48-BALL BGA PACKAGES

48-ball BGA 8x8 and 10x10mm

- Compliant with RoHS, REACH regulations and practices.
- Contain no Red Phosphorus.
- Lead Free.
- Standard Reflow profile.
- Compatible with similar low-power SRAM products and other nonvolatile RAM products.

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COMPLIANCE WITH ENVIRONMENTAL REGULATIONS AND DIRECTIVES

Table 1 – Environmental Regulation and Directive Compliance

Environment	Statement Summary	Download Full Statement
ISO9001:2008	Everspin Technologies is in conformance with ISO9001:2008	Certificate
RoHS Directives	Statement of RoHS 1 and the recast Directive 2011/65/EU is commonly referred to as RoHS 2 Compliance. Everspin MRAM products are also “halogen-free”.	Full Statement
REACH Regulations	REACH regulations require article suppliers to inform recipients if an article contains a Substance of Very High Concern (SVHC) in excess of 0.1% by weight. Based on the material content certifications provided by Everspin's suppliers, none of these substances are present in the materials we use in our products, including packing and shipping materials.	Full Statement
Red Phosphorus	Everspin Technologies, Inc. MRAM products do not contain Red Phosphorus CAS# 7723-14-0 as an intentional additive.	Full Statement

MULTIPLE REFLOW CYCLES AND MOISTURE RESISTANCE

All Everspin packages are qualified by the procedure defined in IPC/JEDEC joint specification IPC/JEDEC J-STD-020D.1. They are guaranteed to withstand up to three reflow cycles without permanent damage, provided the conditions for the rated moisture resistance level for the part are observed prior to reflow.

Everspin parts are generally rated for MSL Level 3. Exceptions may exist and are noted in their respective data sheet. Please the check the latest individual product data sheet to confirm the rated MSL for the product.

RECOMMENDED REFLOW TEMPERATURES AND TIMING

Everspin products can be assembled using a standard assembly lead-free reflow profile. The profile below is based on IPC/JEDEC J-STD-020D.1.

Figure 1 – JEDEC J-STD-020D.1 Assembly Reflow Profile

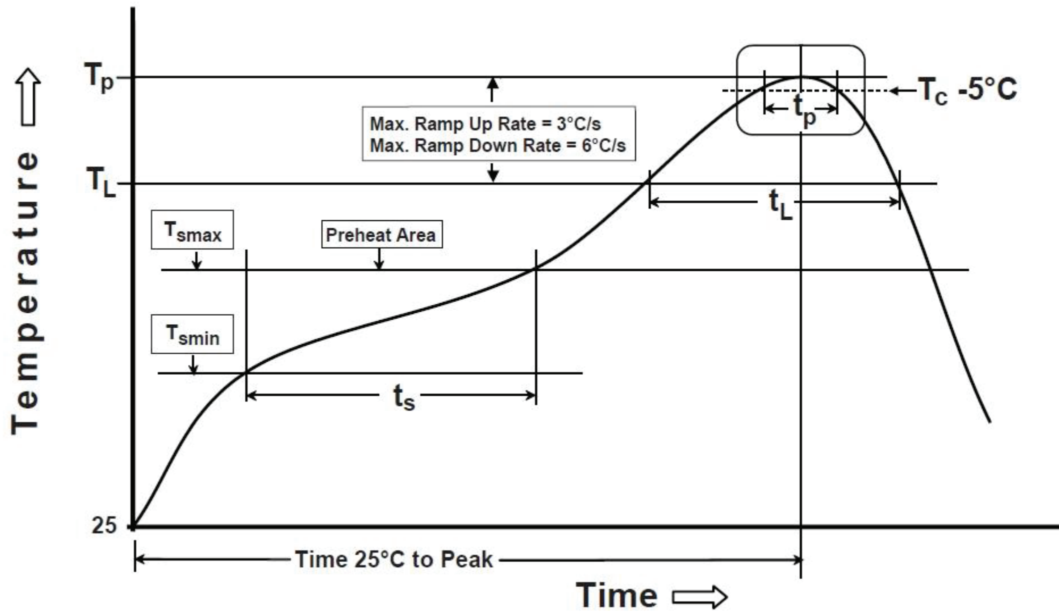


Table 2 – Recommended Reflow Times and Temperatures - All Packages

Profile Step	Parameter	Symbol	Time/Temp	Unit
Preheat / Soak	Temperature mininumum	T_{SMIN}	150	°C
	Temperature maximum	T_{SMAX}	200	°C
	Soak Time	t_S	60 - 120	Seconds
Ramp Up	Rate from T_L to T_P	T_L to T_P	3° / Sec Max	° / Sec
	25°C to T_P		8 minutes max	Minutes
Reflow	Liquidous Temperature	T_L	217	°C
	Time Above T_L		60 - 150	Seconds
	Peak Package Body Tempera-ture	T_P	260	°C
	Time within 5° of Peak Package Body Temperature		20 - 40	Seconds
Ramp Down	Rate from T_P to T_L	T_P to T_L	6° / Sec Max	° / Sec

THERMAL RESISTANCE

Table 3 – Thermal Resistance 8x8 mm 48-BGA

Power (W)	T_A (°C)	T_J (°C)		Θ_{JA} (°C/W)		Ψ_{JT} (°C/W)	Θ_{JC} (°C/W)
		0 m/s	1 m/s	0 m/s	1 m/s		
0.2	25	39.3	37.3	71.5	61.3	-	-

Table 4 – Thermal Resistance 10x10 mm 48-BGA

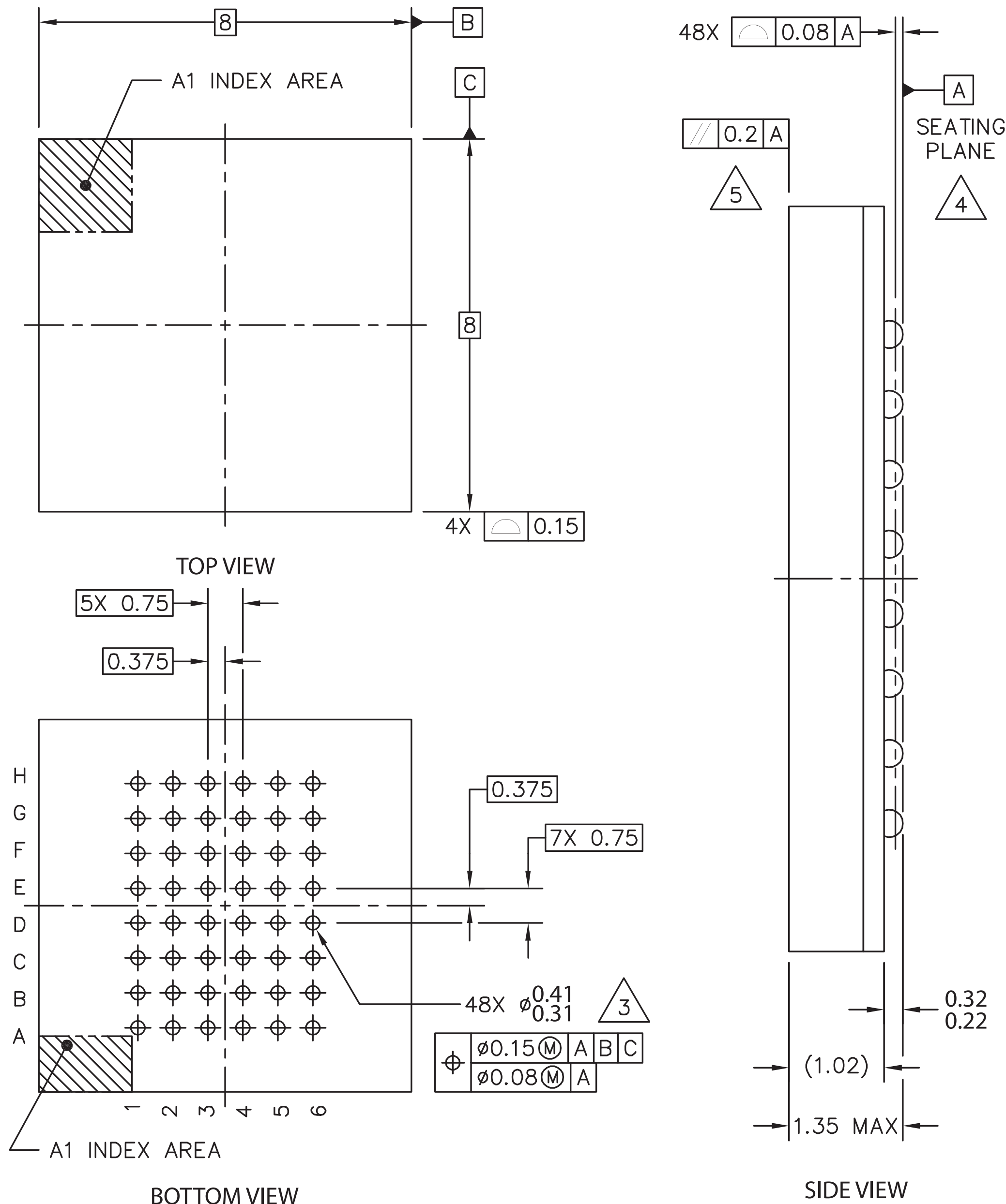
Power (W)	T_A (°C)	Thermal Vias (8x8)	T_J (°C)		Θ_{JA} (°C/W)		Ψ_{JT} (°C/W)	Θ_{JC} (°C/W)
			0 m/s	1 m/s	0 m/s	1 m/s		
0.37	25	Yes	37.9	35.3	34.9	27.8	0.14	5.1
		No	40.5	38.0	42.0	35.1	0.17	5.2

PACKAGE OUTLINES BY PRODUCT FAMILY

Product Family	Density and I/O Width	BGA Package Outline Drawing
MR256A08	256Kb x8	8x8mm 48-BGA Version 1 Figure 2 on page 6
MR256DL08	256Kb x8	
MR0A08	1Mb x8	
MR0D08	1Mb x8	
MR0DL08	1Mb x8	
MR0A16	1Mb x16	8x8mm 48-BGA Version 2 Figure 3 on page 7
MR2A08	4Mb x8	
MR2A16	4Mb x16	
MR4A08	16Mb x8	10x10mm 48-BGA Figure 4 on page 8
MR4A16	16Mb x16	

48-BGA PACKAGE OUTLINE DRAWINGS

Figure 2 – Package Outline 8x8mm 48-BGA Version 1



Not To Scale

1. Dimensions in Millimeters.
2. Dimensions and tolerances per ASME Y14.5M - 1994.
3. (△) Maximum solder ball diameter measured parallel to DATUM A
4. (△) DATUM A, the seating plane is determined by the spherical crowns of the solder balls.
5. (△) Parallelism measurement shall exclude any effect of mark on top surface of package.

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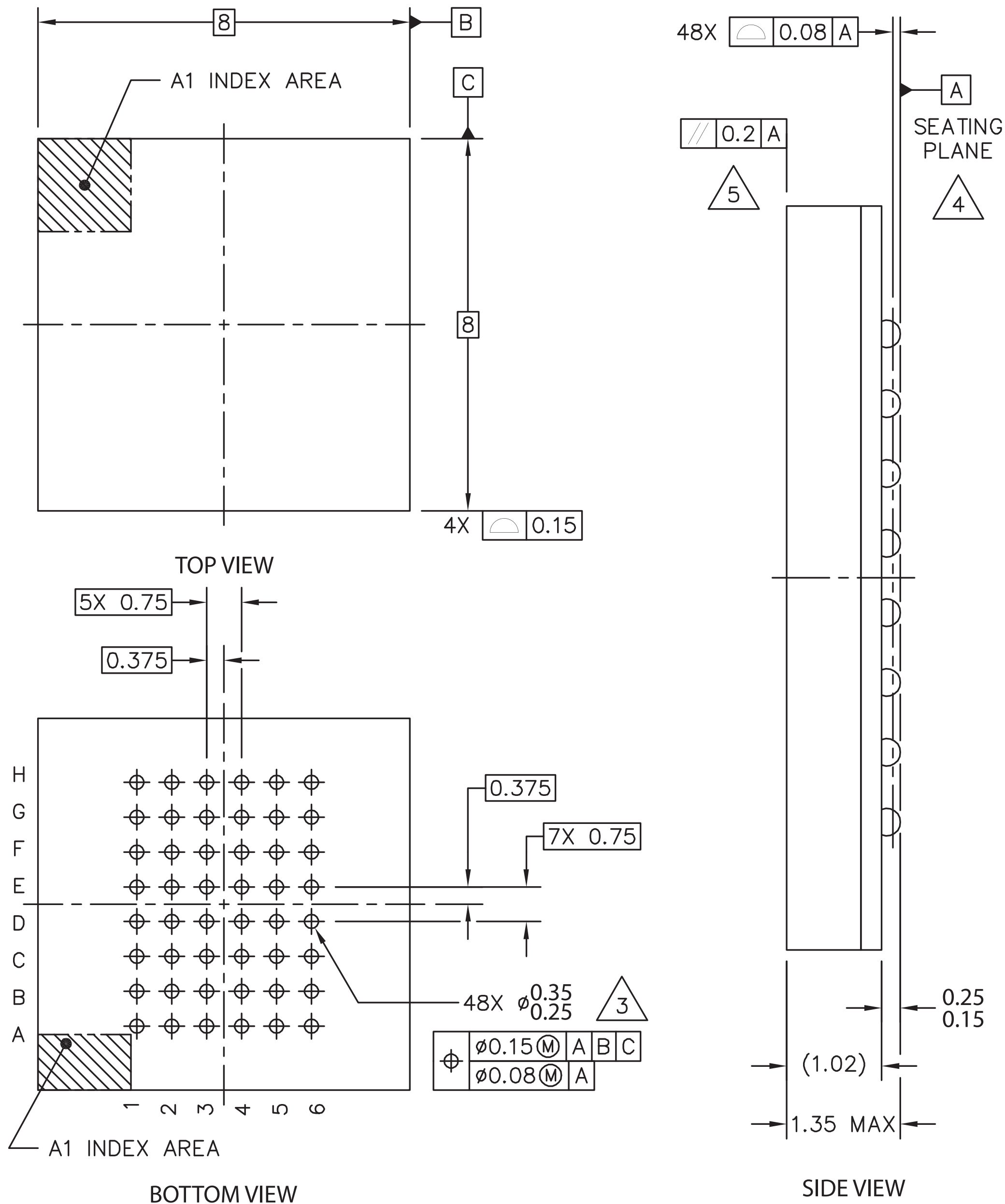
Figure 3 – Package Outline 8x8mm 48-BGA Version 2



Not To Scale

1. Dimensions in Millimeters.
2. Dimensions and tolerances per ASME Y14.5M - 1994.
3. Maximum solder ball diameter measured parallel to DATUM A
4. DATUM A, the seating plane is determined by the spherical crowns of the solder balls.
5. Parallelism measurement shall exclude any effect of mark on top surface of package.

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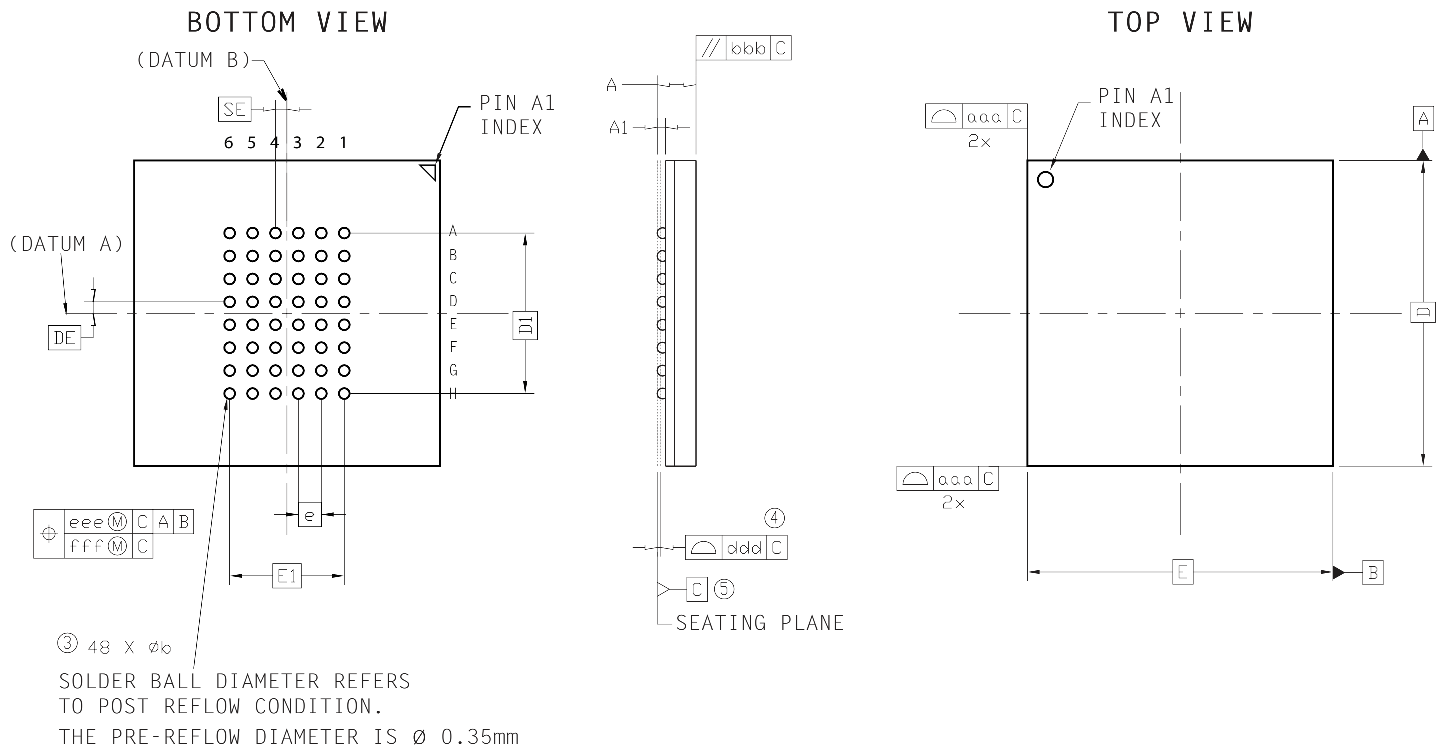
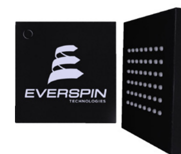
Figure 4 – Package Outline 10x10mm 48-BGA



Ref	Min	Nominal	Max
A	1.19	1.27	1.35
A1	0.22	0.27	0.32
b	0.31	0.36	0.41
D		10.00 BSC	
E		10.00 BSC	
D1		5.25 BSC	
E1		3.75 BSC	
DE		0.375 BSC	
SE		0.375 BSC	
e		0.75 BSC	

Ref	Tolerance of, from and position
aaa	0.10
bbb	0.10
ddd	0.10
eee	0.15
fff	0.08



Not To Scale

1. Dimensions in Millimeters.
2. The 'e' represents the basic solder ball grid pitch.
3. 'b' is measurable at the maximum solder ball diameter in a plane parallel to datum C.
4. Dimension 'ddd' is measured parallel to primary datum C.
5. Primary datum C (seating plane) is defined by the crowns of the solder balls.
6. Package dimensions refer to JEDEC MO-205 Rev. G.

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REVISION HISTORY

Revision	Date	Description of Change
1.0	May 6, 2013	Initial release.
1.1	August 27, 2013	Added 25°C to T_P data to the Temperature Profile Table 1.
1.2	October 21, 2014	Added Reflow Cycle and Moisture Resistance section.
2.0	February 19, 2015	Now two versions of the 8x8 BGA package outline. Listed part numbers for each version. Changed package name from FBGA to BGA.
2.1	July 29, 2015	Added Notes to Versions 1 & 2 of the 8x8mm BGA. Minor correction to the 'ddd' tolerance value for the 10x10mm BGA Package (Note 4.)

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