

FCC Radio Test Report

FCC ID : OEOM3228AMRM0
Equipment : ML3228A-GAIA-M3-PE11
Brand Name : TELINK SEMICONDUCTOR (SHANG HAI) CO., LTD.
Model Name : ML3228A-GAIA-M3-PE11
Applicant : Telink Semiconductor (Shanghai) Co., Ltd.
11F, Building 1, 61 Shengxia Road, Pudong District,
Shanghai, China
Manufacturer : Shenzhen Xinghongju Technology Co., LTD
Building 201, No. 48, Pingzi Road, Nienfeng Community,
Pingdi Street, Longgang District, Shenzhen
Standard : 47 CFR FCC Part 15.247

The product was received on Feb. 11, 2026, and testing was started from Mar. 16, 2026 and completed on Mar. 20, 2026. We, SPORTON INTERNATIONAL INC. Hsinhua Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2020 + Cor.1-2023 + C63.10a-2024 + Errata to C63.10a-2024 and shown compliance with the applicable technical standards.

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


Approved by: Jackson Tsai

SPORTON INTERNATIONAL INC. Hsinhua Laboratory

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



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History of this test report

[illegible]

Summary of Test Result

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

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and explanations:

None

Reviewed by: Ryan Hsiao

Report Producer: Michelle Tsai

1 General Description

1.1 Information

1.1.1 RF General Information

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

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

Note:.

- ♦ Zigbee uses a O-QPSK (250kbps) modulation for DSSS.
- ♦ BWch is the nominal channel bandwidth.

1.1.2 Antenna Information

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Support
1	TELINK	ML3228A-GAIA-M0-PE11	PCB	NA	1.4	BT + Zigbee

For BT function:

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

Ant. 1 (port 1) could transmit/receive.

For Zigbee:

For IEEE 802.15.4 Zigbee mode (1TX/1RX)

Ant. 1 (port 1) could transmit/receive.

1.1.3 EUT Information

Operational Condition			
EUT Power Type	From Test Fixture		
EUT Function	☒ Point-to-multipoint	☐ Point-to-point	
Type of EUT			
☒	Stand-alone		
☐	Combined (EUT where the radio part is fully integrated within another device)		
	Combined Equipment - Brand Name / Model No.:		...
☐	Plug-in radio (EUT intended for a variety of host systems)		
	Host System - Brand Name / Model No.:		...
☐	Other:		

1.1.4 Mode Test Duty Cycle

Mode	DC	DCF (dB)	T (s)	VBW (Hz)_1/T
Zigbee	1	0	100.003m	10Hz (DC>=0.98)

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

1.2 Testing Applied Standards

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

- ♦ 47 CFR FCC Part 15
- ♦ ANSI C63.10-2020 + Cor.1-2023 + C63.10a-2024 + Errata to C63.10a-2024

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

- ♦ KDB 558074 D01 v05r02
- ♦ KDB 414788 D01 v01r01

1.3 Testing Location Information

Test Lab. : Sporton International Inc. Hsinhua Laboratory				
☒ Hsinhua (TAF: 3785)	ADD: No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.)			
	TEL: 886-3-327-3456		FAX: 886-3-327-0973	
Test site Designation No. TW3785 with FCC.				
Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
AC Conduction	CO04-HY	Lego Lin	17.5~19.2°C / 57~61%	20/Mar/2026
RF Conducted	TH07-HY	Alan Chien	23.4~23.9°C / 52~55%	16/Mar/2026
☒ Wenhua 3rd. (TAF: 3785)	ADD: No. 58, Aly. 75, Ln. 564, Wenhua 3rd Rd., Guishan Dist. Taoyuan City 333, Taiwan (R.O.C.)			
	TEL: 886-3-327-0868			
Test site Designation No. TW0036 with FCC.				
Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
Radiated	03CH26-HY	Aaron Kuo	21.5~22.1°C / 46~49%	17/Mar/2026~18/Mar/2026

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
AC Power-line Conducted Emissions	3.44 dB	Confidence levels of 95%
Conducted Output Power	1.48 dB	Confidence levels of 95%
Bandwidth	0.05 MHz	Confidence levels of 95%
Conducted Emission	1.48 dB	Confidence levels of 95%
Power Spectral Density	1.22 dB	Confidence levels of 95%
Radiated Emission (9 kHz ~ 30 MHz)	2.9 dB	Confidence levels of 95%
Radiated Emission (30 MHz ~ 1 GHz)	5.64 dB	Confidence levels of 95%
Radiated Emission (1 GHz ~ 18 GHz)	5.02 dB	Confidence levels of 95%
Radiated Emission (18 GHz ~ 40 GHz)	5.28 dB	Confidence levels of 95%



2 Test Configuration of EUT

2.1 Test Channel Mode

Test Software Version	BDT_v5.8.5
------------------------------	------------

Mode	Power Setting
Zigbee	-
2405MHz	10
2440MHz	10
2475MHz	10
2480MHz	10

2.2 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz
Operating Mode	CTX
1	Test Fixture Mode

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

The Worst Case Mode for Following Conformance Tests			
Tests Item	Emissions in Restricted Frequency Bands		
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.		
Operating Mode < 1GHz	CTX		
1	Test Fixture Mode		
Operating Mode > 1GHz	CTX		
Orthogonal Planes of EUT	X Plane	Y Plane	Z Plane
			
Worst Planes of EUT		V	

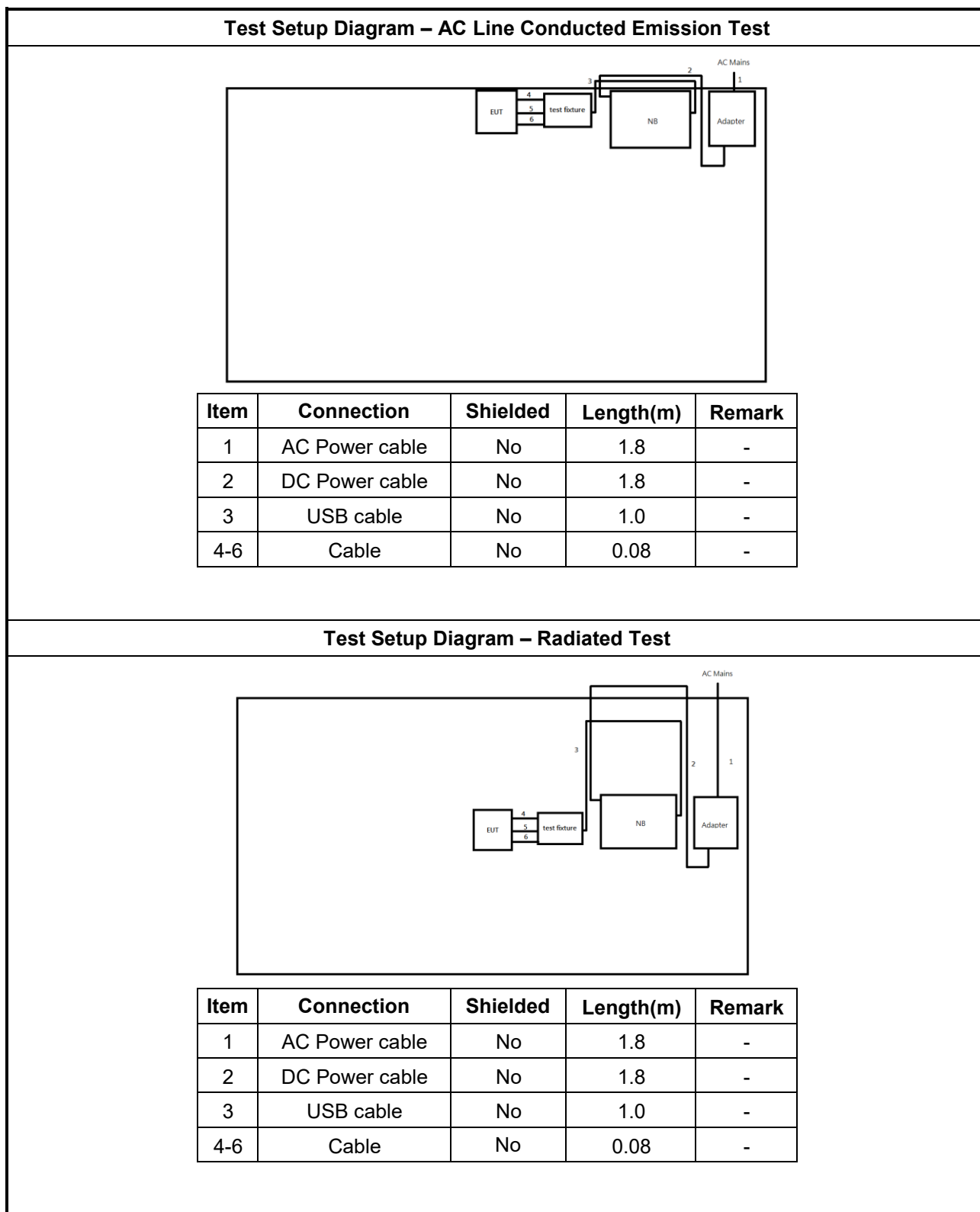
2.3 Support Equipment

Support Equipment – AC Conduction					
No.	Equipment	Brand Name	Model Name	FCC ID	Remark
1	AC Power cable	Power sync	TPCMRN0018	-	-
2	Adapter for NB	DELL	AA90PM111	-	-
3	USB Cable	JingChe Electronic Technology	Mini USB CABLE L=1M	-	-
4	Notebook	DELL	Latitude 7290	-	-
5	test fixture	Telink	Programmer V3.0	-	-
6	Cable	Xiangyu	AV7	-	-

Support Equipment – Conducted					
No.	Equipment	Brand Name	Model Name	FCC ID	Remark
1	Notebook	DELL	E5410	-	-
2	Adapter for NB	DELL	HA65NM130	-	-
3	Programmer V1.0-V3.0	Telink	Programmer V3.0	-	-
4	USB Cable	JingChe Electronic Technology	Mini USB CABLE L=1M	-	-

Support Equipment – Radiated					
No.	Equipment	Brand Name	Model Name	FCC ID	Remark
1	AC Power cable	Power sync	TPCMRN0018	-	-
2	Adapter for NB	DELL	AA90PM111	-	-
3	USB Cable	JingChe Electronic Technology	Mini USB CABLE L=1M	-	-
4	Notebook	DELL	Latitude 7290	-	-
5	test fixture	Telink	Programmer V3.0	-	-
6	Cable	Xiangyu	AV7	-	-

2.4 Test Setup Diagram



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

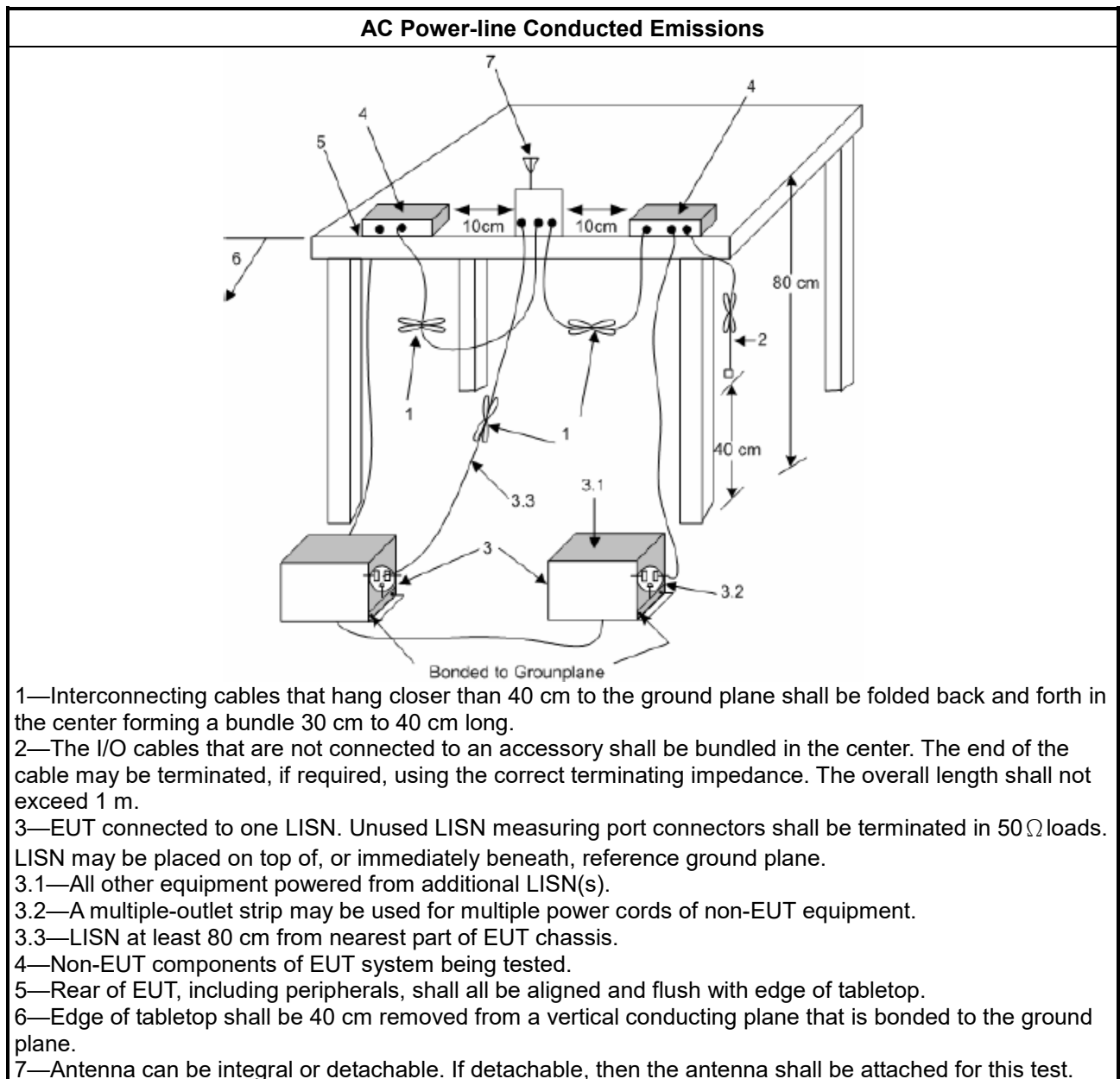
Test Method
☒ Refer as ANSI C63.10, clause 6.2 for AC power-line conducted emissions.

3.1.4 Measurement Results Calculation

The measured Level is calculated using:

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

3.1.5 Test Setup



3.1.6 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A

3.2 DTS Bandwidth

3.2.1 6dB Bandwidth Limit

6dB Bandwidth Limit	
Systems using digital modulation techniques:	
▪	6 dB bandwidth $\geq$ 500 kHz.

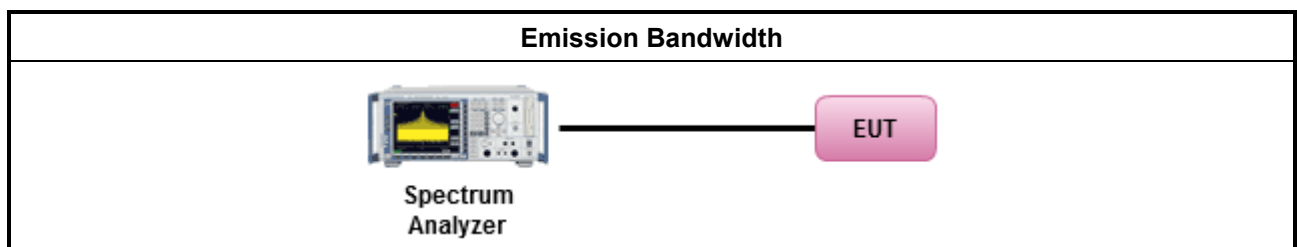
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

Test Method	
▪	For the emission bandwidth shall be measured using one of the options below:
☒	Refer as KDB 558074, clause 8.2 (11.8 of ANSI C63.10) DTS bandwidth measurement.
☐	Refer as RSS-Gen, clause 6.7 for occupied bandwidth testing.
☐	Refer as ANSI C63.10, clause 6.9.3 for occupied bandwidth testing.

3.2.4 Test Setup



3.2.5 Test Result of Emission Bandwidth

Refer as Appendix B

3.3 Maximum Conducted Output Power

3.3.1 Maximum Conducted Output Power Limit

Maximum Conducted Output Power Limit	
	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
e.i.r.p. Power Limit:	
	2400-2483.5 MHz Band
	Point-to-multipoint systems (P2M): $P_{eirp} \leq 36$ dBm (4 W)
	Point-to-point systems (P2P): $P_{eirp} \leq \text{MAX}(36, [P_{Out} + G_{TX}])$ dBm
	Smart antenna system (SAS)
	- Single beam: $P_{eirp} \leq \text{MAX}(36, P_{Out} + G_{TX})$ dBm
	- Overlap beam: $P_{eirp} \leq \text{MAX}(36, P_{Out} + G_{TX})$ dBm
	- Aggregate power on all beams: $P_{eirp} \leq \text{MAX}(36, [P_{Out} + G_{TX} + 8])$ dBm
P_{Out} = maximum peak conducted output power or maximum conducted output power in dBm, G_{TX} = the maximum transmitting antenna directional gain in dBi.	

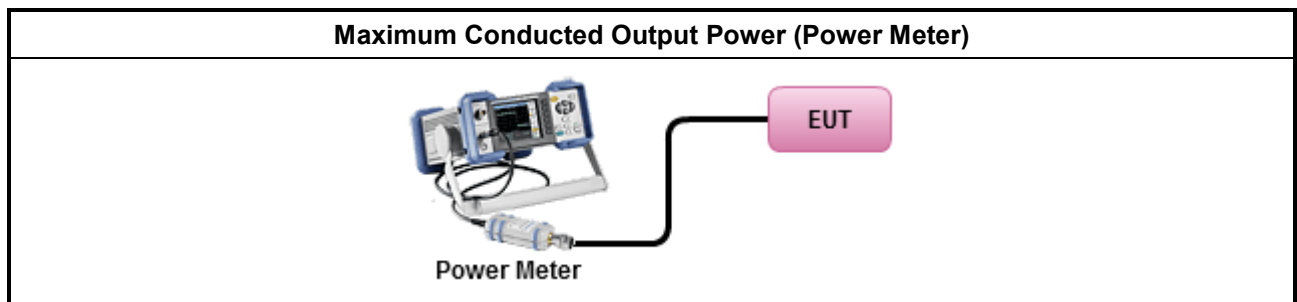
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

Test Method	
Maximum Peak Conducted Output Power	
☐	Refer as KDB 558074, clause 8.3.1.1 (11.9.1.1 of ANSI C63.10) RBW ≥ EBW method.
☐	Refer as KDB 558074, clause 8.3.1.2 integrated band power method.
☐	Refer as KDB 558074, clause 8.3.1.3 (11.9.1.2 of ANSI C63.10) peak power meter.
Maximum Average Conducted Output Power	
☐	Refer as KDB 558074, clause 8.3.2.2 (11.9.2.2 of ANSI C63.10) using a spectrum analyzer.
☒	Refer as KDB 558074, clause 8.3.2.3 (11.9.2.3 of ANSI C63.10) using a power meter.
For conducted measurement.	
If the EUT supports multiple transmit chains using options given below: Refer as KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.	
If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + \dots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$	

3.3.4 Test Setup



3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix C

3.4 Power Spectral Density

3.4.1 Power Spectral Density Limit

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

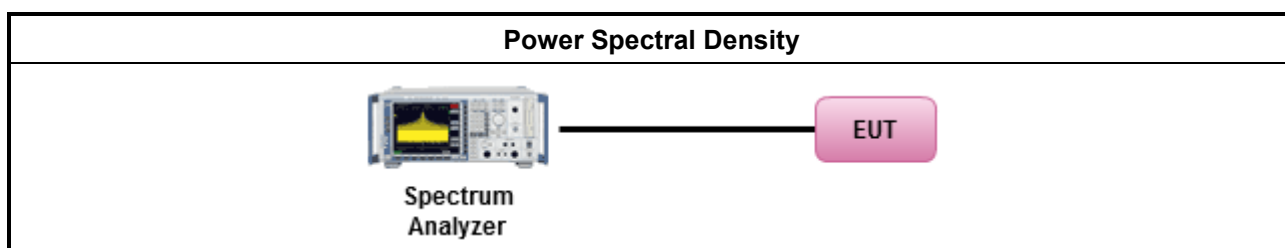
3.4.2 Measuring Instruments

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 KDB 558074, clause 8.4 (11.10 of ANSI C63.10) Max. PSD.
▪	For conducted measurement.
▪	If The EUT supports multiple transmit chains using options given below:
▪	Measure and sum the spectra across the outputs. Refer as KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the NTX output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.

3.4.4 Test Setup



3.4.5 Test Result of Power Spectral Density

Refer as Appendix D

3.5 Emissions in Non-restricted Frequency Bands

3.5.1 Emissions in Non-restricted Frequency Bands Limit

Un-restricted Band Emissions Limit	
RF output power procedure	Limit (dB)
Peak output power procedure	20
Average output power procedure	30
Note 1: If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak level. Note 2: If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band average level.	

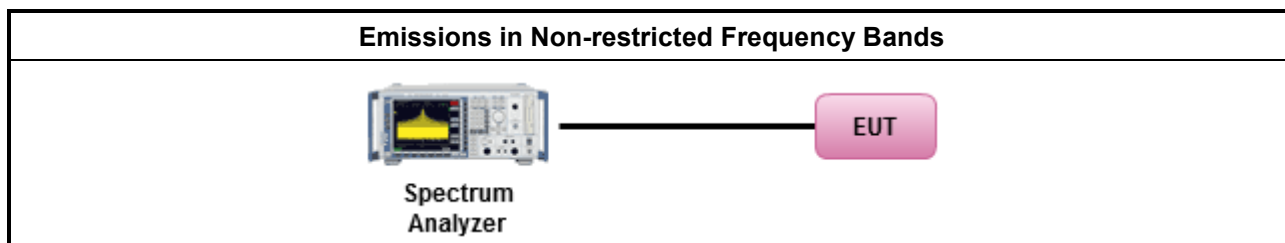
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

Test Method
Refer as KDB 558074, clause 8.5 (11.11 of ANSI C63.10) for non-restricted frequency bands.

3.5.4 Test Setup



3.5.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix E

3.6 Emissions in Restricted Frequency Bands

3.6.1 Emissions in Restricted Frequency Bands Limit

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

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

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

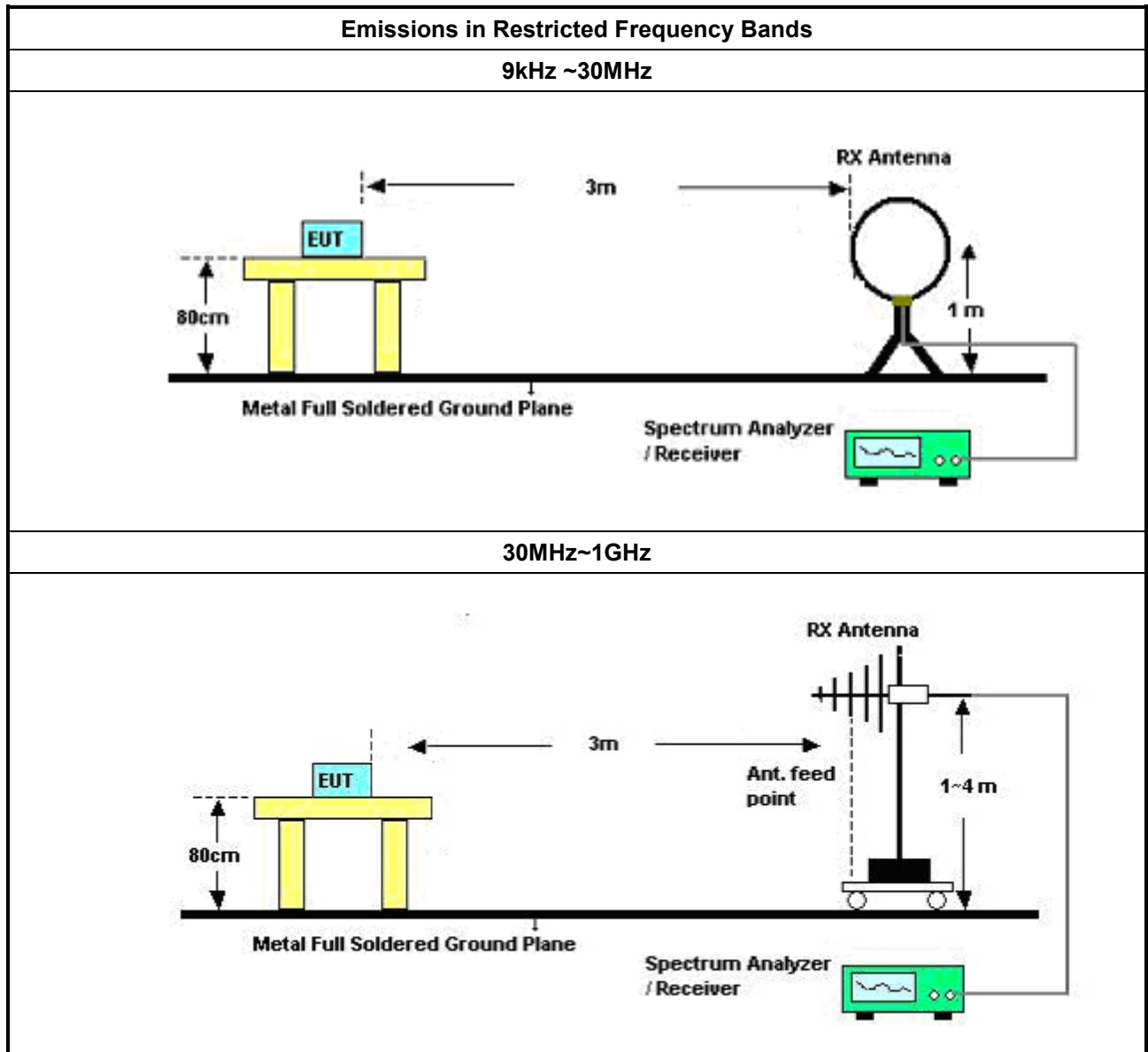
Test Method	
	- The average emission levels shall be measured in [duty cycle $\geq$ 98 or duty factor]. - Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.
	For the transmitter unwanted emissions shall be measured using following options below:
	Refer as KDB 558074, clause 8.6 (11.12 of ANSI C63.10) for restricted frequency bands.
	For the transmitter band-edge emissions shall be measured using following options below:
	Refer as KDB 558074 clause 8.7.1, When the performing peak or average radiated measurements, emissions within 2 MHz of the authorized band edge may be measured using the marker-delta method described below.
	Refer as KDB 558074, clause 8.7.2 (6.10.6 of ANSI C63.10) for marker-delta method for band-edge measurements.
	Refer as KDB 558074, clause 8.7.3 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).
	Use the following spectrum analyzer settings:
	Set RBW=100 kHz for $f < 1$ GHz; VBW=3 * RBW; Sweep = auto; Detector function = peak; Trace = max hold.
	Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement. For average measurement, refer as 1.1.4.
	KDB 414788 Open-Field Test Sites and Chamber Correlation Justification.
	Based on FCC 15.31(f)(2): measurements may be performed at a distance closer than that specified in regulations; however, an attempt should be made to avoid making measurements in the near field.
	Open-field site and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

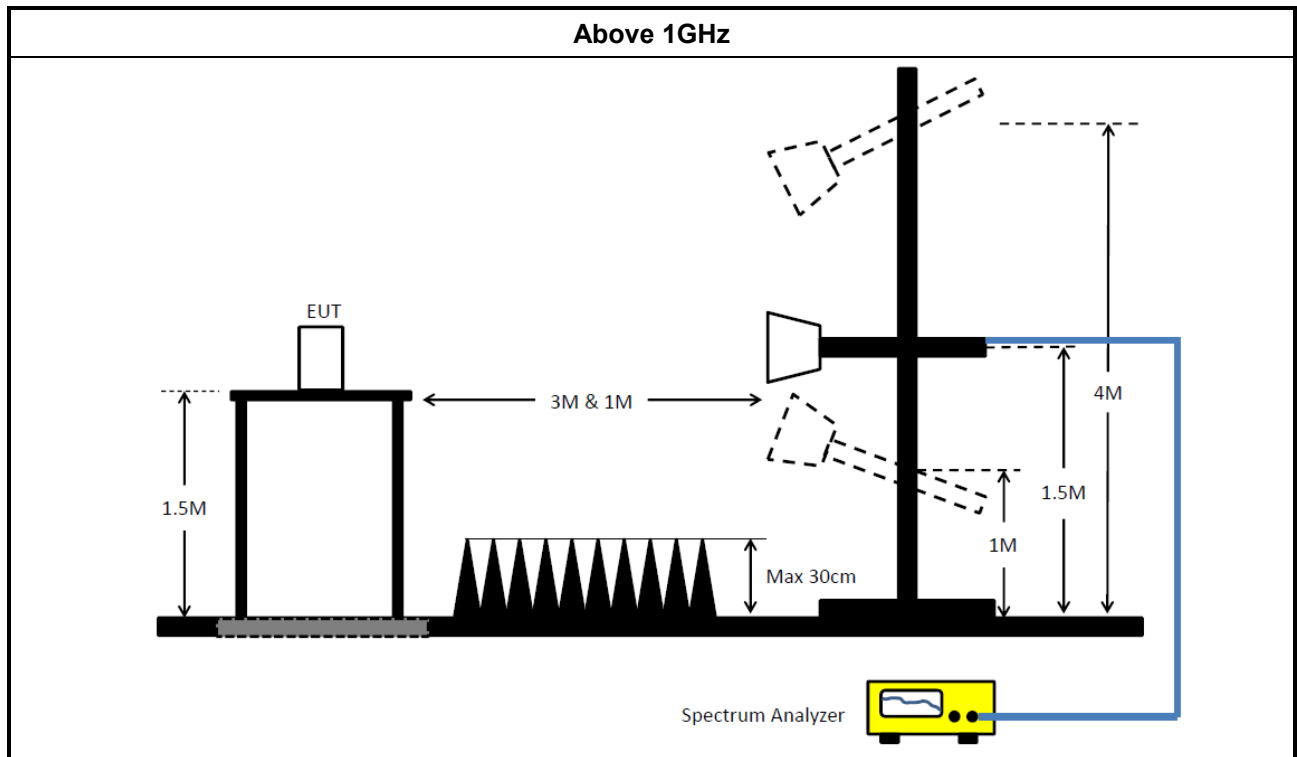
3.6.4 Measurement Results Calculation

The measured Level is calculated using:

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

3.6.5 Test Setup





3.6.6 Test Result of Emissions in Restricted Frequency Bands (Below 30MHz)

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

3.6.7 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix F

4 Test Equipment and Calibration Data

Instrument for AC Conduction

Instrument	Manufacturer /Brand	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
EMI Test Receiver	ROHDE & SCHWARZ	ESR3	102051	9kHz ~ 3.6GHz	21/May/2025	20/May/2026
Two-Line V-Network	ROHDE & SCHWARZ	ENV 216	101578	9kHz ~ 30MHz	24/Aug/2025	23/Aug/2026
RF Cable 5m	TITAN	TITAN	CO04-cable-01	9 kHz~200MHz	25/Feb/2026	24/Feb/2027
Pulse Limiter	SCHWARZBECK	VTSD 9561F-N	1056	9kHz ~ 30MHz	25/Jun/2025	24/Jun/2026
SENSE-EMI	Sporton	V5.11.6	N/A	N/A	N/A	N/A

Instrument for Conducted Test

Instrument	Manufacturer /Brand	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
Signal Analyzer	R&S	FSV 40	101515	10Hz~40GHz	05/Jan/2026	04/Jan/2027
SMB100A Signal Generator	R&S	SMB100A	181147	100kHz~40GHz	29/Oct/2025	28/Oct/2026
Power Meter	Anritsu	ML2495A	1517010	300MHz~40GHz	17/Dec/2025	16/Dec/2026
Pulse Sensor	Anritsu	MA2411B	1339407	300MHz~40GHz	17/Dec/2025	16/Dec/2026
SENSE-15247_FS	Sporton	V5.11.27	N/A	N/A	N/A	N/A

Instrument for Radiated Test

Instrument	Manufacturer /Brand	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	TDK	SAC-3M	03CH26-HY	30MHz~1GHz 3m	06/Aug/2025	05/Aug/2026
3m Semi Anechoic Chamber	TDK	SAC-3M	03CH26-HY	1GHz~18GHz 3m	06/Aug/2025	05/Aug/2026
EMI Test Receiver	ROHDE & SCHWARZ	ESR	102318	9kHz~3.6GHz	08/Dec/2025	07/Dec/2026
Signal Analyzer	ROHDE & SCHWARZ	FSV3044	101411	10Hz~44GHz	30/Sep/2025	29/Sep/2026
Loop Antenna	TESEQ	HLA 6120	31244	9kHz~30MHz	20/Mar/2025	19/Mar/2026
Bilog Antenna & 6dB Attenuator	TESEQ & VGT	CBL 6111D & VFA 04002-06	63540/002	30MHz~1GHz	04/Jun/2025	03/Jun/2026
Double Ridged Guide Horn Antenna	SCHWARZBECK	BBHA 9120 D	02877	1GHz~18GHz	02/Jul/2025	01/Jul/2026
Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	01248	18GHz~40GHz	07/Oct/2025	06/Oct/2026
RF Cable	HUBER+SUHNER	SUOFLEX 104	CB009	9kHz~1GHz	03/Oct/2025	02/Oct/2026
RF Cable	HUBER+SUHNER	SUOFLEX 104	CB009	1GHz~40GHz	03/Oct/2025	02/Oct/2026
Preamplifier	SGH	PRAMP 903	20230515-2	30MHz~1GHz	21/May/2025	20/May/2026
Preamplifier	SGH	PRAMP 118-H	20230515-4	1GHz ~18GHz	21/May/2025	20/May/2026
Amplifier	EM	EM18G40G	060874	18GHz ~ 40GHz	18/Apr/2025	17/Apr/2026
SENSE-15247-DTS	Sporton	V5.11.27	NA	NA	NA	NA



Conducted Emissions at Powerline

Appendix A

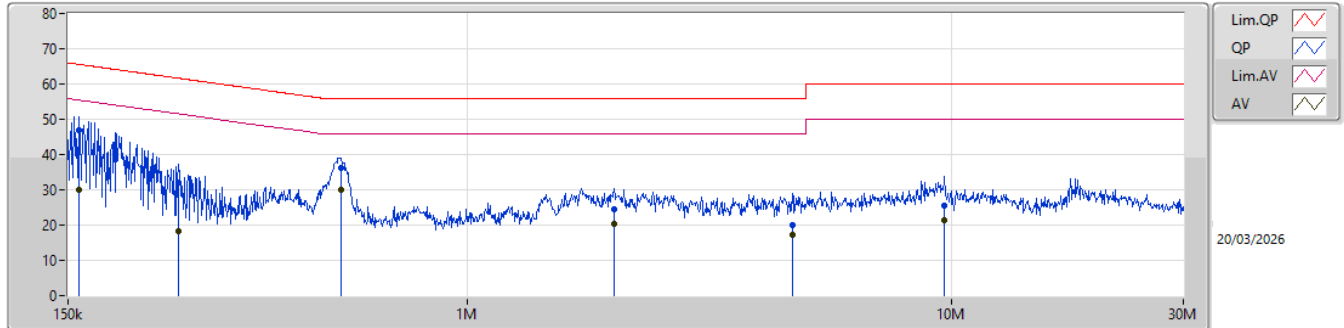
Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition
Mode 1	Pass	AV	544.6k	32.48	46.00	-13.52	Neutral

Result

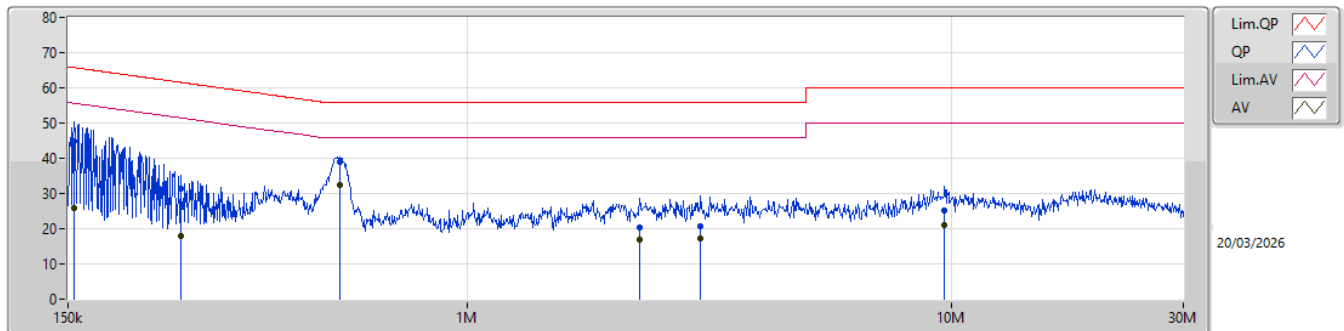
Mode	Result	Type	Freq (Hz)	Level (dBUV)	Limit (dBUV)	Margin (dB)	Condition
Mode 1	Pass	QP	157.99k	47.01	65.56	-18.55	Line
Mode 1	Pass	AV	157.99k	30.06	55.56	-25.50	Line
Mode 1	Pass	QP	253.05k	31.96	61.66	-29.70	Line
Mode 1	Pass	AV	253.05k	18.20	51.66	-33.46	Line
Mode 1	Pass	QP	548.97k	36.14	56.00	-19.86	Line
Mode 1	Pass	AV	548.97k	29.92	46.00	-16.08	Line
Mode 1	Pass	QP	2.01M	24.51	56.00	-31.49	Line
Mode 1	Pass	AV	2.01M	20.22	46.00	-25.78	Line
Mode 1	Pass	QP	4.68M	20.17	56.00	-35.83	Line
Mode 1	Pass	AV	4.68M	17.32	46.00	-28.68	Line
Mode 1	Pass	QP	9.65M	25.64	60.00	-34.36	Line
Mode 1	Pass	AV	9.65M	21.31	50.00	-28.69	Line
Mode 1	Pass	QP	154.25k	44.80	65.77	-20.97	Neutral
Mode 1	Pass	AV	154.25k	25.92	55.77	-29.85	Neutral
Mode 1	Pass	QP	256.1k	31.52	61.56	-30.04	Neutral
Mode 1	Pass	AV	256.1k	18.08	51.56	-33.48	Neutral
Mode 1	Pass	QP	544.6k	39.06	56.00	-16.94	Neutral
Mode 1	Pass	AV	544.6k	32.48	46.00	-13.52	Neutral
Mode 1	Pass	QP	2.27M	20.46	56.00	-35.54	Neutral
Mode 1	Pass	AV	2.27M	17.01	46.00	-28.99	Neutral
Mode 1	Pass	QP	3.03M	20.70	56.00	-35.30	Neutral
Mode 1	Pass	AV	3.03M	17.36	46.00	-28.64	Neutral
Mode 1	Pass	QP	9.65M	25.11	60.00	-34.89	Neutral
Mode 1	Pass	AV	9.65M	20.96	50.00	-29.04	Neutral

Conducted Emissions at Powerline_Mode 1



Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Condition	Comment	Raw (dBuV)	LISN (dB)	CL (dB)	AT (dB)						
QP	157.99k	47.01	65.56	-18.55	19.77	Line	-	27.24	9.64	0.01	10.12						
AV	157.99k	30.06	55.56	-25.50	19.77	Line	-	10.29	9.64	0.01	10.12						
QP	253.05k	31.96	61.66	-29.70	19.78	Line	-	12.18	9.64	0.02	10.12						
AV	253.05k	18.20	51.66	-33.46	19.78	Line	-	-1.58	9.64	0.02	10.12						
QP	548.97k	36.14	56.00	-19.86	19.79	Line	-	16.35	9.63	0.04	10.12						
AV	548.97k	29.92	46.00	-16.08	19.79	Line	-	10.13	9.63	0.04	10.12						
QP	2.01M	24.51	56.00	-31.49	19.81	Line	-	4.70	9.65	0.03	10.13						
AV	2.01M	20.22	46.00	-25.78	19.81	Line	-	0.41	9.65	0.03	10.13						
QP	4.68M	20.17	56.00	-35.83	19.88	Line	-	0.29	9.67	0.08	10.13						
AV	4.68M	17.32	46.00	-28.68	19.88	Line	-	-2.56	9.67	0.08	10.13						
QP	9.65M	25.64	60.00	-34.36	20.06	Line	-	5.58	9.69	0.23	10.14						
AV	9.65M	21.31	50.00	-28.69	20.06	Line	-	1.25	9.69	0.23	10.14						

Conducted Emissions at Powerline_Mode 1



Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Condition	Comment	Raw (dBuV)	LISN (dB)	CL (dB)	AT (dB)						
QP	154.25k	44.80	65.77	-20.97	19.77	Neutral	-	25.03	9.64	0.01	10.12						
AV	154.25k	25.92	55.77	-29.85	19.77	Neutral	-	6.15	9.64	0.01	10.12						
QP	256.1k	31.52	61.56	-30.04	19.77	Neutral	-	11.75	9.63	0.02	10.12						
AV	256.1k	18.08	51.56	-33.48	19.77	Neutral	-	-1.69	9.63	0.02	10.12						
QP	544.6k	39.06	56.00	-16.94	19.79	Neutral	-	19.27	9.63	0.04	10.12						
AV	544.6k	32.48	46.00	-13.52	19.79	Neutral	-	12.69	9.63	0.04	10.12						
QP	2.27M	20.46	56.00	-35.54	19.81	Neutral	-	0.65	9.65	0.03	10.13						
AV	2.27M	17.01	46.00	-28.99	19.81	Neutral	-	-2.80	9.65	0.03	10.13						
QP	3.03M	20.70	56.00	-35.30	19.83	Neutral	-	0.87	9.66	0.04	10.13						
AV	3.03M	17.36	46.00	-28.64	19.83	Neutral	-	-2.47	9.66	0.04	10.13						
QP	9.65M	25.11	60.00	-34.89	20.07	Neutral	-	5.04	9.70	0.23	10.14						
AV	9.65M	20.96	50.00	-29.04	20.07	Neutral	-	0.89	9.70	0.23	10.14						

**Summary**

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4-2.4835GHz	-	-	-	-	-
Zigbee	1.581M	2.419M	2M42G1D	1.251M	2.309M

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)
Zigbee	-	-	-	-
2405MHz	Pass	500k	1.403M	2.419M
2440MHz	Pass	500k	1.581M	2.309M
2475MHz	Pass	500k	1.526M	2.391M
2480MHz	Pass	500k	1.251M	2.378M

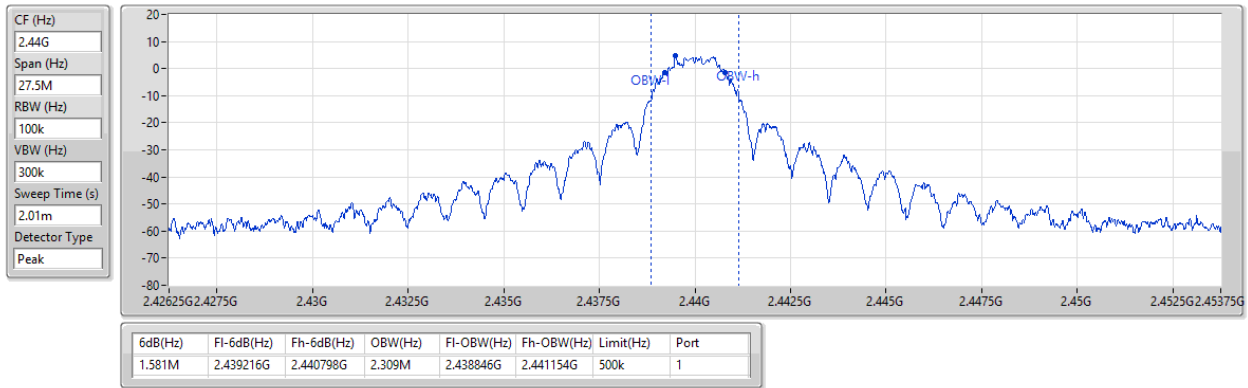
Port X-N dB = Port X 6dB down bandwidth;
Port X-OBW = Port X 99% occupied bandwidth

2.4-2.4835GHz_Zigbee

EBW

2440MHz

16/03/2026





Average Power

Appendix C

Summary

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
Zigbee	8.51	0.00710



Average Power

Appendix C

Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Total Power (dBm)	Power Limit (dBm)
Zigbee	-	-	-	-	-
2405MHz	Pass	1.40	8.18	8.18	30.00
2440MHz	Pass	1.40	8.48	8.48	30.00
2475MHz	Pass	1.40	8.51	8.51	30.00
2480MHz	Pass	1.40	8.51	8.51	30.00

DG = Directional Gain; Port X = Port X output power;
Inf = There's no restriction for the limit.



Summary

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
Zigbee	-6.70

RBW = 3kHz;

Result

Mode	Result	DG (dBi)	Port 1 (dBm/RBW)	PD (dBm/RBW)	PD Limit (dBm/RBW)
Zigbee	-	-	-	-	-
2405MHz	Pass	1.40	-10.45	-10.45	8.00
2440MHz	Pass	1.40	-8.61	-8.61	8.00
2475MHz	Pass	1.40	-6.96	-6.96	8.00
2480MHz	Pass	1.40	-6.70	-6.70	8.00

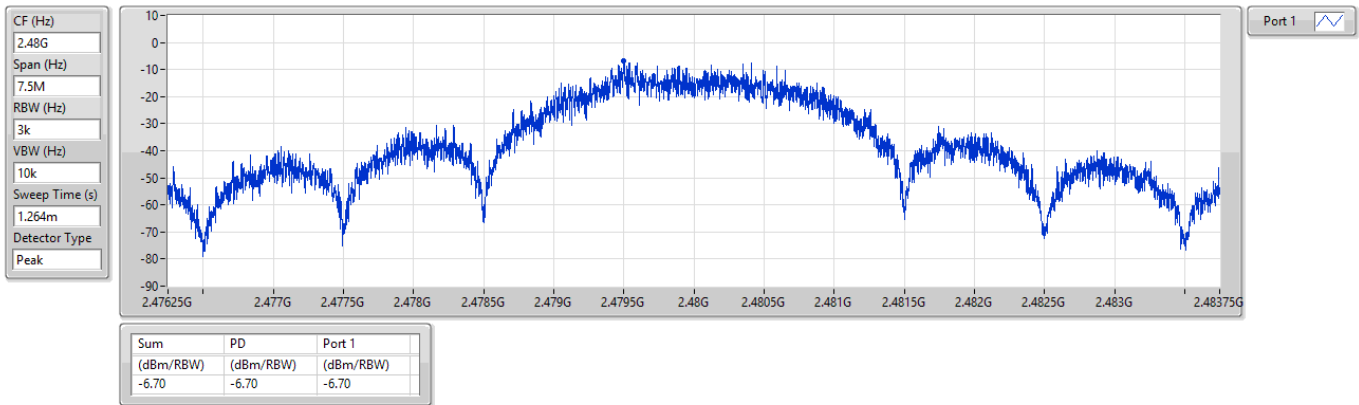
DG = Directional Gain; RBW = 3kHz;
PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; Port X = Port X Power Density;
Inf = There's no restriction for the limit.

2.4-2.4835GHz_Zigbee

PSD

2480MHz

16/03/2026





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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zigbee	Pass	2.47548G	6.02	-23.98	2.30363G	-54.68	2.4G	-37.73	2.4G	-38.10	2.50202G	-53.21	17.62115G	-41.44	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
Zigbee	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2405MHz	Pass	2.47548G	6.02	-23.98	2.30363G	-54.68	2.4G	-37.73	2.4G	-38.10	2.50202G	-53.21	17.62115G	-41.44	1
2440MHz	Pass	2.47548G	6.02	-23.98	2.0557G	-55.47	2.39436G	-54.14	2.4G	-56.02	2.50042G	-52.09	16.50476G	-43.43	1
2475MHz	Pass	2.47548G	6.02	-23.98	2.30363G	-55.09	2.39124G	-54.75	2.4G	-56.38	2.50102G	-53.50	16.21512G	-43.39	1
2480MHz	Pass	2.47548G	6.02	-23.98	2.13325G	-55.23	2.39376G	-54.35	2.4G	-55.26	2.5031G	-52.74	17.60709G	-42.74	1

2.4-2.4835GHz Zigbee

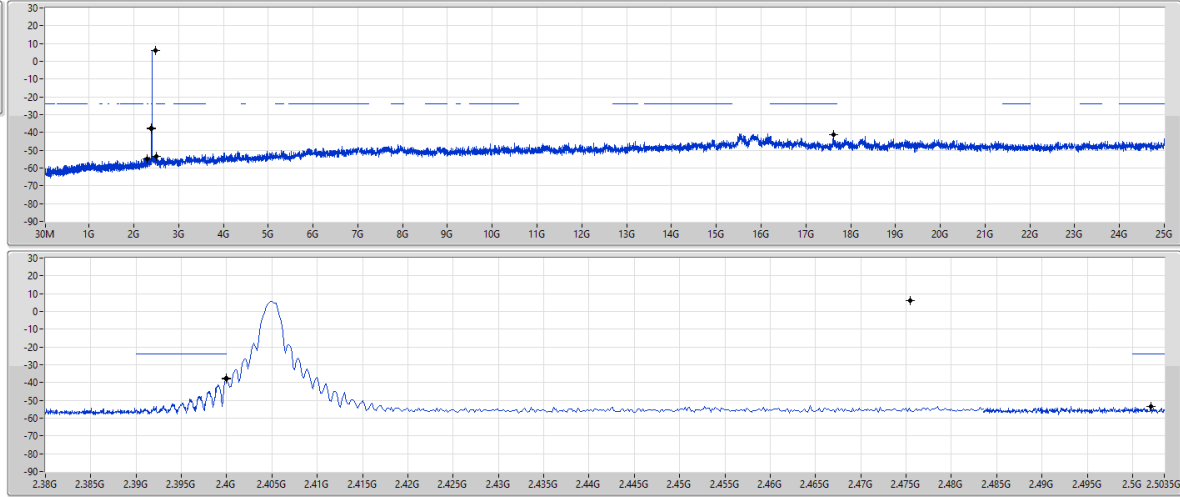
CSEndB

2405MHz

16/03/2025

RBW (Hz)
100k
VBW (Hz)
300k
Detector
Peak

Port 1



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
2.47548G	6.02	-23.98	2.30363G	-54.68	2.4G	-37.73	2.4G	-38.10	2.50202G	-53.21	17.62115G	-41.44	1



Summary

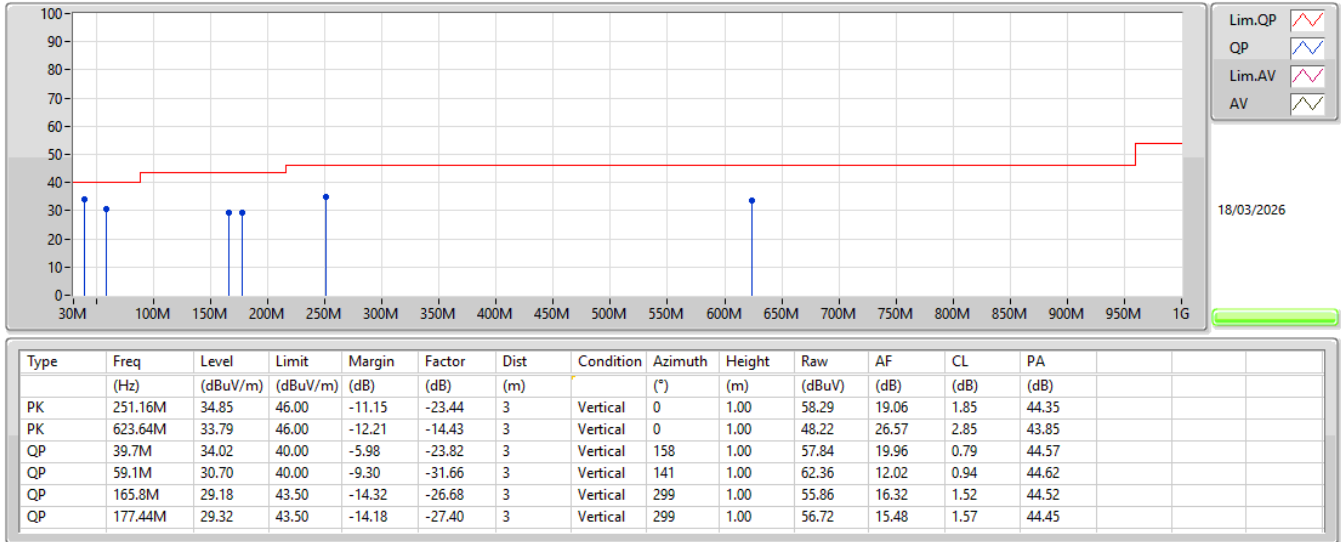
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-
Zigbee	Pass	PK	39.7M	35.54	40.00	-4.46	3	Horizontal	360	1.00

Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)
Zigbee	-	-	-	-	-	-	-	-	-	-
2440MHz_Test Fixture	Pass	PK	251.16M	34.85	46.00	-11.15	3	Vertical	0	1.00
2440MHz_Test Fixture	Pass	PK	623.64M	33.79	46.00	-12.21	3	Vertical	0	1.00
2440MHz_Test Fixture	Pass	QP	39.7M	34.02	40.00	-5.98	3	Vertical	158	1.00
2440MHz_Test Fixture	Pass	QP	59.1M	30.70	40.00	-9.30	3	Vertical	141	1.00
2440MHz_Test Fixture	Pass	QP	165.8M	29.18	43.50	-14.32	3	Vertical	299	1.00
2440MHz_Test Fixture	Pass	QP	177.44M	29.32	43.50	-14.18	3	Vertical	299	1.00
2440MHz_Test Fixture	Pass	PK	39.7M	35.54	40.00	-4.46	3	Horizontal	360	1.00
2440MHz_Test Fixture	Pass	PK	94.02M	33.76	43.50	-9.74	3	Horizontal	360	1.00
2440MHz_Test Fixture	Pass	PK	357.86M	40.72	46.00	-5.28	3	Horizontal	360	1.00
2440MHz_Test Fixture	Pass	PK	551.86M	39.79	46.00	-6.21	3	Horizontal	360	1.00
2440MHz_Test Fixture	Pass	QP	165.8M	37.74	43.50	-5.76	3	Horizontal	71	1.48
2440MHz_Test Fixture	Pass	QP	262.8M	33.73	46.00	-12.27	3	Horizontal	334	1.15

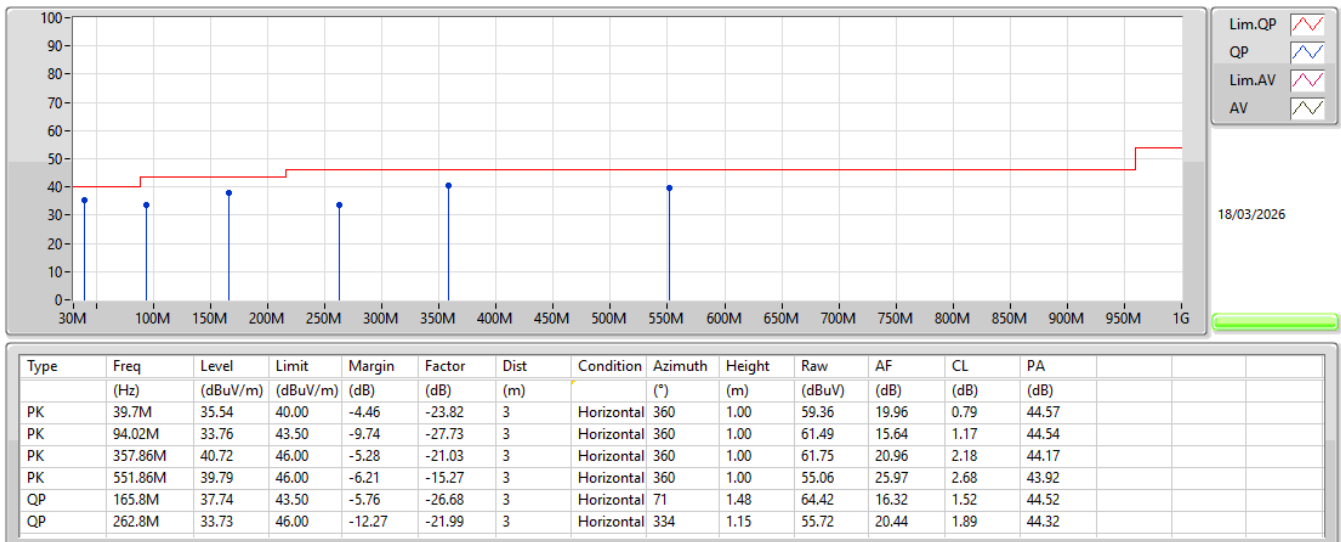
2.4-2.4835GHz_Zigbee

2440MHz_Test Fixture



2.4-2.4835GHz_Zigbee

2440MHz_Test Fixture





Summary

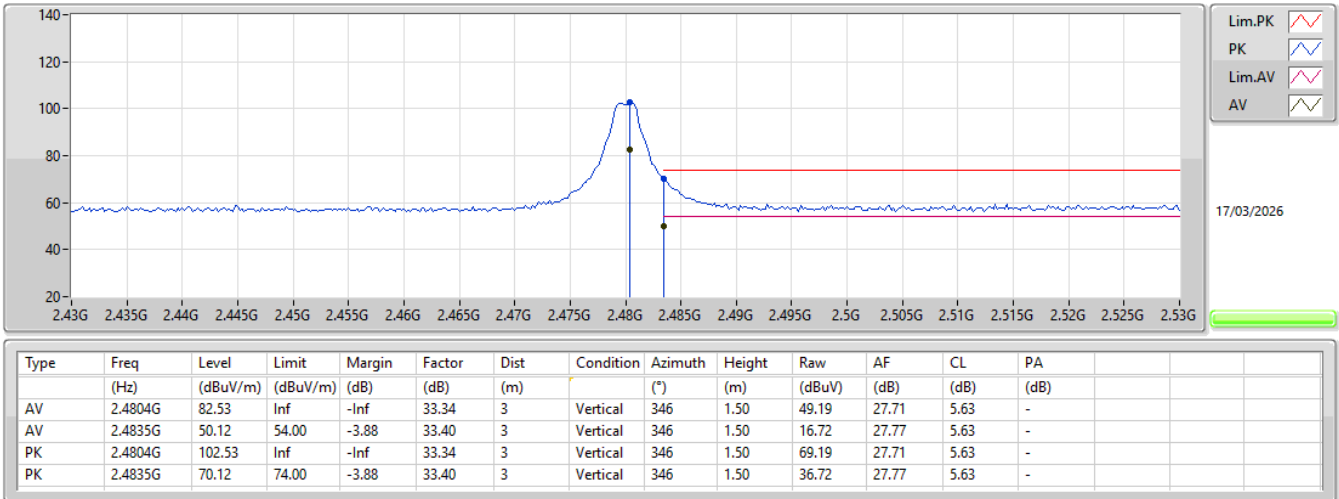
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-
Zigbee	Pass	AV	2.4835G	50.12	54.00	-3.88	3	Vertical	346	1.50

Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)
Zigbee	-	-	-	-	-	-	-	-	-	-
2405MHz	Pass	AV	2.385G	38.56	54.00	-15.44	3	Vertical	67	1.20
2405MHz	Pass	AV	2.4054G	82.53	Inf	-Inf	3	Vertical	67	1.20
2405MHz	Pass	PK	2.385G	58.56	74.00	-15.44	3	Vertical	67	1.20
2405MHz	Pass	PK	2.4054G	102.53	Inf	-Inf	3	Vertical	67	1.20
2405MHz	Pass	AV	2.3872G	38.94	54.00	-15.06	3	Horizontal	338	3.00
2405MHz	Pass	AV	2.4046G	73.39	Inf	-Inf	3	Horizontal	338	3.00
2405MHz	Pass	PK	2.3872G	58.94	74.00	-15.06	3	Horizontal	338	3.00
2405MHz	Pass	PK	2.4046G	93.39	Inf	-Inf	3	Horizontal	338	3.00
2405MHz	Pass	AV	4.81123G	26.68	54.00	-27.32	3	Vertical	88	1.50
2405MHz	Pass	PK	4.81123G	46.68	74.00	-27.32	3	Vertical	88	1.50
2405MHz	Pass	AV	4.81082G	29.06	54.00	-24.94	3	Horizontal	20	1.03
2405MHz	Pass	PK	4.81082G	49.06	74.00	-24.94	3	Horizontal	20	1.03
2440MHz	Pass	AV	2.3656G	38.30	54.00	-15.70	3	Vertical	186	1.50
2440MHz	Pass	AV	2.4396G	82.00	Inf	-Inf	3	Vertical	186	1.50
2440MHz	Pass	AV	2.4856G	38.60	54.00	-15.40	3	Vertical	186	1.50
2440MHz	Pass	PK	2.3656G	58.30	74.00	-15.70	3	Vertical	186	1.50
2440MHz	Pass	PK	2.4396G	102.00	Inf	-Inf	3	Vertical	186	1.50
2440MHz	Pass	PK	2.4856G	58.60	74.00	-15.40	3	Vertical	186	1.50
2440MHz	Pass	AV	2.3684G	38.39	54.00	-15.61	3	Horizontal	79	1.14
2440MHz	Pass	AV	2.4404G	74.06	Inf	-Inf	3	Horizontal	79	1.14
2440MHz	Pass	AV	2.488G	39.31	54.00	-14.69	3	Horizontal	79	1.14
2440MHz	Pass	PK	2.3684G	58.39	74.00	-15.61	3	Horizontal	79	1.14
2440MHz	Pass	PK	2.4404G	94.06	Inf	-Inf	3	Horizontal	79	1.14
2440MHz	Pass	PK	2.488G	59.31	74.00	-14.69	3	Horizontal	79	1.14
2440MHz	Pass	AV	4.87919G	28.19	54.00	-25.81	3	Vertical	63	2.53
2440MHz	Pass	PK	4.87919G	48.19	74.00	-25.81	3	Vertical	63	2.53
2440MHz	Pass	AV	4.88093G	28.74	54.00	-25.26	3	Horizontal	23	1.06
2440MHz	Pass	PK	4.88093G	48.74	74.00	-25.26	3	Horizontal	23	1.06
2475MHz	Pass	AV	2.4756G	83.29	Inf	-Inf	3	Vertical	250	1.31
2475MHz	Pass	AV	2.4936G	39.17	54.00	-14.83	3	Vertical	250	1.31
2475MHz	Pass	PK	2.4756G	103.29	Inf	-Inf	3	Vertical	250	1.31
2475MHz	Pass	PK	2.4936G	59.17	74.00	-14.83	3	Vertical	250	1.31
2475MHz	Pass	AV	2.4756G	72.84	Inf	-Inf	3	Horizontal	69	1.50
2475MHz	Pass	AV	2.4906G	39.01	54.00	-14.99	3	Horizontal	69	1.50
2475MHz	Pass	PK	2.4756G	92.84	Inf	-Inf	3	Horizontal	69	1.50
2475MHz	Pass	PK	2.4906G	59.01	74.00	-14.99	3	Horizontal	69	1.50
2475MHz	Pass	AV	4.95108G	28.59	54.00	-25.41	3	Vertical	38	2.96
2475MHz	Pass	PK	4.95108G	48.59	74.00	-25.41	3	Vertical	38	2.96
2475MHz	Pass	AV	4.95102G	29.32	54.00	-24.68	3	Horizontal	22	1.14
2475MHz	Pass	PK	4.95102G	49.32	74.00	-24.68	3	Horizontal	22	1.14
2480MHz	Pass	AV	2.4804G	82.53	Inf	-Inf	3	Vertical	346	1.50
2480MHz	Pass	AV	2.4835G	50.12	54.00	-3.88	3	Vertical	346	1.50
2480MHz	Pass	PK	2.4804G	102.53	Inf	-Inf	3	Vertical	346	1.50
2480MHz	Pass	PK	2.4835G	70.12	74.00	-3.88	3	Vertical	346	1.50
2480MHz	Pass	AV	2.4806G	74.00	Inf	-Inf	3	Horizontal	308	1.05
2480MHz	Pass	AV	2.4835G	44.22	54.00	-9.78	3	Horizontal	308	1.05
2480MHz	Pass	PK	2.4806G	94.00	Inf	-Inf	3	Horizontal	308	1.05
2480MHz	Pass	PK	2.4835G	64.22	74.00	-9.78	3	Horizontal	308	1.05
2480MHz	Pass	AV	4.96096G	29.01	54.00	-24.99	3	Vertical	36	2.97
2480MHz	Pass	PK	4.96096G	49.01	74.00	-24.99	3	Vertical	36	2.97
2480MHz	Pass	AV	4.96105G	29.27	54.00	-24.73	3	Horizontal	24	1.04
2480MHz	Pass	PK	4.96105G	49.27	74.00	-24.73	3	Horizontal	24	1.04

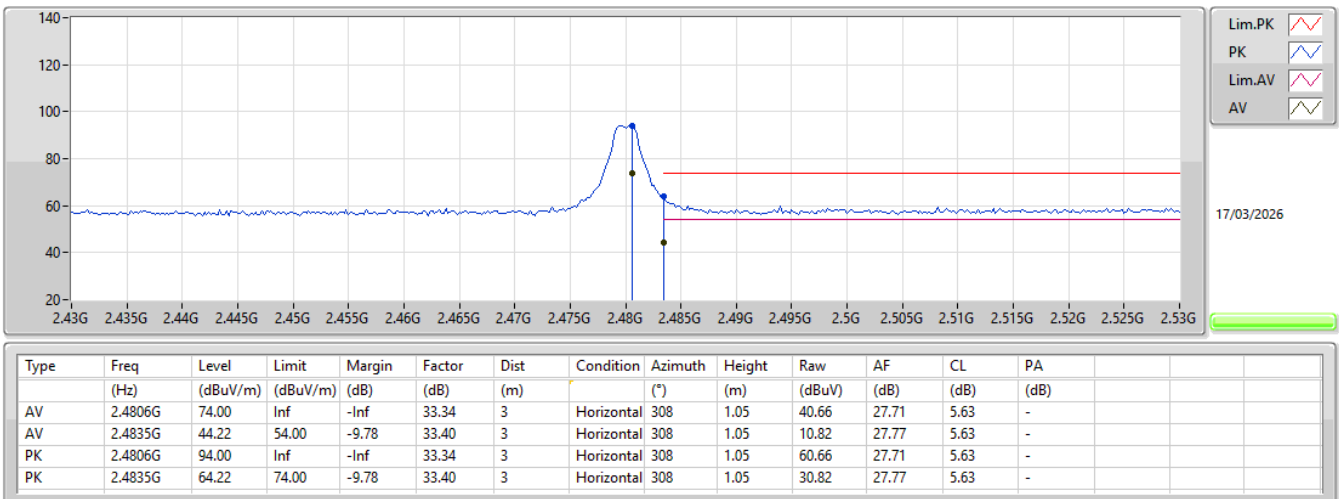
2.4-2.4835GHz_Zigbee

2480MHz_TX



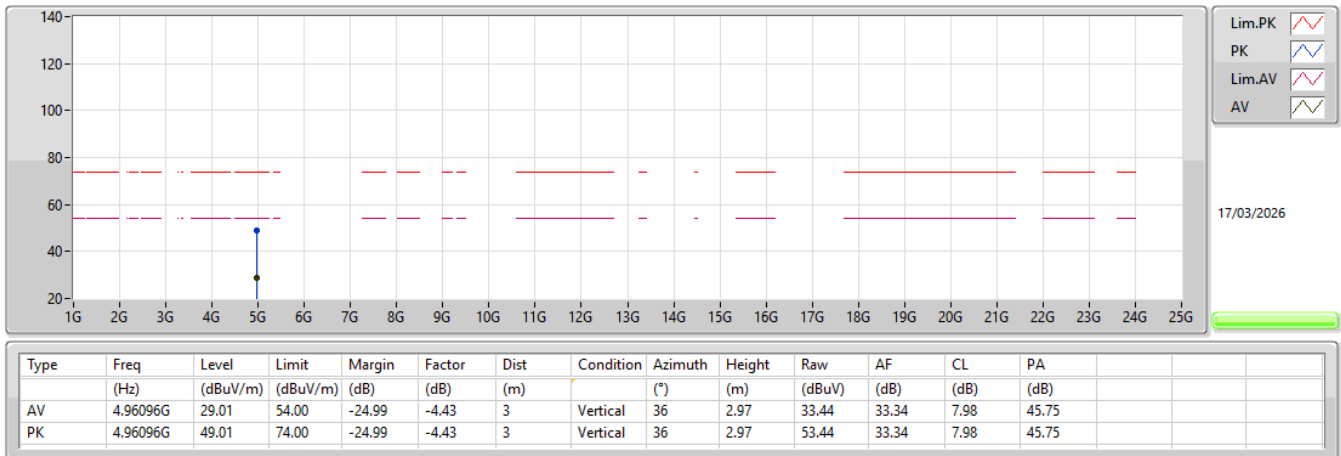
2.4-2.4835GHz_Zigbee

2480MHz_TX



2.4-2.4835GHz_Zigbee

2480MHz_TX



2.4-2.4835GHz_Zigbee

2480MHz_TX

