SXA-389

400-2500 MHz ¼ W Medium Power GaAs HBT Amplifier with Active Bias

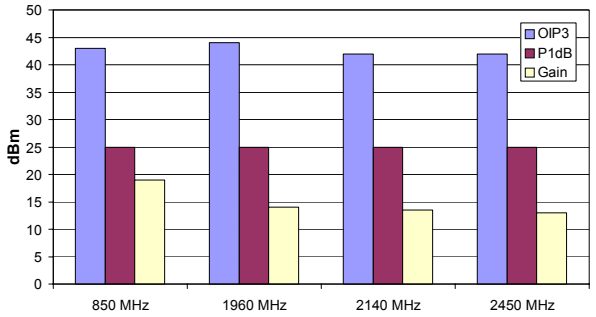
Product Description

Sirenza Microdevices' 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 400-2500 MHz cellular, ISM, WLL, PCS, W-CDMA applications.

Its high linearity makes it an ideal choice for multi-carrier as well as digital applications.

Typical IP3, P1dB, Gain



Product Features

- **On-chip Active Bias Control, Single 5V Supply**
- **High Output 3rd Order Intercept: +42 to +44 dBm typ.**
- **High P1dB : +25 dBm typ.**
- **High Gain: +19 dB at 850 MHz**
- **High Efficiency: consumes only 600 mW**
- **Patented High Reliability GaAs HBT Technology**
- **Surface-Mountable Power Plastic Package**

Applications

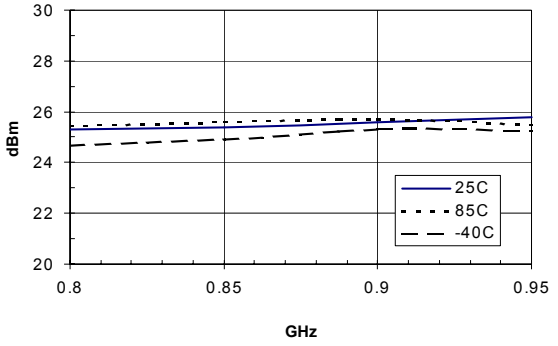
- **W-CDMA, PCS, Cellular Systems**
- **High Linearity IF Amplifiers**
- **Multi-Carrier Applications**

Symbol	Parameters: Test Conditions: Z_0 = 50 Ohms, Ta = 25°C		Units	Min.	Typ.	Max.
P_{1dB}	Output Power at 1dB Compression	f = 850 MHz f = 1960 MHz f = 2140 MHz f = 2450 MHz	dBm	24	25 25 25 25	
S_{21}	Small signal gain	f = 850 MHz f = 1960 MHz f = 2140 MHz f = 2450 MHz	dB	12.5	19 14 13.5 13	15
S_{11}	Input VSWR	f = 850 MHz f = 1960 MHz f = 2140 MHz f = 2450 MHz	-		1.3:1 1.4:1 1.3:1 1.1:1	
OIP_3	Output Third Order Intercept Point (Pout/Tone = +11 dBm, Tone spacing = 1 MHz)	f = 850 MHz f = 1960 MHz f = 2140 MHz f = 2450 MHz	dBm	39	43 44 42 42	
NF	Noise Figure	f = 850 MHz f = 1960 MHz f = 2140 MHz f = 2450 MHz	dB		4.7 5.5 6.0 6.0	
I_D	Device Current	Vcc = 5V	mA	90	115	122
P_{DISS}	Operating Dissipated Power		mW		575	610
$R_{th, j-l}$	Thermal Resistance (junction - lead)		° C/W		100	

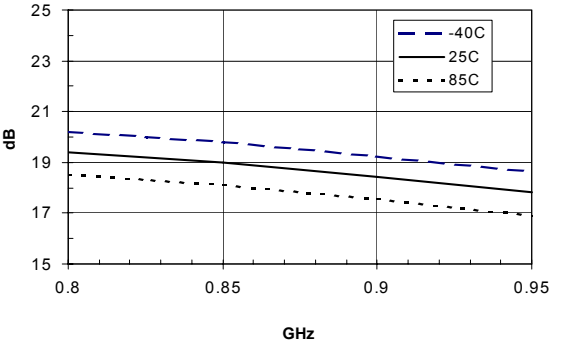
850 MHz Application Circuit Data, V_{CC}= 5V, I_D= 120mA

Note: Tuned for Output IP3

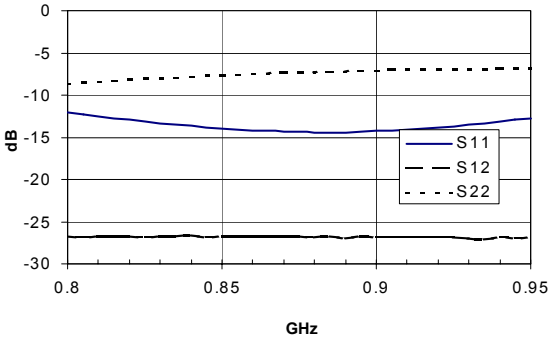
P1dB vs. Frequency



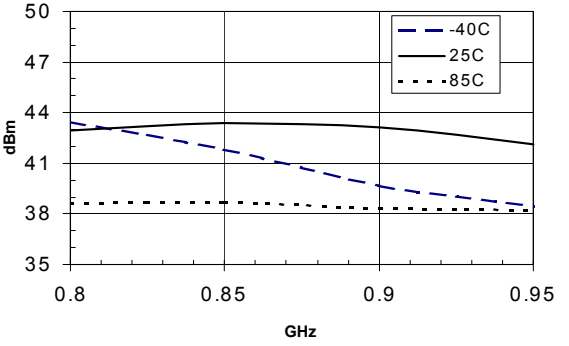
Gain vs. Frequency



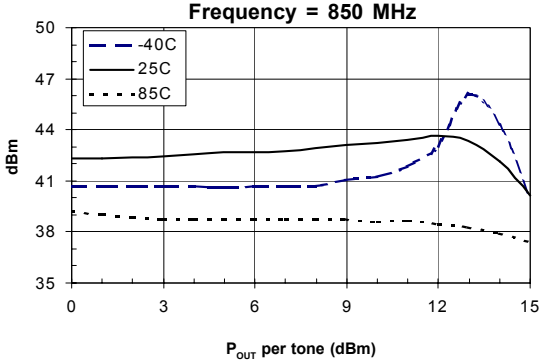
Input/Output Return Loss, Isolation vs. Frequency, T=25°C



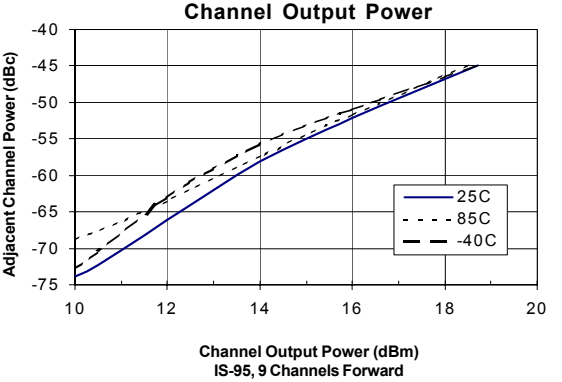
Third Order Intercept vs. Frequency (P_{OUT} per tone = 11dBm)



Third Order Intercept vs. Tone Power Frequency = 850 MHz



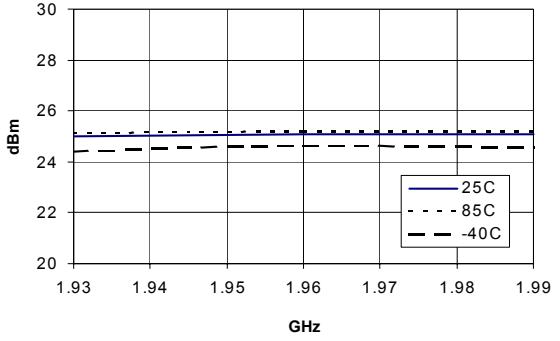
880 MHz Adjacent Channel Power vs. Channel Output Power



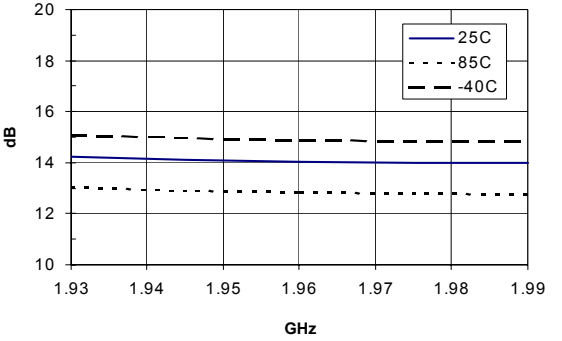
1960 MHz Application Circuit Data, V_{CC}= 5V, I_D= 120mA

Note: Tuned for Output IP3

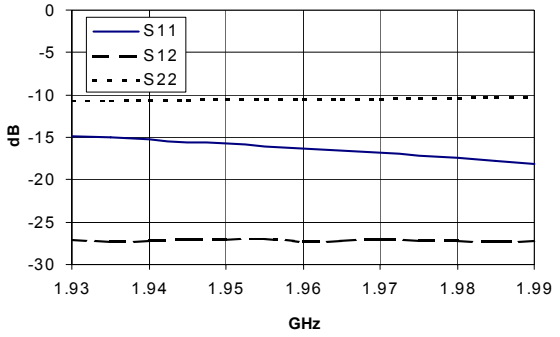
P1dB vs. Frequency



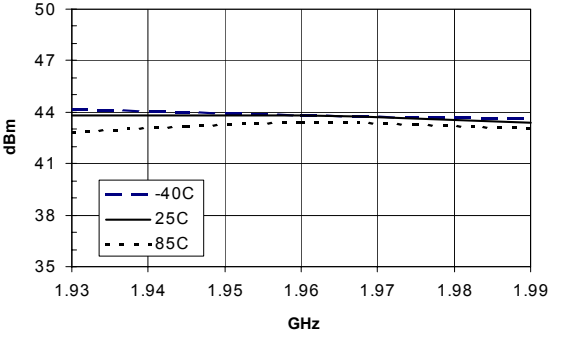
Gain vs. Frequency



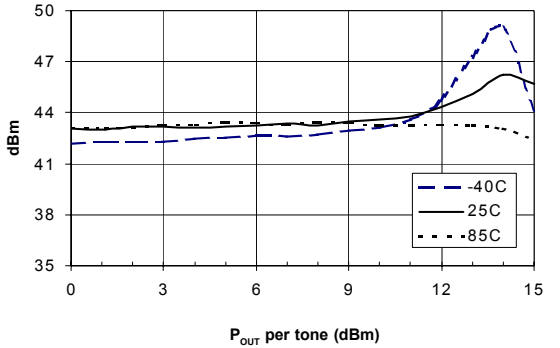
Input/Output Return Loss, Isolation vs. Frequency, T=25°C



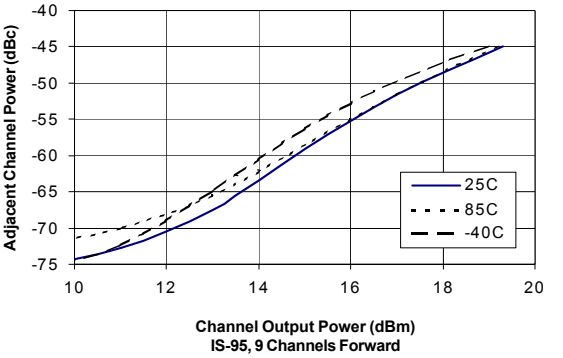
Third Order Intercept vs. Frequency (P_{OUT} per tone = 11dBm)



Third Order Intercept vs. Tone Power Frequency = 1.96 GHz



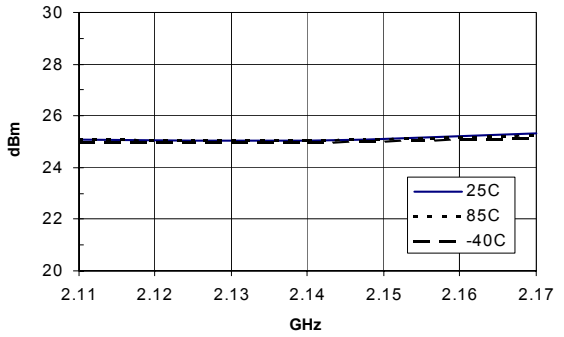
1960 MHz Adjacent Channel Power vs. Channel Output Power



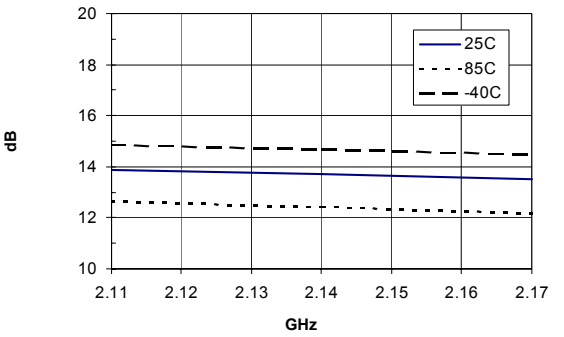
2140 MHz Application Circuit Data, V_{CC}= 5V, I_D= 120mA

Note: Tuned for Output IP3

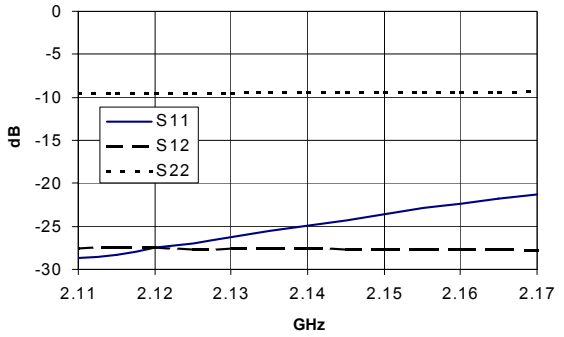
P1dB vs. Frequency



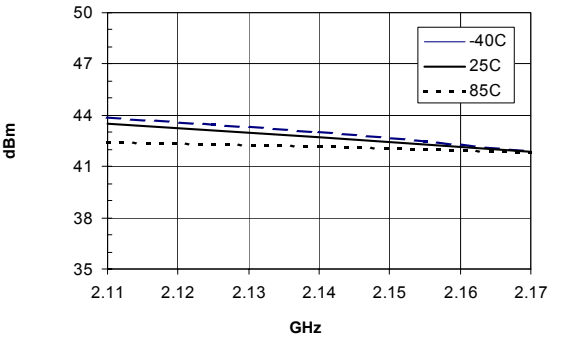
Gain vs. Frequency



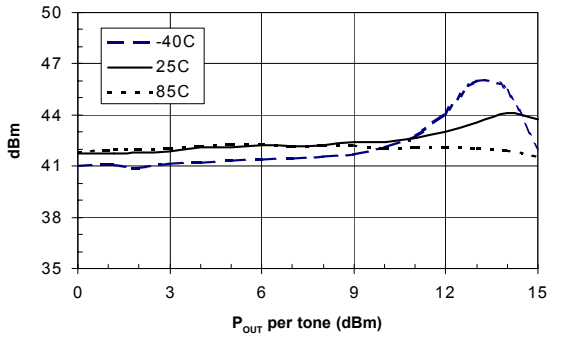
Input/Output Return Loss, Isolation vs. Frequency, T=25°C



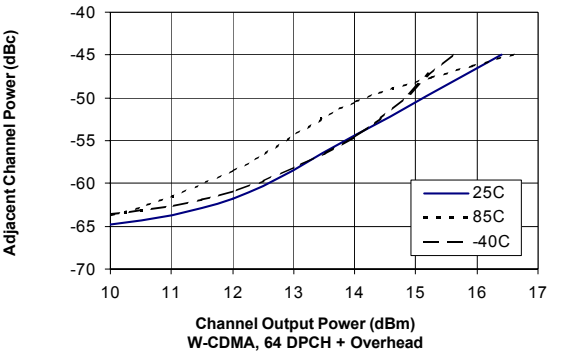
Third Order Intercept vs. Frequency (P_{OUT} per tone = 11dBm)



Third Order Intercept vs. Tone Power Frequency = 2.14 GHz



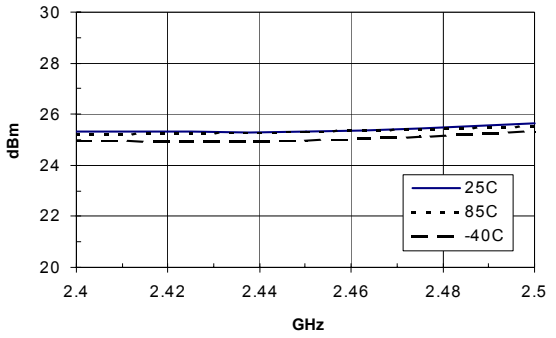
2140 MHz Adjacent Channel Power vs. Channel Output Power



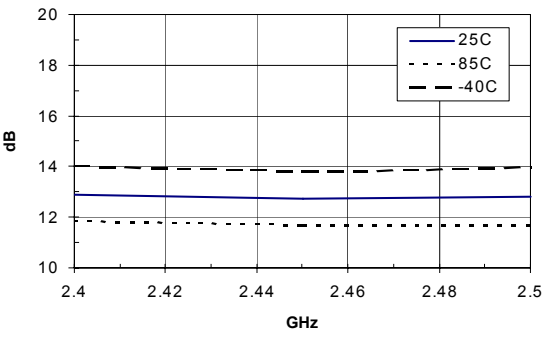
2450 MHz Application Circuit Data, V_{CC}= 5V, I_D= 120mA

Note: Tuned for Output IP3

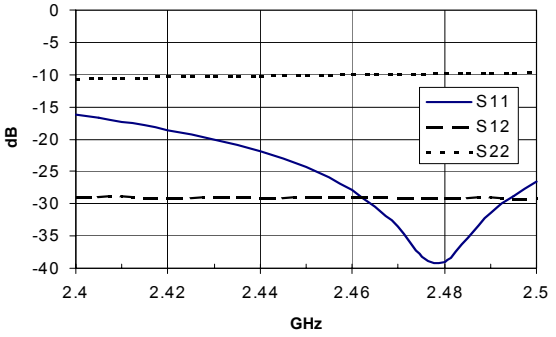
P1dB vs. Frequency



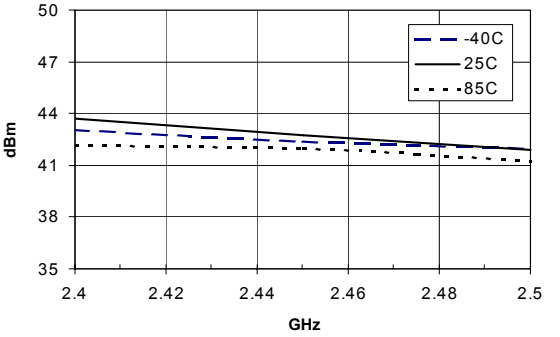
Gain vs. Frequency



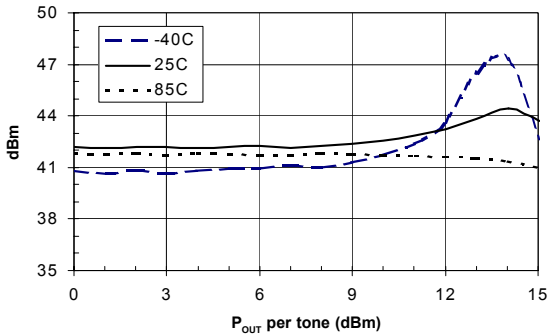
Input/Output Return Loss, Isolation vs. Frequency, T=25°C



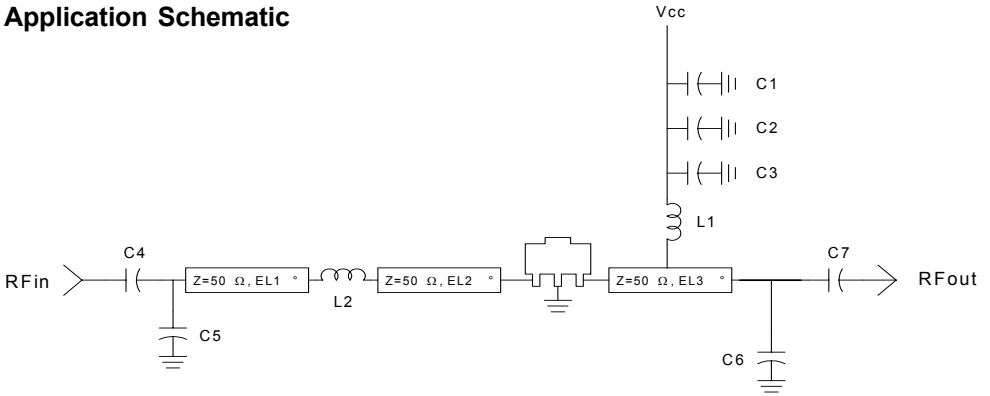
Third Order Intercept vs. Frequency (P_{OUT} per tone = 11dBm)



Third Order Intercept vs. Tone Power Frequency = 2.45 GHz



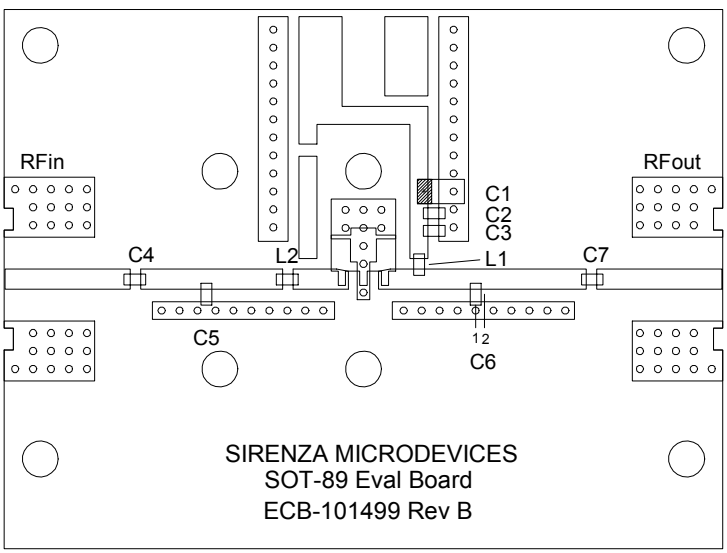
Application Schematic



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



Absolute Maximum Ratings

Parameter	Absolute Limit
Max. Supply Current (I_D)	240 mA
Max. Device Voltage (V_{CC})	6.0 V
Max. Power Dissipation	1500 mW
Max. RF Input Power	100 mW
Max. Junction Temp. (T_J)	+165 ºC
Operating Lead Temp. (T_L)	-40 to +85 ºC
Max. Storage Temp.	+150 ºC

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:
$I_D V_{CC}$ (max) < (T_J - T_L)/R_{th}-j-l

ESD: Class 1B (Passes 500V ESD Pulse)
Appropriate precautions in handling, packaging and testing devices must be observed.

SXA-389 ¼ W GaAs HBT Amplifier

Part Number Ordering Information

Part Number	Devices Per Reel	Reel Size
SXA-389	1000	7"

Part Symbolization

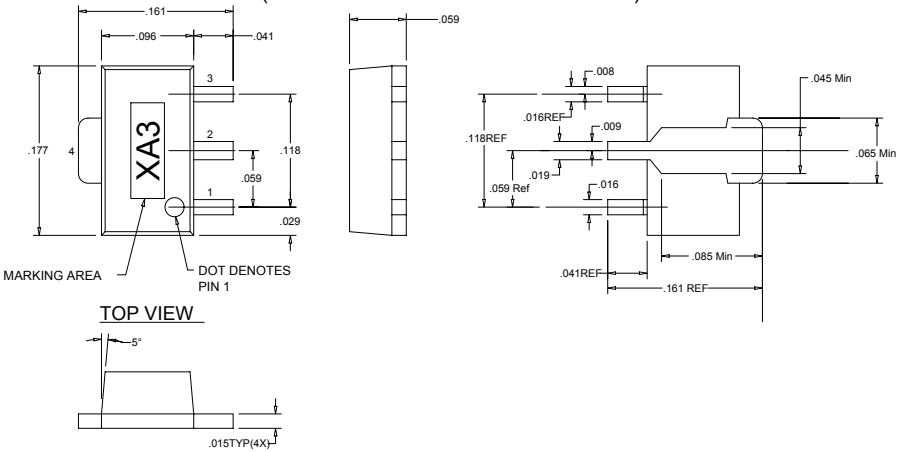
The part will be symbolized with a "XA3" designator on the top surface of the package.

Pin Description

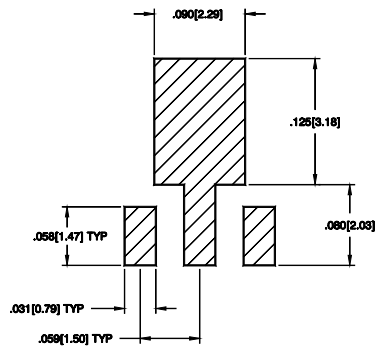
Pin #	Function	Description
1	Base	Base Pin
2	GND & Emitter	Connection to ground. Use via holes to reduce lead inductance. Place vias as close to ground leads as possible.
3	Collector	Collector Pin
4	GND & Emitter	Same as Pin 2

Package Dimensions

(See SMDI MPO-100136 for tolerances)



PCB Pad Layout



DIMENSIONS ARE IN INCHES [MM]

Recommended Mounting Configuration for Optimum RF and Thermal Performance