



FCC LISTED, REGISTRATION
NUMBER: 2764.01

Test report No:

ISED LISTED REGISTRATION
NUMBER: 23595-1

02205ERM.004

Test report

USA FCC Part 15.247, 15.209

CANADA RSS-247, RSS-Gen

Radio Frequency Devices. Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz.

Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices.

General Requirements and Information for the Certification of Radio Apparatus.

Identification of item tested.....:	Bluetooth Low-Energy Proximity Beacon with Accelerometer
Trademark	--
Model and /or type reference	EMBC22
Other identification of the product	FCC ID: 2ACQR-EMBC22 IC: 12155A-EMBC22
Final HW version	V1.5
Final SW version	V00 5A.00.00.01.00.00
Features	The EMBC22 is a high-performance, customizable Bluetooth low energy proximity beacon with an accelerometer for tracking objects that move. Coin-shape housing. Includes Bluetooth IC EM9304.
Manufacturer	EM MICROELECTRONIC – US INC. 5475 Mark Dabling Blvd, Suite 200 Colorado Springs, CO 80918
Test method requested, standard.....:	USA FCC Part 15.247, 10-1-17 Edition: Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. USA FCC Part 15.209, 10-1-17 Edition: Radiated emission limits; general requirements. USA FCC Part 15.207, 10-1-17 Edition: Conducted emission limits; general requirements. CANADA RSS-247 Issue 2 (February 2017). CANADA RSS-Gen Issue 4 (November 2014). Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 558074 D01 DTS Meas Guidance v04 dated 05/04/2017. ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Domingo Galvez EMC & RF Lab. Manager
Date of issue.....	07/18/2018
Report template No.....	FDT08_20

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Competences and guarantees

DEKRA Certification Inc. is a testing laboratory accredited by A2LA (The American Association for Laboratory Accreditation), to perform the tests indicated in the Certificate 2764.01.

DEKRA Certification Inc. is a laboratory with a measurement facility in compliance with the requirements of Section 2.948 of the FCC rules and has been added to the list of facilities whose measurements data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Registration Number: 2764.01.

DEKRA Certification Inc. is a laboratory with a measurement site in compliance with the requirements of RSS 212, Issue 1 (Provisional) and has been added to the list of filed sites of the Canadian Certification and Engineering Bureau. Reference File Number:23595-1.

In order to assure the traceability to other national and international laboratories, DEKRA Certification Inc. has a calibration and maintenance program for its measurement equipment.

DEKRA Certification Inc. Guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Certification Inc. at the time of performance of the test.

DEKRA Certification Inc. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA Certification Inc.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Certification Inc. and the Accreditation Bodies.

Uncertainty

Uncertainty (factor $k=2$) was calculated according to the DEKRA Certification Inc. internal document PODT000.

Usage of samples

Samples undergoing test have been selected by: **the client**

Sample S/01 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
2205/1	Bluetooth Low-Energy Proximity Beacon with Accelerometer (Tunned to Channel 00)	EMBC22	S1	06/27/2018
2205/2	Bluetooth Low-Energy Proximity Beacon with Accelerometer(Tunned to Channel 19)	EMBC22	S5	06/27/2018
2205/3	Bluetooth Low-Energy Proximity Beacon with Accelerometer(Tunned to Channel 39)	EMBC22	S6	06/27/2018

1. Sample S/01 has undergone following test(s).
All Conducted tests indicated in appendix A.

Sample S/02 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
2205/15	Bluetooth Low-Energy Proximity Beacon with Accelerometer (Tunned to Channel 00)	EMBC22	S15	06/27/2018
2205/19	Bluetooth Low-Energy Proximity Beacon with Accelerometer (Tunned to Channel 39)	EMBC22	S19	06/27/2018
2205/17	Bluetooth Low-Energy Proximity Beacon with Accelerometer (Tuned to Channel 19)	EMBC22	S17	06/27/2018

1. Sample S/02 has undergone following test(s).
All Radiated tests indicated in appendix A.

Test sample description

The EMBC22 is a high-performance, customizable Bluetooth low energy proximity beacon with an accelerometer for tracking objects that move. Similar to the EMBC02, the EMBC22 comes in simple, easy to use coin-shape housing, and is now powered by the EM9304, the world's lowest power Bluetooth IC.

Identification of the client

Em Microelectronic – US Inc
5475 Mark Dabling Blvd, Suite 200
Colorado Springs, CO 80918

Testing period

The performed test started on 2018-06-28 and finished on 2018-07-03
The tests have been performed at DEKRA Certification, Inc.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

Remarks and comments

- 1; The tests have been performed by the technical personnel: Divya Adusumilli, Nasir Khan and Emad Parker.
2: Used instrumentation:

Conducted Measurements

Test system Rohde & Schwarz TS 8997:

Control No.	Description	Last Cal. Date	Cal. Due date
1039.	Signal analyzer Rohde & Schwarz FSV40	2017/03	2019/03
1040	Switch unit Rohde & Schwarz with power detector OSP120 / OSP-B157	2017/03	2019/03
1041	RF generator Rohde & Schwarz SMB100A	2017/04	2019/04
1042	RF generator Rohde & Schwarz SMBV100A	2018/01	2019/01
0101	Climatic chamber Espec	2017/12	2018/12
1027	R&S TS8997 ERM TESTSYSTEM SYSTEM SOFTWARE V9.12	N/A	N/A

Radiated Measurements

Control No.	Description	Last Cal. date	Cal. due date
1179	Semi anechoic Absorber Lined Chamber Frankonia SAC 3 plus "L"	N/A	N/A
1065	BiconicalLog antenna ETS LINDGREN 3142E	2017/03	2020/03
1058	Double-ridge Waveguide Horn antenna 1-18 GHz	2017/03	2019/03
1014	Spectrum analyzer Rohde & Schwarz FSV40	2017/03	2019/03
1056	Double Ridge Horn Antenna 18 – 40 GHz	2016/12	2018/12
0980	RF pre-amplifier 30 MHz-6 GHz Bonn Elektronik BLMA 0360-01N	2017/05	2019/05
0981.	RF pre-amplifier 1-18 GHz Bonn Elektronik BLMA 0118-2A	2017/05	2019/05
0982	RF Pre-amplifier 18-40 GHz Bonn Elektronik BLMA1840-1M	2017/05	2019/05
1015, 1017, 1019, 1020	Rohde & Schwarz EMC32 software	N/A	N/A

3. All tests are performed in Worst case scenario

Testing verdicts

Not applicable	N/A
Pass	P
Fail	F
Not measured	N/M

1. BTLE

FCC PART 15 PARAGRAPH / RSS-247		VERDICT			
		NA	P	F	NM
Section 15.247 Subclause (a) (2) / RSS-247 5.2. (a)	6 dB Bandwidth		P		
Section 15.247 Subclause (b) / RSS-247 5.4. (d)	Maximum output power and antenna gain		P		
Section 15.247 Subclause (d) / RSS-247 5.5.	Emission limitations conducted (Transmitter)		P		
Section 15.247 Subclause (d) / RSS-247 5.5.	Band-edge emissions compliance (Transmitter)		P		
Section 15.247 Subclause (e) / RSS-247 5.2. (b)	Power spectral density		P		
Section 15.247 Subclause (d) / RSS-247 5.5.	Emission limitations radiated (Transmitter)		P		

Appendix A – Test result (Bluetooth Low Energy)

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TEST CONDITIONS

Power supply (V):

$$V_{\text{nominal}} = 3.3 \text{ Vdc}$$

Type of power supply = DC voltage from internal battery.

Type of antenna = Integral antenna

Declared Gain for antenna (maximum) = +1.5 dBi

Temperature (°C):

$$T_n = +15 \text{ to } +35$$

$$T_{\text{min}} = -20 (*)$$

$$T_{\text{max}} = +60 (*)$$

The subscript n indicates normal test conditions.

The subscripts min and max indicates extreme test conditions (minimum and maximum respectively).

(*): Declared by applicant.

TEST FREQUENCIES:

Lowest channel: 2402 MHz

Middle channel: 2440 MHz

Highest channel: 2480 MHz

CONDUCTED MEASUREMENTS

The equipment under test was set up in a shielded room and it is directly connected to the Test System TS8997.

RADIATED MEASUREMENTS

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m for the frequency range 30 MHz-1000 MHz (30 MHz-1000 MHz Bilog antenna) and at a distance of 1m for the frequency range 1 GHz-25 GHz (1 GHz-18 GHz Double ridge horn antenna and 18 GHz-40 GHz horn antenna).

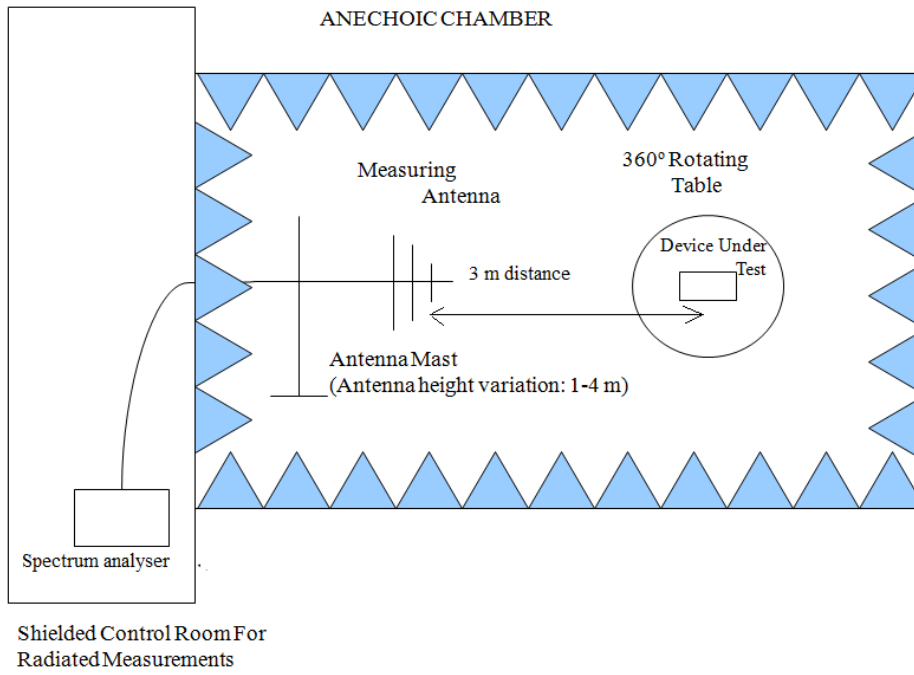
For radiated emissions in the range 1 GHz-25 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

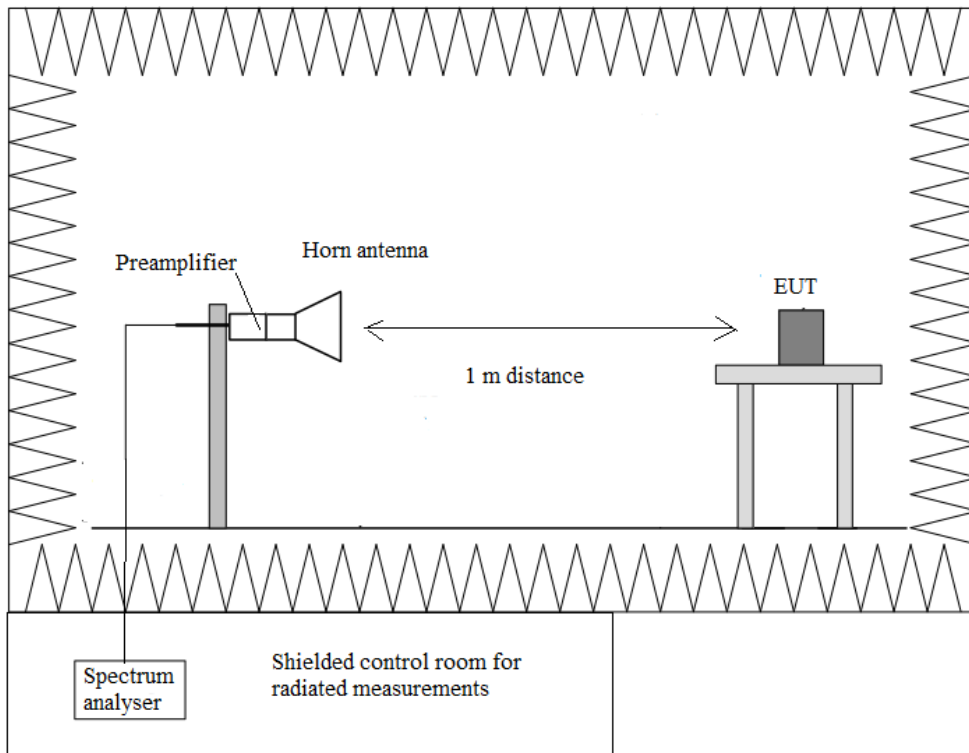
Measurements were made in both horizontal and vertical planes of polarization.

The test was performed with the equipment transmitting first with only the BTLE radio The results and plots below show the worst results obtained.

Radiated measurements setup $f < 1$ GHz



Radiated measurements setup $f > 1$ GHz



Occupied Bandwidth

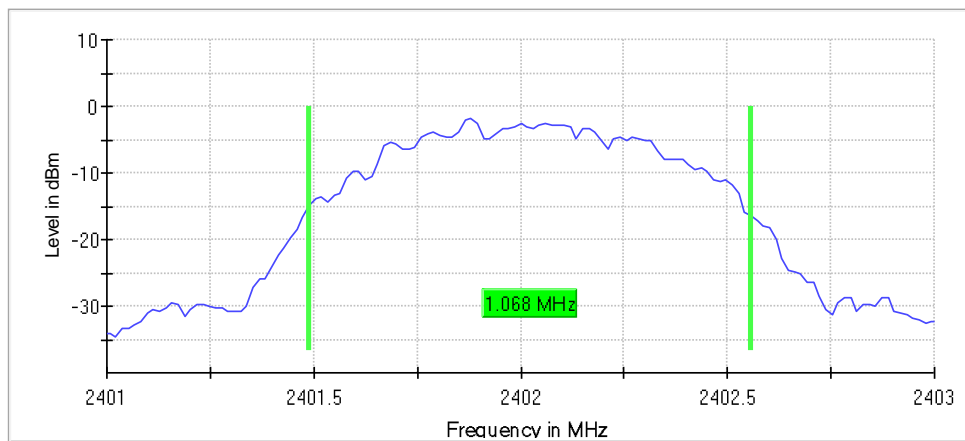
RESULTS

BTLE 1Mb

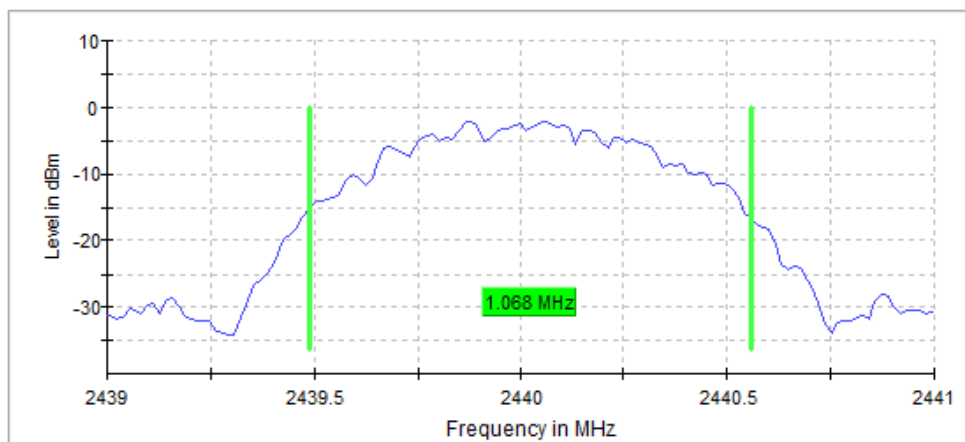
(see next plots).

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
20 dB bandwidth (MHz)	1.218	1.218	1.233
99% bandwidth (MHz)	1.068	1.068	1.068
Measurement uncertainty (kHz)	<± 8.33		

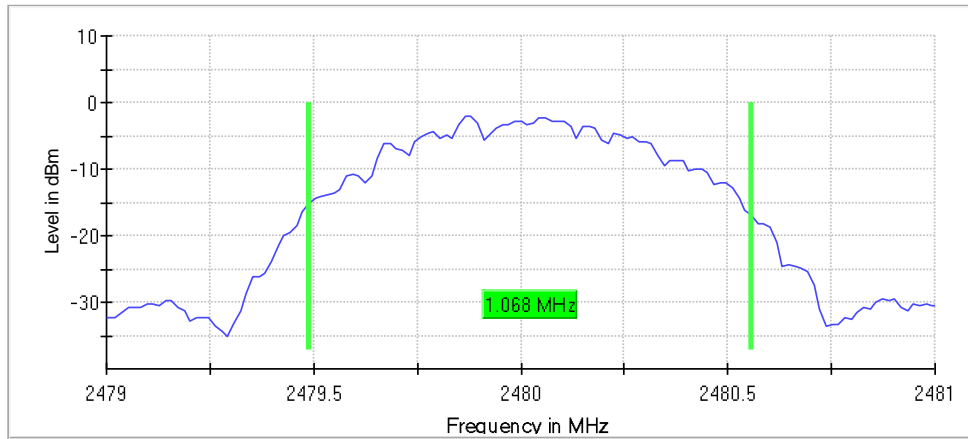
Lowest Channel (99% Bandwidth)



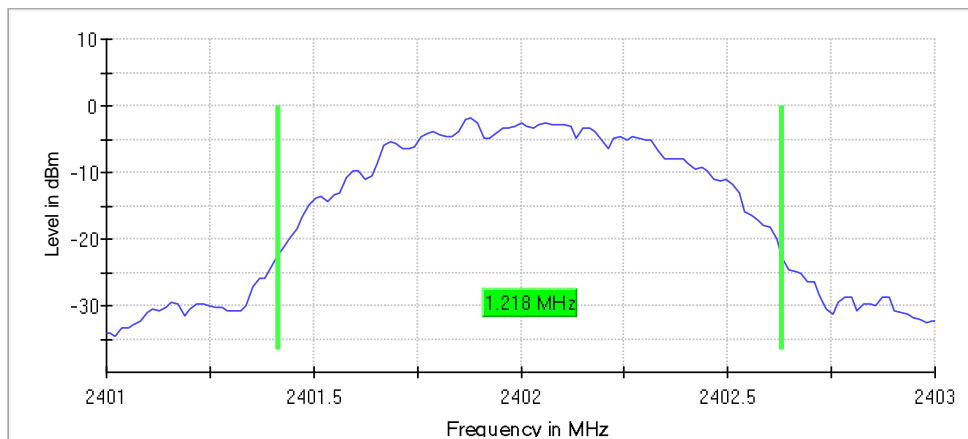
Middle Channel (99% Bandwidth)



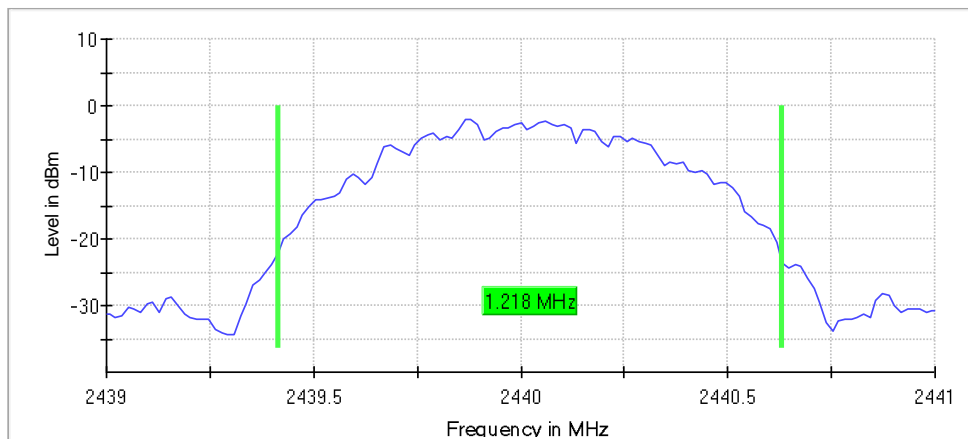
Highest channel (99% Bandwidth)



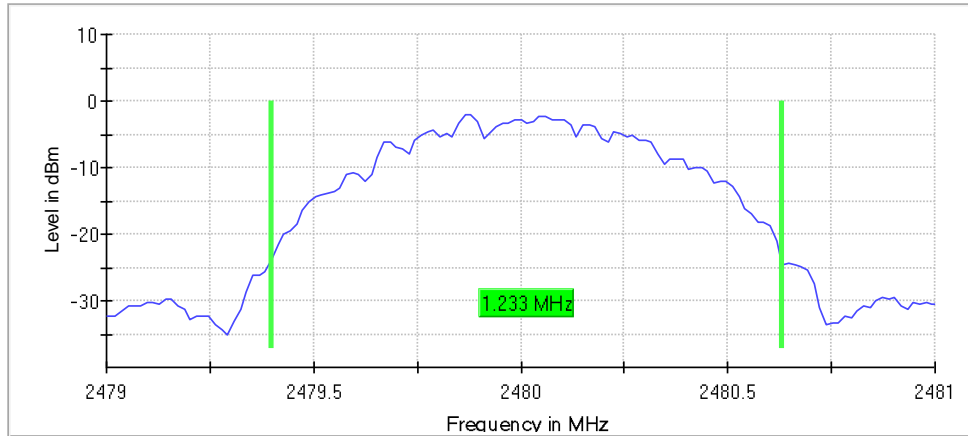
Lowest Channel (20dB Bandwidth)



Middle Channel (20dB Bandwidth)



Highest channel (20dB Bandwidth)



Measurement settings

Setting	Instrument Value
Span	2.000 MHz
RBW	30.000 kHz
VBW	100.000 kHz
SweepPoints	133
Sweeptime	63.123 μ s
Reference Level	10.000 dBm
Attenuation	30.000 dB
Detector	MaxPeak
SweepCount	100
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.50 dB
Run	6 / max. 150
Stable	5 / 5
Max Stable Difference	0.01 dB

Section 15.247 Subclause (a) (2) / RSS-247 5.2. (a). 6 dB Bandwidth

SPECIFICATION

The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

BTLE 1Mb

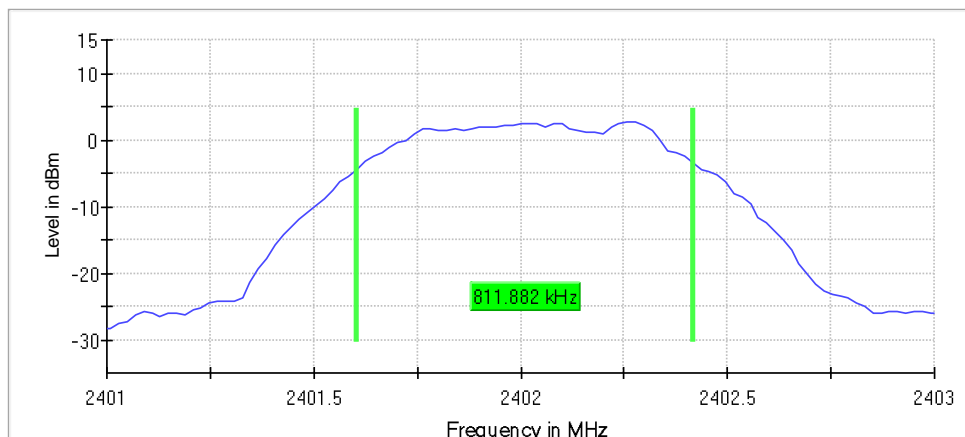
6 dB Bandwidth (see next plots).

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
6 dB Spectrum bandwidth (kHz)	811.882	792.080	792.080
Measurement uncertainty (kHz)	<±20.0		

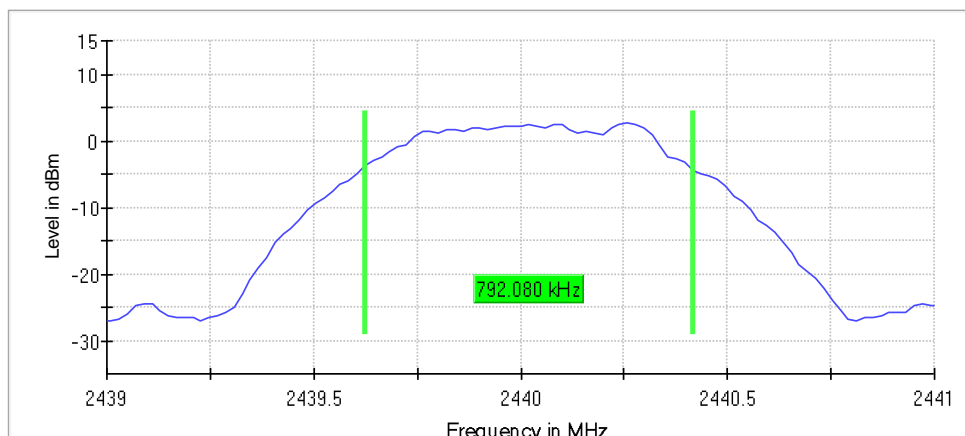
Verdict: PASS

6 dB BANDWIDTH.

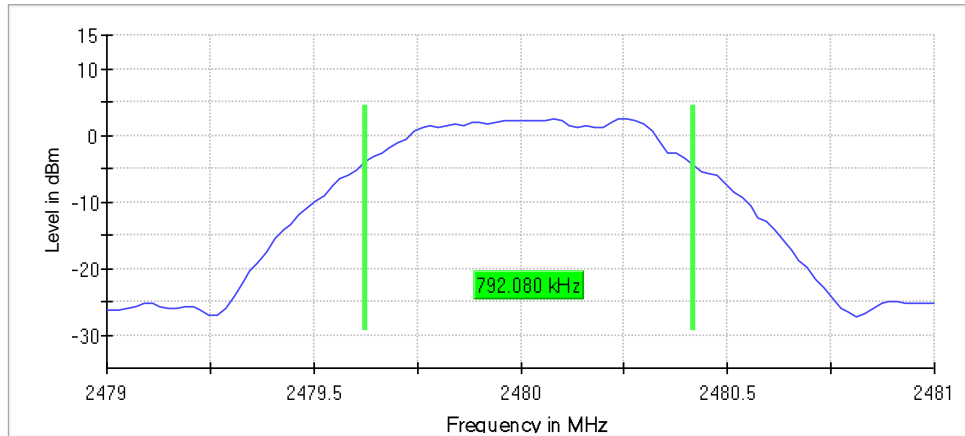
Lowest Channel



Middle Channel



Highest Channel



Measurement settings

Setting	Instrument Value
Span	2.000 MHz
RBW	100.000 kHz
VBW	300.000 kHz
SweepPoints	101
Sweeptime	18.938 μ s
Reference Level	10.000 dBm
Attenuation	30.000 dB
Detector	MaxPeak
SweepCount	100
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.50 dB
Run	7 / max. 150
Stable	5 / 5
Max Stable Difference	0.09 dB

Section 15.247 Subclause (b) / RSS-247 5.4. (d). Maximum output power and antenna gain

SPECIFICATION

For systems using digital modulation in the 2400-2483.5 MHz band: 1 watt (30 dBm).
The e.i.r.p. shall not exceed 4 W (36 dBm) (Canada).

RESULTS

The maximum peak conducted output power was measured using the method according to point 9.1.1. of Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 558074 D01 DTS Meas Guidance v04 dated 05/04/2017.

The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power.

Maximum declared antenna gain: +1.5 dBi.

BTLE 1Mb

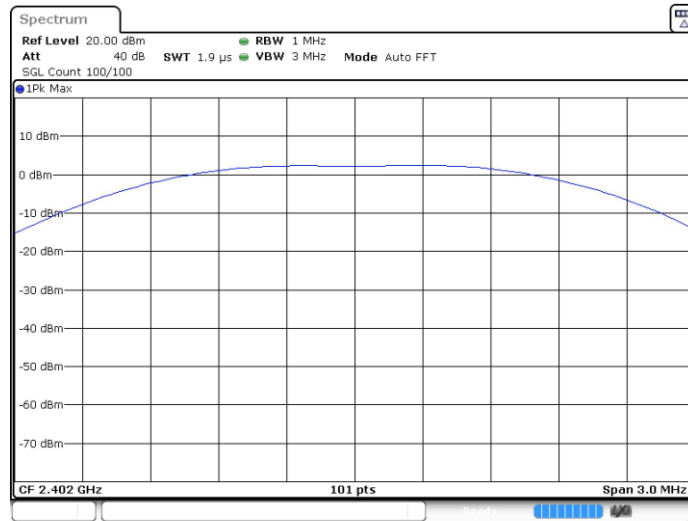
	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
Maximum Conducted Power (dBm)	4.5	4.2	4.2
Maximum EIRP power (dBm)	6	5.7	5.7
Measurement uncertainty (dB)	<±0.78		

The maximum directional gain of the antenna is less than 6 dBi and therefore the maximum output power is not required to be reduced from the stated values.

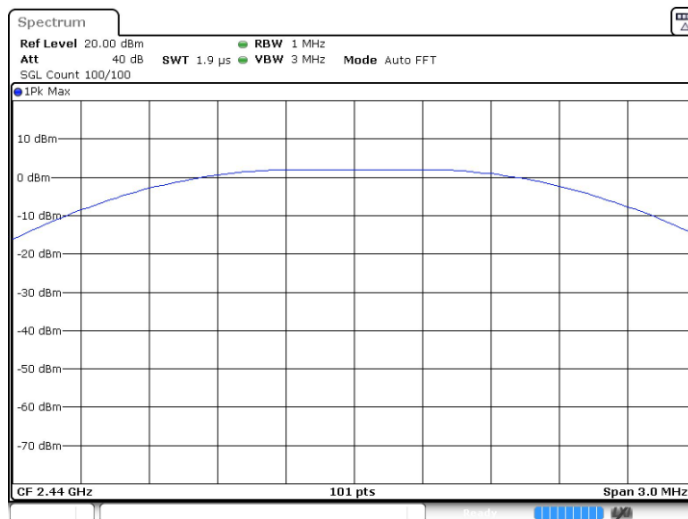
Verdict: PASS

MAXIMUM CONDUCTED POWER

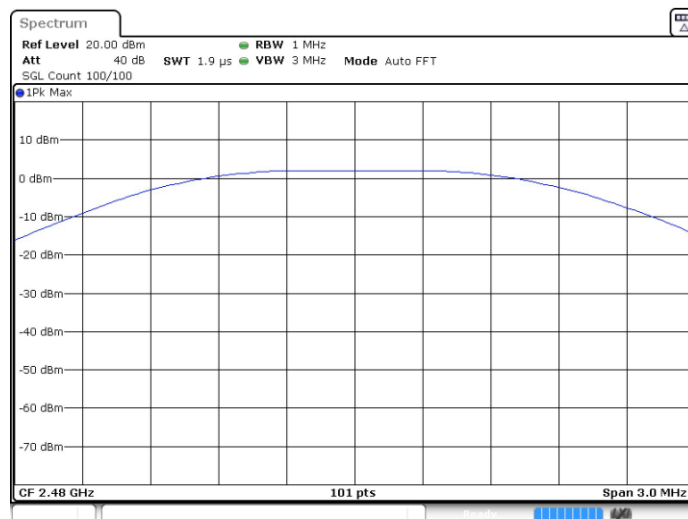
Low Frequency



Middle frequency



Highest frequency



Section 15.247 Subclause (d) / RSS-247 5.5. Emission limitations conducted (Transmitter)

SPECIFICATION

In any 100 kHz bandwidth outside the frequency band in which the digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB instead of 20 dB.

RESULTS:

BTLE 1Mb

Reference Level Measurement

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
Reference Level Measurement (dBm)	2.557	2.838	2.841
Measurement uncertainty (dB)	<±0.78		

Lowest frequency 2402 MHz:

Frequency (GHz)	Emission limitations conducted (dBm)	Limit (dBm)
2395.75	-45.4	-17.4
2396.25	-44.5	-17.4
2397.25	-42.7	-17.4
2398.25	-39.8	-17.4
2399.25	-35.4	-17.4
4803.25	-39.3	-17.4
4804.25	-38.5	-17.4
4805.75	-43.5	-17.4

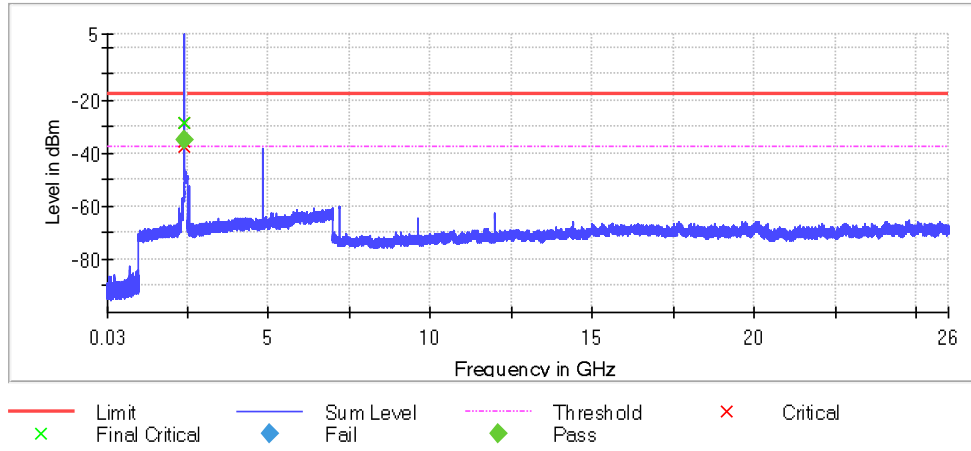
Middle frequency 2440 MHz:

Frequency (GHz)	Emission limitations conducted (dBm)	Limit (dBm)
2391.75	-54.3	-17.2
2392.25	-54.1	-17.2
2392.75	-53.2	-17.2
2583.75	-52.1	-17.2
2584.25	-51.8	-17.2
2584.75	-51.9	-17.2
4878.75	-47.7	-17.2
4879.75	-39.4	-17.2
4880.75	-39.4	-17.2
4881.25	-39.8	-17.2
4881.75	-44.5	-17.2

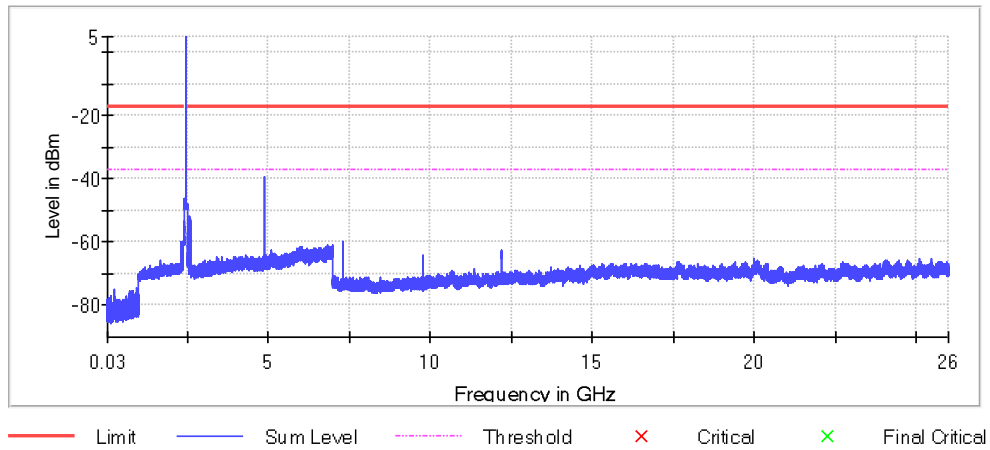
Highest frequency 2480 MHz:

Frequency (GHz)	Emission limitations conducted (dBm)	Limit (dBm)
2483.75	-30.6	-17.2
2484.25	-34.1	-17.2
2484.75	-34.7	-17.2
2485.75	-38.5	-17.2
2486.25	-38.6	-17.2
2486.75	-39.6	-17.2
2487.25	-40.5	-17.2
4959.25	-39.3	-17.2
4959.75	-38.1	-17.2
4960.25	-38	-17.2
4961.25	-38.3	-17.2

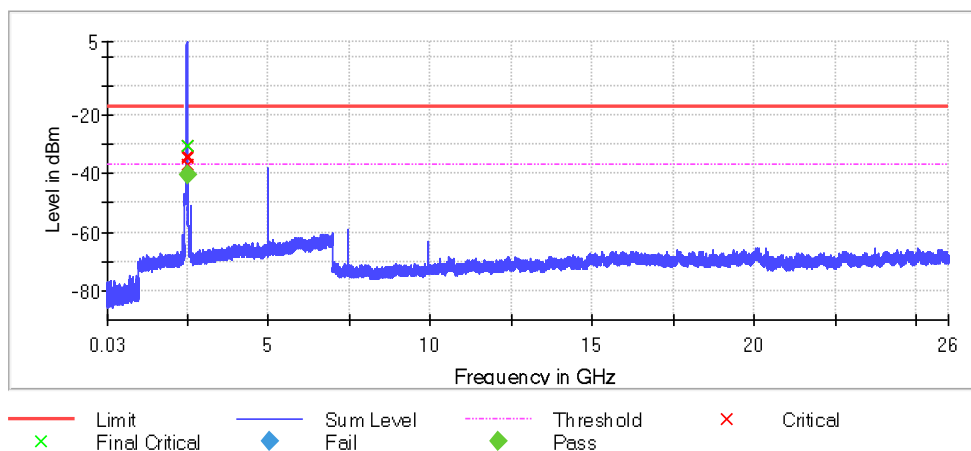
Lowest frequency 2402 MHz:



Middle frequency 2440 MHz:



Highest frequency 2480 MHz:



Measurement Settings

Setting	Instrument Value	Instrument Value	Instrument Value	Instrument Value	Instrument Value	Instrument Value
z	30.000 MHz	1.000 GHz	2.4000 GHz	2.4835 GHz	7.000 GHz	18.000 GHz
Stop Frequency	1.000 GHz	2.400 GHz	2.4835 GHz	7.000 GHz	18.000 GHz	26.000 GHz
RBW	100.000 kHz	1.000 MHz	100.000 kHz	100.000 kHz	100.000 kHz	100.000 kHz
VBW	300.000 kHz	3.000 MHz	300.000 kHz	300.000 kHz	300.000 kHz	300.000 kHz
Sweep Points	19400	2800	2800	2800	2800	2800
Sweep time	1.061 ms	2.800 ms	2.800 ms	2.800 ms	2.800 ms	2.800 ms
Reference Level	-30.000 dBm	-20.000 dBm	-20.000 dBm	-20.000 dBm	-20.000 dBm	-20.000 dBm
Attenuation	0.000 dB	10.000 dB	10.000 dB	10.000 dB	10.000 dB	10.000 dB
Detector	MaxPeak	MaxPeak	MaxPeak	MaxPeak	MaxPeak	MaxPeak
Sweep Count	30	30	30	30	30	30
Filter	3 dB	3 dB	3 dB	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold	Max Hold	Max Hold	Max Hold
Sweep type	FFT	Sweep	Sweep	Sweep	Sweep	Sweep
Preamp	off	off	off	off	off	off
Stable mode	Trace	Trace	Trace	Trace	Trace	Trace
Stable value	0.50 dB	0.50 dB	0.50 dB	0.50 dB	0.50 dB	0.50 dB
Run	4 / max. 150	5 / max. 150	5 / max. 150	5 / max. 150	5 / max. 150	5 / max. 150
Stable	3 / 3	3 / 3	3 / 3	3 / 3	3 / 3	3 / 3
Max Stable Difference	0.00 dB	0.00 dB	0.00 dB	0.00 dB	0.00 dB	0.00 dB

Section 15.247 Subclause (d) / RSS-247 5.5. Band-edge emissions compliance (Transmitter)

SPECIFICATION

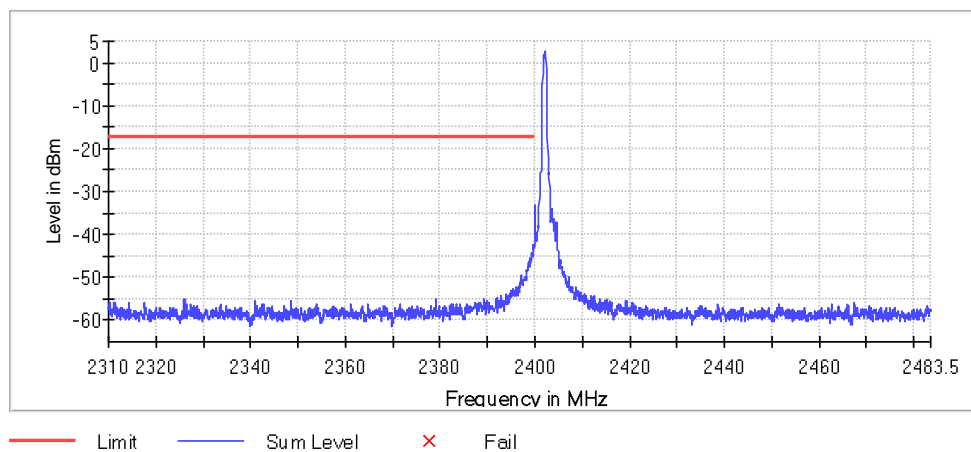
In any 100 kHz bandwidth outside the frequency band in which the digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB instead of 20 dB.

RESULTS:

BTLE 1Mb

1. LOW FREQUENCY SECTION. CONDUCTED.

See next plot.

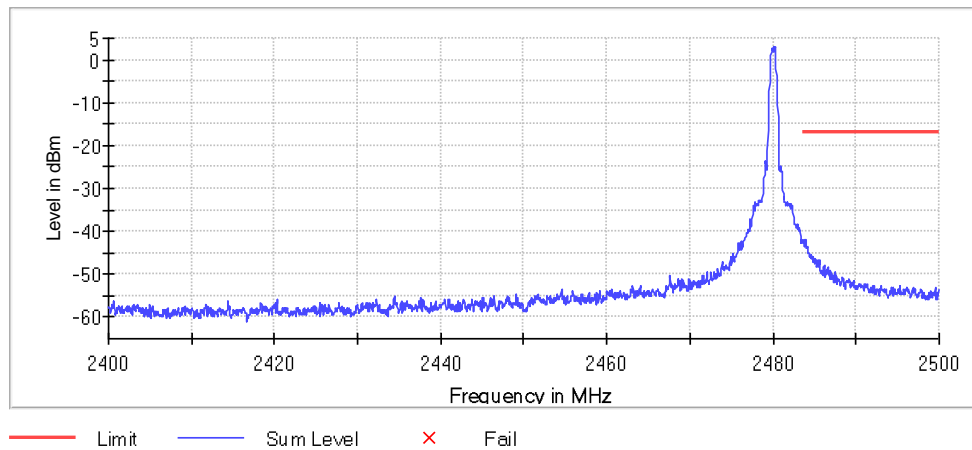


Measurement settings

Setting	Instrument Value	Instrument Value
Start Frequency	2.31000 GHz	2.31000 GHz
Stop Frequency	2.40000 GHz	2.40000 GHz
Span	90.000 MHz	90.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
Sweep Points	1800	~ 1800
Sweep time	113.672 μ s	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
Sweep Count	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweep type	FFT	AUTO
Preamp	off	off
Stable mode	Trace	Trace
Stable value	0.50 dB	0.50 dB
Run	5 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

2. HIGH FREQUENCY SECTION. CONDUCTED.

See next plot.



Measurement settings

Setting	Instrument Value	Instrument Value
Start Frequency	2.40000 GHz	2.48350 GHz
Stop Frequency	2.48350 GHz	2.50000 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
Sweep Points	1670	~ 1670
Sweep time	94.727 μ s	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
Sweep Count	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweep type	FFT	AUTO
Preamp	off	off
Stable mode	Trace	Trace
Stable value	0.50 dB	0.50 dB
Run	5 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.04 dB	0.50 dB

Measurement uncertainty (dB)	< \pm 2.03
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Verdict: PASS

Section 15.247 Subclause (e) / RSS-247 5.2. (b) Power spectral density

SPECIFICATION

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

RESULTS

The maximum power spectral density level in the fundamental emission was measured using the method PKPSD (Peak PSD) according to point 10.2. of Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 558074 D01 DTS Meas Guidance v04 dated 05/04/2017.

Power spectral density (see next plots).

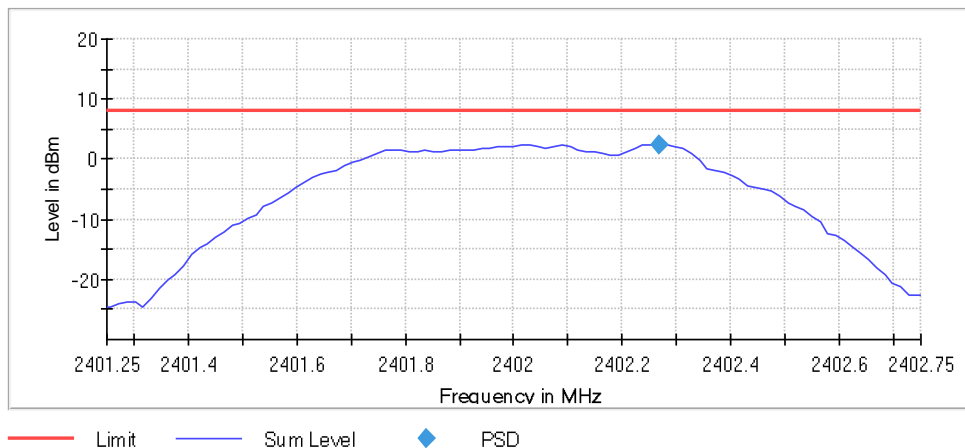
BTLE 1Mb

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
Power spectral density (dBm)	2.497	2.448	2.355
Measurement uncertainty (dB)	<±0.78		

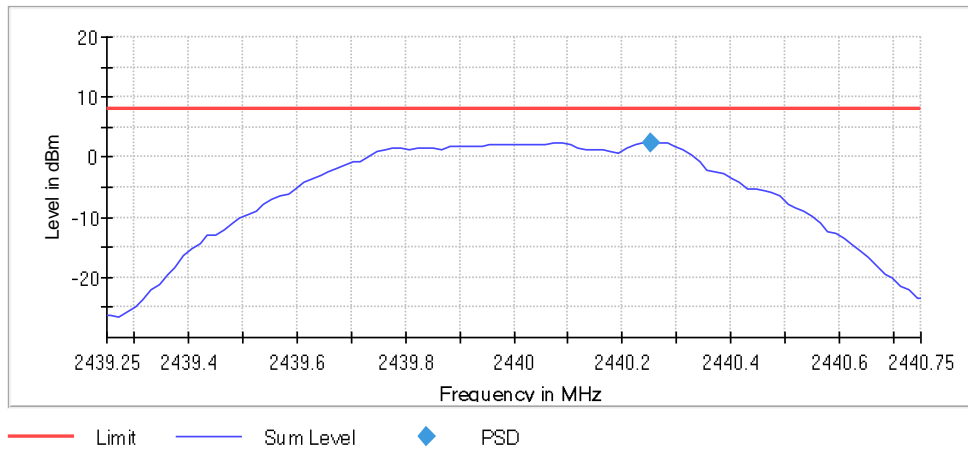
Verdict: PASS

POWER SPECTRAL DENSITY

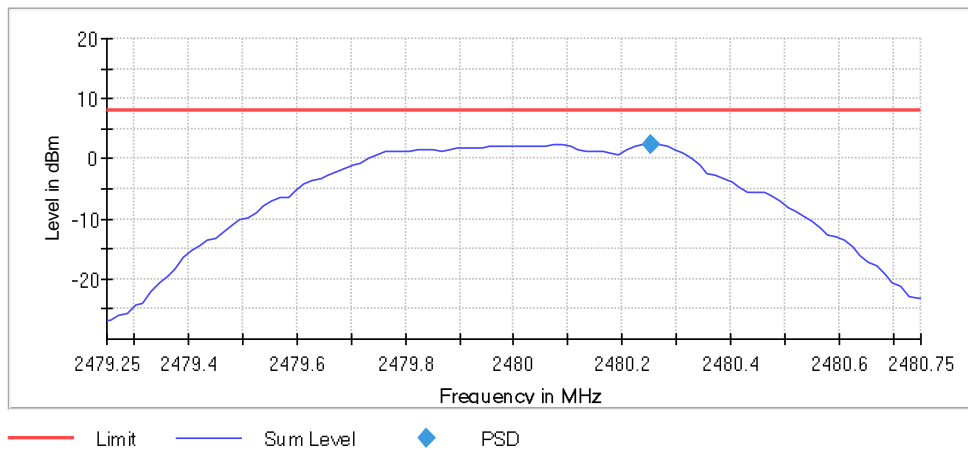
Lowest Channel



Middle Channel



Highest Channel



Measurement settings

Setting	Instrument Value
Start Frequency	2.40125 GHz
Stop Frequency	2.40275 GHz
Span	1.500 MHz
RBW	100.000 kHz
VBW	300.000 kHz
SweepPoints	101
Sweptime	1.000 ms
Reference Level	5.000 dBm
Attenuation	20.000 dB
Detector	MaxPeak
SweepCount	100
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	Sweep
Preamp	off
Stablemode	Trace
Stablevalue	0.50 dB
Run	3 / max. 150
Stable	2 / 2
Max Stable Difference	0.20 dB

Section 15.247 Subclause (d) / RSS-247 5.5. Emission limitations radiated (Transmitter)

SPECIFICATION

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c) / RSS-Gen):

Frequency Range (MHz)	Field strength ($\mu\text{V}/\text{m}$)	Field strength ($\text{dB}\mu\text{V}/\text{m}$)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 25000	500	54	3

The emission limits shown in the above table are based on measurements employing 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.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

RSS-247. Attenuation below the general field strength limits specified in RSS-Gen is not required.

RESULTS:

BTLE 1Mb

The situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

All tests were performed in a semi-anechoic chamber at a distance of 3 m for the frequency range 30 MHz-1000 MHz and at distance of 1m for the frequency range 1 GHz-25 GHz.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

Frequency range 30 MHz-1000 MHz.

The spurious signals detected do not depend on the operating channel.

No radiated spurious signals were detected at less than 20 dB respect to the limit for the lowest, middle and highest operating channels.

Frequency range 1 GHz-25 GHz

The results in the next tables show the maximum measured levels in the 1-25 GHz range.

Here, No Spurious Signals were detected in the restricted bands 2.31-2.39 GHz, 2.4835-2.5 GHz, and 4.5-5.15 GHz (see plots for the worst polarization shown below).

Spurious signals with peak levels above the average limit (54 dB μ V/m at 3 m) are measured with average detector for checking compliance with the average limit.

1. CHANNEL: LOWEST (2402 MHz).

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dB μ V/m)	Measurement Uncertainty (dB)
4803.000000	V	Peak	51.6	± 4.87
		Average	44.8	± 4.87
7207.000000	V	Peak	45.2	± 4.87
		Average	38.0	± 4.87

2. CHANNEL: MIDDLE (2440 MHz).

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dB μ V/m)	Measurement Uncertainty (dB)
4879.500000	H	Peak	49.3	± 4.87
		Average	44.6	± 4.87
7320.500000	H	Peak	45.6	± 4.87
		Average	37.6	± 4.87

3. CHANNEL: HIGHEST (2480 MHz).

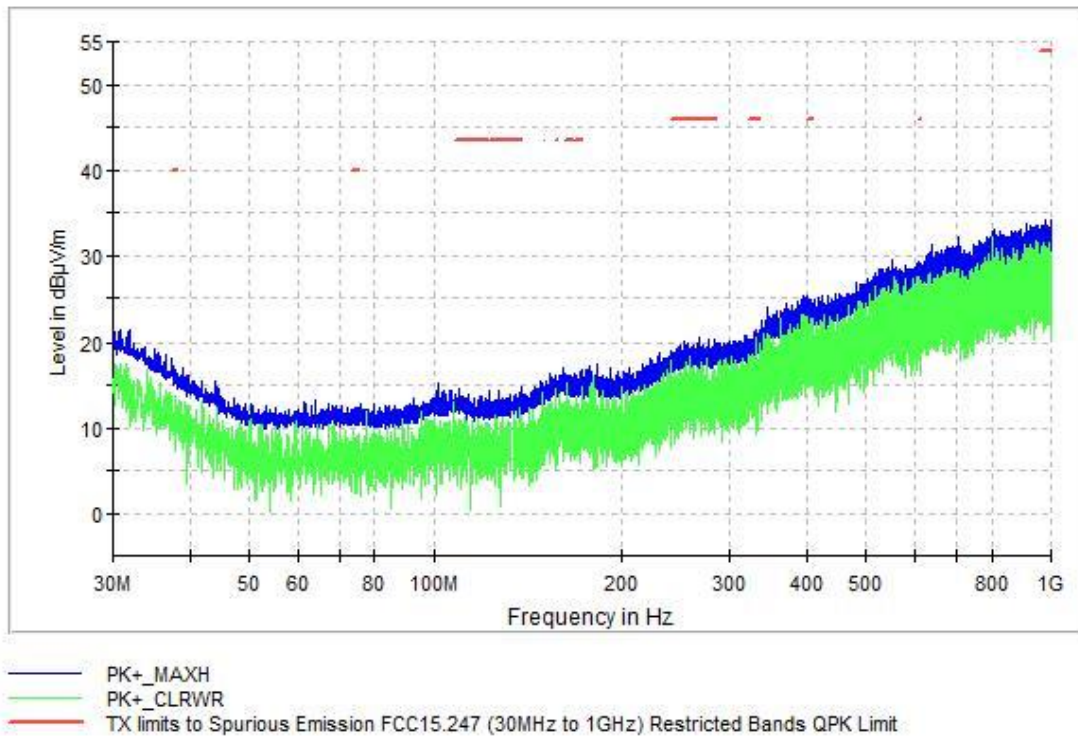
Spurious frequency (GHz)	Polarization	Detector	Emission Level (dB μ V/m)	Measurement Uncertainty (dB)
4959.500000	H	Peak	50.4	± 4.87
		Average	45.4	± 4.87
7440.000000	H	Peak	42.7	± 4.87
		Average	33.5	± 4.87

Verdict: PASS

FREQUENCY RANGE 30 MHz-1000 MHz

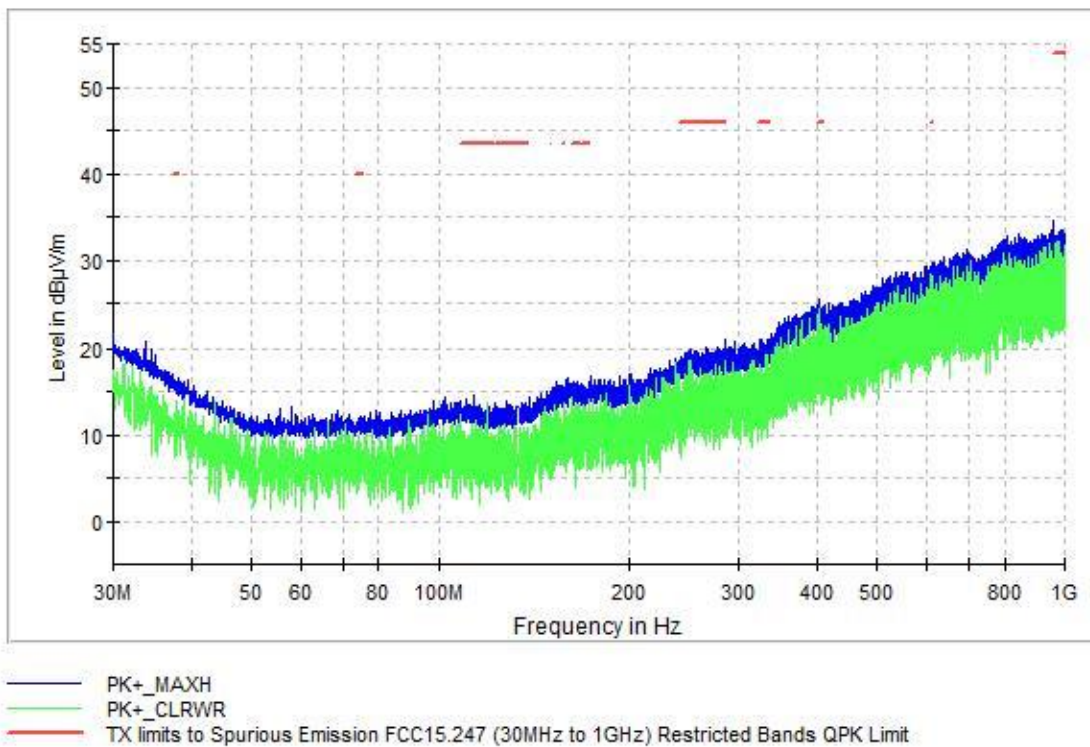
CHANNEL: Lowest (2402 MHz)

RF_FCC_15.247_E Field_30MHz_1GHz



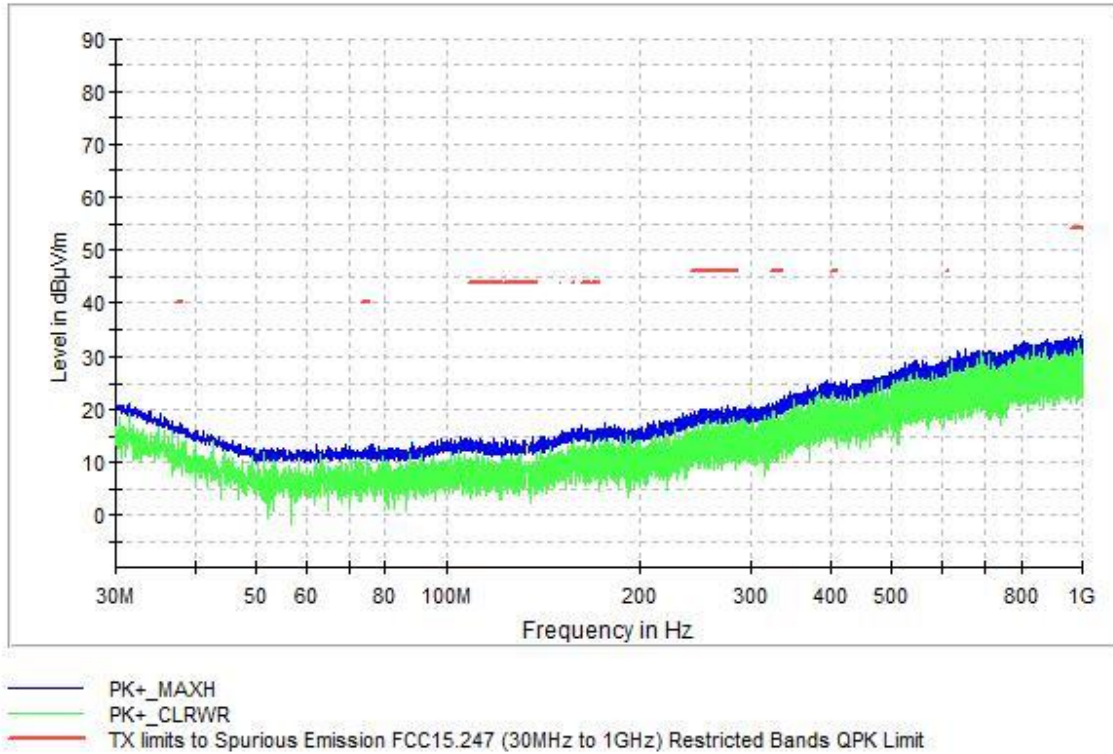
CHANNEL: Middle (2440 MHz)

RF_FCC_15.247_E Field_30MHz_1GHz



CHANNEL: Highest (2480 MHz)

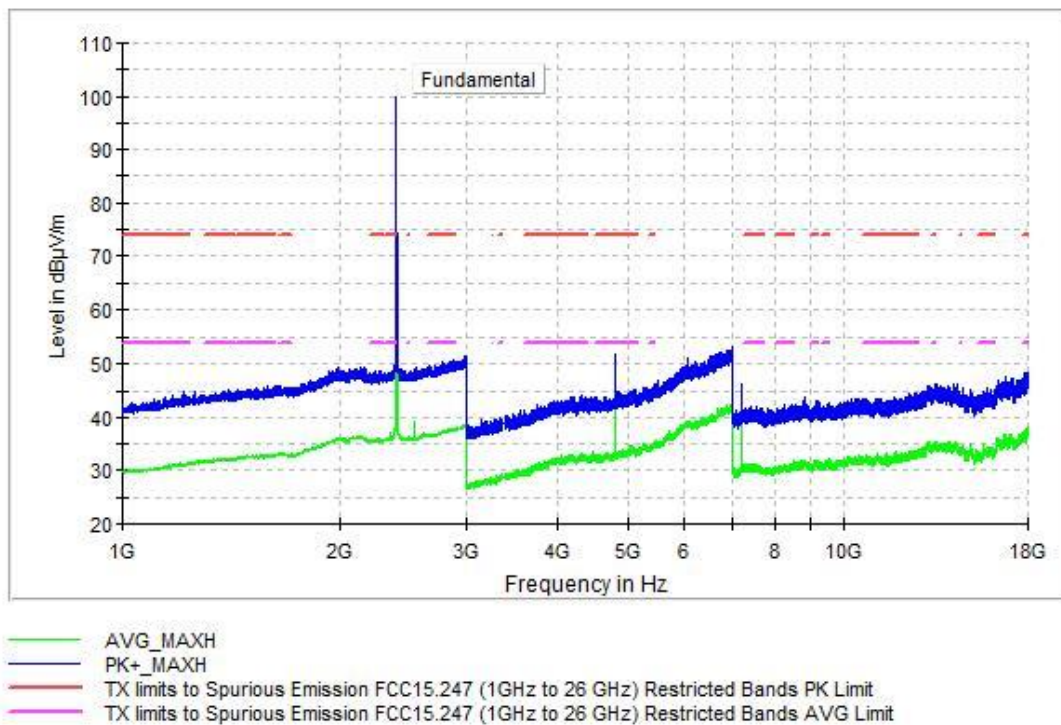
RF_FCC_15.247_E Field_30MHz_1GHz



FREQUENCY RANGE 1 GHz to 18 GHz

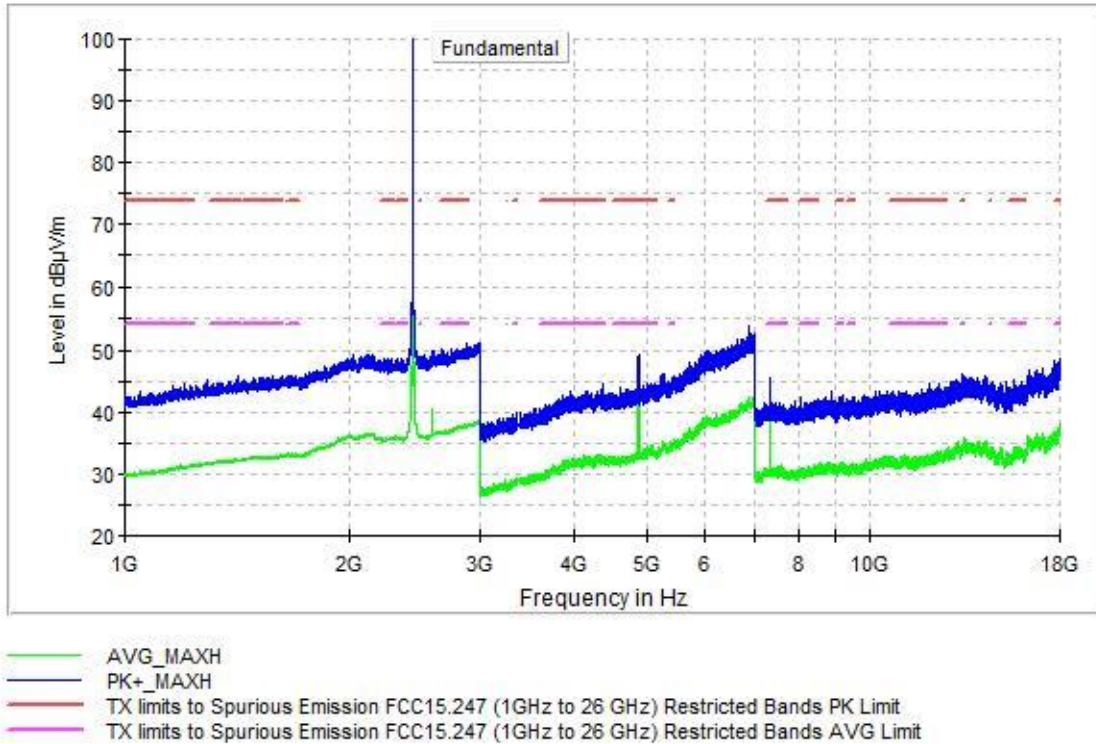
CHANNEL: Lowest (2402 MHz)

RF_FCC_15.247_E Field_1GHz_18GHz



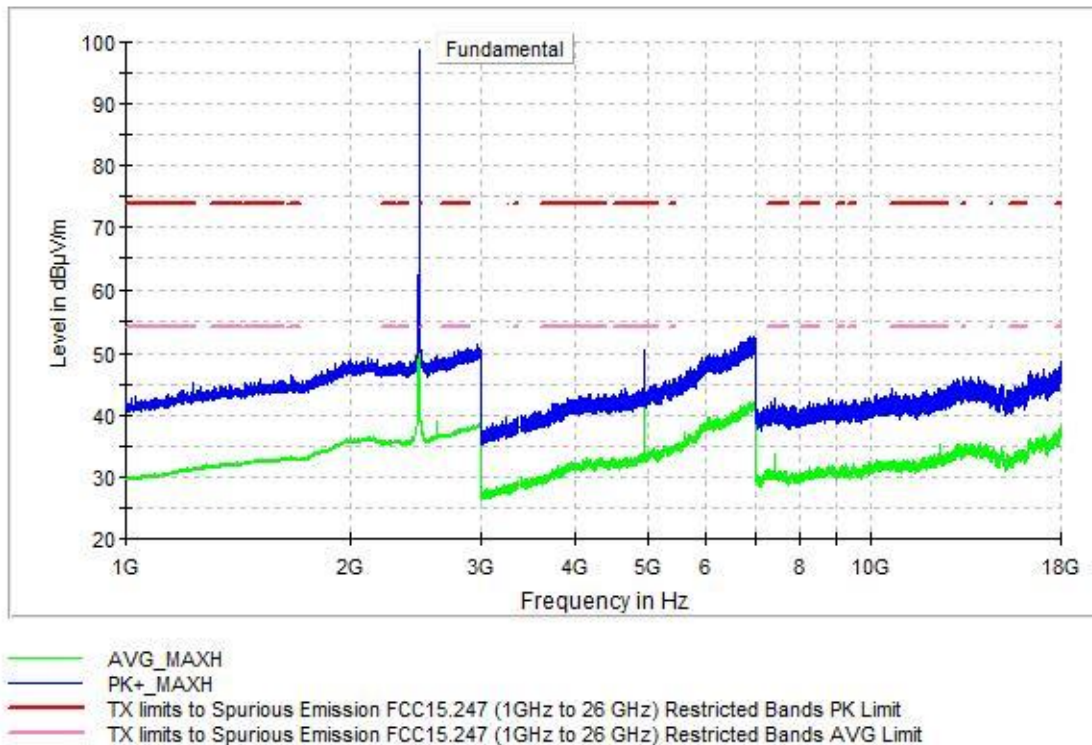
CHANNEL: Middle (2440 MHz)

RF_FCC_15.247_E Field_1GHz_18GHz



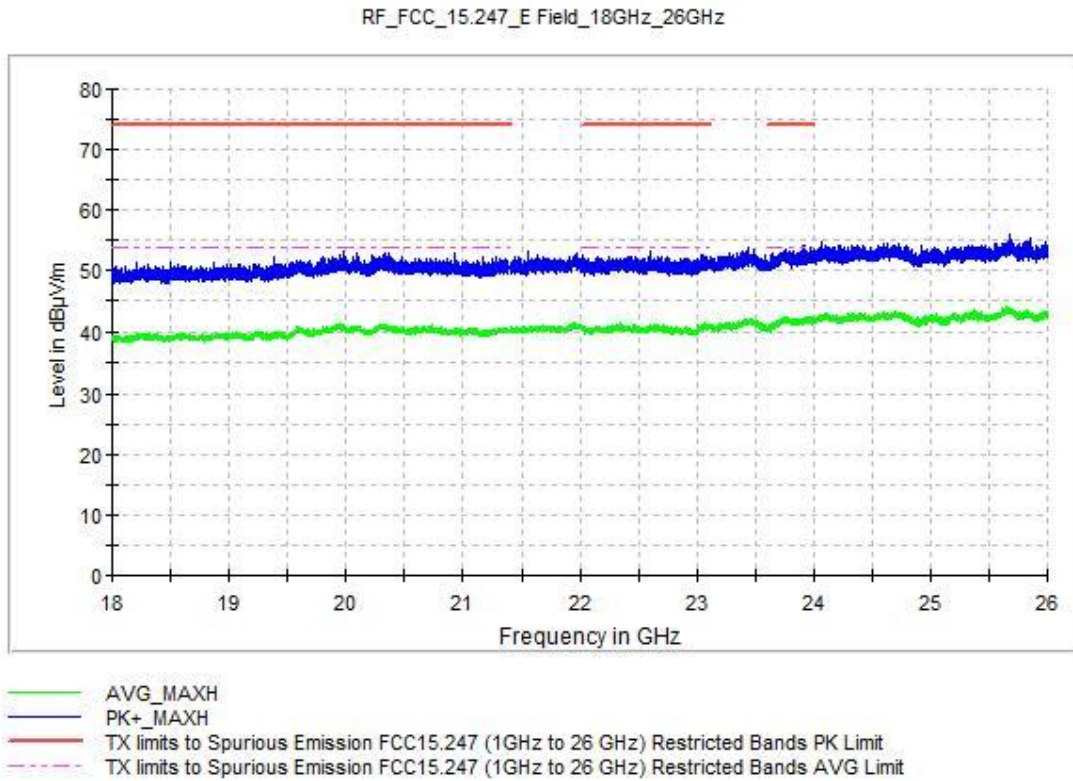
CHANNEL: Highest (2480 MHz)

RF_FCC_15.247_E Field_1GHz_18GHz

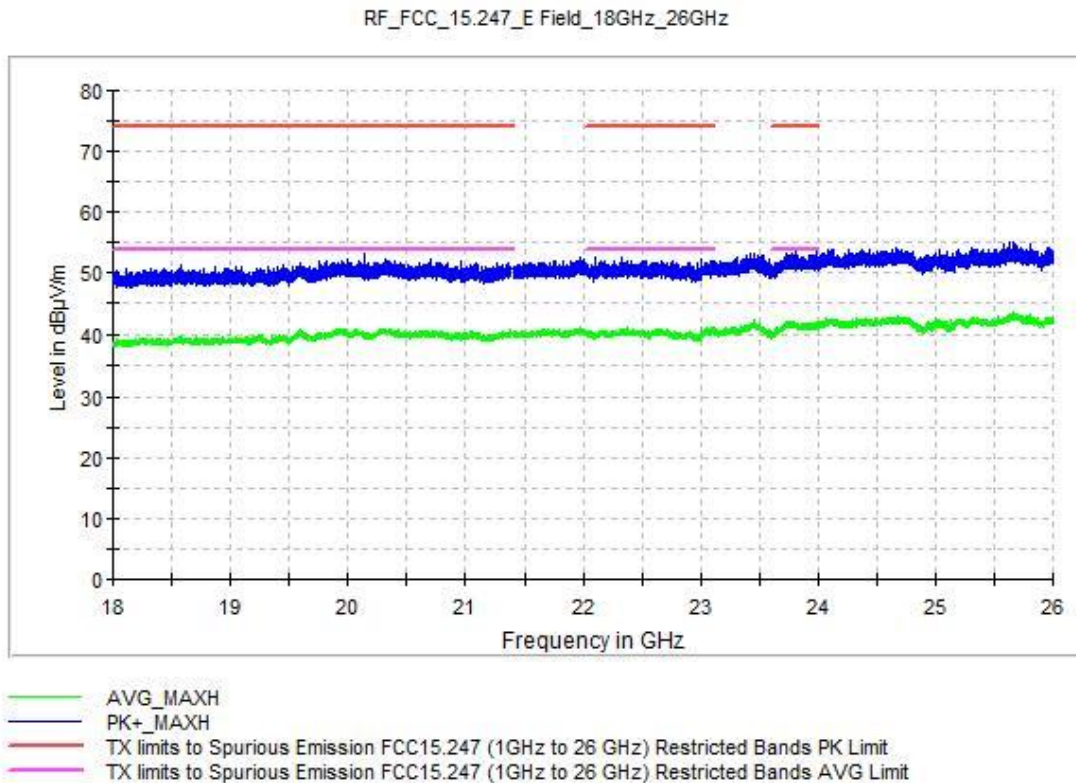


FREQUENCY RANGE 18 GHz to 26 GHz

CHANNEL: Lowest (2402 MHz)

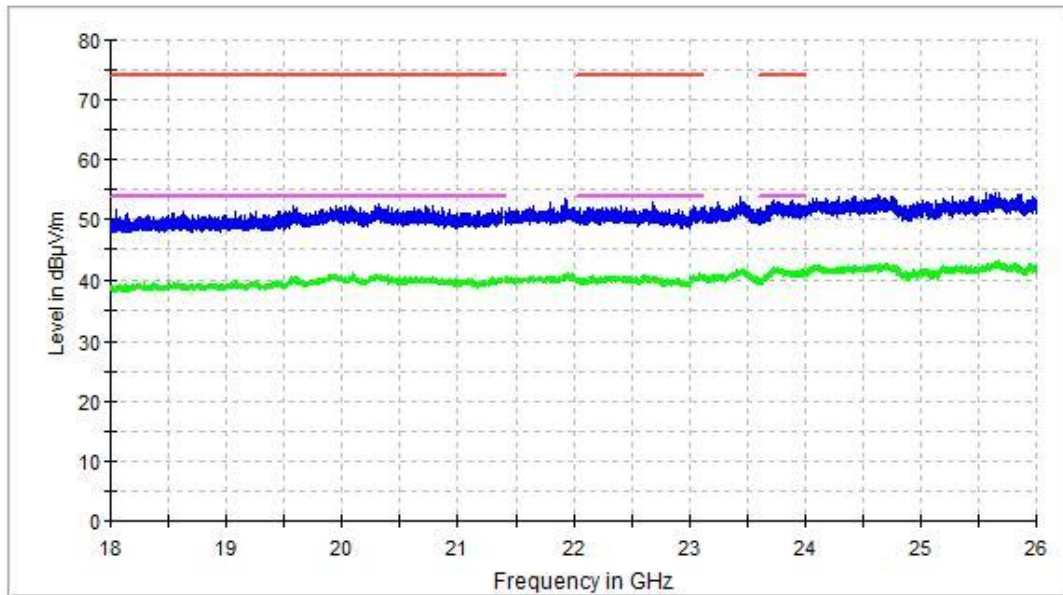


CHANNEL: Middle (2440 MHz)



CHANNEL: Highest (2480 MHz)

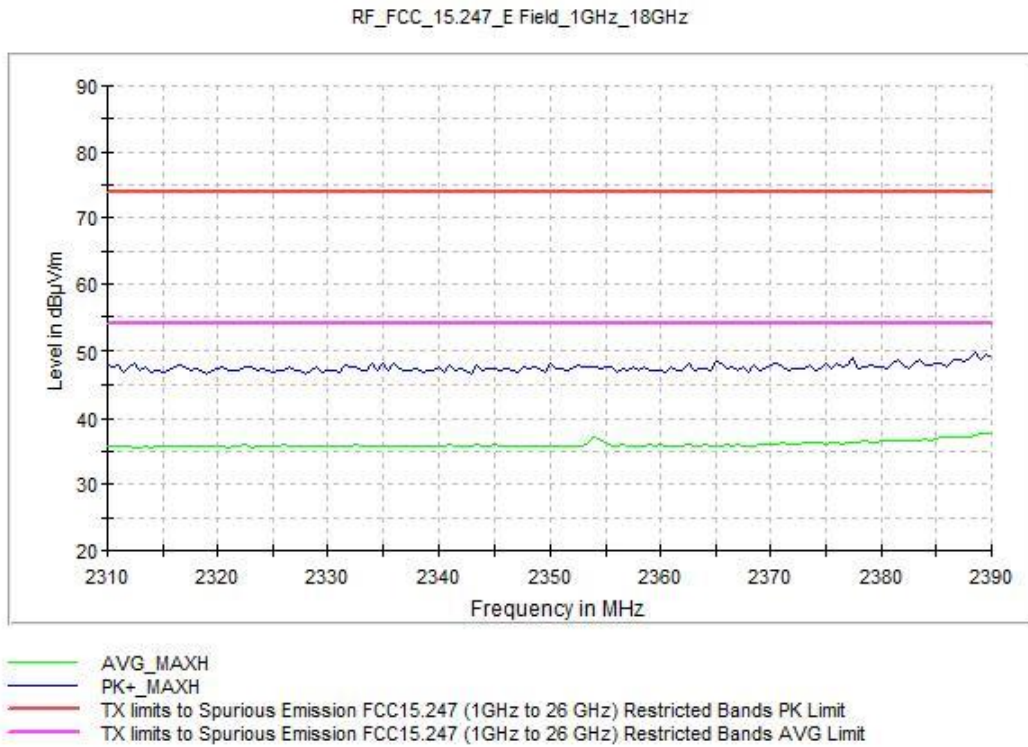
RF_FCC_15.247_E Field_18GHz_26GHz



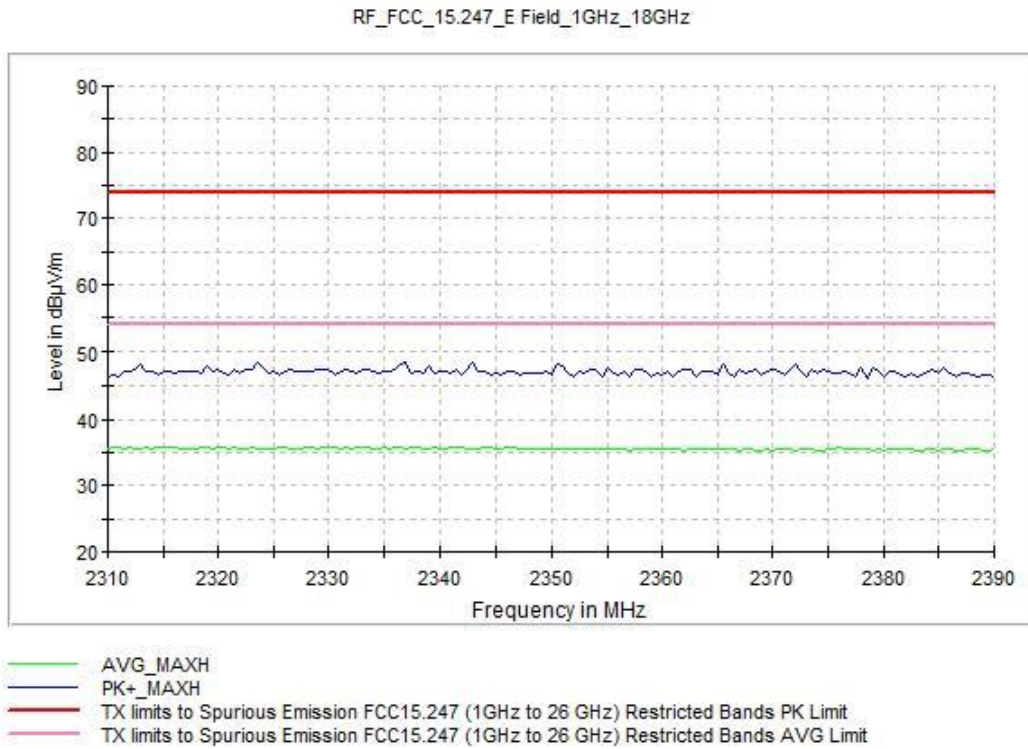
- AVG_MAXH
- PK+_MAXH
- TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

FREQUENCY RANGE 2.31 GHz to 2.39 GHz. (RESTRICTED BAND)

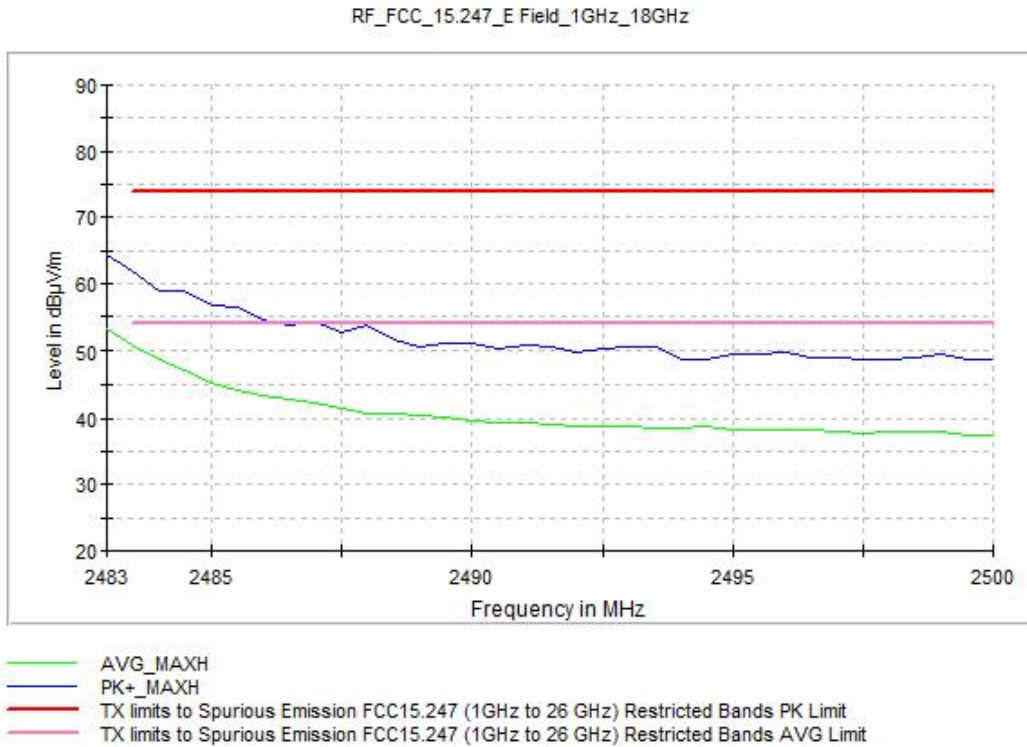
CHANNEL: Lowest (2402 MHz)



CHANNEL: Middle (2440 MHz)

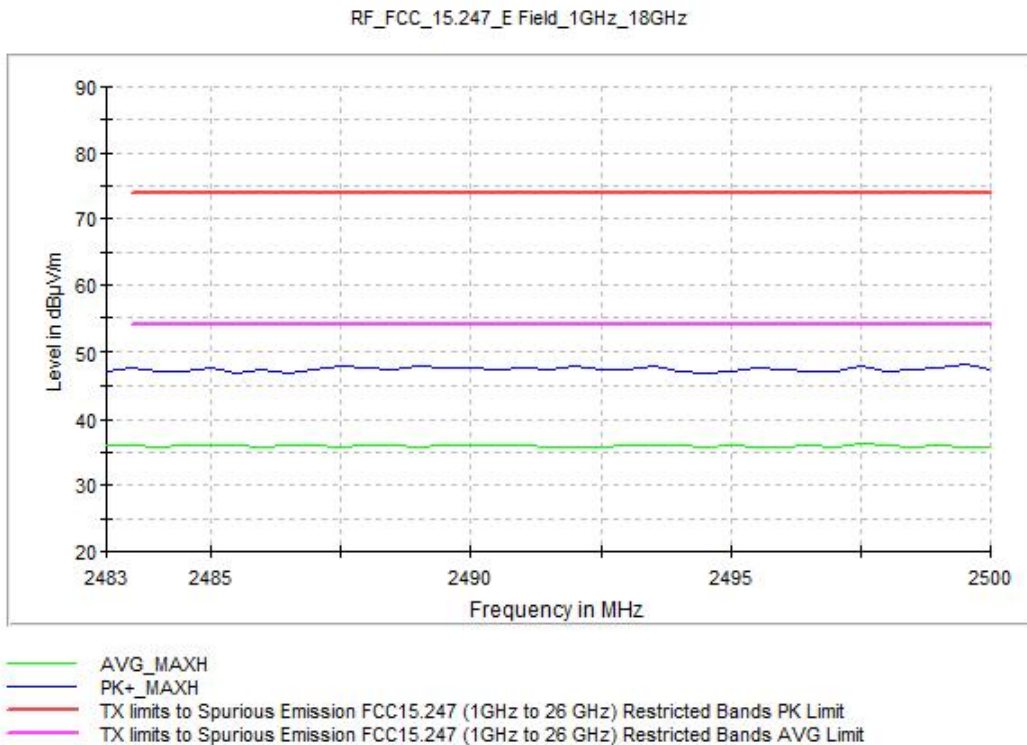


CHANNEL: Highest (2480 MHz)

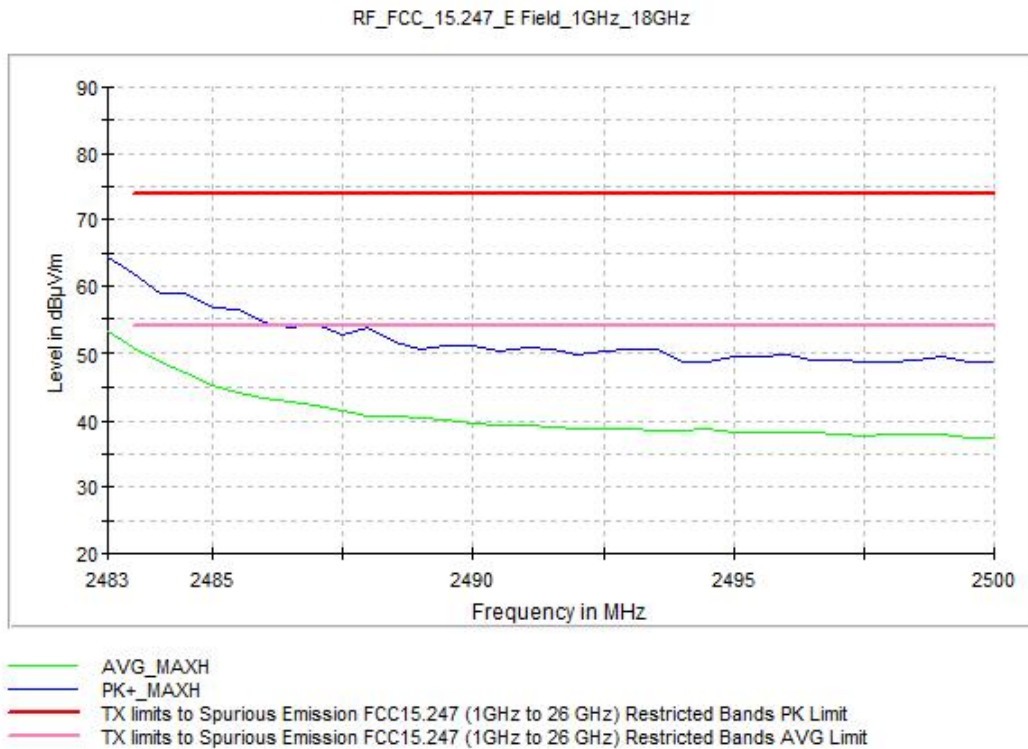


FREQUENCY RANGE 2.4835 GHz to 2.5 GHz. (RESTRICTED BAND)

CHANNEL: Lowest (2402 MHz)



CHANNEL: Middle (2440 MHz)



CHANNEL: Highest (2480 MHz)

