

**FCC - TEST REPORT**

| | | | | |
|----------------------------------|---|--|----------------|----------------------|
| Report Number | : | 64.790.16.03885.01 | Date of Issue: | <u>Oct. 20, 2016</u> |
| Model | : | <u>MAX BUZZ</u> | | |
| Product Type | : | <u>Activity Tracker</u> | | |
| Applicant | : | <u>Virgin Pulse Inc.</u> | | |
| Address | : | <u>492 Old Connecticut Path, Suite 601, Framingham, MA, USA</u> | | |
| Production Facility | : | <u>Guangdong Transtek Medical Electronics Co., Ltd.</u> | | |
| Address | : | <u>Zone A, No. 105, Dongli Road, Torch Development District, Zhongshan, Guangdong, China</u> | | |
| Test Result | : | <input checked="" type="checkbox"/> Positive <input type="checkbox"/> Negative | | |
| Total pages including Appendices | : | <u>29</u> | | |

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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
Building 12&13, Zhiheng Wisdomland Business Park,
Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052,
P. R. China

FCC Registration Number: 502708

IC Registration Number: 10320A-1

Telephone: 86 755 8828 6998
Fax: 86 755 828 5299

3 Description of the Equipment under Test

Product: Activity Tracker

Model no.: **MAX BUZZ**

FCC ID: 2AKPRVP-T001

Rating:DC 4.5V (by built-in battery of LITHIUM)

RF Transmission Frequency: 2402MHz to 2480MHz

Modulation: GFSK

Antenna Type: Integrated Antenna

Antenna Gain:0.5dBi

Description of the EUT:

EUT is a wristband with 2.4GHz Bluetooth 4.0BLE technology.



4 Summary of Test Standards

| Test Standards | |
|--|--|
| FCC Part 15 Subpart C 10-1-2015 Edition | PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators |

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

5 Summary of Test Results

| Technical Requirements | | | | |
|------------------------|--|------------|-------------|-----------|
| FCC Part 15 Subpart C | | | | |
| Test Condition | | Pages | Test Result | Test Site |
| §15.207 | Conducted emission AC power port | 25 | Pass | Site 1 |
| §15.247(b)(1) | Conducted peak output power | 10 | Pass | Site 1 |
| §15.247(e) | Power spectral density | 14 | Pass | Site 1 |
| §15.247(a)(2) | 6dB bandwidth | 12 | Pass | Site 1 |
| §15.247(a)(1) | 20dB bandwidth and 99% Occupied Bandwidth | -- | Pass | Site 1 |
| §15.247(a)(1) | Carrier frequency separation | -- | Pass | Site 1 |
| §15.247(a)(1)(iii) | Number of hopping frequencies | -- | Pass | Site 1 |
| §15.247(a)(1)(iii) | Dwell Time | -- | Pass | Site 1 |
| §15.247(d) | Spurious RF conducted emissions | 16 | Pass | Site 1 |
| §15.247(d) | Band edge | 20 | Pass | Site 1 |
| §15.247(d) & §15.209 & | Spurious radiated emissions for transmitter and receiver | 22 | Pass | Site 1 |
| §15.203 | Antenna requirement | See note 1 | Pass | -- |

Remark 1: N/A – Not Applicable.

Note 1: The EUT uses an Integrated Antenna, which gain is 0.5dBi. 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: 2AKPRVP-T001 complies with Section 15.207, 15.247 of the FCC Part 15, Subpart C.

This report is for the BT 4.0 part.

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: August 22, 2016

Testing Start Date: August 22, 2016

Testing End Date: September 14, 2016

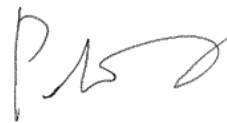
- TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch -

Reviewed by:

Prepared by:



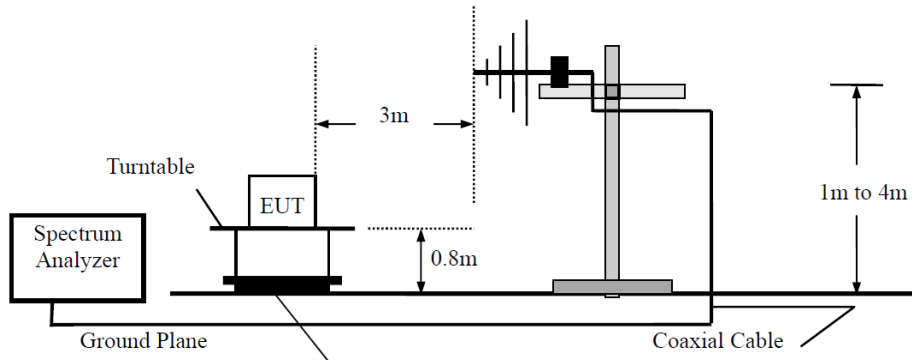
Celia Xiang



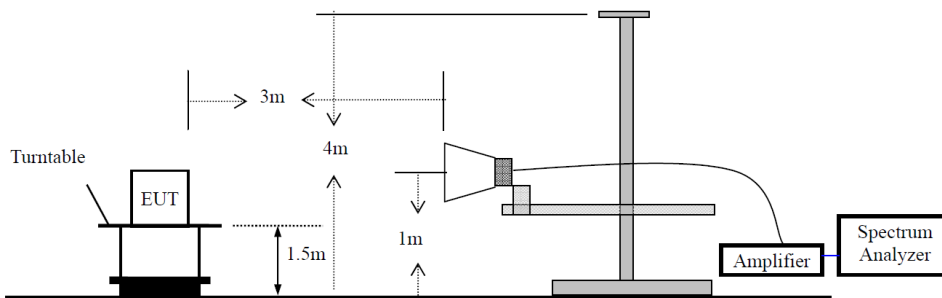
Peter Jia

7 Test Setups

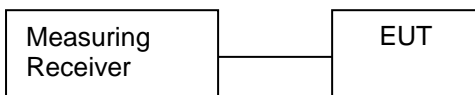
7.1 Radiated test setups Below 1GHz



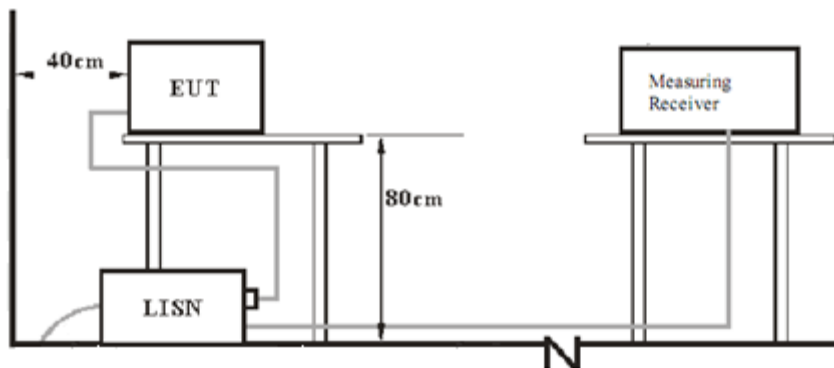
Above 1GHz



7.2 Conducted RF test setups



7.3 Conducted emission AC power port test setups



8 Systems test configuration

Auxiliary Equipment Used during Test:

| DESCRIPTION | MANUFACTURER | MODEL NO.(SHIELD) | S/N(LENGTH) |
|-------------|--------------|-------------------|-------------|
| Laptop | Lenovo | X201 | --- |

9 Technical Requirement

9.1 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

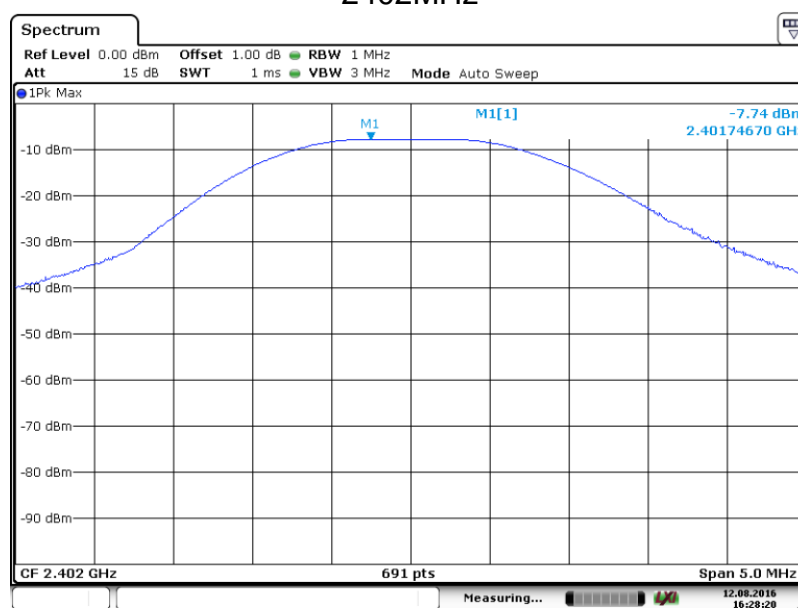
According to §15.247 (b) (1), conducted peak output power limit as below:

| Frequency Range 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 | -7.74 | Pass |
| Middle channel 2440MHz | -9.86 | Pass |
| Bottom channel 2480MHz | -13.20 | Pass |

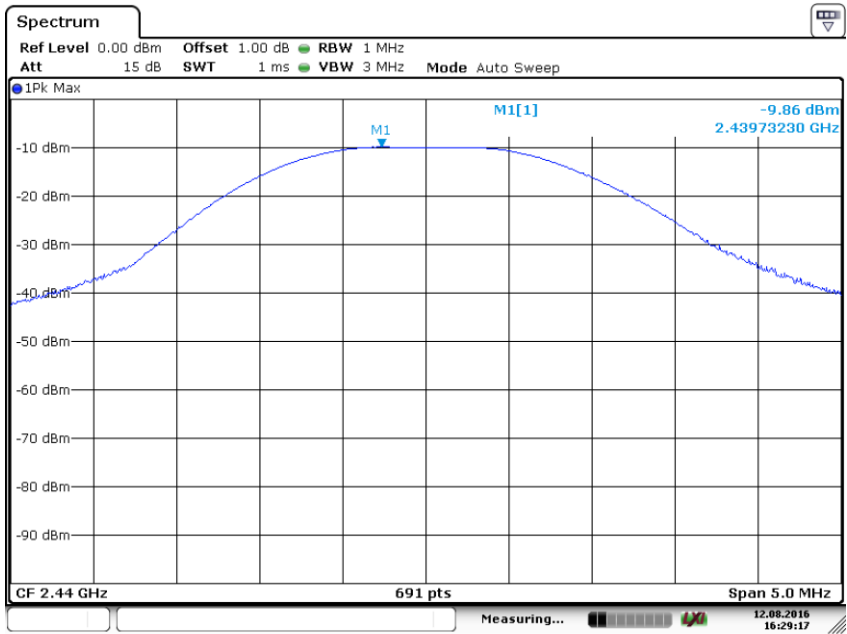
2402MHz



Date: 12.AUG.2016 16:28:20

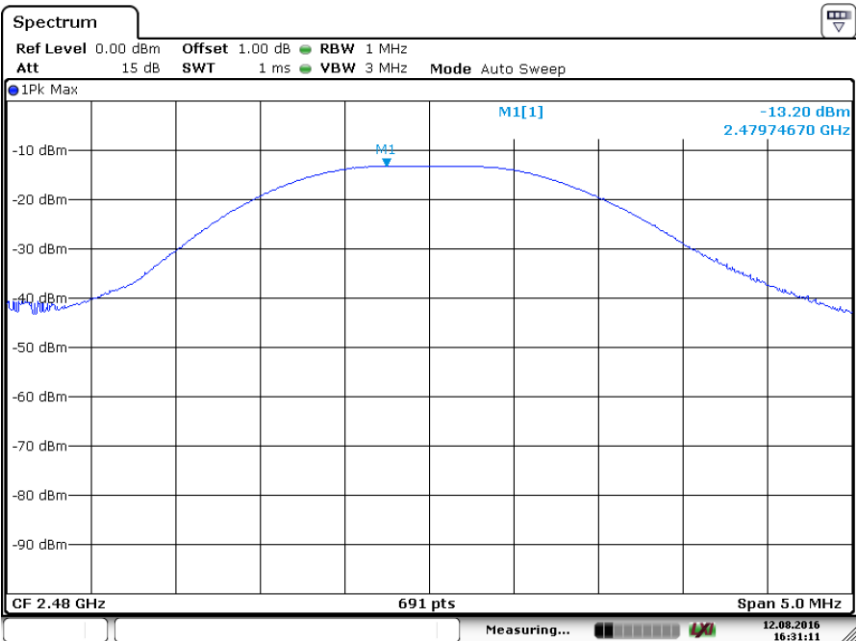


2440MHz



Date: 12.AUG.2016 16:29:17

2480MHz



Date: 12.AUG.2016 16:31:11



9.2 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

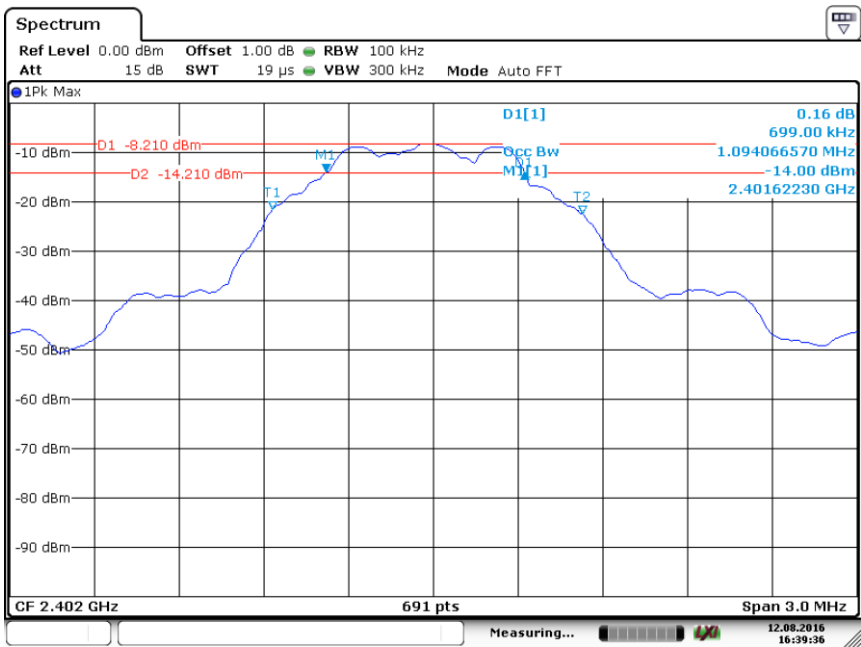
Limit [kHz]

≥500

Test result

| Frequency MHz | 6dB bandwidth kHz | 99 bandwidth kHz | Result |
|------------------------|----------------------|---------------------|--------|
| Top channel 2402MHz | 699.0 | 1094.07 | Pass |
| Middle channel 2440MHz | 694.6 | 1081.04 | Pass |
| Bottom channel 2480MHz | 690.3 | 1085.38 | Pass |

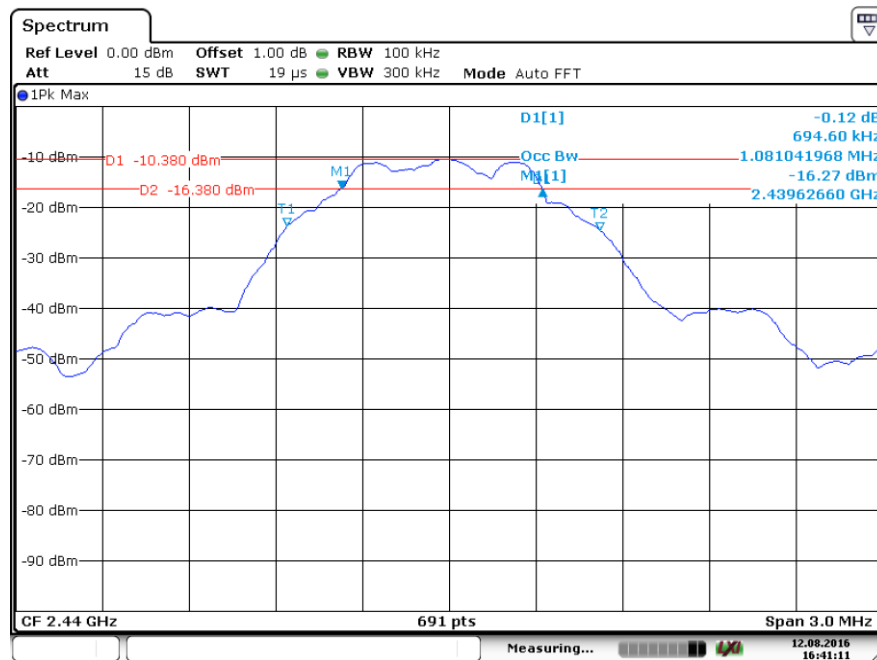
2402MHz



Date: 12.AUG.2016 16:39:37

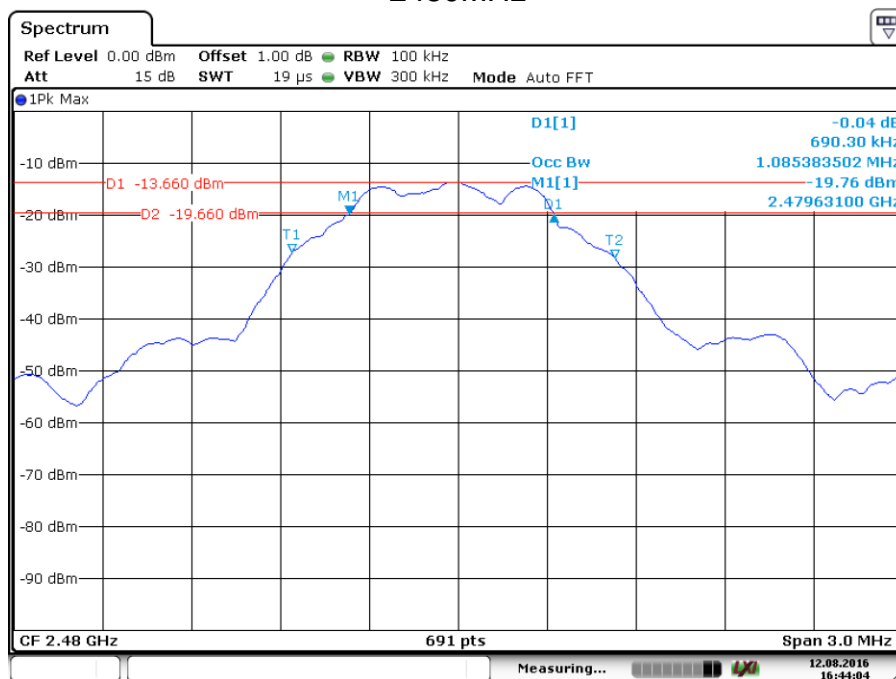
6 dB Bandwidth

2440MHz



Date: 12.AUG.2016 16:41:11

2480MHz



Date: 12.AUG.2016 16:44:04

9.3 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

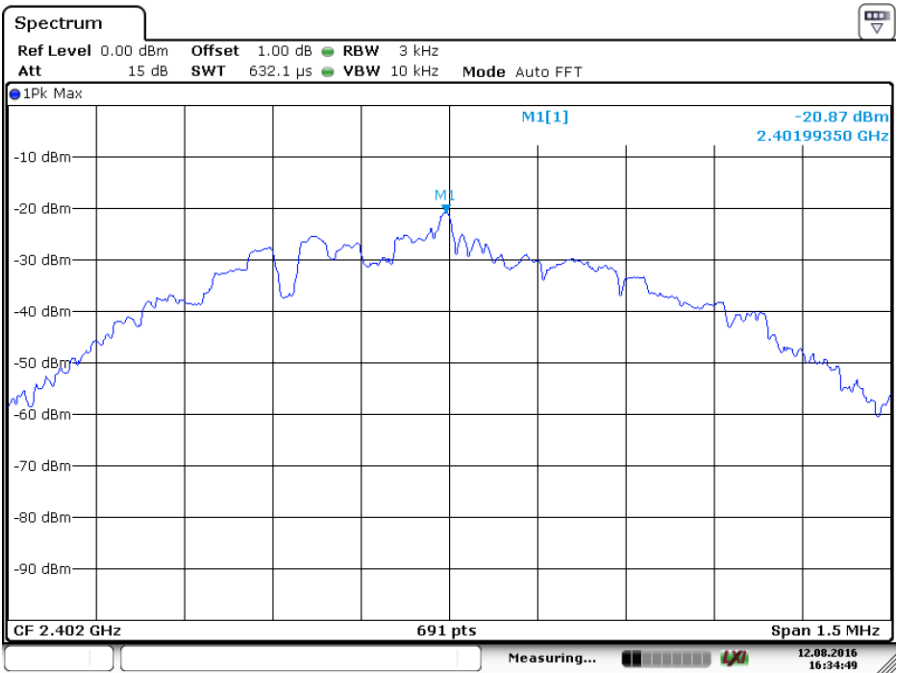
Limit [dBm]

≤8

Test result

| Frequency MHz | Power spectral density dBm | Result |
|------------------------|----------------------------------|--------|
| Top channel 2402MHz | -20.87 | Pass |
| Middle channel 2440MHz | -23.22 | Pass |
| Bottom channel 2480MHz | -26.98 | Pass |

2402MHz



Date: 12.AUG.2016 16:34:50

Spectrum

Ref Level 0.00 dBm Offset 1.00 dB RBW 3 kHz
 Att 15 dB SWT 632.1 μ s VBW 10 kHz Mode Auto FFT

● 1Pk Max

M1[1] -23.22 dBm
 2.43999570 GHz

CF 2.44 GHz 691 pts Span 1.5 MHz

Measuring... 12.08.2015 16:34:12

Spectrum

Ref Level 0.00 dBm Offset 1.00 dB RBW 3 kHz
 Att 15 dB SWT 632.1 μ s VBW 10 kHz Mode Auto FFT

● 1Pk Max

M1[1] -26.98 dBm
 2.47999570 GHz

CF 2.48 GHz 691 pts Span 1.5 MHz

Measuring... 12.08.2016 16:32:37

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9.4 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.

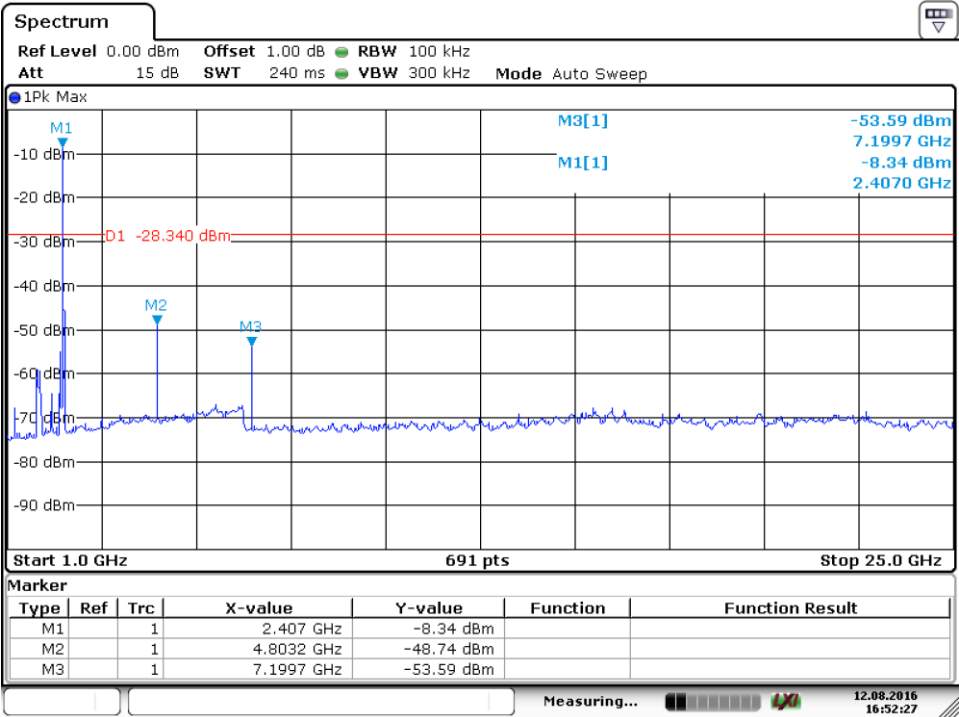
Limit

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

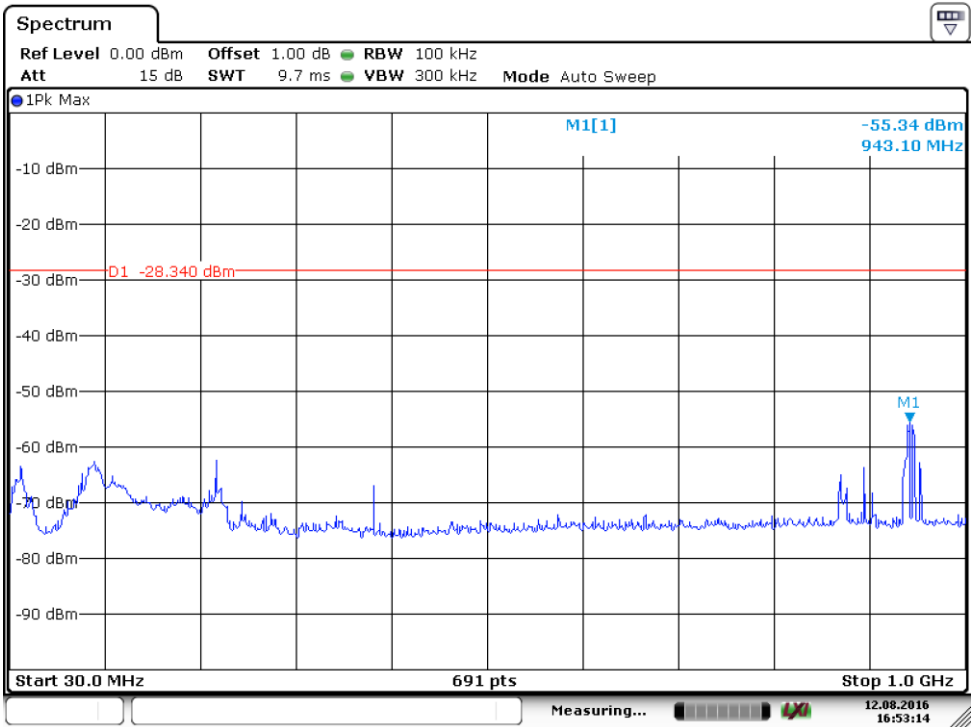


Spurious RF conducted emissions

2402MHz



Date: 12.AUG.2016 16:52:27

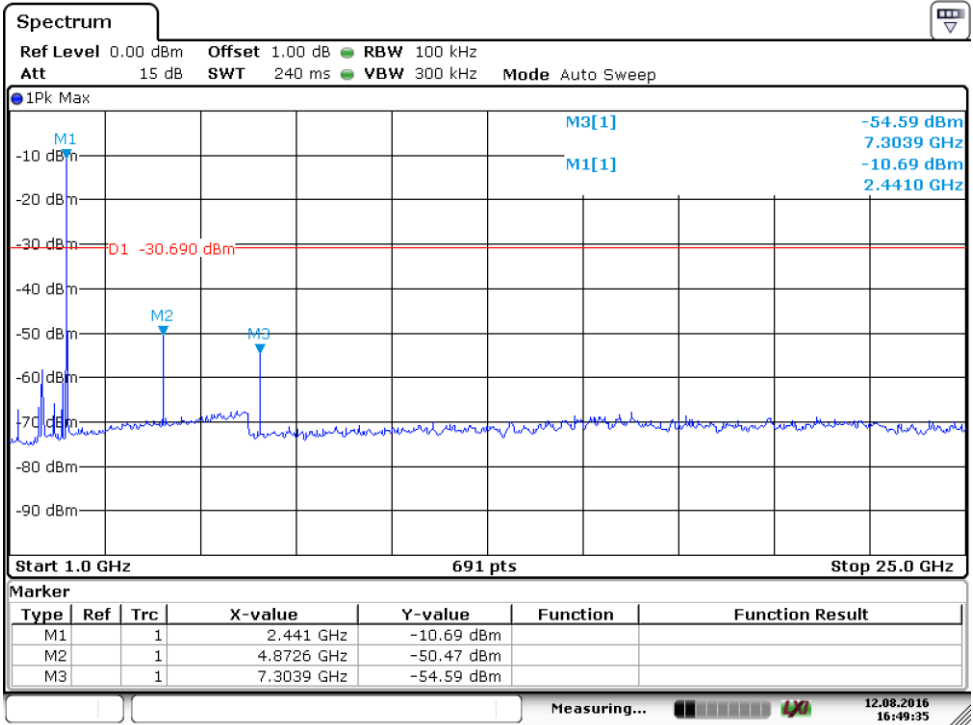


Date: 12.AUG.2016 16:53:14

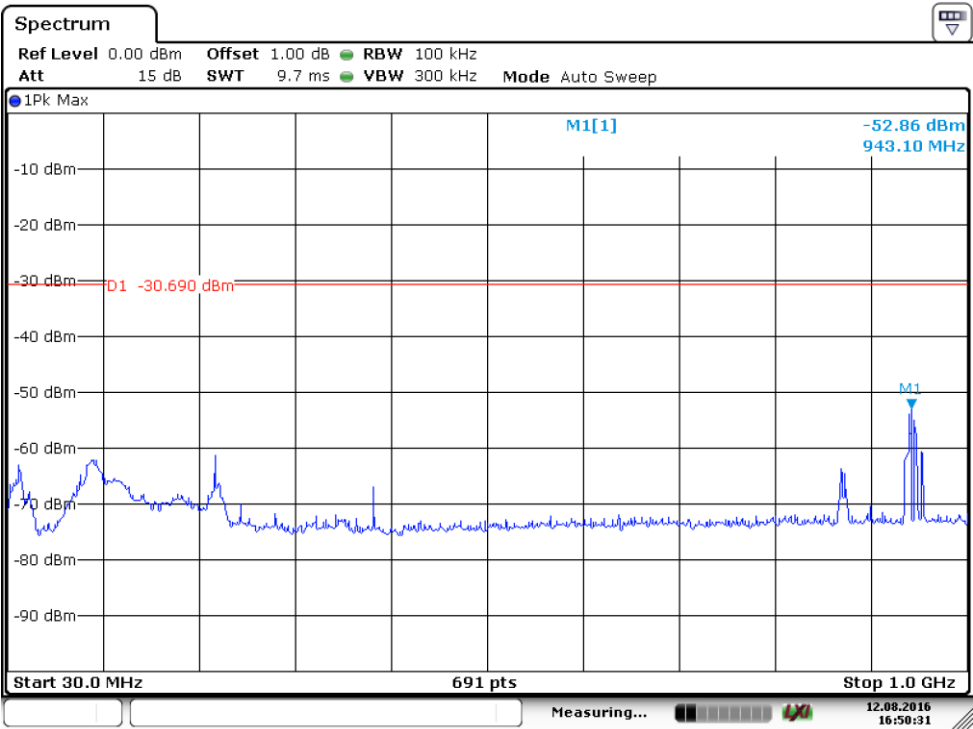


Spurious RF conducted emissions

2440MHz



Date: 12.AUG.2016 16:49:35

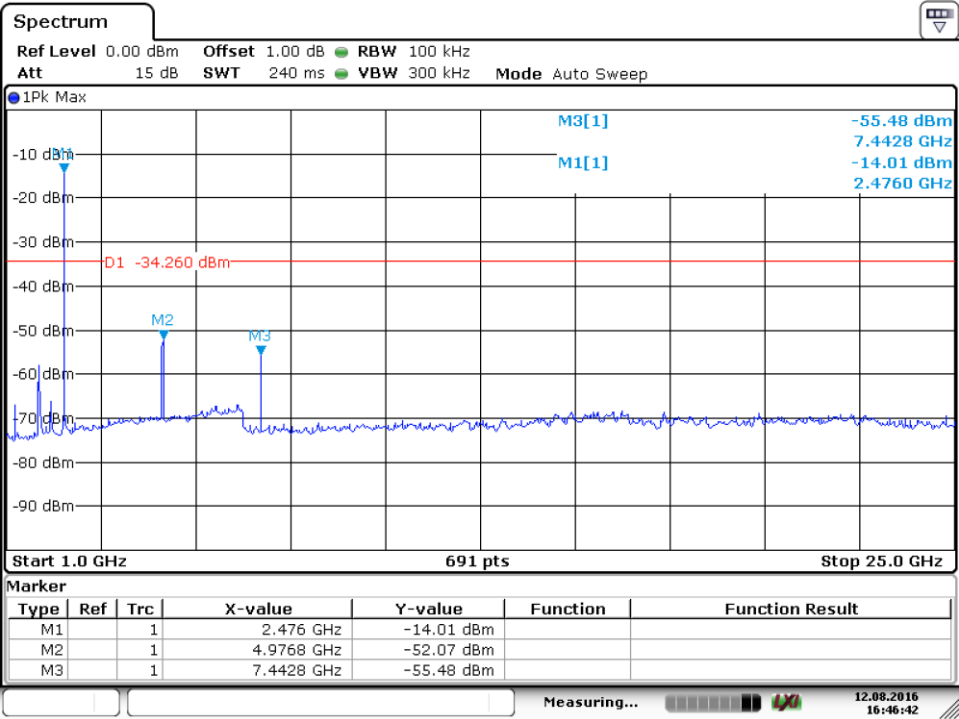


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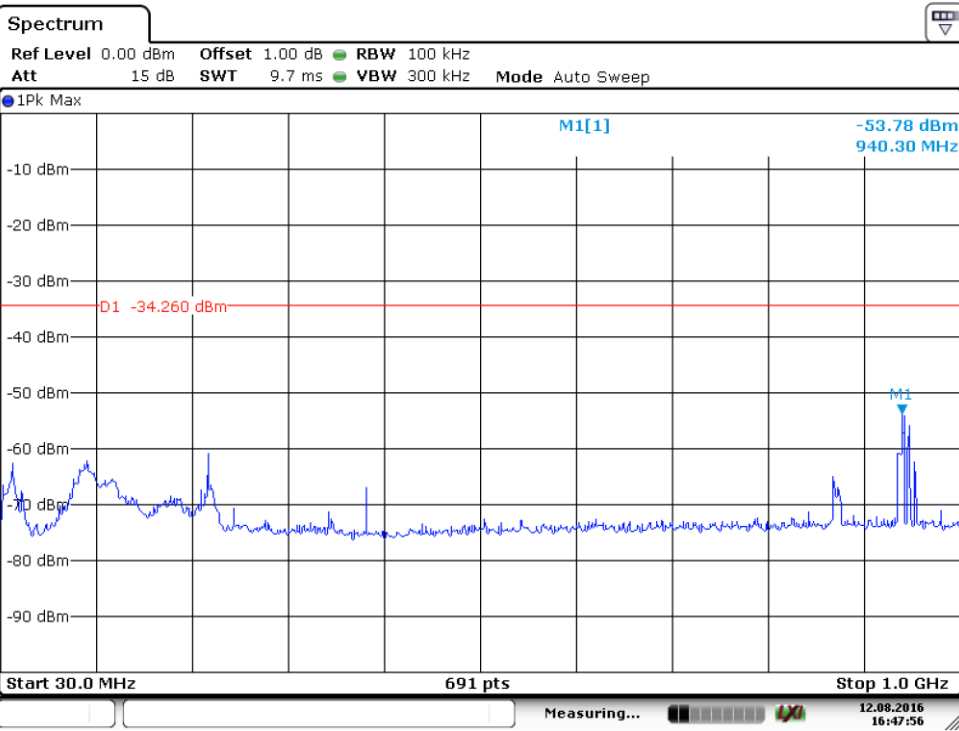


Spurious RF conducted emissions

2480MHz



Date: 12.AUG.2016 16:46:42



Date: 12.AUG.2016 16:47:56



9.5 Band edge

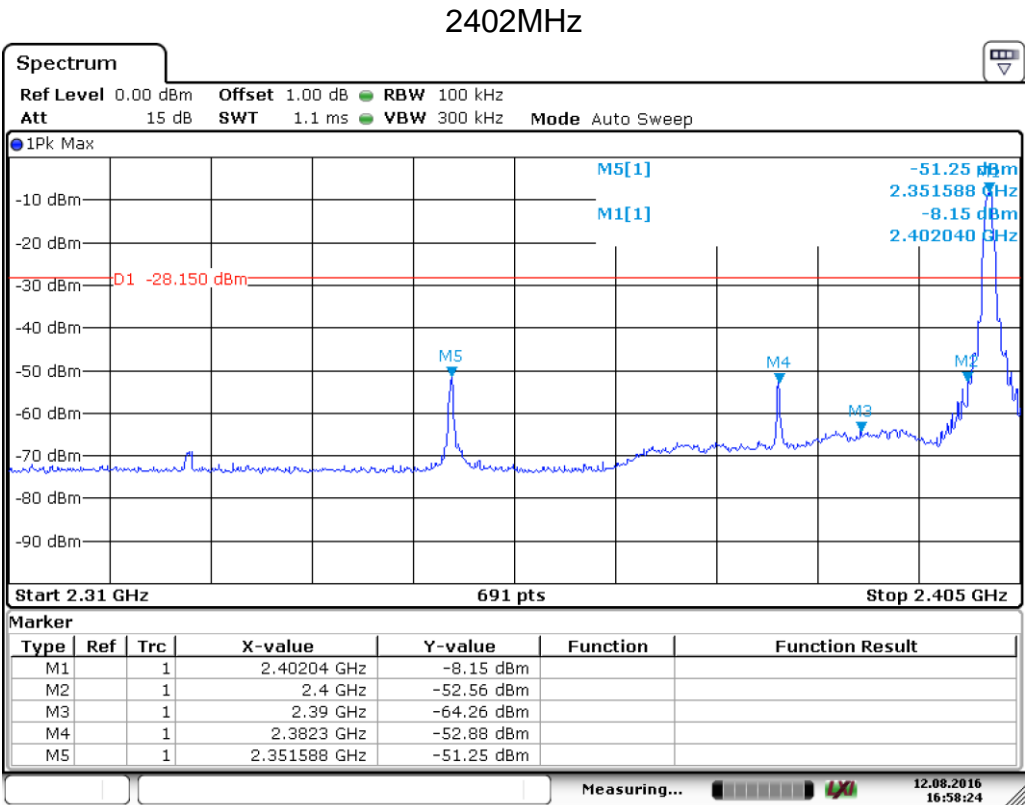
Test Method

- 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 | Limit (dBc) |
|-----------------|-------------|
| MHz | |
| 30-25000 | -20 |

Test result

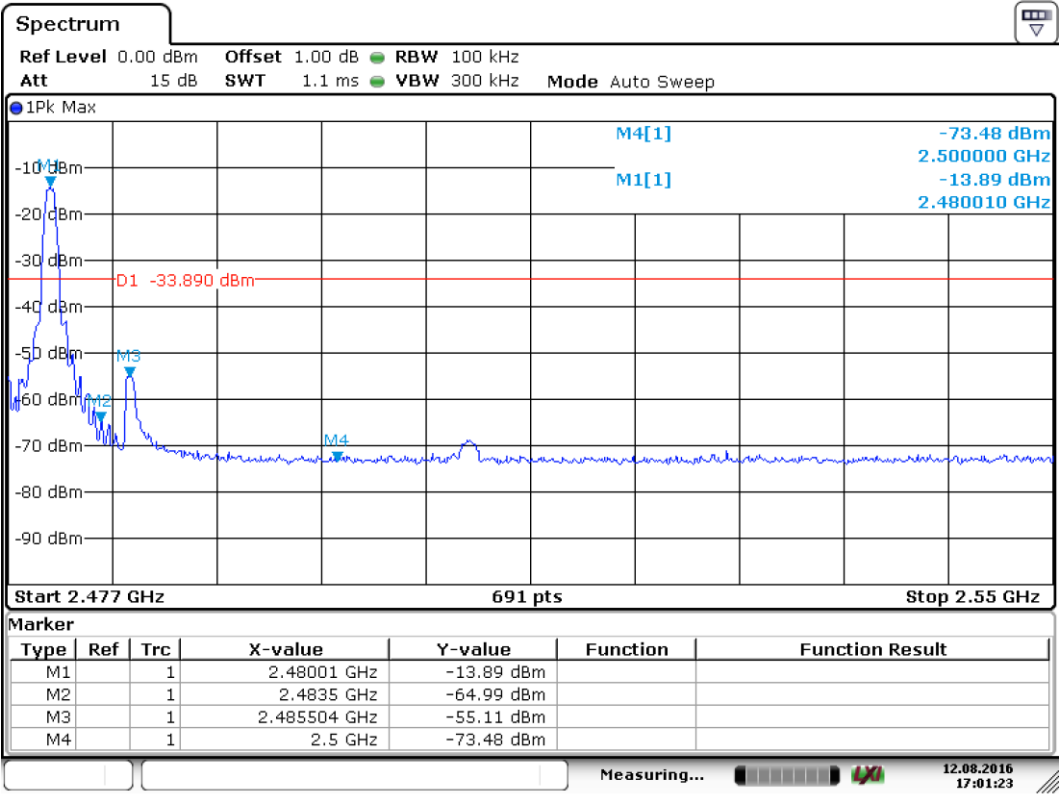


Date: 12.AUG.2016 16:58:24



Band edge

2480MHz



Date: 12.AUG.2016 17:01:23

9.6 Spurious radiated emissions for transmitter

Test Method

- 1: The EUT was placed on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3-meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
- 3: The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4: For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- 5: Use the following spectrum analyzer settings According to C63.10:

For Above 1GHz

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 1MHz, VBW ≥ RBW for peak measurement and VBW = 10Hz for average measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Below 1GHz

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 for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

Note:

- 1: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.
- 2: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for peak detection (PK) at frequency above 1GHz.
- 3: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average ((duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ($20\log(1/\text{duty cycle})$).
- 4: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.

Limit

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 dBμV/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:

2402MHz (30MHz – 1GHz)

| Frequency MHz | Emission Level dBuV/m | Polarization | Limit dBuV/m | Detector | Result |
|------------------|-----------------------------|--------------|-----------------|----------|--------|
| 892.33 | 28.48 | Horizontal | 46.00 | QP | Pass |
| 880.69 | 32.14 | Vertical | 46.00 | QP | Pass |

2402MHz (Above 1GHz)

| Frequency MHz | Emission Level dBuV/m | Polarization | Limit dBuV/m | Detector | Result |
|------------------|-----------------------------|--------------|-----------------|----------|--------|
| *4804.00 | 46.07 | Horizontal | 74.00 | PK | Pass |
| *4803.50 | 45.23 | Vertical | 74.00 | PK | Pass |

2440MHz (Above 1GHz)

| Frequency MHz | Emission Level dBuV/m | Polarization | Limit dBuV/m | Detector | Result |
|------------------|-----------------------------|--------------|-----------------|----------|--------|
| 14442.00 | 46.12 | Horizontal | 74 | PK | Pass |
| 14032.00 | 45.61 | Vertical | 74 | PK | Pass |

2480MHz (Above 1GHz)

| Frequency MHz | Emission Level dBuV/m | Polarization | Limit dBuV/m | Detector | Result |
|------------------|-----------------------------|--------------|-----------------|----------|--------|
| 15011.50 | 48.40 | Horizontal | 74.00 | PK | Pass |
| 13670.50 | 46.06 | Vertical | 74.00 | PK | Pass |

Remark:

- (1) “*” means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

9.7 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

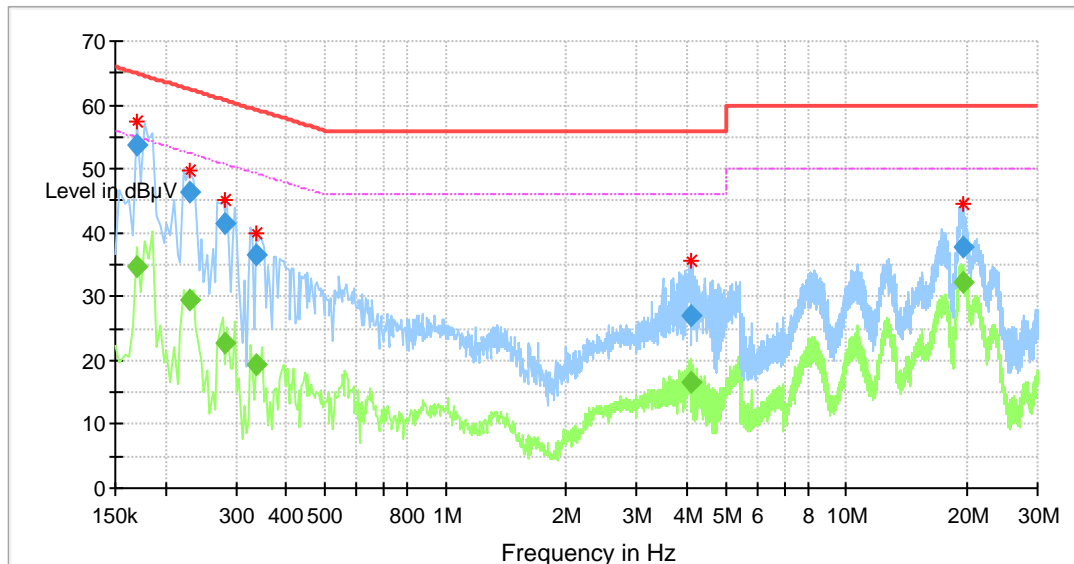
Limit

| Frequency MHz | QP Limit dB μ V | AV Limit dB μ V |
|------------------|------------------------|------------------------|
| 0.150-0.500 | 66-56* | 56-46* |
| 0.500-5 | 56 | 46 |
| 5-30 | 60 | 50 |

* Decreasing linear

Conducted Emission

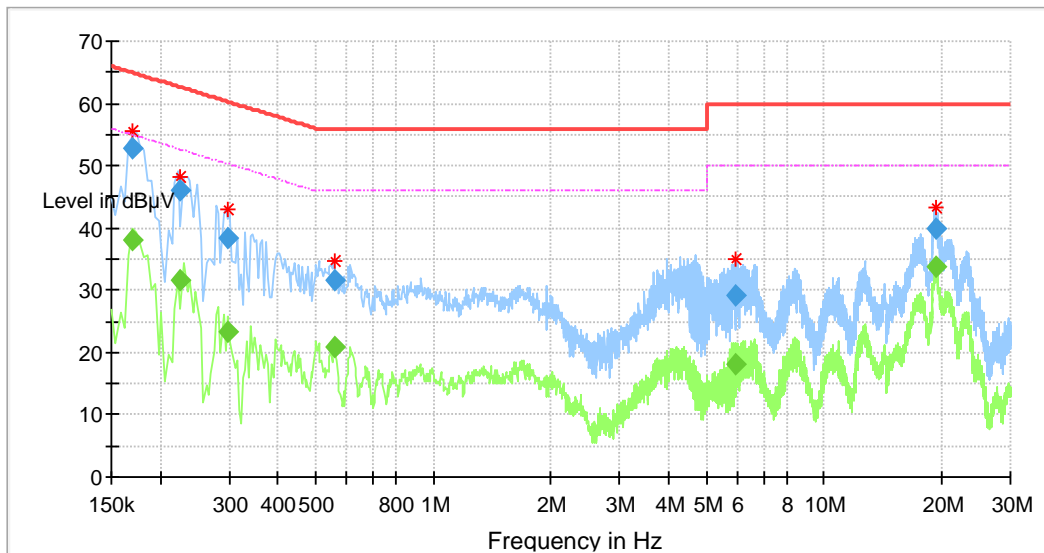
Product Type : Activity Tracker
 M/N : MAX BUZZ
 Operating Condition : Charging & TX
 Test Specification : Live
 Comment : AC 120V/60Hz



| Frequency (MHz) | QuasiPeak (dBμV) | Average (dBμV) | Limit (dBμV) | Margin (dB) |
|-----------------|------------------|----------------|--------------|-------------|
| 0.169500 | --- | 34.61 | 54.98 | 20.37 |
| 0.169500 | 53.81 | --- | 64.98 | 11.17 |
| 0.229500 | --- | 29.40 | 52.47 | 23.07 |
| 0.229500 | 46.50 | --- | 62.47 | 15.97 |
| 0.282500 | --- | 22.80 | 50.74 | 27.94 |
| 0.282500 | 41.44 | --- | 60.74 | 19.30 |
| 0.337500 | --- | 19.21 | 49.26 | 30.05 |
| 0.337500 | 36.49 | --- | 59.26 | 22.77 |
| 4.077500 | --- | 16.48 | 46.00 | 29.52 |
| 4.077500 | 26.98 | --- | 56.00 | 29.02 |
| 19.481500 | --- | 32.20 | 50.00 | 17.80 |
| 19.481500 | 37.65 | --- | 60.00 | 22.35 |

Conducted Emission

Product Type : Activity Tracker
 M/N : MAX BUZZ
 Operating Condition : Charging & TX
 Test Specification : Live
 Comment : AC 120V/60Hz



| Frequency (MHz) | QuasiPeak (dBµV) | Average (dBµV) | Limit (dBµV) | Margin (dB) |
|-----------------|------------------|----------------|--------------|-------------|
| 0.169500 | --- | 37.93 | 54.98 | 17.05 |
| 0.169500 | 52.71 | --- | 64.98 | 12.27 |
| 0.225500 | --- | 31.75 | 52.61 | 20.86 |
| 0.225500 | 45.96 | --- | 62.61 | 16.65 |
| 0.298500 | --- | 23.24 | 50.28 | 27.04 |
| 0.298500 | 38.53 | --- | 60.28 | 21.75 |
| 0.557500 | --- | 20.83 | 46.00 | 25.17 |
| 0.557500 | 31.65 | --- | 56.00 | 24.35 |
| 5.909500 | --- | 18.02 | 50.00 | 31.98 |
| 5.909500 | 29.17 | --- | 60.00 | 30.83 |
| 19.261500 | --- | 33.76 | 50.00 | 16.24 |
| 19.261500 | 40.01 | --- | 60.00 | 19.99 |

10 Test Equipment List

List of Test Instruments

| | DESCRIPTION | MANUFACTURE R | MODEL NO. | SERIAL NO. | CAL. DUE DATE |
|----|-------------------------------------|------------------|-------------------|-----------------|---------------|
| C | Signal Generator | Rohde & Schwarz | SMB100A | 108272 | 2017-7-24 |
| | Signal Analyzer | Rohde & Schwarz | FSV40 | 101030 | 2017-7-24 |
| | Vector Signal Generator | Rohde & Schwarz | SMU 200A | 105324 | 2017-7-24 |
| | RF Switch Module | Rohde & Schwarz | OSP120/OSP-B157 | 101226/100851 | 2017-7-24 |
| | Test software | Rohde & Schwarz | EMC32 | Version 9.22.00 | N/A |
| | EMI Test Receiver | Rohde & Schwarz | ESR 3 | 101782 | 2017-7-15 |
| | LISN | Rohde & Schwarz | ENV216 | 100326 | 2017-7-15 |
| RE | Signal Analyzer | Rohde & Schwarz | FSV40 | 101031 | 2017-8-17 |
| | Trilog Super Broadband Test Antenna | Schwarzbeck | VULB 9163 | 708 | 2017-8-17 |
| | Horn Antenna | Rohde & Schwarz | HF907 | 102295 | 2017-8-17 |
| | Wideband Horn Antenna | Q-PAR | QWH-SL-18-40-K-SG | 12827 | 2017-8-17 |
| | Pre-amplifier | Rohde & Schwarz | SCU 18 | 102230 | 2017-8-17 |
| | Pre-amplifier | Rohde & Schwarz | SCU 40A | 100432 | 2017-8-17 |
| | Fully Anechoic Chamber | TDK | 8X4X4 | -- | 2019-8-29 |

C - Conducted RF tests

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

RE - Radiated RF tests

- Spurious radiated emissions for transmitter

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 Emission in 3m chamber 30MHz-1000MHz | Horizontal: 4.83dB; Vertical: 4.91dB; |
| Uncertainty for Radiated Emission in 3m chamber 1000MHz-18000MHz | Horizontal: 4.89dB; Vertical: 4.88dB; |
| Uncertainty for Conducted RF test | 2.04dB |