

RMLA3565A-58

Wideband Low Noise MMIC Amplifier

PRODUCT INFORMATION

Description

The Raytheon RMLA3565A-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 μm PHEMT process to provide low noise, high linearity, and low current.

Features

- ◆ 19.0 dB Gain typical
- ◆ 1.2 dB Noise Figure Typical 5.0 - 6.5 GHz
- ◆ Single Positive Bias
- ◆ Small Outline Metal Base Quad Plastic Package
- ◆ Internal 50 Ω Matching

**Absolute Maximum Ratings¹**

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

Electrical Characteristics²

Parameter	Min	Typ	Max	Unit	Parameter	Min	Typ	Max	Unit
Frequency Range	3.5		6.5	GHz	OIP3 @ 5.5 GHz, +3 dBm Pout total	17	21.0		dBm
Gain (Small Signal) ^{3,4}	17.0	19.0		dB	Idd		70.0	85.0	mA
Gain Variation vs Temp		-0.008		dB/ $^{\circ}\text{C}$	Vdd	3.0	4.0	6.0	V
Noise Figure ⁴					Input Return Loss		-15.0		dB
3.5 - 5 GHz		1.4	1.9	dB	Output Return Loss		-10.0		dB
5 - 6.5 GHz		1.2	1.4	dB	Thermal Resistance Rjc (Channel to Case)		135		$^{\circ}\text{C}/\text{W}$
Power Out, P1dB @ 5.5 GHz	8.0	10.0		dBm					

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 $^{\circ}\text{C}$, 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.

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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.

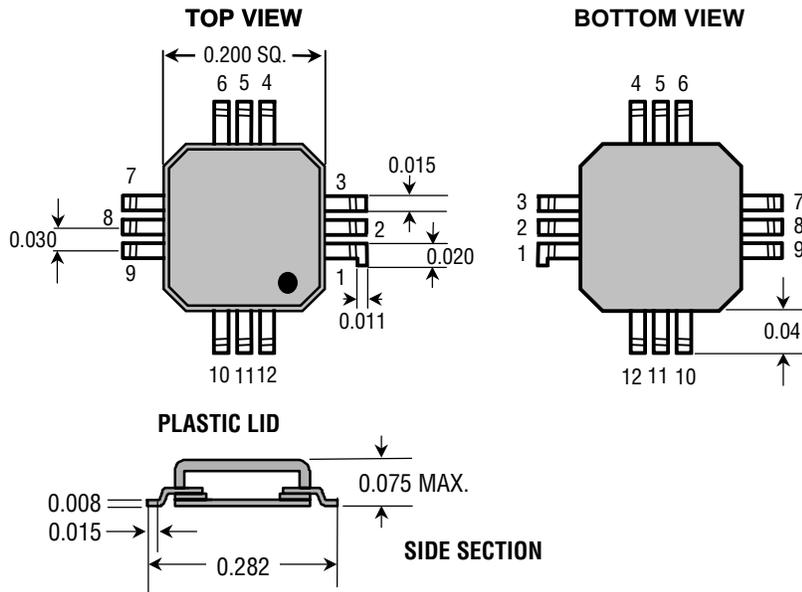
Test Fixture

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. 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 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.

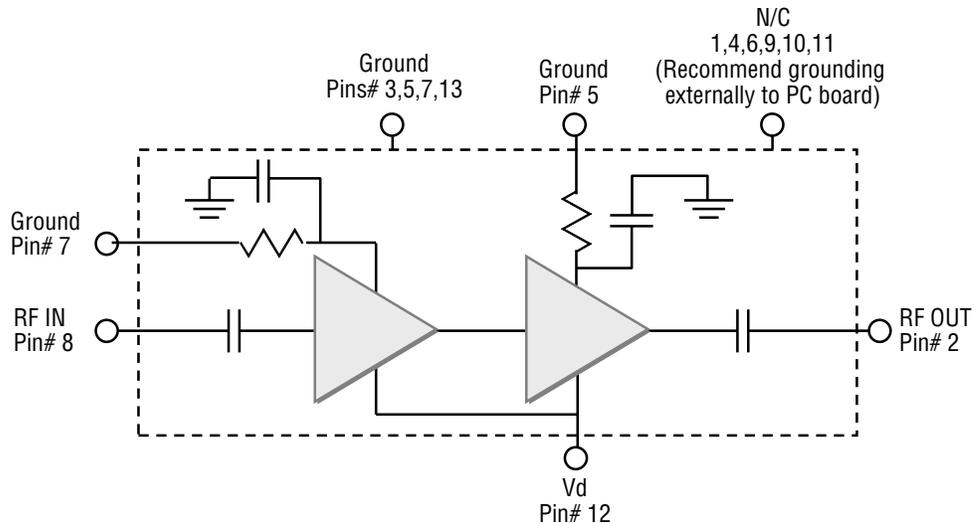
Figure 1
Package Outline and Pin Designations

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



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Figure 3
Schematic for a Typical
Test Evaluation Board
(RMLA3565A-58-TB)

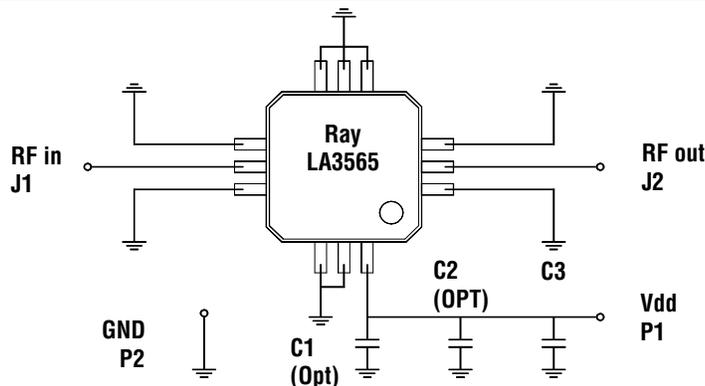
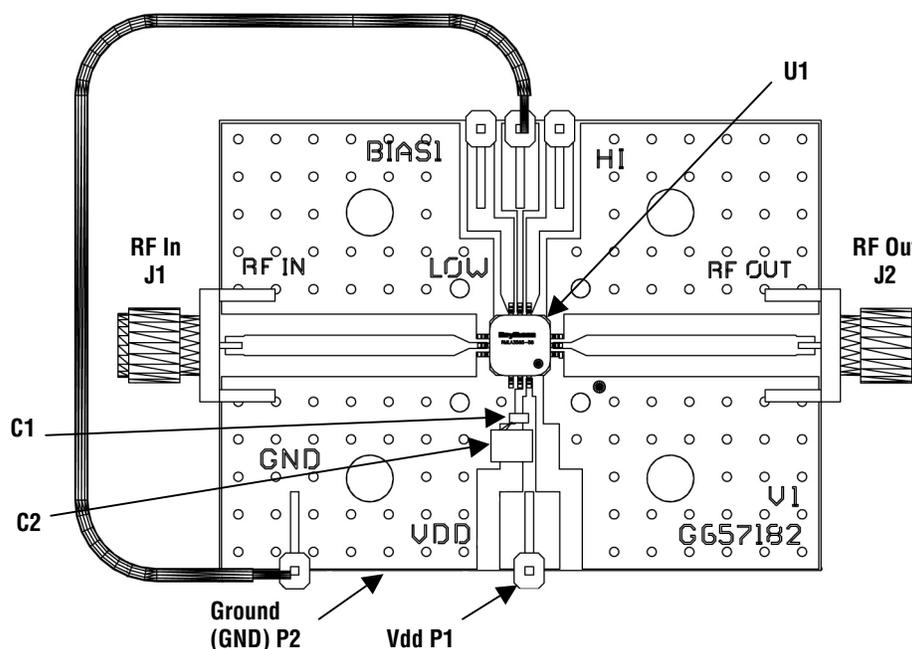


Figure 4
Layout and Assembly of
Test Evaluation Board
(RMLA3565A-58-TB)



Test Procedure
for the evaluation board
(RMLA3565A-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
RMLA3565A-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	RMLA3565A-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

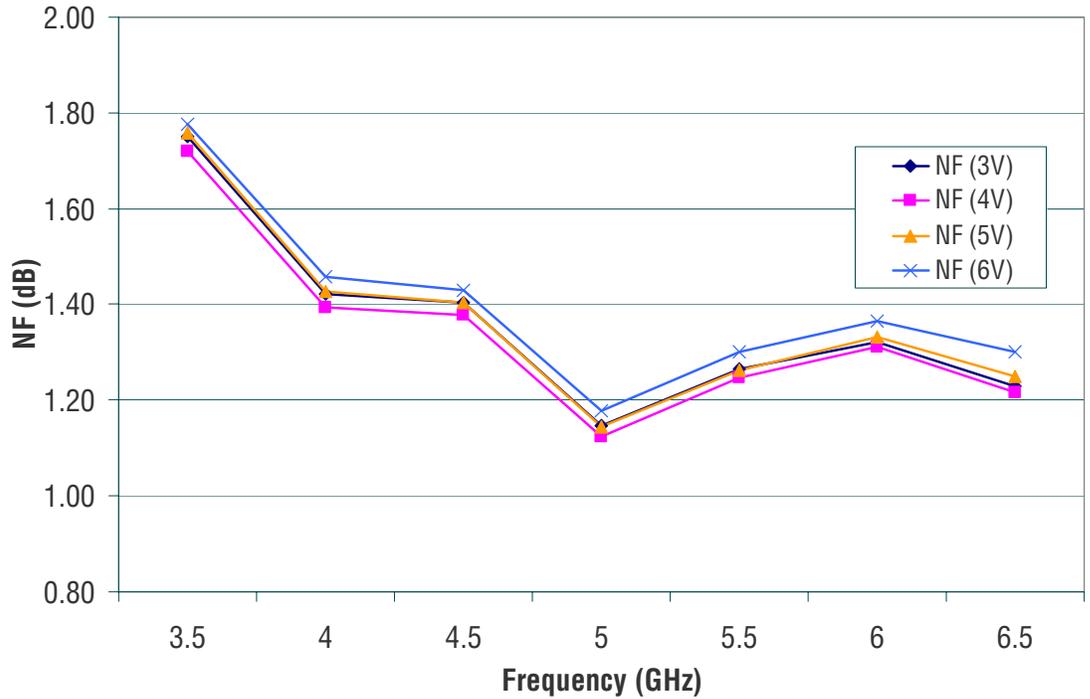
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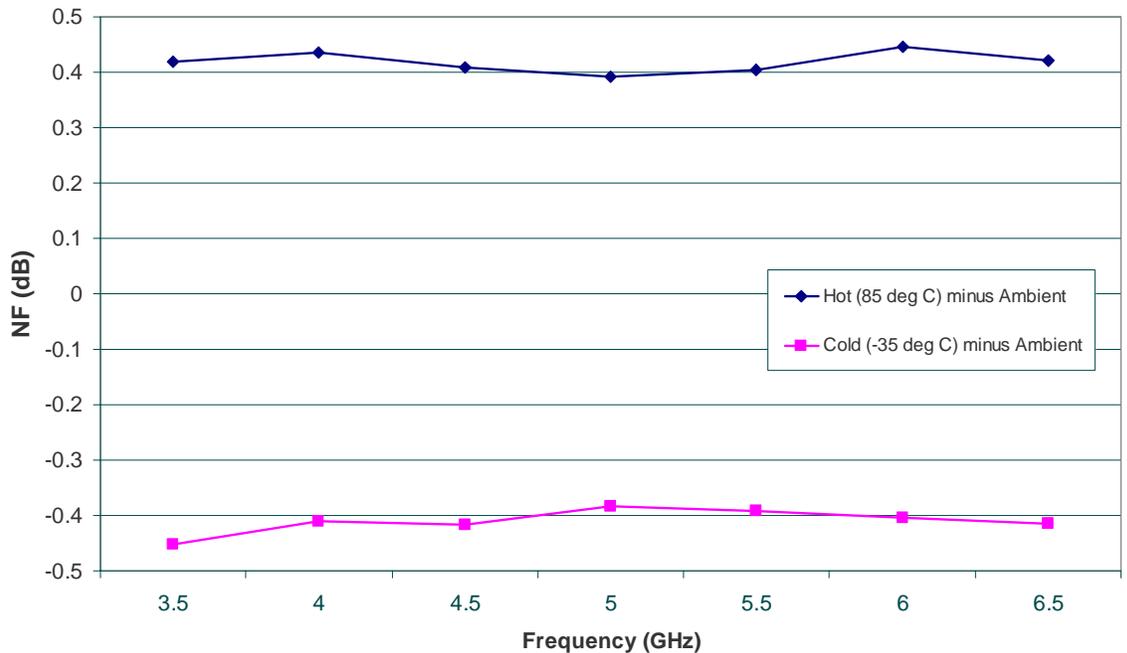
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Performance Data

RMLA3565A-58
Noise Figure Vs Frequency for Vdd from 3 Vdc to 6 Vdc (25°C)



RMLA3565A-58
Noise Figure (4Vdc) Change Vs Temperature

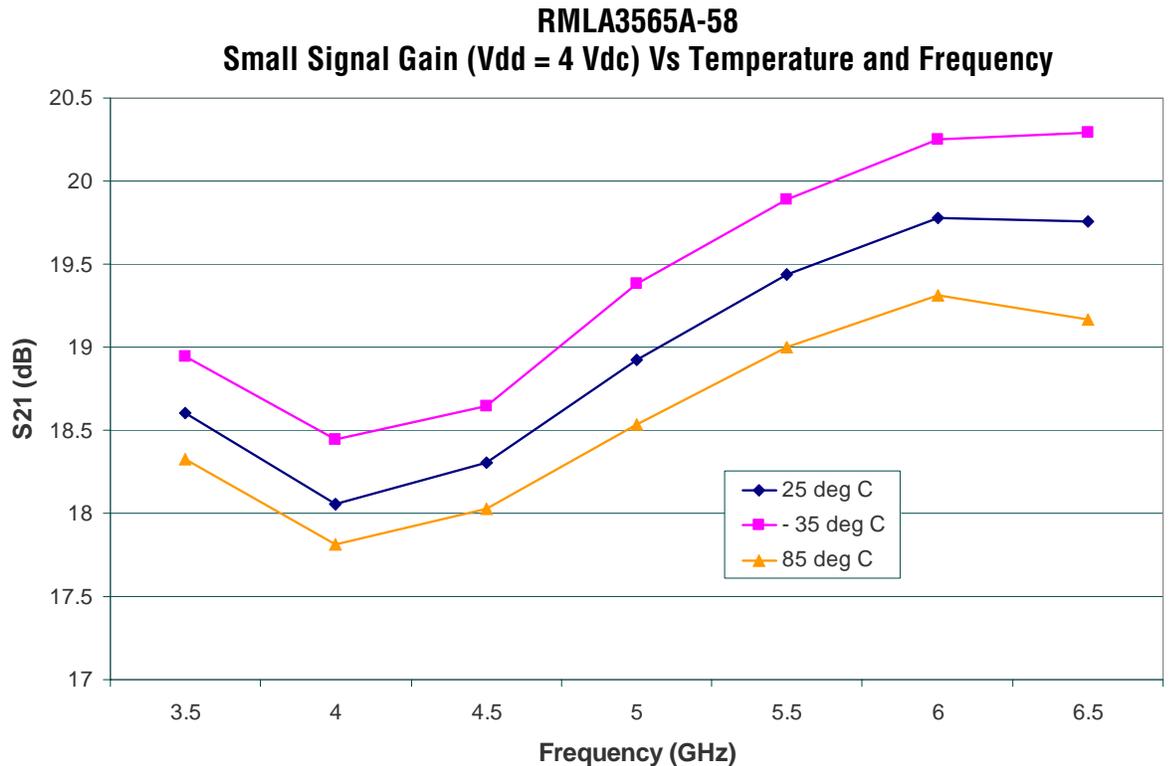
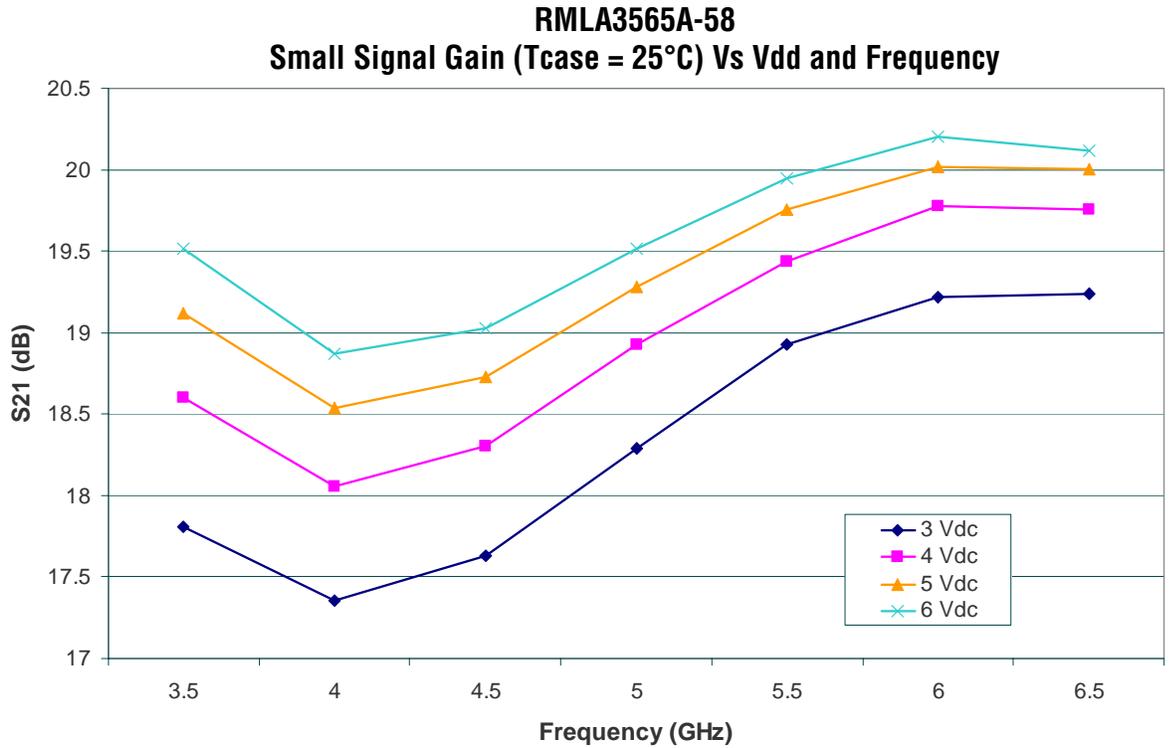


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Wideband Low Noise MMIC Amplifier

Performance Data



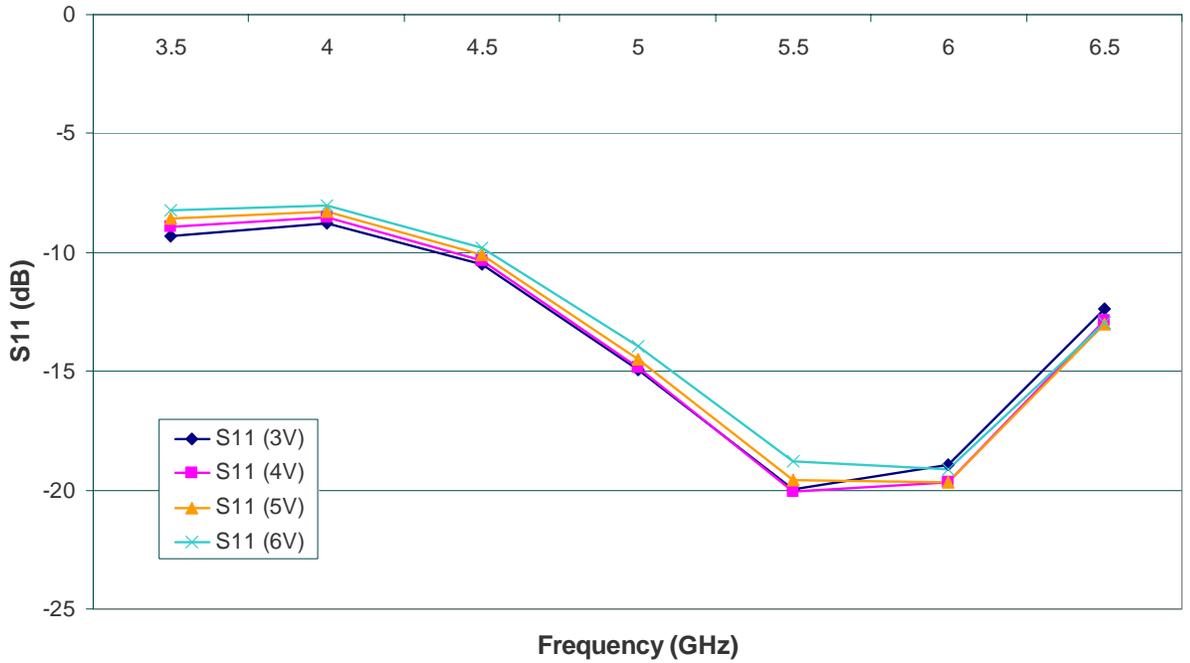
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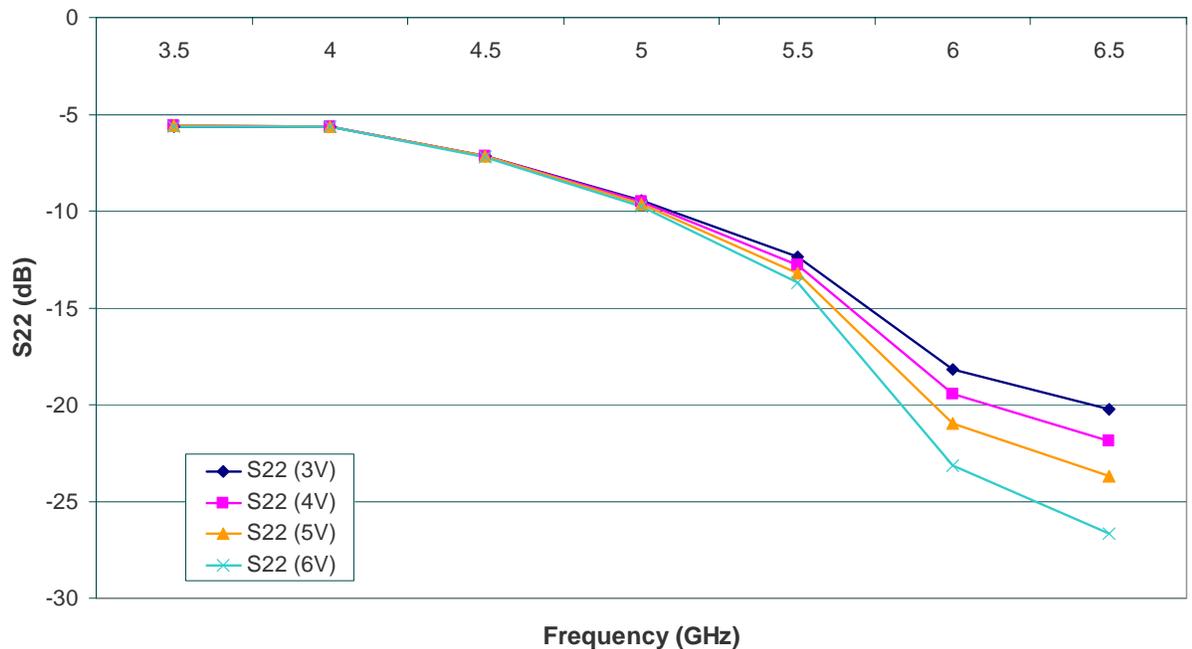
Wideband Low Noise MMIC Amplifier

Performance Data

RMLA3565A-58
Input Return Loss Vs Drain Voltage



RMLA3565A-58
Output Return Loss Vs Drain Voltage



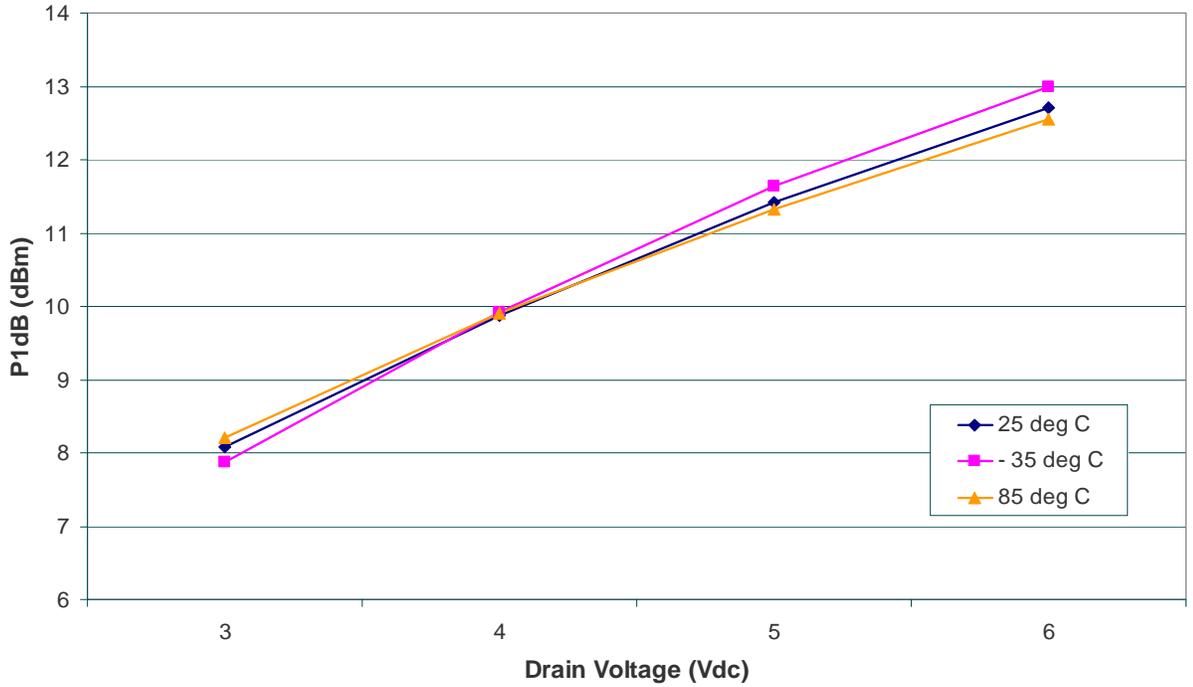
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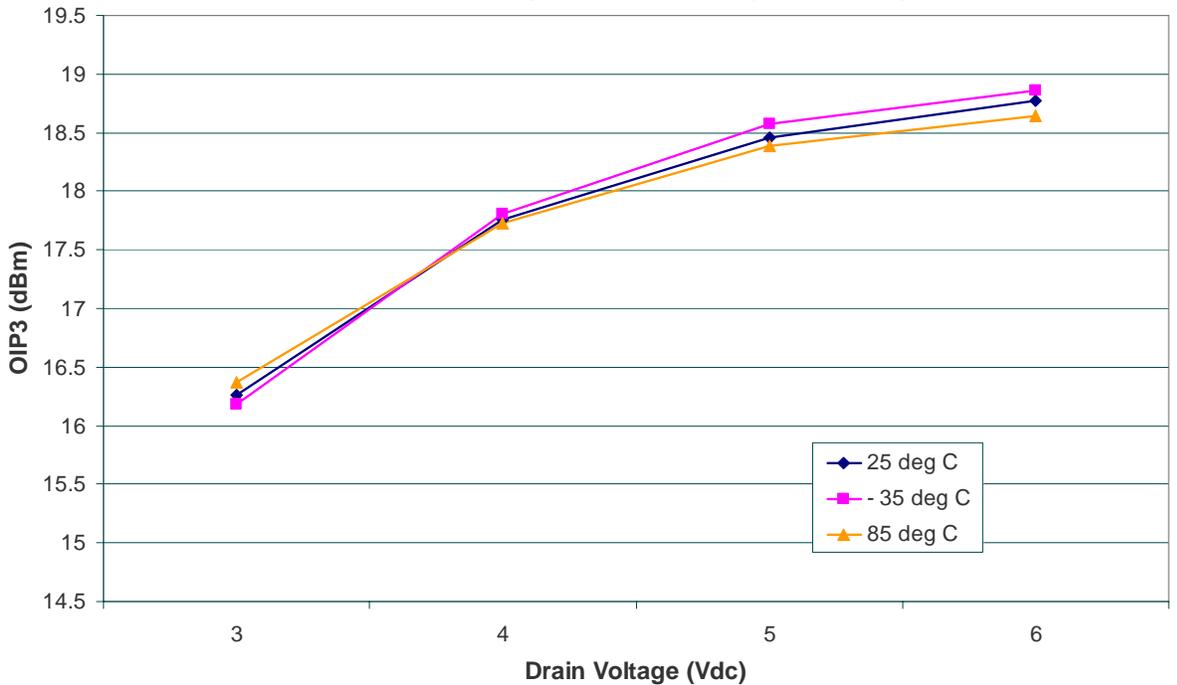
Wideband Low Noise MMIC Amplifier

Performance Data

RMLA3565A-58
1 dB Compression (5.5 GHz) Vs Drain Voltage and Temperature



RMLA3565A-58
Third Order Intercept Vs Drain Voltage and Temperature



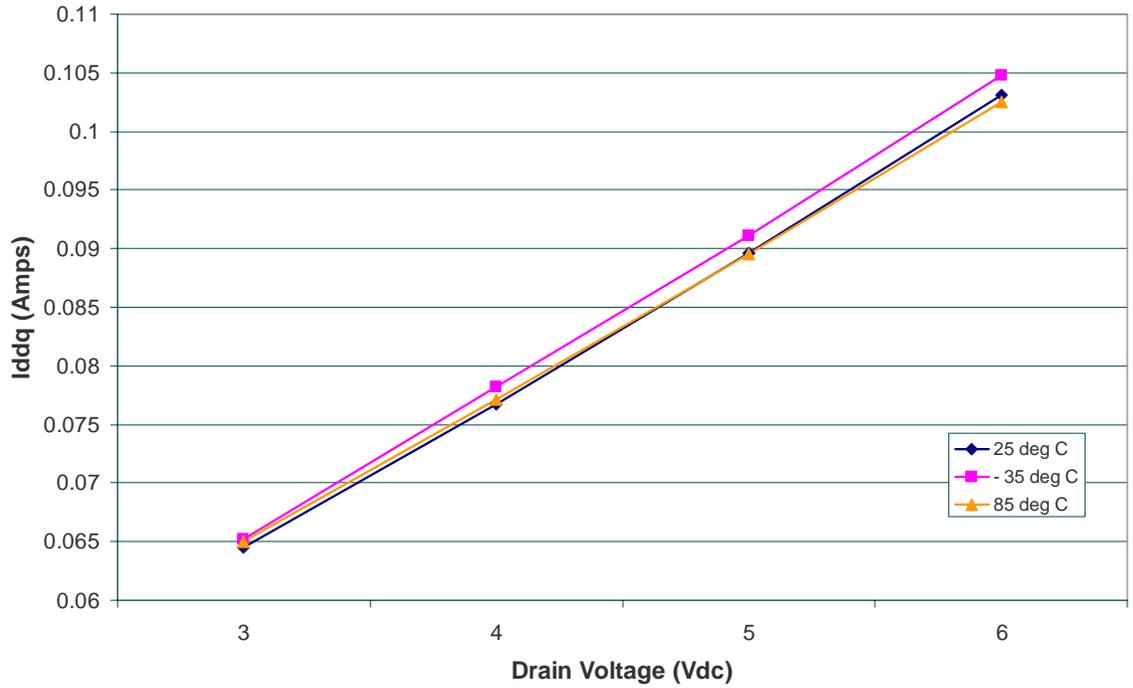
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Wideband Low Noise MMIC Amplifier

Performance
Data

RMLA3565A-58
Drain Current (Quiescent) Vs Drain Voltage and Temperature



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