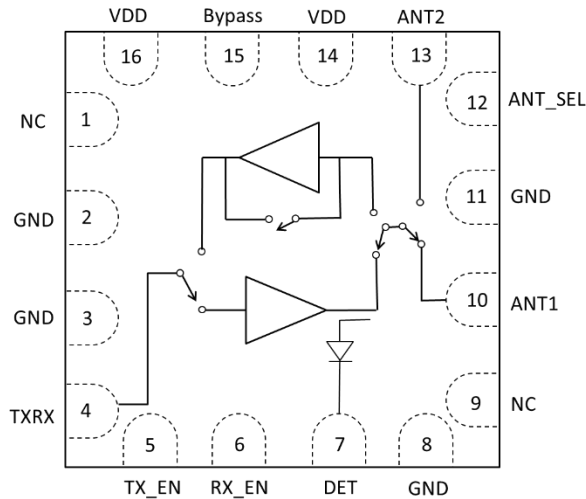




2.4G IoT/ZIGBEE HIGH EFFICIENCY RF FRONT END IC



Description

RT201 is a fully integrated RFIC (RF Front-end Integrated Circuit) which incorporates key RF functionality. It integrates a high-efficiency PA, a low noise amplifier (LNA) with bypass mode, Transmit and Receive switching circuitry, the associated matching network, a harmonic filter and a diversity switch all in one device. The PA power detect circuit is also integrated.

RT201 has simple and low-voltage control logic, and requires minimal external components. Moreover, RT201 has ruggedized ESD, and VSWR protection.

RT201 is designed for use in 2.4GHz ISM band and supports the 802.15.4 and ZigBee standard. It's the perfect RF Front-end solution for applications requiring extended range and bandwidth.

Applications

- ▶ ZigBee Extended Range Devices
- ▶ Wireless Sensor Networks
- ▶ IoT
- ▶ Bluetooth
- ▶ Home and Industrial Automation
- ▶ Custom 2.4GHz Radio Systems
- ▶ Remote Control

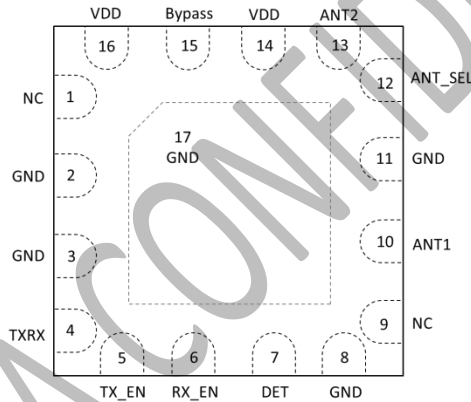
FEATURES

- ▶ 2.4GHz ZigBee High Power, Fully Integrated RF Front-End IC with 22.5dBm Output Power
- ▶ Full On-chip 50Ω Input / Output Matching, Integrate Output Filter for Spurs / Harmonics Rejection
- ▶ Integrated Power Detector for Transmit Power Monitor and Control
- ▶ Dual Antenna for Range-extension
- ▶ Very Low DC Power Consumption
- ▶ Integrated Receive Bypass Function
- ▶ ESD Protection Circuitry on All Ports
- ▶ 3×3×0.75mm Small Outline QFN-16 Package with Exposed Ground Pad
- ▶ Minimal External Components Required

PIN ASSIGNMENTS

Pin Number	Pin Name	Description
1,9	NC	Not Connected; May be Floated or Connected to GND
2,3,8,11	GND	Ground – Must be Connected to Ground in the Application Circuit
4	TXRX	RF Signal to / from the Transceiver; DC Shorted to GND
5	TX_EN	Input Control for TX Enable
6	RX_EN	Input Control for RX Enable
7	DET	Detector Output Voltage
10	ANT1	RF Signal from the PA or RF Signal Applied to the LNA; DC Shorted to GND
12	ANT_SEL	Input for Antenna Diversity Selection
13	ANT2	RF Signal from the PA or RF Signal Applied to the LNA; DC Shorted to GND
14,16	VDD	Voltage Supply Connection
15	Bypass	Input for Bypass Mode

PIN-OUT DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Parameters	Units	Min	Max	Conditions
DC VDD Voltage Supply	V	0	4.0	All VDD Pins
DC Control Pin Voltage	V	0	3.6	
DC VDD Current Consumption	mA		350	Through VDD Pins when TX is "ON"
DC Control Pin Current Consumption	uA		1	
TX RF Input Power	dBm		+5	All Operating Modes
ANT RF Input Power	dBm		+5	When RX is "ON"
Junction Temperature	°C		150	
Storage Ambient Temperature	°C	-50	150	No RF and DC Voltage Applied Appropriate care required according to JEDEC Standards

NOTE: Sustained operation at or above the Absolute Maximum Ratings for any one or combinations of the above parameters may result in permanent damage to the device and is not recommended.

All Maximum RF Input Power Ratings assume 50-ohm terminal impedance.



NOMINAL OPERATING CONDITIONS

Parameters	Units	Min	Typical	Max	Conditions
DC VDD Voltage Supply	V	1.8	3.3	3.6	All VDD Pins
Control Voltage "High"	V	1.2		VDD	Through 1Kohm resistor
Control Voltage "Low"	V	0		0.3	
DC Control Pin Current Consumption	uA		1		
DC Shutdown Current	uA		2		
PA Turn On/Off Time	usec			1	
LNA Turn On/Off Time	usec			1	
Antenna Switch Time	usec			1	
Operating Ambient Temperature	°C	-40		125	See note 2
θ_{jc}	°C/W		30		

NOTE 2: For operation above +85 °C, use the θ_{ja} as guidance for system design to assure the junction temperature will not exceed the maximum of +150 °C.

RT201 ELECTRICAL SPECIFICATIONS

(VDD= 3.3V, T= 25 °C, Unless Otherwise Noted)

Parameters	Units	Min	Typical	Max	Conditions
Frequency Range	GHz	2.4		2.5	All RF Pins Terminated by 50 Ohm
Transmit Mode					
Small-Signal Gain	dB	23	24		
Saturated Output Power	dBm		22.5		
Harmonics					Pout=+20dBm, IEEE 802.15.4 CW signal
2 nd harmonic	dBm/MHz		<-20		
3 rd harmonic			<-10		
Input Return Loss	dB		12		
Output Return Loss	dB		5		
Input / Output Impedance Single-Ended	Ohm		50		
TX Quiescent Current	mA		23		No RF Applied
TX High Current	mA		125		Pout=20dBm
			190		Pout=22.5dBm
Load Stability VSWR=3:1	dBm		20		Psat @ VSWR=3:1
Load VSWR for Ruggedness (Pin=0dBm)	N/A		10:1		No Damage
Receive Mode					
Gain	dB		16		
Noise Figure	dB		3	3.2	
Input P1dB	dBm		-8		At ANT Pin
Input Return Loss	dB		8		
Output Return Loss	dB		12		

This product datasheet is a general list of parameters to provide information on the capabilities of this device and is subject to change without notice.



Parameters	Units	Min	Typical	Max	Conditions
RF Port Impedance	Ohm		50		
RX Quiescent Current	mA		9		No RF Applied
Bypass Mode					
Insertion Loss	dB		5		
Input P1dB	dBm		10		At ANT1 or ANT2 Pin
Total Current Consumption	mA		0.6		

PRODUCT QUALIFICATION

Parameters	Units	Min	Max	Conditions
ESD – Human Body Mode	V		4000	HBM
ESD – Charge Device Mode	V		1500	CDM

ESD HANDLING: Although this device is designed to be as robust as possible, electrostatic discharge (ESD) can damage this device. This device must be protected at all times from ESD when handling or transporting. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection.

Industry-standard ESD handling precautions should be used at all times.

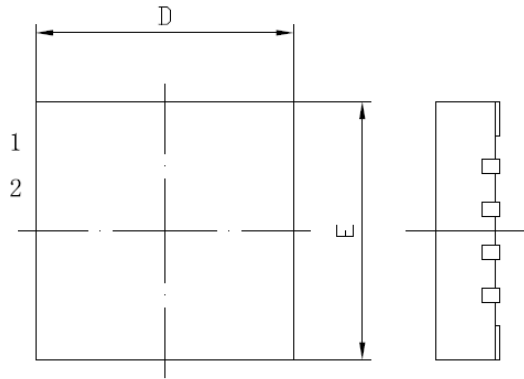
CONTROL LOGIC TABLE

TX_EN	RX_EN	Bypass	Mode of Operation
1	X	X	Transmit Mode
0	1	NC/0	Receive LNA Mode
0	1	1	Bypass Mode
0	0	0	Shutdown Mode

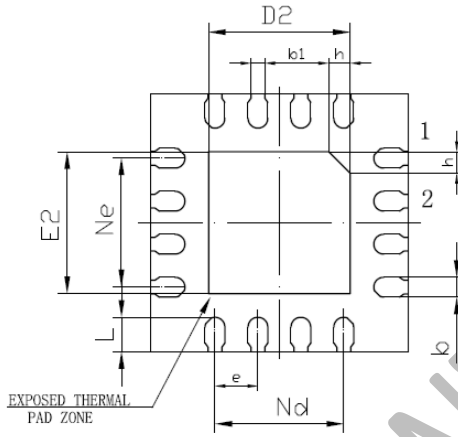
ANT_SEL	Mode of ANT
NC/0	ANT1
1	ANT2

Note: "1" denotes high voltage state (> 1.2V)
 "0" denotes low voltage state (<0.3V) at Control Pins
 "X" denotes the don't care state
 1KΩ – 10KΩ series resistor may be required for each control line

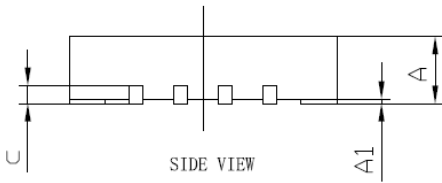
PACKAGE DIMENSIONS (All Dimensions in mm):



TOP VIEW



BOTTOM VIEW



SIDE VIEW

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0	0.02	0.05
b	0.18	0.25	0.30
b1	0.16REF		
c	0.18	0.20	0.25
D	2.90	3.00	3.10
D2	1.55	1.65	1.75
e	0.50BSC		
Ne	1.50BSC		
Nd	1.50BSC		
E	2.90	3.00	3.10
E2	1.55	1.65	1.75
L	0.35	0.40	0.45
h	0.20	0.25	0.30
L/F载体尺寸 (mm)	75x75		

PART MARKING:



This product datasheet is a general list of parameters to provide information on the capabilities of this device and is subject to change without notice.