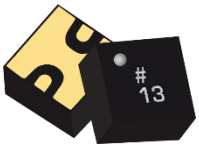
DC - 40GHz Surface Mount Limiter **HLM-8010CSP1**

1. Device Overview



1.5 x 1.5 mm CSP1

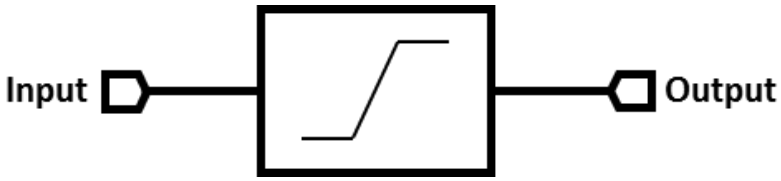
1.1 General Description

The HLM-8010CSP1 is a high-power GaAs Schottky diode signal limiter featuring high IP3 over a broad DC - 40GHz bandwidth. It offers low insertion loss and excellent return loss from DC through Ka band and has a typical 1 dB compression point of +11 dBm. Its small size makes it ideal for protecting sensitive components and for applications requiring high channel counts. It is available as a plastic surface mount chip scale package or as a connectorized evaluation board. For a chip/module version, use the HLM-8011.

1.2 Features

- Low 1dB loss at 38 GHz
- 3.2 W Peak Power (pulsed), 1.9 W CW
- Typical P1dB of +11dBm
- Small signal S2P data: HLM-8010CSP1.zip

1.3 Functional Block Diagram



1.4 Part Ordering Options[1]

Part Number	Description	Package	Green Status	Product Lifecycle	Export Classification
HLM-8010CSP1	1.5 x 1.5 mm CSP1	CSP1	**RoHS**	Active	EAR99
EVB-HLM-8010	Connectorized module, CSP1 reflowed onto PCB	EVB		Active	EAR99

[1] Refer to our website for a list of definitions for terminology presented in this table.

Table of Contents

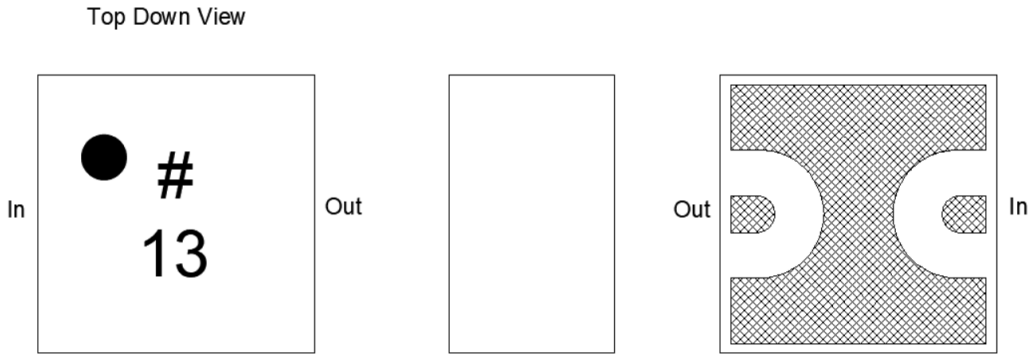
Revision History

Revision Code	Revision Date	Comment
-	May 2023	Datasheet Initial Release

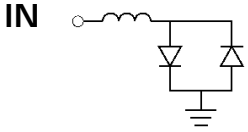
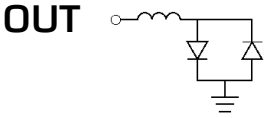
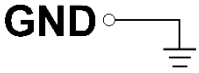
2. Port Configurations and Functions

2.1 Port Diagram

A top-down view of the HLM-8010's CSP1 package outline drawing is shown below. The HLM-8010CSP1 has the input and output ports given in Port Functions.



2.2 Port Functions

Pin	Function	Description	Equivalent Circuit for Package
In	Input	The input port is diode connected for the CSP1 and EVB package.	
Out	Output	The output port is diode connected for the CSP1 and EVB package.	
Ground Paddle	Ground	CSP1 package ground path is provided through the ground paddle and should be connected to RF ground	

3. Specifications

3.1 Absolute Maximum Ratings

The Absolute Maximum Ratings indicate limits beyond which damage may occur to the device. If these limits are exceeded, the device may be inoperable or have a reduced lifetime.

Parameter	Maximum Rating	Units
Average Power Handling at input port[2]	1.9	W
Peak Power Handling at input port[2]	3.2	W
θJc, Junction to Case Thermal Resistance	35	°C/W
Operating Temperature	-55 to +100	°C
Storage Temperature	-65 to +125	°C

3.2 Package Information

Parameter	Details	Rating
ESD	Human Body Model (HBM), per MIL-STD-750, Method 1020	1A
Weight	CSP1 Package	6.7mg

3.3 Linear Regime Electrical Specifications

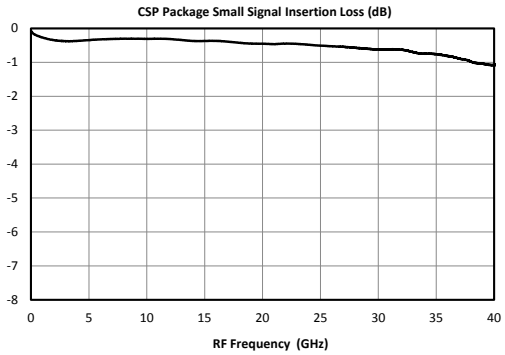
The electrical specifications apply at T_A=+25°C in a 50Ω system. Typical data shown is for the connectorized EVB-package limiter unless otherwise specified. CSP1-package data shown is deembedded from the EVB-package data. Linear Specifications valid for input power up to the 0.1dB compression point. See page 5 for P0.1dB graph.

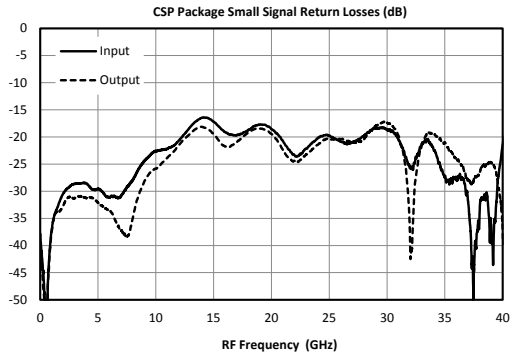
Min and Max limits are guaranteed at T_A=+25°C.

Parameter	Test Conditions	Min	Typical	Max	Units
Insertion Loss, CSP1 Package	DC – 40GHz		0.5	1.2	dB
Return Loss, CSP1 Package		16	24		dB
Flat Leakage	1GHz – 20dBm input		14		dBm
	20GHz – 20dBm input		11		
	40GHz – 16dBm input		8		
Input IP3 (IIP3)	DC – 40GHz		25		dBm
Input 1dB Gain Compression Point (P1dB)			11		dBm

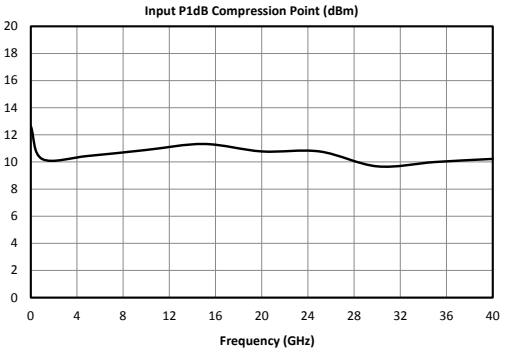
[2] See section 3.5 for basis of power handling specs.

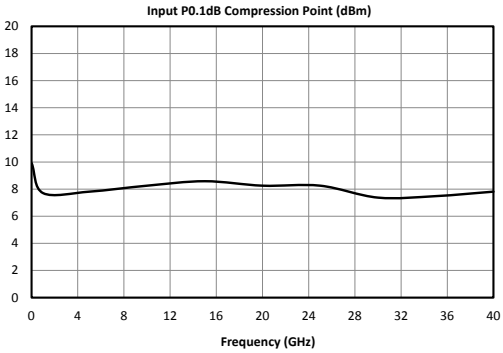
3.4 Typical Performance Plots

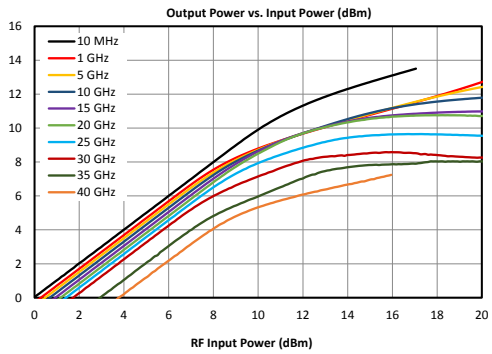


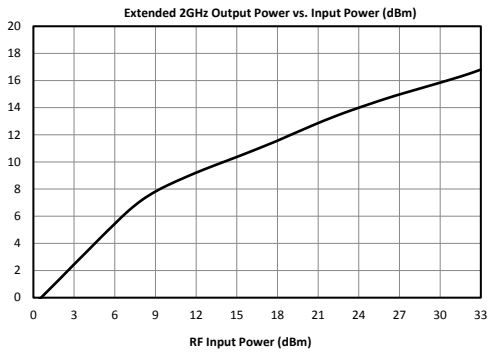


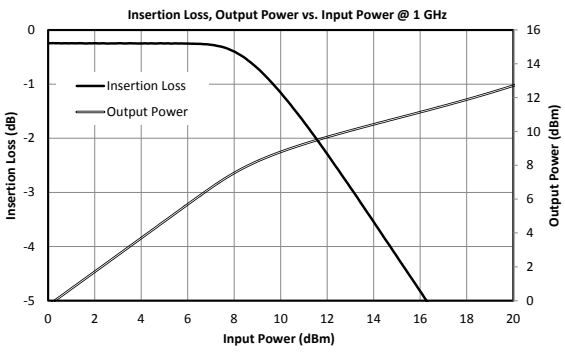
3.4.1 Typical Performance Plots EVB Package

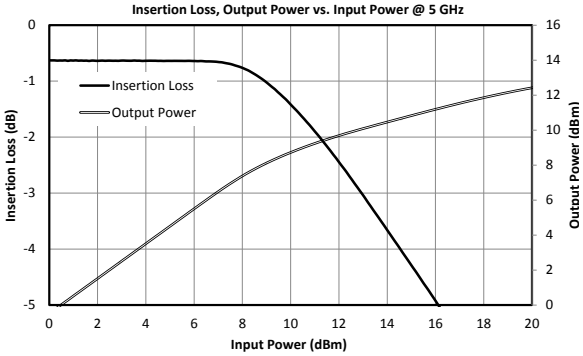


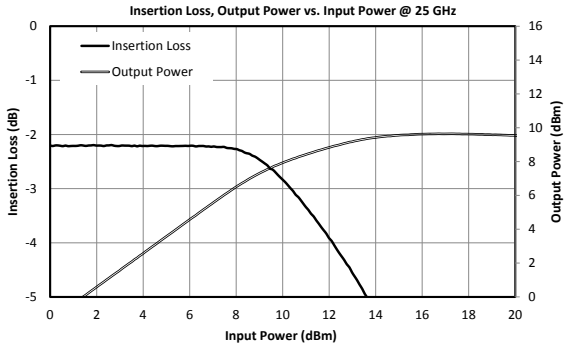


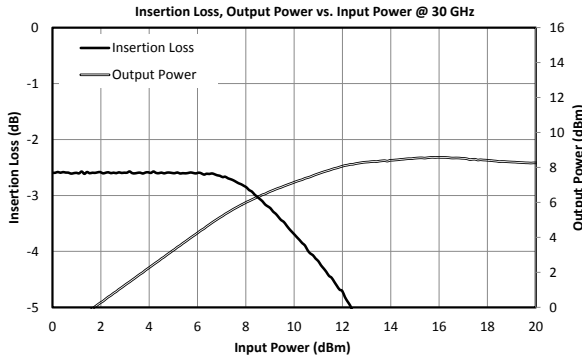


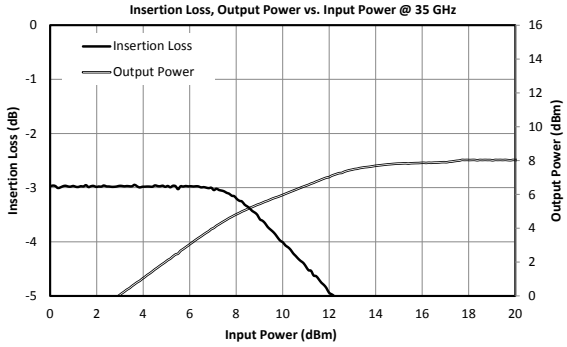


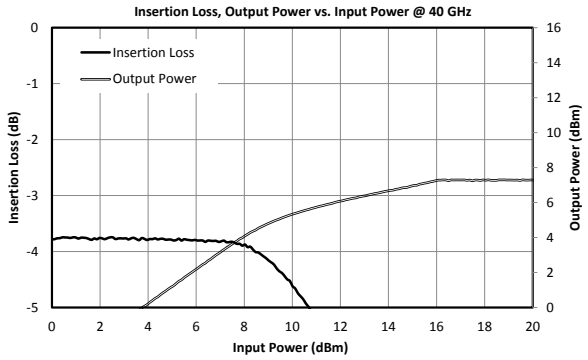


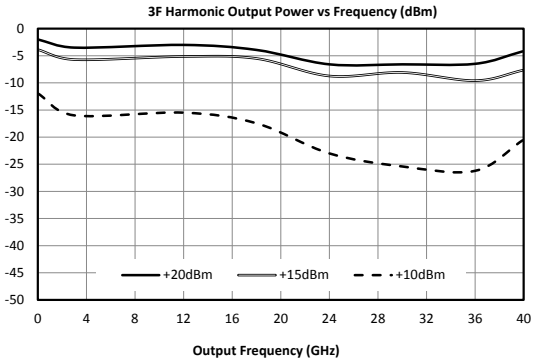


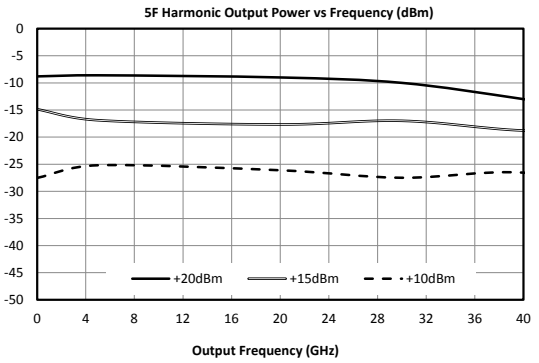


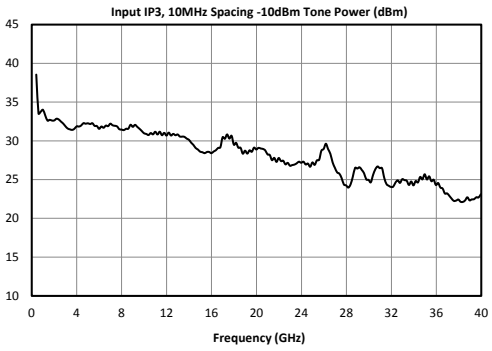


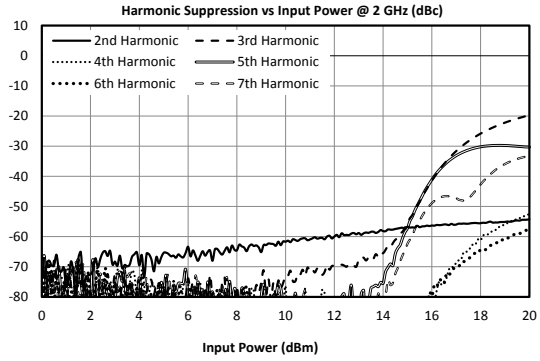












3.5 Input Power at Observed Failure

Power handling specification is based on tests performed at different combinations of temperature and frequency. Input power was increased until catastrophic failure was observed. Results are shown in the following table. The power handling specification listed in section 3.1 is based on the worst observed power handling derated by 2dB.

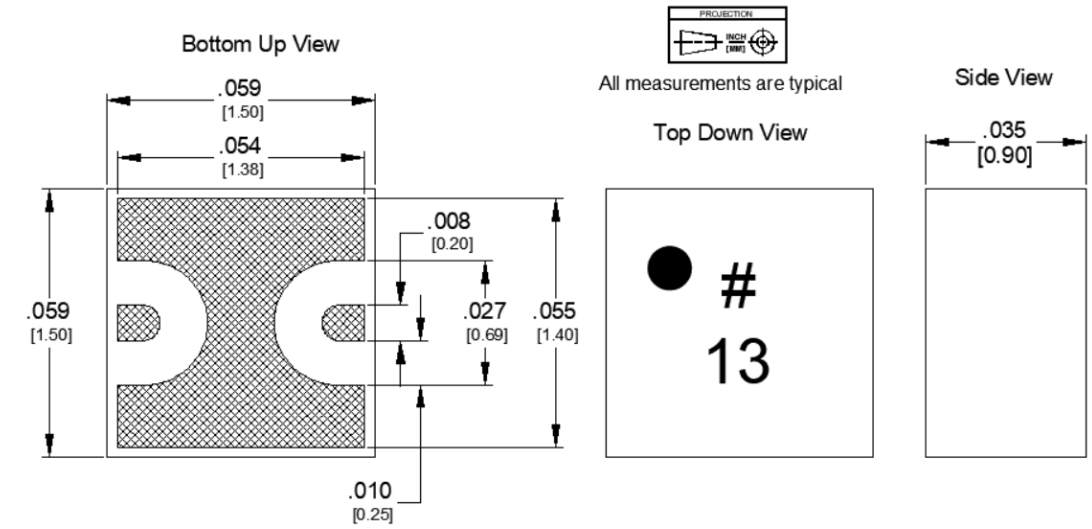
Frequency	Maximum Average Power Handling	Unit
2 GHz	4	W
18 GHz	3	

Frequency	Maximum Peak Power Handling[3]	Unit
2 GHz	6	W
18 GHz	5[4]	

[3] Tested using a 3 µs pulse, 130us period at 25°C
[4] Unit did not break at 5W

4. Mechanical Data

4.1 CSP1 Package Outline Drawing

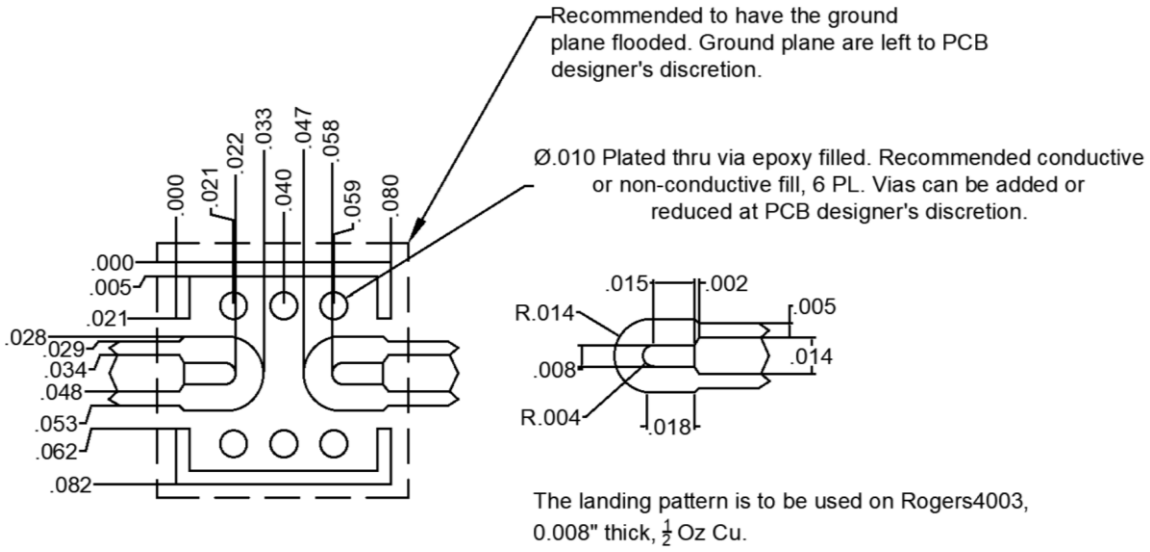


units in inch +/-.004" [millimeter +/-0.1]

Notes: (Unless otherwise specified)

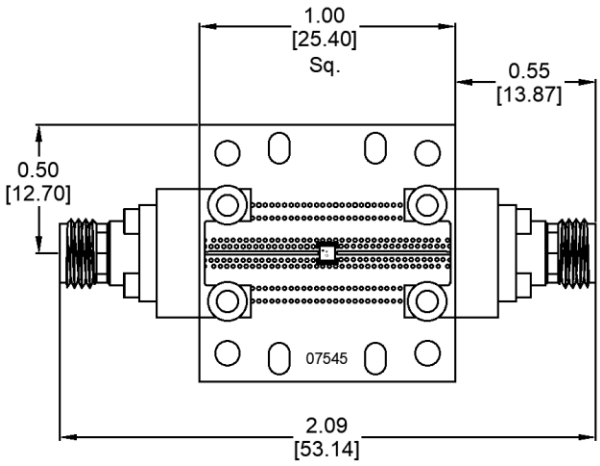
1. Front to back registration to be 50.8µm max.
2. Circuits to be shipped individually.
3. Shaded areas are metalized.
4. Finish: Ni: 0.5 - 2.5 µm
   Pd: 0.02 - 0.15 µm
   Au: 0.003 - 0.015 µm

4.2 CSP1 Package Footprint



Click here for a DXF download of the landing pattern

4.3 EVB Package Footprint

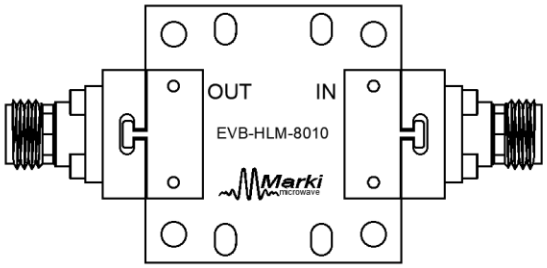


All measurements are typical

PROJECTION

INCH [MM]

Port	Connector Type
IN	2.92mm Female
OUT	2.92mm Female
Note: Eval Connectors are not removeable.	



Backside Label