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|---|---|
| Date | 2024.03.18 |
| Revision | 1.1 |
| Page | |

# PRODUCT APPROVAL DATASHEET

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|---|---|
| PRODUCT | Bluetooth Module V5.4 (LE audio) |
| MODEL NAME | F-3083 |
| Our Part No | |
| CUSTOMER | |

| Checked By | Approved By | Company Seal |
|---|---|---|
| | | |

# Revision History

| Version | Date | Revision Description |
|---|---|---|
| 1.0 | 23/06/13 | First release |
| 1.1 | 24/03/18 | Update paramaters |

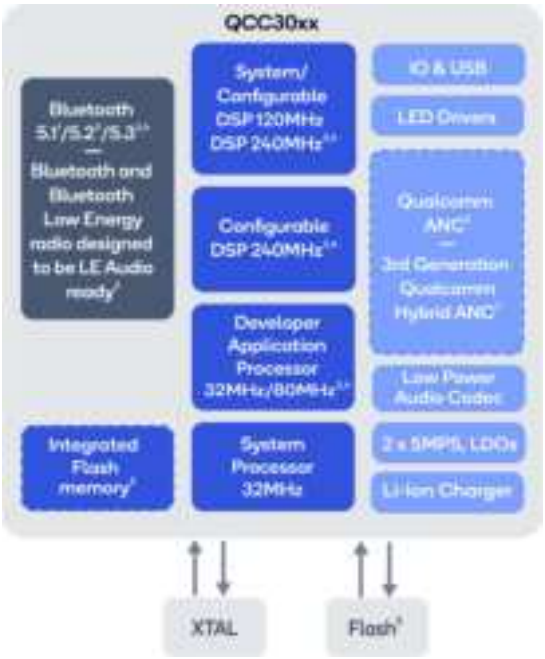
## General Description

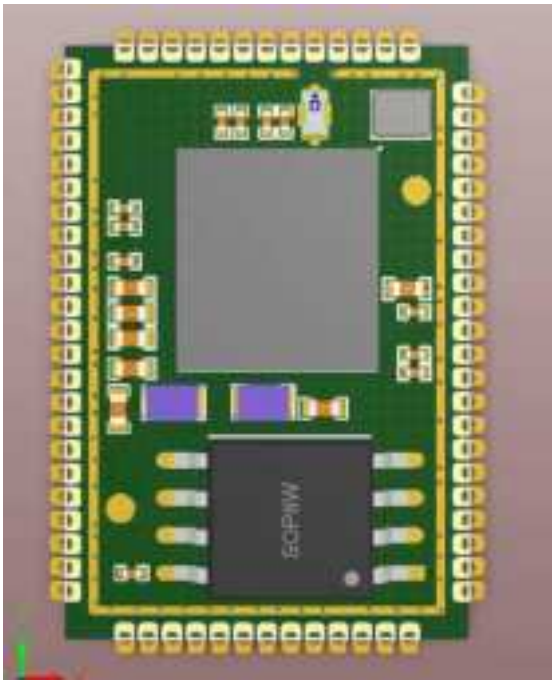
F-3083 is a fully integrated Bluetooth Module, It is based on Qualcomm QCC3083 chipset with specific interface design to meet customers electronics needs. F-3083 is compatible with Bluetooth specification ver5.4. It integrated RF Baseband controller, etc., a completed Bluetoth subsystem. F3083 supports SBC, AAC, LC3 andapt-X, apt-X HD, apt-X adaptive,aptx-LL, Qualcomm lossless audio Snapdragon Sound. Support LE audio Auracast, Unicast and MESH BT technologies.

## Features

- Highly integrated SoC with extremely low-power design
- Support for digital assistants with minimal integration effort
- Fully programmable digital ANC[2,3]
- Support for aptX, aptX HD and aptX Adaptive[2,3,4]
- Lossless audio with Snapdragon Sound[3]
- Support for Qualcomm® cVc™ Echo Cancelling and Noise Suppression (ECNS)
- QCC3083 qualified to Bluetooth 5.4
- QCC3083 designed to integrate LE Audio use cases, works for Auracast and Unicast
- 2Mbps Bluetooth low energy (LE) support
- Variety of form factors, down to ultra-small 5.5mm x 5.5mm
- Dual core 32-bit processor application and Kalimba DSP Audio subsystem
- Embedded ROM + RAM (and integrated Flash with QCC3044)
- High-performance low power audio codec including stereo Class D and Class AB analog outputs
- 192kHz 24-bit I2S & SPDIF interfaces
- Flexible software platform with powerful new IDE support
- Integrated battery charger supporting internal mode (up to 200 mA) and external mode (up to 1.8 A)

## QCC3083 Block Diagram



### Audio subsystem

- 32-bit Kalimba audio digital signal processor (or processing) (DSP) core with flexible clocking from 2 MHz to 240 MHz to enable optimization of performance vs. power consumption
- DSP executes code from ROM
- 384 KB program random access memory (RAM)
- 1024 KB data RAM **Application subsystem**
- Dual-core application subsystem 32/80 MHz operation
- 32-bit Firmware Processor (reserved for system use) executes:
  - Bluetooth upper stack
  - Profiles
  - House-keeping code
- 32-bit Developer Processor executes:
  - Developer applications
- Both cores execute code from external flash memory using QSPI clocked at 32 MHz or 80 MHz
- On-chip caches per core enable optimized performance and power consumption

### Bluetooth subsystem

- Qualified to Bluetooth v5.4 specification including 2 Mbps Bluetooth Low Energy and Bluetooth Low Energy Isochronous Channels
- Qualcomm® Bluetooth High Speed Link
- Single ended antenna connection with on-chip balun and Tx/Rx switch
- Bluetooth, Bluetooth Low Energy, and mixed topologies supported
- Class 1 support

### Li-ion battery charger

- Integrated battery charger supporting:
  - Internal mode (up to 200 mA)
  - External mode (up to 1.8 A)
- Variable float (or termination) voltage adjustable in 50 mV steps from 3.65 V to 4.4 V
- Thermal monitoring and management are available in application software
- Pre-charge to fast charge transition configurable at 2.5 V, 2.9 V, 3.0 V, and 3.1 V

### Power management

- Integrated power management unit (PMU) to minimize external components
- QCC3083 VFBGA runs directly from a Li-ion, USB, or external supply (2.8 V to 6.5 V)
- Auto-switching between battery and USB (or other) charging source
- Power islands employed to optimize power consumption for variety of use-cases
- Dual switch-mode power supply (SMPS):
  - Automatic mode selection to minimize power consumption
  - 1.8 V SMPS generates power for both the device and off-chip circuits
  - Dedicated digital SMPS (output voltage changes automatically to minimize device power consumption)

### Audio engine and digital audio interfaces

- 24-bit inter-integrated circuit sound (I²S) interface with 1 input and 3 output channels
- Programmable audio master clock (MCLK)
- Sony/Philips digital interface (SPDIF): Two instances configurable as input or output
- Stereo analog outputs configurable as differential Class-AB headphone outputs or differential high efficiency Class-D outputs:
  - Class-AB signal-to-noise ratio (SNR): 120.0 dB typ (Quiet mode).
  - Class-AB total harmonic distortion plus noise (THD +N): -91.1 dB typ.
  - Class-D SNR: 105.1 dB typ.
  - Class-D THD+N: -90.1 dB typ.
- Quad analog inputs configurable as single ended line inputs or, unbalanced or balanced analog microphone inputs:
  - SNR differential: 99.2 dB typ.
  - THD+N differential: -95.0 dB typ.
- 1 microphone bias (single bias shared by four channels):
  - Crosstalk attenuation between two inputs using recommended application circuit: 80 dB typ.
- Digital microphone inputs with capability to interface up to 10 digital microphones
- Both analog-to-digital converter (ADC)s and DACs support sample rates of 8 kHz, 16 kHz, 32 kHz, 44.1 kHz, 48 kHz, 96 kHz. DACs also support 192 kHz and 384 kHz.

### Peripherals and physical interfaces

- A universal asynchronous receiver transmitter (UART) interface
- 3 x Bit Serializers (programmable serial peripheral interface (SPI) and inter-integrated circuit interface (I²C) hardware accelerator)
- 1 x USB interface:
  - A full speed USB (USB-FS) Device (12 Mbps)
- QSPI NOR flash interface
  - QSPI encryption to protect developer code and data
  - Encryption programmable with a 128-bit security key of original equipment manufacturer (OEM) choice stored in on-chip one-time programmable (OTP) memory
- Up to 53 programmable input/output (PIO) and 6 open drain/digital input light-emitting diode (LED) pads with pulse width modulation (PWM)

### Package and compliance

- 134-ball 6.7 mm x 7.4 mm x 1.0 mm, 0.5 mm pitch VFBGA
- Green (restriction of hazardous substances (RoHS) compliant, and no antimony or halogenated flame retardants)

## Class-D DAC audio output

| Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Input Sample Width | - | - | - | 24 | Bits |
| Input Sample Rate, Fsample | - | 8 | - | 192 | kHz |
| Max Power | 0 dBFS, 32 Ω load -3 dBFS, 16 Ω load | - | - | 30 | mW |
| Load | - | 16 | 32 | 30K | Ω |
| SNR | Fin = 1 kHz<br>Fsample = 48 kHz<br>Input amplitude = 0 dBFS<br>Analog gain = 0 dB<br>B/W = 20 Hz to 20 kHz<br>A-Weighted<br>32 Ω load | - | 105.1 | - | dB |
| THD+N | Fin = 1 kHz<br>Fsample = 48 kHz<br>Input amplitude = 0 dBFS<br>Analog gain = 0 dB<br>B/W = 20 Hz to 20 kHz<br>32 Ω load | - | -90.1 | - | dB |
| RMS noise | Fsample = 48 kHz<br>Input amplitude = - 200 dBFS<br>Analog gain = 0 dB<br>B/W = 20 Hz to 20 kHz<br>A-Weighted<br>32 Ω load | - | 5.48 | - | uVrms |
| Stereo separation (crosstalk) | - | 80 | - | - | dB |
| Max capacitive load | Per terminal to ground | - | - | 100 | pF |

## Class-AB DAC audio output

| **Parameter** | **Conditions** | | **Min** | Typ | **Max** | **Unit** |
|---|---|---|---|---|---|---|
| Input Sample Width | - | | - | - | 24 | Bits |
| Input Sample Rate, Fsample | - | | 8 | - | 192 | kHz |
| Max Power | 0 dBFS, 32 Ω load -3 dBFS, 16 Ω load | | - | - | 30 | mW |
| Load | - | | 16 | 32 | 30K | Ω |
| SNR | Fin = 1 kHz<br>Fsample = 48 kHz<br>Input amplitude = 0 dBFS<br>Analog gain = 0 dB<br>B/W = 20 Hz to 20 kHz<br>A-Weighted<br>B- 32 Ω load | Analog gain (dB) | Min | Typ | Max | Unit |
| | | 0 | - | 104.8 | - | dB |
| | | -6 | - | 103.9 | - | |
| | | -12 | - | 100.4 | - | |
| | | 0 | - | 120.0 | - | |
| THD+N | Fin = 1 kHz<br>Fsample = 48 kHz<br>Input amplitude = 0 dBFS<br>Analog gain = 0 dB<br>B/W = 20 Hz to 20 kHz<br>32 Ω load | 0 | - | -91.1 | - | dB |
| | | -6 | | -91.7 | | |
| | | -12 | | -91.3 | | |
| RMS noise | Fsample = 48 kHz<br>Input amplitude = -200 dBFS<br>B/W = 20 Hz to 20 kHz<br>A-Weighted<br>32 Ω load | 0 | - | 5.69 | - | uVrms |
| | | -6 | | 3.18 | | |
| | | -12 | | 2.39 | | |
| | Quiet mode | 0 | | <1 | | |
| Stereo separation (crosstalk) | - | | 80 | - | - | dB |

## High-quality (HQADC) single-ended audio input

| Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Output Sample Width | - | - | - | 24 | Bits |
| Output Sample Rate, Fsample | - | 8 | - | 96 | kHz |
| Input level | - | - | - | 2.4 | V pk-pk |
| Input impedance | 0 dB to 24 dB analog gain | - | 20 | - | kΩ |
| | 27 dB to 39 dB analog gain | - | 10 | - | kΩ |
| SNR | fin = 1 kHz<br>48 kHz Fsample<br>B/W = 20 Hz → 20 kHz<br>A-Weighted<br>THD+N<0.1%<br>2.4 V pk-pk input (0 dB gain) | - | 99.1 | - | dB |
| THD+N | fin = 1 kHz<br>48 kHz Fsample<br>B/W = 20 Hz → 20 kHz<br>2.4 V pk-pk input (0 dB gain) | - | -91.4 | - | dB |
| Analog gain | 3 dB steps | 0 | - | 39 | dB |
| Stereo separation (crosstalk) | - | 80 | - | - | dB |

## High-quality (HQADC) differential audio input

| Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Output Sample Width | - | - | - | 24 | Bits |
| Output Sample Rate, Fsample | - | 8 | - | 96 | kHz |
| Input level | - | - | - | 2.4 | V pk-pk |
| Input impedance | 0 dB to 24 dB analog gain | - | 20 | - | kΩ |
| | 27 dB to 39 dB analog gain | - | 10 | - | kΩ |
| SNR | fin = 1 kHz<br>48 kHz Fsample<br>B/W = 20 Hz → 20 kHz<br>A-Weighted<br>2.4 V pk-pk input (0 dB gain) | - | 99.2 | - | dB |
| THD+N | fin = 1 kHz<br>48 kHz Fsample<br>B/W = 20 Hz → 20 kHz<br>2.4 V pk-pk input (0 dB gain) | - | -95 | - | dB |
| Analog gain | 3 dB steps | 0 | - | 39 | dB |
| Stereo separation (crosstalk) | - | 80 | - | - | dB |

### 5.3.5 Microphone bias

| **Parameter** | **Conditions** | **Min** | **Typ** | **Max** | Unit |
|---|---|---|---|---|---|
| Output voltage (Tunable, step = 0.1 V) | - | 1.5 | - | 2.1 | V |
| Output current capability | - | 0.07 | - | 6.0 | mA |
| DC accuracy | | -60 | - | 60 | mV |
| Output noise | B/W = 20 Hz → 20 kHz Unweighted | 4.5 | 5.1 | 7.3 | μVrms |
| Crosstalk Between Microphones | Using recommended application circuit | - | 80 | - | dB |
| Load capacitance | From parasitic PCB routing and package | - | - | 0.1 | nF |

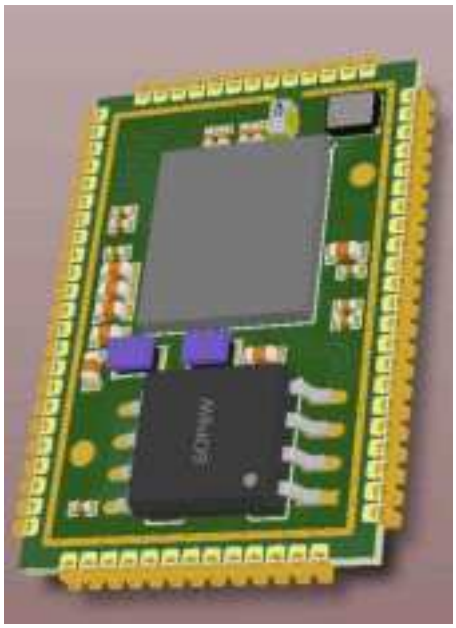
| | Min | Typ | Max | Unit |
|---|---|---|---|---|
| VDD_PADS supply | 1.7 | 1.8 | 3.6 | V |
| VIL input logic level low | - | - | 0.25 x VDD_PADS | V |
| VIH input logic level high | 0.625 x VDD_PADS | - | - | V |
| Drive current (configurable) | 2, 4, 8, 12 | 4 | - | mA |
| VOL output logic level low, at max rated drive | - | - | 0.22 x VDD_PADS | V |
| VOH output logic level high, at max rated drive | 0.75 x VDD_PADS | - | - | V |
| Strong pull (up & down) | 50 | 70 | 125 | kΩ |
| Weak pull (up & down) | 729 | 1050 | 1350 | kΩ |

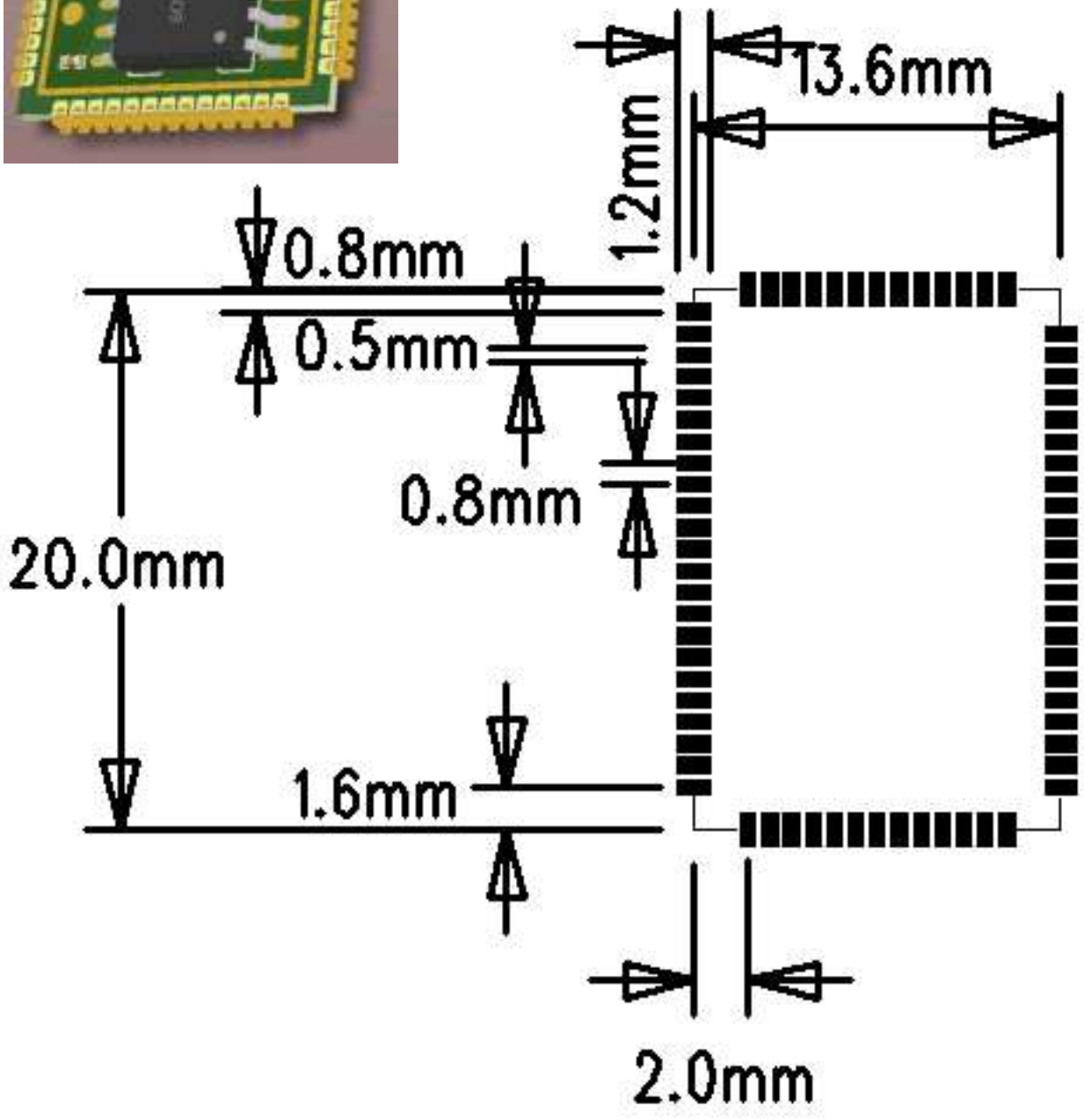
## 5.5 SYS_CTRL

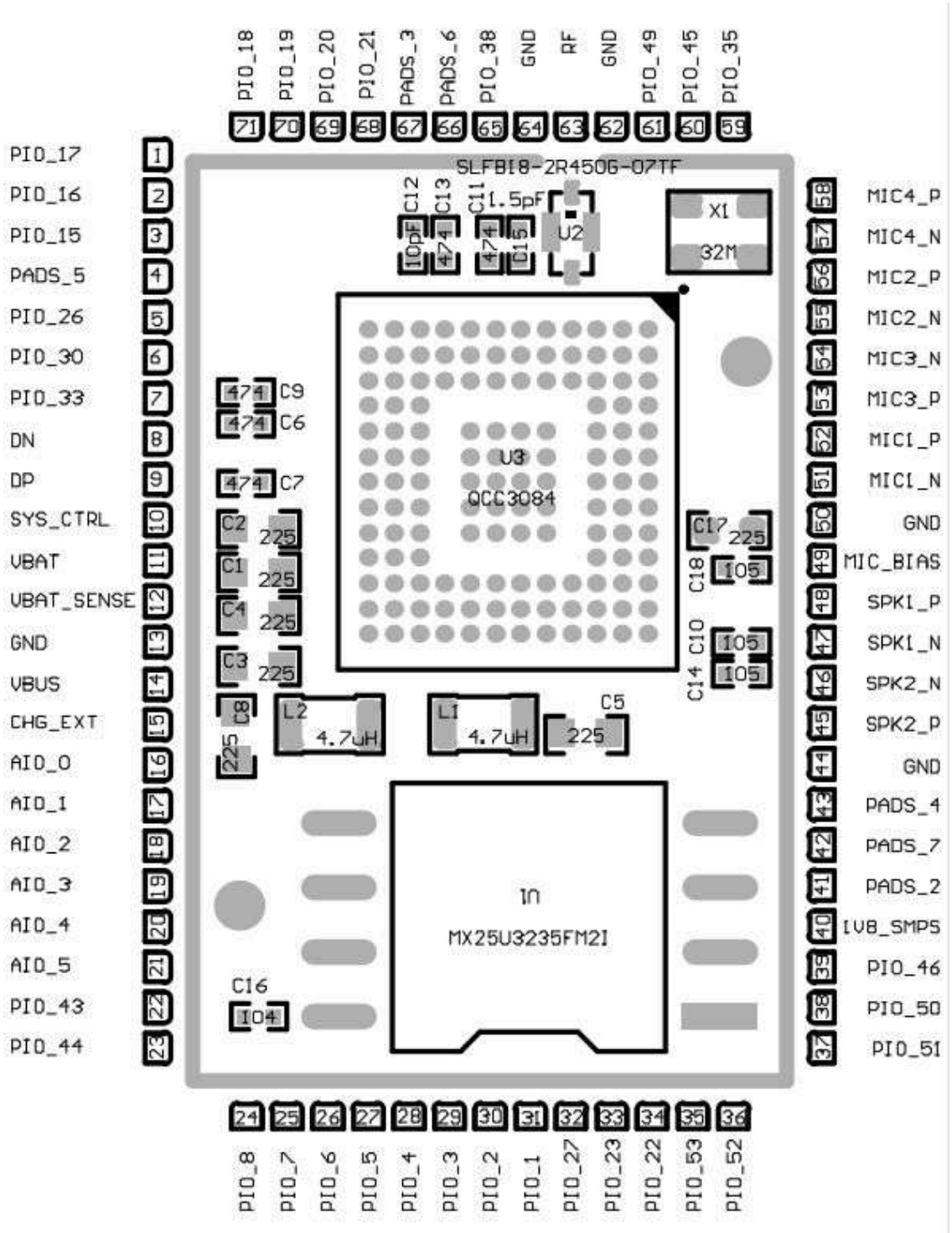
| SYS_CTRL, switching threshold | Min | Typ | Max | Unit |
|---|---|---|---|---|
| Rising threshold | 1.6 | - | - | V |
| Falling threshold | 0 | - | 0.4 | V |

## Dimension and Size

13.6*20*0.8mm







# Pin Descriptions 1

| Pin # | Symbol Name | Initial Status | Descriptions |
|---|---|---|---|
| 1 | PIO_17 | Weak pull-down | Programmable Input/Output Line |
| 2 | PIO_16 | Weak pull-down | Programmable Input/Output Line |
| 3 | PIO_15 | Strong pull-up | Programmable Input/Output Line |
| 4 | PADS_5 | | 1.8 V/3.3 V PIO supply. |
| 5 | PIO_26 | Strong pull-up | Programmable Input/Output Line |
| 6 | PIO_30 | Strong pull-up | Programmable Input/Output Line |
| 7 | PIO_33 | Strong pull-up | Programmable Input/Output Line |
| 8 | DN | | USB Full Speed device D- I/O |
| 9 | DP | | USB Full Speed device D+ I/O |
| 10 | SYS_CTRL | | Typically connected to an ON/OFF push button. If power is present from the battery and/or charger, and software has placed the device in the OFF or DORMANT state, a button press boots the device. Also usable as a digital input in normal operation. |
| 11 | VBAT | | Battery voltage input |
| 12 | VBAT_SENSE | | Charger input sense pin after external mode sense-resistor. High impedance. |
| 13 | GND | | GND |
| 14 | VBUS | | VBUS |
| 15 | CHG_EXT | | External charger transistor current control. Connect to base of external charger transistor as per application schematic. |
| 16 | AIO_0 | | General-purpose analog/digital input or open drain LED output. |
| 17 | AIO_1 | | General-purpose analog/digital input or open drain LED output. |
| 18 | AIO_2 | | General-purpose analog/digital input or open drain LED output. |
| 19 | AIO_3 | | General-purpose analog/digital input or open drain LED output. |
| 20 | AIO_4 | | General-purpose analog/digital input or open drain LED output |
| 21 | AIO_5 | | General-purpose analog/digital input or open drain LED output. |
| 22 | PIO_43 | Weak pull-down | Programmable Input/Output Line |
| 23 | PIO_44 | Strong pull-up | Programmable Input/Output Line |
| 24 | PIO_8 | Weak pull-down | Programmable Input/Output Line |
| 25 | PIO_7 | Strong pull-up | Programmable Input/Output Line |
| 26 | PIO_6 | Strong pull-up | Programmable Input/Output Line |
| 27 | PIO_5 | Weak pull-down | Programmable Input/Output Line |
| 28 | PIO_4 | Weak pull-down | Programmable Input/Output Line |
| 29 | PIO_3 | Strong pull-up | Programmable Input/Output Line |
| 30 | PIO_2 | Weak pull-down | Programmable Input/Output Line |
| 31 | PIO_1 | Strong pull-up | Programmable Input/Output Line |
| 32 | PIO_27 | Strong pull-up | Programmable Input/Output Line |
| 33 | PIO_23 | Weak pull-down | Programmable Input/Output Line |
| 34 | PIO_22 | Weak pull-down | Programmable Input/Output Line |
| 35 | PIO_53 | Weak pull-down | Programmable Input/Output Line |
| 36 | PIO_52 | Weak pull-down | Programmable Input/Output Line |

## Pin Descriptions 2

| | | | |
|---|---|---|---|
| 37 | PIO_51 | Weak pull-down | Programmable Input/Output Line |
| 38 | PIO_50 | Weak pull-down | Programmable Input/Output Line |
| 39 | PIO_46 | Weak pull-down | Programmable Input/Output Line |
| 40 | 1V8_SMPS | | 1.8V Output |
| 41 | PADS_2 | | 1.8 V/3.3 V PIO supply |
| 42 | PADS_7 | | 1.8 V/3.4 V PIO supply |
| 43 | PADS_4 | | 1.8 V/3.5 V PIO supply |
| 44 | GND | | GND |
| 45 | SPK2_P | | Headphone/speaker differential 2 output, positive. |
| 46 | SPK2_N | | Headphone/speaker differential 2 output, negative |
| 47 | SPK1_N | | Headphone/speaker differential 1 output, negative. |
| 48 | SPK1_P | | Headphone/speaker differential 1 output, positive. |
| 49 | MIC_BLAS | | Mic bias output. |
| 50 | GND | | GND |
| 51 | MIC1_N | | Microphone differential 1 input, negative. |
| 52 | MIC1_P | | Microphone differential 1 input, positive. |
| 53 | MIC3_P | | Microphone differential 3 input, positive. |
| 54 | MIC3_N | | Microphone differential 3 input, negative |
| 55 | MIC2_N | | Microphone differential 2 input, negative. |
| 56 | MIC2_P | | Microphone differential 2 input, positive. |
| 57 | MIC4_N | | Microphone differential 4 input, negative. |
| 58 | MIC4_P | | Microphone differential 4 input, positive |
| 59 | PIO_35 | Strong pull-down | Programmable Input/Output Line |
| 60 | PIO_45 | Strong pull-up | Programmable Input/Output Line |
| 61 | PIO_49 | Weak pull-down | Programmable Input/Output Line |
| 62 | GND | | GND |
| 63 | RF | | RF Output |
| 64 | GND | | GND |
| 65 | PIO_38 | | Programmable Input/Output Line |
| 66 | PADS_6 | | 1.8 V/3.3 V PIO supply |
| 67 | PADS_3 | | 1.8 V/3.3 V PIO supply. |
| 68 | PIO_21 | Weak pull-down | Programmable Input/Output Line |
| 69 | PIO_20 | Strong pull-up | Programmable Input/Output Line |
| 70 | PIO_19 | Weak pull-down | Programmable Input/Output Line |
| 71 | PIO_18 | Strong pull-up | Programmable Input/Output Line |

## Design notes:

In order to bet ter SNR, please pay at tent ion to the hardware des ign of PA, DC booster, DC/DC circuit and the module power ci rcui t to avoid inf luencing module.

The signal strength is depending on the environment of Bluetooth applicat ion, such as wood and metal will block the transmission signal to get the shorter transmission distance.

Because of metal will block the signal transmission, it is recommend not to use the metal housing.

## PCB layout guideline:

no any copper existed in the antenna area of the module is the PCB antenna, the metal will weaken the funct ion of the antenna when the antenna module to the module board, following prohibited paving and walk the line.

If the module antenna next to the battery or metal, liquid crystal screen, loudspeaker, at least keep them away from antenna distance 15mm.

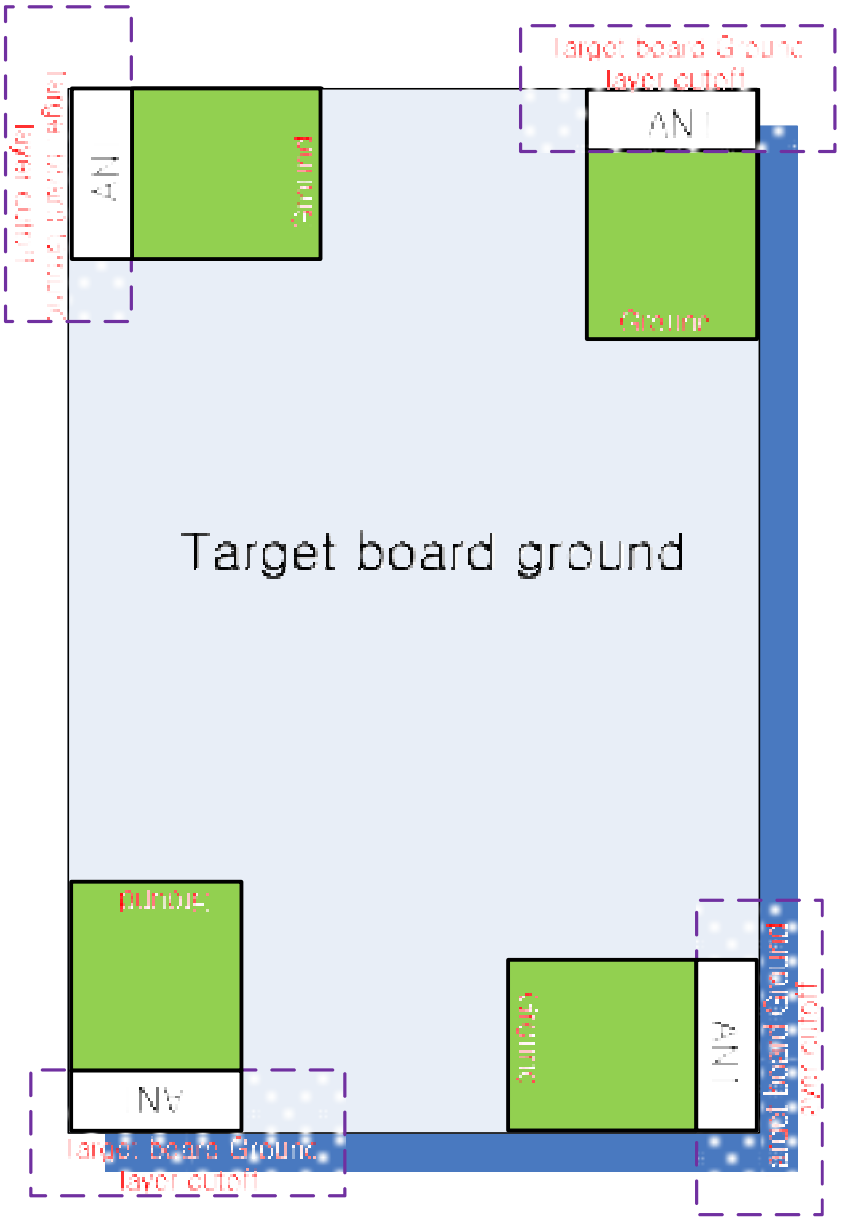
When layout the power supply line recommended star line, and to ensure that the Bluetooth module Power supply lines is better, and BT should be with the amplifier, power amplifier, MCU, separately, and the underside of the BT has no other interference.

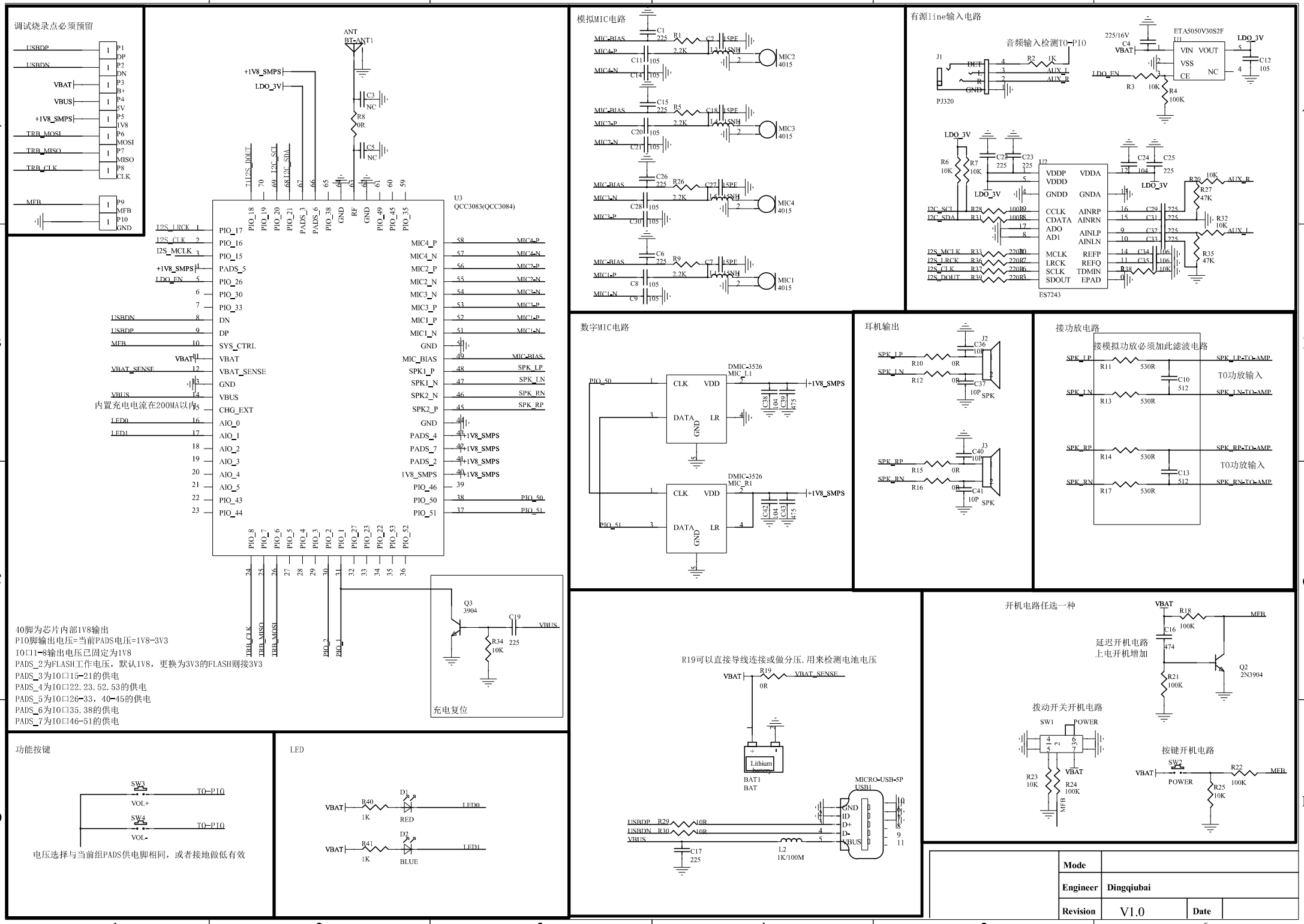
Suggests the module antenna part floating on the floor, do not go around the antenna control line, power line, audio line, MIC interference lines;

If the module antenna near the row seats, Because of metal will block the signal transmission, it is recommended to use professional high-gain antenna.

## Module Position Guide and SMT profile

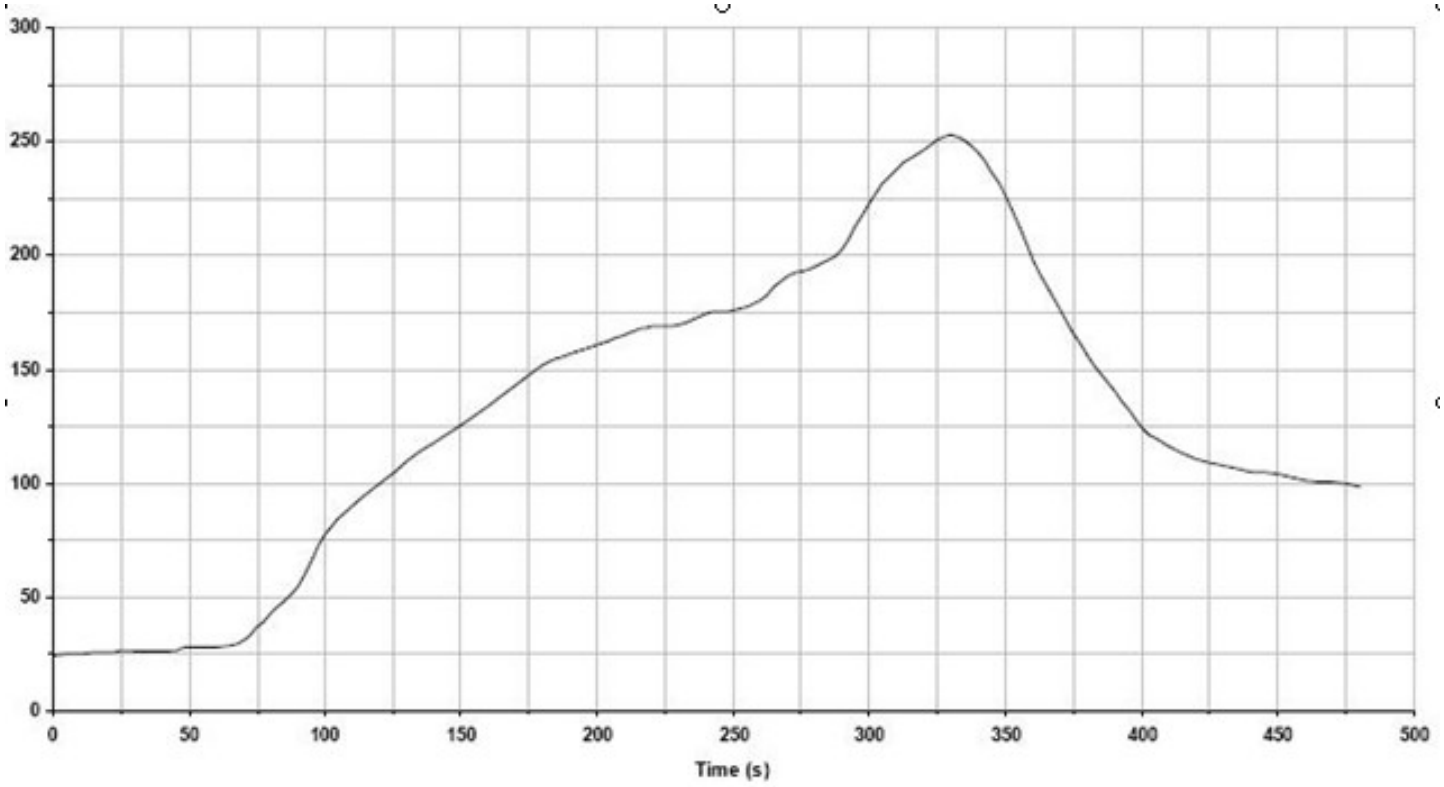
Ground must not exist around Antenna area.






| | |
|---|---|
| Mode | |
| Engineer | Dingqiubai |
| Revision | V1.0 |
| Date | |

Recommended reflow temperature



FCC/IC Statements

(OEM) Integrator has to assure compliance of the entire end-product incl. the integrated RF Module. For 15 B (§15.107 and if applicable §15.109) compliance, the host manufacturer is required to show compliance with 15 while the module is installed and operating.

Furthermore the module should be transmitting and the evaluation should confirm that the module's intentional emissions (15C) are compliant (fundamental / out-of-band). Finally the integrator has to apply the appropriate equipment authorization (e.g. Verification) for the new host device per definition in §15.101.

Integrator is reminded to assure that these installation instructions will not be made available to the end-user of the final host device.

The final host device, into which this RF Module is integrated" has to be labeled with an auxiliary label stating the FCC ID of the RF Module, such as "Contains FCC ID: 2AO2T-F3083

"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."

"Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment."

the Integrator will be responsible to satisfy SAR/ RF Exposure requirements, when the module integrated into the host device.

The final host device, into which this RF Module is integrated" has to be labeled with an auxiliary label stating the IC of the RF Module, such as" Contains transmitter module IC: 33423-F3083
Le périphérique hôte final, dans lequel ce module RF est intégré "doit être étiqueté avec une étiquette auxiliaire indiquant le CI du module RF, tel que" Contient le module émetteur IC: 33423-F3083

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:
(1) This device may not cause interference.
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

(1) L' appareil ne doit pas produire de brouillage;
(2) L' appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d' en compromettre le fonctionnement.

Module statement

The single-modular transmitter is a self-contained, physically delineated, component for which compliance can be demonstrated independent of the host operating conditions, and which complies with all eight requirements of § 15.212(a)(1) as summarized below.

1) The radio elements have the radio frequency circuitry shielded.
2) The module has buffered modulation/data inputs to ensure that the device will comply with Part 15 requirements with any type of input signal.
3) The module contains power supply regulation on the module.
4) The module contains a permanently attached antenna.
5) The module demonstrates compliance in a stand-alone configuration.
6) The module is labeled with its permanently affixed FCC ID label.
7) The module complies with all specific rules applicable to the transmitter, including all the conditions provided in the integration instructions by the grantee.
8) The module complies with RF exposure requirements.

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

Co-location Warning:
This equipment could not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with the FCC multi-transmitter product procedures.

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01
2.2 List of applicable FCC rules
FCC Part 15.247
2.3 Specific operational use conditions
This transmitter/module and its antenna(s) must not be co-located or operating in conjunction with any transmitter. This information also extends to the host manufacturer's instruction manual.
2.4 Limited module procedures
Not applicable
2.5 Trace antenna designs
It is "not applicable" as trace antenna which is not used on the module.
2.6 RF exposure considerations
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment can be used in portable exposure conditions.
The host product manufacturer would provide the above information to end users in their end-product manuals.

2.7 Antennas
FPC antenna; HT-T0228A-2.4G-V0, FPC Ant.,0dBi,2.402 GHz～2.480GHz
2.8 Label and compliance information
The end product must carry a physical label or shall use e-labeling followed KDB784748D01 and KDB 784748 stating "Contains Transmitter Module FCC ID: 2AO2T-F3083".
2.9 Information on test modes and additional testing requirements
For more information on testing, please contact the manufacturer.
2.10 Additional testing, Part 15 Subpart B disclaimer
The modular transmitter is only FCC authorized for the specific rule parts (FCC Part 15.247) listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed when contains digital circuity.