

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT



EUT Description: Aranet Gateway Pro
Applicant: SAF Tehnika AS
24a, Ganibu Dambis, Riga, LV-1005, Latvia
Manufacturer: SAF Tehnika AS
24a, Ganibu Dambis, Riga, LV-1005, Latvia
Brand Name: Aranet
Model No.: TDSGWPU1
/ISED HVIN:
ISED PMN: Aranet Gateway Pro
Report Number: TERF2506002041ER
FCC ID W9Z-ARANETGW
IC: 8855A-ARANETGW
Date of EUT Received: June 18, 2025
Date of Test: June 19, 2025~August 12, 2025
Issue Date: August 18, 2025

Approved By Alex Hsieh
Alex Hsieh

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT comply with FCC rule part §15.247, ISED RSS-Gen and RSS-247.

The results of this report relate only to the sample identified in this report.

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Revision History

Report Number	Revision	Description	Issue Date	Revised By	Remark
TERF2506002041ER	00	Original	July 29, 2025	Susan Lin	
TERF2506002041ER	01	Update section 2.5, 2.6, 6.1, 6.3, 7.5, 10.3.2, 11.6.1, 11.6.2 and 12.3	August 18, 2025	Susan Lin	*

Note:

- 1、The remark "*" indicates modification of the report upon requests from certification body.

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1 GENERAL INFORMATION

1.1 Product Description

EUT Description:	Aranet Gateway Pro
Brand Name:	Aranet
Model No.: /ISED HVIN:	TDSGWPU1
Hardware Version:	N/A
Firmware Version:	N/A
EUT Series No.:	400986000062, 400986000059
Power Supply:	5Vdc from AC/DC Adapter or 56Vdc from PoE 802.3af
Test Software (Name/Version):	Default

1.2 RF Specification

Radio Technology:	LoRa
Frequency Range:	923.2MHz
Channel number:	1 channel
Modulation type:	CSS
Transmit Power:	-4.17 dBm (Peak)

1.3 Antenna Designation

Antenna Type	Freq. (MHz)	Peak Antenna Gain (dBi)
PCB integrated	923.2	-9.7

Note: The antenna information is provided by the applicant, and the laboratory shall not be held liable for the accuracy, completeness, or reliability of any applicant-supplied data.

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1.4 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

RSS-247 issue 3 Aug. 2023

RSS-Gen, Issue 5 April 2018, Amendment 2 (February 2021)

1.5 Test Facility

Laboratory	Test Site Address	Test Site Name	FCC Designa- tion number	IC CAB identifier
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan.	SAC 1	TW0027	TW3702
		SAC 2		
		SAC 3		
		Conduction 1		
		Conducted 1		
		Conducted 2		
		Conducted 3		
		Conducted 4		
		Conducted 5		
		Conducted 6		
	No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333	Conduction C	TW0028	
		SAC C		
		SAC D		
		SAC G		
		Conducted A		
		Conducted B		
		Conducted C		
		Conducted D		
		Conducted E		
		Conducted F		
Conducted G				

Note: Test site name is remarked on the equipment list in each section of this report as an indication where measurements occurred in specific test site and address.

Temperature:	22.5-23.9	°C	Relative Humidity:	50-67	%
Test site	Conducted 2		Test Start:	06/30/2025	
Test Engineer:	Dannis Chen		Test Done:	07/03/2025	

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1.6 Special Accessories

There are no special accessories used while test was conducted.

1.7 Equipment Modifications

There was no modification incorporated into the EUT.

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is placed on a table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz. The CISPR Quasi-Peak and Average detector mode is employed. The two LISNs provide 50uH/50 ohm of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

2.3.2 Conducted Test (RF)

The active antenna port of the unlicensed wireless device is connected to the spectrum analyzer with attenuator to protect the instrumentation. If a second antenna port is available, it is tested at one operating frequency, with other port(s) appropriately terminated, to verify it has similar output characteristics as the fully tested port.

2.3.3 Radiated Emissions

The EUT is placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and

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elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.

2.4 Measurement Results Explanation Example

2.4.1 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m*6m*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

2.4.2 For all conducted test items:

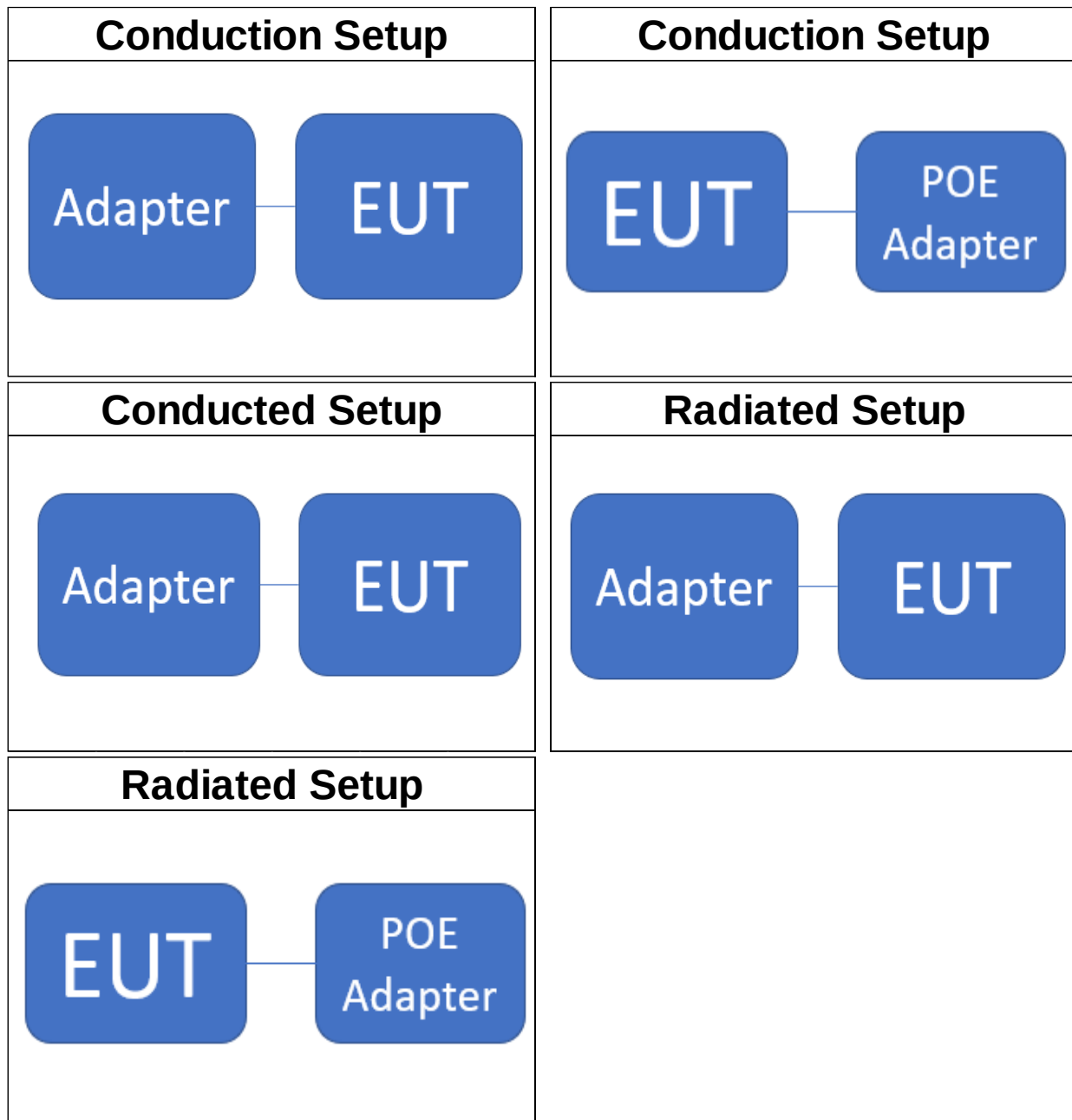
The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

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2.5 Test Configuration

2.6 Control Unit(s)
Adapter

AC Power-Line Conducted Emission Test Site: Conduction 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
Adapter	HN Electronic Componets GmbH & Co KG	HNP27I-C2USB	N/A	N/A	N/A

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POE Adapter

AC Power-Line Conducted Emission Test Site: Conduction 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
POE Adapter	PHIHONG	POE15M-1AFE	N/A	N/A	N/A

Conducted Emission Test Site: Conducted 2					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
Adapter	HN Electronic Componets GmbH & Co KG	HNP27I-C2USB	N/A	N/A	N/A

Adapter

Radiated Emission Test Site: SAC 2					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
Adapter	HN Electronic Componets GmbH & Co KG	HNP27I-C2USB	N/A	N/A	N/A

POE Adapter

Radiated Emission Test Site: SAC 2					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
POE Adapter	PHIHONG	POE15M-1AFE	N/A	N/A	N/A

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3 SUMMARY OF TEST RESULTS

FCC Rules	ISED Rules	Description Of Test	Result
§15.207(a)	RSS-Gen §8.8	AC Power Line Conducted Emission	Compliant
§15.247(b) (3)	RSS-247 §5.4 d	Peak Output Power	Compliant
§15.247(a)(2)	RSS-247 §5.2 a RSS-Gen §6.7	Emission Bandwidth	Compliant
§15.205 §15.209 §15.247(d)	RSS-247 §5.5	Conducted Band Edge and Spurious Emission	Compliant
§15.205 §15.209 §15.247(d)	RSS-247 §5.5	Radiated Band Edge and Spurious Emission	Compliant
§15.205	RSS-Gen § 8.10	Restricted Bands	Compliant
§15.247(e)	RSS-247 §5.2 b	Peak Power Density	Compliant
§15.203	N/A	Antenna Requirement	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 Operating Frequencies

CH	Freq. (MHz)
9	923.2

4.2 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.
3. Investigation has been done on all the possible configurations for searching the worst case.

The given UE is pre-scanned among below modes.

CONDUCTED TEST			
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION
Lora	9	9	CSS

TRANSMIT RADIATED EMISSION TEST (BELOW 1 GHz)			
MODE	AVAILABLE FREQUENCY(MHz)	TESTED FREQUENCY(MHz)	MODULATION
Lora	923.2	923.2	CSS
TRANSMIT RADIATED EMISSION TEST (ABOVE 1 GHz)			
MODE	AVAILABLE FREQUENCY(MHz)	TESTED FREQUENCY(MHz)	MODULATION
Lora	923.2	923.2	CSS

Note:

The field strength of radiated emission was measured as the EUT positioned in different orthogonal planes (E1/E2/H) based on actual usage of the EUT to pre-scan the emissions for determining the worst case scenario.

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5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 1.54 dB
Output Power measurement	+/- 0.97 dB
Emission Bandwidth	+/- 1.38 Hz
Conducted emission measurement	+/- 0.77 dB
Peak Power Density	+/- 0.61 dB
Temperature	+/- 0.6 °C
Humidity	+/- 3 %
DC / AC Power Source	+/- 1 %

Radiated Spurious Emission Measurement Uncertainty				
Polarization: Vertical	+/-	1.89	dB	9kHz~30MHz
	+/-	4.1	dB	30MHz - 1000MHz
	+/-	3.37	dB	1GHz - 18GHz
	+/-	3.83	dB	18GHz - 40GHz
Polarization: Horizontal	+/-	1.89	dB	9kHz~30MHz
	+/-	4.1	dB	30MHz - 1000MHz
	+/-	3.37	dB	1GHz - 18GHz
	+/-	3.83	dB	18GHz - 40GHz
Radiated Spurious Emission	+/-	2	dB	33GHz-50GHz
	+/-	1.59	dB	50GHz-60GHz
	+/-	1.71	dB	60GHz-90GHz
	+/-	1.64	dB	90GHz-140GHz
	+/-	3.84	dB	140GHz-220GHz

Note:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
2. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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6 MEASUREMENT EQUIPMENT USED

6.1 Emission from AC power line

Adapter

AC Power-Line Conducted Emission Test Site: Conduction 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
Coaxial Cables	EMC Instruments Corp.	EMCCFD300-BM-BM-3000	161207	06/22/2025	06/21/2026
EMI Test Receiver	R&S	ESCI 7	100759	08/28/2024	08/27/2025
Pulse Limiter	SCHWARZBECK	VTSD 9561F-N	793	06/22/2025	06/21/2026
LISN	SCHWARZBECK	NSLK 8127	1040	09/07/2024	09/06/2025
Test Software	Audix	e3	Ver. 9.210616	N.C.R	N.C.R

POE Adapter

AC Power-Line Conducted Emission Test Site: Conduction 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
Coaxial Cables	EMC Instruments Corp.	EMCCFD300-BM-BM-3000	161207	06/22/2025	06/21/2026
EMI Test Receiver	R&S	ESCI 7	100759	08/28/2024	08/27/2025
Pulse Limiter	SCHWARZBECK	VTSD 9561F-N	793	06/22/2025	06/21/2026
LISN	SCHWARZBECK	NSLK 8127	1040	09/07/2024	09/06/2025
Test Software	Audix	e3	Ver. 9.210616	N.C.R	N.C.R

6.2 Conducted Measurement

Conducted Emission Test Site: Conducted 2					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
Attenuator	Mini-Circuits	BW-S10W2+	28	12/11/2024	12/10/2025
DC Block	Mini-Circuits	BLK-18-S+	31129	12/11/2024	12/10/2025
EXA Spectrum Analyzer	KEYSIGHT	N9010B	MY59071541	07/08/2024	07/07/2025
Power Meter	Anritsu	ML2496A	2138003	10/09/2024	10/08/2025
Power Sensor	Anritsu	MA2411B	1911393	10/09/2024	10/08/2025
Power Sensor	Anritsu	MA2411B	1911394	10/09/2024	10/08/2025

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6.3 Radiated Measurement

Adapter

Radiated Emission Test Site: SAC 2					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
1.3G High Pass Filter	Woken	WHKX10-1066	20	12/11/2024	12/10/2025
Band Reject Filter 902-928	Titan	T04N90292850S02	24090402-1	10/15/2024	10/14/2025
Bi-log Antenna	SCHWARZBECK	VULB9168	9168-1278	03/10/2025	03/09/2026
Coaxial Cables	EMCI	EMC104-SM-SM-600 +EMC105-SM-SM-2000 +EMC105-SM-SM-1500 +EMC105-SM-SM-10000	RX Cable 9K-18G (220237+220909+220906+240801)	08/30/2024	08/29/2025
EMI Test Receiver	R&S	ESR 7	102525	02/08/2025	02/07/2026
EXA Spectrum Analyzer	Agilent	N9010A	MY54200716	10/14/2024	10/13/2025
Horn Antenna	RF SPIN	DRH18-E	210303A18-ES	02/20/2025	02/19/2026
Loop Antenna	COM-POWER	AL-130R	10160104	12/19/2024	12/18/2025
Pre-Amplifier	EMCI	EMC118A45SEE	980867	08/30/2024	08/29/2025
Pre-Amplifier	EMCI	EMC330N	980826	08/30/2024	08/29/2025
Site Cal	SGS	SAC 2	N/A	08/30/2024	08/29/2025
Test Software	Audix	e3	Ver. 9.210616	N.C.R	N.C.R

POE Adapter

Radiated Emission Test Site: SAC 2					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
Bi-log Antenna	SCHWARZBECK	VULB9168	9168-1278	03/10/2025	03/09/2026
Coaxial Cables	EMCI	EMC104-SM-SM-600 +EMC105-SM-SM-2000 +EMC105-SM-SM-1500 +EMC105-SM-SM-10000	RX Cable 9K-18G (220237+220909+220906+240801)	08/30/2024	08/29/2025
EMI Test Receiver	R&S	ESR 7	102525	02/08/2025	02/07/2026
EXA Spectrum Analyzer	Agilent	N9010A	MY54200716	10/14/2024	10/13/2025
Loop Antenna	COM-POWER	AL-130R	10160104	12/19/2024	12/18/2025
Pre-Amplifier	EMCI	EMC330N	980826	08/30/2024	08/29/2025
Site Cal	SGS	SAC 2	N/A	07/14/2025	07/13/2026
Test Software	Audix	e3	Ver. 9.210616	N.C.R	N.C.R

NOTE: N.C.R refers to Not Calibrated Required.

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7 CONDUCTED EMISSION TEST

7.1 Standard Applicable:

Frequency range within 150kHz to 30MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

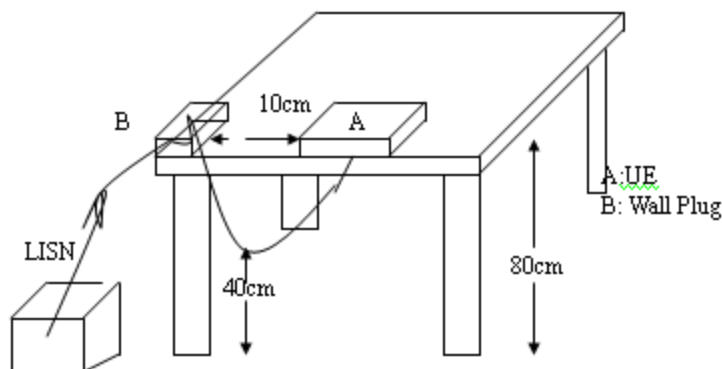
Note

1. The lower limit shall apply at the transition frequencies
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

7.2 EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

7.3 Test Setup



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7.4 Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all phases of power being supplied by given UE are completed

7.5 Measurement Result:

Level = Read Level + Factor

Factor = (LISN, ISN, or current probe)Factor + Cable Loss +Attenuator

Note: Refer to next page for measurement data and plots.

Note2: The * reveals the worst-case results that closest to the limit.

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AC POWER LINE CONDUCTED EMISSION TEST DATA

Adapter

Report Number :TERF2506002041ER

Test Site :Conduction 1

Operation Mode :Lora

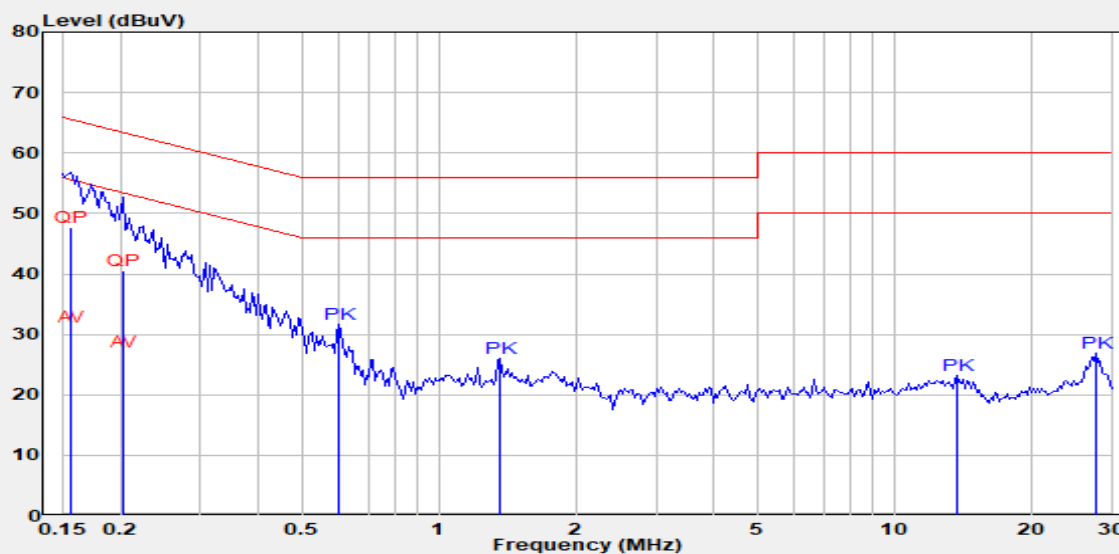
Test Date :2025-06-30

Power :120V/60Hz

Temp./Humi. :23.7°C/58%

Probe :L

Engineer :Bob Chao



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.155	Average	21.09	10.16	31.25	55.74	-24.49
0.155	QP	37.58	10.16	47.74	65.74	-18.00
0.202	Average	16.87	10.16	27.03	53.54	-26.51
0.202	QP	30.42	10.16	40.58	63.54	-22.96
0.601	Peak	21.40	10.18	31.58	56.00	-24.42
1.359	Peak	15.69	10.23	25.92	56.00	-30.08
13.695	Peak	12.67	10.51	23.18	60.00	-36.82
27.855	Peak	16.18	10.68	26.86	60.00	-33.14

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Report Number :TERF2506002041ER

Operation Mode :Lora

Power :120V/60Hz

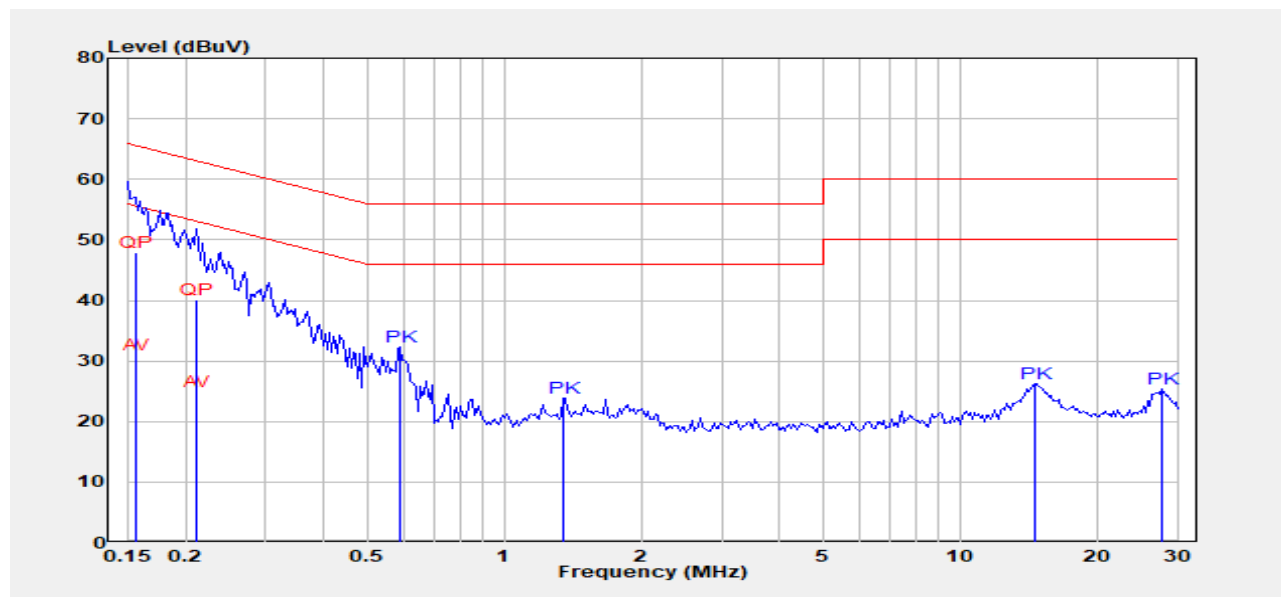
Probe :N

Test Site :Conduction 1

Test Date :2025-06-30

Temp./Humi. :23.7°C/58%

Engineer :Bob Chao



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.155	Average	20.96	10.12	31.08	55.74	-24.66
0.155	QP	37.84	10.12	47.96	65.74	-17.78
0.211	Average	14.88	10.12	25.00	53.18	-28.18
0.211	QP	29.93	10.12	40.05	63.18	-23.13
0.589	Peak	22.18	10.17	32.35	56.00	-23.65
1.345	Peak	13.74	10.19	23.93	56.00	-32.07
14.594	Peak	15.73	10.54	26.27	60.00	-33.73
27.855	Peak	14.58	10.71	25.29	60.00	-34.71

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POE Adapter

Report Number :TERF2506002041ER

Operation Mode :Lora

Power :120V/60Hz

Probe :L

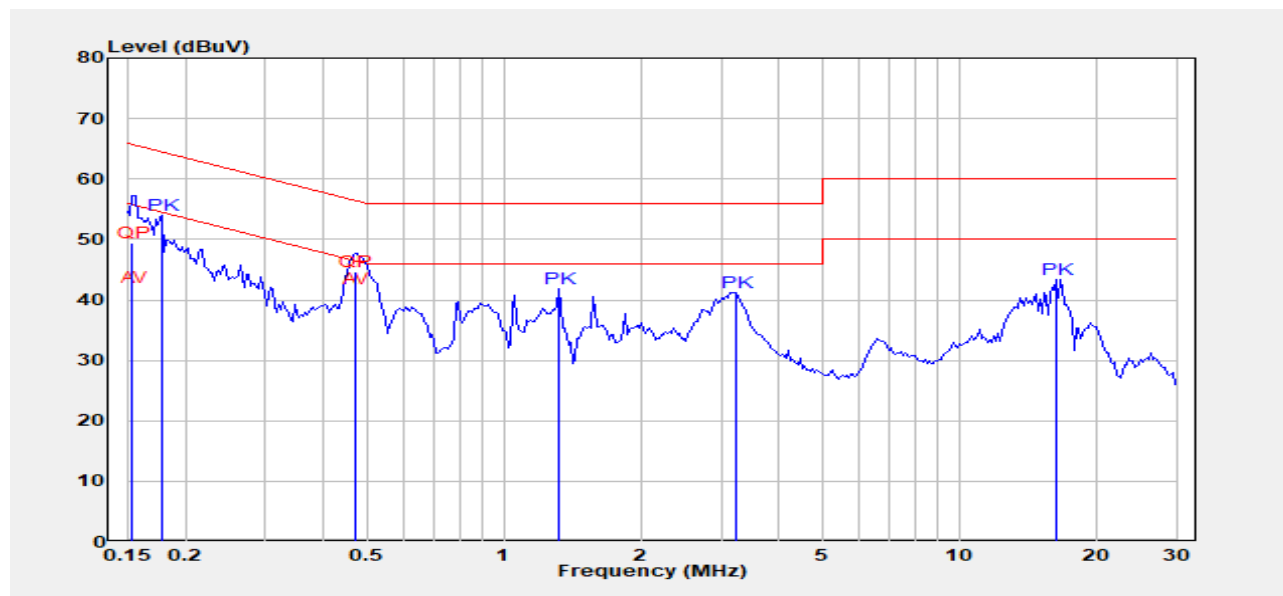
Note: :

Test Site :Conduction 1

Test Date :2025-08-12

Temp./Humi. :23.7°C/59%

Engineer :Bob Chao



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS		
	PK/QP/AV	dBuV	dB	dBuV	dBuV	dB
0.153	Average	31.87	10.16	42.03	55.82	-13.79
0.153	QP	39.24	10.16	49.40	65.82	-16.42
0.178	Peak	43.82	10.16	53.98	64.59	-10.61
0.471	Average	31.65	10.16	41.81	46.49	-4.68
0.471	QP	34.43	10.16	44.59	56.49	-11.90
1.317	Peak	31.58	10.23	41.81	56.00	-14.19
3.241	Peak	30.88	10.31	41.19	56.00	-14.81
16.398	Peak	32.86	10.54	43.40	60.00	-16.60

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Report Number :TERF2506002041ER

Test Site :Conduction 1

Operation Mode :Lora

Test Date :2025-08-12

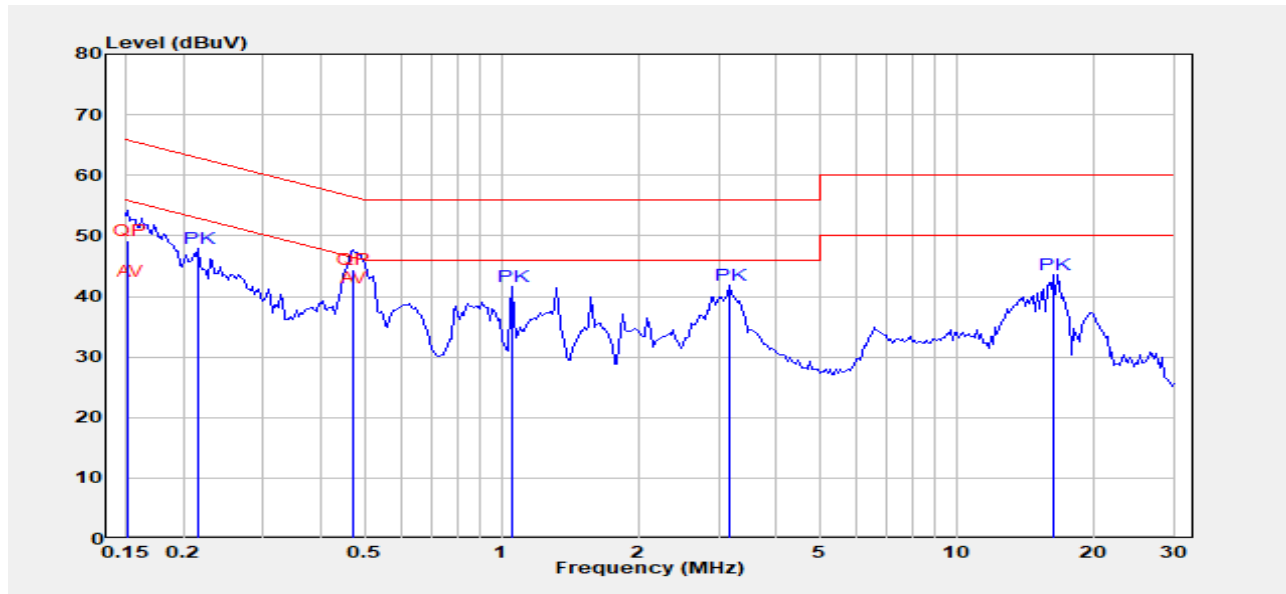
Power :120V/60Hz

Temp./Humi. :23.7°C/59%

Probe :N

Engineer :Bob Chao

Note :



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.152	Average	32.34	10.12	42.46	55.91	-13.45
0.152	QP	39.06	10.12	49.18	65.91	-16.73
0.215	Peak	37.75	10.12	47.87	63.01	-15.13
0.471	Average	31.29	10.17	41.46	46.49	-5.04
0.471	QP	34.37	10.17	44.54	56.49	-11.96
1.054	Peak	31.36	10.16	41.53	56.00	-14.47
3.173	Peak	31.63	10.29	41.92	56.00	-14.08
16.398	Peak	32.94	10.57	43.52	60.00	-16.48

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8 PEAK OUTPUT POWER MEASUREMENT

8.1 Standard Applicable:

8.1.1 FCC

For systems using digital modulation in the 902-928 MHz bands, the limit for peak output power is 1Watt.

If the transmitting antenna of directional gain greater than 6dBi are used the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6dBi. (FCC only)

In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi.

8.1.2 ISED

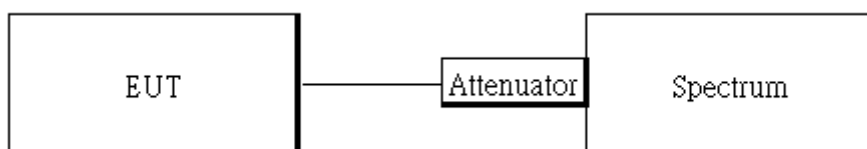
For systems using digital modulation in the 902-928 MHz bands, the limit for peak output power is 1Watt and the e.i.r.p. shall not exceed 4 W.

Note:

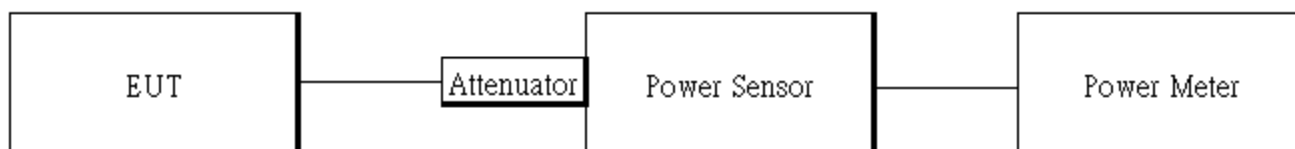
When the antenna gain is greater than 6 dBi, the power limit attenuated accordingly.

8.2 Test Setup

8.2.1 Duty Cycle



8.2.2 Output Power



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8.3 Measurement Procedure:

8.3.1 Duty Cycle

1. Place the EUT on the table and set it in transmitting mode.
2. Set span = Zero
3. RBW = 8MHz, VBW = 8MHz,
4. Detector = Peak

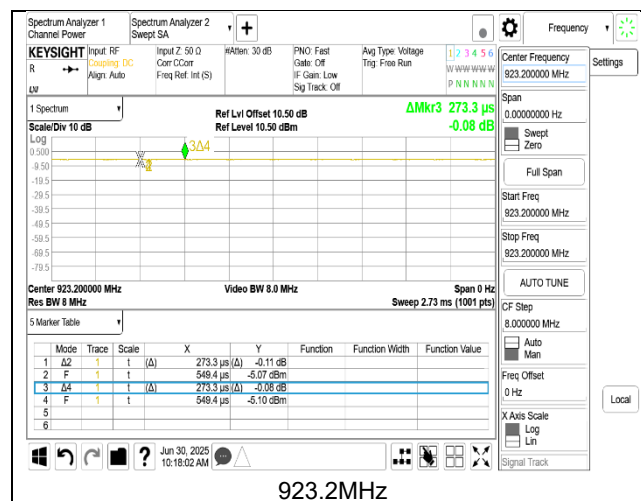
8.4 Output Power

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.
4. Record the max. Reading as observed from Power Meter.
5. Repeat above procedures until all test default channel measured was complete.

8.5 Duty Factor:

Mode	Duty Cycle (%) = Ton / (Ton+Toff)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
Lora	100.00	0.00	0.00	0.01

Duty Cycle Factor: $10 \cdot \log(1/(100/100))=0$



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8.6 Output Power:

8.6.1 Peak & Avg

Lora mode:

CH	Frequency (MHz)	Power Setting	Peak Output Power (dBm)	Required Limit (dBm)
9	923.2	default	-4.17	30
CH	Frequency (MHz)	Power Setting	Avg. Output Power (dBm)	Required Limit (dBm)
9	923.2	default	-4.95	30

***Note:**

1. Measured by power meter, cable loss 10.5 dB + Duty cycle factor has been offsetted to the power meter for Avg. power and cable loss has been offsetted for Peak power measurement.

8.6.2 EIRP

EIRP Lora mode

CH	Frequency (MHz)	Power Setting	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit
9	923.2	default	-4.95	-9.70	-14.65	4W= 36 dBm

*** Note:** EIRP = Average Power + Gain

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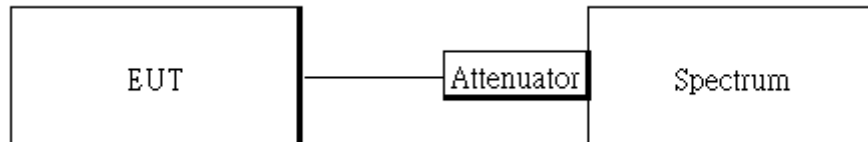
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9 EMISSION BANDWIDTH MEASUREMENT

9.1 Standard Applicable

The minimum 6 dB bandwidth shall be at least 500 kHz .

9.2 Test Setup



9.3 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

9.3.1 6dB BW measurements

1. The testing follows the Measurement Procedure of the KDB 558074 D01.
2. Set the spectrum analyzer as
RBW= 100 kHz ,
VBW = 3 X RBW,
Span= 2 to 5 times of the OBW,
Sweep=auto, Detector = Peak, and Max hold.
3. Mark the upper and lower frequencies of -6dB.
4. Repeat above procedures until all test default channel is completed.

9.3.2 99% BW measurements

1. The testing follows the Measurement Procedure of the RSS-Gen section 6.7.
2. Set the spectrum analyzer as
RBW= 1 % to 5% of 99%,
VBW $\geq$ 3 X RBW,
Span= large enough to capture all products of the modulation process
Sweep=auto, Detector = Peak, and Max hold.
3. Mark the upper and lower frequencies of 99%.
4. Repeat above procedures until all test default channel is completed.

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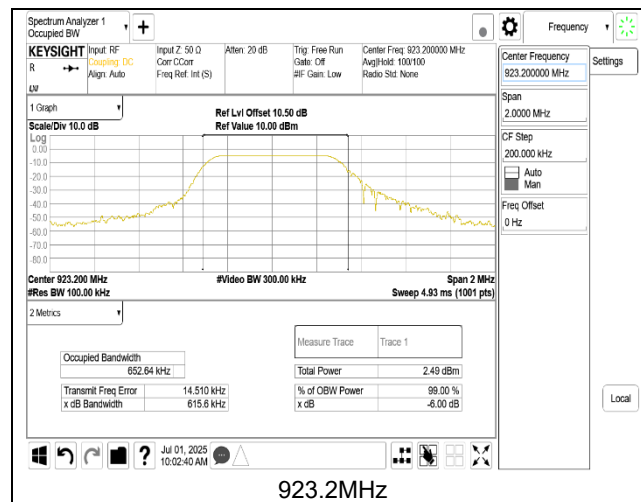
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9.4 Measurement Result:

9.4.1 6dB BW measurements

Lora mode

Frequency (MHz)	6dB BW (MHz)	Required BW (MHz)	Result
923.2	0.6156	≥ 0.5	PASS



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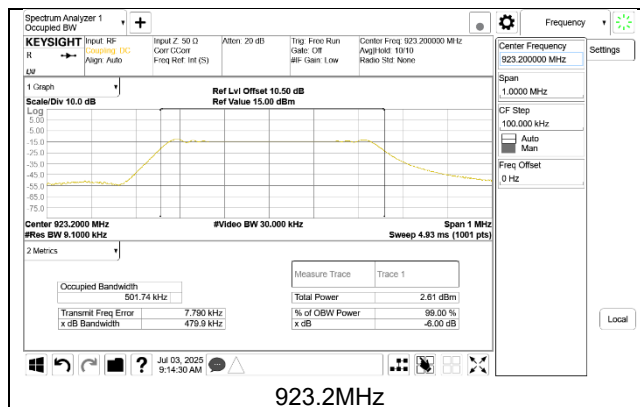
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9.4.2 99% Bandwidth

Lora mode

Frequency (MHz)	99%Bandwidth (MHz)
923.2	0.50174



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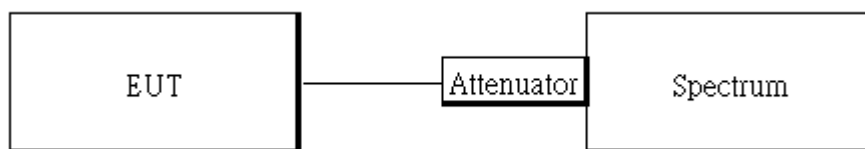
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10 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

10.1 Standard Applicable

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a) & RSS-Gen §8.10, must also comply with the radiated emission limits specified in §15.209(a) & RSS-Gen §8.9.

10.2 Test Setup



10.3 Measurement Procedure

10.3.1 Reference Level of Emission Limit:

1. Set analyzer center frequency to DTS channel center frequency.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
3. Set the span to 1.5 times the DTS channel bandwidth.
4. Set the RBW = 100kHz & VBW = 300 kHz.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.

10.3.2 Conducted Band Edge:

1. To connect Antenna Port of EUT to Spectrum.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.

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3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
4. Set start to edge frequency, and stop frequency of spectrum analyzer so as to encompass the spectrum to be examined.
5. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz, Detector = Peak, Sweep = auto
6. Set DL as the limit = reading on marker of reference level measurement – 20dBm
7. Mark the highest readings of the emissions outside of 902-928 MHz.
8. Repeat above procedures until all default test channel (low, middle, and high) was complete.

10.3.3 Conducted Spurious Emission:

1. To connect Antenna Port of EUT to Spectrum.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
3. Set RBW = 100 kHz & VBW=300 kHz, Detector =Peak, Sweep = Auto
4. Allow trace to fully stabilize.
5. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
6. Repeat above procedures until all default test channel measured were complete.

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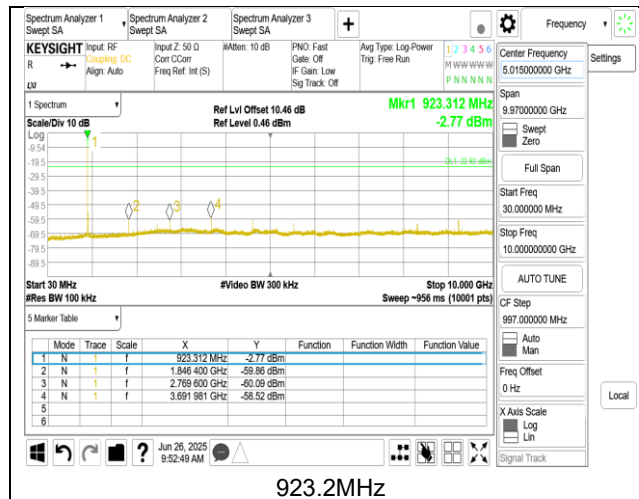
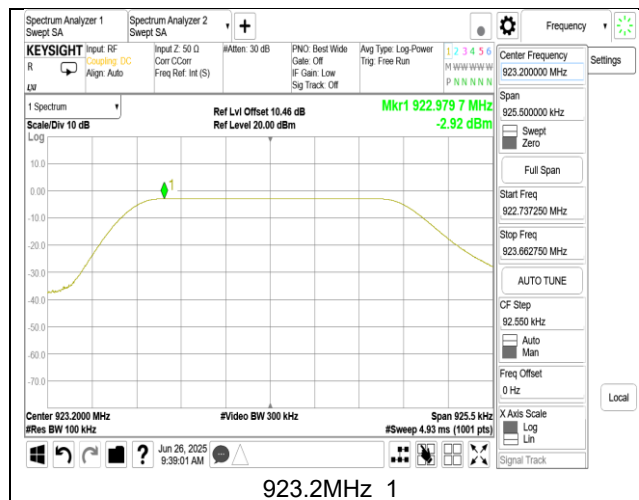
10.4 Measurement Result

Lora_Reference Level of Limit

Frequency (MHz)	RF Power Density (dBm)	Reference Level of Limit = PSD - 20dB (dBm)
923.2	-2.92	-22.92

***Note:**

- 1.cable loss as 10.46dB that offsets in the spectrum
- 2.Refer to next page for plots.



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11 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT

11.1 Standard Applicable

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands must also comply with the §15.209 and RSS-Gen §8.9 Table 5 and 6 limit as below.

And according to §15.33(a) (1) & RSS-Gen §6.13.2.a, for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

Frequency (MHz)	Field strength (microvolts/meter)	Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

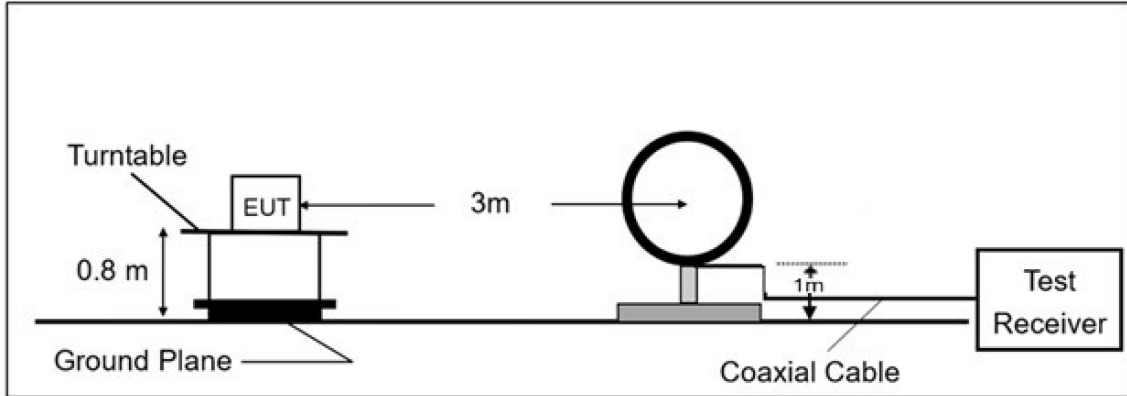
1. The lower limit shall apply at the transition frequencies.

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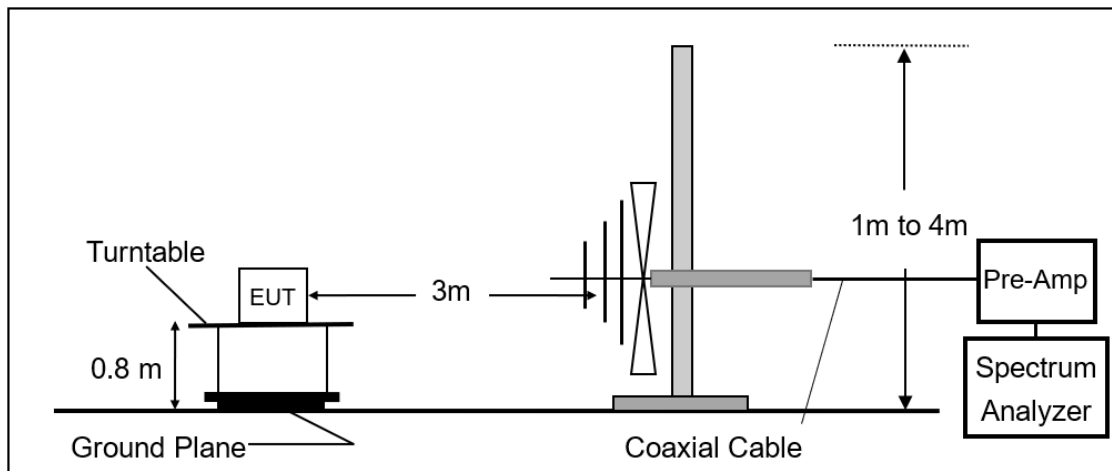
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11.2 Test Setup

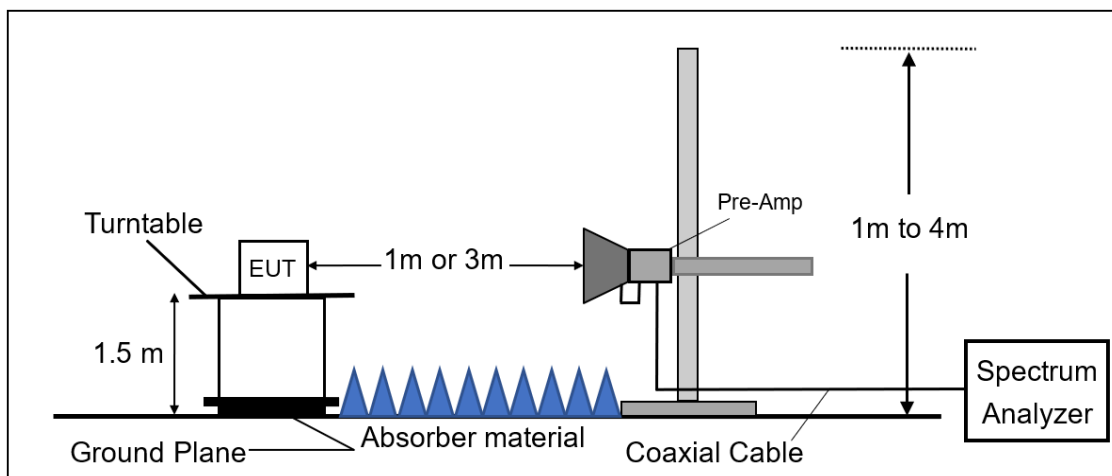
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz.



(B) Radiated Emission Test Set-Up, Frequency From 30MHz to 1000MHz.



(C) Radiated Emission Test Set-Up, Frequency Above 1GHz.



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11.3 Measurement Procedure

1. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
2. The EUT was placed on a turn table with 0.8m for frequency < 1GHz and 1.5m for frequency > 1GHz above ground plane.
3. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
4. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
5. Set the spectrum analyzer as RBW=100 kHz and VBW=300 kHz for Peak Detector (PK) at frequency between 30MHz and 1 GHz.
6. Use receiver mode as RBW=120 kHz for Quasi-peak (QP) at frequency between 30MHz and 1 GHz.
7. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz, Detector= Peak for Maximum Emission Measurements at frequency above 1 GHz.
8. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz, Detector= RMS correction factor is $[10 \log (1 / D)]$ for Average Emission measurements at frequency above 1 GHz **when $D \geq 98\%$** . If a specific emission is demonstrated to be continuous ($D \geq 98\%$) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission, where D is the duty cycle.
9. Set the spectrum analyzer as RBW=1 MHz, VBW $\geq 1/T$ **when $D < 98\%$** for Average Emission Measurements at frequency above 1 GHz.
10. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.
11. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
12. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. On spectrum, change spectrum mode in linear display mode, and reduce VBW = 10Hz if average reading is measured.
13. Repeat above procedures until all default test channel measured were complete.

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11.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where *FS = Field Strength*

CL = Cable Attenuation Factor (Cable Loss)

RA = Reading Amplitude

AG = Amplifier Gain

AF = Antenna Factor

The limit of the emission level is expressed in dBuV/m, which converts $20 \cdot \log(\mu V/m)$

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dB/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

11.5 Test Results of Radiated Spurious Emissions from 9 kHz to 30 MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit per 15.31(o) & RSS-GEN §6.13.2 was not reported.

11.6 Measurement Result:

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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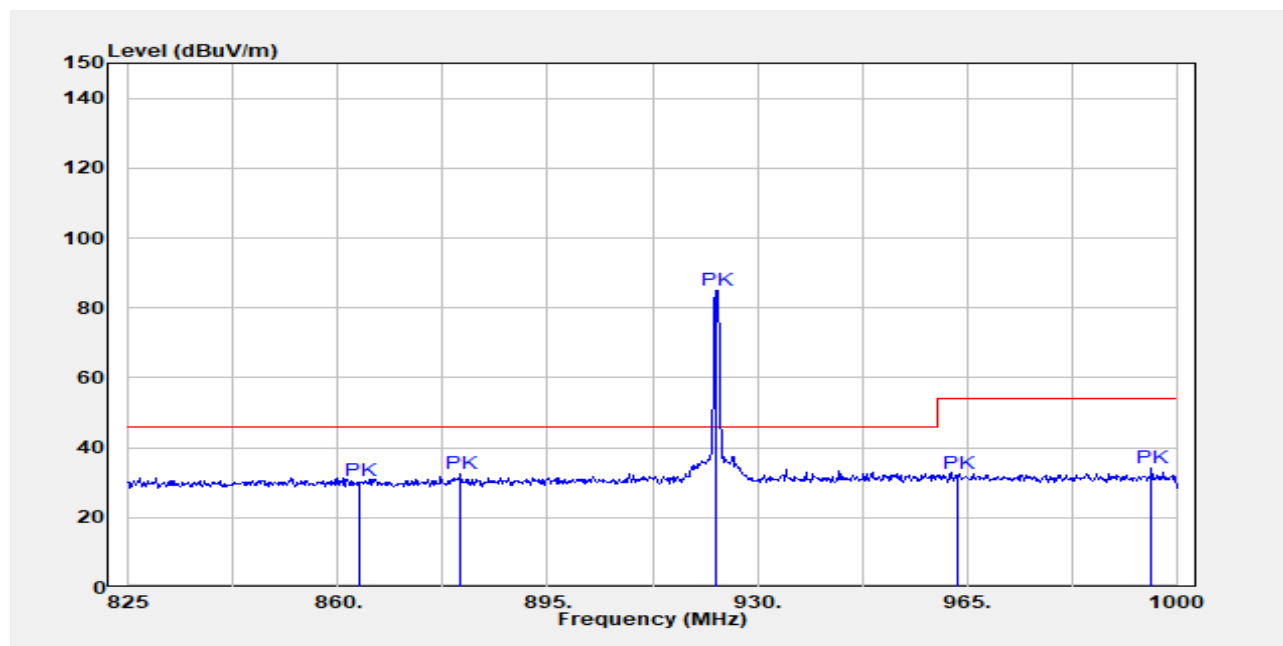
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11.6.1 Radiated Band Edge Measurement Result

Adapter

Report Number :TERF2506002041ER
 Operation Mode :Lora
 Test Frequency :923.2 MHz
 Test Mode :Bandedge
 EUT Pol :E2 Plane

Test Site :SAC 2
 Test Date :2025-06-30
 Temp./Humi. :23.1℃/58%
 Antenna Pol. :Vertical
 Engineer :Bob Chao



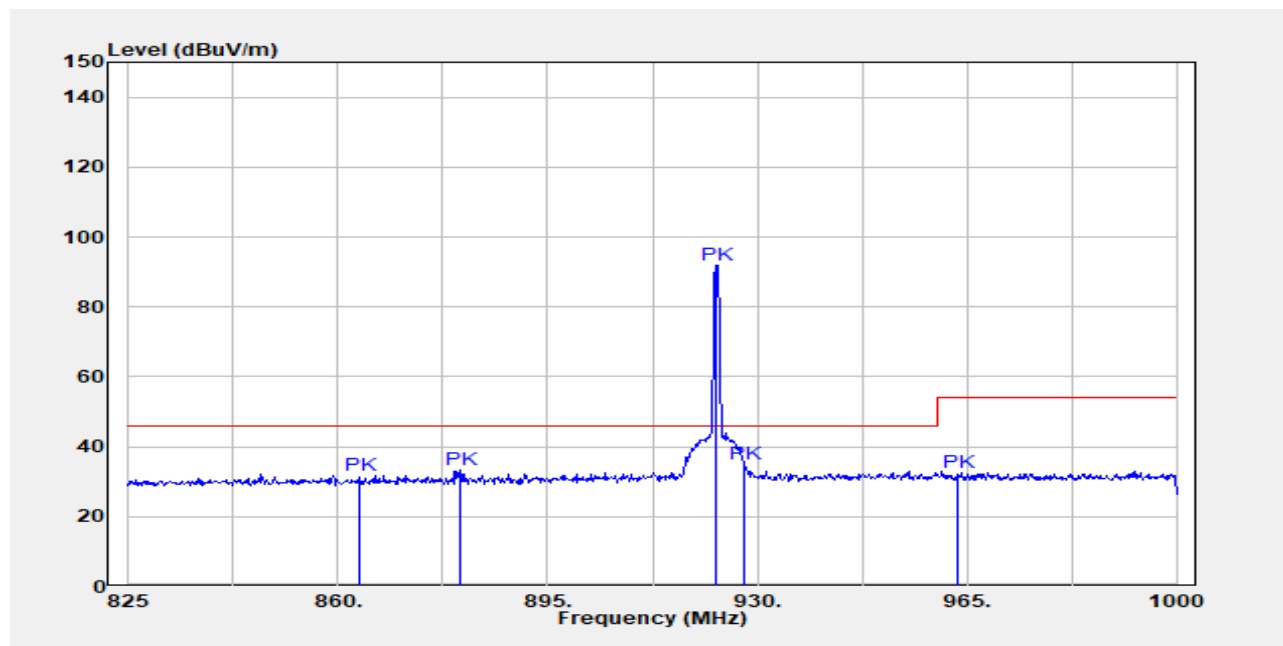
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
863.50	Peak	30.57	-0.13	30.44	46.00	-15.56
880.48	Peak	32.41	0.04	32.45	46.00	-13.55
923.20	Peak	84.12	0.69	84.81	-	-
963.43	Peak	31.02	1.36	32.38	54.00	-21.62
995.80	Peak	32.53	1.58	34.11	54.00	-19.89

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Report Number :TERF2506002041ER
 Operation Mode :Lora
 Test Frequency :923.2 MHz
 Test Mode :Bandedge
 EUT Pol :E2 Plane

Test Site :SAC 2
 Test Date :2025-06-30
 Temp./Humi. :23.1℃/58%
 Antenna Pol. :Horizontal
 Engineer :Bob Chao



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual FS dBUV/m	Limit @3m dBUV/m	Margin dB
863.50	Peak	31.84	-0.13	31.71	46.00	-14.29
880.48	Peak	33.48	0.04	33.52	46.00	-12.48
923.20	Peak	91.14	0.69	91.83	-	-
927.90	Peak	34.18	0.81	34.99	46.00	-11.01
963.43	Peak	31.14	1.36	32.50	54.00	-21.50

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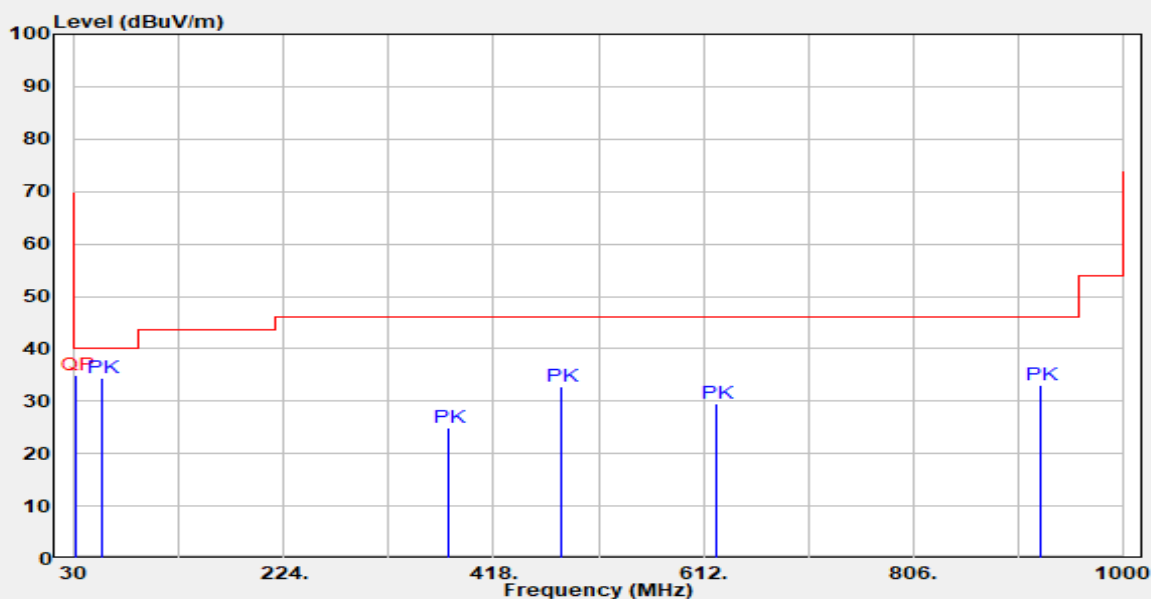
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11.6.2 Radiated Spurious Emission

Adapter

Report Number :TERF2506002041ER
 Operation Mode :Lora
 Test Frequency :923.2 MHz
 Test Mode :Tx
 EUT Pol :E2 Plane

Test Site :SAC 2
 Test Date :2025-06-30
 Temp./Humi. :23.1℃/58%
 Antenna Pol. :Vertical
 Engineer :Bob Chao



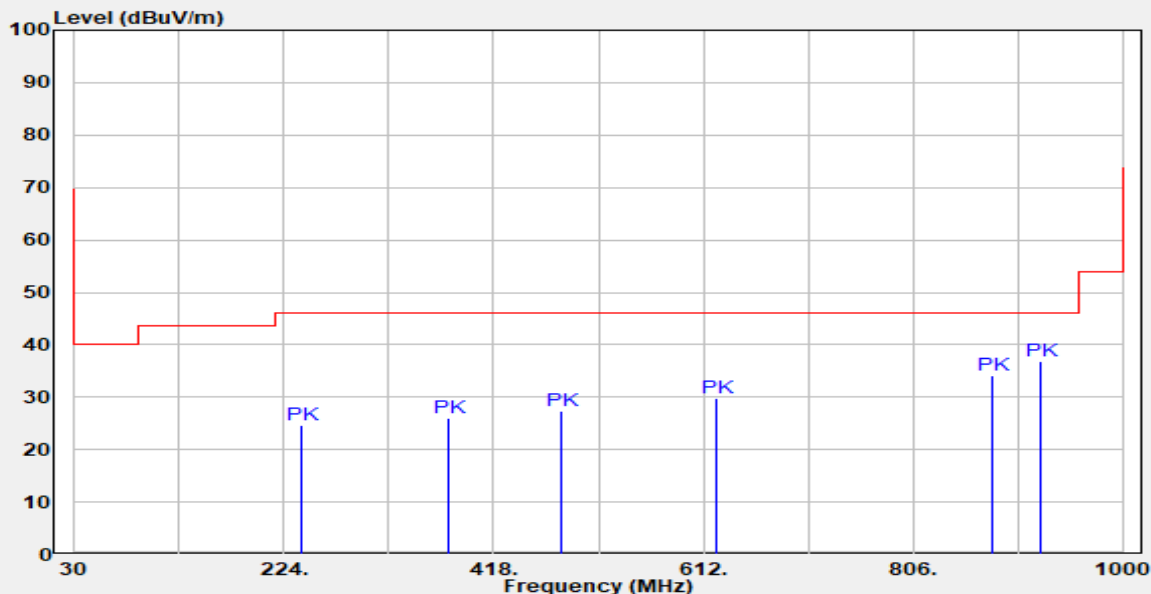
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
30.97	QP	35.81	-0.94	34.87	40.00	-5.13
55.22	Peak	38.44	-4.00	34.44	40.00	-5.56
375.32	Peak	34.55	-9.58	24.97	46.00	-21.03
480.08	Peak	39.95	-7.07	32.88	46.00	-13.12
624.61	Peak	33.43	-3.80	29.63	46.00	-16.37
923.37	Peak	32.44	0.65	33.09	46.00	-12.91

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Report Number :TERF2506002041ER
 Operation Mode :Lora
 Test Frequency :923.2 MHz
 Test Mode :Tx
 EUT Pol :E2 Plane

Test Site :SAC 2
 Test Date :2025-06-30
 Temp./Humi. :23.1°C/58%
 Antenna Pol. :Horizontal
 Engineer :Bob Chao



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
239.52	Peak	37.89	-13.28	24.61	46.00	-21.39
375.32	Peak	35.50	-9.58	25.92	46.00	-20.08
480.08	Peak	34.55	-7.07	27.48	46.00	-18.52
624.61	Peak	33.63	-3.80	29.83	46.00	-16.17
879.72	Peak	34.14	0.00	34.14	46.00	-11.86
923.37	Peak	36.26	0.65	36.91	46.00	-9.09

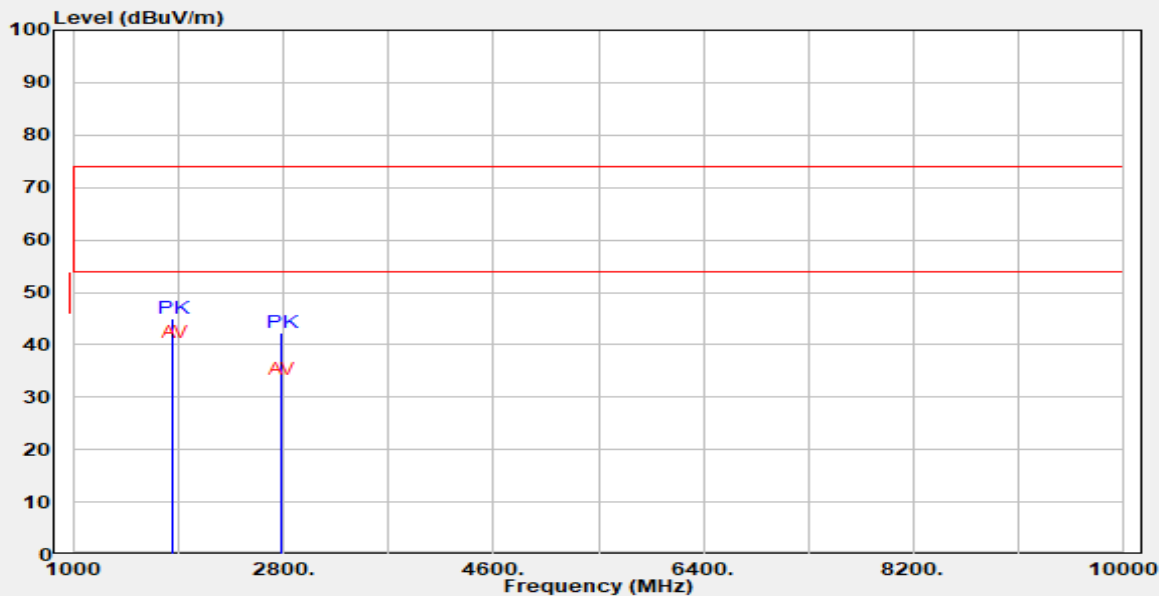
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Report Number :TERF2506002041ER
 Operation Mode :Lora
 Test Frequency :923.2 MHz
 Test Mode :Tx
 EUT Pol :E2 Plane

Test Site :SAC 2
 Test Date :2025-06-30
 Temp./Humi. :23.1℃/58%
 Antenna Pol. :Vertical
 Engineer :Bob Chao



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
1846.40	Peak	51.46	-6.37	45.09	74.00	-28.91
1846.40	Average	46.77	-6.37	40.40	54.00	-13.60
2769.60	Peak	45.74	-3.37	42.37	74.00	-31.63
2769.60	Average	36.71	-3.37	33.34	54.00	-20.66

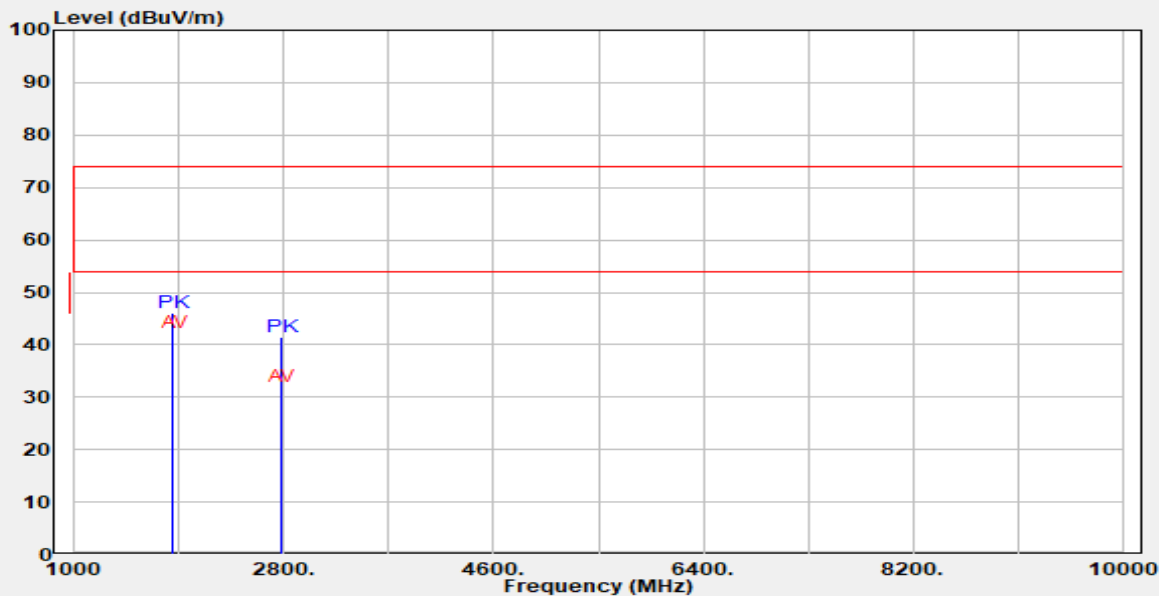
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Report Number :TERF2506002041ER
 Operation Mode :Lora
 Test Frequency :923.2 MHz
 Test Mode :Tx
 EUT Pol :E2 Plane

Test Site :SAC 2
 Test Date :2025-06-30
 Temp./Humi. :23.1℃/58%
 Antenna Pol. :Horizontal
 Engineer :Bob Chao



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
1846.40	Peak	52.53	-6.37	46.16	74.00	-27.84
1846.40	Average	48.52	-6.37	42.15	54.00	-11.85
2769.60	Peak	44.75	-3.37	41.38	74.00	-32.62
2769.60	Average	35.41	-3.37	32.04	54.00	-21.96

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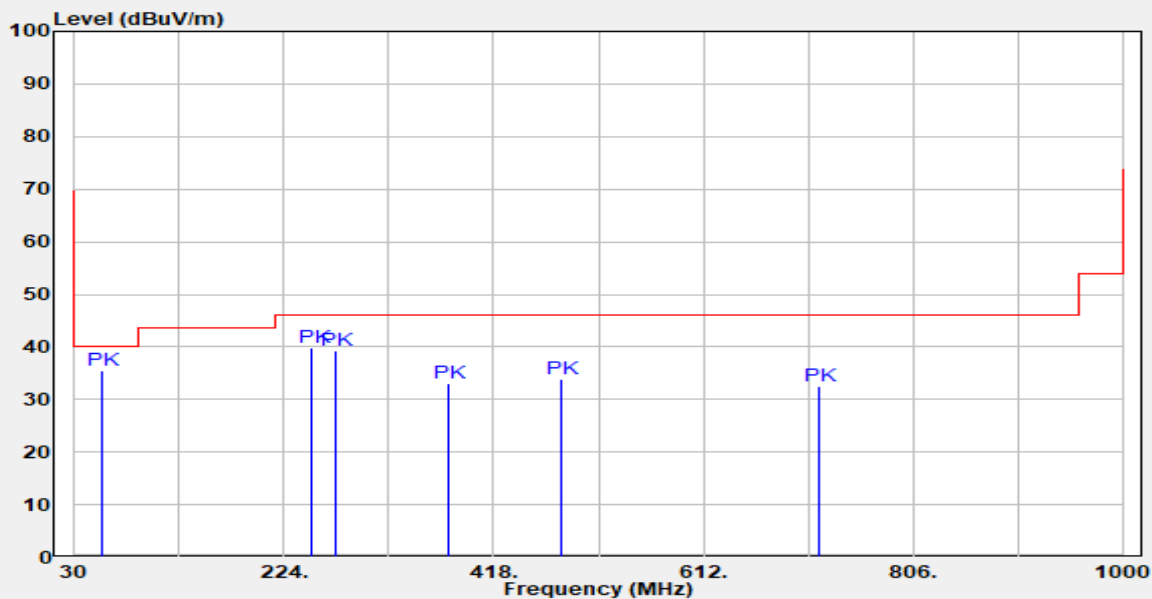
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POE Adapter

Report Number :TERF2506002041ER
 Operation Mode :Lora
 Test Frequency :923.2 MHz
 Test Mode :Tx
 EUT Pol :E2 Plane

Test Site :SAC 2
 Test Date :2025-08-12
 Temp./Humi. :23.5°C/56%
 Antenna Pol. :Vertical
 Engineer :Bob Chao



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
55.220	Peak	48.24	-12.63	35.61	40.00	-4.39
250.190	Peak	53.43	-13.66	39.76	46.00	-6.24
272.500	Peak	51.89	-12.64	39.25	46.00	-6.75
375.320	Peak	42.65	-9.68	32.97	46.00	-13.03
480.080	Peak	40.84	-7.04	33.80	46.00	-12.20
719.670	Peak	34.88	-2.48	32.39	46.00	-13.61

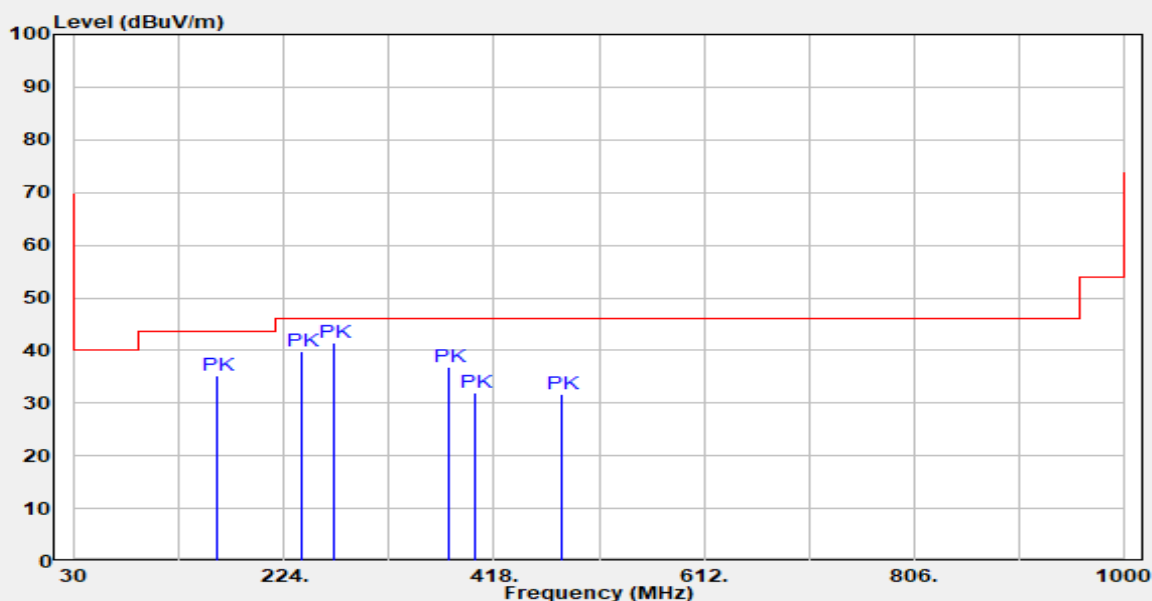
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Report Number :TERF2506002041ER
Operation Mode :Lora
Test Frequency :923.2 MHz
Test Mode :Tx
EUT Pol :E2 Plane

Test Site :SAC 2
Test Date :2025-08-12
Temp./Humi. :23.5°C/56%
Antenna Pol. :Horizontal
Engineer :Bob Chao



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
160.950	Peak	47.71	-12.50	35.21	43.50	-8.29
239.520	Peak	53.78	-14.05	39.73	46.00	-6.27
270.560	Peak	54.23	-12.72	41.50	46.00	-4.50
375.320	Peak	46.57	-9.68	36.89	46.00	-9.11
399.570	Peak	41.00	-9.06	31.93	46.00	-14.07
480.080	Peak	38.66	-7.04	31.62	46.00	-14.38

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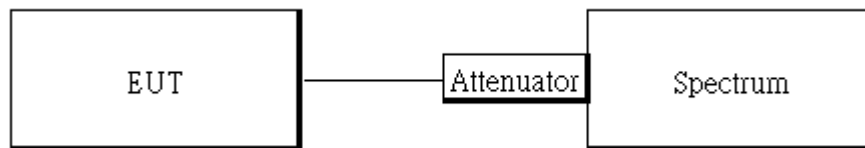
12 POWER SPECTRAL DENSITY

12.1 Standard Applicable:

Per Part 15.247 (e) & RSS-247 section 5.2 b

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

12.2 Test Setup



12.3 Measurement Procedure:

1. Set analyzer center frequency to DTS channel center frequency.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
3. Set the span to 1.5 times the DTS channel bandwidth.
4. Set the RBW = 3 kHz. & the VBW = 10 kHz
5. Set Detector = peak
6. Sweep time = auto couple.
7. Set Trace mode = max hold
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.

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12.4 Measurement Result:

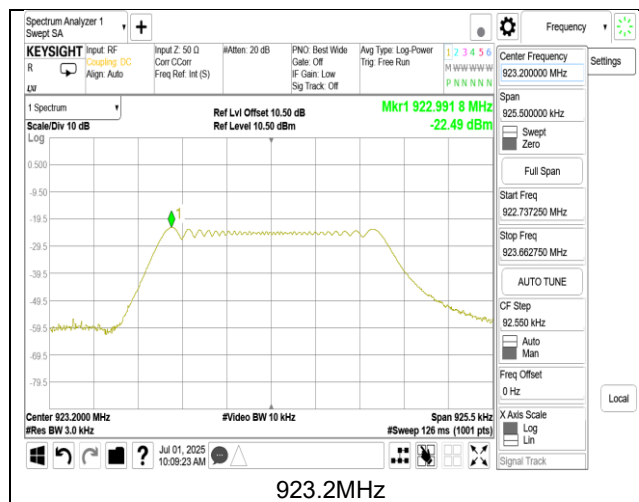
12.4.1 Power Spectral Density

Lora mode

Frequency (MHz)	RF Power Density (dBm/3kHz)	Maximum Limit (dBm/3kHz)	Result
923.2	-22.490	8	PASS

***Note:**

1.cable loss as 10.5dB that offsets in the spectrum



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13 ANTENNA REQUIREMENT

13.1 Standard Applicable:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§ 15.211, 15.213, 15.217, 15.219, 15.221, or § 15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

13.2 Antenna Connected Construction:

The antenna complies with this requirement and no consideration of replacement. Please see EUT photo for details.

~ End of Report ~

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