Testing Laboratory 1190

FCC RADIO TEST REPORT

FCC ID	:	TLZ-CU442
Equipment	:	IEEE 802.11 b/g/n 1T1R WLAN and Bluetooth Low Energy Microcontroller Module
Brand Name	:	AzureWave
Model Name	:	AW-CU442
Applicant	:	AzureWave Technologies, Inc. 8F., No.94, Baozhong Rd. , Xindian Dist., New Taipei City, Taiwan 231
Standard	:	47 CFR FCC Part 15.247

The product was received on Jun. 10, 2020, and testing was started from Jun. 10, 2020 and completed on Jun. 30, 2020. 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 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: Sam Chen

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

Table of Contents

History of this test report

Report No.	Version	Description	Issued Date
FR061820AB	01	Initial issue of report	Jul. 27, 2020

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:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Sam Chen
Report Producer: Vicky Huang

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
2.4-2.4835GHz	BT-LE(500Kb/s)	1.0	1TX
2.4-2.4835GHz	BT-LE(125Kb/s)	1.0	1TX
2.4-2.4835GHz	BT-LE(2Mbps)	2.0	1TX

Note:
- Bluetooth LE uses a GFSK modulation.
- BWch is the nominal channel bandwidth.

1.1.2 Antenna Information

Ant.	Port	Brand	Part No.	Antenna Type	Connector	Gain (dBi)
1	1	LNYwave	AOX20-054AA0	Chip Antenna	N/A	3.62

Note: The above information was declared by manufacturer.

For 2.4GHz function:

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

Only Port 1 can be use as transmit and receive antenna.

For BT function:

For BT mode (1TX/1RX):

Only Port 1 can be use as transmit and receive antenna.

1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
BT-LE(1Mbps)	0.856	0.68	2.14m	1k
BT-LE(2Mbps)	0.557	2.54	1.081m	1k

Note:
- DC is Duty Cycle.
- DCF is Duty Cycle Factor.

1.1.4 EUT Operational Condition

EUT Power Type	From host system			
Function	☒	Point-to-multipoint	☐	Point-to-point
Test Software Version	RtlBluetoothMP.dll (Version:5.2.2.51) RTLBTAPP (Version:5.2.2.34)			
Support Mode	☒	LE 1M PHY: 1 Mb/s		
	☒	LE Coded PHY (S=2): 500 Kb/s		
	☒	LE Coded PHY (S=8): 125 Kb/s		
	☒	LE 2M PHY: 2 Mb/s		

Note: The above information was declared by manufacturer.

1.1.5 Table for EUT source

This product is a transformer that has the following two Sources

EUT	Source	Description
1	Main Source	Which are identical to each other in all aspects except Y1, L1, C27, C36, C37, C40, C41, C42.
2	Second Source	

1.2 Applicable 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

The following reference test guidance is not within the scope of accreditation of TAF.

- FCC KDB 558074 D01 v05r02
- FCC 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
☒	JHUBEI	ADD :	No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C.
		TEL :	886-3-656-9065 FAX : 886-3-656-9085

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
RF Conducted	TH03-CB	Benson Su	29.8~31.7°C / 39~42%	Jun. 25, 2020
Radiated (below 1GHz)	03CH06-CB	Nyle Chang	28.9~31°C / 39~43%	Jun. 24, 2020~ Jun. 25, 2020
Radiated (above 1GHz)	03CH01-CB 03CH03-CB	Stim Sung	29.2~30.9°C / 40~43%	Jun. 10, 2020~ Jun. 24, 2020
AC Conduction	CO01-CB	Peter Wu	23~24°C / 57~58%	Jun. 30, 2020

Test site Designation No. TW0006 with FCC.
Test site registered number IC 4086D with Industry Canada.

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)	2.0 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	4.3 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	4.3 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	5.1 dB	Confidence levels of 95%
Conducted Emission	2.4 dB	Confidence levels of 95%
Output Power Measurement	1.5 dB	Confidence levels of 95%
Power Density Measurement	2.4 dB	Confidence levels of 95%
Bandwidth Measurement	2%	Confidence levels of 95%

2 Test Configuration of EUT

2.1 Test Channel Mode

Mode	Power Setting
BT-LE(1Mbps)	-
2402MHz	0x39
2440MHz	0x39
2480MHz	0x31
BT-LE(2Mbps)	-
2402MHz	0x39
2440MHz	0x39
2480MHz	0x32

2.2 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	Normal Link
1	Normal Link-EUT 1
2	Normal Link-EUT 2
For operating mode 1 is the worst case and it was record in this test report.	

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 EUT has two sources, after evaluating, EUT 1 has been evaluated to be the worst case, so it was selected to test and record in this test report.	
Operating Mode	EUT 1

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	Normal Link
1	Normal Link-EUT 1 at Z-axis
2	Normal Link-EUT 1 at Y-axis
Mode 1 has been evaluated to be the worst case between Mode 1~2, thus measurement for Mode 3 will follow this same test mode.	
3	Normal Link-EUT 2 at Z-axis
For operating mode 3 is the worst case and it was record in this test report.	
Operating Mode > 1GHz	CTX
1. The EUT was performed at X axis, Y axis and Z axis position test, and the worst case was found at Y axis. So the measurement will follow this same test configuration. 2. The EUT has two sources, after evaluating, EUT 1 has been evaluated to be the worst case, so it was selected to test and record in this test report.	
1	EUT 1 at Y-axis

2.3 EUT Operation during Test

For CTX Mode:

The EUT was programmed to be in continuously transmitting mode.

For Normal Link:

During the test, the EUT operation to normal function.

2.4 Accessories

N/A

2.5 Support Equipment

For AC Conduction:

Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
A	Fixture	Azurewave	AW-CU462-I1	N/A
B	NB	DELL	E6430	N/A
C	Earphone	e-Power	S90W	N/A
D	Mouse	HP	FM100	N/A
E	AP Router	ASUS	RP-N53	MSQ-RPN53
F	Smart phone	Samsung	Galaxy J2	A3LSMJ200F
G	AP NB	DELL	E6430	N/A

For Radiated (below 1GHz):

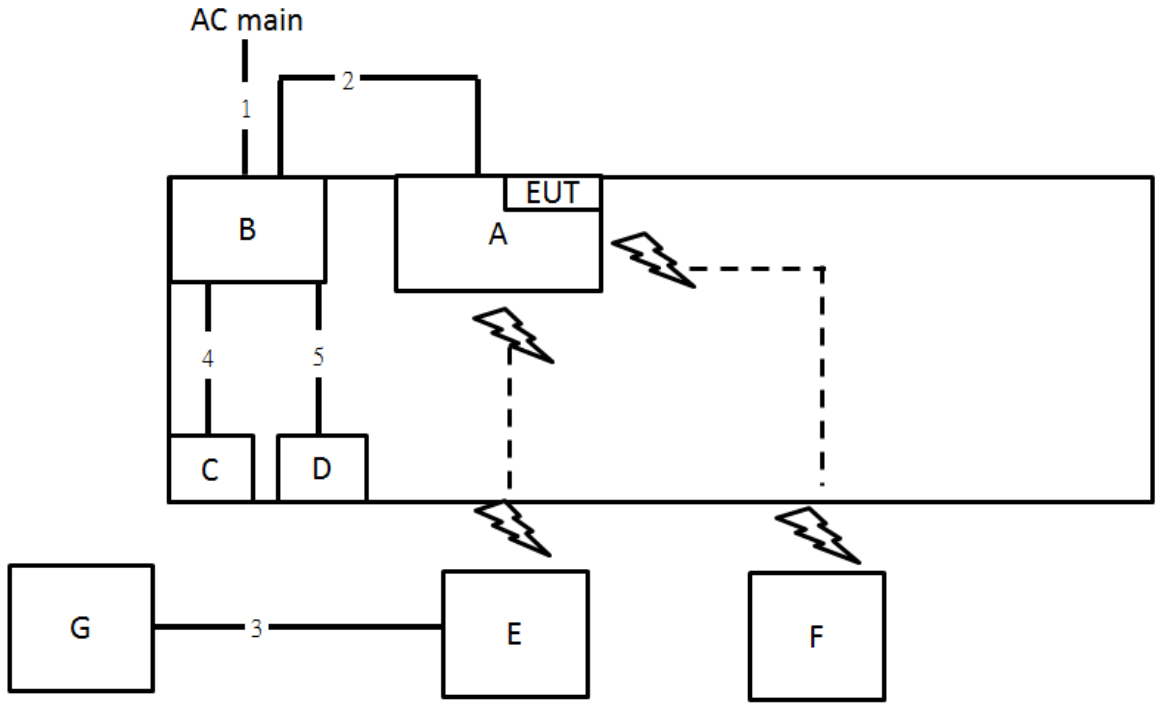
Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
A	NB	DELL	E4300	N/A
B	NB	DELL	E4300	N/A
C	AP Router	ASUS	RP-N53	MSQ-RPN53
D	Earphone	e-Power	S90W	N/A
E	Mouse	Logitech	M-U0026	N/A
F	Fixture	Azurewave	AW-CU462-I1	N/A
G	Smart phone	Samsung	Galaxy J2	A3LSMJ200F

For Radiated (above 1GHz) and RF Conducted:

Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
A	NB	DELL	E4300	N/A
B	Fixture	Azurewave	AW-CU462-I1	N/A

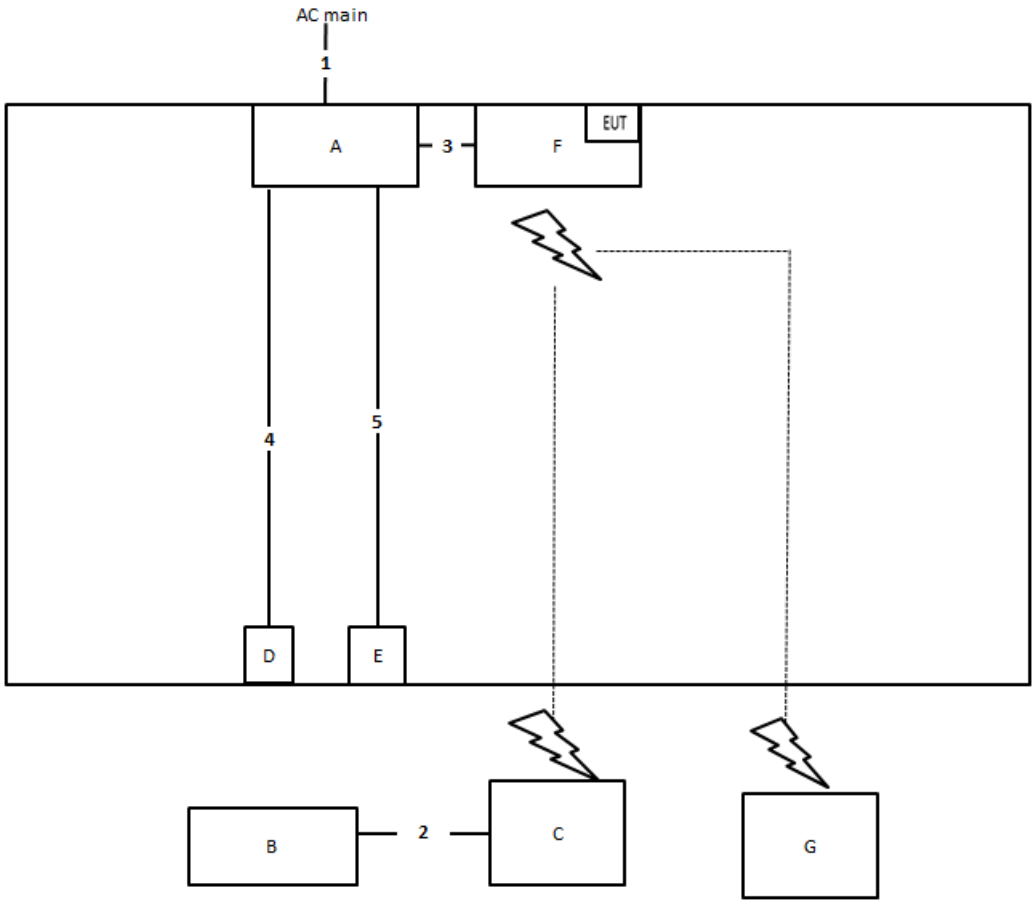
2.6 Test Setup Diagram

Test Setup Diagram – AC Line Conducted Emission Test



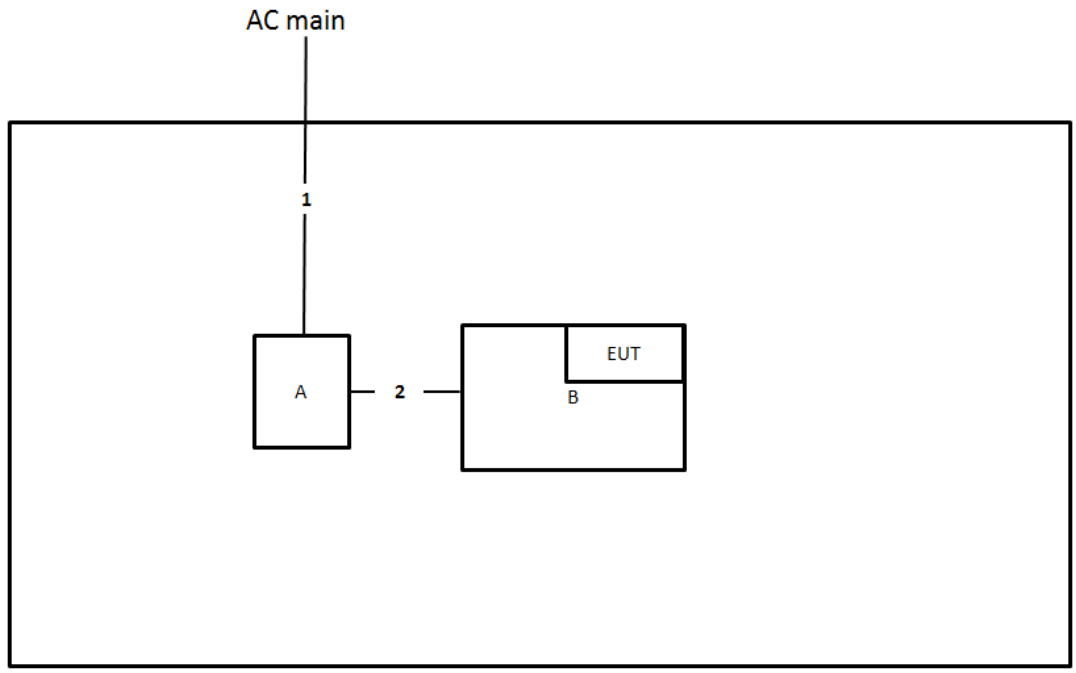
Item	Connection	Shielded	Length
1	Power cable	No	2.6m
2	USB cable	Yes	1.5m
3	RJ-45 cable	No	3m
4	Audio cable	No	1.5m
5	USB cable	Yes	1.5m

Test Setup Diagram - Radiated Test < 1GHz



Item	Connection	Shielded	Length
1	Power cable	No	2.6m
2	RJ-45 cable	No	1.5m
3	USB cable	Yes	1.7m
4	Audio cable	No	1.4m
5	USB cable	Yes	1.8m

Test Setup Diagram - Radiated Test > 1GHz



Item	Connection	Shielded	Length
1	Power cable	No	2.6m
2	USB cable	Yes	0.95m

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

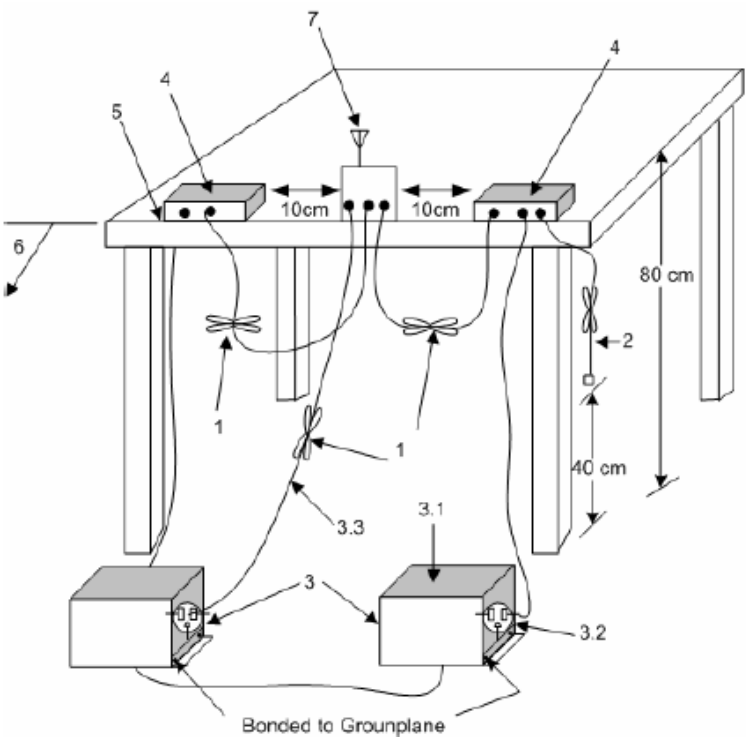
Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

Test Method
▪ Refer as ANSI C63.10-2013, clause 6.2 for AC 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 50 Ω 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.

1.1.1. Measurement Results Calculation

The measured Level is calculated using:

a. Corrected Reading (dBuV) = LISN Factor + Cable Loss + Read Level = Level

b. Margin = - Limit + (Read Level + LISN Factor + Cable Loss)

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.

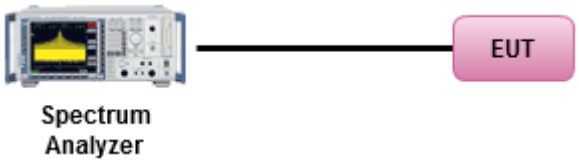
3.2.2 Measuring Instruments

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 FCC KDB 558074, clause 8.2 & C63.10 clause 11.8.1 Option 1 for 6 dB bandwidth measurement.
	☐ Refer as FCC KDB 558074, clause 8.2 & C63.10 clause 11.8.2 Option 2 for 6 dB bandwidth measurement.
	☐ Refer as ANSI C63.10, clause 6.9.1 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
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 FCC KDB 558074, clause 8.3.1.1 & C63.10 clause 11.9.1.1 (RBW ≥ EBW method).
☐	Refer as FCC KDB 558074, clause 8.3.1.3 & C63.10 clause 11.9.1.3 (peak power meter).
▪	Maximum Conducted Output Power
	[duty cycle ≥ 98% or external video / power trigger]
☐	Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.2 Method AVGSA-1.
☐	Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.3 Method AVGSA-1A. (alternative)
	duty cycle < 98% and average over on/off periods with duty factor
☐	Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.4 Method AVGSA-2.
☐	Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.5 Method AVGSA-2A (alternative)
☐	Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.6 Method AVGSA-3
☐	Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.7 Method AVGSA-3A (alternative)
	Measurement using a power meter (PM)
☐	Refer as FCC KDB 558074, clause 8.3.2.3 & C63.10 clause 11.9.2.3.1 Method AVGPM (using an RF average power meter).
☒	Refer as FCC KDB 558074, clause 8.3.2.3 & C63.10 clause 11.9.2.3.2 Method AVGPM-G (using

	an gate RF average power meter).
▪ For conducted measurement.	
	▪ If the EUT supports multiple transmit chains using options given below: Refer as FCC 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

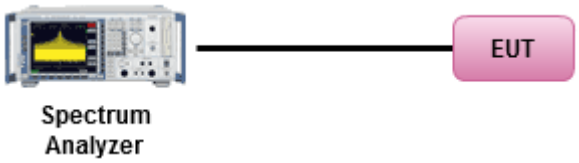
3.4.2 Measuring Instruments

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 FCC KDB 558074, clause 8.4 & C63.10 clause 11.10 Method Max. PSD.		
	[duty cycle ≥ 98% or external video / power trigger]		
▪ For conducted measurement.			
	▪ If The EUT supports multiple transmit chains using options given below:		
		☐	Option 1: Measure and sum the spectra across the outputs. Refer as FCC 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.
		☐	Option 2: Measure and sum spectral maxima across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs. These operations shall be performed separately over frequency spans that have different out-of-band or spurious emission limits,
		☐	Option 3: Measure and add 10 log(N) dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with 10 log(N). Or each transmit chains shall be add 10 log(N) to compared with the limit.

3.4.4 Test Setup

Power Spectral Density
 Spectrum Analyzer

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 (dBc)**
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.	

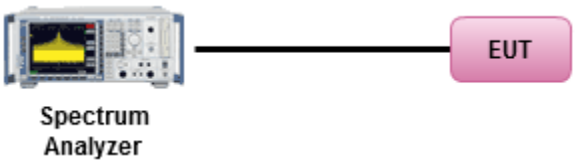
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

Test Method
▪ Refer as FCC KDB 558074, clause 8.5 for unwanted emissions into non-restricted 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.

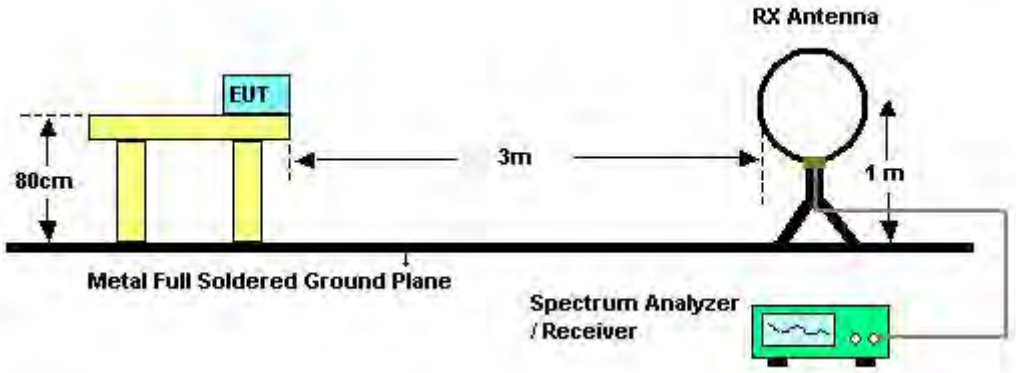
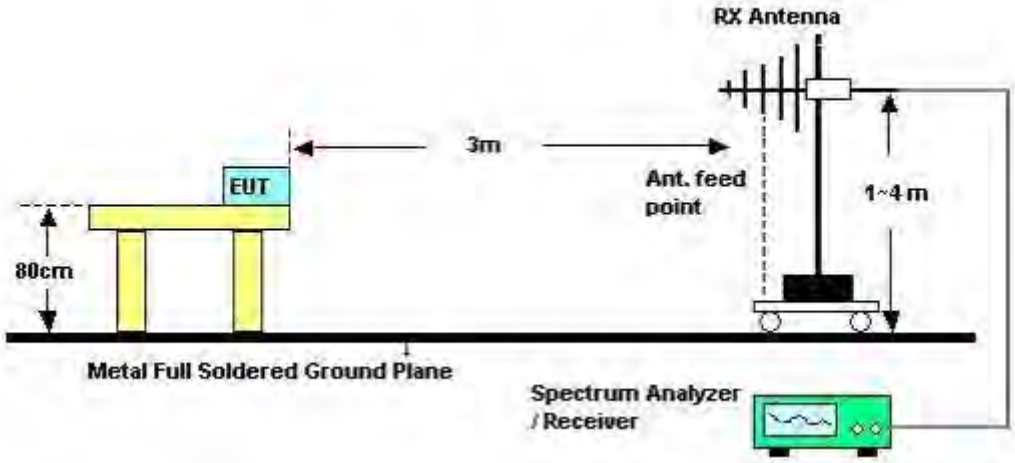
3.6.2 Measuring Instruments

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

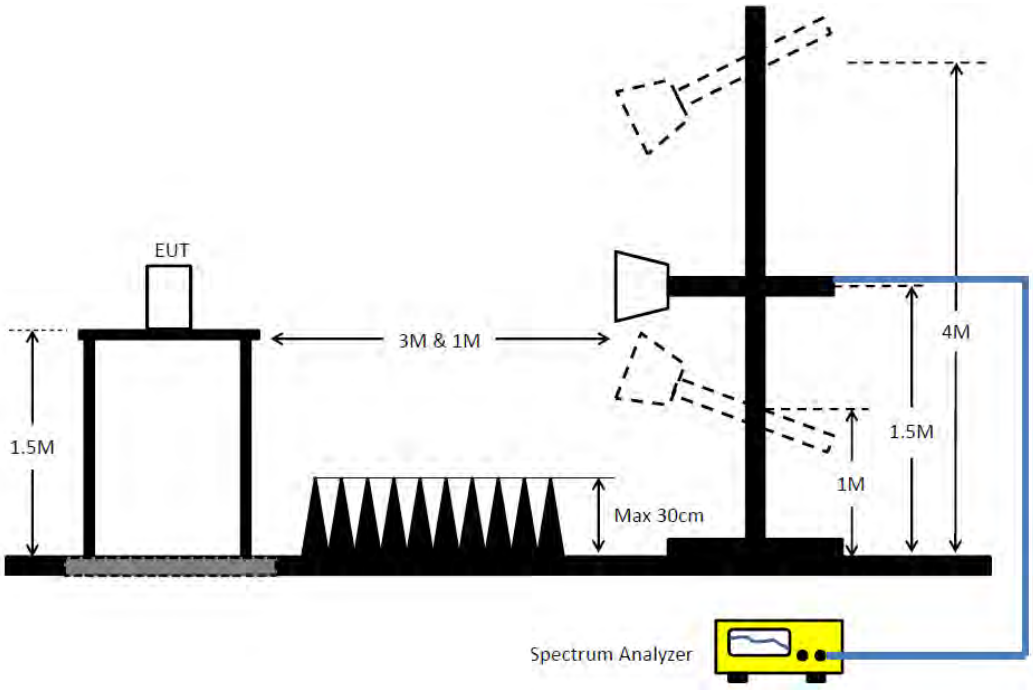
3.6.3 Test Procedures

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 FCC KDB 558074, clause 8.6 for unwanted emissions into restricted bands.	
		☐ Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.1(trace averaging for duty cycle ≥98%).
		☐ Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.2(trace averaging + duty factor).
		☒ Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.3(Reduced VBW≥1/T).
		☐ Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.
		☐ Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions.
		☒ Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.4 measurement procedure peak limit.
▪ For the transmitter band-edge emissions shall be measured using following options below:		
	▪ Refer as FCC KDB 558074 clause 8.7 & c63.10 clause 11.13.1, 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 FCC KDB 558074, clause 8.7 (ANSI C63.10, clause 6.10.6) for marker-delta method for band-edge measurements.	
	▪ Refer as FCC KDB 558074, clause 8.7 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).	
	▪ For conducted unwanted emissions into restricted bands (absolute emission limits). Devices with multiple transmit chains using options given below: (1) Measure and sum the spectra across the outputs or (2) Measure and add 10 log(N) dB	
	▪ For FCC KDB 662911 The methodology described here may overestimate array gain, thereby resulting in apparent failures to satisfy the out-of-band limits even if the device is actually compliant. In such cases, compliance may be demonstrated by performing radiated tests around the frequencies at which the apparent failures occurred.	

3.6.4 Test Setup

Emissions in Restricted Frequency Bands
9kHz ~30MHz

30MHz~1GHz


Above 1GHz



3.6.5 Measurement Results Calculation

The measured Level is calculated using:
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor (if applicable) = Level.

3.6.6 Emissions in Restricted Frequency Bands (Below 30MHz)

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to KDB414788 Radiated Test Site, and the result came out very similar.
All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.
The radiated emissions were investigated from 9 kHz or the lowest frequency generated within the device, up to the 10 harmonic or 40 GHz, whichever is appropriate.

3.6.7 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix F

4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.45GHz	Feb. 26, 2020	Feb. 25, 2021	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Dec. 25, 2019	Dec. 24, 2020	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Feb. 25, 2020	Feb. 24, 2021	Conduction (CO01-CB)
Pulse Limiter	Rohde& Schwarz	ESH3-Z2	100430	9kHz ~ 30MHz	Jan. 31, 2020	Jan. 30, 2021	Conduction (CO01-CB)
COND Cable	Woken	Cable	Low cable-CO01	9kHz ~ 30MHz	May 20, 2020	May 19, 2021	Conduction (CO01-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	N.C.R.	Conduction (CO01-CB)
Bilog Antenna with 6 dB attenuator	TESEQ & EMCI	CBL6112D & N-6-06	37878 & AT-N0606	20MHz ~ 2GHz	Aug. 03, 2019	Aug. 02, 2020	Radiation (03CH06-CB)
Pre-Amplifier	Agilent	310N	187290	0.1MHz ~ 1GHz	Apr. 28, 2020	Apr. 27, 2021	Radiation (03CH06-CB)
Spectrum analyzer	R&S	FSP40	100080	9kHz~40GHz	Oct. 21, 2019	Oct. 20, 2020	Radiation (03CH06-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	May 13, 2020	May 12, 2021	Radiation (03CH06-CB)
RF Cable-low	HUBER+SUHNER	RG402	Low Cable-05+24	30MHz~1GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH06-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Apr. 13, 2020	Apr. 12, 2021	Radiation (03CH06-CB)
Horn Antenna	ETS-LINDGREN	3115	00075790	750MHz ~ 18GHz	Nov. 04, 2019	Nov. 03, 2020	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jun. 27, 2019	Jun. 26, 2020	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 08, 2020	Jan. 07, 2021	Radiation (03CH01-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jul. 03, 2019	Jul. 02, 2020	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Apr. 16, 2020	Apr. 15, 2021	Radiation (03CH01-CB)
RF Cable-high	Woken	RG402	High Cable-16	1 GHz ~ 18 GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH01-CB)

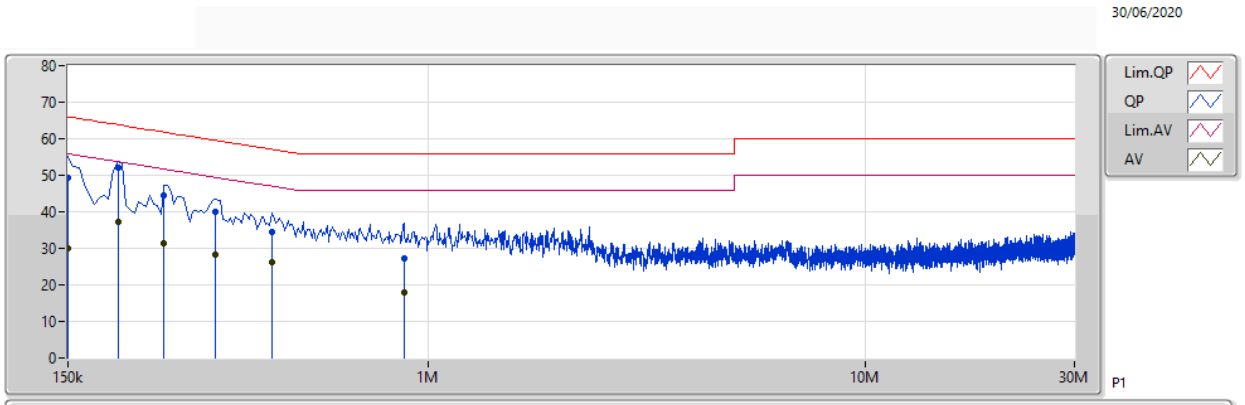
Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
RF Cable-high	Woken	RG402	High Cable-16+17	1 GHz ~ 18 GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH01-CB)
RF Cable-high	Woken	RG402	High Cable-40G#1	18GHz ~ 40 GHz	Jul. 24, 2019	Jul. 23, 2020	Radiation (03CH01-CB)
RF Cable-high	Woken	RG402	High Cable-40G#2	18GHz ~ 40 GHz	Jul. 24, 2019	Jul. 23, 2020	Radiation (03CH01-CB)
Horn Antenna	ETS・Lindgren	3115	6821	750MHz~18GHz	Jan. 20, 2020	Jan. 19, 2021	Radiation (03CH03-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jun. 27, 2019	Jun. 26, 2020	Radiation (03CH03-CB)
Pre-Amplifier	Agilent	8449B	3008A02097	1GHz ~ 26.5GHz	Dec. 19, 2019	Dec.18, 2020	Radiation (03CH03-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jul. 03, 2019	Jul. 02, 2020	Radiation (03CH03-CB)
Spectrum Analyzer	R&S	FSP40	100019	9kHz ~ 40GHz	Jun. 09, 2020	Jun. 08, 2021	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-20+27	1GHz ~ 18GHz	Feb. 01, 2020	Jan. 31, 2021	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-27	1GHz ~ 18GHz	Feb. 01, 2020	Jan. 31, 2021	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-40G#1	18GHz ~ 40 GHz	Jul. 24, 2019	Jul. 23, 2020	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-40G#2	18GHz ~ 40 GHz	Jul. 24, 2019	Jul. 23, 2020	Radiation (03CH03-CB)
Spectrum analyzer	R&S	FSV40	101028	9kHz~40GHz	Nov. 01, 2019	Oct. 31, 2020	Conducted (TH03-CB)
Power Sensor	Anritsu	MA2411B	1726195	300MHz~40GHz	Aug. 13, 2019	Aug. 12, 2020	Conducted (TH03-CB)
Power Meter	Anritsu	ML2495A	1035008	300MHz~40GHz	Aug. 13, 2019	Aug. 12, 2020	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-11	1 GHz – 26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-12	1 GHz – 26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-13	1 GHz – 26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH03-CB)

RF Cable-high	Woken	RG402	High Cable-14	1 GHz – 26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-15	1 GHz – 26.5 GHz	Oct. 07, 2019	Oct. 06, 2020	Conducted (TH03-CB)

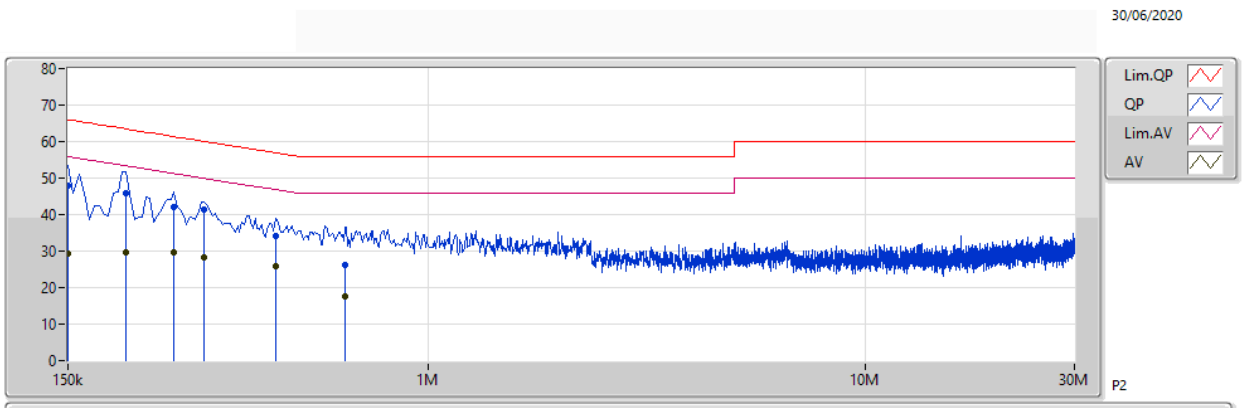
Note: Calibration Interval of instruments listed above is one year.
NCR means Non-Calibration required.

Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Condition
Mode 1	Pass	QP	195k	52.08	63.82	-11.74	9.86	Line



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	AF	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	150k	49.29	66.00	-16.71	9.87	Line	-	39.42	0.05	0.03	9.79
AV	150k	29.99	56.00	-26.01	9.87	Line	-	20.12	0.05	0.03	9.79
QP	195k	52.08	63.82	-11.74	9.86	Line	"Worst"	42.22	0.04	0.03	9.79
AV	195k	37.40	53.82	-16.42	9.86	Line	-	27.54	0.04	0.03	9.79
QP	249k	44.48	61.79	-17.31	9.87	Line	-	34.61	0.04	0.03	9.80
AV	249k	31.35	51.79	-20.44	9.87	Line	-	21.48	0.04	0.03	9.80
QP	325.5k	39.92	59.56	-19.64	9.87	Line	-	30.05	0.04	0.03	9.80
AV	325.5k	28.38	49.56	-21.18	9.87	Line	-	18.51	0.04	0.03	9.80
QP	438k	34.57	57.11	-22.54	9.88	Line	-	24.69	0.04	0.03	9.81
AV	438k	26.06	47.11	-21.05	9.88	Line	-	16.18	0.04	0.03	9.81
QP	879k	27.26	56.00	-28.74	9.91	Line	-	17.35	0.05	0.04	9.82
AV	879k	17.81	46.00	-28.19	9.91	Line	-	7.90	0.05	0.04	9.82



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	AF	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	150k	47.92	66.00	-18.08	9.86	Neutral	-	38.06	0.04	0.03	9.79
AV	150k	29.46	56.00	-26.54	9.86	Neutral	-	19.60	0.04	0.03	9.79
QP	204k	45.77	63.44	-17.67	9.86	Neutral	"Worst"	35.91	0.04	0.03	9.79
AV	204k	29.73	53.44	-23.71	9.86	Neutral	-	19.87	0.04	0.03	9.79
QP	262.5k	41.98	61.35	-19.37	9.87	Neutral	-	32.11	0.04	0.03	9.80
AV	262.5k	29.79	51.35	-21.56	9.87	Neutral	-	19.92	0.04	0.03	9.80
QP	307.5k	41.29	60.03	-18.74	9.87	Neutral	-	31.42	0.04	0.03	9.80
AV	307.5k	28.33	50.03	-21.70	9.87	Neutral	-	18.46	0.04	0.03	9.80
QP	447k	34.24	56.94	-22.70	9.88	Neutral	-	24.36	0.04	0.03	9.81
AV	447k	25.99	46.94	-20.95	9.88	Neutral	-	16.11	0.04	0.03	9.81
QP	645k	26.11	56.00	-29.89	9.91	Neutral	-	16.20	0.05	0.04	9.82
AV	645k	17.45	46.00	-28.55	9.91	Neutral	-	7.54	0.05	0.04	9.82

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)	665k	1.029M	1M03F1D	658.75k	1.026M
BT-LE(2Mbps)	1.155M	2.051M	2M05F1D	1.138M	2.049M

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

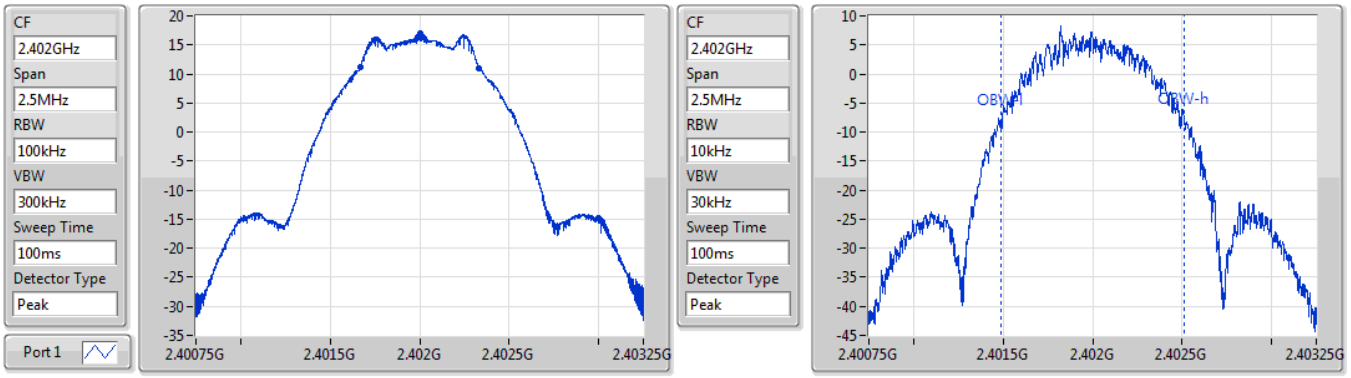
Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	500k	663.75k	1.026M
2440MHz	Pass	500k	665k	1.028M
2480MHz	Pass	500k	658.75k	1.029M
BT-LE(2Mbps)	-	-	-	-
2402MHz	Pass	500k	1.138M	2.049M
2440MHz	Pass	500k	1.155M	2.049M
2480MHz	Pass	500k	1.15M	2.051M

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

BT-LE(1Mbps) EBW

2402MHz

26/06/2020

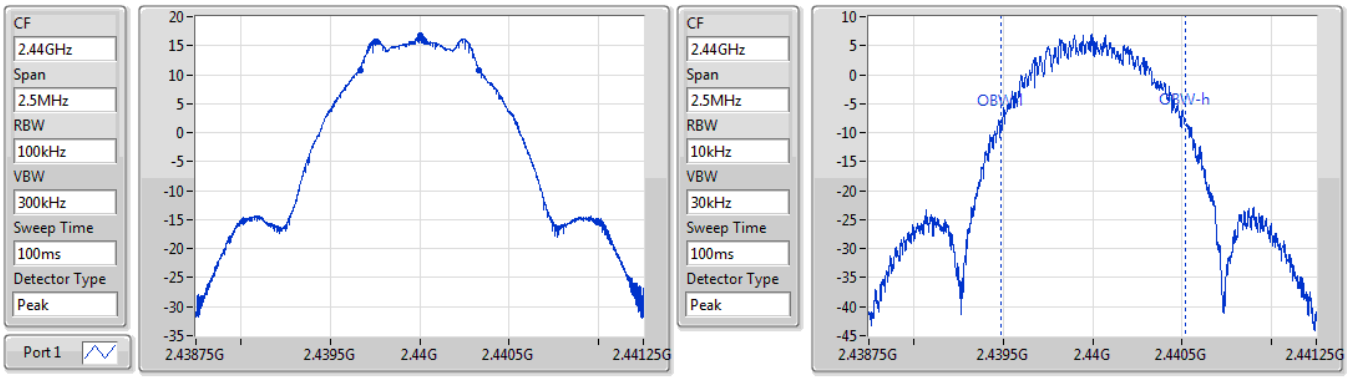


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
663.75k	2.401666G	2.40233G	1.026M	2.401488G	2.402513G	500k	1

BT-LE(1Mbps) EBW

2440MHz

26/06/2020



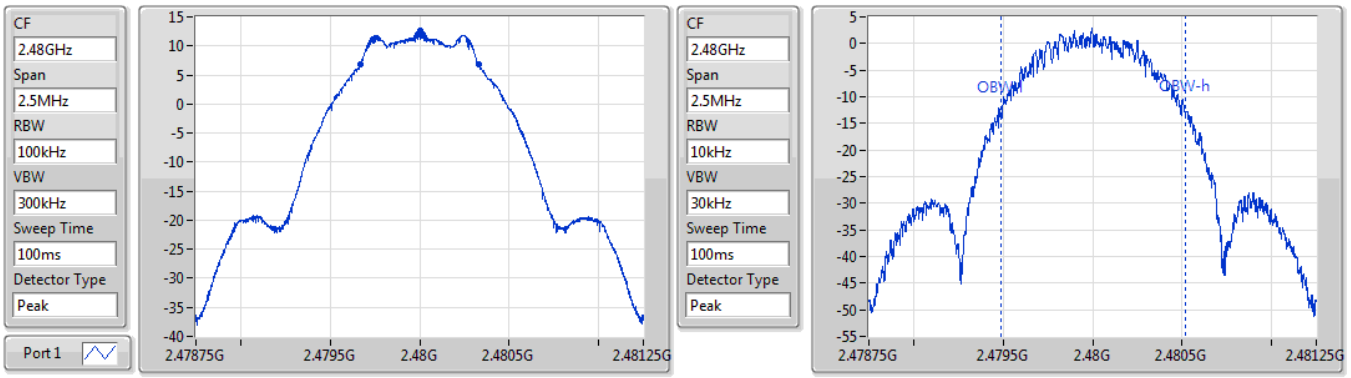
6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
665k	2.439666G	2.440331G	1.028M	2.439488G	2.440516G	500k	1

BT-LE(1Mbps)

EBW

2480MHz

26/06/2020



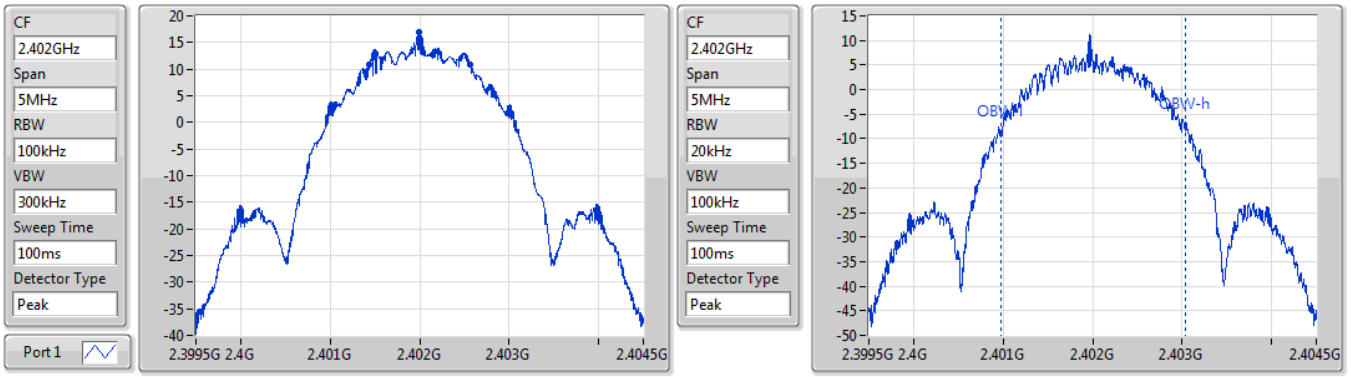
6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
658.75k	2.479669G	2.480328G	1.029M	2.479488G	2.480517G	500k	1

BT-LE(2Mbps)

EBW

2402MHz

26/06/2020

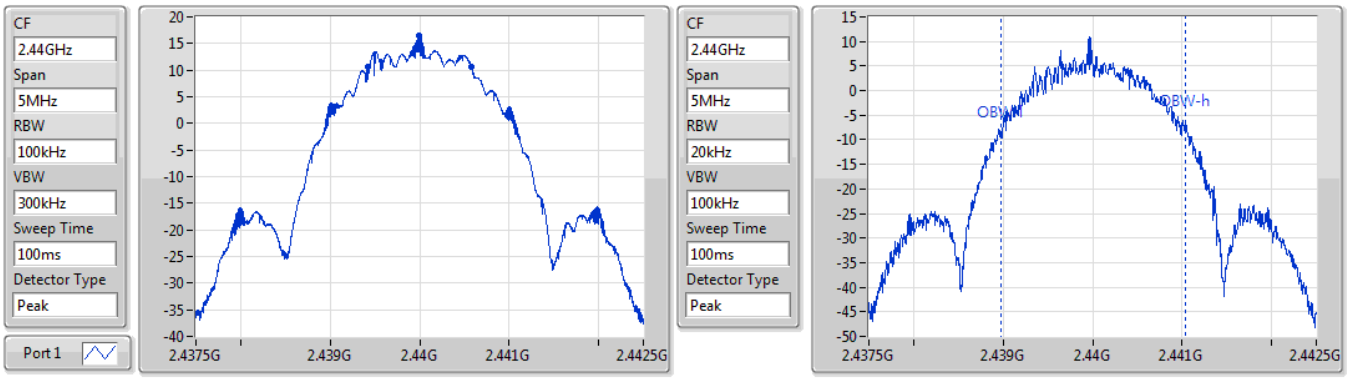


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.138M	2.40143G	2.402568G	2.049M	2.400983G	2.403032G	500k	1

BT-LE(2Mbps) EBW

2440MHz

26/06/2020

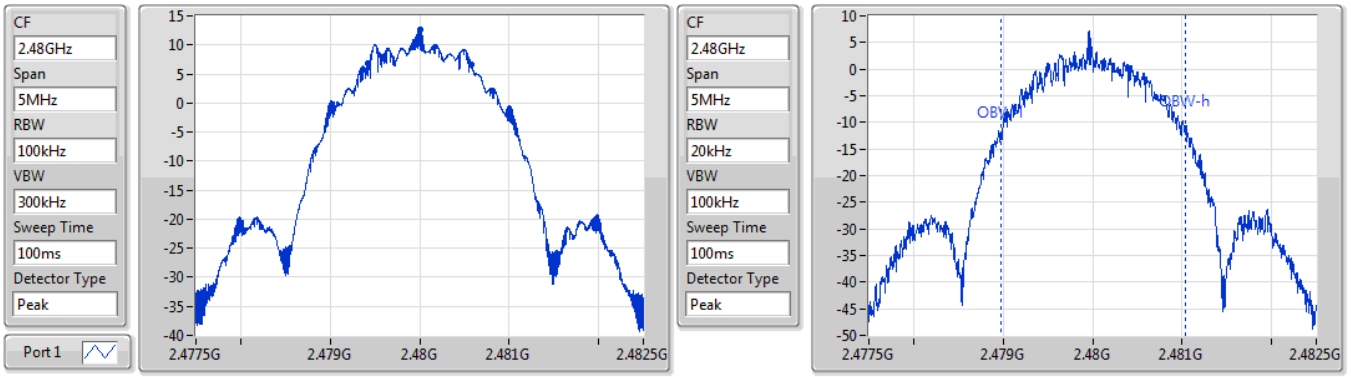


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.155M	2.439428G	2.440583G	2.049M	2.438983G	2.441032G	500k	1

BT-LE(2Mbps) EBW

2480MHz

26/06/2020



6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.15M	2.479428G	2.480578G	2.051M	2.478981G	2.481032G	500k	1

Summary

Mode	Power (dBm)	Power (W)
2.4-2.4835GHz	-	-
BT-LE(1Mbps)	17.25	0.05309
BT-LE(2Mbps)	17.00	0.05012

Result

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	3.62	17.25	30.00
2440MHz	Pass	3.62	16.87	30.00
2480MHz	Pass	3.62	12.58	30.00
BT-LE(2Mbps)	-	-	-	-
2402MHz	Pass	3.62	17.00	30.00
2440MHz	Pass	3.62	16.62	30.00
2480MHz	Pass	3.62	13.20	30.00

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

Summary

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
BT-LE(1Mbps)	0.36
BT-LE(2Mbps)	-2.91

RBW=3 kHz.

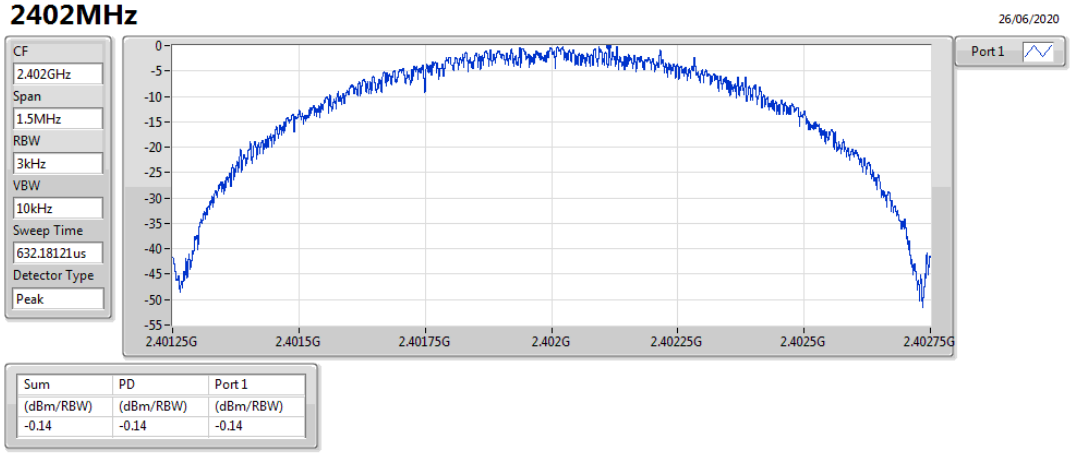
Result

Mode	Result	Gain (dBi)	PD (dBm/RBW)	PD Limit (dBm/RBW)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	3.62	-0.14	8.00
2440MHz	Pass	3.62	0.36	8.00
2480MHz	Pass	3.62	-3.88	8.00
BT-LE(2Mbps)	-	-	-	-
2402MHz	Pass	3.62	-2.91	8.00
2440MHz	Pass	3.62	-6.43	8.00
2480MHz	Pass	3.62	-3.98	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**

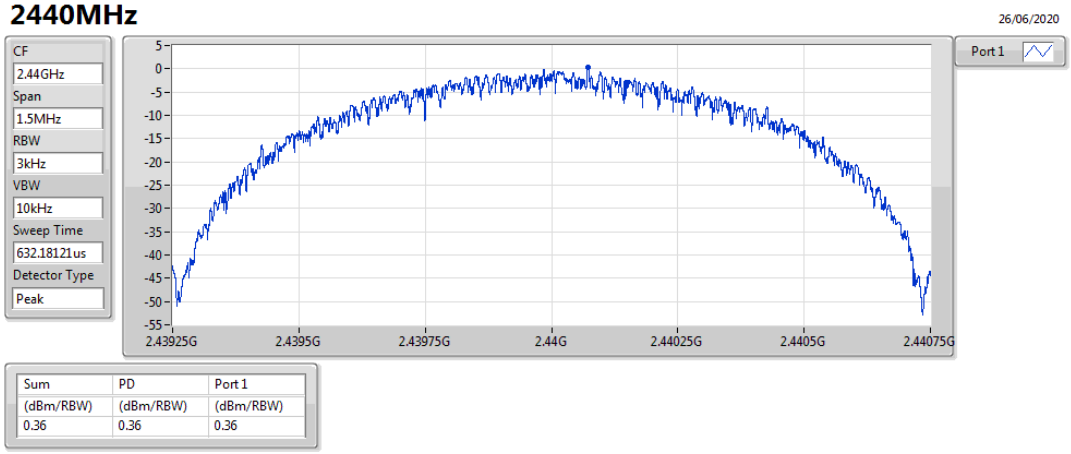
2402MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-0.14	-0.14	-0.14

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

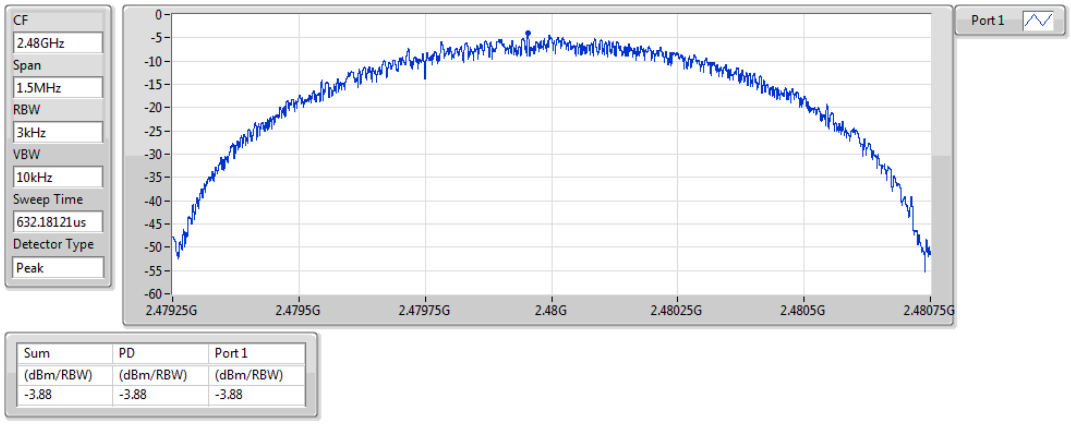
2440MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
0.36	0.36	0.36

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

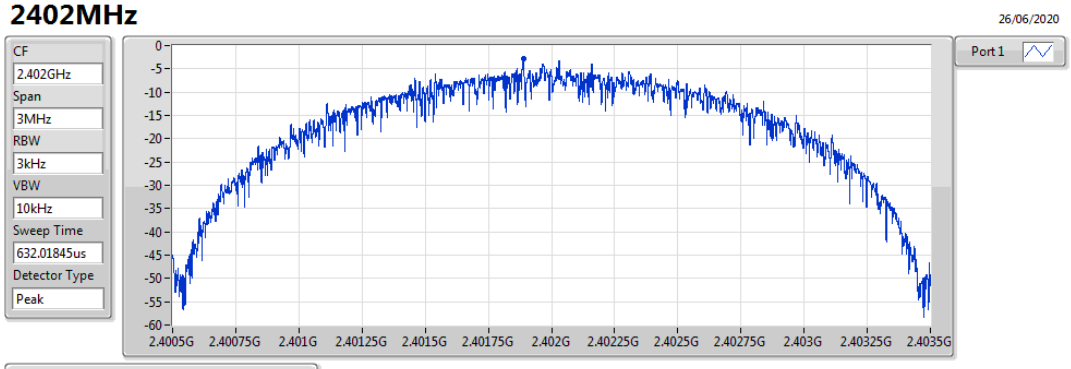
2480MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-3.88	-3.88	-3.88

BT-LE(2Mbps) **PSD**

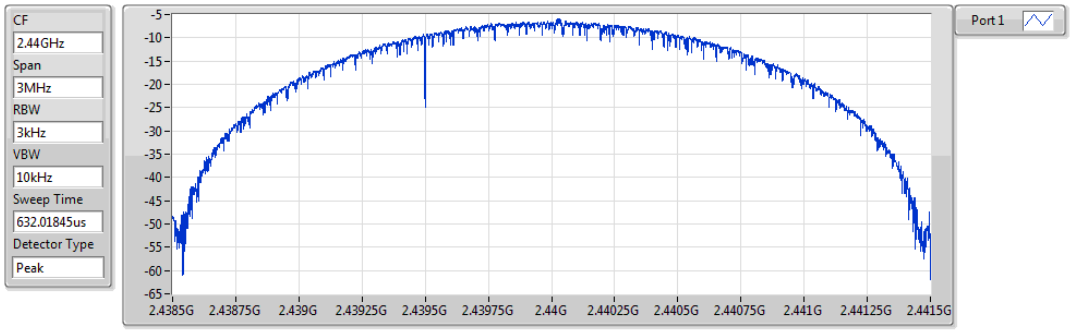
2402MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-2.91	-2.91	-2.91

BT-LE(2Mbps) **PSD**

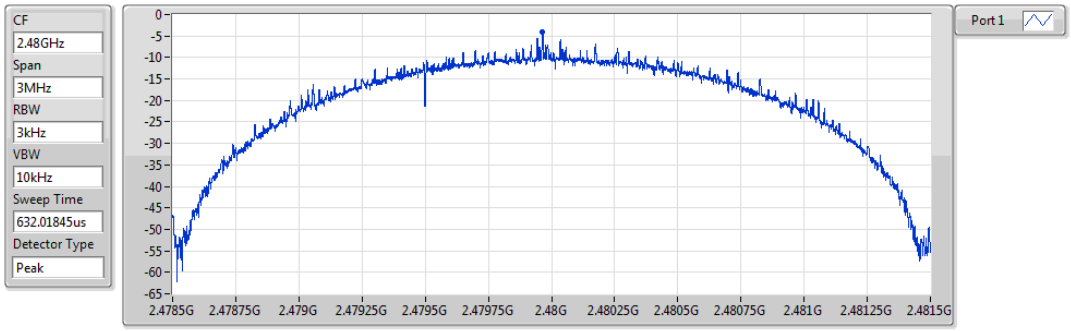
2440MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-6.43	-6.43	-6.43

BT-LE(2Mbps) **PSD**

2480MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-3.98	-3.98	-3.98

Summary

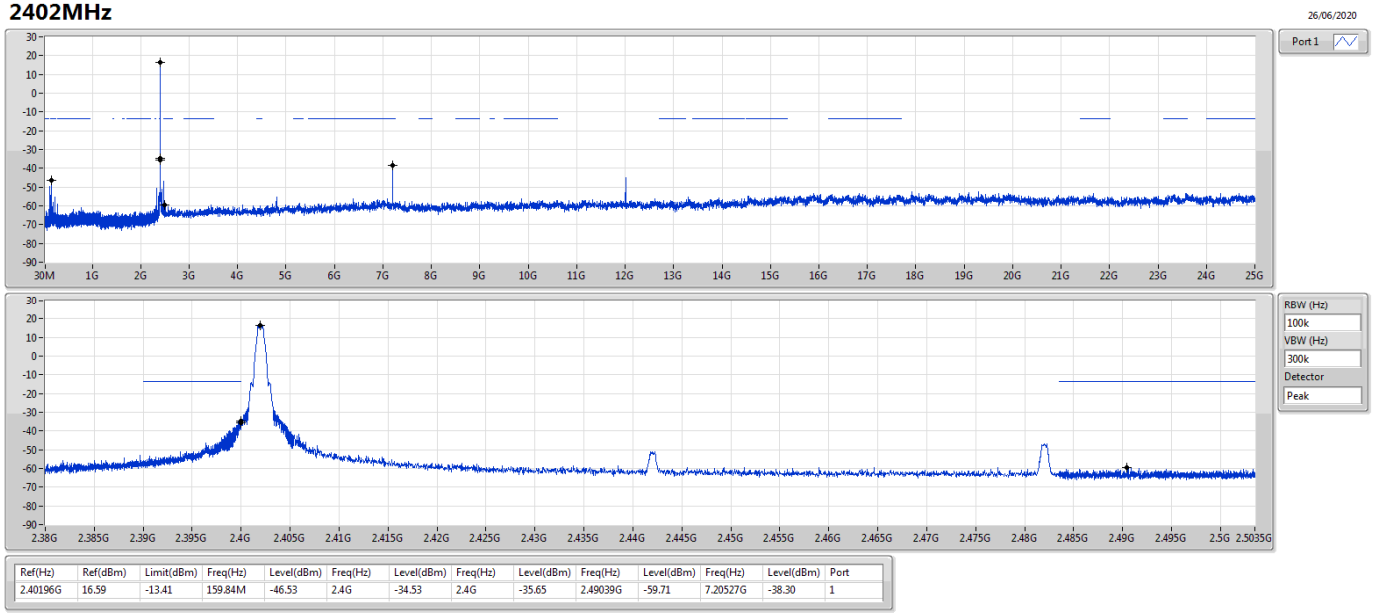
Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	2.40196G	16.59	-13.41	159.84M	-46.53	2.4G	-34.53	2.4G	-35.65	2.49039G	-59.71	7.20527G	-38.30	1
BT-LE(2Mbps)	Pass	2.40196G	16.84	-13.16	159.84M	-46.21	2.4G	-15.74	2.4G	-15.79	2.49075G	-59.58	7.20808G	-39.15	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)	Freq (Hz)	Level (dBm)	Port
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	2.40196G	16.59	-13.41	159.84M	-46.53	2.4G	-34.53	2.4G	-35.65	2.49039G	-59.71	7.20527G	-38.30	1
2440MHz	Pass	2.40196G	16.59	-13.41	159.84M	-45.26	2.39998G	-50.98	2.4G	-51.13	2.48374G	-59.78	2.51756G	-48.62	1
2480MHz	Pass	2.40196G	16.59	-13.41	159.84M	-47.43	2.4G	-49.41	2.4G	-50.57	2.48395G	-50.42	24.6035G	-52.63	1
BT-LE(2Mbps)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	2.40196G	16.84	-13.16	159.84M	-46.21	2.4G	-15.74	2.4G	-15.79	2.49075G	-59.58	7.20808G	-39.15	1
2440MHz	Pass	2.40196G	16.84	-13.16	159.84M	-45.84	2.39999G	-51.00	2.4G	-52.78	2.48618G	-59.52	24.64568G	-52.16	1
2480MHz	Pass	2.40196G	16.84	-13.16	159.84M	-48.41	2.4G	-49.92	2.4835G	-40.25	2.48363G	-38.07	17.64364G	-53.10	1

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

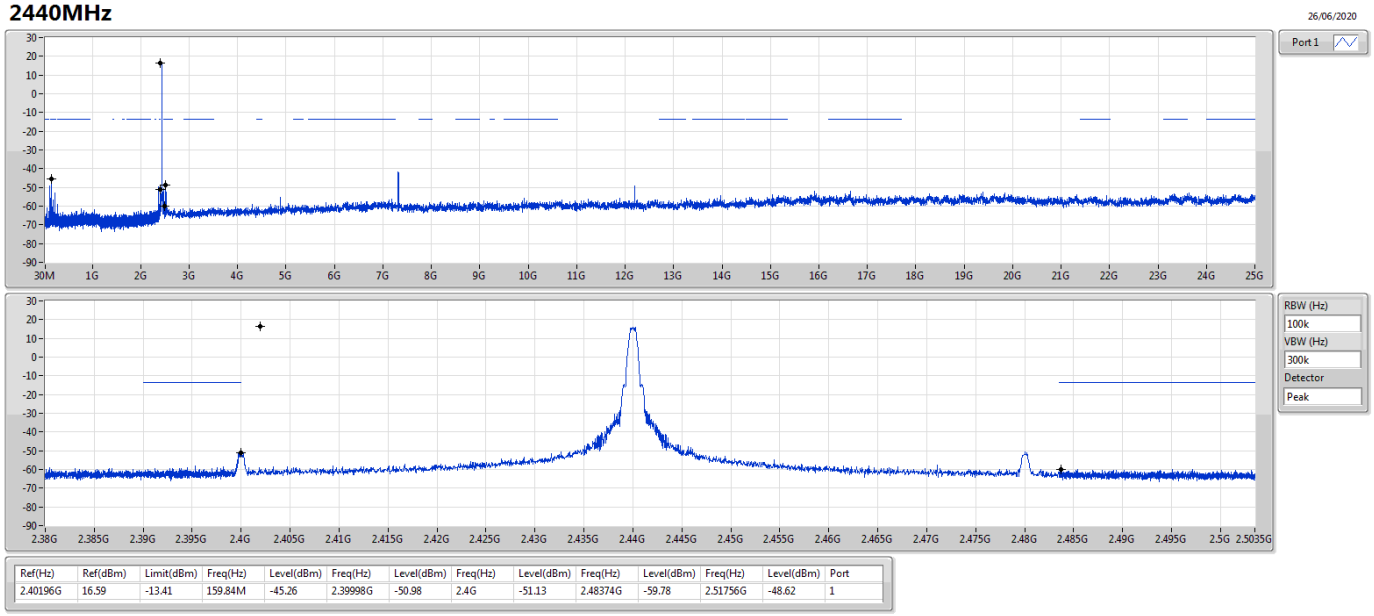
2402MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.40196G	16.59	-13.41	159.84M	-46.53	2.4G	-34.53	2.4G	-35.65	2.49039G	-59.71	7.20527G	-38.30	1

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

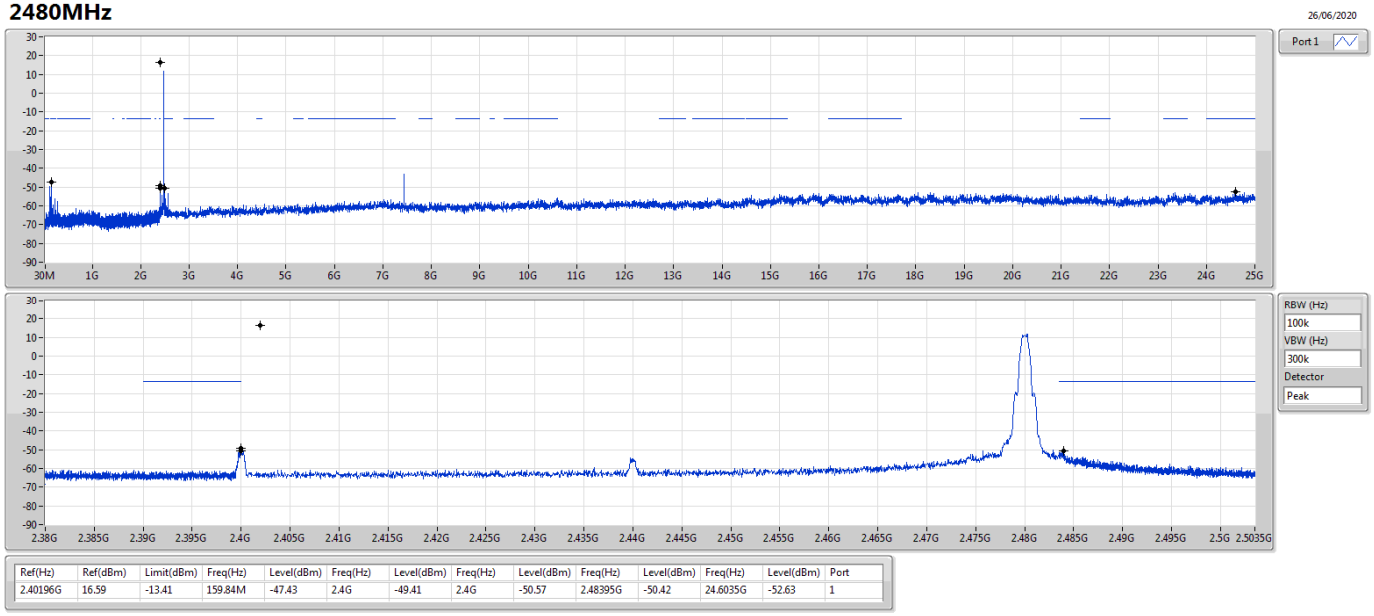
2440MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.40196G	16.59	-13.41	159.84M	-45.26	2.39998G	-50.98	2.4G	-51.13	2.48374G	-59.78	2.51756G	-48.62	1

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

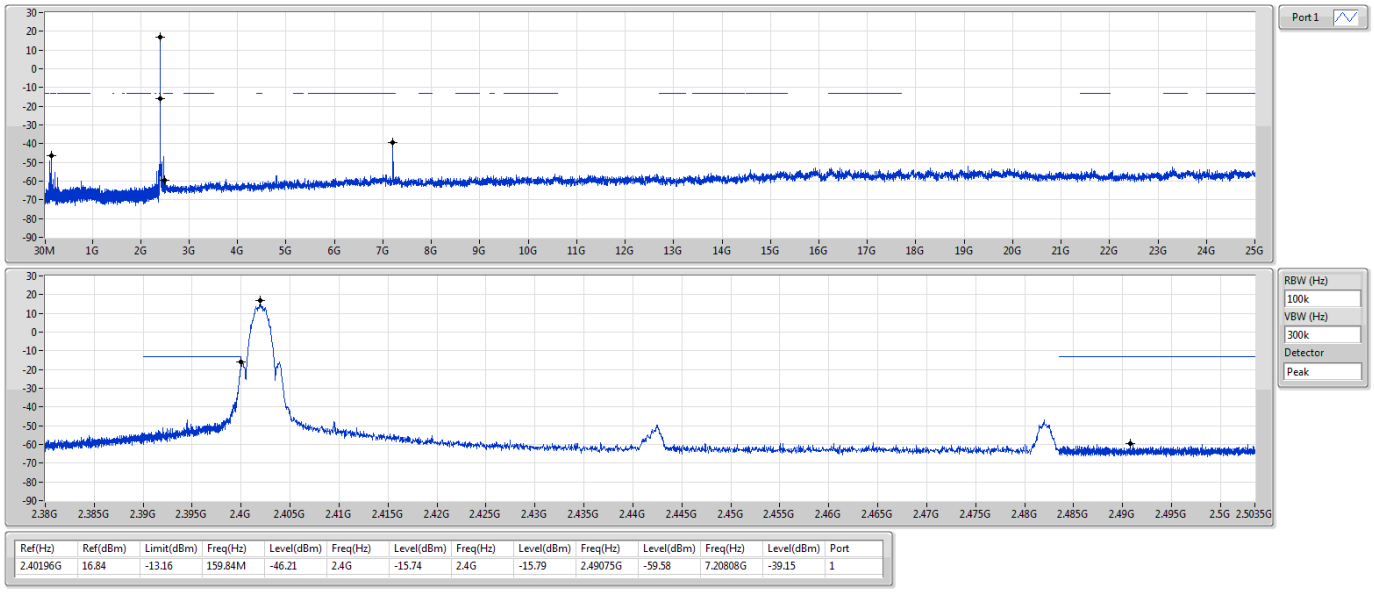
2480MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.40196G	16.59	-13.41	159.84M	-47.43	2.4G	-49.41	2.4G	-50.57	2.48395G	-50.42	24.6035G	-52.63	1

BT-LE(2Mbps) **CSE NdB**

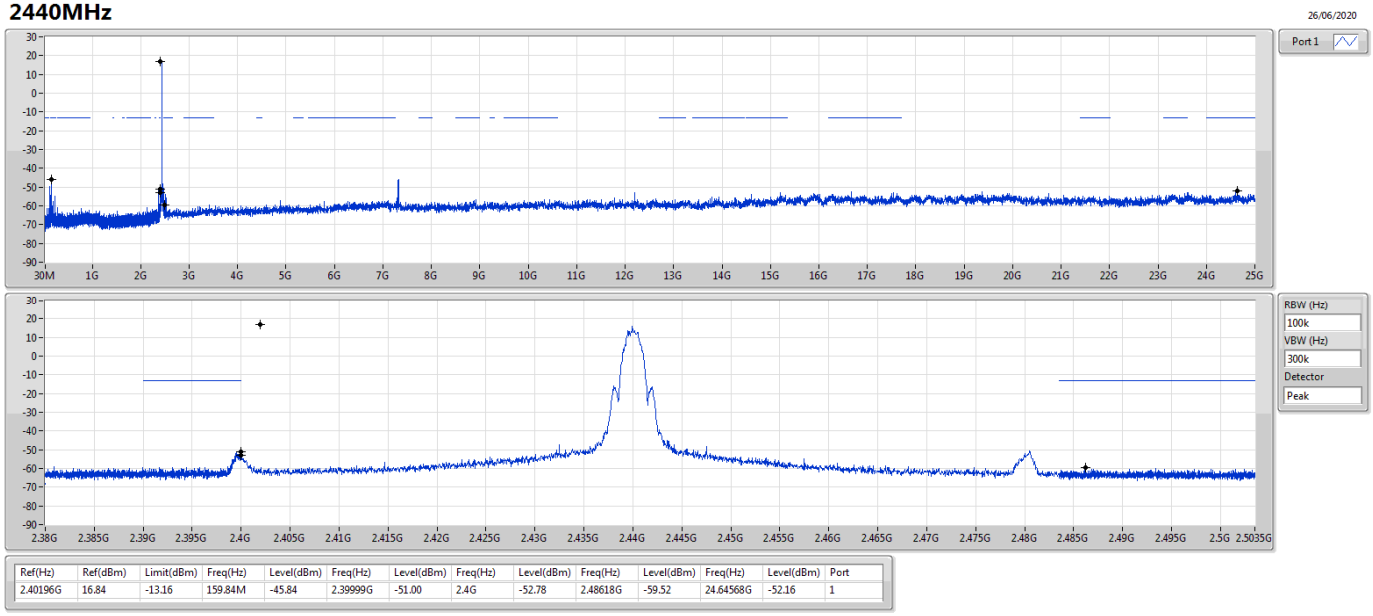
2402MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.40196G	16.84	-13.16	159.84M	-46.21	2.4G	-15.74	2.4G	-15.79	2.49075G	-59.58	7.20808G	-39.15	1

BT-LE(2Mbps) **CSE NdB**

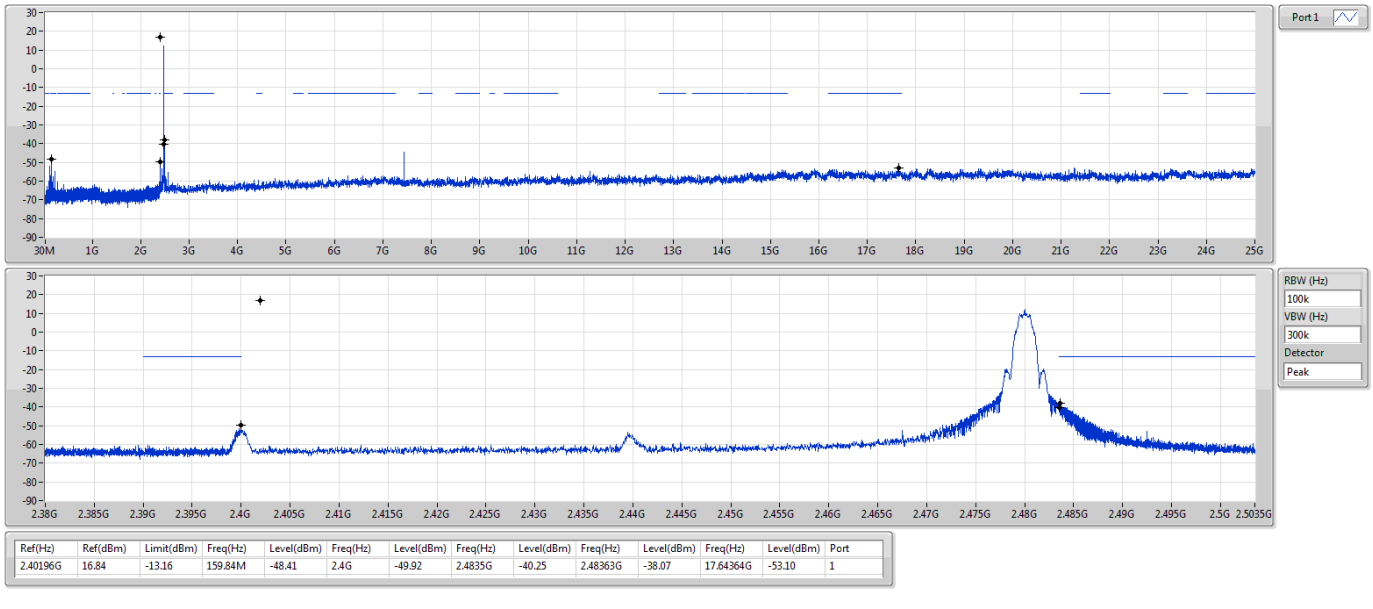
2440MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.40196G	16.84	-13.16	159.84M	-45.84	2.39999G	-51.00	2.4G	-52.78	2.48618G	-59.52	24.64568G	-52.16	1

BT-LE(2Mbps) **CSE NdB**

2480MHz

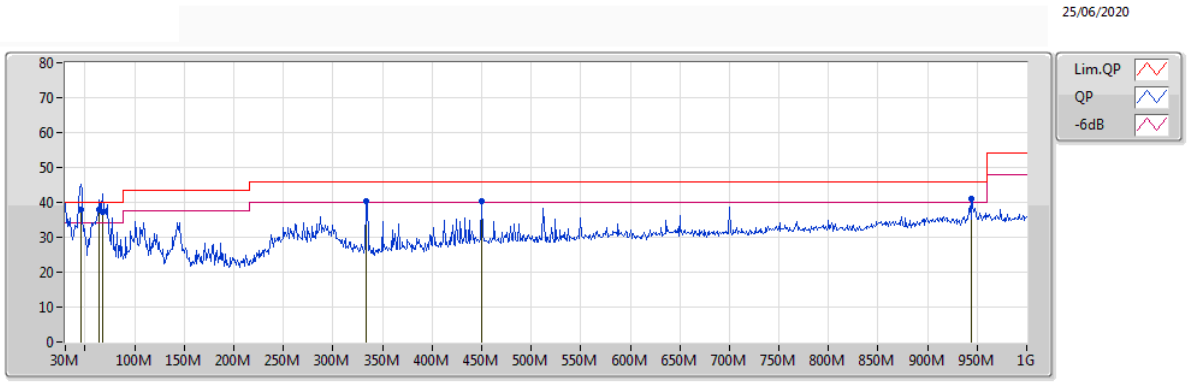


Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.40196G	16.84	-13.16	159.84M	-48.41	2.4G	-49.92	2.4835G	-40.25	2.48363G	-38.07	17.64364G	-53.10	1

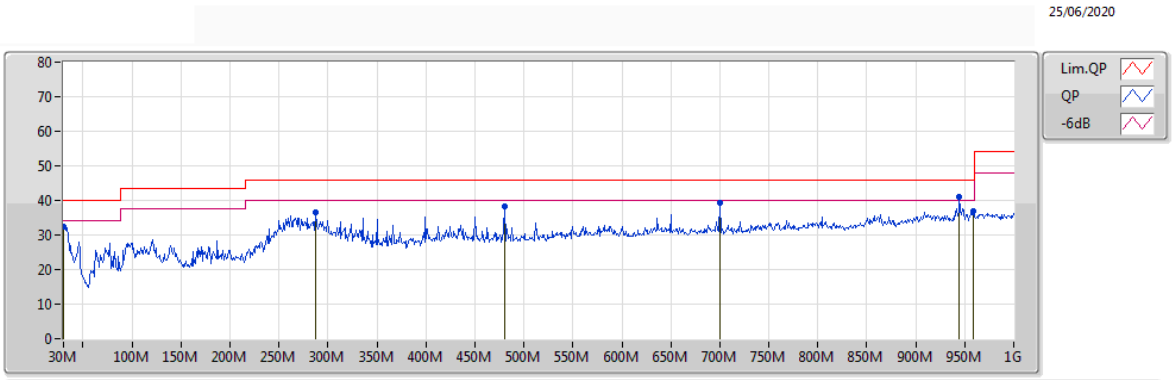
Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 3	Pass	QP	45.52M	37.87	40.00	-2.13	Vertical

Test Mode: Mode 3



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/m)	(dB/m)	(dB)	(dB)
QP	45.52M	37.87	40.00	-2.13	-15.01	3	Vertical	255	1.00	"Worst"	52.88	16.13	1.58	32.72
QP	63.95M	37.82	40.00	-2.18	-18.85	3	Vertical	195	1.50	-	56.67	11.99	1.68	32.52
QP	67.83M	37.40	40.00	-2.60	-18.76	3	Vertical	256	1.25	-	56.16	12.06	1.70	32.52
PK	333.61M	40.39	46.00	-5.61	-8.98	3	Vertical	305	2.00	-	49.37	19.73	3.73	32.44
PK	450.01M	40.19	46.00	-5.81	-5.19	3	Vertical	192	1.00	-	45.38	22.78	4.30	32.27
PK	944.71M	41.03	46.00	-4.97	1.80	3	Vertical	276	2.00	-	39.23	26.70	6.60	31.50



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/m)	(dB/m)	(dB)	(dB)
PK	30M	32.31	40.00	-7.69	-6.72	3	Horizontal	199	1.25	-	39.03	24.21	1.50	32.43
PK	287.05M	36.51	46.00	-9.49	-10.05	3	Horizontal	238	1.00	-	46.56	18.94	3.50	32.49
PK	480.08M	38.12	46.00	-7.88	-4.56	3	Horizontal	1	1.00	-	42.68	23.28	4.48	32.32
PK	700.27M	39.31	46.00	-6.69	-2.16	3	Horizontal	163	1.50	-	41.47	24.91	5.50	32.57
PK	944.71M	41.09	46.00	-4.91	1.80	3	Horizontal	360	1.50	"Worst"	39.29	26.70	6.60	31.50
PK	959.26M	37.04	46.00	-8.96	2.16	3	Horizontal	276	1.25	-	34.88	26.92	6.60	31.36

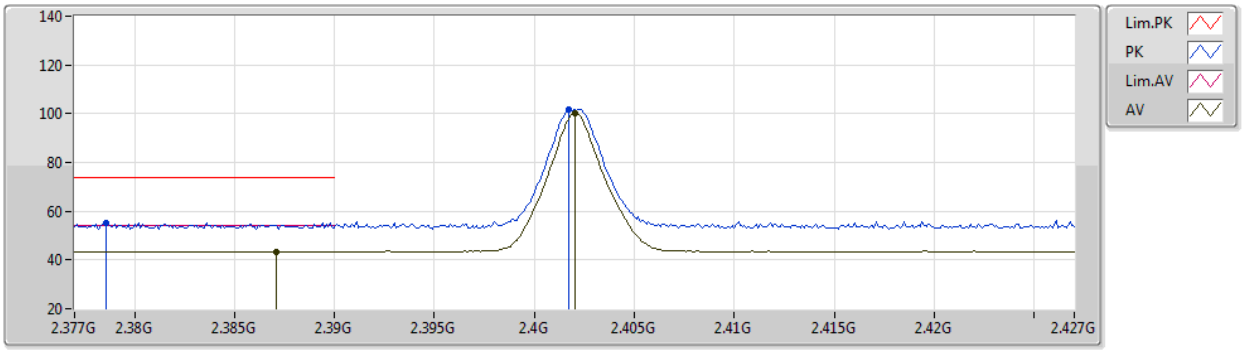
Summary

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	52.99	54.00	-1.01	3	Horizontal	210	1.92	-

BT-LE(1Mbps)

2402MHz_TX

24/06/2020



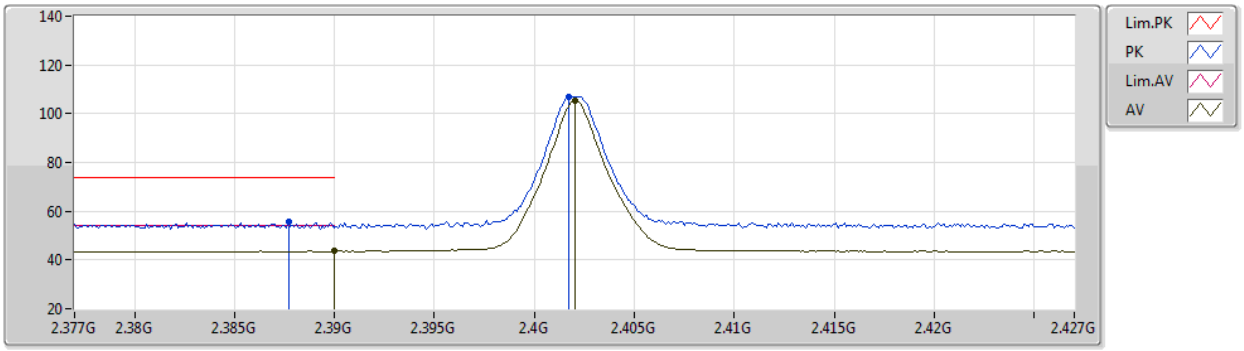
EUT Y_1TX
Setting 0x39
01-D-S-5

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	2.3786G	55.23	74.00	-18.77	24.58	3	Vertical	253	1.78	-	27.46	3.19	-
AV	2.3871G	43.47	54.00	-10.53	12.81	3	Vertical	253	1.78	-	27.47	3.19	-
PK	2.4017G	101.55	Inf	-Inf	70.84	3	Vertical	253	1.78	-	27.51	3.20	-
AV	2.402G	100.05	Inf	-Inf	69.34	3	Vertical	253	1.78	-	27.51	3.20	-

BT-LE(1Mbps)

2402MHz_TX

24/06/2020



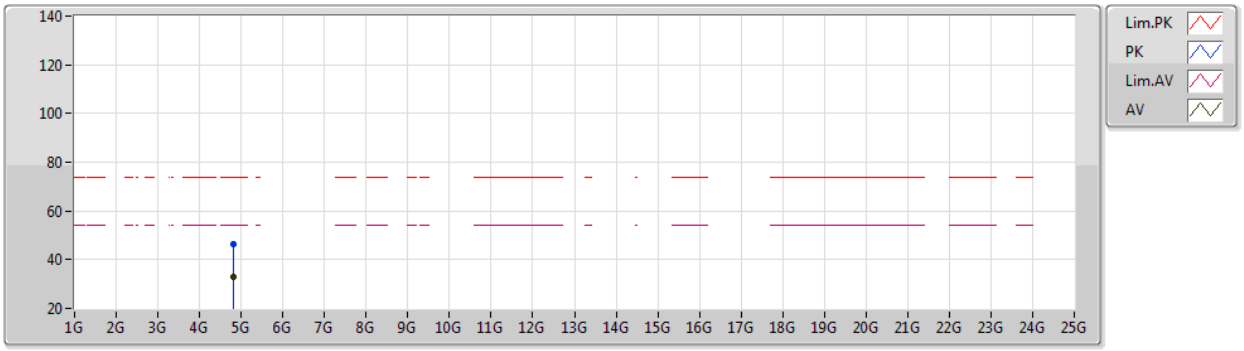
EUT Y_1TX
Setting 0x39
01-D-S-5

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	2.3877G	55.73	74.00	-18.27	25.06	3	Horizontal	15	2.38	-	27.48	3.19	-
AV	2.39G	43.73	54.00	-10.27	13.05	3	Horizontal	15	2.38	-	27.48	3.20	-
PK	2.4017G	106.90	Inf	-Inf	76.19	3	Horizontal	15	2.38	-	27.51	3.20	-
AV	2.402G	105.42	Inf	-Inf	74.71	3	Horizontal	15	2.38	-	27.51	3.20	-

BT-LE(1Mbps)

2402MHz_TX

24/06/2020



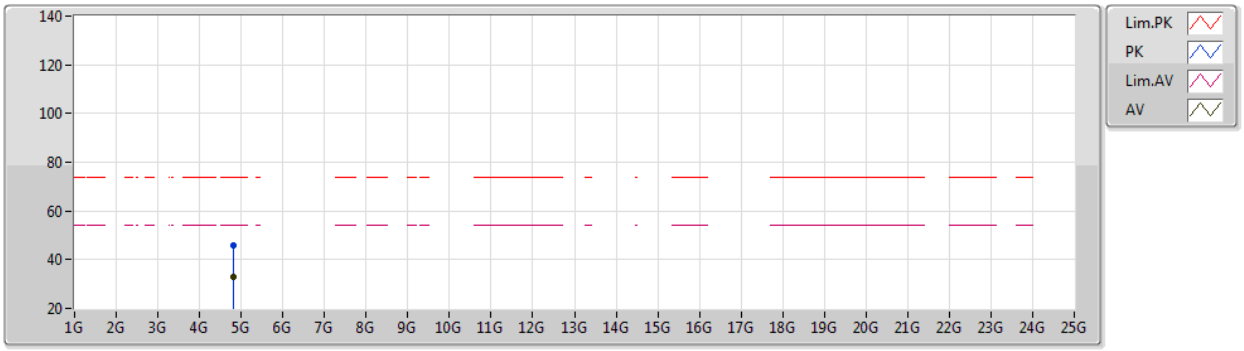
EUT Y_1TX
Setting 0x39
01-D-S-5

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	4.80244G	46.16	74.00	-27.84	42.80	3	Vertical	346	2.03	-	32.40	5.70	34.74
AV	4.80464G	33.13	54.00	-20.87	29.76	3	Vertical	346	2.03	-	32.41	5.70	34.74

BT-LE(1Mbps)

2402MHz_TX

24/06/2020



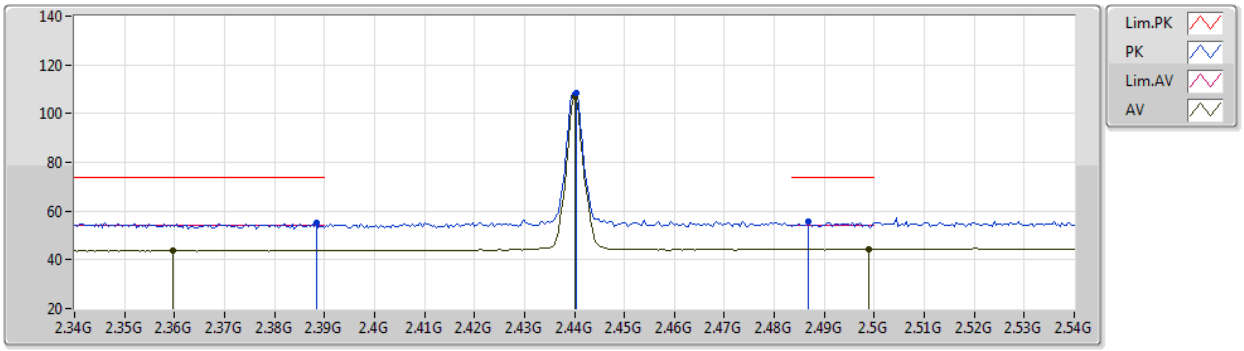
EUT Y_1TX
Setting 0x39
01-D-S-5

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	4.8048G	45.77	74.00	-28.23	42.40	3	Horizontal	154	2.49	-	32.41	5.70	34.74
AV	4.80408G	32.92	54.00	-21.08	29.55	3	Horizontal	154	2.49	-	32.41	5.70	34.74

BT-LE(1Mbps)

2440MHz_TX

24/06/2020



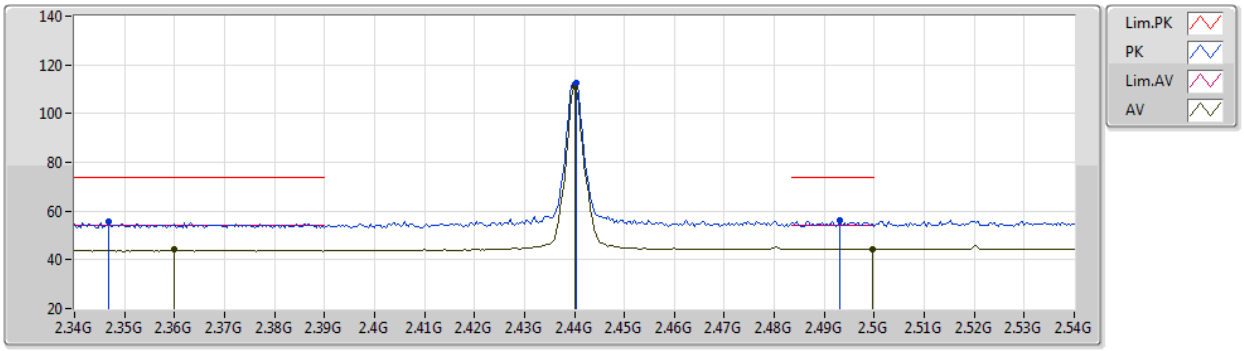
EUT Y_1TX
Setting 0x39
03-A-J-7

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	2.3884G	55.35	74.00	-18.65	23.54	3	Vertical	274	1.75	-	28.08	3.73	-
AV	2.3596G	43.89	54.00	-10.11	12.15	3	Vertical	274	1.75	-	28.02	3.72	-
PK	2.4404G	108.40	Inf	-Inf	76.38	3	Vertical	274	1.75	-	28.26	3.76	-
AV	2.44G	106.93	Inf	-Inf	74.91	3	Vertical	274	1.75	-	28.26	3.76	-
PK	2.4868G	55.56	74.00	-18.44	23.32	3	Vertical	274	1.75	-	28.45	3.79	-
AV	2.4988G	44.52	54.00	-9.48	12.22	3	Vertical	274	1.75	-	28.50	3.80	-

BT-LE(1Mbps)

2440MHz_TX

24/06/2020



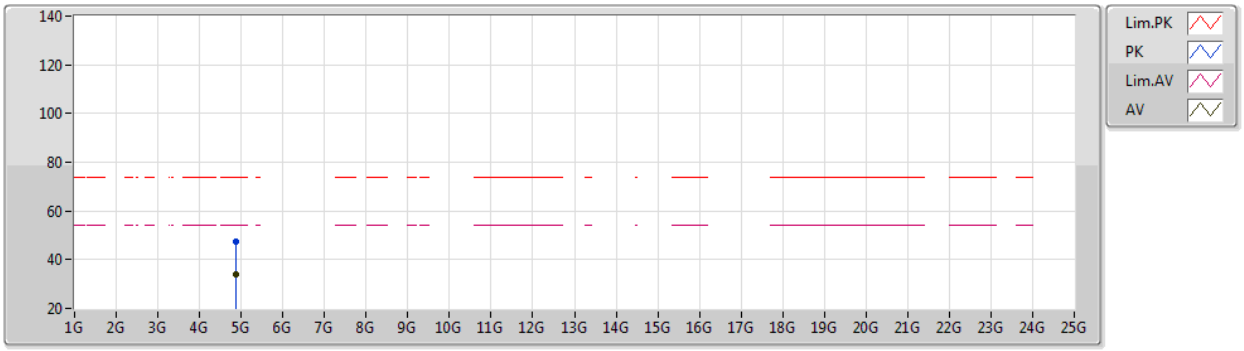
EUT Y_1TX
Setting 0x39
03-A-J-7

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	2.3468G	55.85	74.00	-18.15	24.15	3	Horizontal	210	1.95	-	27.99	3.71	-
AV	2.36G	44.45	54.00	-9.55	12.71	3	Horizontal	210	1.95	-	28.02	3.72	-
PK	2.4404G	112.66	Inf	-Inf	80.64	3	Horizontal	210	1.95	-	28.26	3.76	-
AV	2.44G	111.09	Inf	-Inf	79.07	3	Horizontal	210	1.95	-	28.26	3.76	-
PK	2.4932G	55.96	74.00	-18.04	23.69	3	Horizontal	210	1.95	-	28.47	3.80	-
AV	2.4996G	44.40	54.00	-9.60	12.10	3	Horizontal	210	1.95	-	28.50	3.80	-

BT-LE(1Mbps)

2440MHz_TX

24/06/2020



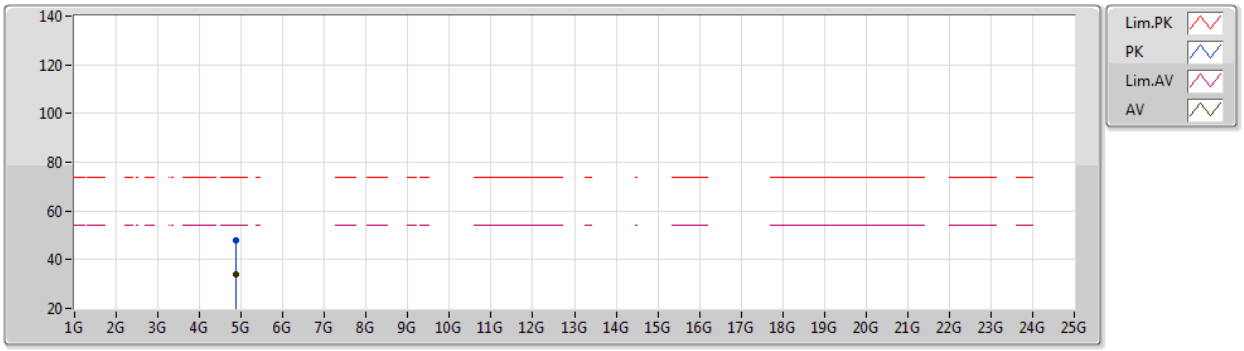
EUT Y_1TX
Setting 0x39
03-A-J-7

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	4.88028G	47.44	74.00	-26.56	42.12	3	Vertical	255	2.56	-	33.52	6.58	34.78
AV	4.8803G	33.97	54.00	-20.03	28.65	3	Vertical	255	2.56	-	33.52	6.58	34.78

BT-LE(1Mbps)

2440MHz_TX

24/06/2020



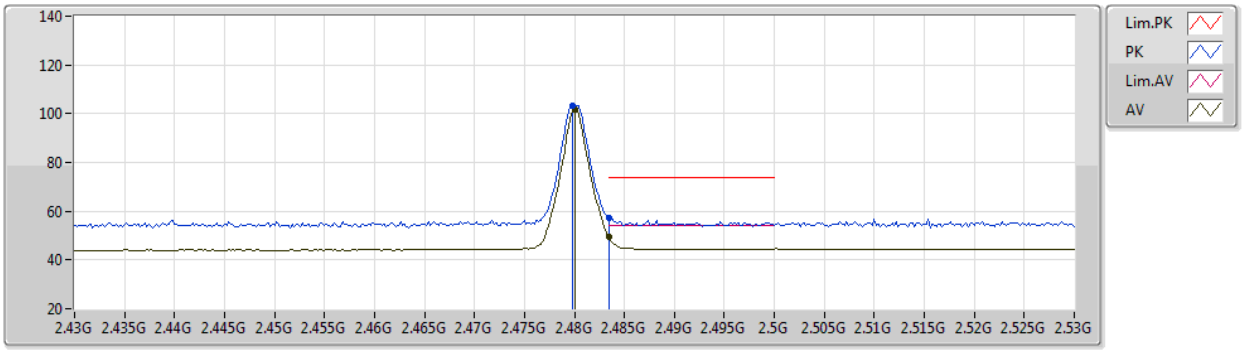
EUT Y_1TX
Setting 0x39
03-A-J-7

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	4.88027G	47.74	74.00	-26.26	42.42	3	Horizontal	195	2.38	-	33.52	6.58	34.78
AV	4.87988G	33.98	54.00	-20.02	28.66	3	Horizontal	195	2.38	-	33.52	6.58	34.78

BT-LE(1Mbps)

2480MHz_TX

24/06/2020



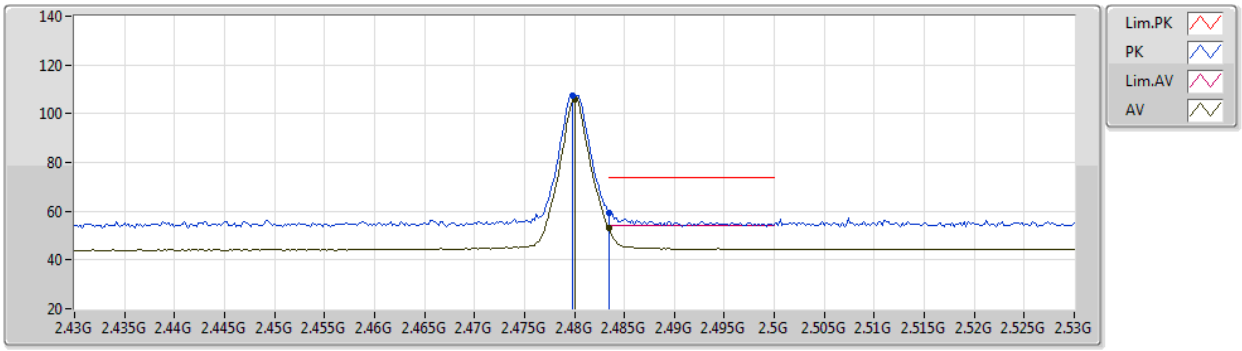
EUT Y_1TX
Setting 0x31
03-A-J-7

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	2.4798G	103.26	Inf	-Inf	71.05	3	Vertical	273	1.75	-	28.42	3.79	-
AV	2.48G	101.76	Inf	-Inf	69.55	3	Vertical	273	1.75	-	28.42	3.79	-
PK	2.4835G	57.03	74.00	-16.97	24.81	3	Vertical	273	1.75	-	28.43	3.79	-
AV	2.4835G	49.31	54.00	-4.69	17.09	3	Vertical	273	1.75	-	28.43	3.79	-

BT-LE(1Mbps)

2480MHz_TX

24/06/2020



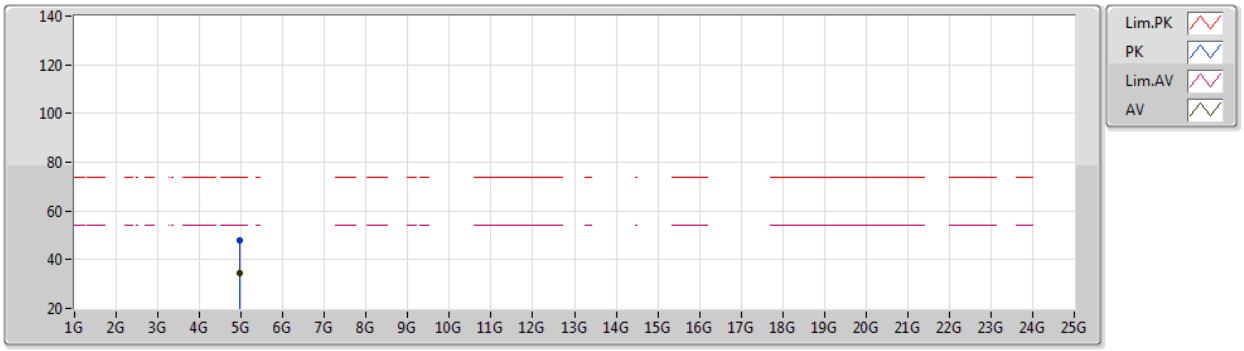
EUT Y_1TX
Setting 0x31
03-A-J-7

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	2.4798G	107.63	Inf	-Inf	75.42	3	Horizontal	210	1.92	-	28.42	3.79	-
AV	2.48G	106.10	Inf	-Inf	73.89	3	Horizontal	210	1.92	-	28.42	3.79	-
PK	2.4835G	59.52	74.00	-14.48	27.30	3	Horizontal	210	1.92	-	28.43	3.79	-
AV	2.4835G	52.99	54.00	-1.01	20.77	3	Horizontal	210	1.92	-	28.43	3.79	-

BT-LE(1Mbps)

2480MHz_TX

24/06/2020



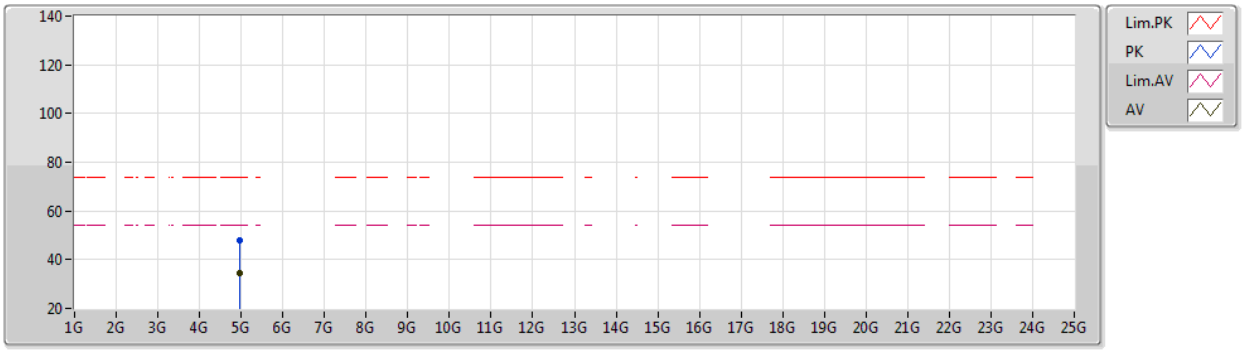
EUT Y_1TX
Setting 0x31
03-A-J-7

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	4.95924G	47.70	74.00	-26.30	42.14	3	Vertical	231	1.44	-	33.66	6.61	34.71
AV	4.96039G	34.60	54.00	-19.40	29.04	3	Vertical	231	1.44	-	33.66	6.61	34.71

BT-LE(1Mbps)

2480MHz_TX

24/06/2020



EUT Y_1TX
Setting 0x31
03-A-J-7

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	4.95998G	47.76	74.00	-26.24	42.20	3	Horizontal	248	1.09	-	33.66	6.61	34.71
AV	4.96063G	34.74	54.00	-19.26	29.18	3	Horizontal	248	1.09	-	33.66	6.61	34.71

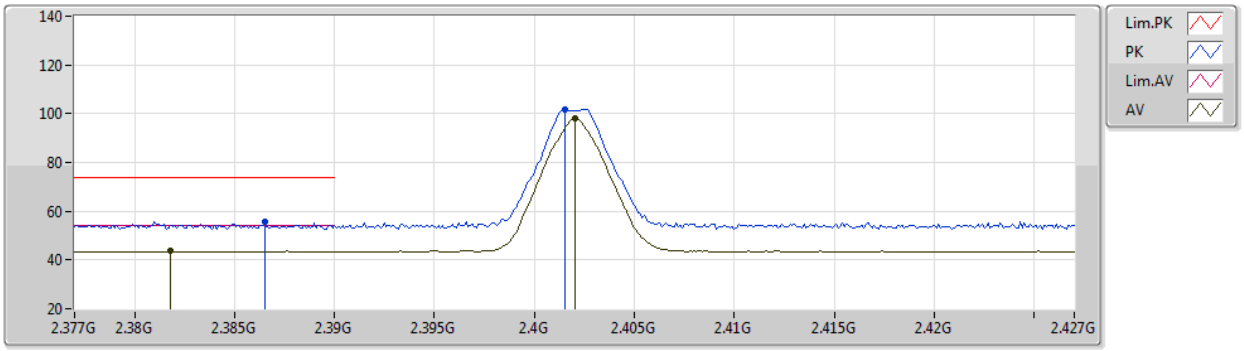
Summary

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	52.76	54.00	-1.24	3	Horizontal	158	2.25	-

BT-LE(1Mbps)

2402MHz_TX

24/06/2020



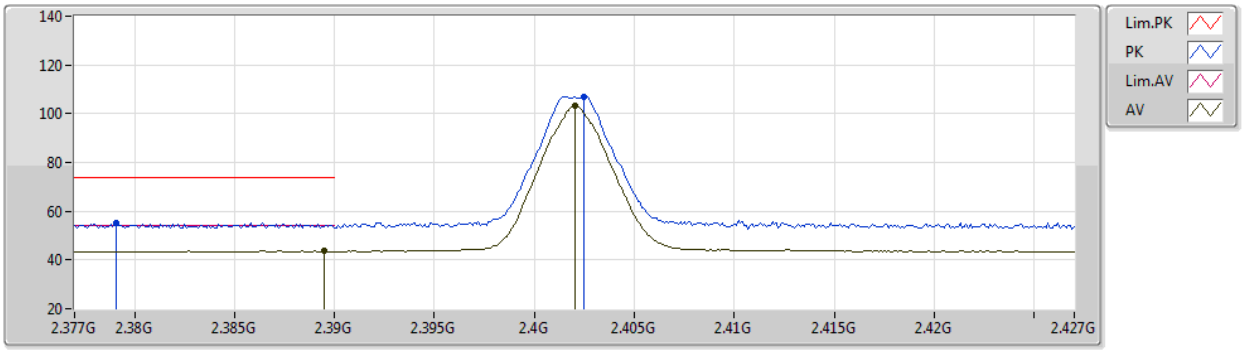
EUT Y_1TX
Setting 0x39
01-D-S-5

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	2.3865G	55.76	74.00	-18.24	25.10	3	Vertical	253	1.80	-	27.47	3.19	-
AV	2.3818G	43.55	54.00	-10.45	12.90	3	Vertical	253	1.80	-	27.46	3.19	-
PK	2.4015G	101.71	Inf	-Inf	71.00	3	Vertical	253	1.80	-	27.51	3.20	-
AV	2.402G	98.10	Inf	-Inf	67.39	3	Vertical	253	1.80	-	27.51	3.20	-

BT-LE(1Mbps)

2402MHz_TX

24/06/2020



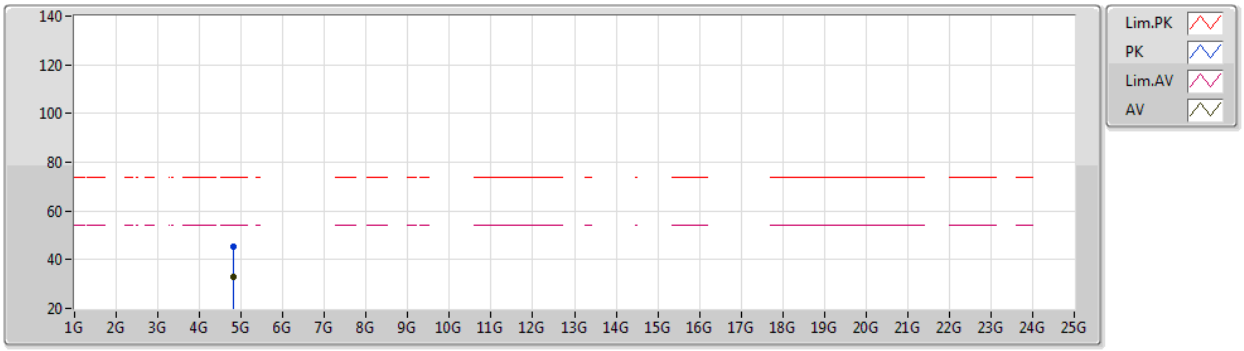
EUT Y_1TX
Setting 0x39
01-D-S-5

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	2.3791G	55.22	74.00	-18.78	24.57	3	Horizontal	29	2.44	-	27.46	3.19	-
AV	2.3895G	43.73	54.00	-10.27	13.06	3	Horizontal	29	2.44	-	27.48	3.19	-
PK	2.4025G	106.97	Inf	-Inf	76.26	3	Horizontal	29	2.44	-	27.51	3.20	-
AV	2.402G	103.31	Inf	-Inf	72.60	3	Horizontal	29	2.44	-	27.51	3.20	-

BT-LE(1Mbps)

2402MHz_TX

24/06/2020



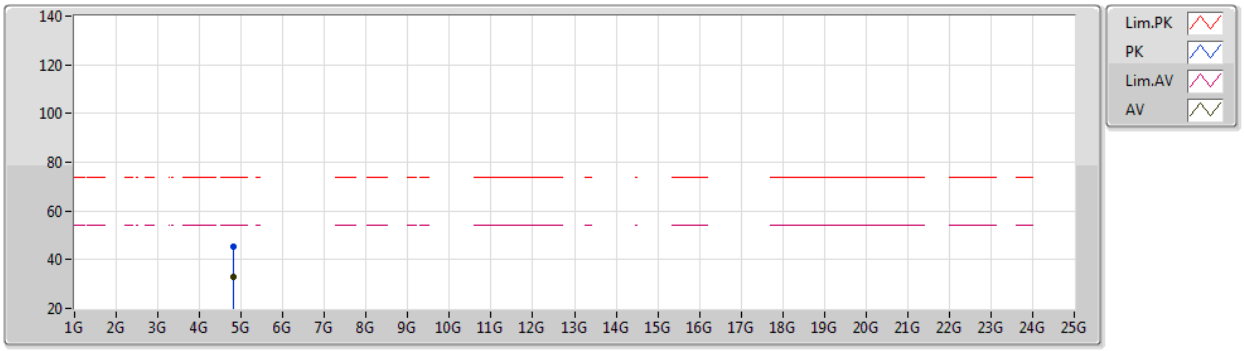
EUT Y_1TX
Setting 0x39
01-D-S-5

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	4.8067G	45.30	74.00	-28.70	41.92	3	Vertical	324	2.21	-	32.41	5.70	34.73
AV	4.8195G	32.77	54.00	-21.23	29.34	3	Vertical	324	2.21	-	32.44	5.71	34.72

BT-LE(1Mbps)

2402MHz_TX

24/06/2020



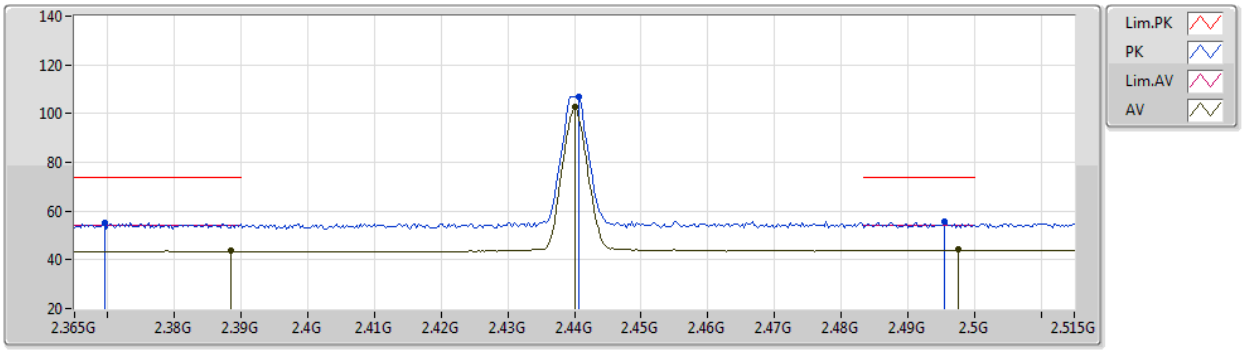
EUT Y_1TX
Setting 0x39
01-D-S-5

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	4.8042G	45.58	74.00	-28.42	42.21	3	Horizontal	27	1.96	-	32.41	5.70	34.74
AV	4.8217G	32.96	54.00	-21.04	29.53	3	Horizontal	27	1.96	-	32.44	5.71	34.72

BT-LE(1Mbps)

2440MHz_TX

24/06/2020



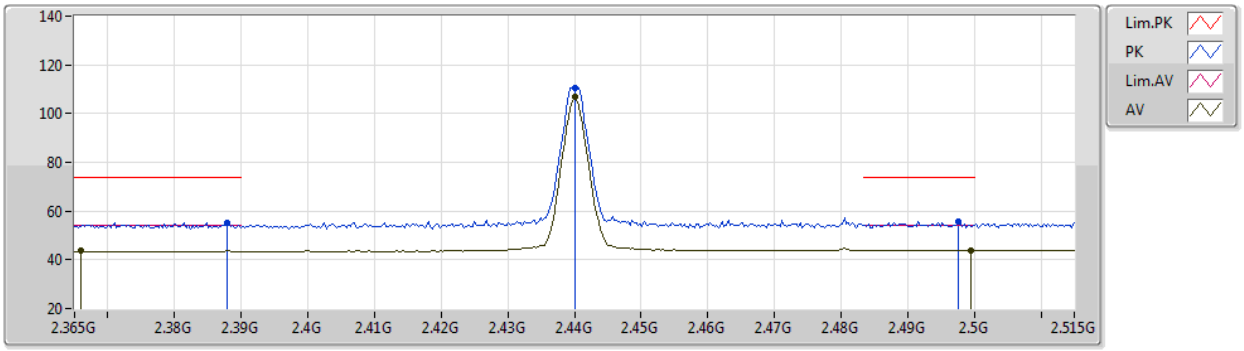
EUT Y_1TX
Setting 0x39
01-D-S-5

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	2.3695G	55.31	74.00	-18.69	24.69	3	Vertical	124	2.63	-	27.44	3.18	-
AV	2.3884G	43.68	54.00	-10.32	13.01	3	Vertical	124	2.63	-	27.48	3.19	-
PK	2.4406G	107.03	Inf	-Inf	76.15	3	Vertical	124	2.63	-	27.66	3.22	-
AV	2.44G	102.90	Inf	-Inf	72.02	3	Vertical	124	2.63	-	27.66	3.22	-
PK	2.4955G	55.63	74.00	-18.37	24.50	3	Vertical	124	2.63	-	27.88	3.25	-
AV	2.4976G	44.06	54.00	-9.94	12.92	3	Vertical	124	2.63	-	27.89	3.25	-

BT-LE(1Mbps)

2440MHz_TX

24/06/2020



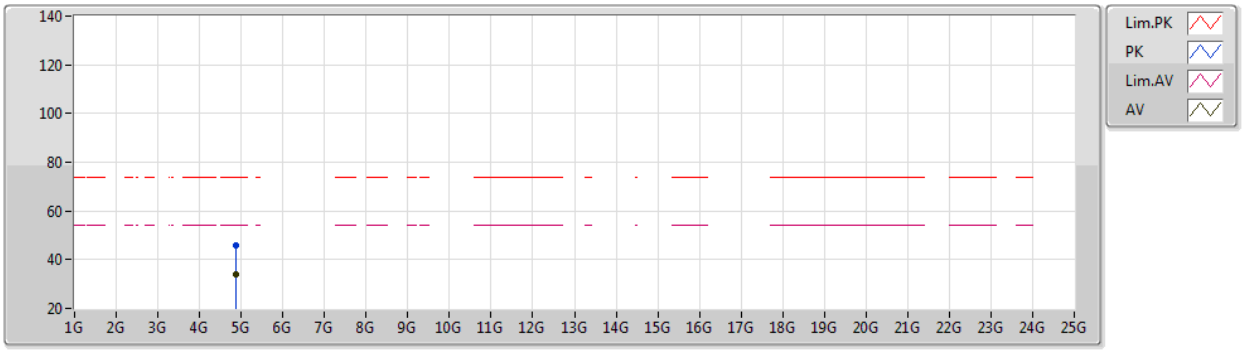
EUT Y_1TX
Setting 0x39
01-D-S-5

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	2.3878G	55.22	74.00	-18.78	24.55	3	Horizontal	18	2.33	-	27.48	3.19	-
AV	2.3659G	43.63	54.00	-10.37	13.02	3	Horizontal	18	2.33	-	27.43	3.18	-
PK	2.44G	110.40	Inf	-Inf	79.52	3	Horizontal	18	2.33	-	27.66	3.22	-
AV	2.44G	106.83	Inf	-Inf	75.95	3	Horizontal	18	2.33	-	27.66	3.22	-
PK	2.4976G	55.80	74.00	-18.20	24.66	3	Horizontal	18	2.33	-	27.89	3.25	-
AV	2.4994G	44.04	54.00	-9.96	12.89	3	Horizontal	18	2.33	-	27.90	3.25	-

BT-LE(1Mbps)

2440MHz_TX

24/06/2020



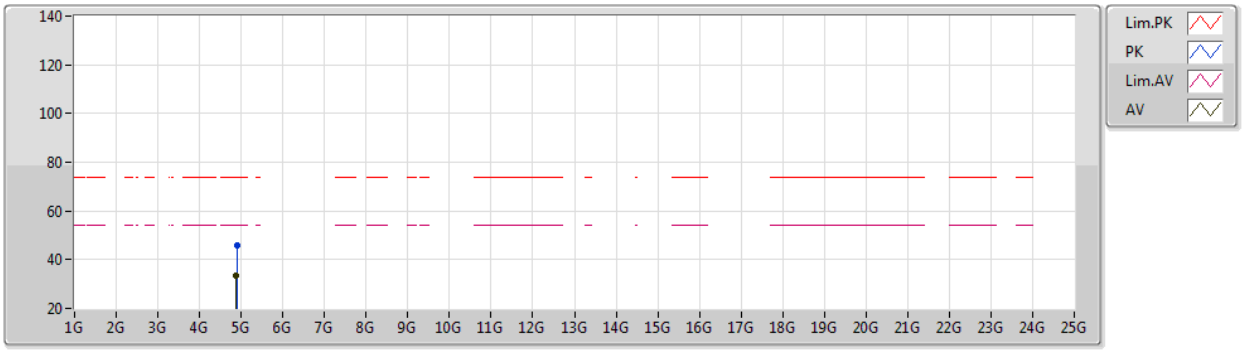
EUT Y_1TX
Setting 0x39
01-D-S-5

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	4.8803G	46.00	74.00	-28.00	42.38	3	Vertical	25	2.37	-	32.56	5.74	34.68
AV	4.8811G	33.75	54.00	-20.25	30.13	3	Vertical	25	2.37	-	32.56	5.74	34.68

BT-LE(1Mbps)

2440MHz_TX

24/06/2020



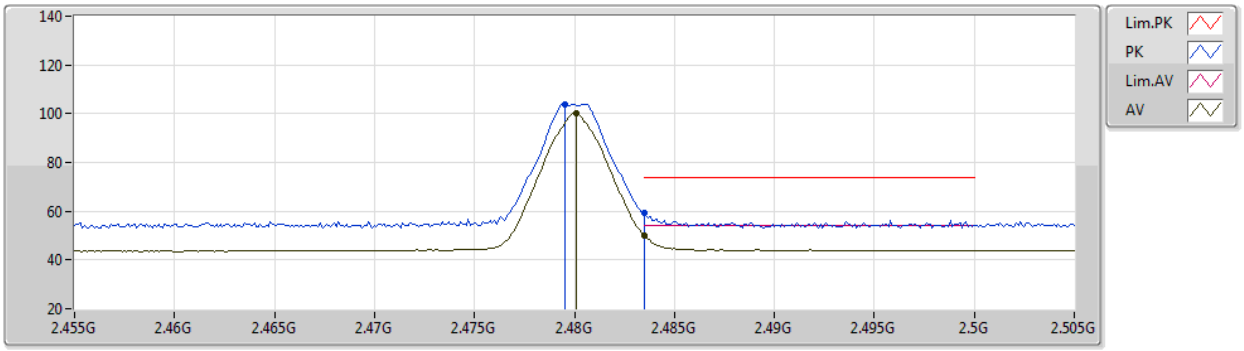
EUT Y_1TX
Setting 0x39
01-D-S-5

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	4.8989G	45.71	74.00	-28.29	42.02	3	Horizontal	86	1.67	-	32.60	5.75	34.66
AV	4.8829G	33.43	54.00	-20.57	29.79	3	Horizontal	86	1.67	-	32.57	5.74	34.67

BT-LE(1Mbps)

2480MHz_TX

24/06/2020



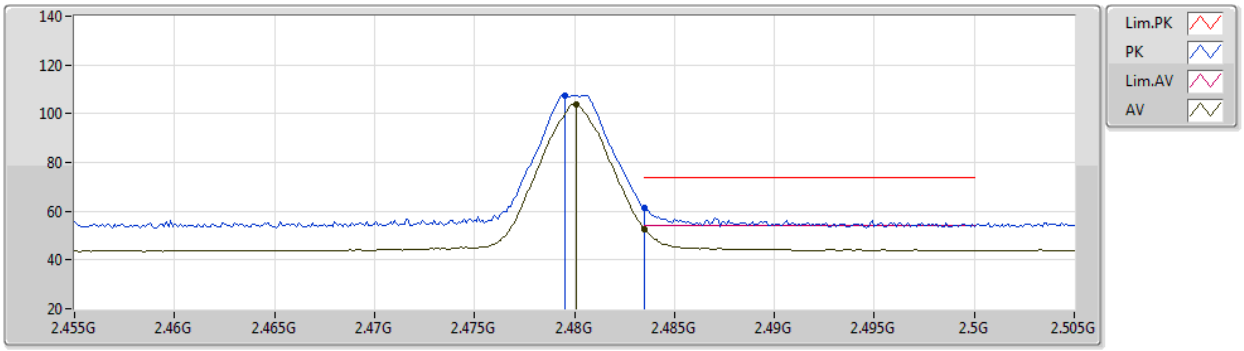
EUT Y_1TX
Setting 0x32
01-D-S-5

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	2.4795G	103.95	Inf	-Inf	72.89	3	Vertical	79	2.80	-	27.82	3.24	-
AV	2.4801G	100.26	Inf	-Inf	69.20	3	Vertical	79	2.80	-	27.82	3.24	-
PK	2.4835G	59.13	74.00	-14.87	28.06	3	Vertical	79	2.80	-	27.83	3.24	-
AV	2.4835G	49.92	54.00	-4.08	18.85	3	Vertical	79	2.80	-	27.83	3.24	-

BT-LE(1Mbps)

2480MHz_TX

24/06/2020



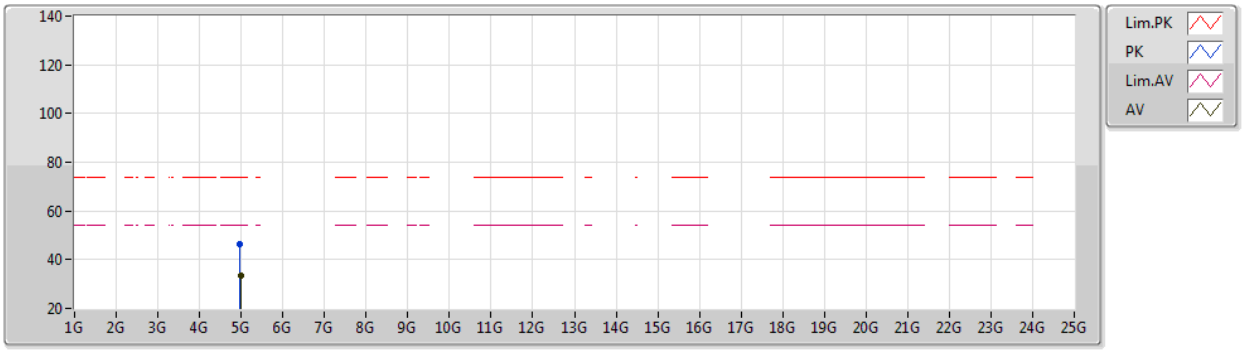
EUT Y_1TX
Setting 0x32
01-D-S-5

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	2.4795G	107.65	Inf	-Inf	76.59	3	Horizontal	158	2.25	-	27.82	3.24	-
AV	2.4801G	103.87	Inf	-Inf	72.81	3	Horizontal	158	2.25	-	27.82	3.24	-
PK	2.4835G	61.15	74.00	-12.85	30.08	3	Horizontal	158	2.25	-	27.83	3.24	-
AV	2.4835G	52.76	54.00	-1.24	21.69	3	Horizontal	158	2.25	-	27.83	3.24	-

BT-LE(1Mbps)

2480MHz_TX

24/06/2020



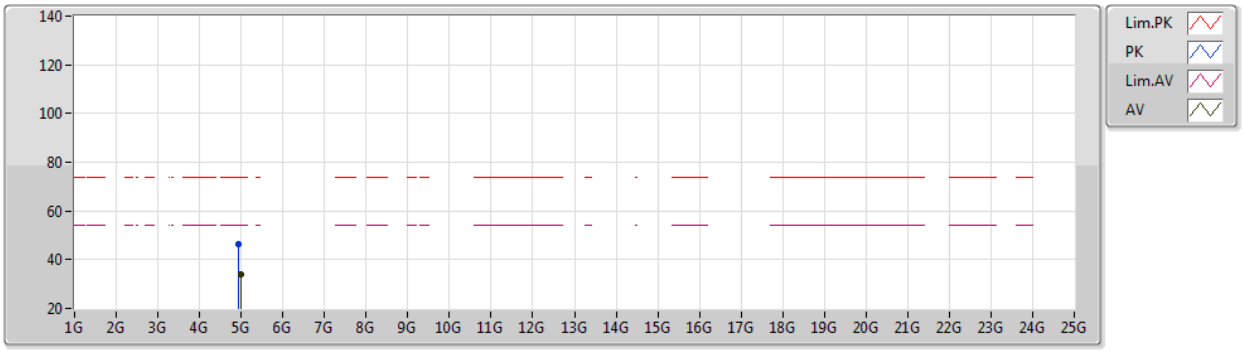
EUT Y_1TX
Setting 0x32
01-D-S-5

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	4.9605G	46.61	74.00	-27.39	42.66	3	Vertical	316	1.88	-	32.78	5.78	34.61
AV	4.9805G	33.69	54.00	-20.31	29.66	3	Vertical	316	1.88	-	32.84	5.79	34.60

BT-LE(1Mbps)

2480MHz_TX

24/06/2020



EUT Y_1TX
Setting 0x32
01-D-S-5

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	4.9393G	46.37	74.00	-27.63	42.51	3	Horizontal	161	2.28	-	32.72	5.77	34.63
AV	4.9821G	33.82	54.00	-20.18	29.77	3	Horizontal	161	2.28	-	32.85	5.79	34.59