

8-Land DFN Packages



8-land DFN Large Flag



8-land DFN Small Flag

- Compliant with RoHS, REACH regulations and practices.
- Contains no Red Phosphorus.
- Lead Free.
- All products meet MSL-3 moisture sensitivity level.
- Assembly with a JEDEC standard reflow profile.
- Can be placed on a standard SOIC footprint in most designs. See Application Note [“Everspin’s New 2mm Exposed Pad DFN Package Meets Both SOIC-8 and DFN8 PCB Layouts”](#).

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Compliance with Environmental Regulations and Directives

Environment	Statement Summary	Download Full Statement
RoHS	Everspin Technologies, Inc. MRAM products comply with RoHS Directive 2002/95/EC.	Full RoHS Compliance Statement
REACH	Under the definition of the REACH regulations EC1907/2006, Everspin Technologies is a producer of “articles”. REACH requires article suppliers to inform recipients if an article contains a Substance of Very High Concern (SVHC) in excess of 0.1% by weight. Everspin products do not contain any of these SVHC in excess of 0.1% by weight.	Full REACH Statement
Red Phosphorus	Everspin Technologies, Inc. MRAM products do not contain Red Phosphorus CAS# 7723-14-0 as an intentional additive.	Full Red Phosphorus Statement
Environmental and Humanitarian Compliance	Materials from Conflict Regions Statement	Full Statement

Multiple Reflow Cycles and Moisture Resistance

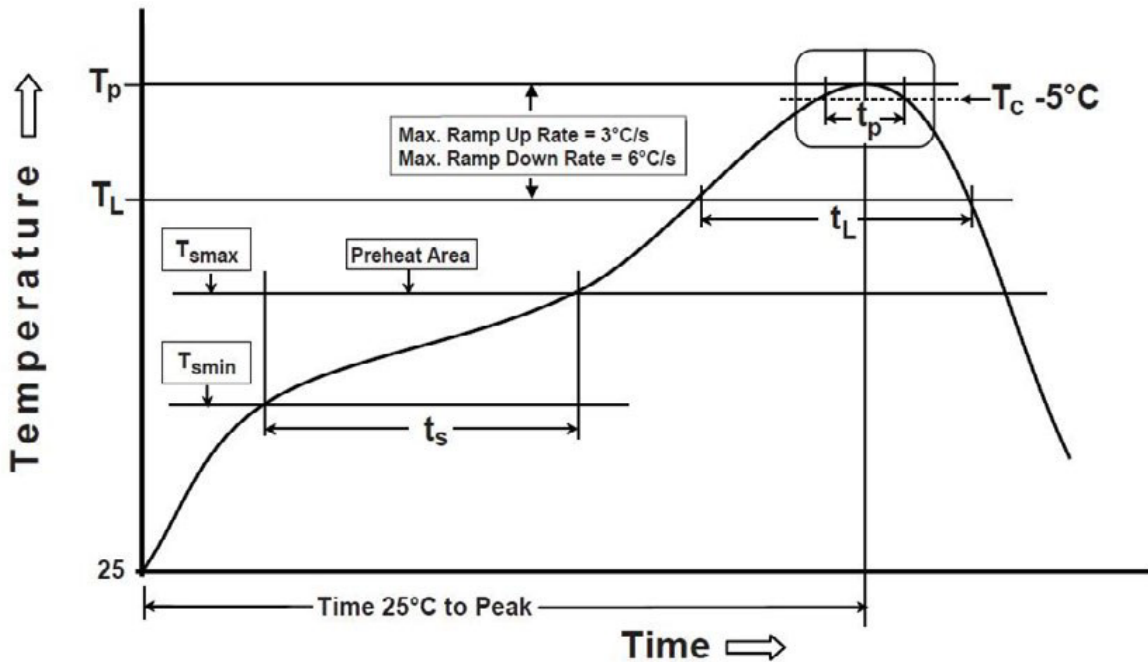
All Everspin packages are qualified by the procedure defined in IPC/JEDEC joint specification IPC/JEDEC J-STD-020D.1. They are guaranteed to withstand up to three reflow cycles without permanent damage, provided the conditions for the rated moisture resistance level for the part are observed prior to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

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

Recommended Reflow Temperatures and Timing – All Packages

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

FIGURE 1 - RECOMMENDED REFLOW PROFILE _ ALL PACKAGES



Profile Step	Parameter	Symbol	Time/Temp	Unit
Preheat / Soak	Temperature minimum	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 Temperature	T_p	260	°C
	Time T_c is within 5° of T_p		30	Seconds
Ramp Down	Rate from T_p to T_L	T_p to T_L	6° / Sec Max	° / Sec

Thermal Resistance

TABLE 1 – THERMAL RESISTANCE 5X6 mm 8-LAND LARGE FLAG DFN (DESIGNATOR DC)

Velocity (m/s)	Ambient Temp	T _J (°C)	Θ _{JA} (°C/W)
0	-40°C	-37.3	31.9
	85°C	87.7	

TABLE 2 - THERMAL RESISTANCE 5X6 mm 8-LAND SMALL FLAG DFN (DESIGNATOR DF)

Velocity (m/s)	Ambient Temp	T _J (°C)	Θ _{JA} (°C/W)	Θ _{JB} (°C/W) ₁	Θ _{JC} (°C/W)	Ψ _{JB} (°C/W)	Ψ _{JT} (°C/W) ₂
0	25°C	34.7	57.7	32.5	1.8	30.2	0.38
1		33.1	48.0			29.0	0.88
2		32.7	45.9			28.5	1.10
3		32.5	44.6			28.1	1.26

Notes:

1. Θ_{JB} value assumes 4-layer PCB.
2. Ψ is a thermal characterization factor indicating the temperature rise between package top and the device junction. See JESD51-2.

TABLE 3 - THERMAL RESISTANCE EMXXLX 6X8 mm 8-LAND DFN (DESIGNATOR DH)

Die Stack	Ta (C)	Package Size (mm)	Θ _{JA} (C/W)		Θ _{JB} (C/W)	Θ _{JC} (C/W)	Ψ _{JT} (C/W)	
			0 m/s	1 m/s			0 m/s	1 m/s
x1	25	8x6	36.9	23.5	18.8	5.7	0.1	0.68
x2	25	8x6	36.8	28.4	20.0	6.8	0.25	0.63

TABLE 4 THERMAL RESISTANCE EMXXLXB 5x6 mm 8-LAND DFN (DESIGNATOR DH)

Velocity (m/s)	Ambient Temp	T _J (°C)	Θ _{JA} (°C/W)	Θ _{JB} (°C/W)	Θ _{JC} (°C/W)	Ψ _{JB} (°C/W)	Ψ _{JC} (°C/W)
0	25°C	48.1	46.0	20.4	17.7	20.3	1.2
1		43.9	37.9			20.0	1.7
2		43.1	36.2			19.8	2.0

Thermal Calculations

Designers may require different thermal numbers for specific models or environments. Figure 2 below depicts the JEDEC thermal resistances of typical packages. Using the thermal resistances and power provided in the device specific data sheet, and using industry standard equations, the desired thermal variable can be calculated. Figure 3 depicts an example calculation using Ta to calculate Tj.

FIGURE 2 - JEDEC PCB THERMAL MODEL

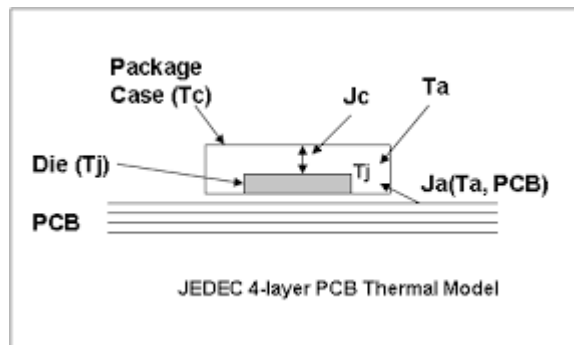


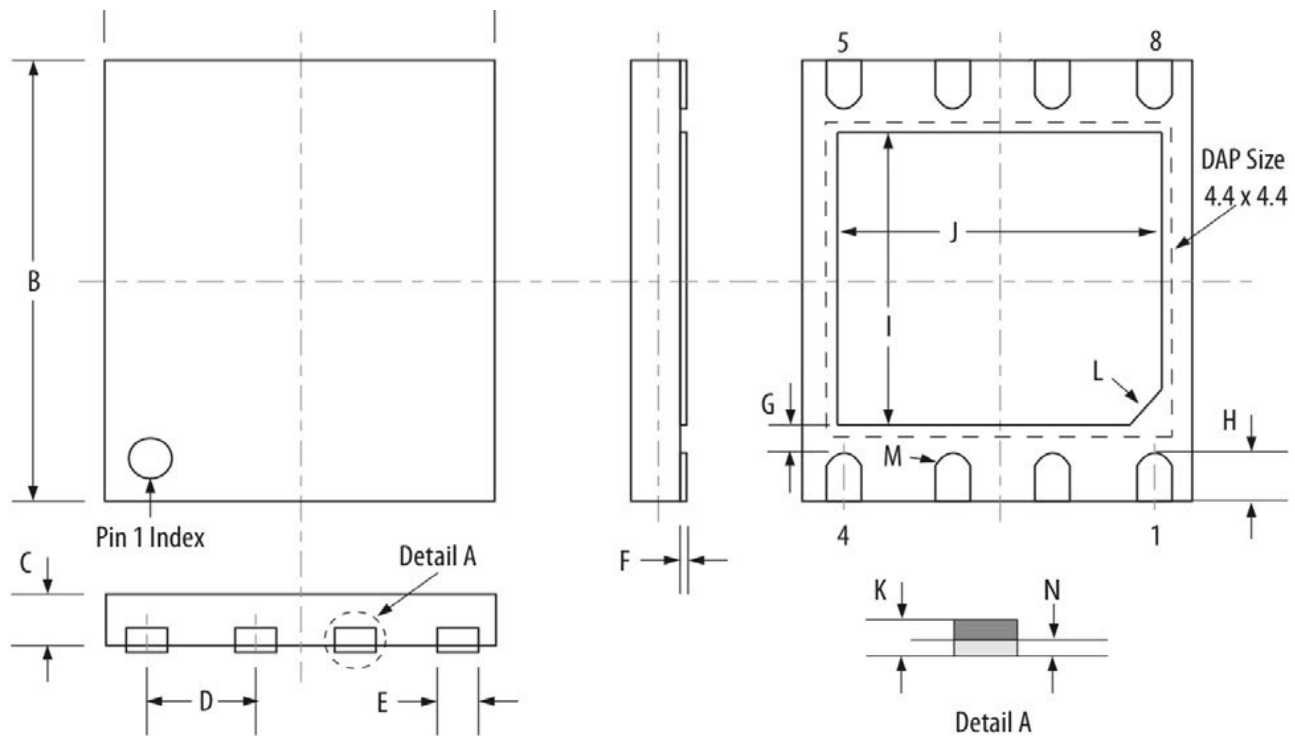
FIGURE 3 - T_J CALCULATION USING T_A

$$T_j = T_a + R_{th(j-a)} \times P$$

T_a : Temperature of ambient atmosphere (= room temperature where the measurement was done)
R_{th(j-a)} : Thermal resistance inbetween Junction and Ambient atmosphere *
P : Power dissipation **

Package Outline Drawings

FIGURE 4 - PACKAGE OUTLINE 5x6 mm 8-LAND DFN LARGE FLAG (DESIGNATOR DC)



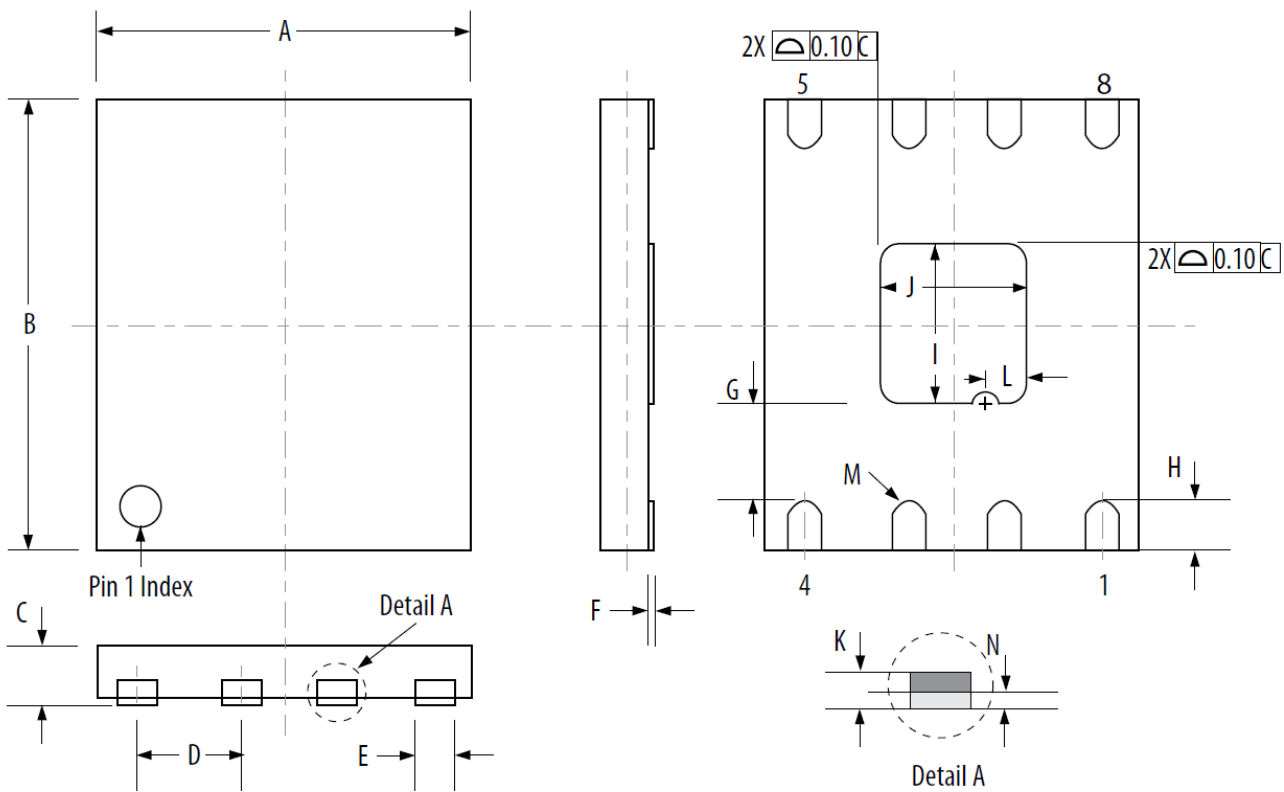
Dimension	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Max.	5.10	6.10	1.00	1.27	0.45	0.05	0.35	0.70	4.20	4.20	0.261	C0.35	R0.20	0.05
Min.	4.90	5.90	0.90	BSC	0.35	0.00	Ref.	0.50	4.00	4.00	0.195			0.00

Notes:

1. All dimensions are in mm. Angles in degrees.

2. Coplanarity applies to the exposed pad as well as the terminals. Coplanarity shall be within 0.08 mm.
3. Warpage shall not exceed 0.10 mm.
4. Refer to JEDEC MO-229
5. Lead plating 400 - 800 μm Sn.

FIGURE 5 - PACKAGE OUTLINE 5x6 mm 8-LAND DFN SMALL FLAG (DESIGNATOR DF)



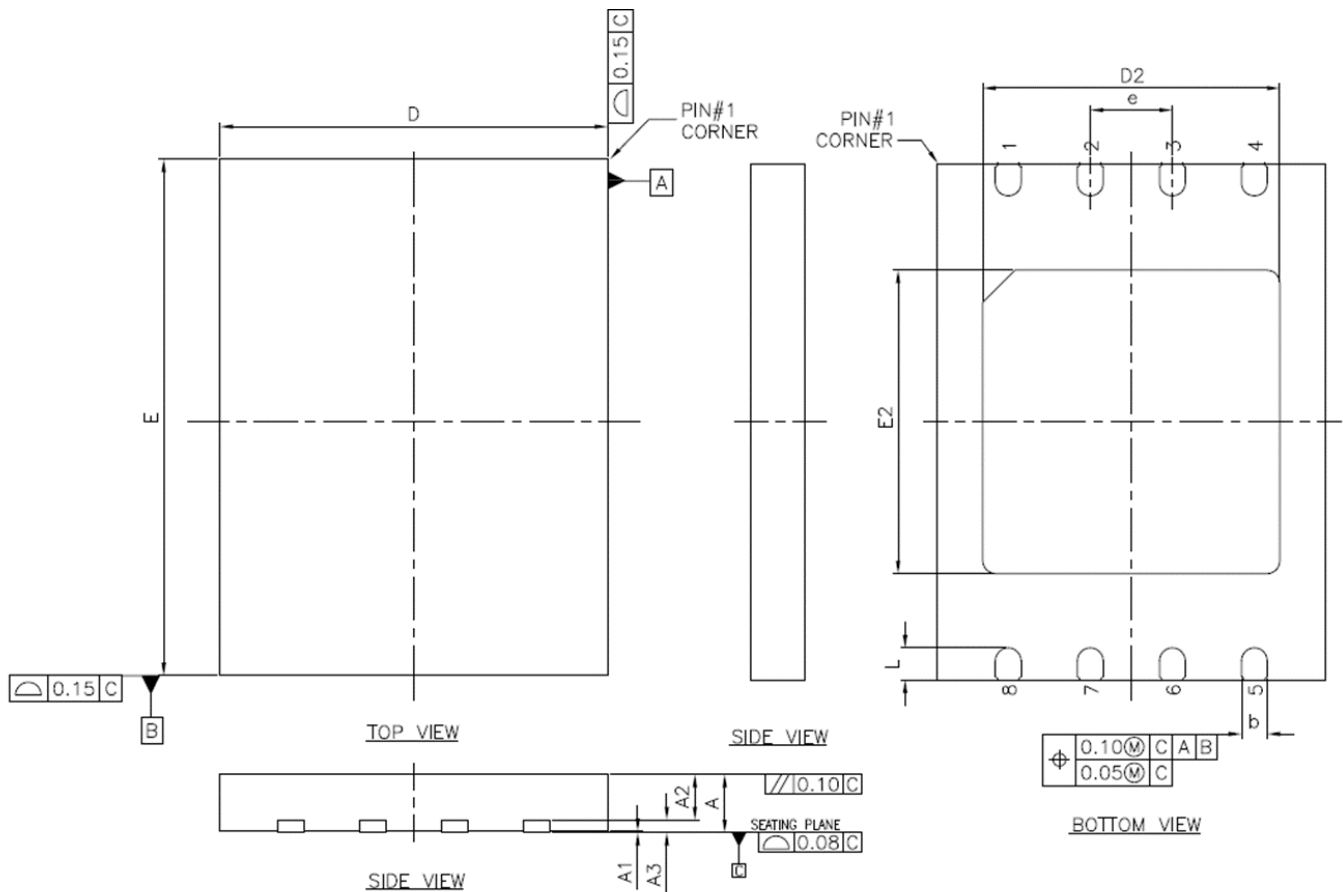
Dimension	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Max	5.10	6.10	0.90	1.27	0.45	0.05	1.60	0.70	2.10	2.10	.210	C0.45	R0.20	0.05
Min	4.90	5.90	0.80	BSC	0.35	0.00	1.20	0.50	1.90	1.90	.196			0.00

NOTE:

1. All dimensions are in mm. Angles in degrees.

2. Coplanarity applies to the exposed pad as well as the terminals. Coplanarity shall be within 0.08 mm.
3. Warpage shall not exceed 0.10 mm.
4. Refer to JEDEC MO-229
5. Lead plating 300 - 600 μm Sn.

FIGURE 6 - PACKAGE OUTLINE 6x8 MM 8-LAND DFN (DESIGNATOR DG)



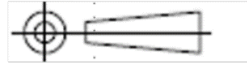
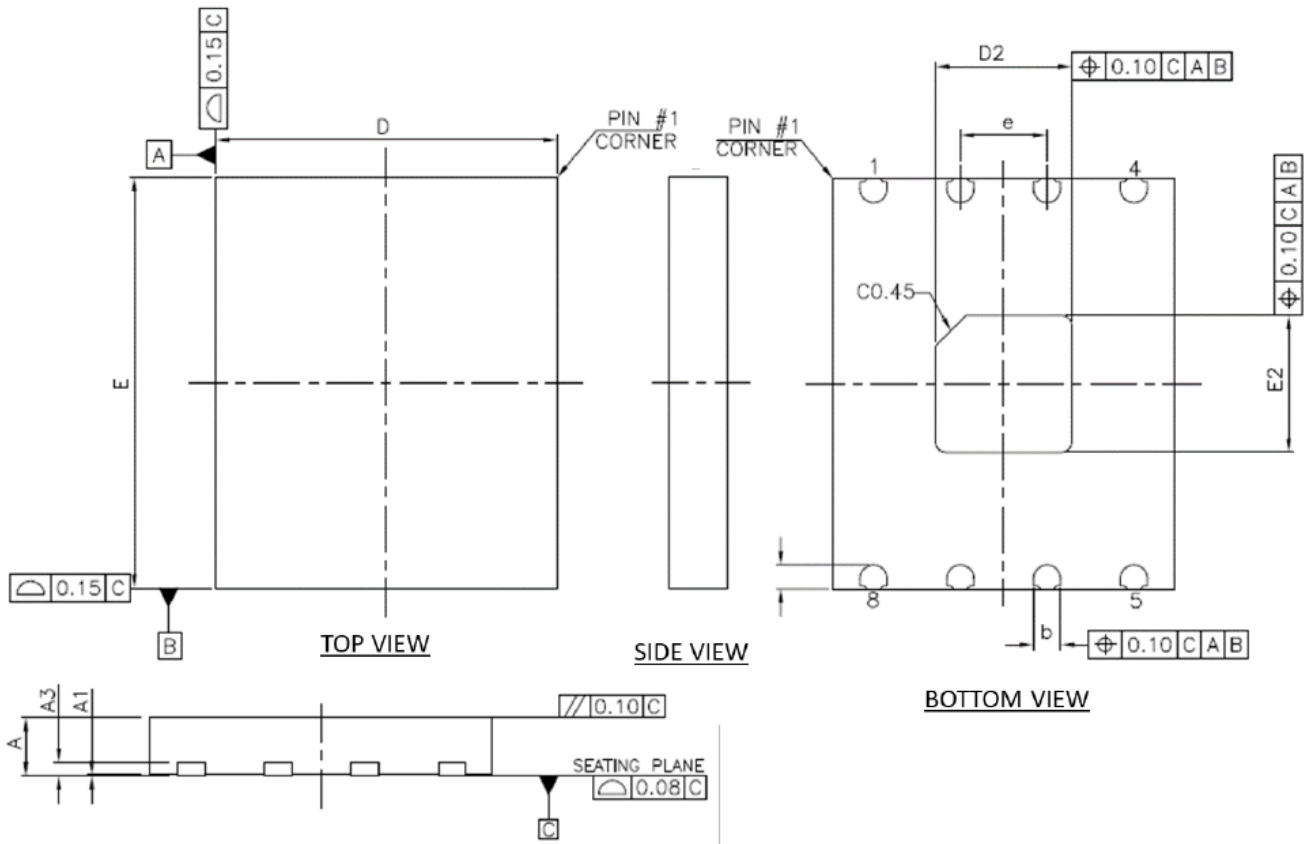
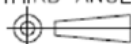
	Symbol	Min.	Nom.	Max.	
Total thickness	A	0.85	0.90	0.95	<p>THIRD ANGLE PROJECTION</p>  <p>UNLESS OTHERWISE SPECIFIED</p> <p>DECIMAL: .X ±</p> <p> .XX ± .10</p> <p> .XXX ± .05</p> <p>ANGULAR ± 3°</p> <p>SCALE: 15:1</p> <p>JEDEC NO.: MO-229(REF.)</p> <p>DWG. NO.: PD-PR23 (OSE) REV.: A</p>
Standoff	A1	0.00	0.02	0.05	
Mold thickness	A2	0.65	0.70	0.75	
Lead thickness	A3	0.20 REF			
Body Size	D	5.90	6.00	6.10	
	E	7.90	8.00	8.10	
Lead width	b	0.35	0.40	0.48	
Exposed pad width	D2	4.55	4.60	4.65	
Exposed pad length	E2	4.65	4.70	4.75	
Lead pitch	E	1.27 BSC			
Lead length	L	0.45	0.50	0.55	
Lead count	N	8L			

FIGURE 7 - PACKAGE OUTLINE EMxxLxB 5x6 MM 8-LAND DFN (DESIGNATOR DH)



	Symbol	Min.	Nom.	Max.
Total thickness	A	0.80	0.85	0.90
Standoff	A1	0.00	0.02	0.05
Lead thickness	A3	0.20 REF		
Body Size	D	4.90	5.00	5.10
	E	5.90	6.00	6.10
Lead width	b	0.35	0.40	0.45
Exposed pad width	D2	1.90	2.00	2.10
Exposed pad length	E2	1.90	2.00	2.10
Lead pitch	e	1.27 BSC		
Lead length	L	0.30	0.35	0.40
Lead count	N	8		

THIRD ANGLE PROJECTION :	
	
UNLESS OTHERWISE SPECIFIED	
DECIMAL:	.X ± .XX ±.10 .XXX ±.05
ANGULAR:	±3°
SCALE:	15:1
JEDEC NO.: MO-229(REF.)	
DWG. NO.:	PD-PR012
REV.:	A

Revision History

Revision	Date	Description of Change
1.0	October 24, 2013	Initial Release
1.1	October 21, 2014	Added Reflow Cycle and Moisture Resistance section.
1.2	April 12, 2018	Updated the Contact Us table
1.3	June 28, 2022	Added 6x8 mm 8 – Land DFN package information
1.4	February 7, 2023	Added Thermal Calculation section. Updated formatting to conform with latest Everspin format template.
1.5	August 18, 2023	Added Table 4: Thermal Resistances EMxxLXB 5x6 mm DFN 8-Land Added Figure 7: Package Outline EMxxLXB 5x6 mm DFN 8-Land Compliance document links updated

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