

FCC Test Report

FCC ID : N7NBX3210
Equipment : AirPrime BX3210 Module
Brand Name : Sierra Wireless Inc.
Model Name : AirPrime BX3210 Module
Applicant/ Manufacturer : Sierra Wireless Inc.
13811 Wireless Way, Richmond,
BC V6V 3A4, Canada
Standard : 47 CFR FCC Part 15.247

The product was received on Feb. 27, 2019, and testing was started from Feb. 28, 2019 and completed on Mar. 06, 2019. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.



Approved by: Allen Lin

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

Table of Contents

HISTORY OF THIS TEST REPORT	3
SUMMARY OF TEST RESULT	4
1 GENERAL DESCRIPTION	5
1.1 Information.....	5
1.2 Testing Applied Standards	7
1.3 Testing Location Information	7
1.4 Measurement Uncertainty	7
2 TEST CONFIGURATION OF EUT.....	8
2.1 Test Condition	8
2.2 Test Channel Mode	8
2.3 The Worst Case Measurement Configuration.....	9
2.4 Support Equipment.....	9
2.5 Test Setup Diagram	10
3 TRANSMITTER TEST RESULT	11
3.1 AC Power-line Conducted Emissions	11
3.2 DTS Bandwidth.....	13
3.3 Maximum Conducted Output Power	14
3.4 Power Spectral Density	16
3.5 Emissions in Non-restricted Frequency Bands	17
3.6 Emissions in Restricted Frequency Bands.....	18
4 TEST EQUIPMENT AND CALIBRATION DATA	21
APPENDIX A. TEST RESULTS OF DTS BANDWIDTH	
APPENDIX B. TEST RESULTS OF MAXIMUM CONDUCTED OUTPUT POWER	
APPENDIX C. TEST RESULTS OF POWER SPECTRAL DENSITY	
APPENDIX D. TEST RESULTS OF EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS	
APPENDIX E. TEST RESULTS OF EMISSIONS IN RESTRICTED FREQUENCY BANDS	
APPENDIX F. TEST PHOTOS	
PHOTOGRAPHS OF EUT V01	



History of this test report

[illegible]

Summary of Test Result

Report Clause	Ref. Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	FCC 15.203
3.1	15.207	AC Power-line Conducted Emissions	Not Required	FCC 15.207
3.2	15.247(a)	DTS Bandwidth	PASS	≥500kHz
3.3	15.247(b)	Maximum Conducted Output Power	PASS	Power [dBm]:30
3.4	15.247(e)	Power Spectral Density	PASS	PSD [dBm/3kHz]:8
3.5	15.247(d)	Emissions in Non-restricted Frequency Bands	PASS	Non-Restricted Bands: >30 dBc
3.6	15.247(d)	Emissions in Restricted Frequency Bands	PASS	Restricted Bands: FCC 15.209

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and explanations:

None

Reviewed by: Jackson Tsai

Report Producer: Michelle Tsai

1 General Description

1.1 Information

1.1.1 RF General Information

Frequency Range (MHz)	Bluetooth Mode	Ch. Frequency (MHz)	Channel Number
2400-2483.5	LE	2402-2480	0-39 [40]

Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	BT-LE(1Mbps)	1.0	1TX

Note:

- ♦ Bluetooth LE uses a GFSK (1Mbps) modulation for DSSS.
- ♦ BWch is the nominal channel bandwidth.

1.1.2 Antenna Information

Ant.	Brand	Model Name	Antenna Type	Connector
1	SmartAnt	USI05-220170	Dipole	Reversed-SMA

Ant.	Port	Gain (dBi)		
		2.4G	BT	5G
1	1	2.5	2.5	5

For 2.4GHz function:

For IEEE 802.11 b/g/n mode (1TX/1RX)

Ant. 1 (port 1) and could transmit/receive simultaneously.

For BT function:

For IEEE 802.15.1 Bluetooth mode (1TX/1RX)

Ant. 1 (port 1) and could transmit/receive simultaneously.

For 5GHz function:

For IEEE 802.11 a/n/ac mode (1TX/1RX)

Ant. 1 (port 1) and could transmit/receive simultaneously.

1.1.3 EUT Information

Operational Condition			
EUT Power Type	For DC Power Supply Mode		
EUT Function	☒ Point-to-multipoint	☐ Point-to-point	
Type of EUT			
☒	Stand-alone		
☐	Combined (EUT where the radio part is fully integrated within another device)		
	Combined Equipment - Brand Name / Model No.: ...		
☐	Plug-in radio (EUT intended for a variety of host systems)		
	Host System - Brand Name / Model No.: ...		
☐	Other:		

1.1.4 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) $\geq 1/T$
BT-LE(1Mbps)	0.663	1.785	415.625u	3k

Note. If DC < 0.98, the DCF was added while measuring Output power and PSD.

1.2 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR FCC Part 15
- ♦ ANSI C63.10-2013
- ♦ KDB 558074 D01 v05r01

1.3 Testing Location Information

Testing Location			
☒	HWA YA	ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)	
		TEL : 886-3-327-3456	FAX : 886-3-327-0973
Test site Designation No. TW1190 with FCC.			
☐	JHUBEI	ADD : No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County, Taiwan (R.O.C.)	
		TEL : 886-3-656-9065	FAX : 886-3-656-9085
Test site Designation No. TW0006 with FCC.			

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
RF Conducted	TH01-HY	Andy	20.7~23.5°C / 59.1~63.5%	05/Mar/2019~06/Mar/2019
Radiated	03CH03-HY	Edward	21.6~23.5°C / 55~60.6%	28/Feb/2019~05/Mar/2019

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	3.54 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	1.6 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	4.3 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.9 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Conducted Emission	1.3 dB	Confidence levels of 95%
Temperature	0.7 °C	Confidence levels of 95%
Humidity	4 %	Confidence levels of 95%

2 Test Configuration of EUT

2.1 Test Condition

RF Conducted	Abbreviation	Remark
TnomVnom	Tnom	20°C
-	Vnom	3.3V

2.2 Test Channel Mode

Test Software	DoS
---------------	-----

Mode	PowerSetting
BT-LE(1Mbps)	-
2402MHz	default
2440MHz	default
2480MHz	default

2.3 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	DTS Bandwidth Maximum Conducted Output Power Power Spectral Density Emissions in Non-restricted Frequency Bands
Test Condition	Conducted measurement at transmit chains

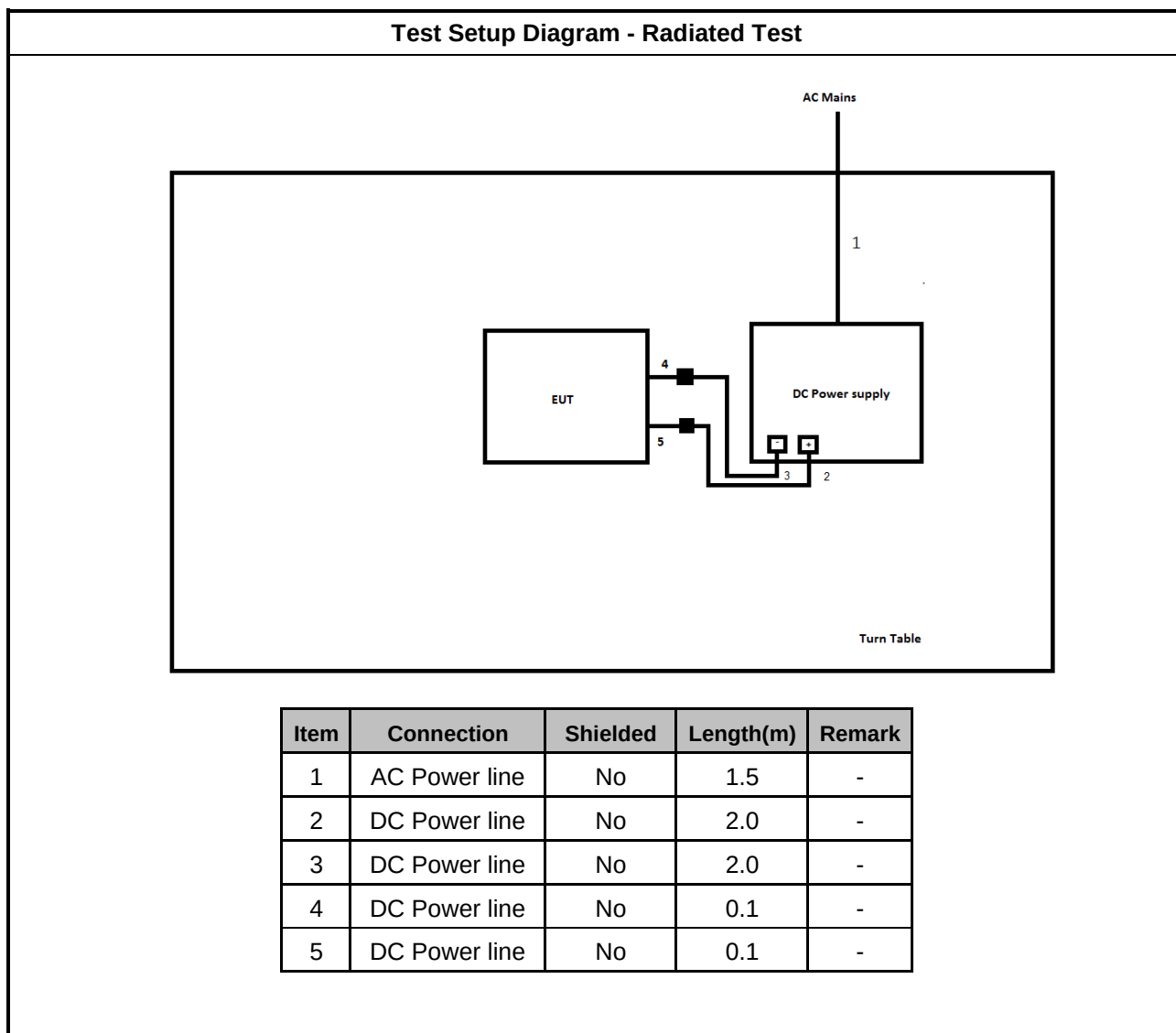
The Worst Case Mode for Following Conformance Tests	
Tests Item	Emissions in Restricted Frequency Bands
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.
Operating Mode < 1GHz	CTX
1	DC Power Supply Mode
Operating Mode > 1GHz	CTX
Orthogonal Planes of EUT	Z Plane
	

2.4 Support Equipment

Support Equipment – RF Conducted				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E5410	DoC
2	Adapter for NB	DELL	HA65NM130	DoC
3	DC Power Supply	GW	GPS-3030DD	N/A

Support Equipment – Radiated Emission				
No.	Equipment	Brand Name	Model Name	FCC ID
1	DC Power Supply	GW	GPS-3030DD	N/A

2.5 Test Setup Diagram



3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

Note 1: * Decreases with the logarithm of the frequency.

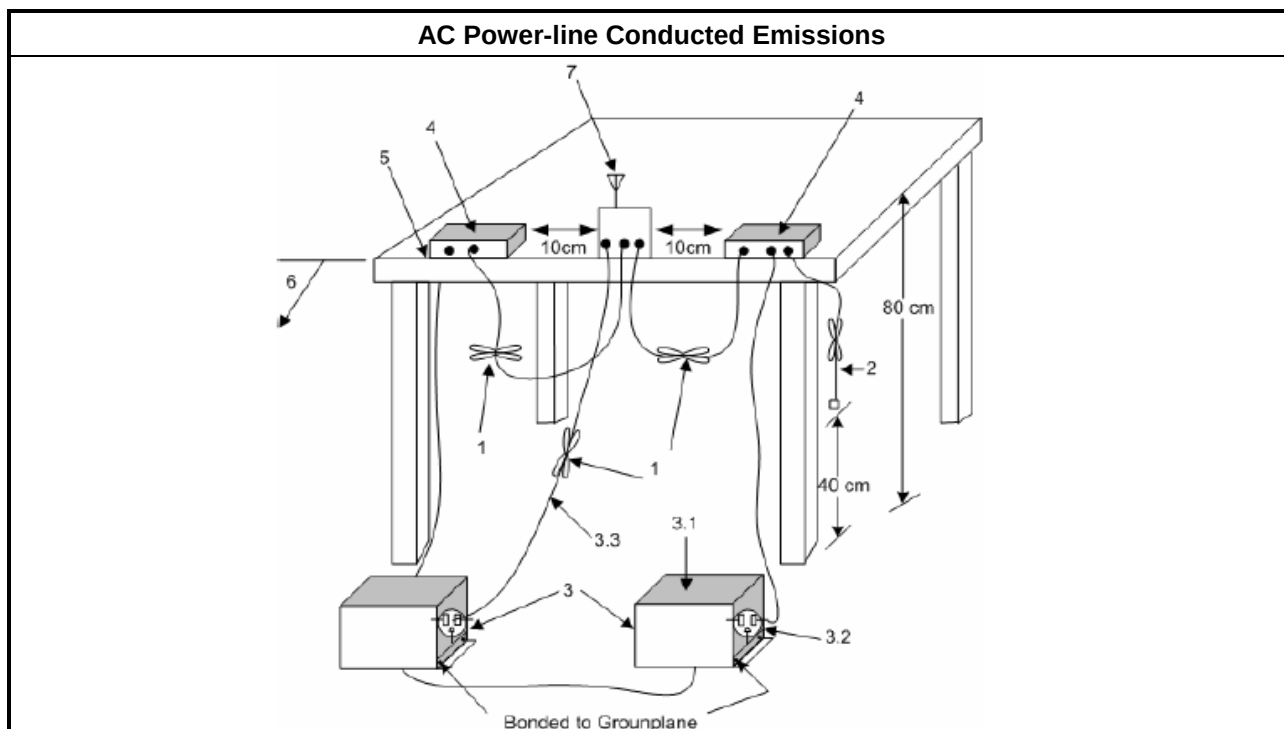
3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

Test Method
Refer as ANSI C63.10-2013, clause 6.2 foray power-line conducted emissions.

3.1.4 Test Setup





3.1.5 Test Result of AC Power-line Conducted Emissions

Please refer to FCC 15.207 which states, "Measurements to demonstrate compliance with the conducted limits are not required for devices employ DC power source for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines".

Therefore, for this device, AC Power Line Conducted Emissions investigation is not required.

3.2 DTS Bandwidth

3.2.1 6dB Bandwidth Limit

6dB Bandwidth Limit	
Systems using digital modulation techniques:	
▪	6 dB bandwidth $\geq$ 500 kHz.

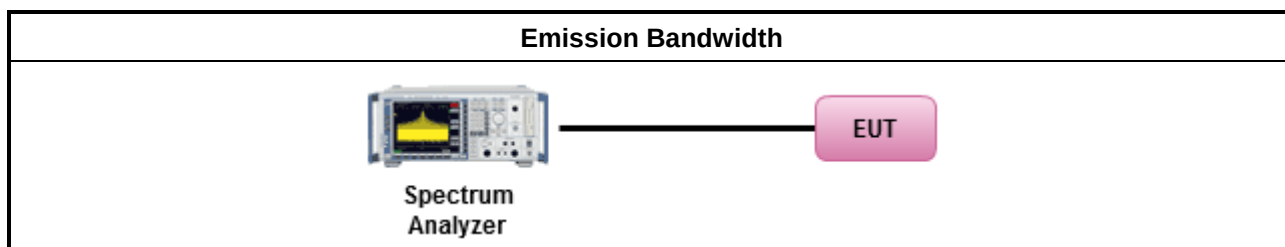
3.2.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

Test Method	
▪ For the emission bandwidth shall be measured using one of the options below:	
☒	Refer as KDB 558074, clause 8.2 (11.8 of ANSI C63.10) DTS bandwidth measurement.
☐	Refer as RSS-Gen, clause 6.7 for occupied bandwidth testing.
☐	Refer as ANSI C63.10, clause 6.9.3 for occupied bandwidth testing.

3.2.4 Test Setup



3.2.5 Test Result of Emission Bandwidth

Refer as Appendix A

3.3 Maximum Conducted Output Power

3.3.1 Maximum Conducted Output Power Limit

Maximum Conducted Output Power Limit	
	If $G_{TX} \leq 6$ dBi, then $P_{Out} \leq 30$ dBm (1 W)
	Point-to-multipoint systems (P2M): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$ dBm
	Point-to-point systems (P2P): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm
	Smart antenna system (SAS):
	- Single beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm
	- Overlap beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm
	- Aggregate power on all beams: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3 + 8$ dB dBm
e.i.r.p. Power Limit:	
	2400-2483.5 MHz Band
	Point-to-multipoint systems (P2M): $P_{eirp} \leq 36$ dBm (4 W)
	Point-to-point systems (P2P): $P_{eirp} \leq \text{MAX}(36, [P_{Out} + G_{TX}])$ dBm
	Smart antenna system (SAS)
	- Single beam: $P_{eirp} \leq \text{MAX}(36, P_{Out} + G_{TX})$ dBm
	- Overlap beam: $P_{eirp} \leq \text{MAX}(36, P_{Out} + G_{TX})$ dBm
	- Aggregate power on all beams: $P_{eirp} \leq \text{MAX}(36, [P_{Out} + G_{TX} + 8])$ dBm
P_{Out} = maximum peak conducted output power or maximum conducted output power in dBm, G_{TX} = the maximum transmitting antenna directional gain in dBi.	

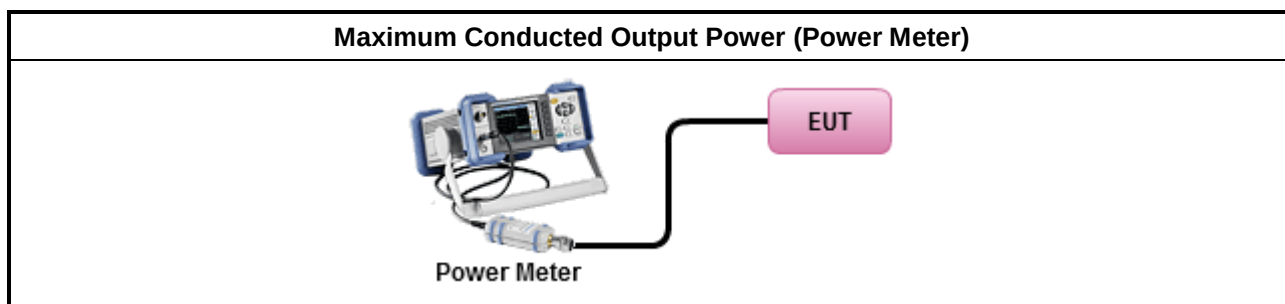
3.3.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.3.3 Test Procedures

Test Method	
Maximum Peak Conducted Output Power	
☐	Refer as KDB 558074, clause 8.3.1.1 (11.9.1.1 of ANSI C63.10) RBW ≥ EBW method.
☐	Refer as KDB 558074, clause 8.3.1.2 (11.9.1.2 of ANSI C63.10) integrated band power method.
☐	Refer as KDB 558074, clause 8.3.1.3 (11.9.1.3 of ANSI C63.10) peak power meter.
Maximum Average Conducted Output Power	
☐	Refer as KDB 558074, clause 8.3.2.2 (11.9.2.2 of ANSI C63.10) using a spectrum analyzer.
☒	Refer as KDB 558074, clause 8.3.2.3 (11.9.2.3 of ANSI C63.10) using a power meter.
For conducted measurement.	
If the EUT supports multiple transmit chains using options given below: Refer as KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.	
If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + \dots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$	

3.3.4 Test Setup



3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix B

3.4 Power Spectral Density

3.4.1 Power Spectral Density Limit

Power Spectral Density Limit	
▪	Power Spectral Density (PSD) ≤ 8 dBm/3kHz

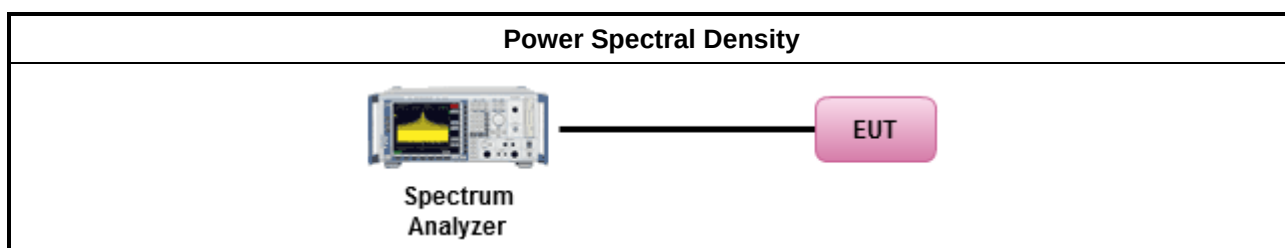
3.4.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.4.3 Test Procedures

Test Method	
▪	Peak power spectral density procedures that the same method as used to determine the conducted output power. If maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum conducted output power was measured to demonstrate compliance to the output power limit, then one of the average PSD procedures shall be used, as applicable based on the following criteria (the peak PSD procedure is also an acceptable option).
☒	Refer as KDB 558074, clause 8.4 (11.10 of ANSI C63.10) Method PKPSD.
▪	For conducted measurement.
▪	If The EUT supports multiple transmit chains using options given below:
▪	Measure and sum the spectra across the outputs. Refer as KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the NTX output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.

3.4.4 Test Setup



3.4.5 Test Result of Power Spectral Density

Refer as Appendix C

3.5 Emissions in Non-restricted Frequency Bands

3.5.1 Emissions in Non-restricted Frequency Bands Limit

Un-restricted Band Emissions Limit	
RF output power procedure	Limit (dB)
Peak output power procedure	20
Average output power procedure	30
Note 1: If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level. Note 2: If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band average PSD level.	

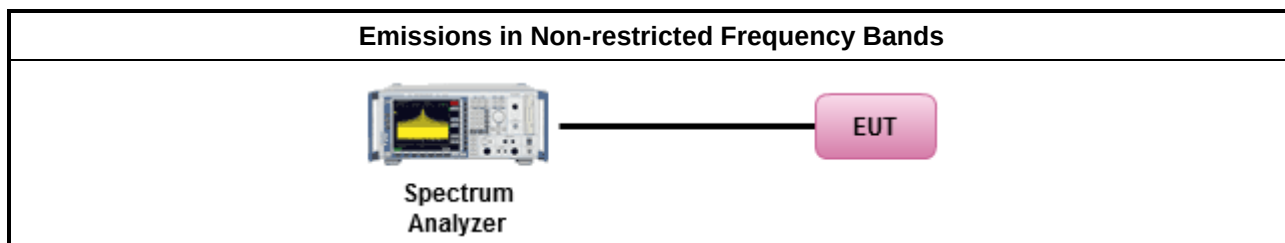
3.5.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.5.3 Test Procedures

Test Method
Refer as KDB 558074, clause 8.5 (11.11 of ANSI C63.10) for non-restricted frequency bands.

3.5.4 Test Setup



3.5.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix D

3.6 Emissions in Restricted Frequency Bands

3.6.1 Emissions in Restricted Frequency Bands Limit

Restricted Band Emissions Limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB / decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

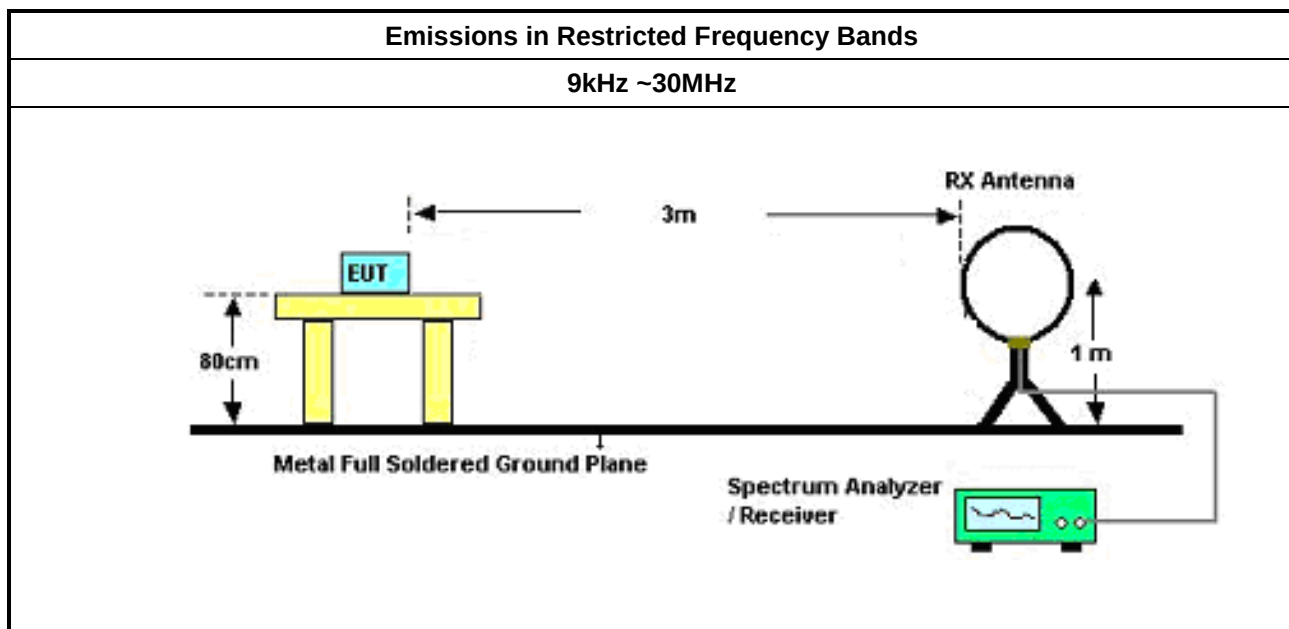
3.6.2 Measuring Instruments

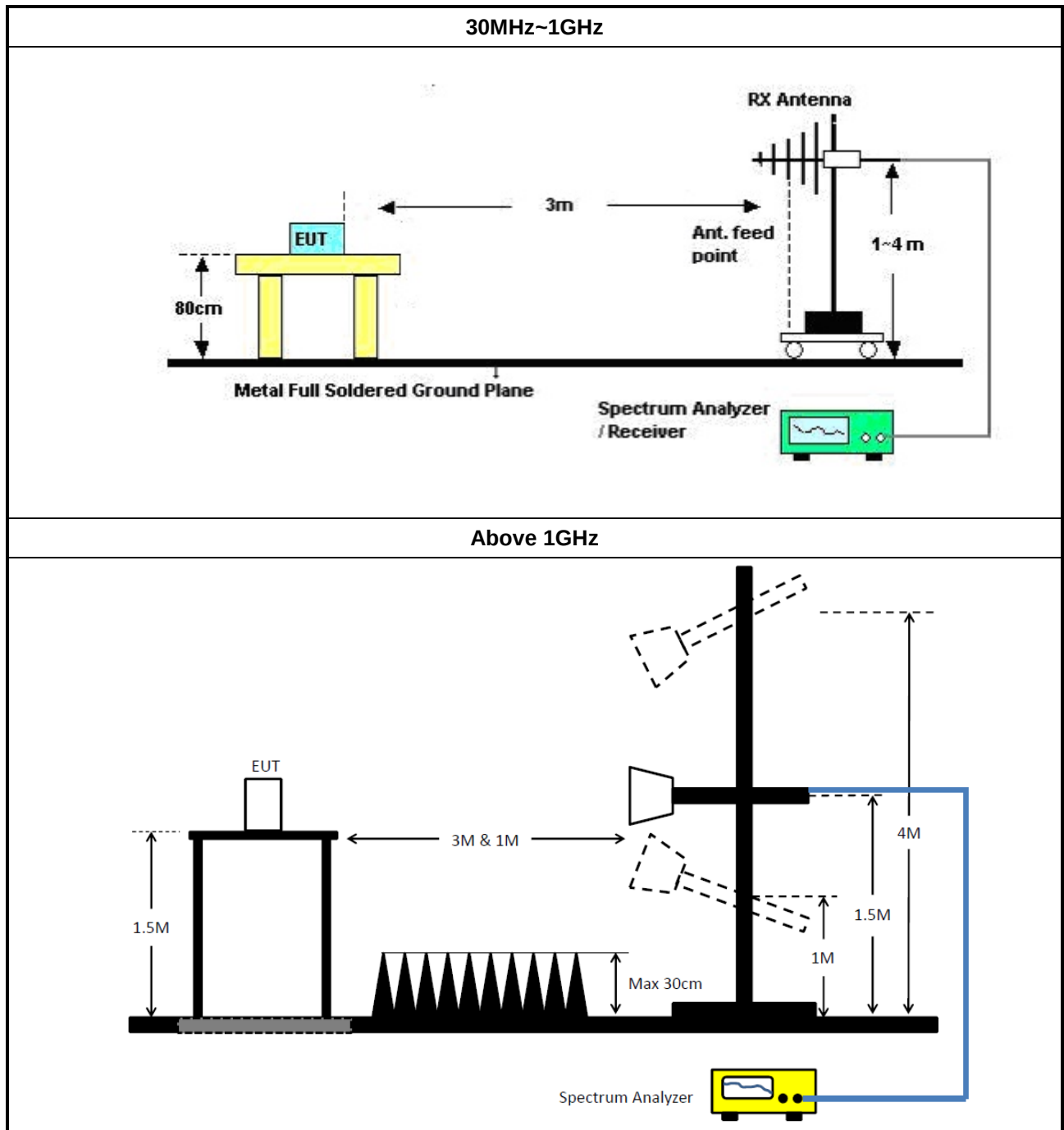
Refer a test equipment and calibration data table in this test report.

3.6.3 Test Procedures

Test Method	
The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].	
Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.	
For the transmitter unwanted emissions shall be measured using following options below:	
	Refer as KDB 558074, clause 8.6 (11.12 of ANSI C63.10) for restricted frequency bands.
For the transmitter band-edge emissions shall be measured using following options below:	
	Refer as KDB 558074 clause 8.7.1, When the performing peak or average radiated measurements, emissions within 2 MHz of the authorized band edge may be measured using the marker-delta method described below.
	Refer as KDB 558074, clause 8.7.2 (6.10.6 of ANSI C63.10) for marker-delta method for band-edge measurements.
	Refer as KDB 558074, clause 8.7.3 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).
Use the following spectrum analyzer settings:	
	Set RBW=100 kHz for $f < 1$ GHz; VBW=3 * RBW; Sweep = auto; Detector function = peak; Trace = max hold.
	Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement. For average measurement, refer as 1.1.4.

3.6.4 Test Setup





3.6.5 Test Result of Emissions in Restricted Frequency Bands (Below 30MHz)

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

3.6.6 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix E

4 Test Equipment and Calibration Data

Instrument for Radiated Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz ~ 1GHz 3m	30/Oct/2018	29/Oct/2019
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	1GHz ~ 18GHz 3m	30/Oct/2018	29/Oct/2019
Amplifier	IFI	SCCX150	03CH03-HY	10KHz ~ 100MHz	14/Sep/2017	13/Sep/2019
Amplifier	HP	8447D	2944A08033	10kHz ~ 1.3GHz	23/Apr/2018	19/Apr/2019
EMI Test Receiver	R&S	ESR3	102052	9kHz ~ 3.6GHz	10/Apr/2018	09/Apr/2019
Bilog Antenna with 5dB Pad	ETS	3142B & MTJ6102-05	00022055	26 MHz - 3 GHz	19/Nov/2018	18/Nov/2019
Microwave System Preamplifier	KEYSIGHT	83017A	MY53270196	1GHz ~ 26.5GHz	05/Sep/2018	04/Sep/2019
Signal Analyzer	R&S	FSV40	101500	10Hz ~ 40GHz	18/Jul/2018	17/Jul/2019
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz ~ 1GHz	28/Jan/2019	27/Jan/2020
RF Cable-high	SUHNER	SUCOFLEX 106	CB222	1GHz ~ 40GHz	28/Jan/2019	27/Jan/2020
Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA 9170221	15GHz ~ 40GHz	12/Mar/2018	11/Mar/2019
Double Ridged Guide Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1531	1GHz ~ 18GHz	18/Apr/ 2018	17/Apr/2019
Preamplifier	MITEQ	TTA1840-35-HG	1864481	18GHz ~ 40GHz	24/Aug/2018	23/Aug/2019
Loop Antenna	TESEQ	HLA 6120	31244	9kHz ~ 30MHz	28/Mar/2018	27/Mar/2019

Instrument for Conducted Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
Spectrum Analyzer	R&S	FSV 40	101500	10Hz~40GHz	18/Jul/2018	17/Jul/2019
Power Sensor	Anritsu	MA2411B	1339407	300MHz ~ 40GHz	17/Nov/2018	16/Nov/2019
Power Meter	Anritsu	ML2495A	1517010	300MHz ~ 40GHz	17/Nov/2018	16/Nov/2019
Cable 0.2m	HUBER	MY10710/4	RF Cable - 01	30MHz ~18G	10/Jan/2019	09/Jan/2020
Cable 0.2m	HUBER	MY10711/4	RF Cable - 02	30MHz ~18G	10/Jan/2019	09/Jan/2020
Cable 0.5m	HUBER	MY39470/4	RF Cable - 29	30MHz ~18G	10/Jan/2019	09/Jan/2020
SMB100A Signal Generator	R&S	SMB100A03	181147	100kHz~40GHz	12/Nov/2018	10/Nov/2020

Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4-2.4835GHz	-	-	-	-	-
BT-LE(1Mbps)	673.75k	1.056M	1M06F1D	668.75k	1.052M

Max-N dB = Maximum 6dB down bandwidth; **Max-OBW** = Maximum 99% occupied bandwidth;

Min-N dB = Minimum 6dB down bandwidth; **Min-OBW** = Minimum 99% occupied bandwidth;

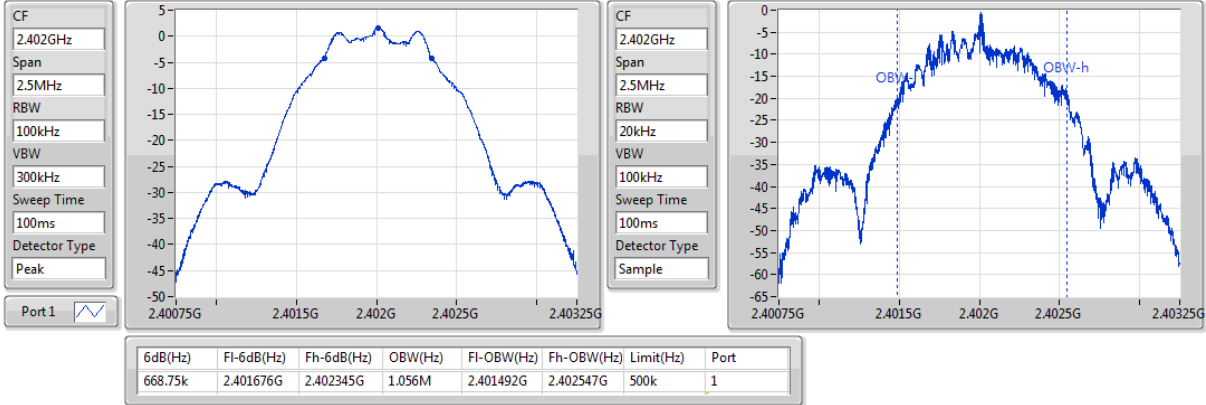
Result

Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
BT-LE(1Mbps)	-	-	-	-
2402MHz_TnomVnom	Pass	500k	668.75k	1.056M
2440MHz_TnomVnom	Pass	500k	673.75k	1.054M
2480MHz_TnomVnom	Pass	500k	672.5k	1.052M

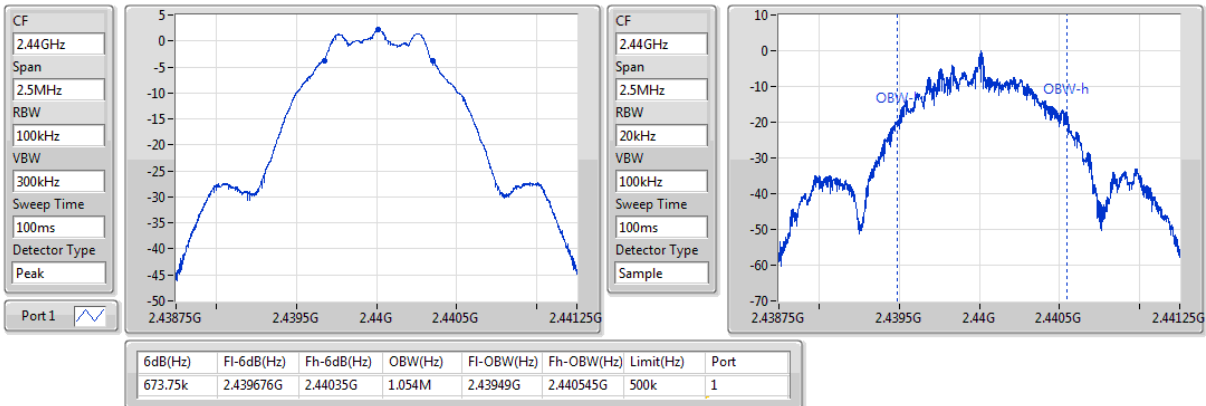
Port X-N dB = Port X 6dB down bandwidth; **Port X-OBW** = Port X 99% occupied bandwidth;

BT-LE(1Mbps)
EBW
2402MHz

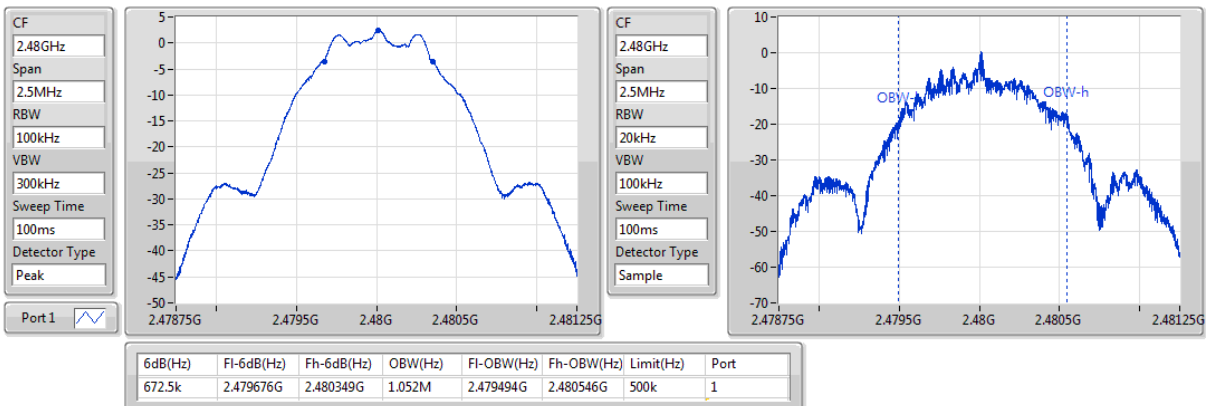
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BT-LE(1Mbps)
EBW
2440MHz

05/03/2019


BT-LE(1Mbps)
EBW
2480MHz

05/03/2019



**Summary**

Mode	Power	Power
	(dBm)	(W)
2.4-2.4835GHz	-	-
BT-LE(1Mbps)	3.39	0.00218

Result

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	2.50	3.24	30.00
2440MHz	Pass	2.50	3.26	30.00
2480MHz	Pass	2.50	3.39	30.00

**Summary**

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
BT-LE(1Mbps)	-14.01

RBW=3kHz.

Result

Mode	Result	Gain (dBi)	PD (dBm/RBW)	PD Limit (dBm/RBW)
BT-LE(1Mbps)	-	-	-	-
2402MHz_TnomVnom	Pass	2.50	-14.66	8.00
2440MHz_TnomVnom	Pass	2.50	-14.01	8.00
2480MHz_TnomVnom	Pass	2.50	-14.01	8.00

RBW=3kHz.

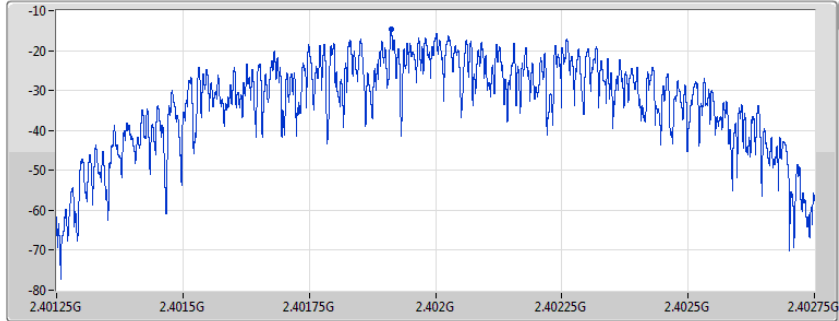
BT-LE(1Mbps)

PSD

2402MHz

05/03/2019

CF
2.402GHz
Span
1.5MHz
RBW
3kHz
VBW
10kHz
Sweep Time
32.1ms
Detector Type
Peak



Port 1

Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-14.66	-14.66	-14.66

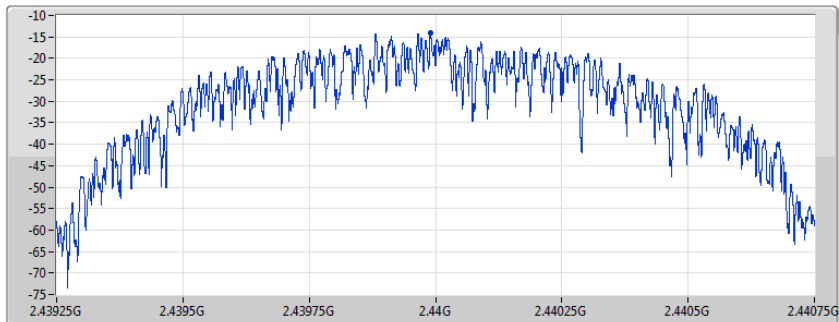
BT-LE(1Mbps)

PSD

2440MHz

05/03/2019

CF
2.44GHz
Span
1.5MHz
RBW
3kHz
VBW
10kHz
Sweep Time
32.1ms
Detector Type
Peak



Port 1

Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-14.01	-14.01	-14.01

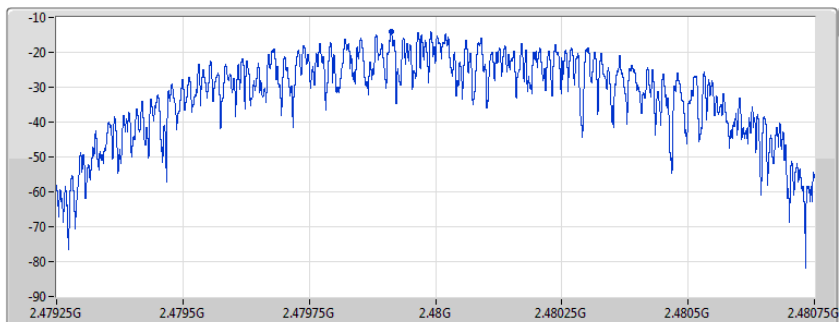
BT-LE(1Mbps)

PSD

2480MHz

05/03/2019

CF
2.48GHz
Span
1.5MHz
RBW
3kHz
VBW
10kHz
Sweep Time
32.1ms
Detector Type
Peak



Port 1

Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-14.01	-14.01	-14.01

Summary

Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	2.47999G	0.67	-29.33	2.39563G	-60.53	2.39989G	-55.12	2.48362G	-62.79	24.43432G	-48.13	1

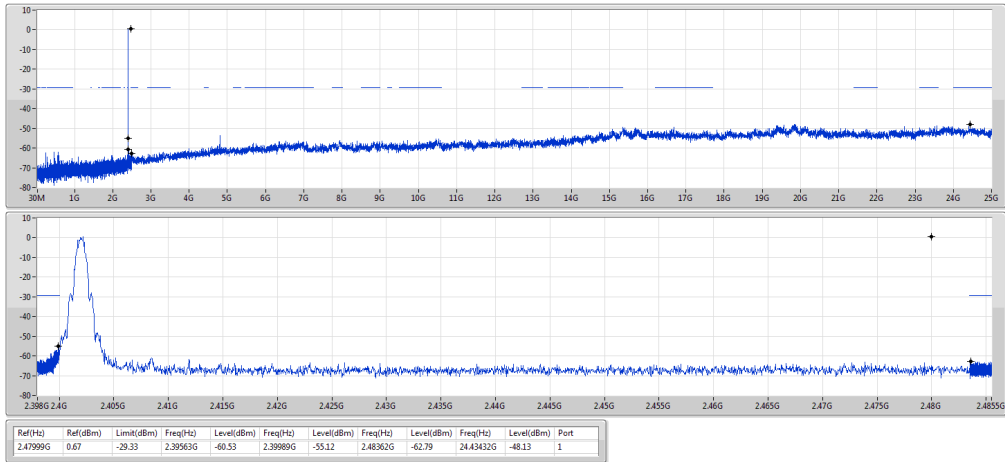
Result

Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz_TnomVnom	Pass	2.47999G	0.67	-29.33	2.39563G	-60.53	2.39989G	-55.12	2.48362G	-62.79	24.43432G	-48.13	1
2440MHz_TnomVnom	Pass	2.47999G	0.67	-29.33	471.93M	-59.99	2.39842G	-63.02	2.48419G	-62.14	24.44839G	-48.15	1
2480MHz_TnomVnom	Pass	2.47999G	0.67	-29.33	471.93M	-62.61	2.39885G	-62.75	2.48381G	-59.03	24.45402G	-48.21	1

BT-LE(1Mbps)
2402MHz

CSE NdB

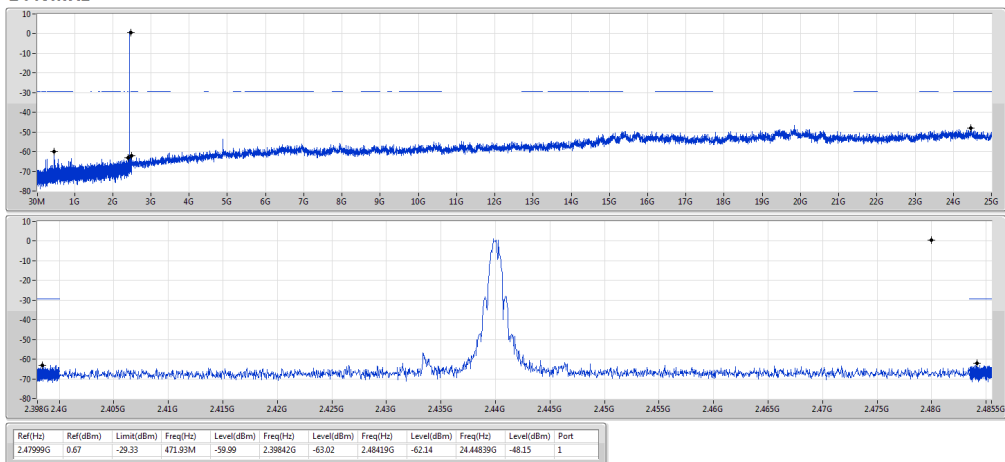
05/03/2019



BT-LE(1Mbps)
2440MHz

CSE NdB

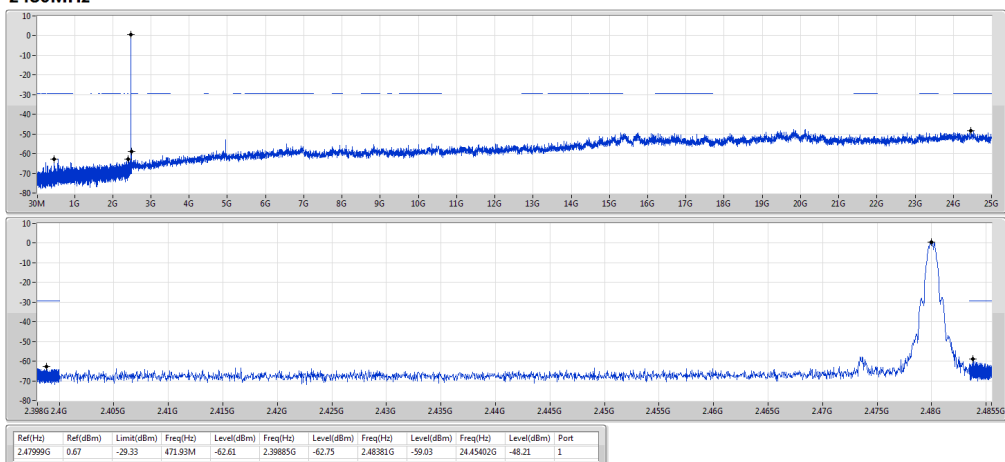
05/03/2019



BT-LE(1Mbps)
2480MHz

CSE NdB

05/03/2019



**Summary**

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	PK	30M	29.88	40.00	-10.12	-2.85	3	Vertical	360	3.00	-

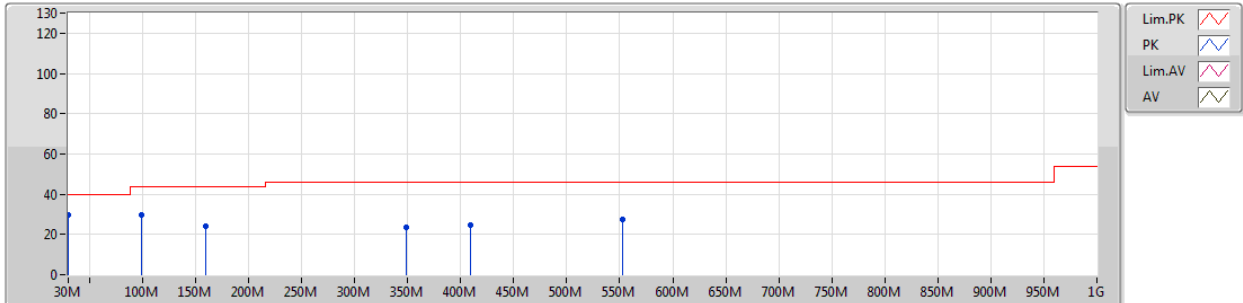
Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-
2440MHz	Pass	PK	30M	29.88	40.00	-10.12	-2.85	3	Vertical	360	3.00	-
2440MHz	Pass	PK	98.88M	29.57	43.50	-13.93	-9.51	3	Vertical	360	3.00	-
2440MHz	Pass	PK	159.33M	23.99	43.50	-19.51	-9.85	3	Vertical	360	3.00	-
2440MHz	Pass	PK	349.12M	23.26	46.00	-22.74	-4.56	3	Vertical	360	3.00	-
2440MHz	Pass	PK	409.57M	24.82	46.00	-21.18	-2.71	3	Vertical	360	3.00	-
2440MHz	Pass	PK	552.96M	27.27	46.00	-18.73	-0.26	3	Vertical	360	3.00	-
2440MHz	Pass	PK	31.41M	24.60	40.00	-15.40	-3.62	3	Horizontal	0	3.00	-
2440MHz	Pass	PK	98.88M	32.06	43.50	-11.44	-9.51	3	Horizontal	0	3.00	-
2440MHz	Pass	PK	278.83M	20.95	46.00	-25.05	-6.02	3	Horizontal	0	3.00	-
2440MHz	Pass	PK	416.59M	25.59	46.00	-20.41	-2.41	3	Horizontal	0	3.00	-
2440MHz	Pass	PK	552.96M	27.84	46.00	-18.16	-0.26	3	Horizontal	0	3.00	-
2440MHz	Pass	PK	658.39M	27.85	46.00	-18.15	0.48	3	Horizontal	0	3.00	-

BT-LE(1Mbps)

2440MHz_DC Power Supply

05/03/2019

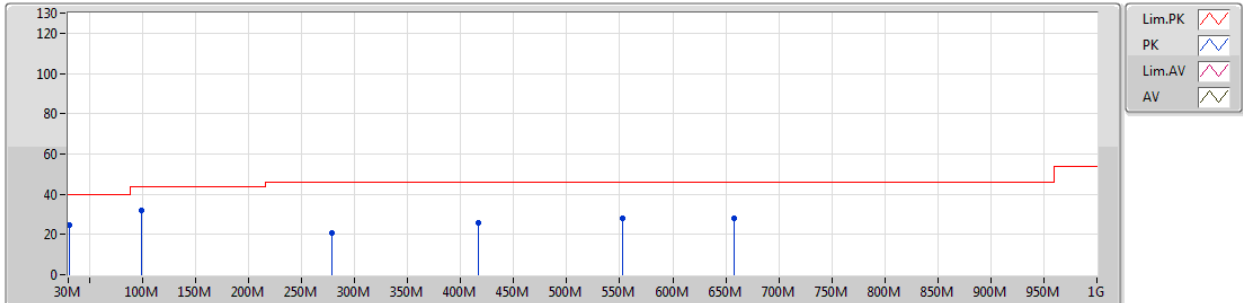


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
PK	30M	29.88	40.00	-10.12	-2.85	3	Vertical	360	3.00	-
PK	98.88M	29.57	43.50	-13.93	-9.51	3	Vertical	360	3.00	-
PK	159.33M	23.99	43.50	-19.51	-9.85	3	Vertical	360	3.00	-
PK	349.12M	23.26	46.00	-22.74	-4.56	3	Vertical	360	3.00	-
PK	409.57M	24.82	46.00	-21.18	-2.71	3	Vertical	360	3.00	-
PK	552.96M	27.27	46.00	-18.73	-0.26	3	Vertical	360	3.00	-

BT-LE(1Mbps)

2440MHz_DC Power Supply

05/03/2019



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
PK	31.41M	24.60	40.00	-15.40	-3.62	3	Horizontal	0	3.00	-
PK	98.88M	32.06	43.50	-11.44	-9.51	3	Horizontal	0	3.00	-
PK	278.83M	20.95	46.00	-25.05	-6.02	3	Horizontal	0	3.00	-
PK	416.59M	25.59	46.00	-20.41	-2.41	3	Horizontal	0	3.00	-
PK	552.96M	27.84	46.00	-18.16	-0.26	3	Horizontal	0	3.00	-
PK	658.39M	27.85	46.00	-18.15	0.48	3	Horizontal	0	3.00	-



Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	AV	2.5G	52.44	54.00	-1.56	35.22	3	Vertical	75	1.98	-

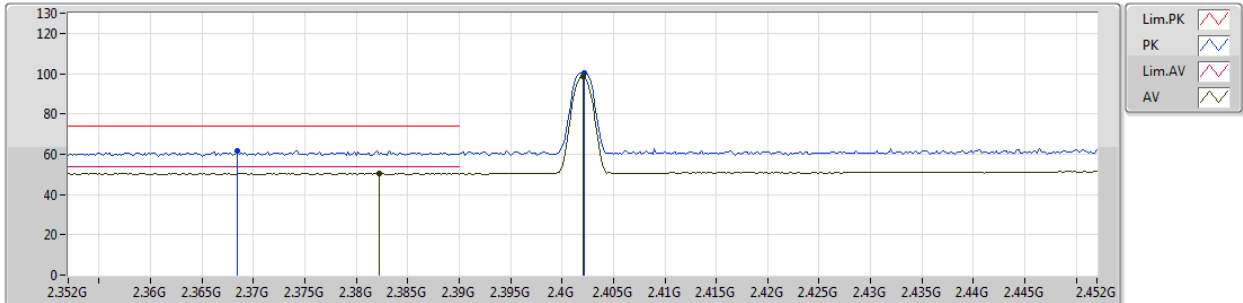
Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	AV	2.3822G	50.58	54.00	-3.42	34.68	3	Vertical	316	1.78	-
2402MHz	Pass	AV	2.402G	98.89	Inf	-Inf	34.77	3	Vertical	316	1.78	-
2402MHz	Pass	PK	2.3684G	61.57	74.00	-12.43	34.61	3	Vertical	316	1.78	-
2402MHz	Pass	PK	2.4022G	100.19	Inf	-Inf	34.77	3	Vertical	316	1.78	-
2402MHz	Pass	AV	4.798G	36.90	54.00	-17.10	8.48	3	Vertical	222	1.40	-
2402MHz	Pass	PK	4.79734G	48.37	74.00	-25.63	8.48	3	Vertical	222	1.40	-
2402MHz	Pass	AV	4.8064G	36.87	54.00	-17.13	8.50	3	Horizontal	83	1.42	-
2402MHz	Pass	PK	4.8055G	48.36	74.00	-25.64	8.49	3	Horizontal	83	1.42	-
2440MHz	Pass	AV	2.3892G	51.18	54.00	-2.82	34.71	3	Vertical	62	1.42	-
2440MHz	Pass	AV	2.44G	100.53	Inf	-Inf	34.94	3	Vertical	62	1.42	-
2440MHz	Pass	AV	2.496G	52.41	54.00	-1.59	35.19	3	Vertical	62	1.42	-
2440MHz	Pass	PK	2.3716G	61.29	74.00	-12.71	34.63	3	Vertical	62	1.42	-
2440MHz	Pass	PK	2.4396G	101.12	Inf	-Inf	34.94	3	Vertical	62	1.42	-
2440MHz	Pass	PK	2.4864G	62.24	74.00	-11.76	35.16	3	Vertical	62	1.42	-
2440MHz	Pass	AV	4.86806G	35.70	54.00	-18.30	8.65	3	Vertical	144	1.21	-
2440MHz	Pass	PK	4.86722G	47.91	74.00	-26.09	8.64	3	Vertical	144	1.21	-
2440MHz	Pass	AV	4.86932G	35.71	54.00	-18.29	8.65	3	Horizontal	161	1.29	-
2440MHz	Pass	PK	4.89272G	48.22	74.00	-25.78	8.70	3	Horizontal	161	1.29	-
2480MHz	Pass	AV	2.48G	100.98	Inf	-Inf	35.12	3	Vertical	75	1.98	-
2480MHz	Pass	AV	2.5G	52.44	54.00	-1.56	35.22	3	Vertical	75	1.98	-
2480MHz	Pass	PK	2.4798G	101.63	Inf	-Inf	35.12	3	Vertical	75	1.98	-
2480MHz	Pass	PK	2.4906G	63.62	74.00	-10.38	35.17	3	Vertical	75	1.98	-
2480MHz	Pass	AV	4.95988G	37.81	54.00	-16.19	8.86	3	Vertical	359	1.79	-
2480MHz	Pass	PK	4.94992G	48.31	74.00	-25.69	8.83	3	Vertical	359	1.79	-
2480MHz	Pass	AV	4.94578G	37.31	54.00	-16.69	8.81	3	Horizontal	176	2.10	-
2480MHz	Pass	PK	4.9597G	48.48	74.00	-25.52	8.86	3	Horizontal	176	2.10	-

BT-LE(1Mbps)

2402MHz_TX

05/03/2019

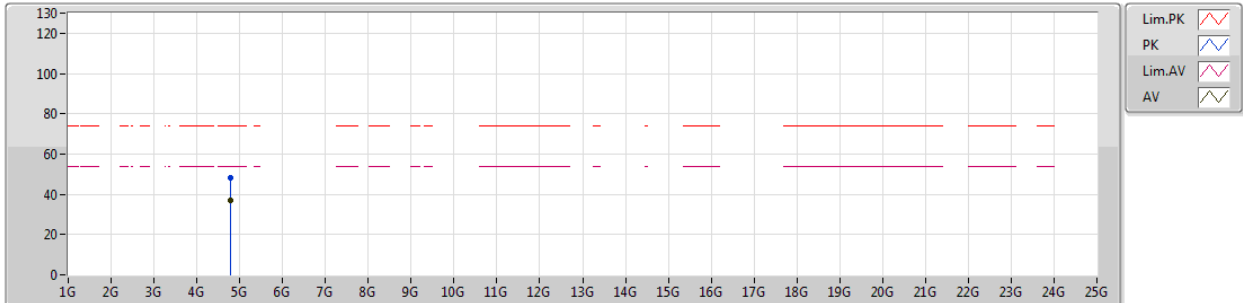


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.3822G	50.58	54.00	-3.42	34.68	3	Vertical	316	1.78	-
AV	2.402G	98.89	Inf	-Inf	34.77	3	Vertical	316	1.78	-
PK	2.3684G	61.57	74.00	-12.43	34.61	3	Vertical	316	1.78	-
PK	2.4022G	100.19	Inf	-Inf	34.77	3	Vertical	316	1.78	-

BT-LE(1Mbps)

2402MHz_TX

05/03/2019

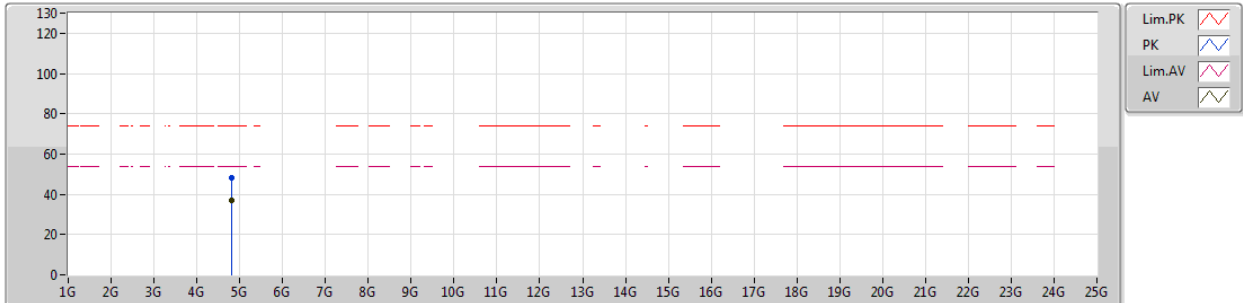


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	4.798G	36.90	54.00	-17.10	8.48	3	Vertical	222	1.40	-
PK	4.79734G	48.37	74.00	-25.63	8.48	3	Vertical	222	1.40	-

BT-LE(1Mbps)

2402MHz_TX

05/03/2019

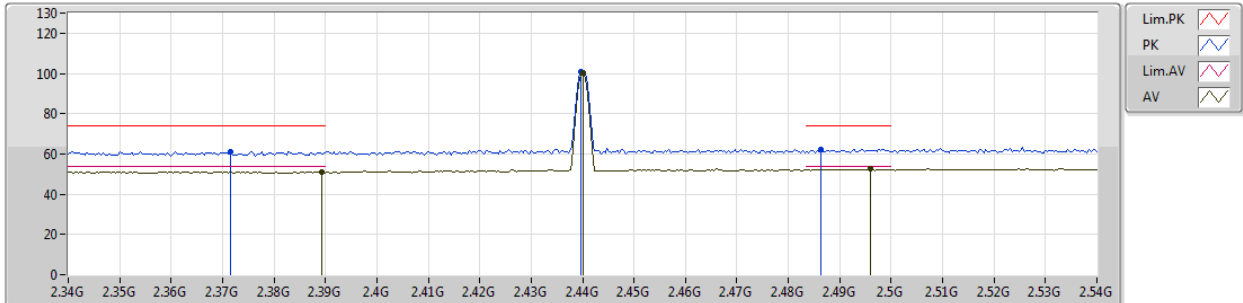


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments								
AV	4.8064G	36.87	54.00	-17.13	8.50	3	Horizontal	83	1.42	-								
PK	4.8055G	48.36	74.00	-25.64	8.49	3	Horizontal	83	1.42	-								

BT-LE(1Mbps)

2440MHz_TX

05/03/2019

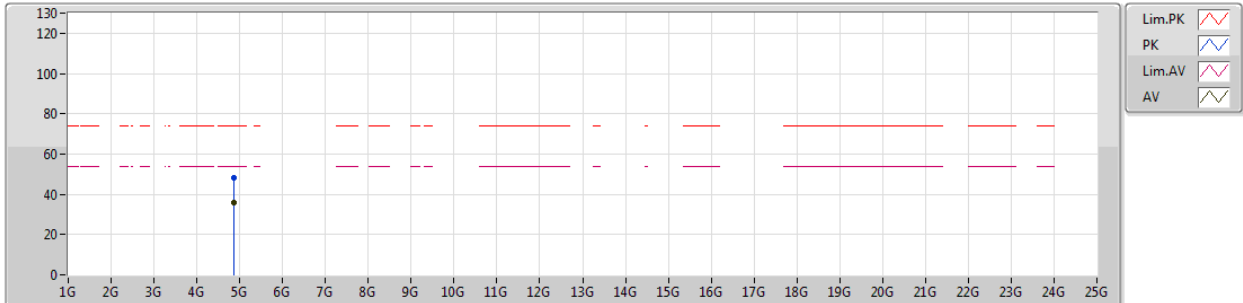


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.3892G	51.18	54.00	-2.82	34.71	3	Vertical	62	1.42	-
AV	2.44G	100.53	Inf	-Inf	34.94	3	Vertical	62	1.42	-
AV	2.496G	52.41	54.00	-1.59	35.19	3	Vertical	62	1.42	-
PK	2.3716G	61.29	74.00	-12.71	34.63	3	Vertical	62	1.42	-
PK	2.4396G	101.12	Inf	-Inf	34.94	3	Vertical	62	1.42	-
PK	2.4864G	62.24	74.00	-11.76	35.16	3	Vertical	62	1.42	-

BT-LE(1Mbps)

2440MHz_TX

05/03/2019

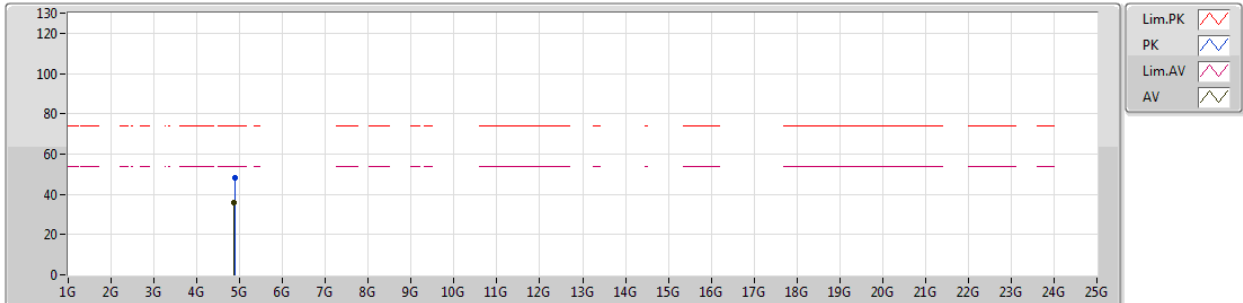


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	4.86806G	35.70	54.00	-18.30	8.65	3	Vertical	144	1.21	-
PK	4.86722G	47.91	74.00	-26.09	8.64	3	Vertical	144	1.21	-

BT-LE(1Mbps)

2440MHz_TX

05/03/2019

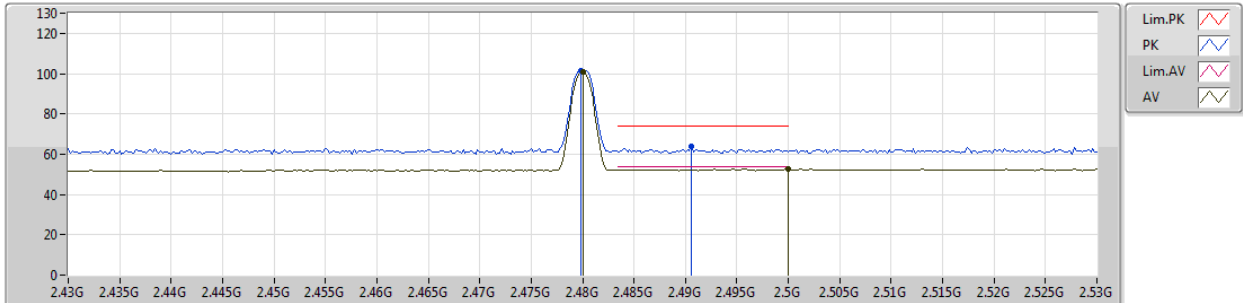


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	4.86932G	35.71	54.00	-18.29	8.65	3	Horizontal	161	1.29	-
PK	4.89272G	48.22	74.00	-25.78	8.70	3	Horizontal	161	1.29	-

BT-LE(1Mbps)

2480MHz_TX

05/03/2019

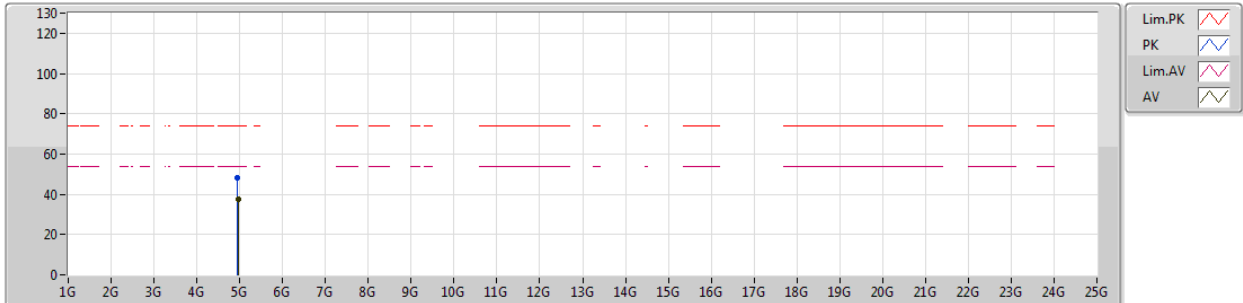


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.48G	100.98	Inf	-Inf	35.12	3	Vertical	75	1.98	-
AV	2.5G	52.44	54.00	-1.56	35.22	3	Vertical	75	1.98	-
PK	2.4798G	101.63	Inf	-Inf	35.12	3	Vertical	75	1.98	-
PK	2.4906G	63.62	74.00	-10.38	35.17	3	Vertical	75	1.98	-

BT-LE(1Mbps)

2480MHz_TX

05/03/2019

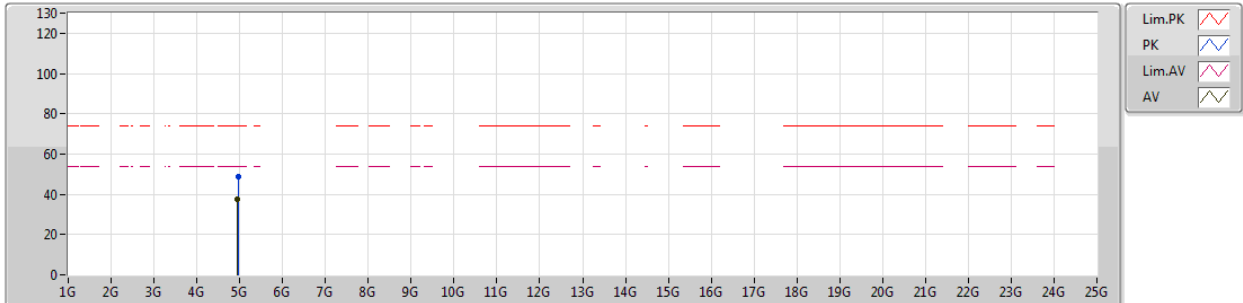


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	4.95988G	37.81	54.00	-16.19	8.86	3	Vertical	359	1.79	-
PK	4.94992G	48.31	74.00	-25.69	8.83	3	Vertical	359	1.79	-

BT-LE(1Mbps)

2480MHz_TX

05/03/2019



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	4.94578G	37.31	54.00	-16.69	8.81	3	Horizontal	176	2.10	-
PK	4.9597G	48.48	74.00	-25.52	8.86	3	Horizontal	176	2.10	-