HIGH GAIN, LOW NOISE & CURRENT

Monolithic Amplifier

PSA-39+

50Ω DC to 6 GHz

THE BIG DEAL

- Wideband, DC to 6 GHz
- High Gain, 23 dB Typ. at 0.1 GHz
- Low NF, 2.2 dB Typ. at 0.1 GHz
- Low Current, 32 mA Typ.
- Protected by US Patent 6,943,629



Generic photo used for illustration purposes only

CASE STYLE: CA1389

+RoHS Compliant

The +Suffix identifies RoHS Compliance. See our website for RoHS Compliance methodologies and qualifications

APPLICATIONS

- Cellular
- PCS
- Communication Receivers & Transmitters
- Satellite Communication
- Military

PRODUCT OVERVIEW

The PSA-39+ is a HBT based wideband low noise MMIC Amplifier with high gain and low current. This design operates on a single +5 V supply, is well matched for 50Ω and comes in a SOT-363 package, accommodating dense circuit board layouts.

KEY FEATURES

Feature	Advantages
High Gain, 23 dB Typ. at 0.1 GHz	Enables signal amplification without the need for multiple gain stages.
Low Noise, 2.2 dB Typ. at 0.1 GHz	Enables lower system noise figure performance. Low NF and High Gain results in lower NF systems.
SOT-363 Package	Tiny footprint saves space in dense layouts while providing low inductance, repeatable transitions, and excellent thermal contact to the PCB.

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ELECTRICAL SPECIFICATIONS[1] AT +25°C, Zo = 50Ω

Parameter	Condition (GHz)	Min.	Typ.	Max.	Units
Frequency Range[2]		DC		6.0	GHz
Gain	0.1	19.7	23.0	26.7	dB
	1.0	18.3	21.3	24.7	
	3.0	13.5	15.7	18.2	
	5.0	10.4	11.4	14.1	
	6.0		10.2		
Input Return Loss	0.1		38		dB
	1.0		18		
	3.0		13		
	5.0		11		
	6.0		15		
Output Return Loss	0.1		21		dB
	1.0		30		
	3.0		10		
	5.0		7		
	6.0		10		
P1dB	0.1		+10.7		dBm
	1.0		+10		
	3.0		+10		
	5.0		+9		
	6.0		+7		
OIP3 (P_{OUT} = -5 dBm/Tone)	0.1		+23.3		dBm
	1.0		+22.5		
	3.0		+22.7		
	5.0		+20.1		
	6.0		+17.6		
Noise Figure	0.1		2.2		dB
	1.0		2.2		
	3.0		2.5		
	5.0		3.0		
	6.0		3.3		
Supply Voltage (V_S)	DC	+4.75	+5	+5.25	V
Device Operating Current (I_S)	DC		32	38	mA
Device Current Variation vs. Voltage[3]			0.022		mA/mV
Device Current Variation vs. Temperature[4]			42		µA/°C
Thermal Resistance, Junction-to-Ground Lead			127		°C/W

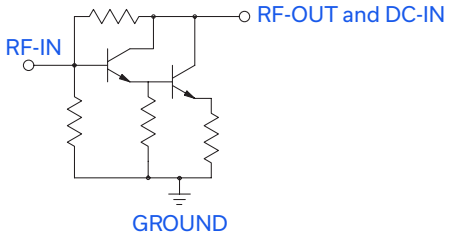
1. Measured on Mini-Circuits Characterization Test Board TB-PSA-39+. See Characterization Test Circuit (Fig. 1).
2. Guaranteed specifications DC to 6 GHz. Low frequency cut-off determined by external coupling capacitor.
3. Device Current Variation vs. Voltage = (Current at +5.25 V - Current at +4.75 V) / (+5.25 V - +4.75 V) * 1000)
4. Device Current Variation vs. Temperature = (Current at +85°C - Current at -45°C)/130

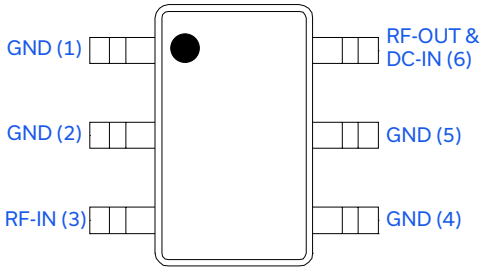
ABSOLUTE MAXIMUM RATINGS[5]

Parameter	Ratings
Operating Temperature	-45°C to +85°C
Storage Temperature	-65°C to +150°C
Input Power (CW)	+13 dBm
Operating Current on Pin 6	55 mA

5. Permanent damage may occur if any of these limits are exceeded. Electrical Maximum rating are not intended for continuous normal operation.

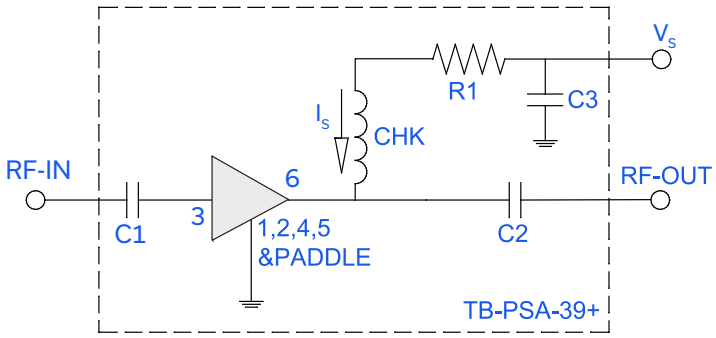
SIMPLIFIED SCHEMATIC AND PAD DESCRIPTION





Function	Pin Number	Description (See Application Circuit, Fig. 1)
RF-IN	3	RF input pin (connect to RF-IN via C1)
RF-OUT & DC-IN	6	RF output pin (connected to RF-OUT via blocking cap C2 and supply voltage V_{DD} via RF Choke L1 & Resistor R1)
GND	1,2,4,5	Connections to ground

CHARACTERIZATION TEST / APPLICATION CIRCUIT

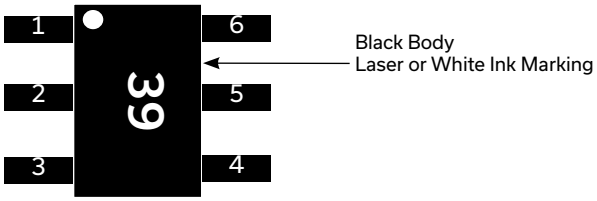


Component	Size	Value	Part Number	Manufacturer
DUT	SOT-363		PSA-39+	MCL
C1,C2	0402	2400 pF	GRM155R71H-242JA01D	Murata
C3	0603	0.1 uF	GCJ188R71H-104KA12D	Murata
R1	0805	43.2Ω	ERJ-6ENF43R2V	Panasonic
CHK	0.15x0.15		TCCH-80+	MCL

Fig 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization Test Board TB-PSA-39+) Gain, Return Loss, Output Power at 1 dB Compression (P1dB), Output IP3 (OIP3) and Noise Figure measured using Agilent's N5242A PNA-X microwave network analyzer.

Conditions:
1. Gain: P_{IN} = -25 dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, -5 dBm/tone at output.

PRODUCT MARKING



Marking may contain other features or characters for internal lot control.

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50Ω DC to 6 GHz

ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASHBOARD. TO ACCESS CLICK HERE

Performance Data	Data Table Swept Graphs S-Parameter (S2P Files) Data Set (.zip file)
Case Style	CA1389 Plastic molded SOT-363 package, Lead Finish: Matte Tin
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-645
Evaluation Board	TB-PSA-39+
Environmental Ratings	ENV08T2

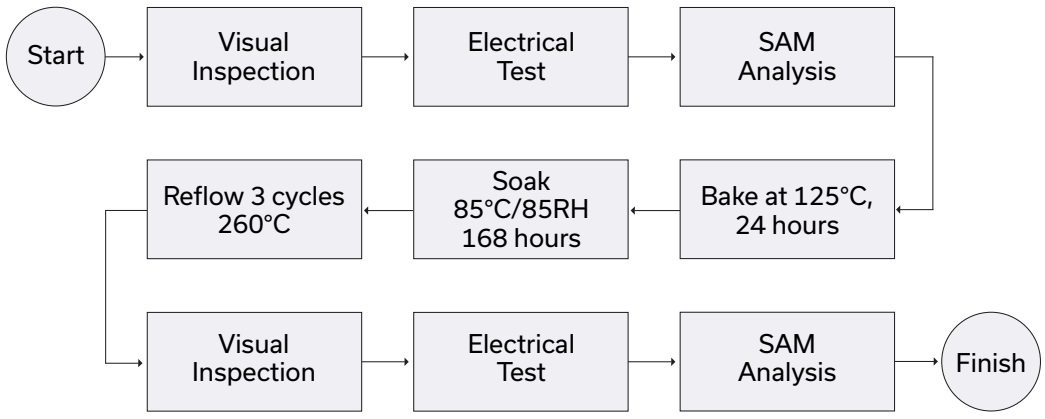
ESD RATING

Human Body Model (HBM): Class 1A (250 to <500 V) in accordance with ANSI/ESD STM 5.1 - 2001

MSL RATING

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

MSL TEST FLOW CHART



NOTES

A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/terms/viewterm.html