



FCC - TEST REPORT

Report Number

: **68.950.17.720.01**Date of Issue: November 28, 2017

Model

: **C-XT001-B, C-XF001-B**

Product Type

: Tracking Module \ Fitness module

Applicant

: Shenzhen Yinrun Technology Co., Ltd

Address

: 16F, Building B1, NanShan zhiyuan, No.1001 XueYuan Road,
NanShan District, ShenZhen, PEOPLE'S REPUBLIC OF CHINA

Production Facility

: Shenzhen Yinrun Technology Co., Ltd

Address

: 16F, Building B1, NanShan zhiyuan, No.1001 XueYuan Road,
NanShan District, ShenZhen, 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
Building 12&13, Zhiheng Wisdomland Business Park,
Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052,
P. R. China

FCC Registration Number: 502708

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

3 Description of the Equipment under Test

Description of the Equipment Under Test

Product: Tracking Module \ Fitness module

Model no.: C-XT001-B

FCC ID: 2AN2D-000003

Options and accessories: NIL

Rating: 3.0VDC supplied by 1*3.0VDC CR1632 Battery

RF Transmission 2402-2480MHz

Frequency:

No. of Operated Channel: 40

Modulation: GFSK

Antenna Type: Integrated Antenna

Antenna Gain: 0dBi

Description of the EUT: The Equipment Under Test (EUT) is a Tracking Module \ Fitness module with Bluetooth function operating at 2.4GHz

4 Summary of Test Standards

| Test Standards | |
|--|--|
| FCC Part 15 Subpart C 10-1-2016 Edition | PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators |

All the test methods were according to KDB558074 D01 DTS Meas Guidance v04 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 | -- | N/A | -- |
| §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 | 12 | Pass | Site 1 |
| §15.247(a)(1) | Carrier frequency separation | -- | N/A | -- |
| §15.247(a)(1)(iii) | Number of hopping frequencies | -- | N/A | -- |
| §15.247(a)(1)(iii) | Dwell Time | -- | N/A | -- |
| §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 0dBi. According to §15.203, it is considered sufficiently to comply with the provisions of this section.

6 General Remarks

Remarks

Model C-XF001-B is identical with model C-XT001-B include the interior structure, electrical circuits, components, appearance, software and power level except model name, and intend using, unless otherwise specified the model: C-XF001-B was selected as representative models to perform all tests.

This submittal(s) (test report) is intended for FCC ID: 2AN2D-000003, complies with Section 15.205, 15.209, 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: October 16, 2017

Testing Start Date: October 16, 2017

Testing End Date: November 24, 2017

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

Reviewed by:

Reviewed by:



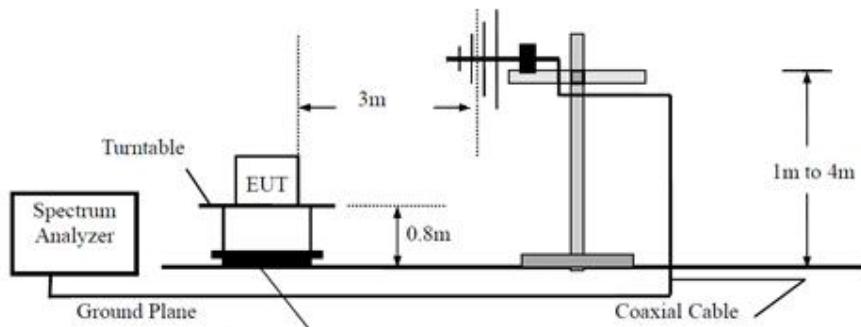
Trevor You
EMC Senior Project Engineer



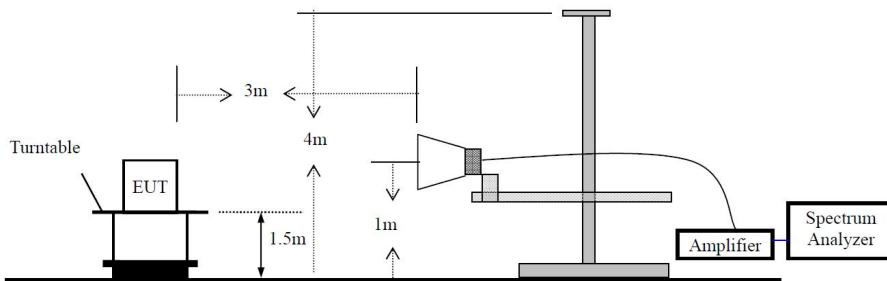
Ricky Yin
EMC Project Engineer

7 Test Setups

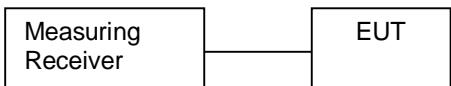
Below 1GHz



Above 1GHz



7.2 Conducted RF test setups



8 Systems test configuration

Auxiliary Equipment Used during Test:

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

Test software: RF test tool, 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

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.

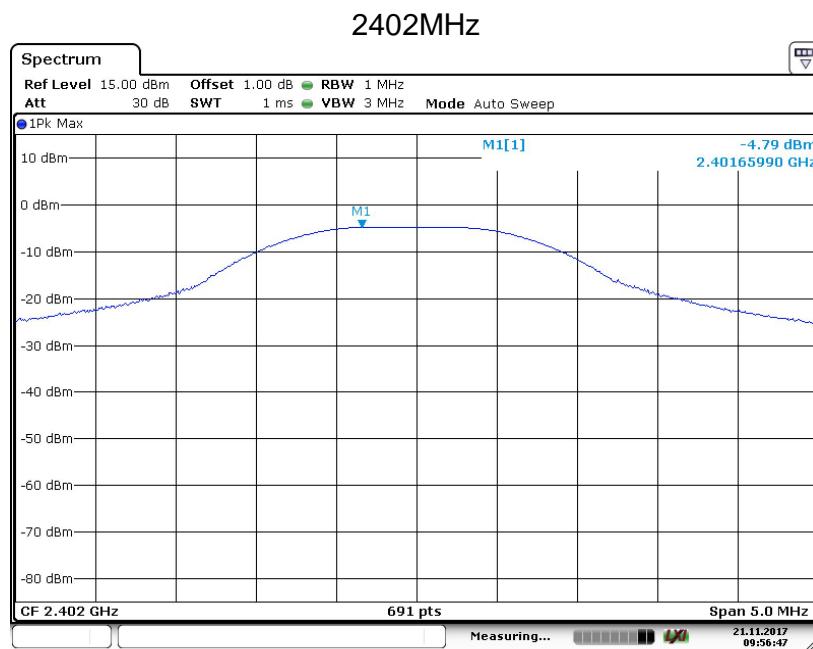
Limits

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

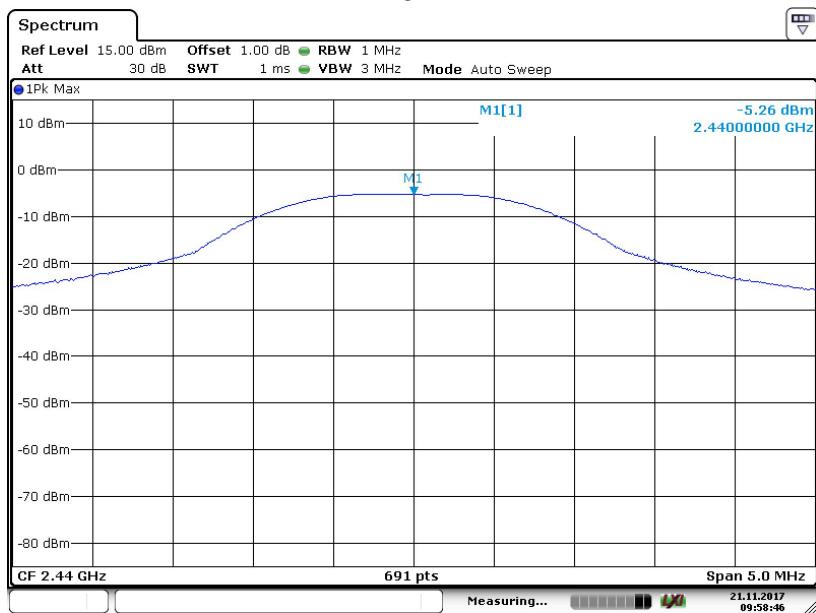
| Frequency Range MHz | Limit W | Limit dBm |
|------------------------|------------|--------------|
| 2400-2483.5 | ≤ 1 | ≤ 30 |

Test result as below table

| Frequency MHz | Conducted Peak Output Power dBm | Result |
|------------------------|---------------------------------------|--------|
| Top channel 2402MHz | -4.79 | Pass |
| Middle channel 2440MHz | -5.26 | Pass |
| Bottom channel 2480MHz | -5.94 | Pass |

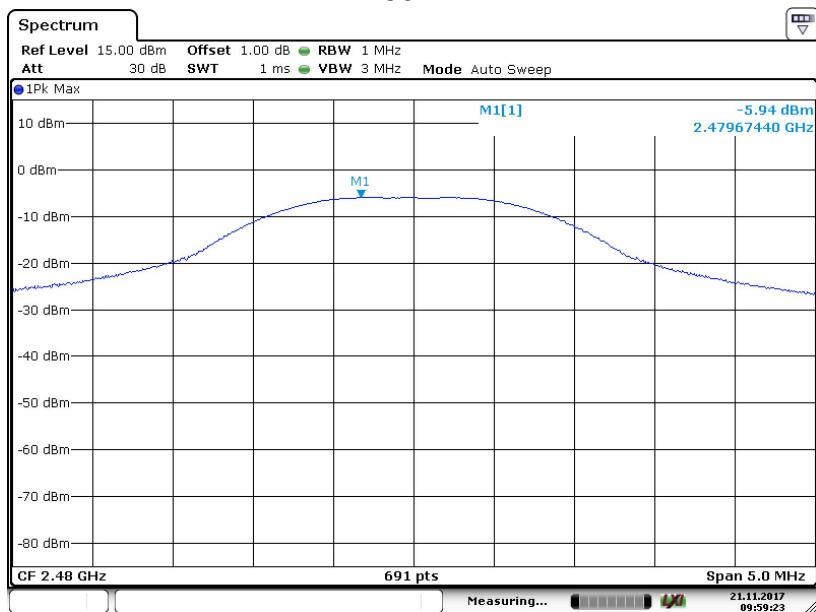


2440MHz



Date: 21.NOV.2017 09:58:46

2480MHz



Date: 21.NOV.2017 09:59:23

9.2 6dB bandwidth

Test Method

1. Use the following spectrum analyzer settings:
RBW=100K, VBW \geq 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 \geq 6 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

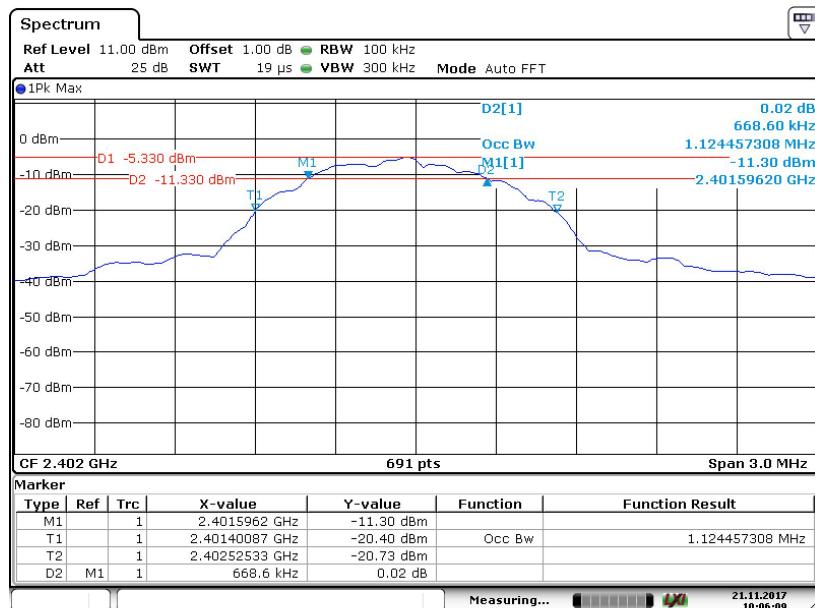
Limit [kHz]

≥ 500

Test result

| Frequency MHz | 6dB bandwidth kHz | 99 bandwidth kHz | Result |
|------------------------|----------------------|---------------------|--------|
| Top channel 2402MHz | 668.60 | 1124.45 | Pass |
| Middle channel 2440MHz | 668.60 | 1133.14 | Pass |
| Bottom channel 2480MHz | 681.60 | 1137.48 | Pass |

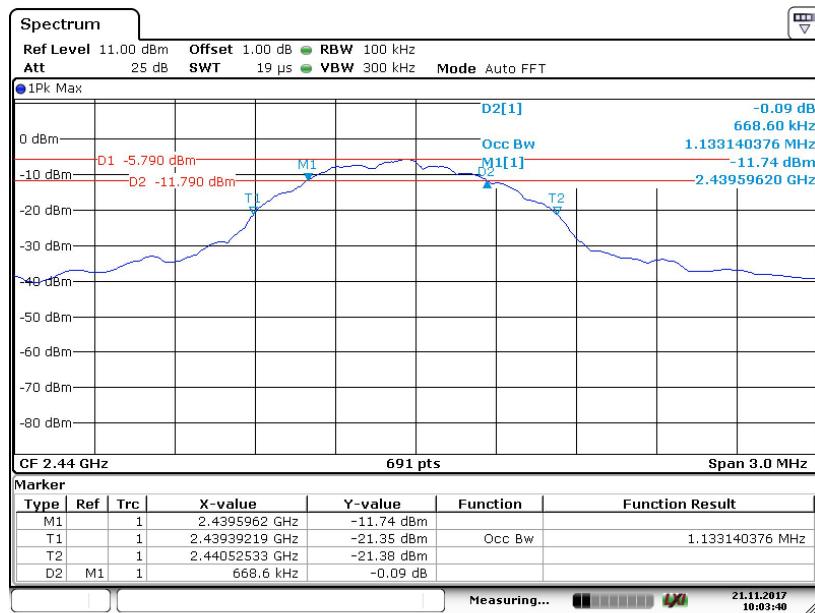
2402MHz



Date: 21.NOV.2017 10:06:10

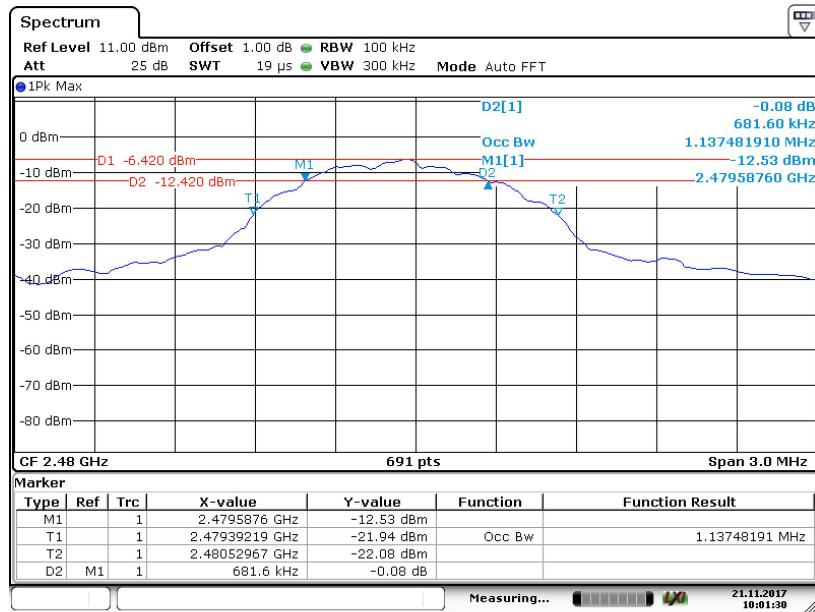
6 dB Bandwidth

2440MHz



Date: 21.NOV.2017 10:03:40

2480MHz



Date: 21.NOV.2017 10:01:30

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 \geq 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

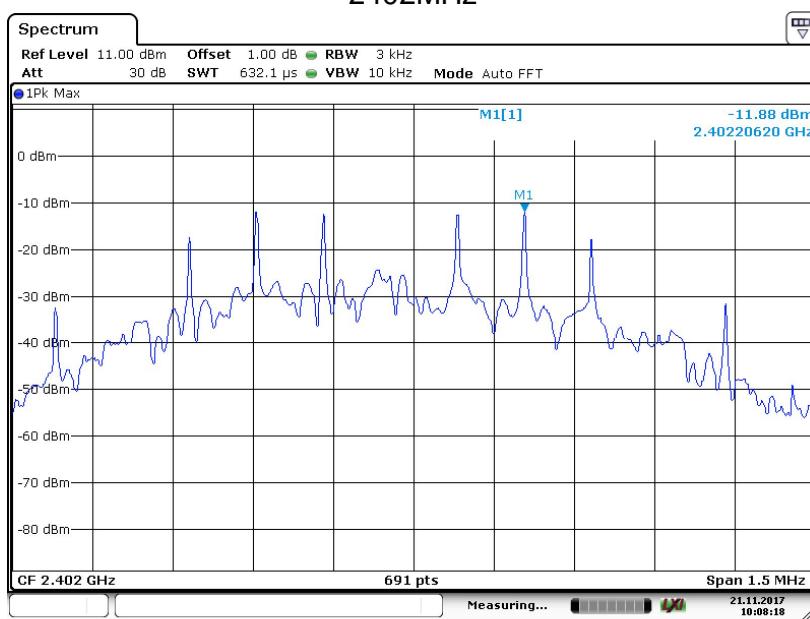
Limit [dBm]

≤ 8

Test result

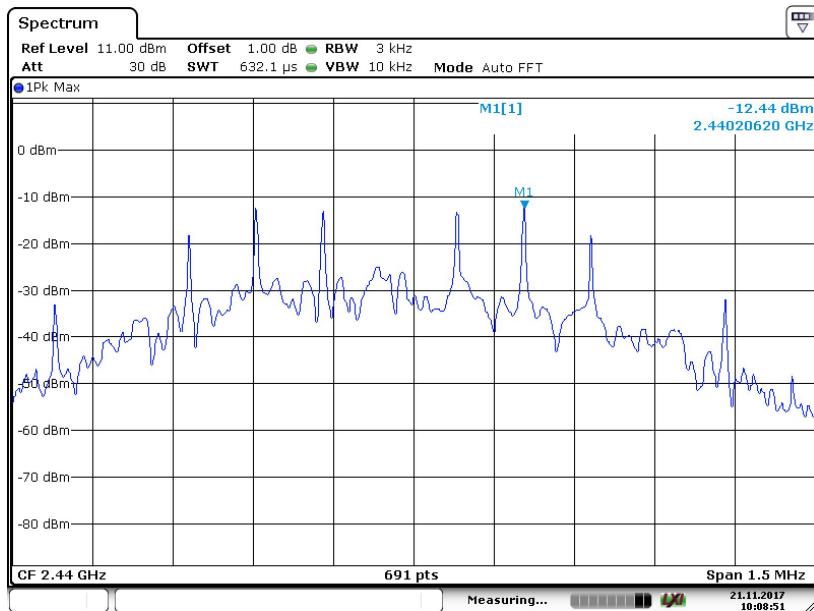
| Frequency MHz | Power spectral density dBm | Result |
|------------------------|----------------------------------|--------|
| Top channel 2402MHz | -11.88 | Pass |
| Middle channel 2440MHz | -12.44 | Pass |
| Bottom channel 2480MHz | -13.04 | Pass |

2402MHz



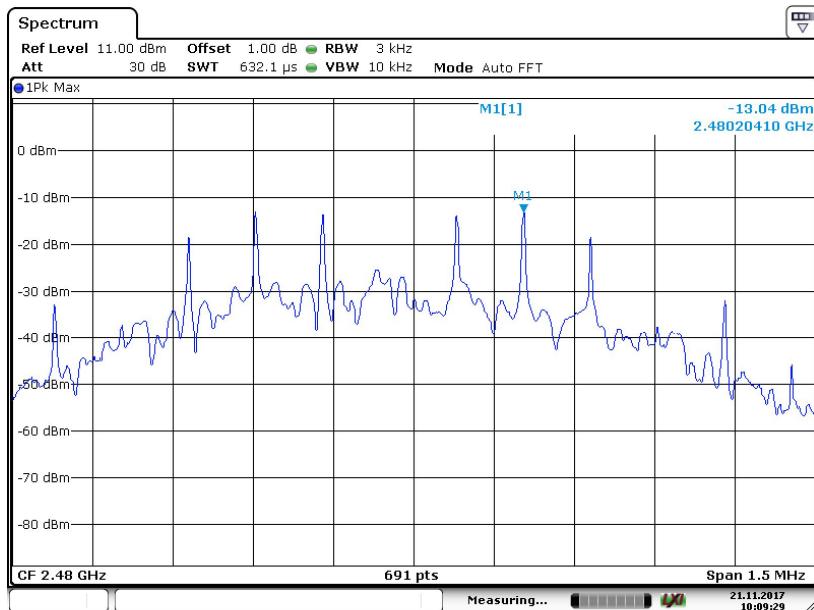
Date: 21.NOV.2017 10:08:18

2440MHz



Date: 21.NOV.2017 10:08:51

2480MHz



Date: 21.NOV.2017 10:09:29

9.4 Spurious RF conducted emissions

Test Method

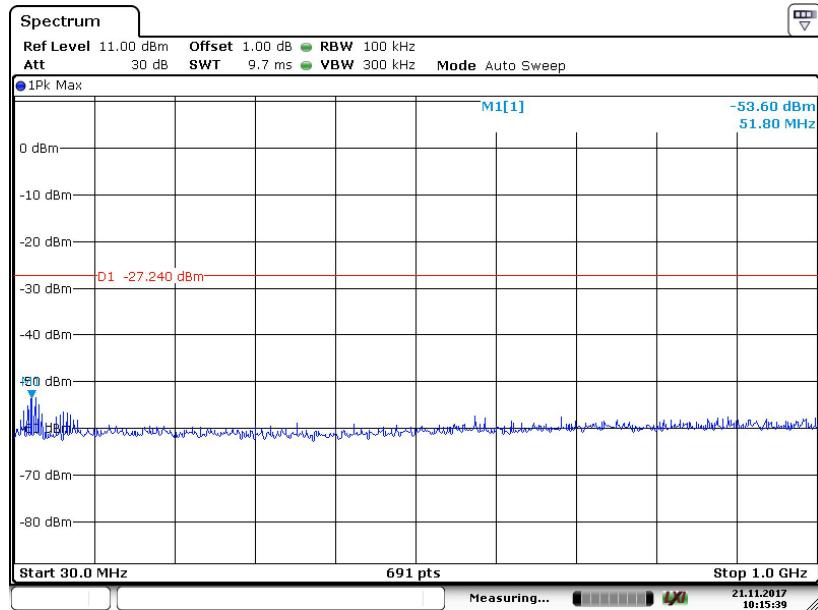
1. Establish a reference level by using the following procedure:
 - a. Set RBW=100 kHz. VBW \geq 3RBW. Detector =peak, Sweep time = auto couple, Trace mode = max hold.
 - b. Allow trace to fully stabilize, use the peak marker function to determine the maximum PSD level.
2. Use the maximum PSD level to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

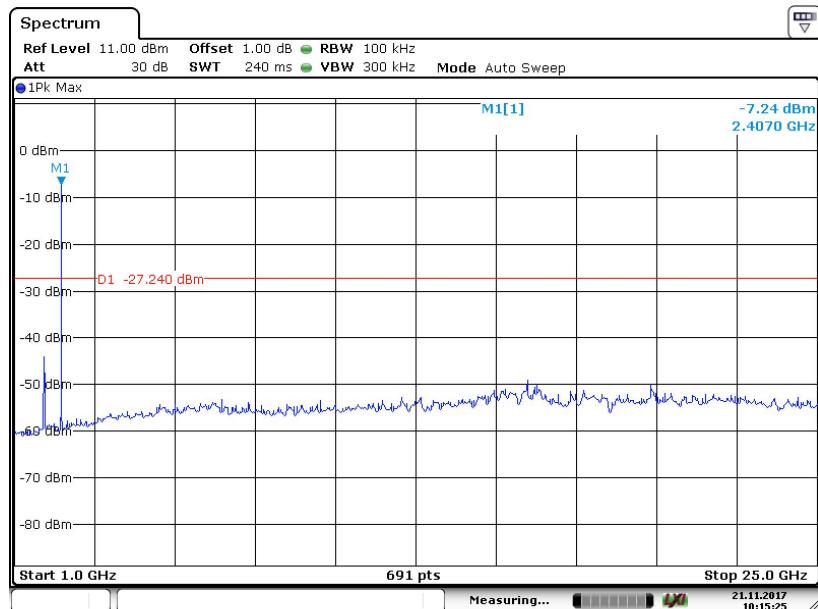
| Frequency Range MHz | Limit (dBc) |
|------------------------|-------------|
| 30-25000 | -20 |

Spurious RF conducted emissions

2402MHz



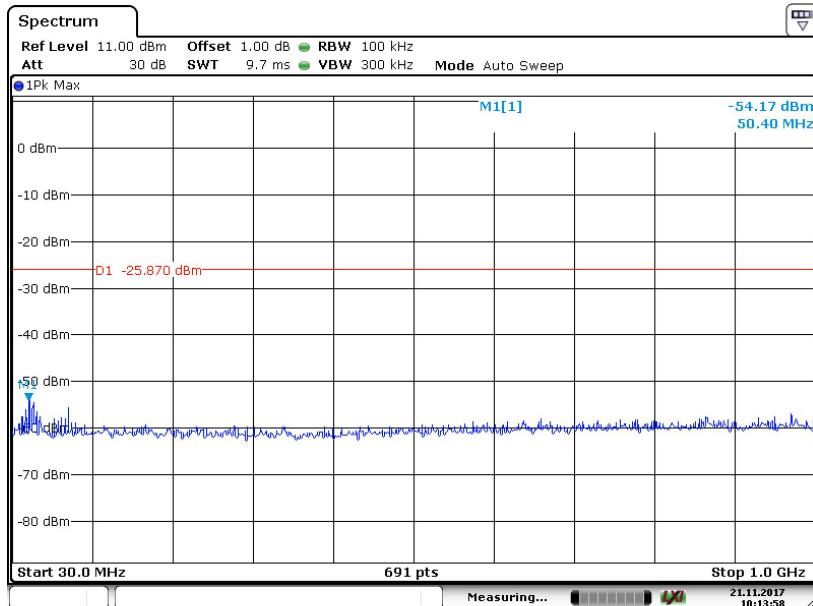
Date: 21.NOV.2017 10:15:39



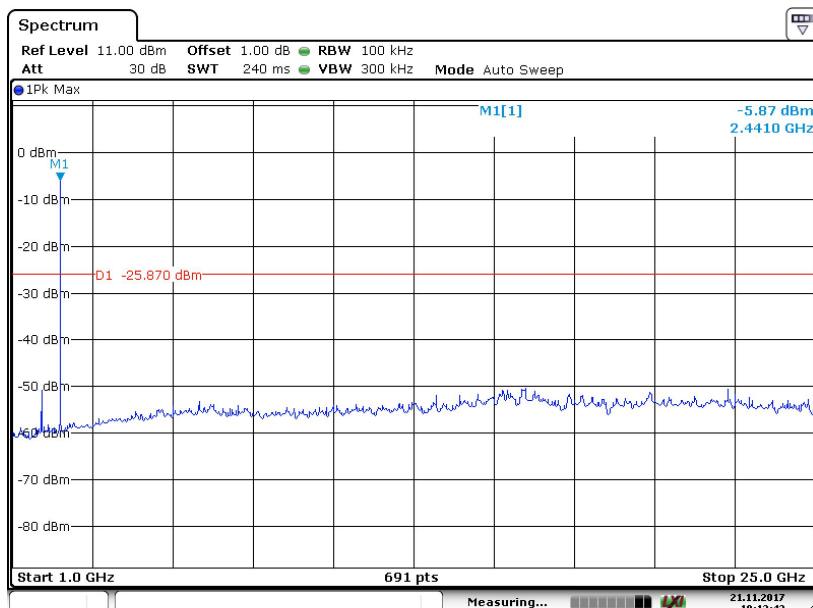
Date: 21.NOV.2017 10:15:25

Spurious RF conducted emissions

2440MHz



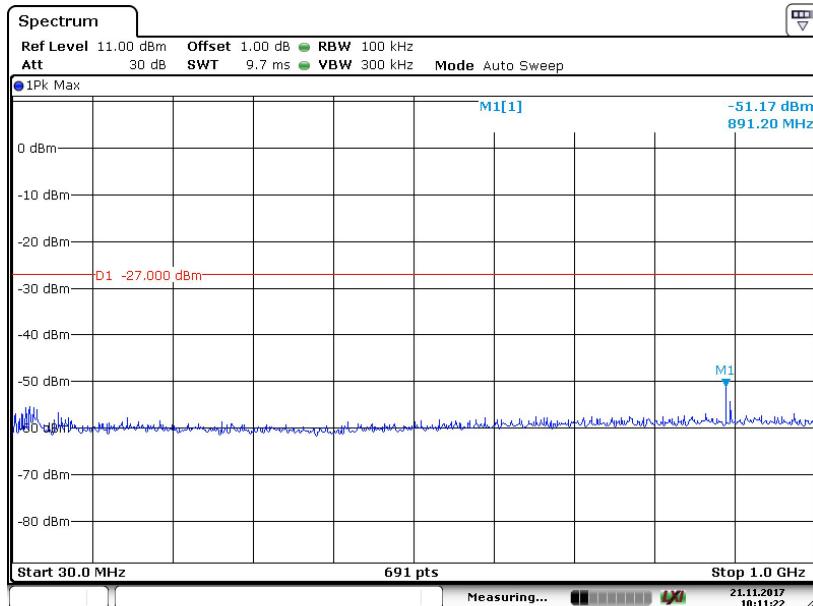
Date: 21.NOV.2017 10:13:57



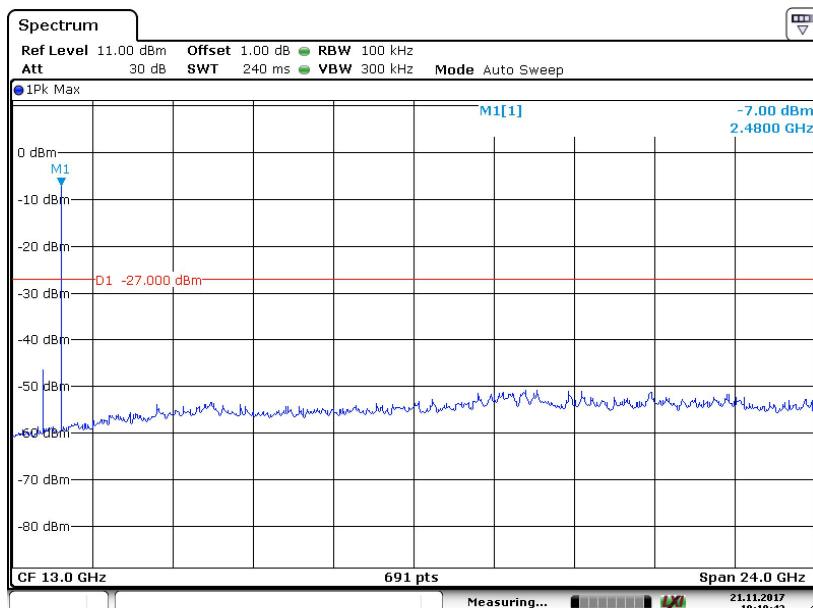
Date: 21.NOV.2017 10:13:42

Spurious RF conducted emissions

2480MHz



Date: 21.NOV.2017 10:11:22



Date: 21.NOV.2017 10:10:42

9.5 Band edge

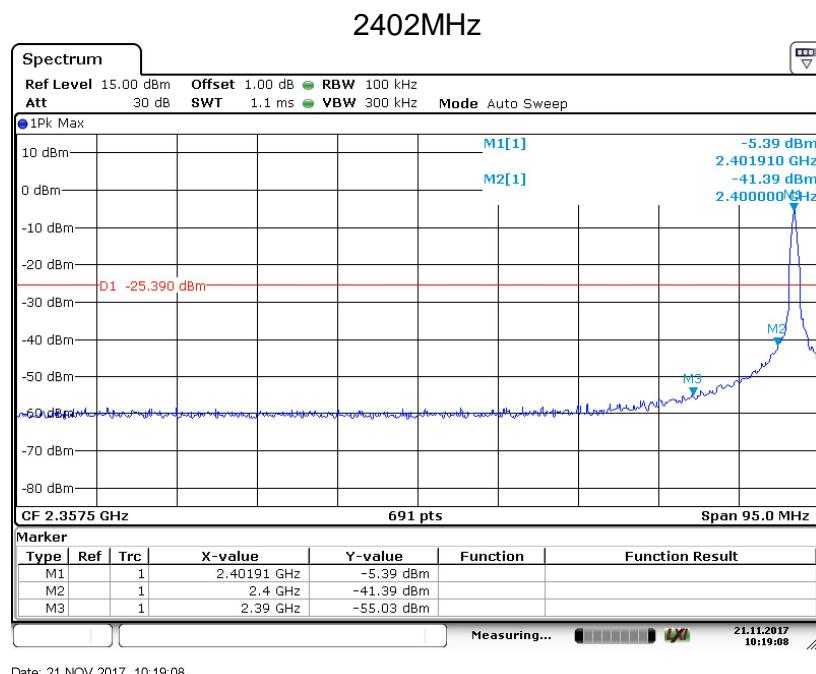
Test Method

- 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 \geq 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

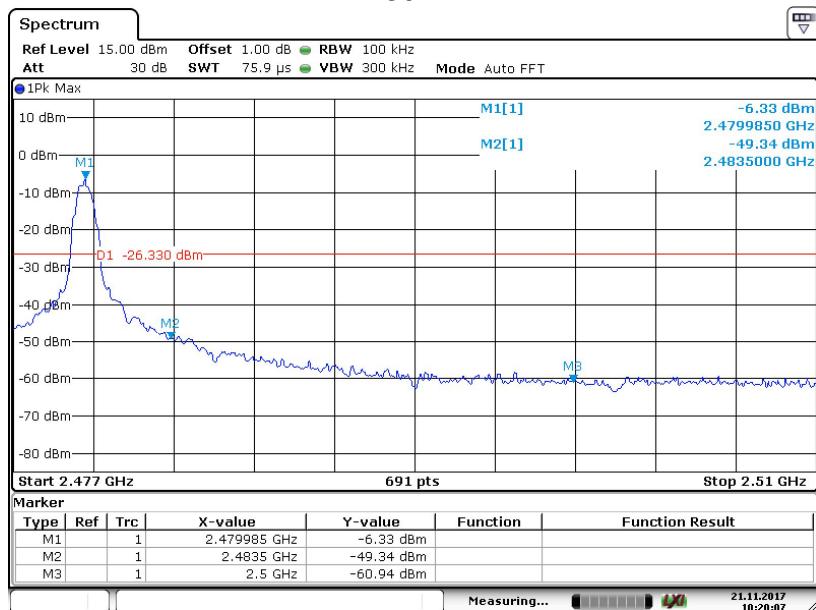
| Frequency Range MHz | Limit (dBc) |
|------------------------|-------------|
| 30-25000 | -20 |

Test result



Band edge

2480MHz



Date: 21.NOV.2017 10:20:07

9.6 Spurious radiated emissions for transmitter

Test Method

- 1: The EUT was place 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 \geq 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 \geq 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 (20log(1/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 dB μ 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:

2402MHz (30MHz – 1GHz)

| Frequency | Emission Level | Corr. | Polarization | Limit | Detector | Result |
|-----------|----------------|--------|--------------|--------------|----------|--------|
| MHz | dBuV/m | dB | | dB μ V/m | | |
| 944.76 | 30.00 | -15.30 | Horizontal | 46.00 | QP | Pass |
| 944.76 | 36.40 | -14.40 | Vertical | 46.00 | QP | Pass |

2402MHz (Above 1GHz)

| Frequency | Emission Level | Corr. | Polarization | Limit | Detector | Result |
|-----------|----------------|-------|--------------|--------------|----------|--------|
| MHz | dBuV/m | dB | | dB μ V/m | | |
| 4803.28 * | 42.32 | 2.50 | Horizontal | 74.00 | PK | Pass |
| 4804.21 * | 38.52 | 2.60 | Vertical | 74.00 | PK | Pass |

2440MHz (30MHz – 1GHz)

| Frequency | Emission Level | Corr. | Polarization | Limit | Detector | Result |
|-----------|----------------|-------|--------------|--------------|----------|--------|
| MHz | dBuV/m | dB | | dB μ V/m | | |
| / | / | / | Horizontal | 46.00 | QP | Pass |
| / | / | / | Vertical | 46.00 | QP | Pass |

2440MHz (Above 1GHz)

| Frequency | Emission Level | Corr. | Polarization | Limit | Detector | Result |
|-----------|----------------|-------|--------------|--------------|----------|--------|
| MHz | dBuV/m | dB | | dB μ V/m | | |
| 4880.15 * | 41.72 | 2.50 | Horizontal | 74.00 | PK | Pass |
| 4880.15 * | 39.39 | 2.60 | Vertical | 74.00 | PK | Pass |

Remark:

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



2480MHz (30MHz – 1GHz)

| Frequency MHz | Emission Level dB _u V/m | Corr. dB | Polarization | Limit dB _u V/m | Detector | Result |
|------------------|--|-------------|--------------|------------------------------|----------|--------|
| / | / | / | Horizontal | 46.00 | QP | Pass |
| / | / | / | Vertical | 46.00 | QP | Pass |

2480MHz (Above 1GHz)

| Frequency MHz | Emission Level dB _u V/m | Corr. dB | Polarization | Limit dB _u V/m | Detector | Result |
|------------------|--|-------------|--------------|------------------------------|----------|--------|
| 4959.84 * | 42.73 | 2.70 | Horizontal | 74.00 | PK | Pass |
| 4959.37 * | 41.78 | 2.80 | Vertical | 74.00 | PK | Pass |

Remark:

- (1) Data of measurement within this 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.
- (2) “*” 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 |
|-------------------------------------|-----------------|-----------|-----------------|---------------|
| EMI Test Receiver | Rohde & Schwarz | ESR 26 | 101269 | 2018-7-14 |
| Trilog Super Broadband Test Antenna | Schwarzbeck | VULB 9163 | 707 | 2018-7-14 |
| Horn Antenna | Rohde & Schwarz | HF907 | 102294 | 2018-7-14 |
| Pre-amplifier | Rohde & Schwarz | SCU 18 | 102230 | 2018-7-14 |
| Signal Generator | Rohde & Schwarz | SMY01 | 839369/005 | 2018-7-7 |
| Attenuator | Agilent | 8491A | MY39264334 | 2018-7-7 |
| 3m Semi-anechoic chamber | TDK | 9X6X6 | ---- | 2020-7-7 |
| Test software | Rohde & Schwarz | EMC32 | Version 9.15.00 | N/A |

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 | |
|---|--|
| Test 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; |
| Uncertainty for Radiated Spurious Emission 18000MHz-40000MHz | Horizontal: 4.93dB; Vertical: 4.92dB; |
| Uncertainty for Conducted Emission 150kHz-30MHz (for test using AMN ENV216) | 3.50dB |
| Uncertainty for Conducted RF test | 2.04dB |