

Features

- Frequency Range 4.9 GHz to 5.9 GHz
- Supply-voltage 2.7 V to 3.6 V
- 3.5% EVM at 19 dBm Output Power at 54 Mbit/s OFDM
- 25.5 dBm P_{1dB}
- On-chip Power Detector with 25 dBm Dynamic Range
- Power-down Mode and Biasing Control
- Low Profile Lead-free Plastic Package QFN16 (4 × 4 × 0.9 mm)

Applications

- IEEE 802.11a OFDM WLAN
- Hiperlan2 WLAN
- PC Cards, PCMCIA
- 5 GHz ISM Band Application

Electrostatic sensitive device.
Observe precautions for handling.



Description

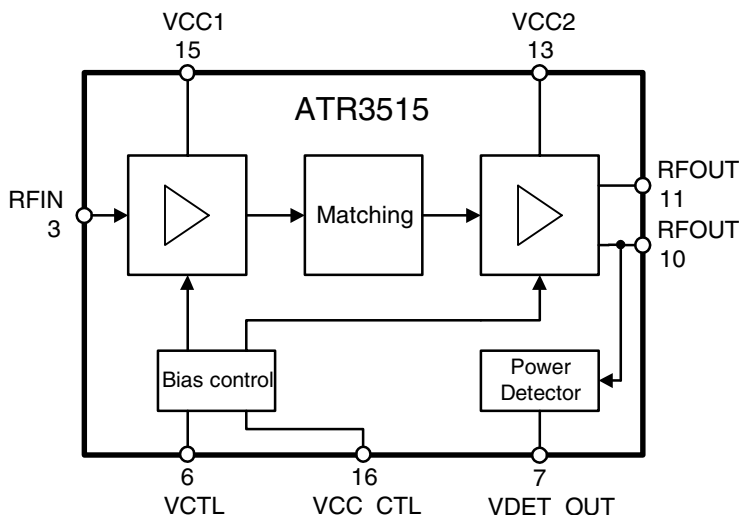
Process

The 5-GHz power amplifier is designed in Atmel's advanced Silicon-Germanium (SiGe) process and provides excellent linearity and noise performance as well as good power-added efficiency.

Circuitry

The PA consists of a two-stage amplifier with a P_{1dB} of 25.5 dBm. The output stage was realized using an open-collector structure. Power-up/down and output level are controlled at bias control pin 6 (VCTL). An on-chip power detector provides a voltage proportional to the output power.

Figure 1. Block Diagram



5-GHz WLAN Power Amplifier for 802.11a

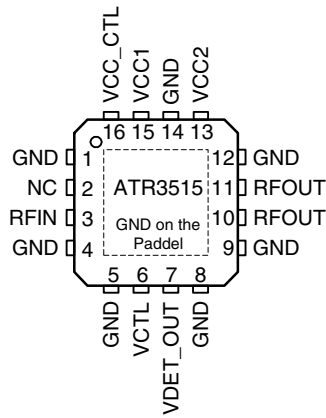
ATR3515

Preliminary



Pin Configuration

Figure 2. Pinning QFN16



Pin Description

Pin	Symbol	Function
1	GND	Ground
2	NC	Not connected
3	RFIN	RF input
4	GND	Ground
5	GND	Ground
6	VCTL	Power-up/biasing control voltage
7	VDET_OUT	Power detector output voltage
8	GND	Ground
9	GND	Ground
10	RFOUT	RF output
11	RFOUT	RF output
12	GND	Ground
13	VCC2	Supply voltage for PA stage
14	GND	Ground
15	VCC1	Supply voltage for driver stage
16	VCC_CTL	Supply voltage for biasing control
Paddel	–	Ground

Absolute Maximum Ratings

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Parameters	Symbol	Value	Unit
Supply voltage	V_{CC}	3.9	V
Supply current	I_{CC}	800	mA
Junction temperature	T_j	150	°C
Storage temperature	T_{Stg}	-40 to +125	°C
Input RF power	P_{IN}	12	dBm
Control voltage power up/down and biasing	V_{CTL}	0 to 2.0	V

Note: The part may not survive all maximums applied simultaneously.

Operating Range

Parameters	Symbol	Value	Unit
Supply voltage range	V_{CC}	2.7 to 3.6	V
Ambient temperature range	T_{amb}	-25 to +75	°C

Electrical Characteristics

No.	Parameters	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
1.0	Supply voltage		V_{CC}	2.7	3.3	3.6	V
1.1	Frequency range		f	4.9		5.9	GHz
1.2	Control voltage range	PA operating mode	V_{CTL}	1.25		1.6	V
1.3		Power down mode	V_{CTL}			0.2	V
1.4	Control current	PA Operation	I_{CTL}			200	μA
1.5	Current consumption	Quiescent	I_{cq}		110		mA
1.6	Current consumption	Power down mode	I_{pd}			10	μA
1.7	Turn on/off time	ON is the time that I_{CC} returns to normal and OFF is the time the current needs to decrease to 10% of normal mode	$t_{on/off}$		0.5	0.6	μs
1.8	Input and output return loss	With external matching			-12	-8	dB
1.9	Spectrum mask ⁽¹⁾	At ±11 MHz offset from carrier				-22	dBr
1.10		At ±20 MHz offset from carrier				-30	dBr
1.11		At ±30 MHz offset from carrier					-42

Note: 1. OFDM signal according to 802.11a specification with $P_{out} = 21$ dBm at 54 Mbps.

Electrical Characteristics - Unmodulated Carrier

Test Conditions (unless otherwise stated): $V_{CC} = 3.3\text{ V}$, Frequency = 5.25 GHz, $T_{amb} = 25^\circ\text{C}$

No.	Parameters	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
2.0	Saturated output power	For reference	P_{sat}		26.5		dBm
2.1	P1dB output power		P_{1dB}		25.5		dBm
2.3	Small signal gain	$I_{cq} = 180\text{ mA}$, small signal condition	GL		18		dB
2.4	Gain deviation	Within 200 MHz frequency band	Gd	-1		+1	dB
2.5	Reverse isolation		ISOr	30	36		dB

Electrical Characteristics - 54 Mbps OFDM-modulation

Test Conditions (unless otherwise stated): $V_{CC} = 3.3\text{ V}$, Frequency = 5.25 GHz, $T_{amb} = 25^\circ\text{C}$, IEEE802.11a conform 54 Mbps OFDM modulation, EVM measurement equipment noise floor is included in EVM measurement result.

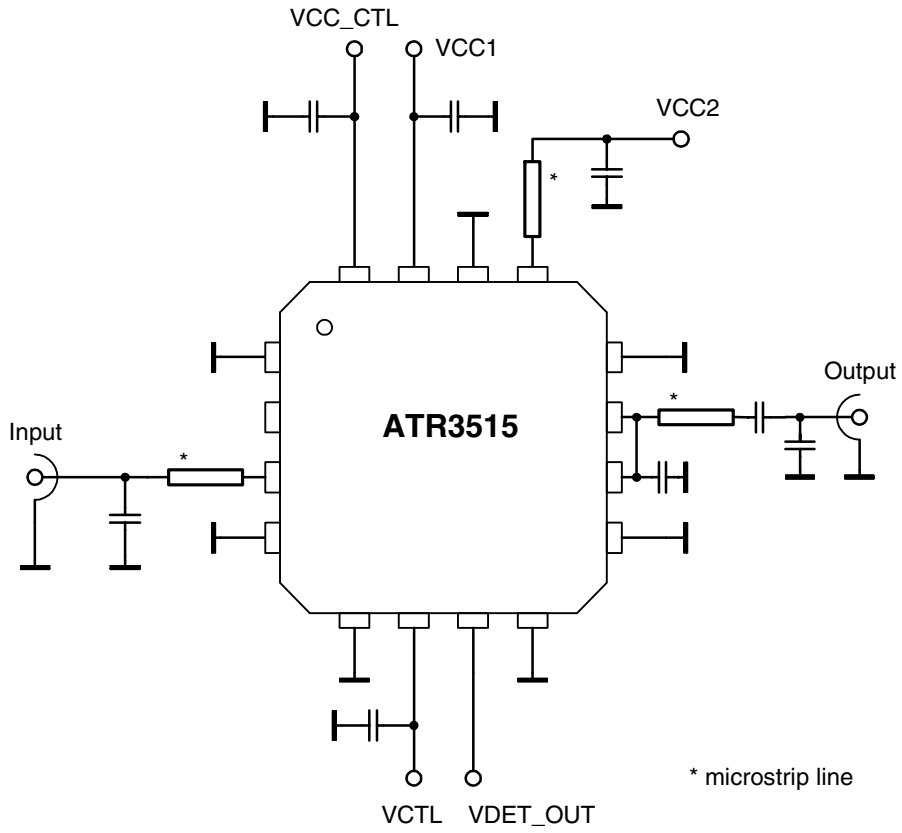
No.	Parameters	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
3.0	Error vector magnitude	$P_{OUT} = 19\text{ dBm}$	EVM		3.5		%
3.1	Linear power gain	$P_{OUT} = 19\text{ dBm}$	GL		18		dB
3.2	Current consumption	$P_{OUT} = 19\text{ dBm}$	I_{CC}		240		mA

Electrical Characteristics - Power Detector

Test Conditions (unless otherwise stated): $V_{CC} = 3.3\text{ V}$, Frequency = 5.25 GHz, $T_{amb} = 25^\circ\text{C}$.

No.	Parameters	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
4.0	Detector voltage range	$P_{OUT} = 2\text{ to }27\text{ dBm}$	V_{DET}	0		1.7	V
4.2	Settling time		tset		0.5		μs

Figure 3. Application Circuit



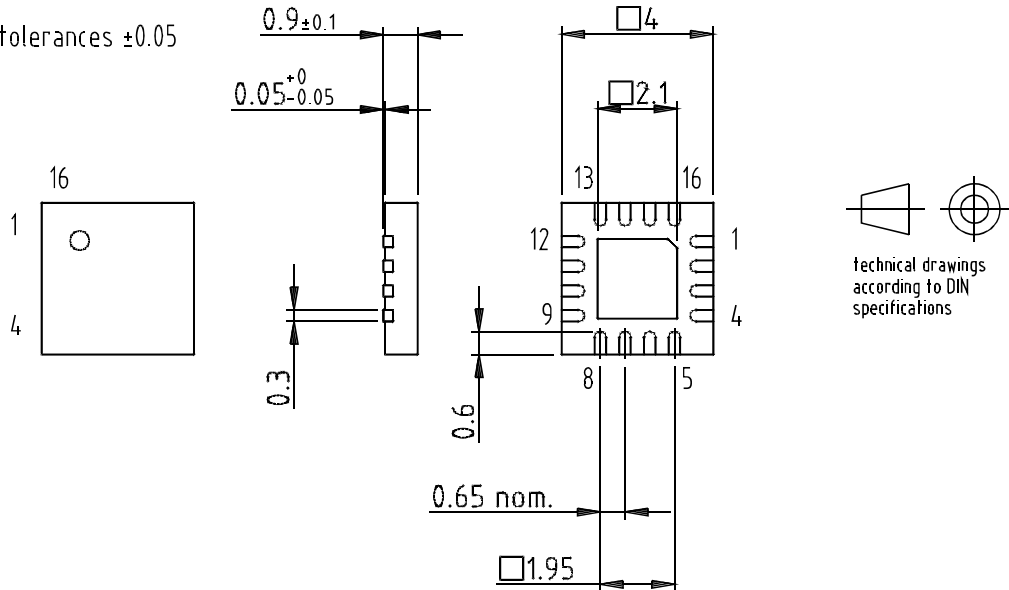
Ordering Information

Extended Type Number	Package	Remarks
ATR3515-PEP	QFN16 - 4x4	Taped and reeled, MOQ 1500
ATR3515-PEQ	QFN16 - 4x4	Taped and reeled, MOQ 6000

Package Information

Package: QFN 16 - 4x4
 Exposed pad 2.1x2.1
 (acc. JEDEC OUTLINE No. MO-220)
 Dimensions in mm

Not indicated tolerances ± 0.05



Drawing-No.: 6.543-5090.01-4

Issue: 2; 24.01.03



Atmel Corporation

2325 Orchard Parkway
San Jose, CA 95131, USA
Tel: 1(408) 441-0311
Fax: 1(408) 487-2600

Regional Headquarters

Europe

Atmel Sarl
Route des Arsenaux 41
Case Postale 80
CH-1705 Fribourg
Switzerland
Tel: (41) 26-426-5555
Fax: (41) 26-426-5500

Asia

Room 1219
Chinachem Golden Plaza
77 Mody Road Tsimshatsui
East Kowloon
Hong Kong
Tel: (852) 2721-9778
Fax: (852) 2722-1369

Japan

9F, Tonetsu Shinkawa Bldg.
1-24-8 Shinkawa
Chuo-ku, Tokyo 104-0033
Japan
Tel: (81) 3-3523-3551
Fax: (81) 3-3523-7581

Atmel Operations

Memory

2325 Orchard Parkway
San Jose, CA 95131, USA
Tel: 1(408) 441-0311
Fax: 1(408) 436-4314

Microcontrollers

2325 Orchard Parkway
San Jose, CA 95131, USA
Tel: 1(408) 441-0311
Fax: 1(408) 436-4314

La Chantrerie
BP 70602
44306 Nantes Cedex 3, France
Tel: (33) 2-40-18-18-18
Fax: (33) 2-40-18-19-60

ASIC/ASSP/Smart Cards

Zone Industrielle
13106 Rousset Cedex, France
Tel: (33) 4-42-53-60-00
Fax: (33) 4-42-53-60-01

1150 East Cheyenne Mtn. Blvd.
Colorado Springs, CO 80906, USA
Tel: 1(719) 576-3300
Fax: 1(719) 540-1759

Scottish Enterprise Technology Park
Maxwell Building
East Kilbride G75 0QR, Scotland
Tel: (44) 1355-803-000
Fax: (44) 1355-242-743

RF/Automotive

Theresienstrasse 2
Postfach 3535
74025 Heilbronn, Germany
Tel: (49) 71-31-67-0
Fax: (49) 71-31-67-2340

1150 East Cheyenne Mtn. Blvd.
Colorado Springs, CO 80906, USA
Tel: 1(719) 576-3300
Fax: 1(719) 540-1759

Biometrics/Imaging/Hi-Rel MPU/ High Speed Converters/RF Datacom

Avenue de Rochepleine
BP 123
38521 Saint-Egreve Cedex, France
Tel: (33) 4-76-58-30-00
Fax: (33) 4-76-58-34-80

Literature Requests

www.atmel.com/literature

Disclaimer: Atmel Corporation makes no warranty for the use of its products, other than those expressly contained in the Company's standard warranty which is detailed in Atmel's Terms and Conditions located on the Company's web site. The Company assumes no responsibility for any errors which may appear in this document, reserves the right to change devices or specifications detailed herein at any time without notice, and does not make any commitment to update the information contained herein. No licenses to patents or other intellectual property of Atmel are granted by the Company in connection with the sale of Atmel products, expressly or by implication. Atmel's products are not authorized for use as critical components in life support devices or systems.

© Atmel Corporation 2004. All rights reserved.

Atmel® and combinations thereof are the registered trademarks of Atmel Corporation or its subsidiaries.

Other terms and product names may be the trademarks of others.



Printed on recycled paper.