# EB35E0x 2.4GHz Wireless Audio Module

## Product Description

The EB350x wireless digital audio transmission module is the highly integrated, small form factor wireless audio solution delivering the CD quality sound effects. By adopting the latest 2.4G RF and digital transmission technologies, the modules can maintain a robust RF link and work against various RF interferences. By adopting the 2.4G ISM band, the module is qualified to ship around global market. Also, the flexible design of the module can offer extra custom functions that can save the total system cost and reduce the time to market.

## Applications

- Speakers
- Headphones
- Surround Speakers
- Microphones
- CD Player, DVD Player
- Music Instruments
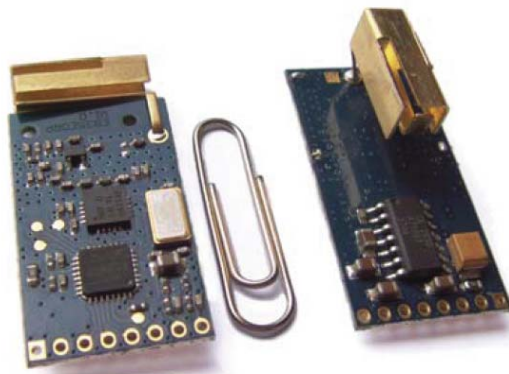
## Features

- 2.4GHz, 125 Channels
- Digital transmission with robust communication protocol.
- Near CD sound quality, 20Hz ~ 20 KHz audio frequency response
- Highly integrated, small form factor
- Low latency (<3ms), good for surround speakers.
- Low power consumption for portable applications
- Power management function for battery powered applications
- Auto muting function when suffering interference or at poor receiving conditions
- Supporting auto channel scan
- 10dBm RF output, range is up to 50 meters (L.O.S.  Outdoor)
- Flexible design, custom functions supported

## Electrical Specification

| | Description | Min/Typical/Max |
|---|---|---|
| **General** | Supply voltage | TX: 3.3V, RX:5V |
| | Supply current | TX: 80mA , RX: 45mA |
| | Operation temperature | -10 ~ +60℃ |
| **RF** | RF Frequency | 2400 ~ 2483MHZ |
| | Modulation | GFSK |
| | Data rate | 2M bps |
| | TX Power | 10dBm |
| | RX Sensitivity | -90dBm |
| | Module Channel Step | 5MHz |
| | Module Channels | 16 Channels |
| | RF Range | 15m+ indoor, 50m outdoor |
| **Audio** | Input level | 1.0Vrms |
| | Input impedance | >10K |
| | Output level | 1.0Vrms |
| | Output impedance | <1K Ohm |
| | Output/input gain | 1:1 |
| | Frequency response | 20Hz ~ 200Hz (-3dB) |
| | Latency | 3ms |
| | S/N ratio | 85dB |
| | THD | < 0.01% @20~20KHz |
| | Dynamic range | 85dB |

Table [1]: Electrical Specification

## EB35E0x Channels and Frequencies

| Channel # | Frequency | Channel # | Frequency |
|---|---|---|---|
| 1 | 2.404GHz | 9 | 2.444GHz |
| 2 | 2.409GHz | 10 | 2.449GHz |
| 3 | 2.413GHz | 11 | 2.454GHz |
| 4 | 2.419GHz | 12 | 2.459GHz |
| 5 | 2.424GHz | 13 | 2.464GHz |
| 6 | 2.429GHz | 14 | 2.469GHz |
| 7 | 2.434GHz | 15 | 2.474GHz |
| 8 | 2.439GHz | 16 | 2.479GHz |

Table [2]: Channels and frequencies

## EB35E0TP

EB35E0TP is 2.4G wireless digital audio transmitter . The pin assignment is as Table[2]. EB35E0TP has 16 RF channels, the channel can be changed by a key connected to the PIN3. Each key input advance to the next channel, and cycle to the first channel is the 16th channel reached. The LED is used to display working status; this can be modified to the customer requirements.

EB35E0TP has 2 spare GPIO pins, this 2 pins can be used as GPIO or the I2C. The I2C is used to interface with external MCUs. The external MCU can act as a master to control the TX module. This is quite flexible for customer to add extra function for their special needs.

EB35E0TP transmitter features a Standby mode by turning off the RF if there is no music signal input exceeds than 5 minutes.
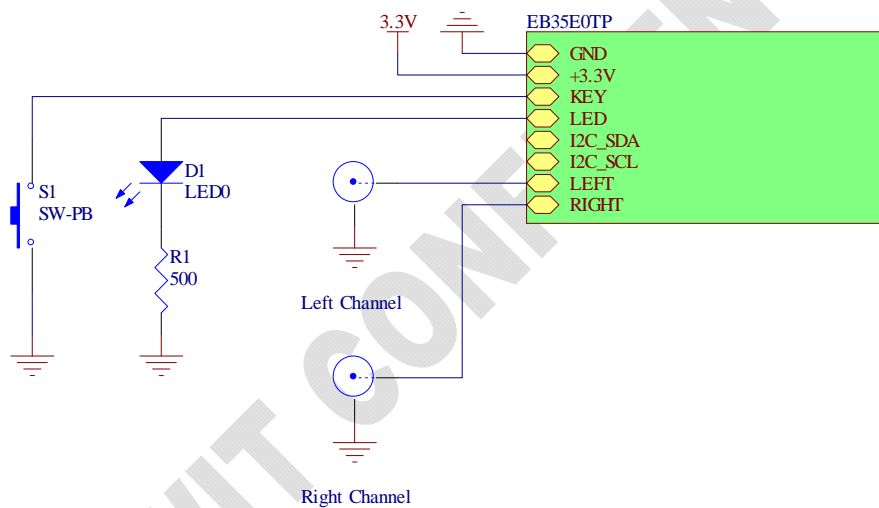


Figure [1]: EB35E0TP Application

| Pin # | Pin name | Type | Description |
|-------|----------|------|-------------|
| 1 | GND | P | Power ground |
| 2 | VCC | P | 2.7V ~ 3.3V DC input |
| 3 | KEY | I/O | Power or pairing Key input, press long than 3s to turn on or off the module, press long than 10s to enter pairing mode. |
| 4 | LED | I/O | Status LED output |
| 5 | SDA/GPIO | I/O | General purpose I/O or I2C SDA. |
| 6 | SCL/GPIO | I/O | General purpose I/O or I2C SCL |
| 7 | LEFT | I | Left Channel Input |

| 8 | RIGHT | I | Right Channel Input |
|---|-------|---|---------------------|

Table [3]: EB35E0TP Pin Assignment

## EB35E0RP

The EB35E0RP is 2.4G wireless digital audio receiver. The pin assignment is as Table[3].

EB35E0RP has 16 RF channels and features auto / manual channel scan function. If there is no RF signal within 1 seconds, the EB35E0RP will enter the auto search mode to search the available RF channel. The KEY can act as a manual channel scan, push the KEY will search the next available channel.

EB35E0RP has a I2C or GPIO interface, this can be used to control the digital power amplifier or to assert a standby control output.

EB35E0RP receiver features a Standby Output when it haven't received the TX signal longer than 5 seconds, it output a high level, this Output can be used to control the amplifier power.
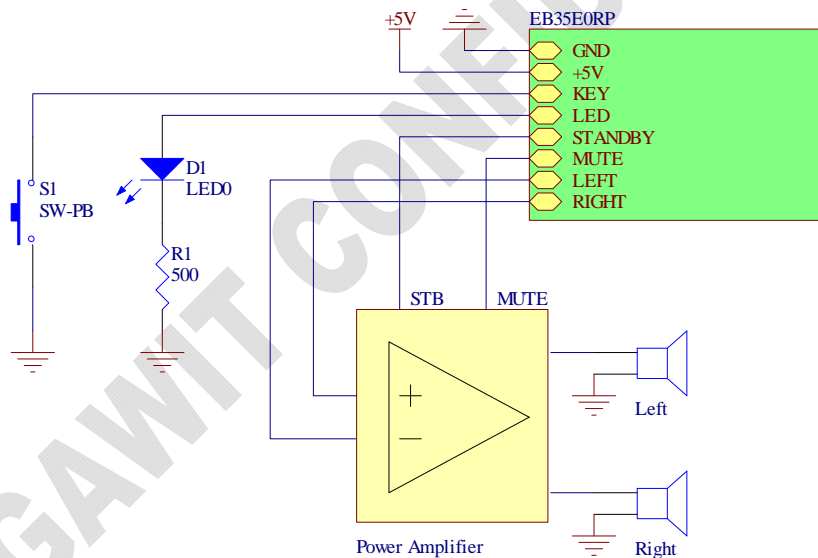


Figure [2]: EB35E0RP Application

| Pin # | Pin name | Type | Description |
|-------|----------|------|-------------|
| 1 | GND | P | Power ground |
| 2 | VCC | P | 5V DC Power Supply |
| 3 | KEY | I/O | Power or pairing Key input, press long than 3s to turn on or off the module, press long than 10s to enter pairing mode. |
| 4 | LED | I/O | Status LED output |

| 5 | STB/SDA/GPIO | I/O | Standby output or I2C SDA. I2C can be both master and slave mode, this add flexibility for custom function, like to control the digital amplifier. For Standby mode, output High when no TX signal >5s, and low with TX signal >2s. |
| 6 | MUTE/SCL/GPIO | I/O | MUTE output or I2C SCL |
| 7 | LEFT | O | Left Channel output |
| 8 | RIGHT | O | Right Channel output |

Table [4]: EB350RP Pin Assignment

To get a more clean audio output for some high-end applications like wireless microphone, wireless speakers, one can add the following active low pass filter to the EB35E0RP output. This can help to further reduce the digital noise caused by the sigma-delta DAC. This is a 3 pole active low pass filter with a gain of 2 and a 20 KHz stop band.
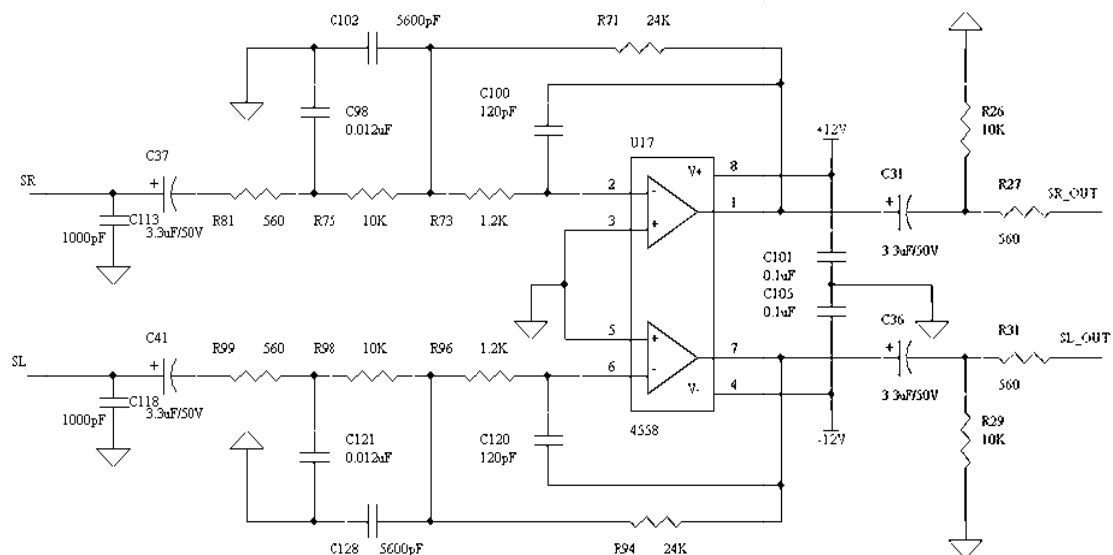


Figure [3]: Low-pass Filter Schematic for Receiver (Optional)

## Pairing

EB35E0x support ID matching to enable multi TX/RX operating in a same area. The RX will only receive the paired TX audio signals. To pair the TX and RX module, follow the below steps.

1) Press the TX POWER key long than 10 seconds when the TX is power down
2) The TX LED will flash until the key released indicating it is in paring mode and a new random ID is generated
3) Press the RX POWER key long than 10 seconds when the RX is power down
4) The RX LED will flash indicating it is in paring mode and when the RX acknowledge the TX ID, the RX will save this ID and restart.
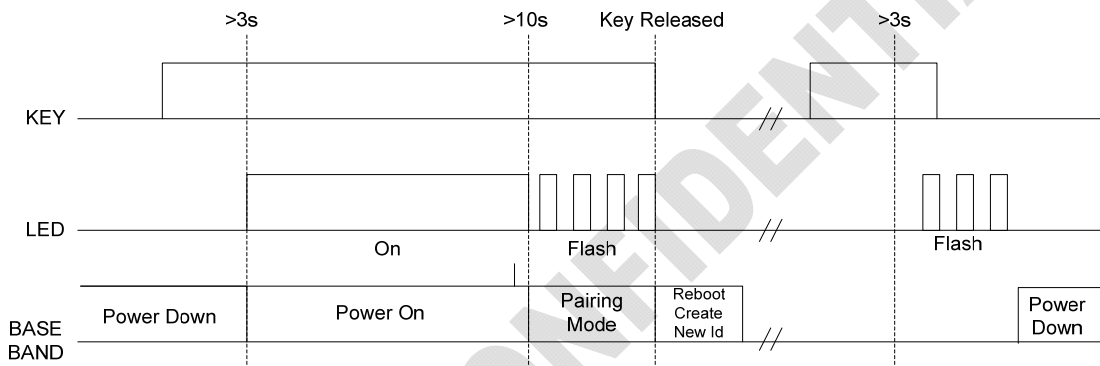5) The TX and RX are paired, and the RX can receive the TX signal.
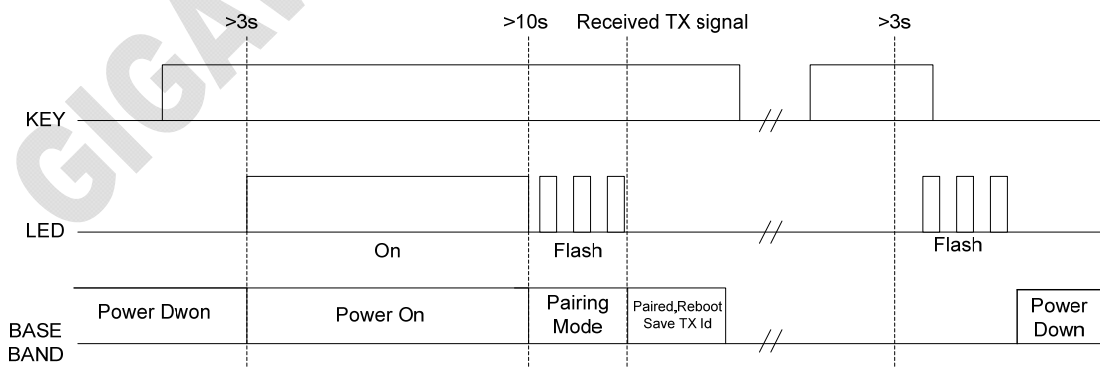


Figure [4]: TX Key and LED Timing



Figure [5]: RX Key and LED Timing

## Physical Dimension



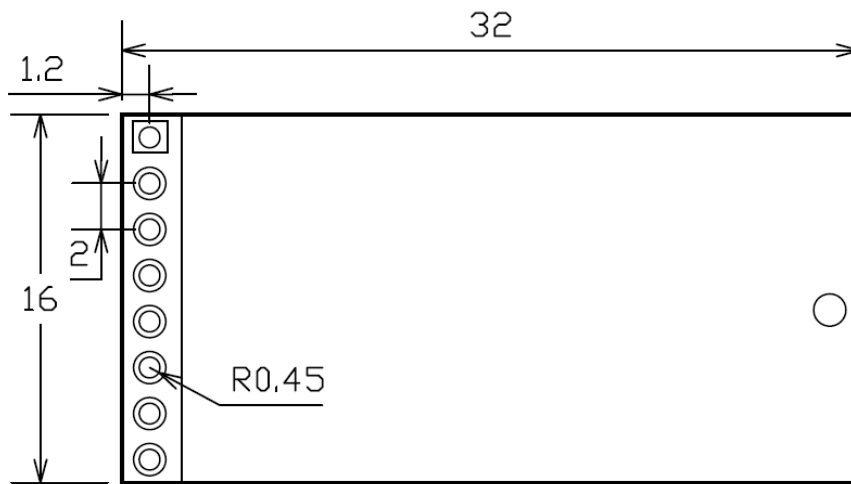Figure [6].  EB35E0TP Module outline



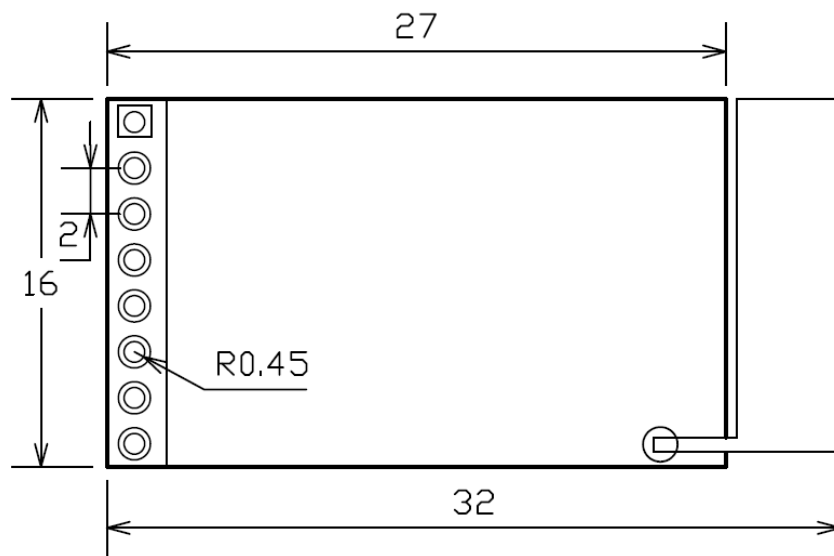Figure [7].  EB35E0RP Module outline

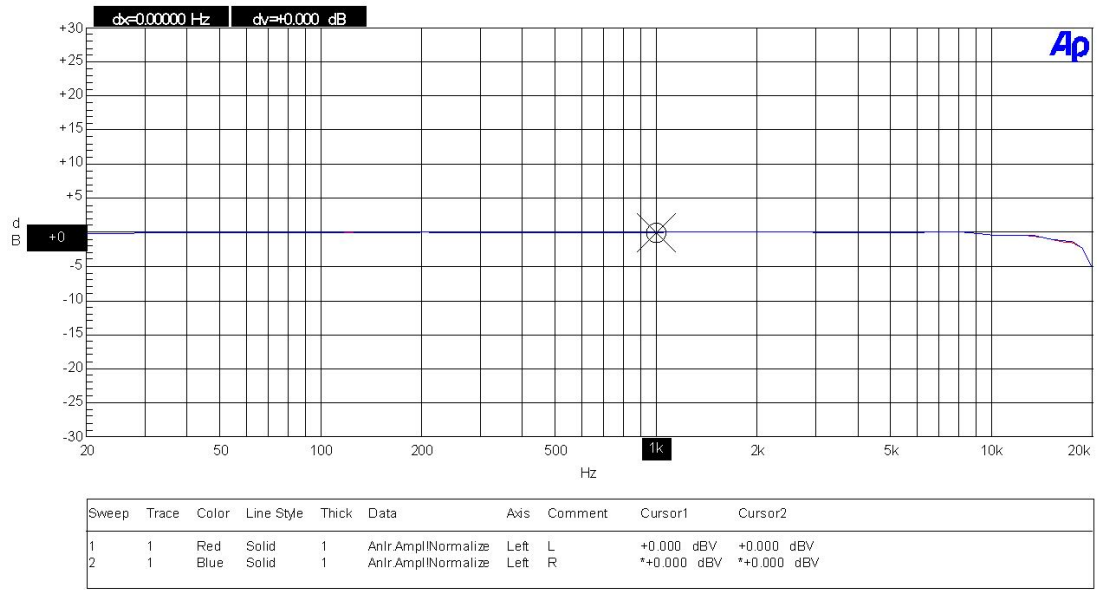INN                                    Frequency Response                                    04/05/07 15:04:42
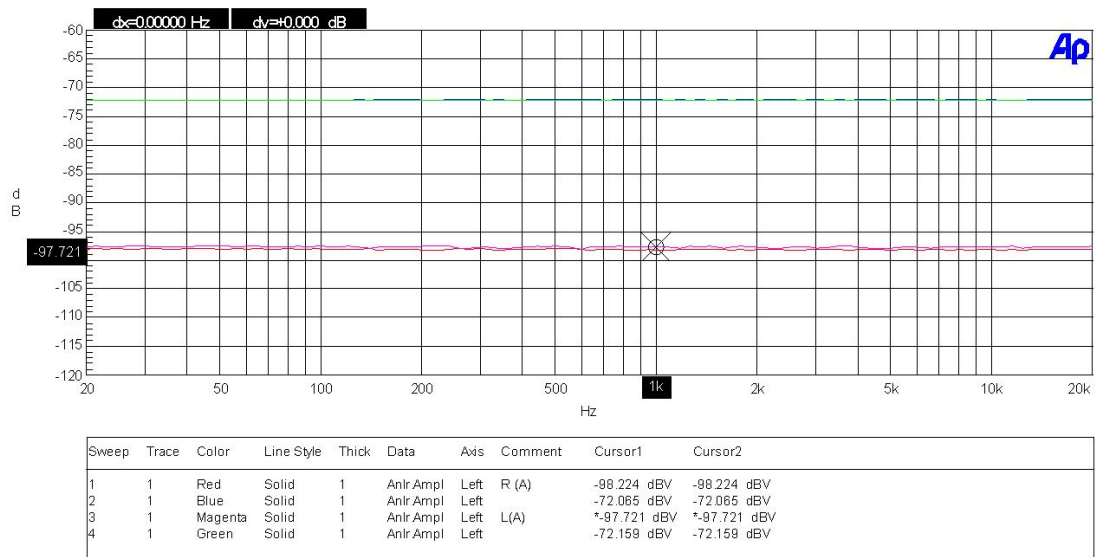


Figure [8].    EB35E0x Frequency Response

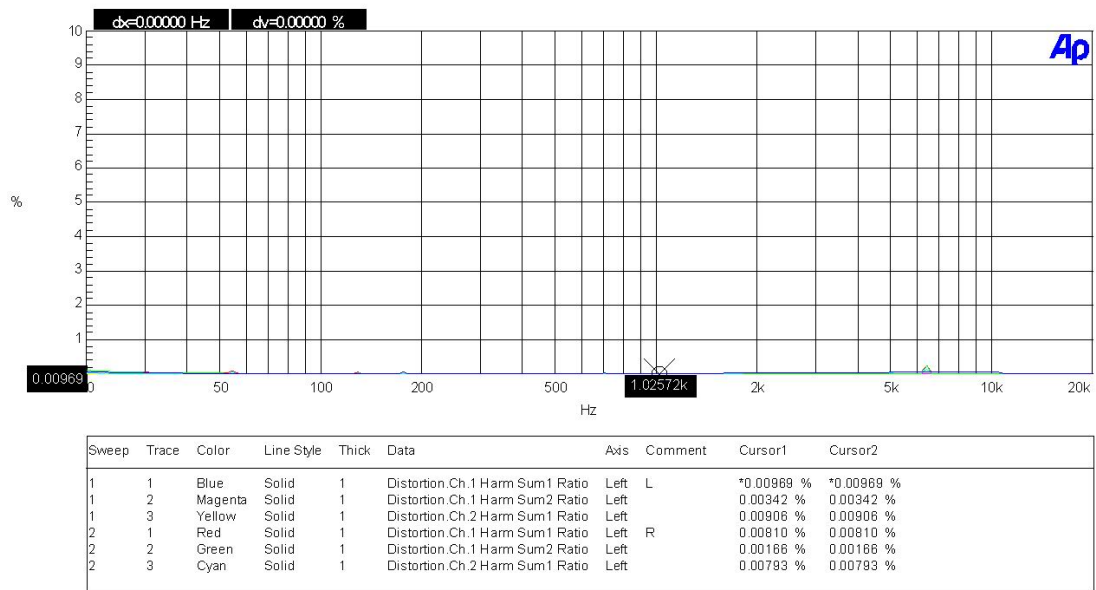INN                                              SN                                          04/05/07 15:38:52



Figure [9].    EB35E0x S/N

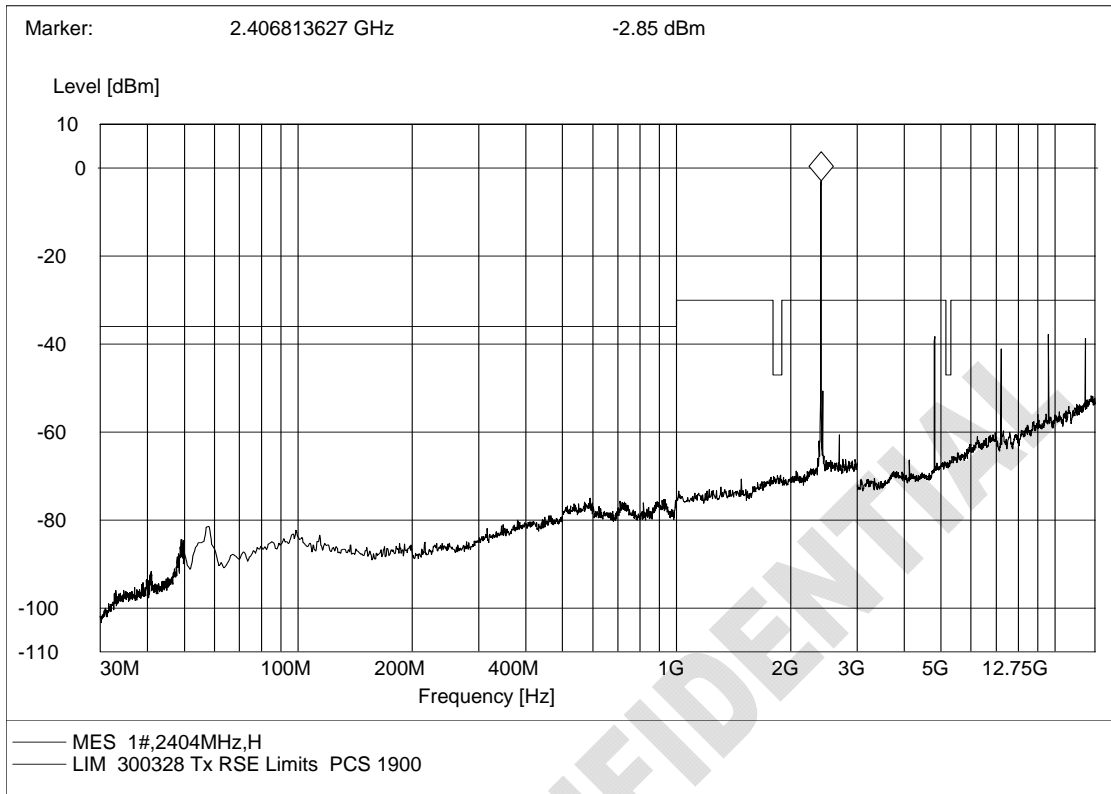| Sweep | Trace | Color | Line Style | Thick | Data | Axis | Comment | Cursor1 | Cursor2 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | Blue | Solid | 1 | Distortion.Ch.1 Harm Sum1 Ratio | Left | L | *0.00969 % | *0.00969 % |
| 1 | 2 | Magenta | Solid | 1 | Distortion.Ch.1 Harm Sum2 Ratio | Left | | 0.00342 % | 0.00342 % |
| 1 | 3 | Yellow | Solid | 1 | Distortion.Ch.2 Harm Sum1 Ratio | Left | | 0.00906 % | 0.00906 % |
| 2 | 1 | Red | Solid | 1 | Distortion.Ch.1 Harm Sum1 Ratio | Left | R | 0.00810 % | 0.00810 % |
| 2 | 2 | Green | Solid | 1 | Distortion.Ch.1 Harm Sum2 Ratio | Left | | 0.00166 % | 0.00166 % |
| 2 | 3 | Cyan | Solid | 1 | Distortion.Ch.2 Harm Sum1 Ratio | Left | | 0.00793 % | 0.00793 % |

Figure [10].    EB35E0x THD

Figure [11]: RF harmonic Test (Horizontal)
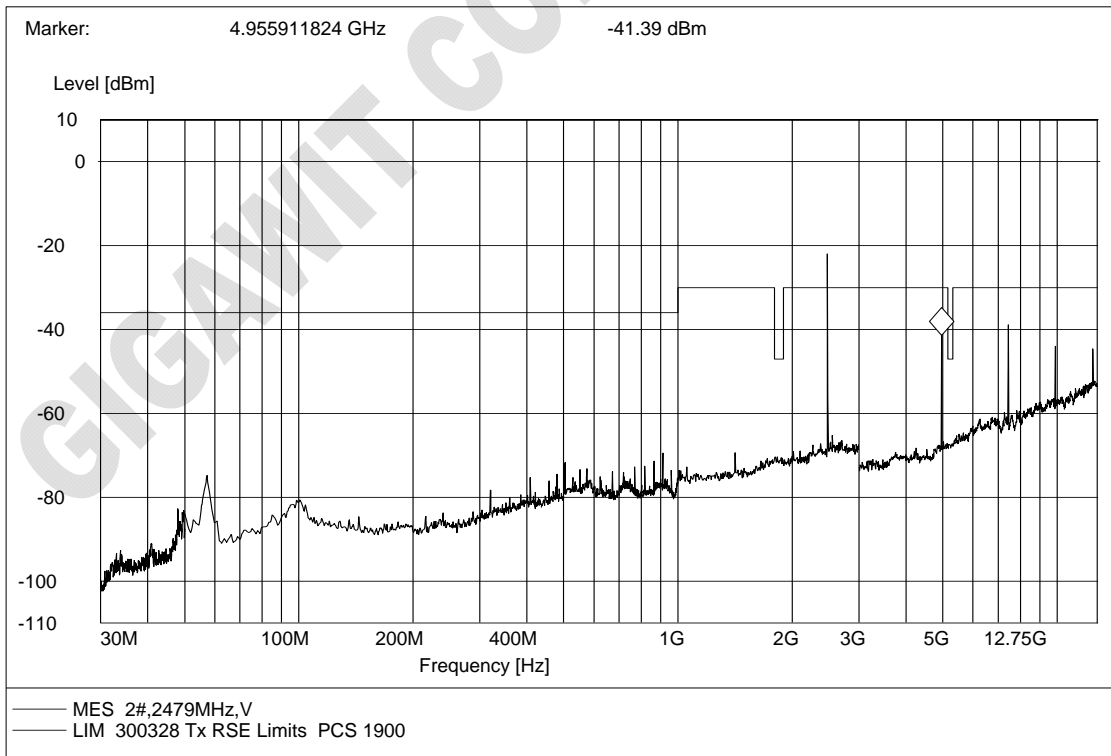


Figure [12]: RF harmonic Test (Vertical)

## Ordering Information

| Gigawit ID. | Description |
|---|---|
| EB35E0TP | E0 Transmitter Module |
| EB35E0RP | E0 Receiver Module |

## Contact:

捷电科技有限公司 Gigawit Electronics Limited

1003 Overseas Scholars Building, South Keyuan Road

Science Park, Nanshan District, 518057 Shenzhen, China

Tel:+86-755-86329300, Fax:+86-755-86329882

http://www.gigawit.com

**Notes:**