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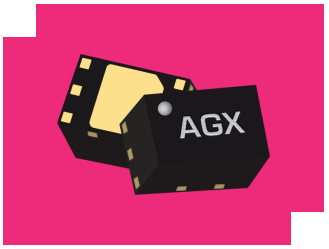
ADM-8536PSM

2 - 20 GHz High Dynamic Range Gain Block

DEVICE OVERVIEW

General Description

The ADM-8536PSM is one of the world's smallest 2-20 GHz high linearity, low noise amplifier solution, featuring 10.5 dB gain, +25 dBm OIP3 and 2.5 dB noise figure, making it suitable for use in RF front-ends. The amplifier is designed for ease of use due to its internal bias network, DC blocking and RF matching. The ADM-8536PSM's compact 1.3 x 2 mm DFN package and low power consumption make it an ideal choice for low SWaP applications.



Download s-parameters here

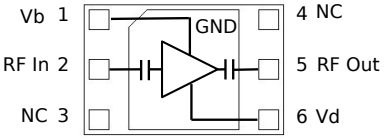
Features

- 10.5 dB flat gain response
- +25 dB output IP3
- 2.5 dB noise figure
- Internal, single-supply biasing

Applications

- Mobile test and measurement equipment
- Radar and satellite communications
- 5G transceivers

Functional Block Diagram



Part Ordering Options

Part Number	Description	Package	Green Status	Product Lifecycle	Export Classification
ADM-8536PSM	2 - 20 GHz High Dynamic Range Gain Block	DFN	REACH RoHS	Released	EAR99
EVB-ADM-8536P	Evaluation Board, 2 - 20 GHz High Dynamic Range Gain Block Amplifier	EVB	REACH RoHS	Released	EAR99

Table Of Contents

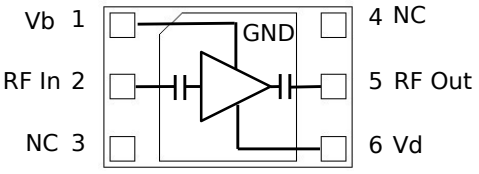
Revision History

Revision Code	Revision Date	Comment
-	2023-06-01	Initial Datasheet Release

Port Configuration and Functions

Port Diagram

A port diagram of the ADM-8536PSM QFN package is shown below (X-ray view from the top). The pin functions are detailed in section 2.2 of this datasheet.



Port Functions

Port	Function	Description	DC Equivalent Circuit
Paddle	Gnd	Package ground paddle must be connected to a DC/RF ground potential with high thermal and electrical conductivity.	-
Pin 1	Vb	Pin 1 provides DC bias voltage to the amplifier. This pin controls the drain current. The drain current may be set by applying the same voltage as Pin 6 through a series resistor. The value of this resistor will determine the drain current.	-
Pin 2	RF Input	Pin 2 is the RF Input of the amplifier. This pin is internally DC Blocked and RF matched to 50 Ω.	-
Pin 3,4	NC	Pin 3 and Pin 4 are internally no-connects and should be connected to DC/RF ground.	-
Pin 5	RF Output	Pin 5 is the RF Output of the amplifier. This pin is internally DC blocked and RF matched to 50 Ω.	-
Pin 6	Vd	Pin 6 is the DC power supply pin of the amplifier. This pin should be set to 5V for normal operation.	-

Specifications

Absolute Maximum Ratings

The Absolute Maximum Ratings indicate limits beyond which damage may occur to the device. If any one of these limits are exceeded, the device may become inoperable or have a reduced lifetime. Reliability limits are individual, instantaneous catastrophic limits only. Functional operation limits are indicated below. Operation of the device at multiple absolute maximum limits or for extended periods at a single limit can cause degradation and damage to the device.

Parameter	Maximum Rating	Unit
Drain Bias Current (Idq)	75	mA
Drain Supply Voltage (Vd)	6	V
Maximum Operating Temperature for MTTF > 1E6 hours	85	°C
Maximum Storage Temperature	125	°C
Max Junction Temperature for MTTF of >1E6 hours	175	°C
Max Power Dissipation for MTTF of > 1E6 hours	0.74	W
Minimum Operating Temperature for MTTF > 1E6 hours	-40	°C
Minimum Storage Temperature	-65	°C
Reference Bias Current (Ib)	10	mA
Reference Bias Voltage (Vb)	6	V
RF Input Power	15	dBm
θ_Jc, Junction to Case Thermal Resistance	75.8	°C/W

Package Information

Parameter	Details	Rating
Weight	Package name: DFN	0.007g
Dimensions	-	2.0 x 1.3 mm
Moisture Sensitivity Level	-	MSL 1

Recommended Operating Conditions

The Recommended Operating Conditions indicate the limits, inside which the device should be operated, to guarantee the performance given in Electrical Specifications Operating outside these limits may not necessarily cause damage to the device, but the performance may degrade outside the limits of the electrical specifications. For limits, above which damage may occur, see Absolute Maximum Ratings.

Parameter	Min	Nominal	Max	Unit
Ta Ambient Temperature	-40	25	85	°C
Power Supply DC Voltage (Vd)	3	5	6	V
Power Supply DC Voltage (Vb) [1]	3	5	6	V
Power Supply DC Current (Idq) (No RF Input) [2]	23	41	48	mA
Input Power for Saturation	-	6	-	dBm

[1] Data collected for this datasheet was measured with the ADM-8536PSM in single-supply configuration with Rbias=100Ω. See the application section for more details.
[2] Recommended operating current conditions without RF input applied. Currents measured with a fixed Rbias = 100Ω.

Sequencing Requirements

There is no sequencing required to power up or power down the amplifier.

Electrical Specifications

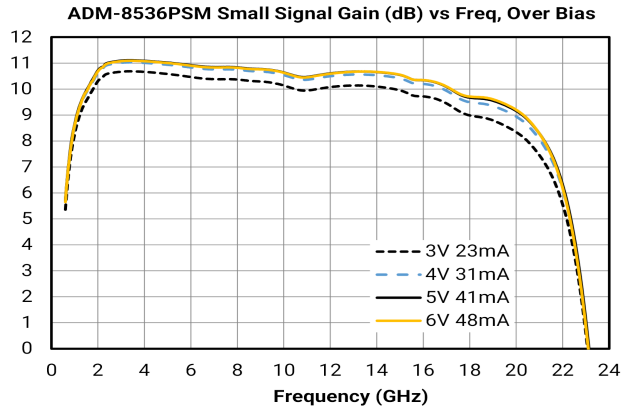
Unless otherwise specified, electrical specifications apply at TA=+25°C, Rbias=100Ω and Vd = 5 V.

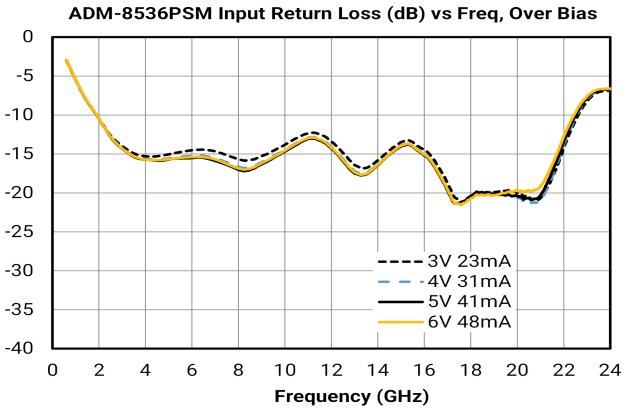
Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
Input IP2	Vd = 5 V Idq = 41mA Pin = -18 dBm per tone, 1 MHz tone spacing	2	20	-	19	-	dBm
Input IP3	Vd = 5 V Idq = 41mA Pin = -18 dBm per tone, 1 MHz tone spacing	2	20	-	14	-	dBm
Input Return Loss	Vd = 5 V Idq = 41mA Pin = -20 dBm	2	20	-	15	-	dB
Noise Figure	Vd = 5 V Idq = 41mA Pin = -20 dBm	2	20	-	2.5	-	dB
Output IP2	Vd = 5 V Idq = 41mA Pin = -18 dBm per tone, 1 MHz tone spacing	2	20	-	29	-	dBm
Output IP3	Vd = 5 V Idq = 41mA Pin = -18 dBm per tone, 1 MHz tone spacingHz tone spacing	2	20	-	25	-	dBm
Output Return Loss	Vd = 5 V Idq = 41mA Pin = -20 dBm	2	20	-	17	-	dB
Reverse Isolation	Vd = 5 V Idq = 41mA Pin = -20 dBm	2	20	-	19	-	dB
Small Signal Gain	Vd = 5 V Idq = 41mA Pin = -20 dBm	2	20	7	10	-	dB
Saturated Output Power	Vd = 5V, Idq = 41mA	2	20	-	14	-	dBm

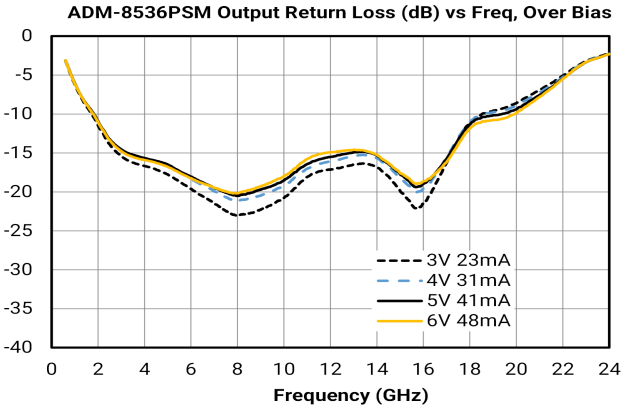
Typical Performance Plots

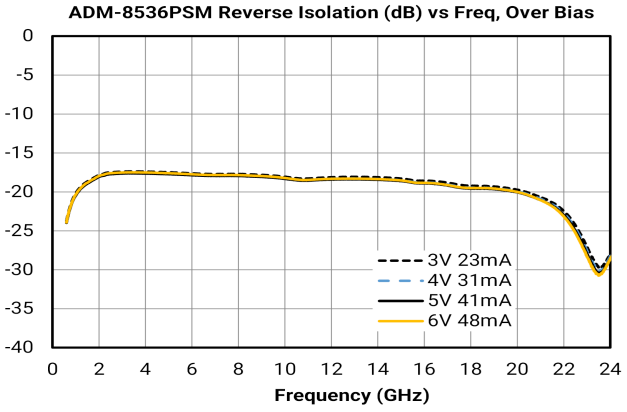
Performance measured on EVB-ADM-8536P. Results are de-embedded to the pin of the part.

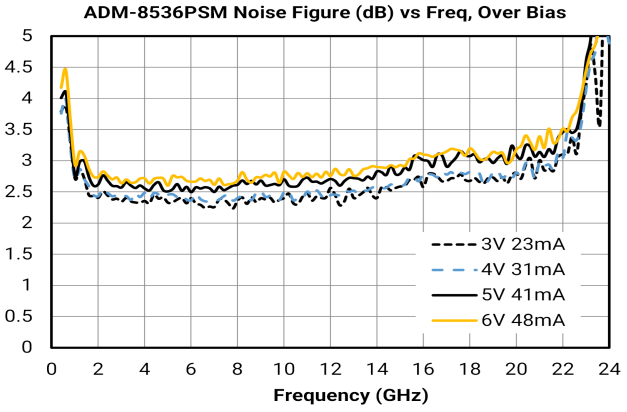
For plots vs bias, the Vd and Vb lines are supplied by a single DC supply with Rbias = 100Ω between Vd and Vb pins.

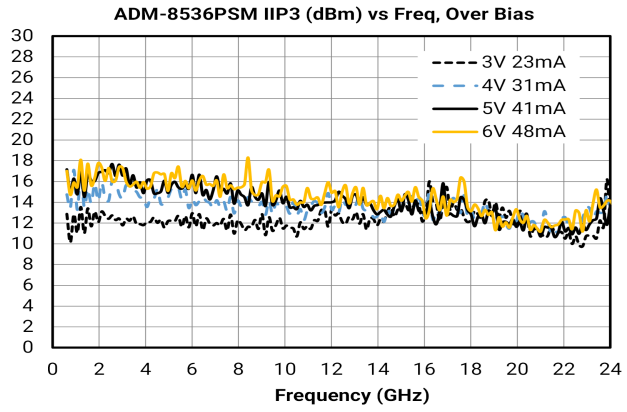




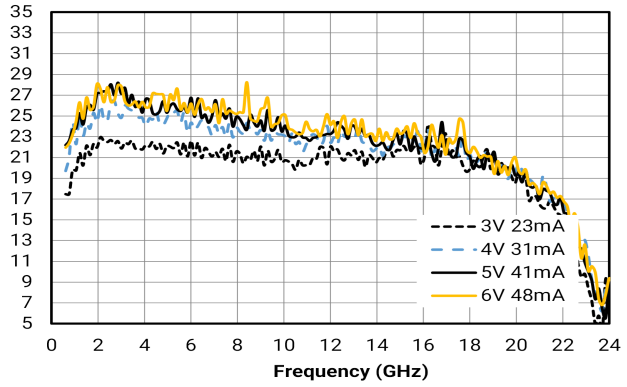




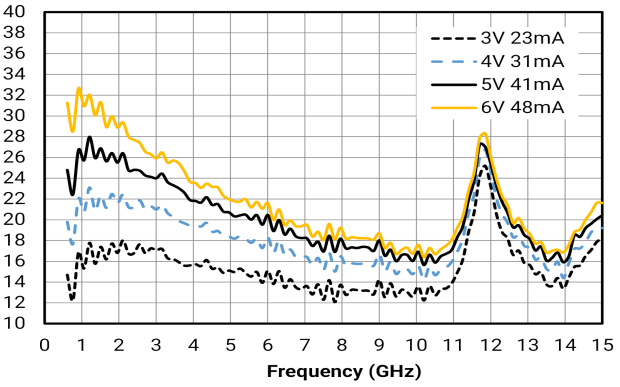




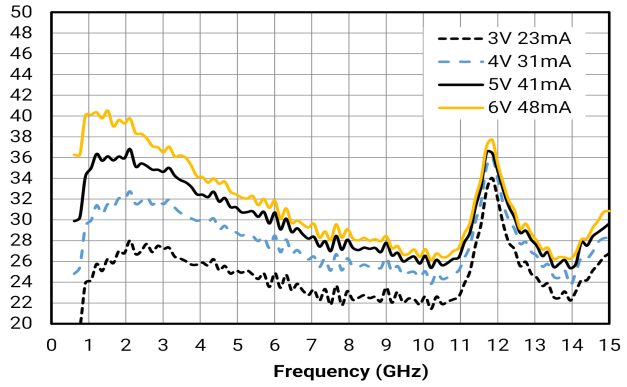
ADM-8536PSM OIP3 (dBm) vs Freq, Over Bias



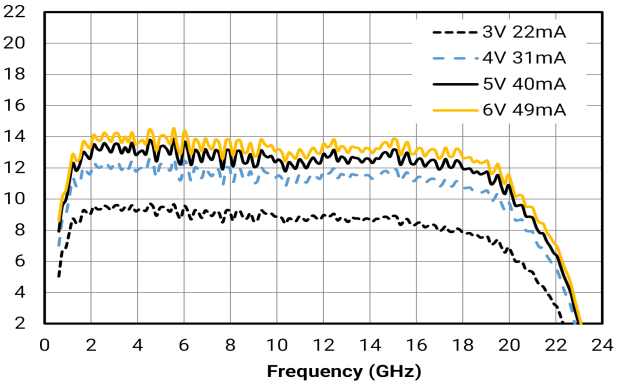
ADM-8536PSM IIP2 (dBm) vs Freq, Over Bias



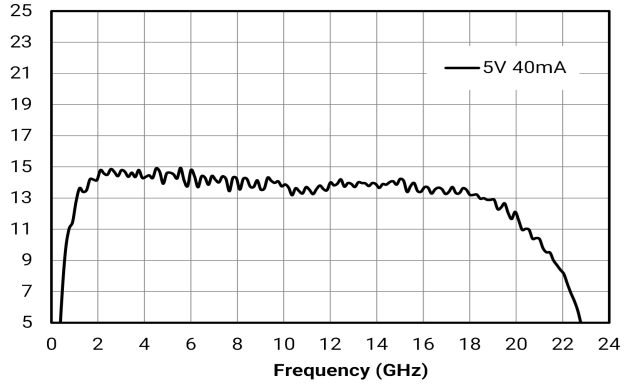
ADM-8536PSM OIP2 (dBm) vs Freq, Over Bias



ADM-8536PSM P1dB (dBm) vs Freq, Over Bias



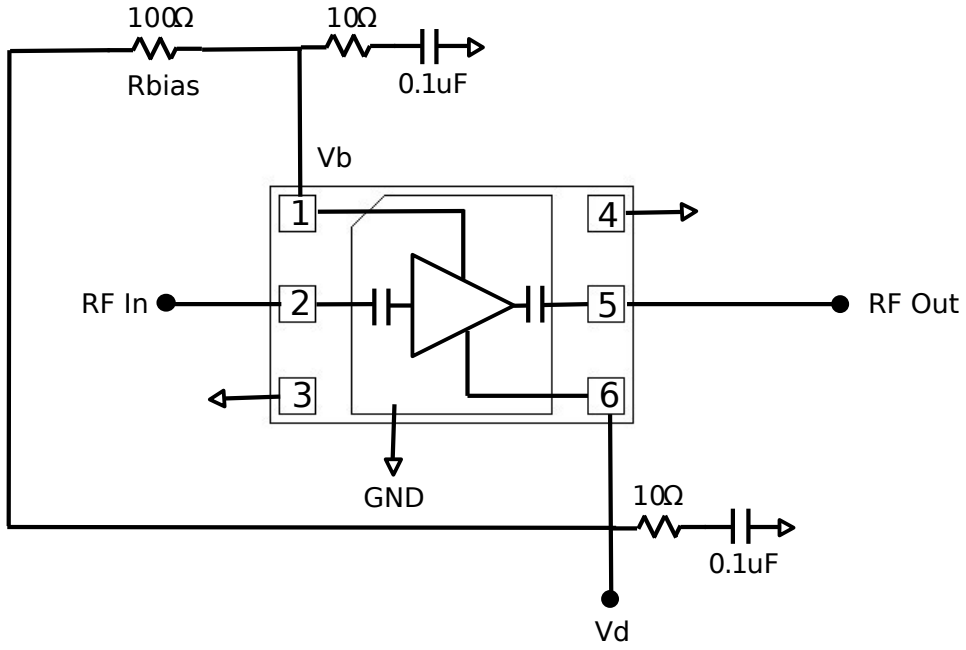
ADM-8536PSM PSat (dBm) vs Freq



Application Information

Below is the recommended application circuit for the ADM-8536PSM.

Application Circuit



Application Circuit Description

The application circuit for the ADM-853 6PSM is made simple by its internal biasing (RF choke) network and DC blocking capacitors. No external RF matching components are required, and a minimum number of bypassing components are recommended on the Vb and Vd lines. The Vb and Vd lines may be fed by a single DC source. For single supply operation at 5V and 40mA, a series 100 Ohm bias resistor (Rbias) is recommended between pins 1 and 6. For setting current with supply voltages other than 5V, the drain current at the Vd pin will vary proportionally with the current going into the Vb pin.
Package ground paddle and unused pins 3 and 4 must be connected to a DC/RF ground potential with high thermal and electrical conductivity. See the recommended landing pattern section for more details on recommended signal routing and grounding.

Mechanical Data

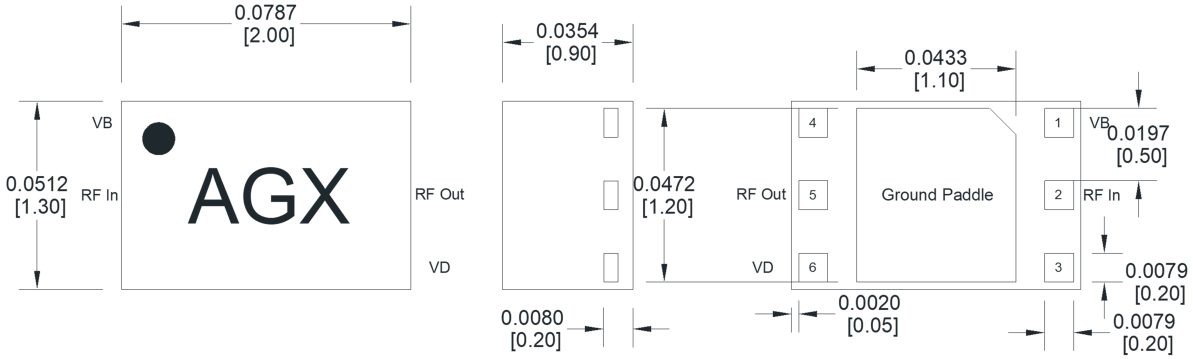
Outline Drawing

Download : Outline 2D Drawing | Outline 3D Drawing | Outline 3D STP

Pad #	Function
1	VB
2	RF In
3	N/C
4	N/C
5	RF Out
6	VD

PROJECTION
INCH [MM]

All dimensions are typical

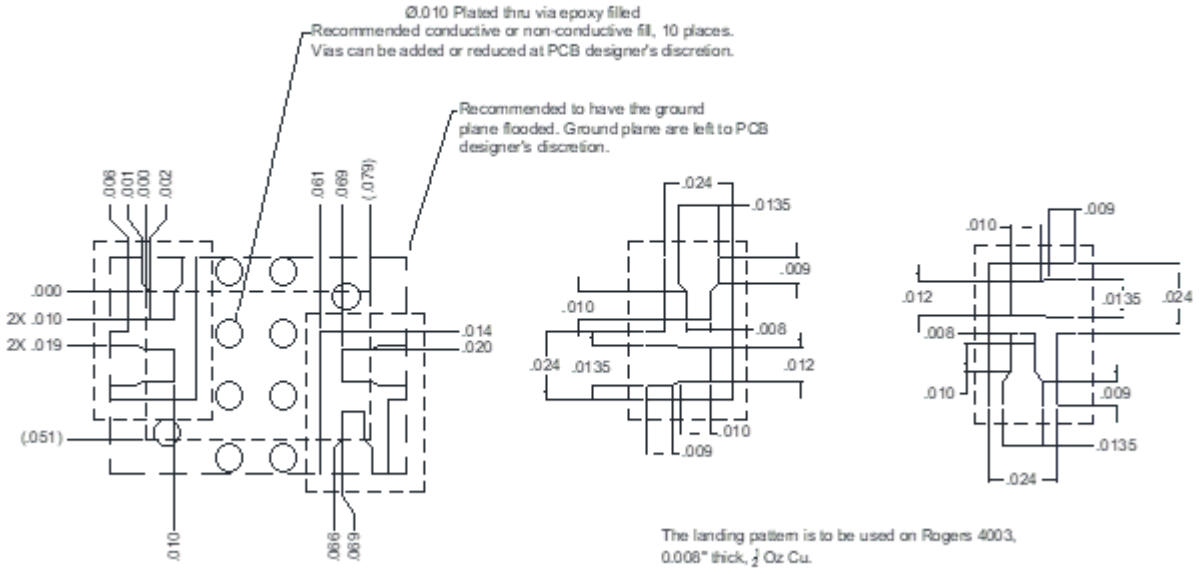


Notes (unless otherwise specified):

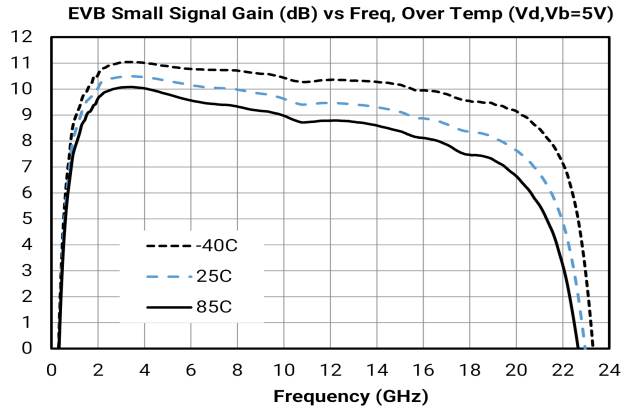
1. Substrate material is LCP.
2. I/O Leads and Die Paddle are 0.05 micron Au over 0.02 microns Pd over 0.5 microns Ni.
3. All unconnected pins should be connected to PCB
   RF ground.

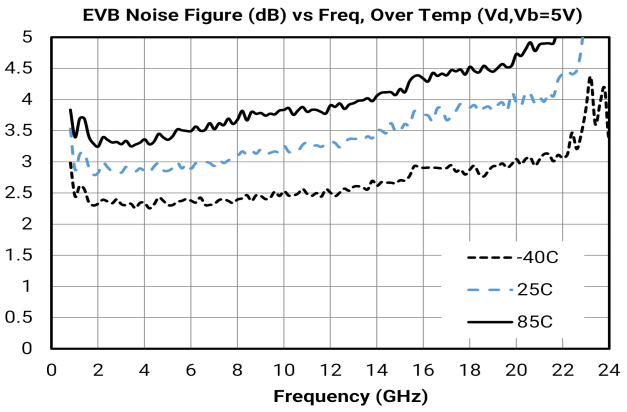
Footprint Image

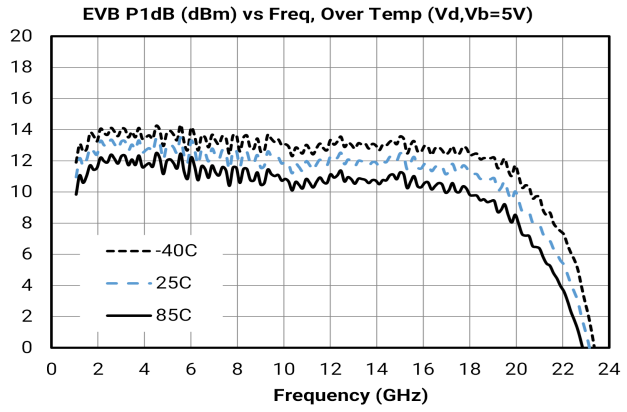
Download : Footprint Drawing



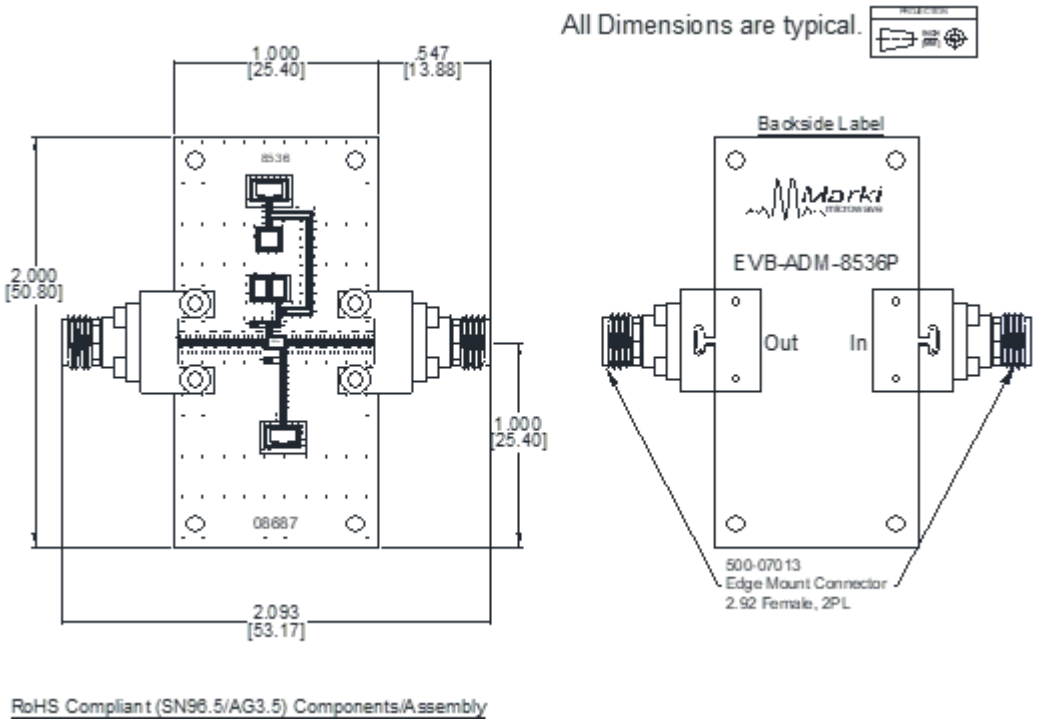
Evaluation Board - Typical Performance Plots







Evaluation Board - Outline Drawing



RoHS Compliant (SN96.5/AG3.5) Components/Assembly

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