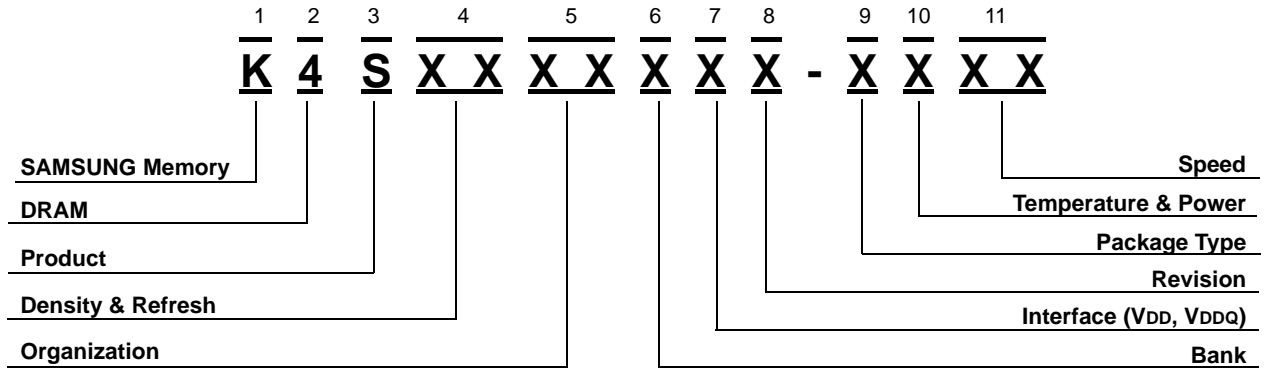


SDRAM Product Guide

February. 2004

Memory Division

A. SDRAM Component Ordering Information



1. SAMSUNG Memory : K

2. DRAM : 4

3. Product

S : SDRAM

4. Density & Refresh

- 16 : 16Mb, 4K/64ms
- 64 : 64Mb, 4K/64ms
- 28 : 128Mb, 4K/64ms
- 56 : 256Mb, 8K/64ms
- 51 : 512Mb, 8K/64ms

5. Organization

- 04 : x 4
- 06 : x 4 Stack (Flex frame)
- 07 : x 8 Stack (Flex frame)
- 08 : x 8
- 16 : x16
- 32 : x32

6. Bank

- 2 : 2 Banks
- 3 : 4 Banks

7. Interface (VDD, VDDQ)

- 2 : LVTTTL (3.3V, 3.3V)

8. Revision

- M : 1st Gen.
- A : 2nd Gen.
- B : 3rd Gen.
- C : 4th Gen.
- D : 5th Gen.
- E : 6th Gen.
- F : 7th Gen.
- H : 9th Gen.

9. Package Type

- T : TSOP II
- N : sTSOP II
- U : TSOP II (Lead Free)
- V : sTSOP II (Lead Free)

10. Temperature & Power

- C : Commercial/Normal (0°C ~ 70°C)
- L : Commercial/Low (0°C ~ 70°C)
- I : Industrial/Normal (-40°C ~ 85°C)
- P : Industrial/Low (-40°C ~ 85°C)
- E : Extended/Normal (-25°C ~ 85°C)
- N : Extended/Low (-25°C ~ 85°C)

11. Speed (Default CL= 3)

- 80 : 8.0ns (125MHz CL=3)
- 75 : PC133 (133MHz CL=3)
- 70 : 7.0ns (143MHz CL=3)
- 60 : 6.0ns (166MHz CL=3)
- 55 : 5.5ns (183MHz CL=3)
- 50 : 5.0ns (200MHz CL=3)

B. SDRAM Component Product Guide

Density	Banks	Part Number	Power ^{*1} (-C/-L) & Speed ^{*2}	Org.	Interface	Ref.	Power (V)	PKG. ^{*3}	Avail.
16Mb H-die	2Banks	K4S161622H	TC55/C60/C70/C80	1Mx16	LVTTTL	2K	3.3 ± 0.3V	50pin TSOP(II)	Now
64Mb H-die	4Banks	K4S640432H	TC75 TL75	16M x 4	LVTTTL	4K	3.3 ± 0.3V	54pin TSOP(II)	Now
		K4S640832H	TC75 TL75	8M x 8					Now
		K4S641632H	TC60/C70/C75 TL60/L70/L75	4M x 16					Now
		K4S643232H	TC50/C55/C60/C70 TL50/L55/L60/L70	2M x 32				86pin TSOP(II)	Now
128Mb E-die	4Banks	K4S280432E	TC75 TL75	32M x 4	LVTTTL	4K	3.3 ± 0.3V	54pin TSOP(II)	Now
		K4S280832E	TC75 TL75	16M x 8					Now
		K4S281632E	TC60/C75 TL60/L75	8M x 16					Now
128Mb F-die	4Banks	K4S280432F	TC75 TL75	32M x 4	LVTTTL	4K	3.3 ± 0.3V	54pin TSOP(II)	Now
		K4S280832F	TC75 TL75	16M x 8					Now
		K4S281632F	TC60/C75 TL60/L75	8M x 16					Now
256Mb E-die	4Banks	K4S560432E	TC75 TL75	64M x 4	LVTTTL	8K	3.3 ± 0.3V	54pin TSOP(II)	Now
			NC75 NL75					54pin sTSOP(II)	Now
		K4S560832E	TC75 TL75	32M x 8				54pin TSOP(II)	Now
			NC75 NL75					54pin sTSOP(II)	Now
K4S561632E	TC60/C75 TL60/L75	16M x 16	54pin TSOP(II)	Now					
Stacked 512Mb E-die	4Banks	K4S510632E	TC75 TL75	128M x 4	LVTTTL	8K	3.3 ± 0.3V	54pin Stack TSOP(II)	Now
		K4S510732E	TC75 TL75	64M x 8					Now
512Mb B-die	4Banks	K4S510432B	TC75 TL75	128M x 4	LVTTTL	8K	3.3 ± 0.3V	54pin TSOP(II)	Now
		K4S510832B	TC75 TL75	64M x 8					Now
		K4S511632B	TC75 TL75	32M x 16					Now
Stacked 1Gb B-die	4Banks	K4S1G0732B	TC75 TL75	128M x 8	LVTTTL	8K	3.3 ± 0.3V	54pin Stack TSOP(II)	April '04

Note 1:

Temperature and Power	Description
C	Commercial Temperature, Normal Power
L	Commercial Temperature, Low Power

Note 3:
T : TSOP(II)
N : sTSOP(II)

Note 2:

Speed	Description
80	8.0 ns (125Mhz @ CL=3)
75	PC133 (133Mhz @ CL=3)
70	7.0 ns (143MHz @ CL=3)
60	6.0 ns (166Mhz @ CL=3)
55	5.5 ns (183Mhz @ CL=3)
50	5.0 ns (200Mhz @ CL=3)

* All products have backward compatibility with PC100.

C. Lead-Free SDRAM Component Product Guide

Density	Banks	Part Number	Power ^{*1} (-C/-L) & Speed ^{*2}	Org.	Interface	Ref.	Power (V)	PKG. ^{*3}	Avail.
16Mb H-die	2Banks	K4S161622H	UC55/C60/C70/C80	1Mx16	LVTTTL	2K	3.3 ± 0.3V	50pin TSOP(II)	Now
64Mb H-die	4Banks	K4S640432H	UC75 UL75	16M x 4	LVTTTL	4K	3.3 ± 0.3V	54pin TSOP(II)	Now
		K4S640832H	UC75 UL75	8M x 8					Now
		K4S641632H	UC60/C70/C75 UL60/L70/L75	4M x 16					Now
		K4S643232H	UC50/C55/C60/C70 UL50/L55/L60/L70	2M x 32				86pin TSOP(II)	Now
128Mb E-die	4Banks	K4S280432E	UC75 UL75	32M x 4	LVTTTL	4K	3.3 ± 0.3V	54pin TSOP(II)	Now
		K4S280832E	UC75 UL75	16M x 8					Now
		K4S281632E	UC60/C75 UL60/L75	8M x 16					Now
128Mb F-die	4Banks	K4S280432F	UC75 UL75	32M x 4	LVTTTL	4K	3.3 ± 0.3V	54pin TSOP(II)	Now
		K4S280832F	UC75 UL75	16M x 8					Now
		K4S281632F	UC60/C75 UL60/L75	8M x 16					Now
256Mb E-die	4Banks	K4S560432E	UC75 UL75	64M x 4	LVTTTL	8K	3.3 ± 0.3V	54pin TSOP(II)	Now
			VC75 VL75					54pin sTSOP(II)	Now
		K4S560832E	UC75 UL75	32M x 8				54pin TSOP(II)	Now
			VC75 VL75					54pin sTSOP(II)	Now
		K4S561632E	UC60/C75 UL60/L75	16M x 16				54pin TSOP(II)	Now
Stacked 512Mb E-die	4Banks	K4S510632E	UC75 UL75	128M x 4	LVTTTL	8K	3.3 ± 0.3V	54pin Stack TSOP(II)	Now
		K4S510732E	UC75 UL75	64M x 16					Now
512Mb B-die	4Banks	K4S510432B	UC75 UL75	128M x 4	LVTTTL	8K	3.3 ± 0.3V	54pin TSOP(II)	Now
		K4S510832B	UC75 UL75	64M x 8					Now
		K4S511632B	UC75 UL75	32M x 16					Now
Stacked 1Gb B-die	4Banks	K4S1G0732B	UC75 UL75	128M x 8	LVTTTL	8K	3.3 ± 0.3V	54pin Stack TSOP(II)	April '04

Note 1:

Temperature and Power	Description
C	Commercial Temperature, Normal Power
L	Commercial Temperature, Low Power

Note 3:

U : TSOP(II) (Lead Free)
V : sTSOP(II) (Lead Free)

Note 2:

Speed	Description
80	8.0 ns (125Mhz @ CL=3)
75	PC133 (133Mhz @ CL=3)
70	7.0 ns (143MHz @ CL=3)
60	6.0 ns (166Mhz @ CL=3)
55	5.5 ns (183Mhz @ CL=3)
50	5.0 ns (200Mhz @ CL=3)

* All products have backward compatibility PC100.

D. Industrial Temperature SDRAM Component Product Guide

Density	Banks	Part Number	Power ^{*1} (-C/-L) & Speed ^{*2}	Org.	Interface	Ref.	Power (V)	PKG. ^{*3}	Avail.
64Mb H-die	4Banks	K4S640432H	TI75 TP75	16M x 4	LVTTTL	4K	3.3 ± 0.3V	54pin TSOP(II)	Now
		K4S640832H	TI75 TP75	8M x 8					Now
		K4S641632H	TI60/I70/I75 TP60/P70/P75	4M x 16					Now
		K4S643232H	TI50/I55/I60/I70 TP50/P55/P60/P70	2M x 32				86pin TSOP(II)	Now
128Mb F-die	4Banks	K4S281632F	TI60/I75 TP60/P75	8M x 16	LVTTTL	4K	3.3 ± 0.3V	54pin TSOP(II)	Now
256Mb E-die	4Banks	K4S560432E	TI75 TP75	64M x 4	LVTTTL	8K	3.3 ± 0.3V	54pin TSOP(II)	Now
		K4S560832E	TI75 TP75	32M x 8				54pin TSOP(II)	Now
		K4S561632E	TI60/I75 TP60/P75	16M x 16				54pin TSOP(II)	Now

E. Industrial Temperature & Lead-Free SDRAM Component Product Guide

Density	Banks	Part Number	Power ^{*1} (-C/-L) & Speed ^{*2}	Org.	Interface	Ref.	Power (V)	PKG. ^{*3}	Avail.
64Mb H-die	4Banks	K4S640432H	UI75 UP75	16M x 4	LVTTTL	4K	3.3 ± 0.3V	54pin TSOP(II)	Now
		K4S640832H	UI75 UP75	8M x 8					Now
		K4S641632H	UI60/I70/I75 UP60/P70/P75	4M x 16					Now
		K4S643232H	UI50/I55/I60/I70 UP50/P55/P60/P70	2M x 32				86pin TSOP(II)	Now
128Mb F-die	4Banks	K4S281632F	UI60/I75 UP60/P75	8M x 16	LVTTTL	4K	3.3 ± 0.3V	54pin TSOP(II)	Now
256Mb E-die	4Banks	K4S560432E	UI75 UP75	64M x 4	LVTTTL	8K	3.3 ± 0.3V	54pin TSOP(II)	Now
		K4S560832E	UI75 UP75	32M x 8				54pin TSOP(II)	Now
		K4S561632E	UI60/I75 UP60/P75	16M x 16				54pin TSOP(II)	Now

Note 1:

Temperature and Power	Description
I	Industrial Temperature, Normal Power
P	Industrial Temperature, Low Power

Note 3:

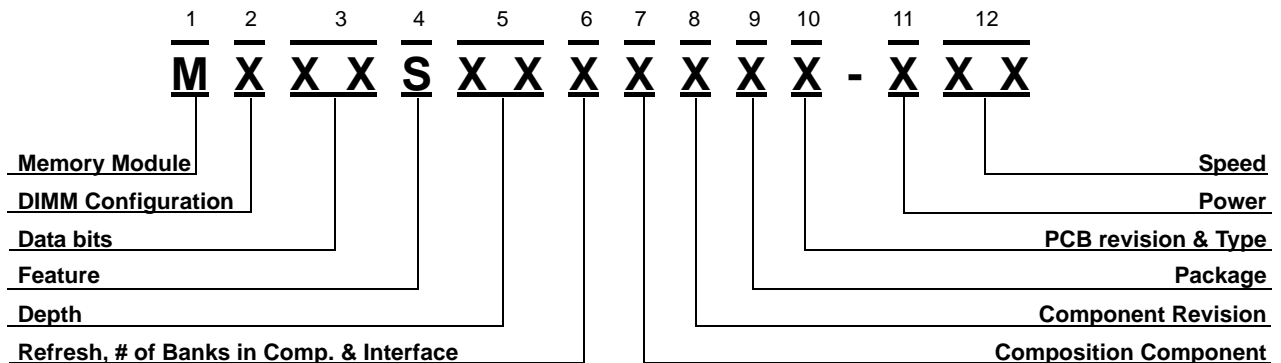
T : TSOP(II)
U : TSOP(II) (Lead Free)

Note 2:

Speed	Description
80	8.0 ns (125Mhz @ CL=3)
75	PC133 (133Mhz @ CL=3)
70	7.0 ns (143MHz @ CL=3)
60	6.0 ns (166Mhz @ CL=3)
55	5.5 ns (183Mhz @ CL=3)
50	5.0 ns (200Mhz @ CL=3)

* All products have backward compatibility PC100.

F. SDRAM Module Ordering Information



1. Memory Module : M

2. DIMM Configuration

- 3 : DIMM
- 4 : SODIMM

3. Data Bits

- 63 : x63 PC100 / PC133 μ SODIMM with SPD for 144pin
- 64 : x64 PC100 / PC133 SODIMM with SPD for 144pin (Intel/JEDEC)
- 66 : x64 Unbuffered DIMM with SPD for 144pin/168pin (Intel/JEDEC)
- 74 : x72 /ECC Unbuffered DIMM with SPD for 168pin (Intel/JEDEC)
- 77 : x72 /ECC PLL + Register DIMM with SPD for 168pin (Intel PC100)
- 90 : x72 /ECC PLL + Register DIMM with SPD for 168pin (JEDEC PC133)

4. Feature

- S : SDRAM

5. Depth

- 16 : 16M
- 32 : 32M
- 64 : 64M
- 28 : 128M
- 56 : 256M
- 09 : 8M (for 128Mb/512Mb)
- 17 : 16M (for 128Mb/512Mb)
- 33 : 32M (for 128Mb/512Mb)
- 65 : 64M (for 128Mb/512Mb)
- 29 : 128M (for 128Mb/512Mb)
- 59 : 256M (for 128Mb/512Mb)

6. Refresh, # of Banks in comp. & Interface

- 2 : 4K/ 64ms Ref., 4Banks & LVTTTL
- 5 : 8K/ 64ms Ref., 4Banks & LVTTTL

7. Composition Component

- 0 : x 4
- 3 : x 8
- 4 : x16
- 8 : x 4 Stack (Flexframe)
- 9 : x 8 Stack (Flexframe)

8. Component Revision

- M : 1st Gen.
- B : 3rd Gen.
- D : 5th Gen.
- F : 7th Gen.
- A : 2nd Gen.
- C : 4th Gen.
- E : 6th Gen.
- H : 9h Gen.

9. Package

- T : TSOP(II) (400mil)
- N : sTSOP(II) (400mil)
- U : TSOP(II) Pb-free (400mil)
- V : sTSOP(II) Pb-free (400mil)

10. PCB Revision & Type

- 0 : Mother PCB
- 2 : 2nd Rev.
- U : Low Profile DIMM
- 1 : 1st Rev.
- 3 : 3rd Rev.
- S : 4Layer PCB.

11. Power

- C : Commercial Normal (0°C ~ 70°C)
- L : Commercial Low (0°C ~ 70°C)

12. Speed (Default CL= 3)

- 7A : PC133 (133MHz CL=3/PC100 CL2)

G. SDRAM Module Product Guide

Org.	Density	Part No.	Speed	Composition	Comp. Version	Power (V)	Internal Banks	External Banks	Feature	Avail.				
168pin PC133 Registered DIMM														
16Mx72	128MB	M390S1723ET1	C7A	16M x 8 * 9 pcs	128Mb 6th	3.3 V	4	1	DS, 1500mil	Now				
		M390S1723ETU	C7A	16M x 8 * 9 pcs	128Mb 6th			1	DS, 1200mil	Now				
		M390S1723FT1	C7A	16M x 8 * 9 pcs	128Mb 7th			1	DS, 1500mil	Now				
		M390S1723FTU	C7A	16M x 8 * 9 pcs	128Mb 7th			1	DS, 1200mil	Now				
32Mx72	256MB	M390S3320ET1	C7A	32M x 4 * 18 pcs	128Mb 6th			3.3 V	4	1	DS, 1700mil	Now		
		M390S3320ETU	C7A	32M x 4 * 18 pcs	128Mb 6th					1	DS, 1200mil	Now		
		M390S3323ET1	C7A	16M x 8 * 18 pcs	128Mb 6th					2	DS, 1700mil	Now		
		M390S3320FT1	C7A	32M x 4 * 18 pcs	128Mb 7th					1	DS, 1700mil	Now		
		M390S3320FTU	C7A	32M x 4 * 18 pcs	128Mb 7th					1	DS, 1200mil	Now		
		M390S3323FT1	C7A	16M x 8 * 18 pcs	128Mb 7th					2	DS, 1700mil	Now		
		M390S3253ET1	C7A	32M x 8 * 9 pcs	256Mb 6th					1	DS, 1500mil	Now		
		M390S3253ETU	C7A	32M x 8 * 9 pcs	256Mb 6th					1	DS, 1200mil	Now		
64Mx72	512MB	M390S6450ET1	C7A	64M x 4 * 18 pcs	256Mb 6th					3.3 V	4	1	DS, 1700mil	Now
		M390S6450ETU	C7A	64M x 4 * 18 pcs	256Mb 6th							1	DS, 1200mil	Now
		M390S6453ET1	C7A	32M x 8 * 18 pcs	256Mb 6th							2	DS, 1700mil	Now
		M390S6553BT1	C7A	64M x 8 * 9 pcs	512Mb 3rd							1	DS, 1500mil	Now
		M390S6553BTU	C7A	64M x 8 * 9 pcs	512Mb 3rd	1	DS, 1200mil					Now		
128Mx72	1GB	M390S2858ET1	C7A	St. 128M x 4 * 18 pcs	256Mb 6th	3.3 V	4					2	DS, 1700mil	Now
		M390S2858ETU	C7A	St. 128M x 4 * 18 pcs	256Mb 6th							2	DS, 1200mil	Now
		M390S2953BT1	C7A	64M x 8 * 18 pcs	512Mb 3rd							2	DS, 1700mil	Now
		M390S2950BT1	C7A	128M x 4 * 18 pcs	512Mb 3rd			1	DS, 1700mil			Now		
		M390S2950BTU	C7A	128M x 4 * 18 pcs	512Mb 3rd			1	DS, 1200mil			Now		
256Mx72	2GB	M390S5658BT1	C7A	St. 256M x 4 * 18 pcs	512Mb 3rd			3.3 V	4			2	DS, 1700mil	May '04
		M390S5658BTU	C7A	St. 256M x 4 * 18 pcs	512Mb 3rd							2	DS, 1200mil	

G. SDRAM Module Product Guide (Continued)

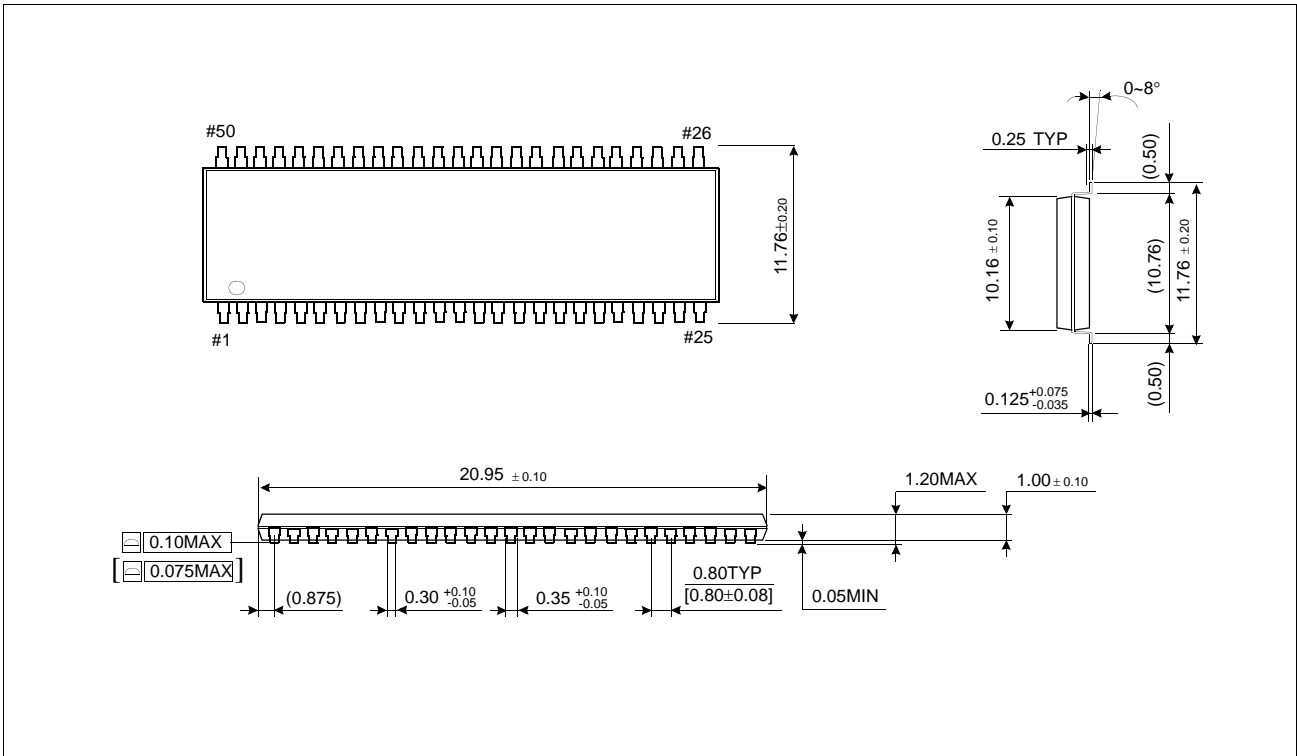
Org.	Density	Part No.	Speed	Composition	Comp. Version	Power (V)	Internal Banks	External Banks	Feature	Avail.						
168pin PC133 Unbuffered DIMM																
8Mx64	64MB	M366S0924ETS	C7A / L7A	8M x 16 * 4 pcs	128Mb 6th	3.3V	4	1	SS, 1000mil	Now						
		M366S0924FTS	C7A	8M x 16 * 4 pcs	128Mb 7th			1	SS, 1000mil	Now						
16Mx64	128MB	M366S1723ETS	C7A / L7A	16M x 8 * 8 pcs	128Mb 6th	3.3V	4	1	SS, 1375mil	Now						
		M366S1723ETU	C7A / L7A	16M x 8 * 8 pcs	128Mb 6th			1	SS, 1125mil	Now						
		M366S1723FTS	C7A	16M x 8 * 8 pcs	128Mb 7th			1	SS, 1375mil	Now						
		M366S1723FTU	C7A	16M x 8 * 8 pcs	128Mb 7th			1	SS, 1125mil	Now						
		M366S1654ETS	C7A	16M x 16 * 4 pcs	256Mb 6th			1	SS, 1000mil	Now						
16Mx72	128MB	M374S1723ETS	C7A / L7A	16M x 8 * 9 pcs	128Mb 6th			3.3V	4	1	SS, 1375mil	Now				
		M374S1723ETU	C7A / L7A	16M x 8 * 9 pcs	128Mb 6th					1	SS, 1125mil	Now				
		M374S1723FTS	C7A	16M x 8 * 9 pcs	128Mb 7th					1	SS, 1375mil	Now				
		M374S1723FTU	C7A	16M x 8 * 9 pcs	128Mb 7th					1	SS, 1125mil	Now				
32Mx64	256MB	M366S3323ETS	C7A	16M x 8 * 16 pcs	128Mb 6th					3.3V	4	2	DS, 1375mil	Now		
		M366S3323ETU	C7A	16M x 8 * 16 pcs	128Mb 6th							2	DS, 1125mil	Now		
		M366S3323FTS	C7A	16M x 8 * 16 pcs	128Mb 7th	2	DS, 1375mil					Now				
		M366S3323FTU	C7A	16M x 8 * 16 pcs	128Mb 7th	2	DS, 1125mil					Now				
		M366S3253ETS	C7A	32M x 8 * 8 pcs	256Mb 6th	1	SS, 1375mil					Now				
		M366S3253ETU	C7A	32M x 8 * 8 pcs	256Mb 6th	1	SS, 1125mil					Now				
32Mx72	256MB	M366S3354BTS	C7A	32M x 16 * 4 pcs	512Mb 3rd	3.3V	4					1	SS, 1000mil	Now		
		M374S3323ETS	C7A	16M x 8 * 18 pcs	128Mb 6th			2	DS, 1375mil			Now				
		M374S3323ETU	C7A	16M x 8 * 18 pcs	128Mb 6th			2	DS, 1125mil			Now				
		M374S3323FTS	C7A	16M x 8 * 18 pcs	128Mb 7th			2	DS, 1375mil			Now				
		M374S3323FTU	C7A	16M x 8 * 18 pcs	128Mb 7th			2	DS, 1125mil			Now				
		M374S3253ETS	C7A	32M x 8 * 9 pcs	256Mb 6th			1	SS, 1375mil	Now						
64Mx64	512MB	M374S3253ETU	C7A	32M x 8 * 9 pcs	256Mb 6th			3.3V	4	1	SS, 1125mil	Now				
		M366S6453ETS	C7A	32M x 8 * 16 pcs	256Mb 6th					2	DS, 1375mil	Now				
		M366S6453ETU	C7A	32M x 8 * 16 pcs	256Mb 6th					2	DS, 1125mil	Now				
64Mx72	512MB	M366S6553BTS	C7A	64M x 8 * 8 pcs	512Mb 3rd					3.3V	4	1	DS, 1375mil	Now		
		M374S6453ETS	C7A	32M x 8 * 18 pcs	256Mb 6th							2	DS, 1375mil	Now		
		M374S6453ETU	C7A	32M x 8 * 18 pcs	256Mb 6th	2	DS, 1125mil					Now				
128Mx64	1GB	M374S6553BTS	C7A	64M x 8 * 8 pcs	512Mb 3rd	3.3V	4					1	DS, 1375mil	Now		
		M366S2953BTS	C7A	64M x 8 * 16 pcs	512Mb 3rd							2	DS, 1375mil	Now		
128Mx72	1GB	M374S2953BTS	C7A	64M x 8 * 18 pcs	512Mb 3rd							3.3V	4	2	DS, 1375mil	Now

G. SDRAM Module Product Guide (Continued)

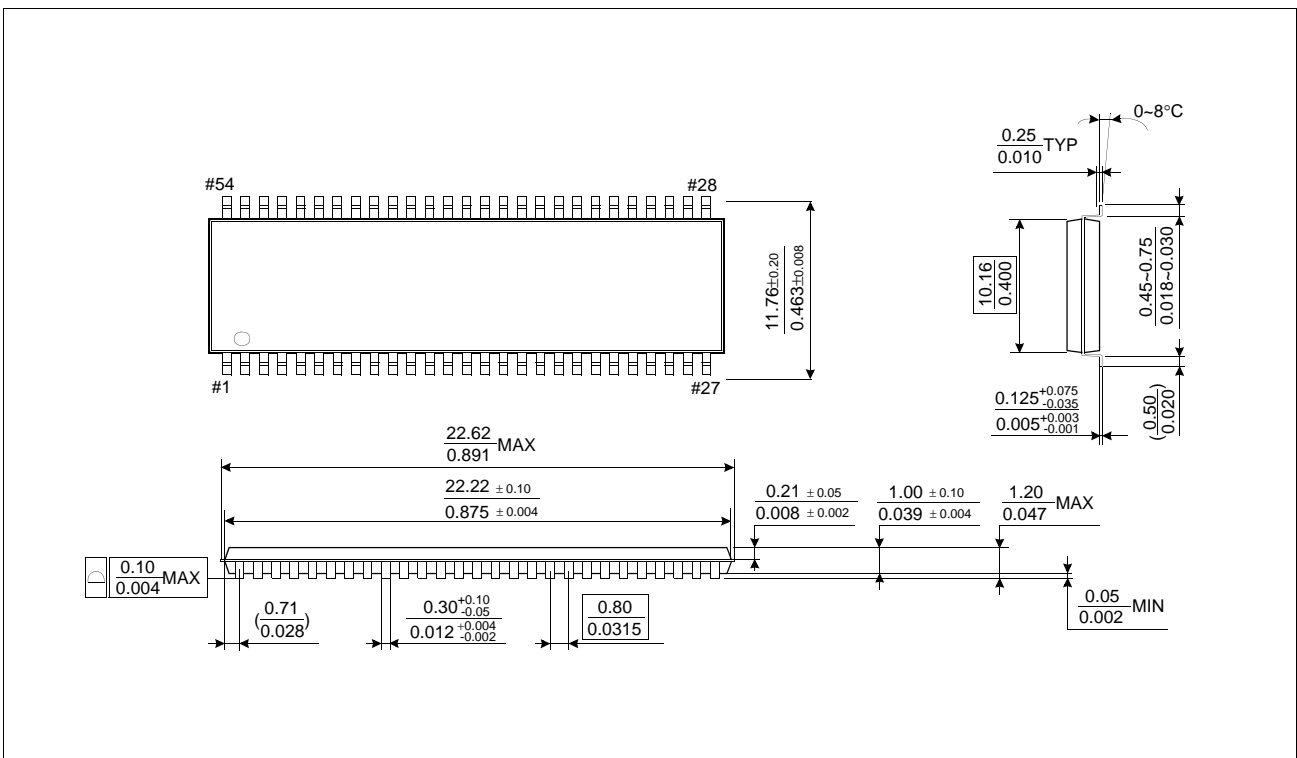
Org.	Density	Part No.	Speed	Composition	Comp. Version	Power (V)	Internal Banks	External Banks	Feature	Avail.
144pin PC133 SODIMM										
8Mx64	64MB	M464S0924ETS	C7A / L7A	8M x 16 * 4 pcs	128Mb 6th	3.3V	4	1	DS, 1000mil	Now
		M464S0924FTS	C7A / L7A	8M x 16 * 4 pcs	128Mb 7th			1	DS, 1000mil	Now
16Mx64	128MB	M464S1724ETS	C7A / L7A	8M x 16 * 8 pcs	128Mb 6th			2	DS, 1250mil	Now
		M464S1724FTS	C7A / L7A	8M x 16 * 8 pcs	128Mb 7th			2	DS, 1250mil	Now
		M464S1654ETS	C7A / L7A	16M x 16 * 4 pcs	256Mb 6th			1	DS, 1000mil	Now
32Mx64	256MB	M464S3254ETS	C7A / L7A	16M x 16 * 8 pcs	256Mb 6th			2	DS, 1250mil	Now
		M464S3354BTS	C7A / L7A	32M x 16 * 4 pcs	512Mb 3rd			1	DS, 1000mil	Now
64Mx64	512MB	M464S6453EN0	C7A / L7A	32M x 8 * 16 pcs	256Mb 6th			2	DS, 1250mil	Now
		M464S6554BTS	C7A / L7A	32M x 16 * 8 pcs	512Mb 3rd			2	DS, 1250mil	Now
144pin PC133 uSODIMM										
8Mx64	64MB	M463S0924ET1	C7A / L7A	8M x 16 * 4 pcs	128Mb 6th	3.3V	4	1	DS, 1181mil	Now
16Mx64	128MB	M463S1654ET1	C7A / L7A	16M x 16 * 16 pcs	256Mb 6th			1	DS, 1181mil	Now

H. Package Dimension

50pin TSOP(II)

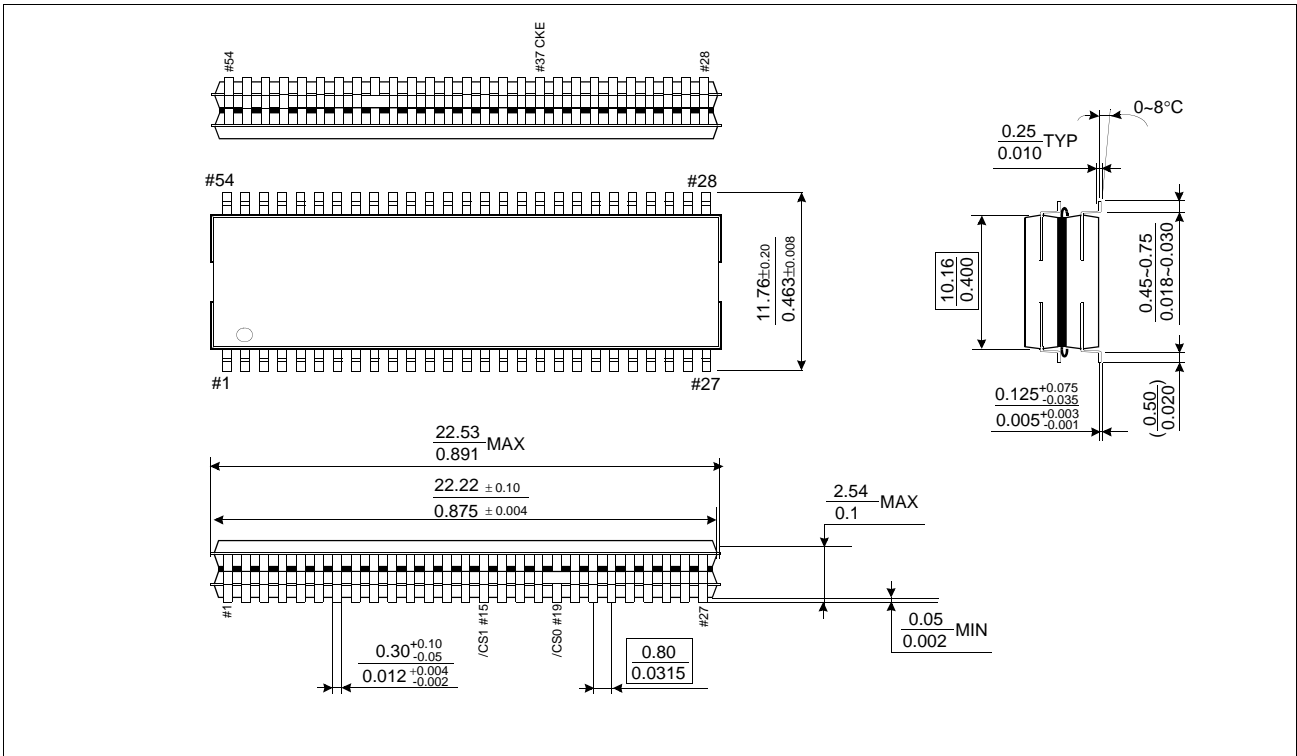


54pin TSOP(II)

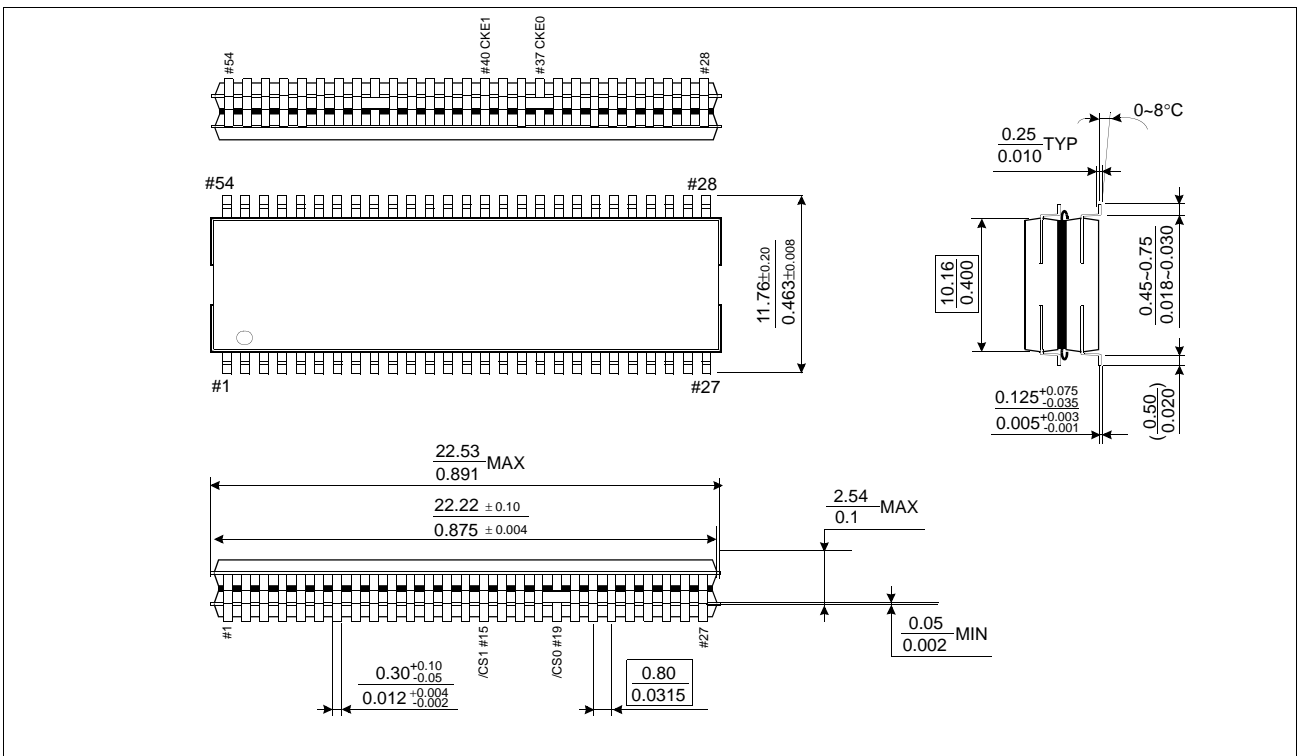


H. Package Dimension (Continued)

54pin TSOP(II) Stack Single CKE



54pin TSOP(II) Stack Dual CKE



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