



DRAM Component Product Guide

DRAM data sheets are available at www.micron.com/dramds

02Q06

■ DDR SDRAM - Double Data Rate (DDR) SDRAM

Density	Memory Configuration	Features	Part Number	Packages		Speed (ns)	Samples	Production
				TSOP (TG) Pins	FBGA Balls			
128Mb	32 Meg x 4	Quad-bank, 2.5V, SSTL_2	MT46V32M4	66	-	6	Now	Now
	32 Meg x 4	Quad-bank, 2.6V, SSTL_2	MT46V32M4	66	-	5	Now	Now
	16 Meg x 8	Quad-bank, 2.5V, SSTL_2	MT46V16M8 ¹	66	-	6	Now	Now
	16 Meg x 8	Quad-bank, 2.6V, SSTL_2	MT46V16M8	66	-	5	Now	Now
	8 Meg x 16	Quad-bank, 2.5V, SSTL_2	MT46V8M16 ¹	66	-	6	Now	Now
	8 Meg x 16	Quad-bank, 2.6V, SSTL_2	MT46V8M16	66	-	5	Now	Now
256Mb	64 Meg x 4	Quad-bank, 2.5V, SSTL_2	MT46V64M4	66	60	6, 7.5	Now	Now
	64 Meg x 4	Quad-bank, 2.6V, SSTL_2	MT46V64M4	66	60	5	Now	Now
	32 Meg x 8	Quad-bank, 2.5V, SSTL_2	MT46V32M8 ¹	66	60	6, 7.5	Now	Now
	32 Meg x 8	Quad-bank, 2.6V, SSTL_2	MT46V32M8	66	60	5	Now	Now
	16 Meg x 16	Quad-bank, 2.5V, SSTL_2	MT46V16M16 ¹	66	60	6, 7.5	Now	Now
	16 Meg x 16	Quad-bank, 2.6V, SSTL_2	MT46V16M16	66	60	5	Now	Now
512Mb	128 Meg x 4	Quad-bank, 2.5V, SSTL_2	MT46V128M4	66	60	6, 7.5	Now	Now
	128 Meg x 4	Quad-bank, 2.6V, SSTL_2	MT46V128M4	66	60	5	Now	Now
	64 Meg x 8	Quad-bank, 2.5V, SSTL_2	MT46V64M8	66	60	6, 7.5	Now	Now
	64 Meg x 8	Quad-bank, 2.6V, SSTL_2	MT46V64M8	66	60	5	Now	Now
	32 Meg x 16	Quad-bank, 2.5V, SSTL_2	MT46V32M16 ¹	66	60	6, 7.5	Now	Now
	32 Meg x 16	Quad-bank, 2.6V, SSTL_2	MT46V32M16	66	60	5	Now	Now
1Gb	256 Meg x 4	Quad-bank, 2.5V, SSTL_2	MT46V256M4	66	-	6, 7.5	Now	Now
	64 Meg x 16	Quad-bank, 2.5V, SSTL_2	MT46V64M16	66	-	6, 7.5	Now	Now
	128 Meg x 8	Quad-bank, 2.5V, SSTL_2	MT46V128M8	66	-	6, 7.5	Now	Now

Note: *DDR SDRAM is available in leaded or lead-free packages. ¹Available in industrial temp, 6 IT.

■ DDR2 SDRAM - Double Data Rate (DDR) SDRAM

Density	Memory Configuration	Features	Base Component Part Number	FBGA Balls	Speed Mark	Samples	Production
256Mb	64 Meg x 4	Quad-bank, 1.8V, SSTL_18	MT47H64M4 ¹	60	-5E, -37E, -3	Now	Now
	32 Meg x 8	Quad-bank, 1.8V, SSTL_18	MT47H32M8 ¹	60	-5E, -37E, -3	Now	Now
	16 Meg x 16	Quad-bank, 1.8V, SSTL_18	MT47H16M16 ¹	84	-5E, -37E, -3	Now	Now
512Mb	128 Meg x 4	Quad-bank, 1.8V, SSTL_18	MT47H128M4 ¹	60	-5E, -37E, -3	Now	Now
	64 Meg x 8	Quad-bank, 1.8V, SSTL_18	MT47H64M8 ¹	60	-5E, -37E, -3, -25E	Now	Now
	32 Meg x 16	Quad-bank, 1.8V, SSTL_18	MT47H32M16 ¹	84	-5E, -37E, -3, -25E	Now	Now
	128 Meg x 4	Quad-bank, 1.8V, SSTL_18	MT47H128M4BG	60	-5E, -37E, -3, -25E	Now	2Q06
1Gb	64 Meg x 8	Quad-bank, 1.8V, SSTL_18	MT47H64M8BG	60	-5E, -37E, -3, -25E	Now	2Q06
	32 Meg x 16	Quad-bank, 1.8V, SSTL_18	MT47H32M16BG	84	-5E, -37E, -3, -25E	Now	2Q06
	256 Meg x 4	Eight-bank, 1.8V, SSTL_18	MT47H256M4	92	-5E, -37E, -3	Now	Now
2Gb	128 Meg x 8	Eight-bank, 1.8V, SSTL_18	MT47H128M8	92	-5E, -37E, -3	Now	Now
	64 Meg x 16	Eight-bank, 1.8V, SSTL_18	MT47H64M16	92	-5E, -37E, -3	Now	Now
	512 Meg x 4	Eight-bank, 1.8V, SSTL_18	MT47H512M4	60	-5E, -37E, -3	2Q06	4Q06
2Gb	256 Meg x 8	Eight-bank, 1.8V, SSTL_18	MT47H256M8	60	-5E, -37E, -3	2Q06	4Q06
	128 Meg x 16	Eight-bank, 1.8V, SSTL_18	MT47H128M16	84	-5E, -37E, -3	2Q06	4Q06

Note: *DDR2 SDRAM is available in FBGA packages only. ¹Available in industrial temp, -5E, and -37E IT.

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SDR SDRAM - Single Data Rate (SDR) SDRAM

Density	Memory Configuration	Features	Part Number	Packages		Speed Mark ¹	Samples	Production
				TSOP (TG) Pins	FBGA Balls			
64Mb	16 Meg x 4	Quad-bank, 3.3V	MT48LC16M4A2	54	-	-7E, -75	Now	Now
	8 Meg x 8	Quad-bank, 3.3V	MT48LC8M8A2 ²	54	-	-7E, -75	Now	Now
	4 Meg x 16	Quad-bank, 3.3V	MT48LC4M16A2 ^{2,3}	54	54	-6, -7E, -75	Now	Now
128Mb	2 Meg x 32	Quad-bank, pipelined, 3.3V	MT48LC2M32B2 ⁴	86	90	-5, -55, -6, -7	Now	Now
	32 Meg x 4	Quad-bank, 3.3V	MT48LC32M4A2	54	-	-7E, -75	Now	Now
	16 Meg x 8	Quad-bank, 3.3V	MT48LC16M8A2 ²	54	60	-7E, -75	Now	Now
	8 Meg x 16	Quad-bank, 3.3V	MT48LC8M16A2 ^{2,3}	54	54	-6A, -7E, -75	Now	Now
256Mb	4 Meg x 32	Quad-bank, pipelined, 3.3V	MT48LC4M32B2 ^{4,10}	86	90	-6, -7	Now	Now
	64 Meg x 4	Quad-bank, 3.3V, 8K Refresh	MT48LC64M4A2	54	60	-7E, -75	Now	Now
	32 Meg x 8	Quad-bank, 3.3V, 8K Refresh	MT48LC32M8A2 ²	54	60	-6, -7E, -75	Now	Now
512Mb	16 Meg x 16	Quad-bank, 3.3V, 8K Refresh	MT48LC16M16A2 ^{2,3}	54	54	-6, -7E, -75	Now	Now
	8 Meg x 32	Quad-bank, 3.3V, 4K Refresh	MT48LC8M32B2 ⁴	86	90	-6, -7	Now	Now
	128 Meg x 4	Quad-bank, 3.3V, 8K Refresh	MT48LC128M4A2	54	-	-7E, -75	Now	Now
	64 Meg x 8	Quad-bank, 3.3V, 8K Refresh	MT48LC64M8A2 ²	54	-	-7E, -75	Now	Now
	32 Meg x 16	Quad-bank, 3.3V, 8K Refresh	MT48LC32M16A2 ²	54	-	-75	Now	Now
	16 Meg x 32	Quad-bank, 3.3V, 4K Refresh	MT48LC16M32S2 ^{4,5}	-	90	-6, -7	Now	Now

Note: ¹SDR SDRAM is available in leaded or lead-free packages. ²-7E = PC133, CL = 2; -75 = PC133, CL = 3. ³Available in industrial temp -75 IT or low-power self refresh -75L. ⁴Available in industrial temp, -7E IT. ⁵Available in industrial temp, -7 IT. ⁶TwinDie™ solution. ¹⁰Available in industrial temp -6 IT.

Mobile DDR SDRAM (Low Power)

Density	Memory Configuration	Features ⁶	Part Number ⁷	FBGA Balls	Speed (ns)	Samples	Production
128Mb	8 Meg x 16	PASR, TCSR, 1.8V	MT46H8M16LF	60	7.5, 10	Now	Now
256Mb	16 Meg x 16	PASR, TCSR, DPD, 1.8V	MT46H16M16LF	60	6, 7.5, 10	1Q06	2Q06
	8 Meg x 32	PASR, TCSR, DPD, 1.8V	MT46H8M32LF	90	6, 7.5, 10	1Q06	3Q06
512Mb	32 Meg x 16	PASR, TCSR, DPD, 1.8V	MT46H32M16LF	60	6, 7.5, 10	Now	4Q06
	16 Meg x 32	PASR, TCSR, DPD, 1.8V	MT46H16M32LF	90	6, 7.5, 10	Now	4Q06

Note: ⁶All parts have special low-power features and low V_{DDQ} available for added power savings. ⁷Available in industrial temperature (IT) range. ⁸Mobile DDR SDRAM is available in leaded or lead-free packages.

Mobile SDR SDRAM (Low Power)

Density	Memory Configuration	Features ⁶	Part Number ⁷	FBGA Balls	Speed (ns)	Samples	Production
64Mb	4 Meg x 16	PASR, TCSR, DPD, 1.8V	MT48H4M16LF	54	8, 10	Now	Now
128Mb	8 Meg x 16	PASR, TCSR, 3.3V	MT48LC8M16LF	54	7.5, 8, 10	Now	Now
	8 Meg x 16	PASR, TCSR, 2.5V	MT48V8M16LF	54	7.5, 8, 10	Now	Now
	8 Meg x 16	PASR, TCSR, DPD, 1.8V	MT48H8M16LF	54	8, 10	Now	Now
256Mb	4 Meg x 32	PASR, TCSR, 2.5V	MT48V4M32LF	90	7.5, 8, 10	Now	Now
	4 Meg x 32	PASR, TCSR, 3.3V	MT48LC4M32LF	90	7.5, 8, 10	Now	Now
	16 Meg x 16	PASR, TCSR, DPD, 1.8V	MT48H16M16LF	54	7.5, 8, 10	2Q06	3Q06
	8 Meg x 32	PASR, TCSR, DPD, 3.3V	MT48LC8M32LF	90	7.5, 8, 10	Now	Now
	8 Meg x 32	PASR, TCSR, DPD, 2.5V	MT48V8M32LF	90	7.5, 8, 10	Now	Now
	8 Meg x 32	PASR, TCSR, DPD, 1.8V	MT48H8M32LF	90	7.5, 8, 10	2Q06	3Q06
512Mb	32 Meg x 16	PASR, TCSR, DPD, 1.8V	MT48H32M16LF	54	7.5, 8, 10	Now	4Q06
	16 Meg x 32	PASR, TCSR, DPD, 1.8V	MT48H16M32LF	90	7.5, 8, 10	Now	4Q06
	16 Meg x 32	PASR, TCSR, DPD, 3.3V	MT48LC16M32L2 ⁸	90	8, 10	Now	Now
	16 Meg x 32	PASR, TCSR, DPD, 2.5V	MT48V16M32L2 ⁸	90	8, 10	Now	Now
	16 Meg x 32	PASR, TCSR, DPD, 1.8V	MT48H16M32L2 ⁸	90	8, 10	Now	Now

Note: ⁶All parts have special low-power features and low V_{DDQ} available for added power savings. ⁷Available in industrial temperature (IT) range. ⁸TwinDie solution. ⁹Mobile SDR SDRAM is available in leaded or lead-free packages.

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■ RLD RAM® Memory⁹

Density	Memory Configuration	Description	Part Number	I/O Voltage	Package	Balls	Speed (ns)	Samples	Production
256Mb	16 Meg x 16	Eight-bank, 1.8V V _{DD} , HSTL	MT49H16M16FM	1.8V	T-FBGA	144	3.3, 4, 5	Now	Now
	8 Meg x 32	Eight-bank, 1.8V V _{DD} , HSTL	MT49H8M32FM	1.8V	T-FBGA	144	3.3, 4, 5	Now	Now

■ RLD RAM II⁹, Common I/O

Density	Memory Configuration	Description	Part Number	I/O Voltage	Package	Balls	Speed (ns)	Samples	Production
288Mb	32 Meg x 9	Eight-bank, 1.8V V _{DD} , HSTL	MT49H32M9FM	1.5V / 1.8V	T-FBGA	144	2.5, 3.3, 5	Now	Now
	16 Meg x 18	Eight-bank, 1.8V V _{DD} , HSTL	MT49H16M18FM	1.5V / 1.8V	T-FBGA	144	2.5, 3.3, 5	Now	Now
	8 Meg x 36	Eight-bank, 1.8V V _{DD} , HSTL	MT49H8M36FM	1.5V / 1.8V	T-FBGA	144	2.5, 3.3, 5	Now	Now
576Mb	64 Meg x 9	Eight-bank, 1.8V V _{DD} , HSTL	MT49H64M9FM	1.5V / 1.8V	T-FBGA	144	1.8, 2.5, 3.3, 5	4Q06	1H07
	32 Meg x 18	Eight-bank, 1.8V V _{DD} , HSTL	MT49H32M18FM	1.5V / 1.8V	T-FBGA	144	1.8, 2.5, 3.3, 5	4Q06	1H07
	16 Meg x 36	Eight-bank, 1.8V V _{DD} , HSTL	MT49H16M36FM	1.5V / 1.8V	T-FBGA	144	1.8, 2.5, 3.3, 5	4Q06	1H07

■ RLD RAM II⁹, Separate I/O

Density	Memory Configuration	Description	Part Number	I/O Voltage	Package	Balls	Speed (ns)	Samples	Production
288Mb	16 Meg x 18	Eight-bank, 1.8V V _{DD} , HSTL	MT49H16M18CFM	1.5V / 1.8V	T-FBGA	144	2.5, 3.3, 5	Now	Now
576Mb	64 Meg x 9	Eight-bank, 1.8V V _{DD} , HSTL	MT49H64M9CFM	1.5V / 1.8V	T-FBGA	144	1.8, 2.5, 3.3, 5	4Q06	1H07
	32 Meg x 18	Eight-bank, 1.8V V _{DD} , HSTL	MT49H32M18CFM	1.5V / 1.8V	T-FBGA	144	1.8, 2.5, 3.3, 5	4Q06	1H07

Note: ⁹RLDRAM II devices are recommended for new designs.

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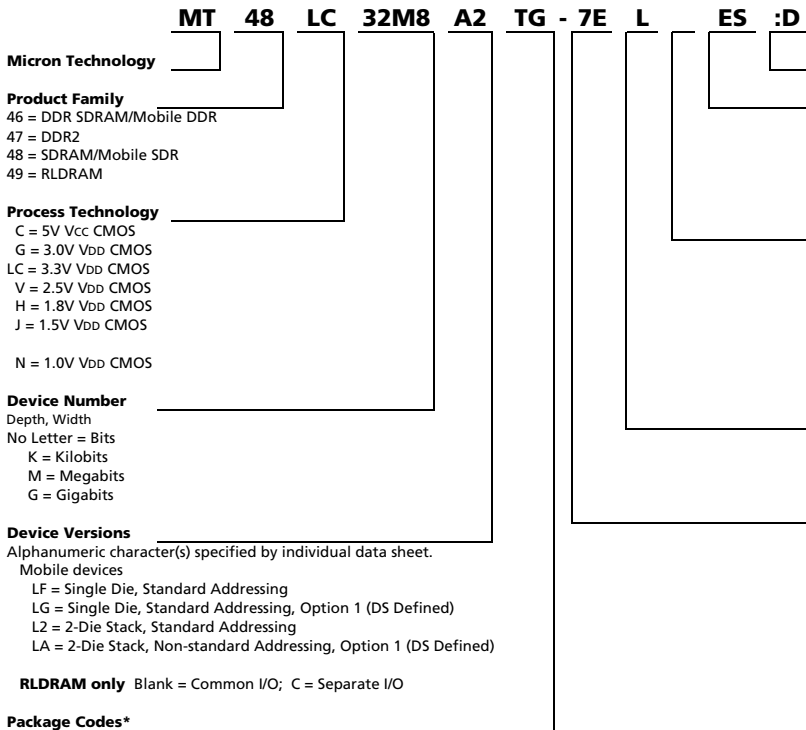
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DRAM Component Part Numbering System

The part numbering system is available at www.micron.com/numberguide

DDR2/DDR/SDR, Mobile DDR/SDR, and RLD RAM®



Die Revision Designator

Special Processing

ES = Engineering Sample
 MS = Mechanical Sample
 K = Interim Offering
 H = Interim Offering
 DM = Custom

Operating Temperatures

Blank = 0°C to +70°C
 WT = -25°C to +85°C
 IT** = -40°C to +85°C
 XT = -25°C to +75°C
 YT = -40°C to +110°C
 AT = -40°C to +105°C
 **The number one (1) and the capital letter "I" utilize the same laser mark—"I."

Special Options

(Multiple processing codes are separated by a space and are listed in hierarchical order.)
 L = Low Power

Access/Cycle Time

DRAM Technology	Speed Grade Mark	¹ RAC Access Time
All DRAM	-0	Untested
	-A	Untested

Lead Plating	Pb-free/RoHS Compliant Plating	Package Description***
SDRAM		
FB	BB	FBGA (60-ball, 8 x 16)
FG	BG	VFBGA (54-ball); FBGA (84-ball, 60-ball, 8 x 14)
F4	B4	VFBGA (54-ball, 8 x 8)
F5	B5	VFBGA (90-ball, 8 x 13)
TG	P	TSOP (Type II)
xTG	xP	Stacked TSOP, "x" = internal stacking code
Mobile SDRAM		
F4	B4	VFBGA (54-ball, 8 x 8)
F5	B5	VFBGA (90-ball, 8 x 13)
	BF	VFBGA (54-ball, 8 x 9)
	CJ	VFBGA (54-ball, 10 x 11.5)
	CM	VFBGA (90-ball, 10 x 12)
Mobile DDR SDRAM		
	BF	VFBGA (50-ball, 60-ball, 8 x 9)
	B5	VFBGA (90-ball, 8 x 13)
	CF	VFBGA (60-ball, 8 x 10)
	CK	VFBGA (60-ball, 10 x 11.5)
	CM	VFBGA (90-ball, 10 x 12)
DDR SDRAM		
FG	BG	FBGA (84-ball, 60-ball, 8 x 14)
FN	BN	FBGA (54-ball, 60-ball, 84-ball, 10 x 12.5)
TG	P	TSOP (Type II)
STG	SP	Stacked TSOP, "S" = internal stacking code
DDR2 SDRAM		
	BP	FBGA (60-ball, 8 x 12)
	BG	FBGA (84-ball, 60-ball, 8 x 14)
	BT	FBGA (92-ball, 11 x 19)
	B7	FBGA (68-ball 10 x 16.5 / 84-ball 10 x 16.5)
	B6	FBGA (60-ball, 12 x 10)
	BN	FBGA (84-ball, 12 x 12.5)
	CB	FBGA (60-ball, 12 x 10)
	CC	FBGA (84-ball, 12 x 12.5)
	THJ	FBGA 2COB (TwinDie 97-ball 12 x 19)
	THK	FBGA 2COB (TwinDie 63-ball 12 x 10)
	THL	FBGA 2COB (TwinDie 71-ball 10 x 16.5)
RLDRAM		
FM	BM	FBGA (144-ball; 11 x 18.5)

DRAM Technology	Speed Grade Mark	MAX Clock Frequency	PC Targets CL ¹ -RCD ² -RP
SDRAM	-75	133 MHz	3-3-3
	-7E	133 MHz	2-2-2
	-7	143 MHz	
	-6	167 MHz	
	-6A	167 MHz	
	-55	183 MHz	
Mobile SDRAM	-10	100 MHz	
	-8	125 MHz	
	-75	133 MHz	
Mobile DDR SDRAM	-10	100 MHz	
	-75	133 MHz	
DDR SDRAM	-6	166 MHz	
	-75	133 MHz	2.5-3-3
	-75Z	133 MHz	2-3-3
	-75E	133 MHz	2-2-2
	-65	150 MHz	
	-6G	167 MHz	
	-6T	167 MHz	2.5-3-3
	-6R	167 MHz	2.5-3-3
	-6	167 MHz	2.5-3-3
	-55	183 MHz	
	-5T	200 MHz	3-4-4
	-5B	200 MHz	3-3-3
	-5A	200 MHz	2.5-3-3
DDR2 SDRAM	-5	200 MHz	
	-4	250 MHz	
	-33	300 MHz	
	-5	200 MHz	4-4-4
	-5E	200 MHz	3-3-3
	-37E	267 MHz	4-4-4
RLDRAM	-3	333 MHz	5-5-5
	-3E	333 MHz	4-4-4
	-25	400 MHz	6-6-6
	-25E	400 MHz	5-5-5
	-5	200 MHz	
	-33	300 MHz	
	-25	400 MHz	
	-18	533 MHz	

*Due to space limitations, FBGA- and µBGA-packaged components and flip chips in packages have an abbreviated part mark that is different from the part number. See our Web site for more information on abbreviated component marks.

***Dimensions in millimeters

Some device offerings are available in a VFBGA rather than an FBGA package; this is noted on the data sheet.

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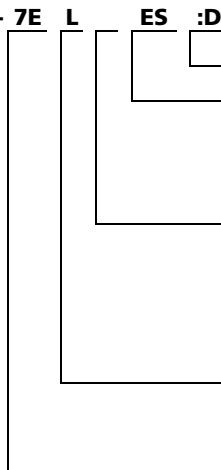
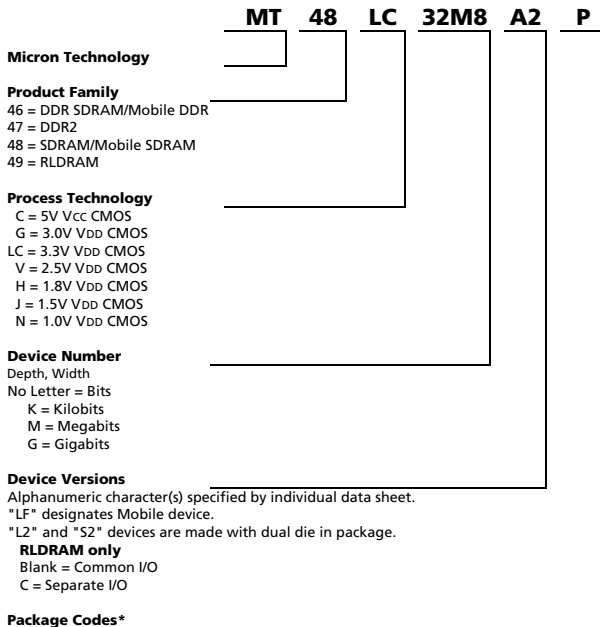


Pb-Free DRAM Component Part Numbering System

The part numbering system is available at www.micron.com/numberguide

Pb-Free = RoHS compliant

■ DDR2/DDR/SDR, Mobile DDR/SDR, and RLDRAM®



Die Revision Designator

Special Processing

ES = Engineering Sample
 MS = Mechanical Sample
 K = Interim Offering
 H = Interim Offering
 DM = Custom

Operating Temperatures

Blank = 0°C to +70°C
 WT = -25°C to +85°C
 IT** = -40°C to +85°C
 XT = -25°C to +75°C
 YT = -40°C to +75°C

**The number one (1) and the capital letter "I" utilize the same laser mark—"I."

Special Options

(Multiple processing codes are separated by a space and are listed in hierarchical order.)
 L = Low Power

Access/Cycle Time

DRAM Technology	Speed Grade Mark	t _{RAC} Access Time
All DRAM	-0	Untested
	-A	Untested

Pb-Free/RoHS Compliant Plating	Package Description***
SDRAM	
BB	FBGA (60-ball, 8 x 16)
BG	VFBGA (54-ball); FBGA (84-ball, 60-ball, 8 x 14)
B4	VFBGA (54-ball, 8 x 8)
B5	VFBGA (90-ball, 8 x 13)
P	TSOP (Type II)
xP	Stacked TSOP, "x" = internal stacking code
Mobile SDRAM	
B4	VFBGA (54-ball, 8 x 8)
B5	VFBGA (90-ball, 8 x 13)
BF	VFBGA (54-ball, 8 x 9)
CJ	VFBGA (54-ball, 10 x 11.5)
CM	VFBGA (90-ball, 10 x 12)
Mobile DDR SDRAM	
BF	VFBGA (50-ball, 60-ball, 8 x 9)
B5	VFBGA (90-ball, 8 x 13)
CF	VFBGA (60-ball, 8 x 10)
CK	VFBGA (60-ball, 10 x 11.5)
CM	VFBGA (90-ball, 10 x 12)
DDR SDRAM	
BG	FBGA (84-ball, 60-ball, 8 x 14)
BN	FBGA (54-ball, 60-ball, 84-ball, 10 x 12.5)
P	TSOP (Type II)
xP	Stacked TSOP, "x" = internal stacking code
DDR2 SDRAM	
BP	FBGA (60-ball, 8 x 12)
BG	FBGA (84-ball, 60-ball, 8 x 14)
BT	FBGA (92-ball, 11 x 19)
CB	FBGA (60-ball, 12 x 10)
CC	FBGA (84-ball, 12 x 12.5)
RLDRAM	
BM	FBGA (144-ball, 11 x 18.5)

DRAM Technology	Speed Grade Mark	MAX Clock Frequency	PC Targets CL-t _{RC} -t _{RP}
SDRAM	-75	133 MHz	3-3-3
	-7E	133 MHz	2-2-2
	-7	143 MHz	
	-6	167 MHz	
	-6A	167 MHz	
	-55	183 MHz	
Mobile SDRAM	-10	100 MHz	
	-8	125 MHz	
	-75	133 MHz	
Mobile DDR SDRAM	-10	100 MHz	
	-75	133 MHz	
DDR SDRAM	-6	166 MHz	
	-75	133 MHz	2.5-3-3
	-75Z	133 MHz	2-3-3
	-75E	133 MHz	2-2-2
	-65	150 MHz	
	-6T	167 MHz	2.5-3-3
	-6	167 MHz	2.5-3-3
	-55	183 MHz	
	-5T	200 MHz	3-4-4
	-5B	200 MHz	3-3-3
	-5A	200 MHz	2.5-3-3
DDR2	-5	200 MHz	4-4-4
	-5E	200 MHz	3-3-3
	-37E	267 MHz	4-4-4
	-3	333 MHz	5-5-5
	-3E	333 MHz	4-4-4
	-25	400 MHz	6-6-6
	-25E	400 MHz	5-5-5
RLDRAM	-5	200 MHz	
	-4	250 MHz	
	-33	300 MHz	
	-18	533 MHz	

*Due to space limitations, FBGA- and μBGA-packaged components and flip chips in packages have an abbreviated part mark that is different from the part number. See our Web site for more information on abbreviated component marks.
 ***Dimensions in millimeters
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