



Produkte
Products

Prüfbericht - Nr.: 50028402 001 <i>Test Report No.:</i>		Seite 1 von 44 Page 1 of 44			
Auftraggeber: CATEYE Co., Ltd. <i>Client:</i>		2-8-25, Kuwazu, Higashi-Sumiyoshi-Ku, Osaka, 546-0041 Japan			
Gegenstand der Prüfung: PADRONE SMART + <i>Test Item:</i>					
Bezeichnung: CC-SC100B <i>Identification:</i>		Serien-Nr.: Refer to Section 4.3 <i>Serial No.:</i>			
Wareneingangs-Nr.: A000185250 <i>Receipt No.:</i>		Eingangsdatum: 2015-04-14 <i>Date of Receipt:</i>			
Zustand des Prüfgegenstandes bei Anlieferung: Good <i>Condition of Test Item at Delivery:</i>					
Prüfört: TÜV Rheinland Japan Ltd. – Global Technology Assessment Center <i>Testing Location:</i> 4-25-2 Kita-Yamata, Tsuzuki-ku, Yokohama 224-0021, Japan					
Prüfgrundlage: FCC 47 CFR Part 15, Subpart C, Section 15.249 (October 1, 2014) <i>Test Specification:</i> ANSI C63.10-2009 RSS-210 (Issue 8): 2010 RSS-Gen (Issue 4): 2014 ANSI C63.10-2013					
Prüfergebnis: Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n). <i>Test Result:</i> The test item passed the test specification(s).					
Prüflaboratorium: TÜV Rheinland Japan Ltd. – Global Technology Assessment Center <i>Testing Laboratory:</i> 4-25-2 Kita-Yamata, Tsuzuki-ku, Yokohama 224-0021, Japan					
geprüft/ tested by:		kontrolliert/ reviewed by:			
2015-05-25 A. Abe / Inspector 		2015-05-25 R. Meiranke / Reviewer 			
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>
Sonstiges / Other Aspects:					
Abkürzungen: P(ass) = entspricht Prüfgrundlage F(ail) = entspricht nicht Prüfgrundlage N/A = nicht anwendbar N/T = nicht getestet			Abbreviations: P(ass) = passed F(ail) = failed N/A = not applicable N/T = not tested		
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.</i>					

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

5.3.1 DUTY CYCLE

5.3.2 20dB BANDWIDTH

RESULT: PASS

5.3.3 99% BANDWIDTH

5.3.4 FIELD STRENGTH OF FUNDAMENTAL

RESULT: Pass

5.3.5 RADIATED SPURIOUS EMISSIONS OF TRANSMITTER

RESULT: PASS

5.4.1 AC POWER LINE CONDUCTED EMISSION OF TRANSMITTER

RESULT: N/A

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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.

The Industry 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.



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	Equipment ID	Calibrated until
For Antenna Port Conducted Emission					
Receiver	Rohde & Schwarz	ESU 40	100029	RF-0021	2016-03
DC Power Supply	Agilent	E3646A	MY40004642	BT-8153	N/A
For Radiated Emission					
Radiated Emission Measurement Software (below 30MHz)	Toyo Corporation	EP5/ME	Ver. 5.0.10	RF-0172	2016-01
Radiated Emission Measurement Software (above 30MHz)	Toyo Corporation	EP7/RE	Ver. 5.0.2	RF-0026	2016-01
Receiver	Rohde & Schwarz	ESU 8	100025	RF-0020	2015-09
Receiver	Rohde & Schwarz	ESU 40	100029	RF-0021	2016-03
RF Selector (10m Chamber)	Toyo Corporation	NS4900	0703-182	RF-0029	2016-01
Loop Antenna with Amplifier, 9kHz-30MHz	Rohde & Schwarz	HFH2-Z2	100139	RF-0048	2016-05
Trilog Antenna No. 2, 30-1000MHz	Schwarzbeck	VULB9168	9168-475	RF-0462	2015-12
10dB Attenuator	Hewlett Packard	8491A 10dB	58354	RF-0314	2016-01
Low Noise Preamplifier, 9kHz-1GHz	TSJ	MLA-10K01-B01-35	1370750	RF-0253	2016-01
Low Pass Filter, DC-1GHz	R&K	LP1000CH3	12104001	RF-0515	2016-01
Horn Antenna, 1-8GHz	Schwarzbeck	BBHA9120D	1059	RF-0553	2015-05
Microwave Preamplifier, 1-8GHz	Toyo Corporation	TPA0108-40	0634	RF-0052	2016-01
Band Reject Filter, 1-8GHz	Nitsuki	NF-49BT	027	RF-0131	2016-01
Horn Antenna with Preamplifier, 8-18GHz	Toyo Corporation	HAP06-18W	00000025	RF-0065	2015-05
High Pass Filter, 8-18GHz	Micro-Tronics	HPM50107	006	RF-0334	2015-05
Horn Antenna with Preamplifier, 18-26.5GHz	Toyo Corporation	HAP18-26N	00000010	RF-0070	2015-05
Constant Voltage Constant Frequency Stabilizers and Power Accessories					
True RMS Multimeter	Fluke	87V	97680445	RF-0281	2016-01

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
Antenna Port Conducted Emission	20Hz - 40GHz	±1.5dB
Radiated Emission	9kHz – 150kHz	±4.0dB
	150kHz - 30MHz	±4.7dB
	30MHz - 1GHz	±4.7dB
	> 1GHz	±4.7dB

3. General Product Information

3.1 Product Function and Intended Use

The EUT (Equipment Under Test) is a wireless Bluetooth Device and is called PADRONE SMART + to be installed on a bicycle. The EUT can transmit speed information to a remote device via Bluetooth.

3.2 System Details

Radio standard:	Bluetooth 4.0 LE
Specified output power:	-2.33dBm (Conducted, Peak)
Antenna gain:	-0.99dBi
Antenna type:	Pattern antenna (printed on PCB)
Antenna mounting type:	On board
Frequency range:	2402 - 2480MHz
Number of channels:	40 $f = 2402\text{MHz} + k \cdot 2\text{MHz}$, where $k=0, 1, \dots, 39$
Modulation type:	GFSK
FCC classification:	DTS
IC classification:	Bluetooth Device
Emission designator:	F1D
Rated voltage:	DC 3.0V
Rated current:	Max. 10mA
Protection class:	III
Test voltage:	DC 3.0V

3.3 Clock Frequencies

The highest frequency generated or used by the EUT is 16MHz for the radio portion, and is 4MHz for the digital interface portion.

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, 15.209 and 15.249.

The test methods, which have been used, are based on ANSI C63.10-2009, RSS-Gen (Issue 4) and ANSI C63.10-2013.

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.

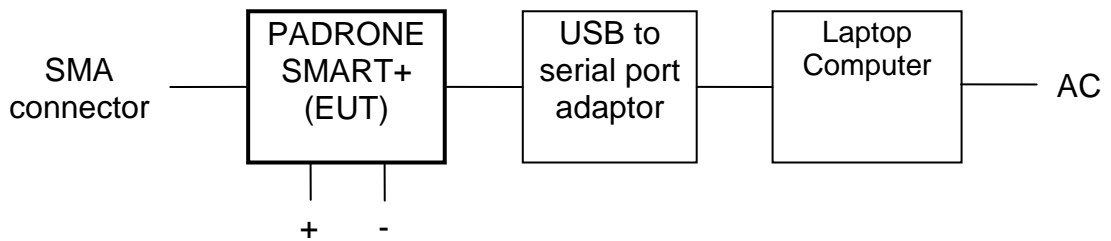
4.3 Physical Configuration for Testing

The test system was configured in a typical fashion. USB to Serial port adaptor and laptop PC were connected for testing purpose only.

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 C63.10-2009 and ANSI C63.10-2013.

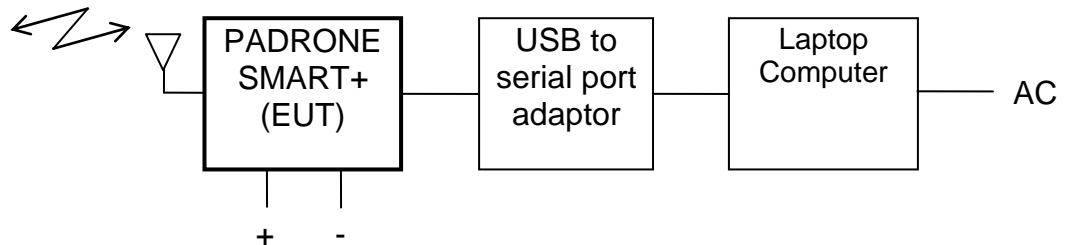
Serial number No.4 was for Conducted Radio Testing.
Serial number No.2 was for Radiated Radio Testing.

Figure 1: Test Setup of Conducted Radio Testing



Note: The laptop computer was used for a testing purpose only.

Figure 2: Test Setup of Radiated Radio Testing



Note: USB to Serial port Adaptor and Laptop computer were disconnected after the initial test mode setting.

Table 3: Interfaces present on the EUT

No.	Interface	Cable Length for Testing, Shielding	Interface Classification
1.	Signal line (Between the EUT and Serial Adaptor)	0.09m, Un-Shielded	Signal Port
2.	Battery Power Line (Conducted Radio test only)	0.10m, Un-Shielded	DC Input Power Port
3.	RF Cable (Conducted Radio test only)	0.06m, Shielded	RF Port

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

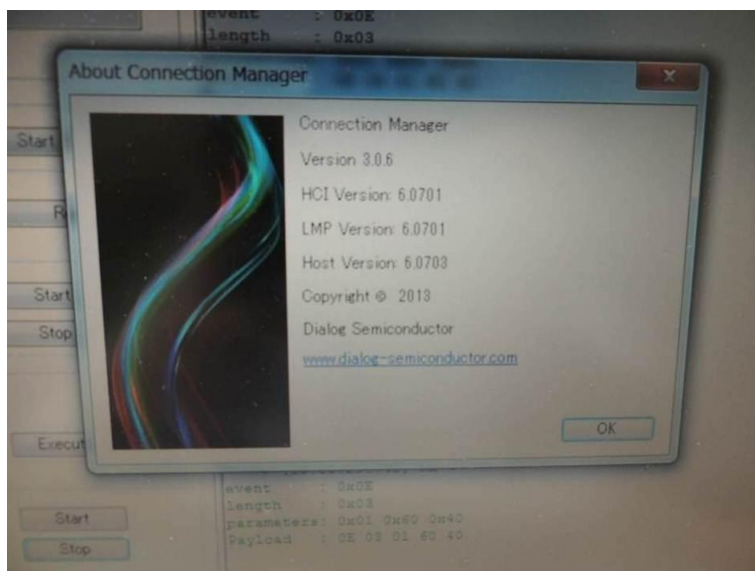
4.4 Test Software

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

Software used for testing: Connection Manager Version 3.0.6 by Dialog Semiconductor.

This software was running on the laptop computer connected to the EUT. It was used to enable the test operation modes listed in section 4.2 as appropriate.

Figure 3: Software Version



4.5 Special Accessories and Auxiliary Equipment

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

1. Product: Laptop Computer
Manufacturer: Panasonic
Model: CF-T9JWFCPS
Rated Voltage: DC 16V
Protection Class: III
Serial Number: 0DKSA02735

2. Product: AC Adapter for Laptop Computer
Manufacturer: Panasonic
Model: CF-AA6372A M3
Rated Voltage: AC 100V-240V
Input Current: 1.5A
Frequency: 50-60Hz
Protection Class: II
Serial Number: 6372AM310201996J

3. Product: Serial Adapter
Manufacturer: IO DATA
Model: USB-RSAQ3
Rated Voltage: DC 5V (via USB)
Protection Class: III
Serial Number: V1E0035358BT

4.6 Countermeasures to achieve EMC 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 is battery operated and it was tested with a new battery. Hence 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 an internal antenna which is not user accessible. Hence 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

5.2.1 Conducted Output Power

Date of testing: 2015-05-18

Ambient temperature: 23°C
Relative humidity: 58%
Atmospheric pressure: 1007hPa

Requirements:

RSS-210 (Issue 8) §A.8.4 (4)

Transmitter output power measurements shall be carried out before the unwanted emissions test.

Test procedure:

RSS-Gen (Issue 4) §6.12

The maximum Peak Output Power (conducted) was measured at the antenna connector with a power meter. Average Power was taken as reference.

Table 4: Conducted Output Power

Frequency [MHz]	Peak Output Power [dBm]	Average Output Power [dBm]
2402	-2.33	-2.55
2440	-2.45	-2.64
2480	-2.55	-2.75

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

5.3 Radiated Measurements

5.3.1 Duty Cycle

Date of testing: 2015-04-28

Ambient temperature: 24°C

Relative humidity: 52%

Atmospheric pressure: 1000hPa

Requirements:

FCC 15.35(c) and RSS-Gen 6.10

Test procedure:

ANSI C63.10-2009 and ANSI C63.10-2013

Note: The duty cycle of the EUT is 100%.

5.3.2 20dB Bandwidth

RESULT:

PASS

Date of testing: 2015-04-27
Ambient temperature: 25°C
Relative humidity: 52%
Atmospheric pressure: 1015hPa

Requirements:

FCC 15.215(c) and FCC 15.249

The 20dB bandwidth of the emission shall be contained within the frequency band designated in the rule section under which the equipment is operated.

Test procedure:

ANSI C63.10-2009

The EUT was placed on a nonconductive turntable 0.8m above the ground plane. Measurements were made at 3m distance. The EUT was rotated 360° and the antenna was raised and lowered from 1 to 4m in order to determine the emission's maximum level.

Measurements were taken using both horizontal and vertical antenna polarizations for 3 EUT orientations (X, Y and Z). The results corresponding to the worst case antenna polarization and EUT orientation are recorded in this report.

Measurements were performed using a spectrum analyzer with a suitable span to encompass the peak of the fundamental and using the following settings: RBW = 50kHz, VBW = 200kHz.

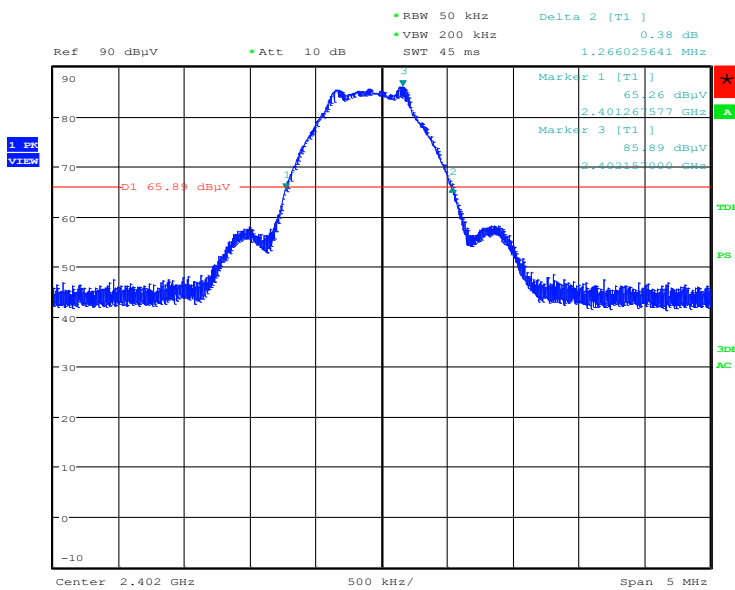
Table 5: 20dB Bandwidth Edge Frequencies

Operating Frequency [MHz]	EUT / Antenna Orient.	Edge Frequency [MHz]	Limit [MHz]	Margin [MHz]
2402	X / H	2401.267	2400.0	1.267
2480	Z / V	2480.520	2483.5	2.980

Table 6: 20dB Bandwidth

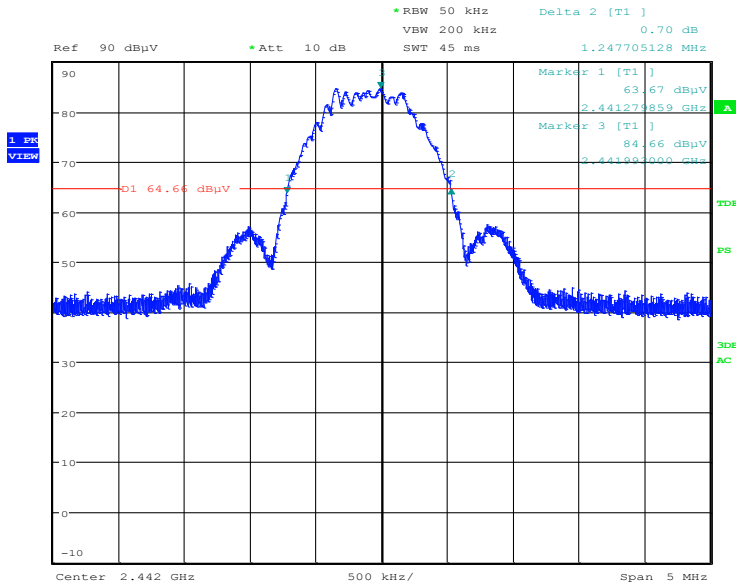
Operating Frequency [MHz]	EUT / Antenna Orient.	20dB Bandwidth [MHz]
2402	Y / H	1.2660
2442	Y / H	1.2477
2480	Y / H	1.2416

Figure 4: 20dB Bandwidth, Mode A (2402MHz)



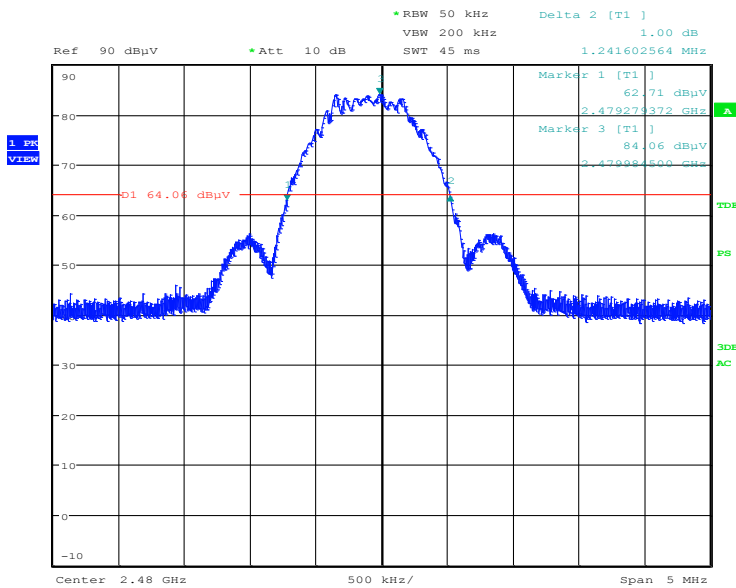
20dB BW, 2.402GHz, Y, H
 Date: 27.APR.2015 14:36:51

Figure 5: 20dB Bandwidth, Mode B (2442MHz)



20dB BW, 2.442GHz, Y, H.wmf
Date: 27.APR.2015 19:29:38

Figure 6: 20dB Bandwidth, Mode C (2480MHz)



20dB BW, 2.480GHz, Y, H
Date: 27.APR.2015 19:55:49

5.3.3 99% Bandwidth

Date of testing:	2015-04-27
Ambient temperature:	25°C
Relative humidity:	52%
Atmospheric pressure:	1015hPa

Requirements:

RSS-Gen 6.6

The 99% bandwidth shall be reported according to RSS-Gen 6.6.

Test procedure:

RSS-Gen 6.6

The EUT was placed on a nonconductive turntable 1.5m above the ground plane. Measurements were made at 3m distance. The EUT was rotated 360° and the antenna was raised and lowered from 1 to 4m in order to determine the emission's maximum level.

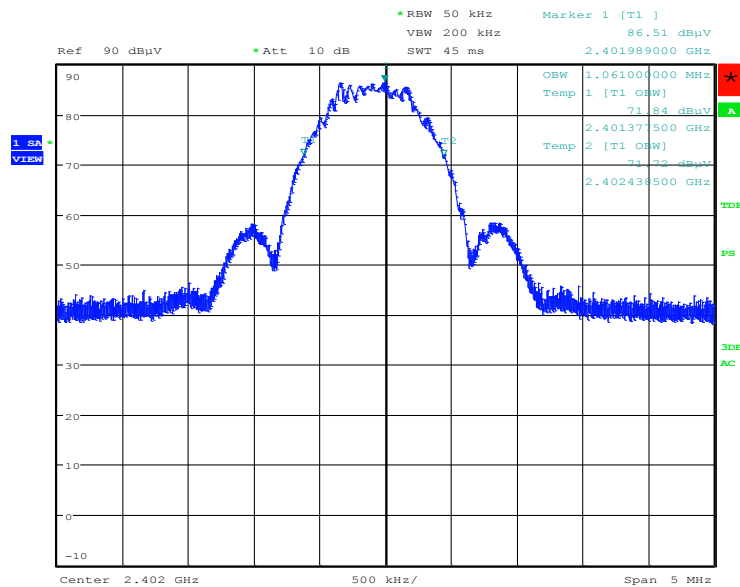
Measurements were taken using both horizontal and vertical antenna polarizations for 3 EUT orientations (X, Y and Z). The results corresponding to the worst case antenna polarization and EUT orientation are recorded in this report.

Final measurements were performed using a spectrum analyzer with the resolution bandwidth (RBW) set to in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3 × RBW. The 99% bandwidth was measured by using the OBW function of the analyzer with a 99% coverage setting. Sample detector was used at this test item.

Table 7: 99% Bandwidth

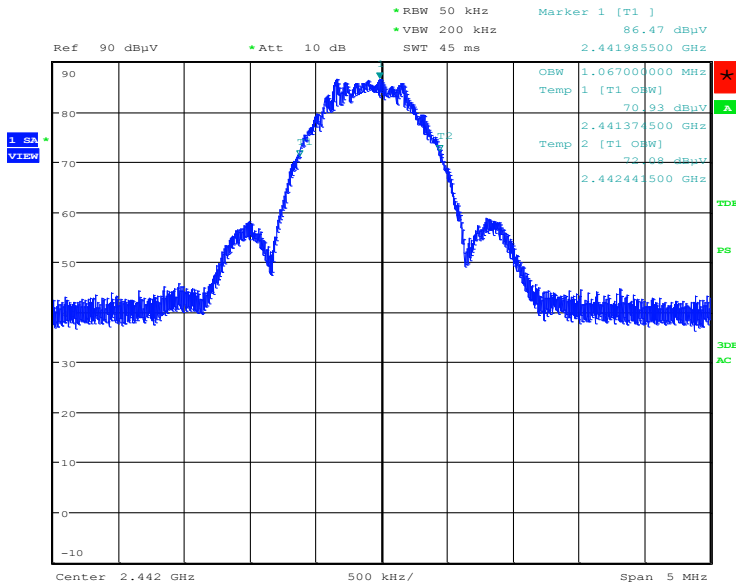
Operating Frequency [MHz]	EUT / Antenna Orient.	99% Bandwidth [MHz]
2402	Y / H	1.0610
2442	Y / H	1.0670
2480	Y / H	1.0710

Figure 7: 99% Bandwidth, Mode A (2402MHz)



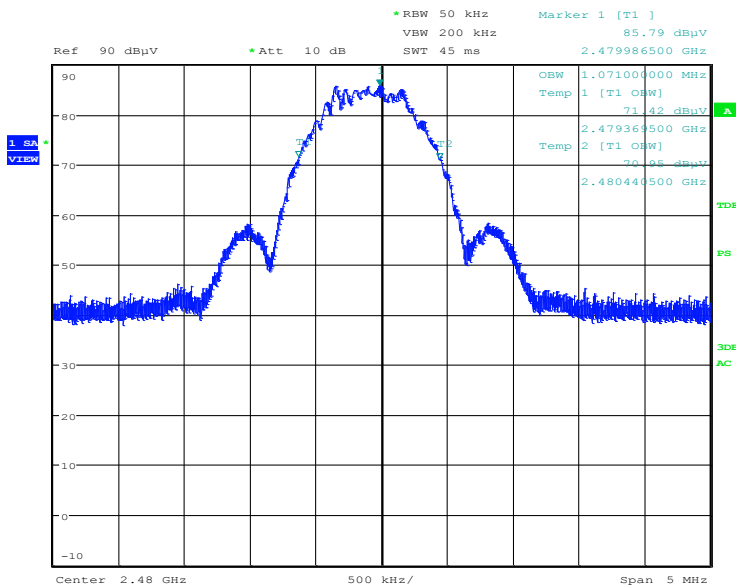
99per BW, 2.402GHz, Y, H, 150
 Date: 27.APR.2015 18:46:22

Figure 8: 99% Bandwidth, Mode B (2442MHz)



99per BW, 2.442GHz, Y, H,150
 Date: 27.APR.2015 16:59:41

Figure 9: 99% Bandwidth, Mode C (2480MHz)



99per BW, 2.480GHz, Y, H,150
 Date: 27.APR.2015 17:44:00

5.3.4 Field Strength of Fundamental

RESULT:

Pass

Date of testing: 2015-04-27
Ambient temperature: 25°C
Relative humidity: 52%
Atmospheric pressure: 1015hPa

Measurement distance: 3m
Kind of test site: Semi Anechoic Chamber

Requirements:

FCC 15.249(a) and RSS 210 A 2.9(a)

The field strength of fundamental shall not exceed the level specified in FCC 15.249(a) and RSS-210 A 2.9(a).

Test procedure:

ANSI C63.10-2009 and ANSI C63.10-2013

The EUT was placed on a nonconductive turntable 0.8m and 1.5m above the ground plane. Measurements were made at 3m distance. The EUT was rotated 360° and the antenna was raised and lowered from 1 to 4m in order to determine the emission's maximum level.

Measurements were taken using both horizontal and vertical antenna polarizations for 3 EUT orientations (X, Y and Z).

Measurements were performed using a spectrum analyzer with a suitable span to encompass the peak of the fundamental and using the following settings: Peak: RBW = 1MHz, VBW = 3MHz, Average: RBW = 1MHz, VBW = 10Hz.

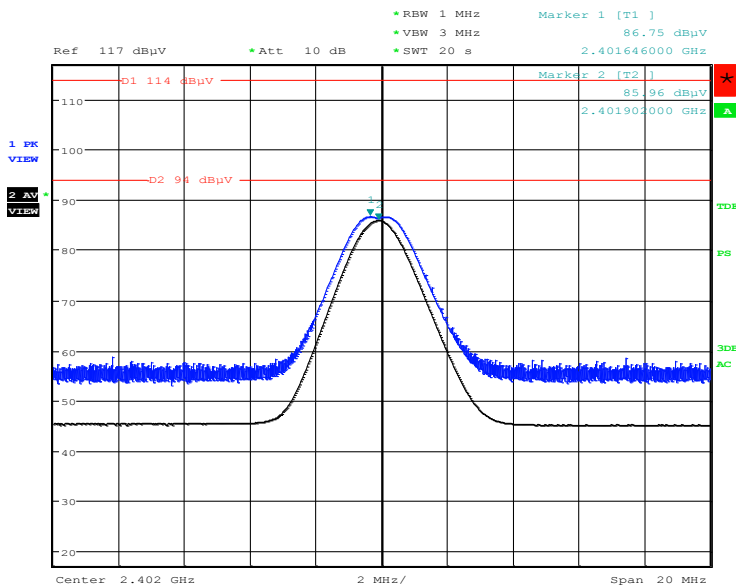
The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report. In the spectra here below, the upper trace corresponds to the peak measurement and the lower trace corresponds to the average measurement.

Table 8: Field Strength of Fundamental at 0.8m height

Operating Frequency [MHz]	EUT / Antenna Orient.	Average Value [dBµV/m]	Peak Value [dBµV/m]	Average Limit [dBµV/m]	Peak Limit [dBµV/m]	Average Margin [dB]	Peak Margin [dB]
2402	Y / H	85.96	86.75	94	114	8.04	27.25
2442	Z / H	85.88	86.70	94	114	8.12	27.30
2480	Z / V	86.61	87.42	94	114	7.39	26.58

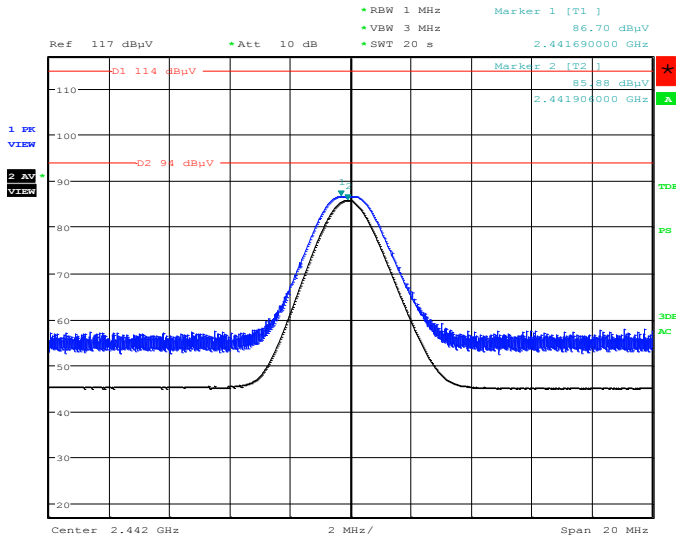
Notes: All correction factors (antenna, cable, pre-amplifier) are included in the measurement values.
 Average limit in dBµV/m is calculated as follows: Average limit = 20 x log (50000µV/m).
 Peak limit in dBµV/m is calculated as follows: Peak limit = Average limit + 20dB.

Figure 10: Field Strength of Fundamental, Spectral Diagram, Mode A (2402MHz) at 0.8m height



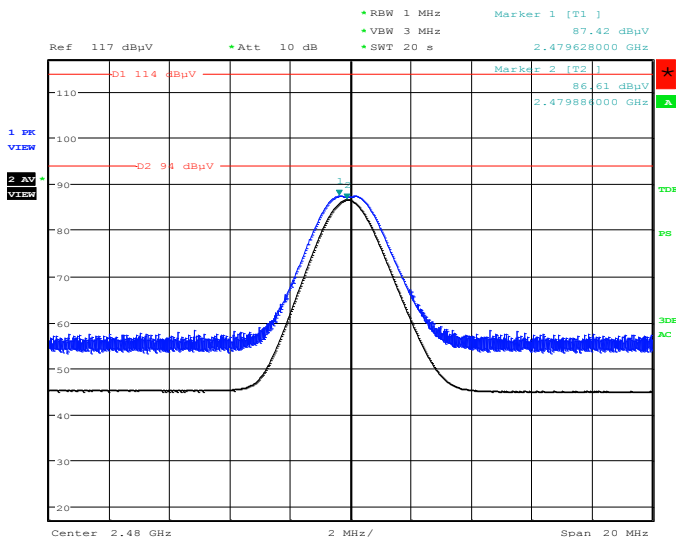
FSoF, 2.402GHz, Y, H
 Date: 27.APR.2015 14:45:35

Figure 11: Field Strength of Fundamental, Spectral Diagram, Mode B (2442MHz) at 0.8m height



FSoF, 2.442GHz, Y, H
 Date: 27.APR.2015 15:41:42

Figure 12: Field Strength of Fundamental, Spectral Diagram, Mode C (2480MHz) at 0.8m height



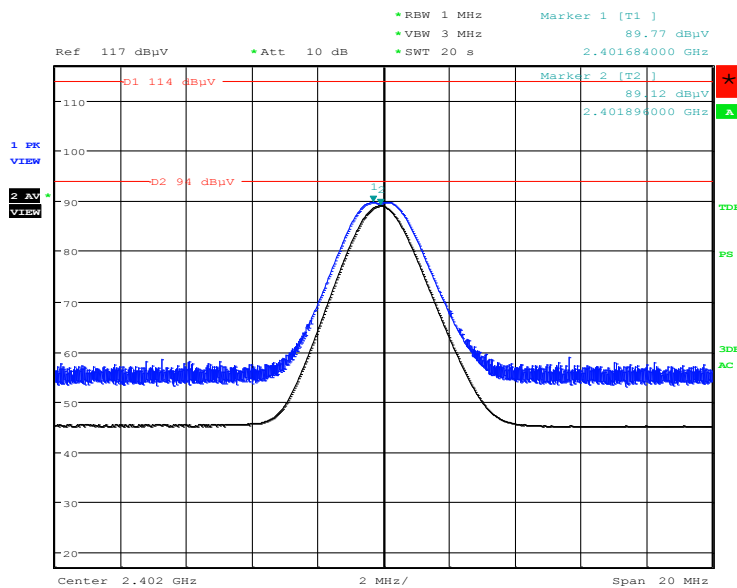
FSoF, 2.480GHz, Y, H
 Date: 27.APR.2015 20:02:33

Table 9: Field Strength of Fundamental at 1.5m height

Operating Frequency [MHz]	EUT / Antenna Orient.	Average Value [dBµV/m]	Peak Value [dBµV/m]	Average Limit [dBµV/m]	Peak Limit [dBµV/m]	Average Margin [dB]	Peak Margin [dB]
2401.956	Y / H	89.12	89.77	94	114	4.88	24.23
2441.960	Y / H	89.13	89.86	94	114	4.87	24.14
2479.964	Y / H	88.32	89.03	94	114	5.68	24.97

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 (50000µV/m).
 Peak limit in dBµV/m is calculated as follows: Peak limit = Average limit + 20dB.

Figure 13: Field Strength of Fundamental, Spectral Diagram, Mode A (2402MHz) at 1.5m height



5.3.5 Radiated Spurious Emissions of Transmitter

RESULT: **PASS**

Date of testing: 2015-04-16, 2015-04-21, 2015-04-22

Ambient temperature: 22, 18, 20°C

Relative humidity: 44, 62, 58%

Atmospheric pressure: 1008, 1008, 1016hPa

Frequency range: 9kHz - 25GHz

Measurement distance: 3m

Kind of test site: Semi Anechoic Chamber

Requirements:

FCC 15.209, FCC 15.249(a), FCC 15.249(d), RSS-Gen 6.1.3 and RSS-210 2.1, 2.2, 2.5, A2.9(a) and A2.9(b)

Emission radiated outside the specified frequency bands must comply with the radiated emission limits specified in FCC 15.209(a), FCC 15.249(a), RSS-Gen 7.2.5 (tables 5 and 6) and RSS-210 A2.9(a).

Test procedure:

ANSI C63.10-2009, ANSI C63.10-2013

The EUT was placed on a nonconductive turntable 0.8m and 1.5m above the ground plane. 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° and the antenna was raised and lowered from 1 to 4m in order to determine the emission's maximum level. 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. The receiver's 6dB bandwidth was 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 range 9kHz - 30MHz.

Since enough margin more than 10dB (i.e. 16.8dB at 939.120MHz, see the Table 13) at the range 30MHz – 1GHz were seen at 80cm table height condition, additional measurement were only performed above 1GHz range at 1.5m table height.

Table 10: Radiated Emissions, Quasi Peak Data, 30MHz - 1GHz, Horizontal and Vertical Antenna Orientations, Mode A (2402MHz) at 0.8m height

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 [°]
35.781	X/V	30.5	-16.2	14.3	40.0	25.7	104	32
40.002	X/V	36.5	-15.7	20.8	40.0	19.2	101	1
56.803	X/H	30.4	-15.4	15.0	40.0	25.0	363	44
119.996	X/V	37.9	-16.9	21.0	43.5	22.5	200	22
159.204	X/V	30.4	-14.3	16.1	43.5	27.4	294	291
342.913	X/V	30.0	-11.7	18.3	46.0	27.7	131	5
579.794	X/V	29.7	-6.0	23.7	46.0	22.3	395	23
855.785	X/H	31.3	-3.1	28.2	46.0	17.8	313	243

Note: Level QP = Reading QP + Factor

Table 11: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, Mode A (2402MHz) at 0.8m height

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 [°]
3758.596	X/H	39.2	-10.0	29.2	54.0	24.8	172	253
7426.839	X/V	38.7	0.3	39.0	54.0	15.0	106	77
7974.206	X/V	38.7	1.4	40.1	54.0	13.9	139	232

Note: Level AV = Reading AV + Factor

Table 12: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, Mode A (2402MHz) at 0.8m height

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 [°]
3758.596	X/H	53.3	-10.0	43.3	74.0	30.7	172	253
7426.839	X/V	53.0	0.3	53.3	74.0	20.7	106	77
7974.206	X/V	52.6	1.4	54.0	74.0	20.0	139	232

Note: Level PK = Reading PK + Factor

Table 13: Radiated Emissions, Quasi Peak Data, 30MHz - 1GHz, Horizontal and Vertical Antenna Orientations, Mode B (2442MHz) at 0.8m height

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 [°]
40.006	Z/V	34.2	-15.7	18.5	40.0	21.5	101	261
44.461	Z/V	32.4	-15.5	16.9	40.0	23.1	101	338
120.000	Z/V	41.0	-16.9	24.1	43.5	19.4	102	1
162.511	Z/V	30.3	-14.4	15.9	43.5	27.6	397	29
187.088	Z/V	30.4	-16.1	14.3	43.5	29.2	156	183
644.994	Z/V	30.0	-5.3	24.7	46.0	21.3	141	20
888.332	Z/V	31.3	-2.6	28.7	46.0	17.3	100	64
939.120	Z/V	30.8	-1.6	29.2	46.0	16.8	396	178

Note: Level QP = Reading QP + Factor

Table 14: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, Mode B (2442MHz) at 0.8m height

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 [°]
4883.847	Z/H	51.6	-7.2	44.4	54.0	9.6	145	226
7217.721	Z/H	39.0	0.0	39.0	54.0	15.0	160	6
7529.949	Z/V	38.8	0.1	38.9	54.0	15.1	119	228
7975.132	Z/H	38.6	1.4	40.0	54.0	14.0	146	174

Note: Level AV = Reading AV + Factor

Table 15: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, Mode B (2442MHz) at 0.8m height

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 [°]
4883.847	Z/H	57.8	-7.2	50.6	74.0	23.4	145	226
7217.721	Z/H	53.4	0.0	53.3	74.0	20.7	160	6
7529.949	Z/V	53.1	0.1	53.2	74.0	20.8	119	228
7975.132	Z/H	53.4	1.4	54.8	74.0	19.2	146	174

Note: Level PK = Reading PK + Factor

Table 16: Radiated Emissions, Quasi Peak Data, 30MHz - 1GHz, Horizontal and Vertical Antenna Orientations, Mode C (2480MHz) at 0.8m height

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 [°]
40.004	X/V	33.8	-15.7	18.1	40.0	21.9	100	316
55.032	X/V	30.3	-15.6	14.7	40.0	25.3	336	224
79.997	X/V	36.0	-18.8	17.2	40.0	22.8	114	1
110.000	X/V	35.3	-17.7	17.6	43.5	25.9	222	144
119.996	X/V	40.9	-16.9	24.0	43.5	19.5	100	1
328.565	X/V	29.9	-12.1	17.8	46.0	28.2	284	276
337.900	X/H	30.0	-12.3	17.7	46.0	28.3	112	280
866.620	X/H	31.1	-2.9	28.2	46.0	17.8	351	292

Note: Level QP = Reading QP + Factor

Table 17: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, Mode C (2480MHz) at 0.8m height

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 [°]
7438.520	Z/H	38.5	0.3	38.8	54.0	15.2	197	169
7792.629	Z/V	38.6	0.7	39.3	54.0	14.7	131	271
7986.364	Z/V	38.6	1.5	40.1	54.0	13.9	196	6

Note: Level AV = Reading AV + Factor

Table 18: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, Mode C (2480MHz) at 0.8m height

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 [°]
7438.520	Z/H	53.0	0.3	53.3	74.0	20.7	197	169
7792.629	Z/V	52.4	0.7	53.1	74.0	20.9	131	271
7986.364	Z/V	52.7	1.5	54.2	74.0	19.8	196	6

Note: Level PK = Reading PK + Factor

Table 19: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, Mode A (2402MHz) at 1.5m height

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 [°]
4803.836	X/H	43.6	-7.1	36.5	54.0	17.5	199	117
7301.309	X/V	38.6	0.3	38.9	54.0	15.1	192	265
7764.162	X/H	38.6	0.6	39.2	54.0	14.8	200	294
7973.233	X/H	38.5	1.4	39.9	54.0	14.1	173	129

Note: Level AV = Reading AV + Factor

Table 20: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, Mode A (2402MHz) at 1.5m height

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 [°]
4803.836	X/H	54.2	-7.1	47.1	74.0	26.9	199	117
7301.309	X/V	52.4	0.3	52.7	74.0	21.3	192	265
7764.162	X/H	52.9	0.6	53.5	74.0	20.5	200	294
7973.233	X/H	52.6	1.4	54.0	74.0	20.0	173	129

Note: Level PK = Reading PK + Factor

Table 21: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, Mode B (2442MHz) at 1.5m height

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 [°]
4883.809	Z/V	47.6	-7.2	40.4	54.0	13.6	149	202
5866.038	Z/H	39.6	-6.2	33.4	54.0	20.6	139	137
7104.803	Z/V	39.1	-0.9	38.2	54.0	15.8	146	295
7315.849	Z/H	38.6	0.3	38.9	54.0	15.1	175	23
7984.204	Z/H	38.4	1.5	39.9	54.0	14.1	101	51

Note: Level AV = Reading AV + Factor

Table 22: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, Mode B (2442MHz) at 1.5m height

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 [°]
4883.809	Z/V	55.5	-7.2	48.3	74.0	25.7	149	202
5866.038	Z/H	53.8	-6.2	47.6	74.0	26.4	139	137
7104.803	Z/V	52.9	-0.9	52.0	74.0	22.0	146	295
7315.849	Z/H	52.5	0.3	52.8	74.0	21.2	175	23
7984.204	Z/H	52.4	1.5	53.9	74.0	20.1	101	51

Note: Level PK = Reading PK + Factor

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Table 23: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, Mode C (2480MHz) at 1.5m height

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 [°]
3858.328	Z/H	38.8	-9.7	29.1	54.0	24.9	101	27
4959.796	Z/V	47.9	-6.9	41.0	54.0	13.0	165	171
7316.308	Z/H	38.6	0.3	38.9	54.0	15.1	139	347
7635.397	Z/V	38.6	0.0	38.6	54.0	15.4	177	9
7983.748	Z/V	38.5	1.5	40.0	54.0	14.0	174	7

Note: Level AV = Reading AV + Factor

Table 24: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, Mode C (2480MHz) at 1.5m height

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 [°]
3858.328	Z/H	53.4	-9.7	43.7	74.0	30.3	101	27
4959.796	Z/V	55.4	-6.9	48.5	74.0	25.5	165	171
7316.308	Z/H	52.5	0.3	52.8	74.0	21.2	139	347
7635.397	Z/V	52.6	0.0	52.6	74.0	21.4	177	9
7983.748	Z/V	52.8	1.5	54.2	74.0	19.8	174	7

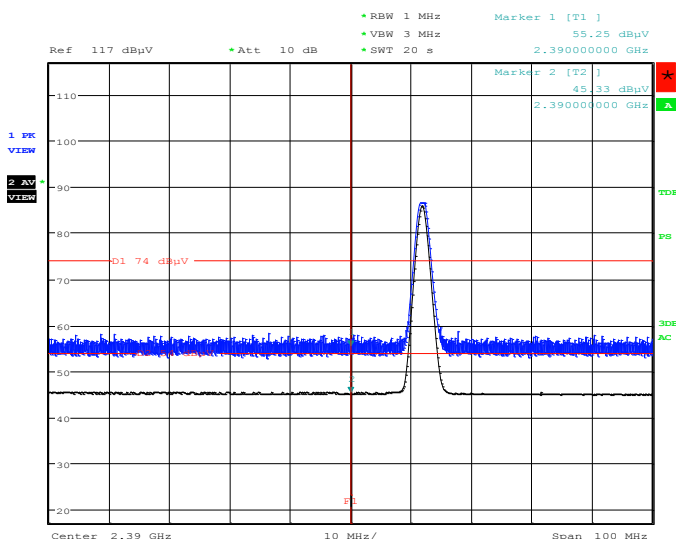
Note: Level PK = Reading PK + Factor

Table 25: 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]	Table Height [m]
2402	Y / H	45.33	55.25	54.0	74.0	8.67	18.75	0.8
2480	Y / H	45.56	56.28	54.0	74.0	8.44	17.72	0.8
2402	Y / H	44.70	53.82	54.0	74.0	9.30	20.18	1.5
2480	Y / H	46.23	57.65	54.0	74.0	7.77	16.35	1.5

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 (500µV/m).
 Peak limit in dBµV/m is calculated as follows: Peak limit = Average limit + 20dB.

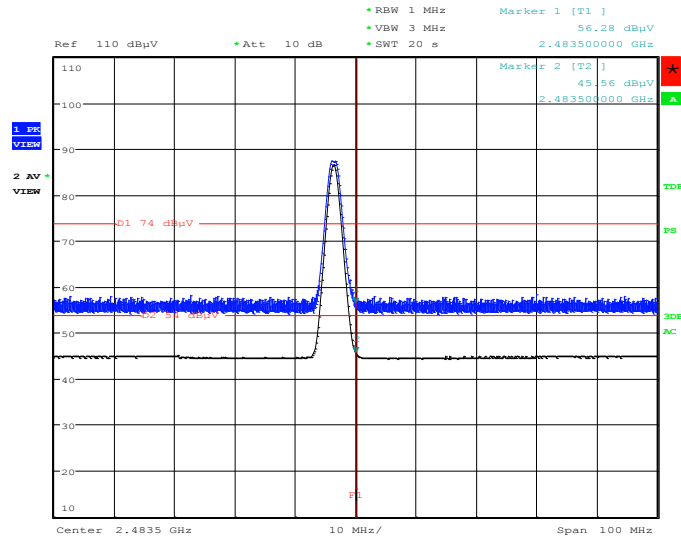
Figure 16: Radiated Emissions at Band Edge, Spectral Diagram, Mode A (2402MHz) at 0.8m height



BandEdge, 2.402GHz, Y, H
 Date: 27.APR.2015 14:58:03

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

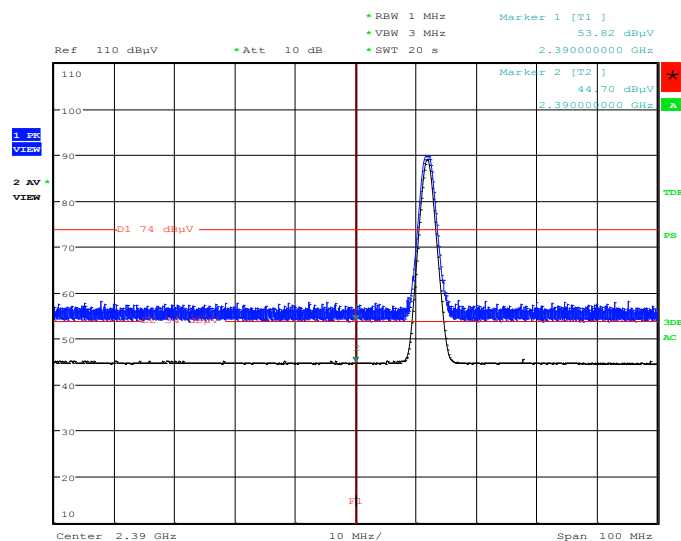
Figure 17: Radiated Emissions at Band Edge, Spectral Diagram, Mode C (2480MHz) at 0.8m height



BandEdge, 2.48GHz, Y, H
Date: 27.APR.2015 20:08:09

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

Figure 18: Radiated Emissions at Band Edge, Spectral Diagram, Mode A (2402MHz) at 1.5m height



BandEdge, 2.402GHz, Y, H,150
Date: 27.APR.2015 19:04:49

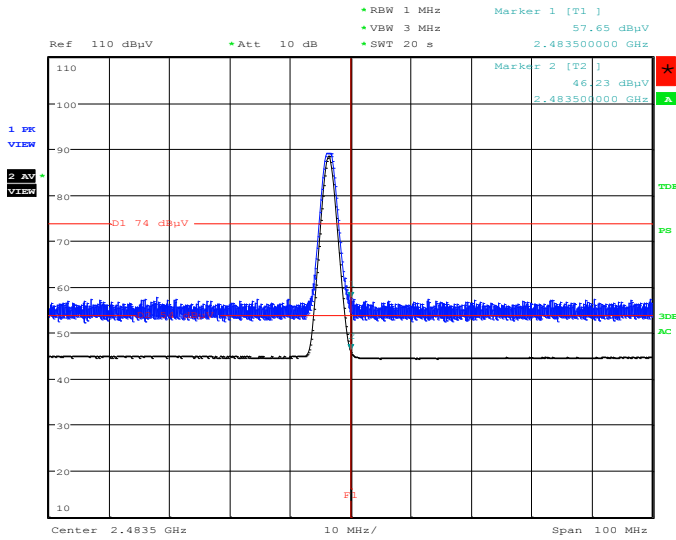
Note: The upper trace shows the peak value and the lower trace shows the average value.

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Figure 19: Radiated Emissions at Band Edge, Spectral Diagram, Mode C (2480MHz) at 1.5m height



BandEdge, 2.48GHz, Y, H, 150
Date: 27.APR.2015 18:07:32

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: N/A

Frequency range: 0.15 - 30MHz

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 C63.10-2009, ANSI C63.10-2013

Note:

It is not applicable since the EUT is battery operated.

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