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SPA1118Z

850 MHz 1 WATT POWER AMPLIFIER WITH ACTIVE BIAS

Package: Exposed Pad SOIC-8

Product Description

RFMD's SPA1118Z 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 850 MHz band. Its high linearity makes it an ideal choice for wireless data and digital 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
- ☐ RF MEMS
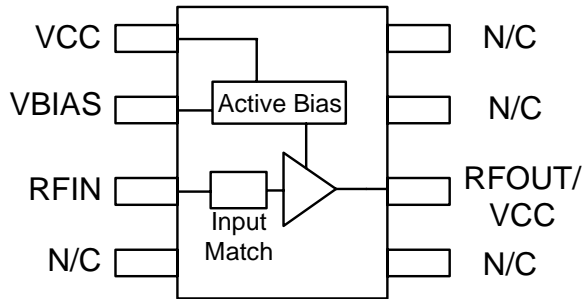
Features

- High Linearity Performance
- +21 dBm IS-95 Channel Power at -55 dBc ACP
- +48 dBm OIP3 Typ.
- On-Chip Active Bias Control
- Patented High Reliability GaAs HBT Technology
- Surface-Mountable Plastic Package

Applications

- Multi-Carrier Applications
- AMPS, ISM Applications

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Frequency of Operation	810		960	MHz	
Output Power at 1dB Compression		29.5		dBm	
Adjacent Channel Power		-57.0	-54.0	dBc	IS-95 at 880 MHz, ±885 KHz, P_{OUT}=21 dBm
Small Signal Gain	16.2	17.2	18.2	dB	880 MHz
Input VSWR		1.5:1			
Output Third Order Intercept Point		48.0		dBm	Power out per tone=+14 dBm
Noise Figure		7.5		dB	
Device Current	275	310	330	mA	
Device Voltage	4.75	5.0	5.25	V	
Thermal Resistance (junction-lead)		35		°C/W	T_L=85°C

Test Conditions: Z_0=50Ω V_{CC}=5V   Temp=25°C

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Absolute Maximum Ratings

Parameter	Rating	Unit
Max Supply Current (I_{CC}) at V_{CC} typ.	750	mA
Max Device Voltage (V_{CC}) at I_{CC} typ.	6.0	V
Max RF Input Power	24	dBm
Max Junction Temp (T_J)	+160	°C
Max Storage Temp	+150	°C
Moisture Sensitivity Level	3	MSL

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:
$$I_D V_D < (T_J - T_L) / R_{TH}, j\text{-}l$$
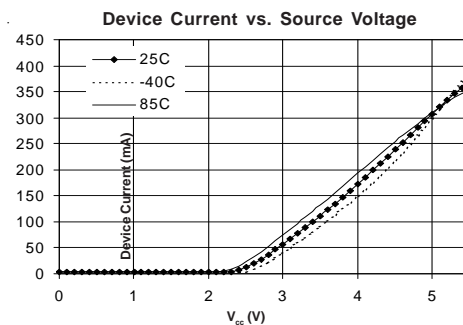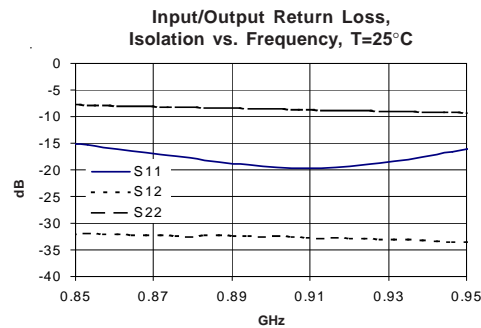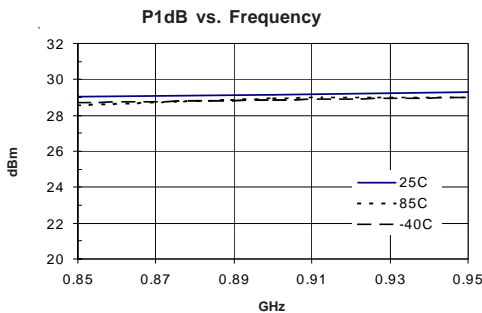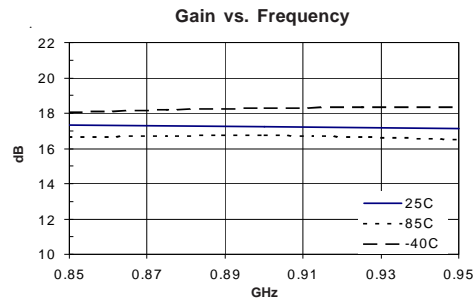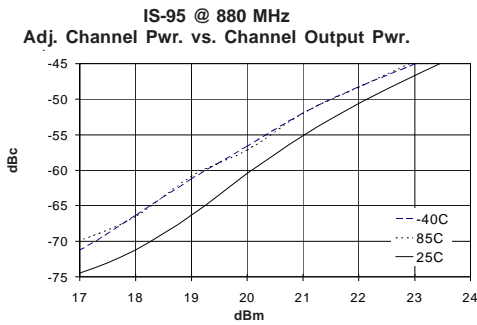
Caution! ESD sensitive device.
Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.
The information in this publication is believed to be accurate and reliable. However, no responsibility is assumed by RF Micro Devices, Inc. ("RFMD") for its use, nor for any infringement of patents, or other rights of third parties, resulting from its use. No license is granted by implication or otherwise under any patent or patent rights of RFMD. RFMD reserves the right to change component circuitry, recommended application circuitry and specifications at any time without prior notice.

RFMD Green: RoHS compliant per EU Directive 2002/95/EC, halogen free per IEC 61249-2-21, < 1000 ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

850 MHz to 950 MHz Application Circuit Data, I_{CC} = 320 mA, V_{CC} = 5 V

IS-95 @ 880 MHz
Adj. Channel Pwr. vs. Channel Output Pwr.

Gain vs. Frequency

P1dB vs. Frequency

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

Device Current vs. Source Voltage

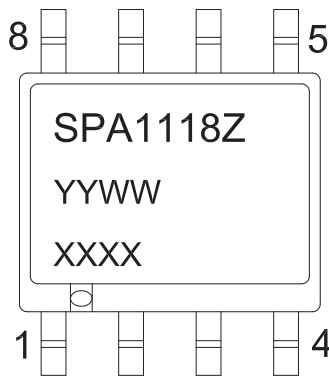| Pin	Function	Description
1	VCC	Supply voltage for the active bias network. Bypassing in the appropriate location as shown on the application schematic is required for optimum RF performance.
2	VBIAS	Bias control pin for the active bias network. Device current is set by the current into this pin. Recommended configuration is shown in the application schematic. Bypassing in the appropriate location as shown on the application schematic is required for optimum RF performance.
3	RF IN	RF input pin. This pin requires the use of an external DC-blocking capacitor chosen for the frequency of operation.
4, 5	NC	No connection.
6	RF OUT/VCC	RF output and bias pin. 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. The supply side of the bias network should be well bypassed. An output matching network is necessary for optimum performance.
7, 8	NC	No connection.
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.

Recommended Land Pattern

0.150 [3.81]

Plated-Thru Holes
(0.015" Dia, 0.030" Pitch)

0.140 [3.56]

Machine
Screws

0.300 [7.62]

0.080 [2.03]

0.050 [1.27]

0.020 [0.51]
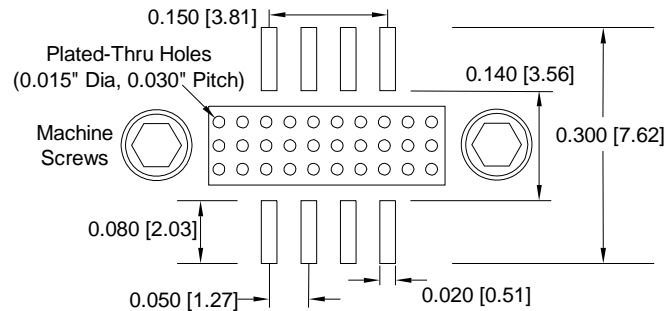
Note: DIMENSIONS ARE IN INCHES [MM]

Branding Diagram

8   5

SPA1118Z

YYWW

XXXX

1   4

YYWW = DateCode
XXXX = TraceCode assigned by Subcon

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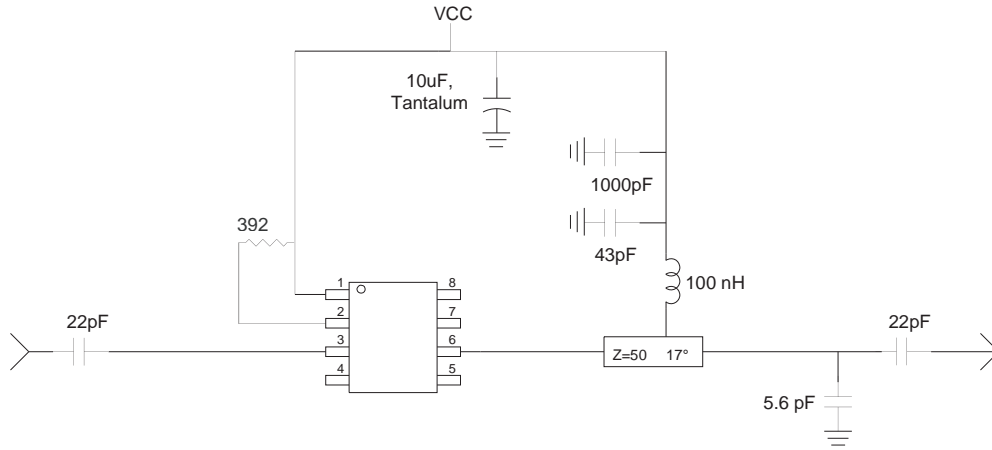## Package Drawing

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

TOP VIEW

BOTTOM VIEW

DETAIL A

SIDE VIEW

END VIEW

THIS TABLE IN MILLIMETERS

S Y M B O L	COMMON DIMENSIONS			N O T E
	MIN.	NOM.	MAX.	
A	1.43	1.55	1.68	
A1	0.00	0.05	0.10	
A2	1.43	1.50	1.58	
B	0.35	0.41	0.49	
C	0.19	0.20	0.25	
D	4.80	4.93	4.98	3
E	3.81	3.94	3.99	
e	1.27 BSC			
H	5.84	5.99	6.20	
h	0.25	0.33	0.41	
L	0.41	0.64	0.89	
∝	0°	5°	8°	

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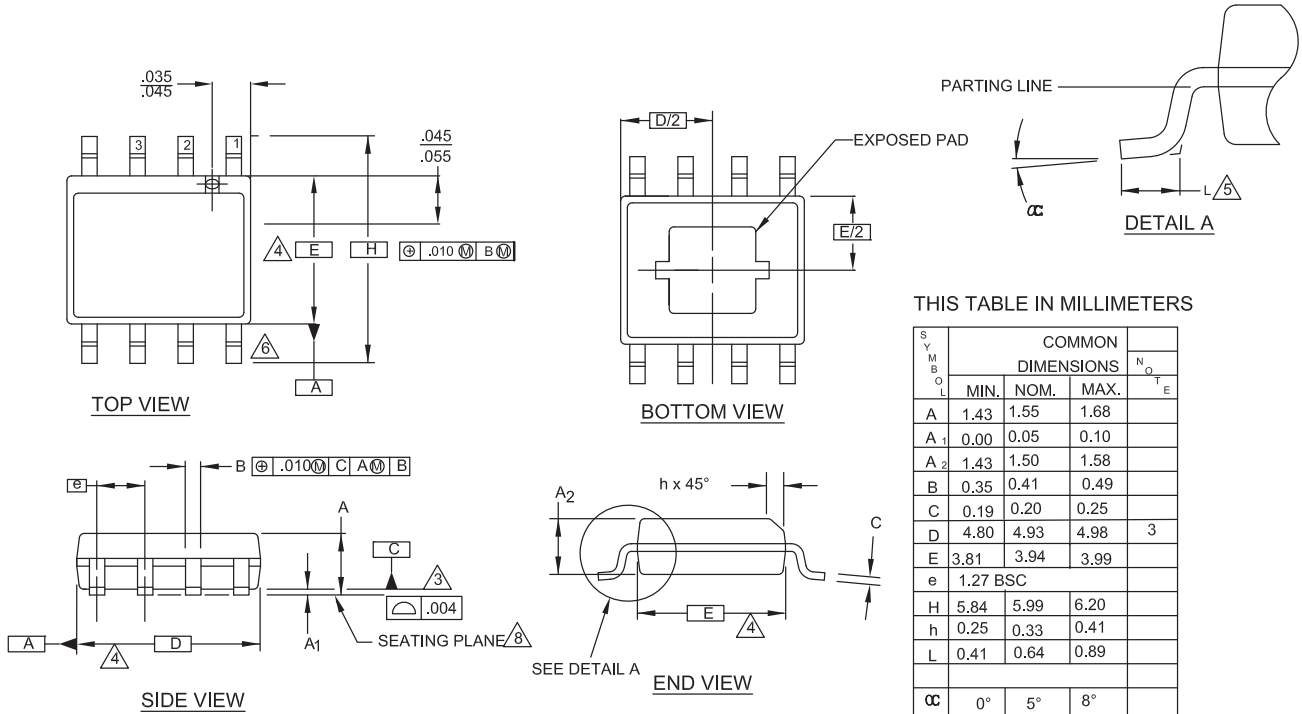
850 MHz to 950 MHz Application Schematic

Evaluation Board Layout

Note: Pins 4, 5, 7, 8 are not connected internally

ECB-101161 Rev. C
SOIC-8 PA
Eval Board
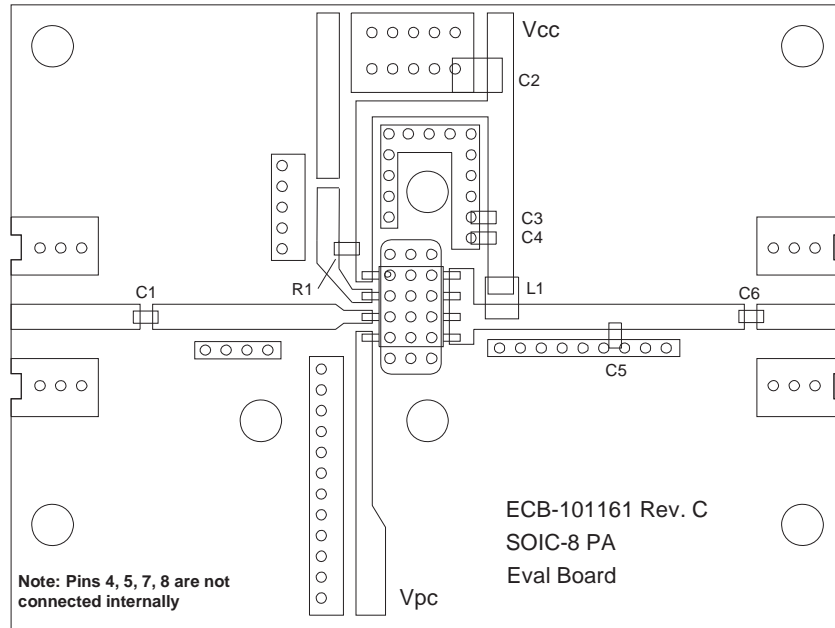
Ref. Des.	Value	Part Number
C1, C6	22 pF, 5%	Rohm MCH18 series
C2	10 uF, 10%	AVX TAJB 106K020R
C3	1000 pF, 5%	Rohm MCH18 series
C4	43 pF, 5%	Rohm MCH18 series
C5	5.6 pF, ±0.5 pF	Rohm MCH18 series
L1	100 nH, 5%	Coilcraft 1008HQ series
R1	392Ω, 1%	Rohm MCR03 series

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Ordering Information

Ordering Code	Description
SPA1118Z	7" Reel with 500 pieces
SPA1118ZSQ	Sample bag with 25 pieces
SPA1118ZSR	7" Reel with 100 pieces
SPA1118Z-EVB1	850 MHz to 950 MHz PCBA with 5-piece sample bag

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