FCC Test Report

FCC ID	:	**PPQ-WSG309S**
Equipment	:	**Sigfox Monarch Module**
Brand Name	:	**LITE-ON**
Model Name	:	**WSG309S**
Applicant	:	**Lite-On Technology Corp. Bldg. C, 90, Chien 1 Road, Chung Ho, New Taipei City 23585, Taiwan, R.O.C**
Manufacturer	:	**LITE-ON Technology (Changzhou) Co., Ltd. A9 Building,No.88 Yanghu Road, Wujin Hi-Tech Industrial Development Zone ,Changzhou City,Jiangsu Province 213100 China**
Standard	:	**47 CFR FCC Part 15.247**

The product was received on Sep. 03, 2019, and testing was started from Sep. 09, 2019 and completed on Sep. 18, 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.)

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History of this test report

Report No.	Version	Description	Issued Date
FR930617-01AL	01	Initial issue of report	Oct. 16, 2019

Summary of Test Result

Report Clause	Ref.Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.207	AC Power-line Conducted Emissions	PASS	-
3.2	15.247(a)	DTS Bandwidth	PASS	-
3.3	15.247(b)	Maximum Conducted Output Power	PASS	-
3.4	15.247(e)	Power Spectral Density	PASS	-
3.5	15.247(d)	Emissions in Non-restricted Frequency Bands	PASS	-
3.6	15.247(d)	Emissions in Restricted Frequency Bands	PASS	-

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: Kate Lo

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.	Port	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	1	Walsin	RFDPA870900SBAB815	Dipole	I-PEX	2.3
2	1	Walsin	RFPCA431015IMAB301	PIFA	I-PEX	2.69
3	1	Walsin	RFDPA131015IMRB301	Dipole	I-PEX	3.01

Note 1: The EUT has three antennas.

For BT function:

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

Ant. 1 (port 1) or Ant. 2 (port 1) could transmit/receive.

For Sigfox function:

For Sigfox mode (1TX/1RX)

Ant. 3 (port 1) could transmit/receive.

1.1.3 EUT Information

Operational Condition				
EUT Power Type	From host system(NB)			
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) ≥ 1/T
BT-LE(1Mbps)	0.632	1.99	400u	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 v05r02
- KDB 414788 D01 v01r01

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	Edward	23.9~25.6°C / 69.2~72.1%	10/Sep/2019
RF Conducted	TH01-HY	Barry	24.9~25.3°C / 48~54%	09/Sep/2019~ 18/Sep/2019
Radiated	03CH01-HY	Edward	23.9~25.6°C / 69.2~72.1%	10/Sep/2019~ 11/Sep/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	120V

2.2 Test Channel Mode

Test Software	DoS

Mode	Power Setting
BT-LE(1Mbps)	-
2402MHz	7
2440MHz	7
2480MHz	7

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

The Worst Case Mode for Following Conformance Tests	
Tests Item	Simultaneous Transmission Analysis
Operating Mode	CTX
1	Sigfox+Bluetooth
Refer to Sporton Test Report No.: FA930617-01 for Co-location RF Exposure Evaluation.	

2.4 Support Equipment

Support Equipment – AC Conduction and Radiated Emission				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	Power Cable	Power sync	PW-GPC180-3	-
2	Notebook	DELL	PP27L	-
3	Adapter for NB	DELL	LA90PM111	-
4	Fixture	LITEON	WSG303S_EVB	-
5	USB Cable	-	-	-

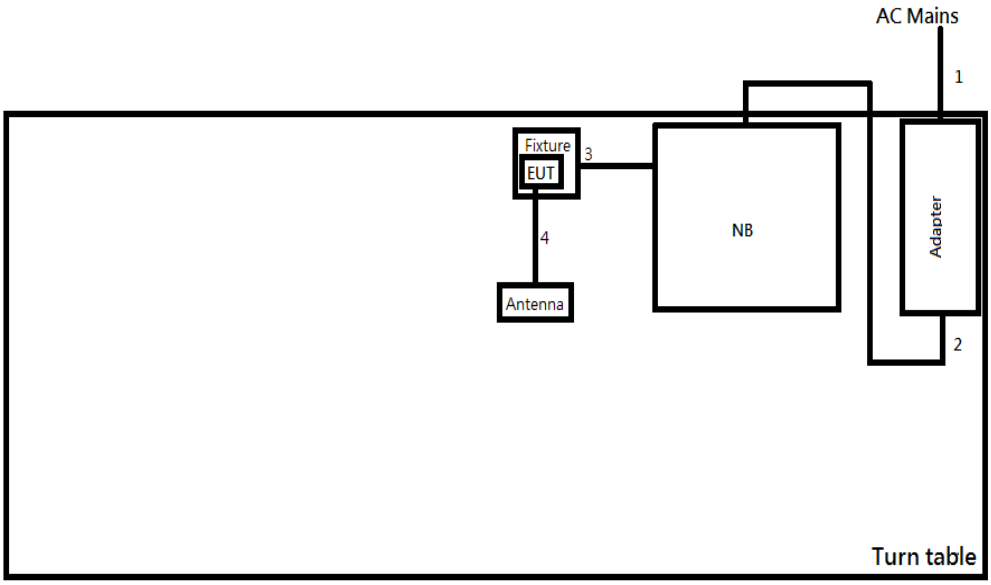
Note: Support equipment No.4 was provided by customer.

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	-
4	Fixture	-	-	-

Note: Support equipment No.4 was provided by customer.

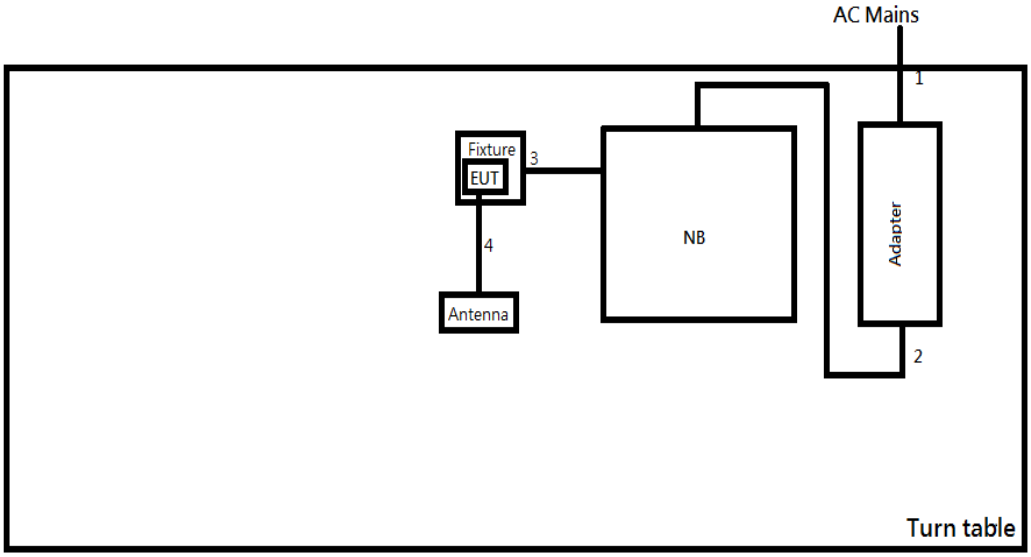
2.5 Test Setup Diagram

Test Setup Diagram – AC Line Conducted Emission Test



Item	Connection	Shielded	Length(m)	Remark
1	AC Power Cable	No	1.8	-
2	DC Power Cable	No	2.0	-
3	USB Cable	No	0.3	-
4	RF Cable	No	0.15	-

Test Setup Diagram - Radiated Test



Item	Connection	Shielded	Length(m)	Remark
1	AC Power Cable	No	1.8	-
2	DC Power Cable	No	2.0	-
3	USB Cable	No	0.3	-
4	RF Cable	No	0.15	-

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

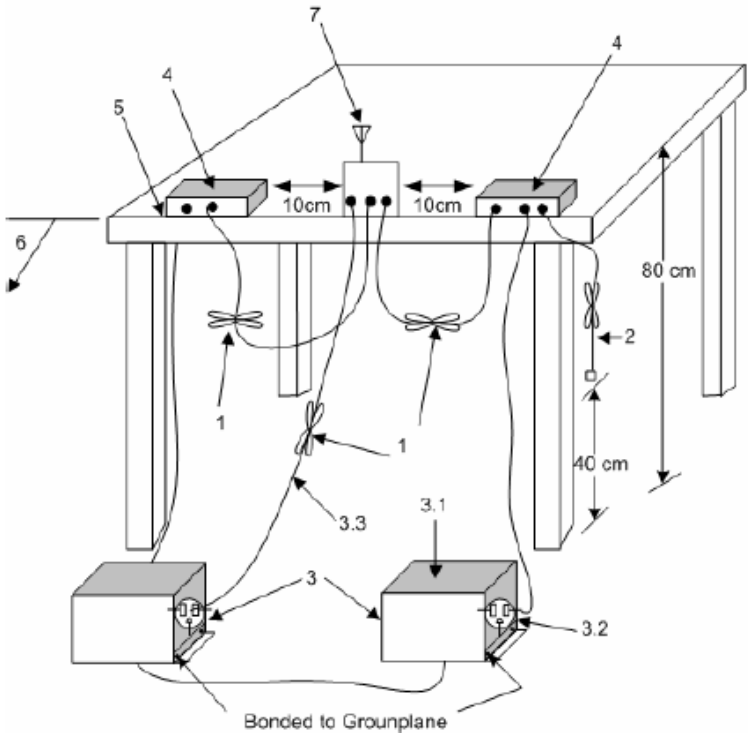
Refer a test equipment and calibration data table in this test report.

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

AC Power-line Conducted Emissions



1—Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long.
2—The I/O cables that are not connected to an accessory shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
3—EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50Ω loads. LISN may be placed on top of, or immediately beneath, reference ground plane.
3.1—All other equipment powered from additional LISN(s).
3.2—A multiple-outlet strip may be used for multiple power cords of non-EUT equipment.
3.3—LISN at least 80 cm from nearest part of EUT chassis.
4—Non-EUT components of EUT system being tested.
5—Rear of EUT, including peripherals, shall all be aligned and flush with edge of tabletop.
6—Edge of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.
7—Antenna can be integral or detachable. If detachable, then the antenna shall be attached for this test.

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 ≥ 500 kHz.

3.2.2 Measuring Instruments

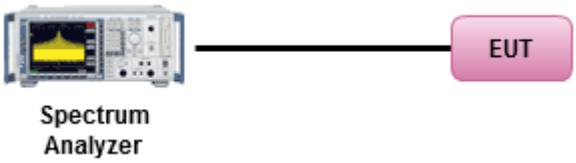
Refer a test equipment and calibration data table in this test report.

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

Emission Bandwidth



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): $P_{eirp} \leq MAX(36, [P_{Out} + G_{TX}])$ dBm		
	▪ Smart antenna system (SAS)		
		- Single beam: $P_{eirp} \leq MAX(36, P_{Out} + G_{TX})$ dBm	
		- Overlap beam: $P_{eirp} \leq MAX(36, P_{Out} + G_{TX})$ dBm	
		- Aggregate power on all beams: $P_{eirp} \leq MAX(36, [P_{Out} + G_{TX} + 8])$ 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: $P_{total} = P_1 + P_2 + \ldots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$

3.3.4 Test Setup

Maximum Conducted Output Power (Power Meter)


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

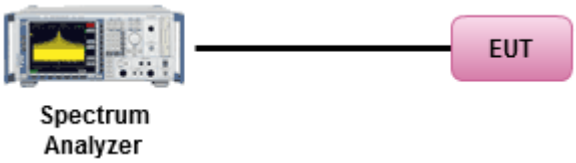
3.4.2 Measuring Instruments

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

Power Spectral Density


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 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 level.	

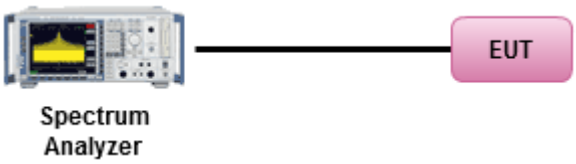
3.5.2 Measuring Instruments

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

Emissions in Non-restricted Frequency Bands


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 below30 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.

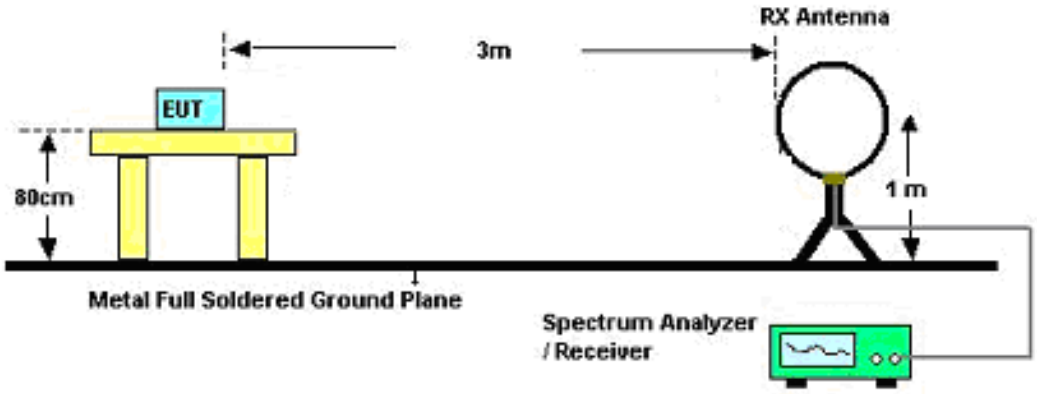
3.6.3 Test Procedures

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.
▪ 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 ≥ 1 GHz for peak measurement. For average measurement, refer as 1.1.4.
▪ KDB 414788 Open-Field Test Sites and Chamber Correlation Justification.
▪ Based on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in regulations; however, an attempt should be made to avoid making measurements in the near field.
▪ Open-field site and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

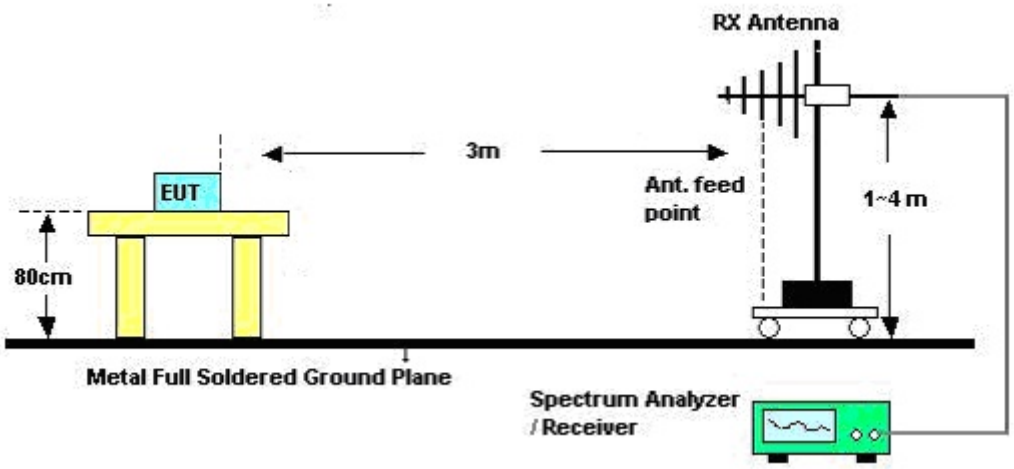
3.6.4 Test Setup

Emissions in Restricted Frequency Bands

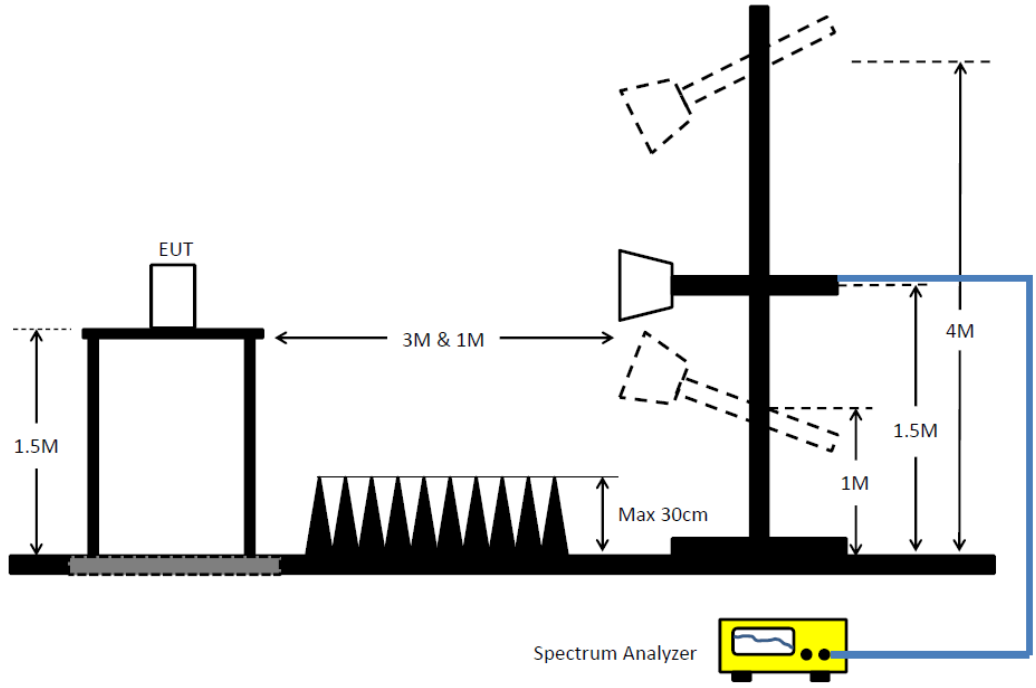
9kHz ~30MHz



30MHz~1GHz



Above 1GHz



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	ESR3	102052	9kHz~3.6GHz	09/Apr/2019	08/Apr/2020
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	9kHz~30MHz	12/Oct/2018	11/Oct/2019

NCR : Non-Calibration Require

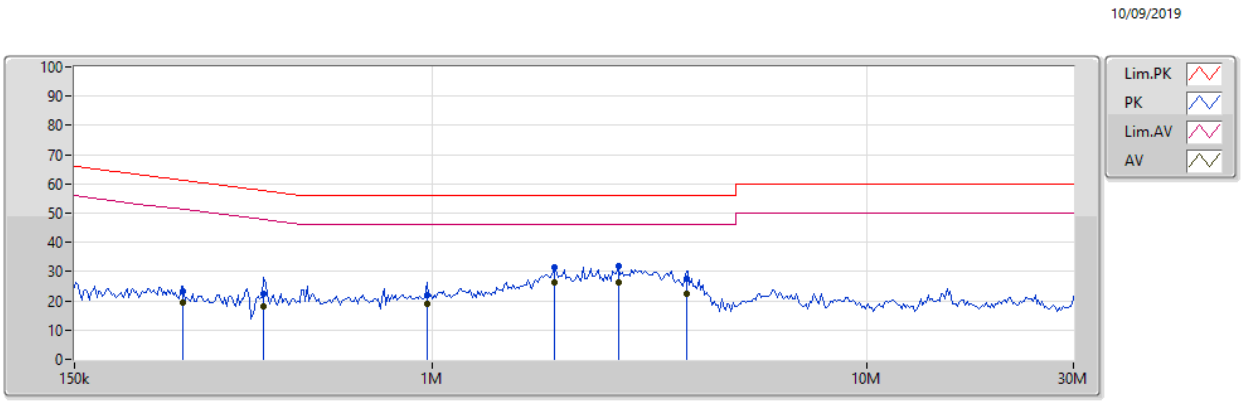
Instrument for Conducted Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
Spectrum Analyzer	R&S	FSV 40	101013	10Hz~40GHz	13/Mar/2019	12/Mar/2020
SMB100A Signal Generator	R&S	SMB100A03	181147	100kHz~40GHz	12/Nov/2018	10/Nov/2020
Power Sensor	Anritsu	MA2411B	0917017	300MHz~40GHz	19/Feb/2019	18/Feb/2020
Power Meter	Anritsu	ML2495A	0949003	300MHz~40GHz	19/Feb/2019	18/Feb/2020
Cable 0.2m	HUBER	MY329022/4	RF Cable - 02	30MHz~18G	10/Jan/2019	09/Jan/2020
Cable 0.2m	HUBER	MY329033/4	RF Cable - 03	30MHz~18G	10/Jan/2019	09/Jan/2020
Cable 1.5m	HUBER	MY37973/4	RF Cable – 16	30MHz~18G	10/Jan/2019	09/Jan/2020

Instrument for Radiated Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	Riken	SAC-3M	03CH01-HY	30MHz~1GHz 3m	11/Jan/2019	10/Jan/2020
3m Semi Anechoic Chamber	Riken	SAC-3M	03CH01-HY	1GHz~18GHz 3m	09/Jan/2019	08/Jan/2020
PreAmplifier	COM-POWER	PA-103	161050	1 MHz~1.0GHz	17/Jul/2019	16/Jul/2020
Microwave Preamplifier	Agilent	8449B	3008A02602	1GHz~26.5GHz	27/Mar/2019	26/Mar/2020
Spectrum Analyzer	R&S	FSP30	100793	9 kHz~30GHz	05/Jun/2019	04/Jun/2020
RF Cable-R03m	Jye Bao	RG142	CB019	9kHz~1GHz	14/Dec/2018	13/Dec/2019
RF Cable-HIGH	SUHNER	SUCOFLEX 104	SN805196/4+MY 39495	1GHz~18GHz	13/Mar/2019	12/Mar/2020
Bilog Antenna & 5db Attenuator	SCHAFFNER/MTJ	CBL6112D / MTJ6102-05	2678 / 001	30MHz~2GHz	13/Mar/2019	12/Mar/2020
EMI Test Receiver	R&S	ESU-26	100422	20Hz~26.5GHz	25/Oct/2018	24/Oct/2019
Loop Antenna	TESEQ	HLA 6120	31244	9k~30MHz	15/Mar/2019	14/Mar/2020
Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170339	18GHz~40GHz	19/Apr/2019	18/Apr/2020
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D-1130	1GHz~18GHz	26/Oct/2018	25/Oct/2019

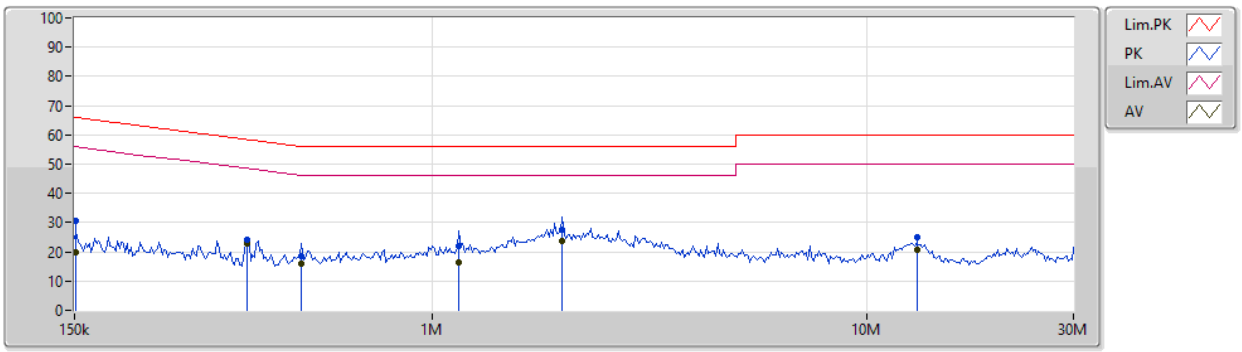
AC Power-line Conducted Emissions Result			
Operating Mode	1	**Power Phase**	Neutral
Operating Function	USB mode_Dipole		



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	267.135k	23.31	61.20	-37.89	19.47	Neutral	-	3.84	9.59	0.01	9.87
AV	267.135k	19.50	51.20	-31.70	19.47	Neutral	-	0.03	9.59	0.01	9.87
QP	409.779k	22.31	57.64	-35.33	19.48	Neutral	-	2.83	9.59	0.01	9.88
AV	409.779k	17.92	47.64	-29.72	19.48	Neutral	-	-1.56	9.59	0.01	9.88
QP	973.889k	22.12	56.00	-33.88	19.49	Neutral	-	2.63	9.59	0.02	9.88
AV	973.889k	18.85	46.00	-27.15	19.49	Neutral	-	-0.64	9.59	0.02	9.88
QP	1.916M	31.29	56.00	-24.71	19.53	Neutral	-	11.76	9.61	0.03	9.89
AV	1.916M	26.37	46.00	-19.63	19.53	Neutral	"Worst"	6.84	9.61	0.03	9.89
QP	2.687M	32.04	56.00	-23.96	19.54	Neutral	-	12.50	9.61	0.04	9.89
AV	2.687M	26.09	46.00	-19.91	19.54	Neutral	-	6.55	9.61	0.04	9.89
QP	3.845M	27.39	56.00	-28.61	19.55	Neutral	-	7.84	9.61	0.05	9.89
AV	3.845M	22.40	46.00	-23.60	19.55	Neutral	-	2.85	9.61	0.05	9.89

AC Power-line Conducted Emissions Result			
Operating Mode	1	**Power Phase**	Line
Operating Function	USB mode_Dipole		

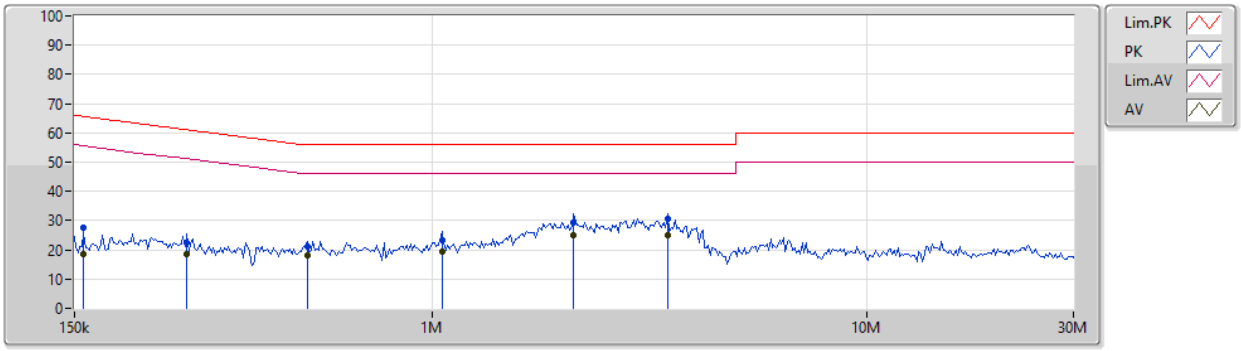
10/09/2019



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	151.5k	30.60	65.92	-35.32	19.48	Line	-	11.12	9.60	0.01	9.87
AV	151.5k	19.87	55.92	-36.05	19.48	Line	-	0.39	9.60	0.01	9.87
QP	374.678k	23.95	58.39	-34.44	19.48	Line	-	4.47	9.59	0.01	9.88
AV	374.678k	22.82	48.39	-25.57	19.48	Line	-	3.34	9.59	0.01	9.88
QP	500k	18.54	56.00	-37.46	19.48	Line	-	-0.94	9.59	0.01	9.88
AV	500k	15.79	46.00	-30.21	19.48	Line	-	-3.69	9.59	0.01	9.88
QP	1.153M	21.78	56.00	-34.22	19.51	Line	-	2.27	9.61	0.02	9.88
AV	1.153M	16.26	46.00	-29.74	19.51	Line	-	-3.25	9.61	0.02	9.88
QP	1.994M	27.57	56.00	-28.43	19.54	Line	-	8.03	9.62	0.03	9.89
AV	1.994M	23.89	46.00	-22.11	19.54	Line	"Worst"	4.35	9.62	0.03	9.89
QP	13.073M	24.93	60.00	-35.07	19.63	Line	-	5.30	9.65	0.08	9.90
AV	13.073M	20.72	50.00	-29.28	19.63	Line	-	1.09	9.65	0.08	9.90

AC Power-line Conducted Emissions Result			
Operating Mode	1	**Power Phase**	Neutral
Operating Function	USB mode_ PIFA		

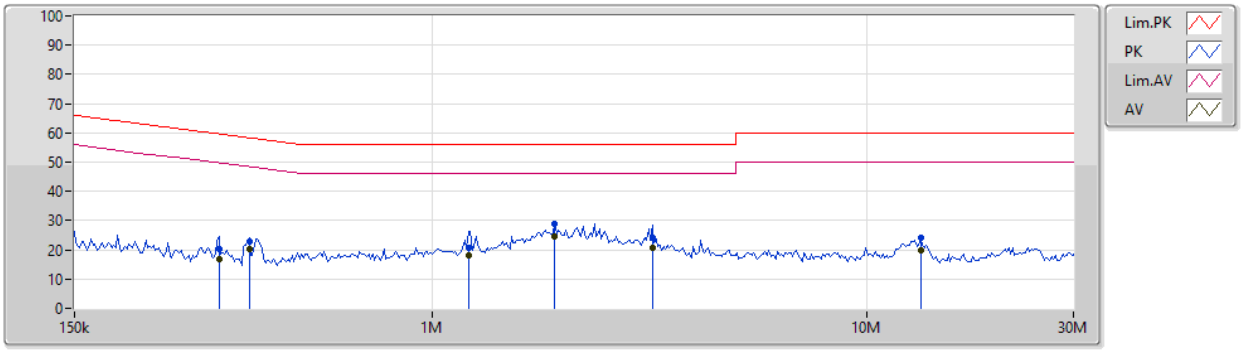
10/09/2019



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	157.652k	27.52	65.58	-38.06	19.48	Neutral	-	8.04	9.60	0.01	9.87
AV	157.652k	18.62	55.58	-36.96	19.48	Neutral	-	-0.86	9.60	0.01	9.87
QP	272.505k	22.34	61.05	-38.71	19.47	Neutral	-	2.87	9.59	0.01	9.87
AV	272.505k	18.56	51.05	-32.49	19.47	Neutral	-	-0.91	9.59	0.01	9.87
QP	515.159k	21.01	56.00	-34.99	19.48	Neutral	-	1.53	9.59	0.01	9.88
AV	515.159k	17.90	46.00	-28.10	19.48	Neutral	-	-1.58	9.59	0.01	9.88
QP	1.055M	23.22	56.00	-32.78	19.49	Neutral	-	3.73	9.59	0.02	9.88
AV	1.055M	19.60	46.00	-26.40	19.49	Neutral	-	0.11	9.59	0.02	9.88
QP	2.116M	29.25	56.00	-26.75	19.53	Neutral	-	9.72	9.61	0.03	9.89
AV	2.116M	25.03	46.00	-20.97	19.53	Neutral	"Worst"	5.50	9.61	0.03	9.89
QP	3.481M	30.64	56.00	-25.36	19.54	Neutral	-	11.10	9.61	0.04	9.89
AV	3.481M	25.03	46.00	-20.97	19.54	Neutral	-	5.49	9.61	0.04	9.89

AC Power-line Conducted Emissions Result			
Operating Mode	1	**Power Phase**	Line
Operating Function	USB mode_ PIFA		

10/09/2019



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	322.728k	20.43	59.63	-39.20	19.48	Line	-	0.95	9.59	0.01	9.88
AV	322.728k	16.84	49.63	-32.79	19.48	Line	-	-2.64	9.59	0.01	9.88
QP	378.424k	22.81	58.31	-35.50	19.48	Line	-	3.33	9.59	0.01	9.88
AV	378.424k	20.27	48.31	-28.04	19.48	Line	-	0.79	9.59	0.01	9.88
QP	1.212M	20.86	56.00	-35.14	19.51	Line	-	1.35	9.61	0.02	9.88
AV	1.212M	17.95	46.00	-28.05	19.51	Line	-	-1.56	9.61	0.02	9.88
QP	1.916M	28.91	56.00	-27.09	19.54	Line	-	9.37	9.62	0.03	9.89
AV	1.916M	24.51	46.00	-21.49	19.54	Line	"Worst"	4.97	9.62	0.03	9.89
QP	3.214M	24.35	56.00	-31.65	19.56	Line	-	4.79	9.63	0.04	9.89
AV	3.214M	20.55	46.00	-25.45	19.56	Line	-	0.99	9.63	0.04	9.89
QP	13.336M	24.10	60.00	-35.90	19.63	Line	-	4.47	9.65	0.08	9.90
AV	13.336M	19.91	50.00	-30.09	19.63	Line	-	0.28	9.65	0.08	9.90

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)	667.5k	1.029M	1M03F1D	662.5k	1.025M

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;

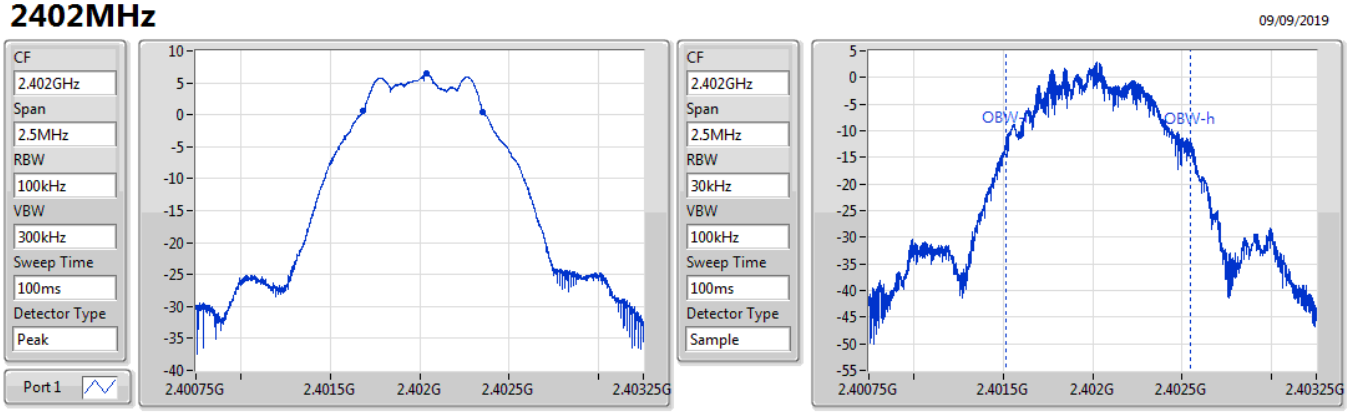
Result

Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	500k	665k	1.029M
2440MHz	Pass	500k	662.5k	1.025M
2480MHz	Pass	500k	667.5k	1.025M

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

BT-LE(1Mbps) **EBW**

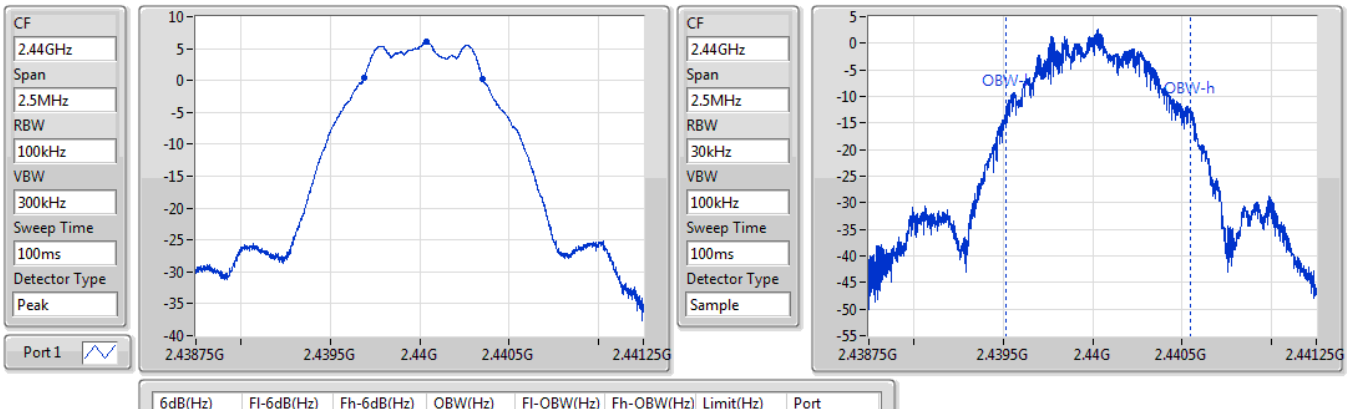
2402MHz



6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
665k	2.401686G	2.402351G	1.029M	2.401516G	2.402545G	500k	1

BT-LE(1Mbps) **EBW**

2440MHz

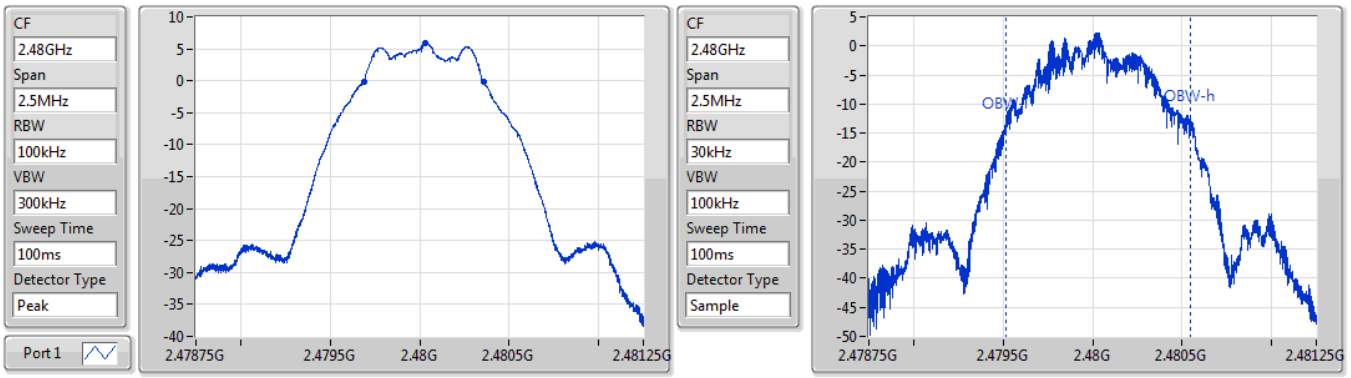


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
662.5k	2.43969G	2.440353G	1.025M	2.439519G	2.440544G	500k	1

BT-LE(1Mbps) **EBW**

2480MHz

09/09/2019



6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
667.5k	2.479689G	2.480356G	1.025M	2.479519G	2.480544G	500k	1

Summary

Mode	Power (dBm)	Power (W)
2.4-2.4835GHz	-	-
BT-LE(1Mbps)	6.88	0.00488

Result

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	2.30	6.88	30.00
2440MHz	Pass	2.30	6.64	30.00
2480MHz	Pass	2.30	6.40	30.00

DG = Directional Gain; **Port X** = Port X output power

Summary

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
BT-LE(1Mbps)	-8.78

RBW=3 kHz.

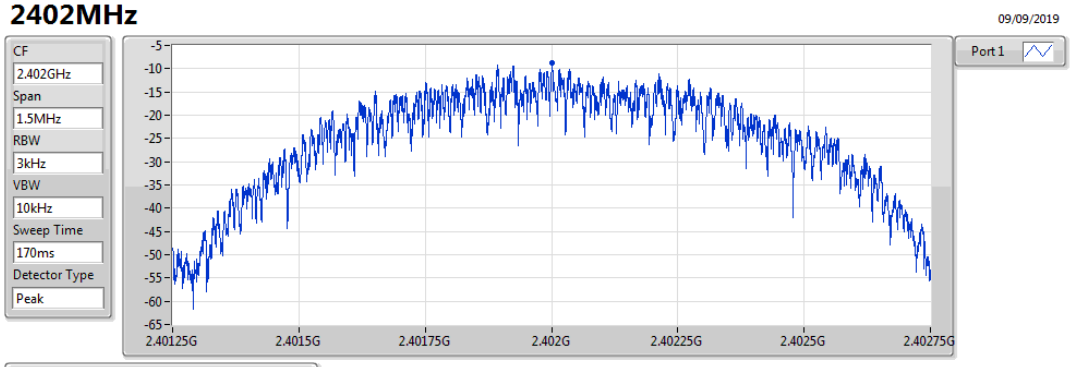
Result

Mode	Result	Gain (dBi)	PD (dBm/RBW)	PD Limit (dBm/RBW)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	2.30	-8.78	8.00
2440MHz	Pass	2.30	-9.31	8.00
2480MHz	Pass	2.30	-9.83	8.00

DG = Directional Gain; RBW=3 kHz;
PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; **Port X** = Port X power density;

BT-LE(1Mbps) **PSD**

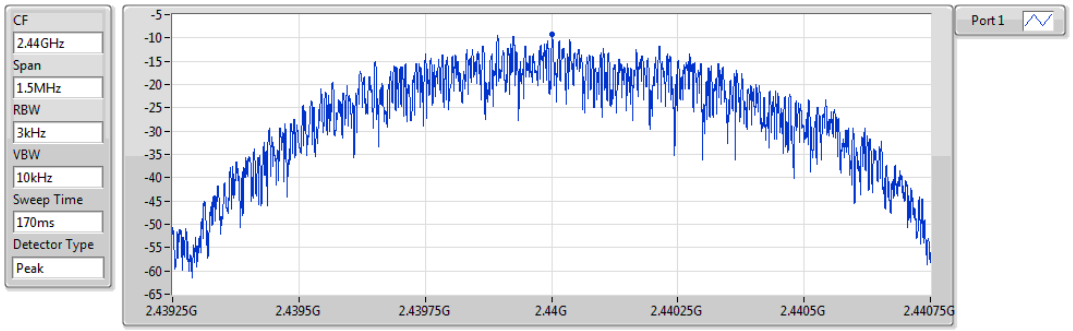
2402MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-8.78	-8.78	-8.78

BT-LE(1Mbps) **PSD**

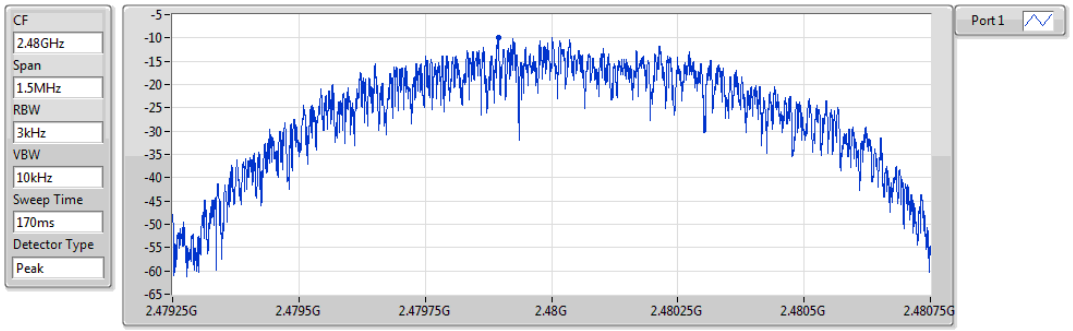
2440MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-9.31	-9.31	-9.31

BT-LE(1Mbps) **PSD**

2480MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-9.83	-9.83	-9.83

Summary

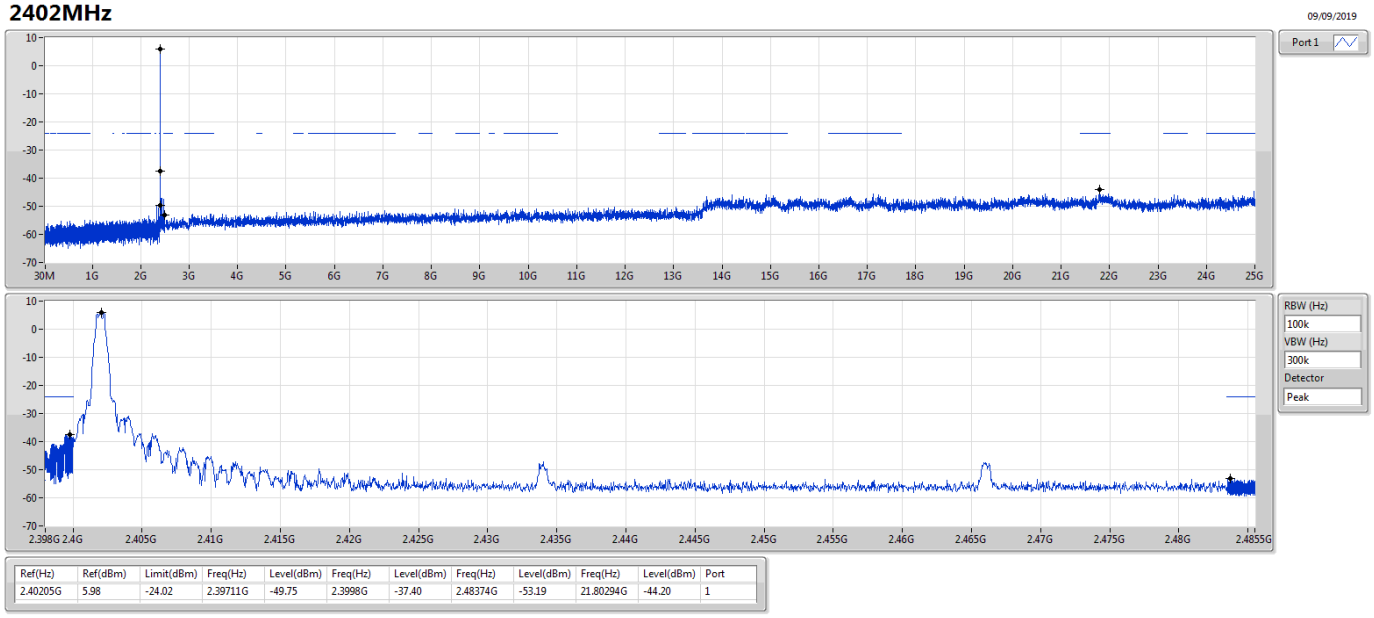
Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	2.40205G	5.98	-24.02	2.39711G	-49.75	2.3998G	-37.40	2.48374G	-53.19	21.80294G	-44.20	1

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	2.40205G	5.98	-24.02	2.39711G	-49.75	2.3998G	-37.40	2.48374G	-53.19	21.80294G	-44.20	1
2440MHz	Pass	2.40205G	5.98	-24.02	2.15173G	-53.41	2.3998G	-51.49	2.48379G	-53.32	21.91551G	-43.29	1
2480MHz	Pass	2.40205G	5.98	-24.02	2.13071G	-54.19	2.399G	-52.87	2.48377G	-37.94	21.76635G	-45.11	1

BT-LE(1Mbps) **CSE NdB**

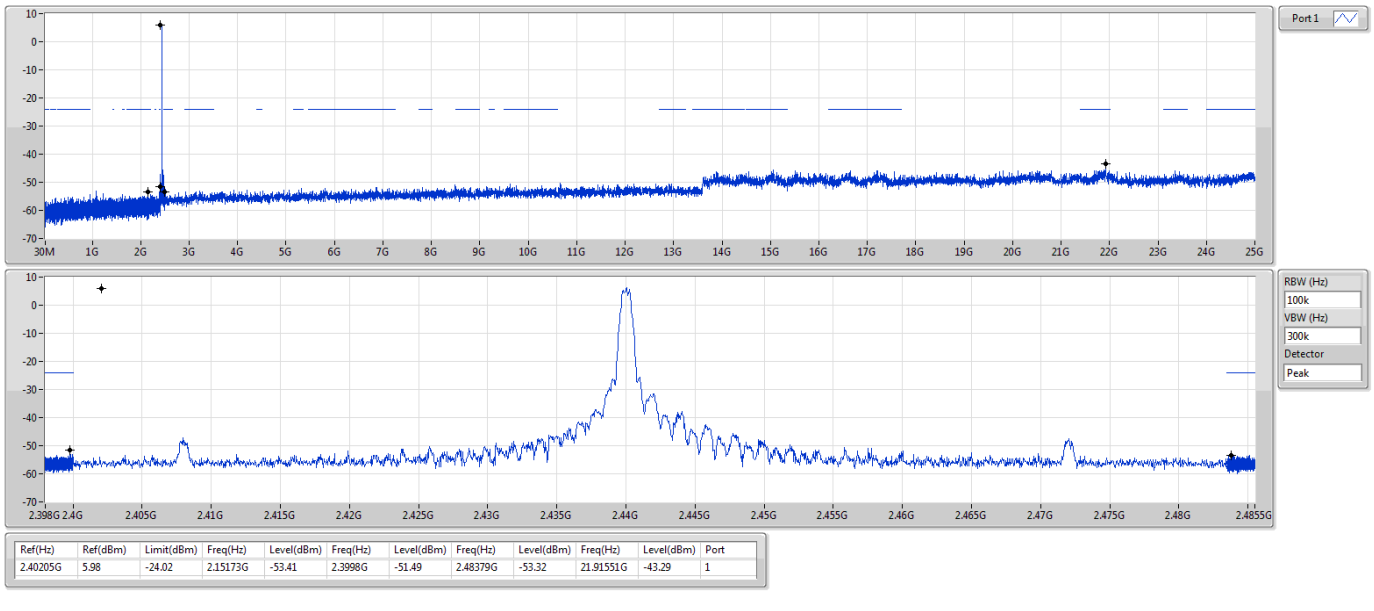
2402MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.40205G	5.98	-24.02	2.39711G	-49.75	2.3998G	-37.40	2.48374G	-53.19	21.80294G	-44.20	1

BT-LE(1Mbps) **CSE NdB**

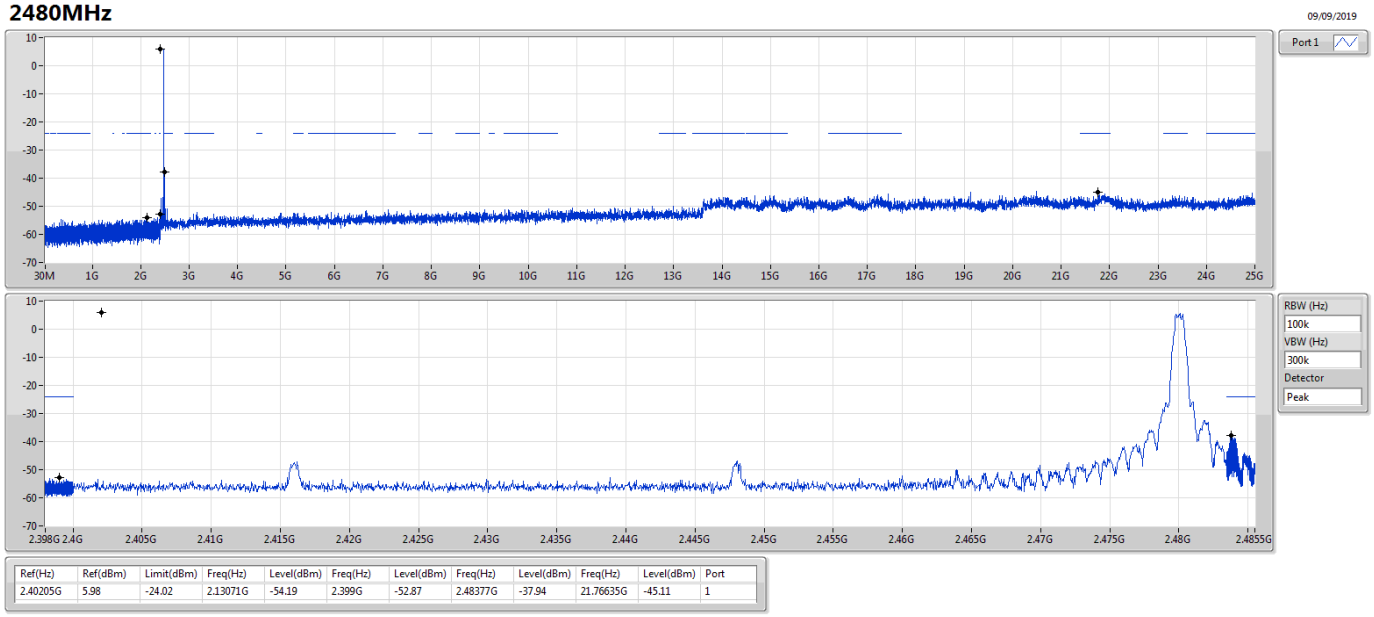
2440MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.40205G	5.98	-24.02	2.15173G	-53.41	2.3998G	-51.49	2.48379G	-53.32	21.91551G	-43.29	1

BT-LE(1Mbps) **CSE NdB**

2480MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.40205G	5.98	-24.02	2.13071G	-54.19	2.399G	-52.87	2.48377G	-37.94	21.76635G	-45.11	1

Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	AV	2.4835G	51.23	54.00	-2.77	3	Vertical	306	1.86	-

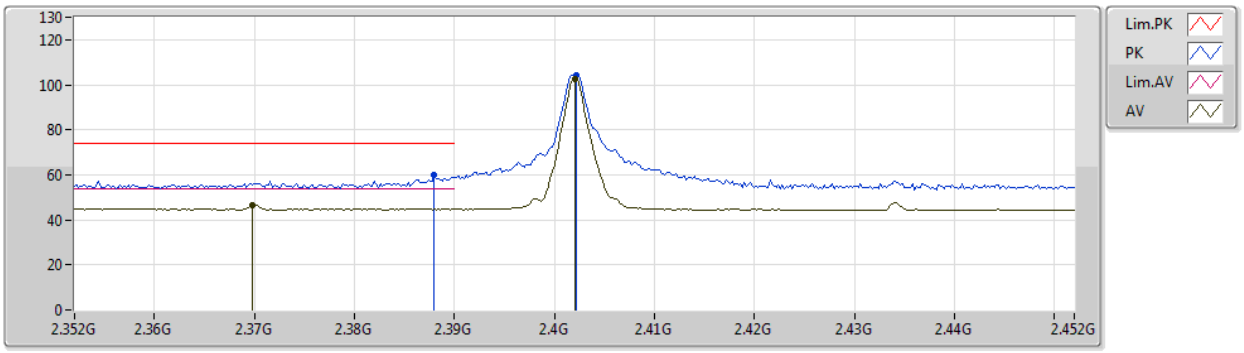
Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-
2402MHz_TX	Pass	AV	2.3698G	46.71	54.00	-7.29	3	Vertical	14	1.51	-
2402MHz_TX	Pass	AV	2.402G	102.72	Inf	-Inf	3	Vertical	14	1.51	-
2402MHz_TX	Pass	PK	2.388G	59.70	74.00	-14.30	3	Vertical	14	1.51	-
2402MHz_TX	Pass	PK	2.4022G	104.04	Inf	-Inf	3	Vertical	14	1.51	-
2402MHz_TX	Pass	AV	4.80393G	46.00	54.00	-8.00	3	Vertical	300	2.22	-
2402MHz_TX	Pass	PK	4.80356G	53.16	74.00	-20.84	3	Vertical	300	2.22	-
2402MHz_TX	Pass	AV	4.80406G	41.53	54.00	-12.47	3	Horizontal	20	1.04	-
2402MHz_TX	Pass	PK	4.8043G	50.00	74.00	-24.00	3	Horizontal	20	1.04	-
2440MHz_TX	Pass	AV	2.376G	47.20	54.00	-6.80	3	Vertical	336	1.45	-
2440MHz_TX	Pass	AV	2.44G	101.62	Inf	-Inf	3	Vertical	336	1.45	-
2440MHz_TX	Pass	AV	2.4952G	44.62	54.00	-9.38	3	Vertical	336	1.45	-
2440MHz_TX	Pass	PK	2.3588G	56.73	74.00	-17.27	3	Vertical	336	1.45	-
2440MHz_TX	Pass	PK	2.4396G	102.97	Inf	-Inf	3	Vertical	336	1.45	-
2440MHz_TX	Pass	PK	2.4972G	55.36	74.00	-18.64	3	Vertical	336	1.45	-
2440MHz_TX	Pass	AV	4.87998G	45.40	54.00	-8.60	3	Vertical	303	2.28	-
2440MHz_TX	Pass	AV	7.31945G	42.27	54.00	-11.73	3	Vertical	323	1.08	-
2440MHz_TX	Pass	PK	4.88003G	52.48	74.00	-21.52	3	Vertical	303	2.28	-
2440MHz_TX	Pass	PK	7.32069G	53.35	74.00	-20.65	3	Vertical	323	1.08	-
2440MHz_TX	Pass	AV	4.88002G	40.08	54.00	-13.92	3	Horizontal	194	1.08	-
2440MHz_TX	Pass	AV	7.31952G	38.65	54.00	-15.35	3	Horizontal	63	1.39	-
2440MHz_TX	Pass	PK	4.88006G	49.28	74.00	-24.72	3	Horizontal	194	1.08	-
2440MHz_TX	Pass	PK	7.31964G	51.17	74.00	-22.83	3	Horizontal	63	1.39	-
2480MHz_TX	Pass	AV	2.48G	102.70	Inf	-Inf	3	Vertical	306	1.86	-
2480MHz_TX	Pass	AV	2.4835G	51.23	54.00	-2.77	3	Vertical	306	1.86	-
2480MHz_TX	Pass	PK	2.48G	104.03	Inf	-Inf	3	Vertical	306	1.86	-
2480MHz_TX	Pass	PK	2.4836G	70.68	74.00	-3.32	3	Vertical	306	1.86	-
2480MHz_TX	Pass	AV	4.96011G	42.44	54.00	-11.56	3	Vertical	92	2.32	-
2480MHz_TX	Pass	AV	7.43945G	40.78	54.00	-13.22	3	Vertical	321	1.17	-
2480MHz_TX	Pass	PK	4.95987G	51.86	74.00	-22.14	3	Vertical	92	2.32	-
2480MHz_TX	Pass	PK	7.4402G	52.47	74.00	-21.53	3	Vertical	321	1.17	-
2480MHz_TX	Pass	AV	4.96002G	40.08	54.00	-13.92	3	Horizontal	25	1.00	-
2480MHz_TX	Pass	AV	7.43922G	38.03	54.00	-15.97	3	Horizontal	316	1.50	-
2480MHz_TX	Pass	PK	4.95976G	49.20	74.00	-24.80	3	Horizontal	25	1.00	-
2480MHz_TX	Pass	PK	7.44201G	50.26	74.00	-23.74	3	Horizontal	274	1.50	-

BT-LE(1Mbps)

2402MHz_TX

10/09/2019

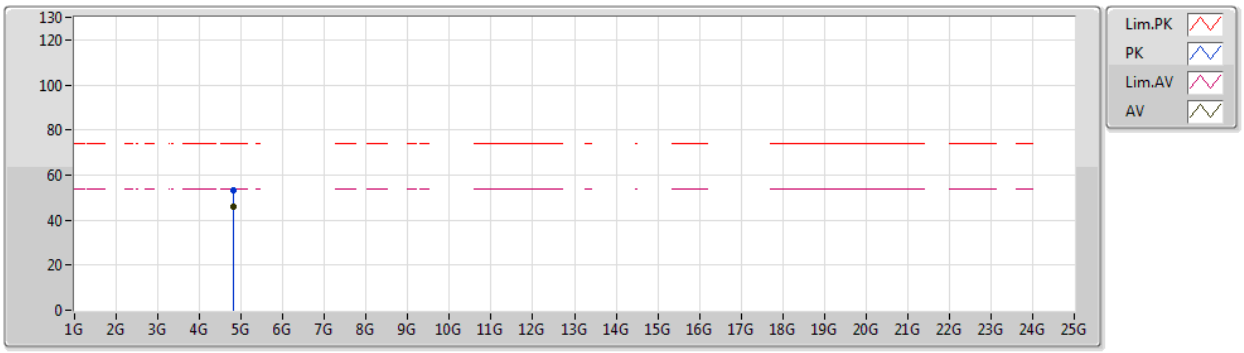


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.3698G	46.71	54.00	-7.29	31.41	3	Vertical	14	1.51	-	15.30	27.76	3.65	-
AV	2.402G	102.72	Inf	-Inf	31.37	3	Vertical	14	1.51	-	71.35	27.70	3.67	-
PK	2.388G	59.70	74.00	-14.30	31.38	3	Vertical	14	1.51	-	28.32	27.72	3.66	-
PK	2.4022G	104.04	Inf	-Inf	31.37	3	Vertical	14	1.51	-	72.67	27.70	3.67	-

BT-LE(1Mbps)

2402MHz_TX

10/09/2019

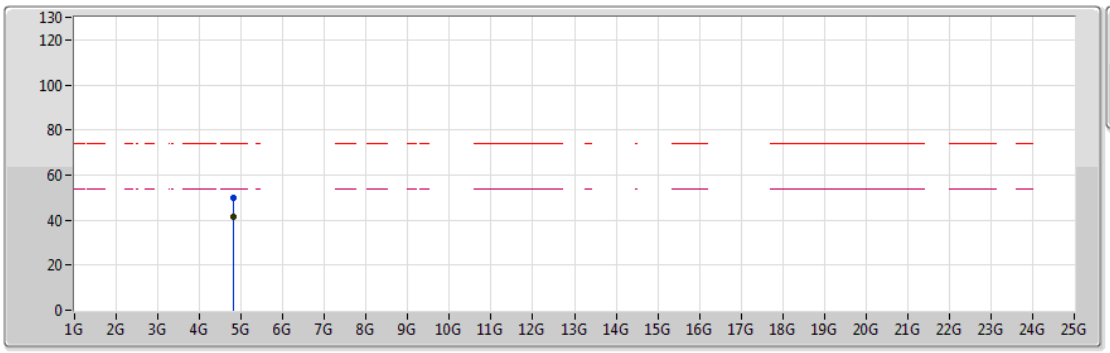


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.80393G	46.00	54.00	-8.00	1.67	3	Vertical	300	2.22	-	44.33	31.20	5.32	34.85
PK	4.80356G	53.16	74.00	-20.84	1.67	3	Vertical	300	2.22	-	51.49	31.20	5.32	34.85

BT-LE(1Mbps)

2402MHz_TX

10/09/2019

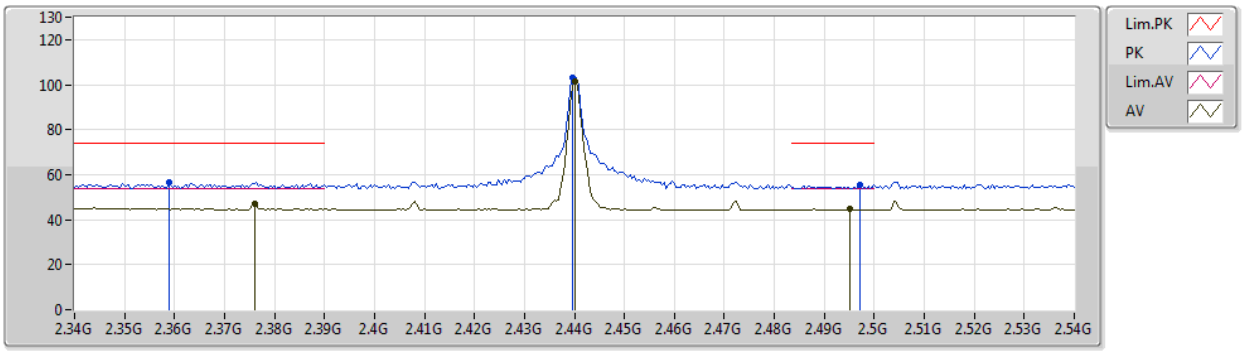


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.80406G	41.53	54.00	-12.47	1.67	3	Horizontal	20	1.04	-	39.86	31.20	5.32	34.85
PK	4.8043G	50.00	74.00	-24.00	1.67	3	Horizontal	20	1.04	-	48.33	31.20	5.32	34.85

BT-LE(1Mbps)

2440MHz_TX

10/09/2019

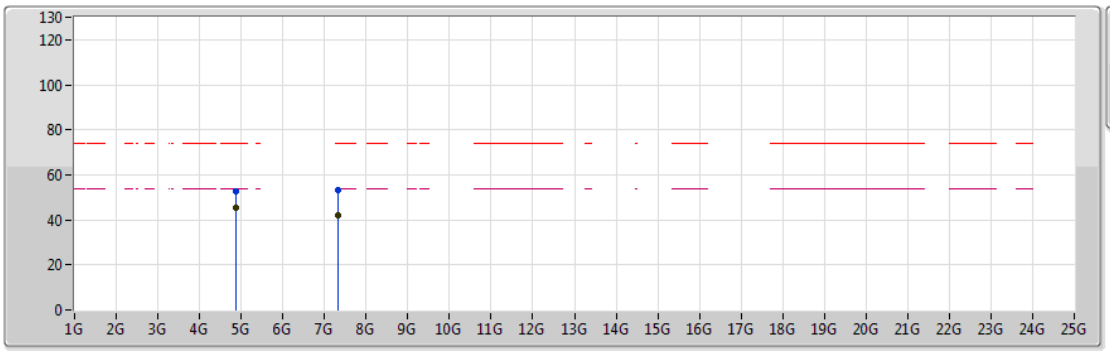


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.376G	47.20	54.00	-6.80	31.40	3	Vertical	336	1.45	-	15.80	27.75	3.65	-
AV	2.44G	101.62	Inf	-Inf	31.37	3	Vertical	336	1.45	-	70.25	27.66	3.71	-
AV	2.4952G	44.62	54.00	-9.38	31.36	3	Vertical	336	1.45	-	13.26	27.60	3.76	-
PK	2.3588G	56.73	74.00	-17.27	31.42	3	Vertical	336	1.45	-	25.31	27.78	3.64	-
PK	2.4396G	102.97	Inf	-Inf	31.37	3	Vertical	336	1.45	-	71.60	27.66	3.71	-
PK	2.4972G	55.36	74.00	-18.64	31.36	3	Vertical	336	1.45	-	24.00	27.60	3.76	-

BT-LE(1Mbps)

10/09/2019

2440MHz_TX

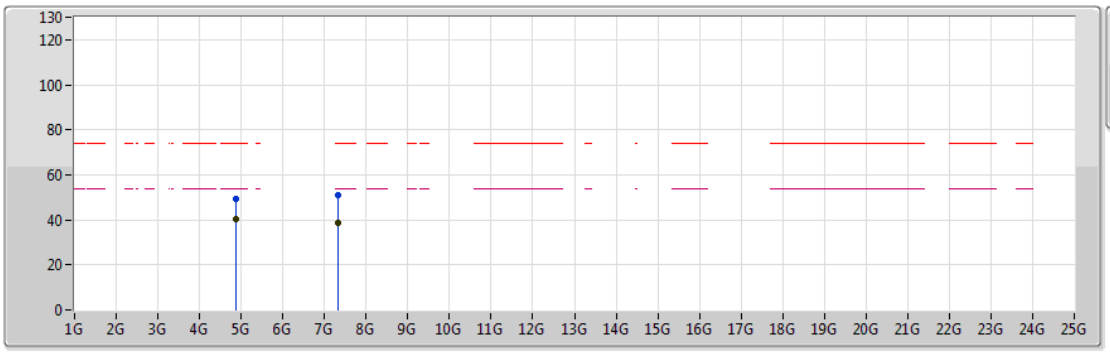


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.87998G	45.40	54.00	-8.60	1.81	3	Vertical	303	2.28	-	43.59	31.28	5.36	34.83
AV	7.31945G	42.27	54.00	-11.73	8.01	3	Vertical	323	1.08	-	34.26	36.48	6.62	35.09
PK	4.88003G	52.48	74.00	-21.52	1.81	3	Vertical	303	2.28	-	50.67	31.28	5.36	34.83
PK	7.32069G	53.35	74.00	-20.65	8.01	3	Vertical	323	1.08	-	45.34	36.48	6.62	35.09

BT-LE(1Mbps)

2440MHz_TX

10/09/2019

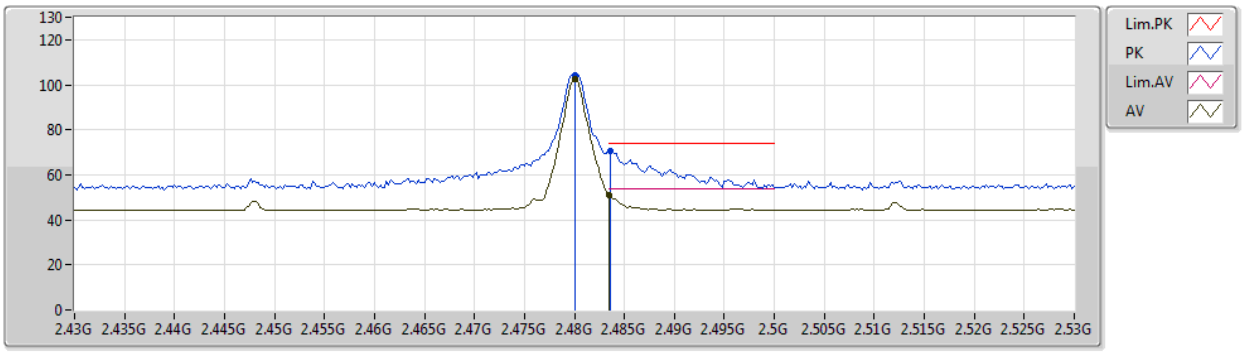


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.88002G	40.08	54.00	-13.92	1.81	3	Horizontal	194	1.08	-	38.27	31.28	5.36	34.83
AV	7.31952G	38.65	54.00	-15.35	8.01	3	Horizontal	63	1.39	-	30.64	36.48	6.62	35.09
PK	4.88006G	49.28	74.00	-24.72	1.81	3	Horizontal	194	1.08	-	47.47	31.28	5.36	34.83
PK	7.31964G	51.17	74.00	-22.83	8.01	3	Horizontal	63	1.39	-	43.16	36.48	6.62	35.09

BT-LE(1Mbps)

2480MHz_TX

10/09/2019

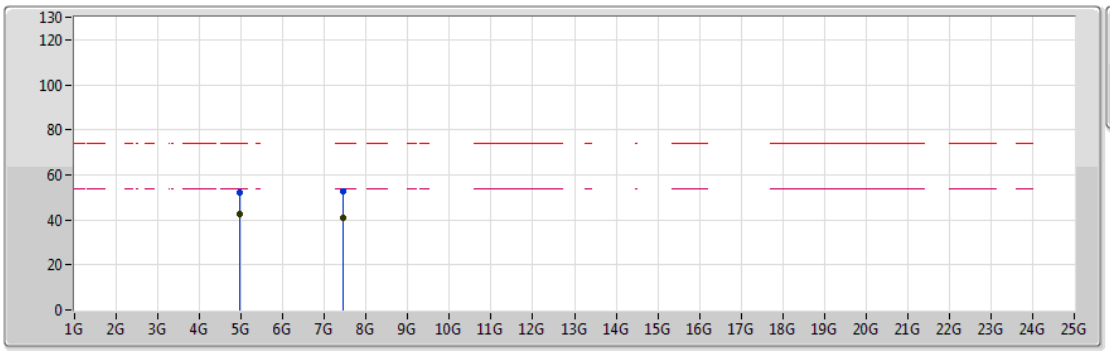


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.48G	102.70	Inf	-Inf	31.36	3	Vertical	306	1.86	-	71.34	27.62	3.74	-
AV	2.4835G	51.23	54.00	-2.77	31.37	3	Vertical	306	1.86	-	19.86	27.62	3.75	-
PK	2.48G	104.03	Inf	-Inf	31.36	3	Vertical	306	1.86	-	72.67	27.62	3.74	-
PK	2.4836G	70.68	74.00	-3.32	31.37	3	Vertical	306	1.86	-	39.31	27.62	3.75	-

BT-LE(1Mbps)

2480MHz_TX

10/09/2019

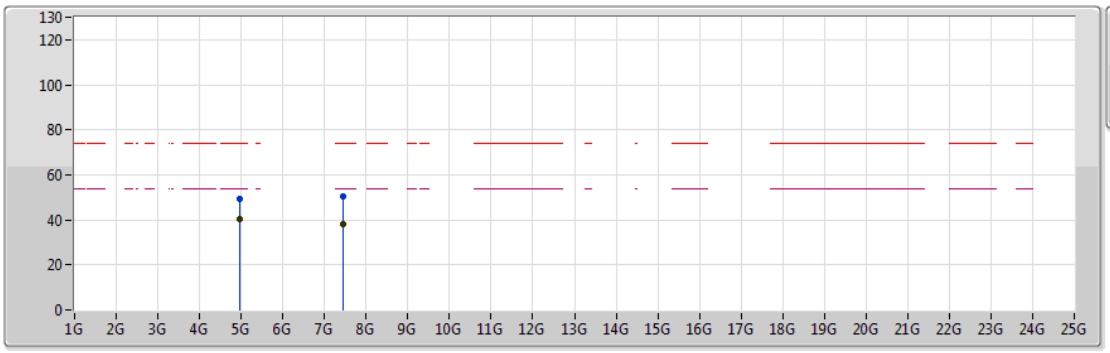


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.96011G	42.44	54.00	-11.56	2.01	3	Vertical	92	2.32	-	40.43	31.42	5.40	34.81
AV	7.43945G	40.78	54.00	-13.22	7.95	3	Vertical	321	1.17	-	32.83	36.40	6.66	35.11
PK	4.95987G	51.86	74.00	-22.14	2.01	3	Vertical	92	2.32	-	49.85	31.42	5.40	34.81
PK	7.4402G	52.47	74.00	-21.53	7.95	3	Vertical	321	1.17	-	44.52	36.40	6.66	35.11

BT-LE(1Mbps)

2480MHz_TX

10/09/2019



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.96002G	40.08	54.00	-13.92	2.01	3	Horizontal	25	1.00	-	38.07	31.42	5.40	34.81
AV	7.43922G	38.03	54.00	-15.97	7.95	3	Horizontal	316	1.50	-	30.08	36.40	6.66	35.11
PK	4.95976G	49.20	74.00	-24.80	2.01	3	Horizontal	25	1.00	-	47.19	31.42	5.40	34.81
PK	7.44201G	50.26	74.00	-23.74	7.95	3	Horizontal	274	1.50	-	42.31	36.40	6.66	35.11

Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	PK	2.4835G	72.38	74.00	-1.62	3	Horizontal	164	1.50	-

Result

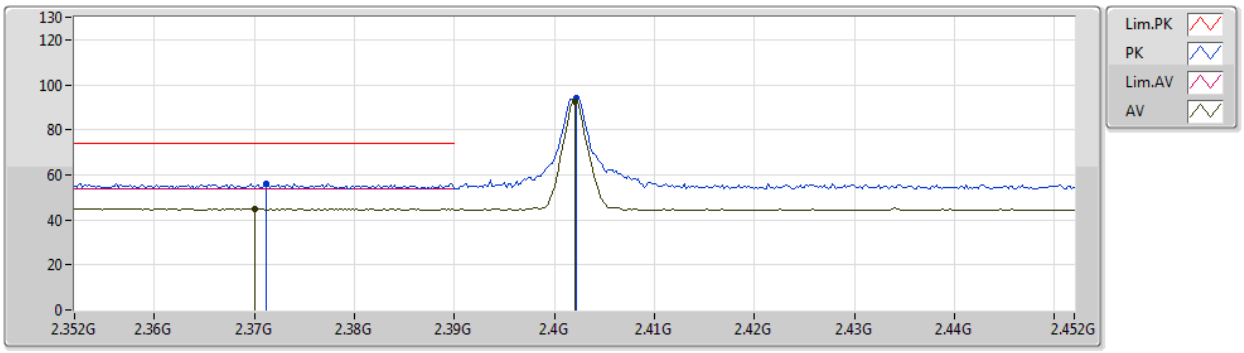
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-
2402MHz_TX	Pass	AV	2.37G	45.08	54.00	-8.92	3	Vertical	212	1.99	-
2402MHz_TX	Pass	AV	2.402G	92.51	Inf	-Inf	3	Vertical	212	1.99	-
2402MHz_TX	Pass	PK	2.3712G	56.27	74.00	-17.73	3	Vertical	212	1.99	-
2402MHz_TX	Pass	PK	2.4022G	93.88	Inf	-Inf	3	Vertical	212	1.99	-
2402MHz_TX	Pass	AV	2.37G	47.49	54.00	-6.51	3	Horizontal	163	1.16	-
2402MHz_TX	Pass	AV	2.402G	100.95	Inf	-Inf	3	Horizontal	163	1.16	-
2402MHz_TX	Pass	PK	2.3854G	59.15	74.00	-14.85	3	Horizontal	163	1.16	-
2402MHz_TX	Pass	PK	2.402G	102.24	Inf	-Inf	3	Horizontal	163	1.16	-
2402MHz_TX	Pass	AV	4.80396G	42.66	54.00	-11.34	3	Vertical	327	1.83	-
2402MHz_TX	Pass	PK	4.80356G	50.61	74.00	-23.39	3	Vertical	327	1.83	-
2402MHz_TX	Pass	AV	4.80386G	40.33	54.00	-13.67	3	Horizontal	347	1.50	-
2402MHz_TX	Pass	PK	4.80438G	49.38	74.00	-24.62	3	Horizontal	347	1.50	-
2440MHz_TX	Pass	AV	2.3404G	45.11	54.00	-8.89	3	Vertical	32	1.00	-
2440MHz_TX	Pass	AV	2.44G	90.55	Inf	-Inf	3	Vertical	32	1.00	-
2440MHz_TX	Pass	AV	2.4896G	44.55	54.00	-9.45	3	Vertical	32	1.00	-
2440MHz_TX	Pass	PK	2.3816G	56.94	74.00	-17.06	3	Vertical	32	1.00	-
2440MHz_TX	Pass	PK	2.4404G	91.87	Inf	-Inf	3	Vertical	32	1.00	-
2440MHz_TX	Pass	PK	2.4888G	55.42	74.00	-18.58	3	Vertical	32	1.00	-
2440MHz_TX	Pass	AV	2.376G	48.33	54.00	-5.67	3	Horizontal	166	1.16	-
2440MHz_TX	Pass	AV	2.44G	103.26	Inf	-Inf	3	Horizontal	166	1.16	-
2440MHz_TX	Pass	AV	2.494G	44.53	54.00	-9.47	3	Horizontal	166	1.16	-
2440MHz_TX	Pass	PK	2.3756G	57.05	74.00	-16.95	3	Horizontal	166	1.16	-
2440MHz_TX	Pass	PK	2.4404G	104.62	Inf	-Inf	3	Horizontal	166	1.16	-
2440MHz_TX	Pass	PK	2.4976G	56.15	74.00	-17.85	3	Horizontal	166	1.16	-
2440MHz_TX	Pass	AV	4.8799G	41.35	54.00	-12.65	3	Vertical	287	1.49	-
2440MHz_TX	Pass	AV	7.31939G	40.55	54.00	-13.45	3	Vertical	317	1.29	-
2440MHz_TX	Pass	PK	4.88055G	49.71	74.00	-24.29	3	Vertical	287	1.49	-
2440MHz_TX	Pass	PK	7.32103G	52.71	74.00	-21.29	3	Vertical	317	1.29	-
2440MHz_TX	Pass	AV	4.87993G	39.91	54.00	-14.09	3	Horizontal	235	1.07	-
2440MHz_TX	Pass	AV	7.32166G	38.27	54.00	-15.73	3	Horizontal	139	1.50	-
2440MHz_TX	Pass	PK	4.88053G	48.79	74.00	-25.21	3	Horizontal	235	1.07	-
2440MHz_TX	Pass	PK	7.32021G	50.81	74.00	-23.19	3	Horizontal	139	1.50	-
2480MHz_TX	Pass	AV	2.48G	93.99	Inf	-Inf	3	Vertical	99	1.19	-
2480MHz_TX	Pass	AV	2.4835G	45.88	54.00	-8.12	3	Vertical	99	1.19	-
2480MHz_TX	Pass	PK	2.4798G	95.38	Inf	-Inf	3	Vertical	99	1.19	-
2480MHz_TX	Pass	PK	2.4835G	64.03	74.00	-9.97	3	Vertical	99	1.19	-
2480MHz_TX	Pass	AV	2.48G	102.58	Inf	-Inf	3	Horizontal	164	1.50	-
2480MHz_TX	Pass	AV	2.4835G	51.36	54.00	-2.64	3	Horizontal	164	1.50	-
2480MHz_TX	Pass	PK	2.4798G	103.94	Inf	-Inf	3	Horizontal	164	1.50	-
2480MHz_TX	Pass	PK	2.4835G	72.38	74.00	-1.62	3	Horizontal	164	1.50	-
2480MHz_TX	Pass	AV	4.95994G	44.10	54.00	-9.90	3	Vertical	332	1.87	-
2480MHz_TX	Pass	AV	7.43944G	40.16	54.00	-13.84	3	Vertical	310	1.00	-
2480MHz_TX	Pass	PK	4.96051G	51.78	74.00	-22.22	3	Vertical	332	1.87	-
2480MHz_TX	Pass	PK	7.44086G	51.97	74.00	-22.03	3	Vertical	310	1.00	-
2480MHz_TX	Pass	AV	4.95993G	43.47	54.00	-10.53	3	Horizontal	195	1.75	-
2480MHz_TX	Pass	AV	7.43953G	38.23	54.00	-15.77	3	Horizontal	0	1.50	-
2480MHz_TX	Pass	PK	4.9598G	51.41	74.00	-22.59	3	Horizontal	195	1.75	-

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2480MHz_TX	Pass	PK	7.44008G	50.64	74.00	-23.36	3	Horizontal	0	1.50	-

BT-LE(1Mbps)

10/09/2019

2402MHz_TX

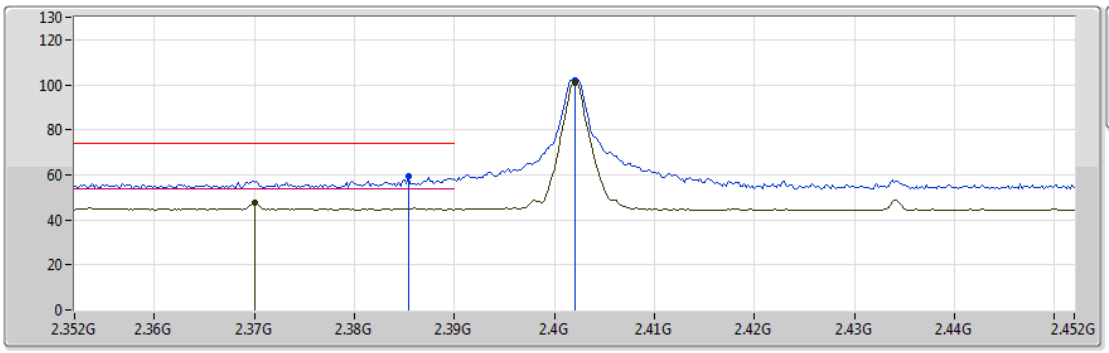


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.37G	45.08	54.00	-8.92	31.41	3	Vertical	212	1.99	-	13.67	27.76	3.65	-
AV	2.402G	92.51	Inf	-Inf	31.37	3	Vertical	212	1.99	-	61.14	27.70	3.67	-
PK	2.3712G	56.27	74.00	-17.73	31.41	3	Vertical	212	1.99	-	24.86	27.76	3.65	-
PK	2.4022G	93.88	Inf	-Inf	31.37	3	Vertical	212	1.99	-	62.51	27.70	3.67	-

BT-LE(1Mbps)

2402MHz_TX

10/09/2019

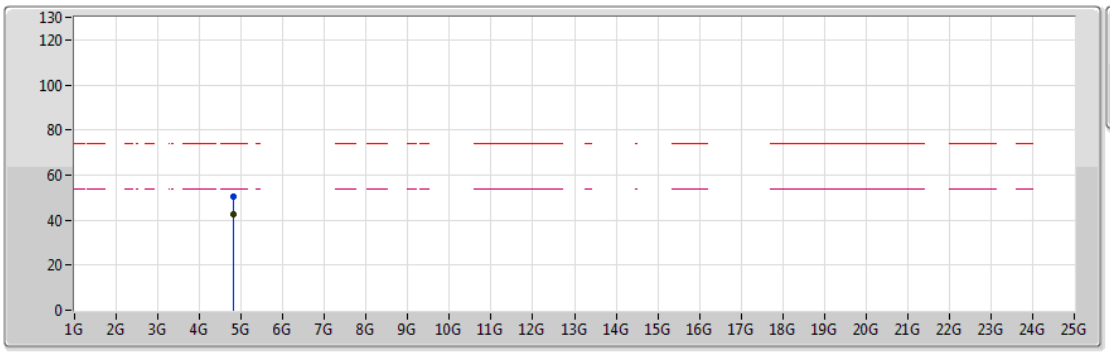


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.37G	47.49	54.00	-6.51	31.41	3	Horizontal	163	1.16	-	16.08	27.76	3.65	-
AV	2.402G	100.95	Inf	-Inf	31.37	3	Horizontal	163	1.16	-	69.58	27.70	3.67	-
PK	2.3854G	59.15	74.00	-14.85	31.39	3	Horizontal	163	1.16	-	27.76	27.73	3.66	-
PK	2.402G	102.24	Inf	-Inf	31.37	3	Horizontal	163	1.16	-	70.87	27.70	3.67	-

BT-LE(1Mbps)

2402MHz_TX

10/09/2019

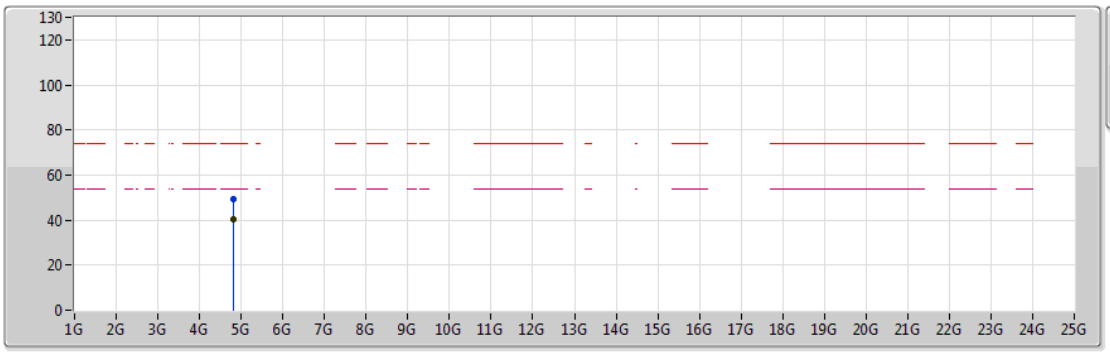


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.80396G	42.66	54.00	-11.34	1.67	3	Vertical	327	1.83	-	40.99	31.20	5.32	34.85
PK	4.80356G	50.61	74.00	-23.39	1.67	3	Vertical	327	1.83	-	48.94	31.20	5.32	34.85

BT-LE(1Mbps)

2402MHz_TX

10/09/2019

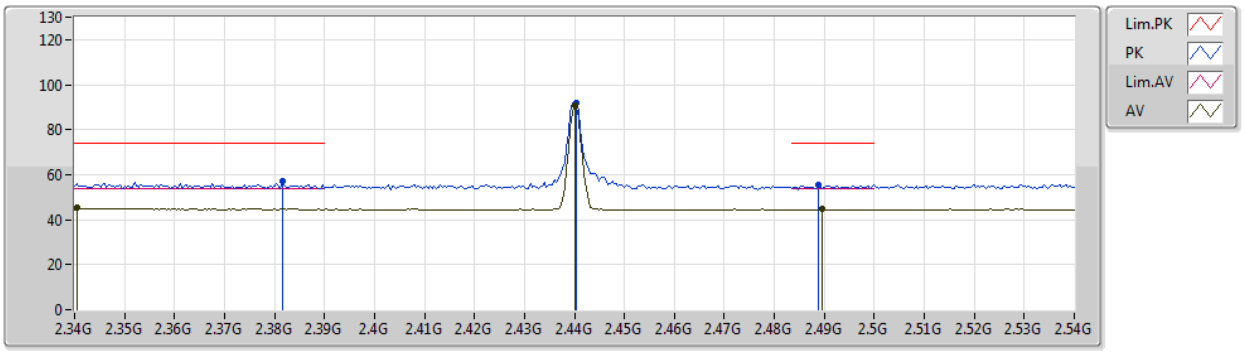


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.80386G	40.33	54.00	-13.67	1.67	3	Horizontal	347	1.50	-	38.66	31.20	5.32	34.85
PK	4.80438G	49.38	74.00	-24.62	1.67	3	Horizontal	347	1.50	-	47.71	31.20	5.32	34.85

BT-LE(1Mbps)

10/09/2019

2440MHz_TX

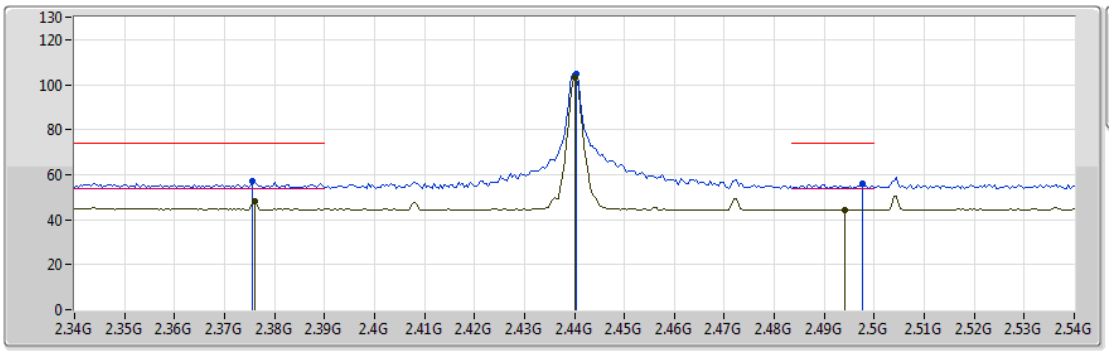


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.3404G	45.11	54.00	-8.89	31.45	3	Vertical	32	1.00	-	13.66	27.82	3.63	-
AV	2.44G	90.55	Inf	-Inf	31.37	3	Vertical	32	1.00	-	59.18	27.66	3.71	-
AV	2.4896G	44.55	54.00	-9.45	31.36	3	Vertical	32	1.00	-	13.19	27.61	3.75	-
PK	2.3816G	56.94	74.00	-17.06	31.40	3	Vertical	32	1.00	-	25.54	27.74	3.66	-
PK	2.4404G	91.87	Inf	-Inf	31.37	3	Vertical	32	1.00	-	60.50	27.66	3.71	-
PK	2.4888G	55.42	74.00	-18.58	31.36	3	Vertical	32	1.00	-	24.06	27.61	3.75	-

BT-LE(1Mbps)

2440MHz_TX

10/09/2019

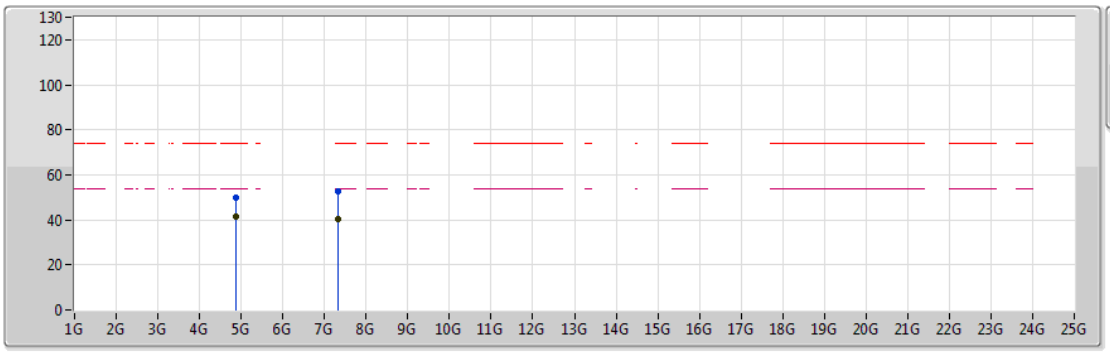


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.376G	48.33	54.00	-5.67	31.40	3	Horizontal	166	1.16	-	16.93	27.75	3.65	-
AV	2.44G	103.26	Inf	-Inf	31.37	3	Horizontal	166	1.16	-	71.89	27.66	3.71	-
AV	2.494G	44.53	54.00	-9.47	31.36	3	Horizontal	166	1.16	-	13.17	27.61	3.75	-
PK	2.3756G	57.05	74.00	-16.95	31.40	3	Horizontal	166	1.16	-	25.65	27.75	3.65	-
PK	2.4404G	104.62	Inf	-Inf	31.37	3	Horizontal	166	1.16	-	73.25	27.66	3.71	-
PK	2.4976G	56.15	74.00	-17.85	31.36	3	Horizontal	166	1.16	-	24.79	27.60	3.76	-

BT-LE(1Mbps)

2440MHz_TX

10/09/2019

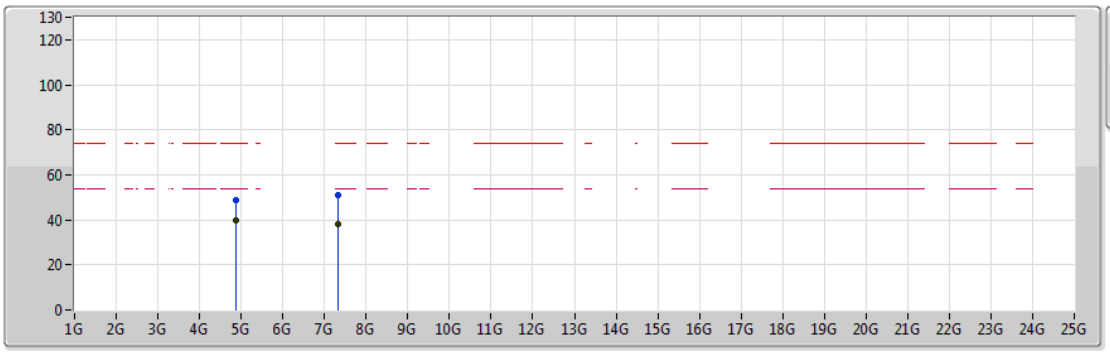


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.8799G	41.35	54.00	-12.65	1.81	3	Vertical	287	1.49	-	39.54	31.28	5.36	34.83
AV	7.31939G	40.55	54.00	-13.45	8.01	3	Vertical	317	1.29	-	32.54	36.48	6.62	35.09
PK	4.88055G	49.71	74.00	-24.29	1.81	3	Vertical	287	1.49	-	47.90	31.28	5.36	34.83
PK	7.32103G	52.71	74.00	-21.29	8.01	3	Vertical	317	1.29	-	44.70	36.48	6.62	35.09

BT-LE(1Mbps)

2440MHz_TX

10/09/2019

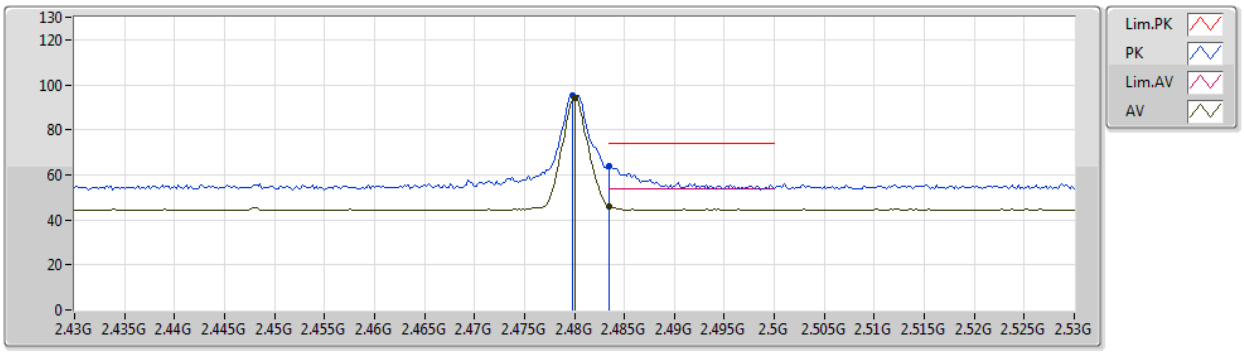


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.87993G	39.91	54.00	-14.09	1.81	3	Horizontal	235	1.07	-	38.10	31.28	5.36	34.83
AV	7.32166G	38.27	54.00	-15.73	8.01	3	Horizontal	139	1.50	-	30.26	36.48	6.62	35.09
PK	4.88053G	48.79	74.00	-25.21	1.81	3	Horizontal	235	1.07	-	46.98	31.28	5.36	34.83
PK	7.32021G	50.81	74.00	-23.19	8.01	3	Horizontal	139	1.50	-	42.80	36.48	6.62	35.09

BT-LE(1Mbps)

2480MHz_TX

10/09/2019

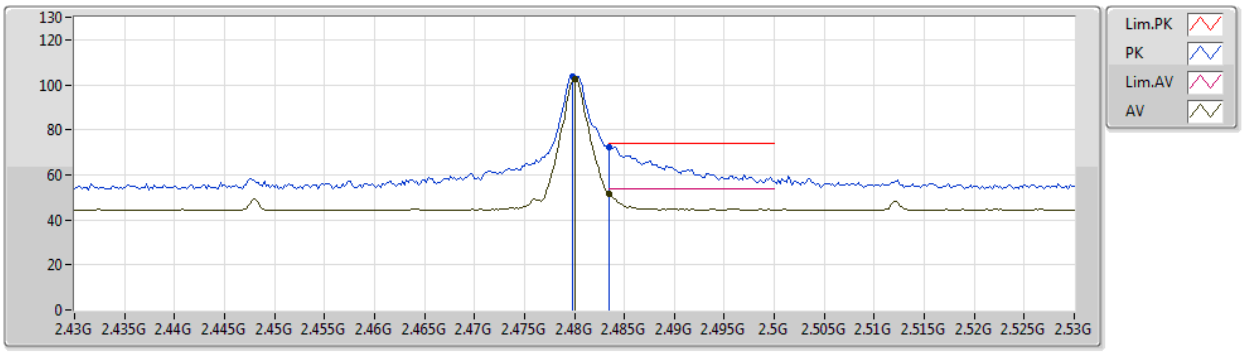


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.48G	93.99	Inf	-Inf	31.36	3	Vertical	99	1.19	-	62.63	27.62	3.74	-
AV	2.4835G	45.88	54.00	-8.12	31.37	3	Vertical	99	1.19	-	14.51	27.62	3.75	-
PK	2.4798G	95.38	Inf	-Inf	31.36	3	Vertical	99	1.19	-	64.02	27.62	3.74	-
PK	2.4835G	64.03	74.00	-9.97	31.37	3	Vertical	99	1.19	-	32.66	27.62	3.75	-

BT-LE(1Mbps)

2480MHz_TX

10/09/2019

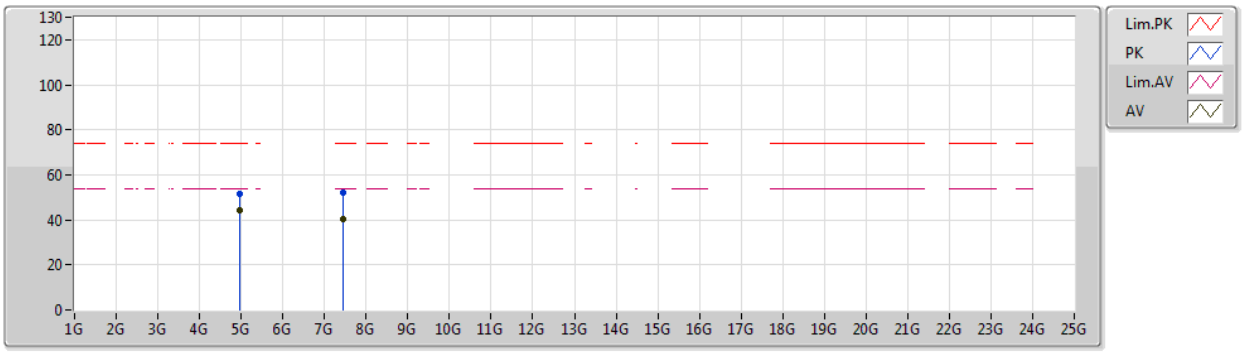


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.48G	102.58	Inf	-Inf	31.36	3	Horizontal	164	1.50	-	71.22	27.62	3.74	-
AV	2.4835G	51.36	54.00	-2.64	31.37	3	Horizontal	164	1.50	-	19.99	27.62	3.75	-
PK	2.4798G	103.94	Inf	-Inf	31.36	3	Horizontal	164	1.50	-	72.58	27.62	3.74	-
PK	2.4835G	72.38	74.00	-1.62	31.37	3	Horizontal	164	1.50	-	41.01	27.62	3.75	-

BT-LE(1Mbps)

10/09/2019

2480MHz_TX

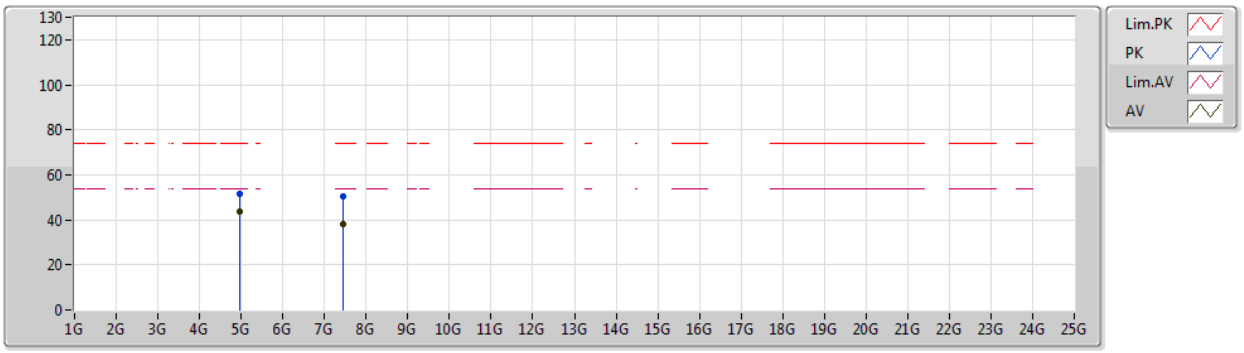


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.95994G	44.10	54.00	-9.90	2.01	3	Vertical	332	1.87	-	42.09	31.42	5.40	34.81
AV	7.43944G	40.16	54.00	-13.84	7.95	3	Vertical	310	1.00	-	32.21	36.40	6.66	35.11
PK	4.96051G	51.78	74.00	-22.22	2.01	3	Vertical	332	1.87	-	49.77	31.42	5.40	34.81
PK	7.44086G	51.97	74.00	-22.03	7.95	3	Vertical	310	1.00	-	44.02	36.40	6.66	35.11

BT-LE(1Mbps)

10/09/2019

2480MHz_TX



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.95993G	43.47	54.00	-10.53	2.01	3	Horizontal	195	1.75	-	41.46	31.42	5.40	34.81
AV	7.43953G	38.23	54.00	-15.77	7.95	3	Horizontal	0	1.50	-	30.28	36.40	6.66	35.11
PK	4.9598G	51.41	74.00	-22.59	2.01	3	Horizontal	195	1.75	-	49.40	31.42	5.40	34.81
PK	7.44008G	50.64	74.00	-23.36	7.95	3	Horizontal	0	1.50	-	42.69	36.40	6.66	35.11