FAIRCHILD SEMICONDUCTOR®

February 2005

RMPA5255
4.9–5.9 GHz WLAN Linear Power Amplifier Module

Features

- Full 4.9 to 5.9 GHz operation
- 34 dB small signal gain
- 230 mA total current at 18 dBm modulated power out
- 2.3% EVM at 18 dBm modulated power out
- 3.3 V collector supply voltage
- Integrated power detector with 20 dB dynamic range
- Lead-free 5 x 5 x 1.5 mm leadless package
- Internally matched to 50Ω and DC blocked RF input/output
- Internal DC bias de-coupling
- Optimized for use in 802.11a applications

Description

The RMPA5255 power amplifier module is designed for high performance WLAN applications in the 4.9–5.9 GHz frequency band. The 10 pin, 5 x 5 x 1.5 mm package with internal matching on both input and output to 50Ω, and internal bias network components, allow for extremely simplified integration. An on-chip detector provides power sensing capability. The PA's low power consumption and excellent linearity are achieved using our InGaP Heterojunction Bipolar Transistor (HBT) technology.

Device

Electrical Characteristics[1] 802.11a OFDM Modulation

(176 µs burst time, 100 µs idle time) 54 Mbps Data Rate, 16.7 MHz Bandwidth

Parameter	Min	Typ	Max	Units
Frequency	4.9		5.9	GHz
Collector Supply Voltage	3.0	3.3	3.6	V
Mirror Supply Voltage		2.9		V
Mirror Supply Current		26		mA
Gain		33		dB
Total Current @ 18dBm Pout		230		mA
EVM @ 18dBm Pout[2]		2.3		%
Detector Output @ 18dBm Pout		450		mV
Detector Threshold[3]		5		dBm

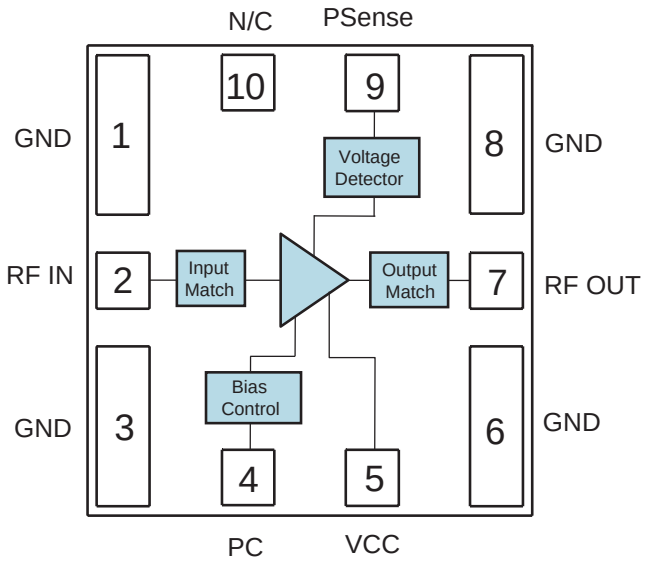
Notes:
1. VCC = 3.3V, VPC = 2.9V, T_A = 25°C, PA is constantly biased, 50Ω system.
2. Percentage includes system noise floor of EVM = 0.8%.
3. P_{OUT} measured at P_{IN} corresponding to power detection threshold.

Electrical Characteristics[1] Single Tone

Parameter	Min	Typ	Max	Units
Frequency	4.9		5.9	GHz
Supply Voltage (VCC)	3.0	3.3	3.6	V
Power Control Voltage (VPC)	2.6	2.9	3.1	V
Gain		33.5		dB
Total Quiescent Current		160		mA
Bias Current at pin VPC[2]		26		mA
P1dB Compression		26		dBm
Current @ P1dB Compression		508		mA
Shutdown Current (VPC = 0V)		<1.0		µA
Input Return Loss		12		dB
Output Return Loss		20		dB
Detector Output at P1dB Compression		1.1		V
Detector Pout Threshold[4]		5		V
Turn-On Time[3]		<1.0		µS

Notes:
1. VCC = 3.3V, VPC = 2.9V, T_A = 25°C, PA is constantly biased, 50Ω system.
2. Power Control bias current is included in the total quiescent current.
3. Measured from Device On signal turn on, (Logic Low) to the point where RF P_{OUT} stabilizes to 0.5dB.
4. P_{OUT} measured at P_{IN} corresponding to power detection threshold.

Functional Block Diagram

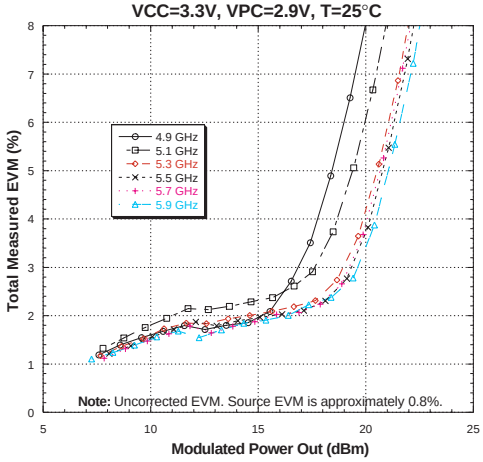


Performance Data

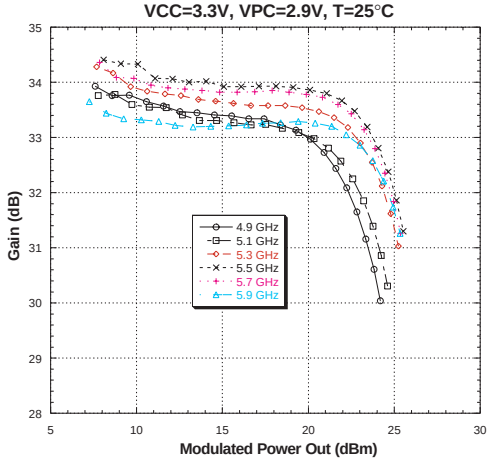
802.11a OFDM Modulation

(176 ms burst time, 100 ms idle time) 54 Mbps Data Rate, 16.7 MHz Bandwidth

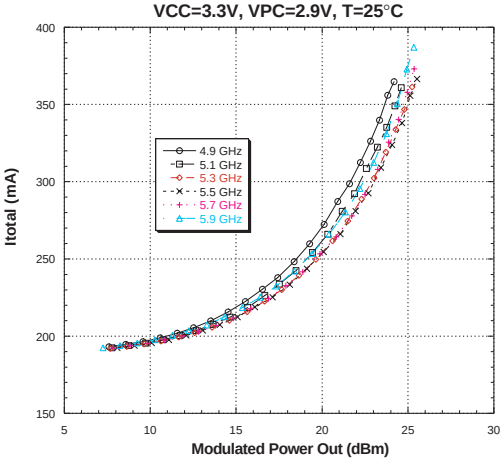
RMPA5255 EVM vs. Modulated Pout
VCC=3.3V, VPC=2.9V, T=25°C



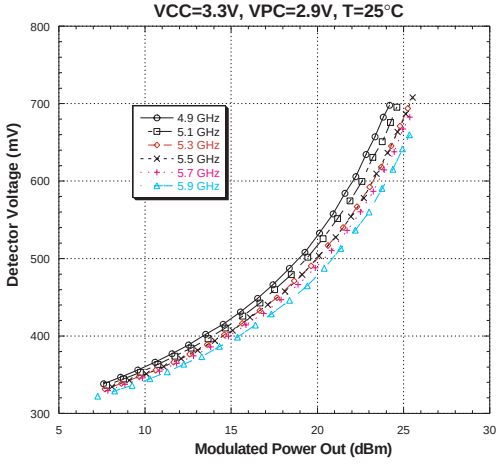
RMPA5255 Gain vs. Modulated Pout
VCC=3.3V, VPC=2.9V, T=25°C



RMPA5255 Total Current vs. Modulated Pout
VCC=3.3V, VPC=2.9V, T=25°C



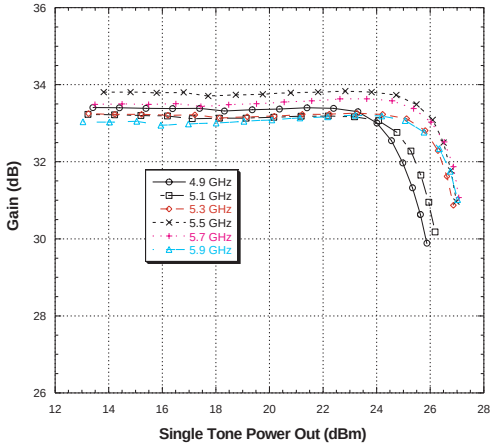
RMPA5255 Detector Voltage vs. Modulated Pout
VCC=3.3V, VPC=2.9V, T=25°C



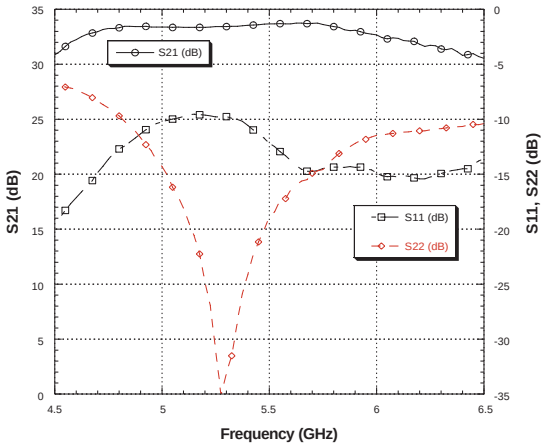
Performance Data

Single Tone

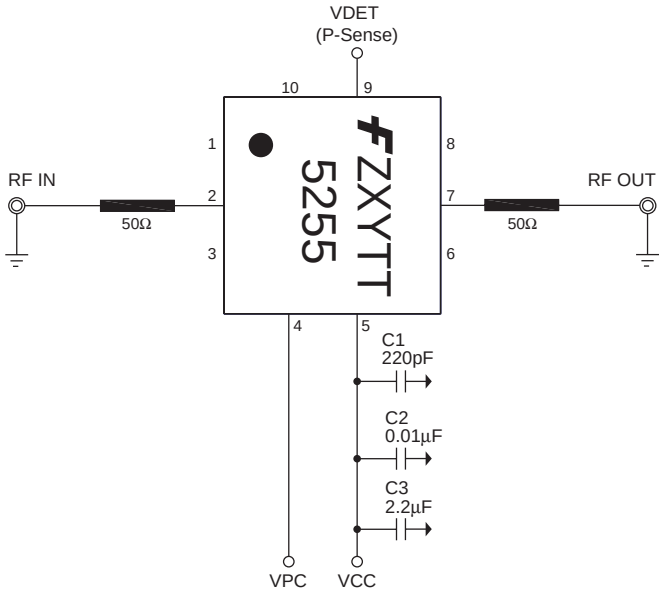
RMPA5255 Gain vs. Single Tone Pout
VCC=3.3V, VPC=2.9V, T=25°C



RMPA5255 S-Parameters vs. Frequency
VCC=3.3V, VPC=2.9V, T=25°C

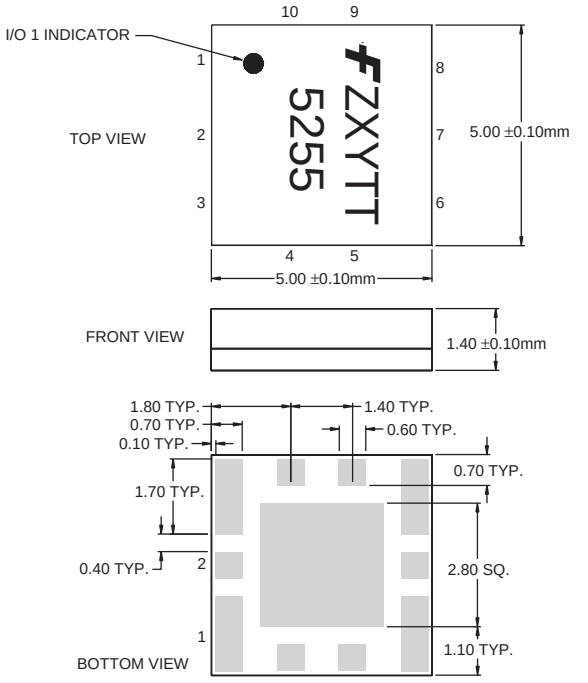


Schematic



Pin	Description
1	GND
2	RF IN
3	GND
4	VPC
5	VCC
6	GND
7	RF OUT
8	GND
9	VDET (P-Sense)
10	N/C
11	CENTER GND

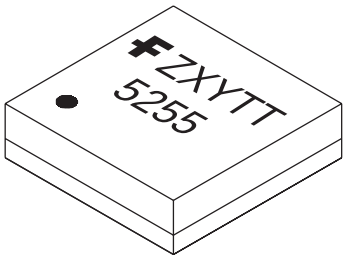
Package Outline



NOTES:

1. PACKAGE BASE MATERIAL AND INTERCONNECT METALLIZATION:
   BT GRADE CCL-HL832, AuNiCu,
   Au 0.38 MICROMETERS MINIMUM.
2. SMT EXPOSURE: THIS DEVICE WILL WITHSTAND EXPOSURE TO TEMPERATURES OF 240°C MAXIMUM FOR DWELL TIME OF 10 SECONDS MAXIMUM.

= EXPOSED METAL CONTACT PADS



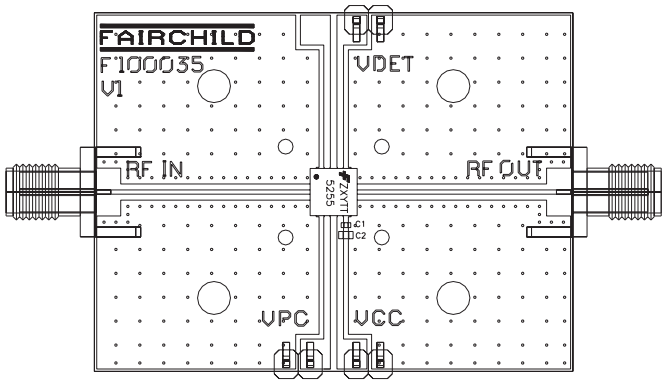
Dimensions in mm

Evaluation Board Bill of Materials

MATERIALS LIST

QTY	ITEM NO.	PART NUMBER	DESCRIPTION	VENDOR
1	1	F100035	PC, BOARD	FAIRCHILD
2	2	#142-0701-841	SMA CONNECTOR	JOHNSON
6	3	#2340-5211TN	TERMINALS	3M
REF	4	F100058	ASSEMBLY, RMPA5255	FAIRCHILD
1	5 (C1)	GRM1885C1H221JA01D	220 pF CAPACITOR (0603)	MURATA
1	6 (C2)	GMC10X7R103M25NT	0.01 uF CAPACITOR (0603)	MURATA
1	7 (C3)	GRM188R60J225KE01D	2.2 uF CAPACITOR (0603)	MURATA
A/R	8	SN63	SOLDER PASTE	INDIUM CORP.
A/R	9	SN96	SOLDER PASTE	INDIUM CORP.

Evaluation Board Layout



Actual Board Size = 2.0" X 1.5"

Evaluation Board Turn-On Sequence[1]

Recommended turn-on sequence:

1) Connect common ground terminal to the Ground (GND) pin on the board.
2) Connect voltmeter to VDET (P-Sense).
3) Apply positive supply voltage (3.3 V) to pin VCC (Collector voltage).
4) Apply positive bias voltage (2.9 V) to pin VPC (Power Control voltage).
5) At this point, you should expect to observe the following positive currents flowing into the pins:

Pin	Current
VCC	150 – 170 mA
VPC	21 – 31 mA

6) Apply input RF power to SMA connector pin RFIN. Current for pin VCC will vary depending on the input drive level.
7) Vary positive voltage VPC from +2.9 V to +0 V to shut down the amplifier or alter the power level. Shut down current flow into the pins:

Pin	Current
VCC	<1 nA

Recommended turn-off sequence:

Use reverse order described in the turn-on sequence above.

Note:

1. Turn on sequence is not critical and it is not necessary to sequence power supplies in actual system level design.

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®	IntelliMAX™	POP™	SPM™
ActiveArray™	FASTr™	ISOPLANAR™	Power247™	Stealth™
Bottomless™	FPS™	LittleFET™	PowerEdge™	SuperFET™
CoolFET™	FRFET™	MICROCOUPLER™	PowerSaver™	SuperSOT™-3
CROSSVOLT™	GlobalOptoisolator™	MicroFET™	PowerTrench®	SuperSOT™-6
DOME™	GTO™	MicroPak™	QFET®	SuperSOT™-8
EcoSPARK™	HiSeC™	MICROWIRE™	QS™	SyncFET™
E²CMOS™	I²C™	MSX™	QT Optoelectronics™	TinyLogic®
EnSigna™	*i-Lo*™	MSXPro™	Quiet Series™	TINYOPTO™
FACT™	ImpliedDisconnect™	OCX™	RapidConfigure™	TruTranslation™
FACT Quiet Series™		OCXPro™	RapidConnect™	UHC™
Across the board. Around the world.™		OPTOLOGIC®	μSerDes™	UltraFET®
The Power Franchise®		OPTOPLANAR™	SILENT SWITCHER®	UniFET™
Programmable Active Droop™		PACMAN™	SMART START™	VCX™

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.

Rev. I15