FCC Test Report

FCC ID	:	**PPQ-WP9333**
Equipment	:	**802.11 a/n/ac + b/g/n Access Point**
Brand Name	:	**LITE-ON, MOJO, ARISTA, WatchGuard**
Model Name	:	**WP9333,WP9331,O-105, WP9331-FM, O-105E, AP327X**
Applicant	:	**LITE-ON Technology Corp. Bldg. C, 90, Chien 1 Rd., Chung-Ho, New Taipei City, 23585 Taiwan**
Manufacturer	:	**Lite-On Network Communication (Dongguan) Limited 30#Keji Rd.,Yin Hu Industrial Area,Qingxi Town,DongGuan City,Guangdong,China**
Standard	:	**47 CFR FCC Part 15.247**

The product was received on Jan. 17, 2019, and testing was started from Feb. 01, 2019 and completed on Feb. 01, 2019. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Approved by: Allen Lin

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

Table of Contents

History of this test report

Report No.	Version	Description	Issued Date
FR790613-04AL	01	Initial issue of report	Mar. 29, 2019

Summary of Test Result

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

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and explanations:
None

Reviewed by: Sam Tsai

Report Producer: Amber Chiu

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

SKU#	Ant.	Port	Brand	Model Name	Antenna Type	Connector	Radio
1~8	1	2	Walsin	RFMTA400809MMLB901	Metal Antenna	MMCX	1
	2	1	Walsin	RFMTA400811MMLB901	Metal Antenna	MMCX	1
	3	2	Walsin	RFMTA400814MM5B901	Metal Antenna	MMCX	2
	4	1	Walsin	RFMTA400816MM5B901	Metal Antenna	MMCX	2
	5	2	Master Wave Technology Co., Ltd	98P7RPIPF000	PCB Antenna	I-PEX	3
	6	1	Master Wave Technology Co., Ltd	98P7RPIPF001	PCB Antenna	I-PEX	3
	7	1	Walsin	RFPCA381017MMAB702	PCB Antenna	MMCX	4
9	8	2	MasterWave	98615MNXX003	Dipole	N-type	1
	9	1					
	10	2	MasterWave	98615UNXX005	Dipole	N-type	2
	11	1					
10	12	2	Senao	5718A0394300	Dipole	N-type	1
	13	1					
	14	2	Senao	5718A0394300	Dipole	N-type	2
	15	1					
9~10	16	1	LITEON	30100011316D	PCB Antenna	MMCX	4

Ant.	Gain (dBi)						
	Radio 1	Radio 2		Radio 3			Radio 4
	2.4G	5G U-NII-1	5G U-NII-3	2.4G	5G U-NII-1	5G U-NII-3	BT
	with cable loss	with cable loss	with cable loss	with cable loss	with cable loss	with cable loss	with cable loss
1	5.9	-	-	-	-	-	-
2	5.9	-	-	-	-	-	-
3	-	6.2	6.4	-	-	-	-
4	-	6.2	6.4	-	-	-	-
5	-	-	-	6.5	4.7	6.0	-
6	-	-	-	6.5	4.8	5.5	-
7	-	-	-	-	-	-	8.6

Ant.	Gain (dBi)						
	Radio 1		Radio 2				Radio 4
	2.4G		5G U-NII-1		5G U-NII-3		BT
	without cable loss	with cable loss	without cable loss	with cable loss	without cable loss	with cable loss	with cable loss
8	5.0	4.46	-	-	-	-	-
9	5.0	4.46	-	-	-	-	-
10	-	-	7.0	6.19	7.0	6.19	-
11	-	-	7.0	6.19	7.0	6.19	-
12	5.5	4.96	-	-	-	-	-
13	5.5	4.96	-	-	-	-	-
14	-	-	7.0	6.19	7.0	6.19	-
15	-	-	7.0	6.19	7.0	6.19	-
16	-	-	-	-	-	-	8

Note 1: Regarding to more detail and other information, please refer to 1.1.5.

Note 2: The SKU#1~2 contain Radio 3 (2.4G)/(5G) RF module(Model Name: WM862FEMD, FCC ID: PPQ-WM862FEMD).

Note 3: For WiFi Function ; SKU# 1~8 use Internal antenna system, and SKU# 9~10 use external antenna system.

Note 4: The antenna gain with cable loss and was used to perform the worst configuration and result of that was recorded as the final test result.

For 2.4 GHz function:

For IEEE 802.11b/g/n/ac mode (2TX/2RX)

Radio 1

SKU#1~8: Ant. 1 (port 2) and Ant. 2 (port 1) could transmit/receive simultaneously.

SKU#9: Ant. 8 (port 2), Ant. 9 (port 1) could transmit/receive simultaneously.

SKU#10: Ant. 12 (port 2) and Ant. 13 (port 1) could transmit/receive simultaneously.

Radio 3

SKU#1~2: Ant. 5 (port 2) and Ant. 6 (port 1) could transmit/receive simultaneously.

For 5 GHz function:

For IEEE 802.11a/n/ac mode (2TX/2RX)

Radio 2 (For U-NII-1 and U-NII-3)

SKU#1~8: Ant. 3 (port 2) and Ant. 4 (port 1) could transmit/receive simultaneously.

SKU#9: Ant. 10 (port 2), Ant. 11 (port 1) could transmit/receive simultaneously.

SKU#10: Ant. 14 (port 2) and Ant. 15 (port 1) could transmit/receive simultaneously.

Radio 3 (For U-NII-1 and U-NII-3)

SKU#1~2: Ant. 5 (port 2) and Ant. 6 (port 1) could transmit/receive simultaneously.

For Bluetooth function:

For Bluetooth mode (1TX/1RX)

Radio 4

SKU#1~8: Only Ant. 7 (port 1) can be used as transmitting/receiving antenna.
SKU#9~10: Only Ant. 16 (port 1) can be used as transmitting/receiving antenna.

- The Signals support CDD and correlated, and transmits simultaneously in multiple channels in single or multiple frequency bands.
- If all antennas have the same gain, GANT:
  Directional gain = GANT + 10 log(NANT/NSS) dBi, where NSS = the number of independent spatial streams of data and GANT is the antenna gain in dBi. (This formula can also be applied when antennas have different gains if the highest antenna gain is substituted for GANT.)
- For power measurements on IEEE 802.11 devices,
  Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;
  Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;
  Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less,for 20-MHz channel widths with NANT ≥ 5.

1.1.3 EUT Information

Operational Condition				
EUT Power Type	From PoE			
EUT Function	☒	Point-to-multipoint	☐	Point-to-point
Type of EUT				
☒	Stand-alone			
☐	Combined (EUT where the radio part is fully integrated within another device)			
	Combined Equipment - Brand Name / Model No.:	…		
☐	Plug-in radio (EUT intended for a variety of host systems)			
	Host System - Brand Name / Model No.:	…		
☐	Other:			

1.1.4 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
BT-LE(1Mbps)	0.62	2.076	404.375u	3k

Note. If DC < 0.98, the DCF was added while measuring Output power and PSD.

1.1.5 Table for Multiple Listing

The brand/model names in the following table are all refer to the identical product.

SKU#	Brand Name	Model Name	CPU	CPU Brand	DDR	DDR Brand	Flash	Flash Brand/Model	NAND	NAND Brand/Model
1	LITE-ON	WP9333	IPQ4029	Qualcomm Atheros	256	Micron	64	1x64 MX25L51245GMI-08G MXIC	-	-
							32X2	2x32 25Q256JVFQ WINBOND	-	-
2			IPQ4019	Qualcomm Atheros	256	Micron	64	1x64 MX25L51245GMI-08G MXIC	-	-
							32X2	2x32 25Q256JVFQ WINBOND	-	-
3		WP9331	IPQ4029	Qualcomm Atheros	256	Micron	64	1x64 MX25L51245GMI-08G MXIC	-	-
							32X2	2x32 25Q256JVFQ WINBOND	-	-
4			IPQ4019	Qualcomm Atheros	256	Micron	64	1x64 MX25L51245GMI-08G MXIC	-	-
							32X2	2x32 25Q256JVFQ WINBOND	-	-
5		WP9331-FM	IPQ4029	Qualcomm Atheros	512	Micron	64	1x64 MX25L51245GMI-08G MXIC	-	-
							32X2	2x32 25Q256JVFQ WINBOND	-	-
6	MOJO	O-105	IPQ4029	Qualcomm Atheros	256	Micron	64	1x64 MX25L51245GMI-08G MXIC	-	-
							32X2	2x32 25Q256JVFQ WINBOND	-	-
7			IPQ4019	Qualcomm Atheros	256	Micron	64	1x64 MX25L51245GMI-08G MXIC	-	-
							32X2	2x32 25Q256JVFQ WINBOND	-	-
8	ARISTA	O-105	IPQ4029 (I-TEMP)	Qualcomm Atheros	512	Micron	32	2x32 25Q256JVFQ WINBOND	128	MT29F1G08ABAEAWP-IT
9	**ARISTA**	**O-105E**	**IPQ4029 (I-TEMP)**	**Qualcomm Atheros**	**512**	**Micron**	**32**	**2x32 25Q256JVFQ WINBOND**	**128**	**MT29F1G08ABAEAWP-IT**
10	**WatchGuard**	**O-105E / AP327X**	**IPQ4029 (I-TEMP)**	**Qualcomm Atheros**	**512**	**Micron**	**32**	**2x32 25Q256JVFQ WINBOND**	**128**	**MT29F1G08ABAEAWP-IT**

SKU#	Brand Name	Model Name	Radio 1	Radio 2	Radio 3	Radio 4	SFP	EUT Power Type
1~2	LITE-ON	WP9333	V	V	V	V	V	AC main / PoE
3~4	LITE-ON	WP9331	V	V	X	V	V	PoE
5	LITE-ON	WP9331-FM	V	V	X	V	V	PoE
6~7	MOJO	O-105	V	V	X	V	V	PoE
8	ARISTA	O-105	V	V	X	V	X	PoE
9	**ARISTA**	**O-105E**	**V**	**V**	**X**	**V**	**X**	**PoE**
10	**WatchGuard**	**O-105E** / **AP327X**	**V**	**V**	**X**	**V**	**X**	**PoE**

Note:
Radio 1: 802.11ac 2.4G only
Radio 2: 802.11ac 5GHz on board
Radio 3: 802.11agnac PCIe card, 2.4G+5GB1/B4
Radio 4: Bluetooth (BT LE and BR/EDR) on board
The models O-105E & AP327X for Brand Name WatchGuard are identical. All the models are identical, the difference models served as marketing strategy.

1.1.6 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FR790613-03AL

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
1. Modified equipment name.	N/A
2. Upgrade BLE version from 4.0(CSR8811A08) to 4.2(CSR8811A12)	All
3. Add a new sample model name: O-105E & AP327X and new type antenna 8~15(only use for O-105E & AP327X).	
4. Add antenna 16 and change it's location for model name: O-105E & AP327X.	

Note. Regarding to more detail and other information, please refer to 1.1.5.

1.2 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR FCC Part 15
- ANSI C63.10-2013
- KDB 558074 D01 v05r01

1.3 Testing Location Information

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

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
RF Conducted	TH01-HY	Andy	22.1~25°C / 50~60%	01/Feb/2019
Radiated	03CH09-HY	Kevin	24~26°C / 54~57%	01/Feb/2019
AC Conduction	CO04-HY	Andy	21.5~22.4°C / 52.7~53.3%	01/Feb/2019

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	3.54 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	1.6 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	4.3 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.9 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Conducted Emission	1.3 dB	Confidence levels of 95%
Temperature	0.7 °C	Confidence levels of 95%
Humidity	4 %	Confidence levels of 95%

2 Test Configuration of EUT

2.1 Test Condition

RF Conducted	Abbreviation	Remark
TnomVnom	Tnom	20°C
-	Vnom	120V

2.2 Test Channel Mode

Test Software Version	Dos

Mode	Power Setting
BT-LE(1Mbps)	-
2402MHz	08
2440MHz	08
2480MHz	07

2.3 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral
Operating Mode	CTX
1	PoE mode, SKU #10

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, SKU #10		
Operating Mode > 1GHz	CTX		
1	PoE mode, SKU #10		
Orthogonal Planes of EUT	**X Plane**	**Y Plane**	**Z Plane**
			
Worst Planes of EUT	V		

The Worst Case Mode for Following Conformance Tests	
Tests Item	Simultaneous Transmission Analysis
Operating Mode	CTX
1	Radio 1 (2.4G) + Radio 2 (5G) + Radio 3 (2.4G) + Radio 4 (BT)
2	Radio 1 (2.4G) + Radio 2 (5G) + Radio 3 (5G) + Radio 4 (BT)
Refer to Sporton Test Report No.: FA790613 for Co-location RF Exposure Evaluation.	

2.4 Accessories and Support Equipment

Accessories		
Ground Wire	**Signal Line**	6.4 meter, non-shielded cable, w/o ferrite core

Reminder: Regarding to more detail and other information, please refer to user manual.

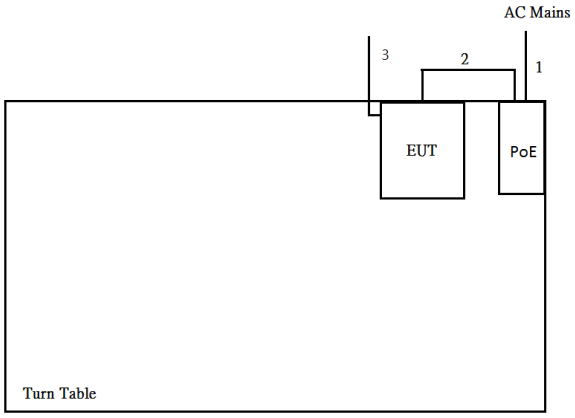
Support Equipment – AC Conduction				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	PoE	PowerDsine	7001G	-

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	AC Source	G.W	APS-9102	-

Support Equipment – Radiated Emission				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	PoE	D-Link	DWL-P200	-

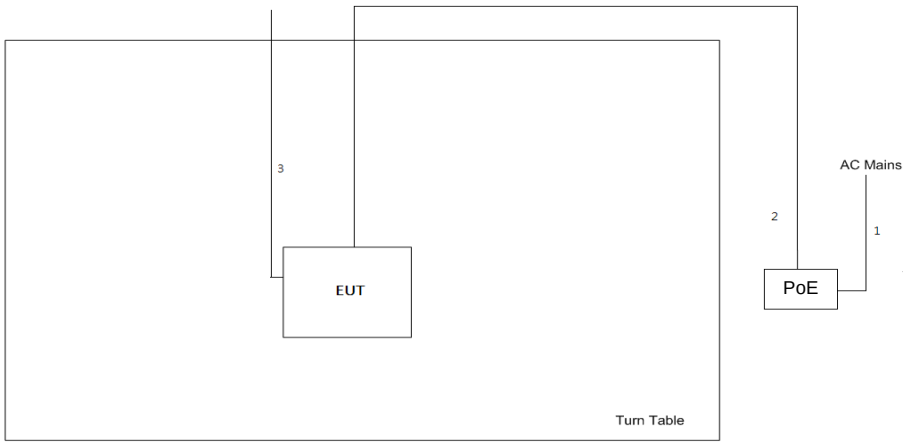
2.5 Test Setup Diagram

Test Setup Diagram – AC Line Conducted Emission Test



Item	Connection	Shielded	Length(m)	Remark
1	AC Power line	No	1.0	-
2	RJ45 Cable	No	10.0	-
3	Ground wire	No	6.4	-

Test Setup Diagram - Radiated Test



Item	Connection	Shielded	Length
1	AC power line	No	1.2
2	RJ-45 cable	No	10
3	Ground wire	No	6.4

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

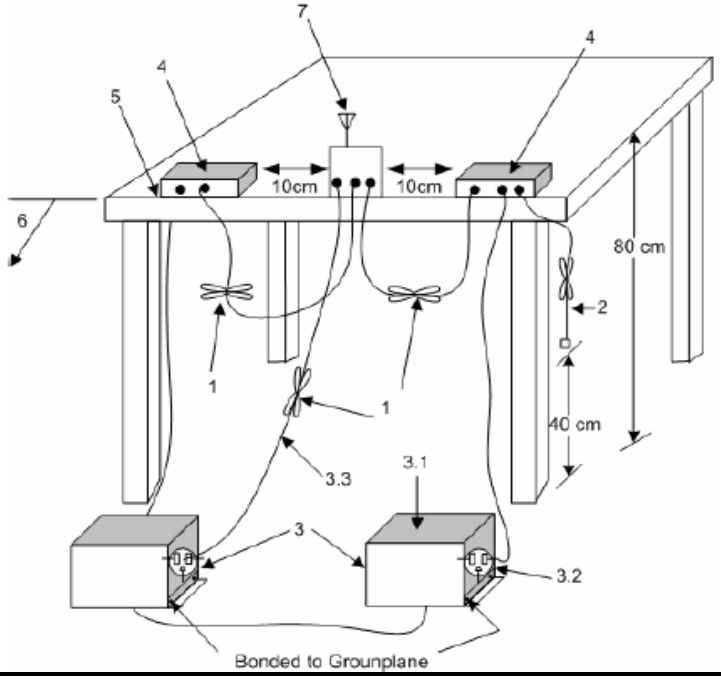
Refer a test equipment and calibration data table in this test report.

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

Refer as Appendix A

3.2 DTS Bandwidth

3.2.1 6dB Bandwidth Limit

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

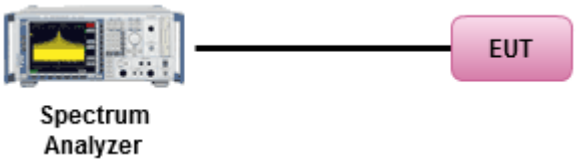
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

Test Method	
▪ For the emission bandwidth shall be measured using one of the options below:	
	☒ Refer as KDB 558074, clause 8.2 (11.8 of ANSI C63.10) DTS bandwidth measurement.
	☒ Refer as RSS-Gen, clause 6.7 for occupied bandwidth testing.
	☐ Refer as ANSI C63.10, clause 6.9.3 for occupied bandwidth testing.

3.2.4 Test Setup

Emission Bandwidth


3.2.5 Test Result of Emission Bandwidth

Refer as Appendix B

3.3 Maximum Conducted Output Power

3.3.1 Maximum Conducted Output Power Limit

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

3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

Test Method	
▪ Maximum Peak Conducted Output Power	
	☐ Refer as KDB 558074, clause 8.3.1.1 (11.9.1.1 of ANSI C63.10) RBW ≥ EBW method.
	☐ Refer as KDB 558074, clause 8.3.1.2 (11.9.1.2 of ANSI C63.10) integrated band power method.
	☐ Refer as KDB 558074, clause 8.3.1.3 (11.9.1.3 of ANSI C63.10) peak power meter.
▪ Maximum Average Conducted Output Power	
	☐ Refer as KDB 558074, clause 8.3.2.2 (11.9.2.2 of ANSI C63.10) using a spectrum analyzer.
	☒ Refer as KDB 558074, clause 8.3.2.3 (11.9.2.3 of ANSI C63.10) using a power meter.
▪ For conducted measurement.	
	▪ If the EUT supports multiple transmit chains using options given below: Refer as KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.
	▪ If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + \ldots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$

3.3.4 Test Setup

Maximum Conducted Output Power (Power Meter)


3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix C

3.4 Power Spectral Density

3.4.1 Power Spectral Density Limit

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

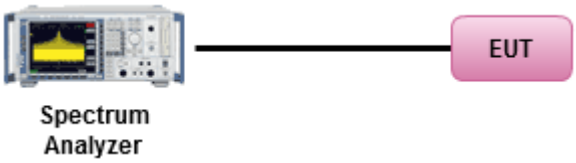
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

Test Method		
▪ Peak power spectral density procedures that the same method as used to determine the conducted output power. If maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum conducted output power was measured to demonstrate compliance to the output power limit, then one of the average PSD procedures shall be used, as applicable based on the following criteria (the peak PSD procedure is also an acceptable option).		
	☒ Refer as KDB 558074, clause 8.4 (11.10 of ANSI C63.10) Method PKPSD.	
▪ For conducted measurement.		
	▪ If The EUT supports multiple transmit chains using options given below:	
		▪ Measure and sum the spectra across the outputs. Refer as KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the NTX output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.

3.4.4 Test Setup

Power Spectral Density


3.4.5 Test Result of Power Spectral Density

Refer as Appendix D

3.5 Emissions in Non-restricted Frequency Bands

3.5.1 Emissions in Non-restricted Frequency Bands Limit

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

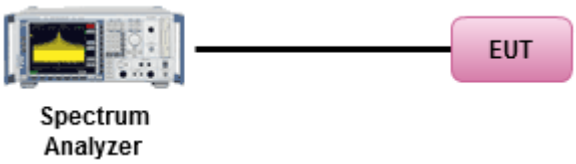
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

Test Method
▪ Refer as KDB 558074, clause 8.5 (11.11 of ANSI C63.10) for non-restricted frequency bands.

3.5.4 Test Setup

Emissions in Non-restricted Frequency Bands


3.5.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix E

3.6 Emissions in Restricted Frequency Bands

3.6.1 Emissions in Restricted Frequency Bands Limit

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

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

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB / decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

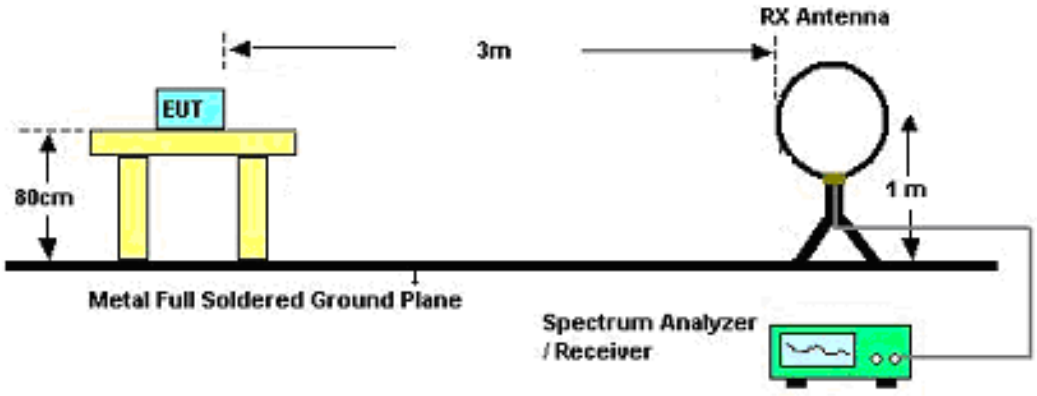
3.6.2 Measuring Instruments

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

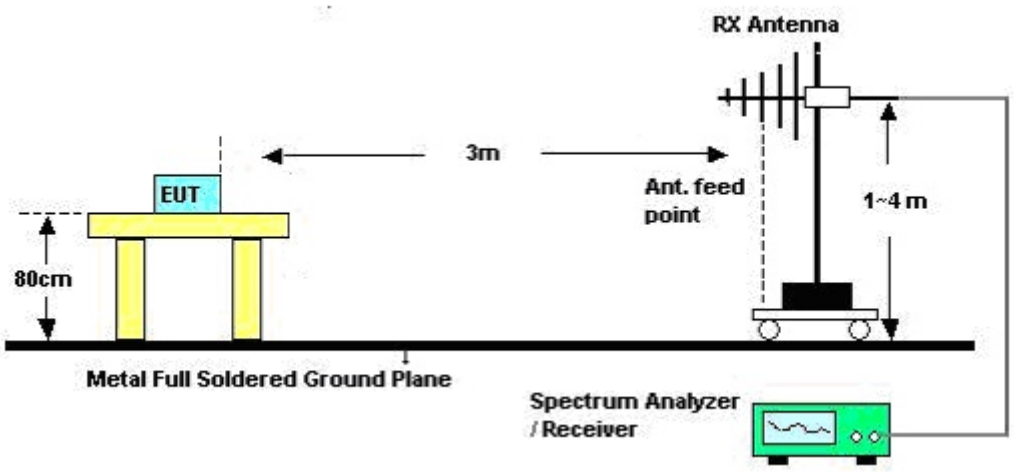
3.6.3 Test Procedures

Test Method	
▪ The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].	
▪ Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.	
▪ For the transmitter unwanted emissions shall be measured using following options below:	
	▪ Refer as KDB 558074, clause 8.6 (11.12 of ANSI C63.10) for restricted frequency bands.
▪ For the transmitter band-edge emissions shall be measured using following options below:	
	▪ Refer as KDB 558074 clause 8.7.1, When the performing peak or average radiated measurements, emissions within 2 MHz of the authorized band edge may be measured using the marker-delta method described below.
	▪ Refer as KDB 558074, clause 8.7.2 (6.10.6 of ANSI C63.10) for marker-delta method for band-edge measurements.
	▪ Refer as KDB 558074, clause 8.7.3 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).
▪ Use the following spectrum analyzer settings:	
	▪ Set RBW=100 kHz for f < 1 GHz; VBW=3 * RBW; Sweep = auto; Detector function = peak; Trace = max hold.
	▪ Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement. For average measurement, refer as 1.1.4.

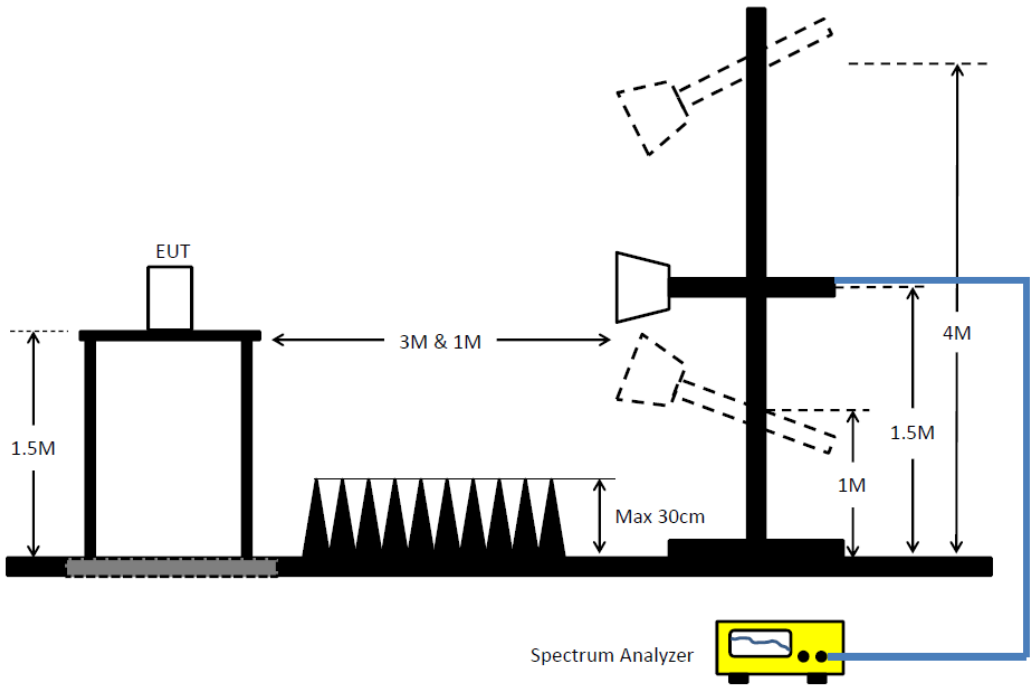
3.6.4 Test Setup

Emissions in Restricted Frequency Bands
9kHz ~30MHz


30MHz~1GHz



Above 1GHz



3.6.5 Test Result of Emissions in Restricted Frequency Bands (Below 30MHz)

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

3.6.6 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix F

4 Test Equipment and Calibration Data

Instrument for AC Conduction

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

NCR : Non-Calibration Require

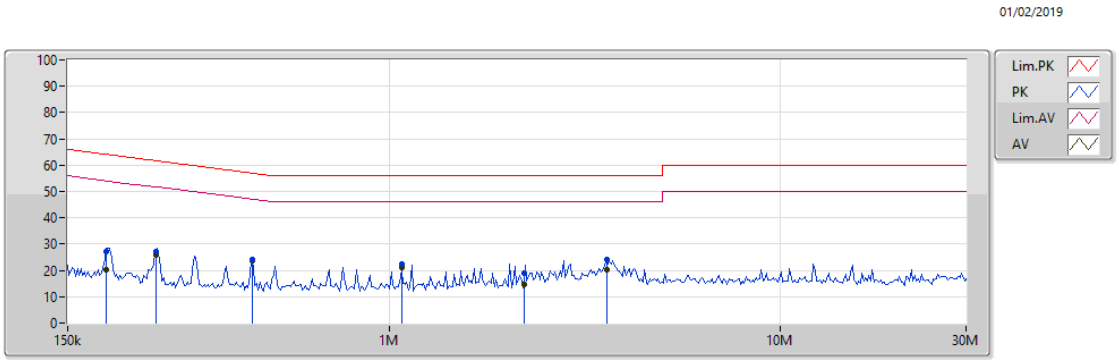
Instrument for Conducted Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
Signal Analyzer	R&S	FSV40	101500	10Hz ~ 40GHz	18/Jul/2018	17/Jul/2019
Signal Generator	R&S	SMB100A	175727	100kHz~40GHz	26/Oct/2018	25/Oct/2019
Power Sensor	Anritsu	MA2411B	0917017	300MHz ~ 40GHz	05/Feb/2018	04/Feb/2019
Power Meter	Anritsu	ML2495A	0949003	300MHz ~ 40GHz	05/Feb/2018	04/Feb/2019
Cable 0.2m	HUBER	MY10710/4	RF Cable - 01	30MHz~18G	11/Jan/2019	10/Jan/2020
Cable 0.2m	HUBER	MY10711/4	RF Cable - 02	30MHz~18G	11/Jan/2019	10/Jan/2020
Cable 0.5m	HUBER	MY10714/4	RF Cable – 05	30MHz~1G	11/Jan/2019	10/Jan/2020

Instrument for Radiated Test

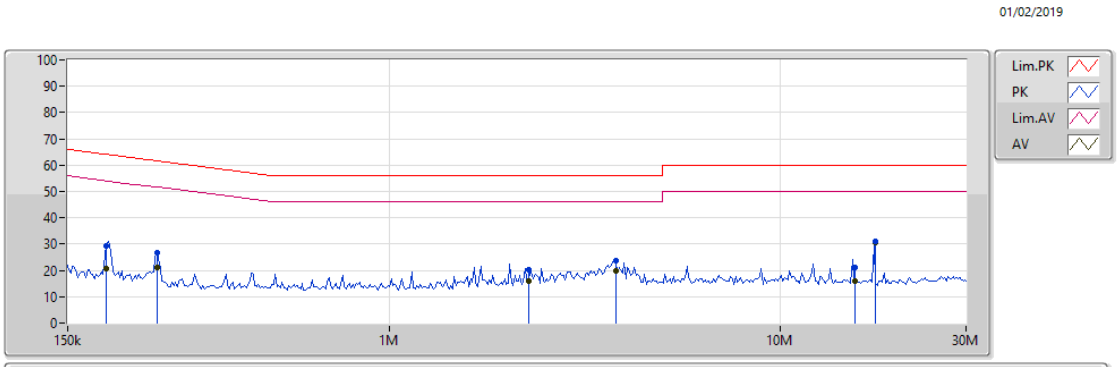
Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	TDK	SAC-3M	03CH09-HY	30MHz ~ 1GHz	23/Apr/2018	22/Apr/2019
3m Semi Anechoic Chamber	TDK	SAC-3M	03CH09-HY	1GHz ~ 18GHz	14/Jun/2018	13/Jun/2019
Microwave Preamplifier	Agilent	8449B	3008A02096	1GHz ~ 26.5GHz	10/May/2018	09/May/2019
Amplifier	EMC	EMC9135	980232	9KHz~1GHz	27/Apr/2018	26/Apr/2019
EMI Test Receiver	R&S	ESR3	102052	9kHz ~ 3.6GHz	10/Apr/2018	09/Apr/2019
EXA Signal Analyzer	KEYSIGHT	N9010A	MY54200885	10Hz ~ 44GHz	31/Jul/2018	30/Jul/2019
Bilog Antenna & 5dB Attenuator	TESEQ & MTJ	CBL6111D & MTJ6102-05	35418 / 3	30MHz~1GHz	02/Oct/2018	03/Oct/2019
Double Ridged Guide Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA9120 D 1534	1GHz~18GHz	30/Apr/2018	29/Apr/2019
Loop Antenna	TESEQ	HLA 6120	31244	9k-30MHz	29/Mar/2018	28/Mar/2019
RF Cable-R03m	Jye Bao	RG142	CB031	9kHz ~ 1GHz	1/Feb/2019	31/Jan/2020
RF Cable-high	HUBER+SUHNER	SUCOFLEX104	SN 556626/4 + 556627	1GHz ~ 40GHz	14/Mar/2018	13/Mar/2019

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



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	188.429k	27.27	64.11	-36.84	19.47	Neutral	-	7.80	9.59	0.01	9.87
AV	188.429k	20.17	54.11	-33.94	19.47	Neutral	-	0.70	9.59	0.01	9.87
QP	252.216k	27.24	61.68	-34.44	19.47	Neutral	-	7.77	9.59	0.01	9.87
AV	252.216k	25.74	51.68	-25.94	19.47	Neutral	-	6.27	9.59	0.01	9.87
QP	444.673k	24.26	56.98	-32.72	19.48	Neutral	-	4.78	9.59	0.01	9.88
AV	444.673k	23.65	46.98	-23.33	19.48	Neutral	"Worst"	4.17	9.59	0.01	9.88
QP	1.078M	22.32	56.00	-33.68	19.49	Neutral	-	2.83	9.59	0.02	9.88
AV	1.078M	21.30	46.00	-24.70	19.49	Neutral	-	1.81	9.59	0.02	9.88
QP	2.221M	19.13	56.00	-36.87	19.53	Neutral	-	-0.40	9.61	0.03	9.89
AV	2.221M	14.81	46.00	-31.19	19.53	Neutral	-	-4.72	9.61	0.03	9.89
QP	3.616M	24.10	56.00	-31.90	19.54	Neutral	-	4.56	9.61	0.04	9.89
AV	3.616M	20.24	46.00	-25.76	19.54	Neutral	-	0.70	9.61	0.04	9.89

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



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	188.811k	29.16	64.09	-34.93	19.48	Line	-	9.68	9.60	0.01	9.87
AV	188.811k	20.72	54.09	-33.37	19.48	Line	-	1.24	9.60	0.01	9.87
QP	254.387k	26.71	61.62	-34.91	19.48	Line	-	7.23	9.60	0.01	9.87
AV	254.387k	21.09	51.62	-30.53	19.48	Line	-	1.61	9.60	0.01	9.87
QP	2.281M	20.43	56.00	-35.57	19.55	Line	-	0.88	9.62	0.04	9.89
AV	2.281M	16.01	46.00	-29.99	19.55	Line	-	-3.54	9.62	0.04	9.89
QP	3.814M	23.58	56.00	-32.42	19.56	Line	-	4.02	9.63	0.04	9.89
AV	3.814M	19.90	46.00	-26.10	19.56	Line	-	0.34	9.63	0.04	9.89
QP	15.573M	21.13	60.00	-38.87	19.63	Line	-	1.50	9.64	0.09	9.90
AV	15.573M	16.04	50.00	-33.96	19.63	Line	-	-3.59	9.64	0.09	9.90
QP	17.522M	31.13	60.00	-28.87	19.64	Line	-	11.49	9.64	0.10	9.90
AV	17.522M	30.59	50.00	-19.41	19.64	Line	"Worst"	10.95	9.64	0.10	9.90

Summary

Mode	Max-N dB (Hz)	Min-N dB (Hz)	Max-OBW (Hz)	Min-OBW (Hz)	ITU-Code
2.4-2.4835GHz	-	-	-		
BT-LE(1Mbps)	700k	687.5k	1.027M	1.026M	1M03F1D

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;

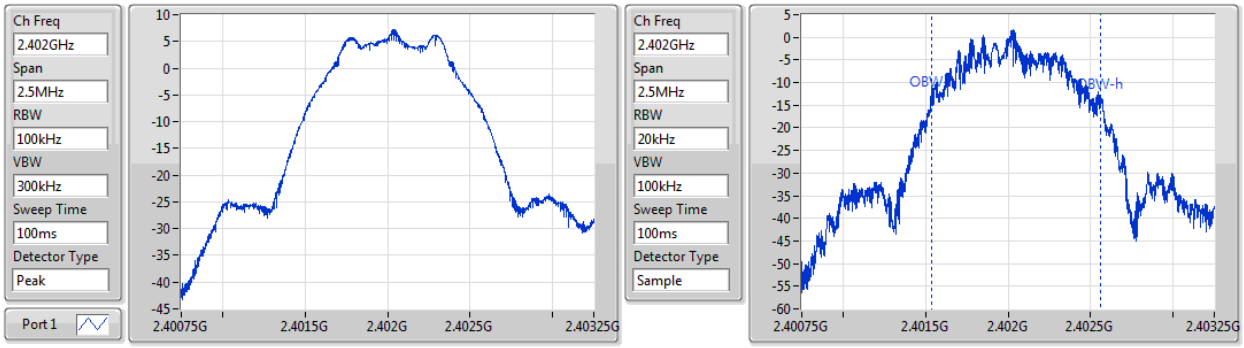
Result

Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
BT-LE(1Mbps)	-	-	-	-
2402MHz_TnomVnom	Pass	500K	700k	1.027M
2440MHz_TnomVnom	Pass	500K	687.5k	1.026M
2480MHz_TnomVnom	Pass	500K	697.5k	1.026M

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

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

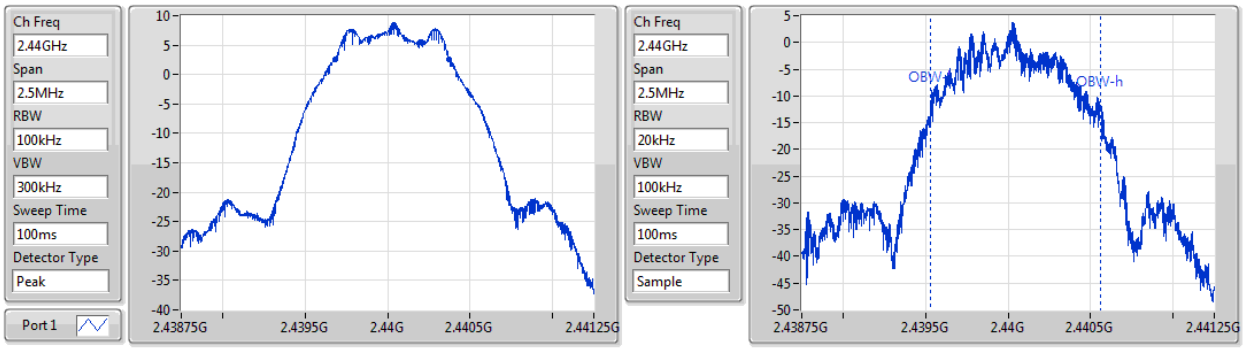
2402MHz



6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
700k	2.401689G	2.402389G	1.027M	2.401534G	2.402561G	500k	1

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

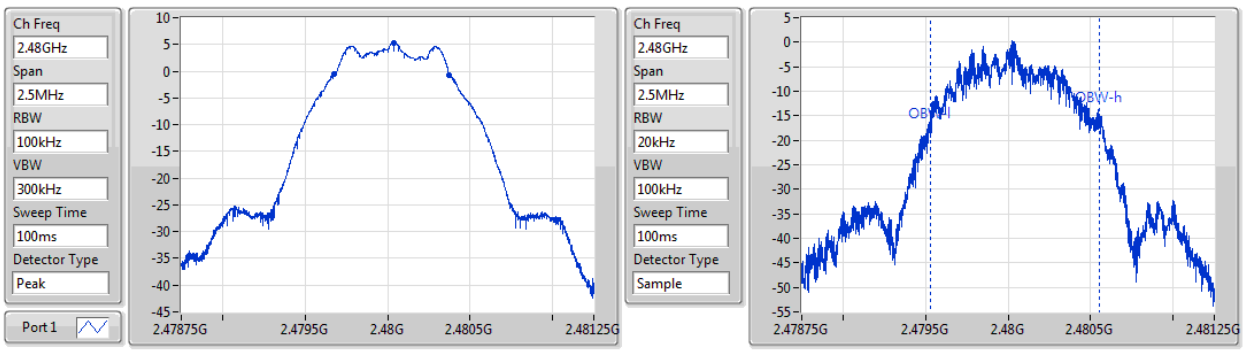
2440MHz



6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
687.5k	2.439686G	2.440374G	1.026M	2.439531G	2.440557G	500k	1

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

2480MHz



6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
697.5k	2.479678G	2.480375G	1.026M	2.479529G	2.480555G	500k	1

Summary

Mode	Power	Power
	(dBm)	(W)
2.4-2.4835GHz	-	-
BT-LE(1Mbps)	7.17	0.00521

Result

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-LE(1Mbps)	-	-	-	-
2402MHz_TnomVnom	Pass	8.60	5.62	27.40
2440MHz_TnomVnom	Pass	8.60	7.17	27.40
2480MHz_TnomVnom	Pass	8.60	4.22	27.40

Summary

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
BT-LE(1Mbps)	-6.83

RBW=3kHz.

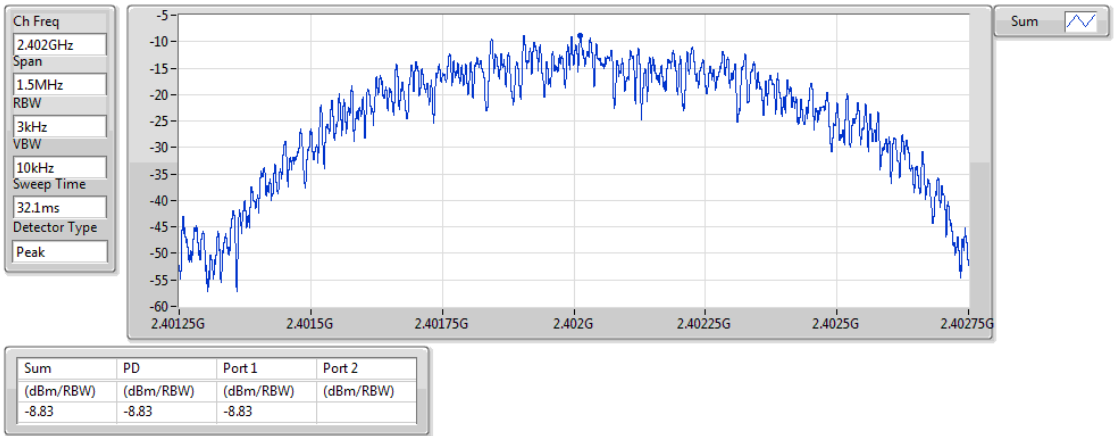
Result

Mode	Result	Gain (dBi)	PD (dBm/RBW)	PD Limit (dBm/RBW)
BT-LE(1Mbps)	-	-	-	-
2402MHz_TnomVnom	Pass	8.60	-8.83	5.40
2440MHz_TnomVnom	Pass	8.60	-6.83	5.40
2480MHz_TnomVnom	Pass	8.60	-10.05	5.40

RBW=3kHz.

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

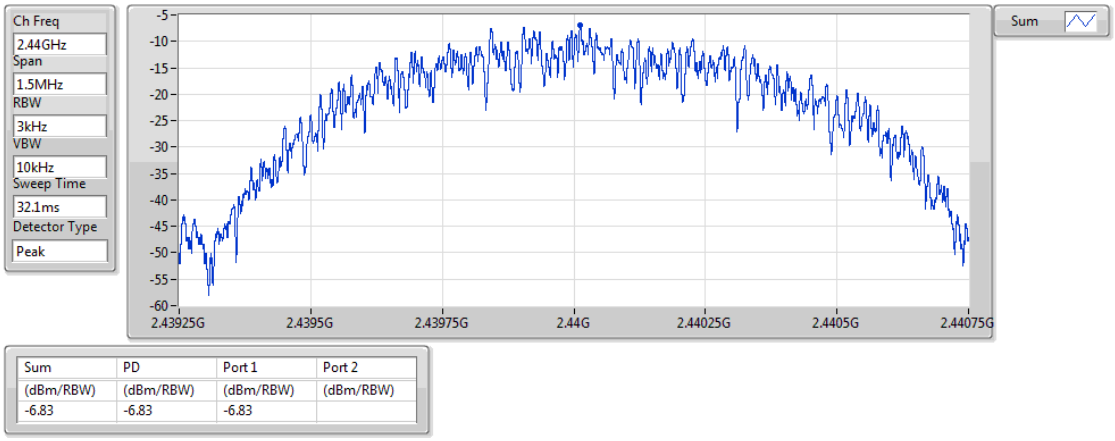
2402MHz



Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-8.83	-8.83	-8.83	

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

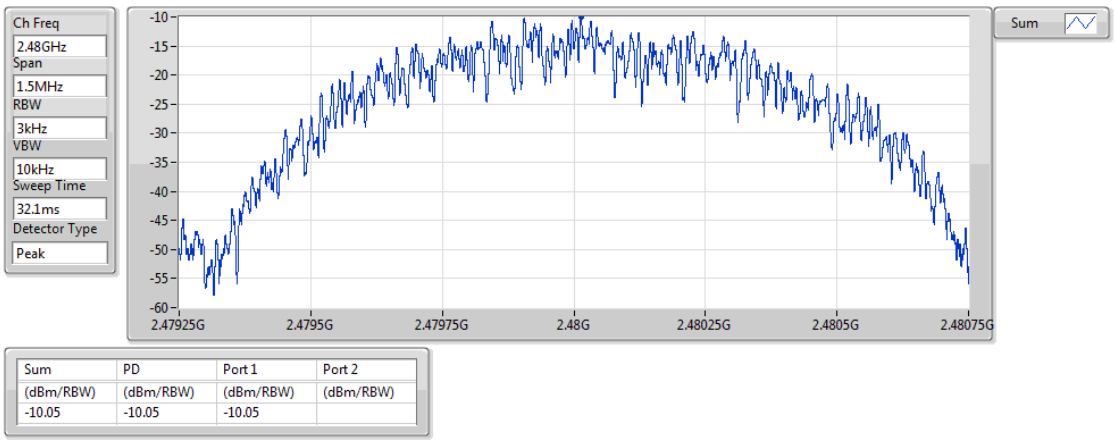
2440MHz



Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-6.83	-6.83	-6.83	

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

2480MHz



Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-10.05	-10.05	-10.05	

Summary

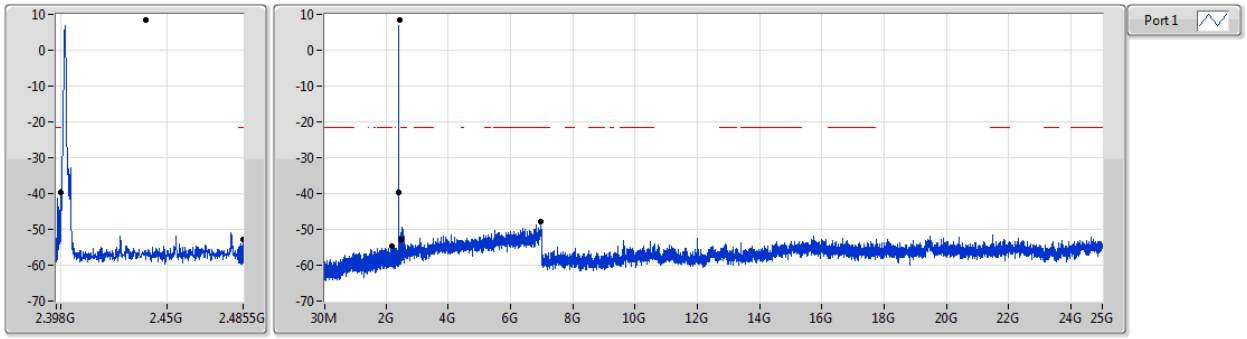
Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	2.44008G	8.32	-21.68	2.199088G	-54.79	2.399992G	-39.73	2.485308G	-52.90	6.954628G	-47.87	1

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	2.44008G	8.32	-21.68	2.199088G	-54.79	2.399992G	-39.73	2.485308G	-52.90	6.954628G	-47.87	1
2440MHz_TnomVnom	Pass	2.44008G	8.32	-21.68	1.714832G	-54.89	2.398012G	-54.94	2.484416G	-54.07	6.954628G	-47.98	1
2480MHz_TnomVnom	Pass	2.44008G	8.32	-21.68	2.03096G	-54.39	2.399552G	-54.12	2.484868G	-53.62	6.991214G	-48.39	1

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

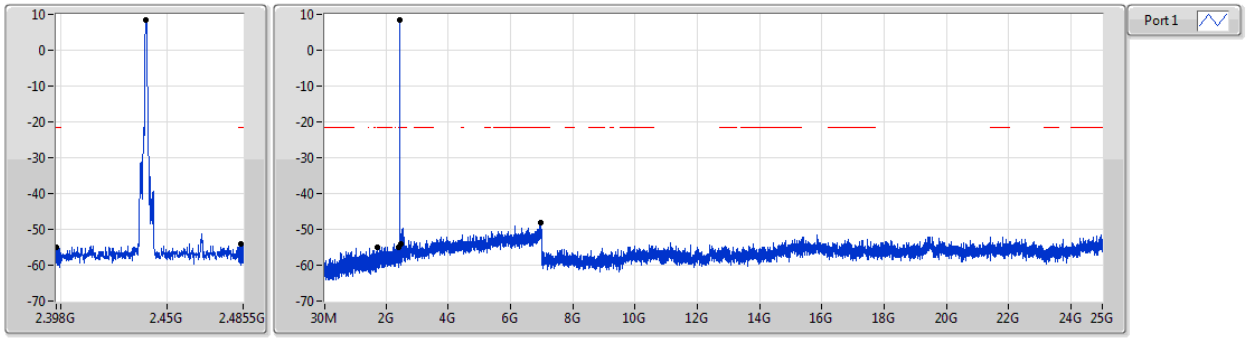
2402MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.44008G	8.32	-21.68	2.199088G	-54.79	2.399992G	-39.73	2.485308G	-52.90	6.954628G	-47.87	1

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

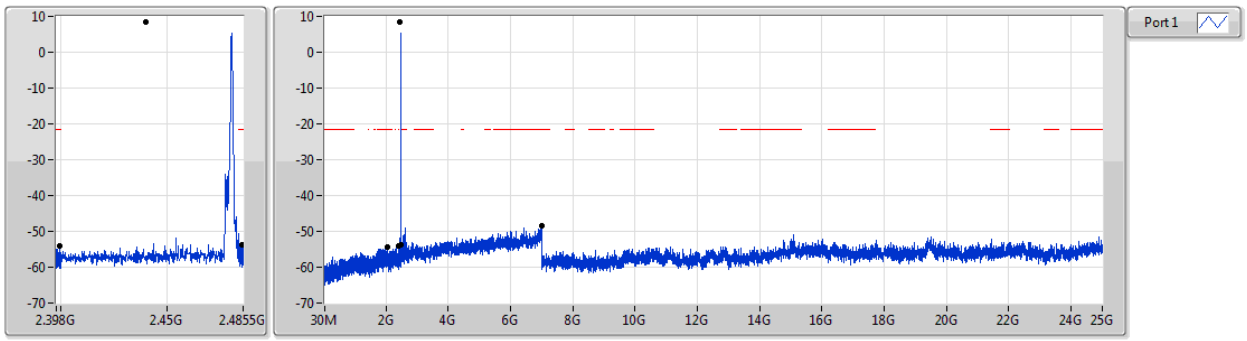
2440MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.44008G	8.32	-21.68	1.714832G	-54.89	2.398012G	-54.94	2.484416G	-54.07	6.954628G	-47.98	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
2.44008G	8.32	-21.68	2.03096G	-54.39	2.399552G	-54.12	2.484868G	-53.62	6.991214G	-48.39	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	286.08M	38.86	46.00	-7.14	-6.17	3	Horizontal	360	1.00	-

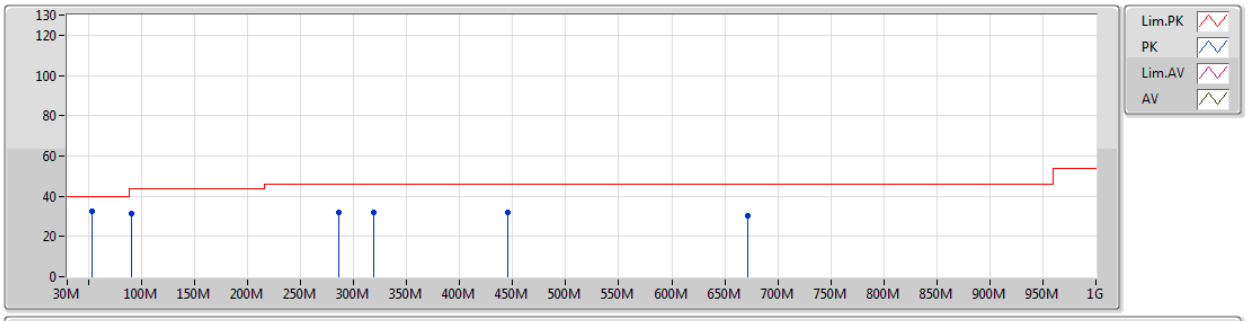
Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-
2440MHz	Pass	PK	53.28M	32.23	40.00	-7.77	-14.69	3	Vertical	0	1.00	-
2440MHz	Pass	PK	90.14M	31.33	43.50	-12.17	-12.55	3	Vertical	0	1.00	-
2440MHz	Pass	PK	286.08M	32.13	46.00	-13.87	-6.17	3	Vertical	0	1.00	-
2440MHz	Pass	PK	319.06M	31.69	46.00	-14.31	-5.51	3	Vertical	0	1.00	-
2440MHz	Pass	PK	445.16M	31.68	46.00	-14.32	-2.96	3	Vertical	0	1.00	-
2440MHz	Pass	PK	672.14M	30.25	46.00	-15.75	-0.28	3	Vertical	0	1.00	-
2440MHz	Pass	PK	35.82M	25.35	40.00	-14.65	-7.68	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	90.14M	30.20	43.50	-13.30	-12.55	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	286.08M	38.86	46.00	-7.14	-6.17	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	319.06M	36.51	46.00	-9.49	-5.51	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	441.28M	33.78	46.00	-12.22	-3.02	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	660.5M	32.59	46.00	-13.41	-0.28	3	Horizontal	360	1.00	-

BT-LE(1Mbps)

2440MHz_PoE

01/02/2019

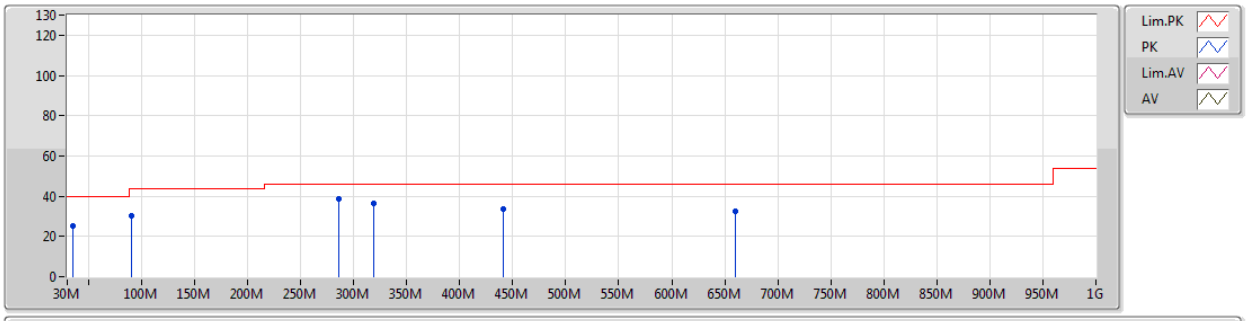


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
PK	53.28M	32.23	40.00	-7.77	-14.69	3	Vertical	0	1.00	-
PK	90.14M	31.33	43.50	-12.17	-12.55	3	Vertical	0	1.00	-
PK	286.08M	32.13	46.00	-13.87	-6.17	3	Vertical	0	1.00	-
PK	319.06M	31.69	46.00	-14.31	-5.51	3	Vertical	0	1.00	-
PK	445.16M	31.68	46.00	-14.32	-2.96	3	Vertical	0	1.00	-
PK	672.14M	30.25	46.00	-15.75	-0.28	3	Vertical	0	1.00	-

BT-LE(1Mbps)

2440MHz_PoE

01/02/2019



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
PK	35.82M	25.35	40.00	-14.65	-7.68	3	Horizontal	360	1.00	-
PK	90.14M	30.20	43.50	-13.30	-12.55	3	Horizontal	360	1.00	-
PK	286.08M	38.86	46.00	-7.14	-6.17	3	Horizontal	360	1.00	-
PK	319.06M	36.51	46.00	-9.49	-5.51	3	Horizontal	360	1.00	-
PK	441.28M	33.78	46.00	-12.22	-3.02	3	Horizontal	360	1.00	-
PK	660.5M	32.59	46.00	-13.41	-0.28	3	Horizontal	360	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	2.492G	48.93	54.00	-5.07	30.72	3	Vertical	360	1.70	-

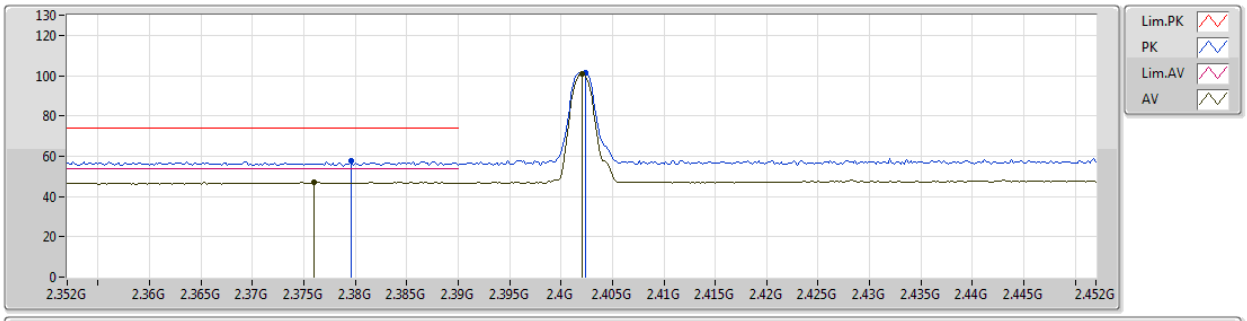
Result

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	2.376G	47.27	54.00	-6.73	30.33	3	Vertical	5	1.71	-
2402MHz	Pass	AV	2.402G	100.97	Inf	-Inf	30.41	3	Vertical	5	1.71	-
2402MHz	Pass	PK	2.3796G	57.54	74.00	-16.46	30.34	3	Vertical	5	1.71	-
2402MHz	Pass	PK	2.4024G	101.69	Inf	-Inf	30.42	3	Vertical	5	1.71	-
2402MHz	Pass	AV	2.3884G	47.11	54.00	-6.89	30.37	3	Horizontal	358	2.06	-
2402MHz	Pass	AV	2.402G	99.95	Inf	-Inf	30.41	3	Horizontal	358	2.06	-
2402MHz	Pass	PK	2.3598G	58.08	74.00	-15.92	30.27	3	Horizontal	358	2.06	-
2402MHz	Pass	PK	2.4024G	100.64	Inf	-Inf	30.42	3	Horizontal	358	2.06	-
2402MHz	Pass	AV	4.80386G	41.54	54.00	-12.46	5.86	3	Vertical	360	1.74	-
2402MHz	Pass	PK	4.80458G	48.92	74.00	-25.08	5.86	3	Vertical	360	1.74	-
2402MHz	Pass	AV	4.80377G	39.72	54.00	-14.28	5.86	3	Horizontal	17	1.31	-
2402MHz	Pass	PK	4.80352G	48.13	74.00	-25.87	5.85	3	Horizontal	17	1.31	-
2440MHz	Pass	AV	2.344G	47.06	54.00	-6.94	30.23	3	Vertical	360	1.70	-
2440MHz	Pass	AV	2.44G	103.20	Inf	-Inf	30.55	3	Vertical	360	1.70	-
2440MHz	Pass	AV	2.492G	48.93	54.00	-5.07	30.72	3	Vertical	360	1.70	-
2440MHz	Pass	PK	2.3844G	57.48	74.00	-16.52	30.36	3	Vertical	360	1.70	-
2440MHz	Pass	PK	2.4396G	103.88	Inf	-Inf	30.55	3	Vertical	360	1.70	-
2440MHz	Pass	PK	2.492G	58.64	74.00	-15.36	30.72	3	Vertical	360	1.70	-
2440MHz	Pass	AV	2.362G	47.23	54.00	-6.77	30.29	3	Horizontal	348	1.81	-
2440MHz	Pass	AV	2.44G	101.85	Inf	-Inf	30.55	3	Horizontal	348	1.81	-
2440MHz	Pass	AV	2.492G	48.46	54.00	-5.54	30.72	3	Horizontal	348	1.81	-
2440MHz	Pass	PK	2.358G	57.69	74.00	-16.31	30.27	3	Horizontal	348	1.81	-
2440MHz	Pass	PK	2.4396G	102.52	Inf	-Inf	30.55	3	Horizontal	348	1.81	-
2440MHz	Pass	PK	2.4924G	58.92	74.00	-15.08	30.72	3	Horizontal	348	1.81	-
2440MHz	Pass	AV	4.87978G	43.76	54.00	-10.24	6.01	3	Vertical	360	1.77	-
2440MHz	Pass	PK	4.87959G	50.73	74.00	-23.27	6.01	3	Vertical	360	1.77	-
2440MHz	Pass	AV	4.87988G	41.23	54.00	-12.77	6.01	3	Horizontal	15	1.45	-
2440MHz	Pass	PK	4.87966G	49.07	74.00	-24.93	6.01	3	Horizontal	15	1.45	-
2480MHz	Pass	AV	2.48G	101.32	Inf	-Inf	30.68	3	Vertical	9	1.71	-
2480MHz	Pass	AV	2.4866G	48.20	54.00	-5.80	30.71	3	Vertical	9	1.71	-
2480MHz	Pass	PK	2.4798G	101.94	Inf	-Inf	30.68	3	Vertical	9	1.71	-
2480MHz	Pass	PK	2.4988G	59.16	74.00	-14.84	30.75	3	Vertical	9	1.71	-
2480MHz	Pass	AV	2.48G	100.08	Inf	-Inf	30.68	3	Horizontal	348	1.44	-
2480MHz	Pass	AV	2.4996G	48.24	54.00	-5.76	30.75	3	Horizontal	348	1.44	-
2480MHz	Pass	PK	2.4798G	100.74	Inf	-Inf	30.68	3	Horizontal	348	1.44	-
2480MHz	Pass	PK	2.485G	58.95	74.00	-15.05	30.69	3	Horizontal	348	1.44	-
2480MHz	Pass	AV	4.95975G	42.22	54.00	-11.78	6.17	3	Vertical	27	1.37	-
2480MHz	Pass	PK	4.95989G	49.97	74.00	-24.03	6.17	3	Vertical	27	1.37	-
2480MHz	Pass	AV	4.95972G	39.62	54.00	-14.38	6.17	3	Horizontal	342	1.76	-
2480MHz	Pass	PK	4.95948G	48.60	74.00	-25.40	6.17	3	Horizontal	342	1.76	-

BT-LE(1Mbps)

2402MHz_TX

01/02/2019

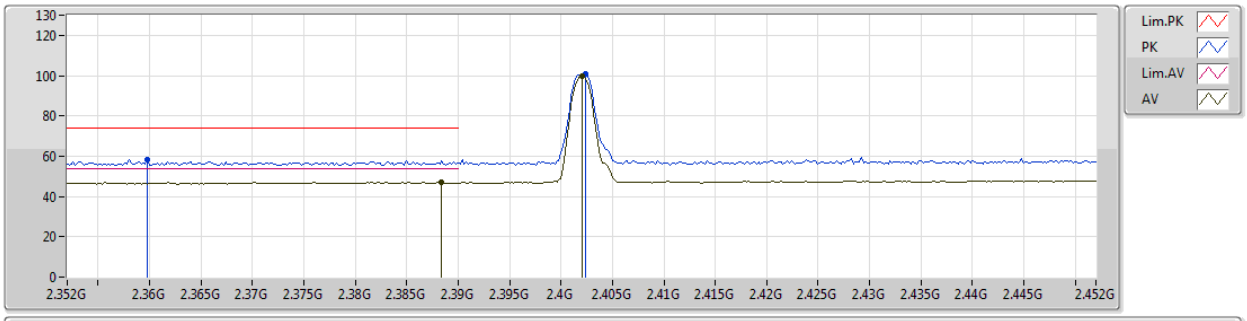


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	2.376G	47.27	54.00	-6.73	30.33	3	Vertical	5	1.71	-
AV	2.402G	100.97	Inf	-Inf	30.41	3	Vertical	5	1.71	-
PK	2.3796G	57.54	74.00	-16.46	30.34	3	Vertical	5	1.71	-
PK	2.4024G	101.69	Inf	-Inf	30.42	3	Vertical	5	1.71	-

BT-LE(1Mbps)

2402MHz_TX

01/02/2019

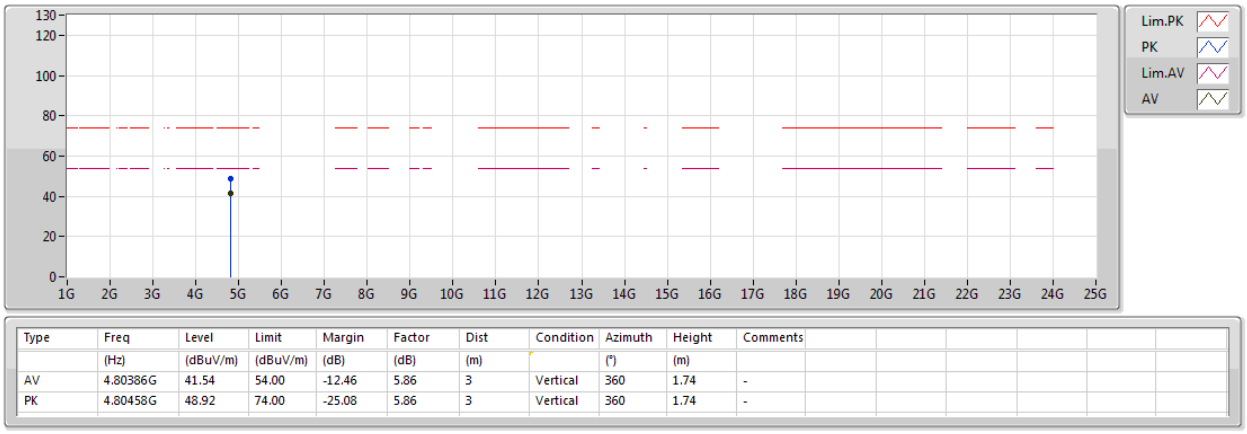


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	2.3884G	47.11	54.00	-6.89	30.37	3	Horizontal	358	2.06	-
AV	2.402G	99.95	Inf	-Inf	30.41	3	Horizontal	358	2.06	-
PK	2.3598G	58.08	74.00	-15.92	30.27	3	Horizontal	358	2.06	-
PK	2.4024G	100.64	Inf	-Inf	30.42	3	Horizontal	358	2.06	-

BT-LE(1Mbps)

2402MHz_TX

01/02/2019

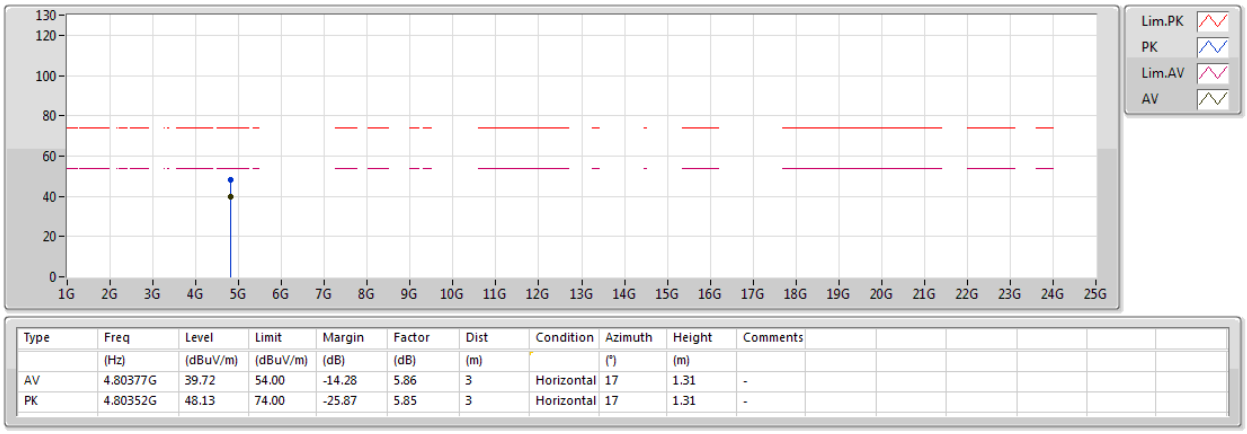


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	4.80386G	41.54	54.00	-12.46	5.86	3	Vertical	360	1.74	-
PK	4.80458G	48.92	74.00	-25.08	5.86	3	Vertical	360	1.74	-

BT-LE(1Mbps)

2402MHz_TX

01/02/2019

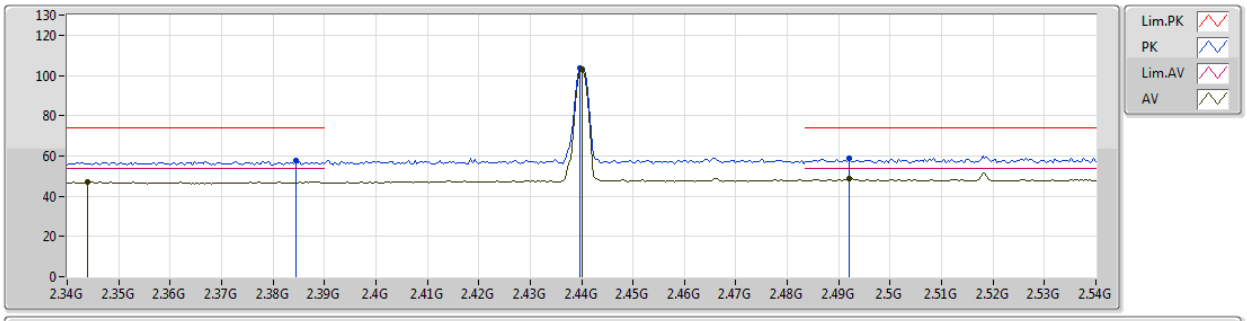


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	4.80377G	39.72	54.00	-14.28	5.86	3	Horizontal	17	1.31	-
PK	4.80352G	48.13	74.00	-25.87	5.85	3	Horizontal	17	1.31	-

BT-LE(1Mbps)

2440MHz_TX

01/02/2019

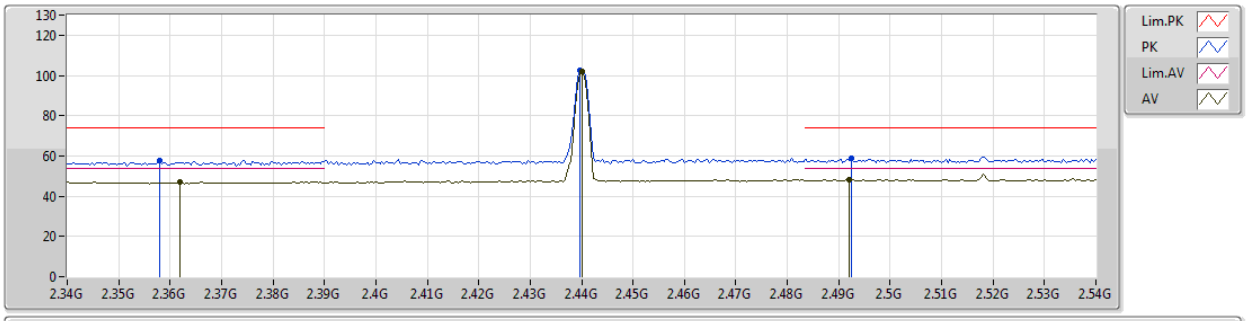


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	2.344G	47.06	54.00	-6.94	30.23	3	Vertical	360	1.70	-
AV	2.44G	103.20	Inf	-Inf	30.55	3	Vertical	360	1.70	-
AV	2.492G	48.93	54.00	-5.07	30.72	3	Vertical	360	1.70	-
PK	2.3844G	57.48	74.00	-16.52	30.36	3	Vertical	360	1.70	-
PK	2.4396G	103.88	Inf	-Inf	30.55	3	Vertical	360	1.70	-
PK	2.492G	58.64	74.00	-15.36	30.72	3	Vertical	360	1.70	-

BT-LE(1Mbps)

2440MHz_TX

01/02/2019

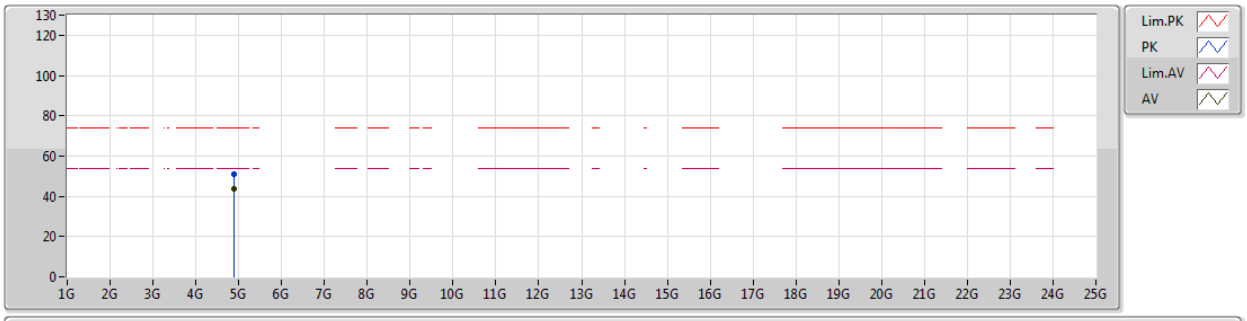


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	2.362G	47.23	54.00	-6.77	30.29	3	Horizontal	348	1.81	-
AV	2.44G	101.85	Inf	-Inf	30.55	3	Horizontal	348	1.81	-
AV	2.492G	48.46	54.00	-5.54	30.72	3	Horizontal	348	1.81	-
PK	2.358G	57.69	74.00	-16.31	30.27	3	Horizontal	348	1.81	-
PK	2.4396G	102.52	Inf	-Inf	30.55	3	Horizontal	348	1.81	-
PK	2.4924G	58.92	74.00	-15.08	30.72	3	Horizontal	348	1.81	-

BT-LE(1Mbps)

2440MHz_TX

01/02/2019

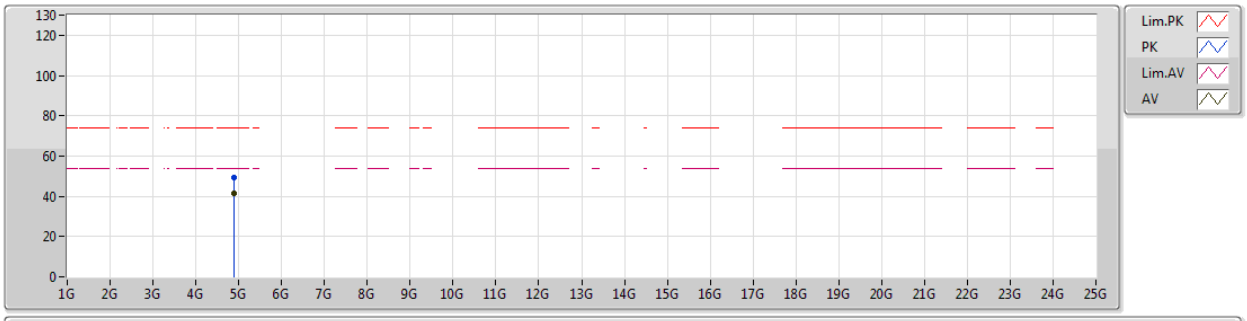


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	4.87978G	43.76	54.00	-10.24	6.01	3	Vertical	360	1.77	-
PK	4.87959G	50.73	74.00	-23.27	6.01	3	Vertical	360	1.77	-

BT-LE(1Mbps)

2440MHz_TX

01/02/2019

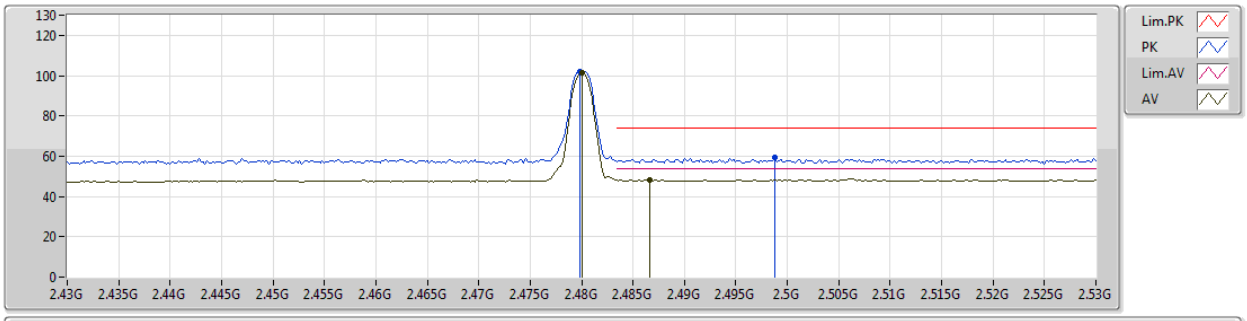


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	4.87988G	41.23	54.00	-12.77	6.01	3	Horizontal	15	1.45	-
PK	4.87966G	49.07	74.00	-24.93	6.01	3	Horizontal	15	1.45	-

BT-LE(1Mbps)

2480MHz_TX

01/02/2019

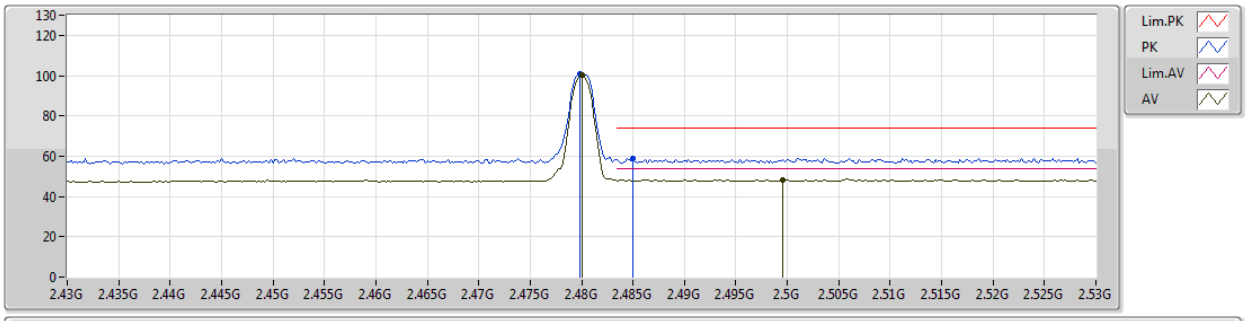


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	2.48G	101.32	Inf	-Inf	30.68	3	Vertical	9	1.71	-
AV	2.4866G	48.20	54.00	-5.80	30.71	3	Vertical	9	1.71	-
PK	2.4798G	101.94	Inf	-Inf	30.68	3	Vertical	9	1.71	-
PK	2.4988G	59.16	74.00	-14.84	30.75	3	Vertical	9	1.71	-

BT-LE(1Mbps)

2480MHz_TX

01/02/2019

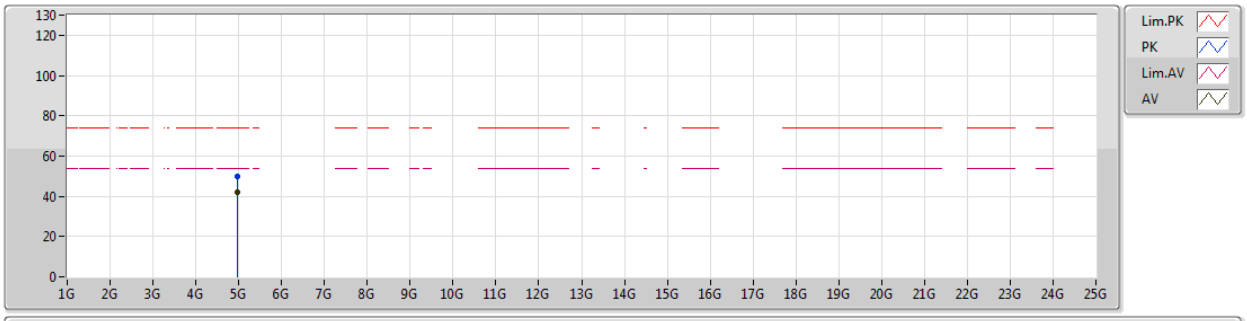


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	2.48G	100.08	Inf	-Inf	30.68	3	Horizontal	348	1.44	-
AV	2.4996G	48.24	54.00	-5.76	30.75	3	Horizontal	348	1.44	-
PK	2.4798G	100.74	Inf	-Inf	30.68	3	Horizontal	348	1.44	-
PK	2.485G	58.95	74.00	-15.05	30.69	3	Horizontal	348	1.44	-

BT-LE(1Mbps)

2480MHz_TX

01/02/2019

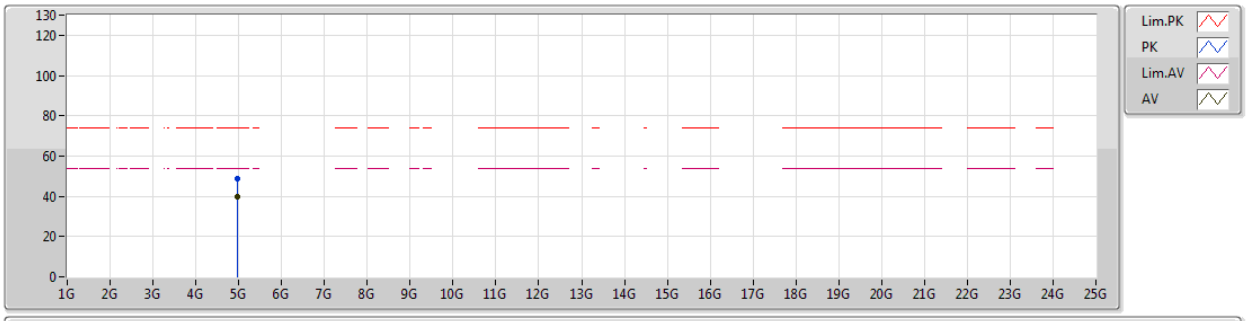


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	4.95975G	42.22	54.00	-11.78	6.17	3	Vertical	27	1.37	-
PK	4.95989G	49.97	74.00	-24.03	6.17	3	Vertical	27	1.37	-

BT-LE(1Mbps)

2480MHz_TX

01/02/2019



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	4.95972G	39.62	54.00	-14.38	6.17	3	Horizontal	342	1.76	-
PK	4.95948G	48.60	74.00	-25.40	6.17	3	Horizontal	342	1.76	-