



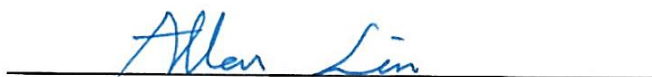
FCC Test Report

FCC ID : SWX-AFAR
Equipment : AMPLIFI ALIEN
Brand Name : UBIQUITI
Model Name : AFI-ALN-R
Applicant : Ubiquiti Inc.
685 Third Avenue, New York, New York 10017 USA
Manufacturer : Ubiquiti Inc.
685 Third Avenue, New York, New York 10017 USA
Standard : 47 CFR FCC Part 15.247

The product was received on Sep. 18, 2018, and testing was started from Oct. 16, 2018 and completed on Nov. 26, 2018. 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.)

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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	PASS	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: Sam Tsai

Report Producer: Ann Hou

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	-	-	Internal antenna	I-PEX

Ant.	Port	Gain (dBi)
		BT
1	1	2

Note 1: The EUT has one antenna.

For BT function:

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

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

1.1.3 EUT Information

Operational Condition			
EUT Power Type	From AC mains		
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)	0.622	2.062	404.375u	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
AC Conduction	CO04-HY	Andy	24.6~26°C / 59~61%	24/Nov/2018
RF Conducted	TH01-HY	Jeremy	20~24°C / 57~60%	16/Oct/2018
Radiated	03CH02-HY	Patrick	21.2~23.6°C / 51-53%	26/Nov/2018

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	120V

2.2 Test Channel Mode

Test Software	CMD
---------------	-----

2.3 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral
Operating Mode	CTX
1	AC mains mode

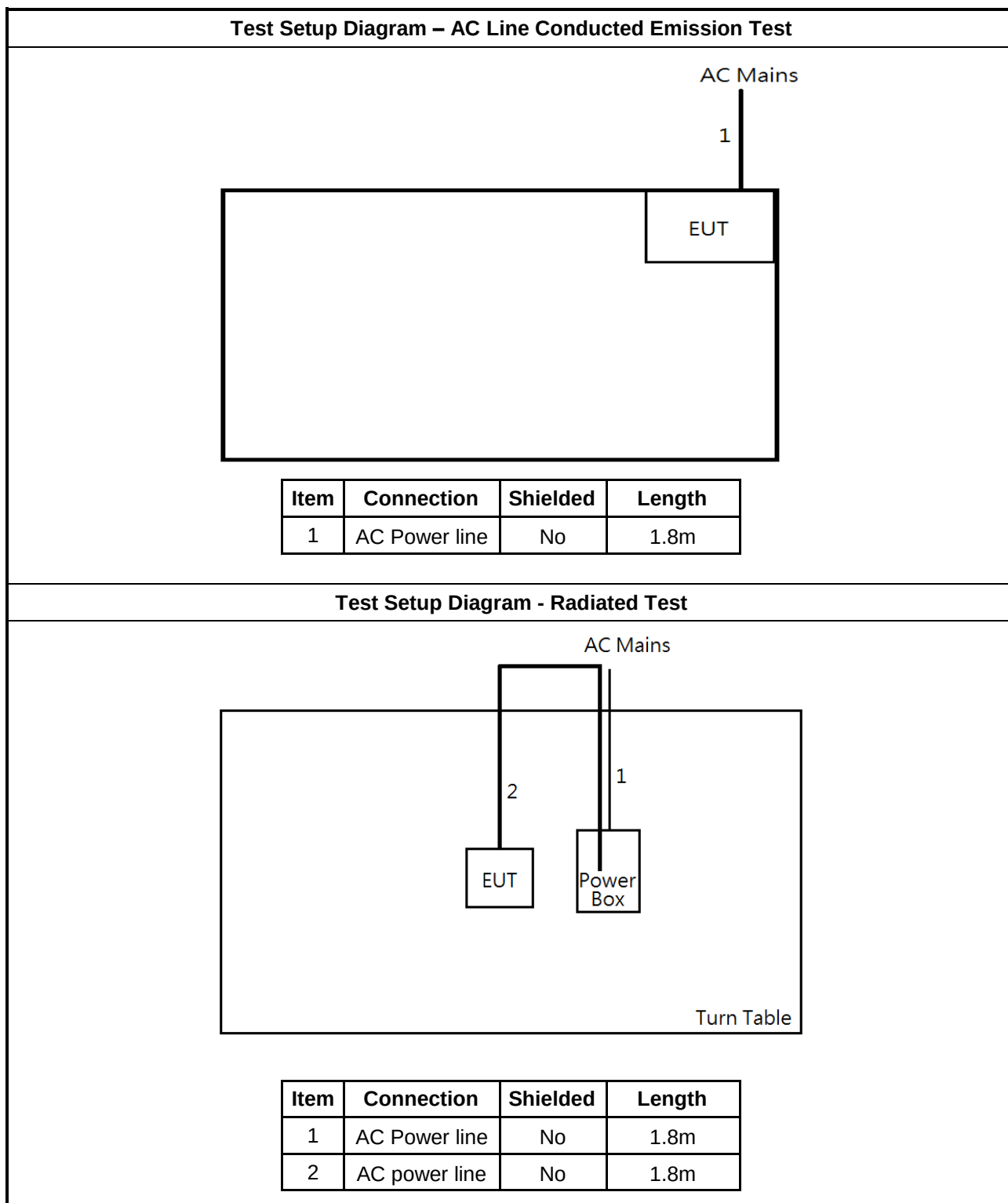
The Worst Case Mode for Following Conformance Tests	
Tests Item	DTS Bandwidth Maximum Conducted Output Power Power Spectral Density Emissions in Non-restricted Frequency Bands
Test Condition	Conducted measurement at transmit chains

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	AC mains mode		
Operating Mode > 1GHz	CTX		
Orthogonal Planes of EUT	X Plane	Y Plane	Z Plane
			
Worst Planes of EUT		V	

2.4 Support Equipment

Support Equipment - RF Conducted				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E5410	DoC
2	Adapter for Notebook	DELL	HA65NM130	DoC

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.

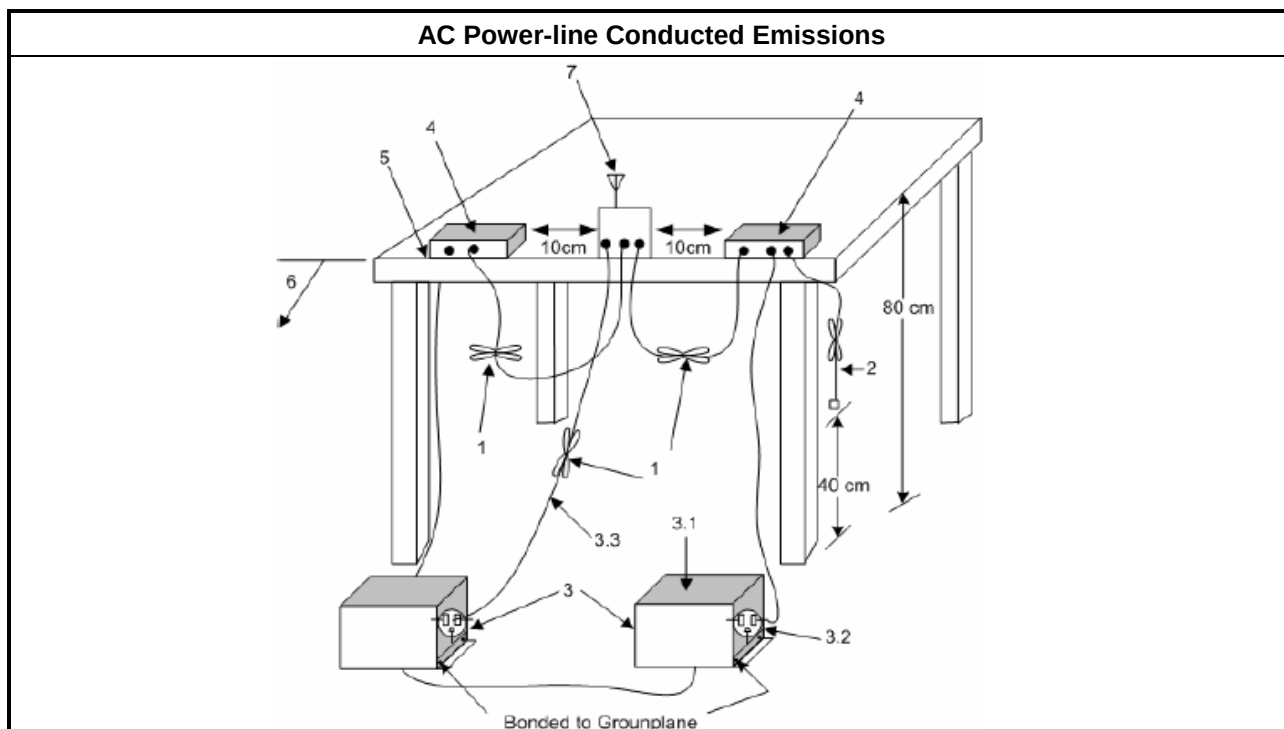
3.1.2 Measuring Instruments

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

Refer as Appendix A

3.2 DTS Bandwidth

3.2.1 6dB Bandwidth Limit

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

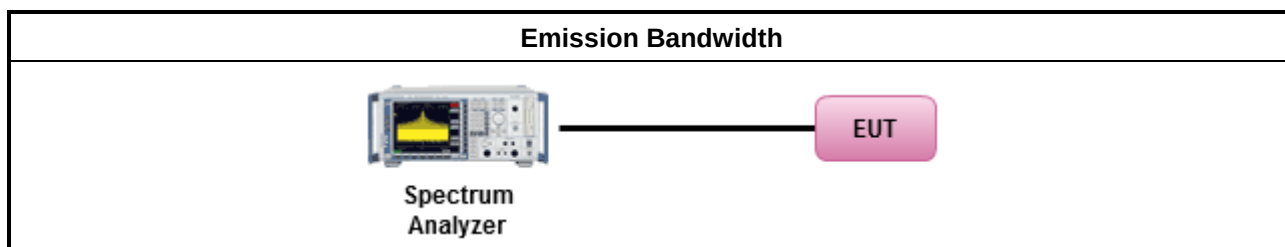
3.2.2 Measuring Instruments

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 B

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.	

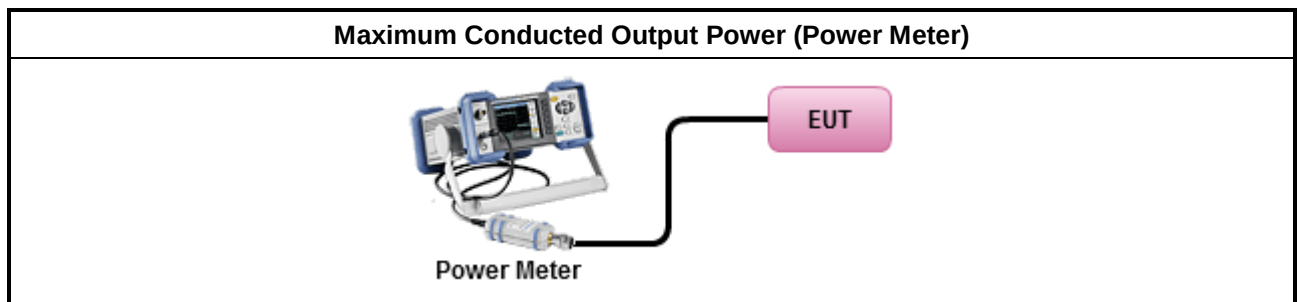
3.3.2 Measuring Instruments

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 C

3.4 Power Spectral Density

3.4.1 Power Spectral Density Limit

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

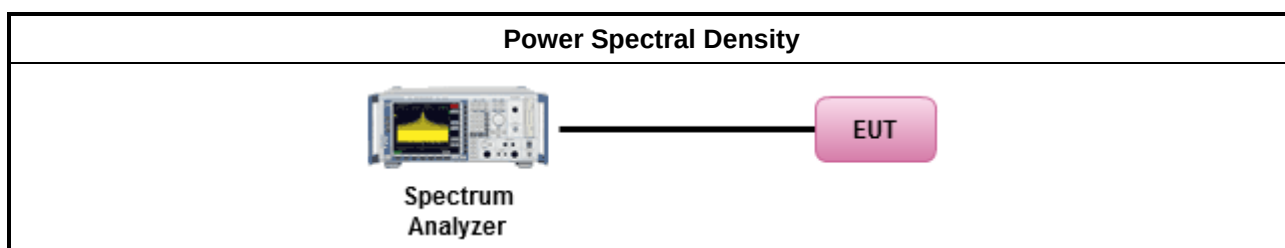
3.4.2 Measuring Instruments

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 D

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.	

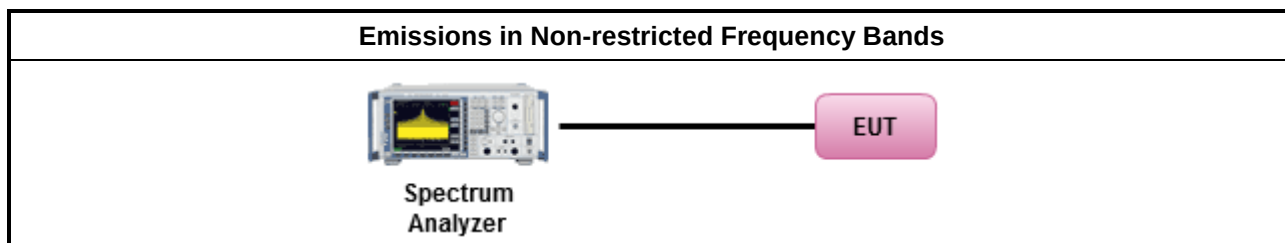
3.5.2 Measuring Instruments

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 E

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.

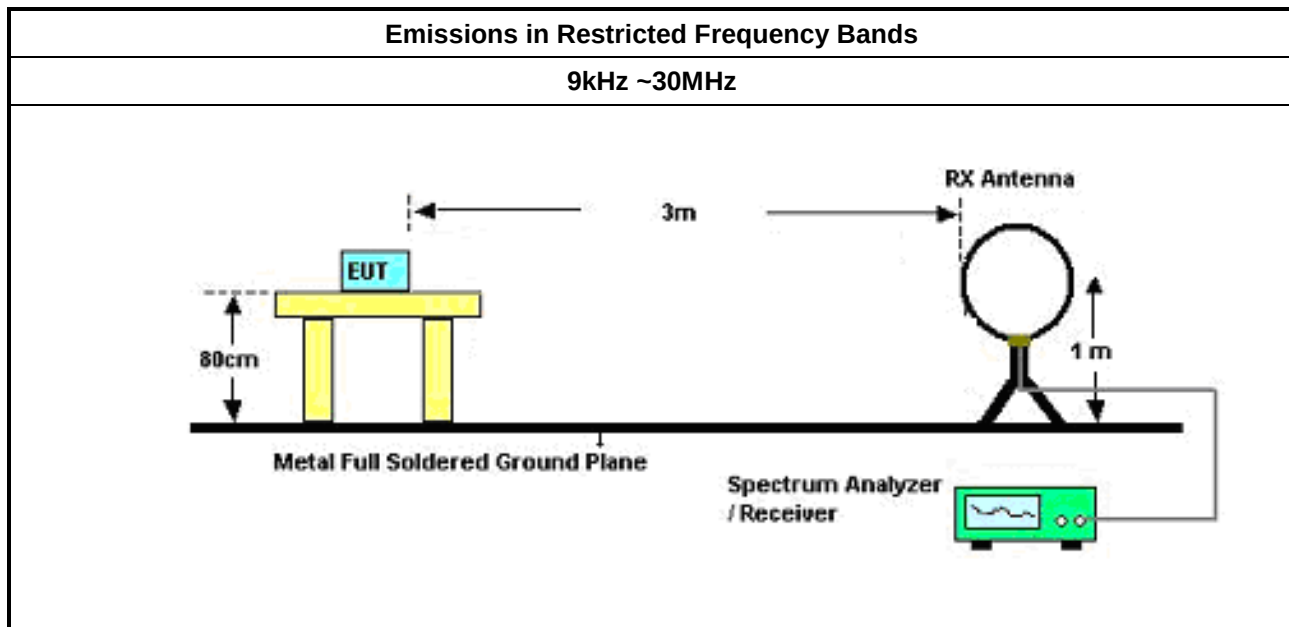
3.6.2 Measuring Instruments

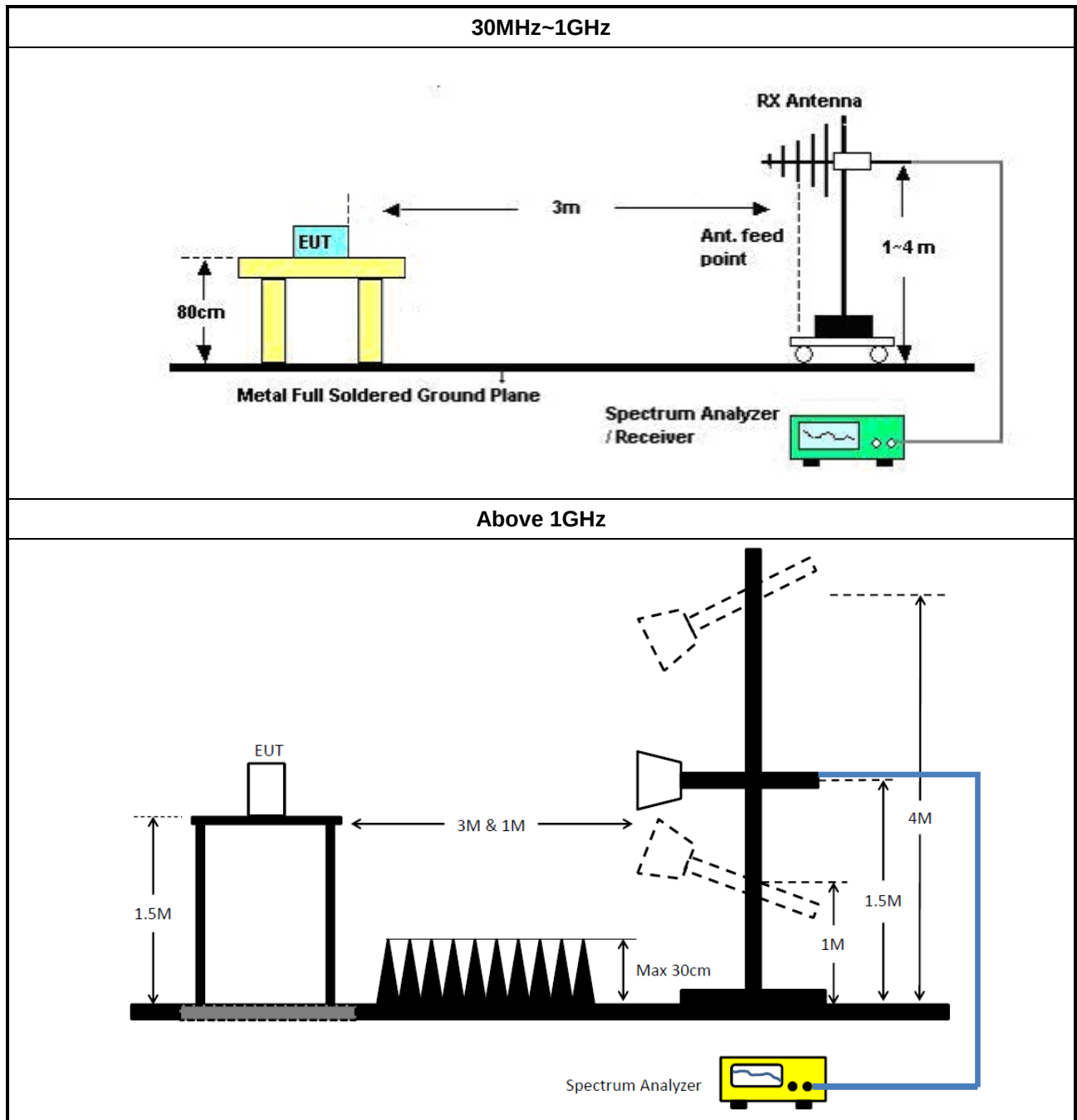
Refer a test equipment and calibration data table in this test report.

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 F

4 Test Equipment and Calibration Data

Instrument for AC Conduction

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
EMC Receiver	R&S	ESR	102051	9KHz ~ 3.6GHz	03/May/2018	02/May/2019
LISN	R&S	ENV216	101295	9kHz ~ 30MHz	08/Nov/2018	07/Nov/2019
RF Cable-CON	MTJ	RG142	CB002-CO	9kHz ~ 200MHz	17/Sep/2018	16/Sep/2019
AC POWER	APC	AFC-11005G	F310050055	47Hz~63Hz 5~300V	NCR	NCR
Impuls Begrenzer Pulse Limiter	SCHWARZBECK	VTSD 9561-F	9561-F041	9 kHz ~ 30 MHz	12/Oct/2018	11/Oct/2019

NCR : Non-Calibration Require

Instrument for Conducted Test

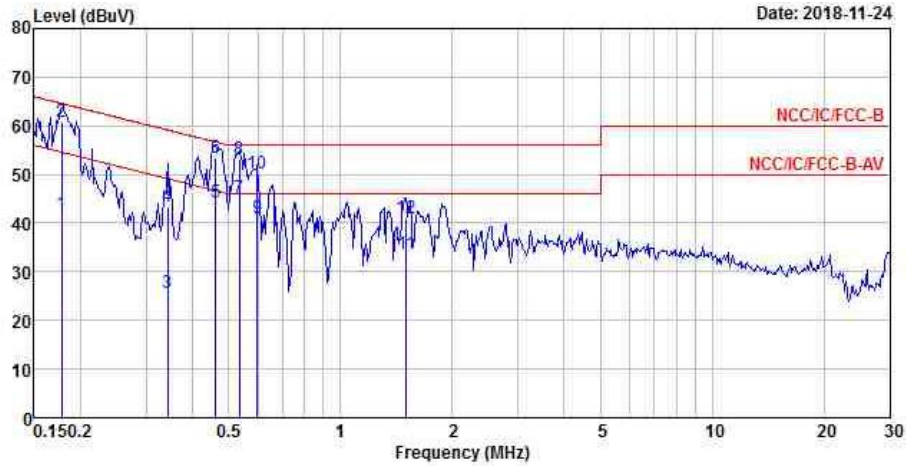
Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
Signal Analyzer	R&S	FSV40	101500	10Hz ~ 40GHz	18/Jul/2018	17/Jul/2019
Power Sensor	Anritsu	MA2411B	1339407	300MHz ~ 40GHz	06/Nov/2017	05/Nov/2018
Power Meter	Anritsu	ML2495A	1517010	300MHz ~ 40GHz	06/Nov/2017	05/Nov/2018
RF Cable-1m	HUBER+SUHNER	MY37332/4	RF Cable - 44	30MHz~1GHz	26/Jan/2018	25/Jan/2019
RF Cable-0.2m	HUBER+SUHNER	SUCOFLEX_104	MY10710/4	30MHz ~ 26.5GHz	26/Jan/2018	25/Jan/2019
RF Cable-0.2m	HUBER+SUHNER	SUCOFLEX_104	MY10709/4	30MHz ~ 26.5GHz	26/Jan/2018	25/Jan/2019
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	26/Jul/2018	25/Jul/2019

Instrument for Radiated Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz ~ 1GHz 3m	20/Oct/2017	19/Oct/2018
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz ~ 1GHz 3m	25/Oct/2018	24/Oct/2019
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	1GHz ~ 18GHz 3m	27/Oct/2017	26/Oct/2018
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	1GHz ~ 18GHz 3m	25/Oct/2018	24/Oct/2019
Amplifier	Agilent	8447D	2944A11149	100kHz ~ 1.3GHz	27/Jul/2018	02/Jul/2019
Spectrum Analyzer	Rohde & Schwarz	FSP40	100593	9KHz - 40GHz	12/Dec/2017	11/Dec/2018
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100354	9kHz ~ 2.75GHz	08/Dec/2017	07/Dec/2018
RF Cable-R03m	Jye Bao	RG142	CB017	9kHz ~ 1GHz	19/Jan/2018	18/Jan/2019
Bilog Antenna	SCHAFFNER	CBL 6112B	2723	30MHz ~ 1GHz	09/Sep/2017	08/Sep/2018
Bilog Antenna	SCHAFFNER	CBL 6112B	2723	30MHz ~ 1GHz	13/Oct/2018	12/Oct/2019
Loop Antenna	TESEQ	HLA 6120	31244	9k-30MHz	29/Mar/2018	28/Mar/2019

AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Neutral
Operating Function	AC mains mode		

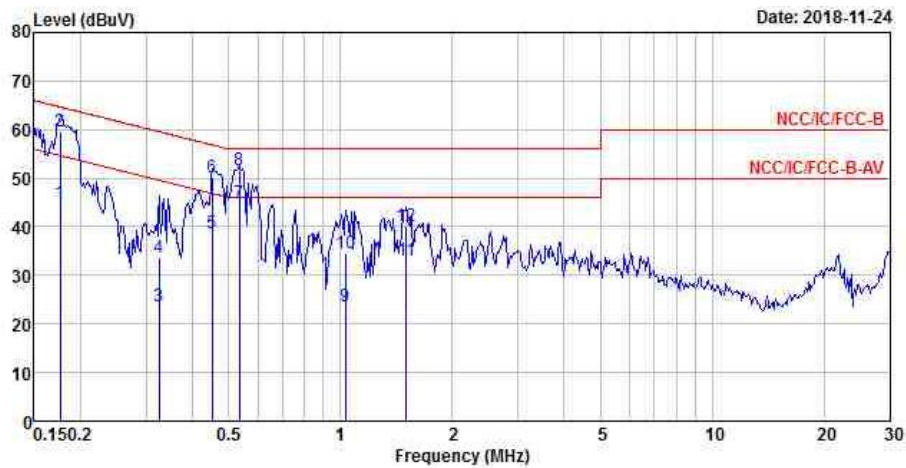


	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.18	41.96	-12.63	54.59	32.32	9.62	0.02	Average
2	0.18	60.88	-3.71	64.59	51.24	9.62	0.02	QP
3	0.34	25.74	-23.39	49.13	16.05	9.61	0.08	Average
4	0.34	43.47	-15.66	59.13	33.78	9.61	0.08	QP
5	0.46	44.39	-2.28	46.67	34.70	9.61	0.08	Average
6	0.46	53.33	-3.34	56.67	43.64	9.61	0.08	QP
7 MAX	0.53	45.31	-0.69	46.00	35.63	9.61	0.07	Average
8	0.53	53.01	-2.99	56.00	43.33	9.61	0.07	QP
9	0.60	41.06	-4.94	46.00	31.39	9.61	0.06	Average
10	0.60	50.12	-5.88	56.00	40.45	9.61	0.06	QP
11	1.50	33.67	-12.33	46.00	24.04	9.63	0.00	Average
12	1.50	41.04	-14.96	56.00	31.41	9.63	0.00	QP

Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)

AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Line
Operating Function	AC mains mode		



	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.18	45.01	-9.67	54.68	35.37	9.62	0.02	Average
2	0.18	59.72	-4.96	64.68	50.08	9.62	0.02	QP
3	0.33	23.57	-26.00	49.57	13.89	9.61	0.07	Average
4	0.33	33.80	-25.77	59.57	24.12	9.61	0.07	QP
5	0.45	38.73	-8.12	46.85	29.03	9.61	0.09	Average
6	0.45	50.20	-6.65	56.85	40.50	9.61	0.09	QP
7 MAX	0.53	44.97	-1.03	46.00	35.29	9.61	0.07	Average
8	0.53	51.54	-4.46	56.00	41.86	9.61	0.07	QP
9	1.03	23.57	-22.43	46.00	13.96	9.61	0.00	Average
10	1.03	34.46	-21.54	56.00	24.85	9.61	0.00	QP
11	1.50	33.02	-12.98	46.00	23.40	9.62	0.00	Average
12	1.50	40.14	-15.86	56.00	30.52	9.62	0.00	QP

Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.

Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)

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)	646.25k	988.256k	988KF1D	643.75k	983.258k

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;

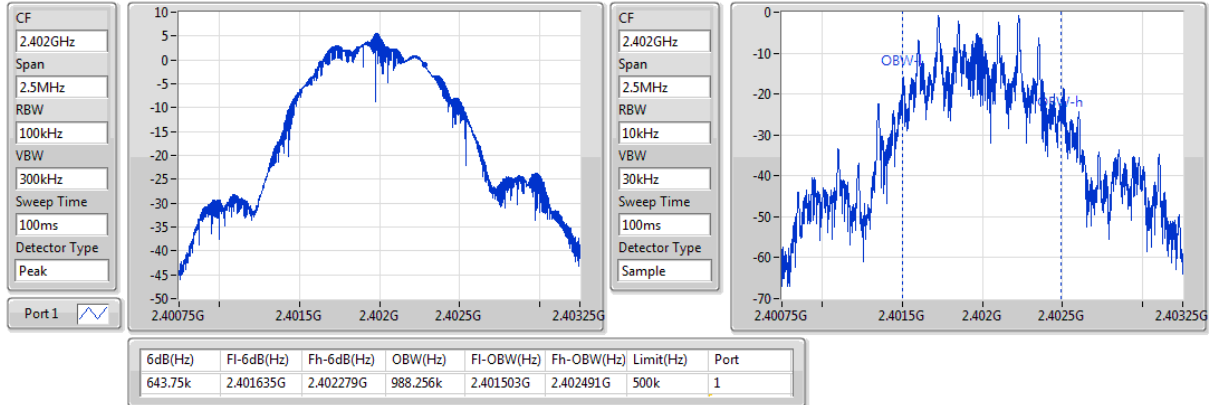
Result

Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	500k	643.75k	988.256k
2440MHz	Pass	500k	645k	983.258k
2480MHz	Pass	500k	646.25k	985.757k

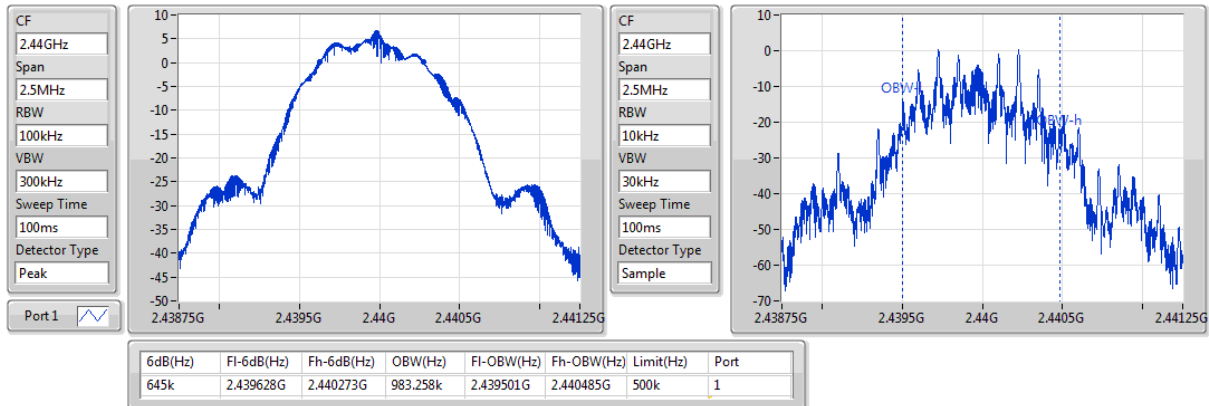
Port X-N dB = Port X 6dB down bandwidth; **Port X-OBW** = Port X 99% occupied bandwidth;

BT-LE(1Mbps)
EBW
2402MHz

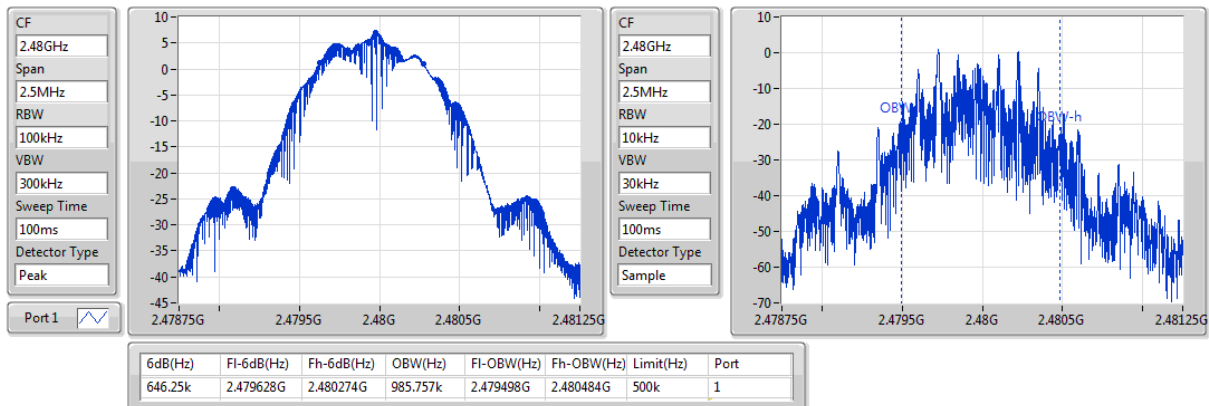
16/10/2018


BT-LE(1Mbps)
EBW
2440MHz

16/10/2018


BT-LE(1Mbps)
EBW
2480MHz

16/10/2018



**Summary**

Mode	Power	Power
	(dBm)	(W)
2.4-2.4835GHz	-	-
BT-LE(1Mbps)	6.94	0.00494

Result

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	2.00	5.17	30.00
2440MHz	Pass	2.00	6.08	30.00
2480MHz	Pass	2.00	6.94	30.00

**Summary**

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
BT-LE(1Mbps)	-0.08

RBW=3kHz.

Result

Mode	Result	Gain (dBi)	PD (dBm/RBW)	PD Limit (dBm/RBW)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	2.00	-2.27	8.00
2440MHz	Pass	2.00	-0.85	8.00
2480MHz	Pass	2.00	-0.08	8.00

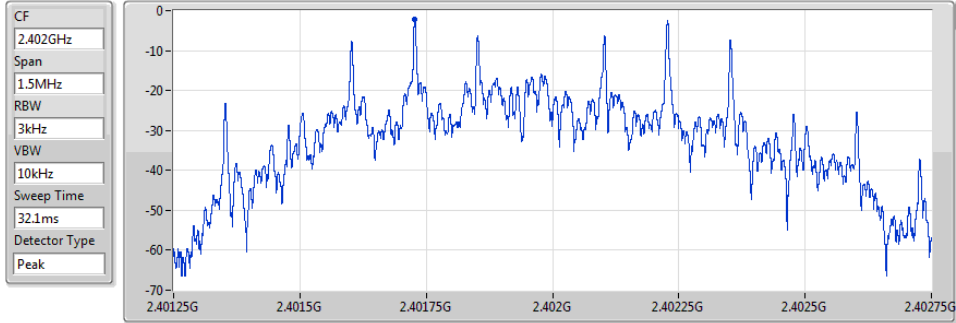
RBW=3kHz.

BT-LE(1Mbps)

PSD

2402MHz

16/10/2018



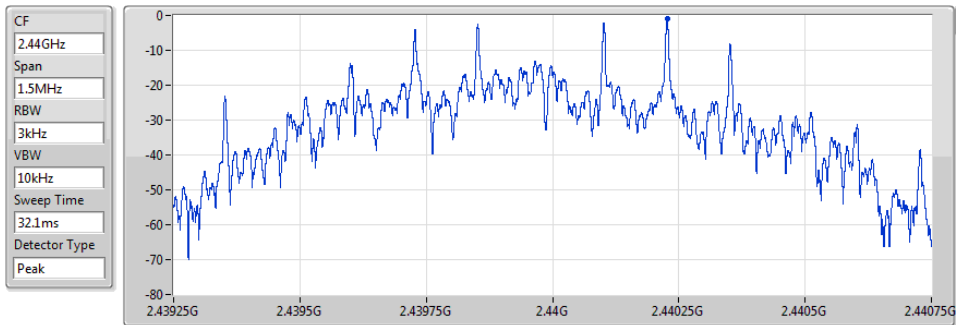
Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-2.27	-2.27	-2.27

BT-LE(1Mbps)

PSD

2440MHz

16/10/2018



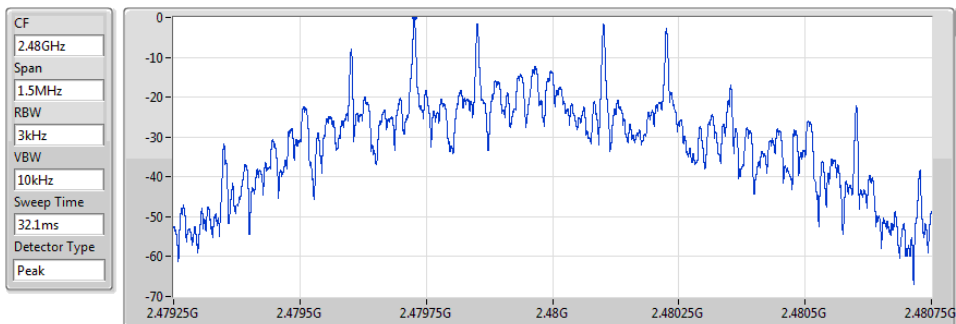
Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-0.85	-0.85	-0.85

BT-LE(1Mbps)

PSD

2480MHz

16/10/2018



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-0.08	-0.08	-0.08

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	2.40188G	3.24	-26.76	1.83619G	-45.70	2.39922G	-41.60	2.48414G	-44.26	15.21464G	-31.43	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	Pass	2.40188G	3.24	-26.76	1.83619G	-45.70	2.39922G	-41.60	2.48414G	-44.26	15.21464G	-31.43	1
2440MHz	Pass	2.43991G	4.24	-25.76	2.102G	-45.88	2.3982G	-45.21	2.48375G	-44.35	16.75125G	-31.47	1
2480MHz	Pass	2.48003G	6.01	-23.99	2.17097G	-45.61	2.39972G	-44.89	2.48542G	-43.35	16.47263G	-31.46	1

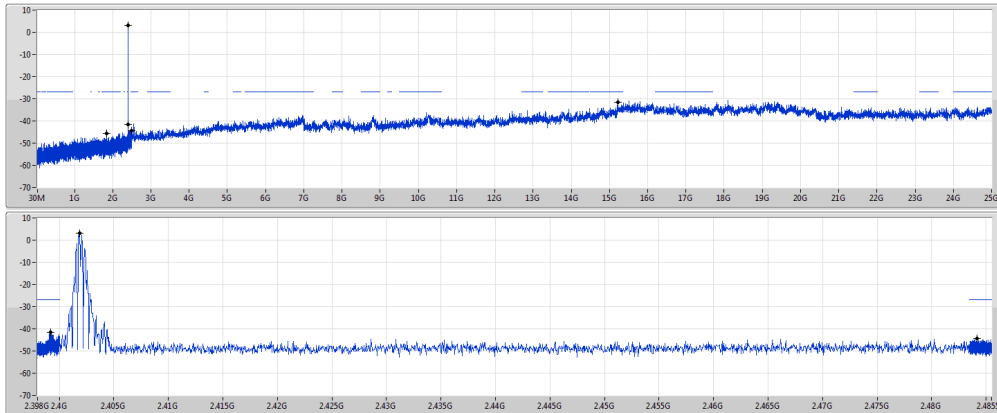
BT-LE(1Mbps)

2402MHz

CSE NdB

16/10/2018

Port 1



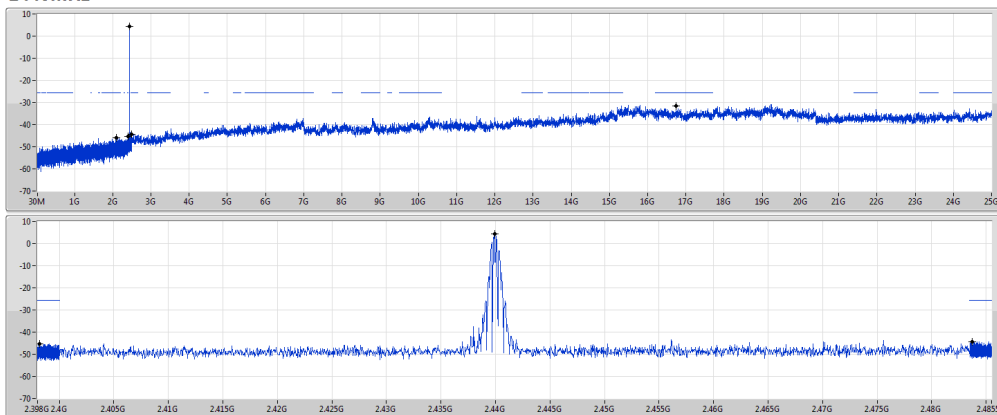
BT-LE(1Mbps)

2440MHz

CSE NdB

16/10/2018

Port 1



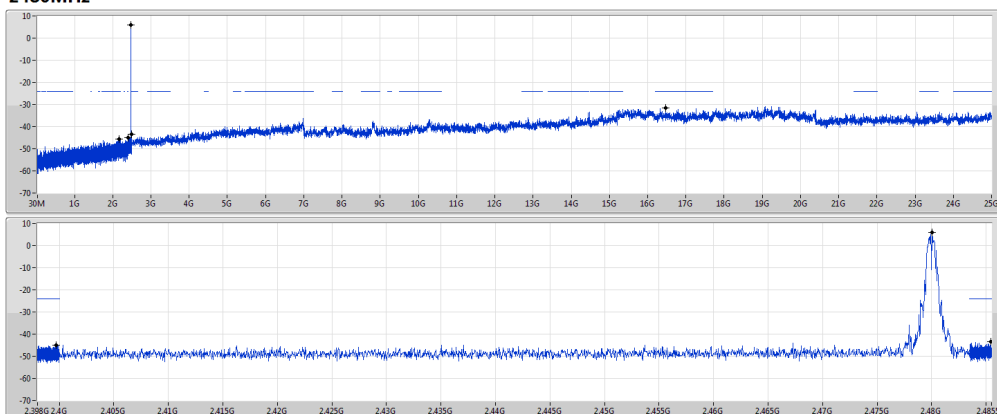
BT-LE(1Mbps)

2480MHz

CSE NdB

16/10/2018

Port 1





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	97.9M	39.90	43.50	-3.60	-10.28	3	Horizontal	360	1.00	-

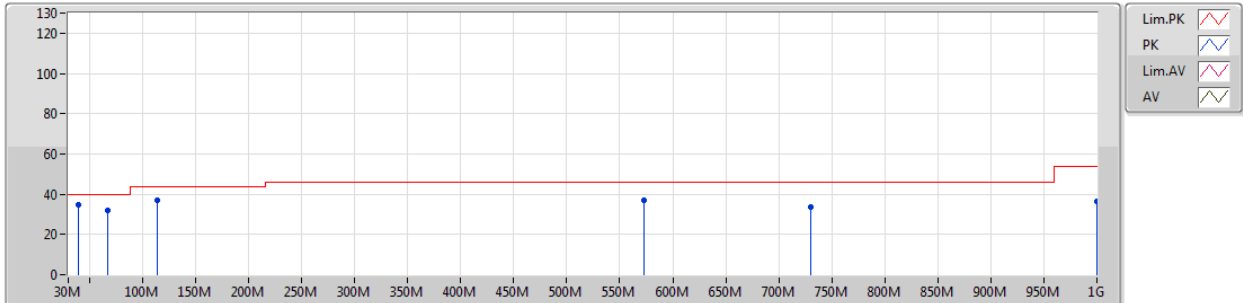
Result

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	573.2M	36.87	46.00	-9.13	-0.45	3	Vertical	0	1.00	-
2440MHz	Pass	PK	730.34M	33.90	46.00	-12.10	1.04	3	Vertical	0	1.00	-
2440MHz	Pass	PK	1G	36.46	54.00	-17.54	4.61	3	Vertical	0	1.00	-
2440MHz	Pass	QP	39.7M	34.50	40.00	-5.50	-9.19	3	Vertical	339	1.14	-
2440MHz	Pass	QP	66.86M	31.84	40.00	-8.16	-15.02	3	Vertical	271	1.46	-
2440MHz	Pass	QP	113.42M	36.82	43.50	-6.68	-8.54	3	Vertical	177	1.05	-
2440MHz	Pass	PK	97.9M	39.90	43.50	-3.60	-10.28	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	177.44M	38.84	43.50	-4.66	-10.36	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	495.6M	30.62	46.00	-15.38	-1.73	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	571.26M	35.77	46.00	-10.23	-0.42	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	840.92M	32.91	46.00	-13.09	2.25	3	Horizontal	360	1.00	-
2440MHz	Pass	QP	119.24M	36.39	43.50	-7.11	-8.33	3	Horizontal	241	2.89	-

BT-LE(1Mbps)

23/11/2018

2440MHz_Switching Power Supply

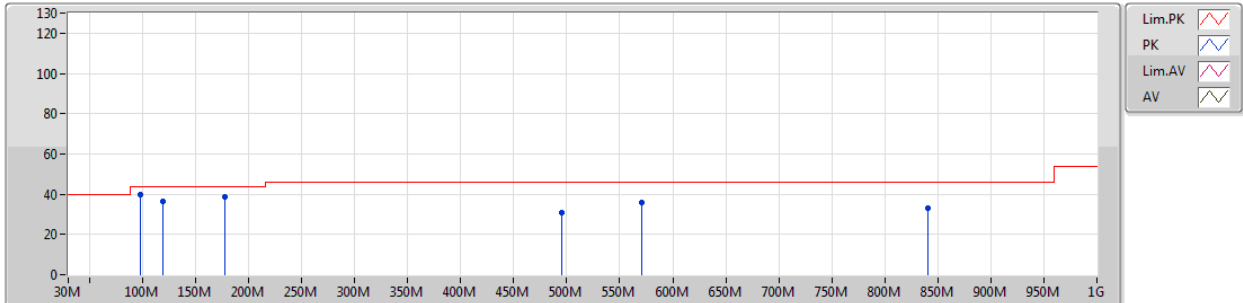


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
PK	573.2M	36.87	46.00	-9.13	-0.45	3	Vertical	0	1.00	-
PK	730.34M	33.90	46.00	-12.10	1.04	3	Vertical	0	1.00	-
PK	1G	36.46	54.00	-17.54	4.61	3	Vertical	0	1.00	-
QP	39.7M	34.50	40.00	-5.50	-9.19	3	Vertical	339	1.14	-
QP	66.86M	31.84	40.00	-8.16	-15.02	3	Vertical	271	1.46	-
QP	113.42M	36.82	43.50	-6.68	-8.54	3	Vertical	177	1.05	-

BT-LE(1Mbps)

2440MHz_Switching Power Supply

23/11/2018



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
PK	97.9M	39.90	43.50	-3.60	-10.28	3	Horizontal	360	1.00	-
PK	177.44M	38.84	43.50	-4.66	-10.36	3	Horizontal	360	1.00	-
PK	495.6M	30.62	46.00	-15.38	-1.73	3	Horizontal	360	1.00	-
PK	571.26M	35.77	46.00	-10.23	-0.42	3	Horizontal	360	1.00	-
PK	840.92M	32.91	46.00	-13.09	2.25	3	Horizontal	360	1.00	-
QP	119.24M	36.39	43.50	-7.11	-8.33	3	Horizontal	241	2.89	-



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	2.4835G	49.33	54.00	-4.67	30.97	3	Horizontal	257	1.74	-

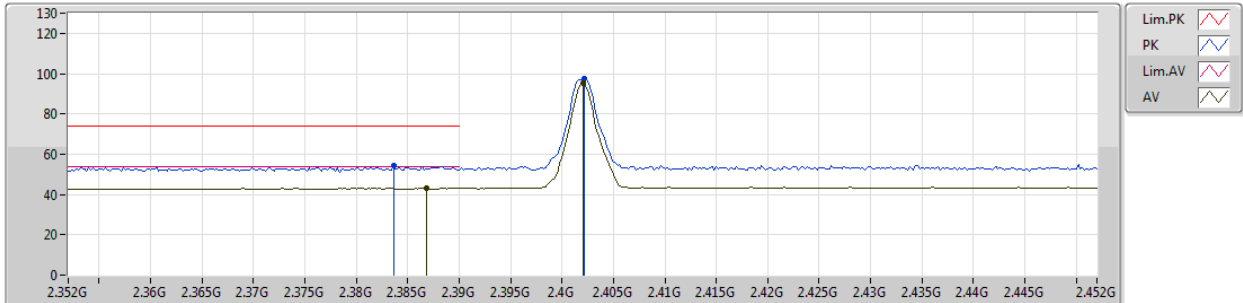
Result

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	2.3868G	43.32	54.00	-10.68	30.68	3	Vertical	286	1.38	-
2402MHz	Pass	AV	2.402G	95.04	Inf	-Inf	30.72	3	Vertical	286	1.38	-
2402MHz	Pass	PK	2.3836G	54.58	74.00	-19.42	30.67	3	Vertical	286	1.38	-
2402MHz	Pass	PK	2.4022G	97.27	Inf	-Inf	30.73	3	Vertical	286	1.38	-
2402MHz	Pass	AV	2.3868G	43.15	54.00	-10.85	30.68	3	Horizontal	254	2.01	-
2402MHz	Pass	AV	2.402G	100.94	Inf	-Inf	30.72	3	Horizontal	254	2.01	-
2402MHz	Pass	PK	2.3888G	54.47	74.00	-19.53	30.68	3	Horizontal	254	2.01	-
2402MHz	Pass	PK	2.4022G	103.10	Inf	-Inf	30.73	3	Horizontal	254	2.01	-
2402MHz	Pass	AV	4.95946G	33.48	54.00	-20.52	6.86	3	Vertical	194	1.77	-
2402MHz	Pass	PK	4.96816G	45.80	74.00	-28.20	6.88	3	Vertical	194	1.77	-
2402MHz	Pass	AV	4.96036G	33.69	54.00	-20.31	6.86	3	Horizontal	312	1.48	-
2402MHz	Pass	PK	4.96006G	45.53	74.00	-28.47	6.86	3	Horizontal	312	1.48	-
2440MHz	Pass	AV	2.3844G	43.13	54.00	-10.87	30.67	3	Vertical	288	2.96	-
2440MHz	Pass	AV	2.44G	95.92	Inf	-Inf	30.84	3	Vertical	288	2.96	-
2440MHz	Pass	AV	2.4976G	43.98	54.00	-10.02	31.00	3	Vertical	288	2.96	-
2440MHz	Pass	PK	2.3856G	54.04	74.00	-19.96	30.68	3	Vertical	288	2.96	-
2440MHz	Pass	PK	2.4396G	97.99	Inf	-Inf	30.84	3	Vertical	288	2.96	-
2440MHz	Pass	PK	2.4976G	54.89	74.00	-19.11	31.00	3	Vertical	288	2.96	-
2440MHz	Pass	AV	2.3876G	43.27	54.00	-10.73	30.68	3	Horizontal	253	2.21	-
2440MHz	Pass	AV	2.44G	101.61	Inf	-Inf	30.84	3	Horizontal	253	2.21	-
2440MHz	Pass	AV	2.492G	43.89	54.00	-10.11	30.99	3	Horizontal	253	2.21	-
2440MHz	Pass	PK	2.3812G	54.16	74.00	-19.84	30.66	3	Horizontal	253	2.21	-
2440MHz	Pass	PK	2.4396G	103.57	Inf	-Inf	30.84	3	Horizontal	253	2.21	-
2440MHz	Pass	PK	2.4948G	54.51	74.00	-19.49	31.00	3	Horizontal	253	2.21	-
2440MHz	Pass	AV	4.96036G	33.71	54.00	-20.29	6.86	3	Vertical	136	1.66	-
2440MHz	Pass	PK	4.94596G	45.61	74.00	-28.39	6.81	3	Vertical	136	1.66	-
2440MHz	Pass	AV	4.95658G	33.44	54.00	-20.56	6.85	3	Horizontal	75	1.84	-
2440MHz	Pass	PK	4.95748G	46.12	74.00	-27.88	6.85	3	Horizontal	75	1.84	-
2480MHz	Pass	AV	2.48G	96.26	Inf	-Inf	30.95	3	Vertical	271	2.60	-
2480MHz	Pass	AV	2.4835G	45.99	54.00	-8.01	30.97	3	Vertical	271	2.60	-
2480MHz	Pass	PK	2.4798G	98.11	Inf	-Inf	30.95	3	Vertical	271	2.60	-
2480MHz	Pass	PK	2.4835G	57.17	74.00	-16.83	30.97	3	Vertical	271	2.60	-
2480MHz	Pass	AV	2.48G	101.69	Inf	-Inf	30.95	3	Horizontal	257	1.74	-
2480MHz	Pass	AV	2.4835G	49.33	54.00	-4.67	30.97	3	Horizontal	257	1.74	-
2480MHz	Pass	PK	2.48G	103.55	Inf	-Inf	30.95	3	Horizontal	257	1.74	-
2480MHz	Pass	PK	2.4835G	57.32	74.00	-16.68	30.97	3	Horizontal	257	1.74	-
2480MHz	Pass	AV	4.95952G	33.89	54.00	-20.11	6.86	3	Vertical	110	1.65	-
2480MHz	Pass	PK	4.95772G	45.69	74.00	-28.31	6.85	3	Vertical	110	1.65	-
2480MHz	Pass	AV	4.95976G	33.82	54.00	-20.18	6.86	3	Horizontal	130	2.10	-
2480MHz	Pass	PK	4.96714G	46.17	74.00	-27.83	6.87	3	Horizontal	130	2.10	-

BT-LE(1Mbps)

2402MHz_TX

26/11/2018

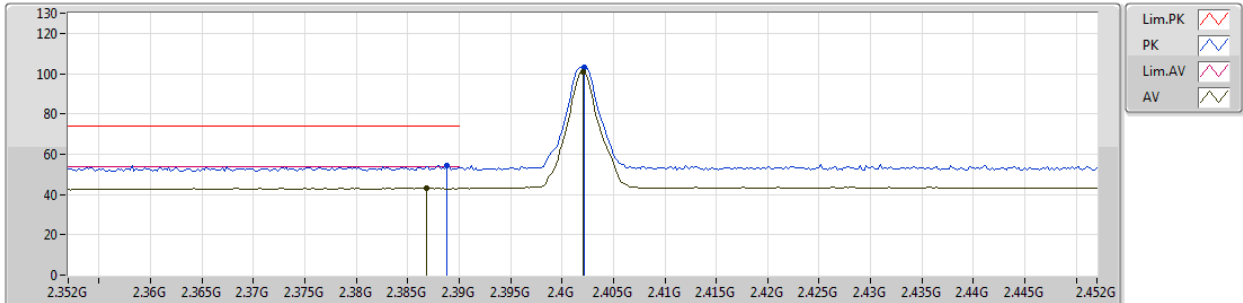


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.3868G	43.32	54.00	-10.68	30.68	3	Vertical	286	1.38	-
AV	2.402G	95.04	Inf	-Inf	30.72	3	Vertical	286	1.38	-
PK	2.3836G	54.58	74.00	-19.42	30.67	3	Vertical	286	1.38	-
PK	2.4022G	97.27	Inf	-Inf	30.73	3	Vertical	286	1.38	-

BT-LE(1Mbps)

2402MHz_TX

26/11/2018

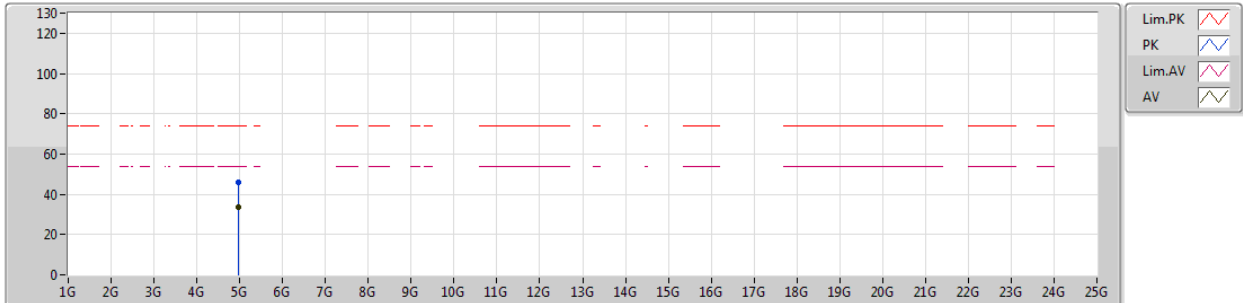


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.3868G	43.15	54.00	-10.85	30.68	3	Horizontal	254	2.01	-
AV	2.402G	100.94	Inf	-Inf	30.72	3	Horizontal	254	2.01	-
PK	2.3888G	54.47	74.00	-19.53	30.68	3	Horizontal	254	2.01	-
PK	2.4022G	103.10	Inf	-Inf	30.73	3	Horizontal	254	2.01	-

BT-LE(1Mbps)

2402MHz_TX

26/11/2018

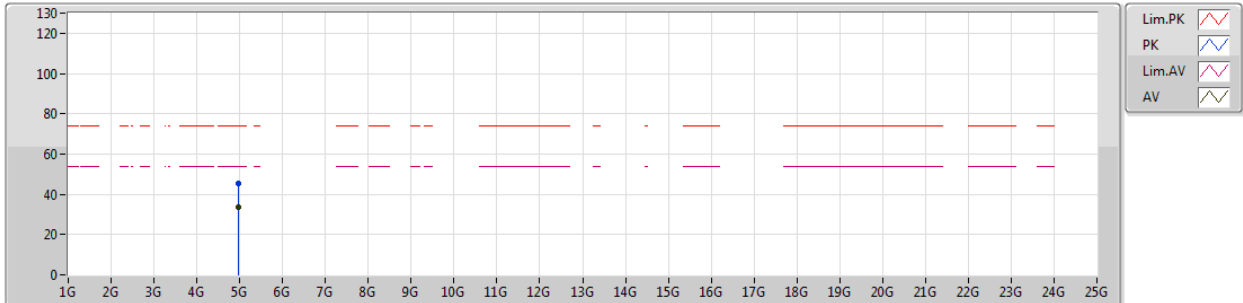


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments								
AV	4.95946G	33.48	54.00	-20.52	6.86	3	Vertical	194	1.77	-								
PK	4.96816G	45.80	74.00	-28.20	6.88	3	Vertical	194	1.77	-								

BT-LE(1Mbps)

2402MHz_TX

26/11/2018

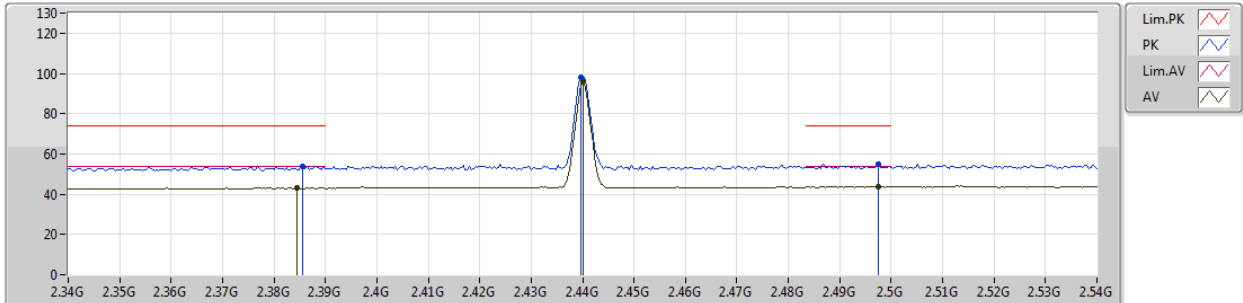


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	4.96036G	33.69	54.00	-20.31	6.86	3	Horizontal	312	1.48	-
PK	4.96006G	45.53	74.00	-28.47	6.86	3	Horizontal	312	1.48	-

BT-LE(1Mbps)

2440MHz_TX

26/11/2018

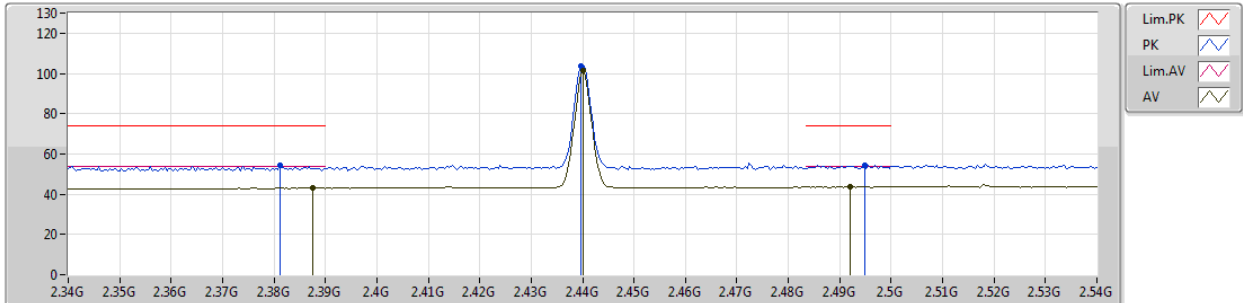


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.3844G	43.13	54.00	-10.87	30.67	3	Vertical	288	2.96	-
AV	2.44G	95.92	Inf	-Inf	30.84	3	Vertical	288	2.96	-
AV	2.4976G	43.98	54.00	-10.02	31.00	3	Vertical	288	2.96	-
PK	2.3856G	54.04	74.00	-19.96	30.68	3	Vertical	288	2.96	-
PK	2.4396G	97.99	Inf	-Inf	30.84	3	Vertical	288	2.96	-
PK	2.4976G	54.89	74.00	-19.11	31.00	3	Vertical	288	2.96	-

BT-LE(1Mbps)

2440MHz_TX

26/11/2018

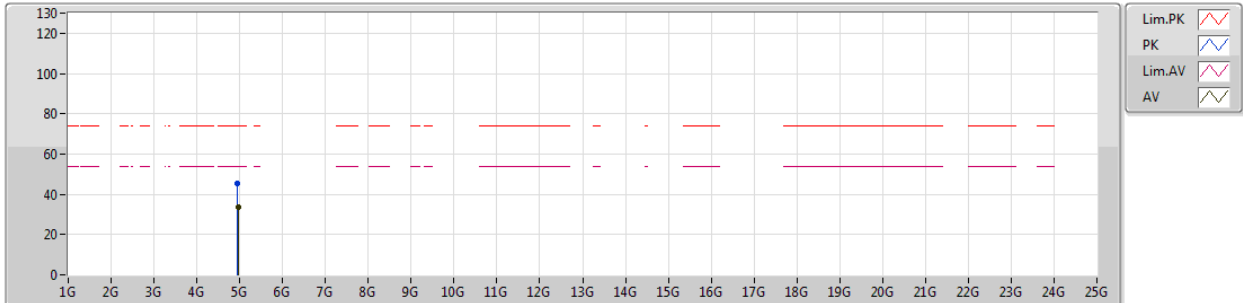


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments								
AV	2.3876G	43.27	54.00	-10.73	30.68	3	Horizontal	253	2.21	-								
AV	2.44G	101.61	Inf	-Inf	30.84	3	Horizontal	253	2.21	-								
AV	2.492G	43.89	54.00	-10.11	30.99	3	Horizontal	253	2.21	-								
PK	2.3812G	54.16	74.00	-19.84	30.66	3	Horizontal	253	2.21	-								
PK	2.4396G	103.57	Inf	-Inf	30.84	3	Horizontal	253	2.21	-								
PK	2.4948G	54.51	74.00	-19.49	31.00	3	Horizontal	253	2.21	-								

BT-LE(1Mbps)

2440MHz_TX

26/11/2018

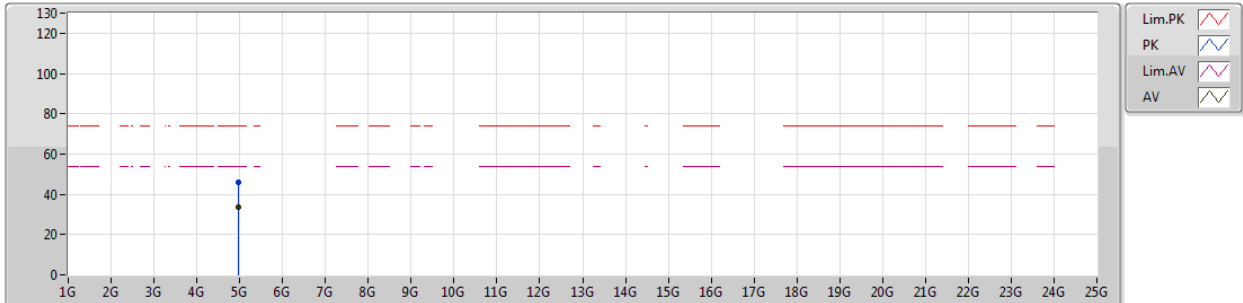


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments							
AV	4.96036G	33.71	54.00	-20.29	6.86	3	Vertical	136	1.66	-							
PK	4.94596G	45.61	74.00	-28.39	6.81	3	Vertical	136	1.66	-							

BT-LE(1Mbps)

2440MHz_TX

26/11/2018

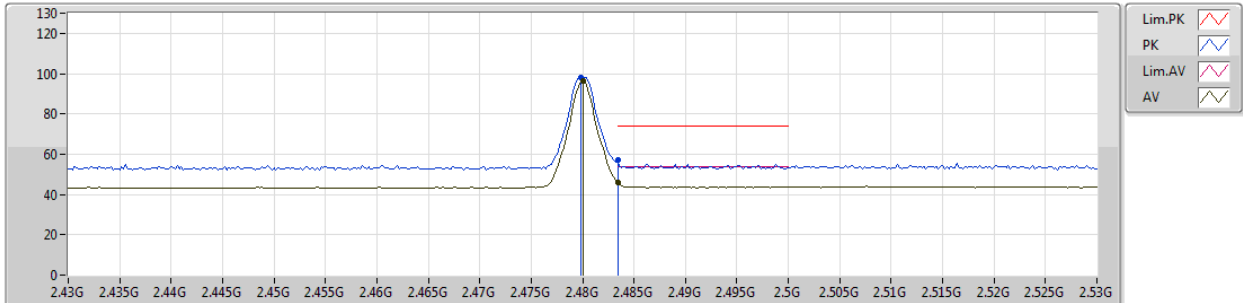


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	4.95658G	33.44	54.00	-20.56	6.85	3	Horizontal	75	1.84	-
PK	4.95748G	46.12	74.00	-27.88	6.85	3	Horizontal	75	1.84	-

BT-LE(1Mbps)

2480MHz_TX

26/11/2018

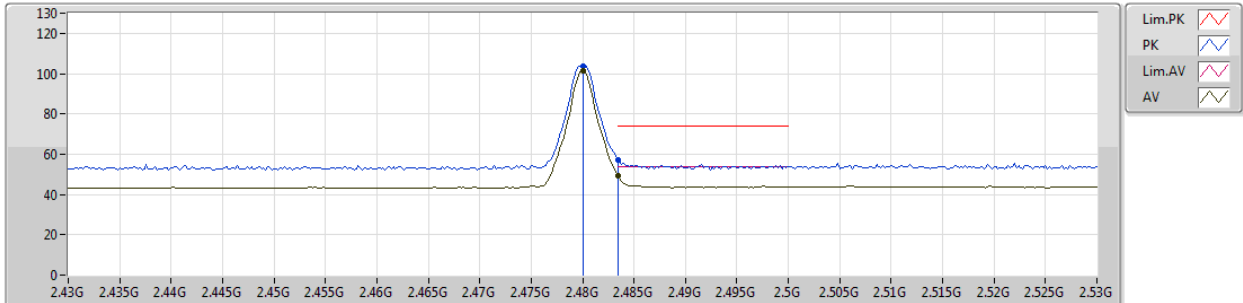


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.48G	96.26	Inf	-Inf	30.95	3	Vertical	271	2.60	-
AV	2.4835G	45.99	54.00	-8.01	30.97	3	Vertical	271	2.60	-
PK	2.4798G	98.11	Inf	-Inf	30.95	3	Vertical	271	2.60	-
PK	2.4835G	57.17	74.00	-16.83	30.97	3	Vertical	271	2.60	-

BT-LE(1Mbps)

2480MHz_TX

26/11/2018

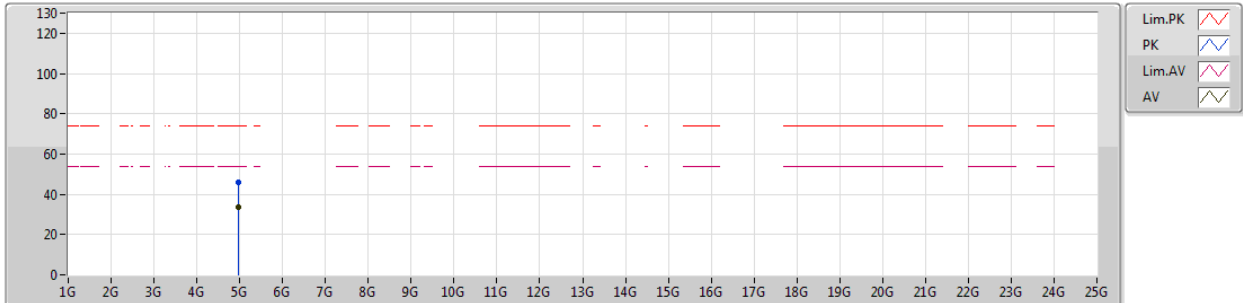


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.48G	101.69	Inf	-Inf	30.95	3	Horizontal	257	1.74	-
AV	2.4835G	49.33	54.00	-4.67	30.97	3	Horizontal	257	1.74	-
PK	2.48G	103.55	Inf	-Inf	30.95	3	Horizontal	257	1.74	-
PK	2.4835G	57.32	74.00	-16.68	30.97	3	Horizontal	257	1.74	-

BT-LE(1Mbps)

2480MHz_TX

26/11/2018

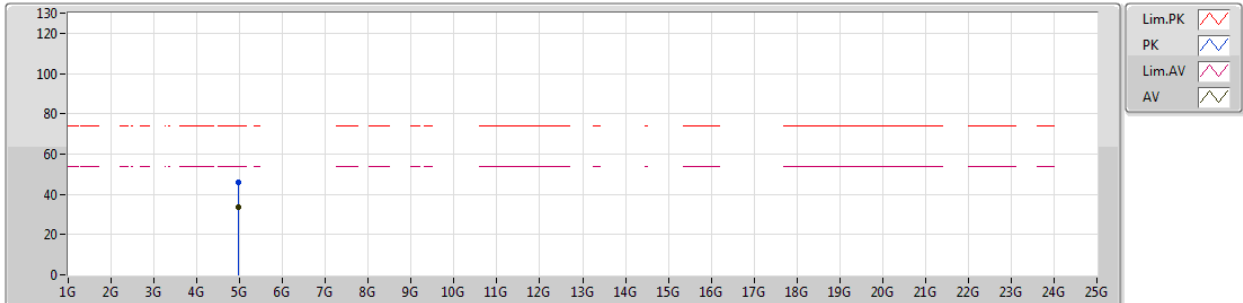


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	4.95952G	33.89	54.00	-20.11	6.86	3	Vertical	110	1.65	-
PK	4.95772G	45.69	74.00	-28.31	6.85	3	Vertical	110	1.65	-

BT-LE(1Mbps)

2480MHz_TX

26/11/2018



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments								
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)									
AV	4.95976G	33.82	54.00	-20.18	6.86	3	Horizontal	130	2.10	-								
PK	4.96714G	46.17	74.00	-27.83	6.87	3	Horizontal	130	2.10	-								