



RADIO TEST REPORT

FCC ID : 2A2CB-0000011000102
Equipment : Wireless Spy Fishing Camera (Receiver)
Brand Name : G-Sau
Model Name : Trident 101
Applicant : Lian Hong Art. Co., Ltd.
Wanshou Road, No. 492-1, 5th Floor, Section
1..Taoyuan City, Taiwan
Manufacturer : Lian Hong Art. Co., Ltd.
Wanshou Road, No. 492-1, 5th Floor, Section
1..Taoyuan City, Taiwan
Standard : 47 CFR FCC Part 15.247

The product was received on Jun. 22, 2021, and testing was started from Jun. 22, 2021 and completed on Jul. 29, 2021. 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

Sportun International Inc. Hsinchu Laboratory
No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)



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Appendix A. Test Results of AC Power-line Conducted Emissions**Appendix B. Test Results of 20dB Bandwidth and Carrier Frequency Separation****Appendix C. Test Results of Maximum Conducted Output Power****Appendix D. Test Results of Number of Hopping Frequencies and Hopping Bandedge****Appendix E. Test Results of Time of Occupancy (Dwell Time)****Appendix F. Test Results of Emissions in Non-restricted Frequency Bands****Appendix G. Test Results of Emissions in Restricted Frequency Bands**



Appendix H. Test Photos

Photographs of EUT v01



History of this test report



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.3	15.203	Antenna Requirement	PASS	-
3.1	15.207	AC Power-line Conducted Emissions	PASS	-
3.2	15.247(a)	20dB Bandwidth	PASS	-
3.2	15.247(a)	Carrier Frequency Separation	PASS	-
3.3	15.247(b)	Maximum Conducted Output Power	PASS	-
3.4	15.247(a)	Number of Hopping Frequencies and Hopping Band edge	PASS	-
3.5	15.247(a)	Time of Occupancy (Dwell Time)	PASS	-
3.6	15.247(d)	Emissions in Non-restricted Frequency Bands	PASS	-
3.7	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:

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: Vicky Huang



1 General Description

1.1 Information

1.1.1 RF General Information

Frequency Range (MHz)	Modulation	Ch. Frequency (MHz)	Channel Number
2400-2483.5	QPSK	2408-2468	1-15 [15]

Band	Mode	BWch (MHz)	Nant
2400-2483.5	QPSK	3	1

Note:

- ♦ BWch is the nominal channel bandwidth.

1.1.2 Table of channel

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	2408	9	2445
2	2411	10	2448
3	2415	11	2452
4	2418	12	2455
5	2422	13	2458
6	2425	14	2465
7	2432	15	2468
8	2442	-	-

1.1.3 Antenna Information

Ant.	Port	Brand	Model Name	Antenna Type	Connector	Antenna Gain (dBi)
1	1	Superbatrf	WA2-882-S01SP-030	Omni-directional	N/A	3

Note: The above information was declared by manufacturer.

For 1TX/1RX:

Only Port 1 can be used as transmitting/receiving.

**1.1.4 Mode Test Duty Cycle**

Mode	DC	DCF(dB)	T(s)	VBW(Hz) $\geq 1/T$
QPSK	0.215	6.68	357.5u	3k

Note:

- ♦ DC is Duty Cycle.
- ♦ DCF is Duty Cycle Factor.

1.1.5 EUT Operational Condition

EUT Power Type	From power adapter or Host system
Test Software Version	ttermpro V4.75



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

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 (TAF: 3787)	ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.) 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	TH01-CB	Caster Jiang	23.2-24.1 / 78-81	Jun. 22, 2021~ Jun. 25, 2021
Radiated (Below 1GHz)	03CH06-CB	Bruce Yang	25.9~27.3 / 65~69	Jul. 05, 2021
Radiated (Above 1GHz)	03CH05-CB	Stim Sung	24.6-25.9 / 63-68	Jun. 24, 2021
AC Conduction	CO01-CB	Wei Li	23~24 / 56~59	Jul. 29, 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)	2.0 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	4.2 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	5.5 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	4.7 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	4.2 dB	Confidence levels of 95%
Conducted Emission	2.5 dB	Confidence levels of 95%
Output Power Measurement	1.3 dB	Confidence levels of 95%
Power Density Measurement	2.5 dB	Confidence levels of 95%
Bandwidth Measurement	0.9%	Confidence levels of 95%



2 Test Configuration of EUT

2.1 Test Channel Mode

Mode	Power Setting
QPSK	-
2408MHz	3
2442MHz	3
2468MHz	3



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
1	Normal Link: EUT + Powered from Adapter
2	Normal Link: EUT + Powered from host system

For operating mode 2 is the worst case and it was record in this test report.

The Worst Case Mode for Following Conformance Tests	
Tests Item	20dB Bandwidth Carrier Frequency Separation Maximum Conducted Output Power Number of Hopping Frequencies Hopping Bandedge Time of Occupancy (Dwell Time) 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
1	Normal Link: EUT in Z axis + Powered from Adapter
2	Normal Link: EUT in Z axis + Powered from host system

For operating mode 1 is the worst case and it was record in this test report.

Operating Mode > 1GHz	CTX
1	EUT in Z axis

Note: The EUT can only be used at Z axis position.

The Adapter is for measurement only, would not be marketed.

Support Unit	Brand	Model
Adapter	Apple	A1443



2.3 EUT Operation during Test

For CTX Mode:

The EUT was programmed to be in continuously transmitting mode.

For Normal Link:

During the test, the EUT operation to normal function.

2.4 Accessories

N/A

2.5 Support Equipment

For AC Conduction:

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
A	NB	DELL	E6430	N/A
B	TV	ASUS	VP28U	N/A
C	SD Card	ADATA	16G	N/A
D	Wireless Device(TX)	G-Sau	Trident 101	N/A
E	Earphone	e-Power	S90W	N/A
F	Mouse	Logitech	M-U0026	N/A

For Radiated (below 1GHz):

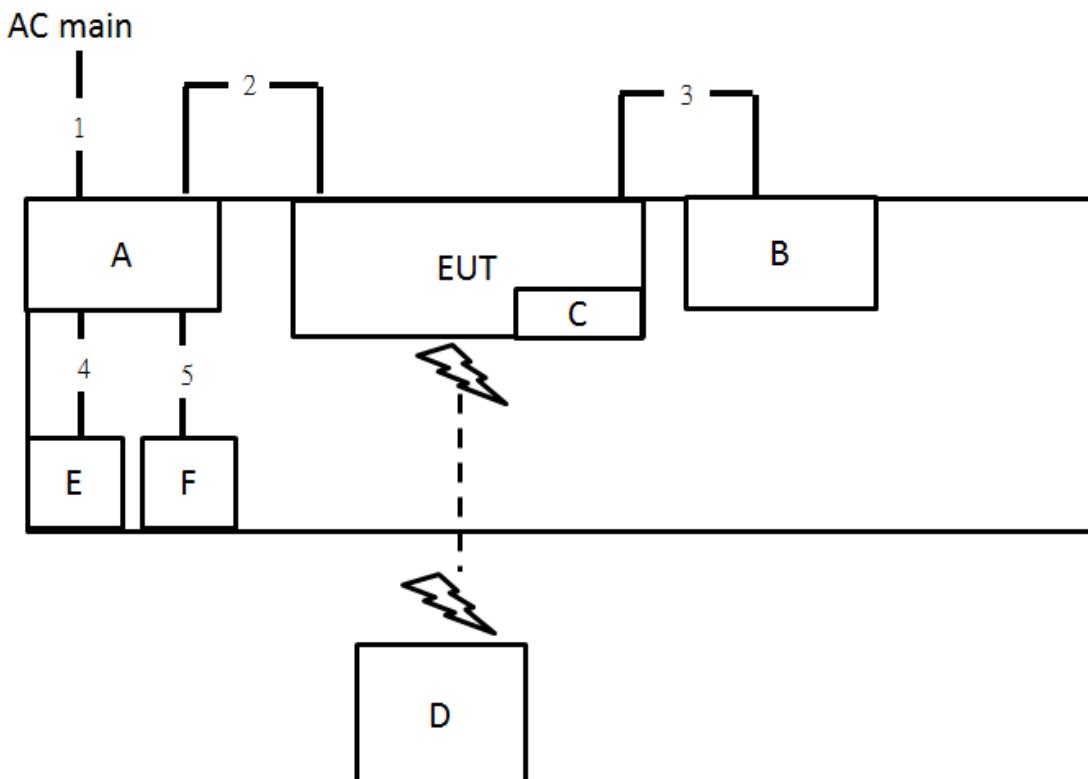
Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
A	TV	ASUS	VP28U	N/A
B	SD Card	Apacer	SD Card	N/A
C	Adapter	Apple	A1443	N/A
D	Wireless Device(TX)	G-Sau	Trident 101	N/A

For Radiated (above 1GHz) and RF Conducted:

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
A	NB	DELL	E4300	N/A

2.6 Test Setup Diagram

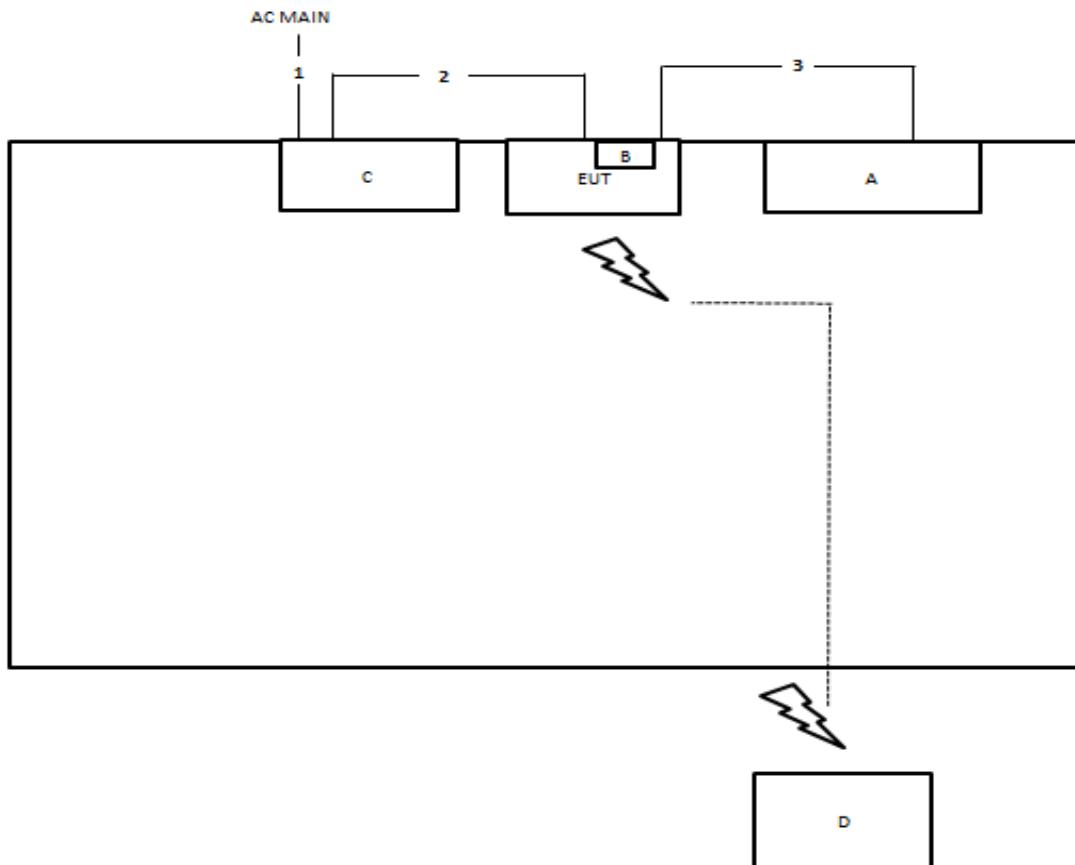
Test Setup Diagram – AC Line Conducted Emission Test



Item	Connection	Shielded	Length
1	Power cable	No	3.1m
2	Type-C cable	Yes	1.5m
3	HDMI cable	Yes	1.8m
4	Audio cable	No	1.5m
5	USB cable	Yes	1.5m



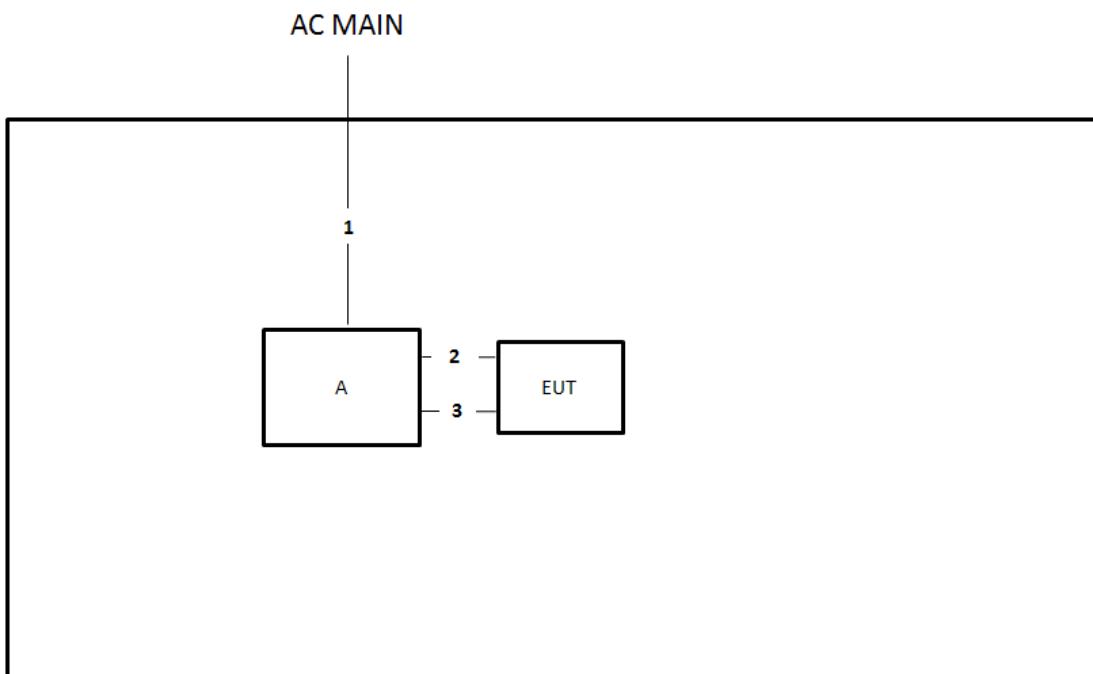
Test Setup Diagram - Radiated Test < 1GHz



Item	Connection	Shielded	Length
1	Power cable	No	1.5m
2	Type-C cable	Yes	1.5m
3	HDMI cable	Yes	1.8m



Test Setup Diagram - Radiated Test > 1GHz



Item	Connection	Shielded	Length
1	Power cable	No	2.6m
2	Type-C cable	Yes	1.5m
3	Console cable	No	0.7m



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

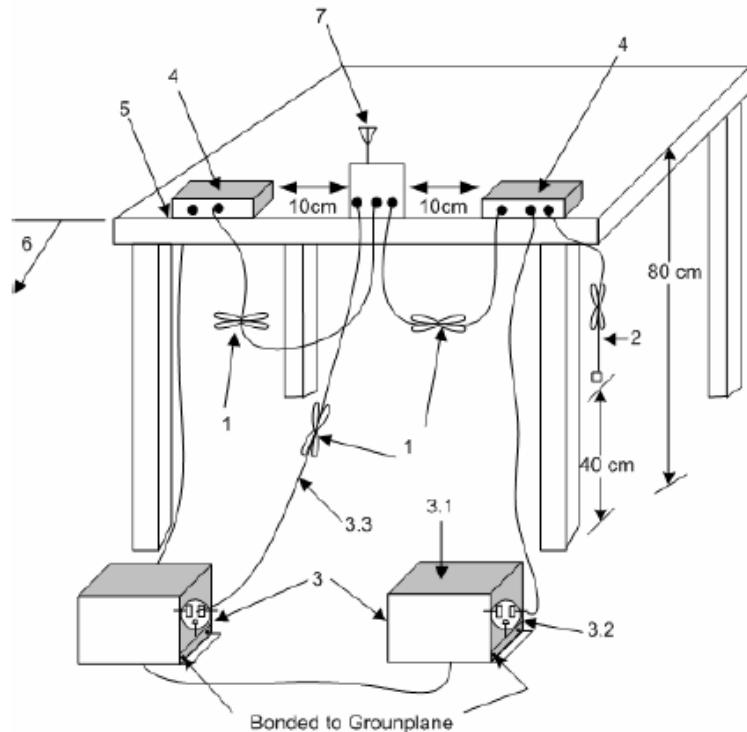
Refer a test equipment and calibration data table in this test report.

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 $50\ \Omega$ 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.

1.1.1. Measurement Results Calculation

The measured Level is calculated using:

- Corrected Reading: LISN Factor (LISN) + Attenuator (AT/AUX) + Cable Loss (CL) + Read Level (Raw) = Level
- Margin = -Limit + Level

3.1.5 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A



3.2 20dB Bandwidth and Carrier Frequency Separation

3.2.1 20dB Bandwidth and Carrier Frequency Separation Limit

20dB Bandwidth and Carrier Frequency Separation Limit for Frequency Hopping Systems	
▪ 902-928 MHz Band:	
	▪ $N \geq 50$ and $ChS \geq MAX$ (20 dB bandwidth, 25 kHz); 20 dB bandwidth ≤ 250 kHz.
	▪ $50 > N \geq 25$ and $ChS \geq MAX$ (20 dB bandwidth, 25 kHz); 20 dB bandwidth > 250 kHz.
▪ 2400-2483.5 MHz Band:	
	▪ $N \geq 75$ and $ChS \geq MAX$ (20 dB bandwidth, 25 kHz).
	▪ $75 > N \geq 15$ and $ChS \geq MAX$ (20 dB bandwidth 2/3, 25 kHz).
▪ 5725-5850 MHz Band:	
	▪ $N \geq 75$ and $ChS \geq MAX$ (20 dB bandwidth, 25 kHz); 20 dB bandwidth ≤ 1 MHz.

N: Number of Hopping Frequencies; ChS: Hopping Channel Separation

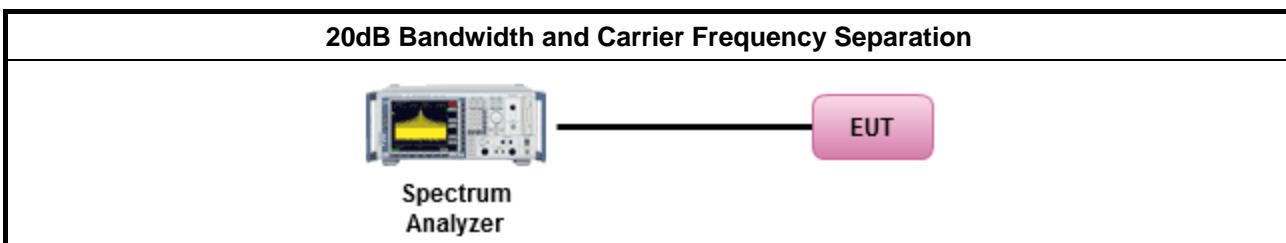
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

Test Method
▪ Refer as ANSI C63.10-2013, clause 6.9.1 for 20 dB bandwidth measurement.
▪ Refer as ANSI C63.10-2013, clause 7.8.2 for carrier frequency separation measurement.

3.2.4 Test Setup



3.2.5 Test Result of 20dB Bandwidth

Refer as Appendix B

3.2.6 Test Result of Carrier Frequency Separation

Refer as Appendix B



3.3 Maximum Conducted Output Power

3.3.1 Maximum Conducted Output Power Limit

Maximum Conducted Output Power Limit	
▪ 902-928 MHz Band:	
	▪ $N \geq 50$; Power 30dBm; EIRP 36dBm
	▪ $50 > N \geq 25$; Power 23.98dBm; EIRP 29.98dBm
▪ 2400-2483.5 MHz Band:	
	▪ $N \geq 75$; Power 30dBm; EIRP 36dBm
	▪ $75 > N \geq 15$; Power 21dBm; EIRP 27dBm
▪ 5725-5850 MHz Band:	
	▪ $N \geq 75$; Power 30dBm; EIRP 36dBm

N: Number of Hopping Frequencies

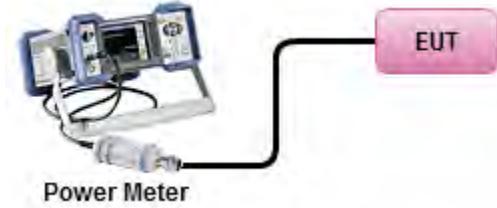
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

Test Method
▪ Refer as ANSI C63.10-2013, clause 7.8.5 for output power measurement.

3.3.4 Test Setup

Maximum Conducted Output Power (Peak Power Meter)


3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix C



3.4 Number of Hopping Frequencies and Hopping Bandedge

3.4.1 Number of Hopping Frequencies Limit

Number of Hopping Frequencies Limit	
▪ 902-928 MHz Band:	
	▪ $N \geq 50$ and $ChS \geq MAX$ (20 dB bandwidth, 25 kHz); 20 dB bandwidth ≤ 250 kHz.
	▪ $50 > N \geq 25$ and $ChS \geq MAX$ (20 dB bandwidth, 25 kHz); 20 dB bandwidth > 250 kHz.
▪ 2400-2483.5 MHz Band:	
	▪ $N \geq 75$ and $ChS \geq MAX$ (20 dB bandwidth, 25 kHz).
	▪ $75 > N \geq 15$ and $ChS \geq MAX$ (20 dB bandwidth 2/3,25 kHz).
▪ 5725-5850 MHz Band:	
	▪ $N \geq 75$ and $ChS \geq MAX$ (20 dB bandwidth, 25 kHz); 20 dB bandwidth ≤ 1 MHz.

N:Number of Hopping Frequencies; ChS : Hopping Channel Separation

3.4.2 Hopping Bandedge Limit

Refer clause 3.6.1 and clause 3.7.1

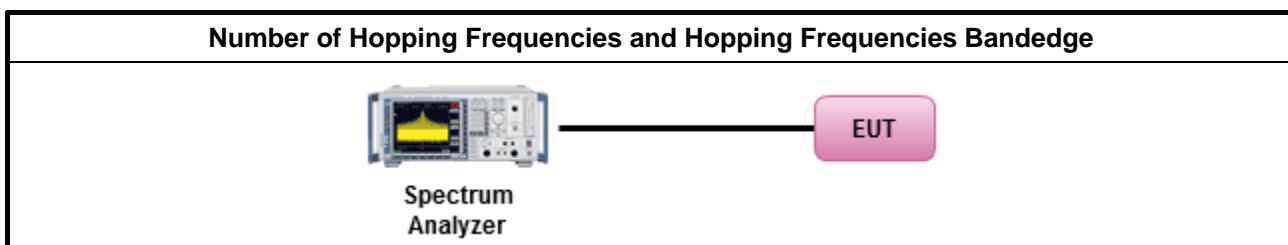
3.4.3 Measuring Instruments

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

3.4.4 Test Procedures

Test Method
▪ Refer as ANSI C63.10-2013, clause 7.8.3 for number of hopping frequencies measurement.
▪ Refer as ANSI C63.10-2013, clause 7.8.6 for hopping frequencies Bandedge measurement.

3.4.5 Test Setup



3.4.6 Test Result of Number of Hopping Frequencies

Refer as Appendix D

3.4.7 Test Result of Number of Hopping Frequencies Bandedge

Refer as Appendix D



3.5 Time of Occupancy (Dwell Time)

3.5.1 Time of Occupancy (Dwell Time) Limit

20dB Bandwidth and Carrier Frequency Separation Limit for Frequency Hopping Systems	
▪ 902-928 MHz Band:	
	▪ $N \geq 50$; 0.4s in 20s period
	▪ $50 > N \geq 25$; 0.4s in 10s period
▪ 2400-2483.5 MHz Band:	
	▪ $N \geq 75$; 0.4s in $N \times 0.4$ period
	▪ $75 > N \geq 15$; 0.4s in $N \times 0.4$ period
▪ 5725-5850 MHz Band:	
	▪ $N \geq 75$; 0.4s in 30s period

N: Number of Hopping Frequencies

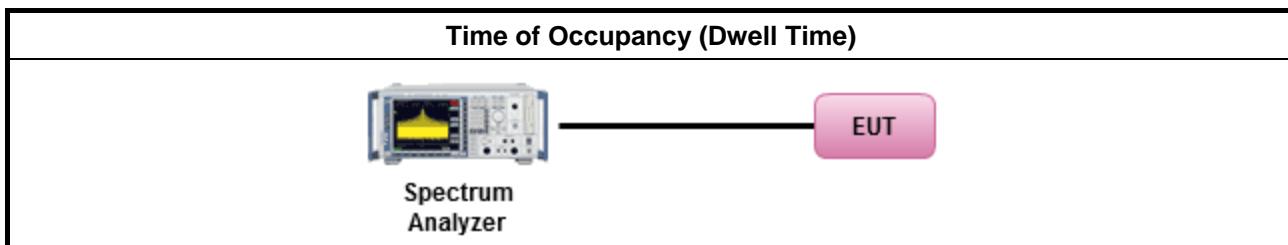
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

Test Method	
▪ Refer as ANSI C63.10-2013, clause 7.8.4 for dwell time measurement.	
▪ Bluetooth ACL packets can be 1, 3, or 5 time slots. Following as dwell time. Operate DH5 at maximum dwell time and maximum duty cycle.	
	▪ The DH5 packet can cover up to 5 time slots. Operate DH5 at maximum dwell time and maximum duty cycle. A maximum length packet has duration of 5 time slots. The hopping rate is 1600 hops/second so the maximum dwell time is $5/1600$ seconds, or 3.125ms. DH5 Packet permit maximum $1600/ 79 / 6 = 3.37$ hops per second in each channel.

3.5.4 Test Setup



3.5.5 Test Result of Time of Occupancy (Dwell Time)

Refer as Appendix E



3.6 Emissions in Non-restricted Frequency Bands

3.6.1 Emissions in Non-restricted Frequency Bands Limit

Un-restricted Band Emissions Limit	
RF output power procedure	Limit (dBc)
Peak output power procedure	20
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.	

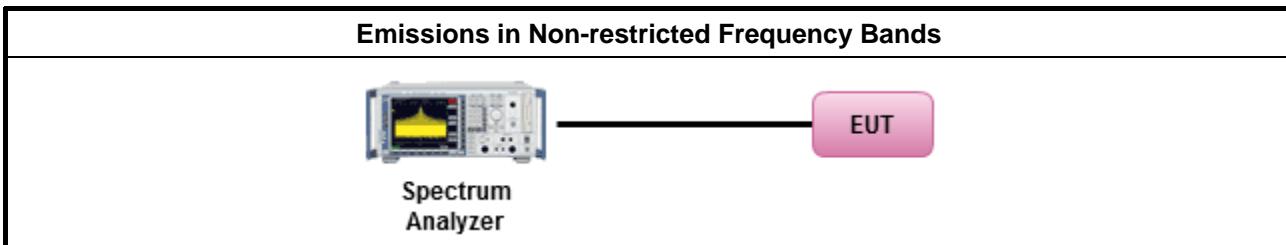
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

Test Method
▪ Refer as ANSI C63.10-2013, clause 7.8.8 for unwanted emissions into non-restricted bands.

3.6.4 Test Setup



3.6.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix F



3.7 Emissions in Restricted Frequency Bands

3.7.1 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.

3.7.2 Measuring Instruments

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

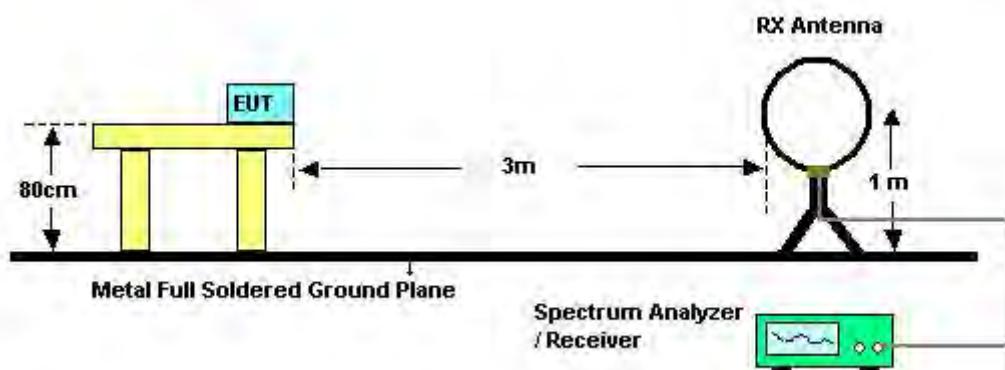
3.7.3 Test Procedures

Test Method	
▪ The average emission levels shall be measured in [hopping 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 ANSI C63.10, clause 4.1.4.2.1 QP value.	
▪ Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak.	
▪ Refer as ANSI C63.10, clause 4.1.4.2.4 average value of hopping pulsed emissions.	

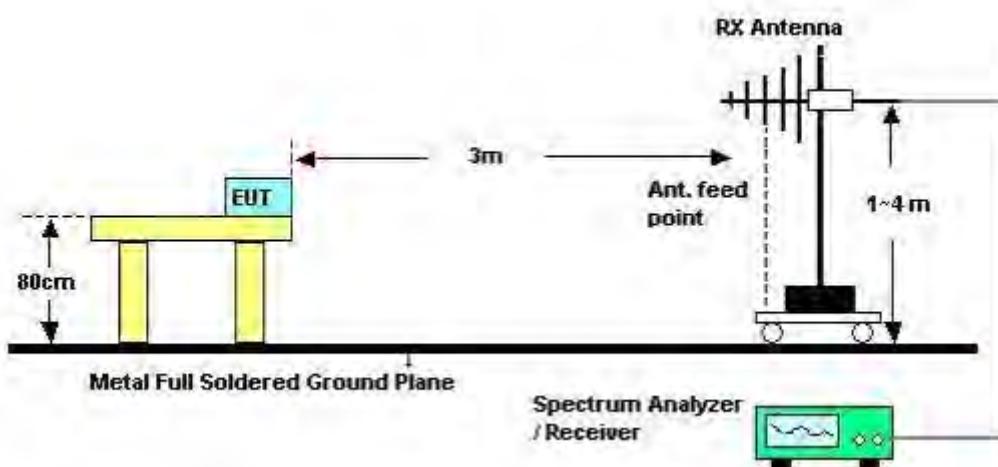
3.7.4 Test Setup

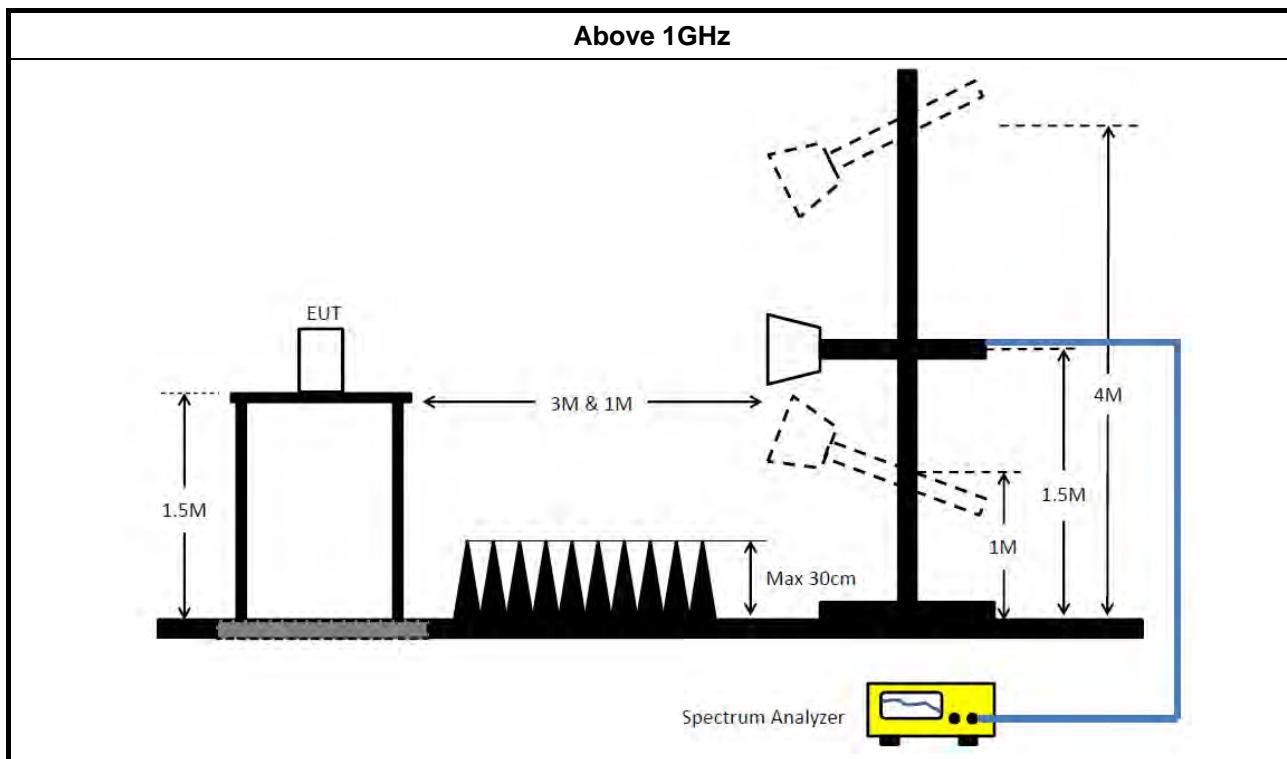
Emissions in Restricted Frequency Bands

9kHz ~30MHz



30MHz~1GHz





3.7.5 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.

3.7.6 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.

3.7.7 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix G



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	Mar. 03, 2021	Mar. 02, 2022	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Jan. 06, 2021	Jan. 05, 2022	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Mar. 07, 2021	Mar. 06, 2022	Conduction (CO01-CB)
Pulse Limiter	Rohde&Schwarz	ESH3-Z2	100430	9kHz ~ 30MHz	Jan. 30, 2021	Jan. 29, 2022	Conduction (CO01-CB)
COND Cable	Woken	Cable	Low cable-CO01	9kHz ~ 30MHz	May 19, 2021	May 18, 2022	Conduction (CO01-CB)
Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conduction (CO01-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH06-CB	30 MHz ~ 1 GHz	Aug. 10, 2020	Aug. 09. 2021	Radiation (03CH06-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Apr. 14, 2021	Apr. 13, 2022	Radiation (03CH06-CB)
Bilog Antenna with 6 dB attenuator	TESEQ & EMCI	CBL6112D & N-6-06	37878 & AT-N0606	20MHz ~ 2GHz	Aug. 02, 2020	Aug. 01, 2021	Radiation (03CH06-CB)
Pre-Amplifier	Agilent	310N	187290	0.1MHz ~ 1GHz	Nov. 05, 2020	Nov. 04, 2021	Radiation (03CH06-CB)
Spectrum analyzer	R&S	FSP40	100080	9kHz~40GHz	Dec. 15, 2020	Dec. 14, 2021	Radiation (03CH06-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	Jun. 21, 2021	Jun. 20, 2022	Radiation (03CH06-CB)
RF Cable-low	Woken	RG402	Low Cable-05+24	30MHz~1GHz	Oct. 05, 2020	Oct. 04, 2021	Radiation (03CH06-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH06-CB)
3m Semi Anechoic Chamber VSWR	TDK	SAC-3M	03CH05-CB	1GHz ~18GHz 3m	Nov. 08, 2020	Nov. 07, 2021	Radiation (03CH05-CB)
Horn Antenna	SCHWARZBECK	BBHA9120D	BBHA 9120 D-1291	1GHz~18GHz	Sep. 05, 2020	Sep. 04, 2021	Radiation (03CH05-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jul. 21, 2020	Jul. 20, 2021	Radiation (03CH05-CB)
Pre-Amplifier	EMCI	EMC12630SE	980287	1GHz – 26.5GHz	Jul. 03, 2020	Jul. 02, 2021	Radiation (03CH05-CB)
Amplifier	-	-	TF-130N-R1	18GHz ~ 40GHz	Jun.15, 2021	Jun. 14, 2022	Radiation (03CH05-CB)
Spectrum Analyzer	R&S	FSP40	100304	9kHz ~ 40GHz	Nov. 10, 2020	Nov. 09, 2021	Radiation (03CH05-CB)
EMI Test Receiver	R&S	ESR7	102171	9kHz ~ 26GHz	Jul. 01, 2020	Jun. 30, 2021	Radiation (03CH05-CB)



Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
RF Cable-high	Woken	RG402	High Cable-28	1GHz~18GHz	Oct. 05, 2020	Oct. 04, 2021	Radiation (03CH05-CB)
RF Cable-high	Woken	RG402	High Cable-40G#1	18GHz ~ 40 GHz	Jul. 16, 2020	Jul. 15, 2021	Radiation (03CH05-CB)
RF Cable-high	Woken	RG402	High Cable-04+28	1GHz~18GHz	Oct. 05, 2020	Oct. 04, 2021	Radiation (03CH05-CB)
RF Cable-high	Woken	RG402	High Cable-40G#2	18GHz ~ 40 GHz	Jul. 16, 2020	Jul. 15, 2021	Radiation (03CH05-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH05-CB)
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	May 21, 2021	May 20, 2022	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-06	1 GHz – 26.5 GHz	Oct. 05, 2020	Oct. 04, 2021	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-07	1 GHz –26.5 GHz	Oct. 05, 2020	Oct. 04, 2021	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-08	1 GHz –26.5 GHz	Oct. 05, 2020	Oct. 04, 2021	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-09	1 GHz –26.5 GHz	Oct. 05, 2020	Oct. 04, 2021	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz –26.5 GHz	Oct. 05, 2020	Oct. 04, 2021	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-30	1 GHz –26.5 GHz	Oct. 05, 2020	Oct. 04, 2021	Conducted (TH01-CB)
Cable	Woken	RG402	low Cable-30	9 kHz –1 GHz	Apr. 06, 2021	Apr. 05, 2022	Conducted (TH01-CB)
Power Sensor	Agilent	E9327A	US40442088	50MHz~18GHz	Feb. 23, 2021	Feb. 22, 2022	Conducted (TH01-CB)
Power Meter	Agilent	E4416A	GB41291199	50MHz~18GHz	Feb. 23, 2021	Feb. 22, 2022	Conducted (TH01-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conducted (TH01-CB)

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

NCR means Non-Calibration required.



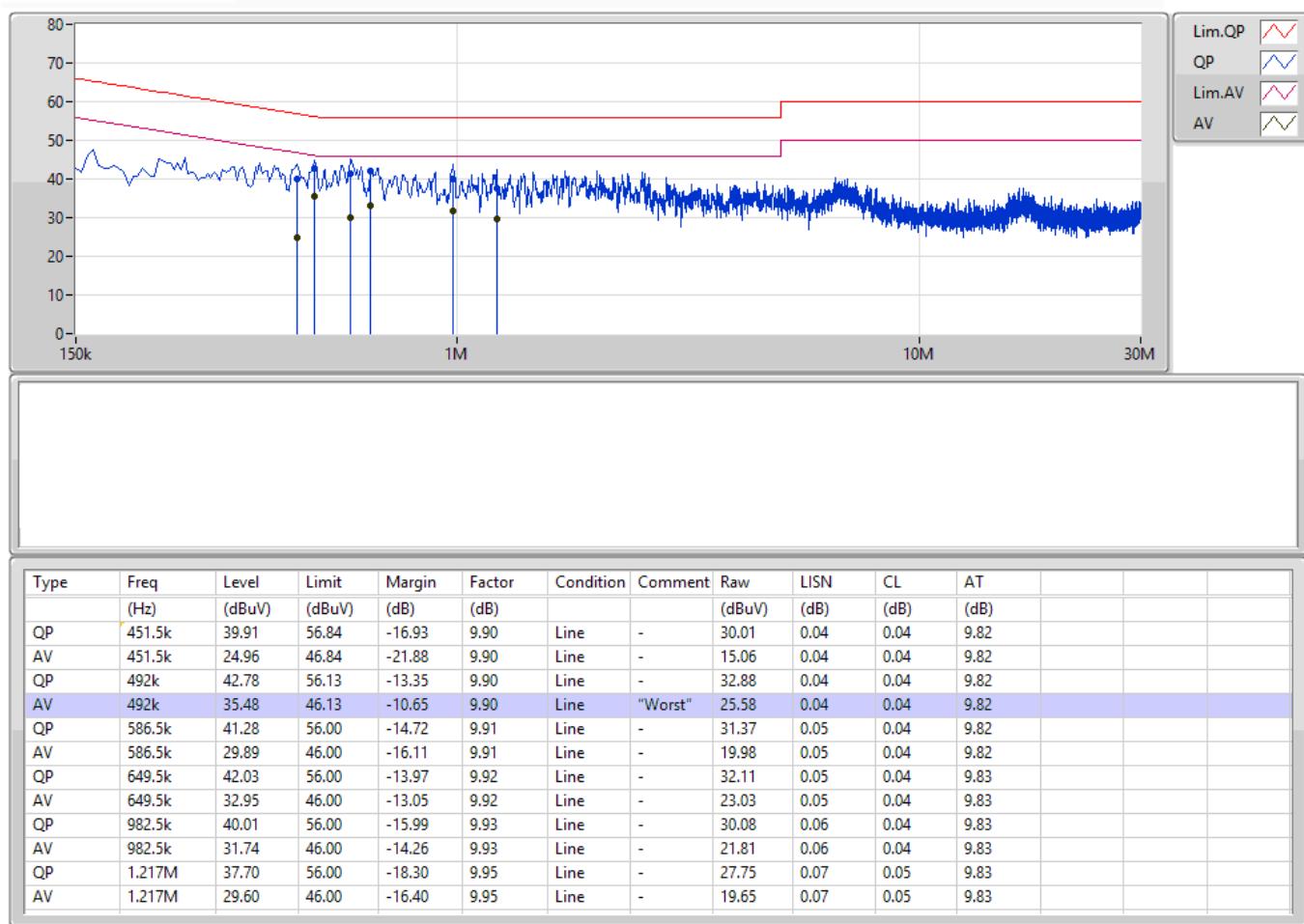
Conducted Emissions at Powerline

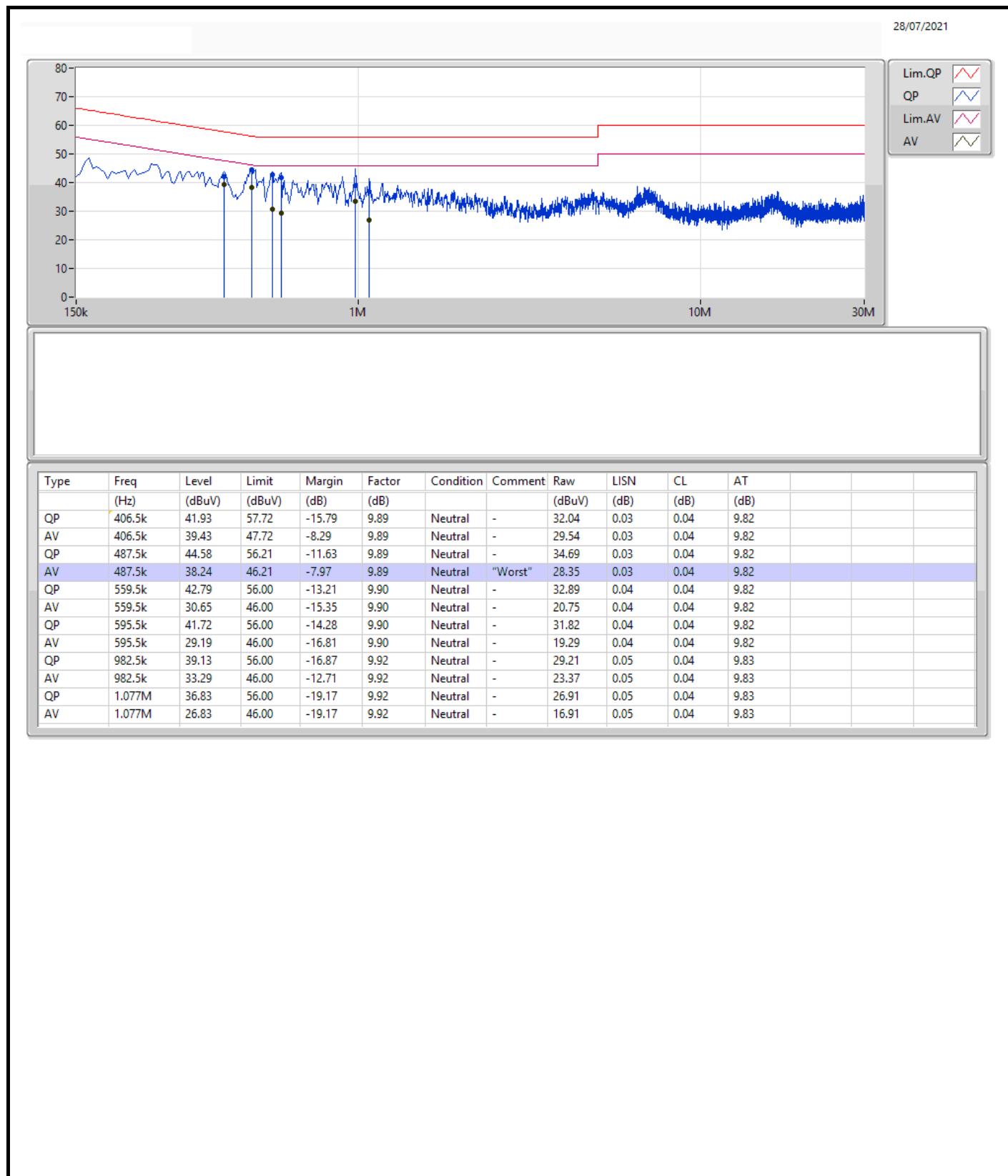
Appendix A

Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition
Mode 2	Pass	AV	487.5k	38.24	46.21	-7.97	Neutral

28/07/2021





**Summary**

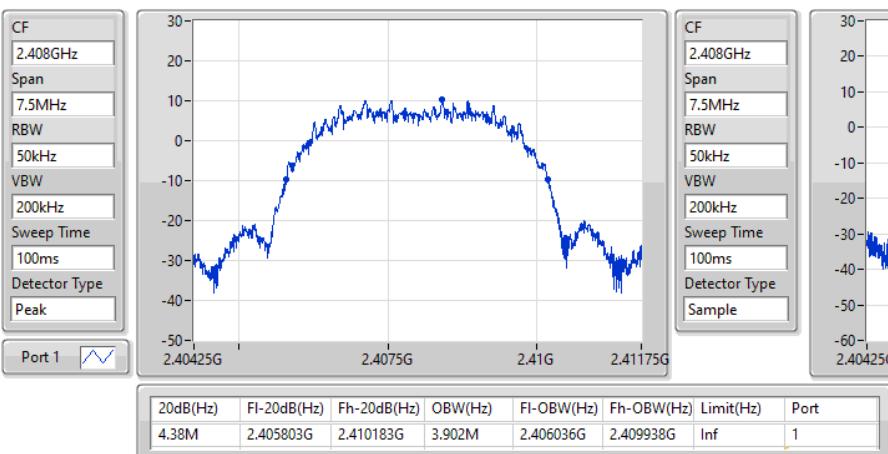
Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4-2.4835GHz	-	-	-	-	-
QPSK	4.391M	3.906M	3M91G7D	4.38M	3.902M

Max-N dB = Maximum 20dB down bandwidth; Max-OBW = Maximum 99% occupied bandwidth;
Min-N dB = Minimum 20dB down bandwidth; Min-OBW = Minimum 99% occupied bandwidth

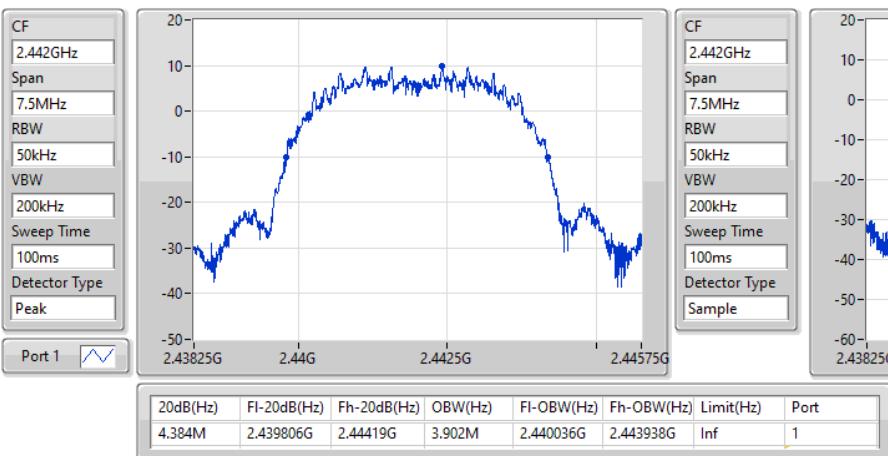
**Result**

Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
QPSK	-	-	-	-
2408MHz	Pass	Inf	4.38M	3.902M
2442MHz	Pass	Inf	4.384M	3.902M
2468MHz	Pass	Inf	4.391M	3.906M

Port X-N dB = Port X 20dB down bandwidth;
Port X-OBW = Port X 99% occupied bandwidth

QPSK
2408MHz

EBW-FS

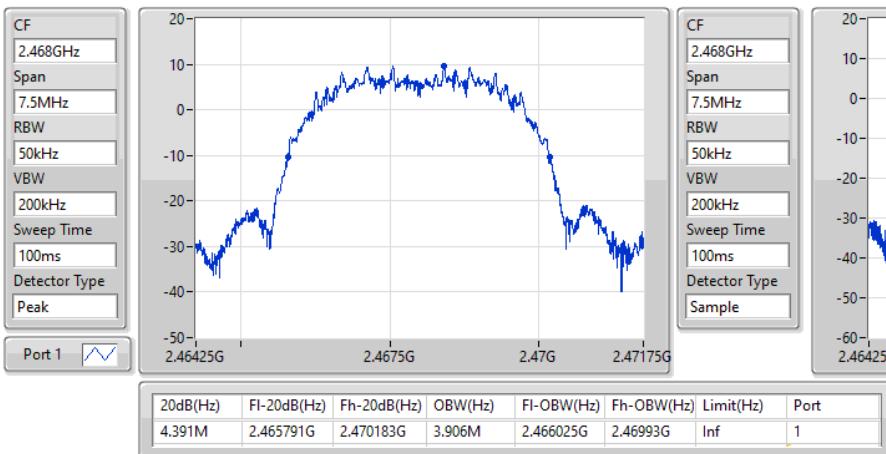
25/06/2021

QPSK
2442MHz

EBW-FS

25/06/2021

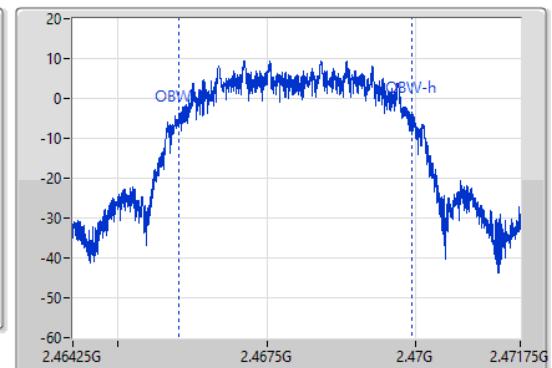
QPSK

2468MHz



EBW-FS

25/06/2021



**Summary**

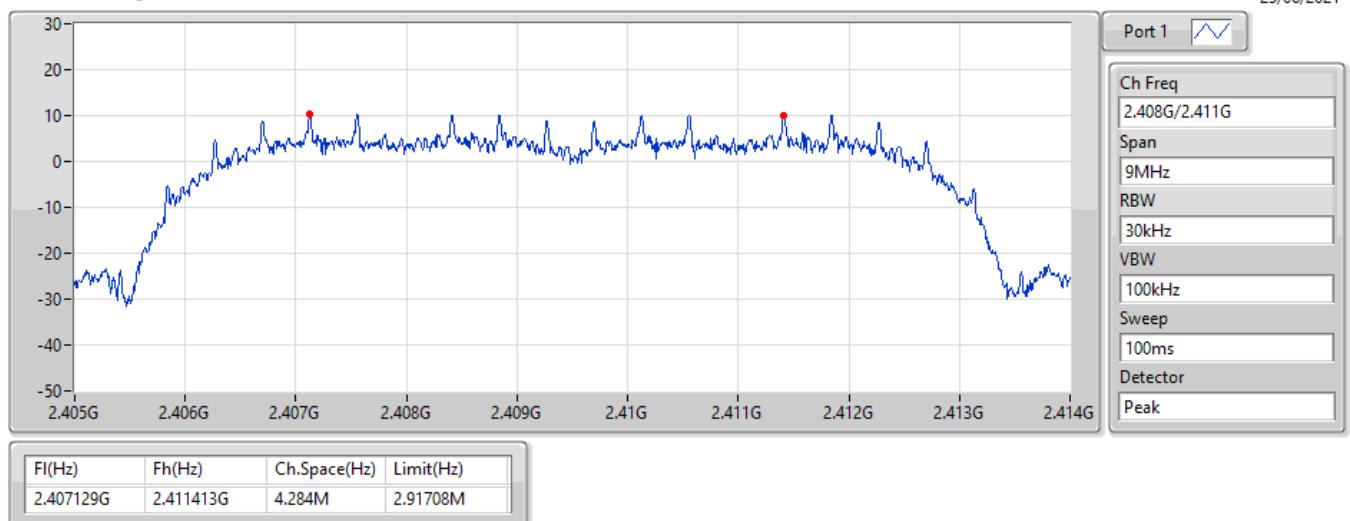
Mode	Max-Space (Hz)	Min-Space (Hz)
2.4-2.4835GHz	-	-
QPSK	4.284M	3.0015M

**Result**

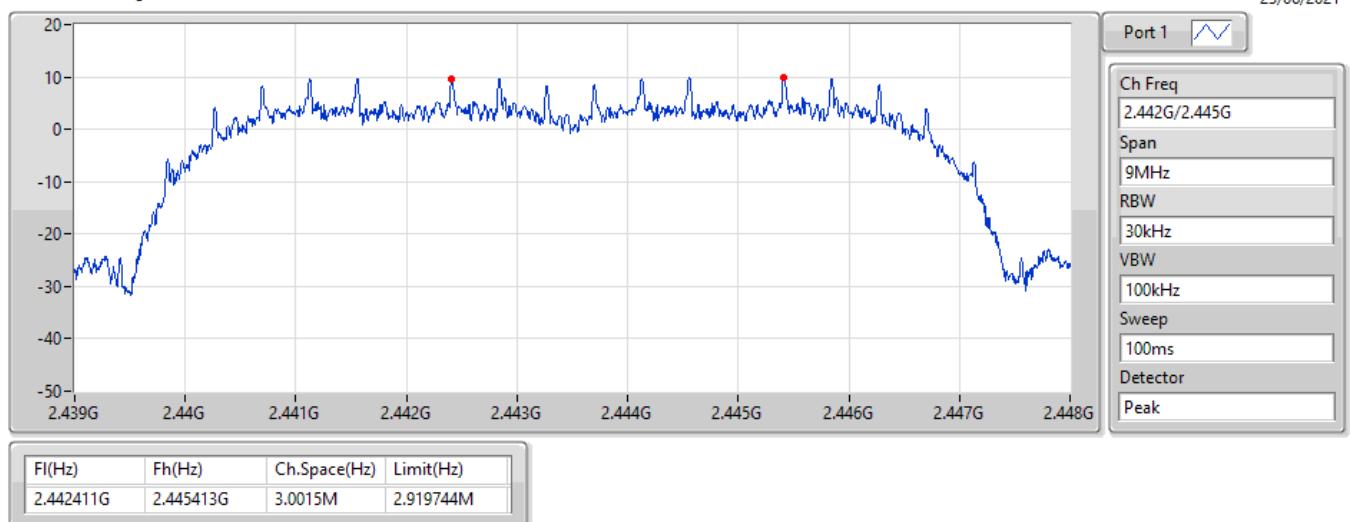
Mode	Result	Fl (Hz)	Fh (Hz)	Ch.Space (Hz)	Limit (Hz)
QPSK	-	-	-	-	-
2408MHz	Pass	2.407129G	2.411413G	4.284M	2.91708M
2442MHz	Pass	2.442411G	2.445413G	3.0015M	2.919744M
2468MHz	Pass	2.464552G	2.467553G	3.0015M	2.924406M

QPSK
2.408G/2.411GHz
Channel Separation-FS

25/06/2021


QPSK
2.442G/2.445GHz
Channel Separation-FS

25/06/2021

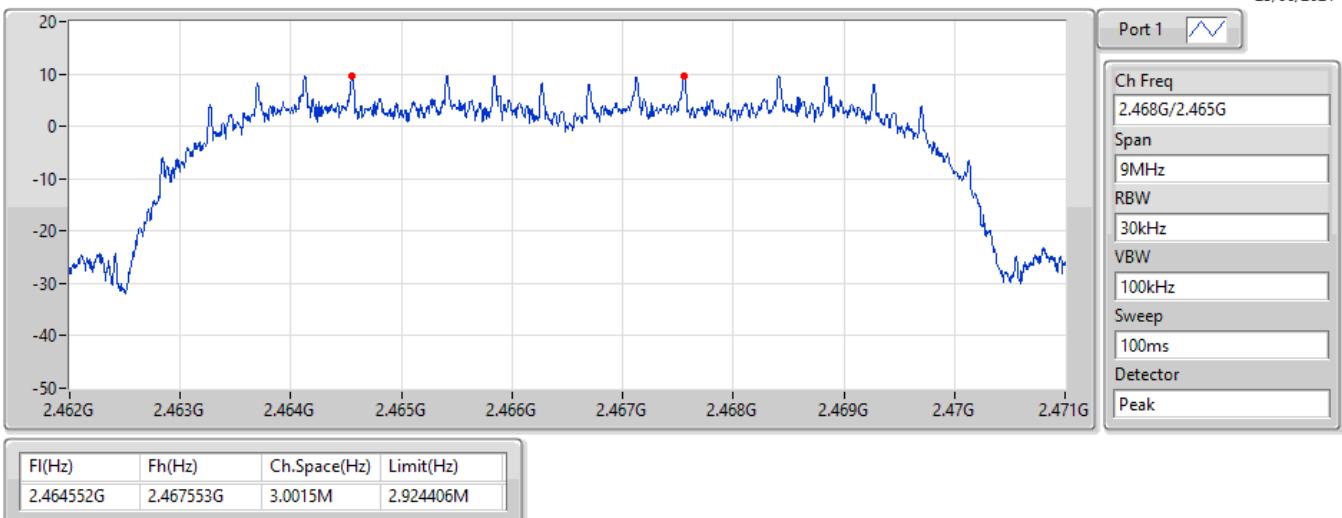


QPSK

2.468G/2.465GHz

Channel Separation-FS

25/06/2021



**Summary**

Mode	Power (dBm)	Power (W)
2.4-2.4835GHz	-	-
QPSK	18.14	0.06516

**Result**

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
QPSK	-	-	-	-
2408MHz	Pass	3.00	18.14	21.00
2442MHz	Pass	3.00	17.79	21.00
2468MHz	Pass	3.00	17.73	21.00

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

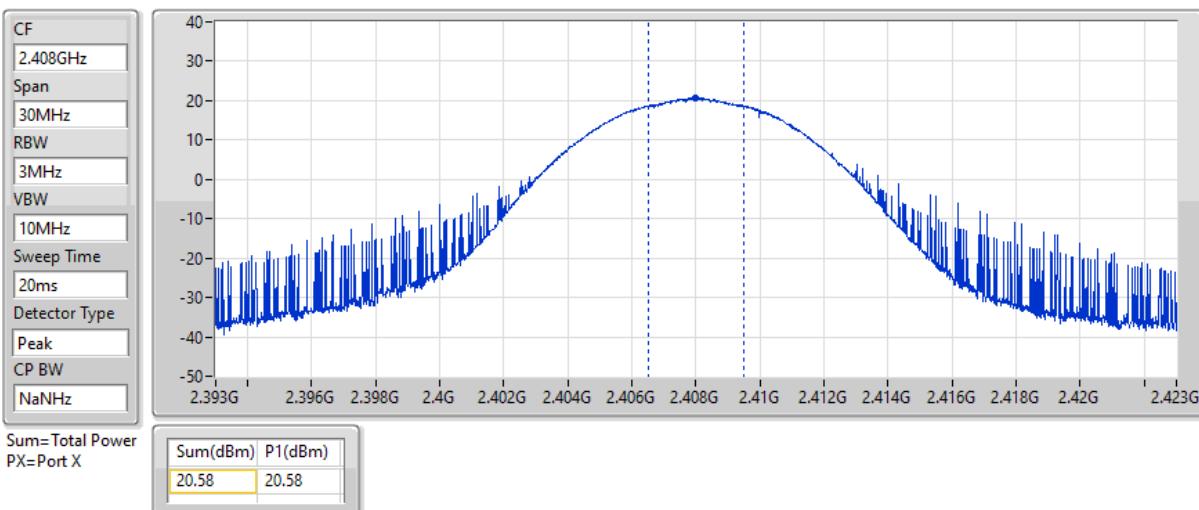
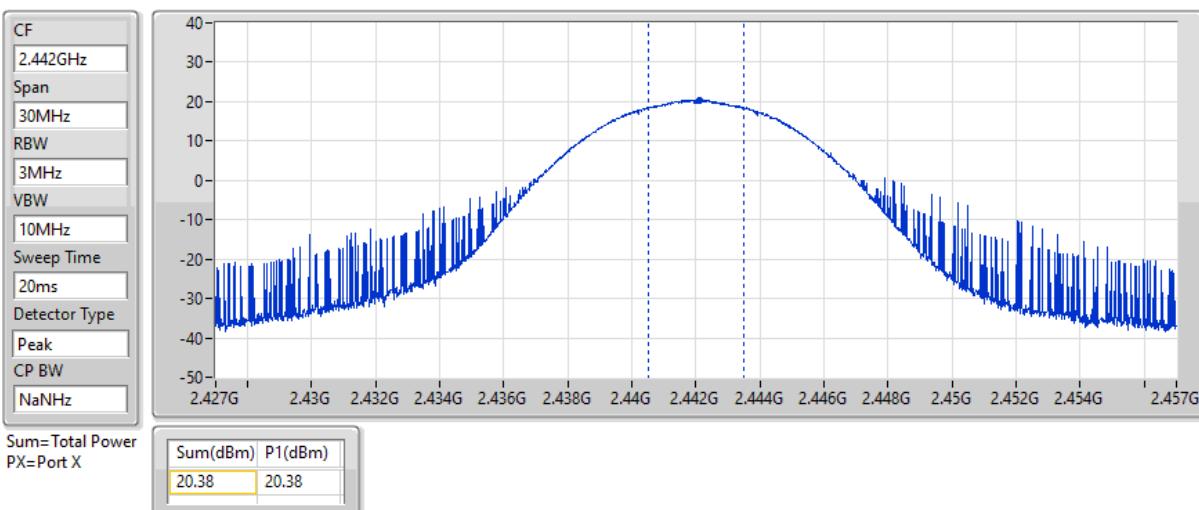
**Summary**

Mode	Power (dBm)	Power (W)
2.4-2.4835GHz	-	-
QPSK	20.58	0.11429

**Result**

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
QPSK	-	-	-	-
2408MHz	Pass	3.00	20.58	21.00
2442MHz	Pass	3.00	20.38	21.00
2468MHz	Pass	3.00	20.16	21.00

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

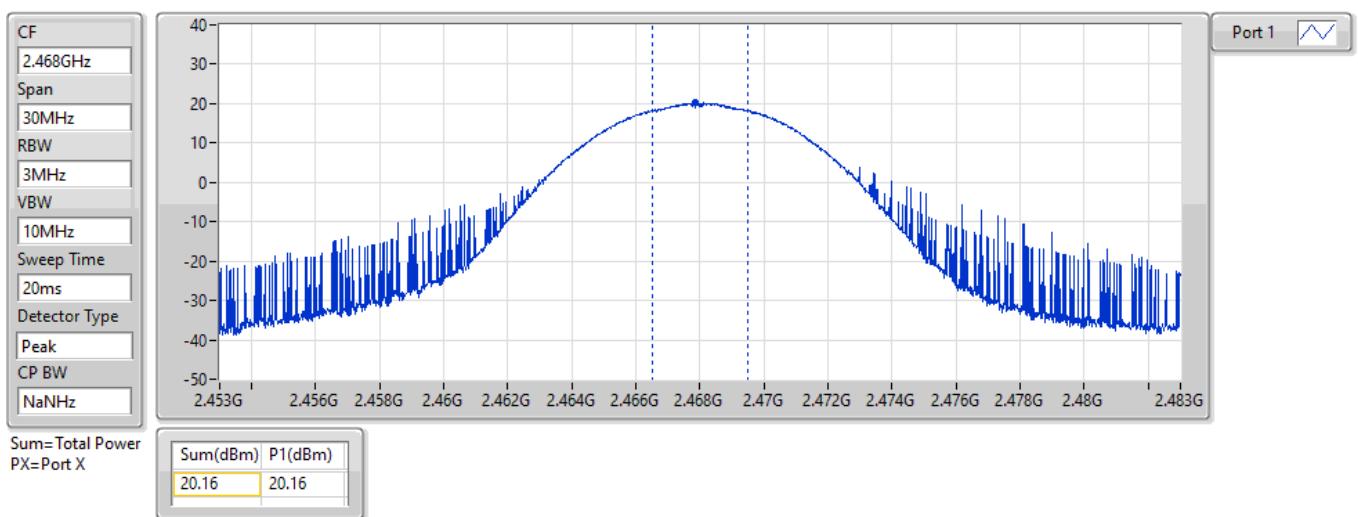
QPSK
2408MHz

PK Power-FS
QPSK
2442MHz


QPSK

2468MHz

PK Power-FS

25/06/2021





Summary

Mode	Max-Hop No
2.4-2.4835GHz	-
QPSK	15

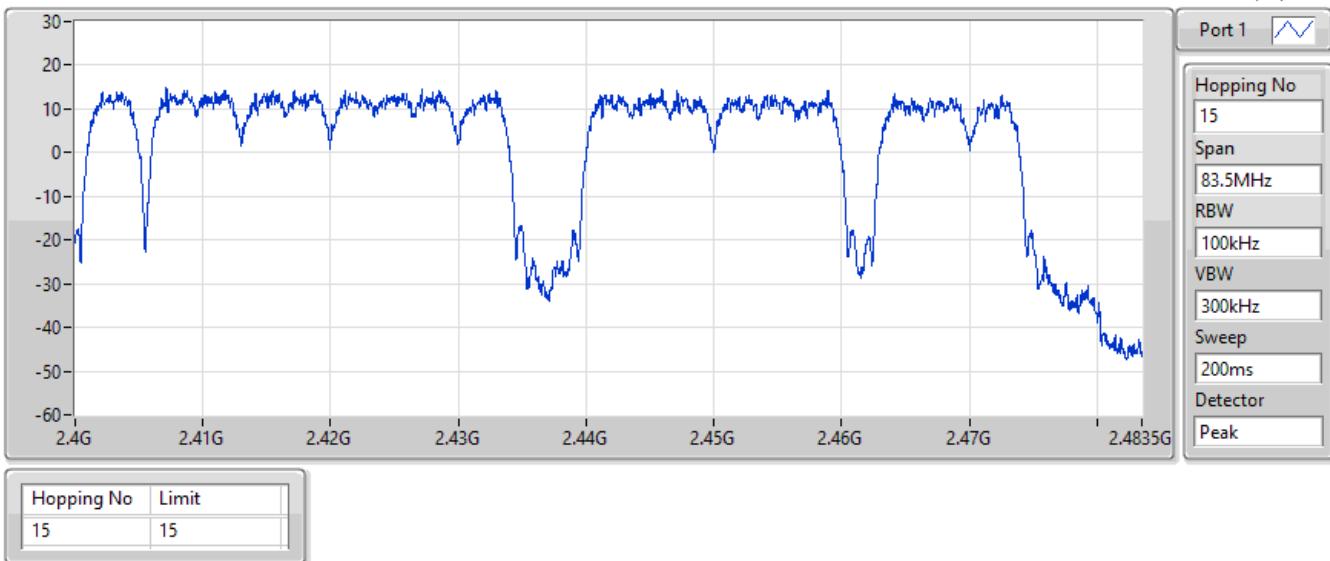


Result

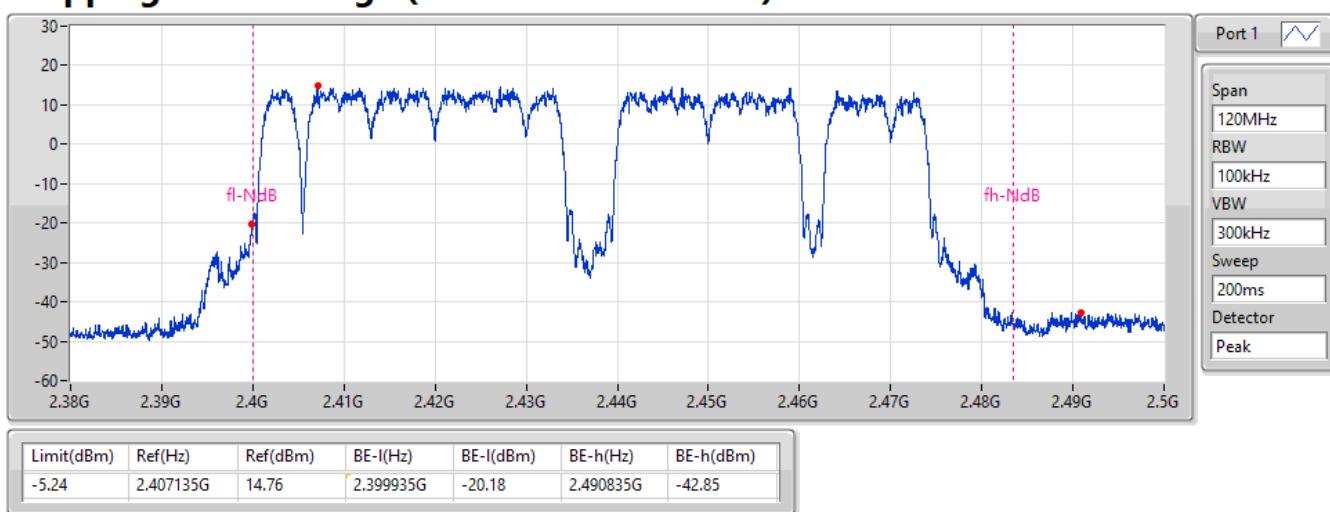
Mode	Result	Hopping No	Limit
QPSK	-	-	-
2442MHz	Pass	15	15

**QPSK
2442MHz**
Hopping-FS

22/06/2021


**QPSK
2442MHz**
Hopping Ch Bandedge (Non-restricted Band)

22/06/2021

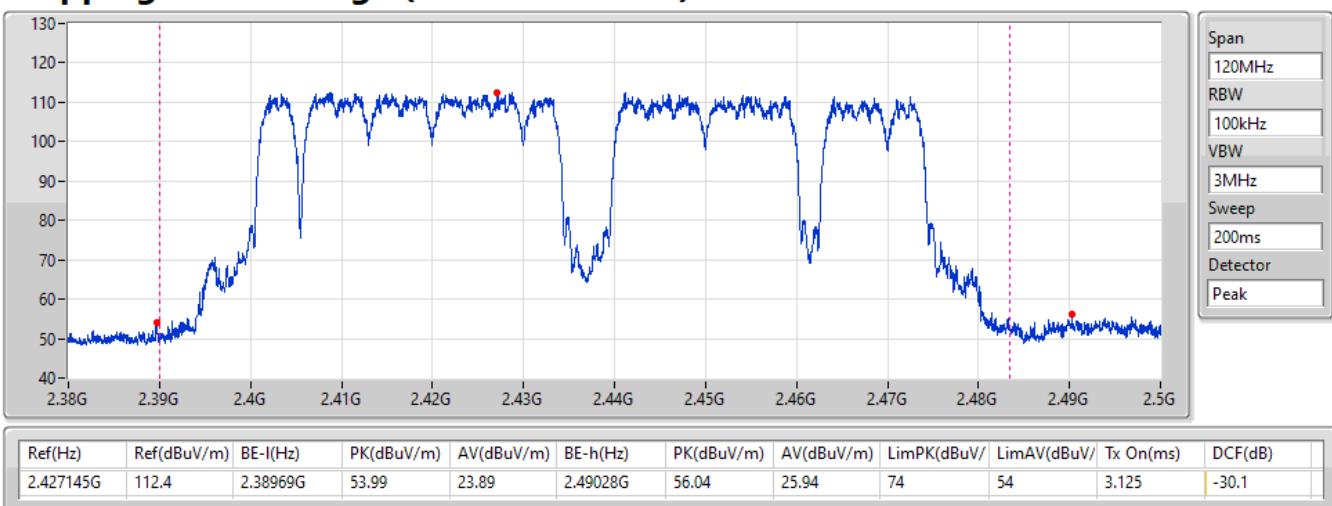


QPSK

2442MHz

Hopping Ch Bandedge (Restricted Band)

22/06/2021



**Summary**

Mode	Max-Dwell (s)
2.4-2.4835GHz	-
QPSK	38.4826m

**Result**

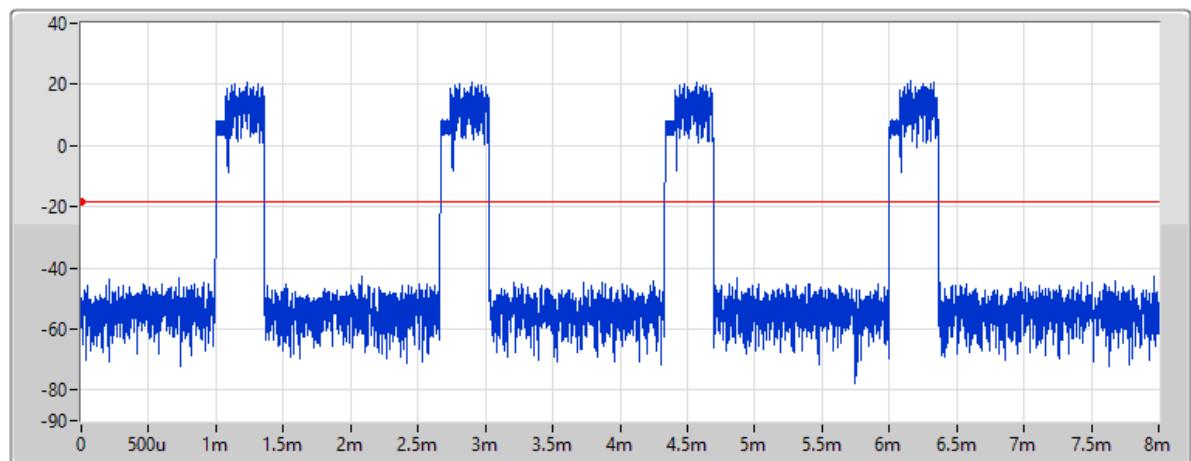
Mode	Result	Period (s)	Dwell (s)	Limit (s)	Tx On (s)
QPSK	-	-	-	-	-
2442MHz	Pass	0	38.4826m	400m	361u

QPSK

2442MHz

Dwell-FS

22/06/2021



Period(s)	Dwell(s)	Limit(s)	Tx On(s)
0	38.4826m	400m	361u

-

**Summary**

Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Port								
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QPSK	Pass	2.40714G	12.72	-7.28	1.77781G	-52.13	2.39973G	-35.61	2.4G	-37.09	2.50314G	-45.46	15.14653G	-46.07	1

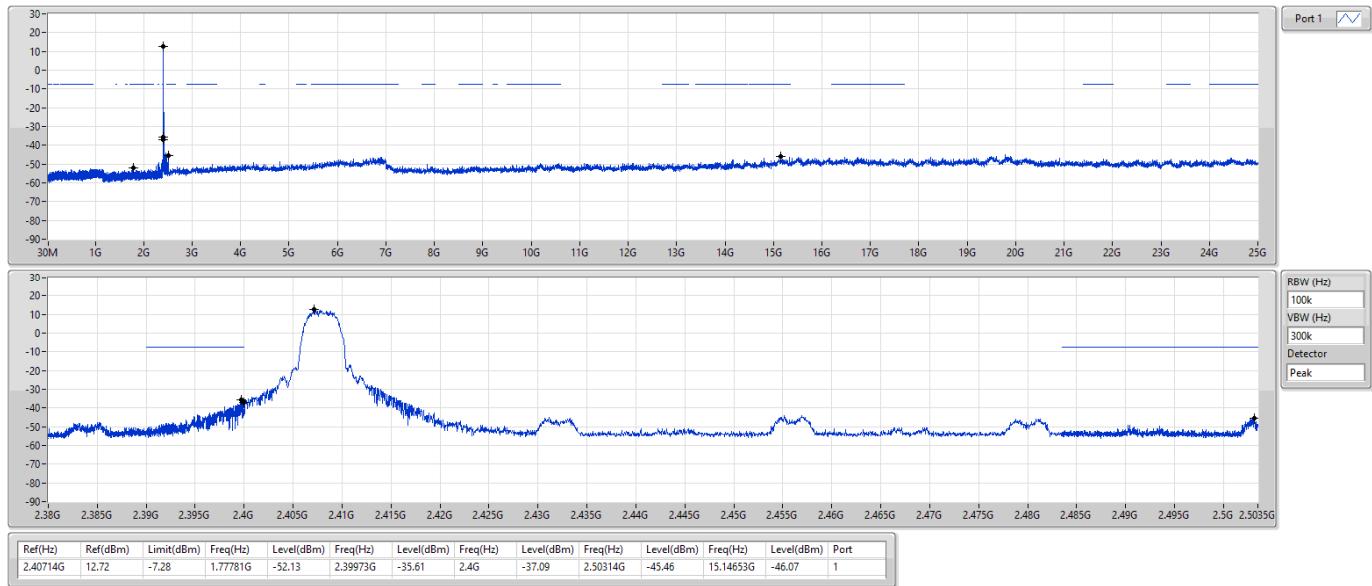


Result

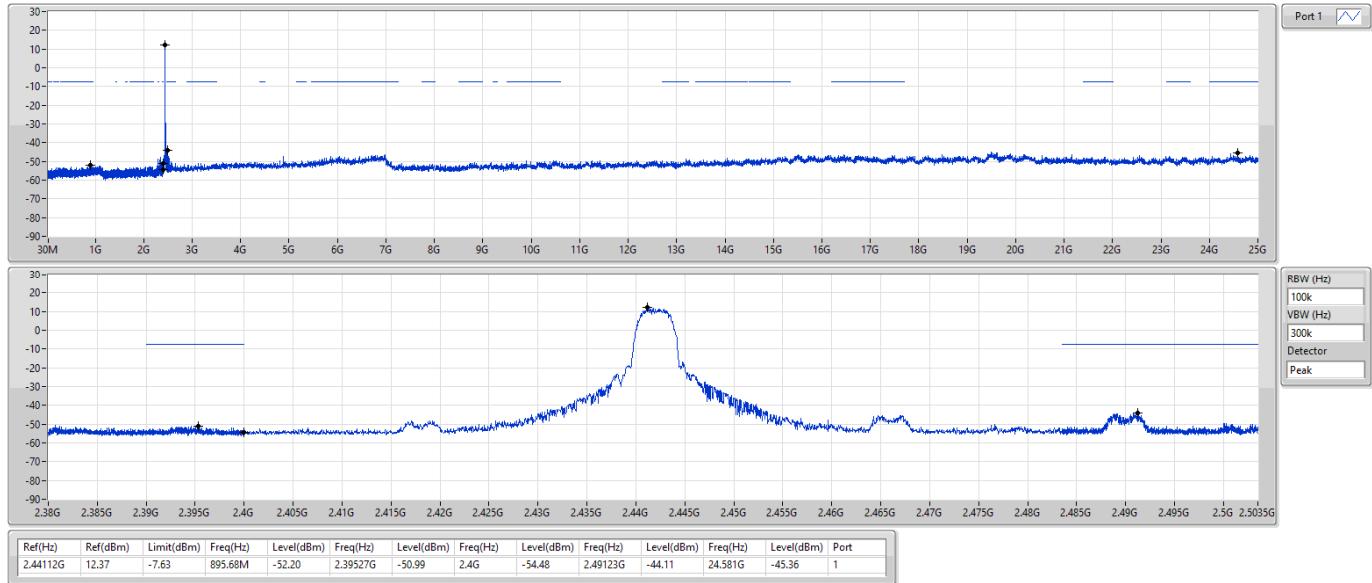
Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Port								
QPSK	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2408MHz	Pass	2.40714G	12.72	-7.28	1.77781G	-52.13	2.39973G	-35.61	2.4G	-37.09	2.50314G	-45.46	15.14653G	-46.07	1
2442MHz	Pass	2.44112G	12.37	-7.63	895.68M	-52.20	2.39527G	-50.99	2.4G	-54.48	2.49123G	-44.11	24.581G	-45.36	1
2468MHz	Pass	2.46713G	12.21	-7.79	1.78193G	-51.31	2.39476G	-47.78	2.4835G	-52.90	2.49113G	-44.84	2.51475G	-46.19	1

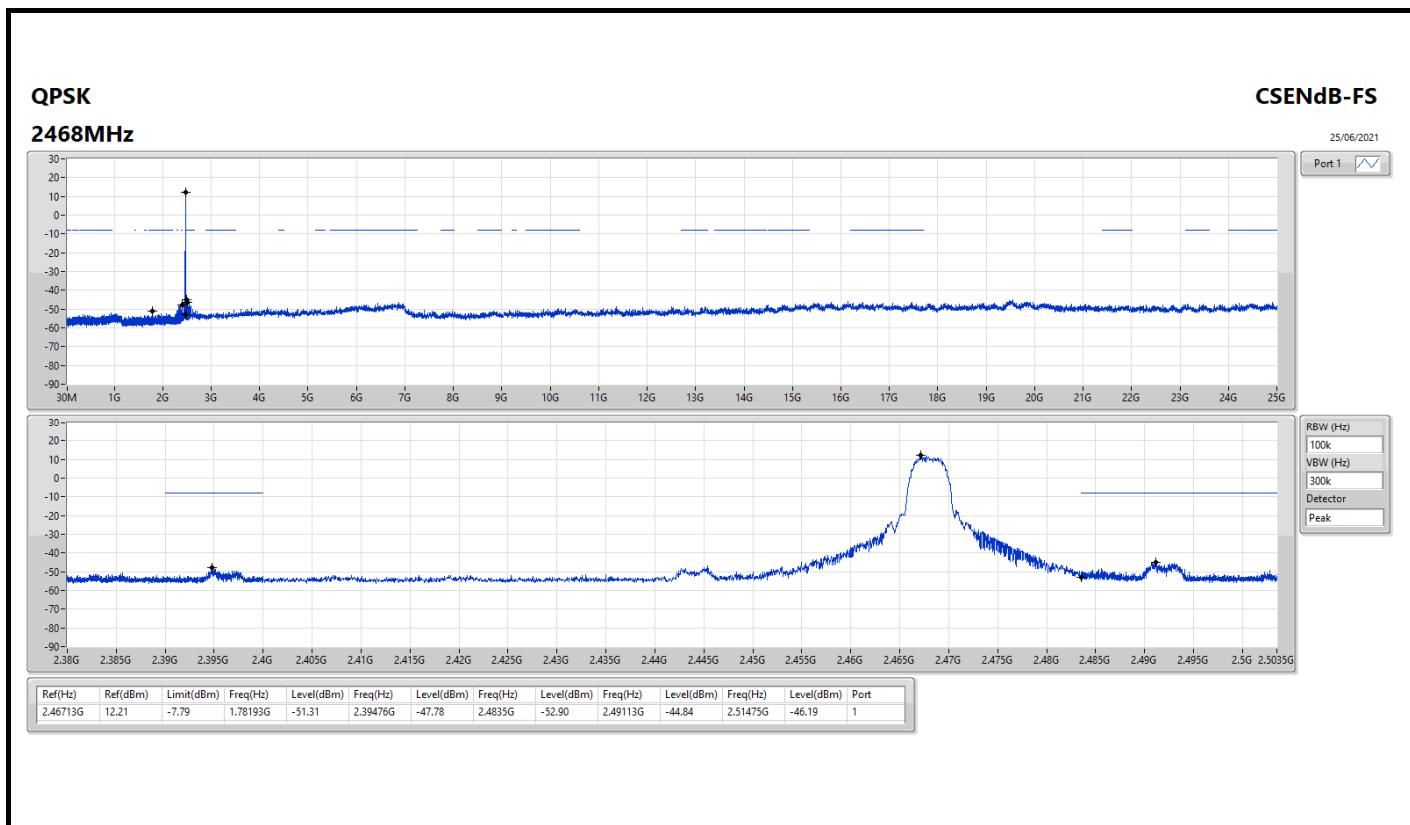
QPSK
2408MHz
CSEndB-FS

25/06/2021

 Port 1

QPSK
2442MHz
CSEndB-FS

25/06/2021

 Port 1




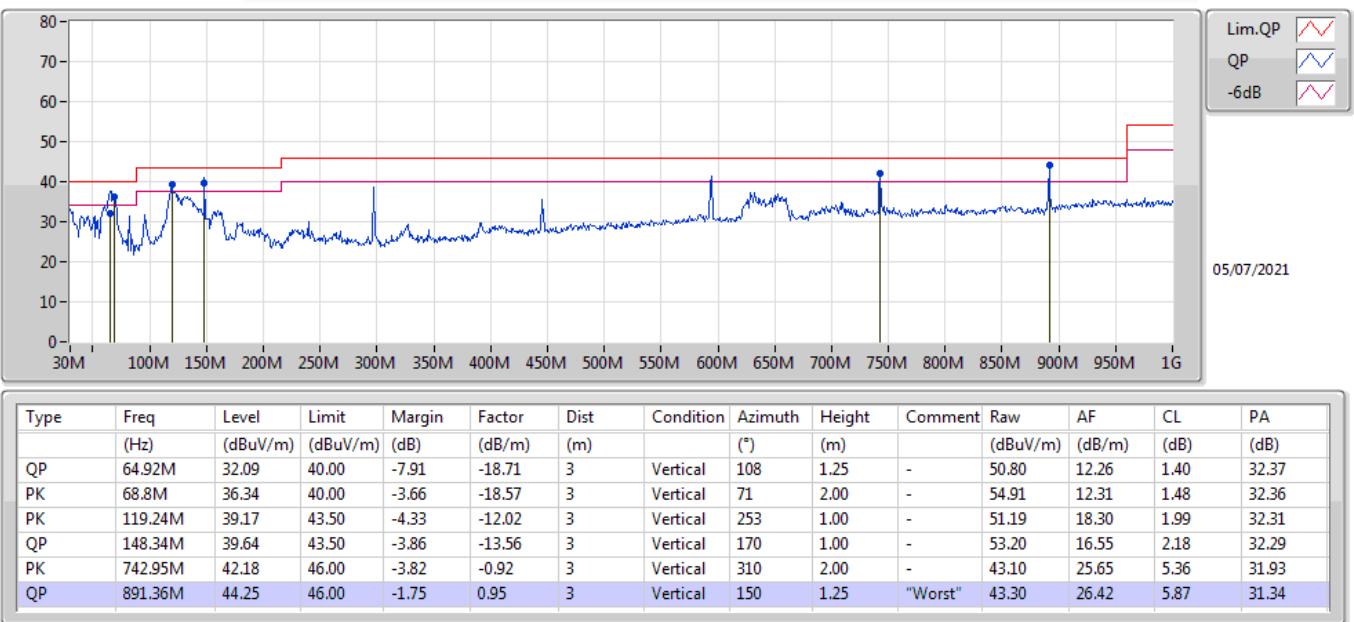


Radiated Emissions below 1GHz

Appendix G.1

Summary

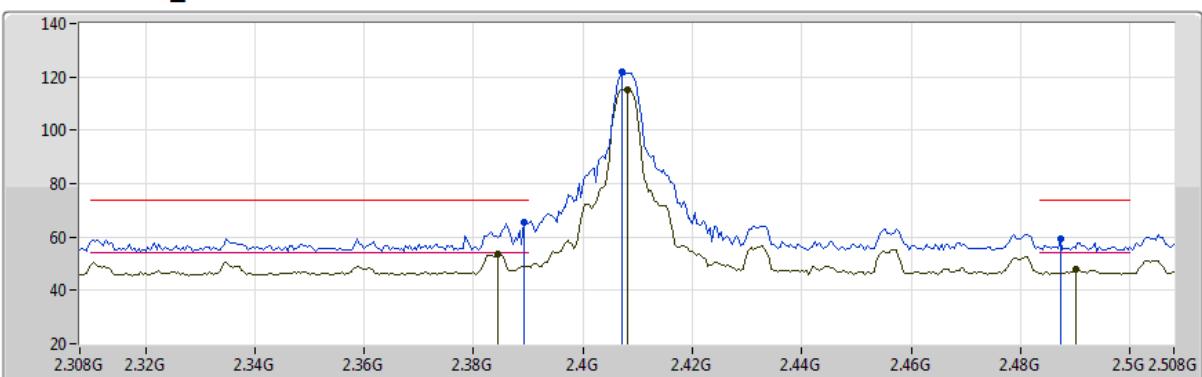
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 1	Pass	QP	891.36M	44.25	46.00	-1.75	Vertical





**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	-	-	-	-	-	-	-	-	-	-	-
QPSK	Pass	AV	2.3844G	53.77	54.00	-0.23	3	Vertical	86	2.16	-

QPSK
2408MHz_TX


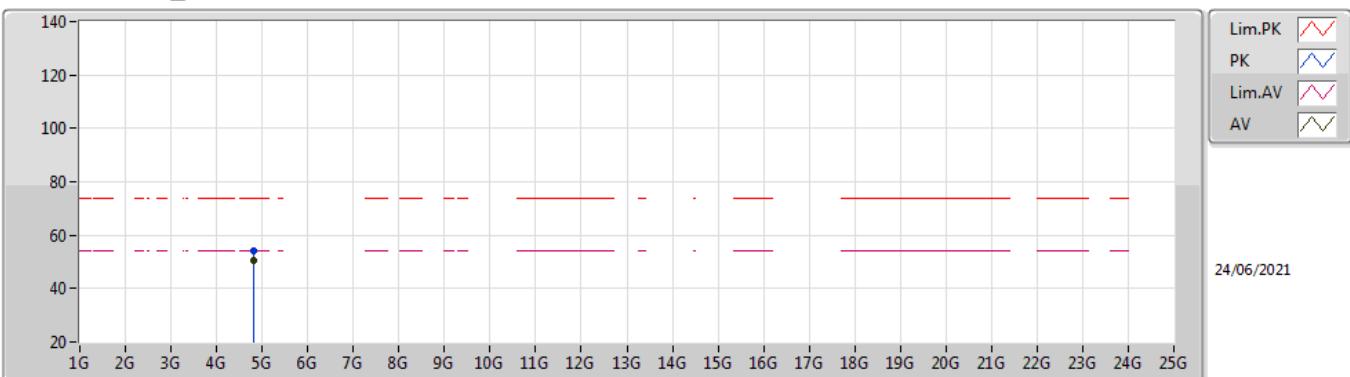
EUT Z_1TX
Setting 0
05-M-E-2

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)	
PK	2.3892G	65.76	74.00	-8.24	35.61	3	Vertical	86	2.16	-	27.56	2.59	-	
AV	2.3844G	53.77	54.00	-0.23	23.60	3	Vertical	86	2.16	-	27.59	2.58	-	
PK	2.4072G	121.83	Inf	-Inf	91.73	3	Vertical	86	2.16	-	27.49	2.61	-	
AV	2.408G	115.34	Inf	-Inf	85.25	3	Vertical	86	2.16	-	27.48	2.61	-	
PK	2.4872G	59.25	74.00	-14.75	29.23	3	Vertical	86	2.16	-	27.33	2.69	-	
AV	2.49G	47.68	54.00	-6.32	17.67	3	Vertical	86	2.16	-	27.32	2.69	-	



QPSK

2408MHz_TX



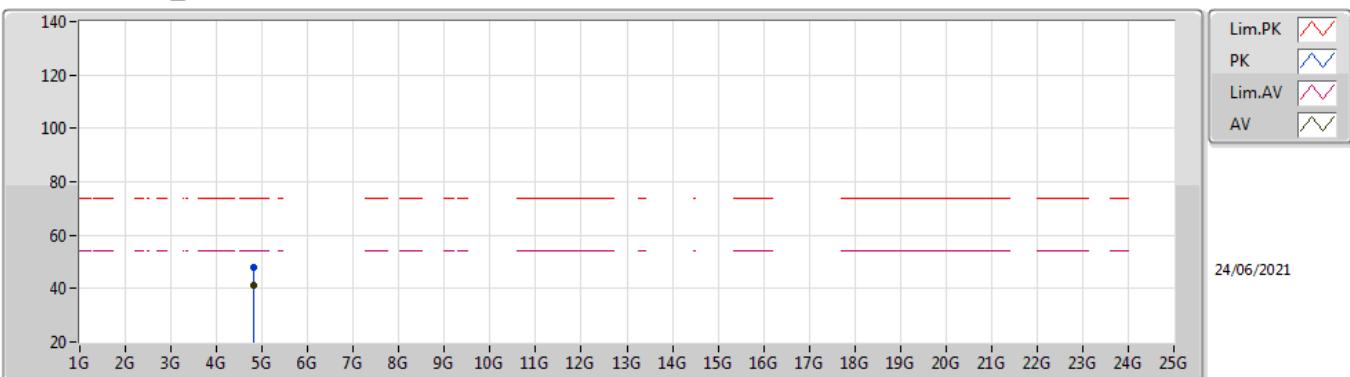
EUT Z_1TX
Setting 0
05-M-E-2

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)
PK	4.81608G	53.89	74.00	-20.11	52.64	3	Vertical	197	2.24	-	31.33	6.02	36.10
AV	4.81574G	50.39	54.00	-3.61	49.14	3	Vertical	197	2.24	-	31.33	6.02	36.10



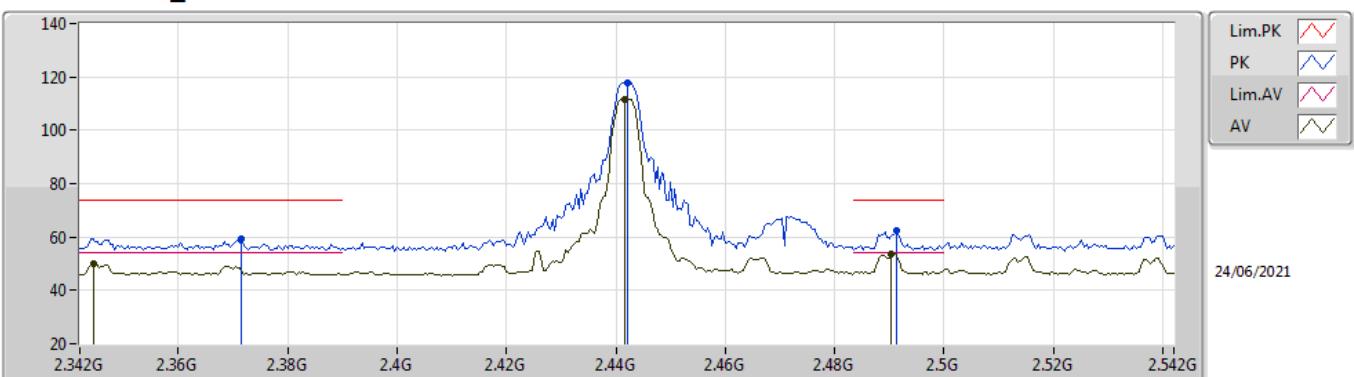
QPSK

2408MHz_TX



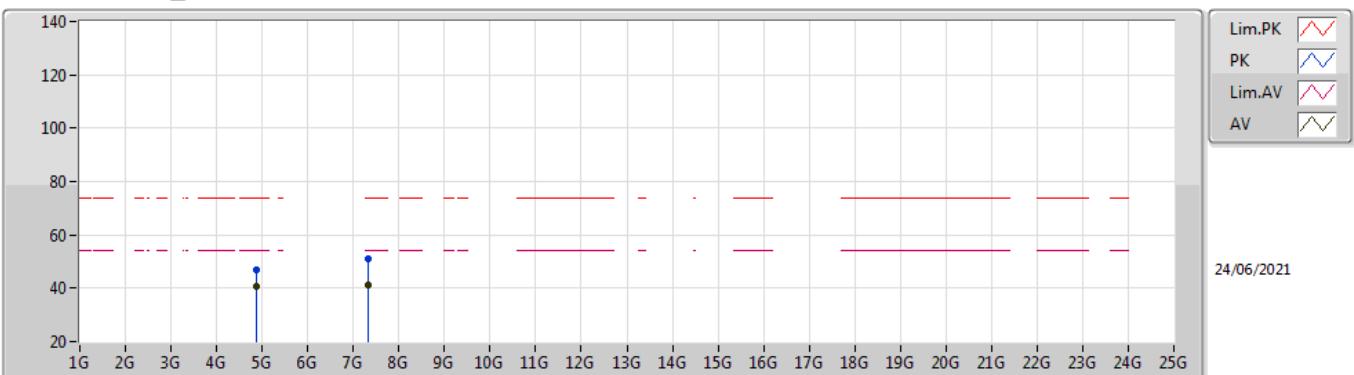
EUT Z_1TX
Setting 0
05-M-E-2

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)
PK	4.81611G	47.82	74.00	-26.18	46.57	3	Horizontal	207	1.97	-	31.33	6.02	36.10
AV	4.81578G	41.21	54.00	-12.79	39.96	3	Horizontal	207	1.97	-	31.33	6.02	36.10

QPSK
2442MHz_TX


EUT Z_1TX
Setting 2
05-M-E-2

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)	
PK	2.3716G	59.16	74.00	-14.84	28.92	3	Vertical	82	1.89	-	27.67	2.57	-	
AV	2.3444G	49.95	54.00	-4.05	19.60	3	Vertical	82	1.89	-	27.81	2.54	-	
PK	2.442G	117.95	Inf	-Inf	87.89	3	Vertical	82	1.89	-	27.42	2.64	-	
AV	2.4416G	111.74	Inf	-Inf	81.68	3	Vertical	82	1.89	-	27.42	2.64	-	
PK	2.4912G	62.43	74.00	-11.57	32.42	3	Vertical	82	1.89	-	27.32	2.69	-	
AV	2.4904G	53.41	54.00	-0.59	23.40	3	Vertical	82	1.89	-	27.32	2.69	-	

QPSK
2442MHz_TX


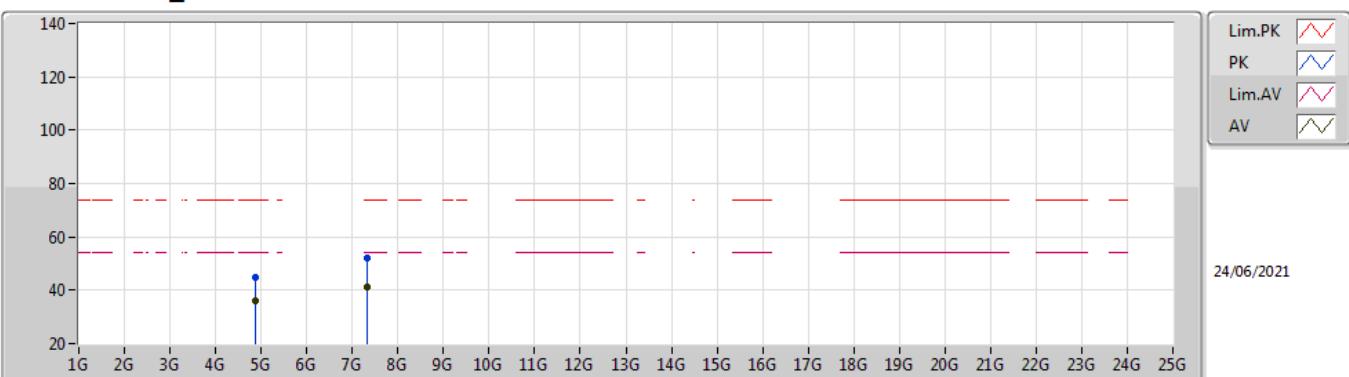
EUT Z_1TX
Setting 2
05-M-E-2

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)	
PK	4.88422G	46.83	74.00	-27.17	45.58	3	Vertical	71	2.17	-	31.26	6.13	36.14	
AV	4.88376G	40.49	54.00	-13.51	39.24	3	Vertical	71	2.17	-	31.26	6.13	36.14	
PK	7.32756G	51.01	74.00	-22.99	42.20	3	Vertical	249	1.44	-	36.60	7.29	35.08	
AV	7.32668G	41.15	54.00	-12.85	32.34	3	Vertical	249	1.44	-	36.60	7.29	35.08	



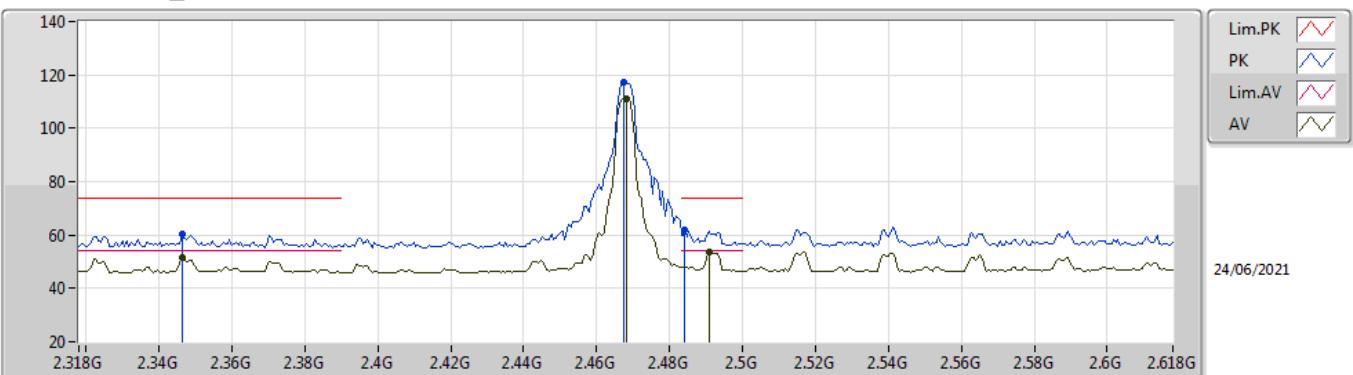
QPSK

2442MHz_TX



EUT Z_1TX
Setting 2
05-M-E-2

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)	
PK	4.884G	44.73	74.00	-29.27	43.48	3	Horizontal	206	1.03	-	31.26	6.13	36.14	
AV	4.88366G	36.23	54.00	-17.77	34.97	3	Horizontal	206	1.03	-	31.27	6.13	36.14	
PK	7.32692G	52.05	74.00	-21.95	43.24	3	Horizontal	229	2.14	-	36.60	7.29	35.08	
AV	7.32646G	41.30	54.00	-12.70	32.49	3	Horizontal	229	2.14	-	36.60	7.29	35.08	

QPSK
2468MHz_TX


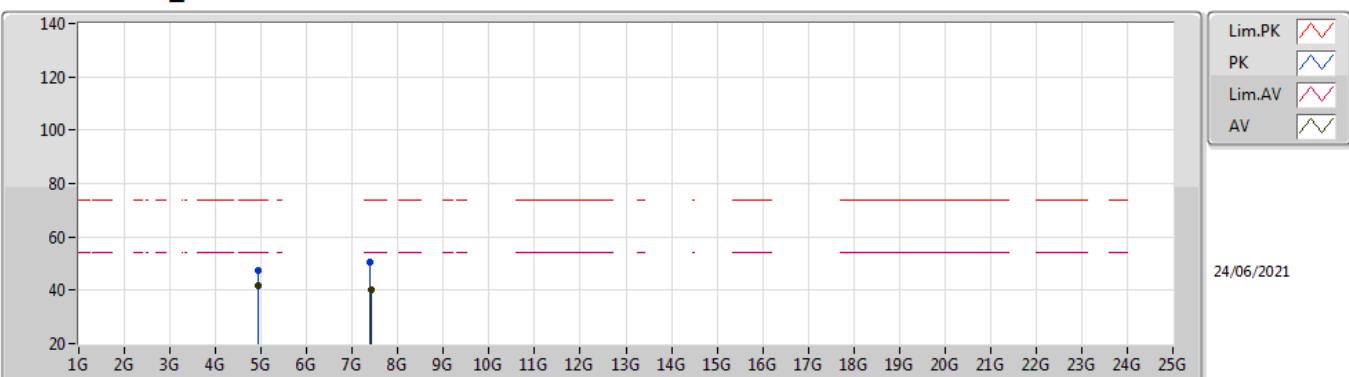
EUT Z_1TX
Setting 2
05-M-S-5

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)	
PK	2.3462G	60.11	74.00	-13.89	29.75	3	Vertical	94	1.69	-	27.81	2.55	-	
AV	2.3462G	51.72	54.00	-2.28	21.36	3	Vertical	94	1.69	-	27.81	2.55	-	
PK	2.4674G	117.21	Inf	-Inf	87.17	3	Vertical	94	1.69	-	27.37	2.67	-	
AV	2.468G	110.89	Inf	-Inf	80.86	3	Vertical	94	1.69	-	27.36	2.67	-	
PK	2.4842G	61.93	74.00	-12.07	31.92	3	Vertical	94	1.69	-	27.33	2.68	-	
AV	2.4908G	53.57	54.00	-0.43	23.56	3	Vertical	94	1.69	-	27.32	2.69	-	



QPSK

2468MHz_TX



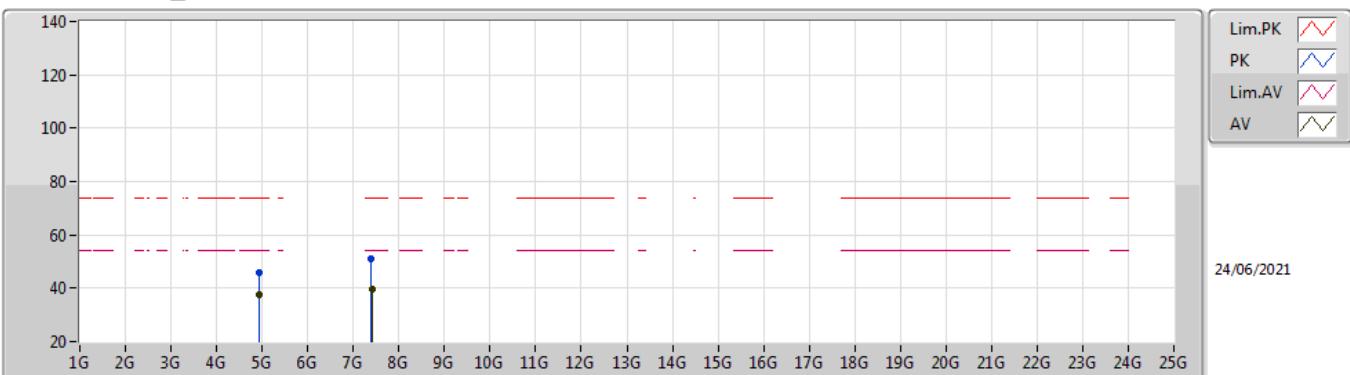
EUT Z_1TX
Setting 2
05-M-S-5

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)	
PK	4.93592G	47.26	74.00	-26.74	45.90	3	Vertical	59	2.24	-	31.34	6.20	36.18	
AV	4.93568G	41.73	54.00	-12.27	40.37	3	Vertical	59	2.24	-	31.34	6.20	36.18	
PK	7.39804G	50.33	74.00	-23.67	41.50	3	Vertical	250	2.19	-	36.50	7.40	35.07	
AV	7.40472G	40.13	54.00	-13.87	31.30	3	Vertical	250	2.19	-	36.50	7.40	35.07	



QPSK

2468MHz_TX



EUT Z_1TX
Setting 2
05-M-S-5

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)	
PK	4.936G	45.71	74.00	-28.29	44.35	3	Horizontal	241	1.26	-	31.34	6.20	36.18	
AV	4.93568G	37.48	54.00	-16.52	36.12	3	Horizontal	241	1.26	-	31.34	6.20	36.18	
PK	7.39488G	51.00	74.00	-23.00	42.17	3	Horizontal	340	2.84	-	36.51	7.39	35.07	
AV	7.4042G	39.79	54.00	-14.21	30.96	3	Horizontal	340	2.84	-	36.50	7.40	35.07	