Features

- **Frequency Range 4.9 GHz to 5.9 GHz**
- **Supply-voltage 2.7 V to 3.6 V**
- **2.5% EVM at 19 dBm Output Power at 54 Mbit/s OFDM**
- **26.5 dB P_{1dB}**
- **On-chip Power Detector with 20 dB 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.

5-GHz WLAN Power Amplifier for 802.11a

ATR3515

Preliminary

Description

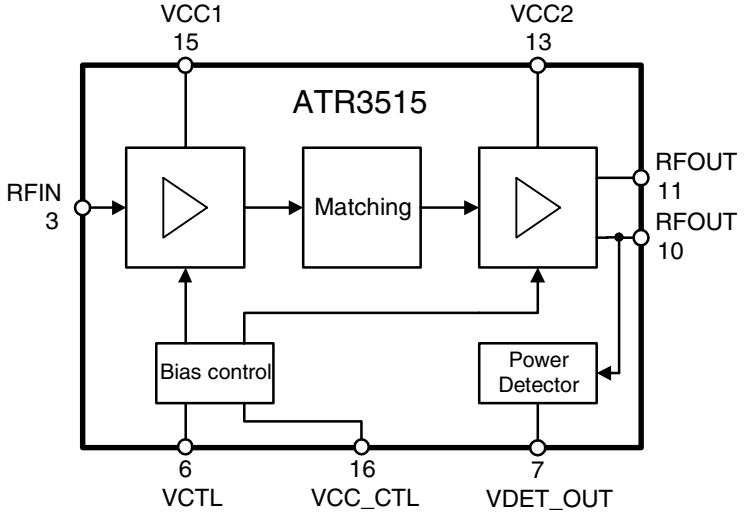
Process

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 26 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.

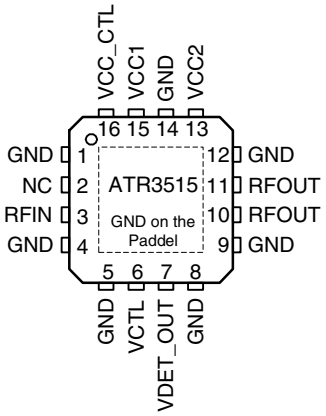
Figure 1. Block Diagram



Rev. 4514H–WLAN–12/03

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	Pin	Symbol	Value	Unit
Supply voltage		V_{CC}	3.8	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	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
1.0	Supply voltage			V_{CC}	2.7	3.3	3.6	V	A
1.1	Frequency range			f	4.9		5.9	GHz	A
1.2	Control voltage range	PA operating mode		V_{CTL}	1.3		1.9	V	A
1.3		Power down mode		V_{CTL}			0.2	V	A
1.4	Control current	PA Operation		I_{CTL}			200	µA	A
1.5	Current consumption	Quiescent		Icq		180		mA	A
1.6	Current consumption	Power down mode		Ipd			10	µA	A
1.7	Turn on/off time	ON is the time that ICC 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	C
1.8	Input and output return loss	With external matching				-12	-8	dB	C
1.9	Spectrum mask(1)	At ±11 MHz offset from carrier					-22	dBr	B
1.10		At ±20 MHz offset from carrier					-30	dBr	B
1.11		At ±30 MHz offset from carrier					-42	dBr	B

*) Type means: A = 100% tested, B = 100% correlation tested, C = Characterized on samples, D = Design parameter

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 V, Frequency = 5.25 GHz, T_{amb} = 25°C

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
2.0	Saturated output power	For reference		Psat		28		dBm	A
2.1	P1dB output power			P1dB		26.5		dBm	A
2.3	Small signal gain	Icq = 180 mA, small signal condition		GL		18		dB	A
2.4	Gain deviation	Within 200 Mhz frequency band		Gd	-1		+1	dB	A
2.5	Reverse isolation			ISOr	30	36		dB	C

*) Type means: A = 100% tested, B = 100% correlation tested, C = Characterized on samples, D = Design parameter

Electrical Characteristics - 54 Mbps OFDM-modulation

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

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
3.0	Error vector magnitude	P_{OUT} = 19 dBm		EVM		2.5		%	C
3.1	Linear power gain	P_{OUT} = 19 dBm		GL		20		dB	C
3.2	Current consumption	P_{OUT} = 19 dBm		I_{CC}		240		mA	A

*) Type means: A = 100% tested, B = 100% correlation tested, C = Characterized on samples, D = Design parameter

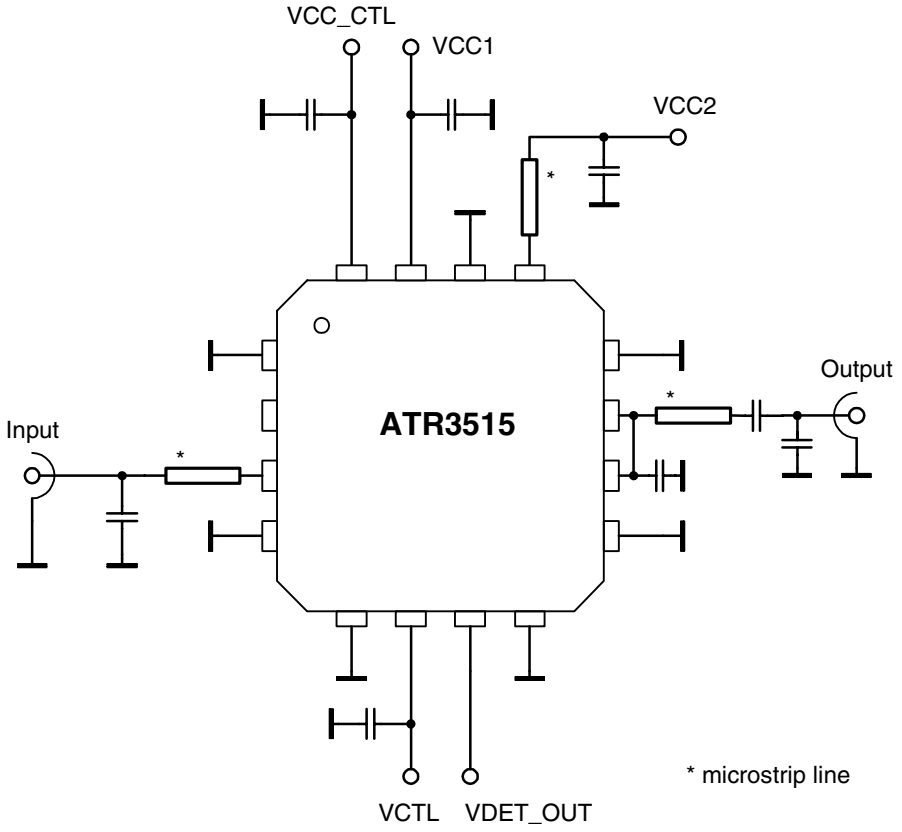
Electrical Characteristics - Power Detector

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

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
4.0	Detector voltage range	P_{OUT} = 2 to 28 dBm		V_{DET}	0		2.4	V	A
4.2	Settling time			tset		0.5		µs	C

*) Type means: A = 100% tested, B = 100% correlation tested, C = Characterized on samples, D = Design parameter

Figure 3. Application Circuit



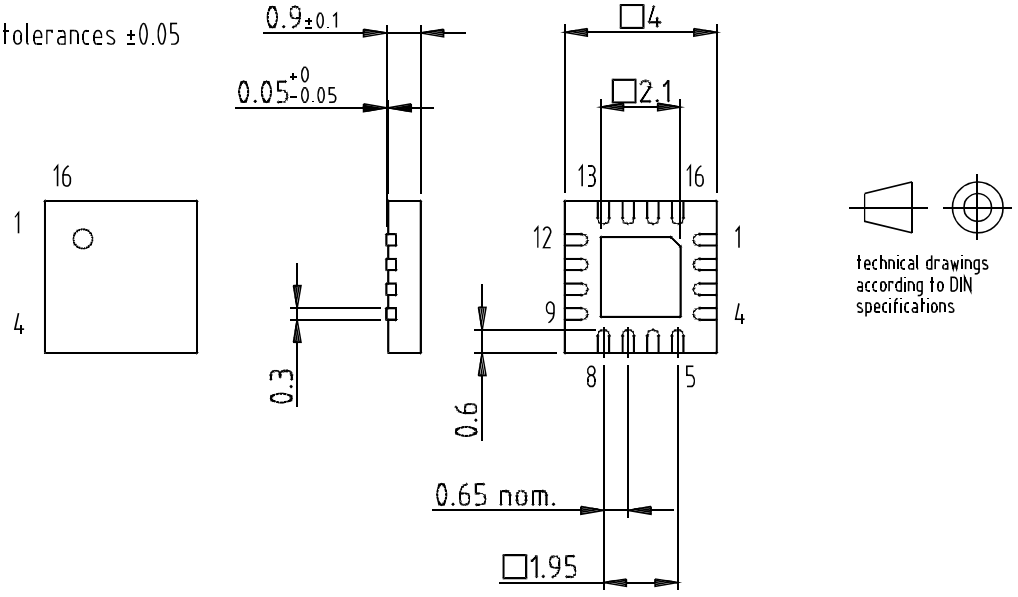
Ordering Information

Extended Type Number	Package	Remarks
ATR3515-PEP	QFN16 - 4x4	Taped and reeled, MOQ 1,500
ATR3515-PEQ	QFN16 - 4x4	Taped and reeled, MOQ 6,000

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
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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
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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
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