

# RMLA3565-58

## Wideband Low Noise MMIC Amplifier

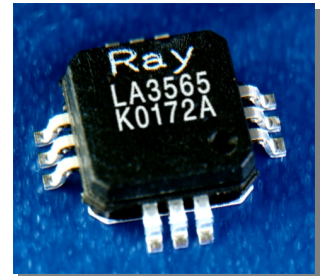
PRODUCT INFORMATION

**Description**

The Raytheon RMLA3565-58 is a single bias wideband low noise MMIC amplifier that meets the following specifications over the 3.5 - 6.5 GHz frequency range. The MMIC requires no external matching circuits no external gate bias supply. This device uses Raytheon's advanced 0.25  $\mu$ m PHEMT process to provide low noise, high linearity and low current.

**Features**

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



**Absolute Maximum Ratings<sup>1</sup>**

Parameter	Symbol	Value	Unit
Positive Drain DC Voltage (No RF)	Vdd	6.5	V
RF Input Power (from 50 $\Omega$ source)	Pin(CW)	0	dBm
Drain Current	Idd	130	mA
Case Operating Temperature	Tc	-35 to 85	$^{\circ}$ C
Storage Temperature Range	Tstg	-40 to 110	$^{\circ}$ C
Soldering Temperature	Tsolder	220	$^{\circ}$ C

**Electrical Characteristics<sup>2</sup>**

Parameter	Min	Typ	Max	Unit
Frequency Range	3.5		6.5	GHz
Gain (Small Signal) <sup>3,4</sup>	17.0	19.0		dB
Gain Variation vs Temp		-0.008		dB/ $^{\circ}$ C
Noise Figure <sup>4</sup>				
3.5 - 5 GHz		1.4	2.2	dB
5 - 6.5 GHz		1.5	1.6	dB
Power Out, P1dB @ 5.5 GHz	8.0	10.0		dBm

Parameter	Min	Typ	Max	Unit
OIP3 @ 5.5 GHz, +3 dBm Pout total	17	21.0		dBm
Idd		70.0	85.0	mA
Vdd	3.0	4.0	6.0	V
Input Return Loss		-15.0		dB
Output Return Loss		-10.0		dB
Thermal Resistance Rjc (Channel to Case)		135		$^{\circ}$ C/W

**Notes:**

1. No permanent damage with only one parameter set at maximum limit and all other parameters at typical conditions
2. All parameters met at Tc = +25  $^{\circ}$ C, Vdd = 4.0V
3. Pin = -20 dBm, Vdd = 4.0 V, Frequency 3.5 - 6.5 GHz
4. Data de-embedded from fixture loss

**Characteristic performance data and specifications are subject to change without notice.**

# RMLA3565-58

## Wideband Low Noise MMIC Amplifier

**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.

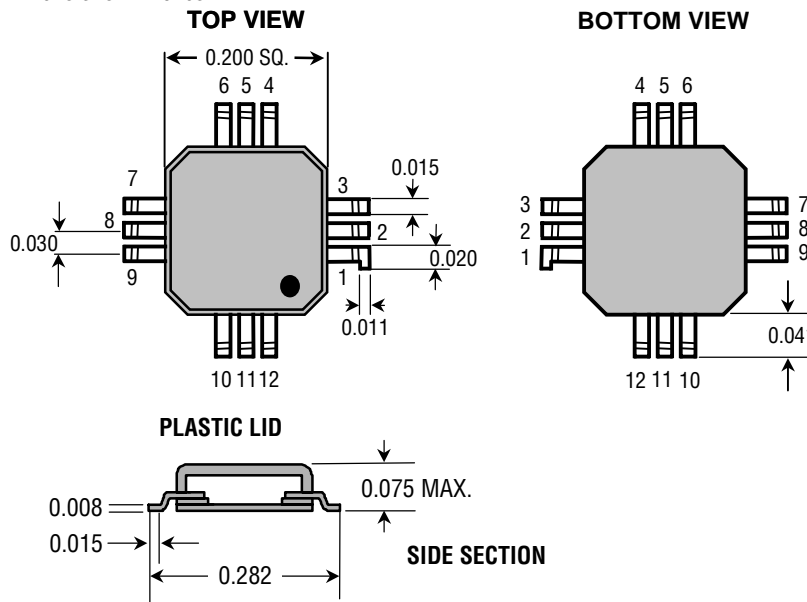
**Test Fixture**

Figure 1 shows the outline and pin-out descriptions for the packaged device. Figure 2 shows the functional block diagram of the packaged product. 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. A typical performance obtained from the test fixture is shown in figure 5. The following should be noted:

- (1) Package pin designations are as shown in figure 1.
- (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

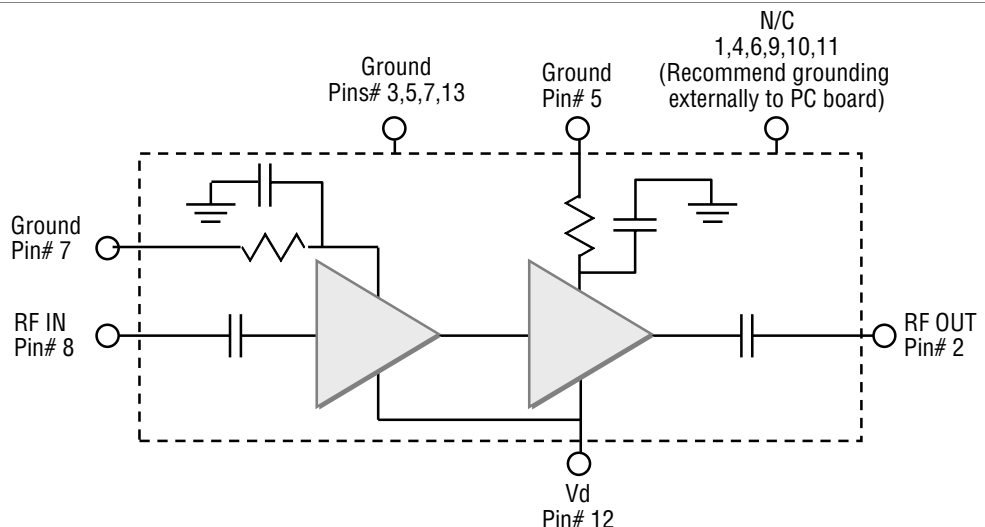
**Figure 1**  
Package Outline and Pin Designations

Dimensions in inches



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

**Figure 2**  
Functional Block Diagram

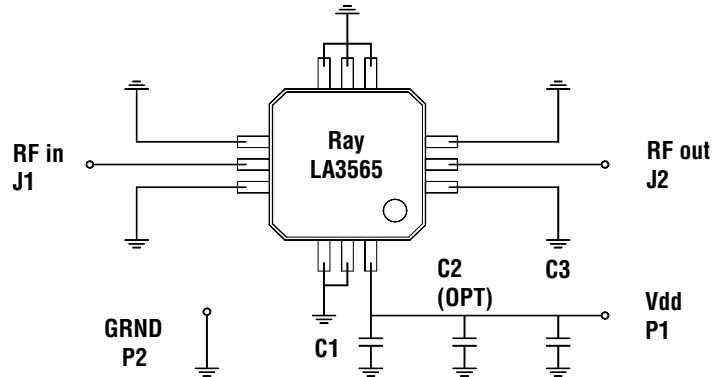


Characteristic performance data and specifications are subject to change without notice.

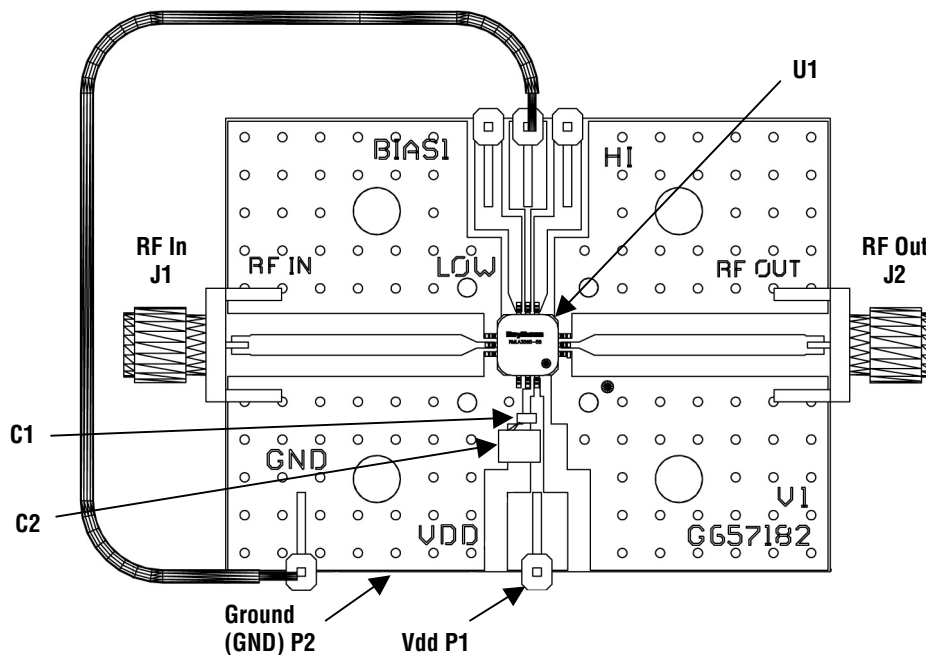
# RMLA3565-58

## Wideband Low Noise MMIC Amplifier

**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 for DC supplies.
- Step 3:** Apply drain supply voltages 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	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

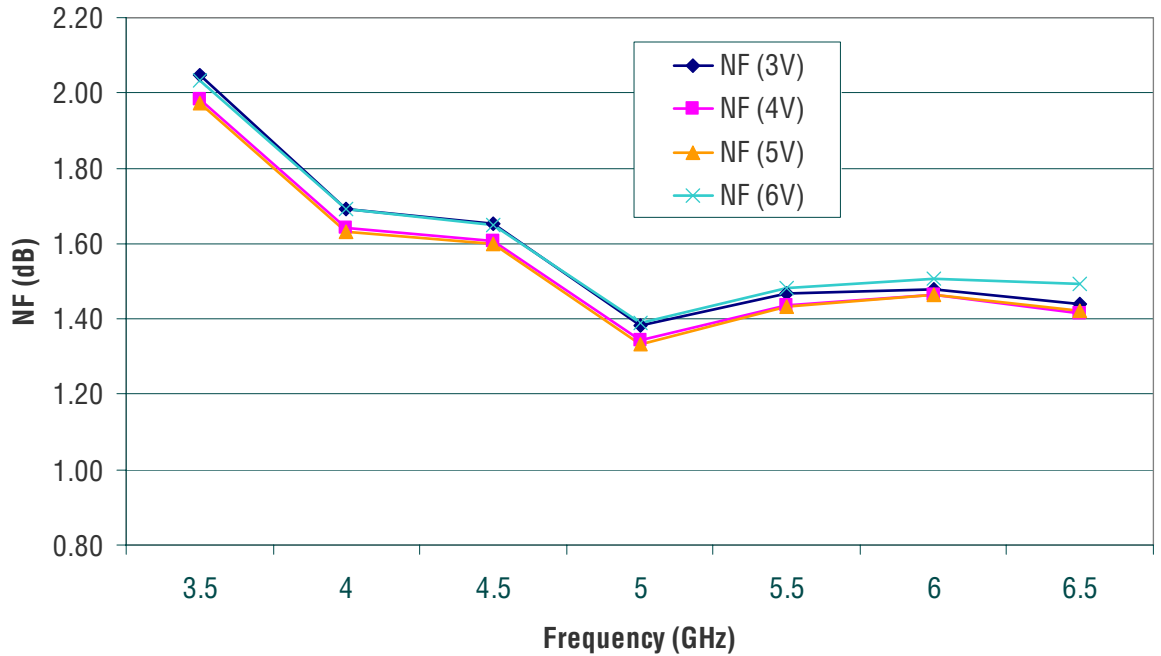
Characteristic performance data and specifications are subject to change without notice.

# RMLA3565-58

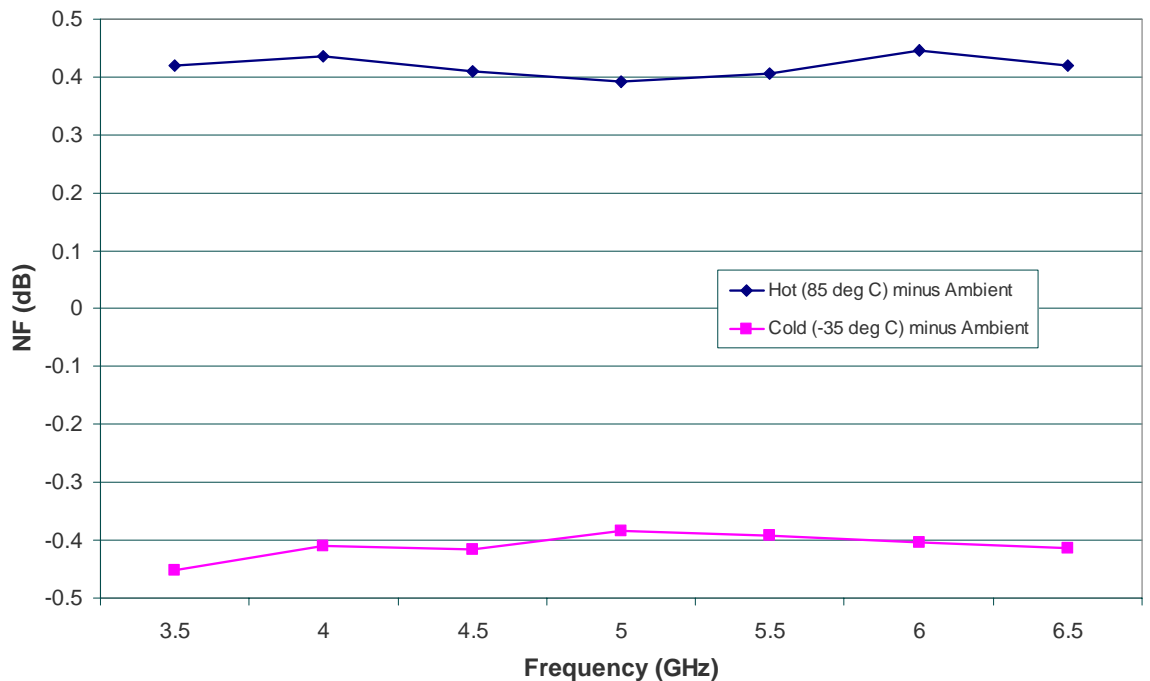
## Wideband Low Noise MMIC Amplifier

Performance Data

**RMLA3565-58**  
**Noise Figure Vs Frequency for V<sub>dd</sub> from 3 Vdc to 6 Vdc (25°C)**



**RMLA3565-58**  
**Noise Figure (4Vdc) Change Vs Temperature**

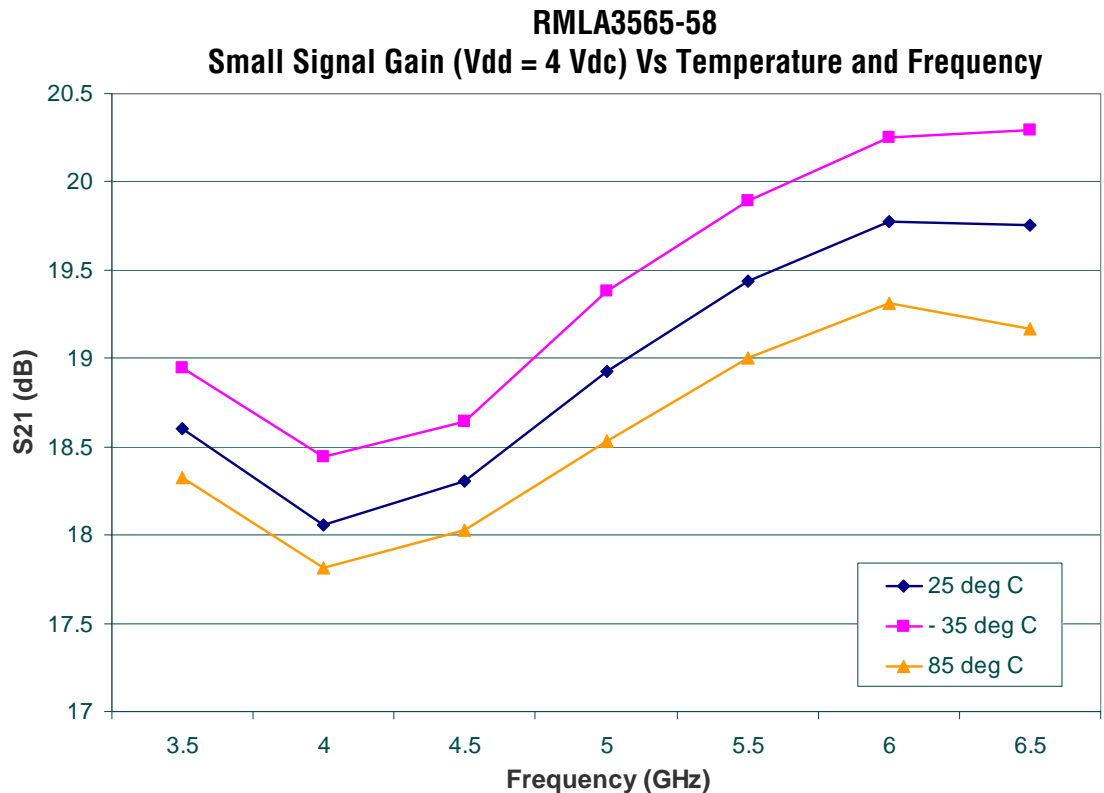
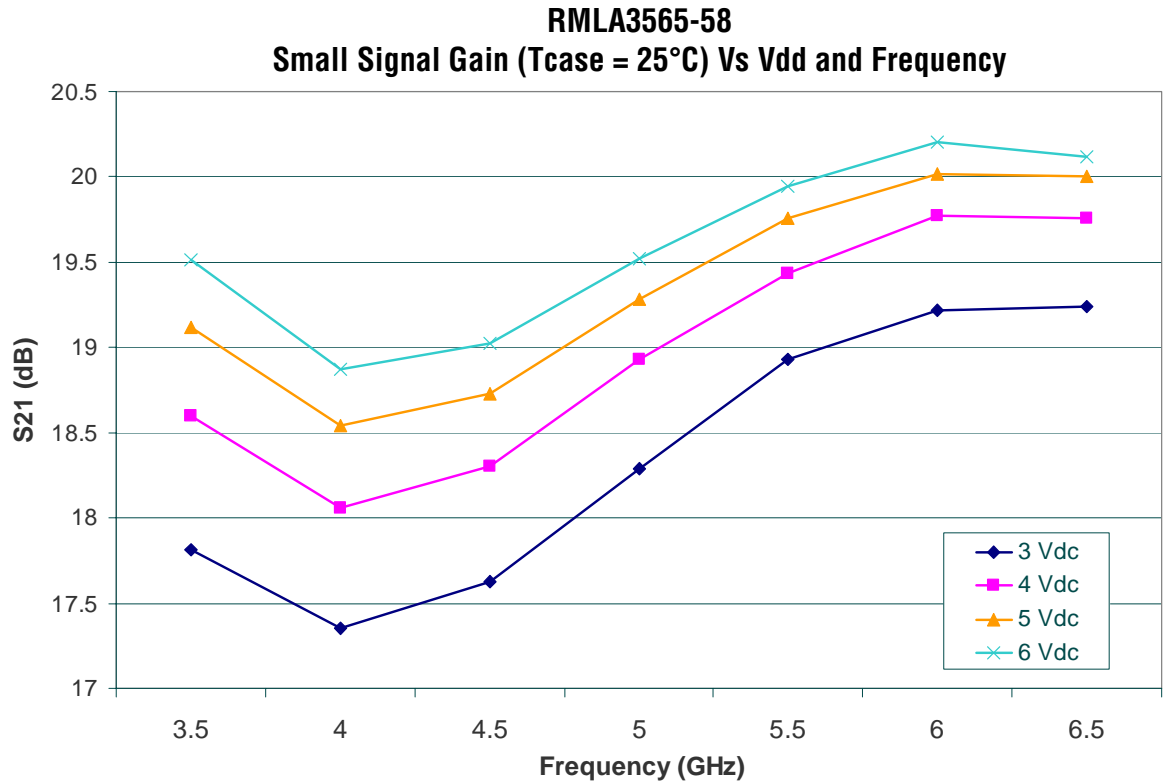


Characteristic performance data and specifications are subject to change without notice.

# RMLA3565-58

## Wideband Low Noise MMIC Amplifier

Performance Data



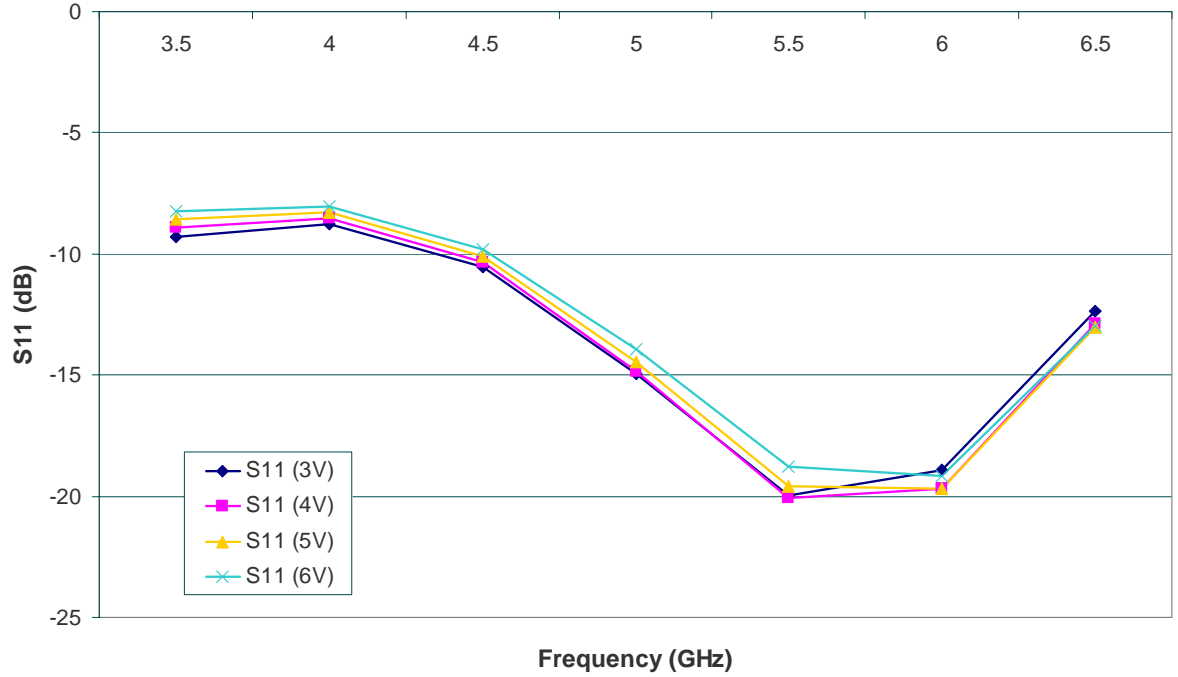
Characteristic performance data and specifications are subject to change without notice.

# RMLA3565-58

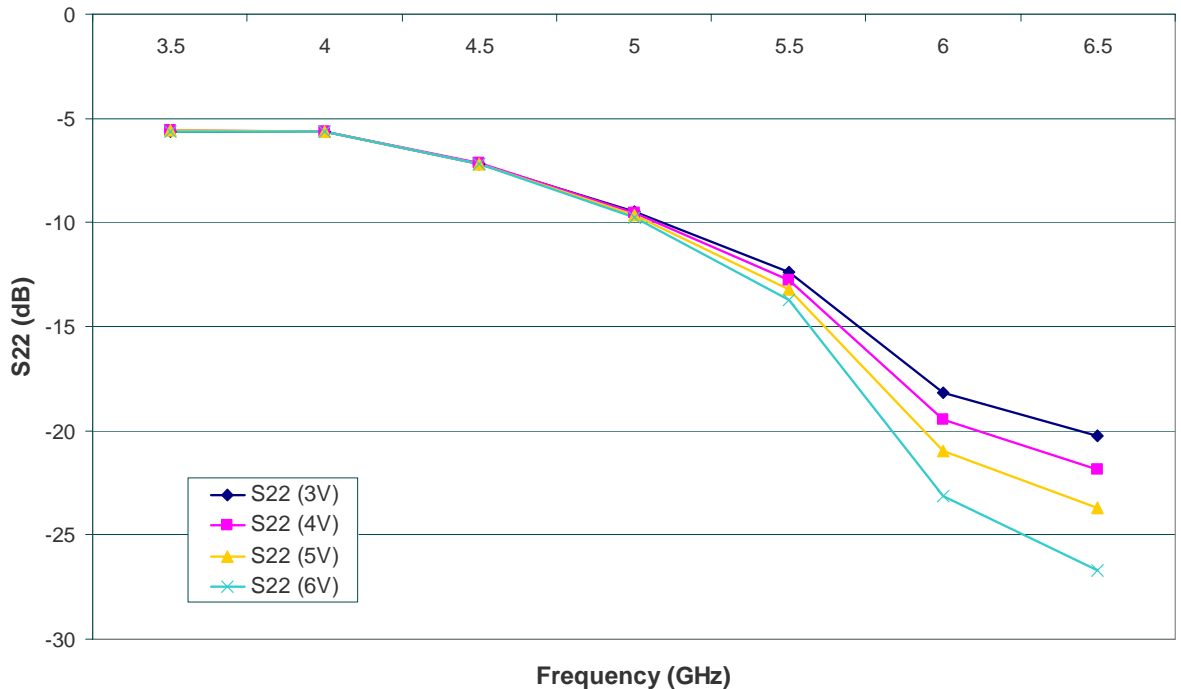
## Wideband Low Noise MMIC Amplifier

Performance Data

RMLA3565-58  
Input Return Loss Vs Drain Voltage



RMLA3565-58  
Output Return Loss Vs Drain Voltage



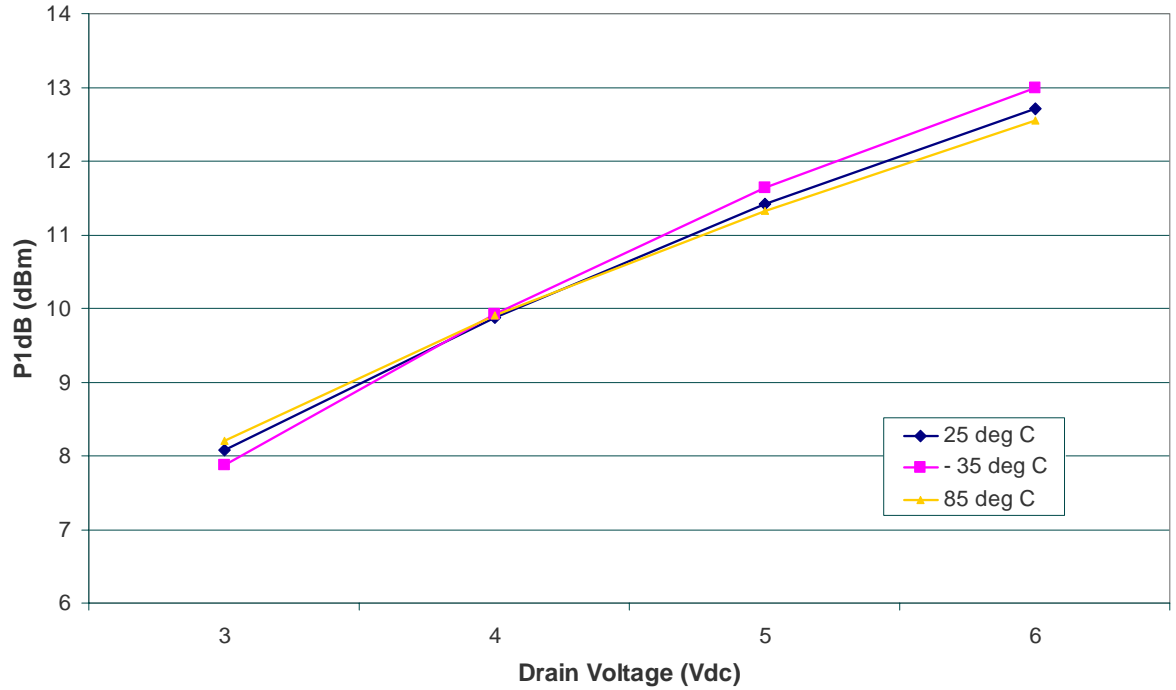
Characteristic performance data and specifications are subject to change without notice.

# RMLA3565-58

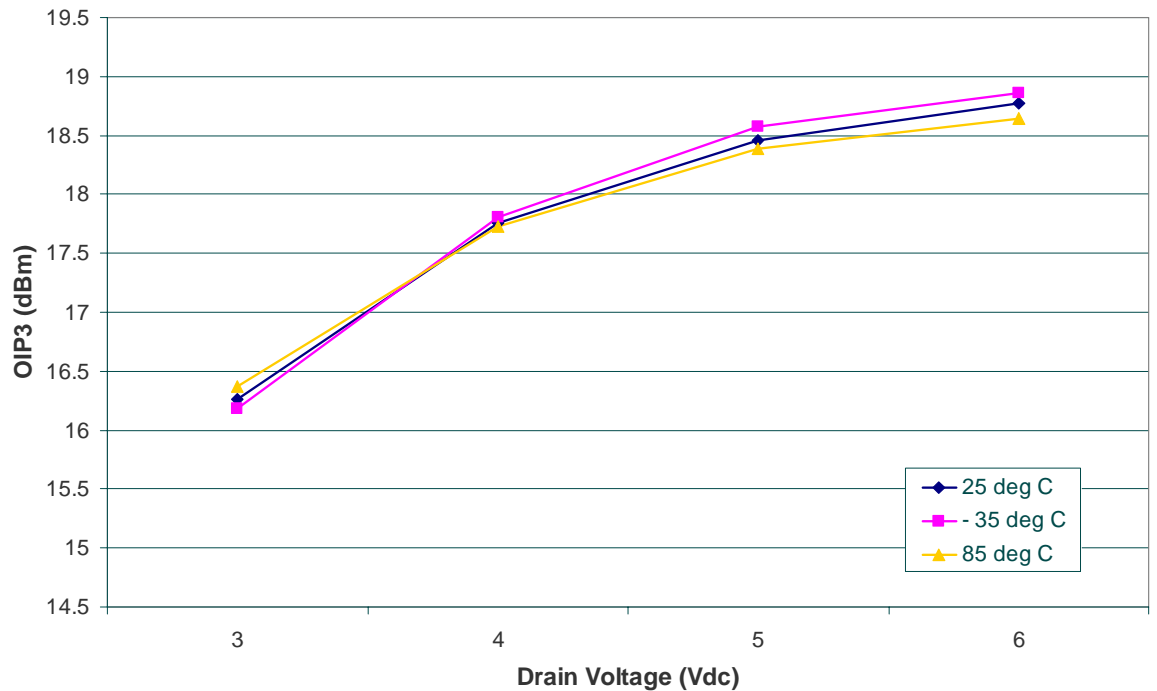
## Wideband Low Noise MMIC Amplifier

Performance Data

**RMLA3565-58**  
**1 dB Compression (5.5 GHz) Vs Drain Voltage and Temperature**



**RMLA3565-58**  
**Third Order Intercept Vs Drain Voltage and Temperature**

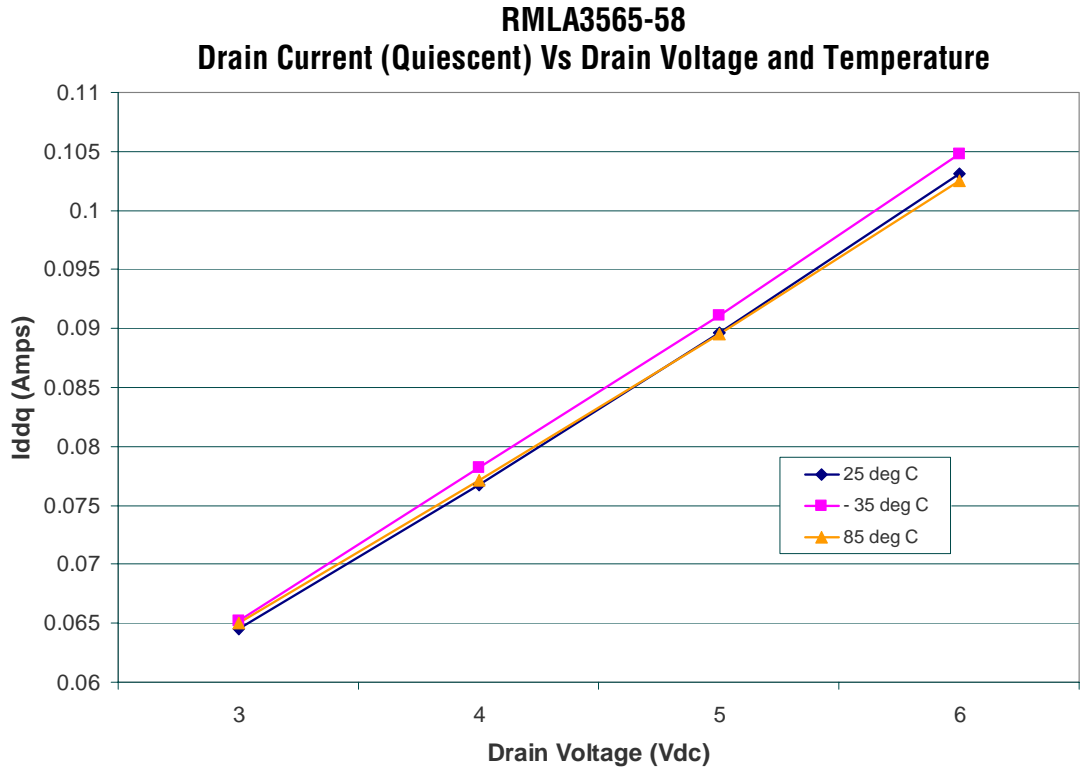


Characteristic performance data and specifications are subject to change without notice.

# RMLA3565-58

## Wideband Low Noise MMIC Amplifier

Performance  
Data



Characteristic performance data and specifications are subject to change without notice.