

FCC Test Report

Equipment : Video Doorbell Elite
Brand Name : RING
Model No. : Video Doorbell Elite
FCC ID : 2AEUPBHAJB001
Standard : 47 CFR FCC Part 15.247
Frequency : 2400 MHz – 2483.5 MHz
Function : ☒ Point-to-multipoint; ☐ Point-to-point
Applicant : Bot Home Automation, Inc.
1523 26th St, Santa Monica, CA 90404, USA
Manufacturer : Chicony Electronics (Dong Guan) Co., Ltd.
San Zhong Guan Li Qu, Qingxi Town, Dongguan City
Guangdong 523651 China

The product sample received on Apr. 11, 2017 and completely tested on Apr. 20, 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 INTERNATIONAL INC., the test report shall not be reproduced except in full.


Phoenix Chen
SPORTON INTERNATIONAL INC.



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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	Complied
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

[illegible]

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
2.4G	BT-LE	1	1

Note:

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

1.1.2 Antenna Information

Ant.	Port	Antenna Type	Connector	Gain (dBi)
1	1	PIFA Antenna	I-PEX	1.44

1.1.3 EUT Information

Operational Condition			
EUT Power Type	From POE		
Beamforming Function	☐ With beamforming	☒ Without beamforming	
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)	0.626	2.034	392.188u	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, Hwa Ya 1st Rd., Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.	
		TEL : 886-3-327-3456	FAX : 886-3-327-0973
Test site Designation No. 553509 with FCC.			
Test site registered number IC 4086B-1 with Industry Canada.			
☐	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 site Designation No. TW0006 with FCC.			
Test site registered number IC 4086D with Industry Canada.			

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
RF Conducted	TH01-HY	Ryan	24.5°C / 67%	12/Apr/2017
Radiated	03CH02-HY	Ryan	23.5°C / 65%	20/Apr/2017
AC Conduction	CO01-HY	Teddy	24°C / 55%	14/Apr/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 (30MHz ~ 1,000MHz)	2.1 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	2.6 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	2.9 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	120V

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	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral
Operating Mode	Normal Link
1	PoE mode

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

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

2.4 Support Equipment

Support Equipment – RF Conducted				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E5410	DoC
2	Adapter for NB	DELL	HA65NM130	DoC
3	PoE	-	PSE3101DCG	-
4	Adapter for PoE	DVE	DSA-18CB-12 FCA 120150	-

Note: Support equipment No.3 was provided by customer.

Support Equipment – Radiated Emission				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E5410	DOC
2	PoE	-	PSE3101DCG	-
3	Adapter for PoE	DVE	DSA-18CB-12 FCA 120150	-

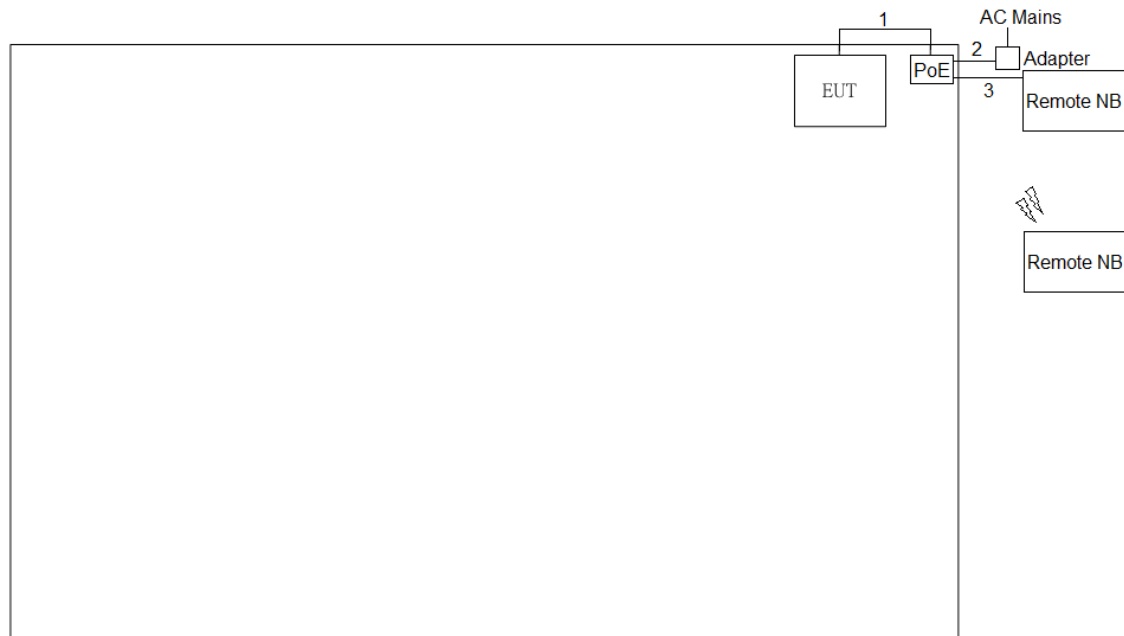
Note: Support equipment No.2 was provided by customer.

Support Equipment – AC Conduction				
No.	Equipment	Brand Name	Model Name	FCC ID
1	PoE	-	PSE3101DCG	-
2	Adapter for PoE	DVE	DSA-18CB-12 FCA 120150	-
3	Notebook	DELL	Latitude E5540	DoC
4	Notebook	DELL	Latitude E5540	DoC

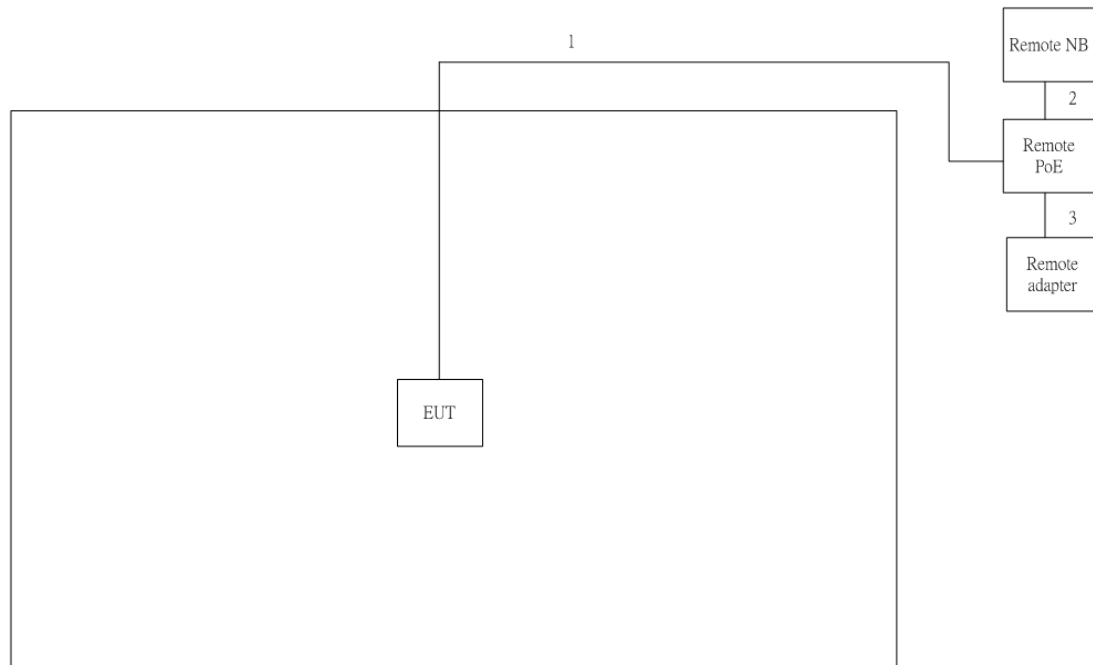
Note: Support equipment No.1 was provided by customer.

2.5 Test Setup Diagram

Test Setup Diagram – AC Line Conducted Emission Test



Item	Connection	Shielded	Length(m)	Remark
1	RJ-45 cable	No	1m	-
2	DC power line	No	1.5m	-
3	RJ-45 cable	No	10m	-

Test Setup Diagram – Radiated Test < 1GHz


Item	Connection	Shielded	Length(m)	Remark
1	RJ-45 cable	No	10m	-
2	RJ-45 cable	No	1.0m	-
3	DC power line	No	1.5m	-

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.

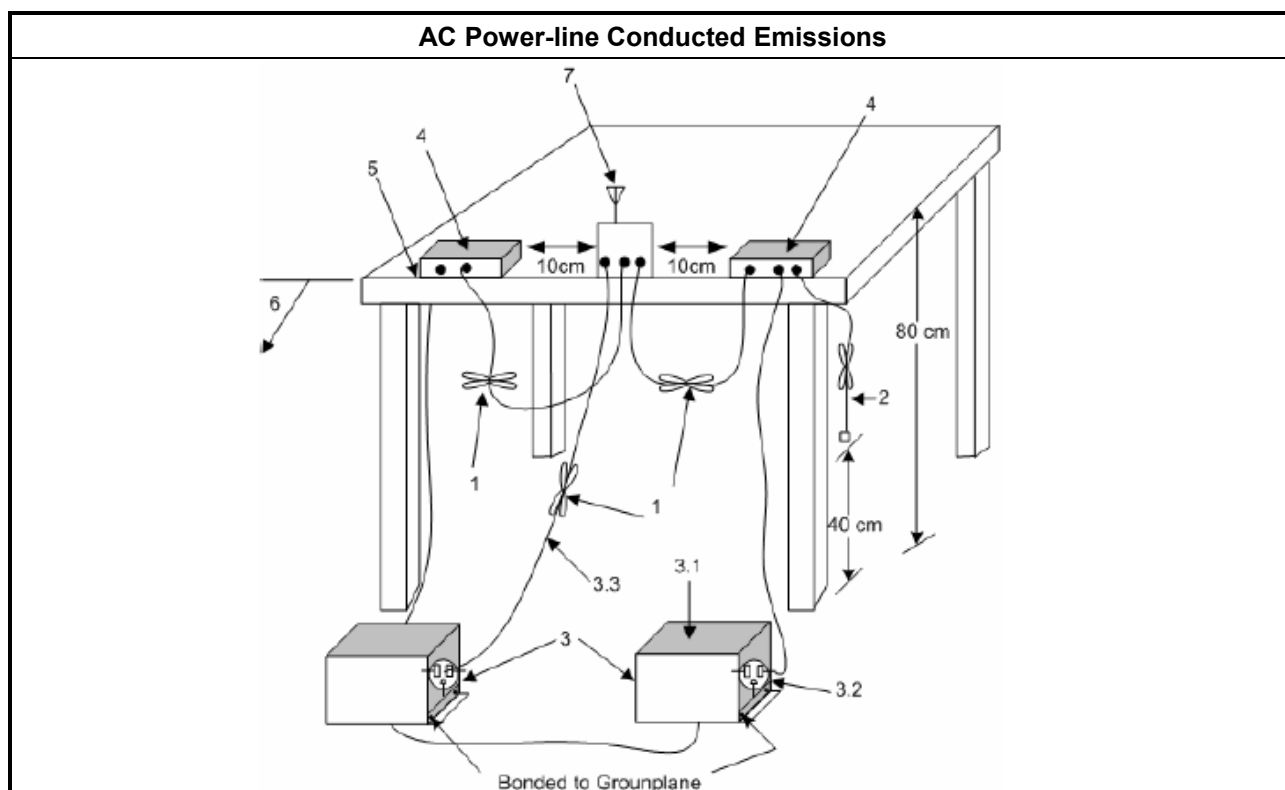
3.1.2 Measuring Instruments

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



3.1.5 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A

3.2 DTS Bandwidth

3.2.1 6dB Bandwidth Limit

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

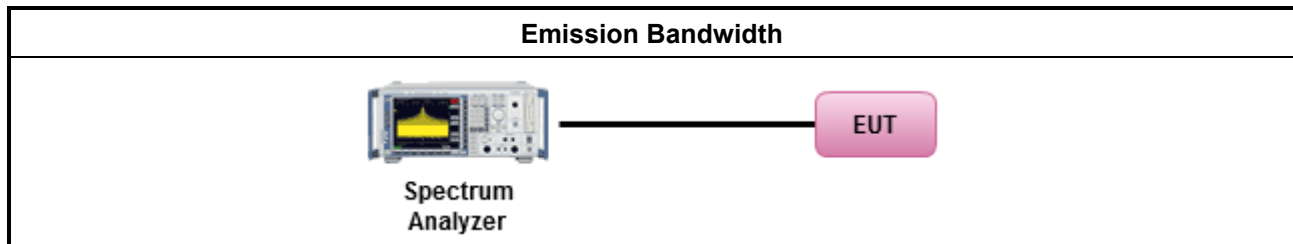
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

Test Method	
▪	For the emission bandwidth shall be measured using one of the options below:
☒	Refer as KDB 558074, clause 8.1 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.

3.2.4 Test Setup



3.2.5 Test Result of Emission Bandwidth

Refer as Appendix B

3.3 Maximum Conducted Output Power

3.3.1 Maximum Conducted Output Power Limit

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

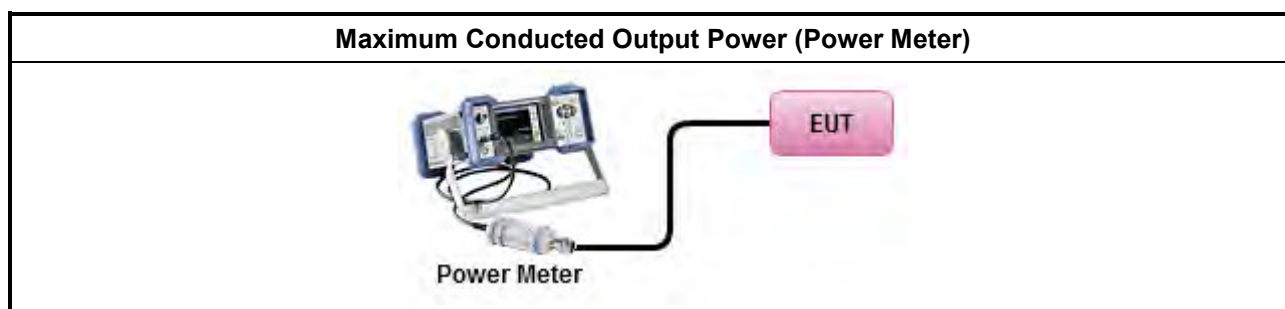
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

Test Method	
Maximum Peak Conducted Output Power	
☐	Refer as KDB 558074, clause 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: $P_{total} = P_1 + P_2 + \dots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$	

3.3.4 Test Setup



3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix C

3.4 Power Spectral Density

3.4.1 Power Spectral Density Limit

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

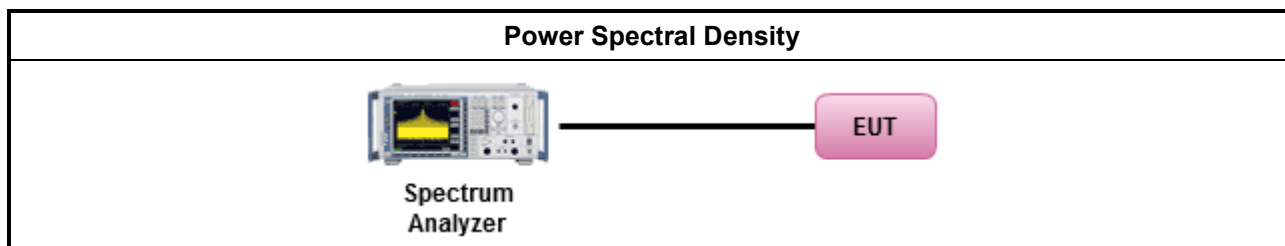
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

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



3.4.5 Test Result of Power Spectral Density

Refer as Appendix D

3.5 Emissions in Non-restricted Frequency Bands

3.5.1 Emissions in Non-restricted Frequency Bands Limit

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

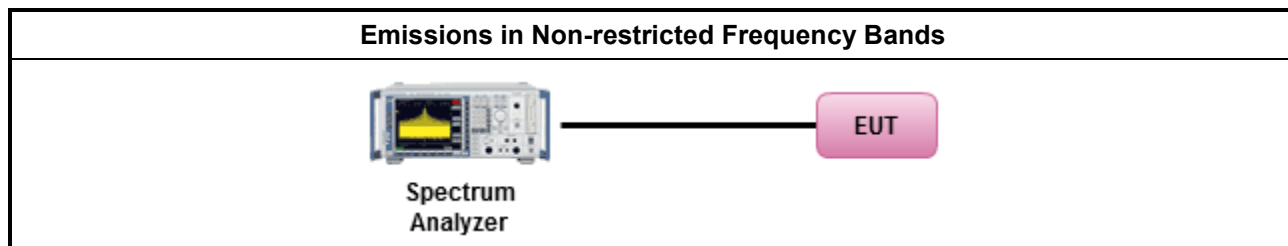
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

Test Method
Refer as KDB 558074, clause 11 for unwanted emissions into non-restricted bands.

3.5.4 Test Setup



3.5.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix E

3.6 Emissions in Restricted Frequency Bands

3.6.1 Emissions in Restricted Frequency Bands Limit

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

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

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

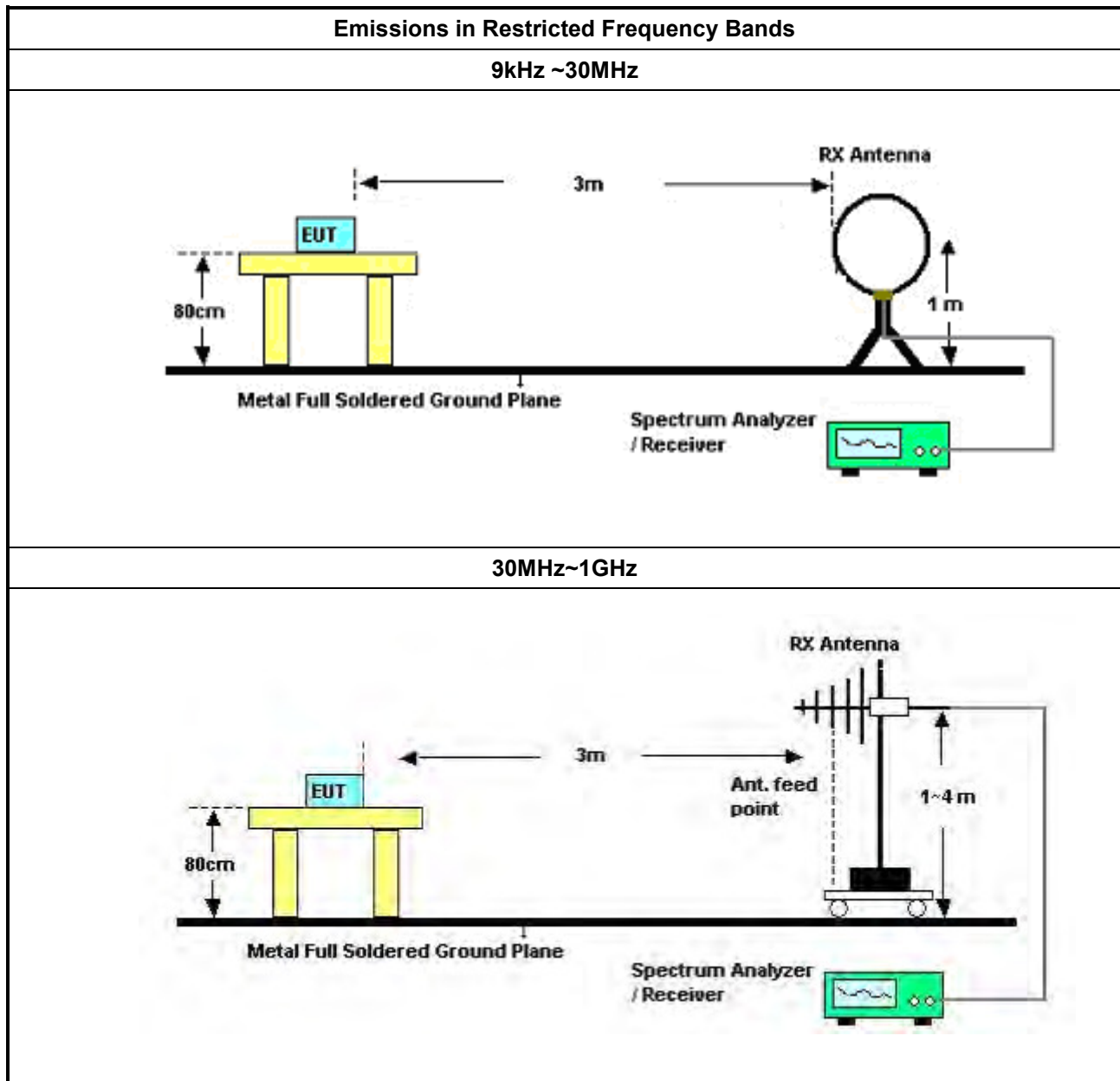
3.6.2 Measuring Instruments

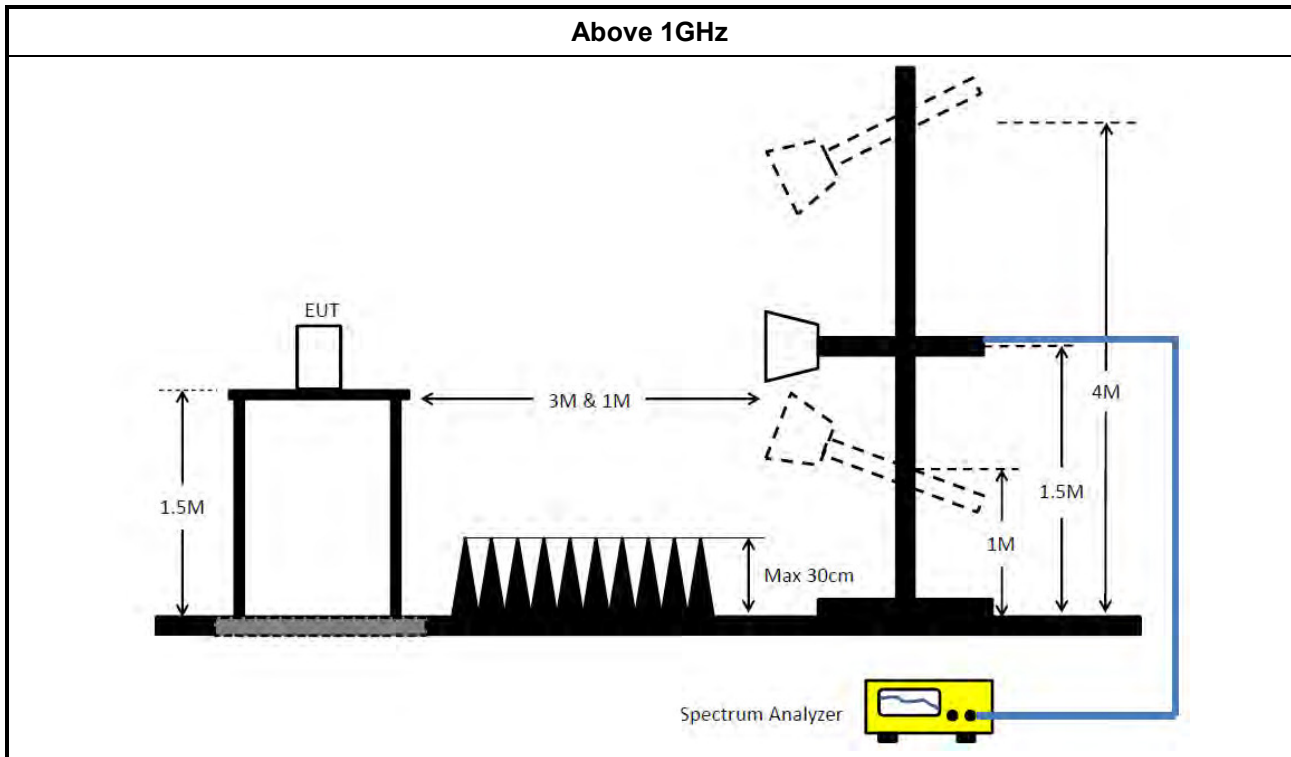
Refer a test equipment and calibration data table in this test report.

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 $\geq 1/T$.
	☒ 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





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

3.6.6 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix F

4 Test Equipment and Calibration Data

Instrument for AC Conduction

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
EMC Receiver	R&S	ESR3	102052	9 kHz ~ 3.6 GHz	18/Apr/2016	17/Apr/2017
LISN	R&S	ENV216	101295	9 kHz ~ 30 MHz	15/Nov/2016	14/Nov/2017
RF Cable-CON	HUBER+SUHNER	RG213/U	07611832010001	9 kHz ~ 30 MHz	06/Mar/2017	05/Mar/2018

NCR : Non-Calibration Require

Instrument for Radiated Test

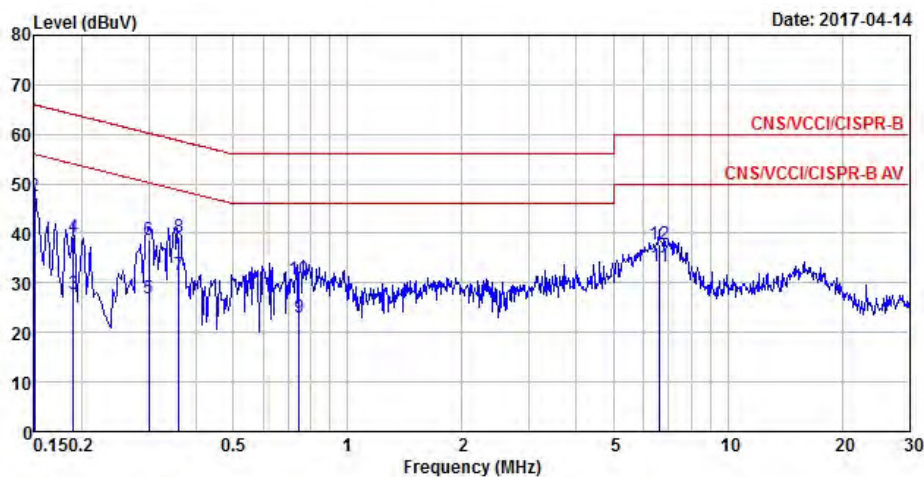
Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
Spectrum Analyzer	R&S	FSP40	100593	9 kHz ~ 40 GHz	26/Oct/2016	25/Oct/2017
3m Semi Anechoic	SIDT FRANKONIA	SAC-3M	03CH02-HY	30 MHz ~ 1 GHz	03/Jun/2016	02/Jun/2017
3m Semi Anechoic	SIDT FRANKONIA	SAC-3M	03CH02-HY	1 GHz ~ 18 GHz	12/Dec/2016	11/Dec/2017
Amplifier	Agilent	8447D	2944A11149	100 kHz ~ 1.3 GHz	01/Jul/2016	30/Jun/2017
Amplifier	Agilent	8449B	3008A02373	1 GHz ~ 26.5 GHz	02/Sep/2016	01/Sep/2017
Horn Antenna	SCHWARZBECK	BBHA9120D	BBHA9120D 01543	1 GHz ~ 18 GHz	22/Apr/2016	21/Apr/2017
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15 GHz ~ 40 GHz	06/Feb/2017	05/Feb/2018
Bilog Antenna	SCHAFFNER	CBL6112B	2723	30 MHz ~ 1 GHz	01/Oct/2016	30/Sep/2017
Loop Antenna	TESEQ	HLA 6120	24155	9 kHz ~ 30 MHz	02/Mar/2017	01/Mar/2018
RF Cable-high	SUHNER	SUCOFLEX104	MY34918/4	1 GHz ~ 40 GHz	26/Jan/2017	25/Jan/2018
RF Cable-R03m	Jye Bao	RG142	CB017	9 kHz ~ 1 GHz	26/Jan/2017	25/Jan/2018

Instrument for Conducted Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
Spectrum Analyzer	R&S	FSV 40	101013	9 kHz ~ 40 GHz	30/Dec/2016	29/Dec/ 2017
Power Sensor	Anritsu	MA2411B	0917017	300 MHz ~ 40 GHz	10/Feb/2017	09/Feb/2018
Power Meter	Anritsu	ML2495A	0949003	300 MHz ~ 40 GHz	10/Feb/2017	09/Feb/2018
Signal Generator	R&S	SMR40	100116	10 MHz ~ 40 GHz	21/Jul/2016	20/Jul/2017
RF Cable-0.2m	HUBER+SUHNER	SUCOFLEX_104	MY10710/4	30 MHz ~ 26.5 GHz	02/Oct/2016	01/Oct/2017
RF Cable-0.2m	HUBER+SUHNER	SUCOFLEX_104	MY10709/4	30 MHz ~ 26.5 GHz	02/Oct/2016	01/Oct/2017
RF Cable-0.5m	HUBER+SUHNER	SUCOFLEX_104	MY10713/4	30 MHz ~ 26.5 GHz	02/Oct/2016	01/Oct/2017

AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Neutral
Operating Function	PoE Mode		

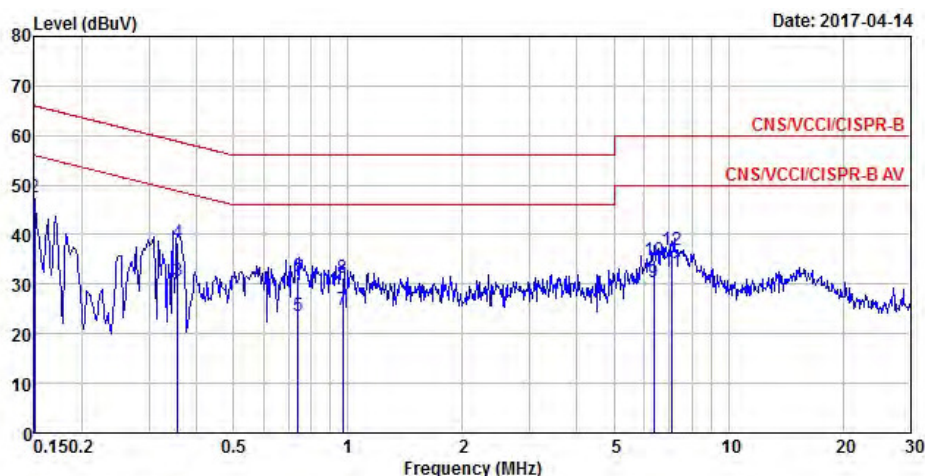


	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.15	34.53	-21.47	56.00	24.83	9.68	0.02	Average
2	0.15	47.65	-18.35	66.00	37.95	9.68	0.02	QP
3	0.19	27.71	-26.31	54.02	18.02	9.67	0.02	Average
4	0.19	39.28	-24.74	64.02	29.59	9.67	0.02	QP
5	0.30	26.75	-23.49	50.24	17.11	9.62	0.02	Average
6	0.30	38.74	-21.50	60.24	29.10	9.62	0.02	QP
7	0.36	31.44	-17.30	48.74	21.83	9.59	0.02	Average
8	0.36	39.32	-19.42	58.74	29.71	9.59	0.02	QP
9	0.75	22.98	-23.02	46.00	13.32	9.64	0.02	Average
10	0.75	30.67	-25.33	56.00	21.01	9.64	0.02	QP
11 MAX	6.61	33.32	-16.68	50.00	23.53	9.67	0.12	Average
12	6.61	37.83	-22.17	60.00	28.04	9.67	0.12	QP

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

AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Line
Operating Function	PoE Mode		



	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.15	33.49	-22.51	56.00	23.83	9.64	0.02	Average
2	0.15	47.54	-18.46	66.00	37.88	9.64	0.02	QP
3	0.36	30.69	-18.09	48.78	21.03	9.64	0.02	Average
4	0.36	38.41	-20.37	58.78	28.75	9.64	0.02	QP
5	0.74	23.67	-22.33	46.00	14.02	9.63	0.02	Average
6	0.74	31.50	-24.50	56.00	21.85	9.63	0.02	QP
7	0.97	24.79	-21.21	46.00	15.14	9.63	0.02	Average
8	0.97	31.37	-24.63	56.00	21.72	9.63	0.02	QP
9	6.36	30.54	-19.46	50.00	20.69	9.73	0.12	Average
10	6.36	34.98	-25.02	60.00	25.13	9.73	0.12	QP
11 MAX	7.10	32.53	-17.47	50.00	22.65	9.75	0.13	Average
12	7.10	36.89	-23.11	60.00	27.01	9.75	0.13	QP

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

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

Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
BT-LE(1Mbps)	-	-	-	-	-
2.4-2.4835GHz	711.25k	1.056M	1M06F1D	710k	1.052M

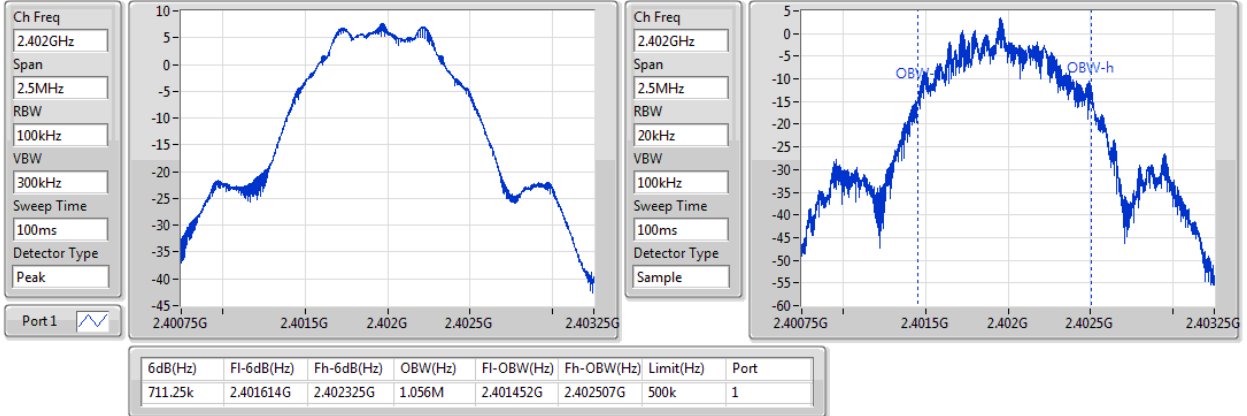
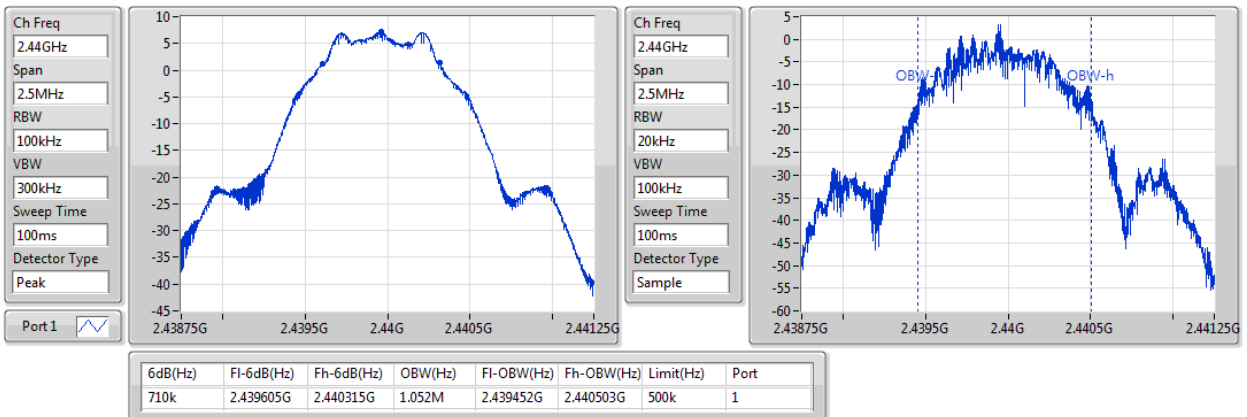
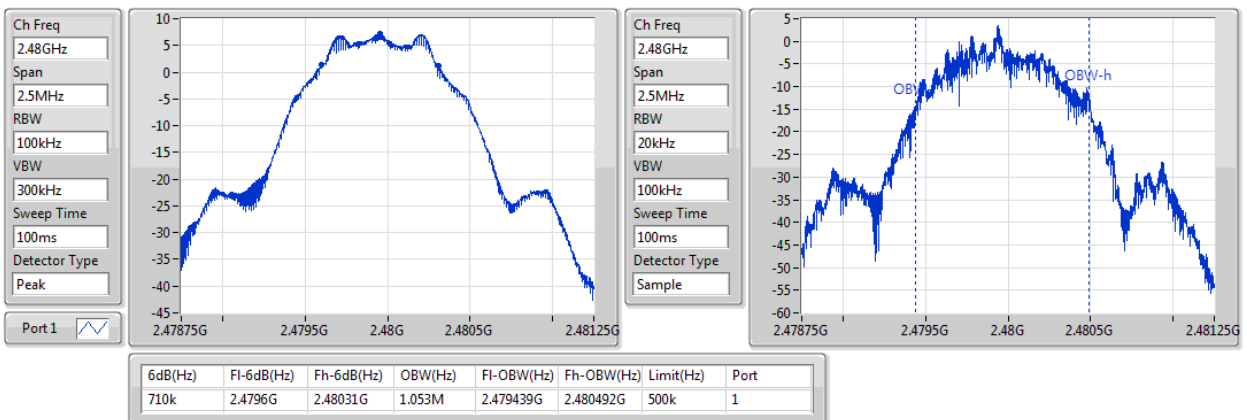
Max-N dB = Maximum 6dB down bandwidth; **Max-OBW** = Maximum 99% occupied bandwidth;

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	Pass	500k	711.25k	1.056M
2440MHz	Pass	500k	710k	1.052M
2480MHz	Pass	500k	710k	1.053M

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

BT-LE(1Mbps)
EBW
2402MHz

BT-LE(1Mbps)
EBW
2440MHz

BT-LE(1Mbps)
EBW
2480MHz


Summary

Mode	Power	Power
	(dBm)	(W)
BT-LE(1Mbps)	-	-
2.4-2.4835GHz	7.13	0.00516

Result

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	1.44	7.04	30.00
2440MHz	Pass	1.44	7.08	30.00
2480MHz	Pass	1.44	7.13	30.00

Summary

Mode	PD (dBm/RBW)
BT-LE(1Mbps)	-
2.4-2.4835GHz	-6.43

RBW=3kHz.

Result

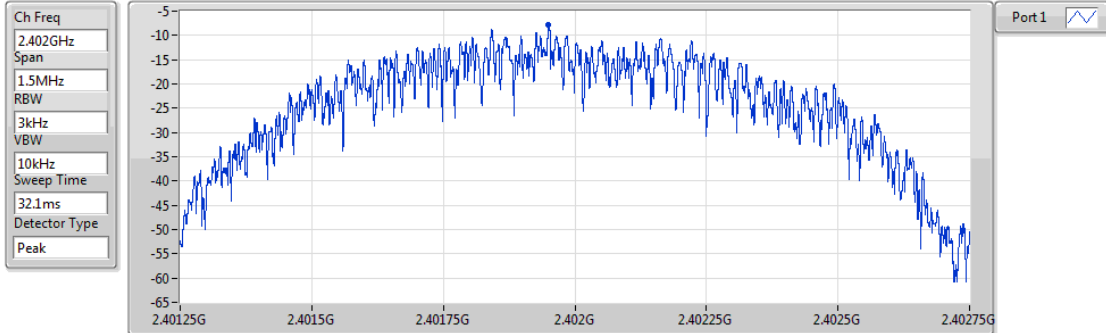
Mode	Result	Gain (dBi)	PD (dBm/RBW)	PD Limit (dBm/RBW)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	1.44	-7.78	8.00
2440MHz	Pass	1.44	-7.70	8.00
2480MHz	Pass	1.44	-6.43	8.00

RBW=3kHz.

BT-LE(1Mbps)

PSD

2402MHz

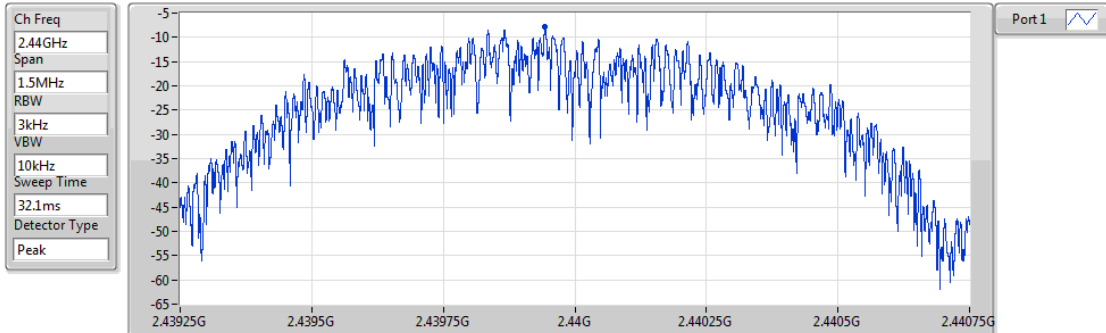


Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-7.78	-7.78	-7.78

BT-LE(1Mbps)

PSD

2440MHz

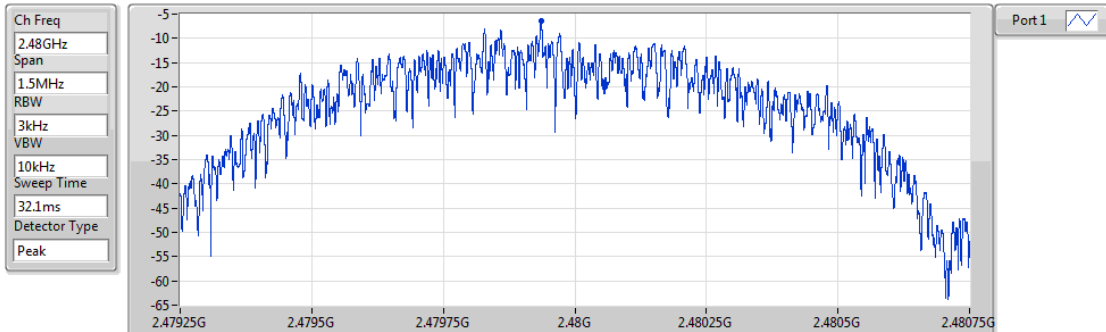


Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-7.70	-7.70	-7.70

BT-LE(1Mbps)

PSD

2480MHz



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

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
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-	-
2.4-2.4835GHz	Pass	2.402004G	6.18	-22.80	842.224M	-58.24	2.39994G	-51.02	2.484244G	-56.21	6.197578G	-52.86	1

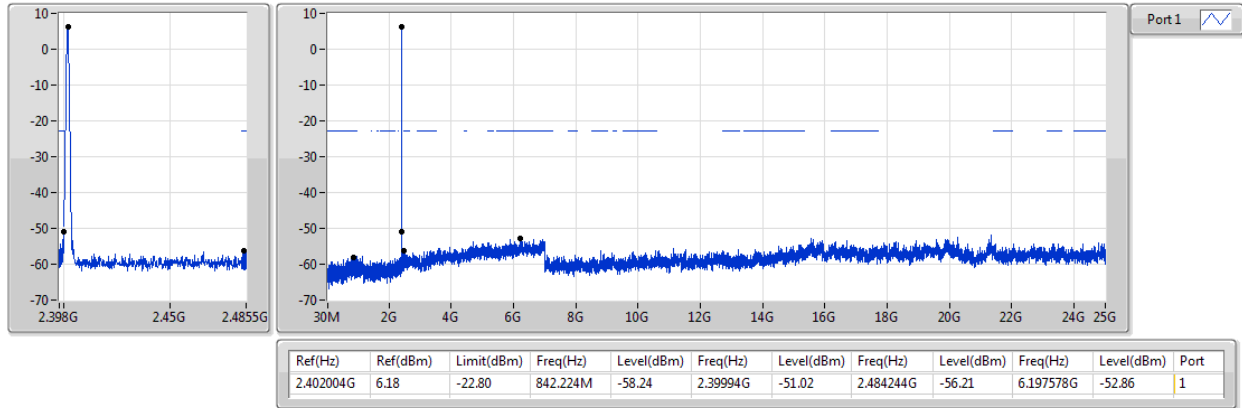
Result

Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	2.402004G	6.18	-22.80	842.224M	-58.24	2.39994G	-51.02	2.484244G	-56.21	6.197578G	-52.86	1
2440MHz	Pass	2.439746G	6.38	-22.80	2.12568G	-57.94	2.39904G	-56.68	2.485348G	-56.20	6.920857G	-52.20	1
2480MHz	Pass	2.480327G	7.20	-22.80	725.008M	-57.48	2.398008G	-56.64	2.483944G	-54.38	6.549367G	-52.21	1

BT-LE(1Mbps)

CSE NdB

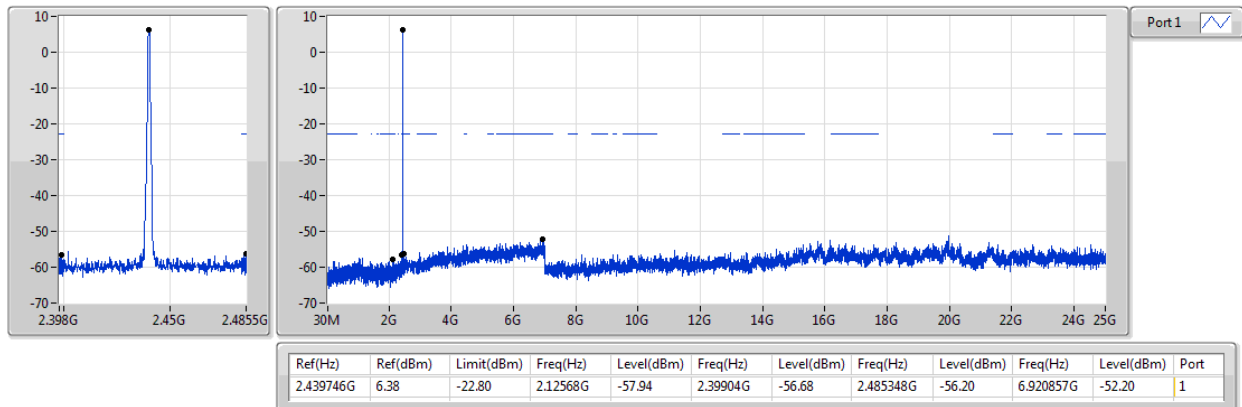
2402MHz



BT-LE(1Mbps)

CSE NdB

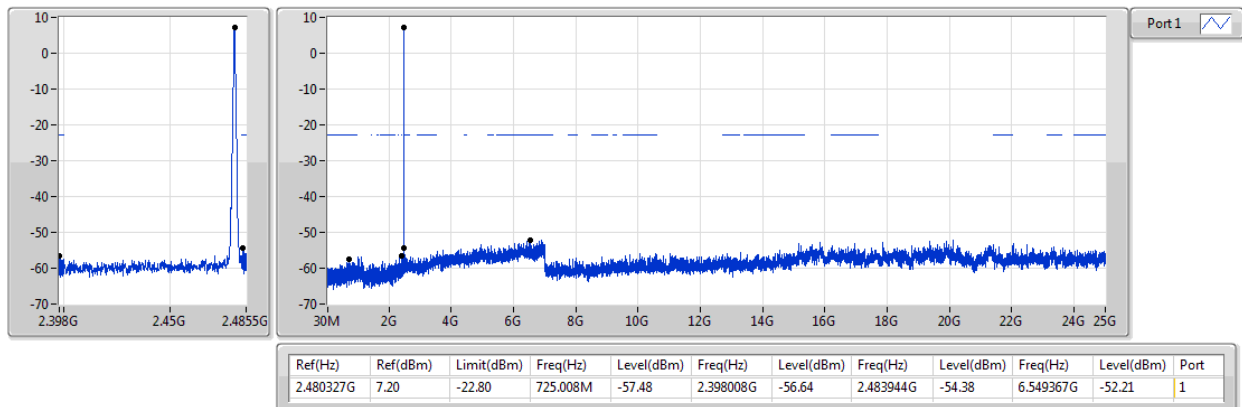
2440MHz



BT-LE(1Mbps)

CSE NdB

2480MHz



Summary

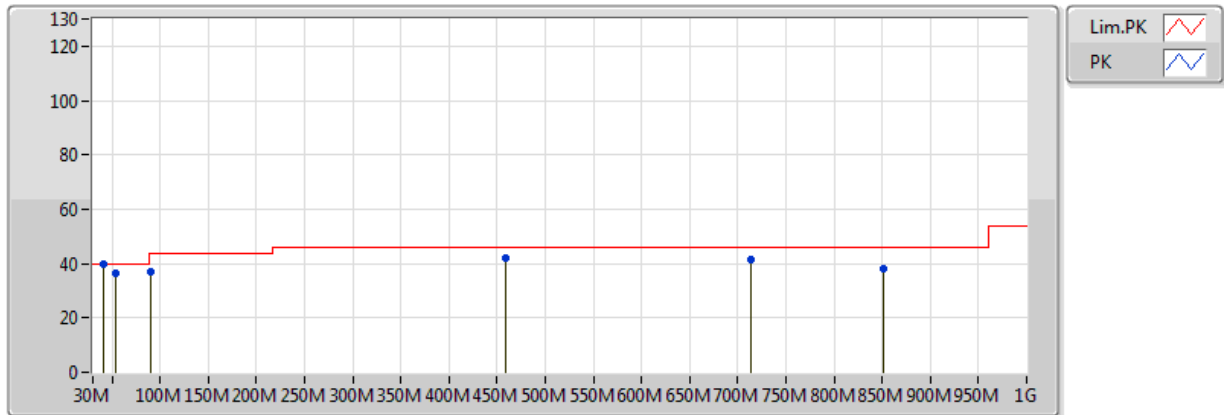
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Pol. (H/V)	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-
2.4-2.4835GHz	Pass	QP	41.64M	39.71	40.00	-0.29	-10.02	3	V	55	1.00	-

Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Pol. (H/V)	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	PK	39.7M	34.82	40.00	-5.18	-9.05	3	H	360	1.00	-
2402MHz	Pass	PK	144.46M	34.11	43.50	-9.39	-10.06	3	H	360	1.00	-
2402MHz	Pass	PK	208.48M	34.96	43.50	-8.54	-11.02	3	H	360	1.00	-
2402MHz	Pass	PK	650.8M	42.51	46.00	-3.49	-0.64	3	H	360	1.00	-
2402MHz	Pass	QP	749.74M	45.20	46.00	-0.80	0.77	3	H	166	1.08	-
2402MHz	Pass	QP	850.62M	39.36	46.00	-6.64	2.19	3	H	0	1.00	-
2402MHz	Pass	PK	90.14M	36.87	43.50	-6.63	-12.53	3	V	0	1.00	-
2402MHz	Pass	PK	458.74M	42.10	46.00	-3.90	-2.94	3	V	0	1.00	-
2402MHz	Pass	PK	712.88M	41.59	46.00	-4.41	-0.07	3	V	0	1.00	-
2402MHz	Pass	QP	41.64M	39.71	40.00	-0.29	-10.02	3	V	55	1.00	-
2402MHz	Pass	QP	53.28M	36.68	40.00	-3.32	-14.18	3	V	193	1.00	-
2402MHz	Pass	QP	850.62M	37.85	46.00	-8.15	2.19	3	V	126	1.00	-

BT-LE(1Mbps)

2402MHz_PoE

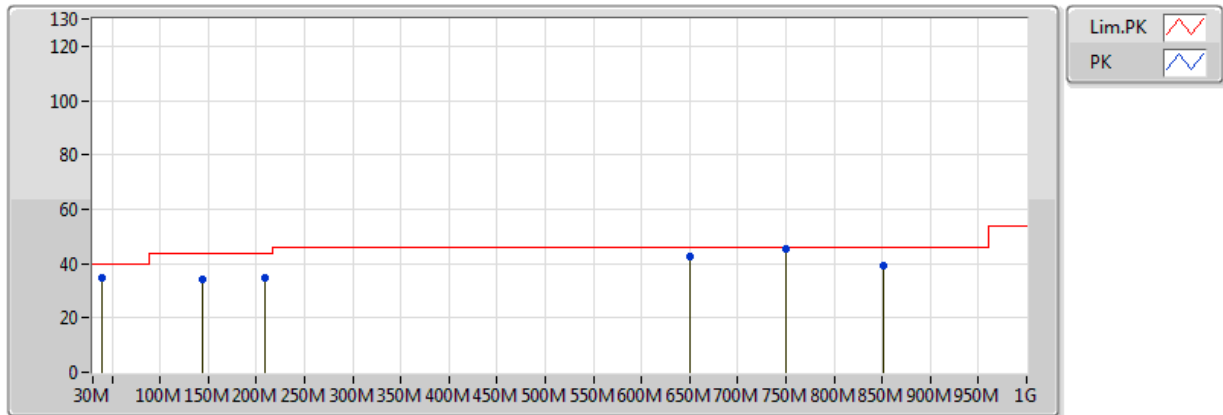


EUT= Y axis

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
PK	90.14M	36.87	43.50	-6.63	-12.53	3	V	0	1.00	-
PK	458.74M	42.10	46.00	-3.90	-2.94	3	V	0	1.00	-
PK	712.88M	41.59	46.00	-4.41	-0.07	3	V	0	1.00	-
QP	41.64M	39.71	40.00	-0.29	-10.02	3	V	55	1.00	-
QP	53.28M	36.68	40.00	-3.32	-14.18	3	V	193	1.00	-
QP	850.62M	37.85	46.00	-8.15	2.19	3	V	126	1.00	-

BT-LE(1Mbps)

2402MHz_PoE



EUT= Y axis

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
PK	39.7M	34.82	40.00	-5.18	-9.05	3	H	360	1.00	-
PK	144.46M	34.11	43.50	-9.39	-10.06	3	H	360	1.00	-
PK	208.48M	34.96	43.50	-8.54	-11.02	3	H	360	1.00	-
PK	650.8M	42.51	46.00	-3.49	-0.64	3	H	360	1.00	-
QP	749.74M	45.20	46.00	-0.80	0.77	3	H	166	1.08	-
QP	850.62M	39.36	46.00	-6.64	2.19	3	H	0	1.00	-

Summary

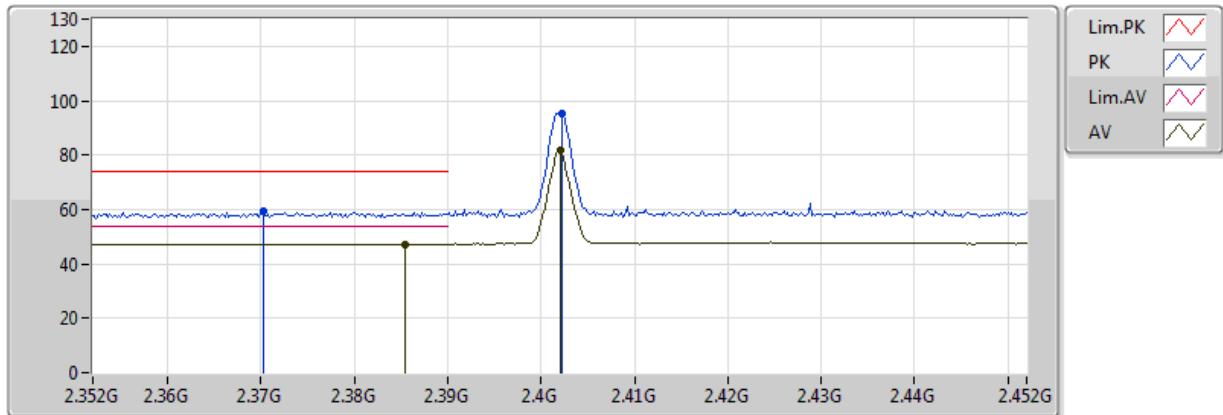
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Pol. (H/V)	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-
2.4-2.4835GHz	Pass	AV	2.483502G	48.26	54.00	-5.74	36.00	3	H	7	1.99	-

Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Pol. (H/V)	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	AV	2.3874G	47.31	54.00	-6.69	35.81	3	H	16	1.73	-
2402MHz	Pass	AV	2.402G	86.39	Inf	-Inf	35.83	3	H	16	1.73	-
2402MHz	Pass	AV	4.804G	40.11	54.00	-13.89	5.05	3	H	355	1.24	-
2402MHz	Pass	PK	2.3678G	60.05	74.00	-13.95	35.77	3	H	16	1.73	-
2402MHz	Pass	PK	2.4018G	101.16	Inf	-Inf	35.83	3	H	16	1.73	-
2402MHz	Pass	PK	4.804G	52.15	74.00	-21.85	5.05	3	H	355	1.24	-
2402MHz	Pass	AV	2.3854G	47.34	54.00	-6.66	35.80	3	V	264	1.42	-
2402MHz	Pass	AV	2.402G	81.95	Inf	-Inf	35.83	3	V	264	1.42	-
2402MHz	Pass	AV	4.804G	39.29	54.00	-14.71	5.05	3	V	360	1.50	-
2402MHz	Pass	PK	2.3702G	59.66	74.00	-14.34	35.77	3	V	264	1.42	-
2402MHz	Pass	PK	2.4022G	95.30	Inf	-Inf	35.83	3	V	264	1.42	-
2402MHz	Pass	PK	4.804G	51.32	74.00	-22.68	5.05	3	V	360	1.50	-
2440MHz	Pass	AV	2.388G	47.50	54.00	-6.50	35.81	3	H	6	1.86	-
2440MHz	Pass	AV	2.44G	85.68	Inf	-Inf	35.91	3	H	6	1.86	-
2440MHz	Pass	AV	2.4968G	47.97	54.00	-6.03	36.02	3	H	6	1.86	-
2440MHz	Pass	AV	4.88G	36.51	54.00	-17.49	5.07	3	H	348	1.91	-
2440MHz	Pass	PK	2.3868G	59.91	74.00	-14.09	35.80	3	H	6	1.86	-
2440MHz	Pass	PK	2.4396G	100.49	Inf	-Inf	35.91	3	H	6	1.86	-
2440MHz	Pass	PK	2.4972G	59.58	74.00	-14.42	36.02	3	H	6	1.86	-
2440MHz	Pass	PK	4.88G	49.46	74.00	-24.54	5.07	3	H	348	1.91	-
2440MHz	Pass	AV	2.3864G	47.40	54.00	-6.60	35.80	3	V	253	1.25	-
2440MHz	Pass	AV	2.44G	82.02	Inf	-Inf	35.91	3	V	253	1.25	-
2440MHz	Pass	AV	2.4976G	47.93	54.00	-6.07	36.03	3	V	253	1.25	-
2440MHz	Pass	AV	4.88G	35.97	54.00	-18.03	5.07	3	V	46	1.95	-
2440MHz	Pass	PK	2.3416G	59.17	74.00	-14.83	35.72	3	V	253	1.25	-
2440MHz	Pass	PK	2.44G	95.67	Inf	-Inf	35.91	3	V	253	1.25	-
2440MHz	Pass	PK	2.4972G	59.73	74.00	-14.27	36.02	3	V	253	1.25	-
2440MHz	Pass	PK	4.88G	48.88	74.00	-25.12	5.07	3	V	46	1.95	-
2480MHz	Pass	AV	2.4798G	84.77	Inf	-Inf	35.99	3	H	7	1.99	-
2480MHz	Pass	AV	2.483502G	48.26	54.00	-5.74	36.00	3	H	7	1.99	-
2480MHz	Pass	AV	4.96G	35.82	54.00	-18.18	5.10	3	H	345	1.24	-
2480MHz	Pass	PK	2.4796G	98.98	Inf	-Inf	35.99	3	H	7	1.99	-
2480MHz	Pass	PK	2.487G	59.89	74.00	-14.11	36.00	3	H	7	1.99	-
2480MHz	Pass	PK	4.96G	48.80	74.00	-25.20	5.10	3	H	345	1.24	-
2480MHz	Pass	AV	2.48G	82.06	Inf	-Inf	35.99	3	V	293	1.88	-
2480MHz	Pass	AV	2.497G	47.93	54.00	-6.07	36.02	3	V	293	1.88	-
2480MHz	Pass	AV	4.96G	36.36	54.00	-17.64	5.10	3	V	21	1.21	-
2480MHz	Pass	PK	2.4798G	95.41	Inf	-Inf	35.99	3	V	293	1.88	-
2480MHz	Pass	PK	2.4984G	59.71	74.00	-14.29	36.03	3	V	293	1.88	-
2480MHz	Pass	PK	4.96G	49.30	74.00	-24.70	5.10	3	V	21	1.21	-

BT-LE(1Mbps)

2402MHz_TX

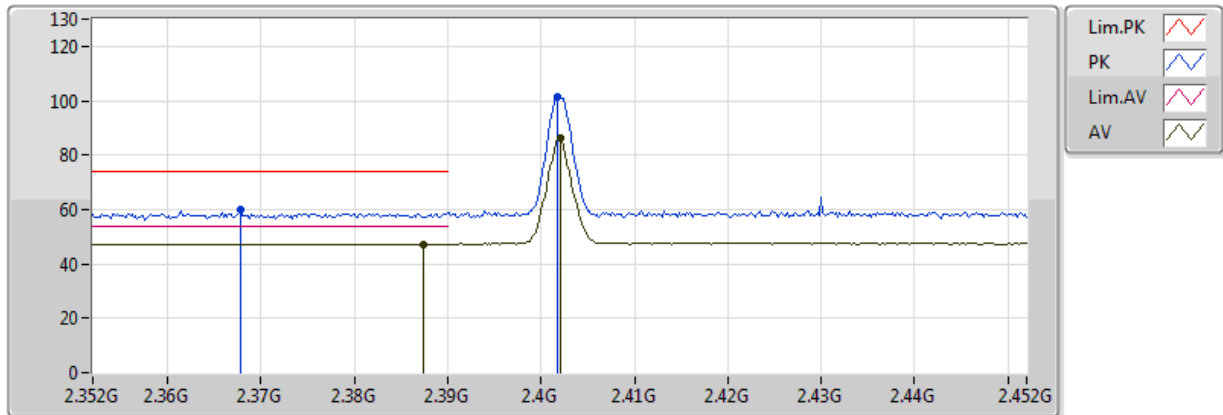


EUT= Y axis

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	2.3854G	47.34	54.00	-6.66	35.80	3	V	264	1.42	-
AV	2.402G	81.95	Inf	-Inf	35.83	3	V	264	1.42	-
PK	2.3702G	59.66	74.00	-14.34	35.77	3	V	264	1.42	-
PK	2.4022G	95.30	Inf	-Inf	35.83	3	V	264	1.42	-

BT-LE(1Mbps)

2402MHz_TX

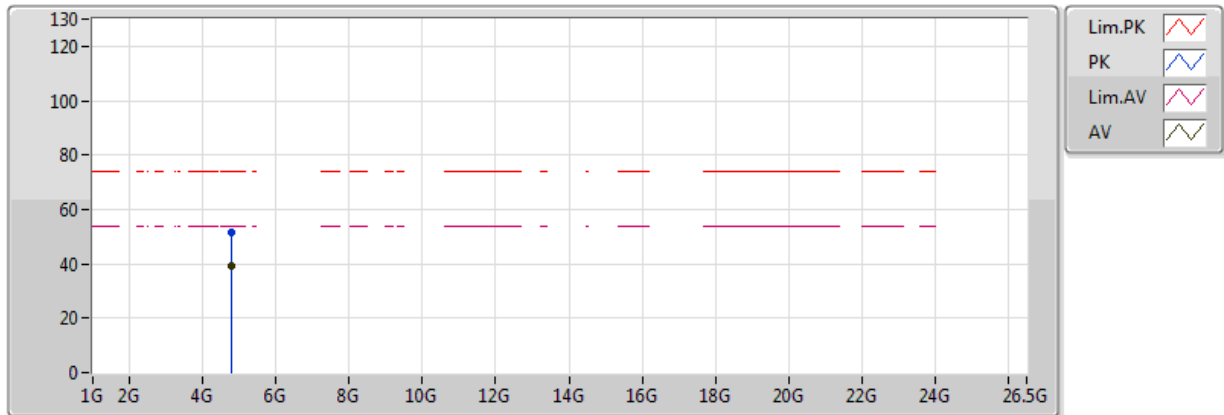


EUT= Y axis

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	2.3874G	47.31	54.00	-6.69	35.81	3	H	16	1.73	-
AV	2.402G	86.39	Inf	-Inf	35.83	3	H	16	1.73	-
PK	2.3678G	60.05	74.00	-13.95	35.77	3	H	16	1.73	-
PK	2.4018G	101.16	Inf	-Inf	35.83	3	H	16	1.73	-

BT-LE(1Mbps)

2402MHz_TX

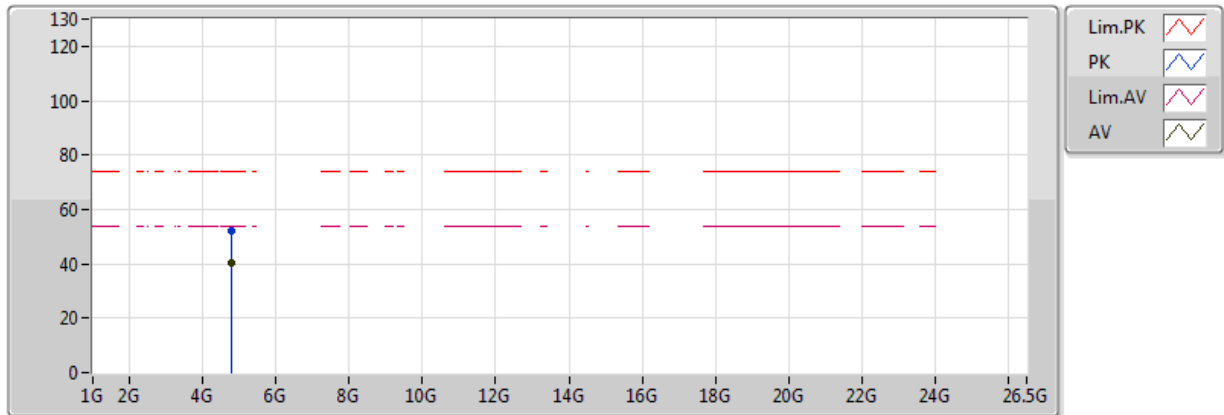


EUT= Y axis

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	4.804G	39.29	54.00	-14.71	5.05	3	V	360	1.50	-
PK	4.804G	51.32	74.00	-22.68	5.05	3	V	360	1.50	-

BT-LE(1Mbps)

2402MHz_TX

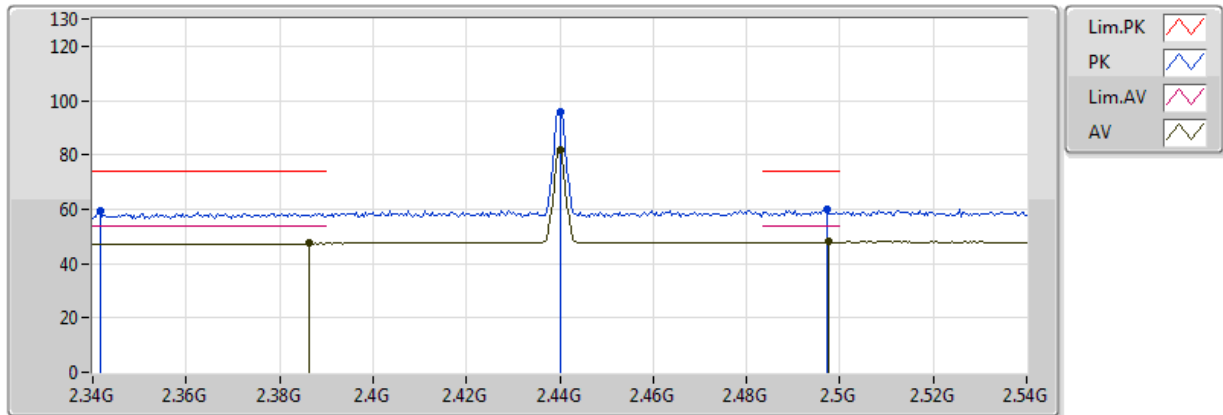


EUT= Y axis

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	4.804G	40.11	54.00	-13.89	5.05	3	H	355	1.24	-
PK	4.804G	52.15	74.00	-21.85	5.05	3	H	355	1.24	-

BT-LE(1Mbps)

2440MHz_TX

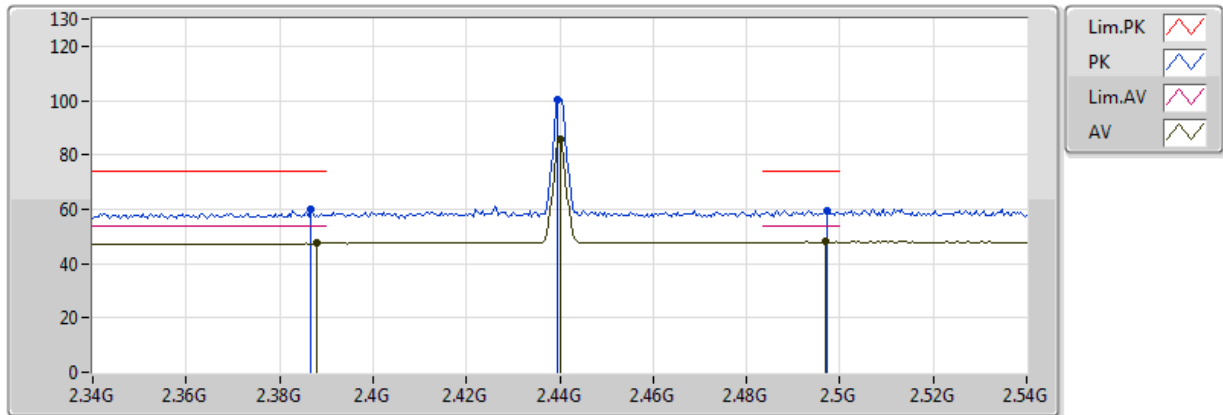


EUT= Y axis

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	2.3864G	47.40	54.00	-6.60	35.80	3	V	253	1.25	-
AV	2.44G	82.02	Inf	-Inf	35.91	3	V	253	1.25	-
AV	2.4976G	47.93	54.00	-6.07	36.03	3	V	253	1.25	-
PK	2.3416G	59.17	74.00	-14.83	35.72	3	V	253	1.25	-
PK	2.44G	95.67	Inf	-Inf	35.91	3	V	253	1.25	-
PK	2.4972G	59.73	74.00	-14.27	36.02	3	V	253	1.25	-

BT-LE(1Mbps)

2440MHz_TX

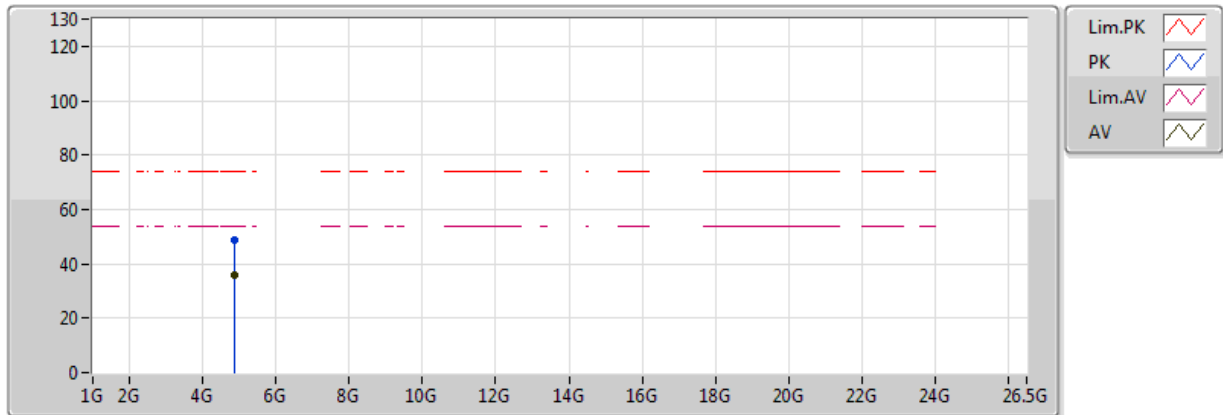


EUT= Y axis

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	2.388G	47.50	54.00	-6.50	35.81	3	H	6	1.86	-
AV	2.44G	85.68	Inf	-Inf	35.91	3	H	6	1.86	-
AV	2.4968G	47.97	54.00	-6.03	36.02	3	H	6	1.86	-
PK	2.3868G	59.91	74.00	-14.09	35.80	3	H	6	1.86	-
PK	2.4396G	100.49	Inf	-Inf	35.91	3	H	6	1.86	-
PK	2.4972G	59.58	74.00	-14.42	36.02	3	H	6	1.86	-

BT-LE(1Mbps)

2440MHz_TX

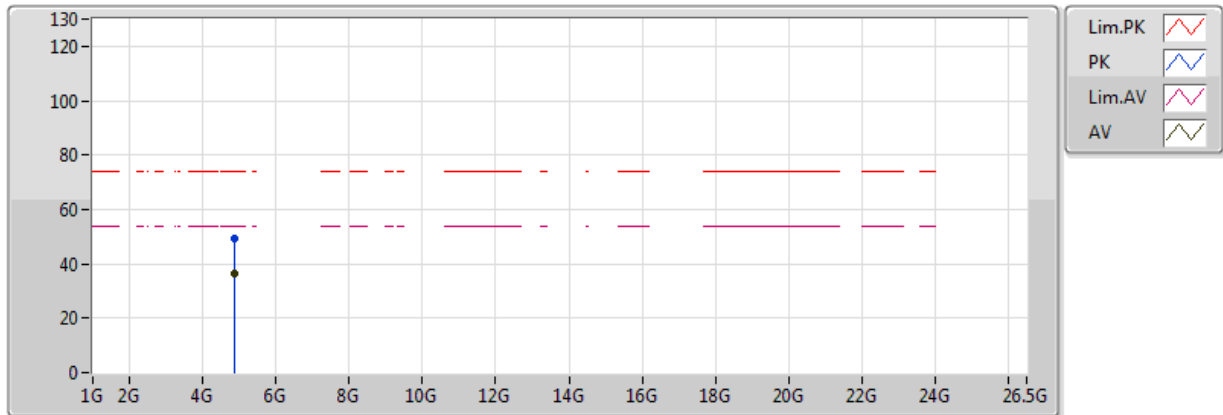


EUT= Y axis

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	4.88G	35.97	54.00	-18.03	5.07	3	V	46	1.95	-
PK	4.88G	48.88	74.00	-25.12	5.07	3	V	46	1.95	-

BT-LE(1Mbps)

2440MHz_TX

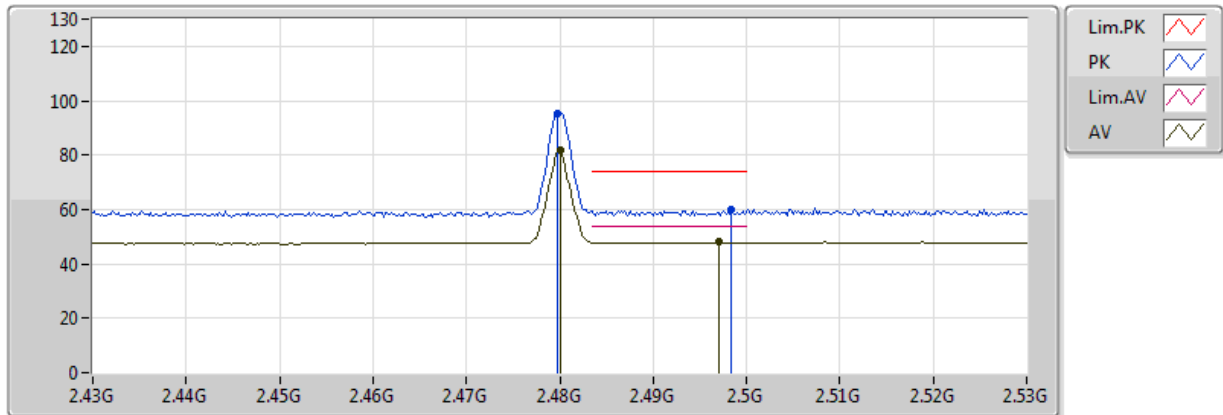


EUT= Y axis

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	4.88G	36.51	54.00	-17.49	5.07	3	H	348	1.91	-
PK	4.88G	49.46	74.00	-24.54	5.07	3	H	348	1.91	-

BT-LE(1Mbps)

2480MHz_TX

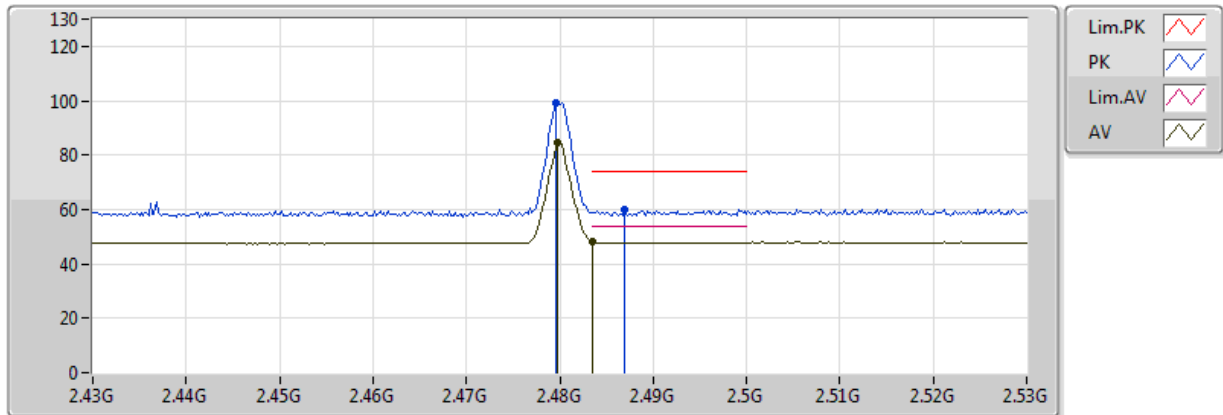


EUT= Y axis

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	2.48G	82.06	Inf	-Inf	35.99	3	V	293	1.88	-
AV	2.497G	47.93	54.00	-6.07	36.02	3	V	293	1.88	-
PK	2.4798G	95.41	Inf	-Inf	35.99	3	V	293	1.88	-
PK	2.4984G	59.71	74.00	-14.29	36.03	3	V	293	1.88	-

BT-LE(1Mbps)

2480MHz_TX

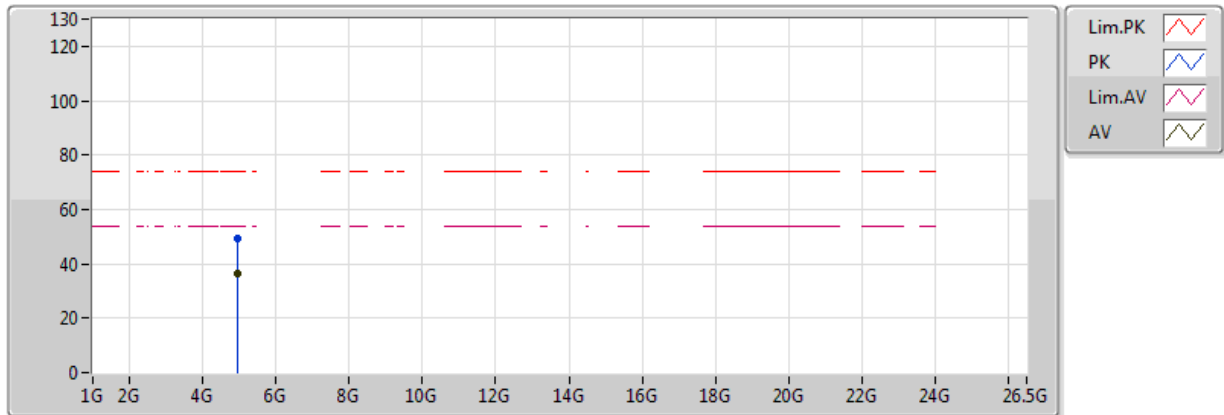


EUT= Y axis

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	2.4798G	84.77	Inf	-Inf	35.99	3	H	7	1.99	-
AV	2.483502G	48.26	54.00	-5.74	36.00	3	H	7	1.99	-
PK	2.4796G	98.98	Inf	-Inf	35.99	3	H	7	1.99	-
PK	2.487G	59.89	74.00	-14.11	36.00	3	H	7	1.99	-

BT-LE(1Mbps)

2480MHz_TX

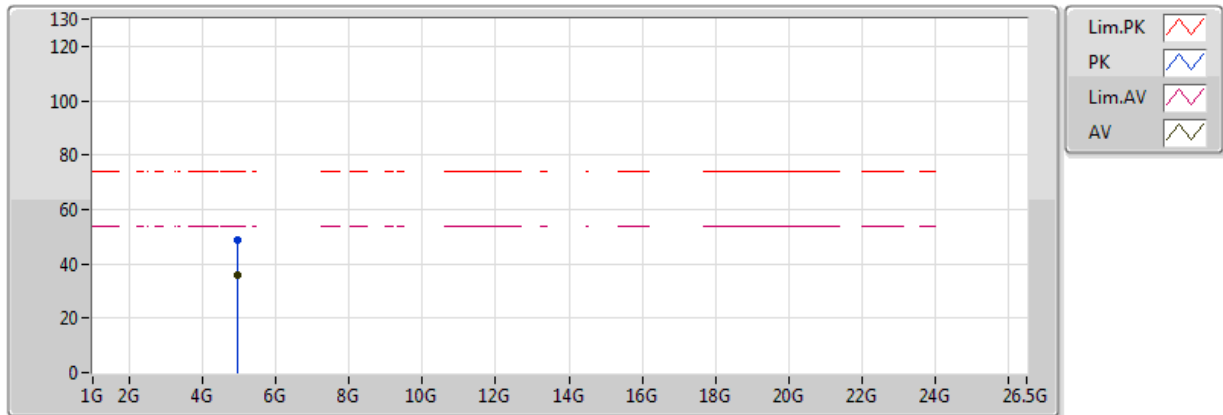


EUT= Y axis

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	4.96G	36.36	54.00	-17.64	5.10	3	V	21	1.21	-
PK	4.96G	49.30	74.00	-24.70	5.10	3	V	21	1.21	-

BT-LE(1Mbps)

2480MHz_TX



EUT= Y axis

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	4.96G	35.82	54.00	-18.18	5.10	3	H	345	1.24	-
PK	4.96G	48.80	74.00	-25.20	5.10	3	H	345	1.24	-