MMIC SURFACE MOUNT

Low Noise Amplifier

PSA2-6+

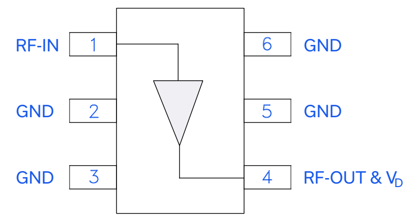
50Ω DC to 7000 MHz Low Current

THE BIG DEAL

- Wide Bandwidth, DC to 7000 MHz
- Low Noise Figure, Typ. 2.4 dB
- High Gain, Typ. 15.2 dB
- Internally Matched to 50 Ohms
- Single +5 V Supply Voltage
- Low Current, Typ. 15 mA

Generic photo used for illustration purposes only

FUNCTIONAL DIAGRAM



APPLICATIONS

- 5G MIMO Radio Systems
- Test and Measurement Equipment
- Radar Systems

PRODUCT OVERVIEW

The PSA2-6+ is a wideband amplifier fabricated using GaAs HBT technology. This device offers +5.6 dBm P1dB, 15.2 dB gain, +17 dBm OIP3 and 2.4 dB NF making it ideal for use in communications applications, radar systems and broadband test and measurement equipment. It has repeatable performance from lot-to-lot and is packaged in a compact 1.85 x 2 mm 6-Lead, SOT-363.

KEY FEATURES

Features	Advantages
Broadband	A single amplifier covers DC to 7000 MHz, making this ideal for wideband Test and Measurement, Wireless Infrastructure, and Radar Systems.
Low Noise Figure, Typ. 2.4 dB	Low noise figure and low current (15 mA) makes this an ideal low noise amplifier in power sensitive applications.
High Gain, Typ. 15.2 dB	High gain helps limit the noise figure contribution of subsequent components.
SOT-363 Package	Tiny footprint saves space in dense layouts, while providing low inductance, repeatable transitions, and excellent thermal contact to the PCB.

REV. A
ECO-020769
PSA2-6+
MCL NY
240205

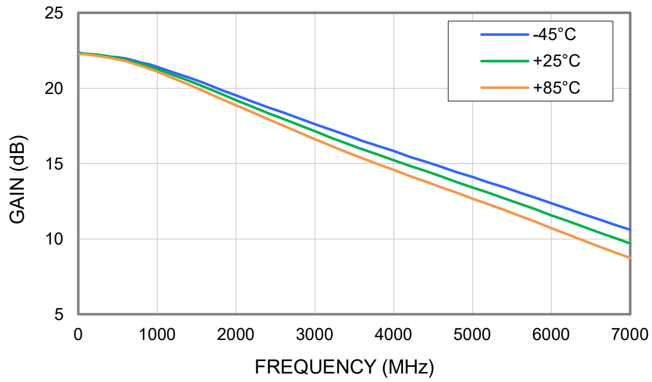
ELECTRICAL SPECIFICATIONS[1] AT +25°C, V_S = +5 V, UNLESS NOTED OTHERWISE

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		DC		7000	MHz
Gain	100		22.2		dB
	1000		21.2		
	2000		19.2		
	4000		15.2		
	6000		11.6		
	7000		9.7		
Output Power at 1 dB Compression (P1dB)[2]	100		+4.5		dBm
	1000		+4.3		
	2000		+3.0		
	4000		+5.6		
	6000		+2.9		
	7000		+1.5		
Output Third-Order Intercept (P_{OUT} = -8 dBm/Tone)	100		+18		dBm
	1000		+19		
	2000		+17		
	4000		+17		
	6000		+14		
	7000		+12		
Input Return Loss	100		28		dB
	1000		25		
	2000		18		
	4000		13		
	6000		8		
	7000		6		
Output Return Loss	100		24		dB
	1000		16		
	2000		14		
	4000		11		
	6000		9		
	7000		8		
Isolation	100		24		dB
	1000		24		
	2000		23		
	4000		21		
	6000		20		
	7000		20		
Noise Figure	100		2.1		dB
	1000		2.1		
	2000		2.1		
	4000		2.4		
	6000		2.8		
	7000		3.2		
Device Supply Voltage (V_S)		+4.75	+5	+5.25	V
Device Operating Voltage (V_D)			+3.6		V
Device Operating Current (I_S)			15		mA
Device Current Variation vs. Temperature[3]			31		μA/°C
Device Current Variation vs. Voltage @ 25°C[4]			0.01		mA/mV

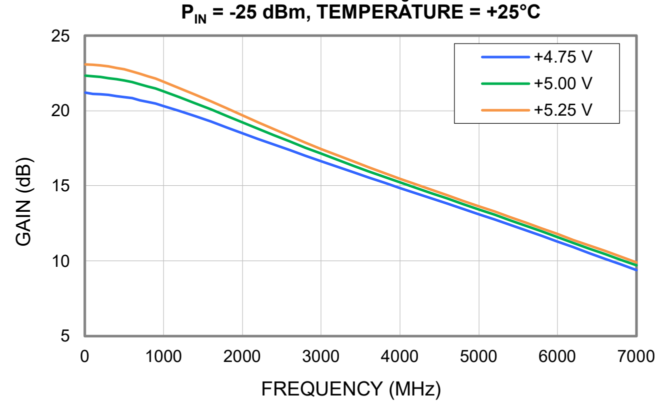
1. Tested on Mini-Circuits Characterization Test Board TB-MB-149C+. See Figure 3. De-embedded to the device reference plane.
2. Defined as Output Power at which Gain is compressed by 1 dB.
3. (Current at +85°C – Current at -45°C) / (130°C)
4. (Current at +5.25 V - Current at -4.75 V) / (+5.25 V - 4.75 V)

TYPICAL PERFORMANCE GRAPHS

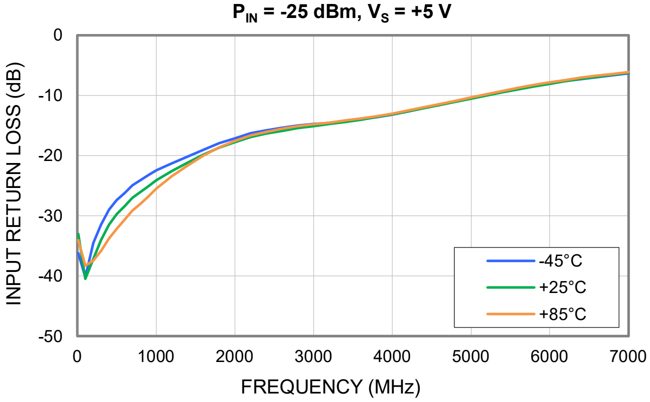
GAIN vs. TEMPERATURE,
P_{IN} = -25 dBm, V_S = +5 V



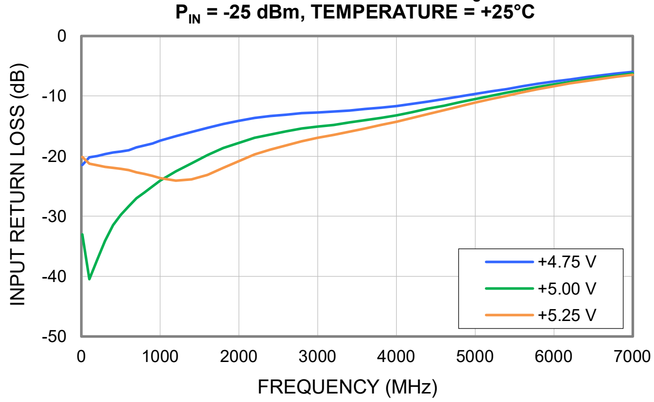
GAIN vs. V_S,
P_{IN} = -25 dBm, TEMPERATURE = +25°C



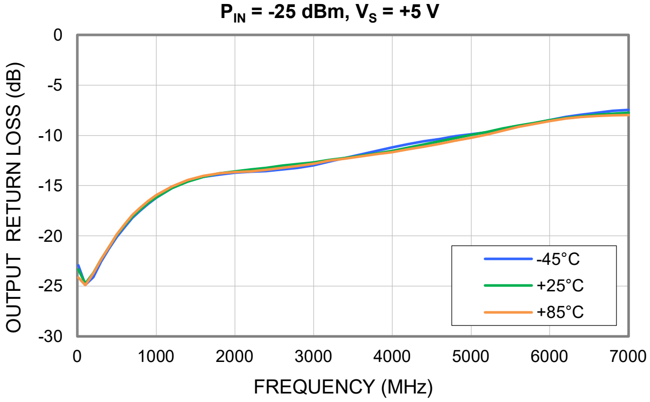
INPUT RETURN LOSS vs. TEMPERATURE,
P_{IN} = -25 dBm, V_S = +5 V



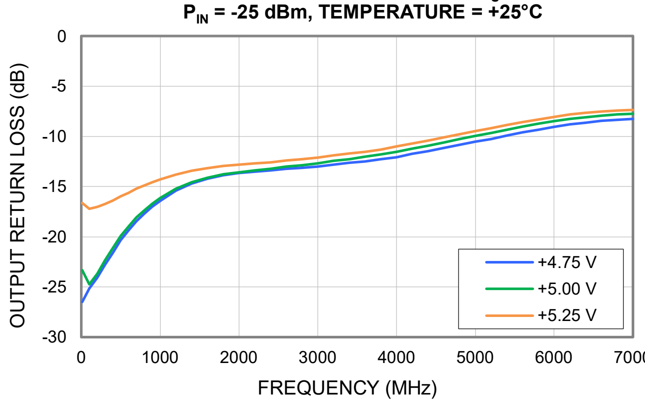
INPUT RETURN LOSS vs. V_S,
P_{IN} = -25 dBm, TEMPERATURE = +25°C



OUTPUT RETURN LOSS vs. TEMPERATURE,
P_{IN} = -25 dBm, V_S = +5 V

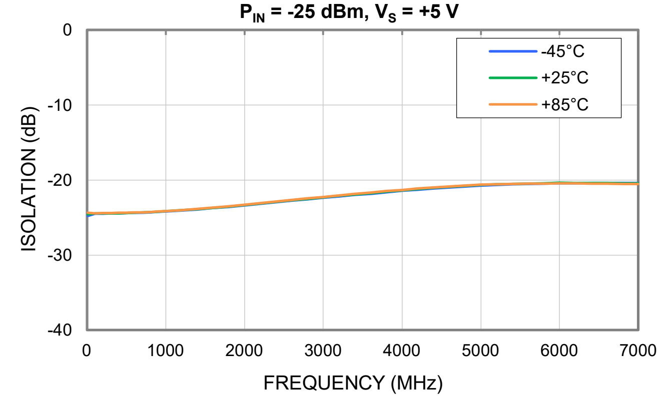


OUTPUT RETURN LOSS vs. V_S,
P_{IN} = -25 dBm, TEMPERATURE = +25°C

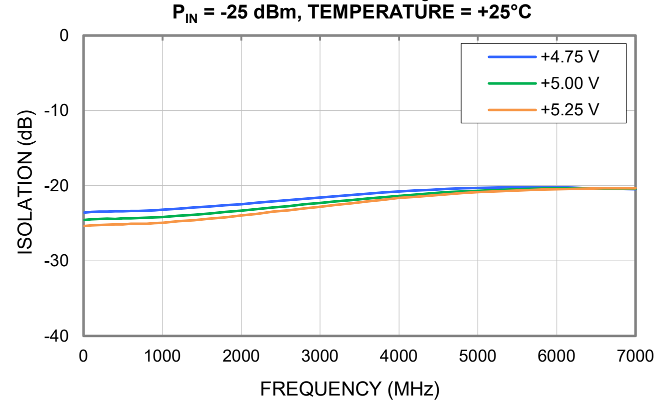


TYPICAL PERFORMANCE GRAPHS

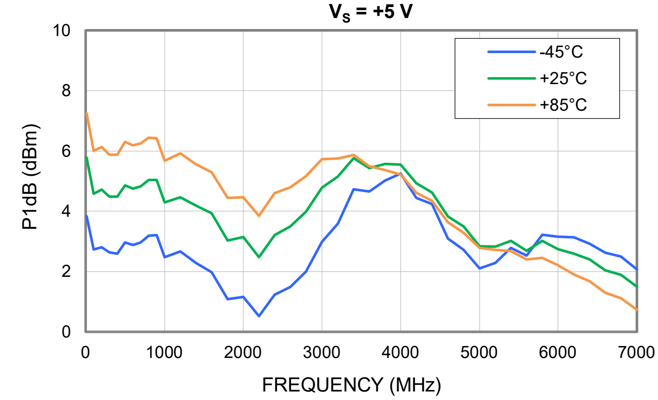
ISOLATION vs. TEMPERATURE, P_{IN} = -25 dBm, V_S = +5 V



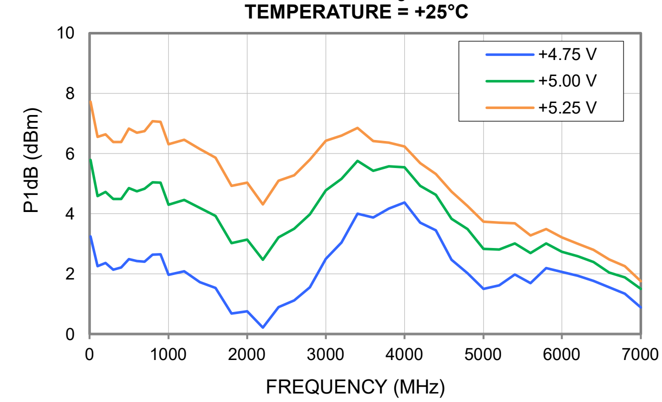
ISOLATION vs. V_S, P_{IN} = -25 dBm, TEMPERATURE = +25°C



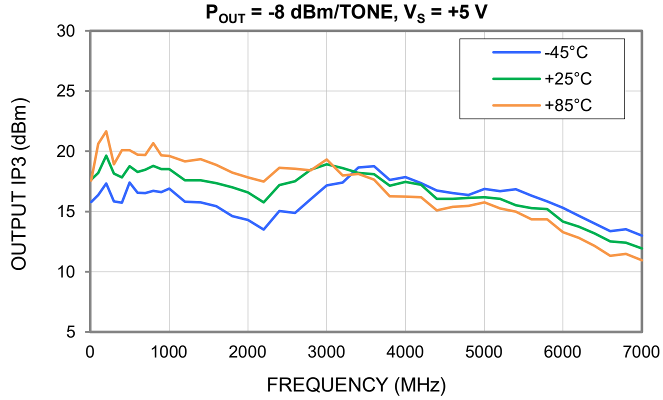
P1dB vs. TEMPERATURE, V_S = +5 V



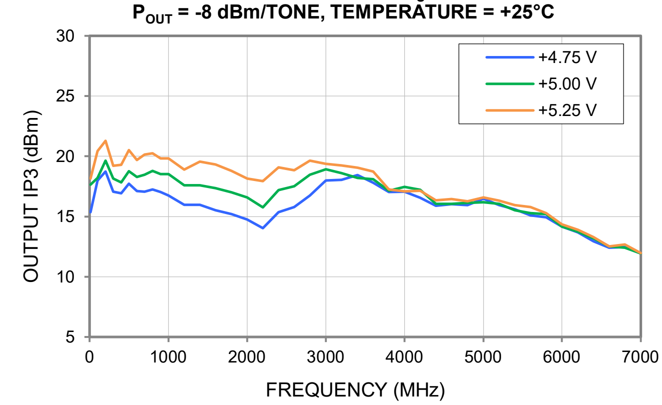
P1dB vs. V_S, TEMPERATURE = +25°C



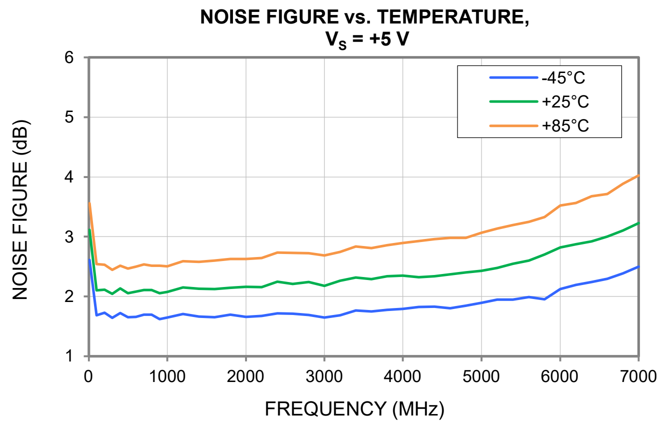
OUTPUT IP3 vs. TEMPERATURE, P_{OUT} = -8 dBm/TONE, V_S = +5 V

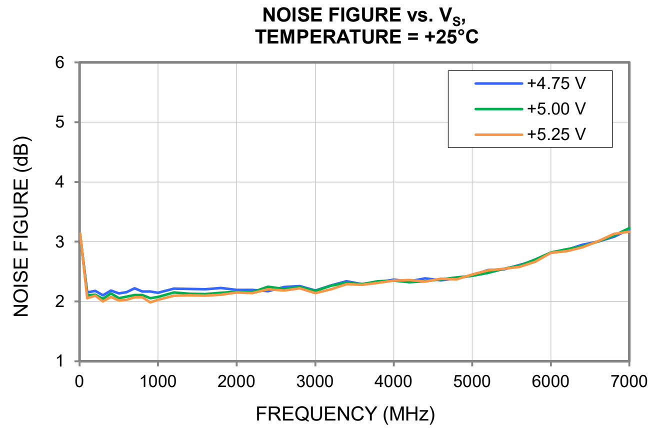


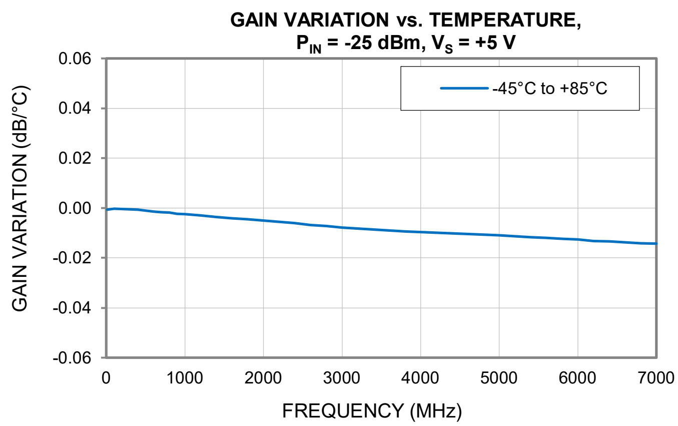
OUTPUT IP3 vs. V_S, P_{OUT} = -8 dBm/TONE, TEMPERATURE = +25°C



TYPICAL PERFORMANCE GRAPHS







ABSOLUTE MAXIMUM RATINGS[5]

Parameter	Ratings
Operating Temperature (ground lead)	-45°C to +85°C
Storage Temperature	-65°C to +150°C
Junction Temperature[6]	+150°C
Total Power Dissipation	0.2 W
Input Power (CW), V_S = +5V	+29 dBm
DC Current on V_S (I_S)	50 mA

5. Permanent damage may occur if any of these limits are exceeded. Maximum ratings are not intended for continuous normal operation.
6. Peak temperature on top of Die.

THERMAL RESISTANCE

Parameter	Ratings
Thermal Resistance (Θ_{jc})[7]	95°C/W

7. Θ_{jc} = (Hot Spot Temperature on Die - Temperature at Ground Lead)/Dissipated Power

ESD RATING

	Class	Voltage Range	Reference Standard
HBM	1C	1000 to < 2000V	ANSI/ESDA/JEDEC JS-001-2017

ESD HANDLING PRECAUTION: This device is designed to be Class 1C for HBM. Static charges may easily produce potentials higher than this with improper handling and can discharge into DUT and damage it. As a preventive measure Industry standard ESD handling precautions should be used at all times to protect the device from ESD damage.

MSL RATING

Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020D

FUNCTIONAL DIAGRAM

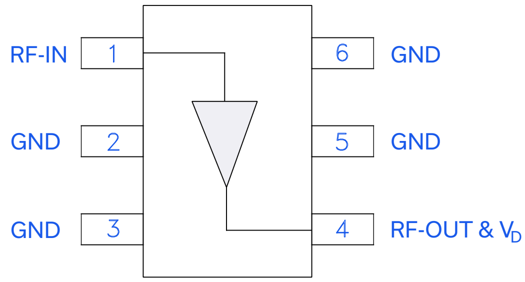
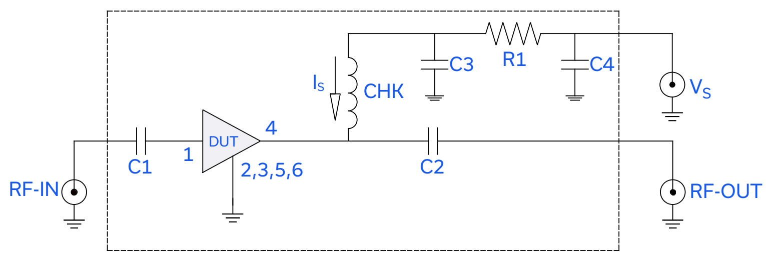


Figure 1. PSA2-6+ Functional Diagram

PAD DESCRIPTION

Function	Pad Number	Application Description (Refer to Fig 2)
RF-IN	1	RF-IN Pad connects to RF input port.
RF-OUT & V_D	4	RF-OUT Pad connects to RF output and V_D port.
GND	2, 3, 5, 6	Connects to ground.

EVALUATION BOARD



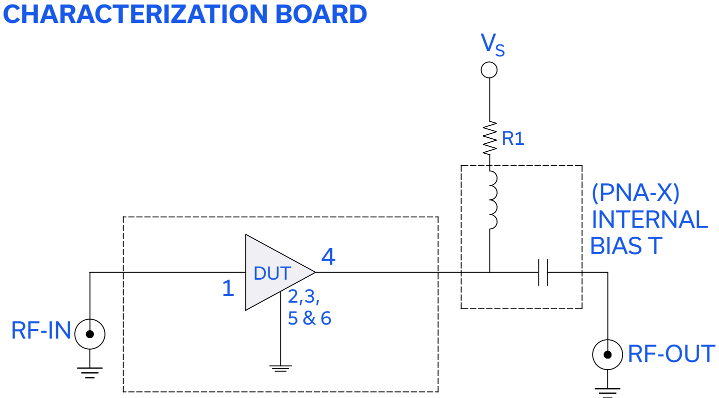
Electrical Parameters and Conditions
Gain, Return Loss, Output Power at 1dB Compression (P1dB), Output IP3 (OIP3), and Noise Figure measured using N5247B PNA-X microwave network analyzer.

Conditions:
1. Gain and Return Loss: P_{IN} = -25 dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, -8 dBm/tone at output.
3. V_S = +5 V

Figure 2. DUT soldered on Mini-Circuits Evaluation Board: TB-PSA2-6C+

Component	Value	Size	Part Number	Manufacturer
C1, C2	2400 pF	0402	GRM155R71H242JA01D	Murata
C3	0.01 uF	0603	GRM1885C1H103JA01D	Murata
C4	0.1 uF	0603	GCJ188R71H104KA12D	Murata
R1	93.1 Ω	0805	ERJ-6ENF93R1V	Panasonic
CHK	-	0.15" x 0.15"	TCCH-80+	Mini-Circuits

CHARACTERIZATION BOARD

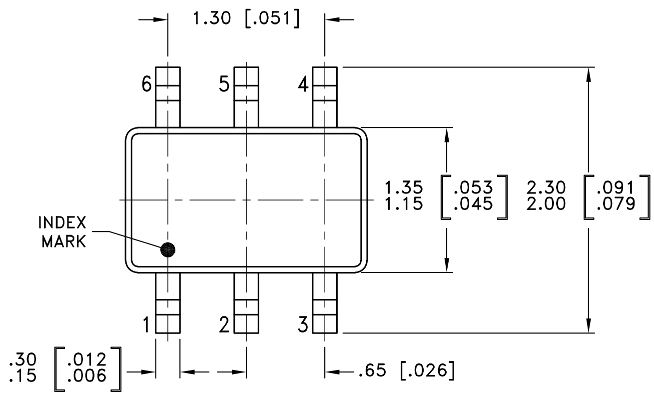


Electrical Parameters and Conditions
Gain, Return Loss, Output Power at 1dB Compression (P1dB), Output IP3 (OIP3), and Noise Figure measured using N5247B PNA-X microwave network analyzer.

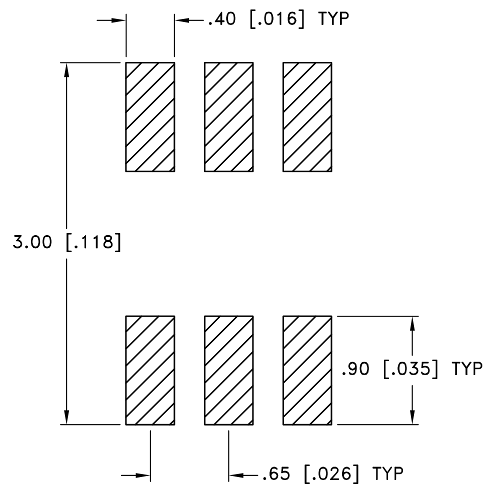
Conditions:
1. PNA Internal Bias T is required
2. Connect R1 = 93 Ω Series Resistor Between Power Supply and Bias T
3. Gain and Return Loss: P_{IN} = - 25 dBm
4. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, -8 dBm/tone at output.
5. Vs = +5 V.

Figure 3. DUT soldered on Mini-Circuits Characterization Board TB-149C+

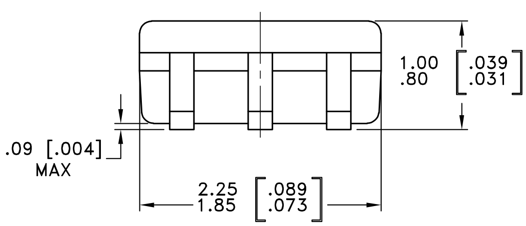
CASE STYLE DRAWING

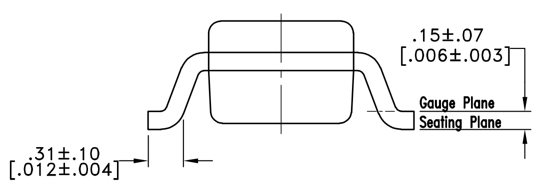


PCB Land Pattern



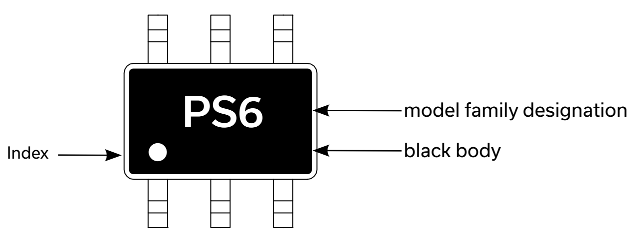
Suggested Layout
Tolerance to be within ±.002





Weight: .010 grams
Dimensions are in inches [mm]. Tolerances: 2 Pl.±0.25[0.01]; 3Pl.± 0.127 [0.005] mm [Inches]

PRODUCT MARKING



Marking may contain other features or characters for internal lot control

ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASH BOARD

CLICK HERE

Performance Data & Graphs	Data Graphs S-Parameter (S2P Files) Data Set (.zip file)
Case Style	CA1389. Plastic molded SOT-363 package, Lead Finish: Matte Tin
RoHS Status	Compliant
Tape & Reel **Standard quantities available on reel**	F101 7" reels with 20, 50, 100, 200, 500, 1000, or 2000 devices
Suggested Layout for PCB Design	PL-770
Evaluation Board	TB-PSA2-6C+ Gerber File
Environmental Ratings	ENV08T02