FLC-BTMDC732 Specification

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1. Introduction

FLC-BTMDC732 is a fully integrated Bluetooth module. It is one of the BlueTone™ series products developed by Flaircomm. FLC-BTMDC732 is based on CSR's Bluecore3-Multimedia with specific interface design to meet automobile industrial and mobile accessory customers' needs. It complies with Bluetooth BQB certification.

FLC-BTMDC732 complies with Bluetooth specification version 2.0. It integrates RF, Baseband controller, etc., a completed Bluetooth subsystem, in an ultra small package. FLC- BTMDC732 supports HS/HF, A2DP, AVRCP and SPP profiles. It provides a UART interface, several user programmable I/Os, stereo speaker outputs, microphone inputs and a USB port.

FLC-BTMDC732 can be controller by UART port or/and several digital input ports. Please refer to FLC-BTMD732 software user guide for the interfacing protocol.

FLC-BTMDC732 has several configurations to meet customer requirements for different IO, RF connection and power supply scheme. Please check Table 1 for details.

Table 1 Ordering Information

Part Name	Digital IO	Analogue IO	PCM	RF Connector	Supply Voltage	Package
FLC-BTMDC732-A	12	3	No	No	3.3 and 1.8	Refer to 3.1
FLC-BTMDC732-AR	12	3	No	Yes	3.3 and 1.8	Refer to 3.1
FLC-BTMDC732-B	10	2	Yes	No	3.3 and 1.8	Refer to 3.1
FLC-BTMDC732-BR	10	2	Yes	Yes	3.3 and 1.8	Refer to 3.1
FLC-BTMDC732-C	12	3	No	No	3.3	Refer to 3.1
FLC-BTMDC732-CR	12	3	No	Yes	3.3	Refer to 3.1
FLC-BTMDC732-D	10	2	Yes	No	3.3	Refer to 3.1
FLC-BTMDC732-DR	10	2	Yes	Yes	3.3	Refer to 3.1

1.1 Block Diagram of the FLC-BTMDC732 Module

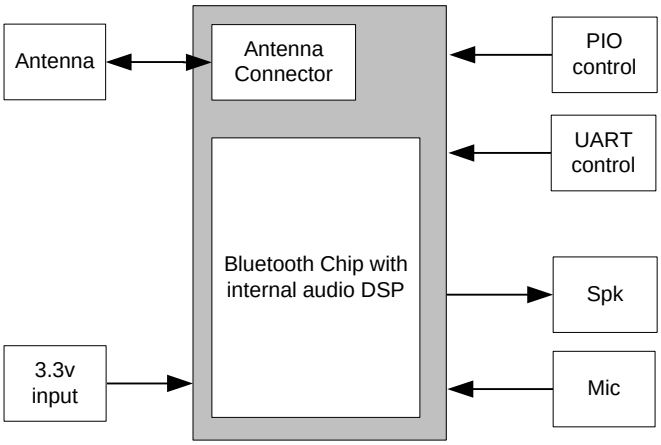

Figure 1 FLC-BTMDC732 Bluetooth Solution for Car Electronics Systems (The FLC-BTMDC732 module is marked with grey in the diagram)

NOTE:

1.2 Implementation of the FLC-BTMDC732 in Car Electronics Systems

1.2.1 Scheme 1: FLC-BTMDC732 Module is Mounted on the Mainboard

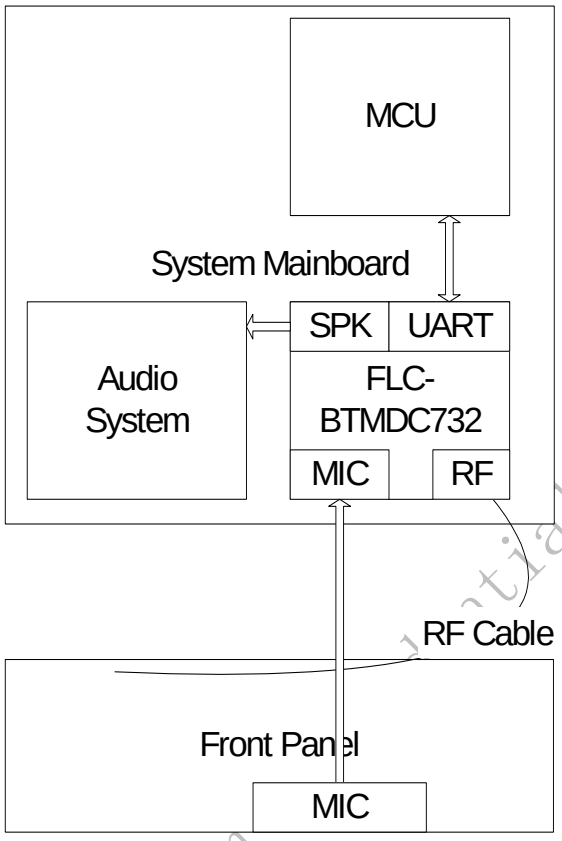

Figure 2 FLC-BTMDC732 on the System Mainboard

1.2.2 Scheme 2: FLC-BTMDC732 Module is Mounted on the Front Panel

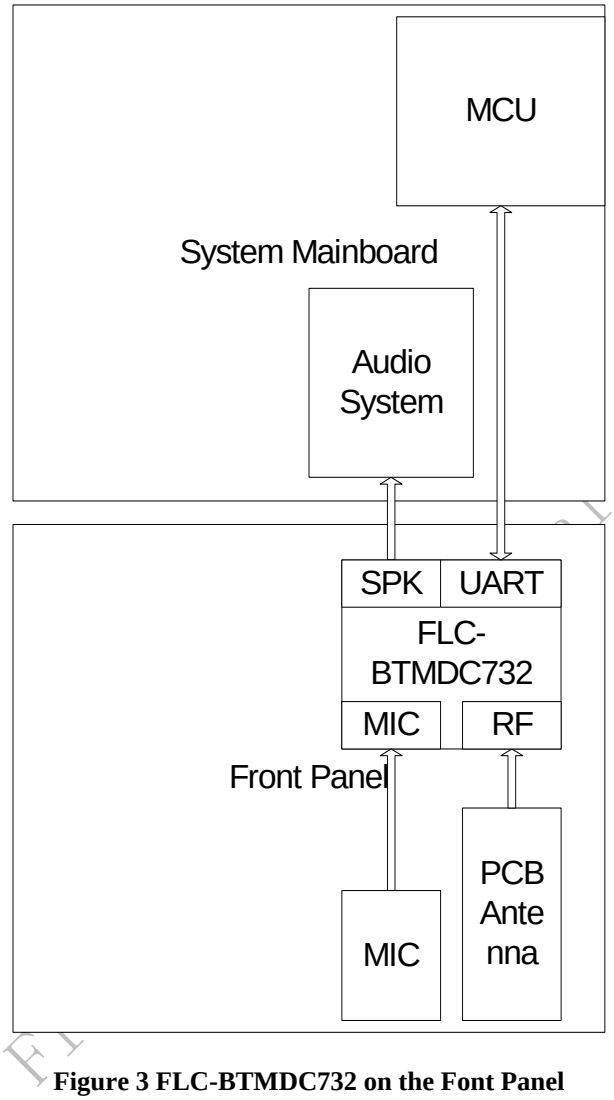

Figure 3 FLC-BTMDC732 on the Font Panel

1.3 Features

- BlueTooth V2.0
- A2DP, AVRCP, HS/HF and SPP Profiles
- Make and Receive Call
- Accept/Reject/End Calls
- Call Waiting
- Conference Call
- Last Number Redial

- Voice Dial
- Caller ID
- Call Progress Information
- Stereo audio play, stop, pause, forward, backward.
- Phonebook download
-

2. General Specification

Table 2: General Specification

Product	BlueTone™ Series Bluetooth Module
Model	FLC-BTMDC732
Bluetooth Specification	
Standard	Bluetooth2.0, Class II
Frequency Band	2.4~2.48GHz
Modulation Method	GFSK, 1Mbps, 0.5BT Gaussian
Maximum Data Rate	Asynchronous: 723.2kbps/57.6kbps Synchronous: 433.9kbps/433.9kbps
Hopping	1600hops/sec, 1MHz channel space
RF Input Impedance	50 ohms
Baseband Crystal OSC	16MHz
Interface	UART, PIO, AIO, USB, SPI, PCM*, Speaker, Microphone
Profiles	A2DP, AVRCP, HS/HF, SPP, OBEX, detailed profiles depends on the firmware
Operation Range	10 meters (33 feet)
Sensitivity	-80dBm@0.1%BER
RF TX Power	0dBm
Connectivity	Point to Point
Audio Codec Specification	
Audio Codec	15bits
Audio SNR	>90dB
Audio Encryption	128bits
Dimension	

Dimension	23.241mmX11.938mmX1.8mm (no RF connector) 23.241mmX11.938mmX2.1mm (with RF connector)
Weight	1g
Power	
Supply Voltage	3.3v port: 2.7~3.6V DC 1.8v port: 1.7~1.9V DC
Working Current	Depends on profiles, 38mA typical when A2DP audio streaming
Standby Current	<0.5mA
Operation Environment	
Temperature	-40° C to +80° C
Humility	10%~90% Non-Condensing
Certifications	BQB, RoHS

Note: *Only available for FLC-BTMDC-B, FLC-BTMDC-BR, FLC-BTMDC-D, FLC-BTMDC-DR.

3. Pin Definition

3.1 Pin Configuration and Package Dimensions

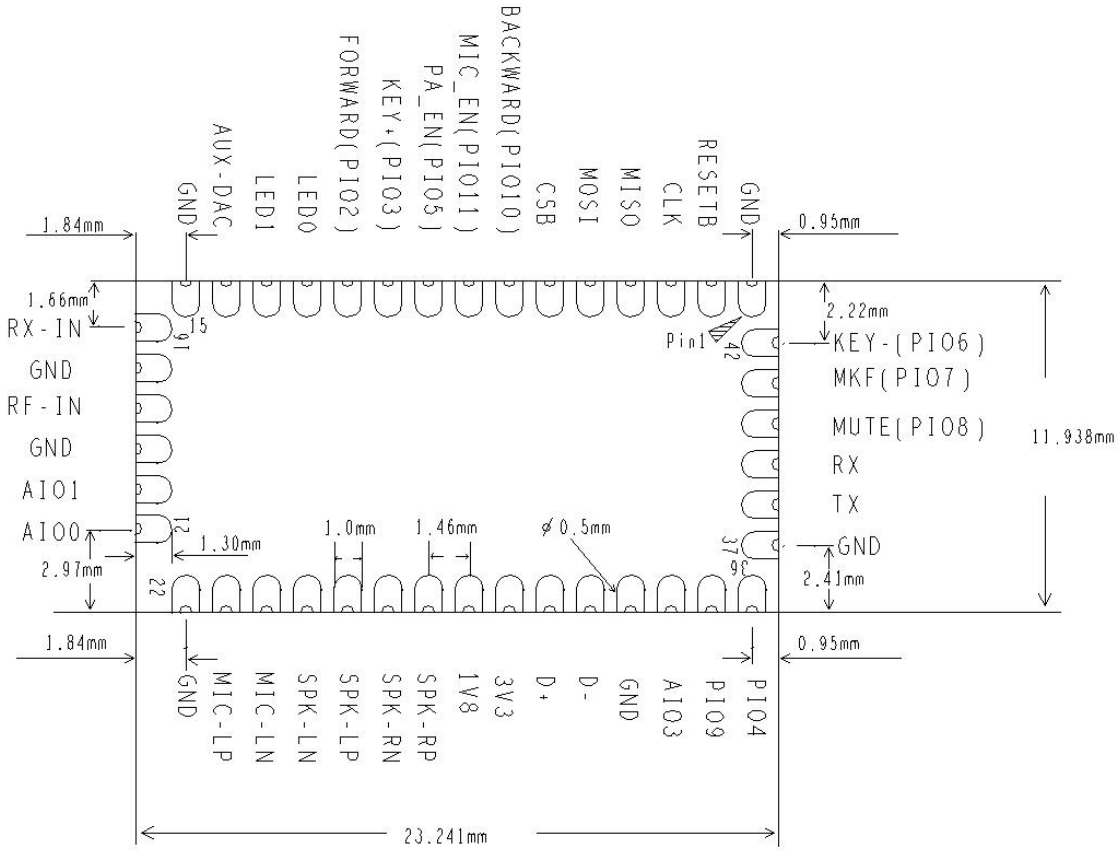

Figure 4 FLC-BTMDC732-A

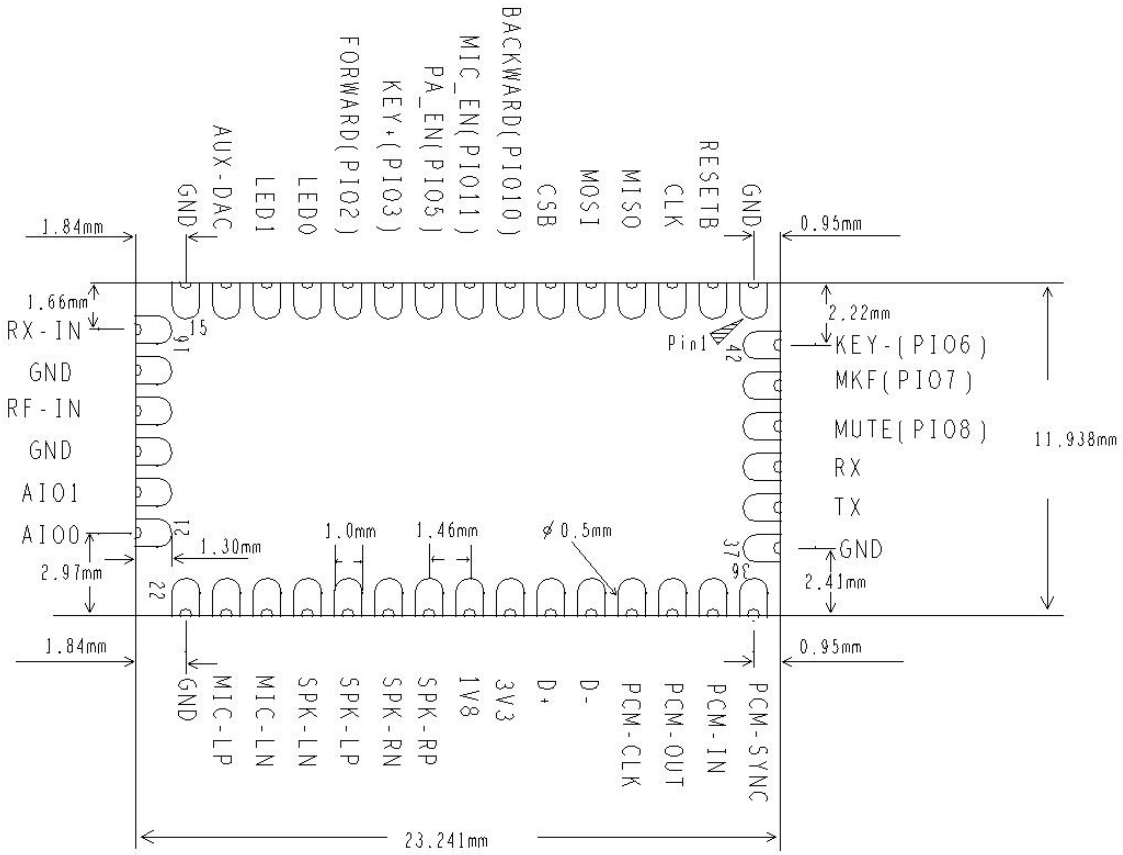

Figure 5 FLC-BTMDC732-B

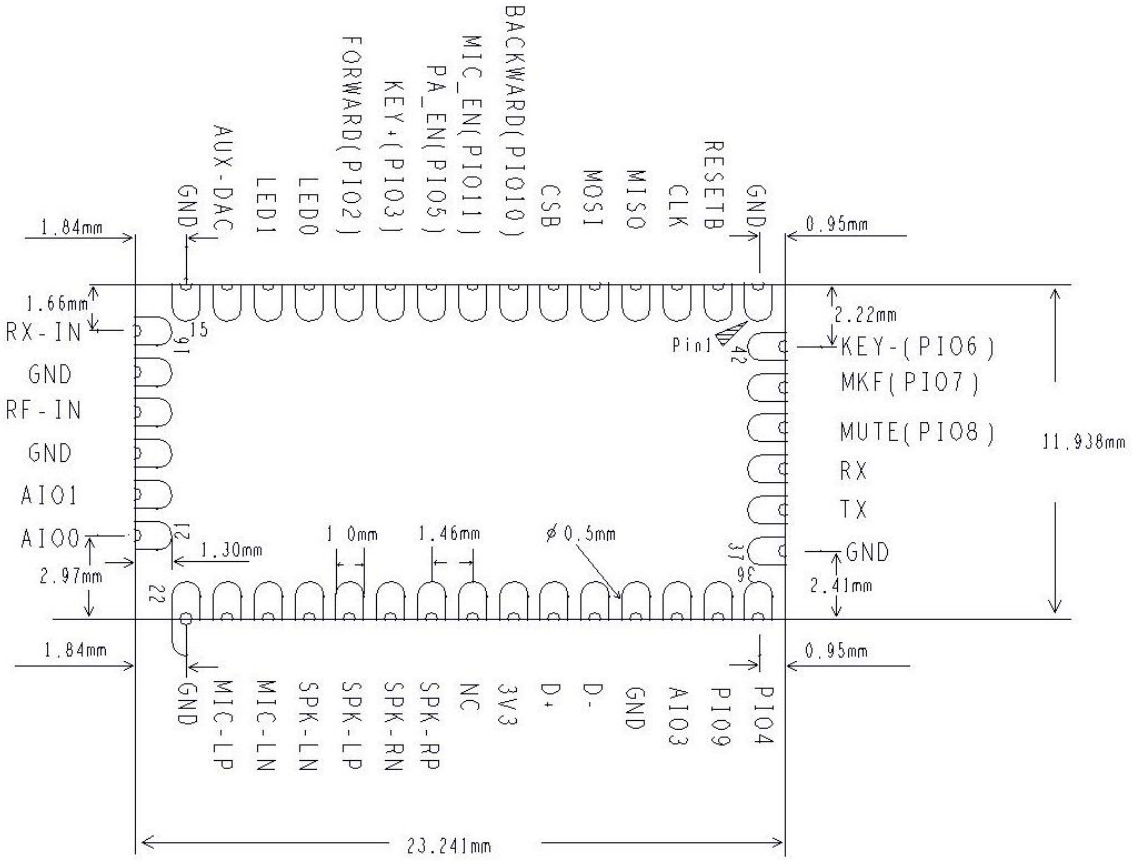

Figure 6 FLC-BTMDC732-C

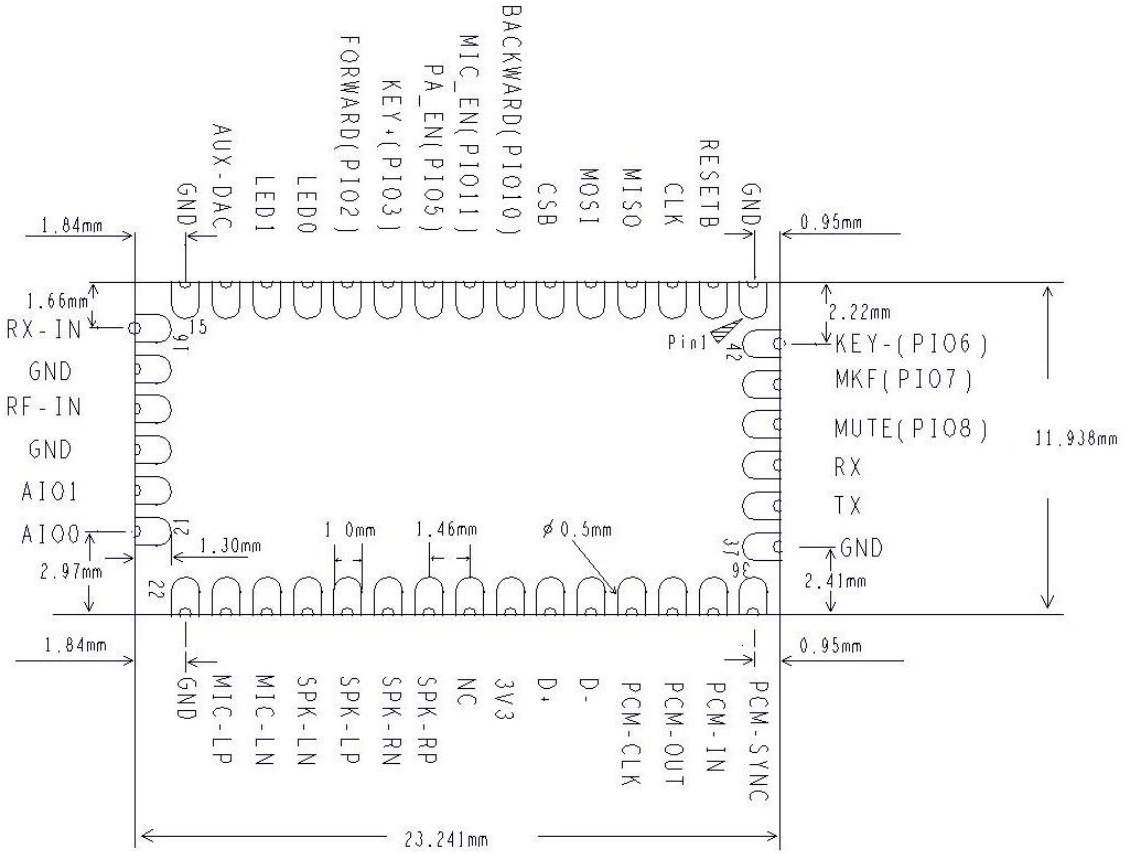

Figure 7 FLC-BTMDC732-D

3.2 Pin Definition

Table 3: Pin Definition of FLC-BTMDC732

Pin	Symbol	I/O Type	Description
1	GND	Ground	Ground
2	RESETB	CMOS input with weak internal pull-up	Reset if low. Input debounced so must be low for >5ms to cause a reset
3	SPI_CLK	CMOS input with weak internal pull-down	Serial Peripheral Interface clock
4	SPI_MISO	CMOS output, tri-state, with weak internal pull-down	Serial Peripheral Interface output
5	SPI_MOSI	CMOS input with weak internal pull-down	Serial Peripheral Interface input

6	SPI_CSB	CMOS input with weak internal pull-up	Chip select for Synchronous Serial Interface active low
7	BACKWARD(PIO10)	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
8	MIC_EN(PIO11)	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
9	PA_EN(PIO5)	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
10	Key+(PIO3)	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
11	FORWARD(PIO2)	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
12	LED0(PIO0)	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
13	LED1(PIO1)	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
14	AUX_DAC	Analogue	Voltage DAC output
15	GND	Ground	Ground
16	RX_IN	Analogue	Single ended receiver input
17	RF_GND	RF Ground	RF Ground
18	RF_IN	Analogue	Transceiver input/output line
19	RF_GND	RF Ground	RF Ground
20	AIO1	Bi-directional	Programmable input/output line
21	AIO0	Bi-directional	Programmable input/output line
22	GND	Ground	Ground
23	MIC_LP	Analogue	Microphone input positive
24	MIC_LN	Analogue	Microphone iput negative
25	SPK_LN	Analogue	Speaker output negative (left side)
26	SPK_LP	Analogue	Speaker output positive (left side)
27	SPK_RN	Analogue	Speaker output negative (right side)
28	SPK_RP	Analogue	Speaker output positive (right

			side)
29	1V8/NC[1]	1.8v power input or NC	1.8v power input/output. Note: please left unconnected for NC pin
30	3V3	3.3v power input	3.3v power input
31	USB_D+	Bi-directional	USB data plus
32	USB_D-	Bi-directional	USB data minus
33	GND/PCM_CLK[2]	Ground	Synchronous data clock
34	AIO3/PCM_OUT[2]	Bi-directional	Programmable input/output line
35	PIO9/PCM_IN[2]	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
36	PIO4/ PCM_SYNC[2]	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
37	GND	Ground	Ground
38	UART_TX	CMOS output, tri-state, with weak internal pull-up	UART data output
39	UART_RX	CMOS input with weak internal pull-down	UART data input
40	MUTE(PIO8)	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
41	MKF(PIO7)	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
42	KEY-(PIO6)	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line

Note:
1. NC pin is for FLC-BTMDC732-C and FLC-BTMDC732-D. It must be left unconnected
2. PCM Interface is only available for FLC-BTMDC732-B and FLC-BTMDC732-D. Please refer to Table 7.

3.3 Electrical Characteristics

Table 4: Absolute Maximum Rating

Rating	Minimum	Maximum
Storage Temperature	-40°C	+150°C

PIO/AIO and UART_* Voltage	-0.4v	+3.7v
VCC Voltage	-0.4v	+3.7v
USB D+/D- Voltage	-0.4v	+5.6v

Table 5: Recommended Operating Conditions

Operating Condition	Minimum	Typical	Maximum
Operating Temperature Range	-40°C	--	+85°C
PIO/AIO and UART_* Voltage	+2.7V	+3.3V	+3.6V
1V8 Voltage	+1.7V	+1.8V	+1.9V
3V3 Voltage	+2.7V	+3.3V	+3.6V
USB D+/D- Voltage	+4.4V	+5.0V	+5.3V

Table 6: Audio Output Terminal Characteristics

OutPut	Minimum	Typical	Maximum	Unit
Output power in 32ohm	-	30	-	mW pk
Output voltage full scale swing	-	2.0V	-	V pk-pk
Allowed load: resistive	16	-	O.C.	ohm
Allowed load: capacitive	-	-	500	pF

4. FLC-BTMDC732 Interfaces

4.1 Power Supply and Reset

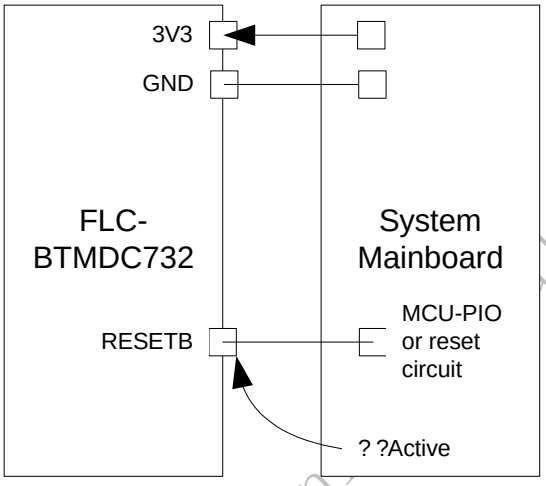

Figure 8 Design of Power Supply and Reset

4.2 RF

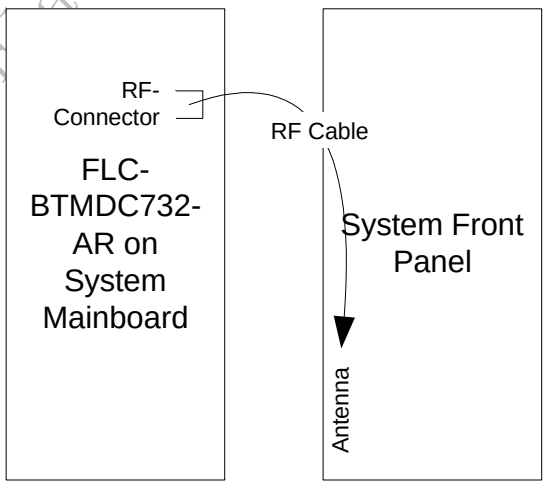

Figure 9 Scheme 1: Design of RF when mounting FLC-BTMDC732-AR on Mainboard

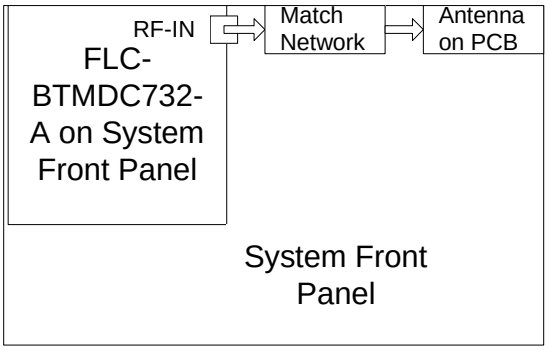

Figure 10 Scheme 2: Design of RF when mounting FLC-BTMDC732-A on Front Panel

4.3 Audio

The FLC-BTMDC732 features a differential stereo audio output interfaces.

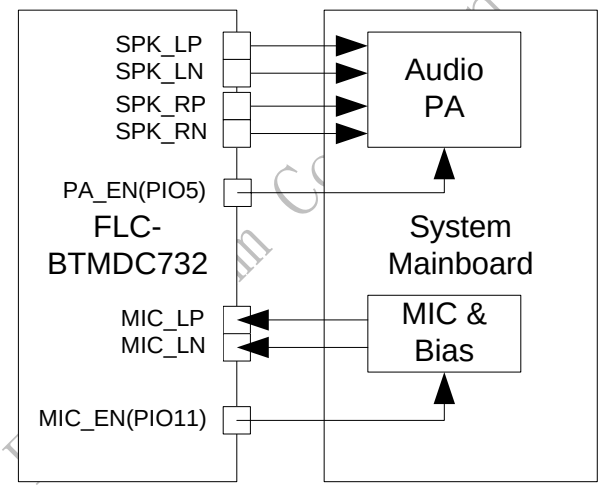

Figure 11 Scheme 1: Design of Audio Interfaces

4.4 UART Interface

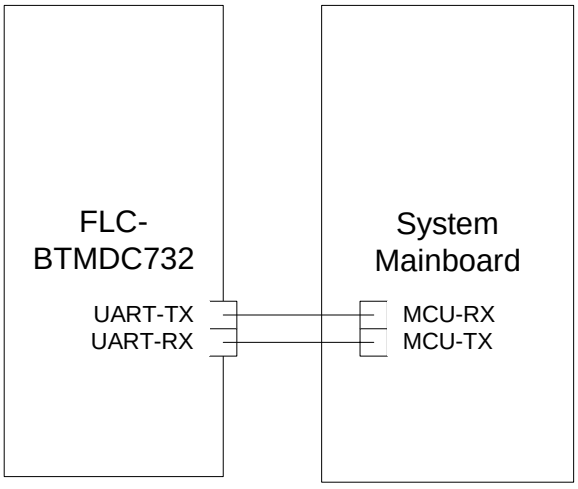

Figure 12 Design of UART

4.5 General Purpose Digital IO

There're several general purpose digital IO ports on the FLC-BTMDC732 module. Their functions depend on the firmware. Please also check the programming guide for details.

4.5.1 Button Interface

4.5.2 Control Interface for Audio Signals

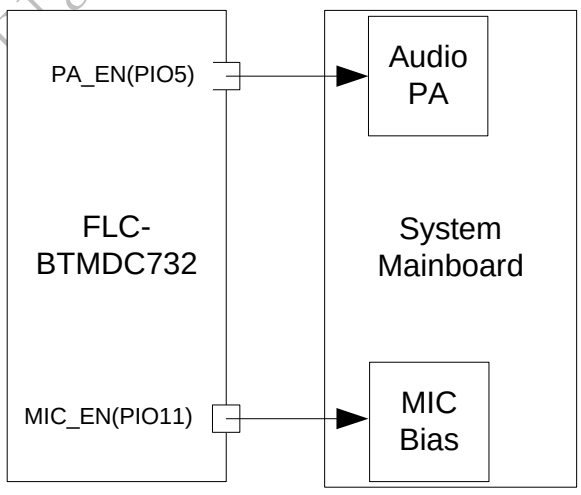

Figure 13 Design of General Purpose Digital IO

4.5.3 LED Interface

4.6 General Purpose Analogue IO

There're several general purpose analogue IO ports on the FLC-BTMDC732 module. Their functions depend on the firmware. Please also check the programming guide for details.

4.7 PCM/I2S Interface

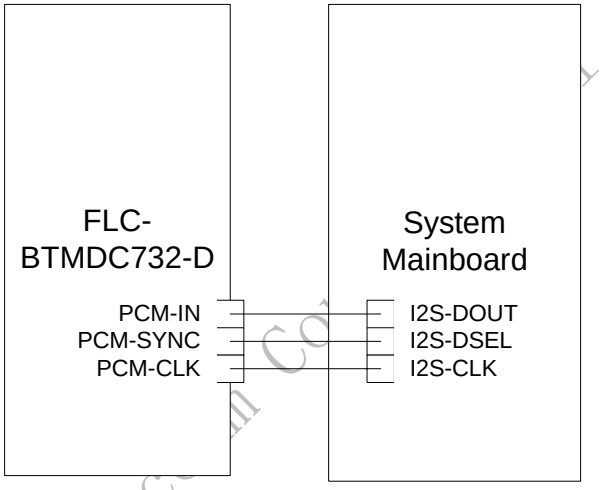

Figure 14 Design of PCM/I2S Interfaces

Table 7: Special Pin Definition of FLC-BTMDC732-B/D

33	PCM_CLK	Bi-directional with weak internal pull-down	Synchronous data clock
34	PCM_OUT	CMOS output, tri-state, with weak internal pull-down	Programmable input/output line
35	PCM_IN	CMOS input with weak internal pull-down	Programmable input/output line /Synchronous data input
36	PCM_SYNC	Bi-directional with weak internal pull-down	Programmable input/output line /Synchronous data sync

4.8 ISP Interfaces

The ISP (In System Programming) interfaces allows firmware update after the FLC-BTMDC732 module has been integrated in the customers systems. Flaircomm will update the firmware for Bluetooth functional upgrade, supporting of new mobile phone model, new requirement from customers and bug fix.

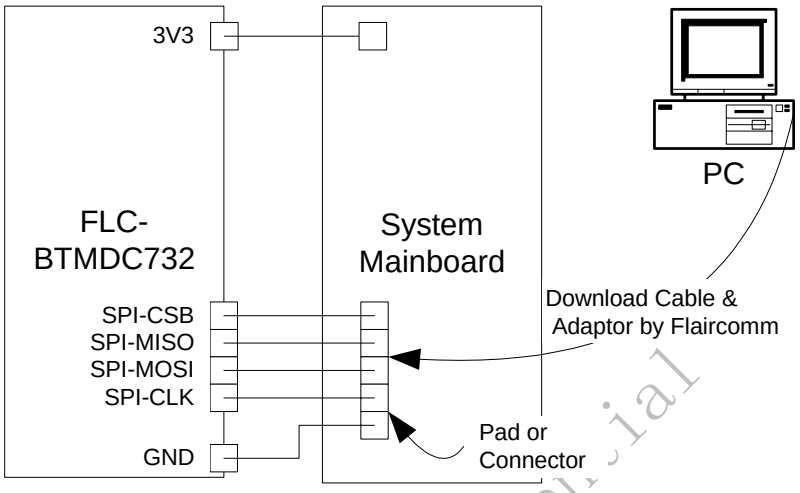

Figure 15 Design of ISP Interface

5. Recommended PCB Mounting Pattern

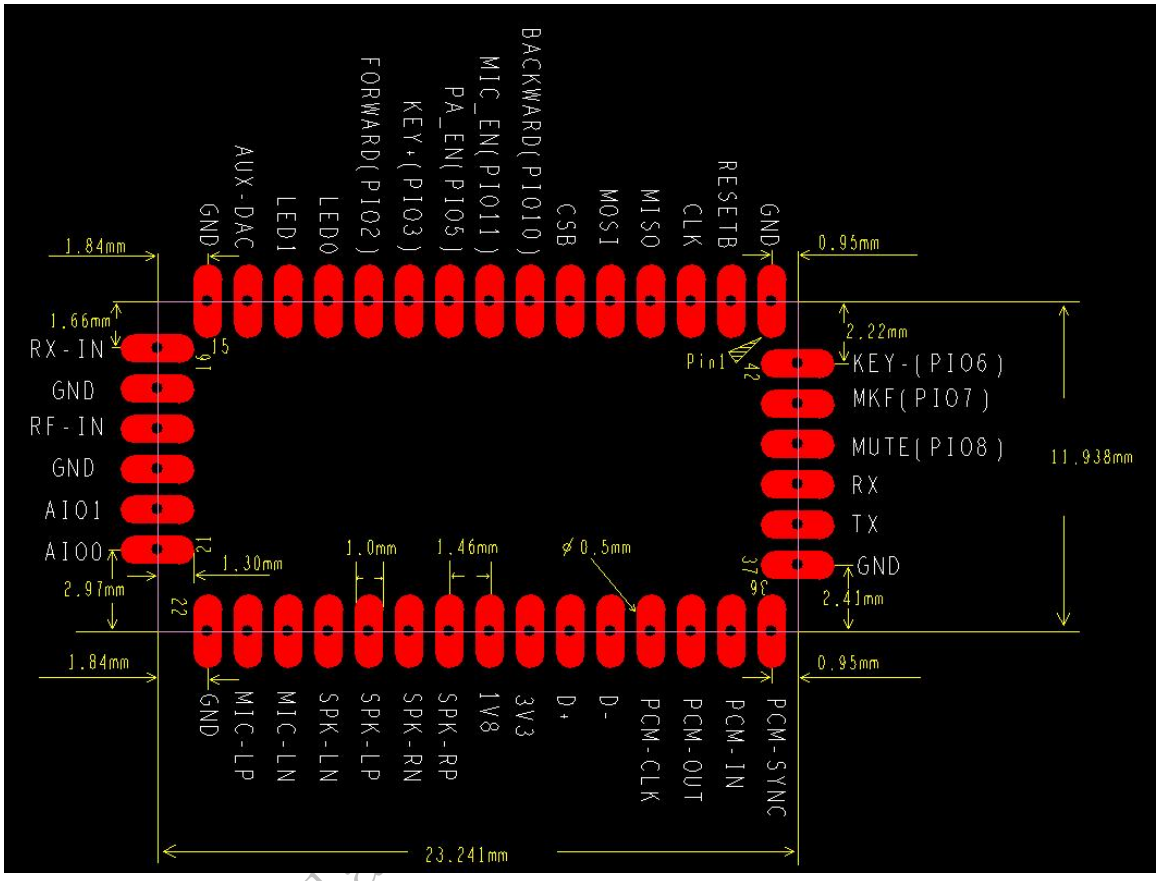

Figure 16 Recommended PCB Mounting Pattern

6. Application Schematic

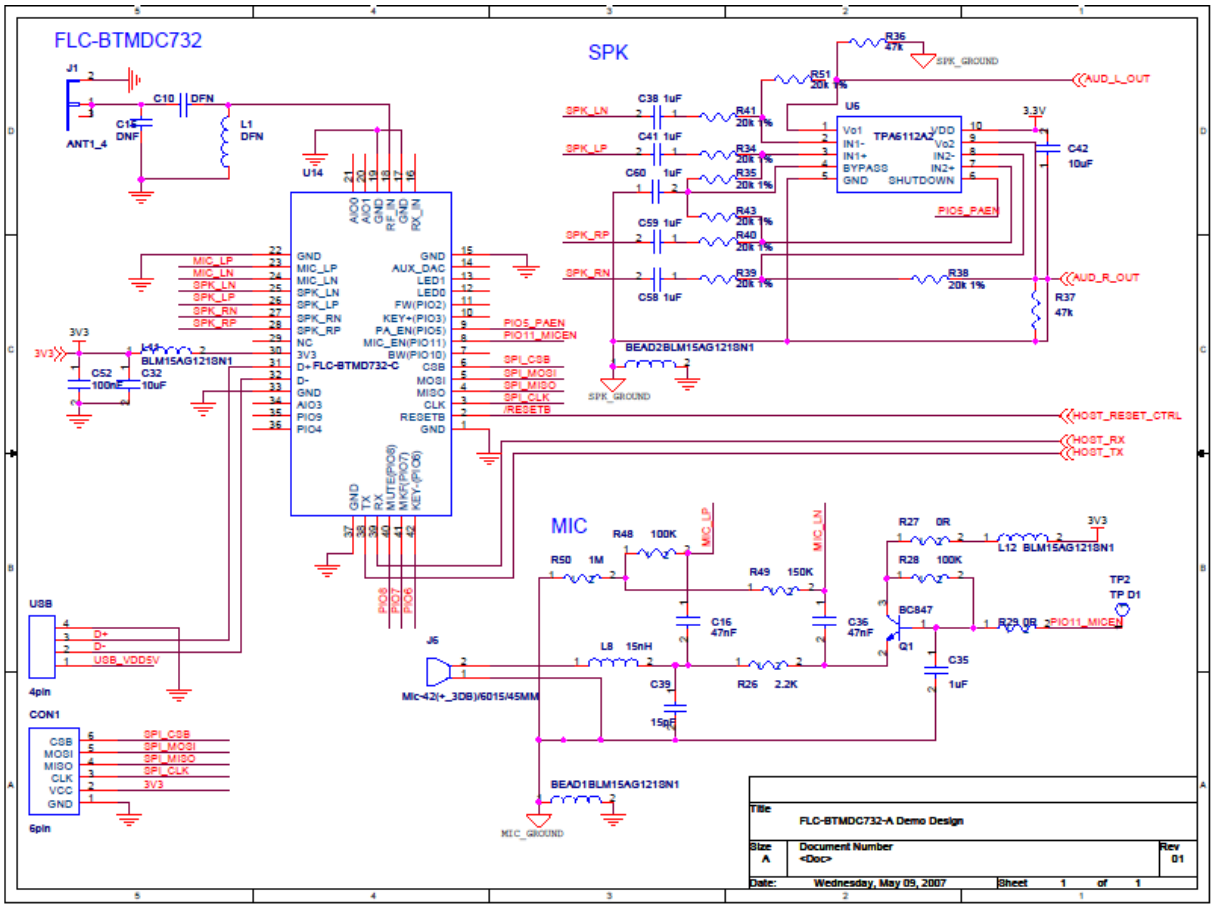

Figure 17 FLC-BTMDC732 Application Schematics