

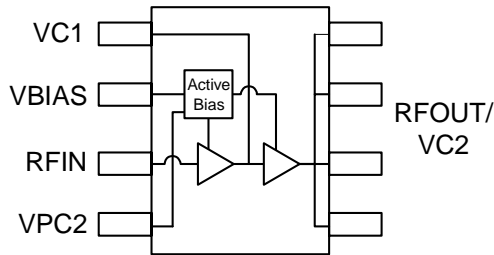


## Product Description

Sirenza Microdevices' SPA-2318 is a high efficiency GaAs Heterojunction Bipolar Transistor (HBT) amplifier housed in a low-cost surface-mountable plastic package. These HBT amplifiers are fabricated using molecular beam epitaxial growth technology which produces reliable and consistent performance from wafer to wafer and lot to lot.

This product is specifically designed for use as a driver amplifier for infrastructure equipment in the 1960 and 2140 MHz bands. Its high linearity makes it an ideal choice for multi-carrier and digital applications.

The matte tin finish on Sirenza's lead-free package utilizes a post annealing process to mitigate tin whisker formation and is RoHS compliant per EU Directive 2002/95. This package is also manufactured with green molding compounds that contain no antimony trioxide nor halogenated fire retardants.



## SPA-2318

**SPA-2318Z** RoHS Compliant & Green Package

**1700-2200 MHz 1 Watt Power Amp with Active Bias**



### Product Features

- Now available in Lead Free, RoHS Compliant, & Green Packaging
- High Linearity Performance:
  - +21 dBm IS-95 Channel Pwr at -55 dBc ACP
  - +20.7 dBm W-CDMA Channel Pwr at -50dBc ACP
  - +47 dBm Typ. OIP3
- On-chip Active Bias Control
- High Gain: 24 dB Typ. at 1960 MHz
- Patented High Reliability GaAsHBT Technology
- Surface-Mountable Plastic Package

### Applications

- W-CDMA Systems
- PCS Systems
- Multi-Carrier Applications

Symbol	Parameters: Test Conditions: Z <sub>0</sub> = 50 Ohms Temp = 25°C, V <sub>CC</sub> = 5.0V		Units	Min.	Typ.	Max.
f <sub>0</sub>	Frequency of Operation		MHz	1700		2200
P <sub>1dB</sub>	Output Power at 1dB Compression <sup>[1]</sup>	f = 1960 MHz f = 2140 MHz	dBm		29.5 29.5	
ACP	Adjacent Channel Power <sup>[1]</sup> IS-95 @ P <sub>OUT</sub> = 21.0 dBm W-CDMA @ P <sub>OUT</sub> = 20.7 dBm	f = 1960 MHz f = 2140 MHz	dBc		-55.0 -50.0	-47.0
S <sub>21</sub>	Small Signal Gain <sup>[1,2]</sup>	f = 1960 MHz f = 2140 MHz	dB	22.5	24.0 23.5	25.0
VSWR	Input VSWR <sup>[1,2]</sup>	f = 1960 MHz f = 2140 MHz	- -		1.6:1 1.6:1	
OIP <sub>3</sub>	Output Third Order Intercept Point <sup>[2]</sup> Power out per tone = +14dBm	f = 1960 MHz f = 2140 MHz	dBm		46.5 47.0	
NF	Noise Figure <sup>[1,2]</sup>	f = 1960 MHz f = 2140 MHz	dB		5.5 5.5	
I <sub>CC</sub>	Device Current <sup>[1,2]</sup>	I <sub>bias</sub> = 10 mA I <sub>c1</sub> = 70 mA I <sub>c2</sub> = 320 mA	mA	360	400	425
V <sub>CC</sub>	Device Voltage <sup>[1,2]</sup>		V	4.75	5.0	5.25
R <sub>th(j-l)</sub>	Thermal Resistance (junction - lead), T <sub>L</sub> = 85°C		°C/W		31	

[1] Optimal ACP tune

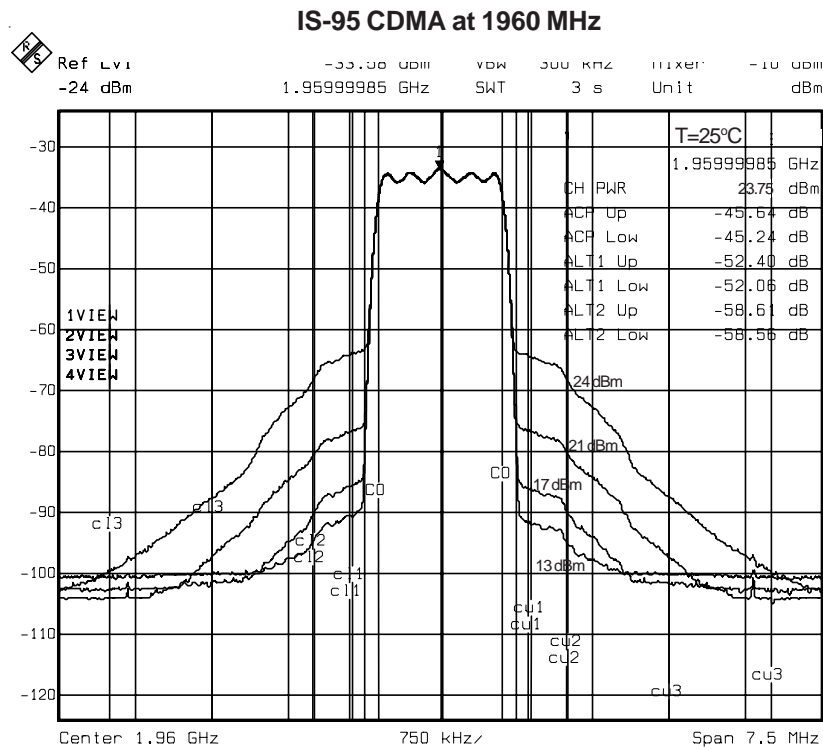
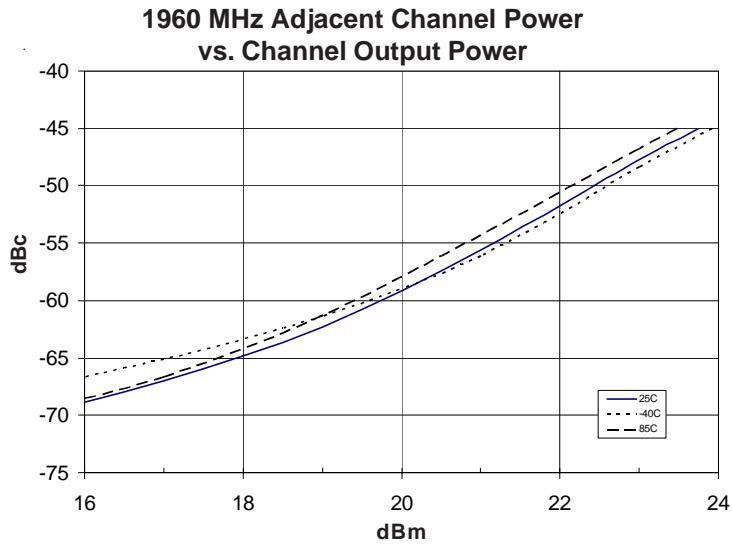
[2] Optimal IP3 tune

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**SPA-2318 1700-2200 MHz 1 Watt Power Amp.**

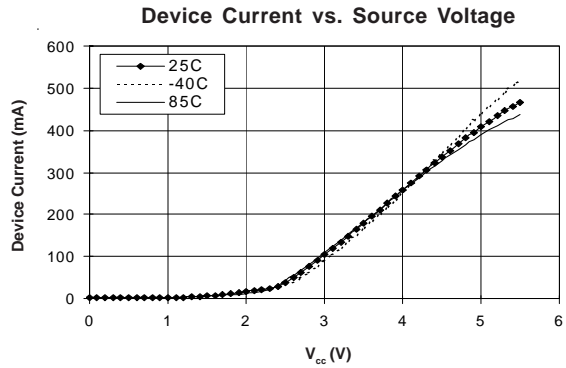
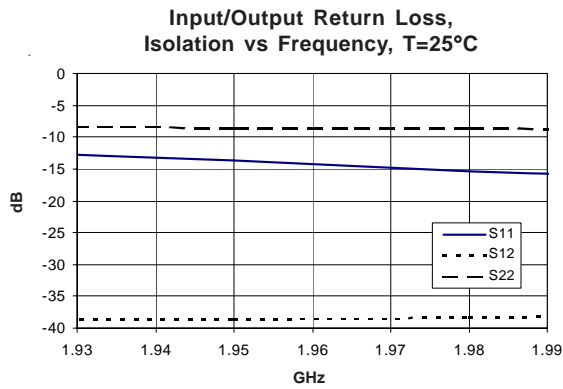
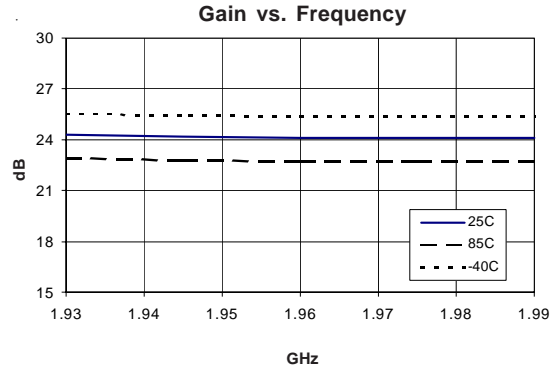
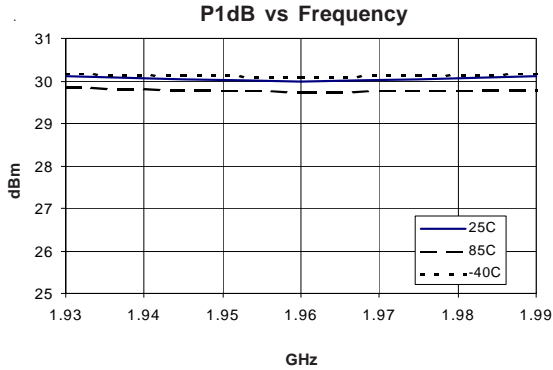
**ACP Optimized 1960 MHz Application Circuit Data, Icc=400mA, Vcc=5V  
IS-95, 9 Channels Forward**





**SPA-2318 1700-2200 MHz 1 Watt Power Amp.**

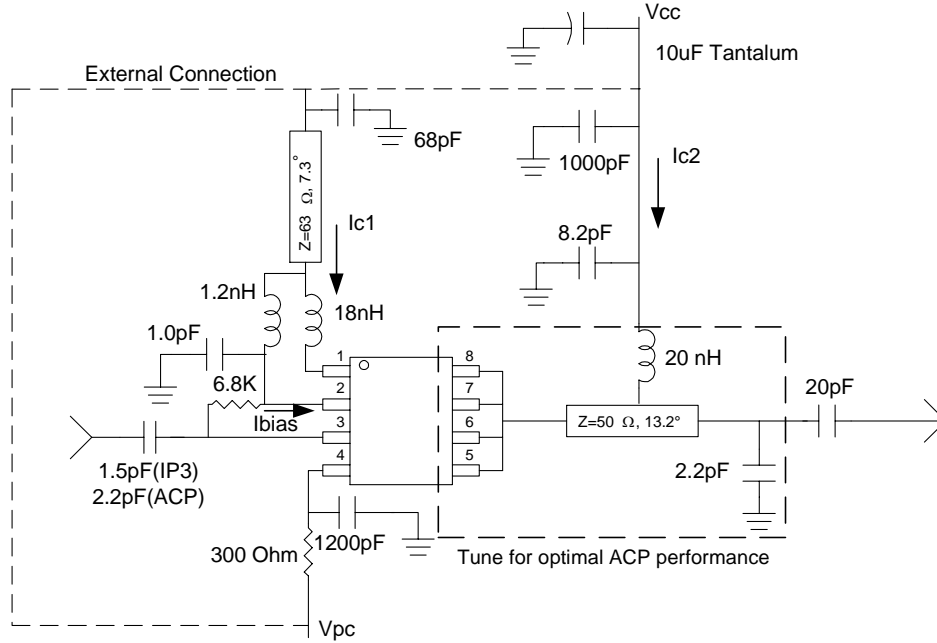
**ACP Optimized 1960 MHz Application Circuit Data, I<sub>cc</sub>=400mA, V<sub>cc</sub>=5V**



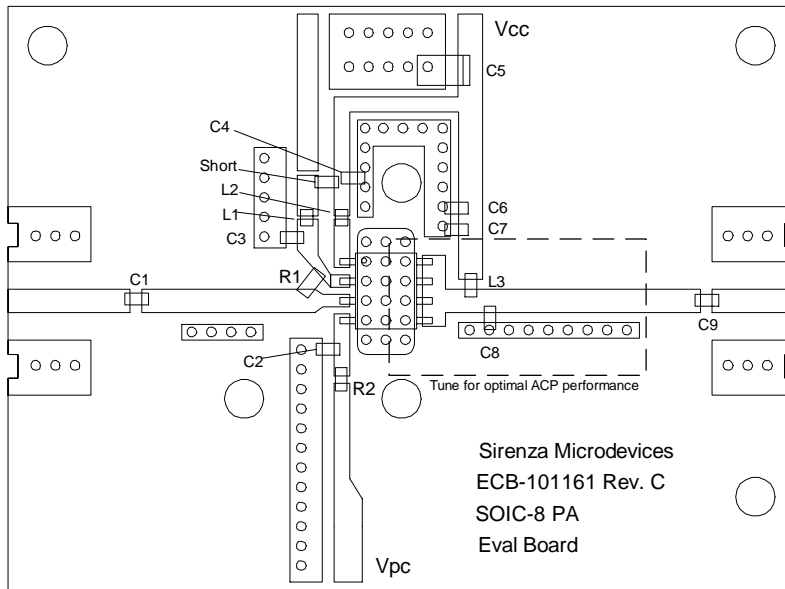


**SPA-2318 1700-2200 MHz 1 Watt Power Amp.**

**1930 - 1990 MHz Schematic**



**1930 - 1990 MHz Evaluation Board Layout**



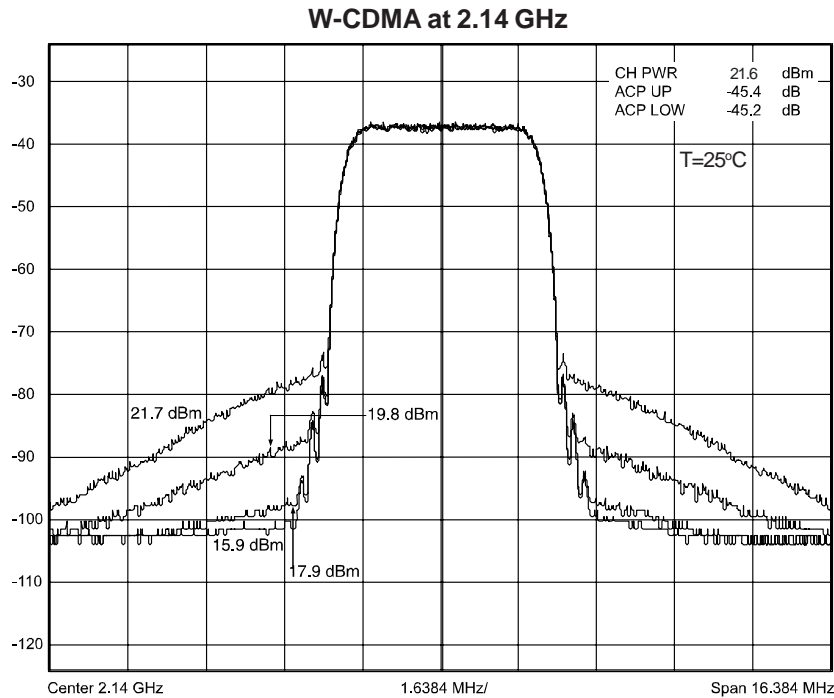
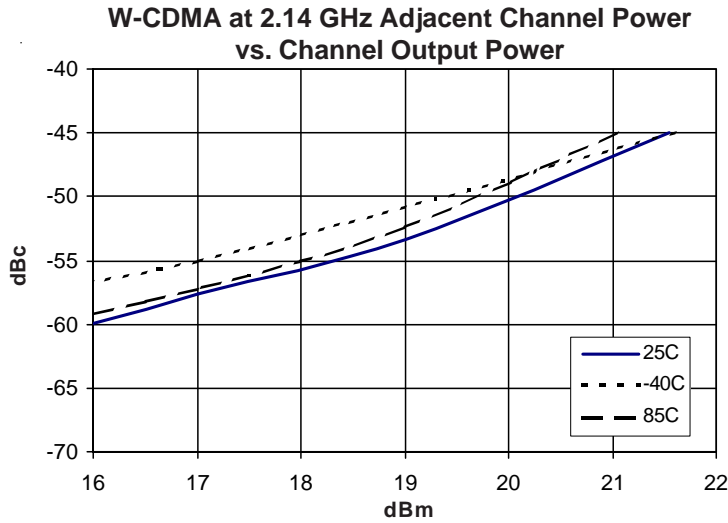
Ref. Des.	Value	Part Number
C1	1.5pF, ±0.25pF (IP3) 2.2pF, ±0.25pF (ACP)	Rohm MCH18 series
C2	1200pF, 5%	Rohm MCH18 series
C3	1.0pF, ±0.25pF	Rohm MCH18 series
C4	68pF, 5%	Rohm MCH18 series
C5	10uF, 10%	AVX TAJB106K020R
C6	1000pF, 5%	Rohm MCH18 series
C7	8.2pF, ±0.5pF	Rohm MCH18 series
C8	2.2pF, ±0.25pF	Rohm MCH18 series
C9	20pF, 5%	Rohm MCH18 series
L1	1.2nH, ±0.3nH	Toko LL1608-FS series
L2	18nH, 5%	Toko LL1608-FS series
L3	20nH, 5%	Coilcraft HQ 0805 series
R1	6.8K Ohm, 5%	Rohm MCR03 series
R2	300 Ohm, 5%	Rohm MCR03 series



**SPA-2318 1700-2200 MHz 1 Watt Power Amp.**

**ACP Optimized 2140 MHz Application Circuit Data, Icc=400mA, Vcc=5V**

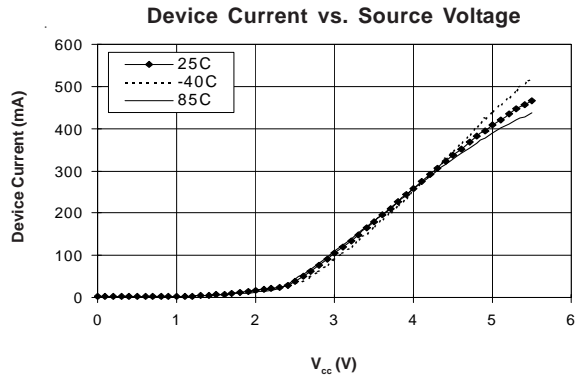
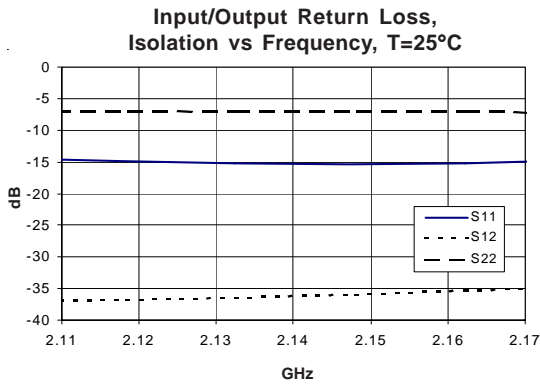
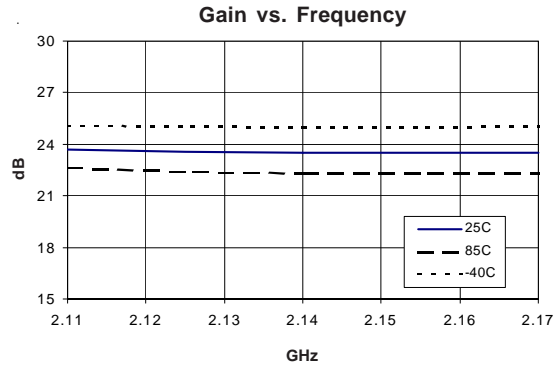
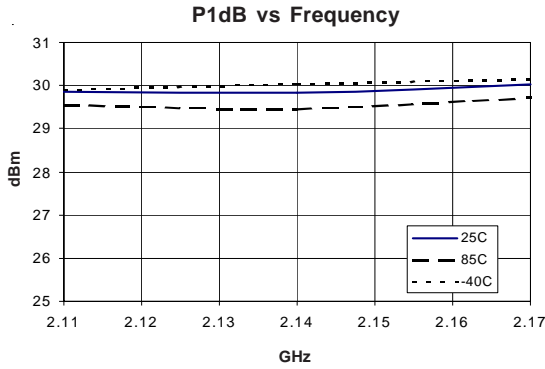
W-CDMA setup is PCCPCH+PSCH+SSCH+CPICH+PICH+64 DPCH,  
10.5 dB peak to average @ 0.001% probability





**SPA-2318 1700-2200 MHz 1 Watt Power Amp.**

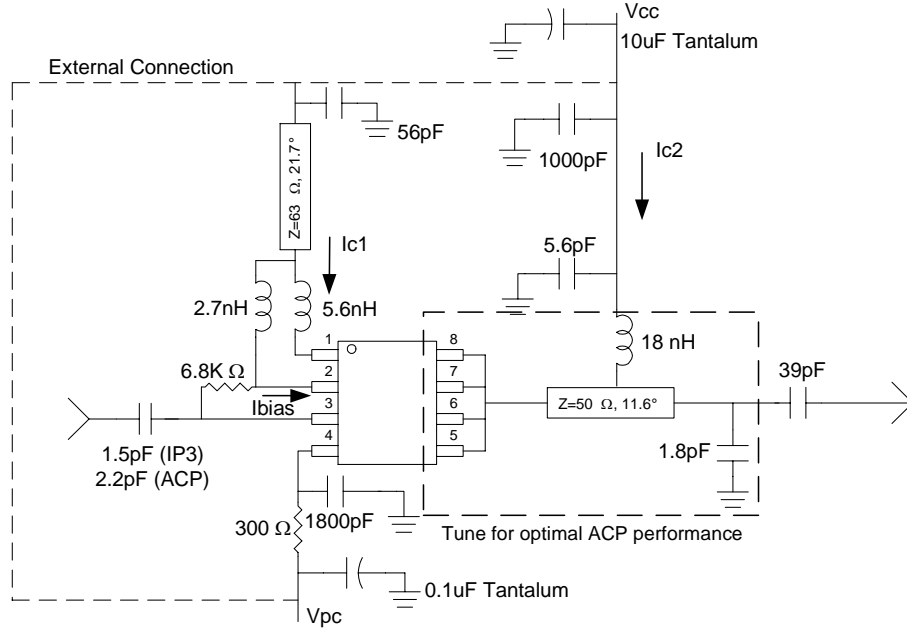
**ACP Optimized 2140 MHz Application Circuit Data, Icc=400mA, Vcc=5V**



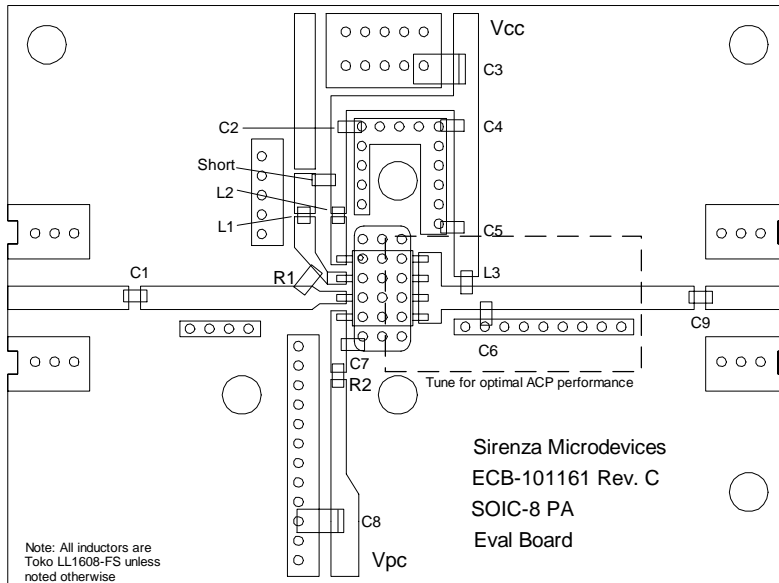


**SPA-2318 1700-2200 MHz 1 Watt Power Amp.**

**2110 - 2170 MHz Schematic**



**2110 - 2170 MHz Evaluation Board Layout**



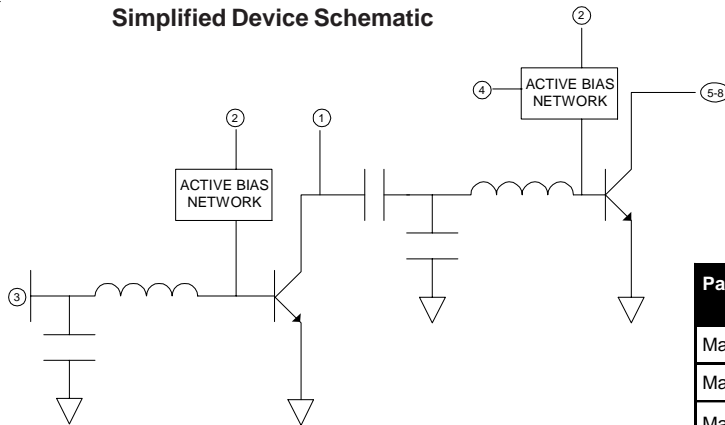
Ref. Des.	Value	Part Number
C1	1.5pF, $\pm 0.25$ pF (IP3) 2.2pF, $\pm 0.25$ pF (ACP)	Rohm MCH18 series
C2	56pF, 5%	Rohm MCH18 series
C3	10uF, 10%	AVX TAJB106K020R
C4	1000pF, 5%	Rohm MCH18 series
C5	5.6pF, $\pm 0.5$ pF	Rohm MCH18 series
C6	1.8pF, $\pm 0.25$ pF	Rohm MCH18 series
C7	1800pF, 5%	Rohm MCH18 series
C8	0.1uF, 10%	Matsuo 267M3502104K
C9	39pF, 5%	Rohm MCH18 series
L1	2.7nH, $\pm 0.3$ nH	Toko LL1608-FS series
L2	5.6nH, $\pm 0.3$ nH	Toko LL1608-FS series
L3	18nH, 5%	Toko LL1608-FS series
R1	6.8K Ohm, 5%	Rohm MCR03 series
R2	300 Ohm, 5%	Rohm MCR03 series



**SPA-2318 1700-2200 MHz 1 Watt Power Amp.**

Pin #	Function	Description
1	VC1	VC1 is the supply voltage for the first stage transistor. The configuration as shown on application schematic is required for optimum RF performance.
2	Vbias	Vbias is the bias control pin for the active bias network. Recommended configuration is shown in the Application Schematic.
3	RF In	RF input pin. This pin requires the use of an external DC blocking capacitor as shown in the Application Schematic.
4	VPC2	VPC2 is the bias control pin for the active bias network for the second stage. The recommended configuration is shown in the Application Schematic.
5, 6, 7, 8	RF Out/VC2	RF output and bias pins. Bias should be supplied to this pin through an external RF choke. Because DC biasing is present on this pin, a DC blocking capacitor should be used in most applications (see application schematic). The supply side of the bias network should be well bypassed. An output matching network is necessary for optimum performance.
EPAD	Gnd	Exposed area on the bottom side of the package needs to be soldered to the ground plane of the board for thermal and RF performance. Several vias should be located under the EPAD as shown in the recommended land pattern (page 9).

**Simplified Device Schematic**



**Absolute Maximum Ratings**

Parameter (Ta = 25°C)	Absolute Limit
Max. Supply Current (I <sub>cc1</sub> ) at V <sub>cc</sub> typ.	150 mA
Max. Supply Current (I <sub>cc2</sub> ) at V <sub>cc</sub> typ.	750 mA
Max. Device Voltage (V <sub>cc</sub> ) at I <sub>cc</sub> typ.	6.0 V
Max. RF Input Power	16 dBm
Max. Junction Temp. (T <sub>J</sub> )	+160 °C
Max. Storage Temp.	+150 °C

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:

$$I_{cc} V_{cc} (\max) < (T_J - T_J) / R_{\theta j-l}$$



**Caution: ESD sensitive**

Appropriate precautions in handling, packaging and testing devices must be observed.

The Moisture Sensitivity Level rating for this device is level 1 (MSL-1) based on the JEDEC 22-A113 standard classification. No special moisture packaging/handling is required during storage, shipment, or installation of the devices.

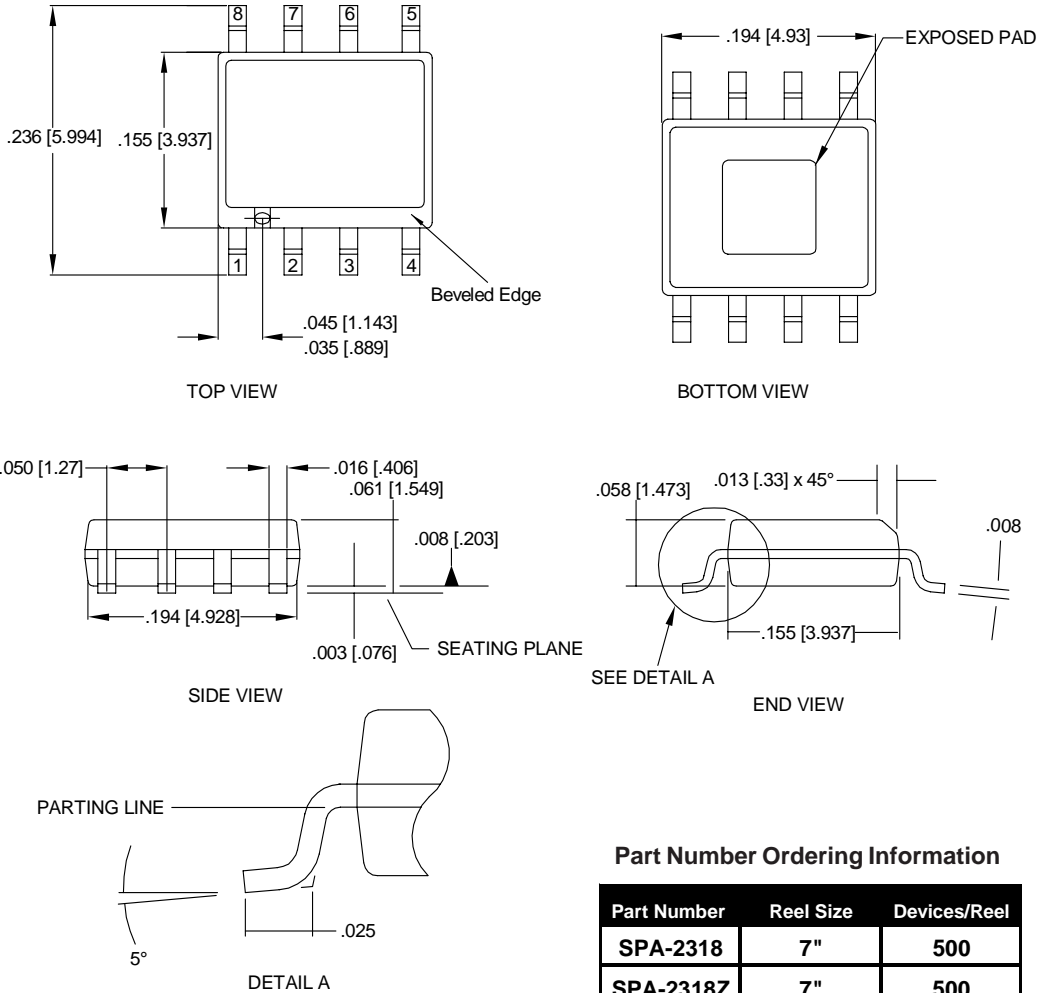




**SPA-2318 1700-2200 MHz 1 Watt Power Amp.**

**Package Outline Drawing**

(See SMDI MPO-101644 for tolerances, available on our website)

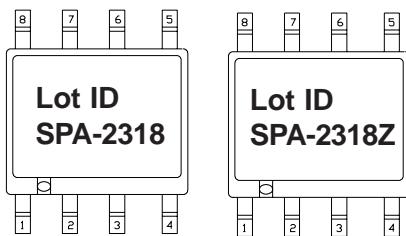


**Part Number Ordering Information**

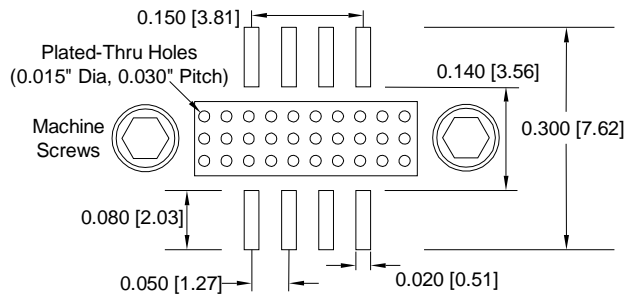
Part Number	Reel Size	Devices/Reel
SPA-2318	7"	500
SPA-2318Z	7"	500

**Note:** DIMENSIONS ARE IN INCHES [MM]

**Part Identification Marking**



**Recommended Land Pattern**



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