



## Features

- Input Frequency Range 2.7 GHz to 3.0 GHz
- $P_{OUT}$  Typically 12 dBm at 5.8 GHz
- $P_{IN}$  Typically 0 dBm
- $V_{CC}$  3.0V to 3.9V
- CW Mode Operation
- Package: QFN16



**2.9 GHz to  
5.8 GHz SiGe  
Frequency  
Doublers IC**

## Benefits

- Ramping Control Extends Battery Lifetime
- AC Input Coupling Saves External Capacitors
- Extremely Low BOM for Application

Electrostatic sensitive device.  
Observe precautions for handling.



**ATR7039**

**Preliminary**

## 1. Description

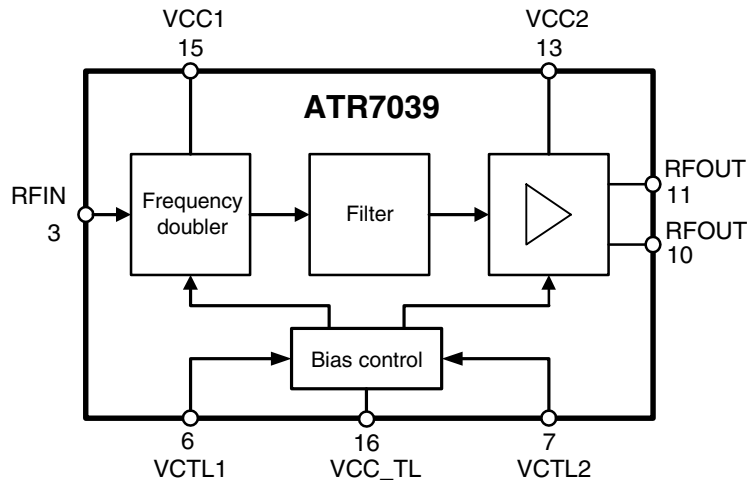
The 5.8-GHz frequency doubler IC is designed with Atmel's Silicon-Germanium (SiGe) process and provides a high conversion gain.

The device consists of a doubler stage, a filter and a driver amplifier with an output power of 11 dBm. The output stage was realized using an open-collector structure. Power-up/down and output levels are controlled via the bias control pin 6 and pin 7 ( $V_{CTL}$ ).

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Figure 1-1. Block Diagram



## 2. Pin Configuration

Figure 2-1. Pinning QFN16

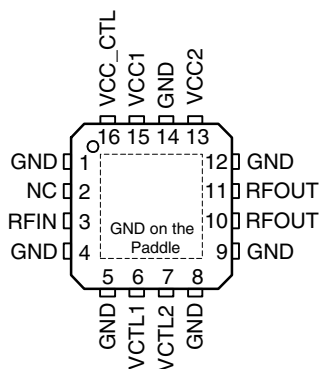


Table 2-1. Pin Description

Pin	Symbol	Function
1	GND	Ground
2	NC	Not connected
3	RFIN	RF input
4	GND	Ground
5	GND	Ground
6	VCTL1	Power-up/biasing control voltage to frequency doubler stage
7	VCTL2	Power-up/biasing control voltage to output amplifier stage
8	GND	Ground
9	GND	Ground
10	RFOUT	RF output
11	RFOUT	RF output
12	GND	Ground
13	VCC2	Supply voltage for output amplifier stage
14	GND	Ground
15	VCC1	Supply voltage for frequency doubler stage
16	VCC_CTL	Supply voltage for biasing control
Paddle	–	Ground

### 3. 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, no RF	$V_{CC}$	5	V
Supply current	$I_{CC}$	400	mA
Junction temperature	$T_J$	150	°C
Storage temperature	$T_{Stg}$	-40 to +125	°C
Input RF power	$P_{IN}$	13	dBm
Control voltage	$V_{CTL1,2}$	2.5	V

Note: The part may not survive all parameters at maximum applied simultaneously!

### 4. Thermal Resistance

Parameters	Symbol	Value	Unit
Junction ambient QFN16 package, slug soldered on PCB	$R_{thJA}$	40	K/W

### 5. Operating Range

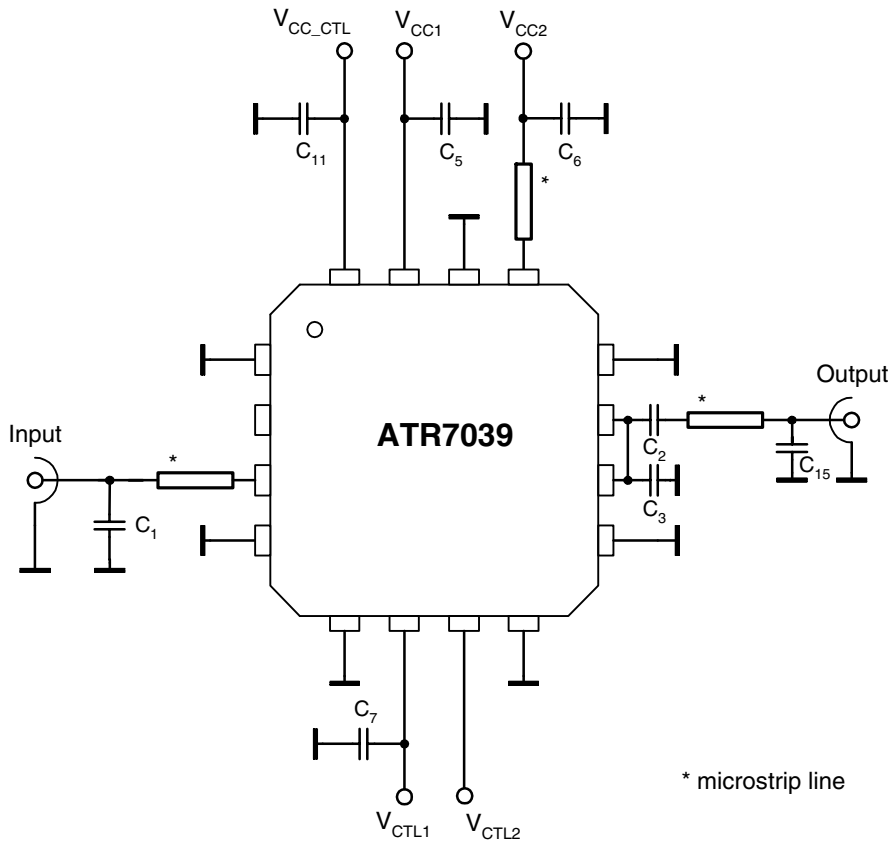
Parameters	Symbol	Value	Unit
Supply voltage	$V_{CC}$	3.0 to 3.9	V
Input frequency range	$f_{in}$	2700 to 3000	MHz
Output frequency range	$f_{out}$	5400 to 6000	MHz
Ambient temperature range	$T_{amb}$	-25 to +75	°C

## 6. Electrical Characteristics

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
1.0	Input power		3	Pin		0	10	dBm	A
1.1	Output power	Measured at harmonic frequency 2f	10, 11	P2f		12		dBm	A
1.2		Measured at harmonic frequency 3f	10, 11	P3f		-8		dBm	A
1.3		Measured at fundamental frequency	10, 11	P1f		TBD		dBm	A
1.4	Output power deviation	Measured at harmonic frequency	10, 11	P <sub>d</sub>	-2		+2	dB	A
1.5	Control voltage range	Doubler operating mode	6	V <sub>CTL1</sub>		1.4		V	A
			7	V <sub>CTL2</sub>		1.7		V	A
1.6		Power down mode	6, 7	V <sub>CTL1,2</sub>			0.2	V	A
1.7	Input and output return loss	With external matching	3, 10, 11			-12	-8	dB	C
1.8	Reverse isolation	2f	3, 10, 11	ISO <sub>r</sub>	30	36		dB	C
1.9	Current consumption	for 12dBm output power	13, 15, 16	I <sub>CC</sub>		90		mA	A
1.10	Current consumption in power down mode	V <sub>CTL1,2</sub> ≤ 0.2V	13, 15, 16	I <sub>CC</sub>		15		μA	A
2.0	Duty cycle						100	%	C

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

## 7. Application Circuit



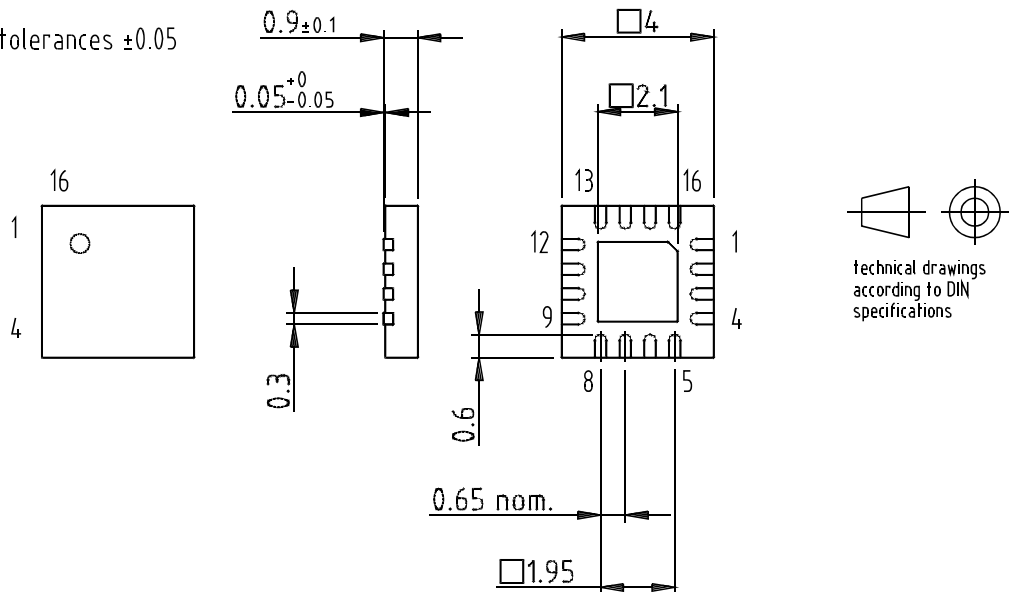
## 8. Ordering Information

Extended Type Number	Package	Remarks
ATR7039-PESG	QFN16 - 4x4	Tube, MOQ 750, Pb-free
ATR7039-PEQG	QFN16 - 4x4	Taped and reeled, MOQ 6000, Pb-free

## 9. Package Information

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

Not indicated tolerances  $\pm 0.05$



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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 Arsenalux 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

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

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Tel: 1(719) 576-3300  
Fax: 1(719) 540-1759

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Fax: (44) 1355-242-743

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Colorado Springs, CO 80906, USA  
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