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# SPECIFICATION

## 2.4 GHz RF SoC FOR WIRELESS DIGITAL AUDIO STREAMING



Model : **2.4GHz RF Module**

Part No : TC85xx-PAT1x-x

Version : V1.0

Date : 2012.10.12

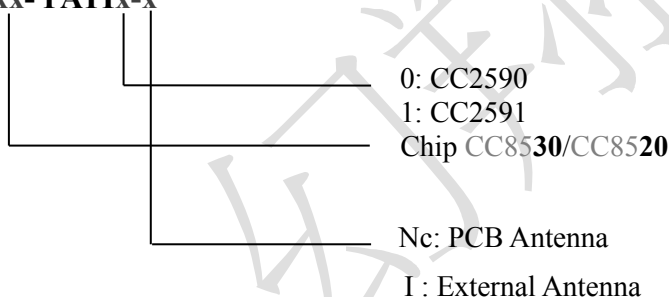
## ■ Applications

- *Wireless high-quality digital audio*
  - *Wireless point-to-point audio link*
  - *Wireless (USB) headphones / headsets*
  - *Wireless (USB) loudspeakers*
  - *Wireless (USB) microphones*
- *Wireless 2.1 speaker systems*
  - *CC852x supports up to 2 channels*
  - *CC853x supports up to 4 channels*
  - *CC85x1 supports USB*

## ■ Selection Guide

Denomination : 2.4GHz Wireless high-quality digital audio Module

Part No. : TC85xx- PATIx-x



## Absolute Maximum Ratings<sup>(1)</sup>



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

Parameter	Min	Max	Units	Condition
Supply voltage <sup>(2)</sup>	- 0.3	3.9	V	All supply pins must have the same voltage
Voltage on any digital pin	- 0.3	VDD+0.3, max 3.9	V	
Input RF level		+10 ±1	dBm	CC2590
Input RF level		+20 ±1	dBm	CC2591
Storage temperature range	- 40	125	°C	
Reflow soldering temperature		260	°C	According to IPC/JEDEC J-STD-020
ESD <sup>(3)</sup>				All pads, according to human-body model (HBM), JEDEC STD 22, method A114
		<500	V	According to charged-device model (CDM), JEDEC STD 22, method C101E

(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) For CC8521 and CC8531 running on USB power, a LDO is needed to comply with these ratings.

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

## Operating Conditions (CC8520/21/CC8530/31)

Parameter	Min	Max	Units	Condition
Operating temperature	- 40	85	°C	
Operating supply voltage	2.0	3.6	V	

## General Characteristics

Parameter	TEST CONDITIONS	Min	Typ	Max	Units
<b>RADIO PART</b>					
Frequency range		2400		2483.5	MHz
Data rate	Shaped 8FSK		5		Mbps
Audio latency	Latency between I2S interface on audio source and I2S interface on audio sink. Uncompressed 16 bit. Audio latency is programmable using the PurePath Wireless Configurator [1].	768		2048	Samples
Audio sample rate	Audio sample rate is programmable using the PurePath Wireless Configurator [1] <sup>(1)</sup>		48 44.1 40.275 <sup>(2)</sup> 32		kHz
Module size	24.53 * 16.3 2.0				mm

(1) ±2000ppm tolerance

(2) Not supported in USB mode. For USB Headset, dynamic sample rate change is not allowed.

## ELECTRICAL CHARACTERISTICS, CC8520/CC8521/CC8530/CC8531 +CC2590

Parameter	TEST CONDITIONS	Min	Typ	Max	Units
<b>RADIO PART</b>					

<b>Current consumption, power down state<sup>(1)</sup></b>	Voltage regulator / crystal oscillator off – status lost (POWERED_DOWN state)		1		μA
<b>Current consumption, Headphone master<sup>(2)</sup></b>	Average current for a PurePath Wireless master with I2S interface active, sourcing two PCM16 channels.		38		mA
<b>Current consumption, Headphone slave<sup>(2)</sup></b>	Average current for a PurePath Wireless slave with I2S interface active, sinking two PCM16 channels		28		mA

(1) CC2590 power down current is 100 nA[4]

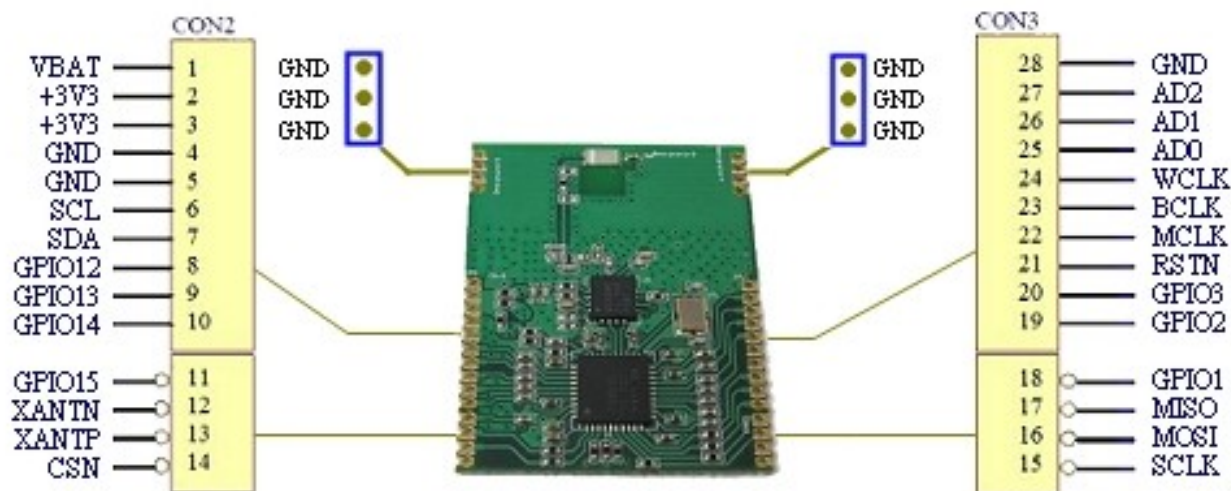
(2) Measured on Texas Instruments CC85xx+CC2590 EM reference designs and CC85XXDK. Sample rate 48 kHz, MCLK disa

**RF CHARACTERISTICS, CC8520/CC8521/CC8530/CC8531 +CC2590**

Parameter	TEST CONDITIONS	Min	Typ	Max	Units
<b>RADIO PART</b>					
<b>Output power</b>	Maximum output power setting		11		dBm
<b>Receiver sensitivity<sup>(1)</sup></b>	5 Mbps, 0.1 % BER		-87		dBm
<b>Saturation (maximum input level)</b>	5 Mbps, 0.1 % BER		-12		dBm
<b>Selectivity</b>	Adjacent channel, ±4MHz, wanted 3dB above sensitivity		9		dBm
	Alternate channel, ±8MHz, wanted 3dB above sensitivity		34		
<b>Spurious emission</b>	Suitable for systems targeting compliance with EN 300 328, EN 300 440 <sup>(2)</sup> , FCC CFR47 Part 15 and ARIB STD-T-66				

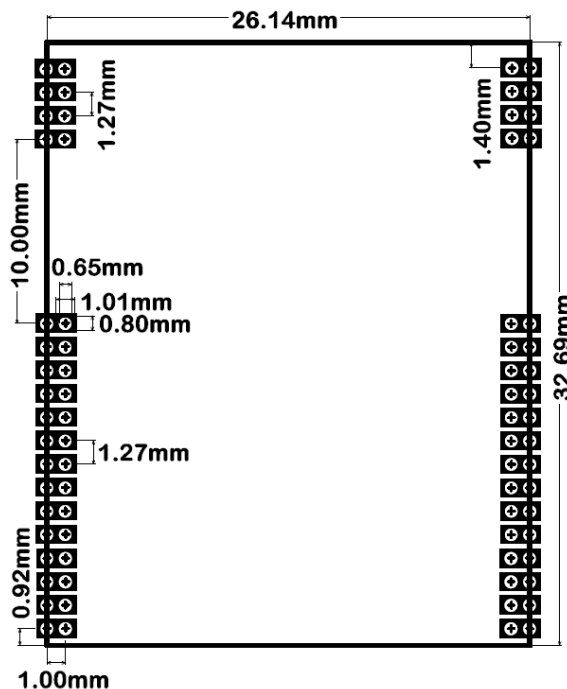
(1) Measured using data packets with 40 byte payload.

**TC85xx-PATIx-x RF Module Pin Configuration**

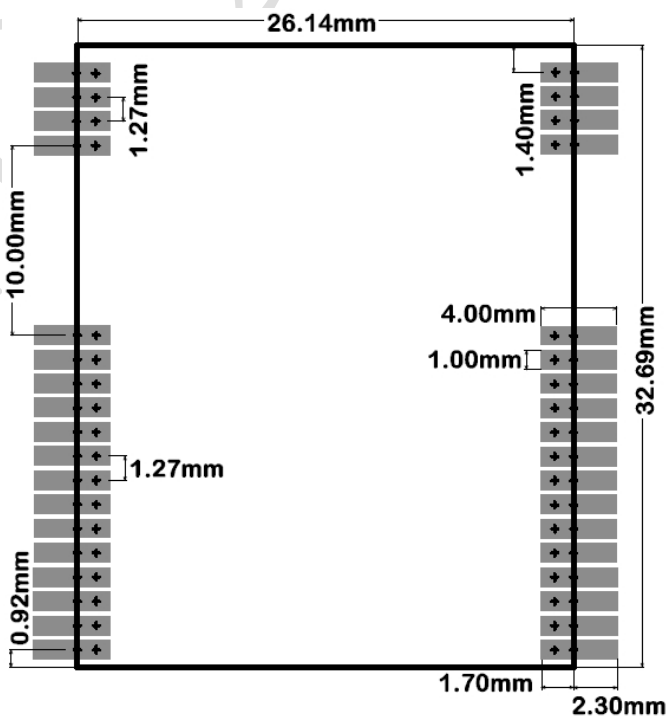


Pin #	Pin name	Pin type	Description
1	VBAT	Power (Digital)	Digital power supply for the linear voltage regulator.
2	+3V3	Power (Digital)	Digital power supply for the linear voltage regulator.
3	+3V3	Power (Digital)	Digital power supply for the linear voltage regulator.
4	GND	Ground	The exposed die attach pad must be connected to a solid ground plane underneath the chip
5	GND	Ground	The exposed die attach pad must be connected to a solid ground plane underneath the chip
6	SCL /GIO10	Digital I/O <sub>1</sub>	I2C master clock line. Must be connected to external pull-up General-purpose digital I/O pin 10
7	SDA GIO11	Digital I/O <sub>1</sub>	I2C master data line. Must be connected to external pull-up General-purpose digital I/O pin 11
8	GPIO12	Digital I/O <sub>1</sub>	General-purpose digital I/O pin 12
9	GPIO13	Digital I/O <sub>1</sub>	General-purpose digital I/O pin 13
10	GPIO14	Digital I/O <sub>2</sub>	Control external PA
11	GPIO15	Digital I/O <sub>2</sub>	Control external LNA
12	XANTN	Digital I/O <sub>1</sub>	CC85x0: DO NOT CONNECT (Future FW: Controlling external antenna switch)
13	XANTP	Digital I/O <sub>1</sub>	CC85x0: DO NOT CONNECT (Future FW: Controlling external antenna switch)
14	CSN	Digital Input (pull-up)	Serial SPI configuration interface, active low chip select
15	SCLK	Digital I/O <sub>1</sub>	Serial SPI configuration interface, clock input/output
16	MOSI	Digital I/O <sub>1</sub>	Serial SPI configuration interface, master data output, slave data input
17	MISO	Digital I/O <sub>1</sub>	Serial SPI configuration interface, master data input, slave data output.
18	GPIO1	Digital I/O <sub>1</sub>	General-purpose digital I/O pin 1 Configurable with PurePath™ Wireless Configurator
19	GPIO2	Digital I/O <sub>1</sub>	General-purpose digital I/O pin 2
20	GPIO3	Digital I/O <sub>1</sub>	General-purpose digital I/O pin 3 Configurable with PurePath™ Wireless Configurator
21	RSTN	Digital Input (pull-up)	Active-low device reset
22	MCLK GIO4	Digital I/O <sub>1</sub>	Master clock output for external audio devices General-purpose digital I/O pin 4
23	BCLK GIO5	Digital I/O <sub>1</sub>	I2S/DSP audio interface bit clock (in/out) General-purpose digital I/O pin 5
24	WCLK GIO6	Digital I/O <sub>1</sub>	I2S/DSP audio interface word clock (in/out) General-purpose digital I/O pin 6
25	AD0 GIO7	Digital I/O <sub>1</sub>	
26	AD1 GIO8	Digital I/O <sub>1</sub>	
27	AD2 GIO9	Digital I/O <sub>1</sub>	
28	GND	Ground	The exposed die attach pad must be connected to a solid ground plane underneath the Chip
*	GND	Ground	The exposed die attach pad must be connected to a solid ground plane underneath the chip

TC85xx-PATIx-x RF Module Description



Recommended PCB layout for Module



**Document History**

Revision	Date	Description/Changes
2.0	2012.10.15	First release

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