

# 1 CHARACTERISTICS AND SPECIFICATIONS

## 1.1 ABSOLUTE MAXIMUM RATINGS

All Min/Max characteristics and specifications are guaranteed over the specified operating conditions. Typical performance characteristics and specifications are derived from measurements taken at typical supply voltages.  $T_A=25^{\circ}\text{C}$ . GND = 0 V, all voltages with respect to 0 V.

### Transmitter

Parameter	Symbol	Value	Unit	Note
Input Power	VCC	5.5	V	
Digital Input Pin Absolute Maximum Input Voltage		3.63	V	IO Inputs are not 5 V Tolerant.
Operating Temperature	TA	50	C	
Storage Temperature	TS	90	C	

**Table 1 - HT-821/CU1511 Tx Module Absolute Maximum Ratings**

## 1.2 TRANSMITTER OPERATING CONDITIONS

Parameter	Conditions	Min	Typical	Max	Unit
<b>POWER CONSUMPTION</b>					
Input Power Supply (Vin)		4.5	5	5.5	V
Current	Vin = 5.0 V		TBD		mA
<b>LOGIC THRESHOLDS</b>					
Input Low Voltage Threshold	Vin = 5.0 V			0.8	V
Input High Voltage Threshold	Vin = 5.0 V	2.0			V
Output Low Voltage Threshold	Vin = 5.0 V			0.4	V
Output High Voltage Threshold	Vin = 5.0 V	2.4			V
Input Leakage Current	Vin = 5.0 V	-10	± 1	10	µA
<b>TEMPERATURE</b>					
Operating Temperature		0		50	C
Storage Temperature		-20		90	C

**Table 2 - HT-821/CU1511 Tx Module Operating Conditions**

### 1.3 HT-821/CU1511 Tx MODULE PIN DESCRIPTION

Pin #	Pin Function	Description	Connector Options			
			Tx	Rx	Tx + XPD	Rx + XPD
1	SCK0	XPD Clock	Not Used	Not Used	XPD Clock	XPD Clock
2	MISO0	XPD DATA	Not Used	Not Used	XPD Data	XPD Data
3	MOSI0	XPD DATA	Not Used	Not Used	XPD Data	XPD Data
4	PB1	XInC2 Chip Select	Not Used	Not Used	XInC2 Chip Select	XInC2 Chip Select
5	PB0	FLASH Chip Select	Not Used	Not Used	FLASH Chip Select	FLASH Chip Select
6	Vin	Unregulated 5 V Input	5 V Input	5 V Input	5 V Input	5 V Input
7	Vin	Unregulated 5 V Input	5 V Input	5 V Input	5 V Input	5 V Input
8	GND	Ground	GND	GND	GND	GND
9	Reset	SIP Reset 3.3 V MAX	Reset	Reset	Reset	Reset
10	MCLK	I2S Master Clock	Not Used	Output to Pulsus	Not Used	Output to Pulsus
11	GND	Ground	GND	GND	GND	GND
12	BCLK	I2S BitClock	Input from DVD	Output to Pulsus	Input from DVD	Output to Pulsus
13	LRCK	I2S LRCK	Input from DVD	Output to Pulsus	Input from DVD	Output to Pulsus
14	SDIO0	I2S Data Input	Input from DVD	Output to Pulsus	Input from DVD	Output to Pulsus
15	SDIO1	I2S Data Input	Input from DVD	Output to Pulsus	Input from DVD	Output to Pulsus
16	PC2	GPIO	I2S SCL	I2S SCL	I2S SCL	I2S SCL
17	PC3	GPIO	I2S SDA	I2S SDA	I2S SDA	I2S SDA
18	AN3	Analog Input 1.8 V MAX	Not Used	Node Config	Not Used	Node Config
19	PF1	GPIO	Not Used	Not Used	Not Used	Not Used
20	PI2	GPIO	Not Used	SMPS Power Control	Not Used	SMPS Power Control
21	PI1	GPIO	Not Used	SMPS Power Sense	Not Used	SMPS Power Sense
22	PD2	GPIO	Not Used	Red LED	Not Used	Red LED
23	PD3	GPIO	Not Used	Blue LED	Not Used	Blue LED
24	PD5	GPIO	Not Used	Pulsus Reset	Not Used	Pulsus Reset
25	PD1	GPIO	Not Used	TAS Power Down	Not Used	TAS Power Down
26	PD0	GPIO	Not Used	TAS OTW	Not Used	TAS OTW
27	GND	Ground	Not Used	GND	Not Used	GND
28	GND	Ground	Not Used	GND	Not Used	GND

**Table 3 - HT-821/CU1511 Tx Module Pinout**

## 1.4 RF CHARACTERISTICS AND BEHAVIOR

The HT-821/CU1511 Transmit module RF characteristics are described below paying special attention to include information pertinent to FCC and ETSI regulations.

Module firmware operates by selecting a palette (or group) of random channels out of the total 37. Any channels with poor transmission rates are replaced with better channels from the remaining unused channels. The switching pattern from channel to channel is a random pattern. The table below describes some important aspects of the channel-hopping algorithm:

Parameter	Conditions	Min	Typical	Max	Unit
<b>RF CHARACTERISTICS</b>					
Transmission Method		ARQ with Adaptive FHSS			
Raw Data Rate				1.536	Mbps
Channel Width			<2		MHz
Total Channels				37	Ch
Hopping Channels			8		Ch
RF Coexistence	In Specified Radius			4	sets
TX Output Power	Preliminary	8	11	14	dBm
<b>DETAILED BANDWIDTH CHARACTERISTICS</b>					
Hopping Rate			187.5		Hz
Frequency Dwell Time			5.333		ms
Audio TX: RF Transmit Time	Tx Node		4.594		ms
Audio RX: RF Transmit Time	Per Each Rx Node		0.219		ms
Frequency Range		5.725		5.825	GHz
Frequency Range (Total)			78.057		MHz
20 dB Channel BW			1.94		MHz
<b>RF RANGE</b>					
Indoor Range (Note 1)				15	m
Open Field Range (Note 2)				200	m

**Table 4 - RF Characteristics**

**Notes:**

1. Typical home/office environment (estimated)
2. Estimated open field line of sight testing results.

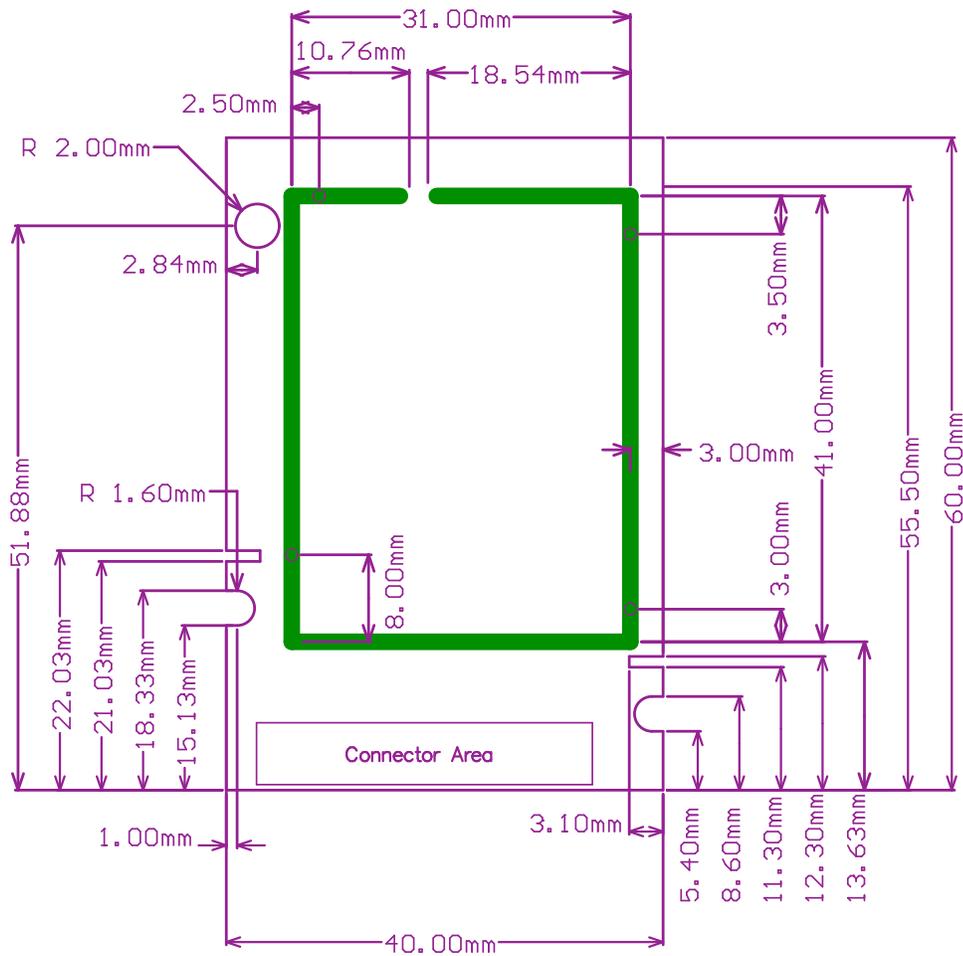
## 2 PACKAGE DIMENSIONS

Shield alignment holes are 45mil diameter

Tallest component under shield is 3mm

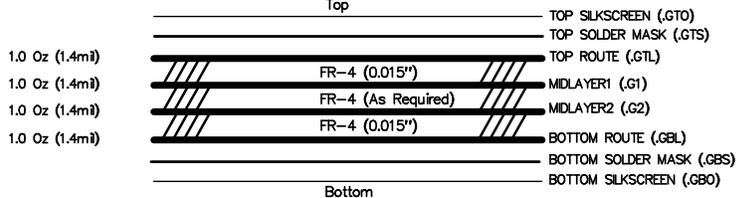
Total shield height not to exceed 4mm

Shield track cutout for antenna to be 0.3mm high



### LAYER STACK DETAIL

Total Board Thickness = 0.062"



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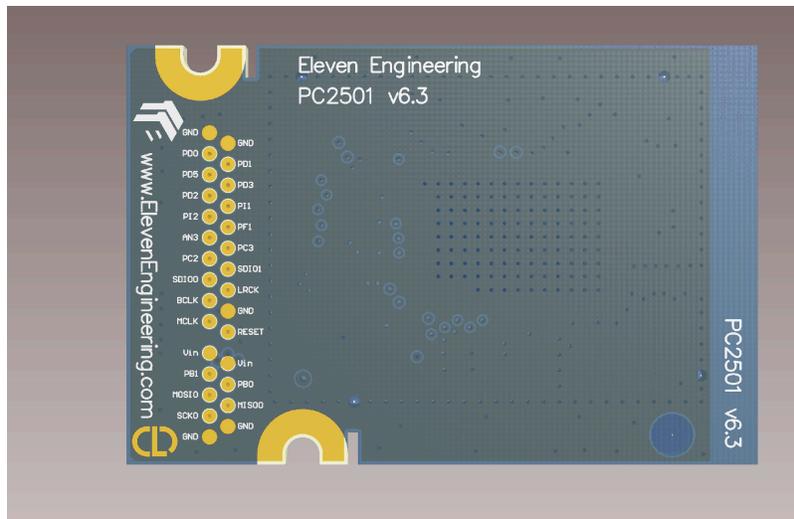
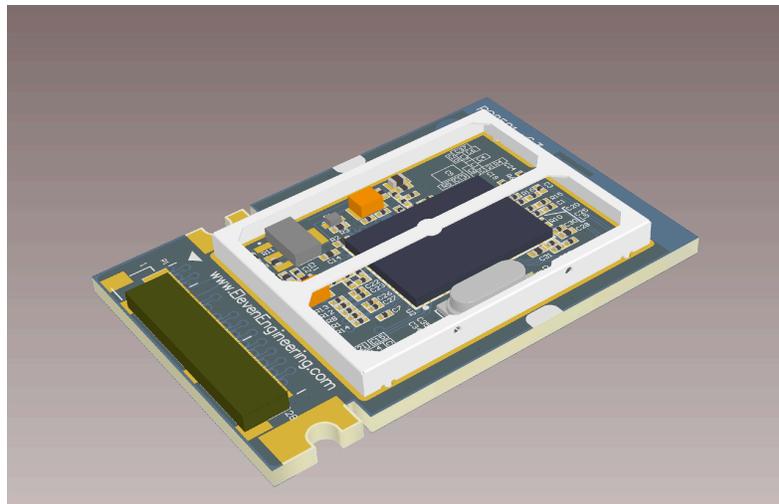
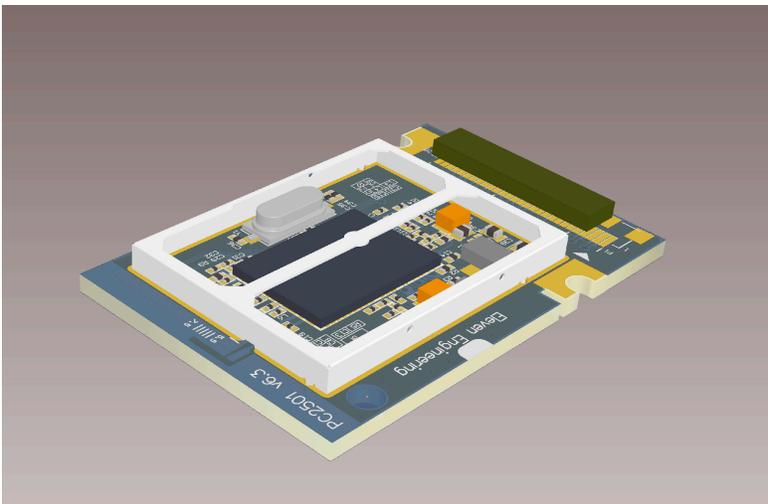
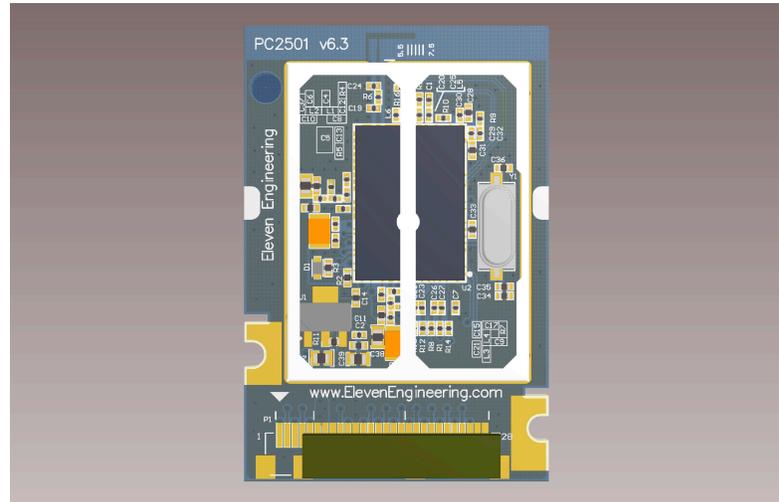
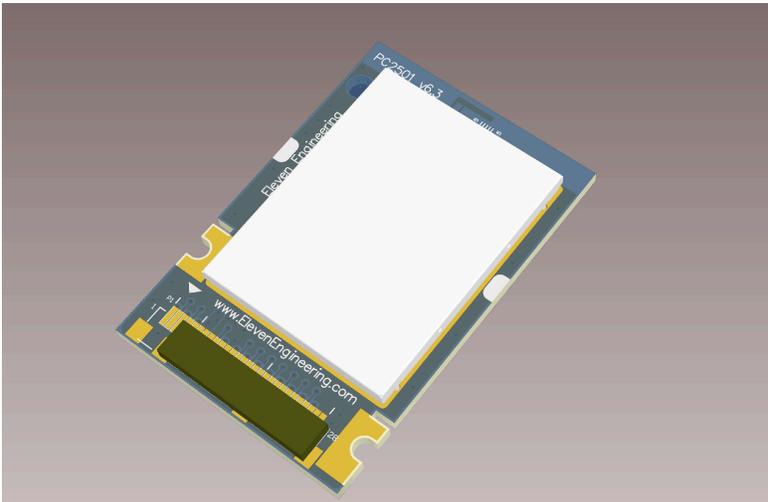
PCB Designer: Cory Sizer	TITLE: XC1501 RF Module
Date: 03/12/2009	Part Number: PC2501 Ver. 16.3
SCALE: 1:00	

#### Design Notes:

- Boards shall conform to IPC-6012, Class 2
- RoHS Compliance (Y/N): Y
- Number of Layer: 4
- Material: FR-4
- SMOBC (Y/N): Y
- Gold Fingers (Y/N): N
- Finish: Flash Gold
- Test (Y/N): Y
- Test Sides (1 or 2): 2
- Solder mask Color: Blue
- Legend Color (Silk Screen): White
- Legend Sides (1 and/or 2): 2
- Min. Plated Copper Thickness: 1.0oz
- Finished Board Thickness: 1.6mm +/- 10%
- No modifications are to be made to Gerber or NC drill files without permission of Eleven Engineering

Figure 1 - Dimensions

## 3 PACKAGE DRAWINGS



## FEDERAL COMMUNICATIONS COMMISSION INTERFERENCE STATEMENT

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

### CAUTION:

To assure continued FCC compliance:

Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.

### FCC Label Compliance Statement:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

### Exposure to Radio Frequency Radiation:

To comply with FCC RF exposure compliance requirements, a separation distance of at least 20cm must be maintained between the antenna of this device and all persons. This device must not be co-located or operating in conjunction with any other antenna or transmitter.

### IC Statement

This installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's website [www.hc-sc.gc.ca/rpb](http://www.hc-sc.gc.ca/rpb).