



RFIC TECHNOLOGIES

RFIC System Technologies Private Limited

project	802.15.4/Zigbee RF Front End IC
customer	
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RFIC System Technologies

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Description:

This chip is a fully integrated, single-chip, single-die RF Front-end Integrated Circuit which incorporates necessary RF functionality needed for IEEE 802.15.4/ZigBee RF Front end module/IC, wireless sensor network, and any other wireless systems in the 2.4GHz ISM band. The architecture integrates the PA, LNA, Transmit and Receive switching circuitry, the associated matching network, and the harmonic filter all in a CMOS single-chip device. Typical high power applications include home and industrial automation, smart power, and RF4CE among others. Combining superior performance, high sensitivity and efficiency, low noise, small form factor, and low cost, this chip is the perfect solution for applications requiring extended range and bandwidth. This IC has simple and low-voltage CMOS control logic, and requires minimal external components for system implementation.

Applications

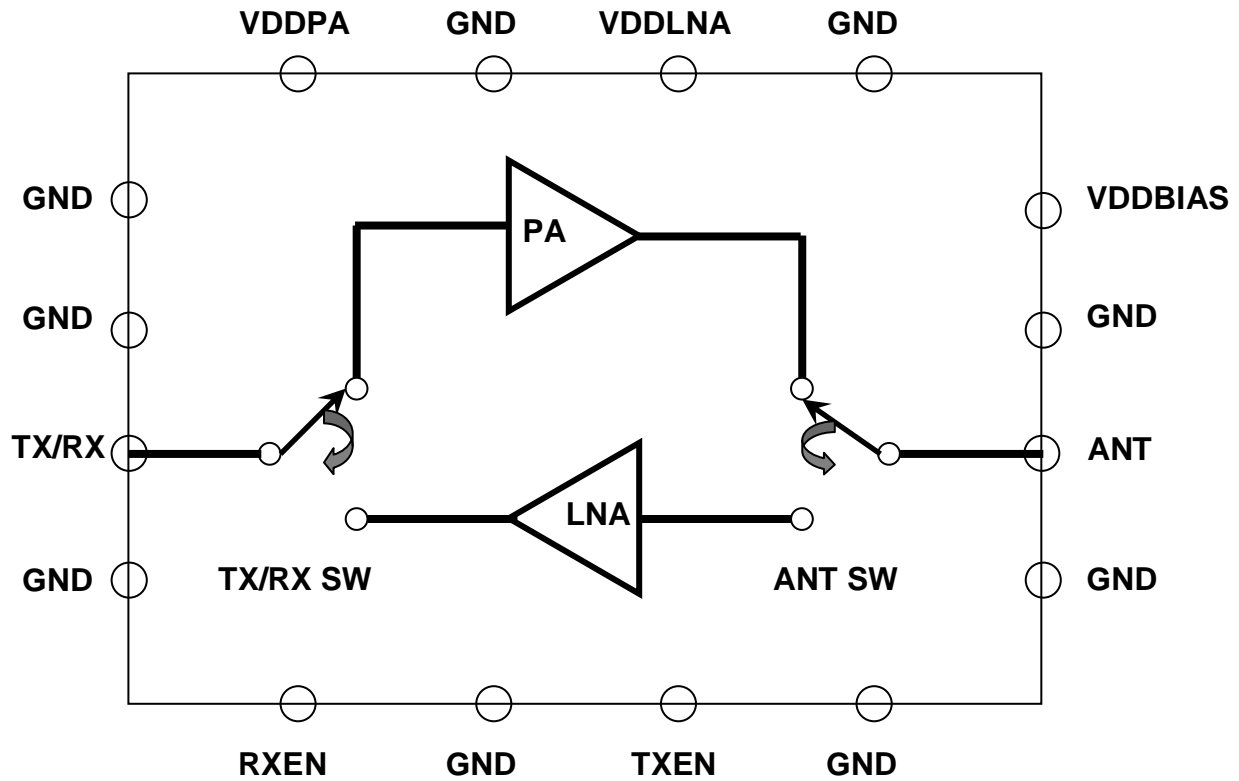
- ZigBee Extended Range Devices
- ZigBee Smart Power
- Wireless Sound and Audio Systems
- Home and Industrial Automation
- Wireless Sensor Networks
- Custom 2.4GHz Radio Systems

FEATURES

- 2.4GHz ZigBee High Power Single-Chip, Single-Die RF Front-End IC
- Combined TX / RX Transceiver Port and Single Antenna Port
- 2.4GHz Transmit High Power Amplifier with Low-Pass Harmonic Filter
- Transmit / Receive Switch Circuitry
- High Transmit Signal Linearity Meeting Standards for OQPSK Modulation
- Low Noise Figure for the Receive Channel
- Internal RF Decoupling on All VDD Bias Pins
- Very Low DC Power Consumption
- DC Decoupled RF Ports
- Full On-chip Matching and Decoupling Circuitry
- ESD Protection Circuitry on All Ports
- Market Proven CMOS Technology

Block diagram

Following is the block&pin diagram of 802.15.4/Zigbee RF Front End IC.



PIN ASSIGNMENTS:

Pin Number	Pin Name	Description
3	TXRX	RF signal to / from the Transceiver: AC coupled
5	RXEN	CMOS Input to Control TX Enable
7	TXEN	CMOS Input to Control RX Enable
10	ANT	RF Signal from the PA or RF Signal Applied to the LNA; AC coupled
1, 2, 4, 6, 8, 9, 11,13, 15, 17	GND	Ground – Must be connected to Ground in the Application Circuit
12	VDDBIAS	Voltage Supply Connection for PA bias (3.3V)
14	VDDLNA	Voltage Supply Connection for LNA (1.2V)
16	VDDPA	Voltage Supply Connection for PA (3.3V)

Specifications:

NOMINAL OPERATING CONDITIONS

parameters	units	min	typ	max	conditions
DC VDD voltage	V		3.3& 1.2		TSMC 130nm CMOS process
control voltage "High"	V		1.2	VDD	
control voltage "Low"	V		0	0.3	
operating ambient temperature	°C	-30		85	All operating modes

TRANSMIT TECHNICAL PARAMETERS (VDD=3.3V, T=25degC)

parameters	units	min	typ	max	conditions
Operating frequency band	GHz	2.4		2.5	
Output P1dB	dBm		18		
Saturated Output Power	dBm		20		
Small signal gain	dB		24		
Second Harmonic	dBm		-9		@18dBm 802.15.4 OQPSK modulated signal o/p power
Thhird Harmonic	dBm		-27		@18dBm 802.15.4 OQPSK modulated signal o/p power
Input return loss	dB		12		
Output return loss	dB		8		
Input/Output Impedance	Ohm		50		
Tx Quiescent current	mA		18		No RF applied
Tx High power current	mA		90		Pout=18dBm
Load VSWR for stability (Pout=18dBm)			6:1		All non harmonically related spurs less than -41dBm/MHz
Load VSWR for ruggedness (Pout=18dBm)			10:1		No Damage

RECEIVE TECHNICAL PARAMETERS (VDD=1.2V, T=25degC)

parameters	units	min	typ	max	conditions
Operating frequency band	GHz	2.4		2.5	
Noise Figure	dB		2.5		



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Gain	dB		12		
Input P1dB	dBm		-10		At ANT input
Input Return loss	dB		12		
Output Return loss	dB		12		
RF port Impedance	Ohms		50		
Rx Quiescent Current	mA		10		No RF Applied

STANDBY MODE TECHNICAL PARAMETERS

parameters	units	min	typ	max	conditions
DC Shutdown Current	uA			1	
TXRX-ANT Insertion Loss (S21)	dB		-45		Pin=-25dBm
ANT-TXRX Insertion Loss (S21)	dB		-45		
Return Loss (S11)	dB		-1		@TXRX port
Transmit-Receive Switching Time	nsec		-900		
Shut-Down and "ON" State Switching Time	nsec		-900		

Control logic truth table

TXEN	RXEN	OPERATING CONDITION
0	1	Rx Active
1	X	Tx Active
0	0	Shutdown

Note: "1" denotes high voltage state (> 1.2V)
 "0" denotes low voltage stage (<0.3V) at Control Pins
 "X" denotes do not care: either "1" or "0" can be applied

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