

## FLC-BTMDC747

Module Name	Antenna
FLC-BTMDC747N	Without on board RF PCB antenna
FLC-BTMDC747B	With on board RF PCB antenna

### 1.1 Block Diagram

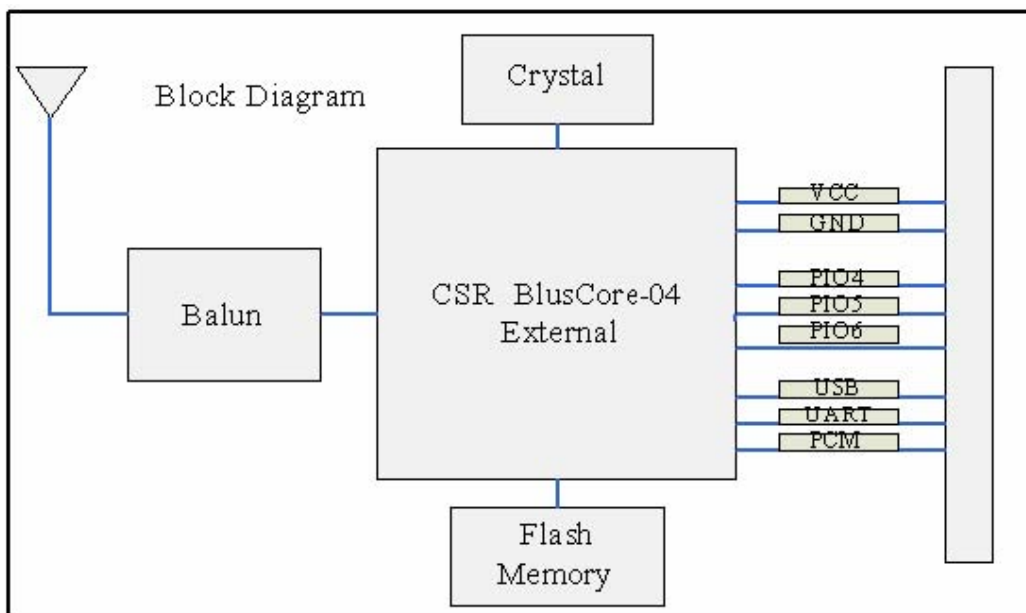


Figure 1 Block Diagram

### 1.2 Device features

Fully qualified Bluetooth 2.1/2.0/1.2/1.1 module

Bluetooth v2.0+EDR support

Postage stamp sized form factor, 13.4mm x25.8 mm x2mm

Low power (*30mA connected,, <10mA sniff mode*)

UART (SPP or HCI) and USB (HCI only) data connection interfaces.

Sustained SPP data rates - 240Kbps (slave),300Kbps (master)

HCI data rates - 1.5Mbps sustained, 3.0Mbps burst in HCI mode

8MB on board flash, HCI mode, or SPP/DUN software stacks available.

Embedded Bluetooth stack profiles included (*requires no host stack*): GAP, SDP,

RFCOMM and L2CAP protocols, with SPP and DUN profile support.

Castellated SMT pads for easy and reliable PCB mounting

Certifications: BQB, FCC, ICS, CE

Environmentally friendly, RoHS compliant

## 1.3 Applications

Cable replacement

Barcode scanners

Measurement and monitoring systems

Industrial sensors and controls

Medical devices

Asset tacking

## 2. Key Specs

Baud rate speeds: 1200bps up to 921Kbps, non-standard baud rates can be programmed.

Class 2 radio, 33' (10m) distance, 12dBm output transmitter, -80dBm typical receive sensitivity

Frequency 2402 ~ 2480MHz

### FLC-BTMDC747 Specification

- ⌘ FHSS/GFSK modulation, 79 channels at 1MHz intervals
- ⌘ Secure communications, 128 bit encryption
- ⌘ Error correction for guaranteed packet delivery
- ⌘ UART local and over-the-air RF configuration
- ⌘ Auto-discovery/pairing requires no software configuration (instant cable replacement).
- ⌘ Auto-connect master, IO pin (DTR) and character based trigger modes

### 3. Electrical characteristic

**Table 1 Absolute maximum ratings**

Rating	Minimum	Maximum
Store temperature	-40	+120
Operation temperature	-40	+85
Power Supply	-0.4 Volt	DC 3.6Volt

**Table 2 recommend operation conditions**

Rating	Minimum	Type	Maximum
Store temperature	-40	+25	+85
Operation temperature	-20	+25	+70
Power Supply	-	DC 3.3Volt	DC 3.6Volt

**Table 3 Electrical characteristics**

Parameter	Min	Typ.	Max	Unit
Supply Voltage (DC)	3.0	3.3	3.6	V
RX Supply Current		35	60	mA
TX Supply Current		65	100	mA
Average power consumption				
Standby/Idle (default settings)		25		mA
Connected (normal mode)		30		mA
Connected (low power Sniff)		8		mA
Standby/Idle (Deep sleep enabled)	250uA	2.5		mA

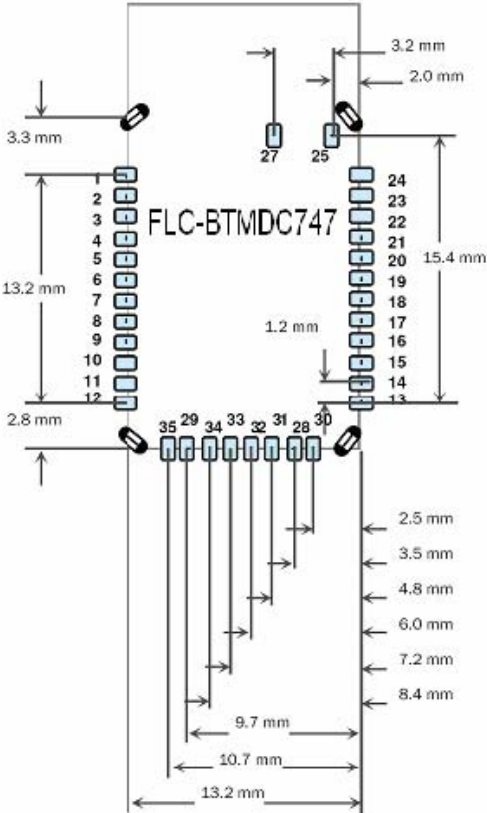
**Table 4 Radio characteristics Table 5 Digital I/O characteristics**

Parameter	Freq. (GHz)	Min	Typ	Max	Bluetooth Specification	Units
Sensitivity @ 0.1%BER	2.402	-	-80	-86	<=-70	dBm
	2.442	-	-80	-86		dBm
	2.480	-	-80	-86		dBm
RF Transmit Power	2.402	15.0	16.0		<=15	dBm
	2.442	15.0	16.0			dBm
	2.480	15.0	16.0			dBm
Initial Carrier Frequency	2.402	-	5	75	75	kHz
	2.442	-	5	75		kHz
Tolerance	2.480	-	5	75		kHz
20dB bandwidth for modulated carrier		-	900	1000	<=1000	kHz
Drift (Five slots packet)		-	15	-	40	kHz
Drift Rate		-	13	-	20	kHz
f1avg Max Modulation	2.402	140	165	175	>140	kHz
	2.442	140	165	175		kHz
	2.480	140	165	175		kHz
f2avg Min Modulation	2.402	140	190	-	115	kHz
	2.442	140	190	-		kHz
	2.480	140	190	-		kHz

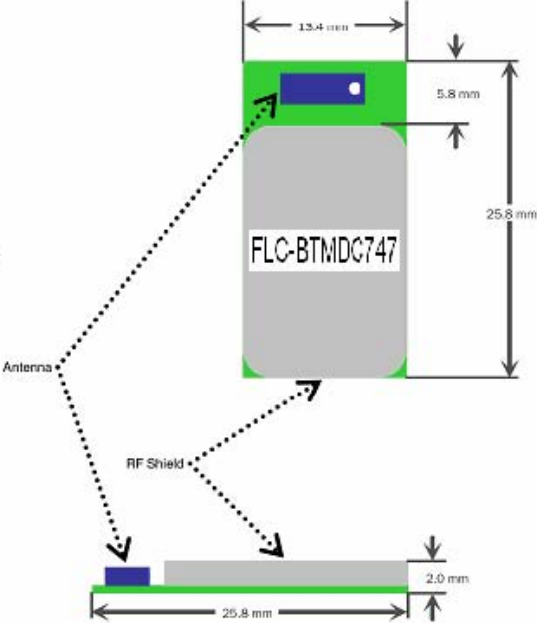
2.7V<=VDD<=3.0V	Min	Typ.	Max.	Unit
Input logic level LOW	-0.4	-	+0.8	V
Input logic level HIGH	0.7VDD	-	VDD+0.4	V
Output logic level LOW	-	-	0.2	V
Output logic level HIGH	VDD-0.2	-	-	V
All I/O's (except reset) default to weak pull down	+0.2	+1.0	+5.0	uA

# 4. Mechanical dimensions

PCB LAYOUT  
PAD SIZE = 0.8 X 1.30 mm



MODULE DIMENSIONS



## 5. Pin definitions

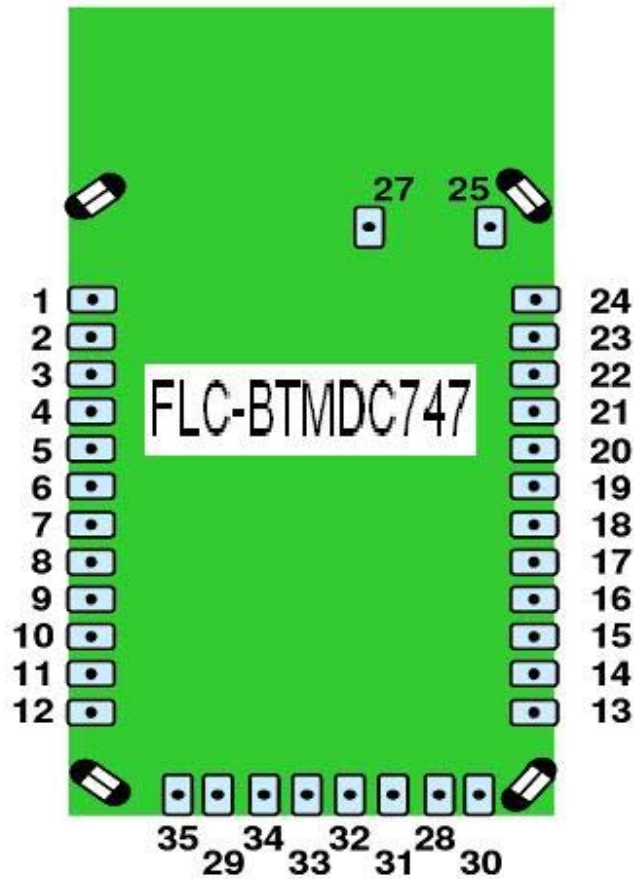


Figure 3 Top view Table 6 pin definitions

Pin	Name	Description	Default
1	GND		
2	SPI MOSI	Programming only	No Connect
3	PIO6	Set BT master (HIGH=auto-master mode)	Input to <b>FLC-BTMDC747</b> with weak pull down
4	PIO7	Set Baud rate (HIGH = force 9600, LOW = 115K or firmware setting)	Input to <b>FLC-BTMDC747</b> with weak pull down

5	RESET	Active LOW reset	Input to <b>FLC-BTMDC747</b> with 1K pull up
6	SPI_CLK	Programming only	No Connect
7	PCM_CLK	PCM interface	No Connect
8	PCM_SYNC	PCM interface	No Connect
9	PCM_IN	PCM interface	No Connect
10	PCM_OUT	PCM interface	No Connect
11	VDD	3.3V regulated power input	
12	GND		
13	UART_RX	UART receive Input	Input to <b>FLC-BTMDC747</b>
14	UART_TX	UART transmit output	High level output from <b>FLC-BTMDC747</b>
15	UART_RTS	UART RTS, goes HIGH to disable host transmitter	Low level output from <b>FLC-BTMDC747</b>
16	UART_CTS	UART CTS, if set HIGH, disables transmitter	Low level input to <b>FLC-BTMDC747</b>
17	USB_D+	USB port	Pull up 1.5K when active
18	USB_D-	USB port	
19	PIO2	Status, HIGH when connected, LOW otherwise	Output from <b>FLC-BTMDC747</b>
20	PIO3	Auto discovery = HIGH	Input to <b>FLC-BTMDC747</b> with weak pull down
21	PIO5	Status, toggles based on state, LOW on connect	Output from <b>FLC-BTMDC747</b>
22	PIO4	Set factory defaults	Input to <b>FLC-BTMDC747</b> with weak pull down
23	SPI_CSB	Programming only	No Connect
24	SPI_MISO	Programming only	No Connect
25	GND		
26	NC	RF pad keep all traces and planes clear.	
27	GND		
28	GND		
29	GND		
30	AIO0	Optional analog input	Not Used
31	PIO8	Status (RF data rx/tx)	Output from <b>FLC-BTMDC747</b>
32	PIO9	IO	Input to <b>FLC-BTMDC747</b> with weak pull down

33	PIO10	IO (remote DTR signal)	Input to <b>FLC-BTMDC747</b> with weak pull down
34	PIO11	IO (remote RTS signal )	Input to <b>FLC-BTMDC747</b> with weak pull down
35	AIO1	Optional analog input	Not Used

## 6. Design concerns

### 6.1 Reset circuit

RN-42 contains a 1k pull up to VCC, the polarity of reset on the **FLC-BTMDC747** is ACTIVE

LOW. A power on reset circuit with delay is OPTIONAL on the reset pin of the module. It should only be required if the input power supply has a very slow ramp, or tends to bounce or have instability on power up. Often a microcontroller or embedded CPU IO is available to generate reset once power is stable. If not, there are many low cost power supervisor chips available, such as MCP809, MCP102/121, and Torex XC61F.

### 6.2 Factory reset PIO4

It is a good idea to connect this pin to a switch, or jumper, or resistor, so it can be accessed. This pin can be used to reset the module to FACTORY DEFAULTS and is often critical in situations where the module has been mis-configured. To set Factory defaults start HIGH, then toggle times.

### 6.3 Connection status

PIO5 is available to drive an LED, and blinks at various speeds to indicate status.

PIO2 is an output which directly reflects the connection state, it goes HIGH when connected, and LOW otherwise.

1. **6.4 HCI mode**
2. **6.5 Using SPI bus for flash upgrade**

The **FLC-BTMDC747** module must be loaded with special firmware to run in HCI mode. When in HCI mode the standard SPP/DUN applications are disabled.

While not required, this bus is very useful for configuring advanced parameters of the Bluetooth modules, and is required for upgrading the firmware on modules. The suggested ref-design shows a 6pin header which can be implemented to gain access to this bus. A minimum-mode version could just use the SPI signals (4pins) and pickup ground and VCC from elsewhere on the design.

## 6.6 Minimizing radio interface

When laying out the carrier board for the **FLC-BTMDC747** module the areas under the antenna and shielding connections should not have surface traces, GND planes, or exposed vias. For optimal radio performance the antenna end of **FLC-BTMDC747** module should protrude 5mm past any metal enclosure.

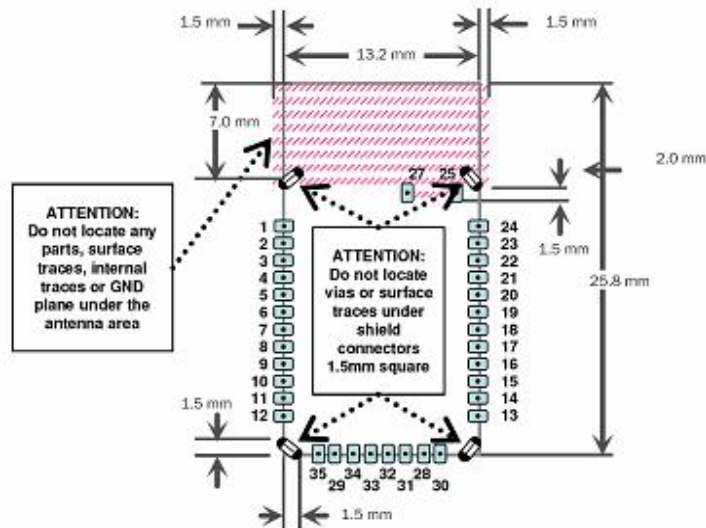


Figure 4 Radio interface



## 8. SMT Reflow Profile

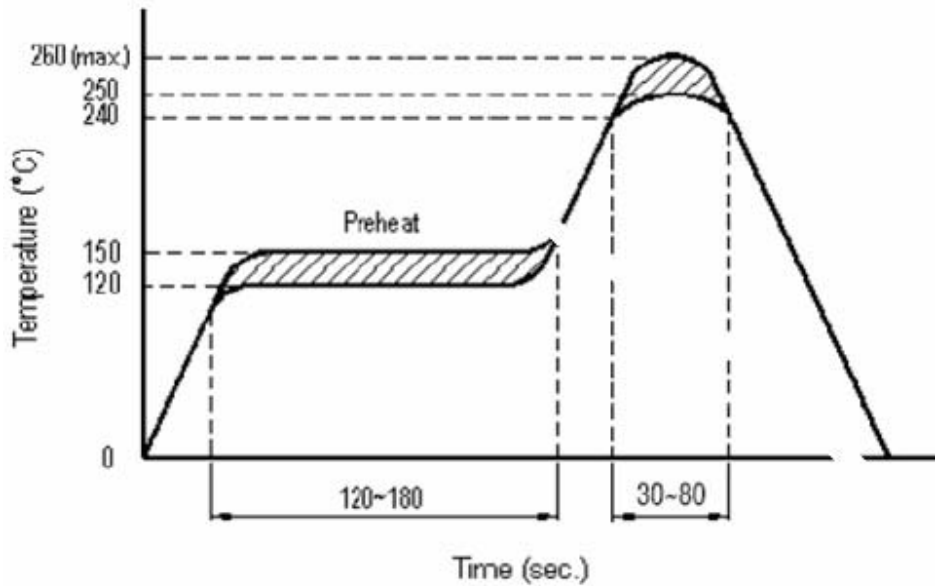


Chart 1 Reliability solder temperature chart

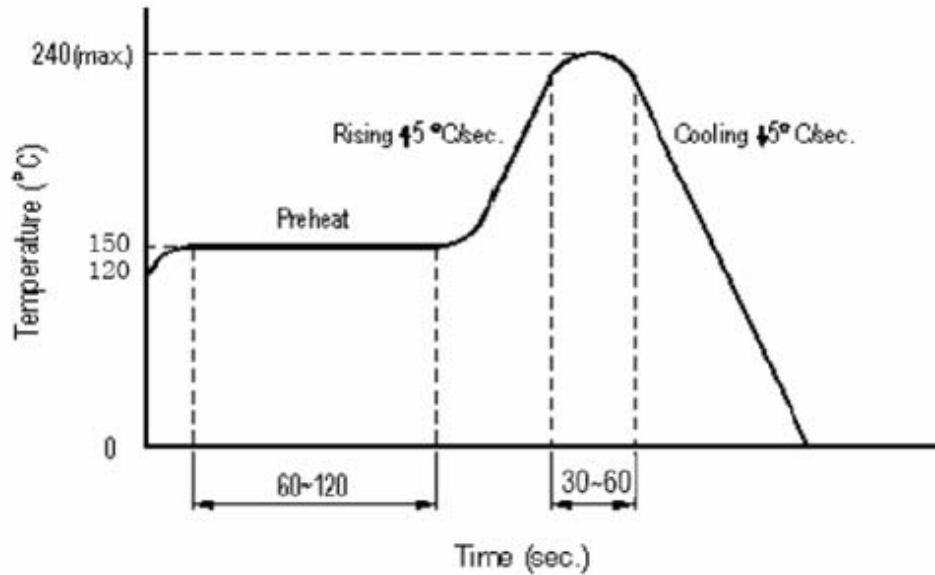


Chart 2 Reflow temperature chart

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