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Prüfbericht - Nr.: *Test Report No.:*	**19660369 001**	**Seite 1 von 44** *Page 1 of 44*
Auftraggeber: *Client:*	**Honeywell Technology Solution Lab, Devarabisanahalli Village, KR Puram Hobli, Bangalore, Karnataka – 560103, India**	
Gegenstand der Prüfung: *Test item:*	**Generation X radio module**	
Bezeichnung: *Identification:*	**Gen X radio Module (GXRM)**	**Serien-Nr.:** *Serial No.* **415085**
Wareneingangs-Nr.: *Receipt No.:*	**1803300194**	**Eingangsdatum:** *Date of receipt:* 26-02-2018
Prüfort: *Testing location:*	**Refer Page 5 of 44 for Test site details**	
Prüfgrundlage: *Test specification:*	**FCC Part 15 Subpart C 15.247, RSS 247 Issue 2 ANSI C63.10- 2013**	
Prüfergebnis: *Test Result:*	**Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).** *The test items passed the test specification(s).*	
Prüflaboratorium: *Testing Laboratory:*	**TÜV Rheinland (India) Pvt. Ltd.** 27 / B, 2nd Cross, Electronic city Phase I, Bengaluru - 560100, India FCC Test Site Registration no.: 496599 ; IC Test Site Registration no.: 3466E-1	

geprüft / *tested by:*

Datum / *Date*	Name/Stellung / *Name/Position*	Unterschrift / *Signature*
07-03-2018	Santhosh S K, Engineer	Santhosh S K.

kontrolliert / *reviewed by:*

Datum / *Date*	Name/Stellung / *Name/Position*	Unterschrift / *Signature*
13-06-2018	Saibaba Siddapur, Assistant Manager	Saibaba

Sonstiges / *Other Aspects:* **FCC ID: S5751454941 & IC:573W-51454941**
On receipt, the equipment was in good condition.

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

FCC Section	IC Section	Test item	Result	Remarks
15.247(a)(2)	RSS 247 5.2 (a)	6dB Bandwidth	PASS	Occupied Bandwidth doesn't have limit
-	RSS Gen 6.7	99% Bandwidth	N/A*	
15.247(b)	RSS 247 5.4 (d)	Power ouput measurement	PASS	
15.247(e)	RSS 247 5.2 (b)	Power spectral density	PASS	
15.247(d)	RSS 247 5.5	Emission in non Restricted frequency bands	PASS	
15.247 (d) / 15.209 & 15.205	RSS Gen 8.9 & 8.10	Radiated spurious emission & restricted bands of operation	PASS	
15.207	RSS Gen 8.8	Conducted Emission on A.C mains lines	N/A*	EUT is exclusively battery operated device

N/A*- Not applicable

Table of Contents

1 GENERAL REMARKS

1.1 Complimentary Materials

All attachments are integral part of this test report with the following appendixes:

Appendix 1: Test setup photos
Appendix 2: EUT external photos
Appendix 3: EUT internal photos
Appendix 4: FCC label and location details
Appendix 5: Block diagram
Appendix 6: Specification of EUT
Appendix 7: Schematics
Appendix 8: Bill of Materials
Appendix 9: User Manual
Appendix 10: Maximum permissible exposure calculation

2 TEST SITES

2.1 Testing Facilities

TUV Rheinland (India) Private Limited
108 , Beside ISBR Business School,
Electronic city Phase I
Bangalore - 560 100.

2.2 List of Test and Measurement Instruments

Table 1: Test and measurement istrument used

Equipment	Manufacturer	Model Name	Serial Number	Calibration Due Date	Periodicity	Used for Test Items
Signal Analyzer	Rohde & Schwarz	FSV7	101644	15-12-2018	Yearly	Conducted measurement
Spectrum Analyser	Agilent	E4407B	US41192772	29-03-2019	Yearly	
EMI Test Receiver	Rohde & Schwarz	ESU 40	100288	24-10-2018	Yearly	Radiated Spurious measurement
Active loop antenna	Frankonia	LAX-10	LAX-10-800	15-01-2019	Yearly	
Baloon and Biconical Antenna	Schwarzbeck mess-elektronik	VHBB-9124 / BBA-9106	9124-656	09-01-2019	Yearly	
Log-Periodic Antenna	Schwarzbeck mess-elektronik	VUSLP-9111B	9111B-111	16-01-2019	Yearly	
Broadband Horn Antenna	Frankonia	HAX-18	HAX18-802	16-09-2018	Yearly	
Semi Anechoic Chamber	Frankonia	-	-	-	-	

3 GENERAL PRODUCT INFORMATION

3.1 Product Function and Intended Use

The 802.15.4 Intrinsically Safe Gen X Radio Module from Honeywell is a second-generation Radio Module combines a high-performance RF solution with the market's premier ISA100 Wireless and Wireless HART stacks. The module comes with configurable transmit power levels: from -5 dBm to +20 dBm, and can accommodate variable range and performance requirements. The small footprint makes it suitable for a wide range of ISA100 Wireless, Wireless HART or ZigBee applications

Note: Report contains only ZigBee radio related test cases.

3.2 Ratings and System Details

Table 2: Ratings and System Details

Operating Frequency Band	2400 MHz – 2483.5 MHz;
Radio Protocol	ZigBee
Data rate	250 kbps
Channel Spacing	5 MHz
Modulation	DSSS (O-QPSK)
Number of antennas supports	Refer Table 3 : Antenna Details
Antenna Gain & Type	Refer Table 3 : Antenna Details
Supply Voltage to Product	3.3 VDC
Dimensions	1.5 inch (L) x 0.075 inch (W) x 1.170 inch (H)
Environmental conditions	Operating: -40 °C to +85 °C; 5 % to 95 % RH non-condensing

3.3 Antenna Details and Power level settings used

Table 3 : Antenna Details and power level settings used

Antenna Type: External				
Sl.No	**Antenna**	**Antenna gain**	**Power level settings**	**Module supported antenna**
1	Centurion MAF94152 Omni Antenna	-2	16	Yes
2	L-COM HG2402RDR-RSP "Rubber-Duck" Omni Antenna	2	14	Yes
3	EM-B14503-MMP-Z6	4	14	Yes
4	L-COM HGV-2404U Omni Antenna	4	14	Yes
5	L-COM HGV-2409U Omni Antenna	8	10	Yes
6	L-COM HG-2414D remote Dish Antenna	14	6	Yes

3.4 Measurement Uncertainty

Table 4: Measurement Uncertainty

Parameter	**Uncertainty**
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±1.5 dB
Power Spectral Density, conducted	±3 dB
Unwanted Emissions, conducted	±3 dB
All emissions, radiated	±6 dB
Temperature	±3 ℃
Supply Voltages	±3 %

4 OPERATIONAL DESCRIPTIONS

The radio module intrinsically safe designed implements ISA100 Wireless, WirelessHART ,ZigBee Protocols. The module is ready to use in any industrial wireless field sensors.

5 TEST SET-UP AND OPERATION MODE

5.1 Principle of Configuration Selection

Transmission was enabled with continuous transmission on low, mid and high channel with 100ms and 100% duty cycle to obtain maximum worst-case emissions

The product was tested with TUV Label **1803300194 – 1** and **1803306376 – 2.**

5.2 Test Operation and Test Software

Testing software was used to enable the continuous transmission on low/mid/high channels on the EUT for the tests in this report.

Software Simulator used : Putty and Tera term
Firmware Version : OW310.1 24.1.1
Hardware Version : 51454941-001
Part Number : 51454941

5.3 Special Accessories and Auxiliary Equipment

- UART Converter and Power Cable were used during testing,

5.4 Countermeasures to achieve EMC Compliance

- None

Table 5: List of Center Frequiences

Frequency Band (MHz)	Channel Number	Channel Frequency (MHz)
2400 – 2483.5	**01**	**2405**
	02	2410
	03	2415
	04	2420
	05	2425
	06	2430
	07	2435
	08	**2440**
	09	2445
	10	2450
	11	2455
	12	2460
	13	2465
	14	2470
	15	**2475**

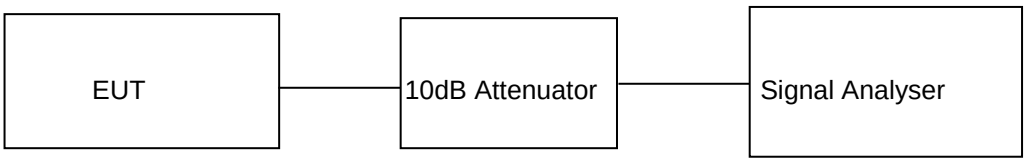
6 ANTENNA PORT TEST CASES

6.1 DTS Bandwidth and OBW

Result ***Pass***

Test Specification	FCC part 15 Subpart C Section 15.247 (a) {2} / RSS 247 5.2 (a)
Test Method	Section 8.2 of KDB 558074 D01 DTS Meas Guidance v04
Detector	Peak
Requirement	DTS Bandwidth shall be at least 500 kHz / 0.5 MHz

Test Setup:

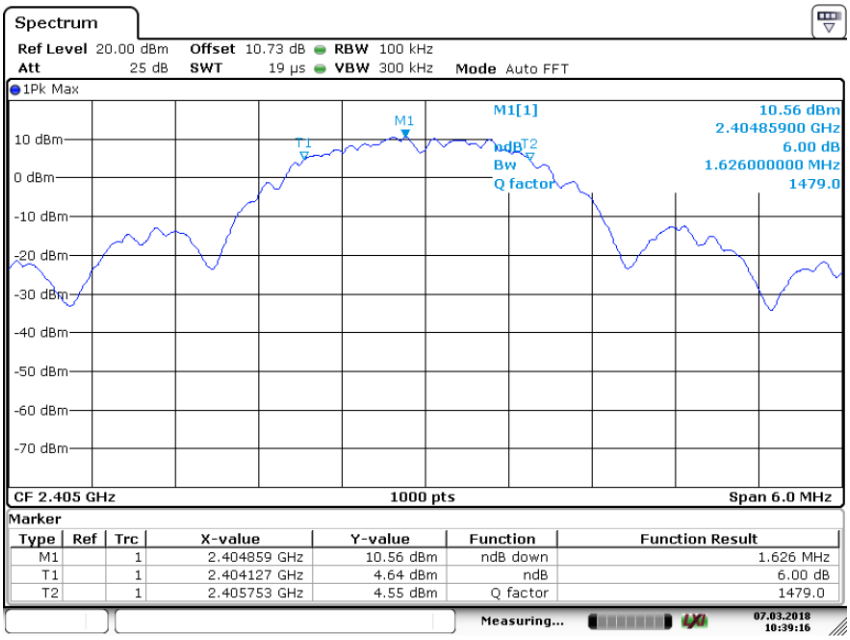


Test Result:

Attenuator (10.48 dB) + cable loss (0.25 dB) = 10.73 dB Considered in the test result.

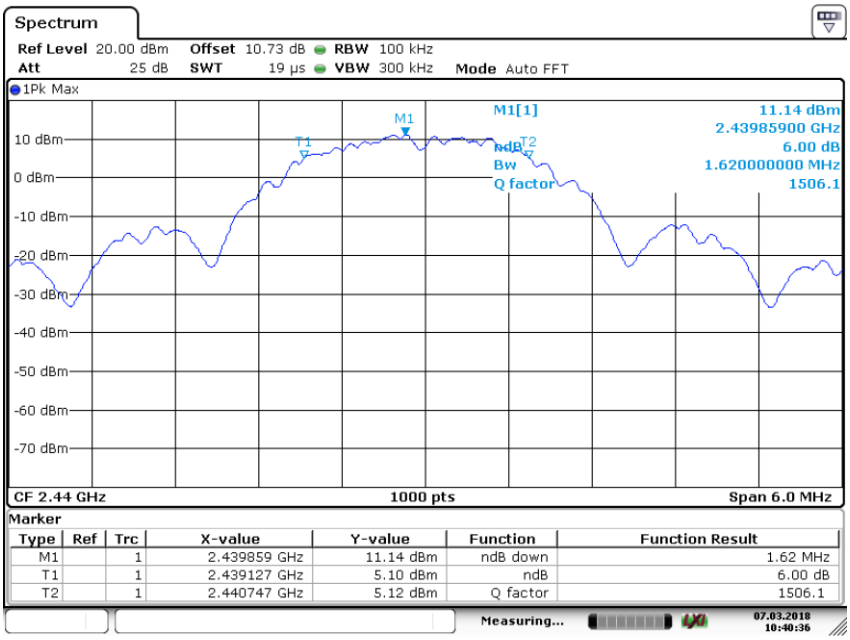
Table 6: DTS Bandwidth and OBW test results

IEEE 802.15.4			
Data Rate (kbps)	**Channel Frequency (MHz)**	**DTS Bandwidth (MHz)**	**99% OBW (MHz)**
250	2405	**1.63**	2.35
	2440	1.62	2.34
	2475	1.62	**2.36**



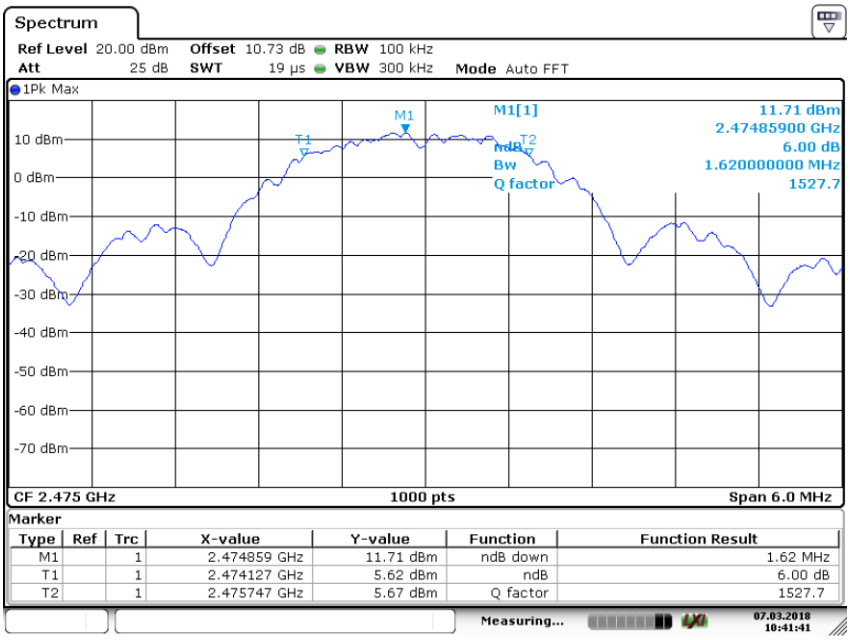
Date: 7.MAR.2018 10:39:16

Test Graph 1: 2405 MHz DTS Bandwidth



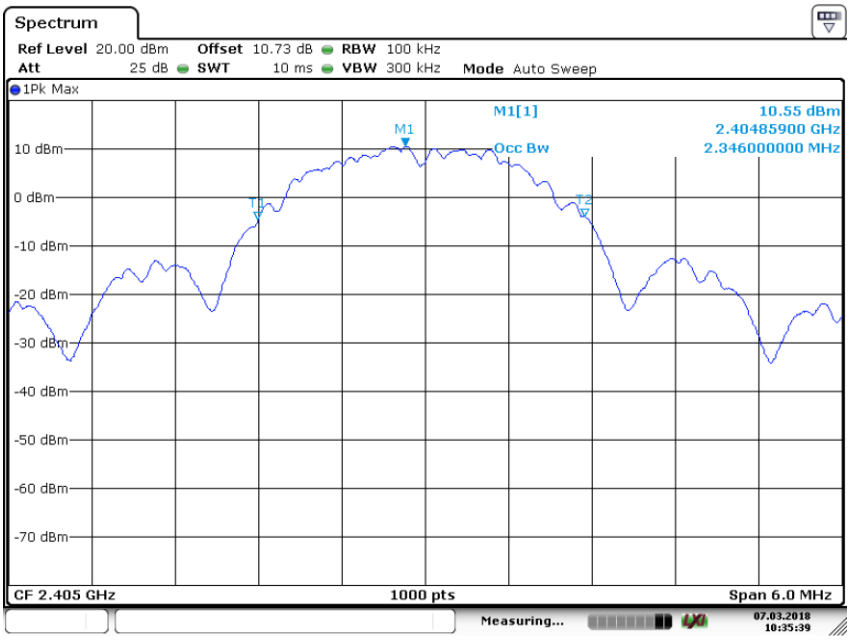
Date: 7.MAR.2018 10:40:36

Test Graph 2: 2440 MHz DTS Bandwidth



Date: 7.MAR.2018 10:41:41

Test Graph 3: 2475 MHz DTS Bandwidth



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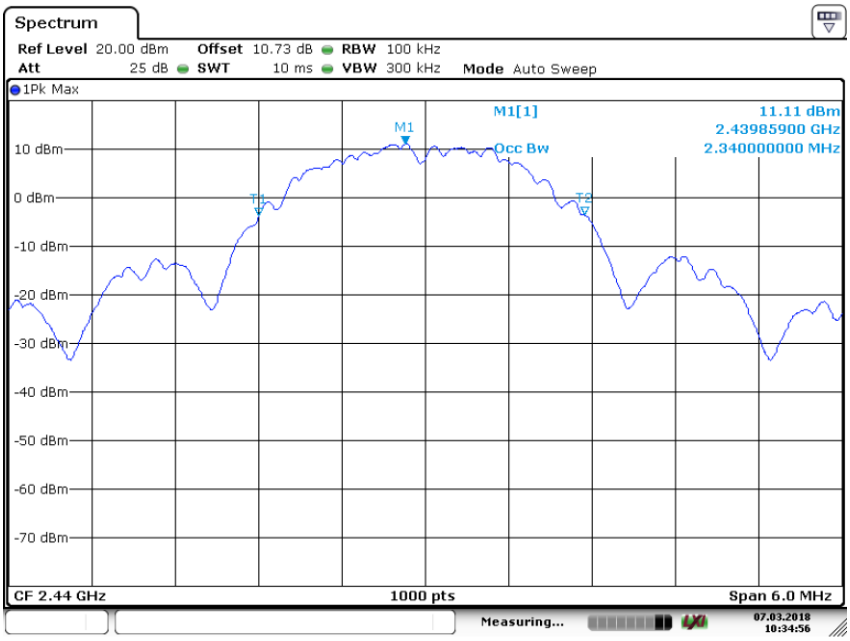
Test Graph 4: 2405 MHz OBW



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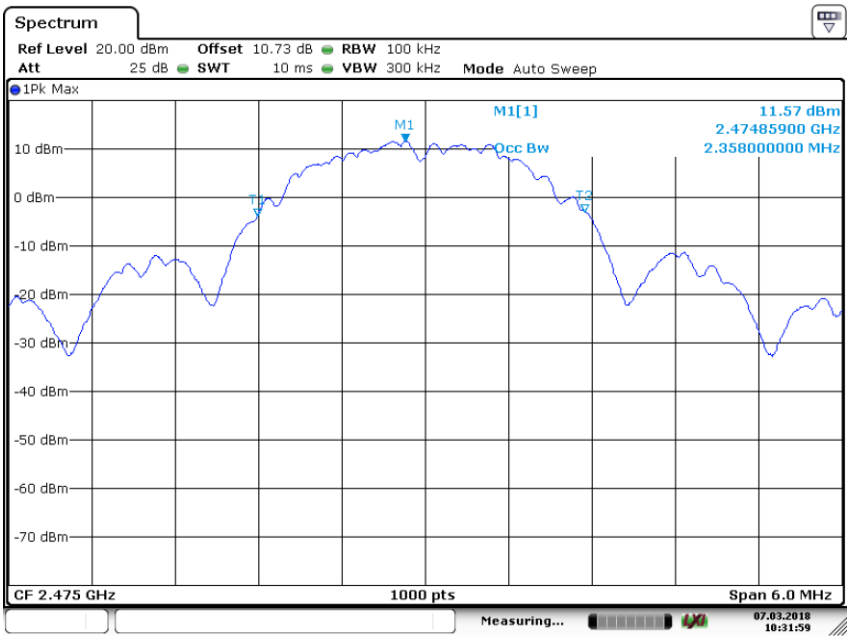
Test Graph 5: 2440 MHz OBW



Date: 7.MAR.2018 10:31:59

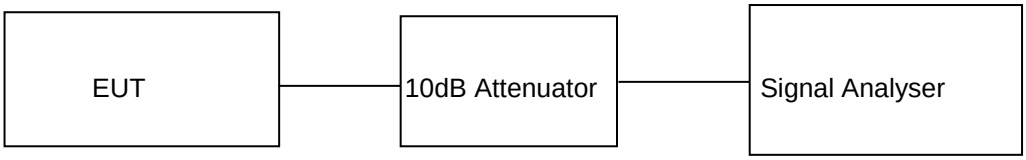
Test Graph 6: 2475 MHz OBW

6.2 Maximum peak conducted output power

Result ***Pass***

Test Specification	FCC part 15 Subpart C Section 15.247 (b) {3} / RSS 247 5.4 (d)
Test Method	Section 9.1.1 of KDB 558074 D01 DTS Meas Guidance v04
Detector	Peak
Requirement	Conducted output power shall be ≤ 1 Watt (30 dBm)

Test Setup:



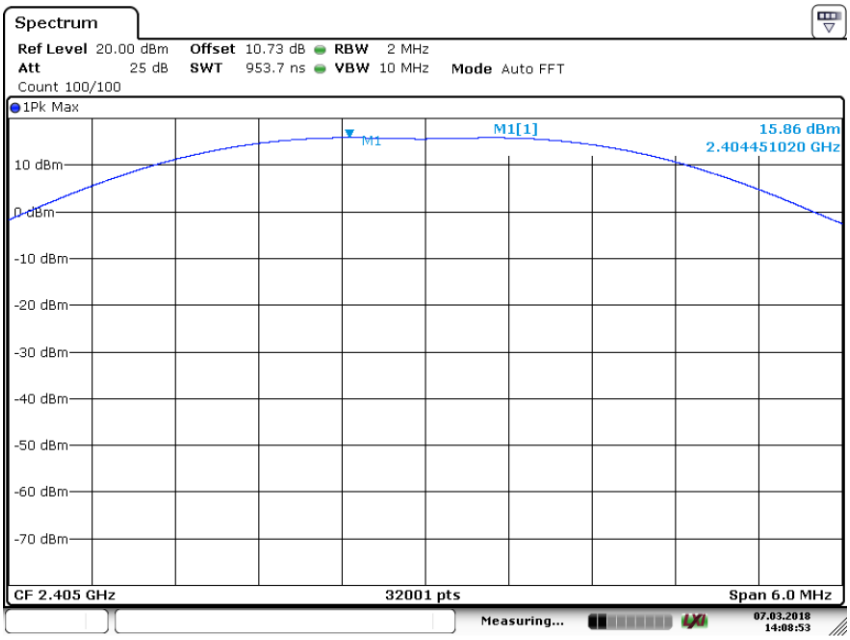
Test Result:

Attenuator (10.48 dB) + cable loss (0.25 dB) = 10.73 dB Considered in the test result.

Table 7: Maximum peak conducted output power

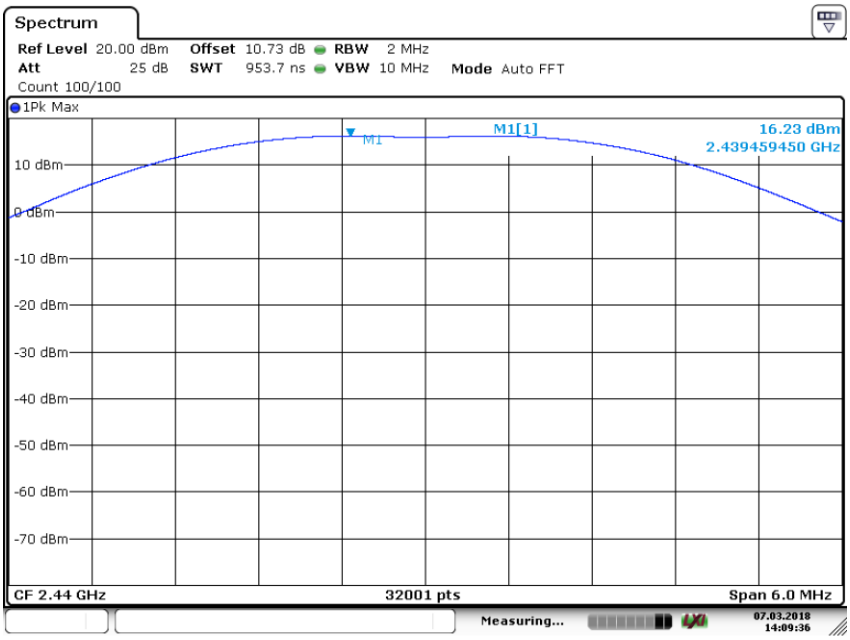
1) 16 dB Power level and -2 dBi antenna gain combination

IEEE 802.15.4			
Data Rate (kbps)	**Channel Frequency (MHz)**	**Maximum peak conducted output power (dBm)**	**Limit (dBm)**
250	2405	15.86	30
	2440	16.23	30
	2475	**16.59**	30



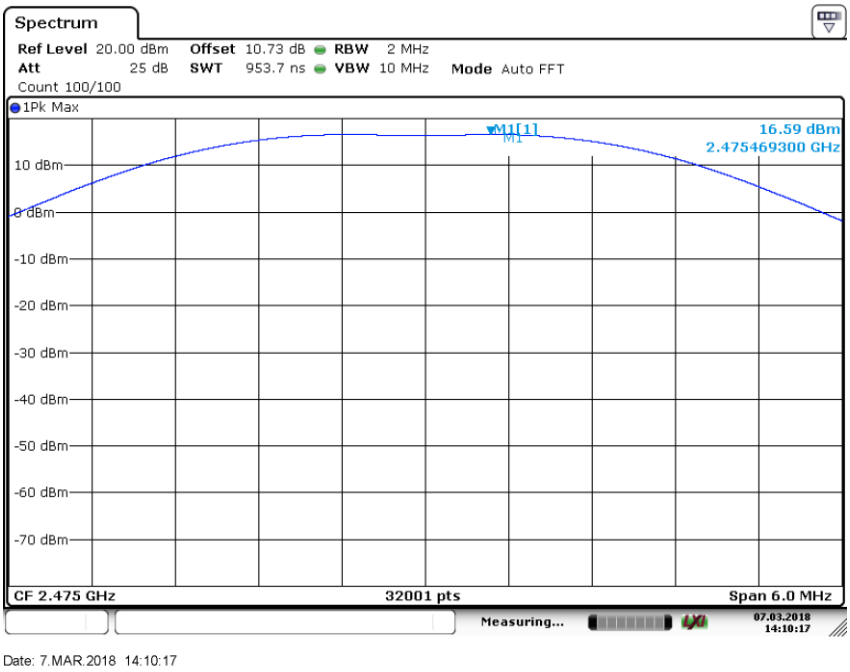
Date: 7.MAR.2018 14:08:53

Test Graph 7: 2405 MHz power for 16 dBm power level setting



Date: 7.MAR.2018 14:09:36

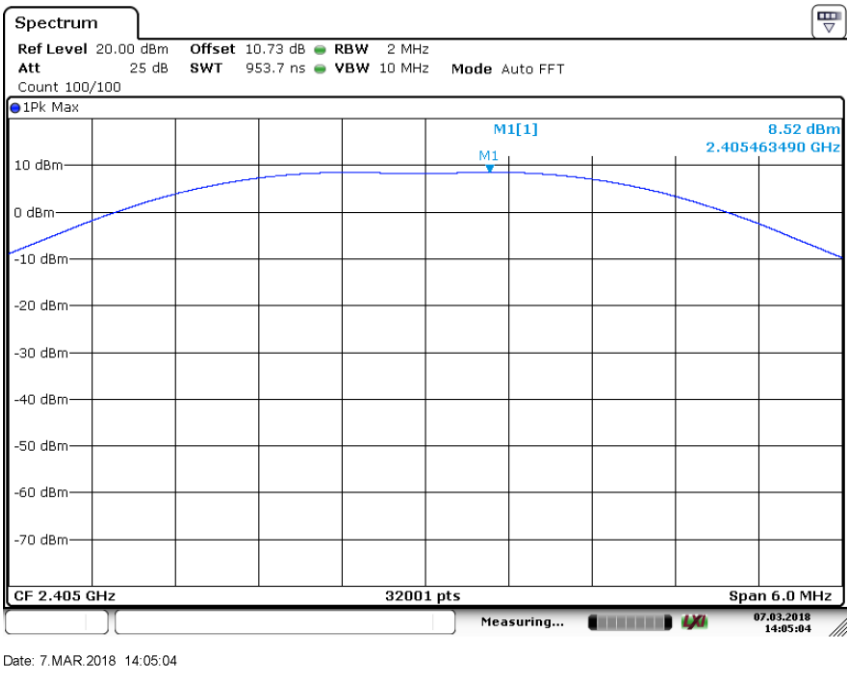
Test Graph 8: 2440 MHz power for 16 dBm power level setting



Test Graph 9: 2475 MHz power for 16 dBm power level setting

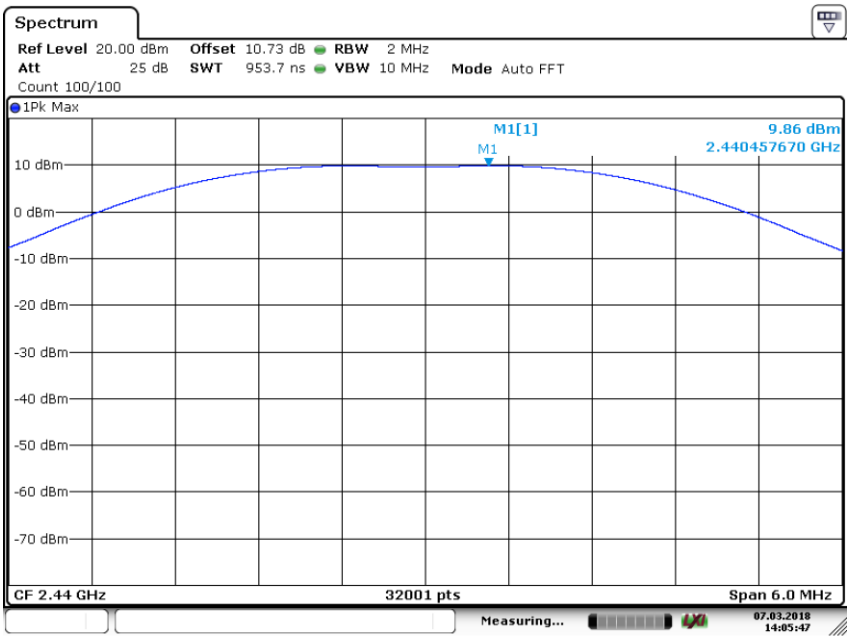
2) 10 dB Power level and 8 dBi antenna gain combination

IEEE 802.15.4			
Data Rate (kbps)	**Channel Frequency (MHz)**	**Maximum peak conducted output power (dBm)**	**Limit (dBm)**
250	2405	8.52	28
	2440	9.86	28
	2475	**11.38**	28



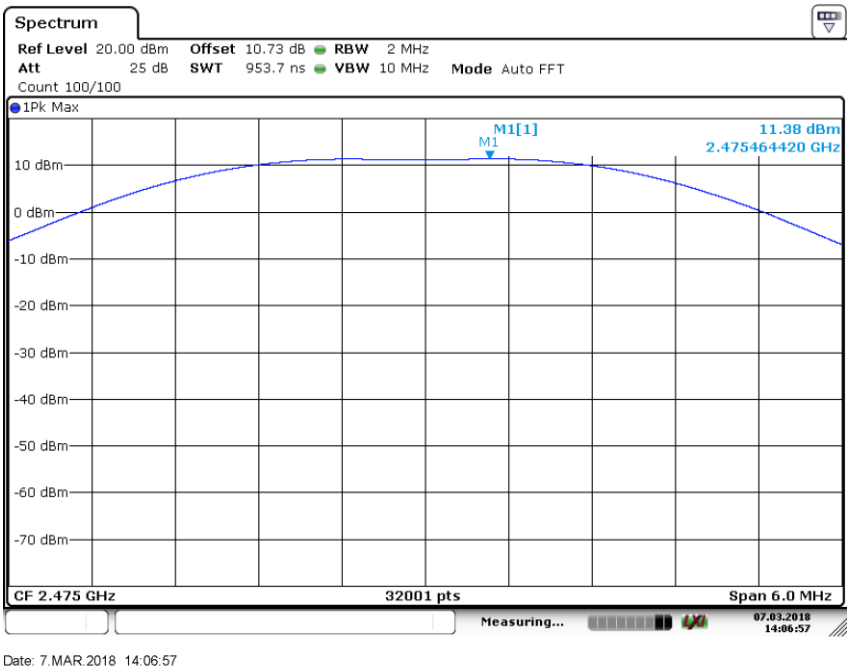
Date: 7.MAR.2018 14:05:04

Test Graph 10: 2405 MHz power for 10dBm power level setting



Date: 7.MAR.2018 14:05:48

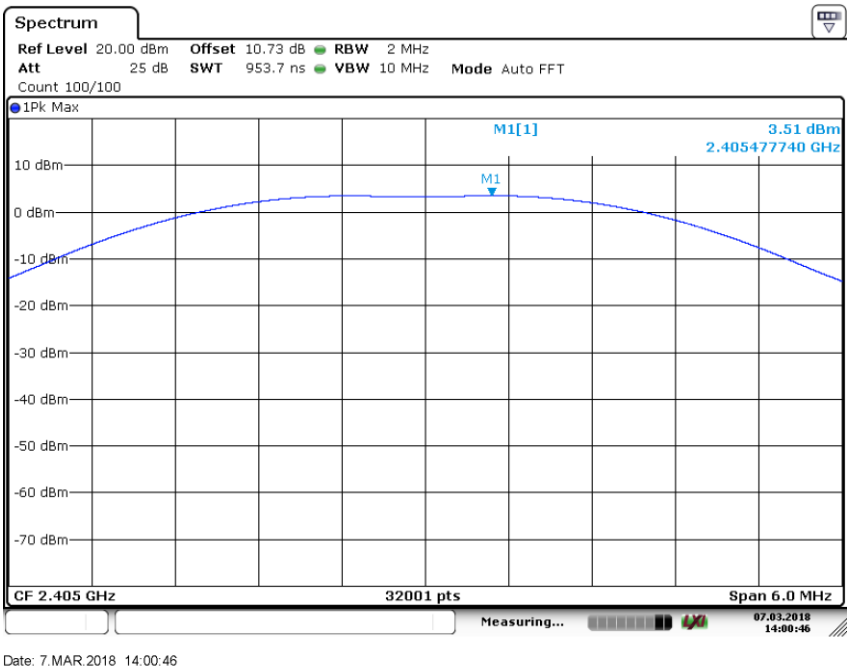
Test Graph 11: 2440 MHz power for 10 dBm power level setting



Test Graph 12: 2475 MHz power for 10 dB power level setting

3) 6 dB Power level and 14 dBi antenna gain combination

IEEE 802.15.4			
Data Rate (kbps)	**Channel Frequency (MHz)**	**Maximum peak conducted output power (dBm)**	**Limit (dBm)**
250	2405	3.51	22
	2440	4.76	22
	2475	**6.37**	22



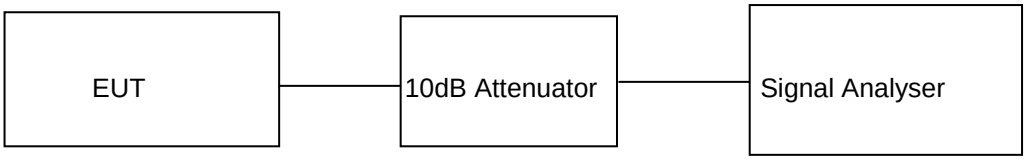
Test Graph 13: 2405 power for 6 dBm power level setting

6.3 Maximum power spectral density

Result ***Pass***

Test Specification	FCC part 15 Subpart C Section 15.247 (e) / RSS 247 5.2 (b)
Test Method	Section 10.2 of KDB 558074 D01 DTS Meas Guidance v04
Detector	Peak
Requirement	For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm.

Test Setup:



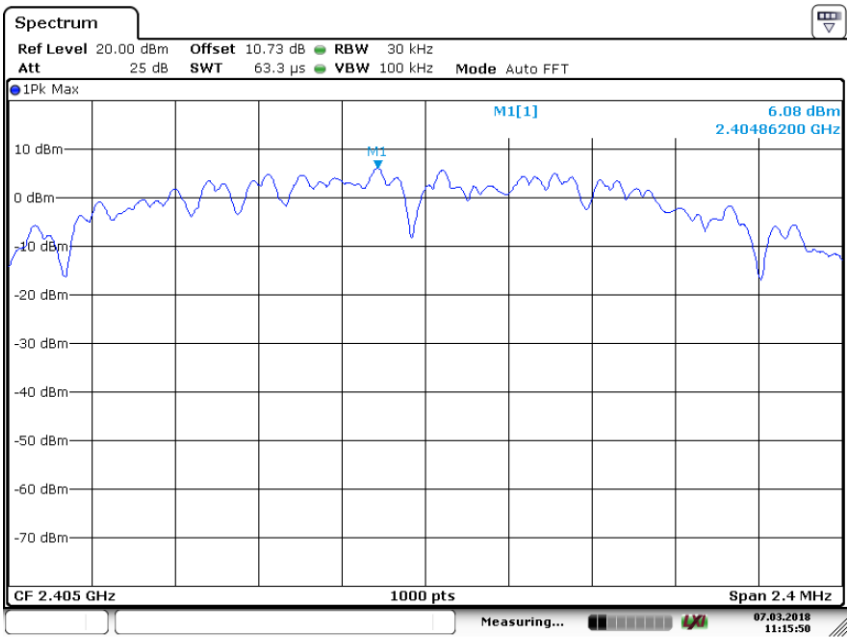
Test Result:

Attenuator (10.48 dB) + cable loss (0.25 dB) = 10.73 dB Considered in the test result.

Table 8: Peak PSD

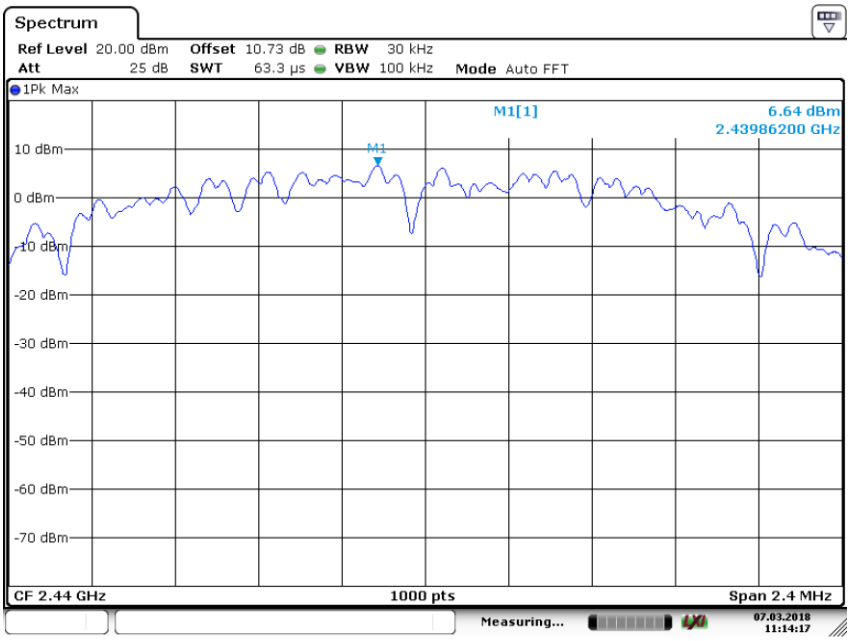
IEEE 802.15.4				
Data Rate (kbps)	**Channel Frequency (MHz)**	**Measured Peak PSD (dBm) at 30kHz**	**Peak PSD (dBm) at 3kHz**	**Limit (dBm)**
250	2405	6.08	-3.92	8
	2440	6.64	-3.36	8
	2475	**7.06**	-2.94	8

Note: -10dB is considered as the conversion factor to convert measured PSD at 30 kHz in to 3 kHz.



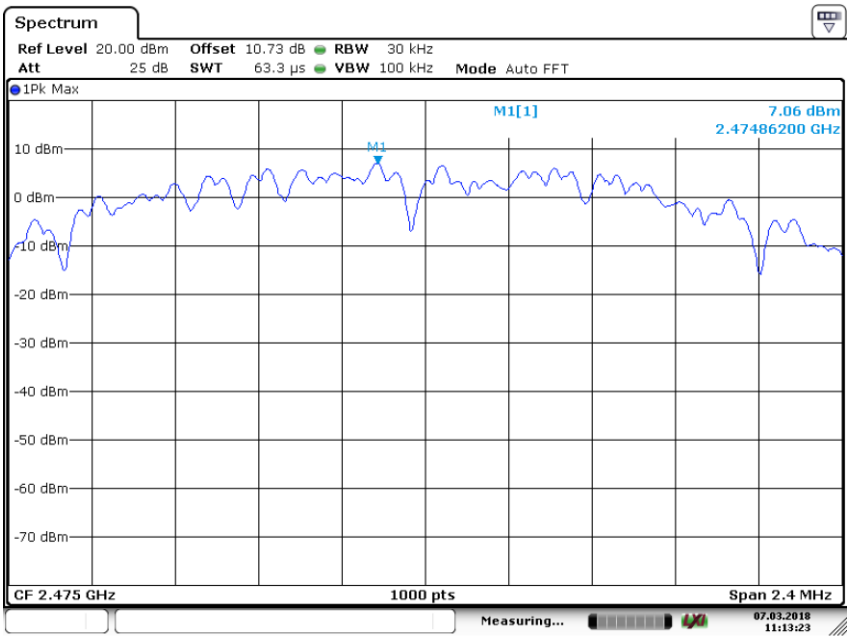
Date: 7.MAR.2018 11:15:50

Test Graph 14: 2405 MHz Peak PSD



Date: 7.MAR.2018 11:14:17

Test Graph 15: 2440 MHz Peak PSD



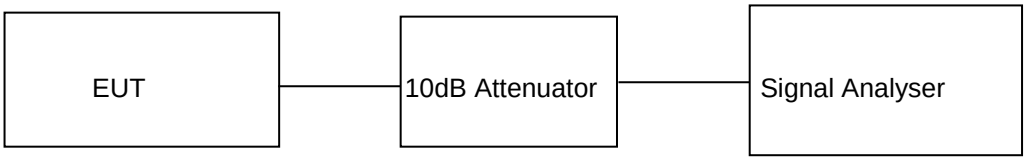
Test Graph 16: 2475 MHz Peak PSD

6.4 Emissions in non- restricted frequency bands

Result ***Pass***

Test Specification	FCC part 15 Subpart C Section 15.247 (d) / RSS 247 5.5
Test Method	Section 11.2 and 11.3 of KDB 558074 D01 DTS Meas Guidance v04
Detector	Peak
Requirement	In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits

Test Setup:

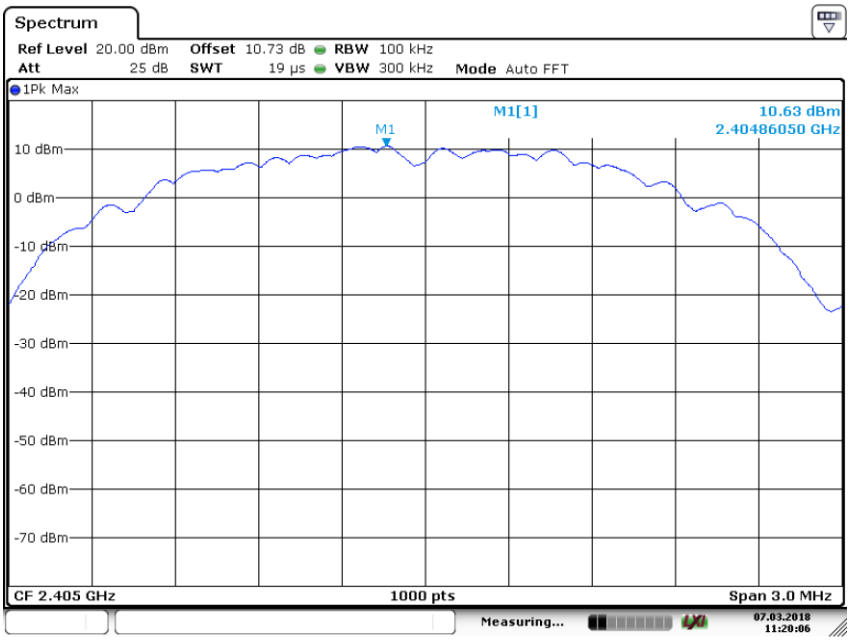


Test Result:

Attenuator (10.48 dB) + cable loss (0.25 dB) = 10.73 dB Considered in the test result.

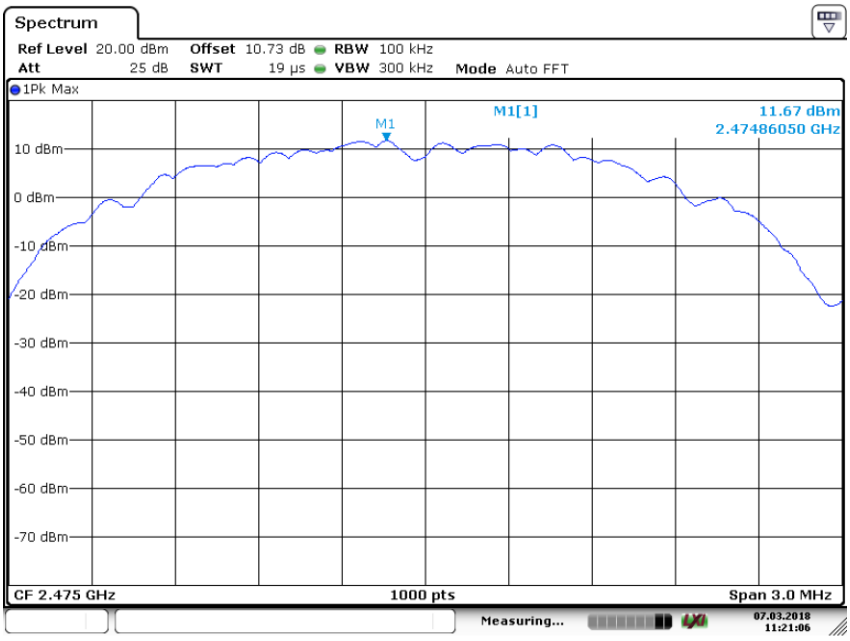
Table 9: Reference level measurement

Channel Frequency (MHz)	Measured reference level (dBm)
2405	10.63
2475	11.67



Date: 7.MAR.2018 11:20:06

Test Graph 17: 2405 MHz Reference level

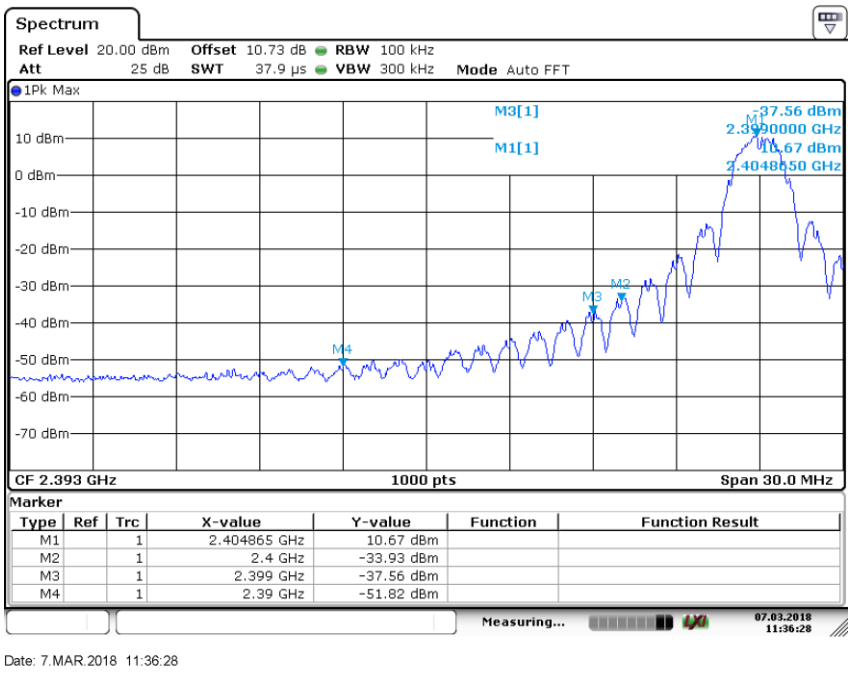


Date: 7.MAR.2018 11:21:07

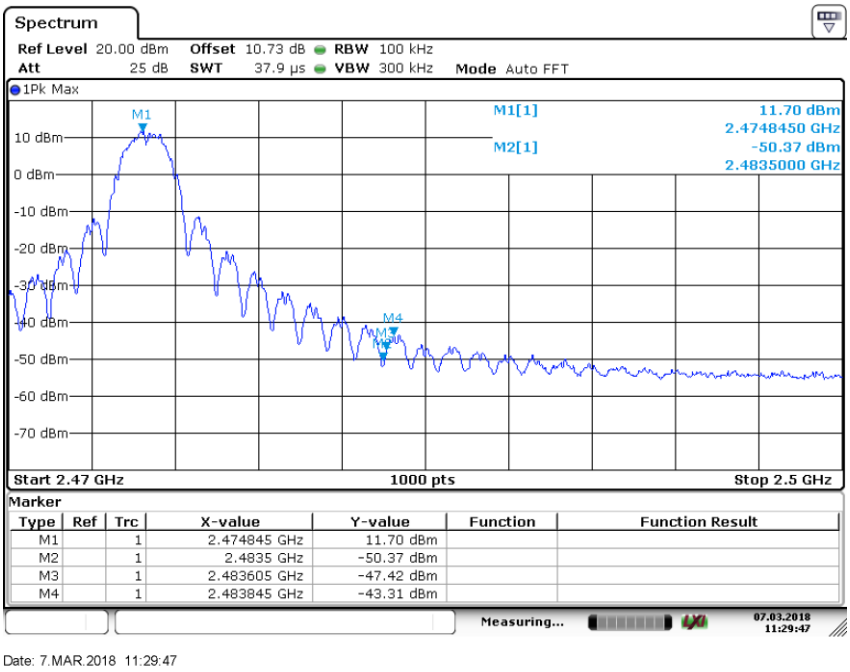
Test Graph 18: 2475 MHz Reference level

Table 10: Emissions in non- restricted frequency bands / Emission level measurement

Channel Frequency (MHz)	Value at Band Edge		Reference Value B (dBm)	Band Edge Value A~B (dB)	Limit (dB)
	Frequency (MHz)	Value A (dBm)			
2405	2400	-33.93	10.63	-44.56	-20
2475	2483.5	-50.37	11.67	-62.04	-20
	2483.8	-43.31	11.67	-54.98	-20



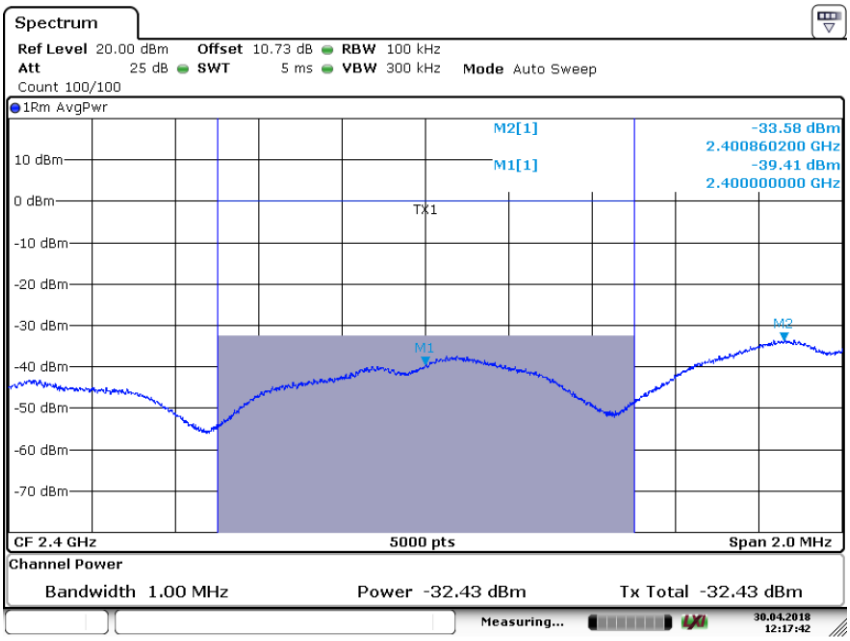
Test Graph 19: 2405 MHz Band edge level



Test Graph 20: 2475 MHz Band edge level

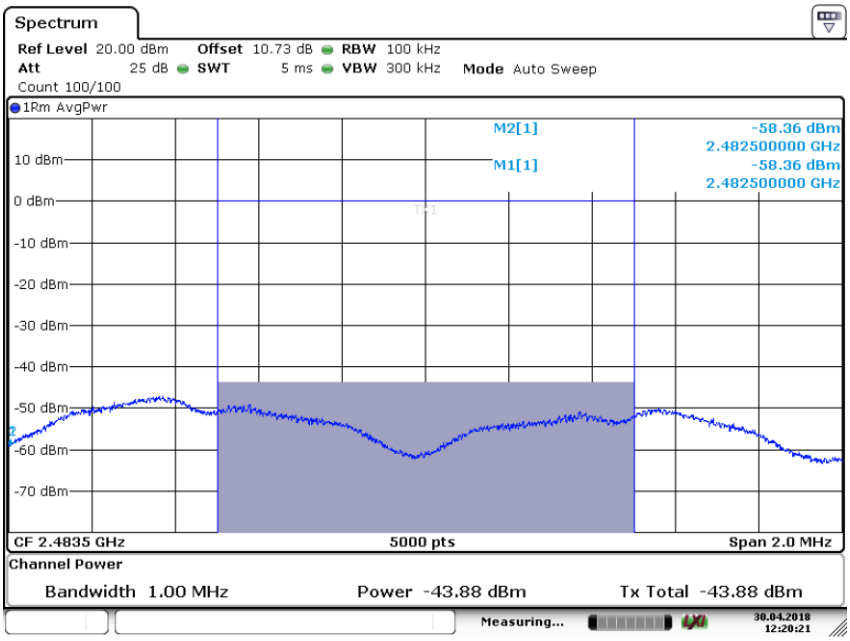
Table 11: Emissions in non- restricted frequency bands / Emission level measurement with 2 MHz span

Channel Frequency (MHz)	**Value at Band Edge**		**Limit (dB)**
	Frequency (MHz)	**Value (dBm)**	
2400	2400	-32.43	-20
2483.5	2483.5	-43.88	-20



Date: 30.APR.2018 12:17:42

Test Graph 21: 2405 MHz Band edge level with 2MHz span

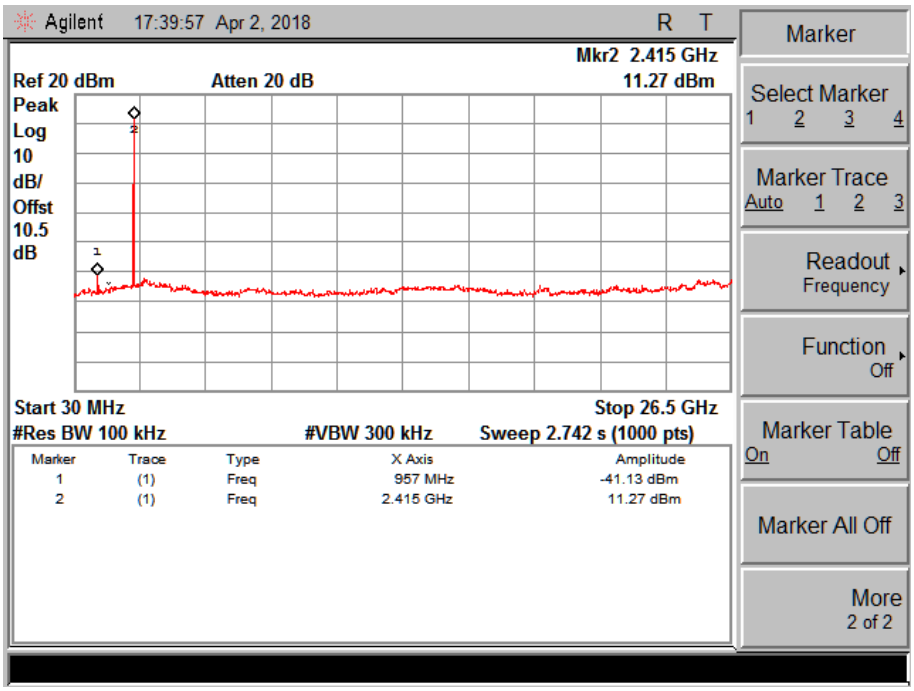


Date: 30.APR.2018 12:20:22

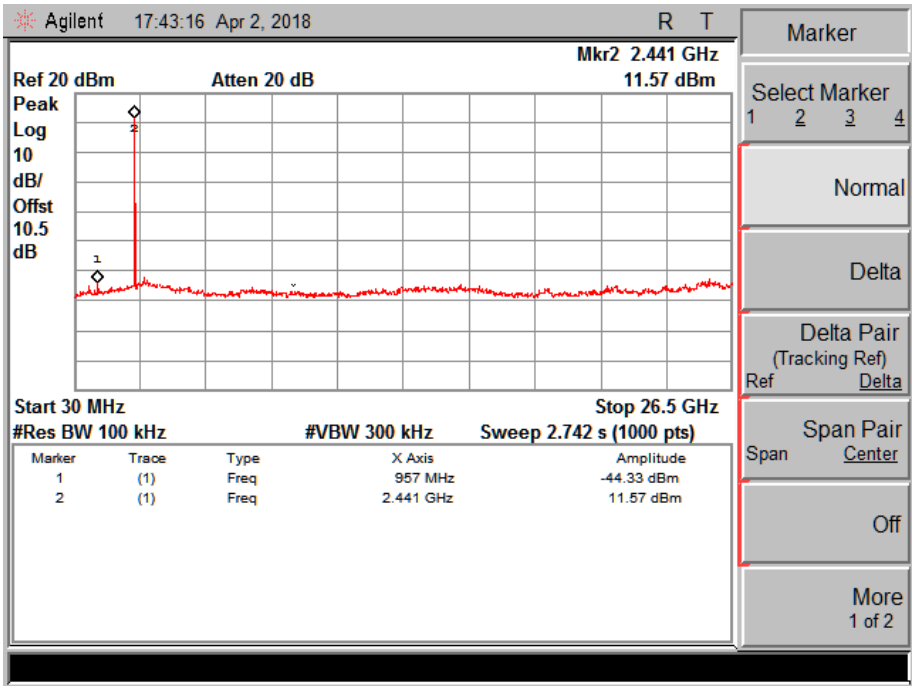
Test Graph 22: 2475 MHz Band edge level with 2MHz span

Conducted spurious emission

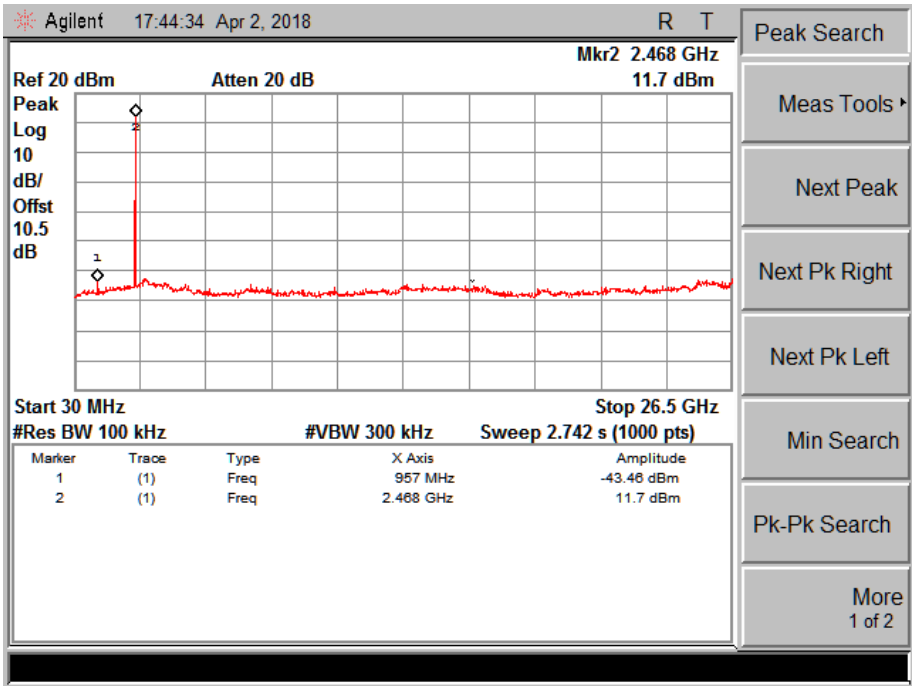
Frequency range 30 MHz to 26.5 GHz span



Test Graph 23: 2405 MHz - 30 MHz to 26.5 GHz spurious emission



Test Graph 24: 2440 MHz - 30 MHz to 26.5 GHz spurious emission



Test Graph 25: 2475 MHz – 30 MHz to 26.5 GHz spurious emission

7 RADIATED TEST METHODOLOGY

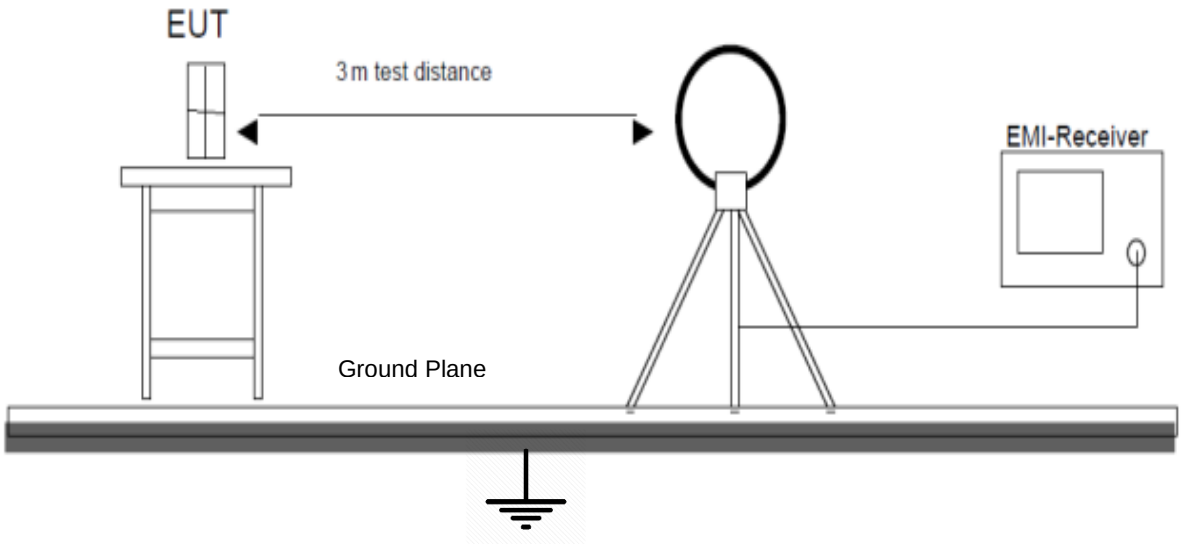
7.1 Radiated Emission Test

The radiated emission measurement was performed according to the procedures in ANSI C63.10-2013. The equipment under test (EUT) was placed at the middle of the 80 cm high turntable for below 1 GHz & 1.5 m height for above 1 GHz measurement, and the EUT is 3 meters far from the measuring antenna. The turntable was rotated 360° for obtaining the maximum emission. The height of the measuring antennas was scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained. The measurement above 1000 MHz was performed by horn antenna, the measurement below 30 MHz was performed by loop antenna, Measurement from 30 MHz to 200 MHz was performed by Baloon and Biconical Antenna, and mesurement from 200 MHz to 1000 MHz was performed by Log-Periodic Antenna

The EUT was rotated around the X-, Y-, and Z-Axis and the results from worst case axis are recorded.

7.1.1 Test Setup Configuration

Figure 1: Frequency Range 9 kHz- 30 MHz



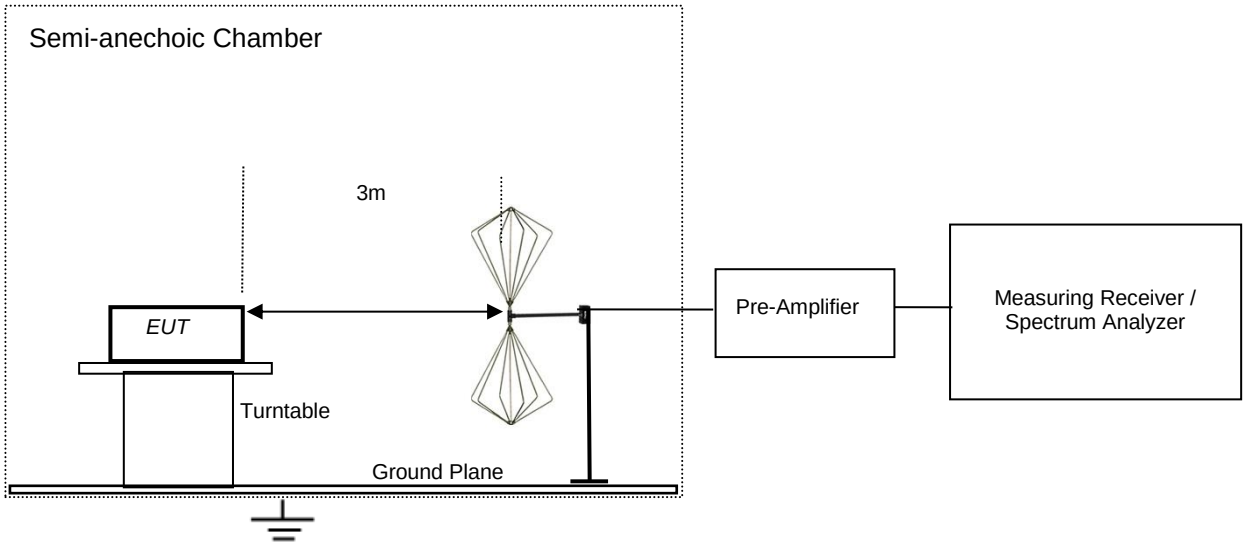


Figure 2: Frequency Range 30 MHz – 200 MHz

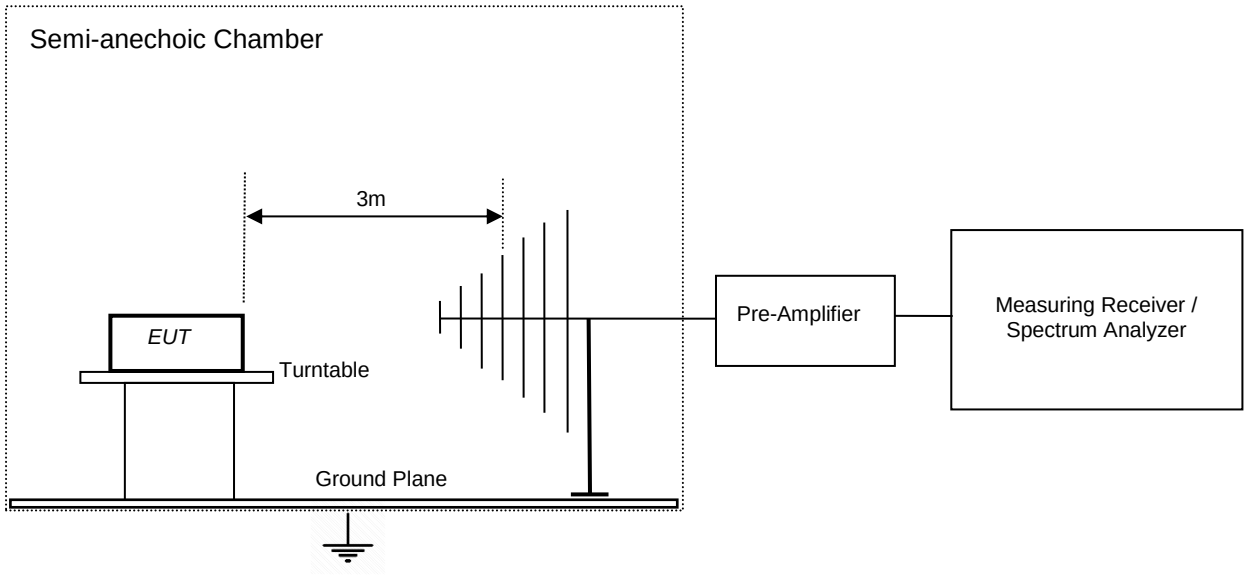


Figure 3: Frequency Range above 200 MHz – 1000 MHz

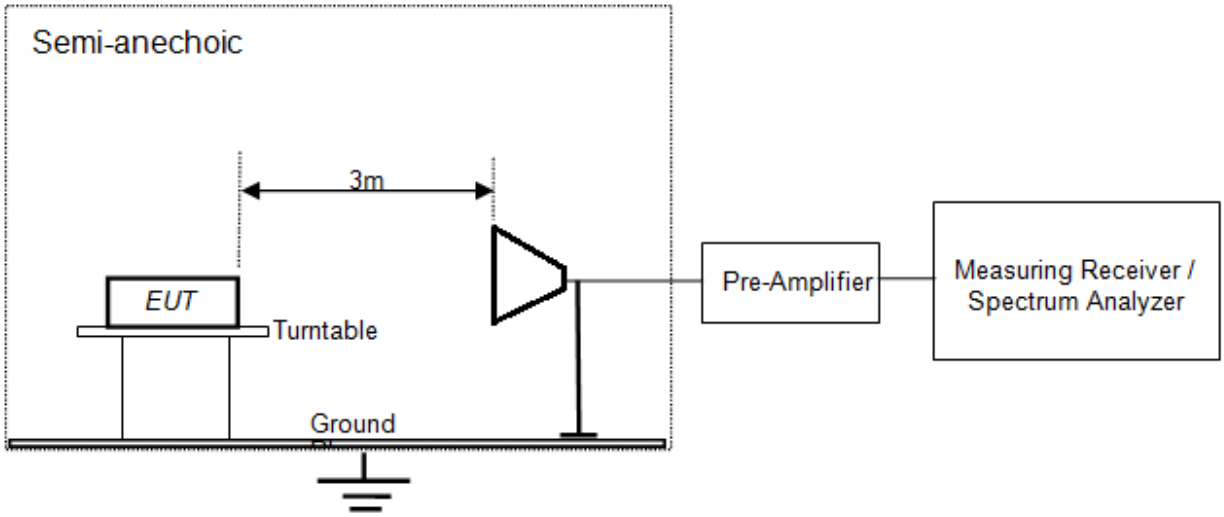


Figure 4: Frequency range above 1000 MHz

8 TEST RESULTS

8.1 Restricted bands of Emissions & Restricted Bands of Operation

Result ***Pass***

Test Specification	FCC part 15 Subpart C Section 15.247 (d) / (15.209 & 15.205) / RSS Gen 8.9 and 8.10
Test Method	ANSI C 63.10 - 2013
Measurement Location	Semi Anechoic Chamber
Measuring Distance	3 m
Detector	QP for frequency below 1 GHz, average for frequency above 1 GHz
Requirement	As per the limits mentioned in the below table

Table 12: Transmitter limits for Radiated emission of Section 15.209, RSS Gen 8.9 and 8.10.

Frequency (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Distance of Measurement (m)
0.009 – 0.490	2400/F(kHz)	48.50 – 13.80	300*
0.490 – 1.705	24000/F(kHz)	33.80 – 23.00	30*
1.705 -30	30	29.54	30*
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Remark: * The limit shows in the table above of frequency range 0.009 – 0.490, 0.490 – 1.705 MHz and 1.705-30MHz is at 300 meter, 30 meter and 30 meter range respectively, which corresponds to 128.51 – 93.80, 73.80 – 62.96 and 69.54dBµV/m at 3m range by extrapolation calculation and the measurement of loop antenna.

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz Radiated emission limits in these three bands are based on measurements employing an average detector.

Test Conditions:

Supply Voltage: 3.3V DC

Environmental conditions:

Temperature: +25.9 °C RH: 62.46 %

8.1.1 Test results for GXRM Module

No emissions found in frequency 9 kHz to 30 MHz

Frequency Range 30 MHz – 200 MHz

Table 13: Test Results for frequency range 30 MHz to 200 MHz

Polarization	Measured Frequency (MHz)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Vertical	39.265	19.6	40	-20.4
	46.4	18.7	40	-21.3
	47.34	20.21	40	-19.79
	57.59	33.46	40	-6.54
	120.03	22.48	43.5	-21.02
	148.3	25.68	43.5	-17.82
	194.45	32.28	43.5	-11.22
	198.56	33.76	43.5	-9.74
Horizontal	71.63	21.01	40	-18.99
	121.22	16.39	43.5	-27.11

Frequency Range 200 MHz – 1000 MHz

Table 14: Test Resutls for frequency range 200 MHz to 1 GHz

Polarization	Measured Frequency (MHz)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Vertical	875.28	34.14	46	-11.86
	884	36.33	46	-9.67
	956.08	40.02	46	-5.98
Horizontal	884	35.23	46	-10.77
	956.6	36.75	46	-9.25

Frequency range above 1 GHz to 26.5 GHz

Table 15: Test results for Antenna -2 dBi and 16 dBm power level

Polarization	Operating Frequency (MHz)	Measured Frequency (MHz)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Vertical	2405.00	2316.5 (Pk)	63.79	74.00	-10.21
		2316.5 (Av)	44.44	54.00	-9.56
		2390 (Pk)	49.23	74.00	-24.77
		2390 (Av)	40.65	54.00	-13.35
		2405 (Pk)	118.21	-	*
		2405 (Av)	114.72	-	*
		4810 (Pk)	55.10	74.00	-18.90
		4810 (Av)	46.04	54.00	-7.96
		7215 (Pk)	59.30	74.00	-14.70
		7215 (Av)	49.25	54.00	-4.75
Horizontal		2365.5 (Pk)	60.02	74.00	-13.98
		2365.5 (Av)	41.76	54.00	-12.24
		2390 (Pk)	46.92	74.00	-27.08
		2390 (Av)	37.94	54.00	-16.06
		2405 (Pk)	110.37	-	*
		2405 (Av)	106.98	-	*
		4810 (Pk)	53.89	74.00	-20.11
		4810 (Av)	44.42	54.00	-9.58
		7215 (Pk)	59.41	74.00	-14.59
		7215 (Av)	48.21	54.00	-5.79
Vertical	2440.00	2440 (Pk)	115.28	-	*
		2440 (Av)	111.97	-	*
		4880 (Pk)	54.94	74.00	-19.06
		4880 (Av)	45.30	54.00	-8.70
		7320 (Pk)	61.50	74.00	-12.50
		7320 (Av)	52.18	54.00	-1.82
Horizontal		2440 (Pk)	111.07	-	*
		2440 (Av)	107.70	-	*
		4880 (Pk)	55.10	74.00	-18.90
		4880 (Av)	45.56	54.00	-8.44
		7320 (Pk)	60.54	74.00	-13.46
		7320 (Av)	50.10	54.00	-3.90

* - Fundamental frequency

Vertical	2475.00	2483.5 (Pk)	61.89	74.00	-12.11
		2483.5 (Av)	52.07	54.00	-1.93
		2475 (Pk)	115.75	-	*
		2475 (Av)	112.45	-	*
		4950 (Pk)	54.15	74.00	-19.85
		4950 (Av)	44.78	54.00	-9.22
		7425 (Pk)	62.03	74.00	-11.97
		7425 (Av)	52.27	54.00	-1.73
Horizontal		2483.5 (Pk)	57.16	74.00	-16.84
		2483.5 (Av)	47.20	54.00	-6.80
		2475 (Pk)	115.38	-	*
		2475 (Av)	111.94	-	*
		4950 (Pk)	52.75	74.00	-21.25
		4950 (Av)	42.88	54.00	-11.12
		7425 (Pk)	61.23	74.00	-12.77
		7425 (Av)	50.07	54.00	-3.93

* - Fundamental frequency

Table 16: Test results for Antenna 2 dBi and 16 dBm power level

Polarization	**Operating Frequency (MHz)**	**Measured Frequency (MHz)**	**Field Strength (dBµV/m)**	**Limit (dBµV/m)**	**Margin (dB)**
Vertical	2405.00	2390 (Pk)	47.83	74.00	-26.17
		2390 (Av)	38.38	54.00	-15.62
		2405 (Pk)	112.40	-	*
		2405 (Av)	108.92	-	*
		4810 (Pk)	56.21	74.00	-17.79
		4810 (Av)	46.24	54.00	-7.76
		7215 (Pk)	62.13	74.00	-11.87
		7215 (Av)	48.41	54.00	-5.59
Horizontal		2390 (Pk)	43.05	74.00	-30.95
		2390 (Av)	32.35	54.00	-21.65
		2405 (Pk)	104.40	-	*
		2405 (Av)	101.00	-	*
		4810 (Pk)	56.98	74.00	-17.02
		4810 (Av)	47.29	54.00	-6.71
		7215 (Pk)	61.82	74.00	-12.18
		7215 (Av)	48.37	54.00	-5.63

* - Fundamental frequency

Vertical	2440.00	2440 (Pk)	110.85	-	*
		2440 (Av)	107.52	-	*
		4880 (Pk)	56.69	74.00	-17.31
		4880 (Av)	46.95	54.00	-7.05
		7320 (Pk)	62.83	74.00	-11.17
		7320 (Av)	48.72	54.00	-5.28
Horizontal		2440 (Pk)	104.38	-	*
		2440 (Av)	100.99	-	*
		4880 (Pk)	57.18	74.00	-16.82
		4880 (Av)	48.15	54.00	-5.85
		7320 (Pk)	62.08	74.00	-11.92
		7320 (Av)	48.65	54.00	-5.35
Vertical	2475.00	2483.5 (Pk)	61.81	74.00	-12.19
		2483.5 (Av)	52.37	54.00	-1.63
		2475 (Pk)	114.29	-	*
		2475 (Av)	110.99	-	*
		4950 (Pk)	56.89	74.00	-17.11
		4950 (Av)	46.99	54.00	-7.01
		7425 (Pk)	62.76	74.00	-11.24
		7425 (Av)	49.25	54.00	-4.75
Horizontal		2483.5 (Pk)	52.87	74.00	-21.13
		2483.5 (Av)	48.29	54.00	-5.71
		2475 (Pk)	106.97	-	*
		2475 (Av)	103.61	-	*
		4950 (Pk)	57.01	74.00	-16.99
		4950 (Av)	48.12	54.00	-5.88
		7425 (Pk)	63.00	74.00	-11.00
		7425 (Av)	49.23	54.00	-4.77

* - Fundamental frequency

Table 17: Test Results for Antenna 4 dBi (EM-B14503-MMP-Z6) and 14 dBm power level

Polarization	Operating Frequency (MHz)	Measured Frequency (MHz)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Vertical	2405.00	2390 (Pk)	47.77	74.00	-26.23
		2390 (Av)	37.30	54.00	-16.70
		2405 (Pk)	110.65	-	*
		2405 (Av)	107.25	-	*
		4810 (Pk)	53.84	74.00	-20.16
		4810 (Av)	42.18	54.00	-11.82
		7215 (Pk)	61.66	74.00	-12.34
		7215 (Av)	48.09	54.00	-5.91
Horizontal		2390 (Pk)	43.03	74.00	-30.97
		2390 (Av)	33.11	54.00	-20.89
		2405 (Pk)	103.97	-	*
		2405 (Av)	100.71	-	*
		4810 (Pk)	54.32	74.00	-19.68
		4810 (Av)	43.58	54.00	-10.42
		7215 (Pk)	61.52	74.00	-12.48
		7215 (Av)	48.11	54.00	-5.89
Vertical	2440.00	2440 (Pk)	111.55	-	*
		2440 (Av)	108.15	-	*
		4880 (Pk)	54.95	74.00	-19.05
		4880 (Av)	44.19	54.00	-9.81
		7320 (Pk)	62.33	74.00	-11.67
		7320 (Av)	48.56	54.00	-5.44
Horizontal		2440 (Pk)	104.86	-	*
		2440 (Av)	101.42	-	*
		4880 (Pk)	55.01	74.00	-18.99
		4880 (Av)	44.94	54.00	-9.06
		7320 (Pk)	62.89	74.00	-11.11
		7320 (Av)	48.58	54.00	-5.42

* - Fundamental frequency

Vertical	2475.00	2483.5 (Pk)	60.04	74.00	-13.96
		2483.5 (Av)	50.77	54.00	-3.23
		2475 (Pk)	113.03	-	*
		2475 (Av)	109.61	-	*
		4950 (Pk)	55.31	74.00	-18.69
		4950 (Av)	44.55	54.00	-9.45
Horizontal		7425 (Pk)	62.85	74.00	-11.15
		7425 (Av)	49.87	54.00	-4.13
		2483.5 (Pk)	54.79	74.00	-19.21
		2483.5 (Av)	44.89	54.00	-9.11
		2475 (Pk)	107.33	-	*
		2475 (Av)	103.96	-	*
		4950 (Pk)	55.97	74.00	-18.03
		4950 (Av)	45.03	54.00	-8.97
		7425 (Pk)	63.02	74.00	-10.98
		7425 (Av)	49.29	54.00	-4.71

* - Fundamental frequency

Table 18: Test Results for Antenna 4 dBi (HGV- 2404U) and 14 dBm Power level

Polarization	**Operating Frequency (MHz)**	**Measured Frequency (MHz)**	**Field Strength (dBµV/m)**	**Limit (dBµV/m)**	**Margin (dB)**
Vertical	2405.00	2390 (Pk)	46.65	74.00	-27.35
		2390 (Av)	38.21	54.00	-15.79
		2405 (Pk)	109.53	-	*
		2405 (Av)	108.16	-	*
		4810 (Pk)	52.72	74.00	-21.28
		4810 (Av)	43.09	54.00	-10.91
		7215 (Pk)	60.54	74.00	-13.46
		7215 (Av)	49.00	54.00	-5.00
Horizontal		2390 (Pk)	41.91	74.00	-32.09
		2390 (Av)	34.02	54.00	-19.98
		2405 (Pk)	102.85	-	*
		2405 (Av)	101.62	-	*
		4810 (Pk)	53.20	74.00	-20.80
		4810 (Av)	44.49	54.00	-9.51
		7215 (Pk)	60.40	74.00	-13.60
		7215 (Av)	49.02	54.00	-4.98

* - Fundamental frequency

Vertical	2440.00	2440 (Pk)	110.43	-	*
		2440 (Av)	109.06	-	*
		4880 (Pk)	53.83	74.00	-20.17
		4880 (Av)	45.10	54.00	-8.90
		7320 (Pk)	61.21	74.00	-12.79
		7320 (Av)	49.47	54.00	-4.53
Horizontal		2440 (Pk)	103.74	-	*
		2440 (Av)	102.33	-	*
		4880 (Pk)	53.89	74.00	-20.11
		4880 (Av)	45.85	54.00	-8.15
		7320 (Pk)	61.77	74.00	-12.23
		7320 (Av)	49.49	54.00	-4.51
Vertical	2475.00	2483.5 (Pk)	58.92	74.00	-15.08
		2483.5 (Av)	51.68	54.00	-2.32
		2475 (Pk)	111.91	-	*
		2475 (Av)	110.52	-	*
		4950 (Pk)	54.19	74.00	-19.81
		4950 (Av)	45.46	54.00	-8.54
Horizontal		7425 (Pk)	61.73	74.00	-12.27
		7425 (Av)	50.78	54.00	-3.22
		2483.5 (Pk)	53.67	74.00	-20.33
		2483.5 (Av)	45.80	54.00	-8.20
		2475 (Pk)	106.21	-	*
		2475 (Av)	104.87	-	*
		4950 (Pk)	54.85	74.00	-19.15
		4950 (Av)	45.94	54.00	-8.06
		7425 (Pk)	61.90	74.00	-12.10
		7425 (Av)	50.20	54.00	-3.80

* - Fundamental frequency

Table 19: Test Results for Antenna 8 dBi and 10 dBm power level

Polarization	Operating Frequency (MHz)	Measured Frequency (MHz)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Vertical	2405.00	2390 (Pk)	46.59	74.00	-27.41
		2390 (Av)	36.50	54.00	-17.50
		2405 (Pk)	109.50	-	*
		2405 (Av)	106.21	-	*
		4810 (Pk)	52.71	74.00	-21.29
		4810 (Av)	42.62	54.00	-11.38
		7215 (Pk)	58.05	74.00	-23.23
		7215 (Av)	44.31	54.00	-14.43
Horizontal		2390 (Pk)	39.83	74.00	-34.17
		2390 (Av)	28.34	54.00	-25.66
		2405 (Pk)	94.95	-	*
		2405 (Av)	91.64	-	*
		4810 (Pk)	50.77	74.00	-23.23
		4810 (Av)	39.57	54.00	-14.43
		7215 (Av)	44.31	54.00	-9.69
Vertical	2440.00	2440 (Pk)	110.33	-	*
		2440 (Av)	106.89	-	*
		4880 (Pk)	53.41	74.00	-20.59
		4880 (Av)	42.92	54.00	-11.08
		7320 (Pk)	58.71	74.00	-15.29
		7320 (Av)	44.91	54.00	-9.09
Horizontal		2440 (Pk)	95.98	-	*
		2440 (Av)	95.28	-	*
		4880 (Pk)	51.19	74.00	-22.81
		4880 (Av)	37.38	54.00	-16.62
		7320 (Pk)	58.89	74.00	-15.11
		7320 (Av)	44.83	54.00	-9.17

* - Fundamental frequency

Vertical	2475.00	2483.5 (Pk)	61.33	74.00	-12.67
		2483.5 (Av)	51.87	54.00	-2.13
		2475 (Pk)	114.16	-	*
		2475 (Av)	110.79	-	*
		4950 (Pk)	51.63	74.00	-22.37
		4950 (Av)	40.22	54.00	-13.78
		7425 (Pk)	59.09	74.00	-14.91
		7425 (Av)	45.09	54.00	-8.91
Horizontal		2483.5 (Pk)	47.01	74.00	-26.99
		2483.5 (Av)	37.08	54.00	-16.92
		2475 (Pk)	98.35	-	*
		2475 (Av)	94.99	-	*
		4950 (Pk)	50.94	74.00	-23.06
		4950 (Av)	37.96	54.00	-16.04
		7425 (Pk)	59.20	74.00	-14.80
		7425 (Av)	45.40	54.00	-8.60

* - Fundamental frequency

Table 20: Test Results for Antenna 14 dBi and 6 dBm power level

Polarization	**Operating Frequency (MHz)**	**Measured Frequency (MHz)**	**Field Strength (dBµV/m)**	**Limit (dBµV/m)**	**Margin (dB)**
Vertical	2405.00	2390 (Pk)	45.87	74.00	-28.13
		2390 (Av)	35.78	54.00	-18.22
		2405 (Pk)	110.83	-	*
		2405 (Av)	107.84	-	*
		4810 (Pk)	51.99	74.00	-22.01
		4810 (Av)	41.90	54.00	-12.10
		7215 (Pk)	57.33	74.00	-23.65
		7215 (Av)	43.59	54.00	-16.86
Horizontal		2390 (Pk)	59.84	74.00	-29.70
		2390 (Av)	41.86	54.00	-12.14
		2405 (Pk)	96.94	-	*
		2405 (Av)	93.46	-	*
		4810 (Pk)	50.35	74.00	-23.65
		4810 (Av)	37.14	54.00	-16.86
		7215 (Pk)	58.09	74.00	-15.91
		7215 (Av)	44.30	54.00	-9.70

* - Fundamental frequency

Vertical	2440.00	2440 (Pk)	111.73	-	*
		2440 (Av)	108.44	-	*
		4880 (Pk)	55.57	74.00	-18.43
		4880 (Av)	42.89	54.00	-11.11
		7320 (Pk)	60.81	74.00	-13.19
		7320 (Av)	48.19	54.00	-5.81
Horizontal		2440 (Pk)	99.84	-	*
		2440 (Av)	96.66	-	*
		4880 (Pk)	56.15	74.00	-17.85
		4880 (Av)	43.57	54.00	-10.43
		7320 (Pk)	61.39	74.00	-12.61
		7320 (Av)	48.87	54.00	-5.13
Vertical	2475.00	2483.5 (Pk)	58.86	74.00	-15.14
		2483.5 (Av)	49.44	54.00	-4.56
		2475 (Pk)	112.59	-	*
		2475 (Av)	109.20	-	*
		4950 (Pk)	55.53	74.00	-18.47
		4950 (Av)	44.64	54.00	-9.36
		7425 (Pk)	62.96	74.00	-11.04
		7425 (Av)	49.14	54.00	-4.86
Horizontal		2483.5 (Pk)	50.17	74.00	-23.83
		2483.5 (Av)	39.48	54.00	-14.52
		2475 (Pk)	100.70	-	*
		2475 (Av)	97.42	-	*
		4950 (Pk)	56.16	74.00	-17.84
		4950 (Av)	44.26	54.00	-9.74
		7425 (Pk)	61.88	74.00	-12.12
		7425 (Av)	49.43	54.00	-4.57

* - Fundamental frequency

Note: Field Strength = Measured Field Strength + Antenna Factor + Cable loss – Preamp Gain

9 LIST OF TABLES

10 LIST OF FIGURES

11 List of Test graphs

*****END OF TEST REPORT*****