

FCC Radio Test Report

FCC ID : PPQ-WPX8988
Contains FCC ID : PPQ-WM6321
Equipment : Wireless Access Point
Brand Name : LITEON, PoEWit
Model Name : WPX8988, WPX8988-1, WAP-1
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 Oct. 12, 2021, and testing was started from Oct. 14, 2021 and completed on Nov. 20, 2021. We, SPORTON INTERNATIONAL INC. Hsinhua Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

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



Approved by: Allen Lin

SPORTON INTERNATIONAL INC. Hsinhua Laboratory

No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.)



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PHOTOGRAPHS OF EUT V01



Summary of Test Result

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

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

Reviewed by: Sam Tsai

Report Producer: Jenny Yang

1 General Description

1.1 Information

The EUT contains certified module FCC ID: PPQ-WM6321 for WLAN 5G Radio 3.

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.
- ◆ BWch is the nominal channel bandwidth.

1.1.2 Antenna Information

Group	Ant.	Brand Name	Model Name	Ant. Type	Connector	Radio
1	5	LYNwave	MLX20X-126AA0-B	PIFA	I-Pex	2.4G R1 + 5G R0
	6	LYNwave	MLX20X-126AA0-B	PIFA	I-Pex	
	7	LYNwave	MLX20X-126AA0-B	PIFA	I-Pex	
	8	LYNwave	MLX20X-126AA0-B	PIFA	I-Pex	
2	1	LYNwave	MLX20X-126AA0-B	PIFA	I-Pex	5G R2
	2	LYNwave	MLX20X-126AA0-B	PIFA	I-Pex	
	3	LYNwave	MLX20X-126AA0-B	PIFA	I-Pex	
	4	LYNwave	MLX20X-126AA0-B	PIFA	I-Pex	
3	9	LYNwave	MLX20X-126AA0-B	PIFA	I-Pex	5G R3
	10	LYNwave	MLX20X-126AA0-B	PIFA	I-Pex	
4	11	LYNwave	MLX20X-126AA0-B	PIFA	I-Pex	BT



Group	Ant.	Port	Gain (dBi)		
			2.4G	5G	BT
1	5	1	4.1	6.2	-
	6	2	4.5	6.3	-
	7	3	4.4	6.6	-
	8	4	5	5.9	-
2	1	5	-	5.9	-
	2	6	-	5.2	-
	3	7	-	4.1	-
	4	8	-	4.6	-
3	9	1	-	5.3	-
	10	2	-	5.6	-
4	11	1	-	-	5.1

Note 1: The EUT has eleven antennas.

For 2.4GHz function:

For IEEE 802.11 b/g/n/VHT/ax mode (4TX/4RX)

Ant. 5 (port 1), Ant. 6 (port 2), Ant. 7 (port 3) and Ant. 8 (port 4) could transmit/receive simultaneously.

For BT function:

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

Only Ant. 11 (port 1) can be used as transmitting/receiving antenna.

For 5GHz function:

For IEEE 802.11 a/n/ac mode (2TX/2RX) **(Radio 3)**

Ant. 9 (port 1) and Ant. 10 (port 2) could transmit/receive simultaneously.

For IEEE 802.11 a/n/ac/ax mode (4TX/4RX) **(Radio 0, Radio 2)**

Ant. 5 (port 1), Ant. 6 (port 2), Ant. 7 (port 3) and Ant. 8 (port 4) could transmit/receive simultaneously.

Ant. 1 (port 5), Ant. 2 (port 6), Ant. 3 (port 7) and Ant. 4 (port 8) could transmit/receive simultaneously.

For IEEE 802.11 a/n/ac/ax mode (8TX/8RX) **(Radio 0+2)**

Ant. 5 (port 1), Ant. 6 (port 2), Ant. 7 (port 3), Ant. 8 (port 4), Ant. 1 (port 5), Ant. 2 (port 6), Ant. 3(port 7), and Ant. 4 (port 8) could transmit/receive simultaneously.



1.1.3 EUT Information

Operational Condition			
EUT Power Type	From AC Adapter / PoE		
EUT Function	<input checked="" type="checkbox"/> Point-to-multipoint	<input checked="" type="checkbox"/> Point-to-point	
Type of EUT			
<input checked="" type="checkbox"/>	Stand-alone		
<input type="checkbox"/>	Combined (EUT where the radio part is fully integrated within another device)		
	Combined Equipment - Brand Name / Model No.: ...		
<input type="checkbox"/>	Plug-in radio (EUT intended for a variety of host systems)		
	Host System - Brand Name / Model No.: ...		
<input type="checkbox"/>	Other:		

1.1.4 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
BT-LE(1Mbps)	0.633	1.99	408.125u	3k

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

1.1.5 Table for Multiple Listing

SKU	Model Name	Radio spec.	Radio 0 filter source
SKU 1	WPX8988	Radio 0+1+2+3+BT	Radio 0 filter Main Source CIROCOMM J5697E
	WPX8988-1	Radio 0+1+2+BT	
	WAP-1	Radio 0+1+2+3+BT	
SKU 2	WPX8988	Radio 0+1+2+3+BT	Radio 0 filter 2nd Source WALSIN WDBPF5697360KAT
	WPX8988-1	Radio 0+1+2+BT	
	WAP-1	Radio 0+1+2+3+BT	

Brand Name	Model Name	Note
LITEON	WPX8988-1	<ol style="list-style-type: none"> 1. Remove DVDD33_PCIE and VDD_3P3_radio power net: R137 and R7093 2. Remove PCIe connector and level shifter: J1, C7252, C7268, Q26, Q27, and Q50. And 2 screw holes: J13 and J14. 3. Remove sniffer: LED control: Q7 and R7232 4. Remove 2pcs 5GHz Sniffer Antennas 5. Remove PCIE Sniffer Radio 3 (QCA9886, 802.11a/b/g/n/ac, 5G Only)
	WPX8988	The difference of model is in sales marketing.
PoEWit	WAP-1	

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

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

- ◆ KDB 558074 D01 v05r02
- ◆ KDB 414788 D01 v01r01

1.3 Testing Location Information

Test Lab. : Sporton International Inc. Hsinhua Laboratory				
<input checked="" type="checkbox"/> Hsinhua (TAF: 3785)	ADD: No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.)			
	TEL: 886-3-327-3456		FAX: 886-3-327-0973	
Test site Designation No. TW3785 with FCC.				
Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
AC Conduction	CO04-HY	Daniel Lin	21.5~21.8°C / 62~65%	30/Oct/2021 - 20/Nov/2021
RF Conducted	TH01-HY	Johnny Yu	20.1~26.9°C / 50~60%	22/Oct/2021~17/Nov/2021
<input checked="" type="checkbox"/> Wen 33rd.St. (TAF: 3785)	ADD: No.14-1, Ln. 19, Wen 33rd St., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)			
	TEL: 886-3-318-0787		FAX: 886-3-318-0287	
Test site Designation No. TW0008 with FCC.				
Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
Radiated	03CH09-HY	Ryan Hsiao	22.5~24.7°C / 42~59%	14/Oct/2021~26/Oct/2021

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)	0.9 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	2.4 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Conducted Emission	1.0 dB	Confidence levels of 95%
Temperature	0.41 °C	Confidence levels of 95%
Humidity	3.4 %	Confidence levels of 95%

2 Test Configuration of EUT

2.1 Test Channel Mode




Test Software Version	Dos6.1
------------------------------	--------

Mode	Power Setting
BT-LE(1Mbps)	-
2402MHz	0x04
2440MHz	0x04
2480MHz	0x04

2.2 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz
Operating Mode	CTX
1	Adapter mode
2	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	Adapter mode		
2	PoE mode		
Operating Mode > 1GHz	CTX		
Orthogonal Planes of EUT	X Plane	Y Plane	Z Plane
			
Worst Planes of EUT		V	

The Worst Case Mode for Following Conformance Tests	
Tests Item	Simultaneous Transmission Analysis
Operating Mode	CTX
1	WLAN 2.4GHz (Radio 1) + WLAN 5GHz 4TX (Radio 0) + WLAN 5GHz 4TX (Radio 2) + WLAN 5GHz (Radio 3) + Bluetooth
2	WLAN 2.4GHz (Radio 1) + WLAN 5GHz 8TX (Radio 0 + Radio 2) + WLAN 5GHz (Radio 3) + Bluetooth
Refer to Sporton Test Report No.: FA192716 for Co-location RF Exposure Evaluation.	

2.3 Accessories

Accessories				
AC Adapter 1(US Plug)	Brand Name	APD	Model Name	WA-36N12FU
	Manufacturer	-	SN	-
	Power Rating	I/P: 100-240 Vac, 0.9 A, O/P: 12 Vdc, 3A		
	Power Cord	1.8 meter, non-shielded cable, w/o ferrite core		

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



2.4 Support Equipment

Support Equipment – AC Conduction					
No.	Equipment	Brand Name	Model Name	FCC ID	Remark
1	AC Power cable	Power sync	PW-GPC180-3	-	-
2	PoE	Cambium	NET-P60-56IN	-	-
3	RJ45 Cable	Power Sync	CAT-6E-10	-	-
4	RJ45 Cable	Power Sync	CAT-6E-01	-	-
5	RJ45 Cable	Power Sync	CAT-6E-01	-	-
6	RJ45 Cable	Power Sync	CAT-6E-01	-	-
7	PoE (Remote)	Cambium	NET-P60-56IN	-	-
8	Client (Remote)	-	-	-	Note 1
9	Notebook (Remote)	HP	E5220	-	-
10	RJ45 Cable (Remote)	Power Sync	CAT-6E-01	-	-

Note 1: Provided by Customer

Support Equipment – Conducted					
No.	Equipment	Brand Name	Model Name	FCC ID	Remark
1	Notebook	DELL	CBT	-	-
2	Adapter for NB	DELL	-	-	-
3	PoE	HP	PD-9001GR/AT/AC	-	-
4	Client	-	-	-	Note 1
5	Notebook	HP	E5220	-	-

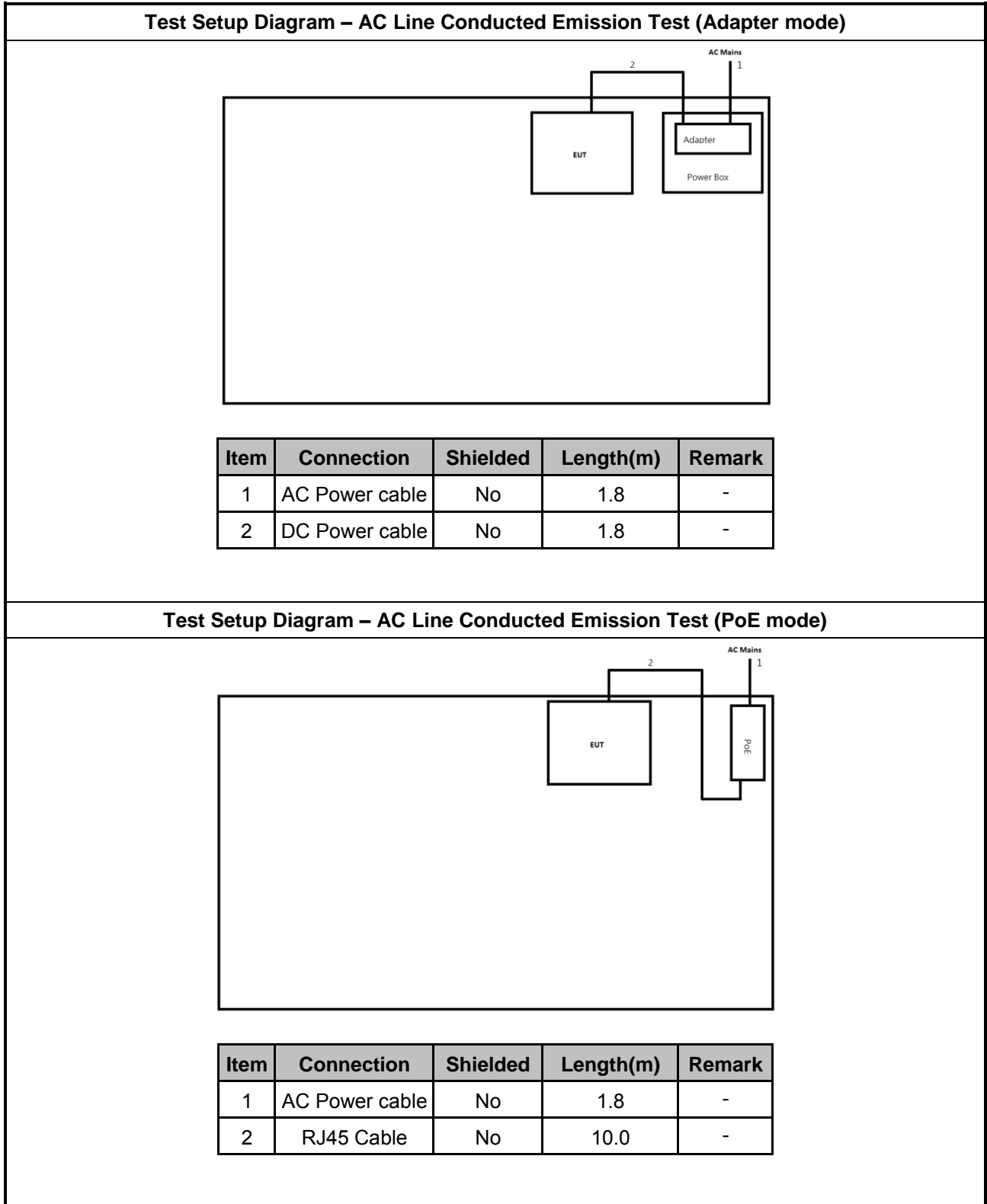
Note 1: Provided by Customer



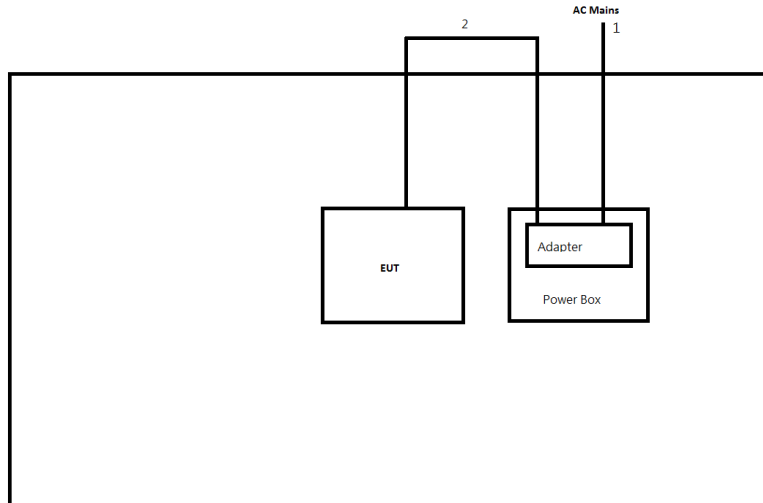
Support Equipment – Radiated					
No.	Equipment	Brand Name	Model Name	FCC ID	Remark
1	AC Power cable	Power sync	PW-GPC180-3	-	-
2	PoE	Cambium	NET-P60-56IN	-	-
3	RJ45 Cable	Power Sync	CAT-6E-10	-	-
4	RJ45 Cable	Power Sync	CAT-6E-01	-	-
5	RJ45 Cable	Power Sync	CAT-6E-01	-	-
6	RJ45 Cable	Power Sync	CAT-6E-01	-	-
7	PoE (Remote)	Cambium	NET-P60-56IN	-	-
8	Client (Remote)	-	-	-	Note 1
9	Notebook (Remote)	HP	E5220	-	-
10	RJ45 Cable (Remote)	Power Sync	CAT-6E-01	-	-
11	Notebook (Remote)	HP	E5220	-	-

Note 1: Provided by Customer

2.1 Test Setup Diagram

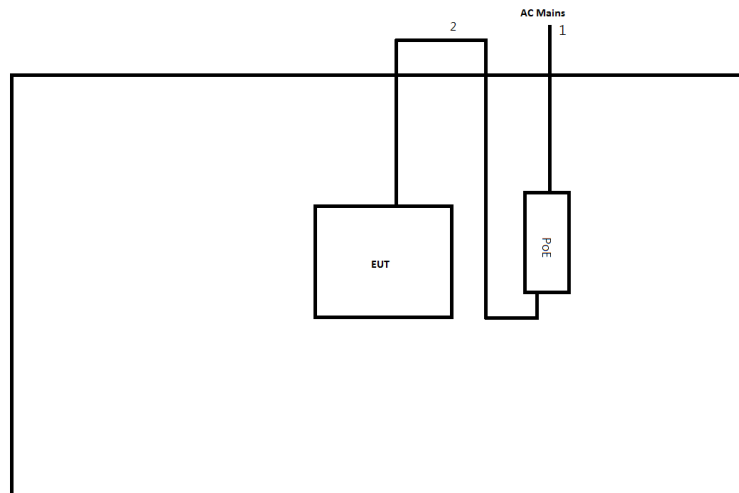


Test Setup Diagram - Radiated Test (Adapter mode)



Item	Connection	Shielded	Length(m)	Remark
1	AC Power cable	No	1.8	-
2	DC Power cable	No	1.5	-

Test Setup Diagram - Radiated Test (PoE mode)



Item	Connection	Shielded	Length(m)	Remark
1	AC Power cable	No	1.8	-
2	DC Power cable	No	1.8	-

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

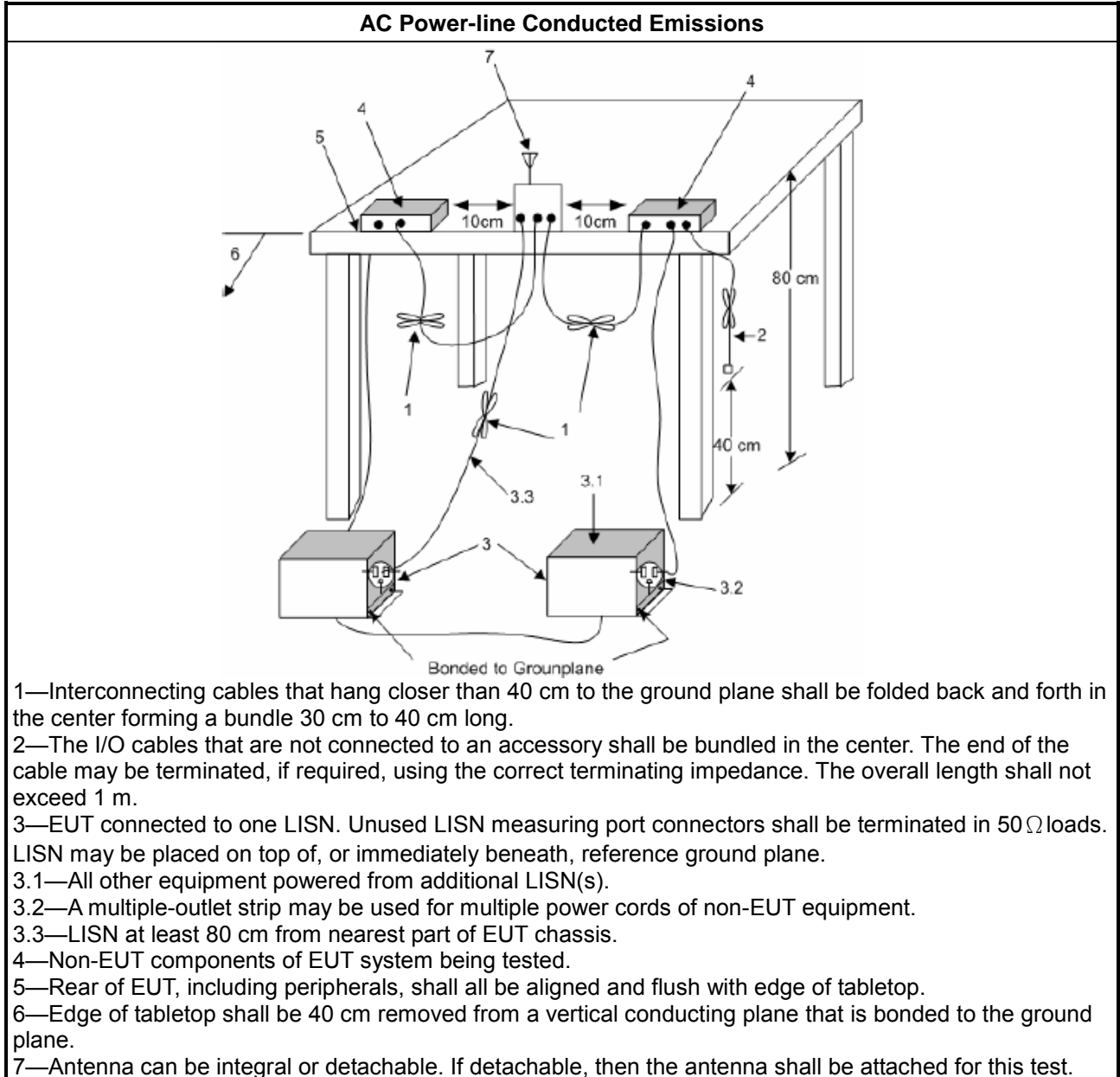
Test Method
<ul style="list-style-type: none"> Refer as ANSI C63.10-2013, clause 6.2 foray power-line conducted emissions.

3.1.4 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Raw(Read Level) + LISN(LISN Factor) + CL(Cable Loss) + AT(Attenuator).

3.1.5 Test Setup



3.1.6 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:
<ul style="list-style-type: none"> ▪ 6 dB bandwidth \geq 500 kHz.

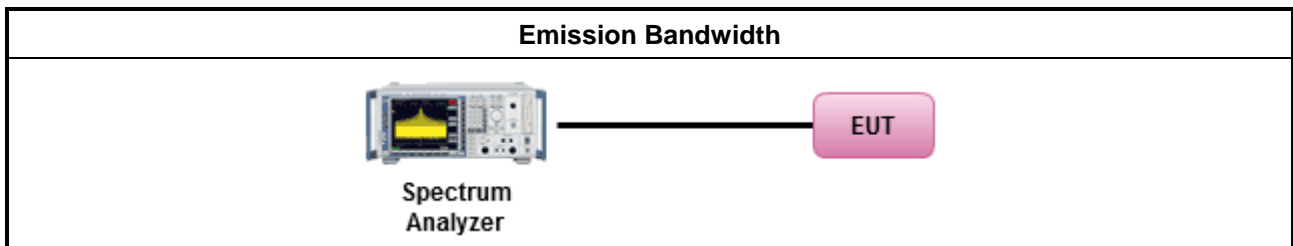
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

Test Method
<ul style="list-style-type: none"> ▪ For the emission bandwidth shall be measured using one of the options below:
<input checked="" type="checkbox"/> Refer as KDB 558074, clause 8.2 (11.8 of ANSI C63.10) DTS bandwidth measurement.
<input type="checkbox"/> Refer as RSS-Gen, clause 6.7 for occupied bandwidth testing.
<input type="checkbox"/> 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	
	<ul style="list-style-type: none"> ▪ If $G_{TX} \leq 6$ dBi, then $P_{Out} \leq 30$ dBm (1 W)
	<ul style="list-style-type: none"> ▪ Point-to-multipoint systems (P2M): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$ dBm
	<ul style="list-style-type: none"> ▪ Point-to-point systems (P2P): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm
	<ul style="list-style-type: none"> ▪ Smart antenna system (SAS):
	<ul style="list-style-type: none"> - Single beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm
	<ul style="list-style-type: none"> - Overlap beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm
	<ul style="list-style-type: none"> - 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:	
	<ul style="list-style-type: none"> ▪ 2400-2483.5 MHz Band
	<ul style="list-style-type: none"> ▪ Point-to-multipoint systems (P2M): $P_{eirp} \leq 36$ dBm (4 W)
	<ul style="list-style-type: none"> ▪ Point-to-point systems (P2P): $P_{eirp} \leq \text{MAX}(36, [P_{Out} + G_{TX}])$ dBm
	<ul style="list-style-type: none"> ▪ Smart antenna system (SAS)
	<ul style="list-style-type: none"> - Single beam: $P_{eirp} \leq \text{MAX}(36, P_{Out} + G_{TX})$ dBm
	<ul style="list-style-type: none"> - Overlap beam: $P_{eirp} \leq \text{MAX}(36, P_{Out} + G_{TX})$ dBm
	<ul style="list-style-type: none"> - 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.	

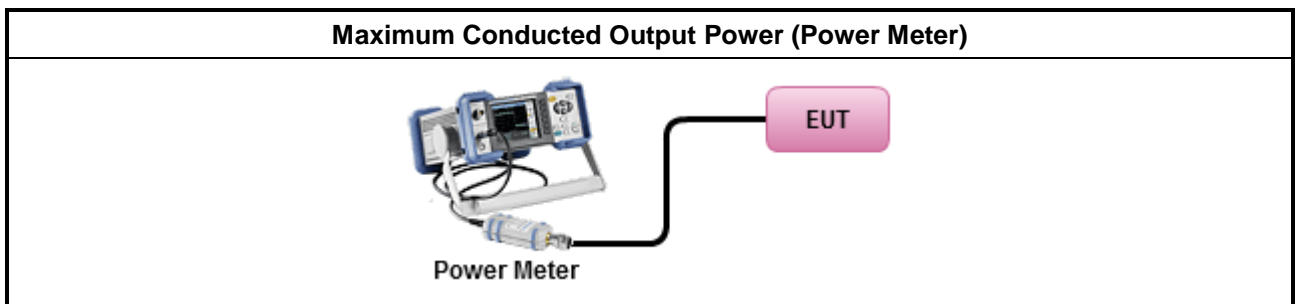
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

Test Method	
<ul style="list-style-type: none"> ▪ Maximum Peak Conducted Output Power 	
<input type="checkbox"/>	Refer as KDB 558074, clause 8.3.1.1 (11.9.1.1 of ANSI C63.10) RBW ≥ EBW method.
<input type="checkbox"/>	Refer as KDB 558074, clause 8.3.1.2 (11.9.1.2 of ANSI C63.10) integrated band power method.
<input type="checkbox"/>	Refer as KDB 558074, clause 8.3.1.3 (11.9.1.3 of ANSI C63.10) peak power meter.
<ul style="list-style-type: none"> ▪ Maximum Average Conducted Output Power 	
<input type="checkbox"/>	Refer as KDB 558074, clause 8.3.2.2 (11.9.2.2 of ANSI C63.10) using a spectrum analyzer.
<input checked="" type="checkbox"/>	Refer as KDB 558074, clause 8.3.2.3 (11.9.2.3 of ANSI C63.10) using a power meter.
<ul style="list-style-type: none"> ▪ For conducted measurement. 	
<ul style="list-style-type: none"> ▪ 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. 	
<ul style="list-style-type: none"> ▪ 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
<ul style="list-style-type: none"> ▪ Power Spectral Density (PSD) ≤ 8 dBm/3kHz

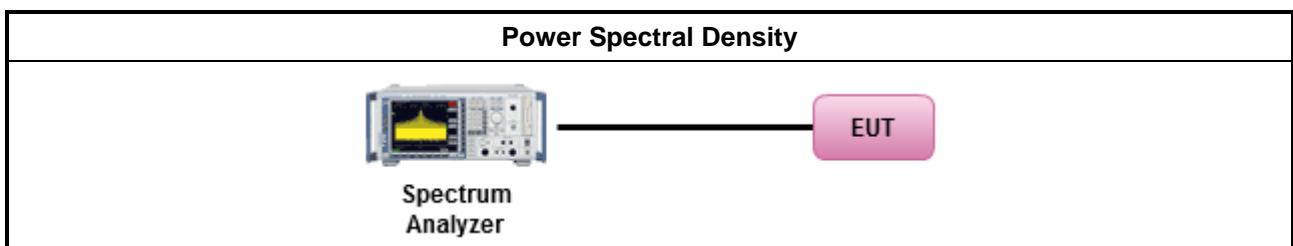
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

Test Method	
	<ul style="list-style-type: none"> ▪ 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).
<input checked="" type="checkbox"/>	Refer as KDB 558074, clause 8.4 (11.10 of ANSI C63.10) Max. PSD.
	<ul style="list-style-type: none"> ▪ For conducted measurement.
	<ul style="list-style-type: none"> ▪ If The EUT supports multiple transmit chains using options given below:
	<ul style="list-style-type: none"> ▪ 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 level.

Note 2: If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band average level.

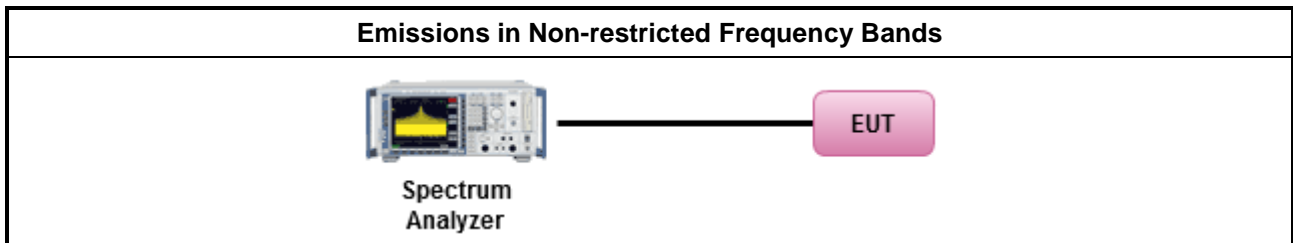
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

Test Method
<ul style="list-style-type: none"> Refer as KDB 558074, clause 8.5 (11.11 of ANSI C63.10) for non-restricted frequency 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.

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

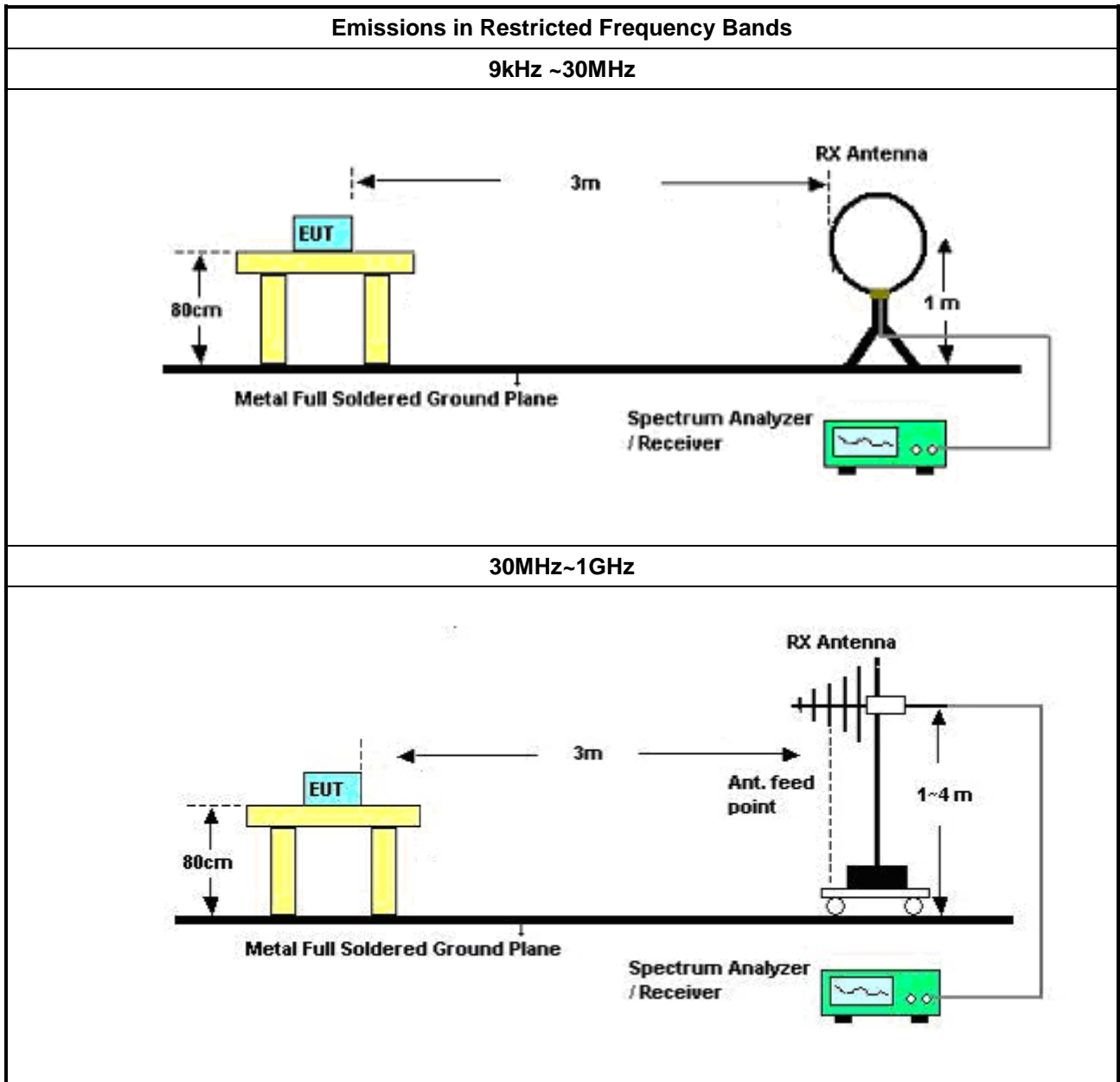
Test Method	
	<ul style="list-style-type: none"> ▪ The average emission levels shall be measured in [duty cycle \geq 98 or duty factor].
	<ul style="list-style-type: none"> ▪ Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.
	<ul style="list-style-type: none"> ▪ For the transmitter unwanted emissions shall be measured using following options below: <ul style="list-style-type: none"> ▪ Refer as KDB 558074, clause 8.6 (11.12 of ANSI C63.10) for restricted frequency bands.
	<ul style="list-style-type: none"> ▪ For the transmitter band-edge emissions shall be measured using following options below: <ul style="list-style-type: none"> ▪ 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.
	<ul style="list-style-type: none"> ▪ Use the following spectrum analyzer settings: <ul style="list-style-type: none"> ▪ 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 $f \geq 1$ GHz for peak measurement. For average measurement, refer as 1.1.4.
	<ul style="list-style-type: none"> ▪ KDB 414788 Open-Field Test Sites and Chamber Correlation Justification. <ul style="list-style-type: none"> ▪ Based on FCC 15.31(f)(2): measurements may be performed at a distance closer than that specified in regulations; however, an attempt should be made to avoid making measurements in the near field. ▪ Open-field site and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

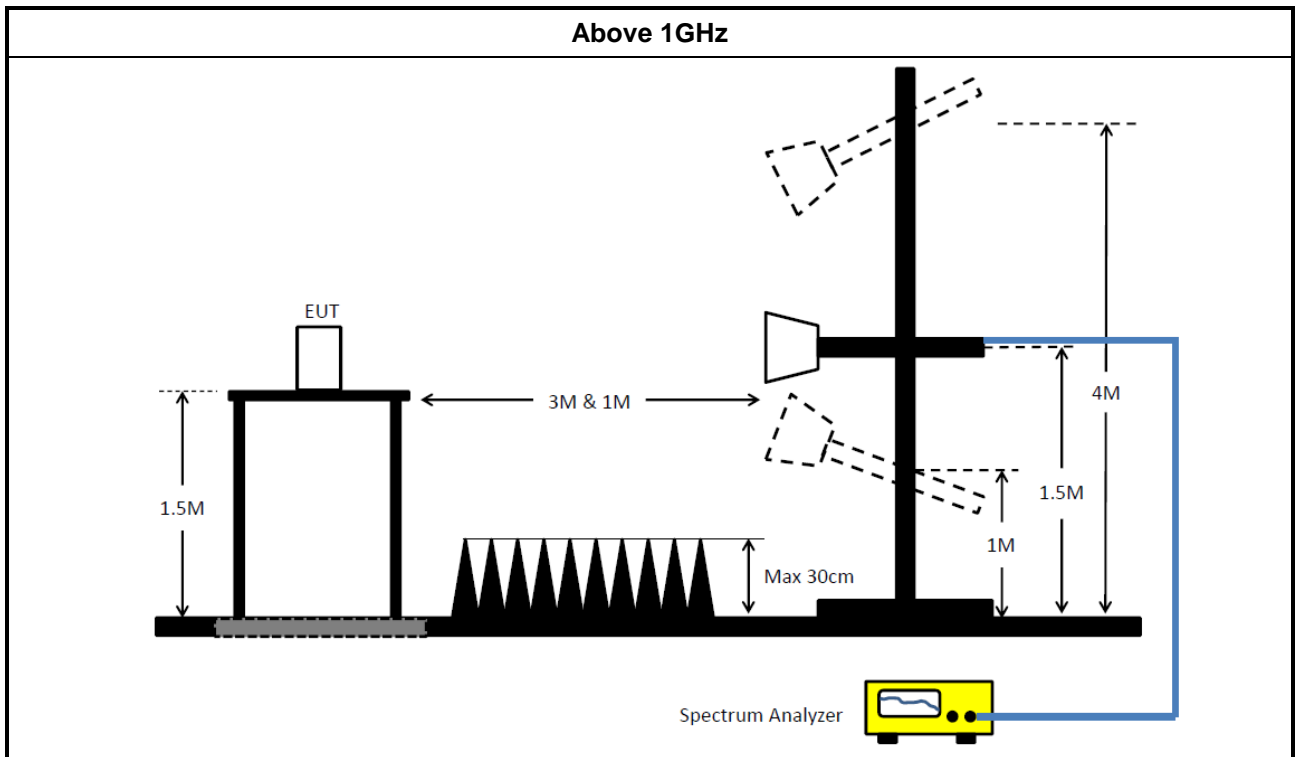
3.6.4 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Raw(Read Level) + AF(Antenna Factor) + CL(Cable Loss) - PA(Preamplifier Factor)

3.6.5 Test Setup





3.6.6 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.

3.6.7 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix F

4 Test Equipment and Calibration Data

Instrument for AC Conduction

Instrument	Manufacturer /Brand	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR3	102051	9kHz ~ 3.6GHz	21/May/2021	20/May/2022
LISN	R&S	ENV216	101295	9kHz ~ 30MHz	11/Nov/2020	10/Nov/2021
LISN	R&S	ENV216	100003	9kHz ~ 30MHz	15/Dec/2020	14/Dec/2021
RF Cable 5m	TITAN	TITAN	CO04-cable-01	0.1MHz~200MHz	03/Mar/2021	02/Mar/2022
Impuls Begrenzer Pulse Limiter	SCHWARZBECK	VTSD 9561-F	9561-F041	9kHz ~ 30MHz	15/Sep/2021	14/Sep/2022

Instrument for Conducted Test

Instrument	Manufacturer /Brand	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
Signal Analyzer	R&S	FSV 40	101013	10Hz~40GHz	30/Mar/2021	29/Mar/2022
Signal Generator	Keysight	N5171B	MY53051240	9kHz~6GHz	23/Nov/2020	22/Nov/2021
Pulse Sensor	Anritsu	MA2411B	0917017	300MHz~40GHz	23/Feb/2021	22/Feb/2022
Power Meter	Anritsu	ML2495A	0949003	300MHz~40GHz	23/Feb/2021	22/Feb/2022

**Instrument for Radiated Test**

Instrument	Manufacturer /Brand	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	TDK	SAC-3M	03CH09-HY	30MHz~1GHz 3m	26/Mar/2021	25/Mar/2022
3m Semi Anechoic Chamber	TDK	SAC-3M	03CH09-HY	1GHz~18GHz 3m	18/Mar/2021	17/Mar/2022
EXA Signal Analyzer	KEYSIGHT	N9010A	MY54200885	10Hz~44GHz	13/Aug/2021	12/Aug/2022
Amplifier	EMC	EMC9135	980232	9kHz~1GHz	12/Apr/2021	11/Apr/2022
Microwave Preamplifier	Agilent	8449B	3008A02096	1GHz~26.5GHz	23/Jul/2021	22/Jul/2022
Bilog Antenna & 5dB Attenuator	TESEQ & MTJ	CBL6111D&MT J6102-05	35418 & 3	30MHz~1GHz	04/Sep/2021	03/Sep/2022
Double Ridged Guide Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA9120 D 1534	1GHz~18GHz	18/May/2021	17/May/2022
RF Cable-low	Jye Bao	RG142	CB031+324530/4	9kHz~30MHz	30/Aug/2021	29/Aug/2022
RF Cable-low	Jye Bao	RG142	CB031+324530/4	30MHz~1GHz	09/Feb/2021	08/Feb/2022
RF CABLE 5m+3m+1m	HUBER+SUHNER	SUCOFLEX104	CB009	1GHz~40GHz	13/Aug/2021	12/Aug/2022
Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA 9170221	18GHz~40GHz	11/Mar/2021	10/Mar/2022
Microwave Preamplifier	EMC INSTRUMENTS	EM18G40G	060604	18GHz ~ 40GHz	09/Mar/2021	08/Mar/2022
Loop Antenna	TESEQ	HLA 6120	31244	9kHz~30MHz	16/Mar/2021	15/Mar/2022
EMI Test Receiver	R&S	ESR3	102052	9kHz~3.6GHz	19/Apr/2021	18/Apr/2022



Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition
Mode 1	Pass	AV	334.632k	38.21	49.33	-11.12	Neutral
Mode 2	Pass	AV	18.863M	35.22	50.00	-14.78	Line

Mode Configure

Mode	Result	Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition	Comments
Mode 1	Pass	QP	156.109k	50.72	65.67	-14.95	Line	-
Mode 1	Pass	AV	156.109k	33.41	55.67	-22.26	Line	-
Mode 1	Pass	QP	169.084k	47.29	65.01	-17.72	Line	-
Mode 1	Pass	AV	169.084k	30.41	55.01	-24.60	Line	-
Mode 1	Pass	QP	183.137k	45.26	64.34	-19.08	Line	-
Mode 1	Pass	AV	183.137k	29.86	54.34	-24.48	Line	-
Mode 1	Pass	QP	337.314k	37.29	59.27	-21.98	Line	-
Mode 1	Pass	AV	337.314k	32.91	49.27	-16.36	Line	-
Mode 1	Pass	QP	1.811M	22.51	56.00	-33.49	Line	-
Mode 1	Pass	AV	1.811M	18.48	46.00	-27.52	Line	-
Mode 1	Pass	QP	7.037M	20.63	60.00	-39.37	Line	-
Mode 1	Pass	AV	7.037M	18.25	50.00	-31.75	Line	-
Mode 1	Pass	QP	156.109k	50.59	65.67	-15.08	Neutral	-
Mode 1	Pass	AV	156.109k	32.58	55.67	-23.09	Neutral	-
Mode 1	Pass	QP	169.084k	47.33	65.01	-17.68	Neutral	-
Mode 1	Pass	AV	169.084k	29.74	55.01	-25.27	Neutral	-
Mode 1	Pass	QP	178.803k	46.17	64.55	-18.38	Neutral	-
Mode 1	Pass	AV	178.803k	29.49	54.55	-25.06	Neutral	-
Mode 1	Pass	QP	334.632k	40.60	59.33	-18.73	Neutral	-
Mode 1	Pass	AV	334.632k	38.21	49.33	-11.12	Neutral	-
Mode 1	Pass	QP	3.376M	22.81	56.00	-33.19	Neutral	-
Mode 1	Pass	AV	3.376M	16.66	46.00	-29.34	Neutral	-
Mode 1	Pass	QP	6.497M	19.51	60.00	-40.49	Neutral	-
Mode 1	Pass	AV	6.497M	17.35	50.00	-32.65	Neutral	-
Mode 2	Pass	QP	157.361k	49.96	65.60	-15.64	Line	-
Mode 2	Pass	AV	157.361k	34.81	55.60	-20.79	Line	-
Mode 2	Pass	QP	170.439k	46.59	64.93	-18.34	Line	-
Mode 2	Pass	AV	170.439k	26.67	54.93	-28.26	Line	-
Mode 2	Pass	QP	195.216k	42.55	63.80	-21.25	Line	-
Mode 2	Pass	AV	195.216k	23.99	53.80	-29.81	Line	-
Mode 2	Pass	QP	469.822k	34.36	56.52	-22.16	Line	-
Mode 2	Pass	AV	469.822k	30.59	46.52	-15.93	Line	-
Mode 2	Pass	QP	1.181M	26.61	56.00	-29.39	Line	-
Mode 2	Pass	AV	1.181M	21.35	46.00	-24.65	Line	-
Mode 2	Pass	QP	18.863M	38.22	60.00	-21.78	Line	-
Mode 2	Pass	AV	18.863M	35.22	50.00	-14.78	Line	-
Mode 2	Pass	QP	157.361k	49.92	65.60	-15.68	Neutral	-
Mode 2	Pass	AV	157.361k	34.62	55.60	-20.98	Neutral	-
Mode 2	Pass	QP	170.439k	46.53	64.93	-18.40	Neutral	-
Mode 2	Pass	AV	170.439k	26.60	54.93	-28.33	Neutral	-
Mode 2	Pass	QP	195.216k	42.43	63.80	-21.37	Neutral	-
Mode 2	Pass	AV	195.216k	23.36	53.80	-30.44	Neutral	-
Mode 2	Pass	QP	447.846k	34.90	56.92	-22.02	Neutral	-

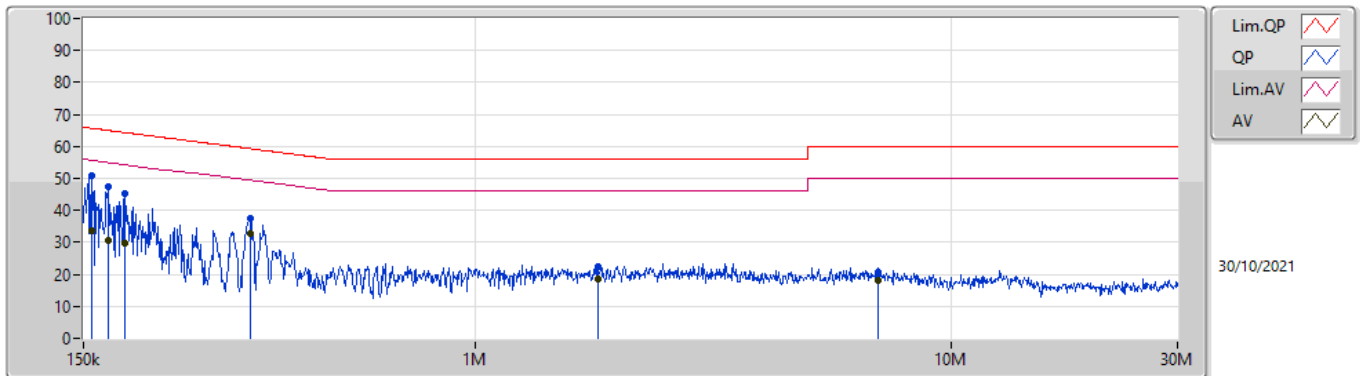


Conducted Emissions at Powerline

Appendix A

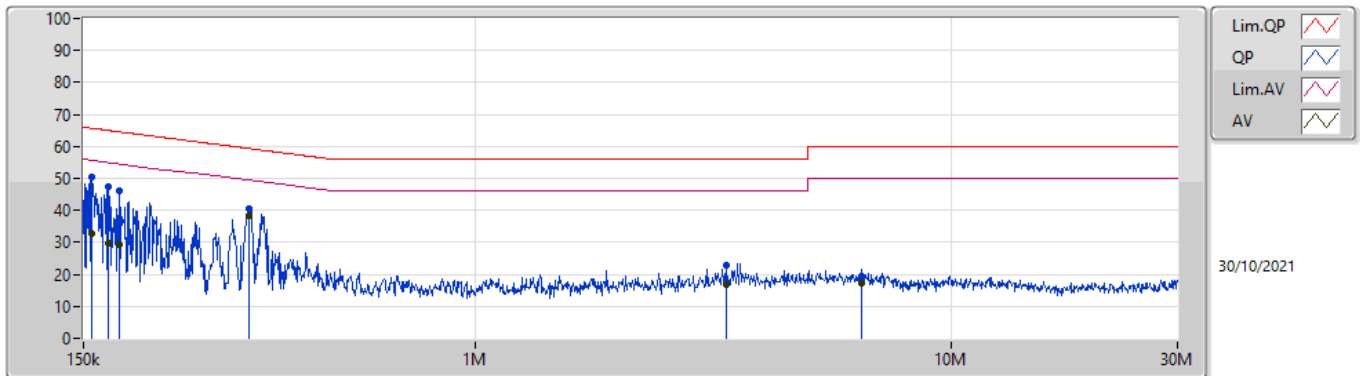
Mode	Result	Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition	Comments
Mode 2	Pass	AV	447.846k	31.72	46.92	-15.20	Neutral	-
Mode 2	Pass	QP	1.205M	23.83	56.00	-32.17	Neutral	-
Mode 2	Pass	AV	1.205M	19.70	46.00	-26.30	Neutral	-
Mode 2	Pass	QP	22.666M	38.67	60.00	-21.33	Neutral	-
Mode 2	Pass	AV	22.666M	33.31	50.00	-16.69	Neutral	-

Conducted Emissions at Powerline_Mode 1



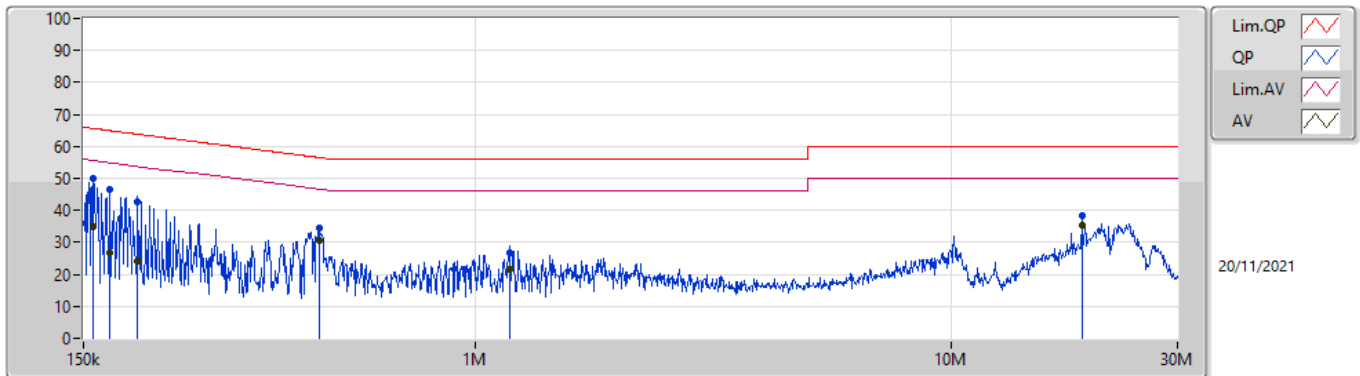
Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Condition	Comment	Raw (dBuV)	LISN (dB)	CL (dB)	AT (dB)
QP	156.109k	50.72	65.67	-14.95	19.62	Line	-	31.10	9.69	0.04	9.89
AV	156.109k	33.41	55.67	-22.26	19.62	Line	-	13.79	9.69	0.04	9.89
QP	169.084k	47.29	65.01	-17.72	19.62	Line	-	27.67	9.69	0.04	9.89
AV	169.084k	30.41	55.01	-24.60	19.62	Line	-	10.79	9.69	0.04	9.89
QP	183.137k	45.26	64.34	-19.08	19.61	Line	-	25.65	9.68	0.04	9.89
AV	183.137k	29.86	54.34	-24.48	19.61	Line	-	10.25	9.68	0.04	9.89
QP	337.314k	37.29	59.27	-21.98	19.62	Line	-	17.67	9.67	0.06	9.89
AV	337.314k	32.91	49.27	-16.36	19.62	Line	-	13.29	9.67	0.06	9.89
QP	1.811M	22.51	56.00	-33.49	19.66	Line	-	2.85	9.68	0.10	9.88
AV	1.811M	18.48	46.00	-27.52	19.66	Line	-	-1.18	9.68	0.10	9.88
QP	7.037M	20.63	60.00	-39.37	19.78	Line	-	0.85	9.71	0.18	9.89
AV	7.037M	18.25	50.00	-31.75	19.78	Line	-	-1.53	9.71	0.18	9.89

Conducted Emissions at Powerline_Mode 1



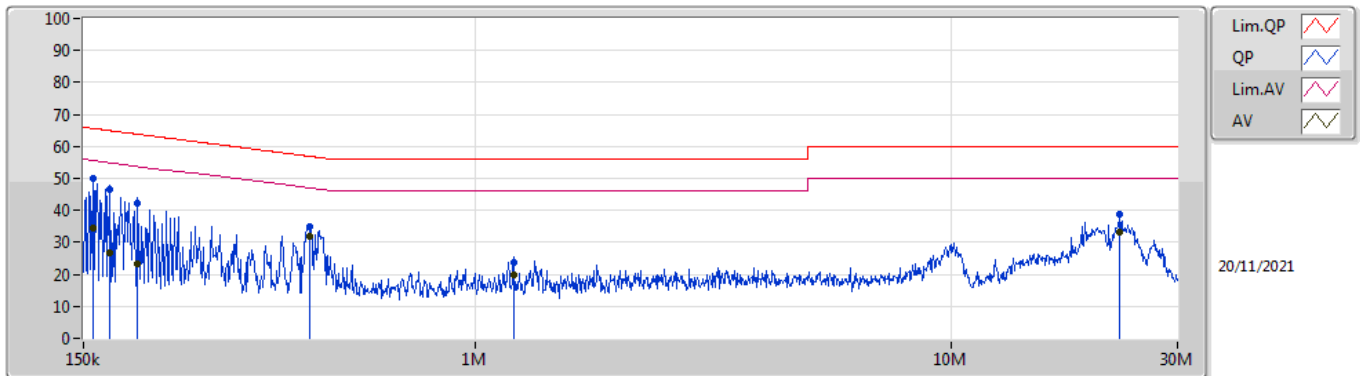
Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Condition	Comment	Raw (dBuV)	LISN (dB)	CL (dB)	AT (dB)
QP	156.109k	50.59	65.67	-15.08	19.62	Neutral	-	30.97	9.69	0.04	9.89
AV	156.109k	32.58	55.67	-23.09	19.62	Neutral	-	12.96	9.69	0.04	9.89
QP	169.084k	47.33	65.01	-17.68	19.62	Neutral	-	27.71	9.69	0.04	9.89
AV	169.084k	29.74	55.01	-25.27	19.62	Neutral	-	10.12	9.69	0.04	9.89
QP	178.803k	46.17	64.55	-18.38	19.61	Neutral	-	26.56	9.68	0.04	9.89
AV	178.803k	29.49	54.55	-25.06	19.61	Neutral	-	9.88	9.68	0.04	9.89
QP	334.632k	40.60	59.33	-18.73	19.61	Neutral	-	20.99	9.67	0.05	9.89
AV	334.632k	38.21	49.33	-11.12	19.61	Neutral	-	18.60	9.67	0.05	9.89
QP	3.376M	22.81	56.00	-33.19	19.71	Neutral	-	3.10	9.69	0.13	9.89
AV	3.376M	16.66	46.00	-29.34	19.71	Neutral	-	-3.05	9.69	0.13	9.89
QP	6.497M	19.51	60.00	-40.49	19.77	Neutral	-	-0.26	9.71	0.17	9.89
AV	6.497M	17.35	50.00	-32.65	19.77	Neutral	-	-2.42	9.71	0.17	9.89

Conducted Emissions at Powerline_Mode 2



Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Condition	Comment	Raw (dBuV)	LISN (dB)	CL (dB)	AT (dB)
QP	157.361k	49.96	65.60	-15.64	19.62	Line	-	30.34	9.69	0.04	9.89
AV	157.361k	34.81	55.60	-20.79	19.62	Line	-	15.19	9.69	0.04	9.89
QP	170.439k	46.59	64.93	-18.34	19.62	Line	-	26.97	9.69	0.04	9.89
AV	170.439k	26.67	54.93	-28.26	19.62	Line	-	7.05	9.69	0.04	9.89
QP	195.216k	42.55	63.80	-21.25	19.61	Line	-	22.94	9.68	0.04	9.89
AV	195.216k	23.99	53.80	-29.81	19.61	Line	-	4.38	9.68	0.04	9.89
QP	469.822k	34.36	56.52	-22.16	19.62	Line	-	14.74	9.67	0.06	9.89
AV	469.822k	30.59	46.52	-15.93	19.62	Line	-	10.97	9.67	0.06	9.89
QP	1.181M	26.61	56.00	-29.39	19.65	Line	-	6.96	9.68	0.08	9.89
AV	1.181M	21.35	46.00	-24.65	19.65	Line	-	1.70	9.68	0.08	9.89
QP	18.863M	38.22	60.00	-21.78	19.96	Line	-	18.26	9.78	0.29	9.89
AV	18.863M	35.22	50.00	-14.78	19.96	Line	-	15.26	9.78	0.29	9.89

Conducted Emissions at Powerline_Mode 2



Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Condition	Comment	Raw (dBuV)	LISN (dB)	CL (dB)	AT (dB)
QP	157.361k	49.92	65.60	-15.68	19.62	Neutral	-	30.30	9.69	0.04	9.89
AV	157.361k	34.62	55.60	-20.98	19.62	Neutral	-	15.00	9.69	0.04	9.89
QP	170.439k	46.53	64.93	-18.40	19.62	Neutral	-	26.91	9.69	0.04	9.89
AV	170.439k	26.60	54.93	-28.33	19.62	Neutral	-	6.98	9.69	0.04	9.89
QP	195.216k	42.43	63.80	-21.37	19.61	Neutral	-	22.82	9.68	0.04	9.89
AV	195.216k	23.36	53.80	-30.44	19.61	Neutral	-	3.75	9.68	0.04	9.89
QP	447.846k	34.90	56.92	-22.02	19.62	Neutral	-	15.28	9.67	0.06	9.89
AV	447.846k	31.72	46.92	-15.20	19.62	Neutral	-	12.10	9.67	0.06	9.89
QP	1.205M	23.83	56.00	-32.17	19.66	Neutral	-	4.17	9.68	0.09	9.89
AV	1.205M	19.70	46.00	-26.30	19.66	Neutral	-	0.04	9.68	0.09	9.89
QP	22.666M	38.67	60.00	-21.33	20.16	Neutral	-	18.51	9.96	0.31	9.89
AV	22.666M	33.31	50.00	-16.69	20.16	Neutral	-	13.15	9.96	0.31	9.89



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)	698.75k	1.027M	1M03F1D	688.75k	1.026M

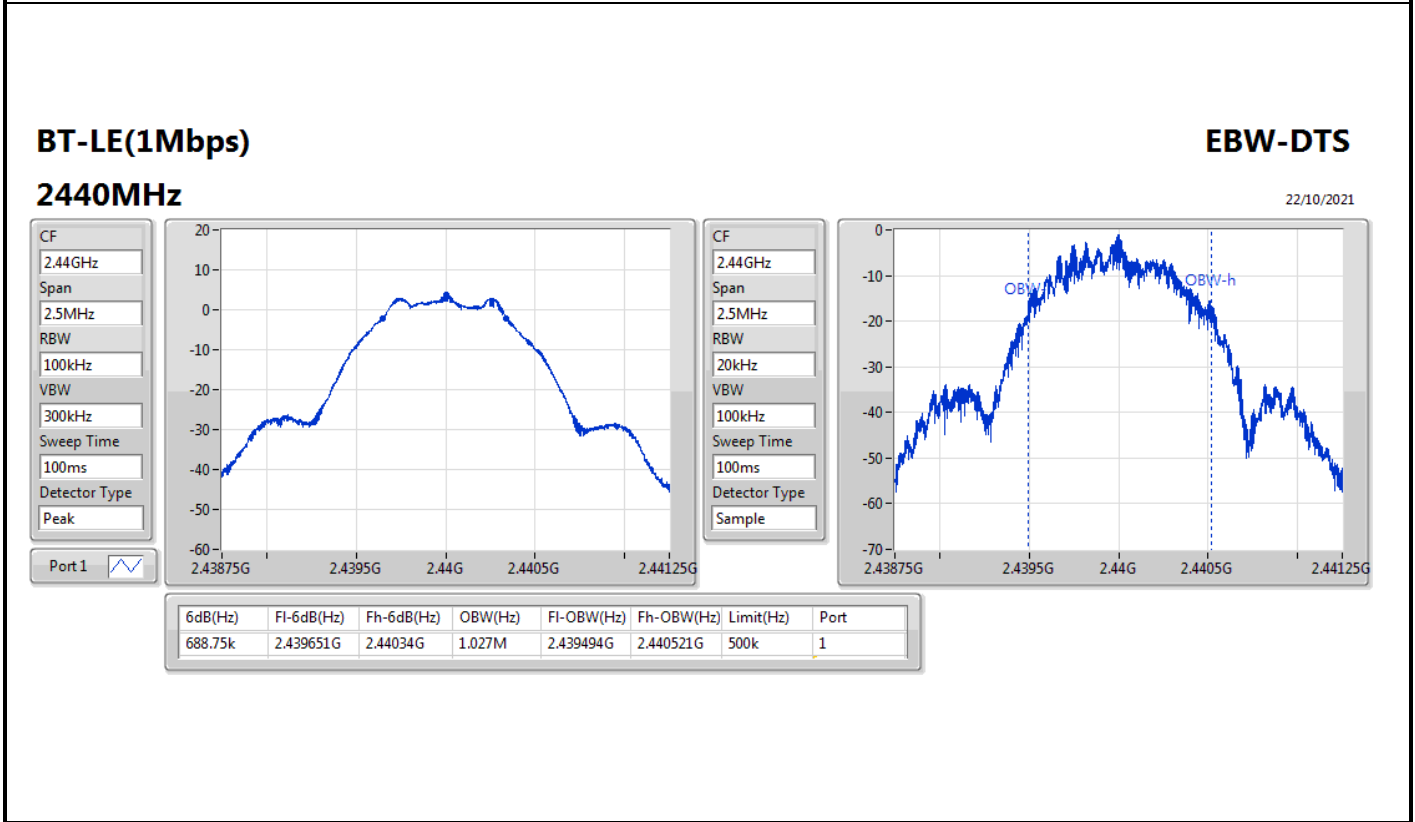
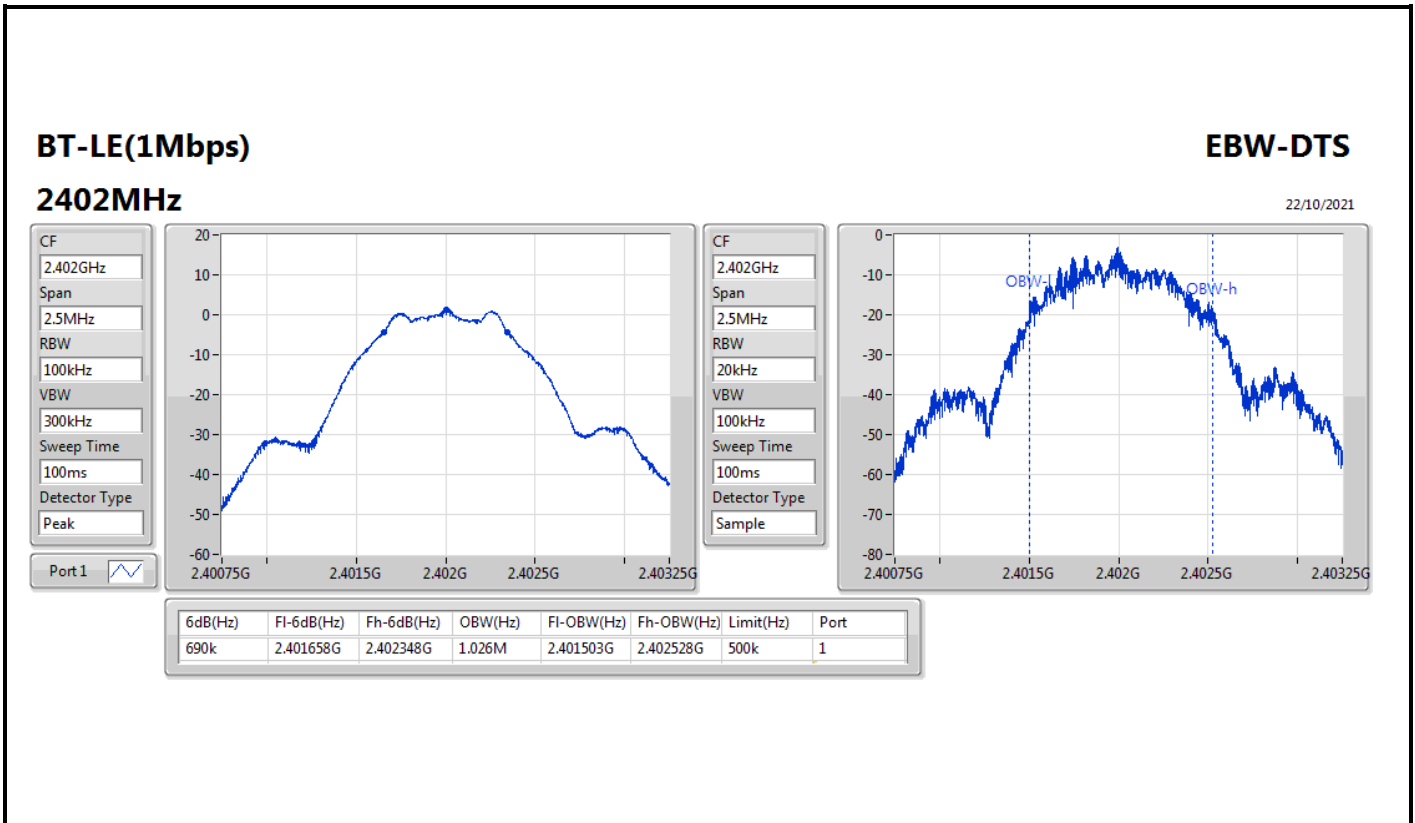
Max-N dB = Maximum 6dB down bandwidth; Max-OBW = Maximum 99% occupied bandwidth;
Min-N dB = Minimum 6dB down bandwidth; Min-OBW = Minimum 99% occupied bandwidth

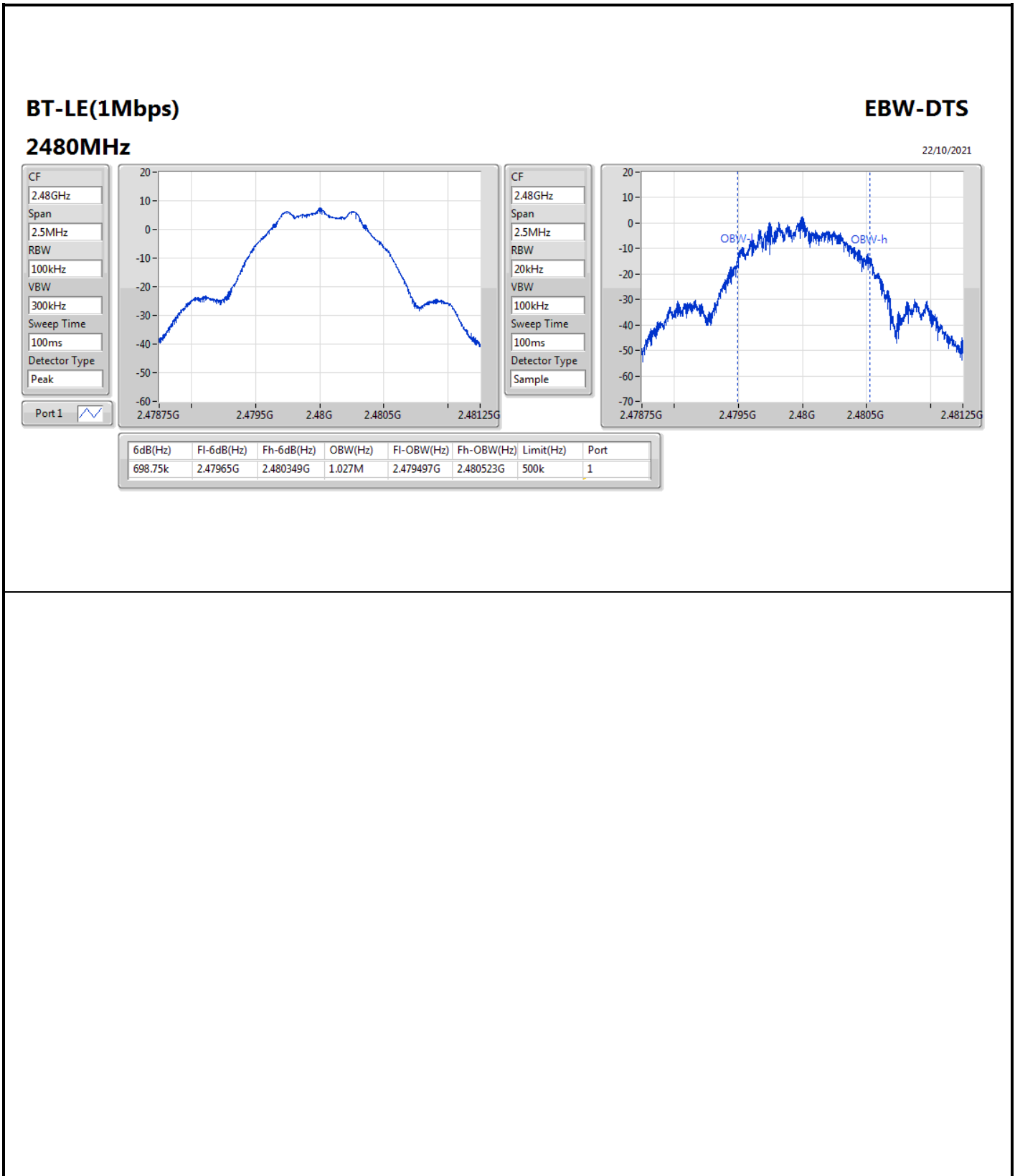


Result

Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	500k	690k	1.026M
2440MHz	Pass	500k	688.75k	1.027M
2480MHz	Pass	500k	698.75k	1.027M

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







Summary

Mode	Power (dBm)	Power (W)
2.4-2.4835GHz	-	-
BT-LE(1Mbps)	6.97	0.00498



Result

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	5.10	1.31	30.00
2440MHz	Pass	5.10	3.52	30.00
2480MHz	Pass	5.10	6.97	30.00

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



Summary

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
BT-LE(1Mbps)	-8.93

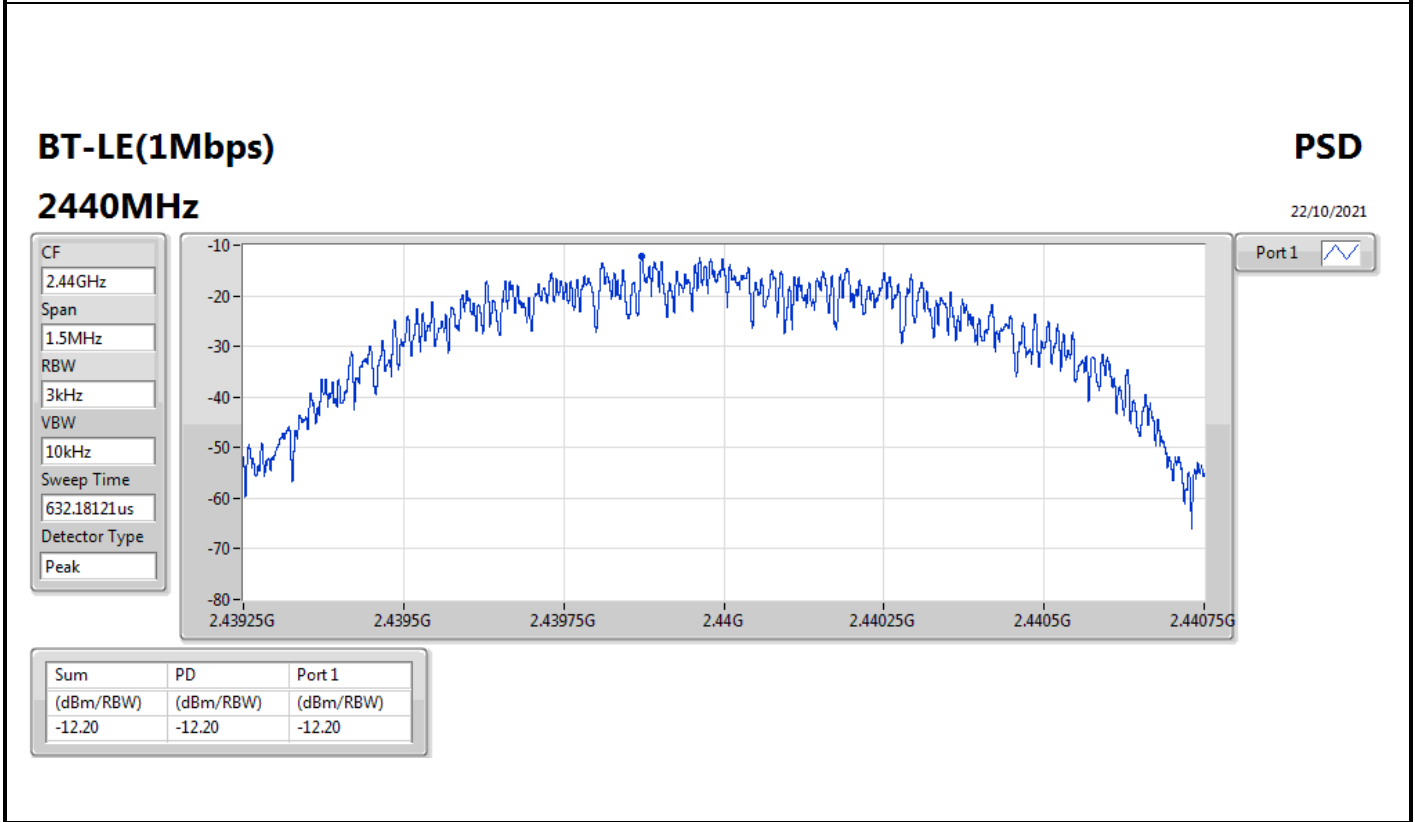
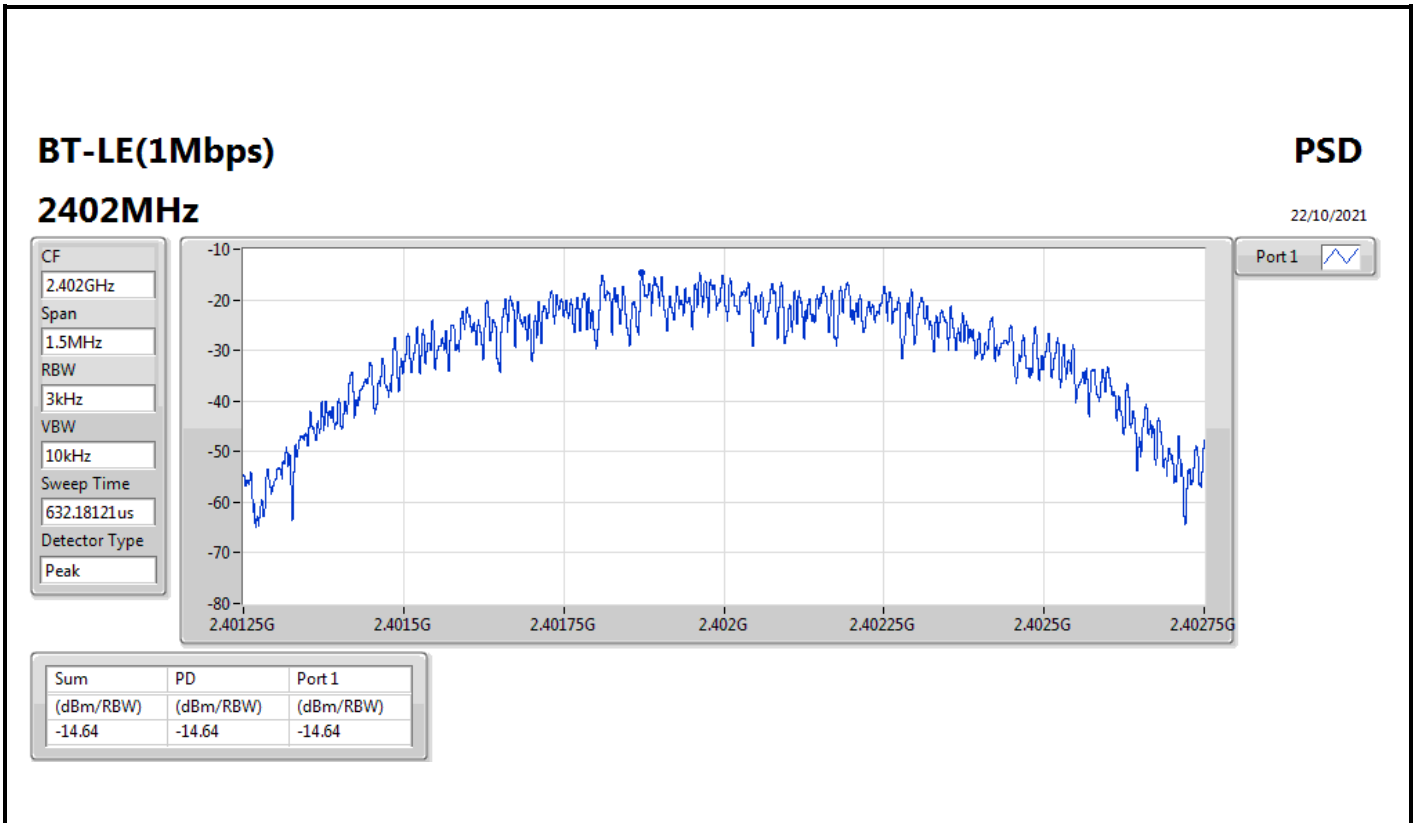
RBW = 3kHz;



Result

Mode	Result	Gain (dBi)	PD (dBm/RBW)	PD Limit (dBm/RBW)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	5.10	-14.64	8.00
2440MHz	Pass	5.10	-12.20	8.00
2480MHz	Pass	5.10	-8.93	8.00

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



BT-LE(1Mbps)

PSD

2480MHz

22/10/2021

CF
2.48GHz

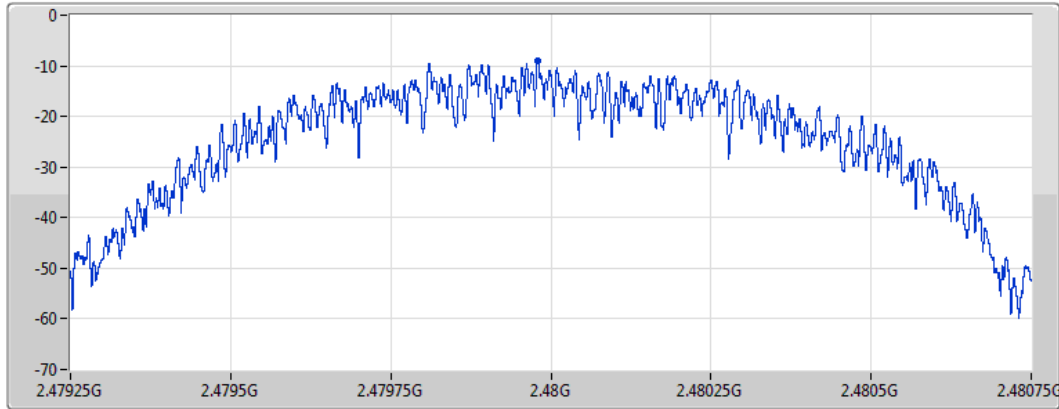
Span
1.5MHz


RBW
3kHz

VBW
10kHz

Sweep Time
632.18121us

Detector Type
Peak



Port 1 

Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-8.93	-8.93	-8.93



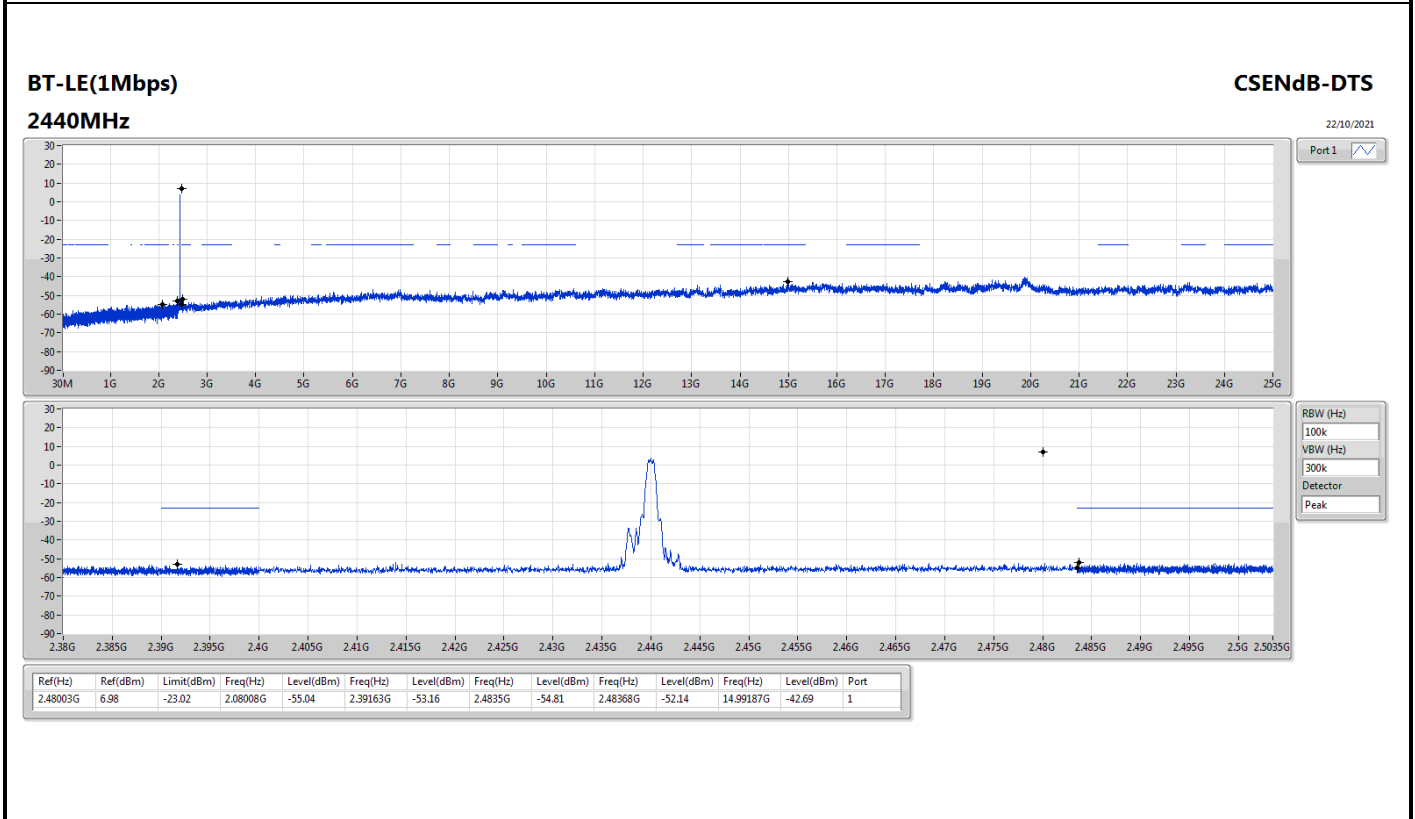
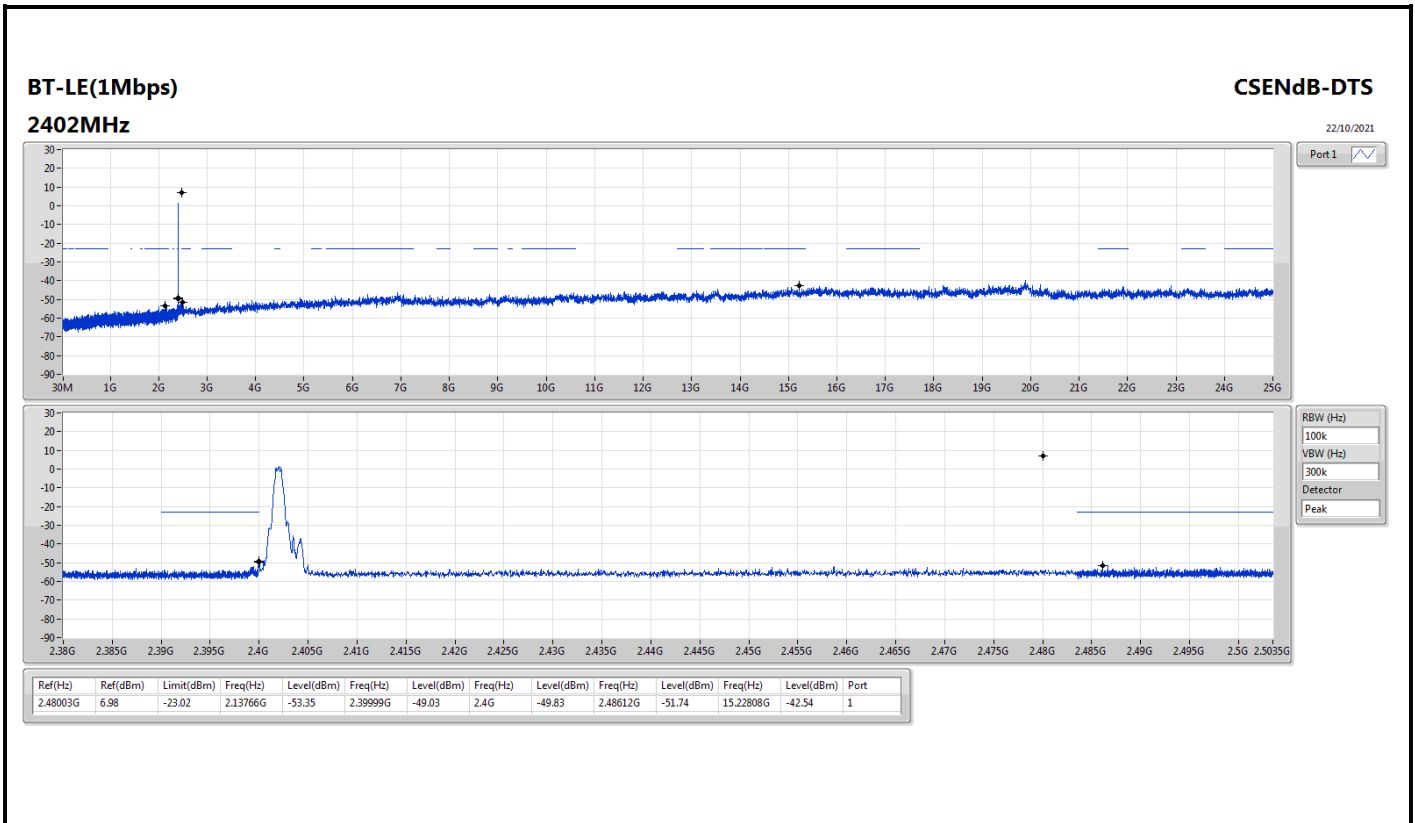
Summary

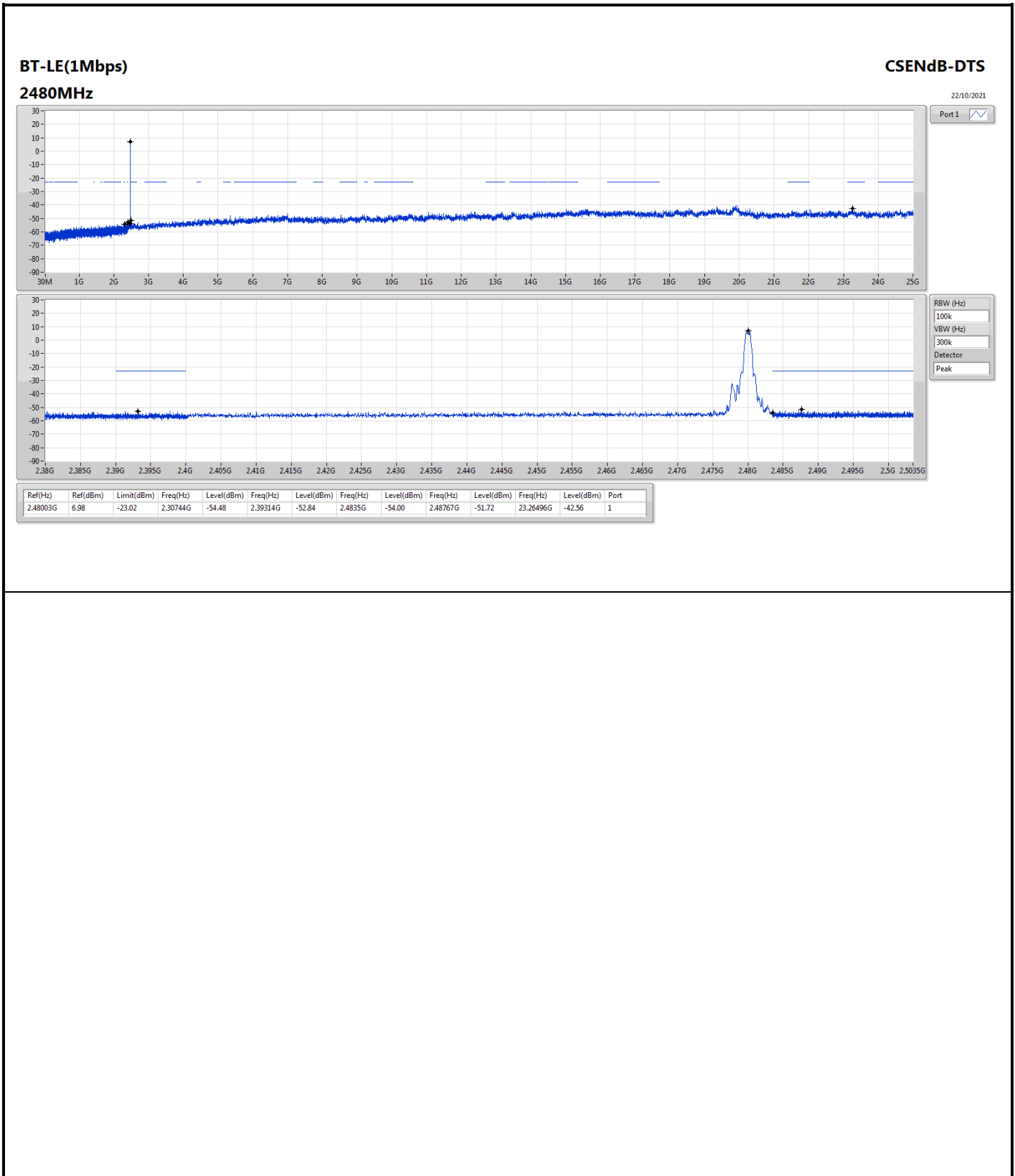
Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	2.48003G	6.98	-23.02	2.13766G	-53.35	2.39999G	-49.03	2.4G	-49.83	2.48612G	-51.74	15.22808G	-42.54	1



Result

Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	2.48003G	6.98	-23.02	2.13766G	-53.35	2.39999G	-49.03	2.4G	-49.83	2.48612G	-51.74	15.22808G	-42.54	1
2440MHz	Pass	2.48003G	6.98	-23.02	2.08008G	-55.04	2.39163G	-53.16	2.4835G	-54.81	2.48368G	-52.14	14.99187G	-42.69	1
2480MHz	Pass	2.48003G	6.98	-23.02	2.30744G	-54.48	2.39314G	-52.84	2.4835G	-54.00	2.48767G	-51.72	23.26496G	-42.56	1







Summary

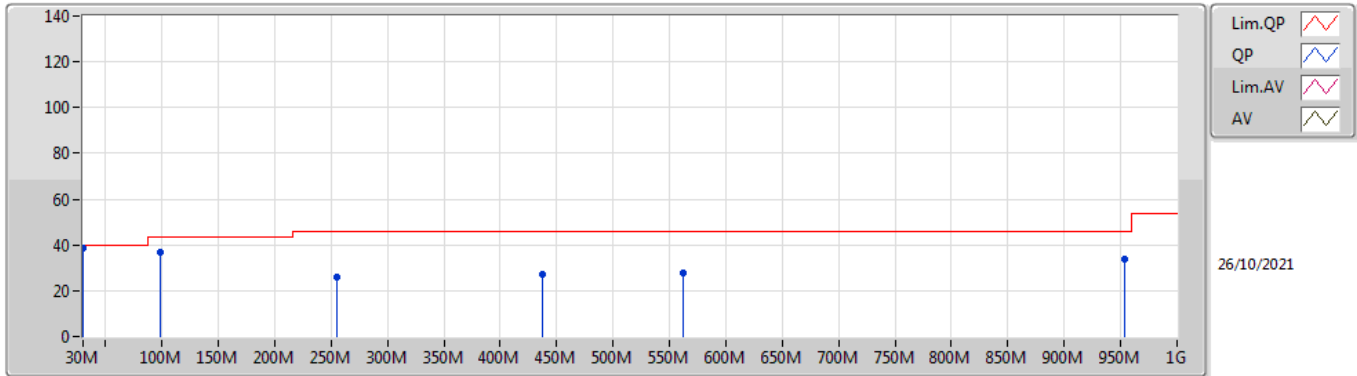
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	QP	30.01M	38.90	40.00	-1.10	3	Vertical	360	1.41	-



Result

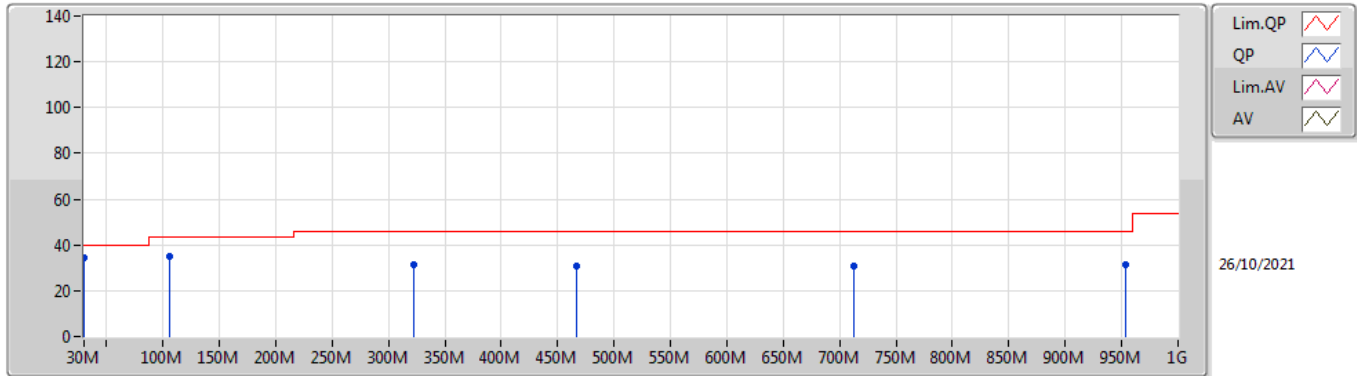
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-
2440MHz	Pass	PK	97.9M	36.68	43.50	-6.82	3	Vertical	360	1.00	-
2440MHz	Pass	PK	255.04M	25.78	46.00	-20.22	3	Vertical	360	1.00	-
2440MHz	Pass	PK	437.4M	27.42	46.00	-18.58	3	Vertical	360	1.00	-
2440MHz	Pass	PK	561.56M	27.90	46.00	-18.10	3	Vertical	360	1.00	-
2440MHz	Pass	PK	953.44M	33.85	46.00	-12.15	3	Vertical	360	1.00	-
2440MHz	Pass	QP	30.01M	38.90	40.00	-1.10	3	Vertical	360	1.41	-
2440MHz	Pass	PK	30M	34.26	40.00	-5.74	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	105.66M	35.15	43.50	-8.35	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	322.94M	31.36	46.00	-14.64	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	466.5M	31.06	46.00	-14.94	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	712.88M	30.69	46.00	-15.31	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	953.44M	31.33	46.00	-14.67	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	43.58M	34.96	40.00	-5.04	3	Vertical	0	1.00	-
2440MHz	Pass	PK	196.84M	40.09	43.50	-3.41	3	Vertical	0	1.00	-
2440MHz	Pass	PK	346.22M	31.06	46.00	-14.94	3	Vertical	0	1.00	-
2440MHz	Pass	PK	493.66M	29.67	46.00	-16.33	3	Vertical	0	1.00	-
2440MHz	Pass	PK	631.4M	36.39	46.00	-9.61	3	Vertical	0	1.00	-
2440MHz	Pass	PK	980.6M	32.40	54.00	-21.60	3	Vertical	0	1.00	-
2440MHz	Pass	PK	76.56M	29.92	40.00	-10.08	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	196.84M	36.78	43.50	-6.72	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	346.22M	33.84	46.00	-12.16	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	567.38M	32.70	46.00	-13.30	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	771.08M	34.16	46.00	-11.84	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	982.54M	31.48	54.00	-22.52	3	Horizontal	360	1.00	-

BT-LE(1Mbps)
2440MHz_Adapter



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
PK	97.9M	36.68	43.50	-6.82	-20.67	3	Vertical	360	1.00	-	57.35	15.01	0.97	36.65
PK	255.04M	25.78	46.00	-20.22	-16.26	3	Vertical	360	1.00	-	42.04	18.62	1.52	36.40
PK	437.4M	27.42	46.00	-18.58	-12.40	3	Vertical	360	1.00	-	39.82	22.16	2.05	36.61
PK	561.56M	27.90	46.00	-18.10	-9.33	3	Vertical	360	1.00	-	37.23	25.36	2.40	37.09
PK	953.44M	33.85	46.00	-12.15	-4.37	3	Vertical	360	1.00	-	38.22	30.07	3.10	37.54
QP	30.01M	38.90	40.00	-1.10	-12.86	3	Vertical	360	1.41	-	51.76	23.73	0.56	37.15

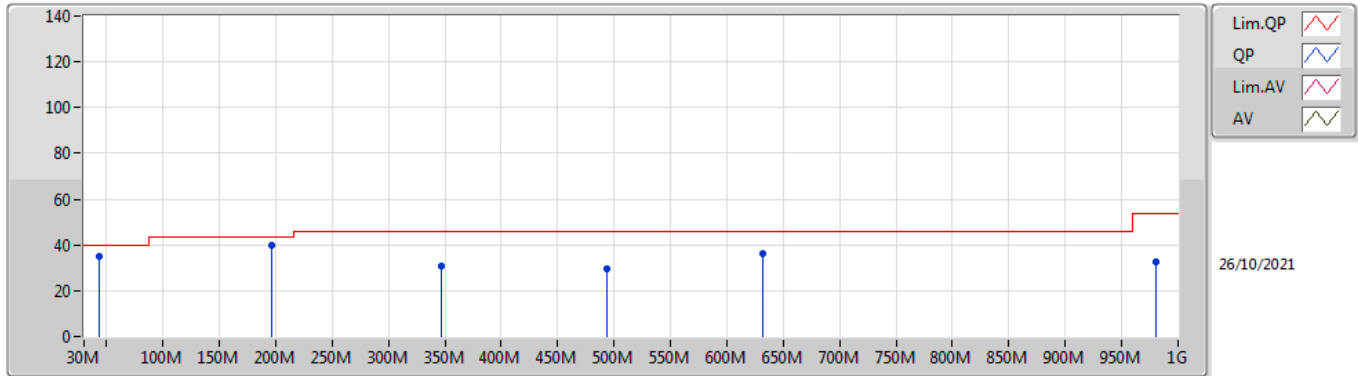
BT-LE(1Mbps)
2440MHz_Adapter



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
PK	30M	34.26	40.00	-5.74	-12.86	3	Horizontal	0	1.00	-	47.12	23.73	0.56	37.15
PK	105.66M	35.15	43.50	-8.35	-19.75	3	Horizontal	0	1.00	-	54.90	15.89	1.00	36.64
PK	322.94M	31.36	46.00	-14.64	-16.06	3	Horizontal	0	1.00	-	47.42	18.70	1.72	36.48
PK	466.5M	31.06	46.00	-14.94	-11.97	3	Horizontal	0	1.00	-	43.03	22.63	2.14	36.74
PK	712.88M	30.69	46.00	-15.31	-8.61	3	Horizontal	0	1.00	-	39.30	26.05	2.71	37.37
PK	953.44M	31.33	46.00	-14.67	-4.37	3	Horizontal	0	1.00	-	35.70	30.07	3.10	37.54

BT-LE(1Mbps)

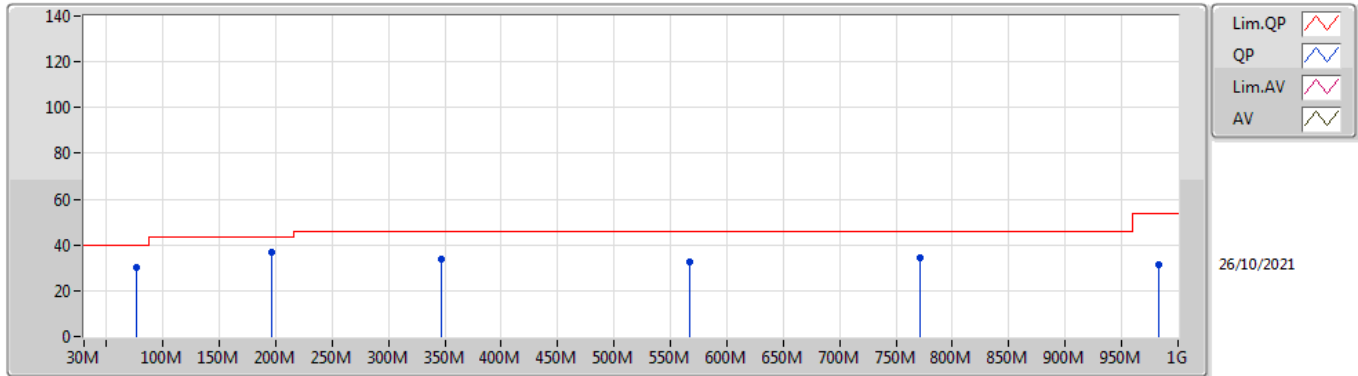
2440MHz_PoE



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
PK	43.58M	34.96	40.00	-5.04	-19.55	3	Vertical	0	1.00	-	54.51	16.75	0.77	37.07
PK	196.84M	40.09	43.50	-3.41	-20.80	3	Vertical	0	1.00	-	60.89	14.19	1.31	36.30
PK	346.22M	31.06	46.00	-14.94	-15.29	3	Vertical	0	1.00	-	46.35	19.47	1.76	36.52
PK	493.66M	29.67	46.00	-16.33	-11.69	3	Vertical	0	1.00	-	41.36	23.04	2.21	36.94
PK	631.4M	36.39	46.00	-9.61	-8.95	3	Vertical	0	1.00	-	45.34	25.69	2.56	37.20
PK	980.6M	32.40	54.00	-21.60	-4.10	3	Vertical	0	1.00	-	36.50	30.04	3.12	37.26

BT-LE(1Mbps)

2440MHz_PoE



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
PK	76.56M	29.92	40.00	-10.08	-23.90	3	Horizontal	360	1.00	-	53.82	12.14	0.87	36.91
PK	196.84M	36.78	43.50	-6.72	-20.80	3	Horizontal	360	1.00	-	57.58	14.19	1.31	36.30
PK	346.22M	33.84	46.00	-12.16	-15.29	3	Horizontal	360	1.00	-	49.13	19.47	1.76	36.52
PK	567.38M	32.70	46.00	-13.30	-9.48	3	Horizontal	360	1.00	-	42.18	25.20	2.41	37.09
PK	771.08M	34.16	46.00	-11.84	-7.50	3	Horizontal	360	1.00	-	41.66	27.29	2.77	37.56
PK	982.54M	31.48	54.00	-22.52	-4.12	3	Horizontal	360	1.00	-	35.60	29.99	3.13	37.24



Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	AV	2.348G	46.21	54.00	-7.79	3	Horizontal	39	2.36	-

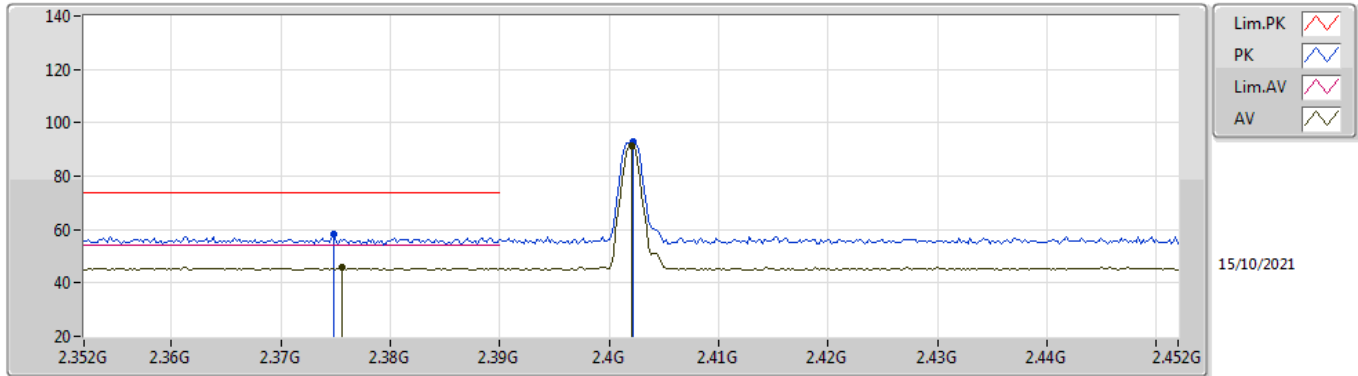


Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	AV	2.3756G	45.71	54.00	-8.29	3	Vertical	32	1.43	-
2402MHz	Pass	AV	2.402G	91.58	Inf	-Inf	3	Vertical	32	1.43	-
2402MHz	Pass	PK	2.3748G	58.41	74.00	-15.59	3	Vertical	32	1.43	-
2402MHz	Pass	PK	2.4022G	92.70	Inf	-Inf	3	Vertical	32	1.43	-
2402MHz	Pass	AV	2.3854G	45.75	54.00	-8.25	3	Horizontal	36	2.14	-
2402MHz	Pass	AV	2.402G	99.24	Inf	-Inf	3	Horizontal	36	2.14	-
2402MHz	Pass	PK	2.3884G	57.59	74.00	-16.41	3	Horizontal	36	2.14	-
2402MHz	Pass	PK	2.4022G	100.37	Inf	-Inf	3	Horizontal	36	2.14	-
2402MHz	Pass	AV	4.80406G	39.13	54.00	-14.87	3	Vertical	22	1.68	-
2402MHz	Pass	PK	4.80379G	48.60	74.00	-25.40	3	Vertical	22	1.68	-
2402MHz	Pass	AV	4.80384G	37.03	54.00	-16.97	3	Horizontal	328	1.37	-
2402MHz	Pass	PK	4.80423G	47.97	74.00	-26.03	3	Horizontal	328	1.37	-
2440MHz	Pass	AV	2.3548G	45.95	54.00	-8.05	3	Vertical	0	1.38	-
2440MHz	Pass	AV	2.44G	97.08	Inf	-Inf	3	Vertical	0	1.38	-
2440MHz	Pass	AV	2.496G	45.93	54.00	-8.07	3	Vertical	0	1.38	-
2440MHz	Pass	PK	2.38G	57.34	74.00	-16.66	3	Vertical	0	1.38	-
2440MHz	Pass	PK	2.4396G	98.16	Inf	-Inf	3	Vertical	0	1.38	-
2440MHz	Pass	PK	2.4888G	56.83	74.00	-17.17	3	Vertical	0	1.38	-
2440MHz	Pass	AV	2.348G	46.21	54.00	-7.79	3	Horizontal	39	2.36	-
2440MHz	Pass	AV	2.44G	100.89	Inf	-Inf	3	Horizontal	39	2.36	-
2440MHz	Pass	AV	2.4852G	45.87	54.00	-8.13	3	Horizontal	39	2.36	-
2440MHz	Pass	PK	2.3676G	57.73	74.00	-16.27	3	Horizontal	39	2.36	-
2440MHz	Pass	PK	2.4396G	102.02	Inf	-Inf	3	Horizontal	39	2.36	-
2440MHz	Pass	PK	2.4908G	57.42	74.00	-16.58	3	Horizontal	39	2.36	-
2440MHz	Pass	AV	4.88004G	42.83	54.00	-11.17	3	Vertical	24	1.64	-
2440MHz	Pass	PK	4.87941G	50.50	74.00	-23.50	3	Vertical	24	1.64	-
2440MHz	Pass	AV	4.87997G	40.61	54.00	-13.39	3	Horizontal	331	1.01	-
2440MHz	Pass	PK	4.88025G	49.14	74.00	-24.86	3	Horizontal	331	1.01	-
2480MHz	Pass	AV	2.48G	101.75	Inf	-Inf	3	Vertical	358	1.00	-
2480MHz	Pass	AV	2.487G	45.91	54.00	-8.09	3	Vertical	358	1.00	-
2480MHz	Pass	PK	2.4798G	102.82	Inf	-Inf	3	Vertical	358	1.00	-
2480MHz	Pass	PK	2.4998G	57.38	74.00	-16.62	3	Vertical	358	1.00	-
2480MHz	Pass	AV	2.48G	101.97	Inf	-Inf	3	Horizontal	354	1.10	-
2480MHz	Pass	AV	2.4916G	45.82	54.00	-8.18	3	Horizontal	354	1.10	-
2480MHz	Pass	PK	2.4798G	103.09	Inf	-Inf	3	Horizontal	354	1.10	-
2480MHz	Pass	PK	2.4904G	57.64	74.00	-16.36	3	Horizontal	354	1.10	-
2480MHz	Pass	AV	4.96003G	41.05	54.00	-12.95	3	Vertical	5	1.44	-
2480MHz	Pass	PK	4.95941G	49.56	74.00	-24.44	3	Vertical	5	1.44	-
2480MHz	Pass	AV	4.9598G	39.98	54.00	-14.02	3	Horizontal	11	1.00	-
2480MHz	Pass	PK	4.96031G	49.48	74.00	-24.52	3	Horizontal	11	1.00	-

BT-LE(1Mbps)

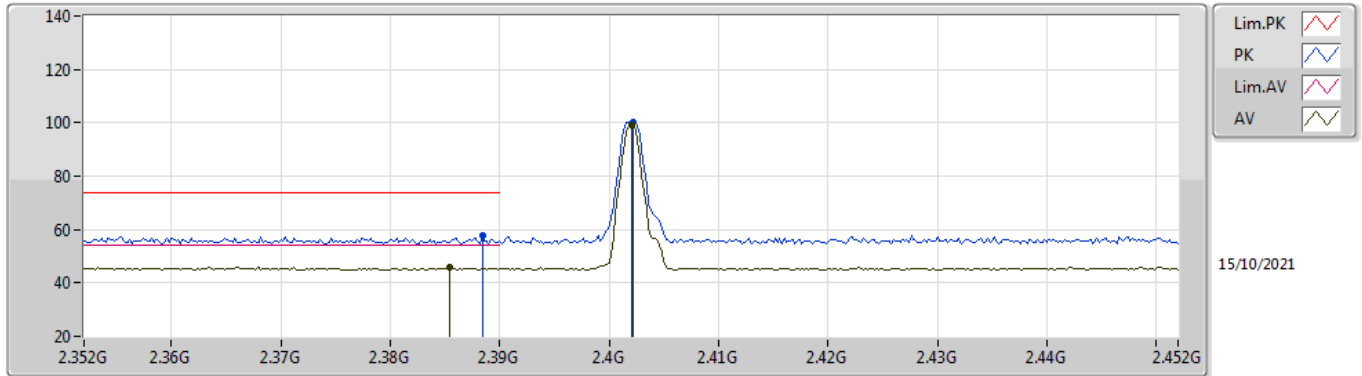
2402MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	2.3756G	45.71	54.00	-8.29	32.26	3	Vertical	32	1.43	-	13.45	27.70	4.56	-
AV	2.402G	91.58	Inf	-Inf	32.18	3	Vertical	32	1.43	-	59.40	27.60	4.58	-
PK	2.3748G	58.41	74.00	-15.59	32.26	3	Vertical	32	1.43	-	26.15	27.70	4.56	-
PK	2.4022G	92.70	Inf	-Inf	32.18	3	Vertical	32	1.43	-	60.52	27.60	4.58	-

BT-LE(1Mbps)

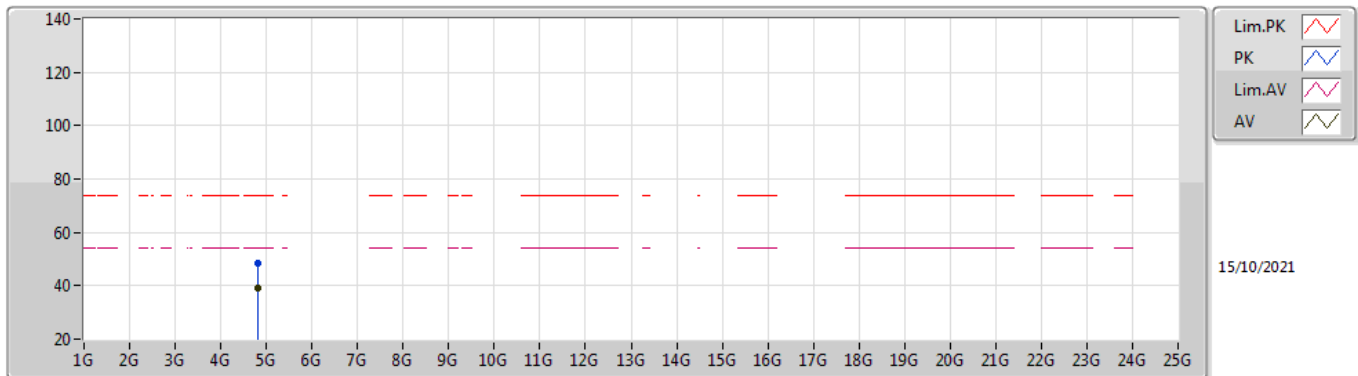
2402MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	2.3854G	45.75	54.00	-8.25	32.23	3	Horizontal	36	2.14	-	13.52	27.66	4.57	-
AV	2.402G	99.24	Inf	-Inf	32.18	3	Horizontal	36	2.14	-	67.06	27.60	4.58	-
PK	2.3884G	57.59	74.00	-16.41	32.22	3	Horizontal	36	2.14	-	25.37	27.65	4.57	-
PK	2.4022G	100.37	Inf	-Inf	32.18	3	Horizontal	36	2.14	-	68.19	27.60	4.58	-

BT-LE(1Mbps)

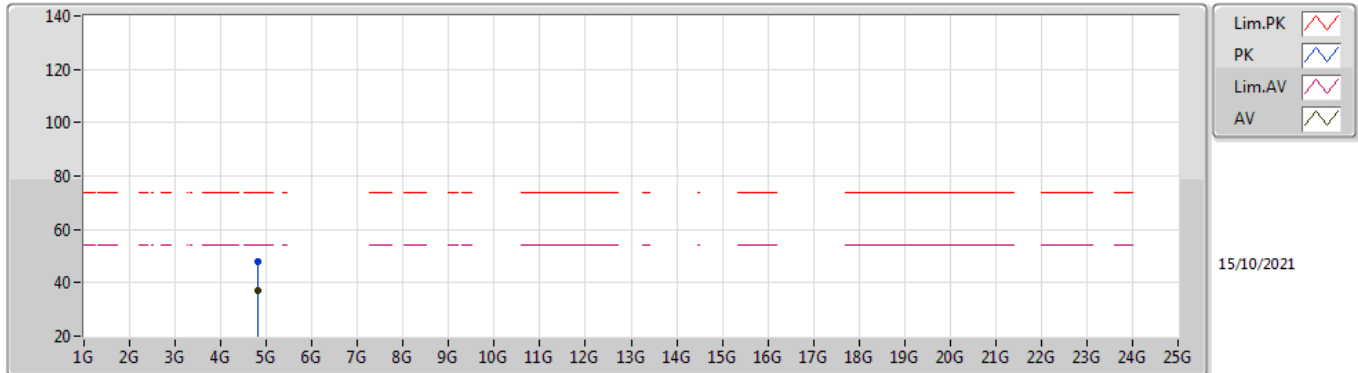
2402MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	4.80406G	39.13	54.00	-14.87	2.95	3	Vertical	22	1.68	-	36.18	31.10	6.66	34.81
PK	4.80379G	48.60	74.00	-25.40	2.95	3	Vertical	22	1.68	-	45.65	31.10	6.66	34.81

BT-LE(1Mbps)

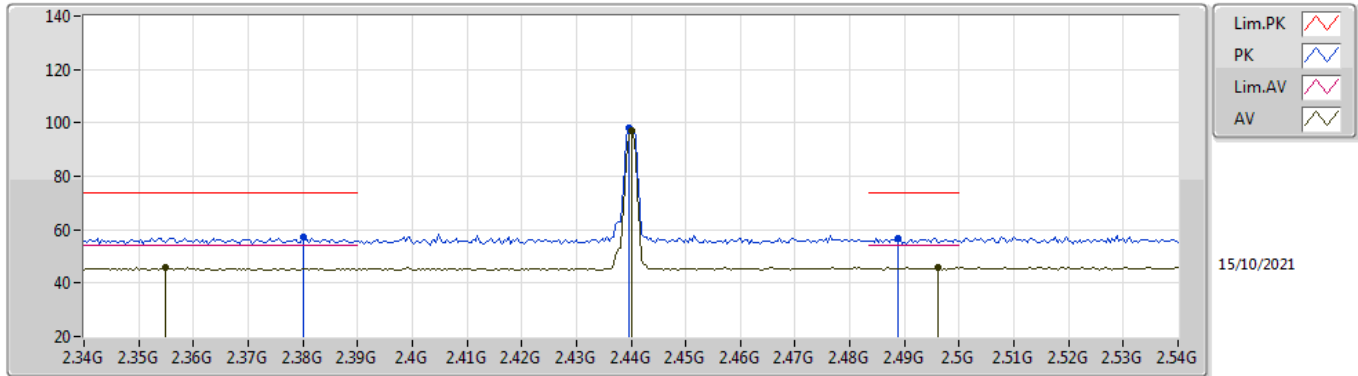
2402MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	4.80384G	37.03	54.00	-16.97	2.95	3	Horizontal	328	1.37	-	34.08	31.10	6.66	34.81
PK	4.80423G	47.97	74.00	-26.03	2.95	3	Horizontal	328	1.37	-	45.02	31.10	6.66	34.81

BT-LE(1Mbps)

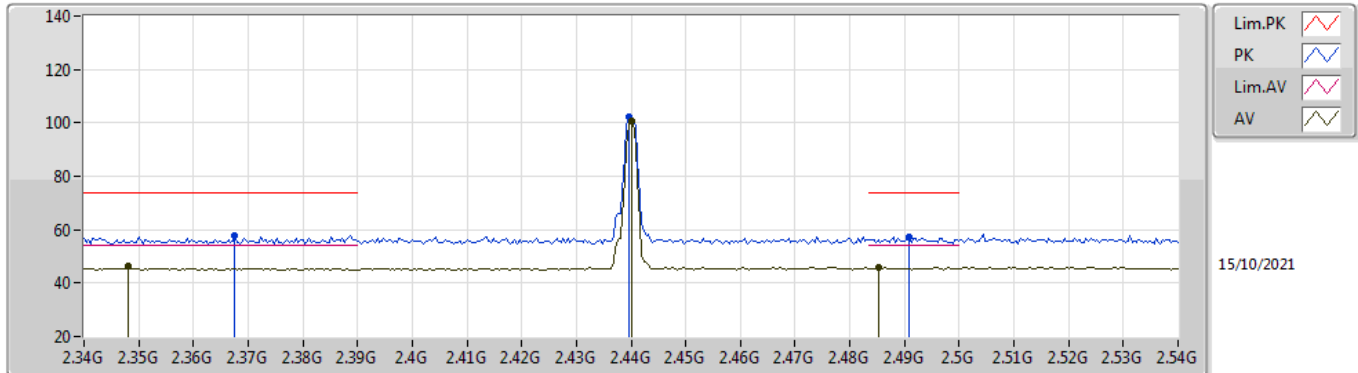
2440MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	2.3548G	45.95	54.00	-8.05	32.32	3	Vertical	0	1.38	-	13.63	27.78	4.54	-
AV	2.44G	97.08	Inf	-Inf	32.12	3	Vertical	0	1.38	-	64.96	27.52	4.60	-
AV	2.496G	45.93	54.00	-8.07	32.12	3	Vertical	0	1.38	-	13.81	27.50	4.62	-
PK	2.38G	57.34	74.00	-16.66	32.24	3	Vertical	0	1.38	-	25.10	27.68	4.56	-
PK	2.4396G	98.16	Inf	-Inf	32.12	3	Vertical	0	1.38	-	66.04	27.52	4.60	-
PK	2.4888G	56.83	74.00	-17.17	32.12	3	Vertical	0	1.38	-	24.71	27.50	4.62	-

BT-LE(1Mbps)

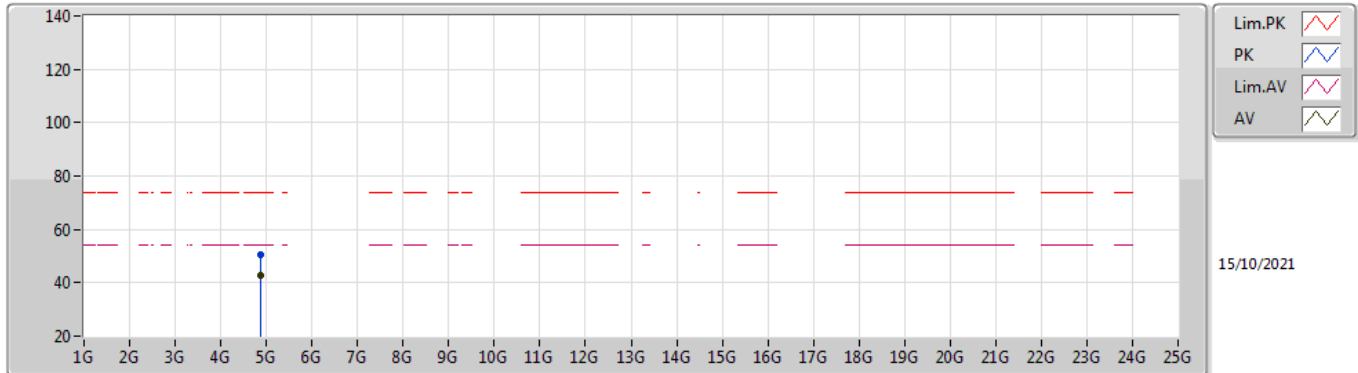
2440MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	2.348G	46.21	54.00	-7.79	32.33	3	Horizontal	39	2.36	-	13.88	27.80	4.53	-
AV	2.44G	100.89	Inf	-Inf	32.12	3	Horizontal	39	2.36	-	68.77	27.52	4.60	-
AV	2.4852G	45.87	54.00	-8.13	32.11	3	Horizontal	39	2.36	-	13.76	27.50	4.61	-
PK	2.3676G	57.73	74.00	-16.27	32.28	3	Horizontal	39	2.36	-	25.45	27.73	4.55	-
PK	2.4396G	102.02	Inf	-Inf	32.12	3	Horizontal	39	2.36	-	69.90	27.52	4.60	-
PK	2.4908G	57.42	74.00	-16.58	32.12	3	Horizontal	39	2.36	-	25.30	27.50	4.62	-

BT-LE(1Mbps)

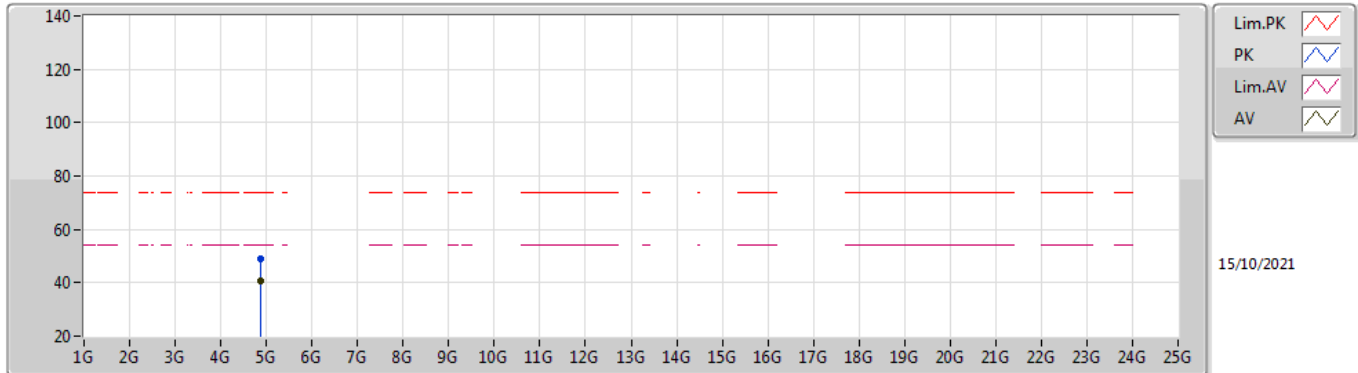
2440MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	4.88004G	42.83	54.00	-11.17	3.03	3	Vertical	24	1.64	-	39.80	31.10	6.72	34.79
PK	4.87941G	50.50	74.00	-23.50	3.03	3	Vertical	24	1.64	-	47.47	31.10	6.72	34.79

BT-LE(1Mbps)

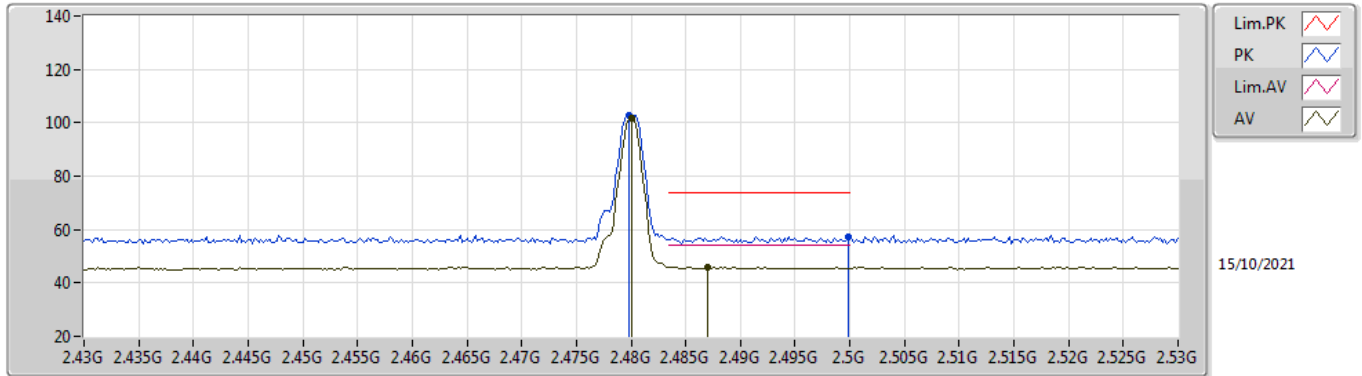
2440MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	4.87997G	40.61	54.00	-13.39	3.03	3	Horizontal	331	1.01	-	37.58	31.10	6.72	34.79
PK	4.88025G	49.14	74.00	-24.86	3.03	3	Horizontal	331	1.01	-	46.11	31.10	6.72	34.79

BT-LE(1Mbps)

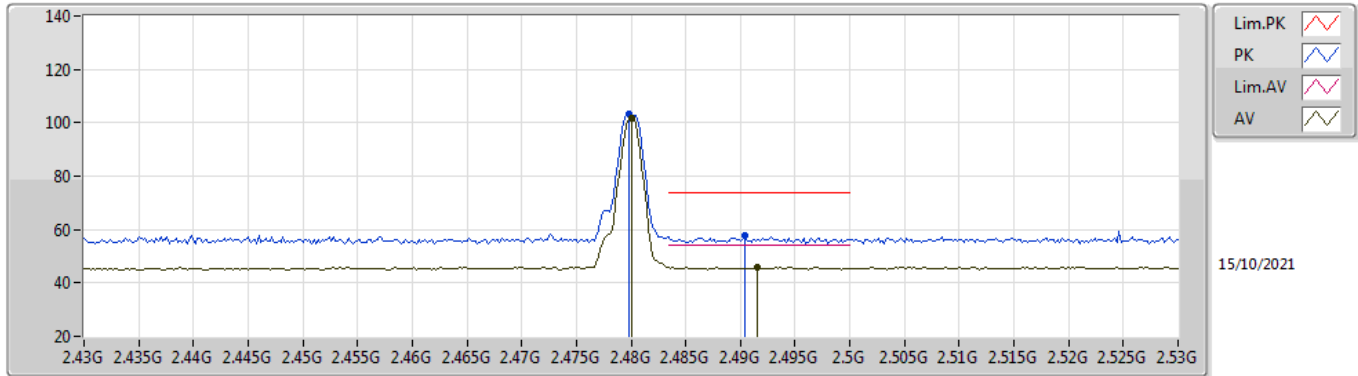
2480MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	2.48G	101.75	Inf	-Inf	32.11	3	Vertical	358	1.00	-	69.64	27.50	4.61	-
AV	2.487G	45.91	54.00	-8.09	32.11	3	Vertical	358	1.00	-	13.80	27.50	4.61	-
PK	2.4798G	102.82	Inf	-Inf	32.11	3	Vertical	358	1.00	-	70.71	27.50	4.61	-
PK	2.4998G	57.38	74.00	-16.62	32.12	3	Vertical	358	1.00	-	25.26	27.50	4.62	-

BT-LE(1Mbps)

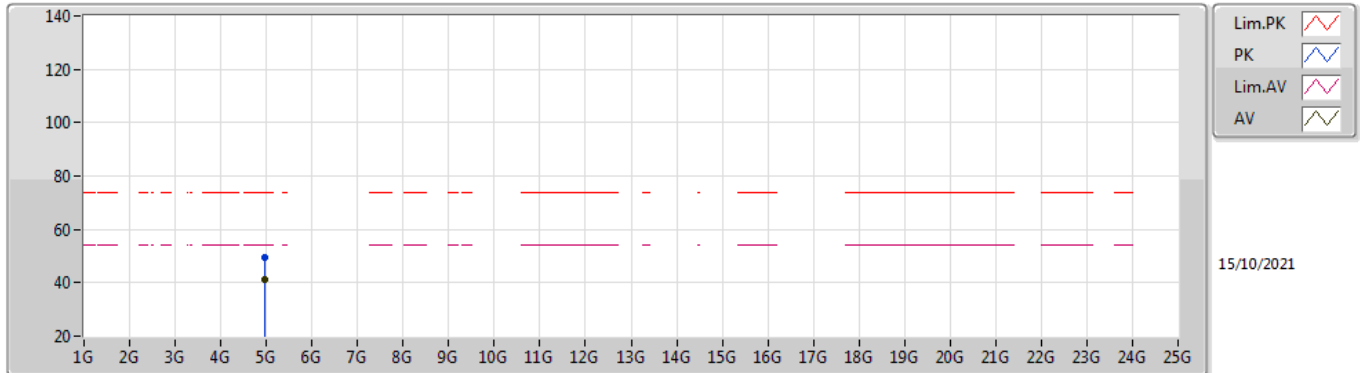
2480MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	2.48G	101.97	Inf	-Inf	32.11	3	Horizontal	354	1.10	-	69.86	27.50	4.61	-
AV	2.4916G	45.82	54.00	-8.18	32.12	3	Horizontal	354	1.10	-	13.70	27.50	4.62	-
PK	2.4798G	103.09	Inf	-Inf	32.11	3	Horizontal	354	1.10	-	70.98	27.50	4.61	-
PK	2.4904G	57.64	74.00	-16.36	32.12	3	Horizontal	354	1.10	-	25.52	27.50	4.62	-

BT-LE(1Mbps)

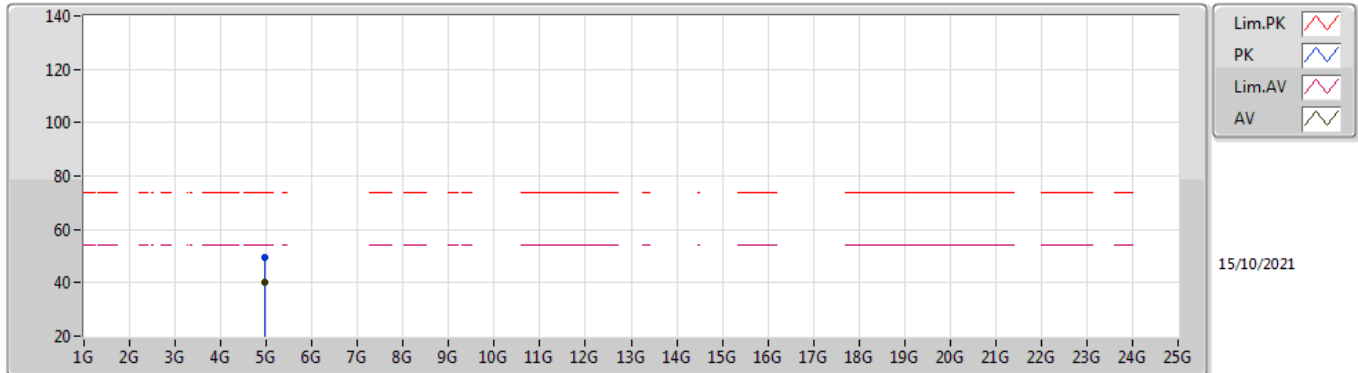
2480MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	4.96003G	41.05	54.00	-12.95	3.35	3	Vertical	5	1.44	-	37.70	31.34	6.78	34.77
PK	4.95941G	49.56	74.00	-24.44	3.35	3	Vertical	5	1.44	-	46.21	31.34	6.78	34.77

BT-LE(1Mbps)

2480MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	4.9598G	39.98	54.00	-14.02	3.35	3	Horizontal	11	1.00	-	36.63	31.34	6.78	34.77
PK	4.96031G	49.48	74.00	-24.52	3.35	3	Horizontal	11	1.00	-	46.13	31.34	6.78	34.77