

SPDT Reflective Switch

100 MHz - 9 GHz



MASW-011227

Rev. V1

Features

- Insertion Loss:
 - 0.27 dB @ 4 GHz
 - 0.41 dB @ 6 GHz
- 30 dB Isolation:
 - 30 dB @ 4 GHz
 - 25 dB @ 6 GHz
- Input P0.1dB: 31.5 dBm
- Input IP3: 64.2 dBm @ 2.7 GHz
- Return Loss: 15 dB @ each RF Port
- Lead Free 2 mm, 8 Lead DFN Package
- RoHS* Compliant

Applications

- Multi Market

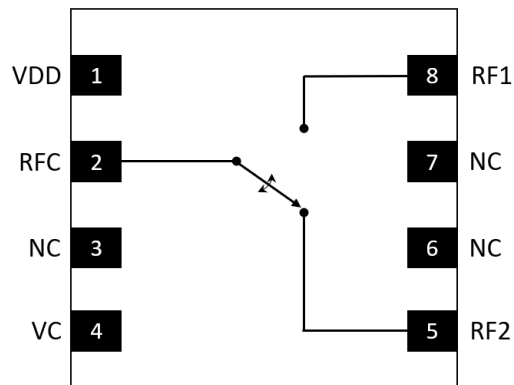
Description

The MASW-011227 is a reflective wideband single pole double throw (SPDT) switch with 0.3 dB of insertion loss and 30 dB isolation at 4 GHz. The power handling capability is 31.5 dBm CW. The input and output return losses in the thru path are typically 15 dB. The frequency band can be extended to 9 GHz for future Wi-Fi and Bluetooth applications.

The MASW-011227 is designed for band switching in multi-channel and multi-mode base-station applications as well as other applications where a low loss SPDT switch with high isolation is required.

The MASW-011227 is manufactured on a Silicon-on-Insulator process. The 2 mm DFN package is lead free and RoHS compliant.

Functional Schematic



Pin Configuration

Pin #	Pin Name	Description
1	VDD	3.3 V
2	RFC ¹	Common RF Input/Output
3, 6, 7	NC	No Connect
4	VC	Control
5	RF2 ¹	RF Input/Output 2
8	RF1 ¹	RF Input/Output 1
Paddle ²	GND	RF and DC Ground

1. RF ports are dc-coupled to GND. There are no internal dc blocking capacitors.
2. The exposed pad centered on the package bottom must be connected to RF, DC, and thermal ground.

Ordering Information

Part Number	Package
MASW-011227-TR1000	1000 Piece Reel
MASW-011227-TR3000	3000 Piece Reel
MASW-011227-SMB	Sample Board

* Restrictions on Hazardous Substances, compliant to current RoHS EU directive.

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Electrical Specifications³: $V_{DD} = 3.3\text{ V}$, $T_A = 25^\circ\text{C}$, $Z_0 = 50\ \Omega$

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss, RFC to RF1/2	1 GHz	dB	—	0.18	—
	3 GHz		0.6	0.26	
	4 GHz		—	0.27	
	6 GHz		0.7	0.41	
	9 GHz		1.1	0.73	
Isolation, RFC to RF1/2	1 GHz	dB	—	48.3	—
	3 GHz		30	35.5	
	4 GHz		—	30.4	
	6 GHz		20	24.5	
	9 GHz		15	17.8	
Isolation, between RF1 and RF2	1 GHz	dB	—	45.4	—
	3 GHz			34.4	
	4 GHz			30.0	
	6 GHz			25.4	
	9 GHz			18.6	
Input P0.1 dB	0.8 to 3.8 GHz	dBm	—	31.5	—
Input IP3	2.7 GHz, $P_{IN} = +20\text{ dBm}$, $\Delta f = 1\text{ MHz}$	dBm	—	64.2	—
Common Port Return Loss	0.1 - 6 GHz	dB	—	18	—
Output Port Return Losses	0.1 - 6 GHz	dB	—	15	—
T_{RISE}/T_{FALL}	10% to 90% RF / 90% to 10% RF	μs	—	0.2	—
T_{ON}/T_{OFF}	50% control to 90%/10% RF	μs	—	0.6	—
Switching Rate	—	kHz	—	—	20
Spurious Output	All ports terminated, no RF inputs	dBm	—	<-105	—
Logic Voltage, Input High (V_{IH})	—	V	1.2	1.8	3.3
Logic Voltage, Input Low (V_{IL})	—	V	0	0	0.65
Logic Pin Current (VC)	$VC = +1.8\text{ V}$	μA	—	18	—
Voltage Supply, VDD	—	V	3.15	3.3	3.45
Supply Current, VDD	—	μA	—	32	—

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Maximum Operating Ratings

Parameter	Absolute Maximum
Input Power, 1 to 6 GHz ³	31.5 dBm
VDD	-0.3 to +3.45 V
VC	-0.3 to VDD
Operating Temperature ⁴	-40 to +105°C

3. $T_C = 105^\circ\text{C}$. See power derating curves for details.

4. Guarantees 10 years lifetime.

Absolute Maximum Ratings^{5,6,7}

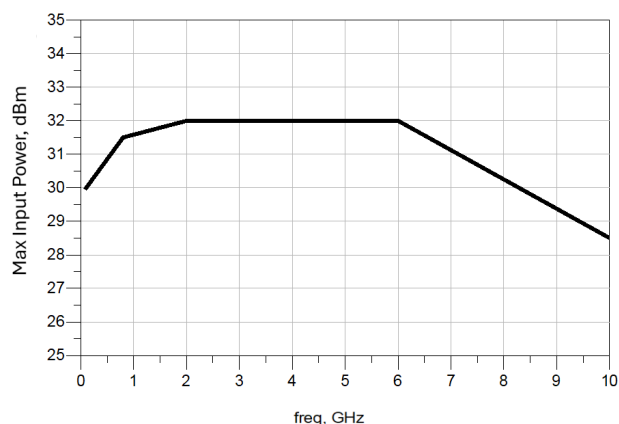
Parameter	Absolute Maximum
Input Power, 1 to 6 GHz	32 dBm
VDD	-0.3 to +3.6 V
VC	-0.3 to +3.45
Junction Temperature	+135°C

5. Exceeding any one or combination of these limits may cause permanent damage to this device.

6. MACOM does not recommend sustained operation near these survivability limits.

7. Based on testing with input power applied for 30 seconds.

Max Input Power



Truth Table

Control Input	Condition of Switch	
	RFC - RF1 Path	RFC - RF2 Path
VC		
V_{IH}	On	Off
V_{IL}	Off	On

Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these HBM Class 2 and CDM Class C3 devices.

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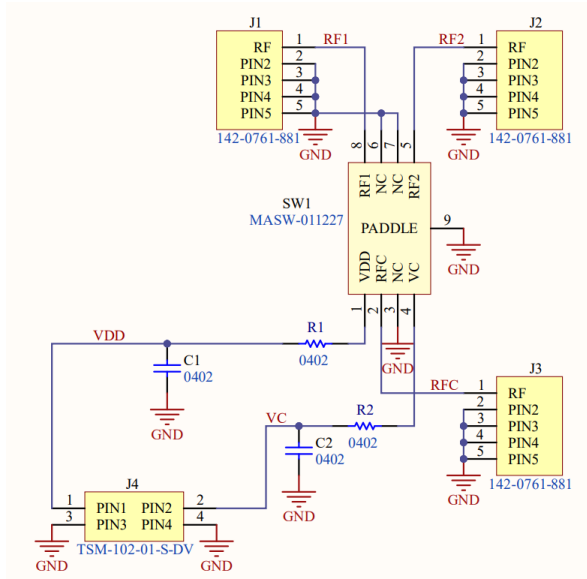
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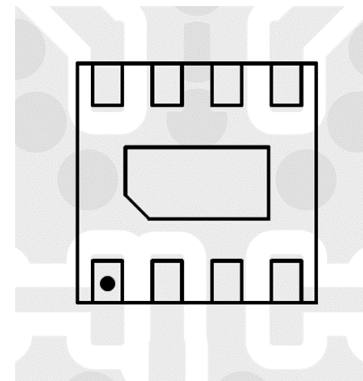
Application Schematic



Recommended PCB Footprint

The evaluation PCB of the MASW-011227 is a 4-layer board with 8 mil Rogers RO4003C dielectric material on top layer and 1.5 oz. copper on primary and secondary metal layers. For this stack-up, the recommended PCB footprint is shown below.

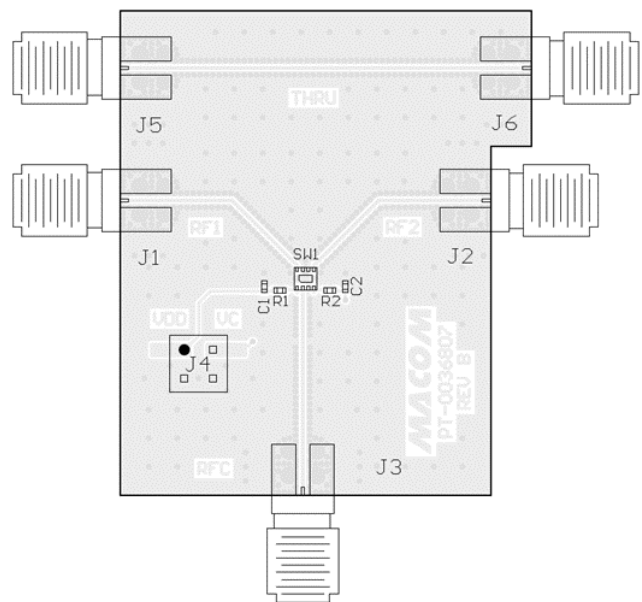
The 50 Ω RF transmission lines are CPWG of 12 mil width with 7.5 mil gap.



Parts List

Part	Value	Case Style
R1	Resistor, 30 Ω	0402
R2	Resistor, 50 Ω	0402
C1	Capacitor, 1 μ F, 25 V	0402
C2	Capacitor, 2 pF, 16 V	0402

Evaluation Board Layout



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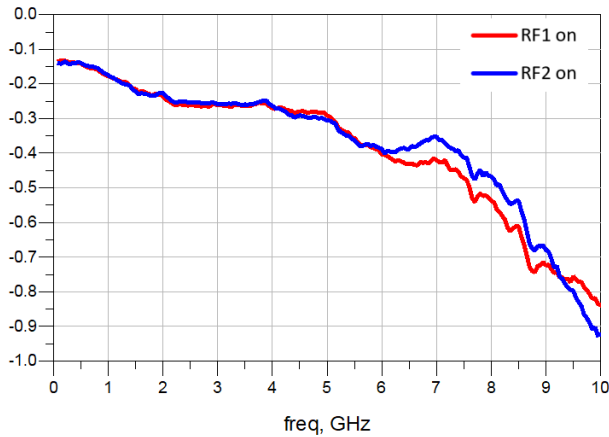


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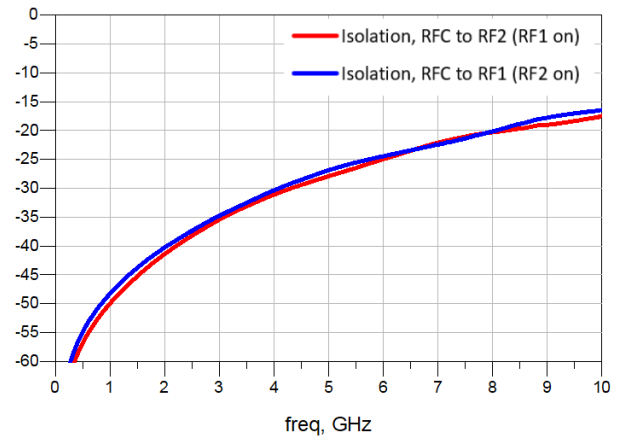
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Typical Performance Curves

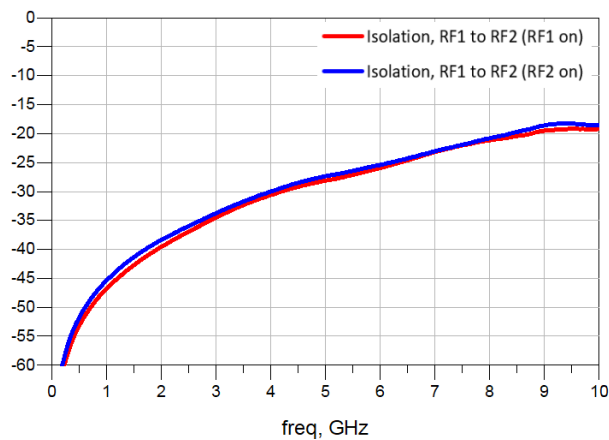
Insertion Loss (T=25C)



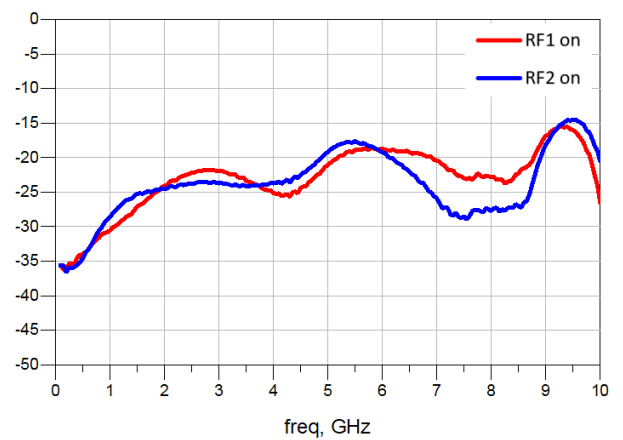
Isolation, RFC to RF1/2 (T=25C)



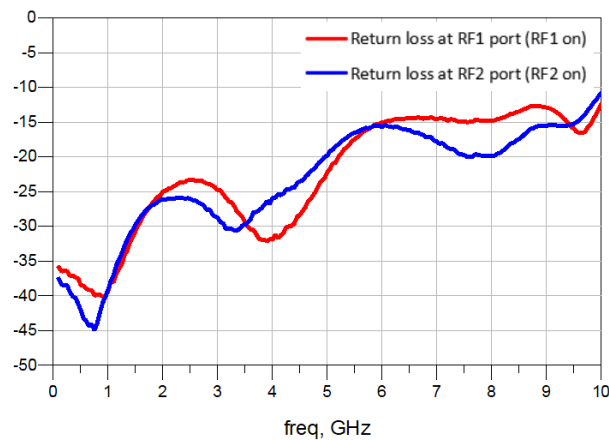
Isolation, RF1 to RF2 (T=25C)



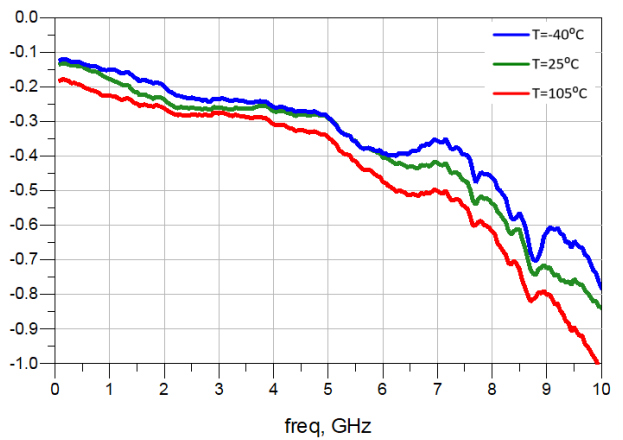
Return Loss, RFC (T=25C)



Return Loss, RF1/2 (T=25C)



Insertion Loss vs T (RF1 on)



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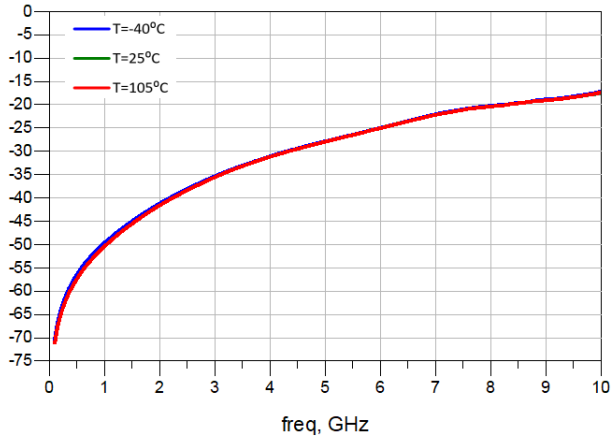


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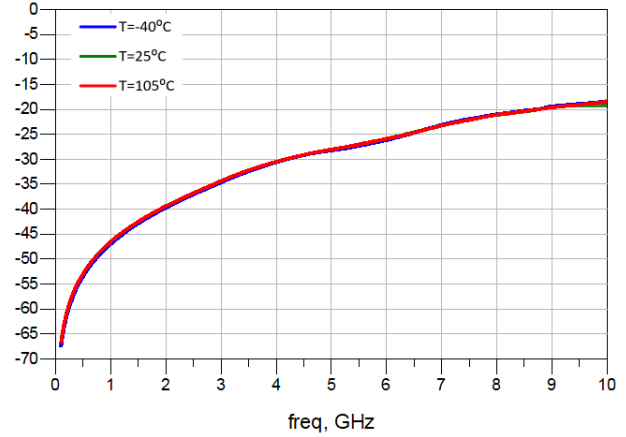
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Typical Performance Curves

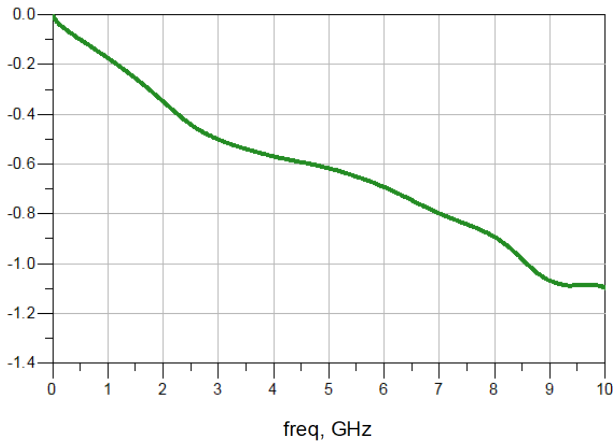
Isolation vs T, RFC to RF2 (RF1 on)



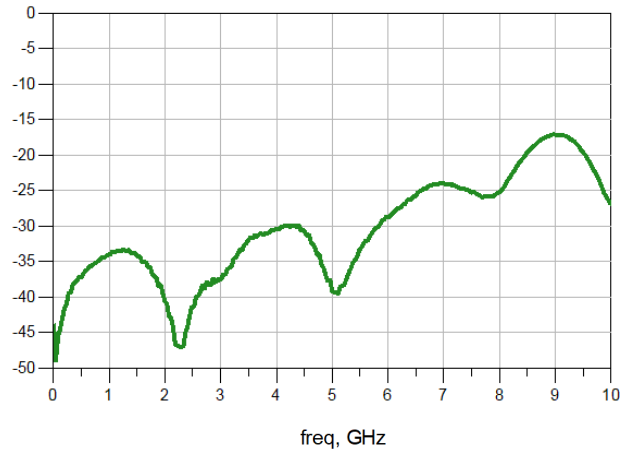
Isolation vs T, RF1 to RF2 (RF1 on)



Evaluation PCB losses (T=25C)

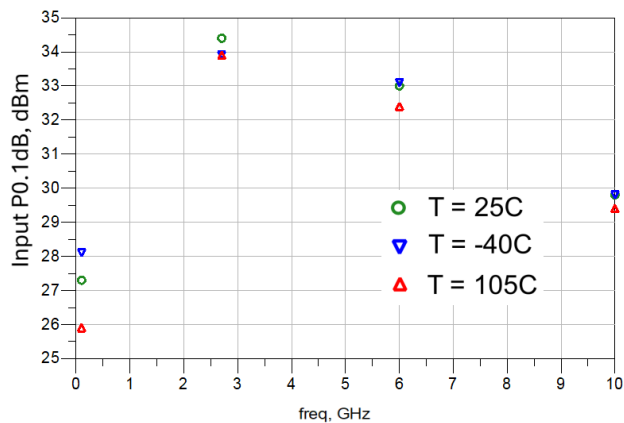


Evaluation PCB Return Loss, through line (T=25C)

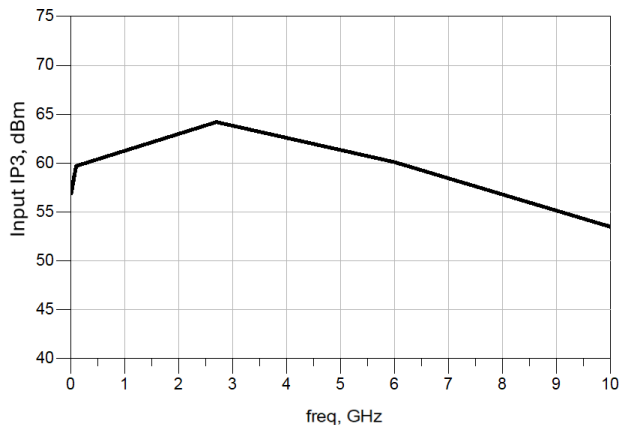


Typical Performance Curves

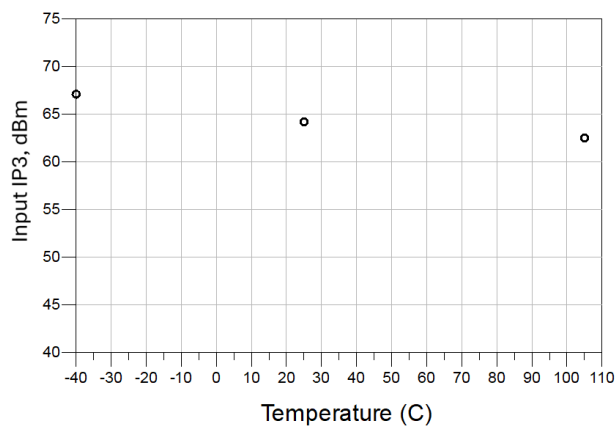
Input P0.1dB vs Freq in term of T



Input IP3



Input IP3 vs T at 2.7 GHz



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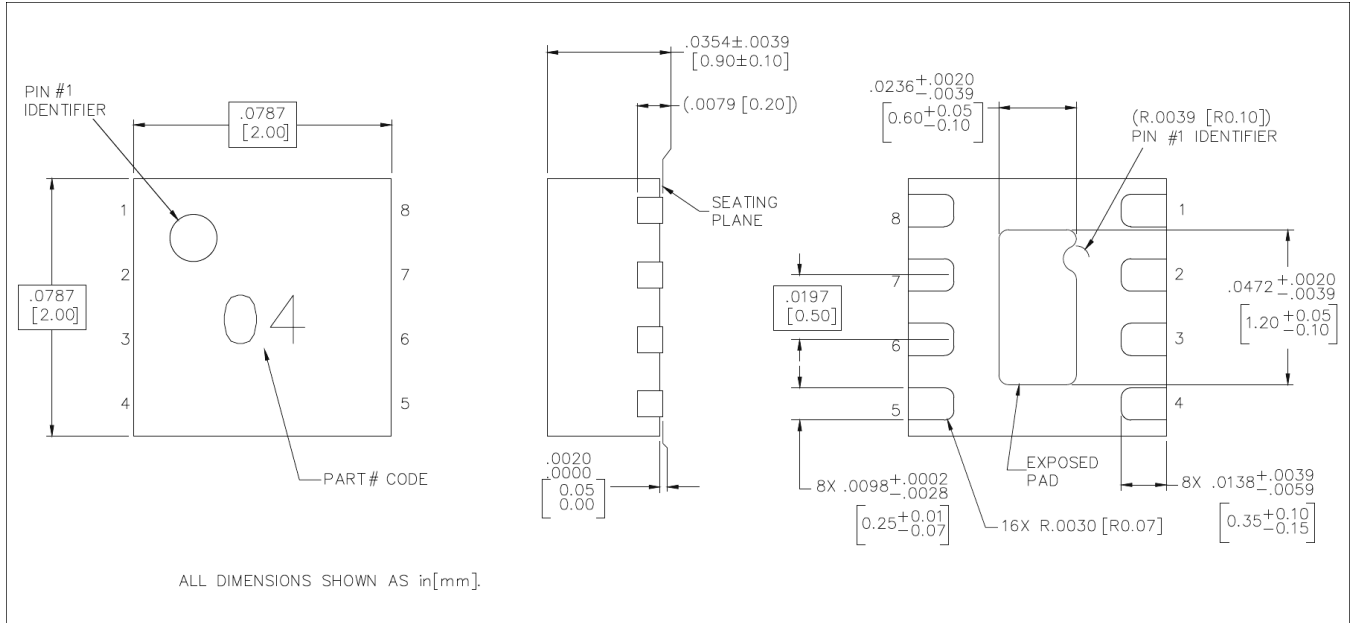
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Lead-Free 2 mm 8-Lead PDFN †



† Reference Application Note S2083 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.

Revision History

Rev	Date	Change Description
V1P	11/12/24	Preliminary Release
V1	12/20/24	Final Release

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