

# RMLA3565-58

## Wideband Low Noise MMIC Amplifier

PRODUCT INFORMATION

### Description

The Raytheon RF Components RMLA3565-58 is a single bias wideband low noise MMIC amplifier designed for the 3.5 - 6.5 GHz frequency range. The MMIC requires no external matching circuits or external gate bias supply. This device uses Raytheon's advanced 0.25  $\mu\text{m}$  PHEMT process to provide low noise, high linearity, and low current.

### Features

- ◆ 18.0 dB Gain typical
- ◆ 1.4 dB Noise Figure Typical 5.0 -6.5 GHz
- ◆ Single Positive Bias
- ◆ Small Outline Metal Base Quad Plastic Package
- ◆ Internal 50  $\Omega$  Matching



### Absolute Ratings

Parameter	Symbol	Value	Unit
Positive Drain DC Voltage	$V_{dd}$	6.5	V
RF Input Power (from 50 $\Omega$ source)	$P_{IN}(CW)$	0	dBm
Drain Current	$I_{dd}$	130	mA
Case Operating Temperature	$T_{case}$	-35 to 85	$^{\circ}\text{C}$
Storage Temperature Range	$T_{storage}$	-40 to 110	$^{\circ}\text{C}$
Soldering Temperature	$T_{solder}$	220	$^{\circ}\text{C}$
Thermal Resistance (Channel to Case)	$R_{jc}$	8	$^{\circ}\text{C}/\text{W}$

### Electrical Characteristics

(50 $\Omega$  System,  
 $V_{dd} = 4\text{ V}$ ,  
 $T = +25^{\circ}\text{C}$ )

Parameter	Min	Typ	Max	Unit
Frequency Range	3.5		6.5	GHz
Gain (Small Signal) <sup>1,2</sup>	17.0	18.0		dB
Gain Variation vs Temp		0.013		dB/ $^{\circ}\text{C}$
Noise Figure <sup>2</sup>				
3.5 - 5 GHz		2.0	2.2	dB
5 - 6.5 GHz		1.4	1.6	dB

Parameter	Min	Typ	Max	Unit
Power Out, P-1dB	8.0	9.0		dBm
IP3 @ 5.5GHz, -8dBm Pout		21.0		dBm
I <sub>dd</sub>		70	90	mA
V <sub>dd</sub>	3.0	4.0	6.0	V
Input/Output Return Loss		10.0	5.0	dB

#### Notes:

1. Pin = - 20,  $V_d = 4.0\text{ V}$ , Frequency 3.5 -6.5 Ghz
2. Data de-embedded from fixture loss.

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**Application Information**

**CAUTION: THIS IS AN ESD SENSITIVE DEVICE**

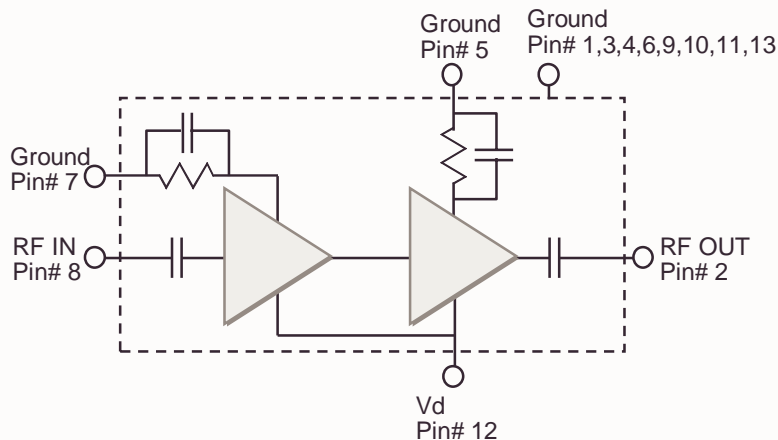
The following briefly describes a procedure for evaluating the high efficiency PHEMT amplifier packaged in a surface mount package. It may be noted that the chip is a fully monolithic single ended two stage amplifier for 3.5 to 6.5 GHz applications. Figure 1 shows the functional block diagram of the packaged product.

**Test Fixture**

Figure 2 shows the outline and pin-out descriptions for the packaged device. A typical test fixture schematic showing external bias components is shown in Figure 3. Figure 4 shows typical layout of an evaluation board corresponding to the schematic diagram. Typical performance of the test fixture is shown in the performance data section. The following should be noted:

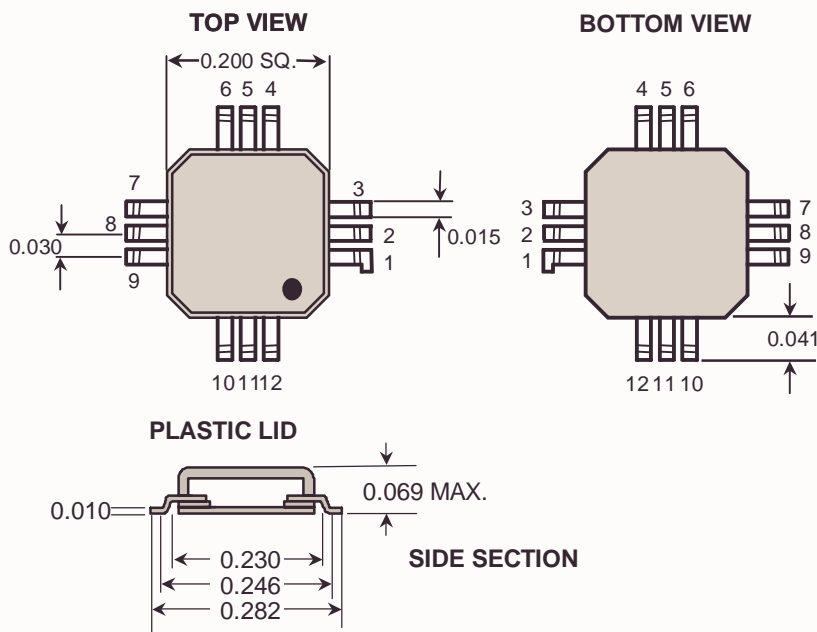
- (1) Package pin designations are shown in figure 2.
- (2) Vd is the drain voltage (positive) applied at the pins of the package.
- (3) Vdd is the positive supply voltage at the evaluation board terminal.

**Figure 1**  
Functional Block Diagram



**Figure 2**  
Package Outline Dimensions

Dimensions in inches



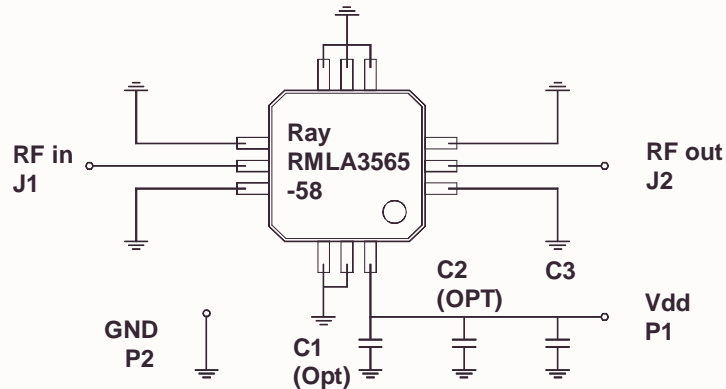
Pin#	Description
1	GND
2	RF Out
3	GND
4	GND
5	GND
6	GND
7	GND
8	RF In
9	GND
10	GND
11	GND
12	Vd
13	GND (Package Base)

# RMLA3565-58

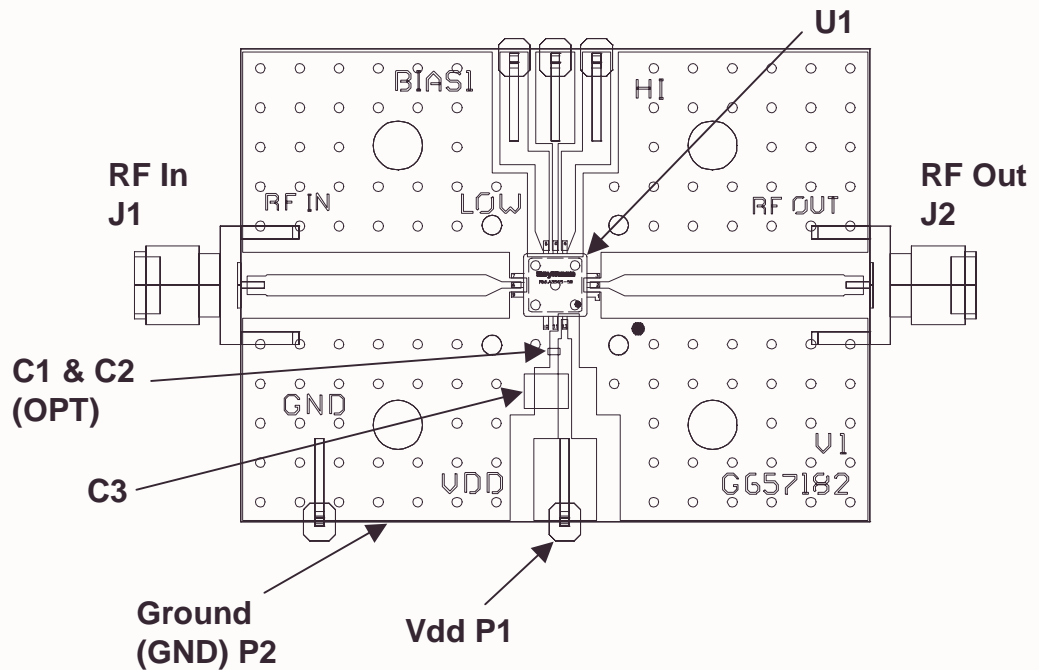
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PRODUCT INFORMATION

**Figure 3**  
Schematic for a  
Typical Test  
Evaluation Board  
(RMLA3565-58-TB)



**Figure 4**  
Layout and Assembly of  
Test Evaluation Board  
(RMLA3565-58-TB)



**Test Procedure**  
for the evaluation board  
(RMLA3565-58-TB)

The following sequence of procedure must be followed to properly test the power amplifier:

- Step 1:** Turn off RF input power.
- Step 2:** Use GND terminal of the evaluation board to connect DC supply grounds.
- Step 3:** Apply drain supply voltage of +4.0 V to evaluation board terminal Vdd.
- Step 4:** After the bias condition is established, RF input signal may now be applied.
- Step 5:** Follow turn-off sequence of:
  - (i) Turn off RF input power.
  - (ii) Turn down and off Vdd.

**Parts List**  
for test evaluation board  
(RMLA3565-58-TB)

Part	Value	EIA Size	Vendor(s)
C1	330 pF	.04" x .02"	AVX, Murata, Novacap,
C2	1000 pF	.04" x .02"	AVX, Murata, Novacap
C3	4.75 uF	.14"x .11"	Sprague, ATC, AVX, Murata
U1	RMLA3565-58	.28" x .28" x .07"	Raytheon
P1, P2	Terminal		Samtec
J1, J2	SMA Connectors		E.F. Johnson
Board	RO4003(Rogers)	1.99x1.50x.032	Raytheon

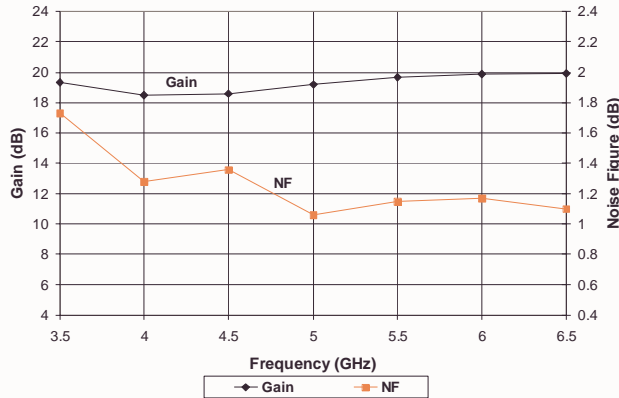
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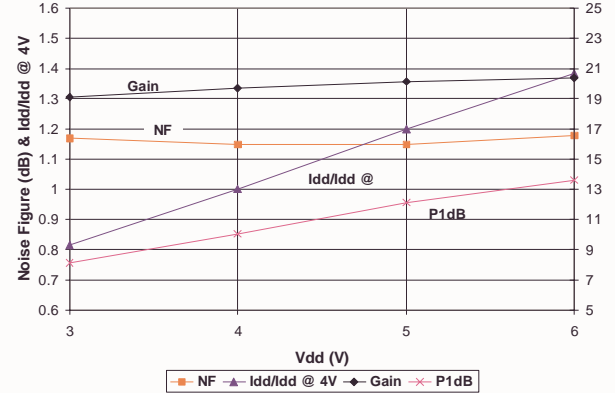
PRODUCT INFORMATION

**Figure 5**  
Performance  
Data

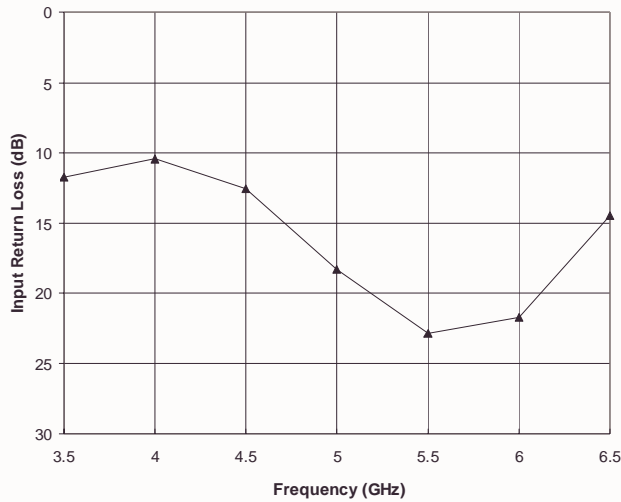
**Gain and De-embedded Noise Figure**  
Vdd = 4.0V, Idd = 70 mA



**Noise Figure, Gain, Idd vs. Vdd**  
Frequency = 5.5 GHz



**Input Return Loss**  
Vdd = 4.0V, Idd = 70 mA



**Output Return Loss**  
Vdd = 4.0V, Idd = 70 mA

