

Consumer Memory

Product Guide

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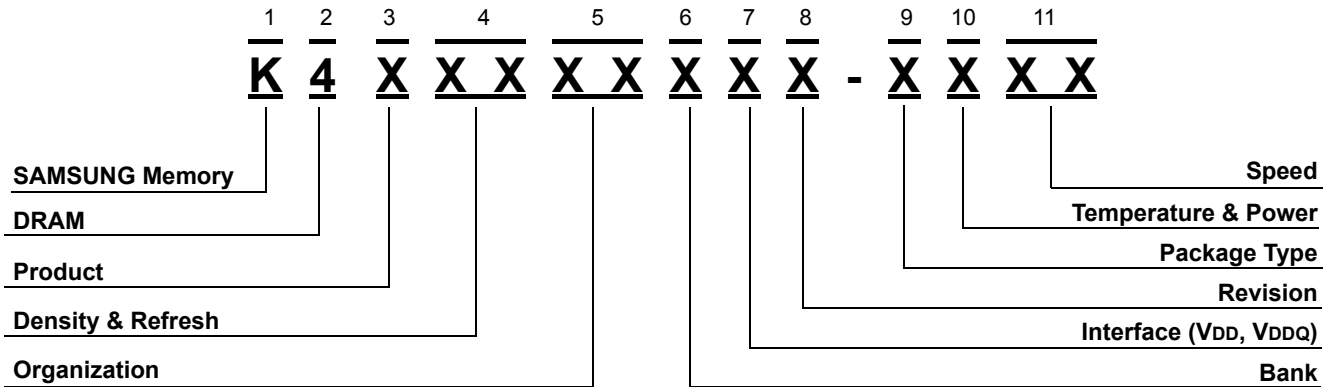
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1. CONSUMER MEMORY ORDERING INFORMATION



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

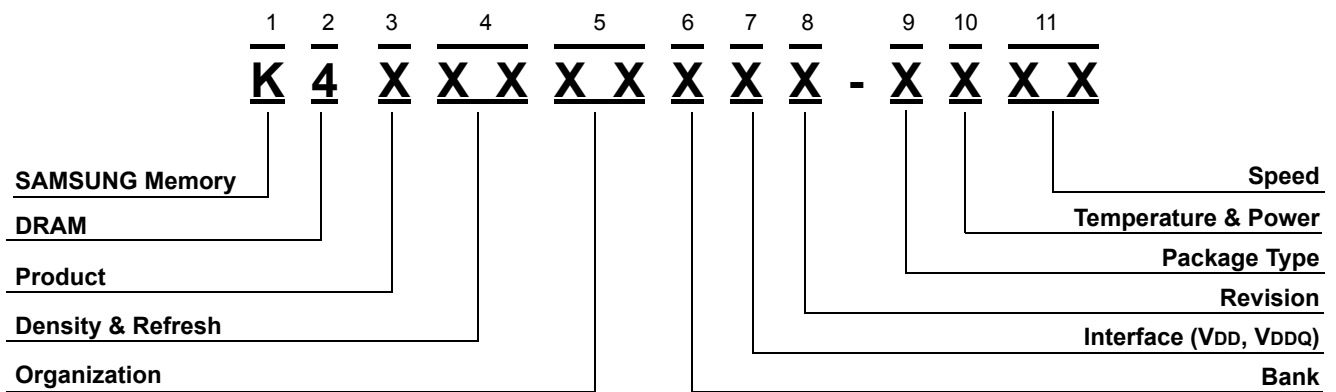
- | | |
|--------------|---------------|
| M : 1st Gen. | H : 9th Gen. |
| A : 2nd Gen. | I : 10th Gen. |
| B : 3rd Gen. | J : 11th Gen. |
| C : 4th Gen. | K : 12th Gen. |
| D : 5th Gen. | L : 13th Gen. |
| E : 6th Gen. | N : 14th Gen. |
| F : 7th Gen. | O : 15th Gen. |
| G : 8th Gen. | S : 19th Gen.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

9. Package Type

- U : TSOPII (Lead-free)
- 100 : 100TQFP(Lead-free) only for 128Mb GDDR
- Z : FBGA (Lead-free)
- V : 144FBGA (Lead-free) only for 128Mb GDDR
- L : TSOPII (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 [†] 1C(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 [†] 1C(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 | | | | | |
| 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 | LVTTL | 4K/64ms | 3.3±0.3V | 54pin TSOP(II) | Now |
| 128Mb K-die | 4Banks | K4S281632K | U ^{*1} I(P)60/I(P)75 | 8M x 16 | LVTTL | 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 | LVTTL | 4K/64ms | 3.3±0.3V | 54pin TSOP(II) | 3Q '10 |
| 256Mb J-die | 4Banks | K4S561632J | U ^{*1} I(P)60/I(P)75 | 16M x 16 | LVTTL | 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 | LVTTL | 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 | |

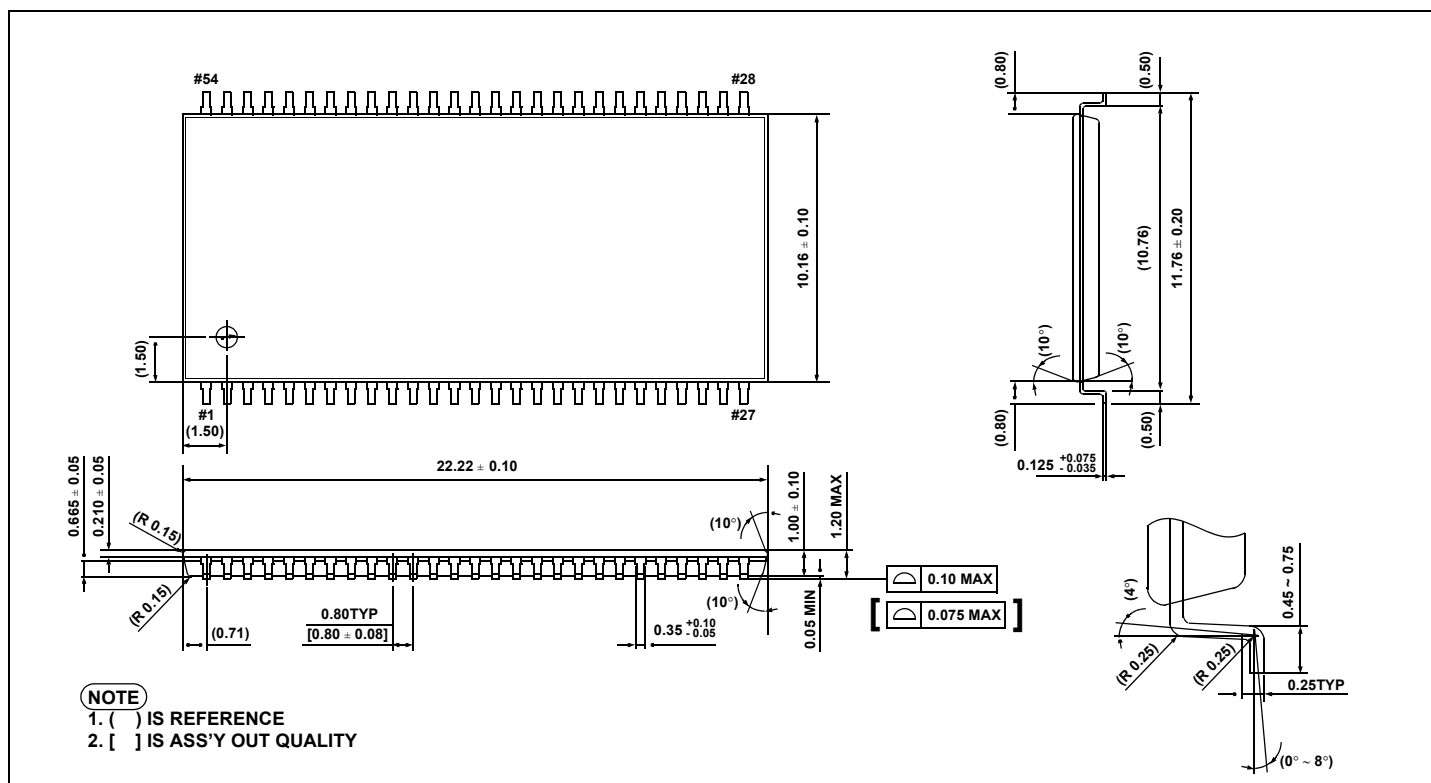
3.4 DDR3 SDRAM

| 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

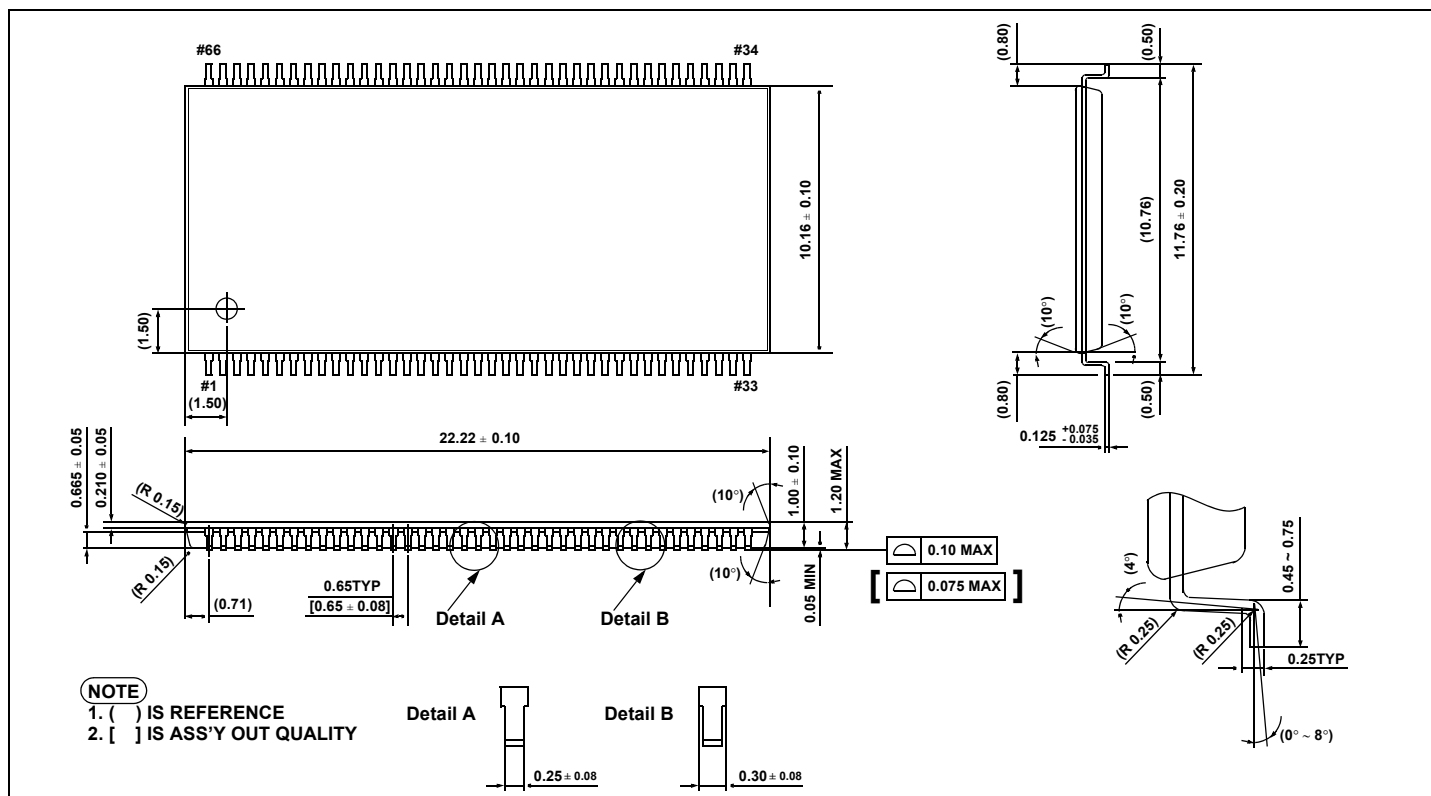
54Pin TSOP(II) (for SDRAM)

Units : Millimeters



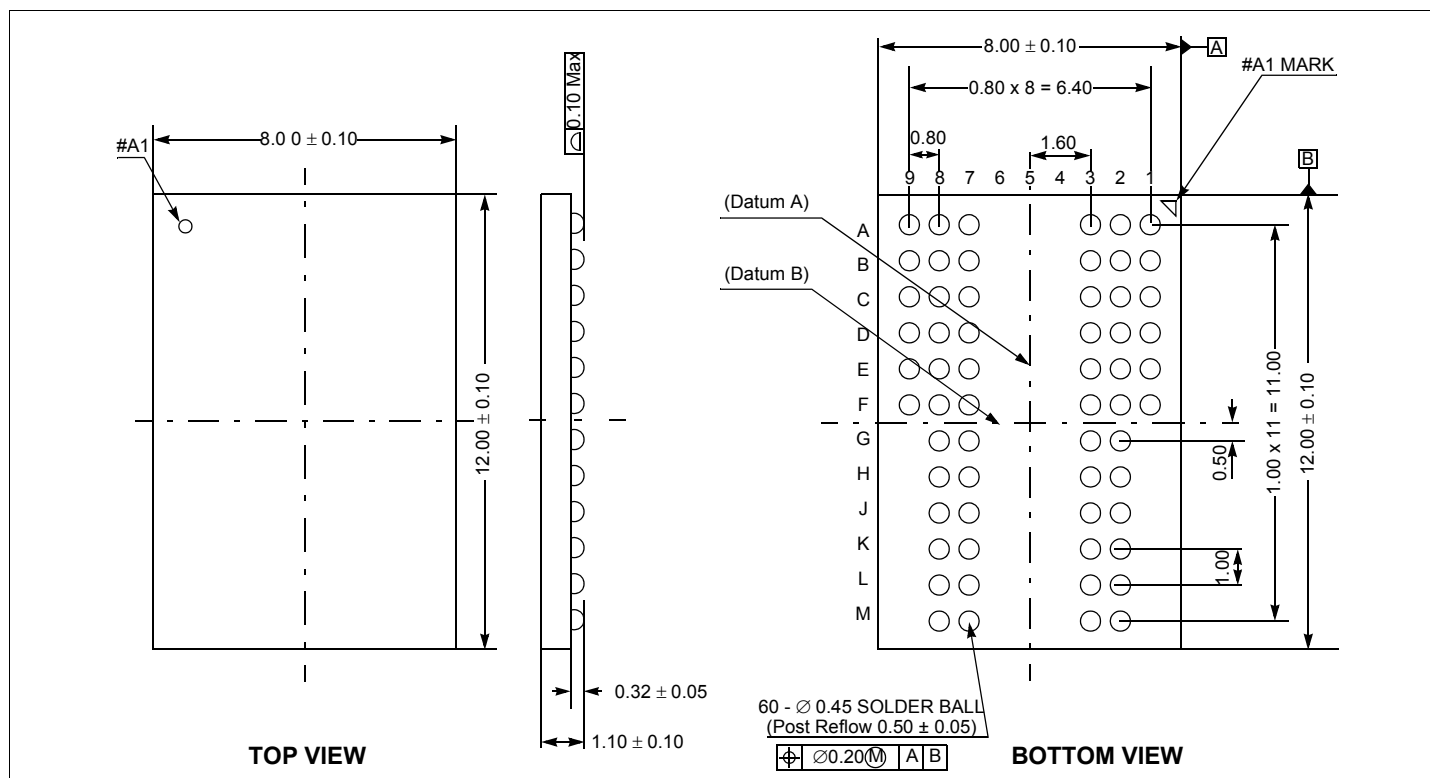
66Pin TSOP(II) (for DDR)

Units : Millimeters



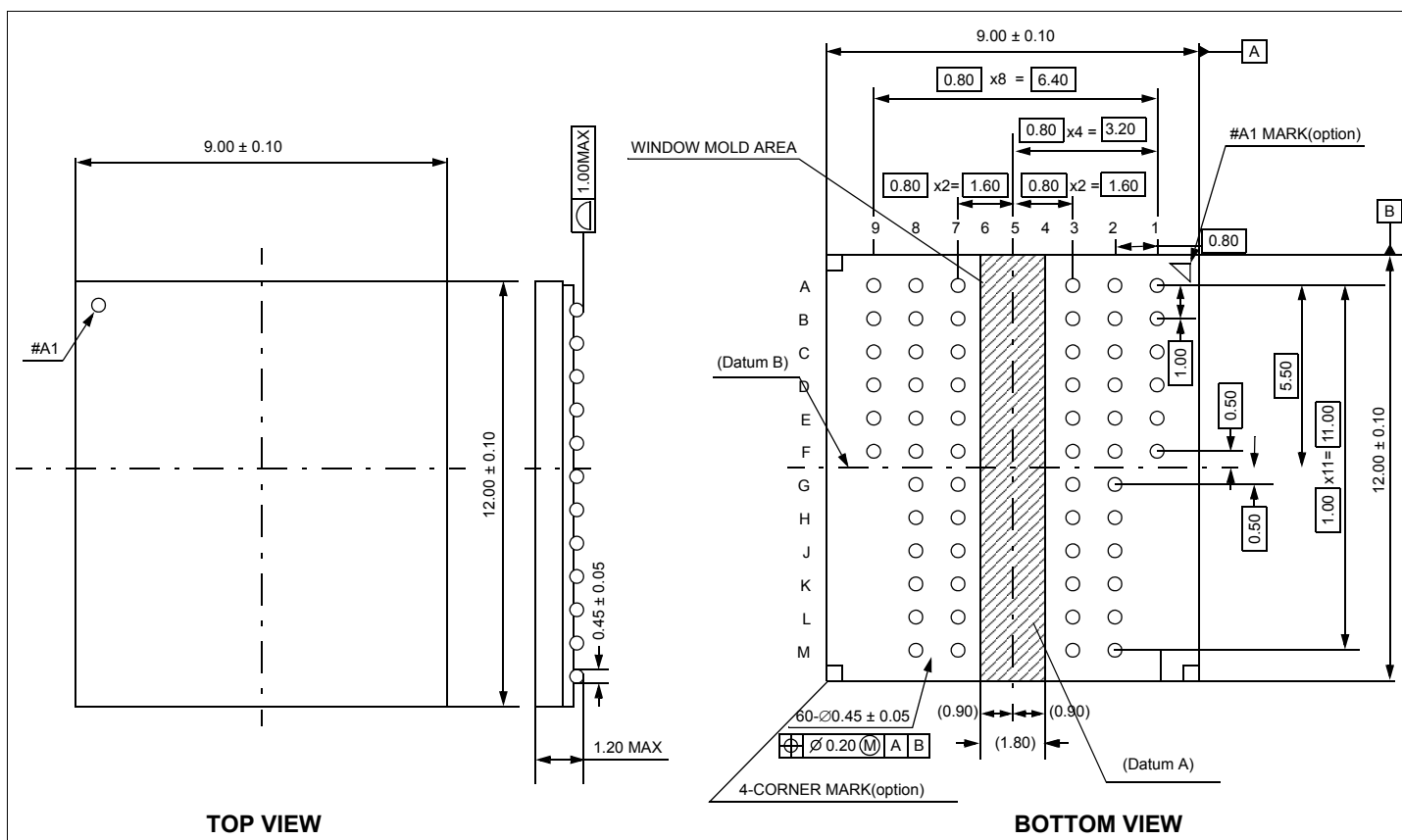
60Ball FBGA (For DDR 64Mb N-die)

Units : Millimeters



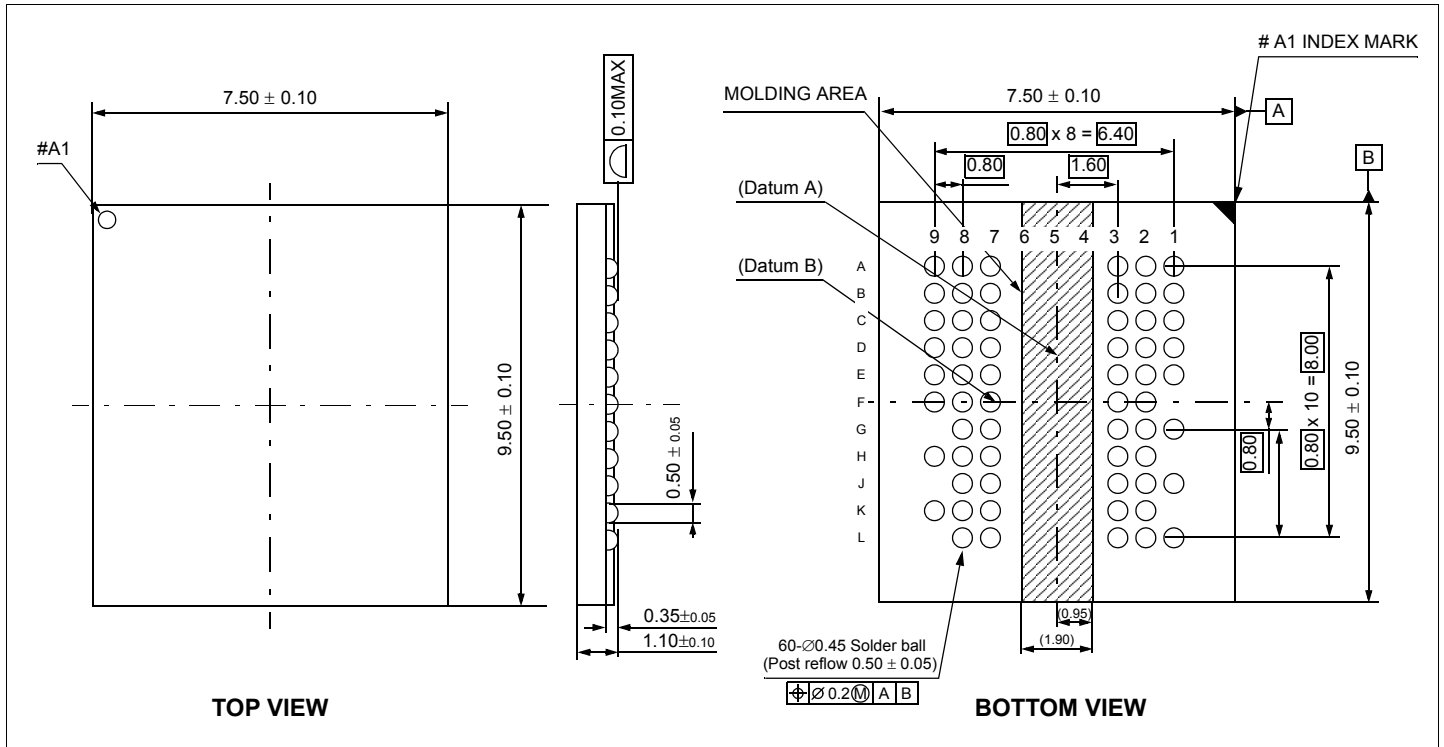
60Ball FBGA (For DDR 512Mb F-die, 512Mb G-die)

Units : Millimeters



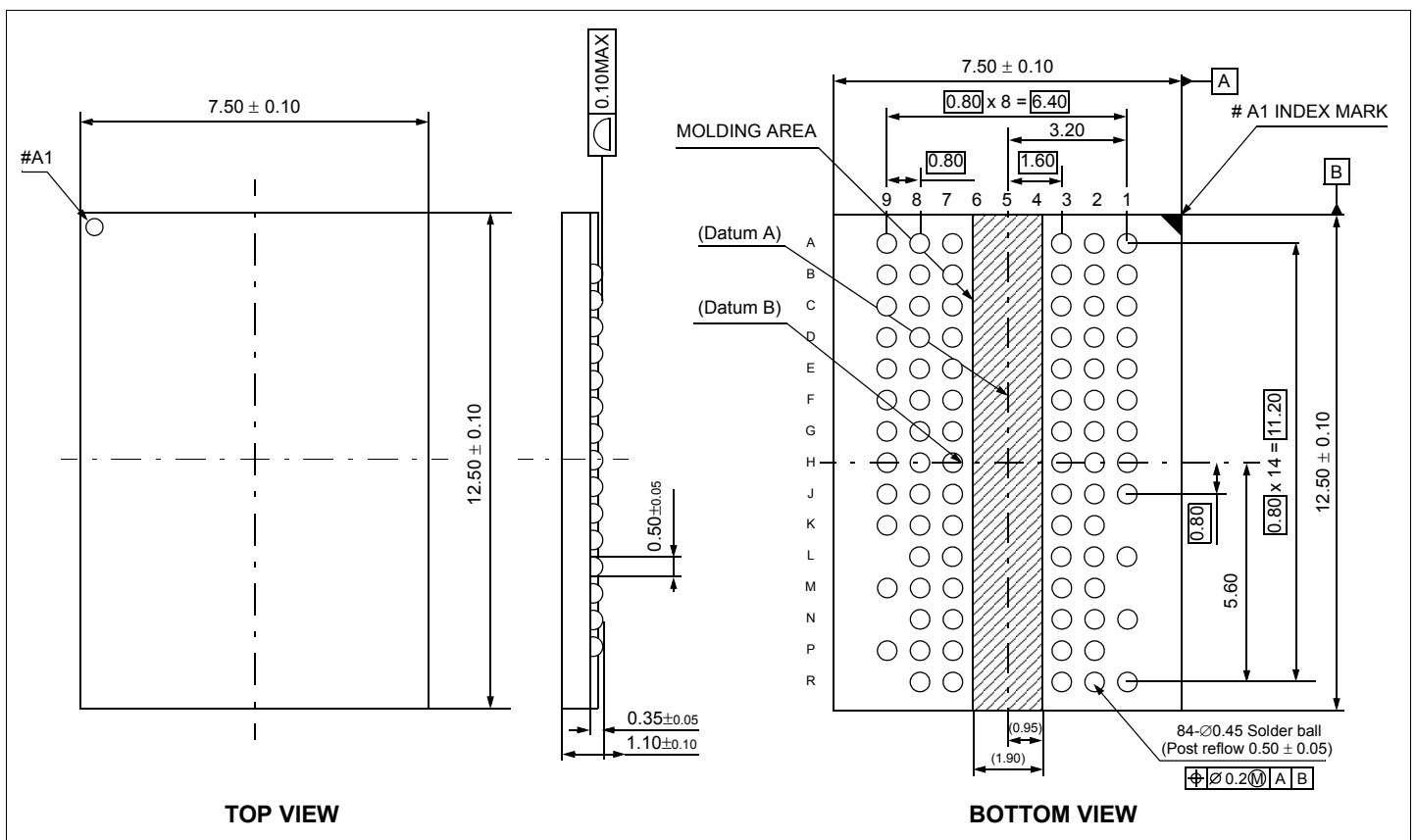
60Ball FBGA (For DDR2 x8)

Units : Millimeters



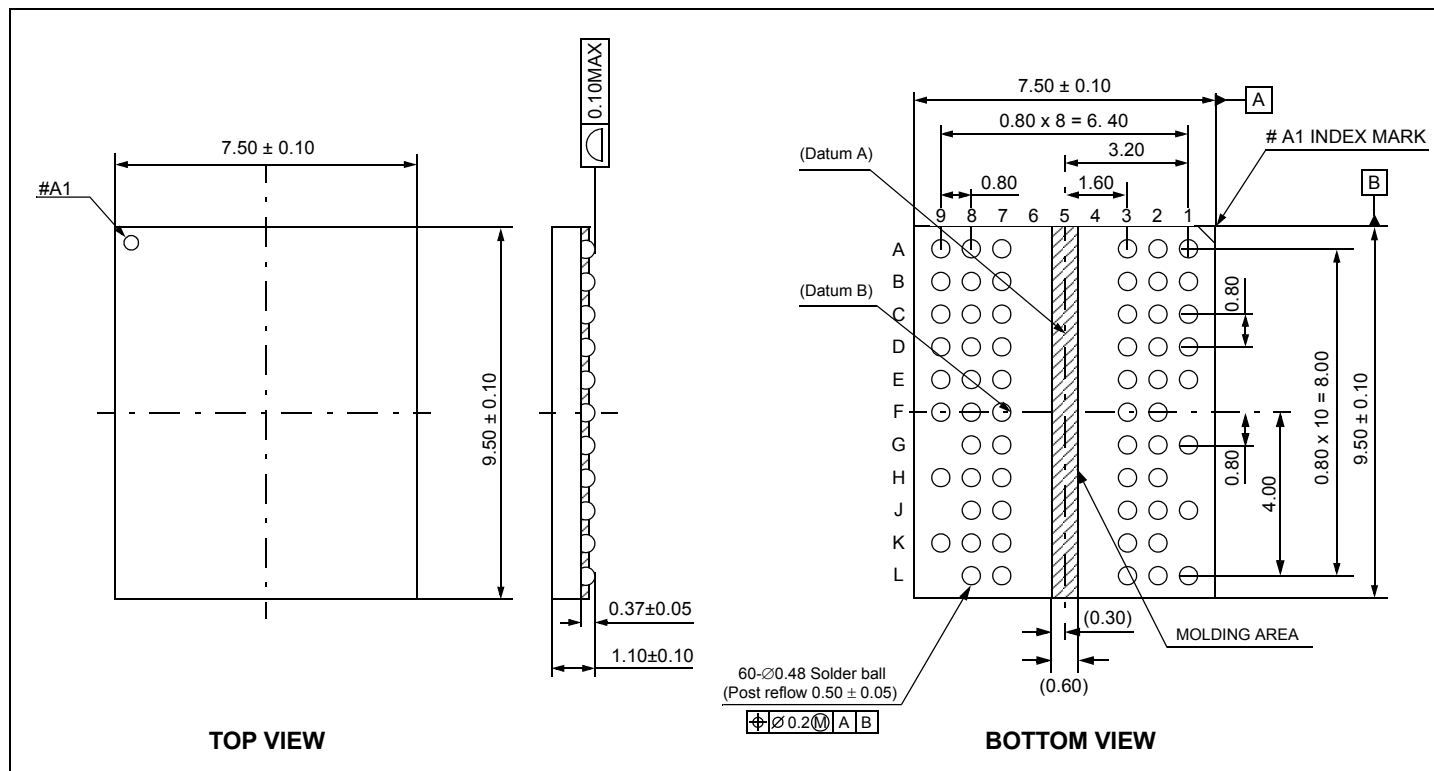
84Ball FBGA (For DDR2 128Mb O-die/256Mb N-die/512Mb G-die, I-die/1Gb E-die)

Units : Millimeters



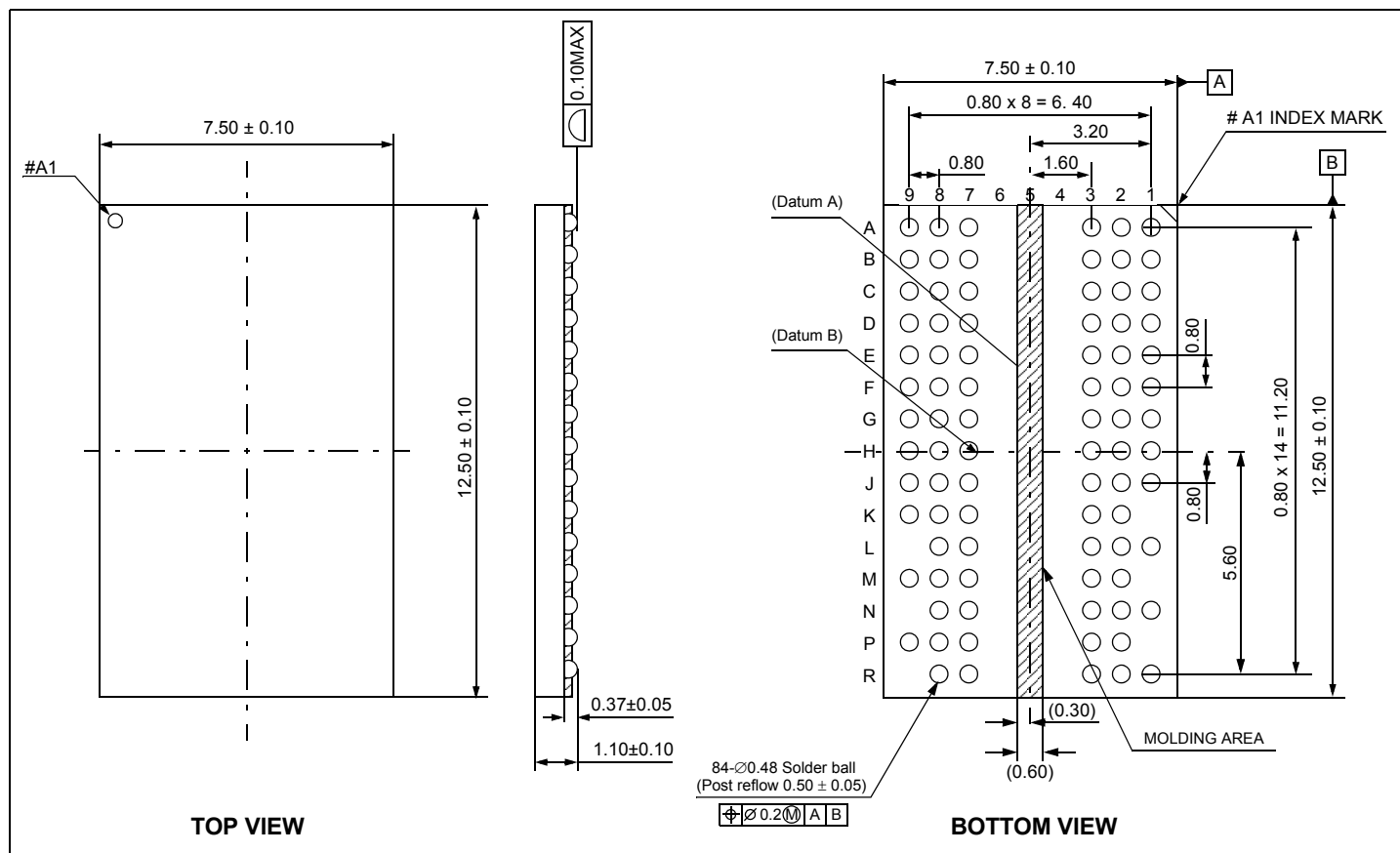
60Ball FBGA (for DDR2 1Gb F-die x8)

Units : Millimeters



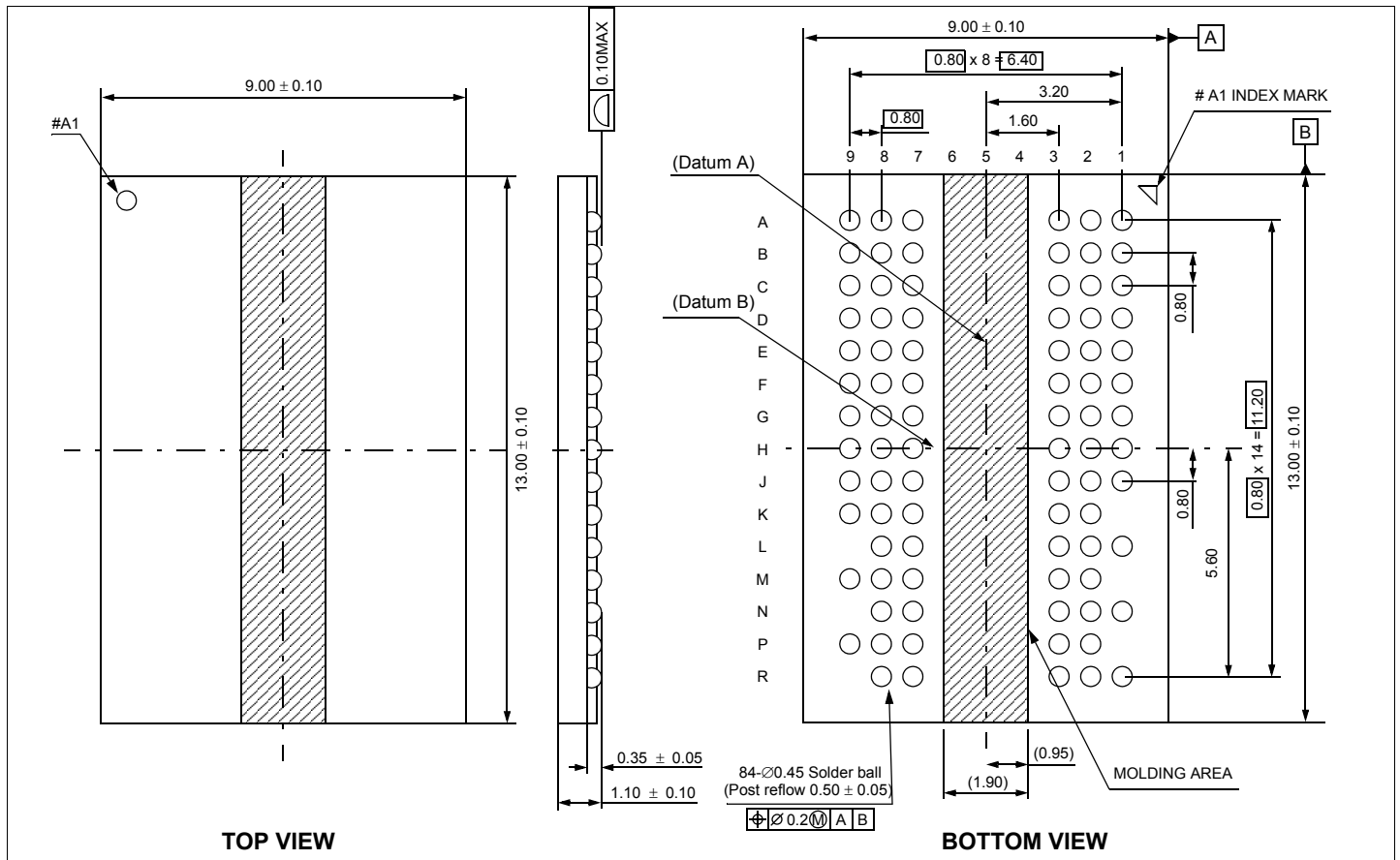
84Ball FBGA (for DDR2 1Gb F-die x16)

Units : Millimeters



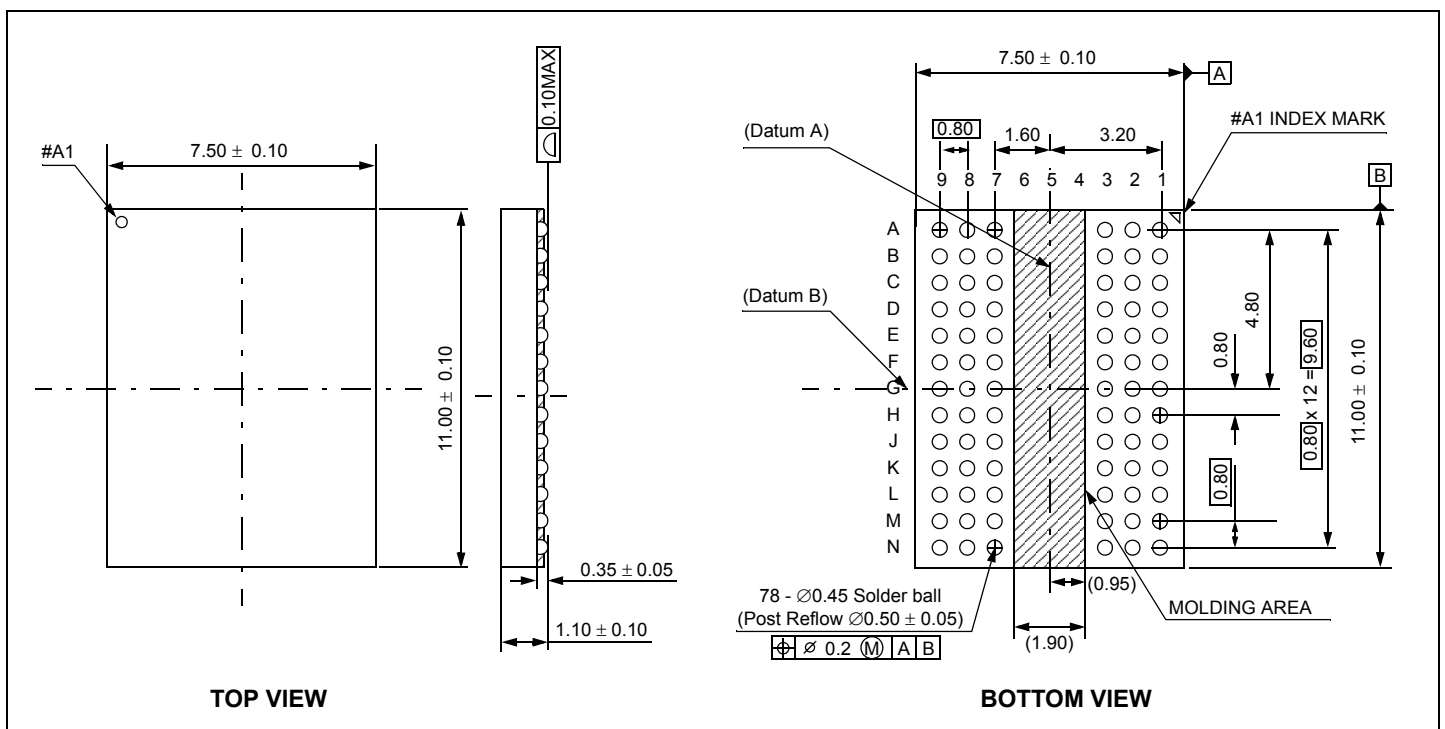
84Ball FBGA (For DDR2 256Mb I-die)

Units : Millimeters



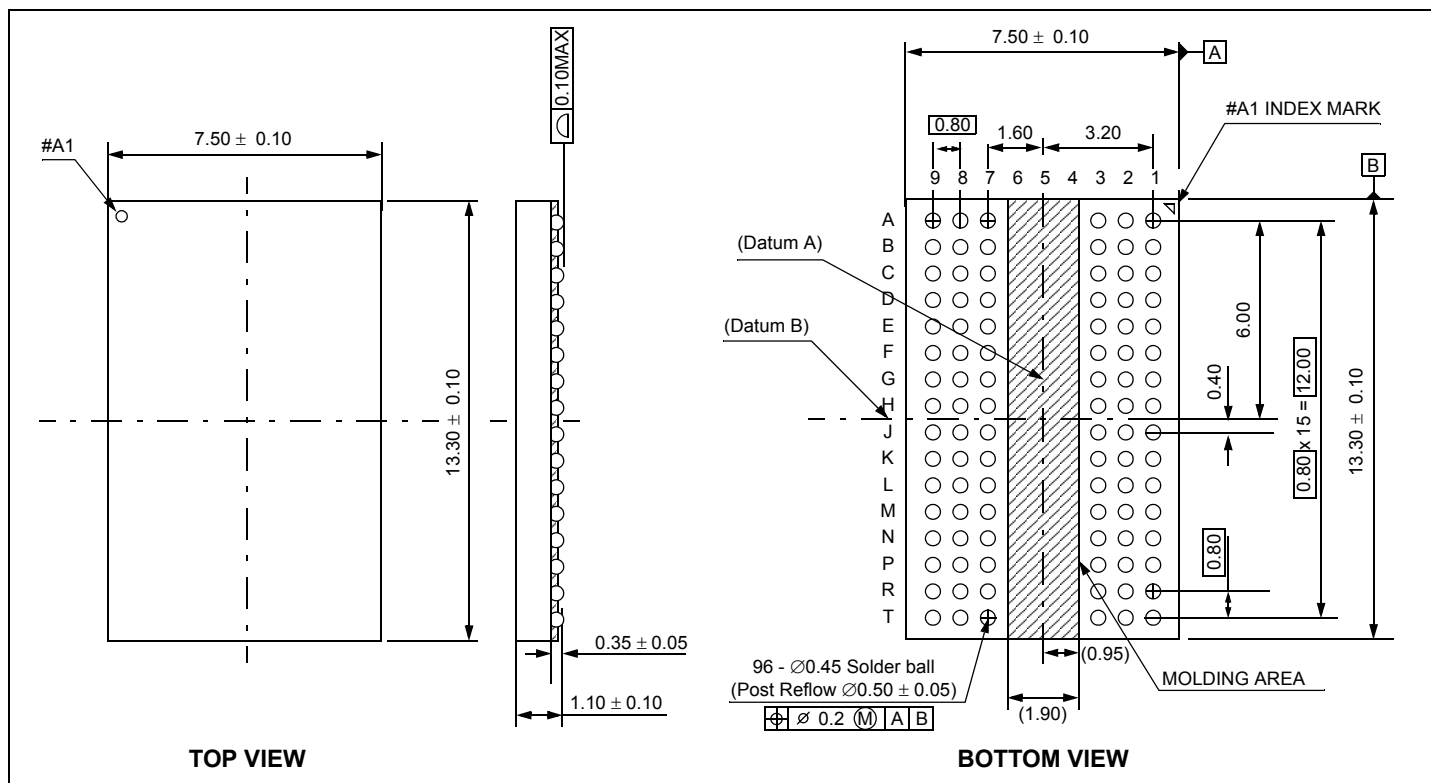
78Ball FBGA (for DDR3 1Gb x8 E-die / DDR3 2Gb x8 C-die)

Units : Millimeters



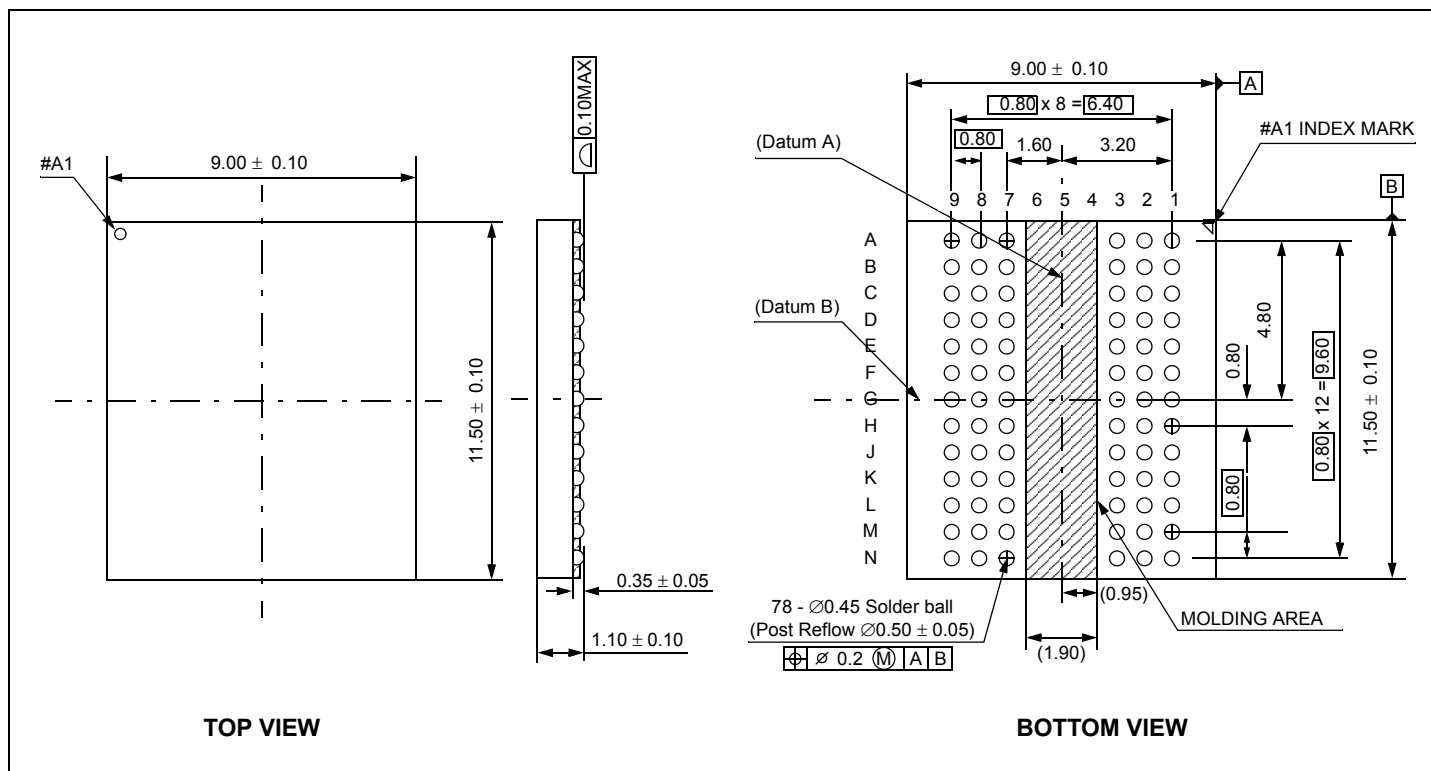
96Ball FBGA (for DDR3 1Gb x16 E-die / DDR3+ 1Gb x16 E-die / DDR3 2Gb x16 C-die)

Units : Millimeters



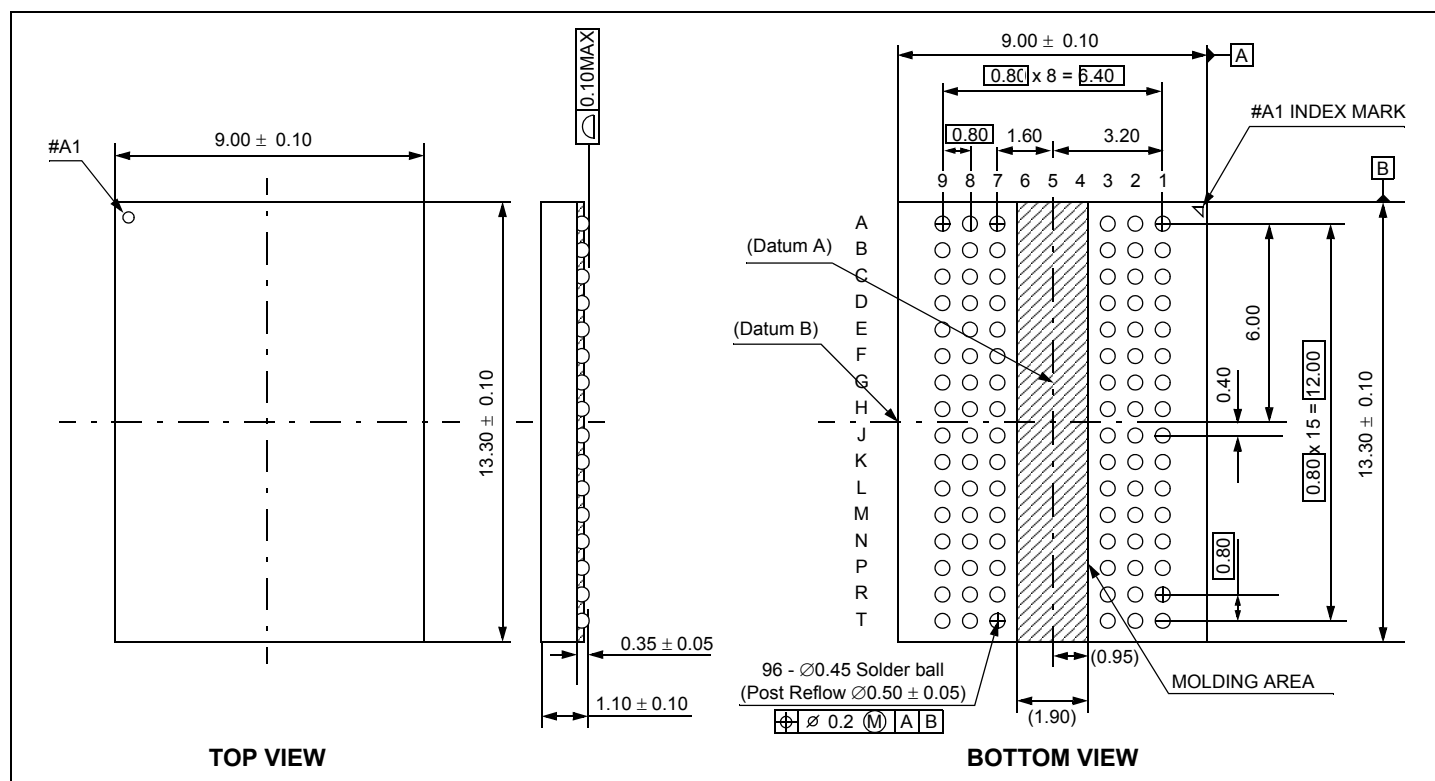
78Ball FBGA (for DDR3 2Gb x8 B-die)

Units : Millimeters



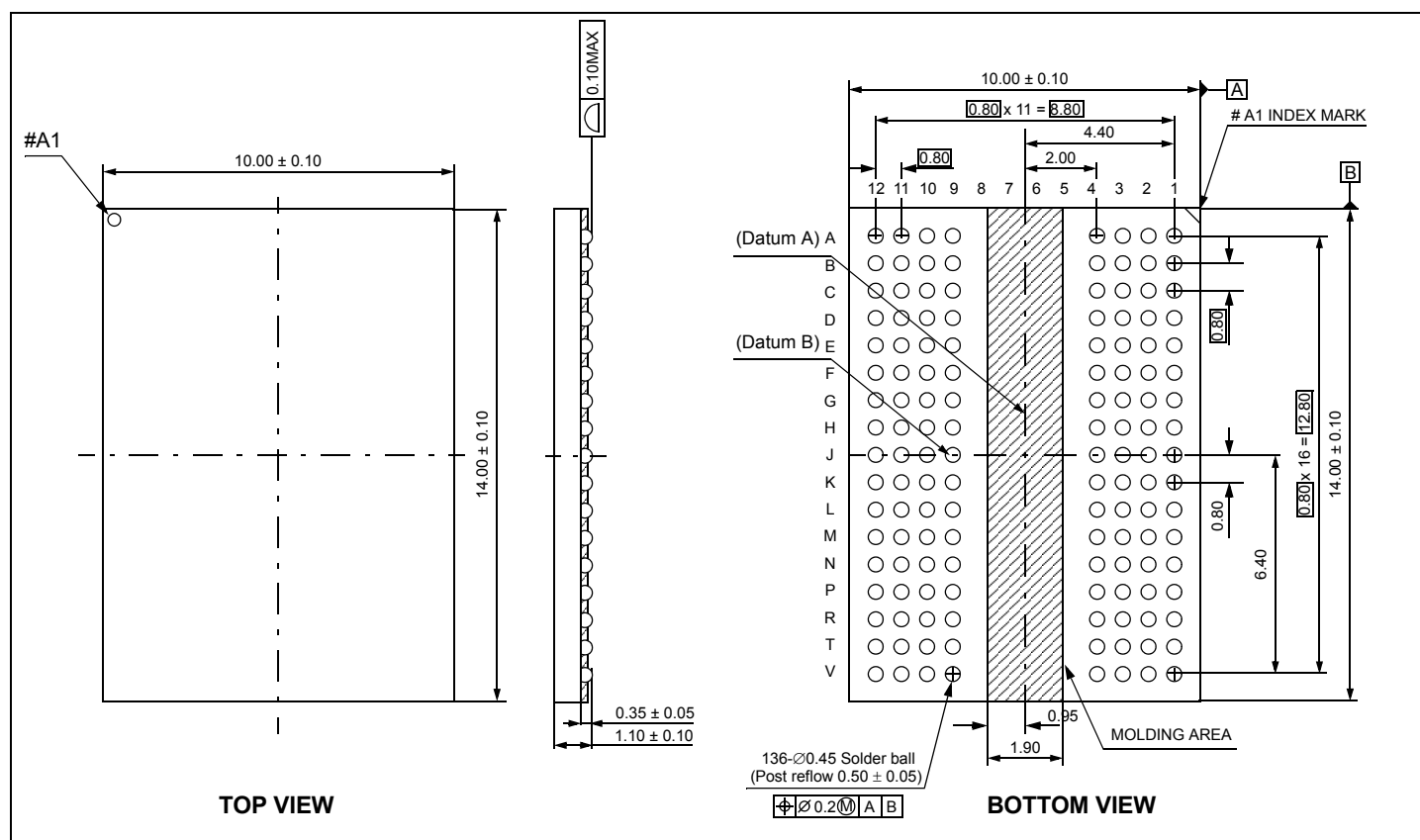
96Ball FBGA (for DDR3 2Gb x16 B-die)

Units : Millimeters



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

Units : Millimeters



For further information,

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