

TEST REPORT

Report No.: BCTC2508392049-2E

Applicant: SHENZHEN MINEWSEMI CO., LTD

Product Name: LoRa Module

Test Model: ME25LS02

Tested Date: 2025-08-18 to 2025-10-31

Issued Date: 2025-11-25



Shenzhen BCTC Testing Co., Ltd.

FCC ID: 2BDJ6-ME25LS02

Product Name: LoRa Module

Trademark: MINEWSEMI

Model/Type Reference: ME25LS02,ME25LS0

Prepared For: SHENZHEN MINEWSEMI CO., LTD

Address: 3rd Floor,I Building, Gangzhilong Science Park, NO.6, Qinglong Road,Longhua District, Shenzhen

Manufacturer: SHENZHEN MINEWSEMI CO., LTD

Address: 3rd Floor,I Building, Gangzhilong Science Park, NO.6, Qinglong Road,Longhua District, Shenzhen

Prepared By: Shenzhen BCTC Testing Co., Ltd.

Address: 1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China

Sample Received Date: 2025-08-18

Sample Tested Date: 2025-08-18 to 2025-10-31

Issue Date: 2025-11-25

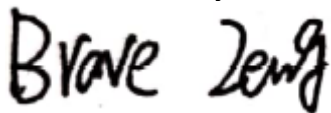
Report No.: BCTC2508392049-2E

Test Standards: FCC Part15.247
ANSI C63.10:2020

Test Results: PASS

Remark: This is Bluetooth BLE radio test report.

Tested by:



Brave Zeng/ Project Handler

Approved by:



Zero Zhou/Reviewer

The test report is effective only with both signature and specialized stamp. This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen BCTC Testing Co., Ltd, this report can't be reproduced except in full. The tested sample(s) and the sample information are provided by the client.

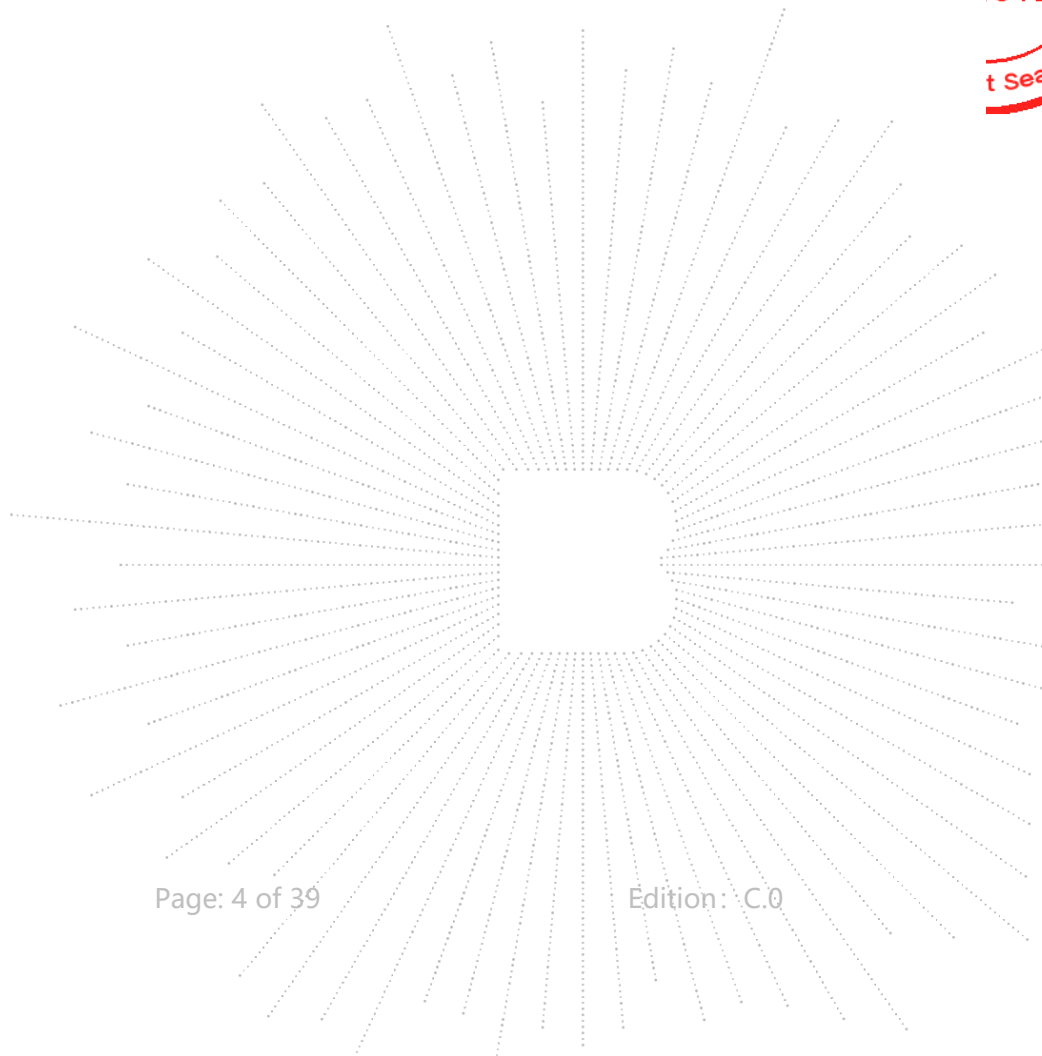
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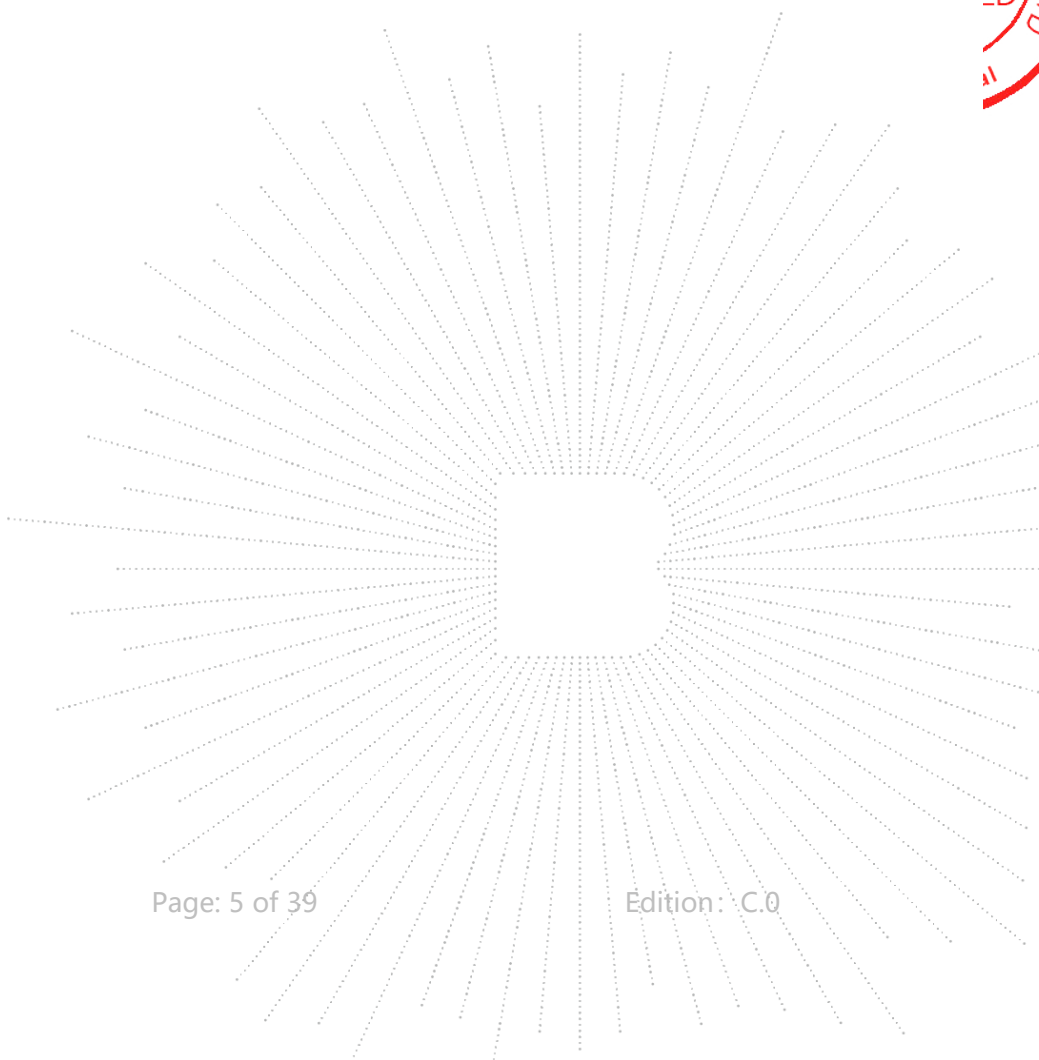
(Note: N/A Means Not Applicable)

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1. Version

Report No.	Issue Date	Description	Approved
BCTC2508392049-2E	2025-11-25	Original	Valid



2. Test Summary

The Product has been tested according to the following specifications:

No.	Test Parameter	Clause No.	Results
1	Conducted Emission	15.207	PASS
2	6dB Bandwidth	15.247 (a)(2)	PASS
3	Peak Output Power	15.247 (b)	PASS
4	Radiated Spurious Emission	15.247 (d), 15.205	PASS
5	Power Spectral Density	15.247 (e)	PASS
6	Restricted Band of Operation	15.205	PASS
7	Antenna Requirement	15.203	PASS

3. Measurement Uncertainty

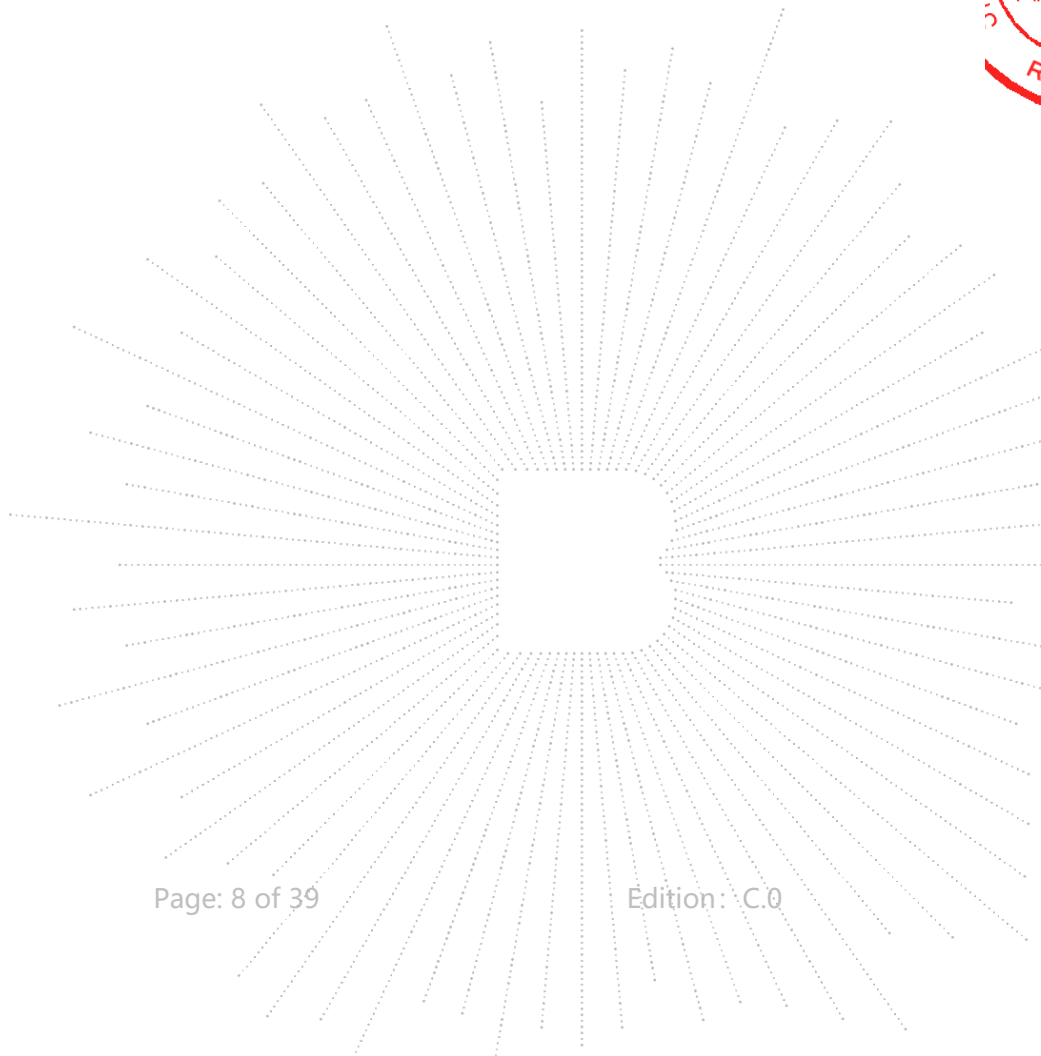
Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Uncertainty
1	3m chamber Radiated spurious emission(30MHz-1GHz)	U=4.3dB
2	3m chamber Radiated spurious emission(9KHz-30MHz)	U=3.7dB
3	3m chamber Radiated spurious emission(1GHz-18GHz)	U=4.5dB
4	3m chamber Radiated spurious emission(18GHz-40GHz)	U=3.34dB
5	Conducted Emission (150kHz-30MHz)	U=3.20dB
6	Conducted Adjacent channel power	U=1.38dB
7	Conducted output power uncertainty Above 1G	U=1.576dB
8	Conducted output power uncertainty below 1G	U=1.28dB
9	humidity uncertainty	U=5.3%
10	Temperature uncertainty	U=0.59℃

4. Product Information And Test Setup

4.1 Product Information

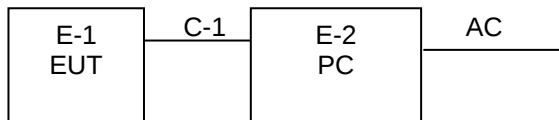
Model/Type Reference:	ME25LS02,ME25LS0
Model Differences:	The following models of units we produce are identical in electrical, mechanical and physical structure; The difference is only in the model name, we finally have ME25LS02 as test model.
Hardware Version:	N/A
Software Version:	N/A
Operation Frequency:	902.3-927.5MHz
Type of Modulation:	LoRa
Number Of Channel	72 Channel
Antenna installation:	External antenna
Antenna Gain:	1.56dBi
	Remark: ☒ The antenna gain of the product comes from the antenna report provided by the customer, and the test data is affected by the customer information. ☐ The antenna gain of the product is provided by the customer, and the test data is affected by the customer information.
Ratings:	DC 3.3V



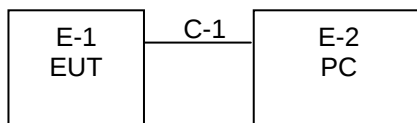
4.2 Test Setup Configuration

See test photographs attached in *EUT TEST SETUP PHOTOGRAPHS* for the actual connections between Product and support equipment.

Conducted Emission:



Radiated Spurious Emission:



4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Note
E-1	LoRa Module	MINEWSEMI	ME25LS02	---	EUT
E-2	PC	N/A	N/A	---	Auxiliary

Item	Shielded Type	Ferrite Core	Length	Note
C-1	---	---	---	---

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.4 Channel List

CH No.	Frequency (MHz)	CH No.	Frequency (MHz)	CH No.	Frequency (MHz)	CH No.	Frequency (MHz)
0	902.3	1	902.5	2	902.7	3	902.9
4	903.1	5	903.3	6	903.5	7	903.7
8	903.9	9	904.1	10	904.3	11	904.5
12	904.7	13	904.9	14	905.1	15	905.3
16	905.5	17	905.7	18	905.9	19	906.1
20	906.3	21	906.5	22	906.7	23	906.9
24	907.1	25	907.3	26	907.5	27	907.7
28	907.9	29	908.1	30	908.3	31	908.5
32	908.7	33	908.9	34	909.1	35	909.3
36	909.5	37	909.7	38	909.9	39	910.1
40	910.3	41	910.5	42	910.7	43	910.9
44	911.1	45	911.3	46	911.5	47	911.7
48	911.9	49	912.1	50	912.3	51	912.5
52	912.7	53	912.9	54	913.1	55	913.3
56	913.5	57	913.7	58	913.9	59	914.1
60	914.3	61	914.5	62	914.7	63	915.0
64	923.3	65	923.9	66	924.5	67	925.1
68	925.7	69	926.3	70	926.9	71	927.5

4.5 Test Mode

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Test Mode	Test mode
Mode 1	Transmitting(902.3MHz, 915MHz, 927.5MHz)

Note:

(1) The measurements are performed at the highest, middle, lowest available channels.

5. Test Facility And Test Instrument Used

5.1 Test Facility

All measurement facilities used to collect the measurement data are located at Shenzhen BCTC Testing Co., Ltd. Address: 1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

FCC Test Firm Registration Number: 712850

A2LA certificate registration number is: CN1212

ISED Registered No.: 23583

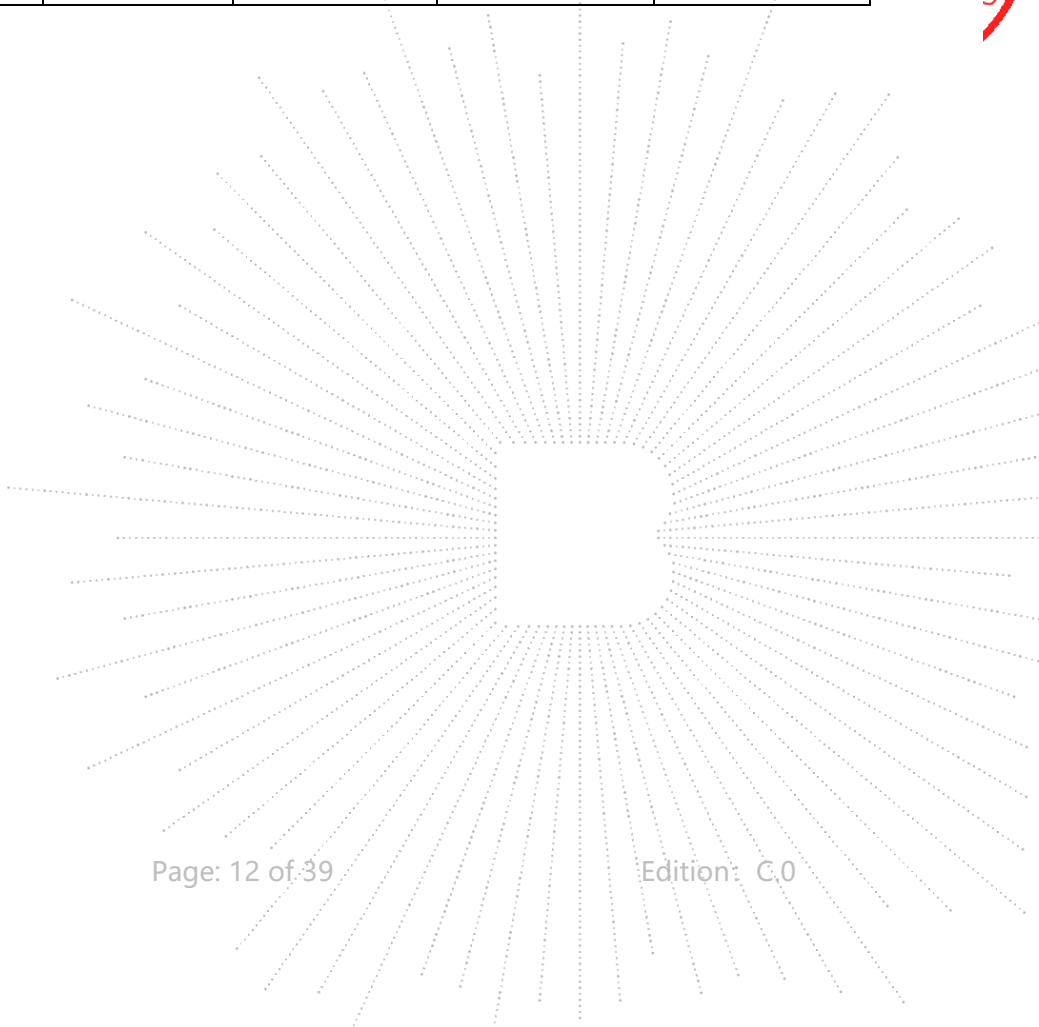
ISED CAB identifier: CN0017

5.2 Test Instrument Used

Conducted Emissions Test					
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
Receiver	R&S	ESR	102075	May 08 2025	May 07, 2026
LISN	R&S	ENV216	101375	May 14, 2025	May 13, 2026
Software	Frad	EZ-EMC	EMC-CON 3A1	\	\
Pulse limiter	Schwarzbeck	VTSD 9561-F	01323	May 14, 2025	May 13, 2026

RF Conducted Test					
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
Power meter	Keysight	E4419	\	May 14, 2025	May 13, 2026
Power Sensor (AV)	Keysight	E9300A	\	May 14, 2025	May 13, 2026
Signal Analyzer 20kHz-26.5GHz	Keysight	N9020A	MY49100060	May 14, 2025	May 13, 2026
Spectrum Analyzer 9kHz-40GHz	R&S	FSP40	100363	May 14, 2025	May 13, 2026

Radiated Emissions Test (966 Chamber)					
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
966 chamber	ChengYu	966 Room	966	May 15, 2023	May 14, 2026
Receiver	R&S	ESR3	102075	May 08, 2025	May 07, 2026
Receiver	R&S	ESRP	101154	May 14, 2025	May 13, 2026
Amplifier	Schwarzbeck	BBV9744	9744-0037	May 14, 2025	May 13, 2026
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	942	May 24, 2025	May 23, 2026
Loop Antenna(9KHz -30MHz)	Schwarzbeck	FMZB1519B	00014	May 24, 2025	May 23, 2026
Amplifier	SKET	LAPA_01G1 8G-45dB	SK2021040901	May 14, 2025	May 13, 2026
Horn Antenna	Schwarzbeck	BBHA9120D	1541	May 24, 2025	May 23, 2026
Amplifier(18G Hz-40GHz)	MITEQ	TTA1840-35-HG	2034381	May 14, 2025	May 13, 2026
Horn Antenn(18GHz-40GHz)	Schwarzbeck	BBHA9170	00822	May 24, 2025	May 23, 2026
Spectrum Analyzer9kHz-40GHz	R&S	FSP40	100363	May 14, 2025	May 13, 2026
Software	Frad	EZ-EMC	FA-03A2 RE	\	\



6. Conducted Emissions

6.1 Block Diagram Of Test Setup



6.2 Limit

Frequency (MHz)	Limit (dBuV)	
	Quas-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

Notes:

- *Decreasing linearly with logarithm of frequency.
- The lower limit shall apply at the transition frequencies.

6.3 Test procedure

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

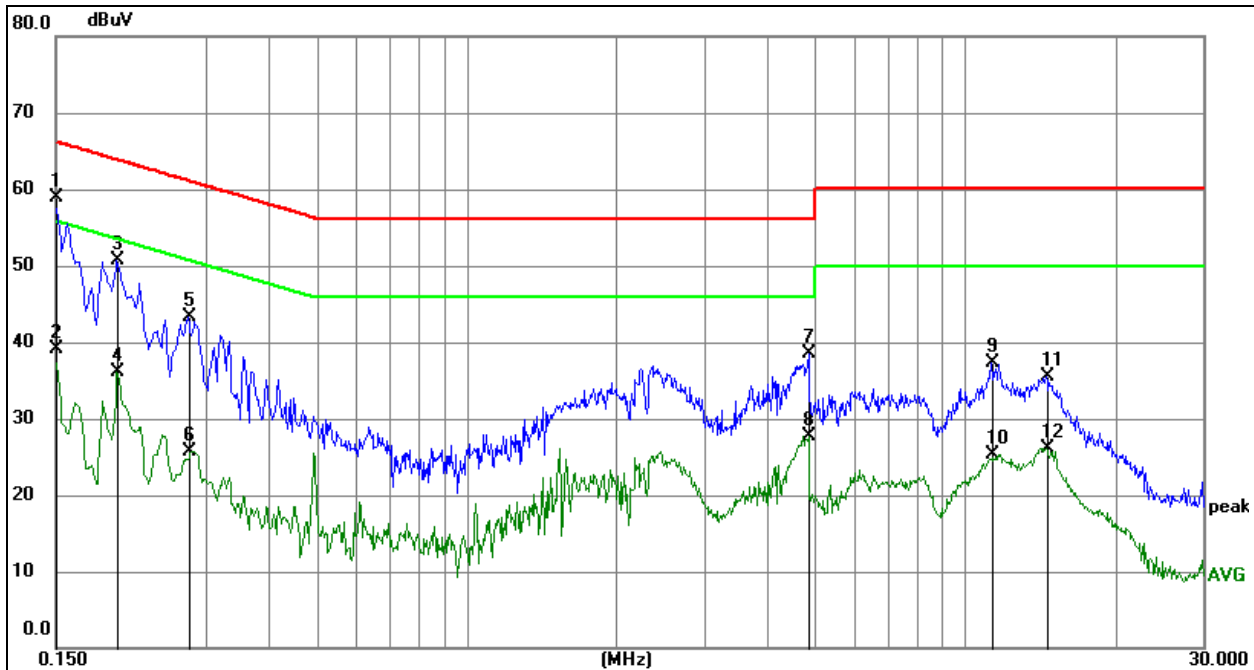
- The Product was placed on a nonconductive table 0.8 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stabilization Network (L.I.S.N).
- The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak and AVG detector in Max Hold mode. Run the receiver's pre-scan to record the maximum disturbance generated from Product in all power lines in the full band.
- For each frequency whose maximum record was higher or close to limit, measure its QP and AVG values and record.

6.4 EUT Operating Conditions

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

6.5 Test Result

Temperature:	24 °C	Relative Humidity:	54%
Pressure:	101KPa	Test Voltage :	AC 120V/60Hz
Test Mode:	Mode 1	Polarization :	L

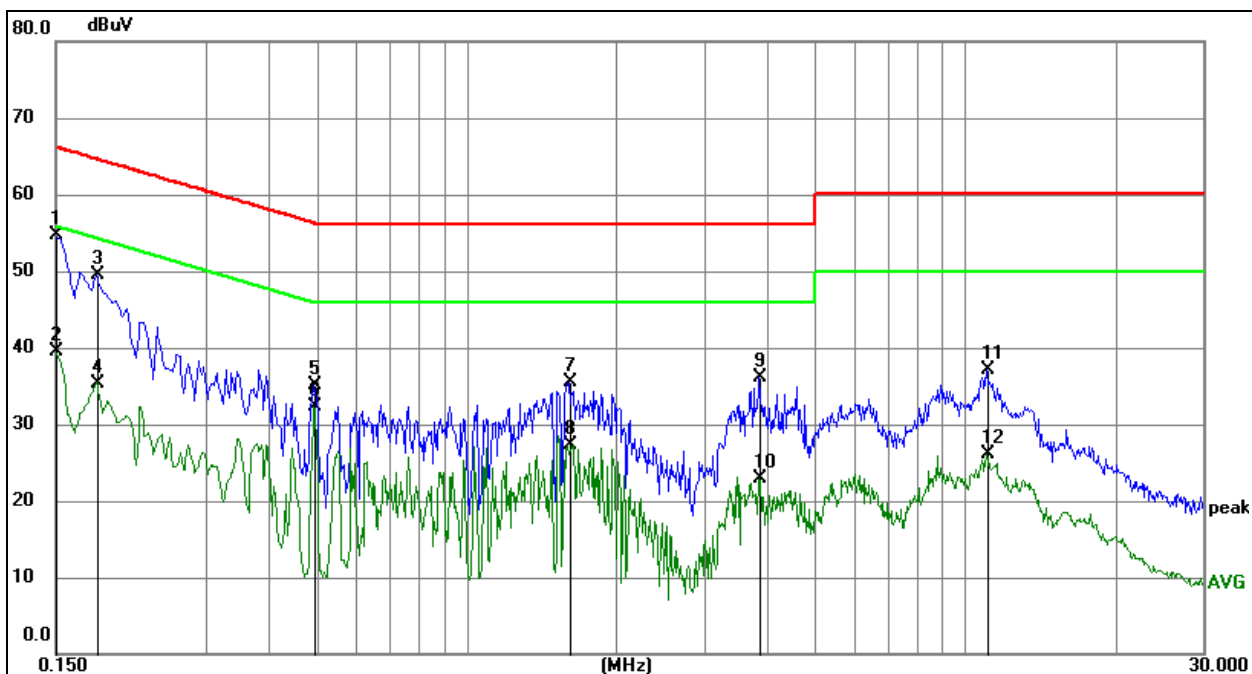


Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. Measurement = Reading Level + Correct Factor
4. Over = Measurement - Limit

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1 *	0.1500	48.35	10.57	58.92	66.00	-7.08	QP
2	0.1500	28.46	10.57	39.03	56.00	-16.97	AVG
3	0.1995	40.11	10.59	50.70	63.63	-12.93	QP
4	0.1995	25.54	10.59	36.13	53.63	-17.50	AVG
5	0.2760	32.75	10.60	43.35	60.94	-17.59	QP
6	0.2760	15.12	10.60	25.72	50.94	-25.22	AVG
7	4.8525	27.21	11.24	38.45	56.00	-17.55	QP
8	4.8525	16.42	11.24	27.66	46.00	-18.34	AVG
9	11.2605	25.66	11.70	37.36	60.00	-22.64	QP
10	11.2605	13.59	11.70	25.29	50.00	-24.71	AVG
11	14.5635	23.46	12.09	35.55	60.00	-24.45	QP
12	14.5635	14.10	12.09	26.19	50.00	-23.81	AVG

Temperature:	24 °C	Relative Humidity:	54%
Pressure:	101KPa	Test Voltage :	AC 120V/60Hz
Test Mode:	Mode 1	Polarization :	N



Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. Measurement = Reading Level + Correct Factor
4. Over = Measurement - Limit

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1 *	0.1500	44.07	10.57	54.64	66.00	-11.36	QP
2	0.1500	29.03	10.57	39.60	56.00	-16.40	AVG
3	0.1815	38.90	10.58	49.48	64.42	-14.94	QP
4	0.1815	24.82	10.58	35.40	54.42	-19.02	AVG
5	0.4965	24.50	10.63	35.13	56.06	-20.93	QP
6	0.4965	21.68	10.63	32.31	46.06	-13.75	AVG
7	1.6035	24.71	10.70	35.41	56.00	-20.59	QP
8	1.6035	16.61	10.70	27.31	46.00	-18.69	AVG
9	3.8715	25.15	11.00	36.15	56.00	-19.85	QP
10	3.8715	11.91	11.00	22.91	46.00	-23.09	AVG
11	11.0265	25.40	11.67	37.07	60.00	-22.93	QP
12	11.0265	14.37	11.67	26.04	50.00	-23.96	AVG

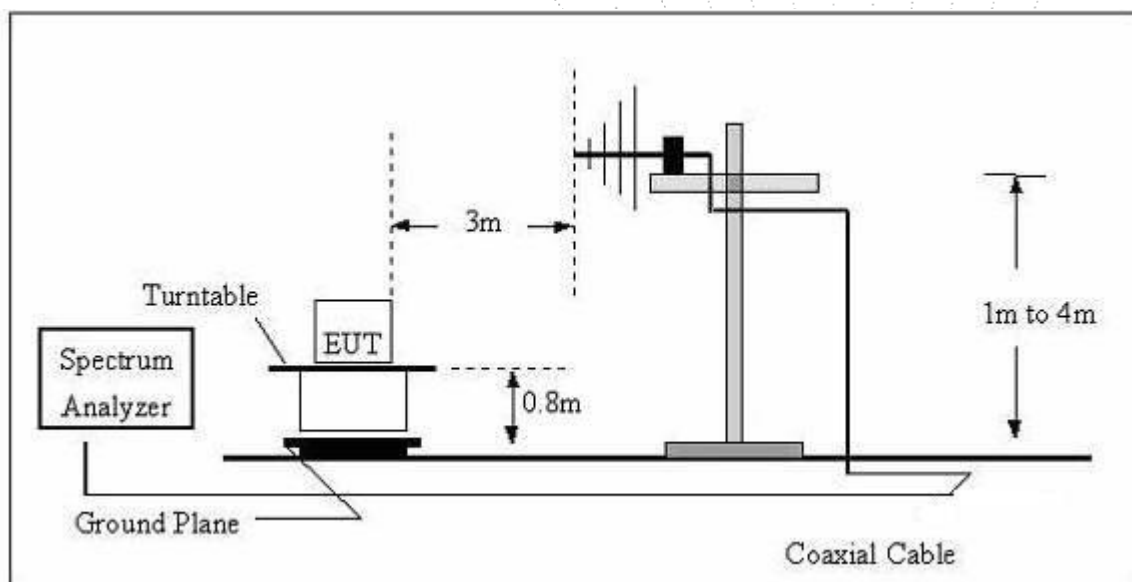
7. Radiated Emissions

7.1 Block Diagram Of Test Setup

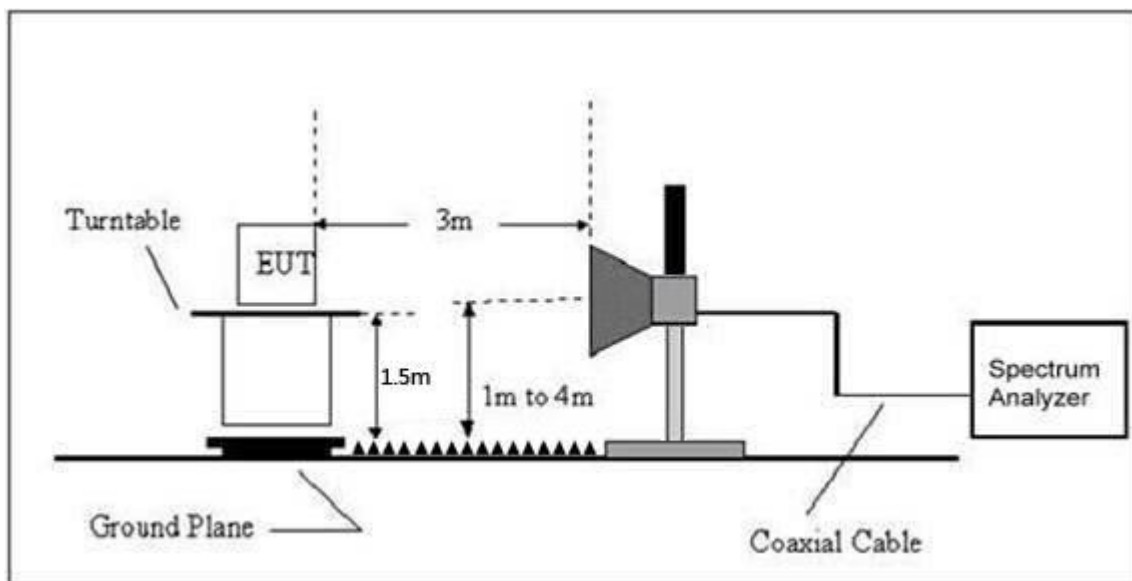
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



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



7.2 Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequency (MHz)	Field Strength $\mu\text{V/m}$	Distance (m)	Field Strength Limit at 3m Distance	
	$\mu\text{V/m}$	(m)	$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
0.009 ~ 0.490	$2400/F(\text{kHz})$	300	$10000 * 2400/F(\text{kHz})$	$20\log^{(2400/F(\text{kHz}))} + 80$
0.490 ~ 1.705	$24000/F(\text{kHz})$	30	$100 * 24000/F(\text{kHz})$	$20\log^{(24000/F(\text{kHz}))} + 40$
1.705 ~ 30	30	30	$100 * 30$	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

Limits Of Radiated Emission Measurement (Above 1000MHz)

Frequency (MHz)	Limit (dB $\mu\text{V/m}$) (at 3M)	
	Peak	Average
Above 1000	74	54

Notes:

(1)The limit for radiated test was performed according to FCC PART 15C.

(2)The tighter limit applies at the band edges.

(3) Emission level (dB $\mu\text{V/m}$)= $20\log$ Emission level ($\mu\text{V/m}$).

Frequency Range Of Radiated Measurement

(a) For an intentional radiator the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in this paragraph:

- (1) If the intentional radiator operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
- (2) If the intentional radiator operates at or above 10 GHz and below 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.
- (3) If the intentional radiator operates at or above 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 200 GHz, whichever is lower, unless specified otherwise elsewhere in the rules.
- (4) If the intentional radiator operates at or above 95 GHz: To the third harmonic of the highest fundamental frequency or to 750 GHz, whichever is lower, unless specified otherwise elsewhere in the rules.
- (5) If the intentional radiator contains a digital device, regardless of whether this digital device controls the functions of the intentional radiator or the digital device is used for additional control or function purposes other than to enable the operation of the intentional radiator, the frequency range shall be investigated up to the range specified in paragraphs (a) (1)through (4) of this section or the range applicable to the digital device, as shown in paragraph (b)(1) of this section, whichever is the higher frequency range of investigation.

7.3 Test procedure

Receiver Parameter	Setting
Attenuation	Auto
9kHz~150kHz	RBW 200Hz for QP
150kHz~30MHz	RBW 9kHz for QP
30MHz~1000MHz	RBW 120kHz for QP

Spectrum Parameter	Setting
1-25GHz	RBW 1 MHz /VBW 1 MHz for Peak, RBW 1 MHz / VBW 10Hz for Average

Below 1GHz test procedure as below:

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

- The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- Test the EUT in the lowest channel, the middlest channel, the Highest channel.

Note:

Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

7.4 EUT operating Conditions

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

7.5 Test Result

Below 30MHz

Temperature:	26 °C	Relative Humidity:	54%RH
Pressure:	101KPa	Test Voltage:	DC 3.3V
Test Mode:	Mode 1		

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

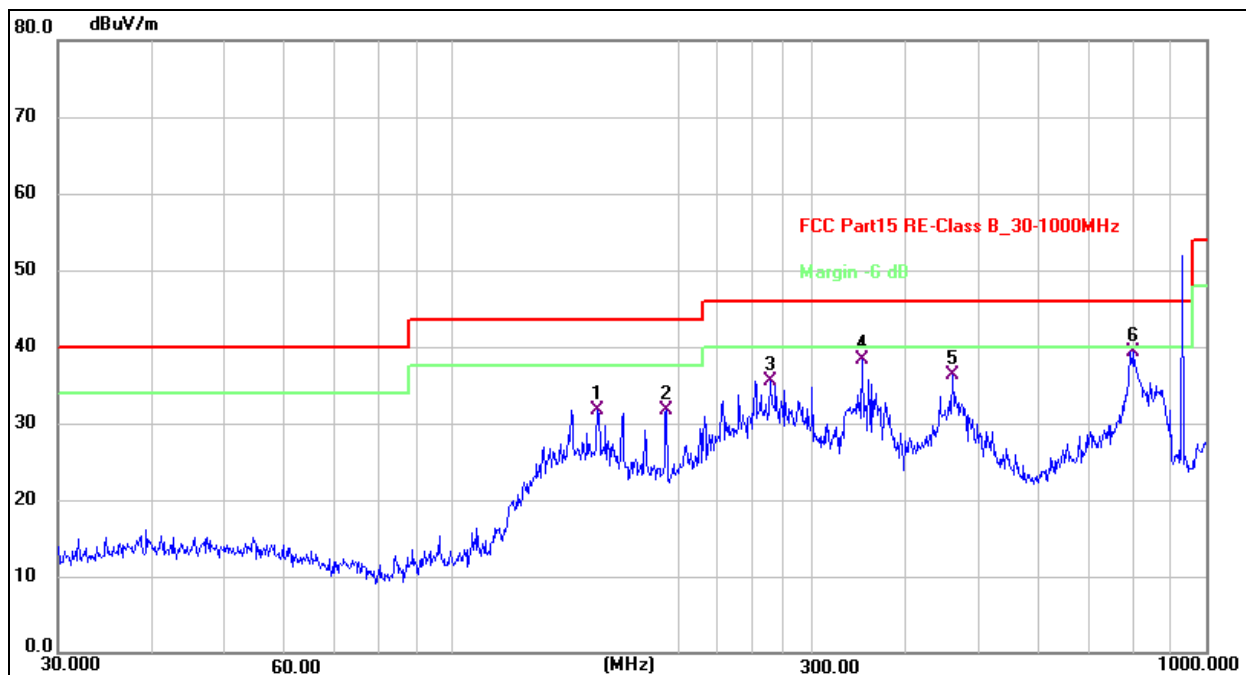
Note:

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

Distance extrapolation factor = $40 \log (\text{specific distance/test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

Temperature:	26 °C	Relative Humidity:	54%RH
Pressure:	101KPa	Test Voltage:	DC 3.3V
Test Mode:	Mode 1	Polarization:	Horizontal

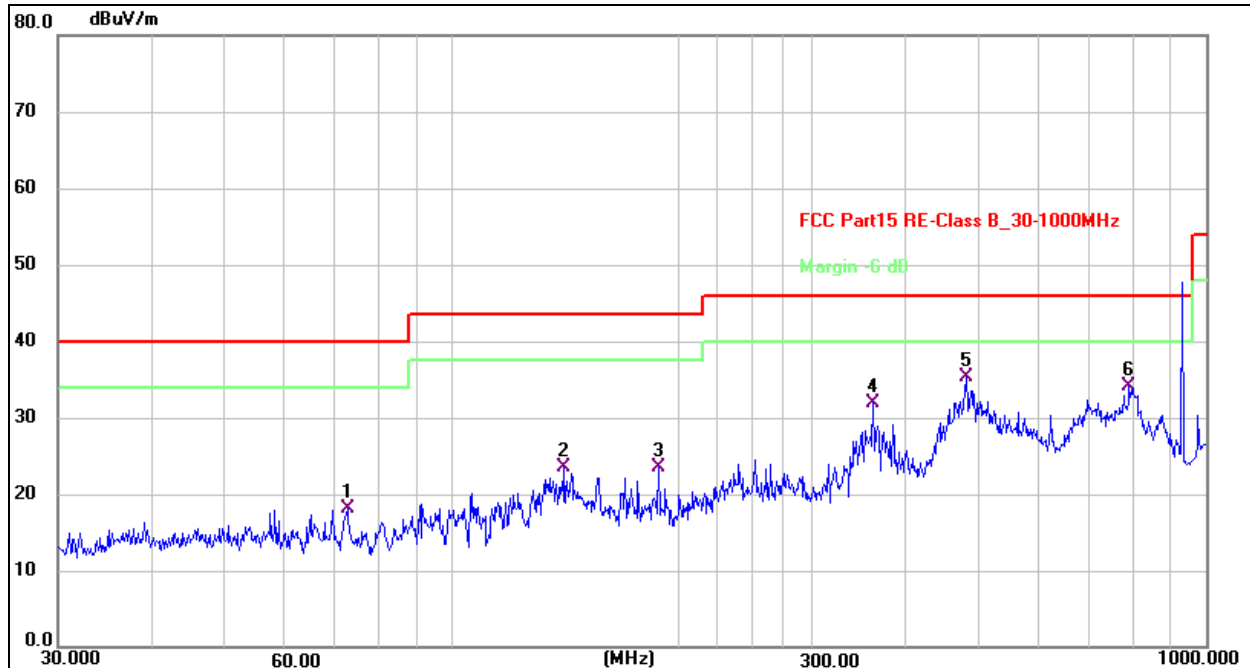


Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.
2. Measurement = Reading Level + Correct Factor
3. Over = Measurement - Limit

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	155.9101	42.07	-10.31	31.76	43.50	-11.74	QP
2	192.4183	44.69	-13.05	31.64	43.50	-11.86	QP
3	263.8190	46.80	-11.29	35.51	46.00	-10.49	QP
4	349.2500	47.24	-8.99	38.25	46.00	-7.75	QP
5	460.7271	42.43	-6.08	36.35	46.00	-9.65	QP
6 *	801.7863	39.70	-0.31	39.39	46.00	-6.61	QP

Temperature:	26 °C	Relative Humidity:	54%RH
Pressure:	101KPa	Test Voltage:	DC 3.3V
Test Mode:	Mode 1	Polarization:	Vertical



Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.
2. Measurement = Reading Level + Correct Factor
3. Over = Measurement - Limit

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	72.5916	31.63	-13.49	18.14	40.00	-21.86	QP
2	140.8351	34.13	-10.60	23.53	43.50	-19.97	QP
3	187.7530	36.21	-12.70	23.51	43.50	-19.99	QP
4	361.7139	40.61	-8.68	31.93	46.00	-14.07	QP
5 *	480.5276	41.10	-5.88	35.22	46.00	-10.78	QP
6	790.6188	34.62	-0.51	34.11	46.00	-11.89	QP

Between 1GHz – 25GHz

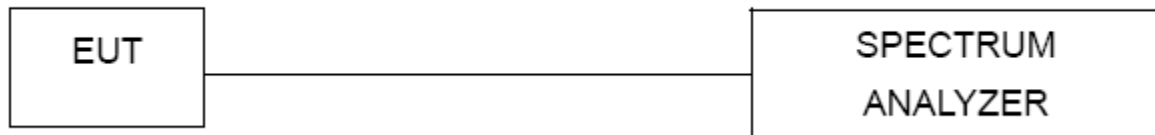
Polar (H/V)	Frequency	Reading Level	Correct Factor	Measure-m ent	Limits	Over	Detector Type
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/ m)	(dB)	
Low channel							
V	1804.6	82.16	-26.94	55.22	74.00	-18.78	PK
V	1804.6	59.71	-26.94	32.77	54.00	-21.23	AV
V	2706.9	74.33	-23.55	50.78	74.00	-23.22	PK
V	2706.9	52.69	-23.55	29.14	54.00	-24.86	AV
H	1804.6	84.53	-26.94	57.59	74.00	-16.41	PK
H	1804.6	62.17	-26.94	35.23	54.00	-18.77	AV
H	2706.9	72.42	-23.55	48.87	74.00	-25.13	PK
H	2706.9	54.33	-23.55	30.78	54.00	-23.22	AV
Middle channel							
V	1830	79.54	-26.87	52.67	74.00	-21.33	PK
V	1830	59.99	-26.87	33.12	54.00	-20.88	AV
V	2745	76.37	-24.63	51.74	74.00	-22.26	PK
V	2745	54.28	-24.63	29.65	54.00	-24.35	AV
H	1830	72.59	-26.87	45.72	74.00	-28.28	PK
H	1830	57.23	-26.87	30.36	54.00	-23.64	AV
H	2745	74.11	-24.63	49.48	74.00	-24.52	PK
H	2745	52.48	-24.63	27.85	54.00	-26.15	AV
High channel							
V	1855	80.26	-26.81	53.45	74.00	-20.55	PK
V	1855	61.93	-26.81	35.12	54.00	-18.88	AV
V	2782.5	77.45	-24.27	53.18	74.00	-20.82	PK
V	2782.5	52.46	-24.27	28.19	54.00	-25.81	AV
H	1855	81.44	-26.81	54.63	74.00	-19.37	PK
H	1855	56.39	-26.81	29.58	54.00	-24.42	AV
H	2782.5	75.21	-24.27	50.94	74.00	-23.06	PK
H	2782.5	54.18	-24.27	29.91	54.00	-24.09	AV

Remark:

1. Measurement = Reading Level + Correct Factor, Correct Factor = Antenna Factor + Cable Loss – Pre-amplifier. Over= Measurement - Limit
- 2.If peak below the average limit, the average emission was no test.
3. In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

8. Power Spectral Density Test

8.1 Block Diagram Of Test Setup



8.2 Limit

FCC Part15 (15.247), Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8 dBm (in any 3KHz)	902-928	PASS

Limits Of Radiated Emission Measurement (Above 1000MHz)

8.3 Test procedure

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: 3 kHz
4. Set the VBW $\geq 3 \times$ RBW.
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 within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

8.4 EUT Operating Conditions

The EUT tested system was configured as the statements of 4.6 Unless otherwise a special operating condition is specified in the follows during the testing.

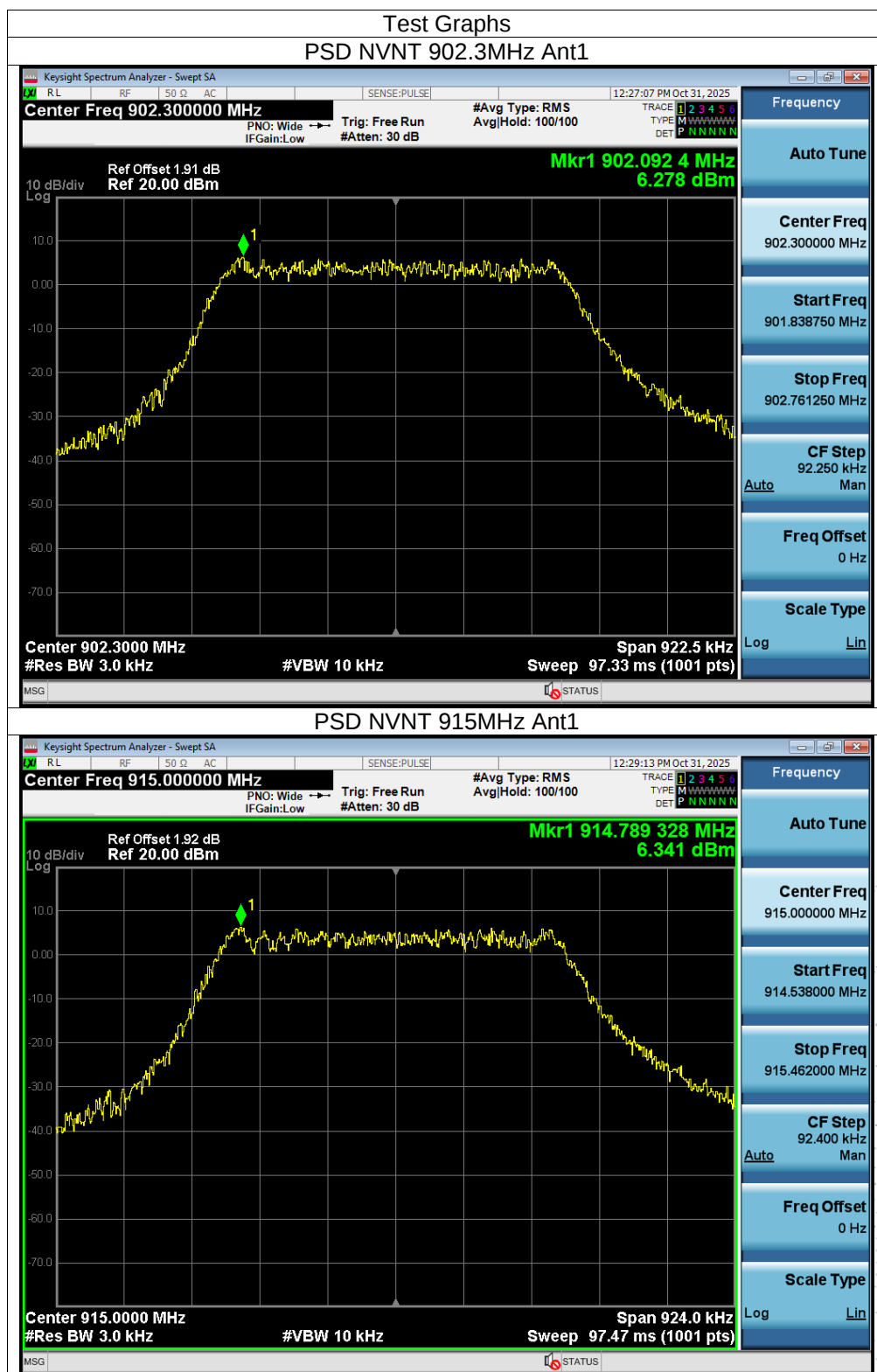
Note: Power Spectral Density(dBm)=Reading+Cable Loss

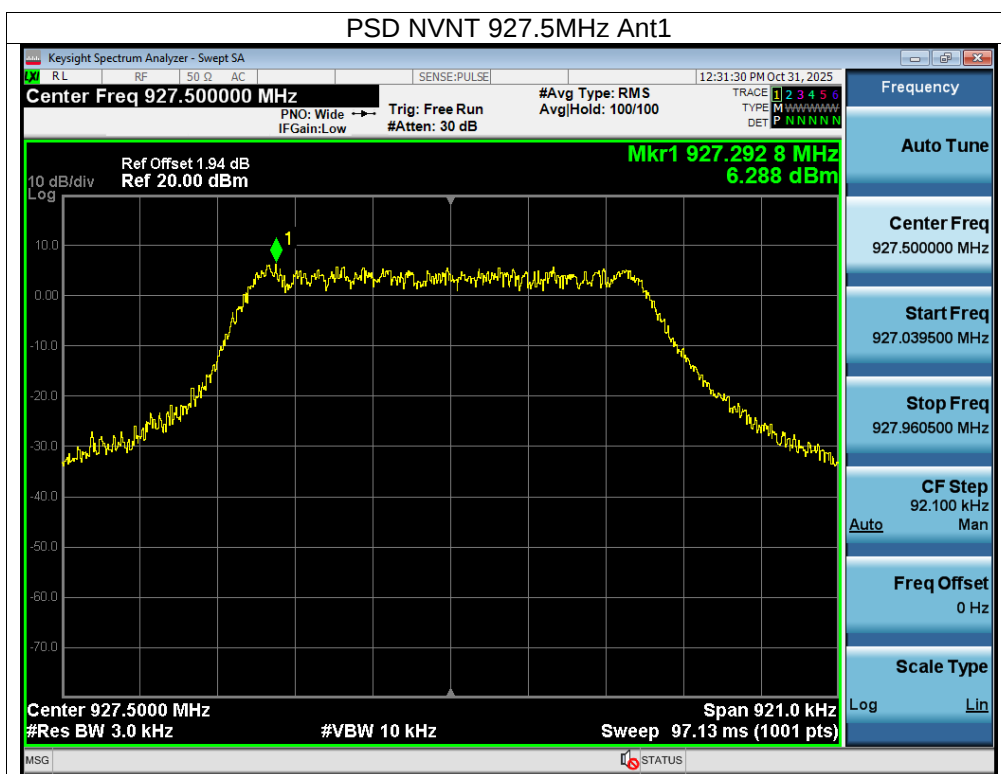
8.5 Test Result

Temperature:	26 °C	Relative Humidity:	54%RH
Pressure:	101KPa	Test Voltage:	DC 3.3V

Mode	Frequency	Power Spectral Density(dBm/3kHz)	Limit (dBm/3kHz)	Result
LoRa	902.3 MHz	4.98	8	PASS
	915 MHz	4.77	8	PASS
	927.5 MHz	4.85	8	PASS

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9. Bandwidth Test

9.1 Block Diagram Of Test Setup



9.2 Limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	$\geq 500\text{KHz}$ (-6dB bandwidth)	902-928	PASS

9.3 Test procedure

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

9.4 EUT operating Conditions

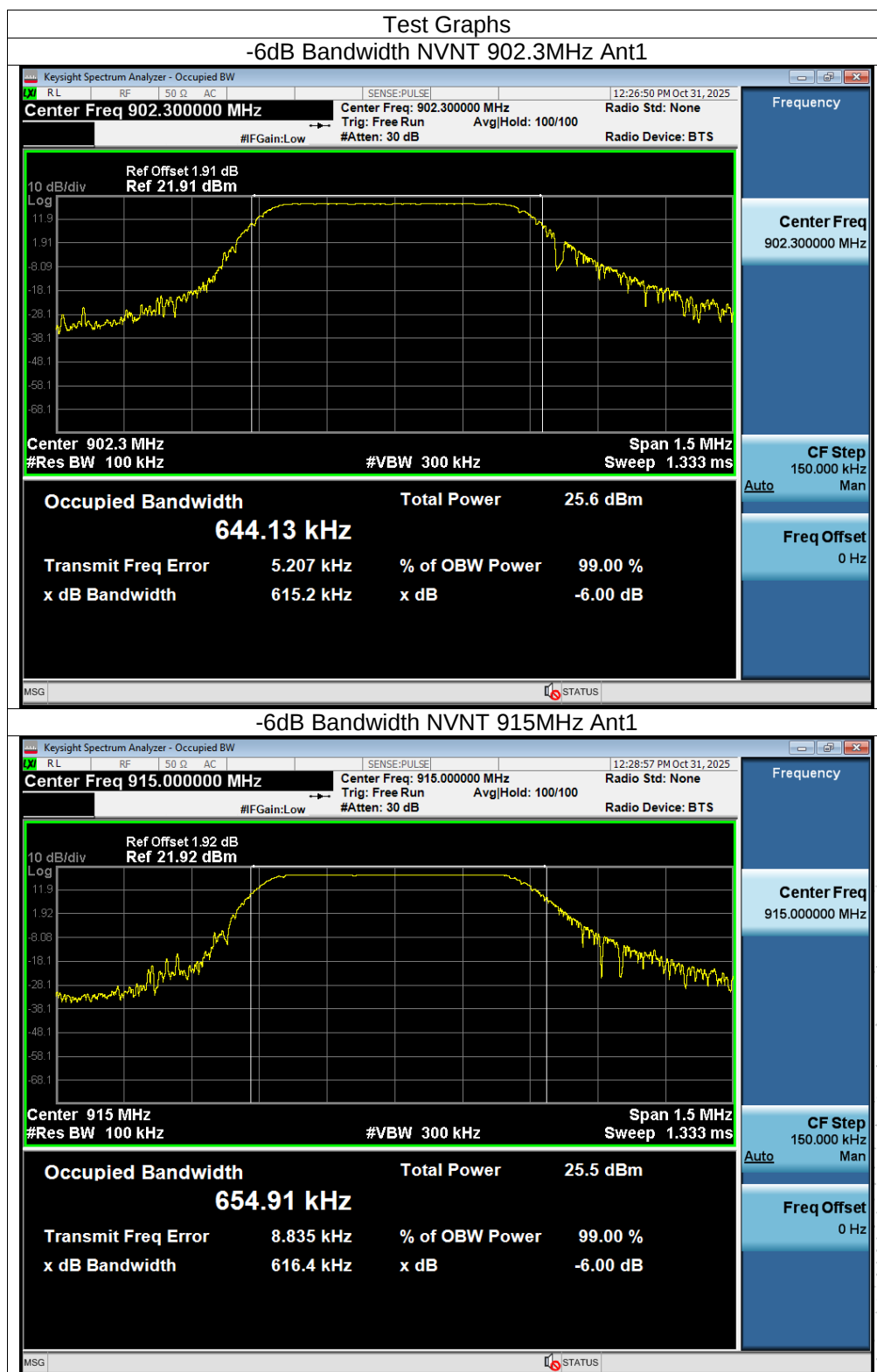
The EUT tested system was configured as the statements of 4.6 Unless otherwise a special operating condition is specified in the follows during the testing.

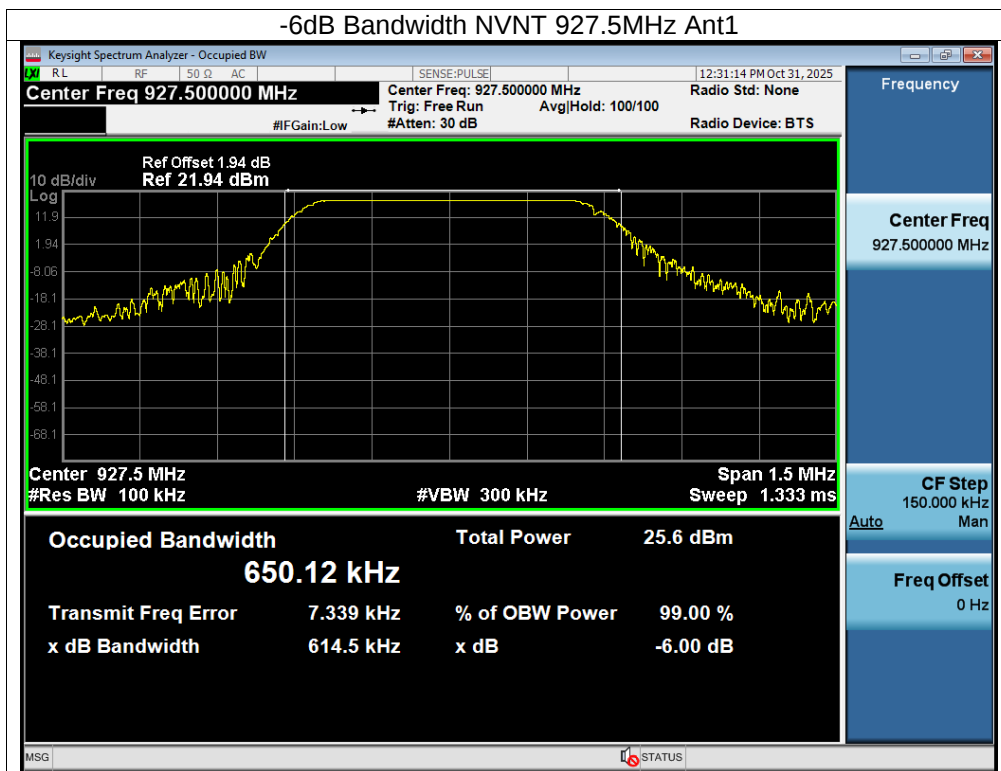
Note: Power Spectral Density(dBm)=Reading+Cable Loss

9.5 Test Result

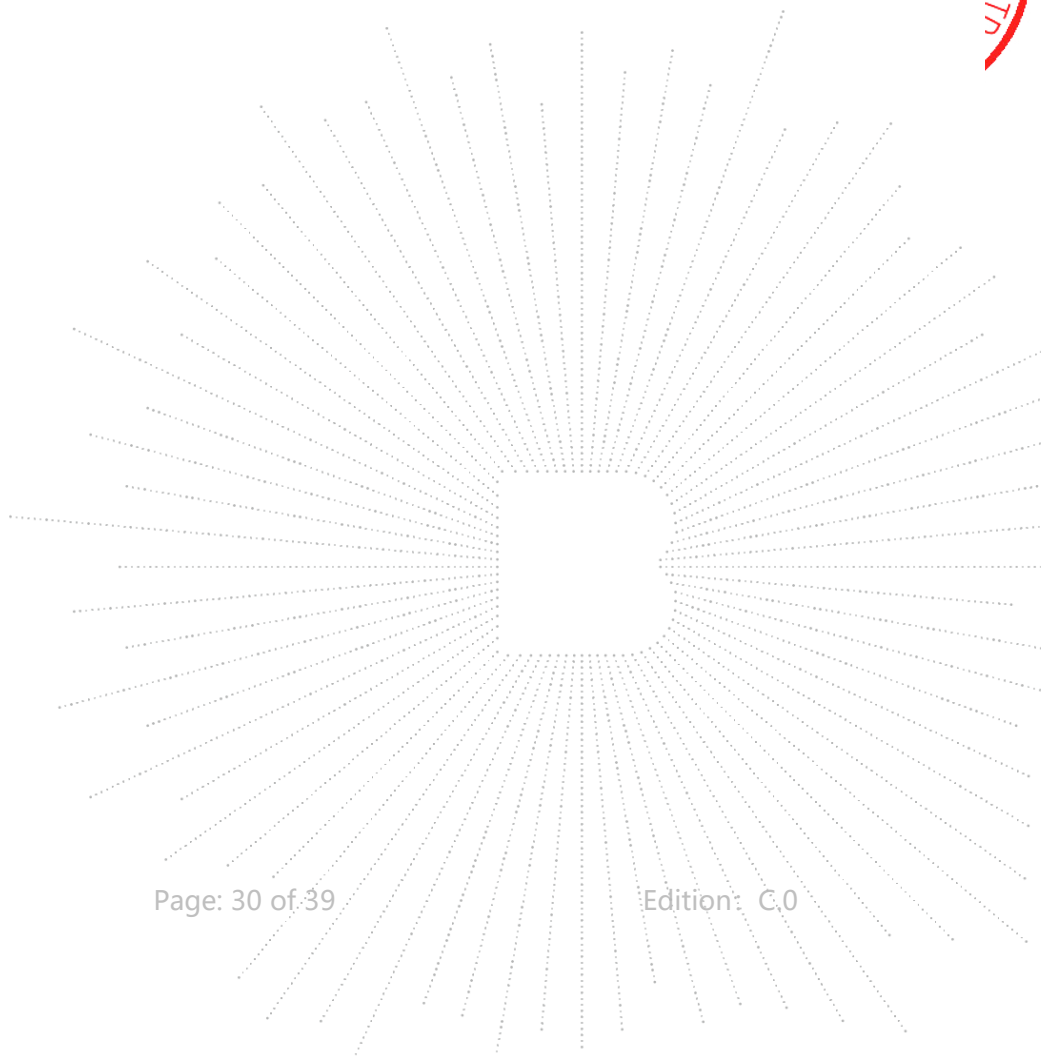
Temperature:	26 °C	Relative Humidity:	54%RH
Pressure:	101KPa	Test Voltage:	DC 3.3V

Mode	Frequency (MHz)	-6dB bandwidth (MHz)	Limit (kHz)	Result
LoRa	902.3 MHz	0.610	500	Pass
	915 MHz	0.608	500	Pass
	927.5 MHz	0.611	500	Pass





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10. Peak Output Power Test

10.1 Block Diagram Of Test Setup



10.2 Limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Peak Output Power	1 watt or 30dBm	902-928	PASS

10.3 Test Procedure

- a. The EUT was directly connected to the Power meter

10.4 EUT Operating Conditions

The EUT tested system was configured as the statements of 4.6 Unless otherwise a special operating condition is specified in the follows during the testing.

Note: Power Spectral Density(dBm)=Reading+Cable Loss

10.5 Test Result

Temperature:	26 °C	Relative Humidity:	54%RH
Pressure:	101KPa	Test Voltage:	DC 3.3V

Mode	Frequency(MHz)	Maximum Conducted Output Power(PK) (dBm)	Conducted Output Power Limit(dBm)
LoRa	902.3	18.35	30
	915	18.21	30
	927.5	18.29	30

11. Conducted Spurious Emission Measurement

11.1 Block Diagram Of Test Setup



11.2 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.

11.3 Test procedure

Using the following spectrum analyzer setting:

- Set the RBW = 100KHz.
- Set the VBW = 300KHz.
- Sweep time = auto couple.
- Detector function = peak.
- Trace mode = max hold.
- Allow trace to fully stabilize.

11.4 EUT operating Conditions

The EUT tested system was configured as the statements of 4.6 Unless otherwise a special operating condition is specified in the follows during the testing.

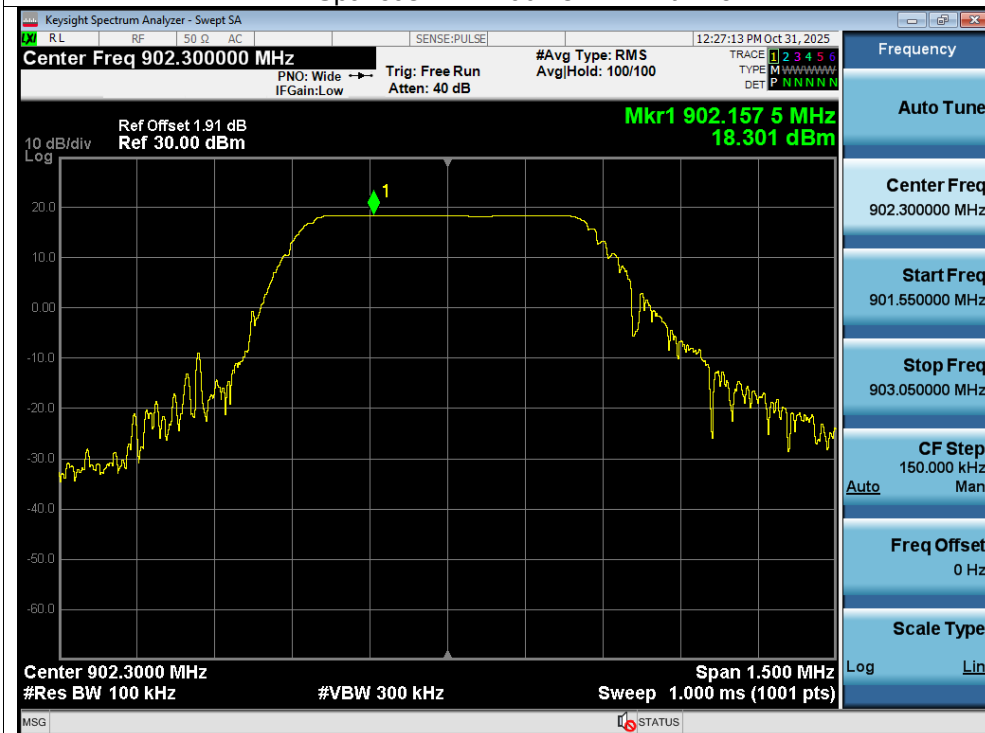
Note: Power Spectral Density(dBm)=Reading+Cable Loss

11.5 Test Result

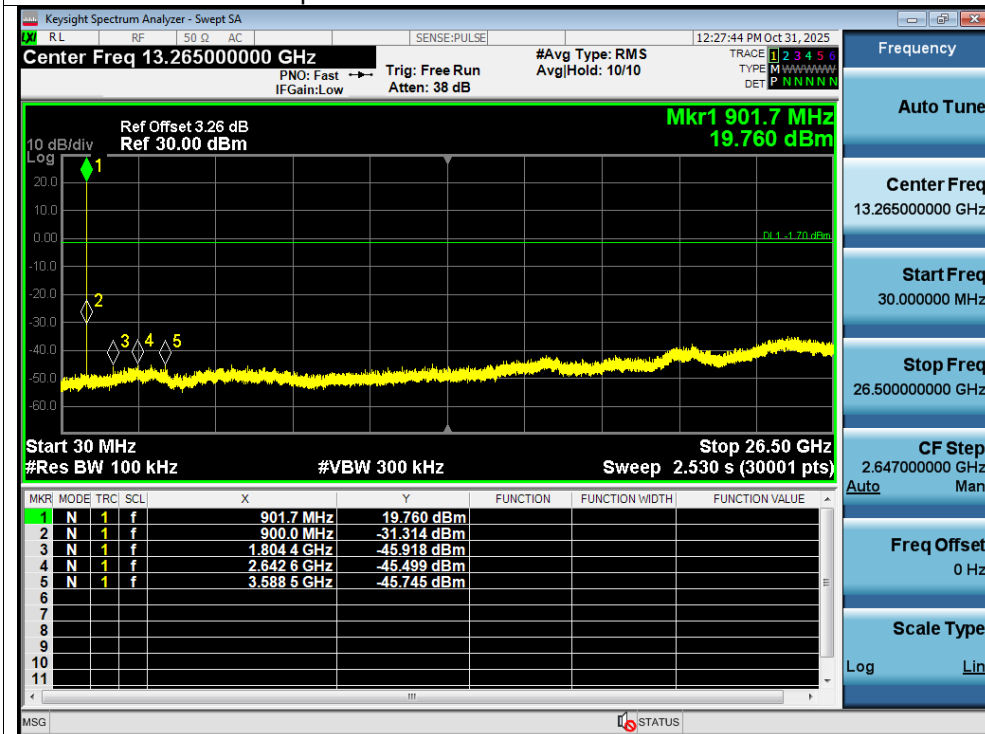
Temperature:	26 °C	Relative Humidity:	54%RH
Pressure:	101KPa	Test Voltage:	DC 3.3V

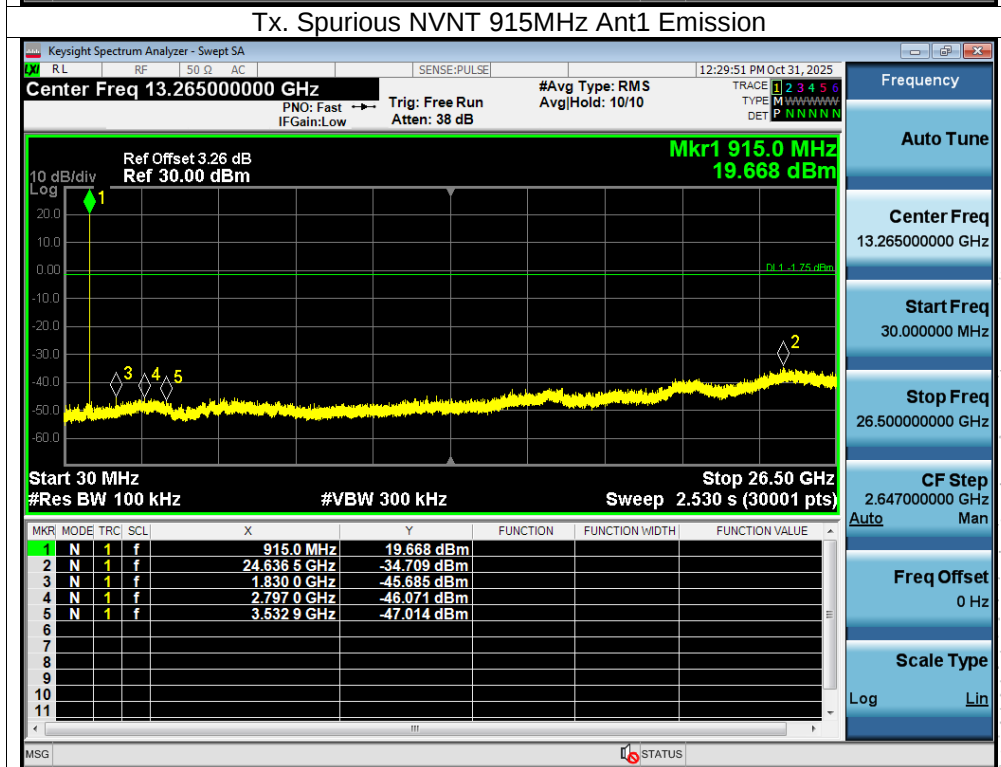
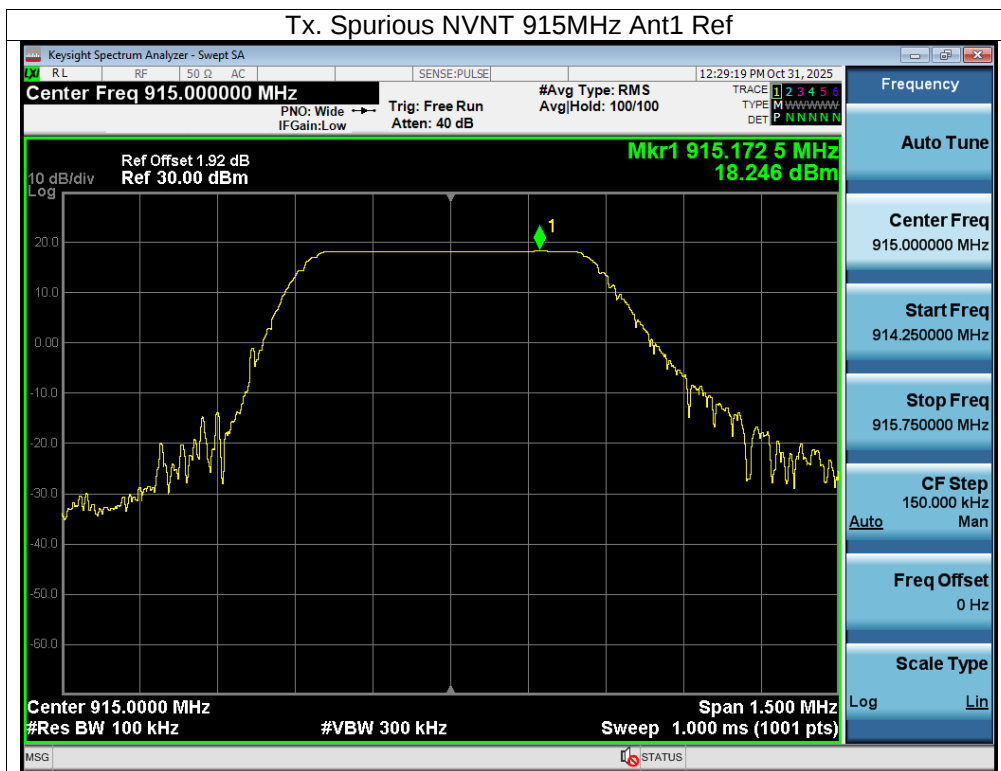
Test Graphs

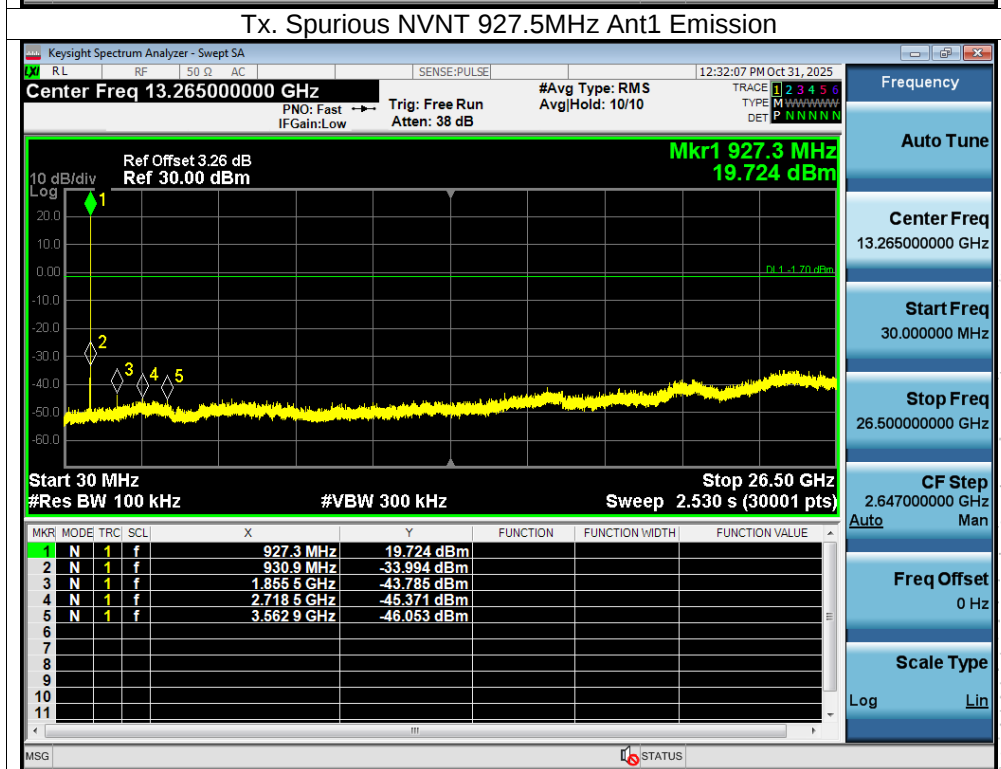
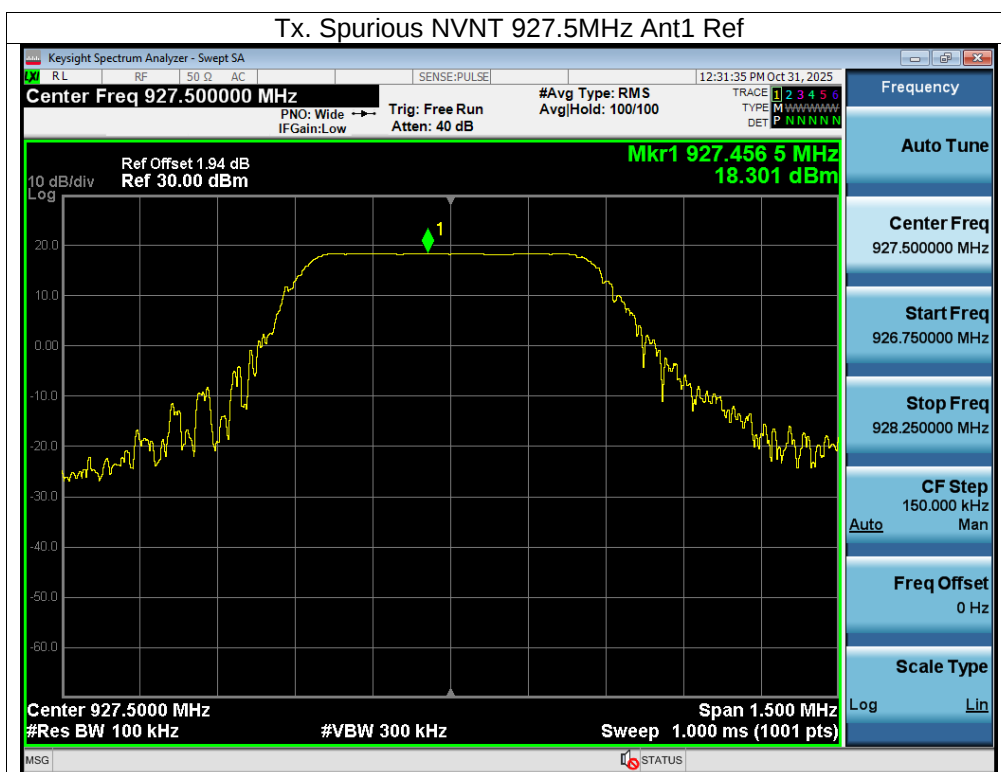
Tx. Spurious NVNT 902.3MHz Ant1 Ref



Tx. Spurious NVNT 902.3MHz Ant1 Emission







12. Antenna Requirement

12.1 Limit

15.203 requirements:

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, or §15.221. 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.

12.2 Test Result

The EUT antenna is external antenna, not using a standard antenna jack or electrical connector for antenna replacement, fulfill the requirement of this section.

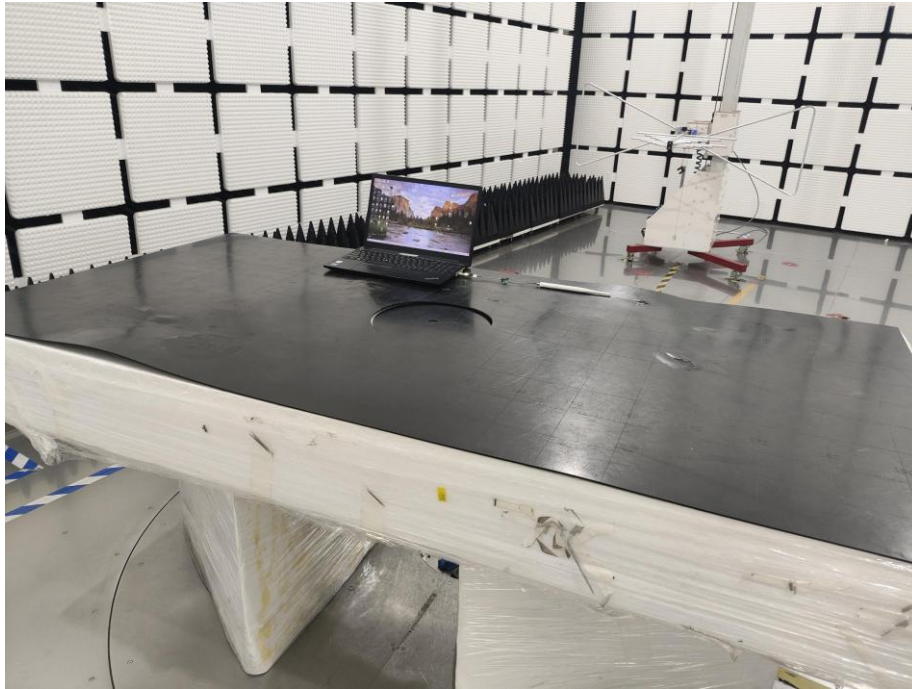
13. EUT Test Setup Photographs

Conducted emissions Photo



ST
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Radiated Measurement Photos



STATEMENT

1. The equipment lists are traceable to the national reference standards.
2. The test report can not be partially copied unless prior written approval is issued from our lab.
3. The test report is invalid without the "special seal for inspection and testing".
4. The test report is invalid without the signature of the approver.
5. The test process and test result is only related to the Unit Under Test.
6. Sample information is provided by the client and the laboratory is not responsible for its authenticity.
7. The quality system of our laboratory is in accordance with ISO/IEC17025.
8. If there is any objection to this test report, the client should inform issuing laboratory within 15 days from the date of receiving test report.

Address:

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***** END *****