

PARAGON GB3221

Pre-configured DSP System for Hearing Aids

Description

The Paragon GB3221 hybrid is a programmable DSP system based on a multi-channel compression circuit. This hybrid is designed for low impedance receivers. It can be used as a platform for a wide range of hearing aid applications. It also offers a separate supply line to the A/D and H-Bridge circuits. The reflowable thinSTAX[®] packaging enables easy integration into BTE applications. This versatile DSP hybrid is capable of multiple configurations and has a wide range of functions.

The Paragon GB3221 hybrid contains the GC5057 controller featuring Power On Reset (POR) behavior.

The Paragon GB3221 hybrid code programmed into the GC5051 and the GC5057 controller chip is "7".

Features

- High Power Applications
- Highly Configurable, Versatile DSP Platform
- High Fidelity, Multi-channel AGC Signal Processing
- 93 dB Input Dynamic Range with HRX[™] Headroom Extension
- Fully Programmable via Serial Data Interface
- High Performance Data Converters – Dual, Over-sampled A/Ds; Over-sampled D/A with Efficient Switched-mode Output Power Amp
- High-fidelity Audio Quality
- Drives Zero-bias 2-terminal Receivers
- Multiple Communication Rates up to 85.3 kb/s
- Multi-memory
- Internal/External Volume Control
- Volume Control Taper determined by External VC
- Two Memory Select Pads
- Tri-state Memory Select Operation
- Audible Memory Change Indicator
- Also Available as E1 RoHS Compliant Hybrid

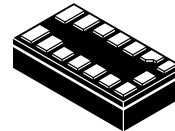
thinSTAX Packaging

- Hybrid Typical Dimensions:
0.227 x 0.125 x 0.060 in
(5.76 x 3.18 x 1.52 mm)



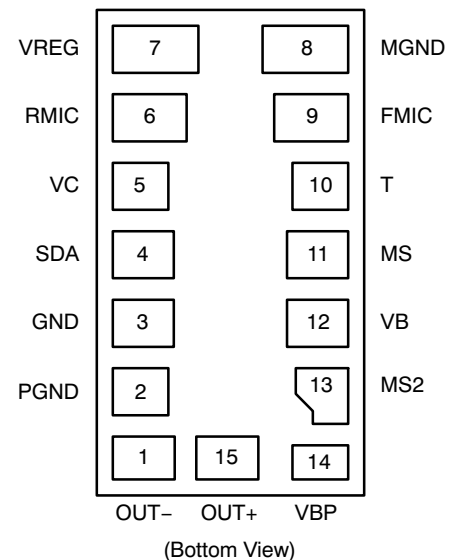
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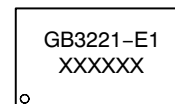


15 PAD
PARAGON
CASE TBD

PAD CONNECTION



MARKING DIAGRAM



GB3221 = Specific Device Code
E1 = RoHS Compliant Hybrid
XXXXXX = Work Order Number

ORDERING INFORMATION

Device	Shipping [†]
GB3221-E1	25 Units / Bubble Pack

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

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BLOCK DIAGRAM

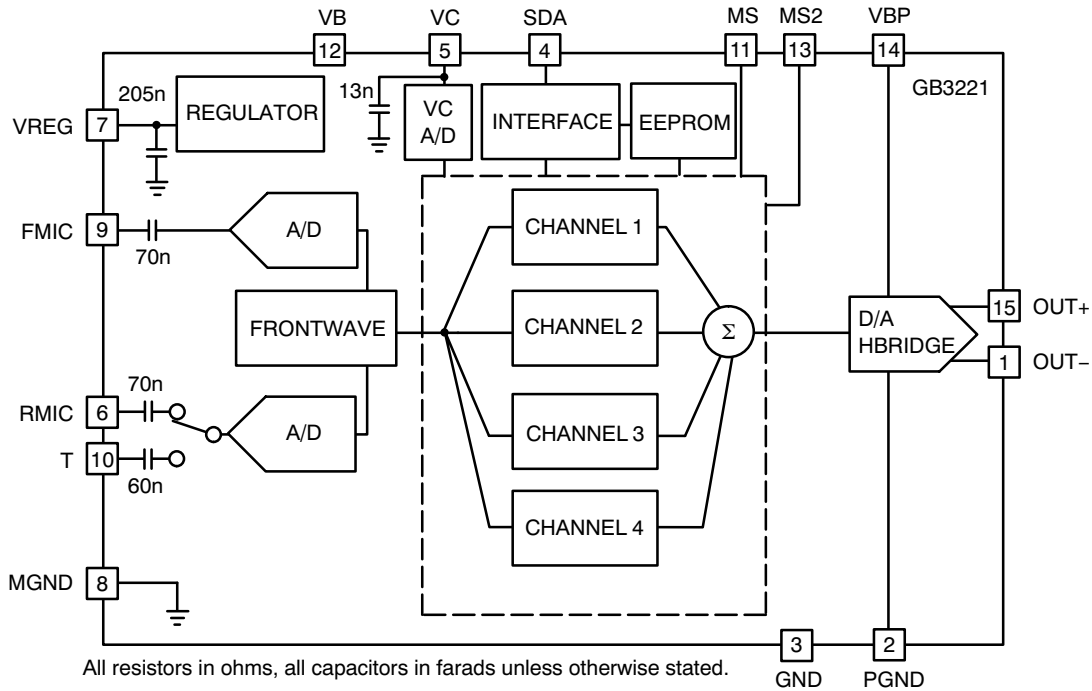


Figure 1. Paragon GB3221 Block Diagram

Table 1. ABSOLUTE MAXIMUM RATINGS

Parameter	Value	Units
Operating Temperature Range	-10 to +40	°C
Storage Temperature Range	-20 to +70	°C
Absolute Maximum Power Dissipation	25	mW
Maximum Operating Supply Voltage	1.5	VDC
Absolute Maximum Supply Voltage	2	VDC

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

WARNING: Electrostatic Sensitive Device – Do not open packages or handle except at a static-free workstation.

WARNING: Moisture Sensitive Device – Non-RoHS Compliant – Level 3 MSL; RoHS Compliant – Level 4 MSL. Do not open packages except under controlled conditions.

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Table 2. ELECTRICAL CHARACTERISTICS (Conditions: $V_B = 1.3\text{ V}$; Temperature = 25°C)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Hybrid Current	I_{AMP}	See current consumption section	–	700	–	μA
Minimum Operating Supply Voltage	V_{BOFF}	Ramp down	0.94	1.0	1.05	V
Supply Voltage Turn On Threshold	V_{BON}	Ramp up	1.06	1.10	1.16	V
Supply Voltage Hysteresis	–	–	90	100	110	mV
Supply Voltage during Communication	V_{BC}	During Communication	1.19	1.35	1.5	V
Hybrid Current during Communication	I_P	Programming (<5 ms)	–	3.7	–	mA
EEPROM Burn Cycles	–	(Note 2)	100 k	–	–	cycles
Low Frequency System Bandwidth	–	–	100	140	225	Hz
High Frequency System Bandwidth	–	–	15.2	16	16.8	kHz
Total Maximum System Gain	A_V	$V_{IN} = -95\text{ dBV}$ at 3 kHz; squelch disabled (Note 1)	81	83	85	dB
Converter Gain	A_{CONV}	A/D + D/A gain	27	29	31	dB
Total Harmonic Distortion	THD	$V_{IN} = -40\text{ dBV}$	–	0.05	1	%
THD at Maximum Input	THD _M	$V_{IN} = -15\text{ dBV}$, HRX – ON	–	1.5	3	%
Clock Frequency	f_{clk}	–	1.945	2.048	2.151	MHz

REGULATOR

Regulator Voltage	V_{REG}	–	0.90	0.95	1.00	V
Regulator Supply Rejection	PSRR _{REG}	–	–	50	–	dB

INPUT

Input Referred Noise	IRN	Bandwidth 100 Hz – 8 kHz	–	–108	–106	dBV
Input Impedance	Z_{IN}	–	11.2	16	22	k Ω
Anti-alias Filter Rejection (input referred)	–	$f = f_{clk} - 8\text{ kHz}$, $V_{IN} = -40\text{ dBV}$	–	80	–	dB
Maximum Input Level	–	–	–	–15	–	dBV
Input Dynamic Range	–	HRX – ON, Bandwidth 100 Hz – 8 kHz	–	93	–	dB
Audio Sample Rate	–	–	30.4	32	33.6	kHz

OUTPUT

Maximum RMS Output Voltage	–	0 dBFS $f = 1\text{ kHz}$	–3	–1	1	dBV
D/A Dynamic Range	–	Bandwidth 100 Hz – 8 kHz	80	–	–	dB
Output Impedance	Z_{OUT}	(Note 2)	–	–	20	Ω

VOLUME CONTROL

Volume Control Resistance	R_{VC}	–	160	200	240	k Ω
Volume Control Range	ΔA	–	47.5	48	48.5	dB

MS INPUT

Low State	Lo	–	0	–	$V_{REG}/3$	V
Open State	Z	–	$V_{REG}/3$	–	$2V_{REG}/3$	V
High State	Hi	–	$2V_{REG}/3$	–	V_B	V

MS2 INPUT

Pull Down Resistance	–	–	–	1	–	M Ω
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- Total System Gain consists of: Wideband System Gain + High and Low Independent Channel Gains + Converter Gain. Total System Gain is calibrated during Cal/Config process.
- Sample tested.

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Table 2. ELECTRICAL CHARACTERISTICS (Conditions: $V_B = 1.3\text{ V}$; Temperature = 25°C)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
MS2 INPUT						
Logic 1 Voltage	-	-	V_{REG}	-	V_B	V
Rising Edge Threshold	-	-	0.5	0.69	0.9	V
Falling Edge Threshold	-	-	0.25	0.45	0.5	V
Hysteresis	-	-	0.1	0.24	0.4	V
SDA INPUT						
Logic 0 Voltage	-	(Note 2)	0	-	0.3	V
Logic 1 Voltage	-	(Note 2)	1	-	1.3	V
SDA OUTPUT						
Standby Pull Up Current	-	-	1.4	2	2.6	μA
Sync Pull Up Current	-	-	450	500	550	μA
Logic 0 Current (Pull Down)	-	-	225	250	275	μA
Logic 1 Current (Pull Up)	-	-	225	250	275	μA
Synchronization Time (Synchronization Pulse Width)	T_{SYNC}	Baud = 0	237	250	263	μs
		Baud = 1	118	125	132	
		Baud = 2	59	62.5	66	
		Baud = 3	29.76	31.25	32.81	
		Baud = 4	14.88	15.63	16.41	
		Baud = 5	7.44	7.81	8.20	
		Baud = 6	3.72	3.91	4.10	
		Baud = 7	1.86	1.95	2.05	

- Total System Gain consists of: Wideband System Gain + High and Low Independent Channel Gains + Converter Gain.
Total System Gain is calibrated during Cal/Config process.
- Sample tested.

Support Software

Paragon GA3221 is fully supported by ON Semiconductor's software tools available at ARKonline® website <http://ark.onsemi.com/>.

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TYPICAL APPLICATIONS

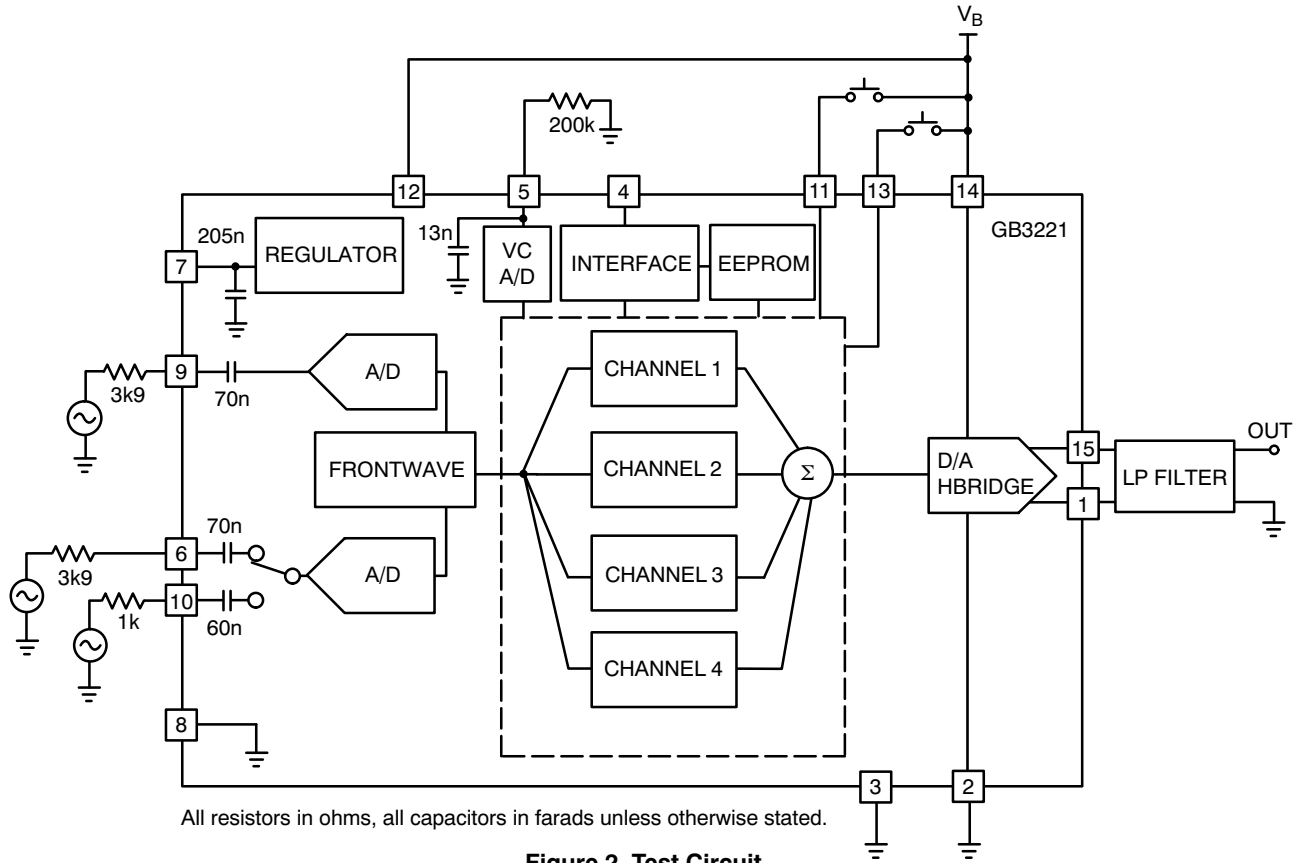


Figure 2. Test Circuit

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TYPICAL APPLICATIONS (continued)

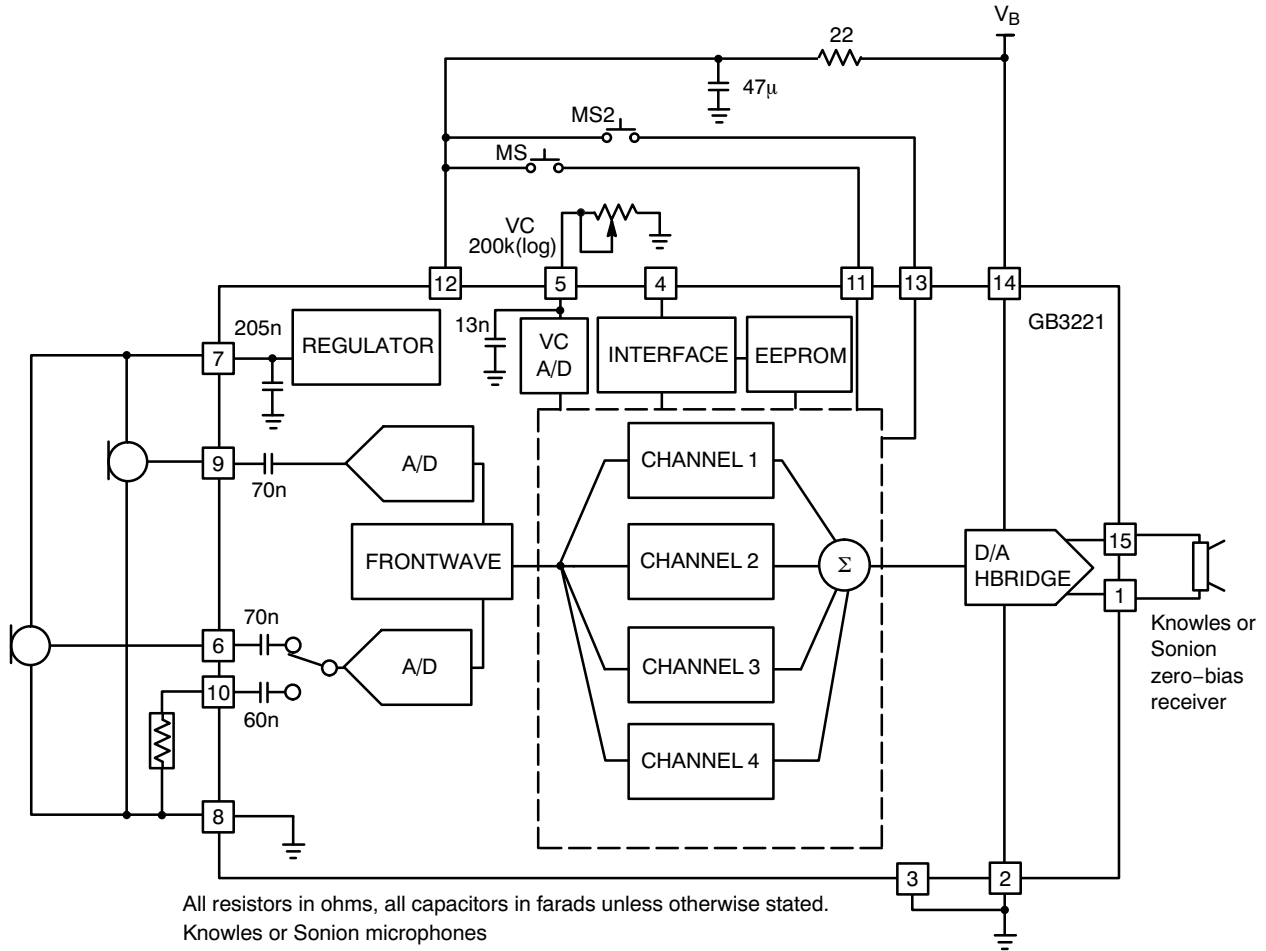


Figure 3. Sample Application Circuit

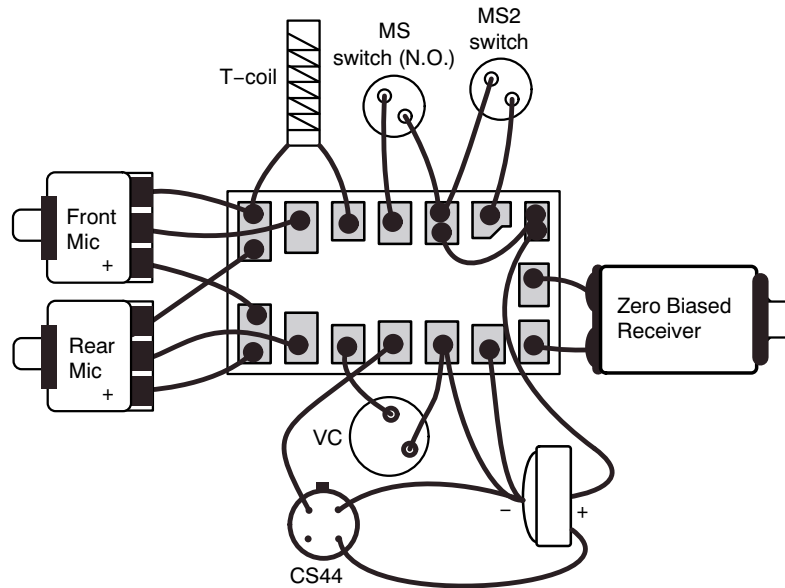


Figure 4. Assembly Diagram

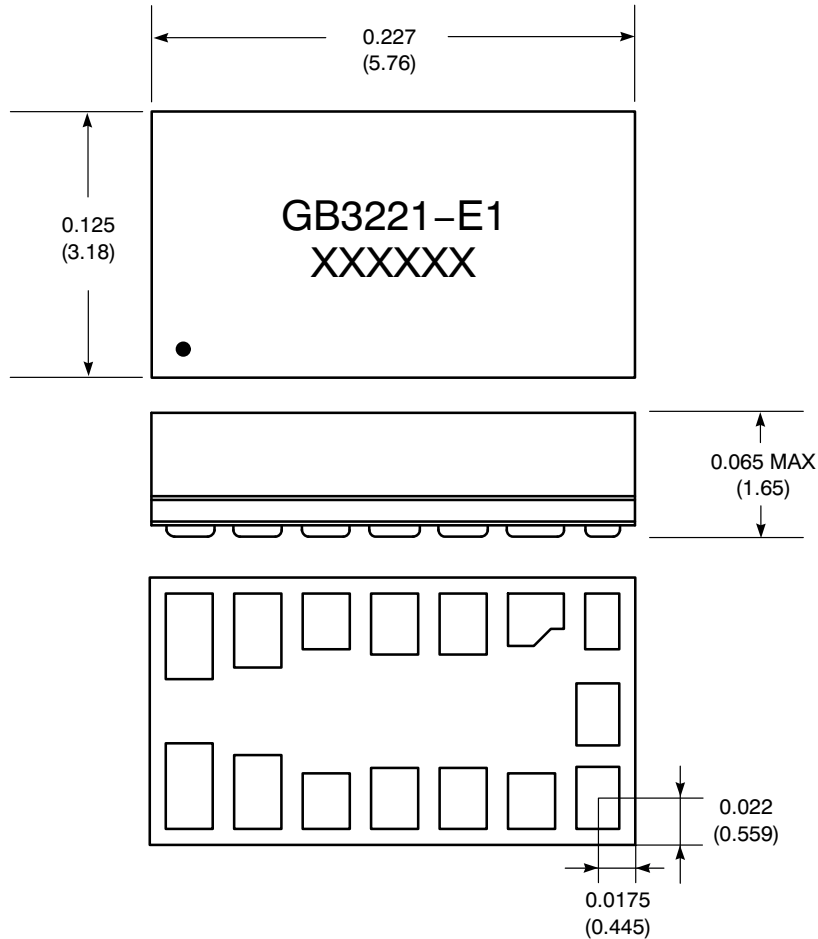
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Table 3. PAD POSITION AND DIMENSIONS

Pad No.	Pad Position		Pad Dimensions	
	X	Y	Xdim (mil)	Ydim (mil)
1	0	0	20	29
2	-31	-1.5	22	26
3	-63	-0.25	22	28.5
4	-95	-0.25	22	28.5
5	-127	-1.5	22	26
6	-159	2.75	22	34.5
7	-191	5.5	22	40
8	-191	75.5	22	40
9	-159	78.25	22	34.5
10	-127	82.5	22	26
11	-95	81.25	22	28.5
12	-63	81.25	22	28.5
13	-30	85.5	26	24.5
14	2	82.5	16	26
15	0	39	20	29
Pad No.	X	Y	Xdim (mm)	Ydim (mm)
1	0	0	0.508	0.737
2	-0.787	-0.038	0.559	0.660
3	-1.600	-0.006	0.559	0.724
4	-2.413	-0.006	0.559	0.724
5	-3.226	-0.038	0.559	0.660
6	-4.039	0.070	0.559	0.876
7	-4.851	0.140	0.559	1.016
8	-4.851	1.918	0.559	1.016
9	-4.039	1.988	0.559	0.876
10	-3.226	2.0965	0.559	0.660
11	-2.413	2.0638	0.559	0.724
12	-1.600	2.0638	0.559	0.724
13	0.762	2.172	0.660	0.622
14	0.051	2.096	0.406	0.660
15	0	0.991	0.508	0.737

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PACKAGE DIMENSIONS



Dimension units are in inches.

Dimensions in parentheses are in millimeters, converted from inches and include minor rounding errors.

1.000 inches = 25.4 mm

Dimension tolerances: ± 0.003 (± 0.08) unless otherwise stated.

• = location of Pin 1


Work order number: XXXXXX

RoHS compliant hybrid, MSL#4, 240°C peak reflow, SAC305.

This Hybrid is designed for either point-to-point manual soldering or for reflow according to ON Semiconductor's reflow process.

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