

## FCC- TEST REPORT

Report Number : **68.930.15.037.01** Date of Issue: October 10, 2015

Model : TMB-1491-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-1491-BT
FCC ID:	OU9TMB1491-B
Options and accessories:	NIL
Rating:	6.0VDC (supplied by 4 *1.5V "AAA" batteries) AC adaptor powered mode: 6V 1A
RF Transmission 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 10-1-14 Edition	PART 15 - RADIO FREQUENCY DEVICES 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: OU9TMB1491-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



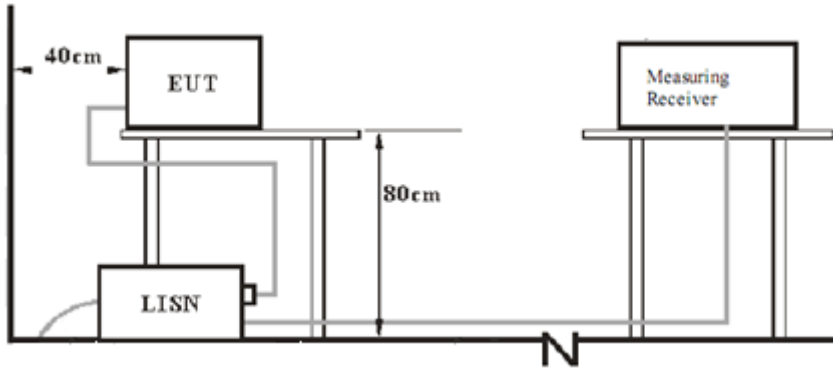
Felix Li  
EMC Project Engineer



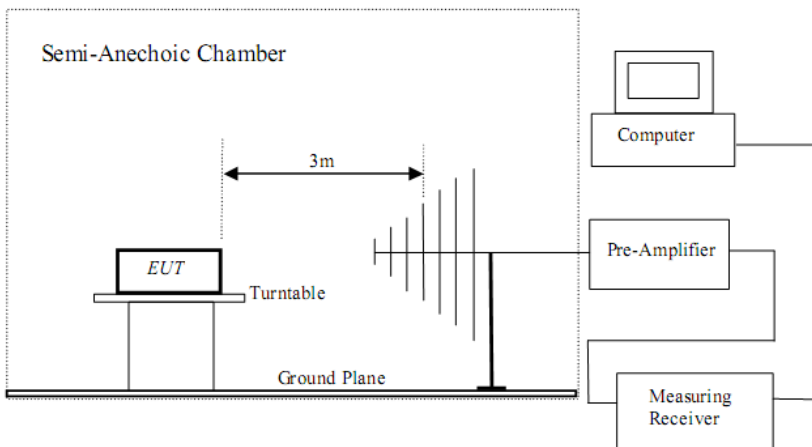
Leon Zhang  
EMC Test Engineer

## 7 Test Setups

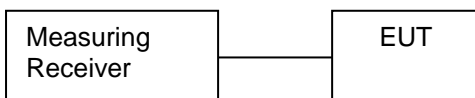
### 7.1 AC Power Line Conducted Emission test setups



### 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: Nrfgostudio.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

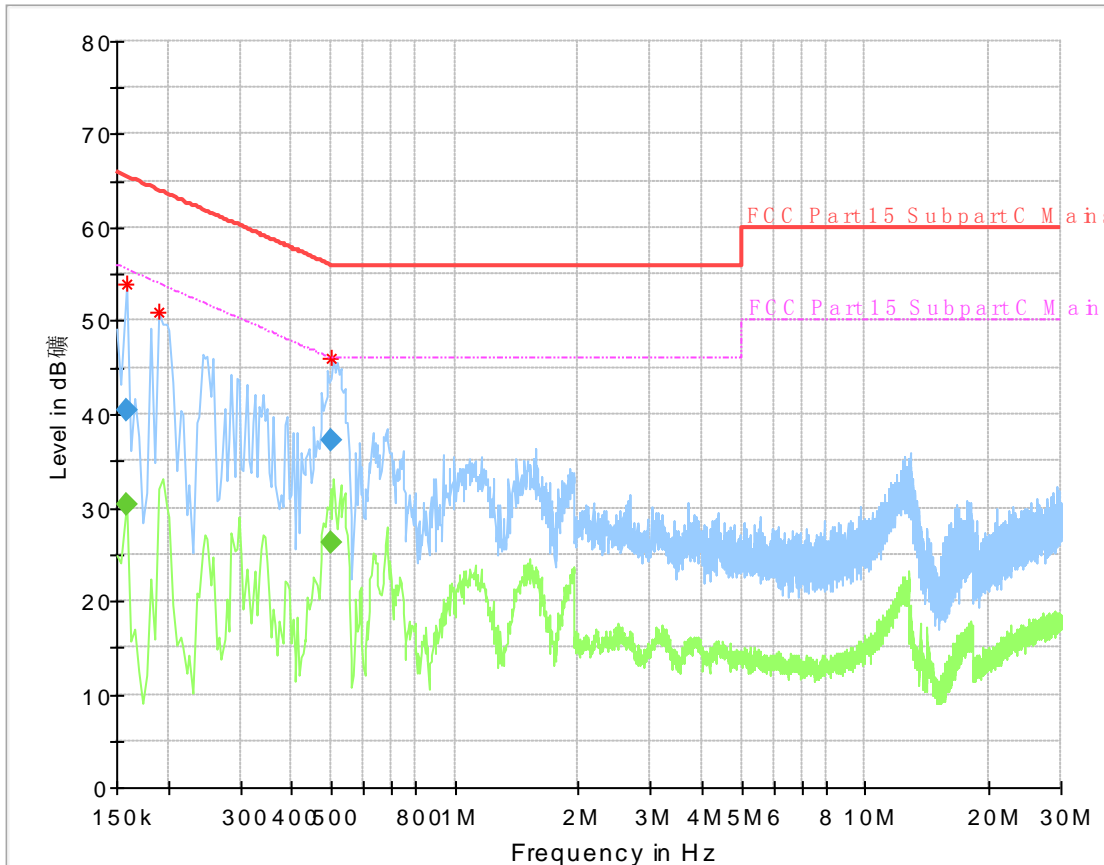
#### Limit

Frequency MHz	QP Limit dB $\mu$ V	AV Limit 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

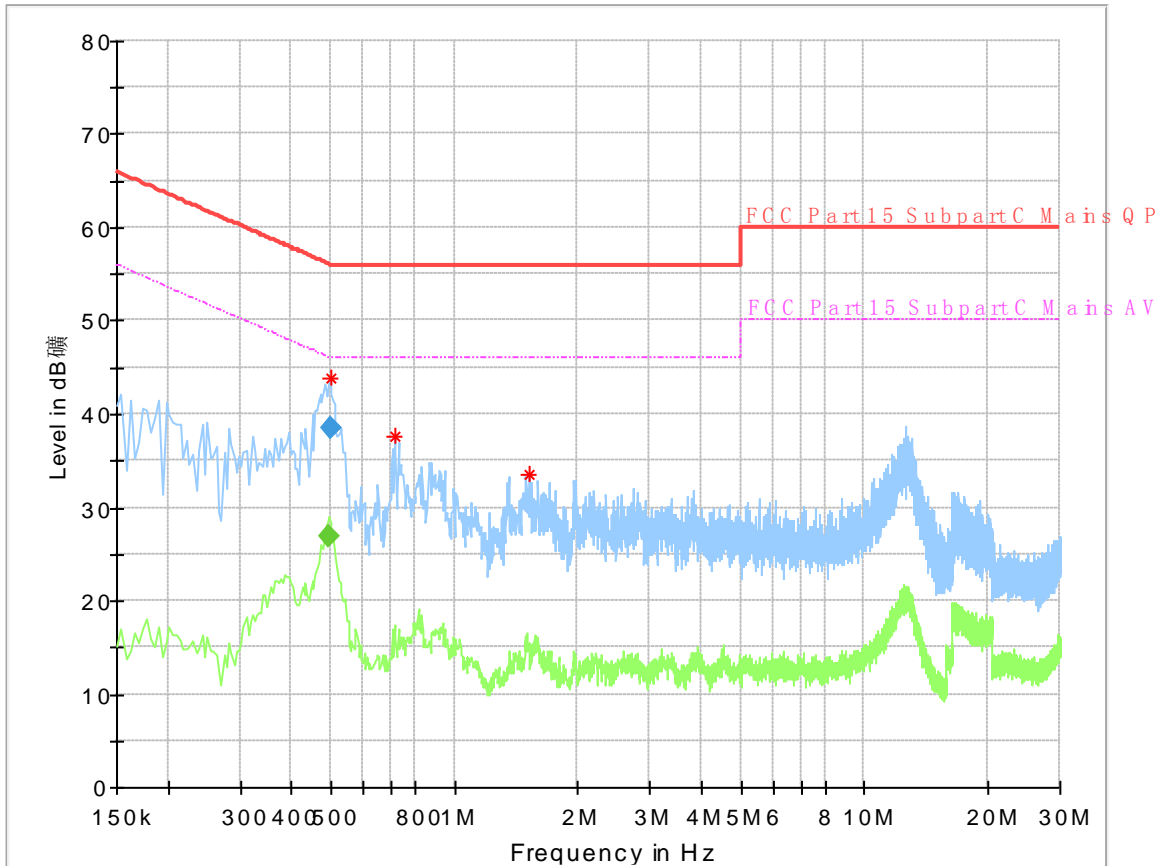
## Conducted Emission

Product Type : Blood Pressure Monitor  
 M/N : TMB-1491-BT  
 Operating Condition : TX Supplied by the adaptor  
 Test Specification : Live  
 Comment : AC 120V/60Hz



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.158000	---	30.38	55.34	24.96	L1	9.6
0.158000	40.46	---	65.34	34.88	L1	9.6
0.501500	---	26.16	46.00	19.84	L1	10.1
0.501500	37.24	---	56.00	18.76	L1	10.1

Product Type : Blood Pressure Monitor  
 M/N : TMB-1491-BT  
 Operating Condition : TX Supplied by the adaptor  
 Test Specification : Neutral  
 Comment : AC 120V/60Hz



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.494000	---	26.79	46.00	19.21	N	10.0
0.502500	38.43	---	56.00	17.57	N	10.0

## 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≥3RBW, Span≥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 MHz	Limit W	Limit dBm
2400-2483.5	≤1	≤30

Test result as below table

Frequency MHz	Conducted Peak Output Power dBm	Result
Top channel 2402MHz	-0.39	Pass
Middle channel 2440MHz	-0.91	Pass
Bottom channel 2480MHz	-1.73	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

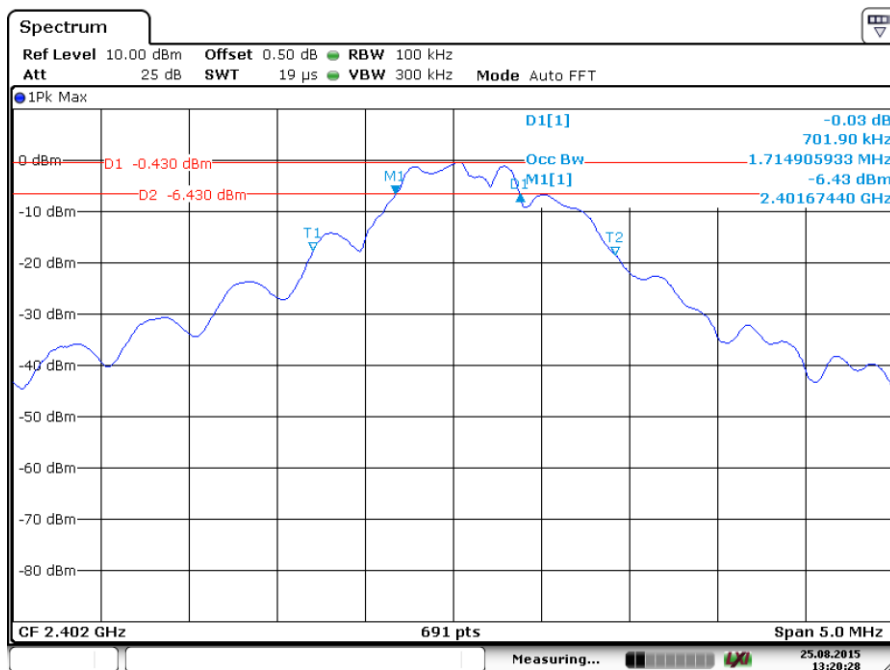
Limit [kHz]

≥500

#### Test result

Frequency MHz	6dB bandwidth kHz	Result
Top channel 2402MHz	701.9	Pass
Middle channel 2440MHz	955.1	Pass
Bottom channel 2480MHz	687.4	Pass

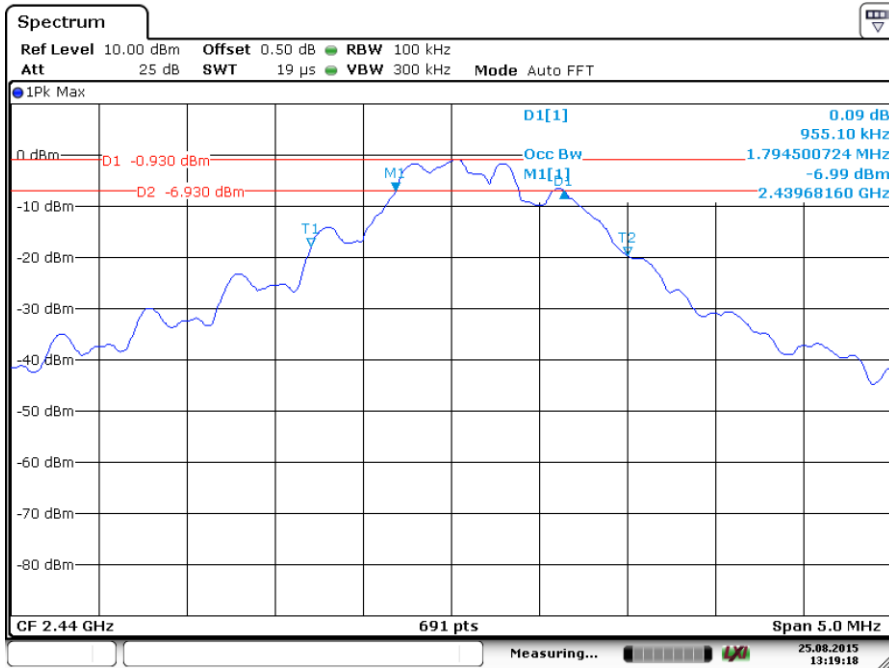
2402MHz



Date: 25.AUG.2015 13:20:28

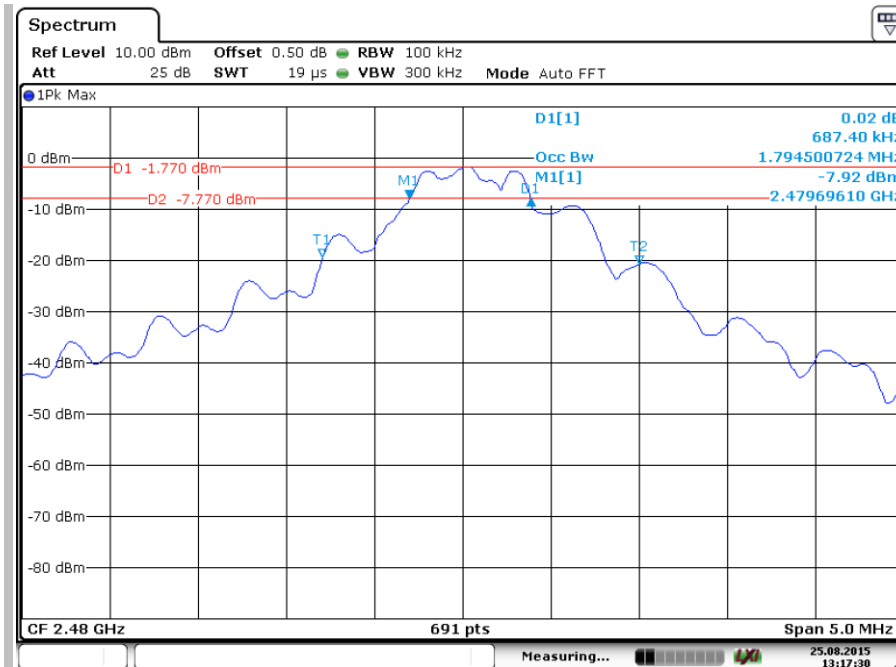
## 6dB bandwidth

### 2440MHz



Date: 25.AUG.2015 13:19:18

### 2480MHz



Date: 25.AUG.2015 13:17:30

## 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 MHz	Power spectral density dBm	Result
Top channel 2402MHz	-15.21	Pass
Middle channel 2440MHz	-15.07	Pass
Bottom channel 2480MHz	-15.64	Pass



## 9.5 Spurious RF conducted emissions

### Test Method

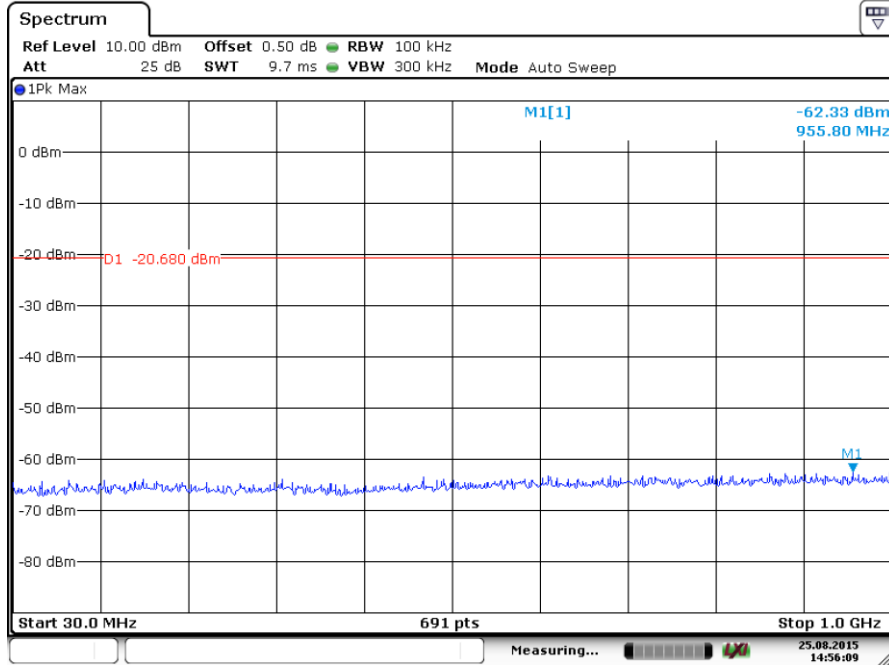
1. Establish a reference level by using the following procedure:
  - a. Set RBW=100 kHz. VBW $\geq$ 3RBW. Detector =peak, Sweep time = auto couple, Trace mode = max hold.
  - b. Allow trace to fully stabilize, use the peak marker function to determine the maximum PSD level.
2. Use the maximum PSD level 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

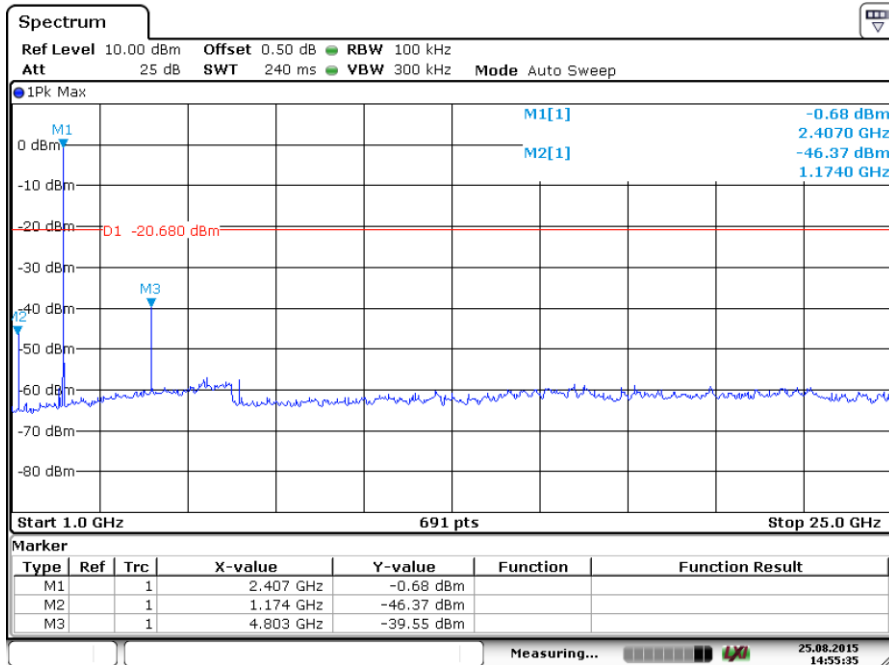
Frequency Range MHz	Limit (dBc)
30-25000	-20

## Spurious RF conducted emissions

2402MHz



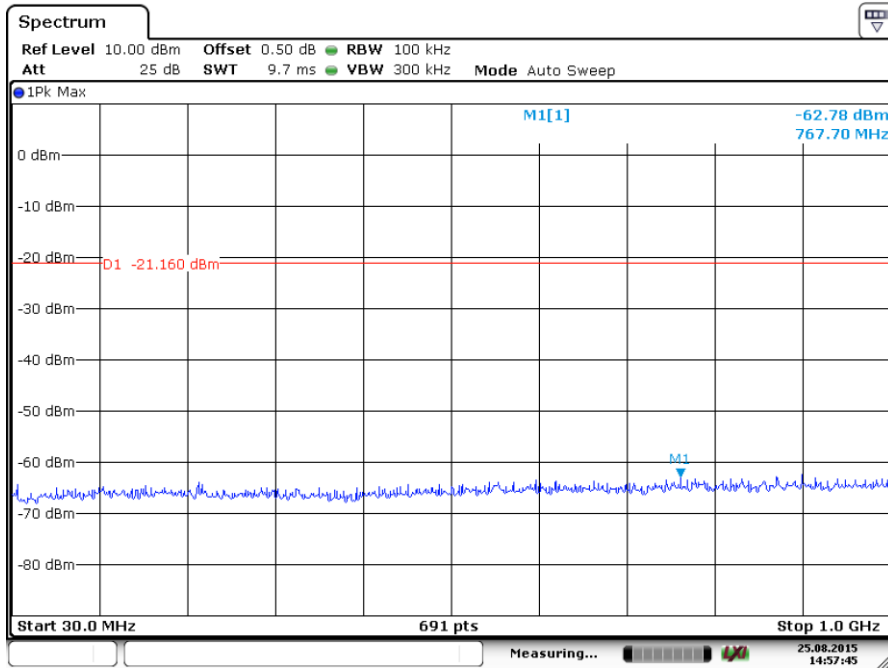
Date: 25.AUG.2015 14:56:10



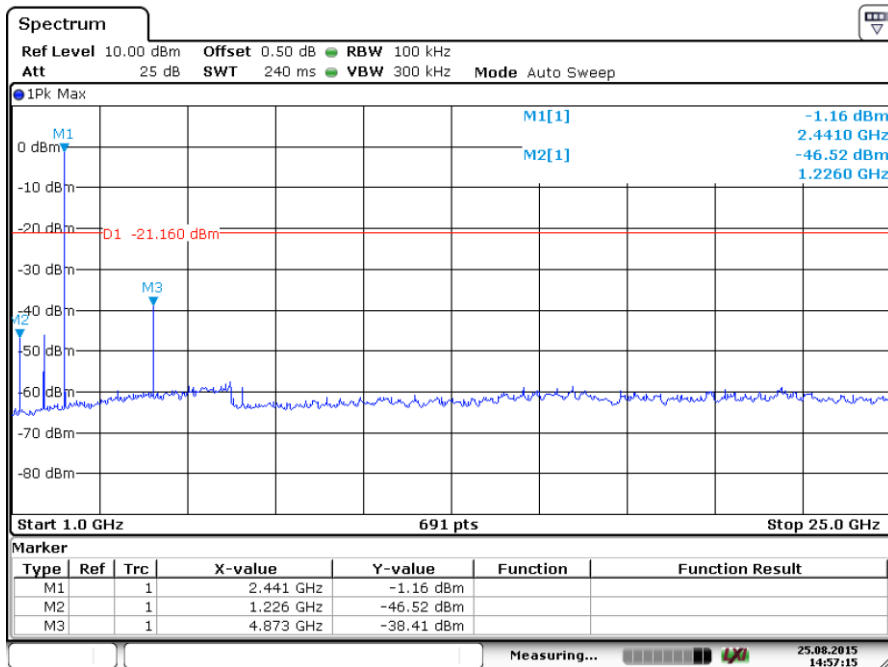
Date: 25.AUG.2015 14:55:35

## Spurious RF conducted emissions

2440MHz



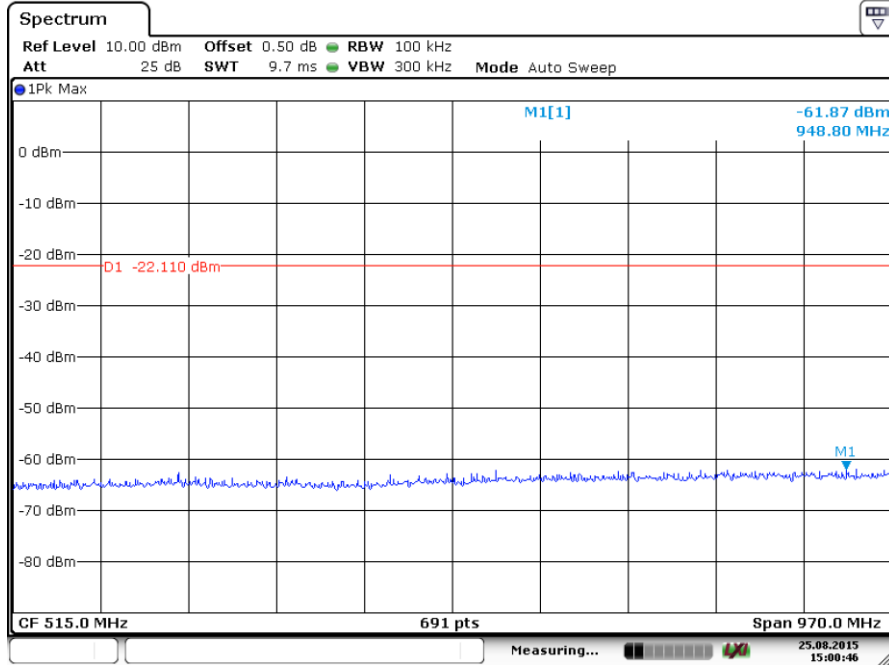
Date: 25.AUG.2015 14:57:45



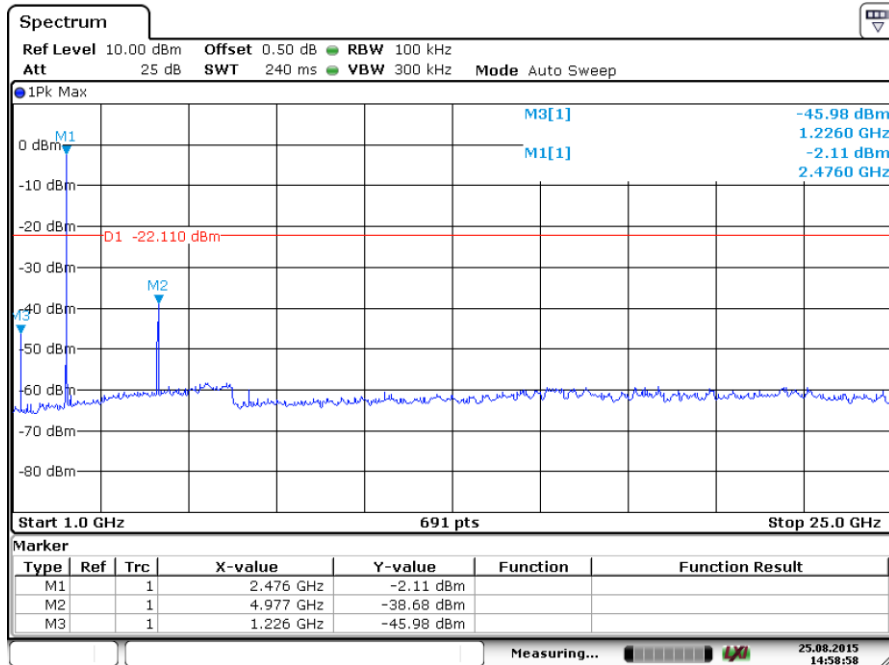
Date: 25.AUG.2015 14:57:15

## Spurious RF conducted emissions

2480MHz



Date: 25.AUG.2015 15:00:46



Date: 25.AUG.2015 14:58:57

## 9.6 Band edge

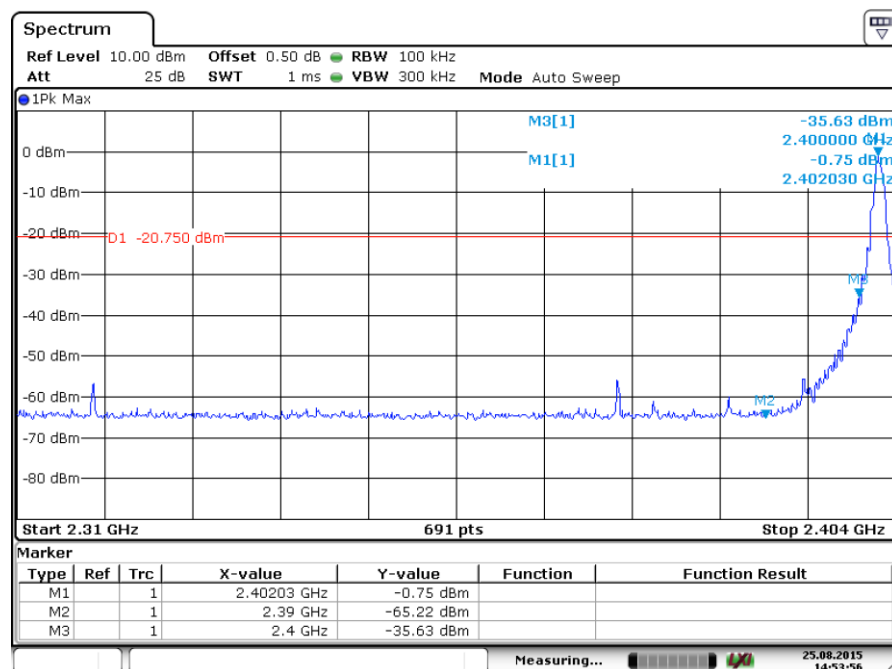
### Test Method

- 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 MHz	Limit (dBc)
30-25000	-20

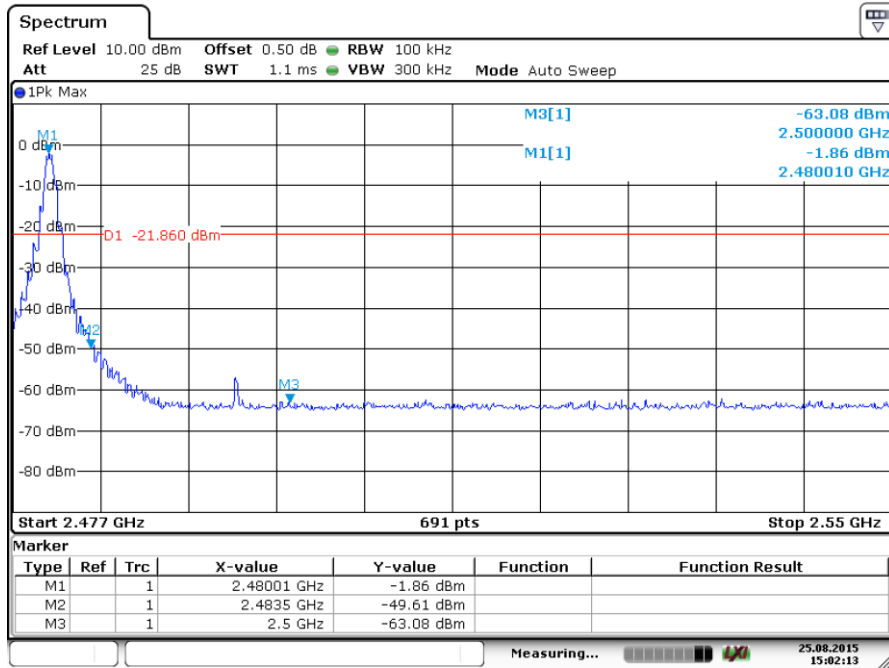
### Test result



Date: 25.AUG.2015 14:53:56

2402MHz

**Band edge**



Date: 25.AUG.2015 15:02:14

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 MHz	Field Strength uV/m	Field Strength 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	
*4804	43.15	H	74.00	PK	30.85	Pass
*7206	46.13	H	74.00	PK	27.87	Pass
31.51	36.56	V	40.00	QP	3.44	Pass
41.21	31.54	V	40.00	QP	8.46	Pass
*4804	44.53	V	74.00	PK	29.47	Pass
*7206	52.78	V	74.00	PK	21.22	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	42.43	H	74.00	PK	31.57	Pass
7320	47.28	H	74.00	PK	26.72	Pass
4880	46.36	V	74.00	PK	27.64	Pass
7320	58.75	V	74.00	PK	15.25	Pass



## Bluetooth Mode GFSK Modulation 2480MHz Test Result

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBμV/m		dBuV/m	
*4960	51.17	H	74.00	PK	22.83	Pass
*7440	51.43	H	74.00	PK	22.57	Pass
*4960	47.90	V	74.00	PK	26.1	Pass
*7440	58.78	V	74.00	PK	15.22	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; Vertical: 5.02dB
Uncertainty for Radiated Spurious Emission 3000MHz-18000MHz	Horizontal: 4.89dB; Vertical: 4.88dB
Output power test	2.04dB
Power density test	2.04dB
Bandwidth	$1.1 \times 10^{-7}$