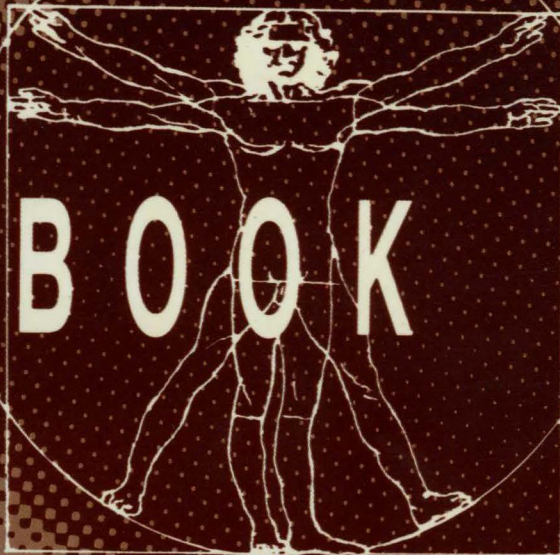


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DATA BOOK



■ PRODUCT GUIDE

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Circuit diagrams utilizing SAMSUNG products are included as a means of illustrating typical semiconductor applications; consequently, complete information sufficient for construction purposes is not necessarily given. The information has been carefully checked and is believed to be entirely reliable. However, no responsibility is assumed for inaccuracies. Furthermore, such information does not convey to the purchaser of the semiconductor devices described herein any license under the patent rights of SAMSUNG or others. SAMSUNG reserves the right to change device specifications.

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PRODUCT GUIDE

Transistors

Power MOSFETs

Linear ICs

Data Converter

CMOS ICs

LCD Products

ASIC Products

Single-Chip Microcontrollers

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1. SMALL SIGNAL TRANSISTORS

1.1 General Purpose Transistors

1.1.1 SOT-23 Type Transistors

Device and Polarity (Marking)		V _{CEO} (V)	I _c (A)	Condition				h _{FE}		Condition		V _{CE(sat)} , V _{BE(sat)} (V)		Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _B (mA)	MAX	MAX	V _{CE} (V)	I _c (mA)	MIN	TYP		
KST08(1G)	KST56(2G)	80	0.5	1	100	50		100	10	0.25		2	10	100			
KST05(1H)	KST55(2H)	60	0.5	1	100	50		100	10	0.25		2	10	100			
	KST2907A(2F)	60	0.6	10	150	100	300	500	50	1.6	2.6	20	50	200			
KSC1623(C1X)	KSA812(D1X)	50	0.1	6	1	90	600	100	10	0.3	1	6	10		250		
BCW71(K1)		45	0.1	5	2	110	220	50	2.5			5	10		300		
BCX70G(AG)		45	0.1	5	2	120	220	50	1.25	0.55	1.05	5	10	125			
BCX70H(AH)		45	0.1	5	2	180	310	50	1.25	0.55	1.05	5	10	125			
BCX70J(AJ)		45	0.1	5	2	250	460	50	1.25	0.55	1.05	5	10	125			
BCX70K(AK)		45	0.1	5	2	380	630	50	1.25	0.55	1.05	5	10	125			
	BCX71G(BG)	45	0.1	5	2	120	220	50	1.25	0.55	1.05						
	BCX71H(BH)	45	0.1	5	2	180	310	50	1.25	0.55	1.05						
	BCX71J(BJ)	45	0.1	5	2	250	460	50	1.25	0.55	1.05						
	BCX71K(BK)	45	0.1	5	2	380	630	50	1.25	0.55	1.05						
KST1623L3(L3)		40	0.1	6	1	60	120	30	3	0.5							
KST1623L4(L4)	KST812M4(M4)	40	0.1	6	1	90	180	30	3	0.5							
KST1623L5(L5)	KST812M5(M5)	40	0.1	6	1	135	270	30	3	0.5							
KST1623L6(L6)	KST812M6(M6)	40	0.1	6	1	200	400	30	3	0.5							
KST1623L7(L7)	KST812M7(M7)	40	0.1	6	1	300	600	30	3	0.5							
KST2222A(1P)		40	0.6	10	150	100	300	500	50	1.6	2.6	20	20	300			
KST3903(1Y)	KST2907(2B)	40	0.6	10	150	100	300	500	50	1.6	2.6	20	50	200			
		40	0.2	1	10	50	150	50	5	0.3	0.95	20	10	250			
KST3904(1A)	KST3906(2A)	40	0.2	1	10	100	300	50	5	0.3	0.95	20	10	300			
KST4401(2X)	KST4403(2T)	40	0.6	1	150	100	300	500	50	0.7	1.2	10	10	250			
KST20(1C)	KST70(2C)	40	0.1	10	5	40	400	10	1	0.25		10	5	125			
BCW60A(AA)	BCW61A(BA)	32	0.1	5	2	120	220	50	1.25	0.55	1.05	5	10	125			
BCW60B(AB)	BCW61B(BB)	32	0.1	5	2	180	310	50	1.25	0.55	1.05	5	10	125			
BCW60C(AC)	BCW61C(BC)	32	0.1	5	2	250	460	50	1.25	0.55	1.05	5	10	125			
BCW60D(AD)	BCW61D(BD)	32	0.1	5	2	380	630	50	1.25	0.55	1.05	5	10	125			
KST2222(1B)		30	0.6	10	150	100	300	500	50	1.6	2.6	20	20	200			
KSC2859(E1X)	KSA1182(F1X)	30	0.5	1	100	70	240	100	10	0.25		6	20		200		
KST4123(5B)	KST4125(ZD)	30	0.2	1	2	50	150	50	5	0.3	0.95	20	10	250			
KSC3265(K1X)	KSA1298(J1X)	25	0.8	1	100	100	320	500	20	0.4		5	10		120		
KST1009F1(F1)		25	0.05	3	0.5	30	60	10	1	0.3		6	1	150			

SOT-23 Type Transistors (Continued)

Device and Polarity (Marking)		V _{CE0} (V)	I _C (A)	Condition		h _{FE}		Condition		V _{CE(sat)} , V _{BE(sat)} (V)		Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _C (mA)	MIN	MAX	I _C (mA)	I _B (mA)	MAX	MAX	V _{CE} (V)	I _C (mA)	MIN	TYP
KST1009F2(F2)	KST4126(C3)	25	0.05	3	0.5	40	80	10	1	0.3		6	1	150	
KST1009F3(F3)		25	0.05	3	0.5	60	120	10	1	0.3		6	1	150	
KST1009F4(F4)		25	0.05	3	0.5	90	180	10	1	0.3		6	1	150	
KST1009F5(F5)		25	0.05	3	0.5	135	270	10	1	0.3		6	1	150	
KST4124(ZC)		25	0.2	1	2	120	360	50	5	0.3	0.95	20	10	300	
BCW31(D1)	BCW29(C1)	20	0.1	5	2	120	260	10	0.5	0.3					
		20	0.1	5	2	110	220	10	0.5	0.3					

1.1.2 TO-92S Type Transistors

Device and Polarity		V _{CE0} (V)	I _C (A)	Condition		h _{FE}		Condition		V _{CE(sat)} , V _{BE(sat)} (V)				Condition		f _T (MHz)		
NPN	PNP			V _{CE} (V)	I _C (mA)	MIN	MAX	I _C (mA)	I _B (mA)	TYP	MAX	TYP	MAX	V _{CE} (V)	I _C (mA)	MIN	TYP	
KSC2710 KSC3488 KSD1020 KSD1021	KSA1150	20	0.5	1	100	40	400	500	50	0.3	0.4	1	1.3	6	10			
	KSA1378	25	0.3	1	50	70	400	300	30	0.35	0.6							
	KSB810	25	0.7	1	100	70	400	700	70	0.25	0.4	0.95	1.2	6	10	50	160	
	KSB811	25	1	0	100	70	400	1000	100		0.5		1.2	6	10		110	
			20	0.5	1	100	40	400	500	50	0.18	0.4						
			25	0.3	1	50	70	400	300	30	0.14	0.4						
			25	0.7	1	100	70	400	700	70	0.2	0.4	0.95	1.2	6	10	50	170
			30	1	1	100	70	400	1000	100		0.5		1.2	6	10		130

1.1.3 TO-92 Type Transistors

Device and Polarity		V _{CE0} (V)	I _C (A)	Condition		h _{FE}		Condition		V _{CE(sat)} , V _{BE(sat)} (V)		Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _C (mA)	MIN	MAX	I _C (mA)	I _B (mA)	MAX	MAX	V _{CE} (V)	I _C (mA)	MIN	TYP
KSP06	KSP56	80	0.5	1	100	50		100	10	0.25		2	10	100	
KSP8099	KSP8599	80	0.5	5	1	100	300	100	10	0.3		5	10	150	
KSC2003	KSA954	80	0.3	1	50	90	400	300	30	0.6	1.2	6	10	50	100
KSD1616A	KSB1116A	60	1	2	100	135	400	1000	50	0.3	1.2	2	100	70	
KSC1008	KSA708	60	0.7	2	50	40	240	500	50	0.7	1.1	10	50		50
	KSP2907A	60	0.6	10	150	100	300	500	50	1.6	2.6	20	50	200	
KSP8098	KSP8598	60	0.5	5	1	100	300	100	10	0.3		5	10	150	
KSP05	KSP55	60	0.5	1	100	50		100	10	0.25		2	10	100	
KSC2002	KSA953	60	0.3	1	50	90	400	300	30	0.6	1.2	6	10	50	100
KSC853	KSA545	60	0.2	1	50	40	400	150	15	0.5	1.2				
KSD1616	KSB1116	50	1	2	100	135	600	1000	50	0.3	1.2	2	100	70	100
KSC1072	KSA707	45	0.7	2	50	40	240	500	50	0.7	1.1				
KSC815	KSA539	45	0.2	1	0.05	40	240	150	15	0.5	1.2				
SS9014	SS9015	45	0.1	5	1	60	1000	100	5	0.3	1	5	10	150	270

TO-92 Type Transistors (Continued)

Device and Polarity		V _{CEO} (V)	I _C (A)	Condition		h _{FE}		Condition		V _{CE(sat)} , V _{BE(sat)} (V)		Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _C (mA)	MIN	MAX	I _C (mA)	I _B (mA)	MAX	MAX	V _{CE} (V)	I _C (mA)	MIN	TYP
KSP6602		40	1	1	500	50		1000	100	0.6		10	50	100	
2N4401	2N4403	40	0.6	1	150	100	300	500	50	0.75	1.2	10	20	200	
KSP2222A	KSP2907	40	0.6	10	150	100	300	500	50	1.6	2.6	20	20	300	
2N4400	2N4402	40	0.6	1	150	50	150	500	50	0.75	1.2	10	20	200	
2N3903	2N3905	40	0.2	1	10	50	150	50	5	0.3	0.95	20	10	250	
2N3904	2N3906	40	0.2	1	10	100	300	50	5	0.3	0.95	20	10	300	
KSP20	KSP70	40	0.1	10	5	40	400					10	5	125	
KSC1330		40	0.1	6	1	70	400	30	3	0.5		6	10		300
KSD471A		30	1	1	100	70	400	1000	100	0.5	1.2	6	10		130
KSP2222		30	0.6	10	150	100	300	500	50	1.6	2.6	20	20	250	
KSC921		30	0.1	10	2	40	240	10	1	0.6		10	1	100	250
KSC839		30	0.1	12	2	40	400	10	1	0.4		10	1	80	200
SS9011		30	0.03	5	1	28	198	10	1	0.3					
SS8050	SS8550	25	1.5		100	85	300	800	80	0.5	1.2	10	50	100	190
	KSB564A	25	1		100	70	400	1000	100	0.5	1.2	10	10		110
KSD227	KSA642	25	0.3		50	70	400	300	30	0.6					
KSP5172		25	0.1		10	100	500	10	1	0.25			2		120
KSC184	KSA542	25	0.05		1	40	400	20	2	0.3		6	1		100
KSD261	KSA643	20	0.5		100	40	400	500	50	0.4	1.3	1			
SS9013	SS9012	20	0.5		50	64	202	500	50	0.6	1.2				
KSD5019		2	1	500	140	600	2000	50	0.5		1	500		150	
KSD5041		20	5	2	500	180	600								150

1.1.4 TO-92L Type Transistors

Device and Polarity		V _{CEO} (V)	I _C (A)	Condition		h _{FE}		Condition		V _{CE(sat)} , V _{BE(sat)} (V)		Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _C (mA)	MIN	MAX	I _C (mA)	I _B (mA)	MAX	MAX	V _{CE} (V)	I _C (mA)	MIN	TYP
KSC2328A	KSA928A	30	2	2	500	100	320	1500	30	2		2	500		120
KSC2331	KSA931	60	0.7	2	50	40	240	500	50	0.7	1.2	10	50		100
KSC2500		10	2	1	500	140	600	2000	50	0.5		1	500		150

1.1.5 SOT-89 Type Transistors

Device and Polarity		V _{CEO} (V)	I _C (A)	Condition		h _{FE}		Condition		V _{CE(sat)} , V _{BE(sat)} (V)		Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _C (mA)	MIN	MAX	I _C (mA)	I _B (mA)	MAX	MAX	V _{CE} (V)	I _C (mA)	MIN	TYP
KSC2882	KSA1202	80	0.4	2	50	70	240	200	20	0.4		10	10		120
KSC2883	KSA1203	30	1.5	2	500	100	320	1500	30	2		2	500		120
KSC2884	KSA1204	30	0.8	1	100	100	320	500	20	0.7		5	10		120
	KSB798	25	1	1	100	90	400	1000	100	0.4	1.2	6	10		110
KSD1621	KSB1121	25	2	2	100	100	560	1500	75	0.6	1.2	10	50		150
KSC2982		30	2	1	500	140	600	2000	50	0.5		1	500		150

1.2 Low Noise Transistors

1.2.1 SOT-23 Type Transistors

Device and Polarity (Marking)		NF (dB)		V _{CE0} (V)	I _c (A)	Condition		h _{FE}		Condition		V _{CE(sat)} (V)
NPN	PNP	MAX	Condition Frequency			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _B (mA)	MAX
KST6428(1K)	KST5086(2P)	4	Audio	50	0.2	5	0.1	250	650	100	5	0.6
KST2484(1U)		3	Audio	60	0.05	5	1	250		1	0.1	0.35
KST5088(1Q)		3	Audio	50	0.05	5	0.1	150	500	10	1	0.3
KST5087(2Q)		3	Audio	30	0.05	5	0.1	300	900	10	1	0.5
		2	Audio	50	0.05	5	0.1	250	800	10	1	0.3
KST5089(1R)	2	Audio	25	0.05	5	0.1	400	1200	10	1	0.5	

1.2.2 TO-92S Type Transistors

Device and Polarity		NF (dB)		V _{CE0} (V)	I _c (A)	Condition		h _{FE}		Condition		V _{CE(sat)}	Condition		f _T (MHz)	
NPN	PNP	TYP	Condition Frequency			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _B (mA)	MAX	V _{CE} (V)	I _c (mA)	MIN	TYP
KSA1175		6	Audio	50	0.15	6	1	40	700	100	10	0.3	6	10		180
KSC2785		4	Audio	50	0.15	6	1	40	700	100	10	0.3	6	10		300

1.2.3 TO-92 Type Transistors

Device and Polarity (Marking)		NF (dB)		V _{CE0} (V)	I _c (A)	Condition		h _{FE}		Condition		V _{CE(sat)} (V)	
NPN	PNP	MAX	Condition Frequency			V _{CE} (V)	I _c (mA)	MIN	MAX	I _c (mA)	I _S (mA)	MAX	
2N6428	2N4125	6	Audio	50	0.2	5	0.1	250	650	100	5	0.6	
2N4123		6	Audio	30	0.2	1	2	50	150	50	5	0.3	
2N4124		5	Audio	30	0.2	1	2	50	150	50	5	0.4	
KSC945		KSA733	5	Audio	25	0.2	1	2	120	360	50	5	0.3
KSC 1815		KSA 1015	4	Audio	50	0.15	6	1	40	700	100	10	0.3
2N5088	2N4126 2N5086	*10	Audio	50	0.15	6	2	70	700	100	10	0.3	
		4	Audio	25	0.2	1	5	120	360	50	5	0.4	
		3	Audio	50	0.05	5	0.1	150	500	10	1	0.3	
KSP6520 KSP6521	2N5087	3	Audio	30	0.05	5	0.1	300	900	10	1	0.5	
		3	Audio	25	0.1	2	2	200	400	50	5	0.5	
		3	Audio	25	0.1	2	2	300	600	50	5	0.5	
2N5089 2N6428A 2N5210 2N5209		2	Audio	50	0.05	0.1	0.1	250	800	10	1	0.3	
		*4	Audio	25	0.05	0.1	0.1	400	1200	10	1	0.5	
		*4	Audio	50	0.2	0.1	0.1	250	650	100	5	0.6	
		*2	Audio	50	0.05	0.1	0.1	200	600	10	1	0.7	
		*2	Audio	50	0.05	0.1	0.1	100	300	10	1	0.7	
KSP8097 KSC1222 KSC900	KSA640	*2	Audio	40	0.2	0.1	0.1	250	700	20	2	0.3	
		**40	Audio	45	0.05	0.5	0.5	120	1000	20	2	0.3	
		**30	Audio	25	0.05	0.5	0.5	120	1000	20	2	0.2	

Audio = 10Hz to 15.7KHz

* = MAX, ** = Noise Level

1-3. RF/VHF/UHF Amplifier Transistors

1-3-1. SOT-23 Type Transistors

Device	Condition		f _T (MHz)		C _{OB} (pF)	V _{CEO} (V)	G _{PE} (dB)	Condition		h _{FE}		NF(dB)		I _{AGC} (mA)	Condition Gain Reduction (dB)
	V _{CE} (V)	I _C (mA)	MIN	TYP				MAX	MIN	MAX	MIN	MAX	MAX		
KSC2734(H8Z)	10	10	1400	3500	1.5	12		10	5	20	200				
KSC3120(H9Z)	10	2	1500	2400	#0.9	15	\$12	10	5	40	200	*8	800		
KSC2759(H6X)	10	5	1250	2000	1.3	14	&10	10	5	40	180				
KST5179	6	5	900	2000	@1	12	15	1	3	25	250	4.5	200		
KSC2757(H3X)	10	5	800	1100	1.5	15		10	5	60	240				
KSC2758(H4Z)	10	3	750	1000	0.8	25	14	10	3	60	240	4.5	900	11	30
KST10(3E)	10	4	650		@0.7	25		10	4	60					
KSC2756(H2X)	10	5	500	850	#0.5	20	\$15	10	5	60	240	*6.5	200		
KST24(3A)	10	8	400	620	@0.36	30	\$19	10	8	30					
KSC2755(H1X)	10	3	400	600	#0.5	30	20	10	3	60	240	3	200	12	30
KSC2223(H5X)	6	1	400	600	*1	20		6	1	40	180	*3	100		
KSC2715(B1X)	10	1	100		3.2	30	27	12	2	40	240				

1.3.2 TO-92S Type Transistors

Device	Condition		f _T (MHz)		C _{OB} (pF)	V _{CEO} (V)	G _{PE} (dB)	Condition		h _{FE}		N _F (dB)	Condition
	V _{CE} (V)	I _C (mA)	MIN	TYP				MAX	MIN	MAX	MIN		
KSC2669	10	1	100	250	3.2	30		12	2	40	240		
KSC2786	6	1	400	600	*1.2	20	18	6	1	40	240	5	100
KSC2787	6	1	150	300	2.5	30		6	1	40	240		

1-3-2 TO-92 Type Transistors

Device	Condition		f _T (MHz)		C _{OB} (pF)	V _{CEO} (V)	G _{PE} (dB)	Condition		h _{FE}		NF(dB)		I _{AGC} (mA)	Condition Gain Reduction (dB)
	V _{CE} (V)	I _C (mA)	MIN	TYP				MAX	MIN	MAX	MIN	MAX	MAX		
KSP5179	6	5	900	2000	@1	12	15	1	3	25	250	4.5	200		
KSC1730	10	5	800	1100	1.5	15		10	5	40	240				
KSP17	10	5	800		@0.9	15	*24	10	5	25	250	6	200		
KSC1070***	10	3	750	1000	0.8	25	14	10	3	40	200	4	900	11	30
SS9018	5	5	700	1100	1.7	15		5	1	28	198				
KSP11	10	4	650		@0.7	25		10	4	60					
KSC1395	10	5	600	1100	1.5	15		10	5	40	240				
KSP24	10	8	400	620	@0.36	30	\$19	10	8	30					
KSC1393	10	3	400	700	#0.5	30	20	10	2	40	240	3	200	12	30
KSC1394	10	3	400	700	#0.5	30	20	10	2	40	240	3.5	200		
SS9016	5	1	400	620	1.6	20		5	1	28	198	5	100		
KSC1187	10	3	400	700	#0.6	20	20	10	2	40	240				
KSC1188	10	3	400	700	1	20	20	10	2	40	240				
KSC1674	6	1	400	600	*1.5	20	18	6	1	40	240	5	100		
KSC388	12.5	12.5	300		2	25	28	12	12.5	20	200				
KSC1675	6	1	150	300	2.5	20		6	1	40	240				
KSC838	10	1	100	250	3.2	30		12	2	40	240				

* = TYP, # = C_{RE}, @ = C_{CB}, \$ = G_{CE}, & = G_{CB}, *** = DISK TYPE TRANSISTOR

1-4. High Voltage Transistors

1-4-1. SOT-23 Type Transistors

Device and Polarity		V _{CEO} (V)	I _C (A)	Condition		h _{FE}		Condition		V _{CE(sat)} , V _{BE(sat)} (V)		Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _C (mA)	MIN	MAX	I _C (mA)	I _B (mA)	MAX	MAX	V _{CE} (V)	I _C (mA)	MIN	TYP
KST42(1D)	KST92(2D)	300	0.5	10	30	40		20	2	0.5	0.9	20	10	50	
KST43(1E)	KST93(2E)	200	0.5	10	30	40		20	2	0.5	0.9	20	10	50	
	KST5401(2L)	150	0.5	5	10	60	240	50	5	0.5	1	10	10	100	
KST5550(1F)		140	0.6	5	10	60	250	50	5	0.25	1.2	10	10	100	

1-4-2. TO-92S Type Transistors

Device and polarity		V _{CEO} (V)	I _C (A)	Condition		h _{FE}		Condition		V _{CE(sat)} , V _{BE(sat)} (V)		Condition		f _T (MHz)		
NPN	PNP			V _{CE} (V)	I _C (mA)	MIN	MAX	I _C (mA)	I _B (mA)	TYP	MAX	TYP	MAX	V _{CE} (V)	I _C (mA)	MIN
KSC2874	KSA1174	120	0.05	6	1	200	800	10	1	0.09	0.3		6	1	50	100
		120	0.05	6	1	200	1200	10	1	0.07	0.3		6	1	50	110

1-4.3 TO-92 Type Transistors

Device and Polarity		V _{CEO} (V)	I _C (A)	Condition		h _{FE}		Condition		V _{CE(sat)} , V _{BE(sat)} (V)		Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _C (mA)	MIN	MAX	I _C (mA)	I _S (mA)	MAX	MAX	V _{CE} (V)	I _C (mA)	MIN	TYP
KSP44	2N6520	400	0.3	10	10	50	200	10	1	0.5	0.75	20	10	40	
2N6517		350	0.5	10	30	30	200	30	3	0.5	0.9				
KSP45		350	0.3	10	10	50	200	10	1	0.5	0.75				
KSP42	KSP92	300	0.5	10	30	40		20	2	0.5	0.9	20	10	50	
2N6516	2N6519	300	0.5	10	30	45	270	30	3	0.5	0.9	20	10	40	
2N6515	2N6518	250	0.5	10	30	50	300	30	3	0.5	0.9	20	10	40	
KSP43	KSP93	200	0.5	10	30	40		20	2	0.5	0.9	20	10	50	
2N5551	KSA709	160	0.6	5	10	80	250	50	6	0.2	1	10	10	100	
		2N5401	150	0.7	2	50	40	240	200	20	0.4	1	10	50	50
		150	0.6	5	10	60	240	50	5	0.5	1	10	10	100	
KSC1009	2N5400	140	0.7	2	50	40	240	200	20	0.2	0.86	10	50	30	50
2N5550		140	0.6	5	10	60	250	50	5	0.25	1.2	10	10	100	
		120	0.6	5	10	40	180	50	5	0.5	1	10	10	100	
KSC1845		KSA992	120	0.05	6	1	200	800	10	1	0.3		6	1	50
		KSP51	100	0.6	5	50	40	250	50	5	0.3	1.2	10	10	60
KSA1625		400	0.5	5	0.1	30	200	100	10	1	1.2				

1-4-4. TO-92L Type Transistors

Device and Polarity		V _{CEO} (V)	I _C (A)	Condition		h _{FE}		Condition		V _{CE(sat)} , V _{BE(sat)} (V)		Condition		f _T (MHz)		
NPN	PNP			V _{CE} (V)	I _C (mA)	MIN	MAX	I _C (mA)	I _B (mA)	MAX	MAX	V _{CE} (V)	I _C (mA)	MIN	TYP	
KSC2340	KSA1013	350	0.1	10	20	30	150	10	1	0.5	10	20	50	15	50	
KSC2330		300	0.1	10	20	40	240	10	1	0.5	30	10				
KSC2383		160	1	5	200	60	320	500	50	1.5	5	200				
KSC2310		KSA910	150	0.05	5	10	40	240	10	1	0.8	30	10			100
KSC2316		KSA916	120	0.8	5	100	80	240	500	50	1	5	100			120

1-4-5. SOT-89 Type Transistors

Device and Polarity		V _{CEO} (V)	I _C (A)	Condition		h _{FE}		Condition		V _{CE(sat)} , V _{BE(sat)} (V)		Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _C (mA)	MIN	MAX	I _C (mA)	I _B (mA)	MAX	MAX	V _{CE} (V)	I _C (mA)	MIN	TYP
KSC2880	KSA1200	150	0.05	5	10	70	240	10	1	0.8		30	10	120	
KSC2881	KSA1201	120	0.8	5	100	80	240	500	50	1		5	100	120	

1-5. Darlington Transistors

1-5-1. SOT-23 Type Transistors

Device and Polarity		V _{CEO} (V)	I _C (A)	Condition		h _{FE}		Condition		V _{CE(sat)} , V _{BE(sat)} (V)		Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _C (mA)	MIN	MAX	I _C (mA)	I _B (mA)	MAX	MAX	V _{CE} (V)	I _C (mA)	MIN	TYP
KST13(1M)	KST63(2U) KST64(2V)	30	0.3	5	100	10K		100	0.1	1.5		5	10	125	
KST14(1N)		30	0.3	5	100	10K		100	0.1	1.5		5	10	125	
		30	0.5	5	100	10K		100	0.1	1.5	5	10	125		
		30	0.5	5	100	10K		100	0.1	1.5	5	10	125		

1-5-2. TO-92 Type Transistors

Device and Polarity		V _{CEO} (V)	I _C (A)	Condition		h _{FE}		Condition		V _{CE(sat)} , V _{BE(sat)} (V)		Condition		f _T (MHz)	
NPN	PNP			V _{CE} (V)	I _C (mA)	MIN	MAX	I _C (mA)	I _B (mA)	MAX	MAX	V _{CE} (V)	I _C (mA)	MIN	TYP
KSP27	KSP77	60	0.5	5	100	10K		100	0.1	1.5					
KSP26		60	0.5	5	100	10K		100	0.1	1.5					
	KSP76	50	0.5	5	100	10K		100	0.1	1.5					
		50	0.5	5	100	10K		100	0.1	1.5					
KSP25	KSP75	40	0.5	5	100	10K		100	0.1	1.5					
		40	0.5	5	100	10K		100	0.1	1.5					
KSP14	KSP64	30	0.5	5	100	10K		100	0.1	1.5	5	10	125		
KSP13	KSP63	30	0.5	5	100	20K		100	0.1	1.5	5	10	125		
KSP12	KSP62	20	0.5	5	10	20K		10	0.01	1					

1-6. Digital Transistors

1-6-1. SOT-23 Type Transistors

Device and Polarity		R1	R2	V _{CEO} (V)	I _C (mA)	Condition		h _{FE}		Condition		V _{CE(sat)} (V)		Condition		f _T (MHz)
NPN	PNP	KΩ	KΩ			V _{CE} (V)	I _C (mA)	MIN	MAX	I _C (mA)	I _B (mA)	TYP	MAX	V _{CE} (V)	I _C (mA)	TYP
KSR1101	KSR2101	4.7	4.7	50	100	5	10	20		10	0.5	0.1	0.3	10	5	250/200
KSR1102	KSR2102	10	10	50	100	5	4	30		10	0.5	0.1	0.3	10	5	250/200
KSR1103	KSR2103	22	22	50	100	5	5	56		10	0.5	0.1	0.3	10	5	250/200
KSR1104	KSR2104	47	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200
KSR1105	KSR2105	4.7	10	50	100	5	5	30		10	0.5	0.1	0.3	10	5	250/200
KSR1106	KSR2106	10	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200
KSR1107	KSR2107	22	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200
KSR1108	KSR2108	47	22	50	100	5	5	56		10	0.5	0.1	0.3	10	5	250/200
KSR1109	KSR2109	4.7		40	100	5	5	100	600	10	1	0.1	0.3	10	5	250/200
KSR1110	KSR2110	10		40	100	5	1	100	600	10	1	0.1	0.3	10	5	250/200
KSR1111	KSR2111	22		40	100	5	1	100	600	10	1	0.1	0.3	10	5	250/200
KSR1112	KSR2112	47		40	100	5	1	100	600	10	1	0.1	0.3	10	5	250/200
KSR1113	KSR2113	2.2	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200
KSR1114	KSR2114	4.7	47	50	100	5	5	68		10	0.5	0.1	0.3	10	5	250/200

1.7 JUNCTION FETS

1.7.1 SOT-23 Type J-FET.

DEVICE	V _{GDO} (V)	I _G (mA)	P _D (mW)	I _{DSS} (mA)			g _m (mS)			Condition			V _{GS(OFF)} (V)	
				MIN	MAX	V _{DS} (V)	MIN	TYP	V _{DS} (V)	V _{DS} (V)	I _D (μA)	MIN	MAX	
KSK211	18	10	200	1	10	10		9	10	10	10	1	0.4	4

1.7.2 TO-92S Type J-FET

DEVICE	V _{GDO} (V)	I _G (mA)	P _D (mW)	I _{DSS} (mA)			g _m (mS)			Condition			V _{GS(OFF)} (V)	
				MIN	MAX	V _{DS} (V)	MIN	TYP	V _{DS} (V)	V _{DS} (V)	I _D (μA)	MIN	MAX	
KSK161	18	10	200	1	10	10		9	10	10	10	1	0.4	4
KSK596	20	10	100	0.1	0.8	5				5	1			1.5

1.7.3 TO-92 Type J-FET

DEVICE	V _{GDO} (V)	I _G (mA)	P _D (mW)	I _{DSS} (mA)			g _m (mS)			Condition			V _{GS(OFF)} (V)	
				MIN	MAX	V _{DS} (V)	MIN	TYP	V _{DS} (V)	V _{DS} (V)	I _D (μA)	MIN	MAX	
KSK30	50	10	100	0.3	6.5	10	1.2		10	10	10	0.1	0.4	5
KSK117	50	10	300	0.6	14	10	4	15	10	10	10	0.1	0.2	1.5

2. POWER TRANSISTORS

2.1. General Purpose Transistors

2.1.1 TO-126 Type Transistors

Ic (A)	V _{CEO} (V)	Device Type		Condition		hFE		Condition		V _{CE(sat)} (V)		Condition		fr(MHz)		Pc (W)
		NPN	PNP	V _{CE} (V)	Ic (A)	MIN	MAX	Ic (A)	I _B (A)	TYP	MAX	V _{CE} (V)	Ic (A)	MIN	TYP	
0.1	180	KSC2682	KSA1142	5	0.01	100	320	0.05	0.005	0.16	0.5	10	0.02	180	8	
	200	KSC3502		10	0.01	40	320	0.02	0.002		0.6	30	0.01	150	5	
	300	KSC3503	KSA1381	10	0.01	40	320	0.02	0.002		0.6	30	0.01	150	7	
0.1	200		KSA1406	10	0.01	40	320	0.03	0.003		0.6	30	0.03	400	7	
0.2	120	KSC3953		10	0.01	40	320	0.03	0.003		1.0	10	0.05	400	80	
0.1	250	KSC2258		20	0.04	40		0.05	0.005		1.2	10	0.01	100	4	
0.1	300	KSC2258A		20	0.04	40		0.05	0.005		1.2	10	0.01	400	4	
0.15	200	KSC5036		10	0.01	40	320	0.05	0.005		0.6	30	0.05	80	7	
0.2	300	KSC2688		10	0.01	40	250	0.05	0.005		1.5	30	0.01	50	500	10
0.3	120	KSC5035		10	0.05	40	320	0.07	0.007		0.6	10	0.05	800	8	
0.5	60	KSC5034		10	0.05	40	320	0.1	0.01		0.6	10	0.01		10	
	250	BD157		10	0.05	30	240	0.25	0.025		2.5				20	
	300	BD158		10	0.05	30	240	0.25	0.025		2.5				20	
	300	KSE340	KSE350	10	0.05	30	240								20	
	350	BD159		10	0.05	30	240	0.25	0.025		2.5				20	
1.2	120	KSC2690	KSA1220	5	0.3	60	320	1	0.2	0.4	0.7	5	0.2	175	20	
	160	KSC2690A	KSA1220A	5	0.3	60	320	1	0.2	0.4	0.7	5	0.2	11	20	
1.5	45	BD135	BD136	2	0.15	40	250	0.5	0.05		0.5				13	
	60	BD137	BD138	2	0.15	40	160	0.5	0.05		0.5				13	
	80	BD139	BD140	2	0.15	40	160	0.5	0.05		0.5				13	
	400	KSE13003		5	0.5	8	40	0.5	0.1		0.5	10	0.1	4	20	
2	45	BD375	BD376	2	0.15	40	375	1	0.1		1.0				25	
	45	BD233	BD234	2	1	25		1	0.1		0.6	10	0.25	3	25	
	60	BD377	BD378	2	0.15	40	375	1	0.1		1.0				25	
	60	BD235	BD236	2	1	25		1	0.1		0.6	10	0.25	3	25	
	80	BD379	BD380	2	0.15	40	375	1	0.1		1.0				25	
	80	BD237	BD238	2	1	25		1	0.1		0.6	10	0.25	3	25	
3	30	KSD882	KSB772	2	1	60	400	2	0.2	0.3	0.5	5	0.1	80	10	
	40	KSE180	KSE170	1	0.1	50	250	3	0.6		1.7	10	0.1	50	12.5	
	45	KSD794	KSB744	5	0.5	60	320	1.5	0.15	0.5	2	5	0.1	45	10	
	45	BD175	BD176	2	0.15	40		1	0.1		0.8	10	0.25	3	30	
	60	KSD794A	KSB744A	5	0.5	60		1.5		0.5	2	5	0.1	45	10	
		KSE181	KSE171	1	0.1	50	250	3	0.6		1.7	10	0.1	50	12.5	
	60	BD177	BD178	2	0.15	40		1	0.1		0.8	10	0.25	3	30	
	80	KSE182	KSE172	1	0.1	50	250	3	0.6		1.7	10	0.1	50	12.5	
80	BD179	BD180	2	0.15	40		1	0.1		0.8	10	0.25	3	30		
4	22	BD433	BD434	1	0.5	85		1	0.2		0.5	1	0.25	3	36	
	32	BD435	BD436	1	0.5	85		2	0.2		0.5	1	0.2	3	36	
	45	BD437	BD438	1	0.5	85		2	0.2		0.6	1	0.25	3	36	
	60	BD439	BD440	1	0.5	40		2	0.2		0.8	1	0.25	3	36	
	80	BD441	BD442	1	0.5	40		2	0.2		0.8	1	0.25	3	36	
5	25	KSE200	KSE210	1	2	45	180	2	0.2		0.75	10	0.1	65	15	
	60	KSD1691	KSB1151	1	2	100	400	2	0.2	0.1	0.3				20	



2.1.2 D-PACK Type Transistors

Ic (A)	Vce0 (V)	Device Type		Condition				hFE		Condition		Vce(sat)(V)		Condition		fr(MHz)		Pc (W)
		NPN	PNP	Vce (V)	Ic (A)	MIN	MAX	Ic (A)	Ib (A)	TYP	MAX	Vce (V)	Ic (A)	MIN	TYP			
0.5	300	KSH340	KSH350	10	0.05	30	240											15
1	40	KSH29	KSH30	4	1	15	75	1	0.125		0.7	10	0.2			3		15
	100	KSH29C	KSH30C	4	1	15	75	1	0.125		0.7	10	0.2			3		15
	250	KSH47		10	0.3	30	150	1	0.2		1	10	0.2			10		15
	400	KSH50		10	0.3	30	150	1	0.2		1	10	0.2			10		15
1.5	400	KSH13003		5	0.5	8	40	0.5	0.1		0.5	10	0.1	4				40
2	400	KSC3233		5	0.1	20		1	0.2		1.2							20
3	40	KSH31	KSH32	4	3	10	50	3	0.375		1.2	10	0.5			3		15
	60	KSD1221	KSB906	5	0.5	60	300	3	0.3	0.4	1	5	0.5			3		20
	100	KSC31C	KSH32C	4	3	10	50	3	0.375		1.2	10	0.5			3		15
5	25	KSH200	MD210	1	0.5	70		0.5	0.05		0.3	10	0.1	65				12.5
6	100	KSH41C	KSH42C	4	3	15	75	6	0.6		1.5	10	0.5			3		20
8	80	KSH44H11	KSH45H11	1	2	60		8	0.4		1	10	0.5			50		20
10	60	KSH3055	KSH2955	4	4	20	100	4	0.4		1.1	10	0.5	2				20

2.1.3 I-PACK Type Transistors

Ic (A)	Vce0 (V)	Device Type		Condition				hFE		Condition		Vce(sat)(V)		Condition		fr(MHz)		Pc (W)
		NPN	PNP	Vce (V)	Ic (A)	MIN	MAX	Ic (A)	Ib (A)	TYP	MAX	Vce (V)	Ic (A)	MIN	TYP			
0.5	400	KSC5054	KSA5055	5	0.05	20	80	0.3	0.06		1							10
1.5	400	KSH13003-I		5	0.5	8	40	0.5	0.1		0.5	10	0.1	4				40
2	50	KSC3076	KSA1241	2	0.5	70	240	1	0.05		0.5	2	0.5			100		10
3	30	KSC3073	KSA1243	2	0.5	70	240	2	0.2	0.3	0.5	2	0.5			100		10
5	20		KSA1242	2	0.5	100	320	4	0.1		0.5	2	0.5			180		10
	50	KSC3074	KSA1244	1	1	70	240	3	0.15		1	4	1			60		20

2.1.4 TO-220 Type Transistors

I _c (A)	V _{CE0} (V)	Device Type		Condition		h _{FE}		Condition		V _{CE(sat)} (V)		Condition		f _r (MHz)		P _c (W)
		NPN	PNP	V _{CE} (V)	I _c (A)	MIN	MAX	I _c (A)	I _B (A)	TYP	MAX	V _{CE} (V)	I _c (A)	MIN	TYP	
0.2	300	KSC1507		1	0.01	40	240	0.05	0.005		2	30	0.01	40	80	15
1	40	TIP29	TIP30	4	1	15	75	1	0.125		0.7	10	0.2	3		30
	60	TIP29A	TIP30A	4	1	15	75	1	0.125		0.7	10	0.2	3		30
	80	TIP29B	TIP30B	4	1	15	75	1	0.125		0.7	10	0.2	3		30
	100	TIP29C	TIP30C	4	1	15	75	1	0.125		0.7	10	0.2	3		30
	250	TIP47		10	0.3	30	150	1	0.2		0.1	10	0.2	10		40
	300	TIP48		10	0.3	30	150	1	0.2		0.1	10	0.2	10		40
	350	TIP49		10	0.3	30	150	1	0.2		0.1	10	0.2	10		40
	400	TIP50		10	0.3	30	150	1	0.2		0.1	10	0.2	10		40
1.5	150	KSC2073	KSA940	10	0.5	40	140	0.5	0.05		1.5	10	0.5	4		25
2	45	BD239	BD240	4	1	15		1	0.1		0.7	10	0.2	3		30
	60	BD239A	BD240A	4	1	15		1	0.1		0.7	10	0.2	3		30
	80	BD239B	BD240B	4	1	15		1	0.1		0.7	10	0.2	3		30
	100	BD239C	BD240C	4	1	15		1	0.1		0.7	10	0.2	3		30
	150	KSD401	KSB546	10	0.4	40	240					10	0.4		5	25
3	30	KSC1173	KSA473	2	0.5	70	240	2	0.2	0.3	0.8	2	0.5		100	10
	40	TIP31	TIP32	4	3	10	50	3	0.375		1.2	10	0.5	3		40
	45	BD241	BD242	4	3	10		3	0.6		1.2	10	0.5	3		40
	55	KSD288	KSA614	5	0.5	40	240	1	0.1	0.15	0.5					25

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2.1.5 TO-220 Type Transistors

I _c (A)	V _{CE0} (V)	Device Type		Condition		h _{FE}		Condition		V _{CE(sat)} (V)		Condition		f _T (MHz)		P _C (W)
		NPN	PNP	V _{CE} (V)	I _c (A)	MIN	MAX	I _c (A)	I _B (A)	TYP	MAX	V _{CE} (V)	I _c (A)	MIN	TYP	
3	60	TIP31A	TIP32A	4	3	10	50	3	0.375		1.2	10	0.5	3	40	
		KSD880	KSB834	5	0.5	60	200	3	0.3	0.5		5	0.5	9	30	
		*KSC1983		4	0.5	500		2	0.05		1	12	0.2	15	30	
	60	BD241A	BD242A	4	3	10		3	0.6		1.2	10	0.5	3	40	
	80	TIP31B	TIP32B	4	3	10	50	3	0.375		1.2	10	0.5	3	40	
	80	BD241B	BD242B	4	3	10		3	0.6		1.2	10	0.5	3	40	
	100	TIP31C	TIP32C	4	3	10	50	3	0.375		1.2	10	0.5	3	40	
100	BD241C	BD242C	4	3	10		3	0.6		1.2	10	0.5	3	40		
4	60	KSC2233		5	1	30	150	4	0.4		1	5	0.5	10	40	
	80	KSD526	KSB595	5	0.5	40	240	3	0.3	1.0	1.7	5	0.5	3	30	
5	60	KSD73		10	1	70	240	5	0.5		2	10	0.3	20	30	
	70	KSD362		5	5	20	140	5	0.5		1	5	0.5	10	40	
	100	KSC2517		5	2	40	200	3	0.3		0.6				30	
6	40	TIP41	TIP42	4	3	15	75	6	0.6		1.5	10	0.5	3	65	
	45	BD243	BD244	4	3	15		6	1		1.5	10	0.5	3	65	
	60	BD243A	BD244A	4	3	15		6	1		1.5	10	0.5	3	65	
	60	TIP41A	TIP42A	4	3	15	75	6	0.6		1.5	10	0.5	3	65	
	80	BD243B	BD244B	4	3	15		6	1		1.5	10	0.5	3	65	
	80	TIP41B	TIP42B	4	3	15	75	6	0.6		1.5	10	0.5	3	65	
	100	BD243C	BD244C	4	3	15		6	1		1.5	10	0.5	3	65	
	100	TIP41C	TIP42C	4	3	15	75	6	0.6		1.5	10	0.5	3	65	
	120	KSD363		5	1	40	240	1	0.1		1	5	0.5	10	40	
7	60	KSD568	KSB707	1	3	40	200	5	0.5		0.5				40	
	80	KSD569	KSB708	1	3	40	200	5	0.5		0.5				40	
	100	KSC2334	KSA1010	5	3	40	200	5	0.5		0.6				40	
	150	BU407							5	0.5		1	10	0.5	10	60
		BU407H							5	0.8		1	10	0.5	10	
	200	BU406							5	0.5		1	10	5	10	60
		BU406H							5	0.8		1	10	5	10	
BU408								6	1.2		1	10	5	10		
8	45	BD533	BD534	2	2	30	100	2	0.2		0.8	5	0.5	3	50	
	60	BD535	BD536	2	2	30	100	2	0.2		0.8	5	0.5	3	50	
	80	BD537	BD538	2	2	30	100	2	0.2		0.8	5	0.5	3	50	
10	60	KSE3055T	KSE2955T	4	4	20	100	4	0.4		1.1	10	0.5	2	75	
	80	KSE44H	KSE45H	1	4	20		8	0.4		1	10	0.5	40	50	

* : high B

2.1.6 TO-220(F) Type Transistors

I _c (A)	V _{CE0} (V)	Device Type		Condition				h _{FE}		Condition		V _{CE(sat)} (V)		Condition		f _T (MHz)		P _C (W)
		NPN	PNP	V _{CE} (V)	I _c (A)	MIN	MAX	I _c (A)	I _B (A)	TYP	MAX	V _{CE} (V)	I _c (A)	MIN	TYP			
																MIN	TYP	
1.5	150	KSC3296	KSA1304	10	0.5	40	75	0.5	0.05		1.5	10	0.5	4	20			
	3	55	KSA1614	5	0.5	40	240	1	0.1	0.15	0.5							
	60	KSD1406	KSB1015	5	0.5	60	200	3	0.3	0.5	1	5	0.5	9	25			
	60	KSD2012	KSB1366	5	0.5	100	320	2	0.2	0.5	1	5	0.5	9	25			
	60	KSD2058		5	0.5	60	300	2	0.2		1.5	5	0.5	4	25			
	60	KSD1273		4	0.5	500	2500	2	0.05		1	12	0.2	30	40			
	60	KSD1944		4	0.5	400	2000	2	0.05		1				30			
4	80	KSD1408	KSB1017	5	0.5	40	240	3	0.3	1	1.7	5	0.5	9	25			
5	70	KSD1362		5	5	20	140	5	0.5		1	5	0.5	10	20			
7	60	KSD1588	KSB1097	1	3	40	200	5	0.5		0.5				30			
	400	KSC3158		5	1	20	80	3	0.6		1				40			

*: high β

2.1.7 TO-3P Type Transistors

I _c (A)	V _{CE0} (V)	Device Type		Condition				h _{FE}		Condition		V _{CE(sat)} (V)		Condition		f _T (MHz)		P _C (W)
		NPN	PNP	V _{CE} (V)	I _c (A)	MIN	MAX	I _c (A)	I _B (A)	TYP	MAX	V _{CE} (V)	I _c (A)	MIN	TYP			
																MIN	TYP	
12	140	KSD1047	KSB817	5	1	60	200	5	0.5	0.6	2.5	5	1	15	100			

2-2. Darlington Transistors

2.2.1 TO-126 Type Transistors

I _c (A)	V _{CE0} (V)	Device Type		Condition				h _{FE}		Condition		V _{CE(sat)} (V)		Condition		f _T (MHz)		P _C (W)
		NPN	PNP	V _{CE} (V)	I _c (A)	MIN	MAX	I _c (A)	I _B (A)	TYP	MAX	V _{CE} (V)	I _c (A)	MIN	TYP			
																MIN	TYP	
1.5	60	KSD985	KSB794	2	1	2K	3K	1A	0.001		1.5				10			
	80	KSD986	KSB795	2	1	2K	3K	1A	0.001		1.5				10			
3	60	KSD1693	KSB1150	2	1.5	2K	20K	1.5	0.0015	0.9	1.2				15			
	100	KSD1692	KSB1149	2	1.5	2K	20K	1.5	0.0015	0.9	1.2				15			
4	60	KSE800	KSE700	3	1.5	0.75K		1.5	0.03		2.5				40			
		KSE801	KSE701	3	2	0.75K		2	0.04		2.8				40			
	80	KSE802	KSE702	3	1.5	0.75K		1.5	0.03		2.5				40			
		KSE803	KSE703	3	2	0.75K		2	0.04		2.8				40			

2.2.2 D-Pack Type Transistors

I _c (A)	V _{CE0} (V)	Device Type		Condition				h _{FE}		Condition		V _{CE(sat)} (V)		Condition		f _T (MHz)		P _C (W)
		NPW	PWP	V _{CE} (V)	I _c (A)	MIN	MAX	I _c (A)	I _B (A)	TYP	MAX	V _{CE} (V)	I _c (A)	MIN	TYP			
																MIN	TYP	
2	100	KSH112	KSH117	3	2	1K	12K	2	0.008		2	10	0.75	25	20			
3	40	KSD1222	KSB907	2	1	2K		2	0.004		1.5				15			
8	100	KSH122	KSH127	4	4	1K	12K	4	0.016		2				20			

2.2.3 TO-220 Type Transistors

I _c (A)	V _{CEO} (V)	Device Type		Condition		h _{FE}		Condition		V _{CE(sat)} (V)		Condition		f _T (MHz)		P _C (W)
		NPN	PNP	V _{CE} (V)	I _c (A)	MIN	MAX	I _c (A)	I _B (A)	TYP	MAX	V _{CE} (V)	I _c (A)	MIN	TYP	
2	60	TIP110	TIP115	4	2	0.5K		2	0.008		2.5					50
	80	TIP111	TIP116	4	2	0.5K		2	0.008		2.5					50
	100	TIP112	TIP117	4	2	0.5K		2	0.008		2.5					50
4	275	KSD5018		5	3			2	0.005		1.5					50
5	60	TIP120	TIP125	3	3	1K		3	0.012		2					65
	80	TIP121	TIP126	3	3	1K		3	0.012		2					65
	100	TIP122	TIP127	3	3	1K		3	0.012		2					65
		KSD560	KSB601	2	3	2K	15K	3	0.003		1.5					30
6	45	BDW23	BDW24	3	2	0.75K	20K	2	0.008		2					50
	60	BDW23C	BDW24C	3	2	0.75K	20K	2	0.008		2					50
	80	BDW23B	BDW24B	3	2	0.75K	20K	2	0.008		2					50
	100	BDW23C	BDW24C	3	2	0.75K	20K	2	0.008		2					50
8	45	BDX53	BDX54	3	3	0.75K		3	0.012		2.5					60
	60	BDX53A	BDX54A	3	3	0.75K		3	0.012		2.5					60
	60	TIP100	TIP105	4	3	1K	20K	3	0.006		2					80
	80	BDX53B	BDX54B	3	3	0.75K		3	0.012		2.5					60
	80	TIP101	TIP106	4	3	1K	20K	3	0.006		2					80
	100	BDX53C	BDX54C	3	3	0.75K		3	0.012		2.5					60
	100	TIP102	TIP107	4	3	1K	20K	3	0.006		2					80
	150	BU807						5	0.05		1.5					60
200	BU806						5	0.05		1.5					60	
10	45	BDX33	BDX34	3	4	0.75K		4	0.008		2.5					70
	60	BDX33A	BDX34A	3	4	0.75K		4	0.008		2.5					70
	80	BDX33B	BDX34B	3	3	0.75K		3	0.006		2.5					70
	80	TIP141T	TIP146T	4	5	1K		5	0.01		2					80
	100	BDX33C	BDX34C	3	3	0.75K		3	0.006		2.5					70
	100	TIP142T	TIP147T	4	5	1K		5	0.01		2					80
12	45	BDW93	BDW94	3	5	0.754	20K	5	0.02		2					80
	60	BDW93A	BDW94A	3	5	0.75K	20K	5	0.02		2					80
	80	BDW93B	BDW94B	3	5	0.75K	20K	5	0.02		2					80
	100	BDW93C	BDW94C	3	5	0.75K	20K	5	0.02		2					80

2.2.4 TO-220(F) Type Transistors

I _c (A)	V _{CE0} (V)	Device Type		Condition		h _{FE}		Condition		V _{CE(sat)} (V)		Condition		f _T (MHz)		P _c (W)
		NPN	PNP	V _{CE} (V)	I _c (A)	MIN	MAX	I _c (A)	I _B (A)	TYP	MAX	V _{CE} (V)	I _c (A)	MIN	TYP	
3	40	KSD1413	KSB1023	2	1	2K		2	0.004		1.5					20
5	100	KSD1589	KSB1098	2	3	2K	15K	3	0.003		1.5					20
7	60	KSD1417	KSB1022	3	3	2K	15K	3	0.006	0.95	1.5					30

2.2.5 TO-3P & TO-3P(F) Type Transistors

I _c (A)	V _{CE0} (V)	Device Type		Condition		h _{FE}		Condition		V _{CE(sat)} (V)		Condition		f _T (MHz)		P _c (W)	PKG
		NPN	PNP	V _{CE} (V)	I _c (A)	MIN	MAX	I _c (A)	I _B (A)	TYP	MAX	V _{CE} (V)	I _c (A)	MIN	TYP		
10	60	TIP140F	TIP145F	4	5	1K		5	0.01		2					60	TO-3P(F)
		TIP140	TIP145	4	5	1K		5	0.01		2					125	TO-3P
80	60	TIP141F	TIP142F	4	5	1K		5	0.01		2					60	TO-3P(F)
		TIP141	TIP142	4	5	1K		5	0.01		2					125	TO-3P
100	60	TIP142F	TIP142F	4	5	1K		5	0.01		2					60	TO-3P(F)
		TIP142	TIP147	4	5	1K		5	0.01		2					125	TO-3P
15	50	KSC5047		5	5	80		5	0.12		0.5					100	TO-3P

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2.3. Switching Transistors

2.3.1 TO-126, TO-220 & TO-3P Type Transistors

V _{CEO} (V)	I _c (A)	Device (NPN)	Condition		h _{FE}		Condition		V _{CE(sat)} (V)		Switching Time			P _c (W)	Package	
			V _{CE} (V)	I _c (A)	MIN	MAX	I _c (A)	I _b (A)	TYP	MAX	ton	tstg	tr			
											MAX (μS)	MAX (μS)	MAX (μS)			
300	4	KSE13004	5	2	8	40	2	0.5		0.6	0.8	3	0.7	75	TO-220	
	8	KSE13006	5	5	5	30	5	1		2	0.8	3	0.7	80	TO-220	
	12	KSE13008	5	8	6	30	8	1.6		1.5	0.8	3	0.7	100	TO-220	
375	0.5	KSA1156	5	0.01	30	200	0.1	0.01		1	1	4	1	10	TO-126(PNP)	
400	0.5	KSC2752	5	0.05	20	80	0.3	0.06		1	1	2.5	1	10	TO-126	
	2	KSC2333	5	0.1	20	80	0.5	0.1		1	1	2.5	1	15	TO-220	
	4	KSE13005	5	1	10	60	1	0.2		0.5	0.8	3	0.7	75	TO-220	
	5	KSC2518	5	0.5	20	80	2	0.1		1	1	2.5	0.7	40	TO-220	
	5	KSC5039	5	2	5		3.5	0.4		5	1	3	0.8	85	TO-220	
	7	KSC2335	5	1	20	80	3	0.7		1	1	2.5	1	40	TO-220	
	8	KSC5337	5	0.5	15	40	3	0.6		0.7	0.2	2	0.5	100	TO-220	
	8	KSE13007	5	2	8	60	2	0.6		1	0.8	3	0.7	80	TO-220	
	12	KSE13009	5	5	8	40	5	0.4		1	0.8	3	0.7	100	TO-220	
		15	KSC2751	5	2	15	80	10	1	0.3	1	1	2.5	0.7	120	TO-3P
	450	5	KSC5338	5	0.5	15	30	1	2		0.8	0.3	1.4	0.3	100	TO-220
500	3	KSC5020	5	0.3	15	50	1.5	0.3		1	0.5	3	0.3	40	TO-220	
	5	KSC5021	5	0.6	15	50	3	0.6		1	0.5	3	0.3	50	TO-220	
	5	KSC5321	5	0.6	15	40	3	0.6		1	0.5	3	0.3	100	TO-220	
	10	KSC5024	5	0.8	15	50	4	0.8		1	0.5	3	0.3	90	TO-3P	
	15	KSC5025	5	1.2	15	50	6	1.2		1	0.5	3	0.3	100	TO-3P	
800	1.5	KSC5026	5	0.1	10	40	0.75	0.15		2	0.5	3	0.3	40	TO-220	
	3	KSC5027	5	0.2	10	40	1.5	0.3		2	0.5	3	0.3	50	TO-220	
		KSC5367	3	0.4	12	35	1	0.2		1.5	0.5	2.2	0.5	80	TO-220	
	4.5	KSC5029	5	0.3	10	40	2	0.4		2	0.5	3	0.3	90	TO-3P	
	6	KSC5030	5	0.4	10	40	3	0.6		2	0.5	3	0.3	100	TO-3P	
	12	KSC3552	5	0.8	10	40	6	1.2		2	0.5	3	0.3	150	TO-3P	

2.3.2 TO-220 F & TO-3PF Type Transistors

V _{CEO} (V)	I _c (A)	Device (NPN)	Condition		h _{FE}		Condition		V _{CE(sat)} (V)		Switching Time			P _c (W)	Package
			V _{CE} (V)	I _c (A)	MIN	MAX	I _c (A)	I _b (A)	TYP	MAX	ton	tstg	tr		
											MAX (μS)	MAX (μS)	MAX (μS)		
400	4	KSE13005F	5	1	10	6	1	0.2		0.5	0.8	3	0.7	30	TO-220F
	5	KSC5039F	5	2	5		3.5	0.7		5	1	3	0.8	30	TO-220F
	7	KSC2335F	5	1	20	80	3	0.6		1	1	2.5	0.7	40	TO-220F
	8	KSE13007F	5	2	8	60	2	0.4		1	0.8	3	0.7	40	TO-220F
	8	KSC5337F	5	0.5	15	40	3	0.6		0.7	0.2	2	0.5	40	TO-220F
	12	KSE13009F	5	5	8	40	5	1		1	0.8	3	0.7	50	TO-220F
450	5	KSC5338F	5	0.5	15	30	1	0.1		0.8	0.3	1.4	0.3	40	TO-220F
500	5	KSC5021F	5	0.6	15	50	3	0.6		1	0.5	3	0.3	40	TO-220F
	5	KSC5321F	3	0.6	15	40	3	0.6		1	0.5	3	0.3	40	TO-220F
800	3	KSC5027F	5	0.2	10	40	1.5	0.3		2	0.5	3	0.3	40	TO-220F
	3	KSC5367F	3	0.4	12	35	1	0.2		1.5	0.5	2.2	0.5	40	TO-220F
	6	KSC5030F	5	0.4	10	40	3	0.6		2	0.5	3	0.3	60	TO-3PF

2.4. Horizontal Deflection Output Transistors

2.4.1. TO-3PF Type Transistors

V _{CB0}	V _{CE0}	I _c	Device	hFE				V _{CE(sat)} (V)				Switching Time			P _c	Comment
				V _{CE}	I _c	MIN	MAX	I _c	I _b	TYP	MAX	t _{on}	t _{stg}	t _f		
(V)	(V)	(A)	(NPN)	(V)	(A)			(A)	(A)		MAX	MAX	MAX	(W)		
1500	800	2.5	KSD5070	5	0.5	8		2	0.6		8			0.4	50	Built in Damper Diode
		3.5	KSD5071	5	0.5	8		2.5	0.8		8			0.4	50	Built in Damper Diode
		5	KSD5072	5	1	8		4	0.8		5			0.4	60	Built in Damper Diode
		2.5	KSD5074	5	0.5	8		2	0.6		8			0.4	50	
		3.5	KSD5075	5	0.5	8		2.5	0.8		8			0.4	50	
		5	KSD5076	5	1	8		4	0.8		5			0.4	60	
		7	KSC5086	5	1	8		5	1.2		5			0.2	50	Built in Damper Diode
		8	KSD5078	5	1	8		6	1.2		5			0.3	70	
		8	KSD5080	5	1	8		6	1.2		5			0.3	70	Built in Damper Diode
8	KSC5088	5	1	8		6	1.5		5		3.0	0.2	50			

2.4. Horizontal Deflection Output Transistors

2.4.2 TO-3P Type Transistors

V _{CB0}	V _{CE0}	I _c	Device	hFE				V _{CE(sat)} (V)				Switching Time			P _c	Comment
				V _{CE}	I _c	MIN	MAX	I _c	I _b	TYP	MAX	t _{on}	t _{stg}	t _f		
(V)	(V)	(A)	(NPN)	(V)	(A)			(A)	(A)		MAX	MAX	MAX	(W)		
1500	800	2.5	KSD5060	5	0.5	8		2	0.6		8			0.4	80	Built in Damper Diode
		3.5	KSD5061	5	0.5	8		2.5	0.8		8			0.4	80	Built in Damper Diode
		5	KSD5062	5	1	8		4	0.8		5			0.4	120	Built in Damper Diode
		2.5	KSD5064	5	0.5	8		2	0.6		8			0.4	80	
		3.5	KSD5065	5	0.5	8		2.5	0.8		8			0.4	80	
		5	KSD5066	5	1	8		4	0.8		5			0.4	120	
		8	KSC5089	5	1	8		6	1.5		5		3.0	0.2		
		8	KSD5090	5	1	8		6	1.2		5			0.3		Built in Damper Diode

3. QUICK REFERENCE TABLE (APPLICATION)

3.1 Audio Equipment

Application	Package	SOT-23	TO-92	TO-92L	TO-126	TO-220
FM	RM AMP Mix Conv Local Osc IF	KSC2223 KSC2223 KSC2223 KSC2715	KSC1674 KSC1674 KSC1674/KSC1675 KSC838/KSC1676			
AM	RF Conv Osc IF	KSC1623 KSC2715 KSC2715	KSC945/KSC815 KSC1675/KSC945 KSC838 KSC1675/KSC945 KSC838			
Diff. Amp	10W 20W 25W 30W 35W 40W 50W 60W 80W 100W 150W	KSA812/KSC1623 KSA812/KSC1623 KSA812/KSC1623 KSA812/KSC1623 KSA812/KSC1623	KSA733/KSC945 KSA733/KSC945 KSA733/KSC945 KSA733/KSC945 KSA992/KSC1845 KSA992/KSC1845 KSA991/KSC1845 KSA992/KSC1845 KSA992/KSC1845 KSA992/KSC1845			
Pre Driver	20W 25W 30W 35W 40W 50W 60W 80W 100W 150W 20W		KSA954/KSC2003 KSA954/KSC2003	KSA910/KSC2310 KSA910/KSC2310 KSA910/KSC2310 KSA910/KSC2310 KSA910/KSC2310 KSA910/KSC2310 KSA910/KSC2310	KSA1142/KSC2682 KSA1142/KSC2682 KSA1142/KSC2682	
Driver	3W 5W 10W 20W 25W 30W 40W 50W 60W 80W		KSA642/KSD227 KSA642/KSD227 KSA954/KSC2003 KSA954/KSC2003 KSA954/KSC2003 KSA954/KSC2003	KSA916/KSC2316 KSA916/KSC2316	KSA1220/KSC2690 KSA1220/KSC2690 KSA1220A/KSC2690A	
Output	3W 5W 10W 20W 25W 30W 35W			KSA928A/KSC2328A	KSB772/KSD882 KSB744/KSD794	KSB834/KSD880 KSA614/KSD288 KSB596/KSD526 TIP41C/TIP42C TIP41C/TIP42C

3.2 Video Equipment

Application			Package	Color TV	B/W TV
Tuner	VHF	RF	SOT-23	KSC2755	KSC2755
			TO-92		KSC1393
		MIX	SOT-23	KSC2756	KSC2756
			TO-92	KSC1393, KSP24	KSC1394, KSP24
		UHF	SOT-23	KSC2757, KSC2759, KSC3120, KST5179	KSC2757, KSC2759, KSC3120, KST5179
			TO-92	KSC1730, KSP5179, KSP10	KSC1730, KSP5179, KSP10
	UHF	RF	SOT-23	KSC2758	KSC2758
		MIX	SOT-23	KSC2758	KSC2758
		SOT-23	KSC2757, KSC2759, KSC3120, KST5179	KSC2757, KSC2759, KSC3120, KST5179	
		TO-92	KSC1730, KSP5179, KSP10	KSC1730, KSP5179, KSP10	
Video Chroma	Output	TO-92	KSA643, KSA733	KSA733, KSC945	
		TO-92L	KSC2330, KSC2340	KSC2330, KSC2340	
		TO-202	KSC1520A	KSC1520A	
		TO-126	KSC2688		
		TO-220	KSC1257	KSC1507	
Vertical Deflection	OSC	TO-92		KSA733, KSC945	
	Driver	TO-92		KSA642, KSA643, KSD227, KSD261	
		TO-92L	KSC2310, KSA910		
	Output	TO-92L		KSC2328A, KSA928A	
		TO-202		KSC1096, KSA643	
		TO-126	KSA1220A, KSC2690A	KSA1220A, KSC2690A, KSB772, KSD882	
		TO-220	KSB546, KSD401, KSA940, KSC2073	KSD880, KSD288, KSA614, KSB834	
Sound	Output	TO-92		KSD261, KSB564, KSB1116, KSA643, KSD471, KSD1616	
		TO-92L	KSC2383, KSA1013	KSC2328A, KSA928A	
		TO-126	KSA1220A, KSC2690A		
		TO-220	KSB546, KSD401, KSA940, KSC2073		
AGC		TO-92	KSC945, KSA733	KSC945, KSA733	
Sync Separator		TO-92	KSC945, KSA733	KSC945, KSA733	
Horizontal Deflection	OSC	TO-92	KSC945, KSA733	KSC945, KSA733	
	Driver	TO-92L	KSC2330, KSC2316, KSA916		
	Output	TO-220		KSD362, KSD73	
TO-3PF		KSD5070, KSD5071, KSD5072, KSD5074, KSD5075, KSD5076, BU508AF			
Series Regulator	Error Amp	TO-92		KSA733, KSC945	
		TO-92L	KSC2310, KSA910		
	Driver	TO-92		KSA733, KSC945	
		TO-92L	KSC2310, KSA910		
		TO-202		KSC1096, KSA634	
	Output	TO-126		KSB772, KSD882	
		TO-220	KSD560	KSD288, KSD880, KSB834, KSA614	
Switching	Driver	TO-92	KSD471A, KSB564A, KSD261, KSA643	KSD471A, KSB564A, KSD261, KSA643	

SOT-23 TYPE

V_{CE0} \ I_c	20mA	30mA	50mA	0.1A	0.2A	0.3A	0.5A	0.6A	0.8A	10mA
12V			KST5179							
14V			KSC2734 KSC2759	KST17						
15V			KSC3120 KSC2757							
20V	KSC2223	KSC2756		BCW31						(2mA) KSK123
25V	KSC2758		KST5089 KST1009F1-5	KST10	KST4124 KST4126				KSA1298 KSC3265	
30V	KSC2755		KSC2715 KST5088	KST24	KST4123 KST4125	KST13 KST14	KSA1182 KSC2859 KST63 KST64	KST2222		
32A				BCW60A-D BCW61A-D						
35V										
40V				KST1623L3-7 KST20 KST70 KSR1109-12 KSR2109-12	KST3903 KST3904 KST3906			KST2222A KST2907 KST4401 KST4403		
45V				BCW71G-K						
50V			KST5086 KST5087	KSA812 KSC1623 KSR1101-8 KSR2101-8 KSR1113/4 KSR2113/4	KST6428					
60V			KST2484				KST05 KST55	KST2907A		
80V							KST06 KST56			
140V								KST5550		
150V							KST5401	KST5551		
200V							KST43 KST93			
300V							KST42 KST92			

TRANSISTORS

FUNCTION GUIDE

TO-92S, TO-92 & TO-92L TYPE (V_{CEO}: 12V~60V)

V _{CEO} I _c	12V	15V	20V	25V	30V	35V	40V	45V	50V	60V
20mA		KSC1395	KSK161(10mA) KSK211(10mA) KSC1674 KSC2786	KSC1070	KSC1393 KSC1394				KSK117 (10mA) KSK30 (10mA)	
25mA			SS9016							
30mA			KSC1187 KSC1188		SS9011 KSC838 KSC2669					
50mA	KSP5179	KSC1730 SS9018		KSA542 KSC184 KSC2787 KSC388 KSC900 2N5089	2N5088 KSC1675			KSA640 KSC1222	2N5086 2N5087 2N5209 2N5210	
0.1A		KSP17		KSP5172 KSP6520 KSP6521 KSP11	KSC839 KSC921 KSC24		KSC1330 KSR1009-12 KSR2009-12 KSR1209-12 KSR2209-12	SS9014 SS9015	KSR1201-8 KSR1213/4 KSR2201-8 KSR2213/4 KSR1001-8 KSR2001-8 KSR1013/4 KSR2-13/4	
0.15A							KSP4250		KSA1175 KSC2785 KSA733 KSC945 KSA1015 KSC1815	
0.2A				2N4124 2N4126	2N4123 2N4125		2N3903 2N3904 2N3905 2N3906 KSP8097	KSA539 KSC8515	2N6428 2N6428A	KSA545 KSC853
0.3A				KSC3488 KSA1378 KSA642 KSD227						KSA953 KSC2002
0.5A			KSP12 KSP62 KSA643 KSD261 SS9012 SS9013 KSA1150 KSC2710		KSP13 KSP14 KSP63 KSP64		KSP25 KSP75		KSP26 KSP76	KSP8098 KSP8598 KSP05 KSP55 KSP27 KSP77

TRANSISTORS

FUNCTION GUIDE

TO-92S, TO-92 & TO-92L TYPE (Continued)

V_{CE0} I_c	12V	15V	20V	25V	30V	35V	40V	45V	50V	60V
0.6A			KSP3706		KSP2222 KSP3703 KSP3704 KSP3705		2N4400 2N4401 2N4402 2N4403 KSP2222A KSP2907			KSP2907A
0.7A				KSB810 KSB811				KSA707 KSC1072		KSA708 KSC1008 KSA931 KSC2331
1A				KSB564A KSB811	KSD1021 KSD471A				KSB1116 KSD1616	KSB116A KSD1616A
1.5A				SS8050 SS8550						
2A	(10V) KSC2500 KSD5019				KSA928A KSC2328A					
5A			KSD5041							

TO-92S, TO-92 & TO-92L Type (V_{CE0} : 80V ~ 400V)

V_{CE0} I_c	80V	100V	120V	140V	150V	160V	200V	250V	300V	350V	400V
50mA			KSA992 KSC1845 KSA1174 KSC2874		KSA910 KSC2310						
0.1A									KSC2330	KSC2340	
0.3A	KSA954 KSC2003									KSP45	KSP44 KSP94
0.5A	KSP8099 KSP8599 KSP06 KSP56						KSP43 KSP93	2N6515 2N6518	2N6519 KSP92 2N6516 KSP42	2N6517 2N6520	KSA1625
0.6A			2N5400	2N5550	2N5401	2N5551					
0.7A				KSC1009	KSA709						
0.8A			KSA916 KSC2316								
1A						KSA1013 KSC2383					
1.5A											
2A											

SOT-89 Type

I_c \ V_{CE0}	10V	25V	30V	80V	120V	150V
0.05A						KSA1220 KSC2880
0.4A				KSA1202		
0.8A			KSA1204		KSA1201 KSC2881	
1A		KSB798				
1.5A			KSA1203 KSC2883			
2A	KSA1314 KSC2982	KSB1121 KSD1621				

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D-PAK & I-PAK Type

I_c \ V_{CE0}	25V	30V	40V	50V	60V	80V	100V	150V	250V	300V	400V
0.5A										KSH340 KSH350	KSA5055 KSC5054
1A			KSH29 KSH30				KSH29C KSH30C		KSH47		KSH50
1.5A											KSH13003
2A				*KSA1241 *KSC3076			KSH112 KSH117	KSB768 KSD1033			KSC3233
3A		*KSA1243 *KSC3073	KSH31 KSH32 KSB907 KSD1222		KSB906 KSD1221		KSH31C KSH32C				
5A	KSH200 KSH210 *KSA1242			*KSA1244 *KSC3074							
6A							KSH41C KSH42C				
8A						KSH44H11 KSH45H11	KSH122 KSH127				
10A					KSH2955 KSH3055						

* : I-PAK (In Case of I-PAK Attach Suffix "-1")

TO-126 Type

V _{CE0} I _c	25V	30V	40V	45V	60V	80V	100V	120V	160V	180V	200V	250V	300V	400V
0.1A										KSC2682 KSA1142	KSC3502 KSA1406	KSC2258	KSC3503 KSA1381	
0.15A											KSC5036			
0.2A								KSC3953					KSC2688	
0.3A								KSC5035						
0.5A					KSC5034							BD157	KSE340 KSE350 BD158 BD159	KSC2752 KSA1156
1.2A								KSC2690 KSA1220	KSC2690A KSA1220A					
1.5A				BD135 BD136	KSD985 KSB794 BD137 BD138	KSD986 KSB795 BD139 BD140								KSE13003
2.0A				BD233 BD378 BD375 BD376	BD377 BD237 BD235 BD236	BD379 BD237 BD238 BD380								
3.0A		KSD882 KSB772	KSE170 KSE180	KSD794 KSB744 BD175 BD176	KSD794A KSB744A KSE171 KSE181 KSD1693 KSB1150 BD177 BD178	KSE172 KSE182 BD179 BD180	KSD1692 KSB1149							
4.0A	BD433 BD434	BD435 BD436		BD437 BD438 BD675 BD675A BD676 BD676A	KSE700 KSE701 KSE800 KSE801 BD677 BD677A BD678 BD678A BD439 BD440	KSE702 KSE703 KSE802 KSE803 BD679 BD679A BD680 BD680A BD441 BD442	BD681 BD682	BD683 BD684						
5.0A	KSE200 KSE210				KSD1691 KSB1151									

TO-220 TYPE

V _{CEO} I _c	30V	40V	45V	55V	60V	70V	80V	100V	120V	150V	200V	250V	300V	350V	400V	450V	500V	800V
0.2													KSC1507					
1		TIP29 TIP30			TIP29A TIP30A		TIP29B TIP30B	TIP29C TIP30C				TIP47	TIP48	TIP49	TIP50			
1.5										KSC2073 KSA940								KSC5026
2A			BD239 BD240		TIP110 TIP115 BD239A BD240A		TIP111 TIP116 BD239B BD240B	TIP112 TIP117 BD239C BD240C		KSD401 KSB546					KSC2333 BUX84			
3A	KSC1173 KSA473	TIP31 TIP32	BD241 BD242	KSD288 KSA614	TIP31A TIP32A KSD880 KSB834 KSC1983 BD241A BD242A		TIP31B TIP32B BD241B BD242B	TIP31C TIP32C BD241C BD242C									KSC5020 KSC5060	KSC5027 KSC5367
4A					KSC2233		KSD526 KSB596						KSD5018 KSE 13004		KSE 13005			
5A					KSD73 TIP120 TIP125	KSD362	TIP121 TIP126	KSC2517 TIP122 TIP127 KSB601 KSD560							KSC2518 BUT11	BUT11A KSC5338	KSC5021 KSC5061	
6		TIP41 TIP42	BDW23 BDW24 BD243 BD244		TIP41A TIP42A BDW23A BDW24A BD243A BD244A		TIP41B TIP42B BUW23B BUW24B BD243B BD244B	TIP41C TIP42C BD243C BDW23C BDW24C	KSD363						KSC2335			
7					KSD568 KSB707		KSD569 KSB708	KSC2334 KSA1010		BU407 BU407H	BU406 BU406H BU408							
8			BDX53 BDX54 BD533 BD534		TIP100 TIP105 BDX53A BDX54A BD535 BD536		TIP101 TIP106 BDX53B BDX54B BD537 BD538	TIP102 TIP107 BDX53C BDX54C		BU807	BU806		KSE 5740 KSE 13006	KSE 5741	KSE 5742 KSE 13007 KSC 5337			
10			BDX33A BDX34A		KSE3055T KSE2855T TIP140T TIP145T BDX33A BDX34A		TIP141T TIP146T BDX33B BDX34B D44H D45H	TIP142T TIP147T BDX33C BDX34C										
12			BDW93 BDW94		BDW93A BDW94A		BDW93B BDW94B	BDW93C BDW94C					KSE 13008		KSE 13009			

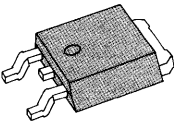
TO-220F Type

V_{CE0} Ic	40V	55V	60V	70V	80V	100V	150V	400V	450V	500V	800V
1.5A							KSA1304 KSC3296				
3A	KSB1023 KSD1413	KSA1614	KSB1015 KSD1046 KSB1366 KSD2012 KSD1273 KSD1944								KSC5027F KSC5367F
4A					KSB1017 KSD1408			KSE13005F			
5A				KSD1362		KSB1098 KSD1589		KSC5039F	KSC5338F	KSC5325F KSC5021F KSC5321F	
7A			KSB1022 KSD1417 KSB1097 KSD1588					KSC2335F			
8A								KSC5337F KSE13007F			
12A								KSE13009F			

TO-3P & TO-3PF Type

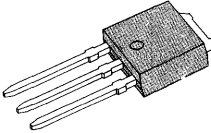
V_{CE0} Ic	2.5A	3A	3.5A	4A	4.5A	5A	6A	7A	8A	9A	10A	12A	15A
50													KSC5047
140												KSB817 KSD1047	
375							BU426						
400							BU426A				KSC2749		KSC2751
450													
500											KSC5024		KSC5025
600													
700						BU508AF							
800	*KSD5070 KSD5074		*KSD5071 KSD5075		KSC5029	*KSD5072 KSD5076	KSC5030 KSC5030F	KSC5086	KSC5088 KSD5078 KSD5080				

D-PAK/I-PAK N-CHANNEL

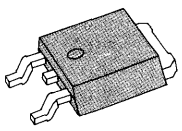
Part Number	$V_{DSS}(V)$	$I_D(ON)(A)$	$R_{DS(ON)}(\Omega)$	$R_{\theta JC}(K/W)$	$P_D(Watt)$	Package	Remark
IRFR010 IRFR020	50	8.20 15.00	0.200 0.100	5.00 3.00	25 42		
IRFR014 SSR3055 IRFR024	60	8.20 12.00 15.00	0.200 0.150 0.100	5.00 3.12 3.00	25 42 42		
IRFR111 IRFR121	80	4.70 8.40	0.540 0.270	5.00 3.00	25 42		
IRFR110 IRFR120	100	4.70 8.40	0.540 0.270	5.00 3.00	25 42		
IRFR211 IRFR221	150	2.70 4.60	1.500 0.800	5.00 3.00	25 42		
IRFR210 IRFR220	200	2.70 4.60	1.500 0.800	5.00 3.00	25 42		
IRFR214 IRFR224	250	2.20 3.80	2.000 1.100	5.00 3.00	25 42		
IRFR311 IRFR321	350	1.70 3.10	3.600 1.800	5.00 3.00	25 42		
IRFR310 IRFR320	400	1.70 3.10	3.600 1.800	5.00 3.00	25 42		
SSR1N45 IRFR421	450	1.20 2.50	8.500 3.000	5.00 3.00	25 42		
SSR1N50 IRFR420	500	1.20 2.50	8.500 3.000	5.00 3.00	25 42		
SSR1N55 SSR2N55	550	1.00 2.00	12.000 5.000	3.12 3.00	40 42		NEW
SSR1N60 SSR2N60	600	1.00 2.00	12.000 5.000	3.12 3.00	40 42		NEW

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D-PAK/I-PAK N-CHANNEL

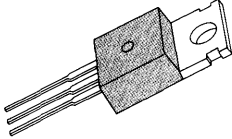
Part Number	BV _{oss} (V)	I _{o(on)} (A)	R _{ds(on)} (Ω)	R θ jc(K/W)	P _o (Watt)	Package	Remark
IRFU010	50	8.20	0.200	5.00	25		
IRFU012		15.00	0.100	3.00	42		
IRFU014	60	8.20	0.200	5.00	25		
SSU3055		12.00	0.150	3.00	40		
IRFU024		15.00	0.100	3.00	42		
IRFU111	80	4.70	0.540	5.00	25		
IRFU121		8.40	0.270	3.00	42		
IRFU110	100	4.70	0.540	5.00	25		
IRFU120		8.40	0.270	3.00	42		
IRFU211	150	2.70	1.500	5.00	25		
IRFU221		4.60	0.800	3.00	42		
IRFU210	200	2.70	1.500	5.00	25		
IRFU220		4.60	0.800	3.00	42		
IRFU214	250	2.20	2.000	5.00	25		
IRFU224		3.80	1.100	3.00	42		
IRFU311	350	1.70	3.600	5.00	25		
IRFU321		3.10	1.800	3.00	42		
IRFU310	400	1.70	3.600	5.00	25		
IRFU320		3.10	1.800	3.00	42		
SSU1N45	450	1.20	8.500	5.00	25		
IRFU421		2.50	3.000	3.00	42		
SSU1N50	500	1.20	8.500	5.00	25		
IRFU420		2.50	3.000	3.00	42		
SSU1N55	550	1.00	12.000	3.12	40		
SSU2N55		2.00	5.000	3.00	42	NEW	
SSU1N60	600	1.00	12.000	3.12	40		
SSU2N60		2.00	5.000	3.00	42	NEW	

D-PAK/I-PAK P-CHANNEL

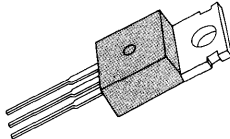
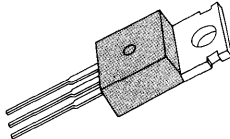
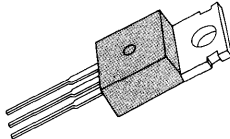
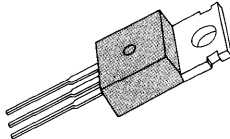
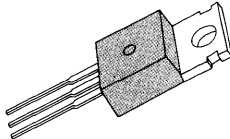
Part Number	$BV_{DSS}(V)$	$I_{D(on)}(A)$	$R_{DS(on)}(\Omega)$	$R_{\theta jc}(K/W)$	$P_D(Watt)$	Package	Remark
IRFR9010 IRFR9020	-50	-5.30 -9.90	0.500 0.280	5.00 3.00	25 42		
IRFR9014 IRFR9024 SSR2955	-60	-5.30 -9.90 -12.00	0.500 0.280 0.300	5.00 3.00 3.00	25 42 42		
IRFR9110 IRFR9120	-100	-3.20 -5.90	1.200 0.600	5.00 3.00	25 42		
IRFR9211 IRFR9221	-150	-2.00 -3.60	3.000 1.500	5.00 3.00	25 42		
IRFR9210 IRFR9220	-200	-2.00 -3.60	3.000 1.500	5.00 3.00	25 42		
IRFU9010 IRFU9020	-50	-5.30 -9.90	0.500 0.280	5.00 3.00	25 42		
IRFU9014 IRFU9024 SSU2955	-60	-5.30 -9.90 -12.00	0.500 0.280 0.300	5.00 3.00 3.00	25 42 42		
IRFU9110 IRFU9120	-100	-3.20 -5.90	1.200 0.600	5.00 3.00	25 42		
IRFU9211 IRFU9221	-150	-2.00 -3.60	3.000 1.500	5.00 3.00	25 42		
IRFU9210 IRFU9220	-200	-2.00 -3.60	3.000 1.500	5.00 3.00	25 42		

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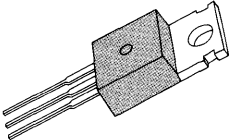
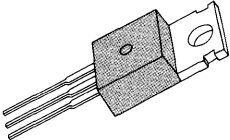
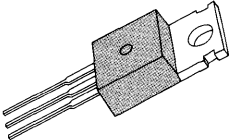
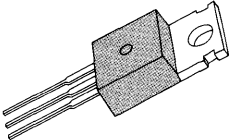
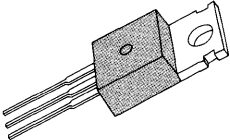
TO-220 N-CHANNEL

Part Number	$V_{BSS}(V)$	$I_{b(on)}(A)$	$R_{\theta s(on)}(\Omega)$	$R/\theta_{jc}(K/W)$	$P_o(\text{Watt})$	Package	Remark
IRFZ10	50	10.00	0.200	3.50	42		
IRFZ20		15.00	0.100	3.00	50		
SSP15N05		16.00	0.084	2.50	60		NEW
IRFZ30		30.00	0.050	1.67	90		
IRFZ40		50.00	0.028	1.00	150		
SSP50N05		50.00	0.024	0.90	170		NEW
SSP60N05	60.00	0.018	0.80	190	NEW		
IRFZ14	60	10.00	0.200	3.50	42		
IRFZ24		15.00	0.100	3.00	50		
SSP15N06		16.00	0.084	2.50	60		NEW
IRFZ34		30.00	0.050	1.67	90		
IRFZ44		50.00	0.028	1.00	150		
SSP50N06		50.00	0.024	0.90	170		NEW
SSP60N06	60.00	0.018	0.80	190	NEW		
IRF511	80	5.60	0.540	3.50	36		
IRF521		9.20	0.270	2.50	50		
IRF531		14.00	0.160	1.67	75		
IRF541		28.00	0.077	1.00	125		
IRF510	100	5.60	0.540	3.50	36		
IRF520		9.20	0.270	2.50	50		
IRF530		14.00	0.160	1.67	75		
IRF540		28.00	0.077	1.00	125		
IRF611	150	3.30	1.580	3.50	36		
IRF621		5.00	0.800	2.50	50		
IRF631		9.00	0.400	1.67	75		
IRF641		18.00	0.180	1.00	125		
IRF610	200	3.30	1.580	3.50	36		
IRF620		5.00	0.800	2.50	40		
IRF630		9.00	0.400	1.67	75		
IRF640		18.00	0.180	1.00	125		
IRF614	250	2.00	2.000	6.40	20		
IRF624		3.80	1.100	3.12	40		
IRF634		8.10	0.450	1.67	75		
IRF644		14.00	0.280	1.00	125		
IRF711	350	2.00	3.600	3.50	36		
IRF721		3.00	1.800	2.50	50		
IRF731		5.50	1.000	1.67	75		
IRF741		10.00	0.550	1.00	125		
IRF710	400	2.00	3.600	3.50	36		
IRF720		3.00	1.800	2.50	50		
IRF730		5.50	1.000	1.67	75		
IRF740		10.00	0.550	1.00	125		
IRF821	450	2.50	3.000	2.50	50		
IRF831		4.50	1.500	1.67	75		
IRF841		8.00	0.850	1.00	125		
IRF820	500	2.50	3.000	2.50	50		
IRF830		4.50	1.500	1.67	75		
IRF840		8.00	0.850	1.00	125		

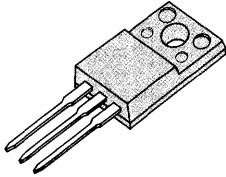
TO-220 N-CHANNEL(Continued)

Part Number	$V_{DSS}(V)$	$I_D(on)(A)$	$R_{DS(on)}(\Omega)$	$R_{\theta jc}(K/W)$	$P_D(Watt)$	Package	Remark			
SSP4N55	550	4.00	2.500	1.67	75		NEW			
SSP6N55		6.00	1.800	1.00	125					
SSP7N55		7.00	1.200	0.90	140					
SSP4N60	600	4.00	2.500	1.67	75			NEW		
SSP6N60		6.00	1.800	1.00	125					
SSP7N60		7.00	1.200	0.90	140					
SSP3N70	700	3.00	5.000	1.67	75				NEW	
SSP4N70		4.00	3.500	1.00	125					
SSP5N70		5.00	2.500	0.90	140					
SSP3N80	800	3.00	5.000	1.67	75					NEW
SSP4N80		4.00	3.500	1.00	125					
SSP5N80		5.00	2.500	0.90	140					
SSP2N90	900	2.00	5.000	2.50	50					NEW
SSP3N90		3.00	4.500	1.39	90					NEW
SSP4N90		4.00	4.300	1.00	125					NEW
SSP5N90		5.00	2.500	0.83	150		NEW			

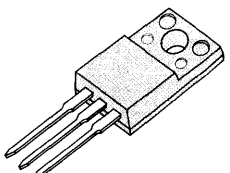
TO-220 P-CHANNEL

Part Number	$V_{DSS}(V)$	$I_D(on)(A)$	$R_{DS(on)}(\Omega)$	$R_{\theta jc}(K/W)$	$P_D(Watt)$	Package	Remark								
IRF9Z10	-50	-4.70	0.500	6.40	20										
IRF9Z20		-9.70	0.280	3.10	40										
IRF9Z30		-18.00	0.140	6.40	74										
IRF9511	-60	-3.00	1.200	6.40	20										
IRF9Z14		-4.70	0.500	6.40	20										
IRF9521		-6.00	0.600	3.12	40										
IRF9Z24		-9.70	0.280	3.10	40										
IRF9531		-12.00	0.300	1.67	75										
IRF9Z34		-18.00	0.140	6.40	74										
IRF9541		-19.00	0.200	1.00	125										
IRF9510		-100	-3.00	1.200	6.40					20					
IRF9520	-6.00		0.600	3.12	40										
IRF9530	-12.00		0.300	1.67	75										
IRF9540	-19.00		0.200	1.00	125										
IRF9611	-150	-1.75	3.000	6.40	20										
IRF9621		-3.50	1.500	3.12	40										
IRF9631		-6.50	0.800	1.67	75										
IRF9641		-11.00	0.500	1.00	125										
IRF9610	-200	-1.75	3.000	6.40	20										
IRF9620		-3.50	1.500	3.12	40										
IRF9630		-6.50	0.800	1.67	75										
IRF9640		-11.00	0.500	1.00	125										

TO-220 FULL PACKAGE N-CHANNEL

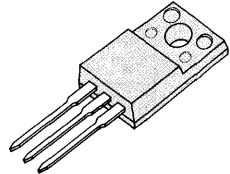
Part Number	BV _{oss} (V)	I _{o(on)} (A)	R _{os(on)} (Ω)	R θ jc(K/W)	P _o (Watt)	Package	Remark	
IRFSZ20	50	13.00	0.100	4.16	36			
SSS15N05		14.00	0.084	4.00	37		NEW	
IRFSZ30		20.00	0.050	3.57	42			
IRFSZ40		28.00	0.028	3.12	48			
SSS50N05		30.00	0.024	3.00	50		NEW	
SSS60N05		36.00	0.018	2.90	52		NEW	
IRFSZ24	60	13.00	0.100	4.16	36			
SSS15N06		14.00	0.084	4.00	37		NEW	
IRFSZ34		20.00	0.050	3.57	42			
IRFSZ44		28.00	0.028	3.12	48			
SSS50N06		30.00	0.024	3.00	50		NEW	
SSS60N06		36.00	0.018	2.90	52		NEW	
IRFS521	80	7.20	0.270	4.16	30			
IRFS531		9.70	0.160	3.57	35			
IRFS541		17.00	0.077	3.12	40			
IRFS520	100	7.20	0.270	4.16	30			
IRFS530		9.70	0.160	3.57	35			
IRFS540		17.00	0.077	3.12	40			
IRFS621	150	4.10	0.800	4.16	30			
IRFS631		5.90	0.400	3.57	35			
IRFS641		9.80	0.180	3.12	40			
IRFS620	200	4.10	0.800	4.16	30			
IRFS630		5.90	0.400	3.57	35			
IRFS640		9.80	0.180	3.12	40			
IRFS624	250	3.40	1.100	4.16	30			
IRFS634		5.60	0.450	3.57	35			
IRFS644		7.90	0.280	3.12	40			
IRFS721	350	2.60	1.800	4.16	30			
IRFS731		3.70	1.000	3.57	35			
IRFS741		5.40	0.550	3.12	40			
IRFS720	400	2.50	1.800	4.16	30			
IRFS730		3.70	1.000	3.57	35			
IRFS740		5.40	0.550	3.12	40			

TO-220 FULL PACKAGE N-CHANNEL(Continued)

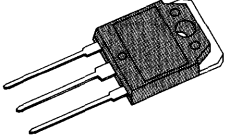
Part Number	BV _{DSS} (V)	I _{D(on)} (A)	R _{DS(on)} (Ω)	R θ jc(K/W)	P _D (Watt)	Package	Remark	
IRFS821	450	2.10	3.000	4.16	30			
IRFS831		3.10	1.500	3.57	35			
IRFS841		4.60	0.850	3.12	40			
IRFS820	500	2.10	3.000	4.16	30			
IRFS830		3.10	1.500	3.57	35			
IRFS840		4.60	0.850	3.12	42			
SSS4N55	550	2.30	3.000	3.57	35			
SSS6N55		3.20	1.800	3.12	40			NEW
SSS7N55		4.00	1.800	3.00	42			
SSS4N60	600	2.30	3.000	3.57	35			
SSS6N60		3.20	1.800	3.12	40		NEW	
SSS7N60		4.00	1.800	3.00	42			
SSS3N70	700	1.80	5.000	3.57	35			
SSS4N70		2.30	3.500	3.12	40		NEW	
SSS5N70		2.70	2.500	3.00	42			
SSS3N80	800	1.80	5.000	3.57	35			
SSS4N80		2.30	3.500	3.12	40		NEW	
SSS5N80		2.70	2.500	3.00	42			
SSS2N90	900	1.80	5.000	3.57	35		NEW	
SSS3N90		2.00	4.500	3.12	40		NEW	
SSS4N90		2.50	3.000	3.00	42		NEW	
SSS5N90		2.80	2.500	2.90	43		NEW	

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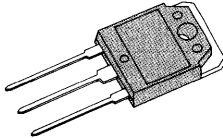
TO-220 FULL PACKAGE P-CHANNEL

Part Number	BV _{DSS} (V)	I _{D(on)} (A)	R _{DS(on)} (Ω)	R θ jc(K/W)	P _D (Watt)	Package	Remark
IRFS9Z30	-50	-12.00	0.140	3.57	42		
IRFS9531	-60	-8.00	0.300	3.57	35		
IRFS9541		-10.70	0.200	3.12	40		
IRFS9Z34		-12.00	0.140	3.57	42		
IRFS9530	-100	-8.00	0.300	3.12	35		
IRFS9540		-10.70	0.200	3.57	40		
IRFS9631	-150	-4.40	1.800	3.12	35		
IRFS9641		-6.20	0.500	3.57	40		
IRFS9630	-200	-4.40	1.800	3.57	35		
IRFS9640		-6.20	0.500	3.12	40		

TO-3P N-CHANNEL

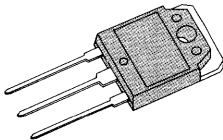
Part Number	BV _{oss} (V)	I _{d(on)} (A)	R _{ds(on)} (Ω)	R θ jc(K/W)	P _d (Watt)	Package	Remark	
IRFP141	80	28.00	0.077	0.83	150			
IRFP151		40.00	0.055	0.65	190			
SSH60N08		60.00	0.030	0.55	230			
SSH70N08		70.00	0.025	0.45	280			
IRFP140	100	28.00	0.077	0.83	150			
IRFP150		40.00	0.055	0.65	190			NEW
SSH60N10		60.00	0.030	0.55	230			
SSH70N10		70.00	0.025	0.45	280			
IRFP241	150	18.00	0.180	0.83	150			
IRFP251		30.00	0.085	0.65	190			
SSH40N15		40.00	0.080	0.55	230			NEW
SSH45N15		45.00	0.065	0.45	280			
IRFP240	200	18.00	0.180	0.83	150			
IRFP250		30.00	0.085	0.65	190			
SSH40N20		40.00	0.080	0.55	230			NEW
SSH45N20		45.00	0.065	0.45	280			
IRFP244	250	14.00	0.280	0.83	150			
IRFP254		23.00	0.140	0.65	190			
IRFP341	350	10.00	0.550	0.83	150			
IRFP351		15.00	0.300	0.65	190			
SSH22N35		22.00	0.250	0.55	230		NEW	
SSH25N35		25.00	0.200	0.45	280			
IRFP340	400	10.00	0.550	0.83	150			
IRFP350		15.00	0.300	0.65	190			
SSH22N40		22.00	0.250	0.55	230		NEW	
SSH25N40		25.00	0.200	0.45	280			
IRFP441	450	8.00	0.850	0.83	150			
IRFP451		13.00	0.400	0.65	190			
SSH20N45		20.00	0.300	0.55	230		NEW	
SSH22N45		22.00	0.250	0.45	280			
IRFP440	500	8.00	0.850	0.83	150			
IRFP450		13.00	0.400	0.65	190			
SSH20N50		20.00	0.300	0.55	230		NEW	
SSH22N50		22.00	0.250	0.45	280			
SSH6N55	550	6.00	1.800	0.93	135			
SSH7N55		7.00	1.200	0.83	150		NEW	
SSH8N55		8.00	1.000	0.75	170			
SSH10N55		10.00	0.800	0.65	190		NEW	
SSH15N55		15.00	0.500	0.55	230			
SSH17N55		17.00	0.450	0.45	280		NEW	

TO-3P N-CHANNEL (Continued)

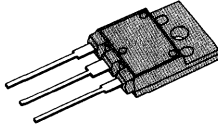
Part Number	$V_{DSS}(V)$	$I_D(on)(A)$	$R_{DS(on)}(\Omega)$	$R\theta_{jc}(K/W)$	$P_D(Watt)$	Package	Remark
SSH6N60	600	6.00	1.800	0.93	135		
SSH7N60		7.00	1.200	0.83	150		NEW
SSH8N60		8.00	1.000	0.75	170		
SSH10N60		10.00	0.800	0.65	190		NEW
SSH15N60		15.00	0.500	0.55	230		
SSH17N60		17.00	0.450	0.45	280		NEW
SSH4N70	700	4.00	3.500	0.93	135		
SSH5N70		5.00	2.500	0.83	150		NEW
SSH6N70		6.00	1.900	0.73	170		
SSH8N70		8.00	1.400	0.65	190		NEW
SSH10N70		10.00	1.200	0.55	230		
SSH12N70		12.00	0.900	0.45	280		NEW
SSH4N80	800	4.00	3.500	0.93	135		
SSH5N80		5.00	2.500	0.83	150		NEW
SSH6N80		6.00	1.900	0.75	170		
SSH8N80		8.00	1.400	0.65	190		NEW
SSH10N80		10.00	1.200	0.55	230		
SSH12N80		12.00	0.900	0.45	280		NEW
SSH3N90	900	3.00	4.500	1.10	110		
SSH4N90		4.00	3.000	0.90	140	NEW	
SSH5N90		5.00	2.500	0.73	170	NEW	
SSH7N90		7.00	1.800	0.65	190	NEW	
SSH11N90		11.00	1.100	0.45	280	NEW	

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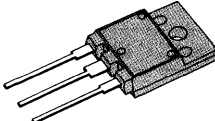
TO-3P P-CHANNEL

Part Number	$V_{DSS}(V)$	$I_D(on)(A)$	$R_{DS(on)}(\Omega)$	$R\theta_{jc}(K/W)$	$P_D(Watt)$	Package	Remark
IRFP9141	-60	-19.00	0.200	1.00	125		
IRFP9140	-100	-19.00	0.200	1.00	125		
IRFP9241	-150	-11.00	0.500	1.00	125		
IRFP9240	-200	-11.00	0.500	1.00	125		

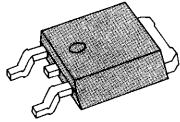
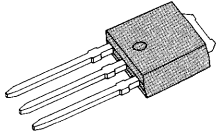
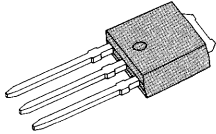
TO-3P FULL PACKAGE N-CHANNEL

Part Number	BV _{oss} (V)	I _{d(on)} (A)	R _{DS(on)} (Ω)	R θ jc(K/W)	P _D (Watt)	Package	Remark
IRFS141	60	19.40	0.077	1.50	83		
IRFS151		27.70	0.055	1.30	96		
IRFS140	100	19.40	0.077	1.50	83		
IRFS150		27.70	0.055	1.30	96		
IRFS241	150	12.50	0.180	1.50	83		
IRFS251		20.70	0.085	1.30	96		
IRFS240	200	12.50	0.180	1.50	83		
IRFS250		20.70	0.085	1.30	96		
IRFS341	350	6.90	0.550	1.50	83		
IRFS351		10.40	0.300	1.30	96		
IRFS340	400	6.90	0.550	1.50	83		
IRFS350		10.40	0.300	1.30	96		
IRFS441	450	5.50	0.850	1.50	83		
IRFS451		9.00	0.400	1.30	96		
IRFS440	500	5.50	0.850	1.50	83		
IRFS450		9.00	0.400	1.30	96		

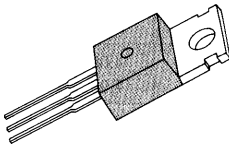
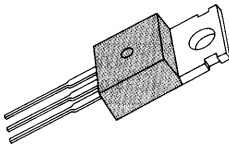
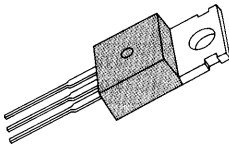
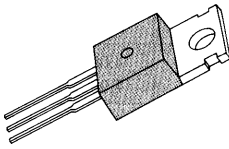
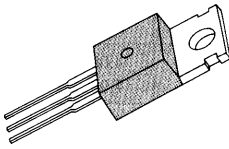
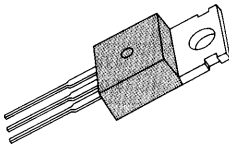
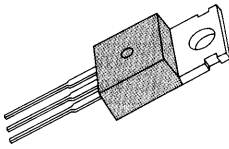
TO-3P FULL PACKAGE P-CHANNEL

Part Number	BV _{oss} (V)	I _{d(on)} (A)	R _{DS(on)} (Ω)	R θ jc(K/W)	P _D (Watt)	Package	Remark
IRFS9141	-60	-13.20	0.200	1.50	83		
IRFS9140	-100	-13.20	0.200	1.50	83		
IRFS9241	-150	-7.60	0.500	1.50	83		
IRFS9240	-200	-7.60	0.500	1.50	83		

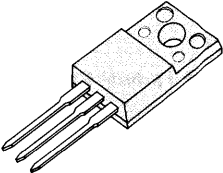
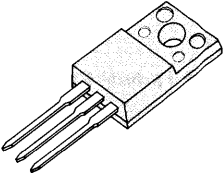
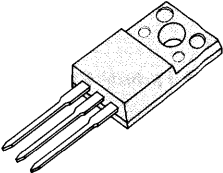
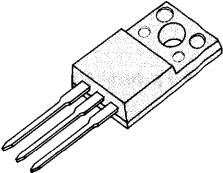
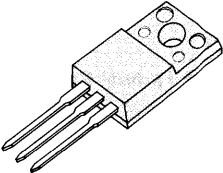
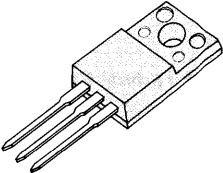
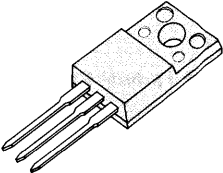
D-PAK/I-PAK N-CHANNEL (LOGIC LEVEL FET)

Part Number	BV _{oss} (V)	I _{b(on)} (A)	R _{bs(on)} (Ω)	R θ jc(K/W)	P _d (Watt)	Package	Remark		
IRLR010	50	6.70	0.300	5.00	25				
IRLR020		14.00	0.150	3.00	42				
IRLR014	60	6.70	0.300	5.00	25				
SSR3055L		12.00	0.180	3.00	42				
IRLR024		14.00	0.150	3.00	42				
IRLR111	80	4.00	0.750	5.00	25				NEW
IRLR121		7.90	0.400	3.00	42				
IRLR110	100	4.00	0.750	5.00	25				
IRLR120		7.90	0.400	3.00	42				
IRLR211	150	2.00	2.400	5.00	25				
IRLR221		4.00	1.200	3.00	42				
IRLR210	200	2.00	2.400	5.00	25				
IRLR220		4.00	1.200	3.00	42				
IRLR224	250	3.30	1.300	3.00	42				
IRLU010	50	6.70	0.300	5.00	25		NEW		
IRLU020		14.00	0.150	3.00	42				
IRLU014	60	6.70	0.300	5.00	25				
SSU3055L		12.00	0.180	3.00	42				
IRLU024		14.00	0.150	3.00	42				
IRLU111	80	4.00	0.750	5.00	25				
IRLU121		7.90	0.400	3.00	42				
IRLU110	100	4.00	0.750	5.00	25				
IRLU120		7.90	0.400	3.00	42				
IRLU211	150	2.00	2.400	5.00	25				
IRLU221		4.00	1.200	3.00	42				
IRLU210	200	2.00	2.400	5.00	25				
IRLU220		4.00	1.200	3.00	42				
IRLU224	250			3.00	42				

TO-220 N-CHANNEL (LOGIC LEVEL FET)

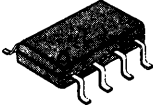
Part Number	BV _{DSS} (V)	I _{D(on)} (A)	R _{Ds(on)} (Ω)	R θ jc(K/W)	P _D (Watt)	Package	Remark						
IRLZ10	50	6.70	0.300	5.00	30		NEW						
IRLZ20		14.00	0.150	3.00	50								
IRLZ30		25.00	0.070	1.70	90								
IRLZ40		35.00	0.040	1.00	150								
SSP50N05L		50.00	0.022	0.80	190								
IRLZ14	60	6.70	0.300	5.00	30			NEW					
IRLZ24		14.00	0.150	3.00	50								
IRLZ34		25.00	0.070	1.70	90								
IRLZ44		35.00	0.040	1.00	150								
SSP50N06L		50.00	0.022	0.80	190								
IRL511	80	4.00	0.750	5.00	25								
IRL521		7.90	0.400	3.00	42								
IRL531		13.00	0.200	1.70	75								
IRL541		24.00	0.110	1.00	125								
IRL510	100	4.00	0.750	5.00	25								
IRL520		7.90	0.400	3.00	42								
IRL530		13.00	0.200	1.70	75								
IRL540		24.00	0.110	1.00	125								
IRL611	150	2.60	2.400	5.00	25								
IRL621		4.00	1.200	3.00	42								
IRL631		8.00	0.600	1.70	75								
IRL641		16.00	0.220	1.00	125								
IRL610	200	2.60	2.400	5.00	25								
IRL620		4.00	1.200	3.00	42								
IRL630		8.00	0.600	1.70	75								
IRL640		16.00	0.220	1.00	125								
IRL624	250	3.30	1.300	3.00	42								

TO-220 FULL-PACKAGE N-CHANNEL(LOGIC LEVEL FET)

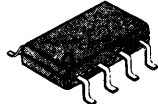
Part Number	BV _{oss} (V)	I _{b(on)} (A)	R _{ds(on)} (Ω)	R θ jc(K/W)	P _b (Watt)	Package	Remark				
IRLSZ10	50	6.50	0.300	5.50	27		NEW				
IRLSZ20		10.30	0.150	4.16	36						
IRLSZ30		16.00	0.070	3.57	42						
IRLSZ40		23.00	0.040	3.10	48						
SSS50N05L		32.00	0.022	3.00	50						
IRLSZ14	60	6.50	0.300	5.50	27			NEW			
IRLSZ24		10.30	0.150	4.16	36						
IRLSZ34		16.00	0.070	3.57	42						
IRLSZ44		23.00	0.040	3.10	48						
SSS50N06L		32.00	0.022	3.00	50						
IRLS511	80	3.60	0.750	5.50	22						
IRLS521		5.80	0.400	4.16	30						
IRLS531		8.80	0.200	3.57	35						
IRLS541		12.70	0.110	3.10	40						
IRLS510	100	3.60	0.750	5.50	22						
IRLS520		5.80	0.400	4.16	30						
IRLS530		8.80	0.200	3.57	35						
IRLS540		12.70	0.110	3.10	40						
IRLS611	150	2.10	2.400	5.50	22						
IRLS621		3.30	1.200	4.16	30						
IRLS631		5.10	0.600	3.57	35						
IRLS641		9.00	0.220	3.10	40						
IRLS610	200	2.10	2.400	5.50	22						
IRLS620		3.30	1.200	4.16	30						
IRLS630		5.10	0.600	3.57	35						
IRLS640		9.00	0.220	3.10	40						
IRLS624	250	3.20	1.300	4.16	30						

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8 SOIC(SINGLE FET) N/P CHANNEL

Part Number	BV _{DSS} (V)	I _{D(on)} (A)	R _{DS(on)} (Ω)	R θ ja(K/W)	P _D (Watt)	Package	Remark
SSD2101(N-CH)	30	7.00	0.030	62.50	2		NEW
SSD2102(P-CH)	-20	-5.30	0.060	62.50	2		NEW
SSD2104(P-CH)	-30	-4.60	0.070	62.50	2		NEW
SSD2106(P-CH)	-20	-2.50	0.250	62.50	2		NEW
SSD2108(P-CH)	-20	-4.30	0.100	62.50	2		NEW

8 SOIC(DUAL FET) N/P CHANNEL

Part Number	BV _{DSS} (V)	I _{D(on)} (A)	R _{DS(on)} (Ω)	R θ ja(K/W)	P _D (Watt)	Package	Remark
SSD2002 (N-CH)	25	3.50	0.100	62.50	2		NEW
(P-CH)	-25	-2.30	0.250				
SSD2003 (N-CH)	25	3.50	0.100	62.50	2		
SSD2004 (N-CH)	20	3.00	0.125	62.50	2		
(P-CH)	-20	-2.00	0.200				
SSD2005 (P-CH)	-25	-2.30	0.250	62.50	2		
SSD2007 (N-CH)	50	2.00	0.300	62.50	2		
SSD2009 (N-CH)	50	3.00	0.130	62.50	2		
SSD2011 (P-CH)	-60	-2.00	0.280	62.50	2		NEW
SSD2013 (N-CH)	12	5.00	0.060	62.50	2		NEW
SSD2015 (P-CH)	-12	-3.20	0.130	62.50	2	NEW	

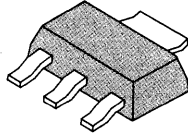
SOT-23/TO-92(SMALL SIGNAL FET)

Part Number	BV _{DSS} (V)	I _{D(on)} (A)	R _{DS(on)} (Ω)	R θ ja(K/W)	P _D (Watt)	Package	Remark
SF5030	500	0.06	300.000	312.50	0.4	TO-92	
2N7000	60	0.20	5.000	312.50	0.4	TO-92	NEW
2N7002	60	0.115	7.000	625.00	0.2	SOT-23	NEW

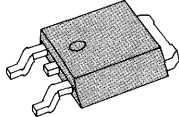
TO-92L(Logic Level SMALL SIGNAL FET)

Part Number	BV _{DSS} (V)	I _{D(on)} (A)	R _{DS(on)} (Ω)	R θ ja(K/W)	P _D (Watt)	Package	Remark
SF2N06L	60	2.00	0.110	62.50	2	TO-92L	

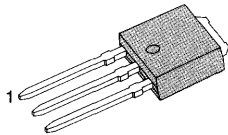
SOT-223 N-CHANNEL

Part Number	BV _{oss} (V)	I _{D(on)} (A)	R _{DS(on)} (Ω)	R θ jc(K/W)	P _D (Watt)	Package	Remark
IRFM014	60	2.70	0.200	40.000	3.1		**
IRFM110	100	1.50	0.540	40.000	3.1		**

D2-PAK N-CHANNEL

Part Number	BV _{oss} (V)	I _{D(on)} (A)	R _{DS(on)} (Ω)	R θ jc(K/W)	P _D (Watt)	Package	Remark
IRFWZ10	50	10.00	0.200	3.50	43		**
IRFWZ20		15.00	0.100	2.50	60		**
IRFWZ30		30.00	0.050	1.70	88		**
IRFWZ40		35.00	0.028	1.00	150		**
SSW50N05		50.00	0.024	0.90	170		**
SSW60N05		60.00	0.018	0.80	190		**
IRFWZ14	60	10.00	0.200	3.50	43		**
IRFWZ24		15.00	0.100	2.50	60		**
IRFWZ34		30.00	0.050	1.70	88		**
IRFWZ44		35.00	0.028	1.00	150		**
SSW50N06		50.00	0.024	0.90	170		**
SSW60N06		60.00	0.018	0.80	190		**

I2-PAK N-CHANNEL

Part Number	BV _{oss} (V)	I _{D(on)} (A)	R _{DS(on)} (Ω)	R θ jc(K/W)	P _D (Watt)	Package	Remark
IRFIZ10	50	10.00	0.200	3.50	43		**
IRFIZ20		15.00	0.100	2.50	60		**
IRFIZ30		30.00	0.050	1.70	88		**
IRFIZ40		35.00	0.028	1.00	150		**
SSI50N05		50.00	0.024	0.90	170		**
SSI60N05		60.00	0.018	0.80	190		**
IRFIZ14	60	10.00	0.200	3.50	43		**
IRFIZ24		15.00	0.100	2.50	60		**
IRFIZ34		30.00	0.050	1.70	88		**
IRFIZ44		35.00	0.028	1.00	150		**
SSI50N06		50.00	0.024	0.90	170		**
SSI60N06		60.00	0.018	0.80	190		**

** : Under development

NOTES

Consumer ICs

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1. AUDIO APPLICATION

A. FM Front End

Device	Package	Function			Use			Supply Voltage	Remark
		RF	OSC	MIXER	H/S	R/C	CAR		
KA22495/D	9SIP/8SOP	0	0	0	0	0		Vcc=1.6-6V	

B. AM Tuner + FM IF System

Device	Package	Function						Use			Supply Voltage	Remark
		FM IF	FM DET	AM RF CONV	AM IF	AM DET	S/M	H/S	R/C	CAR		
KA2244	9SIP	0	0				0			0	Vcc=8-15V	Built in Mute
KA2245	7SIP	0	0							0	Vcc=8-14V	S/N=60dB(typ)
KA22471	16DIP	0	0	0	0	0	0		0		Vcc=3-8V	Built in AM/FM SW
KA2248A	16DIP	0	0	0	0	0	0	0	0		Vcc=1.8-6V	Built in AM/FM SW

C. 1 Chip AM/FM Tuner System

Device	Package	Function					Use				Supply Voltage	Remark
		AM TUNER	FM F/E	FM IF + DET	FM MPX	FM N.C	H/S	R/C	CAR	HIFI		
KA22900/D	24SDIP/SOP	0	0	0	0		0	0			Vcc=1.8-7V	
KA22901/D	24SDIP/SOP	0	0	0	0		0	0			Vcc=1.8-7V	NO ADJ.VCO
KA2295	48QFP	0		0	0					0	Vcc=6-12V	for DTS
†† KA2296	64QFP	0	0	0	0	0				0	Vcc=7.5-9V	for DTS
KA2297	16DIP	0	0	0			0	0			Vcc=1.8-7V	No Need AM/FM IF & FM DET Coil
KA2298	24SDIP	0		0	0		0	0			Vcc=1.8-7V	for DTS

D. FM Stereo Multiplex Decoder

Device	Package	PLL	Lamp Driver	VCO Stop	Sep Cont	Use			Supply Voltage	Remark
						H/S	R/C	CAR		
KA2263B	9SIP	0	0	0			0	0	Vcc=3-12V	Sep=45dB
KA2264/D	9SIP/16SOP	0	0	0			0	0	Vcc=1.8-5V	

† New Product

†† Under Development

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E. 1 Chip Radio System

Device	Package	Function						Supply Voltage	Remark
		AM RF CONV	AM IF + DET	FM F/E	FM IF + DET	POWER AMP	MUTE		
KA22421/D	16DIP/SOP	0	0			0		Vcc=2-5V	Po=100mW (3V/8 Ω)
KA22425D	28SOP	0	0	0	0	0	0	Vcc=2-8.5V	Po=0.5W (6V/8 Ω)
KA22426D	28SOP	0	0	0	0	0		Vcc=2-8.5V	Po=0.5W (6V/8 Ω)
KA22427B	16DIP	0	0		0	0		Vcc=3-12V	Po=0.28W(5.5V/8 Ω)min
KA22429D	16SOP			0	0		0	Vcc=1.8-6V	No FM Det Coil

F. Audio Power Amplifier

Device	Package	Output Power			Function		Use		Supply Voltage
		Vcc	RL=4 Ω	RL=8 Ω	Thermal Protection	Stand-by SW	H/S	R/C	
KA2201	8DIP	6V	0.75W	0.5W				0	Vcc=3-14V
		9V	1.6W	1.2W					
KA2206B/N	12DIPH /16DIP	9V	2.3W X 2				0	Vcc=4.5-11V	
KA22065	12SIP H/S	12V	4.6W x 2		0	0	0	Vcc=6-15V	
KA22066	12DIPH	9V	2.3W x 2		0	0	0	Vcc=6-13V	
		12V	4.0W x 2						
KA2209	8DIP	3V	0.11W x 2				0	Vcc=1.8-9V	
		6V	0.65W x 2						
KA2212	9SIP	6V		0.5W			0	Vcc=3.5-12V	
KA386/S/D	8DIP/9SIP/8SOP	6V		0.325W			0	Vcc=4-12V	

G. Pre + Power Amplifier

Device	Package	Pre Amp	ALC	Volume Control	Motor Speed Control	Output			Use		Supply Voltage
						VCC	RL=4 Ω	RL=32 Ω	H/S	R/C	
KA2213	14DIP H/S	Mono	0			6	1W x 2			0	Vcc=4-12V
KA22130	16 DIP	Mono	0			6	1W x 2			0	Vcc=4-12V
KA22134	16DIP	Dual		0		3		27mW x 2	0		Vcc=1.8-8V
KA22135	22SDIP	Dual			0	3		28mW x 2	0		Vcc=2-7.5V

† New Product

†† Under Development

H. Pre Amplifier

Device	Package	Function								Use		Supply Voltage(Vcc)
		EQ AMP	Rec Amp	ALC	Line Amp	Mute	Mic Amp	AUX	Input Switch	Single Deck	Double Deck	
KA1222	8SIP	2 CH								0		Vcc=2.5-6V
KA2220	9SIP	1 CH		0						0		Vcc=3.5-14V
KA2221	8SIP	2 CH								0		Vcc=12V(typ)
KA22211	8SIP	2 CH								0		Vcc=5-14V
KA2224	14DIP	2 CH		0						0		Vcc=4-13V
KA22241	9SIP	2 CH		0						0		Vcc=4.5-14V
KA22261	16DIP	2 CH		0		0				0		Vcc=6-15V
KA2228	21SZIP	2 CH	2 CH	0			0	0		0		Vcc=3.5-7V
KA22291	24SDIP	2 CH	2 CH	0		0			0		0	Vcc=4-12V
KA22292	48QFP	2 CH	2 CH	0	0	0			0		0	Vcc=6-12V
†† KA22296	30SDIP	2 CH	2 CH	0	0		0	0	0		0	Vcc=4-12V
KA7226	16DIP	2 CH		0						0		Vcc=3-16V

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I. Graphic Equalizer Amplifier

Device	Package	Function	Use			Supply Voltage
			R/C	CAR	M/C	
KA2223	16DIP	5 Band Mono Graphic Equalizer	0	0	0	Vcc=5-13V
KA22234	24SZIP	5 Band Dual Graphic Equalizer	0	0	0	Vcc=3.5-14V

J. Electronic DC Volume Control

Device	Package	Function	Supply Voltage	Remark
KA2250	16DIP	Electronic DC Volume Control	Vcc=6-12V	Volume Up/Down : 2dB Step

K. Noise Reduction

Device	Package	Function	Supply Voltage	Remark
KA2271B/D	16DIP/SOP	Dolby B Type Noise Reduction	Vcc=8-16V	Vo=549mV(typ) / Vcc=12V
KA22711B/D	16DIP/SOP	Dolby B Type Noise Reduction	Vcc=5-16V	Vo=245mV(typ) / Vcc=6V
KA22712B/D	16DIP/SOP	Dolby B Type Noise Reduction	Vcc=6.5-16V	Vo=388mV(typ) / Vcc=9V
KA2272D	16 SOP	FM Noise Canceller	Vcc=8-15V	Use for CAR Stereo

† New Product
 †† Under Development

L. LED Level Meter Driver

Device	Package	Function	Supply Voltage	Remark
KA2281	16DIP	5 Dot Dual Red/Yellow/Green LED Driver	Vcc=5-14V	VU Scale, Vref Included
KA2284	9SIP	5 Dot Mono Green LED Driver	Vcc=3.5-16V	VU Scale, Vref Included
KA2285	9SIP	5 Dot Mono Red LED Driver	Vcc=3.5-16	VU Scale, Vref Included
KA2287	9SIP	5 Dot Mono Green LED Driver	Vcc=3.5-16V	Linear Scale, Vref Included
KA2288	16DIP	7 Dot Mono LED Driver	Vcc=6.2-16V	VU Scale, Vref Included

M. DC Motor Speed Control

Device	Package	Package	Use		Supply Voltage	Remark
			H/S	R/C		
KA2401	8 DIP	DC Motor Speed Controller		0	Vcc=4-12V	Vref=1.27V (typ)
KA2402	8 DIP	DC Motor Speed Controller	0	0	Vcc=1.8-8V	Vref=0.2V (typ)
KA2404	TO-92L	DC Motor Speed Controller		0	Vcc=4-12V	Vref=1.27V (typ)

N. Remote Control

Device	Package	Function	Use	Remark
KS9801	16DIP	Receiver (10 Function)	R/C, M/C	V _{DD} =4.5-5.5V
KS9802	16DIP	Transmitter (18 Function)	R/C, M/C	V _{DD} =2.2-5V
KS9803	22DIP	Receiver (18 Function)	R/C, M/C	V _{DD} =4.5-5.5V

O. u-COM

Device	Package	Function	Use			Supply Voltage	Remark
			H/S	R/C	M/C		
KS56C820	80QFP	System Control for CDP		0	0	V _{DD} =4.5-5.5V	LCD Driver
KS57C3016	100QFP	System Control for CDP/DTS		0	0	V _{DD} =4.5-5.5V	LCD Driver
† KS9820	48VQFP	Logic Deck Control System	0			V _{DD} =0.9-2.2V	

† New Product

†† Under Development

P. Compact Disc Player

1) RF AMP + SSP (SERVO SIGNAL PROCESSOR)

Device	Package	Function				Supply Voltage	Remark
		RF AMP	SSP	LQW VTG(3.4V)	DOUBLE SPEED		
KA9201/Q	30SDIP/SOP/32QFP	0		0		Vcc=5V	Single/Dual Supply Voltage
†† K9202	48 QFP	0			0	Vcc=5V	AGC function for Digital servo
KA8309B	48 QFP		0			Vcc=5V	Auto Sequencer
KA9221	48 QFP		0	0		Vcc=5V	Low Power Consumption
KA9220B	80QFP	0	0	0	0	Vcc=3.4-5.5V	Compatible Double Speed

2) DSP + D/A CONVERTER

Device	Package	Function						Supply Voltage	Remark
		DSP	DAC	DIGITAL OUT	D/F	DIGITAL PLL	DOUBLE SPEED		
KS5991	80 QFP	0			0(2FS)			VDD=3-4V	Included DF/16K SRAM
KS9210	80 QFP	0		0	0(2FS)			VDD=3.4-5.5V	Included DF/D0/16K SRAM
KS9211B	80 QFP	0			0(2FS)			VDD=5V	Included DF/16K SRAM
KS9282B	80 QFP	0	0	0	0(8FS)	0	0	VDD=5V	Compatible Double Speed
KS9283	80 QFP	0		0		0		VDD=5V	Included D0/16K SRAM/DPLL
KDA0316	20 SOP/20 DIP		0(16BIT)					VDD=5V	16BIT DAC
† KDA0340	28 SOP		0(1BIT)		0(8FS)		0	VDD=5V	Delta-Sigma
†† KS9230	100 QFP	0	0	0	0(8FS)	0	0	VDD=5V	Built-in Digital Servo

3) MOTOR DRIVER/AUDIO FILTER

Device	Package	Function					Supply Voltage	Remark
		OUTPUT CHANNEL	Vcc(MAX)	Pd(MAX)	Io	AUDIO FILTER		
KA9256	10 SIP H/S	2CH OP-AMP	±18V	12.5W(with H/S)	0.5A		Vcc=± 15V	Vo(pp) : ±13V(TYP)
KA9257	12 SIP H/S	2CH BTL	+18V	15W(with H/S)	0.5A		Vcc=5-15V	Built-in Mute Circuit
KA9258D	20 SOP/F	4CH BTL	+18V	1.7W	0.5A		Vcc=6-13V	Built-in Regulator(5V)
KA9270/D	20 DIP/20 SOP	2CH				0		

† New Product

†† Under Development

Q. CD-MEDIA

1) CD-G

Device	Package	Function					Supply Voltage	Remark
		DECODER	RGB ENCODER	MEMORY	NTSC/PAL	SUPER IMPOSE		
SRV9205CAB	80 QFP	0	External (KA2194D)	External(256K DRAM/1M DRAM)	0		V _{DD} =5V	Only Decoder
†† KS9298	80 QFP	0	0	0	0	0	V _{DD} =5V	Built-in RGB Encoder/Memory(MCP)

2) CD-ROM

Device	Package	Function					Supply Voltage	Remark
		CD-ROM(MODE 1)	CD-I(MODE 2)	ECC/EDC	ADPCM	INTER FACE		
KS9241B	80 QFP	0	0	0		SCSI Controller for Host Computer	V _{DD} =5V	Only Decoder

R. Laser Disc Player

Device	Package	Function	Supply Voltage	Remark
KA9410	42 SDIP	Video Signal Processor	V _{CC} =5V	
KA9411	100 QFP	Digital Video Signal Processor	V _{CC} =5V	Built-in OSD/DAC/DTBC
KA9412	42 SDIP	NTSC/PAL Video Signal Processor	V _{CC} =5V	Dual NTSC/PAL
†† KA9413	100 QFP	Digital Video Signal Processor	V _{CC} =5V	Built-in OSD/DAC/DTBC/VPS
† KA9414D	30 SOP	Video Demodulator	V _{CC} =5V	
KA9420	42 SDIP	Servo Signal Processor	V _{CC} =±5V	
†† KA9421	100 QFP	I Chip Servo Signal Processor	V _{CC} =±5V	Built-in RF-Amp
KA9430	42 SDIP	Time Base Corrector Servo	V _{CC} =5V	
KA9431	48 SDIP	NTSC/PAL TBC Servo	V _{CC} =5V	Dual NTSC/PAL
SL220B	28 DIP	OSD and Data Processor	V _{CC} =5V	
KA9402P	10 SOP	Pre Amp for Photo Detector	V _{CC} =±5V	
KA9401	80 QFP	Audio Signal Processor + CXNR	V _{CC} =5V	
KA9490	9 SIP	CCD Clock Driver	V _{CC} =±5V	
KS0118B	80 QFP	Generation Lock	V _{DD} =5V	Built-in ADC

† New Product

†† Under Development

2. VIDEO APPLICATION

A. TV Only

Applications	Device	Package	Circuit Functions
SIF System	KA2101	14 DIP	IF amp, IF limiter, IF detector
SIF subsystem for MPX	KA2105	9 SIP	IF amp, IF limiter, IF detector
Sound System	KA2102A	14 DIP H/S	KA2101 + 2.4W audio power amp
Sound Muting	KA2103L	9 SIP	Hori. sync detector, Integrator, Comparater, Voltage controller
Auto Power Off + Sound Muting	KA2104	9 SIP	KA2103 + auto power off control
VIF System	KA2911	16 DIP	VIF amp, Limiter, Video detector, Video amp, Noise invert, AGC detector, IF AGC, AFT, Reverse RF AGC
	KA2916	16 DIP	Forward RF AGC version of KA2911
	KA2912	14 DIP H/S	VIF amp, Limiter, Video detector, Video amp, IF AGC, Forward RF AGC, Noise canceller
VIF + SIF + Deflection	KA2915	28 DIP	VIF amp, Limiter, Video detector, Video AFT, IF AGC, Forward RF AGC, SIF amp, SIF limiter, SIF detector, Sync separator, Hori OSC/driver/AFC, OSC/pre-driver
NTSC CHroma + Deflection + Video System	KA2153	42 DIP	ACC amp/detector, Killer detector, Phase detector, CW OSC, Demodulator, Sawtooth gen, APC, X-ray protection, Hori OSC/drive, Vert OSC/amp, Reverse amp
PAL/NTSC 1 Chip System	KA2161	54 SDIP	VIF amp, Video detector, AGC, AFT, SIF detector, ATT, AF amp, Video amp, DL amp, Chroma demodulator, APC, Matrix, ACC, Sync separator, H-out, AFC, 32fH VCO, Vert. out, 50/60Hz, X-ray
Vertical System	KA2130A	10 DIP H/S	Vert OSC/driver/output, Sawtooth generator
Vertical Output	KA2131	10 SIP H/S	Driver, Output, Flyback generator, Pulse shaper
Horizontal System	KA2135	12 SIP	Polarity SW, AFC, Hori OSC/pre-Amp, Pulse width adj, X-ray protector
Deflection System	KA2133	16 DIP H/S	Vert OSC/driver/output Sawtooth generator, Hori OSC/pre-driver, AFC
	KA2134	18 DIP	Sync separator, Noise detector, Hori/OSC/buffer, AFC, Vert OSC/driver/amp, Ramp generator, X-ray protector
	KA2138	20 DIP	Vert OSC, Ramp generator, Sampling type, DC voltage control, Hori OSC, AFC X-ray protector, Hori phase shifter, Hori pulse duty setting
DC Volume & Tone Control	KA2107	12 SIP	Tone control, Balance control, Volume control, Output amp
Sync Separator	KA2606	9 SIP	Phase Inverter, Hori sync separator, Hori sync compensation, Composite sync separator, Vertical filter, Horizontal filter

† New Product †† Under Development

B. VCR Only

Application	Device	Package	Circuit Function
REC/PB-AMP	KA8116	22 SOP	2CH REC amp, 4CH PB amp, HD SW amp(REC/PB), REC amp gain CTL SW, envelope det.
	KA8122	48 VQFP	4 CH (Video pre-amp) , 2 CH (Audio Hi-Fi amp)
CHROMINANCE	KA8114	30 SDIP	REC sync gate, Limiter, PB sync gate, Timing gen. doubler
Y/C 1 Chip	†† KA8121	64 QFP	YNR, Y/C Comb, 3MHz LPF, Clamp, FBC, Detail enhancer, NL-empha, Main-empha, W/D clip, FM MOD(Demod), SYNC sep, AGC, FM AGC, D.O.C. double limiter, Main de-empha, NL de-empha, Double HPF noise canceller, Picture CTL, Y/C MIX REC killer, 1MHz LPF, ACC DET/AMP, Burst empha(De-empha), 3.58M BPF, PB killer, 4021M BPF, REC APC, PB APC, REC AFC, 320/321fh VCO, VXO/XO, BGP NTSC/PAL/SECAM 1 amp, 3 input SW. PAL/SECAM decoder NTSC(4.43MHz)/PAL full type converter
Audio Processor	KA8401	24 ZIP SH	SP/EP SW, REC/PB SW, PB/EE SW, REC/EE SW, Mute CTL, REC amp
	†† KA8409	80 QFP	Hi-Fi 1 Chip
Servo Controller	KA8320	60 QFP	KA8319 + HD logic select
	KA8327	60 QFP	KA8324 + External filter
	KA8333	60 QFP	KA8324 + External filter
	KA8324	60 QFP	Double C-FG frequency of KA8320
	KA8325	60 QFP	Option of Head select Logic in KA8324
	KA8327	60 QFP	Built in External Filter of D-MIX & C- MIX output
Motor Driver	KA8301	10 SIP H/S	Pre amp, Driver, Logic circuit
	KA8304	12 SIP H/S 12 ZIP H/S	Control amp, CW/CCW, Hall amp, 2-phase motor driver
	KA8306	10 SIP H/S	CTL circuit, Protect circuit, Dual motor driver
MOTOR DRIVER	KA8310	20 ZIP	2 Phase DC brushless hall motor driver, CTL amp, Hall amp, CW/CCW, Driver, TSD
	†† KA8329	32 SDIP	3 phase DC brushless Hall motor driver, Current Limit, CTL amp, Hall amp, TSD, C-FG amp
	† KA8328D	20 SOP	3 Phase DD MOTOR driver with non Inverting & Inverting AMP
	KA8330	10 SIP	DC MOTOR DRIVER
RF Modulator	KA2990D	16 SOP	Video clamp, White clip, AM mod, Sound FM mod, 5.0V
	KA2982BD	20 SOP	Video Clamp, White clip, AM/FM mod, Sound AM/FM mod, 5.0V

† New Product †† Under Development

C. Camcorder only

Application	Device	Package	Circuit Function
DCP	† KS7301	160 VQFP	AF/AE(IRIS)DET, AGC, Color sep, Color multiplexer, H/V aperture, Color matrix, AWB det, Timing generator, Sync. Generator, Encoder(Chroma suppress), using M-Bus full μ -Com Controllable, Compatible for NTSC/PAL, Normal/Hi-band mode
CDS	† KA7302D	30 SSOP	CDS(Correlated Double Sampling), AGC, Gamma control
Character Generator	† KS5515-01D	22 SOP	Character Generation for Camcorder. 6 Output (R.G.B.RB.BB.Mask) Sync output. Compatible for NTSC/PAL
DZ & DE	† KA7304	100 VQFP	Four times digital zoom(24 steps), Digital still, Digital strobe, Low shutter speed, Digital mosaic(3 steps), NTSC/PAL, Normal/Hi-band mode
EVF Driver	† KA7007D	16 SOP	Video amp, SYNC separation, H/V osc, H/V output, Vertical drive
ATF	† KA8322B	64 QFP	ATF(Auto Track Finding), REC ATF, SP/LP det., CLOG det., Envelopdet., T/S reel det., TOP/END det.
8mm Audio Processor	† KA8407	48 VQFP	FM modulator/demodulator, BPF, Line/Mic in, Line/Earphone out, Fade Mute, SP/LP
Sensorless Motor Driver	† KA8323D	30 SSOP	Rotor position det., Logic circuit output driver
Sync. Generator	KS7210	32 QFP	Clock osc., Freq. divider, Sync. out(H/V Composite), Int/Ext mode
Timing Generator	KS7211	48 VQFP	Clock osc., V/H transfer pulse out, Precharge gate pulse, Shutter speed control
Vertical Driver	KS7220	20 SOP	4-Phase vertical driver, Shutter pulse driver

D. Door phone only

Application	Device	Package	Circuit Function
B/W Video Processor	† KA7305	48 VQFP	CDS(Correlated Double Sampling), AGC(Auto Gain Control), IRIS Detect, Gamma 0.45, Set-up Control, White-clip Control, Video Driver & Sag compensation, Internal Comparator.
Timing & Sync Generator	† KS7212	48 VQFP	Compatible EIA and CCIR, auto Iris(Electronic Exposure), Compatible Normal and Mirror, Field Interlace Mode Only.

E. Monitor only

Application	Device	Package	Circuit Function
Video Amplifier	KA2139	28DIP	Video amp, Contrast control, Bright control, Clamp comparator, Vref circuit
Mode selector	† KS2145	24SDIP	Mode control(30~40KHz), Power saving circuit, Vertical oscillator, LED driver, 3.58MHz osc
	KS2146	42SDIP	Mode control(30~61KHz), Power saving circuit, Vertical oscillator, LED driver, 3.58MHz osc

† New Product †† Under Development



F. General Purpose for Video

Application		Device	Package	Circuit Function
VIF + SIF System		KA2913A	16 DIP	VIF amp, Limiter, Video detector, Video amp, IF AGC, Forward RF AGC, Noise canceller
		KA2917	16 DIP	Reverse RF AGC version of KA2913A
		KA2919	30 DIP	VIF amp, Video detector, Video AFT, IF AGC, Reverse RF AGC, SIF Noise canceller, Video amp, SIF detector, Limiter amp, Mute, Attenuator, AF amp
AV switch		KA2186	8 DIP	Switching circuit reference (Low impedance)
		KA8402	7 SIP	2-Input Switch
		KA8403	9 SIP	3-Input Switch
PLL + Prescaler	NTSC	KA2185	20 DIP	Pre-amplifier, 1/8, 1/32, 1/33 prescaler counter, OSC, PLL, Shift register
Remocon	Tx	KS5803A	16 DIP	Key in/output, Driver, Output control, OSC, Data register, Controller
		KS5803B	20 SOP	
		KS5410	20 SOP	Oscillator, Key input, Data code generator, Timing generator, Strobe signal generator, REM-out
	Rx Pre-Amp	KA2181	8 SIP	ALC, Input separation stage, Output gain control
		KA2183	8 SIP	ALC, Input separation stage, Output gain control Low voltage use amp
		KA2184	8 SIP/8 SOP	ALC, Limit amp, BPF, Detector, Hysteresis comparator
Character Generator		KS5513	32 SDIP	Character generator + Sync detector
		KS5514	24 SDIP	Built in external FILTER
		† KS5515 † KS5516	24 SDIP	X-talless, character generator, SYNC-separator, SYNC-Detector
		†† KS5518	24 SDIP	Character generator, SYNC-Detector 256 character, SYNC-Detector.
Sound MPX	Two Carrier System in Korea	KA2268	28 DIP	SIF amp, IF Limiter, detector, LED driver, Mode SW, Matrix, VCO
		KA22682		
R.G.B ENCODER	NTSC/PAL	KA2194D	24 SOP	Regulator, Mixer, Modulator, Pulse Gen., Audio buffer, X-tal OSC., clamp
	NTSC	KA2195D	24 SOP	BPF, D.L circuit, Regulator, Mixer, Modulator, pulse Gen., audio buffer, X-tal OSC.m clamp
	NTSC	† KA2196D	24 SOP	Y/C Driver, BPF, D.L circuit, Regulator, Mixer, Modulator, Pulse Gen., Audio buffer, X-tal OSC., clamp
	PAL	†† KA2197D	24 SOP	Y/C Driver, BPF, D.L circuit, Regulator, Mixer, Modulator, Pulse Gen., Audio buffer, X-tal OSC., clamp
4 CH A/V SWITCH		† KA2192	30 SDIP	Two input decoder, Mode selector, 4 x 1 switch, Mute switch, Bias stage, Gain switch, clamp, TV polarity switch, 2 x 1 switch, pulse Gen.
CHANNEL DECODER		† KA879	30 SOP	Six input Two output

† New Product †† Under Development

3. TELECOMMUNICATION APPLICATION

Application	Device	Package	Circuit Function
Tone Ringer	KA2410 KA2411	8 DIP	Adjustable warbling and 2 frequency tone External triggering or ringer disable (KA2410) Adjustable supply initiating current (KA2411) Built-in hysteresis
Tone Ringer with Bridge Rectifier	KA2418B KA2428B	8 DIP	Protect against overvoltage Low current consumption Allow the parallel operation of 4 devices Built-in hysteresis External components are minimized High output voltage
DTMF/Pulse Switchable Dialer	KS58002 KS58006	22 DIP 18 DIP/20 SOP	Tone/Pulse switchable dialing, touch key or slide switch 32 digit redialing & PABX auto-pause time Make/break ratio pin selectable
	KS58008	18 DIP/20 DIP 22 DIP	One touch redial possible Hands free & Hold function possible Tone/pulse switchable dialing, touch key or slide switch 32 digit redialing & PABX auto-pause time Make/break ratio pin selectable
DTMF/Pulse 3 No. Emergency Dialer	KS58505	22DIP	3 No x 16 digit memory & 32 digit redial Including PABX auto-pause time Make/break ratio pin selectable On/Off hook memory tone/pulse switchable dialing, touch key or slide switch
DTMF/Pulse Switchable 10 No Memory	KS58500	22 DIP	10 No x 16 digit memory & 32 digit redial Including PABX auto-pause time Make/break ratio pin selectable Key in tone possible
	KS58503	18 DIP/20 SOP	10 No x 16 digit memory & 32 digit redial Including PABX auto-pause time Make/Break ratio pin selectable
	KS58520	18 DIP/20 DIP 22 DIP	10 No x 16 digit memory & 32 digit redial Including PABX auto-pause time Make/break ratio pin selectable Flash time pin selectable
	KS58550	22 DIP	10 No x 16 digit memory & 32 digit redial Key In tone function Make/break ratio pin selectable Flash time selectable on the key board.
DTMF/Pulse Switchable 15 No Memory	KS58530	20 DIP/22 DIP	10 No x 16 digit indirect memory 4 No x 16 digit direct memory Flash time pin selectable Hands free & Hold function possible
	KS58555B	22 DIP	10 No x 16 digit indirect memory 4 No x 16 digit indirect memory Flash time selectable on the key board. Hands free & Hold function possible

† New Product †† Under Development

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3. TELECOMMUNICATION APPLICATION (Continued)

Application	Device	Package	Circuit Function
DTMF/Pulse Switchable 20 No Memory	KS58536	28 DIP	20 No x 16 digit memory & 32 digit redial Make/Break ratio pin selectable Flash function Repertory dialing is accessed by direct key or indirect key
DTMF Dialer	KS58015	14 DIP/14 SOP	Direct interface with microprocessor Generates 16 standard tones Binary data inputs with latches very low total harmonic distortion
Speech Network	KA2412A	14 DIP	Transmit/Receiver amplifier Side tone control On chip regulator
Low Voltage Speech Network with Dialer Interface	KA2425A	18 DIP	Low Voltage Operation(1.5V) Tx, Rx & side tone gain set by external resistor Loop length equalization for Tx, Rx & sidetone Provides regulated voltage for CMOS dialer DTME level adjustable with a single resistor Mute function
Speech Network with Dialer interface	KA8501A	16 DIP	Adjusts sending and receiving attenuation length Provides regulated voltage for dialer Linear interface for DTMF Mute function
	KA8504	16 DIP	Low line current operation DTMF signal interface Mute function Easy gain control
	KA8505	18 DIP	Low Voltage operation DTMF signal Interface Mute function
	† KA8603	16 DIP 16 SOP	Line loss Compensation Gain control adaptable to exchanged supply
Low Voltage speech Network	KA8503	18 DIP	Adjust sending and receiving attenuation length Mute function side tone balance network constitution Low voltage operating AC impedance matching
Speaker Phone with Speech Network	KA8601C	48 SDIP	High attenuator gain range(52dB) Microphone amp gain set by external components Regulated voltage for dialer Low operating voltage(1.5V: speech) Mute input for DTMF dialing
DTMF Receiver	KT3170	18 DIP	Full DTMF Receiver Provides DTMF high and low group filtering Dial tone suppression Adjustable acquisition and release times Integrated bandsplit filter and digital decoder functions High quality and performance Single + 5 Volt power supply

† New Product

3. TELECOMMUNICATION APPLICATION (Continued)

1

Application	Device	Package	Circuit Function
Tone Decoder	KA567/L	8 DIP/8 SOP	Touch tone decoding Sequential tone decoding Communication paging High stable center frequency KA567L: Micropower(4mW at 5V) dissipation
FM Receiver	KA3361	16 DIP/16 SOP	Operating voltage range: 2.5-7V Typical supply current: 4mA at 4V Excellent input sensitivity (-3dB limiting, 2.0 μ Vrms/typ) Communication paging
Compander	KA8507	20 DIP/20 SOP	Operating voltage range: 2.4-7V Easy gain control Mute/Bypass logic
	† KA8512	14 DIP/14 SOP	Operating Voltage range: 2-6V ALC function Mute function
1 Chip CLP	KA8510 † KA8511	64 QFP 64 QFP	Included dual conversion receiver, transmitter, compandor and PLL Excellent input sensitivity Included ALC circuit Mute function Unlock detector Included VCO circuit KA8510/11: 15 CH/10 CH(Parallel Input) KA8525: 25 CH(Serial Input)
	†† KA8525	64 QFP	
	KS8803B KS8804B	16 DIP/16 SOP 16 DIP/16 SOP	
PLL	KS8803B KS8804B	16 DIP/16 SOP 16 DIP/16 SOP	10/15 Channel Selectable (Both Tx/Rx) Included Oscillation Circuit with External X-tal(10.24 MHz) 5KHz Output for guard tone Stand-by function for power saving KS8803B: 10 CH, KS8804B: 15 CH
	†† KS8805	16 DIP/16 SOP	Universal programmable Dual PLL Included power saving mode controlled by Micom Maximum operating frequency: 85MHz
FM IF Receiver for PAGER	† KA8513	20 SSOP	Low supply Voltage: VCC=1.0~4.0V Low Battery Alarm function: 1.05V Voltage Regulator: 1.0V FSK Data reception
1 Chip Codec	KT8554 KT8557	16 DIP/16 SOP	Exceeds all D3/D4 and CCITT spec. Complete CODEC and filtering system including \pm 5V operation Low power consumption TTL and CMOS compatible logic
TSAC	KT8555	20 CERDIP	Controls up to eight 1 CHIP CODEC/Filters Low power consumption Single 5V operation Up to 32 time slots per frame

† New Product †† Under Development

3. TELECOMMUNICATION APPLICATION (Continued)

Application	Device	Package	Circuit Function
4 x 4 Crosspoint Switch	KT8592	16 DIP	4 x 4 matrix-array with control memory Low on resistance 2V _{PP} analog signal capability Less than 1% total distortion at 0dBm
12 x 8 Crosspoint Switch	KT8593	40 DIP	12 x 8 matrix-array with control memory Low on resistance 2V _{PP} analog signal capability Less than 1% total distortion at 0dBm
TDX-CODEC	††KT8580	28 PLCC	Complete CODEC and filtering system including Programmable function controlled via serial port On-chip time slot assignment circuit Ringing signal synchronization
Analog Line Card Controller	KT8584	32 PLCC	Peripheral Processor interface for TDX GSLA SLIC off-hook detection data read Control data read & Write for TDX-CODEC MCLK & DCLK alarm function including
TPH Driver	KS0054C	Pallet	Low power CMOS 64 Bit Thermal printer Head Driver It Contains a 64 bit high speed shift register 64 bit latches output control circuit and 64 bit drivers with a driver capability of 30V/10mA
Thinking Image Processor	KS16110B	100 QFP	Shading correction and Gamma correction by pixel unit 8 bit D/A converter, 6 bit A/D converter User Programmable RAM Interface - 1728 word x 6 bit shading memory - 1728 word x 4 bit line memory Various processing mode - Fixed threshold - Local adaptive binary - 8 x 8 wave dither matrix - Error diffusion - Simple mixed - Fuzzy mixed - Smoothing
9600 bps Fax Modem	††KS16112	68 PLCC	Group 3 fax transmission & reception Half duplex(2-wire) Max transmit level: 0dBm--15dBm Receive dynamic range: 0dBm--43dBm Programmable dual tone generation Programmable tone detection CCITT V.29, V.27ter, T.30, V.21 channel 2(FSK), T.4 conformance

† New Product †† Under Development

4. VOLTAGE REGULATOR

A. 3.Terminal Fixed Positive Voltage Regulator

Application	Device	Package	Feature	Application
Very High Output Current($I_o=3A$)	KA78TXX Series	TO-220	Output current in excess of 3A Internal thermal overload protection Internal short circuit current limiting	5V, 6V, 8V, 12V, 15V and 18V fixed output voltage
High Output Current ($I_o=1A$)	KA78XX/A/I series	TO 220	Maximum output current 1A External components are minimized Internal protection circuit for output short	5V, 6V, 8V, 9V, 10V, 11V, 12V, 15V, 18V and 24V fixed output Voltage
	KA340TXX series	TO-220	Output current in excess of 1A Very low line regulation: 0.01 % Very low load regulation: 0.3%	5V, 6V, 8V, 10V, 12V, 15V, 18V, 20V and 24V fixed output voltage
Medium Output Current ($I_o=500mA$)	KA78MXX/I series	TO-220	Maximum output current 500mA External components are minimized Internal protection circuit for output short	5V, 6V, 8V, 10V, 12V, 15V, 18V, 20V and 24V fixed output voltage
Medium Output Current ($I_o=500mA$)	KA78MXXR/I series	D-PAK	Maximum Output current 500mA External component are minimized Short circuit protection	5V, 6V, 8V, 10V, 12V, 15V, 18V, 20V, 24V fixed output voltage
Low Output Current ($I_o=100mA$)	KA78LXXA series	TO-92	Output current in excess of 100mA External components are minimized Internal protection circuit for output short	5V, 6V, 8V, 9V, 10V, 12V, 15V, 18V and 24V fixed output voltage

B. 3.Terminal Fixed Negative Voltage Regulator

Application	Device	Package	Feature	Application
High Output Current ($I_o=1A$)	KA79XX series	TO-220	Output current in excess of 1A Internal thermal overload protection Internal short circuit current limiting	-5V, -6V, -8V, -12V, -15V, -18V and -24V fixed output voltage
Medium Output Current ($I_o=500mA$)	KA79MXX series	TO-220	Output current in excess of 500mA Internal thermal overload protection Internal short circuit current limiting	-5V, -6V, -8V, -12V, -15V, -18V and -24V fixed output voltage
	KA79MXXR series	D-PAK	Output current in excess of 500mA Internal thermal overload protection Internal short circuit protection	-5V, -6V, -8V, -12V, -15V, -18V, and -24V fixed output voltage
Low Output Current ($I_o=100mA$)	KA79LXXA	TO-92	Output current in excess of 100mA Internal short circuit current limiting External components are minimized	-5V, -12V, -15V, -18V, and -24V fixed output voltage

C. Adjustable Voltage Regulator

Application	Device	Package	Feature	Application
Precision Voltage Regulator	KA723	14 DIP 14 SOP	Positive or negative supply operation Series, shunt, switching or floating operation 0.01% line and load regulation Output current up to 150mA without external pass transistor	Output voltage adjustable from 2 to 37V
Adjustable Regulator	KA317	TO-220	Output current in excess of 1.5A Positive output adjustable from 1.2V to 37V Internal short circuit current limiting	Floating operation for high voltage operation Eliminates stocking many fixed voltages
	KA337	TO-220	Output current in excess of 1.5A Negative output adjustable from -1.2V to -37V Internal short circuit current limiting	Floating operation for high voltage operation Eliminates stocking many fixed voltages
	KA350	TO-3P	Output current in excess of 3A Positive output adjustable from 1.2V to 33V Internal short circuit current limiting	Floating operation for high voltage operation Eliminates stocking many fixed voltages
	KA317L	TO-92	Output current in excess of 100mA Positive output adjustable from 1.2V to 37V Internal short circuit current limiting	Floating operation for high voltage operation Eliminates stocking many fixed voltages
	KA317M	TO-220	Output current in excess of 500mA Positive output adjustable from 1.2V to 37V Internal short circuit current limiting	Floating operation for high voltage operation Eliminates stocking many fixed voltages
	KA337L	TO-92	Output current in excess of 100mA Negative output adjustable from -1.2V to -37V Internal short circuit current limiting	Floating operation for high voltage operation Eliminates stocking many fixed voltages

D. Low Dropout Voltage Regulator

Application	Device	Package	Feature	Application
Low Dropout Positive Regulator	KA76L05	TO-92 TO-220	Input-to-output voltage differential of less than 0.6V at 100mA Output current in excess of 100mA 60V load dump protection -50V reverse transient protection Internal current limiting with thermal shutdown	
Low Dropout Positive Regulator	KA78R12	TO-220 FULL PACK (4 LEAD)	Input-to-output voltage differential of less than 0.5V at 50mA Output current in excess of 1.5A over current, thermal protection with on/off control terminal	12V output voltage
Low Dropout Positive Regulator	KA78R05	TO-220 FULL PACK (4LEAD)	Input-to-output voltage differential of less than 0.5V at 50mA Output current in excess of 1.5A over current, thermal protection with on/off control terminal	5V output voltage

E. PWM Control IC

Application	Device	Package	Feature	Application
Voltage Mode PWM Controller	KA7500B	16 DIP 16 SOP	Complete PWM power control circuitry Dead-time control Complementary output Output current up to 200mA	Voltage inverter Voltage step-down Voltage step-up
	KA3524	16 DIP	Complete PWM power control circuitry Internal short circuit current limiting Complementary output Output current up to 100mA	Flyback converter Voltage inverter Voltage step-down
	KA3525A	16 DIP 16 SOP	Adjustable dead-time control Internal soft-start Separate oscillator sync terminal Pulse-by-pulse shutdown Input under voltage lockout with hysteresis	Flyback converter Voltage inverter Voltage step-down Voltage step-up
	KA3526B	18 DIP	Programmable dead time Under voltage lockout Programmed soft-start Digital current limiting	Push-pull converter Voltage inverter Voltage step-down Voltage step-up
	KA7552/3	8 DIP	Wide Operating Frequency Range Pulse by pulse over current Limiting Low standby current Soft Start circuit	Flyback converter Low power SMPS
Dual PWM controller	KA7551	16 SOP	Dual PWM Control circuitry Internal under voltage lockout Wide supply voltage range	DC-DC converter Low power SMPS
High Performance PWM Controller	KA7577	20 SOP 16DIP	Low standby current Pulse by pulse current limiting Over voltage protection	Flyback converter
Current Mode PWM Controller	KA3842B KA3843B KA3844B KA3845B	8 DIP 14 SOP	Automatic feed forward compensation Pulse-by-pulse current limiting Under voltage lockout with hysteresis Double pulse suppression High current totem pole output	Flyback converter Voltage inverter Voltage step-down Voltage step-up
	KA3882 KA3883 KA3884 KA3885	8 DIP 8 SOP	Low start up current Pulse-by-pulse current limiting Under Voltage lockout with hysteresis High current totem pole output	Flyback converter Voltage inverter Voltage step-down Voltage step-up
	KA3846	16 DIP	Programmable pulse-by-pulse Current limiting Double pulse suppression Under voltage lockout Soft-start capability Automatic feed forward compensation	Push-pull converter Voltage inverter Voltage Step-down Voltage step-up

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E. PWM Control IC (Continued)

Application	Device	Package	Feature	Application
Controller for SMPS	KA7511	9 SIP	Low start-up current Direct control of switching transistor Protective circuit for the event of errors Collector current-proportional to base current input	Flyback converter for TV and monitor SMPS
	KA7515	8 DIP	Fold-back characteristic provides over load protection Burst operation under short-circuit Loop error protection Soft-start for quiet start-up Chip over-temperature protection	Flyback converter for TV and VTR SMPS
High SPEED PWM Controller	KA3825	16 DIP	Precision Voltage Reference Wide band width Error. Amplifier Soft Start and Max. Duty Cycle Control Double Pulse Suppression Logic Current Mode or Voltage Mode Control	Resonant Converter Voltage inverter Voltage Step-down Voltage Step-up
DC to DC Converter	KA34063A	8 DIP 8 SOP	Low standby current Short circuit current limiting Output switch current of 1.5A Output voltage adjustable Internal temperature compensated reference	Voltage inverter Voltage step-down Voltage step-up

† New Product

5. VOLTAGE REFERENCE

Application	Device	Package	Feature	Application
Adjustable Reference	KA431/A/L	TO-92 8 DIP 8 SOP	Programmable output voltage from V_{ref} to 36V Voltage reference tolerance: $\pm 2\%$, 1%, 0.5% Low output noise voltage	Switching regulator Constant current source Constant current sink
Reference	KA336-5.0	TO-92	Adjustable 4V to 6V Low temperature coefficient 0.6 Ω dynamic impedance Fast turn-on	Adjustable shunt regulator Precision power regulator

6. OPERATIONAL AMPLIFIER

Application	Device	Package	Feature	Application
Single OP AMP	KA741/I/E	8 DIP 8 SOP	Internal frequency compensation Short circuit protection	Comparator, DC amp, Multivibrator, Summing amp, Integrator or differentiator, Narrow band or BPF
	KA301A	8 DIP 8 SOP	Short circuit protection External frequency compensation	Variable capacitance Multiplier Sine wave oscillator
	KA351	8 DIP 8 SOP	Internally trimmed offset Voltage: 10mV Low input bias current High input impedance: 1012 Ω High slew rate: 13V/ μ S Wide gain bandwidth: 4MHz	HiZin inverting amp Ultra low duty cycle Pulse generator Sample and Hold
Dual OP AMP	KA4558/I	8 DIP 8SOP 9 SIP	Internal frequency compensation Low noise operation	Phon pre-amplifier Tape play back amplifier
	KA1458/I	8 DIP 8 SOP 9 SIP	Internal frequency compensation Short circuit protection	Filter Schmitt trigger Comparator Multivibrator
	KA358/A KA258/A KA2904	8 DIP 8 SOP 9 SIP	Internal frequency compensation for unit gain Large DC voltage gain Wide power supply range Single supply operation	DC summing amplifier Power amplification Rc active bandpass filter Compatible with all forms of logic.
	KA5532	8 DIP	Low input noise voltage High gain bandwidth: 10MHz High slew rate: 9V/ μ S Large supply voltage range: $\sim \pm 3$ to ± 20 V	DC Amp Telephone channel amplifiers Audio equipment
	KF442	8 DIP 8 SOP 9 SIP	Low supply current: 500 μ A(max) Low input bias current High input impedance High gain bandwidth: 1MHz High slew rate: 1V/ μ S	Active filter DC summing amplifier Oscillator
	KF353	8 DIP	Low bias current Wide band width High input impedance: 45MHz High slew rate: 13V/ μ S	Sample and hold D/A converter integrator

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6. OPERATIONAL AMPLIFIER (Continued)

Application	Device	Package	Feature	Application
Quad OP AMP	KA324/A KA224/A KA2902	14 DIP 14 SOP	Internal frequency compensation Wide supply voltage range Single supply: DC 3V~32V Dual supply: DC±1.5V~±16V	Audio power booster DC amp, Multivibrator Switch, Comparator Schmitt trigger
	KA348 KA248	14 DIP 14 SOP	Each amplifier is functionally equivalent to the KA741 Pin compatible with KA324 Short circuit protection	Comparator with hysteresis Voltage reference
	KA3403 KA3303	14 DIP 14 SOP	Class AB output stage for minimal crossover distortion Single or split supply operation Internal frequency compensation	Comparator with hysteresis BI-Quad filter
	KF347	14 DIP 24 SOP	Low bias current Wide gain bandwidth: 4MHz High slew rate: 13V/μS High input impedance	D/A converter Sample and hold Integrator

7. VOLTAGE COMPARATOR

Function	Device	Package	Features	Application
Single Comparator	KA311	8 DIP 8 SOP	Operates from single 5V supply Maximum input current: 250mA Maximum offset current: 50nA Differential input voltage range: $\pm 30V$	Multivibrator output is compatible with DTL and as well as MOS circuits voltage controlled oscillator
	KA710/I	14 DIP	Low offset and thermal drift Compatible with practically all types of integrated logic	Line receiver A/D converter Memory sense amplifier
Dual Comparator	KA393/A KA2903 KA293/A	8 DIP 8 SOP 9 SIP	High precision comparators Reduced V_{OS} drift over temperature Eliminates need for dual supply Allows sensing near ground Compatible with all form of logic Power drain suitable for battery operation Low input biasing current: 25nA Low output saturation voltage 250mA	Output voltage compatible with TTL, DTL, ECL and CMOS logic system Basic comparator Pulse comparator MOS clock driver
	KA319 KA219	14 DIP	Two independent comparators Operates from a single 5V High common mode slew rate	Relay driver Window detector
	KA711/I	14 DIP 14 SOP	Separate differential input and single output Strobing each side	Sense amplifier for core memory Dual comparator with ORed output Double-ended limit detector
Quad Comparator	KA339/A KA2901 KA252/A KA3302	14 DIP 14 SOP	Wide single supply voltage range or dual supplies Very low supply current drain (0.8mA)-independent of supply voltage (2mW/Comparator at +5V DC) Low input biasing current: 25nA Input common-mode voltage range included GND Low output saturation voltage 250mV at 4mA	Compatible with all forms of logic Bi-stable multivibrator One-shot multivibrator Time delay generator Square wave oscillator Pulse generator Limit comparator Crystal controlled oscillator

8. TIMER

Function	Device	Package	Feature	Application
Single Timer	KA555	8 DIP 8 SOP	Maximum operating frequency : 500KHz Adjustable duty cycle	Precision timing Pulse generator
Dual Timer	KA556	14 DIP	TTL Compatible Dual KA555	Time delay generation
Quad Timer	KA558	16 DIP	Wide supply voltage range : 4.5 to 16V 100mA output current per section Time period equal RC	Quad monostable Sequential timing Precision timing

9. Miscellaneous

Application	Device	Package	Feature	Application
Power Factor controller	KA7514/A	8 DIP/ 8 SOP	An active power factor correction Micro power start up Under voltage lock out Totem-pole output	AC to DC converter Electronic ballast
	KA7524	8 DIP/ 8 SOP	An active power factor correction Internal start-up Timer Micro power start-up Under Voltage rockout Totem-pole output	AC to DC converter Electronic ballast
Ballast Controller	KA7521	16 DIP	Over Temperature protection Over Current Protection DC-Feed Forward Non Lamp Protection 3-step soft start	Electronic ballast
Ballast Controller	KA7531	22 SDIP 24 SOP	KA7524 + KA7521	Electronic ballast
Ballast Controller	KA7522	22 SDIP 20 SOP	Current Feedback control ZVS Guard Control 3-step soft Start Input Voltage limit & Brown out Over Temp.protection Over Current protection Non Lamp protection	Electronic ballast
Automotive Power Window Controller	KA3903	16 DIP	Low stand-by current Human Protection Programmable step width control Over Voltage protection Over current protection Thermal shutdown	Automotive
C-MOS Low Power Voltage Detector	KS77XX	TO-92	Extremely low power consumption High accuracy: 2.5% Low minimum operating Voltage	Low battery detection Reset for micro computer Power failure detector
HDD	†† KA2811	48 QFP	5400RPM spindle/VCM Motor Driver	HDD
FDD	† KA2820	20 SOP	5 ½" step Motor Driver	FDD
	†† KA2821	20 SOP	3.5" step Motor Driver	FDD
	†† KB2825	64 QFP	FDD controller & Pre-Amp	FDD
Multimedia	†† KS0119	80 QFP	NTSC composite/RGB Encoder	PC Video
	†† KS0122	100 QFP	NTSC/PAL Front End	PC Video
	†† KS0161	160QFP	PCM Sound Synth sizer	Sound Card
	†† KS0160	160QFP	Sound CODEC	Sound Card

† New Product †† Under Development

9. Miscellaneous (Continued)

Application	Device	Package	Feature	Application
DMM	KAD7000B KAD7001 †† KAD0503 † KAD0505	48 QFP 80 QFP [*] 80 QFP 48 QFP	Micom Interface 3 $\frac{3}{4}$ Digit DMM 3 $\frac{3}{4}$ Digit DMM 3 $\frac{3}{4}$ Digit DMM & Frequency Counter 3 $\frac{3}{4}$ Digit Manual DMM & Frequency Counter	DMM DMM DMM DMM
RAM DAC	†† KDA0484 †† KDA0485 †† KDA0486 †† KDA0495	84 PLCC 84 PLCC 84 PLCC 100QFP	32 bit True Color RAMDAC with H/W Cursor 32 bit True Color RAMDAC with H/W Cursor 32 bit True Color RAMDAC with H/W Cursor 32 bit Syn DAC	PC Graphic PC Graphic PC Graphic PC Graphic
Converter	KSV3208 KAD0228 KDA3310 KDA0408 KDA0310 † KAD0308 KDA0800/8	28 DIP 24 SOP 32PLCC/28DIP 42SDIP/48VQFP 30 SOP 24SOP 16 DIP/SOP	8 bit A/D Converter 8 bit A/D CMOS Converter 10 bit D/A Converter Triple 8 bit D/A Converter 10 bit D/A CMOS Converter 8 bit D/A CMOS Converter 8 bit D/A Converter	Video Processing Video Processing Video Processing Video Processing Video Processing Video Processing General-Purpose
Pen PC Digitizer	†† KB0280	48QFP	12-bit A/D & Glass Tablet Driver	Pen PC Digitizer

† New Product †† Under Development

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1. CMOS LCD Watch

Device	Display					Function			Additional Features					Electrical Characteristic			Remark
	Digit	Day Flags	Marks	Duplexed LCD	Triplexed LCD	Basic 5 Function	Day Type	Year	Alarm	Snooze	Chronograph	Chime	Remark	V _{DD} (V)	I _{DD} (μ A)		
															Typ.	Max.	
KS5120	3.5	—	—	*	—	*	—	—	—	—	—	—	—	1.5	0.8	1.5	Internal Capacitor
KS5195	4	—	4	*	—	*	—	—	*	—	—	*	—	1.5	1.0	2.0	
KS5191	6	7	4	*	—	*	Flag	—	*	*	*	—	Chrono (1/100 sec, 24HR)	1.5	1.0	2.0	Internal Capacitor
KS5199A	3.5	—	—	*	—	*	—	—	—	—	—	—	—	1.5	0.8	1.5	
KS5112	6	—	1	—	*	*	—	—	—	—	—	—	—	1.5	0.8	1.5	Internal Capacitor
KS5121	3.5	—	—	*	—	*	—	—	—	—	—	—	—	1.5	0.8	1.5	1.5V LCD use. colon flash option

2. CMOS Analog LCD Watch

Device	Display			Function	Electrical Characteristic			Remark
	Hand	Segment	LCD duty		V _{DD} (V)	I _{DD} (μ A)		
						Typ	Max	
KS5113	3	120	1/6	3	1.5	1.5	2.5	Internal Capacitor

3. CMOS Analog Watch

Device	PAD	Time keeping	Time stability(ppm)	V _{DD} (V)	I _{DD} (nA)		Remark
					Typ	Max	
KS5243	10	Trimmer cap(OI)	Typ; 0.1	1.5	170	300	Motor output : Mask option

4. CMOS Analog Clock

Device	Feature	V _{DD} (V)	IDD(μA)		OSC.	Package	Remark
			Typ	Max			
KS5224	M : 62.5 msec	1.5	1.0	2.0	32768Hz	8DIP CHIP	Multi Option type

5. CMOS Digital Clock

Device	Feature	V _{DD} (V)	IDD(μA)		OSC.	Package	Remark
			Typ	Max			
KS5127	Automotive Digital Clock	Max 7	-	0.7mA	4.194304 MHz	40 DIP CHIP	<ul style="list-style-type: none"> - 1024Hz External Clock Drive - 1024Hz Signal Output - 4 Ways Display Brightness Control

6. Calculator

Device	Feature	A.P.O*	V _{DD} (V)	IDD(μA)		Package	Remark
				Typ	Max		
KS6325	8 Digit Basic	Option	1.5	4.2	6	Chip 48 QFP	Clear key: ON/C, ON/CE, CE
KS6326	8 Digit Basic	Enable	1.5	4.2	6	Chip 48 QFP	Internal Voltage limiter
KS6426	8 Digit Basic	Enable	1.5	3.5	5	Chip 48 QFP	Internal voltage limiter
KS6129B	10 Digit Basic	Option	1.5	1.5	3	Chip 48 QFP	Clear key: ON/C, ON/CE, CE Low current type
KS6429	10 Digit Basic	Option	1.5	2	4	Chip 48 QFP	Punctuation comma function
KS6525	8 Digit Basic	Option	3.0	20	30	Chip 48 QFP	Touch tone function
KS6529	10 Digit Basic	Option	1.5	6	10	Chip 48 QFP	Touch tone, Punctuation comma
KS6225	8 Digit Basic	Option	1.5	3.5	5	Chip 48 QFP	Mirror type of KS6325
KS6078C	Desk Top Calculator	Enable	1.5	4.4	6.5	Chip 64 QFP	Power: solar, Battery
KS6042	10 Digit Scientific	Enable	3	20	35	Chip 48 QFP	56 kinds function
KS6034C	20 Item Memory Data Bank	ADO* Option	3	20	35	Chip 60 QFP	Clock, telephone, Calculator mode
KS6035B	50 Item Memory DAta Bank	ADO* Option	3	20	35	Chip 60 QFP	Clock, telephone, Calculator mode
KS6037	100 Item Memory Data Bank	ADO* Option	3	20	35	Chip 80 QFP	Single key & Rotary dey Touch tone & Alarm Up/down search system
† KS6626	8 DIGIT Clocke calculator		1.5	5	10	Chip	Clear key: MODE, CCE, CE Clock mode Calculator mode

† New Product * A.P.O : Auto Power Off * A.D.O : Auto Display Off

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NOTES

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ASIC/MICOM

ASIC Products	87
1-Chip MICOMs	91

1. CMOS GATE ARRAY

Items	Products	KG60000	KGL60000	KG70	KGL70
Design Rule(um)		0.8	0.8	0.6	0.6
Supply Voltage(V)		5.0	3.3	5.0	3.3
Maximum Usable Gates		200,000	200,000	350,000/200,000**	350,000/200,000**
Propagation Delay(ns)*		0.325	0.42	0.2	0.26
Maximum I/O Pads		440	440	440	440
Maximum Toggle Frequency(MHz)		250	150	350	250
Cell Library		RAM/ROM DPRAM FIFO/Multiplier	RAM/ROM DPRAM FIFO/Multiplier	RAM/ROM DPRAM FIFO/Multiplier	RAM/ROM DPRAM FIFO/Multiplier
EWS Support		Mentor Viewlogic Verilog Synopsys	Mentor Viewlogic Verilog Synopsys	Mentor Viewlogic Verilog Synopsys	Mentor Viewlogic Verilog Synopsys
Availability		NOW	NOW	3Q,'95	3Q,'95

[Note] * : 2 Input NAND Gate at Fanout=2

[Note] ** : TLM/DLM

2. CMOS STANDARD CELL

Items	Products	STD60	STDL60	STD70	STDL70
Design Rule(um)		0.8	0.8	0.6	0.6
Supply Voltage(V)		5.0	3.3	5.0	3.3/3.0
Maximum Usable Gates		200,000	200,000	350,000/250,000**	350,000/250,000**
Propagation Delay(ns)*		0.325	0.42	0.2	0.26
Maximum I/O Pads		440	440	440	440
Maximum Toggle Frequency(MHz)		250	150	350	250
Cell Library		RAM/ROM DPRAM FIFO/Multiplier Datapath	RAM/ROM DPRAM FIFO/Multiplier Datapath	RAM/ROM DPRAM FIFO/Multiplier Datapath	RAM/ROM DPRAM FIFO/Multiplier Datapath
EWS Support		Mentor Viewlogic Verilog Synopsys	Mentor Viewlogic Verilog Synopsys	Mentor Viewlogic Verilog Synopsys	Mentor Viewlogic Verilog Synopsys
Availability		NOW	NOW	4Q,'95	4Q,'95

[Note] * : 2 Input NAND Gate at Fanout=2

[Note] ** : TLM/DLM

3. CMOS EMBEDDED ARRAY

Items	Products	KG60000E
Design Rule(um)		0.8
Supply Voltage(V)		5.0
Maximum Usable Gates		200,000
Propagation Delay(ns)*		0.325
Maximum I/O Pads		440
Maximum Toggle Frequency(MHz)		250
Cell Library		RAM/ROM/DPRAM FIFO/Multiplier
Core Cell		SSP1601S(DSP)/SM8A#3(80C51)
EWS Support		Mentor/Viewlogic/Verilog
Availability		NOW

[Note] * : 2 Input NAND Gate at Fanout=2

4. GATE ARRAY FAMILIES

4-1. KG60000 SERIES

Master	Gate Count		Utilization (%) *	Pads		
	Total	Usable		I/O	Power	Total
KG6123	11,712	5,856	50	68	16	84
KG6153	14,770	7,385	50	76	16	92
KG6183	18,091	8,931	50	84	16	100
KG6213	20,818	10,409	50	90	16	106
KG6263	25,668	12,834	50	100	16	116
KG6313	30,674	15,337	50	110	16	126
KG6423	41,584	20,792	50	128	16	144
KG6483	47,916	24,738	50	136	16	152
KG6573	57,156	28,578	50	148	16	164
KG6653	65,001	32,501	50	160	16	176
KG6883	87,740	43,870	50	184	16	200
KG6114	110,400	49,680	45	208	16	224
KG6144	142,747	64,236	45	236	16	252
KG6184	184,688	73,875	40	268	16	284
KG6224	221,000	88,400	40	292	16	308
KG6264	261,492	104,597	40	320	16	336
KG6324	315,976	126,390	40	352	16	368
KG6404	395,676	158,270	40	392	16	408
KG6504	500,089	200,035	40	440	16	456

[Note] * : In case of Best

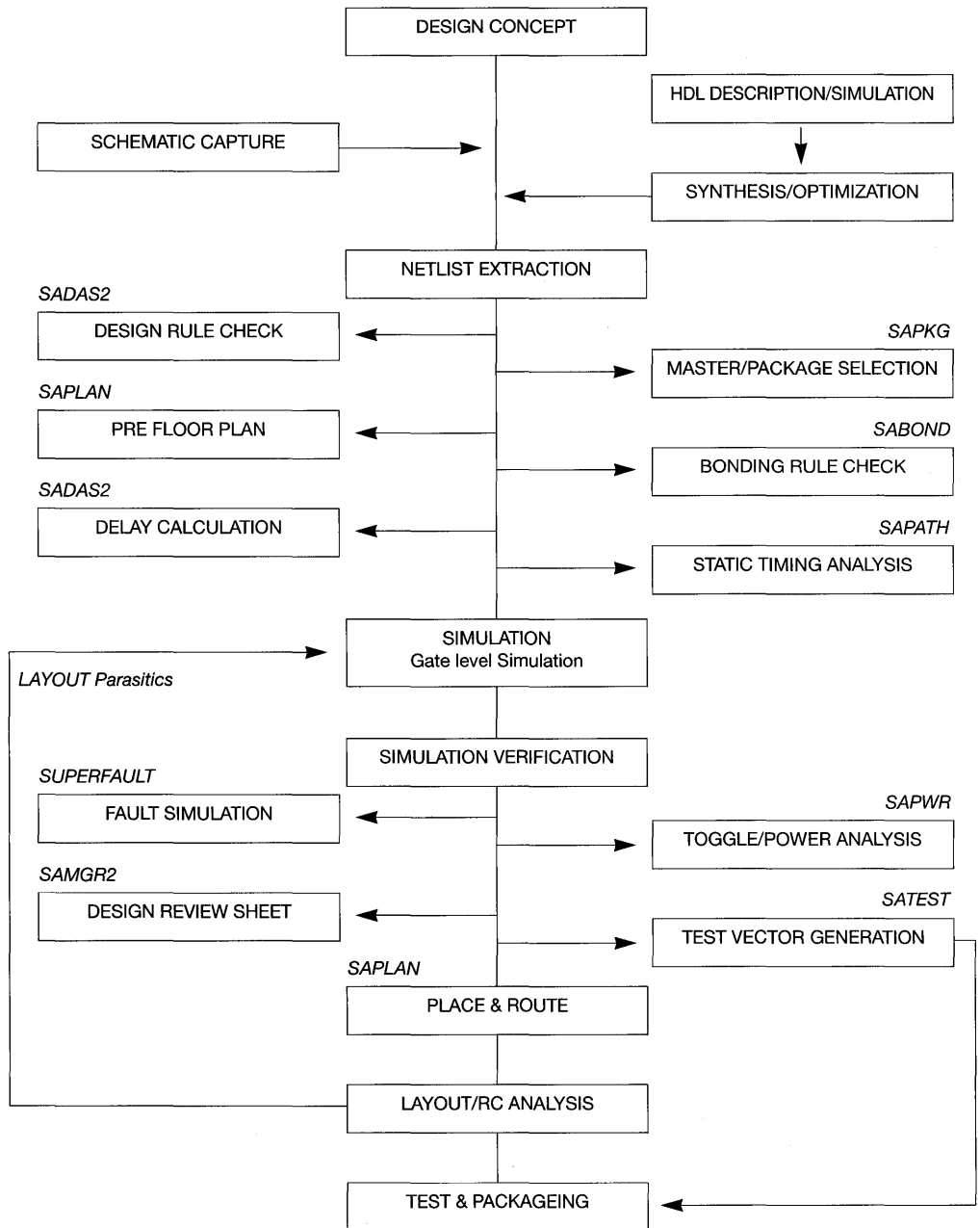
4-2. KG70 SERIES

Master	Gate Count		Utilization(%) (DLM/TLM) *	Pads		
	Total	Usable(DLM/TLM)		I/O	Power	Total
KG7872	8,748	3,936 / 6,123	45 / 70	60	16	76
KG7123	12,360	5,562 / 8,652	45 / 70	66	16	82
KG7163	16,478	7,415 / 11,534	45 / 70	80	16	96
KG7203	19,920	8,964 / 13,944	45 / 70	88	16	104
KG7273	27,068	12,180 / 18,947	45 / 70	100	16	116
KG7323	32,320	14,544 / 22,624	45 / 70	108	16	124
KG7393	38,584	17,362 / 27,008	45 / 70	116	16	132
KG7463	46,168	20,775 / 32,317	45 / 70	128	16	144
KG7503	50,336	22,651 / 35,235	45 / 70	132	16	148
KG7593	59,212	23,684 / 41,448	40 / 70	144	16	160
KG7743	74,088	29,635 / 51,861	40 / 70	160	16	176
KG7903	90,396	36,158 / 63,177	40 / 70	176	16	192
KG7134	127,776	51,106 / 89,436	40 / 70	208	16	224
KG7174	172,032	68,812 / 120,422	40 / 70	240	16	256
KG7204	195,980	78,392 / 137,186	40 / 70	256	16	272
KG7224	221,996	88,798 / 155,397	40 / 70	272	16	288
KG7284	279,300	111,720 / 195,510	40 / 70	304	16	320
KG7384	376,678	131,837 / 244,840	35 / 65	352	16	368
KG7444	444,240	155,484 / 288,756	35 / 65	380	16	396
KG7524	522,600	182,910 / 339,690	35 / 65	412	16	428
KG7594	594,048	207,916 / 386,131	35 / 65	440	16	456

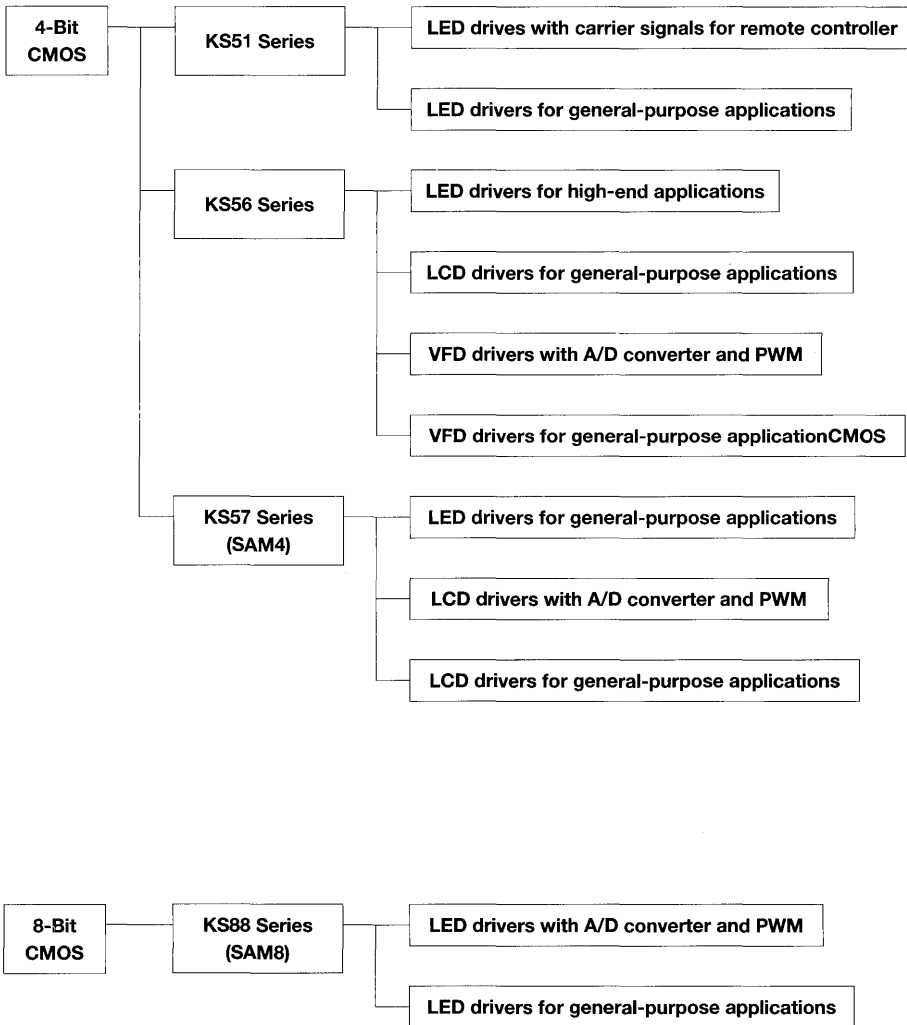
[Note] * : In case of Best

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5. ASIC DESIGN FLOW



Samsung Microcontroller Hierarchy



1

SINGLE-CHIP MICROCONTROLLERS FUNCTION GUIDE

Microcontroller Tool availability

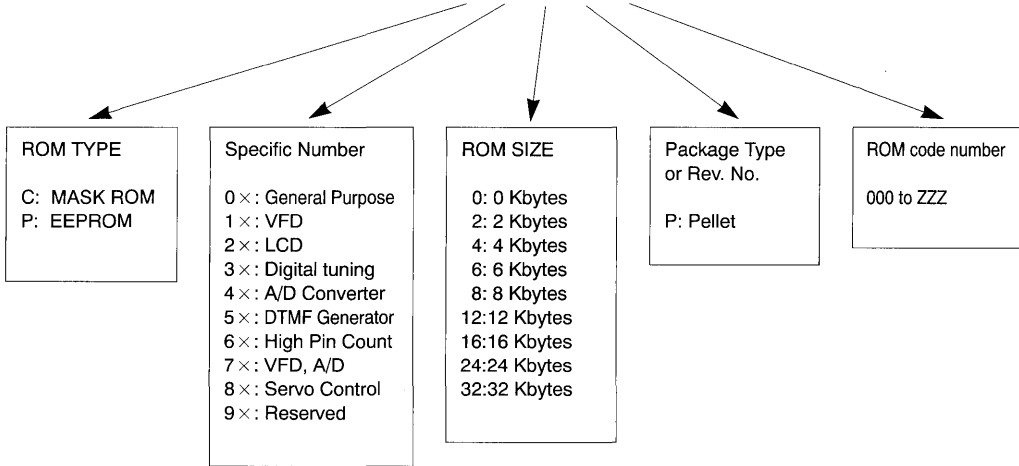
DEVICE		MDS	Target Board	Piggyback	MTP(EEPROM)
KS51	KS51600	SMDS2	TB51600/700		
	KS51700		TB51600/700		
	KS51810		TB51810/910	EB51810/910	
	KS51910		TB51810/910	EB51810/910	
KS56	KS56C1620		TB561620	PC56C1620	
	KS56C820		TB561620	PC56C1620	KS56P820
	KS56C220		TB56220	PC56C220	
	KS56C401		TB56401		
	KS56C450		TB56450	PC56C450	KS56P450
	KS56C821		TB56821	PC56C821	
KS57	KS57C0002		TB570002	PB57C0002	KS57P0002
	KS57C0108		TB570108	PB57C0108	KS57P0108
	KS57C0208		TB570208		
	KS57C0302		TB570302	PB57C0302	
	KS57C2016		TB572016	PC57C2016	
	KS57C2102		TB572102	PB57C2102	
	KS57C2202		TB572202		
	KS57C2408/16		TB572408	PC57C2408	KS57P2416
	KS57C2504		TB572504	PC57C2504	
	KS57C2616		TB572616	PC57C2616	
	KS57C3016	TB573016	PC57C3016	KS57P3016	
	KS57CC3108*	TB573108	PC57C3108		
	KS57C4004	TB574004	PC57C4004	KS57P4004	
	KS57C5016	TB575016	PC57C5016	KS57P5016	
KS88	KS88C0016	TB880016	PC88C0016	KS88P0016	
	KS88C0316*	TB880316	PB88C0316		
	KS88C0504	TB880504	PB88C0504		
	KS88C0604	TB880604		KS88P0604	
	KS88C3016	TB883016	PB88C3016		
	KS88C3116	TB883116	PB88C3116		
	KS88C4116	TB884116		KS88P4116	
	KS88C4208	TB884208	PB88C4208		
	KS88C4316	TB884316	PC88C4316		
	KS88C7132	TB887132		KS88P7132	
	KS88C8016	TB888016	PC88C8016	KS88P8032	
KS88C9108	TB889108				

* Under development

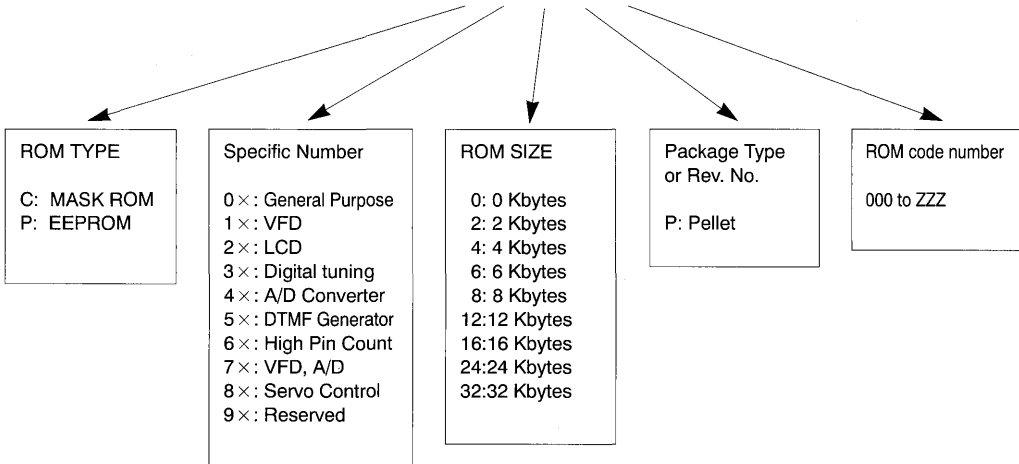
MICROCONTROLLER ORDERING CODE

1

KS57 C 24 08 Q - XX



KS88 C 00 16 P - XX



SINGLE-CHIP MICROCONTROLLERS FUNCTION GUIDE

KS51 SERIES

FEATURES

- Programmable carrier signals for remote transmitter
- User-writable PLA output for KS51600
- Power-down mode
- Built-in RC and/or Crystal/Ceramic oscillation circuit
- Operating temperature from -20 to 85 °C

APPLICATIONS

- Remote control transmitter
- Low-end, low-cost consumer electronics

CHARACTERISTICS

Device	ROM (byte)	RAM (nibble)	Supply Voltage	OSC. (max.) (MHz)	I/O Pins		Remote carrier Frequency	Package	Piggyback
					In	Out			
KS51600	1K	64	3/5V	1/3	8	16		30SDIP	PB51600
KS51700	0.5K	32	3/5V	1/3	5 (4)	9 (10)		20DIP 20SOP	PB51700
KS51810	1K	32	3V	0.7	8	11	Fosc/8, Fosc/12, No carrier Auto reset	24SOP	PB51810
KS51910	0.5K	32	3V	0.7	5	9	Fosc/8, Fosc/12, No carrier Auto reset	20DIP 20SOP	PB51910

Note : Byte = 8 bits, nibble = 4 bits

SINGLE-CHIP MICROCONTROLLERS FUNCTION GUIDE

KS56 SERIES

FEATURES

- Interrupt handler up to seven interrupt sources
- Power-down mode
- Built-in RC and/or Crystal/Ceramic oscillation circuit
- Buzzer sound output except KS56C460B/1660
- Operating voltage form 2.7V to 6.0V
- Operating temperature from -40 to 85 °C

APPLICATIONS

- VCR
- CD Players
- Cameras
- Telephone
- Audio set
- LCD Remote Controller
- Other LED, LCD and VFD Application

1

CHARACTERISTICS

Device	ROM (byte)	RAM (nibble)	Max. Osc (MHz)	I/O pins			Ext. Inte- rrupt	SIO	Timer/ Counter	Basic Timer	Display	Others	Package	Piggyback
				In	Out	I/O								
KS56C220	2K	288	4.5	4	8	12	2		8bit 1ch	8bit 1ch	LCD, 32seg, 4com		64 QFP	PC56C220
KS56C820	8K	512	4.5	8	8	24	4	8bit 1ch	8bit 1ch	8bit 1ch	LCD, 32seg, 4com		80QFP	PC56C1620
KS56C1620	16K	512	4.5	8	8	24	4	8bit 1ch	8bit 1ch	8bit 1ch	LCD, 32seg, 4com		80QFP	PC56C1620
KS56C821	8K	5K	1.5	4	16	16	14		8bit 1ch	8bit 1ch	LCD, 60seg, 9com	RC oscillator	100QFP	
KS56C450	4K	736	4.5	4	0	31	9		8bit 2ch	8bit 1ch		DTMF generator	42SDIP 28DIP	PC56C450
KS56C401	4K	512	4.0	1	1	23	9		8bit 2ch	8bit 1ch		Low Voltage Operation	32SOP	

Note : Byte = 8 bits, nibble = 4 bits

* Under Development

SINGLE-CHIP MICROCONTROLLERS FUNCTION GUIDE

KS57(SAM4) SERIES

SAM4=Samsung Arrangeable 4-bit Microcontrollers

FEATURES

- 4-bit arrangeable microcontrollers
- Various user-arrangeable modules:
 - 5 MHz clock frequency(Maximum)
 - ROM(up to 32K × 8 bits)
 - RAM(up to 1K × 4 bits)
 - SIO, PIO
 - Timers and timer/event counters
 - A/D converter, Comparator
 - Low voltage detector
 - Buzzer(2K, 4K, 8K, and 16KHz)
- Power down mode
- Operating voltage from 2.7V to 6.0V
- Operating temperature from -40 to 85 °C

APPLICATIONS

- VCR
- CD Players
- Cameras
- Telephone
- Audio set
- LCD Remote Controller
- Other LED, LCD and VFD Application

CHARACTERISTICS

Device	ROM (byte)	RAM (nibble)	I/O pins			Ext. Inte- rrupt	SIO	Timer/ Counter	Basic Timer	Display	Others	Package	Piggback
			In	Out	I/O								
KS57C0002	2K	256	6	0	18	5	8bit 1ch	8bit 1ch	8bit 1ch		Comparator: 4ch	30SDIP	PB57C0002
KS57C2016	16K	512	4	12	40	12	8bit 1ch	8bit (1ch) 16bit (1ch)	8bit 1ch	LCD, 40seg, 4com	PWM: 16bit, (1ch)Capture	100QFP	PC57C2016
KS57C2202	2K	256	2	9	15	6		8bit 1ch	8bit 1ch	LCD, 32seg, 4com	Effect sound melody	64QFP	
KS57C2408	8K	512	10	12	28	12	8bit 1ch	8bit (1ch) 16bit (1ch)	8bit 1ch	LCD, 24seg, 4com	A/D: 8bit, 6ch	80QFP	PC57C2408
KS57C2416	16K												
KS57C3016	16K	1024	4	12	39	8	8bit 1ch	8bit 1ch	8bit 1ch	LCD, 32seg, 4com	A/D: 8bit, (4ch) PWM: 8bit, (6ch) PLL: 200MHz	100QFP	PC57C3016
KS57C0108	8K	512	4	0	32	12	8bit 1ch	8bit 2ch	8bit 1ch			42SDIP 44QFP	PB57C0108
KS57C0208	8K	512	0	0	18	8		8bit 2ch	8bit 1ch		Low Voltage Operation	24SOP	
KS57C2616	16K	768	4	0	35	12	8bit 1ch	8bit (1ch) 16bit (1ch)	8bit 1ch	LCD, 56seg, 16com		100QFP	PC57C2616
KS57C4004	4K	256	4	0	30	7	8bit 1ch	8bit 1ch	8bit 1ch			42SDIP 44QFP	PC57C4004
KS57C5016	16K	512	4	0	51	12	8bit 1ch	8bit 2ch	8bit 1ch		DTMF generator	64SDIP 64QFP	PB57C5016

Note : Byte = 8 bits, nibble = 4 bits
* Under Development

SINGLE-CHIP MICROCONTROLLERS FUNCTION GUIDE

CHARACTERISTICS (Continued)

Device	ROM (byte)	RAM (nibble)	I/O pins			Ext. Inter- rupt	SIO	Timer/ Counter	Basic Timer	Display	Others	Package	Piggyback
			In	Out	I/O								
KS57C0302	2K	256	0	0	15	1		8bit 1ch	8bit 1ch		Comparator: 4ch	20 DIP 20SOP	PB57C0302
KS57C2102	2K	256	0	4	4	2		8bit 1ch	8bit 1ch	LCD, 12seg 4com		28DIP 28SOP	PB57C2102
KS57C2504	2K	256	4	8	15	4	8 bit 1ch	8bit 1ch	8bit 1ch	LCD 40seg 8com		42SDIP 44QFP	PB57C2504
KS57C3108*	2K	256	4	12	24	4	8 bit 1ch	8bit 1ch	8bit 1ch	LCD 28seg 4com	A/D: 8bit 4ch, PWM PLL, IF couner	80QFP	PB57C3108

Note : Byte = 8 bits, nibble = 4 bits

* Under Development

1

SINGLE-CHIP MICROCONTROLLERS FUNCTION GUIDE

KS88(SAM8) SERIES

SAM8=Samsung Arrangable 8Bit Microcontrollers

FEATURES

- 8-Bit arrangeable microcontrollers
- Various user arrangeable modules:
 - ROM(up to 64 KBytes)
 - RAM(up to 64 KBytes)
 - PIO, SIO, UART, I²C
 - Timer/event counters, Back-up timers
 - OSD, PWM
 - A/D converter, Comparator
 - External memory interface
- Power-down mode
- Operating voltage form 4.0V to 6.0V
- Operating temperature from -40 to 85 ° C

APPLICATIONS

- High-end consumer electronics
- OA machines

CHARACTERISTICS

Device	ROM (byte)	RAM (byte)	Max. Osc (MHz)	I/O pins			Ext. Inter- rupt	Timer/ Counter	Others	Package	Pigback
				In	Out	I/O					
KS88C0016	16k	272	10	0	8	46	12	16bit 2ch	External Memory Interface UART: 8bit (1ch)	64SDIP 64QFP	PC88C0016
KS88C3016	16k	281	10	0	0	30	8	8bit 2ch	A/D : 4bit (1ch), OSD PWM : 8bit (12ch), 14bit (1ch)	64SDIP	PB88C3016
KS88C3116	16k	256	10	0	0	36	8	8bit 2ch	SIO : 8bit (1ch) for 3016 I ² C for 3116, Caption	48SDIP 48QFP	
KS88C8016	16k	336	12	0	0	40	16	8bit-2ch 16bit-1ch 20bit-1ch	A/D : 8bit (8ch) PWM : 14bit (2ch) SIO : 8bit (1ch)	80QFP	PC88C8032
KS88C0504	4k	192	8	0	0	32	12	8bit 1ch	Inturrupt terminates STOP mode	40DIP	PB88C0504
KS88C4116	16k	1040	12	0	0	64	11	16bit 2ch 8bit 2ch	A/D : 8bit (8ch) PWM : 8bit (2ch) UART : 8bit (1ch) External Memory Interface	80QFP	
KS88C7132	32k	528	12	8	48	32	8	8bit-2ch 16bit-2ch	A/D : 8bit (8ch) VFD (15seg, 16dig) PWM : 8bit (2ch) Buzzer (2k, 4kHz) SIO : 8bit (2ch)	100QFP	
KS88C0604	4K	208	8	0	0	32	12	8-bit 1ch	for Keyboard Application	40DIP	
KS88C0316	16K	272	10	0	8	46	12	16-bit 2ch	HDLC for CATV converter	64SDIP	PB88C0316
KS88C4208	8K	208	10	0	0	34	8	16bit 2ch 8bit 1ch	A/D: 8-bit 6ch, UART Romless mode available	42SDIP 44QFP	PB88C4208
KS88C4316	16K	272	10	0	0	56	14	16bit 3ch 8bit 2ch	A/D: 8bit 8ch, PWM SIO: 2ch	64SDIP	
KS88C9108	8K	208	3.57	1	0	0	2		8kbytes EEPROM for Smart card	COB	

Note : Byte = 8 bits, nibble = 4 bits
* Under Development

LCD Products

LCD Driver & Controller ICs	101
Color TFT LCD Panel	103

1. LCD Driver & Controller ICs

Application	Device	Package	Feature	Application
53CH Static Driver	† KS0035	bare chip	<ul style="list-style-type: none"> - Power supply: +3.0~6.5V - Drive system: 1/1 duty(53 seg) 1/2 duty(104 seg) - 2 Pins for 5 level AD converter 	Car radio
40 CH SEG/COM Driver	† KS0065B	60 QFP bare chip	<ul style="list-style-type: none"> - Interface with KS0066 (Controller LSI) - Selectable function to use Common/segment drivers simultaneously 	<ul style="list-style-type: none"> - Electronic measurement system - FAX, OA system, etc.
LCD Controller & Driver 16 com/40 SEG	KS0066	80 QFP bare chip	<ul style="list-style-type: none"> - Interface with 4 bit or 8 bit MPU - Interface LCD driver 16 common/40 segment controller & Driver. - DD RAM for 80 character - Internal CG ROM 	<ul style="list-style-type: none"> - Electronic measurement system - FAX, OA system, etc
LCD Controller & Driver 16 COM/60SEG	KS0068	100 QFP bare chip	<ul style="list-style-type: none"> - Interface with 4 bit or 8 bit MPU - Internal LCD driver 16 common and 60 segment - DD RAM for 80 character - Internal CG ROM. 	<ul style="list-style-type: none"> - Electronic measurement system - FAX, OA system, etc.
80 CH Segment Driver	KS0063	100 QFP bare chip	<ul style="list-style-type: none"> - Interface with KS0066 (Controller LSI) - Only segment driver 	<ul style="list-style-type: none"> - Electronic measurement system - FAX, OA system, etc.
80 CH COM/SEG Driver	KS0083	100 QFP bare chip	<ul style="list-style-type: none"> - Supply voltage: -4.5~-5.5V - LCD driving voltage: -24V(typ) - COM/SEG driver 	<ul style="list-style-type: none"> - Electronic measurement system - FAX, OA system, etc. - Lap top computer
80 CH COM/SEG Driver	† KS0084	100QFP bare chip	<ul style="list-style-type: none"> - Reverse type of KS0083 - Supply voltage: -4.5~-5.5V - LCD driving voltage: -24V(typ) 	<ul style="list-style-type: none"> - Electronic Measurement system - FAX, OA system - Lap top computer
68 CH COM/SEG Driver	KS0103	80 QFP bare chip	<ul style="list-style-type: none"> - Power supply voltage:4.5~5.5V - Display voltage: -8~-28V (VEE-VDD) - Applicable LCD duty: 1/68-1/256 	<ul style="list-style-type: none"> - Lap top computer, - Word Processor
80 CH Segment Driver	KS0104 KS0704	100 QFP bare chip 100 TAB	<ul style="list-style-type: none"> - Power supply voltage: 5V ± 10% - Display voltage: -8~-28V (VEE-VDD) - Applicable LCD duty: 1/64-1/256 	<ul style="list-style-type: none"> - Lap top computer, - Word Processor
32 CH Common driver	KS0105	60 QFP bare chip	<ul style="list-style-type: none"> - Power supply voltage: 5V ± 10% - Display voltage: 0~-5.5V (VEE-VDD) - Applicable LCD duty: 1/8-1/64 	<ul style="list-style-type: none"> - Game machine - Electronic dictionary
50 CH Segment Driver	KS0106	80 QFP bare chip	<ul style="list-style-type: none"> - Power supply vottage: 5V ± 10% - Display vottage: 0V~-5.5V (VEE-VDD) - Internal RAM(1,600 bits) 	<ul style="list-style-type: none"> - Game macine - Electronic dictionary

† New Product †† Under Development

1. LCD Driver & Controller ICs (Continued)

Application	Device	Package	Feature	Application
64 CH Common Driver	† KS0107B	100 QFP bare chip	<ul style="list-style-type: none"> - Power supply: +5V±10% - VLCD: +8~17V - Display Duty Cycle : 1/48, 1/64, 1/96, 1/128 	- Translation Dictionary
64 CH Segment Driver	† KS0108B	100QFP bare chip	<ul style="list-style-type: none"> - Power supply: +5V±10% - VLCD: +8~17V - Display Data RAM: 512 x 8 bit - Display Duty Cycle: 1/32~1/64 	- Translation Dictionary
LCD Controller & Driver 16COM/80SEG	† KS0070B	128QFP bare chip	<ul style="list-style-type: none"> - Power supply: +5V±10% - Interface with 4 bit or 8 bit MPU 	- FAX, OA system, etc.
LCD Controller & Driver 16COM/40SEG	† KS0076B	80 QFP bare chip	<ul style="list-style-type: none"> - Power supply: +5V±10% - Interface with 4 bit or 8 bit MPU 	- FAX, OA System, etc.
160 CH Segment Driver	†† KS0787	191 STAB	<ul style="list-style-type: none"> - Power supply: +5V±10% - Bidirectional Shift Register - Display Duty Cycle: 1/100~1/480 - Internal stand by function 	- Note book PC

† New Product

†† Under Development

2. Color TFT LCD Panel

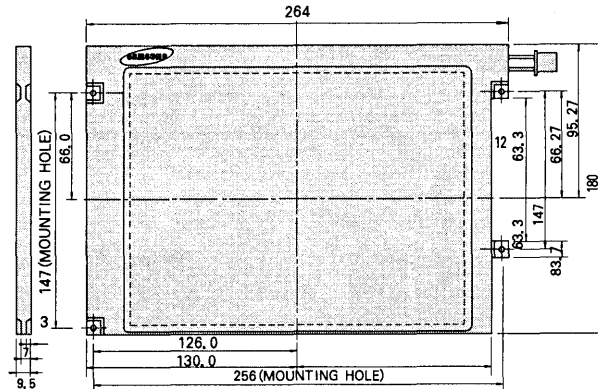
2.1 LT104V3

Diagonal 10.4"(26cm)Size

FEATURES

- Display Size 10.4" (Diagonal)
- Just Notebooks PC Size
- VGA Compatible
- 262, 144 Colors
- Low Power Consumption
- Single CCFL
- High-Speed response

OUTLINE DIMENSIONS(unit:mm)



SPECIFICATIONS

ITEMS	Descriptions	Unit
Model Name	LT104V3	
Display Size	260	mm
Display Mode	Normally White	
Number of Pixels	640 × 480	(W × H)
Active area	211.2 × 158.4	mm
Pixel Pitch	0.33 × 0.33	mm
Pixel Arrangement	Vertical Stripe	
Outline Dimensions	264(H) × 180(V) × 9.5(D)	mm
Contrast Ratio	100(typ)	
Luminance	70	cd/m ²
Backlight	1	CCFT
Number of Color	262144	
Viewing Angle	Vertical < +10°, -30°	
	Horizontal < ± 45°	
Response Time	Tr=30, Tf=50	msec
Operating Temperature	0-50	°C
Power Supply	5	V
Power Consumption	3.0	W
Weight	500	g
Application	Notebook PC	

* A Complete specification is available.

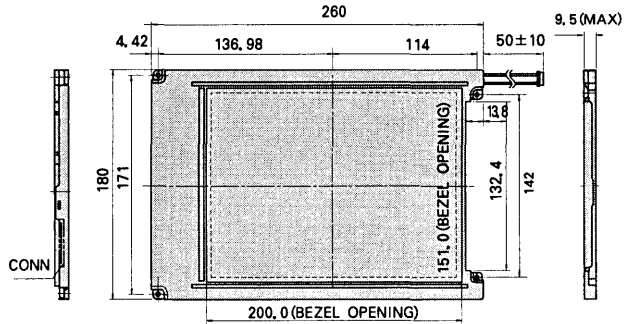
2.2 LT094V3

Diagonal 9.4"(24cm)Size

FEATURES

- Display Size 9.4" (Diagonal)
- Notebooks PC Size, VGA Compatible
- Low Power Consumption(2.8W)
- 4096 Colors

OUTLINE DIMENSIONS(unit:mm)



SPECIFICATIONS

ITEMS	Descriptions	Unit
Model Name	LT094V3	
Display Size	240	mm
Display Mode	Normally White	
Number of Pixels	640 × 480	(W × H)
Active area	192 × 144	mm
Pixel Pitch	0.30 × 0.30	mm
Pixel Arrangement	Vertical Stripe	
Outline Dimensions	260(H) × 180(V) × 9.5(D)	mm
Contrast Ratio	100(typ)	
Luminance	70	cd/m ²
Backlight	1	CCFT
Number of Color	4096	
Viewing Angle	Vertical < +10°, -30°	
	Horizontal < ± 45°	
Response Time	Tr=30, Tf=50	msec
Operating Temperature	0-50	°C
Power Supply	5	V
Power Consumption	2.8	W
Weight	500	g
Application	Notebook PC	

* A Complete specification is available.

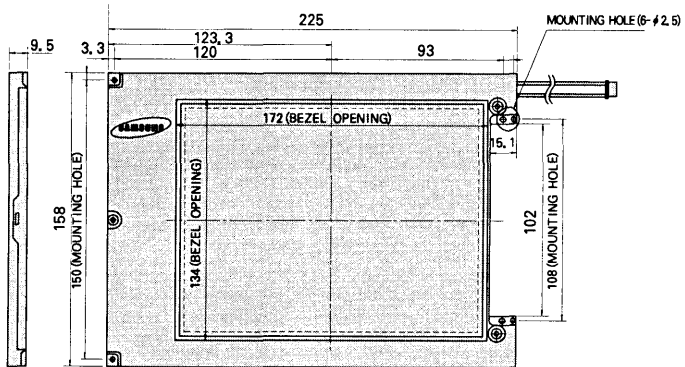
2.3 LT078V3

Diagonal 7.8"(20cm)Size

FEATURES

- Display Size 7.8" (Diagonal)
- Subnotebooks PC Size, VGA Compatible
- Low Power Consumption(2.0W)
- 4096 Colors

OUTLINE DIMENSIONS(unit:mm)

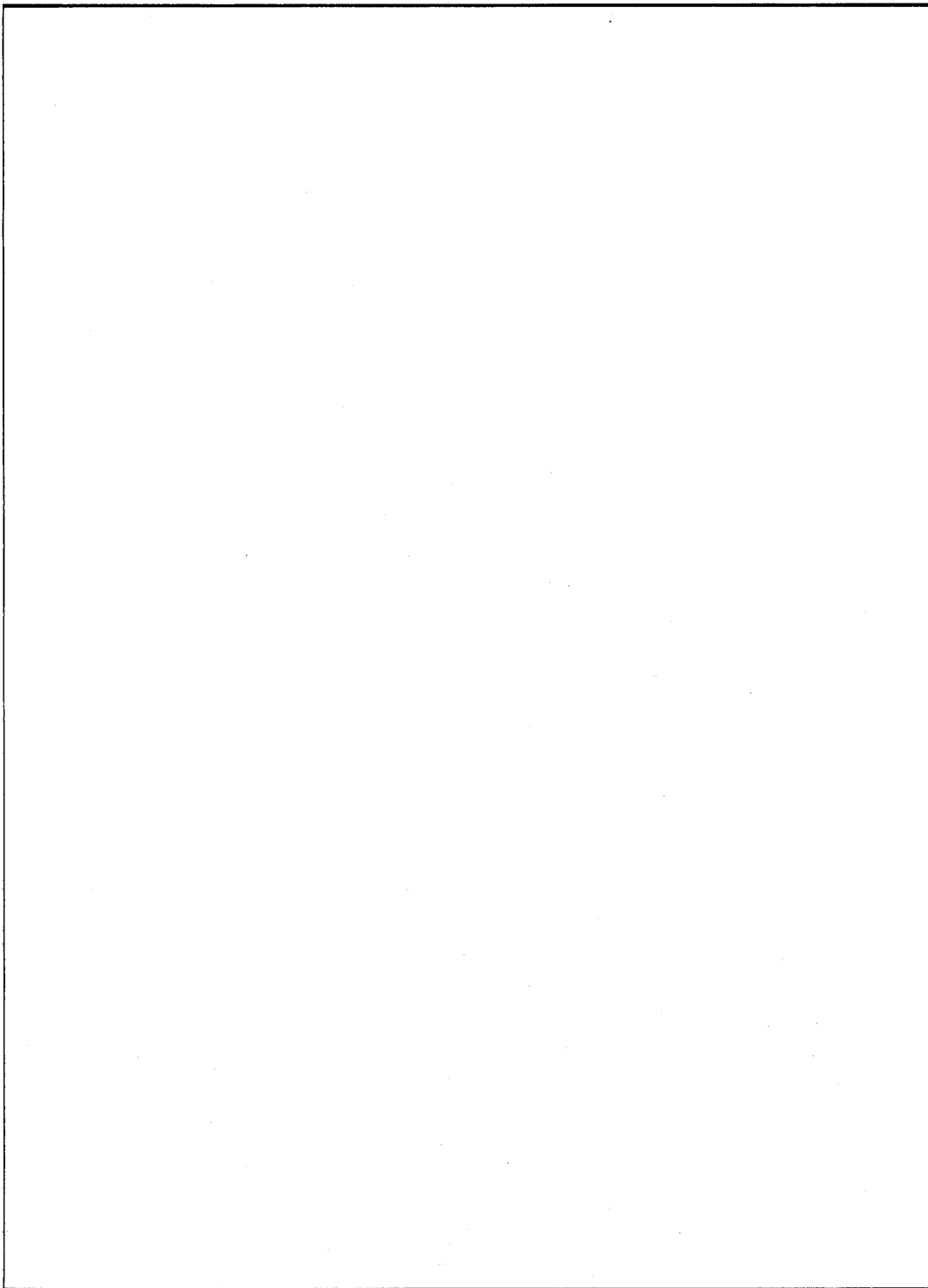


SPECIFICATIONS

ITEMS	Descriptions	Unit
Model Name	LT078V3	
Display Size	200	mm
Display Mode	Normally White	
Number of Pixels	640 × 480	(W × H)
Active area	159.4 × 119.5	mm
Pixel Pitch	0.25 × 0.25	mm
Pixel Arrangement	Vertical Stripe	
Outline Dimensions	225(H) × 158(V) × 9.5(D)	mm
Contrast Ratio	100(typ)	
Luminance	70	cd/m ²
Backlight	1	
Number of Color	4096	
Viewing Angle	Vertical < +10°, -30°	
	Horizontal < ±45°	
Response Time	Tr=30, Tf=50	msec
Operating Temperature	0-50	°C
Power Supply	5	V
Power Consumption	2.0	W
Weight	380(typ)	g
Application	Subnotebook PC	

* A Complete specification is available.

NOTES

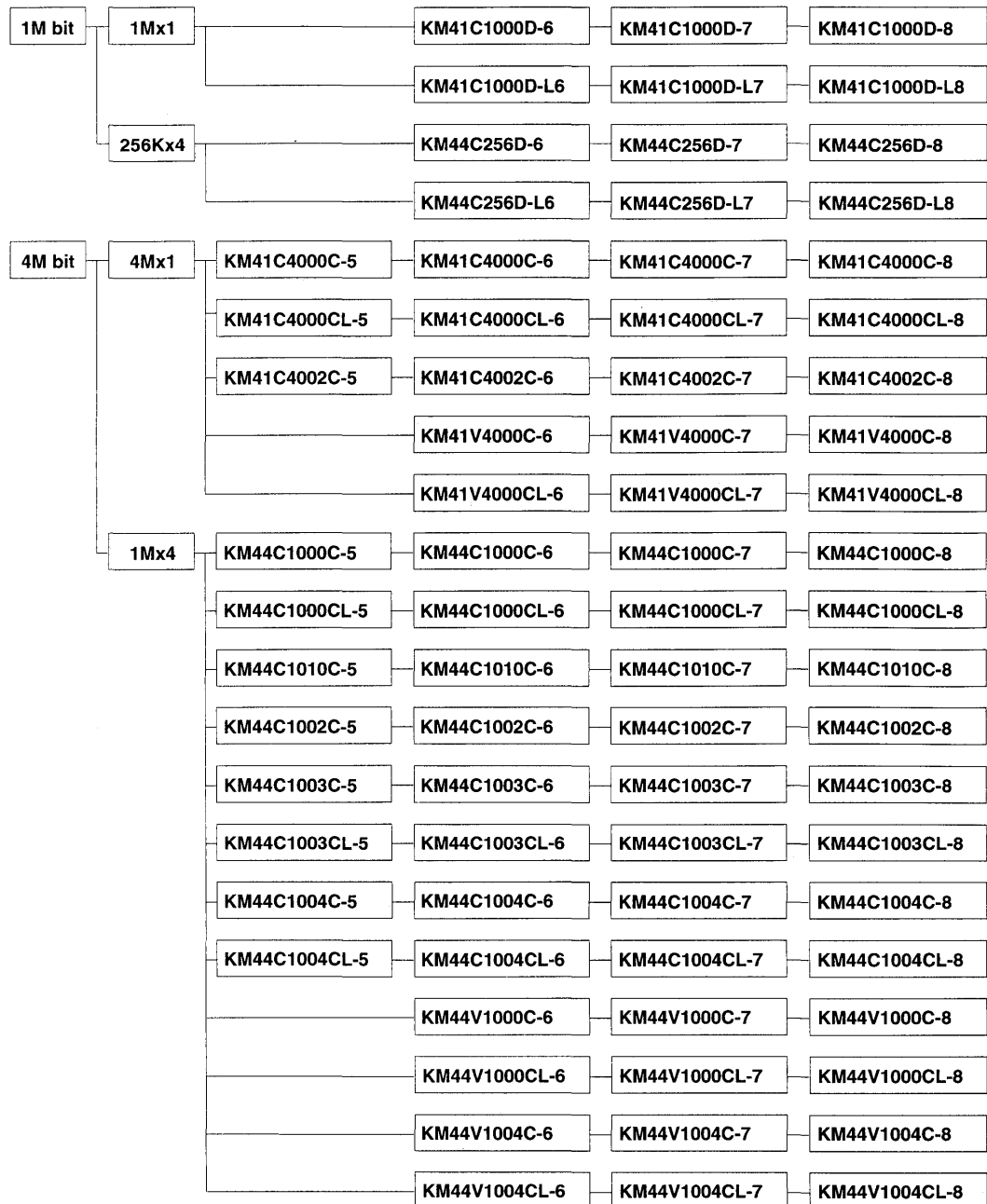
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Memory ICs

DRAM	109
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Dual Port RAM	128
SRAM	130
MASK ROM	139
EEPROM	145
Flash	146

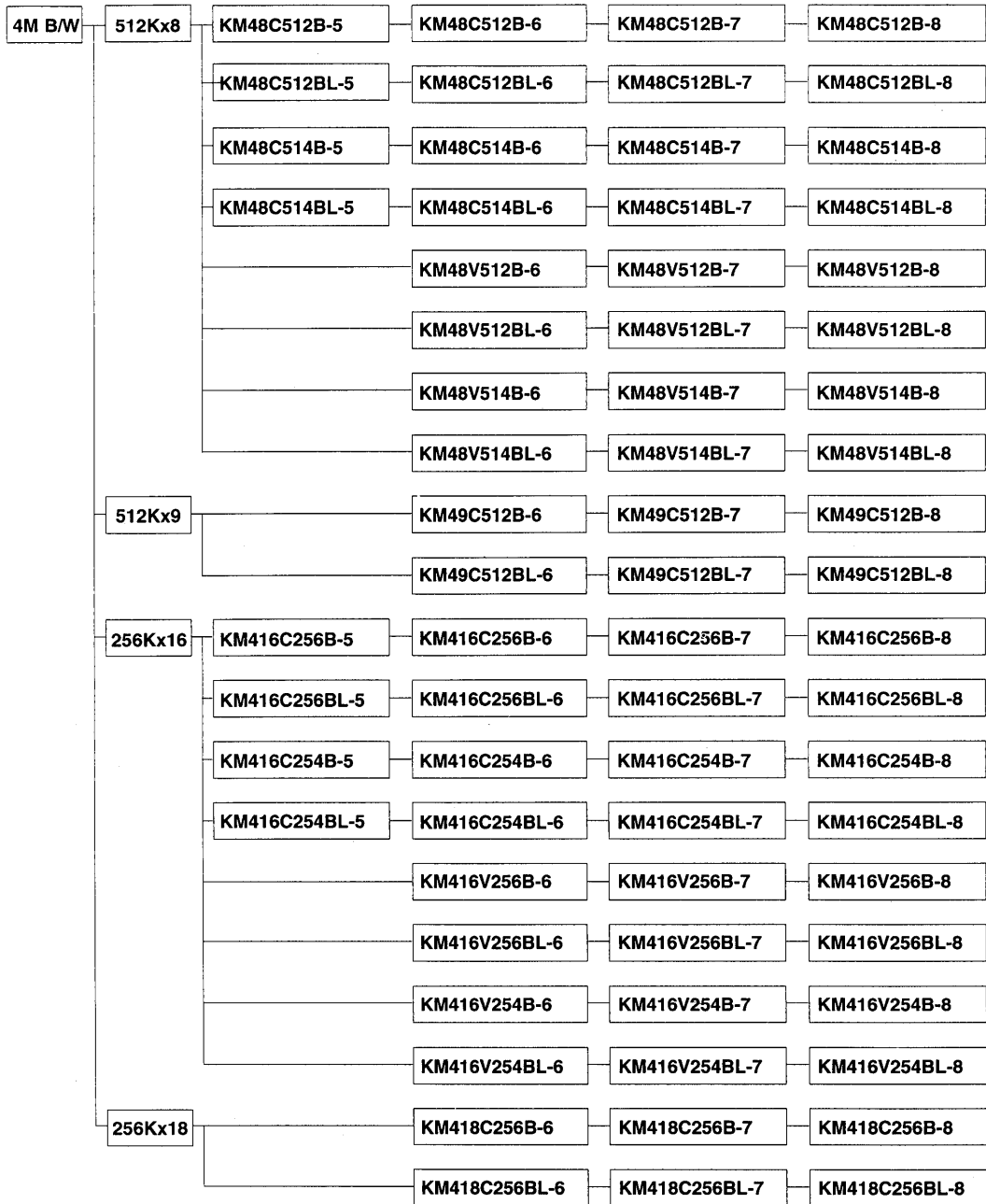
1. DRAM

1.1 INTRODUCTION

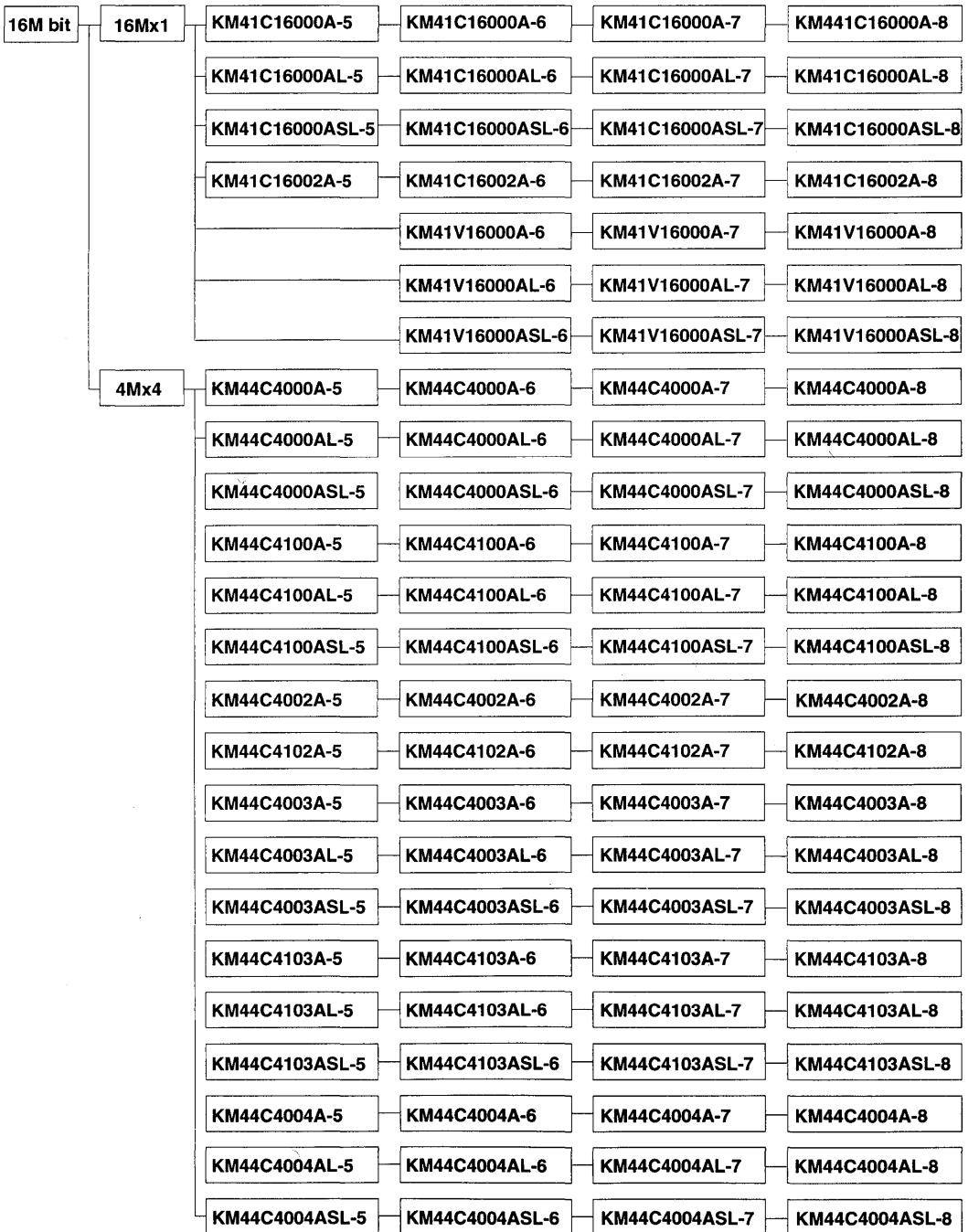


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1.1 INTRODUCTION (Continued)

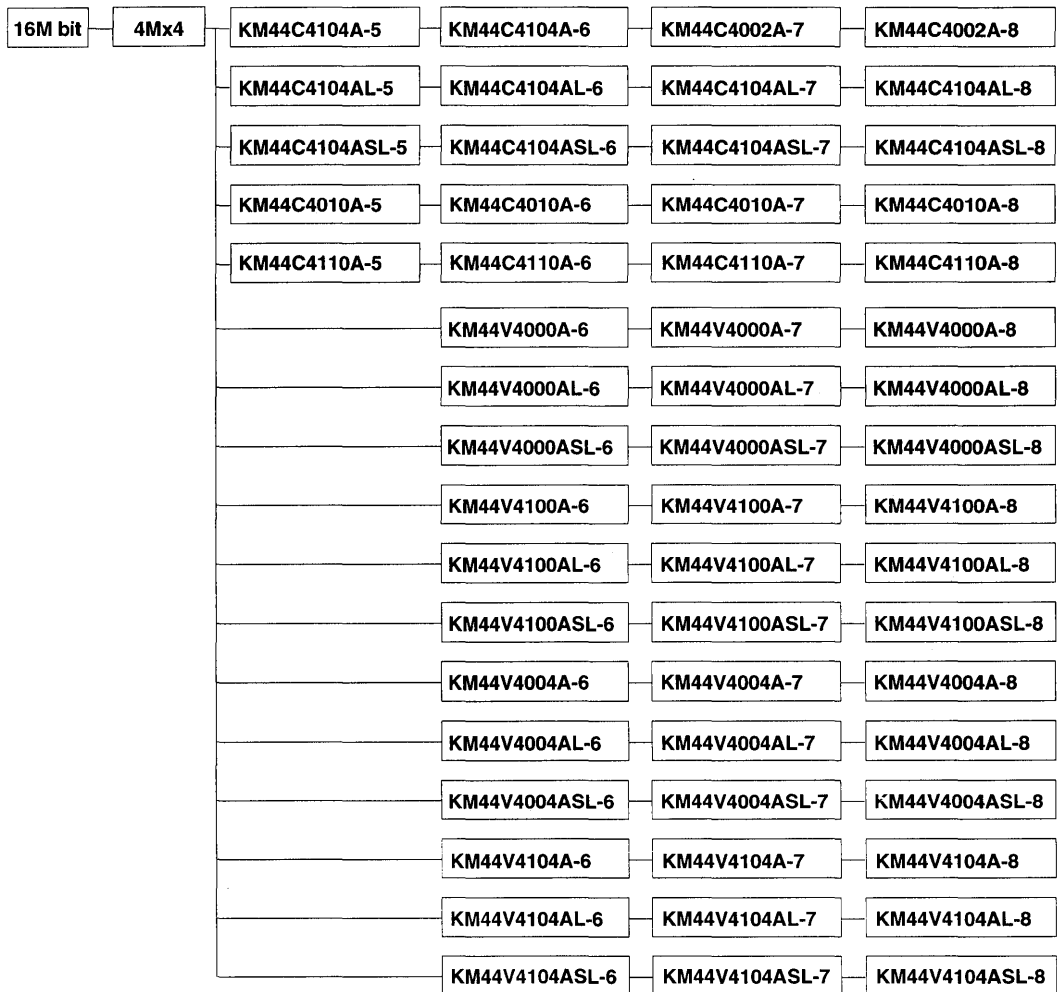


1.1 INTRODUCTION (Continued)



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1.1 INTRODUCTION (Continued)

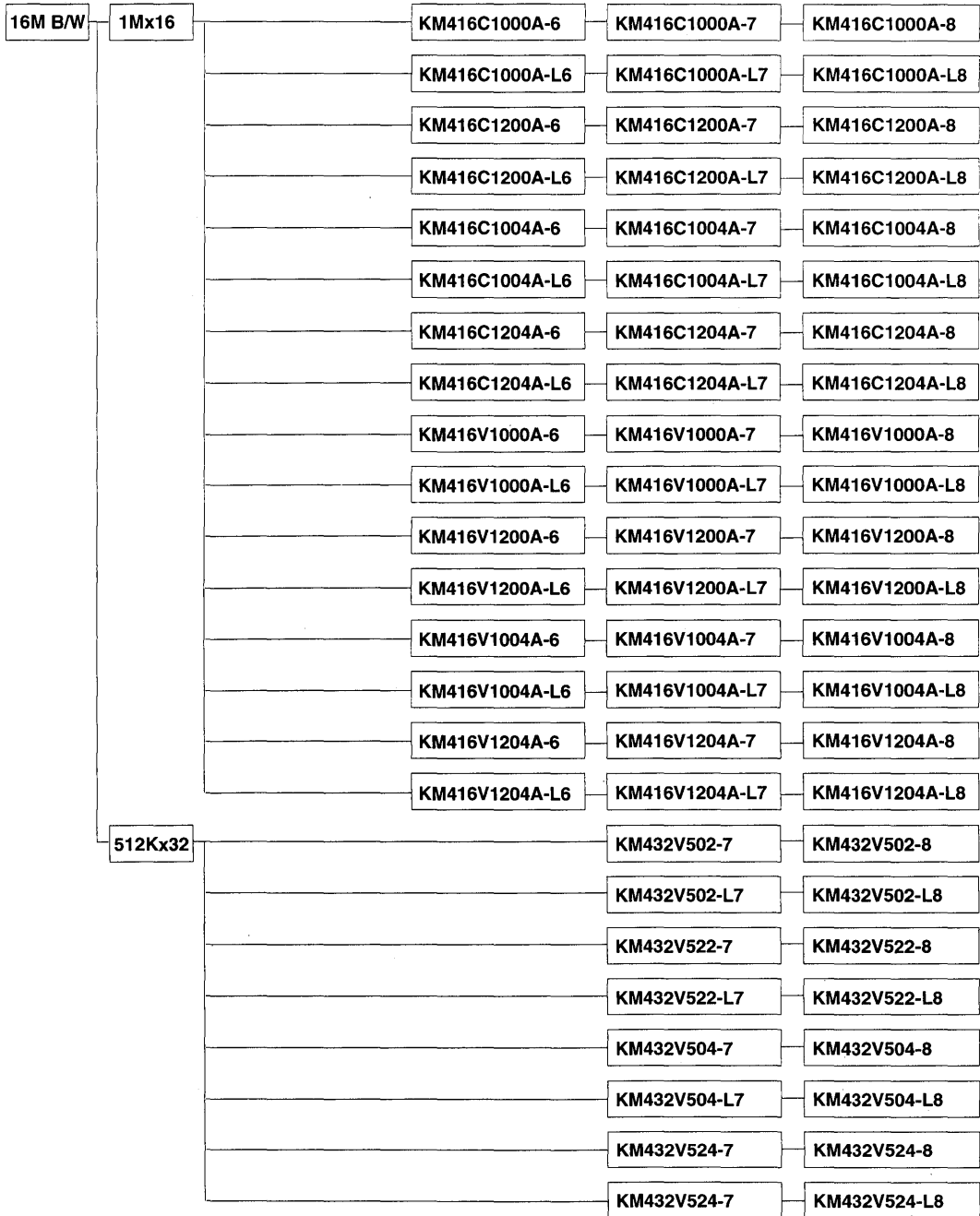


1.1 INTRODUCTION (Continued)

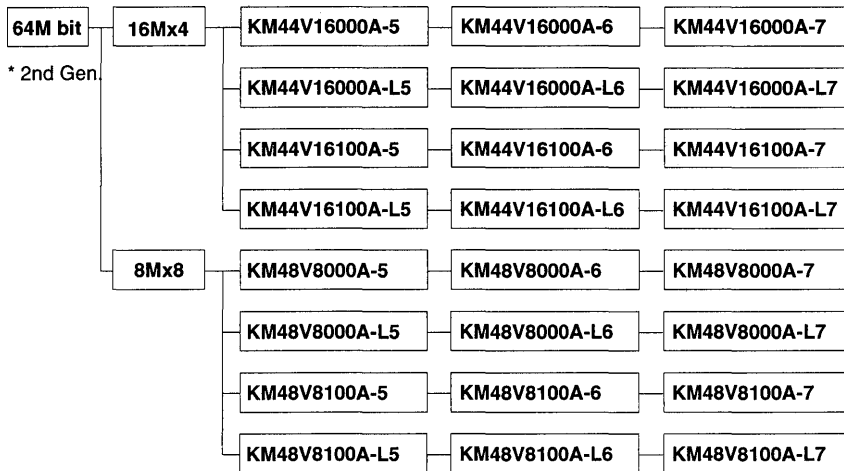
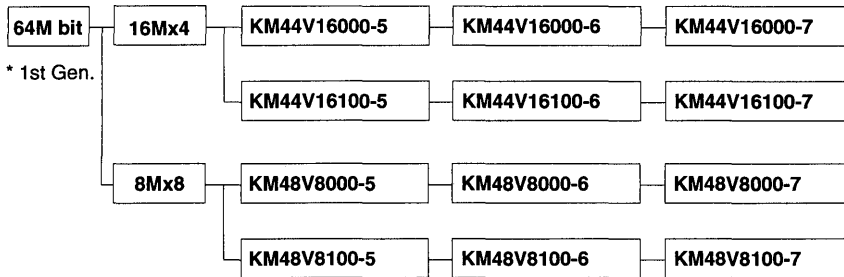
16M B/W	2Mx8	KM48C2000A-5	KM48C2000A-6	KM48C2000A-7	KM48C2000A-8
		KM48C2000AL-5	KM48C2000AL-6	KM48C2000AL-7	KM48C2000AL-8
		KM48C2000ASL-5	KM48C2000ASL-6	KM48C2000ASL-7	KM48C2000ASL-8
		KM48C2100A-5	KM48C2100A-6	KM48C2100A-7	KM48C2100A-8
		KM48C2100AL-5	KM48C2100AL-6	KM48C2100AL-7	KM48C2100AL-8
		KM48C2100ASL-5	KM48C2100ASL-6	KM48C2100ASL-7	KM48C2100ASL-8
		KM48C2004A-5	KM48C2004A-6	KM48C2004A-7	KM48C2004A-8
		KM48C2004AL-5	KM48C2004AL-6	KM48C2004AL-7	KM48C2004AL-8
		KM48C2004ASL-5	KM48C2004ASL-6	KM48C2004ASL-7	KM48C2004ASL-8
		KM48C2104A-5	KM48C2104A-6	KM48C2104A-7	KM48C2104A-8
		KM48C2104AL-5	KM48C2104AL-6	KM48C2104AL-7	KM48C2104AL-8
		KM48C2104ASL-5	KM48C2104ASL-6	KM48C2104ASL-7	KM48C2104ASL-8
			KM48V2000A-6	KM48V2000A-7	KM48V2000A-8
			KM48V2000AL-6	KM48V2000AL-7	KM48V2000AL-8
			KM48V2000ASL-6	KM48V2000ASL-7	KM48V2000ASL-8
			KM48V2100A-6	KM48V2100A-7	KM48V2100A-8
			KM48V2100AL-6	KM48V2100AL-7	KM48V2100AL-8
			KM48V2100ASL-6	KM48V2100ASL-7	KM48V2100ASL-8
			KM48V2004A-6	KM48V2004A-7	KM48V2004A-8
			KM48V2004AL-6	KM48V2004AL-7	KM48V2004AL-8
	KM48V2004ASL-6	KM48V2004ASL-7	KM48V2004ASL-8		
	KM48V2104A-6	KM48V2104A-7	KM48V2104A-8		
	KM48V2104AL-6	KM48V2104AL-7	KM48V2104AL-8		
	KM48V2104ASL-6	KM48V2104ASL-7	KM48V2104ASL-8		

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1.1 INTRODUCTION (Continued)



1.1 INTRODUCTION (Continued)



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1.2 PRODUCT GUIDE

Density	Org.	Power Supply	Part Number	Speed(ns)	Features	Packages (#)			
1M bit	1Mx1	5V±10%	KM41C1000D# KM41C1000D-L#	60/70/80	Fast Page	P:18 Pin DIP (1Mx1) 20 Pin DIP (256Kx4)			
	256Kx4	5V±10%	KM44C256D# KM44C256D-L#	60/70/80	Fast Page	J:20 Pin SOJ Z:20 Pin ZIP			
4M bit	4Mx1	5V±10%	KM41C4000C#	50/60/70/80	Fast Page	P:20 Pin DIP J:20 Pin SOJ Z:20 Pin ZIP			
			KM41C4000CL#		Static Column				
			KM41C4002C#						
	1Mx4	5V±10%	KM41V4000C#	60/70/80	Fast Page	T:20 Pin TSOP-II (Forward) TR:20 Pin TSOP-II (Reverse)			
			KM41V4000CL#						
			KM44C1000C#		50/60/70/80		Fast Page	*Quad CAS J:24 Pin SOJ T:24 Pin TSOP-II (Forward) TR:24 Pin TSOP-II (Reverse)	
KM44C1000CL#	Fast Page with WPB Static Column Quad CAS								
KM44C1010C#									
KM44C1002C#									
KM44C1003C#		EDO							
KM44C1003CL#									
3.3V±0.3V	5V±10%	KM44C1004C#	60/70/80	Fast Page	EDO				
		KM44C1004CL#							
		KM44V1000C#							
		KM44V1000CL#							
4M B/W	512Kx8	5V±10%	KM48C512B#	50/60/70/80	Fast Page	J:28 Pin SOJ T:28 Pin TSOP-II(Forward) TR:28 Pin TSOP-II(Reverse)			
			KM48C512BL#		EDO				
			KM48C514B#						
			KM48C514BL#						
			3.3V±0.3V		5V±10%		KM48V512B#	60/70/80	Fast Page
							KM48V512BL#		EDO
	KM48V514B#								
	KM48V514BL#								
	512Kx9	5V±10%	5V±10%	60/70/80	Fast Page				
							KM49C512B#		
	256Kx16	5V±10%	5V±10%	60/70/80	Fast Page	J:40 Pin SOJ T:40 Pin TSOP-II (Forward) TR:40 Pin TSOP-II(Reverse)			
							KM416C256B#		
KM416C256BL#									
KM416C254B#									
KM416C254BL#									

1.2 PRODUCT GUIDE (Continued)

Density	Org.	Power Supply	Part Number	Speed(ns)	Features	Packages (#)
4M B/W	256Kx16	3.3V±0.3V	KM416V256B# KM416V256BL# KM416V254B# KM416V254BL#	60/70/80	Fast Page(4K) EDO	J:40 Pin SOJ T:40 Pin TSOP-II(Forward) TR:40 Pin TSOP-II(Reverse)
	256Kx18	5V±10%	KM418C256B# KM418C256BL#	60/70/80	Fast Page	
16M bit	16Mx1	5V±10%	KM41C16000A# KM41C16000AL# KM41C16000ASL# KM41C16002A#	50/60/70/80	Fast Page(4K) Static Column(4K)	J:24 Pin SOJ (400mil) T:24 Pin TSOP-II (Forward) (400mil) TR:24 Pin TSOP-II (Reverse) (400mil)
		3.3V±0.3V	KM41V16000A# KM41V16000AL# KM41V16000ASL#	60/70/80	Fast Page(4K)	K:24 Pin SOJ (300mil) S:24 Pin TSOP-II(Forward) (300mil)
4Mx4	4Mx4	5V±10%	KM44C4000A# KM44C4000AL# KM44C4000ASL#	50/60/70/80	Fast Page(4K)	*Quad CAS J:28 Pin SOJ T:28 Pin TSOP-II(Forward) TR:28 Pin TSOP-II(Reverse)
			KM44C4100A# KM44C4100AL# KM44C4100ASL#		Fast Page(2K)	
			KM44C4002A# KM44C4102A#		Static Column(4K) Static Column(2K)	
			KM44C4003A# KM44C4003AL# KM44C4003ASL#		Quad CAS(4K)	
			KM44C4103A# KM44C4103AL# KM44C4103ASL#		Quad CAS(2K)	
			KM44C4004A# KM44C4004AL# KM44C4004ASL#		EDO(4K)	
			KM44C4104A# KM44C4104AL# KM44C4104ASL#		EDO(2K)	
			KM44C4010A#		Fast Page with WPB(4K)	

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1.2 PRODUCT GUIDE (Continued)

Density	Org.	Power Supply	Part Number	Speed(ns)	Features	Packages (#)
16M bit	4Mx4	5V±10%	KM44C4110A#	50/60/70/80	Fast Page with WPB(2K)	J:24 Pin SOJ (400mil)
			KM44V4000A#	60/70/80	Fast Page(4K)	T:24 Pin TSOP-II (Forward) (400mil)
		KM44V4000AL#				TR:24 Pin TSOP-II (Reverse) (400mil)
		KM44V4000ASL#				
		KM44V4100A#			Fast Page(2K)	K:24 Pin SOJ(300mil)
		KM44V4100AL#				S:24 Pin TSOP-II(Forward) (300mil)
		KM44V4100ASL#			EDO(4K)	SR:24 Pin TSOP-II(Reverse) (300mil)
		KM44V4004A#				
		KM44V4004AL#				
		KM44V4004ASL#				
		KM44V4104A#			EDO(2K)	
		KM44V4104AL#				
		KM44V4104ASL#				
16M B/W	2Mx8	5V±10%	KM48C2000A#	50/60/70/80	Fast Page(4K)	J:28 Pin SOJ
			KM48C2000AL#			T:28 Pin TSOP-II (Forward)
			KM48C2000ASL#			TR:28 Pin TSOP-II (Reverse)
			KM48C2100A#			Fast Page(2K)
			KM48C2100AL#			
			KM48C2100ASL#			
			KM48C2004A#			EDO(4K)
			KM48C2004AL#			
		KM48C2004ASL#				
		KM48C2104A#			EDO(2K)	
		KM48C2104AL#				
		KM48C2104ASL#				
		3.3V±0.3V	KM48V2000A#	60/70/80	Fast Page(4K)	
			KM48V2000AL#			
			KM48V2000ASL#			
			KM48V2100A#			Fast Page(2K)
KM48V2100AL#						
KM48V2100ASL#						
KM48V2004A#				EDO(4K)		
KM48V2004AL#						
KM48V2004ASL#						

1.2 PRODUCT GUIDE (Continued)

Density	Org.	Power Supply	Part Number	Speed(ns)	Features	Packages (#)	
16M B/W	2Mx8	3.3V±0.3V	KM48V2104A#	60/70/80	EDO(2K)	J:28 Pin SOJ T:28 Pin TSOP-II (Forward) TR:28 Pin TSOP-II(Reverse)	
			KM48V2104AL#				
			KM48V2104ASL#				
	1Mx16	5V±10%	3.3V±0.3V	KM416C1000A#	60/70/80	Fast Page(4K)	J:42 Pin SOJ T:44 Pin TSOP-II (Forward) R:44 Pin TSOP-II(Reverse)
				KM416C1000A#-L		Fast Page(1K)	
				KM416C1200A#			
				KM416C1200A#-L		EDO(4K)	
				KM416C1004A#			
				KM416C1004A#-L		EDO(1K)	
	KM416C1204A#						
			KM416C1204A#-L				
			KM416V1000A#	60/70/80	Fast Page(4K)		
			KM416V1000A#-L		Fast Page(1K)		
			KM416V1200A#				
			KM416V1200A#-L		EDO(4K)		
			KM416V1004A#				
			KM416V1004A#-L		EDO(1K)		
			KM416V1204A#				
			KM416V1204A#-L				
512Kx32	3.3V±0.3V	3.3V±0.3V	KM432V502#	70/80	Fast Page(4K)	T:70 Pin TSOP-II (Forward) R:70 Pin TSOP-II(Reverse)	
			KM432V502#-L		Fast Page(1K)		
			KM432V522#				
			KM432V522#-L		EDO(4K)		
			KM432V504#				
			KM432V504#-L		EDO(1K)		
			KM432V524#				
			KM432V524#-L				

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1.2 PRODUCT GUIDE (Continued)

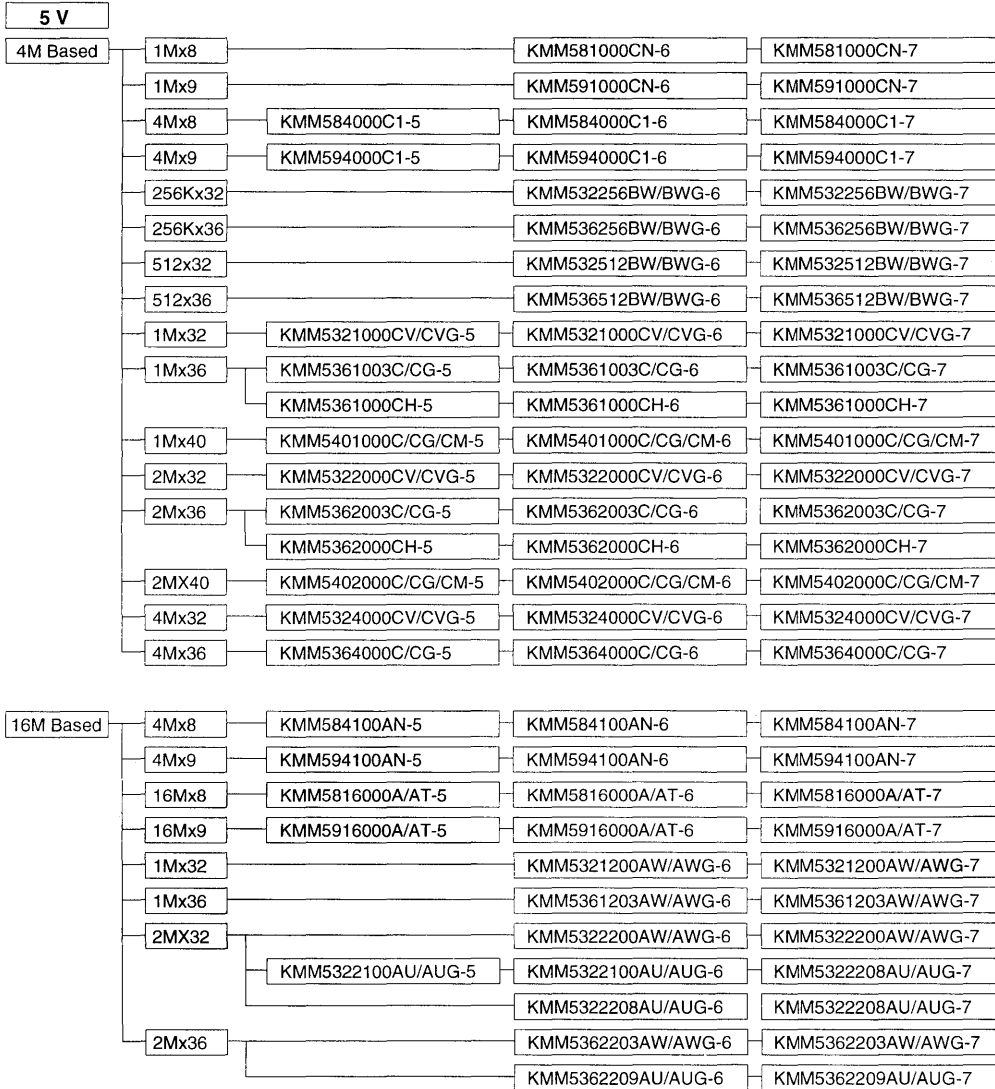
Density	Org.	Power Supply	Part Number	Speed(ns)	Features	Packages (#)
64M bit	16Mx4	3.3V±0.3V	KM44V16000# KM44V16100#	50/60/70	Fast Page(8K) Fast Page(4K)	J : 34 Pin SOJ
	8Mx8	3.3V±0.3V	KM48V8000# KM48V8100#	50/60/70	Fast Page(8K) Fast Page(4K)	
64M bit	16Mx4	3.3V±0.3V	KM44V16000A# KM44V16000A#-L KM44V16100A# KM44V16100A#-L	50/60/70	Fast Page(8K) Fast Page(4K)	J : 32 Pin SOJ T : 32 pin TSOP II(Forward) R : 32 pin TSOP II(Reverse)
	8Mx8	3.3V±0.3V	KM48V8000A# KM48V8000A#-L KM48V8100A# KM48V8100A#-L	50/60/70	Fast Page(8K) Fast Page(4K)	

2. DRAM Module

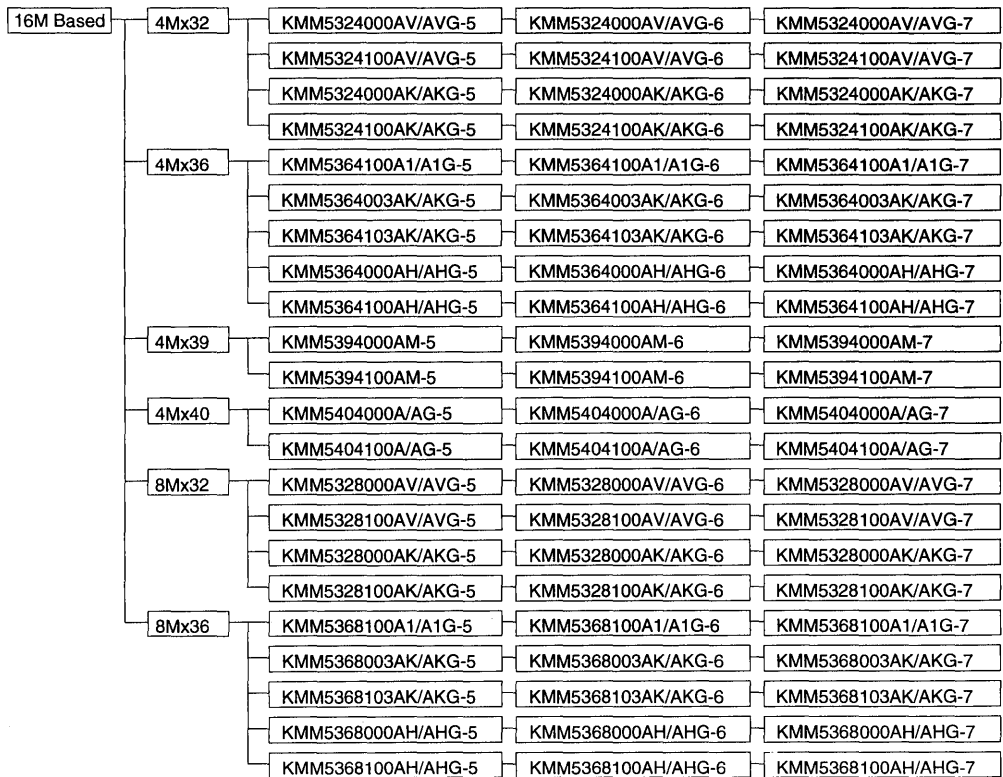
2.1. INTRODUCTION

I. Single In-Line Memory Module (SIMM)

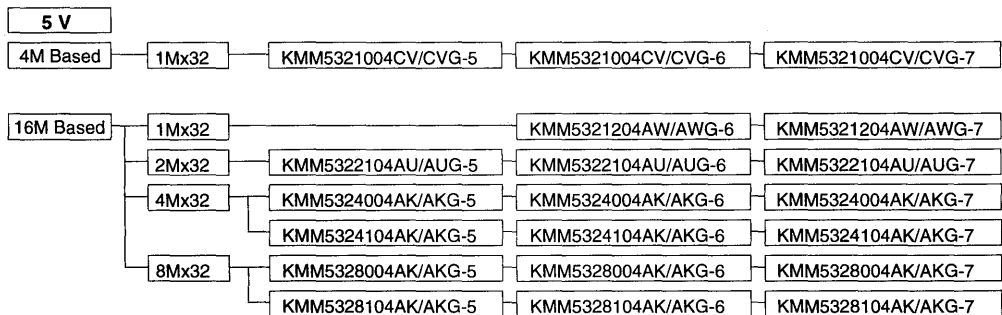
I-I. Fast Page (FP) Mode



2.1. INTRODUCTION (Continued)



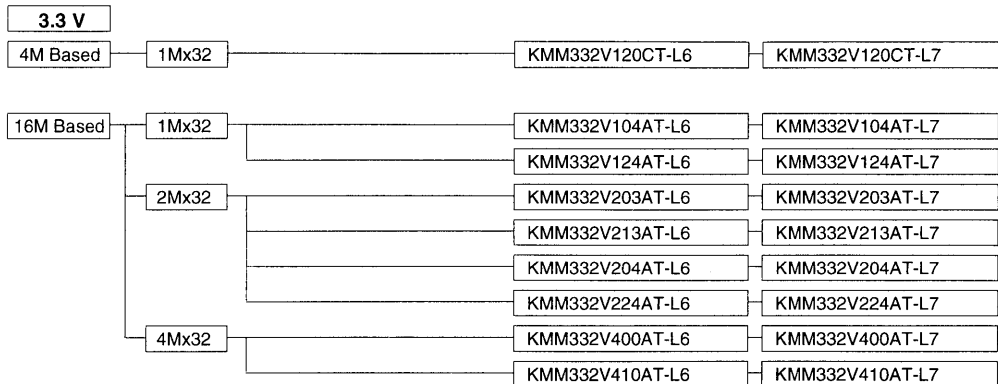
-II. Extended Data Out (EDO) Mode



2.1. INTRODUCTION (Continued)

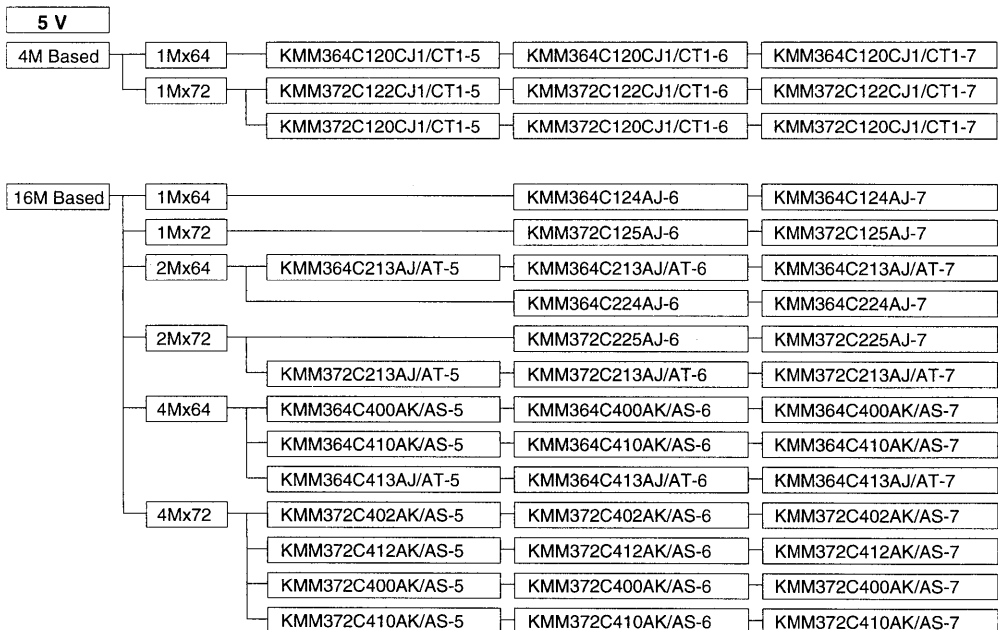
II. Small Out-Line DIMM (SODIMM)

II-I. Fast Page (FP) Mode

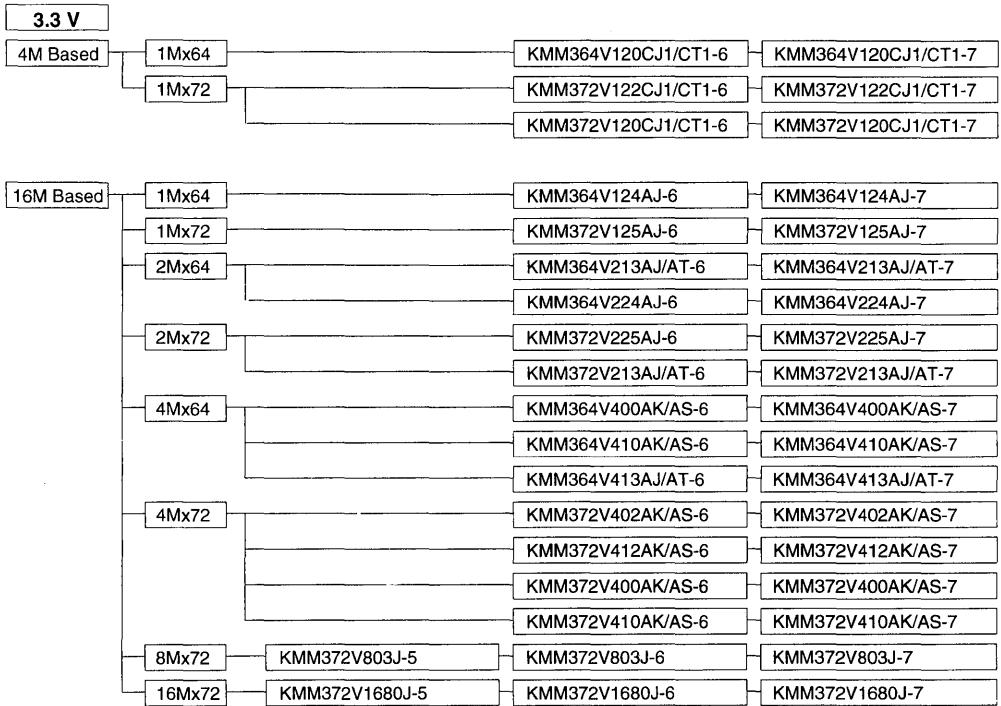


III. Dual In Line Memory Module (DIMM)

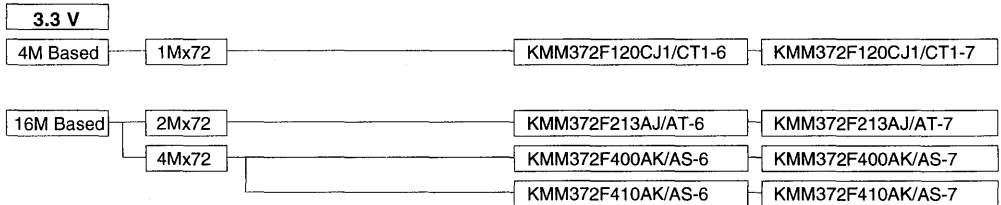
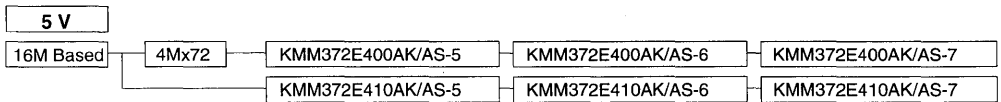
III-I. Fast Page (FP) Mode



2.1. INTRODUCTION (Continued)



III-II. Extended Data Out (EDO) Mode



2.2. PRODUCT GUIDE

Org.	Part No.	Feature	Based DRAM	Speed(ns)	PCB Height	Refresh cycle/ms	C/S
1 Byte Single In-Line Memory Module (5 V)							
1Mx8	KMM581000CN	FP, Single	1Mx4, SOJ	60/70	650	1024/16	NOW
1Mx9	KMM591000CN	FP, Single	1Mx4, SOJ	60/70	650	1024/16	NOW
4Mx8	KMM584000C1	FP, Single	4Mx1, SOJ	50/60/70	950	1024/16	NOW
	KMM584100AN	FP, Single	4Mx4, 400mil SOJ	50/60/70	650	2048/32	NOW
4Mx9	KMM594000C1	FP, Single	4Mx1, SOJ	50/60/70	950	1024/16	NOW
	KMM594100AN	FP, Single	4Mx4, 400mil SOJ	50/60/70	650	2048/32	NOW
16Mx8	KMM5816000A/AT	FP, Double	16Mx1, SOJ/TSOP	50/60/70	900	4096/64	NOW
16Mx9	KMM5916000A/AT	FP, Double	16Mx1, SOJ/TSOP	50/60/70	900	4096/64	NOW
4 Byte Single In-Line Memory Module (5 V)							
256Kx32	KMM532256BW/BWG	FP, Single	256Kx16, SOJ	60/70	1,000	512/8	NOW
256Kx36	KMM536256BW/BWG	FP, Single	256Kx18, SOJ	60/70	1,000	512/8	NOW
512Kx32	KMM532512BW/BWG	FP, Single	256Kx16, SOJ	60/70	1,000	512/8	NOW
512Kx36	KMM536512BW/BWG	FP, Single	256Kx18, SOJ	60/70	1,000	512/8	NOW
1Mx32	KMM5321000CV/CVG	FP, Single	1Mx4, SOJ	50/60/70	850	1024/16	NOW
	KMM5321004CV/CVG	EDO, Single	1Mx4, SOJ	50/60/70	850	1024/16	NOW
	KMM5321200AW/AWG	FP, Single	1Mx16, SOJ	60/70	750	1024/16	NOW
	KMM5321204AW/AWG	EDO, Single	1Mx16, SOJ	60/70	750	1024/16	NOW
1Mx36	KMM5361003C/CG	FP, Single	1Mx4, SOJ	50/60/70	1,000	1024/16	NOW
	KMM5361203AW/AWG	FP, Single	1Mx16, SOJ	60/70	750	1024/16	NOW
	KMM5361000CH	FP, Single, ECC	1Mx4, SOJ	50/60/70	1,000	1024/16	NOW
1Mx40	KMM5401000C/CG/CM	FP, Single, ECC	1Mx4, SOJ	50/60/70	1,000	1024/16	NOW
2Mx32	KMM5322000CV/CVG	FP, Double	1Mx4, SOJ	50/60/70	850	1024/16	NOW
	KMM5322200AW/AWG	FP, Double	1Mx16, SOJ	60/70	750	1024/16	NOW
	KMM5322100AU/AUG	FP, Single	2Mx8, SOJ	50/60/70	1,000	2048/32	NOW
	KMM5322104AU/AUG	EDO, Single	2Mx8, SOJ	50/60/70	1,000	2048/32	NOW
	KMM5322208AU/AUG	FP, Single, AND	2Mx8, SOJ	60/70	1,000	1024/16	NOW
2Mx36	KMM5362003C/CG	FP, Double	1Mx4, SOJ	50/60/70	1,000	1024/16	NOW
	KMM5362203AW/AWG	FP, Double	1Mx16, SOJ	60/70	1,000	1024/16	NOW
	KMM5362209AU/AUG	FP, Single, AND	2Mx8, SOJ	60/70	1,000	1024/16	NOW
	KMM5362000CH	FP, Double, ECC	1Mx4, SOJ	50/60/70	1,000	1024/16	NOW
2MX40	KMM5402000C/CG/CM	FP, Double, ECC	1Mx4, SOJ	50/60/70	1,000	1024/16	NOW
4Mx32	KMM5324000CV/CVG	FP, Double, Ear	4Mx1, SOJ	50/60/70	1,290	1024/16	NOW
	KMM5324000AV/AVG	FP, Single	4Mx4, 400mil SOJ	50/60/70	1,000	4096/64	NOW
	KMM5324100AV/AVG	FP, Single	4Mx4, 400mil SOJ	50/60/70	1,000	2048/32	NOW
	KMM5324000AK/AKG	FP, Single	4Mx4, 300mil SOJ	50/60/70	1,000	4096/64	NOW
	KMM5324100AK/AKG	FP, Single	4Mx4, 300mil SOJ	50/60/70	1,000	2048/32	NOW
	KMM5324004AK/AKG	EDO, Single	4Mx4, 300mil SOJ	50/60/70	1,000	4096/64	NOW
	KMM5324104AK/AKG	EDO, Single	4Mx4, 300mil SOJ	50/60/70	1,000	2048/32	NOW
4Mx36	KMM5364000C/CG	FP, Double, Ear	4Mx1, SOJ	50/60/70	1,290	1024/16	NOW

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2.2.PRODUCT GUIDE (Continued)

Org.	Part No.	Feature	Based DRAM	Speed(ns)	PCB Height	Refresh cycle/ms	C/S
4 Byte Single In-Line Memory Module (5 V) - continued							
4Mx36	KMM5364100A1/A1G	FP, Single	4Mx4, 400mil, SOJ	50/60/70	1,250	2048/32	NOW
	KMM5364003AKAKG	FP, Single	4Mx4, 300mil, SOJ	50/60/70	1,000	4096/64	NOW
	KMM5364103AK/AG	FP, Single	4Mx4, 300mil, SOJ	50/60/70	1,000	2048/32	NOW
	KMM5364000AH/AHG	FP, Single, ECC	4Mx4, 400mil, SOJ	50/60/70	1,250	4096/64	NOW
	KMM5364100AH/AHG	FP, Single, ECC	4Mx4, 400mil, SOJ	50/60/70	1,250	2048/32	NOW
4Mx39	KMM5394000AM	FP, Double, ECC	4Mx4, 400mil, SOJ	50/60/70	1,000	4096/64	NOW
	KMM5394100AM	FP, Double, ECC	4Mx4, 400mil, SOJ	50/60/70	1,000	2048/32	NOW
4Mx40	KMM5404000A/AG	FP, Double, ECC	4Mx4, 400mil, SOJ	50/60/70	1,000	4096/64	NOW
	KMM5404100A/AG	FP, Double, ECC	4Mx4, 400mil, SOJ	50/60/70	1,000	2048/32	NOW
8Mx32	KMM5328000AV/AVG	FP, Double	4Mx4, 400mil, SOJ	50/60/70	1,000	4096/64	NOW
	KMM5328100AV/AVG	FP, Double	4Mx4, 400mil, SOJ	50/60/70	1,000	2048/32	NOW
	KMM5328000AK/AKG	FP, Double	4Mx4, 300mil, SOJ	50/60/70	1,000	4096/64	NOW
	KMM5328100AK/AKG	FP, Double	4Mx4, 300mil, SOJ	50/60/70	1,000	2048/32	NOW
	KMM5328004AK/AKG	EDO, Double	4Mx4, 300mil, SOJ	50/60/70	1,000	4096/64	NOW
	KMM5328104AK/AKG	EDO, Double	4Mx4, 300mil, SOJ	50/60/70	1,000	2048/32	NOW
8Mx36	KMM5368100A1/A1G	FP, Double	4Mx4, 400mil, SOJ	50/60/70	1,250	2048/32	NOW
	KMM5368000AH/AHG	FP, Double, ECC	4Mx4, 400mil, SOJ	50/60/70	1,250	4096/64	NOW
	KMM5368100AH/AHG	FP, Double, ECC	4Mx4, 400mil, SOJ	50/60/70	1,250	2048/32	NOW
	KMM5368003AK/AKG	FP, Double	4Mx4, 300mil, SOJ	50/60/70	1,000	4096/64	NOW
	KMM5368103AK/AKG	FP, Double	4Mx4, 300mil, SOJ	50/60/70	1,000	2048/32	NOW
4 Byte Small Out-Line DIMM (3.3 V)							
1Mx32	KMM332V120CT	FP, Double	1Mx4, TSOP	60/70	1,000	1024/16	NOW
	KMM332V104AT	FP, Single	1Mx16, TSOP	60/70	1,000	4096/64	NOW
	KMM332V124AT	FP, Single	1Mx16, TSOP	60/70	1,000	1024/16	NOW
2Mx32	KMM332V203AT	FP, Single	2Mx8, TSOP	60/70	1,000	4096/64	NOW
	KMM332V213AT	FP, Single	2Mx8, TSOP	60/70	1,000	2048/32	NOW
	KMM332V204AT	FP, Double	1Mx16, TSOP	60/70	1,000	4096/64	NOW
	KMM332V224AT	FP, Double	1Mx16, TSOP	60/70	1,000	1024/16	NOW
4Mx32	KMM332V400AT	FP, Double	4Mx4, 400mil, TSOP	60/70	1,000	4096/64	NOW
	KMM332V410AT	FP, Double	4Mx4, 400mil, TSOP	60/70	1,000	2048/32	NOW
8 Byte Dual In-Line Memory Module (5 V)							
1Mx64	KMM364C120CJ1/CT1	FP, Double	1Mx4, SOJ/TSOP	50/60/70	1,000	1024/16	NOW
	KMM364C124AJ	FP, Single	1Mx16, SOJ	60/70	1,000	1024/16	NOW
1Mx72	KMM372C122CJ1/CT1	FP, Double	1Mx4, SOJ/TSOP	50/60/70	1,000	1024/16	NOW
	KMM372C125AJ	FP, Single	1Mx16, SOJ	60/70	1,000	1024/16	NOW
	KMM372C120CJ1/CT1	FP, Double, ECC	1Mx4, SOJ/TSOP	50/60/70	1,000	1024/16	NOW
2Mx64	KMM364C213AJ/AT	FP, Single	2Mx8, SOJ/TSOP	50/60/70	1,000	2048/321	NOW
	KMM364C224AJ	FP, Double	1Mx16, SOJ	60/70	1,000	024/16	NOW
2Mx72	KMM372C225AJ	FP, Double	1Mx16, SOJ	60/70	1,000	1024/16	NOW
	KMM372C213AJ/AT	FP, Double, ECC	2Mx8, SOJ/TSOP	50/60/70	1,000	2048/32	NOW

2.2.PRODUCT GUIDE (Continued)

Org.	Part No.	Feature	Based DRAM	Speed(ns)	PCB Height	Refresh cycle/ms	C/S
8 Byte Dual In-Line Memory Module (5 V) - continued							
4Mx64	KMM364C400AK/AS	FP, Double	4Mx4, SOJ/TSOP	50/60/70	1,000	4096/64	NOW
	KMM364C410AK/AS	FP, Double	4Mx4, SOJ/TSOP	50/60/70	1,000	2048/32	NOW
	KMM364C413AJ/AT	FP, Double	2Mx8, SOJ/TSOP	50/60/70	1,000	2048/32	NOW
4Mx72	KMM372C402AK/AS	FP, Double	4Mx4, SOJ/TSOP	50/60/70	1,000	4096/64	NOW
	KMM372C412AK/AS	FP, Double	4Mx4, SOJ/TSOP	50/60/70	1,000	2048/32	NOW
	KMM372C400AK/AS	FP, Double, ECC	4Mx4, SOJ/TSOP	50/60/70	1,000	4096/64	NOW
	KMM372C410AK/AS	FP, Double, ECC	4Mx4, SOJ/TSOP	50/60/70	1,000	2048/32	NOW
	KMM372E400AK/AS	EDO, Double, ECC	4Mx4, SOJ/TSOP	50/60/70	1,000	4096/64	NOW
	KMM372E410AK/AS	EDO, Double, ECC	4Mx4, SOJ/TSOP	50/60/70	1,000	2048/32	NOW
8 Byte Dual In-Line Memory Module (3.3V)							
1Mx64	KMM364V120CJ1/CT1	FP, Double	1Mx4, SOJ/TSOP	60/70	1,000	1024/16	NOW
	KMM364V124AJ	FP, Single	1Mx16, SOJ	60/70	1,000	1024/16	NOW
1Mx72	KMM372V122CJ1/CT1	FP, Double	1Mx4, SOJ/TSOP	60/70	1,000	1024/16	NOW
	KMM372V125AJ	FP, Single	1Mx16, SOJ	60/70	1,000	1024/16	NOW
	KMM372V120CJ1/CT1	FP, Double, ECC	1Mx4, SOJ/TSOP	60/70	1,000	1024/16	NOW
	KMM372F120CJ1/CT1	EDO, Double, ECC	1Mx4, SOJ/TSOP	60/70	1,000	1024/16	NOW
2Mx64	KMM364V213AJ/AT	FP, Single	2Mx8, SOJ/TSOP	60/70	1,000	2048/32	NOW
	KMM364V224AJ	FP, Double	1Mx16, SOJ	60/70	1,000	1024/16	NOW
2Mx72	KMM372V225AJ	FP, Double	1Mx16, SOJ	60/70	1,000	1024/16	NOW
	KMM372V213AJ/AT	FP, Double, ECC	2Mx8, SOJ/TSOP	60/70	1,000	2048/32	NOW
	KMM372F213AJ/AT	EDO, Double, ECC	2Mx8, SOJ/TSOP	60/70	1,000	2048/32	NOW
4Mx64	KMM364V400AK/AS	FP, Double	4Mx4, SOJ/TSOP	60/70	1,000	4096/64	NOW
	KMM364V410AK/AS	FP, Double	4Mx4, SOJ/TSOP	60/70	1,000	2048/32	NOW
	KMM364V413AJ/AT	FP, Single	2Mx8, SOJ/TSOP	60/70	1,000	2048/32	NOW
4Mx72	KMM372V402AK/AS	FP, Double	4Mx4, SOJ/TSOP	60/70	1,000	4096/64	NOW
	KMM372V412AK/AS	FP, Double	4Mx4, SOJ/TSOP	60/70	1,000	2048/32	NOW
	KMM372V400AK/AS	FP, Double, ECC	4Mx4, SOJ/TSOP	60/70	1,000	4096/64	NOW
	KMM372V410AK/AS	FP, Double, ECC	4Mx4, SOJ/TSOP	60/70	1,000	2048/32	NOW
	KMM372F400AK/AS	EDO, Double, ECC	4Mx4, SOJ/TSOP	60/70	1,000	4096/64	NOW
	KMM372F410AK/AS	EDO, Double, ECC	4Mx4, SOJ/TSOP	60/70	1,000	2048/32	NOW
	KMM372V803J	FP, Single, ECC	8Mx8, 500mil, SOJ	50/60/70	1,500	4096/64	NOW
16Mx72	KMM372V1680J	FP, Double, ECC	16Mx4, 500mil, SOJ	50/60/70	1,500	8192/128	NOW

NOTICE

* FP : Fast Page Mode, EDO : Extended Data Out Mode

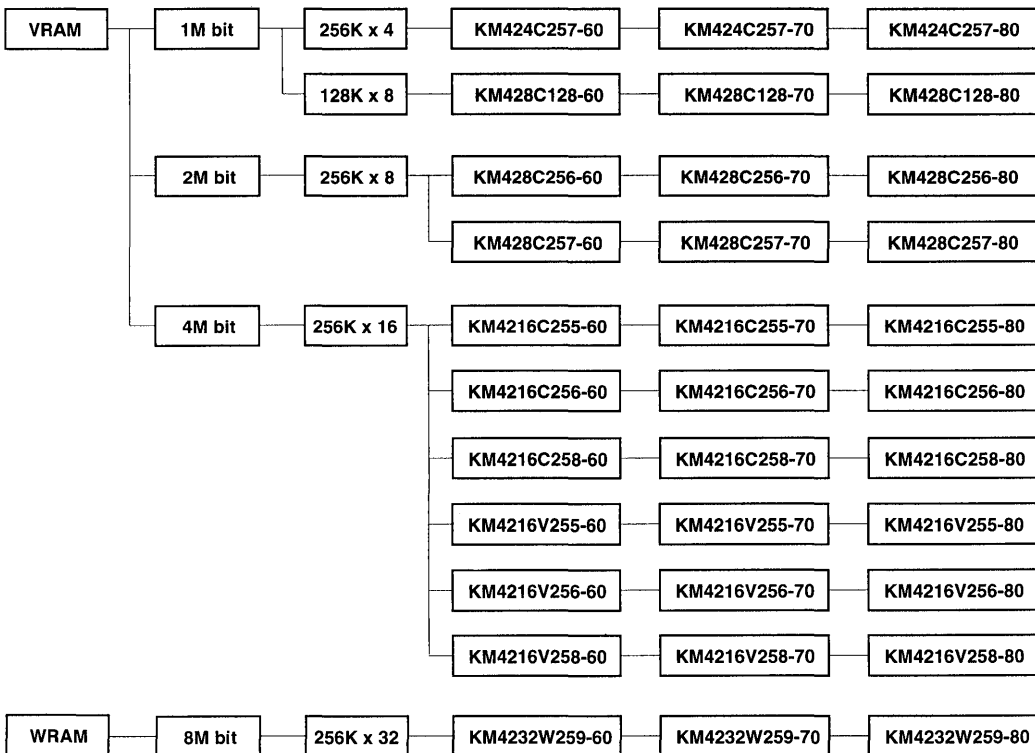
* Double : Mounted on both sides, Single : Mounted on one side

* AND : AND gated Module

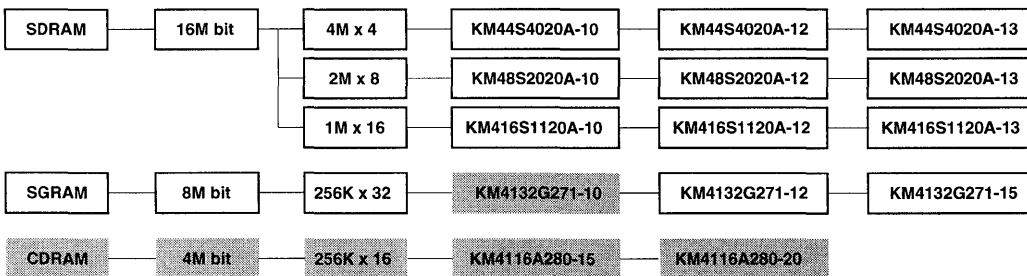
* Ear : Double Notch

3. DUAL PORT RAM

3.1. INTRODUCTION



* SPECIALTY MEMORY



 : Under Development

3.2 DUAL PORT RAM PRODUCT GUIDE

Density	Orgnization	Power Supply	Part Number	Speed (ns)	Features	Package	Remark
1Mbit	256K x 4 128K x 8	5V±10%	KM424C257	60/70/80	E/F	28 ZIP/SOJ 40 SOJ/ 44/40TSOP-II	Now
			KM428C128	60/70/80	E/F		Now
2Mbit	256K x 8	5V±10%	KM428C256	60/70/80	E/F	40 SOJ/ 44/40TSOP-II	Now
			KM428C257	60/70/80	F/F (EDO)		Now
4Mbit	256K x 16	5V±10%	KM4216C255	60/70/80	F/F (2WE)	64 SSOP	Now
			KM4216C256	60/70/80	F/F (EDO, 2WE)		Now
			KM4216C258	60/70/80	F/F (EDO, 2CAS)		Now
		3.3V±10%	KM4216V255	60/70/80	F/F (2WE)	64 SSOP	Now
KM4216V256	60/70/80		F/F (EDO, 2WE)	Now			
KM4216V258	60/70/80		F/F (EDO, 2CAS)	Now			
8Mbit	256K x 32	5V±10%	KM4232W259	60/70/80	(EDO, 4BE)	120 PQFP	Now

*** E/F : Extended Feature**
 - Block Write
 - Flash Write
 - Split Read Transfer

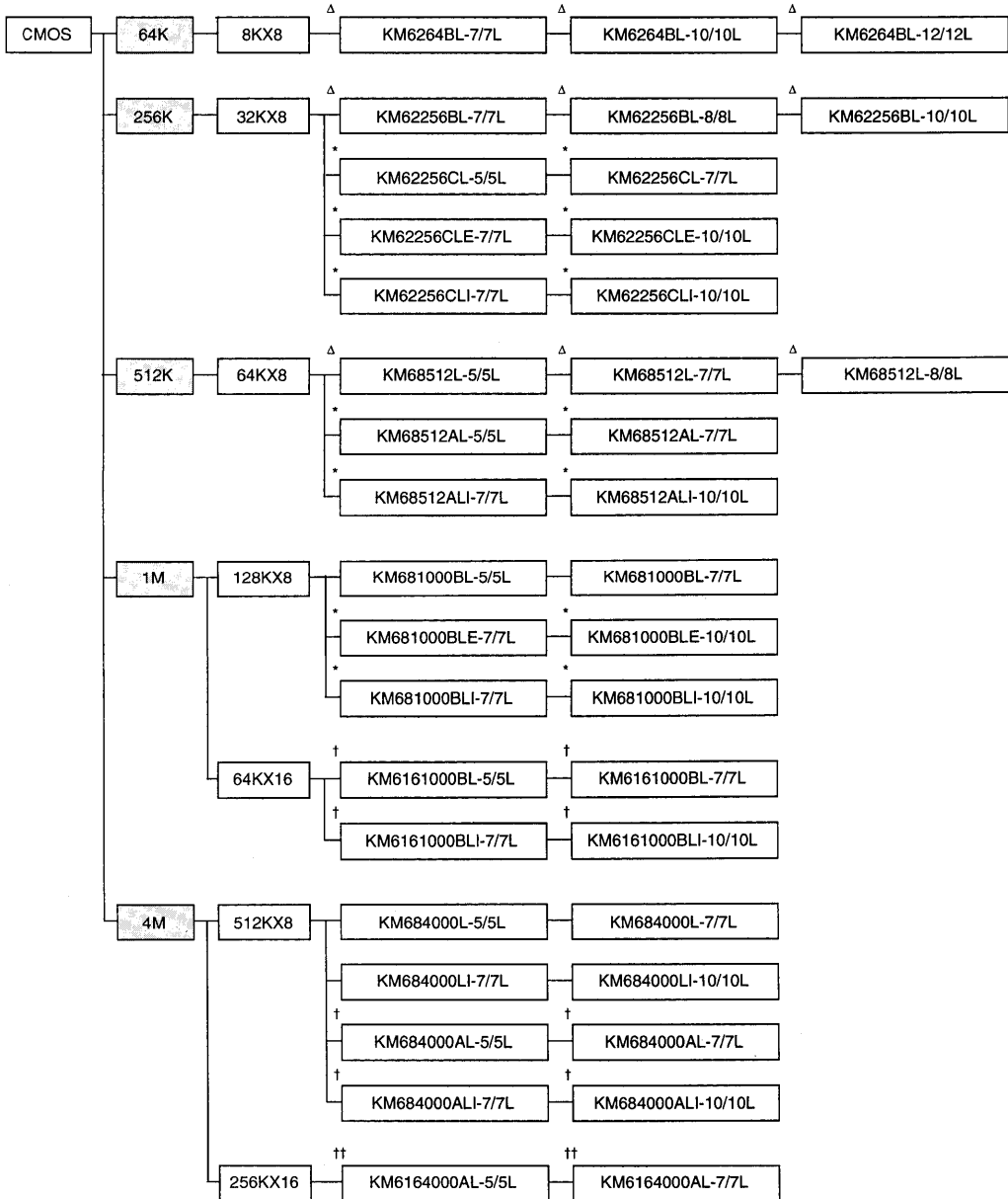
*** F/F : Full Feature**
 E/F + Old Mask
 Stop Register

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4. SRAM

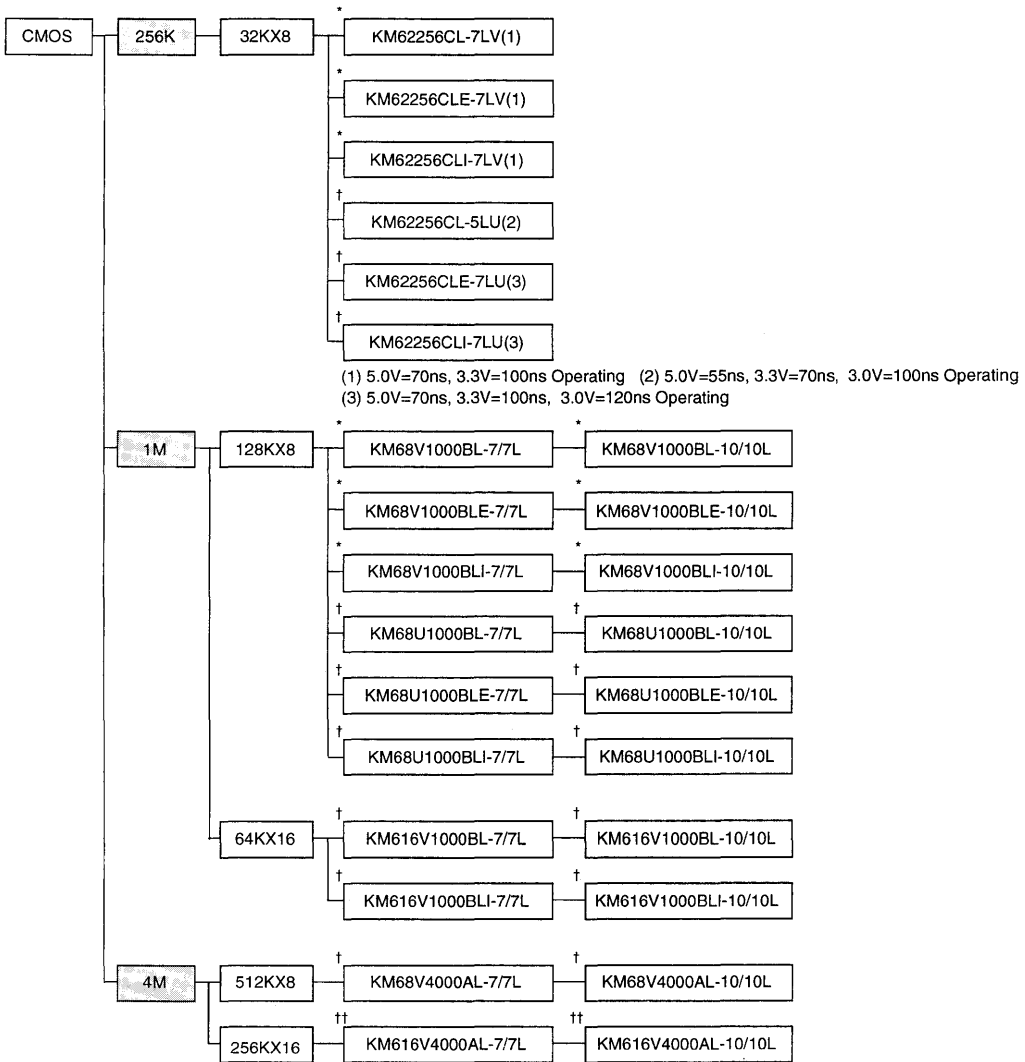
4.1 INTRODUCTION

4.1.1 Low Power Slow SRAM

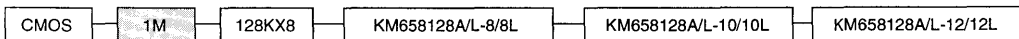


4.1 INTRODUCTION (Continued)

4.1.2 Low Voltage Slow SRAM

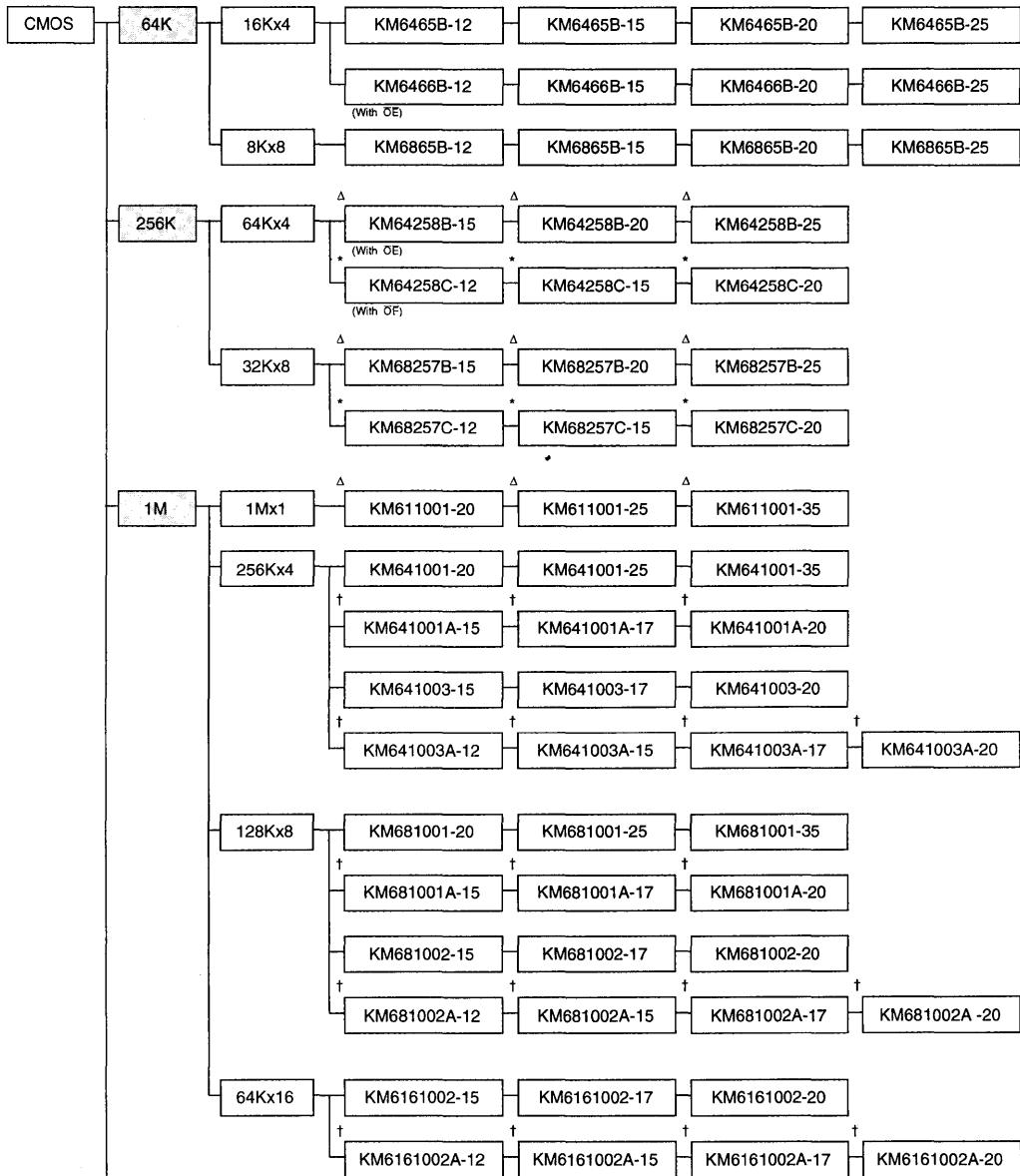


4.1.3 Pseudo SRAM

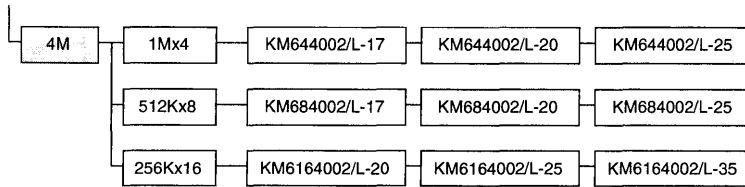


4.1 INTRODUCTION (Continued)

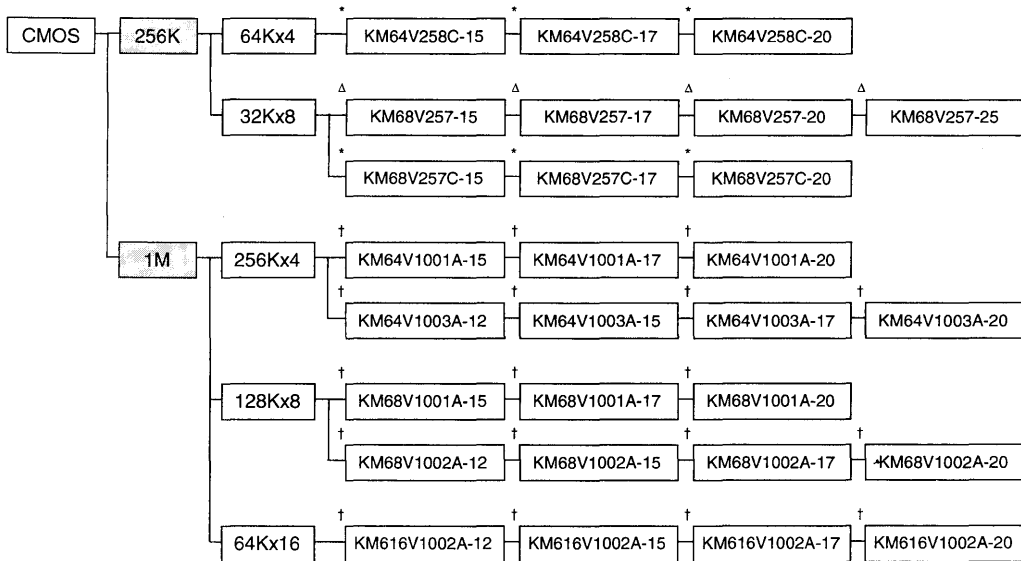
4.1.4 5V CMOS Fast SRAM



4.1 INTRODUCTION (Continued)

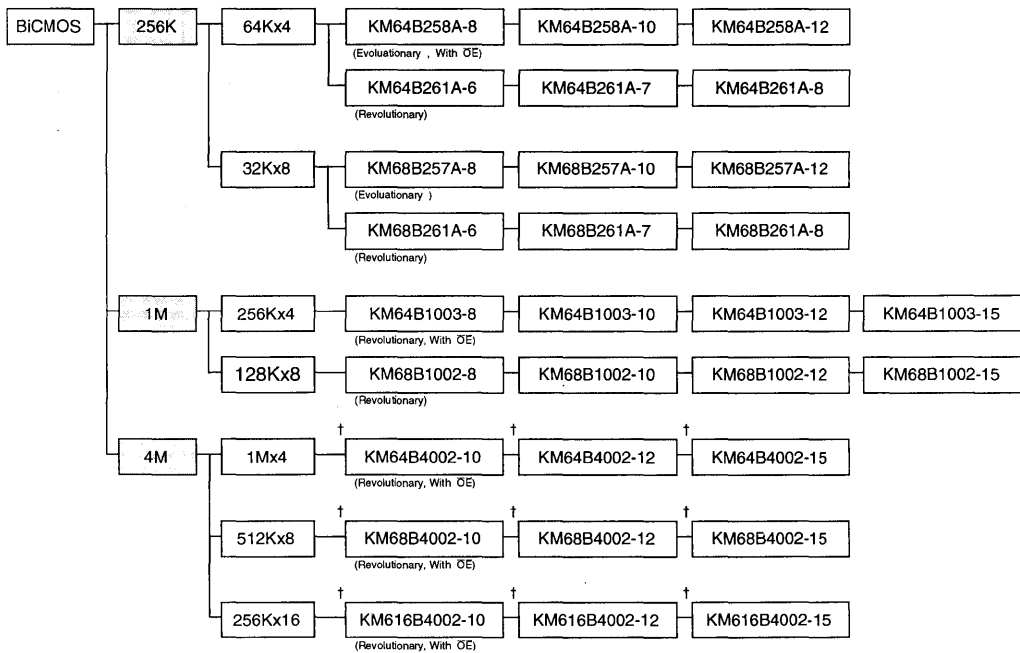


4.1.5 3.3V CMOS Fast SRAM

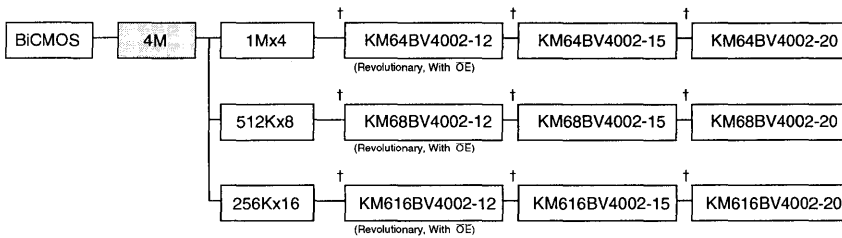


4.1 INTRODUCTION (Continued)

4.1.1.6 5V BiCMOS Fast SRAM

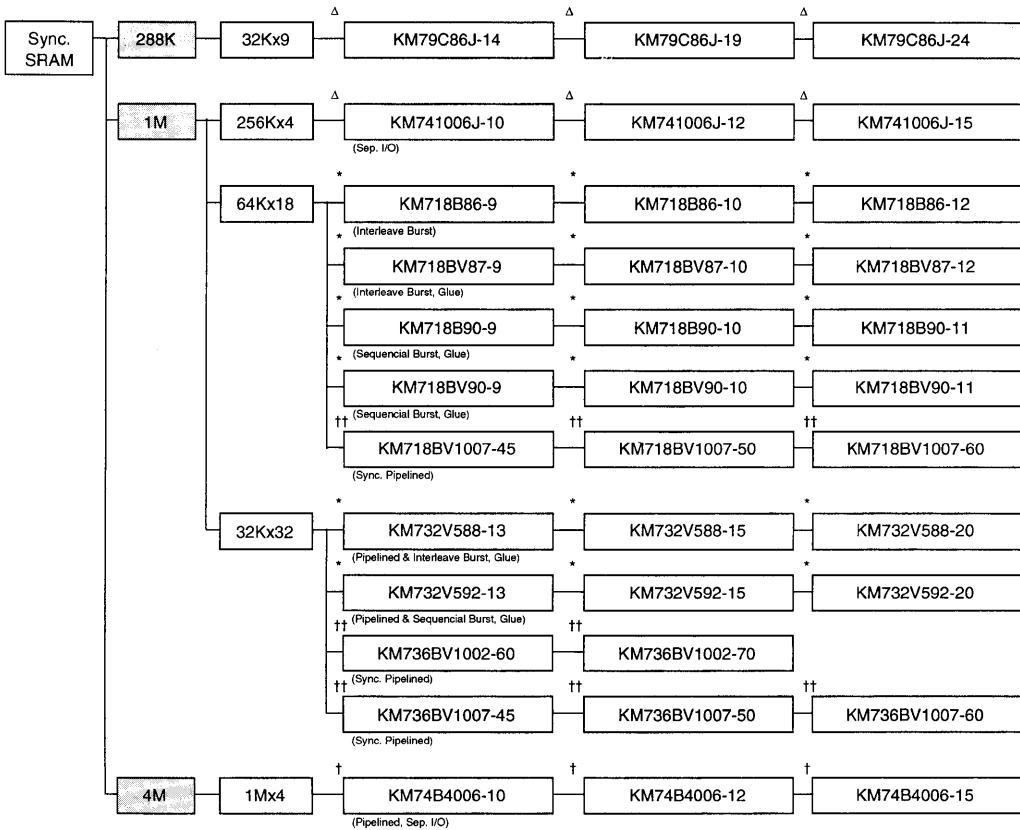


4.1.1.7 3.3V BiCMOS Fast SRAM



4.1 INTRODUCTION (Continued)

4.1.8 Specialty SRAM



* : New Product † : Preliminary Product †† : Advanced Information Δ : Last Time by Product

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4.2 PRODUCT GUIDE

4.2.1 Low Power Slow SRAM

Den.	Part Name	Org.	Speed(ns)	Tech.	Power Dissipation		Package
					Active Max(mA)	Standby Max(mA)	
64K	Δ KM6264BL/BL-L	8Kx8	70/100/120	CMOS	55	100/10	DIP/SDIP/SOP
256K	Δ KM62256BL/BL-L	32Kx8	70/85/100	CMOS	70	100/20	DIP/SDIP/SOP/TSOP
	* KM62256CL/CL-L	32Kx8	55/70	CMOS	70	100/20	DIP/SOP/TSOP
	* KM62256CLE/CLE-L	32Kx8	70/100	CMOS	70	100/50	SOP/TSOP
	* KM62256CLI/CLI-L	32Kx8	70/100	CMOS	70	100/50	SOP/TSOP
512K	Δ KM68512L/L-L	64Kx8	55/70/85	CMOS	70	100/20	SOP/TSOP
	* KM68512AL/AL-L	64Kx8	55/70	CMOS	70	100/20	SOP/TSOP
	* KM68512ALI/ALI-L	64Kx8	70/100	CMOS	70	100/50	SOP/TSOP
1M	KM681000BL/BL-L	128Kx8	55/70	CMOS	70	100/20	DIP/SOP/TSOP
	* KM681000BLE/BLE-L	128Kx8	70/100	CMOS	70	100/50	SOP/TSOP
	KM681000BLI/BLI-L	128Kx8	70/100	CMOS	70	100/50	SOP/TSOP
	† KM6161000BL/BL-L	64Kx16	55/70	CMOS	120	100/20	TSOP
	† KM6161000BLI/BLI-L	64Kx16	70/100	CMOS	120	100/50	TSOP
4M	KM684000L/L-L	512Kx8	55/70	CMOS	70	100/20	DIP/SOP/TSOP
	KM684000LI/LI-L	512Kx8	70/100	CMOS	70	100/50	SOP/TSOP
	† KM684000AL/AL-L	512Kx8	55/70	CMOS	70	100/20	SOP/TSOP
	† KM684000ALI/ALI-L	512Kx8	70/100	CMOS	70	100/50	SOP/TSOP
	†† KM6164000AL/AL-L	256Kx16	55/70	CMOS	120	100/20	TSOP

4.2.2 Low Voltage Slow SRAM

Den.	Part Name	Org.	Speed(ns)	Tech.	Power Dissipation		Package
					Active Max(mA)	Standby Max(mA)	
256K	* KM62256CL-LV	32Kx8	70/100(1)	CMOS	70/30	20/10	SOP/TSOP
	* KM62256CLE-LV	32Kx8	70/100(1)	CMOS	70/30	50/20	SOP/TSOP
	* KM62256CLI-LV	32Kx8	70/100(1)	CMOS	70/30	50/20	SOP/TSOP
	† KM62256CL-LU	32Kx8	55/70/100(2)	CMOS	70/30	20/10	SOP/TSOP
	† KM62256CLE-LU	32Kx8	70/100/120(3)	CMOS	70/30	50/20	SOP/TSOP
	† KM62256CL-LU	32Kx8	70/100/120(3)	CMOS	70/30	50/20	SOP/TSOP
1M	* KM68V1000BL/BL-L	128Kx8	70/100	CMOS	40	50/15	SOP/TSOP
	* KM68V1000BLE/BLE-L	128Kx8	70/100	CMOS	40	100/20	SOP/TSOP
	* KM68V1000BLI/BLI-L	128Kx8	70/100	CMOS	40	100/20	SOP/TSOP
	† KM68U1000BL/BL-L	128Kx8	70/100	CMOS	40	50/15	SOP/TSOP
	† KM68U1000BLE/BLE-L	128Kx8	70/100	CMOS	40	50/15	SOP/TSOP
	† KM68U1000BLI/BLI-L	128Kx8	70/100	CMOS	40	50/15	SOP/TSOP
	† KM6816V1000BL/BL-L	64Kx16	70/100	CMOS	50	50/15	TSOP
† KM6816V1000BLI/BLI-L	64Kx16	70/100	CMOS	50	100/20	TSOP	
4M	† KM68V4000AL/AL-L	512Kx8	70/100	CMOS	40	50/15	SOP/TSOP
	†† KM616V4000AL/AL-L	256Kx16	70/100	CMOS	70	50/15	TSOP

(1) 5.0V=70ns, 3.3V=100ns Operating (2) 5.0V=55ns, 3.3V=70ns, 3.0V=100ns Operating

(3) 5.0V=70ns, 3.3V=100ns, 3.0V=120ns Operating

4.2 PRODUCT GUIDE (Continued)

4.2.3 Pseudo SRAM

Den.	Part Name	Org.	Speed(ns)	Tech.	Power Dissipation		Package
					Active Max(mA)	Standby Max(μA)	
1M	KM658128A/AL/AL-L	128Kx8	80/100/120	CMOS	70	100/20	DIP/SOP

4.2.4 5V CMOS Fast SRAM

Den.	Part Name	Org.	Speed(ns)	Tech.	Power Dissipation		Package
					Active Max(mA)	Standby Max(mA)	
64K	KM6465B	16Kx4	12/15/20/25	CMOS	140	1	22 DIP
	KM6466B	16Kx4	12/15/20/25	CMOS	140	1	24 DIP/SOJ
	KM6865B	8Kx8	12/15/20/25	CMOS	140	1	28 SIP/SOJ
256K	Δ KM64258B	64Kx4	15/20/25	CMOS	140	2	28 DIP/SOJ
	* KM64258C	64Kx4	12/15/20	CMOS	150	2	28 SOJ
	Δ KM68257B	32Kx8	15/20/25	CMOS	150	2	28 DIP/SOJ
	* KM68257C	32Kx8	12/15/20	CMOS	165	2	28 DIP/SOJ
1M	Δ KM611001	1Mx1	20/25/35	CMOS	130	2	28 DIP/SOJ
	KM641001	256Kx4	20/25/35	CMOS	150	2	28 DIP/SOJ
	† KM641001A	256Kx4	15/17/20	AMOS	190	10	28 SOJ
	KM641003	256Kx4	15/17/20	CMOS	170	10	32 SOJ
	† KM641003A	256Kx4	12/15/17/20	AMOS	200	10	32 SOJ
	KM681001	128Kx8	20/25/35	CMOS	170	2	32 DIP/SOJ
	† KM681001A	128Kx8	15/17/20	AMOS	190	10	32 SOJ
	KM681002	128Kx8	15/17/20	CMOS	170	10	32 SOJ/TSOP(II)
	† KM681002A	128Kx8	12/15/17/20	AMOS	200	10	32 SOJ/TSOP(II)
	KM6161002	64Kx16	15/17/20	CMOS	230	10	44SOJ
† KM6161002A	64Kx16	12/15/17/20	AMOS	220	10	44SOJ/TSOP(II)	
4M	KM644002/L	1Mx4	17/20/25	CMOS	170	10/0.5	32 SOJ
	KM684002/L	512Kx8	17/20/25	CMOS	180	10/0.5	36 SOJ
	KM6164002/L	256Kx16	20/25/35	CMOS	240	10/0.5	44 SOJ

4.2.5 3.3V CMOS Fast SRAM

Den.	Part Name	Org.	Speed(ns)	Tech.	Power Dissipation		Package
					Active Max(mA)	Standby Max(mA)	
256K	* KM64V258C	64Kx4	15/17/20	CMOS	80	0.1	28 SOJ
	* KM68V257C	32Kx8	15/17/20	CMOS	90	0.1	28 DIP/SOJ
	Δ KM68V257	32Kx8	15/17/20/25	CMOS	110	0.1	28 DIP/SOJ
1M	† KM64V1001A	256Kx4	15/17/20	AMOS	160	10	28 SOJ
	† KM64V1003A	256Kx4	12/15/17/20	AMOS	160	10	32 SOJ
	† KM68V1001A	128Kx8	15/17/20	AMOS	165	10	32 SOJ
	† KM68V1002A	128Kx8	12/15/17/20	AMOS	170	10	32 SOJ/TSOP(II)
	† KM616V1002A	64Kx16	12/15/17/20	AMOS	200	10	44SOJ/TSOP(II)

4.2 PRODUCT GUIDE (Continued)

4.2.6 5V BiCMOS Fast SRAM

Den.	Part Name	Org.	Speed(ns)	Tech.	Power Dissipation		Package
					Active Max(mA)	Standby Max(mA)	
258K	KM64B261A	64Kx4	6/7/8	BiCMOS	160	20	28 SOJ
	KM64B258A	64Kx4	8/10/12	BiCMOS	185	20	28 SOJ
	KM68B261A	32Kx8	6/7/8	BiCMOS	170	20	32 SOJ
	KM68B257A	32Kx8	8/10/12	BiCMOS	185	20	28 SOJ
1M	KM64B1003	256Kx4	8/10/12/15	BiCMOS	165	10	32 SOJ
	KM68B1002	128Kx8	8/10/12/15	BiCMOS	175	10	32 SOJ
4M	† KM64B4002	1Mx4	10/12/15	BiCMOS	190	30	32SOJ
	† KM68B4002	512Kx8	10/12/15	BiCMOS	200	30	36SOJ
	† KM616B4002	256Kx16	10/12/15	BiCMOS	280	30	44SOJ

4.2.7 3.3V BiCMOS Fast SRAM

Den.	Part Name	Org.	Speed(ns)	Tech.	Power Dissipation		Package
					Active Max(mA)	Standby Max(mA)	
4M	† KM64BV4002	1Mx4	12/15/20	BiCMOS	160	30	32SOJ
	† KM68BV4002	512Kx8	12/15/20	BiCMOS	170	30	36SOJ
	† KM616BV4002	256Kx16	12/15/20	BiCMOS	240	30	44SOJ

4.2.8 Specialty SRAM

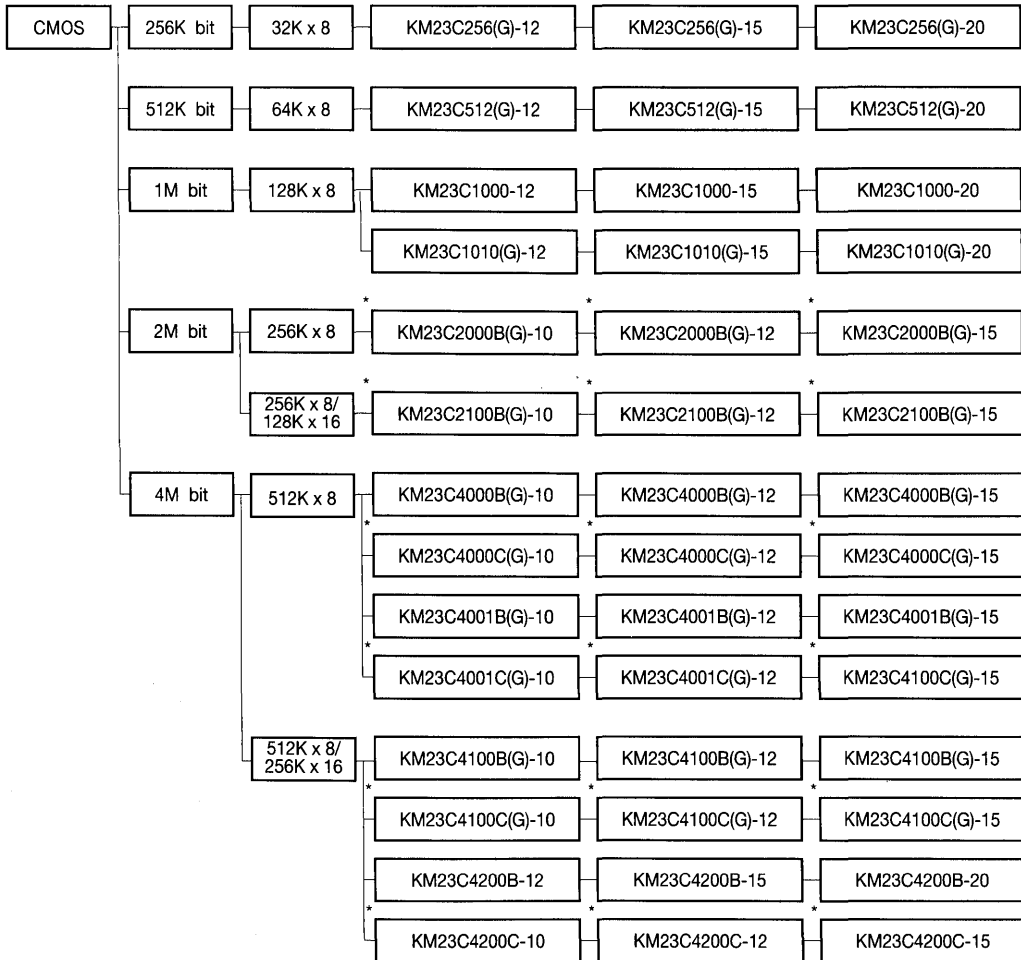
Den.	Part Name	Org.	Speed(ns)	Tech.	Power Dissipation		Package
					Active Max(mA)	Standby Max(mA)	
288K	Δ KM79C86	32Kx9	14/19/24	CMOS	190	50	44 PLCC
1M	Δ KM741006	256Kx4	6.5/7/8	CMOS	190	40	36 SOJ
	* KM718B86	64Kx18	9/10/12	BiCMOS	270	80	52 PLCC
	* KM718BV87	64Kx18	9/10/12	BiCMOS	270	80	52 PLCC
	* KM718B90	64Kx18	9/10/11	BiCMOS	270	80	52 PLCC
	* KM718BV90	64Kx18	9/10/11	BiCMOS	270	80	52 PLCC
	†† KM718BV1007	64Kx18	2.5/3/3	BiCMOS	600	100	119 BGA
	* KM732V588	32Kx32	7/8/9	AMOS	220	10	100 QFP
	* KM732V592	32Kx32	7/8/9	AMOS	220	10	100 QFP
	†† KM736BV1002	32Kx36	3.5/4.0	BiCMOS	440	20	119 BGA
	†† KM736BV1007	32Kx36	2.5/3/3	BiCMOS	600	100	119 BGA
4M	† KM74B4006	1Mx4	10/12/15	BiCMOS	190	60	36 SOJ

* : New Product † : Preliminary Product †† : Under Development Δ : Last Time by Product

5. Mask ROM

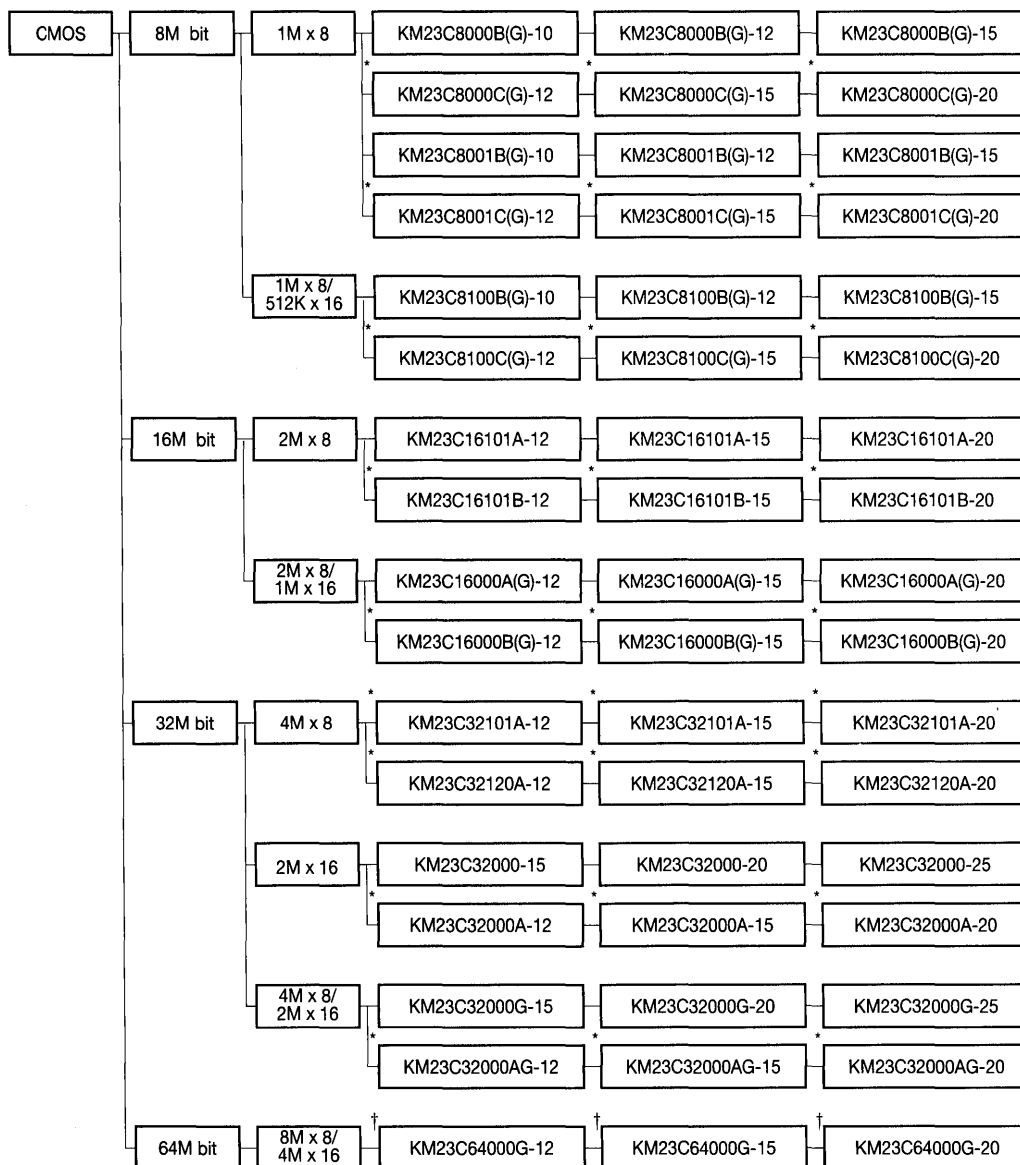
5.1 INTRODUCTION

Standard Product



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5.1 INTRODUCTION (Continued)

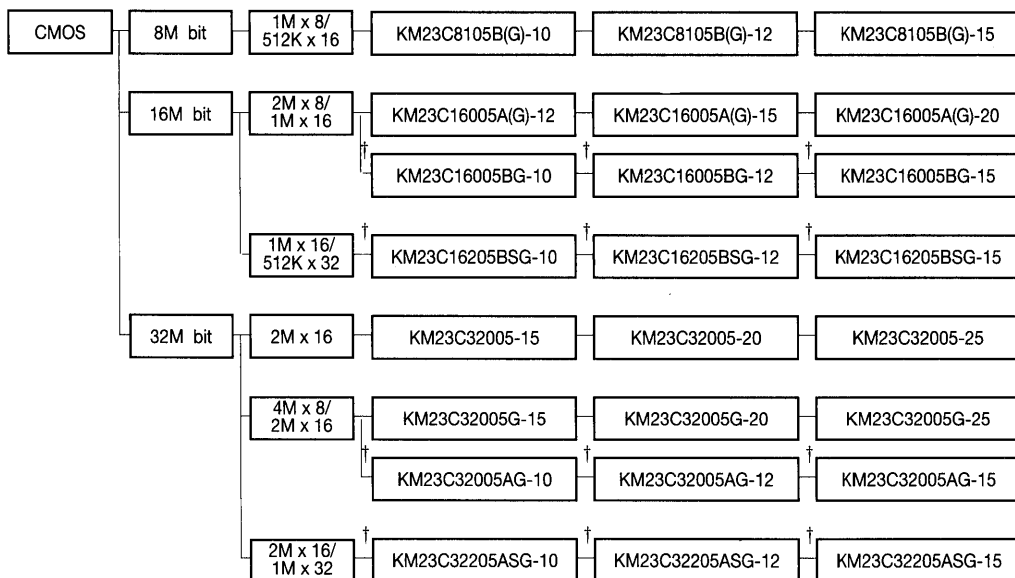


* : New Product

† : Under Development

5.1 INTRODUCTION (Continued)

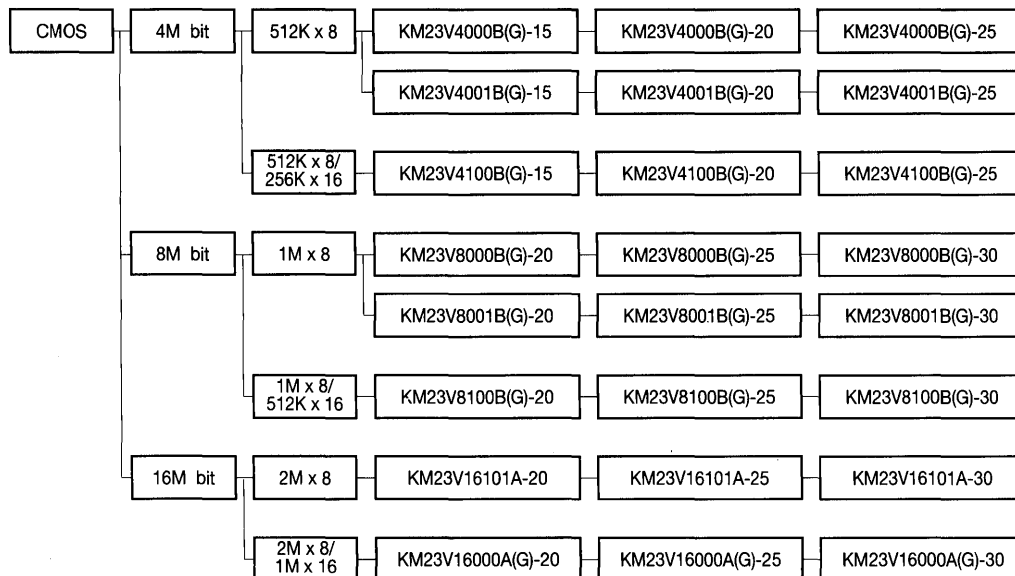
Page Mode Product



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5.1 INTRODUCTION (Continued)

Low Voltage Product



* : New Product

† : Under Development

5.2 PRODUCT GUIDE

Capacity	Part Number	Organization	Speed(ns)	Technology	Features	Package	Remark
256K	KM23C256(G)	32K x 8	120/150/200	CMOS	Programmable CE & OE	28DIP(32SOP)	NOW
512K	KM23C512(G)	64K x 8	120/150/200	CMOS	Programmable CE & OE	28DIP(32SOP)	NOW
1M	KM23C1000	128K x 8	120/150/200	CMOS	Programmable CE	28DIP	NOW
	KM23C1010(G)	128K x 8	120/150/200	CMOS	Programmable CE & OE	32DIP(32SOP)	NOW
2M	* KM23C2000B(G)	256K x 8	100/120/150	CMOS	Programmable CE & OE	32DIP(32SOP)	NOW
	* KM23C2100B(G)	256K x 8/ 128K x 16	100/120/150	CMOS	Programmable CE & OE Word/Byte Mode	40DIP(40SOP)	NOW
4M	KM23C4000B(G)	512K x 8	100/120/150	CMOS	Programmable CE & OE	32DIP(32SOP)	NOW
	KM23C4001B(G)	512K x 8	100/120/150	CMOS	Programmable OE	32DIP(32SOP)	NOW
	KM23C4100B(G)	512K x 8/ 256K x 16	100/120/150	CMOS	Programmable CE & OE Word/Byte Mode	40DIP(40SOP)	NOW
	KM23C4200B	512K x 8/ 256K x 16	120/150/200	CMOS	Programmable CE & OE Word/Byte Mode	40DIP	NOW
	* KM23C4000C(G)	512K x 8	100/120/150	CMOS	Programmable CE & OE	32DIP(32SOP)	NOW
	* KM23C4001C(G)	512K x 8	100/120/150	CMOS	Programmable OE	32DIP(32SOP)	NOW
	* KM23C4100C(G)	512K x 8/ 256K x 16	100/120/150	CMOS	Programmable CE & OE Word/Byte Mode	40DIP(40SOP)	NOW
	* KM23C4200C	512K x 8/ 256K x 16	100/120/150	CMOS	Programmable CE & OE Word/Byte Mode	40DIP	NOW
	KM23V4000B(G)	512K x 8	150/200/250	CMOS	3.3V Operation	32DIP(32SOP)	NOW
	KM23V4001B(G)	512K x 8	150/200/250	CMOS	3.3V Operation	32DIP(32SOP)	NOW
	KM23V4100B(G)	512K x 8/ 256K x 16	150/200/250	CMOS	3.3V Operation	40DIP(40SOP)	NOW
	8M	KM23C8000B(G)	1M x 8	100/120/150	CMOS	Programmable CE & OE	32DIP(32SOP)
KM23C8001B(G)		1M x 8	100/120/150	CMOS	Programmable OE	32DIP(32SOP)	NOW
KM23C8100B(G)		1M x 8/ 512K x 16	100/120/150	CMOS	Programmable CE & OE Word/Byte Mode	42DIP(44SOP)	NOW
* KM23C8000C(G)		1M x 8	120/150/200	CMOS	Programmable CE & OE	32DIP(32SOP)	NOW
* KM23C8001C(G)		1M x 8	120/150/200	CMOS	Programmable OE	32DIP(32SOP)	NOW
* KM23C8100C(G)		1M x 8/ 512K x 16	120/150/200	CMOS	Programmable CE & OE Word/Byte Mode	42DIP(44SOP)	NOW
KM23C8105B(G)		1M x 8/ 512K x 16	100/120/150 (tP>50)	CMOS	4Word Page	42DIP(44SOP)	NOW
KM23V8000B(G)		1M x 8	200/250/300	CMOS	3.3V Operation	32DIP(32SOP)	NOW
KM23V8001B(G)		1M x 8	200/250/300	CMOS	3.3V Operation	32DIP(32SOP)	NOW
KM23V8100B(G)		1M x 8/ 512K x 16	200/250/300	CMOS	3.3V Operation	42DIP(44SOP)	NOW

1

5.2 PRODUCT GUIDE (Continued)

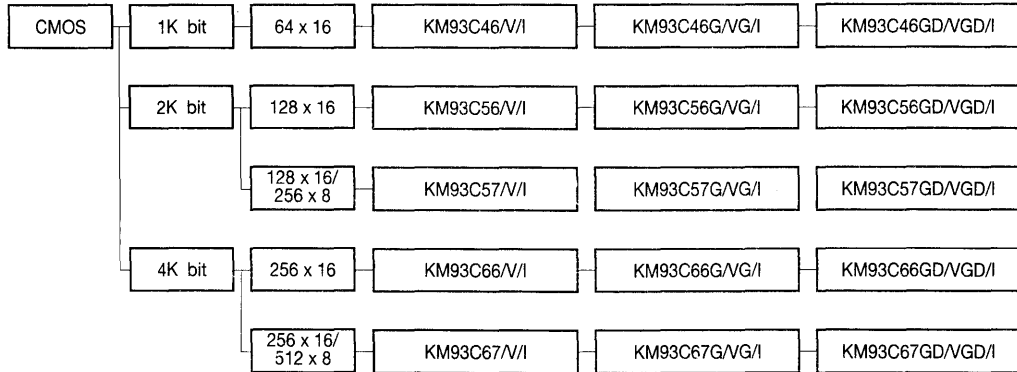
Capacity	Part Number	Organization	Speed(ns)	Technology	Features	Package	Remark	
16M	KM23C16101A KM23C16000A(G)	2M x 8 2M x 8/ 1M x 16	120/150/200 120/150/200	CMOS CMOS	Programmable OE Programmable CE & OE Word/Byte Mode	36DIP 42DIP(44SOP)	NOW NOW	
	* KM23C16101B * KM23C16000B(G)	2M x 8 2M x 8/ 1M x 16	120/150/200 120/150/200	CMOS CMOS	Programmable OE Programmable CE & OE Word/Byte Mode	36DIP 42DIP(44SOP)	NOW NOW	
	KM23C16005A(G)	2M x 8/ 1M x 16	120/150/200 (tP > 50)	CMOS	8Word Page	42DIP(44SOP)	NOW	
	† KM23C16005BG	2M x 8/ 1M x 16	100/120/150 (tP > 30)	CMOS	8Word Page	44SOP	-	
	† KM23C16205BSG	1M x 16/ 512K x 32	100/120/150 (tP > 30)	CMOS	8Word Page	70SSOP	-	
	KM23V16101A KM23V16000A(G)	2M x 8 2M x 8/ 1M x 16	200/250/300 200/250/300	CMOS CMOS	3.3V Operation 3.3V Operation	36DIP 42DIP(44SOP)	NOW NOW	
32M	KM23C32000 KM23C32000G	2M x 16 4M x 8/ 2M x 16	150/200/250 150/200/250	CMOS CMOS	Programmable CE & OE Programmable CE & OE	42DIP(44SOP) 42DIP(44SOP)	NOW NOW	
	* KM23C32101A * KM23C32120A * KM23C32000A * KM23C32000AG	4M x 8 4M x 8 2M x 16 4M x 8/ 2M x 16	120/150/200 120/150/200 120/150/200 120/150/200	CMOS CMOS CMOS CMOS	Programmable OE Programmable CE & OE Programmable CE & OE Programmable CE & OE Word/Byte Mode	36DIP 42DIP 42DIP 44SOP	NOW NOW NOW NOW	
	KM23C32005 KM23C32005G	2M x 16 4M x 8/ 2M x 16	150/200/250 150/200/250	CMOS CMOS	8Word Page 8word Page	42DIP 44SOP	NOW NOW	
	† KM23C32005AG	4M x 8/ 2M x 16	100/120/150 (tP > 30)	CMOS	8Word Page	44SOP	-	
	† KM23C32205ASG	2M x 16 1M x 32	100/120/150 (tP > 30)	CMOS	8word Page	70SSOP	-	
	64M	† KM23C64000G	8M x 8/ 4M x 16	120/150/200	CMOS	Programmable CE & OE Word/Byte Mode	44SOP	-

* : New Product

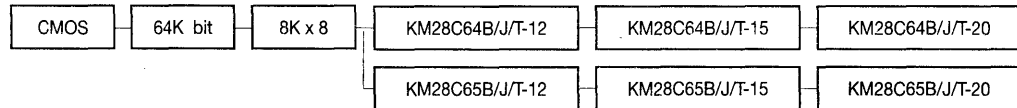
† : Under Development

6. EEPROM

*Serial EEPROM

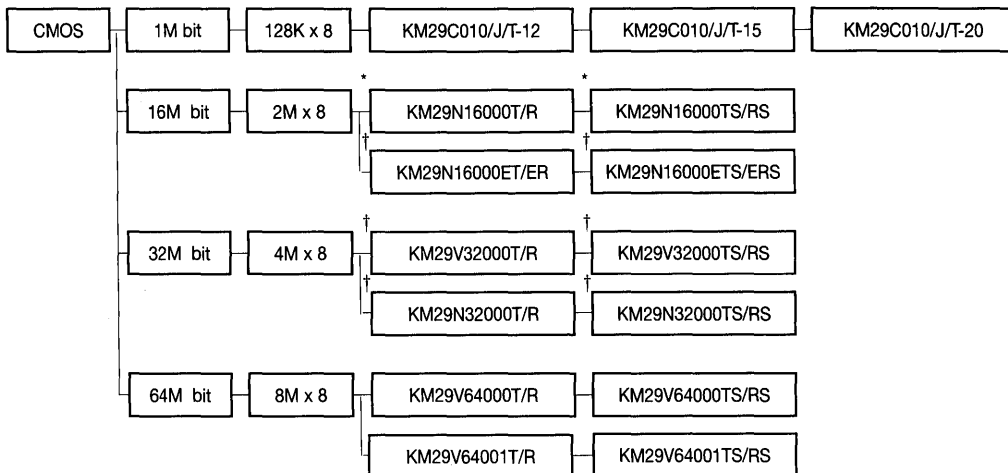


*Parallel EEPROM



Density	Part Number	Organization	Speed(ns)	Technology	Features	Package	Remark
1K bit	KM93C46G/GD/I	64 x 16	1MHz	CMOS	Self-timed	8DIP/8SOP	Now
	KM93C46V/VG/VGD/I	64 x 16	250KHz	CMOS	3.0V-Operation	8DIP/8SOP	Now
2K bit	KM93C56G/GD/I	128 x 16	1MHz	CMOS	Auto Erase, Self-timed	8DIP/8SOP	Now
	KM93C57G/GD/I	128 x 16/256 x 8	1MHz	CMOS	Select Organization	8DIP/8SOP	Now
	KM93C56V/VG/VGD/I	128 x 16	1MHz	CMOS	3.0V Operation	8DIP/8SOP	Now
	KM93C57V/VG/VGD/I	128 x 16/256 x 8	1MHz	CMOS	3.0V Operation	8DIP/8SOP	Now
4K bit	KM93C66G/GD/I	256 x 16	1MHz	CMOS	Auto Erase, Self Timed	8DIP/8SOP	Now
	KM93C67G/GD/I	256 x 16/512 x 8	1MHz	CMOS	Select Organization	8DIP/8SOP	Now
	KM93C66V/VG/VGD/I	256 x 16	1MHz	CMOS	3.0V Operation	8DIP/8SOP	Now
	KM93C67V/VG/VGD/I	256 x 16/512 x 8	1MHz	CMOS	3.0V Operation	8DIP/8SOP	Now
64K bit	KM28C64B/B/J/BT	8K x 8	120/150/200	CMOS	64B Page Mode, D-P, T-B	28DIP/32PLCC/28TSOP	Now
	KM28C64B/B/J/BT1	8K x 8	120/150/200	CMOS	Industrial	28DIP/32PLCC/28TSOP	'95. 2Q
	KM28C65B/B/J/BT	8K x 8	120/150/200	CMOS	64B Page Mode, D-P, T-B, R-B	28DIP/32PLCC/28TSOP	Now
	KM28C65B/B/J/BT1	8K x 8	120/150/200	CMOS	Industrial	28DIP/32PLCC/28TSOP	'95. 2Q

7. FLASH

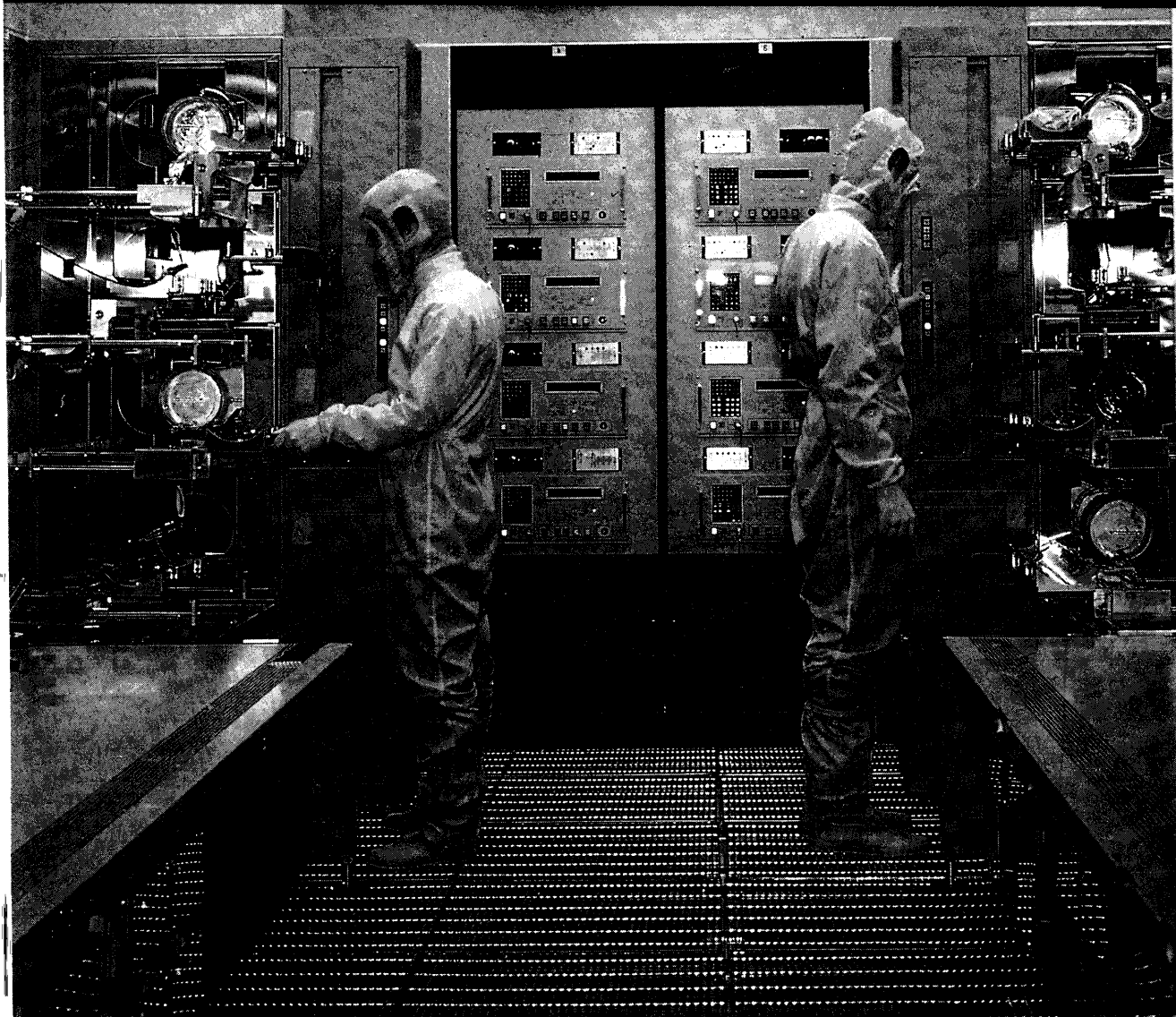


* : New Product
 †: Preliminary Product

Density	Part Number	Organization	Speed(ns)	Technology	Features	Package	Remark
1M bit	KM29C010/J/T	128K x 8	100/120/150	CMOS	128B Page Mode, D-P, T-B	32DIP/32PLCC/32TSOP	Now
16M bit	KM29N16000T/R KM29N16000TS/RS	2M x 8	tr = 20 μs trc = 80ns	CMOS	256B Page Mode 4K Byte Block Erase	44(40)TSOP II	Now
	KM29N16000ET/ER KM29N16000ETS/ERS	2M x 8	tr = 20 μs trc = 80ns	CMOS	EXTENDED TEMP. (-20 C--+85 C)	44(40)TSOP II	1Q. 95
32M bit	KM29V32000T/R KM29V32000TS/RS	4M x 8	tr = 10 μs trc = 50ns	CMOS	512B Page Mode (3.3V) 8K Byte Block Erase	44(40)TSOP II	1Q. 95
	KM29N32000T/R KM29N32000TS/RS	4M x 8	tr = 10 μs trc = 50ns	CMOS	512B Page Mode (5.0V) 8K Byte Block Erase	44(40)TSOP II	1Q. 95

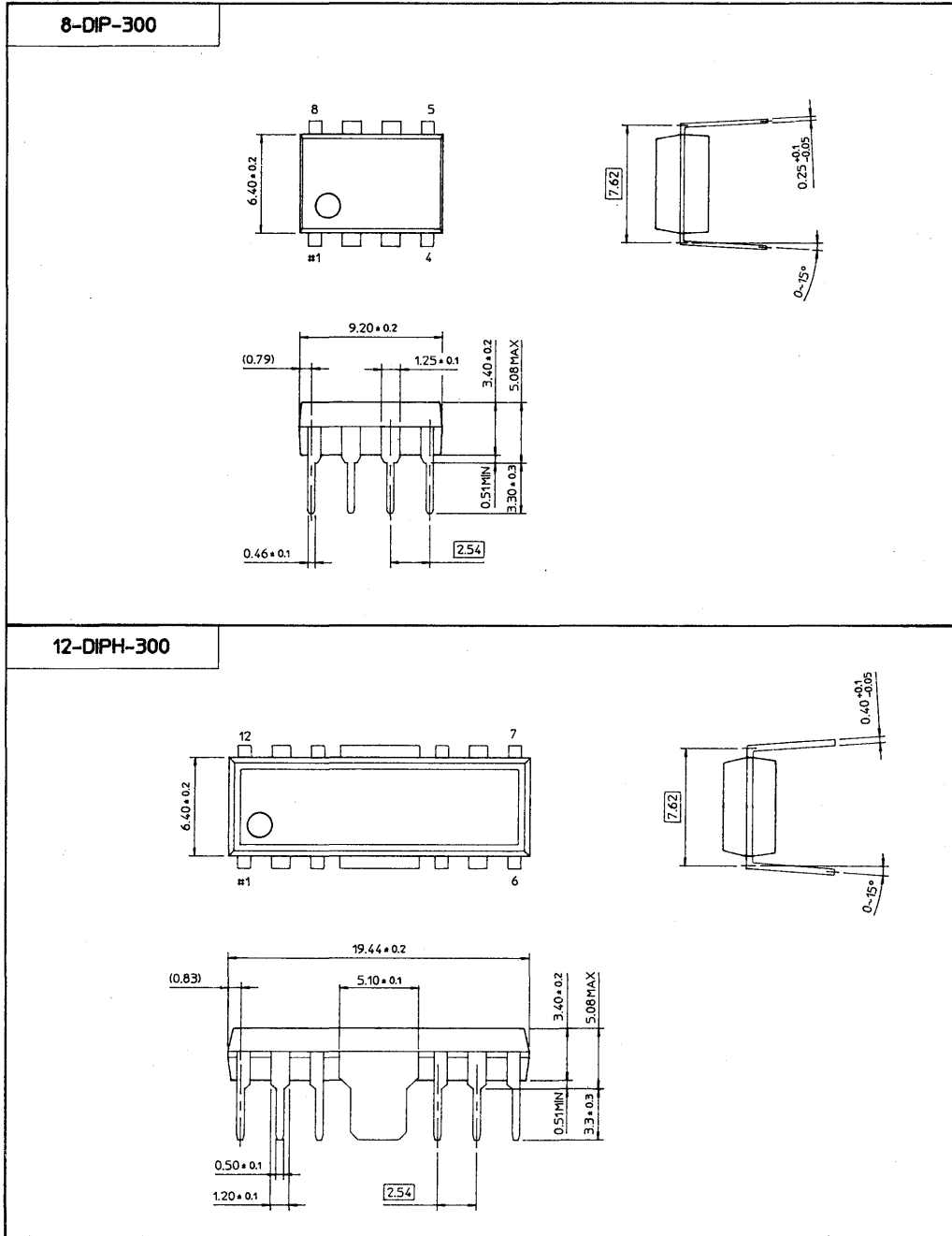
* D-P : Data-Polling, R/B : Ready/Busy, T-B : Toggle Bit

PACKAGE DIMENSIONS 2



PACKAGE DIMENSIONS

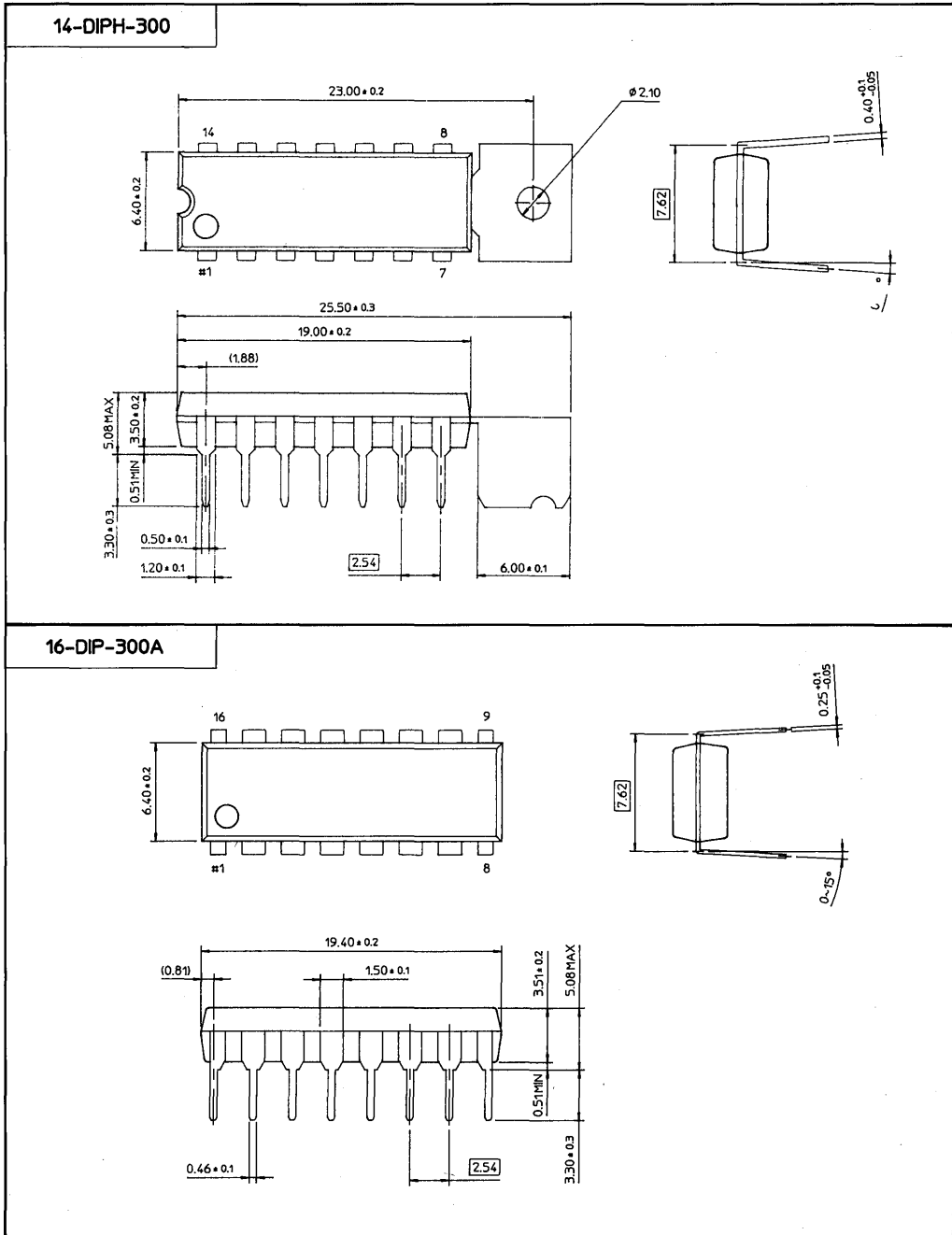
Dimensions in Millimeters



2

PACKAGE DIMENSIONS

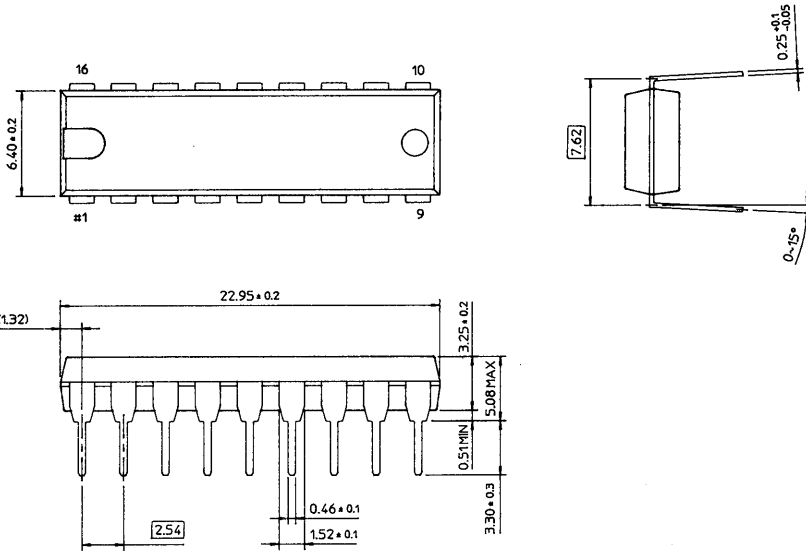
Dimensions in Millimeters



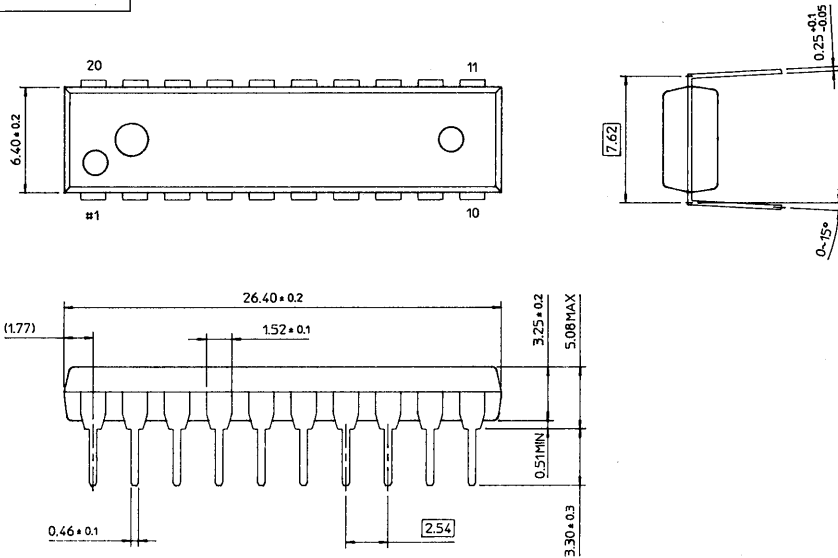
PACKAGE DIMENSIONS

Dimensions in Millimeters

18-DIP-300A

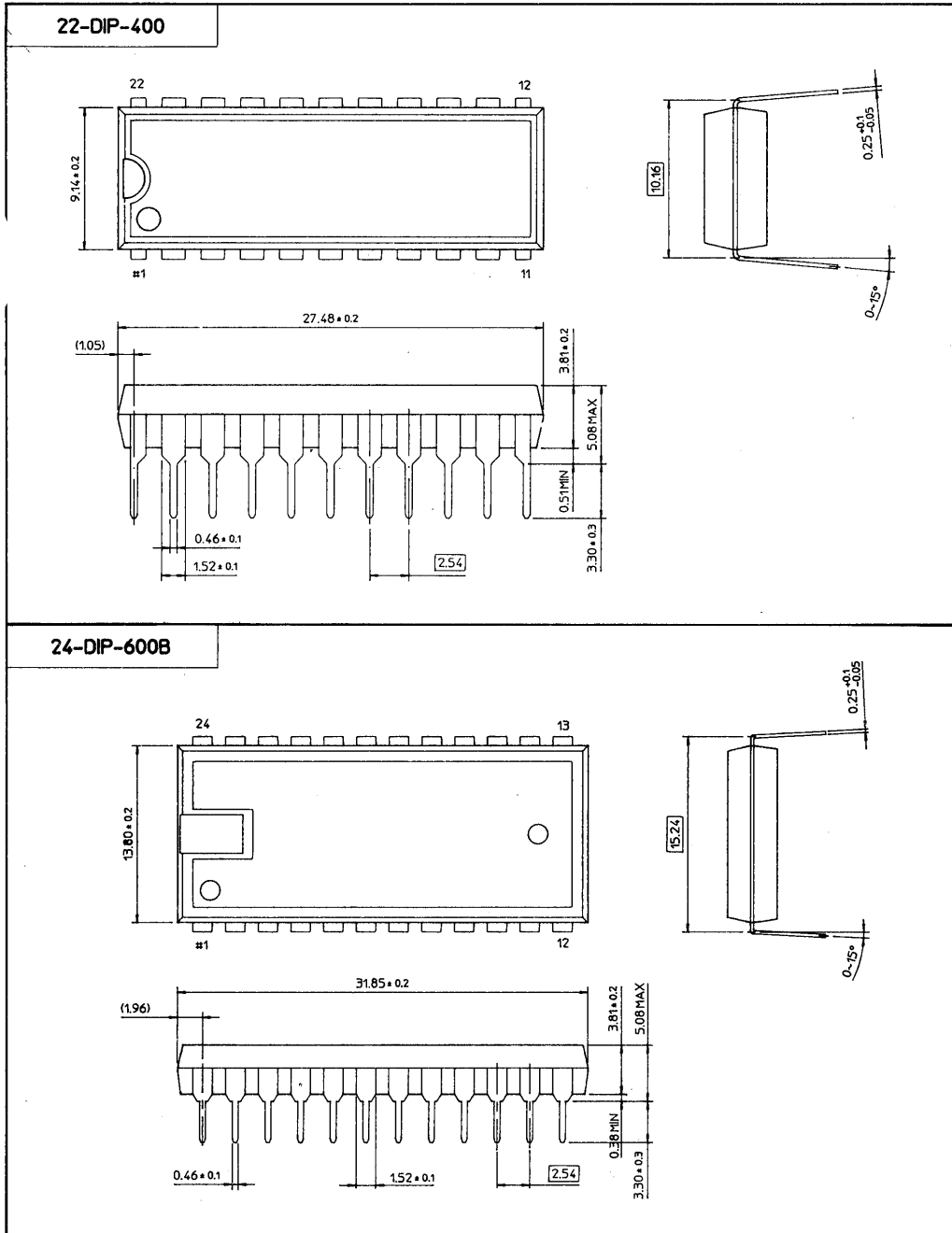


20-DIP-300A



PACKAGE DIMENSIONS

Dimensions in Millimeters

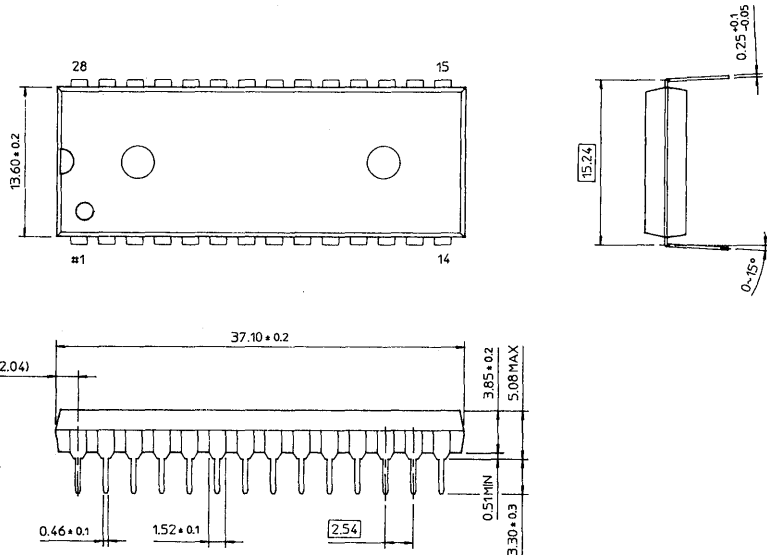


PACKAGE DIMENSIONS

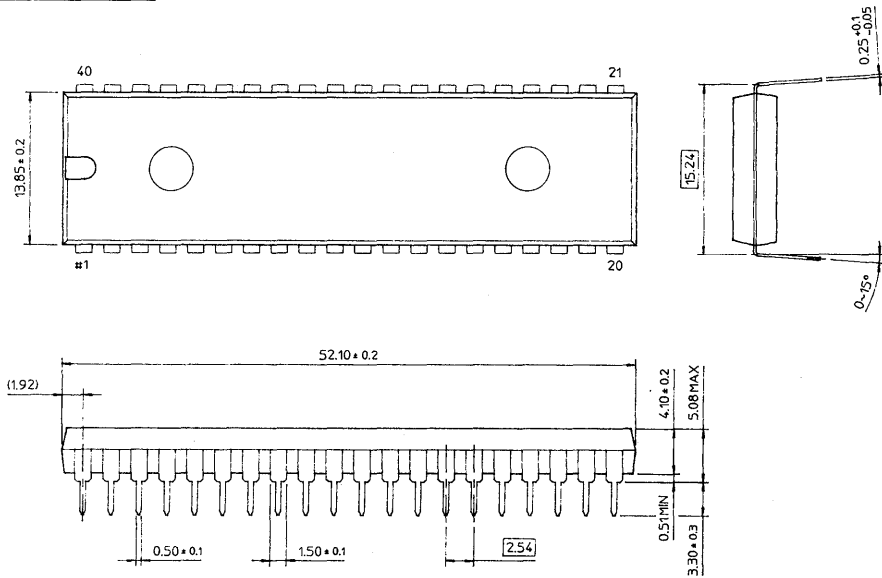
Dimensions in Millimeters

2

28-DIP-600A

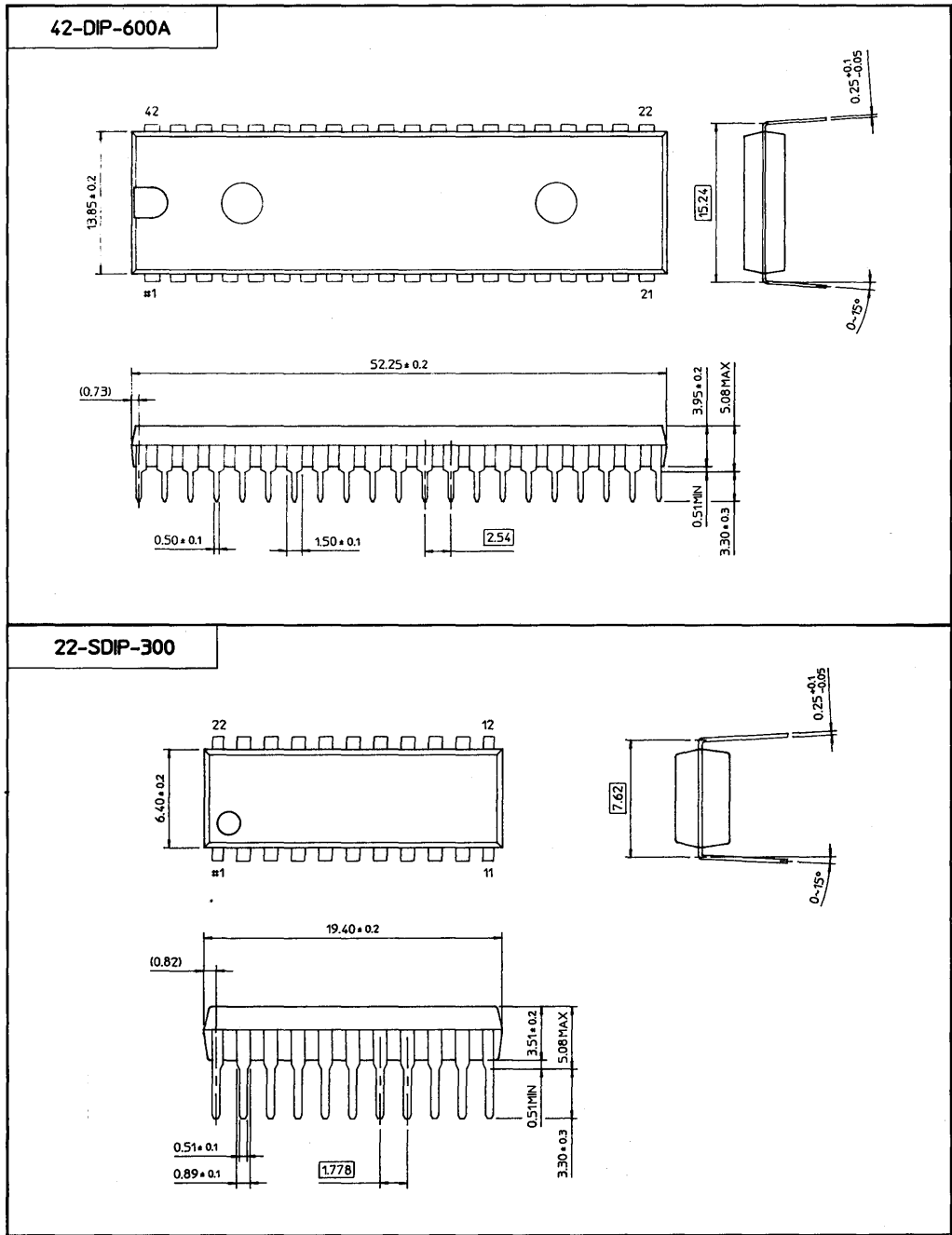


40-DIP-600A



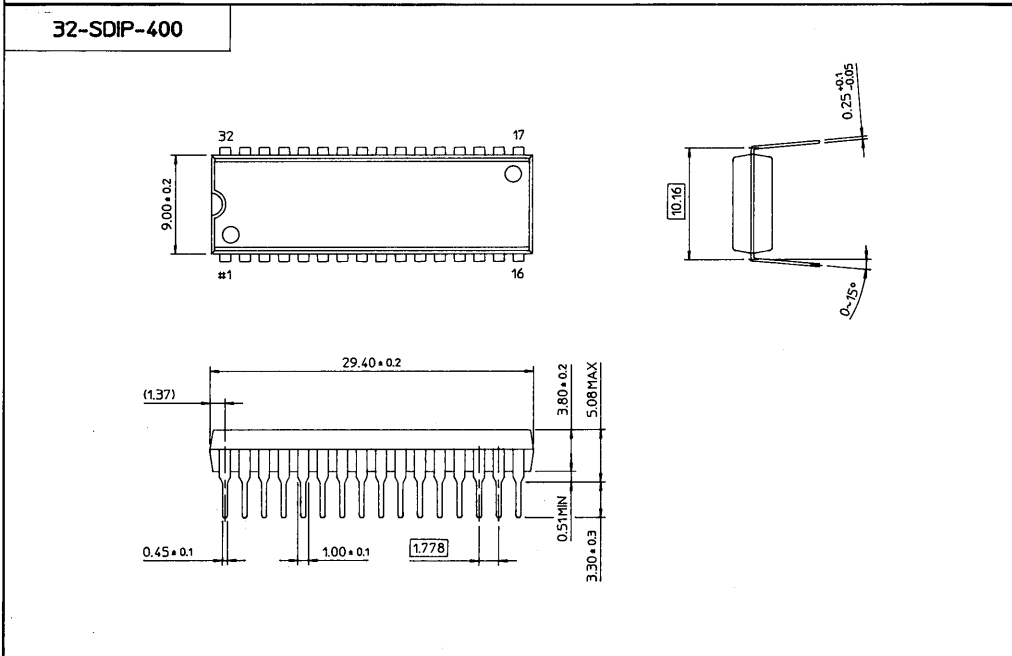
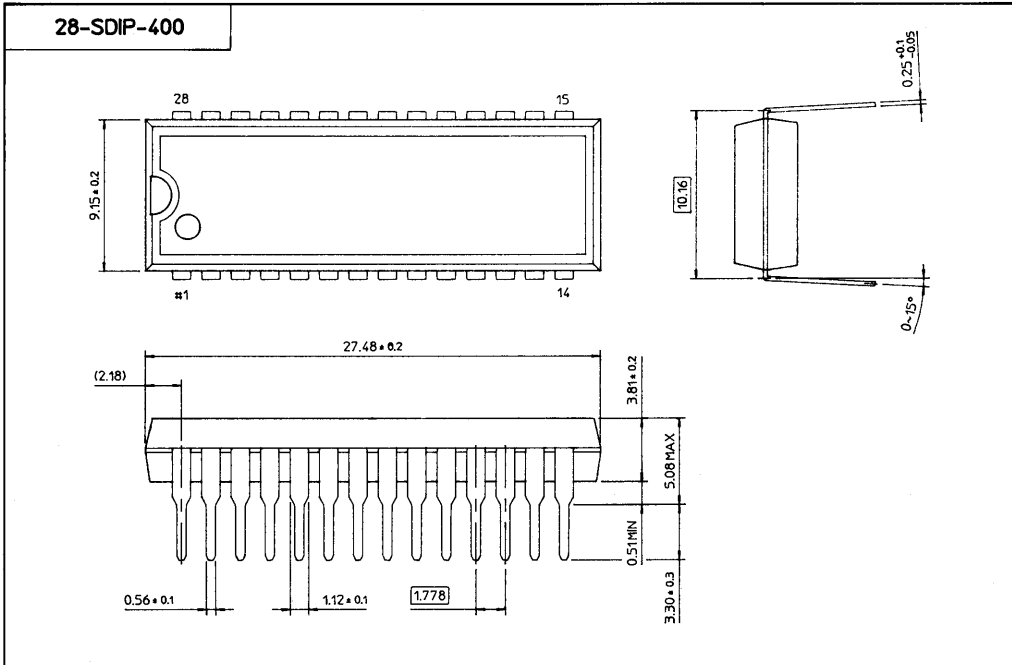
PACKAGE DIMENSIONS

Dimensions in Millimeters



PACKAGE DIMENSIONS

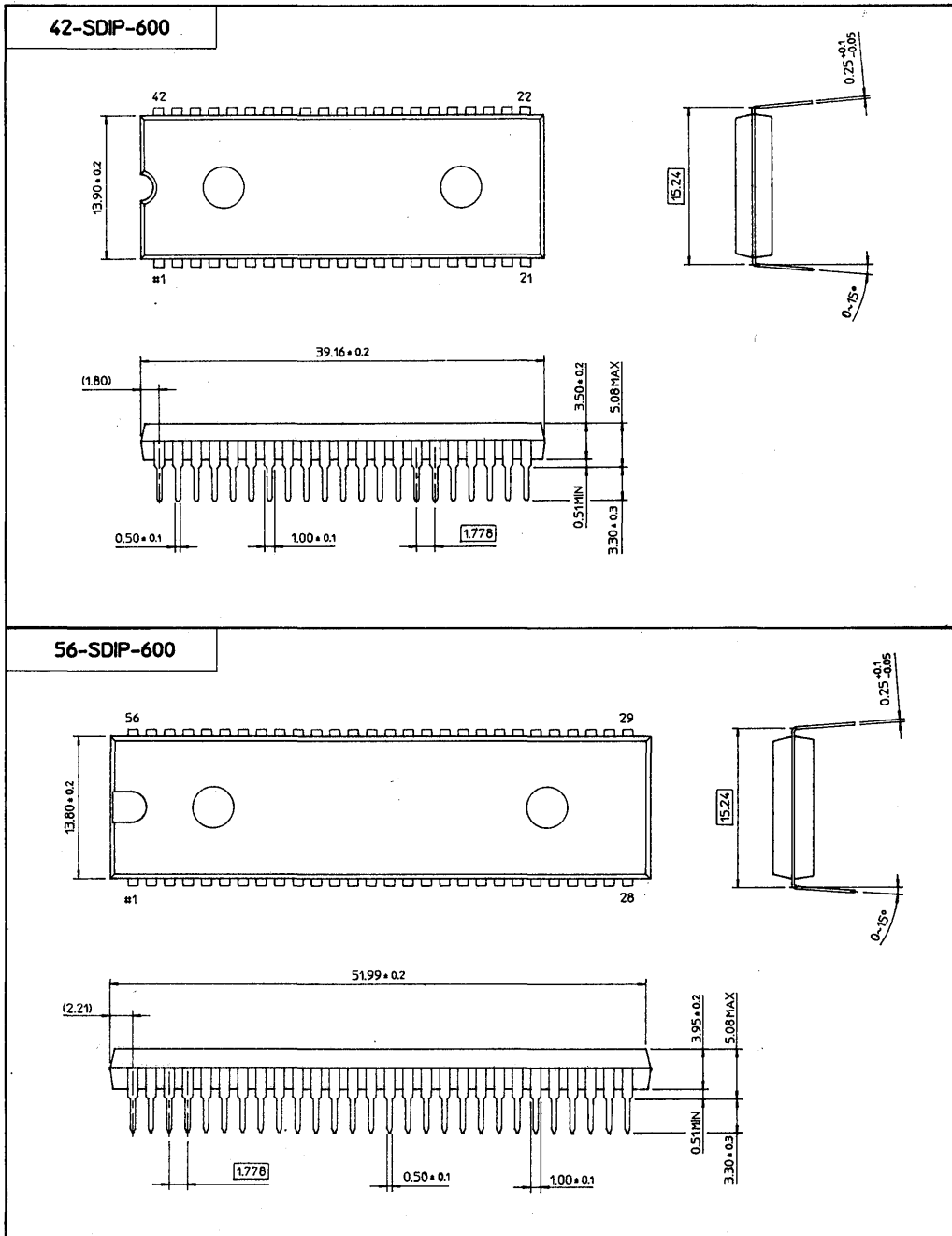
Dimensions in Millimeters



2

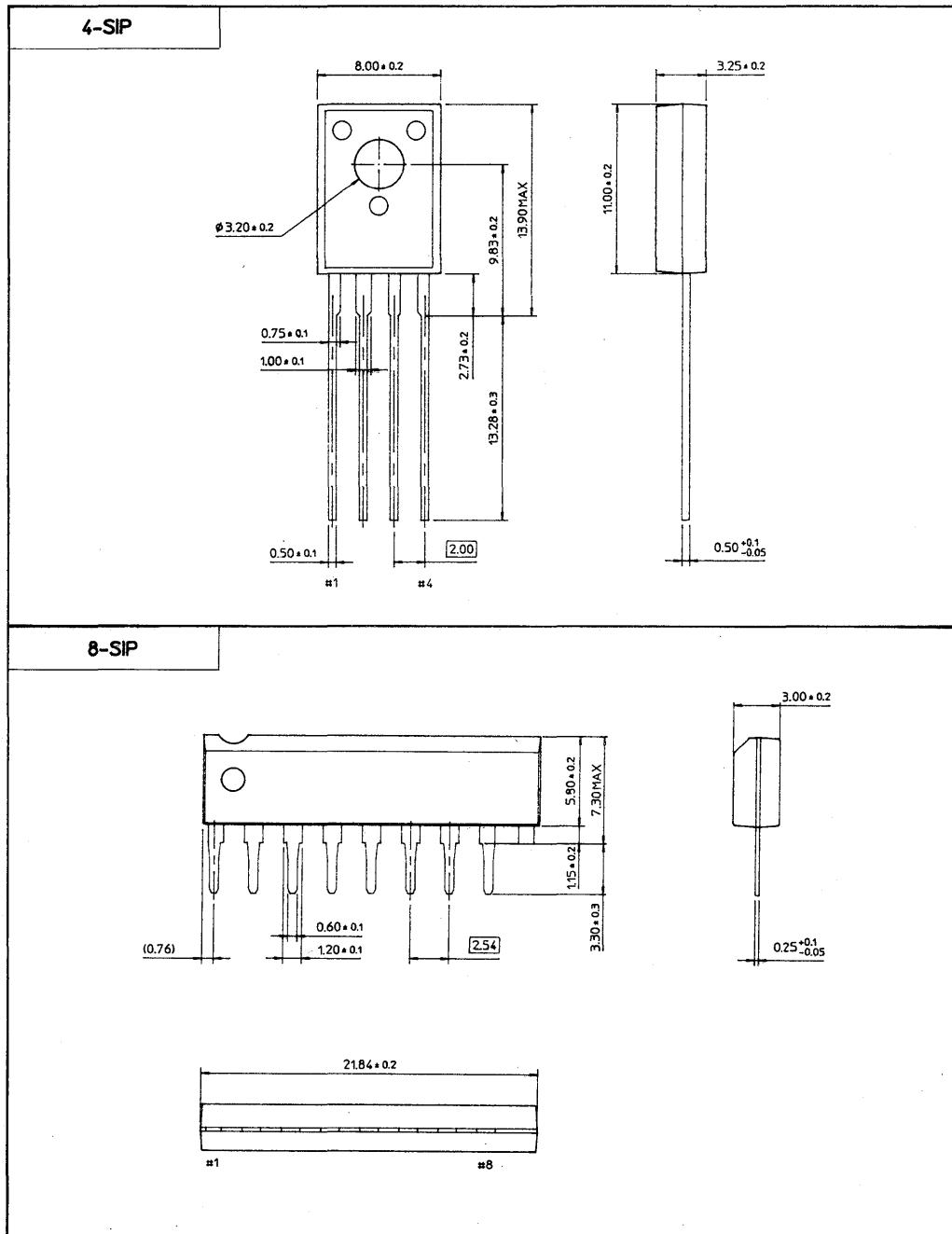
PACKAGE DIMENSIONS

Dimensions in Millimeters



PACKAGE DIMENSIONS

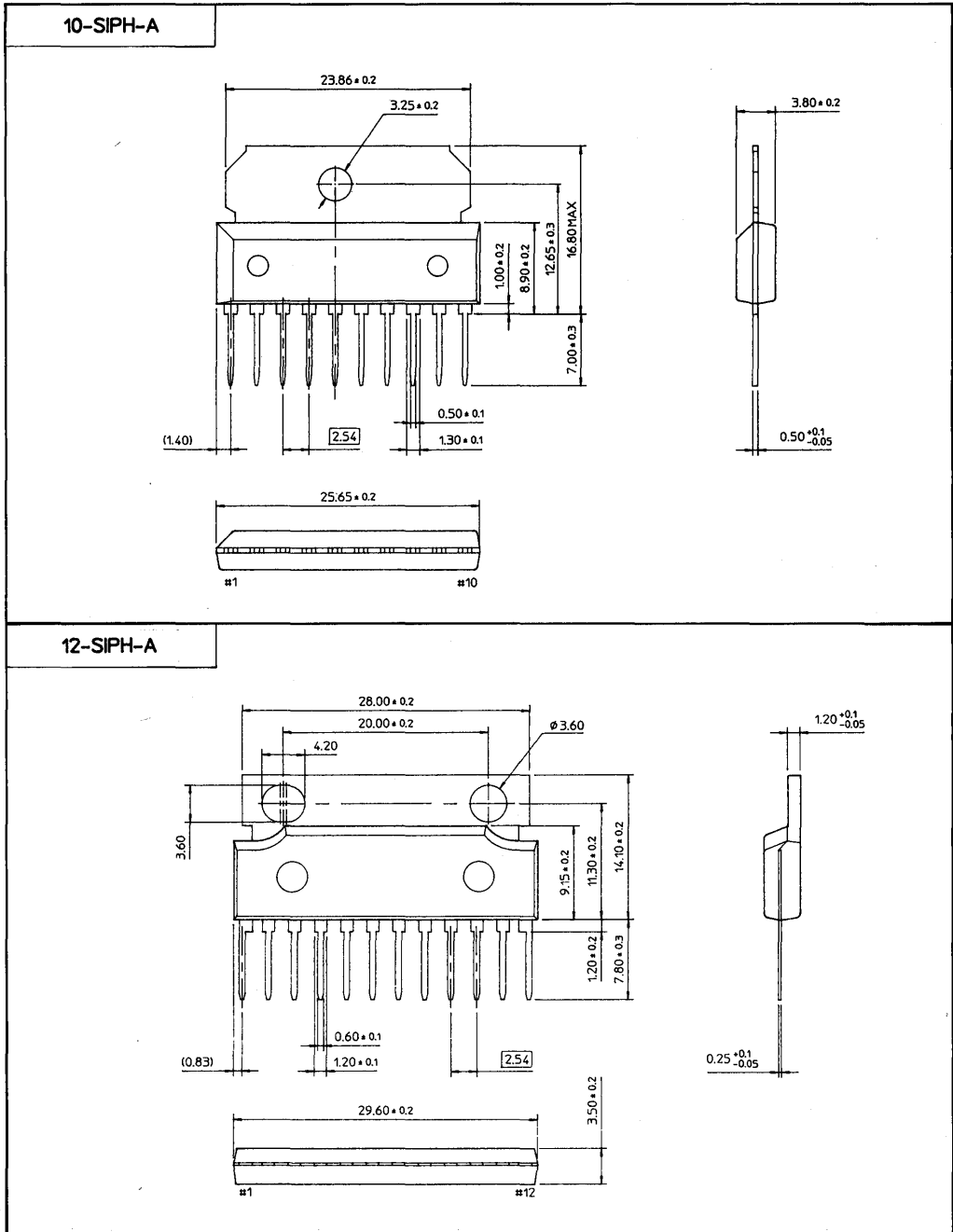
Dimensions in Millimeters



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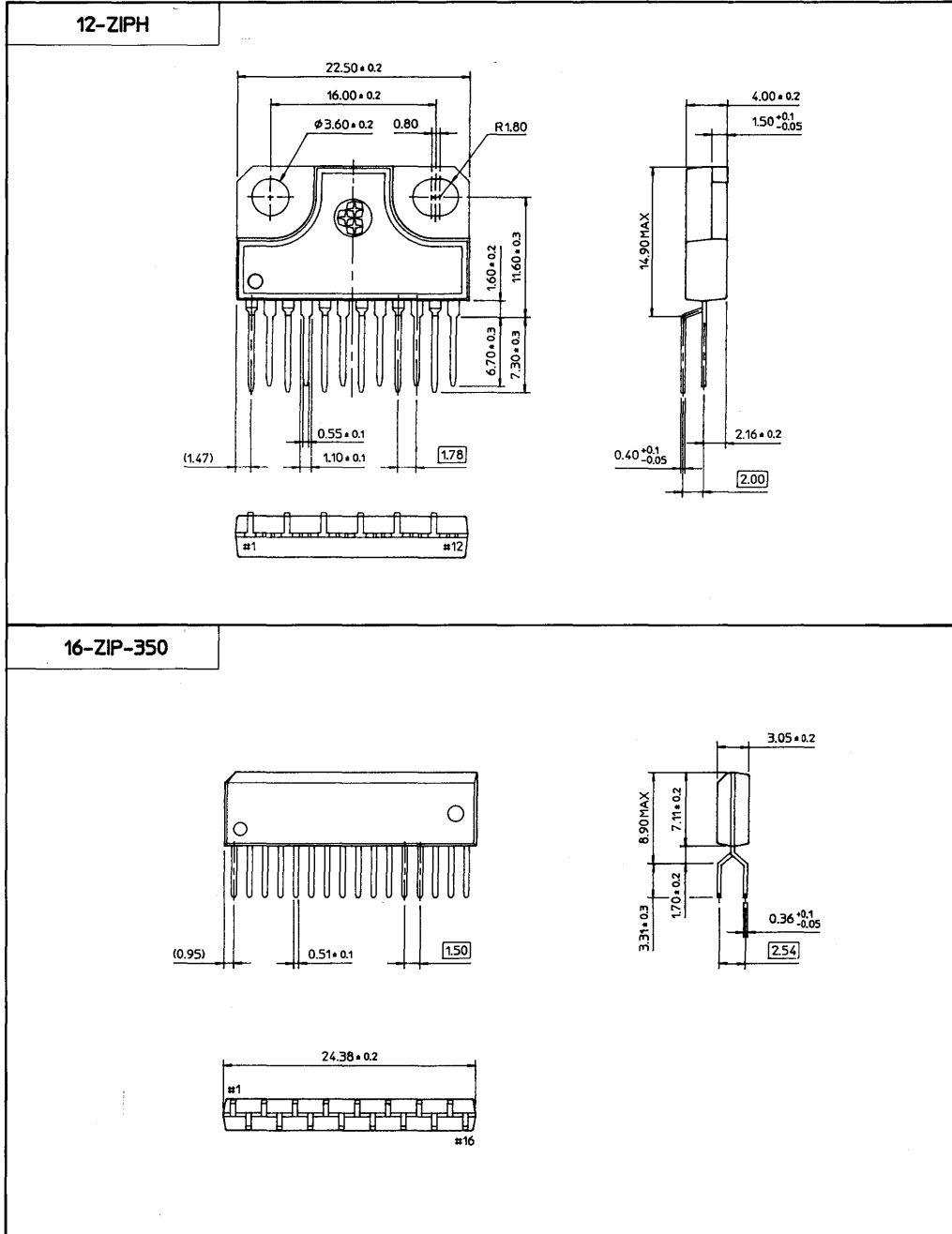
PACKAGE DIMENSIONS

Dimensions in Millimeters



PACKAGE DIMENSIONS

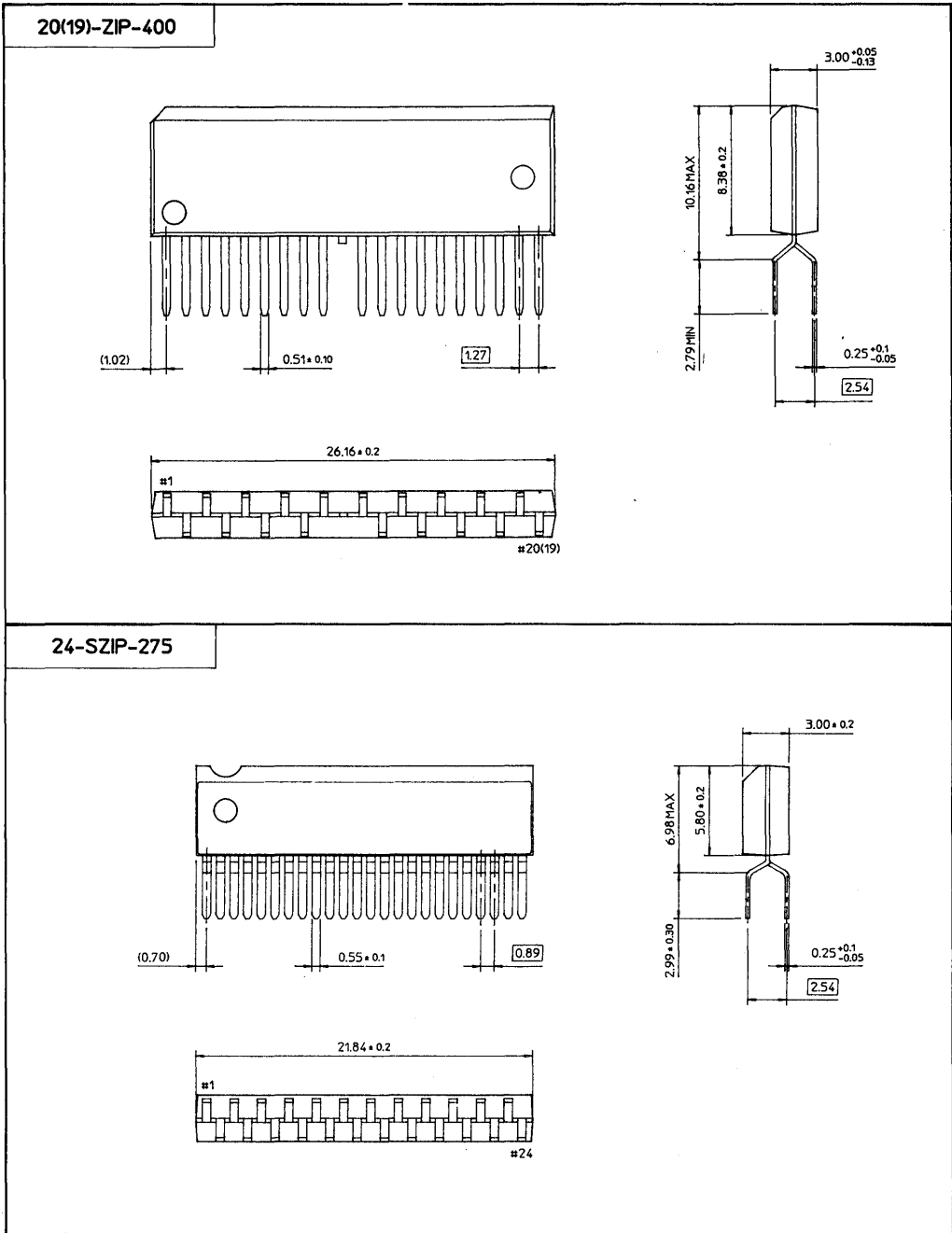
Dimensions in Millimeters



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PACKAGE DIMENSIONS

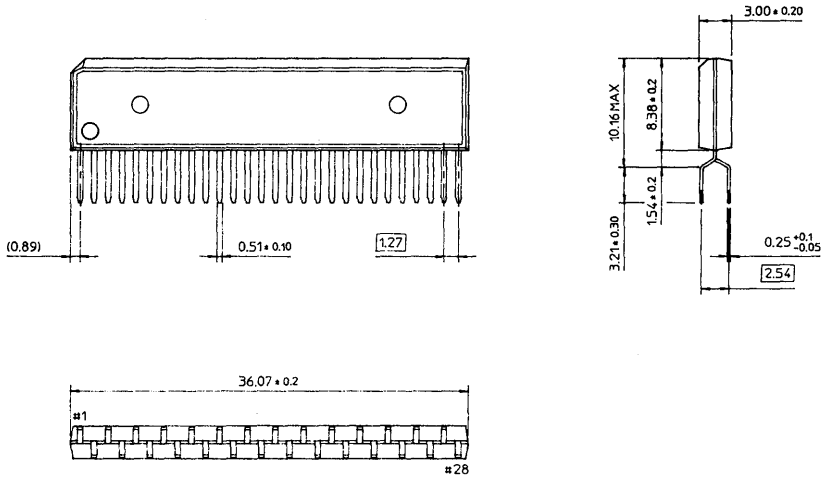
Dimensions in Millimeters



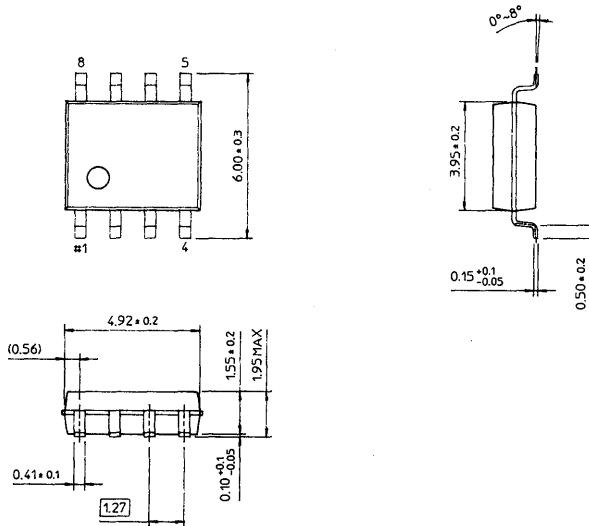
PACKAGE DIMENSIONS

Dimensions in Millimeters

28-ZIP-400A

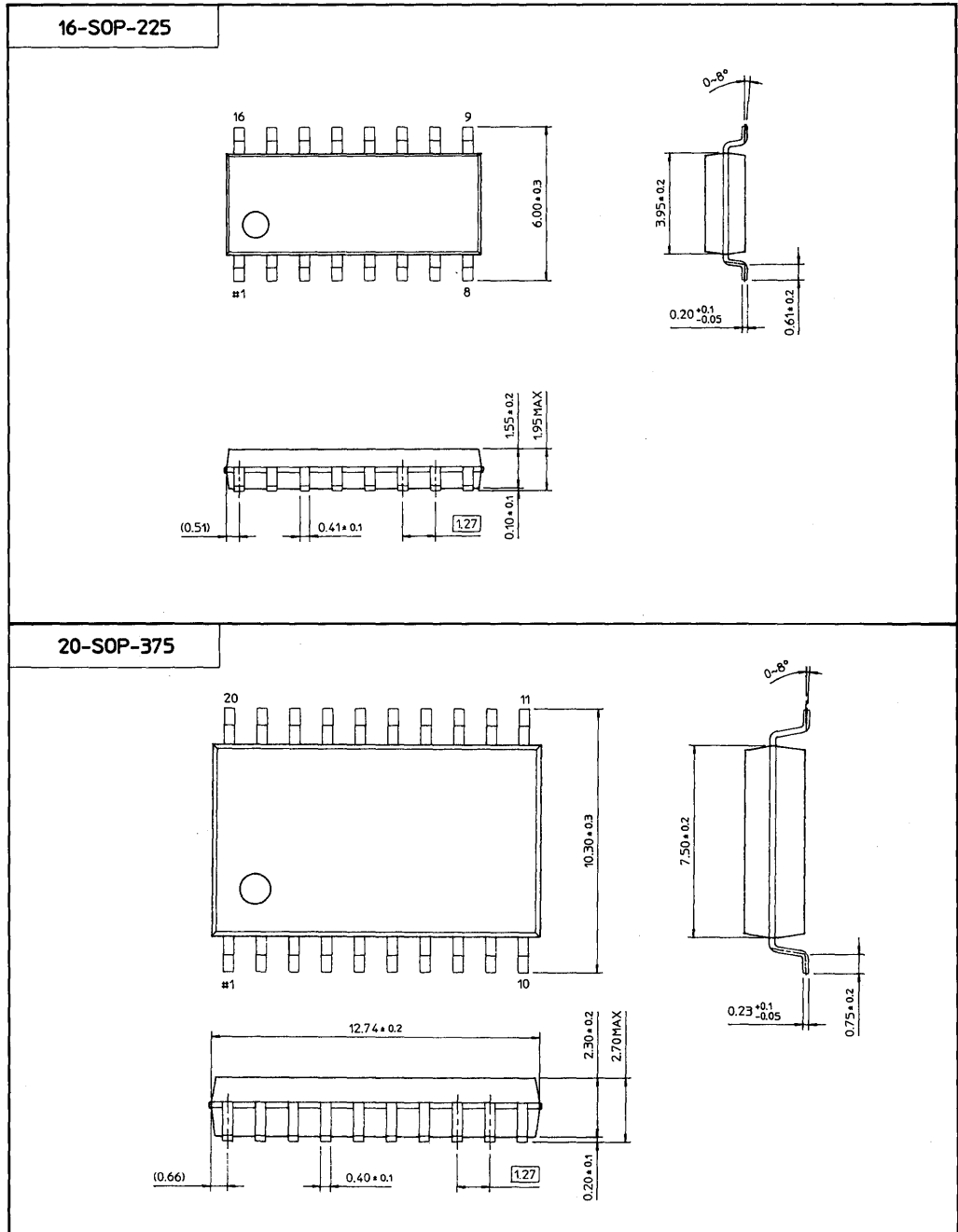


8-SOP-225



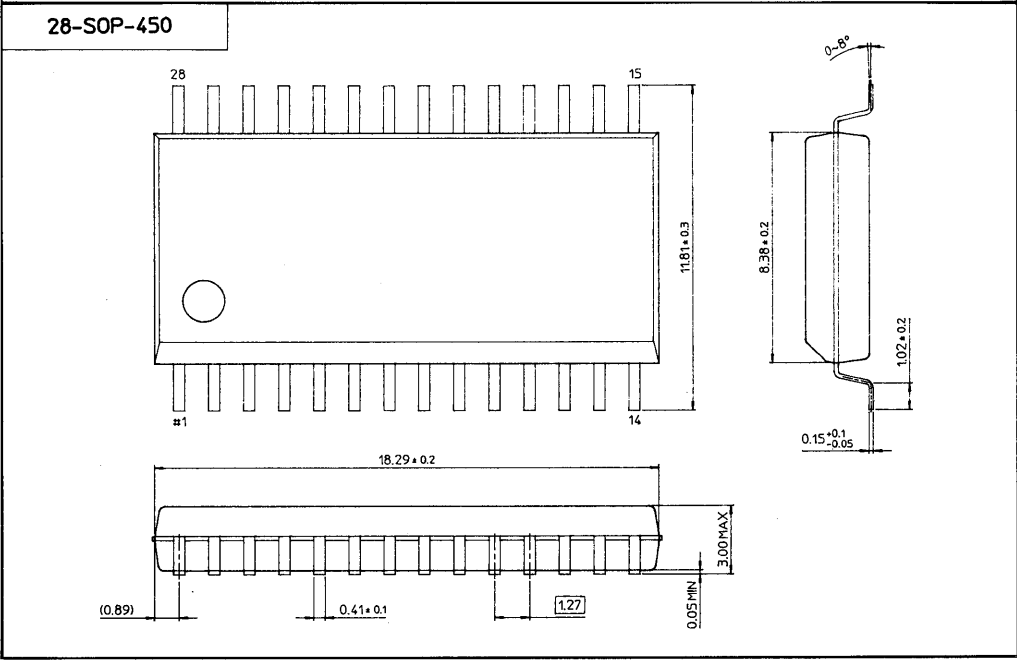
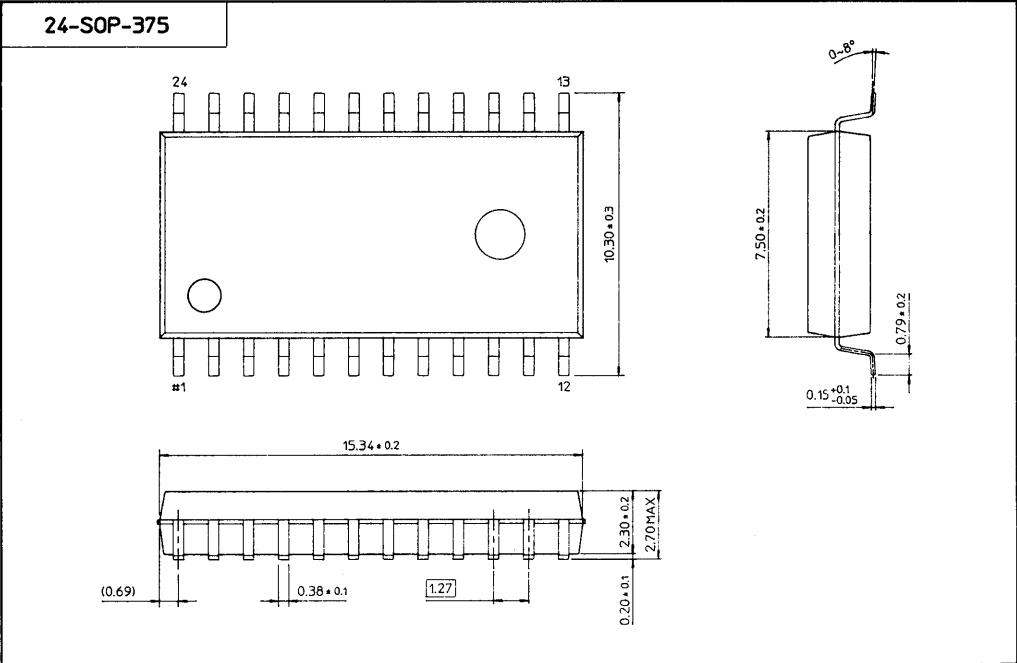
PACKAGE DIMENSIONS

Dimensions in Millimeters



PACKAGE DIMENSIONS

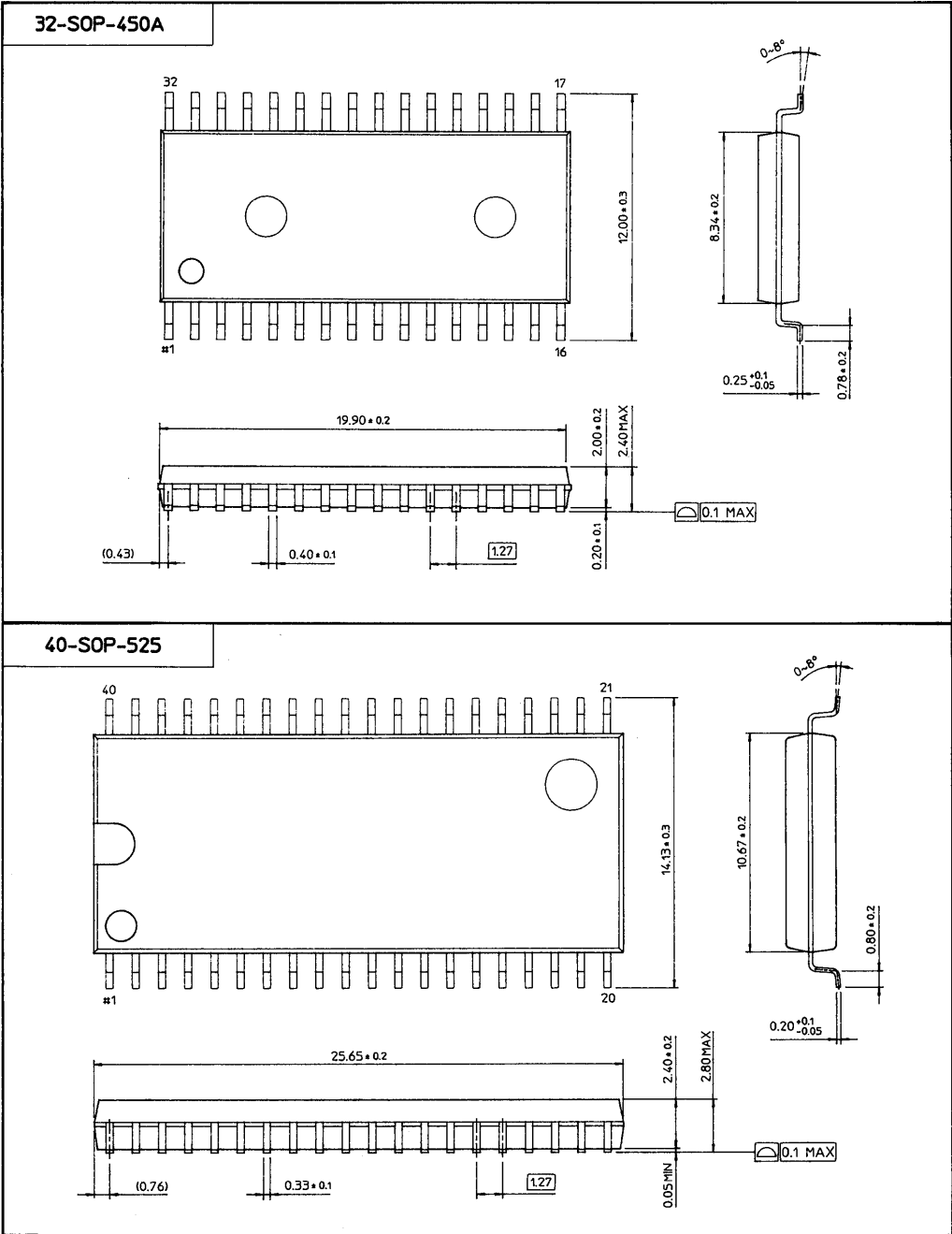
Dimensions in Millimeters



2

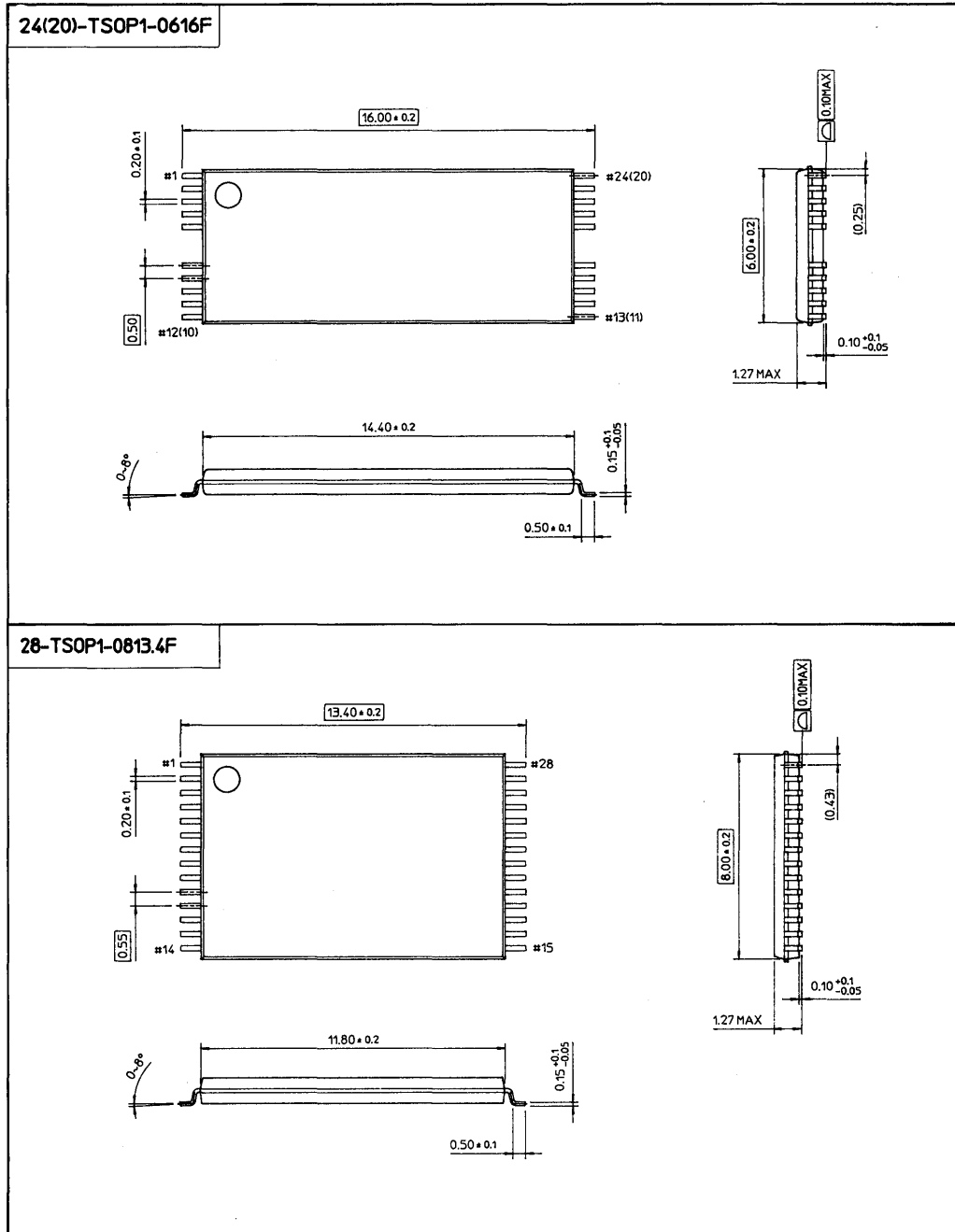
PACKAGE DIMENSIONS

Dimensions in Millimeters



PACKAGE DIMENSIONS

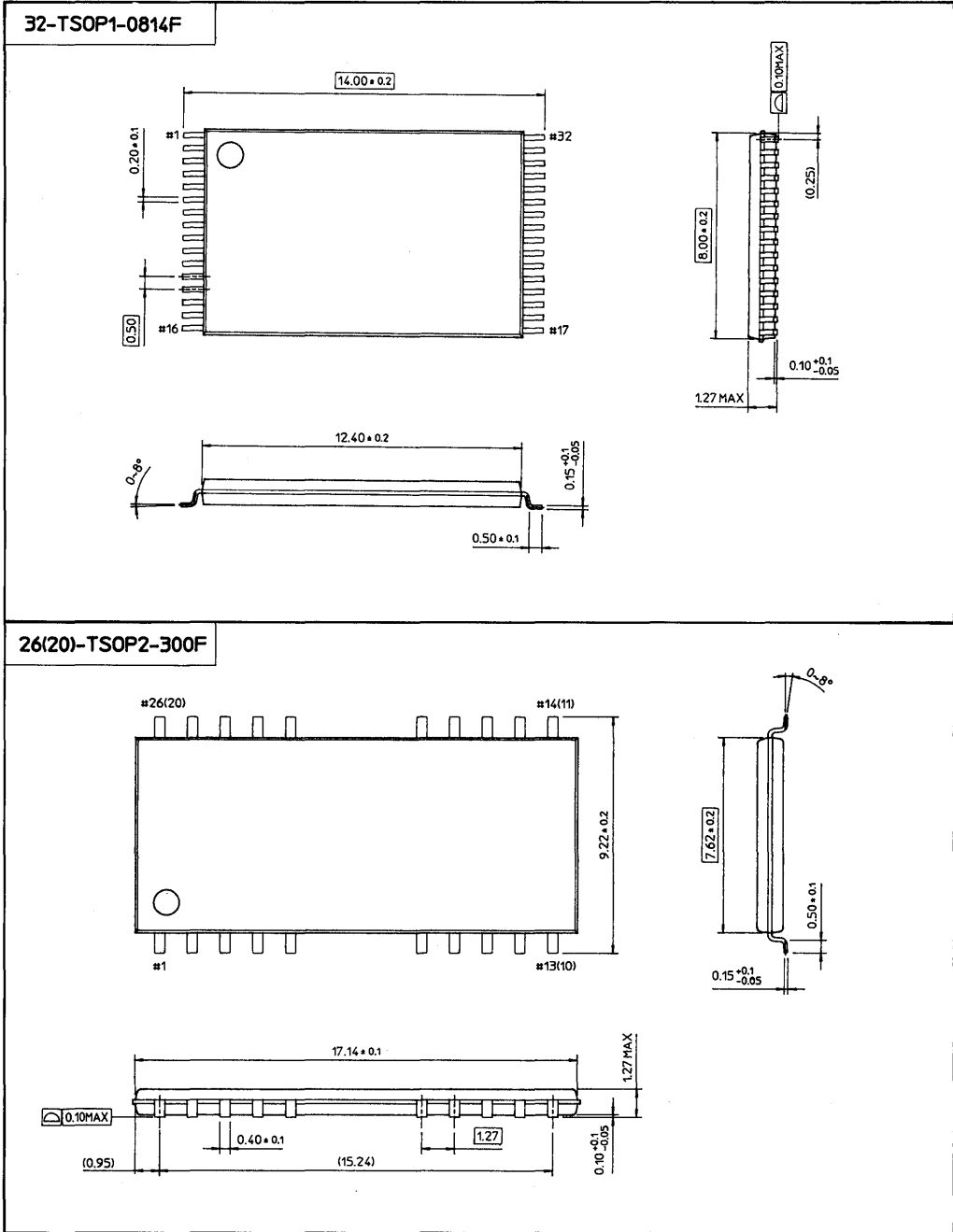
Dimensions in Millimeters



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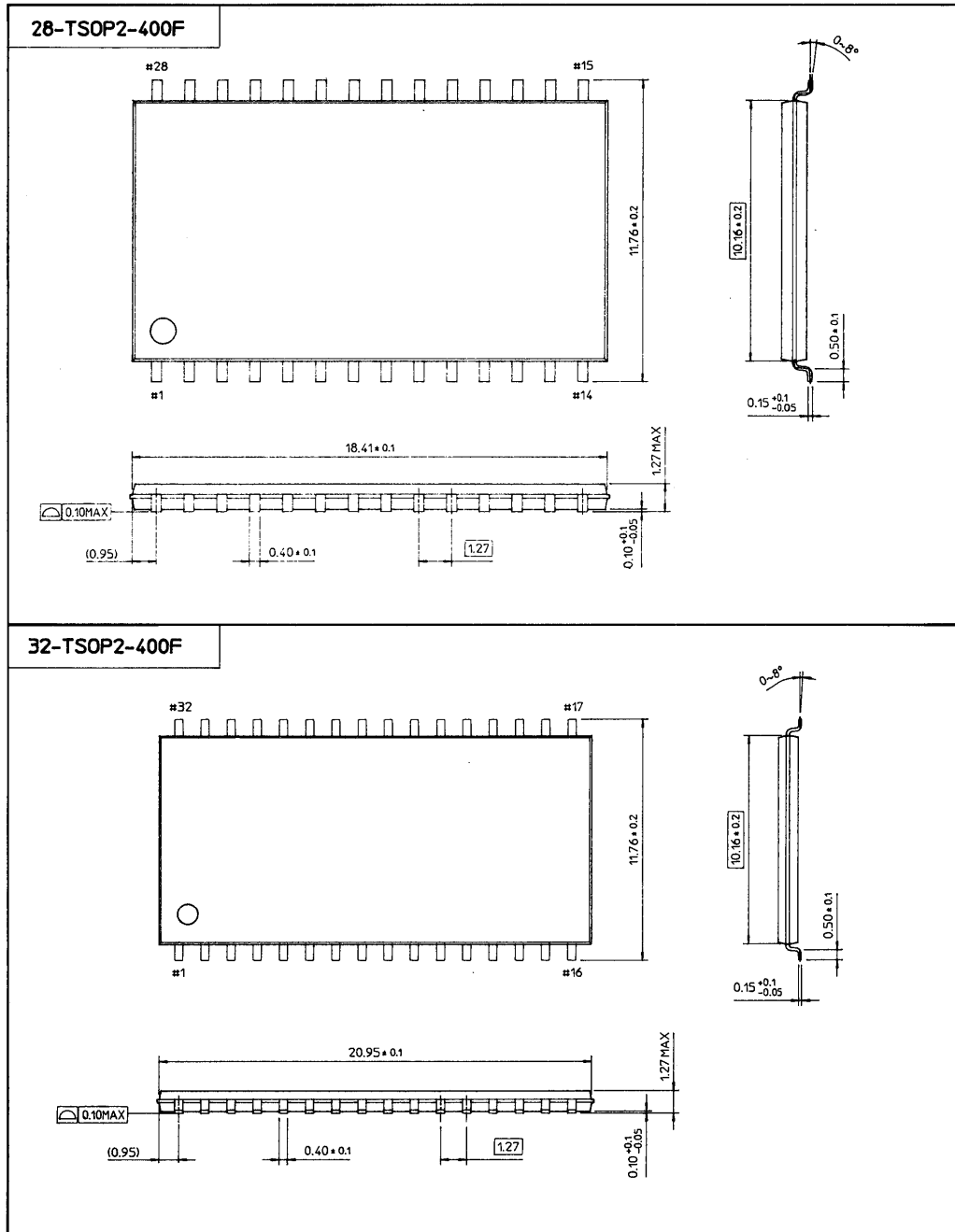
PACKAGE DIMENSIONS

Dimensions in Millimeters



PACKAGE DIMENSIONS

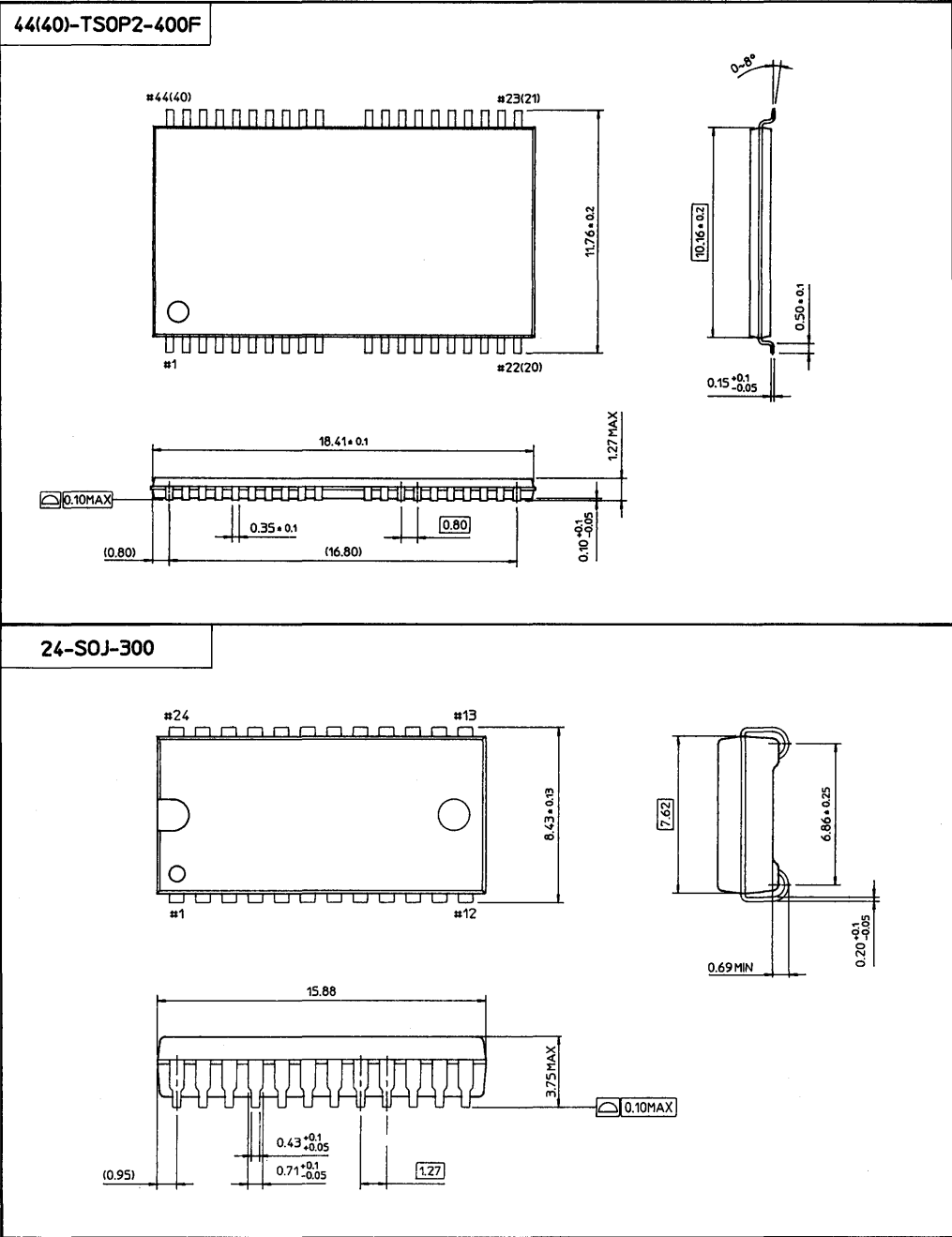
Dimensions in Millimeters



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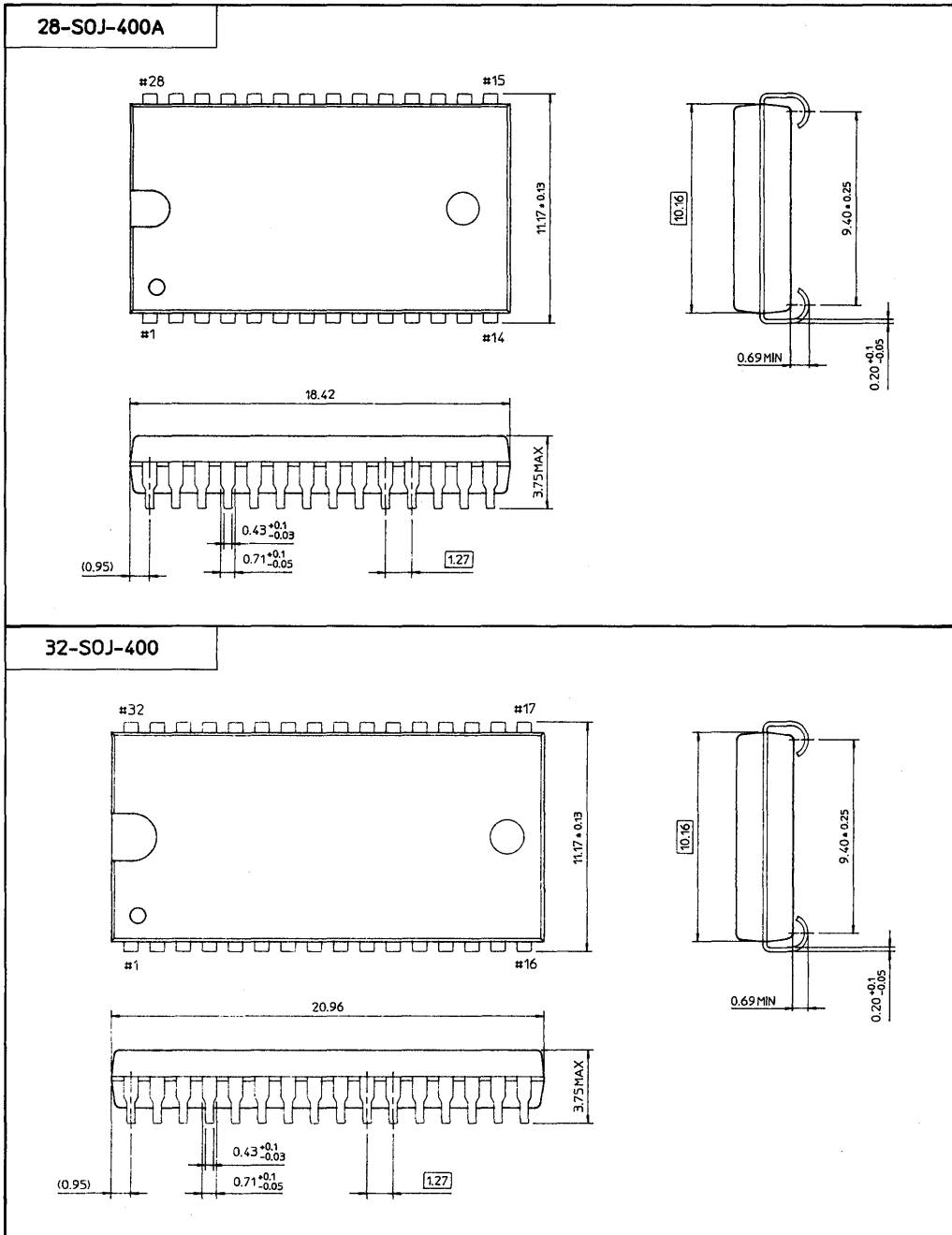
PACKAGE DIMENSIONS

Dimensions in Millimeters



PACKAGE DIMENSIONS

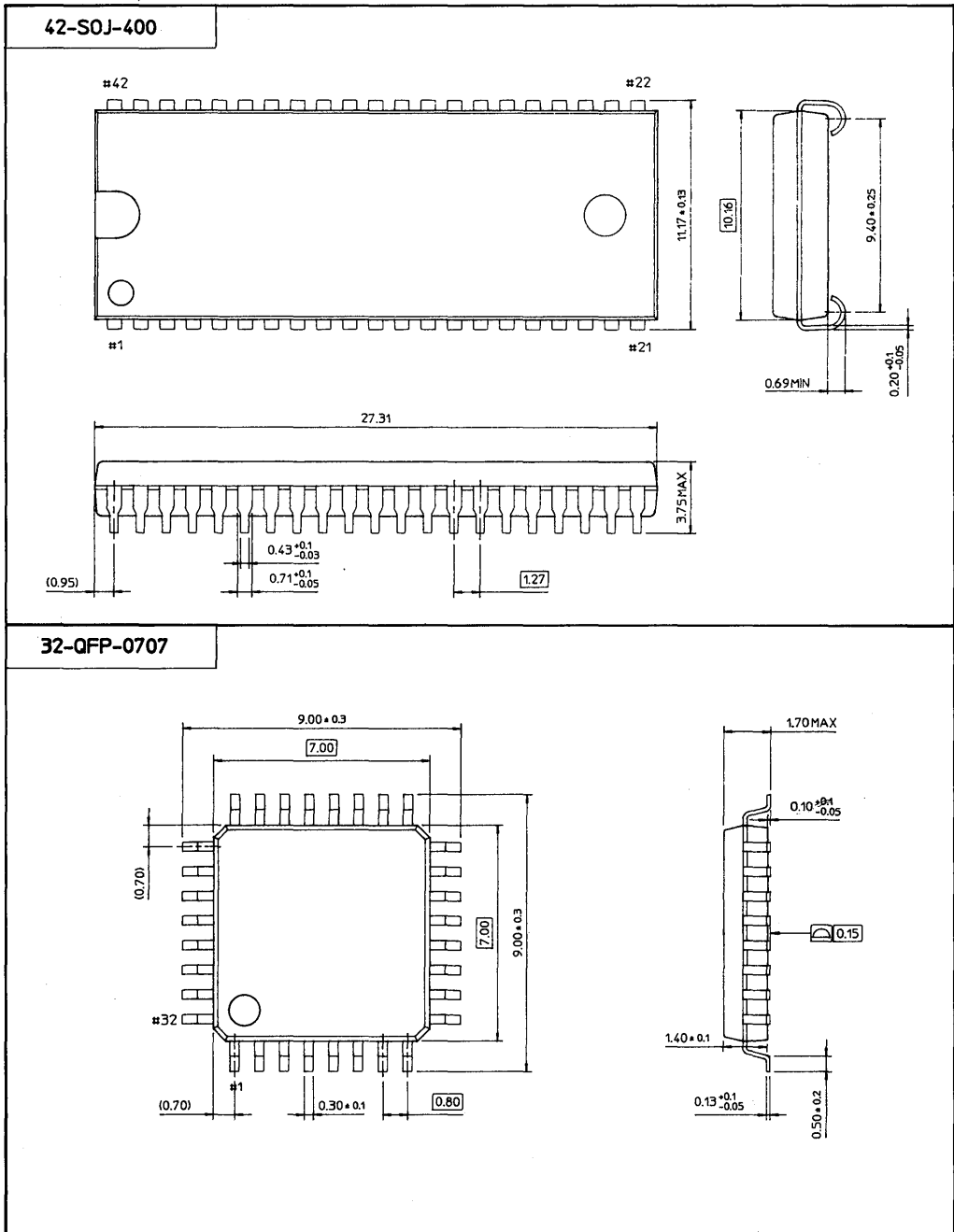
Dimensions in Millimeters



2

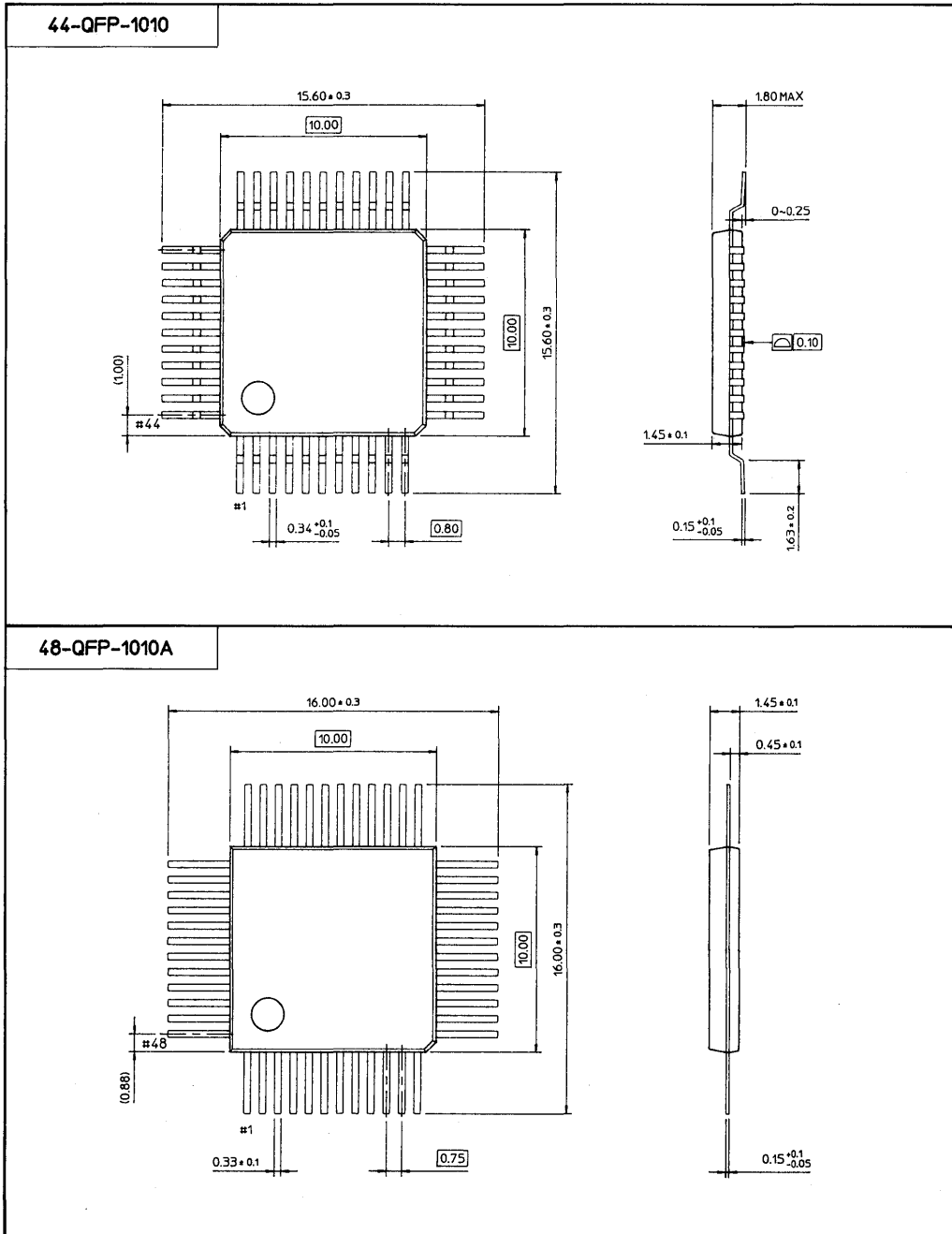
PACKAGE DIMENSIONS

Dimensions in Millimeters



PACKAGE DIMENSIONS

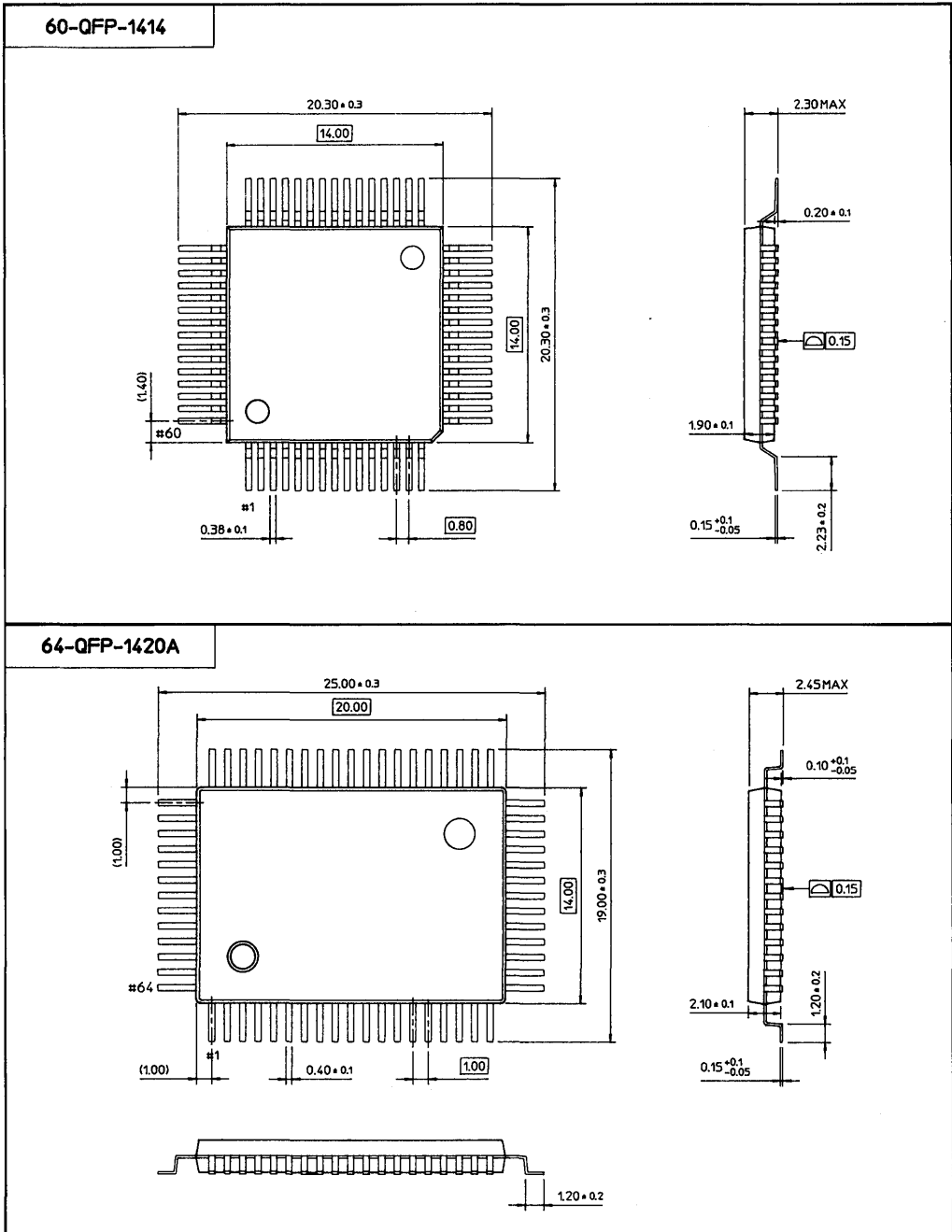
Dimensions in Millimeters



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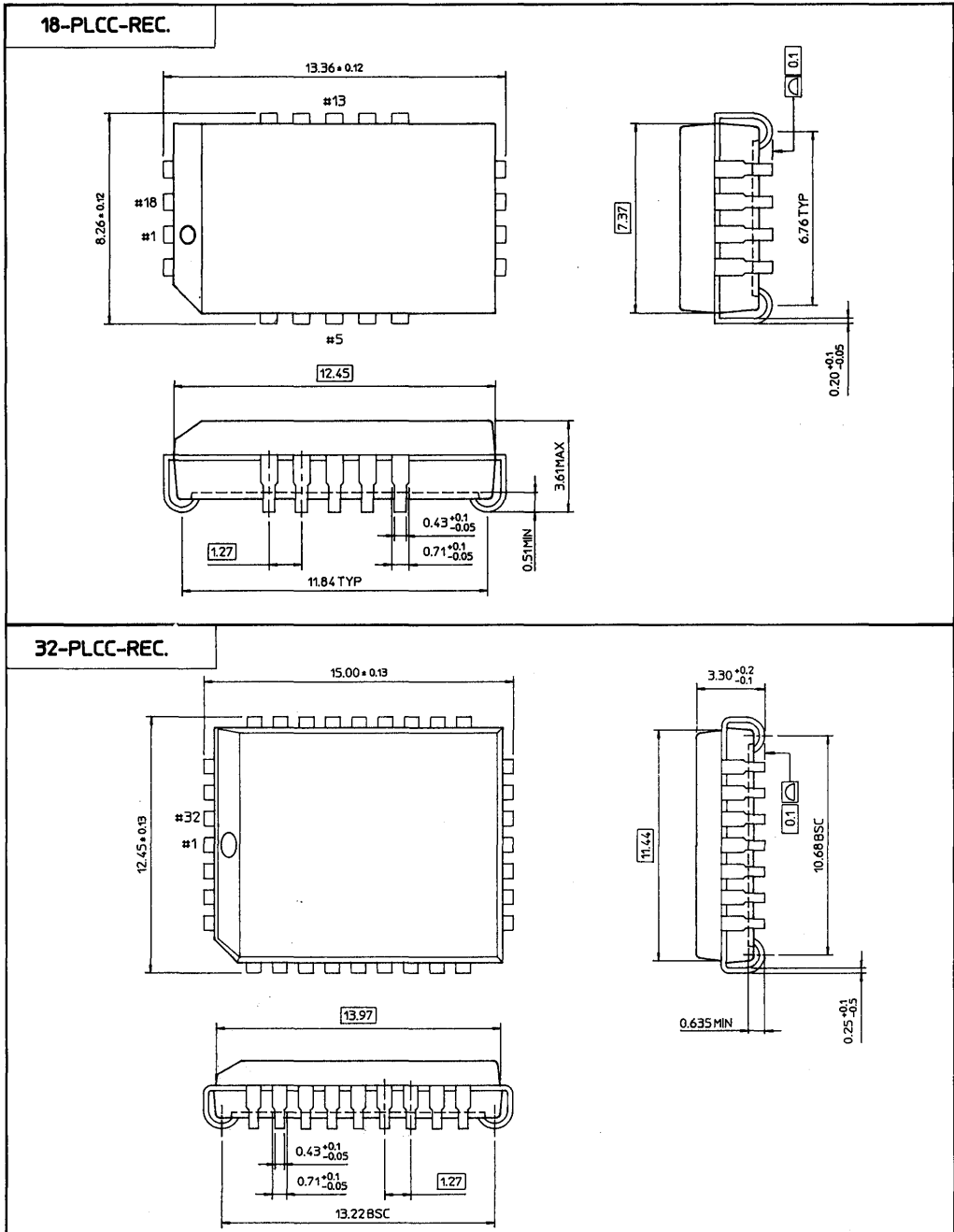
PACKAGE DIMENSIONS

Dimensions in Millimeters



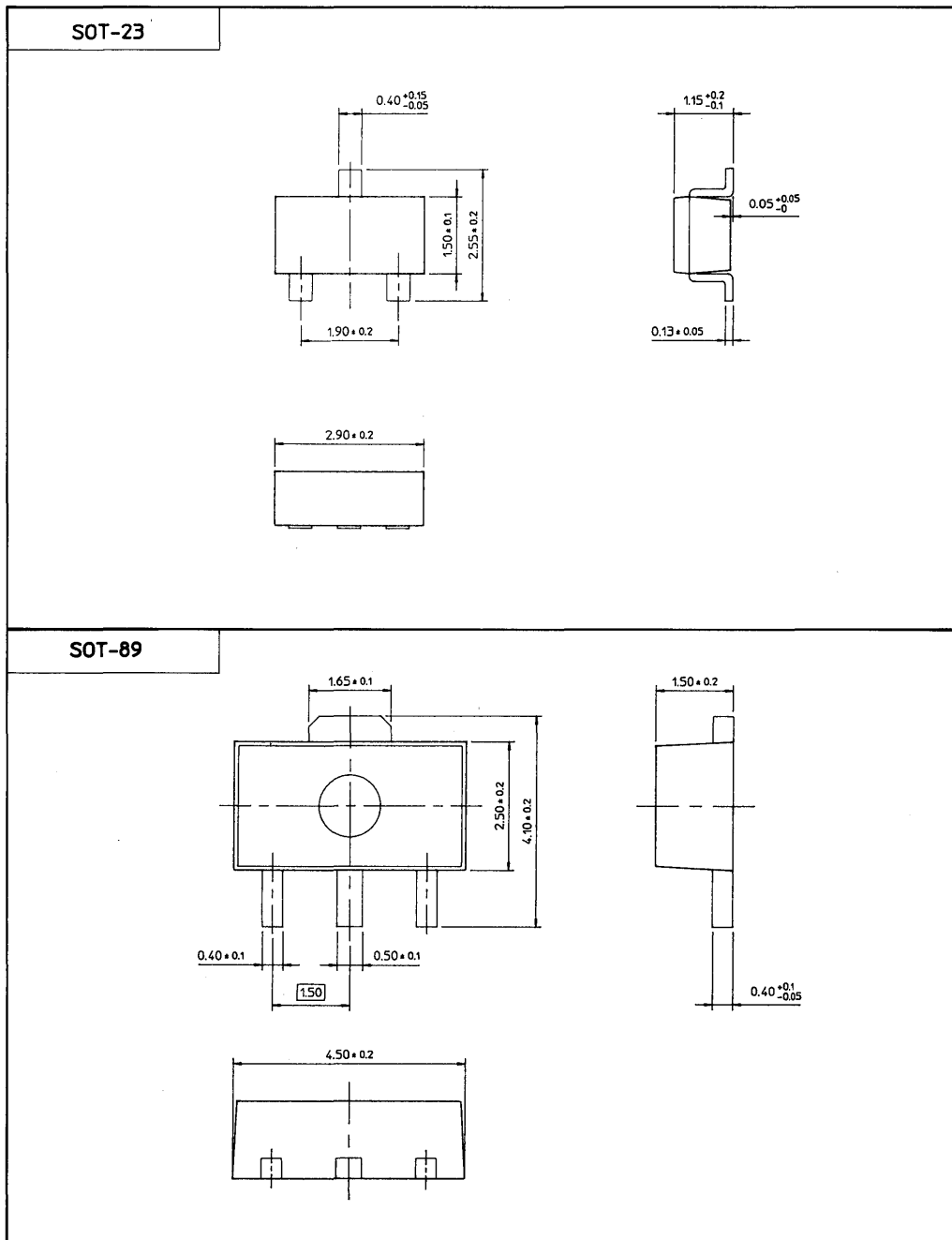
PACKAGE DIMENSIONS

Dimensions in Millimeters



PACKAGE DIMENSIONS

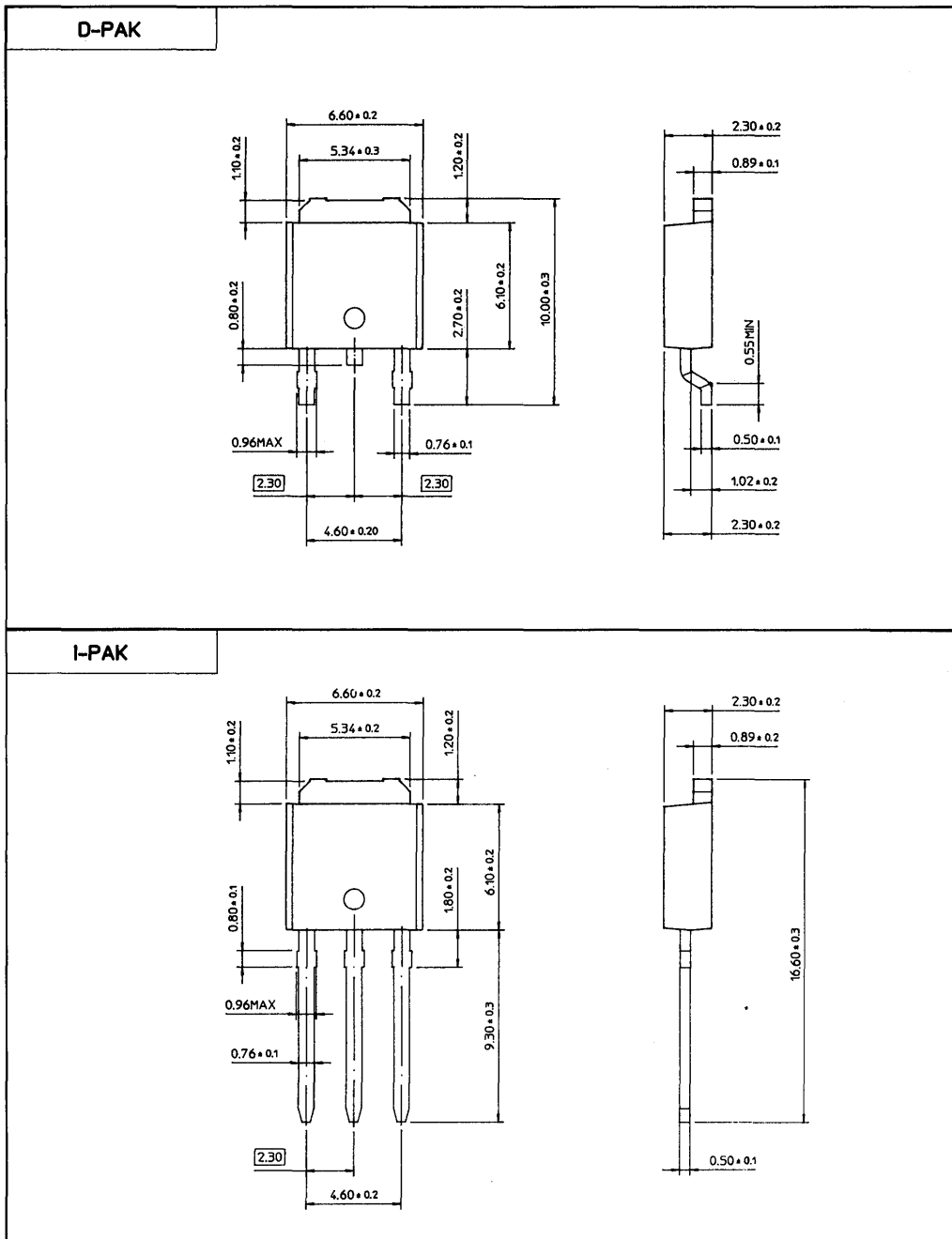
Dimensions in Millimeters



2

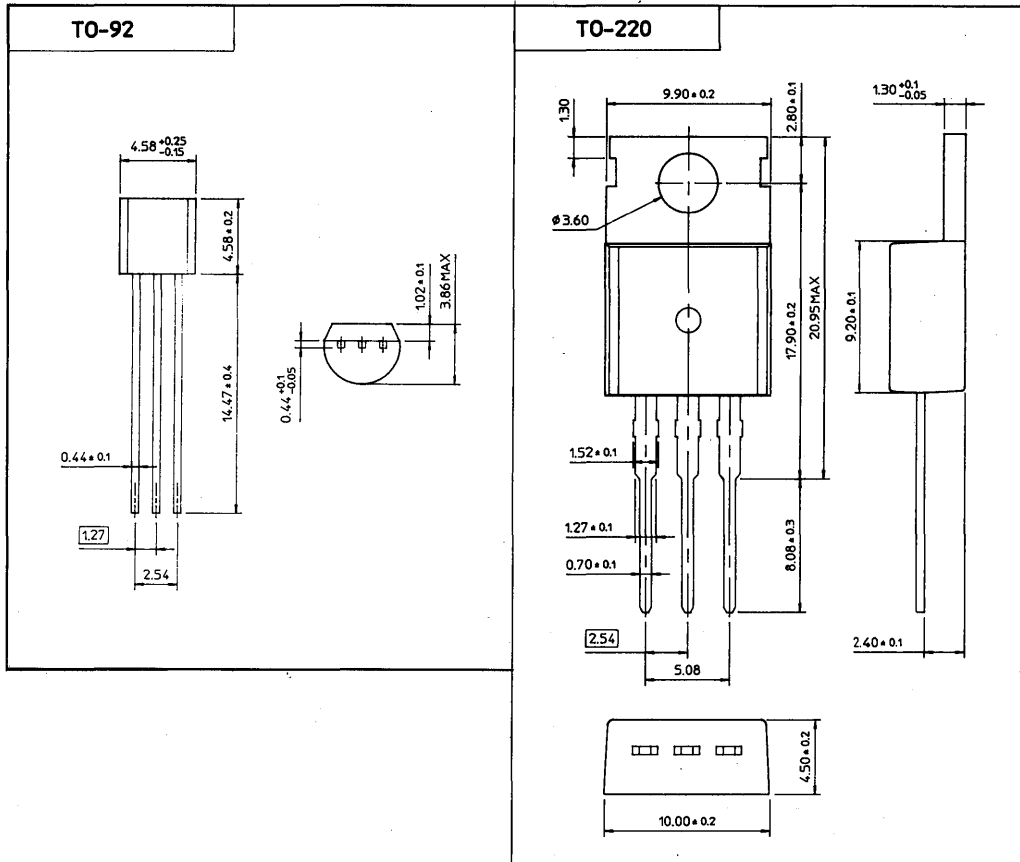
PACKAGE DIMENSIONS

Dimensions in Millimeters



PACKAGE DIMENSIONS

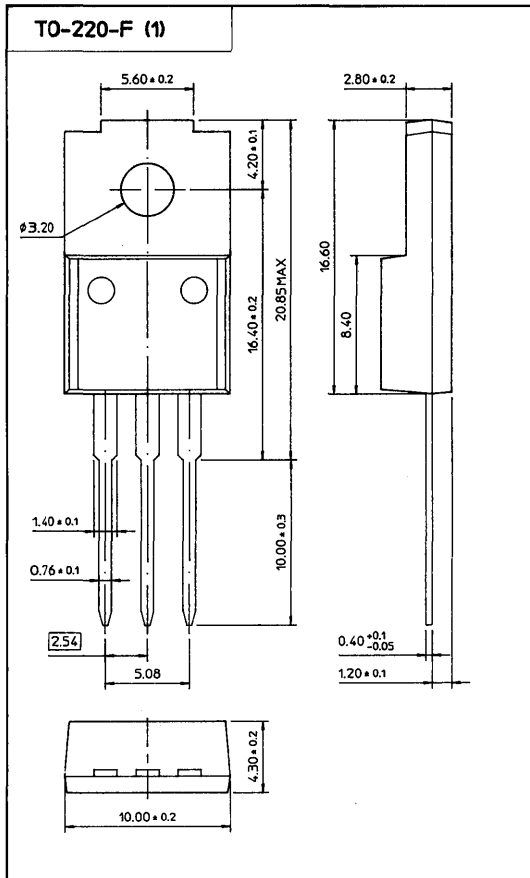
Dimensions in Millimeters



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PACKAGE DIMENSIONS

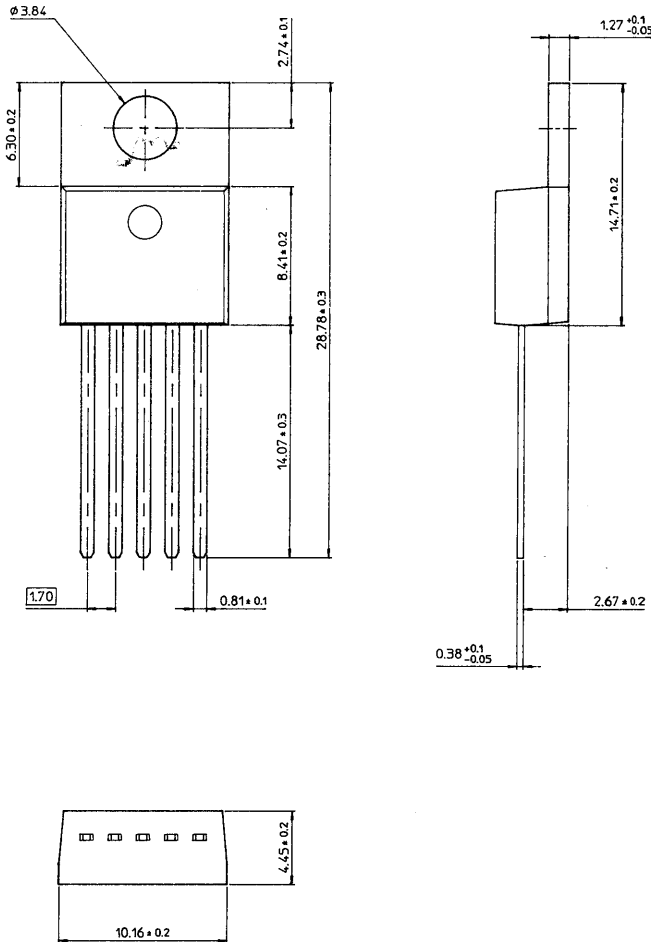
Dimensions in Millimeters



PACKAGE DIMENSIONS

Dimensions in Millimeters

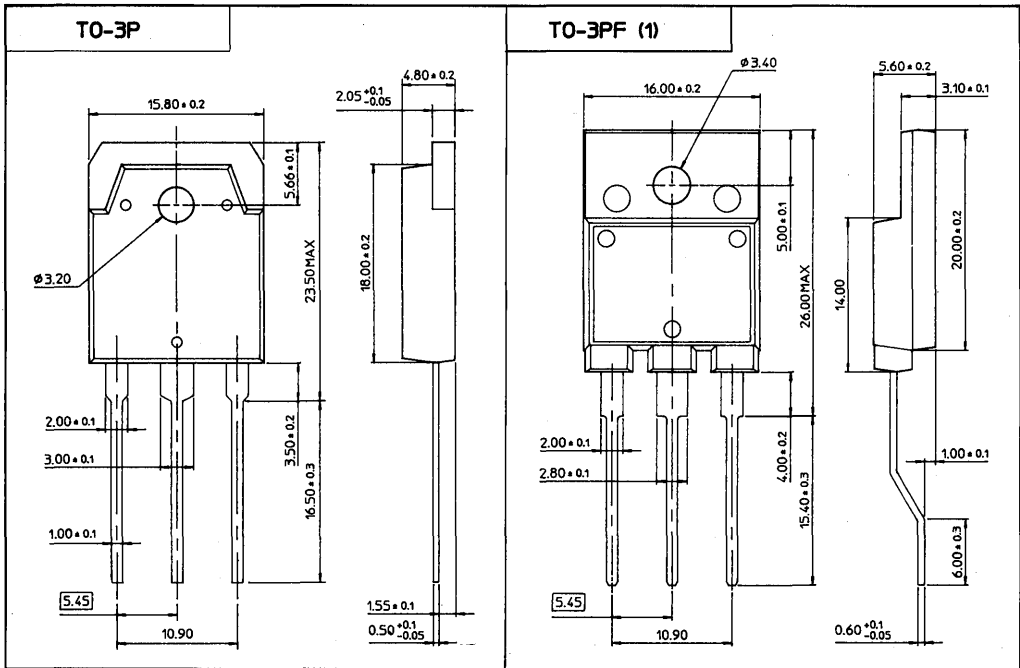
TO-220-5L (1)



2

PACKAGE DIMENSIONS

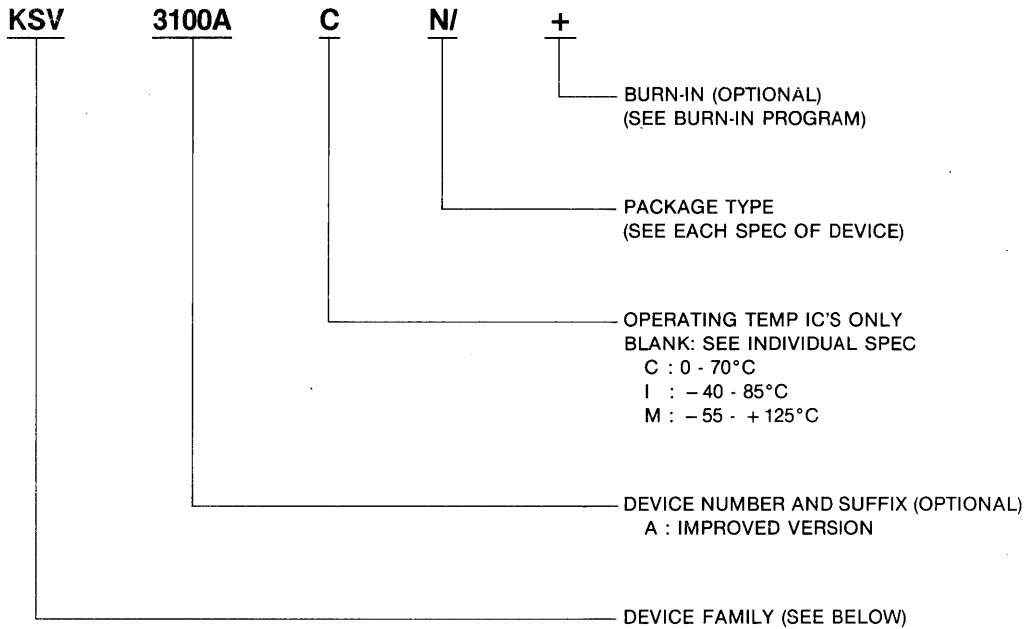
Dimensions in Millimeters





ORDERING INFORMATION 3

ORDERING INFORMATION



3

DEVICE FAMILY

TRANSISTOR / FET

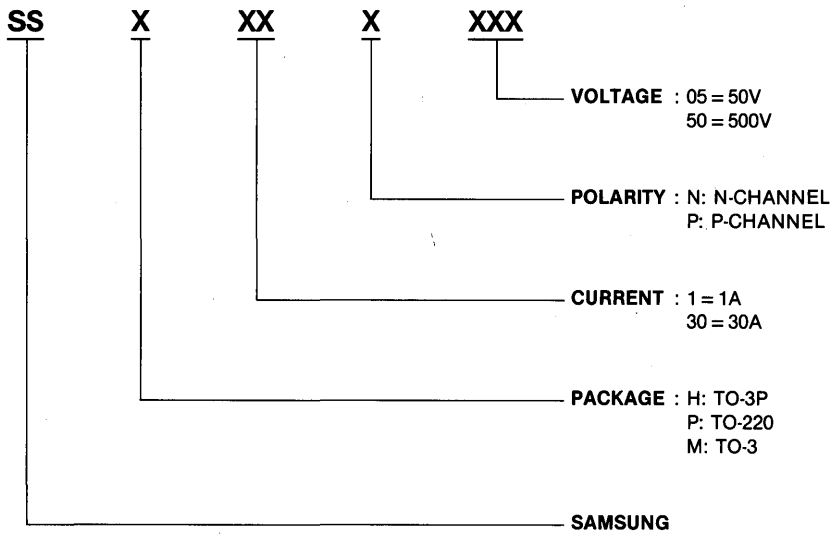
- DKS DALINGTON TR
- IRF MOS POWER
- IRFP MOS POWER, TO-3P
- KSA PNP TR
- KSB PNP TR
- KSC NPN TR
- KSD NPN TR
- KST TR, SOT-23
- KST TR, SOT-23
- KST TR, SOT-23
- KSP TR, TO-92
- KSP TR, TO-92
- KSP TR, TO-92
- PN TR, TO-92
- SSH MOS POWER, TO-3P
- SSP MOS POWER, TO-220
- TIP BIPOLAR TR
- 2N TR

INTEGRATED CIRCUIT

- KA LINEAR IC
- KG GATE ARRAY
- KS CMOS IC
- KT TELECOM
- SA LINEAR ARRAY
- SD H.L AND LINEAR ARRAY
- KSV A/D-D/A CONVERTER
- KAD A/D CONVERTER
- KDA D/A CONVERTER
- KC CCD

- NOTE: Direct-Replacement parts for products initiated by other manufacturers

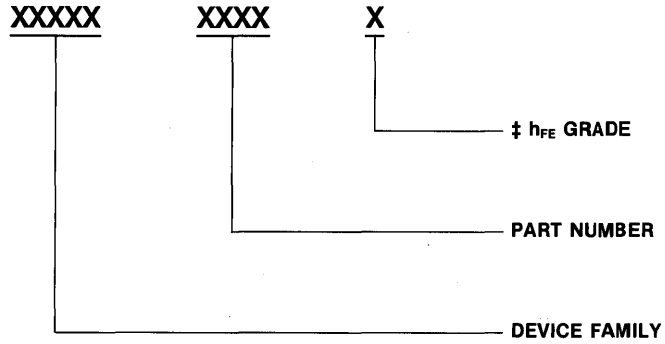
ORDERING INFORMATION



IRFP100 THRU 400 SERIES : TO-3P N-CH
IRFP9100 THRU 9200 SERIES : TO-3P P-CH
IRF500 THRU 800 SERIES : TO-220 N-CH
IRF9500 THRU 9600 SERIES : TO-220 P-CH

ORDERING INFORMATION

BIPOLAR TRANSISTOR



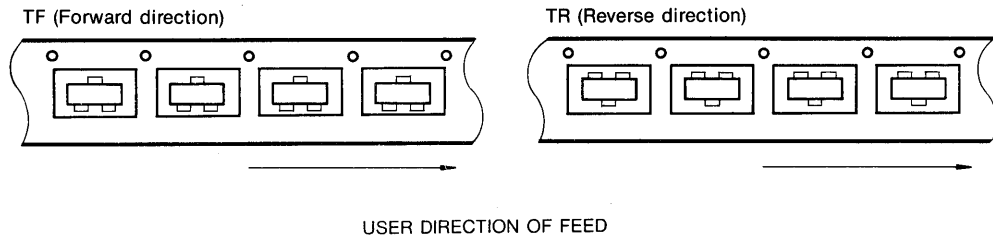
† h_{FE} GRADE SEE INDIVIDUAL SPEC.

ORDERING INFORMATION

SOT-23 ORDERING INFORMATION

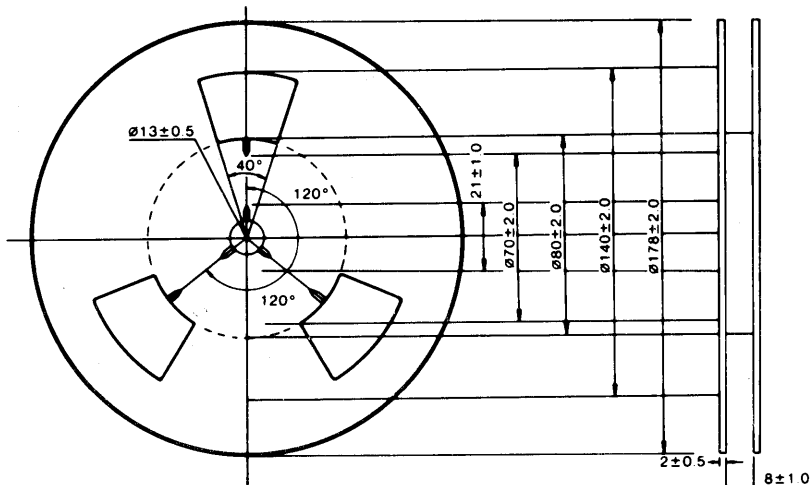
TAPE AND REEL TYPE

Samsung's tape and reel fully meets EIA standard RS481 (8mm Type) all parts will be shipped in tape and reel forward (TF) tape and Reel Reverse (TR) tape and reel 13" types (TI). TF, TR, TI are available according to the packing type added to the device number. Also Samsung's tape and reel's Quantity have 2 types. One type is 3K per reel another type is 10K per reel. And minimum order quantity is 3K PCS.



CARRIER TAPE REELS

Unit: mm



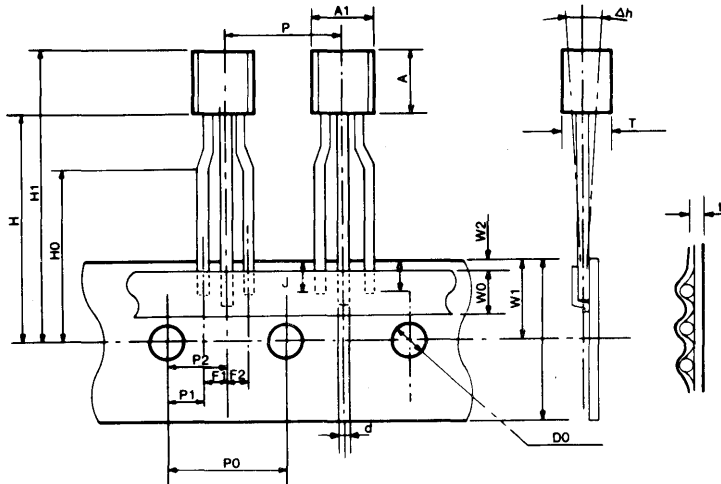
ORDERING INFORMATION

TO-92 ORDERING INFORMATION

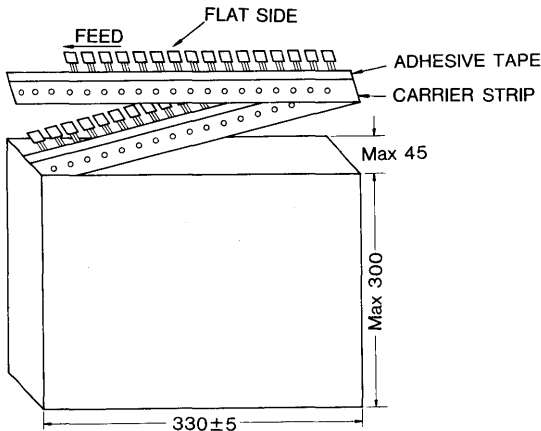
AMMO PACK, BULK, TAPE & REEL FORWARD and TAPE & REEL REVERSE are available. The device will be shipped in 4 kind of packing description.

AMMO PACK

TO-92 TAPING SPECIFICATION



P	12.7±0.5	H ₀	16±0.5
P ₀	12.7±0.2	F	5 ^{+0.1} / _{-0.1}
P ₁	3.85±0.5	F ₁ , F ₂	±0.3
P ₂	6.35±0.5	D ₀	4±0.2
W	18 ^{+0.1} / _{-0.1}	t	0.65±0.2
W ₀	6±0.5	Δh	C±1
W ₁	9±0.5	d	0.46
W ₂	Max. 0.5	T	3.56
H	Max. 21	L ₁	Min. 2.5
H ₁	Max. 27		



FLAT SIDE OF TRANSISTOR and ADHESIVE TAPE VISIBLE

1 AMMO PACK contains 2000 pcs Transistors.

SAMSUNG's AMMO PACK is equivalent to styles A,B,C,D of reel pack depending on which box-flat is opened and which end of the box the devices are fed from.

Minimum Order Quantity is 1 AMMO PACK.
Increment is 1 AMMO PACK

BULK TYPE

Minimum Order Quantity is 2000 pcs.
Increment is 1000pcs.

ORDERING INFORMATION

SAMSUNG'S A+ Program

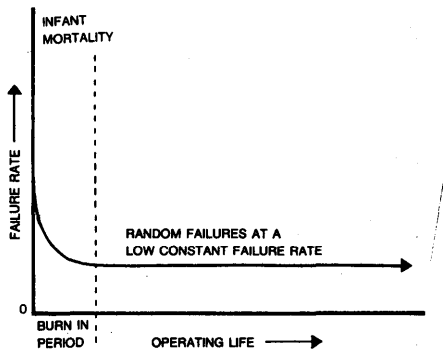
The Samsung A+ Program has been designed to offer the customer an alternative to standard off-the-shelf plastic encapsulated CMOS circuits. The A+ Program will significantly reduce incoming inspection requirements as well as early device failures (infant mortality). These results are achieved by a tightened AQL inspection plan and a burn-in of each unit for 160+8, -0 hours at 125°C or equivalent conditions established from a time/temperature regression curve.

The AQL Plan. Acceptable Quality Levels (AQL) are a measure of the quality of outgoing CMOS circuits. These levels are established by the manufacturer to show the process percent defective being produced and to ensure that the customer is receiving material that meets his requirements. The Samsung A+ Program has tightened these AQL levels to a point at which incoming inspection by the customer is no longer a necessity. A+ product quality is monitored significantly more closely than standard product; those lots which fall the AQL level are 100% reworked before resubmission to the AQL gate.

The Reliability Plan. Reliability is the statistical probability that a product will give satisfactory performance for a specified period of time when used under specified conditions. A typical rate curve is shown below:

Reliability theory assumes that devices fail according to the above curve. When a group of devices is manufactured a small portion of the units will be inherently weaker than the average. These weak units will probably fail during the first few hours of operation—hence the term "infant mortality." If the units are burned-in however, thereby allowing the weak units to fail, there is a much lower probability that those finally put into system use will fail.

The SAMSUNG A+ Flow. In order to achieve an extremely high quality unit and reduce infant mortality failures the following flow has been established:

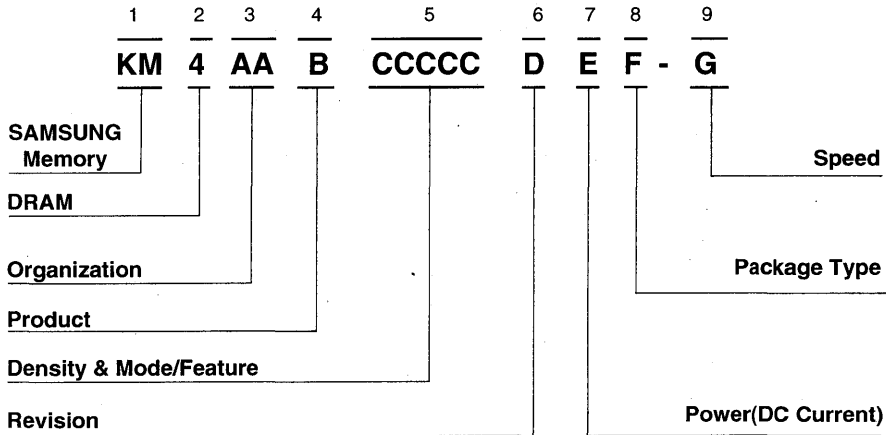


Process Flow

	DESCRIPTION
☐	WAFER FABRICATION CMOS PROCESS CV PLOTS OXIDE AND NITRIDE THICKNESS MEASUREMENTS OPTICAL INSPECTIONS SEM ANALYSIS
☐	ENCAPSULATION NITTO HC10 TYPE 2 EPOXY MOLDING COMPOUND ULTRA PURE FOR CMOS APPLICATIONS
☐	POST MOLD BAKE 6 HOURS AT 175 DEG. C. CURES PLASTIC STRESSES ALL WIRE BONDS AND DIE
☐	O/S FUNCTIONAL ELECTRICAL 100% TESTING OPENS/SHORTS AND INTERMITTENTS REMOVE
☐	HIGH TEMPERATURE BURN-IN 160 HOURS AT 125 DEG. C. OR EQUIVALENT CONDITIONS ESTABLISHED FROM A TIME/ TEMPERATURE REGRESSION CURVE. 0.96 eV
☐	FULL FUNCTIONAL AND PARAMETRIC ELECTRICAL TESTING 100% ELECTRICAL TESTING AC, DC 88 DEG. C.
■	THERMAL SHOCK MONITOR -65 DEG. C. TO + 125 DEG. C. LIQUID TO LIQUID 5 CYCLES- SAMPLES SELECTED AT RANDOM
☐	TIGHT AQL SAMPLING PLAN ELECTRICAL-0.05% AQL AT 88 DEG. C. MECHANICAL-0.01% AQL CRITICAL & MAJOR
☐	SHIP UNITS

ORDERING INFORMATION

DRAM



1. SAMSUNG Memory

2. DRAM(4)

3. Organization

1	-----	x 1
4	-----	x 4
8	-----	x 8
9	-----	x 9
16	-----	x 16
18	-----	x 18
32	-----	x 32

4. Product

C	-----	5V
V	-----	3.3V

5. Density & Mode/Feature

Refer to the previous "Chapter 2. Product Guide."

6. Revision

Blank	-----	1st Gen.
A	-----	2nd Gen.
B	-----	3rd Gen.
C	-----	4th Gen.
D	-----	5th Gen.

7. Power(DC Current)

Blank	-----	Normal
L	-----	Low power with Self refresh
SL	-----	Super Low power

8. Package Type

J	-----	SOJ
T	-----	TSOP II (Forward)
TR	-----	TSOP II (Reverse)
P	-----	DIP
Z	-----	ZIP
K	-----	SOJ(Shrunked PKG,SOJ)
S	-----	TSOP II (Shrunked PKG,Forward)
SR	-----	TSOP II (Shrunked PKG,Reverse)

9. Speed

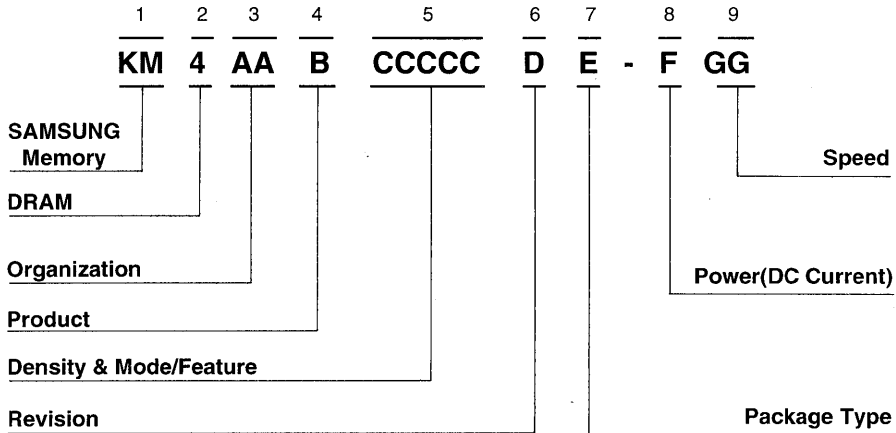
- 5	-----	50 ns
- 6	-----	60 ns
- 7	-----	70 ns
- 8	-----	80 ns

ORDERING INFORMATION

DRAM (Continued)

* NEW DRAM ORDERING SYSTEM

This new DRAM ordering system will be used for all SAMSUNG's New DRAM products from 1995. In '95 DRAM Databook, only used for 1M 5th Gen., 16M Byte Word Wide 2nd Gen. and 64M DRAM.



1. SAMSUNG Memory

2. DRAM(4)

3. Organization

1	-----	x 1
4	-----	x 4
8	-----	x 8
9	-----	x 9
16	-----	x 16
18	-----	x 18
32	-----	x 32

4. Product

C	-----	5V
V	-----	3.3V

5. Density & Mode/Feature (Same)

6. Revision

Blank	-----	1st Gen.
A	-----	2nd Gen.
B	-----	3rd Gen.
C	-----	4th Gen.
D	-----	5th Gen.

7. Package Type

J	-----	SOJ
T	-----	TSOP II (Forward)
R	-----	TSOP II (Reverse)
P	-----	DIP
Z	-----	ZIP
K	-----	SOJ(Shrunked PKG,SOJ)
S	-----	TSOP II (Shrunked PKG,Forward)
W	-----	TSOP II (Shrunked PKG,Reverse)

8. Power(DC Current)

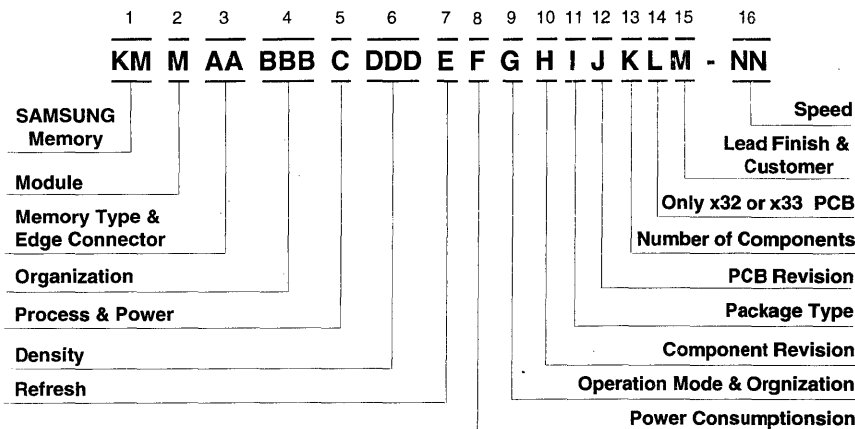
Blank	-----	Normal
L	-----	Low power with Self refresh
H	-----	Super Low power

9. Speed

- 5	-----	50 ns
- 6	-----	60 ns
- 7	-----	70 ns
- 8	-----	80 ns

ORDERING INFORMATION

DRAM Module (SIMM)



1. SAMSUNG Memory

2. Module

3. Memory Type & Edge Connector

- 1 ----- FLASH
- 2 ----- Mask ROM
- 3 ----- DRAM DIMM
- 4 ----- DRAM SIP
- 5 ----- DRAM SIMM
- 6 ----- SRAM
- 7 ----- Pseudo SRAM
- 8 ----- ASSP
- 9 ----- VRAM

4. Organization

- 8/9 ----- x8/x9 bit wide
- 18 ----- x18 bit wide
- 32/33 ----- x32/x33
- 36/40 ----- x36/x39/x40
- 64/66 ----- x64/x66
- 72/80 ----- x72/x80
- 144 ----- x144 bit wide

5. Process & Operating Voltage

- Blank ----- CMOS 5V
- V ----- CMOS 3.3V
- S ----- Sync 3.3V

6. Density

- 16 ----- 16M
- 8 ----- 8M
- 4 ----- 4M
- 2 ----- 2M
- 1 ----- 2M
- 512 ----- 512K
- 256 ----- 256K

7. Refresh (16M DRAM Based)

- 0 ----- 4K
- 1 ----- 2K
- 2 ----- 1K

8. Power Consumption

- 0 ----- Normal
- 2 ----- Low Power

9. Operation Mode & Organization

- 0 ----- F/P
- 1 ----- Nibble
- 2 ----- Static Column
- 3 ----- Using Quad CAS
- 4 ----- Using EDO
- 5 ----- Using EDO & Quad CAS
- 8 ----- Using Non Memory Logic
- 9 ----- Using Non Memory Logic & Quad CAS

10. Component Revision

- Blank ----- None
- A ----- First Rev.
- B ----- Second Rev.
- C ----- Third Rev.

11. Package Type

- Blank ----- SOJ or PLCC
- T ----- TSOP

12. PCB Revision

- Blank ----- None
- 1 ----- First Rev.
- 2 ----- Second Rev.
- 3 ----- Third Rev.

13. Number of Components

- Blank ----- more than 7 chip
- N ----- less than 8 chip
- U ----- Byte Wide Base
- W ----- Word wide Base

14. Only x32 or x33 PCB

- V ----- x32 or x33 PCB

15. Lead Finish & Customer

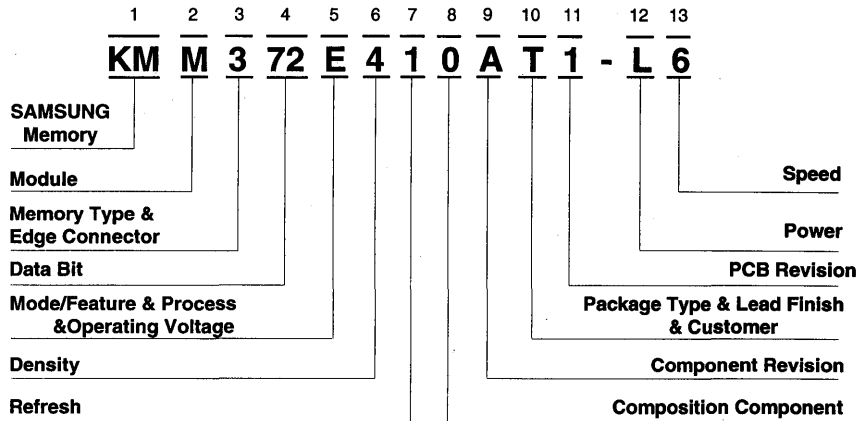
- Blank ----- Solder
- G ----- Gold
- D ----- DEC
- H ----- HP
- M ----- IBM
- P ----- Nickel
- Q ----- Compaq
- X ----- Cambex

16. Speed

- 5 ----- 50 ns
- 6 ----- 60 ns
- 7 ----- 70 ns
- 8 ----- 80 ns

ORDERING INFORMATION

DRAM Module (DIMM)



1. SAMSUNG Memory

2. Module

3. Memory Type & Edge Connector

- 1 ----- FLASH
- 2 ----- Mask ROM
- 3 ----- DRAM DIMM
- 4 ----- DRAM SIP
- 5 ----- DRAM SIMM
- 6 ----- SRAM
- 7 ----- Reserved
- 8 ----- Reserved
- 9 ----- VRAM

4. Data Bit

- 8/9 ----- x8/x9 bit
- 18 ----- x18 bit
- 32/33 ----- x32/x33
- 36/39/40 ----- x36/x39/x40
- 64/66 ----- x64/x66
- 72/80 ----- x72/x80
- 144 ----- x144 bit

5. Mode/Feature & Process & Operating Voltage

- C ----- F/P, 5V
- V ----- F/P, 3.3V
- E ----- EDO, 5V
- F ----- EDO, 3.3V
- W ----- WINDOW RAM, 5V
- S ----- SYNC, 3.3V
- G ----- SYNC GRAPHIC, 3.3V

6. Density

- 1 ----- 1M
- 2 ----- 2M
- 4 ----- 4M
- 8 ----- 8M
- 16 ----- 16M

7. Refresh

- 0 ----- 4K Cycle
- 1 ----- 2K Cycle
- 2 ----- 1K Cycle
- 8 ----- 8K Cycle

8. Composition Component

- 0 ----- x4
- 1 ----- x4 + x1
- 2 ----- x4 + x4 (Quad CAS)
- 3 ----- x8
- 4 ----- x16
- 5 ----- x16 + x4 (Quad CAS)
- 6 ----- x9 Parity DIMM
- 7 ----- x18 Parity DIMM
- 8 ----- x9 ECC DIMM
- 9 ----- x18 ECC DIMM

9. Component Revision

- Blank ----- None
- A ----- First Rev.
- B ----- Second Rev.
- C ----- Third Rev.

10. Package Type & Lead Finish & Customer

- J ----- SOJ(1'st) & Gold
- K ----- SOJ(2'nd) & Gold
- T ----- TSOP(1'st) & Gold
- S ----- TSOP(2'nd) & Gold
- Q ----- SOJ(1'st) & Solder
- Y ----- SOJ(2'nd) & Solder
- X ----- TSOP(1'st) & Solder
- Z ----- TSOP(2'nd) & Solder

11. PCB Revision

- Blank ----- None
- 1 ----- First Rev.
- 2 ----- Second Rev.
- 3 ----- Third Rev.

12. Power

- Blank ----- Normal
- L ----- Low power

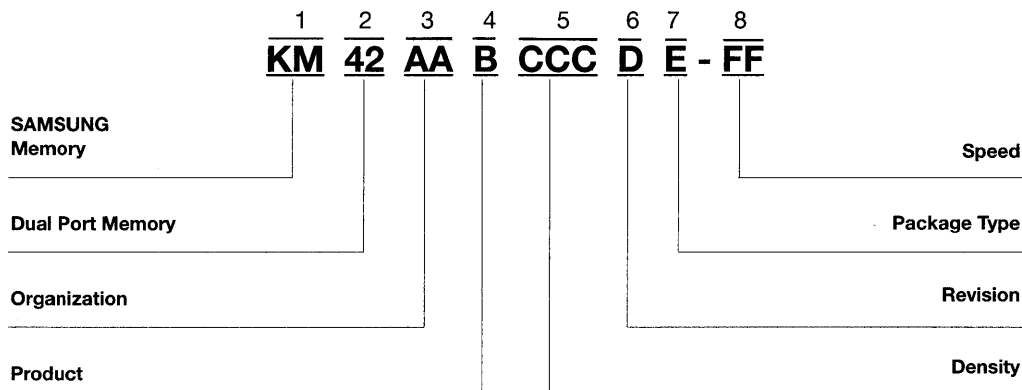
13. Speed (#5 Mode/Feature & Process Reference)

- i) Using 'C', 'V', 'E', 'F'.
 - 5 --- 50 ns
 - 6 --- 60 ns
 - 7 --- 70 ns
 - 8 --- 80 ns
- ii) Using 'W', 'S', 'G'.
 - 0 --- 10 ns
 - 2 --- 12 ns
 - 3 --- 13 ns
 - 5 --- 15 ns

* All Kinds of Numbering index will not be used.
All module part number will not be over 16 digit.

ORDERING INFORMATION

VRAM



1. SAMSUNG Memory

2. Dual Port Memory

DRAM Based Dual Port Memory

3. Organization

- 4X4
- 8X8
- 16X16
- 32X32

4. Product

- CVRAM(5V)
- VVRAM(3.3V)
- WWindow RAM(5V)
- XWindow RAM(3.3V)

5. Density

Refer to previous "2. PRODUCT GUIDE."

6. Revision

- Blank 1st Version
- A 2nd Version

7. Package Type

- ZZIP
- JSOJ
- GSSOP
- TTSOPII
- TR(2M)TSOPII Reverse
- QPQFP (WRAM)

8. Speed

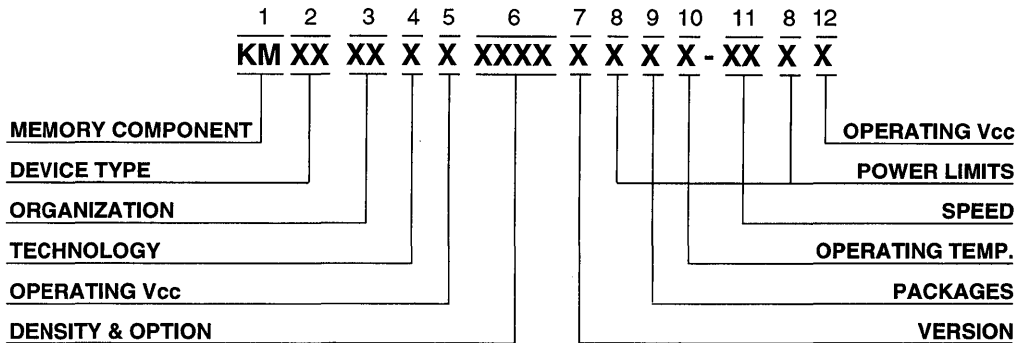
- 660ns
 - 770ns
 - 880ns
- } 1M, 2M
- 6060ns
 - 7070ns
 - 8080ns
- } 4M, 8M

3

ORDERING INFORMATION

SRAM

1. Asynchronous SRAM Ordering Information



1. MEMORY COMPONENT

2. DEVICE TYPE

- 6 SRAM(Async.)
- 65 Pseudo SRAM
- 7 SRAM(ASSP)

3. ORGANIZATION

- 1 x1 bit
- 4 x4 bits
- 2 or 8 x8 bits
- 9 x9 bits
- 16 x16 bits

4. TECHNOLOGY

- BLANK CMOS or AMOS
- B BiCMOS

5. OPERATING V_{cc}

- BLANK 5.0V
- V 3.3V
- U 3.0V

6. DENSITY & OPTION

- 64 64:64K Slow
- 65 65:64K Fast
- 66 66:64K Fast(with \overline{OE})
- 256 256:256K Slow
- 257 257:256K Fast
- 258 258:256K Fast(with \overline{OE})
- 512 512:512K Slow
- 513 513:512K Fast
- 1000 1000:1M Slow
- 1001 1001:1M Fast
- 1002 1002:1M Fast(Revolutionary)
- 1003 1003:1M Fast(Revolutionary, with \overline{OE})
- 4000 4000:4M Slow
- 4002 4002:4M Fast(Revolutionary)
- 8128 8128:128Kx8 Pseudo SRAM
- 8512 8512:512Kx8 Pseudo SRAM

7. VERSION

- BLANK None
- A First Rev.
- B Second Rev.
- C Third Rev.

8. POWER LIMITS

- BLANK High Power
- L Low Power
- L-L Low Low Power

9. PACKAGES

- P DIP
- G SOP
- J SOJ or PLCC
- T TSOP(Standard)
- R TSOP(Reverse)

10. OPERATING TEMP.

- BLANK Commercial
- E Extended
- I Industrial

11. SPEED

SLOW SRAM

- 5 55ns
- 7 70ns
- 8 80ns
- 10 100ns
- 12 120ns

FAST SRAM

- 8 8ns
- 10 10ns
- 12 12ns
- 15 15ns
- 17 17ns
- 20 20ns
- 25 25ns
- 30 30ns
- 35 35ns

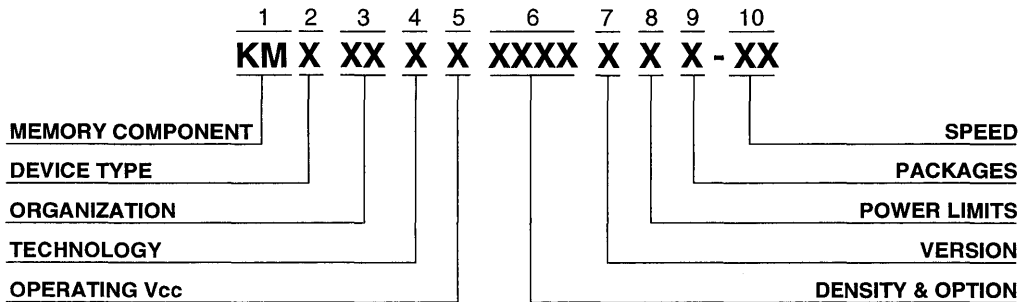
12. OPERATING V_{cc}

- BLANK 5.0V
- V Wide Voltage

ORDERING INFORMATION

SRAM (Continued)

2. Synchronous Pipe SRAM Ordering Information



1. MEMORY COMPONENT

2. DEVICE TYPE

- 6 SRAM(Async.)
- 7 SRAM(ASSP)

3. ORGANIZATION

- 4 x4 bits
- 8 x8 bits
- 9 x9 bits
- 16 x16 bits
- 18 x18 bits
- 32 x32 bits

4. TECHNOLOGY

- BLANK CMOS or AMOS
- B BiCMOS

5. OPERATING Vcc

- BLANK 5.0V
- V 3.3V

6. DENSITY & OPTION

- 1002 1M Sync., LVTTL
- 1006 1M Sync., Sep. I/O
- 1007 1M Sync., GTL
- 4002 4M Sync., LVTTL
- 4006 4M Sync., Sep. I/O
- 4007 4M Sync., GTL

7. VERSION

- BLANK None
- A First Rev.
- B Second Rev.
- C Third Rev.

8. POWER LIMITS

- BLANK High Power
- L Low Power

9. PACKAGES

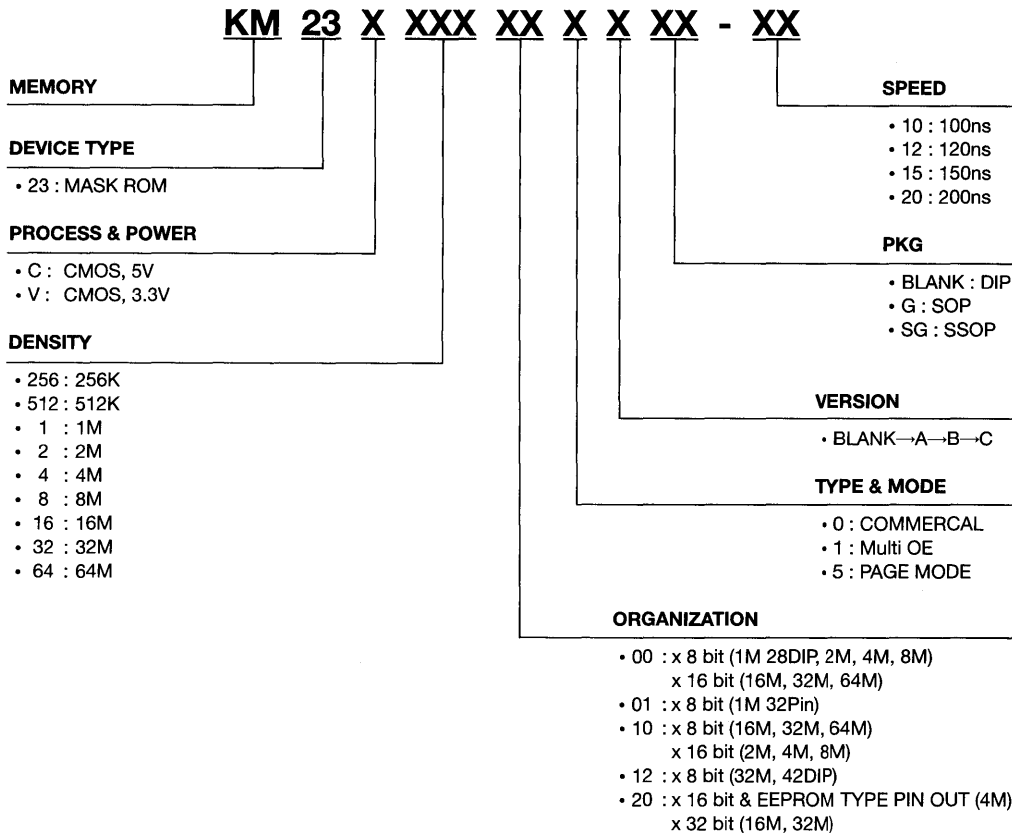
- H BGA
- T TSOP
- J PLCC
- G QFP

10. CLOCK CYCLE TIME

- Below 100MHz**
- 10 10ns
 - 12 12.5ns
 - 15 15ns
- Over 100MHz**
- 40 4.0ns
 - 45 4.5ns
 - 50 5.0ns
 - .
 - .
 - 90 9.0ns

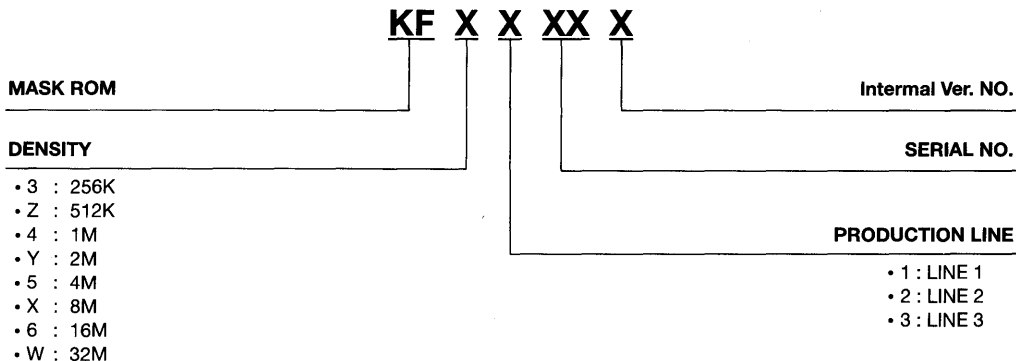
ORDERING INFORMATION

MASK ROM



3

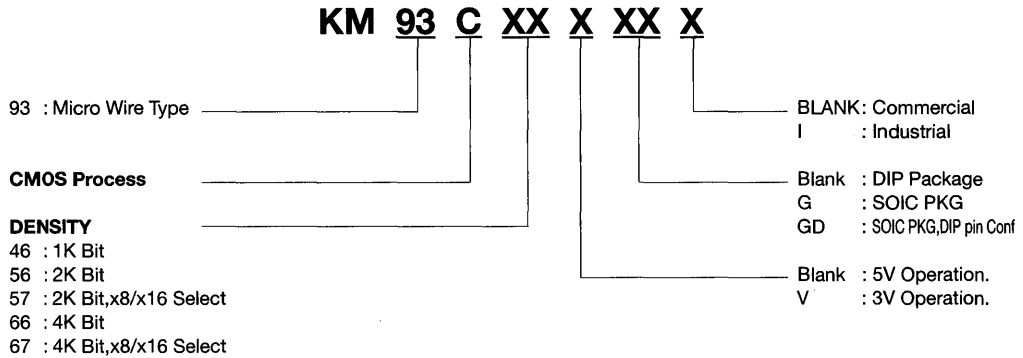
* Internal KF · CODE Information



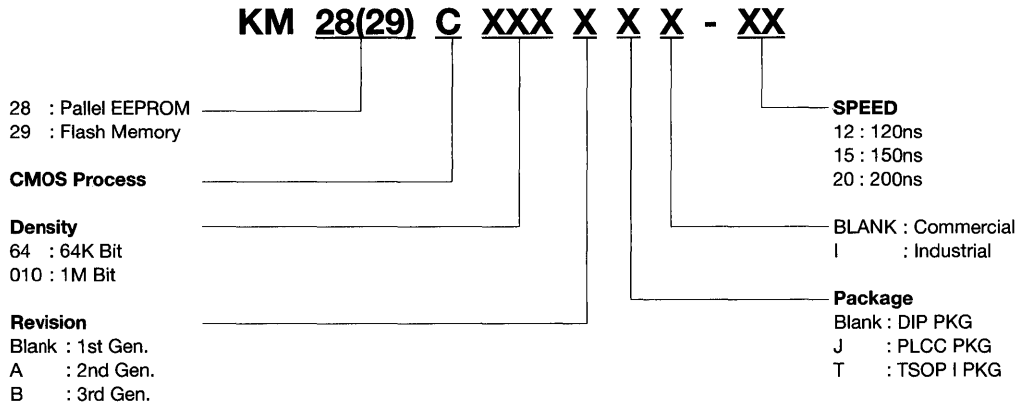
ORDERING INFORMATION

EEPROM/FLASH

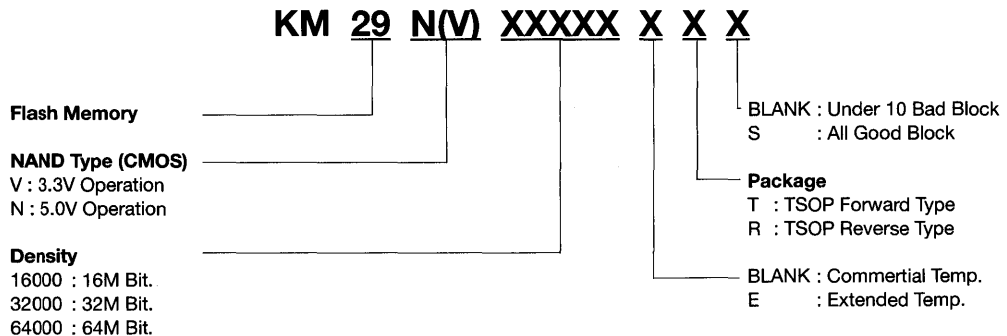
*Serial EEPROM



*Parallel EEPROM



*NAND Flash Memory





SALES OFFICES and MANUFACTURER'S REPRESENTATIVES

4

SAMSUNG SEMICONDUCTOR SALES OFFICES-U.S.A.

Northwest

3655 North First Street
San Jose, CA 95134
TEL: (408) 954-7000
FAX: (408) 954-7883

North Central

300 Park Boulevard
Suite 210
Itasca, IL 60143-2636
TEL: (708) 775-1050
FAX: (708) 775-1058

Northeast

119 Russell Street
Littleton, MA 01460
TEL: (508) 486-0700
FAX: (508) 486-8209

Southwest

16253 Laguna Canyon Road
Suite 100
Irvine, CA 92718
TEL: (714) 753-7530
FAX: (714) 753-7544

South Central

15851 Dallas Parkway
Suite 410
Dallas, TX 75248-3307
TEL: (214) 770-7970
FAX: (214) 770-7971

Southeast

802 Greenvalley Road
Suite 204
Greensboro, NC 27408
TEL: (919) 370-1600
FAX: (919) 370-1633

SAMSUNG SEMICONDUCTOR REPRESENTATIVES

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SOUTHERN COMPONENT SALES

307 Clinton Ave. East
Suite 413
Huntsville, AL 35801
TEL: (205) 533-6500
FAX: (205) 533-6578

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O'DONNELL ASSOCIATES TEL: (602) 944-9542
2432 W. Peoria Ave.
Suite 1026
Phoenix, AZ 85029
O'DONNELL ASSOCIATES TEL: (602) 797-2047
11449 N. Copper Springs Trail
Tucson, AZ 85737
FAX: (602) 861-2615
FAX: (602) 797-2047

CALIFORNIA

BESTRONICS TEL: (619) 693-1111
9683 Tierno Granda Street
Suite 102
San Diego, CA 92126
FAX: (619) 693-1963

I-SQUARED TEL: (408) 988-3400
3355-1 Scott Blvd.
Suite 102
Santa Clara, CA 95054
FAX: (408) 988-2079

WESTAR REP COMPANY TEL: (714) 453-7900
15265 Alton Parkway
Suite 400
Irvine, CA 92718
FAX: (714) 453-7930

WESTAR REP COMPANY TEL: (818) 880-0594
26500 Agoura Rd.
Suite 204
Calabasas, CA 91302
FAX: (818) 880-5013

CANADA

INTELETECH, INC. TEL: (613) 762-8014
275 Michael Copeland Drive
Kanata, Ontario K2M 2G2
FAX: (613) 253-1370

INTELETECH, INC. TEL: (514) 343-4877
3700 Griffith Street
Suite 93
St. Laurent, Quebec H4T 1A7
FAX: (514) 343-4355

INTELETECH, INC. TEL: (905) 629-0082
5525 Orbitor Drive
Suite 2
Mississauga, Ontario L4W4Y8
FAX: (905) 629-1795

COLORADO

FRONT RANGE MARKETING TEL: (303) 443-4780
3100 Arapahoe Road
Suite 404
Boulder, CO 80303
FAX: (303) 447-0371

FLORIDA

B/B TECH SALES TEL: (305) 477-0341
3900 N.W. 79th Avenue
Suite 636
Miami, FL 33166
FAX: (305) 477-0343

DYNE-A-MARK TEL: (407) 660-1661
500 Winderley Place
Suite 110
Maitland, FL 32751
FAX: (407) 660-9407

DYNE-A-MARK TEL: (305) 485-3500
3355 N.W. 55th Street
Fort Lauderdale, FL 33309
FAX: (305) 485-6555

DYNE-A-MARK TEL: (407) 725-7470
742 Penguin Ave., NE
Palm Bay, FL 32905
FAX: (407) 984-2718

DYNE-A-MARK TEL: (813) 345-9411
7884 Tent Avenue S
St. Petersburg, FL 33707
FAX: (813) 345-3731

GEORGIA

SOUTH ATLANTIC COMPONENT SALES TEL: (404) 447-6154
3300 Holcomb Bridge Road
Suite 210
Norcross, GA 30092
FAX: (404) 447-6714

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DAVIX INTERNATIONAL, LTD. TEL: (708) 259-5300
1655 N. Arlington Heights Rd.
Suite 204 East
Arlington Heights, IL 60004
FAX: (708) 259-5428

INDIANA

GEN II MARKETING, INC. TEL: (317) 848-3083
31 E. Main Street
Camel, IN 46032
FAX: (317) 848-1264

GEN II MARKETING, INC. TEL: (219) 436-4485
1415 Magnavox Way
Suite 130
Ft. Wayne, IN 46804
FAX: (219) 436-1977

IOWA

ASSOCIATED ELECTRONIC MARKETERS, INC.
4001 Shady Oak TEL: (319) 377-1129
Marion, IA 52302 FAX: (319) 377-1539

KANSAS

ASSOCIATED ELECTRONIC MARKETERS, INC.
8843 Long St. TEL: (913) 888-0022
Lenexa, KS 66215 FAX: (913) 888-4848

KENTUCKY

GEN II MARKETING, INC. TEL: (502) 894-9903
4012 Dupont Circle FAX: (502) 893-2435
Suite 414
Louisville, KY 40207

MASSACHUSETTS

NEW TECH SOLUTIONS, INC. TEL: (617) 229-8888
111 South Bedford Street FAX: (617) 229-1614
Suite 102
Burlington, MA 01803

MICHIGAN

MICROTECH SALES TEL: (313) 459-0200
9357 General Drive FAX: (313) 459-0232
Suite 116
Plymouth, MI 48170

MINNESOTA

GP SALES, INC. TEL: (612) 831-2362
7600 Parklawn FAX: (612) 831-2619
Suite 315
Edina, MN 55435

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ASSOCIATED ELECTRONIC MARKETERS, INC.
11520 St. Charles Rock Rd. TEL: (314) 298-9900
Suite 131 FAX: (314) 298-8660
Bridgeton, MO 63044

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NEPTUNE ELEC. TEL: (516) 349-1600
255 Executive Dr. FAX: (516) 349-1343
Suite 211
Plainview, NY 11803

T-SQUARED TEL: (315) 699-1559
6170 Wynmoor Drive FAX: (315) 699-1705
Cicero, NY 13039

T-SQUARED TEL: (716) 924-9101
7353 Victor-Pittsford Road FAX: (716) 924-4946
Victor, NY 14564

T-SQUARED TEL: (607) 625-3983
1790 Pennsylvania Avenue FAX: (607) 625-5294
Apalachin, NY 13732

NORTH CAROLINA

SOUTH ATLANTIC COMPONENT SALES
5200 Park Road TEL: (704) 525-0510
Suite 103 FAX: (704) 525-9714
Charlotte, NC 28209

SOUTH ATLANTIC COMPONENT SALES
4904 Waters Edge Drive TEL: (919) 859-9970
Suite 268 FAX: (919) 859-9974
Raleigh, NC 27606

OHIO

J.N. BAILEY & ASSOCIATES TEL: (513) 687-1325
129 W. Main Street FAX: (513) 687-2930
New Lebanon, OH 45345

J.N. BAILEY & ASSOCIATES TEL: (614) 262-7274
3591 Milton Avenue FAX: (614) 262-0384
Columbus, OH 43214

J.N. BAILEY & ASSOCIATES TEL: (216) 273-3798
1667 Devonshire Drive FAX: (216) 225-1461
Brunswick, OH 44212

OREGON

ATMI TEL: (503) 643-8307
4900 SW Griffith FAX: (503) 643-4364
Suite 155
Beaverton, OR 97005

PENNSYLVANIA

CMS SALES & MARKETING TEL: (215) 834-6840
527 Plymouth Road FAX: (215) 834-6848
Suite 420
Plymouth Meeting, PA 19462

PUERTO RICO

DIGIT-TECH
P.O. Box 1945 TEL: (809) 892-4260
Calle Cruz #2 FAX: (809) 892-3366
Bajos, San German
Puerto Rico 00753

TEXAS

O'DONNELL ASSOCIATES TEL: (915) 778-2581
5959 Gateway West FAX: (915) 778-6429
Suite 558
El Paso, TX 79925

VIELOCK ASSOCIATES TEL: (214) 881-1940
555 Republic Drive FAX: (214) 423-8556
Suite 105
Plano, TX 75074

VIELOCK ASSOCIATES TEL: (512) 345-8498
9430 Research Blvd. FAX: (512) 346-4037
Echelon Bldg. 2, Suite 330
Austin, TX 78759

VIELOCK ASSOCIATES TEL: (713) 974-3287
10700 Richmond Avenue FAX: (713) 974-3289
Suite 108
Houston, TX 77042

UTAH

FRONT RANGE MARKETING, INC.
488 E. 6400 South TEL: (801) 288-2500
Suite 280 FAX: (801) 288-2505
Murray, UT 84107

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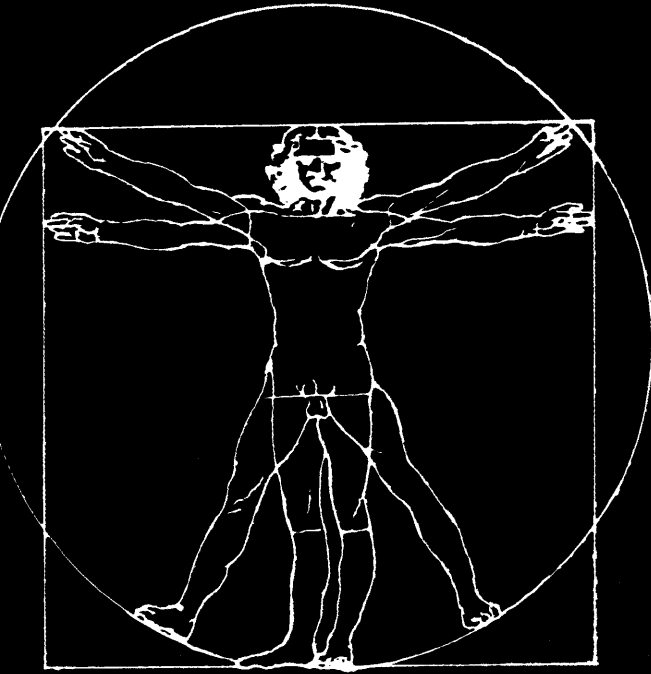
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