Testing Laboratory 3787

RADIO TEST REPORT

FCC ID	:	RSL-TQ6403GEN2
Equipment	:	IEEE802.11ax tri-radio 5G/5G/2.4GHz 2x2+2x2+2x2+BLE wireless AP
Brand Name	:	Allied Telesis
Model Name	:	AT-TQ6403 GEN2
Applicant	:	Allied Telesis K.K. 2nd. TOC Bldg.7-21-11 Nishi-Gotanda, Shinagawa-ku Tokyo 1410031 Japan
Manufacturer	:	Allied Telesis K.K. 2nd. TOC Bldg.7-21-11 Nishi-Gotanda, Shinagawa-ku Tokyo 1410031 Japan
Standard	:	47 CFR FCC Part 15.247

The product was received on Aug. 01, 2022, and testing was started from Aug. 04, 2022 and completed on Sep. 14, 2022. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

Sporton International Inc. Hsinchu Laboratory
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History of this test report

Report No.	Version	Description	Issued Date
FR272619AD	01	Initial issue of report	Oct. 05, 2022

Summary of Test Result

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

Declaration of Conformity:

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

Comments and Explanations:

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: Sandy Chuang

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	Zigbee (IEEE802.15.4)	2405-2480	11-26 [26]

Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	Zigbee (IEEE802.15.4)	3	1

Note:
- Zigbee (IEEE802.15.4) uses a O-QPSK (250kbps) modulation.
- BWch is the nominal channel bandwidth.

1.1.2 Antenna Information

Ant.	Port				Brand	P/N	Antenna Type	Connector	Gain (dBi)
	2.4GHz	5GHz UNII 1	5GHz UNII 3	Bluetooth / Zigbee (IEEE802.15.4)					
1	1	1	-	-	WNC	ATKK RANQ-AK610	PIFA	I-PEX	Note 1
2	2	2	-	-	WNC	ATKK RANQ-AK610	PIFA	I-PEX	
3	-	-	1	-	WNC	ATKK RANQ-AK610	PIFA	I-PEX	
4	-	-	2	1	WNC	ATKK RANQ-AK610	PIFA	I-PEX	

Note 1

Ant.	Gain (dBi)			
	2.4GHz	5GHz UNII 1	5GHz UNII 3	Bluetooth / Zigbee (IEEE802.15.4)
1	2.93	5.39	5.95	-
2	2.69	5.99	5.88	-
3	-	5.54	5.92	-
4	-	5.84	5.91	3.49

Note 2: The above information was declared by manufacturer.

For 2.4GHz function:

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

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

Port 1 and Port 2 could transmit/receive simultaneously.

For 5GHz function:

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

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

Port 1 and Port 2 could transmit/receive simultaneously.

For Bluetooth (1TX/1RX):

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

Port 1 could transmit/receive simultaneously.

For Zigbee (IEEE802.15.4) (1TX/1RX):

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

Port 1 could not transmit/receive simultaneously.

Note 3: The directional gain is measured which follows the procedure of KDB 662911 D01.

Type	Maximum Output Power	Power Spectral Density
Non-BF	Directional gain = Max.gain + array gain. For power measurements on IEEE 802.11 devices Array Gain = 0 dB (i.e., no array gain) for N ANT ≤ 4	$Directiona\ lGain = 10 \cdot \log\left[\frac{\sum_{i=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{i,k}\right\}^2}{N_{ANT}}\right]$
BF	$Directiona\ lGain = 10 \cdot \log\left[\frac{\sum_{i=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{i,k}\right\}^2}{N_{ANT}}\right]$	$Directiona\ lGain = 10 \cdot \log\left[\frac{\sum_{i=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{i,k}\right\}^2}{N_{ANT}}\right]$

Ex.

Directional Gain (NSS1) formula : $Directiona\ lGain = 10 \cdot \log\left[\frac{\sum_{i=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{i,k}\right\}^2}{N_{ANT}}\right]$

NSS1(g1,1) = $10^{G1/20}$; NSS1(g1,2)= $10^{G2/20}$;

gi,k =(Nss1(g1,1) + Nss1(g1,2))^2

DG = 10 log[(Nss1(g1,1) + Nss1(g1,2))^2 / N_{ANT}] => 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / N_{ANT}]

Where :

G1 = 10 ; G2 = 10 ;

2.4G G1 = 2.93 dBi; G2 = 2.69 dBi ; DG = 5.82 dBi

5G UNII1 G1 = 5.39 dBi; G2 = 5.99 dBi; DG = 8.71 dBi

5G UNII3 G1 = 5.92 dBi; G2 = 5.91 dBi; DG = 8.93 dBi

1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.15.4	1	0	n/a (DC>=0.98)	n/a (DC>=0.98)

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

1.1.4 EUT Operational Condition

EUT Power Type	From Power Adapter or PoE			
Function	☒	Point-to-multipoint	☐	Point-to-point
Test Software Version	QSPR V5.0-00199			

Note: The above information was declared by manufacturer.

1.1.5 Table for Radio function

Radio	WLAN 2.4GHz	5GHz UNII 1	5GHz UNII 3	Bluetooth / Zigbee (IEEE802.15.4)
1	V	-	-	-
2	-	V	-	-
3	-	-	V	-
4	-	-	-	V

Note: The above information was declared by manufacturer.

1.2 Applicable Standards

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

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

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

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

1.3 Testing Location Information

Testing Location Information	
Test Lab.：Sporton International Inc. Hsinchu Laboratory	
Hsinchu (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	TH02-CB	Owen Hsu	23.3~24.9 / 67~69	Aug. 08, 2022~ Aug. 09, 2022
Radiated <Below 1GHz>	03CH06-CB	Stim Sung	24.4~25.5 / 55~58	Sep. 14, 2022
Radiated <Above 1GHz>	03CH01-CB	KJ Chang	24.8~26.3 / 63~66	Aug. 04, 2022~ Aug. 08, 2022
Radiated <Co-location>	03CH06-CB	KJ Chang	24.4-25.5 / 55-58	Aug. 04, 2022~ Aug. 08, 2022
AC Conduction	CO02-CB	Ryan Huang	24~25 / 61~62	Sep. 05, 2022

1.4 Measurement Uncertainty

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

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	3.4 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	3.4 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	5.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	5.2 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	4.7 dB	Confidence levels of 95%
Conducted Emission	3.2 dB	Confidence levels of 95%
Output Power Measurement	0.8 dB	Confidence levels of 95%
Power Density Measurement	3.2 dB	Confidence levels of 95%
Bandwidth Measurement	2.0 %	Confidence levels of 95%

2 Test Configuration of EUT

2.1 Test Channel Mode

Mode	Power Setting
802.15.4	-
2405MHz	20
2440MHz	20
2475MHz	20
2480MHz	8

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	EUT (WLAN + Bluetooth) with Adapter
2	EUT (WLAN + Bluetooth) with PoE 1_LAN 1
3	EUT (WLAN + Bluetooth) with PoE 1_LAN 2
Mode 3 has been evaluated to be the worst case among Mode 1~3, thus measurement for Mode 4~5 will follow this same test mode.	
4	Normal Link: EUT (WLAN + Zigbee (RX Function)) with PoE 1_LAN 2
5	Normal Link: EUT (WLAN + Zigbee (TX Function)) with PoE 1_LAN 2
Mode 3 generated the worst test result, so it was recorded in this report.	

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

The Worst Case Mode for Following Conformance Tests	
Tests Item	Emissions in Restricted Frequency Bands
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.
Operating Mode < 1GHz	Normal Link
1	EUT in Z axis (WLAN + Bluetooth) with Adapter
2	EUT in Y axis (WLAN + Bluetooth) with Adapter
3	EUT in X axis (WLAN + Bluetooth) with Adapter
Mode 1 has been evaluated to be the worst case among Mode 1~3, thus measurement for Mode 4~5 will follow this same test mode.	
4	EUT in Z axis (WLAN + Bluetooth) with PoE 1_LAN 1
5	EUT in Z axis (WLAN + Bluetooth) with PoE 1_LAN 2
Mode 5 has been evaluated to be the worst case among Mode 1~5, thus measurement for Mode 6~7 will follow this same test mode.	
6	Normal Link: EUT in Z axis (WLAN + Zigbee (RX Function)) with PoE 1_LAN 2
7	Normal Link: EUT in Z axis (WLAN + Zigbee (TX Function)) with PoE 1_LAN 2
For operating mode 5 is the worst case and it was record in this test report.	
Operating Mode > 1GHz	CTX
	The EUT was performed at X axis, Y axis and Z axis position, and the worst case as below:
1	EUT in X axis

The Worst Case Mode for Following Conformance Tests	
Tests Item	Simultaneous Transmission Analysis - Radiated Emission Co-location
Test Condition	Radiated measurement
Operating Mode	Normal Link
	The EUT can be placed in X axis, Y axis and Z axis. EUT Z axis has been evaluated to be the worst case at Radiated measurement <Above 1GHz>; thus, the measurement will follow this same test configuration.
1	EUT in Z axis + WLAN 2.4GHz + WLAN 5GHz_UNII1
2	EUT in Z axis + WLAN 5GHz_UNII3 + Zigbee (IEEE802.15.4)
3	EUT in Z axis + WLAN 5GHz_UNII3 + Bluetooth
For operating mode 1 is the worst case and it was record in this test report.	
Refer to Appendix G for Radiated Emission Co-location.	

The Worst Case Mode for Following Conformance Tests	
Tests Item	Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation
Operating Mode	
1	EUT + WLAN 2.4GHz + WLAN 5GHz_UNII1 + WLAN 5GHz_UNII3 + Zigbee (IEEE802.15.4)
2	EUT + WLAN 2.4GHz + WLAN 5GHz_UNII1 + WLAN 5GHz_UNII3 + Bluetooth
Refer to Sporton Test Report No.: FA272619 for Co-location RF Exposure Evaluation.	

Note The Adapter and PoE below is for measurement only, would not be marketed.

The Adapter and PoE information as below:

Support Unit	Brand Name	Model
Adapter	APD	DA-48Z12
PoE 1	Microsemi	PD-9001-10GC/AC
PoE 2	PHIHONG	POEA33U-1ATE

2.3 EUT Operation during Test

For CTX Mode:

The EUT was programmed to be in continuously transmitting mode.

For Normal Link Mode:

During the test, the EUT operation to normal function.

2.4 Accessories

Wall-mounted rack*1

2.5 Support Equipment

For AC Conduction:

Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
A	LAN1 NB	DELL	E6430	N/A
B	LAN2 NB	DELL	E6430	N/A
C	2.4G NB	DELL	E6431	N/A
D	5GL NB	DELL	E6432	N/A
E	5GH NB	DELL	E6433	N/A
F	Phone	Samsung	Galaxy J2	N/A
G	PoE 1	Microsemi	PD-9001-10GC/AC	N/A

For Radiated <below 1GHz>:

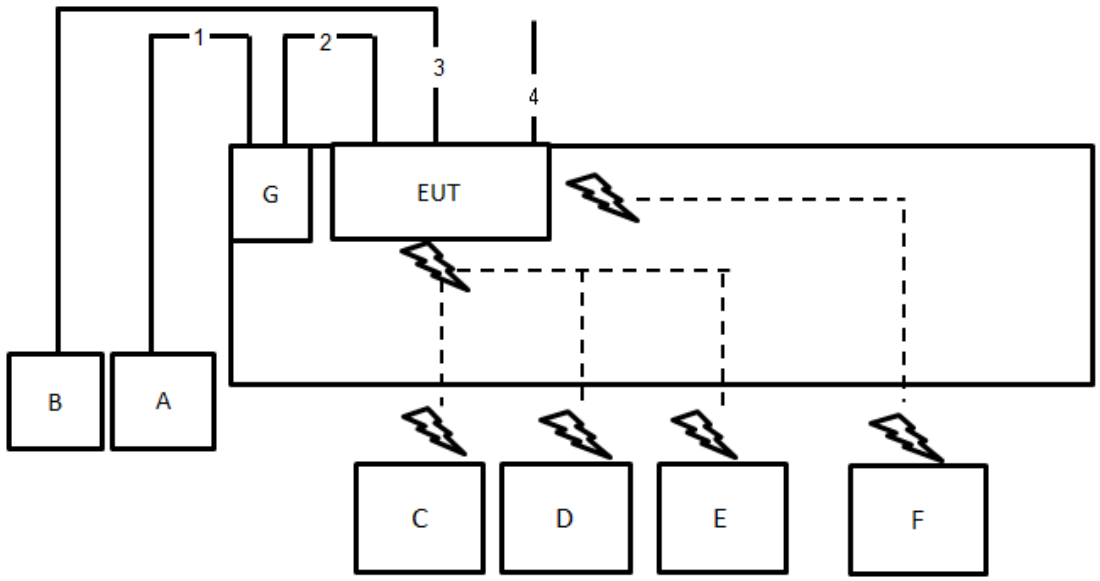
Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
A	PoE 1	Microsemi	PD-9001-10GC/AC	N/A
B	2.5G LAN NB	DELL	E4300	N/A
C	2.4G WIFI NB	DELL	E4300	N/A
D	5G L WIFI NB	DELL	E4300	N/A
E	5G H WIFI NB	DELL	E4300	N/A
F	2.5G LAN NB	DELL	E4300	N/A
G	Smart phone	Samsung	Galaxy J2	N/A

For Radiated <above 1GHz> and For RF Conducted:

Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
A	NB	DELL	E4300	N/A
B	PoE 2	PHIHONG	POEA33U-1ATE	N/A

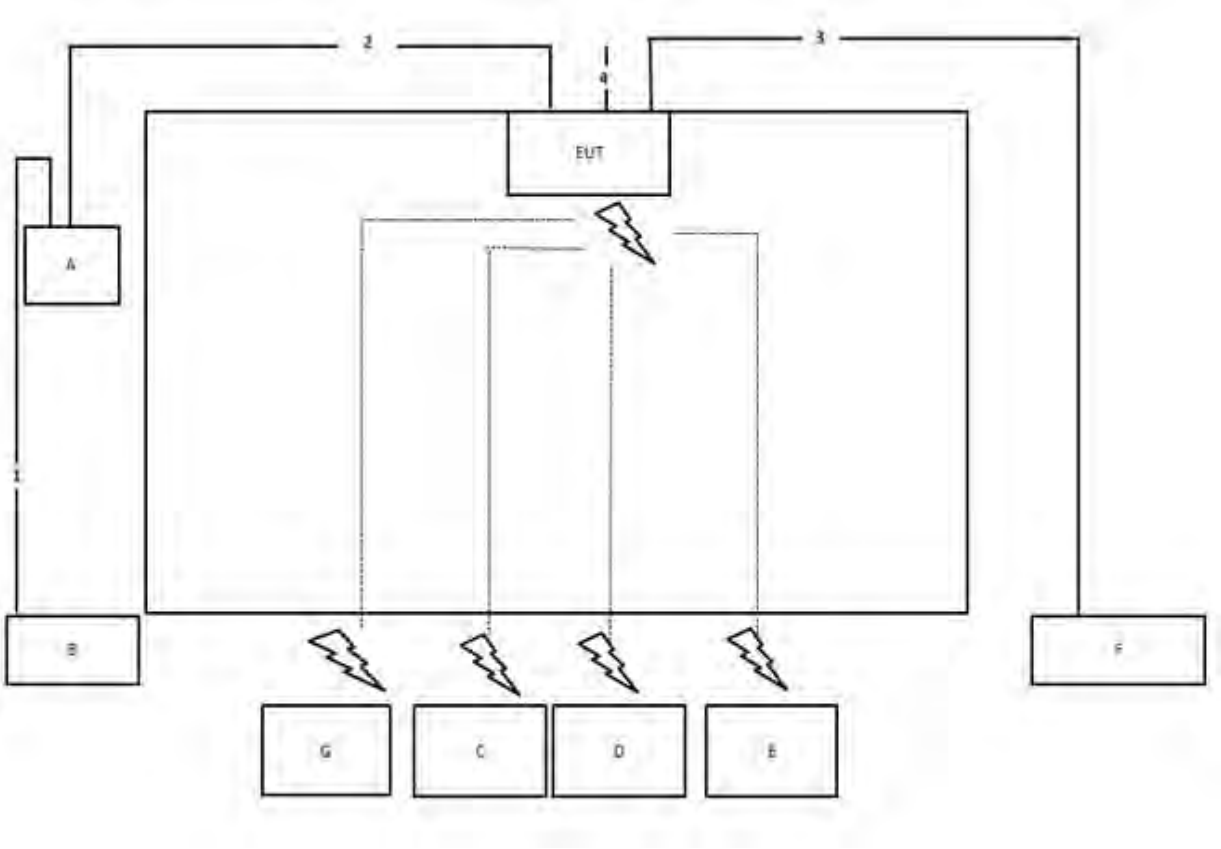
2.6 Test Setup Diagram

Test Setup Diagram – AC Line Conducted Emission Test



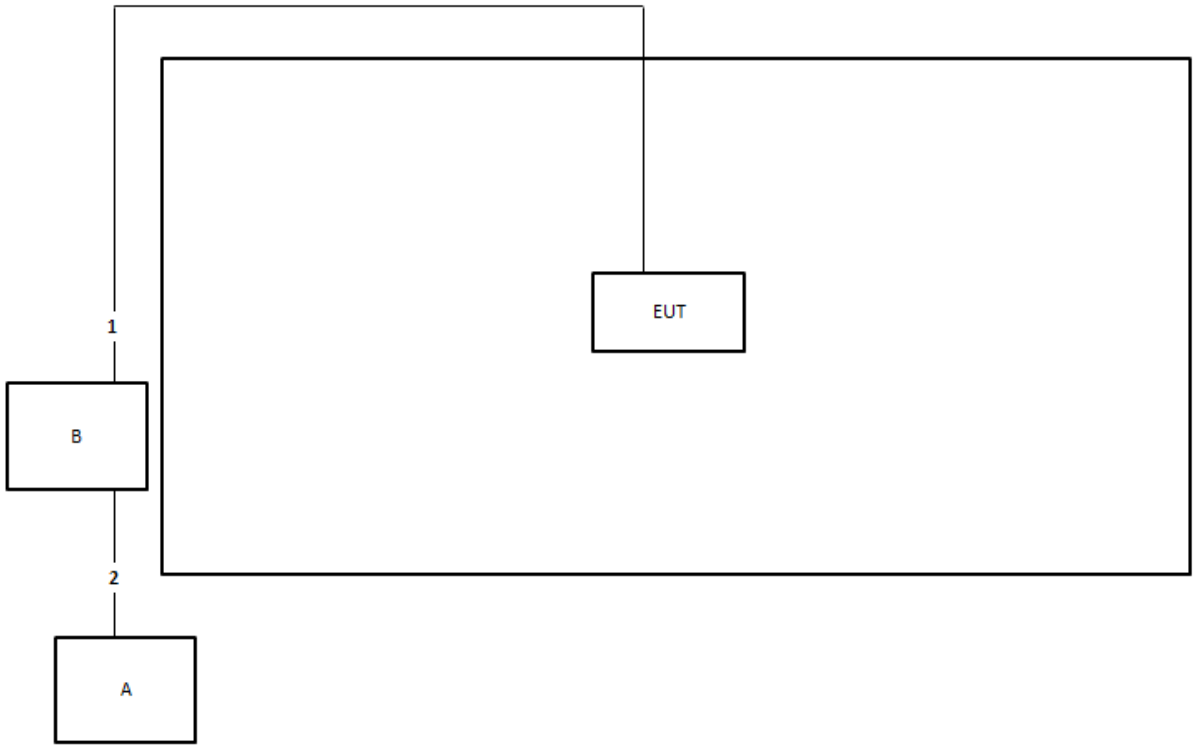
Item	Connection	Shielded	Length
1	RJ-45 Cable	No	10m
2	RJ-45 Cable	No	1.5m
3	RJ-45 Cable	No	10m
4	Console cable	No	1.8m

Test Setup Diagram - Radiated Test < 1GHz



Item	Connection	Shielded	Length
1	RJ-45 cable	No	1.5m
2	RJ-45 cable	No	10m
3	RJ-45 cable	No	10m
4	Console cable	No	1.8m

Test Setup Diagram - Radiated Test > 1GHz



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

3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

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

3.1.2 Measuring Instruments

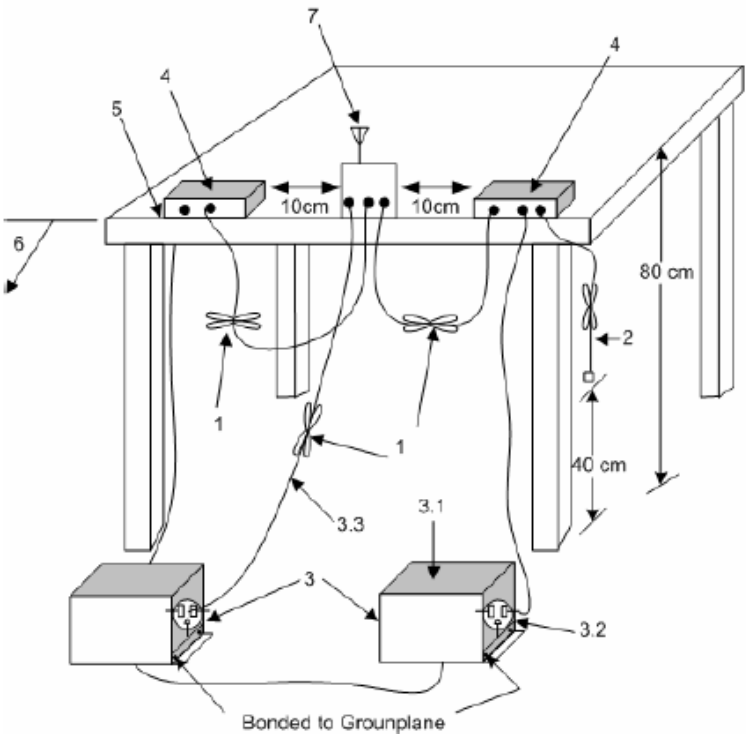
Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

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

3.1.4 Test Setup

AC Power-line Conducted Emissions



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

3.1.5 Measurement Results Calculation

The measured Level is calculated using:

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

b. Margin = -Limit + Level

3.1.6 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A

3.2 DTS Bandwidth

3.2.1 6dB Bandwidth Limit

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

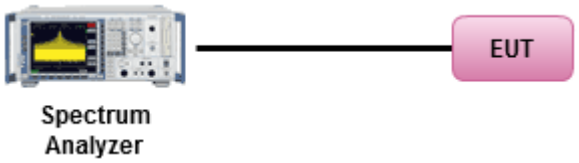
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

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

3.2.4 Test Setup

Emission Bandwidth
 Spectrum Analyzer

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

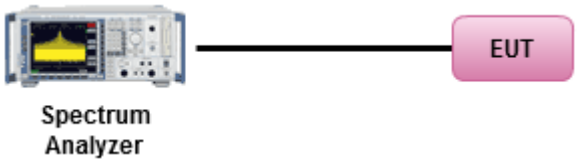
3.4.2 Measuring Instruments

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.	

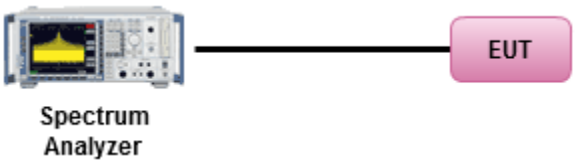
3.5.2 Measuring Instruments

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.

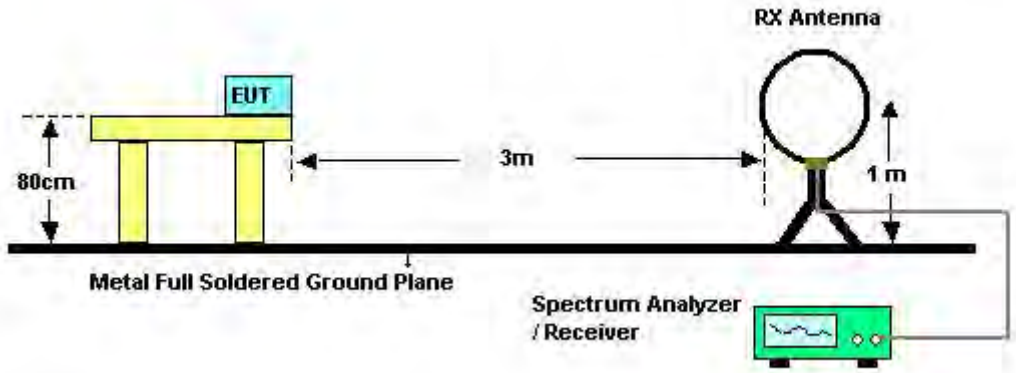
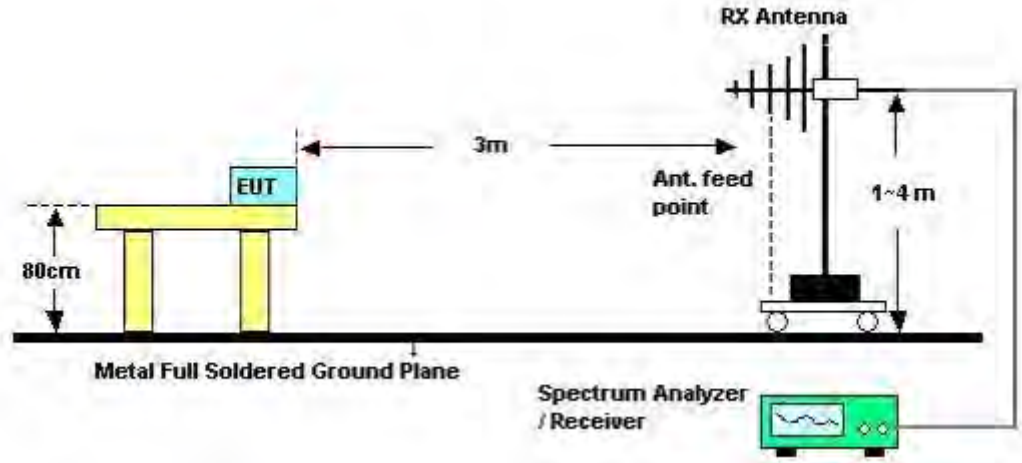
3.6.2 Measuring Instruments

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

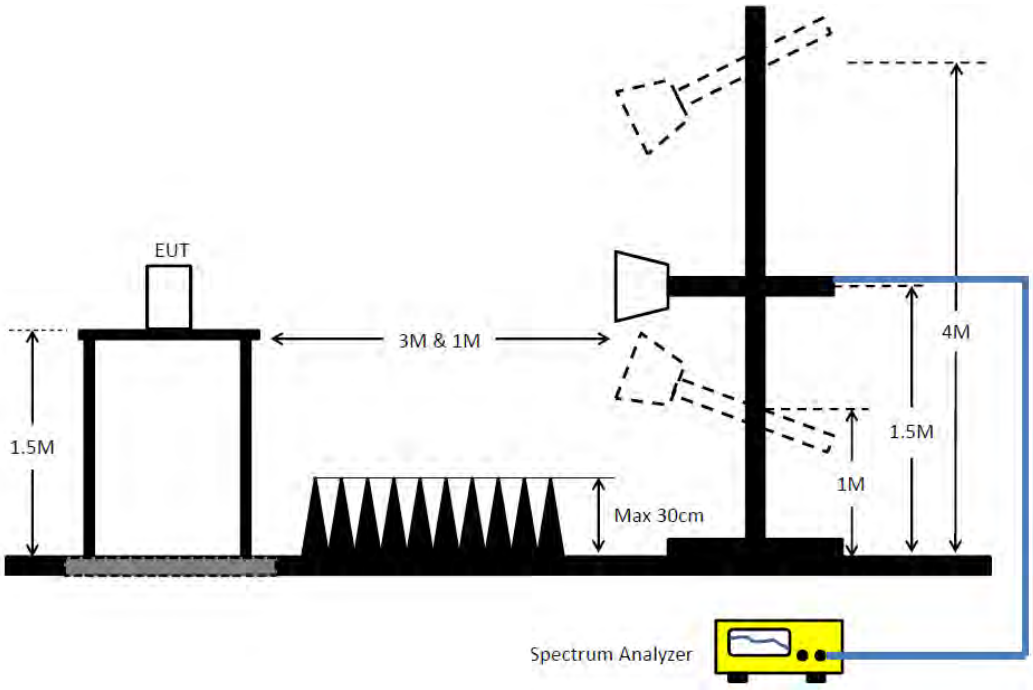
3.6.3 Test Procedures

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
LISN	Schwarzbeck	NSLK 8127	8127650	9kHz ~ 30MHz	Jan. 07, 2022	Jan. 06, 2023	Conduction (CO02-CB)
LISN	Schwarzbeck	NSLK 8127	8127478	9kHz ~ 30MHz	Dec. 22, 2021	Dec. 21, 2022	Conduction (CO02-CB)
EMI Receiver	Agilent	N9038A	MY52260140	9kHz ~ 8.4GHz	May 06, 2022	May 05, 2023	Conduction (CO02-CB)
Pulse Limiter	Schwarzbeck	VTSD 9561F-N	00378	9kHz ~ 30MHz	Mar. 18, 2022	Mar. 17, 2023	Conduction (CO02-CB)
Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conduction (CO02-CB)
Loop Antenna	Teseq	HLA 6120	31244	9kHz - 30 MHz	Mar. 18, 2022	Mar. 17, 2023	Radiation (03CH06-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH06-CB	30 MHz ~ 1 GHz	Aug. 04, 2022	Aug. 03. 2023	Radiation (03CH06-CB)
3m Semi Anechoic Chamber VSWR	TDK	SAC-3M	03CH06-CB	1GHz ~18GHz 3m	Oct. 01, 2021	Sep. 30, 2022	Radiation (03CH06-CB)
Bilog Antenna with 6 dB attenuator	TESEQ & EMCI	CBL6112D & N-6-06	37878 & AT-N0606	20MHz ~ 2GHz	Jul. 31, 2022	Jul. 30, 2023	Radiation (03CH06-CB)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1370	1GHz~18GHz	Jun. 23, 2022	Jun. 22, 2023	Radiation (03CH06-CB)
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170507	15GHz ~ 40GHz	Jul. 05, 2022	Jul. 04, 2023	Radiation (03CH06-CB)
Pre-Amplifier	Agilent	310N	187290	0.1MHz ~ 1GHz	Nov. 04, 2021	Nov. 03, 2022	Radiation (03CH06-CB)
Pre-Amplifier	Agilent	83017A	MY53270064	0.5GHz ~ 26.5GHz	Aug 02, 2022	Aug 01, 2023	Radiation (03CH06-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jul. 20, 2022	Jul. 19, 2023	Radiation (03CH06-CB)
Spectrum analyzer	R&S	FSP40	100080	9kHz~40GHz	Dec. 24, 2021	Dec. 23, 2022	Radiation (03CH06-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	Jun. 17, 2022	Jun. 16, 2023	Radiation (03CH06-CB)
RF Cable-low	Woken	RG402	Low Cable-24+67	30MHz~1GHz	Jun. 20, 2022	Jun. 19, 2023	Radiation (03CH06-CB)
RF Cable-high	Woken	RG402	High Cable-67	1GHz~18GHz	Feb. 24, 2022	Feb. 23, 2023	Radiation (03CH06-CB)
RF Cable-high	Woken	RG402	High Cable-05+67	1GHz~18GHz	Feb. 24, 2022	Feb. 23, 2023	Radiation (03CH06-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH06-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH01-CB	30 MHz ~ 1 GHz	Jan. 25, 2022	Jan. 24, 2023	Radiation (03CH01-CB)
3m Semi Anechoic Chamber VSWR	TDK	SAC-3M	03CH01-CB	1GHz ~18GHz 3m	May 06, 2022	May 05, 2023	Radiation (03CH01-CB)

Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
BILOG ANTENNA with 6dB Attenuator	TESEQ & EMCI	CBL6112D N-6-06	37880 & AT-N0609	20MHz ~ 2GHz	Feb. 21, 2022	Feb. 20, 2023	Radiation (03CH01-CB)
Horn Antenna	ETS-LINDGREN	3115	00075790	750MHz ~ 18GHz	Nov. 06, 2021	Nov. 05, 2022	Radiation (03CH01-CB)
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170507	15GHz ~ 40GHz	Jul. 05, 2022	Jul. 04, 2023	Radiation (03CH01-CB)
Amplifier	EMCI	EMC330N	980332	20MHz ~ 3GHz	Jul. 01, 2022	Jun. 30, 2023	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02121	1GHz ~ 26.5GHz	May 19, 2022	May 18, 2023	Radiation (03CH01-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jul. 20, 2022	Jul. 19, 2023	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	May 06, 2022	May 05, 2023	Radiation (03CH01-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	Jun. 17, 2022	Jun. 16, 2023	Radiation (03CH01-CB)
RF Cable-low	Woken	RG402	Low Cable-16+17	30 MHz ~ 1 GHz	Oct. 04, 2021	Oct. 03, 2022	Radiation (03CH01-CB)
RF Cable-high	Woken	RG402	High Cable-16	1 GHz ~ 18 GHz	Oct. 04, 2021	Oct. 03, 2022	Radiation (03CH01-CB)
RF Cable-high	Woken	RG402	High Cable-16+17	1 GHz ~ 18 GHz	Oct. 04, 2021	Oct. 03, 2022	Radiation (03CH01-CB)
High Cable	Woken	WCA0929M	40G#5+7	1GHz ~ 40 GHz	Dec. 14, 2021	Dec. 13, 2022	Radiation (03CH01-CB)
High Cable	Woken	WCA0929M	40G#5	1GHz ~ 40 GHz	Dec. 08, 2021	Dec. 07, 2022	Radiation (03CH01-CB)
High Cable	Woken	WCA0929M	40G#7	1GHz ~ 40 GHz	Dec. 14, 2021	Dec. 13, 2022	Radiation (03CH01-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH01-CB)
Signal Analyzer	R&S	FSV40	101904	9kHz ~ 40GHz	Apr. 26, 2022	Apr. 25, 2023	Conducted (TH02-CB)
Power Sensor	Anritsu	MA2411B	1126203	300MHz~40GHz	Oct. 25, 2021	Oct. 24, 2022	Conducted (TH02-CB)
Power Meter	Anritsu	ML2495A	1210004	300MHz~40GHz	Oct. 25, 2021	Oct. 24, 2022	Conducted (TH02-CB)
RF Cable-high	Woken	RG402	High Cable-01	1 GHz – 18 GHz	Oct. 04, 2021	Oct. 03, 2022	Conducted (TH02-CB)
RF Cable-high	Woken	RG402	High Cable-02	1 GHz – 18 GHz	Oct. 04, 2021	Oct. 03, 2022	Conducted (TH02-CB)
RF Cable-high	Woken	RG402	High Cable-03	1 GHz – 18 GHz	Oct. 04, 2021	Oct. 03, 2022	Conducted (TH02-CB)
RF Cable-high	Woken	RG402	High Cable-04	1 GHz – 18 GHz	Oct. 04, 2021	Oct. 03, 2022	Conducted (TH02-CB)
RF Cable-high	Woken	RG402	High Cable-05	1 GHz – 18 GHz	Oct. 04, 2021	Oct. 03, 2022	Conducted (TH02-CB)
Switch	SPTCB	SP-SWI	SWI-02	1 GHz –26.5 GHz	Dec. 13, 2021	Dec. 12, 2022	Conducted (TH02-CB)

Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
RF Cable-high	Woken	RG402	SWI-02-P1	1 GHz –26.5 GHz	Dec. 13, 2021	Dec. 12, 2022	Conducted (TH02-CB)
RF Cable-high	Woken	RG402	SWI-02-P2	1 GHz –26.5 GHz	Dec. 13, 2021	Dec. 12, 2022	Conducted (TH02-CB)
RF Cable-high	Woken	RG402	SWI-02-P3	1 GHz –26.5 GHz	Dec. 13, 2021	Dec. 12, 2022	Conducted (TH02-CB)
RF Cable-high	Woken	RG402	SWI-02-P4	1 GHz –26.5 GHz	Dec. 13, 2021	Dec. 12, 2022	Conducted (TH02-CB)
RF Cable-high	Woken	RG402	SWI-02-P5	1 GHz –26.5 GHz	Dec. 13, 2021	Dec. 12, 2022	Conducted (TH02-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conducted (TH02-CB)

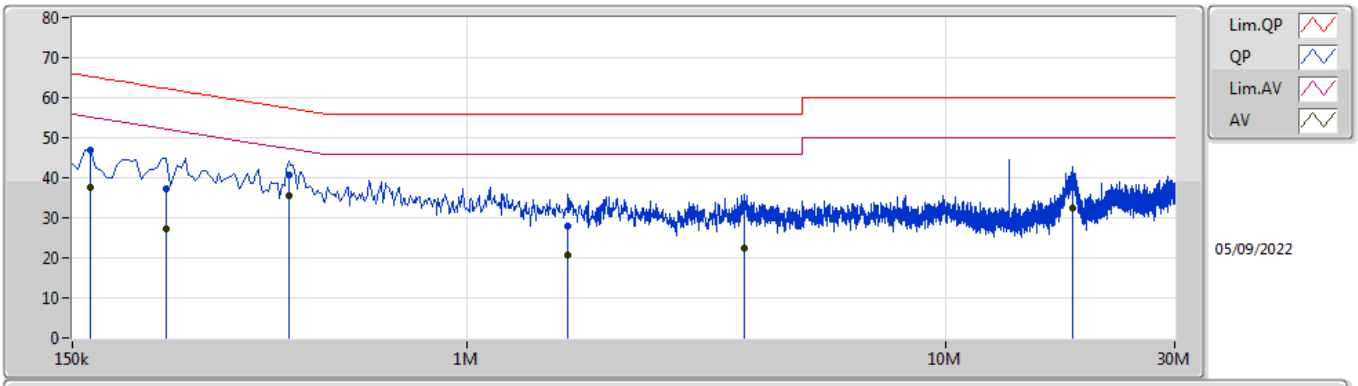
Note: Calibration Interval of instruments listed above is one year.

NCR means Non-Calibration required.

Summary

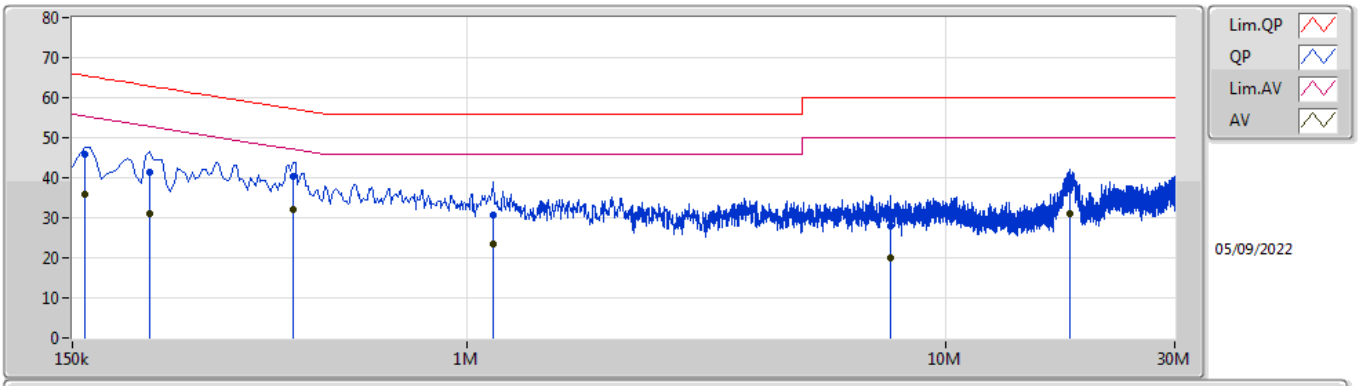
Mode	Result	Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition
Mode 3	Pass	AV	424.5k	35.39	47.36	-11.97	Line

Mode 3



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	163.5k	46.94	65.27	-18.33	10.23	Line	-	36.71	0.12	0.02	10.09
AV	163.5k	37.51	55.27	-17.76	10.23	Line	-	27.28	0.12	0.02	10.09
QP	235.5k	37.18	62.25	-25.07	10.21	Line	-	26.97	0.12	0.02	10.07
AV	235.5k	27.15	52.25	-25.10	10.21	Line	-	16.94	0.12	0.02	10.07
QP	424.5k	40.52	57.36	-16.84	10.25	Line	-	30.27	0.12	0.02	10.11
AV	424.5k	35.39	47.36	-11.97	10.25	Line	"Worst"	25.14	0.12	0.02	10.11
QP	1.626M	27.92	56.00	-28.08	10.35	Line	-	17.57	0.16	0.04	10.15
AV	1.626M	20.82	46.00	-25.18	10.35	Line	-	10.47	0.16	0.04	10.15
QP	3.786M	33.10	56.00	-22.90	10.49	Line	-	22.61	0.23	0.07	10.19
AV	3.786M	22.57	46.00	-23.43	10.49	Line	-	12.08	0.23	0.07	10.19
QP	18.353M	38.91	60.00	-21.09	10.71	Line	-	28.20	0.38	0.12	10.21
AV	18.353M	32.44	50.00	-17.56	10.71	Line	-	21.73	0.38	0.12	10.21

Mode 3



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	159k	45.77	65.52	-19.75	10.28	Neutral	-	35.49	0.16	0.02	10.10
AV	159k	35.75	55.52	-19.77	10.28	Neutral	-	25.47	0.16	0.02	10.10
QP	217.5k	41.52	62.92	-21.40	10.25	Neutral	-	31.27	0.16	0.02	10.07
AV	217.5k	31.16	52.92	-21.76	10.25	Neutral	-	20.91	0.16	0.02	10.07
QP	433.5k	40.33	57.19	-16.86	10.29	Neutral	-	30.04	0.16	0.02	10.11
AV	433.5k	32.12	47.19	-15.07	10.29	Neutral	"Worst"	21.83	0.16	0.02	10.11
QP	1.136M	30.57	56.00	-25.43	10.34	Neutral	-	20.23	0.17	0.03	10.14
AV	1.136M	23.51	46.00	-22.49	10.34	Neutral	-	13.17	0.17	0.03	10.14
QP	7.656M	27.98	60.00	-32.02	10.53	Neutral	-	17.45	0.27	0.07	10.19
AV	7.656M	20.01	50.00	-29.99	10.53	Neutral	-	9.48	0.27	0.07	10.19
QP	18.11M	37.40	60.00	-22.60	10.65	Neutral	-	26.75	0.32	0.12	10.21
AV	18.11M	30.96	50.00	-19.04	10.65	Neutral	-	20.31	0.32	0.12	10.21

Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4-2.4835GHz	-	-	-	-	-
802.15.4_1TX	1.631M	2.269M	2M27G1D	1.613M	2.26M

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

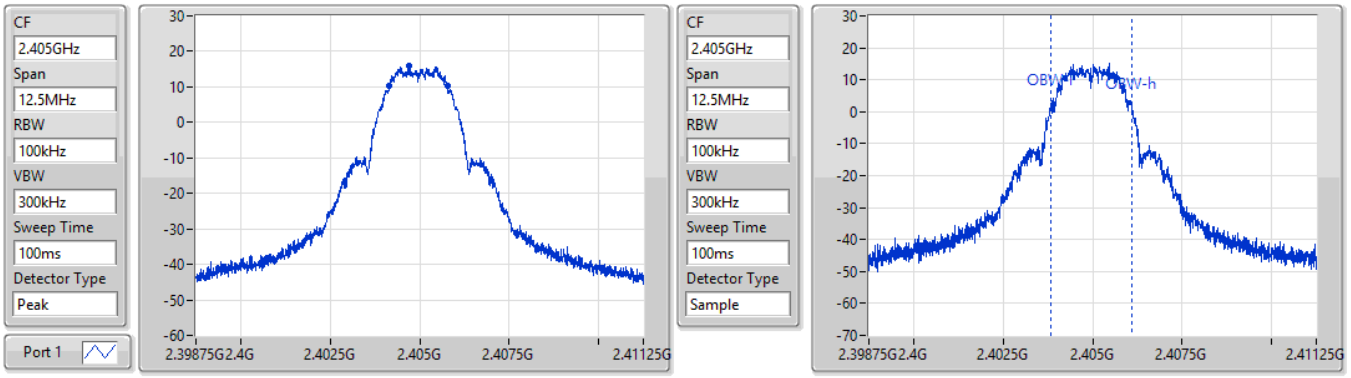
Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
802.15.4_1TX	-	-	-	-
2405MHz	Pass	500k	1.613M	2.26M
2440MHz	Pass	500k	1.631M	2.26M
2480MHz	Pass	500k	1.631M	2.269M

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

802.15.4_1TX EBW-DTS

2405MHz

08/08/2022

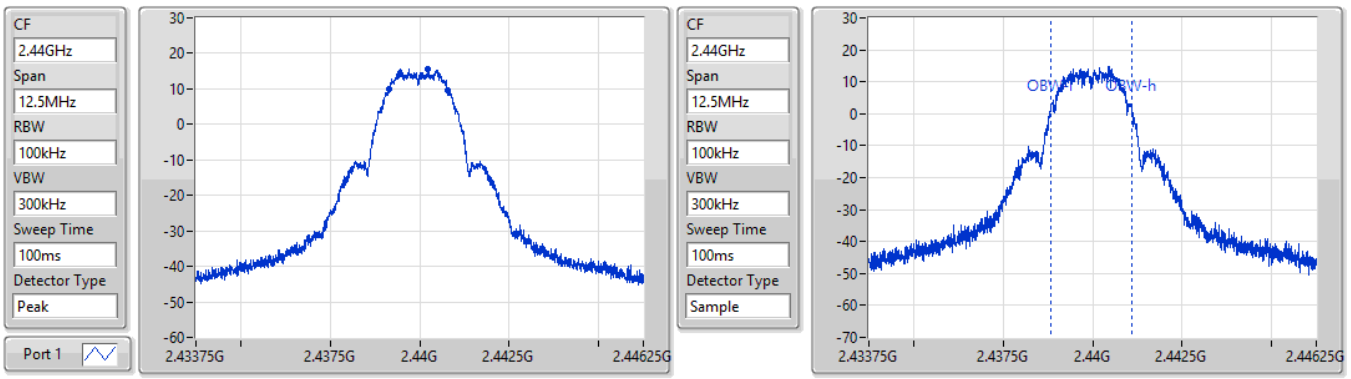


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.613M	2.404156G	2.405769G	2.26M	2.40383G	2.40609G	500k	1

802.15.4_1TX EBW-DTS

2440MHz

08/08/2022

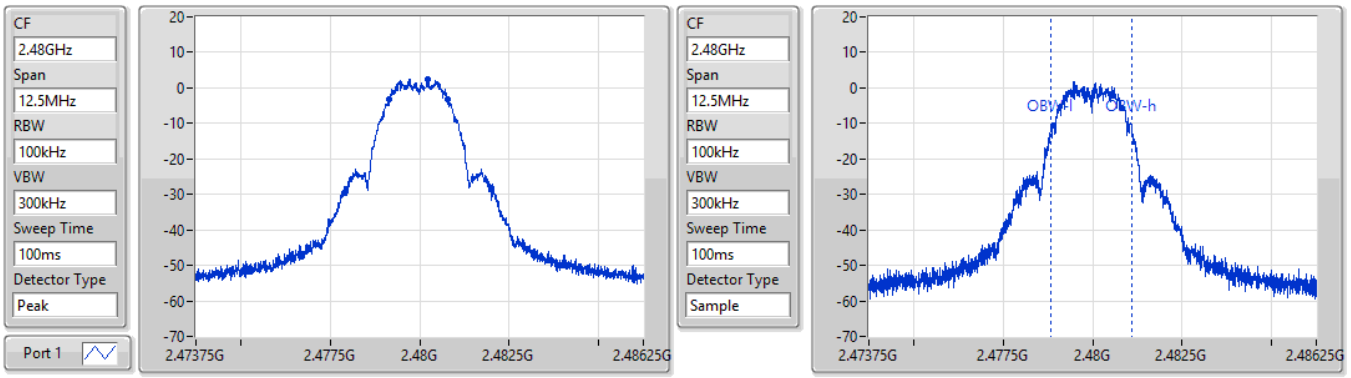


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.631M	2.43915G	2.440781G	2.26M	2.438832G	2.441092G	500k	1

802.15.4_1TX **EBW-DTS**

2480MHz

08/08/2022



6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.631M	2.47915G	2.480781G	2.269M	2.478829G	2.481098G	500k	1

Summary

Mode	Power (dBm)	Power (W)
2.4-2.4835GHz	-	-
802.15.4_1TX	19.38	0.08670

Result

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
802.15.4_1TX	-	-	-	-
2405MHz	Pass	3.49	19.38	30.00
2440MHz	Pass	3.49	19.20	30.00
2475MHz	Pass	3.49	19.08	30.00
2480MHz	Pass	3.49	5.86	30.00

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

Summary

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
802.15.4_1TX	3.37

RBW = 3kHz;

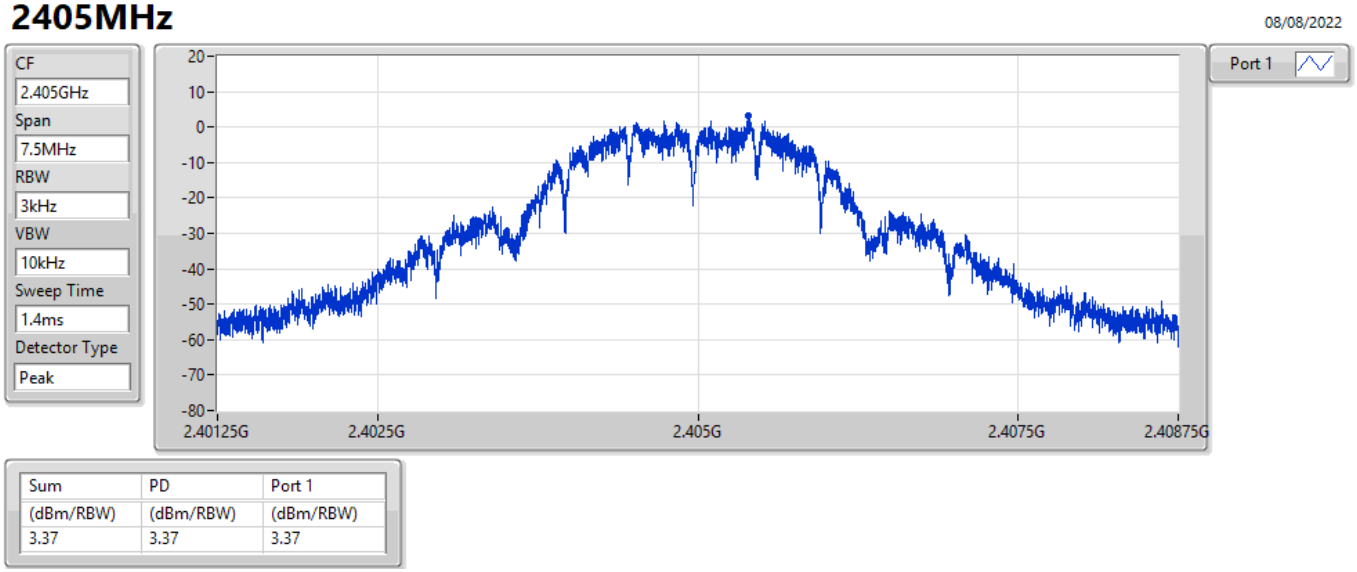
Result

Mode	Result	Gain (dBi)	PD (dBm/RBW)	PD Limit (dBm/RBW)
802.15.4_1TX	-	-	-	-
2405MHz	Pass	3.49	3.37	8.00
2440MHz	Pass	3.49	2.85	8.00
2480MHz	Pass	3.49	-9.83	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;

802.15.4_1TX PSD

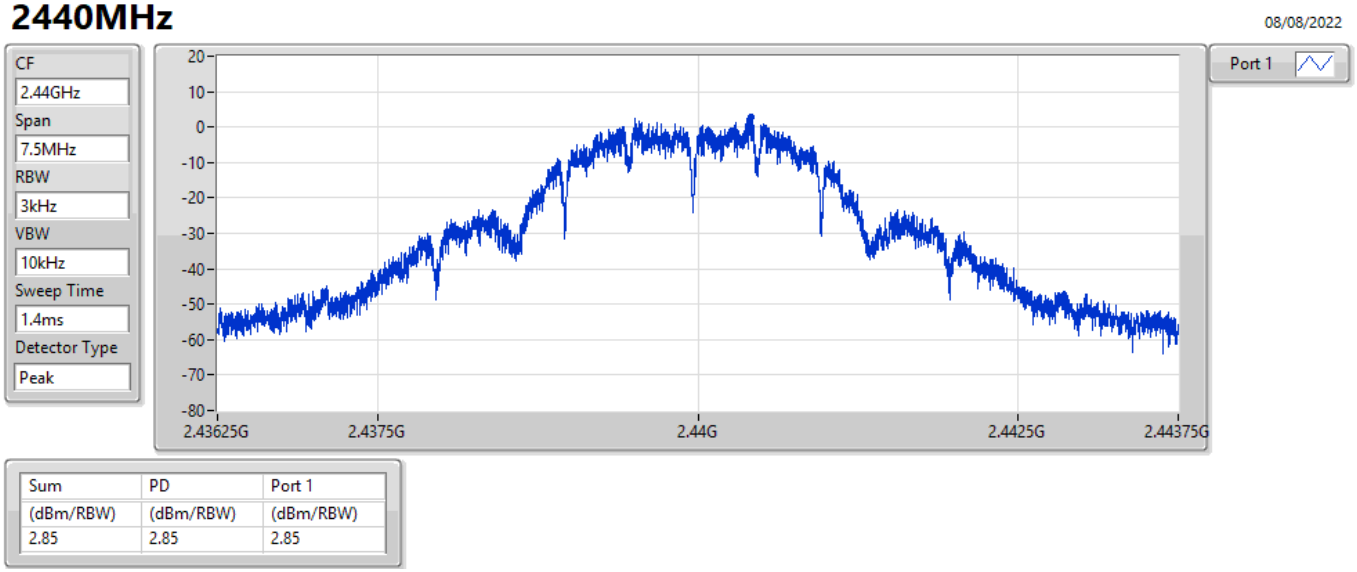
2405MHz



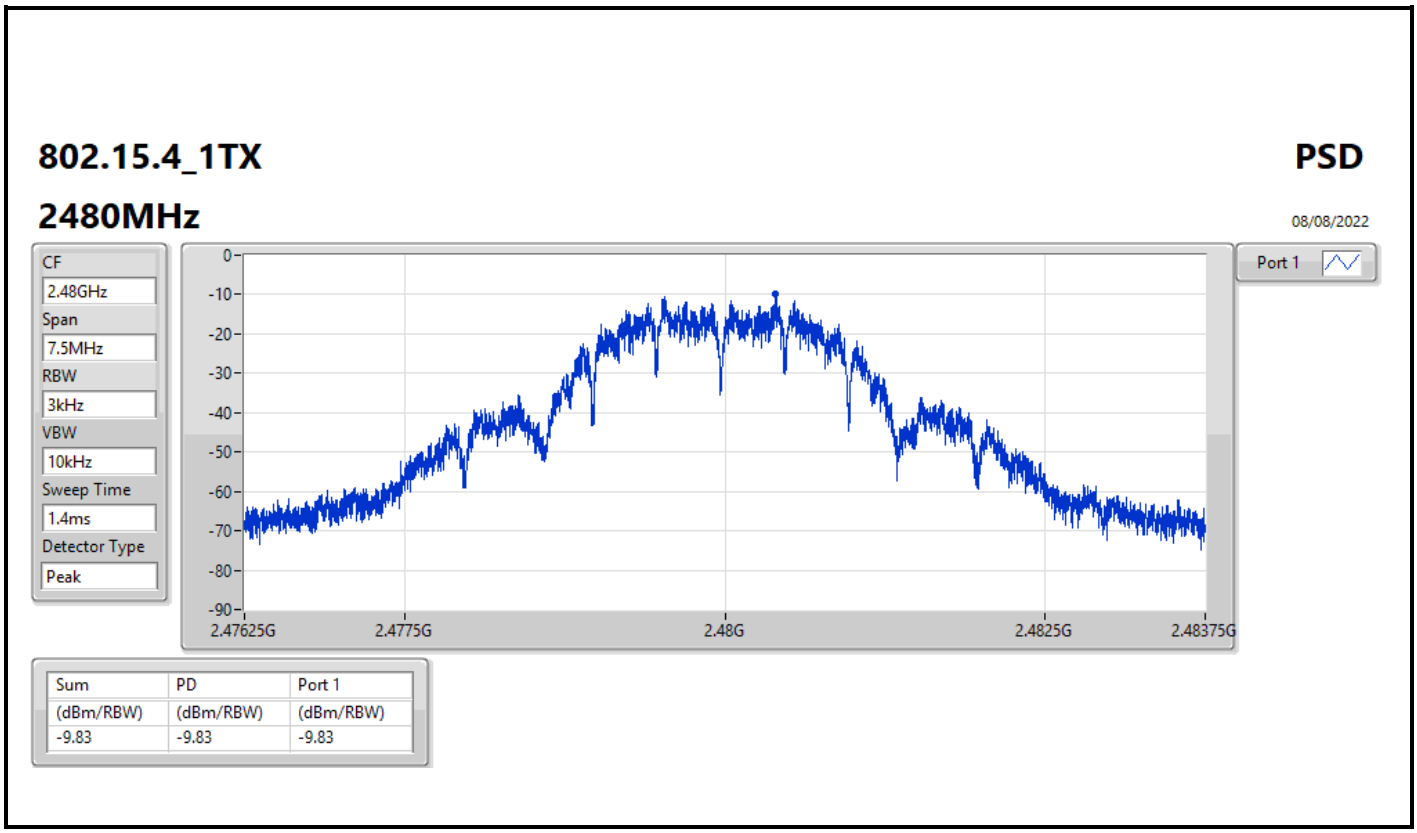
Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
3.37	3.37	3.37

802.15.4_1TX PSD

2440MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
2.85	2.85	2.85


802.15.4_1TX
PSD
2480MHz
08/08/2022
CF
2.48GHz
Span
7.5MHz
RBW
3kHz
VBW
10kHz
Sweep Time
1.4ms
Detector Type
Peak
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
2.47625G
2.4775G
2.48G
2.4825G
2.48375G
Port 1
Sum
PD
Port 1
(dBm/RBW)
(dBm/RBW)
(dBm/RBW)
-9.83
-9.83
-9.83

Summary

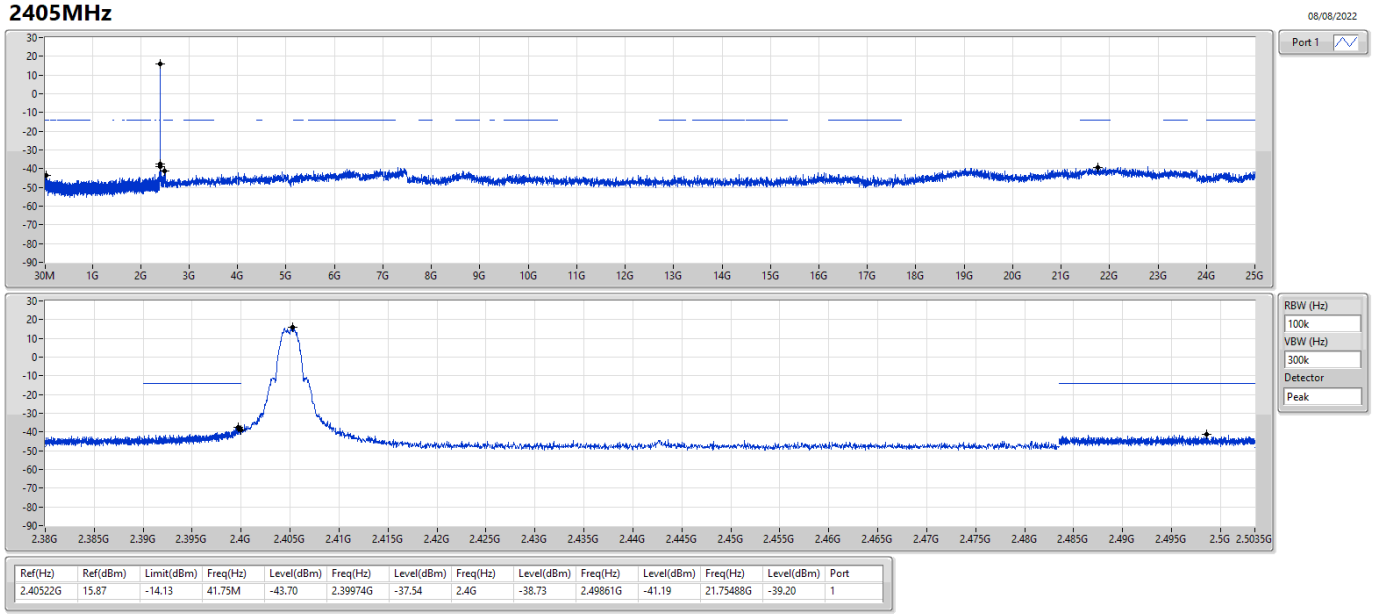
Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
802.15.4_1TX	Pass	2.40522G	15.87	-14.13	41.75M	-43.70	2.39974G	-37.54	2.4G	-38.73	2.49861G	-41.19	21.75488G	-39.20	1

Result

Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
802.15.4_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2405MHz	Pass	2.40522G	15.87	-14.13	41.75M	-43.70	2.39974G	-37.54	2.4G	-38.73	2.49861G	-41.19	21.75488G	-39.20	1
2440MHz	Pass	2.40522G	15.87	-14.13	350.48M	-44.94	2.39868G	-41.98	2.4835G	-47.62	2.50326G	-41.17	21.59459G	-39.21	1
2480MHz	Pass	2.40522G	15.87	-14.13	2.15205G	-44.90	2.39548G	-42.11	2.4835G	-44.01	2.49983G	-40.68	21.58616G	-37.69	1

802.15.4_1TX **CSENdB-DTS**

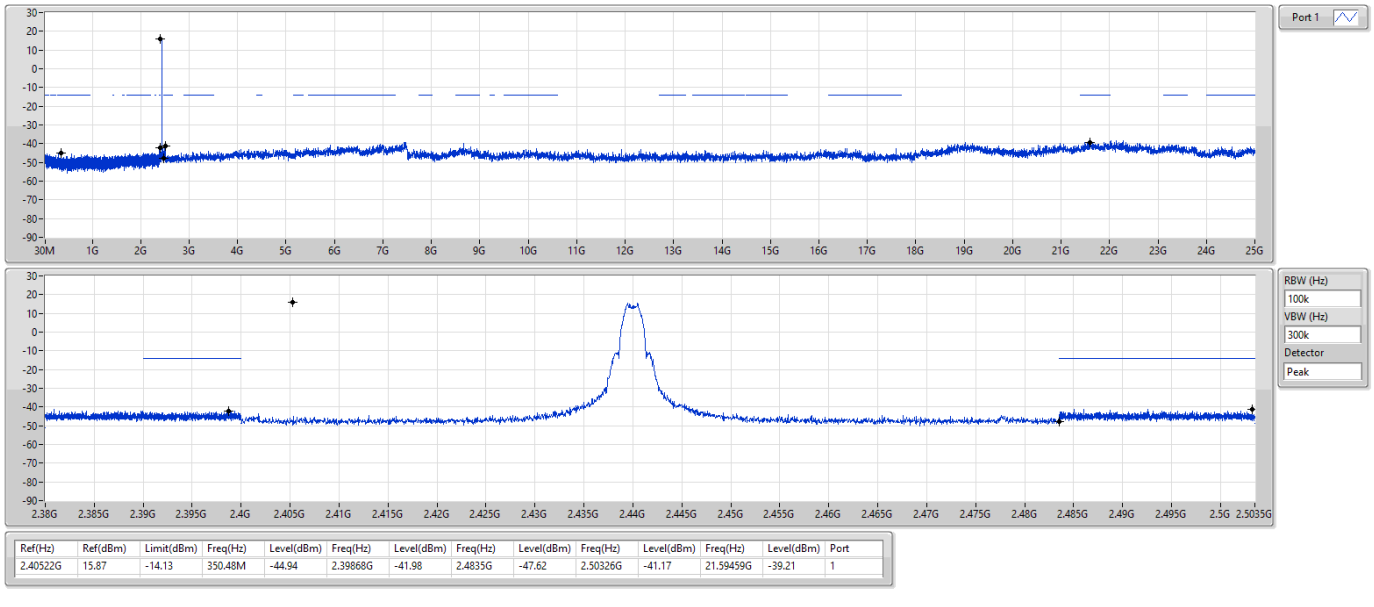
2405MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.40522G	15.87	-14.13	41.75M	-43.70	2.39974G	-37.54	2.4G	-38.73	2.49861G	-41.19	21.75488G	-39.20	1

802.15.4_1TX **CSENdB-DTS**

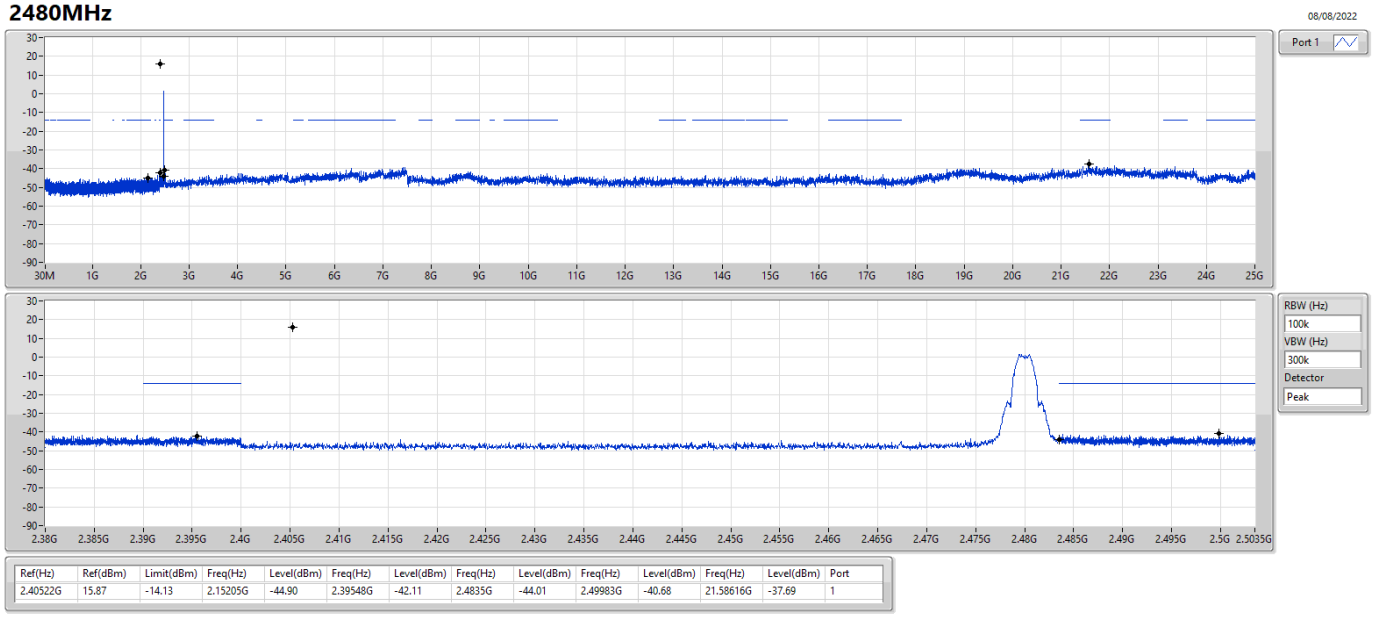
2440MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.40522G	15.87	-14.13	350.48M	-44.94	2.39868G	-41.98	2.4835G	-47.62	2.50326G	-41.17	21.59459G	-39.21	1

802.15.4_1TX CSENdB-DTS

2480MHz

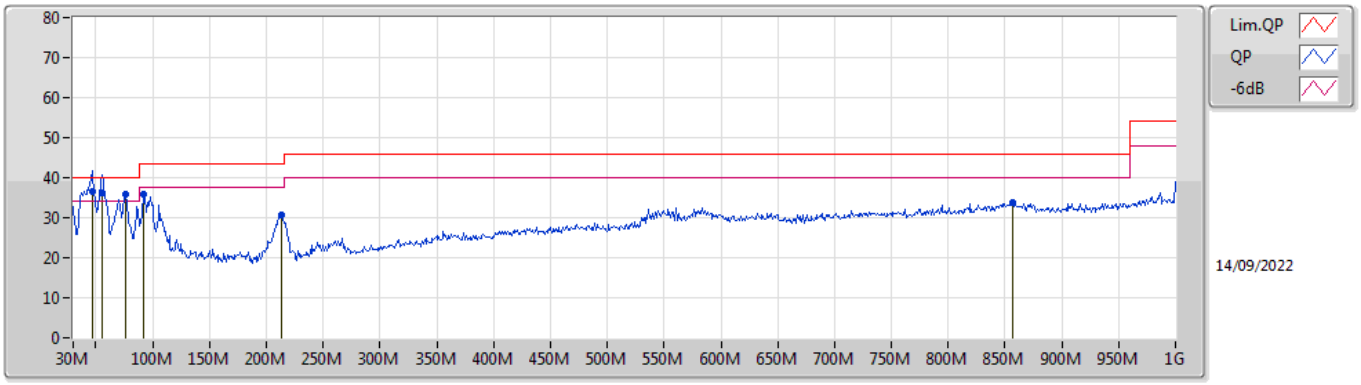


Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.40522G	15.87	-14.13	2.15205G	-44.90	2.39548G	-42.11	2.4835G	-44.01	2.49983G	-40.68	21.58616G	-37.69	1

Summary

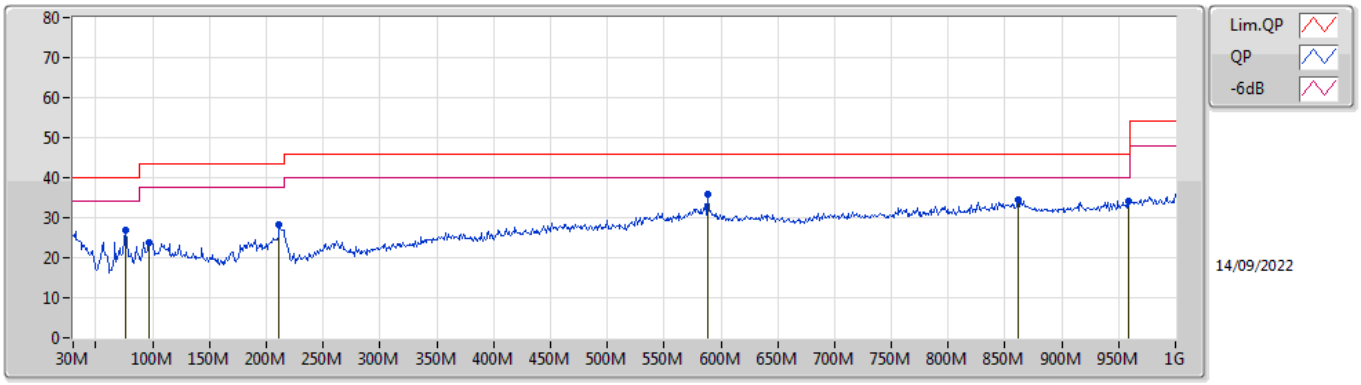
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 5	Pass	QP	46.49M	36.62	40.00	-3.38	Vertical

Mode 5



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	46.49M	36.62	40.00	-3.38	-15.38	3	Vertical	34	1.00	"Worst"	52.00	15.90	1.20	32.48
QP	55.22M	36.04	40.00	-3.96	-18.26	3	Vertical	0	1.00	-	54.30	12.92	1.30	32.48
PK	76.56M	35.78	40.00	-4.22	-18.23	3	Vertical	109	1.00	-	54.01	12.64	1.53	32.40
PK	92.08M	35.90	43.50	-7.60	-15.42	3	Vertical	253	1.25	-	51.32	15.18	1.74	32.34
PK	213.33M	30.64	43.50	-12.86	-14.65	3	Vertical	216	1.00	-	45.29	14.98	2.68	32.31
PK	856.44M	33.90	46.00	-12.10	0.40	3	Vertical	360	1.25	-	33.50	26.24	5.73	31.57

Mode 5



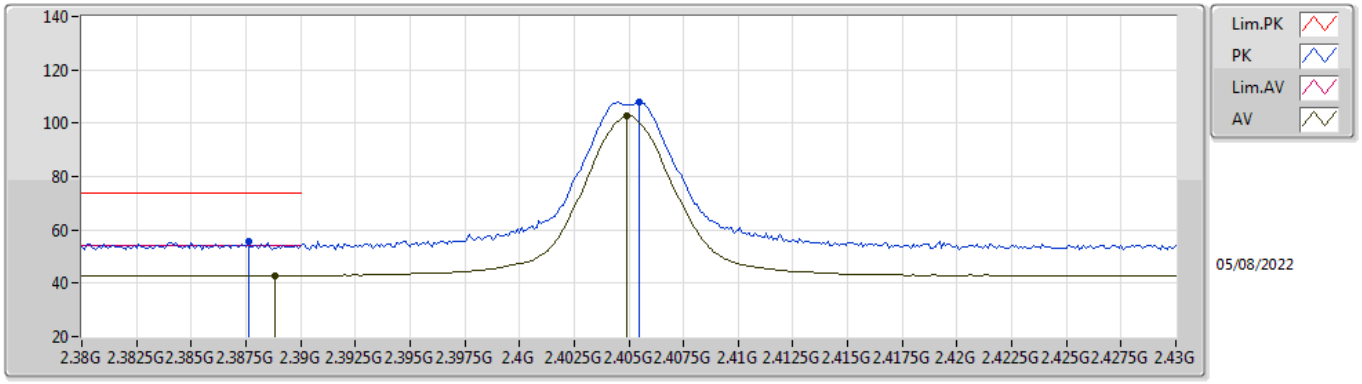
Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB/m)	(m)		(°)	(m)		(dBuV/m)	(dB/m)	(dB)	(dB)
PK	76.56M	26.92	40.00	-13.08	-18.23	3	Horizontal	131	1.50	-	45.15	12.64	1.53	32.40
PK	96.93M	23.95	43.50	-19.55	-14.36	3	Horizontal	46	2.00	-	38.31	16.18	1.80	32.34
PK	211.39M	28.33	43.50	-15.17	-14.55	3	Horizontal	245	2.00	-	42.88	15.10	2.67	32.32
PK	588.72M	35.79	46.00	-10.21	-2.89	3	Horizontal	226	2.00	"Worst"	38.68	24.58	4.65	32.12
PK	861.29M	34.32	46.00	-11.68	0.41	3	Horizontal	245	1.25	-	33.91	26.23	5.75	31.57
PK	958.29M	34.09	46.00	-11.91	1.93	3	Horizontal	162	1.50	-	32.16	26.78	6.13	30.98

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	-	-	-	-	-	-	-	-	-	-	-
802.15.4_Nss1_1TX	Pass	AV	2.4835G	53.12	54.00	-0.88	3	Horizontal	50	1.17	-

802.15.4_Nss1_1TX

2405MHz_TX

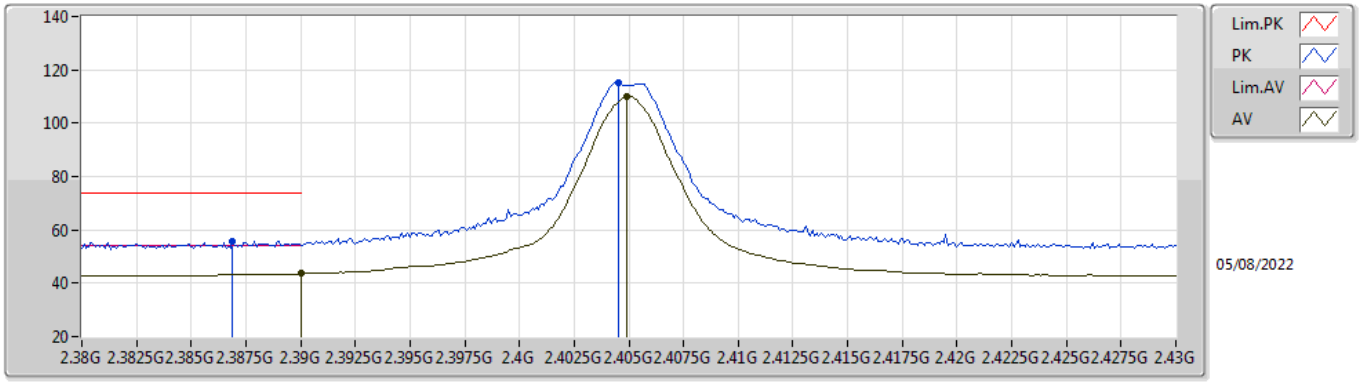


EUT X_1TX
Setting 20dBm
01-A-K-3

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	2.3876G	55.57	74.00	-18.43	24.22	3	Vertical	186	1.26	-	27.55	3.80	-	
AV	2.3888G	42.85	54.00	-11.15	11.49	3	Vertical	186	1.26	-	27.56	3.80	-	
PK	2.4055G	107.71	Inf	-Inf	76.32	3	Vertical	186	1.26	-	27.59	3.80	-	
AV	2.4049G	102.86	Inf	-Inf	71.47	3	Vertical	186	1.26	-	27.59	3.80	-	

802.15.4_Nss1_1TX

2405MHz_TX

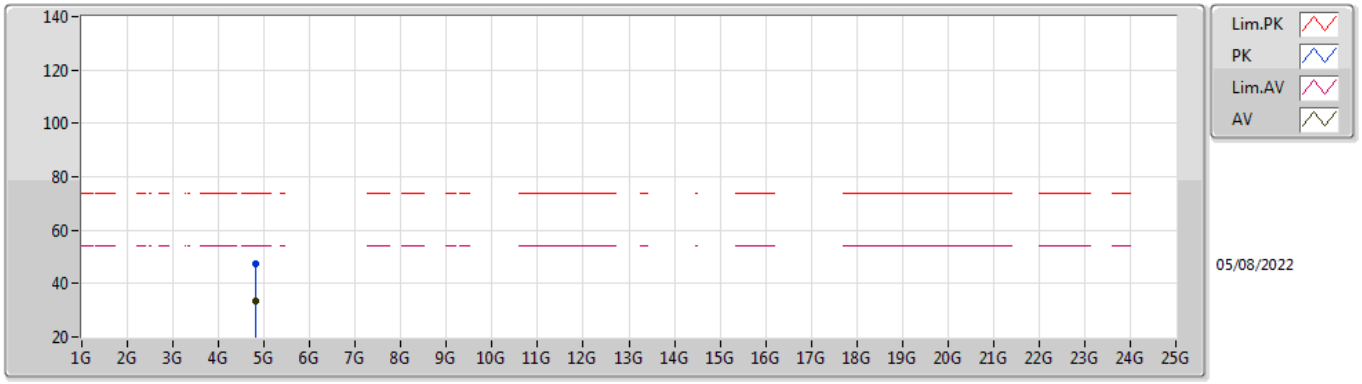


EUT X_1TX
Setting 20dBm
01-A-K-3

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	2.3869G	55.71	74.00	-18.29	24.36	3	Horizontal	56	1.44	-	27.55	3.80	-
AV	2.39G	43.56	54.00	-10.44	12.20	3	Horizontal	56	1.44	-	27.56	3.80	-
PK	2.4045G	114.95	Inf	-Inf	83.56	3	Horizontal	56	1.44	-	27.59	3.80	-
AV	2.4049G	110.13	Inf	-Inf	78.74	3	Horizontal	56	1.44	-	27.59	3.80	-

802.15.4_Nss1_1TX

2405MHz_TX

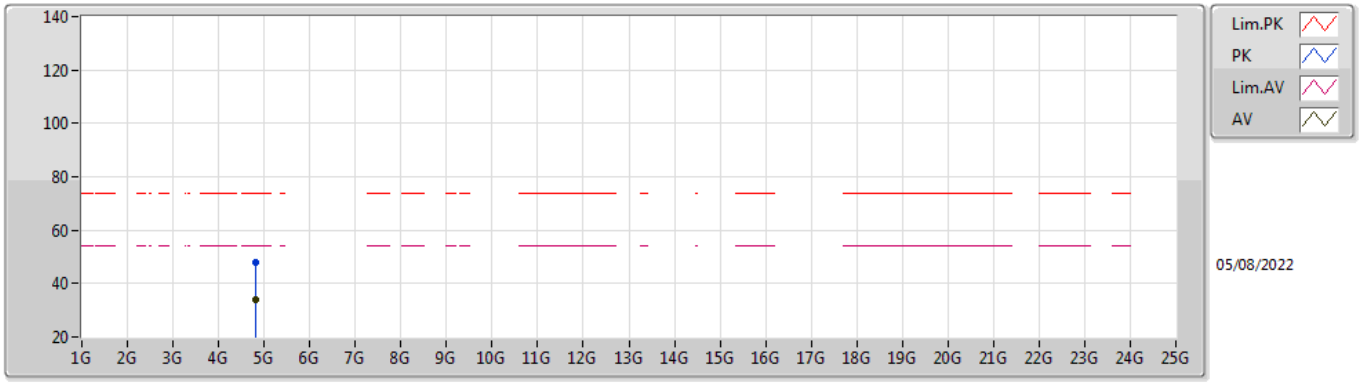


EUT X_1TX
Setting 20dBm
01-A-K-3

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	4.80988G	47.40	74.00	-26.60	41.57	3	Vertical	88	1.80	-	32.42	6.30	32.89
AV	4.80914G	33.51	54.00	-20.49	27.68	3	Vertical	88	1.80	-	32.42	6.30	32.89

802.15.4_Nss1_1TX

2405MHz_TX

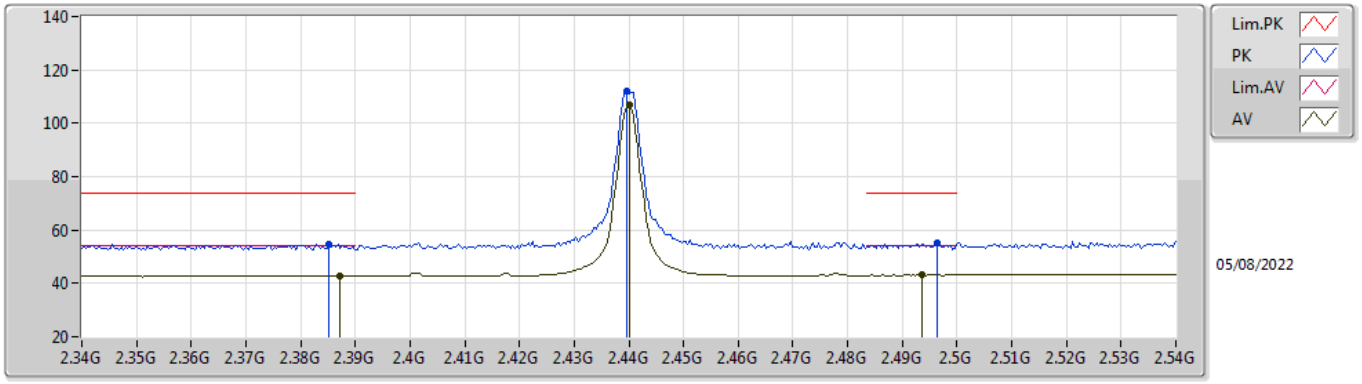


EUT X_1TX
Setting 20dBm
01-A-K-3

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	4.8178G	47.70	74.00	-26.30	41.85	3	Horizontal	195	1.80	-	32.44	6.30	32.89
AV	4.8154G	33.88	54.00	-20.12	28.04	3	Horizontal	195	1.80	-	32.43	6.30	32.89

802.15.4_Nss1_1TX

2440MHz_TX

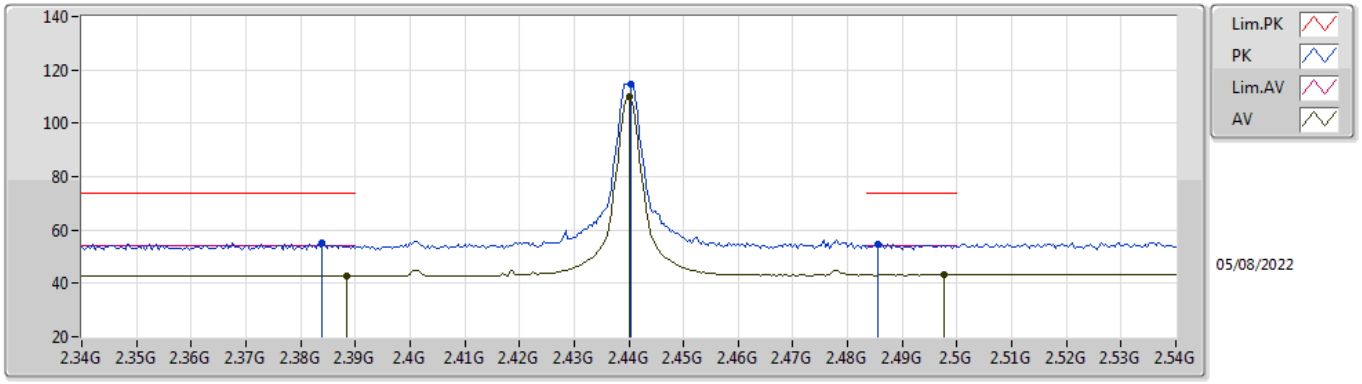


EUT X_1TX
Setting 20dBm
01-A-K-3

Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)
PK	2.3852G	54.84	74.00	-19.16	23.50	3	Vertical	59	1.79	-	27.54	3.80	-
AV	2.3872G	42.72	54.00	-11.28	11.37	3	Vertical	59	1.79	-	27.55	3.80	-
PK	2.4396G	111.84	Inf	-Inf	80.50	3	Vertical	59	1.79	-	27.52	3.82	-
AV	2.44G	106.98	Inf	-Inf	75.64	3	Vertical	59	1.79	-	27.52	3.82	-
PK	2.4964G	55.29	74.00	-18.71	23.66	3	Vertical	59	1.79	-	27.78	3.85	-
AV	2.4936G	43.10	54.00	-10.90	11.49	3	Vertical	59	1.79	-	27.76	3.85	-

802.15.4_Nss1_1TX

2440MHz_TX

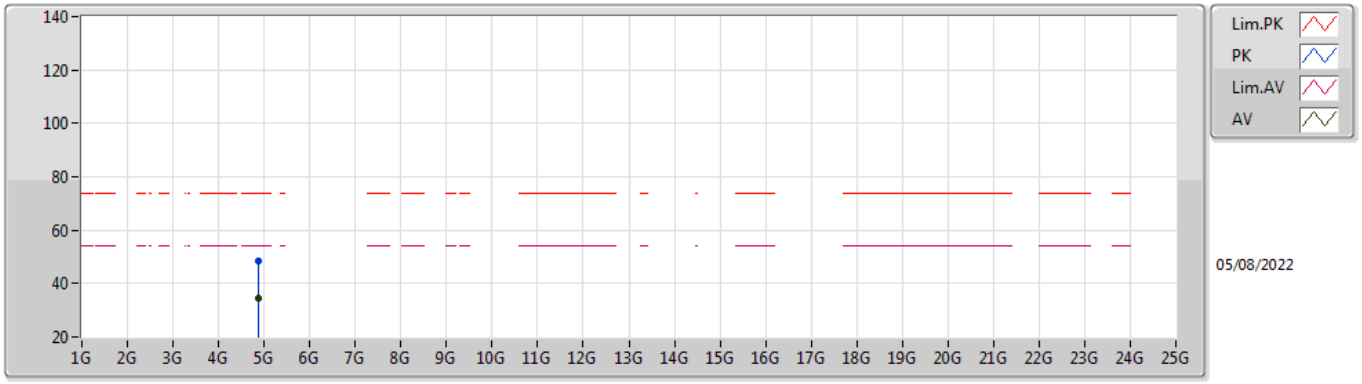


EUT X_1TX
Setting 20dBm
01-A-K-3

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	2.384G	55.23	74.00	-18.77	23.89	3	Horizontal	312	1.14	-	27.54	3.80	-
AV	2.3884G	42.85	54.00	-11.15	11.50	3	Horizontal	312	1.14	-	27.55	3.80	-
PK	2.4404G	114.90	Inf	-Inf	83.56	3	Horizontal	312	1.14	-	27.52	3.82	-
AV	2.44G	110.13	Inf	-Inf	78.79	3	Horizontal	312	1.14	-	27.52	3.82	-
PK	2.4856G	54.66	74.00	-19.34	23.11	3	Horizontal	312	1.14	-	27.71	3.84	-
AV	2.4976G	43.21	54.00	-10.79	11.57	3	Horizontal	312	1.14	-	27.79	3.85	-

802.15.4_Nss1_1TX

2440MHz_TX

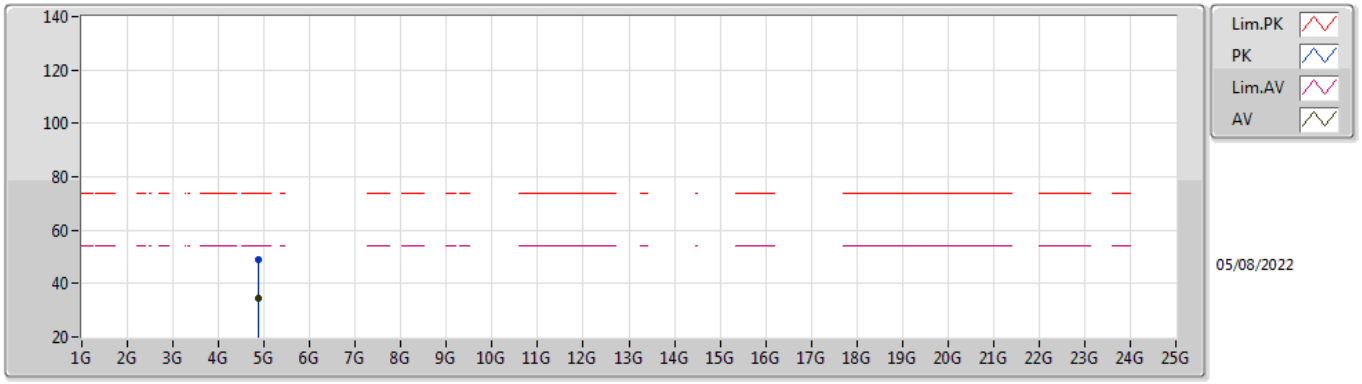


EUT X_1TX
Setting 20dBm
01-A-K-3

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	4.8799G	48.36	74.00	-25.64	42.37	3	Vertical	224	2.63	-	32.56	6.30	32.87
AV	4.87864G	34.35	54.00	-19.65	28.36	3	Vertical	224	2.63	-	32.56	6.30	32.87

802.15.4_Nss1_1TX

2440MHz_TX

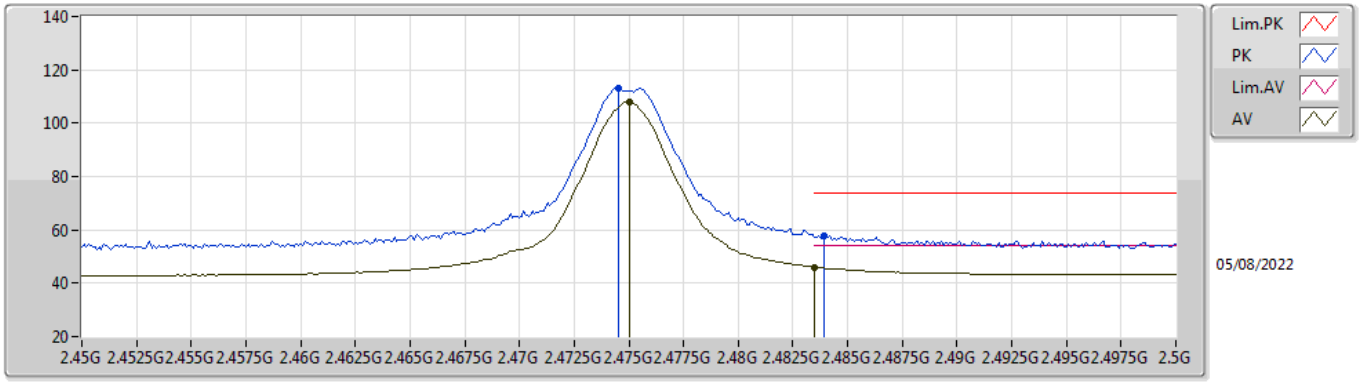


EUT X_1TX
Setting 20dBm
01-A-K-3

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	4.87974G	49.11	74.00	-24.89	43.12	3	Horizontal	137	2.82	-	32.56	6.30	32.87
AV	4.87873G	34.33	54.00	-19.67	28.34	3	Horizontal	137	2.82	-	32.56	6.30	32.87

802.15.4_Nss1_1TX

2475MHz_TX

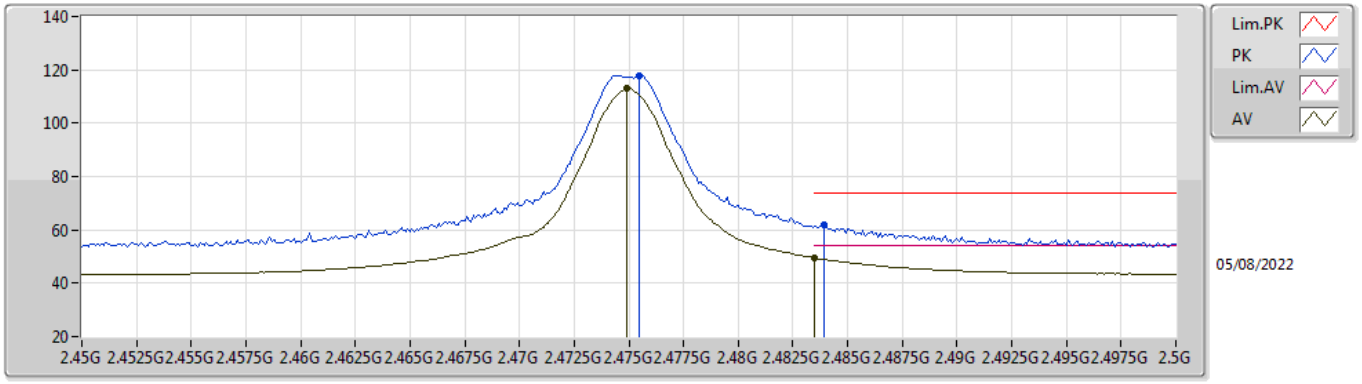


EUT X_1TX
Setting 20dBm
01-A-K-3

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	2.4745G	112.87	Inf	-Inf	81.38	3	Vertical	0	3.00	-	27.65	3.84	-
AV	2.475G	108.09	Inf	-Inf	76.60	3	Vertical	0	3.00	-	27.65	3.84	-
PK	2.4839G	57.79	74.00	-16.21	26.25	3	Vertical	0	3.00	-	27.70	3.84	-
AV	2.4835G	46.01	54.00	-7.99	14.47	3	Vertical	0	3.00	-	27.70	3.84	-

802.15.4_Nss1_1TX

2475MHz_TX

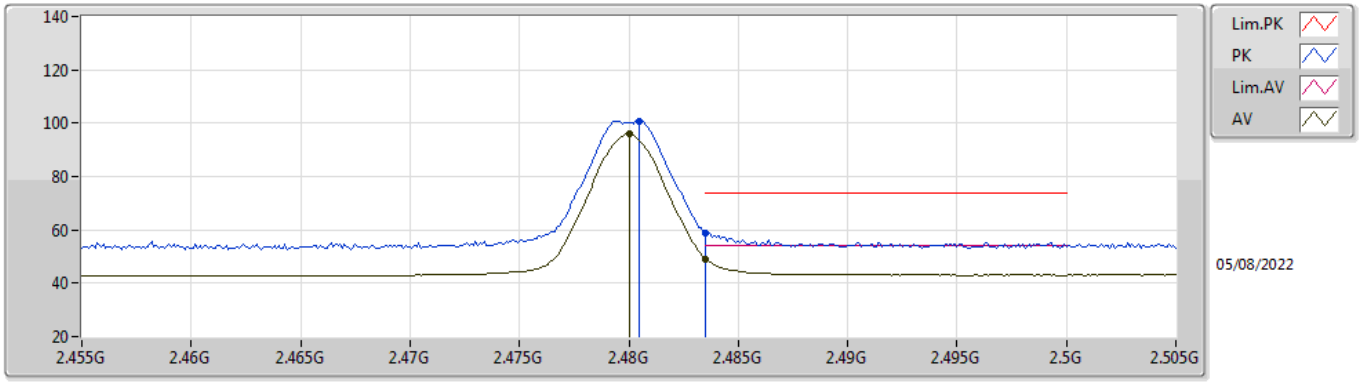


EUT X_1TX
Setting 20dBm
01-A-K-3

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	2.4755G	117.95	Inf	-Inf	86.46	3	Horizontal	51	1.02	-	27.65	3.84	-
AV	2.4749G	113.11	Inf	-Inf	81.62	3	Horizontal	51	1.02	-	27.65	3.84	-
PK	2.4839G	62.11	74.00	-11.89	30.57	3	Horizontal	51	1.02	-	27.70	3.84	-
AV	2.4835G	49.51	54.00	-4.49	17.97	3	Horizontal	51	1.02	-	27.70	3.84	-

802.15.4_Nss1_1TX

2480MHz_TX

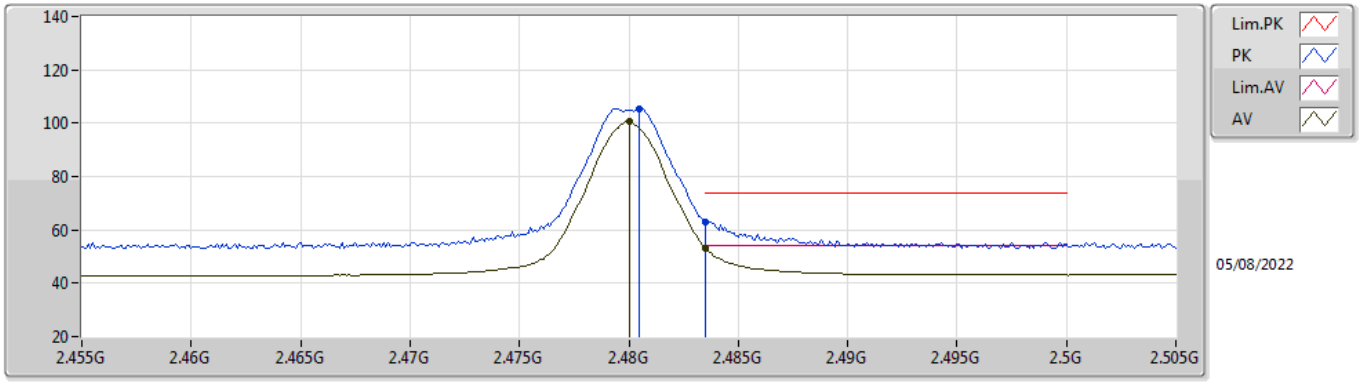


EUT X_1TX
Setting 8dBm
01-A-K-3

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	2.4805G	100.93	Inf	-Inf	69.41	3	Vertical	335	1.04	-	27.68	3.84	-
AV	2.48G	96.14	Inf	-Inf	64.62	3	Vertical	335	1.04	-	27.68	3.84	-
PK	2.4835G	59.05	74.00	-14.95	27.51	3	Vertical	335	1.04	-	27.70	3.84	-
AV	2.4835G	49.16	54.00	-4.84	17.62	3	Vertical	335	1.04	-	27.70	3.84	-

802.15.4_Nss1_1TX

2480MHz_TX

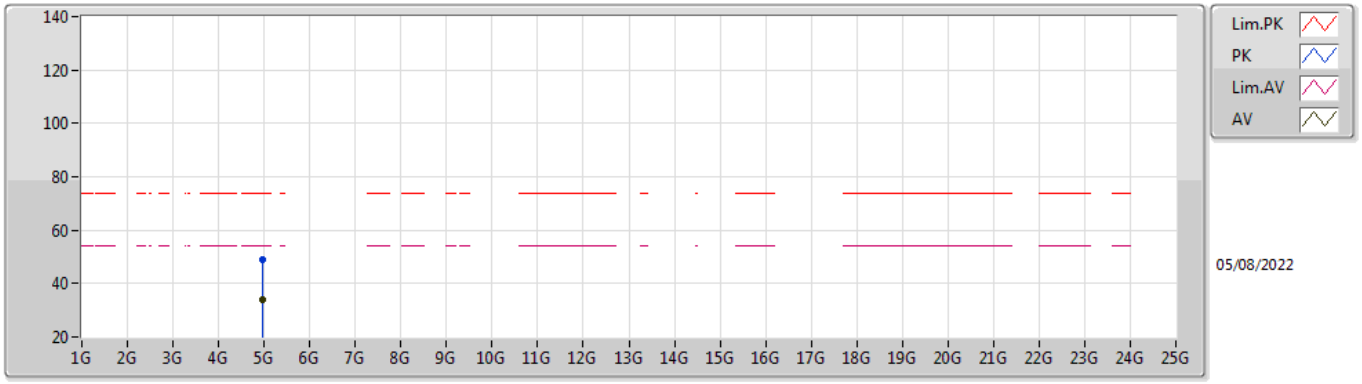


EUT X_1TX
Setting 8dBm
01-A-K-3

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	2.4805G	105.41	Inf	-Inf	73.89	3	Horizontal	50	1.17	-	27.68	3.84	-
AV	2.48G	100.65	Inf	-Inf	69.13	3	Horizontal	50	1.17	-	27.68	3.84	-
PK	2.4835G	63.06	74.00	-10.94	31.52	3	Horizontal	50	1.17	-	27.70	3.84	-
AV	2.4835G	53.12	54.00	-0.88	21.58	3	Horizontal	50	1.17	-	27.70	3.84	-

802.15.4_Nss1_1TX

2480MHz_TX

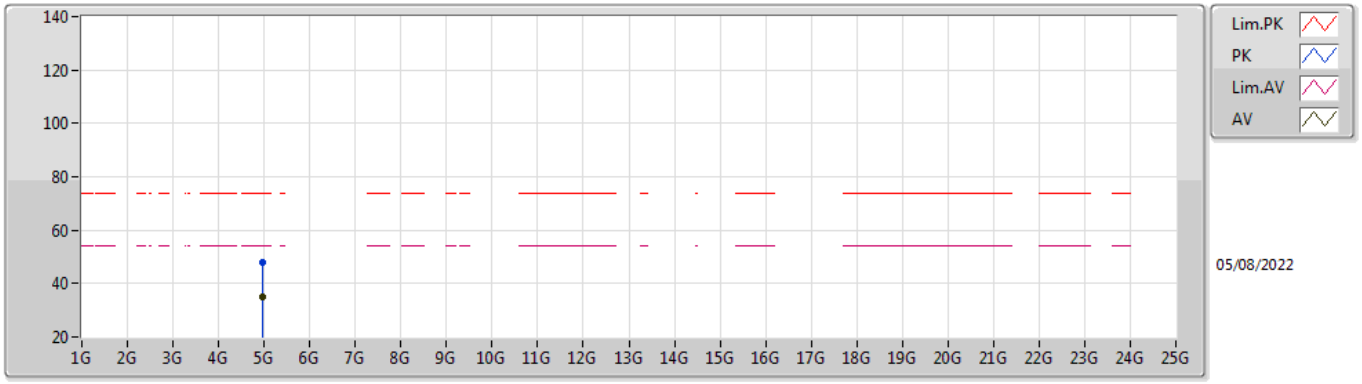


EUT X_1TX
Setting 8dBm
01-A-K-3

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	4.96202G	49.12	74.00	-24.88	42.91	3	Vertical	72	1.80	-	32.77	6.30	32.86
AV	4.95891G	34.01	54.00	-19.99	27.82	3	Vertical	72	1.80	-	32.75	6.30	32.86

802.15.4_Nss1_1TX

2480MHz_TX



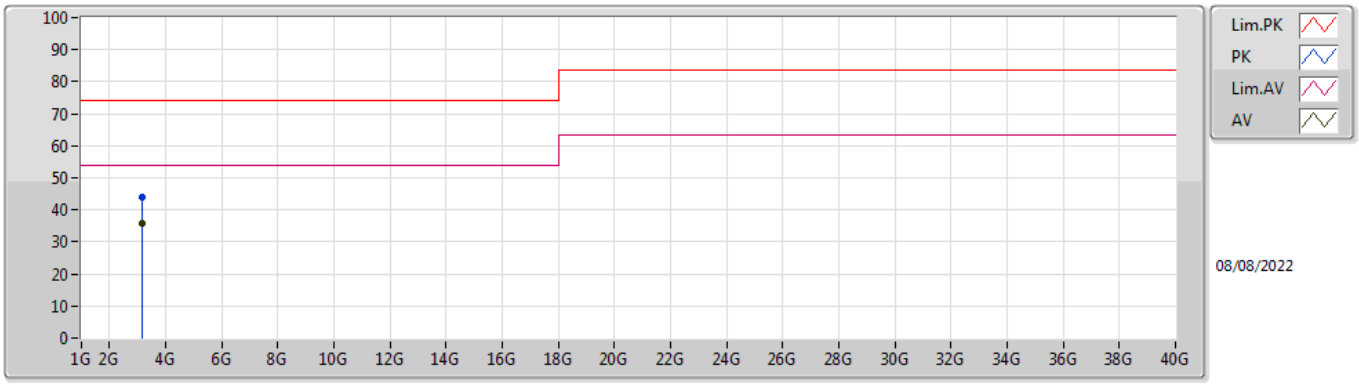
EUT X_1TX
Setting 8dBm
01-A-K-3

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	4.95874G	48.03	74.00	-25.97	41.84	3	Horizontal	68	1.80	-	32.75	6.30	32.86
AV	4.96098G	34.82	54.00	-19.18	28.61	3	Horizontal	68	1.80	-	32.77	6.30	32.86

Summary

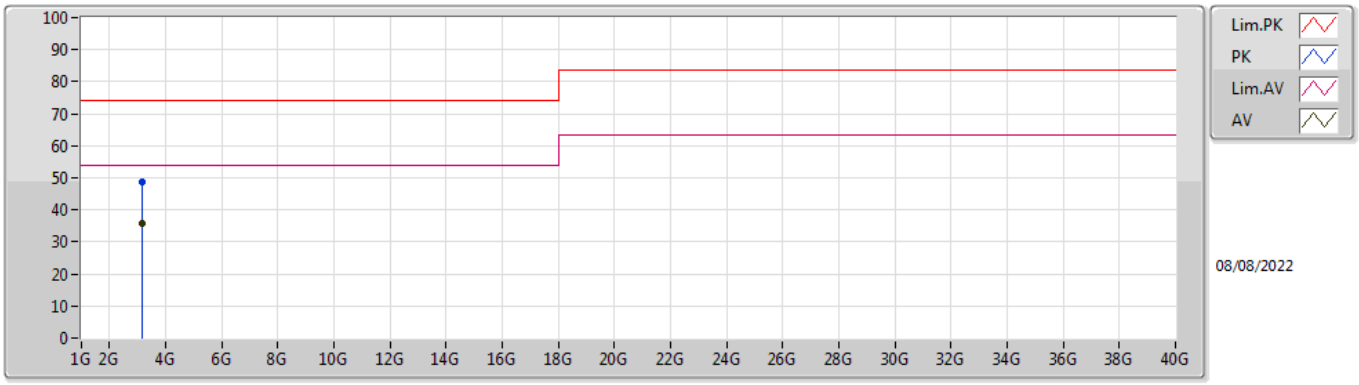
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 1	Pass	AV	3.18763G	35.75	54.00	-18.25	Horizontal

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)
PK	3.18749G	44.12	74.00	-29.88	0.08	3	Vertical	180	1.10	-	44.04	29.03	4.39	33.34
AV	3.18765G	35.66	54.00	-18.34	0.07	3	Vertical	180	1.10	"Worst"	35.59	29.02	4.39	33.34

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)
PK	3.18752G	48.53	74.00	-25.47	0.07	3	Horizontal	324	1.00	-	48.46	29.02	4.39	33.34
AV	3.18763G	35.75	54.00	-18.25	0.07	3	Horizontal	324	1.00	"Worst"	35.68	29.02	4.39	33.34