

# F1DA2835P

## Datasheet

Confidential / Preliminary Documentation  
Revision 1.3

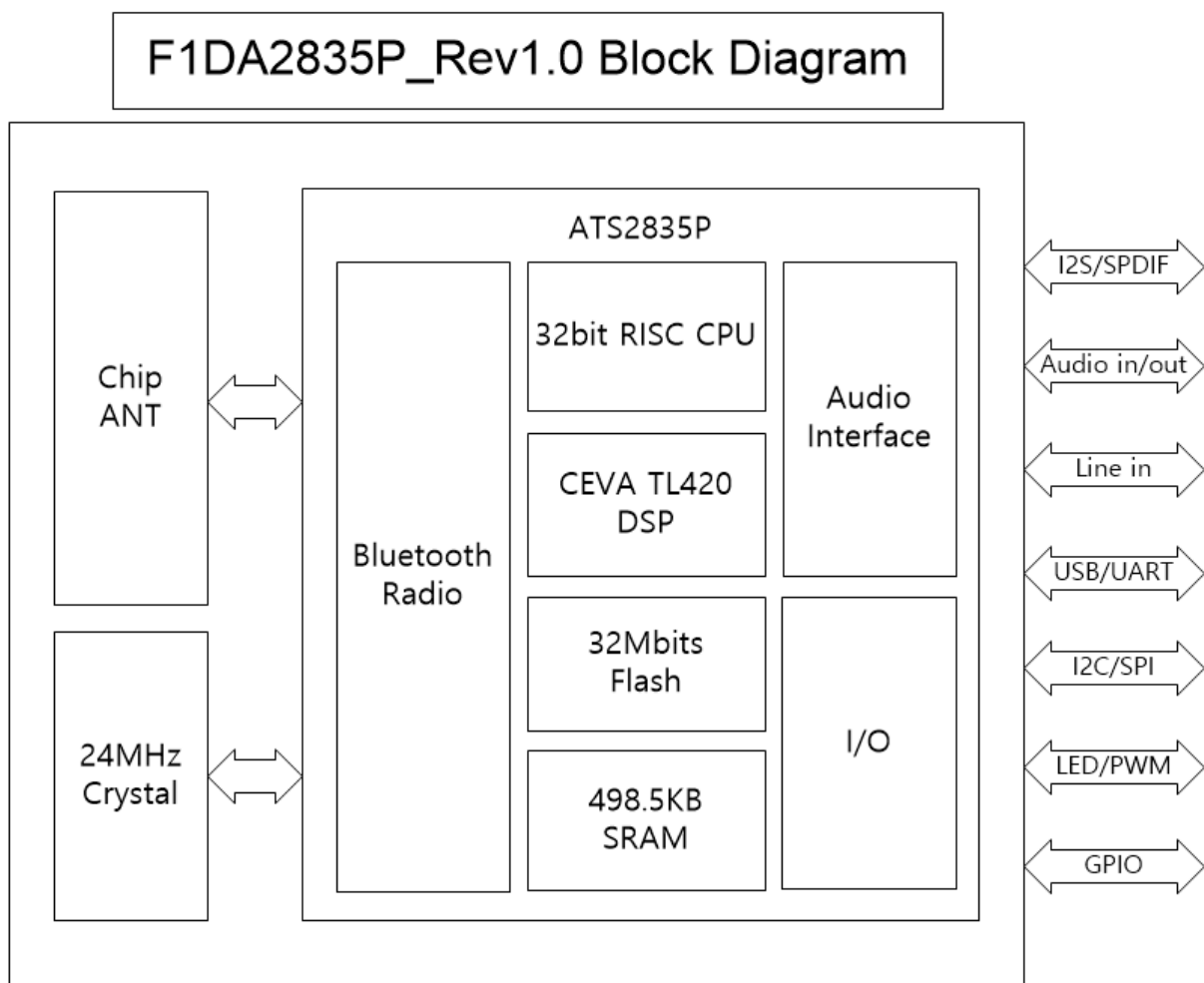
# **List of Contents**

1. General
  - 1.1 Overview
  - 1.2 Features
  - 1.3 Application
  - 1.4 Pinout Diagram
  - 1.5 Device Terminal Functions
  - 1.6 Module Dimension
2. Characteristics
  - 2.1 Electrical Characteristics
  - 2.2 RF Characteristics
  - 2.3 Audio Characteristics
3. Interface
  - 3.1 USB
  - 3.2 I2C
  - 3.3 UART0 and UART1
  - 3.4 SPI
  - 3.5 PWM
  - 3.6 Audio Interfaces
4. Application Schematic
5. Antenna Spec
6. Module Placement Rule
7. PCB Layout
8. Reflow Temperature Profile
9. Packing Information
10. Revision History

# 1. General

## 1.1 Overview

This specification covers Bluetooth module which complies with Bluetooth specification version 5.3 and integrates RF & Baseband controller in small package. This Module has deployed Action's ATS2835P Chipset



## 1.2 Features

- Bluetooth supports
  - . Support Bluetooth V5.3
  - . Compatible with Bluetooth V5.2/V5.0/V4.2/V4.2 LE/V4.0/V3.0/V2.1 + EDR
  - . RF performance of 5dbm Transmitter power
  - . -93dBm@GFSK, -92dBm@ $\pi/4$  DQPSK, -87dBm@8DPSK modulation.
  - . Internal Chip Antenna
- 342MHz CEVA TL420 DSP core
- Audio Interface
  - . I2S TX and I2S RX\*2, sampling rate up to 192KHz
  - . SPDIF TX and RX, sampling rate up to 96KHz
  - . Analog and Digital microphone
- Physical interfaces
  - . Supports SD/MMC/eMMC card interface
  - . Supports SDIO interface
  - . USB 2.0 device and host controllers
  - . Serial Interface: SPI\*2, UART\*2, I2C
  - . Supports Remote Control with internal IRC
  - . Supports LCM with 8bit CPU Interface, 4COM/5COM/6COM Segment LCD, 7pin LED
  - . 9 PWM drivers independent of MCU
  - . Supports 32 GPIO and 1 WIO(wake up IO)
- Memory
  - . Internal 32M bits SPI serial Flash for custom defined software
  - . Internal 498.5KB RAM
  - . Internal 32KB CPU ICache for SPI NorFlash
  - . Internal 32KB Cache for SPI pSRAM
- Improved Audio Quality
  - . SBC & AAC Bluetooth audio transmission format
  - . Stereo Codec

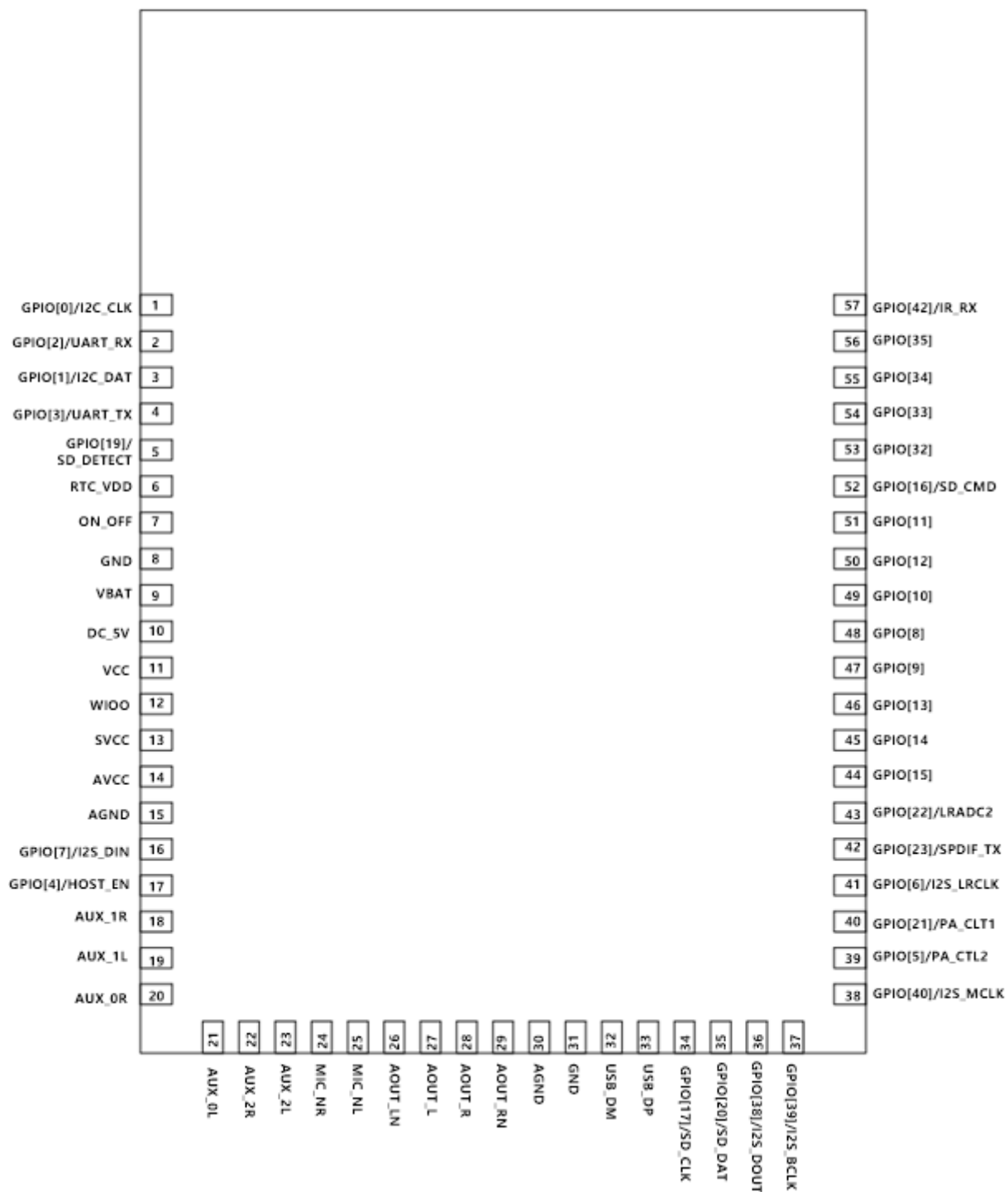
## 1.3 Application

- Portable stereo speakers
- Bluetooth car audio unit
- Stereo headsets and headphones
- Other Bluetooth audio applications
- Speaker phones

## 1.4 Pinout Diagram

### F1DA2835P\_Rev1.1\_PINMAP

#### 1. Top View



## 1.5 Device Terminal Functions

| Pin No. | Pin Name       | Function Multiplex                                                                                                                                   | IO Type | PAD Drive Level           | GPI O Initial State | Description                       |
|---------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------------------------|---------------------|-----------------------------------|
| 1       | GPIO0 /I2C_CLK | LED_COM0<br>LCD_WRB<br>LCD_COM0<br>PWM1<br>UART0_RTS<br>I2STX_MCLK<br>I2SRX0_MCLK<br>I2SRX1_MCLK<br>Timer2_cap<br>SPI2_SS                            | DIO     | 2/4/6/8/10/<br>12/14/16mA | Z                   | Bit0 of General purpose I/O port  |
| 2       | GPIO2          | LED_COM2<br>LCD_RDB<br>LCD_COM2<br>SPI1_MOSI<br>PWM2<br>UART0_RX<br>LRADC4<br>I2STX_LRCLK<br>I2SRX0_LRCLK<br>I2SRX1_LRCLK<br>Timer2_cap<br>SPI2_MOSI | DIO     | 2/4/6/8/10/<br>12/14/16mA | V                   | Bit2 of General purpose I/O port  |
| 3       | GPIO1          | LED_COM1<br>LCD_RS<br>LCD_COM1<br>I2C_SDA<br>PWM3<br>UART0_CTS<br>I2STX_BCLK<br>I2SRX0_BCLK<br>I2SRX1_BCLK<br>Timer3_cap<br>SPI2_MISO                | DIO     | 2/4/6/8/10/<br>12/14/16mA | Z                   | Bit1 of General purpose I/O port  |
| 4       | GPIO3          | LED_COM3<br>LCD_CEB<br>LCD_COM3<br>SPI1_CLK<br>UART0_TX<br>I2STX_DOUT<br>I2SRX0_DIN<br>I2SRX1_DIN<br>Timer3_cap<br>SPI2_CLK                          | DIO     | 2/4/6/8/10/<br>12/14/16mA | V                   | Bit3 of General purpose I/O port  |
| 5       | GPIO19         | LCD_SEG17<br>I2C_SDA<br>Timer3_cap                                                                                                                   | DIO     | 2/4/6/8/10/<br>12/14/16mA | Z                   | Bit19 of General purpose I/O port |
| 6       | RTC_VDD        |                                                                                                                                                      | PWR     |                           |                     | RTC power                         |
| 7       | ON_OFF         |                                                                                                                                                      | AI      |                           |                     | ON/OFF reset signal               |

|    |                     |                                                                                                                                     |        |                           |          |                                     |
|----|---------------------|-------------------------------------------------------------------------------------------------------------------------------------|--------|---------------------------|----------|-------------------------------------|
| 8  | GND                 |                                                                                                                                     | GND    |                           |          | GND                                 |
| 9  | VBAT                |                                                                                                                                     | PWR    |                           |          | Battery Voltage input               |
| 10 | DC_5V               |                                                                                                                                     | PWR    |                           |          | 5.0V Voltage                        |
| 11 | VCC                 |                                                                                                                                     | PWR    |                           |          | Digital IO PWR                      |
| 12 | WIO0                | LRADC1                                                                                                                              | DIO    | 2/4/6/8/10/<br>12/14/16mA | WIO<br>0 | LRADC1                              |
| 13 | SVCC                |                                                                                                                                     | PWR    |                           |          | PWR for standby                     |
| 14 | AVCC                |                                                                                                                                     | PWR    |                           |          | Analog IO PWR                       |
| 15 | AGND                |                                                                                                                                     | GND    |                           |          | Analog GND                          |
| 16 | GPIO[7]<br>/I2S_DIN | LED_COM7<br>PTA_GRANT<br>LCD_SEG1<br>SPDIF_RX<br>PWM0<br>UART1_TX<br>FMCLKOUT<br>I2STX_DOUT<br>I2SRX1_DIN<br>Timer3_cap<br>SD1_DAT3 | DIO    | 2/4/6/8/10/<br>12/14/16mA | Z        | Bit7 of General purpose I/O<br>port |
| 17 | GPIO[4]<br>/HOST_EN | LED_COM4<br>LCD_CEB<br>LCD_COM4<br>PWM1<br>Timer2_cap<br>IR_RX                                                                      | DIO    | 2/4/6/8/10/<br>12/14/16mA | Z        | Bit4 of General purpose I/O<br>port |
| 18 | AUX_1R              | GPIO49                                                                                                                              | AI/DIO | 2/4/6/8/10/<br>12/14/16mA |          | Linein right channel input1         |
| 19 | AUX_1L              | GPIO48                                                                                                                              | AI/DIO | 2/4/6/8/10/<br>12/14/16mA |          | Linein left channel input1          |
| 20 | AUX_0R              | GPIO47                                                                                                                              | AI/DIO | 2/4/6/8/10/<br>12/14/16mA |          | Linein right channel input0         |
| 21 | AUX_0L              | GPIO46                                                                                                                              | AI/DIO | 2/4/6/8/10/<br>12/14/16mA |          | Linein left channel input0          |
| 22 | AUX_2R              | GPIO55                                                                                                                              | AI/DIO | 2/4/6/8/10/<br>12/14/16mA |          | Linein right channel input2         |
| 23 | AUX_2L              | GPIO54                                                                                                                              | AI/DIO | 2/4/6/8/10/<br>12/14/16mA |          | Linein left channel input2          |
| 24 | MIC_NR              | GPIO45<br>DMIC_DAT                                                                                                                  | AI/DIO | 2/4/6/8/10/<br>12/14/16mA |          | Microphone right channel<br>input   |
| 25 | MIC_NL              | GPIO44<br>DMIC_CLK                                                                                                                  | AI/DIO | 2/4/6/8/10/<br>12/14/16mA |          | Microphone left channel input       |
| 26 | AOUT_LN             | GPIO51<br>I2STX_LRCLK<br>I2SRX0_LRCLK<br>I2SRX1_LRCLK<br>PWM3                                                                       | AO/DIO | 2/4/6/8/10/<br>12/14/16mA |          | Left channel differential output    |
| 27 | AOUT_L              | GPIO50                                                                                                                              | AO/DIO | 2/4/6/8/10/<br>12/14/16mA |          | Left channel output                 |
| 28 | AOUT_R              | GPIO52                                                                                                                              | AO/DIO | 2/4/6/8/10/<br>12/14/16mA |          | Right channel output                |
| 29 | AOUT_RN             | GPIO53<br>I2STX_DOUT                                                                                                                | AO/DIO | 2/4/6/8/10/<br>12/14/16mA |          | Right channel differential output   |

|    |                       |                                                                                                                                                                           |     |                           |    |                                   |
|----|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|---------------------------|----|-----------------------------------|
|    |                       | I2SRX0_DIN<br>I2SRX1_DIN<br>PWM5                                                                                                                                          |     |                           |    |                                   |
| 30 | AGND                  |                                                                                                                                                                           | GND |                           |    | Analog Ground                     |
| 31 | GND                   |                                                                                                                                                                           | GND |                           |    | GND                               |
| 32 | USB_DM                |                                                                                                                                                                           | AIO |                           |    | USB Data minus                    |
| 33 | USB_DP                |                                                                                                                                                                           | AIO |                           |    | USB Data plus                     |
| 34 | GPIO[17]<br>/SD_CLK   | SPI2_CLK<br>LCD_SEG15<br>SPI1_CLK<br>UART0_TX<br>Timer3_cap                                                                                                               | DIO | 2/4/6/8/10/<br>12/14/16mA | Z  | Bit17 of General purpose I/O port |
| 35 | GPIO[20]<br>/SD_DAT   | SPI2_MISO<br>LCD_D8<br>LCD_SEG10<br>SPI1_MISO<br>PWM2<br>UART1_CTS<br>Timer2_cap                                                                                          | DIO | 2/4/6/8/10/<br>12/14/16mA | Z  | Bit20 of General purpose I/O port |
| 36 | GPIO[38]<br>/I2S_DOUT | SPDIF_RX<br>BT_REQ<br>LCD_SEG28<br>PWM0<br>I2SRX0_DIN<br>I2SRX1_DIN                                                                                                       | DIO | 2/4/6/8/10/<br>12/14/16mA | PU | Bit38 of General purpose I/O port |
| 37 | GPIO[39]<br>/I2S_BCLK | BT_ACCESS<br>LCD_SEG29<br>PWM1<br>I2SRX0_BCLK<br>I2SRX1_BCLK                                                                                                              | DIO | 2/4/6/8/10/<br>12/14/16mA | PU | Bit39 of General purpose I/O port |
| 38 | GPIO[40]<br>/I2S_MCLK | PTA_GRANT<br>LCD_SEG30<br>PWM2<br>I2SRX0_MCLK<br>I2SRX1_MCLK                                                                                                              | DIO | 2/4/6/8/10/<br>12/14/16mA | PU | Bit40 of General purpose I/O port |
| 39 | GPIO[5]<br>/PA_CTL2   | LED_COM5<br>BT_REQ<br>LCD_COM5<br>PWM3<br>Timer3_cap                                                                                                                      | DIO | 2/4/6/8/10/<br>12/14/16mA | Z  | Bit5 of General purpose I/O port  |
| 40 | GPIO[21]<br>/PA_CTL1  | SPI2_MOSI<br>LCD_D9<br>LCD_SEG11<br>SPI1_MOSI<br>PWM0<br>UART0_RX<br>TEMPADC<br>I2STX_MCLK<br>I2SRX0_MCLK<br>I2SRX1_MCLK<br>Timer3_cap<br>SD1_CLK<br>UART1_TX<br>SD0_DAT1 | DIO | 2/4/6/8/10/<br>12/14/16mA | Z  | Bit21 of General purpose I/O port |



|    |                       |                                                                                                                                                    |     |                           |   |                                   |
|----|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-----|---------------------------|---|-----------------------------------|
| 41 | GPIO[6]<br>/I2S_LRCLK | LED_COM6<br>BT_ACCESS<br>LCD_SEG0<br>PWM4<br>I2SRX0_LRCLK<br>I2SRX1_LRCLK<br>Timer2_cap<br>SD1_DAT0                                                | DIO | 2/4/6/8/10/<br>12/14/16mA | Z | Bit6 of General purpose I/O port  |
| 42 | GPIO[23]<br>/SPDIF_TX | LCD_D11<br>LCD_SEG13<br>PWM2<br>UART0_TX<br>LRADC3<br>I2STX_BCLK<br>I2SRX0_BCLK<br>I2SRX1_BCLK<br>Timer3_cap<br>SD1_CMD<br>SD0_DAT3<br>SD0_DAT0    | DIO | 2/4/6/8/10/<br>12/14/16mA | Z | Bit23 of General purpose I/O      |
| 43 | GPIO[22]<br>/LRADC2   | LCD_D10<br>LCD_SEG12<br>IR_RX<br>PWM1<br>UART0_TX<br>I2STX_LRCLK<br>I2SRX0_LRCLK<br>I2SRX1_LRCLK<br>Timer2_cap<br>SD1_DAT2<br>UART1_RX<br>SD0_DAT2 | DIO | 2/4/6/8/10/<br>12/14/16mA | Z | Bit22 of General purpose I/O port |
| 44 | GPIO[15]              | LED_SEG7<br>LCD_D7<br>LCD_SEG9<br>SPI1_IO3<br>PWM4<br>UART1_RX<br>I2STX_MCLK<br>I2SRX0_MCLK<br>I2SRX1_MCLK<br>Timer3_cap<br>SD1_DAT0               | DIO | 2/4/6/8/10/<br>12/14/16mA | Z | Bit15 of General purpose I/O port |
| 45 | GPIO[14]              | LED_SEG6<br>LCD_D6<br>LCD_SEG8<br>SPI1_IO2<br>LRADC11<br>Timer2_cap                                                                                | DIO | 2/4/6/8/10/<br>12/14/16mA | Z | Bit14 of General purpose I/O port |
| 46 | GPIO[13]              | LED_SEG5<br>LCD_D5<br>LCD_SEG7<br>SPI1_IO3<br>PWM8<br>UART1_RTS<br>LRADC10<br>Timer3_cap<br>SD1_DAT3                                               | DIO | 2/4/6/8/10/<br>12/14/16mA | Z | Bit13 of General purpose I/O port |

|    |                     |                                                                                                                   |     |                           |    |                                   |
|----|---------------------|-------------------------------------------------------------------------------------------------------------------|-----|---------------------------|----|-----------------------------------|
| 47 | GPIO[9]             | LED_SEG1<br>LCD_D1<br>LCD_SEG3<br>SPI1_CLK<br>PWM4<br>LRADC6<br>SPI2_CLK<br>Timer3_cap<br>SD1_CMD                 | DIO | 2/4/6/8/10/<br>12/14/16mA | Z  | Bit9 of General purpose I/O port  |
| 48 | GPIO[8]             | LED_SEG0<br>LCD_D0<br>LCD_SEG2<br>SPI1_SS<br>PWM3<br>LRADC5<br>SPI2_SS<br>Timer2_cap<br>SD1_CLK                   | DIO | 2/4/6/8/10/<br>12/14/16mA | Z  | Bit8 of General purpose I/O port  |
| 49 | GPIO[10]            | LED_SEG2<br>LCD_D2<br>LCD_SEG4<br>SPI1_MISO<br>PWM5<br>UART0_CTS<br>LRADC7SPI2<br>_MISO<br>Timer2_cap<br>SD1_DAT0 | DIO | 2/4/6/8/10/<br>12/14/16mA | Z  | Bit10 of General purpose I/O port |
| 50 | GPIO[12]            | LED_SEG4<br>LCD_D4<br>LCD_SEG6<br>SPI1_IO2<br>PWM7<br>LRADC9<br>Timer2_cap<br>SD1_DAT2                            | DIO | 2/4/6/8/10/<br>12/14/16mA | Z  | Bit12 of General purpose I/O port |
| 51 | GPIO[11]            | LED_SEG3<br>LCD_D3<br>LCD_SEG5<br>SPI1_MOSI<br>PWM6<br>UART0_RTS<br>LRADC8<br>SPI2_MOSI<br>Timer3_cap<br>SD1_DAT1 | DIO | 2/4/6/8/10/<br>12/14/16mA | Z  | Bit11 of General purpose I/O port |
| 52 | GPIO[16]<br>/SD_CMD | SPI2_SS<br>LCD_SEG14<br>SPI1_SS<br>PWM4<br>UART0_RX<br>Timer2_cap                                                 | DIO | 2/4/6/8/10/<br>12/14/16mA | Z  | Bit16 of General purpose I/O port |
| 53 | GPIO[32]            | LCD_SEG22<br>I2STX_MCLK<br>I2SRX0_MCLK<br>I2SRX1_MCLK                                                             | DIO | 2/4/6/8/10/<br>12/14/16mA | PU | Bit32 of General purpose I/O port |
| 54 | GPIO[33]            | LCD_SEG23                                                                                                         | DIO | 2/4/6/8/10/               | PU | Bit33 of General purpose I/O port |

|    |                    |                                                                                                                  |     |                           |    |                                   |
|----|--------------------|------------------------------------------------------------------------------------------------------------------|-----|---------------------------|----|-----------------------------------|
|    |                    | I2STX_BCLK<br>I2SRX0_BCLK<br>I2SRX1_BCLK                                                                         |     | 12/14/16mA                |    | port                              |
| 55 | GPIO[34]           | LCD_SEG24<br>I2STX_LRCLK<br>I2SRX0_LRCLK<br>I2SRX1_LRCLK                                                         | DIO | 2/4/6/8/10/<br>12/14/16mA | PU | Bit34 of General purpose I/O port |
| 56 | GPIO[35]           | SPDIF_TX<br>LCD_SEG25<br>I2STX_DOUT<br>I2SRX0_DIN<br>I2SRX1_DIN                                                  | DIO | 2/4/6/8/10/<br>12/14/16mA | Z  | Bit35 of General purpose I/O port |
| 57 | GPIO[42]<br>/IR_RX | I2C_SCL<br>PWM3<br>PWM5<br>I2STX_BCLK<br>I2SRX0_BCLK<br>I2SRX1_BCLK<br>SD0_CLK0<br>IR_RX<br>UART1_TX<br>SD1_DAT1 | DIO | 2/4/6/8/10/<br>12/14/16mA | Z  | Bit42 of General purpose I/O port |

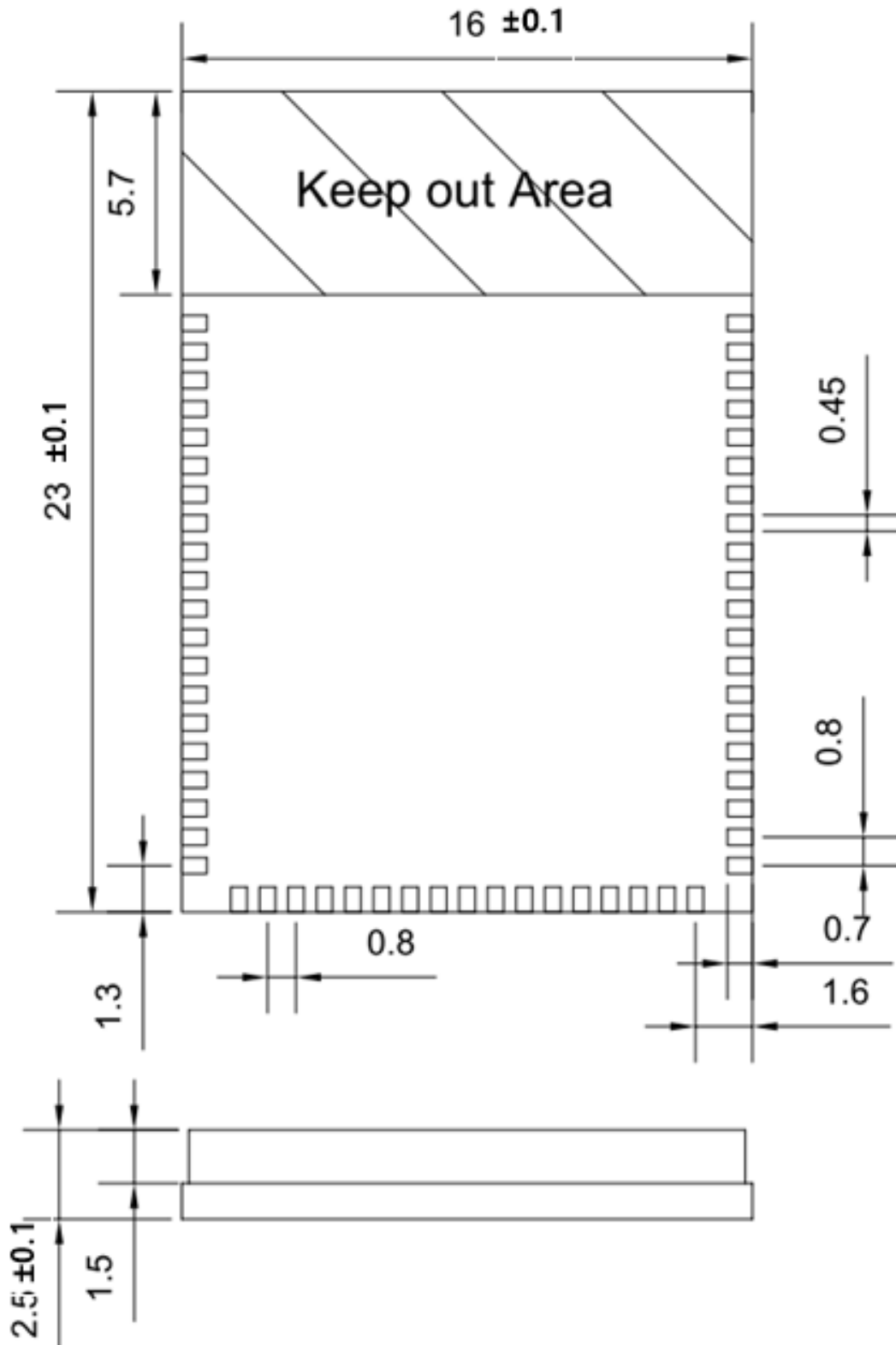
Note:

- (1) Boot from SPI Nor Flash;
- (2) PU: Pull up through 10K resistor;
- (3) Z: High resistance;
- (4) V: Variable state;
- (5) L: Low level.

## 1.6 Module Dimension

F1DA2835P\_Rev1.1\_Dimension

1. Top View (Unit : mm)



## 2. Characteristics

### 2.1.1 Electrical Characteristics

| Absolute Maximum Ratings |                         |      |      |      |
|--------------------------|-------------------------|------|------|------|
| Parameter                | Symbol                  | Min  | Max  | Unit |
| Ambient Temperature      | Tamb                    | -30  | +80  | °C   |
| Storage temperature      | Tstg                    | -55  | +150 | °C   |
| ESD Stress voltage       | Vesd (Human body model) | 4000 | -    | V    |
| Supply Voltage           | DC5V                    | -0.3 | 9    | V    |
|                          | BAT                     | -0.3 | 5    | V    |
|                          | VCC/SVCC/AVCC           | -0.3 | 3.6  | V    |
|                          | VDD                     | -0.3 | 1.32 | V    |
| Input Voltage            | 3.3V IO                 | -0.3 | 3.6  | V    |
|                          | 1.2V IO                 | -0.3 | 1.32 | V    |

| Recommended PWR Supply |      |     |      |      |
|------------------------|------|-----|------|------|
| Supply Voltage         | Min  | Typ | Max  | Unit |
| BAT (Li)               | 3.4  | 3.8 | 4.5  | V    |
| DC5V                   | 4.5  | 5.0 | 7.0  | V    |
| VCC/SVCC/AVCC          | 2.8  | 3.1 | 3.4  | V    |
| VDD/RTCVDD             | 1.08 | 1.2 | 1.32 | V    |
| VREF                   | --   | 1.5 | --   | V    |
| ONOFF                  | --   | --  | 1.32 | V    |

| DC Parameters for +3.3V IO Pin with Schmitt Trigger Off |        |      |      |      |                                   |
|---------------------------------------------------------|--------|------|------|------|-----------------------------------|
| Parameter                                               | Symbol | Min. | Max. | Unit | Condition                         |
| Low-level input voltage                                 | VIL    | -    | 0.8  | V    | VCC = 3.1V<br>Tamb = -10 to 70 °C |
| High-level input voltage                                | VIH    | 2.0  | -    | V    |                                   |
| Low-level output voltage                                | VOL    | -    | 0.4  | V    |                                   |
| High-level output voltage                               | VOH    | 2.4  | -    | V    |                                   |

| DC Parameter for +3.3V IO Pin with Schmitt Trigger On |        |      |      |      |                                 |
|-------------------------------------------------------|--------|------|------|------|---------------------------------|
| Parameter                                             | Symbol | Min. | Max. | Unit | Condition                       |
| Schmitt trigger positive-going threshold              | VT+    | -    | 1.9  | V    | VCC=3.1V<br>Tamb = -10 to 70 °C |
| Schmitt trigger negative-going threshold              | VT-    | 1.2  | -    | V    |                                 |

### 2.1.2 Power consumption

VDD = 1.2V @ 25°C unless otherwise specified

| Parameter  | Symbol | Condition             | Min. | Typ. | Max. | Unit |
|------------|--------|-----------------------|------|------|------|------|
| A2DP       | Ct     | SBC                   | -    | 13.5 | -    | mA   |
| HFP        | Cr     | mSBC                  | -    | 16.5 | -    | mA   |
| Sniff Mode | Cs     | 500ms                 | -    | 450  | 500  | µA   |
| Standby    | Cd     | Vbat = 3.8V, with RTC | 35   | -    | 50   | µA   |

## 2.2 RF Characteristics

### 2.2.1 BR(Conducted)

#### Transmitter

| Parameter                            | Condition                            | Min. | Typ.     | Max. | Unit     |
|--------------------------------------|--------------------------------------|------|----------|------|----------|
| Maximum RF Transmit PWR              | -                                    | -    | 6        | 7    | dBm      |
| RF PWR Control Step                  | -                                    | 2    | 4        | 8    | dB       |
| 20dB Bandwidth for Modulated Carrier | -                                    | -    | 914      |      | KHz      |
| Adjacent Channel Transmit            | +2 MHz                               | -    |          | -20  | dBm      |
|                                      | -2 MHz                               | -    |          | -20  | dBm      |
|                                      | +3 MHz                               | -    |          | -40  | dBm      |
|                                      | -3 MHz                               | -    |          | -40  | dBm      |
| Frequency Deviation                  | $\Delta f_{1avg}$ Maximum Modulation | 140  | 166      | 175  | KHz      |
|                                      | $\Delta f_{2max}$ Maximum Modulation | 115  | 130      |      | KHz      |
|                                      | $\Delta f_{1avg}/\Delta f_{2avg}$    | 0.8  | 1        |      |          |
| Initial Carrier Frequency Tolerance  | -                                    | -75  | $\pm 10$ | 75   | KHz      |
| Frequency Drift                      | DH1 Packet                           | -25  | $\pm 10$ | 25   | KHz      |
|                                      | DH3 Packet                           | -40  | $\pm 10$ | 40   | KHz      |
|                                      | DH5 Packet                           | -40  | $\pm 10$ | 40   | KHz      |
| Frequency Drift Rate                 | -                                    | -20  | 3        | 20   | KHz/50us |

#### Receiver

| Description                      |                         | Min. | Typ. | Max. | Unit |
|----------------------------------|-------------------------|------|------|------|------|
| Sensitivity                      |                         |      | -91  |      | dBm  |
| Maximum Input PWR at 0.1% BER    |                         | -20  |      |      | dBm  |
| Co-Channel Interface             |                         | -    |      | 11   | dB   |
| Adjacent Channel Selectivity C/I | $F = F_0 + 1\text{MHz}$ | -    |      | 0    | dB   |
|                                  | $F = F_0 - 1\text{MHz}$ | -    |      | 0    | dB   |
|                                  | $F = F_0 + 2\text{MHz}$ | -    |      | -30  | dB   |
|                                  | $F = F_0 - 2\text{MHz}$ | -    |      | -30  | dB   |
|                                  | $F = F_0 + 3\text{MHz}$ | -    |      | -40  | dB   |
|                                  | $F = F_{\text{image}}$  | -    |      | -9   | dB   |

## 2.2.2 EDR(Conducted)

### Transmitter

| Description                                                         |                         | Min | Typ.    | Max. | Unit |
|---------------------------------------------------------------------|-------------------------|-----|---------|------|------|
| Relative Transmit PWR(EDR)                                          |                         | -   | 3       | 4    | dB   |
| $\pi/4$ DQPSK max carrier frequency stability $ \omega_0 $          |                         | -10 | $\pm 3$ | 10   | KHz  |
| $\pi/4$ DQPSK max carrier frequency stability $ \omega_i $          |                         | -75 | $\pm 5$ | 75   | KHz  |
| $\pi/4$ DQPSK max carrier frequency stability $ \omega_0+\omega_i $ |                         | -75 | $\pm 4$ | 75   | KHz  |
| 8DPSK max carrier frequency stability $ \omega_0 $                  |                         | -10 | $\pm 3$ | 10   | KHz  |
| 8DPSK max carrier frequency stability $ \omega_i $                  |                         | -75 | $\pm 5$ | 75   | KHz  |
| 8DPSK max carrier frequency stability $ \omega_0+\omega_i $         |                         | -75 | $\pm 5$ | 75   | KHz  |
| $\pi/4$ DQPSK Modulation Accuracy                                   | RMS DEVM                |     |         | 20   | %    |
|                                                                     | 99% DEVM                | 99  | 100     |      | %    |
|                                                                     | Peak DEVM               |     |         | 35   | %    |
| In-band spurious emissions                                          | $F > F_0 + 3\text{MHz}$ |     |         | -40  | dBm  |
|                                                                     | $F < F_0 - 3\text{MHz}$ |     |         | -40  | dBm  |
|                                                                     | $F = F_0 + 3\text{MHz}$ |     |         | -40  | dBm  |
|                                                                     | $F = F_0 - 3\text{MHz}$ |     |         | -40  | dBm  |
|                                                                     | $F = F_0 + 2\text{MHz}$ |     |         | -20  | dBm  |
|                                                                     | $F = F_0 - 2\text{MHz}$ |     |         | -20  | dBm  |
|                                                                     | $F = F_0 + 1\text{MHz}$ |     |         | -26  | dBm  |
|                                                                     | $F = F_0 - 1\text{MHz}$ |     |         | -26  | dBm  |
| EDR Differential Phase Encoding                                     |                         | 99  | 100     |      | %    |

### Receiver

| Description                   |               | Min. | Typ. | Max. | Unit |
|-------------------------------|---------------|------|------|------|------|
| Sensitivity at 0.1% BER       | $\pi/4$ DQPSK |      | -90  | -    | dBm  |
|                               | 8DPSK         |      | -85  | -    | dBm  |
| Maximum Input PWR at 0.1% BER | $\pi/4$ DQPSK | -20  |      |      | dBm  |
|                               | 8DPSK         | -20  |      |      | dB   |
| C0-Channel Interference       | $\pi/4$ DQPSK | -    |      | 13   | dB   |
|                               | 8DPSK         | -    |      | 21   | dB   |

## 2.2.3 LE 1M(Conducted)

### Transmitter

| Description                |                                         | Min. | Typ.   | Max. | Unit |
|----------------------------|-----------------------------------------|------|--------|------|------|
| Maximum RF Transmit PWR    |                                         |      | 3.5    | 4.5  | dBm  |
| In-band emissions          | +2 MHz                                  |      | -45    | -20  | dBm  |
|                            | -2 MHz                                  |      | -45    | -20  | dBm  |
|                            | +3 MHz                                  |      | -43    | -30  | dBm  |
|                            | -3 MHz                                  |      | -43    | -30  | dBm  |
| Modulation Characteristics | $\Delta f_{1avg}$<br>Maximum Modulation | 225  | 252    | 275  | KHz  |
|                            | $\Delta f_{2max}$<br>Maximum Modulation | 185  | 232    |      | KHz  |
|                            | $\Delta f_{1avg}/\Delta f_{2avg}$       | 0.8  | 0.95   |      |      |
| Carrier Frequency Offset   |                                         | -150 | <+/-10 | 150  | KHz  |
| Frequency Drift            |                                         | -50  | <+/-10 | 50   | KHz  |

### Receiver

| Description                   |                                                                 | Min. | Typ.  | Max. | Specification                  |
|-------------------------------|-----------------------------------------------------------------|------|-------|------|--------------------------------|
| Sensitivity LE 1M (dBm)       |                                                                 |      | -95   |      | <-70                           |
| Maximum Input PWR at 0.1% BER |                                                                 | -10  | -2    |      | -10                            |
| C/I (dB)                      | Co-channel                                                      |      | 17    |      | <21dB                          |
|                               | Adjacent 1Mhz                                                   |      | 20    |      | <15dB                          |
|                               | Adjacent 2MHz                                                   |      | 23/26 |      | <-17dB                         |
|                               | Adjacent >=3Mhz                                                 |      | 21    |      | <-27dB                         |
|                               | Image interference                                              |      | 27    |      | <-9dB                          |
|                               | Image+/-1Mhz                                                    |      | 21    |      | <-15dB                         |
| Blocking(dBm)                 | 30Mhz~2000Mhz                                                   | -30  |       |      | -30                            |
|                               | 2000Mhz~2400MHz                                                 | -35  |       |      | -35                            |
|                               | 2500MHz~3000MHz                                                 | -35  |       |      | -35                            |
|                               | 3000MHz~12.75Ghz                                                | -30  |       |      | -30                            |
| Inter-Modulation              | Payload length: 37, n: 3,<br>Packets: 1500<br>RF Level: -64 dBm |      | -30   |      | PER $\leq$ 30.8%<br>$\geq$ -50 |
|                               | Payload length: 37, n: 4<br>Packets: 1500<br>RF Level: -64 dBm  |      | -30   |      | PER $\leq$ 30.8%<br>$\geq$ -50 |
|                               | Payload length: 37, n: 5<br>Packets: 1500<br>RF Level: -64 dBm  |      | -30   |      | PER $\leq$ 30.8%<br>$\geq$ -50 |



## 2.2.4 LE 2M(Conducted)

### Transmitter

| Description               |                                         | Min. | Typ.   | Max. | Unit         |
|---------------------------|-----------------------------------------|------|--------|------|--------------|
| Maximum RF Transmit PWR   |                                         |      | 3.5    | 4.5  | dBm          |
| Adjacent Channel Transmit | +2 MHz                                  |      | -53    | -20  | dBm          |
|                           | -2 MHz                                  |      | -53    | -20  | dBm          |
|                           | +3 MHz                                  |      | -56    | -30  | dBm          |
|                           | -3 MHz                                  |      | -56    | -30  | dBm          |
| Frequency Deviation       | $\Delta f_{1avg}$<br>Maximum Modulation | 450  | 495    | 550  | KHz          |
|                           | $\Delta f_{2max}$<br>Maximum Modulation | 370  | 442    |      | KHz          |
|                           | $\Delta f_{1avg}/\Delta f_{2avg}$       | 0.8  | 0.92   |      |              |
| Carrier Frequency Offset  |                                         | -150 | <+/-10 | 150  | KHz          |
| Frequency Drift           |                                         | -50  | <+/-10 | 50   | KHz          |
| Frequency Drift Rate      |                                         | -20  | <+/-5  | 20   | KHz/50u<br>s |

### Receiver

| Description                   |                                                                 | Min. | Typ.  | Max. | Specification     |
|-------------------------------|-----------------------------------------------------------------|------|-------|------|-------------------|
| Sensitivity LE 2M(dBm)        |                                                                 |      | -92   |      | <-70              |
| Maximum Input PWR at 0.1% BER |                                                                 | -10  | -8    |      | -10               |
| C/I (dB)                      | Co-channel                                                      |      | 14    |      | <21dB             |
|                               | Adjacent 2Mhz                                                   |      | 22    |      | <15dB             |
|                               | Adjacent 4MHz                                                   |      | 16/20 |      | <-17dB            |
|                               | Adjacent >=6Mhz                                                 |      | 13    |      | <-27dB            |
|                               | Image interference                                              |      | 24    |      | <-9dB             |
|                               | Image+/-2Mhz                                                    |      | 22    |      | <-15dB            |
| Blocking(dBm)                 | 30Mhz~2000Mhz                                                   | -30  |       |      | -30               |
|                               | 2000Mhz~2400MHz                                                 | -35  |       |      | -35               |
|                               | 2500MHz~3000MHz                                                 | -35  |       |      | -35               |
|                               | 3000MHz~12.75Ghz                                                | -30  |       |      | -30               |
| Inter-Modulation              | Payload length: 37, n: 3,<br>Packets: 1500<br>RF Level: -64 dBm |      | -30   |      | PER≤30.8%<br>≥-50 |
|                               | Payload length: 37, n: 4<br>Packets: 1500<br>RF Level: -64 dBm  |      | -30   |      | PER≤30.8%<br>≥-50 |
|                               | Payload length: 37, n: 5<br>Packets: 1500                       |      | -30   |      | PER≤30.8%<br>≥-50 |

## 2.3 Audio Characteristics

### 2.3.1 Audio ADC

| Pre-Amplifier                 |                                                                    |                   |     |     |     |      |
|-------------------------------|--------------------------------------------------------------------|-------------------|-----|-----|-----|------|
| Parameter                     | Conditions                                                         |                   | Min | Typ | Max | Unit |
| Full Scale Input Voltage      | THD+N < 1%                                                         |                   | -   | -   | 2.8 | Vpp  |
| Analogue gain                 | AUX OP                                                             | -                 | -12 | -   | 7.5 | dB   |
|                               | MIC OP                                                             | Single Ended      | 26  | -   | 39  | dB   |
|                               |                                                                    | Full Differential | 32  | -   | 45  |      |
| Analogue to Digital Converter |                                                                    |                   |     |     |     |      |
| Resolution                    | -                                                                  |                   | -   | -   | 20  | Bits |
| Input Sample Rate             | -                                                                  |                   | 8   | -   | 96  | kHz  |
| SNR                           | fin = 1kHz@Full Scale InputVoltage<br>B/W = 22Hz~22kHz<br>Fs=48kHz |                   | -   | 96  | -   | dB   |
| Dynamic Range                 | fin = 1kHz@-40dBFS Input Voltage<br>B/W = 22Hz~22kHz<br>Fs=48kHz   |                   | -   | 94  | -   | dB   |
| THD+N                         | fin = 1kHz(input=1.6Vpp)<br>B/W= 22Hz~22kHz<br>Fs=48kHz            |                   | -   | -85 | -   | dB   |
| Digital gain                  | -                                                                  |                   | 0   | -   | 45  | dB   |

## 2.3.2 Stereo DAC

| Digital to Analogue Converter |                                                                    |                          |      |     |      |       |
|-------------------------------|--------------------------------------------------------------------|--------------------------|------|-----|------|-------|
| Parameter                     | Conditions                                                         |                          | Min  | Typ | Max  | Unit  |
| Resolution                    | -                                                                  |                          | -    | -   | 20   | Bits  |
| Output Sample Rate            | -                                                                  |                          | 8    | -   | 96   | kHz   |
| SNR                           | fin = 1kHz@0dBFS input<br>B/W = 22Hz~22kHz<br>Fs=48kHz, Load=16Ω   | -                        | -    | 98  | -    | dB    |
|                               |                                                                    | A-Weighting              | -    | 101 | -    | dBA   |
| Dynamic Range                 | fin = 1kHz@-48dBFS input<br>B/W = 22Hz~22kHz<br>Fs=48kHz, Load=16Ω | -                        | -    | 98  | -    | dB    |
|                               |                                                                    | A-Weighting              | -    | 101 | -    | dBA   |
| THD+N                         | fin = 1kHz@0dBFS input<br>B/W = 22Hz~22kHz<br>Fs=48kHz, Load=16Ω   | -                        | -    | -87 | -    | dB    |
| Digital gain                  | -                                                                  |                          | <-98 | -   | 24   | dB    |
| Stereo crosstalk              | fin = 1kHz@0dBFS input                                             | -                        | -    | -78 | -    | dB    |
| PWR Amplifier                 |                                                                    |                          |      |     |      |       |
| Analogue gain                 | -                                                                  |                          | -98  | -   | 0    | dB    |
| Max                           | fin = 1kHz@0dBFS input                                             | Single Ended             | -    | -   | 536  | mVrms |
| Amplitude/PWR                 | Fs=48kHz, Load=16Ω                                                 | Output                   | -    | -   | 18   | mW    |
|                               | fin = 1kHz@0dBFS input<br>Fs=48kHz, Load=16Ω                       | Direct drive             | -    | -   | 536  | mVrms |
|                               |                                                                    | Output                   |      |     | 18   | mW    |
|                               | fin = 1kHz@0dBFS input<br>Fs=48kHz, Load=10KΩ                      | Full Differential Output | -    | -   | 1.82 | Vrms  |

## 3. Interface

### 3.1 USB

- Complies with the USB2.0 Specification Revision 1.0a.
- UTMI+ level2 Transceiver Macrocell Interface.
- Supports point-to-point communication with one full-speed or high-speed device in Host mode (no HUB support).
- Supports full-speed or high-speed in peripheral mode.
- Supports 3 IN endpoint and 3 OUT endpoint except endpoint0.
- Supports bulk Isochronous and Interrupt transfer.
- Partially configurable endpoint endpoint type and single, double triple or quad buffering.
- Integrated synchronous RAM as endpoint FIFOs.
- Supports suspend, resume and power managements function.
- Support remote wakeup for device mode.
- Support DMA transfer for endpoint in1 and out2

### 3.2 I2C

- Both master and slave functions supported
- Support standard mode (100kbps) and fast-speed mode (400kbps)
- Only 7-bit address mode support
- 8 bit x16 TX FIFO and 8bit x16 RX FIFO
- Supports general call
- Pull-up resistors are required on both of the I2C signal lines as the I2C drivers are open drain.  
Typically external 2.2k-Ohm resistors are used to pull the signals up to VCC if not select internal Pull-Up resistor.

| I2C     | GPIO  |        |
|---------|-------|--------|
| I2C_SCL | GPIO0 | GPIO42 |
| I2C_SDA | GPIO1 | GPIO19 |

### 3.3 UART0 and UART1

F1DA2835P contains two UART interfaces (UART0 and UART1)

- 5-8 Data Bits and LSB first in Transmit and Received
- 1-2 Stop Bits
- Even, Odd, or No Parity
- 16 Byte Transmit and Receive FIFOs
- Capable of speeds up to 6Mbps to enable connections with Bluetooth and other peripherals
- Support IRQ and DMA mode to transmit data
- Support RTS/CTS Automatic Hardware Flow Control to reduce interrupts to host system
- UART RX Support DMA single mode
- Add UART RX DMA counter for valid data in RAM.



- RX Baud Rate tolerance  $\leq \pm 2\%$
- UART0 TXFIFO can be accessed by CPU and DSP

| UART0 | GPIO  |        |        |        |
|-------|-------|--------|--------|--------|
| RTS   | GPIO0 | GPIO11 |        |        |
| CTS   | GPIO1 | GPIO10 |        |        |
| RX    | GPIO2 | GPIO16 | GPIO21 |        |
| TX    | GPIO3 | GPIO22 | GPIO17 | GPIO23 |

| UART1 | GPIO   |        |        |
|-------|--------|--------|--------|
| RTS   | GPIO13 |        |        |
| CTS   | GPIO20 |        |        |
| RX    | GPIO15 | GPIO22 |        |
| TX    | GPIO7  | GPIO21 | GPIO42 |

## 3.4 SPI

### 3.4.1 SPI1

The SPI module is designed according to Motorola serial peripheral interface protocols. It can be configured as either a master or slave device. It can generate a large range of SPI clock so as to communicate with different devices supporting SPI protocols. Especially, this module support three operation mode: write & read, write only, read only mode.

SPI write & read mode use the MOSI pin to serially write instructions, addresses or data to the device. It also uses the MISO pin to read data or status from the device synchronous. This mode is designed to meet normal SPI application.

- Support SPI normal mode: mode 0/1/2/3
- Only support normal 4 wire mode
- Support IRQ and DMA mode to transmit data
- Support D-cache Interface
- Support 16 level delay chain, 1ns/step
- Support 1x/2x/dual/4x/quad access SPI NOR
- Support slave mode
- Support 100MHz spi\_clk as highest speed

| SPI       | GPIO   |        |       |
|-----------|--------|--------|-------|
| SPI1_SS   | GPIO8  | GPIO16 |       |
| SPI1_CLK  | GPIO9  | GPIO17 | GPIO3 |
| SPI1_MISO | GPIO10 | GPIO20 |       |
| SPI1_MOSI | GPIO11 | GPIO21 | GPIO2 |
| SPI1_I2   | GPIO12 | GPIO14 |       |
| SPI1_I3   | GPIO13 | GPIO15 |       |

### 3.4.2 SPI2

- Support SPI normal mode: mode 0/1/2/3
- Only support normal 4 wire mode
- Support IRQ and DMA mode to transmit data
- Support 16 level delay chain, 1ns/step
- Support slave mode
- Support 100MHz spi clk as highest speed

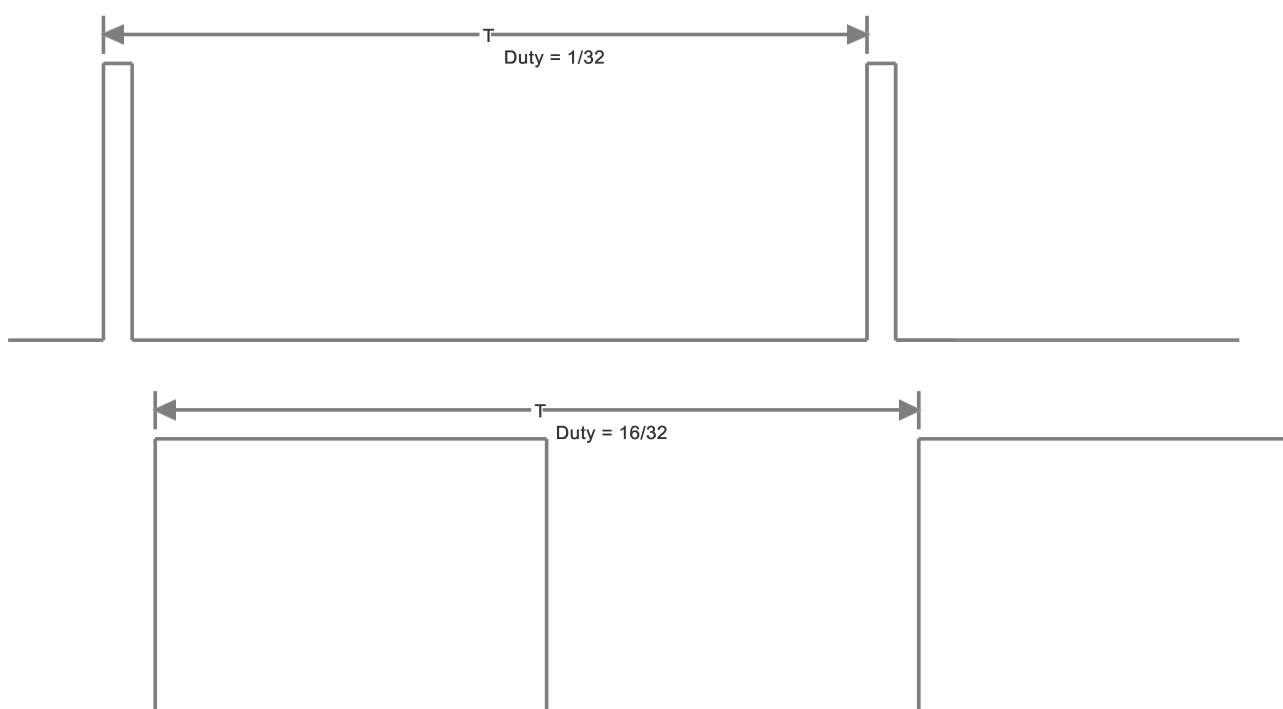
| SPI       | GPIO   |        |       |
|-----------|--------|--------|-------|
| SPI2_SS   | GPIO8  | GPIO16 | GPIO0 |
| SPI2_CLK  | GPIO9  | GPIO17 | GPIO3 |
| SPI2_MISO | GPIO10 | GPIO20 | GPIO1 |
| SPI2_MOSI | GPIO11 | GPIO21 | GPIO2 |

## 3.5 PWM

- Independent of 9 PWM
- The frequency of PWM comes from the division of 32KHz
- Support normal mode and breath mode
  - Normal mode can output 256 kinds of duty
  - Breath mode supports breathing lights with various flicker frequencies

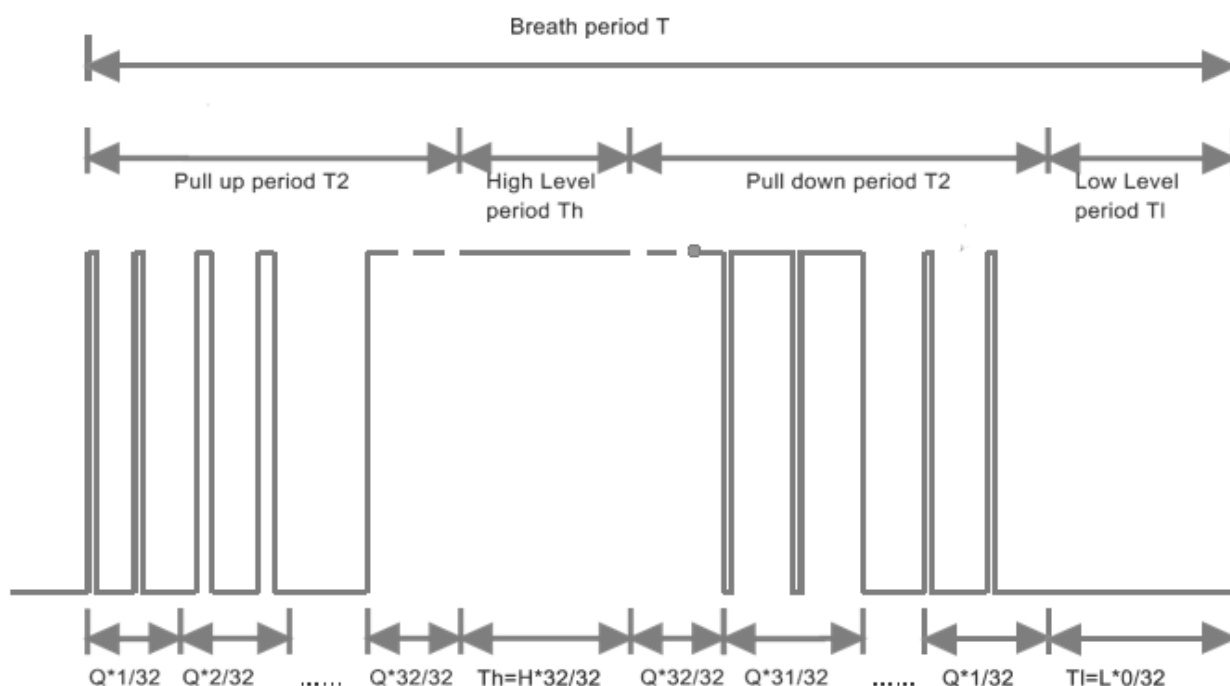
| PWM  | GPIO   |        |        |        |       |
|------|--------|--------|--------|--------|-------|
| PWM0 | GPIO7  | GPIO38 | GPIO21 |        |       |
| PWM1 | GPIO0  | GPIO4  | GPIO22 |        |       |
| PWM2 | GPIO23 | GPIO2  | GPIO20 | GPIO40 |       |
| PWM3 | GPIO8  | GPIO42 | GPIO1  | GPIO51 | GPIO5 |
| PWM4 | GPIO16 | GPIO9  |        |        |       |
| PWM5 | GPIO10 | GPIO42 | GPIO53 |        |       |
| PWM6 | GPIO11 |        |        |        |       |
| PWM7 | GPIO12 |        |        |        |       |
| PWM8 | GPIO13 |        |        |        |       |

### 3.5.1 Normal Mode Timing



PWM can be used as backlights enable signal of LCD. The brightness of the backlights is decided by the duty cycle of

## 3.5.2 Breath Mode Timing



The breath mode of PWM can be used for driver of breathing light. For example, if PWM CLK from CMU is  $f=1/t$  and we need the time of pull up or pull down to be  $T_2=Q \cdot 32 \cdot 32t=0.5s$ , and the time of high level  $T_h=H \cdot 32T=0.5s$  and the time of low level  $T_l=L \cdot 32t=2s$ , when we set  $Q=2$ , the  $f$  should be 4096 and  $H$  is 64,  $L$  is 256.

## 3.6 Audio Interfaces

### 3.6.1 DAC

- Build in stereo 24 bit input sigma-delta DAC, SNR>98dB, SNR (A-WEIGHTING)>101dB, THD<-87dB
- DAC supports sample rate 8k/12k/11.025k/16k/22.05k/24k/32k/44.1/48/96kHz
- Support digital volume of 256 steps with zero cross detection
- Build in stereo 20mW PA (Power Amplifier) for headphone. PA output supports traditional mode and direct drive mode(for earphone)
- An anti-pop circuit for suppressing noise of PA when enable and disable
- Support differential audio output for speaker PA

### 3.6.2 ADC

- Build in stereo 24 bit input sigma-delta ADCs, SNR>96dB, SNR (A-WEIGHTING)>98dB, THD<-85dB
- ADC supports sample rate 8k/12k/11.025k/16k/22.05k/24k/32k/44.1/48/96kHz
- A digital high-pass filter can be used to remove dc offsets when ADC use



- Supports single-ended input analog microphones and full difference input microphone
- Supports Digital microphones

### 3.6.3 I2S

- F1DA2835P supports 3 groups of I2S, two of which are receivers (I2SRX0 and I2SRX1), and one is transmitter (I2STX).
- I2SRX0 and I2SRX1 support I2S receiver(RX) with master mode and slave mode
- I2STX support I2S transmission(TX) with master mode and slave mode
- I2S support sample rate 8k/12k/11.025k/16k/22.05k/24k/32k/44.1k/48k/96k/192kHz

| I2S          | GPIO  |        |        |        |        |
|--------------|-------|--------|--------|--------|--------|
| I2STX_MCLK   | GPIO0 | GPIO15 | GPIO21 | GPIO32 | GPIO40 |
| I2STX_BCLK   | GPIO1 | GPIO23 | GPIO33 | GPIO39 | GPIO42 |
| I2STX_LRCLK  | GPIO2 | GPIO6  | GPIO22 | GPIO34 | GPIO51 |
| I2STX_DOUT   | GPIO3 | GPIO7  | GPIO35 | GPIO38 | GPIO53 |
|              |       |        |        |        |        |
| I2SRX0_MCLK  | GPIO0 | GPIO15 | GPIO21 | GPIO32 | GPIO40 |
| I2SRX0_BCLK  | GPIO1 | GPIO23 | GPIO33 | GPIO39 | GPIO42 |
| I2SRX0_LRCLK | GPIO2 | GPIO6  | GPIO22 | GPIO34 | GPIO51 |
| I2SRX0_DIN   | GPIO3 | GPIO7  | GPIO35 | GPIO38 | GPIO53 |
|              |       |        |        |        |        |
| I2SRX1_MCLK  | GPIO0 | GPIO15 | GPIO21 | GPIO32 | GPIO40 |
| I2SRX1_BCLK  | GPIO1 | GPIO23 | GPIO33 | GPIO39 | GPIO42 |
| I2SRX1_LRCLK | GPIO2 | GPIO6  | GPIO22 | GPIO34 | GPIO51 |
| I2SRX1_DIN   | GPIO3 | GPIO7  | GPIO35 | GPIO38 | GPIO53 |

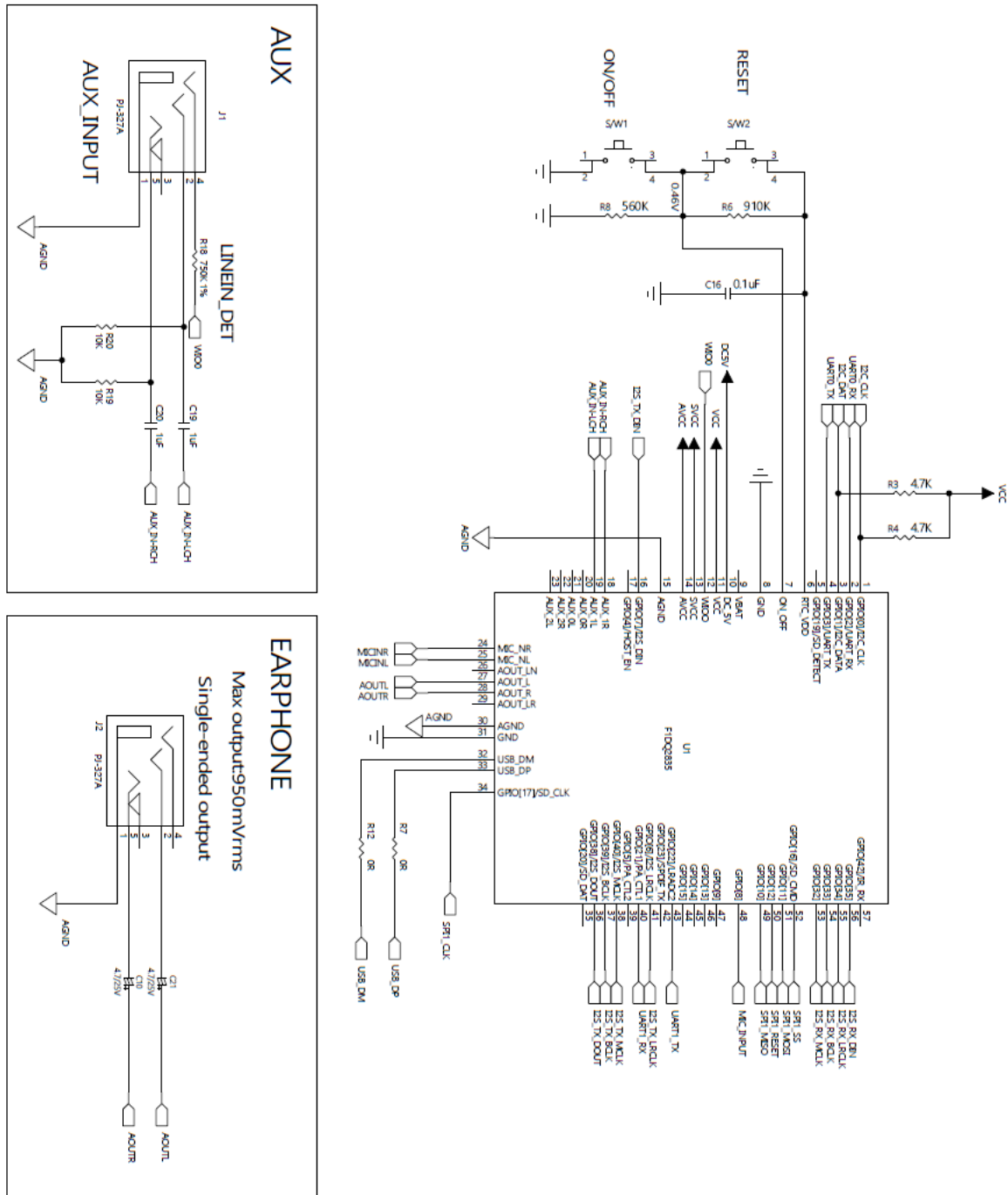
### 3.6.4 SPDIF

F1DA2835P supports SPDIF TX and RX.

The SPDIF of F1DA2835P supports sampling rate: 192k/96k/48k/44.1k/32kHz

| SPDIF    | GPIO   |        |
|----------|--------|--------|
| SPDIF_TX | GPIO35 | GPIO23 |
| SPDIF_RX | GPIO7  | GPIO38 |

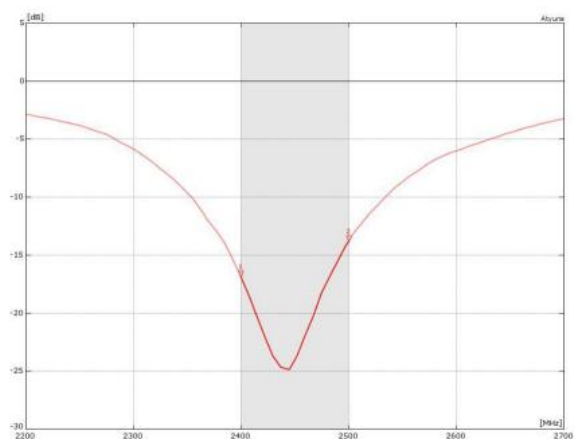
## 4. Application Schematic



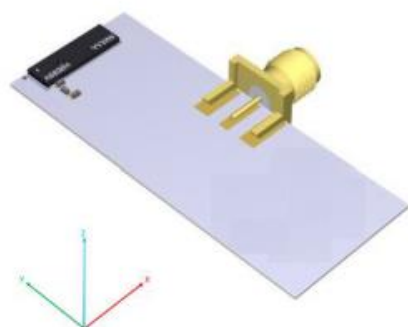
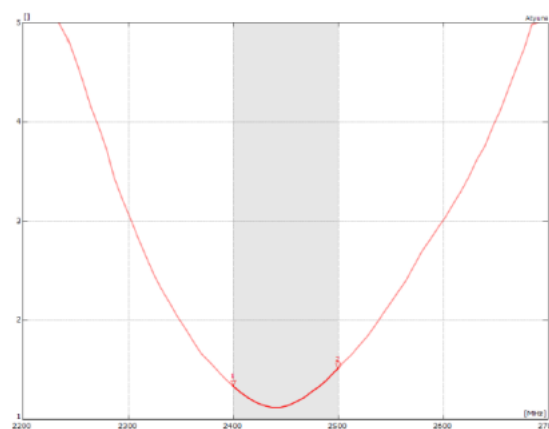
## 5. Antenna spec

### 5.1 Passive measurement data

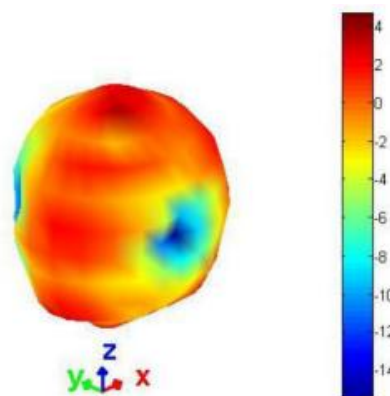
Return Loss



VSWR

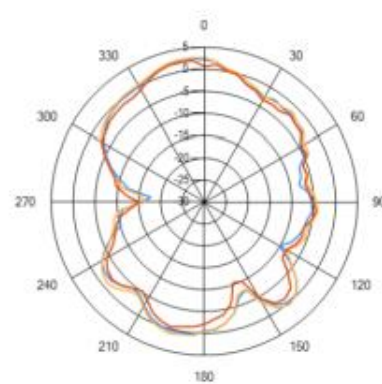
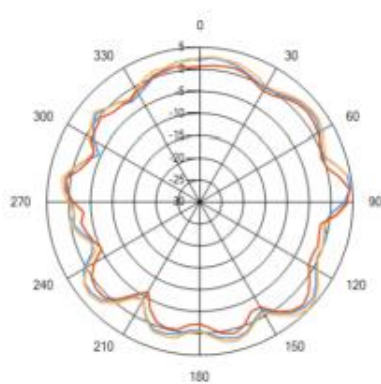
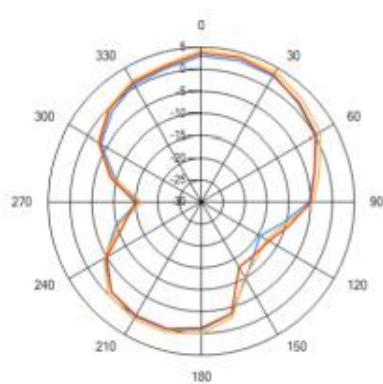


XY



XZ

YZ

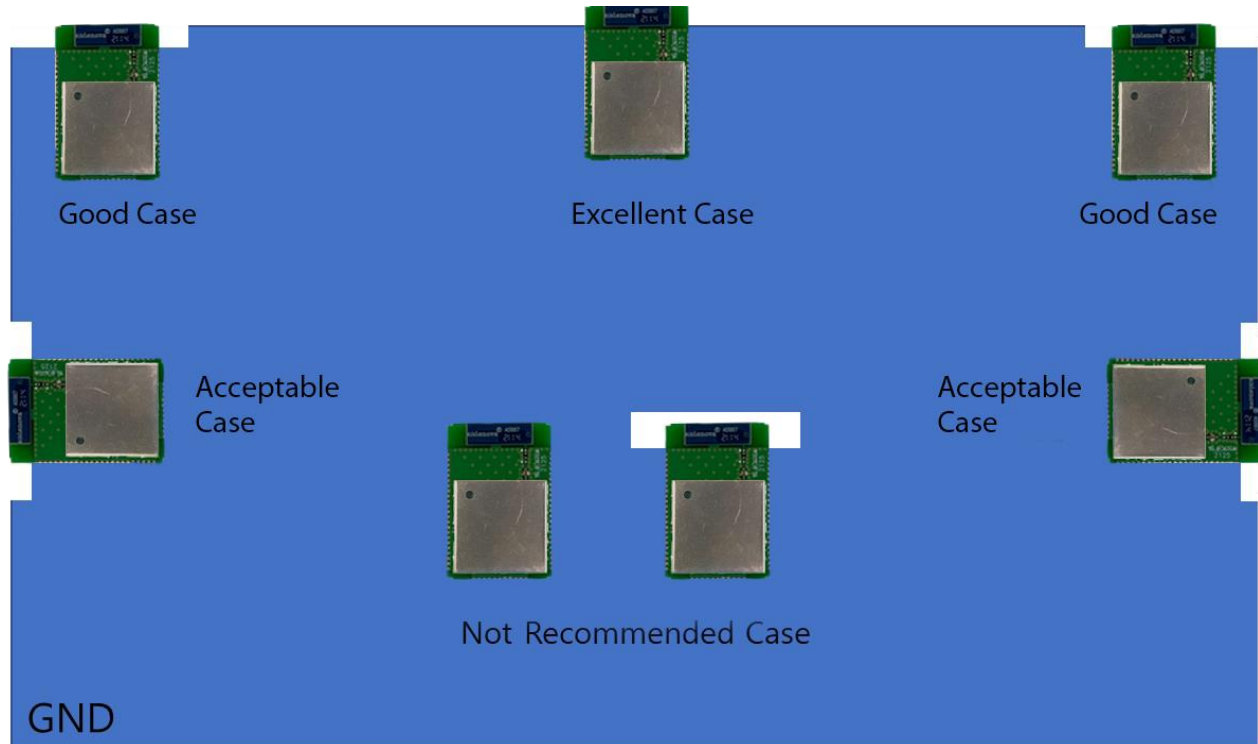


— 2.4GHz — 2.45GHz — 2.5GHz

## 5.2 Active measurement data(T.B.D)

## 6. Module Placement Rule

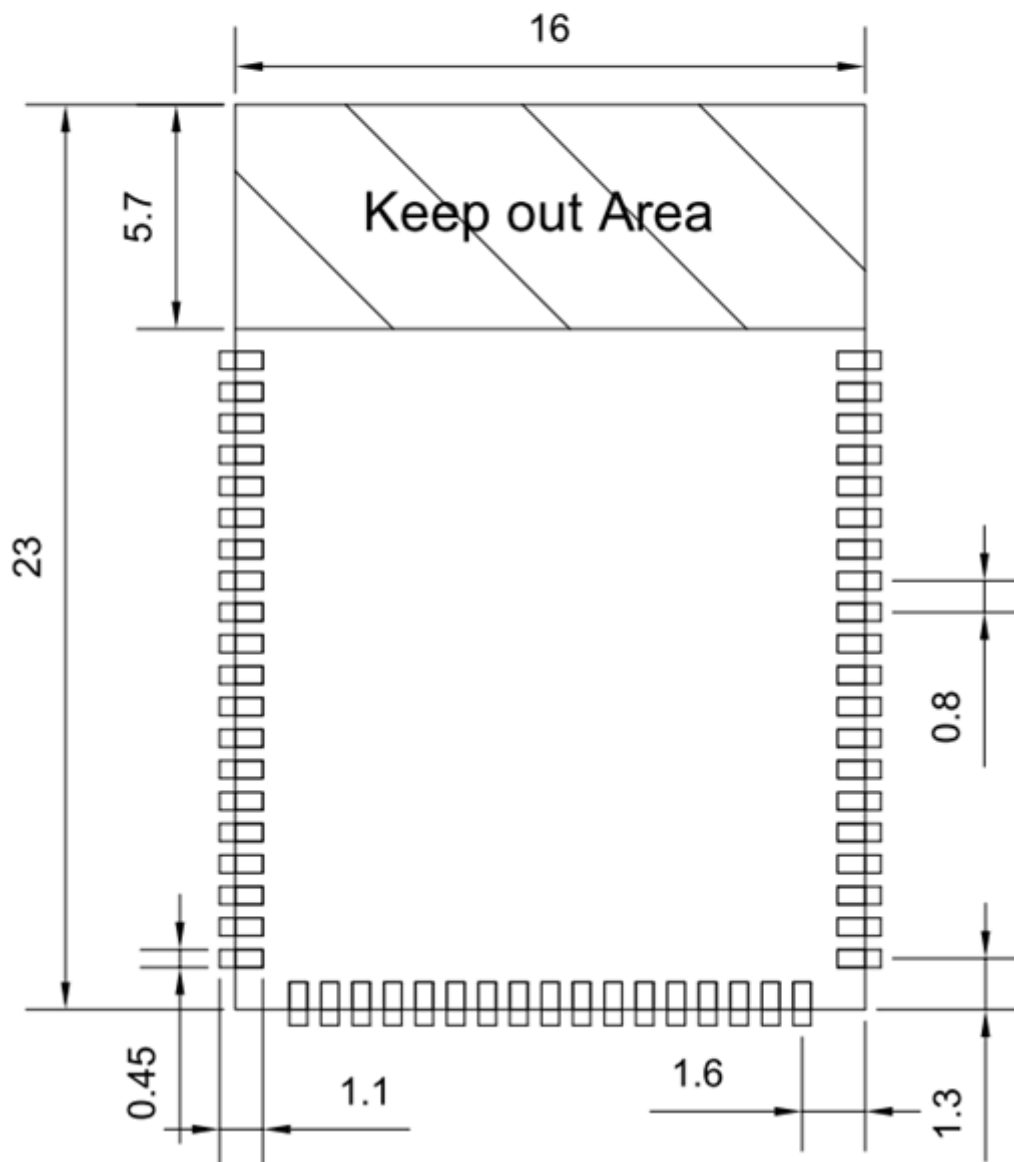
On the main PCB, the areas under the antenna should not contain any top, inner layer, or bottom copper as shown in Figure. For the best range performance, keep all external metal away from the chip antenna at least 45 mm. In all cases, the performance of the antenna can vary depending on GND.



## 7 . PCB Layout

### F1DA2835P\_Rev1.1\_Layout

#### 1. Top View (Unit : mm)



## 8. Reflow Temperature Profile

The F1DA2835P is constructed with all RoHS compliant material and should be reflowed accordingly. This Module is Moisture Sensitivity Level MSL4 and must be stored and handled accordingly.

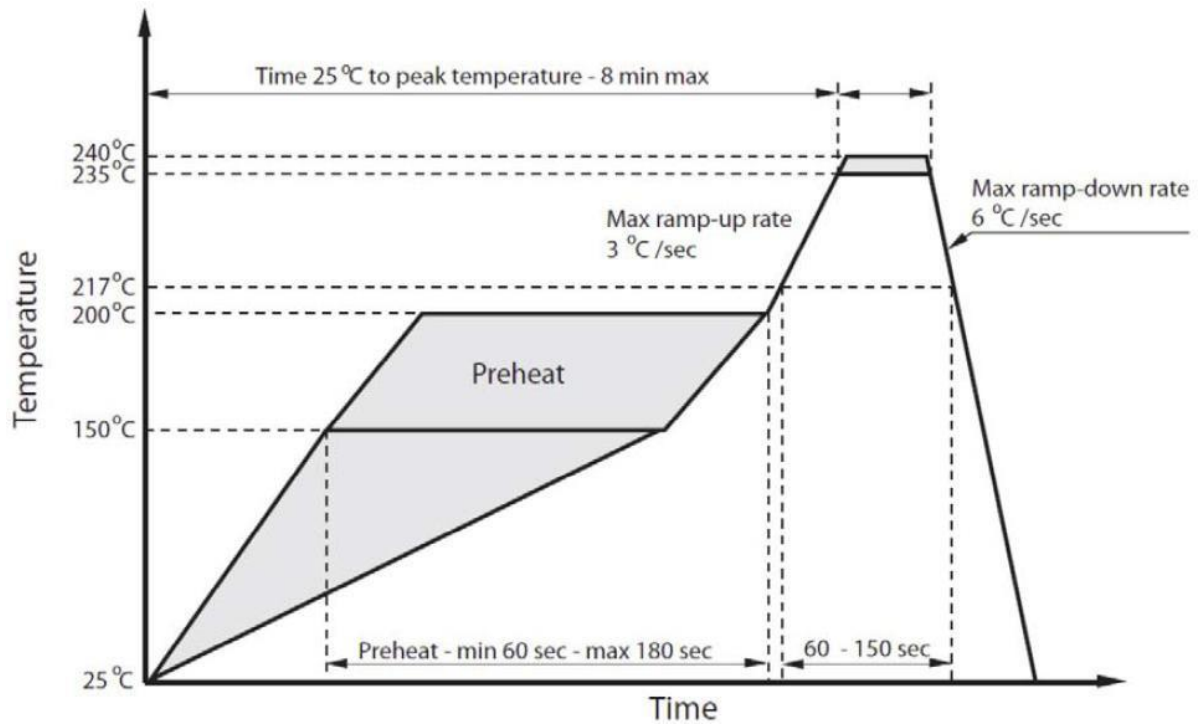
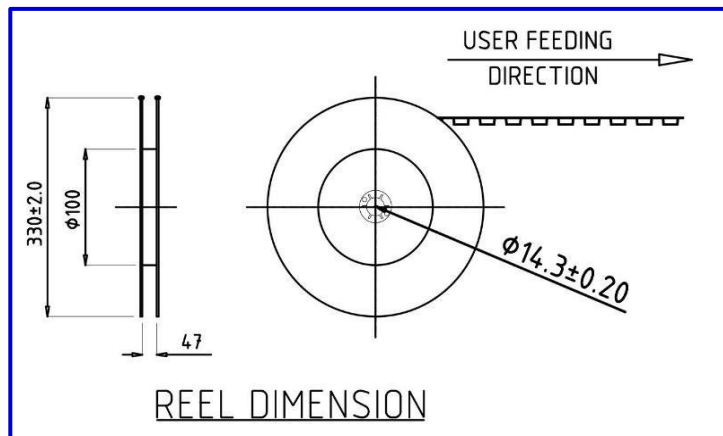


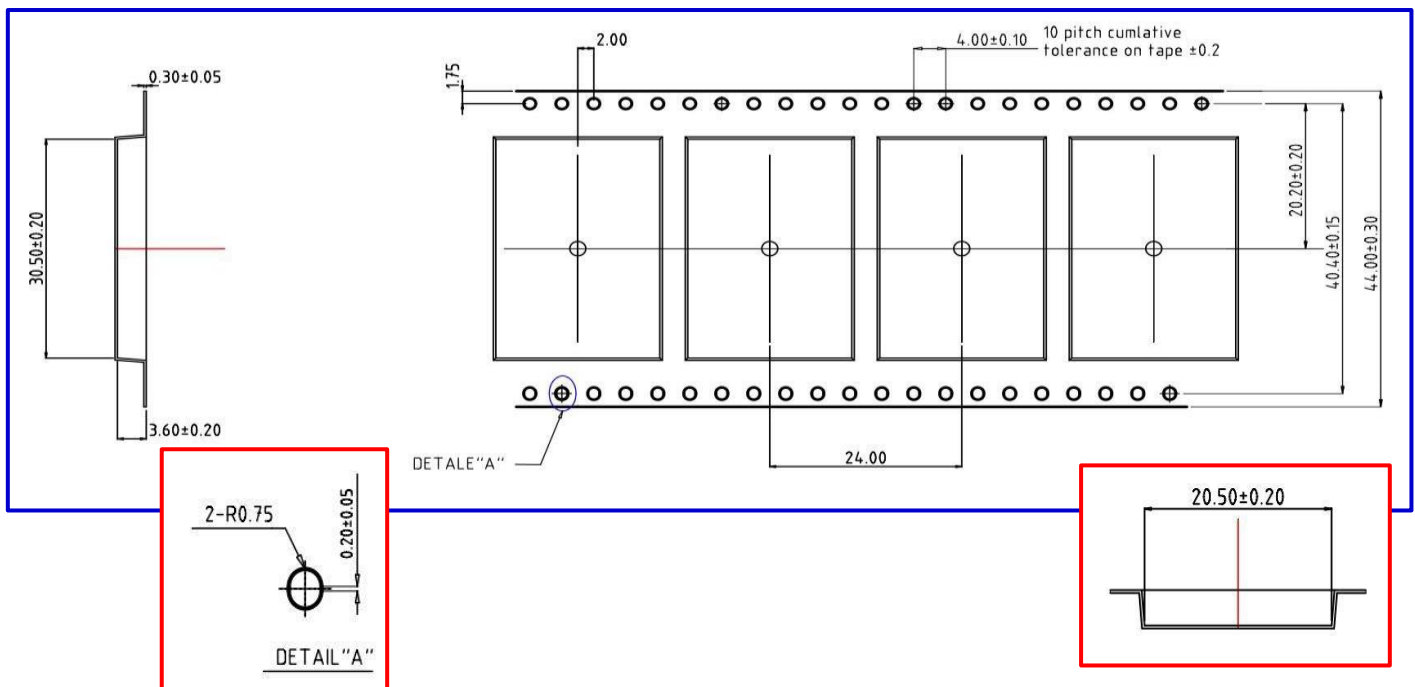
Figure 8-1 Typical Reflow Solder Profile

## 9. Packing information

### a. Reel(Robbin)

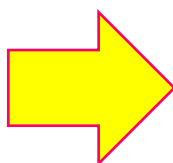
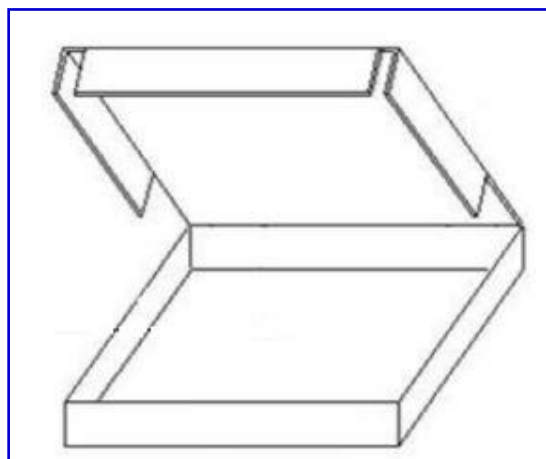
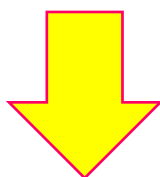
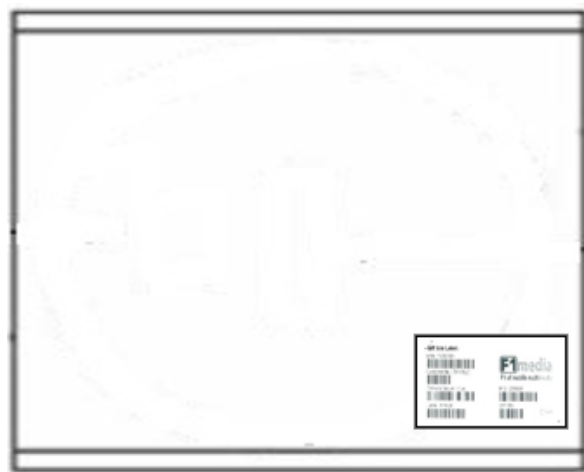


### b. Carrier Tape(Robbin)





## c. Gift Box Packing



Gift BOX Size (단위; mm)

| 구분 |     |     |    | QTY(ea) |
|----|-----|-----|----|---------|
| #0 | 340 | 360 | 54 | 700     |

## d. Carton Box Packing



| Carton BOX Size (단위; cm) |      |      |    |            |         |
|--------------------------|------|------|----|------------|---------|
| 구분                       |      |      |    | Gift BOX수량 | QTY(ea) |
| #1                       | 37.5 | 38   | 63 | 10         | 7,000   |
| #2                       | 36   | 33.5 | 39 | 5          | 3,500   |

## 10. Revision History

| Revision | Date       | Change Descriptions                | Issued by |
|----------|------------|------------------------------------|-----------|
| Rev 1.0  | 2023-05-17 | Initial release                    | T. G. KIM |
| Rev 1.1  | 2023-05-25 | Changed antenna spec               | T. G. KIM |
| Rev 1.2  | 2023-09-15 | Changed RF Characteristics spec    | T. G. KIM |
| Rev 1.3  | 2023-09-25 | Changed Electrical Characteristics | T. G. KIM |

## **FCC Statement**

FCC Part 15C 15.247, 15E 15.407 is applied to the modular transmitter.

### Federal Communication Commission Interference Statement

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 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.

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.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device and its antenna(s) must not be co-located or operation in conjunction with any other antenna or transmitter.

**IMPORTANT NOTE:****FCC Radiation Exposure Statement:**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

This equipment should be installed and operated with minimum distance 6.17 mm between the radiator & your body.

When this module is installed on an end product and operated with minimum distance 6.17 mm or less, additional SAR evaluation is required.

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

**USERS MANUAL OF THE END PRODUCT:**

The end user has to be informed that the FCC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied. The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product. 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. If the device is small or for such use that it is not practicable to place the statement on the product, then additional FCC part 15.19 statement is required to be available in the users manual: This device complies with Part 15 of 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.

**LABEL OF THE END PRODUCT:**

The final end product must be labeled in a visible area with the following " Contains FCC ID: BEJ-F1DA2835P ". If the device is small or for such use that it is not practicable to place the statement on the product, then the following FCC part 15.19 statement has to also be available on the label: This device complies with Part 15 of 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.

## **IC Statement**

This Class B digital apparatus complies with Canadian ICES-003.

This device complies with Industry Canada license-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.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

Le présent appareil est conforme aux CNR d'Industrie 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, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

This device and its antenna(s) must not be co-located or operation in conjunction with any other antenna or transmitter.

The device could automatically discontinue transmission in case of absence of information to transmit, or operational failure. Note that this is not intended to prohibit transmission of control or signaling information or the use of repetitive codes where required by the technology.

### **IMPORTANT NOTE:**

#### **IC Radiation Exposure Statement**

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 6.17 mm between the radiator & your body.

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 6.17 mm de distance entre la source de rayonnement et votre corps.

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.

When this module is installed on an end product and operated with minimum distance 5mm or less, additional SAR evaluation is required.

**USERS MANUAL OF THE END PRODUCT:**

In the users manual of the end product, the end user has to be informed to keep at least 6.17 mm 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. If the device is small or for such use that it is not practicable to place the statement on the product, then following IC statement is required to be available in the users manual: IC statement is required to be available in the users manual: This device complies with Industry Canada license-exempt RSS standard(s). This Class B digital apparatus complies with Canadian ICES-003. 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.

**LABEL OF THE END PRODUCT:**

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

" Contains IC : 2703H-F1DA2835P "

**Transmit Antenna Notice**

This radio transmitter [IC:2703H-F1DA2835P] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Antenna list ( type, maximum gain(dBi) )

| Model               | Type | Maximum gain (dBi) |
|---------------------|------|--------------------|
| F1-FR4-ANT : F1304R | SMD  | 2.1                |