TÜVRheinland®

**Produkte**
*Products*

| | | |
|---|---|---|
| **Prüfbericht - Nr.:** *Test Report No.:* | **50070395 001** | **Seite 1 von 53** *Page 1 of 53* |
| **Auftraggeber:** *Client:* | **Mitsubishi Electric Corporation** 6-5-66, Tebira, Wakayama-shi, Wakayama 640-8686, Japan | |
| **Gegenstand der Prüfung:** *Test Item:* | **Remote Controller for Package Air Conditioner** | |
| **Bezeichnung:** *Identification:* | **PAR-CT01MAU-SB** | **Serien-Nr.:** *Serial No.:* **Refer to section 4.3** |
| **Wareneingangs-Nr.:** *Receipt No.:* | **A000525205-001 to -005** | **Eingangsdatum:** *Date of Receipt:* **2017-04-06** |
| **Zustand des Prüfgegenstandes bei Anlieferung:** *Condition of Test Item at Delivery:* | **Good** | |
| **Prüfort:** *Testing Location:* | **TÜV Rheinland Japan Ltd. – Global Technology Assessment Center** 4-25-2 Kita-Yamata, Tsuzuki-ku, Yokohama 224-0021, Japan | |
| **Prüfgrundlage:** *Test Specification:* | **FCC 47 CFR Part 15, Subpart C, Section 15.247 (October 1, 2015)**<br>**RSS-247 (Issue 1): 2015**<br>**RSS-Gen (Issue 4): 2014**<br>ANSI C63.10-2013<br>KDB Publication No. 558074 D01: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 (v04) | |
| **Prüfergebnis:** *Test Result:* | **Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).** *The test item passed the test specification(s).* | |
| **Prüflaboratorium:** *Testing Laboratory:* | **TÜV Rheinland Japan Ltd. – Global Technology Assessment Center** 4-25-2 Kita-Yamata, Tsuzuki-ku, Yokohama 224-0021, Japan | |

| **geprüft/** *tested by:* | | | **kontrolliert/** *reviewed by:* | | |
|---|---|---|---|---|---|
| 2017-05-16 | A. Abe / Inspector | | 2017-05-16 | R. Meiranke / Reviewer | |
| **Datum** *Date* | **Name/Stellung** *Name/Position* | **Unterschrift** *Signature* | **Datum** *Date* | **Name/Stellung** *Name/Position* | **Unterschrift** *Signature* |

**Sonstiges /** *Other Aspects:*

| *Abkürzungen:* | | | | *Abbreviations:* | | | |
|---|---|---|---|---|---|---|---|
| *P(ass)* | = | *entspricht Prüfgrundlage* | | *P(ass)* | = | *passed* | |
| *F(ail)* | = | *entspricht nicht Prüfgrundlage* | | *F(ail)* | = | *failed* | |
| *N/A* | = | *nicht anwendbar* | | *N/A* | = | *not applicable* | |
| *N/T* | = | *nicht getestet* | | *N/T* | = | *not tested* | |

# TEST SUMMARY

**5.1.1 SUPPLY VOLTAGE REQUIREMENTS**
*RESULT: PASS*

**5.1.2 ANTENNA REQUIREMENTS**
*RESULT: PASS*

**5.1.3 RESTRICTED BANDS OF OPERATION**
*RESULT: PASS*

**5.2.1 CONDUCTED OUTPUT POWER**
*RESULT: PASS*

**5.2.2 CONDUCTED SPURIOUS EMISSIONS**
*RESULT: PASS*

**5.2.3 PEAK POWER SPECTRAL DENSITY**
*RESULT: PASS*

**5.3.1 6DB BANDWIDTH**
*RESULT: PASS*

**5.3.2 99% BANDWIDTH**

**5.3.3 RADIATED SPURIOUS EMISSIONS OF TRANSMITTER**
*RESULT: PASS*

**5.4.1 AC POWER LINE CONDUCTED EMISSION OF TRANSMITTER**
*RESULT: PASS*

# Contents

# 1. General Remarks

## 1.1 Complementary Materials

There is no attachment to this test report.

# 2. Test Sites

## 2.1 Test Facilities

TÜV Rheinland Japan Ltd. – Global Technology Assessment Center
4-25-2 Kita-Yamata, Tsuzuki-ku, Yokohama 224-0021, Japan

The used test equipment is in accordance with CISPR 16 for measurement of radio interference.

The Federal Communications Commission has reviewed the technical characteristics of the radiated and conducted emission facilities and has found these test sites to be in compliance with the requirements of section 2.948 of the FCC rules. The description of the test facility is listed under FCC registration number 299054.

Innovation, Science and Economic Development Canada has reviewed the technical characteristics of the radiated and conducted emission facilities and has found these test sites to be in compliance with Canadian requirements. The description of the test facility is listed under OATS filing number 3466B-1.

The test facility is accredited by VLAC (member of ILAC) under number VLAC-017 according to ISO/IEC 17025:2005.

ilac-MRA VLAC Lab Accreditation VLAC-017

TÜV Rheinland Japan Ltd. is accredited by the Federal Communications Commission as a Conformity Assessment Body under Designation Number JP0017 and Test Firm Registration Number 386498.

## 2.2 List of Test and Measurement Instruments

### Table 1: List of Test and Measurement Equipment

| Kind of Equipment | Manufacturer | Model Name | Serial Number | Equip. ID | Cal. Interval | Cal. Date | Next Cal. |
|---|---|---|---|---|---|---|---|
| **For Antenna Port Conducted Emission** | | | | | | | |
| Receiver | Rohde & Schwarz | ESU 40 | 100029 | RF-0021 | 1 year | 2016-08-31 | 2017-08-31 |
| **For AC Power Line Conducted Emission** | | | | | | | |
| Conducted Emission Measurement Software | Toyo Corporation | EP5/CE | Ver. 5.0.20 | RF-0025 | 1 year | 2017-03-31 | 2018-03-31 |
| Receiver | Rohde & Schwarz | ESU 8 | 100025 | RF-0020 | 1 year | 2016-07-30 | 2017-07-30 |
| LISN | Rohde & Schwarz | ENV216 | 100276 | RF-0016 | 1 year | 2016-05-27 | 2017-05-27 |
| **For Radiated Emission** | | | | | | | |
| Radiated Emission Measurement Soft-ware (below 30MHz) | Toyo Corporation | EP5/ME | Ver. 5.0.10 | RF-0172 | 1 year | 2017-03-31 | 2018-03-31 |
| Radiated Emission Measurement Soft-ware (above 30MHz) | Toyo Corporation | EP7/RE | Ver. 5.0.2 | RF-0026 | 1 year | 2017-03-31 | 2018-03-31 |
| Receiver | Rohde & Schwarz | ESU 8 | 100025 | RF-0020 | 1 year | 2016-07-30 | 2017-07-30 |
| Receiver | Rohde & Schwarz | ESU 40 | 100029 | RF-0021 | 1 year | 2016-08-31 | 2017-08-31 |
| RF Selector (10m Chamber) | Toyo Corporation | NS4900 | 0703-182 | RF-0029 | 1 year | 2017-03-31 | 2018-03-31 |
| Loop Antenna with Amplifier, 9kHz-30MHz | Rohde & Schwarz | HFH2-Z2 | 100139 | RF-0048 | 1 year | 2016-06-03 | 2017-06-03 |
| Trilog Antenna No. 2, 30-1000MHz | Schwarzbeck | VULB 9168 | 9168-475 | RF-0462 | 1 year | 2017-04-04 | 2018-04-04 |
| 5dB Attenuator | Pasternack | PE7047-5 | - | RF-0731 | 1 year | 2017-03-01 | 2018-03-01 |
| Low Noise Preamplifier, 9kHz-1GHz | TSJ | MLA-10K01-B01-35 | 1370750 | RF-0253 | 1 year | 2017-01-18 | 2018-01-18 |
| Low Pass Filter, DC-1GHz | R&K | LP1000CH 3 | 12104001 | RF-0515 | 1 year | 2017-01-18 | 2018-01-18 |
| Horn Antenna, 1-8GHz | Schwarzbeck | BBHA 9120 D | 1059 | RF-0553 | 1 year | 2016-06-03 | 2017-06-03 |
| Microwave Preamplifier, 1-8GHz | Toyo Corporation | TPA0108-40 | 0634 | RF-0052 | 1 year | 2017-01-25 | 2018-01-25 |
| Band Reject Filter, 1-8GHz | Nitsuki | NF-49BT | 027 | RF-0131 | 1 year | 2017-01-26 | 2018-01-26 |
| Horn Antenna with Preamplifier, 8-18GHz | Toyo Corporation | HAP06-18W | 00000025 | RF-0065 | 1 year | 2016-06-03 | 2017-06-03 |

| Kind of Equipment | Manufacturer | Model Name | Serial Number | Equip. ID | Cal. Interval | Cal. Date | Next Cal. |
|---|---|---|---|---|---|---|---|
| High Pass Filter, 8-18GHz | Micro-Tronics | HPM50107 | 006 | RF-0334 | 1 year | 2016-07-01 | 2017-07-01 |
| Horn Antenna with Preamplifier, 18-26.5GHz | Toyo Corporation | HAP18-26N | 00000010 | RF-0070 | 1 year | 2016-06-03 | 2017-06-03 |
| **Constant Voltage Constant Frequency Stabilizers and Power Accessories** | | | | | | | |
| CVCF (Shielded Room) | NF Corporation | ES2000S | 9075612 | RF-0210 | 1 year | 2017-03-21 | 2018-03-21 |
| CVCF Booster (Shielded Room) | NF Corporation | ES2000B | 9074403 | RF-0211 | 1 year | 2017-03-21 | 2018-03-21 |
| CVCF (10m Chamber) | NF Corporation | ES2000U | 9067307 | RF-0212 | 1 year | 2017-03-21 | 2018-03-21 |
| CVCF Booster (10m Chamber) | NF Corporation | ES2000B | 9074408 | RF-0213 | 1 year | 2017-03-21 | 2018-03-21 |
| DC Power Supply | Agilent | E3646A | MY50350007 | RF-0412 | N/A | N/A | N/A |
| True RMS Multimeter | Fluke | 87V | 97680445 | RF-0281 | 1 year | 2017-02-02 | 2018-02-02 |

Conformance of the used measurement and test equipment with the requirements of ISO/IEC 17025:2005 has been confirmed before testing.

## 2.3 Measurement Uncertainty

**Table 2: Emission Measurement Uncertainty**

| Measurement Type | Frequency | Uncertainty |
|---|---|---|
| AC Power Line Conducted Emission | 150kHz - 30MHz | ±2.0dB |
| Antenna Port Conducted Emission | 20Hz - 40GHz | ±1.5dB |
| Radiated Emission | 150kHz - 30MHz | ±4.7dB |
| | 30MHz - 1GHz | ±4.7dB |
| | > 1GHz | ±4.7dB |

# 3. General Product Information

## 3.1 Product Function and Intended Use

The EUT (**E**quipment **U**nder **T**est) is a wall mounted type wired remote controller with a BLE (**B**luetooth **L**ow **E**nergy) module. The EUT is intended to be used with thier package Air Conditioner Systems for office, factory, commercial facility etc. A wireless device such as smart phone can remotely access and control an air conditioner via BLE wireless communication.

This module was newly designed by the customer. Therefore, all radio testing was conducted at the final product.

Note:

Minimum separation distance among the EUT and an end user and/or bystanders is expected to be more than 20cm. However, corresponded RF exposure evaluation is performed as portable equipment.

## 3.2 System Details

| | |
|---|---|
| Specified output power: | -0.1dBm (conducted peak) |
| Antenna gain: | +1.6dBi |
| Antenna type: | Single chip antenna |
| Antenna mounting type: | Internal (mounted on PCB) |
| Frequency range: | 2402-2480MHz |
| Number of channels: | 40 (f= 2402MHz +k*2MHz, where k=0, 1,….., 39) |
| Channel spacing: | 2MHz |
| Modulation type: | GFSK |
| | |
| FCC classification: | DTS |
| IC classification: | Bluetooth Device |
| Emission designator: | 1M06F1D (See section 5.3.2, 99% bandwidth) |
| | |
| Rated voltage: | DC 12.0V |
| Rated current: | Max. 1.5mA |
| Protection class: | III |
| | |
| Test voltage: | DC 12.0V |
| Test voltage and frequency: | AC 120V, 60Hz for Conducted Emission |
| | |
| Duty cycle for radio testing: | 100% |

## 3.3 Clock Frequencies

The highest frequency generated or used by the EUT is 32MHz for the digital interface.

## 3.4 Noise Suppressing Parts

Refer to schematics.

# 4. Test Set-up and Operation Modes

## 4.1 Test Methodology

The test methodology used is based on the requirements of 47 CFR Part 15, Sections 15.31, 15.33, 15.35, 15.205, 15.207, 15.209, 15.247 and KDB Publication No. 558074 D01.

The test methods, which have been used, are based on ANSI C63.10 and RSS-Gen.

For details, see under each test item.

## 4.2 Operation Modes

Testing was performed at the lowest operating frequency (2402MHz), at the operating frequency in the middle of the specified frequency band (2442MHz) and at the highest operating frequency (2480MHz).

The basic operation modes used for testing are:

A. EUT transmits (TX mode), with full power, at lowest channel (2402MHz), a continuous modulated signal streaming with 100% duty cycle.

B. EUT transmits (TX mode), with full power, at middle channel (2442MHz), a continuous modulated signal streaming with 100% duty cycle.

C. EUT transmits (TX mode), with full power, at highest channel (2480MHz), a continuous modulated signal streaming with 100% duty cycle.

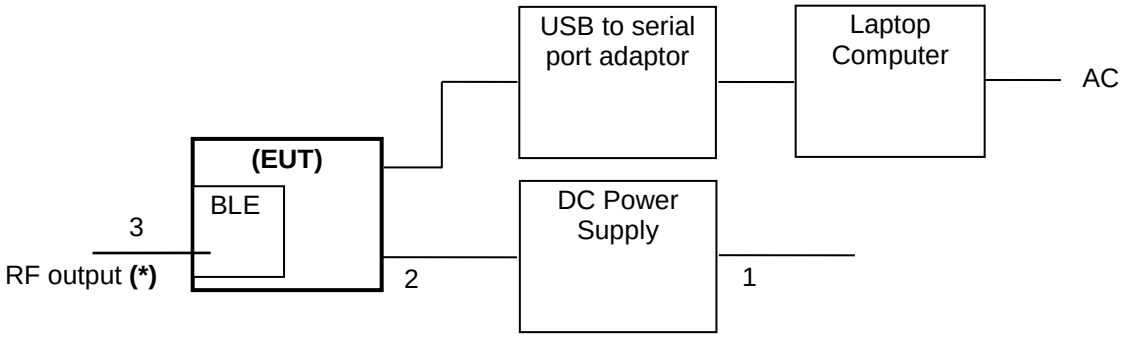
## 4.3 Physical Configuration for Testing

The test system was configured in a typical fashion (as a customer would normally use it).

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.10.

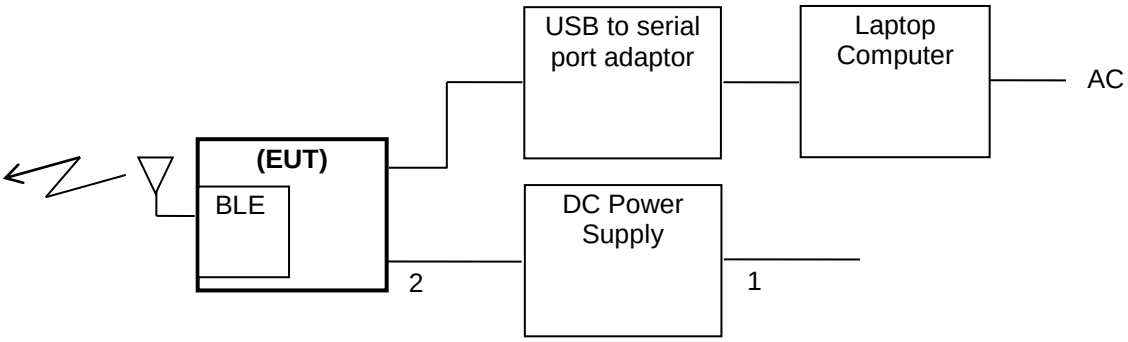
**Figure 1: Block Diagram**

1) Test Setup of Conducted Radio Testing




Note: A laptop computer and USB to serial adaptor were only used for an initial setup of radio operation. They were disconnected to the EUT during conducted and radiated radio testing.

2) Test Setup of Radiated Radio and Conducted Emission testing




Note: A laptop computer and USB to serial adaptor were only used for an initial setup of radio operation. They were disconnected to the EUT during conducted and radiated radio testing.

**Table 3: Interfaces present on the EUT**

| No. | Interface | Cable Length for Testing, Shielding | Interface Classification |
|---|---|---|---|
| 1. | AC Mains for AC/DC Adapter | (Direct plug-in type) **(*)** | AC Input Power Port |
| 2. | DC Mains for conducted radio | 1m, Un-shielded | DC Input Power Port |
| | DC Mains for radiated radio | 2.5m, Un-shielded | |
| 3. | RF Cable **(**)** | 0.3m, Shielded | RF Port |

Note:

**(*)** AC extension cable was used with an AC/DC adapter for AC Power Line Conducted Measurements in section 5.4.

**(**)** This interface is not user accessible, but for testing purpose only.

Two test samples were available,

- Sample No. 7IBCT17200017 was used for antenna conducted measurements;
- Sample No. 7IBCT17200031 was used for AC power line conducted measurement and for radiated emission measurements.

For antenna conducted measurements, the antenna was replaced by a 50Ω antenna connector.

For more details, refer to section: Photographs of the Test Set-Up.

## 4.4 Test Software

The EUT was provided by the manufacturer with suitable software to allow operation in all the required modes.

Software used for testing: rBLE_Tool Version 1.12 by Renesas Electronics.

Before starting radio testing, special software mentioned above was running on a laptop computer connected to the EUT through a converter for an initial setting purpose. It was used to enable the test operation modes (mode A, B and C) listed in section 4.2 as appropriate.

## 4.5 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

1. Product: Laptop Computer
   Manufacturer: Dell
   Model: Latitude E6230
   Rated Voltage: DC 19.5V
   Input Current: 4.62A
   Protection Class: III
   Serial Number: 24352642117

2. Product: AC Adaptor for Laptop Computer
   Manufacturer: Dell
   Model: LA65NS2-01
   Rated Voltage: AC 100-240V
   Input Current: 1.6A
   Frequency: 50-60Hz
   Protection Class: II
   Serial Number: CN-06TM1C-72438-374-73A5-A01

3. Product: AC/DC Adaptor (For Conducted Emission)
   Manufacturer: UNIFIVE
   Model: UU336-1230
   Rated Voltage: AC 100-240V
   Input Current: 0.79A
   Frequency: 50/60Hz
   Protection Class: II
   Serial Number: G11-0286491

4. Product: USB-TTL Serial Convertor
   Manufacturer: FTDI Chip
   Model: TTL-232R-3V3
   Rated Voltage: DC 5V (USB bus-powered)
   Protection Class: III

## 4.6 Countermeasures to achieve Compliance

No additional measures were employed to achieve compliance.

# 5. Test Results RADIO

## 5.1 Technical Requirements

### 5.1.1 Supply Voltage Requirements

**RESULT:** **PASS**

Requirements:

FCC 15.31(e)

For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

Verdict:

The EUT has an internal voltage regulator to supply the RF circuit. Therefore it complies with the supply voltage requirements.

### 5.1.2 Antenna Requirements

**RESULT:** **PASS**

Requirements:

FCC 15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Verdict:

The EUT has one chip antenna inside its enclosure. It is not user accessible. Therefore it complies with the antenna requirements.

## 5.1.3 Restricted Bands of Operation

**RESULT:** **PASS**

Requirements:

FCC 15.205 and RSS-Gen §8.10

Only spurious emissions are permitted in any of the restricted frequency bands, unless otherwise specified.

Verdict:

The EUT operation frequency range is 2402 - 2480MHz. Therefore only spurious emissions may be found in the restricted bands of operation and the EUT complies with the restricted frequency band requirement.

# 5.2 Conducted Measurements at Antenna Port

## 5.2.1 Conducted Output Power

**RESULT:** **PASS**

Date of testing: 2017-04-23

Ambient temperature: 24°C
Relative humidity: 48%
Atmospheric pressure: 1011hPa

Requirements:

FCC 15.247(b)(3) and RSS-247 §5.4(4)

For systems using digital modulation in the 2400-2483.5MHz band, the maximum peak conducted output power is 1W (30dBm).

If transmitting antennas of directional gain greater than 6dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Test procedure:

KDB Publication No. 558074 D01, section 9.1.1 and RSS-Gen §6.12.

The maximum peak conducted output power was measured at the antenna port with a spectrum analyzer using a peak detector. The resolution bandwidth was set to 1MHz (≥ measured DTS bandwidth in the section 5.3.1) and the video bandwidth was set to 3MHz (≥ 3 × RBW). The readings of the measurements take into account the loss generated by all the involved cables.

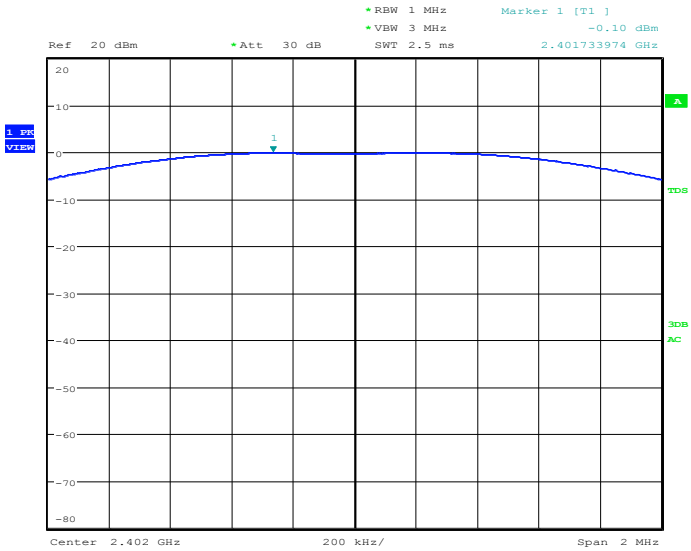
The measurement was performed at GFSK modulation and corresponded data rate of 1Mbps. All the other measurements for the evaluation of the radio properties of the EUT have been performed using this data rate.

## Table 4: Conducted Output Power

| Operating Frequency [MHz] | Conducted Output Power | | Limit [dBm] | Margin [dB] |
|---|---|---|---|---|
| | [dBm] | [mW] | | |
| 2402MHz | -0.10 | 0.9772 | 30 | 30.10 |
| 2442MHz | -0.42 | 0.9078 | 30 | 30.42 |
| 2480MHz | -0.68 | 0.8551 | 30 | 30.68 |

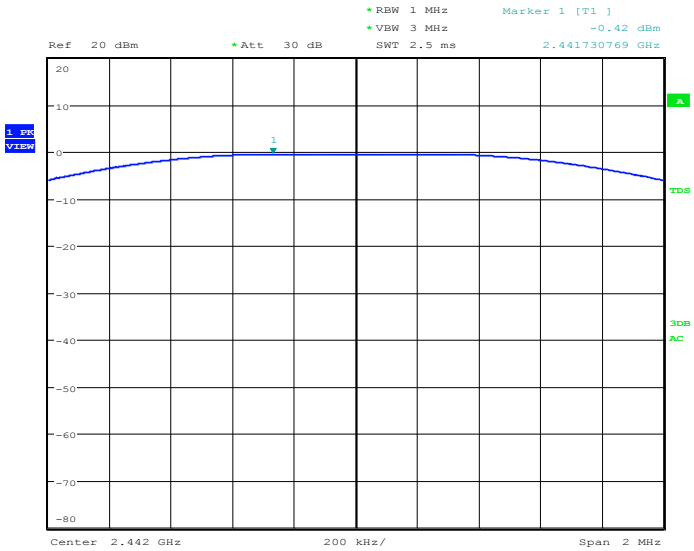
Note: Grey shading area shows the highest output power in this test result.

## Figure 2: Conducted Output Power, Mode A (2402MHz)



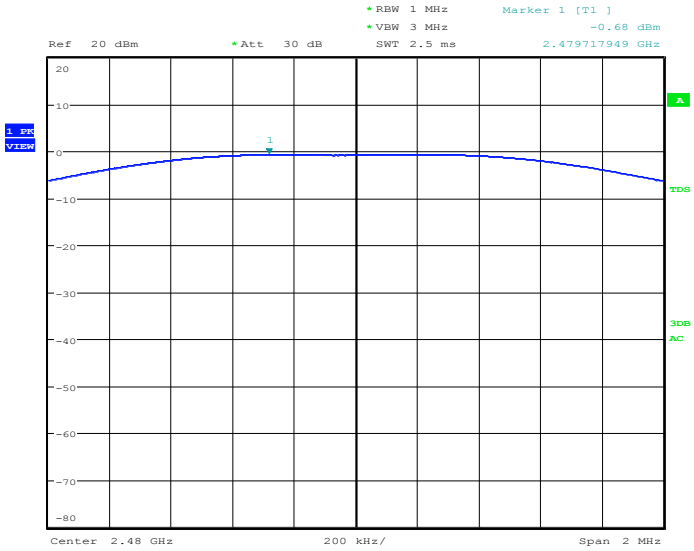

Maximum peak conducted output power, mode A
Date: 23.APR.2017 17:07:51

## Figure 3: Conducted Output Power, Mode B (2442MHz)




Maximum peak conducted output power, mode B
Date: 23.APR.2017 17:17:04

## Figure 4: Conducted Output Power, Mode C (2480MHz)




Maximum peak conducted output power, mode C
Date: 23.APR.2017 17:24:06

## 5.2.2 Conducted Spurious Emissions

**RESULT:** **PASS**

| | |
|---|---|
| Date of testing: | 2017-04-23 |
| Ambient temperature: | 24°C |
| Relative humidity: | 48% |
| Atmospheric pressure: | 1011hPa |

Requirements:

FCC 15.247(d) and RSS-247 §5.5

In any 100kHz bandwidth outside the frequency band in which the intentional radiator is operating, the RF power shall be at least 20dB below that of the maximum in-band 100kHz emission.

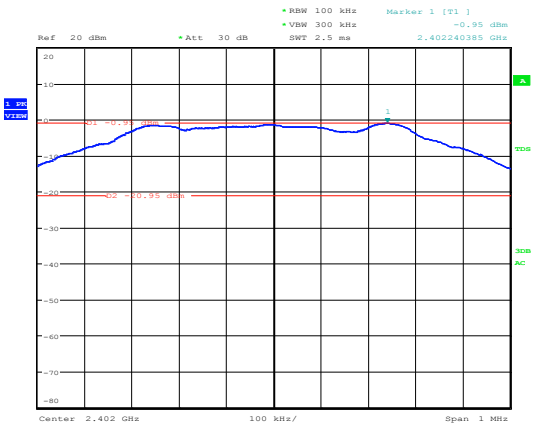
Test procedure:

KDB Publication No. 558074 D01 and RSS-Gen §6.13.

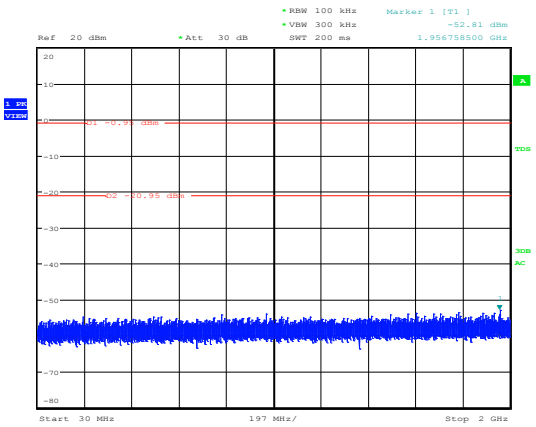
The conducted spurious emissions were measured at the antenna port with a spectrum analyzer using a peak detector. The resolution bandwidth was set to 100kHz and the video bandwidth to 300kHz. Measurements were performed from 30MHz to 25GHz ($10^{th}$ harmonics).

The readings of the measurements take into account the loss generated by all the involved cables.

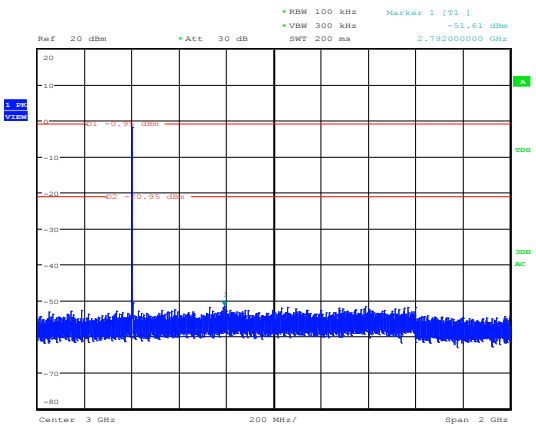
## Figure 5: Conducted Spurious Emissions, 30MHz - 10GHz, Mode A (2402MHz)



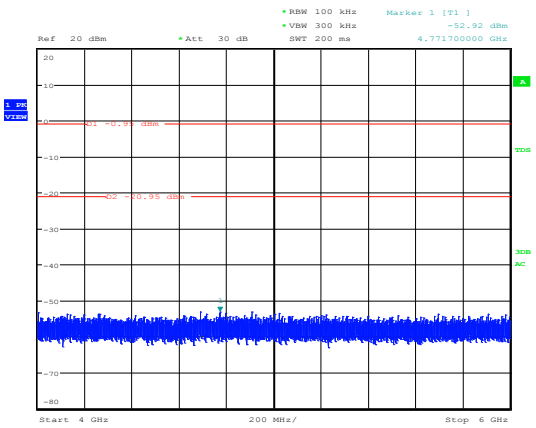

Conducted spurious emissions, mode A
Date: 23.APR.2017 17:09:04



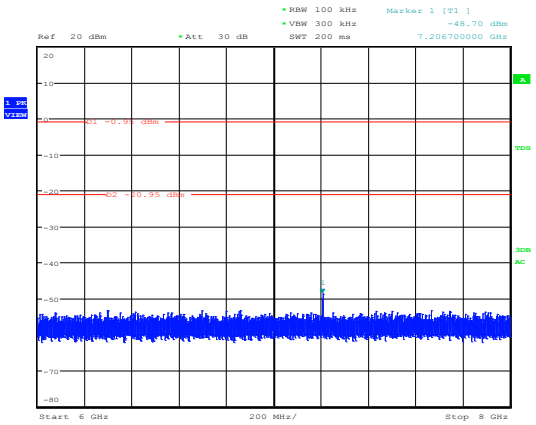

Conducted spurious emissions, mode A
Date: 23.APR.2017 17:09:36



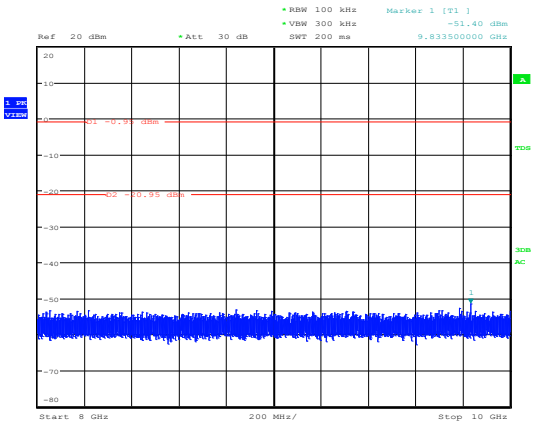

Conducted spurious emissions, mode A
Date: 23.APR.2017 17:10:06




Conducted spurious emissions, mode A
Date: 23.APR.2017 17:10:23

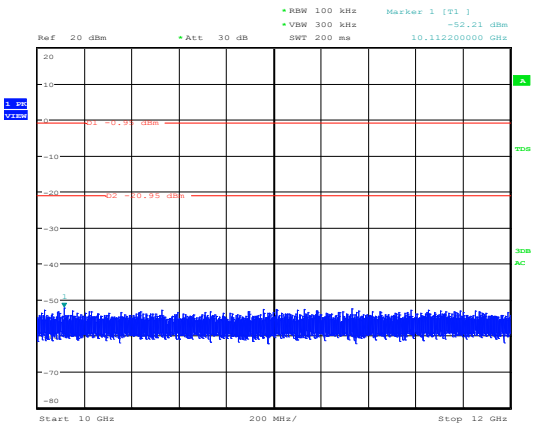



Conducted spurious emissions, mode A
Date: 23.APR.2017 17:10:43

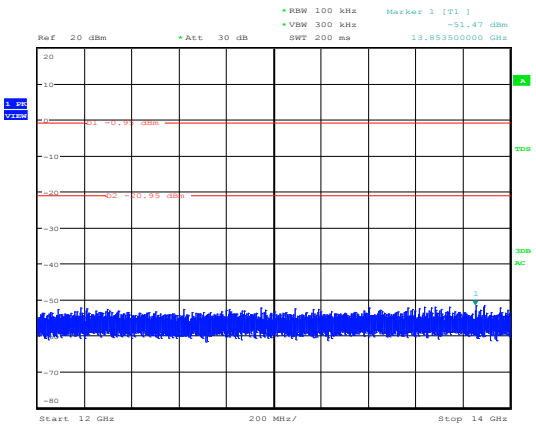



Conducted spurious emissions, mode A
Date: 23.APR.2017 17:11:01

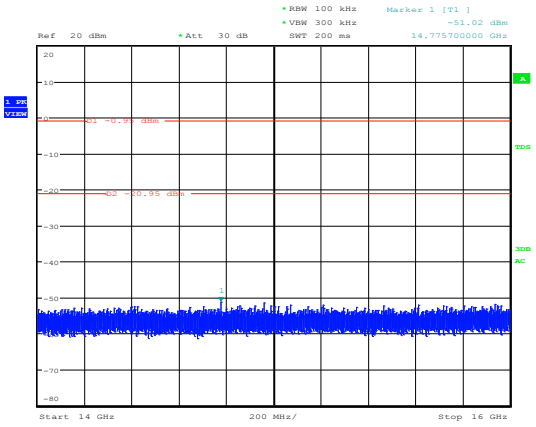
## Figure 6: Conducted Spurious Emissions, 10 - 22GHz, Mode A (2402MHz)



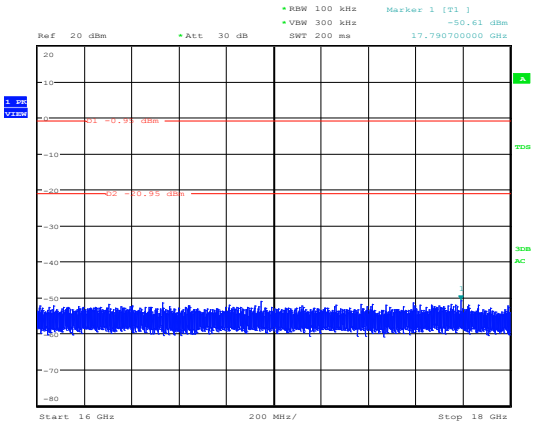

Conducted spurious emissions, mode A
Date: 23.APR.2017 17:11:18



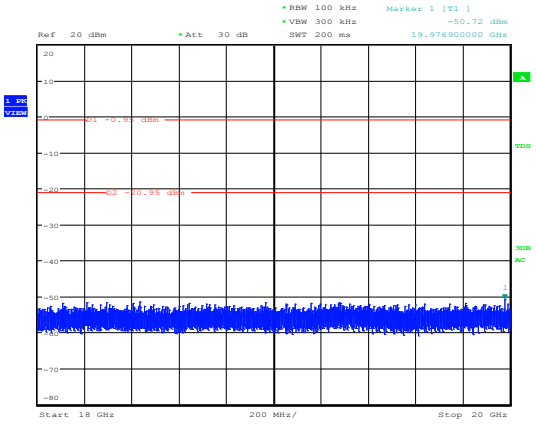

Conducted spurious emissions, mode A
Date: 23.APR.2017 17:11:35



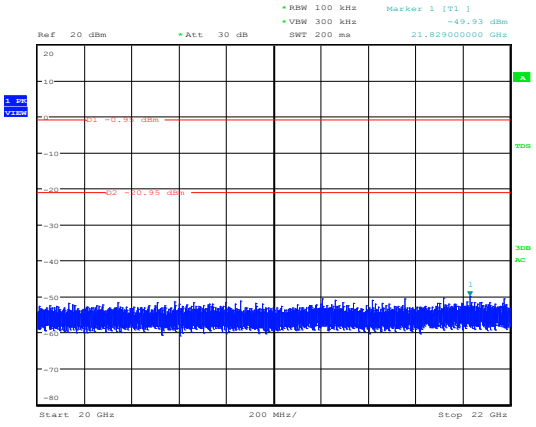

Conducted spurious emissions, mode A
Date: 23.APR.2017 17:11:52




Conducted spurious emissions, mode A
Date: 23.APR.2017 17:12:29

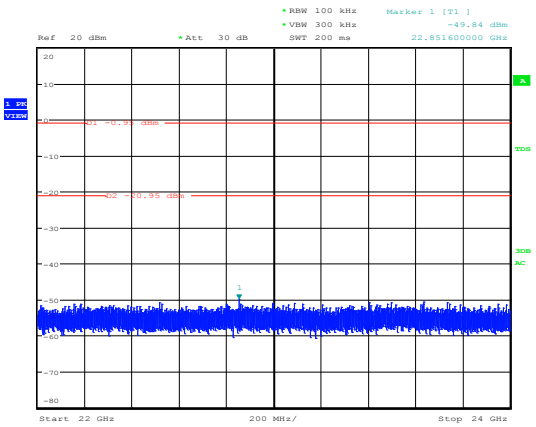



Conducted spurious emissions, mode A
Date: 23.APR.2017 17:12:46

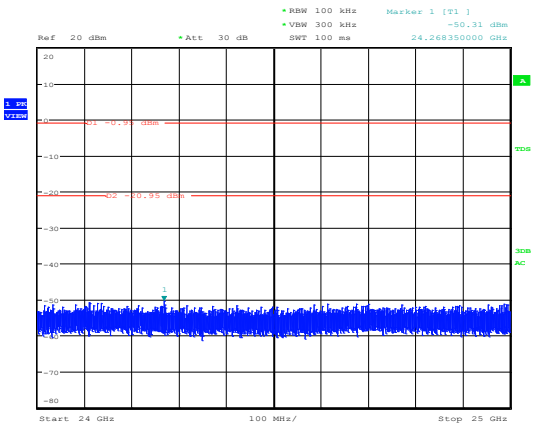



Conducted spurious emissions, mode A
Date: 23.APR.2017 17:13:02

## Figure 7: Conducted Spurious Emissions, 22 - 25GHz, Mode A (2402MHz)

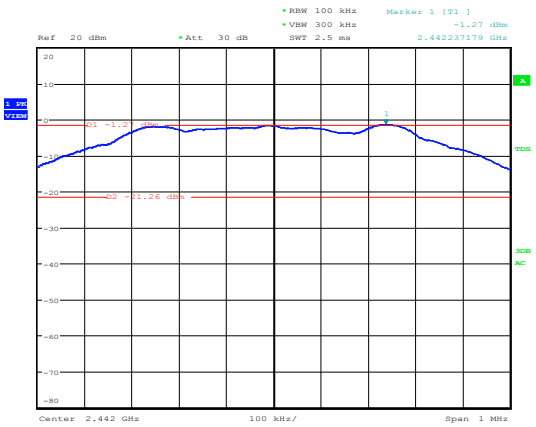



Conducted spurious emissions, mode A
Date: 23.APR.2017 17:13:18

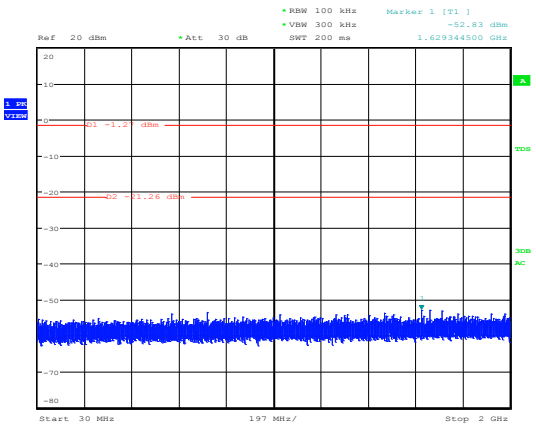



Conducted spurious emissions, mode A
Date: 23.APR.2017 17:14:03

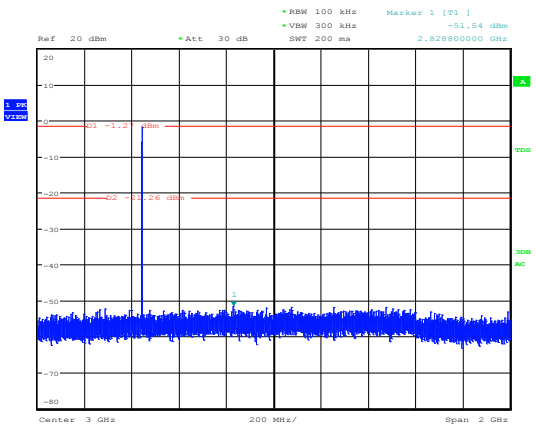
## Figure 8: Conducted Spurious Emissions, 30MHz - 10GHz, Mode B (2442MHz)



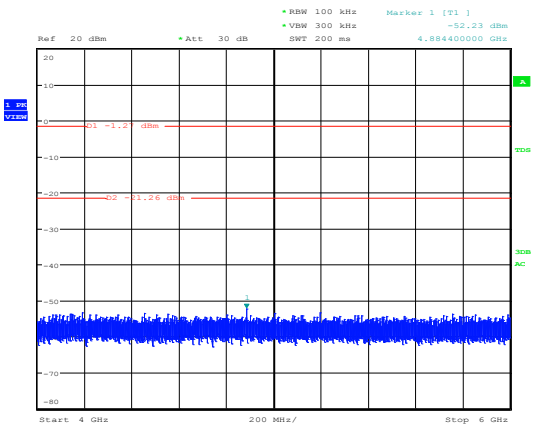

Conducted spurious emissions, mode B
Date: 23.APR.2017 17:18:24



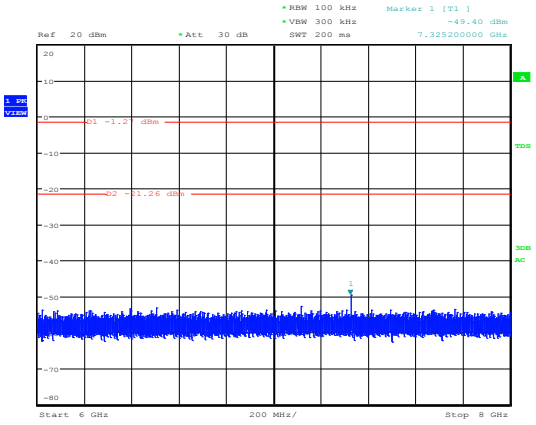

Conducted spurious emissions, mode B
Date: 23.APR.2017 17:18:41



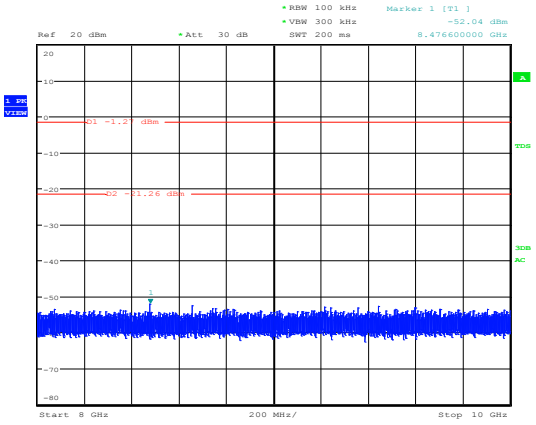

Conducted spurious emissions, mode B
Date: 23.APR.2017 17:19:17




Conducted spurious emissions, mode B
Date: 23.APR.2017 17:19:39

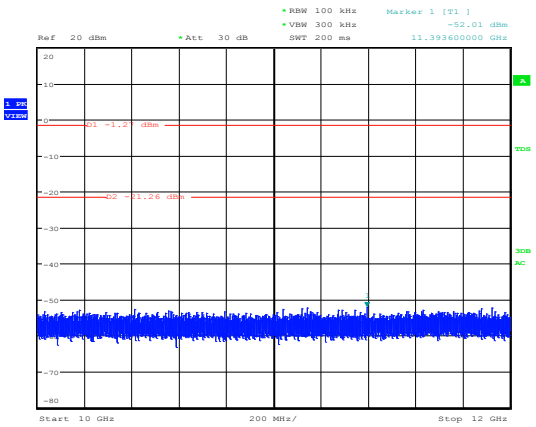



Conducted spurious emissions, mode B
Date: 23.APR.2017 17:20:01

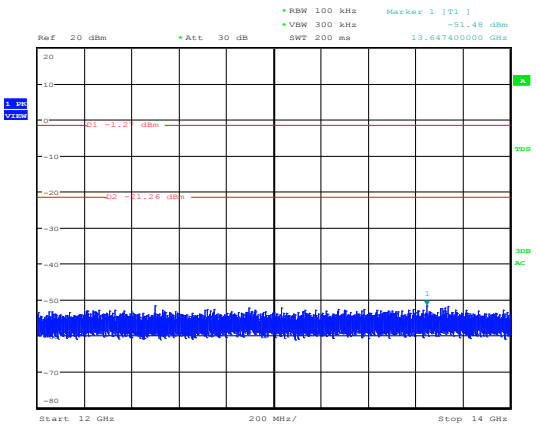



Conducted spurious emissions, mode B
Date: 23.APR.2017 17:20:23

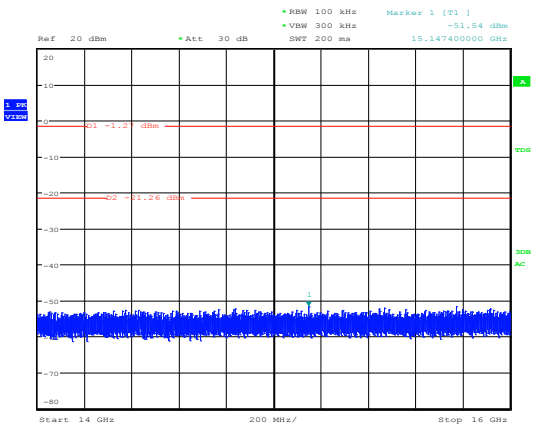
## Figure 9: Conducted Spurious Emissions, 10 - 22GHz, Mode B (2442MHz)



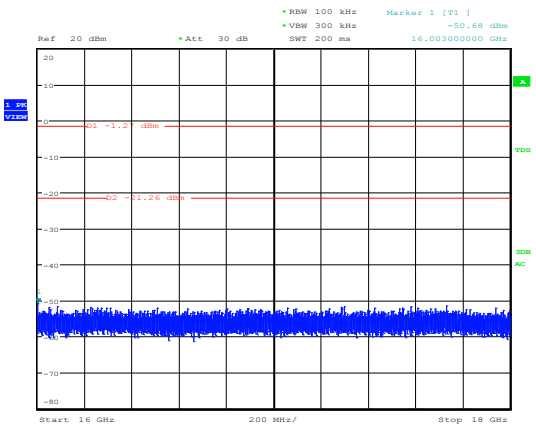

Conducted spurious emissions, mode B
Date: 23.APR.2017 17:20:40



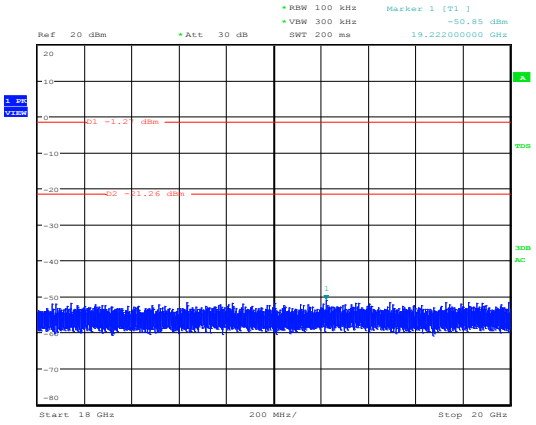

Conducted spurious emissions, mode B
Date: 23.APR.2017 17:21:06



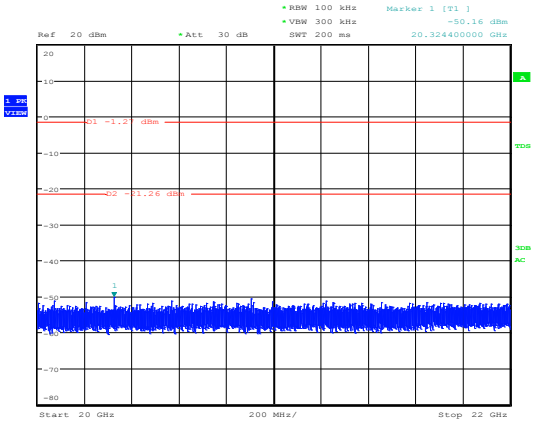

Conducted spurious emissions, mode B
Date: 23.APR.2017 17:21:21




Conducted spurious emissions, mode B
Date: 23.APR.2017 17:21:38

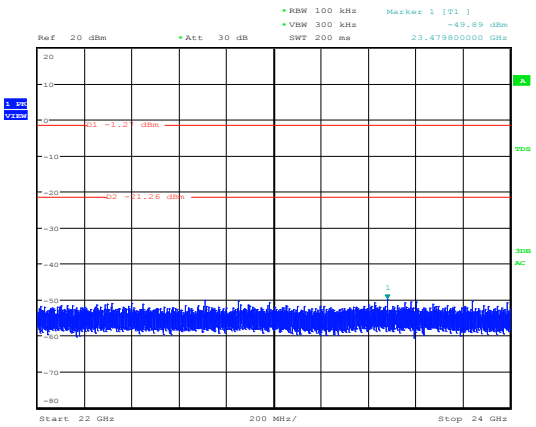



Conducted spurious emissions, mode B
Date: 23.APR.2017 17:21:57

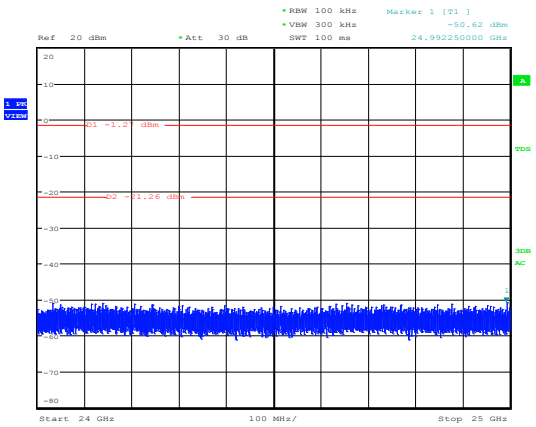



Conducted spurious emissions, mode B
Date: 23.APR.2017 17:22:16

## Figure 10: Conducted Spurious Emissions, 22 - 25GHz, Mode B (2442MHz)

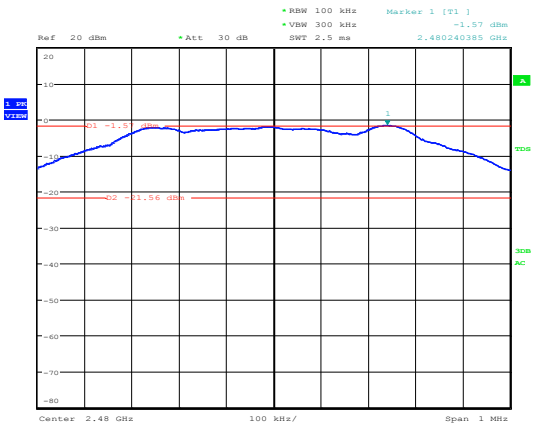



Conducted spurious emissions, mode B
Date: 23.APR.2017 17:22:38

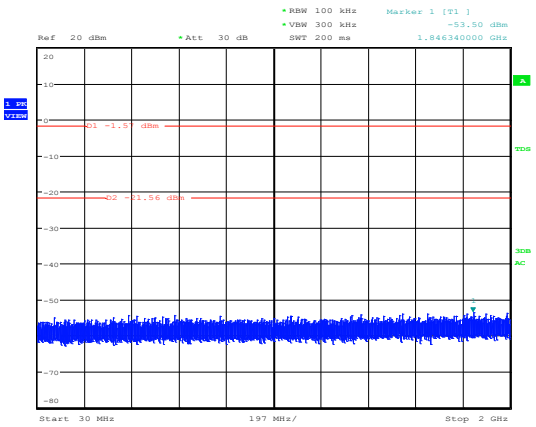



Conducted spurious emissions, mode B
Date: 23.APR.2017 17:22:56

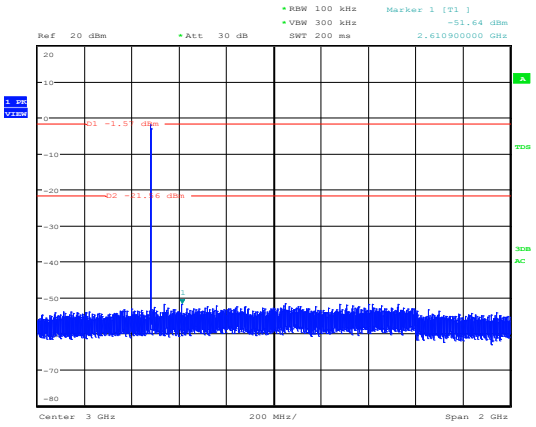
## Figure 11: Conducted Spurious Emissions, 30MHz - 10GHz, Mode C (2480MHz)



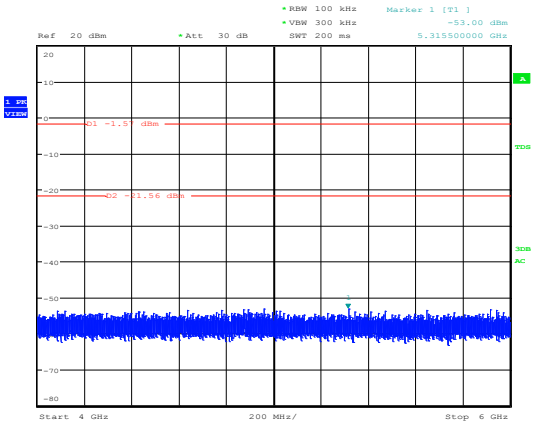

Conducted spurious emissions, mode C
Date: 23.APR.2017 17:28:53



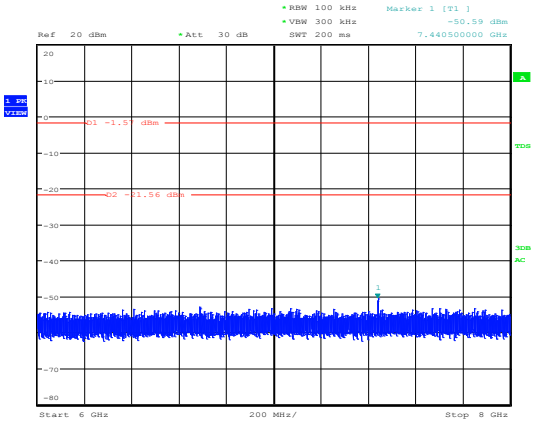

Conducted spurious emissions, mode C
Date: 23.APR.2017 17:29:14



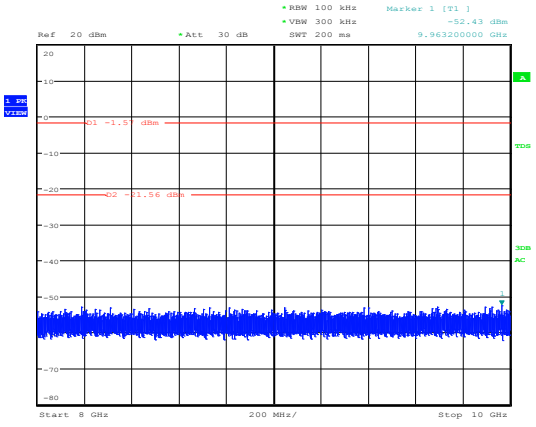

Conducted spurious emissions, mode C
Date: 23.APR.2017 17:29:45




Conducted spurious emissions, mode C
Date: 23.APR.2017 17:30:01

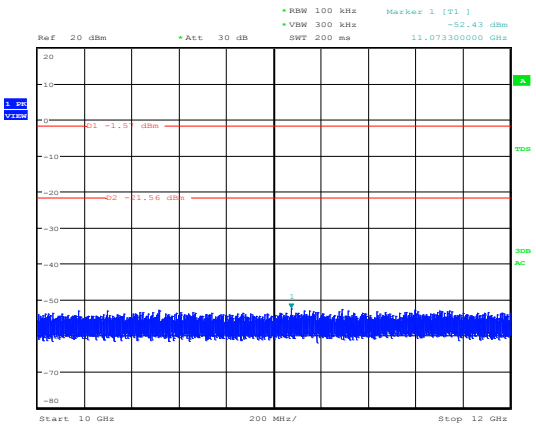



Conducted spurious emissions, mode C
Date: 23.APR.2017 17:30:27

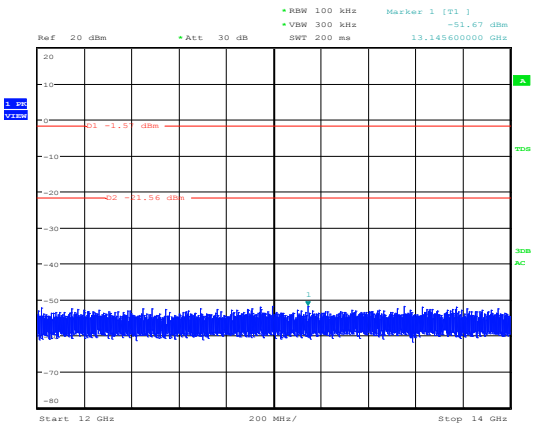



Conducted spurious emissions, mode C
Date: 23.APR.2017 17:30:47

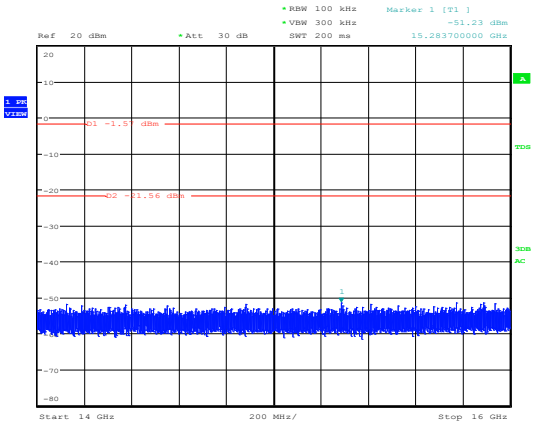
## Figure 12: Conducted Spurious Emissions, 10 - 22GHz, Mode C (2480MHz)



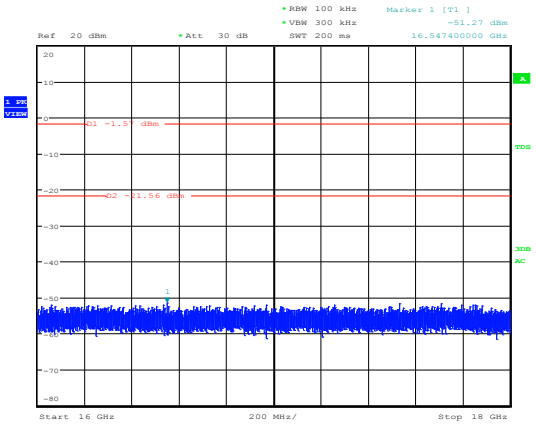

Conducted spurious emissions, mode C
Date: 23.APR.2017 17:31:11



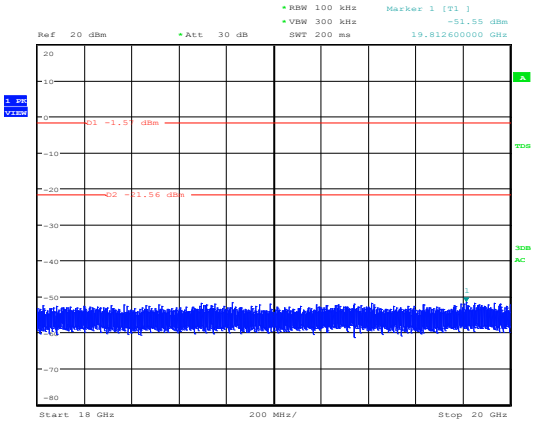

Conducted spurious emissions, mode C
Date: 23.APR.2017 17:31:28



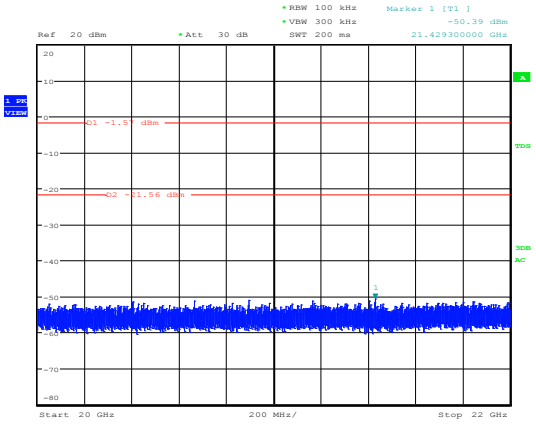

Conducted spurious emissions, mode C
Date: 23.APR.2017 17:31:47




Conducted spurious emissions, mode C
Date: 23.APR.2017 17:32:04

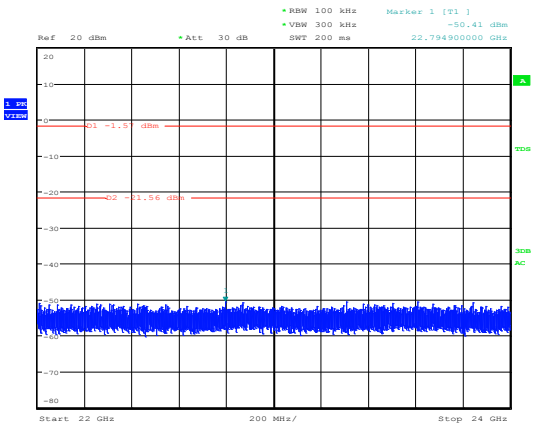



Conducted spurious emissions, mode C
Date: 23.APR.2017 17:32:27

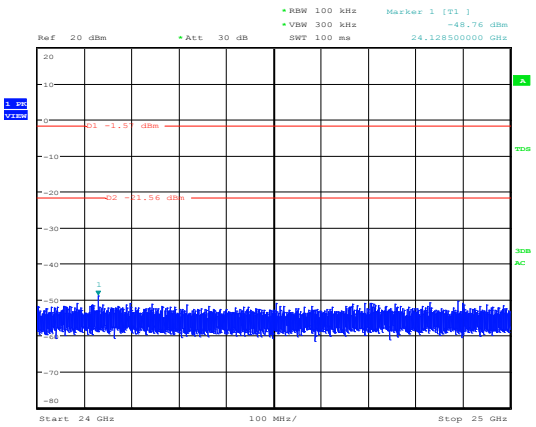



Conducted spurious emissions, mode C
Date: 23.APR.2017 17:32:49

## Figure 13: Conducted Spurious Emissions, 22 - 25GHz, Mode C (2480MHz)




Conducted spurious emissions, mode C
Date: 23.APR.2017 17:33:07




Conducted spurious emissions, mode C
Date: 23.APR.2017 17:33:45

## 5.2.3 Peak Power Spectral Density

**RESULT:** **PASS**

Date of testing: 2017-04-23

Ambient temperature: 24°C
Relative humidity: 48%
Atmospheric pressure: 1011hPa

Requirements:

FCC 15.247(e) and RSS-247 §5.2(2)

For digitally modulated systems, the power spectral density (PSD) conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

Test procedure:

KDB Publication No. 558074 D01.

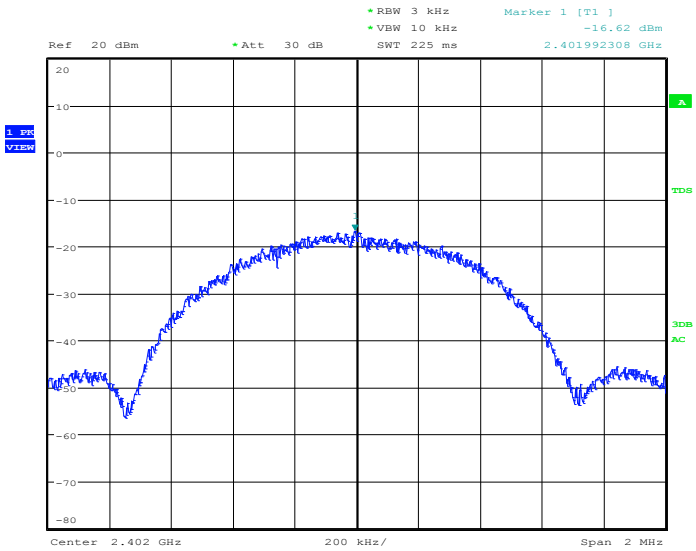
The peak power spectral density was measured at the antenna port with a spectrum analyzer using a peak detector with a resolution bandwidth of 3kHz and a video bandwidth of 10kHz.

The readings of the measurements take into account the loss generated by all the involved cables.

## Table 5: Peak Power Spectral Density

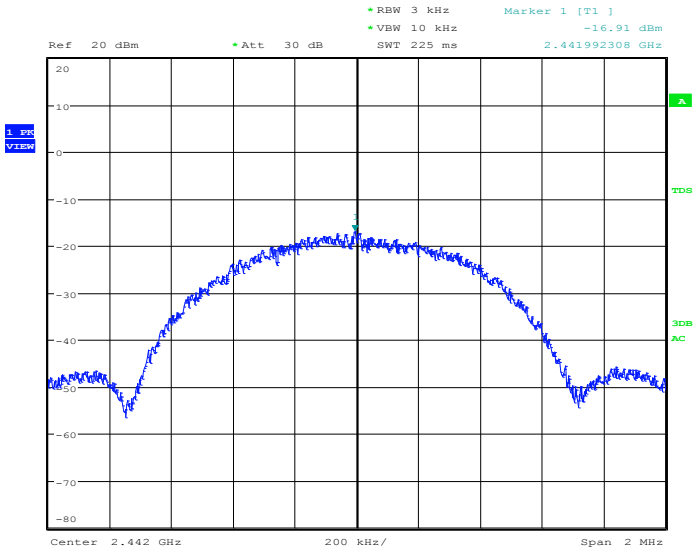
| Operating Frequency [MHz] | Max PSD Frequency [MHz] | Max PSD [dBm] | Limit [dBm] | Margin [dB] |
|---|---|---|---|---|
| 2402MHz | 2401.992308 | -16.62 | 8 | 24.62 |
| 2442MHz | 2441.992308 | -16.91 | 8 | 24.91 |
| 2480MHz | 2479.992308 | -16.97 | 8 | 24.97 |

## Figure 14: Power Spectral Density, Mode A (2402MHz)



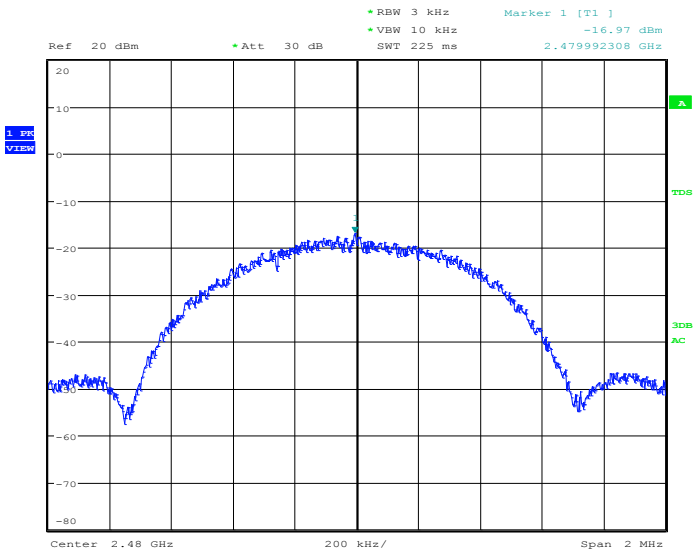

Peak power spectral density, mode A
Date: 23.APR.2017 17:08:35

## Figure 15: Power Spectral Density, Mode B (2442MHz)




Peak power spectral density, mode B
Date: 23.APR.2017 17:17:53

## Figure 16: Power Spectral Density, Mode C (2480MHz)




Peak power spectral density, mode C
Date: 23.APR.2017 17:28:29

# 5.3 Radiated Measurements

## 5.3.1 6dB Bandwidth

**RESULT:** **PASS**

| | |
|---|---|
| Date of testing: | 2017-04-22 |
| Ambient temperature: | 25°C |
| Relative humidity: | 58% |
| Atmospheric pressure: | 1003hPa |

Requirements:

FCC 15.215(c), 15.247(a)(2) and RSS-247 §5.2(1)

For systems using digital modulation in the 2400-2483.5MHz band, the 6dB bandwidth shall be at least 500kHz. Additionally, for FCC, the 6dB bandwidth shall be contained within the frequency band designated in the rule section under which the equipment is operated.

Test procedure:

KDB Publication No. 558074 D01, section 8.1 and RSS-Gen §6.6.

Since radiated method was applied, the EUT and measurement antenna positions were oriented to produce the highest emission level for each requirement.

The 6dB bandwidth was measured with a spectrum analyzer using a peak detector. The resolution bandwidth was set to 100kHz and the video bandwidth to 300kHz. Markers placed at the lowest and highest intersections of the trace with a 6dBc line were used to calculate the emission bandwidth.

## Table 6: 6dB Bandwidth Edge Frequencies

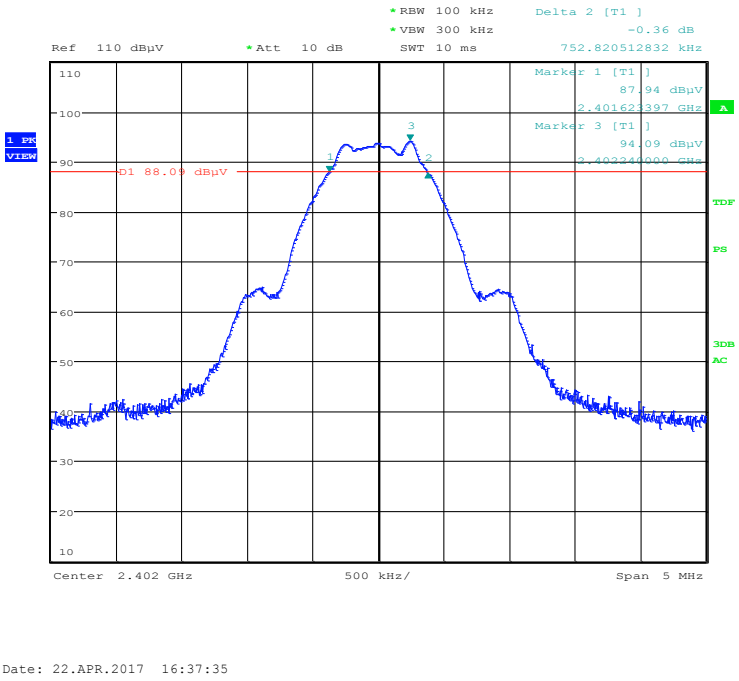
| 6dB Bandwidth Edge Side | Operating Frequency [MHz] | Edge Frequency [MHz] | Limit [MHz] | Margin [MHz] |
|---|---|---|---|---|
| Lower freq. | 2402MHz | 2401.623397 | 2400 | 1.623397 |
| Upper freq. | 2480MHz | 2480.364205 | 2483.5 | 3.135795 |

## Table 7: 6dB Bandwidth

| Operating Frequency [MHz] | EUT/ Antenna Orientation | 6dB Bandwidth [MHz] | Limit [MHz] |
|---|---|---|---|
| 2402MHz | V/Z | 0.752820512832 | 0.5 |
| 2442MHz | V/Z | 0.744256410254 | 0.5 |
| 2480MHz | V/Z | 0.737179487175 | 0.5 |

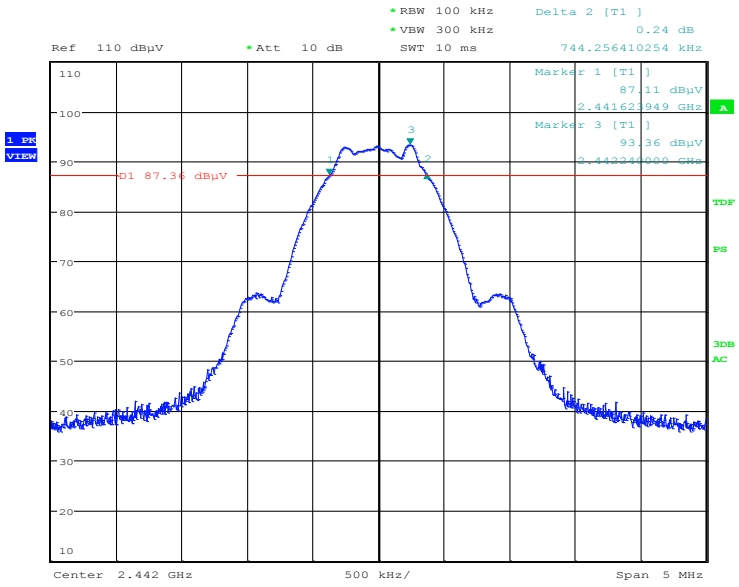
Note: Grey shading area shows the widest bandwidth in this test result.

## Figure 17: 6dB Bandwidth, Mode A (2402MHz)



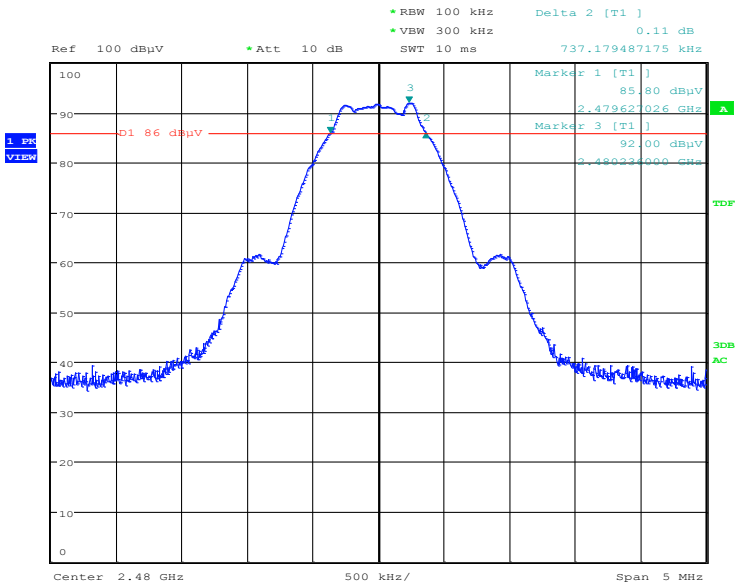

Date: 22.APR.2017 16:37:35

## Figure 18: 6dB Bandwidth, Mode B (2442MHz)




Date: 22.APR.2017 16:12:55

## Figure 19: 6dB Bandwidth, Mode C (2480MHz)




Date: 22.APR.2017 15:45:04

Note: Frequency of the maker 2 is calculated by the following.
2479.627026+0.737179= 2480.364205 (MHz)

## 5.3.2 99% Bandwidth

| | |
|---|---|
| Date of testing: | 2017-04-22 |
| Ambient temperature: | 25°C |
| Relative humidity: | 58% |
| Atmospheric pressure: | 1003hPa |

Requirements:

RSS-Gen §6.6 and 8.11

The 99% bandwidth shall be reported and shall lie entirely outside the restricted bands and the prohibited TV bands of 54-72MHz, 76-88MHz, 174-216MHz, 470-608MHz and 614-806MHz.

Test procedure:

ANSI C63.10 §6.9.3 and RSS-Gen §6.6

Since radiated method was used, the EUT and measurement antenna positions were oriented to produce the highest emission level.

The 99% bandwidth was measured with a spectrum analyzer using a sample detector. The resolution bandwidth was set to in the range of 1% to 5% of the observed occupied bandwidth and video bandwidth was approximately 3 × RBW.

The 99% bandwidth was measured by using the OBW function of the analyzer with a 99% coverage setting.

### Table 8: 99% Bandwidth Edge Frequencies

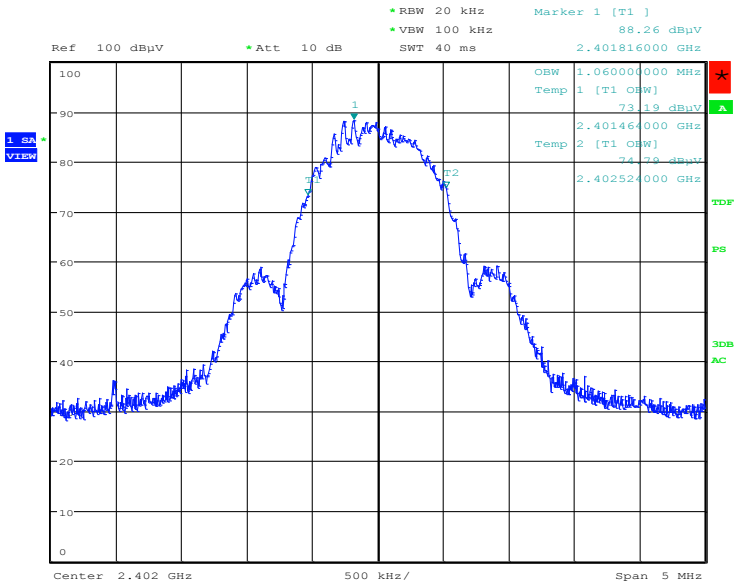
| 99% Bandwidth Edge Side | Operating Frequency [MHz] | Edge Frequency [MHz] | Limit [MHz] | Margin [MHz] |
|---|---|---|---|---|
| Lower freq. | 2402MHz | 2401.464000 | 2390 | 11.464 |
| Upper freq. | 2480MHz | 2480.516000 | 2655 | 174.484 |

### Table 9: 99% Bandwidth

| Operating Frequency [MHz] | EUT/ Antenna Orientation | 99% Bandwidth [MHz] |
|---|---|---|
| 2402MHz | V / Z | 1.060000000 |
| 2442MHz | V / Z | 1.052000000 |
| 2480MHz | V / Z | 1.044000000 |

Note: Grey shading area shows the widest bandwidth in this test result.

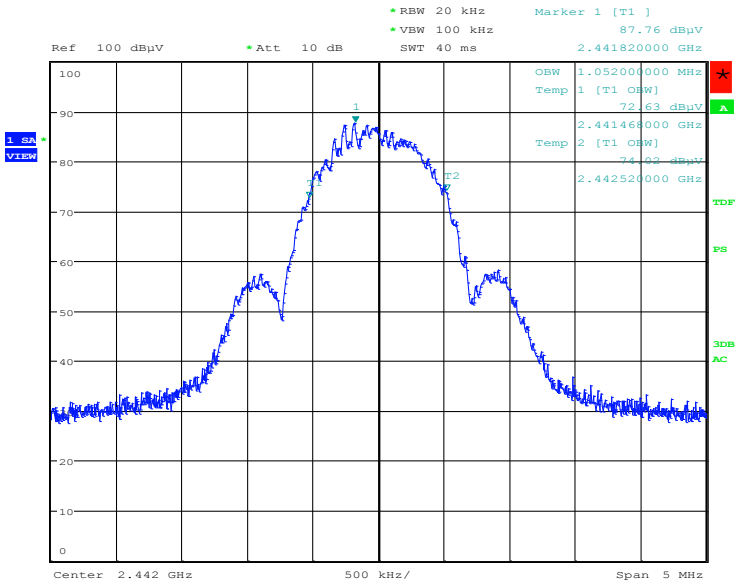
### Figure 20: 99% Bandwidth, Mode A (2402MHz)




Date: 22.APR.2017 16:41:51

Note: RBW was set to 1.89% of the observed OBW. (20 kHz / 1060 kHz) × 100 = 1.89 %

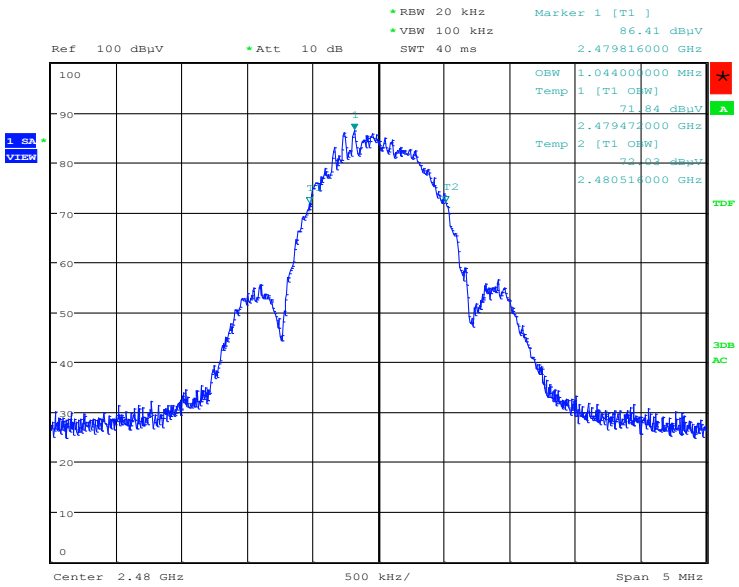
## Figure 21: 99% Bandwidth, Mode B (2442MHz)




Date: 22.APR.2017 16:17:13

Note: RBW was set to 1.90% of the observed OBW. (20 kHz / 1052 kHz) × 100 = 1.90 %

## Figure 22: 99% Bandwidth, Mode C (2480MHz)

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Note: RBW was set to 1.92% of the observed OBW. (20 kHz / 1044 kHz) × 100 = 1.92 %

## 5.3.3 Radiated Spurious Emissions of Transmitter

**RESULT:** **PASS**

| | |
|---|---|
| Date of testing: | 2017-04-17, 2017-04-22 |
| Ambient temperature: | 25, 25°C |
| Relative humidity: | 58, 58% |
| Atmospheric pressure: | 1009, 1003hPa |
| Frequency range: | 9kHz - 25GHz |
| Measurement distance: | 3m |
| Kind of test site: | Semi Anechoic Chamber |

Requirements:

FCC 15.205, FCC 15.209, FCC 15.247(d), RSS-Gen §8.9 and 8.10 and RSS-247 3.1.

Radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a) and RSS-Gen §8.10 (table 6), must comply with the radiated emission limits specified in FCC 15.209(a) and RSS-Gen §8.9 (tables 4 and 5).

Radiated emissions which fall outside the operation frequency band and outside restricted bands shall either meet the limit specified in FCC 15.209(a) and RSS-Gen §8.9 or be attenuated at least 20dB below the power level in the 100kHz bandwidth within the band that contains the highest level of the desired power (the less severe limit applies).

Test procedure:

KDB Publication No. 558074 D01, ANSI C63.10 §6.3, 6.4, 6.5, 6.6, 6.10 and RSS-Gen §6.13 and 8.1

The EUT was placed on a nonconductive turntable. The table height was 0.8m for measurements below 1GHz and 1.5m for measurements above 1GHz. Before final measurements of radiated emissions were performed, the EUT was scanned to determine its emission spectrum profile. The physical arrangement of the test system, the associated cabling and the EUT orientation (X, Y and Z) were varied in order to ensure that maximum emission amplitudes were attained.

The spectrum was examined from 9kHz to the 10th harmonic of the highest fundamental transmitter frequency (25GHz). Final radiated emission measurements were made at 3m distance.

At each frequency where a spurious emission was found, the EUT was rotated 360° in order to determine the emission's maximum level. For frequencies above 30MHz, the antenna was raised and lowered from 1 to 4m and measurements were taken using both horizontal and vertical antenna polarizations.

For emissions between 30MHz and 1GHz, measurements were performed with a test receiver operating in the CISPR quasi-peak detection mode with a 6dB bandwidth set to

120kHz. For emissions above 1GHz, measurements were performed with a spectrum analyzer using the following settings: for peak field strength: RBW = 1MHz & VBW ≥ 1MHz; for average field strength: RBW = 1MHz & VBW = 10Hz.

Absorbers have been placed on the floor between the EUT and the measuring antenna for testing above 1GHz.

The highest emission amplitudes relative to the appropriate limit were recorded in this report. Emissions other than those mentioned are small or not detectable.

No spurious emission was found in the following ranges, from 9kHz to 30MHz, from 8 to 18GHz and from 18 to 25GHz.

### Table 10: Radiated Emissions, Quasi Peak Data, 30MHz - 1GHz, Horizontal and Vertical Antenna Orientations, Mode A (2402MHz)

| Frequency [MHz] | EUT / Antenna Orientation | Reading QP [dBµV] | Factor [dB(1/m)] | Level QP [dBµV/m] | Limit [dBµV/m] | Margin QP [dB] | Height [cm] | Angle [°] |
|---|---|---|---|---|---|---|---|---|
| 134.502 | Z/V | 41.5 | -21.3 | 20.2 | 43.5 | 23.3 | 105 | 90 |
| 186.857 | Z/V | 47.6 | -22.1 | 25.5 | 43.5 | 18.0 | 101 | 299 |
| 529.287 | Z/V | 30.4 | -12.7 | 17.7 | 46.0 | 28.3 | 123 | 330 |
| 823.258 | Z/H | 30.9 | -8.8 | 22.1 | 46.0 | 23.9 | 273 | 341 |

Note: Level QP = Reading QP + Factor

### Table 11: Radiated Emissions, Quasi Peak Data, 30MHz - 1GHz, Horizontal and Vertical Antenna Orientations, Mode B (2442MHz)

| Freq. [MHz] | EUT / Antenna Orientation | Reading QP [dBµV] | Factor [dB(1/m)] | Level QP [dBµV/m] | Limit [dBµV/m] | Margin QP [dB] | Height [cm] | Angle [°] |
|---|---|---|---|---|---|---|---|---|
| 144.114 | Z/V | 41.8 | -20.9 | 20.9 | 43.5 | 22.6 | 101 | 150 |
| 185.242 | Z/V | 47.7 | -22.0 | 25.7 | 43.5 | 17.8 | 101 | 86 |
| 471.997 | Z/V | 36.8 | -14.2 | 22.6 | 46.0 | 23.4 | 157 | 144 |
| 900.102 | Z/H | 31.0 | -7.8 | 23.2 | 46.0 | 22.8 | 100 | 171 |

Note: Level QP = Reading QP + Factor

### Table 12: Radiated Emissions, Quasi Peak Data, 30MHz - 1GHz, Horizontal and Vertical Antenna Orientations, Mode C (2480MHz)

| Freq. [MHz] | EUT / Antenna Orientation | Reading QP [dBµV] | Factor [dB(1/m)] | Level QP [dBµV/m] | Limit [dBµV/m] | Margin QP [dB] | Height [cm] | Angle [°] |
|---|---|---|---|---|---|---|---|---|
| 71.999 | Z/V | 37.4 | -22.8 | 14.6 | 40.0 | 25.4 | 100 | 79 |
| 144.002 | Z/V | 44.4 | -20.9 | 23.5 | 43.5 | 20.0 | 100 | 145 |
| 187.596 | Z/V | 49.2 | -22.1 | 27.1 | 43.5 | 16.4 | 101 | 281 |
| 824.233 | Z/V | 31.0 | -8.9 | 22.1 | 46.0 | 23.9 | 343 | 32 |

Note: Level QP = Reading QP + Factor

### Table 13: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, Mode A (2402MHz)

| Freq. [MHz] | EUT / Antenna Orientation | Reading AV [dBµV] | Factor [dB(1/m)] | Level AV [dBµV/m] | Limit [dBµV/m] | Margin AV [dB] | Height [cm] | Angle [°] |
|---|---|---|---|---|---|---|---|---|
| 1499.940 | X/H | 39.1 | -16.5 | 22.6 | 54.0 | 31.4 | 200 | 61 |
| 2434.120 | X/H | 39.7 | -14.9 | 24.8 | 54.0 | 29.2 | 166 | 19 |
| 7390.800 | X/H | 38.3 | -1.8 | 36.5 | 54.0 | 17.5 | 164 | 124 |
| 8016.188 | X/H | 38.3 | 0.0 | 38.3 | 54.0 | 15.7 | 193 | 206 |

Note: Level AV = Reading AV + Factor

### Table 14: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, Mode A (2402MHz)

| Freq. [MHz] | EUT / Antenna Orientation | Reading PK [dBµV] | Factor [dB(1/m)] | Level PK [dBµV/m] | Limit [dBµV/m] | Margin PK [dB] | Height [cm] | Angle [°] |
|---|---|---|---|---|---|---|---|---|
| 1499.940 | X/H | 53.6 | -16.5 | 37.1 | 74.0 | 36.9 | 200 | 61 |
| 2434.120 | X/H | 54.2 | -14.9 | 39.3 | 74.0 | 34.7 | 166 | 19 |
| 7390.800 | X/H | 52.6 | -1.8 | 50.8 | 74.0 | 23.2 | 164 | 124 |
| 8016.188 | X/H | 52.0 | 0.0 | 52.0 | 74.0 | 22.0 | 193 | 206 |

Note: Level PK = Reading PK + Factor

### Table 15: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, Mode B (2442MHz)

| Freq. [MHz] | EUT / Antenna Orientation | Reading AV [dBµV] | Factor [dB(1/m)] | Level AV [dBµV/m] | Limit [dBµV/m] | Margin AV [dB] | Height [cm] | Angle [°] |
|---|---|---|---|---|---|---|---|---|
| 1398.834 | X/H | 39.1 | -16.4 | 22.7 | 54.0 | 31.3 | 142 | 26 |
| 3561.337 | X/H | 40.0 | -11.8 | 28.2 | 54.0 | 25.8 | 160 | 305 |
| 5151.494 | X/V | 39.3 | -7.8 | 31.5 | 54.0 | 22.5 | 114 | 223 |
| 7266.347 | X/V | 38.9 | -1.8 | 37.1 | 54.0 | 16.9 | 153 | 227 |

Note: Level AV = Reading AV + Factor

### Table 16: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, Mode B (2442MHz)

| Freq. [MHz] | EUT / Antenna Orientation | Reading PK [dBµV] | Factor [dB(1/m)] | Level PK [dBµV/m] | Limit [dBµV/m] | Margin PK [dB] | Height [cm] | Angle [°] |
|---|---|---|---|---|---|---|---|---|
| 1398.834 | X/H | 53.1 | -16.4 | 36.7 | 74.0 | 37.3 | 142 | 26 |
| 3561.337 | X/H | 53.8 | -11.8 | 42.1 | 74.0 | 31.9 | 160 | 305 |
| 5151.494 | X/V | 53.4 | -7.8 | 45.6 | 74.0 | 28.4 | 114 | 223 |
| 7266.347 | X/V | 53.3 | -1.8 | 51.5 | 74.0 | 22.5 | 153 | 227 |

Note: Level PK = Reading PK + Factor

### Table 17: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, Mode C (2480MHz)

| Freq. [MHz] | EUT / Antenna Orientation | Reading AV [dBµV] | Factor [dB(1/m)] | Level AV [dBµV/m] | Limit [dBµV/m] | Margin AV [dB] | Height [cm] | Angle [°] |
|---|---|---|---|---|---|---|---|---|
| 1547.766 | X/V | 39.0 | -16.8 | 22.2 | 54.0 | 31.8 | 100 | 45 |
| 3572.277 | X/H | 39.9 | -11.7 | 28.2 | 54.0 | 25.8 | 179 | 123 |
| 7390.906 | X/V | 39.0 | -1.8 | 37.2 | 54.0 | 16.8 | 200 | 107 |
| 7942.682 | X/H | 38.9 | -0.9 | 38.0 | 54.0 | 16.0 | 100 | 92 |

Note: Level AV = Reading AV + Factor

### Table 18: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, Mode C (2480MHz)

| Freq. [MHz] | EUT / Antenna Orientation | Reading PK [dBµV] | Factor [dB(1/m)] | Level PK [dBµV/m] | Limit [dBµV/m] | Margin PK [dB] | Height [cm] | Angle [°] |
|---|---|---|---|---|---|---|---|---|
| 1547.766 | X/V | 53.1 | -16.8 | 36.3 | 74.0 | 37.7 | 100 | 45 |
| 3572.277 | X/H | 54.1 | -11.7 | 42.4 | 74.0 | 31.6 | 179 | 123 |
| 7390.906 | X/V | 52.9 | -1.8 | 51.1 | 74.0 | 22.9 | 200 | 107 |
| 7942.682 | X/H | 52.7 | -0.9 | 51.8 | 74.0 | 22.2 | 100 | 92 |

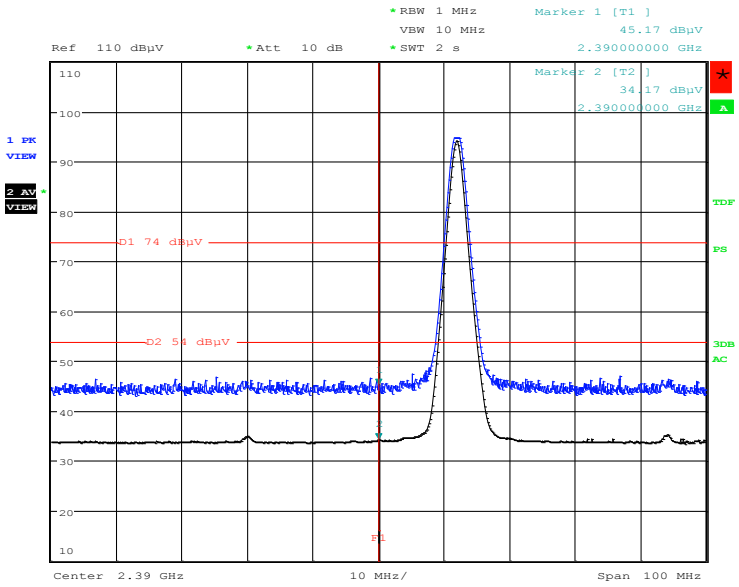
Note: Level PK = Reading PK + Factor

## Table 19: Radiated Emissions at Band Edge, Average and Peak Data, Horizontal and Vertical Antenna Orientations, Modes A (2402MHz) and C (2480MHz)

| Operating Frequency [MHz] | EUT / Antenna Orientation | Level AV [dBµV/m] | Level PK [dBµV/m] | Limit AV [dBµV/m] | Limit PK [dBµV/m] | Margin AV [dB] | Margin PK [dB] |
|---|---|---|---|---|---|---|---|
| 2402MHz | Z/V | 34.17 | 45.17 | 54 | 74 | 19.83 | 28.83 |
| 2480MHz | Z/V | 47.05 | 52.26 | 54 | 74 | 6.95 | 21.74 |

Notes: All correction factors (antenna, cable, pre-amplifier) are included in the measurement values.
Average limit in dBµV/m is calculated as follows: Average limit = 20 x $Log_{10}$(500µV/m).
Peak limit in dBµV/m is calculated as follows: Peak limit = Average limit + 20dB.

## Figure 23: Radiated Emissions at Band Edge, Spectral Diagram, Mode A (2402MHz)

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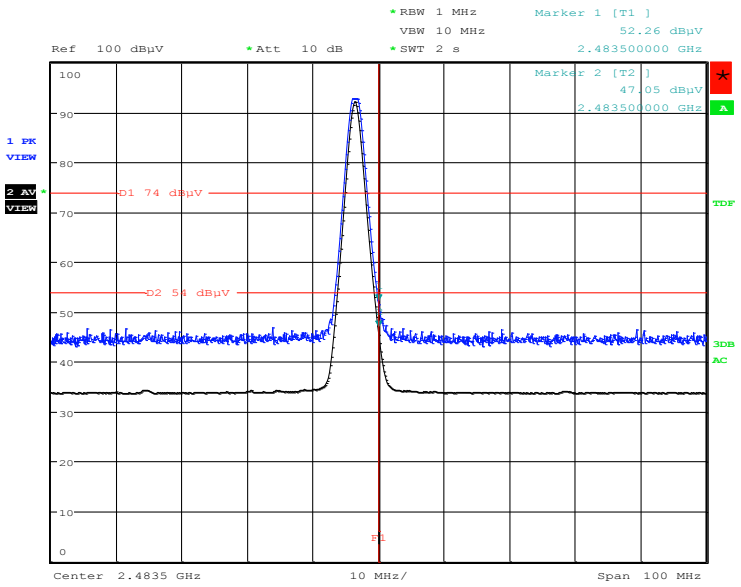
Note: The upper trace shows the peak value and the lower trace shows the average value.

## Figure 24: Radiated Emissions at Band Edge, Spectral Diagram, Mode C (2480MHz)




Date: 22.APR.2017 15:55:12

Note: The upper trace shows the peak value and the lower trace shows the average value.

# 5.4 AC Power Line Conducted Measurements

## 5.4.1 AC Power Line Conducted Emission of Transmitter

**RESULT:** **PASS**

| | |
|---|---|
| Date of testing: | 2017-04-17 |
| Ambient temperature: | 24°C |
| Relative humidity: | 50% |
| Atmospheric pressure: | 1011hPa |
| Frequency range: | 0.15 - 30MHz |
| Kind of test site: | Shielded Room |

Requirements:

FCC 15.207 and RSS-Gen §8.8

The AC power line conducted emission on any frequency within the band 150kHz to 30MHz shall not exceed the limits specified in FCC 15.207 and RSS-Gen §8.8 (table 3).

Test procedure:

ANSI C63.10 §6.2 and RSS-Gen §8.1

The EUT was placed on a wooden table raised 80cm above the reference ground plane. A vertical conducting plane of the screened room was located 40cm to the rear of the EUT. One commercial available AC adapter was connected to a Line Impedance Stabilization Network (LISN).

The physical arrangement of the test system and associated cabling was varied to determine the effect on the EUT's emissions in amplitude and frequency in order to ensure that maximum emission amplitudes were attained.

The measurements were performed with a test receiver operating in the CISPR quasi-peak and average detection modes. The receiver’s 6dB bandwidth was set to 9kHz.

Disturbances other than those mentioned are small or not detectable.

## Table 20: AC Power Line Conducted Emission, Quasi Peak and Average Data, 0.15 - 30MHz, Phase N (N) and L1 (L), Mode A (2402MHz)

| Freq. [MHz] | Phase | Reading QP [dBµV] | Reading AV [dBµV] | Factor [dB] | Level QP [dBµV] | Level AV [dBµV] | Limit QP [dBµV] | Limit AV [dBµV] | Margin QP [dB] | Margin AV [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.15431 | N | 30.0 | 7.5 | 9.6 | 39.6 | 17.1 | 65.8 | 55.8 | 26.2 | 38.7 |
| 0.17326 | N | 26.9 | 6.0 | 9.7 | 36.6 | 15.7 | 64.8 | 54.8 | 28.2 | 39.1 |
| 0.19970 | L1 | 24.2 | 2.9 | 9.7 | 33.9 | 12.6 | 63.6 | 53.6 | 29.7 | 41.0 |
| 0.24735 | N | 20.6 | 3.8 | 9.7 | 30.3 | 13.5 | 61.8 | 51.8 | 31.5 | 38.3 |
| 0.26794 | N | 20.8 | 4.3 | 9.7 | 30.5 | 14.0 | 61.2 | 51.2 | 30.7 | 37.2 |
| 0.55839 | N | 24.2 | 7.4 | 9.7 | 33.9 | 17.1 | 56.0 | 46.0 | 22.1 | 28.9 |
| 0.84658 | L1 | 20.2 | 4.6 | 9.7 | 29.9 | 14.3 | 56.0 | 46.0 | 26.1 | 31.7 |
| 13.55501 | L1 | 9.2 | -3.1 | 10.1 | 19.3 | 7.0 | 60.0 | 50.0 | 40.7 | 43.0 |

Note: Level QP = Reading QP + Factor, Level AV = Reading AV + Factor

## Table 21: AC Power Line Conducted Emission, Quasi Peak and Average Data, 0.15 - 30MHz, Phase N (N) and L1 (L), Mode B (2442MHz)

| Freq. [MHz] | Phase | Reading QP [dBµV] | Reading AV [dBµV] | Factor [dB] | Level QP [dBµV] | Level AV [dBµV] | Limit QP [dBµV] | Limit AV [dBµV] | Margin QP [dB] | Margin AV [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.15282 | N | 29.7 | 7.0 | 9.6 | 39.3 | 16.6 | 65.8 | 55.8 | 26.5 | 39.2 |
| 0.17236 | N | 26.8 | 6.0 | 9.7 | 36.5 | 15.7 | 64.8 | 54.8 | 28.3 | 39.1 |
| 0.18351 | L1 | 26.3 | 3.3 | 9.7 | 36.0 | 13.0 | 64.3 | 54.3 | 28.3 | 41.3 |
| 0.19989 | N | 24.5 | 4.9 | 9.7 | 34.2 | 14.6 | 63.6 | 53.6 | 29.4 | 39.0 |
| 0.25953 | L1 | 19.5 | 1.9 | 9.7 | 29.2 | 11.6 | 61.4 | 51.4 | 32.2 | 39.8 |
| 0.55545 | N | 24.0 | 7.4 | 9.7 | 33.7 | 17.1 | 56.0 | 46.0 | 22.3 | 28.9 |
| 0.85725 | L1 | 20.1 | 4.3 | 9.7 | 29.8 | 14.0 | 56.0 | 46.0 | 26.2 | 32.0 |
| 13.96735 | L1 | 9.8 | -3.0 | 10.1 | 19.9 | 7.1 | 60.0 | 50.0 | 40.1 | 42.9 |

Note: Level QP = Reading QP + Factor, Level AV = Reading AV + Factor

## Table 22: AC Power Line Conducted Emission, Quasi Peak and Average Data, 0.15 - 30MHz, Phase N (N) and L1 (L), Mode C (2480MHz)

| Freq. [MHz] | Phase | Reading QP [dBµV] | Reading AV [dBµV] | Factor [dB] | Level QP [dBµV] | Level AV [dBµV] | Limit QP [dBµV] | Limit AV [dBµV] | Margin QP [dB] | Margin AV [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.15852 | L1 | 29.8 | 4.5 | 9.6 | 39.4 | 14.1 | 65.5 | 55.5 | 26.1 | 41.4 |
| 0.18087 | L1 | 26.5 | 3.4 | 9.7 | 36.2 | 13.1 | 64.4 | 54.4 | 28.2 | 41.3 |
| 0.21269 | L1 | 23.0 | 3.0 | 9.7 | 32.7 | 12.7 | 63.1 | 53.1 | 30.4 | 40.4 |
| 0.22728 | N | 21.8 | 3.7 | 9.7 | 31.5 | 13.4 | 62.5 | 52.5 | 31.0 | 39.1 |
| 0.26580 | N | 21.3 | 4.7 | 9.7 | 31.0 | 14.4 | 61.2 | 51.2 | 30.2 | 36.8 |
| 0.55435 | L1 | 24.1 | 6.4 | 9.7 | 33.8 | 16.1 | 56.0 | 46.0 | 22.2 | 29.9 |
| 4.04300 | N | 8.6 | -2.7 | 9.9 | 18.5 | 7.2 | 56.0 | 46.0 | 37.5 | 38.8 |
| 14.07218 | L1 | 9.7 | -2.7 | 10.1 | 19.8 | 7.4 | 60.0 | 50.0 | 40.2 | 42.6 |

Note: Level QP = Reading QP + Factor, Level AV = Reading AV + Factor

# 7. List of Tables



# 8. List of Figures

# 9. List of Photographs