

RMLA3565C

Wideband Low Noise MMIC Amplifier

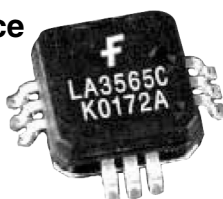
General Description

The Fairchild Semiconductor's RMLA3565C 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 our advanced 0.25µm PHEMT process to provide low noise, high linearity, and low current.

Features

- 20dB Gain typical
- 1.2dB Noise Figure Typical 5.0–6.5GHz
- 4.0V Single Positive Bias
- Small Outline Metal Base Quad Plastic Package
- Internal 50Ω Matching

Device



Absolute Ratings

Symbol	Parameter	Ratings	Units
V_{dd}	Positive Drain DC Voltage	6.5	V
P_{IN} (CW)	RF Input Power (from 50Ω source)	0	dBm
I_{dd}	Drain Current	130	mA
T_{case}	Case Operating Temperature	-30 to 85	°C
$T_{storage}$	Storage Temperature Range	-40 to 110	°C
T_{solder}	Soldering Temperature	220	°C
R_{jc}	Thermal Resistance (Channel to Case)	8	°C/W

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

Parameter	Min	Typ	Max	Units
Frequency Range	3.5		6.5	GHz
Gain (Small Signal) ^{1, 2}	17.0	20		dB
Gain Variation vs Temp		0.013		dB/°C
Noise Figure ²				
3.5–5 GHz		1.5	2.2	dB
5–6.5 GHz		1.2	1.6	dB
Power Out, P-1dB	8.0	13		dBm
OIP3 @ 5.5 GHz, 0 dBm per tone Pout		25.5		dBm
I_{dd}		80	90	mA
V_{dd}	3.0	4.0	6.0	V
Input/Output Return Loss		10.0		dB

Notes:

1. $P_{in} = -20$, $V_d = 4.0V$, Frequency 3.5–6.5GHz
2. Data de-embedded from fixture loss.

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.

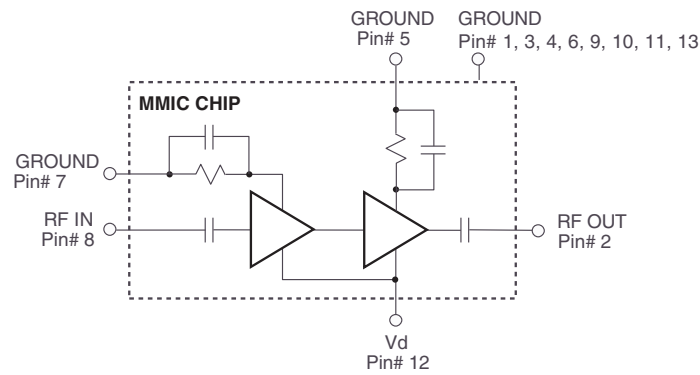


Figure 1. Functional Block Diagram

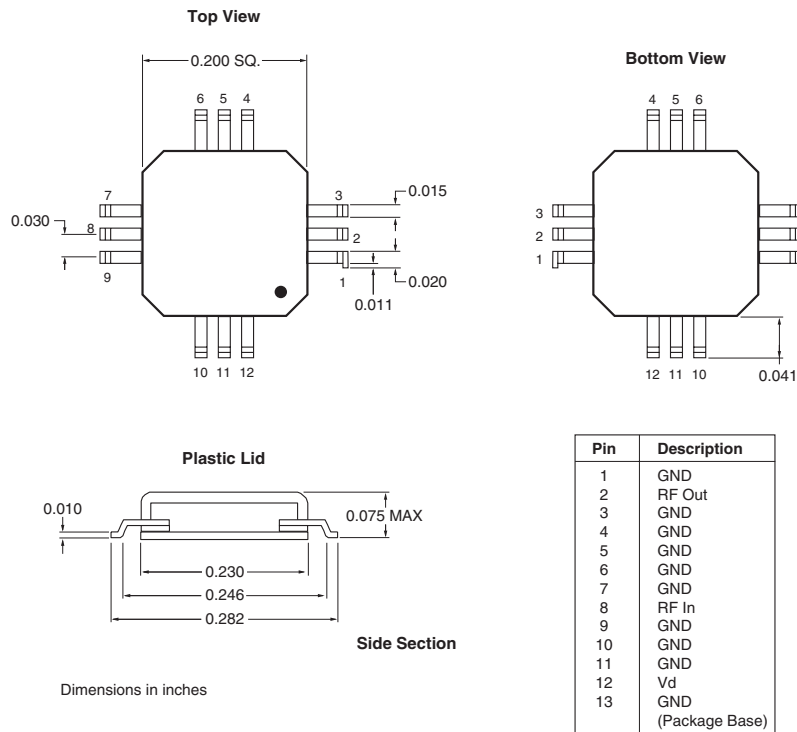


Figure 2. Package Outline Dimensions

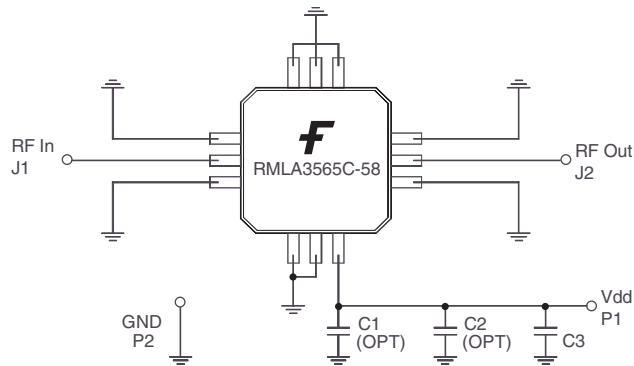


Figure 3. Schematic for a Typical Test Evaluation Board (RMLA3565C-TB)

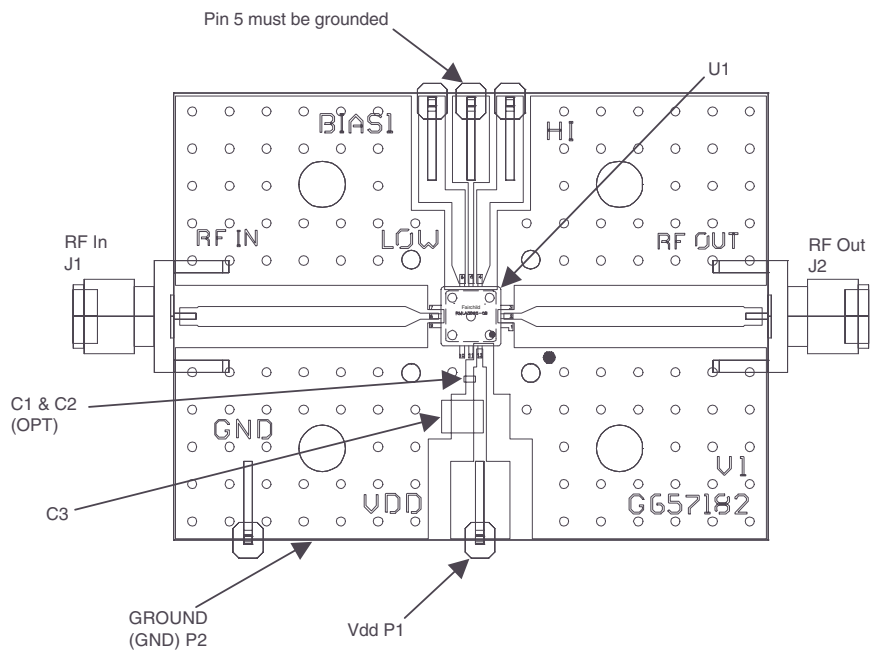


Figure 4. Layout and Assembly of Test Evaluation Board (RMLA3565C-TB)

Test Procedure for the evaluation board (RMLA3565C-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 and Pin 5.

Step 3: Apply drain supply voltage of +4.0V to evaluation board terminal Vdd.

Step 4: After the bias condition is established, RF input signal may now be applied.

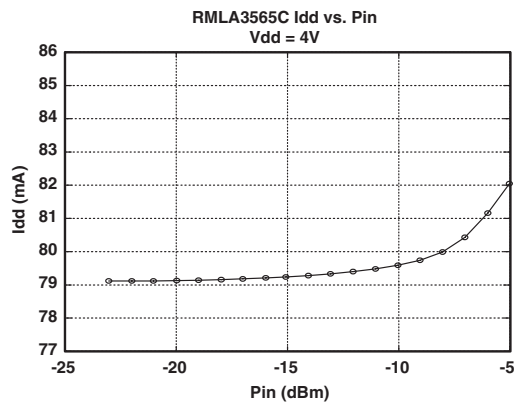
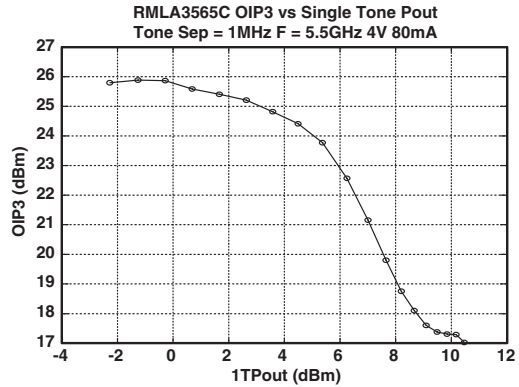
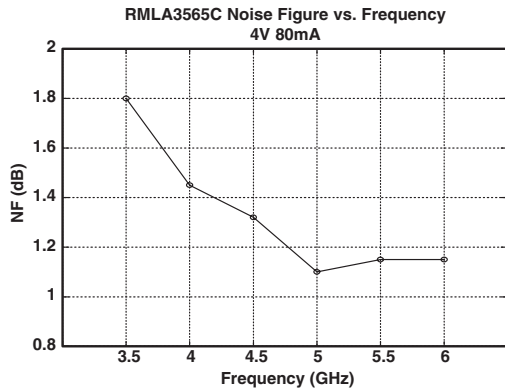
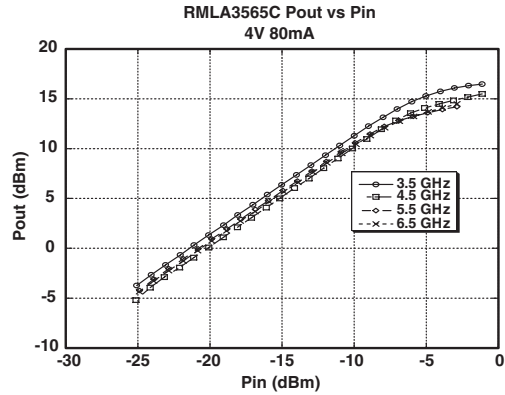
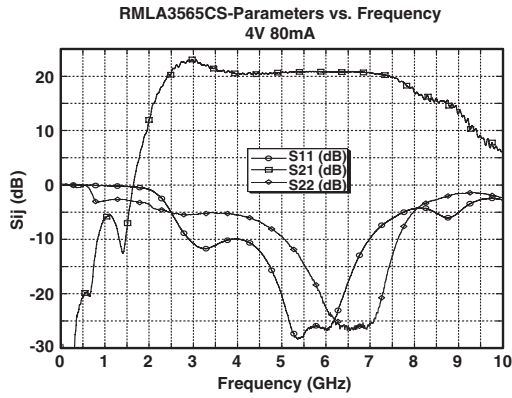
Step 5: Follow turn-off sequence of:

- (i) Turn off RF input power.
- (ii) Turn down and off Vdd.

Parts List For Test Evaluation Board (RMLA3565C-TB)

Part	Value	Size (EIA)	Vendor(s)
C1	330 pF	.04" x .02"	AVX, Murata, Novacap
C2	1000 pF	.04" x .02"	AVX, Murata, Novacap
C3	4.75 μ F	.14" x .11"	Sprague, ATC, AVX, Murata
U1	RMLA3565C	.28" x .28" x .07"	Fairchild
P1, P2	Terminals		Samtec
J1, J2	SMA Connectors		E.F. Johnson
Board	RO4003 (Rogers)	1.99 x 1.50 x .032	Fairchild

Typical Characteristics



TRADEMARKS

The following are registered and unregistered trademarks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

ACEx™	FAST®	ISOPLANAR™	Power247™	SuperFET™
ActiveArray™	FASTr™	LittleFET™	PowerSaver™	SuperSOT™-3
Bottomless™	FPST™	MICROCOUPLER™	PowerTrench®	SuperSOT™-6
CoolFET™	FRFET™	MicroFET™	QFET®	SuperSOT™-8
CROSSVOLT™	GlobalOptoisolator™	MicroPak™	QS™	SyncFET™
DOMET™	GTO™	MICROWIRE™	QT Optoelectronics™	TinyLogic®
EcoSPARK™	HiSeC™	MSX™	Quiet Series™	TINYOPTO™
E ² C MOS™	ꝑC™	MSXPro™	RapidConfigure™	TruTranslation™
EnSigna™	i-Lo™	OCX™	RapidConnect™	UHC™
FACT™	ImpliedDisconnect™	OCXPro™	µSerDes™	UltraFET®
FACT Quiet Series™		OPTOLOGIC®	SILENT SWITCHER®	VCX™
Across the board. Around the world.™		OPTOPLANAR™	SMART START™	
The Power Franchise®		PACMAN™	SPM™	
Programmable Active Droop™		POP™	Stealth™	

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.