RF Test Report
Bluetooth (Low Energy)

Report No.	:	RF200522K003-1 R1
Customer	:	Samsung Electronics Co., Ltd.
Address	:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
Use of Report	:	Certification
Model Name	:	SM-T975
FCC ID / IC	:	A3LSMT975
Date of Test	:	2020.06.01 to 2020.07.15
Test Method Used	:	FCC 47 CFR PART 15 Subpart C (Section §15.247) / ISED RSS-247
Testing Environment	:	Refer to the Test Condition

Test Result : ☒ **Pass** ☐ **Fail**

ISSUED BY: BV CPS ADT Korea Ltd., EMC/RF Laboratory

ADDRESS: Innoplex No.2 106, Sinwon-ro 306, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea 16675

TEST LOCATION: HeungAn-daero 49, DongAn-gu, Anyang-si, Gyeonggi-do, Korea, 14119

Tested by

Name : Donghwa Shin (Signature)

Technical Manager

Name : Jongha Choi (Signature)

2020. 07. 15

BV CPS ADT Korea Ltd.

RELEASE CONTROL RECORD

REPORT NO.	REASON FOR CHANGE	DATE ISSUED
RF200522K003-1	Original release	2020.07.01
RF200522K003-1 R1	Corrected the regarding distance extrapolation factor	2020.07.15

Table of Contents

1 Summary of Test Results

The EUT has been tested according to the following specifications

Applied Standard : FCC Part 15, Subpart C 15.247, RSS-247					
FCC Part Section(s)	**RSS Section(s)**	**Test Description**	**Limit**	**Test Result**	**Reference**
15.247(a)(2)	RSS-247 [5.2]	6 dB Bandwidth	> 500 kHz	PASS	Section 3.2
-	-	Occupied Bandwidth (99 % Bandwidth)	N/A	PASS	Section 2.5
15.247(b)(3)	RSS-247 [5.4(4)]	Maximum Conducted Output Power	< 1 Watt	PASS	Section 3.3
15.247(e)	RSS-247 [5.2]	Power Spectral Density	< 8 dBm / 3 kHz Band	PASS	Section 3.4
15.247(d)	RSS-247 [5.5]	Band Edge / Out-of-Band Emissions (Conducted Spurious Emission)	≥ 20 dBc	PASS	Section 3.5
15.205 15.209	RSS-Gen [8.9]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in Restricted bands must meet the radiated limits detailed in 15.209 (RSS-247 limits)	PASS	Section 3.5
15.207	RSS-Gen [8.8]	AC Conducted Emissions (150 kHz – 30 MHz)	< FCC 15.207 limits (RSS-Gen [8.8] limits)	PASS	Section 3.6

NOTES

1) The general test methods used to test on this devices are ANSI C63.10.

2) Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

1.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2

Measurement Items	Frequency Range	Expanded Uncertainty U = *k*Uc (*k* = 2)
Conducted Emissions at main ports	150 kHz – 30 MHz	2.62
Radiated Spurious Emissions	9 kHz – 30 MHz	1.97
	30 MHz – 1 GHz	4.04
	1 GHz – 18 GHz	5.38
	18 GHz – 26.5 GHz	5.46

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k = 2.

2 General Information

2.1 General Description of EUT

Product	Tablet
Brand	Samsung
Model	SM-T975
Identification No. of EUT	-
Series Model	-
Model Difference	-
Power Supply	3.86 V DC By Battery / DC 5/9 V By Adapter
Modulation Type	GFSK
Transfer Rate	125 kbps, 500kbps, 1 Mbps, 2 Mbps
Operating Frequency	2 402 to 2 480 MHz
Number of Channel	40 Channels
Output Power	3.52 dBm
Antenna Type	Metal Antenna
Antenna Connector	C-clip
H/W Version	REV0.4
S/W Version	T975.001

NOTES

1) The above equipment has been tested by **Bureau Veritas Consumer Products Services ADT Korea**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

2) The following antennas were provided to the EUT.

Antenna	Type	Connector	Peak Gain (dBi)				
			2.4 GHz	U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
Antenna 1	Metal Antenna	Internal	-5.71	-8.45	-6.15	-6.05	-8.65
Antenna 2	Metal Antenna	Internal	-6.52	-8.84	-8.46	-8.57	-7.70

3) Spurious emission of the simultaneous operation RSDB mode and the test data please refer to report no. RF200522K003-6 (U-NII Test Report).

4) **List of Accessories**

Accessories	Brand	Model	Manufacturer	Specification
Ear phone	Samsung	EHS64	Samsung	3.5 mm
S-pen	Samsung	EJ-PT870	Samsung	Bluetooth
Keyboard	Samsung	EF-DT970	Samsung	N/A
TA	Samsung	EP-TA200	Samsung	Input : AC 100-240 V, 50 – 60 Hz, 0.5 A Output : DC 9.0 V, 1.67 A, DC5.0 V, 2.0 A
Cable	Samsung	EP-DG930M	Samsung	A to C type, Shielded, 1.m
Battery	Samsung	EB-BT975ABY	Samsung	Rating: 3.86Vdc, 9800mAh, 37.83Wh

2.2 Description of Test Mode

[Test Channel of EUT]

- Bluetooth Low Energy

Channel	Frequency [MHz]	Channel	Frequency [MHz]	Channel	Frequency [MHz]	Channel	Frequency [MHz]
0	2 402	10	2 422	20	2 442	30	2 462
1	2 404	11	2 424	21	2 444	31	2 464
2	2 406	12	2 426	22	2 446	32	2 466
3	2 408	13	2 428	23	2 448	33	2 468
4	2 410	14	2 430	24	2 450	34	2 470
5	2 412	15	2 432	25	2 452	35	2 472
6	2 414	16	2 434	26	2 454	36	2 474
7	2 416	17	2 436	27	2 456	37	2 476
8	2 418	18	2 438	28	2 458	38	2 478
9	2 420	19	2 440	29	2 460	39	2 480

2.2.1 Test Mode Applicability and Tested Channel Details

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. The worst case was found when positioned on X axis for radiated emission. Following channel(s) was(were) selected for the final test as listed below :

EUT Configure mode	Applicable to				Description
	RE < 1G	RE ≥ 1G	PLC	APCM	
-	√	√	√	√	-

Where RE ≥ 1 G : Radiated Emission above 1 GHz & Bandedge Measurement
RE < 1 G : Radiated Emission below 1 GHz
PLC : Power Line Conducted Emission
APCM : Antenna Port Conducted Measurement

Radiated Emission Test (Below 1 GHz)

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and data rate.

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure mode	Available Channel	Tested Channel	Modulation Type	Data Rate
-	0 to 39	0	GFSK	125 kbps

Radiated Emission Test (Above 1 GHz)

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and data rate.

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure mode	Available Channel	Tested Channel	Modulation Type	Data Rate
-	0 to 39	0, 19, 39	GFSK	125 kbps
-	0 to 39	0, 19, 39	GFSK	500 kbps
-	0 to 39	0, 19, 39	GFSK	1 Mbps
-	0 to 39	0, 19, 39	GFSK	2 Mbps

Power line Conducted Emission Test

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and data rate.

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure mode	Available Channel	Tested Channel	Modulation Type	Data Rate
-	0 to 39	0, 19, 39	GFSK	125 kbps

Antenna Port Conducted Measurement

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and data rate.

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure mode	Available Channel	Tested Channel	Modulation Type	Data Rate
-	0 to 39	0, 19, 39	GFSK	125 kbps
-	0 to 39	0, 19, 39	GFSK	500 kbps
-	0 to 39	0, 19, 39	GFSK	1 Mbps
-	0 to 39	0, 19, 39	GFSK	2 Mbps

Test Condition

Applicable to	Environmental Conditions	Test Voltage	Tested by
RE < 1G	22 °C, 55 % RH	DC 5/9 V By Adaptor	Donghwa Shin
RE ≥ 1G	22 °C, 55 % RH	DC 5/9 V By Adaptor	Donghwa Shin
PLC	23 °C, 49 % RH	DC 5/9 V By Adaptor	Donghwa Shin
APCM	22 °C, 51 % RH	DC 5/9 V By Adaptor	Donghwa Shin

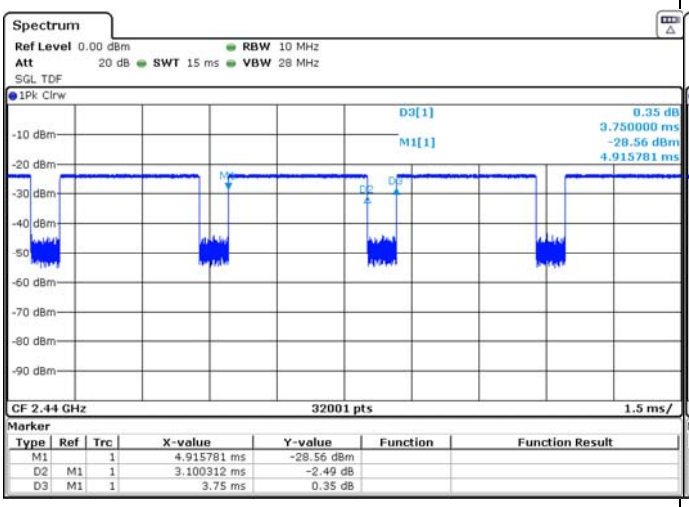
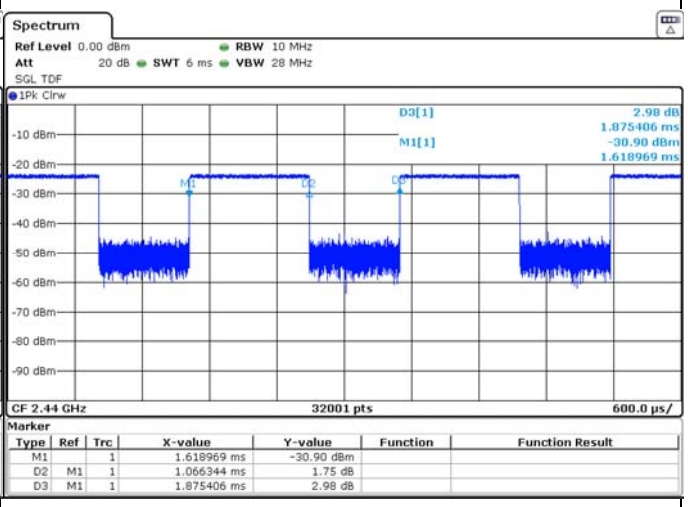
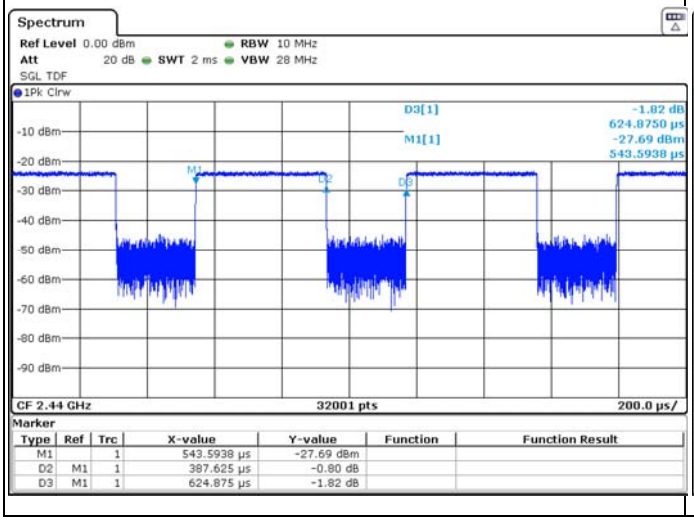
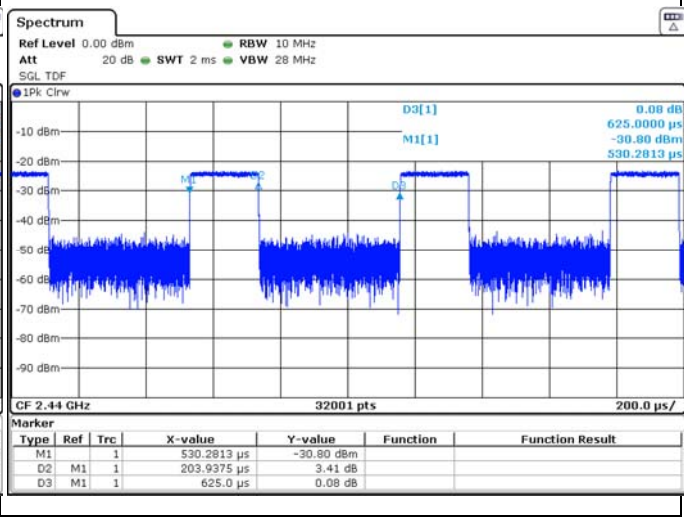
2.3 Maximum Output Power

Frequency Range [MHz]	Test Items	Test Mode	Result [dBm]	Result [mW]
2 402 - 2 480	Peak Power	100 kbps	3.47	2.22
		250 kbps	3.48	2.23
		1 Mbps	3.52	2.25
		2 Mbps	3.41	2.19
	Average Power	100 kbps	3.41	2.19
		250 kbps	3.45	2.21
		1 Mbps	3.43	2.2
		2 Mbps	3.21	2.09

2.4 Duty Cycle of Test Signal

Test Items	Mode	On Time B [msec]	Period [msec]	Duty Cycle X [Linear]	Duty Cycle [%]	DCCF [dB]	1/T Min. VBW [kHz]
Duty Cycle	125 kbps	3.100	3.750	0.827	82.7	0.83	0.323
	500 kbps	1.066	1.875	0.569	56.9	2.45	0.938
	1 Mbps	0.388	0.625	0.620	62.0	2.07	2.580
	2 Mbps	0.204	0.625	0.326	32.6	4.86	4.903

[Test Plot of Duty Cycle]

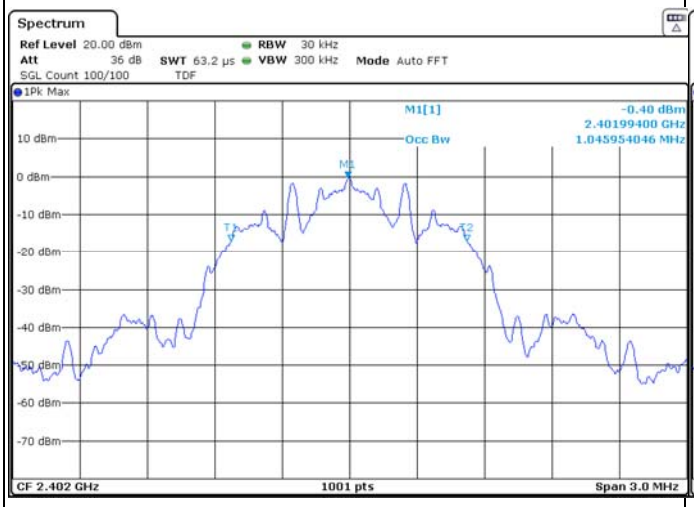
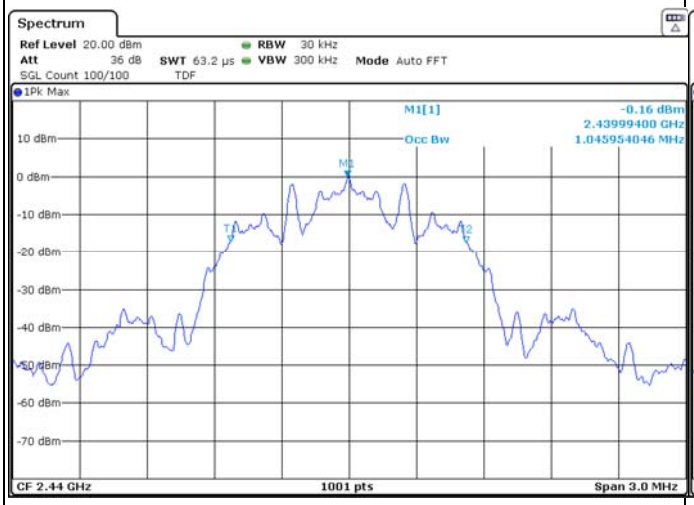
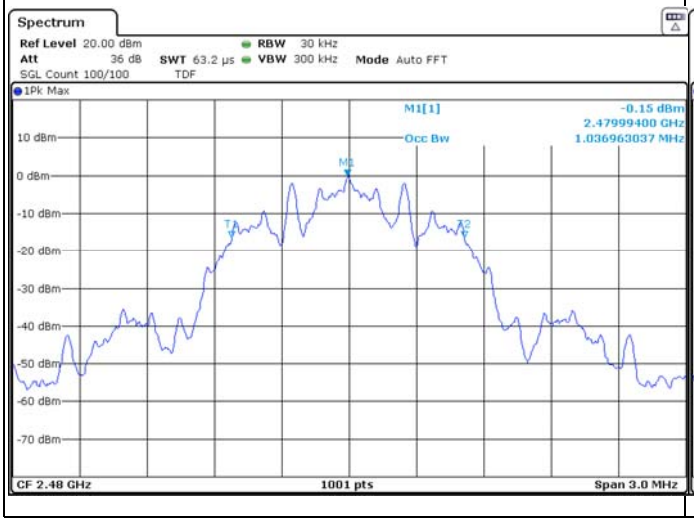
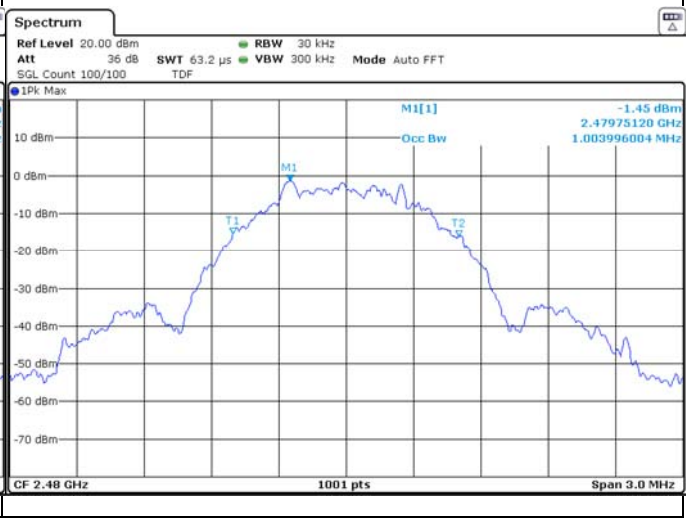
125 kbps	500 kbps
	
1 Mbps	**2 Mbps**
	

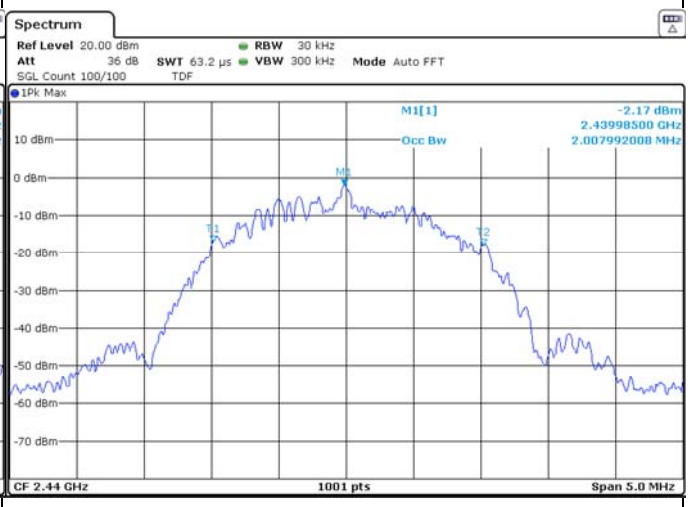
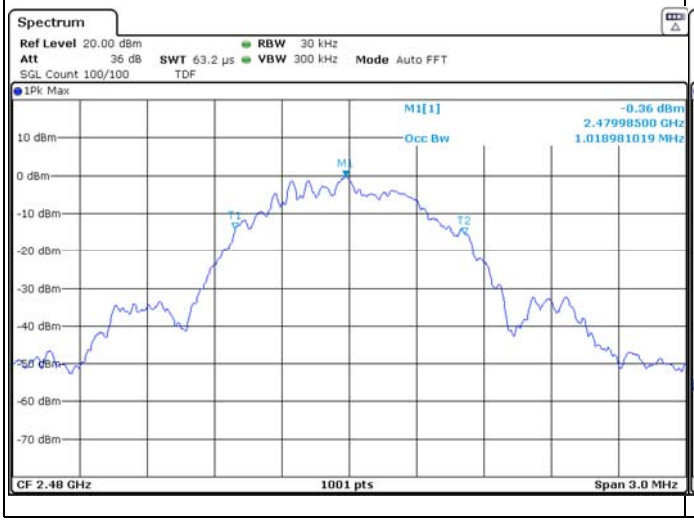
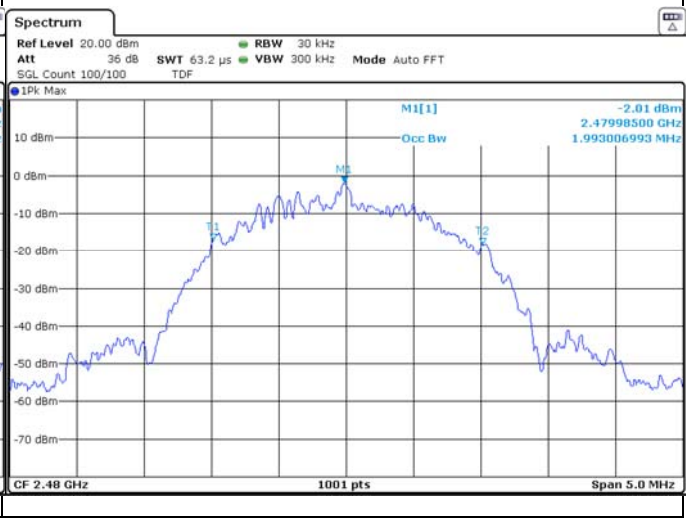
2.5 99 % Bandwidth

[Test Data of 99 % Bandwidth]

Test Mode	Channel	Frequency [MHz]	99 BW [MHz]
125 kbps	Lowest	2 402	1.046
	Middle	2 440	1.046
	Highest	2 480	1.037
Worst Result			1.046
500 kbps	Lowest	2 402	1.013
	Middle	2 440	1.016
	Highest	2 480	1.004
Worst Result			1.016
1 Mbps	Lowest	2 402	1.025
	Middle	2 440	1.016
	Highest	2 480	1.019
Worst Result			1.025
2 Mbps	Lowest	2 402	2.003
	Middle	2 440	2.008
	Highest	2 480	1.993
Worst Result			2.008

Test Plot of 99 % Bandwidth

125 kbps_2 402 MHz	500 kbps_2 402 MHz
	
125 kbps_2 440 MHz	**500 kbps_2 440 MHz**
	
125 kbps_2 480 MHz	**500 kbps_2 480 MHz**
	

1 Mbps_2 402 MHz	2 Mbps_2 402 MHz
	
1 Mbps_2 440 MHz	**2 Mbps_2 440 MHz**
	
1 Mbps_2 480 MHz	**2 Mbps_2 480 MHz**
	

2.6 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards.

FCC CFR 47 Part 15, Subpart C (§15.247)
KDB 558074 D01 15.247 Meas Guidance v05r02
ANSI C63.10-2013

All test items in this test report have been performed and recorded as per the above standards.

2.7 Test Equipment

Test Equipment is traceable to the National Institute of Standards and Technology (NIST). Measurement antenna used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Serial Number	Cal Date	Cal Due
R&S	HFH2-Z2E	Active Loop Antenna, 30 MHz	349806	2019.03.27	2021.03.27
Schwarzbeck	VULB 9163	Trilog Antenna, 3 GHz (with 6 dB ATT.)	01199	2019.04.03	2021.04.03
R&S	HF907	Horn Antenna, 18 GHz	102772	2020.01.22	2021.01.22
Steatite Antenna	QSH-SL-18-26-S-20	Horn Antenna, 26.5 GHz	19926	2020.03.04	2021.03.04
R&S	SCU08F2	Signal Conditioning Unit, 8 GHz	08400016	2019.12.30	2020.12.30
R&S	SCU-18F	Signal Conditioning Unit, 18 GHz	180111	2019.12.30	2020.12.30
R&S	SCU-26F	Signal Conditioning Unit, 26.5 GHz	260005	2019.12.30	2020.12.30
L3 Narda-MITEQ	JS44-18004000-33-8P	Amplifier, 40 GHz	2142086	2020.04.07	2021.04.07
R&S	ESW44	EMI Test Receiver, 44 GHz	101812	2020.02.20	2021.02.20
R&S	FSV30	Spectrum Analyzer, 30 GHz	103017	2019.12.27	2020.12.27
Aeroflex	40AH2W-3	Attenuator, 3 dB	1	2019.12.31	2020.12.31
Mini-Circuits	VAT-10W2+	Attenuator, 10 dB	1531	2020.01.02	2021.01.02
Aeroflex	40AH2W-10	Attenuator, 10 dB	1	2019.12.31	2020.12.31
Wt Microwave	WT-A1698-HS	High Pass Filter 3.5 GHz	WT190313-6-4	2020.01.03	2021.01.03
R&S	NRP6A	Average Power Sensor	102045	2019.12.31	2020.12.31
R&S	NRP6A	Average Power Sensor	102044	2019.12.31	2020.12.31
R&S	NRX	Power Meter, 110 GHz	100947	2019.12.30	2020.12.30
Keysight Technologies	MP400B	MIMO Power Set Master, 18 GHz	None	2020.01.03	2021.01.03
R&S	ENV216	LISN	102437	2019.12.26	2020.12.26
R&S	ESR	EMI Test Receiver, 3.6 GHz	102529	2019.12.27	2020.12.27

3 Test Results

3.1 Antenna Requirement

Except from §15.203 of the FCC Rules/Regulations:

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of the section.

- The antenna(s) of the EUT are Permanently attached.
- There are no provisions for connection to an external antenna.

Result

The EUT complies with the requirement of §15.203

3.2 6 dB Bandwidth

3.2.1 Regulation

§15.247(a)(2) : Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

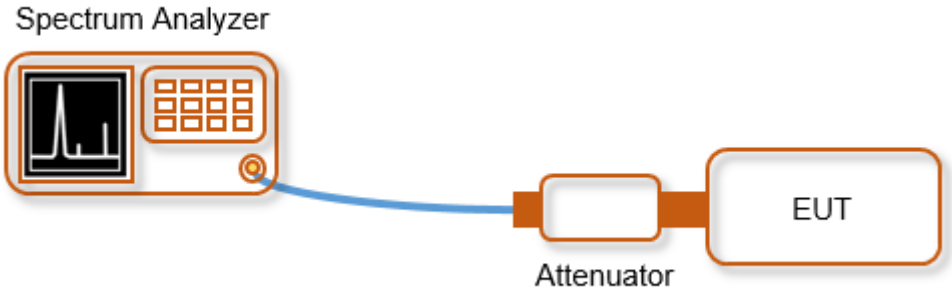
3.2.2 Test Procedure

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described in 11.8.1 (i.e., RBW = 100 kHz, VBW ≥ 3 × RBW, and peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥6 dB.

3.2.3 Deviation from Test Standard

No deviation.

3.2.4 Test Setup



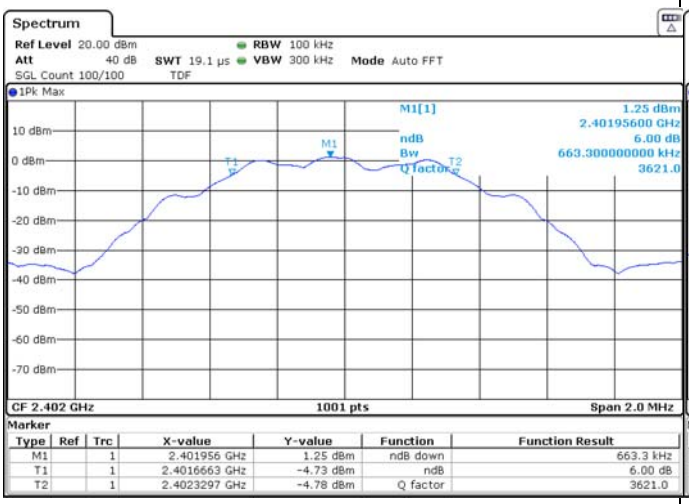
3.2.5 Test Result

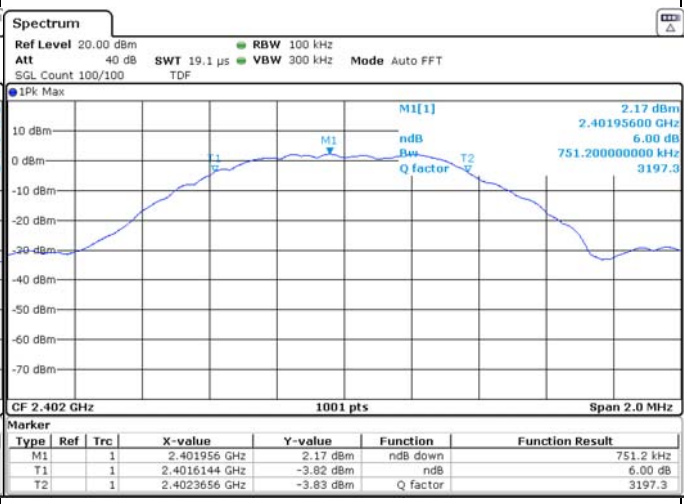
[Test Data of 6 dB Bandwidth]

Test Mode	Channel	Frequency [MHz]	6 dB BW [MHz]	Minimum Limit [MHz]
125 kbps	Lowest	2 402	0.663	0.500
	Middle	2 441	0.669	0.500
	Highest	2 480	0.665	0.500
Worst Result			0.669	0.500
500 kbps	Lowest	2 402	0.751	0.500
	Middle	2 441	0.685	0.500
	Highest	2 480	0.665	0.500
Worst Result			0.751	0.500
1 Mbps	Lowest	2 402	0.701	0.500
	Middle	2 441	0.655	0.500
	Highest	2 480	0.685	0.500
Worst Result			0.701	0.500
2 Mbps	Lowest	2 402	1.329	0.500
	Middle	2 441	1.424	0.500
	Highest	2 480	1.334	0.500
Worst Result			1.424	0.500

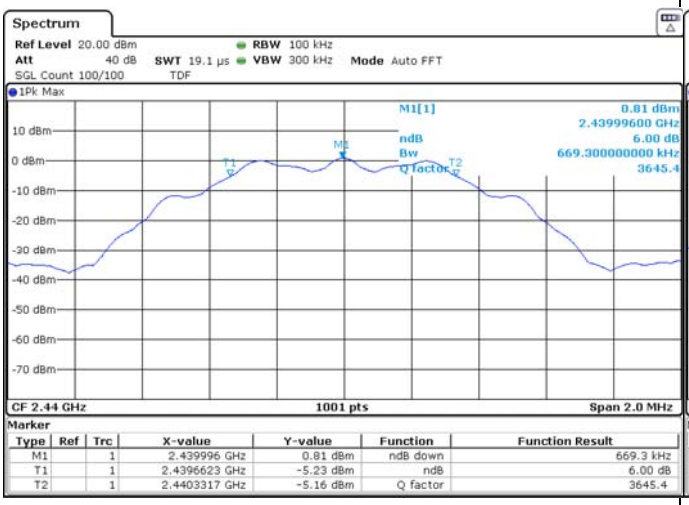
[Test Plot of 6 dB Bandwidth]

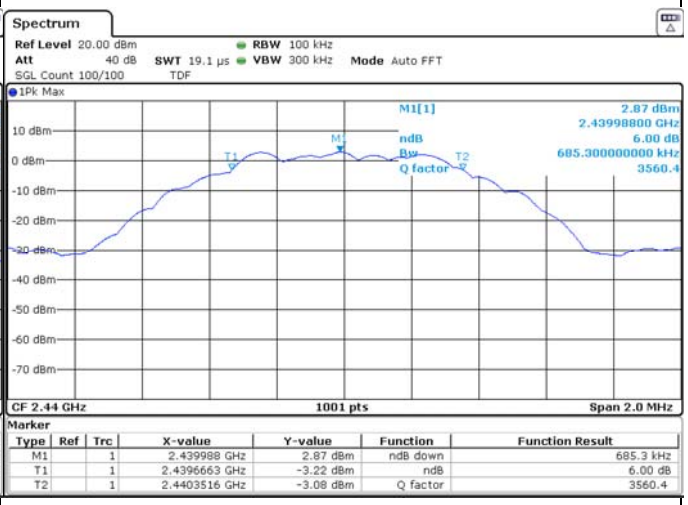
125 kbps_2 402 MHz	500 kbps_2 402 MHz



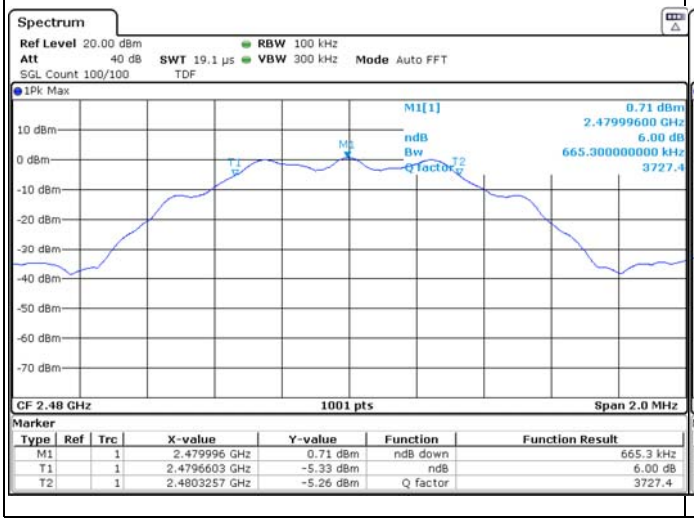


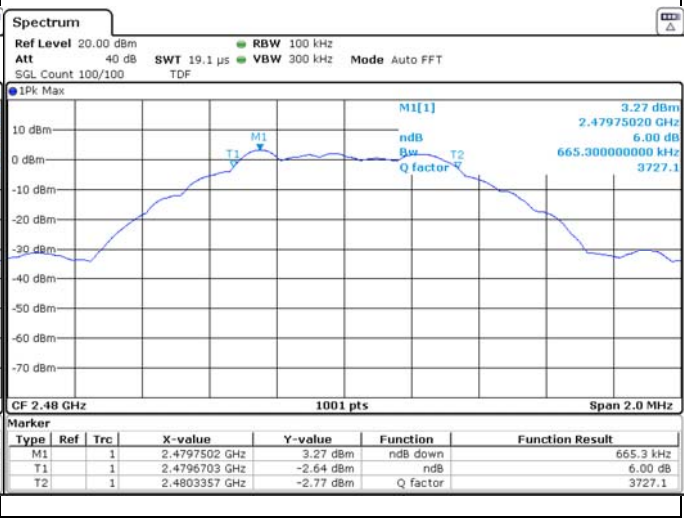
125 kbps_2 440 MHz	500 kbps_2 440 MHz

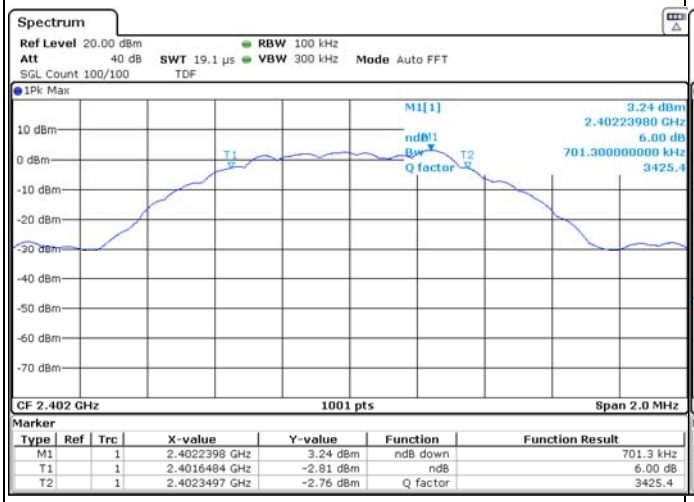
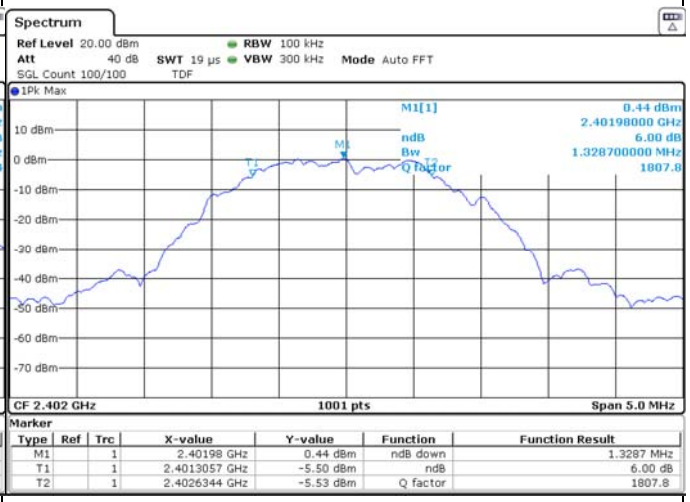
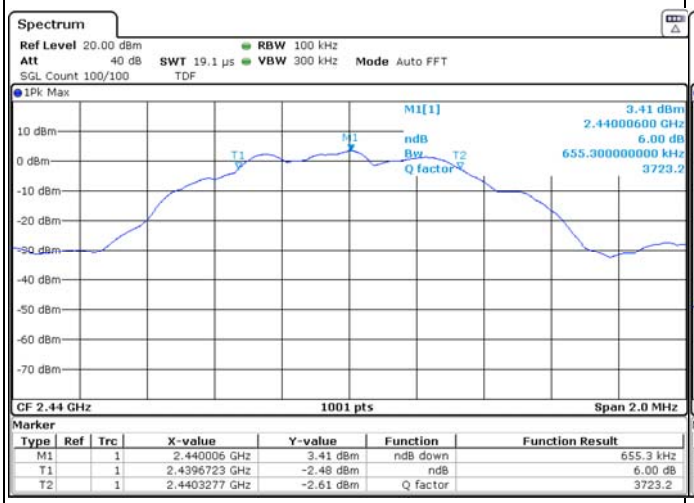
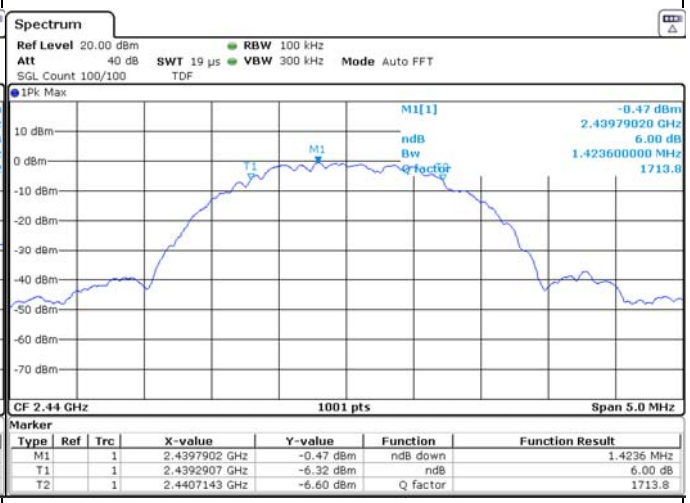
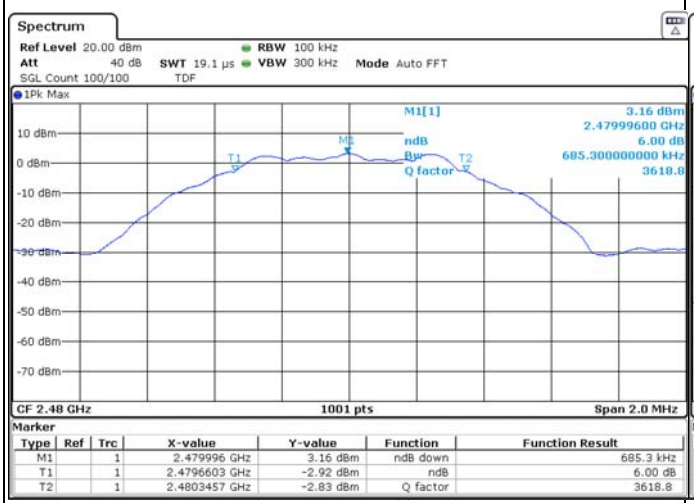
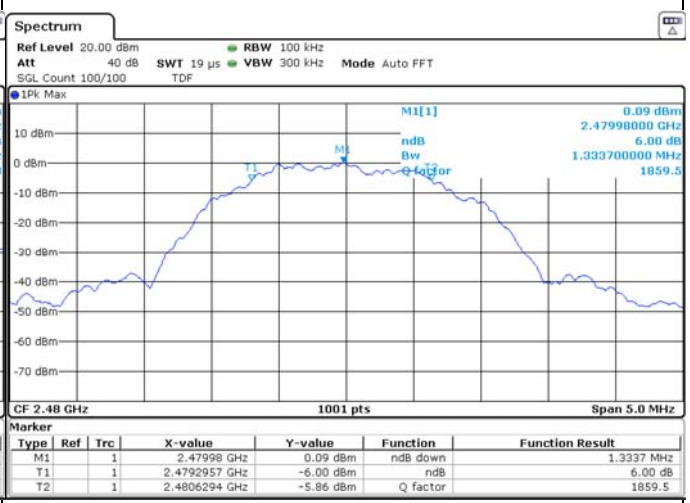




125 kbps_2 480 MHz	500 kbps_2 480 MHz





1 Mbps_2 402 MHz	2 Mbps_2 402 MHz
 Marker Type Ref Trc X-value Y-value Function Function Result M1 1 2.4022398 GHz 3.24 dBm ndB down 701.3 kHz T1 1 2.4016484 GHz -2.81 dBm ndB 6.00 dB T2 1 2.4023497 GHz -2.76 dBm Q factor 3425.4	 Marker Type Ref Trc X-value Y-value Function Function Result M1 1 2.40198 GHz 0.44 dBm ndB down 1.3287 MHz T1 1 2.4013057 GHz -5.50 dBm ndB 6.00 dB T2 1 2.4026344 GHz -5.53 dBm Q factor 1807.8
1 Mbps_2 440 MHz	**2 Mbps_2 440 MHz**
 Marker Type Ref Trc X-value Y-value Function Function Result M1 1 2.440006 GHz 3.41 dBm ndB down 655.3 kHz T1 1 2.4396723 GHz -2.48 dBm ndB 6.00 dB T2 1 2.4403277 GHz -2.61 dBm Q factor 3723.2	 Marker Type Ref Trc X-value Y-value Function Function Result M1 1 2.4397902 GHz -0.47 dBm ndB down 1.4236 MHz T1 1 2.4392907 GHz -6.32 dBm ndB 6.00 dB T2 1 2.4407143 GHz -6.60 dBm Q factor 1713.8
1 Mbps_2 480 MHz	**2 Mbps_2 480 MHz**
 Marker Type Ref Trc X-value Y-value Function Function Result M1 1 2.479996 GHz 3.16 dBm ndB down 685.3 kHz T1 1 2.4796603 GHz -2.92 dBm ndB 6.00 dB T2 1 2.4803457 GHz -2.83 dBm Q factor 3618.8	 Marker Type Ref Trc X-value Y-value Function Function Result M1 1 2.47998 GHz 0.09 dBm ndB down 1.3337 MHz T1 1 2.4792957 GHz -6.00 dBm ndB 6.00 dB T2 1 2.4806294 GHz -5.86 dBm Q factor 1859.5

3.3 Maximum Peak Output Power

3.3.1 Regulation

§15.247(b)(3) : For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

§15.247(b)(4) : The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.3.2 Test Procedure

The method of measurement used to test this FHSS device is ANSI C63.10-2013.

This is an RF conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation.

a) Use the following spectrum analyzer settings:

Peak Power Measurement

1) Span : Approximately five times the 20 dB bandwidth, centered on hopping channel.
2) RBW > 20 dB bandwidth of emission being measured.
3) VBW ≥ RBW.
4) Sweep : Auto.
5) Detector function : Peak.
6) Trace : Max hold.

b) Allow trace to stabilize

c) Use the marker-to-peak function to set the marker to the peak of the emissions

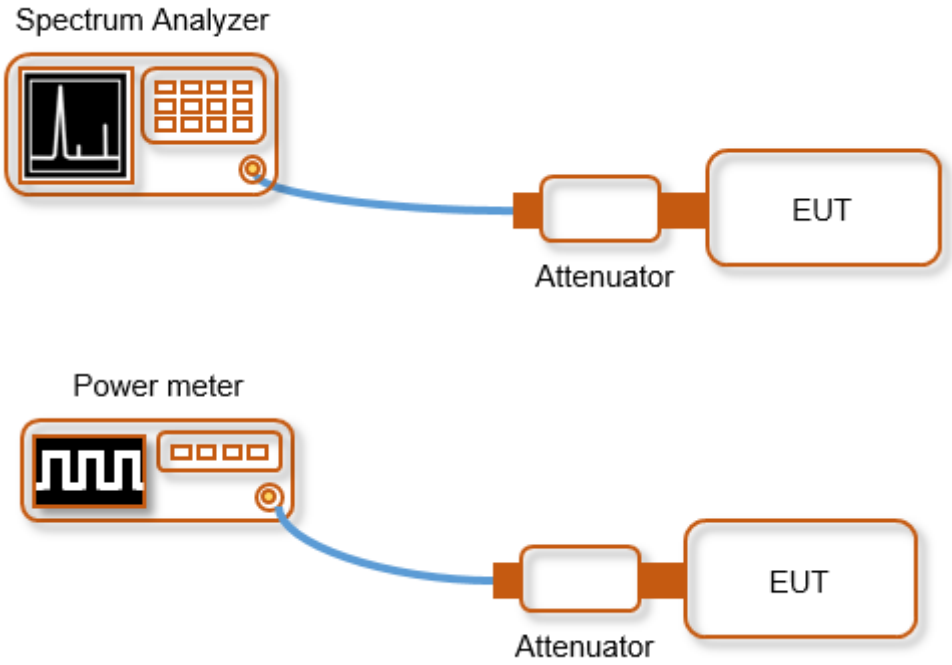
d) The indicated level is the peak output power, after any corrections for external attenuators and cables.

e) A plot of the test results and setup description shall be included in the test report.

3.3.3 Deviation from Test Standard

No deviation.

3.3.4 Test Setup



3.3.5 Test Result

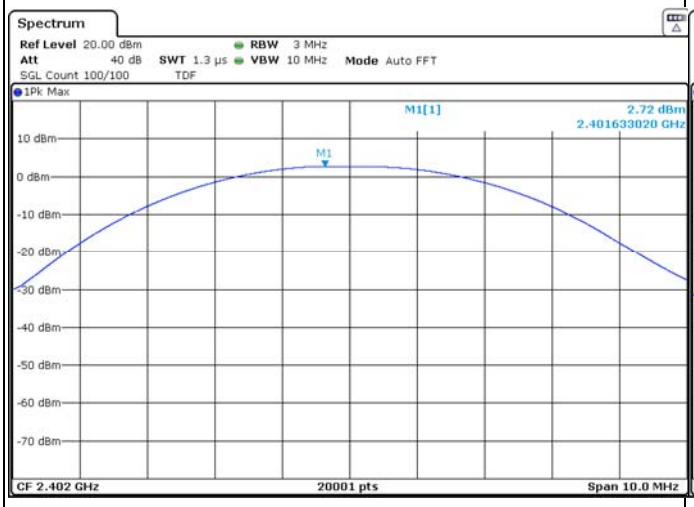
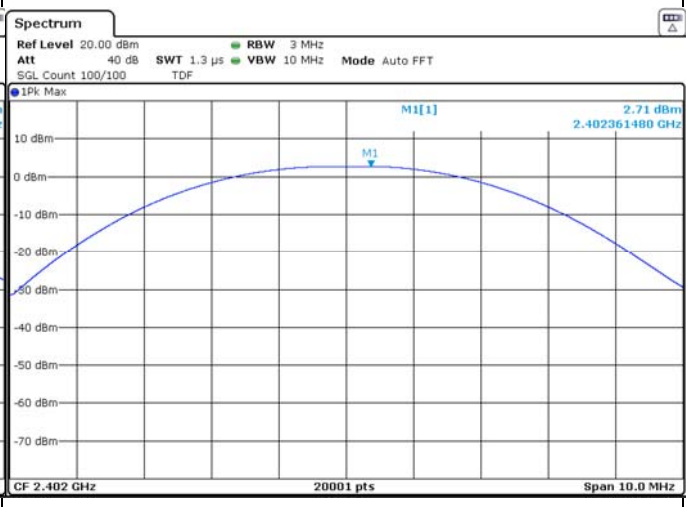
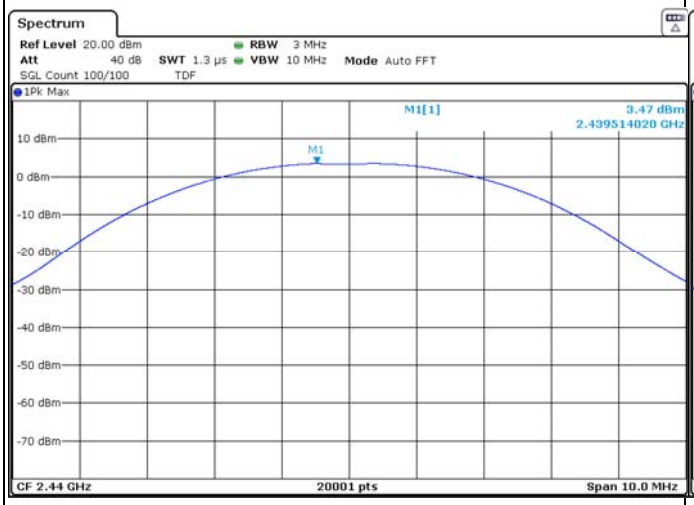
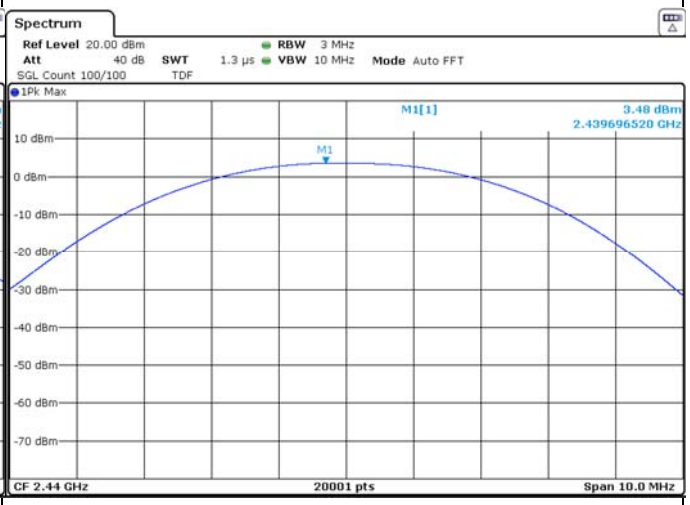
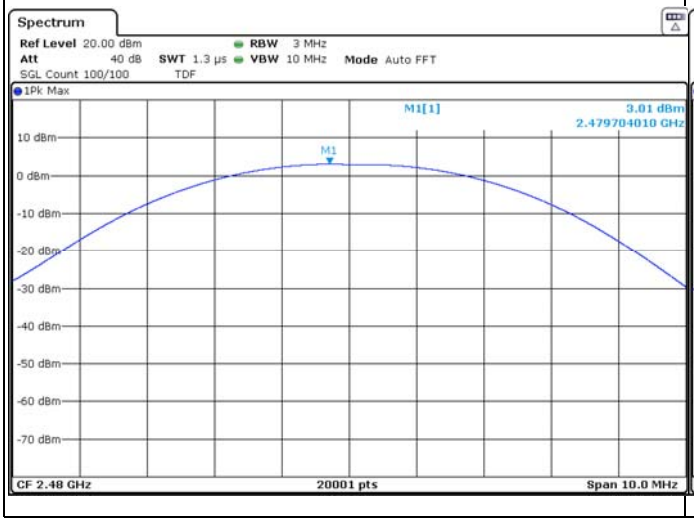
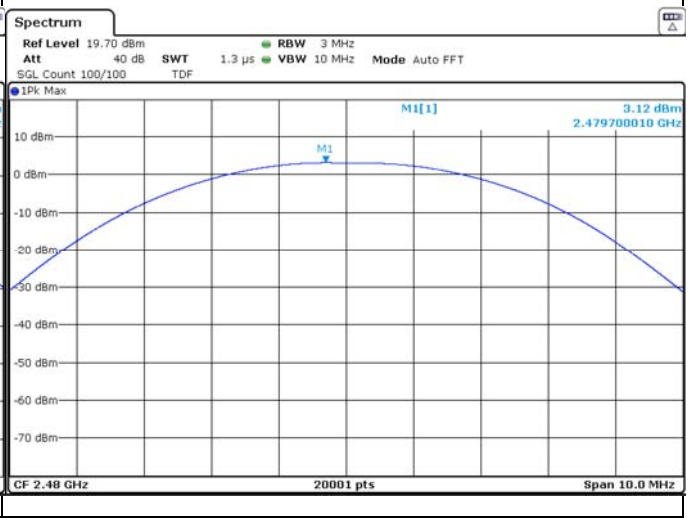
[Test Data of Peak Power]

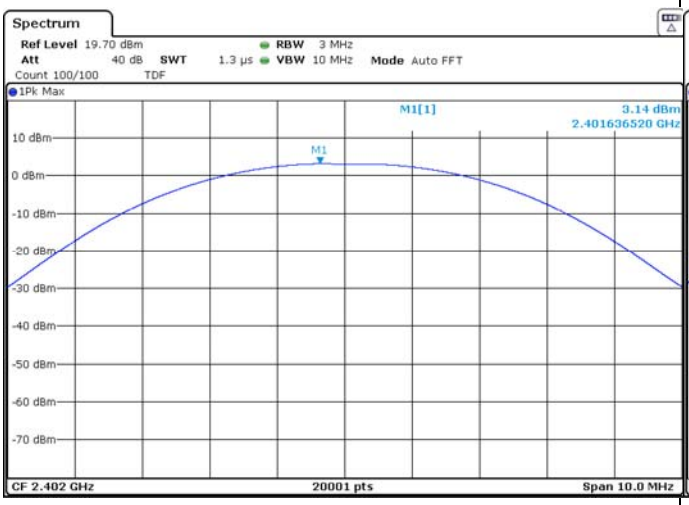
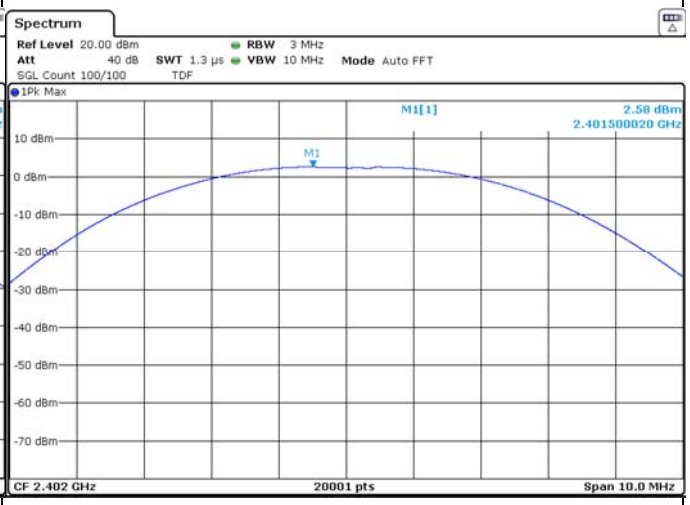
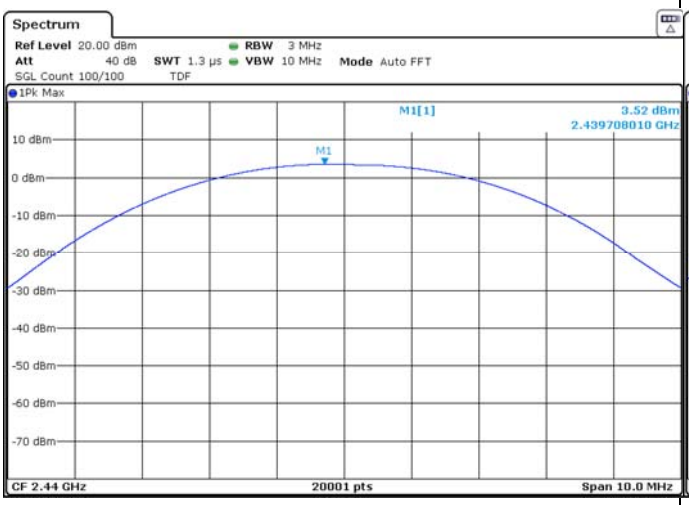
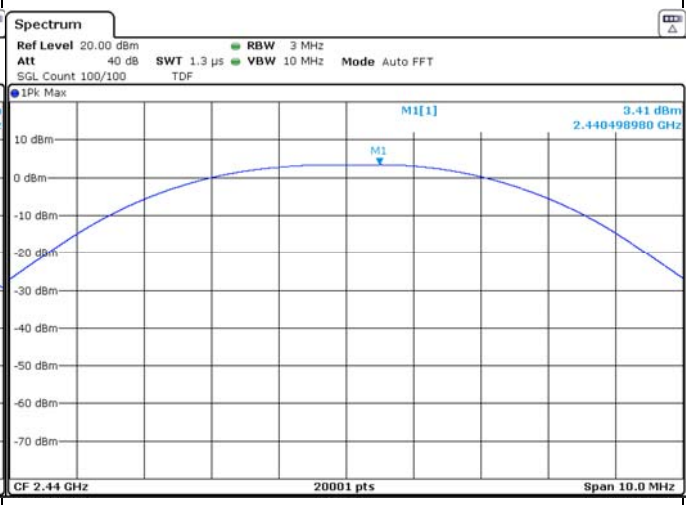
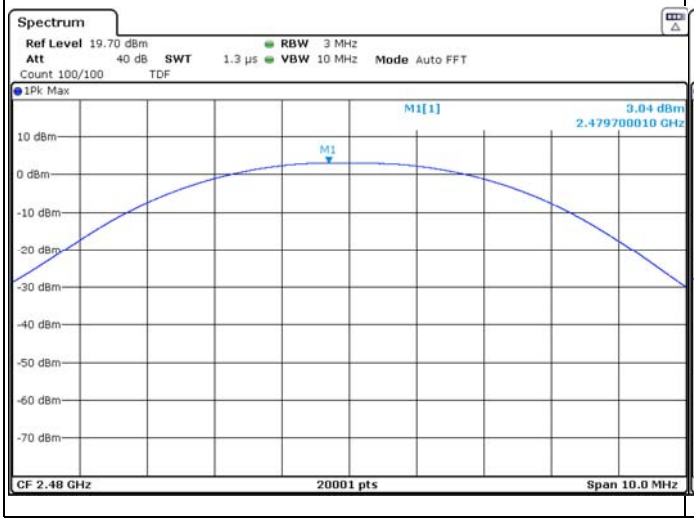
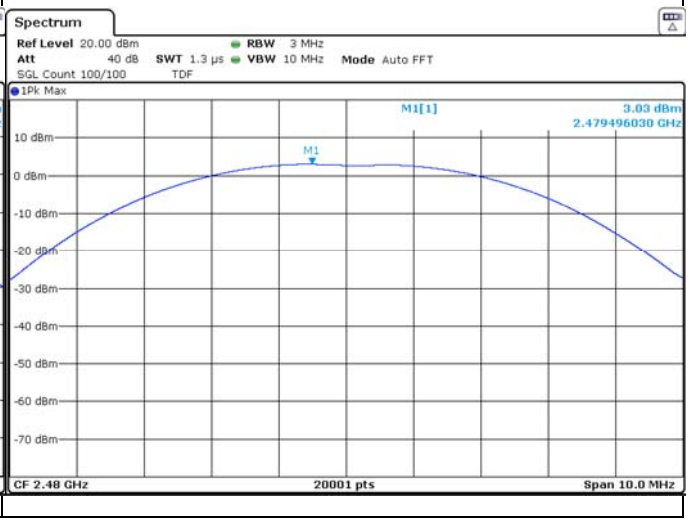
Test Mode	Channel	Frequency [MHz]	Peak Power [dBm]	Limit [dBm]	Margin [dB]
125 kbps	Lowest	2 402	2.72	30.00	27.28
	Middle	2 441	3.47	30.00	26.53
	Highest	2 480	3.01	30.00	26.99
Worst Result			3.47	30.00	26.53
500 kbps	Lowest	2 402	2.71	30.00	27.29
	Middle	2 441	3.48	30.00	26.52
	Highest	2 480	3.12	30.00	26.88
Worst Result			3.48	30.00	26.52
1 Mbps	Lowest	2 402	3.14	30.00	26.86
	Middle	2 441	3.52	30.00	26.48
	Highest	2 480	3.04	30.00	26.96
Worst Result			3.52	30.00	26.48
2 Mbps	Lowest	2 402	2.58	30.00	27.42
	Middle	2 441	3.41	30.00	26.59
	Highest	2 480	3.03	30.00	26.97
Worst Result			3.41	30.00	26.59

[Test Plot of Average Power]

Test Mode	Channel	Frequency [MHz]	Aveage Power [dBm]	Aveage Power [mW]
125 kbps	Lowest	2 402	2.61	1.82
	Middle	2 440	3.41	2.19
	Highest	2 480	2.90	1.95
500 kbps	Lowest	2 402	2.64	1.84
	Middle	2 440	3.45	2.21
	Highest	2 480	2.94	1.97
1 Mbps	Lowest	2 402	2.67	1.85
	Middle	2 440	3.43	2.20
	Highest	2 480	2.95	1.97
2 Mbps	Lowest	2 402	2.42	1.75
	Middle	2 440	3.21	2.09
	Highest	2 480	2.76	1.89

[Test Plot of Peak Power]

125 kbps_2 402 MHz	500 kbps_2 402 MHz
	
125 kbps_2 440 MHz	**500 kbps_2 440 MHz**
	
125 kbps_2 480 MHz	**500 kbps_2 480 MHz**
	

1 Mbps_2 402 MHz	2 Mbps_2 402 MHz
	
1 Mbps_2 440 MHz	**2 Mbps_2 440 MHz**
	
1 Mbps_2 480 MHz	**2 Mbps_2 480 MHz**
	

3.4 Power Spectral Density

3.4.1 Regulation

§15.247(e) : 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. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

3.4.2 Test Procedure

The following procedure shall be used if maximum peak conducted output power was used to determine compliance, and it is optional if the maximum conducted (average) output power was used to determine compliance:

a) Set analyzer center frequency to DTS channel center frequency.

b) Set the span to 1.5 times the DTS bandwidth.

c) Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.

d) Set the VBW ≥ [3 × RBW].

e) Detector = peak.

f) Sweep time = auto couple.

g) Trace mode = max hold.

h) Allow trace to fully stabilize.

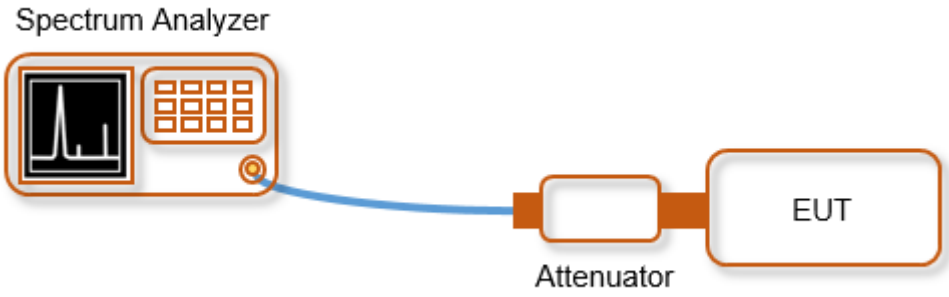
i) Use the peak marker function to determine the maximum amplitude level within the RBW.

j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

3.4.3 Deviation from Test Standard

No deviation.

3.4.4 Test Setup

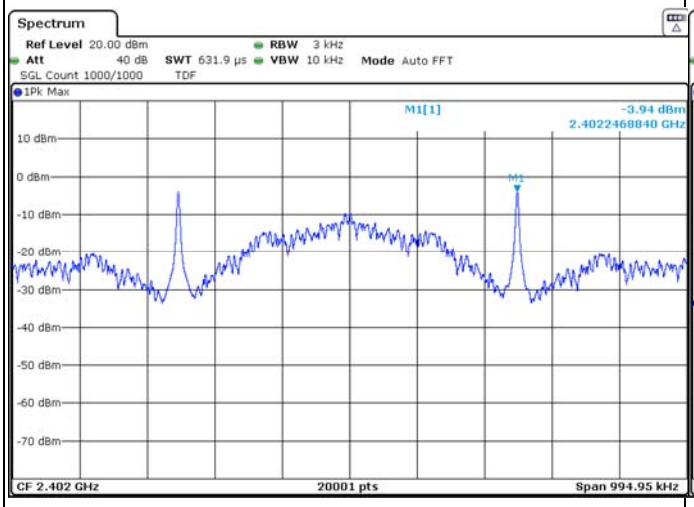
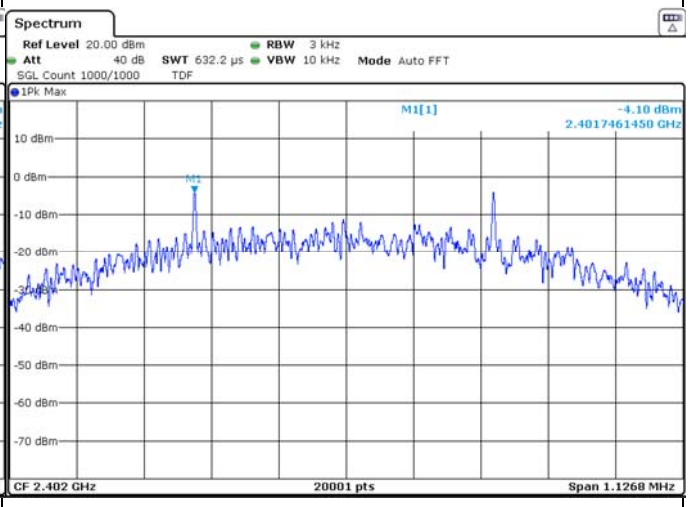
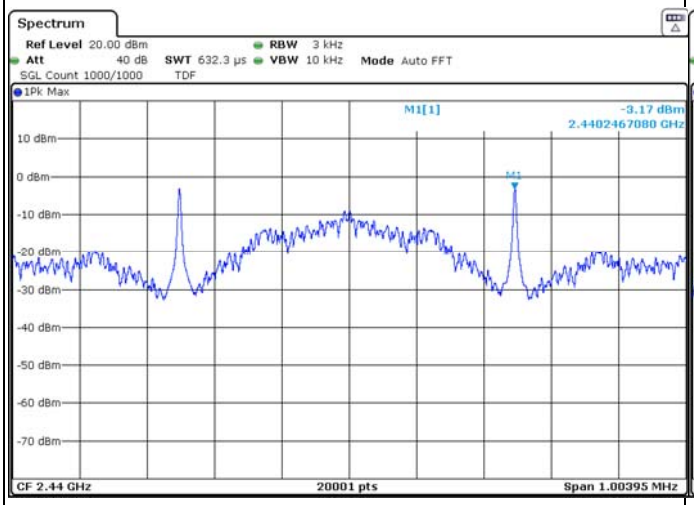
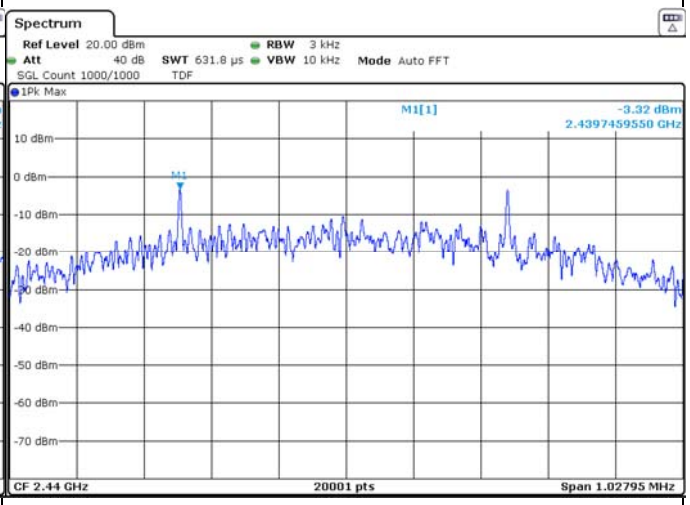
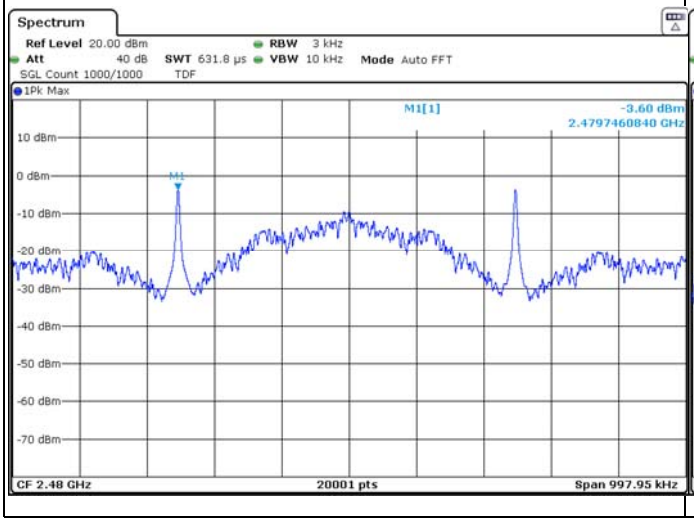
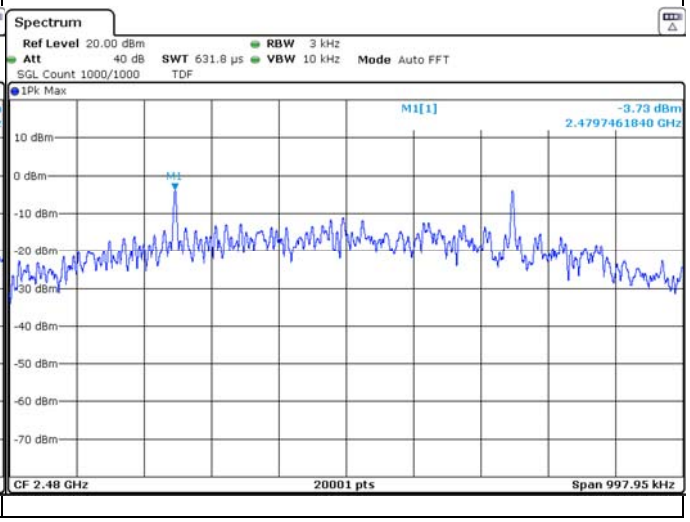


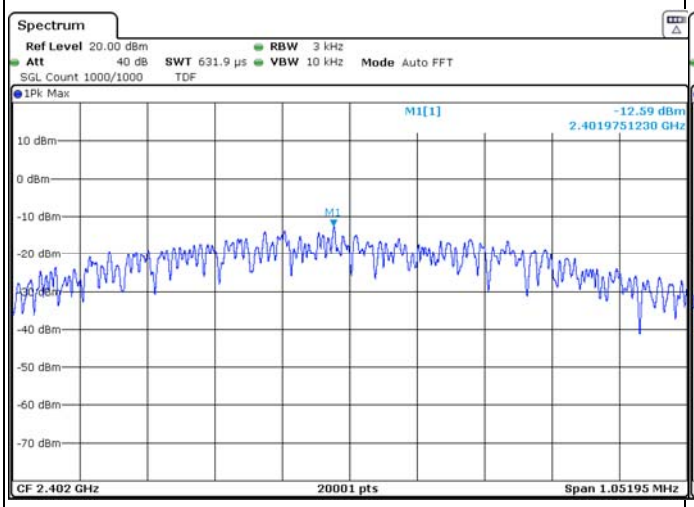
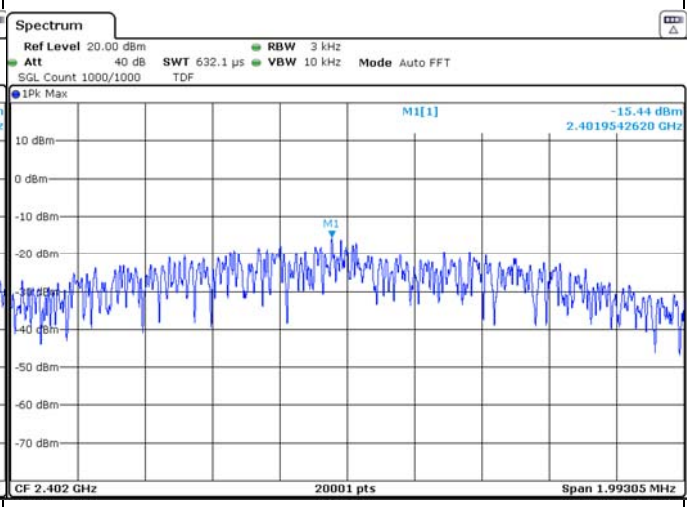
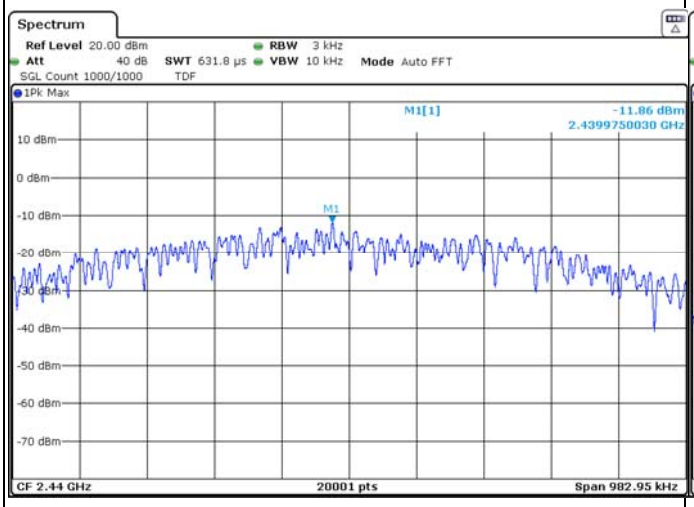
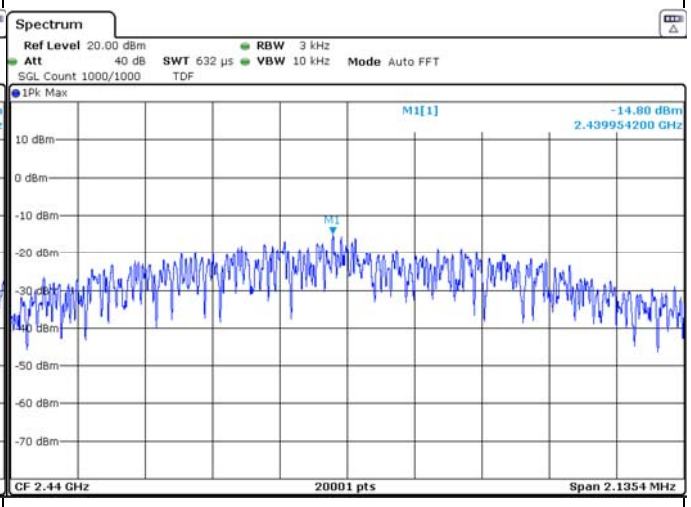
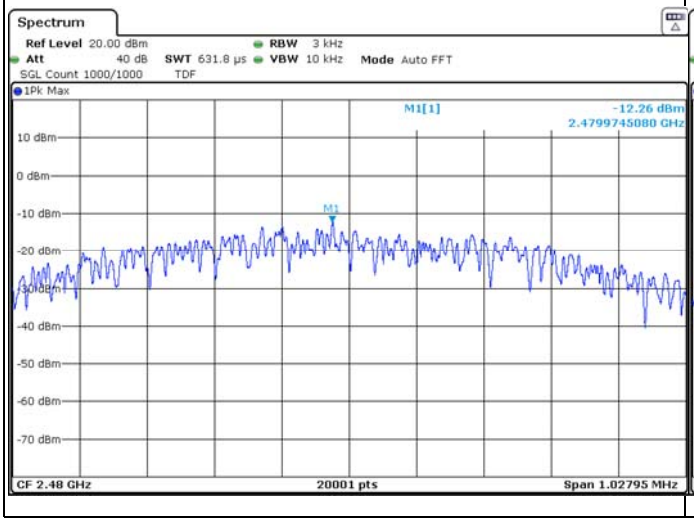
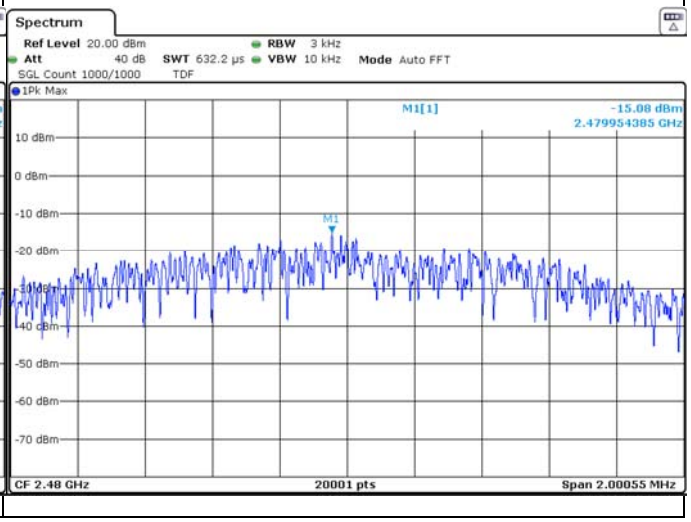
3.4.5 Test Result

[Test Data of Power Spectral Density]

Test Mode	Channel	Frequency [MHz]	PSD [dBm/3 kHz]	Limit [dBm/3 kHz]	Margin [dB]
125 kbps	Lowest	2 402	-3.94	8.00	11.94
	Middle	2 440	-3.17	8.00	11.17
	Highest	2 480	-3.60	8.00	11.60
500 kbps	Lowest	2 402	-4.10	8.00	12.10
	Middle	2 440	-3.32	8.00	11.32
	Highest	2 480	-3.73	8.00	11.73
1 Mbps	Lowest	2 402	-12.59	8.00	20.59
	Middle	2 440	-11.86	8.00	19.86
	Highest	2 480	-12.26	8.00	20.26
2 Mbps	Lowest	2 402	-15.44	8.00	23.44
	Middle	2 440	-14.80	8.00	22.80
	Highest	2 480	-15.08	8.00	23.08

[Test Plot of Power Spectral Density]

125 kbps_2 402 MHz	500 kbps_2 402 MHz
	
125 kbps_2 440 MHz	**500 kbps_2 440 MHz**
	
125 kbps_2 480 MHz	**500 kbps_2 480 MHz**
	

1 Mbps_2 402 MHz	2 Mbps_2 402 MHz
	
1 Mbps_2 440 MHz	**2 Mbps_2 440 MHz**
	
1 Mbps_2 480 MHz	**2 Mbps_2 480 MHz**
	

3.5 Spurious Emission, Band edge and Restricted Bands

3.5.1 Regulation

§15.247(d) : In any 100 kHz 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 20 dB below that in the 100 kHz 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, 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)).

§15.209(a) : Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
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**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permItted under other sections of this part, e.g., §§15.231 and 15.241.

§15.205(a) : Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

[1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2]Above 38.6

§15.205 (b) : Except as provided in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

3.5.2 Test Procedure

Band-edge Compliance for RF Conducted Emissions

These procedures are applicable for determining compliance at authorized-band band-edges where the requirements are expressed as a value relative to the in-band signal level. Procedures for determining compliance with field strength limits at or close to the band-edges are given in 6.10.6 (see also Table A.2).

Band-edge tests are typically performed as a conducted test but may be performed as radiated measurements on a test site meeting the specifications in 5.2, at the measurement distances specified in 5.3. The instrumentation shall meet the requirements in 4.1.1 using the bandwidths and detectors specified in 4.1.4.2.

When performing radiated measurements, the measurement antenna(s) shall meet the specifications in 4.3. The EUT shall be connected to an antenna and operated at the highest power settings following procedures in 6.3.

For other than frequency-hopping devices, this test sequence shall be performed once. For devices that support frequency hopping, this test sequence shall be performed twice: once with the hopping function turned OFF and then repeated with the hopping function turned ON. The purpose of the test with the hopping function turned on is to confirm that the RF power remains OFF while the device is changing frequencies, and that the oscillator stabilizes at the new frequency before RF power is turned back ON. Overshoot of any oscillator, including phase-lock-loop stabilized oscillators, can cause the device to be temporarily tuned to frequencies outside the authorized band, and it is important that no transmissions occur during such temporary periods. Particular attention to the hopping sequence requirements specified below is needed in the case of adaptive frequency-hopping devices:

a) Connect the EMI receiver or spectrum analyzer to the EUT using an appropriate RF cable connected to the EUT output. Configure the spectrum analyzer settings as described in step e) (be sure to enter all losses between the unlicensed wireless device output and the spectrum analyzer).

b) Set the EUT to the lowest frequency channel (for the hopping on test, the hopping sequence shall include the lowest frequency channel).

c) Set the EUT to operate at maximum output power and 100% duty cycle, or equivalent “normalmode of operation” as specified in 6.10.3.

d) If using the radiated method, then use the applicable procedure(s) of 6.4, 6.5, or 6.6, and orient the EUT and measurement antenna positions to produce the highest emission level.

e) Perform the test as follows:

    1) Span: Wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products that fall outside of the authorized band of operation.

    2) Reference level: As required to keep the signal from exceeding the maximum instrument input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.

    3) Attenuation: Auto (at least 10 dB preferred).

    4) Sweep time: Coupled.

    5) Resolution bandwidth: 100 kHz.

    6) Video bandwidth: 300 kHz.

    7) Detector: Peak.

    8) Trace: Max hold.

f) Allow the trace to stabilize. For the test with the hopping function turned ON, this can takeseveral minutes to achieve a reasonable probability of intercepting any emissions due to oscillator overshoot.

g) Set the marker on the emission at the band edge, or on the highest modulation product outside of the band, if this level is greater than that at the band edge. Enable the marker-delta function, and then use the marker-to-peak function to move the marker to the peak of the in-band emission.

h) Repeat step c) through step e) for every applicable modulation.

i) Set the EUT to the highest frequency channel (for the hopping on test, the hopping sequence shall include the highest frequency channel) and repeat step c) through step d).

j) The band-edge measurement shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

Spurious RF Conducted Emissions

Conducted spurious emissions shall be measured for the transmit frequency, per 5.5 and 5.6, and at the maximum transmit powers.

Connect the primary antenna port through an attenuator to the spectrum analyzer input; in the results,account for all losses between the unlicensed wireless device output and the spectrum analyzer. The instrument shall span 30 MHz to 10 times the operating frequency in GHz, with a resolution bandwidth of 100 kHz, video bandwidth of 300 kHz, and a coupled sweep time with a peak detector. The band 30 MHz to the highest frequency may be split into smaller spans, as long as the entire spectrum is covered.

Spurious Radiated Emissions

1. The preliminary radiated measurement were performed to determine the frequency producing the maximum emissions in an semi-anechoic chamber at a distance of 3 meters.

2. The EUT was placed on the top of the 0.8-meter height, 1 x 1.5 meter non-metallic table. To find the maximum emission levels, the height of a measuring antenna was changed and the turntable was rotated 360^{o}.

3. The antenna polarization was also changed from vertical to horizontal. The spectrum was scanned from 9 kHz to 30 MHz using the loop antenna, and from 30 to 1000 MHz using the Bi-Log antenna, and from 1000 MHz to 26500 MHz using the horn antenna.

4. To obtain the final measurement data, the EUT was arranged on a turntable situated on a 4 x 4 meter in an semi-anechoic chamber. The EUT was tested at a distance 3 meters.

5. Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector fuction with specified bandwidth.

6. The 0.8 m height is for below 1 GHz testing, and 1.5 m is for above 1GHz testing.

- Procedure for unwanted emissions measurements below 1 000 MHz

The procedure for unwanted emissions measurements below 1 000 MHz is as follows:

a) Follow the requirements in 12.7.4.

b) Compliance shall be determined using CISPR quasi-peak detection; however, peak detection is permitted as an alternative to quasi-peak detection.

- Procedure for peak unwanted emissions measurements above 1 000 MHz

The procedure for peak unwanted emissions measurements above 1 000 MHz is as follows:

a) Follow the requirements in 12.7.4.

b) Peak emission levels are measured by setting the instrument as follows:

1) RBW = 1 MHz.

2) VBW ≥ [3 × RBW].

3) Detector = peak.

4) Sweep time = auto.

5) Trace mode = max hold.

6) Allow sweeps to continue until the trace stabilizes. Note that if the transmission is not ontinuous, then the time required for the trace to stabilize will increase by a factor of pproximately 1 / D, where D is the duty cycle. For example, at 50 % duty cycle, the easurement time will increase by a factor of two, relative to measurement time for ontinuous transmission.

- Procedure for average unwanted emissions measurements above 1 000 MHz

Method VB-A is averaging using reduced video bandwidth. The procedure for this method is as follows:

a) RBW = 1 MHz.

b) Video bandwidth:

1) If the EUT is configured to transmit with D ≥ 98 %, then set VBW ≤ RBW / 100 (i.e., 10 kHz), but not less than 10 Hz.

2) If the EUT D is < 98%, then set VBW ≥ 1 / T, where T is defined in item a1) of 12.2.

c) Video bandwidth mode or display mode:

1) The instrument shall be set with video filtering applied in the power domain. Typically, this requires setting the detector mode to RMS (power averaging) and setting the average-VBW type to power (rms).

2) As an alternative, the instrument may be set to linear detector mode. Video filtering shall be applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode to accomplish this. Others have a setting for average-VBW type, which can be set to "voltage" regardless of the display mode.

d) Detector = peak.

e) Sweep time = auto.

f) Trace mode = max hold.

g) Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 % duty cycle. For lower duty cycles, increase the minimum number of traces by a factor of 1/x, where D is the duty cycle. For example, use at least 200 traces if the duty cycle is 25 %. (If a specific emission is demonstrated to be continuous—i.e., 100 % duty cycle—then rather than turning ON and OFF with the transmit cycle, at least 50 traces should be averaged.)

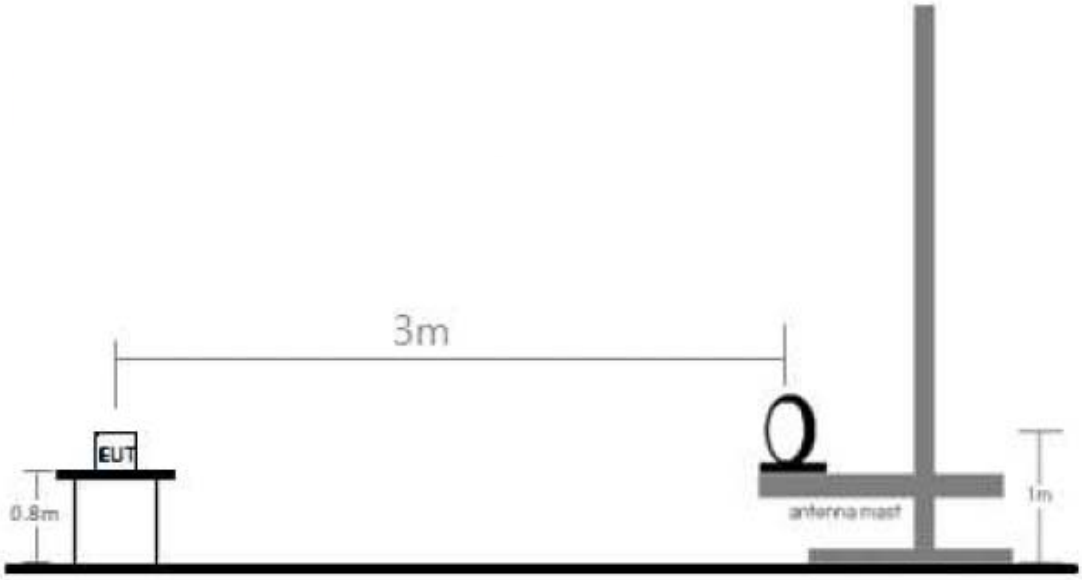
- Sample Calculation

- Field Strength Level [dBµV/m] = Analyzer Level [dBm] + 107 + AFCL [dB/m] + Duty Cycle Correction [dB]
- AFCL [dB/m] = Antenna Factor [dB/m] + Cable loss [dB]
- Margin [dB] = Field Strength Level [dBµV/m] – Limit [dBµV/m]

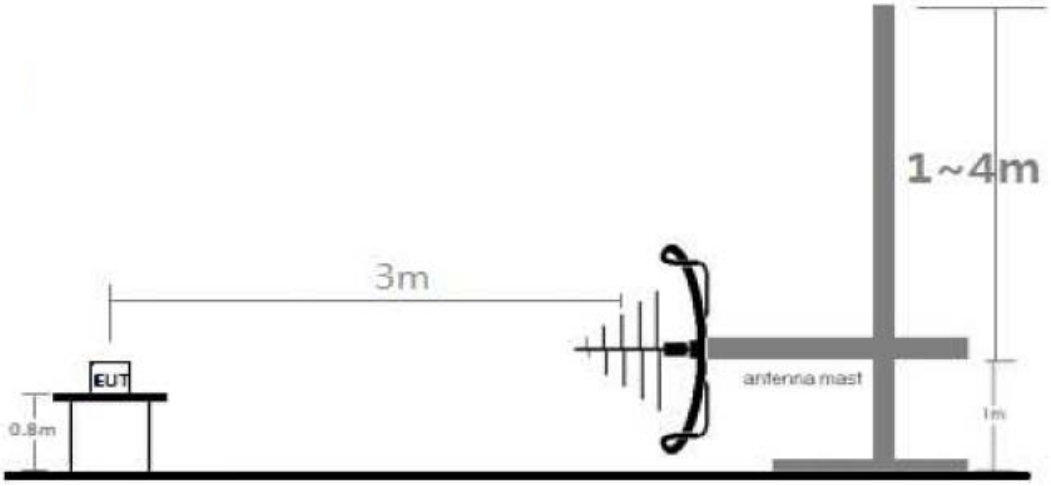
3.5.3 Deviation from Test Standard

No deviation.

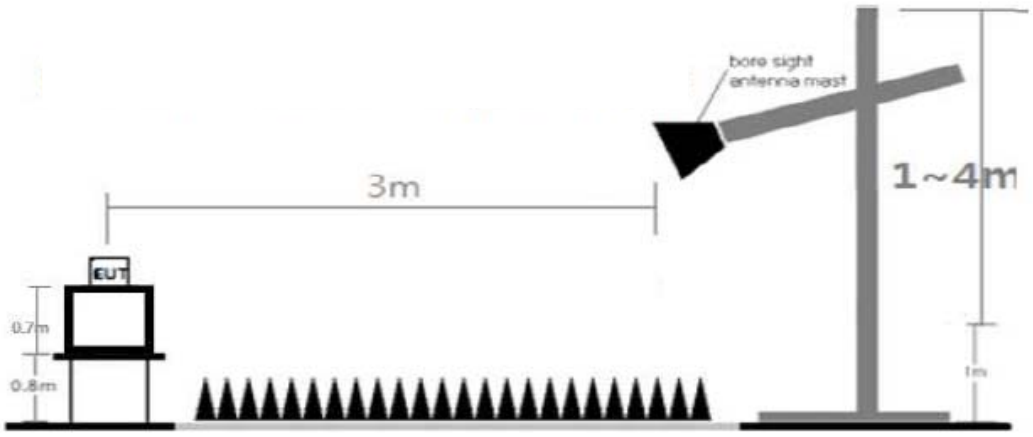
3.5.4 Test Setup

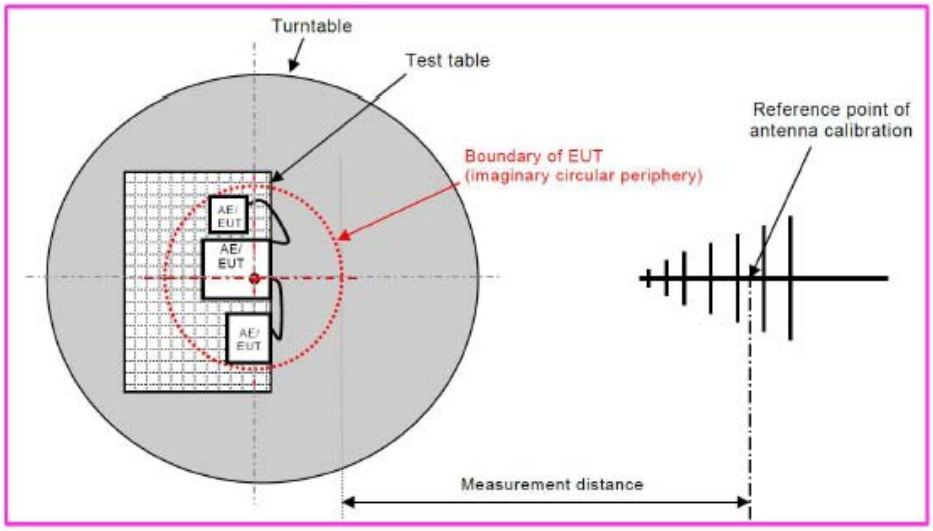


[Radiated Emission Test Setup Below 30 MHz]

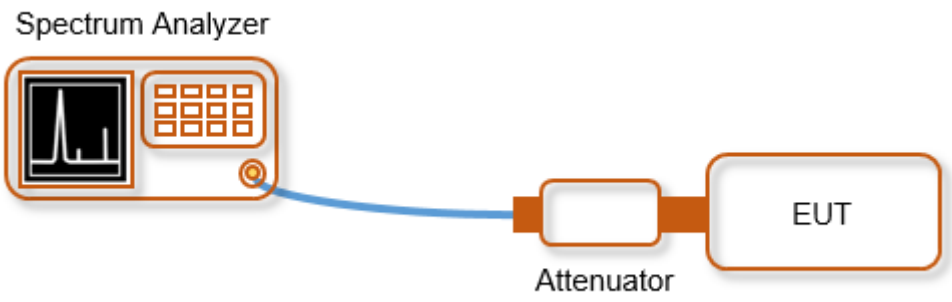


[Radiated Emission Test Setup Below 1 GHz]





[Radiated Emission Test Setup Above 1 GHz]

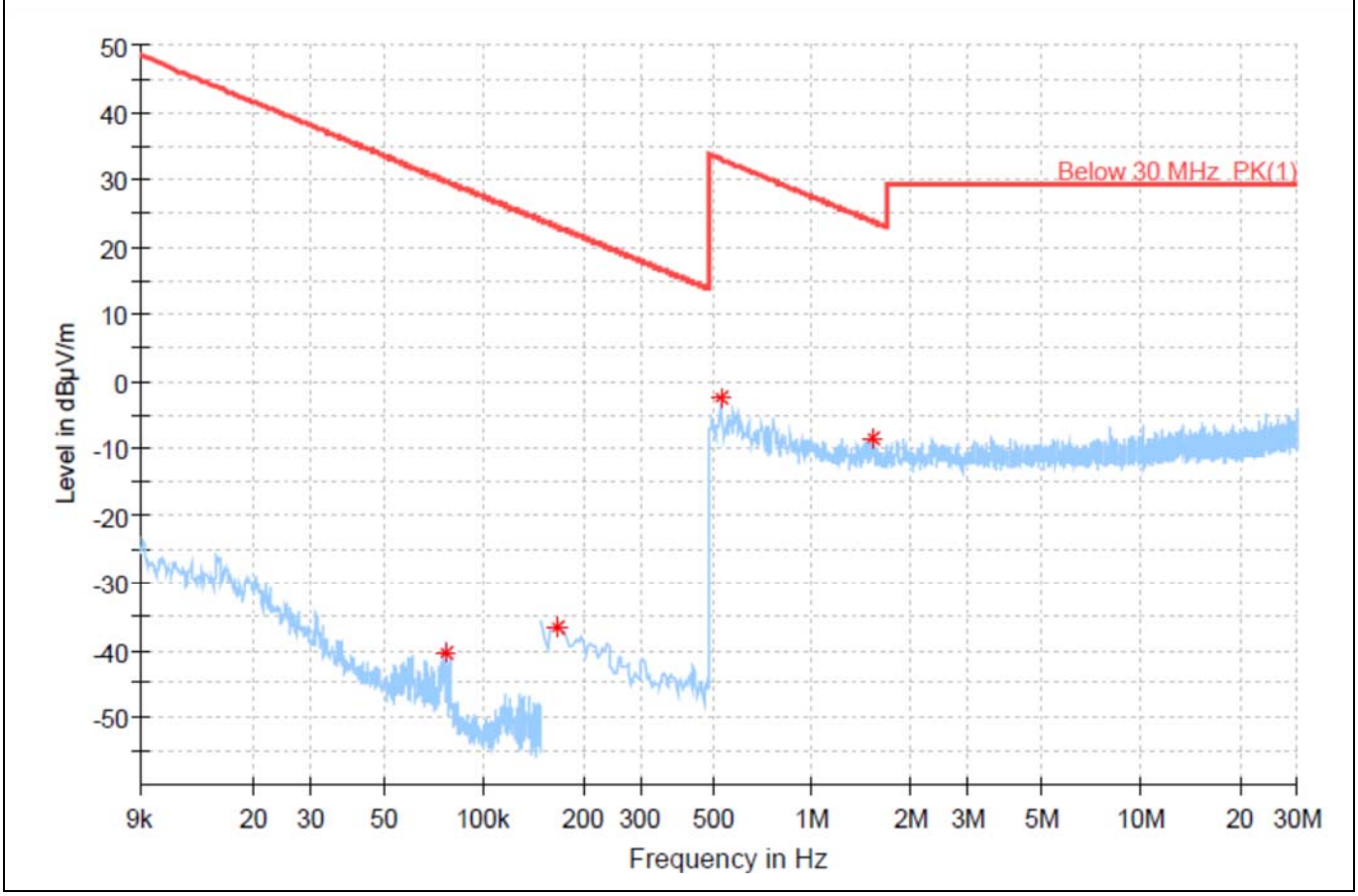


[Conducted Spurious Emission]

3.5.5 Test Result of Radiated Spurious Emission

3.5.5.1 Radiated Emissions (Below 30 MHz)

RSE(Below 30 MHz)_SISO_Bluetooth LE_GFSK_2402_Z



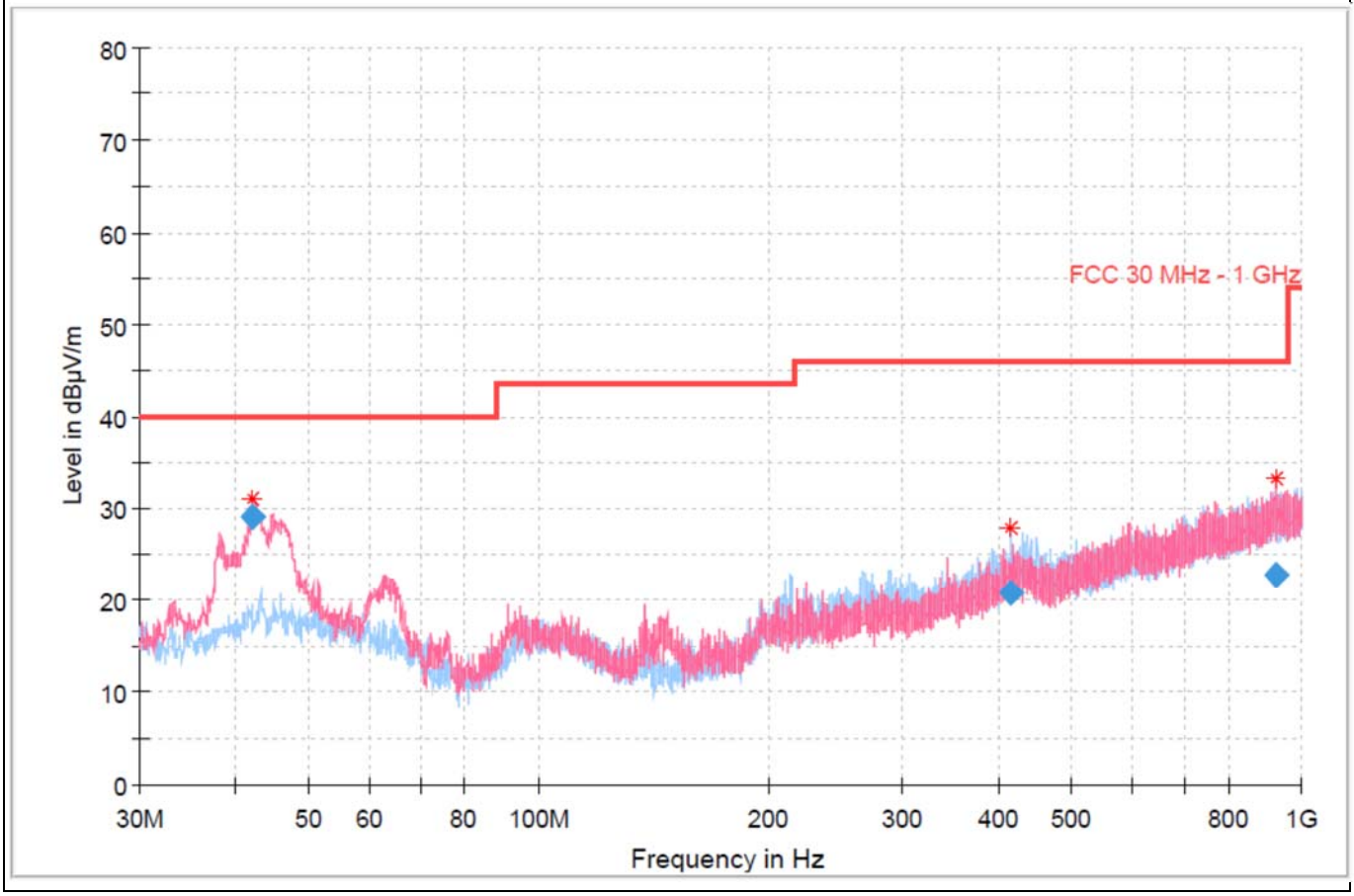
Frequency [MHz]	Peak Reading Value [dBuV/m]	Peak [dBuV/m]	Quasi Reading Value [dBuV/m]	Quasi Peak [dBuV/m]	Distance Factor [dB]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Pol	Azimuth [deg]	Correction Factor [dB]
0.08	19.05	-40.55	-	-	-80.00	29.84	70.40	100.00	H	201.00	-59.60
0.17	22.96	-36.64	-	-	-80.00	23.13	59.76	100.00	H	249.00	-59.60
0.53	17.35	-2.35	-	-	-40.00	33.15	35.49	100.00	H	195.00	-19.70
1.54	10.87	-8.63	-	-	-40.00	23.84	32.47	100.00	H	174.00	-19.50

Remarks

1. Peak(dBuV/m) = Peak Reading Value(dBµV/m) + Correction Factor(dB) + Distance Factor(dB)
2. Correction Factor(dB) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin(dB) = (Peak) Result (dBµV/m) – (Peak) Limit (dBµV/m)

3.5.5.2 Radiated Emissions (Below 1 GHz)

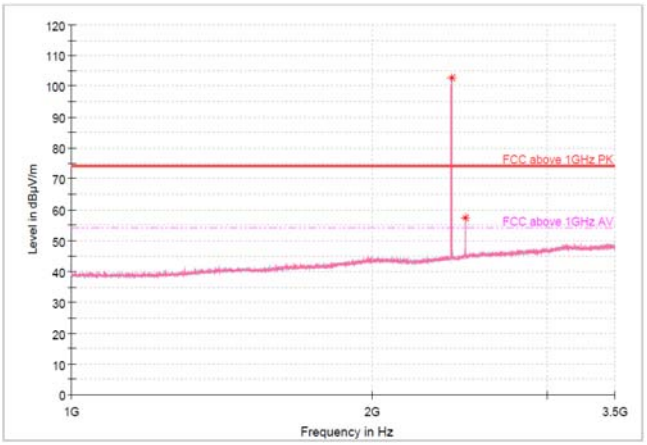
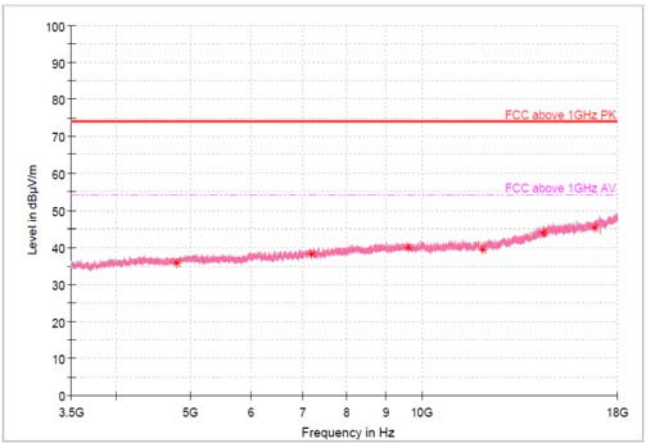
RSE(Below 1 GHz)_SISO_Bluetooth LE_GFSK_2402



Frequency [MHz]	Peak Reading Value [dBuV/m]	Peak [dBuV/m]	Quasi Reading Value [dBuV/m]	Quasi Peak [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Pol	Azimuth [deg]	Correction Factor [dB]
42.29	49.53	29.13	-	-	40.00	10.87	100.0	V	340.00	-20.40
414.39	36.96	20.76	-	-	46.00	25.24	100.0	H	109.00	-16.20
924.66	31.95	22.75	-	-	46.00	23.25	100.0	V	124.00	-9.20

Remarks
1. Peak(dBuV/m) = Peak Reading Value(dBµV/m) + Correction Factor(dB)
2. Correction Factor(dB) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin(dB) = (Peak) Result (dBµV/m) – (Peak) Limit (dBµV/m)

3.5.5.3 Radiated Emissions (Above 1 GHz)

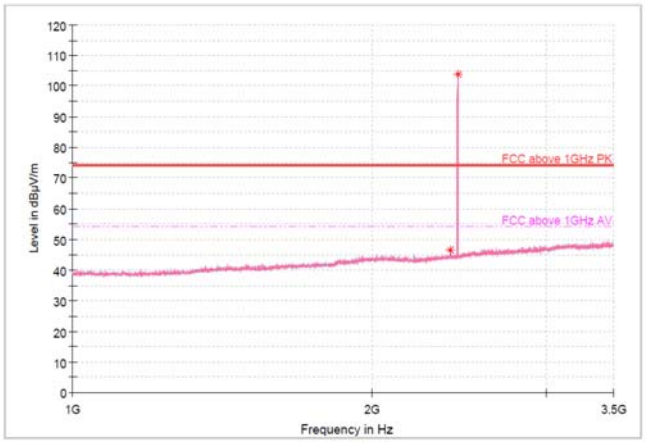
RSE_SISO_ANT1_Bluetooth LE_GFSK_2402_125 kbps	
1 GHz - 3.5 GHz	3.5 GHz - 18 GHz
	

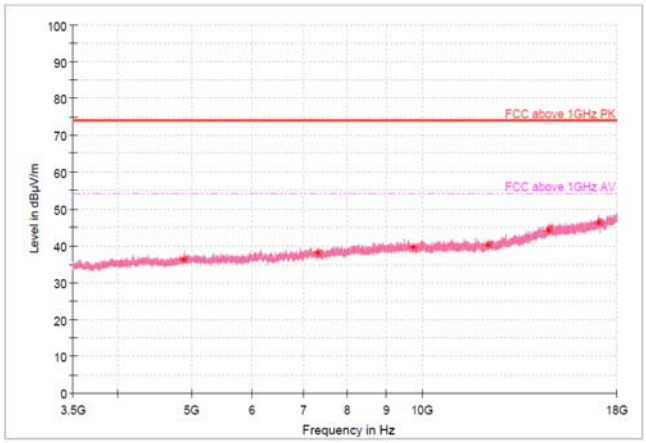
Frequency [MHz]	Peak Reading Value [dBuV/m]	Peak Result [dBuV/m]	AVG Reading Value [dBuV/m]	AVG Result [dBuV/m]	DCCF [dB]	Bandwidth [kHz]	Height [cm]	Pol [H/V]	Azimuth [deg]	Correction Factor [dB/m]	Margin [dB]	Limit [dBuV/m]
4 804.03	58.68	35.88	---	---	---	1 000	400.0	V	10.0	-22.80	38.12	74
7 206.20	57.41	38.31	---	---	---	1 000	100.0	V	0.0	-19.10	35.69	74
9 608.37	56.20	40.00	---	---	---	1 000	400.0	H	111.0	-16.20	34.00	74
12 010.53	53.27	39.47	---	---	---	1 000	300.0	H	146.0	-13.80	34.53	74
14 412.22	56.13	44.03	---	---	---	1 000	100.0	H	4.0	-12.10	29.97	74
16 814.38	53.67	45.37	---	---	---	1 000	100.0	V	317.0	-8.30	28.63	74
19 215.97	40.91	39.91	---	---	---	1 000	100.0	H	353.0	-1.00	34.09	74
21 628.08	38.74	40.44	---	---	---	1 000	100.0	V	162.0	1.70	33.56	74
24 020.36	40.28	40.98	---	---	---	1 000	100.0	H	340.0	0.70	33.02	74
26 422.08	39.86	41.86	---	---	---	1 000	100.0	V	292.0	2.00	32.14	74

Remarks

1. Peak Result(dBµV/m) = Peak Reading Value(dBµV/m) + Correction Factor(dB)
2. Average Result(dBµV/m) = Average Reading Value(dBµV/m) + DCCF + Correction Factor(dB)
3. DCCF(Duty Cycle Correction Factor) = 10 x Log(1/Duty Cycle)
4. Correction Factor(dB) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor (dB)
5. Distance Factor(dB) = 20 x Log(3/4.5) [Reference Distance: 3 m, Measurement Distance: 4.5 m]
6. Margin(dB) = (Peak/Average) Result (dBµV/m) – (Peak/Average) Limit (dBµV/m)

RSE_SISO_ANT1_Bluetooth LE_GFSK_2440_125 kbps	
1 GHz - 3.5 GHz	3.5 GHz - 18 GHz

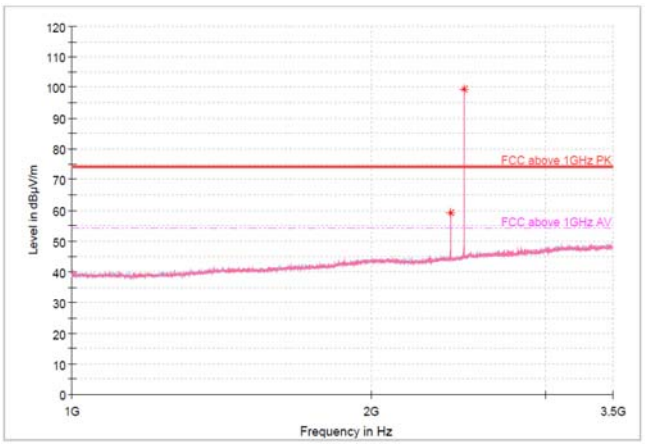
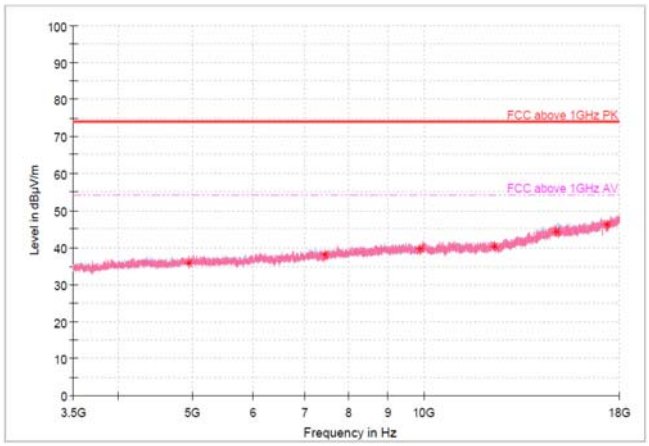




Frequency [MHz]	Peak Reading Value [dBuV/m]	Peak Result [dBuV/m]	AVG Reading Value [dBuV/m]	AVG Result [dBuV/m]	DCCF [dB]	Bandwidth [kHz]	Height [cm]	Pol [H/V]	Azimuth [deg]	Correction Factor [dB/m]	Margin [dB]	Limit [dBuV/m]
4 880.40	58.86	36.46	---	---	---	1 000	100.0	V	130.0	-22.40	37.54	74
7 320.75	57.55	38.25	---	---	---	1 000	100.0	H	29.0	-19.30	35.75	74
9 760.62	55.87	39.87	---	---	---	1 000	100.0	H	0.0	-16.00	34.13	74
12 200.00	54.22	40.22	---	---	---	1 000	100.0	V	356.0	-14.00	33.78	74
14 640.83	55.76	44.36	---	---	---	1 000	100.0	H	275.0	-11.40	29.64	74
17 080.70	54.41	46.11	---	---	---	1 000	100.0	H	139.0	-8.30	27.89	74
19 520.08	42.51	41.51	---	---	---	1 000	100.0	V	19.0	-1.00	32.49	74
21 960.06	38.44	40.44	---	---	---	1 000	100.0	V	278.0	2.00	33.56	74
24 400.03	40.01	40.31	---	---	---	1 000	100.0	H	216.0	0.30	33.69	74

Remarks

1. Peak Result(dBµV/m) = Peak Reading Value(dBµV/m) + Correction Factor(dB)
2. Average Result(dBµV/m) = Average Reading Value(dBµV/m) + DCCF + Correction Factor(dB)
3. DCCF(Duty Cycle Correction Factor) = 10 x Log(1/Duty Cycle)
4. Correction Factor(dB) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor (dB)
5. Distance Factor(dB) = 20 x Log(3/4.5) [Reference Distance: 3 m, Measurement Distance: 4.5 m]
6. Margin(dB) = (Peak/Average) Result (dBµV/m) – (Peak/Average) Limit (dBµV/m)

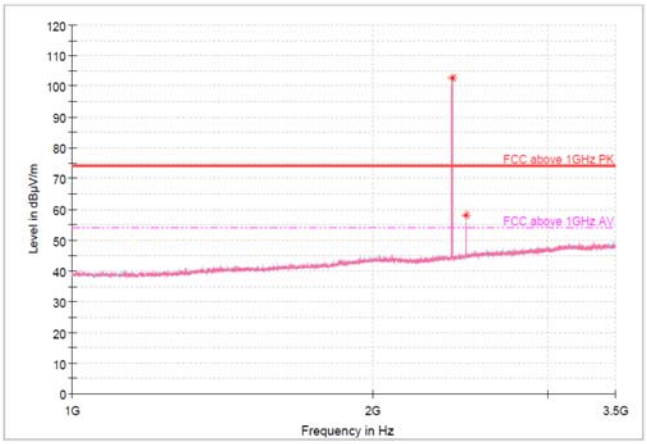
RSE_SISO_ANT1_Bluetooth LE_GFSK_2480_125 kbps	
1 GHz - 3.5 GHz	3.5 GHz - 18 GHz
	

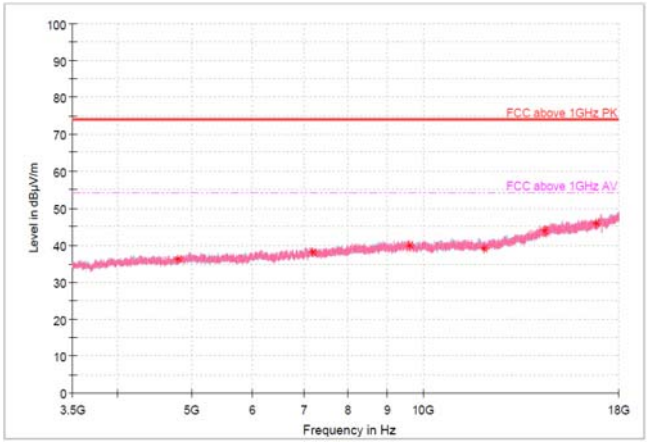
Frequency [MHz]	Peak Reading Value [dBuV/m]	Peak Result [dBuV/m]	AVG Reading Value [dBuV/m]	AVG Result [dBuV/m]	DCCF [dB]	Bandwidth [kHz]	Height [cm]	Pol [H/V]	Azimuth [deg]	Correction Factor [dB/m]	Margin [dB]	Limit [dBuV/m]
4 960.15	58.55	36.25	---	---	---	1 000	100.0	H	139.0	-22.30	37.75	74
7 440.62	57.61	38.41	---	---	---	1 000	100.0	V	0.0	-19.20	35.59	74
9 920.60	55.55	40.25	---	---	---	1 000	100.0	V	123.0	-15.30	33.75	74
12 400.58	54.06	39.66	---	---	---	1 000	100.0	V	110.0	-14.40	34.34	74
14 880.08	54.36	43.76	---	---	---	1 000	100.0	H	288.0	-10.60	30.24	74
17 360.55	54.36	45.86	---	---	---	1 000	100.0	V	162.0	-8.50	28.14	74
19 840.25	39.81	39.91	---	---	---	1 000	100.0	V	104.0	0.10	34.09	74
22 320.36	38.97	41.27	---	---	---	1 000	100.0	H	223.0	2.30	32.73	74
24 800.00	40.62	41.52	---	---	---	1 000	100.0	H	204.0	0.90	32.48	74

Remarks

1. Peak Result(dBµV/m) = Peak Reading Value(dBµV/m) + Correction Factor(dB)
2. Average Result(dBµV/m) = Average Reading Value(dBµV/m) + DCCF + Correction Factor(dB)
3. DCCF(Duty Cycle Correction Factor) = 10 x Log(1/Duty Cycle)
4. Correction Factor(dB) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor (dB)
5. Distance Factor(dB) = 20 x Log(3/4.5) [Reference Distance: 3 m, Measurement Distance: 4.5 m]
6. Margin(dB) = (Peak/Average) Result (dBµV/m) – (Peak/Average) Limit (dBµV/m)

RSE_SISO_ANT1_Bluetooth LE_GFSK_2402_500 kbps	
1 GHz - 3.5 GHz	3.5 GHz - 18 GHz



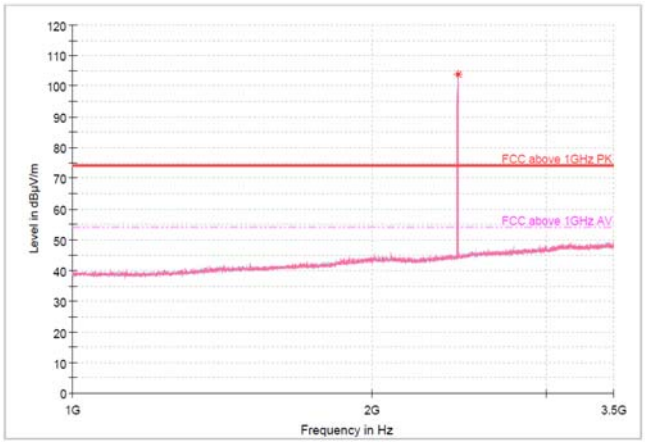


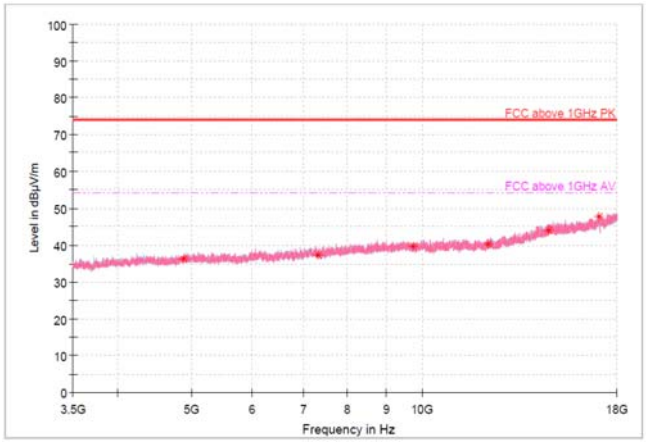
Frequency [MHz]	Peak Reading Value [dBuV/m]	Peak Result [dBuV/m]	AVG Reading Value [dBuV/m]	AVG Result [dBuV/m]	DCCF [dB]	Bandwidth [kHz]	Height [cm]	Pol [H/V]	Azimuth [deg]	Correction Factor [dB/m]	Margin [dB]	Limit [dBuV/m]
4 804.03	58.79	35.99	---	---	---	1 000	100.0	V	65.0	-22.80	38.01	74
7 206.20	56.27	37.17	---	---	---	1 000	100.0	V	215.0	-19.10	36.83	74
9 608.37	55.86	39.66	---	---	---	1 000	100.0	H	320.0	-16.20	34.34	74
12 010.53	53.37	39.57	---	---	---	1 000	100.0	H	275.0	-13.80	34.43	74
14 412.22	54.81	42.71	---	---	---	1 000	100.0	H	80.0	-12.10	31.29	74
16 814.38	53.32	45.02	---	---	---	1 000	100.0	V	351.0	-8.30	28.98	74
19 216.44	40.76	39.76	---	---	---	1 000	100.0	H	55.0	-1.00	34.24	74
21 628.08	39.12	40.82	---	---	---	1 000	100.0	H	80.0	1.70	33.18	74
24 020.83	39.82	40.52	---	---	---	1 000	100.0	V	338.0	0.70	33.48	74
26 422.08	39.79	41.79	---	---	---	1 000	100.0	H	282.0	2.00	32.21	74

Remarks

1. Peak Result(dBµV/m) = Peak Reading Value(dBµV/m) + Correction Factor(dB)
2. Average Result(dBµV/m) = Average Reading Value(dBµV/m) + DCCF + Correction Factor(dB)
3. DCCF(Duty Cycle Correction Factor) = 10 x Log(1/Duty Cycle)
4. Correction Factor(dB) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor (dB)
5. Distance Factor(dB) = 20 x Log(3/4.5) [Reference Distance: 3 m, Measurement Distance: 4.5 m]
6. Margin(dB) = (Peak/Average) Result (dBµV/m) – (Peak/Average) Limit (dBµV/m)

RSE_SISO_ANT1_Bluetooth LE_GFSK_2440_500 kbps	
1 GHz - 3.5 GHz	3.5 GHz - 18 GHz



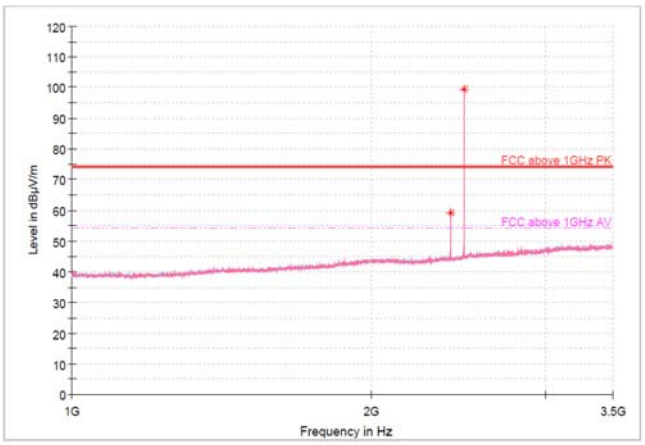


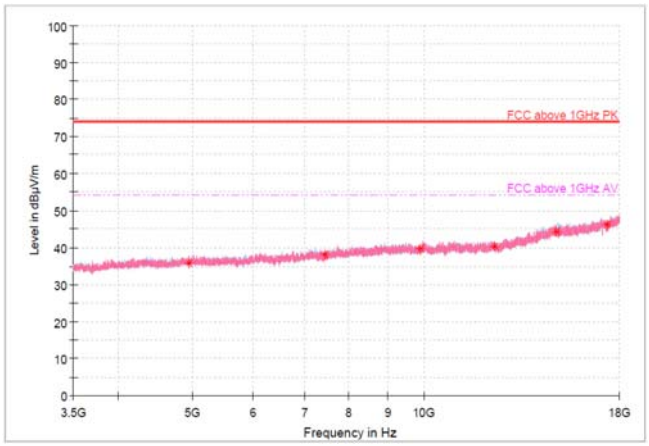
Frequency [MHz]	Peak Reading Value [dBuV/m]	Peak Result [dBuV/m]	AVG Reading Value [dBuV/m]	AVG Result [dBuV/m]	DCCF [dB]	Bandwidth [kHz]	Height [cm]	Pol [H/V]	Azimuth [deg]	Correction Factor [dB/m]	Margin [dB]	Limit [dBuV/m]
4 880.40	58.92	36.52	---	---	---	1 000	100.0	H	269.0	-22.40	37.48	74
7 320.27	56.46	37.16	---	---	---	1 000	100.0	H	0.0	-19.30	36.84	74
9 760.13	55.62	39.62	---	---	---	1 000	100.0	H	210.0	-16.00	34.38	74
12 200.00	54.47	40.47	---	---	---	1 000	100.0	V	259.0	-14.00	33.53	74
14 640.35	55.41	44.01	---	---	---	1 000	100.0	H	36.0	-11.40	29.99	74
17 080.22	55.98	47.68	---	---	---	1 000	100.0	V	208.0	-8.30	26.32	74
19 520.08	42.05	41.05	---	---	---	1 000	100.0	V	247.0	-1.00	32.95	74
21 960.06	38.33	40.33	---	---	---	1 000	100.0	H	113.0	2.00	33.67	74
24 400.03	39.88	40.18	---	---	---	1 000	100.0	H	126.0	0.30	33.82	74

Remarks

1. Peak Result(dBµV/m) = Peak Reading Value(dBµV/m) + Correction Factor(dB)
2. Average Result(dBµV/m) = Average Reading Value(dBµV/m) + DCCF + Correction Factor(dB)
3. DCCF(Duty Cycle Correction Factor) = 10 x Log(1/Duty Cycle)
4. Correction Factor(dB) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor (dB)
5. Distance Factor(dB) = 20 x Log(3/4.5) [Reference Distance: 3 m, Measurement Distance: 4.5 m]
6. Margin(dB) = (Peak/Average) Result (dBµV/m) – (Peak/Average) Limit (dBµV/m)

RSE_SISO_ANT1_Bluetooth LE_GFSK_2480_500 kbps	
1 GHz - 3.5 GHz	3.5 GHz - 18 GHz



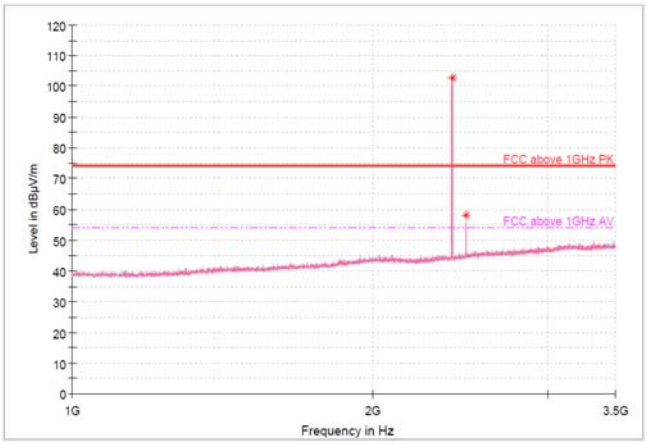


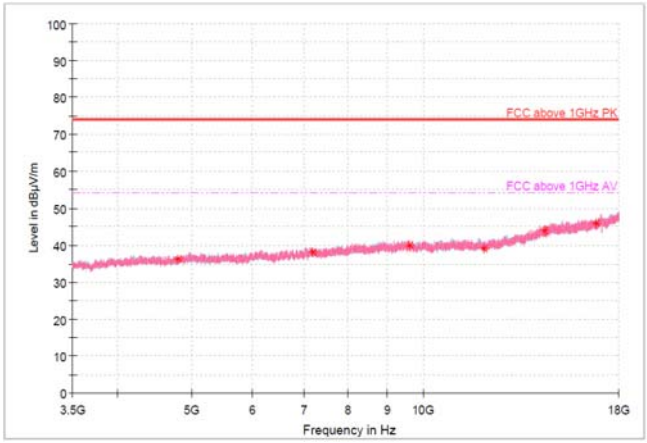
Frequency [MHz]	Peak Reading Value [dBuV/m]	Peak Result [dBuV/m]	AVG Reading Value [dBuV/m]	AVG Result [dBuV/m]	DCCF [dB]	Bandwidth [kHz]	Height [cm]	Pol [H/V]	Azimuth [deg]	Correction Factor [dB/m]	Margin [dB]	Limit [dBuV/m]
4 960.15	58.22	35.92	---	---	---	1 000	100.0	V	359.0	-22.30	38.08	74
7 440.13	57.41	38.21	---	---	---	1 000	100.0	V	189.0	-19.20	35.80	74
9 920.12	55.15	39.85	---	---	---	1 000	100.0	V	0.0	-15.30	34.15	74
12 400.10	54.75	40.35	---	---	---	1 000	100.0	H	120.0	-14.40	33.65	74
14 880.57	54.86	44.26	---	---	---	1 000	100.0	V	208.0	-10.60	29.74	74
17 360.07	54.80	46.30	---	---	---	1 000	100.0	V	254.0	-8.50	27.70	74
19 840.25	40.91	41.01	---	---	---	1 000	100.0	H	4.0	0.10	32.99	74
22 320.36	38.12	40.42	---	---	---	1 000	100.0	V	331.0	2.30	33.58	74
24 800.00	40.47	41.37	---	---	---	1 000	100.0	H	55.0	0.90	32.63	74

Remarks

1. Peak Result(dBµV/m) = Peak Reading Value(dBµV/m) + Correction Factor(dB)
2. Average Result(dBµV/m) = Average Reading Value(dBµV/m) + DCCF + Correction Factor(dB)
3. DCCF(Duty Cycle Correction Factor) = 10 x Log(1/Duty Cycle)
4. Correction Factor(dB) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor (dB)
5. Distance Factor(dB) = 20 x Log(3/4.5) [Reference Distance: 3 m, Measurement Distance: 4.5 m]
6. Margin(dB) = (Peak/Average) Result (dBµV/m) – (Peak/Average) Limit (dBµV/m)

RSE_SISO_ANT1_Bluetooth LE_GFSK_2402_1 Mbps	
1 GHz - 3.5 GHz	3.5 GHz - 18 GHz

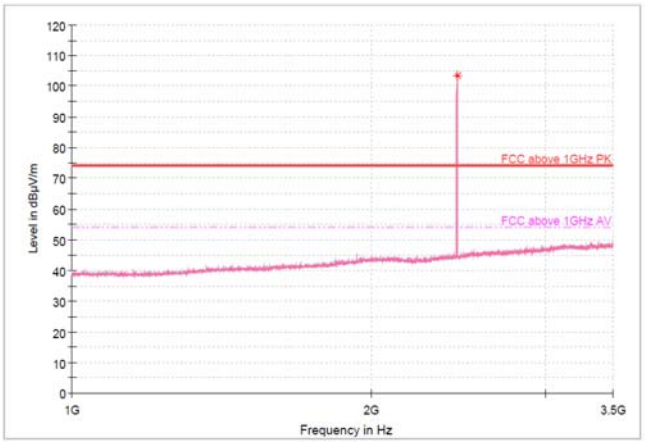
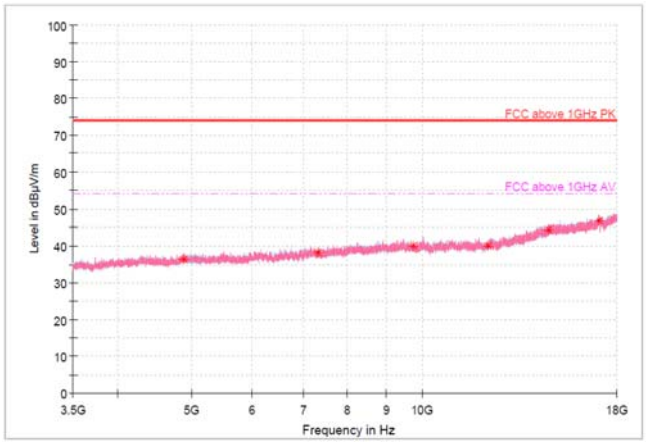




Frequency [MHz]	Peak Reading Value [dBuV/m]	Peak Result [dBuV/m]	AVG Reading Value [dBuV/m]	AVG Result [dBuV/m]	DCCF [dB]	Bandwidth [kHz]	Height [cm]	Pol [H/V]	Azimuth [deg]	Correction Factor [dB/m]	Margin [dB]	Limit [dBuV/m]
4 804.03	59.25	36.45	---	---	---	1 000	100.0	H	61.0	-22.80	37.55	74
7 206.20	57.46	38.36	---	---	---	1 000	100.0	V	306.0	-19.10	35.64	74
9 608.37	56.27	40.07	---	---	---	1 000	100.0	V	228.0	-16.20	33.93	74
12 010.05	52.89	39.09	---	---	---	1 000	100.0	V	0.0	-13.80	34.91	74
14 412.22	55.99	43.89	---	---	---	1 000	100.0	V	202.0	-12.10	30.11	74
16 814.38	54.10	45.80	---	---	---	1 000	100.0	V	150.0	-8.30	28.20	74
19 216.44	40.81	39.81	---	---	---	1 000	100.0	H	152.0	-1.00	34.19	74
21 628.08	39.37	41.07	---	---	---	1 000	100.0	H	0.0	1.70	32.93	74
24 019.89	39.10	39.80	---	---	---	1 000	100.0	V	299.0	0.70	34.20	74
26 422.08	38.82	40.82	---	---	---	1 000	100.0	V	33.0	2.00	33.18	74

Remarks

1. Peak Result(dBµV/m) = Peak Reading Value(dBµV/m) + Correction Factor(dB)
2. Average Result(dBµV/m) = Average Reading Value(dBµV/m) + DCCF + Correction Factor(dB)
3. DCCF(Duty Cycle Correction Factor) = 10 x Log(1/Duty Cycle)
4. Correction Factor(dB) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor (dB)
5. Distance Factor(dB) = 20 x Log(3/4.5) [Reference Distance: 3 m, Measurement Distance: 4.5 m]
6. Margin(dB) = (Peak/Average) Result (dBµV/m) – (Peak/Average) Limit (dBµV/m)

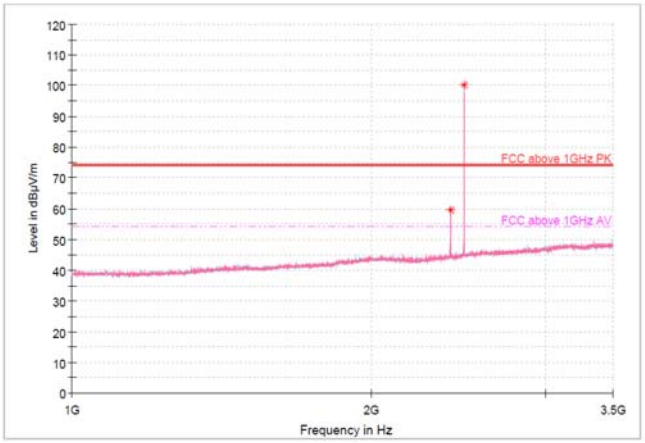
RSE_SISO_ANT1_Bluetooth LE_GFSK_2440_1 Mbps	
1 GHz - 3.5 GHz	3.5 GHz - 18 GHz
	

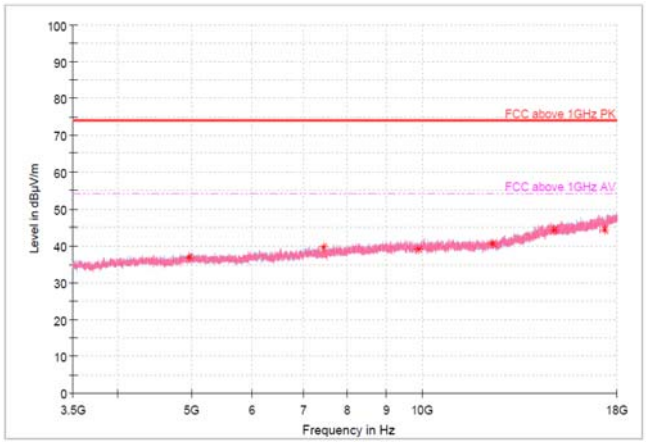
Frequency [MHz]	Peak Reading Value [dBuV/m]	Peak Result [dBuV/m]	AVG Reading Value [dBuV/m]	AVG Result [dBuV/m]	DCCF [dB]	Bandwidth [kHz]	Height [cm]	Pol [H/V]	Azimuth [deg]	Correction Factor [dB/m]	Margin [dB]	Limit [dBuV/m]
4 880.40	58.82	36.42	---	---	---	1 000	100.0	H	42.0	-22.40	37.58	74
7 320.75	57.48	38.18	---	---	---	1 000	100.0	H	120.0	-19.30	35.82	74
9 760.13	56.08	40.08	---	---	---	1 000	100.0	H	42.0	-16.00	33.92	74
12 200.48	54.05	40.05	---	---	---	1 000	100.0	V	214.0	-14.00	33.95	74
14 640.35	55.72	44.32	---	---	---	1 000	100.0	H	314.0	-11.40	29.68	74
17 080.22	55.07	46.77	---	---	---	1 000	100.0	H	275.0	-8.30	27.23	74
19 520.08	41.84	40.84	---	---	---	1 000	100.0	H	107.0	-1.00	33.16	74
21 960.06	38.08	40.08	---	---	---	1 000	100.0	V	359.0	2.00	33.92	74
24 400.50	40.83	41.13	---	---	---	1 000	100.0	V	20.0	0.30	32.87	74

Remarks

1. Peak Result(dBµV/m) = Peak Reading Value(dBµV/m) + Correction Factor(dB)
2. Average Result(dBµV/m) = Average Reading Value(dBµV/m) + DCCF + Correction Factor(dB)
3. DCCF(Duty Cycle Correction Factor) = 10 x Log(1/Duty Cycle)
4. Correction Factor(dB) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor (dB)
5. Distance Factor(dB) = 20 x Log(3/4.5) [Reference Distance: 3 m, Measurement Distance: 4.5 m]
6. Margin(dB) = (Peak/Average) Result (dBµV/m) – (Peak/Average) Limit (dBµV/m)

RSE_SISO_ANT1_Bluetooth LE_GFSK_2480_1 Mbps	
1 GHz - 3.5 GHz	3.5 GHz - 18 GHz

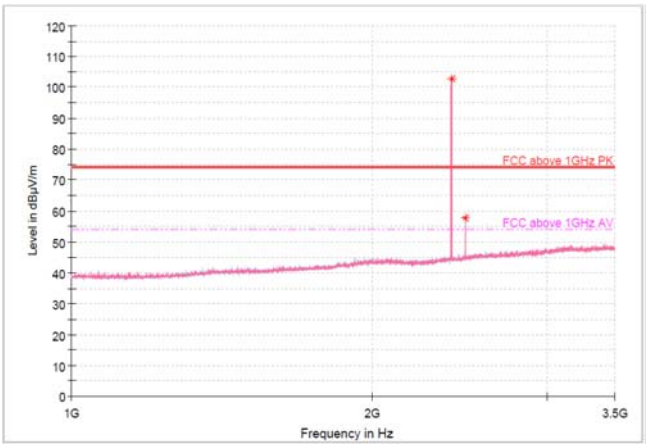
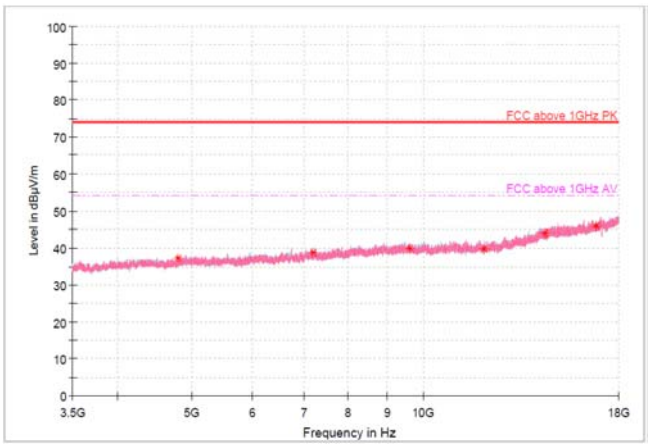




Frequency [MHz]	Peak Reading Value [dBuV/m]	Peak Result [dBuV/m]	AVG Reading Value [dBuV/m]	AVG Result [dBuV/m]	DCCF [dB]	Bandwidth [kHz]	Height [cm]	Pol [H/V]	Azimuth [deg]	Correction Factor [dB/m]	Margin [dB]	Limit [dBuV/m]
4 960.63	59.17	36.87	---	---	---	1 000	100.0	V	26.0	-22.30	37.13	74
7 440.13	58.95	39.75	---	---	---	1 000	100.0	V	240.0	-19.20	34.25	74
9 920.12	54.48	39.18	---	---	---	1 000	100.0	H	42.0	-15.30	34.82	74
12 400.10	55.16	40.76	---	---	---	1 000	100.0	V	311.0	-14.40	33.24	74
14 880.57	54.84	44.24	---	---	---	1 000	100.0	V	330.0	-10.60	29.76	74
17 360.07	52.95	44.45	---	---	---	1 000	100.0	V	246.0	-8.50	29.55	74
19 840.25	39.86	39.96	---	---	---	1 000	100.0	H	249.0	0.10	34.04	74
22 320.36	38.41	40.71	---	---	---	1 000	100.0	H	275.0	2.30	33.29	74
24 800.00	40.81	41.71	---	---	---	1 000	100.0	V	312.0	0.90	32.29	74

Remarks

1. Peak Result(dBµV/m) = Peak Reading Value(dBµV/m) + Correction Factor(dB)
2. Average Result(dBµV/m) = Average Reading Value(dBµV/m) + DCCF + Correction Factor(dB)
3. DCCF(Duty Cycle Correction Factor) = 10 x Log(1/Duty Cycle)
4. Correction Factor(dB) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor (dB)
5. Distance Factor(dB) = 20 x Log(3/4.5) [Reference Distance: 3 m, Measurement Distance: 4.5 m]
6. Margin(dB) = (Peak/Average) Result (dBµV/m) – (Peak/Average) Limit (dBµV/m)

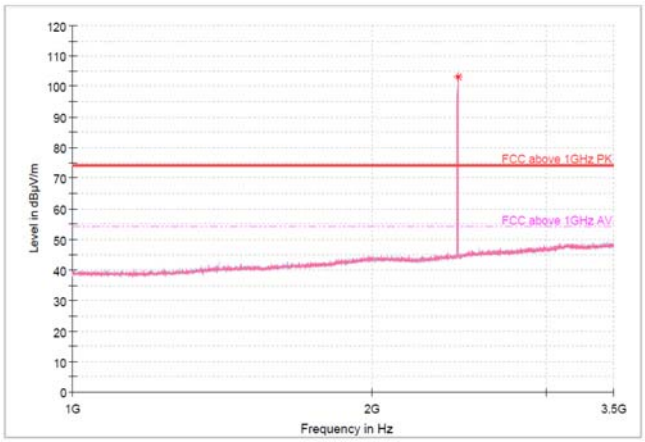
RSE_SISO_ANT1_Bluetooth LE_GFSK_2402_2 Mbps	
1 GHz - 3.5 GHz	3.5 GHz - 18 GHz
	

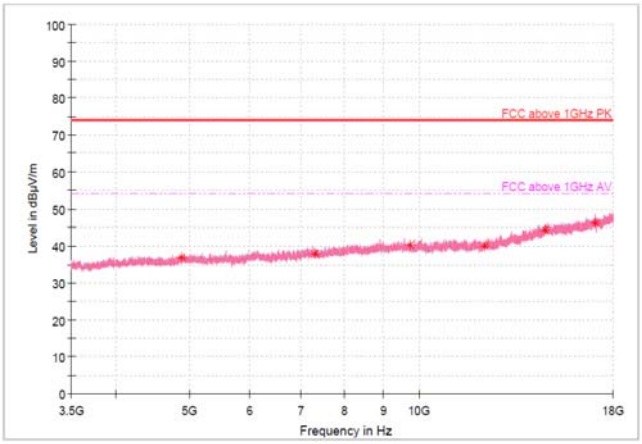
Frequency [MHz]	Peak Reading Value [dBuV/m]	Peak Result [dBuV/m]	AVG Reading Value [dBuV/m]	AVG Result [dBuV/m]	DCCF [dB]	Bandwidth [kHz]	Height [cm]	Pol [H/V]	Azimuth [deg]	Correction Factor [dB/m]	Margin [dB]	Limit [dBuV/m]
4 804.03	60.04	37.24	---	---	---	1 000	100.0	H	275.0	-22.80	36.76	74
7 206.20	57.96	38.86	---	---	---	1 000	100.0	H	29.0	-19.10	35.14	74
9 608.37	56.12	39.92	---	---	---	1 000	100.0	V	195.0	-16.20	34.08	74
12 010.53	53.60	39.80	---	---	---	1 000	100.0	H	113.0	-13.80	34.20	74
14 412.22	56.02	43.92	---	---	---	1 000	100.0	H	314.0	-12.10	30.08	74
16 814.38	54.04	45.74	---	---	---	1 000	100.0	H	0.0	-8.30	28.26	74
19 216.44	40.87	39.87	---	---	---	1 000	100.0	V	240.0	-1.00	34.13	74
21 618.17	39.33	41.03	---	---	---	1 000	100.0	H	4.0	1.70	32.97	74
24 020.83	39.92	40.62	---	---	---	1 000	100.0	V	325.0	0.70	33.38	74
26 422.08	39.41	41.41	---	---	---	1 000	100.0	V	325.0	2.00	32.59	74

Remarks

1. Peak Result(dBµV/m) = Peak Reading Value(dBµV/m) + Correction Factor(dB)
2. Average Result(dBµV/m) = Average Reading Value(dBµV/m) + DCCF + Correction Factor(dB)
3. DCCF(Duty Cycle Correction Factor) = 10 x Log(1/Duty Cycle)
4. Correction Factor(dB) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor (dB)
5. Distance Factor(dB) = 20 x Log(3/4.5) [Reference Distance: 3 m, Measurement Distance: 4.5 m]
6. Margin(dB) = (Peak/Average) Result (dBµV/m) – (Peak/Average) Limit (dBµV/m)

RSE_SISO_ANT1_Bluetooth LE_GFSK_2440_2 Mbps	
1 GHz - 3.5 GHz	3.5 GHz - 18 GHz



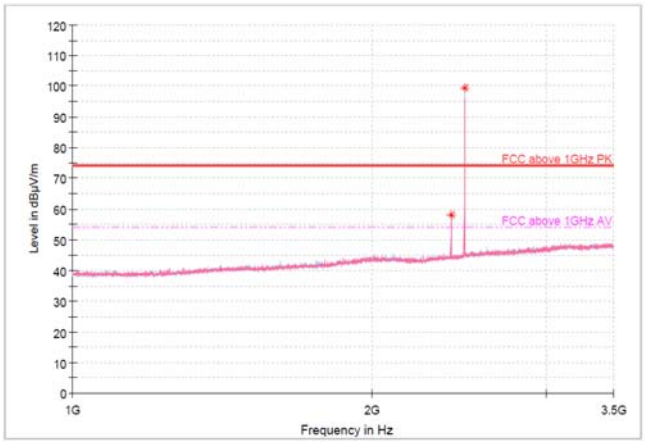


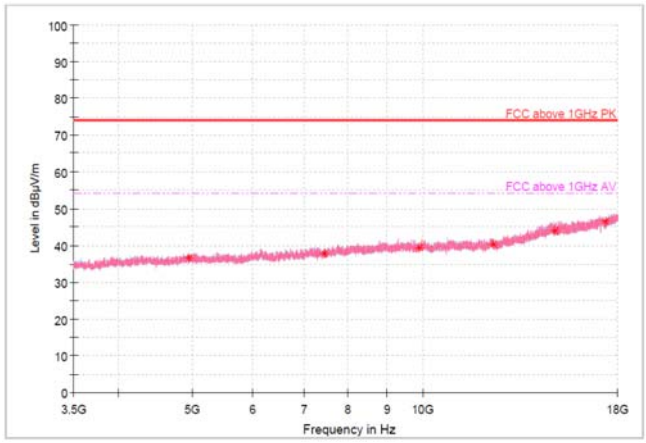
Frequency [MHz]	Peak Reading Value [dBuV/m]	Peak Result [dBuV/m]	AVG Reading Value [dBuV/m]	AVG Result [dBuV/m]	DCCF [dB]	Bandwidth [kHz]	Height [cm]	Pol [H/V]	Azimuth [deg]	Correction Factor [dB/m]	Margin [dB]	Limit [dBuV/m]
4 880.88	59.41	37.01	---	---	---	1 000	100.0	H	165.0	-22.40	36.99	74
7 320.75	57.27	37.97	---	---	---	1 000	100.0	H	0.0	-19.30	36.03	74
9 760.62	56.33	40.33	---	---	---	1 000	100.0	V	162.0	-16.00	33.67	74
12 200.00	53.98	39.98	---	---	---	1 000	100.0	H	114.0	-14.00	34.02	74
14 640.83	55.74	44.34	---	---	---	1 000	100.0	H	23.0	-11.40	29.66	74
17 080.22	54.37	46.07	---	---	---	1 000	100.0	V	13.0	-8.30	27.93	74
19 520.08	42.10	41.10	---	---	---	1 000	100.0	V	273.0	-1.00	32.90	74
21 960.06	38.09	40.09	---	---	---	1 000	100.0	V	195.0	2.00	33.91	74
24 400.03	40.82	41.12	---	---	---	1 000	100.0	V	110.0	0.30	32.88	74

Remarks

1. Peak Result(dBµV/m) = Peak Reading Value(dBµV/m) + Correction Factor(dB)
2. Average Result(dBµV/m) = Average Reading Value(dBµV/m) + DCCF + Correction Factor(dB)
3. DCCF(Duty Cycle Correction Factor) = 10 x Log(1/Duty Cycle)
4. Correction Factor(dB) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor (dB)
5. Distance Factor(dB) = 20 x Log(3/4.5) [Reference Distance: 3 m, Measurement Distance: 4.5 m]
6. Margin(dB) = (Peak/Average) Result (dBµV/m) – (Peak/Average) Limit (dBµV/m)

RSE_SISO_ANT1_Bluetooth LE_GFSK_2480_2 Mbps	
1 GHz - 3.5 GHz	3.5 GHz - 18 GHz



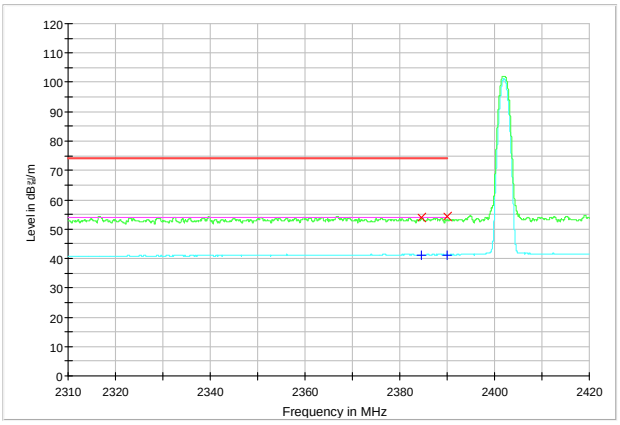
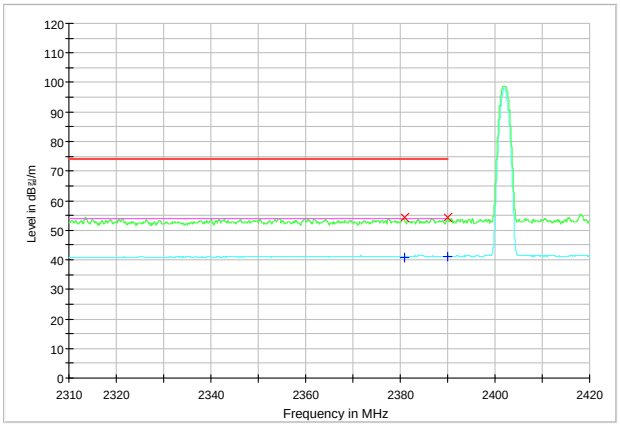


Frequency [MHz]	Peak Reading Value [dBuV/m]	Peak Result [dBuV/m]	AVG Reading Value [dBuV/m]	AVG Result [dBuV/m]	DCCF [dB]	Bandwidth [kHz]	Height [cm]	Pol [H/V]	Azimuth [deg]	Correction Factor [dB/m]	Margin [dB]	Limit [dBuV/m]
4 960.15	59.14	36.84	---	---	---	1 000	100.0	H	249.0	-22.30	37.16	74
7 440.13	57.17	37.97	---	---	---	1 000	100.0	H	184.0	-19.20	36.03	74
9 920.60	54.61	39.31	---	---	---	1 000	100.0	V	124.0	-15.30	34.69	74
12 400.10	54.75	40.35	---	---	---	1 000	100.0	V	59.0	-14.40	33.65	74
14 880.08	54.64	44.04	---	---	---	1 000	100.0	H	171.0	-10.60	29.96	74
17 360.55	55.11	46.61	---	---	---	1 000	100.0	H	4.0	-8.50	27.39	74
19 840.25	39.83	39.93	---	---	---	1 000	100.0	H	204.0	0.10	34.07	74
22 320.36	37.77	40.07	---	---	---	1 000	100.0	V	175.0	2.30	33.93	74
24 480.31	40.83	41.23	---	---	---	1 000	100.0	V	305.0	0.40	32.77	74

Remarks

1. Peak Result(dBµV/m) = Peak Reading Value(dBµV/m) + Correction Factor(dB)
2. Average Result(dBµV/m) = Average Reading Value(dBµV/m) + DCCF + Correction Factor(dB)
3. DCCF(Duty Cycle Correction Factor) = 10 x Log(1/Duty Cycle)
4. Correction Factor(dB) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor (dB)
5. Distance Factor(dB) = 20 x Log(3/4.5) [Reference Distance: 3 m, Measurement Distance: 4.5 m]
6. Margin(dB) = (Peak/Average) Result (dBµV/m) – (Peak/Average) Limit (dBµV/m)

3.5.5.4 Restricted Band Edge Measurements

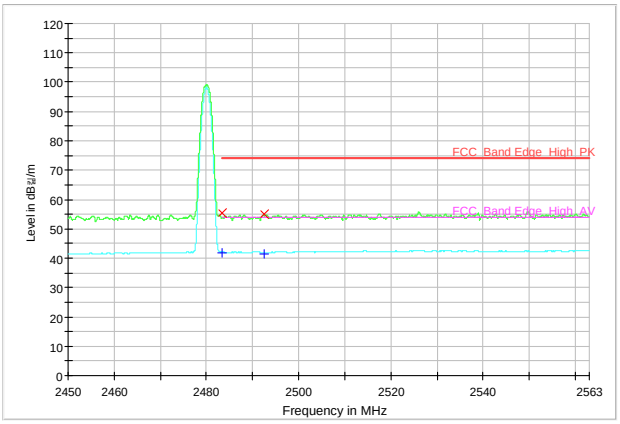
Band Edge_SISO_Bluetooth LE_GFSK_2402_125 kbps	
Horizontal	**Vertical**
	

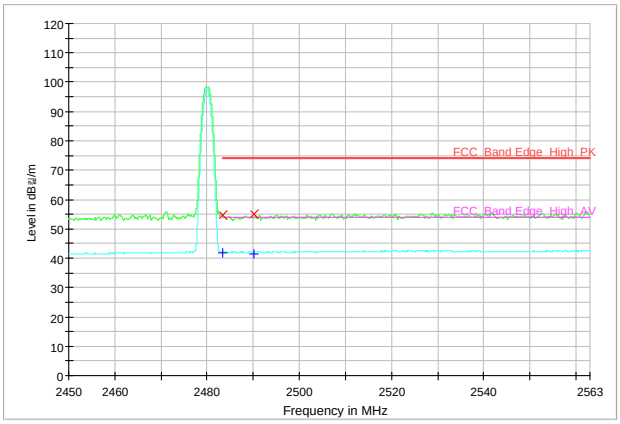
Frequency [MHz]	AVG Reading Value [dBuV/m]	AVG Result [dBuV/m]	Peak Reading Value [dBuV/m]	Peak Result [dBuV/m]	DCCF [dB]	Bandwidth [kHz]	Height [cm]	Pol [H/V]	Azimuth [deg]	Correction Factor [dB/m]	AVG Margin [dB]	AVG Limit [dBuV/m]	Peak Margin [dB]	Peak Limit [dBuV/m]
2 384.57	31.80	40.90	45.00	54.10		1 000	192	H	212	9.10	13.10	54	19.90	74
2 390.00	31.90	41.00	45.30	54.40		1 000	192	H	212	9.10	13.00	54	19.60	74
2 380.80	31.80	40.90	45.30	54.40		1 000	368	V	169	9.10	13.10	54	19.60	74
2 390.00	31.90	41.00	45.00	54.10		1 000	368	V	169	9.10	13.10	54	19.90	74

Remarks

1. Peak Result(dBµV/m) = Peak Reading Value(dBµV/m) + Correction Factor(dB)
2. Average Result(dBµV/m) = Average Reading Value(dBµV/m) + DCCF + Correction Factor(dB)
3. DCCF(Duty Cycle Correction Factor) = 10 x Log(1/Duty Cycle)
4. Correction Factor(dB) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor (dB)
5. Distance Factor(dB) = 20 x Log(3/4.5) [Reference Distance: 3 m, Measurement Distance: 4.5 m]
6. Margin(dB) = (Peak/Average) Result (dBµV/m) – (Peak/Average) Limit (dBµV/m)

Band Edge_SISO_Bluetooth LE_GFSK_2480_125 kbps	
Horizontal	Vertical



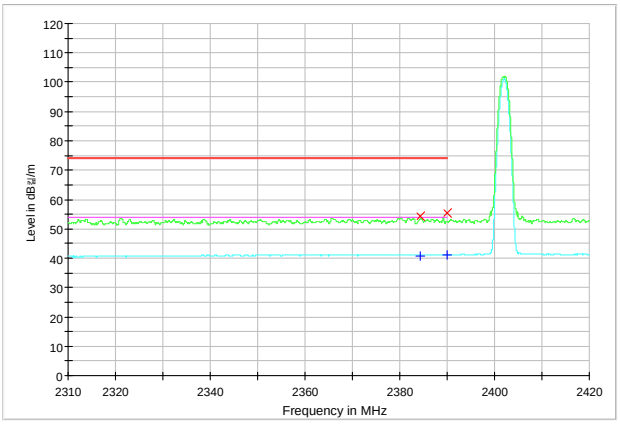


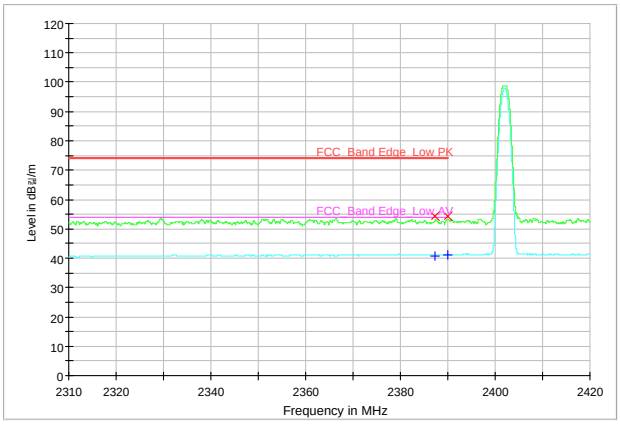
Frequency [MHz]	AVG Reading Value [dBuV/m]	AVG Result [dBuV/m]	Peak Reading Value [dBuV/m]	Peak Result [dBuV/m]	DCCF [dB]	Bandwidth [kHz]	Height [cm]	Pol [H/V]	Azimuth [deg]	Correction Factor [dB/m]	AVG Margin [dB]	AVG Limit [dBuV/m]	Peak Margin [dB]	Peak Limit [dBuV/m]
2 483.50	32.00	41.70	45.70	55.40		1 000	154	H	195	9.70	12.30	54	18.60	74
2 492.53	31.80	41.60	45.20	55.00		1 000	154	H	195	9.80	12.40	54	19.00	74
2 483.50	32.00	41.70	45.10	54.80		1 000	340	V	172	9.70	12.30	54	19.20	74
2 490.17	31.90	41.60	45.40	55.10		1 000	340	V	172	9.70	12.40	54	18.90	74

Remarks

1. Peak Result(dBµV/m) = Peak Reading Value(dBµV/m) + Correction Factor(dB)
2. Average Result(dBµV/m) = Average Reading Value(dBµV/m) + DCCF + Correction Factor(dB)
3. DCCF(Duty Cycle Correction Factor) = 10 x Log(1/Duty Cycle)
4. Correction Factor(dB) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor (dB)
5. Distance Factor(dB) = 20 x Log(3/4.5) [Reference Distance: 3 m, Measurement Distance: 4.5 m]
6. Margin(dB) = (Peak/Average) Result (dBµV/m) – (Peak/Average) Limit (dBµV/m)

Band Edge_SISO_Bluetooth LE_GFSK_2402_500 kbps	
Horizontal	**Vertical**





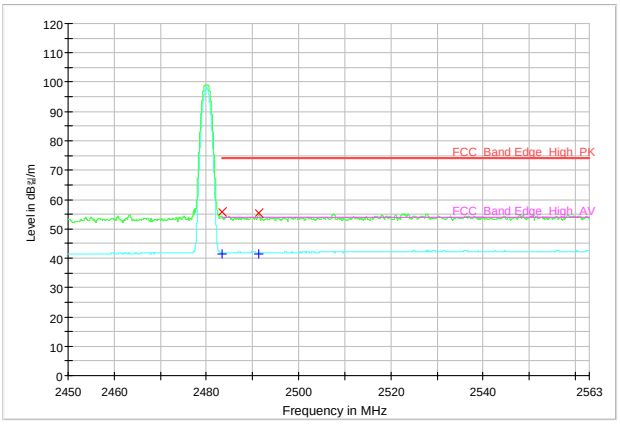
Frequency [MHz]	AVG Reading Value [dBuV/m]	AVG Result [dBuV/m]	Peak Reading Value [dBuV/m]	Peak Result [dBuV/m]	DCCF [dB]	Bandwidth [kHz]	Height [cm]	Pol [H/V]	Azimuth [deg]	Correction Factor [dB/m]	AVG Margin [dB]	AVG Limit [dBuV/m]	Peak Margin [dB]	Peak Limit [dBuV/m]
2 384.40	31.80	40.90	45.20	54.30		1 000	370	H	167	9.10	13.10	54	19.70	74
2 390.00	31.90	41.00	46.20	55.30		1 000	370	H	167	9.10	13.10	54	18.70	74
2 387.39	31.80	40.90	45.30	54.40		1 000	372	V	167	9.10	13.10	54	19.60	74
2 390.00	31.80	40.90	45.20	54.30		1 000	372	V	167	9.10	13.10	54	19.70	74

Remarks

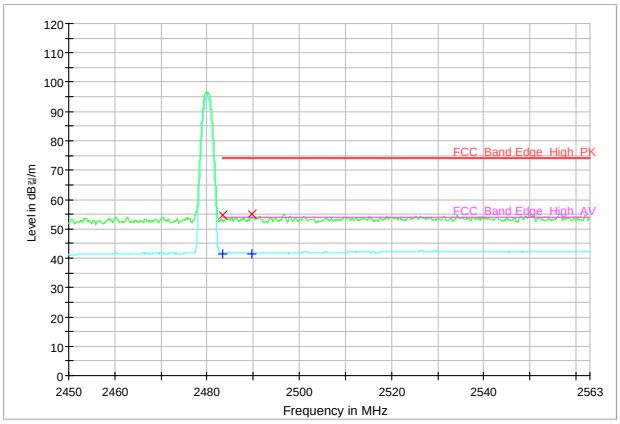
1. Peak Result(dBµV/m) = Peak Reading Value(dBµV/m) + Correction Factor(dB)
2. Average Result(dBµV/m) = Average Reading Value(dBµV/m) + DCCF + Correction Factor(dB)
3. DCCF(Duty Cycle Correction Factor) = 10 x Log(1/Duty Cycle)
4. Correction Factor(dB) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor (dB)
5. Distance Factor(dB) = 20 x Log(3/4.5) [Reference Distance: 3 m, Measurement Distance: 4.5 m]
6. Margin(dB) = (Peak/Average) Result (dBµV/m) – (Peak/Average) Limit (dBµV/m)

Band Edge_SISO_Bluetooth LE_GFSK_2480_500 kbps

Horizontal



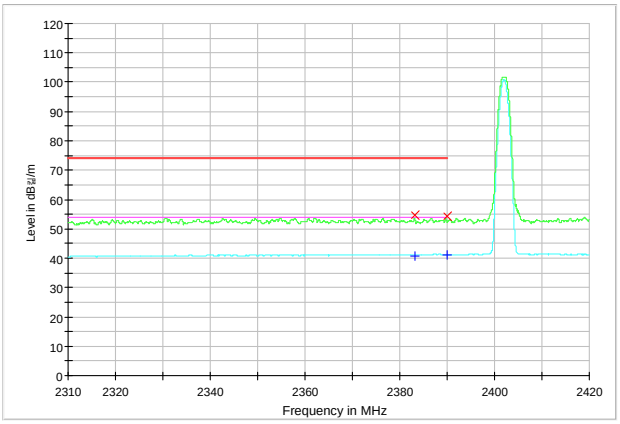
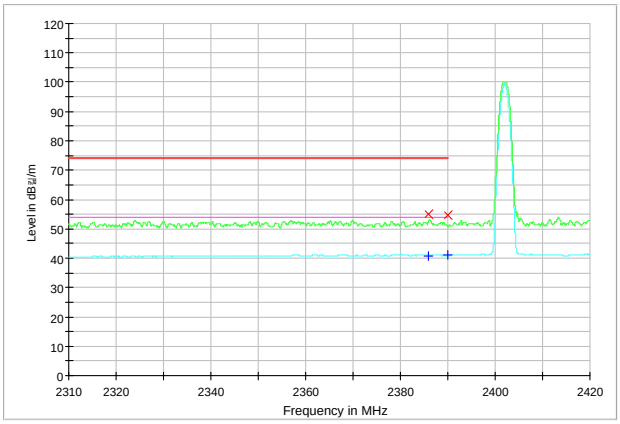
Vertical



Frequency [MHz]	AVG Reading Value [dBuV/m]	AVG Result [dBuV/m]	Peak Reading Value [dBuV/m]	Peak Result [dBuV/m]	DCCF [dB]	Bandwidth [kHz]	Height [cm]	Pol [H/V]	Azimuth [deg]	Correction Factor [dB/m]	AVG Margin [dB]	AVG Limit [dBuV/m]	Peak Margin [dB]	Peak Limit [dBuV/m]
2 483.50	31.90	41.60	46.20	55.90		1 000	193	H	209	9.70	12.40	54	18.20	74
2 491.32	31.80	41.50	45.60	55.30		1 000	193	H	209	9.70	12.50	54	18.70	74
2 483.50	31.90	41.60	45.00	54.70		1 000	354	V	169	9.70	12.50	54	19.30	74
2 489.76	31.80	41.50	45.30	55.00		1 000	354	V	169	9.70	12.50	54	19.00	74

Remarks

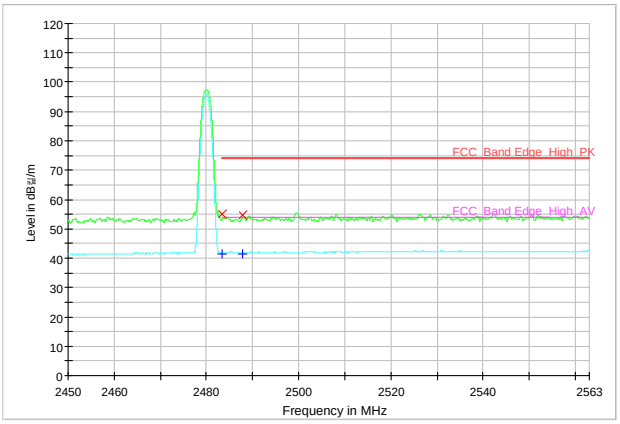
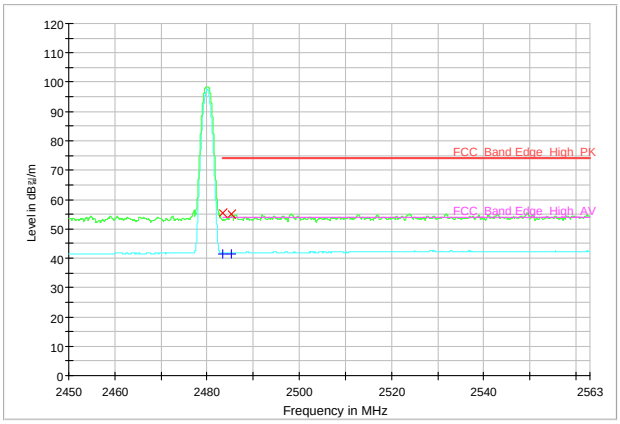
1. Peak Result(dBµV/m) = Peak Reading Value(dBµV/m) + Correction Factor(dB)
2. Average Result(dBµV/m) = Average Reading Value(dBµV/m) + DCCF + Correction Factor(dB)
3. DCCF(Duty Cycle Correction Factor) = 10 x Log(1/Duty Cycle)
4. Correction Factor(dB) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor (dB)
5. Distance Factor(dB) = 20 x Log(3/4.5) [Reference Distance: 3 m, Measurement Distance: 4.5 m]
6. Margin(dB) = (Peak/Average) Result (dBµV/m) – (Peak/Average) Limit (dBµV/m)

Band Edge_SISO_Bluetooth LE_GFSK_2402_1 Mbps	
Horizontal	**Vertical**
	

Frequency [MHz]	AVG Reading Value [dBuV/m]	AVG Result [dBuV/m]	Peak Reading Value [dBuV/m]	Peak Result [dBuV/m]	DCCF [dB]	Bandwidth [kHz]	Height [cm]	Pol [H/V]	Azimuth [deg]	Correction Factor [dB/m]	AVG Margin [dB]	AVG Limit [dBuV/m]	Peak Margin [dB]	Peak Limit [dBuV/m]
2 383.20	31.80	40.90	45.50	54.60		1 000	193	H	221	9.10	13.10	54	19.40	74
2 390.00	31.80	40.90	45.40	54.50		1 000	193	H	221	9.10	13.10	54	19.50	74
2 386.00	31.80	40.90	45.80	54.90		1 000	354	V	161	9.10	13.10	54	19.10	74
2 390.00	31.80	40.90	45.50	54.60		1 000	354	V	161	9.10	13.10	54	19.40	74

Remarks

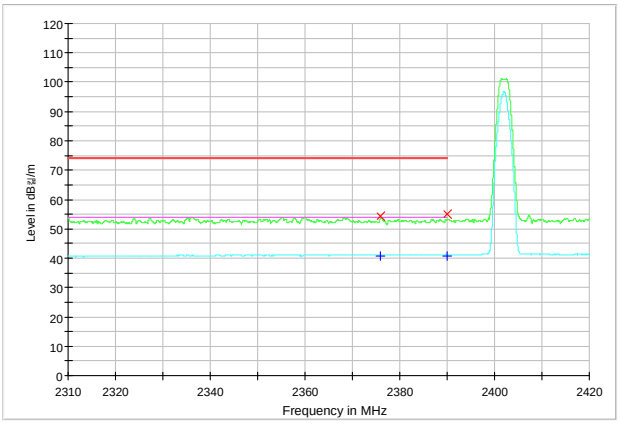
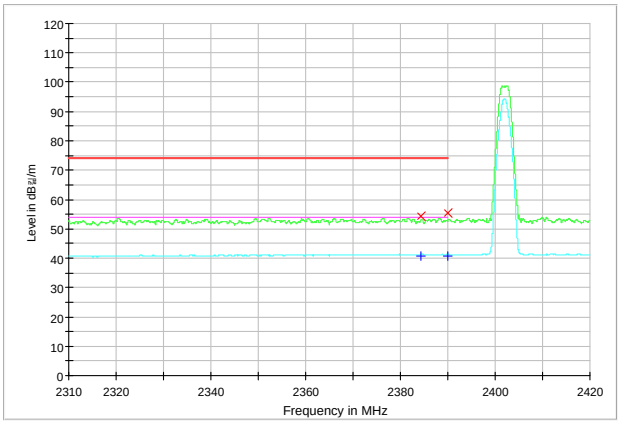
1. Peak Result(dBµV/m) = Peak Reading Value(dBµV/m) + Correction Factor(dB)
2. Average Result(dBµV/m) = Average Reading Value(dBµV/m) + DCCF + Correction Factor(dB)
3. DCCF(Duty Cycle Correction Factor) = 10 x Log(1/Duty Cycle)
4. Correction Factor(dB) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor (dB)
5. Distance Factor(dB) = 20 x Log(3/4.5) [Reference Distance: 3 m, Measurement Distance: 4.5 m]
6. Margin(dB) = (Peak/Average) Result (dBµV/m) – (Peak/Average) Limit (dBµV/m)

Band Edge_SISO_Bluetooth LE_GFSK_2480_1 Mbps	
Horizontal	**Vertical**
	

Frequency [MHz]	AVG Reading Value [dBuV/m]	AVG Result [dBuV/m]	Peak Reading Value [dBuV/m]	Peak Result [dBuV/m]	DCCF [dB]	Bandwidth [kHz]	Height [cm]	Pol [H/V]	Azimuth [deg]	Correction Factor [dB/m]	AVG Margin [dB]	AVG Limit [dBuV/m]	Peak Margin [dB]	Peak Limit [dBuV/m]
2 483.50	31.90	41.60	45.20	54.90		1 000	175	H	204	9.70	12.40	54	19.10	74
2 487.83	31.80	41.50	45.10	54.80		1 000	175	H	204	9.70	12.50	54	19.20	74
2 483.50	31.90	41.60	45.70	55.40		1 000	372	V	194	9.70	12.40	54	18.70	74
2 485.36	31.90	41.60	45.20	54.90		1 000	372	V	194	9.70	12.50	54	19.10	74

Remarks

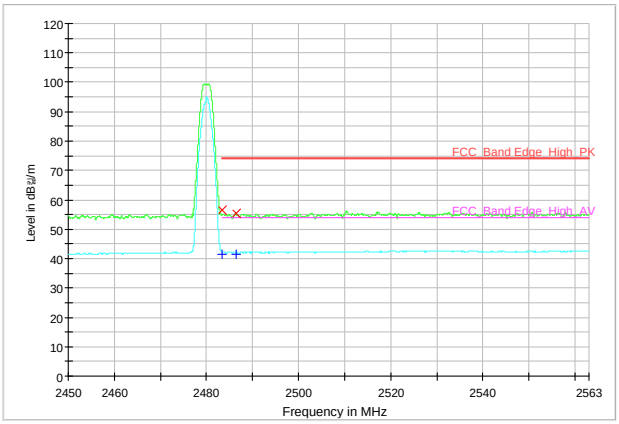
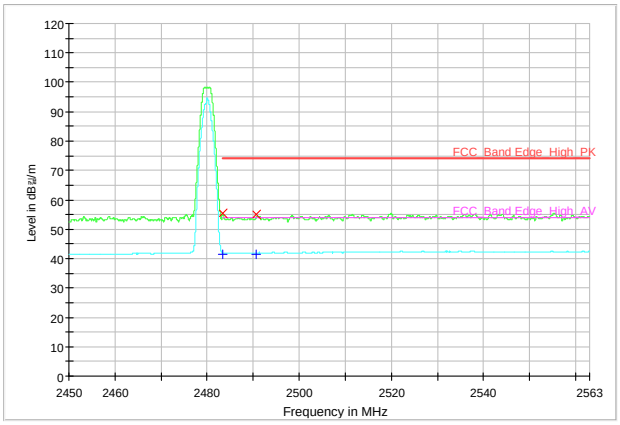
1. Peak Result(dBµV/m) = Peak Reading Value(dBµV/m) + Correction Factor(dB)
2. Average Result(dBµV/m) = Average Reading Value(dBµV/m) + DCCF + Correction Factor(dB)
3. DCCF(Duty Cycle Correction Factor) = 10 x Log(1/Duty Cycle)
4. Correction Factor(dB) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor (dB)
5. Distance Factor(dB) = 20 x Log(3/4.5) [Reference Distance: 3 m, Measurement Distance: 4.5 m]
6. Margin(dB) = (Peak/Average) Result (dBµV/m) – (Peak/Average) Limit (dBµV/m)

Band Edge_SISO_Bluetooth LE_GFSK_2402_2 Mbps	
Horizontal	**Vertical**
	

Frequency [MHz]	AVG Reading Value [dBuV/m]	AVG Result [dBuV/m]	Peak Reading Value [dBuV/m]	Peak Result [dBuV/m]	DCCF [dB]	Bandwidth [kHz]	Height [cm]	Pol [H/V]	Azimuth [deg]	Correction Factor [dB/m]	AVG Margin [dB]	AVG Limit [dBuV/m]	Peak Margin [dB]	Peak Limit [dBuV/m]
2 376.00	31.90	40.90	45.10	54.10		1 000	192	H	221	9.00	13.20	54	19.90	74
2 390.00	31.80	40.90	45.80	54.90		1 000	192	H	221	9.10	13.10	54	19.10	74
2 384.40	31.80	40.90	45.00	54.10		1 000	382	V	168	9.10	13.10	54	19.90	74
2 390.00	31.80	40.90	46.30	55.40		1 000	382	V	168	9.10	13.10	54	18.60	74

Remarks

1. Peak Result(dBµV/m) = Peak Reading Value(dBµV/m) + Correction Factor(dB)
2. Average Result(dBµV/m) = Average Reading Value(dBµV/m) + DCCF + Correction Factor(dB)
3. DCCF(Duty Cycle Correction Factor) = 10 x Log(1/Duty Cycle)
4. Correction Factor(dB) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor (dB)
5. Distance Factor(dB) = 20 x Log(3/4.5) [Reference Distance: 3 m, Measurement Distance: 4.5 m]
6. Margin(dB) = (Peak/Average) Result (dBµV/m) – (Peak/Average) Limit (dBµV/m)

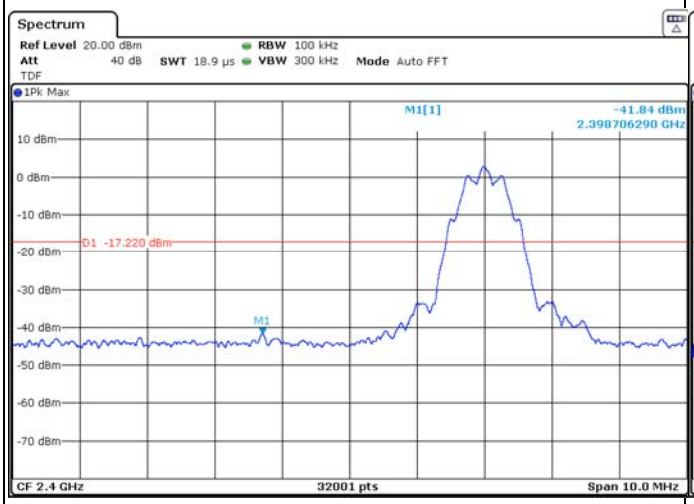
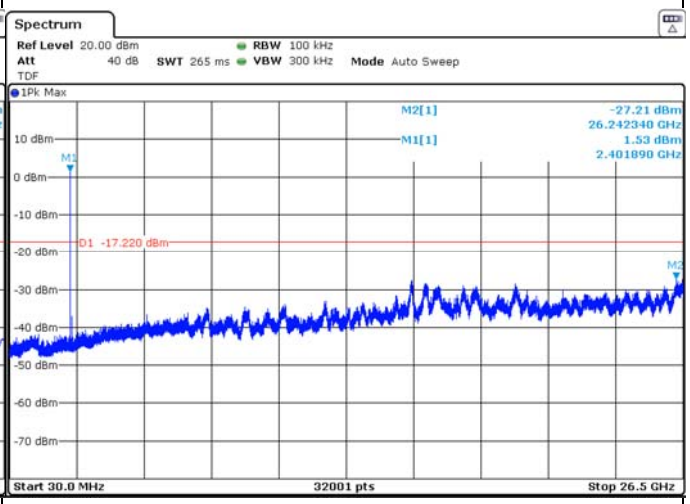
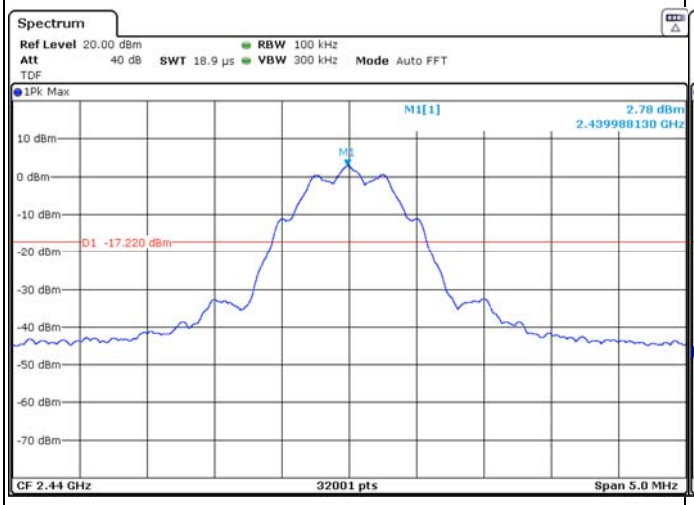
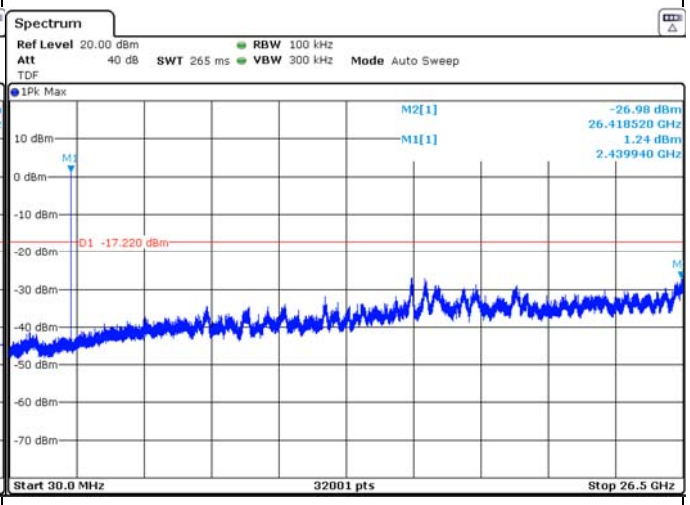
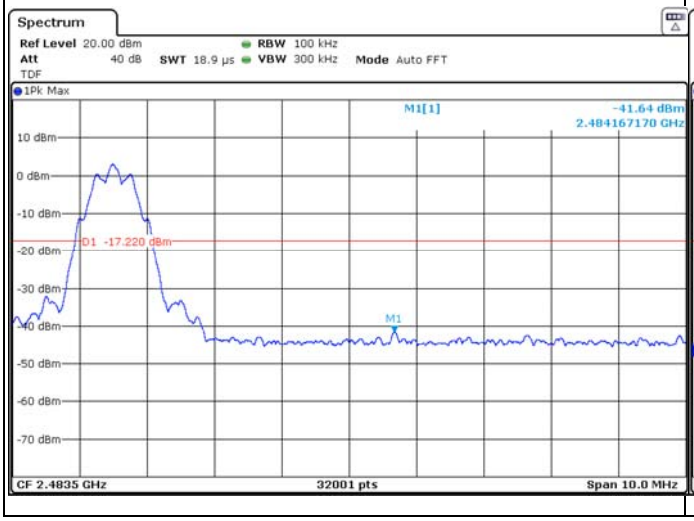
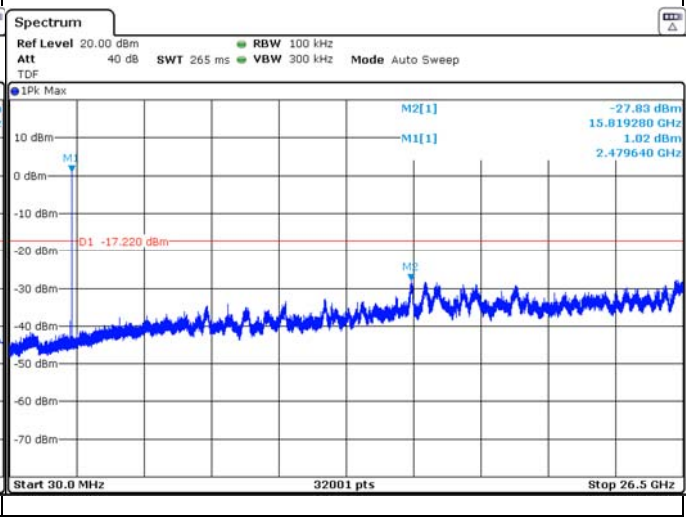
Band Edge_SISO_Bluetooth LE_GFSK_2480_2 Mbps	
Horizontal	**Vertical**
	

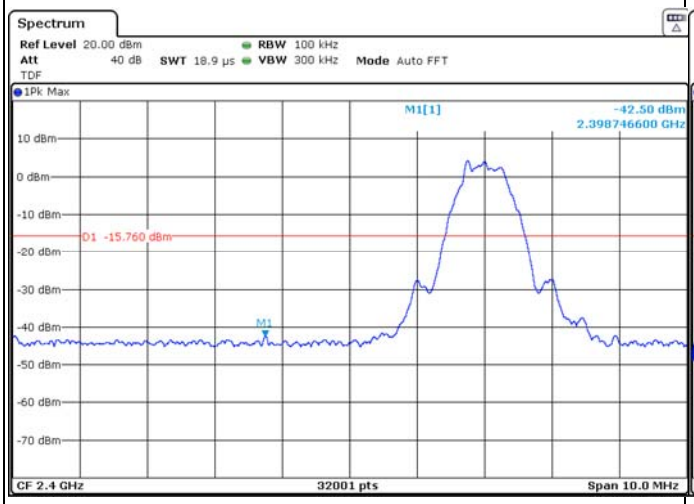
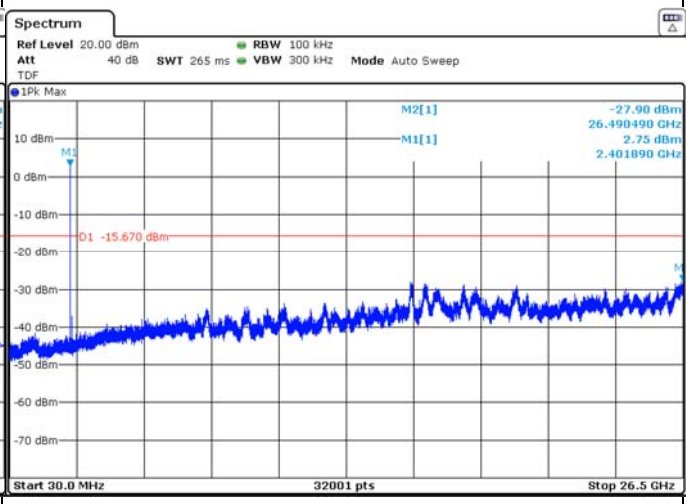
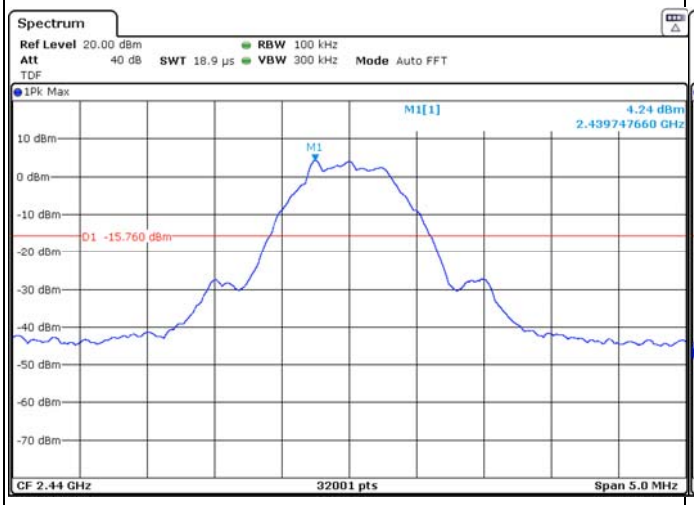
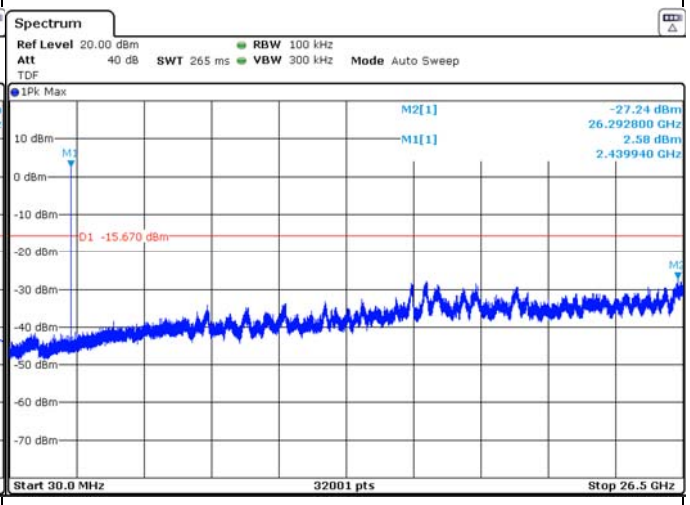
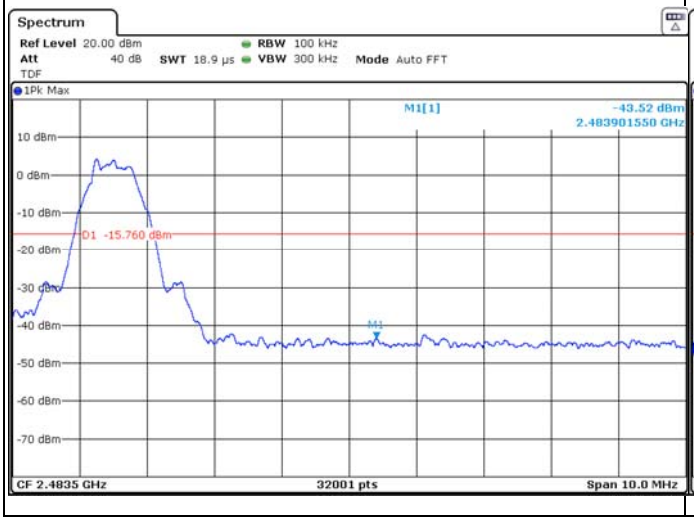
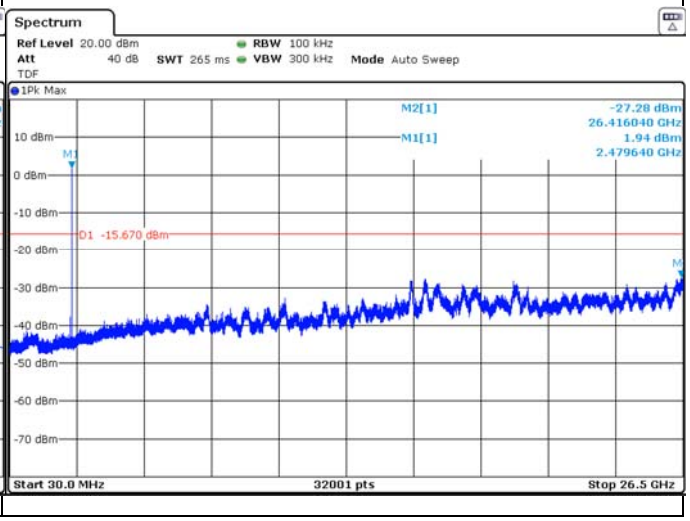
Frequency [MHz]	AVG Reading Value [dBuV/m]	AVG Result [dBuV/m]	Peak Reading Value [dBuV/m]	Peak Result [dBuV/m]	DCCF [dB]	Bandwidth [kHz]	Height [cm]	Pol [H/V]	Azimuth [deg]	Correction Factor [dB/m]	AVG Margin [dB]	AVG Limit [dBuV/m]	Peak Margin [dB]	Peak Limit [dBuV/m]
2 483.50	31.90	41.60	46.80	56.50		1 000	192	H	213	9.70	12.40	54	17.50	74
2 486.41	31.80	41.50	45.60	55.30		1 000	192	H	213	9.70	12.50	54	18.70	74
2 483.50	31.90	41.60	45.80	55.50		1 000	388	V	162	9.70	12.40	54	18.50	74
2 490.73	31.80	41.50	45.20	54.90		1 000	388	V	162	9.70	12.50	54	19.10	74

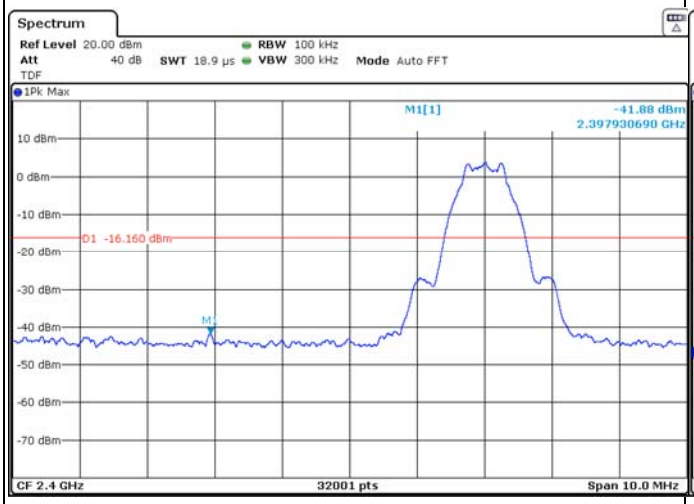
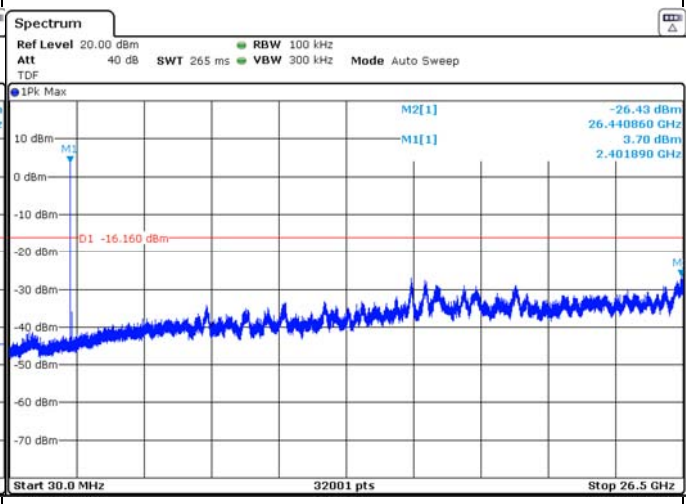
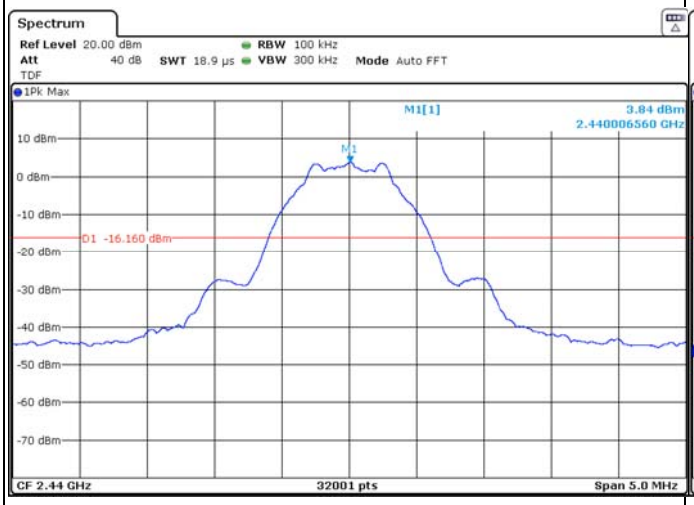
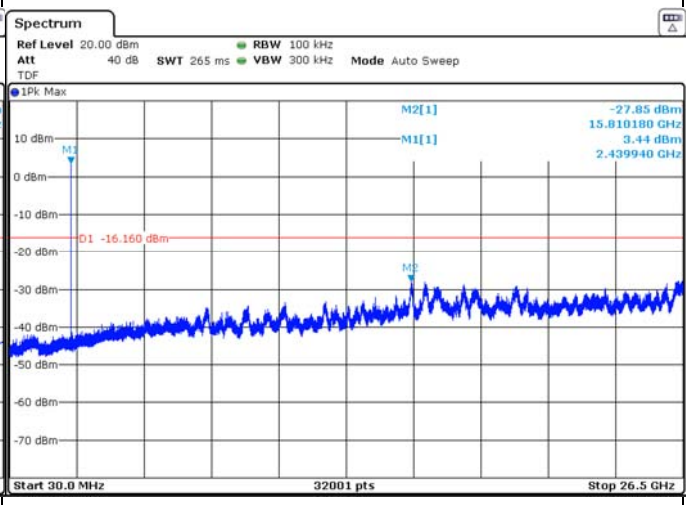
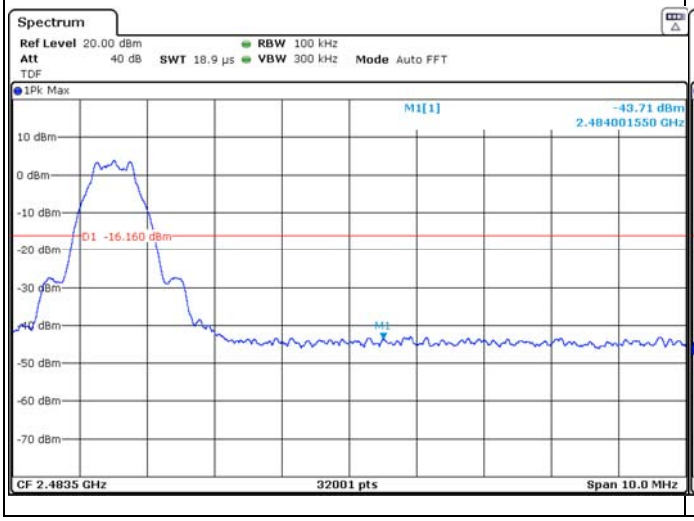
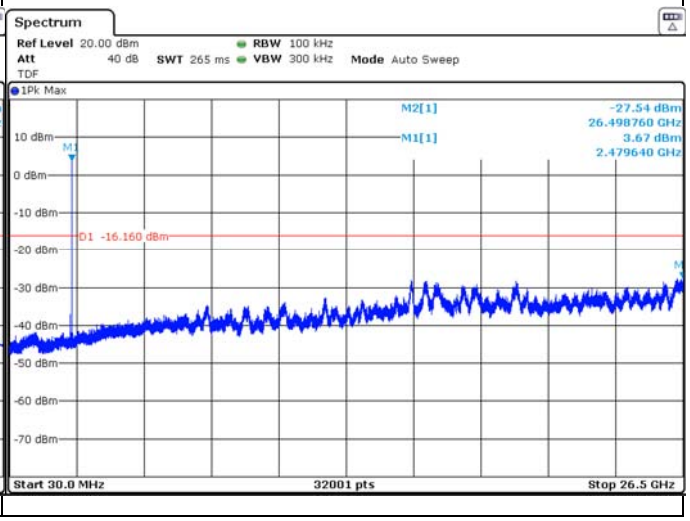
Remarks

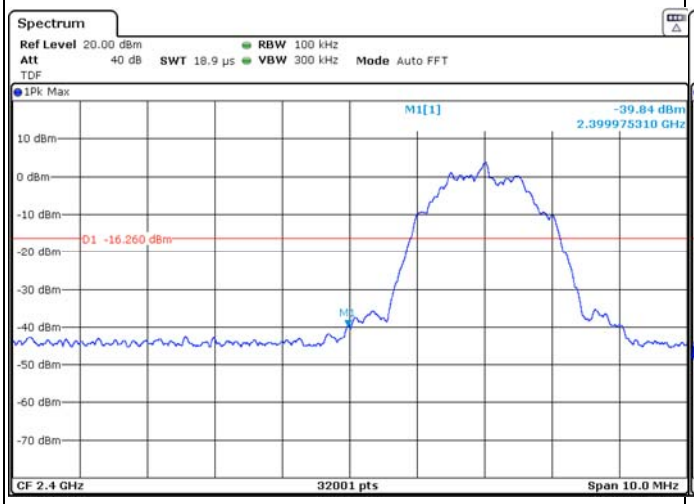
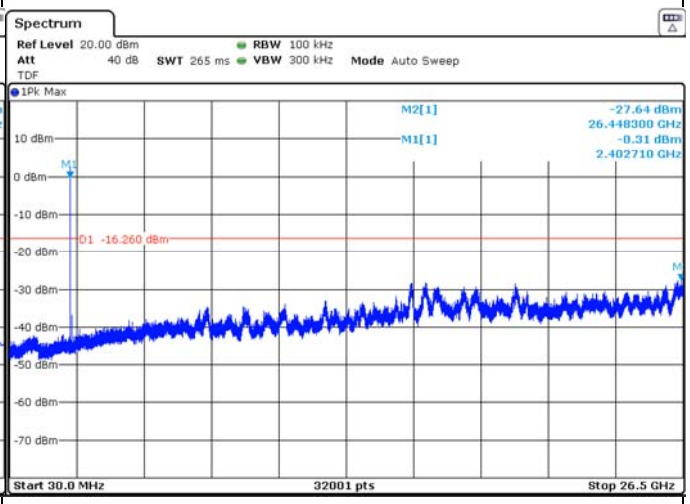
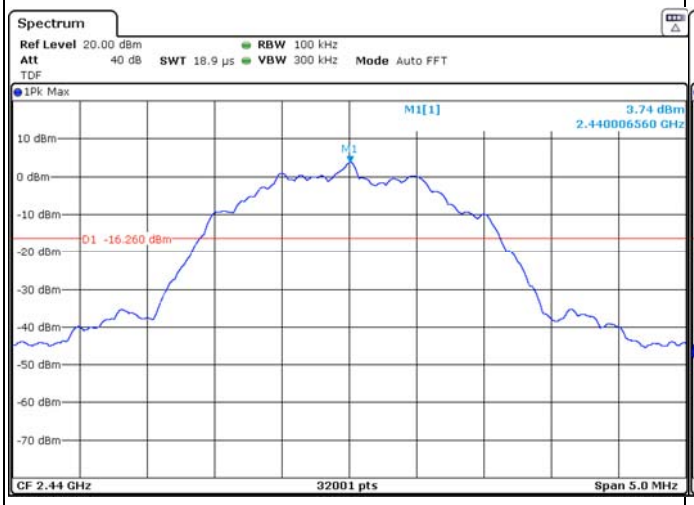
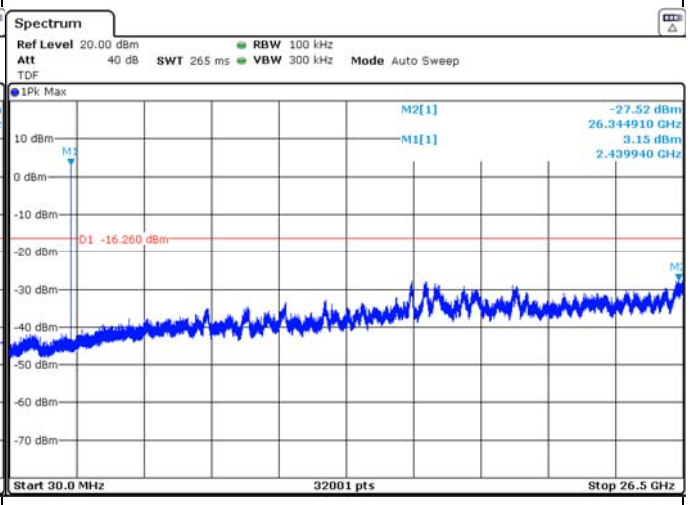
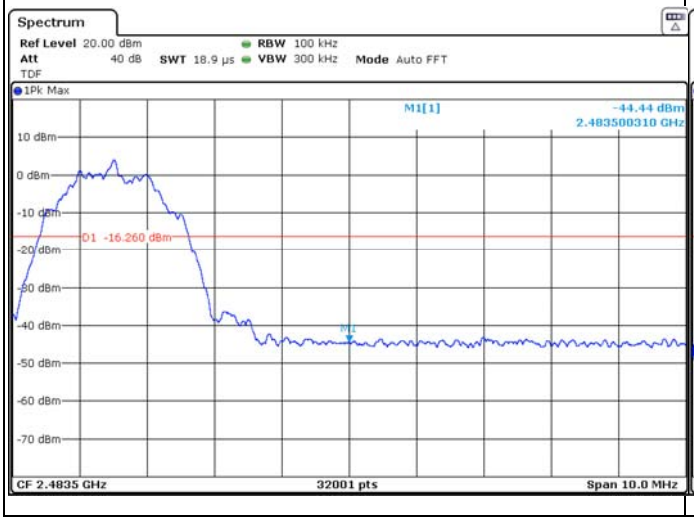
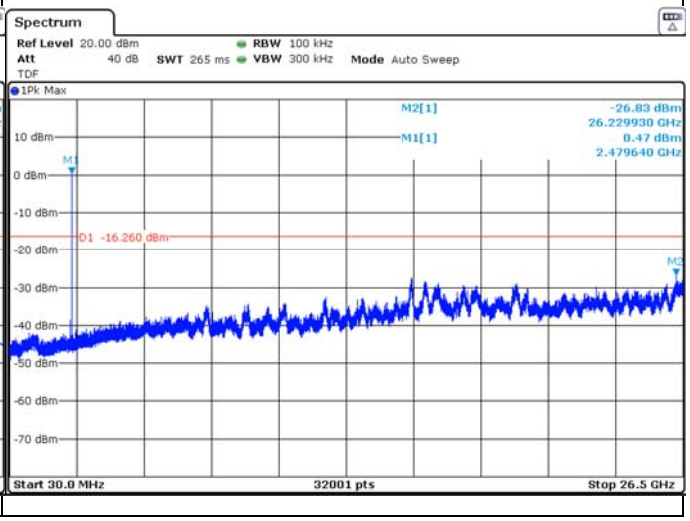
1. Peak Result(dBµV/m) = Peak Reading Value(dBµV/m) + Correction Factor(dB)
2. Average Result(dBµV/m) = Average Reading Value(dBµV/m) + DCCF + Correction Factor(dB)
3. DCCF(Duty Cycle Correction Factor) = 10 x Log(1/Duty Cycle)
4. Correction Factor(dB) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor (dB)
5. Distance Factor(dB) = 20 x Log(3/4.5) [Reference Distance: 3 m, Measurement Distance: 4.5 m]
6. Margin(dB) = (Peak/Average) Result (dBµV/m) – (Peak/Average) Limit (dBµV/m)

3.5.6 Test Result of Conducted Spurious Emission

Bluetooth LE 125 kbps	
Bandedge_2 402 MHz	**Spurious_2 402 MHz**
	
Bandedge_2 440 MHz	**Spurious_2 440 MHz**
	
Bandedge_2 480 MHz	**Spurious_2 480 MHz**
	

Bluetooth LE 500 kbps	
Bandedge_2 402 MHz	**Spurious_2 402 MHz**
	
Bandedge_2 440 MHz	**Spurious_2 440 MHz**
	
Bandedge_2 480 MHz	**Spurious_2 480 MHz**
	

Bluetooth LE 1 Mbps	
Bandedge_2 402 MHz	**Spurious_2 402 MHz**
	
Bandedge_2 440 MHz	**Spurious_2 440 MHz**
	
Bandedge_2 480 MHz	**Spurious_2 480 MHz**
	

Bluetooth LE 2 Mbps	
Bandedge_2 402 MHz	**Spurious_2 402 MHz**
	
Bandedge_2 440 MHz	**Spurious_2 440 MHz**
	
Bandedge_2 480 MHz	**Spurious_2 480 MHz**
	

3.6 AC Conducted Emissions (150 kHz to 30 MHz)

3.6.1 Regulation

§15.207(a) : Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

	Conducted limit (dBµV)	
Frequency of emission (MHz)	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

3.6.2 Test Procedure

a) The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm / 50 µH of coupling impedance for the measuring instrument.

b) Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

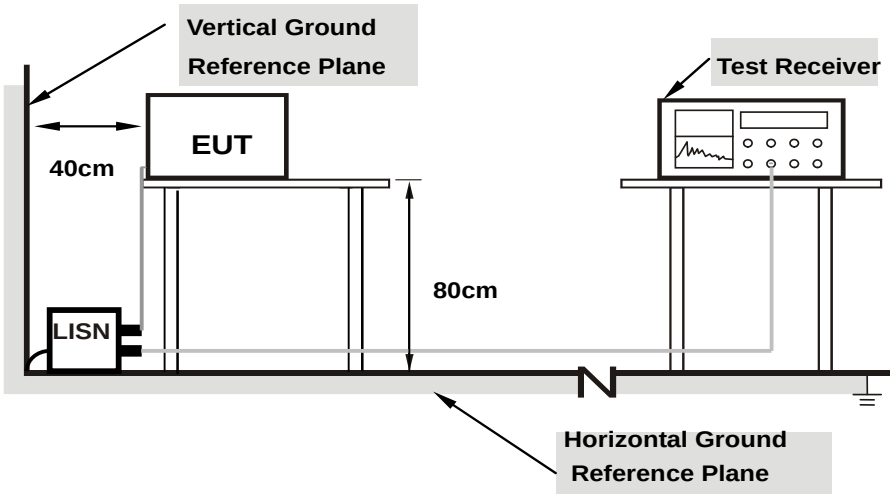
c) The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

Remark : The resolution bandwidth and video bandwidth of test receiver is 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15 MHz – 30 MHz.

3.6.3 Deviation from Test Standard

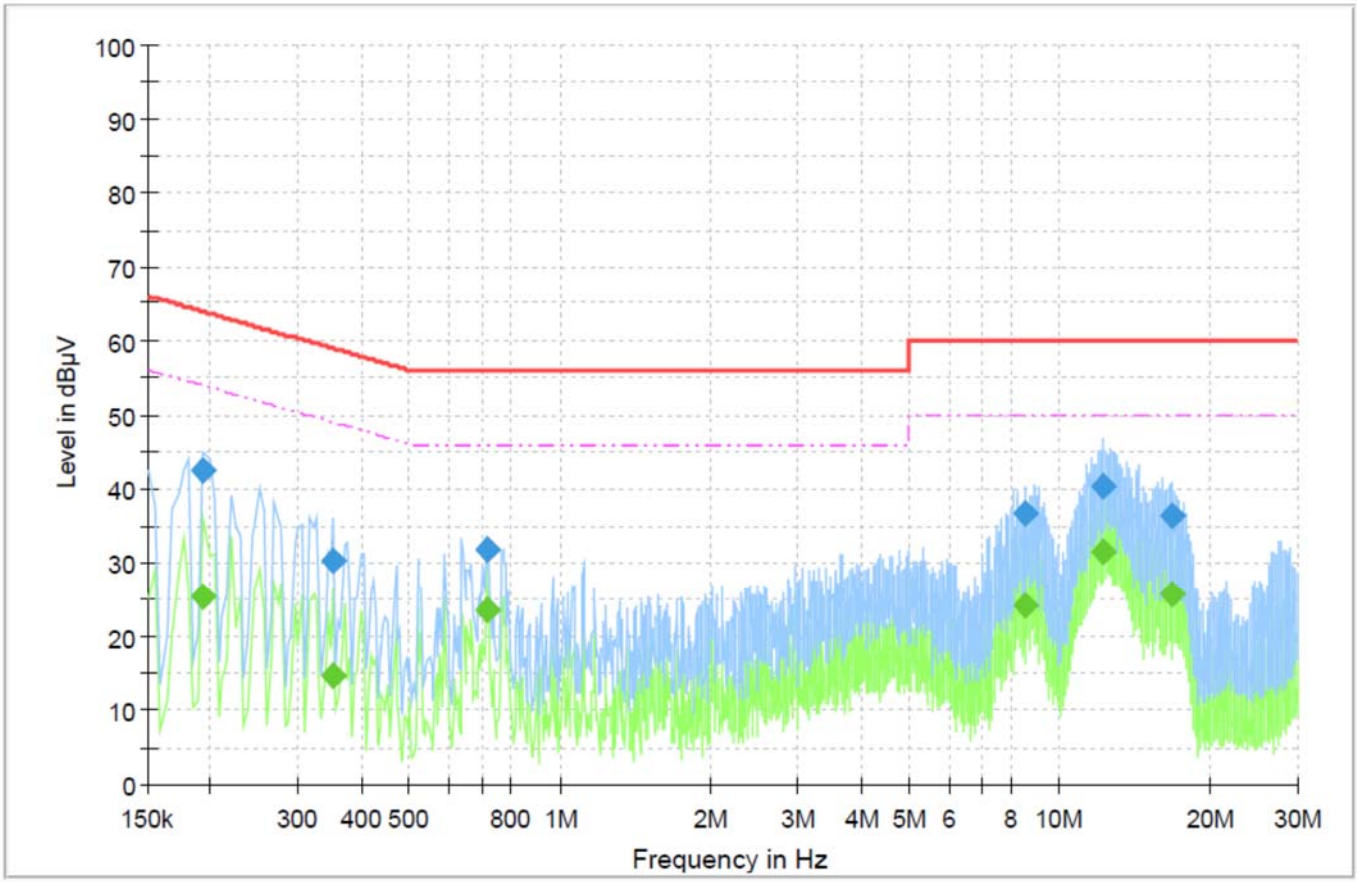
No deviation.

3.6.4 Test Setup



3.6.5 Test Result

Bluetooth_LE_GFSK_2402



Frequency [MHz]	Quasi Peak Reading Value [dBuV]	Quasi Peak Result [dBuV]	CAV Reading Value [dBuV]	CAV Result [dBuV]	Line	Correction Factor [dB/m]	Quasi Peak Margin [dBuV]	Quasi Peak Limit [dBuV]	CAV Margin [dBuV]	CAV Limit [dBuV]
0.19	32.58	42.58	-	-	L1	10.00	21.28	63.87	-	-
0.19	-	-	15.29	25.29	L1	10.00	-	-	28.58	53.87
0.35	20.40	30.40	-	-	N	10.00	28.52	58.92	-	-
0.35	-	-	4.73	14.73	N	10.00	-	-	34.19	48.92
0.71	-	-	13.51	23.61	L1	10.10	-	-	22.39	46.00
0.71	21.84	31.94	-	-	L1	10.10	24.06	56.00	-	-
8.52	26.73	36.83	-	-	L1	10.10	23.17	60.00	-	-
8.52	-	-	14.19	24.29	L1	10.10	-	-	25.71	50.00
12.25	-	-	21.15	31.45	L1	10.30	-	-	18.55	50.00
12.25	30.11	40.41	-	-	L1	10.30	19.59	60.00	-	-
16.80	25.96	36.46	-	-	N	10.50	23.54	60.00	-	-
16.80	-	-	15.11	25.61	N	10.50	-	-	24.39	50.00

Remarks

1. Final Value (QP and/or CAV) = Reading Value (QP and/or CAV) + Corr. (LISN Insertion Loss + Cable Loss)
Margin (QP and/or CAV) = Limit – Final Value (QP and/or CAV)
QP = Quasi-Peak, CAV = CISPR-Average, Corr. = Correction Factor
2. Two graphs measured for both Live (L1) and Neutral (N) of the LISN are combined into one graph.

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services Korea. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

Test Firm Name : BV CPS ADT Korea Ltd.

Address : Innoplex No.2 106, Sinwon-ro 306, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675 KOREA

FCC

Designation Number : KR0158
Test Firm Registration Number : 666061

ISED

Designation Number : KR0158
Test Firm Registration Number : 25944

If you have any comments, please feel free to contact us at the following:

Email: Meyer.Shin@bureauveritas.com
Web Site: www.bureauveritas.co.kr/cps/eaw

The address and road map of all our labs can be found in our web site also.

- End of report -