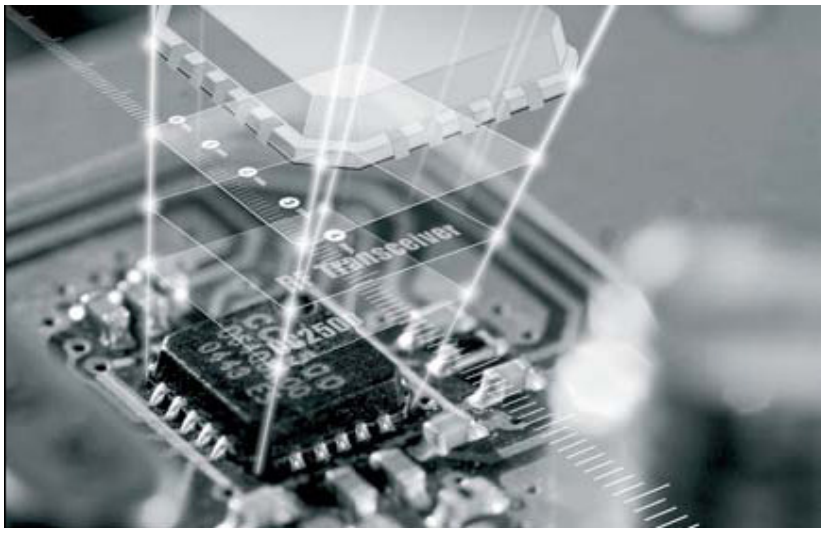
SPECIFICATION

A True System-on-Chip Solution for 2.4-GHz IEEE 802.15.4



Model : **2.4GHz RF Module**
Part No : TC2530-xHPTIFxxx
Version : V2.0
Date : 2012.10.12

■ Applications

- *2.4-GHz IEEE 802.15.4 Systems*
- *RF4CE Remote Control Systems (64-KB Flash and Higher)*
- *ZigBee Systems (256-KB Flash)*
- *Home/Building Automation*
- *Lighting Systems*
- *Industrial Control and Monitoring*
- *Low-Power Wireless Sensor Networks*
- *Consumer Electronics*
- *Health Care*

■ Selection Guide

Denomination : 2.4-GHz IEEE 802.15.4 and ZigBee Applications RF Module

Part No. : TC2530**- x**HPTIF**xxx**

- **xxx**: 32/64/128/256 KB in-system Programmable Flash
- **x**: i : I-PEX / p : PCB Antenna
- TC2530: Chip CC2530

■ Absolute Maximum Ratings

Caution! *ESD sensitive device. Precaution should be used when handling the device in order to prevent permanent damage.*

		MIN	MAX	UNIT
Supply voltage	All supply pins must have the same voltage	-0.3	3.9	V
Voltage on any digital pin		-0.3	VDD+0.3 ≦3.9	V
Input RF level			10	dBm
Storage temperature range		-40	80	
ESD(2)	All pads, according to human-body model, JEDEC STD 22, method A114		2	kV
	According to charged-device model, JEDEC STD 22, method C101		500	V

(1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only,and functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) CAUTION: ESD sensitive device. Precaution should be used when handling the device in order to prevent permanent damage.

■ General Characteristics

Parameter	TEST CONDITIONS	Min	Typ	Max	Units
RADIO PART					
Frequency range	Programmable in 1-MHz steps	2400		2500	MHz
Data rate and modulation format			250k		Bps
Transmit power(Connect SMA antenna)			+3.5 ±0.5		dBm
Receiver sensitivity	Nominal		-97		
Module size	25.7 * 16.15 * 2.0				mm

■ Module interface

Interface	Description
Antenna	External Antenna 50 Ω
UART Interface	TX, RX ,RTS, CTS
SPI Interface	Synchronous Serial Interface
PIO Interface	19 terminals

■ Electrical Specifications

● Current Consumption

Measured on Texas Instruments CC2530 EM reference design with TA = 25°C and VDD = 3 V, unless otherwise noted. Boldface limits apply over the entire operating range, TA = –40°C to 125°C, VDD = 2 V to 3.6 V, and fc = 2394 MHz to 2507 MHz.

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Icore Core current consumption	Digital regulator on. 16-MHz RCOSC running. No radio, crystals, or peripherals active. Medium CPU activity: normal flash access(1), no RAM access			3.4	mA
	32-MHz XOSC running. No radio or peripherals active. Medium CPU activity: normal flash access(1), no RAM access		6.5	8.9	mA
	32-MHz XOSC running, radio in RX mode, –50-dBm input power, no peripherals active, CPU idle			20.5	mA
	32-MHz XOSC running, radio in RX mode at -100-dBm input power (waiting for signal), no peripherals active, CPU idle		24.3	29.6	mA
	32-MHz XOSC running, radio in TX mode, 1-dBm output power, no peripherals active, CPU idle			28.7	mA
	32-MHz XOSC running, radio in TX mode, 4.5-dBm output power, no peripherals active, CPU idle		33.5	39.6	mA
	Power mode 1. Digital regulator on; 16-MHz RCOSC and 32-MHz crystal oscillator off; 32.768-kHz XOSC, POR, BOD and sleep timer active; RAM and register retention		0.2	0.3	mA
	Power mode 2. Digital regulator off; 16-MHz RCOSC and 32-MHz crystal oscillator off; 32.768-kHz XOSC, POR, and sleep timer active; RAM and register retention		1	2	µA
	Power mode 3. Digital regulator off; no clocks; POR active;RAM and register retention		0.4	1	µA

(1) Normal flash access means that the code used exceeds the cache storage, so cache misses happen frequently.

■ GENERAL CHARACTERISTICS :

Measured on Texas Instruments CC2530 EM reference design with TA = 25℃ and VDD = 3 V, unless otherwise noted.

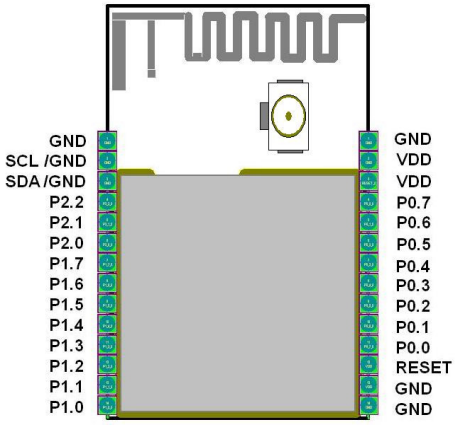
PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
WAKE-UP AND TIMING					
Power mode 1 → active	Digital regulator on, 16-MHz RCOSC and 32-MHz crystal oscillator off. Start-up of 16-MHz RCOSC		4		µA
Power mode 2 or 3 → active	Digital regulator off, 16-MHz RCOSC and 32-MHz crystal oscillator off. Start-up of regulator and 16-MHz RCOSC		0.1		mA
Active → TX or RX	Initially running on 16-MHz RCOSC, with 32-MHz XOSC OFF		0.5		mA
	With 32-MHz XOSC initially on			192	µA
RX/TX and TX/RX turnaround				192	µA
RADIO PART					
RF frequency range	Programmable in 1-MHz steps, 5 MHz between channels for compliance with [1]	2394		2507	MHz
Radio baud rate	As defined by [1]		250		kbps
Radio chip rate	As defined by [1]		2		Mchip/s

■ TC2530-HPTIFxxx RF Module Peripheral I/O Pin Mapping

Peripheral I/O Pin Mapping

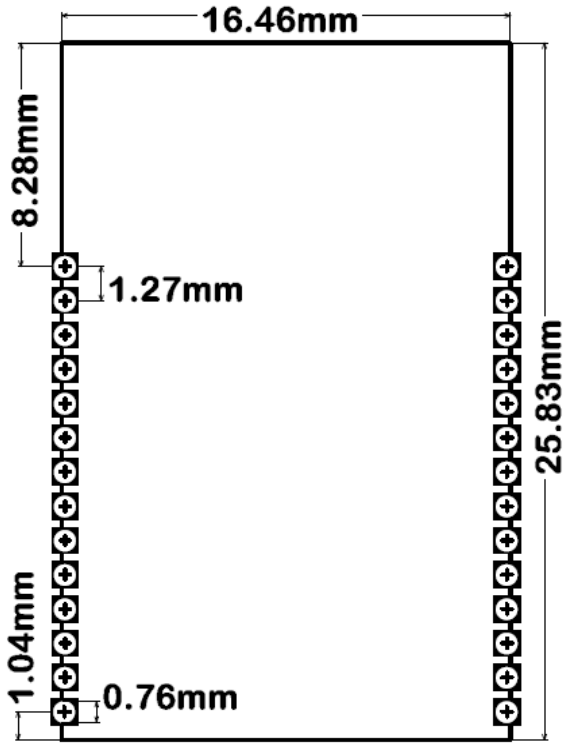
Periphery/ Function	P0								P1								P2				
	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	4	3	2	1	0
ADC	A7	A6	A5	A4	A3	A2	A1	A0													T
USART 0 SPI			C	SS	MO	MI															
Alt. 2											M0	MI	C	SS							
USART 0 UART			RT	CT	TX	RX															
Alt. 2											TX	RX	RT	CT							
USART 1 SPI			MI	M0	C	SS															
Alt. 2									MI	M0	C	SS									
USART 1 UART			RX	TX	RT	CT															
Alt. 2									RX	TX	RT	CT									
TIMER 1		4	3	2	1	0															
Alt. 2	3	4												0	1	2					
TIMER 3												1	0								
Alt. 2									1	0											
TIMER 4															1	0					
Alt. 2																		1			0
32-kHz XOSC																	Q1	Q2			
DEBUG																			DC	DD	

■ TC2530-xHPTIFxxx RF Module Pin Configuration

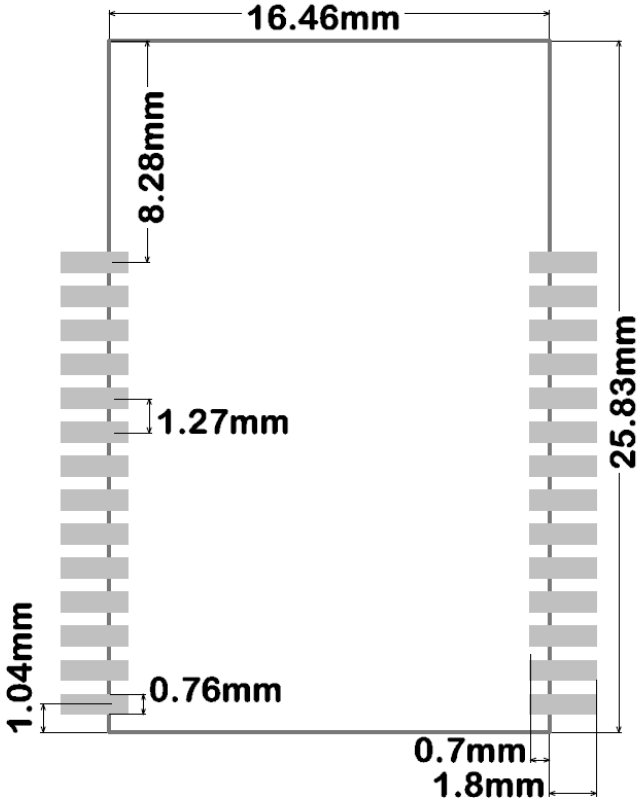


Pin #.	Pin Name	Pin Type	Description
1	GND	GND	Ground
2	GND	GND	Ground
3	GND	GND	Ground
4	P2.2	Digital IO	Port 2.2
5	P2.1	Digital IO	Port 2.1
6	P2.0	Digital IO	Port 2.0
7	P1.7	Digital IO	Port 1.7
8	P1.6	Digital IO	Port 1.6
9	P1.5	Digital IO	Port 1.5
10	P1.4	Digital IO	Port 1.4
11	P1.3	Digital IO	Port 1.3
12	P1.2	Digital IO	Port 1.2
13	P1.1	Digital IO	Port 1.1
14	P1.0	Digital IO	Port 1.0
15	GND	GND	Ground
16	GND	GND	Ground
17	RESET	Digital Input	Reset, Active Low
18	P0.0	Analog / Digital IO	Port 0.0
19	P0.1	Analog / Digital IO	Port 0.1
20	P0.2	Analog / Digital IO	Port 0.2
21	P0.3	Analog / Digital IO	Port 0.3
22	P0.4	Analog / Digital IO	Port 0.4
23	P0.5	Analog / Digital IO	Port 0.5
24	P0.6	Analog / Digital IO	Port 0.6
25	P0.7	Analog / Digital IO	Port 0.7
26	VDD	Power	2.0V ~ 3.7V Power Supply
27	VDD	Power	2.0V ~ 3.7V Power Supply
28	GND	GND	Ground

■ TC2530-xHPTIFxxx RF Module Description



■ Recommended PCB layout for Module



■ Document History

Revision	Date	Description/Changes
1.0	2012.10.15	First release

■ Address Information

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