TEST REPORT

Applicant Name:	GESTRA AG
Address:	Münchener Str. 77, 28215 Bremen. Germany
Report Number:	2501Z01980E-RFA
FCC ID:	2BTU2MSBN-2
IC:	35069-MSBN2

Test Standard (s)

FCC PART 15.247 ;

RSS-GEN ISSUE 5, FEBRUARY 2021 AMENDMENT 2; RSS-247 ISSUE 4, July 24, 2025

Sample Description

Product Type:	MSBN-2 LoRa Node with MSBS Sensor
Model No.:	MSBN-2 MAX
Multiple Model(s) No.:	MSBN-2
Trade Mark:	GESTRA, Spirax Sarco
Date Received:	2025/11/19
Issue Date:	2026/08/07
Test Result:	Pass▲

▲ In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

Allen Bai
RF Engineer

Approved By:

Nancy Wang
RF Supervisor

Note: The information marked# is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report. Customer model name, addresses, names, trademarks etc. are included.

This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk "▼".

TABLE OF CONTENTS

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	2501Z01980E-RFA	Original Report	2026/08/07

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

HVIN	MSBN-2, MSBN-2 MAX
FVIN	V1.2.4
Product	MSBN-2 LoRa Node with MSBS Sensor
Tested Model	MSBN-2 MAX
Multiple Model(s)	MSBN-2
Mode	Hybrid System
Frequency Range	902.3-914.9MHz
Maximum Conducted Peak Output Power	6.29dBm
Modulation Technique	Lora_ Chirp Spread Spectrum (CSS)
Antenna Specification#	0.3dBi (provided by the applicant)
Voltage Range	DC 3.6V from battery
Sample serial number	3D2C-1(MSBN-2 MAX), 3P7U-5 (MSBN-2) (Assigned by BACL, Shenzhen)
Sample/EUT Status	Good condition
Adapter Information	N/A
Note1: The Multiple models are electrically identical with the test model except for MSBN-2 MAX has an additional Bluetooth module. Please refer to the declaration letter# for more detail, which was provided by manufacturer. Note2: Based on the differences between the two models, model MSBN-2 MAX requires full testing, while model MSBN-2 requires Below 1GHz Radiated Emission Test.	

Objective

This report is in accordance with FCC Part 2-Subpart J, Part 15-Subpart A and C, and section 15.203, 15.205, 15.209, 15.247 rules RSS-GEN Issue 5, February 2021 Amendment 2 and RSS-247 Issue 4, July 24, 2025▼ of the Innovation, Science and Economic Development Canada rules.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2020+Cor.1-2023+C63.10a-2024 + Errata to C63.10a-2024▼, RSS-Gen and RSS-247.

And KDB 558074 D01 15.247 Meas Guidance v05r02.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Each test item follows test standards and with no deviation.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		109.2kHz(k=2, 95% level of confidence)
RF output power, conducted		0.86dB(k=2, 95% level of confidence)
Unwanted Emission, conducted		1.60dB(k=2, 95% level of confidence)
AC Power Lines Conducted Emissions	9kHz-150kHz	3.63dB(k=2, 95% level of confidence)
	150kHz-30MHz	3.66dB(k=2, 95% level of confidence)
Radiated Emissions	0.009MHz~30MHz	3.60dB(k=2, 95% level of confidence)
	30MHz~200MHz (Horizontal)	5.32dB(k=2, 95% level of confidence)
	30MHz~200MHz (Vertical)	5.43dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Horizontal)	5.77dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Vertical)	5.73dB(k=2, 95% level of confidence)
	1GHz - 6GHz	5.34dB(k=2, 95% level of confidence)
	6GHz - 18GHz	5.40dB(k=2, 95% level of confidence)
	18GHz - 40GHz	5.64dB(k=2, 95% level of confidence)
Temperature		±1℃
Humidity		±1%
Supply voltages		±0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 5F(B-West) , 6F, 7F, the 3rd Phase of Wan Li Industrial Building D, Shihua Rd, FuTian Free Trade Zone, Shenzhen, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, test firm registration No.: 715558, the FCC Designation No. : CN5045.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0023.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in engineering mode.

Channel List

Channel	Freq.(MHz)	Channel	Freq.(MHz)	Channel	Freq.(MHz)	Channel	Freq.(MHz)
0	**902.3**	16	905.5	**32**	**908.7**	48	911.9
1	902.5	17	905.7	33	908.9	49	912.1
2	902.7	18	905.9	34	909.1	50	912.3
3	902.9	19	906.1	35	909.3	51	912.5
4	903.1	20	906.3	36	909.5	52	912.7
5	903.3	21	906.5	37	909.7	53	912.9
6	903.5	22	906.7	38	909.9	54	913.1
7	903.7	23	906.9	39	910.1	55	913.3
8	903.9	24	907.1	40	910.3	56	913.5
9	904.1	25	907.3	41	910.5	57	913.7
10	904.3	26	907.5	42	910.7	58	913.9
11	904.5	27	907.7	43	910.9	59	914.1
12	904.7	28	907.9	44	911.1	60	914.3
13	904.9	29	908.1	45	911.3	61	914.5
14	905.1	30	908.3	46	911.5	62	914.7
15	905.3	31	908.5	47	911.7	**63**	**914.9**

EUT was test with channel 0/32/63.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

“Serial Port Utility#” exercise software was used and the power level is 12#. The software and power level was provided by the manufacturer.

Support Equipment List and Details

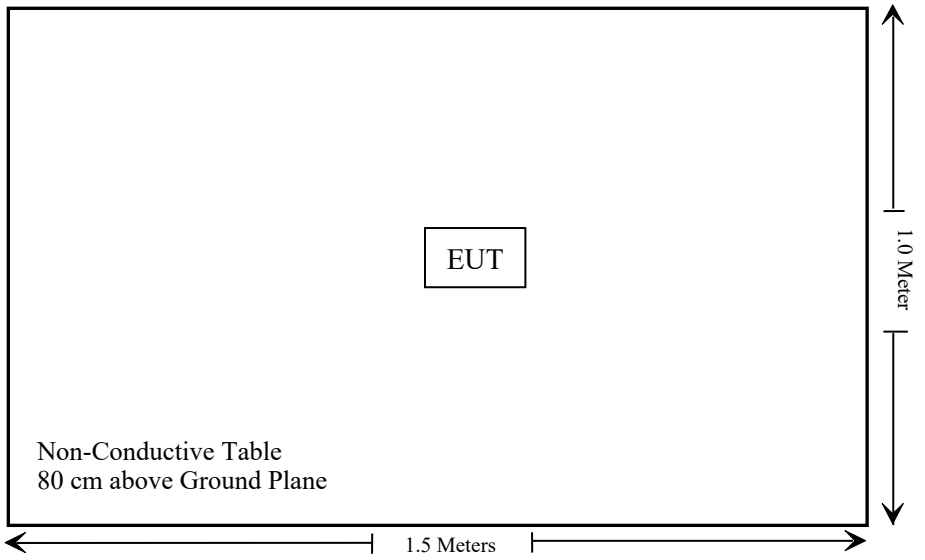
Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

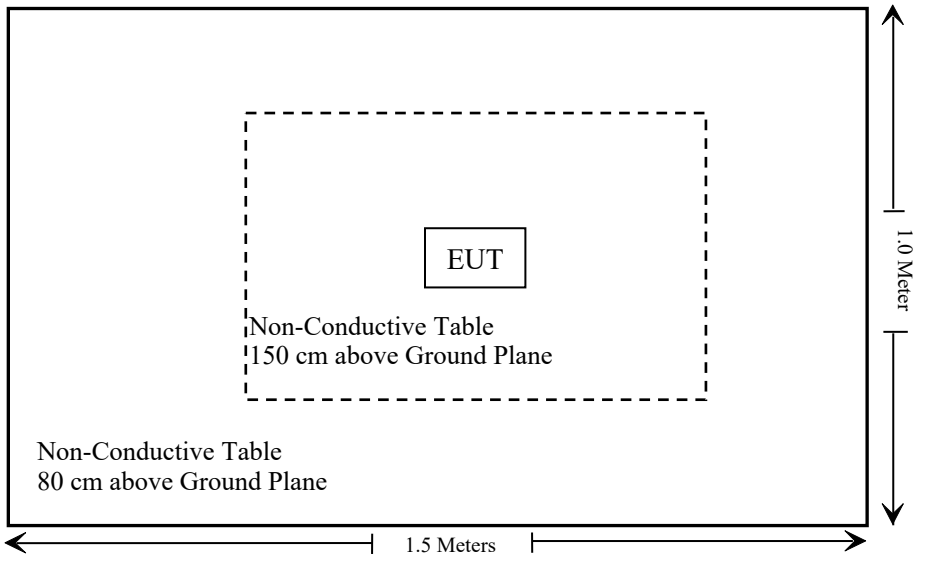
Cable Description	Length (m)	From Port	To
/	/	/	/

Block Diagram of Test Setup

For Radiated Emissions: Below 1GHz:



For Radiated Emissions: Above 1GHz:



SUMMARY OF TEST RESULTS

Test Rules		Description of Test	Result
FCC §15.247 (i) & §1.1307 (b) (3) & §2.1091	/	MPE-Based Exemption	Compliant
/	RSS-102 § 6.6	Field reference level exposure exemption limits	Compliant
FCC §15.203	RSS-Gen §6.8	Antenna Requirement	Compliant
FCC §15.207(a)	RSS-Gen §8.8	AC Line Conducted Emissions	Not Applicable
FCC §15.209, §15.205 & §15.247(d)	RSS-GEN §8.10, RSS-247 §6.6	Spurious Emissions	Compliant
FCC §15.247(a)(1)(i)	RSS-247 §6.2.1(a), RSS-Gen § 6.7	20 dB Emission Bandwidth & 99% Occupied Bandwidth	Compliant
FCC §15.247(a)(1)	RSS-247 §6.2.1(b)	Channel Separation Test	Compliant
FCC §15.247(f)	RSS-247 §6.4(b)	Time of Occupancy (Dwell Time)	Compliant
FCC §15.247(b)(3)	RSS-247 §6.3.2	Peak Output Power Measurement	Compliant
FCC §15.247(f)	RSS-247 §6.4(a)	Power Spectral Density	Compliant
FCC §15.247(d)	RSS-247 §6.6	Band edges	Compliant
FCC §15.247(d)	RSS-247 §6.6	Conducted Spurious Emission	Compliant
C63.10 §11.6	C63.10 §11.6	Duty Cycle	/

Not Applicable: The EUT is powered by battery.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test (Below 1GHz)					
Rohde & Schwarz	EMI Test Receiver	ESR3	102455	2025/09/01	2026/08/31
Sonoma instrument	Pre-amplifier	310 N	186238	2025/09/08	2026/09/07
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2023/07/20	2026/07/19
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2026/06/26	2029/06/25
Unknown	Chamber A Cable	Cable A1	Cable A1	2025/09/08	2026/09/07
Unknown	Chamber A Cable	Cable A2	Cable A2	2025/09/08	2026/09/07
BACL	Active Loop Antenna	1313-1A	4031911	2024/05/14	2027/05/13
Unknown	Chamber A Cable	Cable A3	Cable A3	2025/09/08	2026/09/07
Unknown	Chamber A Cable	Cable A4	Cable A4	2025/09/08	2026/09/07
Audix	EMI Test software	E3	19821b(V9)	NCR	NCR
TDK	Chamber	Chamber A	2#	2023/07/12	2026/07/11
TDK	Chamber	Chamber A	2#	2026/07/03	2029/07/02
Radiated Emission Test (Above 1GHz)					
Rohde & Schwarz	Spectrum Analyzer	FSV40	101605	2025/09/01	2026/08/31
A.H.System	Preamplifier	PAM-0118P	489	2025/09/08	2026/09/07
Schwarzbeck	Horn Antenna	BBHA9120D(1201)	1143	2023/07/26	2026/07/25
Unknown	Chamber B Cable	Cable B1	Cable B1	2025/09/08	2026/09/07
Unknown	Chamber B Cable	Cable B2	Cable B2	2025/09/08	2026/09/07
Unknown	Chamber B Cable	Cable B3	Cable B3	2025/09/08	2026/09/07
JD	Filter Switch Unit	DT7220FSU	DS79906	2025/08/12	2026/08/11
JD	Multiplex Switch Test Control Set	DT7220SCU	DS79903	2025/08/12	2026/08/11
Audix	EMI Test software	E3	191218 V9(c)	NCR	NCR
TDK	Chamber	Chamber B	1#	2023/07/14	2026/07/13

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSV40-N	102259	2025/09/01	2026/08/31
Unknown	10dB Attenuator	Unknown	F-03-EM190	2025/06/26	2026/06/25
Unknown	10dB Attenuator	Unknown	F-03-EM190	2026/06/24	2027/06/23

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.247 (i) & §1.1307 (b) (3) & §2.1091- MPE-Based Exemption

Applicable Standard

According to subpart 15.247 (i) and subpart 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

According to KDB 447498 D04 Interim General RF Exposure Guidance V01

MPE-Based Exemption:

General frequency and separation-distance dependent MPE-based effective radiated power (ERP) thresholds are in Table B.1 [Table 1 of § 1.1307(b)(3)(i)(C)] to support an exemption from further evaluation from 300 kHz through 100 GHz.

Table 1 to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R^2.
1.34-30	3,450 R^2/f^2.
30-300	3.83 R^2.
300-1,500	0.0128 R^2f.
1,500-100,000	19.2R^2.

R is the minimum separation distance in meters
f = frequency in MHz

Result

Mode	Frequency (MHz)	Tune up conducted power# (dBm)	Antenna Gain#		ERP		Evaluation Distance (m)	ERP Limit (mW)
			(dBi)	(dBd)	(dBm)	(mW)		
Lora_ Hybrid	902.3-914.9	6.5	0.3	-1.85	4.65	2.92	0.2	462
Lora_ DTS	903-914.2	18.5	0.3	-1.85	16.65	46.24	0.2	462
BLE	2402-2480	0.97	1.9	-0.25	0.72	1.18	0.2	768

Note: 1. The tune up conducted power# and antenna gain# was declared by the applicant.
2. 0dBd=2.15dBi
3. The BLE and Lora can transmit at same time, the Lora_ Hybrid and Lora_ DTS cannot transmit at same time.
4. The device contains a certified RF module (Model: STM32WB5MMGH, FCC ID: YCP-32WB5MMGH02)

Simultaneous transmitting consideration (worst case):

The ratio= ERP $_{Lora}$/limit + ERP $_{BLE}$/limit = 46.24/462+ 1.18/768 =0.102<1.0

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Compliant.

RSS-102 § 6.6 - FIELD REFERENCE LEVEL EXPOSURE EXEMPTION LIMITS

Applicable Standard

According to RSS-102 Issue 6§6.6:

Field reference level (FRL) exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm (i.e. mobile devices), except when the device operates as follows:

• below 20 MHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than 1 W (adjusted for tune-up tolerance)

• at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz

• at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance)

• at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz

• at or above 6 GHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than 5 W (adjusted for tune-up tolerance) In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the EIRP was derived.

Test Result:

For worst case:

Mode	Frequency (MHz)	Maximum tune-up conducted power# (dBm)	Antenna Gain#	Maximum tune-up EIRP		Evaluation Distance (m)	Limit (mW)
			(dBi)	(dBm)	(mW)		
Lora_ Hybrid	902.3-914.9	6.5	0.3	6.80	4.79	0.2	1371
Lora_ DTS	903-914.2	18.5	0.3	18.80	75.86	0.2	1371
BLE	2402-2480	0.97	1.9	2.87	1.94	0.2	2676

Note: 1. The tune up conducted power# and antenna gain# was declared by the applicant.
2. The BLE and Lora can transmit at same time, the Lora_ Hybrid and Lora_ DTS cannot transmit at same time.
3. The device contains a certified RF module (Model: STM32WB5MMGH, IC: 8976A-32WB5MMGH02)

Simultaneous transmitting consideration (worst case):

The ratio= EIRP $_{Lora}$/limit + EIRP $_{BLE}$/limit = 75.86/1371+ 1.94/2676 =0.056<1.0

Result: Compliant

Note: To maintain compliance with the RF exposure guidelines, place the equipment at least 20cm from nearby persons.

FCC §15.203& RSS-Gen §6.8 - ANTENNA REQUIREMENT

Applicable Standard

According to FCC § 15.203, 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.

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.

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

According to RSS-Gen §6.8,

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer. The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

This radio transmitter [enter the device's ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device. Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

Antenna Connector Construction

The EUT has an external antenna with unique antenna connector, and the maximum antenna gain# is 0.3dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Antenna Type	Antenna Gain#	Impedance	Frequency Range
External	0.3dBi	50Ω	902.3-914.9MHz

Result: Compliant.

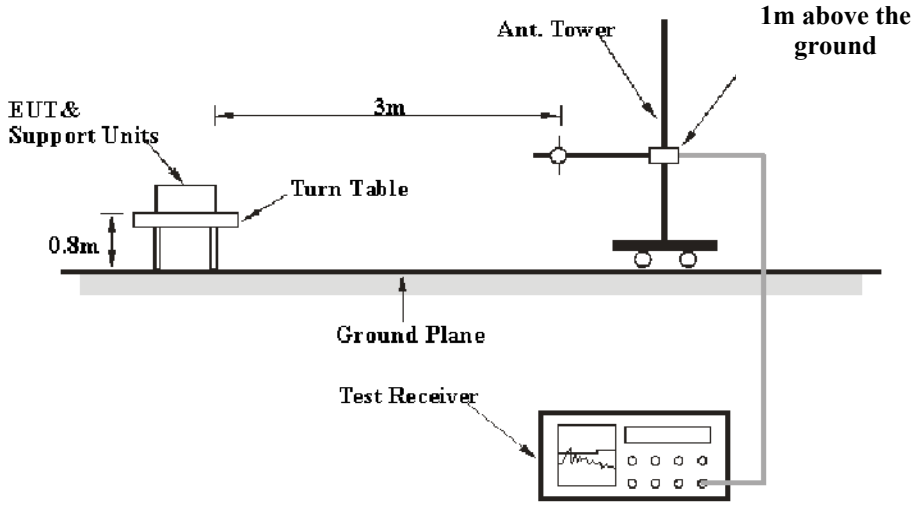
FCC §15.209, §15.205, §15.247(d), RSS-GEN §8.10 & RSS-247 §6.6 - SPURIOUS EMISSIONS

Applicable Standard

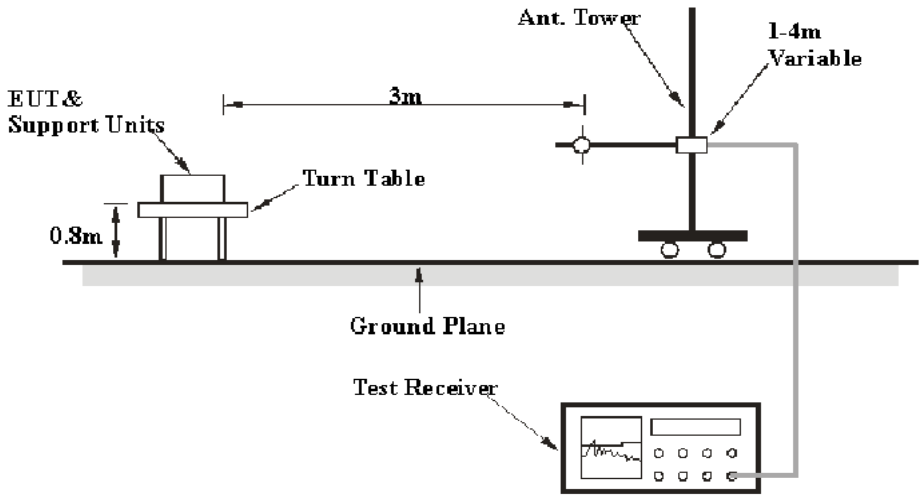
FCC §15.247 (d); §15.209; §15.205; RSS-247 §6.6, RSS-GEN §8.10.

EUT Setup

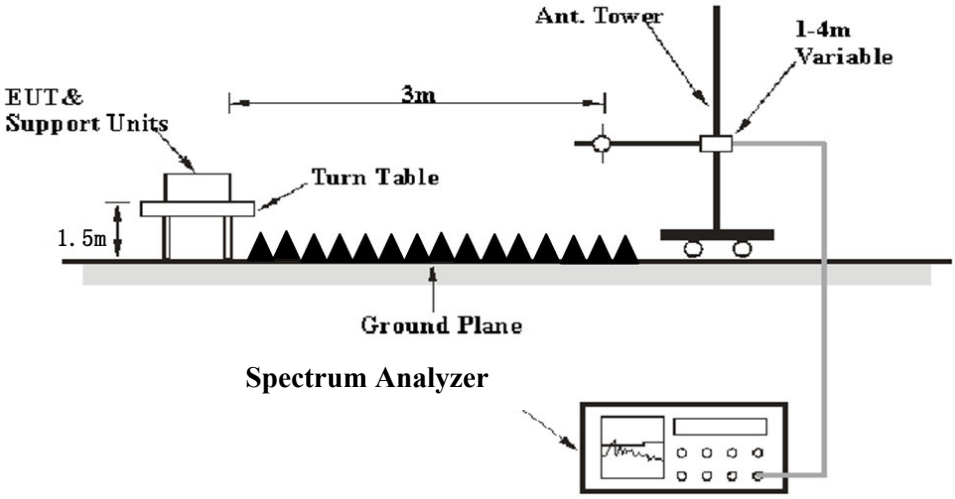
9 kHz-30MHz:



30MHz-1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2020. The specification used was the FCC 15.205, FCC 15.209, FCC 15.247, RSS-Gen and RSS-247 limits.

EMI Test Receiver & Spectrum Analyzer Setup

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

9 kHz-1GHz:

Frequency Range	RBW	Video B/W	IF B/W	Detector	Measurement
9 kHz – 150 kHz	/	/	200 Hz	QP	QP
	300 Hz	1 kHz	/	PK	PK
150 kHz – 30 MHz	/	/	9 kHz	QP	QP
	10 kHz	30 kHz	/	PK	PK
30 MHz – 1000 MHz	/	/	120 kHz	QP	QP
	100 kHz or 120kHz	300 kHz or 500kHz	/	PK	PK

Above 1 GHz:
Pre-scan

Measurement	Duty cycle	RBW	Video B/W	Detector
PK	Any	1MHz	3 MHz	Peak
AV	>98%	1MHz	1 kHz	Peak
	<98%	1MHz	>1/Ton, not less than 1kHz	Peak

Final measurement for emission identified during pre-scan

Measurement	Duty cycle	RBW	Video B/W	Detector
PK	Any	1MHz	3 MHz	Peak
AV	>98%	1MHz	10 Hz	Peak
	<98%	1MHz	≥1/Ton	Peak

Note: Ton is minimum transmission duration

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All final data was recorded in Quasi-peak detection mode except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz, average detection modes for frequency bands 9–90 kHz and 110–490 kHz, peak and average detection modes for frequencies above 1 GHz.

For 9 kHz-30MHz, the report shall list the six emissions with the smallest margin relative to the limit, for each of the three antenna orientations (parallel, perpendicular, and ground-parallel) unless the margin is greater than 20 dB.

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

All emissions under the average limit and under the noise floor have not recorded in the report.

Factor & Over Limit/Margin Calculation

The Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain. The basic equation is as follows:

Factor = Antenna Factor + Cable Loss - Amplifier Gain

The "**Over Limit/Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit/margin of -7dB means the emission is 7dB below the limit. The equation for calculation is as follows:

Over Limit/Margin = Level/Corrected Amplitude – Limit
Level / Corrected Amplitude = Read Level + Factor

Test Data

Environmental Conditions

Temperature:	23.1~24.0 ℃
Relative Humidity:	44~51 %
ATM Pressure:	101.3~102.2 kPa

The testing was performed by Nico Wu and Alex Yan from 2025-12-05 to 2026-08-07 for below 1GHz and Leon Guo on 2025-12-03 for above 1GHz.

EUT operation mode: Transmitting

Note:
1. Pre-scan in the X, Y and Z axes of orientation, the worst case Z-axis of orientation was recorded.

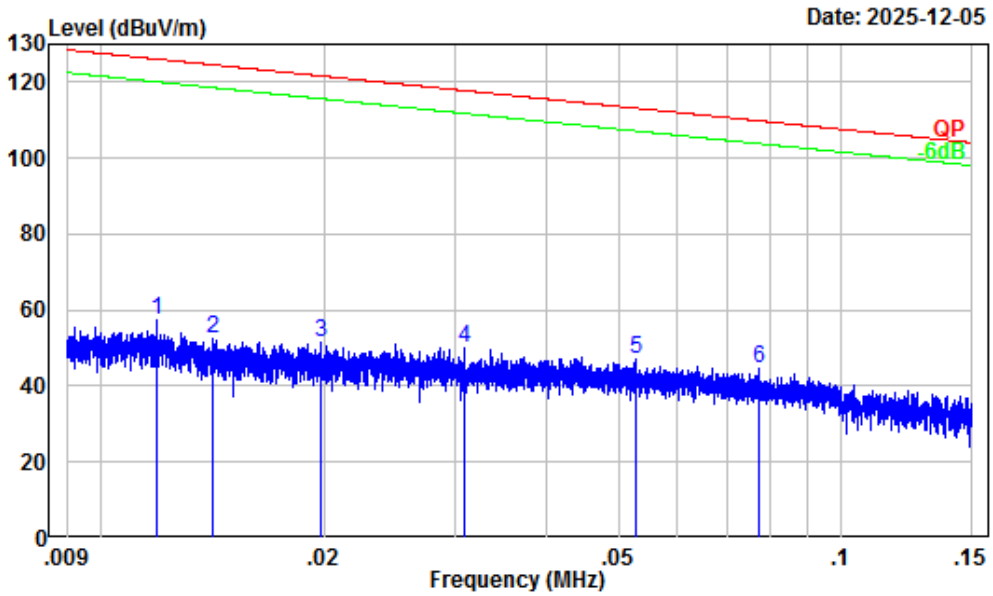
2. For the radiated spurious emission below 1GHz, When the test result of peak was less than the limit of QP/Average more than 6dB, just peak value were recorded.

3. The spurious emission from 9 kHz-30MHz of IC RSS-Gen standard, the unit of final result on the test plots are dBµV/m, so the limit should be added by 51,5 dB from dBµA/m to dBµV/m.

For model: MSBN-2 MAX

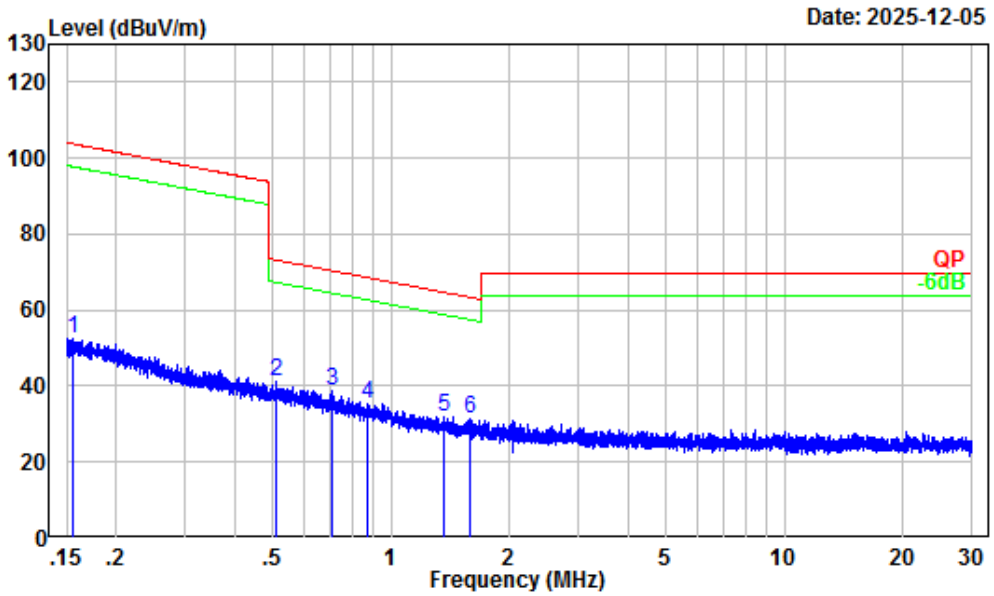
9 kHz-30MHz: (Maximum output power mode, Low channel)

Parallel (worst case)



Site : Chamber A
Condition : 3m
Project Number : 2501Z01980E-RF
Test Mode : Transmitting
Detector: Peak RBW/VBW: 0.3/1kHz
Tester : Nico Wu

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.012	31.94	25.29	57.23	126.08	-68.85	Peak
2	0.014	31.51	21.02	52.53	124.59	-72.06	Peak
3	0.020	30.43	21.22	51.65	121.65	-70.00	Peak
4	0.031	28.40	21.64	50.04	117.78	-67.74	Peak
5	0.053	26.13	20.85	46.98	113.16	-66.18	Peak
6	0.077	23.67	21.16	44.83	109.84	-65.01	Peak

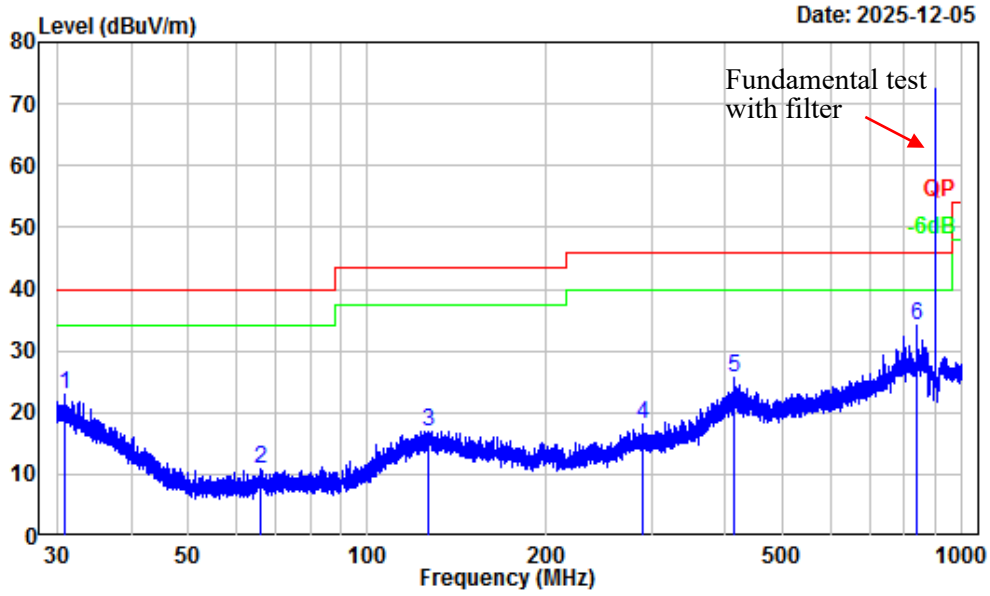


Site : Chamber A
Condition : 3m
Project Number : 2501Z01980E-RF
Test Mode : Transmitting
Detector: Peak RBW/VBW: 10/30kHz
Tester : Nico Wu

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.156	18.71	34.00	52.71	103.75	-51.04	Peak
2	0.511	6.26	34.94	41.20	73.42	-32.22	Peak
3	0.709	3.82	35.05	38.87	70.52	-31.65	Peak
4	0.876	2.13	33.07	35.20	68.64	-33.44	Peak
5	1.366	0.18	31.50	31.68	64.71	-33.03	Peak
6	1.583	-0.43	31.92	31.49	63.40	-31.91	Peak

30 MHz~1 GHz: (Maximum output power mode, Low channel)

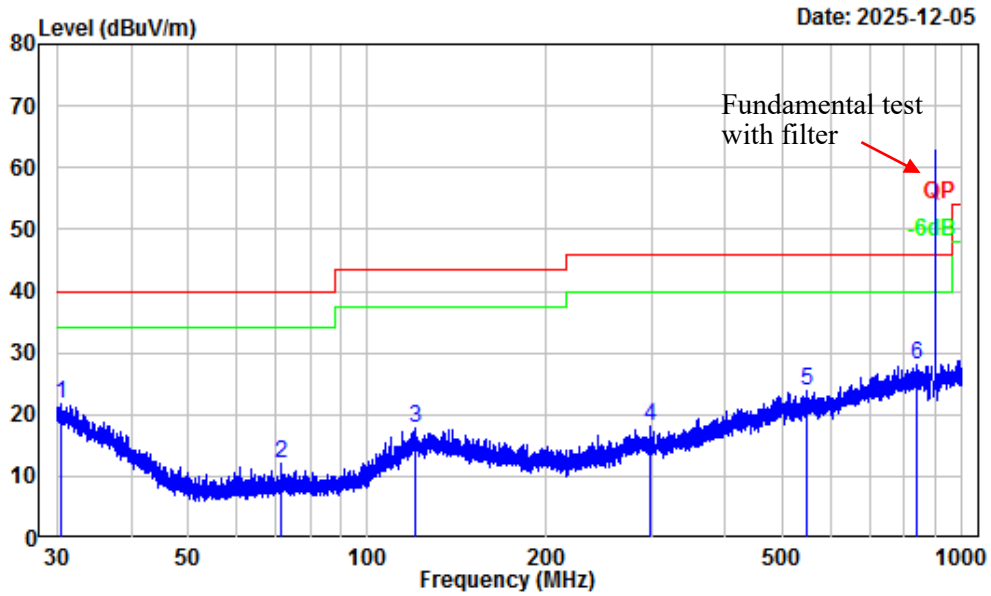
Horizontal



Site : Chamber A
Condition : 3m Horizontal
Project Number : 2501Z01980E-RF
Test Mode : Transmitting
Detector: Peak RBW/VBW: 100/300kHz
Tester : Nico Wu

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	31.00	-6.47	29.30	22.83	40.00	-17.17	Peak
2	65.98	-17.89	28.90	11.01	40.00	-28.99	Peak
3	126.94	-11.12	28.06	16.94	43.50	-26.56	Peak
4	290.78	-11.21	29.34	18.13	46.00	-27.87	Peak
5	414.90	-8.01	33.59	25.58	46.00	-20.42	Peak
6	838.81	-1.83	35.82	33.99	46.00	-12.01	Peak

Vertical



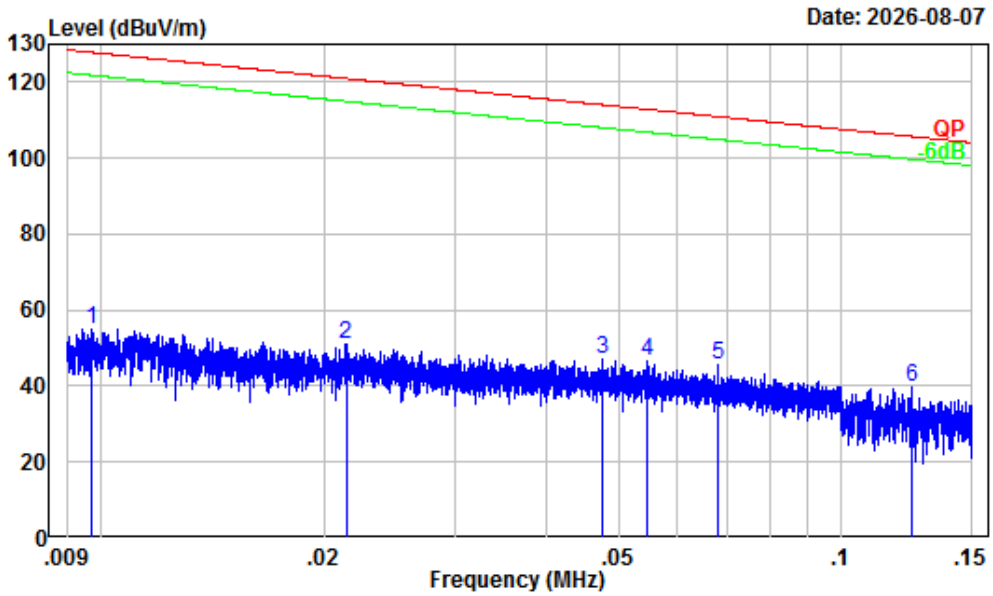
Site : Chamber A
Condition : 3m Vertical
Project Number : 2501Z01980E-RF
Test Mode : Transmitting
Detector: Peak RBW/VBW: 100/300kHz
Tester : Nico Wu

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	30.42	-6.17	27.94	21.77	40.00	-18.23	Peak
2	71.74	-17.85	29.81	11.96	40.00	-28.04	Peak
3	120.22	-11.43	29.18	17.75	43.50	-25.75	Peak
4	298.01	-11.21	29.26	18.05	46.00	-27.95	Peak
5	548.54	-5.54	29.53	23.99	46.00	-22.01	Peak
6	838.81	-1.83	30.01	28.18	46.00	-17.82	Peak

For model: MSBN-2

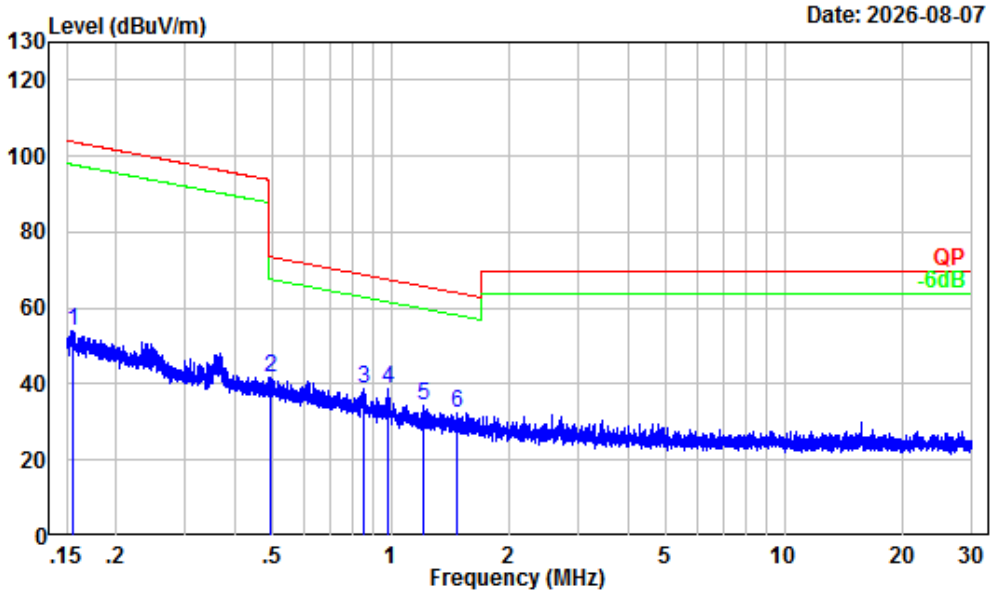
9 kHz-30MHz: (Maximum output power mode, Low channel)

Parallel (worst case)



Site : Chamber A
Condition : 3m
Project Number : 2501Z01980E-RF
Test Mode : Transmitting
Detector: Peak RBW/VBW: 0.3/1kHz
Tester : Alex Yan

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.010	32.36	22.82	55.18	127.85	-72.67	Peak
2	0.021	30.13	20.99	51.12	120.98	-69.86	Peak
3	0.048	26.66	20.60	47.26	114.06	-66.80	Peak
4	0.055	25.94	20.55	46.49	112.86	-66.37	Peak
5	0.068	24.60	20.81	45.41	110.95	-65.54	Peak
6	0.124	20.56	19.22	39.78	105.70	-65.92	Peak

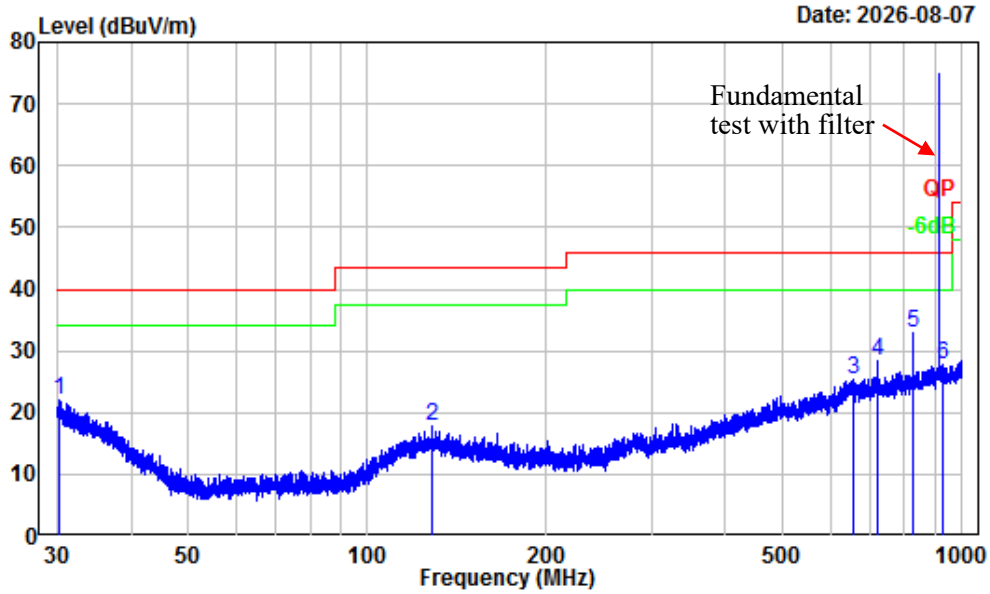


Site : Chamber A
Condition : 3m
Project Number : 2501Z01980E-RF
Test Mode : Transmitting
Detector: Peak RBW/VBW: 10/30kHz
Tester : Alex Yan

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.156	18.72	35.44	54.16	103.76	-49.60	Peak
2	0.494	6.52	35.21	41.73	73.73	-32.00	Peak
3	0.853	2.30	36.21	38.51	68.89	-30.38	Peak
4	0.987	1.30	37.32	38.62	67.59	-28.97	Peak
5	1.214	0.60	33.66	34.26	65.75	-31.49	Peak
6	1.478	-0.14	32.57	32.43	64.01	-31.58	Peak

30 MHz~1 GHz: (Maximum output power mode, Low Channel)

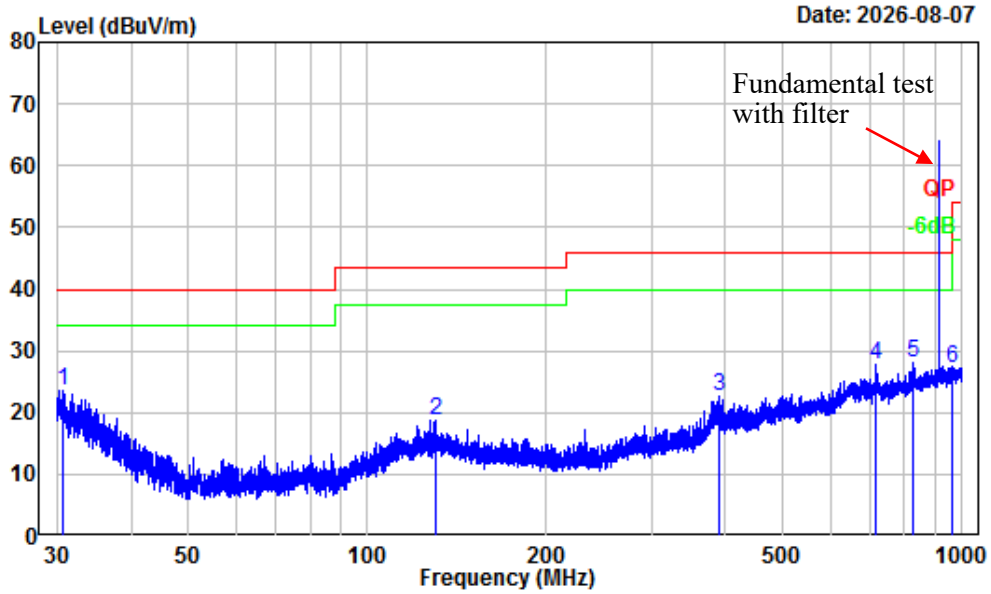
Horizontal



Site : Chamber A
Condition : 3m Horizontal
Project Number : 2501Z01980E-RF
Test Mode : Transmitting
Detector: Peak RBW/VBW: 120/500kHz
Tester : Alex Yan

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	30.185	-5.80	27.86	22.06	40.00	-17.94	Peak
2	128.225	-11.06	28.88	17.82	43.50	-25.68	Peak
3	656.530	-2.80	28.25	25.45	46.00	-20.55	Peak
4	722.042	-2.71	31.14	28.43	46.00	-17.57	Peak
5	827.493	-1.38	34.15	32.77	46.00	-13.23	Peak
6	926.162	-0.43	28.11	27.68	46.00	-18.32	Peak

Vertical



Site : Chamber A
Condition : 3m Vertical
Project Number : 2501Z01980E-RF
Test Mode : Transmitting
Detector: Peak RBW/VBW: 120/500kHz
Tester : Alex Yan

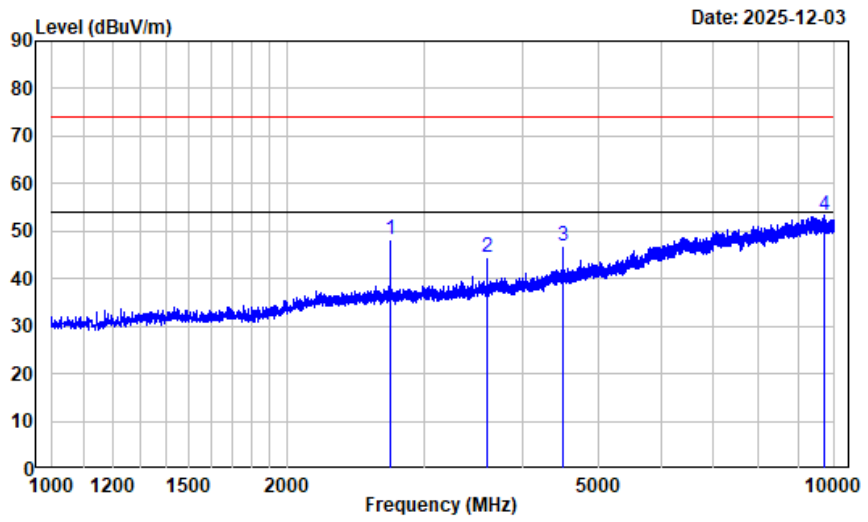
	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	30.624	-6.15	29.59	23.44	40.00	-16.56	Peak
2	130.094	-11.27	30.09	18.82	43.50	-24.68	Peak
3	390.038	-8.53	31.06	22.53	46.00	-23.47	Peak
4	713.860	-2.92	30.74	27.82	46.00	-18.18	Peak
5	829.673	-1.38	29.35	27.97	46.00	-18.03	Peak
6	959.635	0.28	26.78	27.06	46.00	-18.94	Peak

Above 1 GHz:

Frequency (MHz)	Reading (dBµV)	PK/Ave	Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Low Channel 902.3MHz							
2706.90	58.75	PK	H	-10.51	48.24	74	-25.76
2706.90	60.29	PK	V	-10.51	49.78	74	-24.22
3609.20	54.61	PK	H	-10.07	44.54	74	-29.46
3609.20	53.95	PK	V	-10.07	43.88	74	-30.12
4511.50	54.94	PK	H	-8.04	46.90	74	-27.10
4511.50	53.92	PK	V	-8.04	45.88	74	-28.12
Middle Channel 908.7MHz							
2726.10	59.07	PK	H	-10.56	48.51	74	-25.49
2726.10	59.12	PK	V	-10.56	48.56	74	-25.44
3634.80	54.96	PK	H	-9.89	45.07	74	-28.93
3634.80	53.12	PK	V	-9.89	43.23	74	-30.77
4543.50	55.23	PK	H	-8.14	47.09	74	-26.91
4543.50	53.93	PK	V	-8.14	45.79	74	-28.21
High Channel 914.9 MHz							
2744.70	59.07	PK	H	-10.63	48.44	74	-25.56
2744.70	58.94	PK	V	-10.63	48.31	74	-25.69
3659.60	55.41	PK	H	-9.72	45.69	74	-28.31
3659.60	53.45	PK	V	-9.72	43.73	74	-30.27
4574.50	55.80	PK	H	-8.23	47.57	74	-26.43
4574.50	53.92	PK	V	-8.23	45.69	74	-28.31

Note:
Factor = Antenna factor (RX) + Cable Loss – Amplifier Gain
Corrected Amplitude = Factor + Reading
Margin = Corrected Amplitude - Limit
The other spurious emission which is in the noise floor level was not recorded.
The test result of peak was less than the limit of average, so just peak values were recorded.

Listed with the worst case test plot:

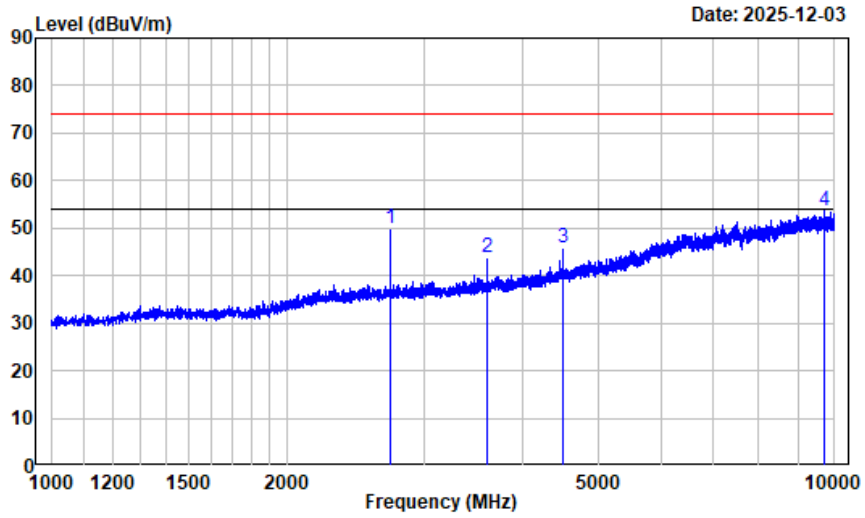
Horizontal	
1-10GHz	

Condition : Horizontal
Project No. : 2501Z01980E-RF
Tester : Leon Guo
Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak
Note : Lora_902.3MHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2706.900	-10.51	58.75	48.24	74.00	-25.76	Peak
2	3609.200	-10.07	54.61	44.54	74.00	-29.46	Peak
3	4511.500	-8.04	54.94	46.90	74.00	-27.10	Peak
4	9689.500	1.12	52.12	53.24	74.00	-20.76	Peak

Vertical

1-10GHz




```
Condition       : Vertical
Project No.     : 2501Z01980E-RF
Tester          : Leon Guo
Spectrum setting: Peak reading: RBW:1MHz VBW:3MHz Detector:Peak
Note            : Lora_902.3MHz
```

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2706.900	-10.51	60.29	49.78	74.00	-24.22	Peak
2	3609.200	-10.07	53.95	43.88	74.00	-30.12	Peak
3	4511.500	-8.04	53.92	45.88	74.00	-28.12	Peak
4	9719.875	1.16	52.56	53.72	74.00	-20.28	Peak

FCC §15.247(a) (1) & RSS-247 §6.2.1 (b) - CHANNEL SEPARATION TEST

Applicable Standard

FCC §15.247(a) (1):
Frequency hopping systems shall have hoping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater provided the systems operate with an output power no greater than 125 mW.

According to RSS-247 § 6.2.1 (b):
The hopping channel carrier frequencies shall be separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

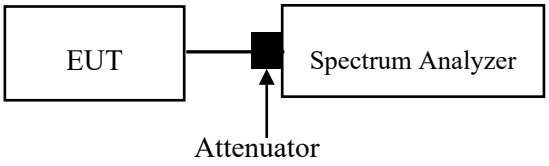
Test Procedure

Test Method: ANSI C63.10a-2024 Clause 7.8.2

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

a) Span: Wide enough to capture the peaks of two adjacent channels.
b) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
c) Video (or average) bandwidth (VBW) ≥1/10th the RBW.
d) Sweep: Auto.
e) Detector function: Peak.
f) Trace: Max hold.
g) Allow the trace to stabilize.

Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Compliance of an EUT with the appropriate regulatory limit shall be determined.



Test Data

Environmental Conditions

Temperature:	25.4 ℃
Relative Humidity:	47 %
ATM Pressure:	100.9 kPa

The testing was performed by Barry Feng on 2026-07-30.

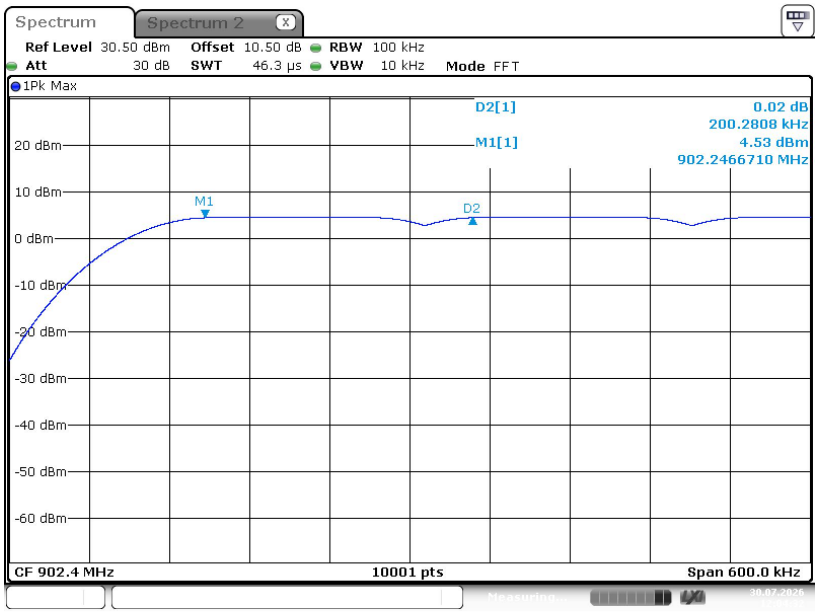
EUT operation mode: Transmitting

***Test Result: Compliant**. Please refer to following table and plots*

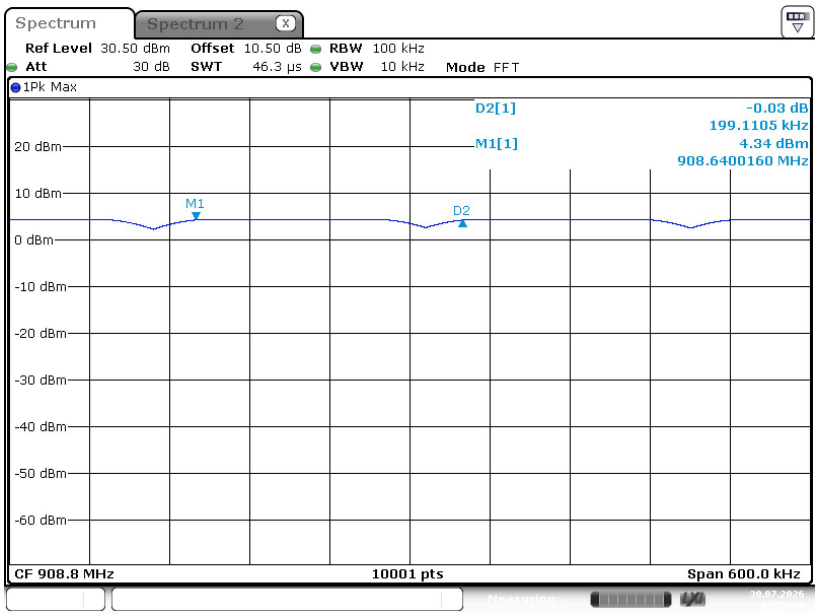
Test Mode	Frequency [MHz]	Frequency Separation [MHz]	20dB Bandwidth [MHz]	Verdict
Hopping	902.3	0.200	0.140	Pass
	908.7	0.199	0.140	Pass
	914.9	0.201	0.141	Pass

Note: Limit ≥ 20 dB bandwidth

Low Channel

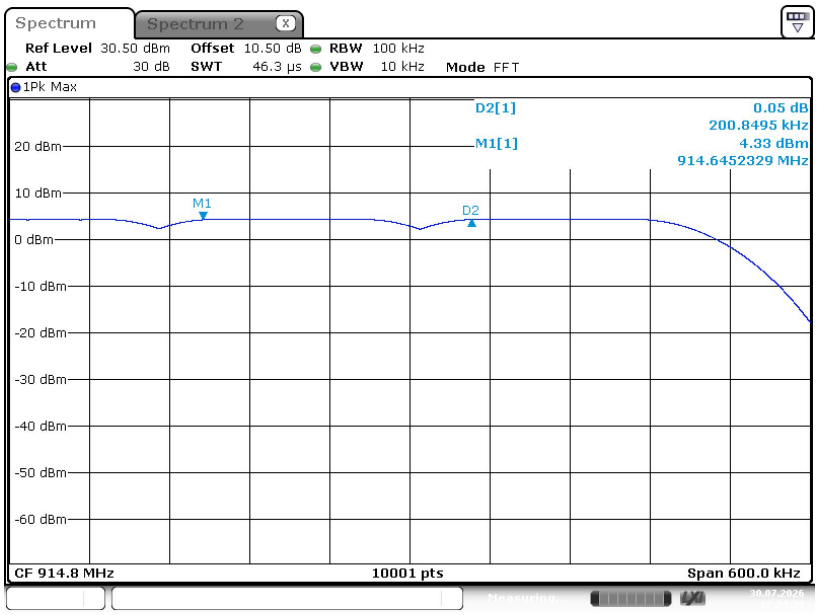


Middle Channel



ProjectNo.:2501Z01980E-RFTester:Barry Feng
Date: 30.JUL.2026 12:27:00

High Channel



ProjectNo.:2501Z01980E-RFTester:Barry Feng
Date: 30.JUL.2026 12:24:31

FCC §15.247(a) (1) (i) & RSS-247 § 6.2.1 (a), RSS-GEN § 6.7 - 20 dB EMISSION BANDWIDTH & 99% OCCUPIED BANDWIDTH

Applicable Standard

According to FCC §15.247(a) (1) (i):

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

According to RSS-247 § 6.2.1 (a), RSS-Gen § 6.7:

The bandwidth of a frequency hopping channel is the 20 dB emission bandwidth, measured with the hopping stopped. The system's RF bandwidth is equal to the channel bandwidth multiplied by the number of channels in the hopset. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

The 20 dB bandwidth is defined as the frequency range between two points, one at the lowest frequency below and one at the highest frequency above the carrier frequency, at which the maximum power level of the transmitted emission is attenuated 20 dB below the maximum in-band power level of the modulated signal, where the two points are on the outskirts of the in-band emission.

The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.
In some cases, the “x dB bandwidth” is required, which is defined as the frequency range between two points, one at the lowest frequency below and one at the highest frequency above the carrier frequency, at which the maximum power level of the transmitted emission is attenuated x dB below the maximum in-band power level of the modulated signal, where the two points are on the outskirts of the in-band emission.

The following conditions shall be observed for measuring the occupied bandwidth and x dB bandwidth:

- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.
- The detector of the spectrum analyzer shall be set to “Sample”. However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or “Max Hold”) may be necessary to determine the occupied / x dB bandwidth if the device is not transmitting continuously.
- The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.

For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).

Test Procedure

Test Method: ANSI C63.10-2020 Clause 6.9.2

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement.

c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level.

d) Steps a) through c) might require iteration to adjust within the specified tolerances.

e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target "−xx dB down" requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.

f) Set detection mode to peak and trace mode to max hold.

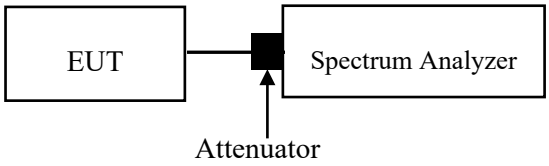
g) Determine the reference value: Set the EUT to transmit an un-modulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).

h) Determine the "−xx dB down amplitude" using [(reference value) − xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.

i) If the reference value is determined by an un-modulated carrier, then turn the EUT modulation on, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).

j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the "−xx dB down amplitude" determined in step h). If a marker is below this "−xx dB down amplitude" value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the "−xx dB down amplitude" determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.

k) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).



Test Data

Environmental Conditions

Temperature:	25.4 ℃
Relative Humidity:	47 %
ATM Pressure:	100.9 kPa

The testing was performed by Cheeb Huang on 2025-12-24.

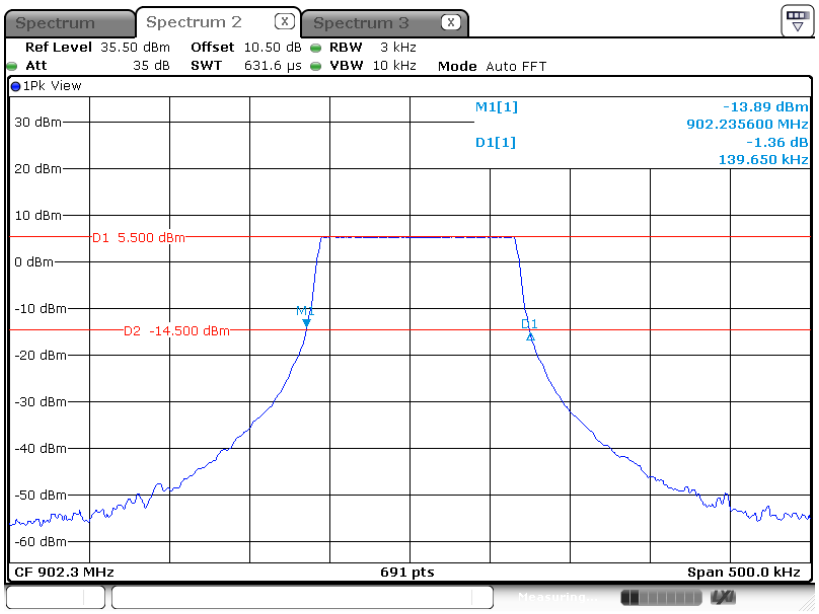
EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the following table and plots.

Test Channel	Test Frequency (MHz)	20 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
Lowest	902.3	0.140	0.125
Middle	908.7	0.140	0.125
Highest	914.9	0.141	0.126

20 dB Bandwidth

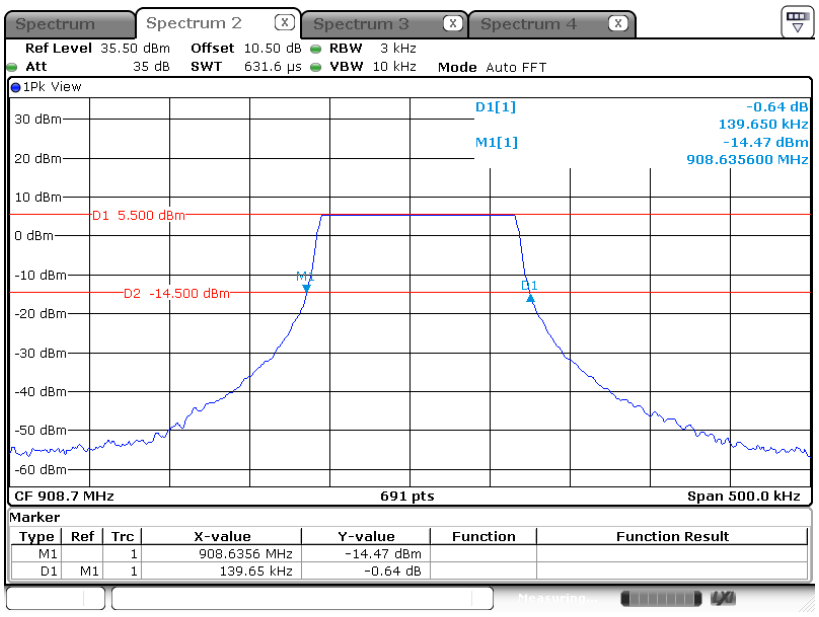
Low Channel



ProjectNo.:2501Z01980E-RF Tester:Cheeb Huang

Date: 24.DEC.2025 14:36:53

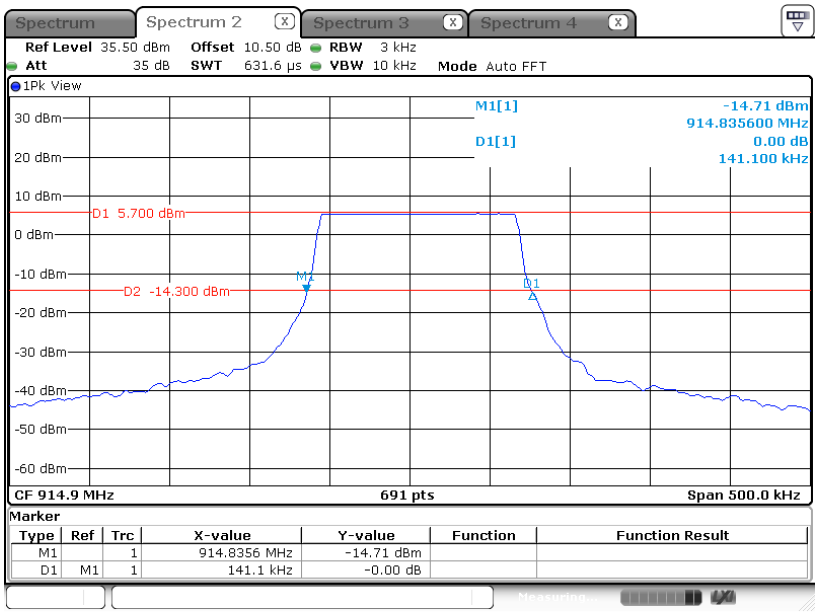
Middle Channel



ProjectNo.:2501Z01980E-RF Tester:Cheeb Huang

Date: 24.DEC.2025 15:01:48

High Channel

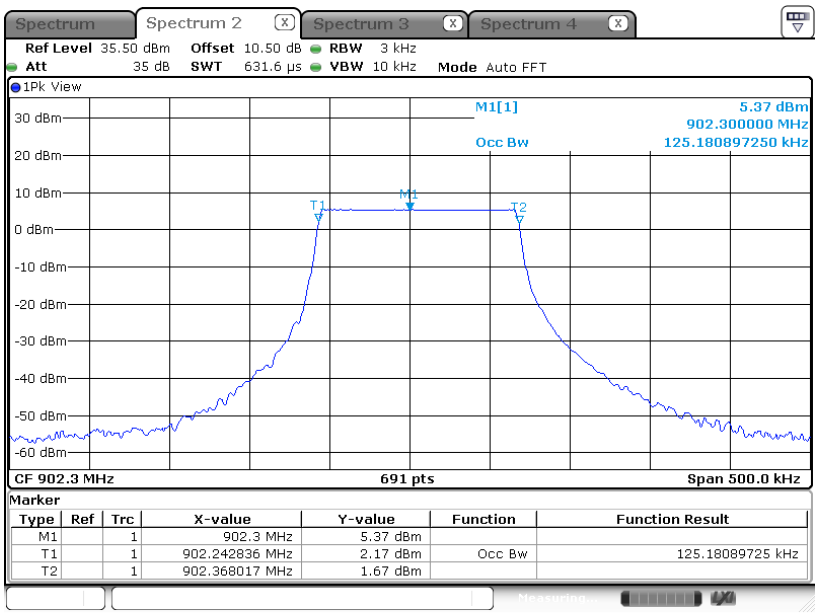


ProjectNo.:2501Z01980E-RF Tester:Cheeb Huang

Date: 24.DEC.2025 15:06:03

99% Occupied Bandwidth

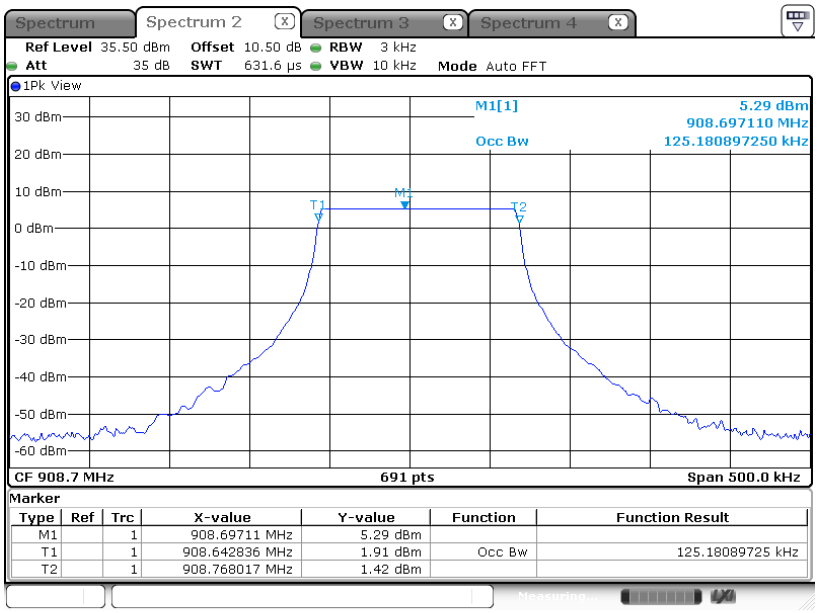
Low Channel



ProjectNo.:2501Z01980E-RF Tester:Cheeb Huang

Date: 24.DEC.2025 14:59:14

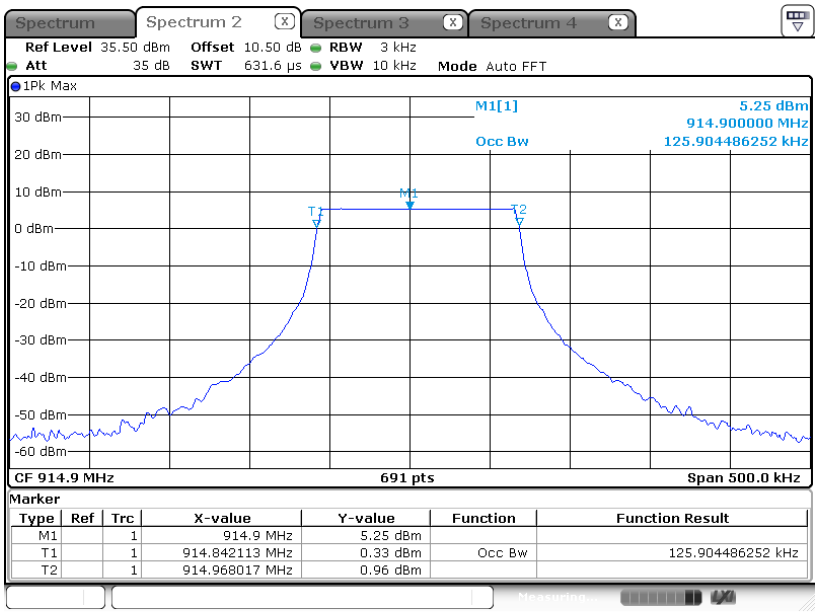
Middle Channel



ProjectNo.:2501Z01980E-RF Tester:Cheeb Huang

Date: 24.DEC.2025 15:00:47

High Channel



ProjectNo.:2501Z01980E-RF Tester:Cheeb Huang

Date: 24.DEC.2025 14:55:10

FCC §15.247(f) & RSS-247 §6.4(b) - TIME OF OCCUPANCY (DWELL TIME)

Applicable Standard

FCC §15.247(f):
For the purposes of this section, hybrid systems are those that employ a combination of both frequency hopping and digital modulation techniques. The frequency hopping operation of the hybrid system, with the direct sequence or digital modulation operation turned-off, shall have an average time of occupancy on any frequency not to exceed 0.4 seconds within a time period in seconds equal to the number of hopping frequencies employed multiplied by 0.4.

According to RSS-247 § 6.4 (b):
The frequency hopping operation shall have an average time of occupancy on any frequency not exceeding 0.4 s within a duration in seconds equal to the number of hopping frequencies multiplied by 0.4, when the frequency hopping function is enabled.

Test Procedure

Test Method: ANSI C63.10-2020 Clause 7.8.4

Use the following spectrum analyzer settings to determine the dwell time per hop:

a) Span: Zero span, centered on a hopping channel.

b) RBW shall be ≤ channel spacing and where possible RBW should be set >> 1 / T, where T is the expected transmission time per hop.

c) Sweep time: Set so that the start of the first transmission and end of the last transmission for the hop are clearly captured. Setting the sweep time to be slightly longer than the hopping period per channel (hopping period = 1/hopping rate) should achieve this.

d) Use a video trigger, where possible with a trigger delay, so that the start of the transmission is clearly observed. The trigger level might need adjustment to reduce the chance of triggering when the system hops on an adjacent channel.

e) Detector function: Peak.

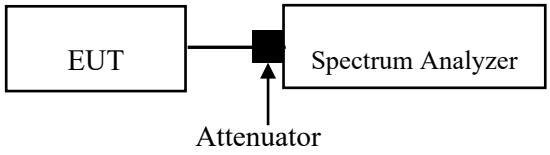
f) Trace: Clear-write, single sweep.

g) Place markers at the start of the first transmission on the channel and at the end of the last transmission. The dwell time per hop is the time between these two markers.

To determine the number of hops on a channel in the regulatory observation period repeat the measurement using a longer sweep time. When the device uses a single hopping sequence the period of measurement should be sufficient to capture at least 2 hops. When the device uses a dynamic hopping sequence, or the sequence varies, the period of measurement may need to capture multiple hops to better determine the average time of occupancy. Count the number of hops on the channel across the sweep time.

The average number of hops on the same channel within the regulatory observation period is calculated from the number of hops on the channel divided by the spectrum analyzer sweep time multiplied by the regulatory observation period. For example, if three hops are counted with an analyzer sweep time of 50ms and the regulatory observation period is 10 s, then the number of hops in that ten seconds is 3 / 0.5 × 10, or 60 hops.

The average time of occupancy is calculated by multiplying the dwell time per hop by the number of hops in the observation period.



Test Data

Environmental Conditions

Temperature:	25.4 ℃
Relative Humidity:	47 %
ATM Pressure:	100.9 kPa

The testing was performed by Cheeb Huang and Barry Feng from 2025-12-24 to 2026-07-30.

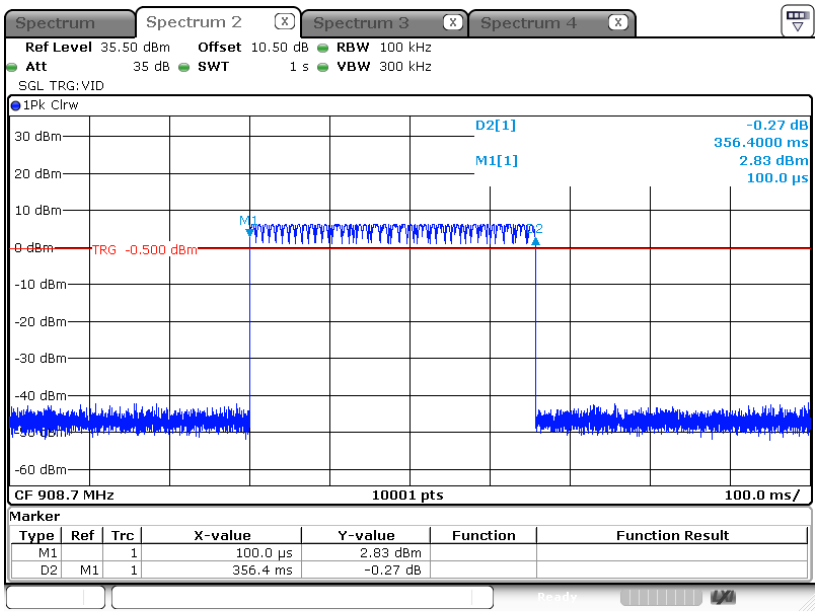
EUT operation mode: Transmitting

Test Result: Compliant. *Please refer to following table and plots.*

Mode	Frequency (MHz)	Pulse width (ms)	Hopping Number	Observation time(s)	Dwell Time (s)	Limit (s)	Result
Hopping	908.7	356.40	1	25.6	0.356	0.400	Pass

Note: A period time=0.4*64= 25.6(s), Dwell Time=Pulse Width*Hopping Number

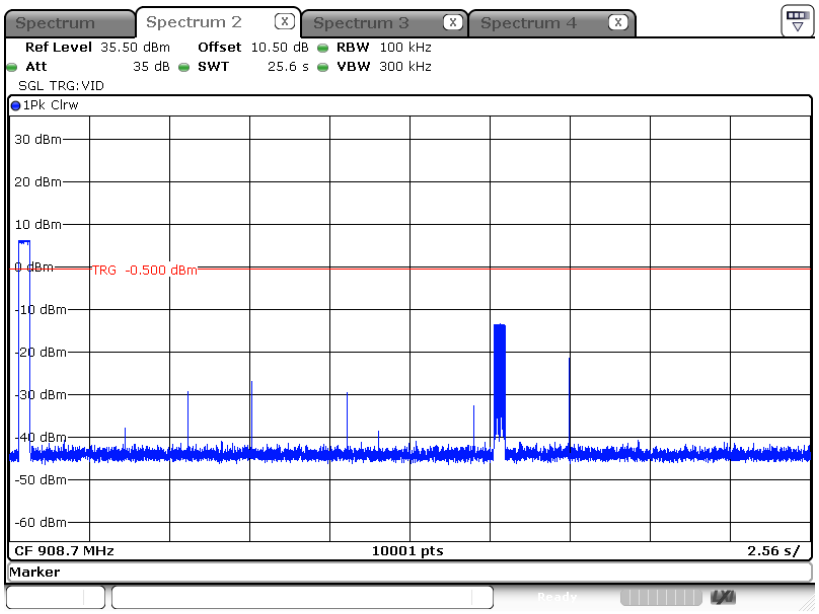
Pulse Width



ProjectNo.:2501Z01980E-RF Tester:Cheeb Huang

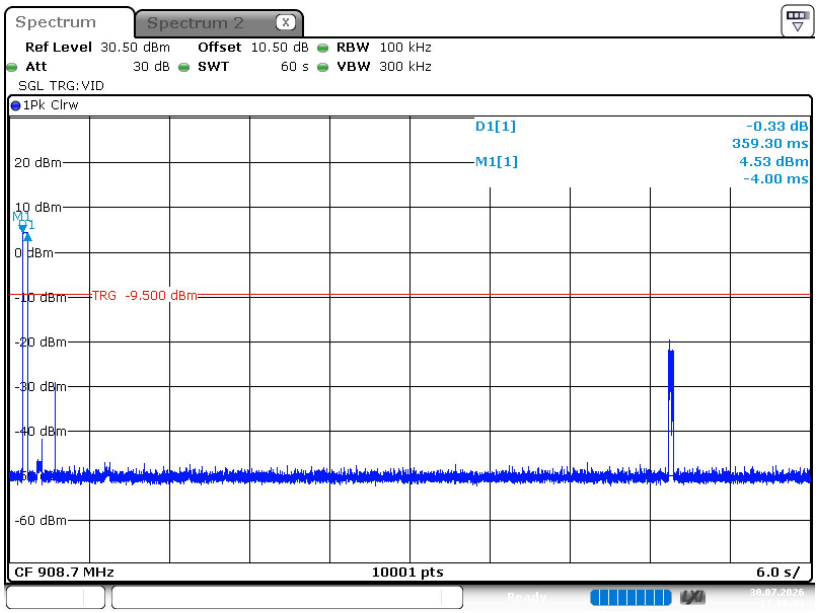
Date: 24.DEC.2025 16:19:31

Hopping Numbers in Observation time



ProjectNo.:2501Z01980E-RF Tester:Cheeb Huang

Date: 24.DEC.2025 16:25:15



ProjectNo.:2501Z01980E-RFTester:Barry Feng
Date: 30.JUL.2026 11:38:03

FCC §15.247(b) (3) & RSS-247 § 6.3.2 - MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

FCC §15.247(b) (3)
For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

According to RSS-247 §6.3.2 For DTS operating in the band 902-928 MHz, the maximum peak conducted output power shall not exceed 1W, and the e.i.r.p. shall not exceed 4 W.

Test Procedure

Test Method: ANSI C63.10-2020 Clause 11.9.1.1

The following procedure shall be used when an instrument with a resolution bandwidth that is greater than the DTS bandwidth is available to perform the measurement:

a) Set the RBW ≥ DTS bandwidth.

b) Set VBW ≥ [3 × RBW].

c) Set span ≥ [3 × RBW].

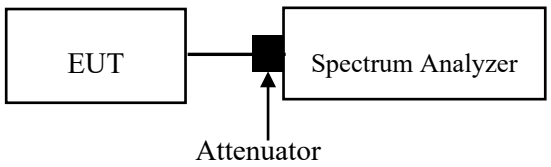
d) Sweep time = No faster than coupled (auto) time.

e) Detector = peak.

f) Trace mode = max-hold.

g) Allow trace to fully stabilize.

h) Use peak marker function to determine the peak amplitude level.



Note: A short RF cable with low cable loss connected to the EUT antenna port, which was provided by client or lab, the cable loss was add with offset into test equipment, the total offset consists of attenuator and/or RF cable loss

Test Data

Environmental Conditions

Temperature:	25.4 ℃
Relative Humidity:	47 %
ATM Pressure:	100.9 kPa

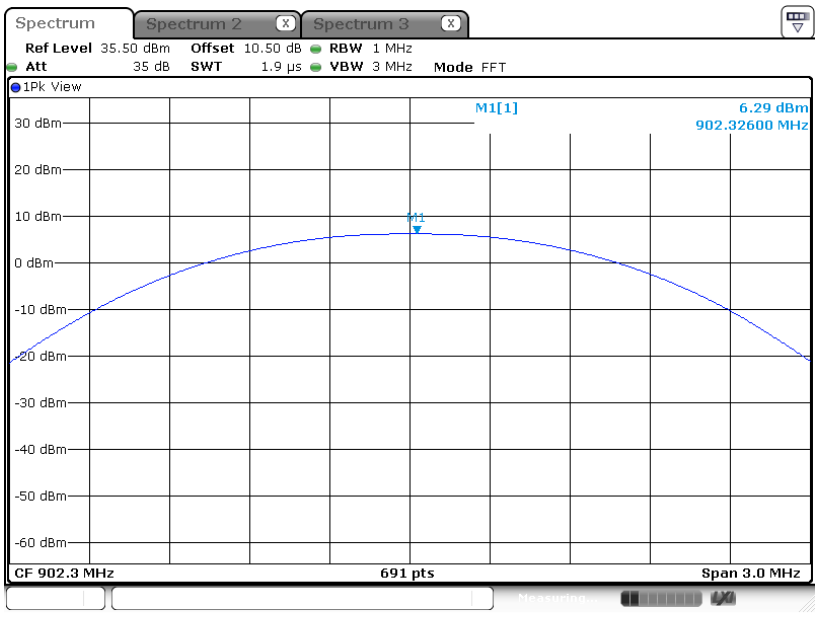
The testing was performed by Cheeb Huang on 2025-12-24.

EUT operation mode: Transmitting

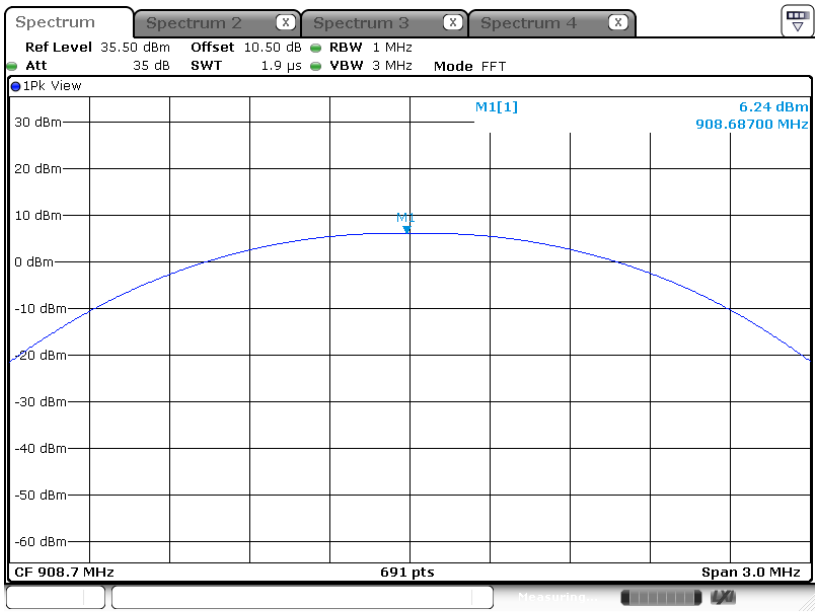
Test Result: Compliant. Please refer to the following table and plots.

Test Channel	Test Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)	Limit (dBm)	EIRP (dBm)	EIRP Limit_ IC (dBm)
Lowest	902.3	6.29	≤30	6.59	36
Middle	908.7	6.24	≤30	6.54	36
Highest	914.9	6.21	≤30	6.51	36

Low Channel

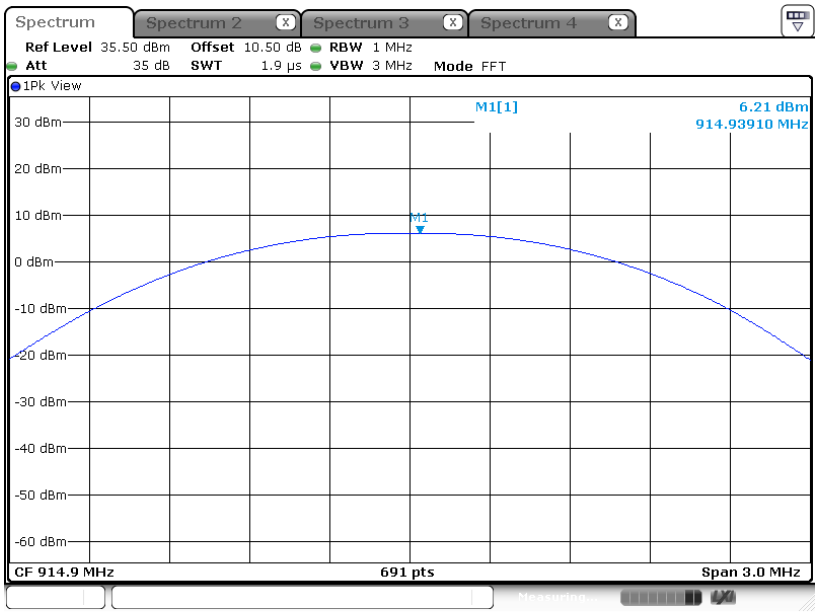


Middle Channel



ProjectNo.:2501Z01980E-RF Tester:Cheeb Huang
Date: 24.DEC.2025 15:02:36

High Channel



ProjectNo.:2501Z01980E-RF Tester:Cheeb Huang
Date: 24.DEC.2025 14:56:11

FCC §15.247(f)& RSS-247 §6.4 (a) - POWER SPECTRAL DENSITY

Applicable Standard

According to FCC §15.247(f):

For the purposes of this section, hybrid systems are those that employ a combination of both frequency hopping and digital modulation techniques. The frequency hopping operation of the hybrid system, with the direct sequence or digital modulation operation turned-off, shall have an average time of occupancy on any frequency not to exceed 0.4 seconds within a time period in seconds equal to the number of hopping frequencies employed multiplied by 0.4. The power spectral density conducted from the intentional radiator to the antenna due to the digital modulation operation of the hybrid system, with the frequency hopping operation turned off, shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

According to RSS-247 §6.4 (a):

The power spectral density requirements for digital modulation operation, when the frequency hopping operation is stopped, shall not exceed 8 dBm/3 kHz.

Test Procedure

Test Method: ANSI C63.10-2020 Clause 11.10.2

The following procedure shall be used if maximum peak conducted output power was used to determine compliance, and it is optional if the maximum conducted (average) output power was used to determine compliance:

a) Set analyzer center frequency to DTS channel center frequency.

b) Set the span >1.5 times the DTS bandwidth.

c) Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.

d) Set the VBW ≥ [3 × RBW].

e) Detector = peak.

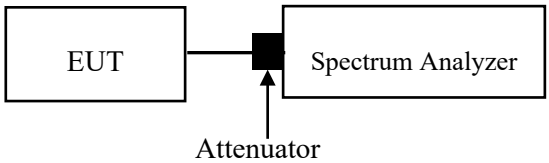
f) Sweep time = No faster than coupled (auto) time.

g) Trace mode = max-hold.

h) Allow trace to fully stabilize.

i) Use the peak marker function to determine the maximum amplitude level within the RBW.

j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.



Note: A short RF cable with low cable loss connected to the EUT antenna port, which was provided by client or lab, the cable loss was add with offset into test equipment, the total offset consists of attenuator and/or RF cable loss

Test Data

Environmental Conditions

Temperature:	25.4 °C
Relative Humidity:	47 %
ATM Pressure:	100.9 kPa

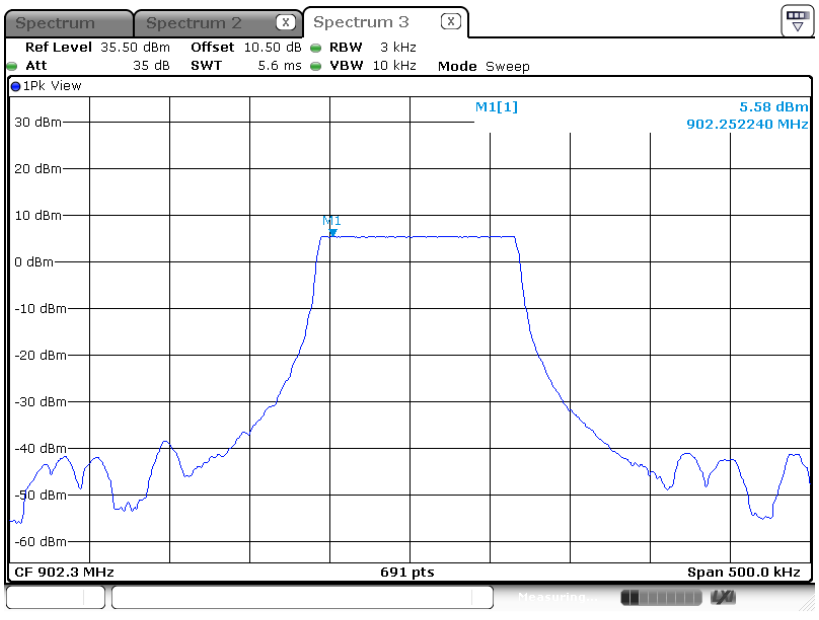
The testing was performed by Cheeb Huang on 2025-12-24.

EUT operation mode: Transmitting

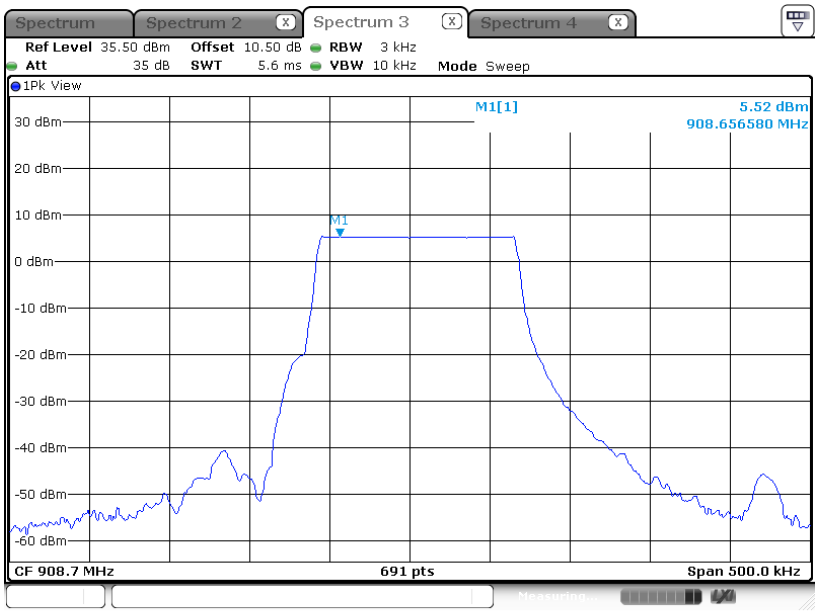
Test Result: Compliant. Please refer to the following table and plots.

Test Channel	Test Frequency (MHz)	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)
Low	902.3	5.58	≤8.00
Middle	908.7	5.52	≤8.00
High	914.9	5.40	≤8.00

Low Channel



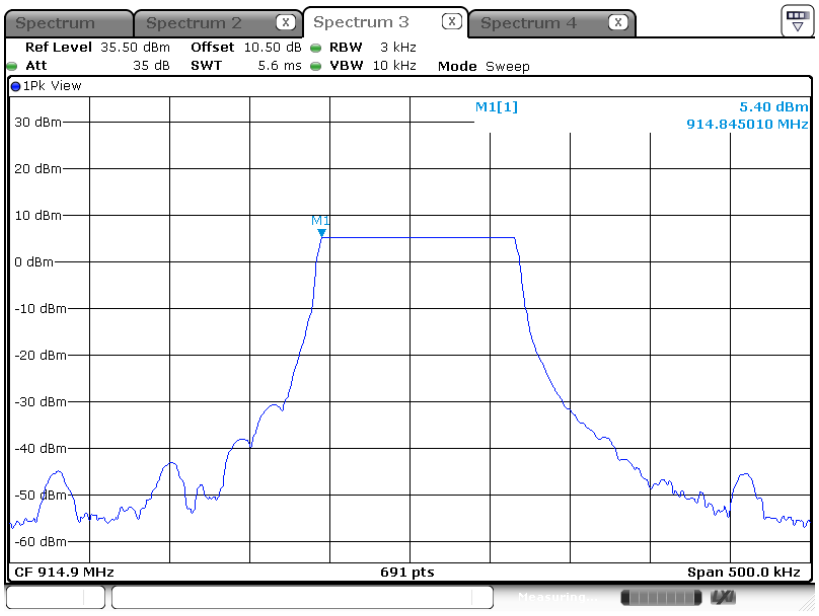
Middle Channel



ProjectNo.:2501Z01980E-RF Tester:Cheeb Huang

Date: 24.DEC.2025 15:03:34

High Channel



ProjectNo.:2501Z01980E-RF Tester:Cheeb Huang

Date: 24.DEC.2025 14:53:39

FCC §15.247(d) & RSS-247 § 6.6 - 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

According to FCC §15.247(d),
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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

According to RSS-247 § 6.6,
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device, or hybrid system is operating,, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 6.3.2, the attenuation required shall be 30 dB instead of 20dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

Test Procedure

Test Method: ANSI C63.10-2020 Clause 11.11.3

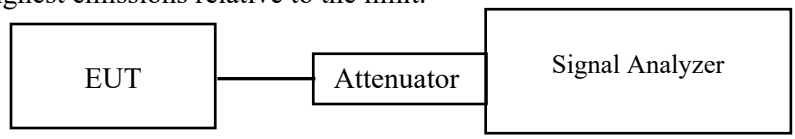
Establish an emission level by using the following procedure:

a) Set the center frequency and span to encompass frequency range to be measured. Note that the frequency range might need to be divided into multiple frequency ranges to retain frequency resolution.

NOTE—the number of points can also be increased for large spans to retain frequency resolution

b) Set the RBW = 100 kHz.
c) Set the VBW ≥ [3 × RBW].
d) Detector = peak.
e) Sweep time = No faster than coupled (auto) time.
f) Trace mode = max-hold.
g) Allow trace to fully stabilize.
h) Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.



Test Data

Environmental Conditions

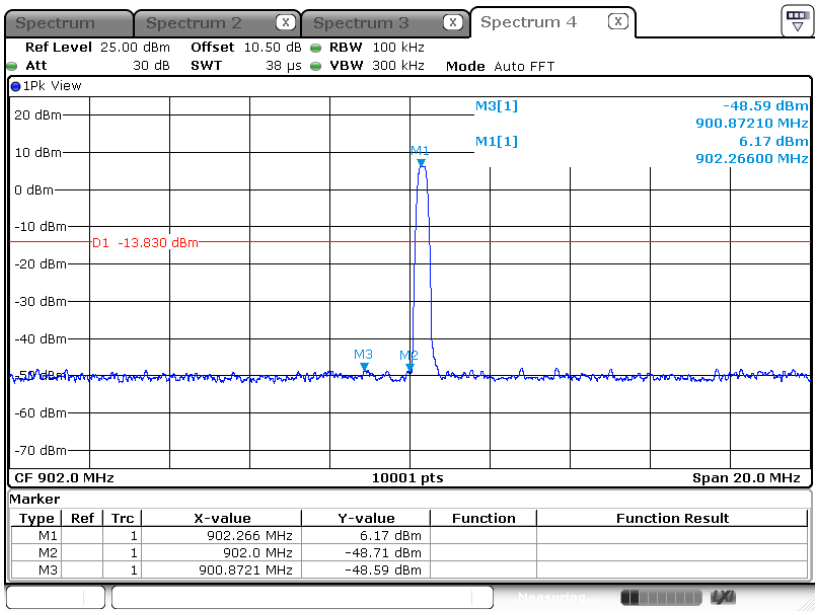
Temperature:	25.4 ℃
Relative Humidity:	47 %
ATM Pressure:	100.9 kPa

The testing was performed by Cheeb Huang on 2025-12-24.

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the following plots.

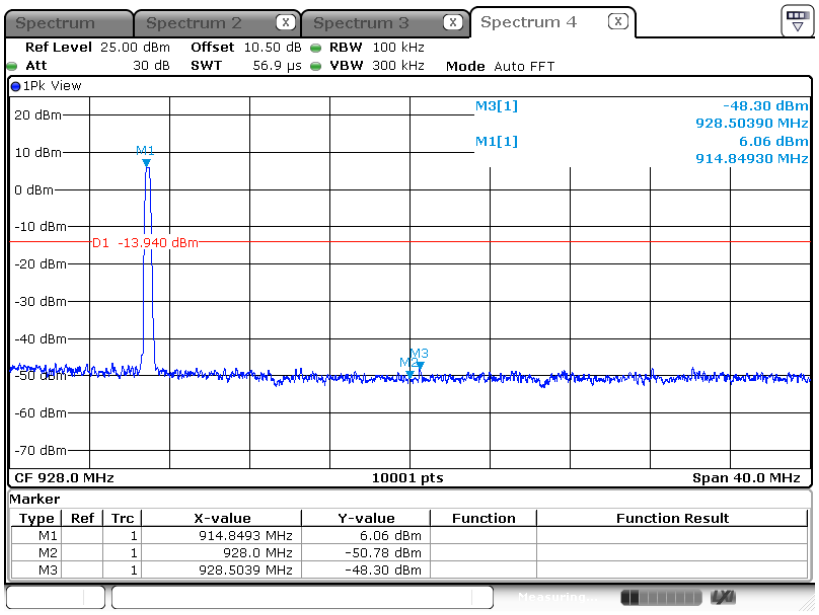
Single Mode Band Edge, Left Side



ProjectNo.:2501Z01980E-RF Tester:Cheeb Huang

Date: 24.DEC.2025 15:11:36

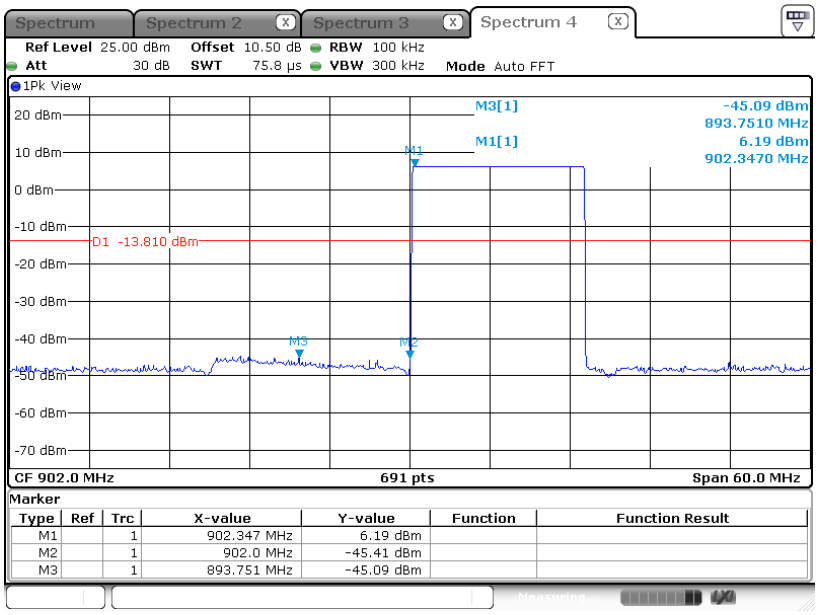
Single Mode Band Edge, Right Side



ProjectNo.:2501Z01980E-RF Tester:Cheeb Huang

Date: 24.DEC.2025 15:09:29

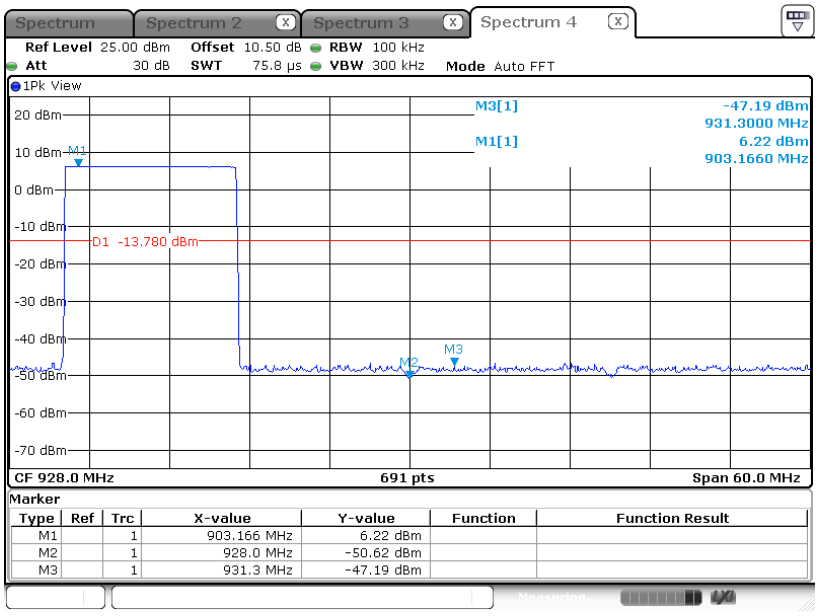
Hopping mode Band Edge, Left Side



ProjectNo.:2501Z01980E-RF Tester:Cheeb Huang

Date: 24.DEC.2025 15:48:42

Hopping mode Band Edge, Right Side



ProjectNo.:2501Z01980E-RF Tester:Cheeb Huang

Date: 24.DEC.2025 15:57:04

FCC §15.247(d) & RSS-247 §6.6 - CONDUCTED SPURIOUS EMISSION

Applicable Standard

According to FCC §15.247(d),
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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

According to RSS-247 § 6.6,
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device, or hybrid system is operating,, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 6.3.2, the attenuation required shall be 30 dB instead of 20dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

Test Procedure

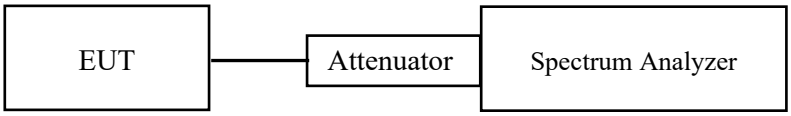
Test Method: ANSI C63.10-2020 Clause 11.11.3

Establish an emission level by using the following procedure:
a) Set the center frequency and span to encompass frequency range to be measured. Note that the frequency range might need to be divided into multiple frequency ranges to retain frequency resolution.

NOTE—the number of points can also be increased for large spans to retain frequency resolution

b) Set the RBW = 100 kHz.
c) Set the VBW ≥ [3 × RBW].
d) Detector = peak.
e) Sweep time = No faster than coupled (auto) time.
f) Trace mode = max-hold.
g) Allow trace to fully stabilize.
h) Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit



Note: the worst cable loss among the test frequency range was added into plots.

Test Data

Environmental Conditions

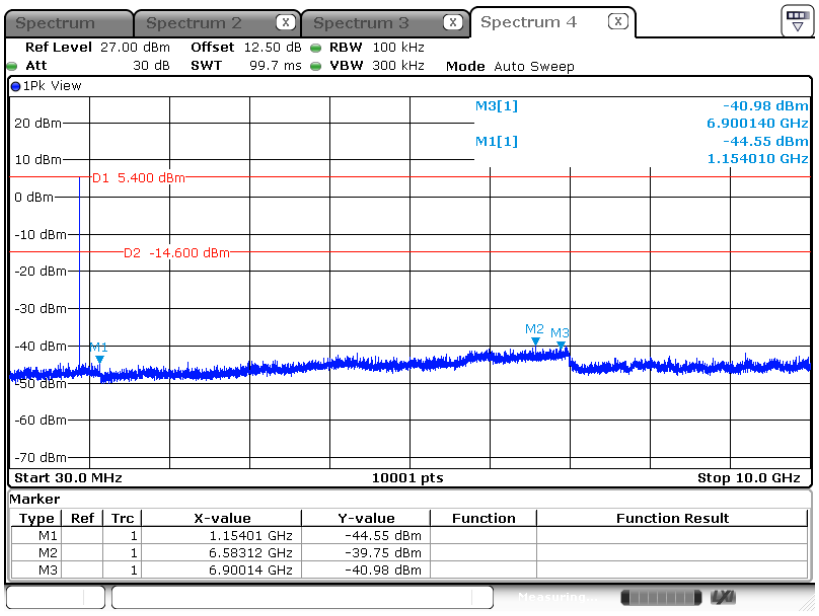
Temperature:	25.4 °C
Relative Humidity:	47 %
ATM Pressure:	100.9 kPa

The testing was performed by Cheeb Huang on 2025-12-24.

EUT operation mode: Transmitting

Test Result: Compliant

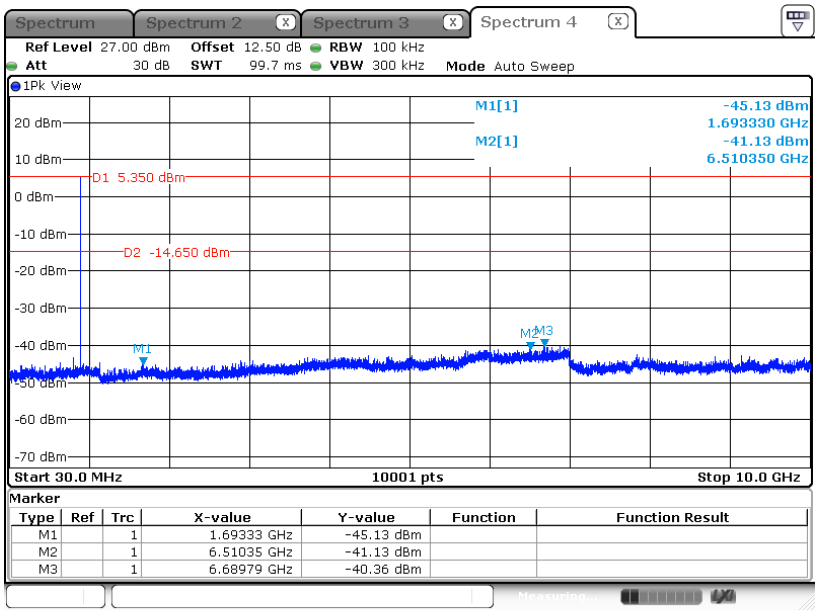
Low Channel



ProjectNo.:2501Z01980E-RF Tester:Cheeb Huang

Date: 24.DEC.2025 14:45:40

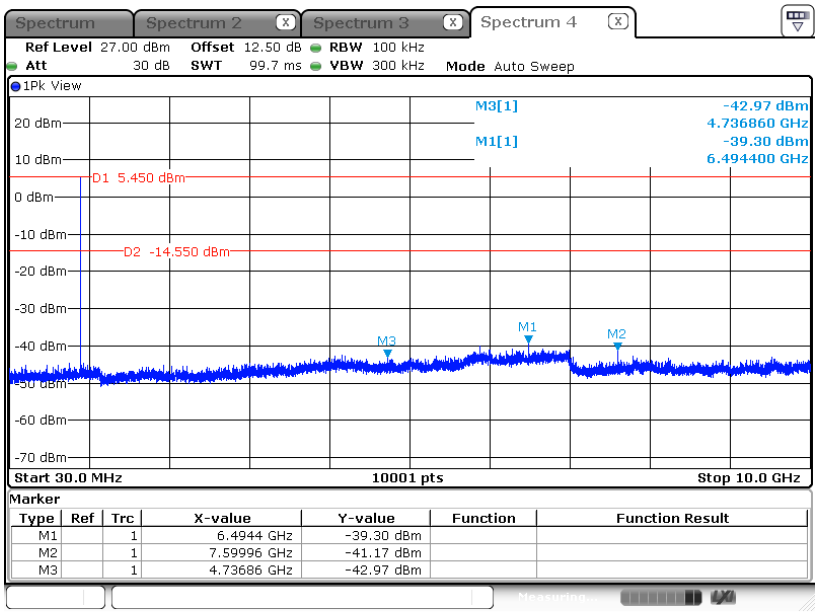
Middle Channel



ProjectNo.:2501Z01980E-RF Tester:Cheeb Huang

Date: 24.DEC.2025 14:48:39

High Channel



ProjectNo.:2501Z01980E-RF Tester:Cheeb Huang

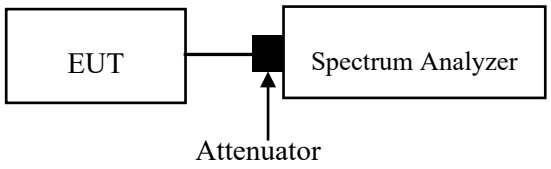
Date: 24.DEC.2025 14:51:02

C63.10 §11.6- DUTY CYCLE

Test Procedure

According to ANSI C63.10-2020 Section 11.6

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the ON and OFF times of the transmitted signal:
1) Set the center frequency of the instrument to the center frequency of the transmission.
2) Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value.
3) Set VBW ≥ RBW. Set detector = peak or average.
4) The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring the duty cycle shall not be used if T ≤ 16.7 μs.)



Test Data

Environmental Conditions

Temperature:	24.5 ℃
Relative Humidity:	45 %
ATM Pressure:	101.0 kPa

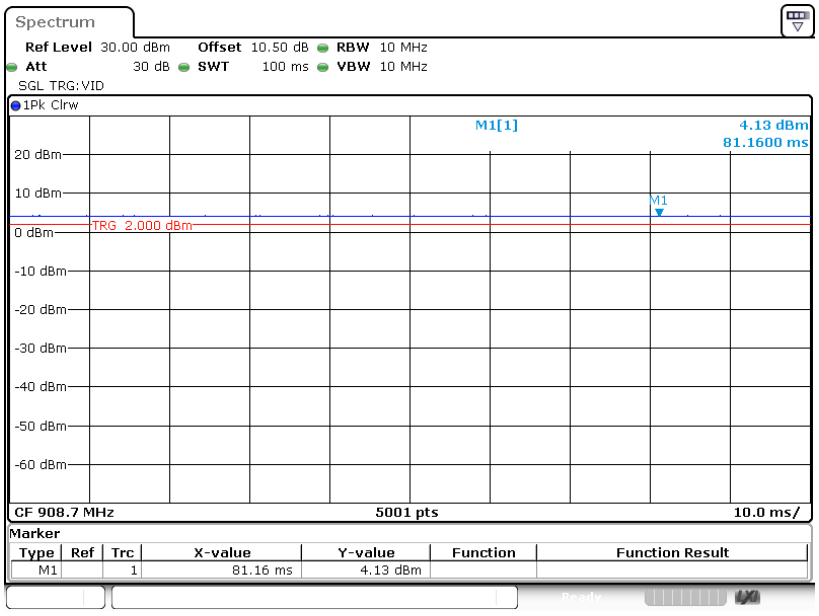
The testing was performed by Ethan Bu on 2026-06-18.

EUT operation mode: Transmitting

Test Result: Compliant.

Test Frequency (MHz)	Ton (ms)	Ton+off (ms)	Duty cycle (%)	$1/T_{on}$ (Hz)	VBW Setting (Hz)
908.7	100	100	100.00	/	10

Middle Channel



ProjectNo.:2501Z01980E-RF Tester:Ethan Bu

Date: 18.JUN.2026 18:30:46

EUT PHOTOGRAPHS

Please refer to the attachment 2501Z01980E-RF-EXP External photo and 2501Z01980E-RF-INP Internal photo.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment 2501Z01980E-RF-TSP Test Setup photo.

******* END OF REPORT *******