

## FCC- TEST REPORT

Report Number : **68.930.15.035.01** Date of Issue: August 16, 2015

Model : TMB-1490-BT

Product Type : Blood Pressure Monitor

Applicant : Guangdong Transtek Medical Electronics Co., Ltd

Address : Zone A, No. 105 Dongli Road, Torch Development District,  
528437 Zhongshan, Guangdong,  
PEOPLE'S REPUBLIC OF CHINA

Production Facility : Guangdong Transtek Medical Electronics Co., Ltd

Address : Zone B, No. 105 Dongli Road, Torch Development District,  
528437 Zhongshan, Guangdong,  
PEOPLE'S REPUBLIC OF CHINA

Test Result :  Positive  Negative

Total pages including Appendices : 27

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## 2 Details about the Test Laboratory

### Details about the Test Laboratory

#### Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch  
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### 3 Description of the Equipment under Test

#### Description of the Equipment Under Test

|                               |  |
|-------------------------------|--|
| Product:                      | Blood Pressure Monitor   |
| Model no.:                    | TMB-1490-BT  |
| FCC ID:                       | OU9TMB1490-B   |
| Options and accessories:      | NIL  |
| Rating:                       | 6.0VDC (supplied by 4 *1.5V "AAA" batteries)<br>AC adaptor powered mode: 6V 1A                         |
| RF Transmission<br>Frequency: | 2402-2480MHz   |
| No. of Operated Channel:      | 40   |
| Modulation:                   | GFSK   |
| Antenna Type:                 | PCB Antenna  |
| Antenna Gain:                 | 0dBi   |
| Description of the EUT:       | The Equipment Under Test (EUT) is a Blood Pressure Monitor with Bluetooth function operating at 2.4GHz |

## 4 Summary of Test Standards

| Test Standards                           |  |
|--|--|
| FCC Part 15 Subpart C<br>10-1-14 Edition | PART 15 - RADIO FREQUENCY DEVICES<br>Subpart C - Intentional Radiators |

All the test methods were according to KDB558074 D01 DTS Meas Guidance v03r02 and ANSI C63.10 (2013).

## 5 Summary of Test Results

| Technical Requirements   |            |           |                                     |                          |                                     |
|--|------------|-----------|-------------------------------------|--------------------------|-------------------------------------|
| FCC Part 15 Subpart C  |            |           |                                     |                          |                                     |
| Test Condition   | Pages      | Test Site | Test Result                         |                          |                                     |
|  |            |           | Pass                                | Fail                     | N/A                                 |
| §15.207 Conducted emission AC power port                         | 10         | Site 1    | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| §15.247 (b) (1) Conducted peak output power                      | 13         | Site 1    | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| §15.247(a)(1) 20dB bandwidth                                     | ---        | ---       | <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| §15.247(a)(1) Carrier frequency separation                       | ---        | ---       | <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| §15.247(a)(1)(iii) Number of hopping frequencies                 | ---        | ---       | <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| §15.247(a)(1)(iii) Dwell Time                                    | ---        | ---       | <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| §15.247(a)(2) 6dB bandwidth                                      | 14         | Site 1    | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| §15.247(e) Power spectral density                                | 16         | Site 1    | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| §15.247(d) Spurious RF conducted emissions                       | 17         | Site 1    | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| §15.247(d) Band edge   | 21         | Site 1    | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| §15.247(d) & §15.209 Spurious radiated emissions for transmitter | 23         | Site 1    | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| §15.203 Antenna requirement                                      | See note 1 |           | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |

Note 1: N/A – Not Applicable.

Note 2: The EUT uses a permanently PCB Antenna, which gain is 0dBi. According to §15.203, it is considered sufficiently to comply with the provisions of this section.

## 6 General Remarks

### Remarks

This submittal(s) (test report) is intended for FCC ID: OU9TMB1580-B, complies with Section 15.209, 15.247 of the FCC Part 15, Subpart C.

### SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

□ - **Not** Performed

The Equipment under Test

■ - **Fulfills** the general approval requirements.

□ - **Does not** fulfill the general approval requirements.

Sample Received Date: 16 June 2015

Testing Start Date: 23 June 2015

Testing End Date: 13 August 2015

- TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch -

Reviewed by:

Prepared by:

Tested by:



Phoebe Hu  
EMC Project Manager



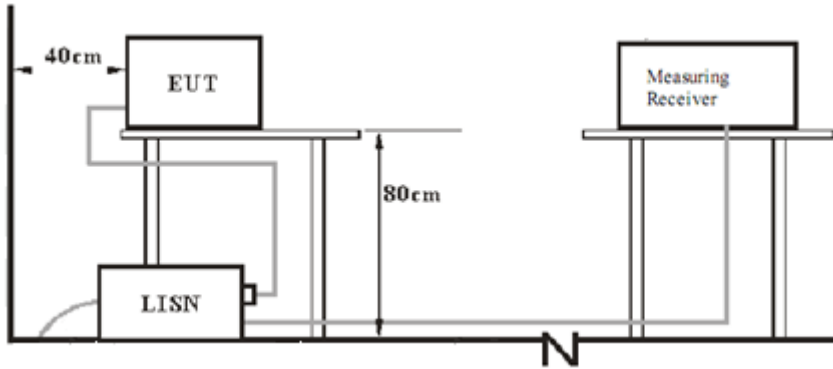
Felix Li  
EMC Project Engineer



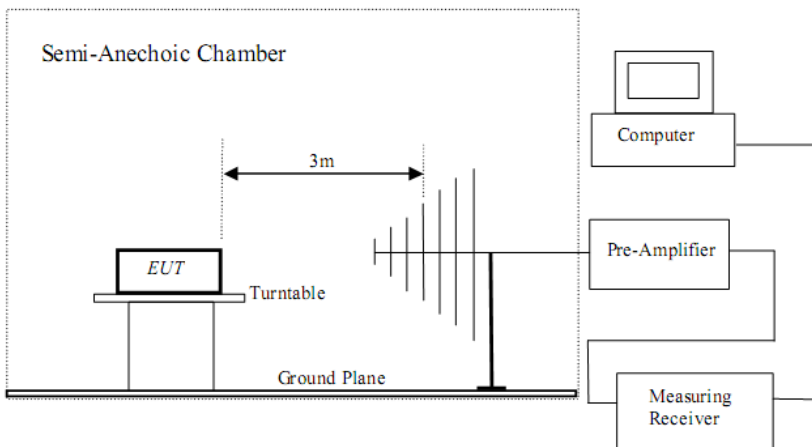
Leon Zhang  
EMC Test Engineer

## 7 Test Setups

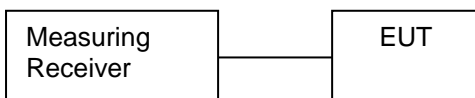
### 7.1 AC Power Line Conducted Emission test setups



### 7.2 Radiated test setups



### 7.3 Conducted RF test setups





## 8 Systems test configuration

Auxiliary Equipment Used during Test:

| DESCRIPTION | MANUFACTURER | MODEL NO.(SHIELD) | S/N(LENGTH) |
|-------------|--------------|-------------------|-------------|
| NoteBook    | Lenovo       | X240              | ---         |

Test software: BLE-CC254x-1.2.1 – Btool.exe, which used to control the EUT in continues transmitting mode.

The system was configured to channel 0, 19, and 39 for the test.

## 9 Technical Requirement

### 9.1 Conducted Emission

#### Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

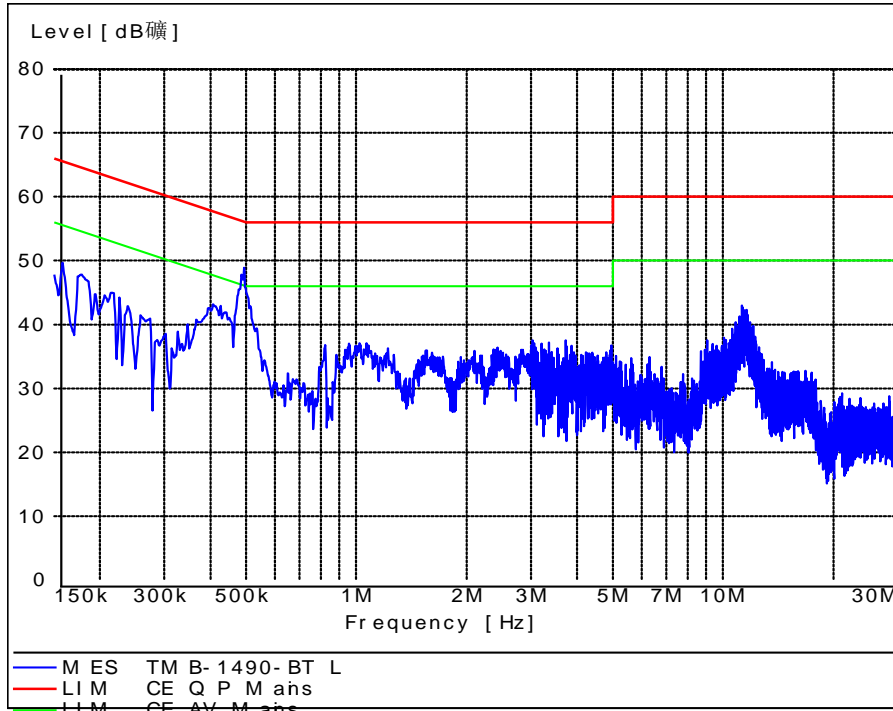
#### Limit

| Frequency<br>MHz | QP Limit<br>dB $\mu$ V | AV Limit<br>dB $\mu$ V |
|------------------|------------------------|------------------------|
| 0.150-0.500      | 66-56*                 | 56-46*                 |
| 0.500-5          | 56                     | 46                     |
| 5-30             | 60                     | 50                     |

Decreasing linearly with logarithm of the frequency

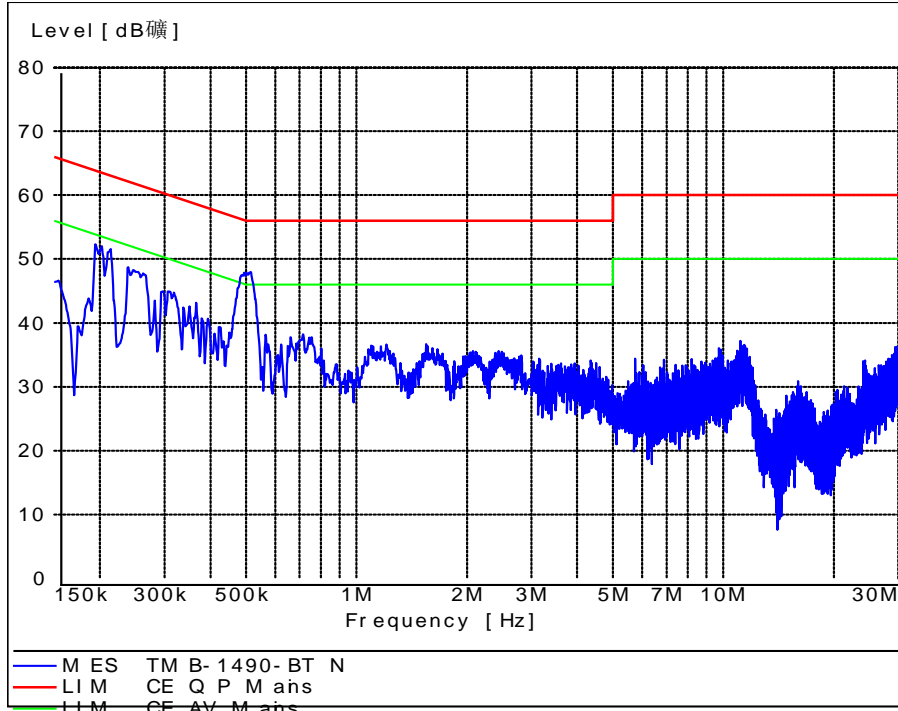
## Conducted Emission

Product Type : Blood Pressure Monitor  
 M/N : TMB-1490-BT  
 Operating Condition : TX Supplied by the adaptor  
 Test Specification : Live  
 Comment : AC 120V/60Hz



| Frequency<br>MHz | QP Test result<br>dBμV | QP Limit<br>dBμV | Margin<br>dB |
|------------------|------------------------|------------------|--------------|
| 0.158            | 56.0                   | 65.6             | 9.6          |
| 0.406            | 39.8                   | 57.7             | 17.9         |
| 0.494            | 45.6                   | 56.1             | 10.5         |
| Frequency<br>MHz | AV Test result<br>dBμV | AV Limit<br>dBμV | Margin<br>dB |
| 0.158            | 29.8                   | 55.6             | 25.8         |
| 0.406            | 25.6                   | 47.7             | 22.1         |
| 0.494            | 37.9                   | 46.1             | 8.2          |

Product Type : Blood Pressure Monitor  
 M/N : TMB-1490-BT  
 Operating Condition : TX Supplied by the adaptor  
 Test Specification : Neutral  
 Comment : AC 120V/60Hz



| Frequency<br>MHz | QP Test result<br>dBμV | QP Limit<br>dBμV | Margin<br>dB |
|------------------|------------------------|------------------|--------------|
| 0.194            | 46.9                   | 63.9             | 17           |
| 0.214            | 46.6                   | 63.0             | 16.4         |
| 0.514            | 47.5                   | 56.0             | 8.5          |
| Frequency<br>MHz | AV Test result<br>dBμV | AV Limit<br>dBμV | Margin<br>dB |
| 0.194            | 27.2                   | 53.9             | 26.7         |
| 0.214            | 28.6                   | 53.0             | 24.4         |
| 0.514            | 37.5                   | 46.0             | 8.5          |

## 9.2 Conducted peak output power

### Test Method

1. Use the following spectrum analyzer settings:  
RBW > the 6 dB bandwidth of the emission being measured, VBW $\geq$ 3RBW, Span $\geq$ 3RBW  
Sweep = auto, Detector function = peak, Trace = max hold.
2. Add a correction factor to the display.
3. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

### Limits

According to §15.247 (b) (1), conducted peak output power limit as below:

| Frequency Range<br>MHz | Limit<br>W | Limit<br>dBm |
|------------------------|------------|--------------|
| 2400-2483.5            | $\leq 1$   | $\leq 30$    |

Test result as below table

| Frequency<br>MHz       | Conducted Peak<br>Output Power<br>dBm | Result |
|------------------------|---------------------------------------|--------|
| Top channel 2402MHz    | -3.00                                 | Pass   |
| Middle channel 2440MHz | -3.13                                 | Pass   |
| Bottom channel 2480MHz | -3.47                                 | Pass   |

### 9.3 6dB bandwidth

#### Test Method

1. Use the following spectrum analyzer settings:  
RBW=100K, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 6 dB, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

#### Limit

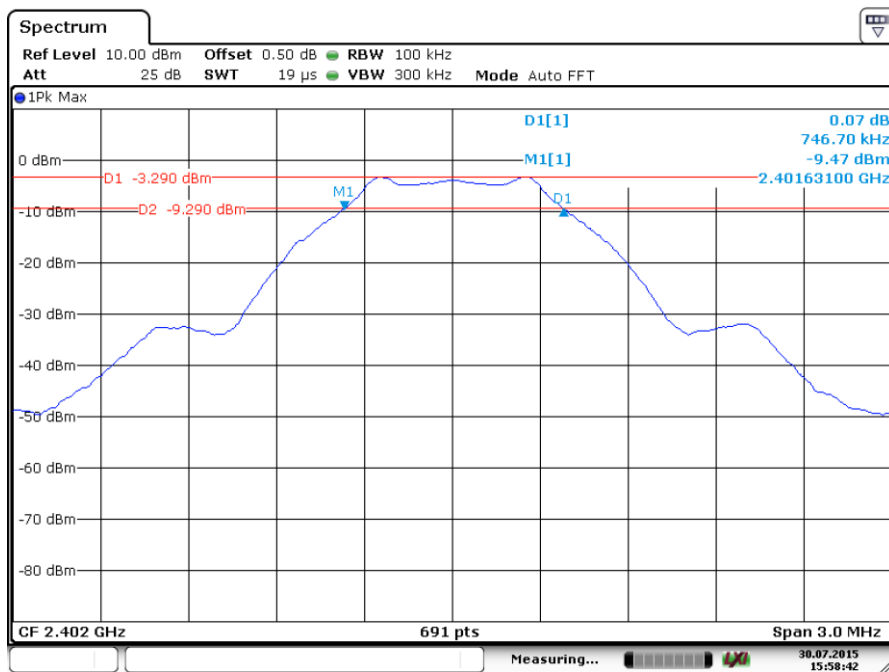
Limit [kHz]

≥500

#### Test result

| Frequency<br>MHz       | 6dB bandwidth<br>kHz | Result |
|------------------------|----------------------|--------|
| Top channel 2402MHz    | 746.7                | Pass   |
| Middle channel 2440MHz | 738.1                | Pass   |
| Bottom channel 2480MHz | 733.7                | Pass   |

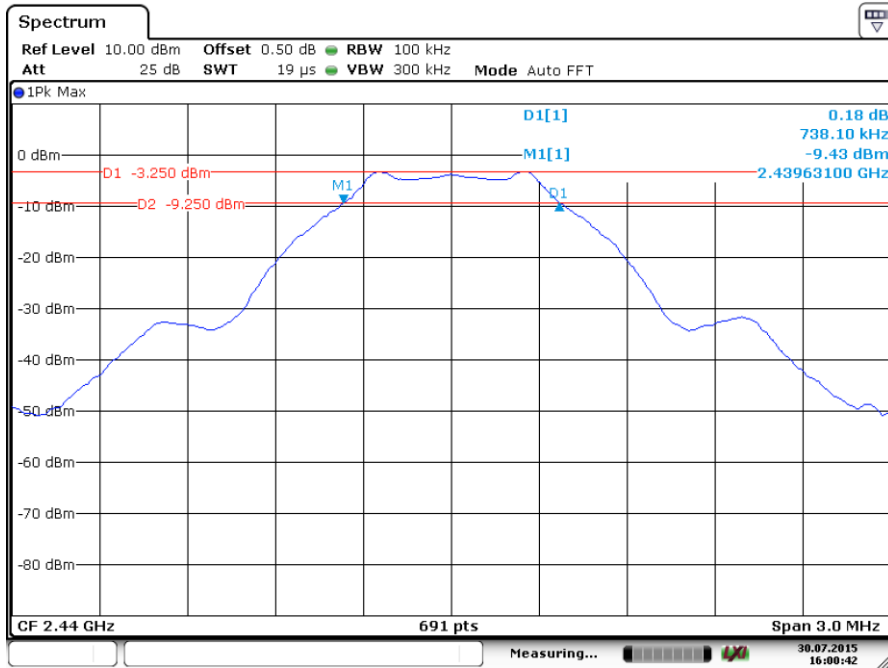
2402MHz



Date: 30.JUL.2015 15:58:41

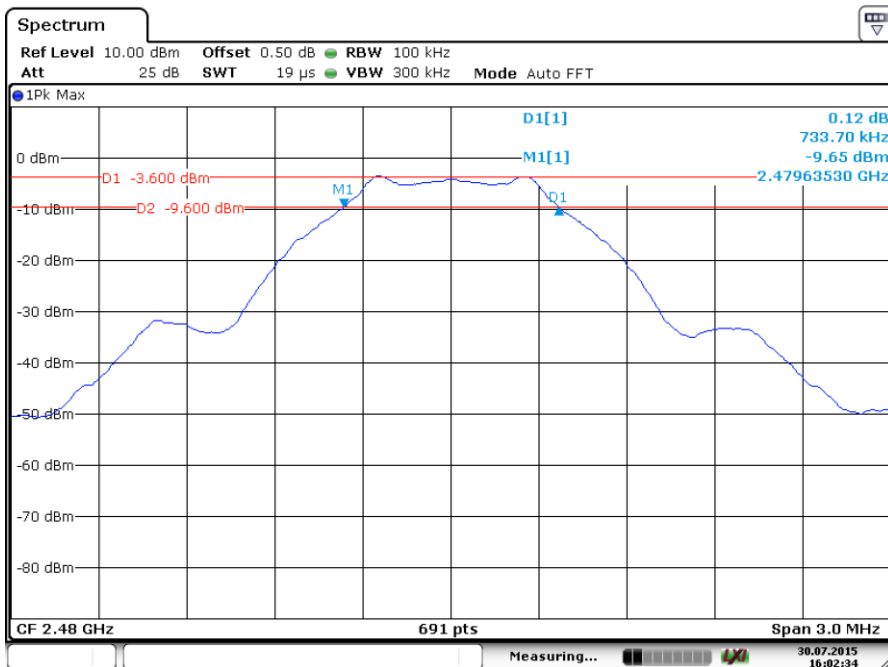
## 6dB bandwidth

### 2440MHz



Date: 30.JUL.2015 16:00:43

### 2480MHz



Date: 30.JUL.2015 16:02:34

## 9.4 Power spectral density

### Test Method

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance:

1. Set analyzer center frequency to DTS channel center frequency.  
RBW=3kHz,VBW≥3RBW,Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace= max hold.
2. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
3. Repeat above procedures until other frequencies measured were completed.

### Limit

Limit [dBm]

≤8

### Test result

| Frequency<br>MHz       | Power spectral<br>density<br>dBm | Result |
|------------------------|----------------------------------|--------|
| Top channel 2402MHz    | -14.55                           | Pass   |
| Middle channel 2440MHz | -14.11                           | Pass   |
| Bottom channel 2480MHz | -14.77                           | Pass   |



## 9.5 Spurious RF conducted emissions

### Test Method

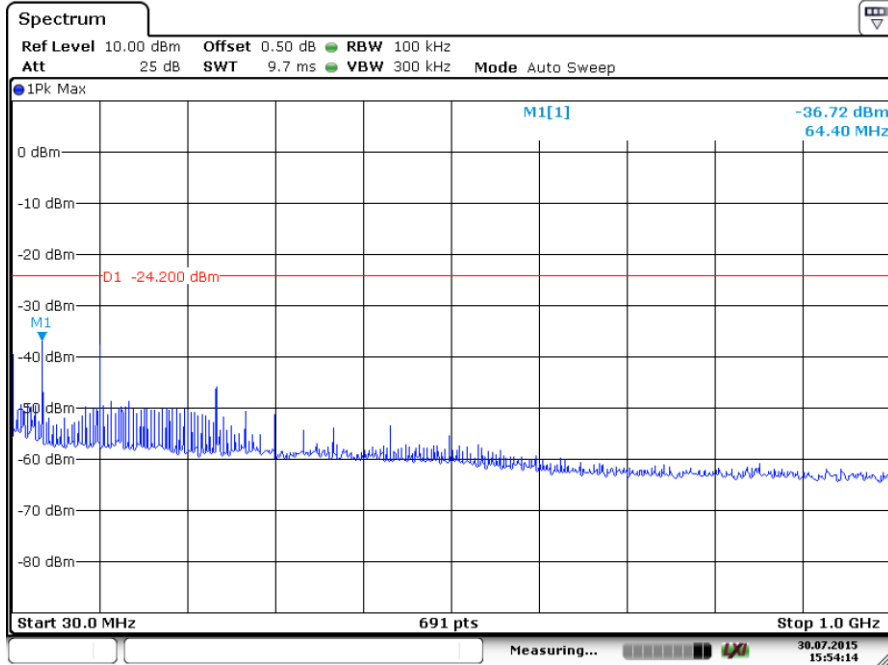
1. Establish a reference level by using the following procedure:
  - a. Set RBW=100 kHz. VBW $\geq$ 3RBW. Detector =peak, Sweep time = auto couple, Trace mode = max hold.
  - b. Allow trace to fully stabilize, use the peak marker function to determine the maximum PSD level.
2. Use the maximum PSD level to establish the reference level.
  - a. Set the center frequency and span to encompass frequency range to be measured.
  - b. Use the peak marker function to determine the maximum amplitude level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements, report the three highest emissions relative to the limit.
3. Repeat above procedures until other frequencies measured were completed.

### Limit

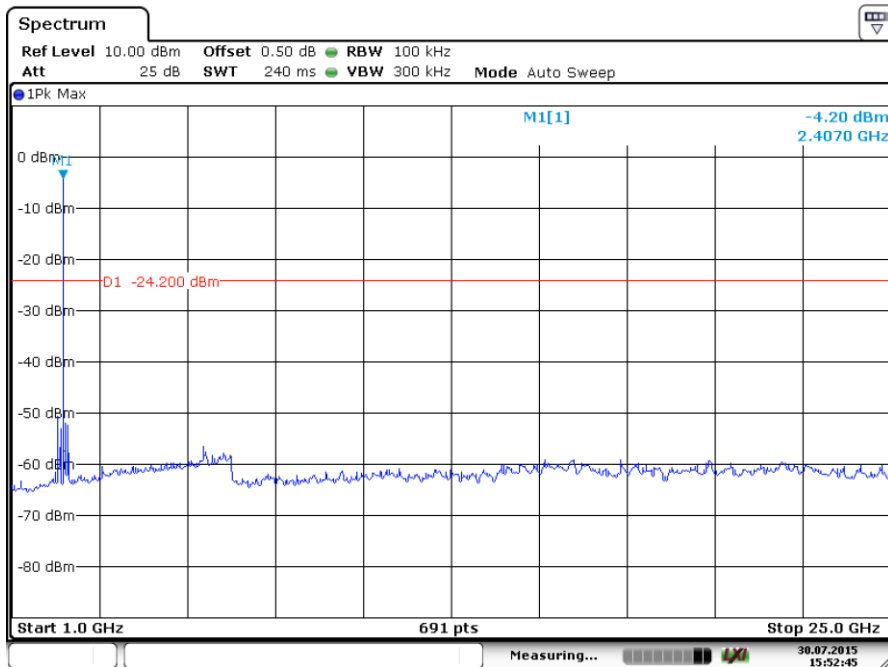
| Frequency Range<br>MHz | Limit (dBc) |
|------------------------|-------------|
| 30-25000               | -20         |

# Spurious RF conducted emissions

2402MHz



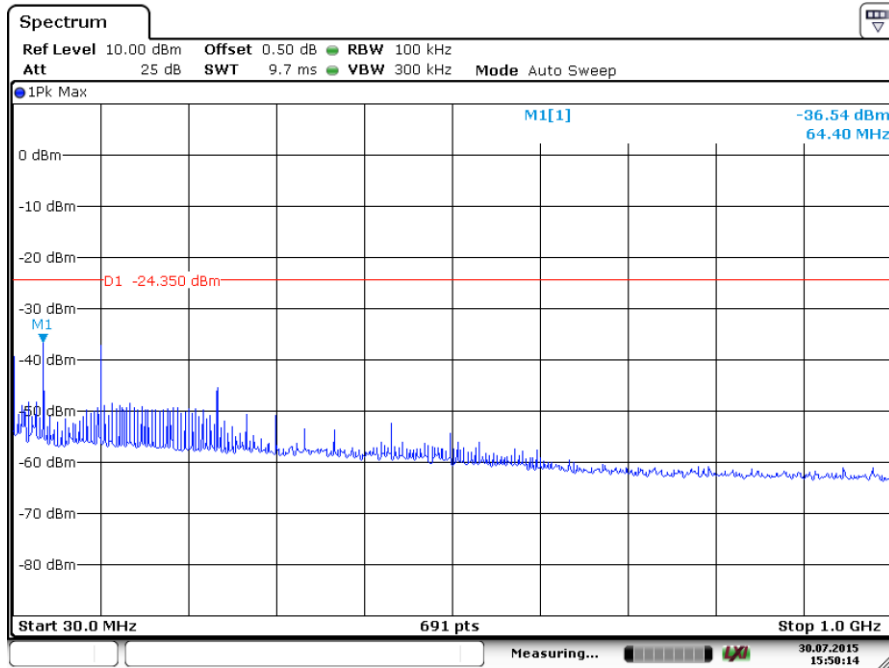
Date: 30.JUL.2015 15:54:14



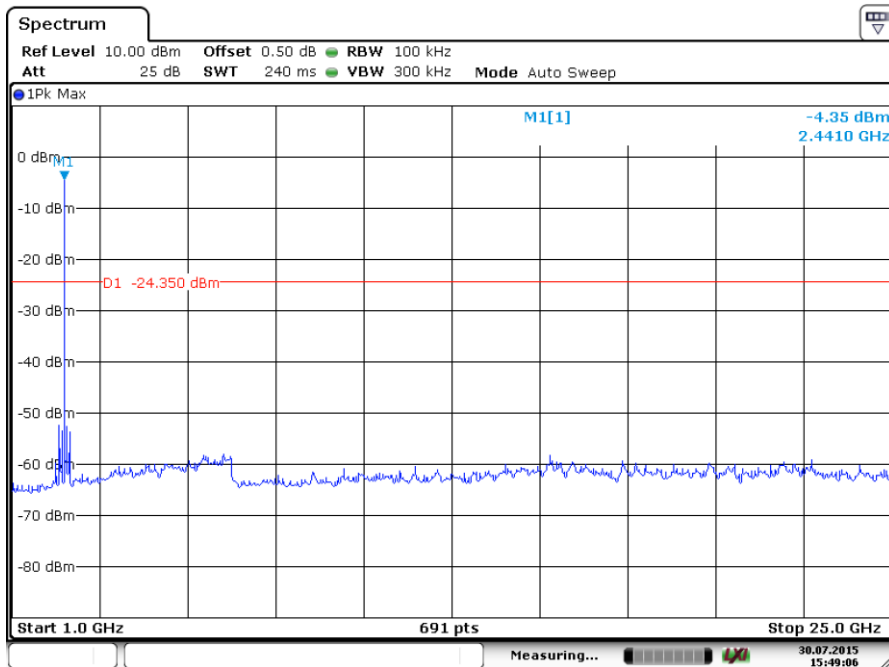
Date: 30.JUL.2015 15:52:45

## Spurious RF conducted emissions

2440MHz



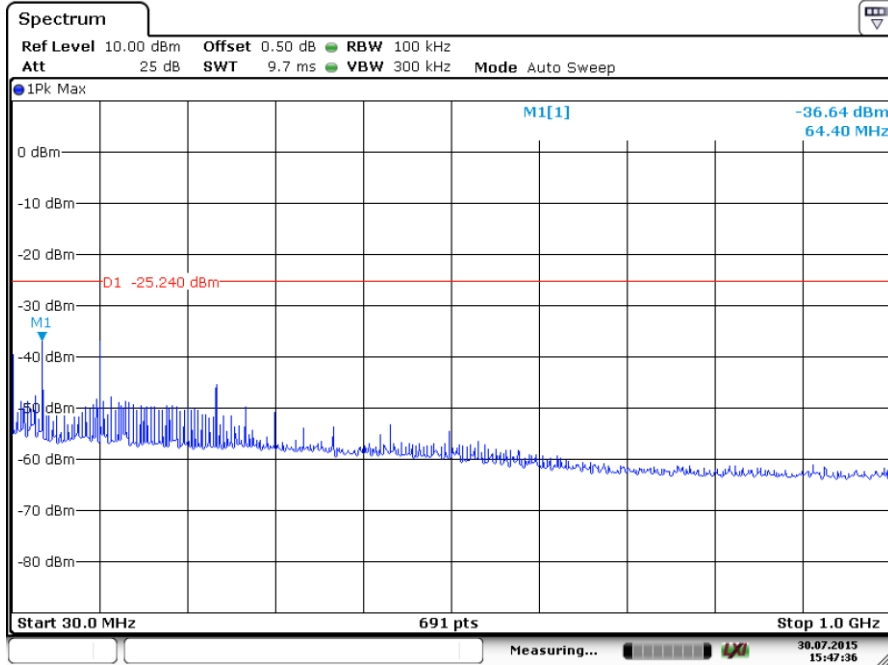
Date: 30.JUL.2015 15:50:14



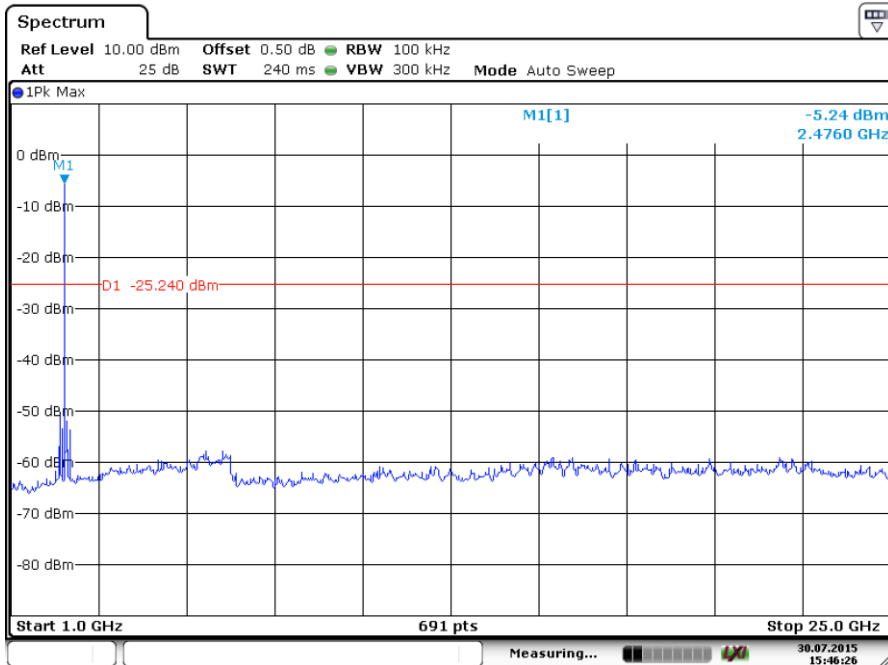
Date: 30.JUL.2015 15:49:06

# Spurious RF conducted emissions

2480MHz



Date: 30.JUL.2015 15:47:36



Date: 30.JUL.2015 15:46:26

## 9.6 Band edge

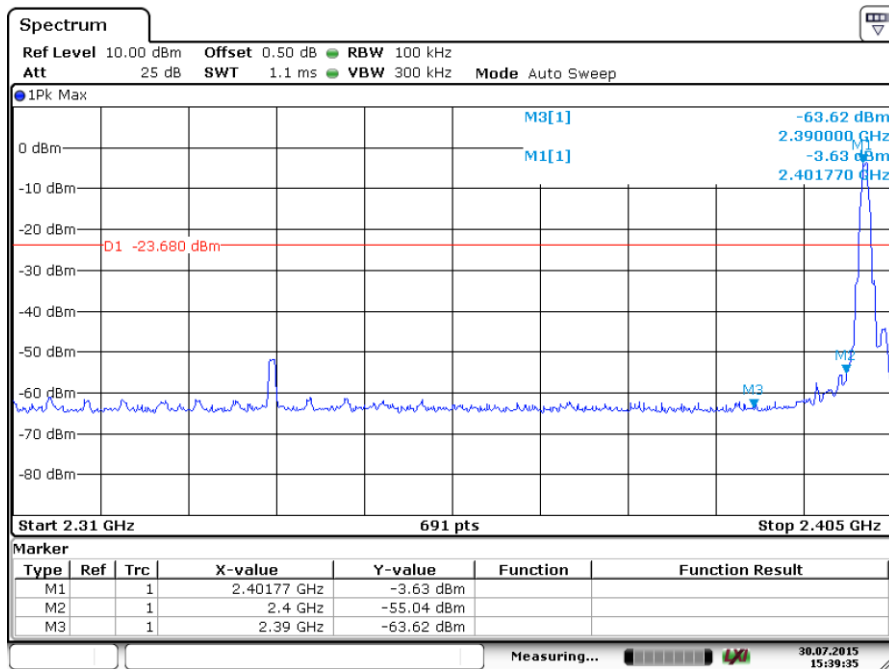
### Test Method

- 1 Use the following spectrum analyzer settings:  
Span = wide enough to capture the peak level of the in-band emission and all spurious  
RBW = 100 kHz, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold.
- 2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
- 3 The level displayed must comply with the limit specified in this Section.

### Limit

| Frequency Range<br>MHz | Limit (dBc) |
|------------------------|-------------|
| 30-25000               | -20         |

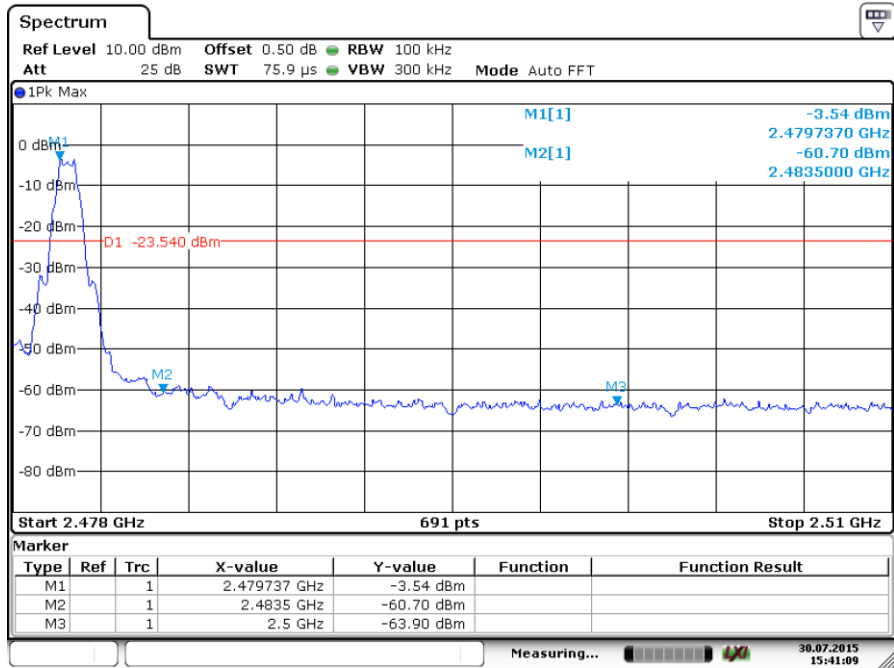
### Test result



Date: 30.JUL.2015 15:39:36

2402MHz

**Band edge**



Date: 30.JUL.2015 15:41:10

2480MHz

## 9.7 Spurious radiated emissions for transmitter

### Test Method

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
3. Use the following spectrum analyzer settings:  
Span = wide enough to fully capture the emission being measured, RBW = 1 MHz for  $f \geq 1$ GHz, 100 kHz for  $f < 1$  GHz, VBW  $\geq$  RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Follow the guidelines in ANSI C63.4-2009 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the duty cycle per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from  $20\log(\text{duty cycle}/100 \text{ ms})$ , in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

### Limit

According to part 15.247(d), the radio emission outside the operating frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section 15.205, must comply with the radiated emission limits specified in section 15.209.

| Frequency<br>MHz | Field Strength<br>uV/m | Field Strength<br>dB $\mu$ V/m | Detector |
|------------------|------------------------|--------------------------------|----------|
| 30-88            | 100                    | 40                             | QP       |
| 88-216           | 150                    | 43.5                           | QP       |
| 216-960          | 200                    | 46                             | QP       |
| 960-1000         | 500                    | 54                             | QP       |
| Above 1000       | 500                    | 54                             | AV       |
| Above 1000       | 5000                   | 74                             | PK       |

## Spurious radiated emissions for transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

### Transmitting spurious emission test result as below:

#### Bluetooth Mode GFSK Modulation 2402MHz Test Result

| Frequency | Emission Level | Polarization | Limit  | Detector | Margin | Result |
|-----------|----------------|--------------|--------|----------|--------|--------|
| MHz       | dBuV/m         |              | dBuV/m |          | dBuV/m |        |
| 121.18    | 33.90          | H            | 43.50  | QP       | 8.15   | Pass   |
| 142.37    | 35.35          | H            | 43.50  | QP       | 4.24   | Pass   |
| 366.52    | 41.76          | H            | 46.00  | QP       | 8.15   | Pass   |
| *4804     | --             | H            | 74.00  | PK       | --     | Pass   |
| *7206     | --             | H            | 74.00  | PK       | --     | Pass   |
| 32.00     | 36.93          | V            | 40.00  | QP       | 3.07   | Pass   |
| 34.42     | 35.46          | V            | 40.00  | QP       | 4.54   | Pass   |
| 63.95     | 31.95          | V            | 40.00  | QP       | 8.05   | Pass   |
| *4804     | --             | V            | 74.00  | PK       | --     | Pass   |
| *7206     | --             | V            | 74.00  | PK       | --     | Pass   |

#### Bluetooth Mode GFSK Modulation 2440 MHz Test Result

| Frequency | Emission Level | Polarization | Limit  | Detector | Margin | Result |
|-----------|----------------|--------------|--------|----------|--------|--------|
| MHz       | dBuV/m         |              | dBuV/m |          | dBuV/m |        |
| 4880      | --             | H            | 74.00  | PK       | --     | Pass   |
| 7320      | --             | H            | 74.00  | PK       | --     | Pass   |
| 4880      | --             | V            | 74.00  | PK       | --     | Pass   |
| 7320      | --             | V            | 74.00  | PK       | --     | Pass   |



## Bluetooth Mode GFSK Modulation 2480MHz Test Result

| Frequency | Emission Level | Polarization | Limit  | Detector | Margin | Result |
|-----------|----------------|--------------|--------|----------|--------|--------|
| MHz       | dBuV/m         |              | dBμV/m |          | dBuV/m |        |
| *4960     | --             | H            | 74.00  | PK       | --     | Pass   |
| *7440     | --             | H            | 74.00  | PK       | --     | Pass   |
| *4960     | --             | V            | 74.00  | PK       | --     | Pass   |
| *7440     | --             | V            | 74.00  | PK       | --     | Pass   |

## Remark:

- (1) QP Emission Level= Antenna Factor +Cable Loss + Reading  
 PK Emission Level= Antenna Factor +Cable Loss - Amp. Factor + Reading  
 AV Emission Level= PK Emission Level+20log (duty cycle) or set the RBW/VBW to be 1MHz/10Hz to read the level.
- (2) Data of measurement within 30-25000MHz frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.
- (3) "\*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

## 10 Test Equipment List

### List of Test Instruments

|    | DESCRIPTION                         | MANUFACTURER    | MODEL NO. | SERIAL NO. | CAL. DUE DATE |
|----|-------------------------------------|-----------------|-----------|------------|---------------|
| C  | Signal Analyzer                     | Rohde & Schwarz | FSV40     | 101031     | 2015-8-17     |
| RE | Trilog Super Broadband Test Antenna | Schwarzbeck     | VULB 9163 | 708        | 2017-8-17     |
|    | Horn Antenna                        | Rohde & Schwarz | HF907     | 102295     | 2017-8-17     |
|    | Pre-amplifier                       | Rohde & Schwarz | SCU 18    | 102230     | 2015-8-17     |
|    | Pre-amplifier                       | Rohde & Schwarz | SCU 40A   | 100432     | 2015-8-17     |
|    | 3m Semi-anechoic chamber            | TDK             | 9X6X6     | ----       | 2019-5-29     |

#### C - Conducted RF tests

- Conducted peak output power
- 6dB bandwidth
- Power spectral density\*
- Spurious RF conducted emissions
- Band edge

## 11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty

| Items   | Extended Uncertainty                    |
|---|---|
| Uncertainty for Radiated Spurious Emission 25MHz-3000MHz    | Horizontal: 4.95dB;<br>Vertical: 5.02dB |
| Uncertainty for Radiated Spurious Emission 3000MHz-18000MHz | Horizontal: 4.89dB;<br>Vertical: 4.88dB |
| Output power test   | 2.04dB                                  |
| Power density test  | 2.04dB                                  |
| Bandwidth   | $1.1 \times 10^{-7}$                    |