Testing Laboratory 3787

RADIO TEST REPORT

FCC ID	:	QXO-AP5050
Equipment	:	Access Point
Brand Name	:	Extreme Networks
Model Name	:	AP5050U
Applicant	:	Extreme Networks, Inc. 2121 RDU Center Drive Morrisville North Carolina United States 27560
Manufacturer	:	Extreme Networks, Inc. 2121 RDU Center Drive Morrisville North Carolina United States 27560
Standard	:	47 CFR FCC Part 15.247

The product was received on May 16, 2022, and testing was started from May 30, 2022 and completed on Sep. 12, 2022. We, Sporton International Inc. Hsinchu 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. Hsinchu Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

Sporton International Inc. Hsinchu Laboratory
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Photographs of EUT v01

History of this test report

Report No.	Version	Description	Issued Date
FR251735AH	01	Initial issue of report	Oct. 31, 2022

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:

1. The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results.
2. The measurement uncertainty please refer to report "Measurement Uncertainty".

Comments and Explanations:

1. The test configuration, test mode and test software were written in this test report are declared by the manufacturer.
2. The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Sam Chen
Report Producer: Viola Huang

1 General Description

1.1 Information

1.1.1 RF General Information

Frequency Range (MHz)	IEEE Std.	Ch. Frequency (MHz)	Channel Number
2400-2483.5	802.15.4	2405-2480	11-26 [16]

For Radio 3

Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	O-QPSK	3	1

Note:
- 802.15.4 uses a O-QPSK (250kbps) modulation.
- BWch is the nominal channel bandwidth.

1.1.2 Antenna Information

Ant.	Port					Brand Name	Model Name	Antenna Type	Connector	Gain (dBi)
	WLAN 2.4GHz (Radio 1) (Scanning Radio 1)	WLAN 5GHz (Radio 2)	WLAN 5GHz (Scanning Radio 1)	BT / IEEE802.15.4 (Radio 3)	GPS (Radio 4)					
1	1	-	-	-	-	WNC	95XEAJ15.G45	Metal PIFA	I-PEX	Note 1
2	2	-	-	-	-	WNC	95XEAJ15.G46	Metal PIFA	I-PEX	
3	3	-	1	-	-	WNC	95XEAJ15.G53	Metal PIFA	I-PEX	
4	4	-	2	-	-	WNC	95XEAJ15.G54	Metal PIFA	I-PEX	
5	-	1	-	-	-	WNC	95XEAJ15.G47	Metal PIFA	I-PEX	
6	-	2	-	-	-	WNC	95XEAJ15.G48	Metal PIFA	I-PEX	
7	-	3	-	-	-	WNC	95XEAJ15.G91	Metal PIFA	I-PEX	
8	-	4	-	-	-	WNC	95XEAJ15.G92	Metal PIFA	I-PEX	
9	-	-	-	-	-	WNC	95XEAJ15.G49	Metal PIFA	I-PEX	
10	-	-	-	-	-	WNC	95XEAJ15.G50	Metal PIFA	I-PEX	
11	-	-	-	-	-	WNC	95XEAJ15.G51	Metal PIFA	I-PEX	
12	-	-	-	-	-	WNC	95XEAJ15.G52	Metal PIFA	I-PEX	
13	-	-	-	1	-	WNC	95XEAJ15.G55	Metal PIFA	I-PEX	
14	-	-	-	-	1	WNC	95XEAJ15.G89	Metal PIFA	I-PEX	

Note 1:

Ant.	Antenna Gain (dBi)												
	WLAN 2.4GHz (Radio 1) (Scanning Radio 1)			WLAN 5GHz (Radio 2)				WLAN 5GHz (Scanning Radio 1)				BT / IEEE802.15.4 (Radio 3)	GPS (Radio 4)
	2.4G	2.45G	2.4835G	UNII 1	UNII 2A	UNII 2C	UNII 3	UNII 1	UNII 2A	UNII 2C	UNII 3		
1	2.3	2.62	2.51	-	-	-	-	-	-	-	-	-	-
2	2.79	3.09	3.11	-	-	-	-	-	-	-	-	-	-
3	3.18	2.35	2.56	-	-	-	-	4.4	4.4	4.4	4.4	-	-
4	3.8	4.63	3.64	-	-	-	-	4.4	4.4	4.4	4.4	-	-
5	-	-	-	3.18	2.87	2.65	2.51	-	-	-	-	-	-
6	-	-	-	3.24	3.59	3.6	3.35	-	-	-	-	-	-
7	-	-	-	3.75	4.08	3.8	4.59	-	-	-	-	-	-
8	-	-	-	3.3	3.05	2.6	2.53	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-	-	-	-	4.9	-
14	-	-	-	-	-	-	-	-	-	-	-	-	3.3

Ant.	Directional Gain (dBi)														
	WLAN 2.4GHz (Radio 1) (Scanning Radio 1)														
	2.4G		2.45G		2.4835G		2.4G			2.45G			2.4835G		
	2T1S	2T2S	2T1S	2T2S	2T1S	2T2S	4T1S	4T2S	4T4S	4T1S	4T2S	4T4S	4T1S	4T2S	4T4S
1	4.13	2.79	4.72	3.09	4.15	3.11	7.27	4.27	3.8	7.68	4.68	4.63	7.05	4.05	3.64
2															
3	-	-	-	-	-	-									
4															

Ant.	Directional Gain (dBi)							
	WLAN 5GHz (Radio 2)							
	UNII 1		UNII 2A		UNII 2C		UNII 3	
	2T1S	2T2S	2T1S	2T2S	2T1S	2T2S	2T1S	2T2S
5	5.5	3.24	5.81	3.59	4.34	3.6	4.53	3.35
6								

Ant.	Directional Gain (dBi)											
	WLAN 5GHz (Radio 2)											
	UNII 1			UNII 2A			UNII 2C			UNII 3		
	4T1S	4T2S	4T4S	4T1S	4T2S	4T4S	4T1S	4T2S	4T4S	4T1S	4T2S	4T4S
5	8.43	5.43	3.75	8.12	5.12	4.08	7.02	4.02	3.8	7.68	4.68	4.59
6												
7												
8												

Note 2: The EUT has fourteen antennas.
Note 3: The above information (except gain of Radio 1 2.4GHz, Scanning Radio 1 2.4GHz, Radio 2) was declared by manufacturer.
Note 4: Radio 1 2.4GHz, Scanning Radio 1 2.4GHz, Radio 2: Maximum Directional Gain following KDB662911 D03.
Note 5: Scanning Radio 1 5GHz: Maximum Directional Gain following KDB662911 D01.
Note 6: The EUT doesn't enable the DFS and 6GHz band. The antenna 9~12 is 6GHz's antenna. Thus, the antenna 9~12 function doesn't enable it at this time.
Note 7: Directional gain information.
For Scanning Radio 1 5GHz

5G G1 = 4.4 dBi; G2 = 4.4 dBi

5G 2T1S DG= 7.41 dBi; 2T2S DG= 4.4 dBi

For Radio 1
For 2.4GHz:
For IEEE 802.11b/g/n/VHT/ax mode (1TX, 2TX, 4TX/4RX):
1TX
Only Port 1 can be use as transmitting antenna.
2TX
Port 1, Port 2 can be use as transmitting antenna.
Port 1, Port 2 could transmitting simultaneously.
4TX
Port 1, Port 2, Port 3 and Port 4 can be used as transmitting antenna.
Port 1, Port 2, Port 3 and Port 4 could transmit simultaneously.
4RX
Port 1, Port 2, Port 3, Port 4 can be used as receiving antennas.
Port 1, Port 2, Port 3, Port 4 could receive simultaneously.

For Scanning Radio 1
For 2.4GHz:
For IEEE 802.11b/g/n/VHT/ax mode (4TX/4RX):
Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.
Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.
For 5GHz UNII 1, 3:
For IEEE 802.11a/n/ac/ax mode (2TX/2RX):
Port 1, Port 2 can be used as transmitting/receiving antenna.
Port 1, Port 2 could transmit/receive simultaneously.

For Radio 2
For 5GHz UNII 1, 3:
For IEEE 802.11a/n/ac/ax mode (1TX, 2TX, 4TX/4RX):
1TX
Only Port 1 can be use as transmitting antenna.
2TX
Port 1, Port 2 can be use as transmitting antenna.
Port 1, Port 2 could transmitting simultaneously.
4TX
Port 1, Port 2, Port 3 and Port 4 can be used as transmitting antenna.
Port 1, Port 2, Port 3 and Port 4 could transmit simultaneously.
4RX
Port 1, Port 2, Port 3, Port 4 can be used as receiving antennas.
Port 1, Port 2, Port 3, Port 4 could receive simultaneously.

For Radio 3
Bluetooth / IEEE802.15.4 (1TX):
Only Port 1 can be used as transmitting antenna.

For Radio 4
GPS (1RX):
Only Port 1 can be used as receiving antenna.

1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
O-QPSK	1	0	n/a (DC>=0.98)	n/a (DC>=0.98)

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

1.1.4 EUT Operational Condition

EUT Power Type	From PoE			
Beamforming Function	☒	With beamforming	☐	Without beamforming
	The product has beamforming function for 11n/VHT/11ax in radio 1 2.4GHz, 11n/11ac/11ax in radio 2 5GHz.			
Function	☒	Point-to-multipoint	☐	Point-to-point
Test Software Version	DOS [ver 6.1.7601]			

Note: The above information was declared by manufacturer.

1.1.5 Table for EUT support function

Function
AP
Bridge
Mesh

Note1: For above table list, only AP mode was tested and recorded in this test.
Note2: The above information was declared by manufacturer.

1.1.6 Table for Radio function

Radio (R)	WLAN 2.4GHz	5GHz	Scanning radio (WLAN 2.4GHz 4TX / 5GHz 2TX)	Bluetooth / IEEE802.15.4	GPS
R1	V (AP, Bridge, Mesh)	-	V (AP, Bridge, Mesh for 2.4GHz, AP for 5GHz UNII 1, 3)	-	-
R2	-	V (AP for UNII 1, 3 / Bridge, Mesh for UNII 1, 3)	-	-	-
R3	-	-	-	V	-
R4	-	-	-	-	V

Note: The above information was declared by manufacturer.

1.2 Applicable Standards

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

- 47 CFR FCC Part 15.247
- ANSI C63.10-2013

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

- FCC KDB 558074 D01 v05r02
- FCC KDB 414788 D01 v01r01

1.3 Testing Location Information

Testing Location Information	
Test Lab.：Sporton International Inc. Hsinchu Laboratory	
Hsinchu	ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)
(TAF: 3787)	TEL: 886-3-656-9065 FAX: 886-3-656-9085
	Test site Designation No. TW3787 with FCC.
	Conformity Assessment Body Identifier (CABID) TW3787 with ISED.

Test Condition	Test Site No.	Test Engineer	Test Environment (°C / %)	Test Date
RF Conducted	TH03-CB	Caster Chang	25.6~26.1 / 65~69	Jun. 06, 2022~Aug. 15, 2022
Radiated below 1GHz	10CH01-CB	Joe Chu	22~23 / 57~58	May 30, 2022~Sep. 12, 2022
Radiated above 1GHz	03CH04-CB	RJ Huang	24.3~25.9 / 62~66	May 31, 2022~Jul. 01, 2022
AC Conduction	CO01-CB	Allen Chung	23~24 / 56~57	May 30, 2022

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 Date : After Mar. 10, 2022

Test Items	Uncertainty	Remark
Radiated Emission (9kHz ~ 30MHz)	5.0 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	4.9 dB	Confidence levels of 95%

Test Date : Before Nov. 04, 2022

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	3.4 dB	Confidence levels of 95%

Test Date : Before Jun. 01, 2022

Test Items	Uncertainty	Remark
Radiated Emission (1GHz ~ 18GHz)	4.7 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	4.2 dB	Confidence levels of 95%

Test Date : After May 31, 2022

Test Items	Uncertainty	Remark
Radiated Emission (1GHz ~ 18GHz)	5.2 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	4.7 dB	Confidence levels of 95%
Conducted Emission	3.2 dB	Confidence levels of 95%
Output Power Measurement	0.8 dB	Confidence levels of 95%
Power Density Measurement	3.2 dB	Confidence levels of 95%
Bandwidth Measurement	2.0 %	Confidence levels of 95%

2 Test Configuration of EUT

2.1 Test Channel Mode

Mode	Power Setting
O-QPSK_1TX	-
2405MHz	5
2440MHz	5
2475MHz	5
2480MHz	1

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	Normal Link(WLAN, GPS), CTX(Bluetooth, IEEE802.15.4)
1	R1 (2.4GHz)+R2 (5GHz)+R3 (BT)+R4 (GPS)+PoE 1
2	R1 (2.4GHz)+R2 (5GHz)+R3 (802.15.4)+R4 (GPS)+PoE 1
Mode 2 has been evaluated to be the worst case between Mode 1~2, thus measurement for Mode 3 will follow this same test mode.	
3	Scaning R1 (5GHz)+R2 (5GHz)+R3 (802.15.4)+R4 (GPS)+PoE 1
For operating mode 3 is the worst case and it was record in this test report.	

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

The Worst Case Mode for Following Conformance Tests	
Tests Item	Emissions in Restricted Frequency Bands
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.
Operating Mode < 1GHz	Normal Link(WLAN, GPS), CTX(Bluetooth, IEEE802.15.4)
1	EUT in Z axis_R1 (2.4GHz)+R2 (5GHz)+R3 (BT)+R4 (GPS)+PoE 1
2	EUT in Y axis_R1 (2.4GHz)+R2 (5GHz)+R3 (BT)+R4 (GPS)+PoE 1
3	EUT in X axis_R1 (2.4GHz)+R2 (5GHz)+R3 (BT)+R4 (GPS)+PoE 1
Mode 1 has been evaluated to be the worst case among Mode 1~3, thus measurement for Mode 4~Mode 6 will follow this same test mode.	
4	EUT in Z axis_R1 (2.4GHz)+R2 (5GHz)+R3 (802.15.4)+R4 (GPS)+PoE 1
5	EUT in Z axis_Scaning R1 (5GHz)+R2 (5GHz)+R3 (BT)+R4 (GPS)+PoE 1
6	EUT in Z axis_Scaning R1 (5GHz)+R2 (5GHz)+R3 (802.15.4)+R4 (GPS)+PoE 1
For operating mode 1 is the worst case and it was record in this test report.	
Operating Mode > 1GHz	CTX
	The EUT was performed at X axis, Y axis and Z axis and the worst case was found at Y axis. So the measurement will follow this same test configuration.
1	EUT in Y axis_R3_1T1S

Note 1: The PoE is for measurement only, would not be marketed.

Their information as below:

Power	Brand	Model
PoE 1	Microsemi	PD-9501-10GC/AC
PoE 2	Microsemi	PD-9001GR/AT/AC

2.3 EUT Operation during Test

For CTX Mode:

The EUT was programmed to be in continuously transmitting mode.

For Normal Link Mode:

During the test, the EUT operation to normal function.

2.4 Accessories

Accessories
Bracket*1
Sealing Collar*2

2.5 Support Equipment

For AC Conduction and Radiated (below 1GHz):

Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
A	PoE 1	Microsemi	PD-9501-10GC/AC	N/A
B	PD Load	JUNIPER	RXRB-MIB	N/A
C	5G LAN PC	DELL	T3400	N/A
D	2.5G LAN NB	DELL	E6430	N/A
E	WiFi (R2) 5G NB	DELL	E6430	N/A
F	WiFi (R1) 2.4G / 5G SCAN NB	DELL	E6430	N/A

For Radiated (above 1GHz):

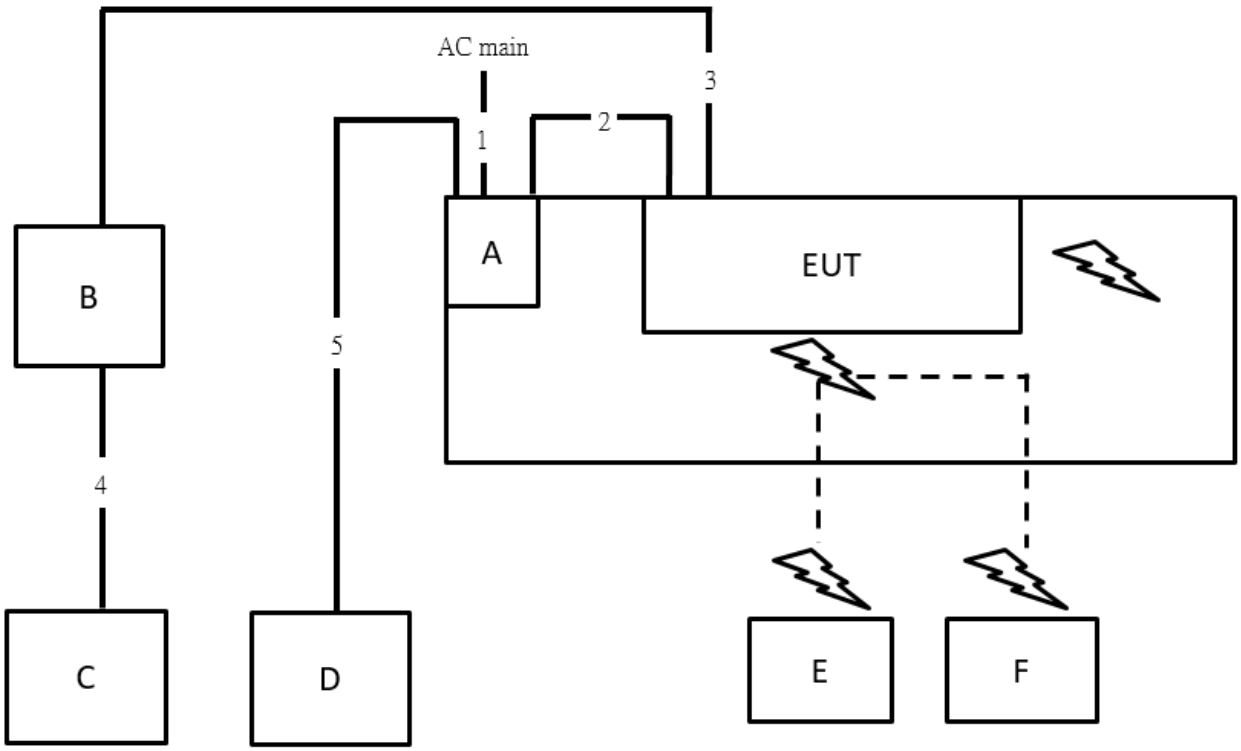
Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
A	Notebook	DELL	E4300	N/A
B	PoE 1	Microsemi	PD-9501-10GC/AC	N/A

For RF Conducted:

Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
A	Notebook	DELL	E4300	N/A
B	PoE 2	Microsemi	PD-9001GR/AT/AC	N/A

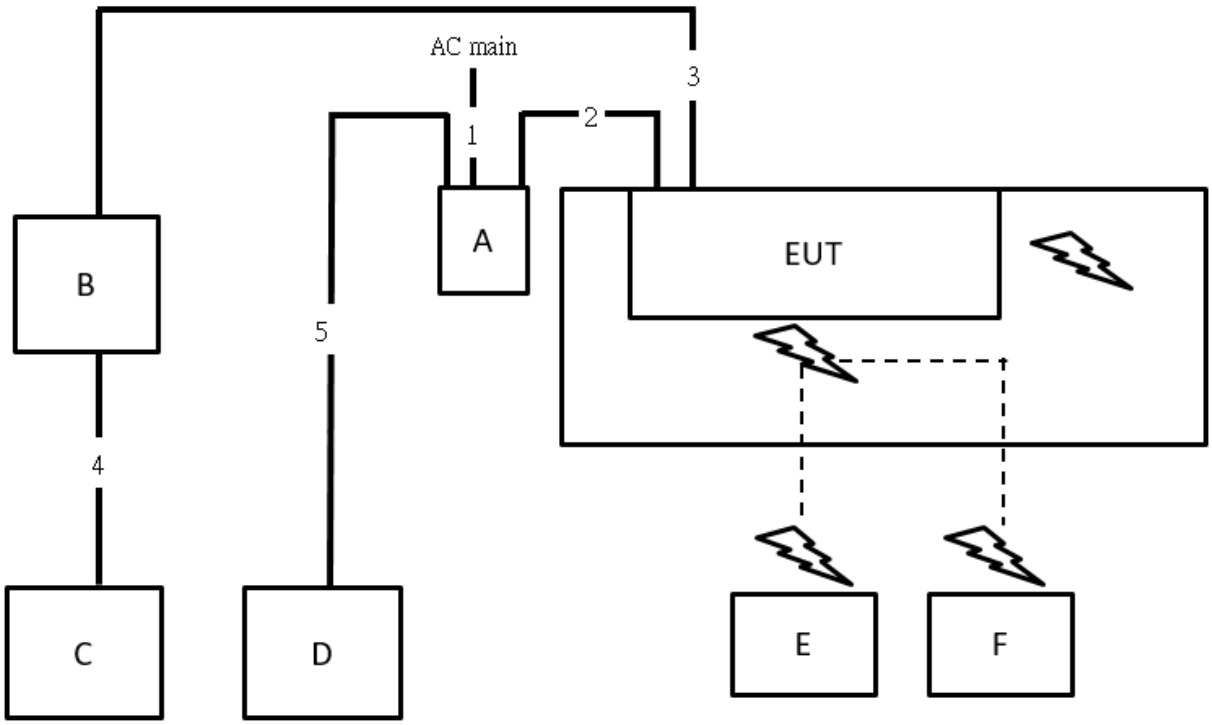
2.6 Test Setup Diagram

Test Setup Diagram – AC Line Conducted Emission Test



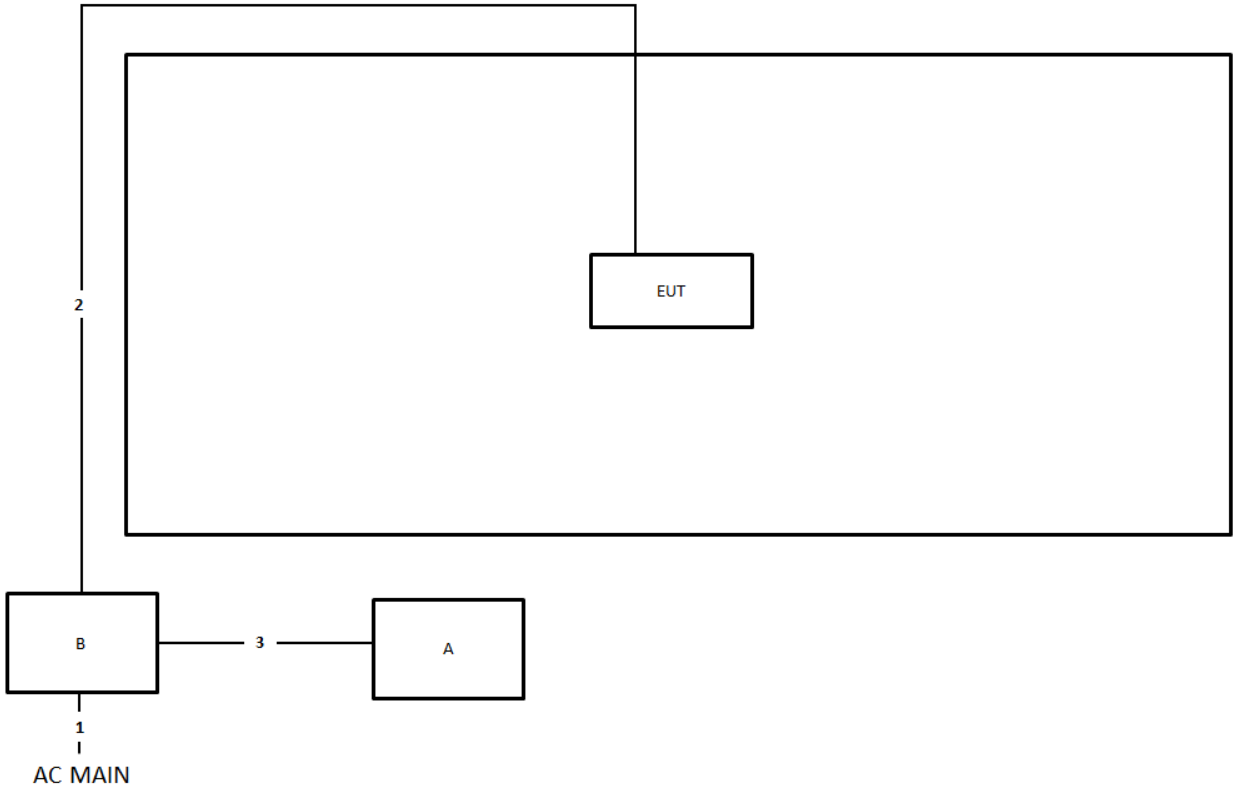
Item	Connection	Shielded	Length
1	Power cable	No	0.8m
2	RJ-45 cable	No	1.5m
3	RJ-45 cable	No	10m
4	RJ-45 cable	No	1.5m
5	RJ-45 cable	No	10m

Test Setup Diagram - Radiated Test < 1GHz



Item	Connection	Shielded	Length
1	Power cable	No	0.8m
2	RJ-45 cable	No	1.5m
3	RJ-45 cable	No	10m
4	RJ-45 cable	No	1.5m
5	RJ-45 cable	No	10m

Test Setup Diagram - Radiated Test > 1GHz



Item	Connection	Shielded	Length
1	Power cable	No	1.5m
2	RJ-45 cable	No	10m
3	RJ-45 cable	No	1.5m

3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line Conducted Emissions Limit		
Frequency Emission (MHz)	**Quasi-Peak**	**Average**
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50
Note 1: * Decreases with the logarithm of the frequency.		

3.1.2 Measuring Instruments

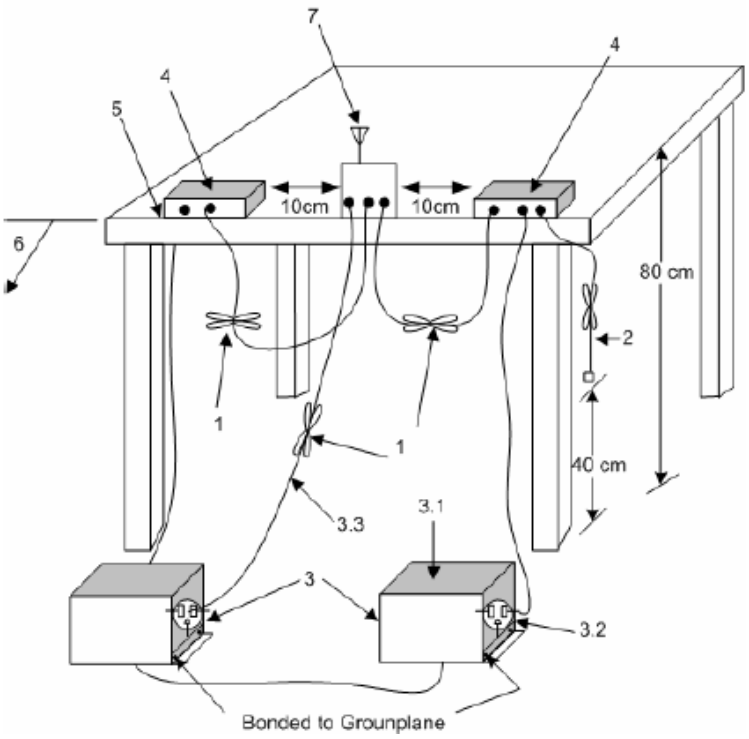
Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

Test Method
☒ Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions.

3.1.4 Test Setup

AC Power-line Conducted Emissions



1—Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long.
2—The I/O cables that are not connected to an accessory shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
3—EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω loads. LISN may be placed on top of, or immediately beneath, reference ground plane.
3.1—All other equipment powered from additional LISN(s).
3.2—A multiple-outlet strip may be used for multiple power cords of non-EUT equipment.
3.3—LISN at least 80 cm from nearest part of EUT chassis.
4—Non-EUT components of EUT system being tested.
5—Rear of EUT, including peripherals, shall all be aligned and flush with edge of tabletop.
6—Edge of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.
7—Antenna can be integral or detachable. If detachable, then the antenna shall be attached for this test.

3.1.5 Measurement Results Calculation

The measured Level is calculated using:

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

b. Margin = -Limit + Level

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:
▪ 6 dB bandwidth ≥ 500 kHz.

3.2.2 Measuring Instruments

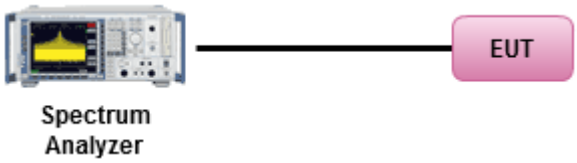
Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

Test Method		
▪ For the emission bandwidth shall be measured using one of the options below:		
	☒	Refer as FCC KDB 558074, clause 8.2 & C63.10 clause 11.8.1 Option 1 for 6 dB bandwidth measurement.
	☐	Refer as FCC KDB 558074, clause 8.2 & C63.10 clause 11.8.2 Option 2 for 6 dB bandwidth measurement.
	☐	Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.

3.2.4 Test Setup

Emission Bandwidth



3.2.5 Test Result of Emission Bandwidth

Refer as Appendix B

3.3 Maximum Conducted Output Power

3.3.1 Maximum Conducted Output Power Limit

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

3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

Test Method	
▪ Maximum Peak Conducted Output Power	
	☐ Refer as FCC KDB 558074, clause 8.3.1.1 & C63.10 clause 11.9.1.1 (RBW ≥ EBW method).
	☐ Refer as FCC KDB 558074, clause 8.3.1.3 & C63.10 clause 11.9.1.3 (peak power meter).
▪ Maximum Conducted Output Power	
	[duty cycle ≥ 98% or external video / power trigger]
	☐ Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.2 Method AVGSA-1.
	☐ Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.3 Method AVGSA-1A. (alternative)
	duty cycle < 98% and average over on/off periods with duty factor
	☐ Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.4 Method AVGSA-2.
	☐ Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.5 Method AVGSA-2A (alternative)
	☐ Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.6 Method AVGSA-3
	☐ Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.7 Method AVGSA-3A (alternative)
	Measurement using a power meter (PM)
	☐ Refer as FCC KDB 558074, clause 8.3.2.3 & C63.10 clause 11.9.2.3.1 Method AVGPM (using an RF average power meter).
	☒ Refer as FCC KDB 558074, clause 8.3.2.3 & C63.10 clause 11.9.2.3.2 Method AVGPM-G (using an gate RF average power meter).
▪ For conducted measurement.	
	▪ If the EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.
	▪ If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + \ldots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$

3.3.4 Test Setup

Maximum Conducted Output Power (Power Meter)

3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix C

3.4 Power Spectral Density

3.4.1 Power Spectral Density Limit

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

3.4.2 Measuring Instruments

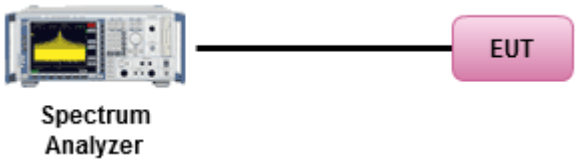
Refer a test equipment and calibration data table in this test report.

3.4.3 Test Procedures

Test Method		
▪ Peak power spectral density procedures that the same method as used to determine the conducted output power. If maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum conducted output power was measured to demonstrate compliance to the output power limit, then one of the average PSD procedures shall be used, as applicable based on the following criteria (the peak PSD procedure is also an acceptable option).		
	☒ Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10 Method Max. PSD.	
▪ For conducted measurement.		
	▪ If The EUT supports multiple transmit chains using options given below:	
		☐ Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the NTX output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.
		☐ Option 2: Measure and sum spectral maxima across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs. These operations shall be performed separately over frequency spans that have different out-of-band or spurious emission limits,
		☐ Option 3: Measure and add 10 log(N) dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with 10 log(N). Or each transmit chains shall be add 10 log(N) to compared with the limit.

3.4.4 Test Setup

Power Spectral Density



3.4.5 Test Result of Power Spectral Density

Refer as Appendix D

3.5 Emissions in Non-restricted Frequency Bands

3.5.1 Emissions in Non-restricted Frequency Bands Limit

Un-restricted Band Emissions Limit	
RF output power procedure	**Limit (dBc)**
Peak output power procedure	20
Average output power procedure	30

Note 1: If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level.

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

3.5.2 Measuring Instruments

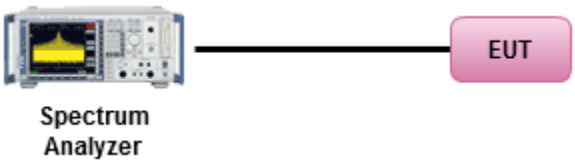
Refer a test equipment and calibration data table in this test report.

3.5.3 Test Procedures

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

3.5.4 Test Setup

Emissions in Non-restricted Frequency Bands



3.5.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix E

3.6 Emissions in Restricted Frequency Bands

3.6.1 Emissions in Restricted Frequency Bands Limit

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

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

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

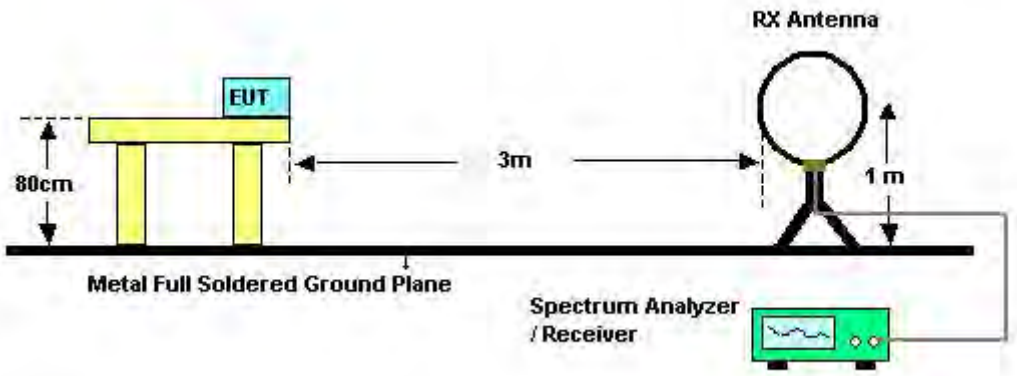
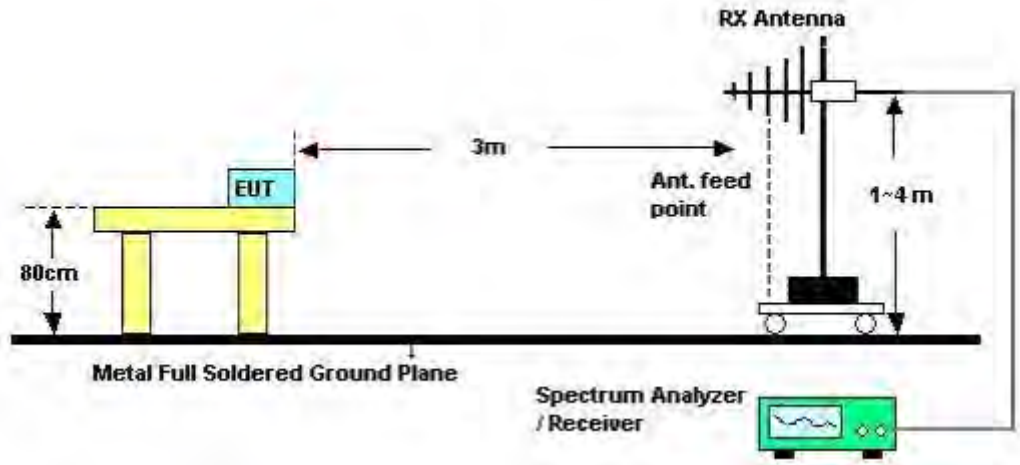
3.6.2 Measuring Instruments

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

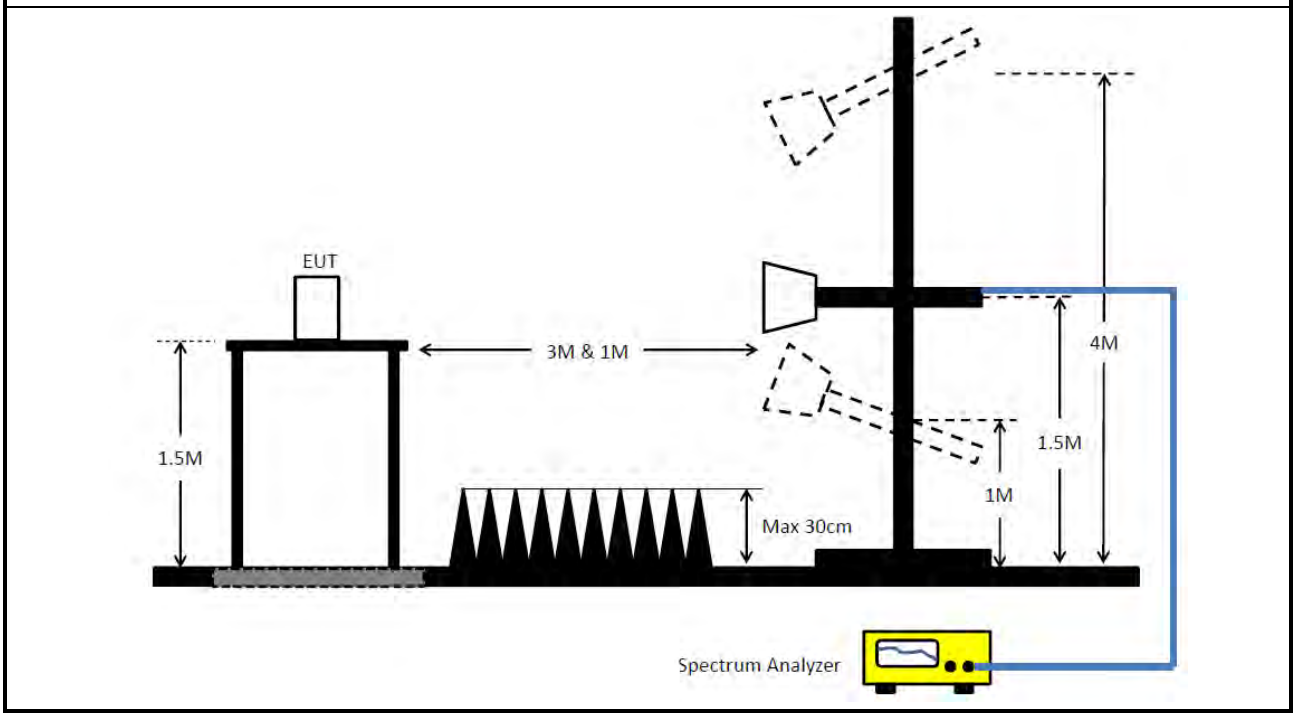
3.6.3 Test Procedures

Test Method			
▪ The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].			
▪ Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.			
▪ For the transmitter unwanted emissions shall be measured using following options below:			
	▪ Refer as FCC KDB 558074, clause 8.6 for unwanted emissions into restricted bands.		
		☐	Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.1(trace averaging for duty cycle ≥98%).
		☐	Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.2(trace averaging + duty factor).
		☒	Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.3(Reduced VBW≥1/T).
		☐	Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.
		☐	Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions.
		☒	Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.4 measurement procedure peak limit.
▪ For the transmitter band-edge emissions shall be measured using following options below:			
	▪ Refer as FCC KDB 558074 clause 8.7 & c63.10 clause 11.13.1, When the performing peak or average radiated measurements, emissions within 2 MHz of the authorized band edge may be measured using the marker-delta method described below.		
	▪ Refer as FCC KDB 558074, clause 8.7 (ANSI C63.10, clause 6.10.6) for marker-delta method for band-edge measurements.		
	▪ Refer as FCC KDB 558074, clause 8.7 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).		
	▪ For conducted unwanted emissions into restricted bands (absolute emission limits). Devices with multiple transmit chains using options given below: (1) Measure and sum the spectra across the outputs or (2) Measure and add 10 log(N) dB		
	▪ For FCC KDB 662911 The methodology described here may overestimate array gain, thereby resulting in apparent failures to satisfy the out-of-band limits even if the device is actually compliant. In such cases, compliance may be demonstrated by performing radiated tests around the frequencies at which the apparent failures occurred.		

3.6.4 Test Setup

Emissions in Restricted Frequency Bands
9kHz ~30MHz

30MHz~1GHz


Above 1GHz



3.6.5 Measurement Results Calculation

The measured Level is calculated using:
Corrected Reading: Antenna factor (AF) + Cable loss (CL) + Read level (Raw) - Preamp factor (PA)(if applicable) = Level.

3.6.6 Emissions in Restricted Frequency Bands (Below 30MHz)

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

3.6.7 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix F

4 Test Equipment and Calibration Data

Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.4GHz	Feb. 22, 2022	Feb. 21, 2023	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-1 6-2	04083	150kHz ~ 100MHz	Feb. 09, 2022	Feb. 08, 2023	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Apr. 12, 2022	Apr. 11, 2023	Conduction (CO01-CB)
Pulse Limiter	Rohde& Schwarz	ESH3-Z2	100430	9kHz ~ 30MHz	Feb. 10, 2022	Feb. 09, 2023	Conduction (CO01-CB)
COND Cable	Woken	Cable	Low cable-CO01	9kHz ~ 30MHz	May 18, 2022	May 17, 2023	Conduction (CO01-CB)
Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conduction (CO01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	May 14, 2022	May 13, 2023	Radiation (10CH01-CB)
10m Semi Anechoic Chamber NSA	TDK	SAC-10M	10CH01-CB	30MHz~1GHz 10m,3m	Jan. 27, 2022	Jan. 26, 2023	Radiation (10CH01-CB)
Amplifier	Agilent	8447D	2944A10783	9kHz ~ 1.3GHz	Mar. 11, 2022	Mar. 10, 2023	Radiation (10CH01-CB)
Amplifier	Agilent	8447D	2944A10784	9kHz ~ 1.3GHz	Mar. 11, 2022	Mar. 10, 2023	Radiation (10CH01-CB)
Low Cable	Woken	SUCOFLEX 104	low cable-01	25MHz ~ 1GHz	Oct. 19, 2021	Oct. 18, 2022	Radiation (10CH01-CB)
Low Cable	Woken	SUCOFLEX 104	low cable-02	25MHz ~ 1GHz	Oct. 19, 2021	Oct. 18, 2022	Radiation (10CH01-CB)
EMI Test Receiver	Rohde& Schwarz	ESCI	100186	9kHz ~ 3GHz	Jul. 12, 2021	Jul. 11, 2022	Radiation (10CH01-CB)
EMI Test Receiver	Rohde& Schwarz	ESCI	100186	9kHz ~ 3GHz	Jul. 11, 2022	Jul. 10, 2023	Radiation (10CH01-CB)
Spectrum Analyzer	Rohde& Schwarz	FSV30	101026	9kHz ~ 30GHz	Apr. 22, 2022	Apr. 21, 2023	Radiation (10CH01-CB)
Bilog Antenna with 6dB Attenuator	Chase & EMCI	CBL6111A &N-6-06	1543 &AT-N0609	30MHz ~ 1GHz	Jul. 01, 2021	Jun. 30, 2022	Radiation (10CH01-CB)
Bilog Antenna with 6dB Attenuator	Chase & EMCI	CBL6111A &N-6-06	1543 &AT-N0609	30MHz ~ 1GHz	Jun. 25, 2022	Jun. 24, 2023	Radiation (10CH01-CB)
Amplifier	EM	EM101	060703	10MHz ~ 1GHz	Oct. 20, 2021	Oct. 19, 2022	Radiation (10CH01-CB)
Low Cable	TITAN	T318E	low cable-03	30MHz ~ 1GHz	Jun. 17, 2022	Jun. 16, 2023	Radiation (10CH01-CB)
Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (10CH01-CB)
3m Semi Anechoic Chamber VSWR	TDK	SAC-3M	03CH04-CB	1GHz ~18GHz 3m	Feb. 24, 2022	Feb. 23, 2023	Radiation (03CH04-CB)

Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
Horn Antenna	ETS·Lindgren	3115	00143147	750MHz~18GHz	Oct. 25, 2021	Oct. 24, 2022	Radiation (03CH04-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Aug. 05, 2021	Aug. 04, 2022	Radiation (03CH04-CB)
Pre-Amplifier	Agilent	83017A	MY53270063	0.5GHz ~ 26.5GHz	Jul. 12, 2021	Jul. 11, 2022	Radiation (03CH04-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jul. 13, 2021	Jul. 12, 2022	Radiation (03CH04-CB)
Spectrum Analyzer	R&S	FSP40	100142	9kHz~40GHz	Mar. 28, 2022	Mar. 27, 2023	Radiation (03CH04-CB)
RF Cable-high	Woken	RG402	High Cable-21	1GHz - 18GHz	Oct. 04, 2021	Oct. 03, 2022	Radiation (03CH04-CB)
RF Cable-high	Woken	RG402	High Cable-21+67	1GHz - 18GHz	Oct. 04, 2021	Oct. 03, 2022	Radiation (03CH04-CB)
High Cable	Woken	WCA0929M	40G#5+7	1GHz ~ 40 GHz	Dec. 14, 2021	Dec. 13, 2022	Radiation (03CH04-CB)
High Cable	Woken	WCA0929M	40G#5	1GHz ~ 40 GHz	Dec. 08, 2021	Dec. 07, 2022	Radiation (03CH04-CB)
High Cable	Woken	WCA0929M	40G#7	1GHz ~ 40 GHz	Dec. 14, 2021	Dec. 13, 2022	Radiation (03CH04-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH04-CB)
Spectrum analyzer	R&S	FSV40	101028	9kHz~40GHz	Jan. 07, 2022	Jan. 06, 2023	Conducted (TH03-CB)
Power Sensor	Anritsu	MA2411B	1726195	300MHz~40GHz	Aug. 22, 2021	Aug. 21, 2022	Conducted (TH03-CB)
Power Meter	Anritsu	ML2495A	1035008	300MHz~40GHz	Aug. 22, 2021	Aug. 21, 2022	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-11	1 GHz –18 GHz	Oct. 04, 2021	Oct. 03, 2022	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-12	1 GHz –18 GHz	Oct. 04, 2021	Oct. 03, 2022	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-13	1 GHz –18 GHz	Oct. 04, 2021	Oct. 03, 2022	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-14	1 GHz –18 GHz	Oct. 04, 2021	Oct. 03, 2022	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-15	1 GHz –18 GHz	Oct. 04, 2021	Oct. 03, 2022	Conducted (TH03-CB)
Switch	SPTCB	SP-SWI	SWI-03	1 GHz –26.5 GHz	Dec. 13, 2021	Dec. 12, 2022	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	SWI-03-P1	1 GHz –26.5 GHz	Dec. 13, 2021	Dec. 12, 2022	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	SWI-03-P2	1 GHz –26.5 GHz	Dec. 13, 2021	Dec. 12, 2022	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	SWI-03-P3	1 GHz –26.5 GHz	Dec. 13, 2021	Dec. 12, 2022	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	SWI-03-P4	1 GHz –26.5 GHz	Dec. 13, 2021	Dec. 12, 2022	Conducted (TH03-CB)

Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
RF Cable-high	Woken	RG402	SWI-03-P5	1 GHz –26.5 GHz	Dec. 13, 2021	Dec. 12, 2022	Conducted (TH03-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conducted (TH03-CB)

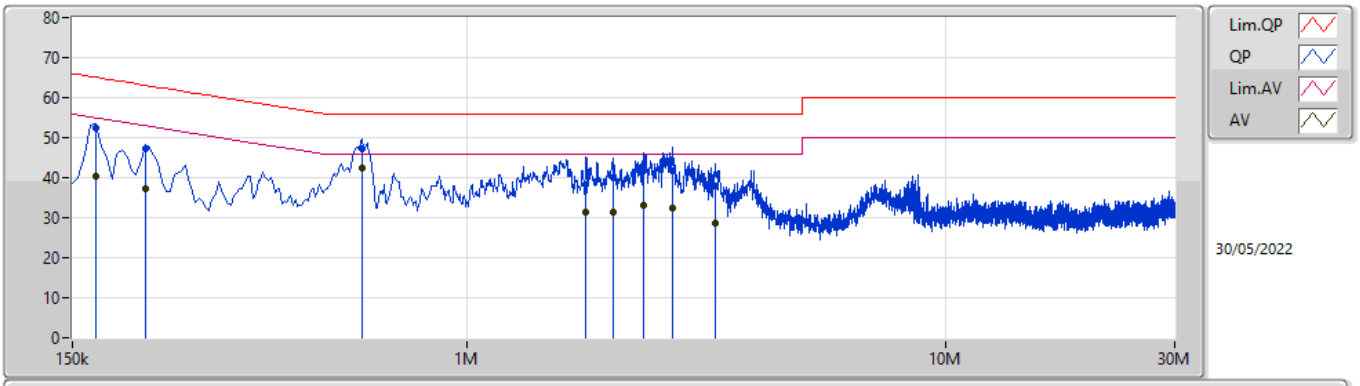
Note: Calibration Interval of instruments listed above is one year.

N.C.R. means Non-Calibration required.

Summary

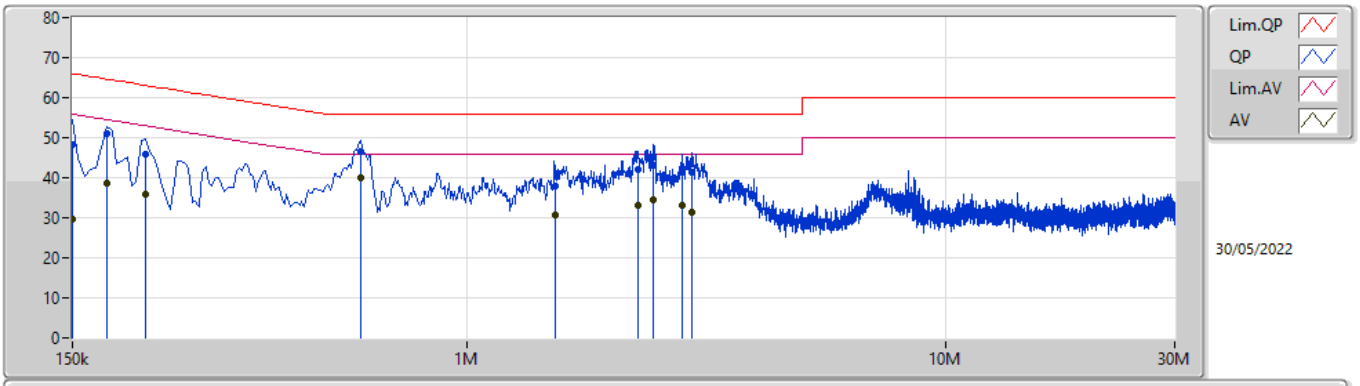
Mode	Result	Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition
Mode 3	Pass	AV	604.5k	42.51	46.00	-3.49	Line

Mode 3



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	168k	52.47	65.06	-12.59	9.99	Line	-	42.48	0.06	0.04	9.89
AV	168k	40.32	55.06	-14.74	9.99	Line	-	30.33	0.06	0.04	9.89
QP	213k	47.23	63.09	-15.86	9.99	Line	-	37.24	0.06	0.04	9.89
AV	213k	37.29	53.09	-15.80	9.99	Line	-	27.30	0.06	0.04	9.89
QP	604.5k	47.13	56.00	-8.87	10.00	Line	-	37.13	0.06	0.05	9.89
AV	604.5k	42.51	46.00	-3.49	10.00	Line	"Worst"	32.51	0.06	0.05	9.89
QP	1.77M	38.43	56.00	-17.57	10.06	Line	-	28.37	0.09	0.08	9.89
AV	1.77M	31.23	46.00	-14.77	10.06	Line	-	21.17	0.09	0.08	9.89
QP	2.013M	40.03	56.00	-15.97	10.07	Line	-	29.96	0.09	0.09	9.89
AV	2.013M	31.36	46.00	-14.64	10.07	Line	-	21.29	0.09	0.09	9.89
QP	2.342M	41.63	56.00	-14.37	10.08	Line	-	31.55	0.10	0.09	9.89
AV	2.342M	33.01	46.00	-12.99	10.08	Line	-	22.93	0.10	0.09	9.89
QP	2.684M	41.87	56.00	-14.13	10.08	Line	-	31.79	0.10	0.09	9.89
AV	2.684M	32.42	46.00	-13.58	10.08	Line	-	22.34	0.10	0.09	9.89
QP	3.296M	37.98	56.00	-18.02	10.10	Line	-	27.88	0.11	0.10	9.89
AV	3.296M	28.71	46.00	-17.29	10.10	Line	-	18.61	0.11	0.10	9.89

Mode 3



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	150k	48.44	66.00	-17.56	10.00	Neutral	-	38.44	0.07	0.04	9.89
AV	150k	29.80	56.00	-26.20	10.00	Neutral	-	19.80	0.07	0.04	9.89
QP	177k	51.05	64.62	-13.57	10.00	Neutral	-	41.05	0.07	0.04	9.89
AV	177k	38.72	54.62	-15.90	10.00	Neutral	-	28.72	0.07	0.04	9.89
QP	213k	45.72	63.09	-17.37	10.00	Neutral	-	35.72	0.07	0.04	9.89
AV	213k	35.74	53.09	-17.35	10.00	Neutral	-	25.74	0.07	0.04	9.89
QP	600k	46.63	56.00	-9.37	10.01	Neutral	-	36.62	0.07	0.05	9.89
AV	600k	39.97	46.00	-6.03	10.01	Neutral	"Worst"	29.96	0.07	0.05	9.89
QP	1.523M	37.97	56.00	-18.03	10.05	Neutral	-	27.92	0.09	0.07	9.89
AV	1.523M	30.57	46.00	-15.43	10.05	Neutral	-	20.52	0.09	0.07	9.89
QP	2.27M	41.92	56.00	-14.08	10.09	Neutral	-	31.83	0.11	0.09	9.89
AV	2.27M	32.94	46.00	-13.06	10.09	Neutral	-	22.85	0.11	0.09	9.89
QP	2.454M	43.04	56.00	-12.96	10.09	Neutral	-	32.95	0.11	0.09	9.89
AV	2.454M	34.41	46.00	-11.59	10.09	Neutral	-	24.32	0.11	0.09	9.89
QP	2.805M	42.34	56.00	-13.66	10.09	Neutral	-	32.25	0.11	0.09	9.89
AV	2.805M	33.15	46.00	-12.85	10.09	Neutral	-	23.06	0.11	0.09	9.89
QP	2.945M	41.52	56.00	-14.48	10.11	Neutral	-	31.41	0.12	0.10	9.89
AV	2.945M	31.49	46.00	-14.51	10.11	Neutral	-	21.38	0.12	0.10	9.89

Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4-2.4835GHz	-	-	-	-	-
O-QPSK_1TX	1.609M	2.586M	2M59G7D	1.583M	2.56M

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

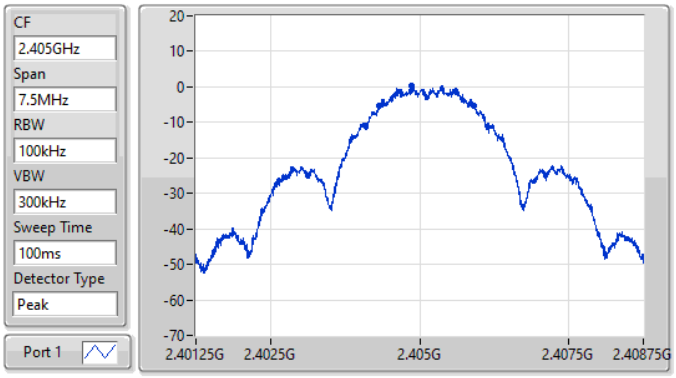
Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
O-QPSK_1TX	-	-	-	-
2405MHz	Pass	500k	1.586M	2.586M
2440MHz	Pass	500k	1.583M	2.582M
2475MHz	Pass	500k	1.609M	2.56M
2480MHz	Pass	500k	1.583M	2.571M

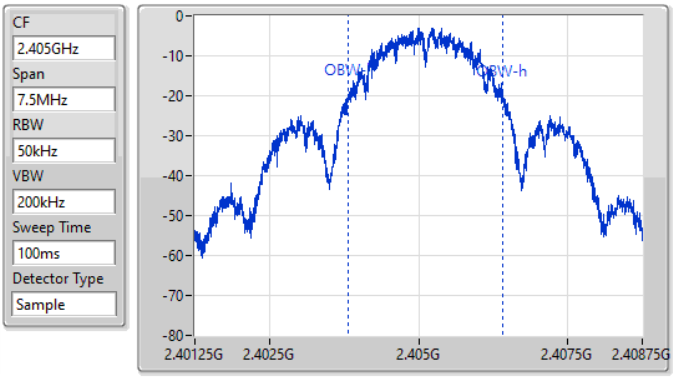
Port X-N dB = Port X 6dB down bandwidth;
Port X-OBW = Port X 99% occupied bandwidth

O-QPSK_1TX EBW-DTS

2405MHz

06/06/2022



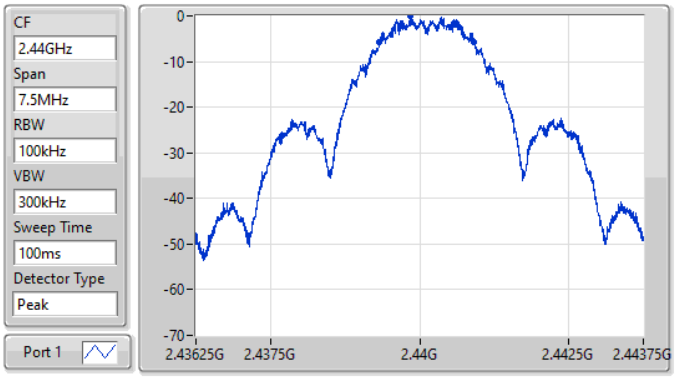


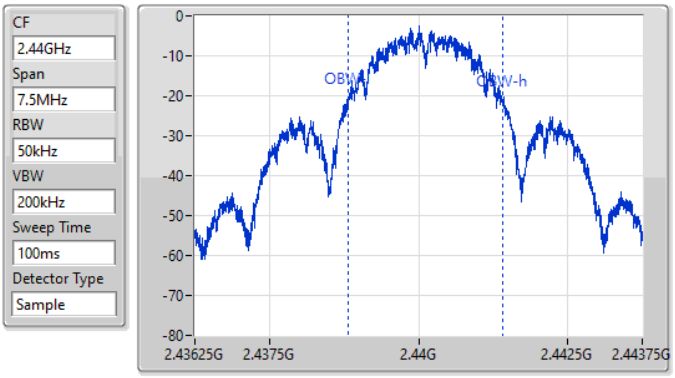
6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.586M	2.404329G	2.405915G	2.586M	2.403823G	2.406409G	500k	1

O-QPSK_1TX EBW-DTS

2440MHz

06/06/2022



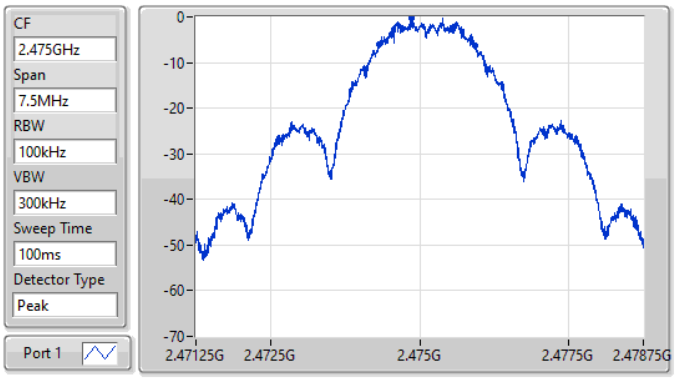


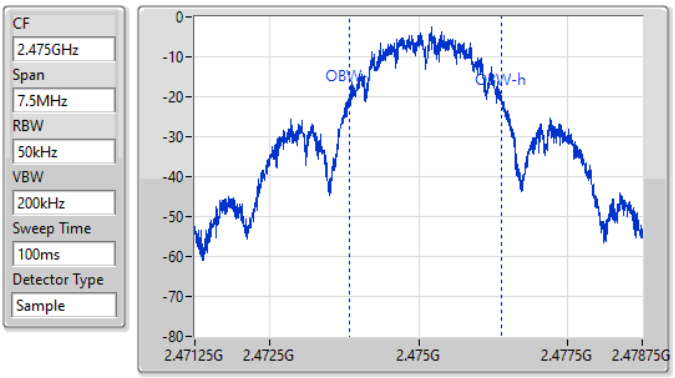
6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.583M	2.439325G	2.440908G	2.582M	2.438827G	2.441409G	500k	1

O-QPSK_1TX EBW-DTS

2475MHz

06/06/2022



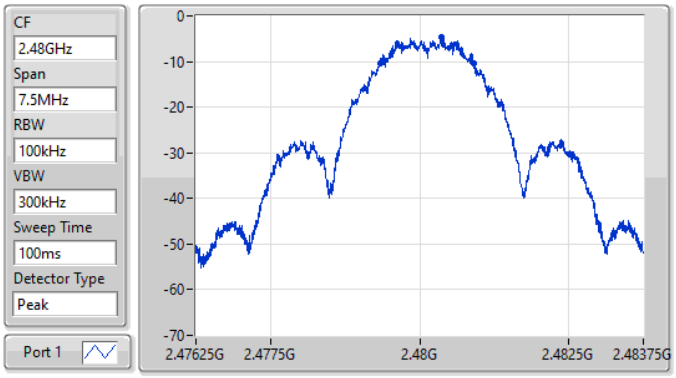


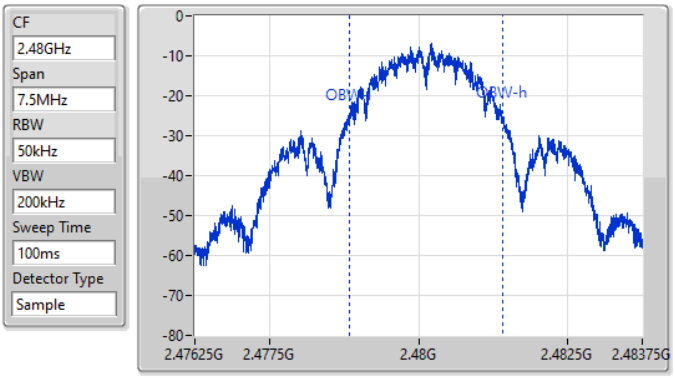
6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.609M	2.474321G	2.47593G	2.56M	2.473838G	2.476398G	500k	1

O-QPSK_1TX EBW-DTS

2480MHz

06/06/2022





6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.583M	2.479333G	2.480915G	2.571M	2.478834G	2.481406G	500k	1

Summary

Mode	Power (dBm)	Power (W)
2.4-2.4835GHz	-	-
O-QPSK_1TX	4.30	0.00269

Result

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
O-QPSK_1TX	-	-	-	-
2405MHz	Pass	4.90	4.30	30.00
2440MHz	Pass	4.90	3.78	30.00
2475MHz	Pass	4.90	3.56	30.00
2480MHz	Pass	4.90	-0.70	30.00

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

Summary

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
O-QPSK_1TX	-12.04

RBW = 3kHz;

Result

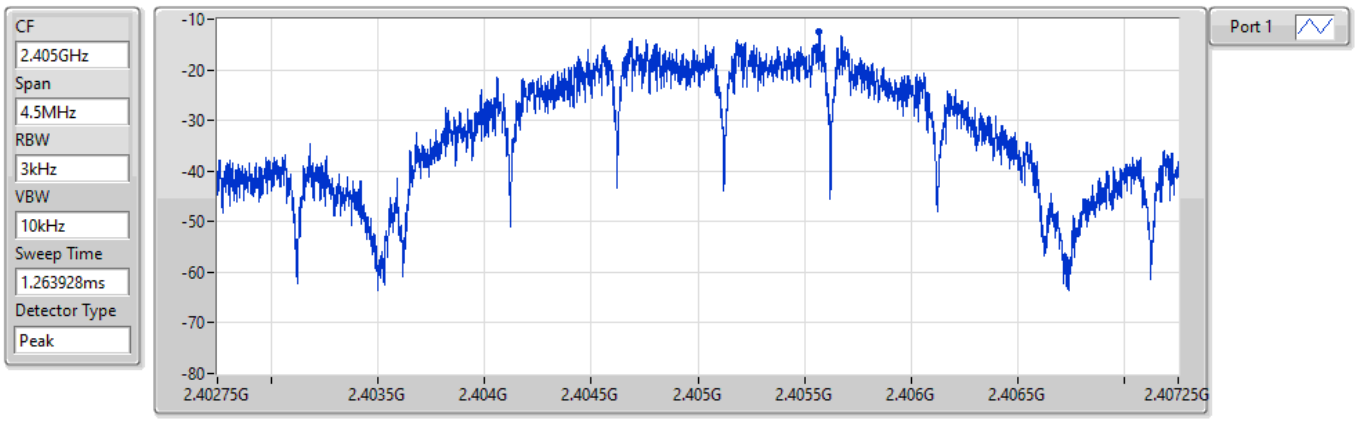
Mode	Result	Gain (dBi)	PD (dBm/RBW)	PD Limit (dBm/RBW)
O-QPSK_1TX	-	-	-	-
2405MHz	Pass	4.90	-12.50	8.00
2440MHz	Pass	4.90	-12.04	8.00
2480MHz	Pass	4.90	-17.73	8.00

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;

O-QPSK_1TX PSD

2405MHz

06/06/2022

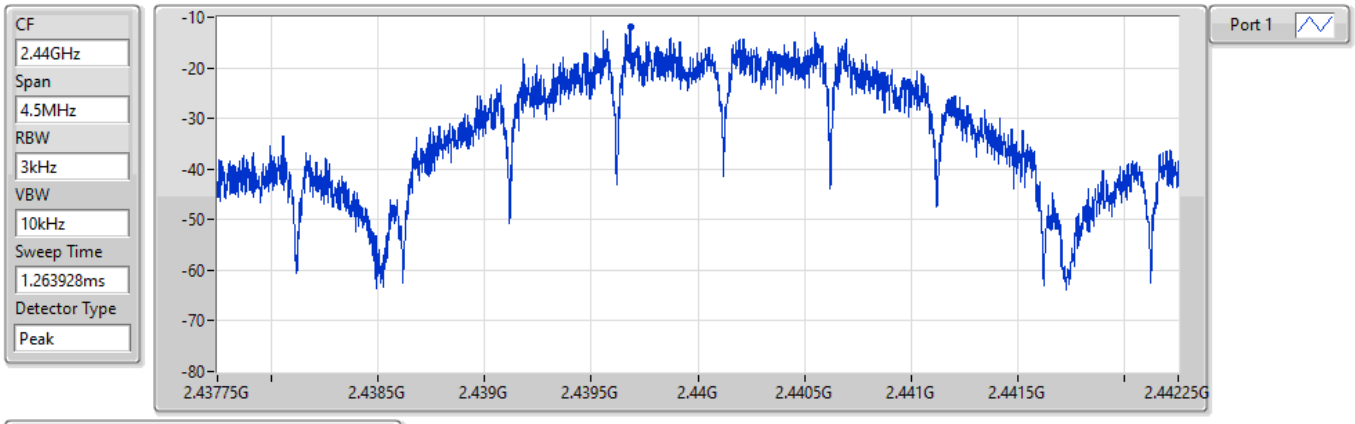


Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-12.50	-12.50	-12.50

O-QPSK_1TX PSD

2440MHz

06/06/2022

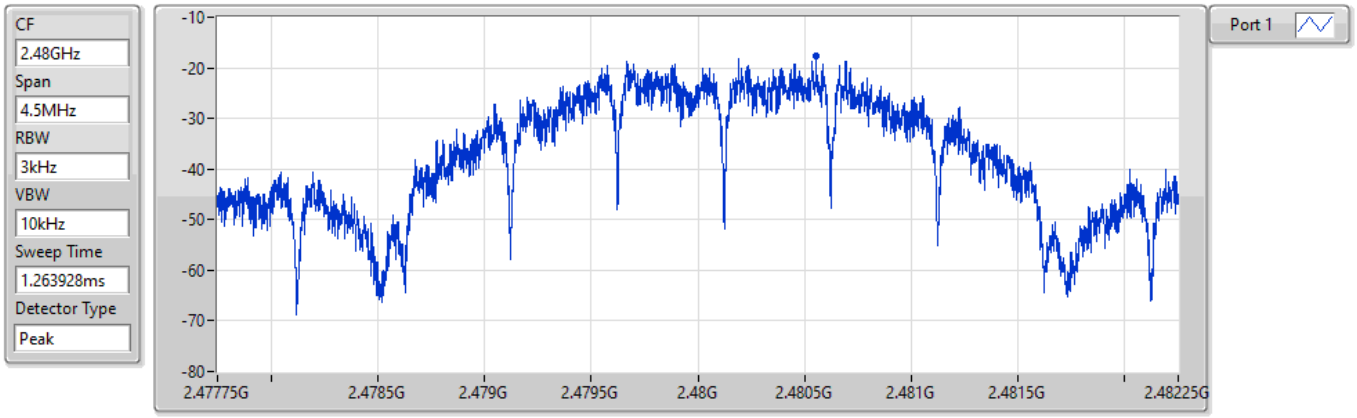


Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-12.04	-12.04	-12.04

O-QPSK_1TX **PSD**

2480MHz

06/06/2022



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-17.73	-17.73	-17.73

Summary

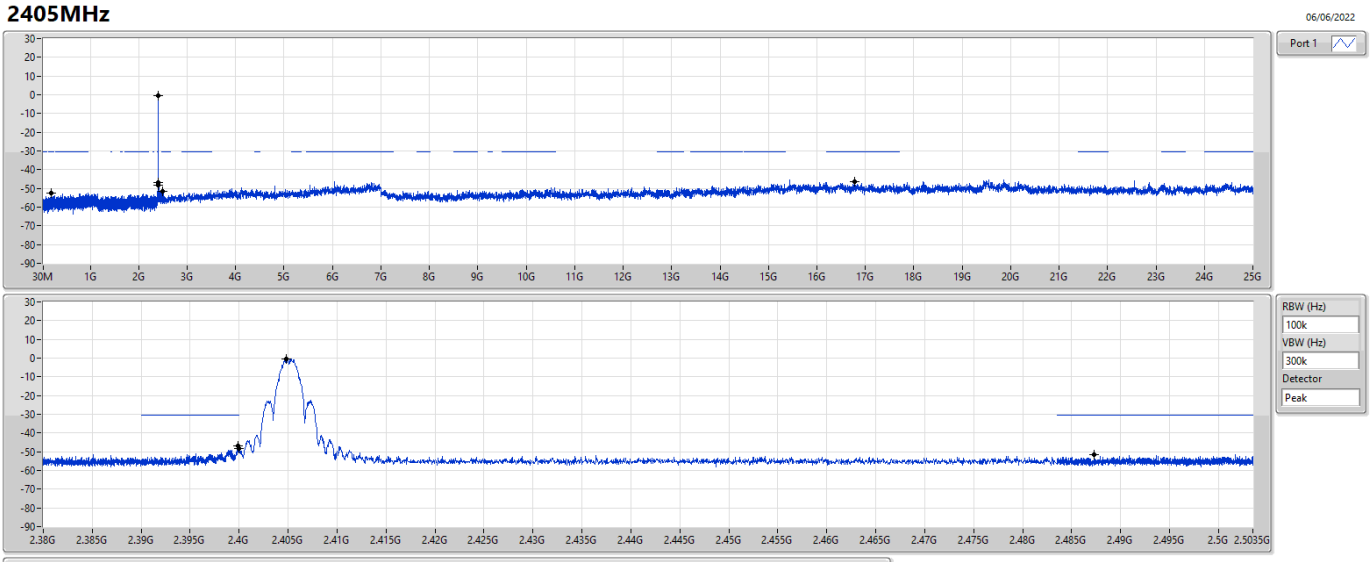
Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
O-QPSK_1TX	Pass	2.40484G	-0.39	-30.39	223.88M	-52.55	2.39071G	-52.63	2.4835G	-47.08	2.48351G	-46.49	24.17888G	-46.57	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
O-QPSK_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2405MHz	Pass	2.40484G	-0.39	-30.39	191.86M	-52.34	2.39985G	-47.00	2.4G	-48.43	2.48727G	-51.48	16.77472G	-46.21	1
2440MHz	Pass	2.40484G	-0.39	-30.39	934.16M	-52.73	2.39779G	-51.92	2.4835G	-55.12	2.49888G	-51.76	21.83643G	-46.19	1
2475MHz	Pass	2.40484G	-0.39	-30.39	1.87593G	-51.63	2.39151G	-52.86	2.4835G	-52.90	2.50037G	-51.50	16.76628G	-46.72	1
2480MHz	Pass	2.40484G	-0.39	-30.39	223.88M	-52.55	2.39071G	-52.63	2.4835G	-47.08	2.48351G	-46.49	24.17888G	-46.57	1

O-QPSK_1TX **CSENdB-DTS**

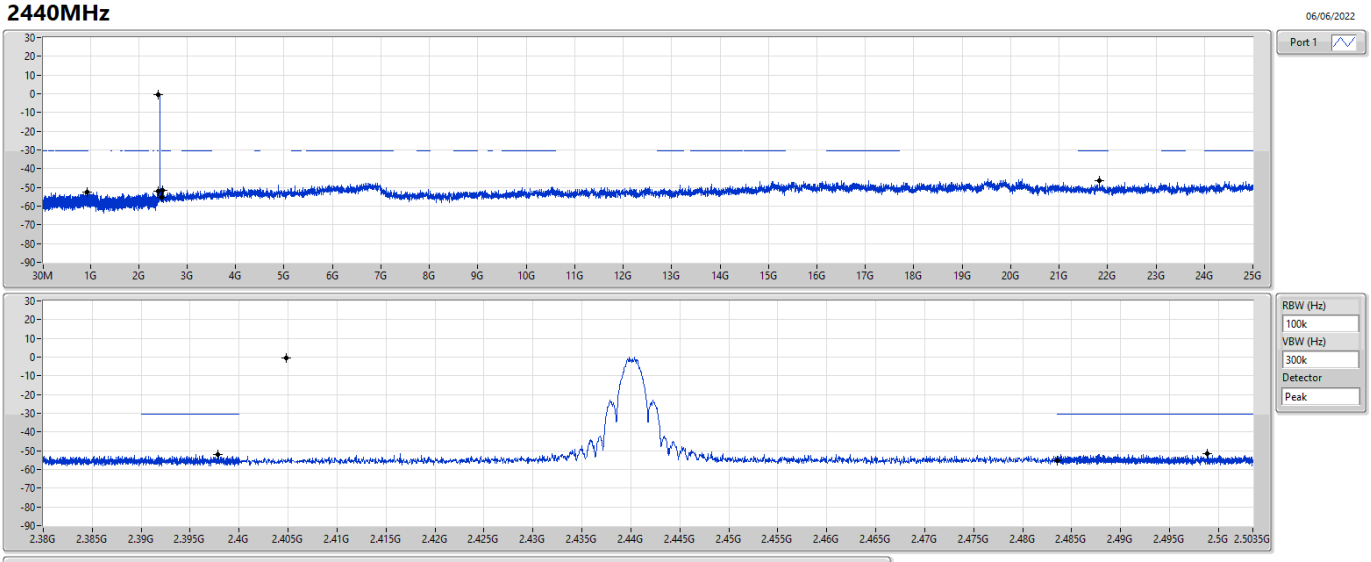
2405MHz



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
2.40484G	-0.39	-30.39	191.86M	-52.34	2.39985G	-47.00	2.4G	-48.43	2.48727G	-51.48	16.77472G	-46.21	1

O-QPSK_1TX **CSENdB-DTS**

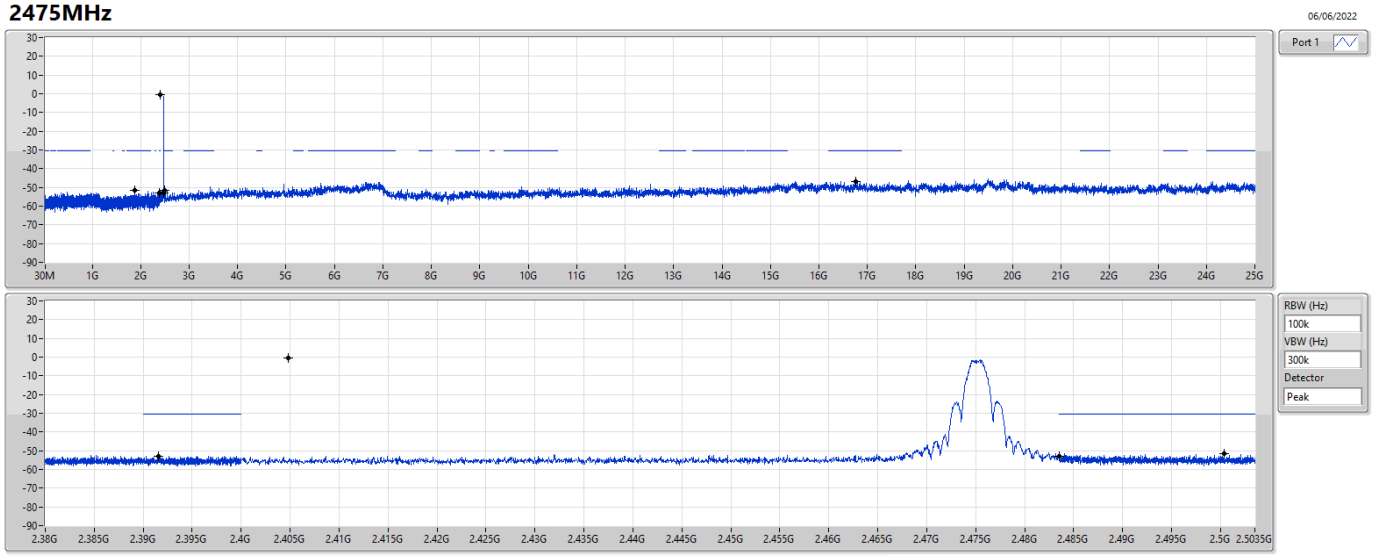
2440MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.40484G	-0.39	-30.39	934.16M	-52.73	2.39779G	-51.92	2.4835G	-55.12	2.49888G	-51.76	21.83643G	-46.19	1

O-QPSK_1TX **CSENdB-DTS**

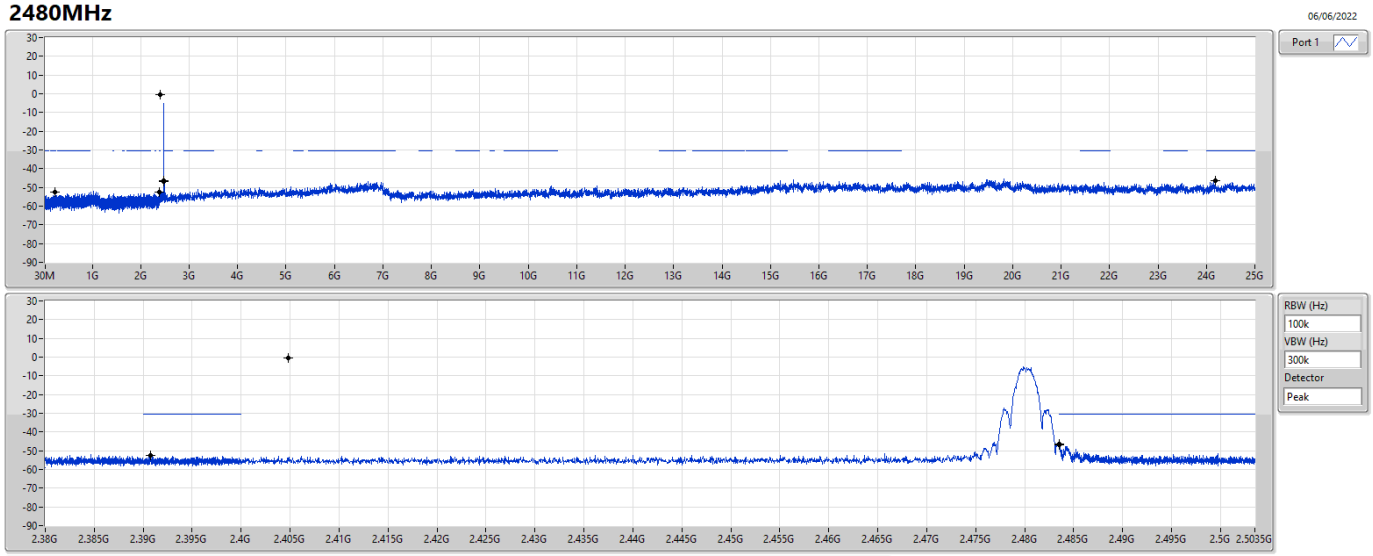
2475MHz



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
2.40484G	-0.39	-30.39	1.87593G	-51.63	2.39151G	-52.86	2.4835G	-52.90	2.50037G	-51.50	16.76628G	-46.72	1

O-QPSK_1TX **CSENdB-DTS**

2480MHz

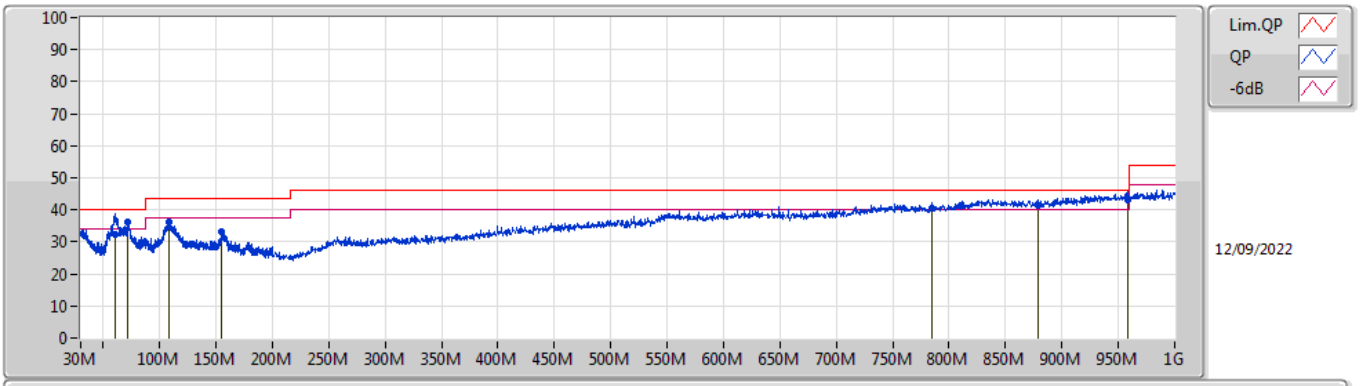


Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.40484G	-0.39	-30.39	223.88M	-52.55	2.39071G	-52.63	2.4835G	-47.08	2.48351G	-46.49	24.17888G	-46.57	1

Summary

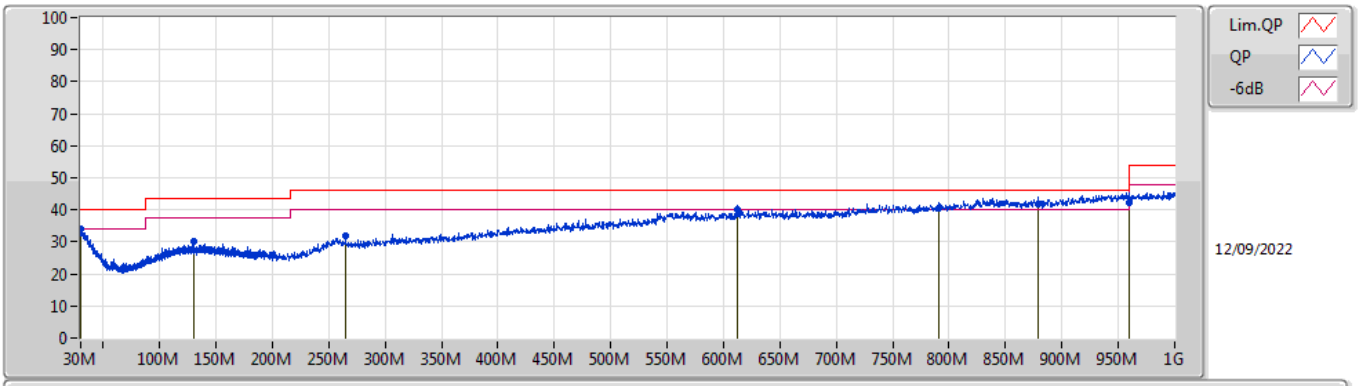
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 1	Pass	PK	958M	42.91	46.00	-3.09	Vertical

Mode 1



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
QP	60.35M	32.14	40.00	-7.86	-14.56	3	Vertical	161	1.00	-	46.70	11.91	1.31	27.78
PK	71.74M	36.04	40.00	-3.96	-13.78	3	Vertical	257	1.00	-	49.82	12.40	1.60	27.78
PK	108.8M	36.05	43.50	-7.45	-8.79	3	Vertical	208	4.00	-	44.84	16.92	2.03	27.74
PK	155.12M	33.31	43.50	-10.19	-8.04	3	Vertical	352	4.00	-	41.35	16.73	2.75	27.52
PK	784.4M	40.57	46.00	-5.43	4.34	3	Vertical	3	1.00	-	36.23	25.70	5.91	27.27
PK	878.4M	41.24	46.00	-4.76	5.73	3	Vertical	248	1.00	-	35.51	26.21	6.26	26.74
PK	958M	42.91	46.00	-3.09	6.91	3	Vertical	0	3.00	"Worst"	36.00	26.71	6.53	26.33

Mode 1



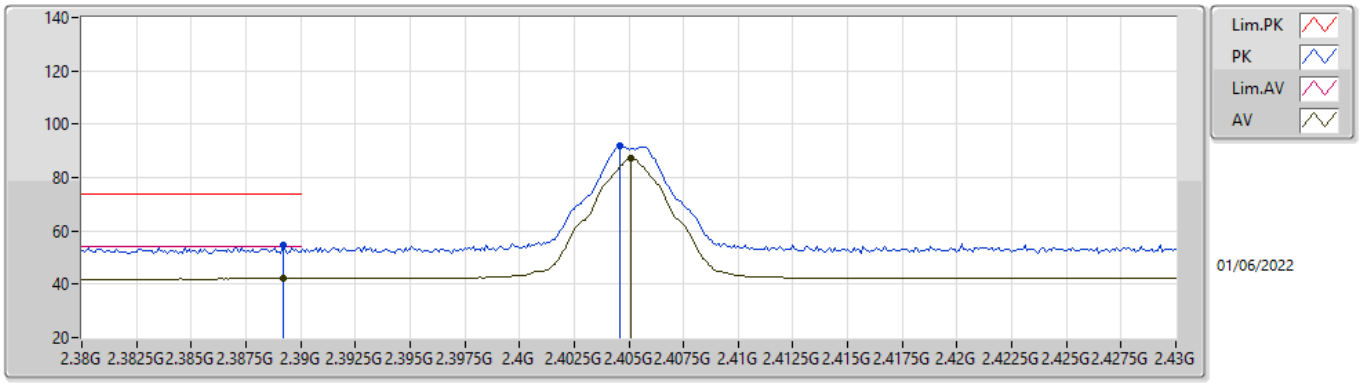
Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	30.6M	33.87	40.00	-6.13	-3.07	3	Horizontal	242	4.00	-	36.94	24.09	0.72	27.88
PK	130.05M	30.37	43.50	-13.13	-7.45	3	Horizontal	169	1.00	-	37.82	17.74	2.40	27.59
PK	265.2M	32.02	46.00	-13.98	-3.60	3	Horizontal	225	2.00	-	35.62	19.38	3.36	26.34
PK	612.8M	40.11	46.00	-5.89	1.80	3	Horizontal	180	2.00	-	38.31	24.46	5.15	27.81
PK	790.4M	40.57	46.00	-5.43	4.40	3	Horizontal	360	2.00	-	36.17	25.67	5.94	27.21
PK	878.8M	41.89	46.00	-4.11	5.73	3	Horizontal	8	1.00	-	36.16	26.21	6.26	26.74
PK	959.2M	42.19	46.00	-3.81	6.93	3	Horizontal	79	1.00	"Worst"	35.26	26.72	6.54	26.33

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	-	-	-	-	-	-	-	-	-	-	-
O-QPSK_1TX	Pass	AV	2.4835G	53.72	54.00	-0.28	3	Horizontal	50	2.04	-

O-QPSK_1TX

2405MHz_TX

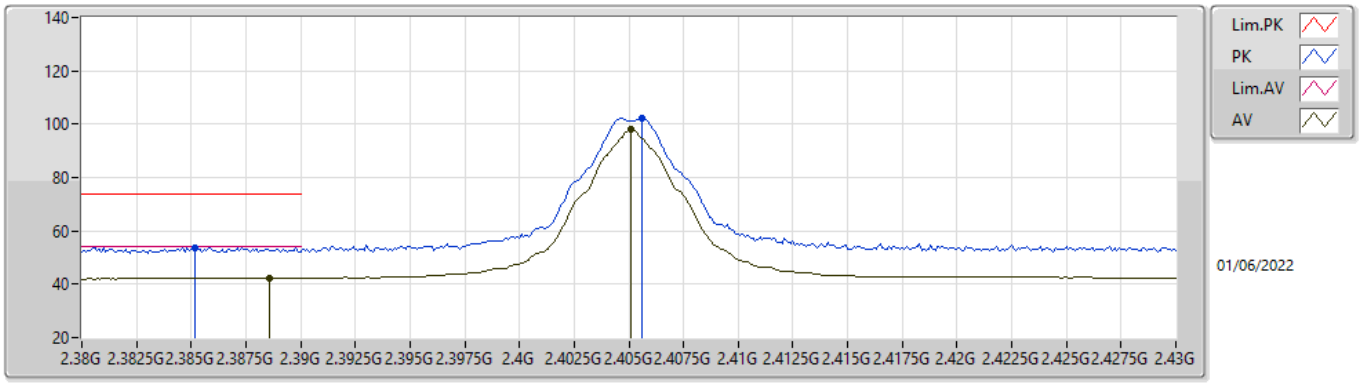


EUT Y_1TX
Setting 5
04-D-G-4

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	2.3892G	54.42	74.00	-19.58	24.15	3	Vertical	344	1.80	-	27.48	2.79	-
AV	2.3892G	42.06	54.00	-11.94	11.79	3	Vertical	344	1.80	-	27.48	2.79	-
PK	2.4046G	91.84	Inf	-Inf	61.53	3	Vertical	344	1.80	-	27.51	2.80	-
AV	2.4051G	87.46	Inf	-Inf	57.15	3	Vertical	344	1.80	-	27.51	2.80	-

O-QPSK_1TX

2405MHz_TX

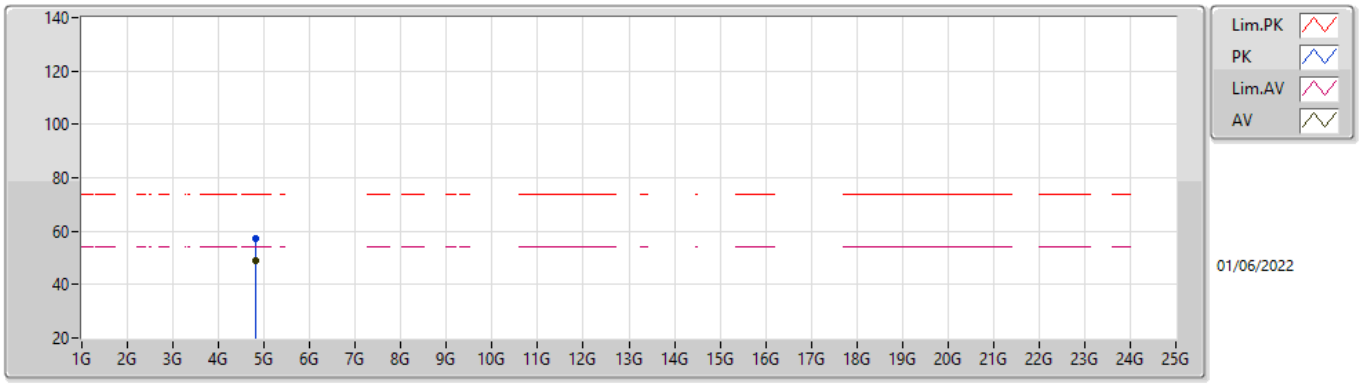


EUT Y_1TX
Setting 5
04-D-G-4

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	2.3852G	53.82	74.00	-20.18	23.56	3	Horizontal	48	1.74	-	27.47	2.79	-
AV	2.3886G	42.24	54.00	-11.76	11.97	3	Horizontal	48	1.74	-	27.48	2.79	-
PK	2.4056G	102.24	Inf	-Inf	71.93	3	Horizontal	48	1.74	-	27.51	2.80	-
AV	2.4051G	97.86	Inf	-Inf	67.55	3	Horizontal	48	1.74	-	27.51	2.80	-

O-QPSK_1TX

2405MHz_TX

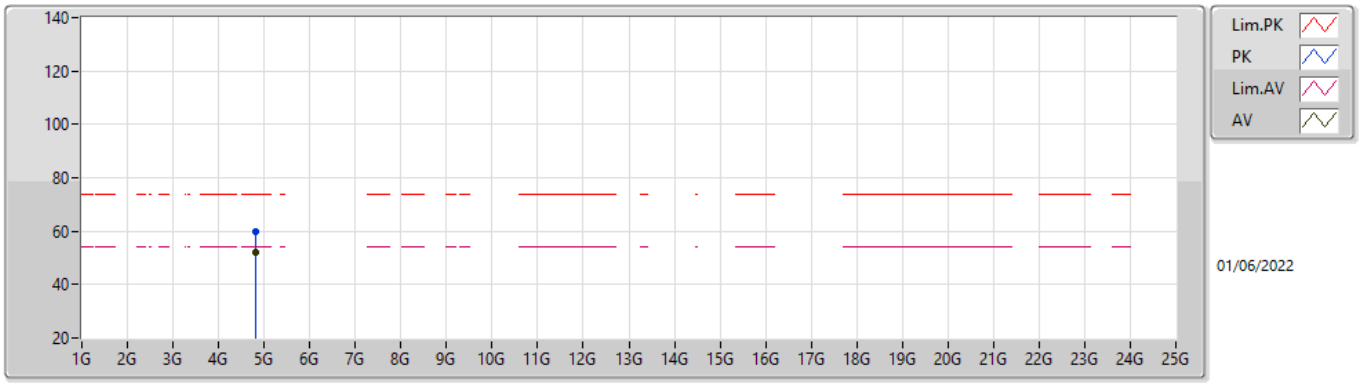


EUT Y_1TX
Setting 5
04-D-G-4

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
AV	4.80924G	48.72	54.00	-5.28	44.54	3	Vertical	300	1.70	-	32.64	4.80	33.26
PK	4.80918G	57.15	74.00	-16.85	52.97	3	Vertical	300	1.70	-	32.64	4.80	33.26

O-QPSK_1TX

2405MHz_TX

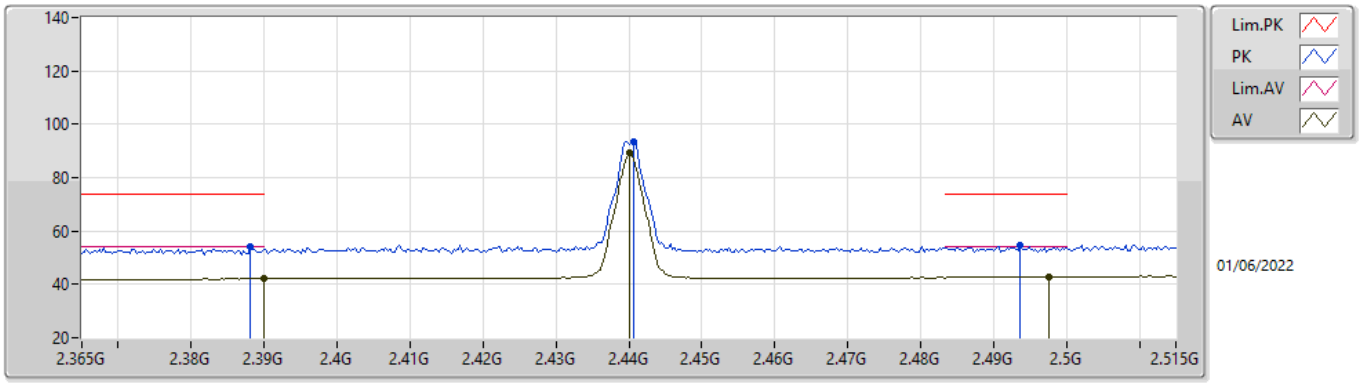


EUT Y_1TX
Setting 5
04-D-G-4

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	4.80912G	59.84	74.00	-14.16	55.66	3	Horizontal	348	1.64	-	32.64	4.80	33.26
AV	4.80924G	51.88	54.00	-2.12	47.70	3	Horizontal	348	1.64	-	32.64	4.80	33.26

O-QPSK_1TX

2440MHz_TX

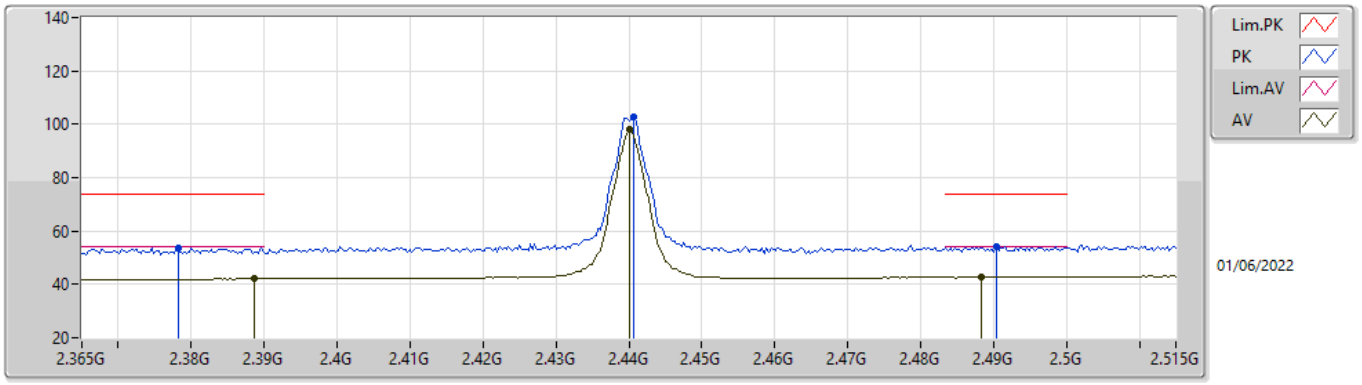


EUT Y_1TX
Setting 5
04-D-G-4

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	2.3881G	54.00	74.00	-20.00	23.73	3	Vertical	355	1.48	-	27.48	2.79	-
AV	2.3899G	42.13	54.00	-11.87	11.86	3	Vertical	355	1.48	-	27.48	2.79	-
PK	2.4406G	93.55	Inf	-Inf	63.15	3	Vertical	355	1.48	-	27.58	2.82	-
AV	2.44G	89.24	Inf	-Inf	58.84	3	Vertical	355	1.48	-	27.58	2.82	-
PK	2.4937G	54.82	74.00	-19.18	24.11	3	Vertical	355	1.48	-	27.86	2.85	-
AV	2.4976G	42.87	54.00	-11.13	12.13	3	Vertical	355	1.48	-	27.89	2.85	-

O-QPSK_1TX

2440MHz_TX

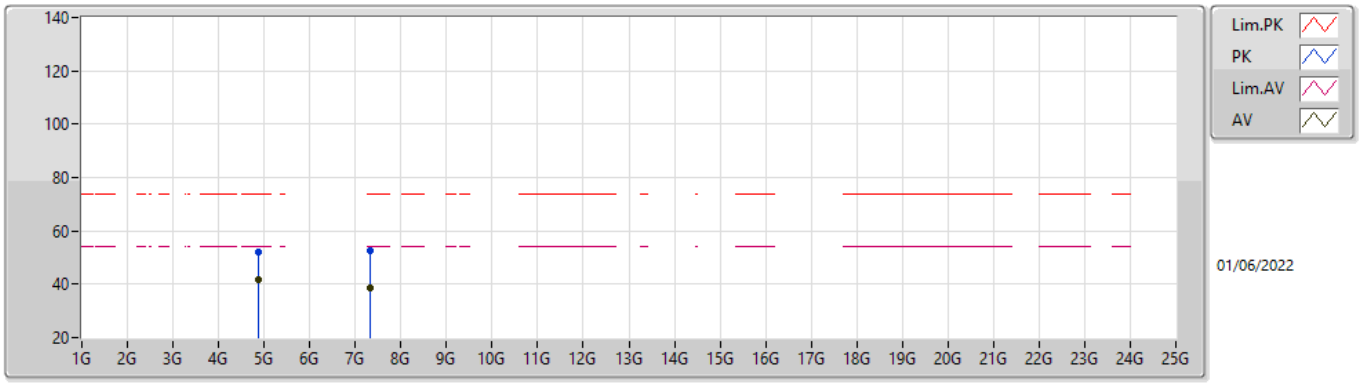


EUT Y_1TX
Setting 5
04-D-G-4

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	2.3782G	53.66	74.00	-20.34	23.41	3	Horizontal	52	1.87	-	27.46	2.79	-
AV	2.3887G	42.10	54.00	-11.90	11.83	3	Horizontal	52	1.87	-	27.48	2.79	-
PK	2.4406G	102.53	Inf	-Inf	72.13	3	Horizontal	52	1.87	-	27.58	2.82	-
AV	2.44G	98.17	Inf	-Inf	67.77	3	Horizontal	52	1.87	-	27.58	2.82	-
PK	2.4904G	54.31	74.00	-19.69	23.62	3	Horizontal	52	1.87	-	27.84	2.85	-
AV	2.4883G	42.88	54.00	-11.12	12.21	3	Horizontal	52	1.87	-	27.83	2.84	-

O-QPSK_1TX

2440MHz_TX

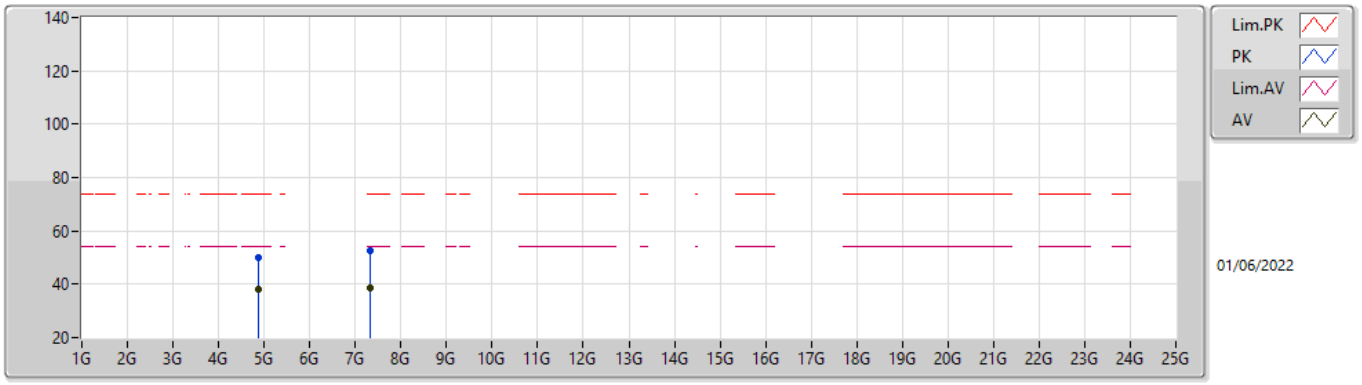


EUT Y_1TX
Setting 5
04-D-G-4

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	4.88112G	51.88	74.00	-22.12	47.34	3	Vertical	109	2.34	-	32.92	4.84	33.22
AV	4.8792G	41.73	54.00	-12.27	37.19	3	Vertical	109	2.34	-	32.92	4.84	33.22
PK	7.31958G	52.59	74.00	-21.41	42.70	3	Vertical	186	2.18	-	37.50	6.06	33.67
AV	7.32338G	38.66	54.00	-15.34	28.78	3	Vertical	186	2.18	-	37.50	6.06	33.68

O-QPSK_1TX

2440MHz_TX

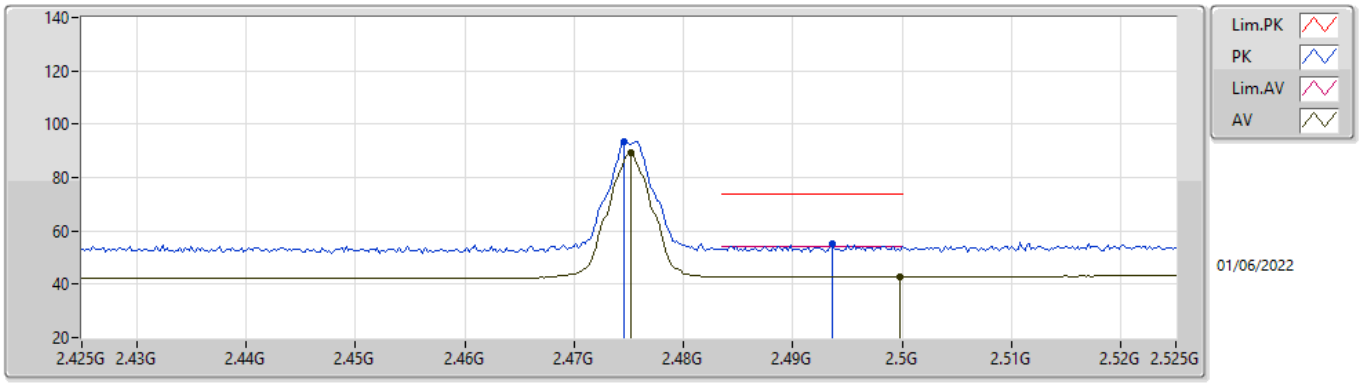


EUT Y_1TX
Setting 5
04-D-G-4

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	4.88118G	50.08	74.00	-23.92	45.54	3	Horizontal	241	2.58	-	32.92	4.84	33.22
AV	4.87924G	37.93	54.00	-16.07	33.39	3	Horizontal	241	2.58	-	32.92	4.84	33.22
PK	7.31986G	52.74	74.00	-21.26	42.85	3	Horizontal	89	1.89	-	37.50	6.06	33.67
AV	7.31992G	38.60	54.00	-15.40	28.71	3	Horizontal	89	1.89	-	37.50	6.06	33.67

O-QPSK_1TX

2475MHz_TX

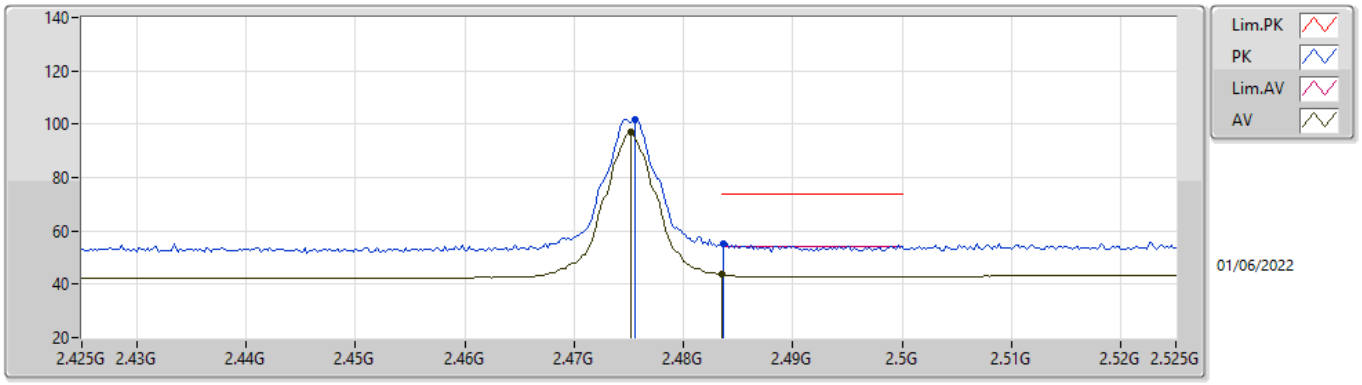


EUT Y_1TX
Setting 5
04-D-R-5

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	2.4746G	93.60	Inf	-Inf	63.01	3	Vertical	354	1.28	-	27.75	2.84	-
AV	2.4752G	89.21	Inf	-Inf	58.62	3	Vertical	354	1.28	-	27.75	2.84	-
PK	2.4936G	55.18	74.00	-18.82	24.47	3	Vertical	354	1.28	-	27.86	2.85	-
AV	2.4998G	42.79	54.00	-11.21	12.04	3	Vertical	354	1.28	-	27.90	2.85	-

O-QPSK_1TX

2475MHz_TX

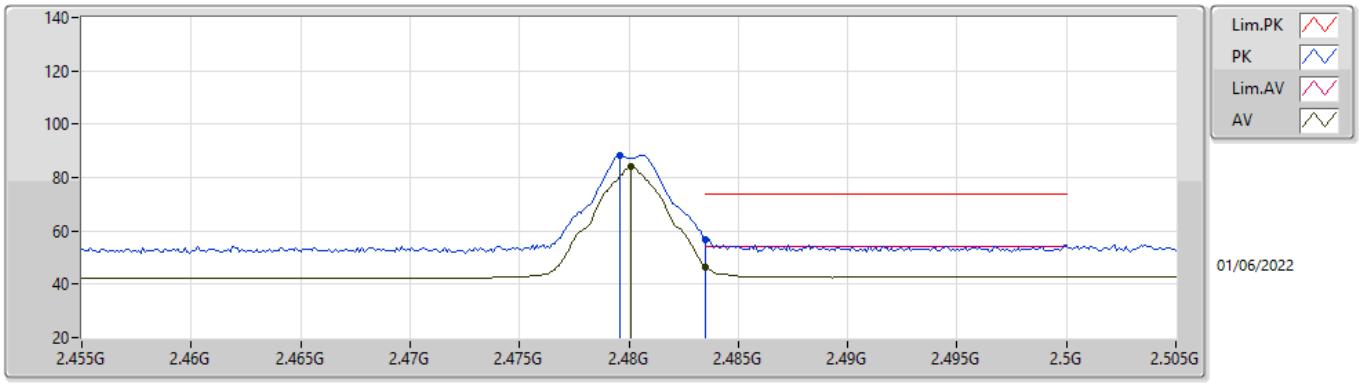


EUT Y_1TX
Setting 5
04-D-R-5

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	2.4756G	101.87	Inf	-Inf	71.28	3	Horizontal	42	1.87	-	27.75	2.84	-
AV	2.4752G	97.28	Inf	-Inf	66.69	3	Horizontal	42	1.87	-	27.75	2.84	-
PK	2.4836G	55.26	74.00	-18.74	24.62	3	Horizontal	42	1.87	-	27.80	2.84	-
AV	2.4835G	43.83	54.00	-10.17	13.19	3	Horizontal	42	1.87	-	27.80	2.84	-

O-QPSK_1TX

2480MHz_TX

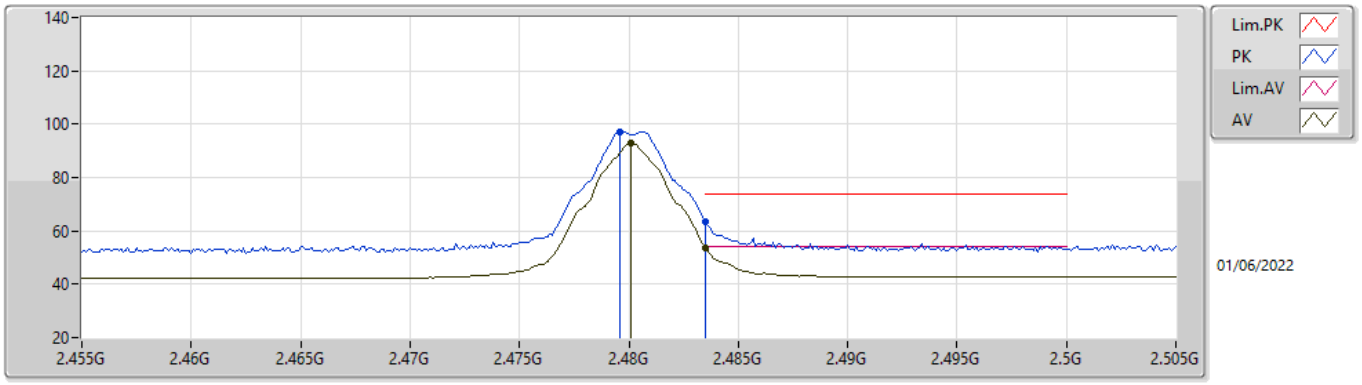


EUT Y_1TX
Setting 1
04-D-G-4

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	2.4796G	88.36	Inf	-Inf	57.74	3	Vertical	352	1.49	-	27.78	2.84	-
AV	2.4801G	84.00	Inf	-Inf	53.38	3	Vertical	352	1.49	-	27.78	2.84	-
PK	2.4835G	56.76	74.00	-17.24	26.12	3	Vertical	352	1.49	-	27.80	2.84	-
AV	2.4835G	46.58	54.00	-7.42	15.94	3	Vertical	352	1.49	-	27.80	2.84	-

O-QPSK_1TX

2480MHz_TX

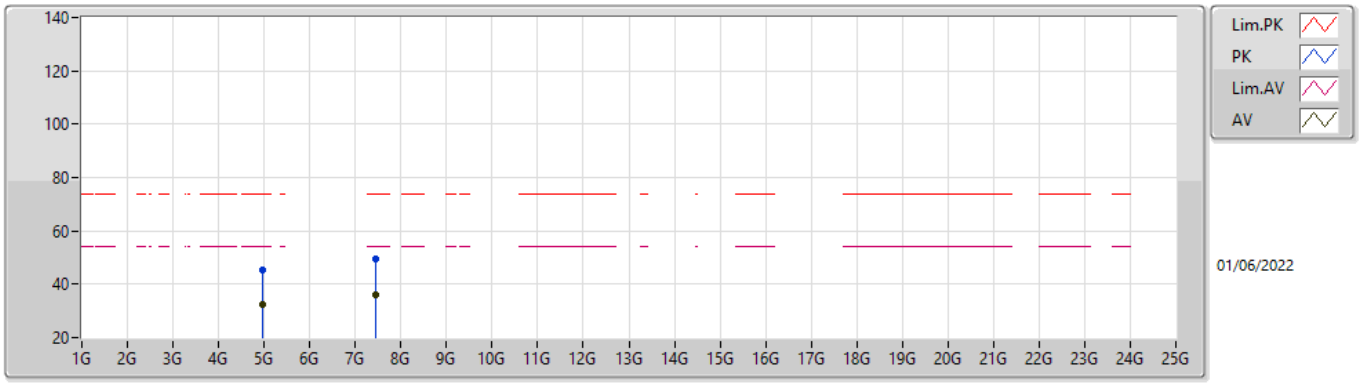


EUT Y_1TX
Setting 1
04-D-G-4

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	2.4796G	97.32	Inf	-Inf	66.70	3	Horizontal	50	2.04	-	27.78	2.84	-
AV	2.4801G	92.93	Inf	-Inf	62.31	3	Horizontal	50	2.04	-	27.78	2.84	-
PK	2.4835G	63.33	74.00	-10.67	32.69	3	Horizontal	50	2.04	-	27.80	2.84	-
AV	2.4835G	53.72	54.00	-0.28	23.08	3	Horizontal	50	2.04	-	27.80	2.84	-

O-QPSK_1TX

2480MHz_TX

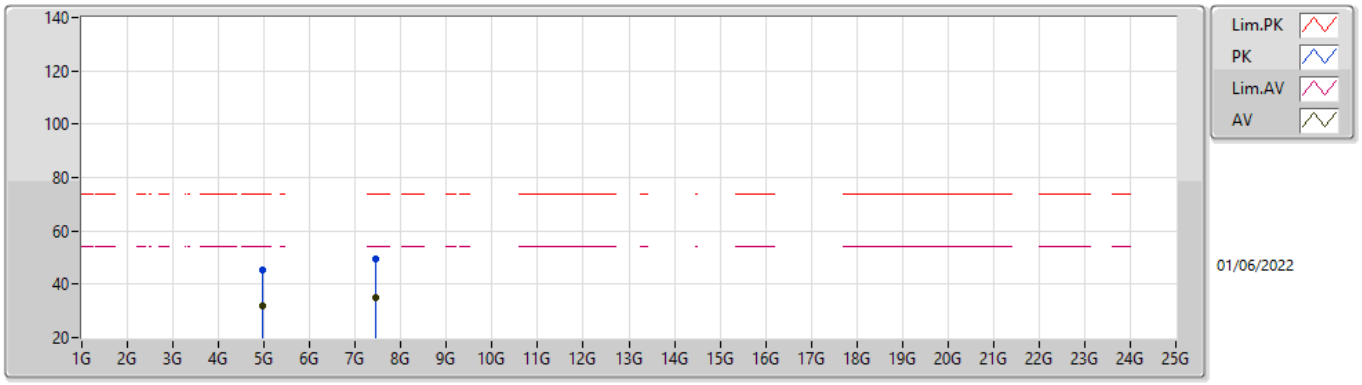


EUT Y_1TX
Setting 1
04-D-G-4

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	4.95932G	45.57	74.00	-28.43	40.77	3	Vertical	21	2.12	-	33.10	4.88	33.18
AV	4.95926G	32.16	54.00	-21.84	27.36	3	Vertical	21	2.12	-	33.10	4.88	33.18
PK	7.44392G	49.49	74.00	-24.51	39.65	3	Vertical	310	1.43	-	37.52	6.14	33.82
AV	7.44442G	36.06	54.00	-17.94	26.22	3	Vertical	310	1.43	-	37.52	6.14	33.82

O-QPSK_1TX

2480MHz_TX



EUT Y_1TX
Setting 1
04-D-G-4

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	4.9611G	45.47	74.00	-28.53	40.67	3	Horizontal	282	2.00	-	33.10	4.88	33.18
AV	4.95926G	32.13	54.00	-21.87	27.33	3	Horizontal	282	2.00	-	33.10	4.88	33.18
PK	7.43976G	49.61	74.00	-24.39	39.75	3	Horizontal	10	1.31	-	37.54	6.14	33.82
AV	7.4449G	35.24	54.00	-18.76	25.40	3	Horizontal	10	1.31	-	37.52	6.14	33.82