FCC Test Report

Equipment	:	BLE Card
Brand Name	:	CoolBitX
Model No.	:	CWS
FCC ID	:	2ADPT-CWS
Standard	:	47 CFR FCC Part 15.247
Operating Band	:	2400 MHz – 2483.5 MHz
Function	:	☒Point-to-multipoint; ☐Point-to-point
Applicant/ Manufacturer	:	SmartDisplayer Technology Co., Ltd. No.2-1, Gongjian Rd., Qidu Dist., Keelung City 20647, Taiwan (R.O.C.)

The product sample received on Dec. 06, 2017 and completely tested on Dec. 26, 2017. We, SPORTON, 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 INTERNATIONALINC., the test report shall not be reproduced except in full.

Phoenix Chen / Assistant Manager

Testing Laboratory 1190

Table of Contents

Summary of Test Result

Conformance Test Specifications				
Report Clause	**Ref. Std. Clause**	**Description**	**Limit**	**Result**
1.1.2	15.203	Antenna Requirement	FCC 15.203	Complied
3.1	15.207	AC Power-line Conducted Emissions	FCC 15.207	N/A
3.2	15.247(a)	DTS Bandwidth	≥500kHz	Complied
3.3	15.247(b)	Maximum Conducted Output Power	Power [dBm]:30	Complied
3.4	15.247(e)	Power Spectral Density	PSD [dBm/3kHz]:8	Complied
3.5	15.247(d)	Emissions in Non-restricted Frequency Bands	Non-Restricted Bands: >30 dBc	Complied
3.6	15.247(d)	Emissions in Restricted Frequency Bands	Restricted Bands: FCC 15.209	Complied

Revision History

Report No.	Version	Description	Issued Date
FR7O0212-01AL	Rev. 01	Initial issue of report	Jan. 10, 2018

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	SmartDisplayer	CWS	PCB Antenna	fixed on board	2.09

1.1.3 EUT Information

Operational Condition		
EUT Power Type	From Battery	
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)	0.628	2.02	392.5u	3k

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 v04

1.3 Testing Location Information

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

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
RF Conducted	TH06-HY	Barry	23.5°C / 65%	08/Dec/2017
Radiated	03CH02-HY	Andy	21.6°C / 57%	26/Dec/2017

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)	3.6 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	3.0 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%

2 Test Configuration of EUT

2.1 Test Condition

RF Conducted	Abbreviation	Remark
TnomVnom	Tnom	20°C
-	Vnom	110V

2.2 Test Channel Mode

Test Software	Dos

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

2.3 The Worst Case Measurement Configuration

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

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

2.4 Accessories

Accessories				
Charger	Brand Name	-	Model Name	-
Micro USB Cable	Power Cord	0.2 meter, Shielded cable		

2.5 Support Equipment

Support Equipment – RF Conducted				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	Notebook	DELL	E5410	DOC
2	Adapter for NB	DELL	HA65NM130	DOC
3	DC Source	GW	GPS-3030DD	-
4	Fixture	-	-	-

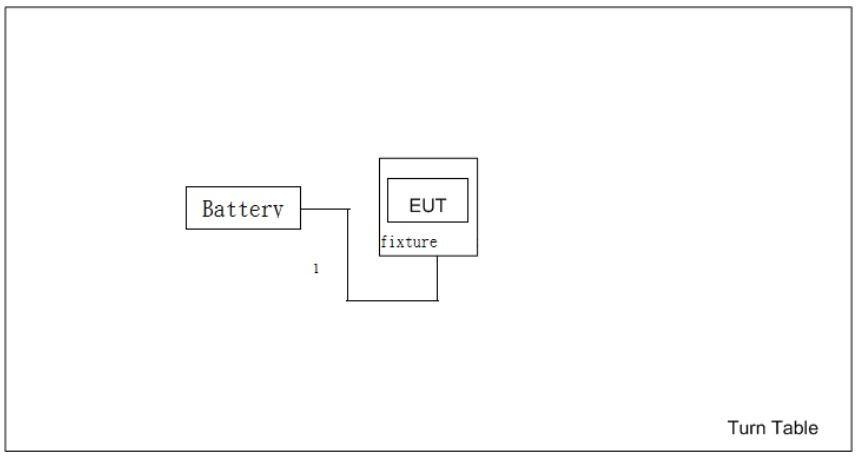
Note: Support equipment No.4 was provided by customer.

Support Equipment – Radiated Emission				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	Fixture	-	-	-
2	Battery	Panasonic	R6NNT/4SC	-

Note: Support equipment No.1 was provided by customer.

2.6 Test Setup Diagram

Test Setup Diagram - Radiated Test



Item	Connection	Shielded	Length(m)	Remark
1	DC Power line	No	0.5m	-

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

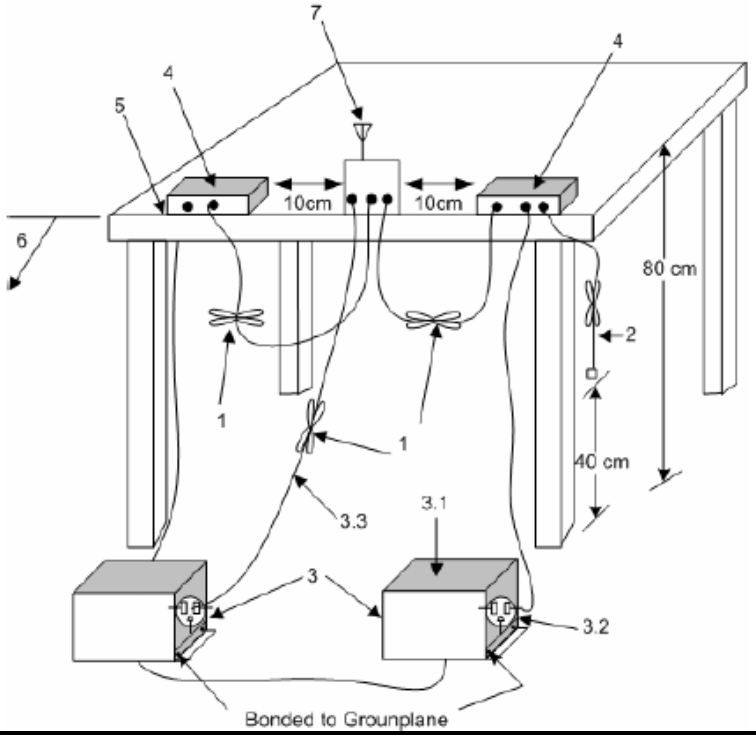
Refer a test equipment and calibration data table in this test report.

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



3.1.5 Test Result of AC Power-line Conducted Emissions

Please refer to FCC 15.207 which states, “Measurements to demonstrate compliance with the conducted limits are not required for devices employ battery for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines”.
Therefore, for this device, AC Power Line Conducted Emissions investigation is not required.

3.2 DTS Bandwidth

3.2.1 6dB Bandwidth Limit

6dB Bandwidth Limit
Systems using digital modulation techniques:
▪ 6 dB bandwidth ≥ 500 kHz.

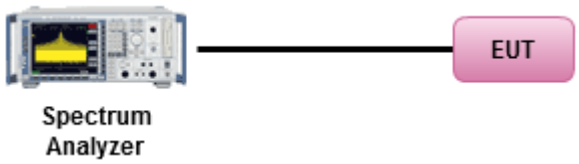
3.2.2 Measuring Instruments

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 8.1 Option 1 for 6 dB bandwidth measurement.
	☐ Refer as KDB 558074, clause 8.2 Option 2 for 6 dB bandwidth measurement.
	☐ Refer as ANSI C63.10, clause 6.9.3 for occupied bandwidth testing.
	☐ Refer as RSS-Gen, clause 6.6 for occupied bandwidth testing.

3.2.4 Test Setup

Emission Bandwidth


3.2.5 Test Result of Emission Bandwidth

Refer as Appendix A

3.3 Maximum Conducted Output Power

3.3.1 Maximum Conducted Output Power Limit

Maximum Conducted Output Power Limit		
	▪ If $G_{TX} \leq 6$ dBi, then $P_{Out} \leq 30$ dBm (1 W)	
	▪ Point-to-multipoint systems (P2M): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)$ dBm	
	▪ Point-to-point systems (P2P): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)/3$ dBm	
	▪ Smart antenna system (SAS):	
		- Single beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)/3$ dBm
		- Overlap beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)/3$ dBm
		- Aggregate power on all beams: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)/3 + 8$dB dBm
e.i.r.p. Power Limit:		
▪ 2400-2483.5 MHz Band		
	▪ Point-to-multipoint systems (P2M): $P_{eirp} \leq 36$ dBm (4 W)	
	▪ Point-to-point systems (P2P): $P_{eirp} \leq MAX(36, [P_{Out} + G_{TX}])$ 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 9.1.1 Option 1 (RBW ≥ EBW method).
	☐ Refer as KDB 558074, clause 9.1.2 Option 2 (integrated band power method)
	☐ Refer as KDB 558074, clause 9.1.3 Option 3 (peak power meter for VBW ≥ DTS BW)
▪ Maximum Average Conducted Output Power	
	Duty cycle ≥ 98%
	☐ Refer as KDB 558074, clause 9.2.2.4 Method AVGSA-2 (spectral trace averaging).
	Duty cycle < 98%
	☐ Refer as KDB 558074, clause 9.2.2.5 Method AVGSA-2 Alt. (slow sweep speed)
	RF power meter and average over on/off periods with duty factor or gated trigger
	☒ Refer as KDB 558074, clause 9.2.3.1 Method AVGPM (using an RF average 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 B

3.4 Power Spectral Density

3.4.1 Power Spectral Density Limit

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

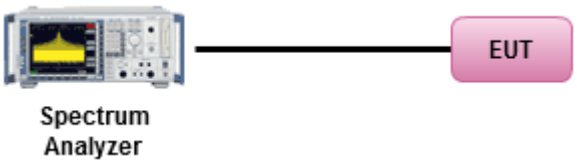
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

Test Method		
▪ Peak power spectral density procedures that the same method as used to determine the conducted output power. If maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum conducted output power was measured to demonstrate compliance to the output power limit, then one of the average PSD procedures shall be used, as applicable based on the following criteria (the peak PSD procedure is also an acceptable option).		
	☒ Refer as KDB 558074, clause 10.2 Method PKPSD (RBW=3-100kHz; Detector=peak).	
▪ 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 C

3.5 Emissions in Non-restricted Frequency Bands

3.5.1 Emissions in Non-restricted Frequency Bands Limit

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

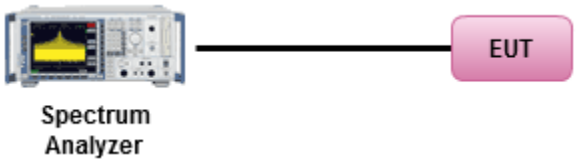
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

Test Method
▪ Refer as KDB 558074, clause 11 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 D

3.6 Emissions in Restricted Frequency Bands

3.6.1 Emissions in Restricted Frequency Bands Limit

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

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

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements 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.

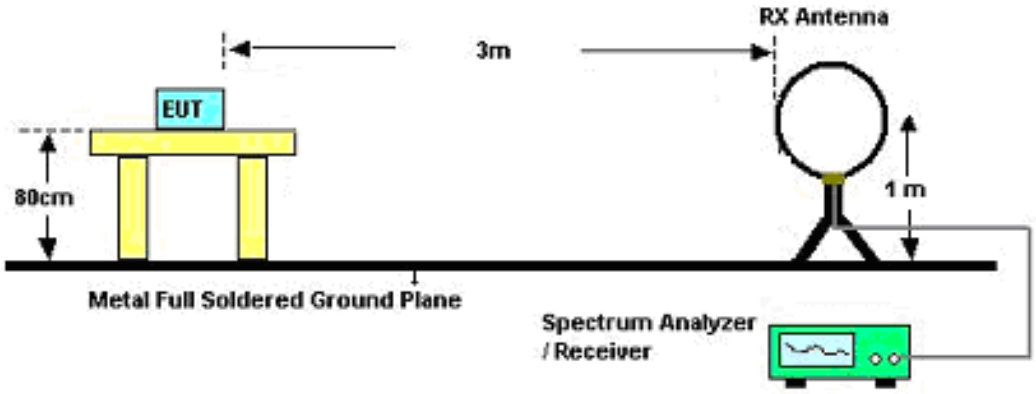
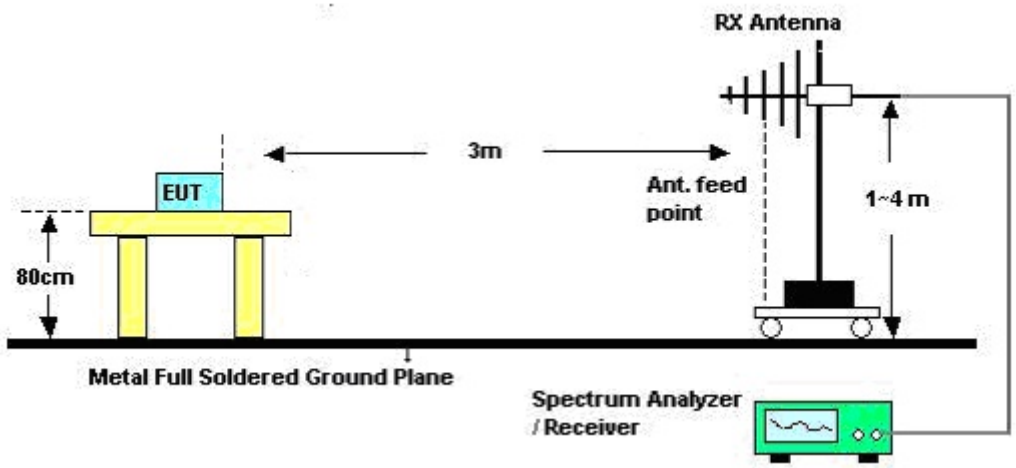
3.6.2 Measuring Instruments

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

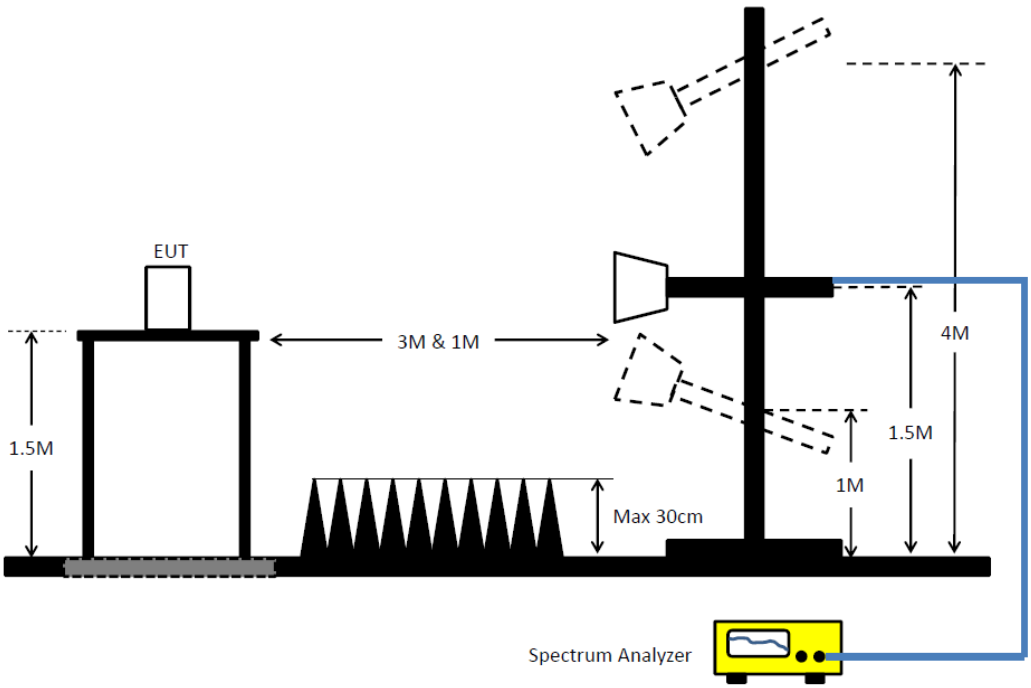
3.6.3 Test Procedures

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 12 for unwanted emissions into restricted bands.
☒ Refer as KDB 558074, clause 12.2.5.3 (ANSI C63.10, clause 4.1.4.2.3), Reduced VBW≥1/T.
☒ Refer as KDB 558074, clause 12.2.4 measurement procedure peak limit.
▪ For the transmitter band-edge emissions shall be measured using following options below:
▪ Refer as KDB 558074 clause 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 KDB 558074, clause 13.2 (ANSI C63.10, clause 6.10.6) for marker-delta method for band-edge measurements.
▪ Refer as KDB 558074, clause 13.3 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).
▪ For conducted and cabinet radiation measurement, refer as KDB 558074, clause 12.2.2.
▪ 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 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 Test Result of Emissions in Restricted Frequency Bands (Below 30MHz)

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

3.6.6 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix E

4 Test Equipment and Calibration Data

Instrument for Radiated Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
Spectrum Analyzer	R&S	FSP40	100305	9KHz - 40GHz	12/Dec/2017	11/Dec/2018
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz ~ 1GHz 3m	20/Oct/2017	19/Oct/2018
3m Semi Anechoic	SIDT FRANKONIA	SAC-3M	03CH02-HY	1GHz ~ 18GHz	27/Oct/2017	26/Oct/2018
Amplifier	Agilent	8447D	2944A11149	100kHz ~ 1.3GHz	29/Jun/2017	28/Jun/2018
RF Cable-R03m	Jye Bao	RG142	CB017	9kHz ~ 1GHz	26/Jan/2017	25/Jan/2018
RF Cable-high	SUHNER	SUCOFLEX104	MY34918/4	1GHz ~ 40GHz	26/Jan/2017	25/Jan/2018
Amplifier	Agilent	8449B	3008A02602	1GHz ~ 26.5GHz	19/Sep/2017	18/Sep/2018
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 01543	1GHz ~ 18GHz	11/May/2017	10/May/2018
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170221	18GHz ~ 40GHz	06/Feb/2017	05/Feb/2018
Bilog Antenna	SCHAFFNER	CBL 6112B	2723	30MHz ~ 1GHz	09/Sep/2017	8/Sep/2018
Receiver	R&S	ESU3	102052	9kHz ~ 3.6GHz	29/Apr/2017	28/Apr/2018
Amplifier	MITEQ	JS44-18004000 -33-8P	1840917	18GHz ~ 40GHz	06/Feb/2017	05/Feb/2018
Loop Antenna	TESEQ	HLA 6120	24155	9 kHz~30 MHz	03/Feb/2017	02/Feb/2018

Instrument for Conducted Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
Spectrum Analyzer	R&S	FSV 40	101013	9kHz~40GHz	30/Dec/2016	29/Dec/2017
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	27/Jul/2017	26/Jul/2018
Power Sensor	Anritsu	MA2411B	0917017	300MHz ~ 40GHz	10/Feb/2017	09/Feb/2018
Power Meter	Anritsu	ML2495A	0949003	300MHz ~ 40GHz	10/Feb/2017	09/Feb/2018
RF Cable-0.2m	HUBER+ SUHNER	SUCOFLEX_104	MY10709/4	30MHz ~ 26.5GHz	25/Aug/2017	24/Aug/2018
RF Cable-0.2m	HUBER+ SUHNER	SUCOFLEX_104	MY10712/4	30MHz ~ 26.5GHz	25/Aug/2017	24/Aug/2018
RF Cable-0.5m	HUBER+ SUHNER	SUCOFLEX_104	MY10713/4	30MHz ~ 26.5GHz	25/Aug/2017	24/Aug/2018

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)	707.5k	1.057M	1M06F1D	687.5k	1.052M

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

Result

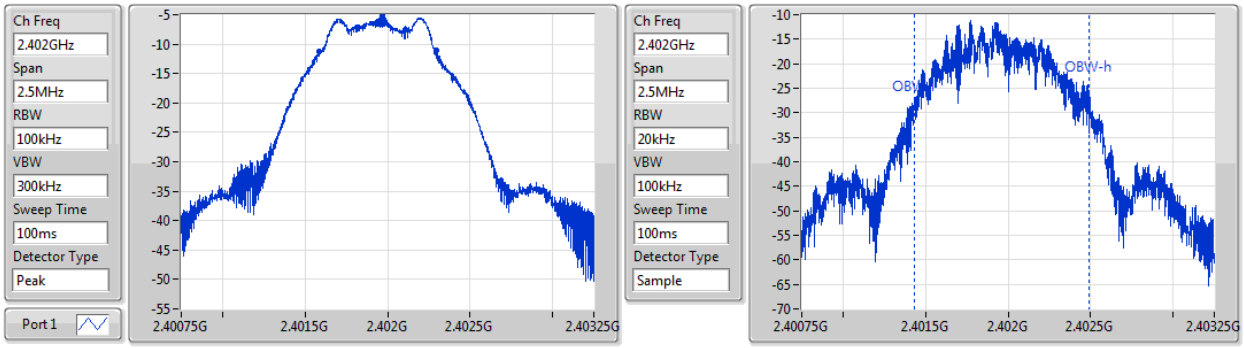
Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
BT-LE(1Mbps)	-	-	-	-
2402MHz_TnomVnom	Pass	500k	707.5k	1.056M
2440MHz_TnomVnom	Pass	500k	706.25k	1.057M
2480MHz_TnomVnom	Pass	500k	687.5k	1.052M

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

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

2402MHz

08/12/2017

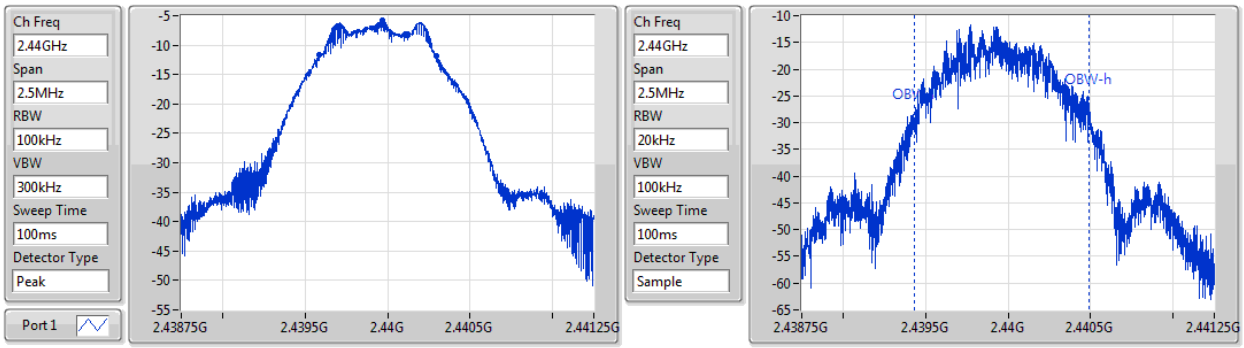


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
707.5k	2.401588G	2.402295G	1.056M	2.401434G	2.40249G	500k	1

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

2440MHz

08/12/2017

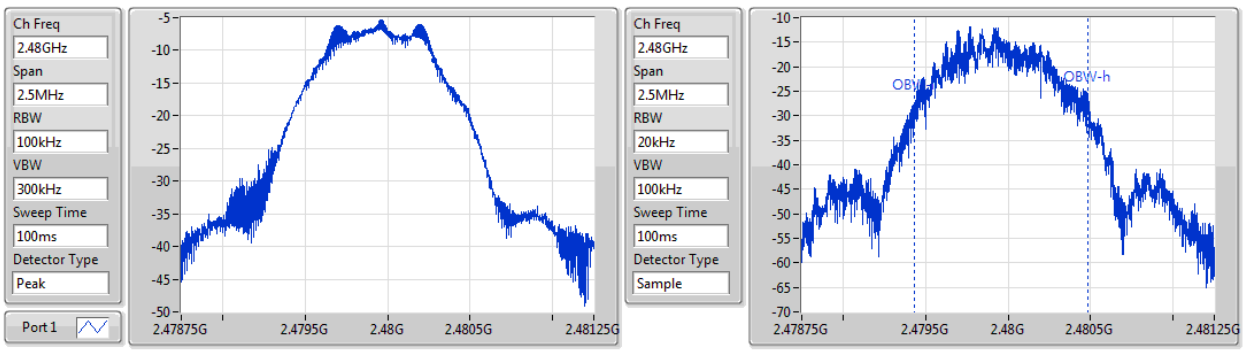


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
706.25k	2.439586G	2.440293G	1.057M	2.439433G	2.44049G	500k	1

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

2480MHz

08/12/2017



6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
687.5k	2.479598G	2.480285G	1.052M	2.479433G	2.480485G	500k	1

Summary

Mode	Power	Power
	(dBm)	(W)
2.4-2.4835GHz	-	-
BT-LE(1Mbps)	-6.37	0.00023

Result

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-LE(1Mbps)	-	-	-	-
2402MHz_TnomVnom	Pass	2.09	-6.37	30.00
2440MHz_TnomVnom	Pass	2.09	-7.08	30.00
2480MHz_TnomVnom	Pass	2.09	-6.90	30.00

Summary

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
BT-LE(1Mbps)	-19.85

RBW=3kHz.

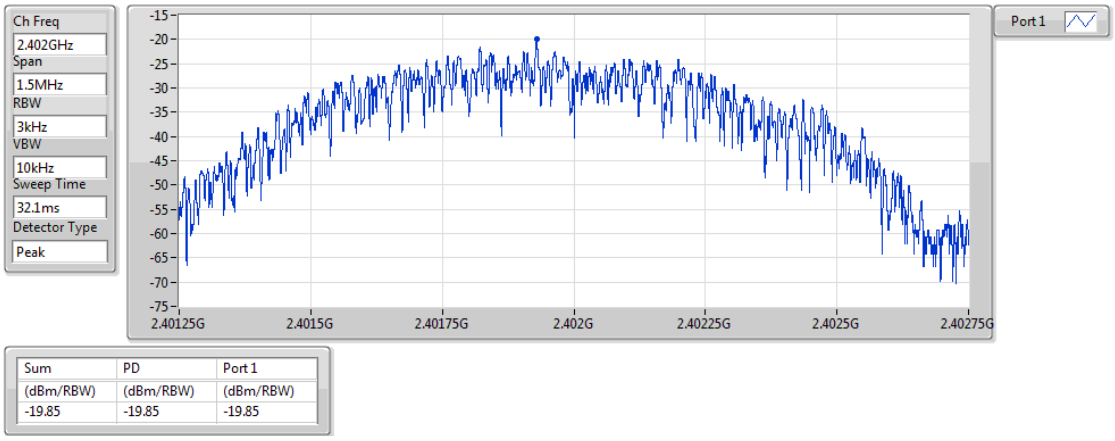
Result

Mode	Result	Gain (dBi)	PD (dBm/RBW)	PD Limit (dBm/RBW)
BT-LE(1Mbps)	-	-	-	-
2402MHz_TnomVnom	Pass	2.09	-19.85	8.00
2440MHz_TnomVnom	Pass	2.09	-20.57	8.00
2480MHz_TnomVnom	Pass	2.09	-22.93	8.00

RBW=3kHz.

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

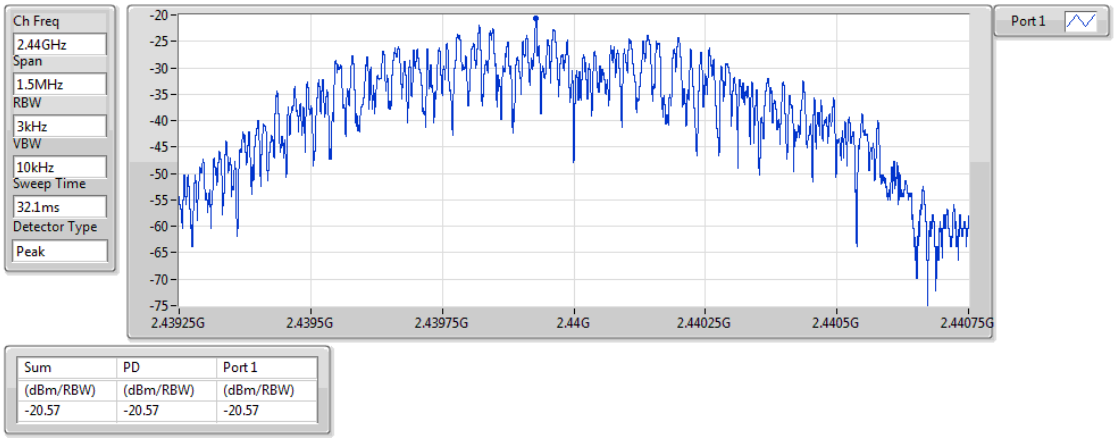
2402MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-19.85	-19.85	-19.85

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

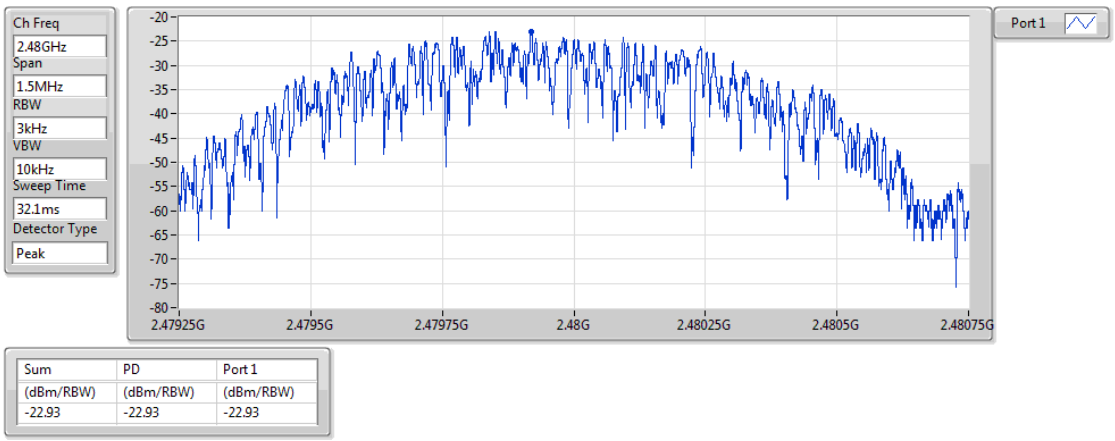
2440MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-20.57	-20.57	-20.57

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

2480MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-22.93	-22.93	-22.93

Summary

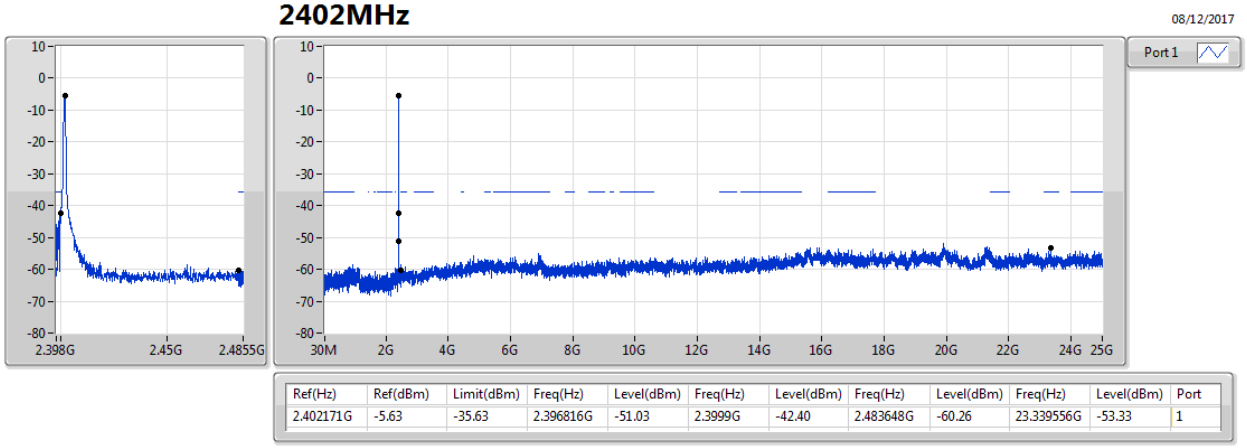
Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	2.402171G	-5.63	-35.63	2.396816G	-51.03	2.3999G	-42.40	2.483648G	-60.26	23.339556G	-53.33	1

Result

Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz_TnomVnom	Pass	2.402171G	-5.63	-35.63	2.396816G	-51.03	2.3999G	-42.40	2.483648G	-60.26	23.339556G	-53.33	1
2440MHz_TnomVnom	Pass	2.402171G	-5.63	-35.63	354.416M	-58.95	2.39986G	-59.86	2.484308G	-58.86	17.649016G	-53.32	1
2480MHz_TnomVnom	Pass	2.402171G	-5.63	-35.63	226.544M	-58.50	2.39822G	-60.09	2.483548G	-48.06	24.862099G	-53.10	1

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

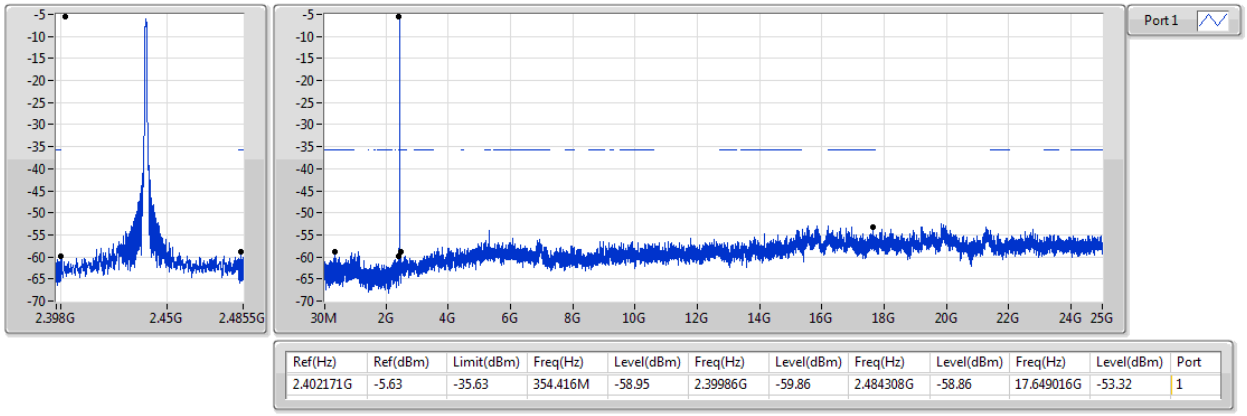
2402MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.402171G	-5.63	-35.63	2.396816G	-51.03	2.3999G	-42.40	2.483648G	-60.26	23.339556G	-53.33	1

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

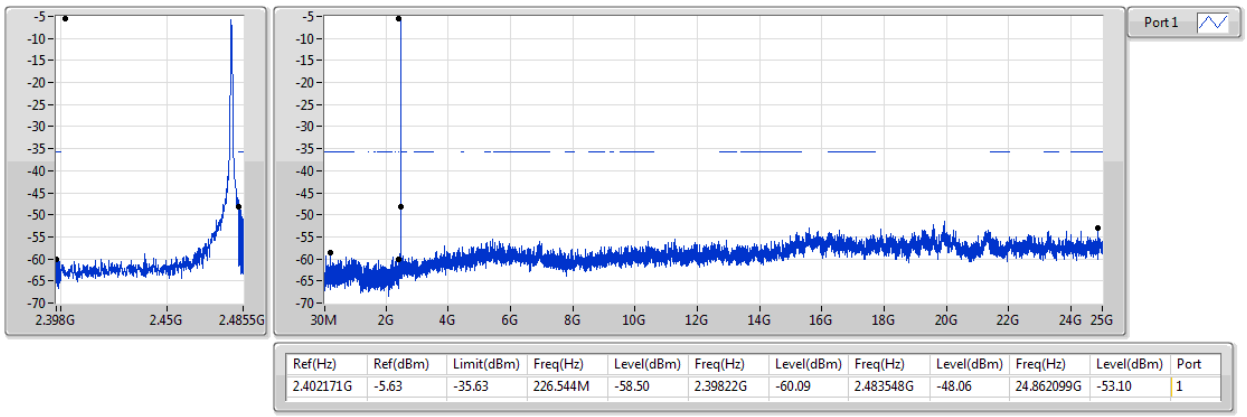
2440MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.402171G	-5.63	-35.63	354.416M	-58.95	2.39986G	-59.86	2.484308G	-58.86	17.649016G	-53.32	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
2.402171G	-5.63	-35.63	226.544M	-58.50	2.39822G	-60.09	2.483548G	-48.06	24.862099G	-53.10	1

Summary

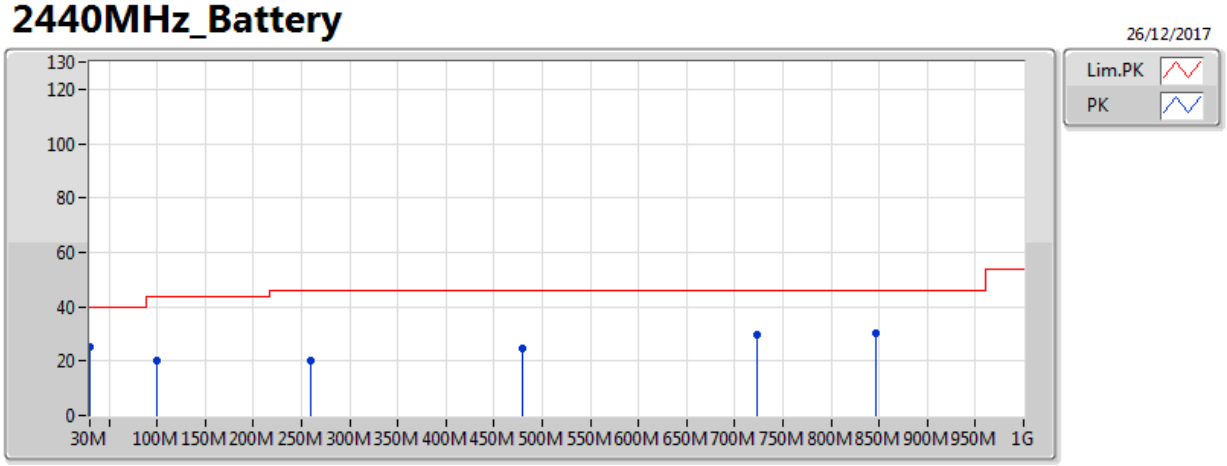
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	PK	30M	25.60	40.00	-14.40	-4.06	3	Horizontal	0	1.00	-

Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-
2440MHz	Pass	PK	30M	25.60	40.00	-14.40	-4.06	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	99.84M	17.92	43.50	-25.58	-10.40	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	284.14M	23.17	46.00	-22.83	-6.66	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	458.74M	25.58	46.00	-20.42	-2.76	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	612M	27.37	46.00	-18.63	-0.74	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	846.74M	30.23	46.00	-15.77	2.43	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	30M	25.31	40.00	-14.69	-4.06	3	Vertical	360	1.00	-
2440MHz	Pass	PK	99.84M	20.31	43.50	-23.19	-10.40	3	Vertical	360	1.00	-
2440MHz	Pass	PK	258.92M	20.24	46.00	-25.76	-6.26	3	Vertical	360	1.00	-
2440MHz	Pass	PK	480.08M	24.83	46.00	-21.17	-2.26	3	Vertical	360	1.00	-
2440MHz	Pass	PK	722.58M	29.49	46.00	-16.51	0.39	3	Vertical	360	1.00	-
2440MHz	Pass	PK	846.74M	30.06	46.00	-15.94	2.43	3	Vertical	360	1.00	-

BT-LE(1Mbps)

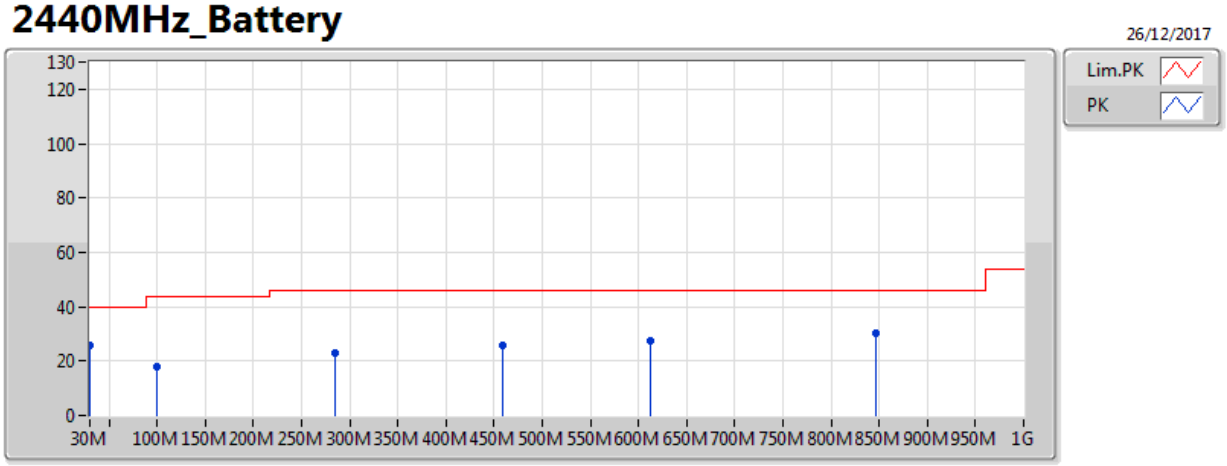
2440MHz_Battery



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
PK	30M	25.31	40.00	-14.69	-4.06	3	Vertical	360	1.00	-
PK	99.84M	20.31	43.50	-23.19	-10.40	3	Vertical	360	1.00	-
PK	258.92M	20.24	46.00	-25.76	-6.26	3	Vertical	360	1.00	-
PK	480.08M	24.83	46.00	-21.17	-2.26	3	Vertical	360	1.00	-
PK	722.58M	29.49	46.00	-16.51	0.39	3	Vertical	360	1.00	-
PK	846.74M	30.06	46.00	-15.94	2.43	3	Vertical	360	1.00	-

BT-LE(1Mbps)

2440MHz_Battery



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
PK	30M	25.60	40.00	-14.40	-4.06	3	Horizontal	0	1.00	-
PK	99.84M	17.92	43.50	-25.58	-10.40	3	Horizontal	0	1.00	-
PK	284.14M	23.17	46.00	-22.83	-6.66	3	Horizontal	0	1.00	-
PK	458.74M	25.58	46.00	-20.42	-2.76	3	Horizontal	0	1.00	-
PK	612M	27.37	46.00	-18.63	-0.74	3	Horizontal	0	1.00	-
PK	846.74M	30.23	46.00	-15.77	2.43	3	Horizontal	0	1.00	-

Summary

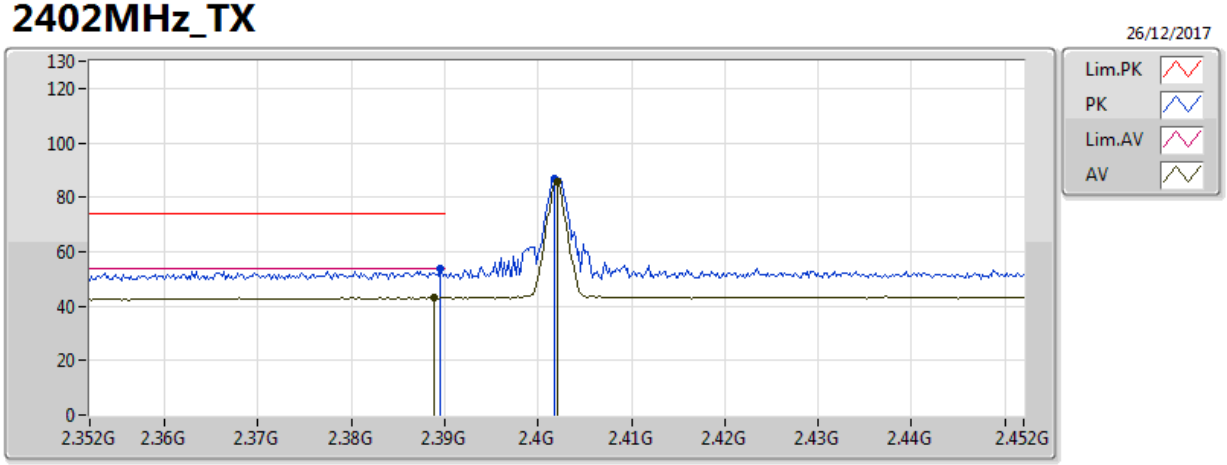
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	AV	2.4902G	44.06	54.00	-9.94	31.19	3	Vertical	99	1.11	-

Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	AV	2.386G	43.32	54.00	-10.68	30.82	3	Horizontal	269	1.18	-
2402MHz	Pass	AV	2.402G	74.74	Inf	-Inf	30.88	3	Horizontal	269	1.18	-
2402MHz	Pass	PK	2.3738G	53.53	74.00	-20.47	30.78	3	Horizontal	269	1.18	-
2402MHz	Pass	PK	2.4018G	76.35	Inf	-Inf	30.88	3	Horizontal	269	1.18	-
2402MHz	Pass	AV	2.3888G	43.24	54.00	-10.76	30.83	3	Vertical	100	1.00	-
2402MHz	Pass	AV	2.402G	85.49	Inf	-Inf	30.88	3	Vertical	100	1.00	-
2402MHz	Pass	PK	2.3896G	53.89	74.00	-20.11	30.83	3	Vertical	100	1.00	-
2402MHz	Pass	PK	2.4018G	86.95	Inf	-Inf	30.88	3	Vertical	100	1.00	-
2402MHz	Pass	AV	4.80376G	33.98	54.00	-20.02	1.98	3	Horizontal	172	2.22	-
2402MHz	Pass	PK	4.80418G	45.49	74.00	-28.51	1.98	3	Horizontal	172	2.22	-
2402MHz	Pass	AV	4.803712G	33.23	54.00	-20.77	1.98	3	Vertical	317	1.28	-
2402MHz	Pass	PK	4.803212G	46.06	74.00	-27.94	1.98	3	Vertical	317	1.28	-
2440MHz	Pass	AV	2.3792G	43.22	54.00	-10.78	30.80	3	Horizontal	19	2.79	-
2440MHz	Pass	AV	2.44G	80.59	Inf	-Inf	31.01	3	Horizontal	19	2.79	-
2440MHz	Pass	AV	2.494G	43.99	54.00	-10.01	31.21	3	Horizontal	19	2.79	-
2440MHz	Pass	PK	2.382G	54.07	74.00	-19.93	30.81	3	Horizontal	19	2.79	-
2440MHz	Pass	PK	2.4396G	82.03	Inf	-Inf	31.01	3	Horizontal	19	2.79	-
2440MHz	Pass	PK	2.4844G	54.24	74.00	-19.76	31.17	3	Horizontal	19	2.79	-
2440MHz	Pass	AV	2.3808G	43.17	54.00	-10.83	30.80	3	Vertical	99	1.15	-
2440MHz	Pass	AV	2.44G	84.52	Inf	-Inf	31.01	3	Vertical	99	1.15	-
2440MHz	Pass	AV	2.4996G	43.93	54.00	-10.07	31.23	3	Vertical	99	1.15	-
2440MHz	Pass	PK	2.382G	53.19	74.00	-20.81	30.81	3	Vertical	99	1.15	-
2440MHz	Pass	PK	2.4396G	86.50	Inf	-Inf	31.01	3	Vertical	99	1.15	-
2440MHz	Pass	PK	2.4912G	53.89	74.00	-20.11	31.20	3	Vertical	99	1.15	-
2440MHz	Pass	AV	4.87979G	33.87	54.00	-20.13	2.20	3	Horizontal	172	2.33	-
2440MHz	Pass	PK	4.87947G	46.70	74.00	-27.30	2.20	3	Horizontal	172	2.33	-
2440MHz	Pass	AV	4.87986G	34.08	54.00	-19.92	2.20	3	Vertical	326	1.34	-
2440MHz	Pass	PK	4.87944G	46.78	74.00	-27.22	2.20	3	Vertical	326	1.34	-
2480MHz	Pass	AV	2.48G	81.28	Inf	-Inf	31.16	3	Horizontal	172	2.75	-
2480MHz	Pass	AV	2.4974G	43.86	54.00	-10.14	31.22	3	Horizontal	172	2.75	-
2480MHz	Pass	PK	2.4798G	82.71	Inf	-Inf	31.16	3	Horizontal	172	2.75	-
2480MHz	Pass	PK	2.484G	55.71	74.00	-18.29	31.17	3	Horizontal	172	2.75	-
2480MHz	Pass	AV	2.48G	84.49	Inf	-Inf	31.16	3	Vertical	99	1.11	-
2480MHz	Pass	AV	2.4902G	44.06	54.00	-9.94	31.19	3	Vertical	99	1.11	-
2480MHz	Pass	PK	2.4802G	86.03	Inf	-Inf	31.16	3	Vertical	99	1.11	-
2480MHz	Pass	PK	2.4836G	59.43	74.00	-14.57	31.17	3	Vertical	99	1.11	-
2480MHz	Pass	AV	4.95972G	33.09	54.00	-20.91	2.43	3	Horizontal	327	1.56	-
2480MHz	Pass	PK	4.96031G	45.99	74.00	-28.01	2.43	3	Horizontal	327	1.56	-
2480MHz	Pass	AV	4.959508G	37.79	54.00	-16.21	2.43	3	Vertical	325	1.18	-
2480MHz	Pass	PK	4.959484G	47.54	74.00	-26.46	2.43	3	Vertical	325	1.18	-

BT-LE(1Mbps)

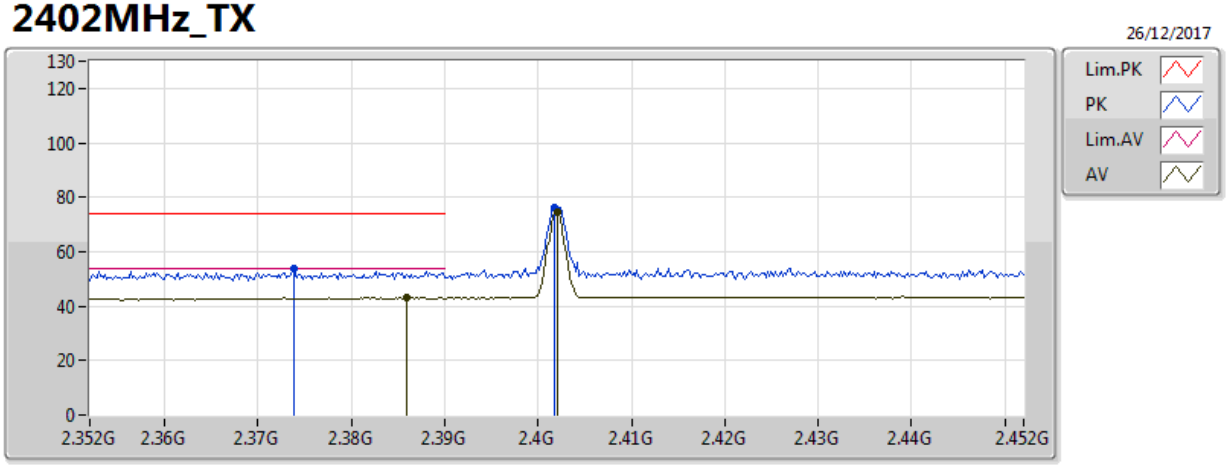
2402MHz_TX



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	2.3888G	43.24	54.00	-10.76	30.83	3	Vertical	100	1.00	-
AV	2.402G	85.49	Inf	-Inf	30.88	3	Vertical	100	1.00	-
PK	2.3896G	53.89	74.00	-20.11	30.83	3	Vertical	100	1.00	-
PK	2.4018G	86.95	Inf	-Inf	30.88	3	Vertical	100	1.00	-

BT-LE(1Mbps)

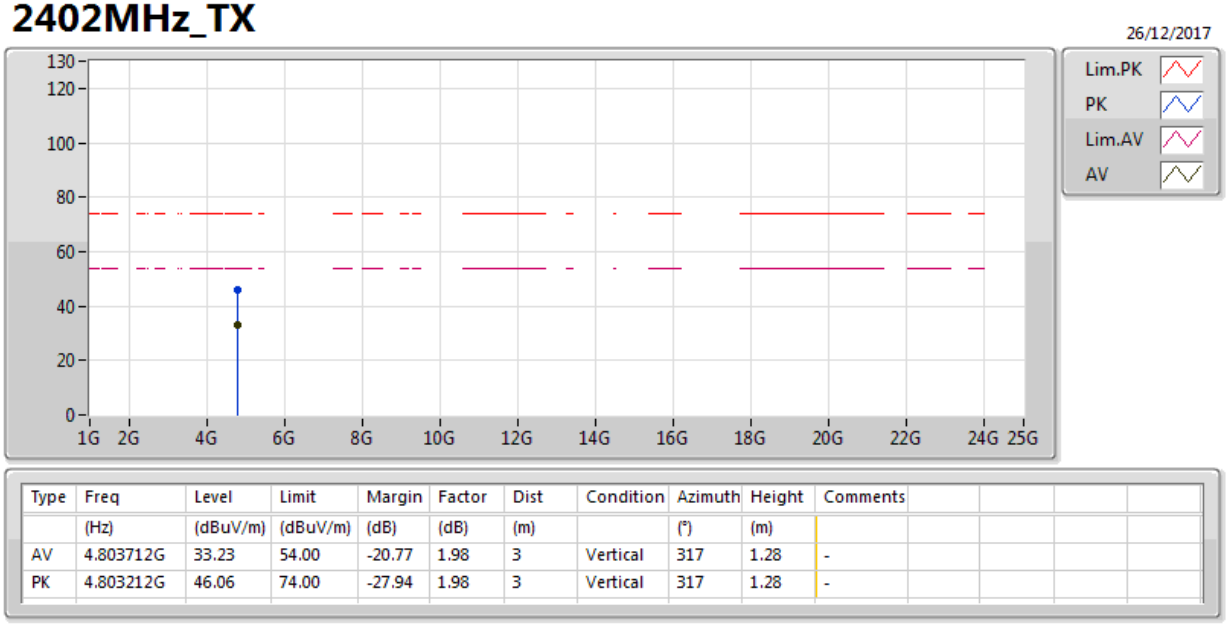
2402MHz_TX



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	2.386G	43.32	54.00	-10.68	30.82	3	Horizontal	269	1.18	-
AV	2.402G	74.74	Inf	-Inf	30.88	3	Horizontal	269	1.18	-
PK	2.3738G	53.53	74.00	-20.47	30.78	3	Horizontal	269	1.18	-
PK	2.4018G	76.35	Inf	-Inf	30.88	3	Horizontal	269	1.18	-

BT-LE(1Mbps)

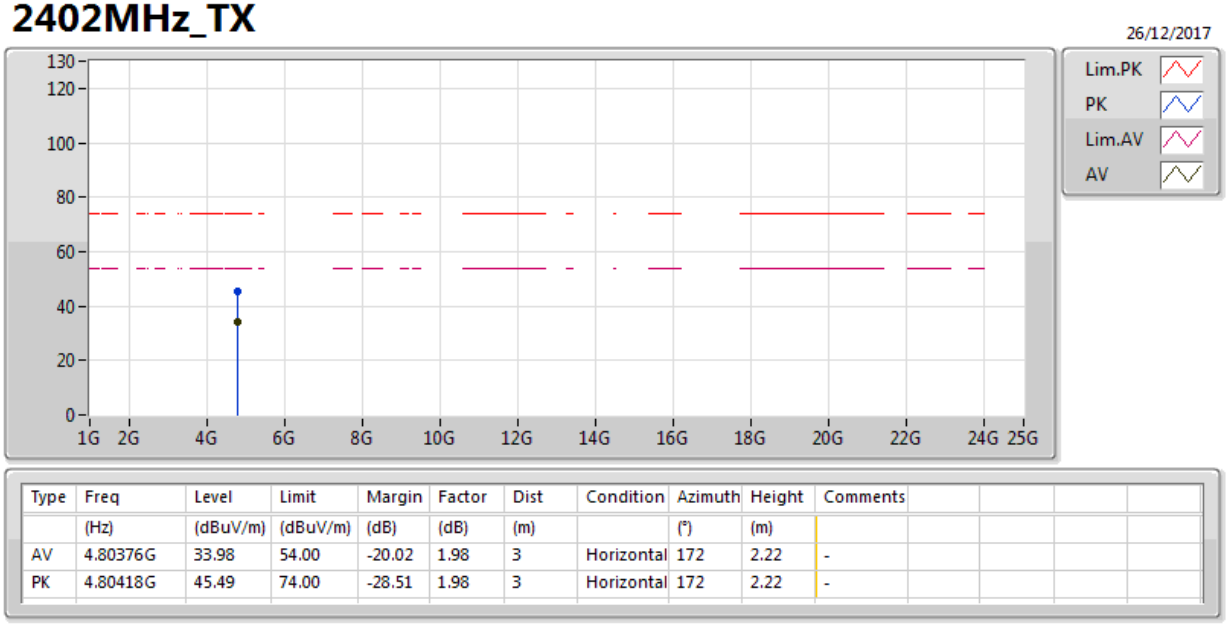
2402MHz_TX



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	4.803712G	33.23	54.00	-20.77	1.98	3	Vertical	317	1.28	-
PK	4.803212G	46.06	74.00	-27.94	1.98	3	Vertical	317	1.28	-

BT-LE(1Mbps)

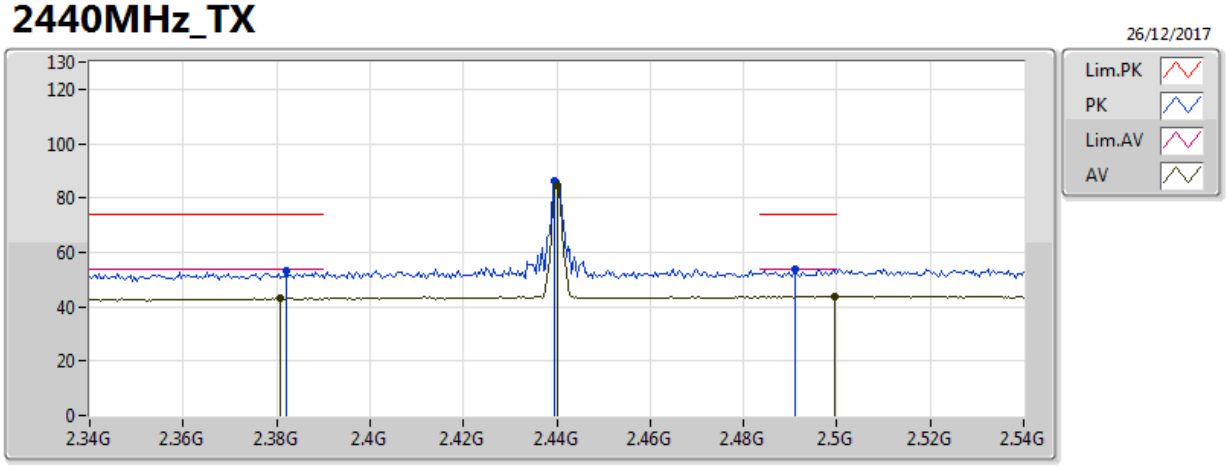
2402MHz_TX



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	4.80376G	33.98	54.00	-20.02	1.98	3	Horizontal	172	2.22	-
PK	4.80418G	45.49	74.00	-28.51	1.98	3	Horizontal	172	2.22	-

BT-LE(1Mbps)

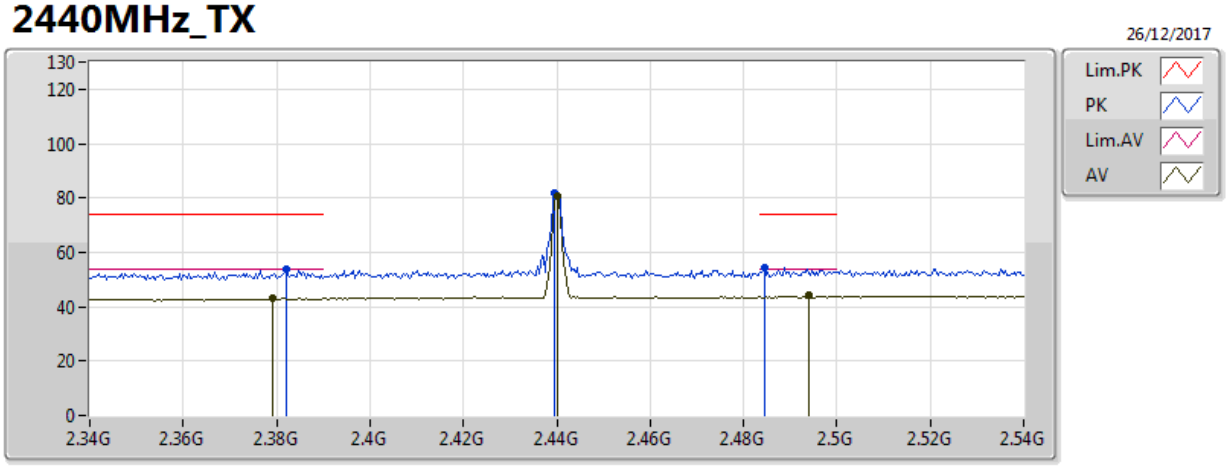
2440MHz_TX



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	2.3808G	43.17	54.00	-10.83	30.80	3	Vertical	99	1.15	-
AV	2.44G	84.52	Inf	-Inf	31.01	3	Vertical	99	1.15	-
AV	2.4996G	43.93	54.00	-10.07	31.23	3	Vertical	99	1.15	-
PK	2.382G	53.19	74.00	-20.81	30.81	3	Vertical	99	1.15	-
PK	2.4396G	86.50	Inf	-Inf	31.01	3	Vertical	99	1.15	-
PK	2.4912G	53.89	74.00	-20.11	31.20	3	Vertical	99	1.15	-

BT-LE(1Mbps)

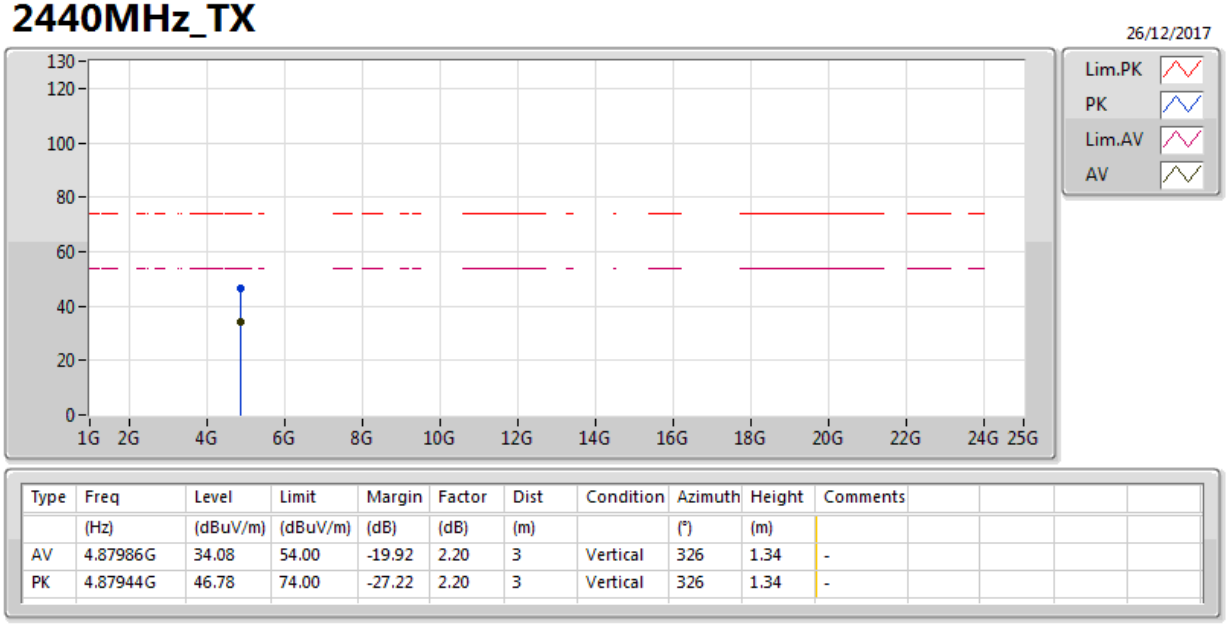
2440MHz_TX



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	2.3792G	43.22	54.00	-10.78	30.80	3	Horizontal	19	2.79	-
AV	2.44G	80.59	Inf	-Inf	31.01	3	Horizontal	19	2.79	-
AV	2.494G	43.99	54.00	-10.01	31.21	3	Horizontal	19	2.79	-
PK	2.382G	54.07	74.00	-19.93	30.81	3	Horizontal	19	2.79	-
PK	2.4396G	82.03	Inf	-Inf	31.01	3	Horizontal	19	2.79	-
PK	2.4844G	54.24	74.00	-19.76	31.17	3	Horizontal	19	2.79	-

BT-LE(1Mbps)

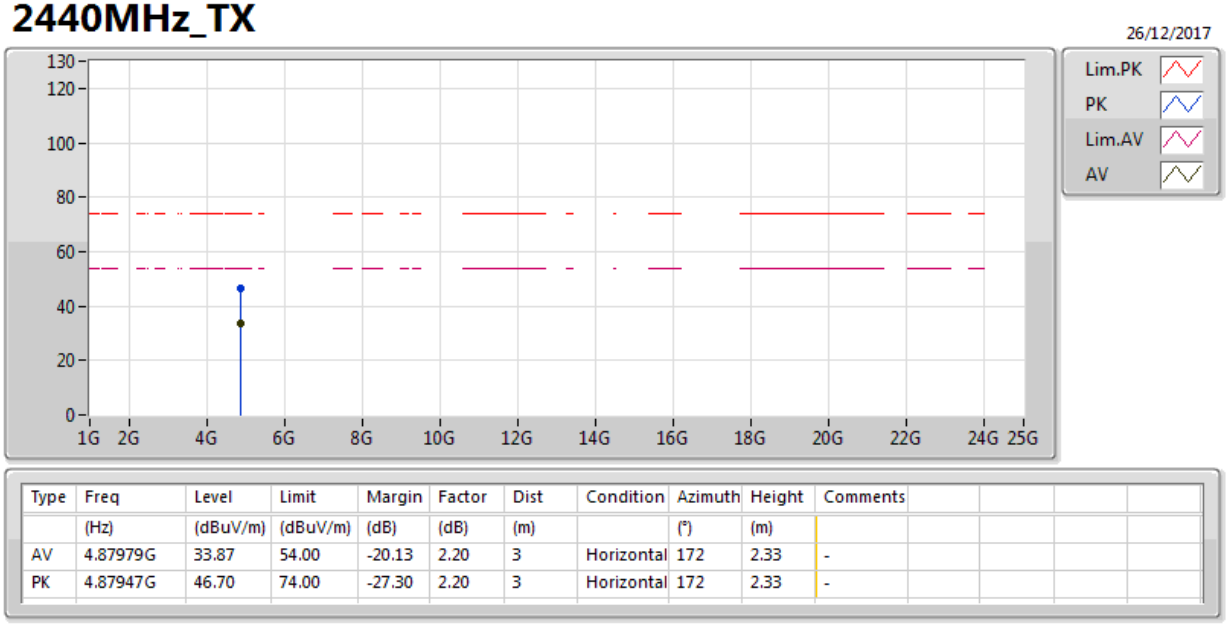
2440MHz_TX



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	4.87986G	34.08	54.00	-19.92	2.20	3	Vertical	326	1.34	-
PK	4.87944G	46.78	74.00	-27.22	2.20	3	Vertical	326	1.34	-

BT-LE(1Mbps)

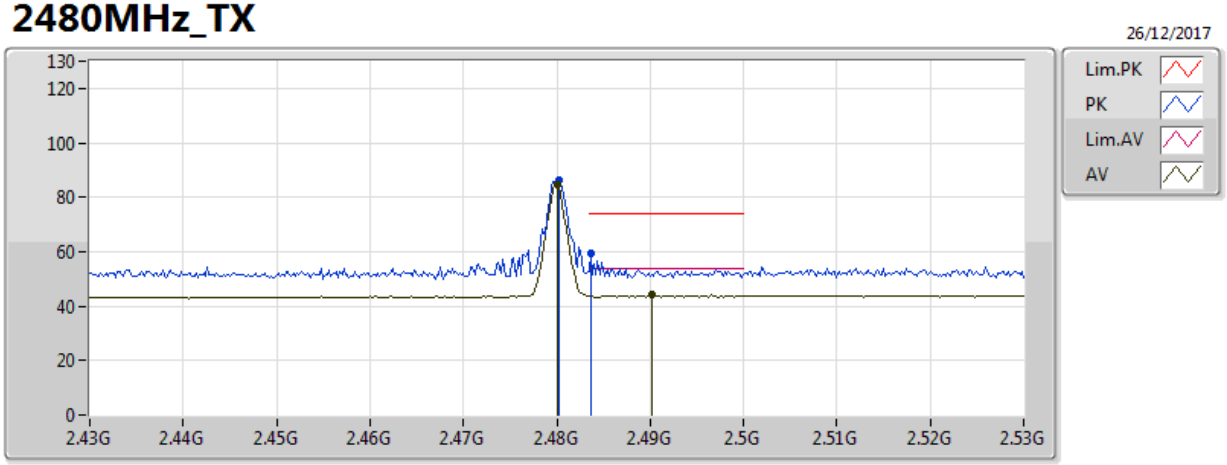
2440MHz_TX



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	4.87979G	33.87	54.00	-20.13	2.20	3	Horizontal	172	2.33	-
PK	4.87947G	46.70	74.00	-27.30	2.20	3	Horizontal	172	2.33	-

BT-LE(1Mbps)

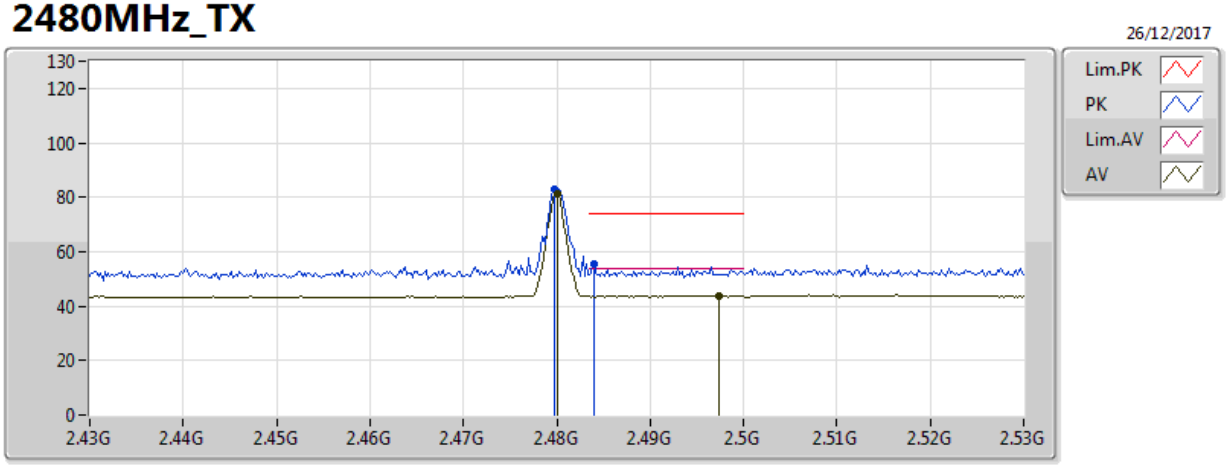
2480MHz_TX



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	2.48G	84.49	Inf	-Inf	31.16	3	Vertical	99	1.11	-
AV	2.4902G	44.06	54.00	-9.94	31.19	3	Vertical	99	1.11	-
PK	2.4802G	86.03	Inf	-Inf	31.16	3	Vertical	99	1.11	-
PK	2.4836G	59.43	74.00	-14.57	31.17	3	Vertical	99	1.11	-

BT-LE(1Mbps)

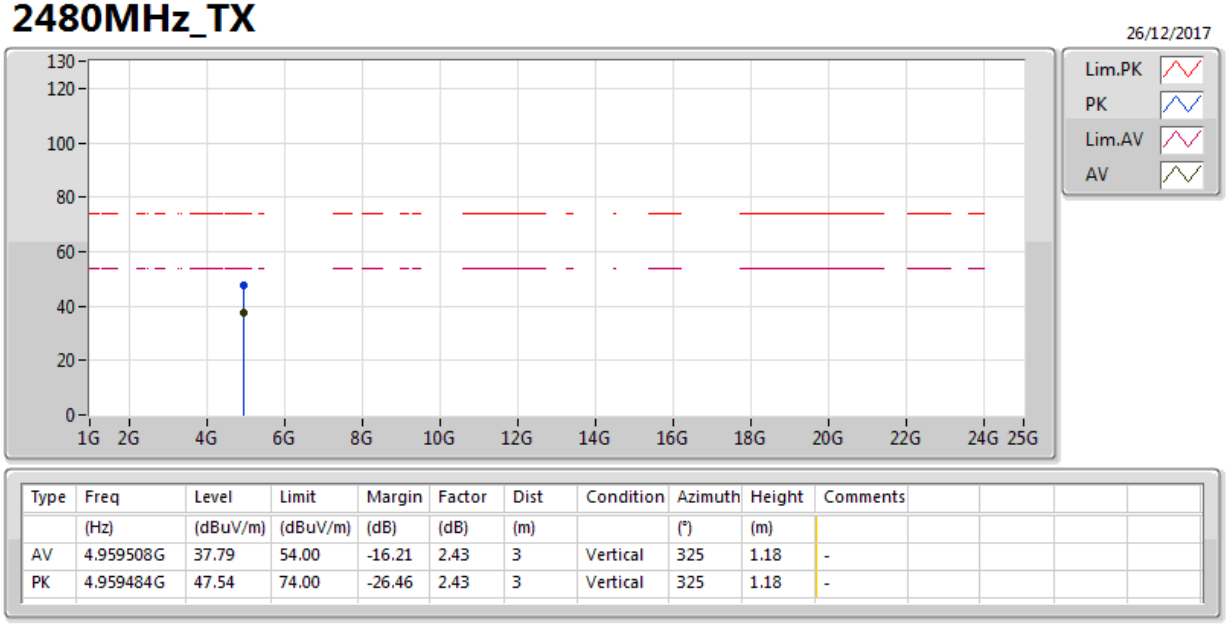
2480MHz_TX



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	2.48G	81.28	Inf	-Inf	31.16	3	Horizontal	172	2.75	-
AV	2.4974G	43.86	54.00	-10.14	31.22	3	Horizontal	172	2.75	-
PK	2.4798G	82.71	Inf	-Inf	31.16	3	Horizontal	172	2.75	-
PK	2.484G	55.71	74.00	-18.29	31.17	3	Horizontal	172	2.75	-

BT-LE(1Mbps)

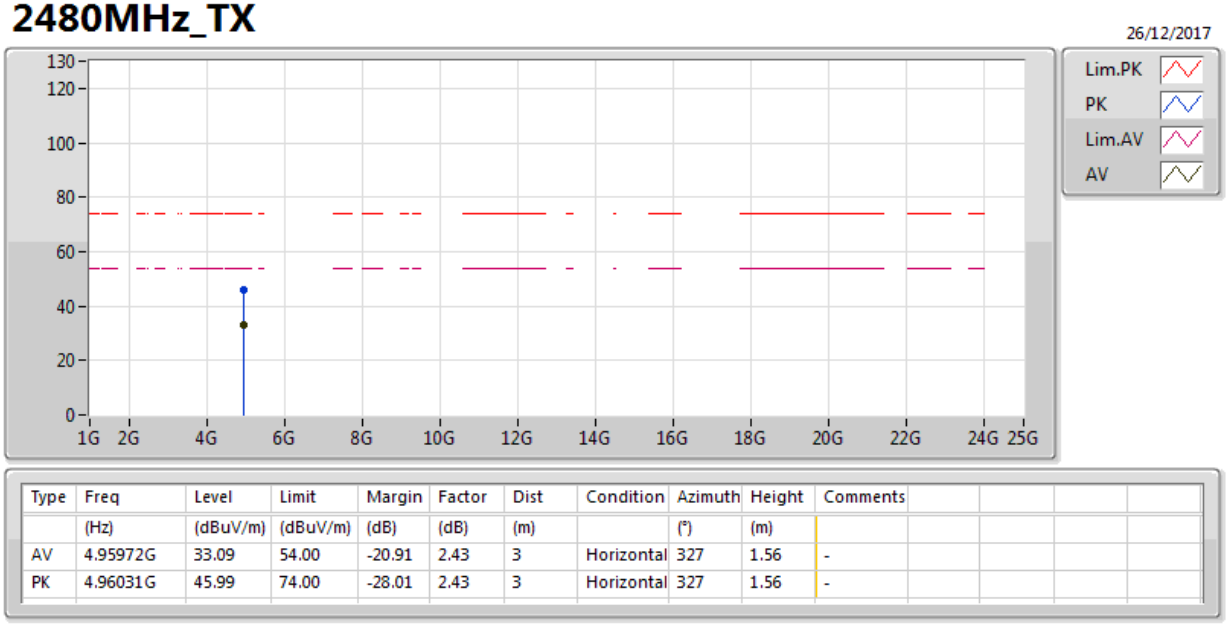
2480MHz_TX



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	4.959508G	37.79	54.00	-16.21	2.43	3	Vertical	325	1.18	-
PK	4.959484G	47.54	74.00	-26.46	2.43	3	Vertical	325	1.18	-

BT-LE(1Mbps)

2480MHz_TX



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	4.95972G	33.09	54.00	-20.91	2.43	3	Horizontal	327	1.56	-
PK	4.96031G	45.99	74.00	-28.01	2.43	3	Horizontal	327	1.56	-