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RFMD
rfmd.com

SXA-389(Z)

400MHz to 2500MHz ¼W MEDIUM POWER GaAs HBT AMPLIFIER WITH ACTIVE BIAS

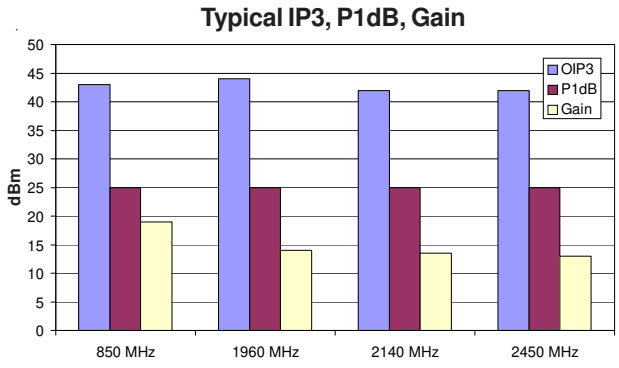
Package: SOT-89

Product Description

RFMD's SXA-389 amplifier is a high efficiency GaAs Heterojunction Bipolar Transistor (HBT) MMIC housed in low-cost surface-mountable plastic package. These HBT MMICs are fabricated using molecular beam epitaxial growth technology which produces reliable and consistent performance from wafer to wafer and lot to lot. These amplifiers are specially designed for use as driver devices for infrastructure equipment in the 400MHz to 2500MHz cellular, ISM, WLL, PCS, W-CDMA applications.

Optimum Technology Matching® Applied

- ✓ GaAs HBT
- ☐ GaAs MESFET
- ☐ InGaP HBT
- ☐ SiGe BiCMOS
- ☐ Si BiCMOS
- ☐ SiGe HBT
- ☐ GaAs pHEMT
- ☐ Si CMOS
- ☐ Si BJT
- ☐ GaN HEMT
- ☐ InP HBT
- ☐ RF MEMS
- ☐ LDMOS



Features

- Available in RFMD Green, RoHS Compliant, and Pb-Free (Z Part Number)
- On-Chip Active Bias Control, Single 5V Supply
- High Output 3rd Order Intercept: +42 to +44dBm Typ.
- High P_{1dB}: +25dBm Typ.
- High Gain: +19dB at 850MHz
- High Efficiency: Consumes Only 600mW
- Patented High Reliability GaAs HBT Technology
- Surface-Mountable Power Plastic Package

Applications

- W-CDMA, PCS, Cellular Systems
- High Linearity IF Amplifiers
- Multi-Carrier Applications

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Small Signal Gain		19.0		dB	850MHz
		14.0		dB	1960MHz
	12.5	13.5	15.0	dB	2140MHz
		13.0		dB	2450MHz
Output Power at 1dB Compression		25.0		dBm	850MHz
		25.0		dBm	1960MHz
	24.0	25.0		dBm	2140MHz
		25.0		dBm	2450MHz
Output Third Order Intercept Point		43.0		dBm	850MHz
		44.0		dBm	1960MHz
	39.0	42.0		dBm	2140MHz
		42.0		dBm	2450MHz
Noise Figure		4.7		dB	850MHz
		5.5		dB	1960MHz
		6.0		dB	2140MHz
		6.0		dB	2450MHz
Input VSWR		1.3:1			850MHz
		1.4:1			1960MHz
		1.3:1			2140MHz
		1.1:1			2450MHz
Device Operating Current	90.0	115.0	122.0	mA	V_{CC}=5V
Operating Dissipated Power		575.0	610.0	mW	
Thermal Resistance		100		°C/W	junction to backside

Test Conditions: Z_O=50Ω, T_A=25°C

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Absolute Maximum Ratings

Parameter	Rating	Unit
Max Device Current (I_D)	240	mA
Max Device Voltage (V_D)	6	V
Max RF Input Power	100	mW
Max Dissipated Power	1500	mW
Max Junction Temperature (T_J)	165	°C
Operating Temperature Range (T_L)	-40 to + 85	°C
Max Storage Temperature	150	°C
ESD	1B	Class
Moisture Sensitivity Level	MSL 2	

Operation of this device beyond any one of these limits may cause permanent damage. For reliable continuous operation, the device voltage and current must not exceed the maximum operating values specified in the table on page one.

Bias Conditions should also satisfy the following expression:

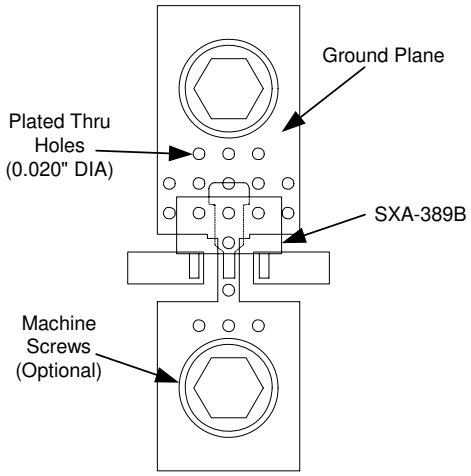
$I_D V_D < (T_J - T_L) / R_{TH}$, j-l

Caution! ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

RoHS status based on EUDirective2002/95/EC (at time of this document revision).

Recommended Mounting Configuration for Optimum RF and Thermal Performance



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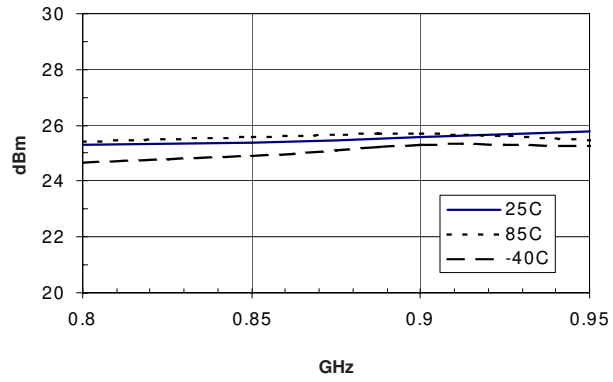
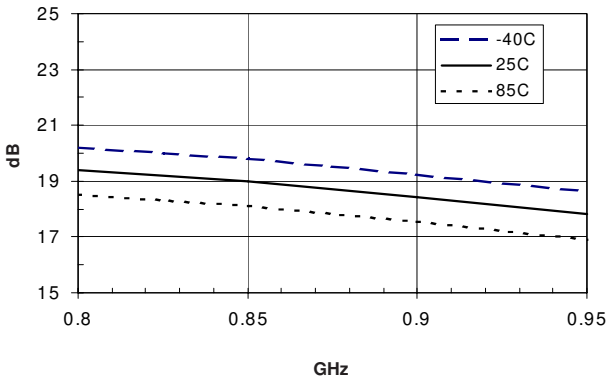
850MHz Application Circuit Data, V_{CC}=5V, I_D=120mA (Tuned for Output IP3)

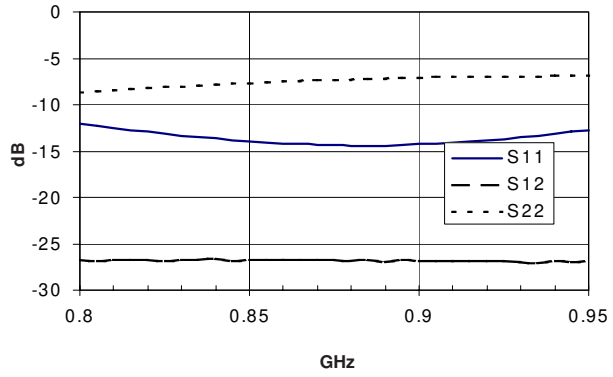
P1dB vs. Frequency



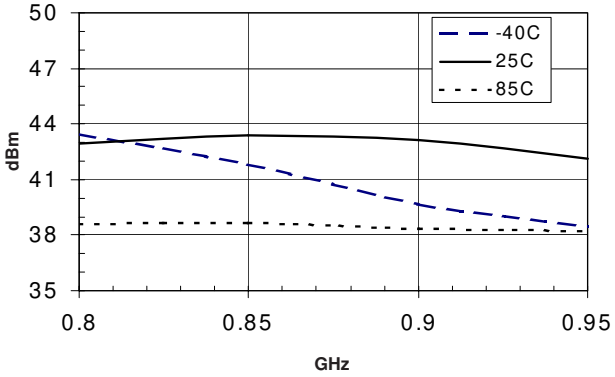
Gain vs. Frequency



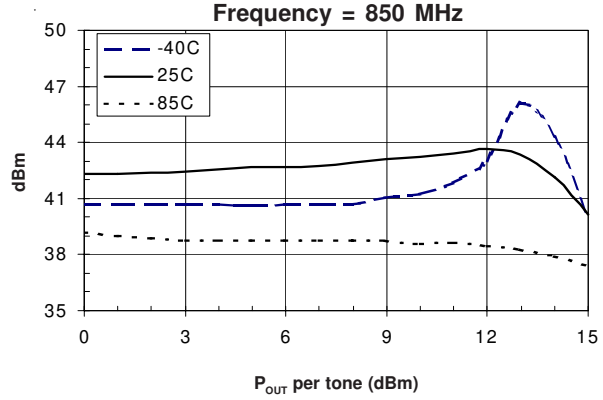
Input/Output Return Loss, Isolation vs. Frequency, T=25°C



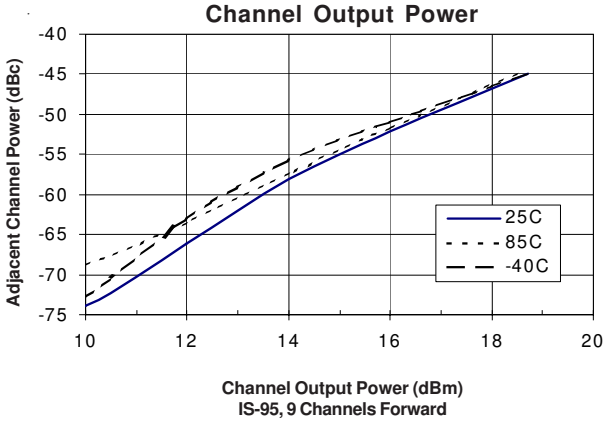
Third Order Intercept vs. Frequency (P_{OUT} per tone = 11dBm)



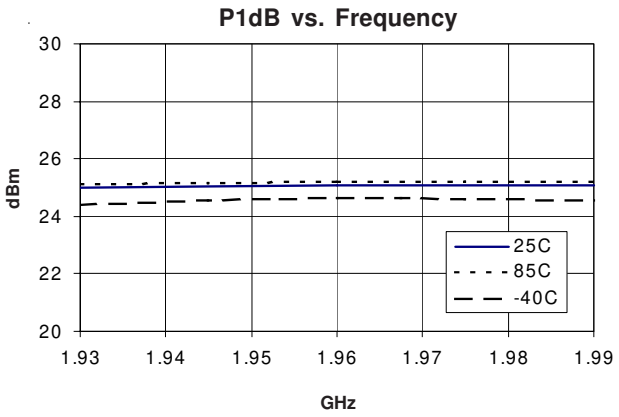
Third Order Intercept vs. Tone Power Frequency = 850 MHz

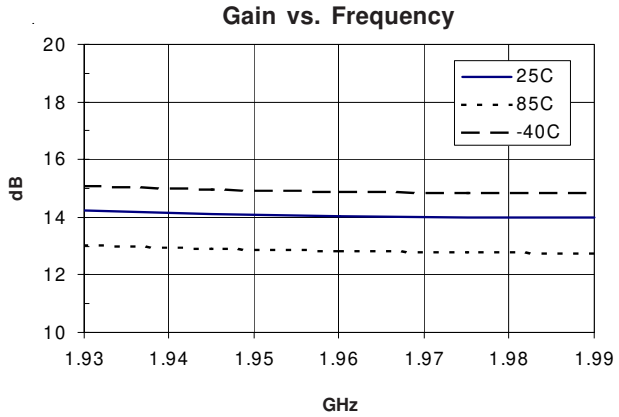


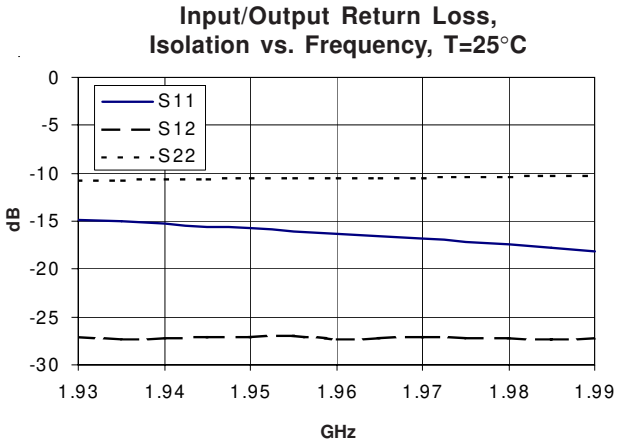
880 MHz Adjacent Channel Power vs. Channel Output Power

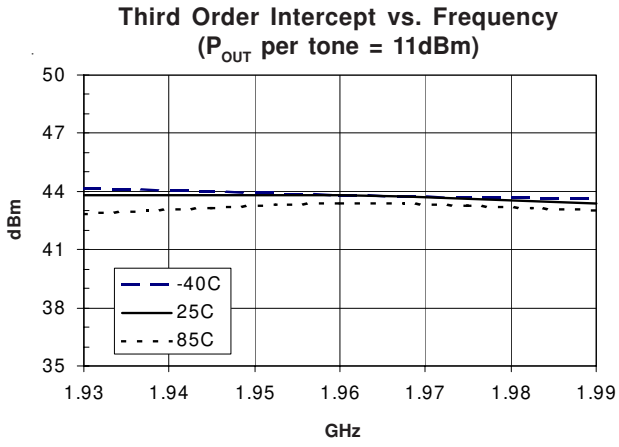


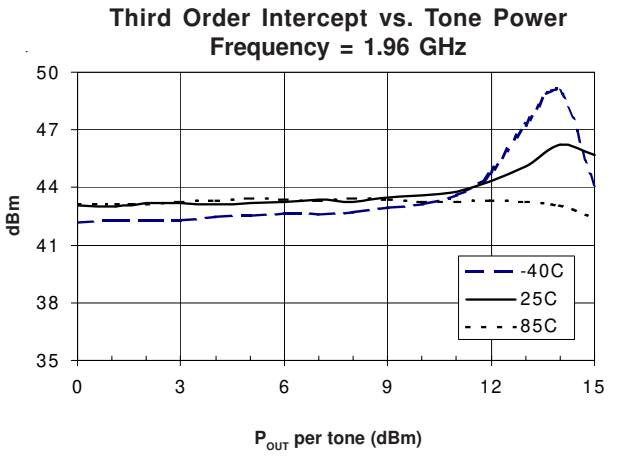
1960MHz Application Circuit Data, V_{CC}=5V, I_D=120mA (Tuned for Output IP3)

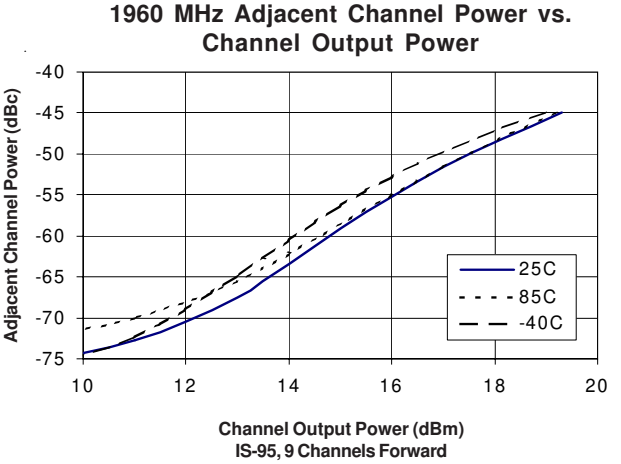












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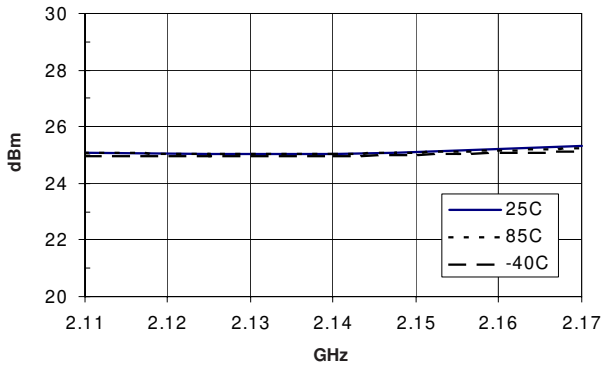
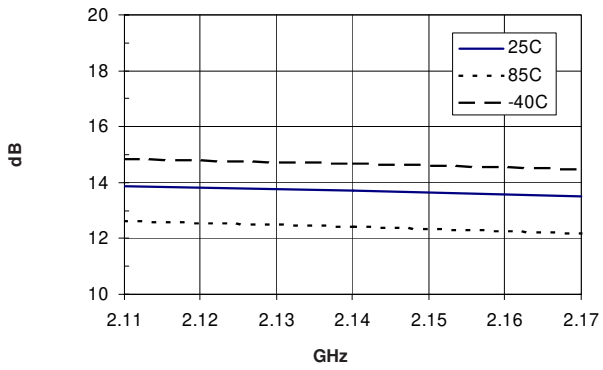
2140MHz Application Circuit Data, V_{CC}=5V, I_D=120mA (Tuned for Output IP3)

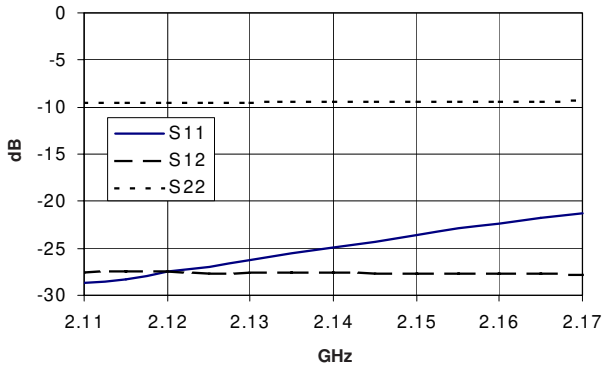
P1dB vs. Frequency



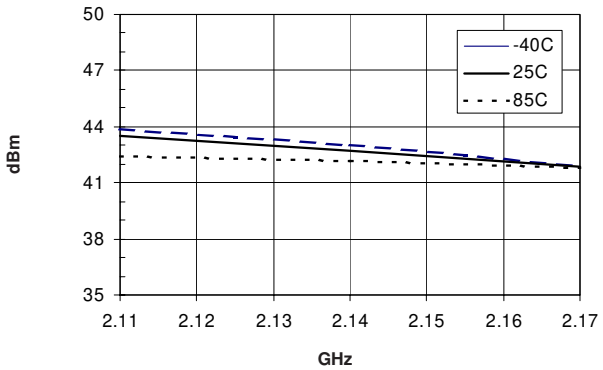
Gain vs. Frequency



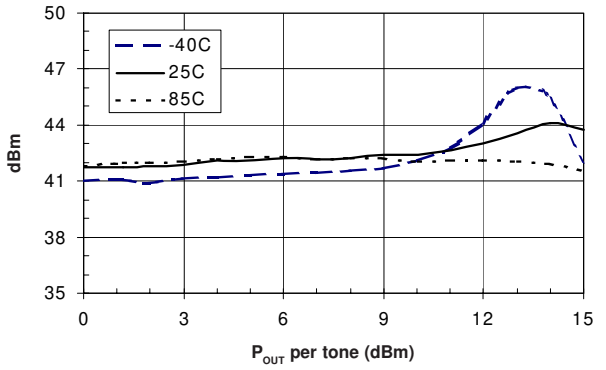
Input/Output Return Loss, Isolation vs. Frequency, T=25°C



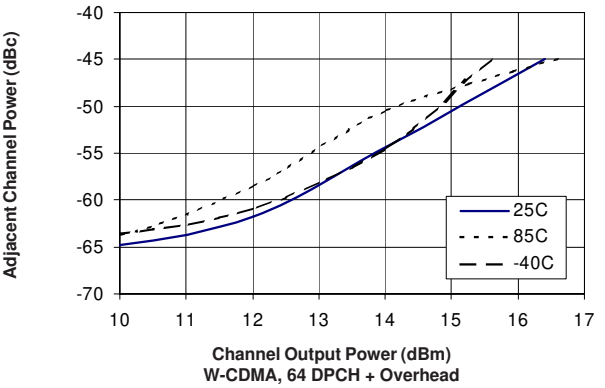
Third Order Intercept vs. Frequency (P_{OUT} per tone = 11dBm)



Third Order Intercept vs. Tone Power Frequency = 2.14 GHz

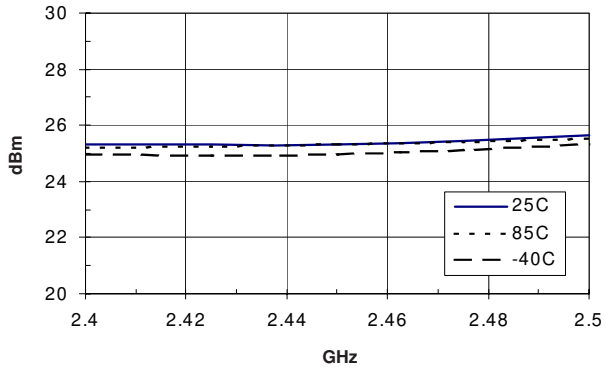


2140 MHz Adjacent Channel Power vs. Channel Output Power

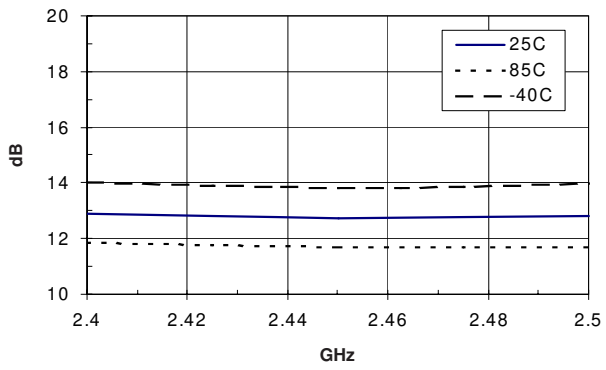


2450MHz Application Circuit Data, V_{CC}=5V, I_D=120mA (Tuned for Output IP3)

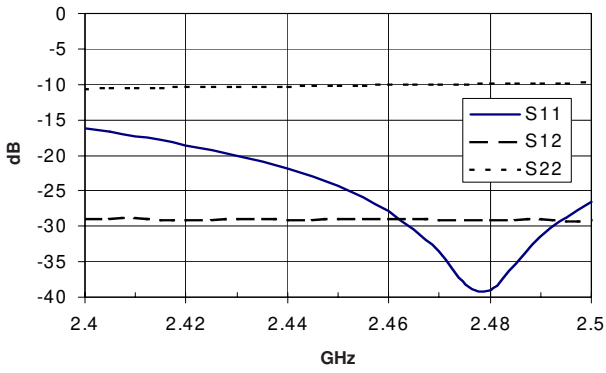
P1dB vs. Frequency



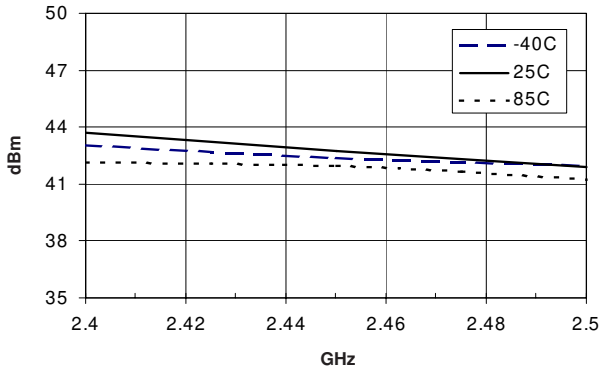
Gain vs. Frequency



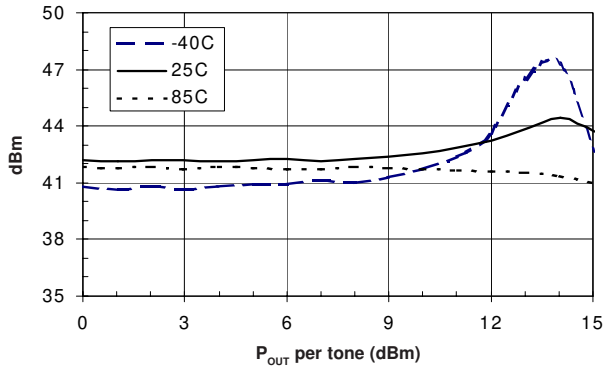
Input/Output Return Loss,
Isolation vs. Frequency, T=25°C



Third Order Intercept vs. Frequency
(P_{OUT} per tone = 11dBm)



Third Order Intercept vs. Tone Power
Frequency = 2.45 GHz



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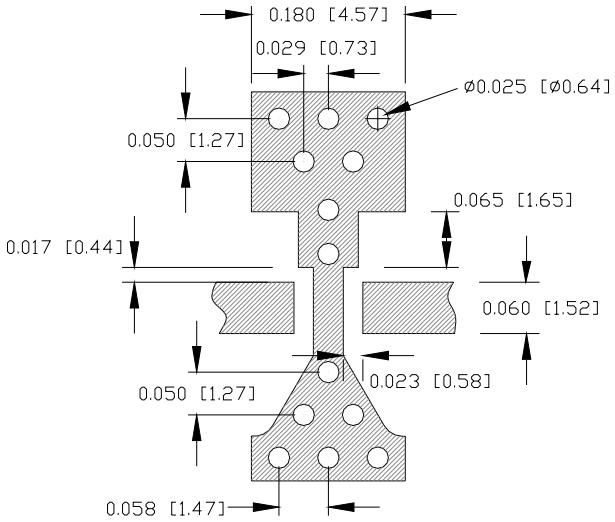
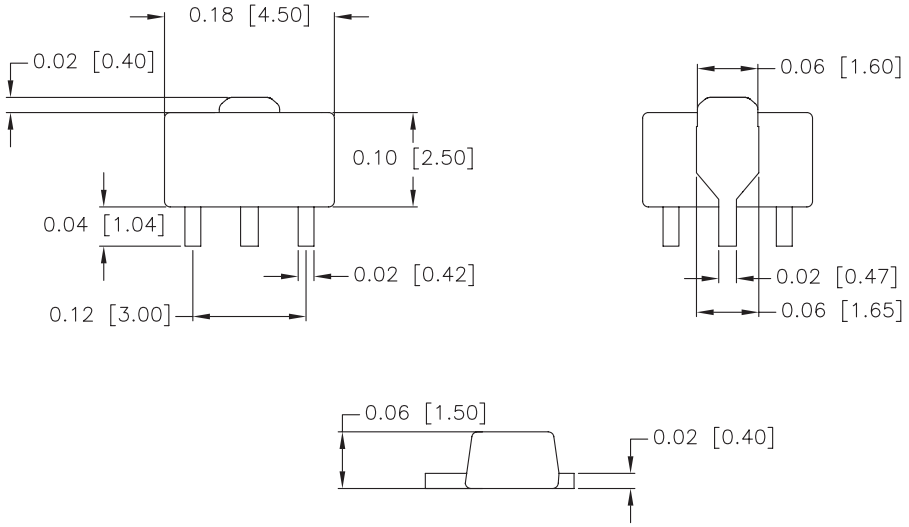
Pin	Function	Description
1	Base	Base Pin
2	GND and Emitter	Connection to ground. Use via holes to reduce lead inductance. Place via holes as close to ground leads as possible.
3	Collector	Collector pin
4	GND and Emitter	Connection to ground. Use via holes to reduce lead inductance. Place via holes as close to ground leads as possible.

Suggested Pad Layout

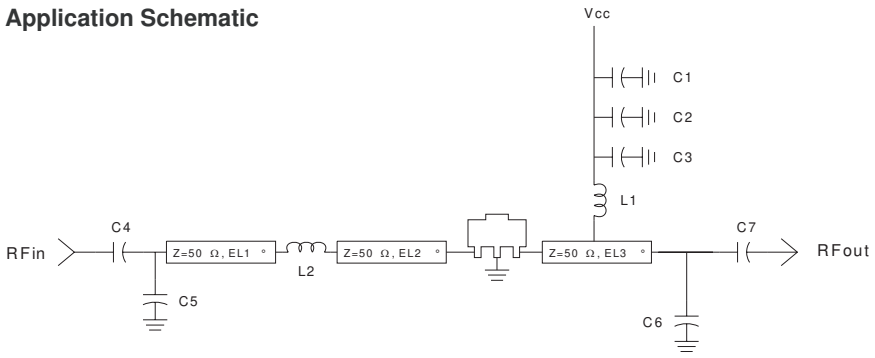


Package Drawing

Dimensions in inches (millimeters)
Refer to drawing posted at www.rfmd.com for tolerances.



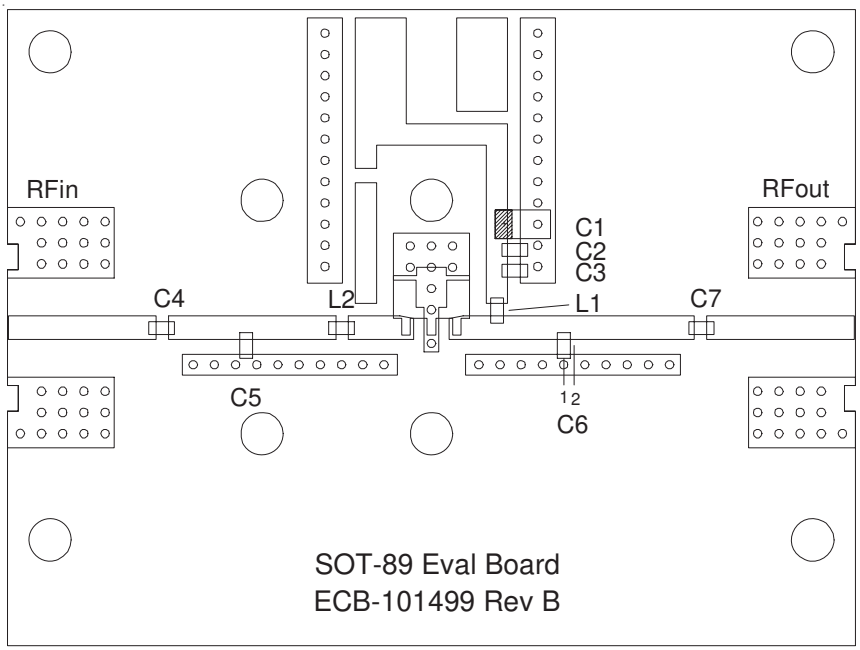
Application Schematic



Ref. Des.	Vendor Series	850 MHz	1960 MHz	2140 MHz	2450 MHz
C1	Matsuo 267M3502104K	0.1uF 10%	0.1uF 10%	0.1uF 10%	0.1uF 10%
C2	Rohm MCH18	1000pF 5%	1000pF 5%	1000pF 5%	1000pF 5%
C3, C7	Rohm MCH18	47pF 5%	22pF 5%	22pF 5%	22pF 5%
C4	Rohm MCH18	47pF 5%	22pF 5%	22pF 5%	1.2pF ±0.25pF
C5	Rohm MCH18	3.9pF ±0.25pF	-	-	-
C6	Rohm MCH18	3.9pF ±0.25pF	0.5pF ±0.25pF	0.5pF ±0.25pF	0.5pF ±0.25pF

Ref. Des.	Vendor Series	850 MHz	1960 MHz	2140 MHz	2450 MHz
C6 Position		2	1	1	1
L1	Toko LL1608-FS	33nH 5%	18nH 5%	18nH 5%	15nH 5%
L2	Toko LL1608-FS	1.2nH ±0.3nH	thru	thru	thru
EL1		9.7	-	-	-
EL2		5.6	-	-	-
EL3		13.2	28.7	31.4	35.9

Evaluation Board Layout



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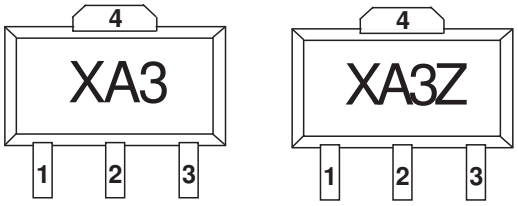
Part Identification



Alternate marking “SXA389Z” or “SXA389” on line one with Trace Code on line 2.

Ordering Information

Part Number	Reel Size	Devices/Reel
SXA-389	7”	1000
SXA-389Z	7”	1000

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