

# SJM PREWELL PS204-63

Wideband Gain Block

## Features

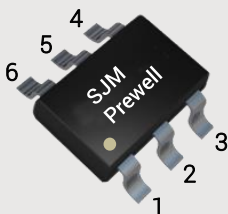
- 5 to 3000MHz
- Gain 24.1dB @ 75MHz
- P1dB 15.1dBm @ 75MHz
- OIP3 31.6dBm @ 75MHz
- Lead-free / Green / **RoHS**  compliant SOT-363 Package

## Applications

- Base station / Repeater / Mobile / Automotive / Military
  - FDD-LTE, TD-LTE, TDS-CDMA, CDMA, WCDMA, WIMAX, PCS, GSM, GPS, GPRS, TETRA
- IoT / Broadcasting / WLAN
  - FM, DMB, DVB, ISM

## Functional Diagram

RF IN 3 RF OUT / Bias 6  
GND 1,2,4,5



## ESD/MSL

- 1 ESD sensitive device. Observe handling precautions.
- 2 HBM: Class 2, JESD22-A114
- 3 CDM: Class C3, JESD22-C101F
- 4 MSL 3, J-STD-020

## Description

The PS204-63 is a high performance InGaP HBT MMIC Amplifier and consists of Darlington pair amplifiers. The PS204-63 features high linear performance, wideband operation and high reliability. The PS204-63 operates from a single voltage supply and requires only two DC-blocking capacitors, a bias resistor and an inductor for operation. The device is a general purpose buffer amplifier that offers high dynamic range in a low cost surface-mounted plastic SOT-363 package. All devices are 100% RF and DC tested.

## Specifications for Vd=3.53V, Ic=45mA

Parameter	Units	Frequency (MHz)			
		75	900	1900	2300
S21	dB	24.1	23.0	20.4	19.6
S11	dB	-20	-17	-20	-19
S22	dB	-17	-14	-10	-10
P1dB	dBm	15.1	14.7	12.2	10.1
OIP3	dBm	31.6	27.5	23.5	22.9
NF	dB	1.7	2.0	2.2	2.2
V/I	V/mA	3.53/45			
Rth	°C/W	60			

1) Test Conditions : T=25°C, Supply Voltage=4.5V, Rbias=21ohm, 50ohm System

2) OIP3 measured with two tones at an output power of -5dBm/tones separated by 1MHz.

## Specifications for Vd=3.47V, Ic=34mA

Parameter	Units	Frequency (MHz)			
		75	900	1900	2300
S21	dB	23.5	22.5	20.3	19.3
S11	dB	-16	-15	-18	-16
S22	dB	-14	-13	-10	-10
P1dB	dBm	12.2	11.5	10.8	8.9
OIP3	dBm	26.7	25.2	22.4	21.2
NF	dB	1.7	1.8	2.0	2.0
V/I	V/mA	3.47/34			
Rth	°C/W	60			

1) Test Conditions : T=25°C, Supply Voltage=4.5V, Rbias=33ohm, 50ohm System

2) OIP3 measured with two tones at an output power of -5dBm/tones separated by 1MHz.

## Absolute Maximum Ratings

Parameter	Rating	Unit
Device Voltage	8	V
Device Current	150	mA
RF Power Input	5	dBm
Storage Temperature	-55 to 150	°C
Ambient Operating Temperature	-40 to 85	°C
Junction Temperature	187	°C

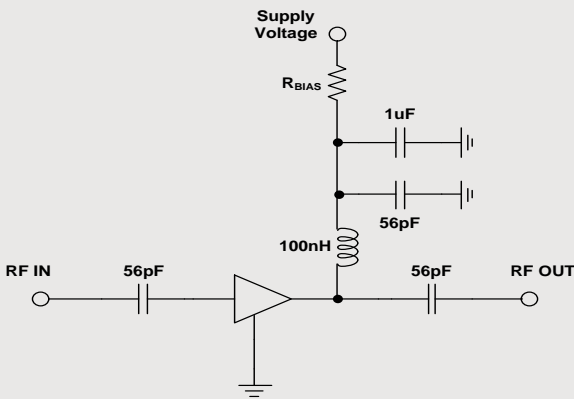
1) Stresses above the maximum values listed have may cause permanent damage to the device.

2) MTTF is more than 100 years.

**Typical RF Performance for 900MHz Tuned Application Circuit (3.53V / 45mA)**

Supply Bias Voltage = 4.5V, R(bias)= 21 ohm, Current= 45mA

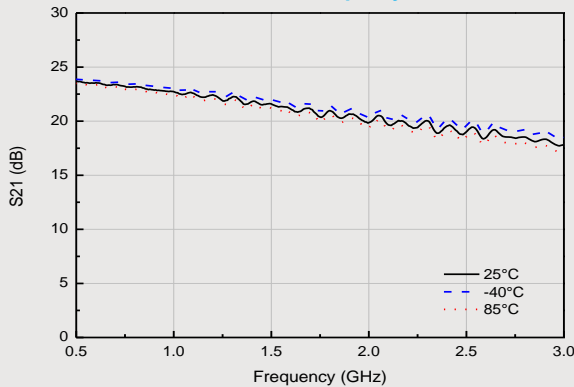
Parameters	Units	Frequency(MHz)					
		500	900	1500	1900	2300	3000
S21	dB	23.8	23.1	21.5	20.4	19.5	18.0
S11	dB	-18	-17	-18	-20	-19	-10
S22	dB	-16	-14	-11	-10	-10	-15
P1dB	dBm	15.1	14.7	13.3	12.2	10.1	8.5
OIP3@-5dBm	dBm	28.6	27.5	24.3	23.5	22.9	20.1
NF	dB	2.0	2.0	2.0	2.2	2.2	2.4



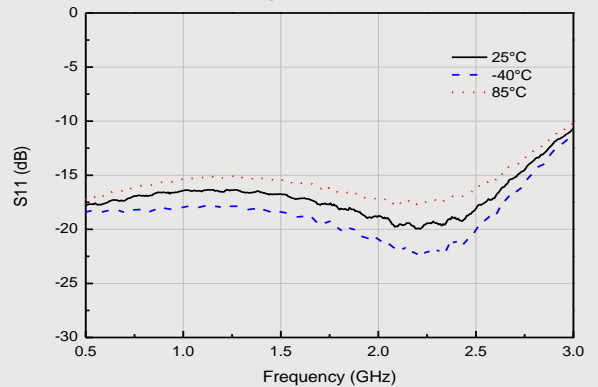
**Recommended Bias Values**

Supply Voltage (V)	R <sub>BIAS</sub> Value (ohm)	Size
4.5	21.0	0805
5	32.0	1210
6	53.5	1210
7	75.0	2010
8	97.0	2010
10	140.0	2010
12	183.0	2512

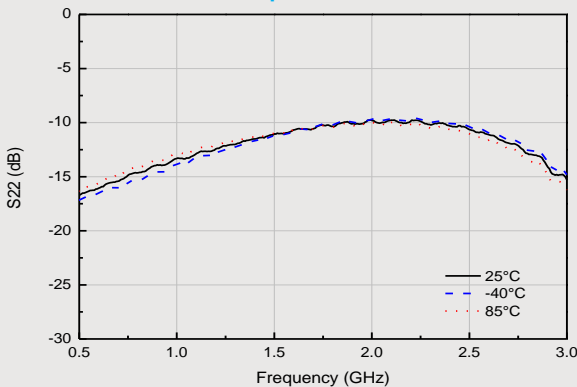
**Gain vs. Frequency**



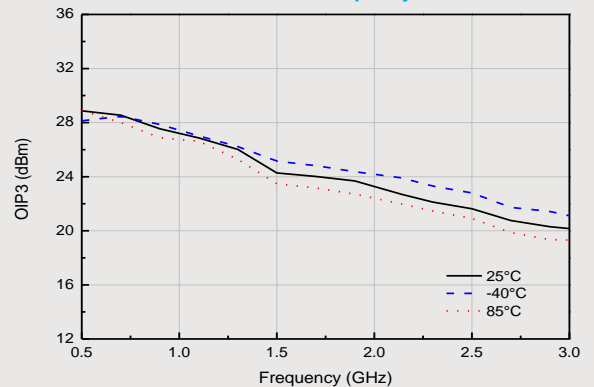
**Input Return Loss**



**Output Return Loss**



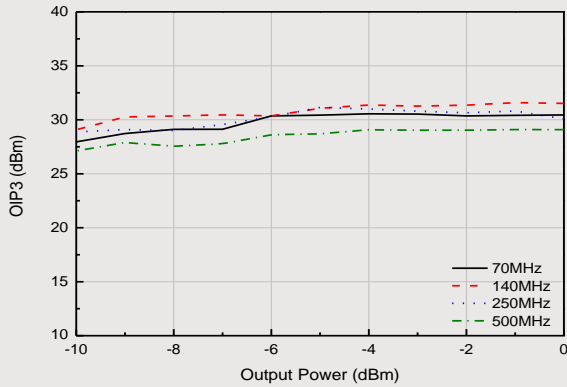
**OIP3 vs. Frequency**



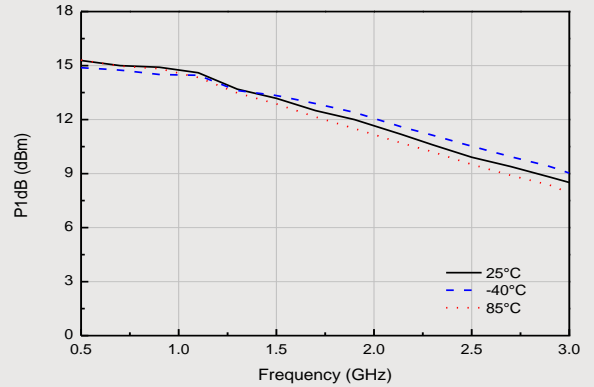
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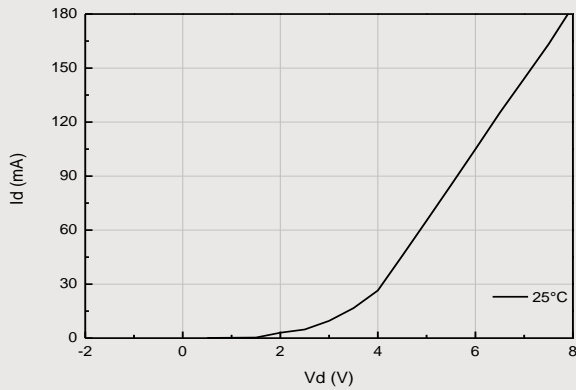
OIP3 vs. Output Power



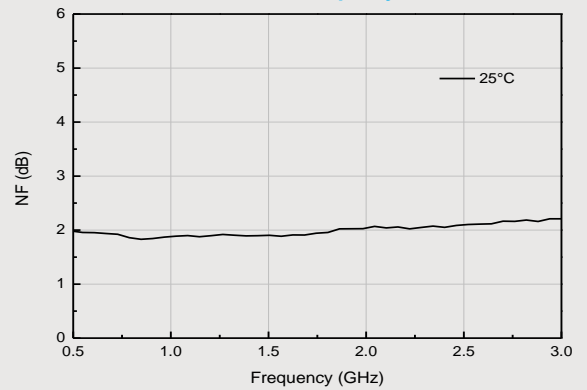
P1dB vs. Frequency



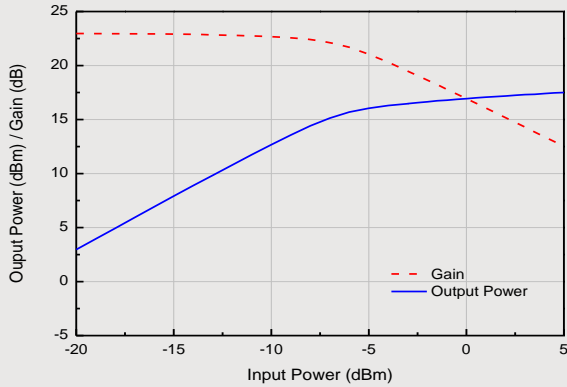
Id vs. Vd



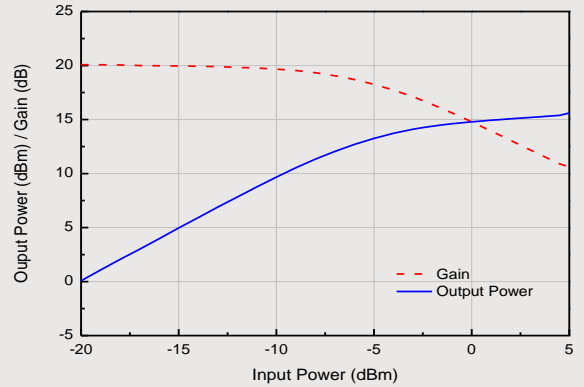
NF vs. Frequency



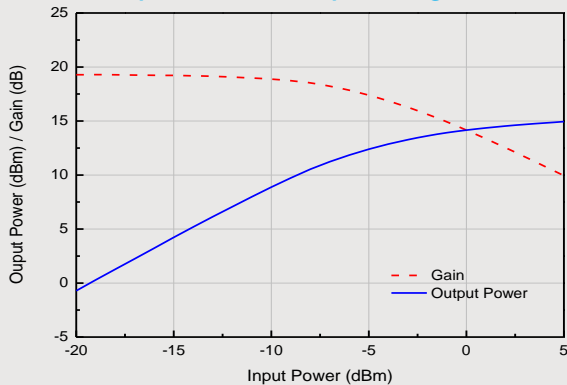
Output Power / Gain vs Input Power @ 900MHz



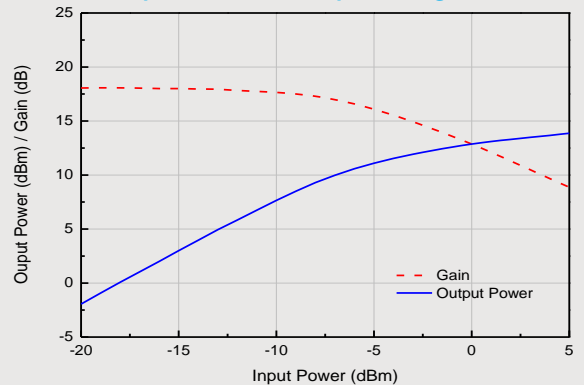
Output Power / Gain vs Input Power @ 1900MHz



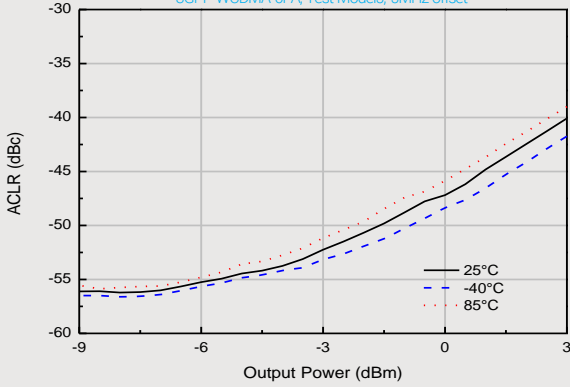
Output Power / Gain vs Input Power @ 2140MHz



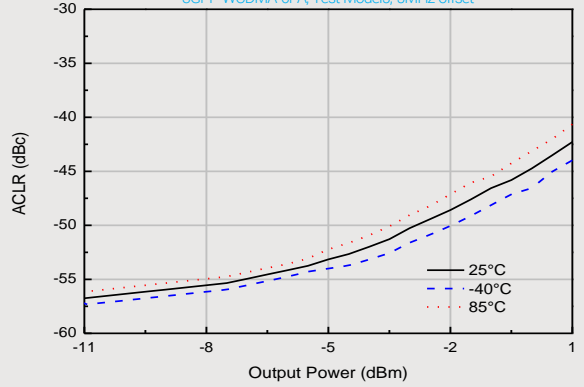
Output Power / Gain vs Input Power @ 2600MHz



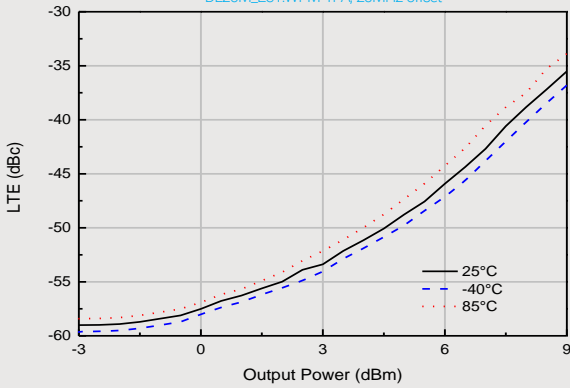
**WCDMA ACLR vs. Output Power @ 1850MHz**  
 3GPP WCDMA 6FA, Test Model5, 5MHz offset



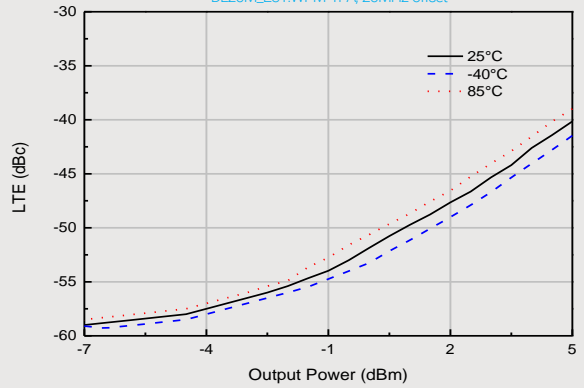
**WCDMA ACLR vs. Output Power @ 2140MHz**  
 3GPP WCDMA 6FA, Test Model5, 5MHz offset



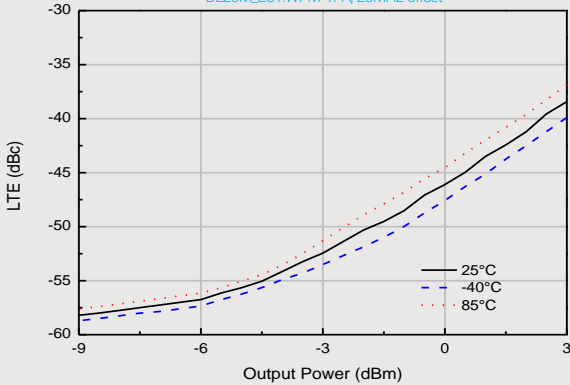
**LTE ACLR vs. Output Power @ 900MHz**  
 DL20M\_E31.WFM 1FA, 20MHz offset



**LTE ACLR vs. Output Power @ 1850MHz**  
 DL20M\_E31.WFM 1FA, 20MHz offset



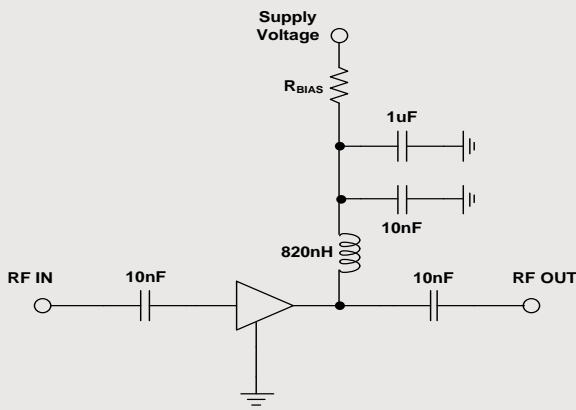
**LTE ACLR vs. Output Power @ 2650MHz**  
 DL20M\_E31.WFM 1FA, 20MHz offset



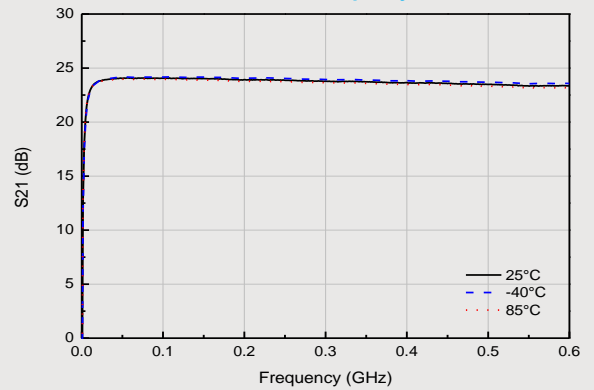
**Typical RF Performance for 50 -500MHz Tuned Application Circuit (3.53V / 45mA)**

Supply Bias Voltage = 4.5V, R(bias)= 21ohm, Current=45mA

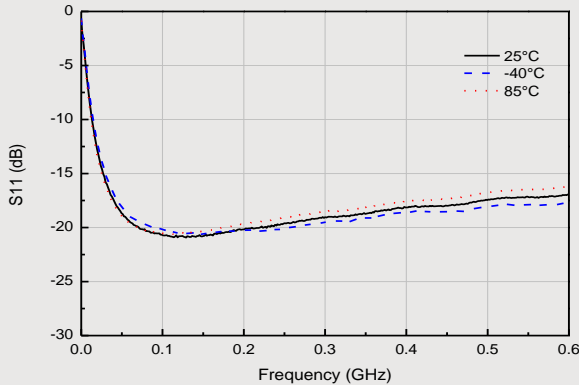
Parameters	Units	Frequency(MHz)			
		75	125	300	500
S21	dB	24.1	24.1	23.9	23.6
S11	dB	-20	-21	-19	-17
S22	dB	-17	-17	-17	-15
P1dB	dBm	15.1	15.3	15.2	15.0
OIP3 @ -5dBm	dBm	31.6	30.9	30.0	29.3
NF	dB	1.7	1.7	1.9	1.9



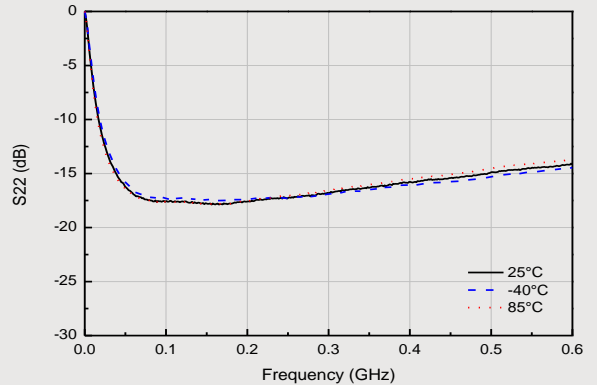
**Gain vs. Frequency**



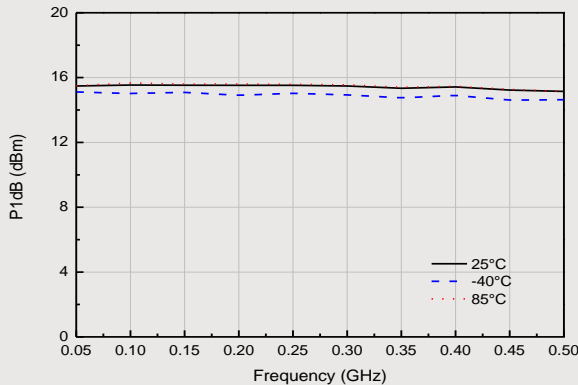
**Input Return Loss**



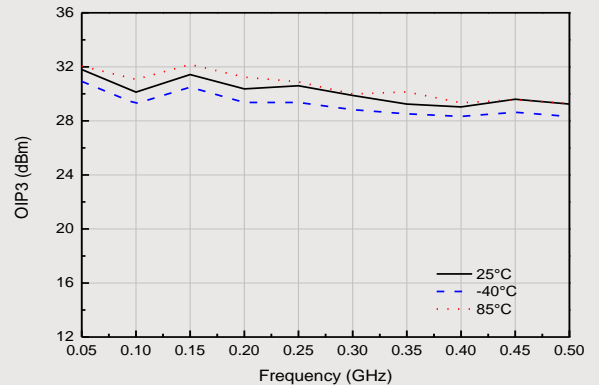
**Output Return Loss**



**P1dB vs. Frequency**

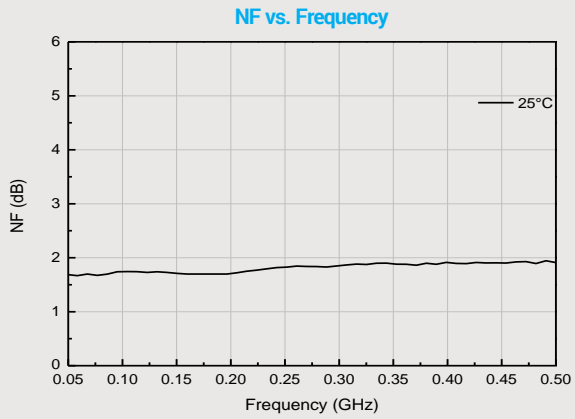


**OIP3 vs. Frequency**



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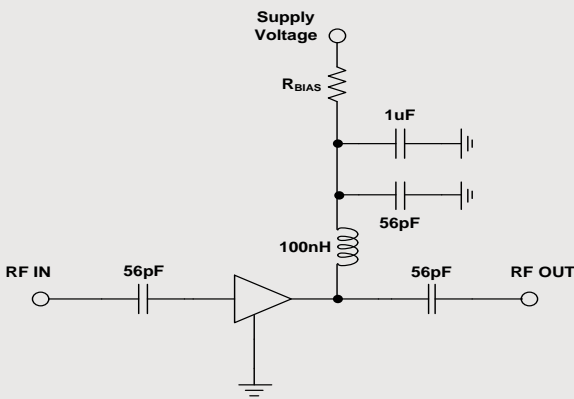
Wideband Gain Block



**Typical RF Performance for 900MHz Tuned Application Circuit (3.47V / 34mA)**

Supply Bias Voltage = 4.5V, R(bias)= 33 ohm, Current= 34mA

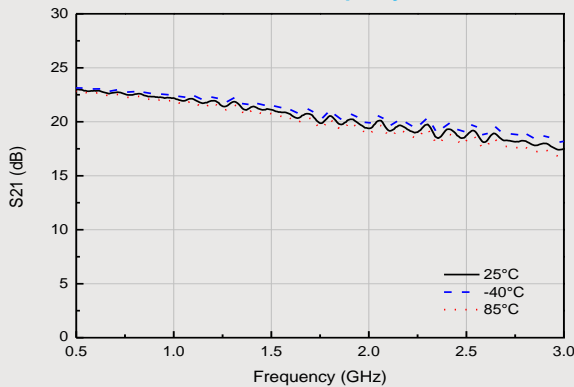
Parameters	Units	Frequency(MHz)					
		500	900	1500	1900	2300	3000
S21	dB	23.1	22.5	21.1	20.2	19.2	17.6
S11	dB	-15	-15	-16	-18	-16	-9
S22	dB	-14	-13	-10	-10	-10	-15
P1dB	dBm	12.0	11.5	11.6	10.8	8.9	7.3
OIP3@-5dBm	dBm	25.2	25.2	23.2	22.4	21.2	18.4
NF	dB	1.9	1.9	1.9	2.0	2.0	2.2



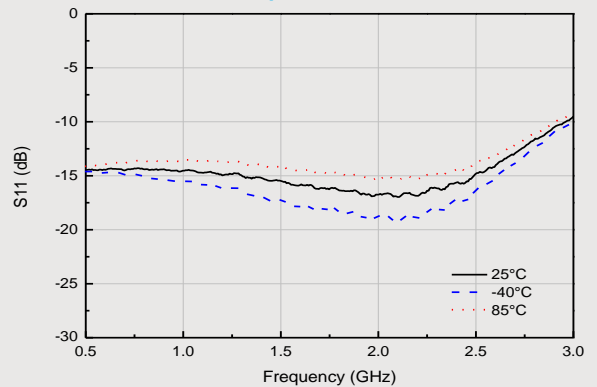
**Recommended Bias Values**

Supply Voltage (V)	R <sub>BIAS</sub> Value (ohm)	Size
4.5	33.0	0805
5	47.5	1210
6	77.0	1210
7	106.0	2010
8	135.0	2010
10	194.0	2010
12	253.0	2512

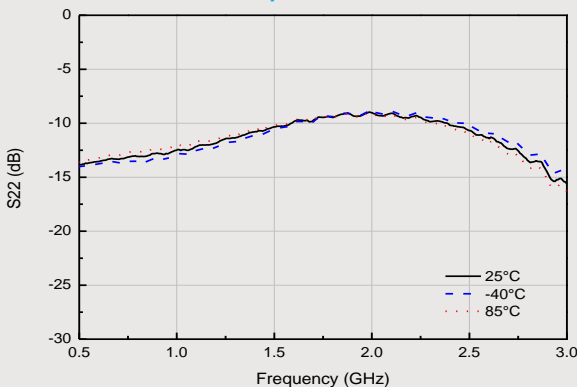
**Gain vs. Frequency**



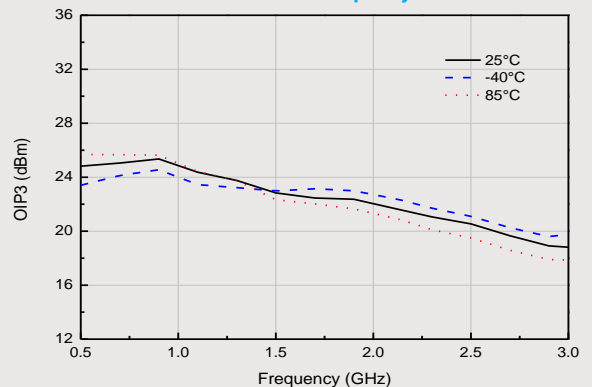
**Input Return Loss**



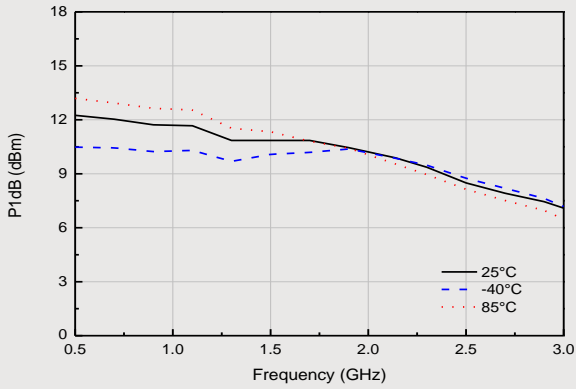
**Output Return Loss**



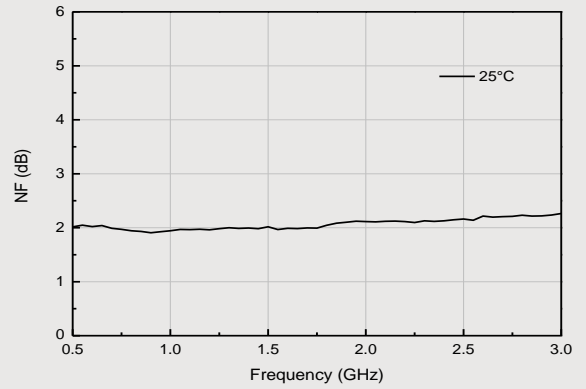
**OIP3 vs. Frequency**



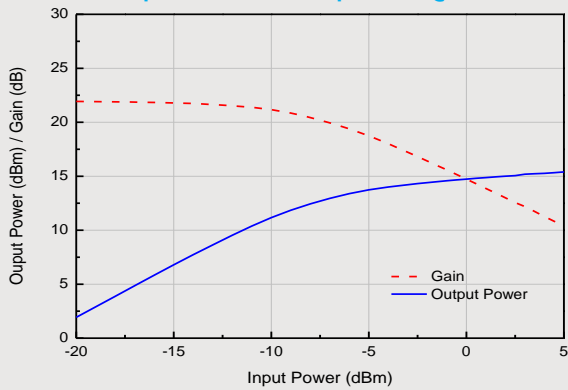
**P1dB vs. Frequency**



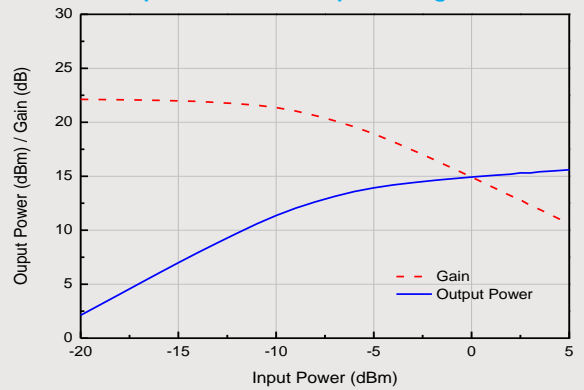
**NF vs. Frequency**



**Output Power / Gain vs Input Power @ 900MHz**



**Output Power / Gain vs Input Power @ 1900MHz**

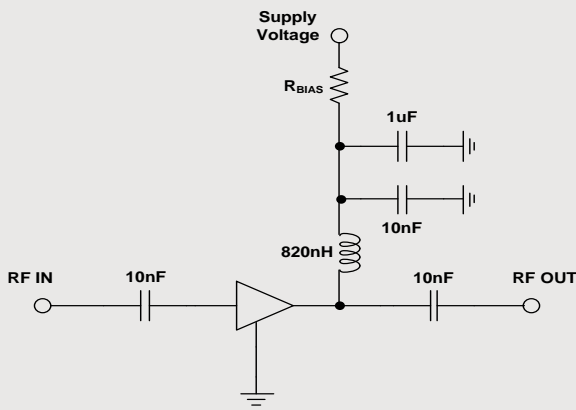




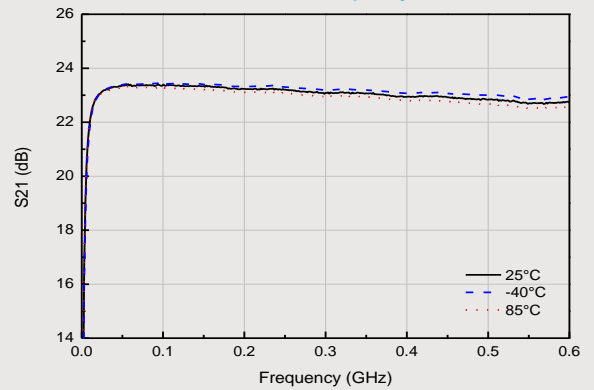
**Typical RF Performance for 50 -500MHz Tuned Application Circuit (3.47V / 34mA)**

Supply Bias Voltage = 4.5V, R(bias)= 33ohm, Current= 34mA

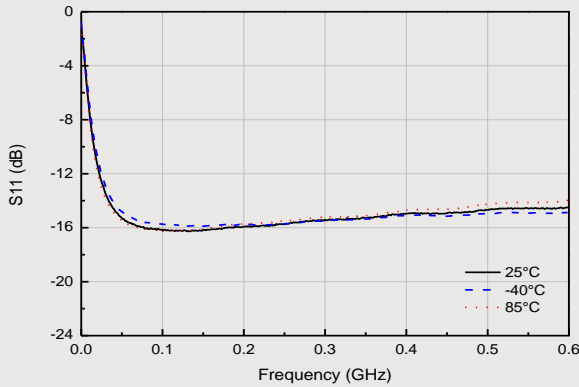
Parameters	Units	Frequency(MHz)			
		75	125	300	500
S21	dB	23.5	23.5	23.2	23.0
S11	dB	-16	-16	-15	-15
S22	dB	-14	-14	-14	-13
P1dB	dBm	12.1	12.3	12.0	11.6
OIP3 @ -5dBm	dBm	26.7	25.6	25.2	25.2
NF	dB	1.7	1.7	1.8	1.9



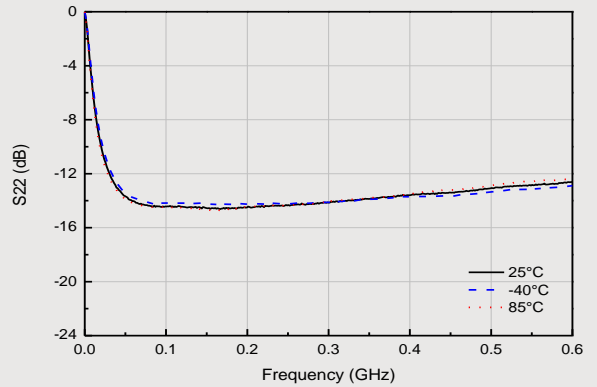
**Gain vs. Frequency**



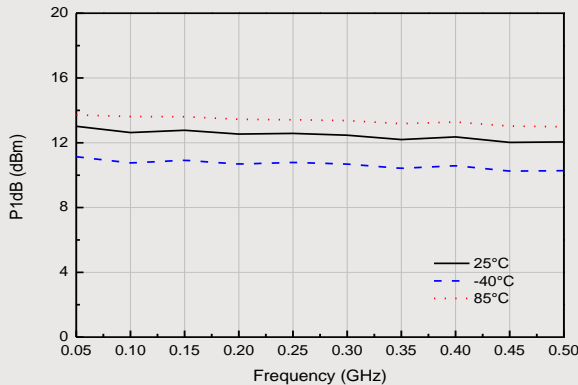
**Input Return Loss**



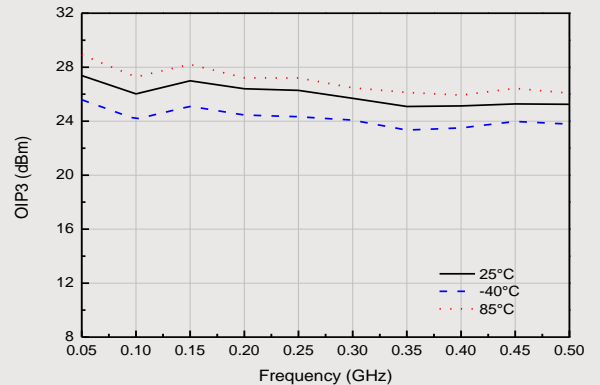
**Output Return Loss**

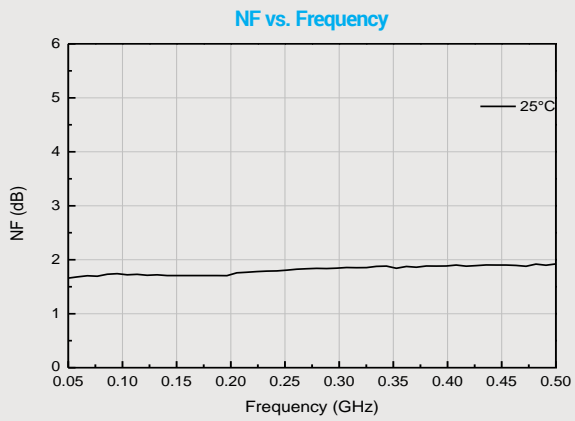


**P1dB vs. Frequency**



**OIP3 vs. Frequency**

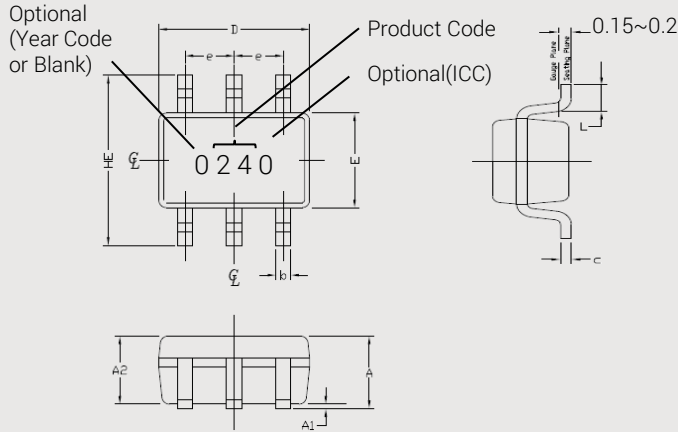




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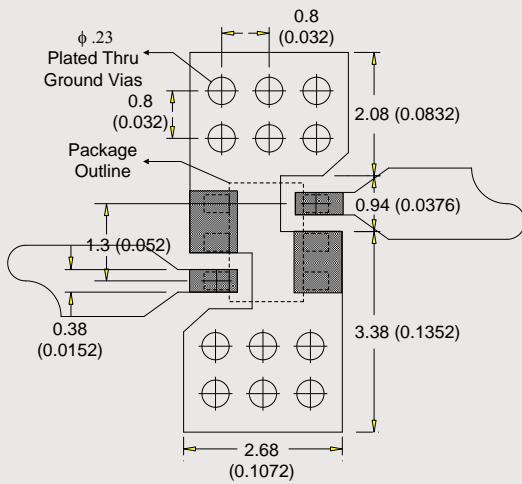
Wideband Gain Block

## Lead-free /RoHS Compliant / Green SOT-363 Package Outline

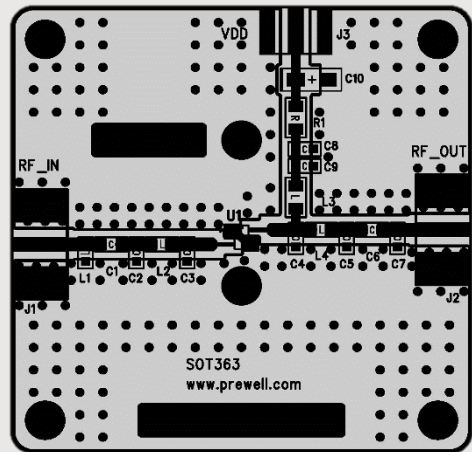


SYMBOL	MIN.	MAX.
E	1.15	1.35
D	1.85	2.25
HE	1.95	2.30
A	0.80	1.10
A2	0.70	1.00
A1	0.00	0.10
e	0.65 BSC	
b	0.15	0.40
c	0.08	0.25
L	0.21	0.26

## Land Pattern



## Evaluation Board Layout (40x40)



## Mounting Instructions

- 1 Use a large ground pad area with many plated through-holes as shown.
- 2 We recommend 1 oz copper minimum.
- 3 Measurement for our data sheet was made on 0.8mm thick FR-4 Board.
- 4 RF trace width depends on the board material and construction.
- 5 Add mounting screws near the part to fasten the board to a heatsink.
- 6 Add as much copper as possible to inner and outer layers near the part to ensure optimal thermal performance.