Testing Laboratory 3787

RADIO TEST REPORT

FCC ID	:	O6ZHR54R1-500
Equipment	:	Digital Satellite Receiver
Brand Name	:	DIRECTV
Model Name	:	HR54-500
Applicant	:	Humax Co., Ltd. HUMAX BLDG., 2, Yeongmun-ro, Cheoin-gu Yongin-si, Gyeonggi-do South Korea 17040
Manufacturer	:	Humax Co., Ltd. HUMAX BLDG., 2, Yeongmun-ro, Cheoin-gu Yongin-si, Gyeonggi-do South Korea 17040
Standard	:	47 CFR FCC Part 15.247

The product was received on Sep. 11, 2023, and testing was started from Sep. 25, 2023 and completed on Nov. 30, 2023. 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
No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)

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History of this test report

Report No.	Version	Description	Issued Date
FR7O2406-03AC	01	Initial issue of report	Jan. 03, 2024

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	-

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the chapter "Measurement Uncertainty".

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Sam Chen
Report Producer: Vicky 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	RF4CE	2425-2475	15-25 [11]

Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	RF4CE	5	1TX

Note:
- RF4CE use a combination of O-QPSK modulation.
- BWch is the nominal channel bandwidth.

1.1.2 Antenna Information

Ant.	WLAN 2.4/5GHz Port	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	
						2.4GHz	5GHz
1	2	Airgain	N2425HMHRA-290	PCB Antenna	I-PEX	2.8	4.1
2	1	Airgain	N2425HMHRD-190	PCB Antenna	I-PEX	3.8	4.2
Ant.	**RF4CE Port**	**Brand**	**Model Name**	**Antenna Type**	**Connector**	**Gain (dBi)**	
3	1	HUMAX	HR54RF4CE_Ant1	Printed Antenna	N/A	5.2	
4	2	HUMAX	HR54RF4CE_Ant2	Printed Antenna	N/A	4.8	

Note 1: The above information was declared by manufacturer.

Note 2: The antenna is the cross-polarized antenna; it doesn't need to evaluate array gain.

<For 2.4GHz function>

For IEEE 802.11b mode <1TX/1RX>:

Only Port 1 can be used as transmitting/receiving antenna.

For IEEE 802.11g mode <1TX/1RX>:

The EUT supports the antenna with TX and RX diversity functions.

Both Port 1 and Port 2 support transmit and receive functions, but only one of them will be used at one time.

The Port 1 generated the worst case, so it was selected to test and record in the report.

For IEEE 802.11n mode <2TX/2RX>:

Port 1 and Port 2 will transmit/receive the same signal simultaneously.

Port 1 and Port 2 can be used as transmitting/receiving antennas.

<For 5GHz function>

For IEEE 802.11a mode <1TX/1RX>:

The EUT supports the antenna with TX and RX diversity functions.

Both Port 1 and Port 2 support transmit and receive functions, but only one of them will be used at one time.

The Port 1 generated the worst case, so it was selected to test and record in the report.

For IEEE 802.11n mode <2TX/2RX>:

Port 1 and Port 2 will transmit/receive the same signal simultaneously.

Port 1 and Port 2 can be used as transmitting/receiving antennas.

<For RF4CE function>

For RF4CE mode <1TX/1RX>:

The EUT supports the antenna with TX and RX diversity functions.

Both Port 1 and Port 2 support transmit and receive functions, but only one of them will be used at one time.

The Port 1 generated the worst case, so it was selected to test and record in the report.

1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
RF4CE	0.998	0.01	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 Power Adapter			
Beamforming Function	☐	With beamforming	☒	Without beamforming
Function	☒	Point-to-multipoint	☐	Point-to-point
Test Software Version	Tera Term V.1.0.0.18			

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	TH01-CB	Jay Lo	22.2-24 / 63-66	Oct. 20, 2023~ Nov. 28, 2023
Radiated (below 1G)	03CH03-CB	Jackson Peng	22.2-23.3 / 56-59	Sep. 25, 2023~ Nov. 27, 2023
Radiated (above 1G)	03CH02-CB		24.4-25.5 / 55-58	
AC Conduction	CO01-CB	Joe Chu	22-23 / 50-51	Nov. 30, 2023

1.4 Measurement Uncertainty

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

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	3.4 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	5.1 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	4.1 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	4.2 dB	Confidence levels of 95%
Conducted Emission	3.1 dB	Confidence levels of 95%
Output Power Measurement	0.8 dB	Confidence levels of 95%
Power Density Measurement	3.1 dB	Confidence levels of 95%
Bandwidth Measurement	2.2%	Confidence levels of 95%

2 Test Configuration of EUT

2.1 Test Channel Mode

Mode	Power Setting
RF4CE_1TX	-
2425MHz	7
2450MHz	7
2475MHz	7

2.2 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz
Operating Mode	CTX
There are three modes of EUT, one is CTX - 2.4GHz, another is CTX - 5GHz, and the other is CTX - RF4CE. CTX - 2.4GHz mode has been evaluated to be the worst case after evaluating. So the AC power-line conducted emissions test will follow this same test configuration.	
1	CTX - 2.4GHz

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

The Worst Case Mode for Following Conformance Tests	
Tests Item	Emissions in Restricted Frequency Bands
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.
Operating Mode < 1GHz	CTX
1. There are three modes of EUT, one is CTX - 2.4GHz, another is CTX - 5GHz, and the other is CTX - RF4CE. CTX - 5GHz mode has been evaluated to be the worst case after evaluating. So the Emissions in Restricted Frequency Bands test will follow this same test configuration 2. After evaluating, the worst case was found at Z axis, so it was selected to perform test and its test result was written in the report.	
1	CTX-EUT in Z axis-5GHz
Operating Mode > 1GHz	CTX
	After evaluating, the worst case was found at Z axis, so it was selected to perform test and its test result was written in the report.
1	EUT in Z axis

The Worst Case Mode for Following Conformance Tests	
Tests Item	Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation
Operating Mode	
1	WLAN 2.4GHz + RF4CE
2	WLAN 5GHz + RF4CE
Refer to Sporton Test Report No.: FA7O2406-03 for Co-location RF Exposure Evaluation.	

2.3 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

2.4 Accessories

Accessories			
Equipment Name	**Brand Name**	**Model Name**	**Rating**
Adapter	DIRECTV	EPS44R3-15	INPUT: 120V~1.3A, 60Hz OUTPUT: 12V, 4A, 48W
Equipment Name	**Brand Name**	**Part Number**	**Rating**
Hard Disk	SEAGATE	1SD102-500	-

2.5 Support Equipment

For AC Conduction:

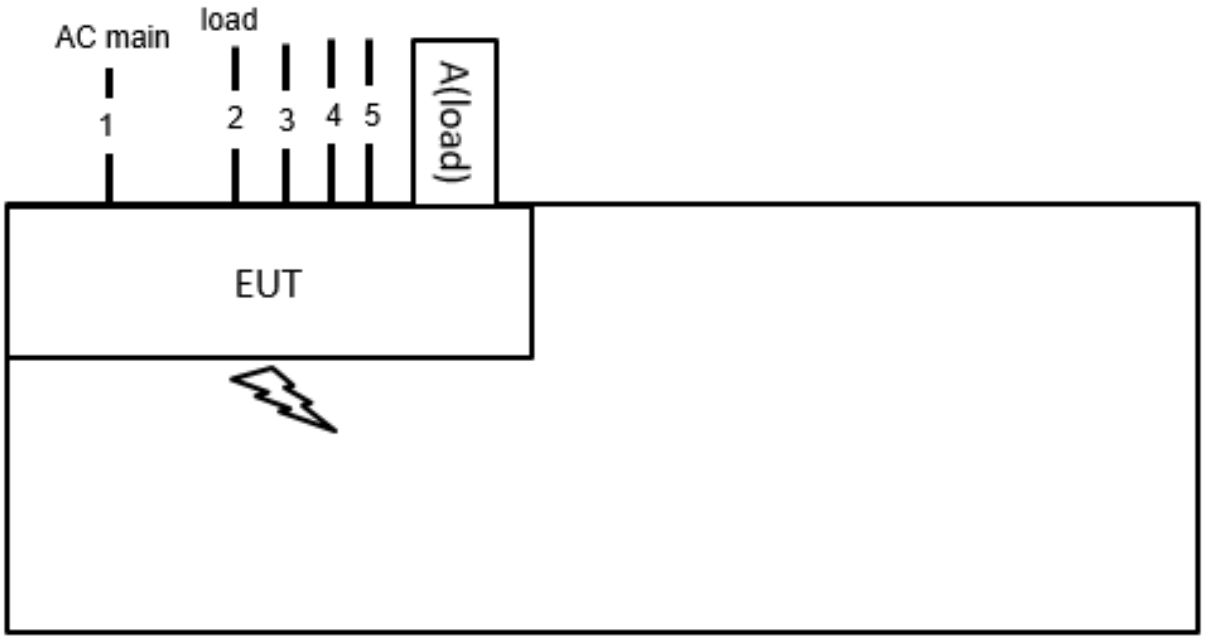
Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
A	Flash disk3.0	Transcend	JetFlash-700	N/A

For Radiated and RF Conducted:

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

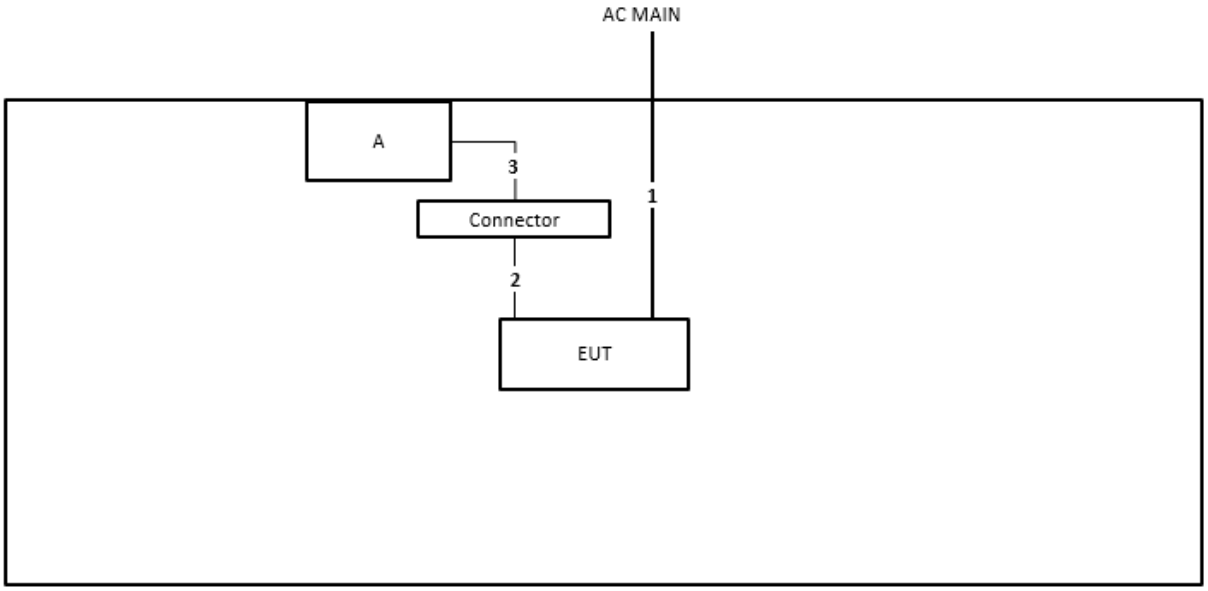
2.6 Test Setup Diagram

Test Setup Diagram – AC Line Conducted Emission Test



Item	Connection	Shielded	Length
1	Power cable	No	3.1m
2	RJ-45 cable	No	1.5m
3	Coaxial cable	Yes	1.5m
4	HDMI cable	Yes	1.5m
5	Optical fiber cable	No	1.5m

Test Setup Diagram - Radiated Test



Item	Connection	Shielded	Length
1	Power cable	No	3.1m
2	Console to RS232	No	1.5m
3	RS232 to USB cable	No	1m

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

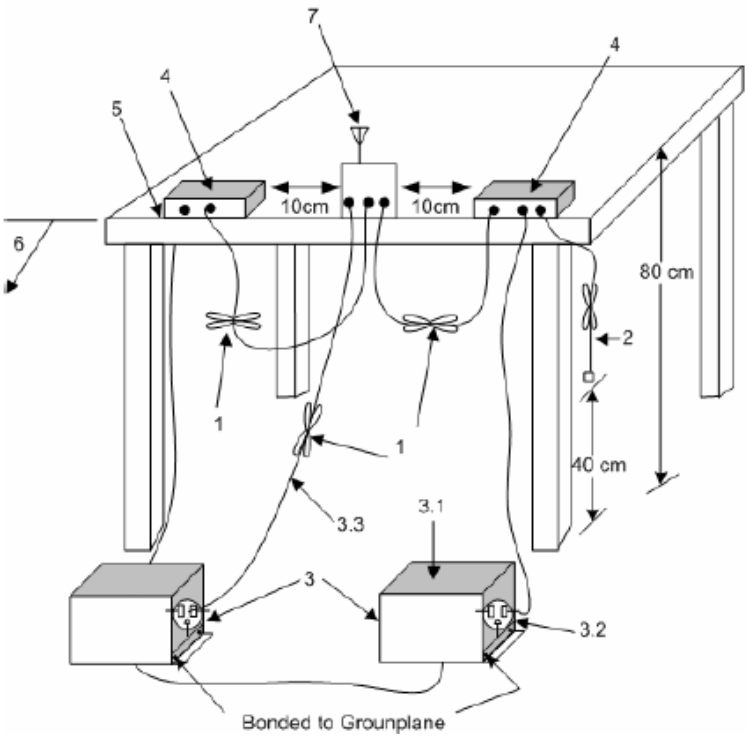
Refer a test equipment and calibration data table in this test report.

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.

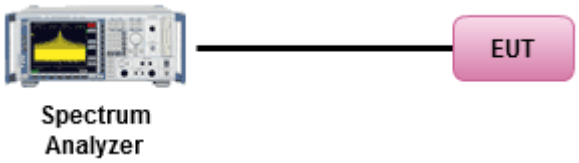
3.2.2 Measuring Instruments

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

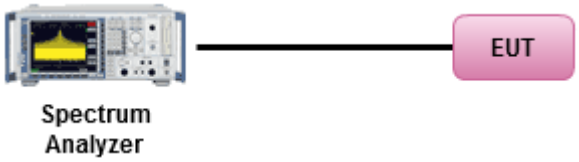
3.4.2 Measuring Instruments

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.	

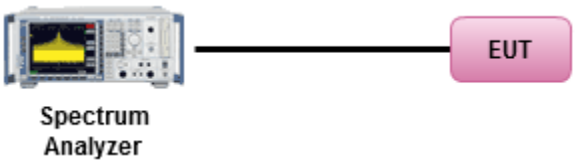
3.5.2 Measuring Instruments

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.

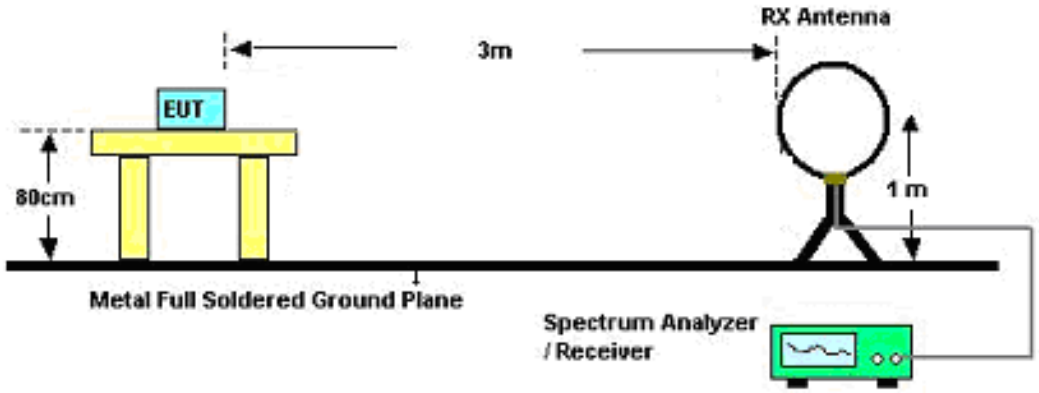
3.6.3 Test Procedures

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.		

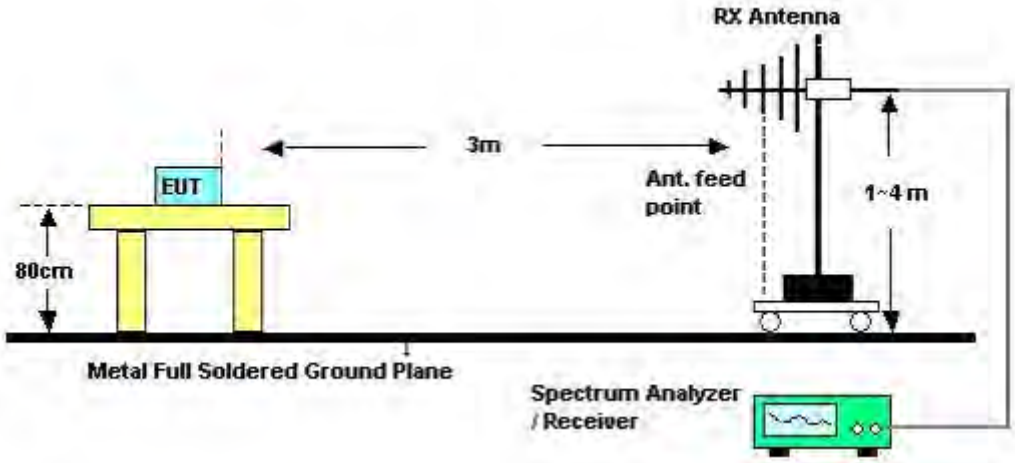
3.6.4 Test Setup

Emissions in Restricted Frequency Bands

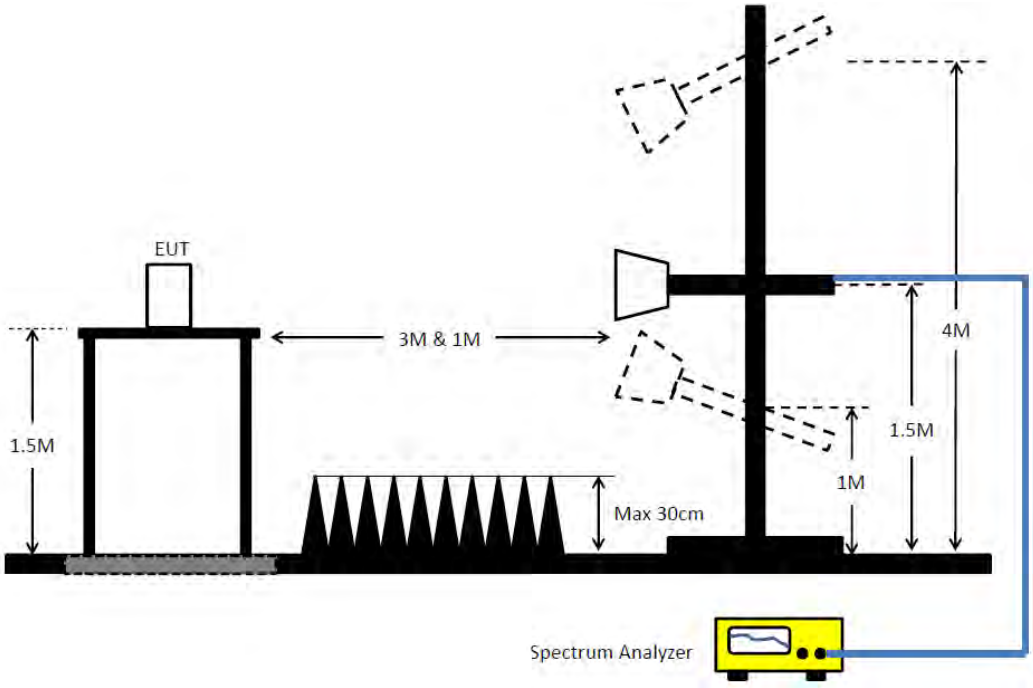
9kHz ~30MHz



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. 20, 2023	Feb. 19, 2024	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Feb. 16, 2023	Feb. 15, 2024	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Apr. 27, 2023	Apr. 26, 2024	Conduction (CO01-CB)
Pulse Limiter	Rohde&Schwarz	ESH3-Z2	100430	9kHz ~ 30MHz	Feb. 09, 2023	Feb. 08, 2024	Conduction (CO01-CB)
COND Cable	Woken	Cable	Low cable-CO01	9kHz ~ 30MHz	Oct. 18, 2022	Oct. 17, 2023	Conduction (CO01-CB)
COND Cable	Woken	Cable	Low cable-CO01	9kHz ~ 30MHz	Oct. 17, 2023	Oct. 16, 2024	Conduction (CO01-CB)
Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conduction (CO01-CB)
Loop Antenna	Teseq	HLA 6120	31244	9kHz - 30 MHz	Mar. 23, 2023	Mar. 22, 2024	Radiation (03CH03-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH03-CB	30 MHz ~ 1 GHz	Jan. 17, 2023	Jan. 16, 2024	Radiation (03CH03-CB)
Bilog Antenna with 6 dB attenuator	Schaffner & EMCI	CBL6112B & N-6-06	2928 & AT-N0608	20MHz ~ 2GHz	Feb. 19, 2023	Feb. 18, 2024	Radiation (03CH03-CB)
Pre-Amplifier	Agilent	8447D	2944A10259	9kHz ~ 1.3GHz	Jan. 09, 2023	Jan. 08, 2024	Radiation (03CH03-CB)
Spectrum Analyzer	R&S	FSP40	100019	9kHz ~ 40GHz	Jun. 12, 2023	Jun. 11, 2024	Radiation (03CH03-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	Jun. 13, 2023	Jun. 12, 2024	Radiation (03CH03-CB)
RF Cable-low	Woken	RG402	Low Cable-02+29	30MHz ~ 1GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH03-CB)
RF Cable-low	Woken	RG402	Low Cable-02+29	30MHz ~ 1GHz	Oct. 02, 2023	Oct. 01, 2024	Radiation (03CH03-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH03-CB)
3m Semi Anechoic Chamber VSWR	RIKEN	SAC-3M	03CH02-CB	1GHz ~18GHz	Mar. 25, 2023	Mar. 24, 2024	Radiation (03CH02-CB)
Horn Antenna	EMCO	3115	9610-4976	1GHz ~ 18GHz	Apr. 18, 2023	Apr. 17, 2024	Radiation (03CH02-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Sep. 04, 2023	Sep. 03, 2024	Radiation (03CH02-CB)
Pre-Amplifier	Agilent	83017A	MY39501305	1GHz ~ 26.5GHz	Jun. 30, 2023	Jun. 29, 2024	Radiation (03CH02-CB)
Pre-Amplifier	SGH	SGH184	20230109-3	18~40GHz	Jan. 13, 2023	Jan. 12, 2024	Radiation (03CH02-CB)

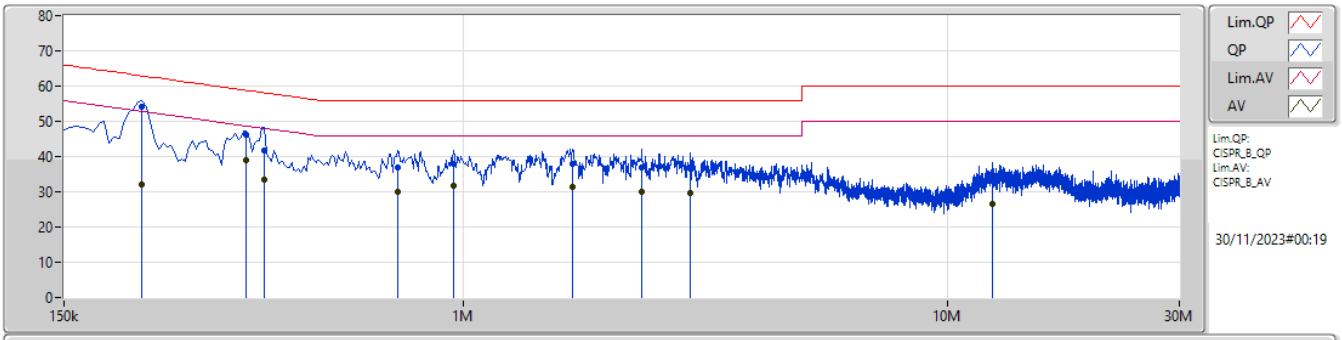
Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
Spectrum analyzer	R&S	FSU	100015	9kHz~26GHz	Dec. 05, 2022	Dec. 04, 2023	Radiation (03CH02-CB)
RF Cable-high	Woken	RG402	High Cable-18	1GHz ~ 18GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH02-CB)
RF Cable-high	Woken	RG402	High Cable-18	1GHz ~ 18GHz	Oct. 02, 2023	Oct. 01, 2024	Radiation (03CH02-CB)
RF Cable-high	Woken	RG402	High Cable-18+19	1GHz ~ 18GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH02-CB)
RF Cable-high	Woken	RG402	High Cable-18+19	1GHz ~ 18GHz	Oct. 02, 2023	Oct. 01, 2024	Radiation (03CH02-CB)
High Cable	Woken	WCA0929M	40G#5+6	1GHz ~ 40 GHz	Dec. 07, 2022	Dec. 06, 2023	Radiation (03CH02-CB)
High Cable	Woken	WCA0929M	40G#5	1GHz ~ 40 GHz	Dec. 07, 2022	Dec. 06, 2023	Radiation (03CH02-CB)
High Cable	Woken	WCA0929M	40G#6	1GHz ~ 40 GHz	Dec. 07, 2022	Dec. 06, 2023	Radiation (03CH02-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH02-CB)
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	May 29, 2023	May 28, 2024	Conducted (TH01-CB)
Switch	SPTCB	SP-SWI	SWI-01	1~26.5 GHz	Oct. 03, 2023	Oct. 02, 2024	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-06	1 GHz – 18 GHz	Oct. 02, 2023	Oct. 01, 2024	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-07	1 GHz – 18 GHz	Oct. 02, 2023	Oct. 01, 2024	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-08	1 GHz – 18 GHz	Oct. 02, 2023	Oct. 01, 2024	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-09	1 GHz – 18 GHz	Oct. 02, 2023	Oct. 01, 2024	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz – 18 GHz	Oct. 02, 2023	Oct. 01, 2024	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-30	1 GHz – 18 GHz	Oct. 02, 2023	Oct. 01, 2024	Conducted (TH01-CB)
Power Sensor	Agilent	E9327A	US40442088	50MHz~18GHz	Feb. 22, 2023	Feb. 21, 2024	Conducted (TH01-CB)
Power Meter	Agilent	E4416A	GB41291199	50MHz~18GHz	Feb. 22, 2023	Feb. 21, 2024	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.

Summary

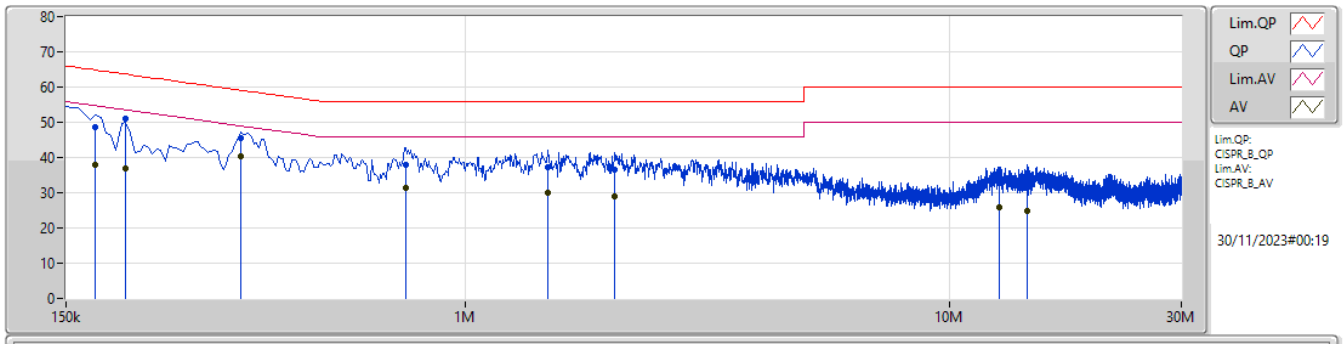
Mode	Result	Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition
Mode 1	Pass	QP	217.5k	54.08	62.92	-8.84	Line

Mode 1



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	217.5k	54.08	62.92	-8.84	9.96	Line	"Worst"	44.12	0.08	0.02	9.86
AV	217.5k	32.22	52.92	-20.70	9.96	Line	-	22.26	0.08	0.02	9.86
QP	357k	46.30	58.79	-12.49	10.00	Line	-	36.30	0.09	0.02	9.89
AV	357k	39.01	48.79	-9.78	10.00	Line	-	29.01	0.09	0.02	9.89
QP	388.5k	41.81	58.10	-16.29	10.01	Line	-	31.80	0.09	0.02	9.90
AV	388.5k	33.60	48.10	-14.50	10.01	Line	-	23.59	0.09	0.02	9.90
QP	730.5k	36.90	56.00	-19.10	10.01	Line	-	26.89	0.10	0.01	9.90
AV	730.5k	29.85	46.00	-16.15	10.01	Line	-	19.84	0.10	0.01	9.90
QP	955.5k	37.83	56.00	-18.17	10.02	Line	-	27.81	0.11	0.01	9.90
AV	955.5k	31.82	46.00	-14.18	10.02	Line	-	21.80	0.11	0.01	9.90
QP	1.68M	37.95	56.00	-18.05	10.08	Line	-	27.87	0.13	0.05	9.90
AV	1.68M	31.21	46.00	-14.79	10.08	Line	-	21.13	0.13	0.05	9.90
QP	2.333M	36.95	56.00	-19.05	10.14	Line	-	26.81	0.15	0.09	9.90
AV	2.333M	30.10	46.00	-15.90	10.14	Line	-	19.96	0.15	0.09	9.90
QP	2.94M	36.43	56.00	-19.57	10.18	Line	-	26.25	0.16	0.11	9.91
AV	2.94M	29.57	46.00	-16.43	10.18	Line	-	19.39	0.16	0.11	9.91
QP	12.377M	33.20	60.00	-26.80	10.39	Line	-	22.81	0.27	0.16	9.96
AV	12.377M	26.64	50.00	-23.36	10.39	Line	-	16.25	0.27	0.16	9.96

Mode 1



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	172.5k	48.58	64.83	-16.25	9.96	Neutral	-	38.62	0.07	0.02	9.87
AV	172.5k	37.77	54.83	-17.06	9.96	Neutral	-	27.81	0.07	0.02	9.87
QP	199.5k	50.96	63.63	-12.67	9.95	Neutral	-	41.01	0.07	0.02	9.86
AV	199.5k	36.89	53.63	-16.74	9.95	Neutral	-	26.94	0.07	0.02	9.86
QP	343.5k	45.40	59.12	-13.72	9.98	Neutral	-	35.42	0.07	0.02	9.89
AV	343.5k	40.26	49.12	-8.86	9.98	Neutral	"Worst"	30.28	0.07	0.02	9.89
QP	753k	37.78	56.00	-18.22	9.99	Neutral	-	27.79	0.08	0.01	9.90
AV	753k	31.29	46.00	-14.71	9.99	Neutral	-	21.30	0.08	0.01	9.90
QP	1.482M	37.18	56.00	-18.82	10.03	Neutral	-	27.15	0.09	0.04	9.90
AV	1.482M	29.92	46.00	-16.08	10.03	Neutral	-	19.89	0.09	0.04	9.90
QP	2.031M	36.43	56.00	-19.57	10.07	Neutral	-	26.36	0.10	0.07	9.90
AV	2.031M	29.10	46.00	-16.90	10.07	Neutral	-	19.03	0.10	0.07	9.90
QP	12.651M	32.76	60.00	-27.24	10.37	Neutral	-	22.39	0.25	0.16	9.96
AV	12.651M	25.98	50.00	-24.02	10.37	Neutral	-	15.61	0.25	0.16	9.96
QP	14.406M	31.49	60.00	-28.51	10.42	Neutral	-	21.07	0.26	0.18	9.98
AV	14.406M	24.92	50.00	-25.08	10.42	Neutral	-	14.50	0.26	0.18	9.98

Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4-2.4835GHz	-	-	-	-	-
RF4CE_1TX	1.594M	2.381M	2M38D1D	1.563M	2.35M

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

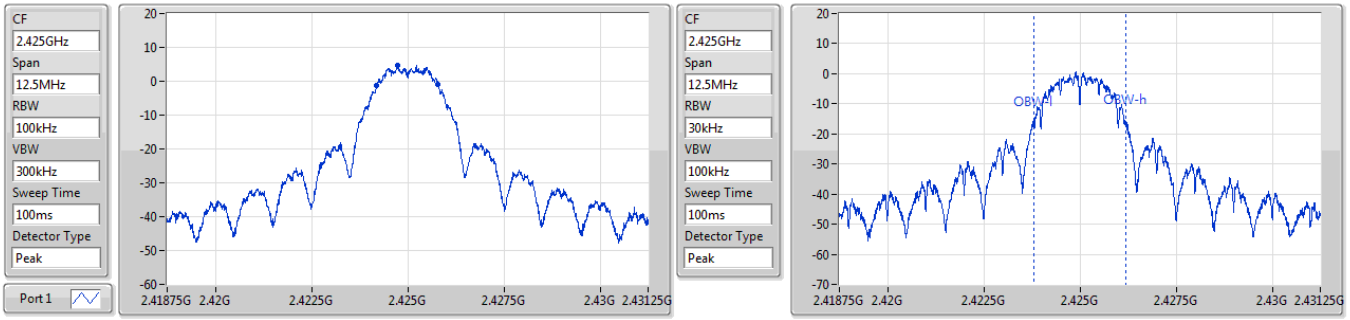
Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
RF4CE_1TX	-	-	-	-
2425MHz	Pass	500k	1.594M	2.381M
2450MHz	Pass	500k	1.569M	2.369M
2475MHz	Pass	500k	1.563M	2.35M

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

2.4-2.4835GHz_RF4CE_1TX **EBW**

2425MHz

03/11/2023

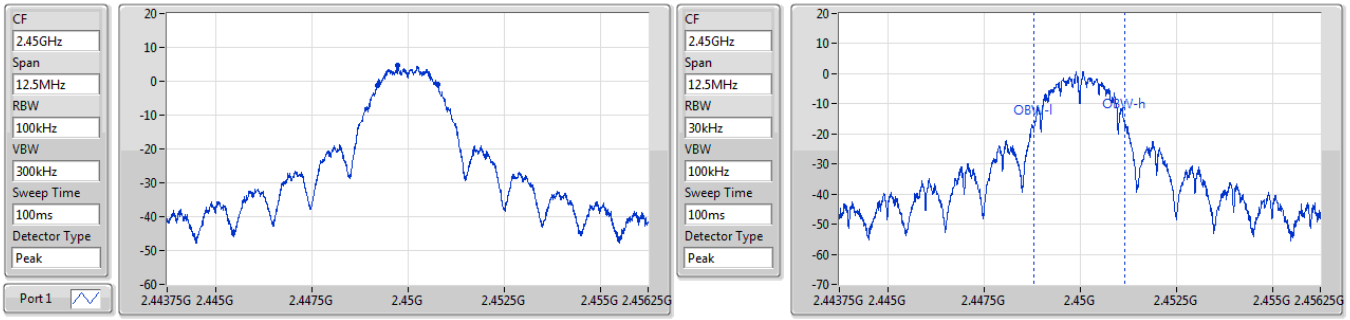


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.594M	2.4242G	2.425794G	2.381M	2.423806G	2.426188G	500k	1

2.4-2.4835GHz_RF4CE_1TX **EBW**

2450MHz

03/11/2023



6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.569M	2.449206G	2.450775G	2.369M	2.4488G	2.451169G	500k	1

2.4-2.4835GHz_RF4CE_1TX **EBW**

2475MHz

6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.563M	2.474219G	2.475781G	2.35M	2.473825G	2.476175G	500k	1

Summary

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
RF4CE_1TX	3.83	0.00242

Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Total Power (dBm)	Power Limit (dBm)
RF4CE_1TX	-	-	-	-	-
2425MHz	Pass	5.20	3.66	3.66	30.00
2450MHz	Pass	5.20	3.61	3.61	30.00
2475MHz	Pass	5.20	3.83	3.83	30.00

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

Summary

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
RF4CE_1TX	-19.85

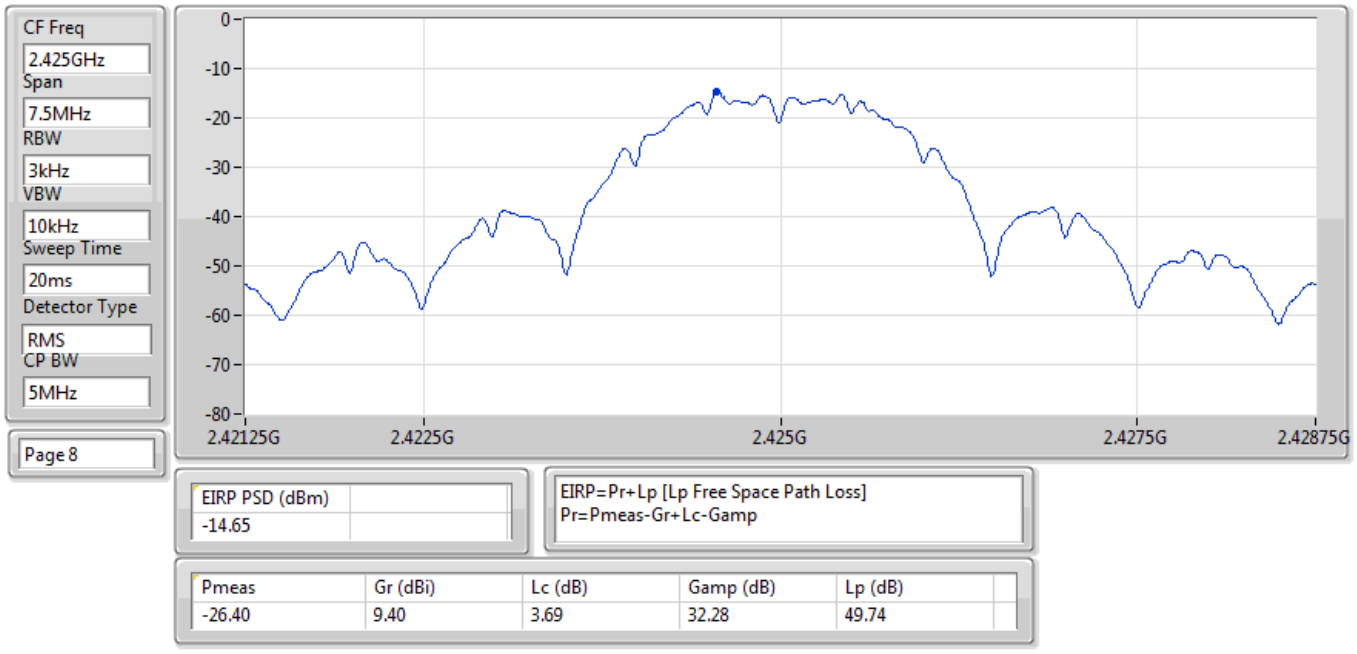
RBW = 3kHz;

Result

Mode	Result	DG (dBi)	Port 1 (dBm/RBW)	PD (dBm/RBW)	PD Limit (dBm/RBW)
RF4CE_1TX	-	-	-	-	-
2425MHz	Pass	5.20	-19.85	-19.85	8.00
2450MHz	Pass	5.20	-20.76	-20.76	8.00
2475MHz	Pass	5.20	-20.32	-20.32	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;

EIRP PSD;Band:2.4G;RF4CE;BWch:5MHz;Nss:1,(1D);Nant:1;Ch:2425MHz;TX

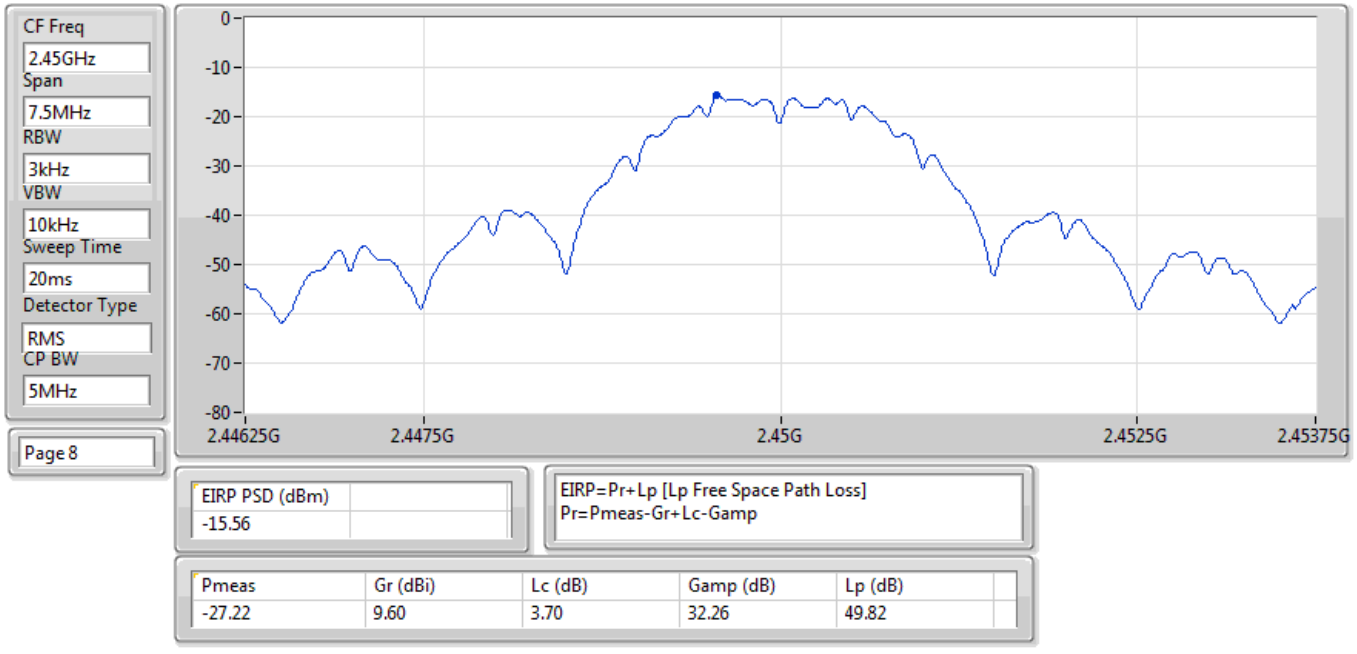


EIRP PSD (dBm)
-14.65

EIRP=Pr+Lp [Lp Free Space Path Loss]
Pr=Pmeas-Gr+Lc-Gamp

Pmeas	Gr (dBi)	Lc (dB)	Gamp (dB)	Lp (dB)
-26.40	9.40	3.69	32.28	49.74

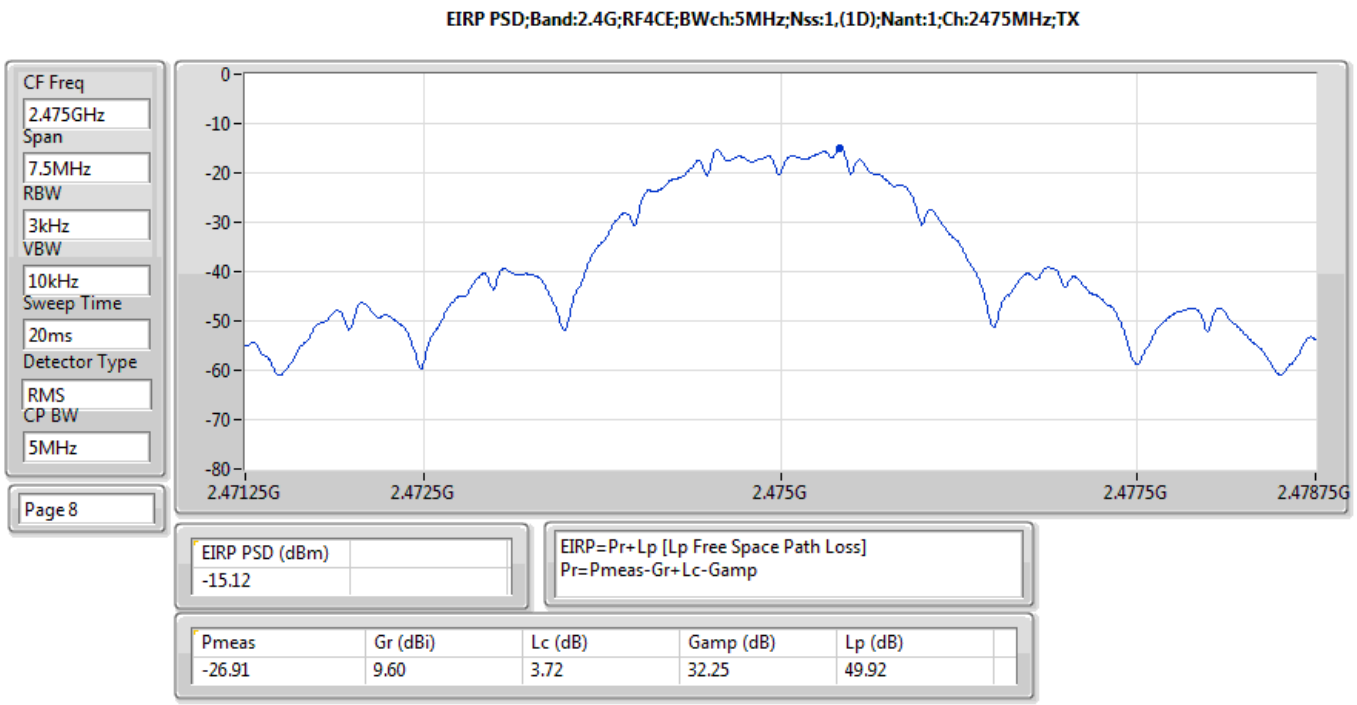
EIRP PSD;Band:2.4G;RF4CE;BWch:5MHz;Nss:1,(1D);Nant:1;Ch:2450MHz;TX



EIRP PSD (dBm)
-15.56

EIRP=Pr+Lp [Lp Free Space Path Loss]
Pr=Pmeas-Gr+Lc-Gamp

Pmeas	Gr (dBi)	Lc (dB)	Gamp (dB)	Lp (dB)
-27.22	9.60	3.70	32.26	49.82


EIRP PSD;Band:2.4G;RF4CE;BWch:5MHz;Nss:1,(1D);Nant:1;Ch:2475MHz;TX
CF Freq
2.475GHz
Span
7.5MHz
RBW
3kHz
VBW
10kHz
Sweep Time
20ms
Detector Type
RMS
CP BW
5MHz
Page 8
0
-10
-20
-30
-40
-50
-60
-70
-80
2.47125G
2.4725G
2.475G
2.4775G
2.47875G
EIRP PSD (dBm)
-15.12
EIRP=Pr+Lp [Lp Free Space Path Loss]
Pr=Pmeas-Gr+Lc-Gamp
Pmeas
Gr (dBi)
Lc (dB)
Gamp (dB)
Lp (dB)
-26.91
9.60
3.72
32.25
49.92

Summary

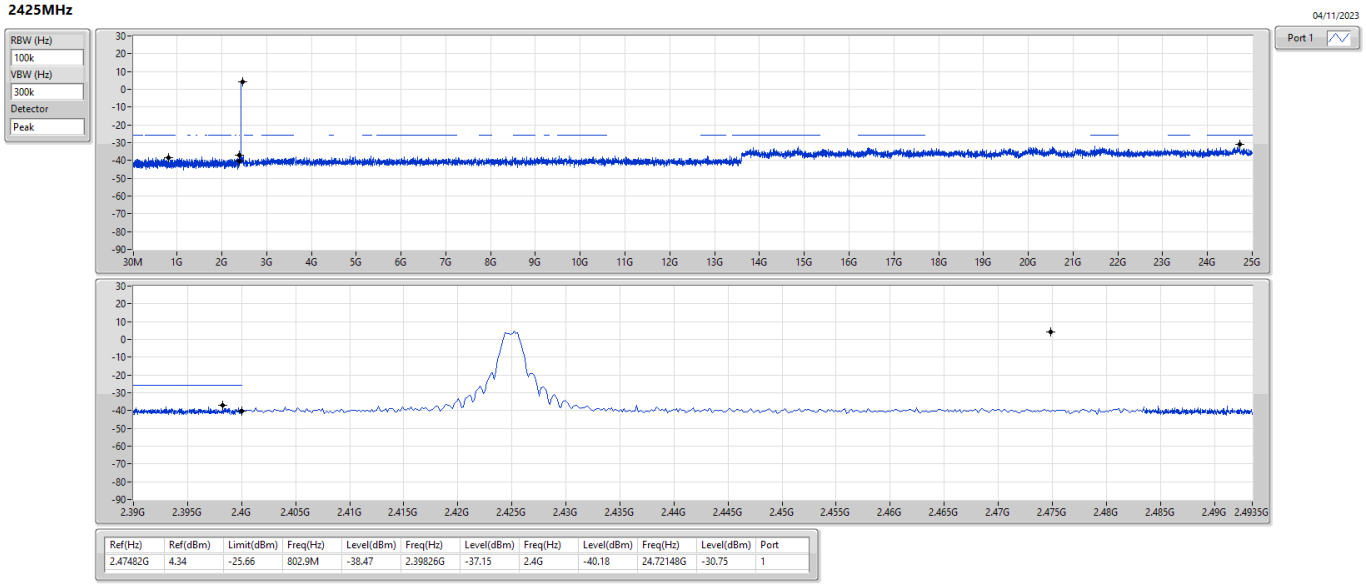
Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-
RF4CE_1TX	Pass	2.47482G	4.34	-25.66	802.9M	-38.47	2.39826G	-37.15	2.4G	-40.18	24.72148G	-30.75	1

Result

Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
RF4CE_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-
2425MHz	Pass	2.47482G	4.34	-25.66	802.9M	-38.47	2.39826G	-37.15	2.4G	-40.18	24.72148G	-30.75	1
2450MHz	Pass	2.47482G	4.34	-25.66	2.30032G	-38.29	2.39904G	-38.17	2.4G	-40.87	24.12787G	-32.49	1
2475MHz	Pass	2.47482G	4.34	-25.66	342.7M	-38.13	2.39536G	-38.11	2.4G	-40.15	16.51505G	-32.40	1

2.4-2.4835GHz_RF4CE_1TX CSENdB

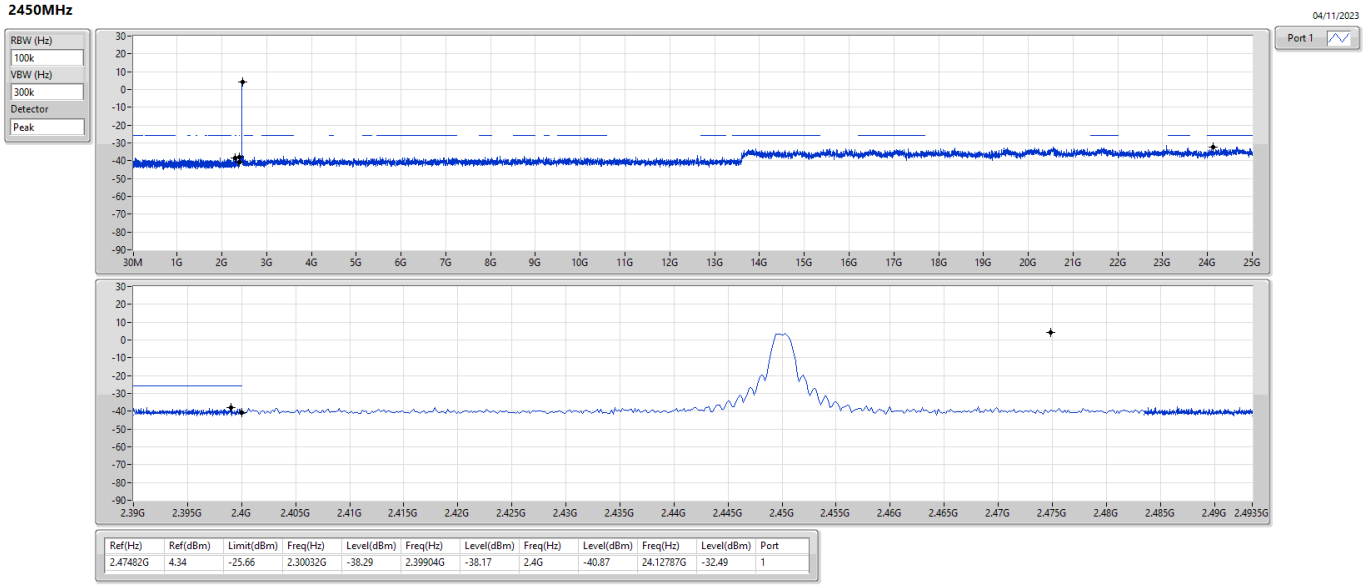
2425MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.47482G	4.34	-25.66	802.9M	-38.47	2.39826G	-37.15	2.4G	-40.18	24.72148G	-30.75	1

2.4-2.4835GHz_RF4CE_1TX CSENdB

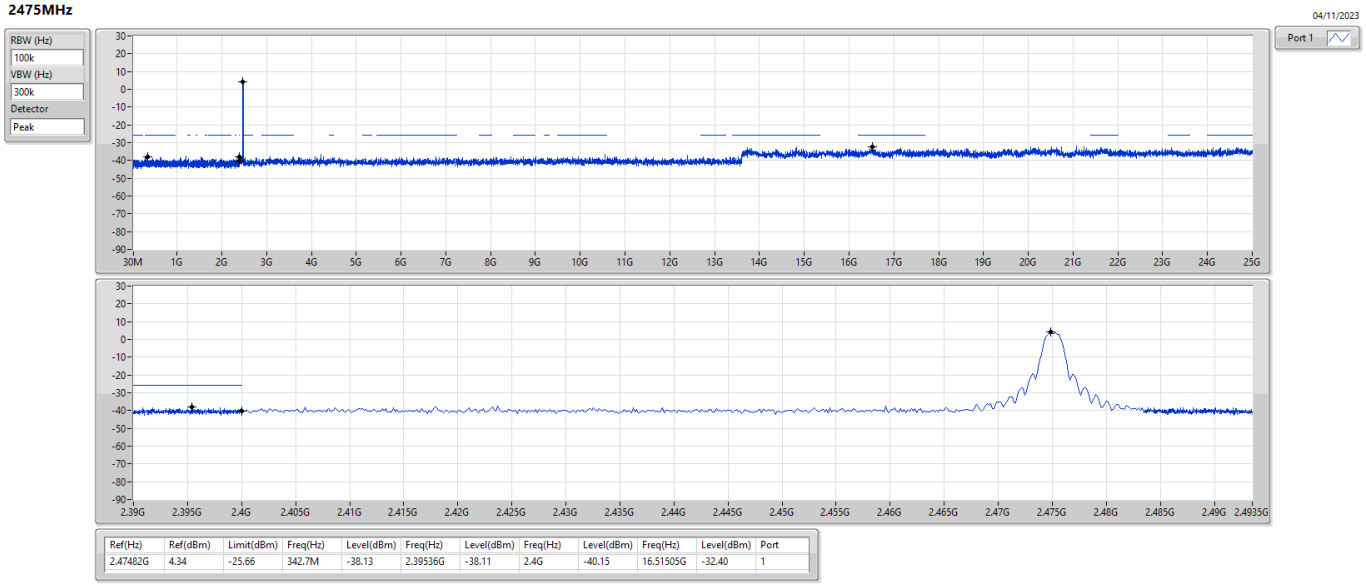
2450MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.47482G	4.34	-25.66	2.30032G	-38.29	2.39904G	-38.17	2.4G	-40.87	24.12787G	-32.49	1

2.4-2.4835GHz_RF4CE_1TX CSENdB

2475MHz

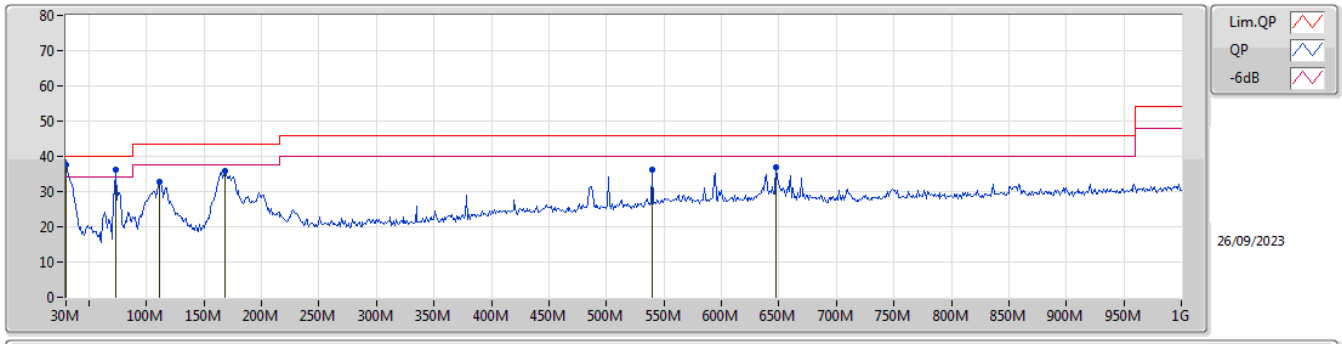


Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.47482G	4.34	-25.66	342.7M	-38.13	2.39536G	-38.11	2.4G	-40.15	16.51505G	-32.40	1

Summary

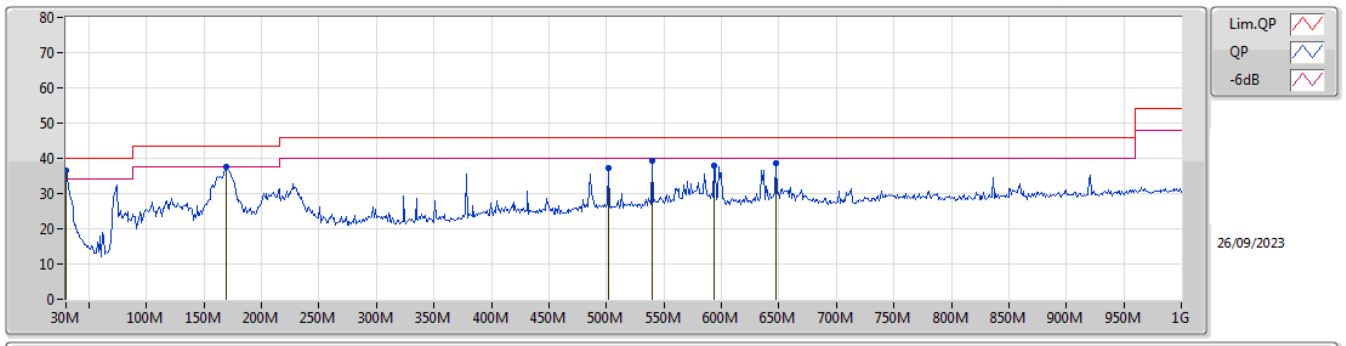
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 1	Pass	QP	30M	37.52	40.00	-2.48	Vertical

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)		(°)	(m)		(dBuV/m)	(dB/m)	(dB)	(dB)
QP	30M	37.52	40.00	-2.48	-2.47	3	Vertical	143	2.00	"Worst"	39.99	25.28	0.74	28.49
PK	73.65M	36.10	40.00	-3.90	-15.09	3	Vertical	95	2.00	-	51.19	12.35	1.11	28.55
PK	111.48M	32.67	43.50	-10.83	-9.44	3	Vertical	180	1.00	-	42.11	17.65	1.36	28.45
PK	168.71M	35.71	43.50	-7.79	-11.03	3	Vertical	0	1.25	-	46.74	15.54	1.68	28.25
PK	540.22M	36.28	46.00	-9.72	-1.74	3	Vertical	174	1.00	-	38.02	24.52	3.10	29.36
PK	647.89M	36.99	46.00	-9.01	-0.62	3	Vertical	30	1.00	-	37.61	25.32	3.36	29.30

Mode 1



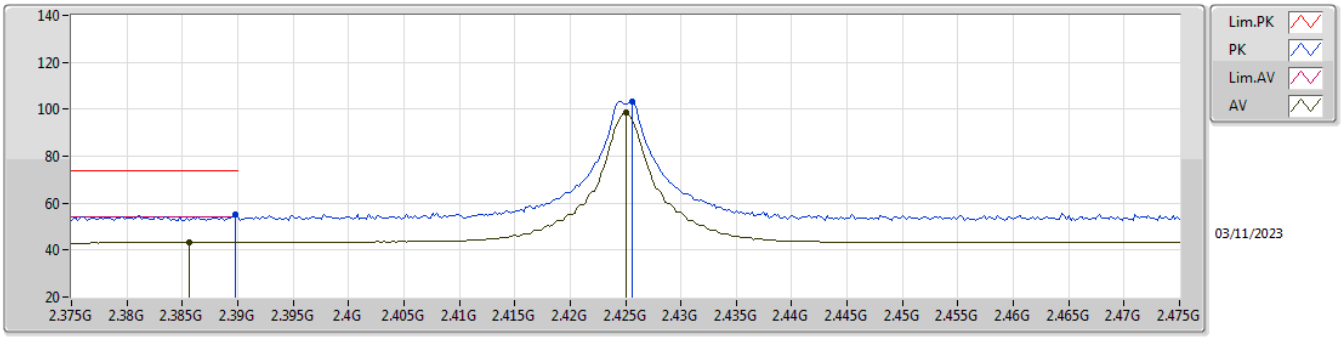
Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB/m)	(m)		(°)	(m)		(dBuV/m)	(dB/m)	(dB)	(dB)
QP	30M	36.51	40.00	-3.49	-2.47	3	Horizontal	209	2.00	"Worst"	38.98	25.28	0.74	28.49
PK	169.68M	37.57	43.50	-5.93	-11.05	3	Horizontal	81	1.50	-	48.62	15.50	1.69	28.24
PK	501.42M	37.28	46.00	-8.72	-3.00	3	Horizontal	322	2.00	-	40.28	23.37	2.97	29.34
PK	540.22M	39.34	46.00	-6.66	-1.74	3	Horizontal	300	1.50	-	41.08	24.52	3.10	29.36
PK	593.57M	38.08	46.00	-7.92	-1.33	3	Horizontal	123	1.50	-	39.41	24.81	3.20	29.34
PK	647.89M	38.49	46.00	-7.51	-0.62	3	Horizontal	114	1.50	-	39.11	25.32	3.36	29.30

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	-	-	-	-	-	-	-	-	-	-	-
RF4CE_1TX	Pass	AV	7.2736G	49.78	54.00	-4.22	3	Vertical	90	2.84	-

2.4-2.4835GHz_RF4CE_1TX

2425MHz_TX

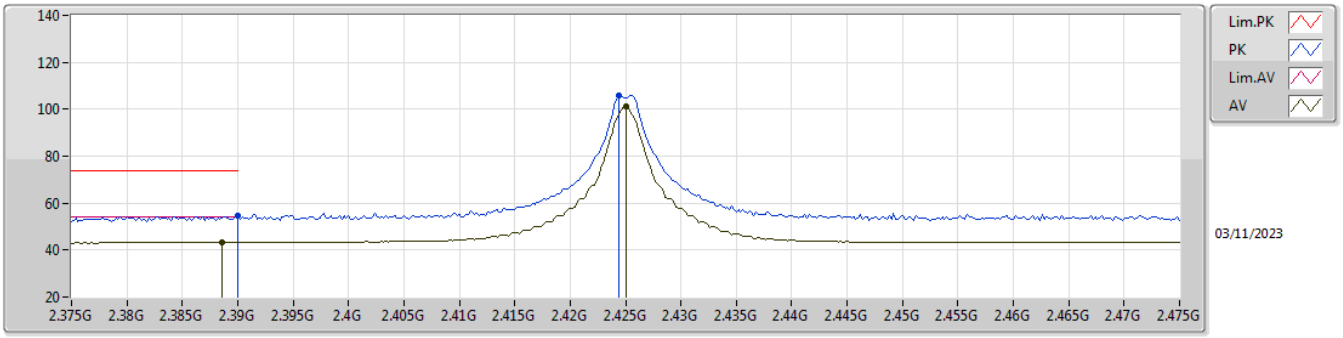


EUT Z_1TX
Setting 7
02-E-G-5

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	2.3898G	54.97	74.00	-19.03	23.52	3	Vertical	276	2.82	-	28.40	3.05	-
AV	2.3856G	43.27	54.00	-10.73	11.82	3	Vertical	276	2.82	-	28.40	3.05	-
PK	2.4256G	103.13	Inf	-Inf	71.60	3	Vertical	276	2.82	-	28.46	3.07	-
AV	2.425G	98.71	Inf	-Inf	67.19	3	Vertical	276	2.82	-	28.45	3.07	-

2.4-2.4835GHz_RF4CE_1TX

2425MHz_TX

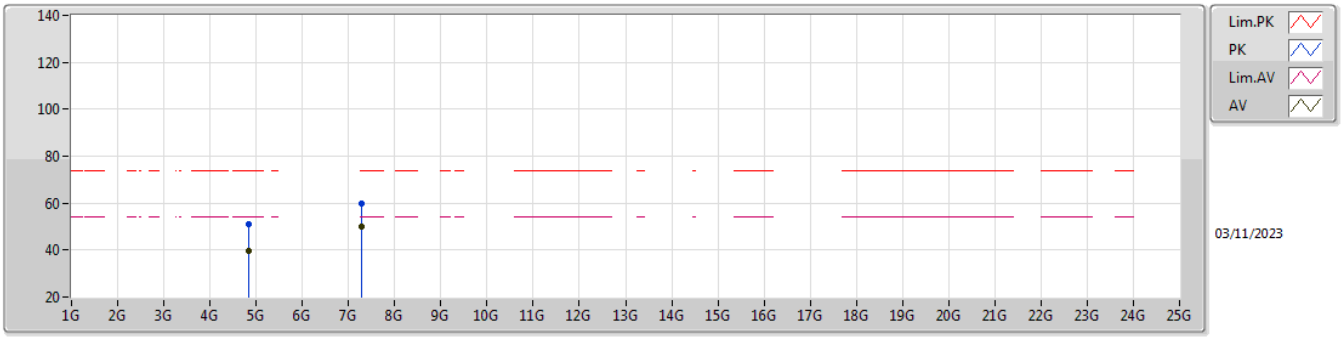


EUT Z_1TX
Setting 7
02-E-G-5

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	2.39G	54.49	74.00	-19.51	23.03	3	Horizontal	346	2.23	-	28.40	3.06	-
AV	2.3886G	43.28	54.00	-10.72	11.83	3	Horizontal	346	2.23	-	28.40	3.05	-
PK	2.4244G	105.65	Inf	-Inf	74.14	3	Horizontal	346	2.23	-	28.44	3.07	-
AV	2.425G	101.31	Inf	-Inf	69.79	3	Horizontal	346	2.23	-	28.45	3.07	-

2.4-2.4835GHz_RF4CE_1TX

2425MHz_TX

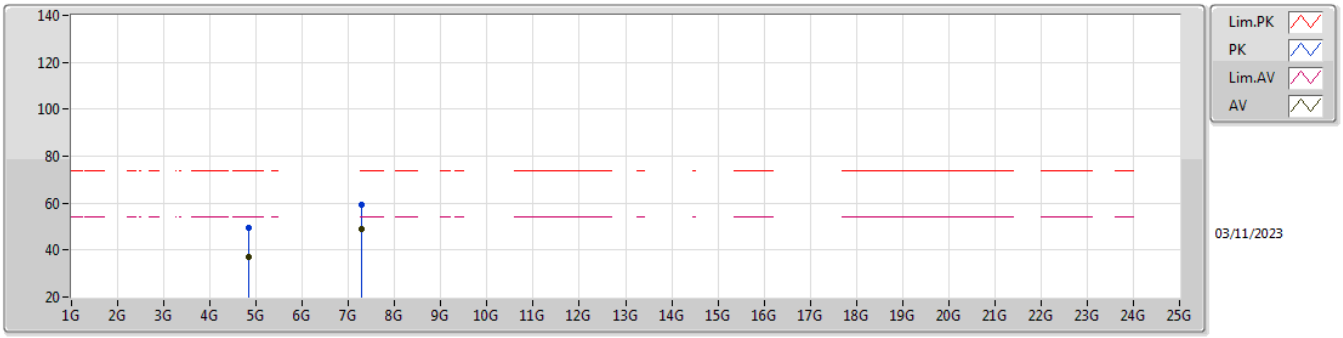


EUT Z_1TX
Setting 7
02-E-G-5

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	4.85092G	50.97	74.00	-23.03	43.42	3	Vertical	246	2.13	-	33.10	5.11	30.66
AV	4.85092G	39.51	54.00	-14.49	31.96	3	Vertical	246	2.13	-	33.10	5.11	30.66
PK	7.2765G	59.95	74.00	-14.05	49.04	3	Vertical	90	2.84	-	36.51	6.49	32.09
AV	7.2736G	49.78	54.00	-4.22	38.89	3	Vertical	90	2.84	-	36.49	6.49	32.09

2.4-2.4835GHz_RF4CE_1TX

2425MHz_TX

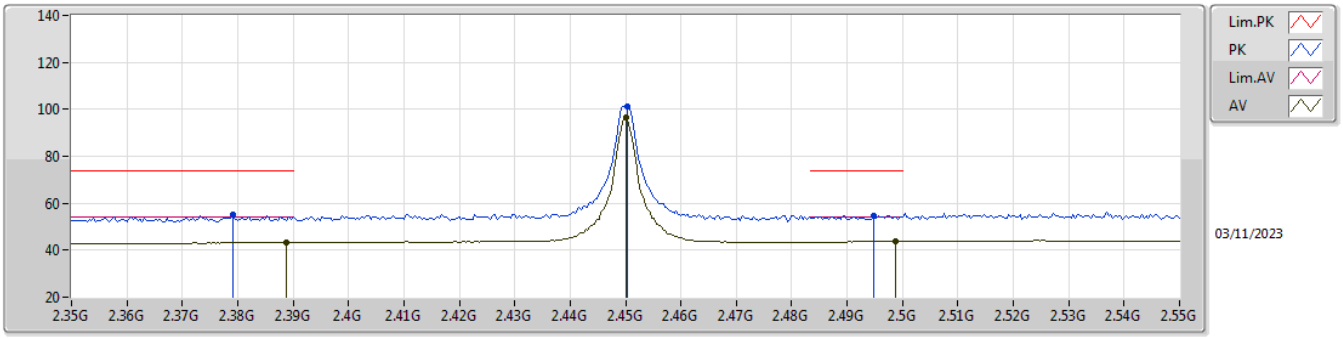


EUT Z_1TX
Setting 7
02-E-G-5

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	4.85104G	49.31	74.00	-24.69	41.76	3	Horizontal	106	1.14	-	33.10	5.11	30.66
AV	4.84896G	37.26	54.00	-16.74	29.73	3	Horizontal	106	1.14	-	33.09	5.10	30.66
PK	7.27334G	59.52	74.00	-14.48	48.63	3	Horizontal	77	1.13	-	36.49	6.49	32.09
AV	7.27368G	48.86	54.00	-5.14	37.97	3	Horizontal	77	1.13	-	36.49	6.49	32.09

2.4-2.4835GHz_RF4CE_1TX

2450MHz_TX

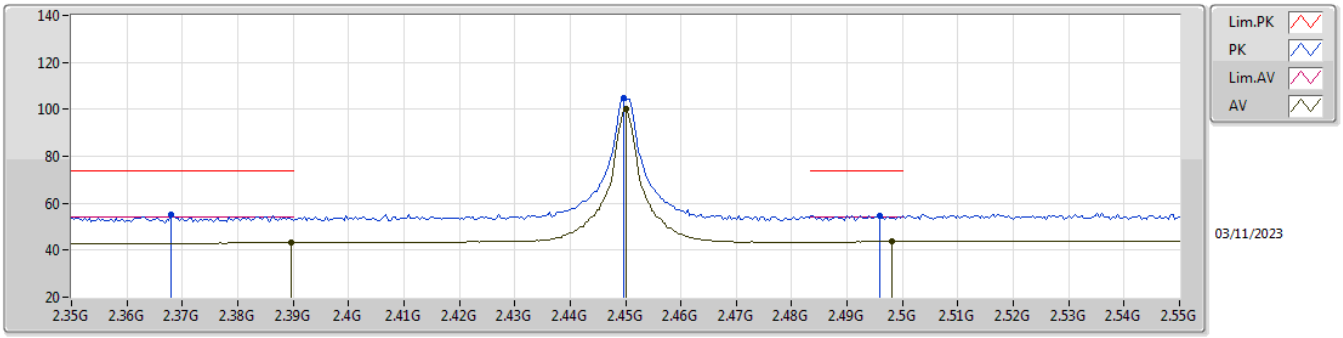


EUT Z_1TX
Setting 7
02-E-G-5

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	2.3792G	54.99	74.00	-19.01	23.55	3	Vertical	235	3.00	-	28.39	3.05	-
AV	2.3888G	43.24	54.00	-10.76	11.79	3	Vertical	235	3.00	-	28.40	3.05	-
PK	2.4504G	100.99	Inf	-Inf	69.51	3	Vertical	235	3.00	-	28.40	3.08	-
AV	2.45G	96.70	Inf	-Inf	65.22	3	Vertical	235	3.00	-	28.40	3.08	-
PK	2.4948G	54.82	74.00	-19.18	23.17	3	Vertical	235	3.00	-	28.55	3.10	-
AV	2.4988G	43.76	54.00	-10.24	12.07	3	Vertical	235	3.00	-	28.59	3.10	-

2.4-2.4835GHz_RF4CE_1TX

2450MHz_TX

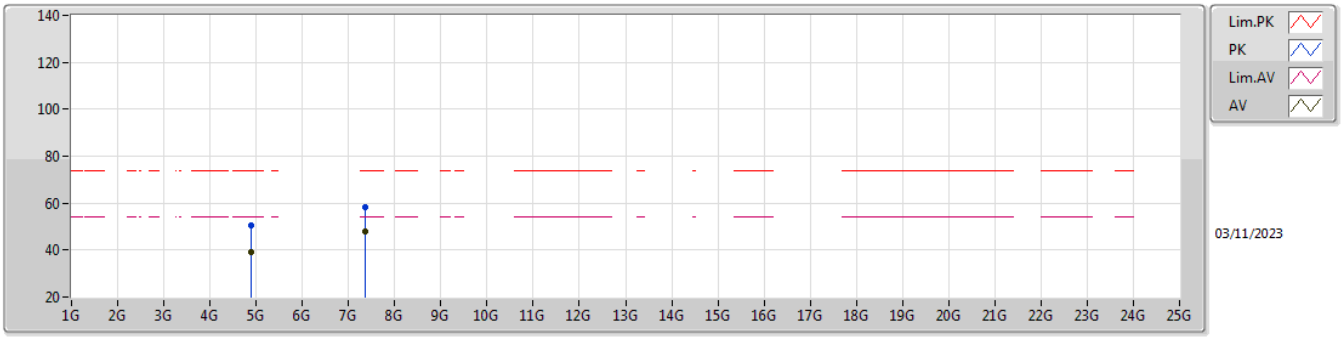


EUT Z_1TX
Setting 7
02-E-G-5

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	2.368G	55.13	74.00	-18.87	23.81	3	Horizontal	348	3.00	-	28.28	3.04	-
AV	2.3896G	43.31	54.00	-10.69	11.86	3	Horizontal	348	3.00	-	28.40	3.05	-
PK	2.4496G	104.68	Inf	-Inf	73.20	3	Horizontal	348	3.00	-	28.40	3.08	-
AV	2.45G	100.40	Inf	-Inf	68.92	3	Horizontal	348	3.00	-	28.40	3.08	-
PK	2.496G	54.66	74.00	-19.34	23.00	3	Horizontal	348	3.00	-	28.56	3.10	-
AV	2.498G	43.71	54.00	-10.29	12.03	3	Horizontal	348	3.00	-	28.58	3.10	-

2.4-2.4835GHz_RF4CE_1TX

2450MHz_TX

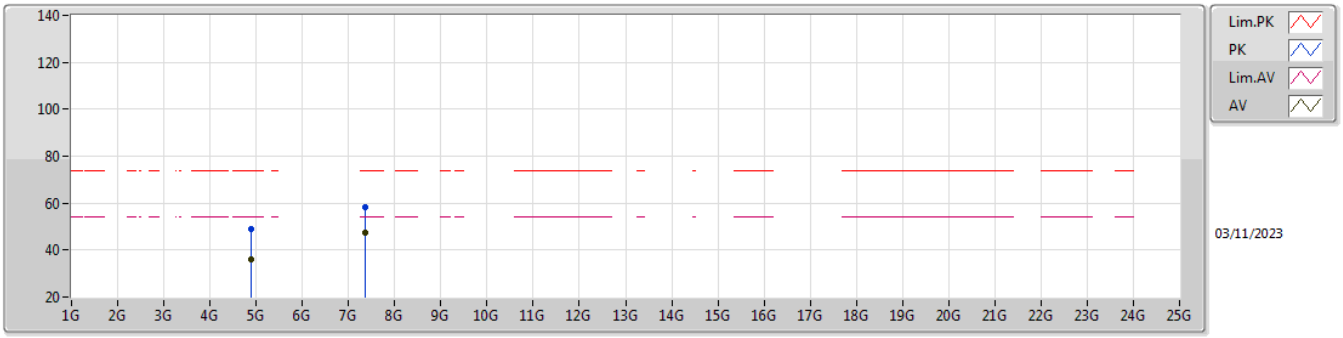


EUT Z_1TX
Setting 7
02-E-G-5

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	4.90085G	50.44	74.00	-23.56	42.75	3	Vertical	246	2.11	-	33.20	5.12	30.63
AV	4.90102G	38.88	54.00	-15.12	31.19	3	Vertical	246	2.11	-	33.20	5.12	30.63
PK	7.34851G	58.47	74.00	-15.53	47.38	3	Vertical	92	2.68	-	36.70	6.53	32.14
AV	7.35131G	47.96	54.00	-6.04	36.87	3	Vertical	92	2.68	-	36.70	6.53	32.14

2.4-2.4835GHz_RF4CE_1TX

2450MHz_TX

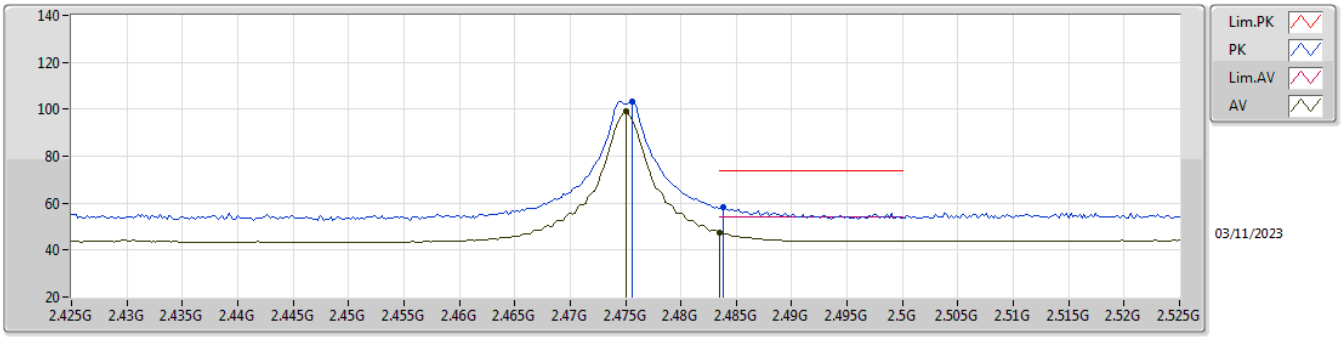


EUT Z_1TX
Setting 7
02-E-G-5

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	4.901115G	49.14	74.00	-24.86	41.45	3	Horizontal	0	1.01	-	33.20	5.12	30.63
AV	4.90089G	36.00	54.00	-18.00	28.31	3	Horizontal	0	1.01	-	33.20	5.12	30.63
PK	7.34844G	58.46	74.00	-15.54	47.37	3	Horizontal	65	1.02	-	36.70	6.53	32.14
AV	7.34861G	47.36	54.00	-6.64	36.27	3	Horizontal	65	1.02	-	36.70	6.53	32.14

2.4-2.4835GHz_RF4CE_1TX

2475MHz_TX

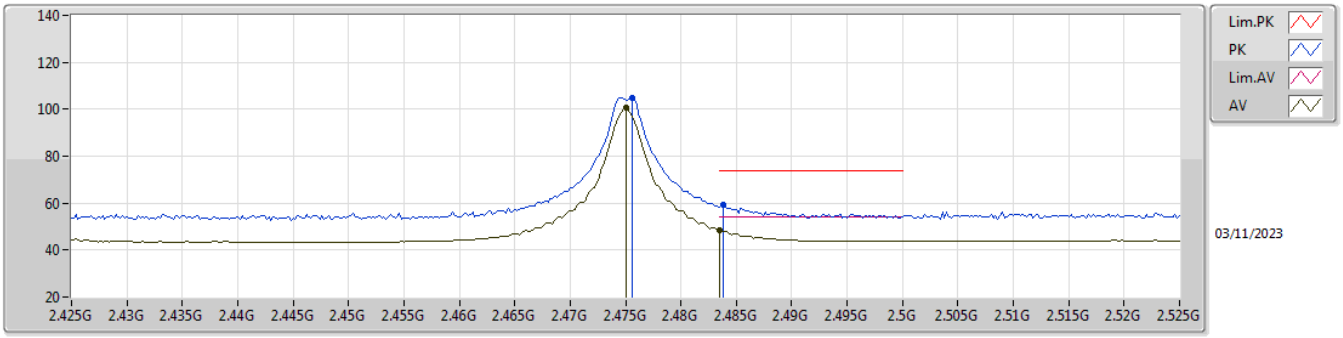


EUT Z_1TX
Setting 7
02-E-G-5

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	103.22	Inf	-Inf	71.63	3	Vertical	260	3.00	-	28.50	3.09	-
AV	2.475G	98.94	Inf	-Inf	67.35	3	Vertical	260	3.00	-	28.50	3.09	-
PK	2.4838G	58.48	74.00	-15.52	26.89	3	Vertical	260	3.00	-	28.50	3.09	-
AV	2.4835G	47.34	54.00	-6.66	15.75	3	Vertical	260	3.00	-	28.50	3.09	-

2.4-2.4835GHz_RF4CE_1TX

2475MHz_TX

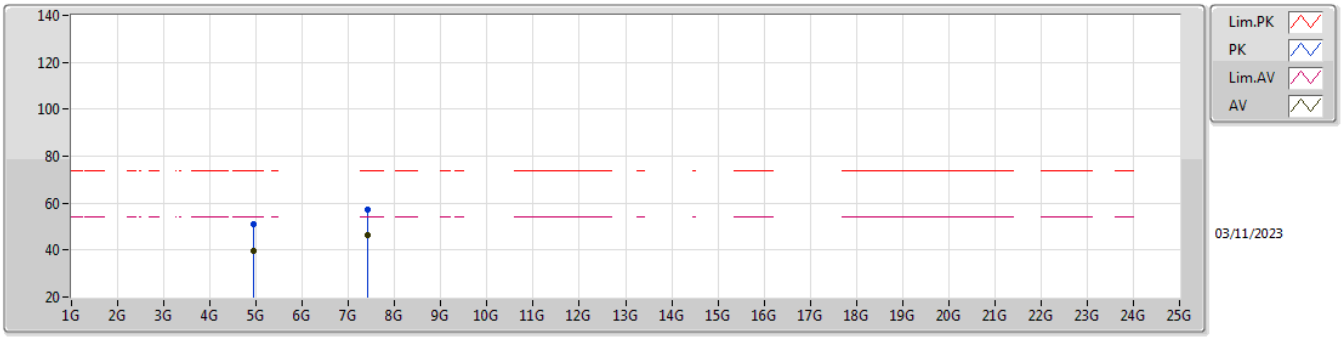


EUT Z_1TX
Setting 7
02-E-G-5

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	104.68	Inf	-Inf	73.09	3	Horizontal	342	2.97	-	28.50	3.09	-
AV	2.475G	100.44	Inf	-Inf	68.85	3	Horizontal	342	2.97	-	28.50	3.09	-
PK	2.4838G	59.08	74.00	-14.92	27.49	3	Horizontal	342	2.97	-	28.50	3.09	-
AV	2.4835G	48.26	54.00	-5.74	16.67	3	Horizontal	342	2.97	-	28.50	3.09	-

2.4-2.4835GHz_RF4CE_1TX

2475MHz_TX

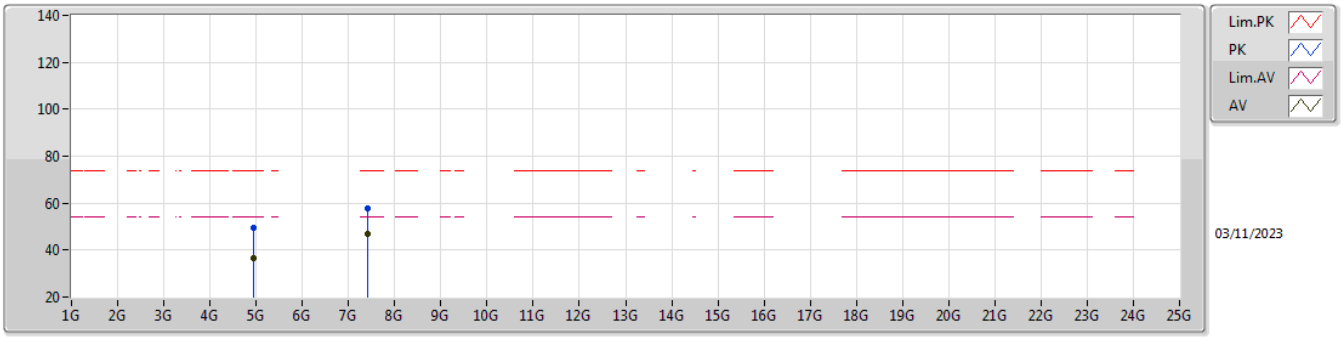


EUT Z_1TX
Setting 7
02-E-G-5

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	4.9511G	50.98	74.00	-23.02	43.13	3	Vertical	31	1.29	-	33.30	5.14	30.59
AV	4.95094G	39.49	54.00	-14.51	31.64	3	Vertical	31	1.29	-	33.30	5.14	30.59
PK	7.42658G	57.26	74.00	-16.74	46.17	3	Vertical	104	2.60	-	36.70	6.57	32.18
AV	7.42635G	46.44	54.00	-7.56	35.35	3	Vertical	104	2.60	-	36.70	6.57	32.18

2.4-2.4835GHz_RF4CE_1TX

2475MHz_TX



EUT Z_1TX
Setting 7
02-E-G-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	4.94915G	49.33	74.00	-24.67	41.49	3	Horizontal	285	1.12	-	33.30	5.13	30.59
AV	4.95099G	36.79	54.00	-17.21	28.94	3	Horizontal	285	1.12	-	33.30	5.14	30.59
PK	7.42353G	57.89	74.00	-16.11	46.80	3	Horizontal	66	1.05	-	36.70	6.57	32.18
AV	7.42366G	46.72	54.00	-7.28	35.63	3	Horizontal	66	1.05	-	36.70	6.57	32.18