Fender FMA BT-FTSW-USB PCBA (PN 7710068000)

Manual and Spec, revision 1.0

Module Description

The Fender FMA BT-FTSW-USB PCB Assembly is an auxiliary PCB used in the family of Fender Modular Architecture (FMA) products. The board has a USB port with a micro AB connector, a Fender Footswitch port with a ¼" phone jack and a wireless module.

Circuit Description/Theory of Operation

There are three main sections of the circuit:

- Bluetooth module (FreeWings FW3817-30), antenna, & audio output circuit
- USB port
- Footswitch port

The USB circuit consists of ESD protection components and a micro AB USB connector. The Footswitch circuit consists of ESD protection components and a ¼" phone jack connector. Both of these circuits are unrelated to the Bluetooth section, and are shared on the PCB for mechanical convenience.

The FreeWings module is a complete Bluetooth implementation with analog audio output. An F-style antenna is connected to the RF output of the module through a test switch and matching network. The module is powered with a 3.3V DC supply and digital ground. The PCB is dual layer with digital ground plane sections stitched together on both sides where possible. The analog stereo audio output from the module is buffered by an op-amp stage before sending back to the host system. The analog audio buffer circuit has a separate power supply and ground system to isolate it from digital noise.

All Bluetooth functionality is controlled by on-board firmware. But the module may be accessed for test through the SPI port to a computer interface module (available from FreeWings). A description of specific commands for Bluetooth is beyond the scope of this document and can be found in documentation from FreeWings or CSR for the CSR8630 chipset.

FMA Main PCB Interface Header

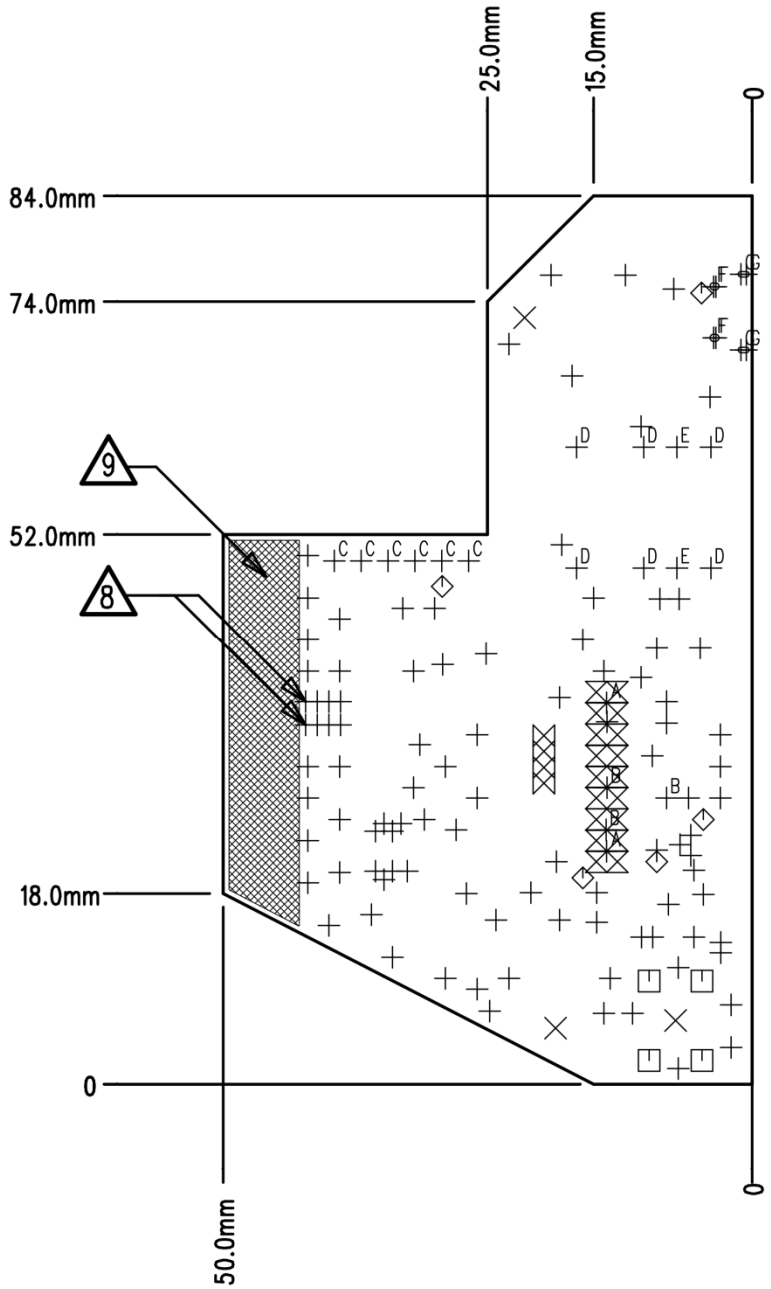
All control and power signals come from a connection to a motherboard through an 18-pin, 2mm dual row female header. The pinout for the header is in the table below:

Pin	Signal	Description
1	USB_OTG_DP	USB OTG port data signal
2	USB_OTG_DN	USB OTG port data signal
3	GNDD	Digital GND
4	FTSW_DAT	Footswitch port data signal
5	STATUS_LED-CHIP_WAKE	Status GPIO output
6	FTSW_DET	Footswitch port detect
7	PAIR-HOST_WAKE	Pair GPIO input
8	USB_OTG_5V	Reserved for future use
9	USB_OTG_ID	USB OTG port ID signal
10	3.3V	3.3V DC Supply for digital circuitry and BT module
11		Not used
12	GNDD	Digital GND
13		Not used
14	+5V_ANALOG	5V DC Supply for analog audio circuit
15	GNDA	Audio GND
16	G2V5	2.5V half-bias reference for analog audio circuit
17	BTA_L	Analog audio signal output LEFT
18	BTA_R	Analog audio signal output RIGHT

Power Consumption

Operating Voltage	3.3VDC +/- 9%
Operating Current	50mA

Board Dimensions



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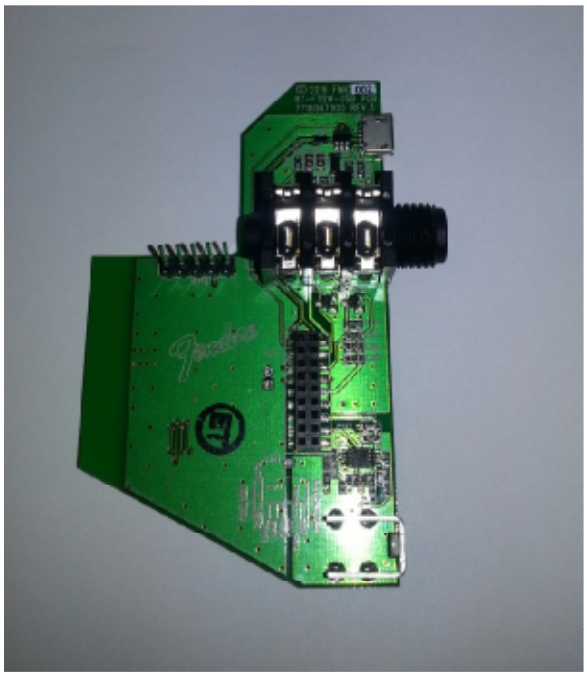
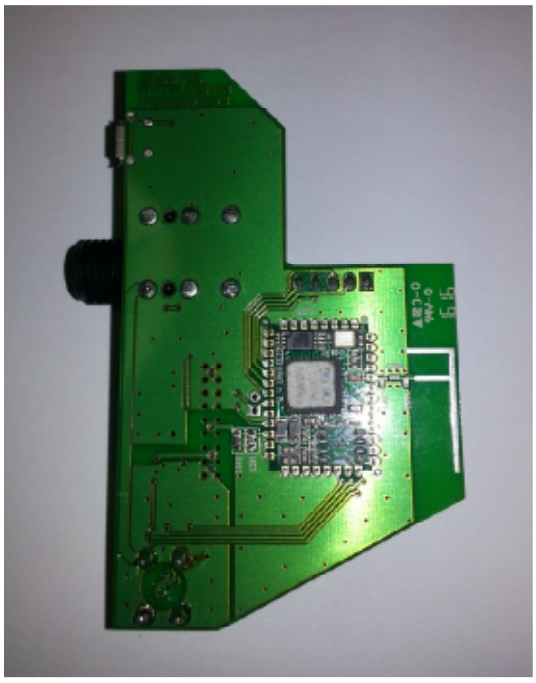
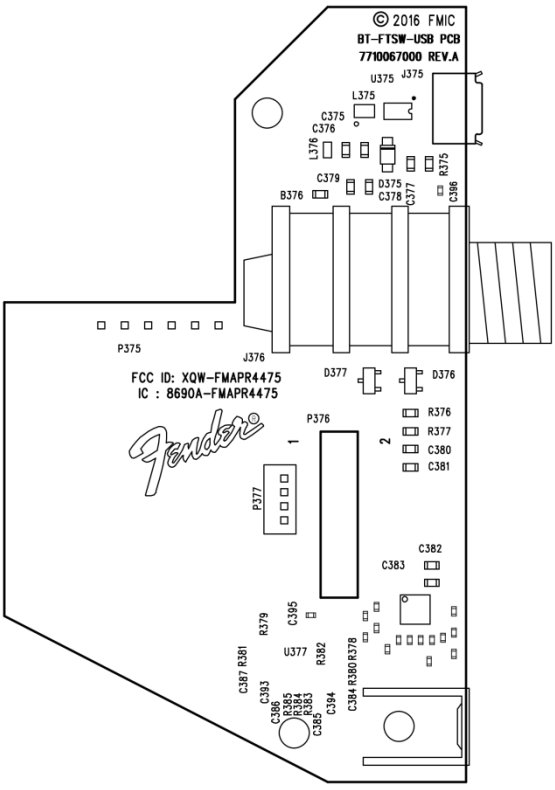


Top Side PCB Module



Bottom Side PCB Module

SILKSCREEN ID LABEL



COMPLIANCE STATEMENTS

FCC 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. (2) This device must accept any interference received, including interference that may cause undesired operation.

NOTE: 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.

WARNING: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

LABEL OF THE END PRODUCT:

The final end product must be labelled in a visible area with the following:

"Contains FCC ID: XQW-FMAPR4475"

If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19 statement is required to be available in the users manual: 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.

RF Exposure

This device has been evaluated and shown compliant with the FCC RF Exposure limits under fixed exposure conditions (antennas are greater than 20cm from a person's body) when installed in certain specific OEM configurations.

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. Due to missing shielding the module is strictly limited to integration by the Grantee himself

or his dedicated OEM integrator under control of the Grantee. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

IMPORTANT NOTE:

This device is intended only for OEM integrators under the following conditions:

(1) According to FCC Part 15 Subpart C Section 15.212, the radio elements of the modular transmitter must have their own shielding. However, due to there is no shielding for this WIFI/BT module, this module is granted as a Limited Modular Approval.

(2) This module has been designed to operate with PCBA antenna having a maximum gain of 0dBi.

(3) Integration is typically strictly restricted to Grantee himself or dedicated OEM integrators under control of the Grantee.

The module will be responsible to satisfy SAR/RF Exposure requirements, when the module integrated into any (portable, mobile, fixed) host device.

This module is intended for OEM integrator only and the OEM integrators and instructed to ensure that the end user has no manual instructions to remove or install the device. The OEM integrator is still responsible for the FCC compliance requirement of the end product, which integrates this module.

The module has no shielding and tested stand alone. This module is tested and approved as Limited modular approval with stand alone configuration, any OEM incorporated this radio module into any system are require additional testing and evaluation.

The module is only certified with the installed antenna. Any change of the antenna will void the certification.

IC Notice:

This device complies with Canada Industry licence-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) this device may not cause interference; and

(2) this device must accept any interference. Including interference that may cause undesired operation of the device.

Avis d'Industrie Canada

Le présent appareil est conforme aux CNR d'industrie Canada applicables aux appareils radio exem pts de licence L'exploitation est autorisée aux deux conditions suivantes:

1) l'appareil ne doit pas produire de brouillage; et

2) l'utillsateur de I'appareil doit accepterbrouillage radioélectrique subi meme si le brouillage est susceptible d'encompromettre le fonctionnement. mauvais fonctionnement de I'appareil.

Radiation Exposure Statement:

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Déclaration d'exposition aux radiations:

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

This device and its antenna(s) must not be co-located with any other transmitters except in accordance with IC multi-transmitter product procedures.

Refering to the multi-transmitter policy, multiple-transmitter(s) and module(s) can be operated simultaneously without reassessment permissive change.

Cet appareil et son antenne (s) ne doit pas être co-localisés ou fonctionnement en association avec une autre antenne ou transmetteur. This module is intended for OEM integrator.

The OEM integrator is still responsible for the IC compliance requirement of the end product, which integrates this module.

In the users manual of the end product, the end user has to be informed to keep at least 20cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the IC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied. The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment. 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.

The final end product must be labeled in a visible area with the following

"Contains TX IC : 8690A-FMAPR4475 ".

This radio transmitter (identify the device by certification number, or model number if Category II) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated.

Le présent émetteur radio (identifier le dispositif par son numéro de certification ou son numéro de modèle s'il fait partie du matériel de catégorie I) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne.

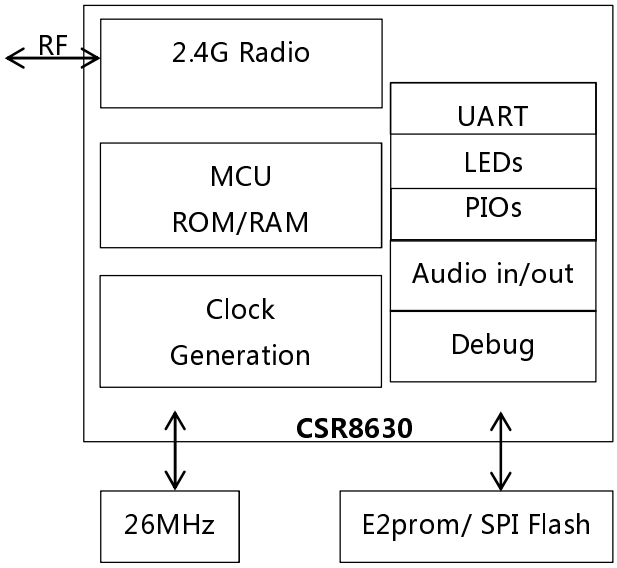
FW3817-30 Bluetooth Module

CSR8630 Audio Solution

Fully Qualified Single-chip
Bluetooth® v4.0 System
FW3817-30
V1.5

Features

- Bluetooth v4.0 specification compliant
- 80MHz RISC MCU and 80MIPS Kalimba DSP
- Support AVRCP/A2DP
- +8dBm TX power and -89dBm RX sensitivity
- AVRCP v1.4
- A2DP v1.2, multipoint A2DP support enables connection to 2 A2DP source devices for music playback
- 5-band fully configurable EQs
- Multipoint support for A2DP connection to 2 A2DP sources for music playback
- Secure simple pairing, CSR's proximity pairing and CSR's proximity connections
- Stereo line-in
- Serial interfaces: USB 2.0, UART, I²C and SPI
- SBC, MP3 and AAC decoder support
- Wired audio support
- Integrated dual switch-mode regulators, linear regulators and battery charger.
- 3 LED outputs (RGB)
- 14.7mm x 21mm SMT package



General Description

FW3817-30 is a high performance, cost effective, low power and compact solution. The Bluetooth module provides a complete 2.4GHz Bluetooth system based on the BlueCore CSR8630 chipset which is a single chip radio and baseband IC for Bluetooth 2.4GHz systems,. This module is fully compliant to Bluetooth v4.0 for audio communications.

Applications

- Bluetooth stereo speakers
- Bluetooth stereo earphone
- A2DP audio sink (including multipoint) for music streaming

FW3817-30 Details

Features

Bluetooth Profiles

- Bluetooth v4.0 specification support
- A2DP v1.2
- AVRCP v1.4
- DI v1.3

Music Enhancements

- Configurable 5-band EQ for music playback (rock, pop, classical, jazz, dance etc)
- SBC,MP3, AAC and fast stream decoder
- Volume Boost
- Wired Audio Mode supported
- USB Audio Mode supported
- Stereo Widening (S3D)

Additional Functionality

- Support for multi-language programmable audio prompts
- CSR’ s proximity pairing and CSR’ s proximity connection
- Multipoint support HFP connection to 2 handsets for voice
- Multipoint support A2DP connection to 2 A2DP source devices for music playback
- Talk-time extension
- Fast charging support up to 200mA with no external components. Higher charge currents using external pass device.
- Slim module with 21mm x 14.7mm x 2.0mm

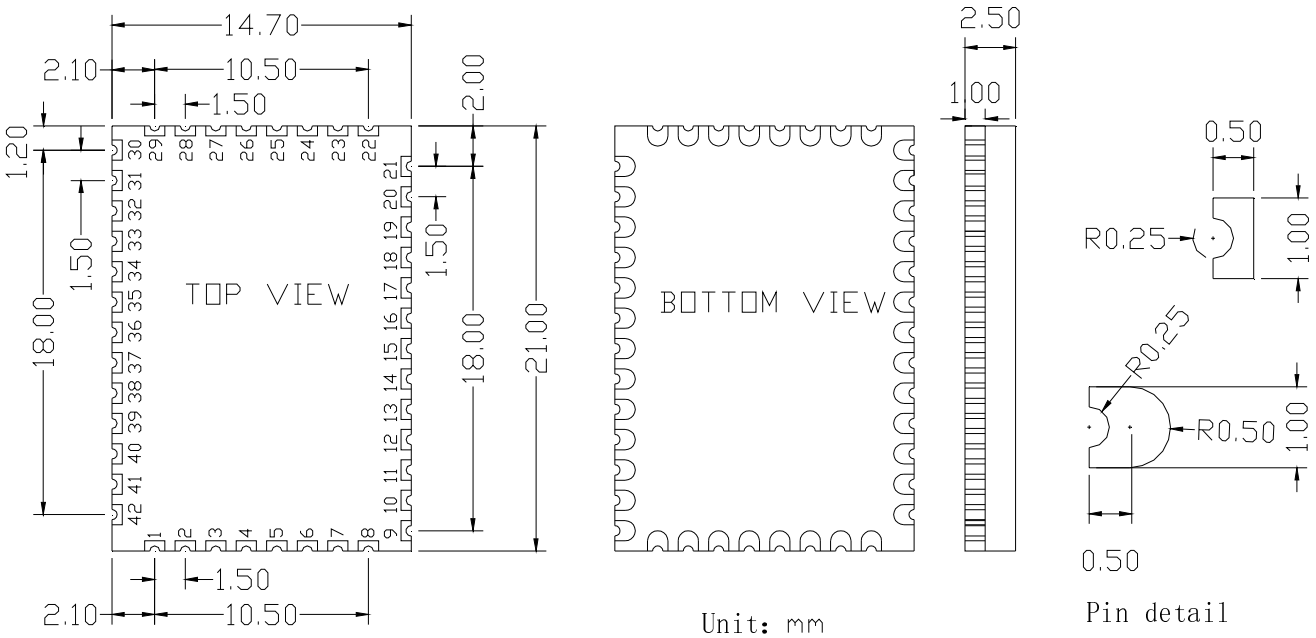
Contents

1 General specifications

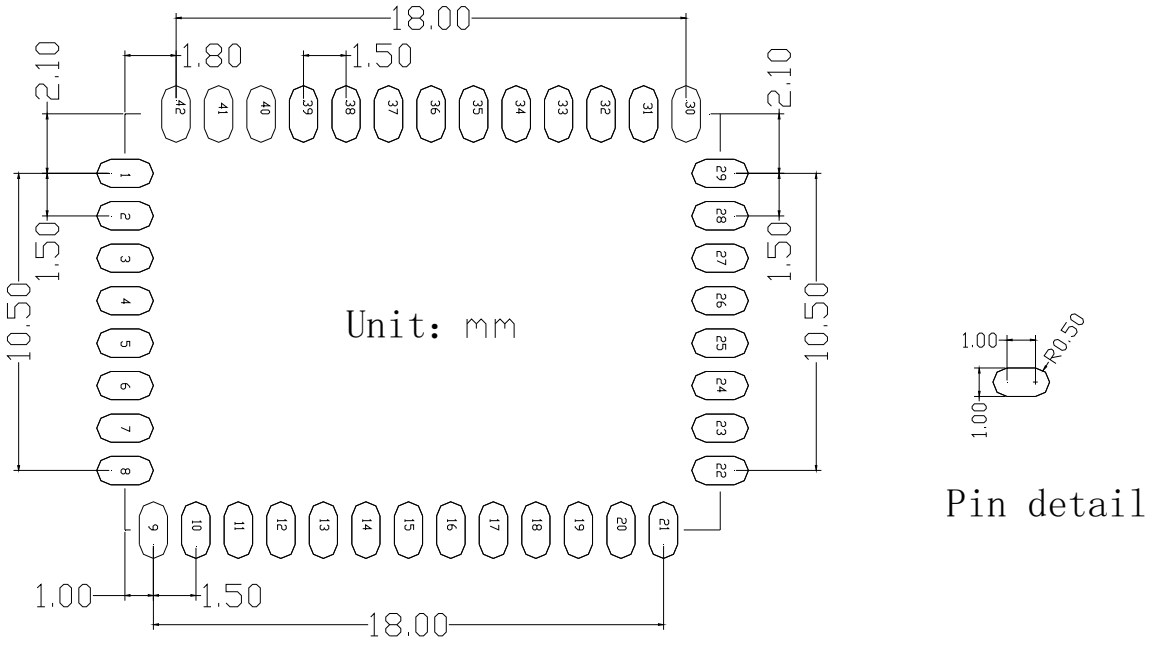
Model Name	**FW3817-30**
Product Description	**Bluetooth 4.0 Class2 Module**
Bluetooth Standard	Bluetooth 4.0
Chipset	CSR8630
Dimension	21mm x 14.7mm x 2.0mm
Temperature	
Storage Temperature	-40～+85℃
Operating Temperature	-20～+70℃
Electrical Specifications	
Supply Voltage	2.80~4.25V
Power Consumption in A2DP slave mode with no load and playing peak noise	14mA
Modulation	GFSK/π/4 DQPSK/8DPSK
Frequency Range	2402～2480MHz
Maximum RF Transmit Power	4dBm
Receive Sensitivity	-84dBm

2 Module Package Information

6.1 Pinout Diagram and package dimensions



Mechanical Dimensions



Recommended PCB layout footprint

6.2 Module Pin descriptions

Pin No.	Pin Name	Pin Type	Description
1	GND	VSS	Ground
2	USB_P	Bidirectional	USB data plus
3	USB_N	Bidirectional	USB data minus
4	PIO15	Bidirectional with strong pull-up	MFB key input
5	PIO14	Bidirectional with strong pull-up	Skip+ key input
6	PIO16	Bidirectional with strong pull-up	Volume+ key input
7	PIO9	Bidirectional with strong pull-down	External PA enable output high
8	PIO1	Bidirectional with strong pull-up	Volume- key input
9	NC	N.C	NOT CONNECTED
10	PIO17	Bidirectional with strong pull-down	Skip- key input
11	RSTn	Input with strong pull-up	Reset if low. Pull low for minimum 5ms to cause a reset.
12	SPI_MOSI	Bidirectional with weak pull-down	SPI_MOSI for debug only
13	SPI_CLK	Bidirectional with weak pull-down	SPI_CLK for debug only
14	SPI_CSB	Bidirectional with weak pull-down	SPI_CSB active low for debug only
15	SPI_MISO	Bidirectional with weak pull-down	SPI_MISO for debug only
16	LED1	Open drain output	LED driver
17	LED0	Open drain output	LED driver
18	VREG_EN	Power on/off key input	Power on/off input key indication
19	VBAT	Battery positive terminal	Power supply input for 2.8~4.2V
20	VCHG	Charger voltage input	Internal charger input for charging
21	1V8	1.8V output	1.8V output for keys
22	GND	VSS	Ground
23	VBAT_SENSE	Battery Sense	Battery charger sense input
24	PIO6	Bidirectional with strong pull-down	Programmable input/output line
25	CHG_EXT	Charger external pin	External battery charger control. External battery charger transistor base control when using external charger boost. Otherwise leave unconnected.
26	LED2	Open drain output	LED driver
27	NC	N.C	Not Connected
28	LINE_RP	Analog input	Line input, positive right
29	LINE_RN	Analog input	Line input, negative right
30	AIO0	Analog input	ADC input used only to test temperature of battery
31	LINE_LP	Analog input	Line input, positive left
32	LINE_LN	Analog input	Line input, negative left

33	SPK_RN	Analog output	Speaker output negative right
34	SPK_RP	Analog output	Speaker output positive right
35	SPK_LN	Analog output	Speaker output negative left
36	SPK_LP	Analog output	Speaker output positive left
37	GND	VSS	Ground
38	RF PORT	Analog	Bluetooth signal input/output port 50Ohm
39	GND	VSS	Ground
40	NC	N.C	Not Connected
41	NC	N.C	Not Connected
42	NC	N.C	Not Connected

3 Electrical Characteristics

7.1 Reset

FW3817-30 module is reset from several sources.We suggest to use power-on reset,that means to leave the RSTn pin floating:

- RSTn pin pulled low for minimum 5ms
- Power-on reset, leaving the RSTn pin floating. It should be that it was 0V voltage at any pin before reset.
- USB charger attach reset
- Software configured watchdog timer

7.2 Power on and power off

FW3817-30 module is power on from two sources:

- VREG_EN pin pulled high for minimum 100ms when VBAT pin is in the status of stable power.
- VREG_EN pin pulled high from low when VBAT pin is in the status of stable power.

The wrong timing sequence of VREN_EN and VBAT will lead to error of power on.

FW3817-30 module is power off from two sources:

- VREG_EN pin pulled high for minimum 100ms when VBAT pin is in the status of stable power.
- VREG_EN pin pulled low from high when VBAT pin is in the status of stable power.

The wrong timing sequence of VREN_EN and VBAT will lead to error of power off.

7.3 I/O

The driver power voltage of all the PIO port is 1.8V inside of the module.

7.4 Battery Charger

FW3817-30 module provides two kinds of battery charger controls.

The internal charger circuit can provide up to 200mA of charger circuit.

The module controls an external pass transistor which can provide 500mA of charger circuit.

7.5 USB

USB_P and USB_N can be used to updating software or USB audio.Both of them request that VCHG pin must be supplied 5V power.The two data signals do not need any resistance or capacitance.

7.6 Absolute Maximum Ratings

Rating	Minimum	Maximum	Unit
Storage Temperature	-40	85	℃
Supply Voltage			
VCHG	-0.4	5.75	V
LEDs	-0.4	4.4	V
VBAT SENSE	-0.4	4.4	V
VREG_EN	-0.4	4.4	V
VBAT	-0.4	4.4	V

7.7 Recommended Operating Conditions

Rating	Minimum	Typical	Maximum	Unit
Operating Temperature	-20	20	70	℃
Supply Voltage				
VCHG	4.75	5.00	5.75	V
LEDs	1.10	3.70	4.30	V
PIO	1.50	1.80	1.90	V
VBAT SENSE	0	3.70	4.25	V
VREN_EN	2.80	3.70	4.25	V
VBAT	2.80	3.70	4.25	V

7.8 Power consumption

Status	Current	Typical	Unit
Power off	VBAT	0.1	uA
A2DP slave mode with no load and playing peak noise	VBAT	12	mA
A2DP slave mode with two16ohm speakers and playing peak noise	VBAT	24	mA
Pause in A2DP slave mode connection	VBAT	0.5	mA

4 Main components list

NO.	Description	Manufacture	Manufacturer P/N
1	Inductor 4.7uH ±20% 0805	麦捷	MGFL2012C4R7MT-LF
	Inductor 4.7uH ±20% 0805	达方	IP20124R7MPS9
	Inductor 4.7uH ±20% 0805	顺络Sunlord	MSL2012S4R7MHT
2	IC BT BC8630 QFN68	CSR	CSR8630B04-IQQF-R
3	Filter WiFi 1608	ACX	BF1608-L2R4DAAT/LF
4	Crystal 26M 8.5PF 10PPM	HOSONIC	E3SB26.0000F8ES11M
	Crystal 26M 8.5PF 10PPM	TXC	7M26000314
	Crystal 26M 8.5PF 10PPM	EPSON	XIE000021008300
	Crystal 26M 9PF 10PPM	H.ELE	X3S026000B91H-NZ
5(ROM版)	IC EEPROM FM24C128A-TS-T-G TSSOP-8	复旦微电子	FM24C128A-TS-T-G
	IC EEPROM GT24C128A-2ZLI-TR TSSOP-8	聚辰	GT24C128A-2ZLI-TR
6（Flash版）	IC Flash Serial GD25Q41B 4M-bit SOP-8 Gigadevice	先捷	GD25Q41BTIGR
	IC Flash Serial MD25D40 4M-bit SOP-8 Gigadevice	先捷	MD25D40TIGR
	IC 1.8V 4M SPI FLASH SOP -8 150mile	MXIC	MX25U4033EM1I-12G
	IC 1.8V 4M SPI FLASH SOP -8 150mile	MXIC	KH25U4033EM1I-12G

5 Recommended reflow temperature profile

1) Follow: IPC/JEDEC J-STD-020 C
2) Condition:

Average ramp-up rate(217℃ to peak): 1～2℃/sec max.

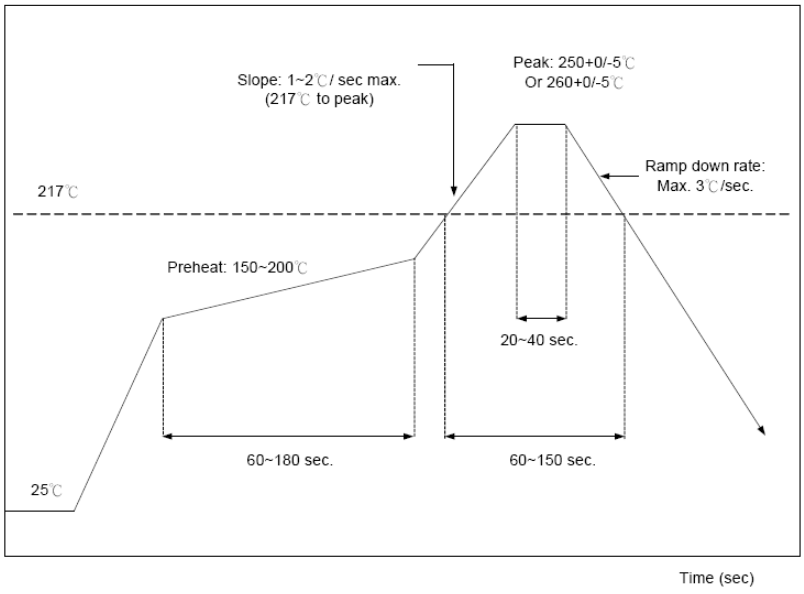
Preheat: 150～200C, 60～180 seconds

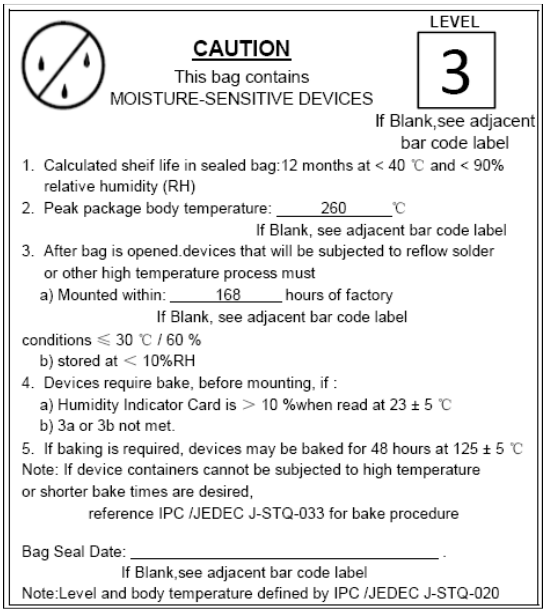
Temperature maintained above 217℃: 20～40 sec

Peak temperature: 250+0/-5℃ or 260+0/-5℃

Ramp-down rate: temperature: 8 minutes max

Cycle interval: 5 minus





The module Must go through 125℃ baking for at least 9 hours before SMT AND IR reflow process!

若拆封后未立即上线，翼动通讯建议让下次上线前务必以 125℃烘烤 9 小时以上！

6 Record of Changes

Data	Revision	Description
2015-12-14	V1.5	Upgrade the spec. format

7 Important Notice

Free Wings Technologies Co.,Ltd (FW) reserve the right to make changes to their products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current. All products are sold subject to the FW terms and conditions of sale supplied at the time of order acknowledgement, including those pertaining to warranty, patent infringement, and limitation of liability.

FW warrants performance of its products to specifications applicable at the time of sale in accordance with FW’ s standard warranty. Testing and other quality control techniques are utilized to the extent FW deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

In order to minimize risks associated with customer applications, adequate design and operating safeguards must be used by the customer to minimize inherent or procedural hazards. FW products are not authorized for use as critical components in life support devices or systems without the express written approval of an officer of the company. Life support devices or systems are devices or systems that are intended for surgical implant into the body, or support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided, can be reasonably expected to result in a significant injury to the user. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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