

High Power DC - 20GHz Limiter

HLM-20PSM

1. Device Overview



4x4 mm QFN

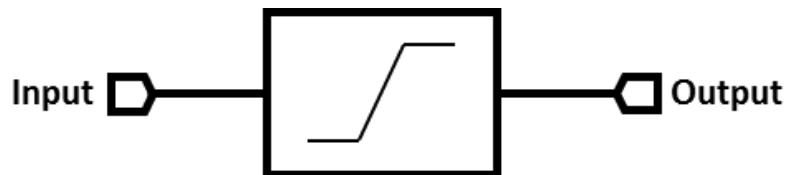
1.1 General Description

The HLM-20PSM is a high-power GaAs Schottky diode signal limiter featuring high IP3 over a broad DC - 20GHz bandwidth. It offers low insertion loss and excellent return loss from DC through K band and has a typical 1 dB compression point of 14 dBm. Its high power handling makes it ideal for protecting sensitive components and for applications requiring high linearity. It is available as a plastic surface mount or as a connectorized evaluation board.

1.2 Features

- Low 0.7dB loss at 10 GHz
- 50 W Peak Power (pulsed), 5 W CW
- +13 to +17 dBm Flat Leakage @ 1 W CW
- Typical P1dB of +15dBm
- Small signal S2P data: [HLM-20PSM.zip](#)

1.3 Functional Block Diagram



1.4 Part Ordering Options¹

Part Number	Description	Package	Green Status	Product Lifecycle	Export Classification
HLM-20PSM	4x4 mm ² QFN	PSM	RoHS	Active	EAR99
EVAL-HLM-20P	Connectorized module, QFN reflowed onto PCB	EVAL		Active	EAR99

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

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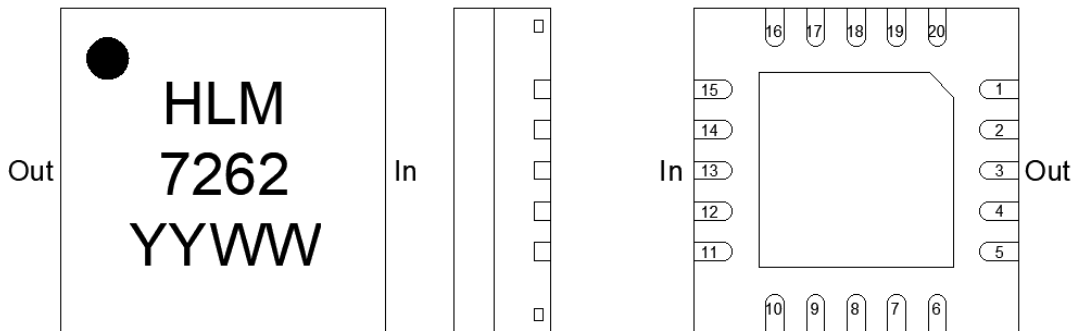
Revision History

Revision Code	Revision Date	Comment
-	September 2021	Datasheet Initial Release
A	April 2022	IIP2 Data Added
B	February 2023	Pout vs Pin Plots Extended to 1W and Surface Mount Outline Dimension Callouts Updated

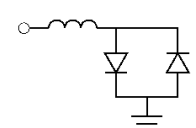
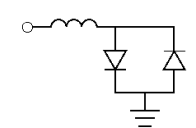
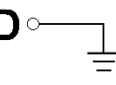
2. Port Configurations and Functions

2.1 Port Diagram

A top-down view of the HLM-20's PSM package outline drawing is shown below. The HLM-20PSM has the input and output ports given in Port Functions.



2.2 Port Functions

Pin	Function	Description	Equivalent Circuit for Package
13	Input	The input port is diode connected for the PSM and EVAL package.	13 
3	Output	The output port is diode connected for the PSM and EVAL package.	3 
Ground Paddle	Ground	PSM package ground path is provided through the ground paddle. Unused pins should be connected to RF ground	GND 

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 ^{2,3}	5	W
Peak Power Handling at input port ³	50	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	EVAL Package	23.5g

3.3 Linear Regime Electrical Specifications

The electrical specifications apply at $T_A=+25^{\circ}\text{C}$ in a 50Ω system. Typical data shown is for the connectorized EVAL-package limiter unless otherwise specified. PSM-package data shown is deembedded from the EVAL-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 $T_A=+25^{\circ}\text{C}$.

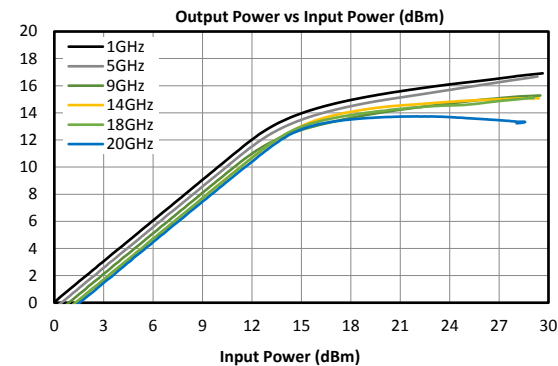
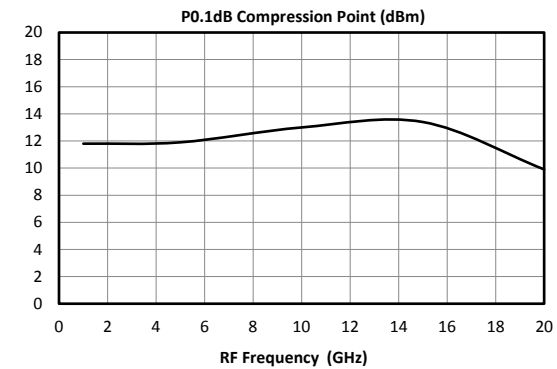
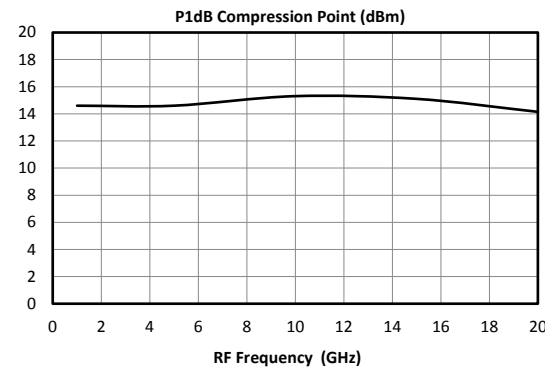
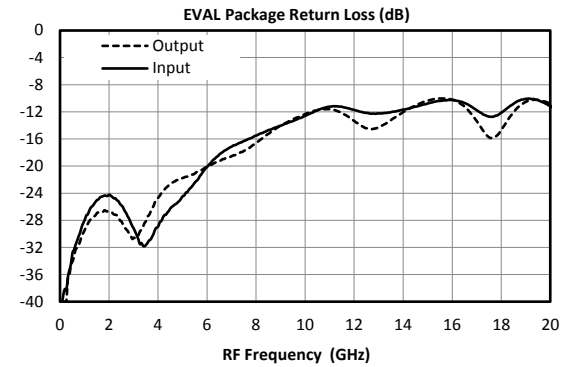
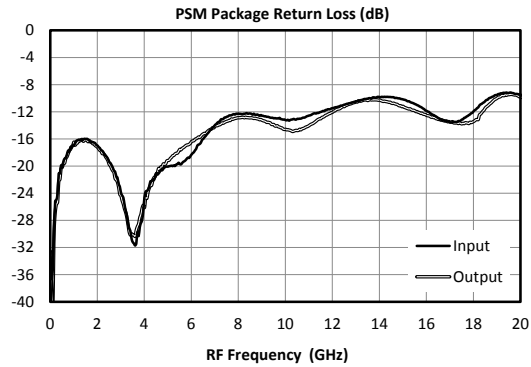
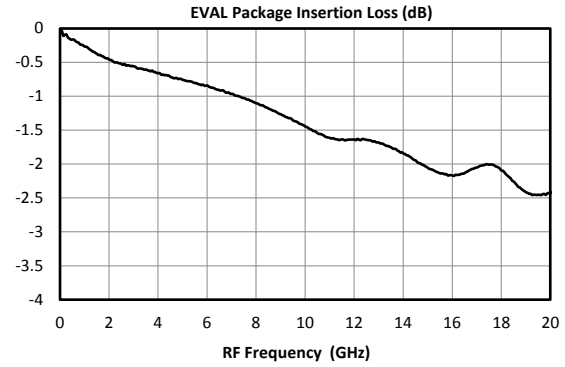
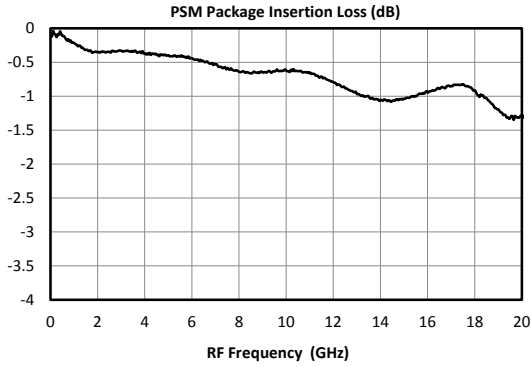
Parameter	Test Conditions	Min	Typical	Max	Units
Insertion Loss, PSM Package	DC – 20GHz		0.5	1.5	dB
Insertion Loss, EVAL package			1.5		
Return Loss, PSM Package			15		dB
Return Loss, EVAL package			17		
Flat Leakage	1GHz		17		dBm
	20GHz		13		
Input IP3 (IIP3)	DC – 20GHz		See graph		dBm
Input 1dB Gain Compression Point (P1dB)			15		dBm

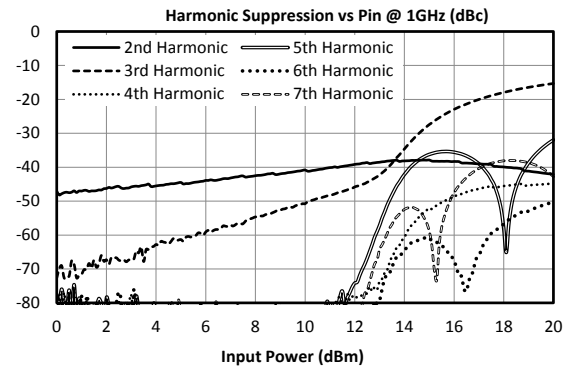
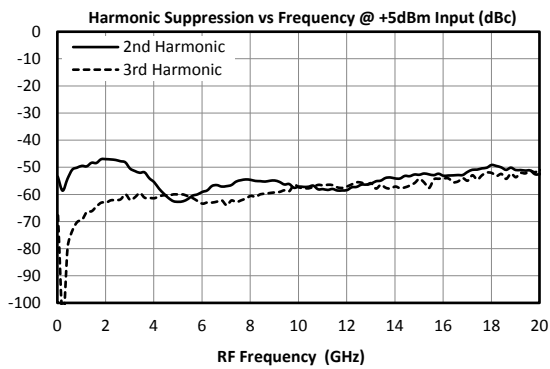
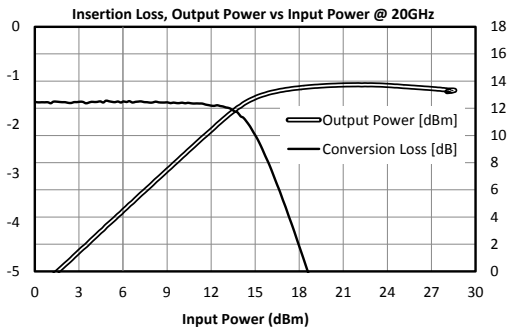
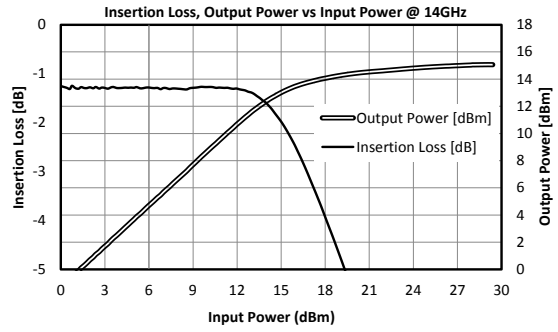
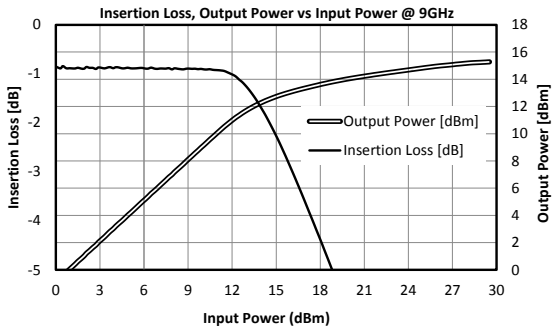
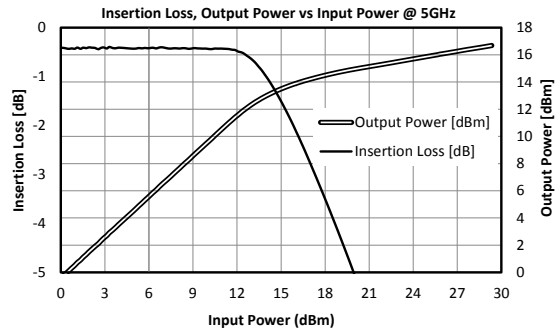
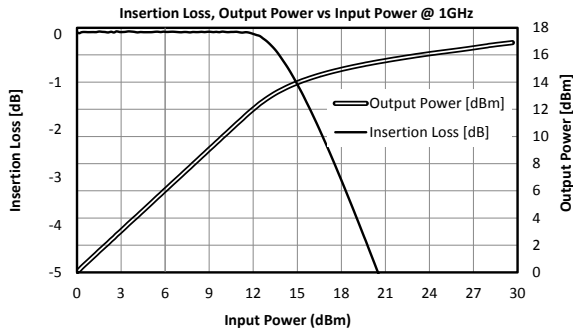
² Average power handling derated linearly to +37dBm at 85°C. Power handling spec based on observed power handling at 6GHz.

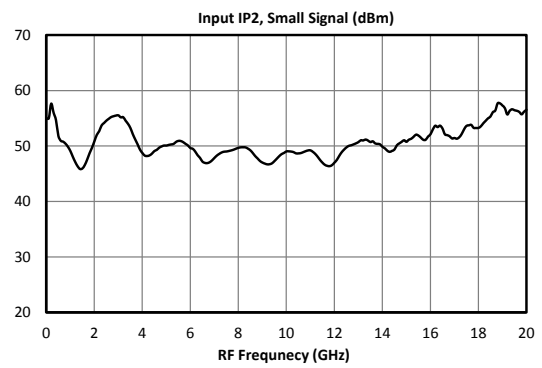
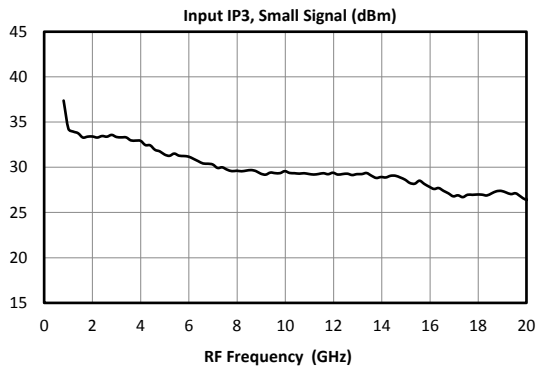
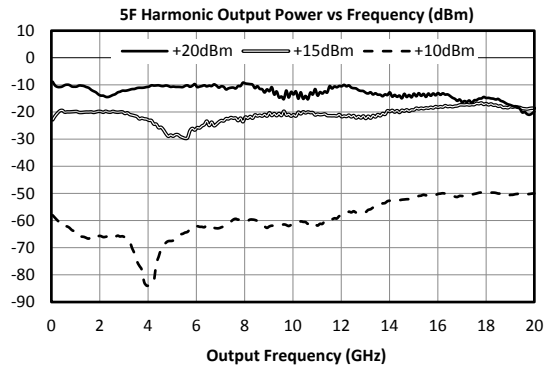
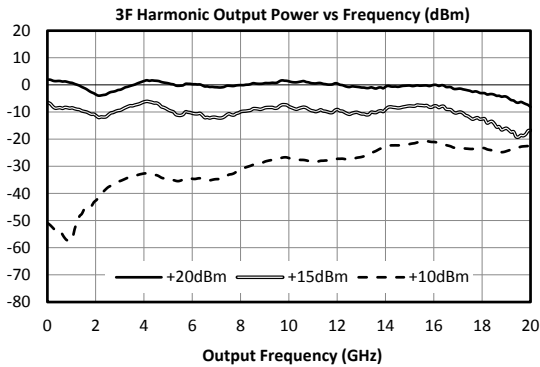
³ See section 3.5 for basis of power handling specs.

3.4 Typical Performance Plots

Plots shown are for the connectorized EVAL-package unless otherwise specified







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.

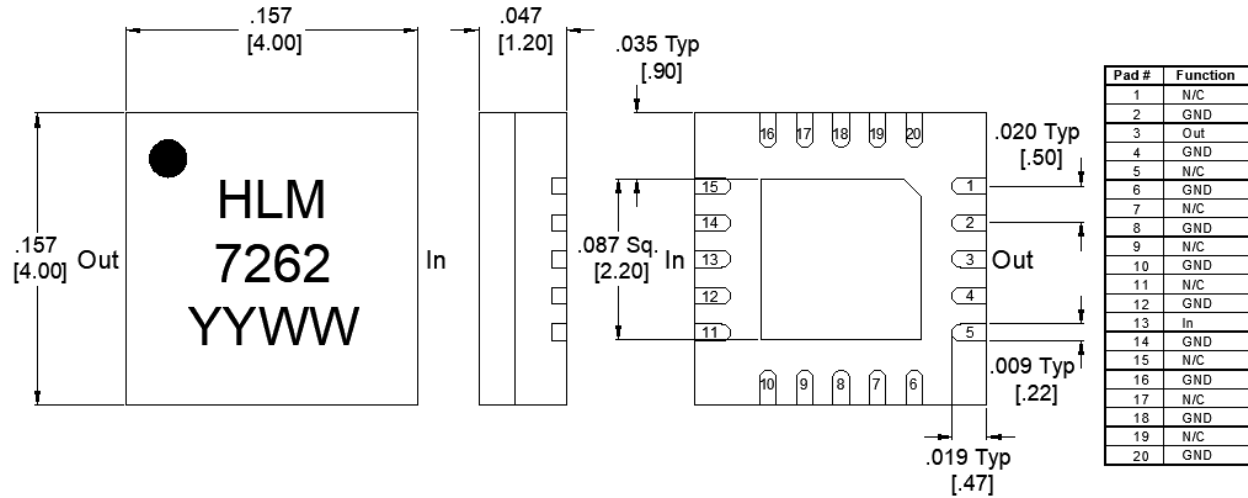
Frequency	Maximum Average Power Handling		Unit
	at 25°C	at 85°C	
0.8 GHz	42	41	dBm
2.5 GHz	41	40	
6 GHz	40	39	

Frequency	Maximum Peak Power Handling ⁴	Unit
2 GHz	85	W

⁴ Tested using a 1 μs pulse, 1% duty cycle at 25°C

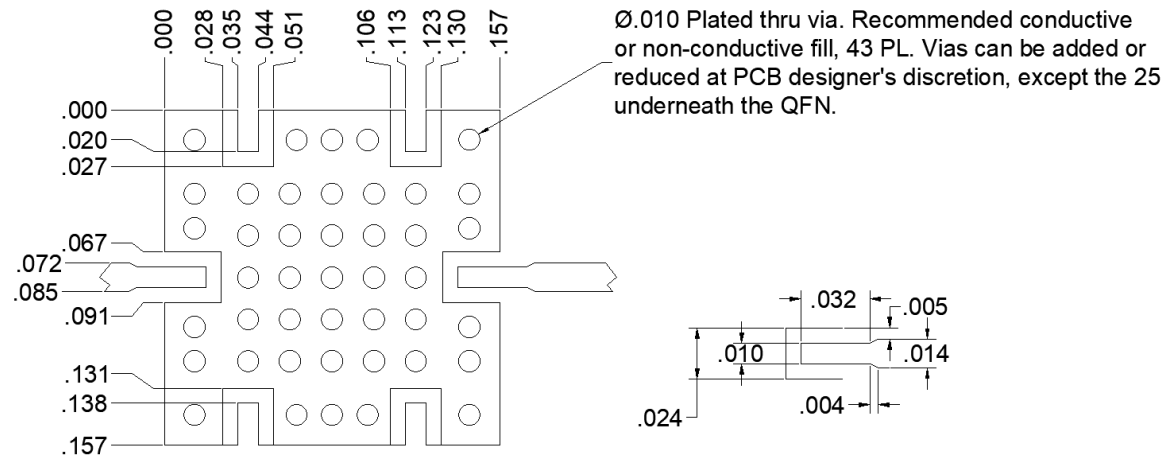
4. Mechanical Data

4.1 PSM Package Outline Drawing



1. Substrate material is LCP.
2. I/O leads and die paddle are 0.008um – 0.05um gold, over 0.08um – 0.15um Palladium, over 0.5um – 2.0um Nickel.
3. All unconnected pins should be connected to PCB RF ground

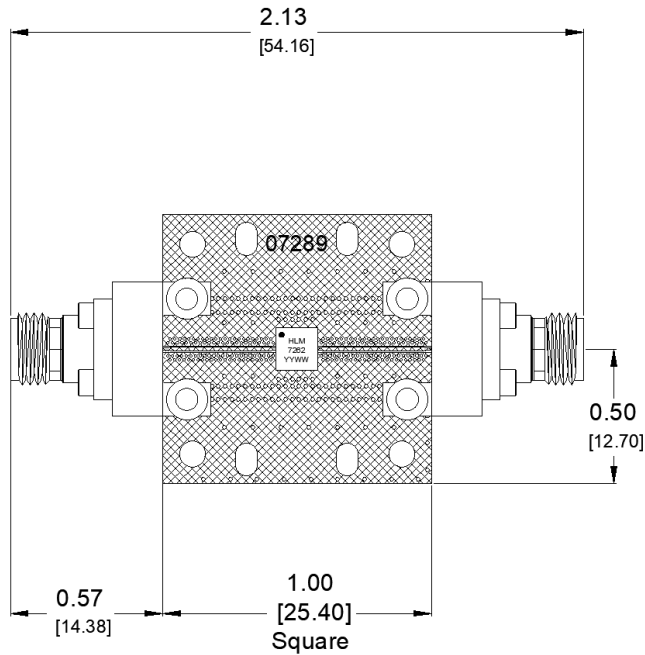
4.2 PSM Package Footprint



The landing pattern is to be used on Rogers4003, 0.008" thick, 1/2 Oz Cu. Grounded coplanar wave guide with 0.005" slot, 6 PL.

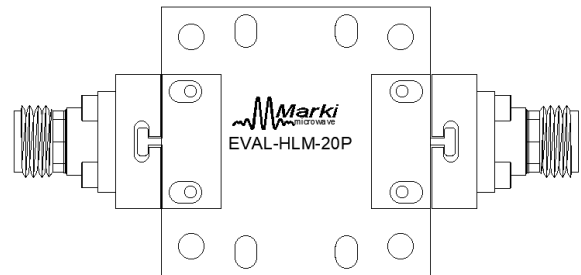
[Click here for a DXF download of the landing pattern](#)

4.3 EVAL Package Footprint



All Measurements are Typical
Input and output connectors are 2.92mm F

Backside



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