

Consumer Memory

Product Guide

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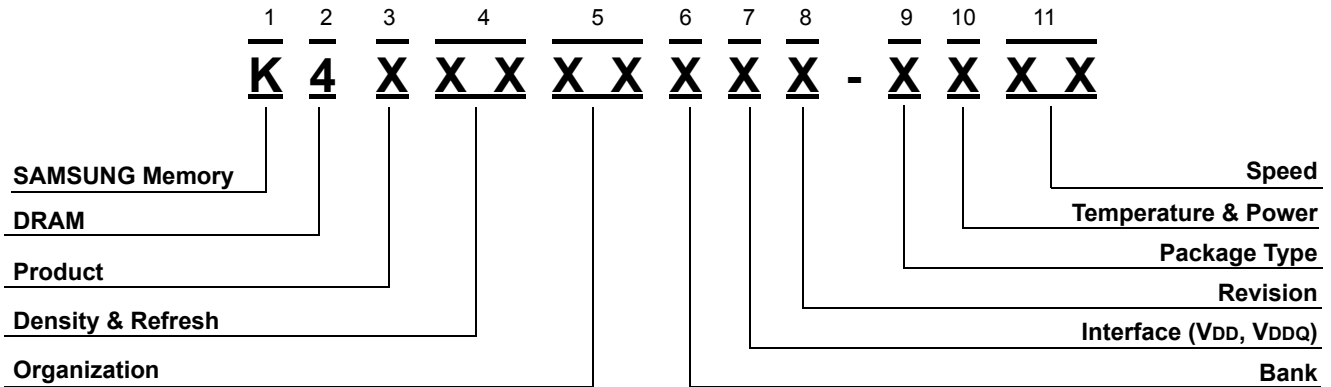
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1. CONSUMER MEMORY ORDERING INFORMATION

**1. SAMSUNG Memory : K****2. DRAM : 4****3. Product**

- S : SDRAM
- H : DDR SDRAM
- T : DDR2 SDRAM
- B : DDR3 SDRAM
- D : GDDR
- J : GDDR3

4. Density & Refresh

- 64 : 64Mb, 4K/64ms
- 28 : 128Mb, 4K/64ms
- 56 : 256Mb, 8K/64ms
- 51 : 512Mb, 8K/64ms
- 1G : 1Gb, 8K/64ms
- 2G : 2Gb, 8K/64ms
- 10 : 1Gb, 8K/32ms

5. Organization

- 04 : x4
- 08 : x8
- 16 : x16
- 32 : x32
- 31 : x32 (2CS)

6. Bank

- 2 : 2 Banks
- 3 : 4 Banks
- 4 : 8 Banks

7. Interface (VDD, VDDQ)

- 2 : LVTTTL (3.3V, 3.3V)
- 8 : SSTL_2 (2.5V, 2.5V)
- Q : SSTL_18 (1.8V, 1.8V)
- 6 : SSTL_15 (1.5V, 1.5V)
- K : POD_18 (1.8V, 1.8V)

8. Revision

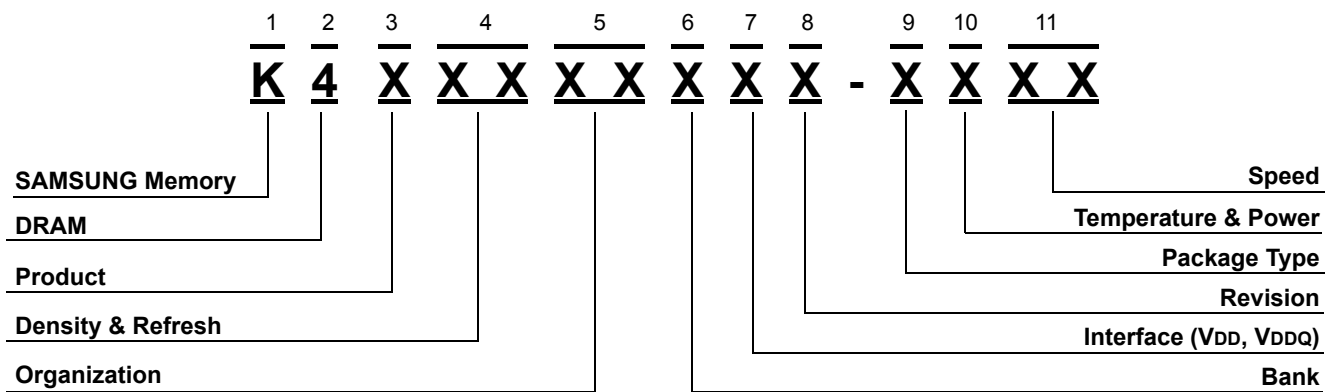
- | | |
|--------------|---------------|
| M : 1st Gen. | H : 9th Gen. |
| A : 2nd Gen. | I : 10th Gen. |
| B : 3rd Gen. | J : 11th Gen. |
| C : 4th Gen. | K : 12th Gen. |
| D : 5th Gen. | L : 13th Gen. |
| E : 6th Gen. | N : 14th Gen. |
| F : 7th Gen. | O : 15th Gen. |
| G : 8th Gen. | S : 19th Gen. |

9. Package Type

- U : TSOP118 (Lead-free)
- Z : 100TQFP(Lead-free) only for 128Mb GDDR
- Z : FBGA (Lead-free)
- V : 144FBGA (Lead-free) only for 128Mb GDDR
- L : TSOP118 (Lead-free & Halogen-free)
- H : FBGA (Lead-free & Halogen-free)
- F : FBGA(Lead-free & Halogen-free) for 64Mb DDR, 128Mb GDDR
- M : FBGA DDP (Lead-free & Halogen-free)
- B : FBGA FLIP-CHIP (Lead-free & Halogen-free)

10. Temperature & Power

- C : Commercial Temp. & Normal Power
- L : Commercial Temp. & Low Power
- I : Industrial Temp. & Normal Power
- P : Industrial Temp. & Low Power
- D : Industrial Temp. & Super Low Power
- Q : Commercial Temp. DDR3+ (Gapless, BL4)



11. Speed

- 75 : 7.5ns, PC133 (133MHz CL=3)
- 60 : 6.0ns (166MHz CL=3)
- 50 : 5.0ns (200MHz CL=3)
- 40 : 4.0ns (250MHz CL=3)
- B0 : DDR266 (133MHz @ CL=2.5, tRCD=3, tRP=3)
- B3 : DDR333 (166MHz @ CL=2.5, tRCD=3, tRP=3)
- CC : DDR400 (200MHz @ CL=3, tRCD=3, tRP=3)
- E6 : DDR2-667 (333MHz @ CL=5, tRCD=5, tRP=5)
- E7 : DDR2-800 (400MHz @ CL=5, tRCD=5, tRP=5)
- F7 : DDR2/3-800 (400MHz @ CL=6, tRCD=6, tRP=6)
- F8 : DDR2/3-1066 (533MHz @ CL=7, tRCD=7, tRP=7)
- H9 : DDR3-1333 (667MHz @ CL=9, tRCD=9, tRP=9)
- K0 : DDR3-1600 (800MHz @ CL=11, tRCD=11, tRP=11)
- 7A : GDDR3-2.6Gbps (0.77ns)
- 08 : GDDR3-2.4Gbps (0.8ns)
- 1A : GDDR3-2.0Gbps (1.0ns)
- 12 : GDDR3-1.6Gbps (1.25ns)
- 14 : GDDR3-1.4Gbps (1.4ns)

2. Commercial Temperature Consumer DRAM Component Product Guide

2.1 SDRAM

Density	Bank	Part Number	Package & Power, Temp. (-C/-L) & Speed	Org.	Interface	Refresh	Power (V)	Package	Avail.
64Mb N-die	4Banks	K4S640832N	LC(L)75	8M x 8	LVTTL	4K/64ms	3.3±0.3V	54pin TSOP(II)	Now
		K4S641632N	LC(L)50/C(L)60/C(L)75	4M x 16					
128Mb K-die	4Banks	K4S280832K	U ¹ C(L)75	16M x 8	LVTTL	4K/64ms	3.3±0.3V	54pin TSOP(II) ^{*1}	Now
		K4S281632K	UC(L)50/C(L)60/C(L)75	8M x 16					
128Mb O-die	4Banks	K4S280832O	LC(L)75	16M x 8	LVTTL	4K/64ms	3.3±0.3V	54pin TSOP(II)	3Q'10
		K4S281632O	LC(L)50/C(L)60/C(L)75	8M x 16					
256Mb J-die	4Banks	K4S560432J	U ¹ C(L)75	64M x 4	LVTTL	8K/64ms	3.3±0.3V	54pin TSOP(II) ^{*1}	Now
		K4S560832J	UC(L)75	32M x 8					
		K4S561632J	UC(L)60/C(L)75	16M x 16					
256Mb N-die	4Banks	K4S560432N	LC(L)75	64M x 4	LVTTL	8K/64ms	3.3±0.3V	54pin TSOP(II)	Now
		K4S560832N	LC(L)75	32M x 8					
		K4S561632N	LC(L)60/C(L)75	16M x 16					

NOTE : 1. 128Mb K-die SDR and 256Mb J-die SDR DRAMs support Lead-free & Halogen-free package with Lead-free package code(-U)

2.2 DDR SDRAM

Density	Bank	Part Number	Package & Power, Temp. (-C/-L) & Speed	Org.	Interface	Refresh	Power (V)	Package	Avail.
64Mb N-die	4Banks	K4H641638N	LC(L)CC	4M x 16	SSTL_2	4K/64m	2.5±0.2V	66pinTSOPII	Now
			FC(L)CC					60ball FBGA	
64Mb Q-die	4Banks	K4H641638Q	LC(L)CC	4M x 16	SSTL_2	4K/64m	2.5±0.2V	66pinTSOPII	2Q'10
128Mb L-die	4Banks	K4H281638L	LC(L)/C(L)CC	8M x 16	SSTL_2	4K/64m	2.5±0.2V ^{*1}	66pinTSOPII	Now
128Mb O-die	4Banks	K4H281638O	LC(L)CC/C(L)B3	8M x 16	SSTL_2	4K/64m	2.5±0.2V ^{*1}	66pinTSOPII	2Q'10
256Mb J-die	4Banks	K4H560438J	LC(L)B3/C(L)B0	64M x 4	SSTL_2	8K/64m	2.5±0.2V ^{*2}	66pinTSOPII	Now
		K4H560838J	LC(L)CC/C(L)B3	32M x 8					
		K4H561638J	LC(L)CC/C(L)B3	16M x 16					
256Mb N-die	4Banks	K4H560438N	LC(L)B3/C(L)B0	64M x 4	SSTL_2	8K/64m	2.5±0.2V ^{*2}	66pinTSOPII	Now
		K4H560838N	LC(L)CC/C(L)B3	32M x 8					
		K4H561638N	LC(L)CC/C(L)B3	16M x 16					
512Mb F-die	4Banks	K4H510438F	LC(L)B3/C(L)B0	128M x 4	SSTL_2	8K/64m	2.5±0.2V ^{*2}	66pinTSOPII	Now
			HC(L)CC/C(L)B3					60ball FBGA	
		K4H510838F	LC(L)CC/C(L)B3	64M x 8				66pinTSOPII	
			HC(L)CC/C(L)B3					60ball FBGA	
		K4H511638F	LC(L)CC/C(L)B3	32M x 16				66pinTSOPII	
			HC(L)CC/C(L)B3					60ball FBGA	
512Mb G-die	4Banks	K4H510438G	LC(L)B3/C(L)B0	128M x 4	SSTL_2	8K/64m	2.5±0.2V ^{*2}	66pinTSOPII	Now
			HC(L)CC/C(L)B3					60ball FBGA	
		K4H510838G	LC(L)CC/C(L)B3	64M x 8				66pinTSOPII	
			HC(L)CC/C(L)B3					60ball FBGA	
		K4H511638G	LC(L)CC/C(L)B3	32M x 16				66pinTSOPII	
			HC(L)CC/C(L)B3					60ball FBGA	

NOTE : 1. V_{DD}/V_{DDQ} SPEC for 128Mb DDR L-die

	DDR500	DDR400
V _{DD} /V _{DDQ}	2.5V ± 0.125V	2.5V ± 0.2V

2. V_{DD}/V_{DDQ} SPEC for 256/512Mb DDR

	DDR400	DDR333/266
V _{DD} /V _{DDQ}	2.6V ± 0.1V	2.5V ± 0.2V

2.3 DDR2 SDRAM

Density	Banks	Part Number	Package & Power, Temp. (-C/-L) & Speed	Org.	Interface	Refresh	Power (V)	Package	Avail.
128Mb O-die	4Banks	K4T28163QO	HCF8/E7/F7/E6	8M x 16	SSTL_18	4K/64m	1.8V±0.1V	84ball FBGA	Now
256Mb I-die	4Banks	K4T56163QI	Z ¹ C(L)E7/F7/E6/D5/CC	16M x 16	SSTL_18	8K/64m	1.8V±0.1V	84ball FBGA	Now
256Mb N-die	4Banks	K4T56163QN	HCF8/E7/F7/E6	16M x 16	SSTL_18	8K/64m	1.8V±0.1V	84ball FBGA	Now
512Mb G-die	4Banks	K4T51083QG	HC(L)F8/E7/F7/E6	64M x 8	SSTL_18	8K/64m	1.8V±0.1V	60ball FBGA	Now
		K4T51163QG	HC(L)F8/E7/F7/E6	32M x 16				84ball FBGA	
512Mb I-die	4Banks	K4T51043QI	HC(L)E7/F7/E6	128M x 4	SSTL_18	8K/64m	1.8V±0.1V	60ball FBGA	Now
		K4T51083QI	HC(L)E7/F7/E6	64M x 8				84ball FBGA	Now
		K4T51163QI	HC(L)F8/E7/F7/E6	32M x 16				84ball FBGA	Now
1Gb E-die	8Banks	K4T1G084QE	HC(L)F8/E7/F7/E6	128M x 8	SSTL_18	8K/64m	1.8V±0.1V	60ball FBGA	Now
		K4T1G164QE	HC(L)F8/E7/F7/E6	64M x 16				84ball FBGA	
1Gb F-die	8Banks	K4T1G084QF	BC(L)F8/E7/F7/E6	128M x 8	SSTL_18	8K/64m	1.8V±0.1V	60ball FBGA	Now
		K4T1G164QF	BC(L)F8/E7/F7/E6	64M x 16				84ball FBGA	

NOTE : 1. 128Mb I-die DDR2 84ball FBGA supports Halogen-free package

2.4 DDR3 SDRAM

Density	Banks	Part Number	Package & Power, Temp. (-C/-L) & Speed	Org.	Interface	Refresh	Power (V)	PKG	Avail.
1Gb E-die	8Banks	K4B1G0846E	HC(L)F7/F8/H9/K0	128M x 8	SSTL_15	8K/64m	1.5V±0.075V	78ball FBGA	Now
		K4B1G1646E	HC(L)F7/F8/H9/K0	64M x 16				96ball FBGA	
2Gb B-die	8Banks	K4B2G0846B	HC(L)F7/F8/H9/K0	256M x 8	SSTL_15	8K/64m	1.5V±0.075V	78ball FBGA	Now
		K4B2G1646B	HC(L)F7/F8/H9/K0	128M x 16				96ball FBGA	
2Gb C-die	8Banks	K4B2G0846C	HC(L)F8/H9/K0	256M x 8	SSTL_15	8K/64m	1.5V±0.075V	78ball FBGA	Now
		K4B2G1646C	HC(L)F8/H9/K0	128M x 16				96ball FBGA	

2.5 DDR3+ SDRAM

Density	Banks	Part Number	Package & Power, Temp. (-C/-L) & Speed	Org.	Interface	Refresh	Power (V)	PKG	Avail.
1Gb E-die	8Banks	K4B1G1646E	HQH9	64M x 16	SSTL_15	8K/64m	1.5V±0.075V	96ball FBGA	Now
2Gb C-die	8Banks	K4B2G1646C	HQH9	128M x 16	SSTL_15	8K/64m	1.5V±0.075V	96ball FBGA	Now

NOTE : For more details about product specifications or technical files, please contact us "semiconductor@samsung.com"

2.6 GDDR SDRAM

Density	Banks	Part Number	Package & Power, Temp. (-C/-L) & Speed	Org.	Interface	Refresh	Power (V)	PKG	Avail.
128Mb K-die	4Banks	K4D263238K	FC40/50	4M x 32	SSTL_2	4K/32m	2.5V±5%	Lead-free & Halogen-free 144ball FBGA	3Q. '10 EOL
			VC40/50					Lead-free 144ball FBGA	
			U ^{*1} C40/50					Lead-free & Halogen-free 100pin TQFP ^{*1}	

NOTE : 1. 128Mb K-die GDDR TQFP supports Lead-free & Halogen-free package with Lead-free package code(-U)

2.7 GDDR3 SDRAM

Density	Banks	Part Number	Package & Power, Temp. (-C/-L) & Speed	Org.	Interface	Refresh	Power (V)	PKG	Avail.
1Gb E-die	8Banks	K4J10324KE	HC7A/08/1A/12/14	32M x 32	SSTL_2	8K/32m	1.8V±0.1V	136ball FBGA	Now

3. Industrial Temperature Consumer DRAM Component Product Guide

3.1 SDRAM

Density	Bank	Part Number	Package & Power, Temp. & Speed	Org.	Interface	Refresh	Power (V)	Package	Avail.
64Mb N-die	4Banks	KS641632N	LI(P)60/I(P)75	4M x 16	LVTTTL	4K/64ms	3.3±0.3V	54pin TSOP(II)	Now
128Mb K-die	4Banks	K4S281632K	U [†] 1I(P)60/I(P)75	8M x 16	LVTTTL	4K/64ms	3.3±0.3V	54pin TSOP(II) ^{†1}	Now
128Mb O-die	4Banks	K4S281632O	LI(P)60/I(P)75	8M x 16	LVTTTL	4K/64ms	3.3±0.3V	54pin TSOP(II)	3Q '10
256Mb J-die	4Banks	K4S561632J	U [†] 1I(P)60/I(P)75	16M x 16	LVTTTL	8K/64ms	3.3±0.3V	54pin TSOP(II) ^{†1}	Now
256Mb N-die	4Banks	K4S561632N	LI(P)60/I(P)75	16M x 16	LVTTTL	8K/64ms	3.3±0.3V	54pin TSOP(II)	2Q '10

NOTE : 1. 128Mb K-die SDR and 256Mb J-die SDR DRAMs support Lead-free & Halogen-free package with Lead-free package code(-U)

3.2 DDR SDRAM

Density	Bank	Part Number	Package & Power, Temp. & Speed	Org.	Interface	Refresh	Power (V)	Package	Avail.
512Mb F-die	4Banks	K4H510838F	LI(P)B3	64M x 8	SSTL_2	8K/64m	2.5±0.2V ^{†1}	66pinTSOPII	Now
		K4H511638F	LI(P)B3	32M x 16				66pinTSOPII	
			HI(P)B3					60ball FBGA	
512Mb G-die	4Banks	K4H511638G	LI(P)CC/B3	32M x 16	SSTL_2	8K/64m	2.5±0.2V ^{†1}	66pinTSOPII	Now
			HI(P)CC/B3					60ball FBGA	

NOTE : 1. V_{DD}/V_{DDQ} SPEC for 256/512Mb DDR

	DDR400	DDR333/266
V _{DD} /V _{DDQ}	2.6V ± 0.1V	2.5V ± 0.2V

3.3 DDR2 SDRAM

Density	Bank	Part Number	Package & Power, Temp. & Speed	Org.	Interface	Refresh	Power (V)	Package	Avail.
512Mb G-die	4Banks	K4T51163QG	HI(P)F7/I(P)E6/I(P)D5/ I(P)CC	32M x 16	SSTL_18	8K/64m	1.8V±0.1V	84ball FBGA	Now
		K4T51163QG	HDE6						
512Mb I-die	4Banks	K4T51163QI	HI(P)E7/I(P)F7/I(P)E6	32M x 16	SSTL_18	8K/64m	1.8V±0.1V	84ball FBGA	Now
		K4T51163QI	HDE7/E6						
1Gb E-die	8Banks	K4T1G084QE	HI(P)F7/I(P)E6	128M x 8	SSTL_18	8K/64m	1.8V ± 0.1V	60ball FBGA	Now
		K4T1G164QE	HI(P)F7/I(P)E6	64M x 16				84ball FBGA	Now
1Gb F-die	8Banks	K4T1G084QF	BI(P)F7/I(P)E6	128M x 8	SSTL_18	8K/64m	1.8V ± 0.1V	60ball FBGA	2Q '10
		K4T1G164QF	BI(P)F7/I(P)E6	64M x 16				84ball FBGA	

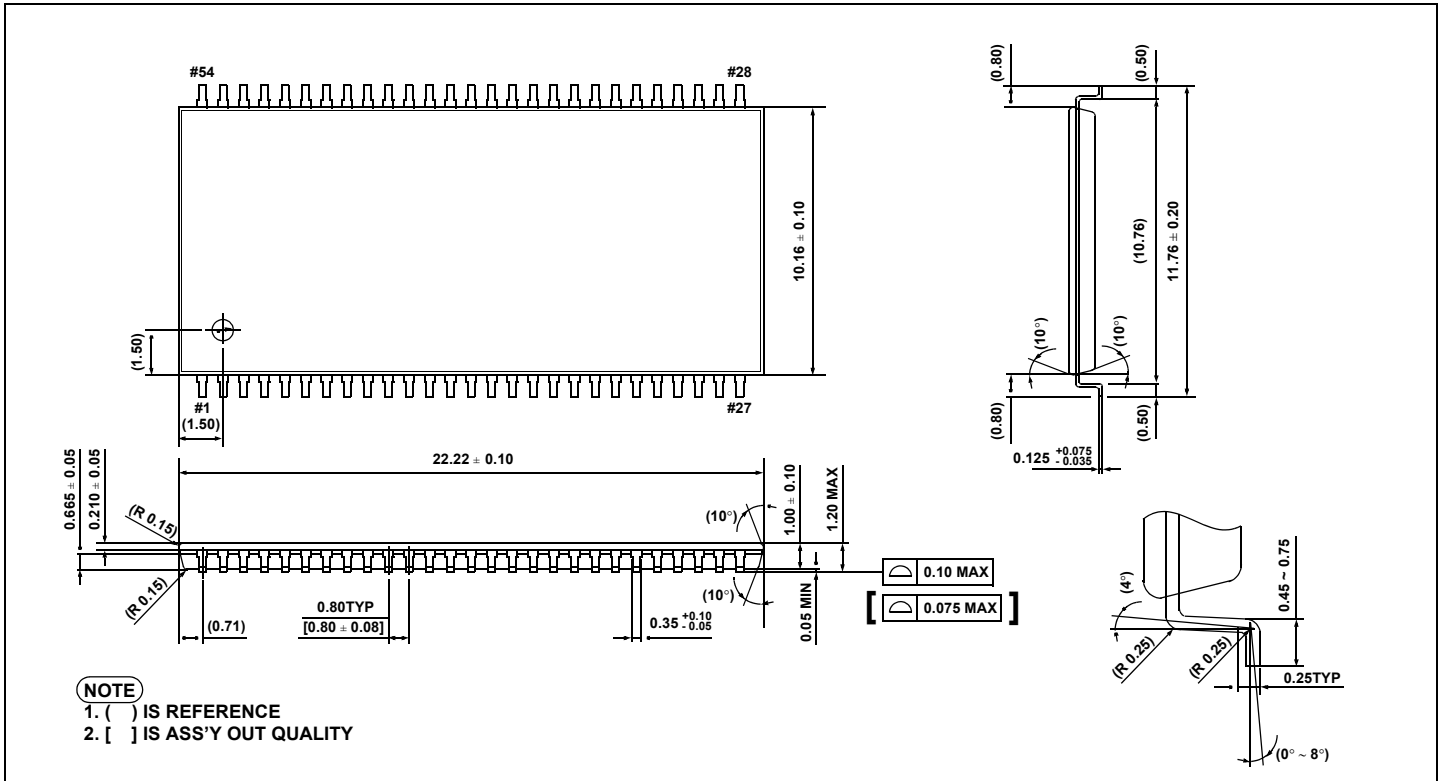
3.4 DDR3 SDRAM

Density	Bank	Part Number	Package & Power, Temp. & Speed	Org.	Interface	Refresh	Power (V)	Package	Avail.
1Gb E-die	8Banks	K4B1G1646E	HI(P)H9	64M x 16	SSTL_15	8K/64m	1.5V±0.075V	96ball FBGA	Now
2Gb B-die	8Banks	K4B2G1646B	HI(P)H9	128M x 16	SSTL_15	8K/64m	1.5V±0.075V	96ball FBGA	Now
2Gb C-die	8Banks	K4B2G1646C	HI(P)H9	128M x 16	SSTL_15	8K/64m	1.5V±0.075V	96ball FBGA	2Q '10

4. Package Dimension

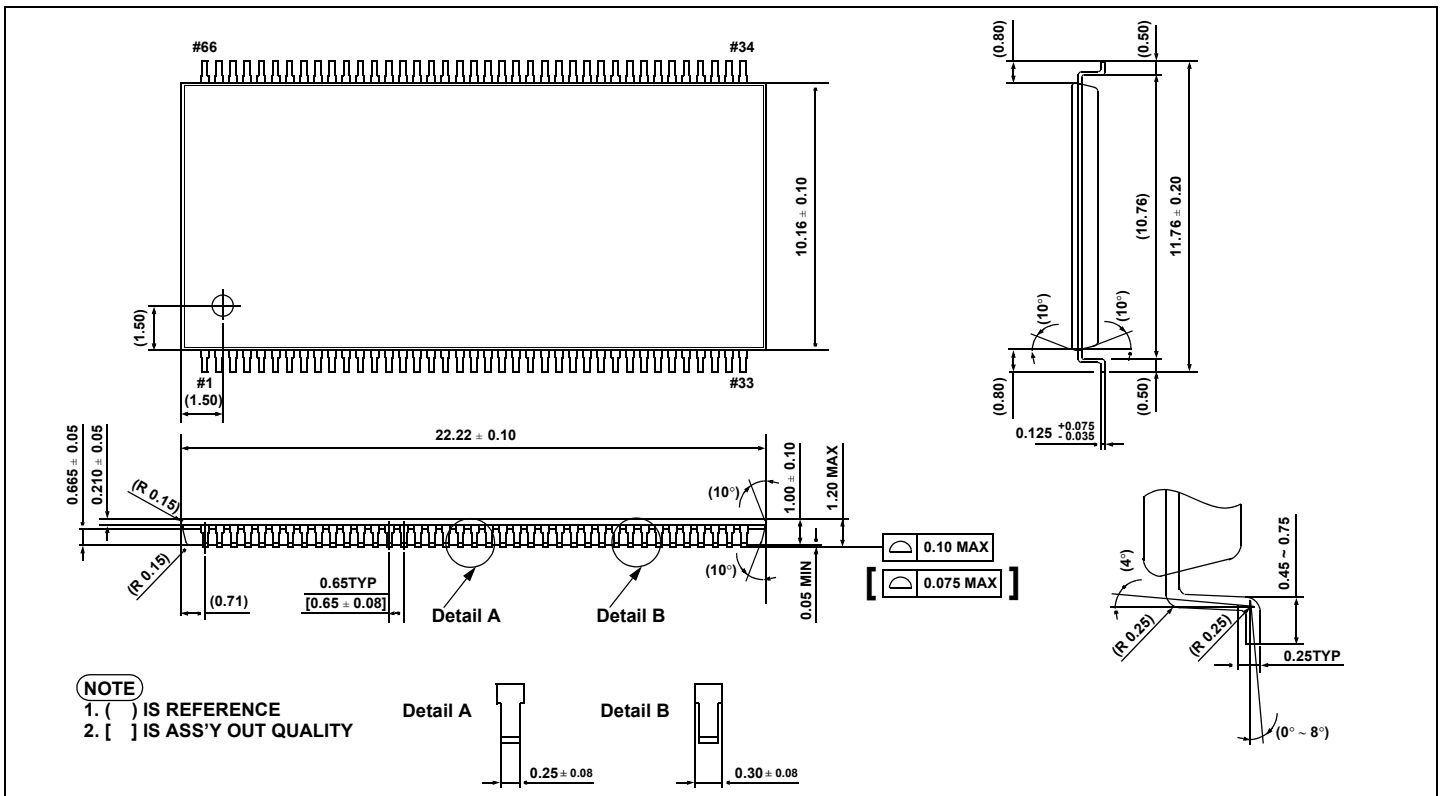
54Pin TSOP(II) (for SDRAM)

Units : Millimeters



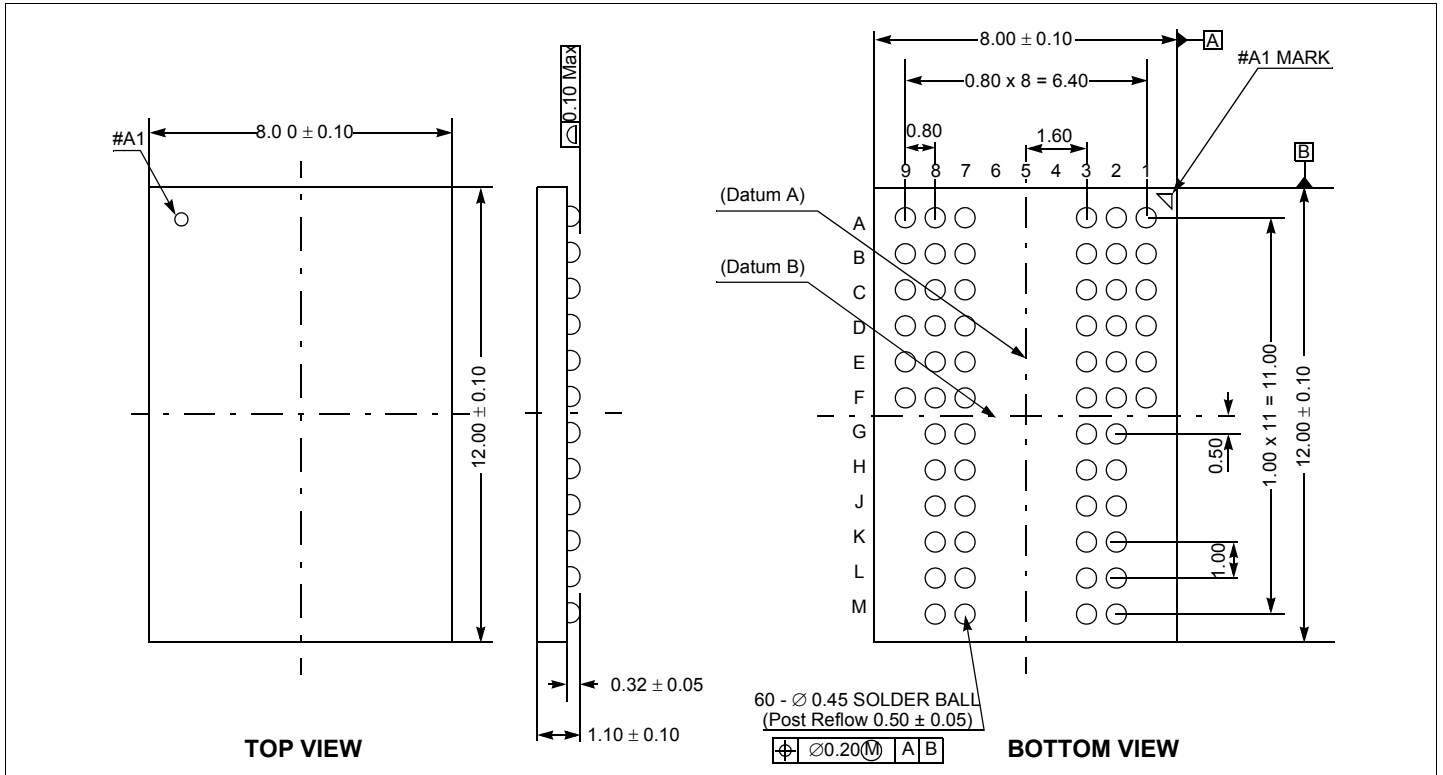
66Pin TSOP(II) (for DDR)

Units : Millimeters



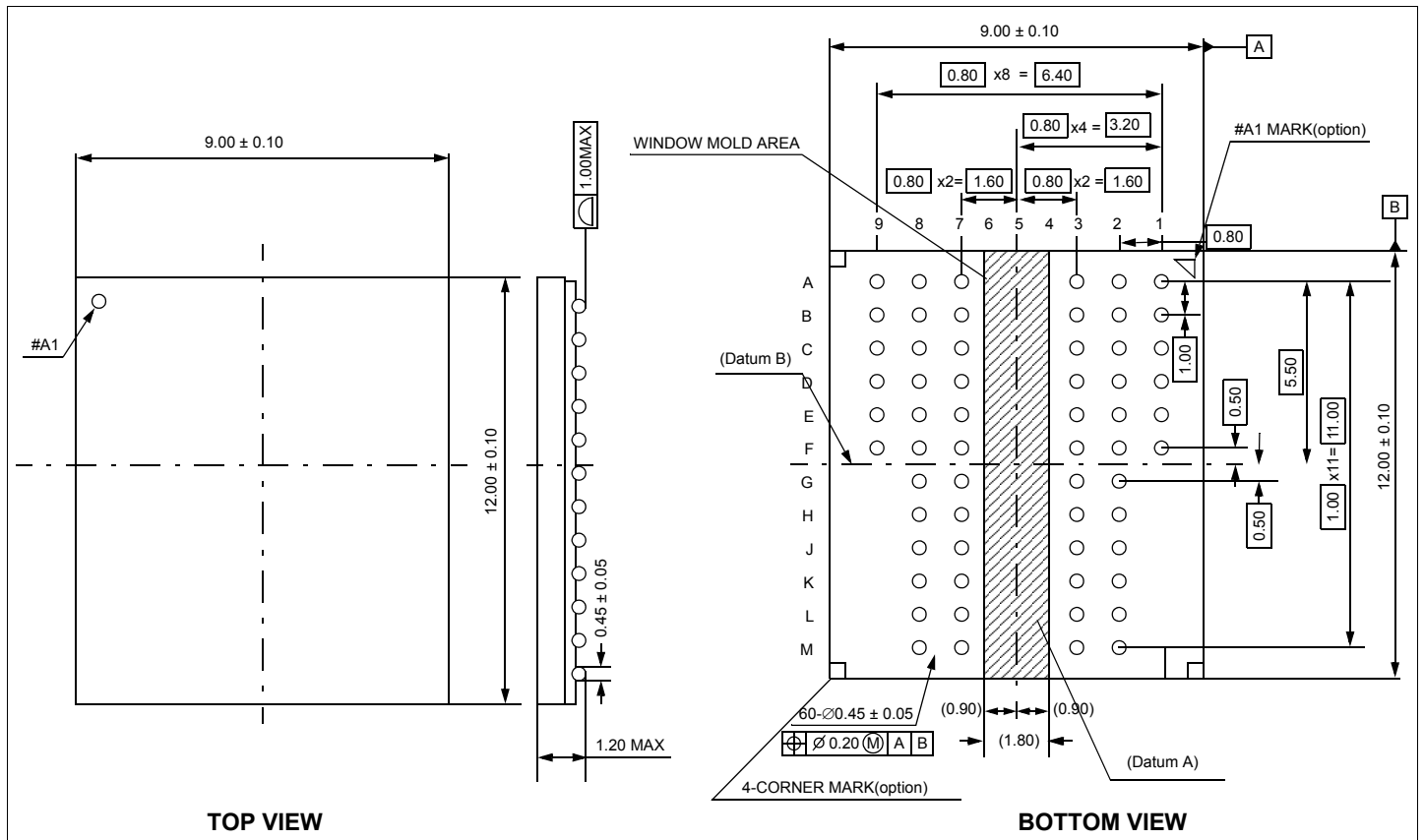
60Ball FBGA (For DDR 64Mb N-die)

Units : Millimeters



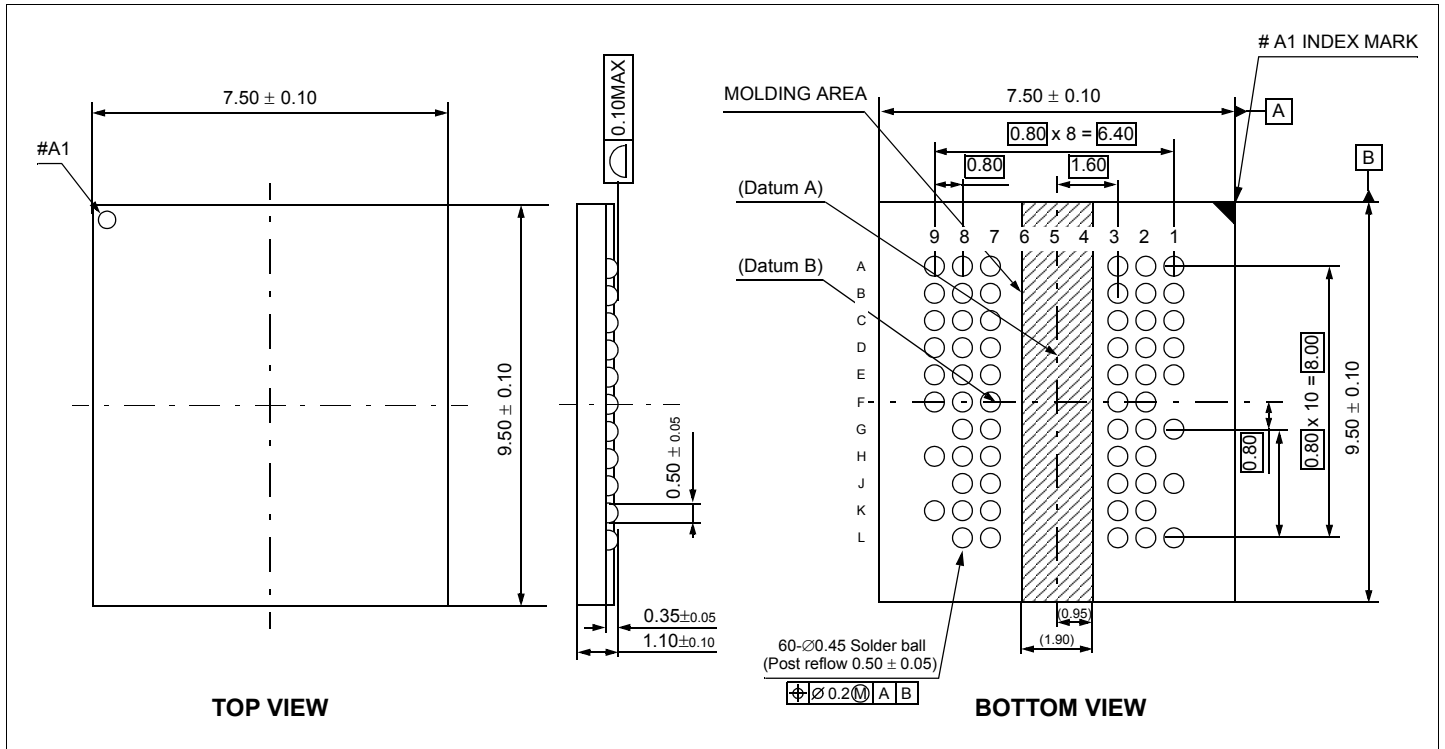
60Ball FBGA (For DDR 512Mb F-die, 512Mb G-die)

Units : Millimeters



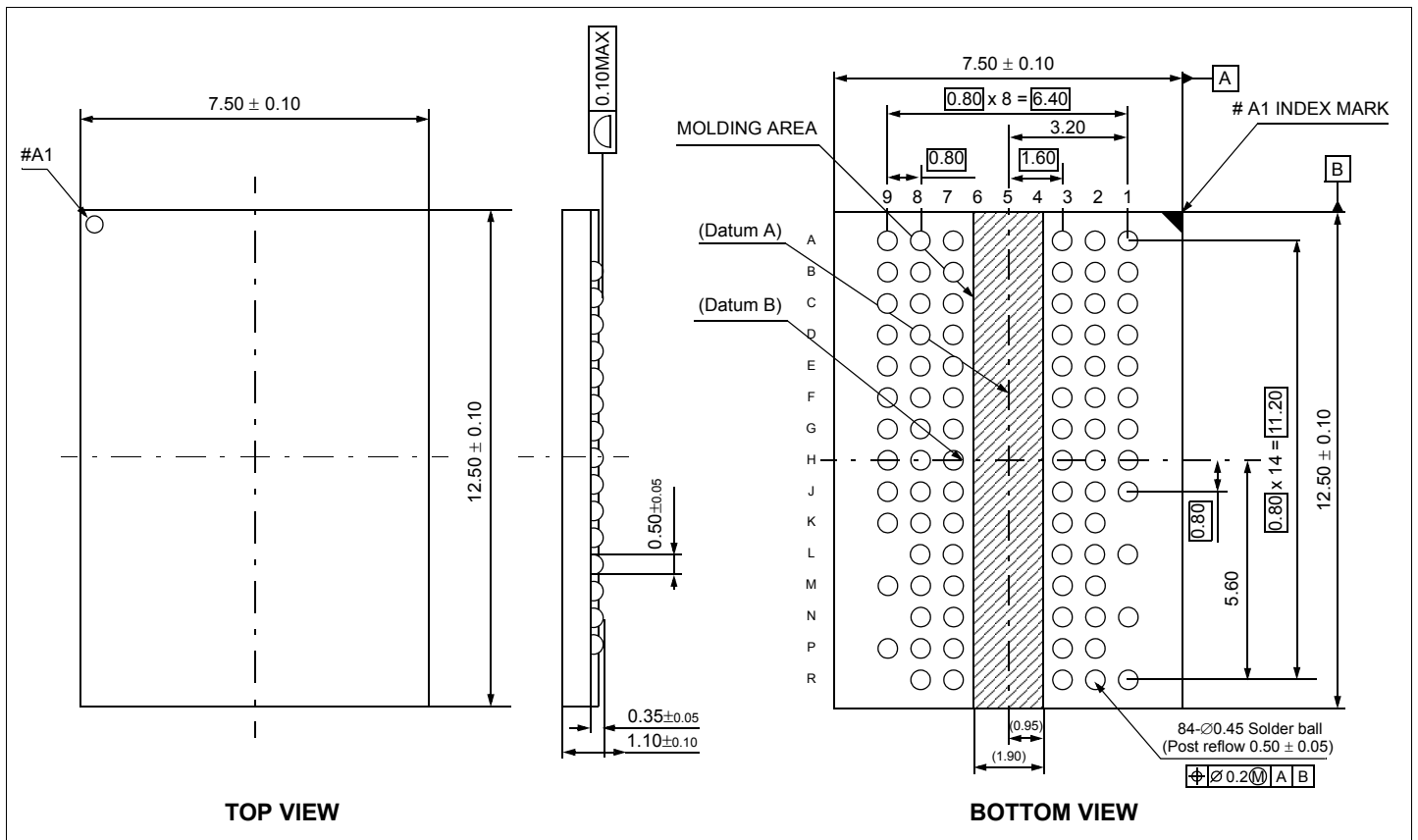
60Ball FBGA (For DDR2 x8)

Units : Millimeters



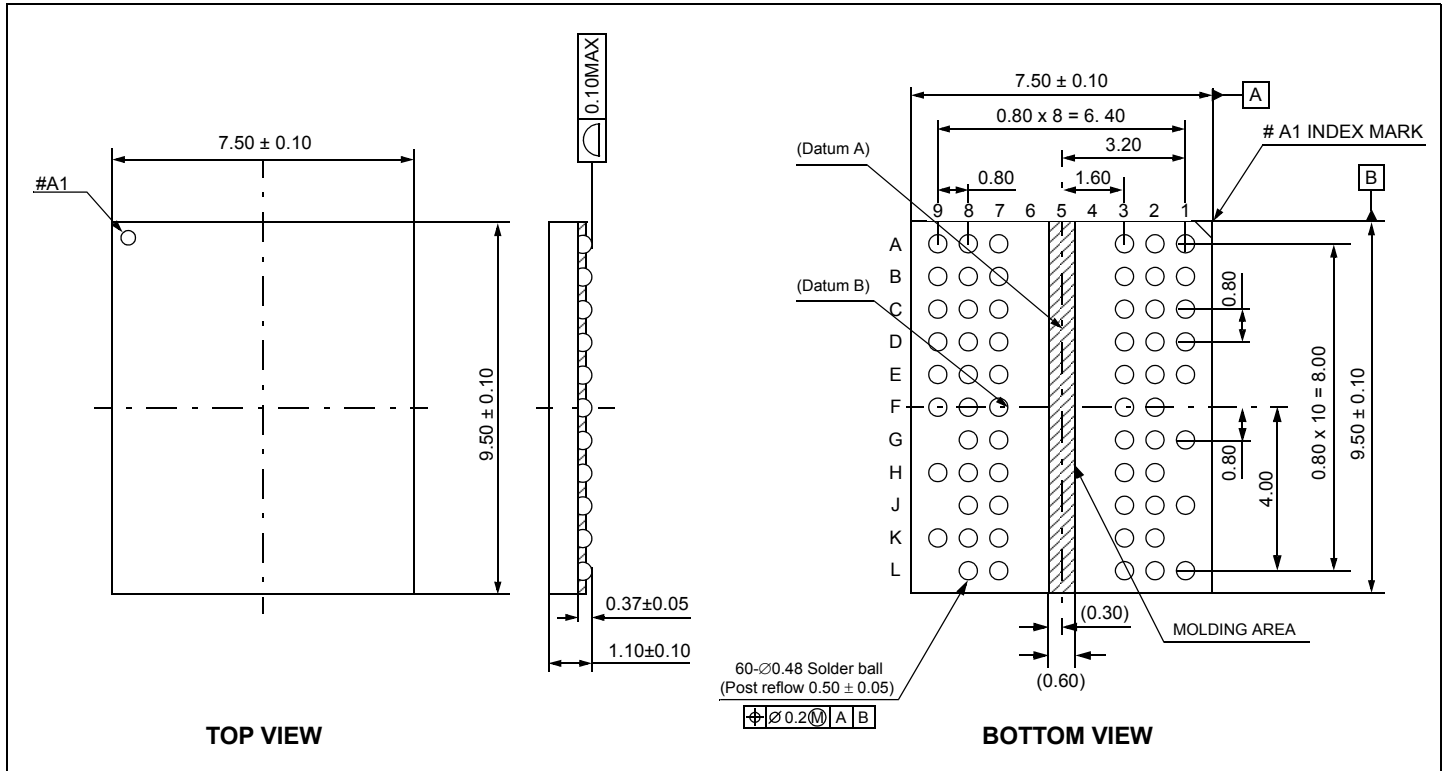
84Ball FBGA (For DDR2 128Mb O-die/256Mb N-die/512Mb G-die, I-die/1Gb E-die)

Units : Millimeters



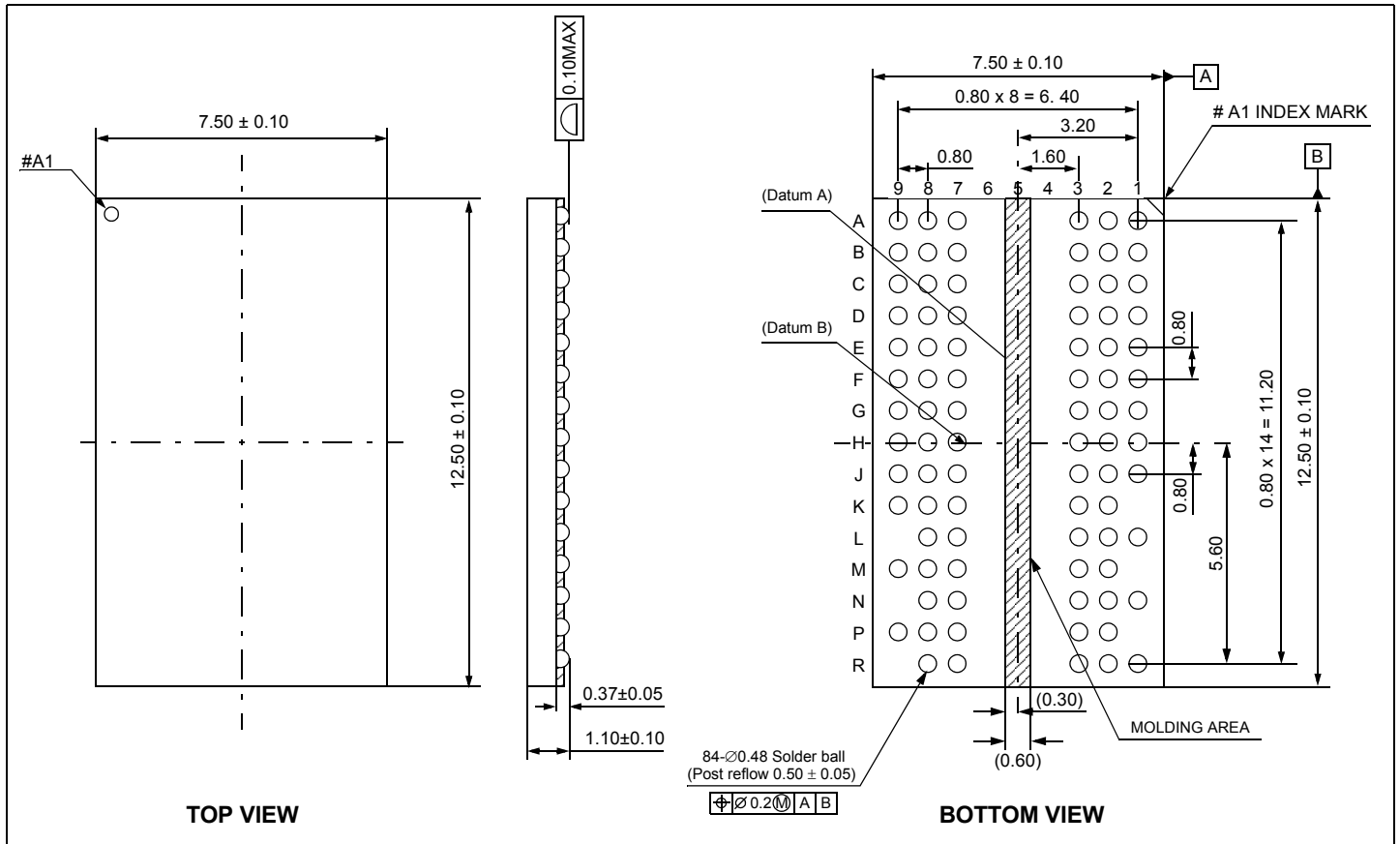
60Ball FBGA (for DDR2 1Gb F-die x8)

Units : Millimeters



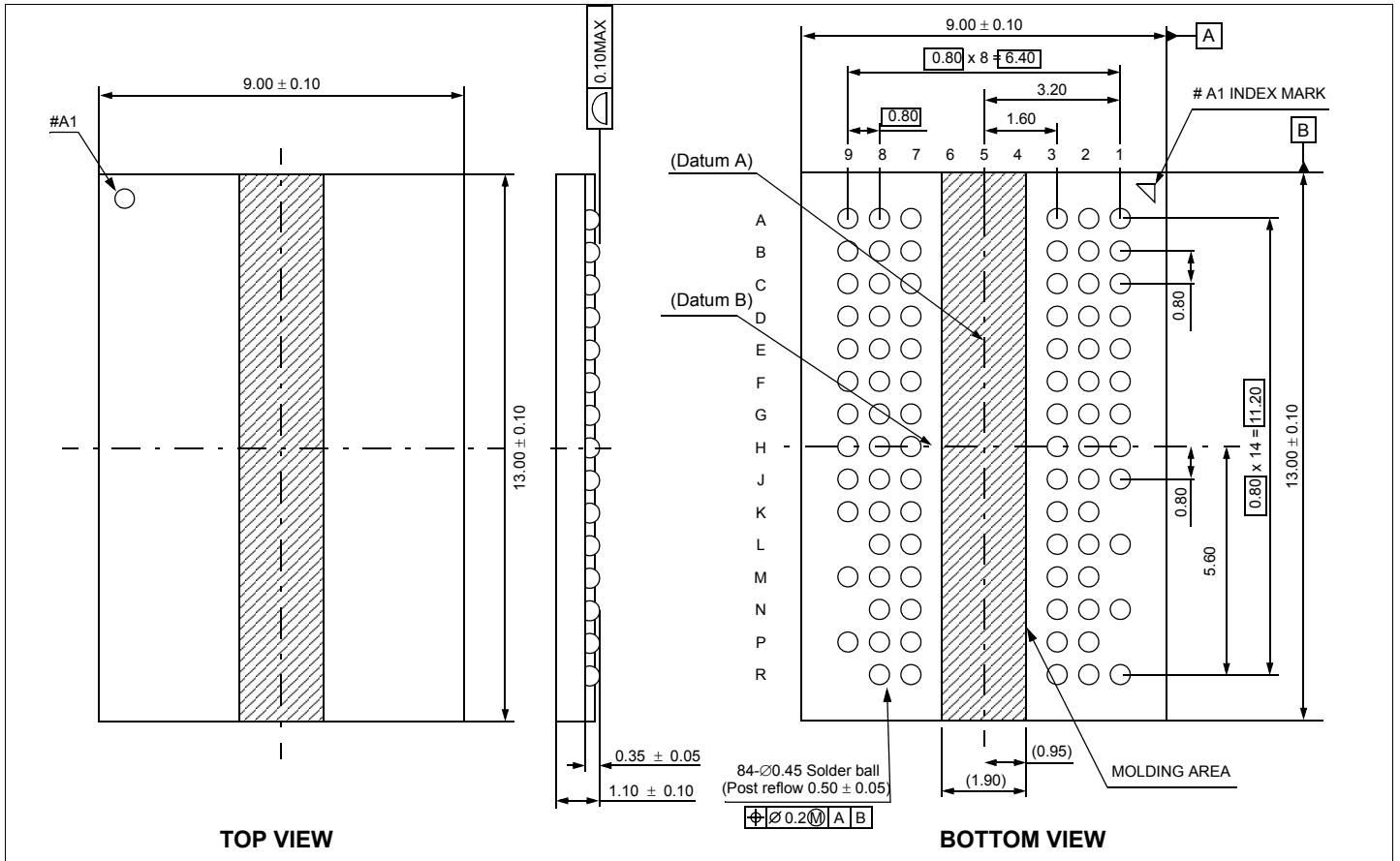
84Ball FBGA (for DDR2 1Gb F-die x16)

Units : Millimeters



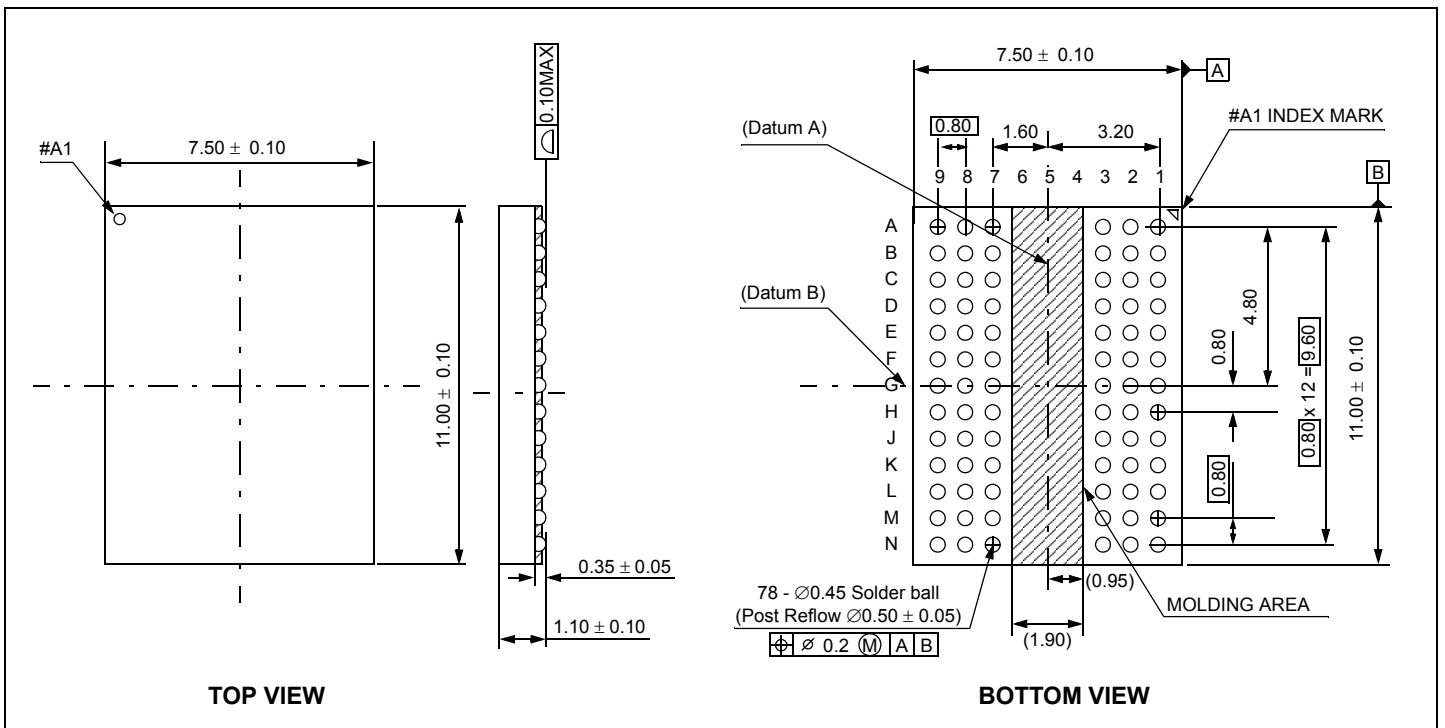
84Ball FBGA (For DDR2 256Mb I-die)

Units : Millimeters



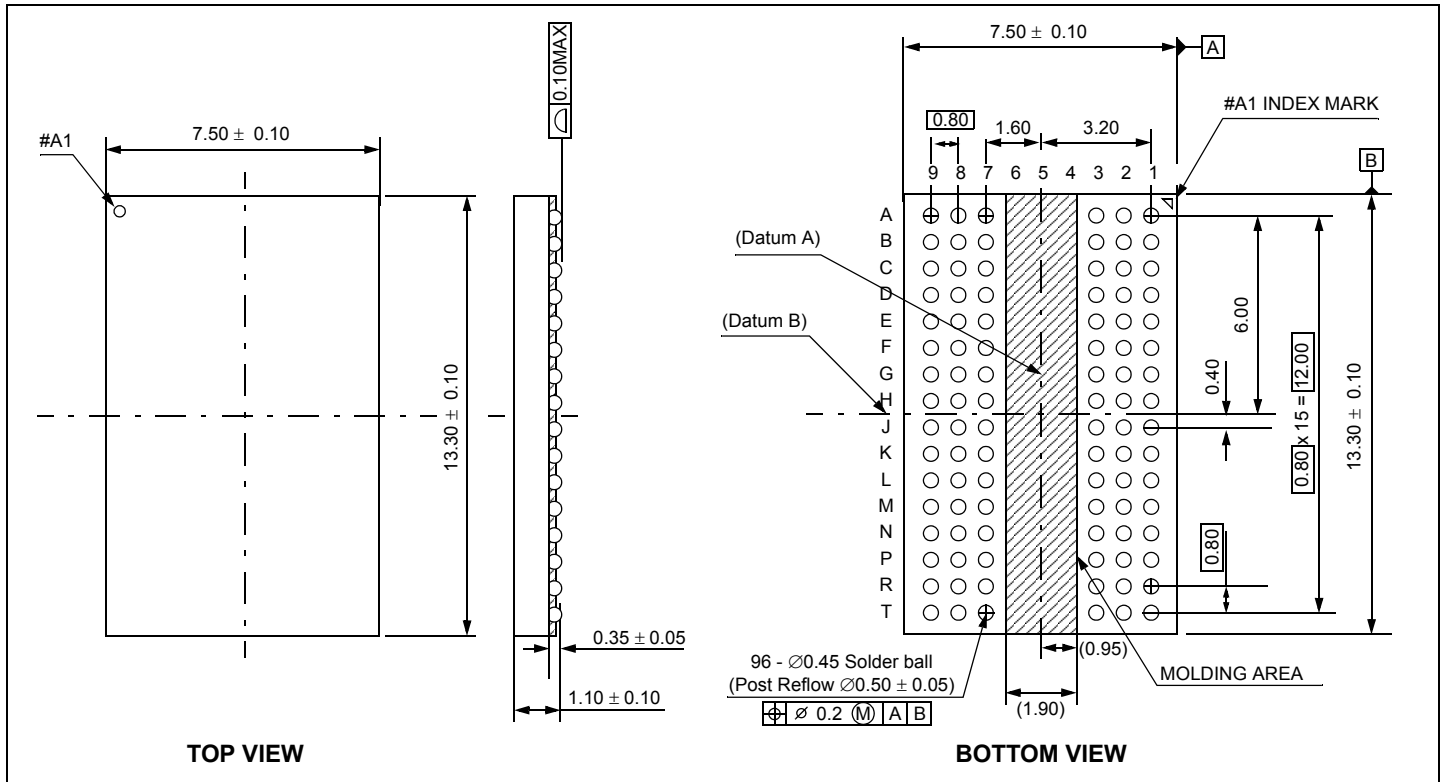
78Ball FBGA (for DDR3 1Gb x8 E-die / DDR3 2Gb x8 C-die)

Units : Millimeters



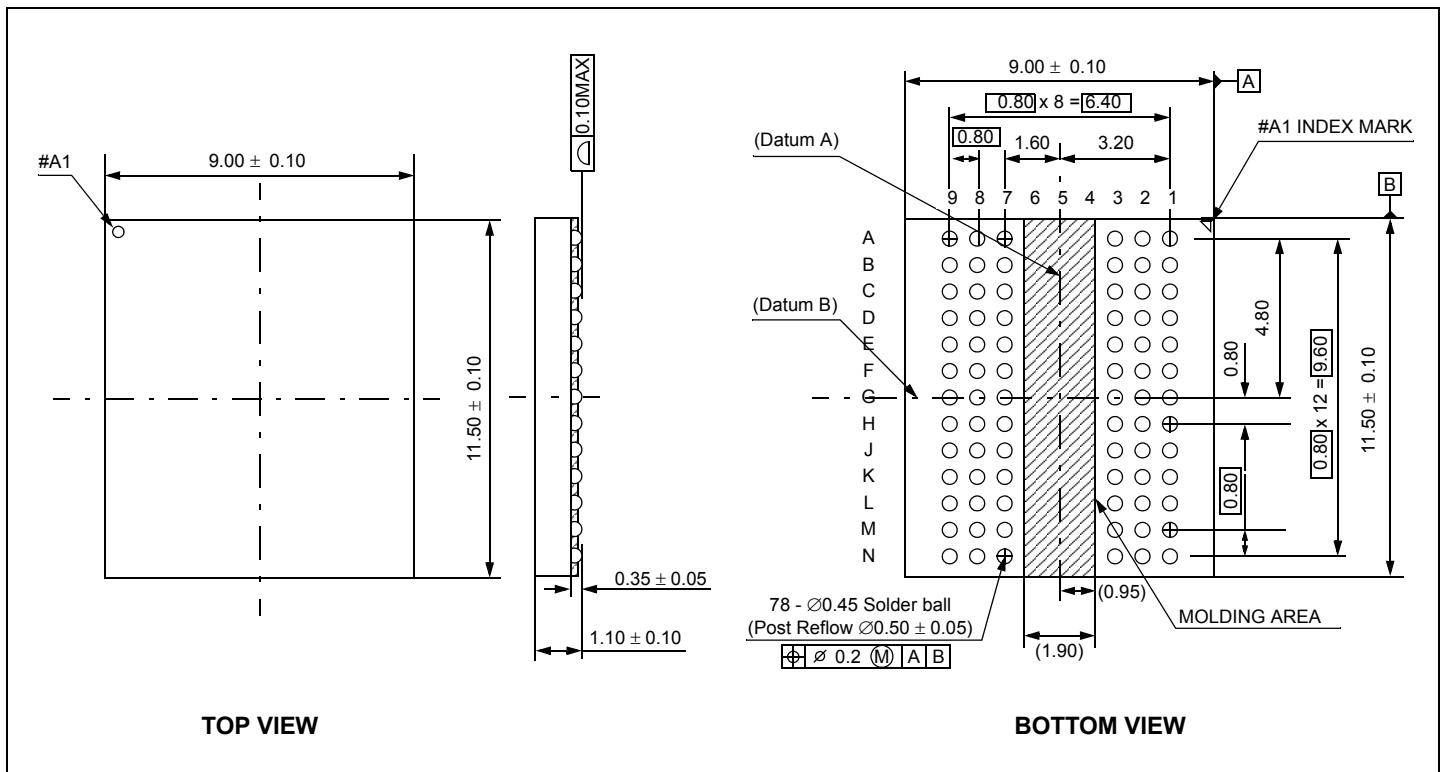
96Ball FBGA (for DDR3 1Gb x16 E-die / DDR3+ 1Gb x16 E-die / DDR3 2Gb x16 C-die)

Units : Millimeters



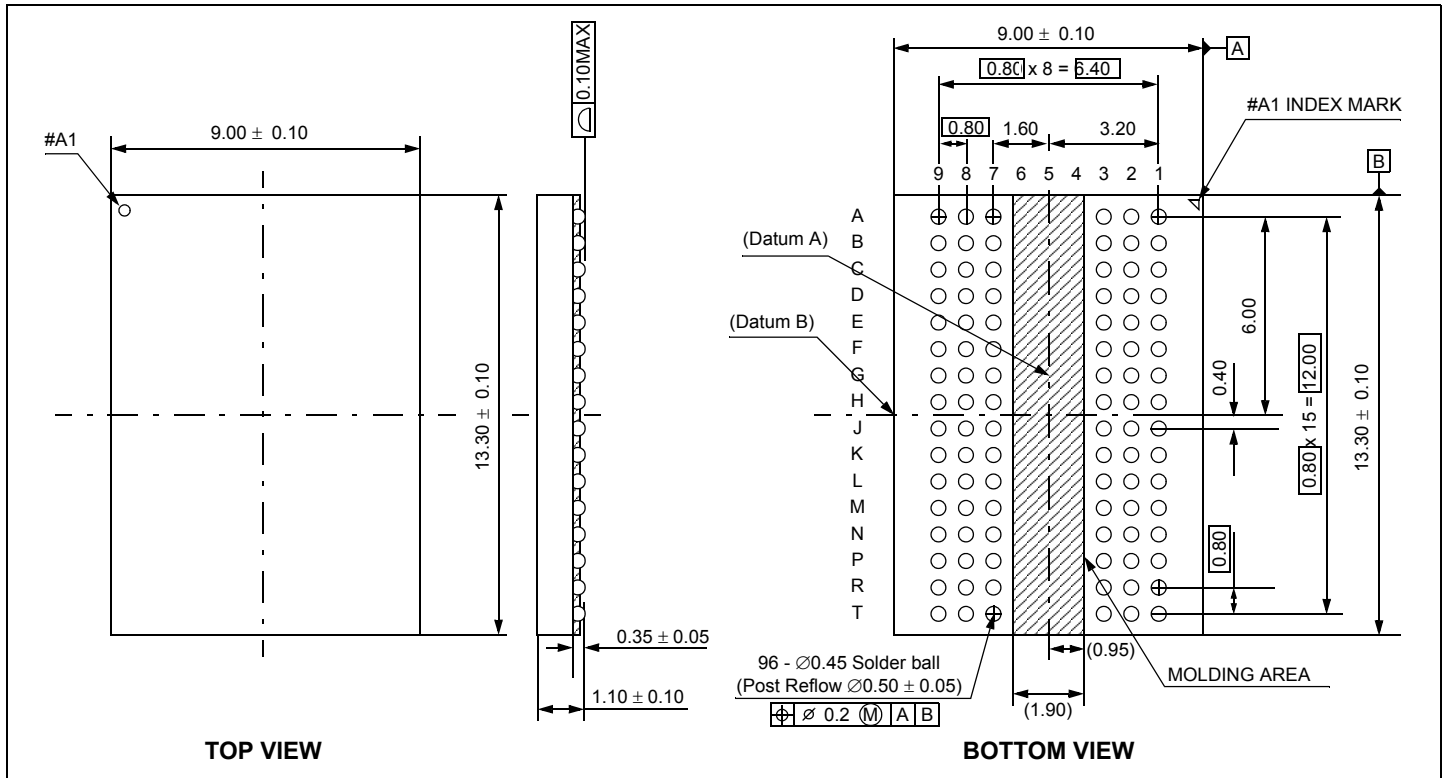
78Ball FBGA (for DDR3 2Gb x8 B-die)

Units : Millimeters



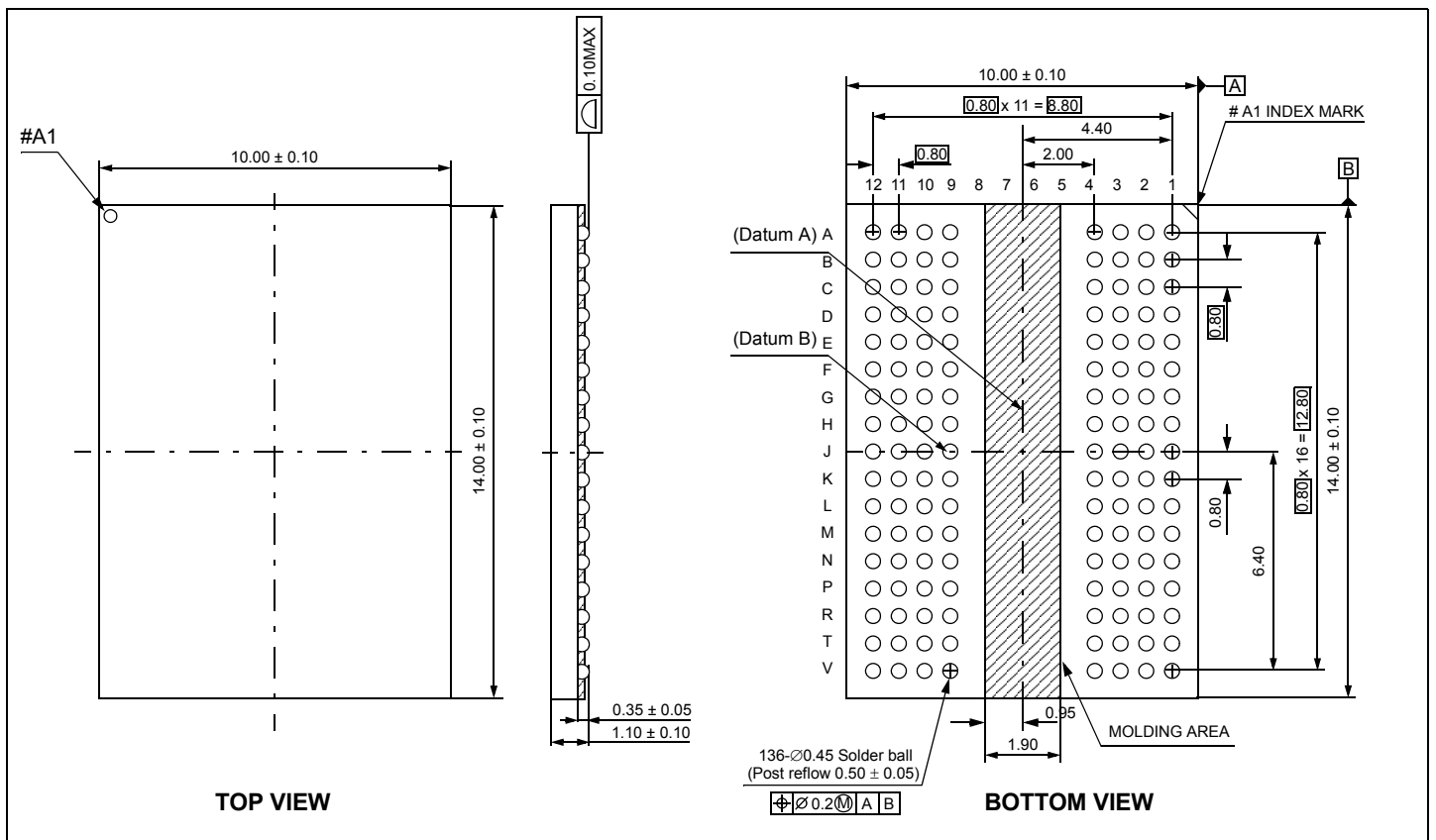
96Ball FBGA (for DDR3 2Gb x16 B-die)

Units : Millimeters



136Ball FBGA (for GDDR3 1Gb E-die)

Units : Millimeters



For further information,

semiconductor@samsung.com