

# FLC-BTMDC746 Specification

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## Release Record

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**TABLE OF CONTENTS**

<b>1. INTR ODUCTION .....</b>	<b>5</b>
1.1 BLOCK DIAGRAM OF THE FLC-BTMDC746 MODULE.....	5
1.2 FEATURES .....	5
<b>2. GENERAL SPECIFICATION.....</b>	<b>6</b>
<b>3. PIN DEFINITION .....</b>	<b>8</b>
3.1 PIN CONFIGURATION AND PACKAGE DIMENSIONS .....	8
3.2 PIN DEFINITION .....	8
3.3 ELECTRICAL CHARACTERISTICS .....	9
<b>4. FLC-BTMDC746 INTERFACES DESCRIPTION.....</b>	<b>11</b>
4.1 USB .....	11
4.2 UART .....	11
4.3 SPI .....	11
<b>5. RECOMMENDED PCB MOUNTING PATTERN .....</b>	<b>12</b>
5.1 LAYER GUIDELINES.....	12
5.2 SOLDERING RECOMMENDATIONS .....	12
<b>6. REGULATORY COMPLIANCES.....</b>	<b>14</b>
6.1 BLUETOOTH .....	14
6.2 FCC .....	14
6.3 CE.....	15
6.4 ROHS .....	15
<b>7. APPLICATION SCHEMATIC.....</b>	<b>16</b>

**TABLE OF FIGURES**

Figure 1 FLC-BTMDC746Bluetooth Solution for Car Electronics Systems .....	5
Figure 4 FLC-BTMDC746 pin definition .....	8
Figure 12 Recommended PCB Mounting Pattern .....	12

**TABLE OF TABLES**

Table 2: General Specification .....	6
Table 3: Pin Definition of FLC-BTMDC746 .....	8
Table 4: Absolute Maximum Rating .....	9
Table 5: Recommended Operating Conditions.....	9
Table 6: DC Characteristics.....	9

## 1. Introduction

FLC-BTMDC746 is a fully integrated Bluetooth module. It is one of the BlueTone™ series products developed by Flaircomm. FLC-BTMDC746 is based on CSR's Bluecore4-ROM with specific interface design to meet automobile industrial and mobile accessory customers' needs. It complies with Bluetooth qualified certification and FCC.

FLC-BTMDC746 complies with Bluetooth specification version 2.1+EDR Class 1. It integrates RF, Baseband controller, etc., a completed Bluetooth subsystem, in an ultra small package. FLC- BTMDC746 supports OBXN,SPP profiles. It provides a UART interface, several user programmable I/Os and a USB port.

### 1.1 Block Diagram of the FLC-BTMDC746 Module

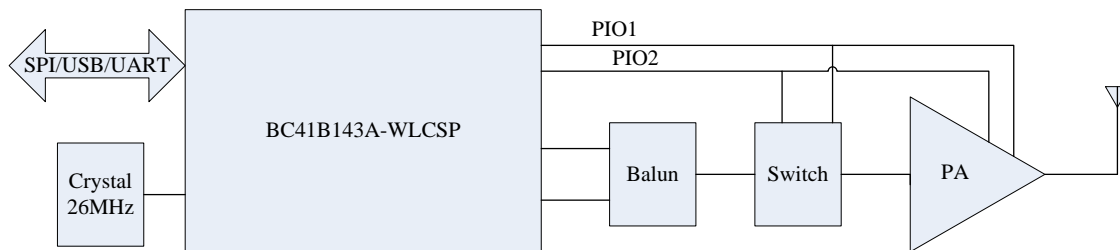


Figure 1 FLC-BTMDC746Bluetooth Solution for Car Electronics Systems

### 1.2 Features

- BlueTooth V2.1+EDR
- FTP,OBEX and SPP Profiles

## 2. General Specification

Table 1: General Specification

<b>Product</b>	BlueTone™ Series Bluetooth Module
<b>Model</b>	FLC-BTMDC746
<b>Bluetooth Specification</b>	
Standard	Bluetooth2.1, Class I
Frequency Band	2.4~2.48GHz
Modulation Method	GFSK; $\pi/4$ -DQPSK;8DPSK
Maximum Data Rate	3Mbps
Hopping	1600hops/sec, 1MHz channel space
RF Input Impedance	50 ohms
Baseband Crystal OSC	26MHz
Interface	UART, USB, SPI,
Profiles	FTP,SPP, OBEX, detailed profiles depends on the firmware
Operation Range	100 meters
Sensitivity	-85dBm@0.1%BER
RF TX Power	Max 20dBm(class I)
Connectivity	Point to Point
<b>Dimension</b>	
Dimension	34.8mm x 14mm x 2.5mm
Weight	1g
<b>Power</b>	
Supply Voltage	3.3v port: 2.7~3.6V DC
Working Current	---

Standby Current	<0.5mA
<b>Operation Environment</b>	
Temperature	-40° C to +80° C
Humidity	10%~90% Non-Condensing
Bluetooth DeviceAddress	Stored in Module's E2PROM
<b>Certifications</b>	BQB, FCC, RoHS

### 3. Pin Definition

#### 3.1 Pin Configuration and Package Dimensions

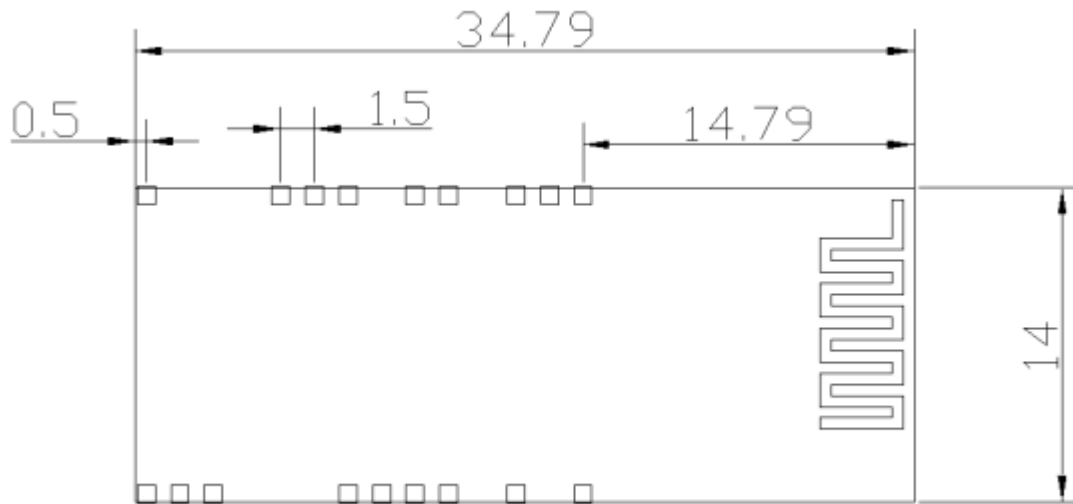


Figure 2 FLC-BTMDC746 pin definition

#### 3.2 Pin Definition

Table 2: Pin Definition of FLC-BTMDC746

Pin	Symbol	I/O Type	Description
1	GND	Ground	Ground connection.
2	VCC	Power	Positive power supply for RF circuitry.
3	MODE	Input	Not connected.
4	UART_RTS	Output	UART request to send, active low.
5	UART_RXD	Input	UART data input.
6	USB_D+	Differential	USB data plus with built-in 1.5KOhm pull-up resistor.
7	USB_D-	Differential	USB data minus.
8	UART_CTS	Input	UART clear to send, active low.
9	GND	Ground	Ground connection.



10	GND	Ground	Ground connection.
11	VDD	Power	Positive supply for digital circuitry.
12	/RST	Input	Reset if low. Input debounced so must be low for > 5ms to cause a reset.
13	/SPI_CS	Input	Chip select for Serial Peripheral Interface device, active low.
14	SPI_CLK	Input	Serial Peripheral Interface clock.
15	SPI_MISO	Output	Serial Peripheral Interface data output.
16	SPI_MOSI	Input	Serial Peripheral Interface data input.
17	UART_TXD	Output	UART data output.
18	GND	Ground	Ground connection.

### 3.3 Electrical Characteristics

**Table 3: Absolute Maximum Rating**

Rating	Minimum	Maximum
Storage Temperature	-40°C	+150°C
Operating Temperature	-40°C	+85°C
VCC Voltage	-0.4v	+3.7v
I/O Pin Output Current	-	35mA

**Table 4: Recommended Operating Conditions**

Operating Condition	Minimum	Typical	Maximum
Operating Temperature Range	-40°C	25°C	+80°C
UART Voltage	+2.7V	+3.3V	+3.6V
3V3 Voltage	+2.7V	+3.3V	+3.6V
USB D+/D- Voltage	+4.4V	+5.0V	+5.3V

**Table 5: DC Characteristics**

Terminal	Min	Typical	Max	Unit
Input/Output Voltage Level	3.1	3.3	3.6	V
VIL input logic low	-0.4	-	+0.8	V
VIH input logic high	3.1	-	3.7	V
VOL output logic low	-	-	0.2	V
VOH output logic high	2.9	-	-	V
Strong pull-up	-100	-40	-10	uA
Strong pull-down	10	40	100	uA
Weak pull-up	-5.0	-1.0	-0.2	uA
Weak pull-down	0.2	1.0	5.0	uA
I/O Pad leakage	-1	0	+1	uA

**Table 7: Radio Characteristics**

RF Characteristics	Min	Typical	Max	Unit
Operating Frequency Range	2400	-	2483.5	KHz
Carrier Frequency	2402	-	2480	KHz
Transmit Output Power	-	-	+14 ~ +18	dBm
Receive Sensitivity Range	-82	-	-20	dBm
Modulation Method	GFSK, $\pi/4$ DQPSK, 8DQPSK			
RF Input Impedance	-	50	-	Ohm

**Table 7: Radio Characteristics**

## **4. FLC-BTMDC746 Interfaces Description**

### **4.1 USB**

FLC-BTMDC746 module contains a Full Speed (12Mbit/s) USB v2.0 interface operating as a USB client peripheral device. It is capable of driving the USB cable directly thus no external USB transceiver is required. It also features an internal USB pull-up resistor on USB\_D+ signal to identify itself as a Full Speed USB device.

To reduce the current consumption, add 15K pull-down resistors on USB\_D+ and USB\_D- signals to prevent these two signals from floating when not in use.

To select USB interface as the host transport interface, set PSKEY\_HOST\_INTERFACE to 2.

### **4.2 UART**

The UART interface provides a simple mechanism for communications with the host using the RS-232 protocol. It also implements the RS-323 hardware flow control using UART\_RTS and UART\_CTS signals. It is capable of running at a maximum of 3Mbits/s baudrate.

The UART interface signals operate at the logical levels of 0 to VDD, thus an external level shifter IC is required when interfacing to the standard RS-232 voltages.

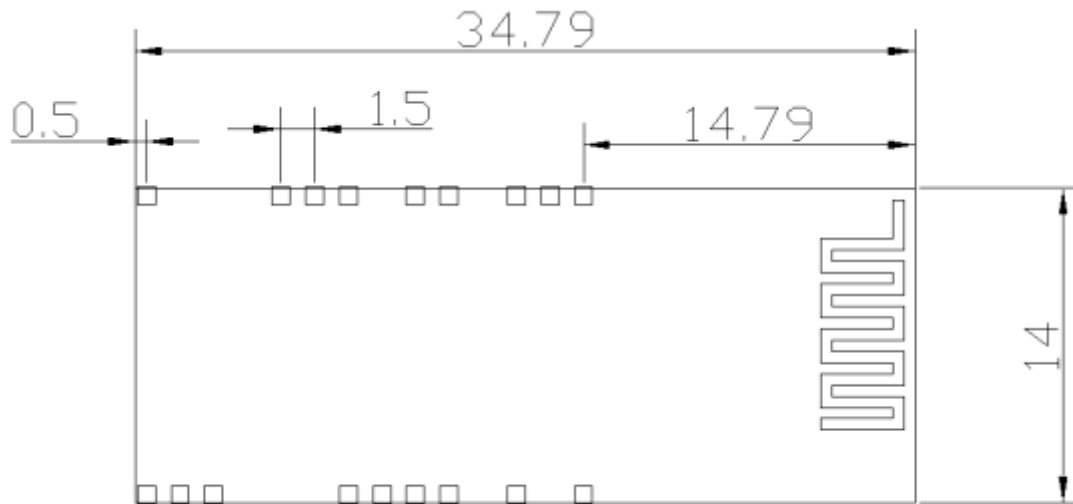
To select USB interface as the host transport interface, set PSKEY\_HOST\_INTERFACE to 1 (BCSP), 3 (H4) or 7 (H4DS).

### **4.3 SPI**

PIKBT-BC4-HCI module provides a Synchronous Serial Peripheral interface (16-bit address and 16-bit data) and operates as a slave SPI device.

The primary use of SPI interface is for system debugging as well as programming persistent settings into non-volatile memory of a Bluetooth system during production.

## 5. Recommended PCB Mounting Pattern



**Figure 3 Recommended PCB Mounting Pattern**

### 5.1 Layer Guidelines

To obtain the optimal system performance, a system integrator incorporating this module into the design should follow the following PCB guidelines:

Do not place any copper or metal near, underneath or above the antenna.

Place ground sticking vias around the edges of the ground copper pours and the board outline to prevent the RF signal from penetrating into the PCB board causing unintentional resonators.

Avoid placing plastic or any dielectric material closer than 5mm to the antenna.

Any metal placed should be at least 20mm away from the antenna in any direction.

Avoid copper trace loops.

### 5.2 Soldering Recommendations

FLC-BTMDC746 module is compatible with industrial standard reflow profile for Pb-free soldering process, while the actual profile used in reflowing the entire system incorporating the module depends on the thermal mass of the entire components populated on such system. The following soldering recommendations are given below to ensure the reliable solder joints and operation of the module after soldering:

- Refer to the technical documents of the solder paste used for the reflow profile configurations.

- No more than one flow run.
- To ensure enough solder pastes are deposited on the soldering pads, the stencil should be at least 0.15mm thick.
- Always use a low residue “no clean” solder paste.

## 6. Regulatory Compliances

### 6.1 Bluetooth

FLC-BTMDC746 module complies with the following Bluetooth 2.0+EDR specifications:

- Radio Specification (Part A, Volume 2 Core System Package)
- Baseband Specification (Part A, Volume 2 Core System Package)
- Link Management Specification (Part C, Volume 2 Core System Package)
- HCI Specification (Part E, Volume 2 Core System Package)

### 6.2 FCC

*Warning: any changes or modifications to the module can void the user's authority to operate the module in compliance with FCC requirements.*

#### **FLC-BTMDC746 FCC ID: TQ6BTMD746**

FLC-BTMDC746 module complies with the FCC Declaration of Conformity (DOC) conforming to 1) Part 15 Sub-part B Section 15.109 regulation and 2) Part 15 Sub-part C 15.247 regulation.

The 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.

Operation of this device is categorized as a class B equipment in residential area.

#### **FCC RF Radiation Exposure Statement:**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

#### **Warning:**

The maximum antenna gain allowed for use with this device is 0.35 dBi.

When the module is installed in the host device, the FCC ID label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily removed. If not, a second label must be placed on the outside of the final device that contains the following text: "Contains FCC ID: TQ6BTMD746 "

## 6.3 CE

FLC-BTMDC746 module conforms to the following standards, thus in accordance with the provisions of the EC Directives 89/336/EEC, 92/31/EEC and 93/68/EEC:

- EN 301 489-17 V.1.2.1: EN 55022, EN 55024, EN 61000
- EN 300.328 V1.6.1

## 6.4 RoHS

FLC-BTMDC746 module meets the requirements of Directive 2002/95/EC of the Europe Parliament and of the Council on the Restriction of Hazardous Substance (RoHS) and does not contain the following banned substances:

Cadmium, Lead, Mercury, Hexavalent Chromium, PBB (Polybrominated Bi-Phenyl), PBDE (Polybrominated Diphenyl Ether)

## **7. Application Schematic**

Please contact with flaircomm R&D