FCC PART 15.247
RSS-GEN ISSUE 5, FEBRUARY 2021 AMENDMENT2
RSS-247 ISSUE 3, AUGUST 2023

TEST REPORT

For

FCC: Xiamen Milesight IoT Co., Ltd.

Building C09, Software Park Phase III, Xiamen 361024, Fujian, China

IC: Xiamen Milesight IoT Co., Ltd.

Building C09, Software Park Phase III, Xiamen Fujian 361024 China

FCC ID: 2AYHY-WT201V2
IC: 27737-WT201V2

Report Type:	**Product Name:**
Original Report	Smart Thermostat

Report Number:	2507P40548E-RF-01
Report Date:	2025-03-03
Reviewed By:	Ash Lin
Approved By:	Miles Chen
Prepared By:	Bay Area Compliance Laboratories Corp. (Xiamen) Unit 102, No. 902 Meifeng South Road, Binhai West Avenue, Science and Technology Innovation Park, Torch High tech Zone XiaMen Tel: + 86-592-3200111 www.baclcorp.com.cn

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REPORT REVISION HISTORY

Number of Revisions	Report No.	Version	Issue Date	Description
0	2507P40548E-RF-01	R1V1	2025-03-03	Initial Release

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product Name:	Smart Thermostat
Tested Model:	WT201-868M/915M
Multiple Model(s):	NN201-868M/915M
Trade mark:	Milesight
HVIN:	WT201-868M/915M, NN201-868M/915M
Power Supply:	AC 24V
Maximum Conducted Output Power:	6.49dBm
Operating Band/Frequency:	902-928MHz
Modulation Type:	CSS
Antenna Type:	PCB
★Maximum Antenna Gain:	1.46dBi
EUT Received Status	Good

Note:
1. The Maximum Antenna Gain was declared by manufacturer.
2. The difference between tested model and series model is outer packaging and appearance logo, please refer to declaration letter for more detail.
3. All measurement and test data in this report was gathered from production sample serial number: 2X29-2 (Assigned by the BACL (Xiamen). The EUT supplied by the applicant was received on 2025-01-06)

Objective

This test report is prepared for *Xiamen Milesight IoT Co., Ltd.* in accordance with:
RSS-247 Issue 3, August 2023 and RSS-Gen, Issue 5, February 2021 Amendment 2 of the Innovation, Science and Economic Development Canada.

And Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission's rules.
The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Test Methodology

All tests and measurements indicated in this document were performed in accordance with RSS-247 Issue 3, August 2023 of the Innovation, Science and Economic Development Canada & RSS-Gen, Issue 5, February 2021 Amendment 2: General Requirements for Compliance of Radio Apparatus & ANSI C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices. And KDB 558074 D01 15.247 Meas Guidance v05r02.

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

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Xiamen) to collect test data is located on the Unit 102, No. 902 Meifeng South Road, Binhai West Avenue, Science and Technology Innovation Park, Torch High tech Zone XiaMen.

Bay Area Compliance Laboratories Corp. (Xiamen) Lab is accredited to ISO/IEC 17025 by A2LA (Certificate Number: 7134.01) and the lab has been recognized as the IC accredited lab under the KDB 974614 D01, the IC Designation No. : CN0176.

Measurement Uncertainty

Item		U_{lab}
Radiated Emission	9kHz-30MHz	2.59 dB
	30MHz~200MHz	4.38 dB
	200MHz ~1GHz	4.50 dB
	1GHz~6GHz	4.58 dB
	6GHz-18GHz	5.43 dB
AC Power Lines Conducted Emissions	150kHz-30MHz	2.33 dB
Occupied Channel Bandwidth		0.053 kHz
Transmitter Conducted Power(Conducted RF power)		±0.624 dB
Temperature		±1℃
Humidity		±5%
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.

SYSTEM TEST CONFIGURATION

Test Mode and Voltage

The system was configured for testing in a typical mode (as normally used by a typical user).	
Test mode:	Test mode 1: Transmitting
Test voltage:	Test mode 1: AC 24V from adapter (AC 120V/60Hz)
Remark:	During all emission tests, the EUT was configured to measure its highest possible emission level and the worst case's test data was presented in this test report.

Description of Test Configuration

Channel list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	902.3	65	915.2
2	902.5	66	915.4
…	…	…	…
…	…	…	…
63	914.7	127	927.6
64	914.9	/	/

EUT was tested with Channel 1, 64 and 127.
The EUT is a hybrid system.

★EUT Exercise Software

RF Test Tool: certificationTools

Mode	Power level		
	Low channel	Middle channel	High channel
FHSS	**12**	**12**	**12**

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

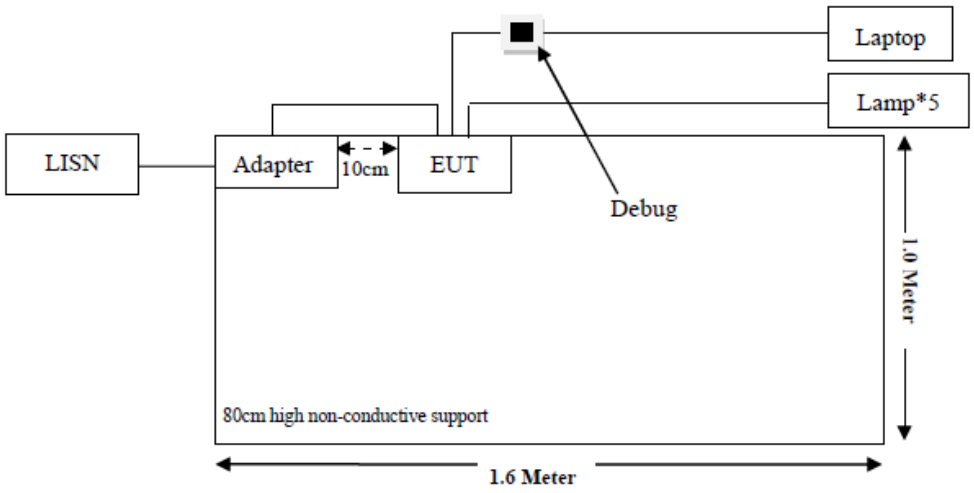
Manufacturer	Description	Model	Serial Number
Lenovo	Laptop	T480	PF1P5K4F
Unknown	Debug	Unknown	Unknown
MaCable	AC ADAPTOR	MKAC-66-243000U	Unknown
Unknow	signal indicator lamp	AD16-22DS	Unknown

External I/O Cable

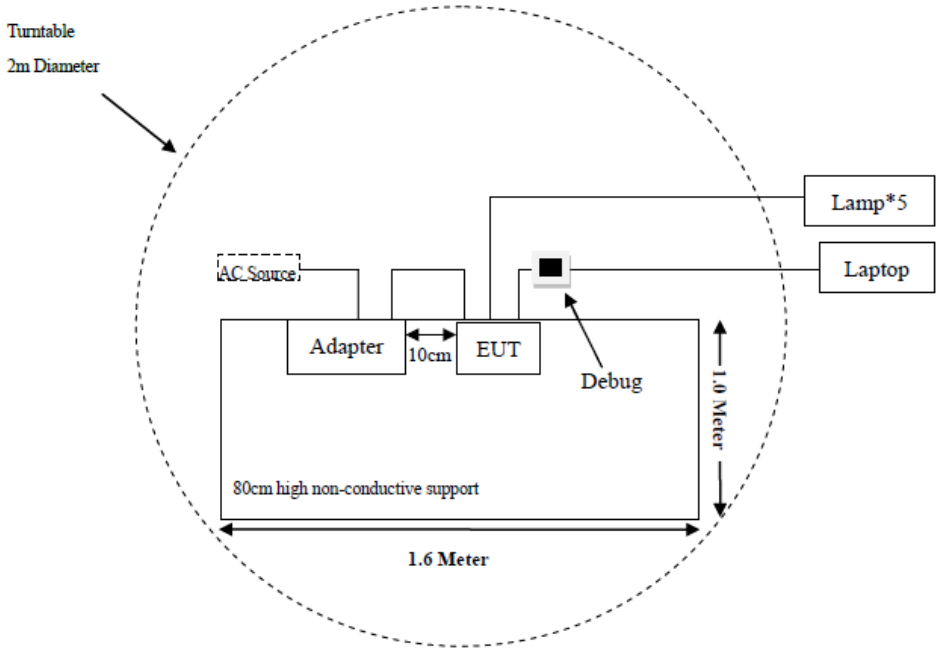
Cable Description	Length (m)	From Port	To
Cable	0.5	EUT	Debug
USB Cable	10	Debug	Laptop
Cable	10	EUT	Signal indicator lamp
Power Cable	1.5	EUT	Adapter

Block Diagram of Test Setup

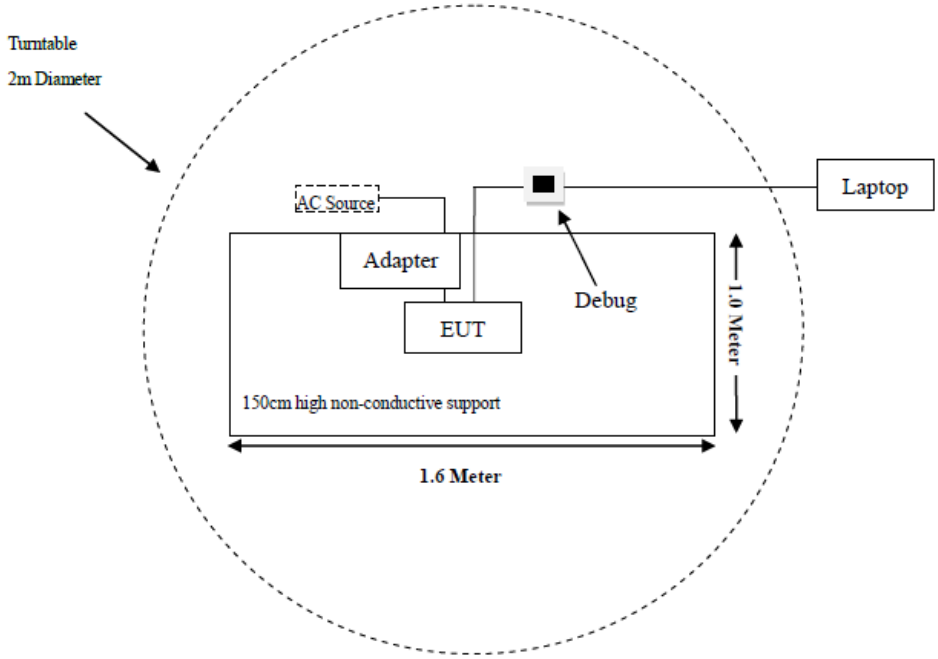
Conducted Emission:



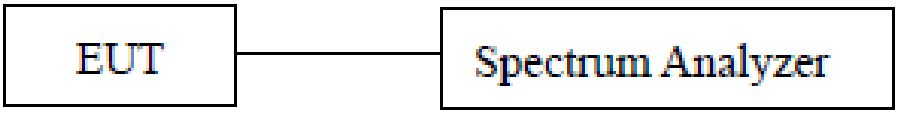
Radiated Emission：
Below 1GHz



Above 1GHz:



RF Conduction:



Note: The cable assembly insertion loss of 0.5dB was entered as an offset in the spectrum analyzer. (Actual cable loss was unavailable at the time of testing, therefore loss of 0.5dB was assumed as worst case.) This was later verified to be true by laboratory.

SUMMARY OF TEST RESULTS

Standard(s)/Rule(s)	Description of Test	Result
FCC §15.207(a) RSS-Gen Clause 8.8	AC line conducted emissions	Compliant
FCC §15.205, §15.209, §15.247(d) RSS-Gen Clause 8.10 RSS-247 Clause 5.5	Radiated Spurious Emissions & Radiated Bands Emissions	Compliant
FCC §15.247(a)(1)(i) RSS-247 Clause 5.1 c)	20 dB Emission bandwidth	Compliant
RSS-Gen Clause 6.7	99% Occupied Bandwidth	Compliant
FCC §15.247(a)(1) RSS-247 Clause 5.1 b)	Channel separation	Compliant
FCC §15.247(a)(1)(i) RSS-247 Clause 5.1 c)	Number of hopping Frequency	Compliant
FCC §15.247(f) RSS-247 Clause 5.3 a)	Time of occupancy (dwell time)	Compliant
FCC §15.247(b)(2) RSS-247 Clause 5.4 a)	Maximum Conducted output power	Compliant
FCC §15.247(d) RSS-247 Clause 5.5	100 kHz Bandwidth of Frequency Band Edge	Compliant
FCC §15.203 RSS-Gen Clause 6.8	Antenna Requirement	Compliant
FCC §15.247(f) RSS-247 Clause 5.3 a)	Power spectral density	Compliant

TEST EQUIPMENT LIST

Test Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions					
EMI Test Receiver	Rohde & Schwarz	ESR	103105	2024/03/29	2025/03/28
LISN	Rohde & Schwarz	ENV216	100129	2024/03/29	2025/03/28
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	0357.8810.54	2024/03/29	2025/03/28
Coaxial Cable	XINHANGWEIBO	XH400T-N-4M	CC001	2024/03/29	2025/03/28
Test Software	Audix	E3	18621a	N/A	N/A
Radiated Emissions Below 1 GHz					
EMI Test Receiver	Rohde & Schwarz	ESR	103103	2024/03/29	2025/03/28
Antenna	Sunol Sciences	JB6	A122022-5	2023/07/27	2026/07/26
Loop Antenna	Rohde & Schwarz	HFH2-Z2	830749/001	2023/07/27	2026/07/26
Amplifier	Sonoma	310B	120903	2024/03/29	2025/03/28
Band-Reject Filter	HX Microwave	HXLBQ-DZA05	24091101-1	2024/10/12	2025/10/11
Coaxial Cable	XINHANGWEIBO	XH400T-N-4M	CC002	2024/03/29	2025/03/28
Coaxial Cable	XINHANGWEIBO	XH460B-N-2M	CC006	2024/03/29	2025/03/28
Coaxial Cable	XINHANGWEIBO	XH460B-N-12M	CC007	2024/03/29	2025/03/28
Coaxial Cable	XINHANGWEIBO	HFH2-CC	335.3609	2024/03/29	2025/03/28
Test Software	Audix	E3	18621a	N/A	N/A
Radiated Emissions Above 1 GHz					
Spectrum Analyzer	Rohde & Schwarz	FSV40-N	102051	2024/03/29	2025/03/28
Multiplex Switch Test Control Set	Decentest	DT7220SCU	DS79901	2024/02/23	2025/02/22
Filter Switch Unit	Decentest	DT7220FSU	DS79904	2024/02/23	2025/02/22
Band-Reject Filter	HX Microwave	HXLBQ-DZA05	24091101-1	2024/10/12	2025/10/11
Horn Aantenna	EMCO	3115	9002-3355	2024/11/19	2027/11/18
Preamplifier	A.H.Systems	PAM-0118P	489	2024/03/29	2025/03/28
Coaxial Cable	XINHANGWEIBO	XH800A-N-6M	CC003	2024/03/29	2025/03/28
Coaxial Cable	XINHANGWEIBO	XH800A-N-1M	CC005	2024/03/29	2025/03/28
Test Software	Audix	E3	18621a	N/A	N/A
RF Conducted Test					
Spectrum Analyzer	Rohde & Schwarz	FSV40-N	102051	2024/03/29	2025/03/28
Coaxial Cable	N/A	N/A	N/A	Each time	N/A

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

FCC §15.207(a) & RSS-Gen Clause 8.8 - AC LINE CONDUCTED EMISSIONS

Applicable Standard

According to FCC §15.207(a)

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

	Conducted limit (dBμV)	
Frequency of emission (MHz)	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

(b) The limit shown in paragraph (a) of this section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

(1) For carrier current system containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.
(2) For all other carrier current systems: 1000 μV within the frequency band 535-1705 kHz, as measured using a 50 μH/50 ohms LISN.
(3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits in §15.205, §15.209, §15.221, §15.223, or §15.227, as appropriate.

(c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provisions for, the use of battery chargers which permit operating while charging, AC adapters or battery eliminators or that connect to the AC power lines indirectly, obtainig their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

According to RSS-Gen Clause 8.8

Unless stated otherwise in the applicable RSS, for radio apparatus that are designed to be connected to the public utility AC power network, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the range 150 kHz to 30 MHz shall not exceed the limits in table 4, as measured using a 50 μH / 50 Ω line impedance stabilization network. This requirement applies for the radio frequency voltage measured between each power line and the ground terminal of each AC power-line mains cable of the EUT.

For an EUT that connects to the AC power lines indirectly, through another device, the requirement for compliance with the limits in table 4 shall apply at the terminals of the AC power-line mains cable of a representative support device, while it provides power to the EUT. The lower limit applies at the boundary between the frequency ranges. The device used to power the EUT shall be representative of typical applications.

Table 4 – AC power-line conducted emissions limits

Frequency (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56[1]	56 to 46[1]
0.5 – 5	56	46
5 – 30	60	50

Note 1: The level decreases linearly with the logarithm of the frequency.

For an EUT with a permanent or detachable antenna operating between 150 kHz and 30 MHz, the AC power-line conducted emissions must be measured using the following configurations:
(a) Perform the AC power-line conducted emissions test with the antenna connected to determine compliance with the limits of table 4 outside the transmitter's fundamental emission band.

(b) Retest with a dummy load instead of the antenna to determine compliance with the limits of table 4 within the transmitter's fundamental emission band. For a detachable antenna, remove the antenna and connect a suitable dummy load to the antenna connector. For a permanent antenna, remove the antenna and terminate the RF output with a dummy load or network that simulates the antenna in the fundamental frequency band.

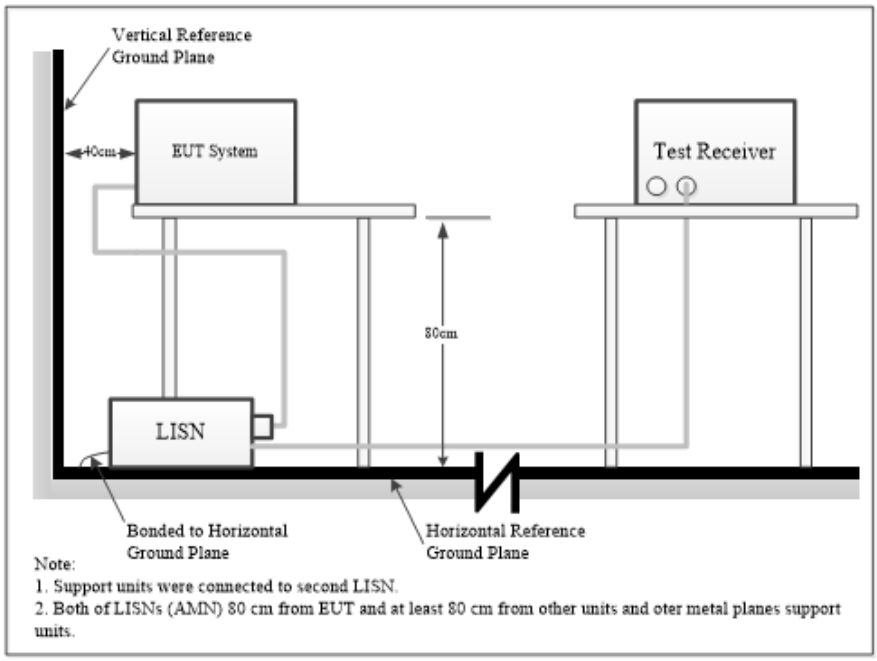
EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test System Setup



The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the RSS-Gen limits and FCC Part 15.207.

The spacing between the peripherals was 10 cm.

The adapter or EUT was connected to the main LISN with a 120 V/60 Hz AC power source.

Test Procedure

The frequency and amplitude of the six highest ac power-line conducted emissions relative to the limit, measured over all the current-carrying conductors of the EUT power cords, and the operating frequency or frequency to which the EUT is tuned (if appropriate), should be reported, unless such emissions are more than 20 dB below the limit. AC power-line conducted emissions measurements are to be separately carried out only on each of the phase ("hot") line(s) and (if used) on the neutral line(s), but not on the ground [protective earth] line(s). If less than six emission frequencies are within 20 dB of the limit, then the noise level of the measuring instrument at representative frequencies should be reported. The specific conductor of the power-line cord for each of the reported emissions should be identified. Measure the six highest emissions with respect to the limit on each current-carrying conductor of each power cord associated with the EUT (but not the power cords of associated or peripheral equipment that are part of the test configuration). Then, report the six highest emissions with respect to the limit from among all the measurements identifying the frequency and specific current-carrying conductor identified with the emission. The six highest emissions should be reported for each of the current-carrying conductors, or the six highest emissions may be reported over all the current-carrying conductors.

Result &Margin Calculation

The Result is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation from the Meter Reading. The basic equation is as follows:

Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)
Result (dBμV) = Reading (dBμV) + Factor (dB)

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

Margin (dB) = Limit (dBμV) –Result (dBμV)

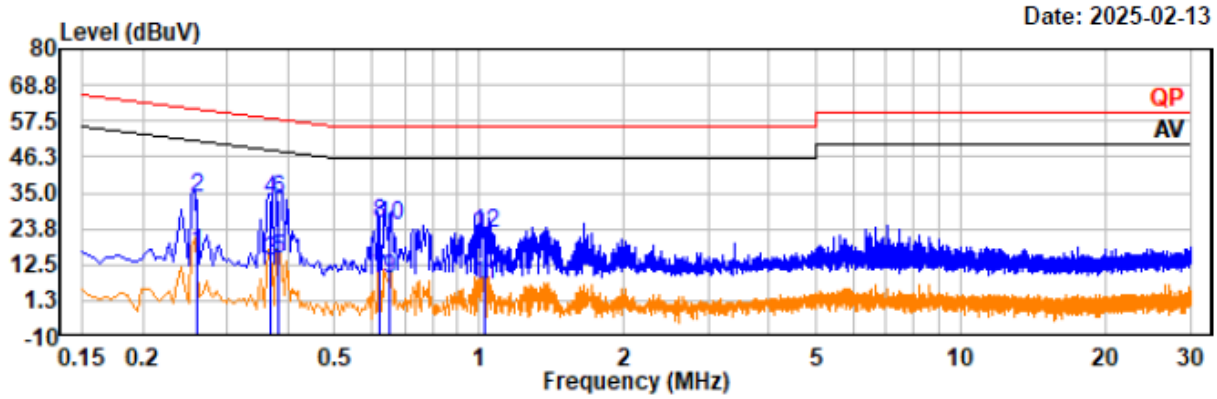
Test Data

Temperature:	23.7℃
Relative Humidity:	50%
ATM Pressure:	100.4kPa
Test Date:	2025-02-13
Test Engineer:	Spike Gao

EUT operation mode: Transmitting in the high channel (927.6MHz)(worst case)

Project No.: 2507P40548E-RF
Test Mode: 125K 927.6MHz
EUT Model: WT201-868M/915M

Temp/Humi/ATM: 23.7℃/50%/100.4kPa
Tested by: Spike Gao
Power Source: AC 24V from adapter(AC 120V/60Hz)

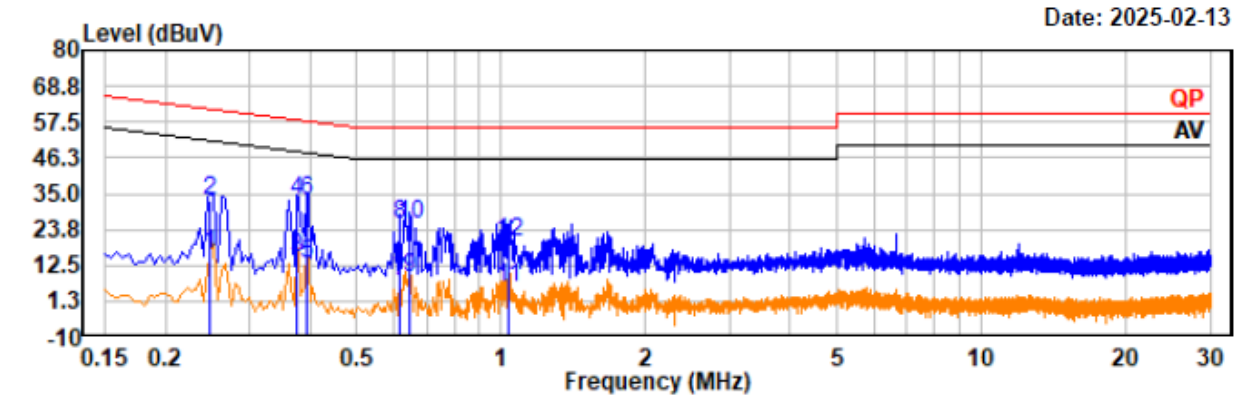


Trace: 1
Condition: QP RBW:9kHz
AV RBW:9kHz

Freq MHz	Reading dBuV	Factor dB	Result dBuV	Limit dBuV	Margin dB	Phase	Remark
0.26	-4.09	19.95	15.86	51.41	35.55	Line	Average
0.26	13.45	19.95	33.40	61.41	28.01	Line	QP
0.37	-5.95	19.81	13.86	48.54	34.68	Line	Average
0.37	12.72	19.81	32.53	58.54	26.01	Line	QP
0.38	-5.58	19.80	14.22	48.20	33.98	Line	Average
0.38	12.96	19.80	32.76	58.20	25.44	Line	QP
0.62	-11.21	19.44	8.23	46.00	37.77	Line	Average
0.62	5.91	19.44	25.35	56.00	30.65	Line	QP
0.65	-11.65	19.38	7.73	46.00	38.27	Line	Average
0.65	5.32	19.38	24.70	56.00	31.30	Line	QP
1.03	-13.61	19.51	5.90	46.00	40.10	Line	Average
1.03	3.06	19.51	22.57	56.00	33.43	Line	QP

Project No.: 2507P40548E-RF
Test Mode: 125K 927.6MHz
EUT Model: WT201-868M/915M

Temp/Humi/ATM: 23.7℃/50%/100.4kPa
Tested by: Spike Gao
Power Source: AC 24V from adapter(AC 120V/60Hz)



Trace: 1
Condition: QP RBW:9kHz
AV RBW:9kHz

Freq MHz	Reading dBuV	Factor dB	Result dBuV	Limit dBuV	Margin dB	Phase	Remark
0.25	-3.36	19.49	16.13	51.86	35.73	Neutral	Average
0.25	13.38	19.49	32.87	61.86	28.99	Neutral	QP
0.37	-4.82	19.55	14.73	48.41	33.68	Neutral	Average
0.37	13.03	19.55	32.58	58.41	25.83	Neutral	QP
0.39	-6.59	19.55	12.96	47.97	35.01	Neutral	Average
0.39	13.21	19.55	32.76	57.97	25.21	Neutral	QP
0.62	-11.69	19.23	7.54	46.00	38.46	Neutral	Average
0.62	5.85	19.23	25.08	56.00	30.92	Neutral	QP
0.64	-10.55	19.15	8.60	46.00	37.40	Neutral	Average
0.64	6.47	19.15	25.62	56.00	30.38	Neutral	QP
1.04	-13.94	19.42	5.48	46.00	40.52	Neutral	Average
1.04	0.61	19.42	20.03	56.00	35.97	Neutral	QP

FCC §15.205, §15.209, §15.247(d) & RSS-Gen Clause 8.10, RSS-247 Clause 5.5 - RADIATION SPURIOUS EMISSIONS

Applicable Standard

According to FCC §15.205, §15.209, §15.247(d)

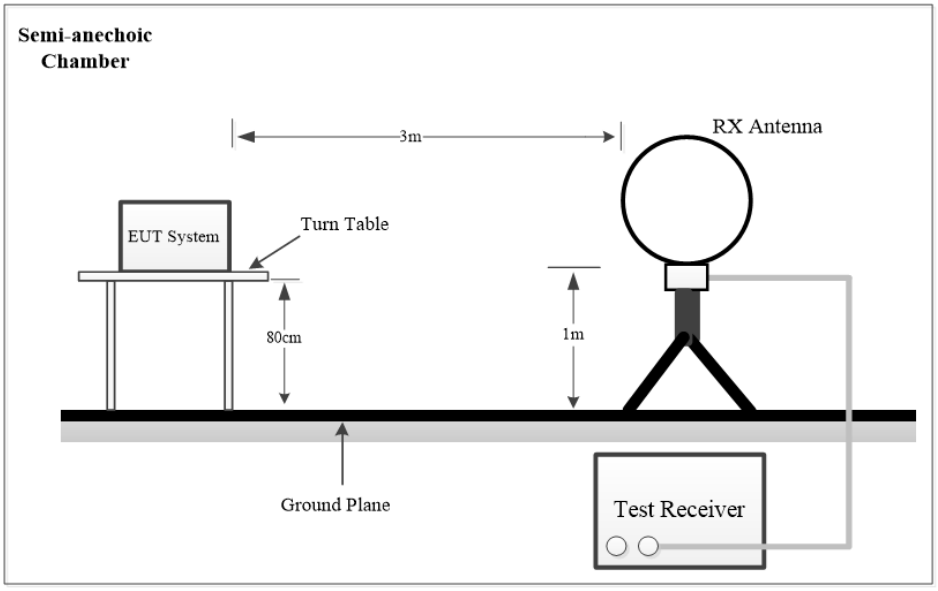
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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 Clause 5.5

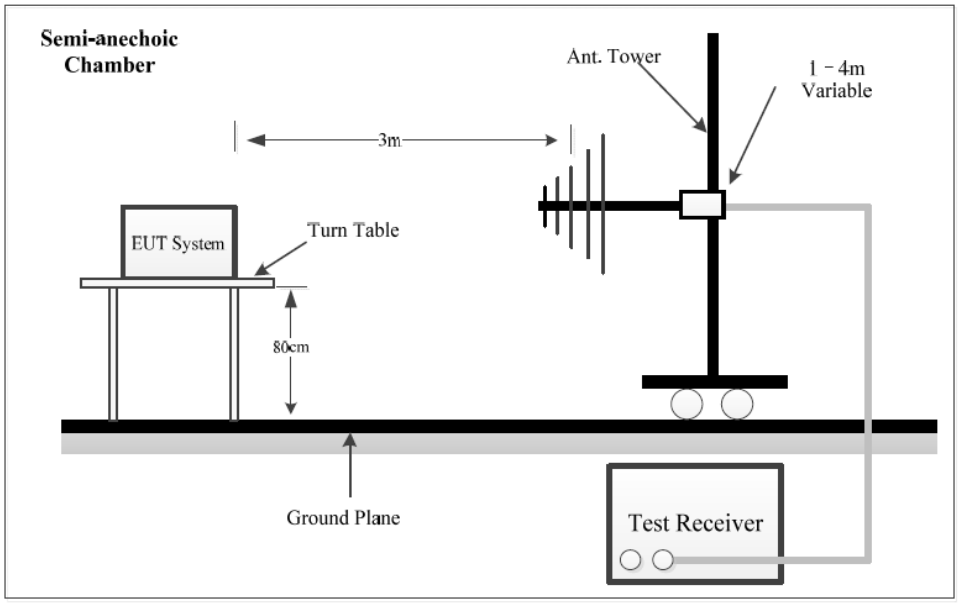
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either 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 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

EUT Setup

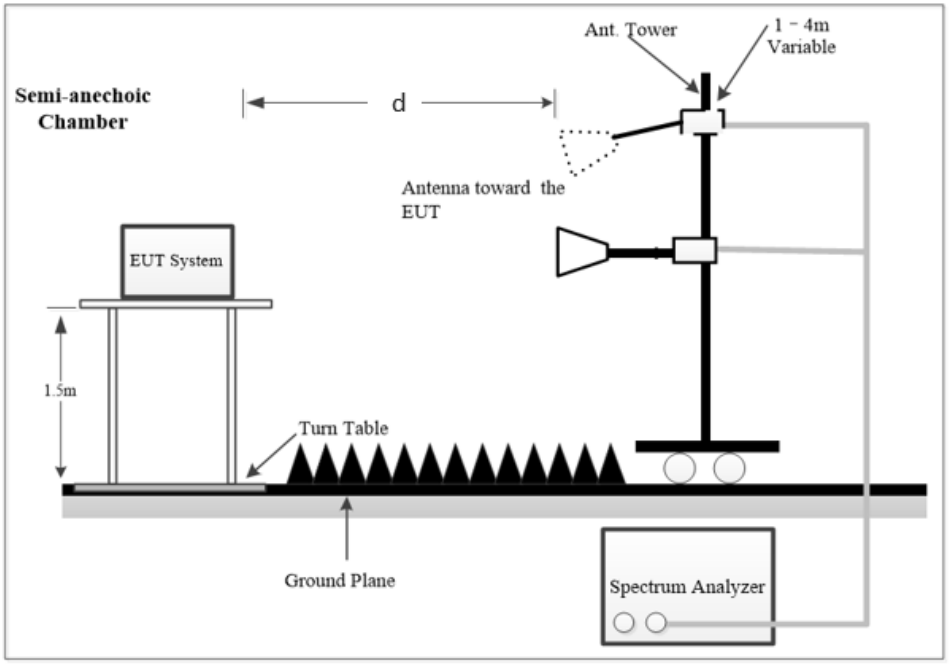
9 kHz-30MHz:



Below 1GHz:



Above 1GHz:



The radiated emissions were performed in the 3 meters distance, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, FCC 15.247 and RSS-247, RSS-Gen limits.

NOTE: d is testing distance:

For Radiated Emission test (1GHz-10GHz), which was performed at 3 m distance.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 9 kHz to 10 GHz.

During the radiated emission test, the EMI Test Receiver & Spectrum Analyzer Setup was set with the following configurations:

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

1GHz~10GHz:
Pre-scan:

Measurement	RBW	Video B/W
PK	1MHz	3MHz
Ave.	1MHz	5kHz

Final measurement for emission identified during the pre-scan:

Measurement	RBW	Video B/W
PK	1MHz	3MHz
Ave.	1MHz	10Hz

Test Procedure

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

For each measurement antenna alignment, the EUT shall be rotated through 0°to 360°on a turntable. 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, then the following statement shall be made: “all emissions were greater than 20 dB below the limit.”

Below 1GHz, if the measured peak level of the emissions that the measuring receiver reading level plus corrected factor is at least 6 dB below the QP emission limit, there's no need to record the measured QP level of the emissions in the report.

Above 1GHz, if the measured peak level of the emissions that the measuring receiver reading level plus corrected factor is below the AV emission limit, there's no need to record the measured AV level of the emissions in the report.

Result &Margin Calculation

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

For 9 kHz to 10GHz Radiated emission test
Factor (dB/m) =Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB)

Result (dBμV/m) = Reading (dBμV) + Factor (dB/m)

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

Margin (dB) = Limit (dBμV/m) –Result (dBμV/m)

Test Data

Please refer to the below table and plots.

Frequency Range:	Below 1 GHz	Above 1 GHz
Temperature:	23.1℃	23.1℃
Relative Humidity:	52 %	52 %
ATM Pressure:	100.2kPa	100.2kPa
Test Date:	2025-02-17	2025-02-17
Test Engineer:	Wlif Wu	Wlif Wu

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

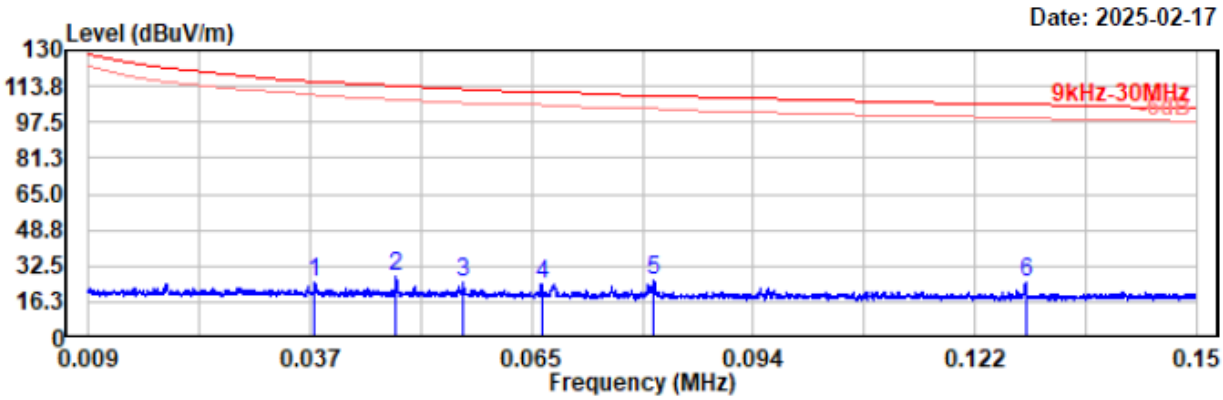
1)9 kHz-30MHz

Pre-scan in parallel, ground-parallel and perpendicular of orientation of loop antenna, parallel is worst case.

EUT operation mode: Transmitting in the high channel 927.6MHz (worst case)

Project No.: 2507P40548E-RF
Test Mode: 125K 927.6MHz
EUT Model: WT201-868M/915M
Test distance: 3m

Temp/Humi/ATM: 23.1℃/52%/100.2kPa
Tested by: Wlif Wu
Power Source: AC 24V from adapter(AC 120V/60Hz)

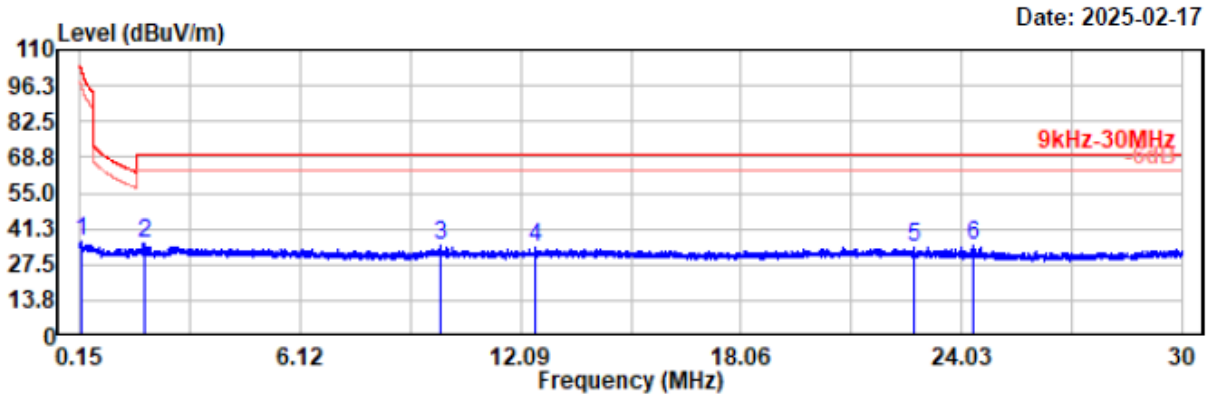


Condition: PK RBW:300Hz VBW:1kHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Remark
0.038	5.30	19.91	25.21	116.07	90.86	Peak
0.048	7.47	19.91	27.38	113.96	86.58	Peak
0.057	5.25	19.91	25.16	112.54	87.38	Peak
0.067	4.80	19.84	24.64	111.12	86.48	Peak
0.081	6.02	19.72	25.74	109.44	83.70	Peak
0.128	4.93	19.73	24.66	105.45	80.79	Peak

Project No.: 2507P40548E-RF
Test Mode: 125K 927.6MHz
EUT Model: WT201-868M/915M
Test distance: 3m

Temp/Humi/ATM: 23.1℃/52%/100.2kPa
Tested by: Wlif Wu
Power Source: AC 24V from adapter(AC 120V/60Hz)



Condition: PK RBW:10kHz VBW:30kHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Remark
0.195	17.05	19.72	36.77	101.81	65.04	Peak
1.899	16.44	19.59	36.03	69.54	33.51	Peak
9.938	15.29	19.70	34.99	69.54	34.55	Peak
12.496	14.19	19.73	33.92	69.54	35.62	Peak
22.749	13.80	20.16	33.96	69.54	35.58	Peak
24.349	14.53	20.21	34.74	69.54	34.80	Peak

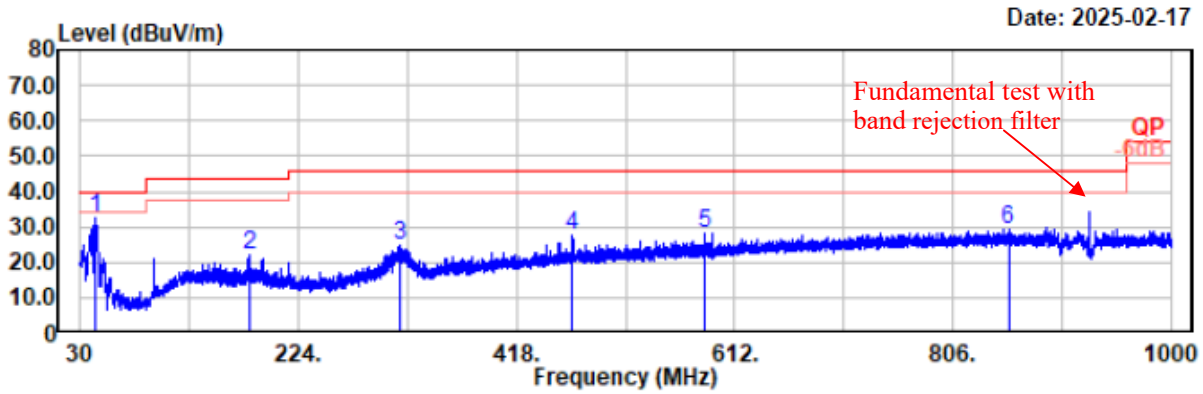
Note: dBuV/m=dBuA/m+51.5dB

2) 30MHz-1GHz

EUT operation mode: Transmitting in the high channel (927.6 MHz) (worst case)

Project No.: 2507P40548E RF
Test Mode: 125K 927.6MHz
EUT Model: WT201-868M/915M
Test distance: 3m

Temp/Humi/ATM: 23.1℃/52%/100.2kPa
Tested by: Wlif Wu
Power Source: AC 24V from adapter(AC 120V/60Hz)

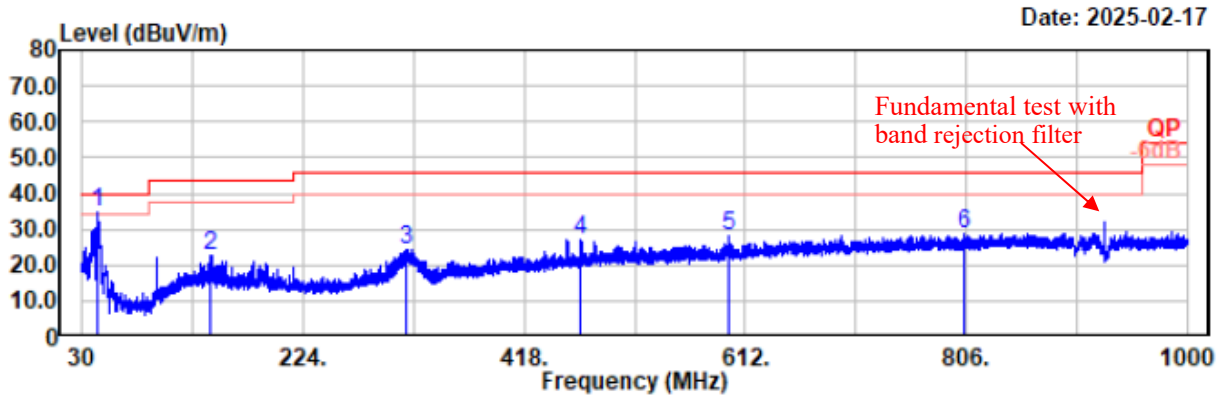


Condition: PK RBW:100kHz VBW:300kHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
43.87	47.14	-14.50	32.64	40.00	7.36	Horizontal	QP
180.16	34.69	-12.36	22.33	43.50	21.17	Horizontal	QP
314.89	33.51	-8.89	24.62	46.00	21.38	Horizontal	QP
467.96	31.89	-4.25	27.64	46.00	18.36	Horizontal	QP
584.65	30.82	-2.48	28.34	46.00	17.66	Horizontal	QP
855.37	27.23	1.97	29.20	46.00	16.80	Horizontal	QP

Project No.: 2507P40548E RF
Test Mode: 125K 927.6MHz
EUT Model: WT201-868M/915M
Test distance: 3m

Temp/Humi/ATM: 23.1℃/52%/100.2kPa
Tested by: Wlif Wu
Power Source: AC 24V from adapter(AC 120V/60Hz)



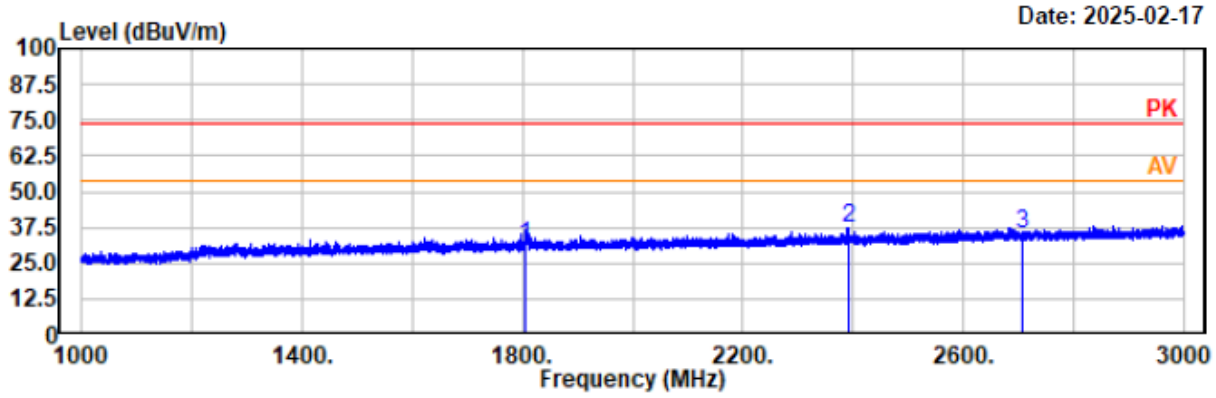
Condition: PK RBW:100kHz VBW:300kHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
43.39	49.06	-14.17	34.89	40.00	5.11	Vertical	QP
143.39	33.78	-10.92	22.86	43.50	20.64	Vertical	QP
314.40	33.21	-8.91	24.30	46.00	21.70	Vertical	QP
468.05	31.23	-4.25	26.98	46.00	19.02	Vertical	QP
598.03	30.53	-2.34	28.19	46.00	17.81	Vertical	QP
803.96	27.43	1.26	28.69	46.00	17.31	Vertical	QP

3) 1 GHz-10 GHz

Project No.: 2507P40548E-RF
Test Mode: 125K 902.3MHz
EUT Model: WT201-868M/915M
Test distance: 3m

Temp/Humi/ATM: 23.1℃/52%/100.2kPa
Tested by: Wlif Wu
Power Source: AC 24V from adapter(AC 120V/60Hz)

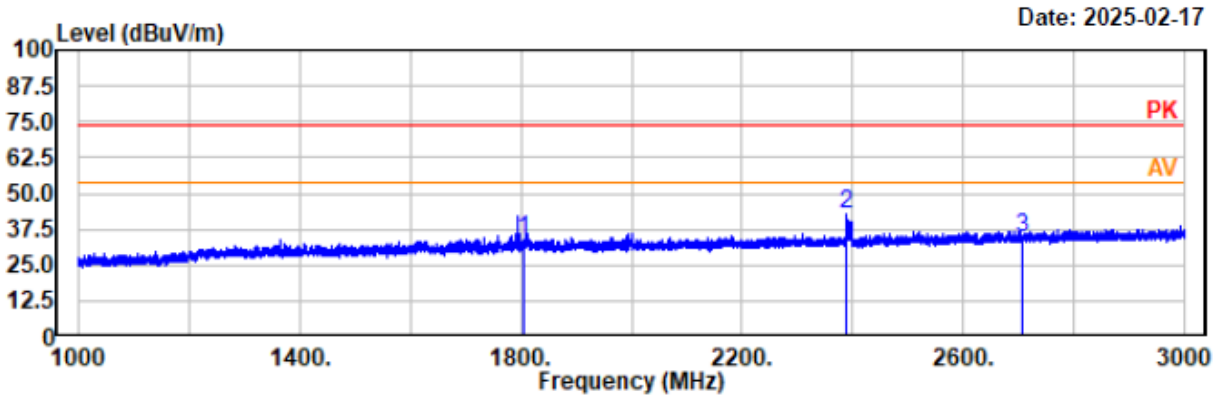


Condition: PK RBW:1MHz VBW:3MHz SWT:auto

Freq	Reading	Factor	Result	Limit	Margin	Polarity	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1804.60	44.53	-13.21	31.32	74.00	42.68	horizontal	Peak
2391.40	48.37	-11.15	37.22	74.00	36.78	horizontal	Peak
2706.90	45.31	-10.00	35.31	74.00	38.69	horizontal	Peak

Project No.: 2507P40548E-RF
Test Mode: 125K 902.3MHz
EUT Model: WT201-868M/915M
Test distance: 3m

Temp/Humi/ATM: 23.1℃/52%/100.2kPa
Tested by: Wlif Wu
Power Source: AC 24V from adapter(AC 120V/60Hz)

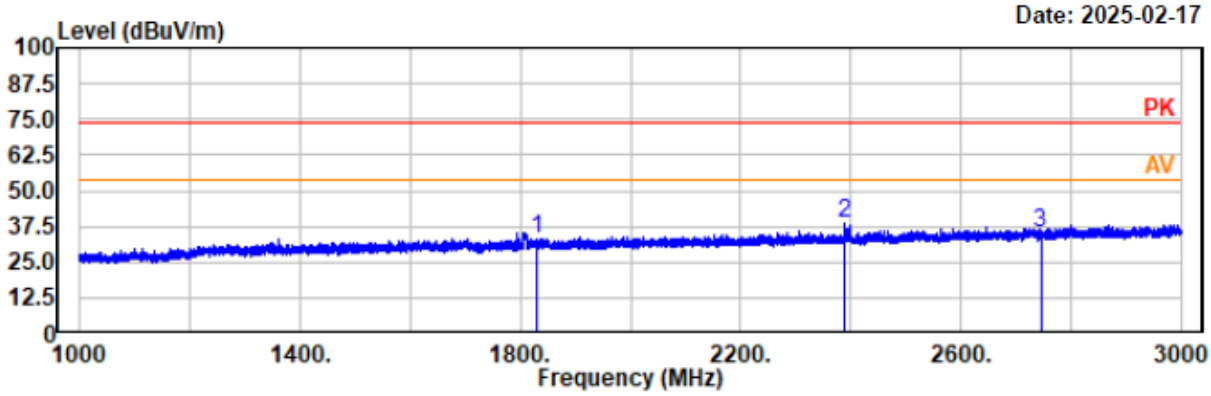


Condition: PK RBW:1MHz VBW:3MHz SWT:auto

Freq	Reading	Factor	Result	Limit	Margin	Polarity	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1804.60	46.95	-13.21	33.74	74.00	40.26	vertical	Peak
2390.00	53.70	-11.15	42.55	74.00	31.45	vertical	Peak
2706.80	44.63	-10.00	34.63	74.00	39.37	vertical	Peak

Project No.: 2507P40548E-RF
Test Mode: 125K 914.9MHz
EUT Model: WT201-868M/915M
Test distance: 3m

Temp/Humi/ATM: 23.1℃/52%/100.2kPa
Tested by: Wlif Wu
Power Source: AC 24V from adapter(AC 120V/60Hz)

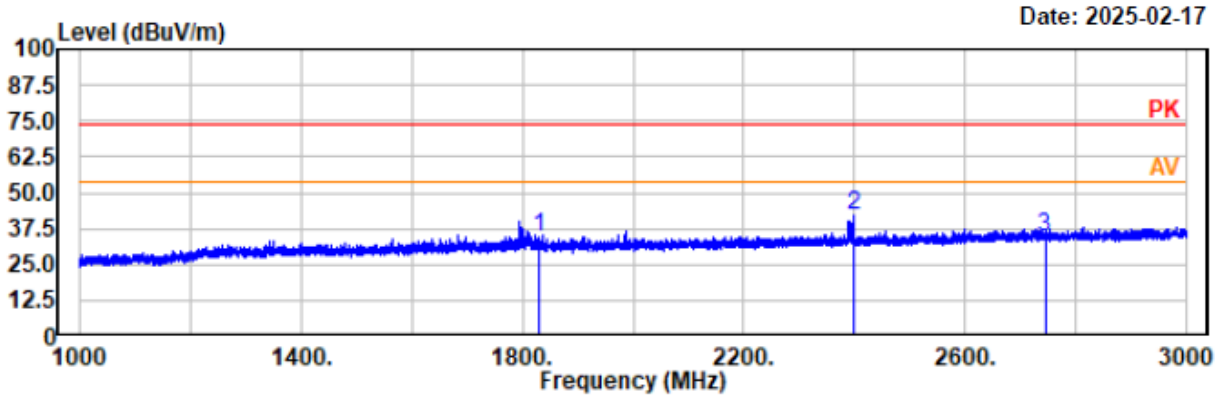


Condition: PK RBW:1MHz VBW:3MHz SWT:auto

Freq	Reading	Factor	Result	Limit	Margin	Polarity	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1829.80	45.94	-13.14	32.80	74.00	41.20	horizontal	Peak
2389.80	49.69	-11.15	38.54	74.00	35.46	horizontal	Peak
2744.70	45.45	-9.95	35.50	74.00	38.50	horizontal	Peak

Project No.: 2507P40548E-RF
Test Mode: 125K 914.9MHz
EUT Model: WT201-868M/915M
Test distance: 3m

Temp/Humi/ATM: 23.1℃/52%/100.2kPa
Tested by: Wlif Wu
Power Source: AC 24V from adapter(AC 120V/60Hz)

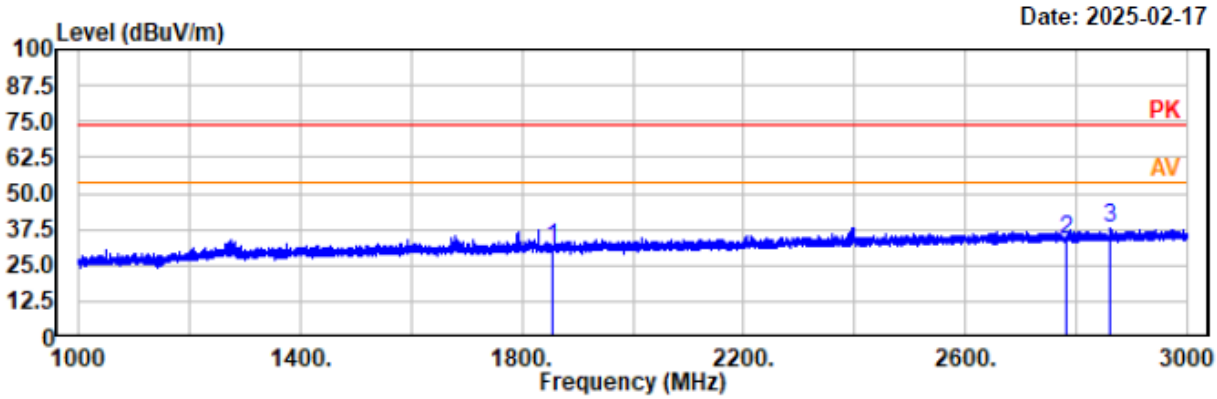


Condition: PK RBW:1MHz VBW:3MHz SWT:auto

Freq	Reading	Factor	Result	Limit	Margin	Polarity	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1829.80	47.37	-13.14	34.23	74.00	39.77	vertical	Peak
2400.00	52.86	-11.12	41.74	74.00	32.26	vertical	Peak
2744.70	44.15	-9.95	34.20	74.00	39.80	vertical	Peak

Project No.: 2507P40548E-RF
Test Mode: 125K 927.6MHz
EUT Model: WT201-868M/915M
Test distance: 3m

Temp/Humi/ATM: 23.1℃/52%/100.2kPa
Tested by: Wlif Wu
Power Source: AC 24V from adapter(AC 120V/60Hz)

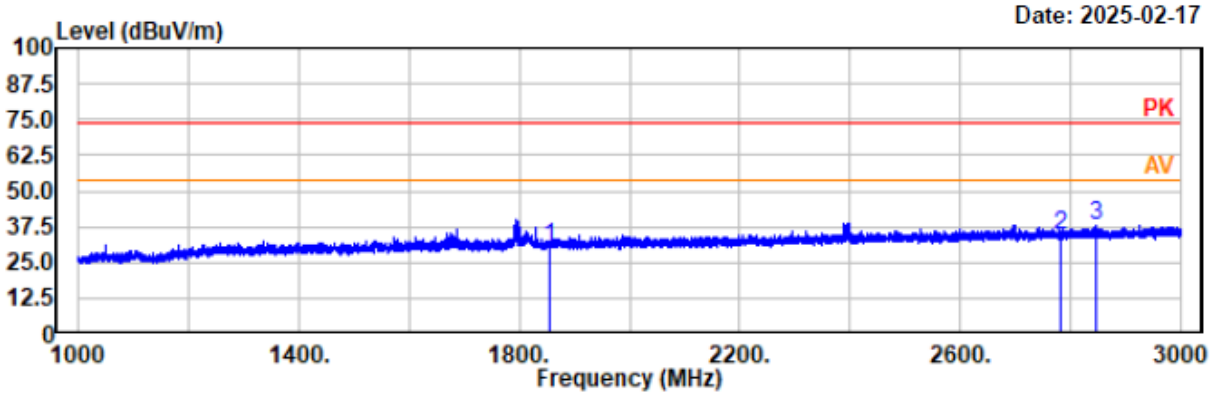


Condition: PK RBW:1MHz VBW:3MHz SWT:auto

Freq	Reading	Factor	Result	Limit	Margin	Polarity	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1855.20	43.96	-13.08	30.88	74.00	43.12	horizontal	Peak
2782.80	43.88	-9.84	34.04	74.00	39.96	horizontal	Peak
2859.80	47.72	-9.61	38.11	74.00	35.89	horizontal	Peak

Project No.: 2507P40548E-RF
Test Mode: 125K 927.6MHz
EUT Model: WT201-868M/915M
Test distance: 3m

Temp/Humi/ATM: 23.1℃/52%/100.2kPa
Tested by: Wlif Wu
Power Source: AC 24V from adapter(AC 120V/60Hz)

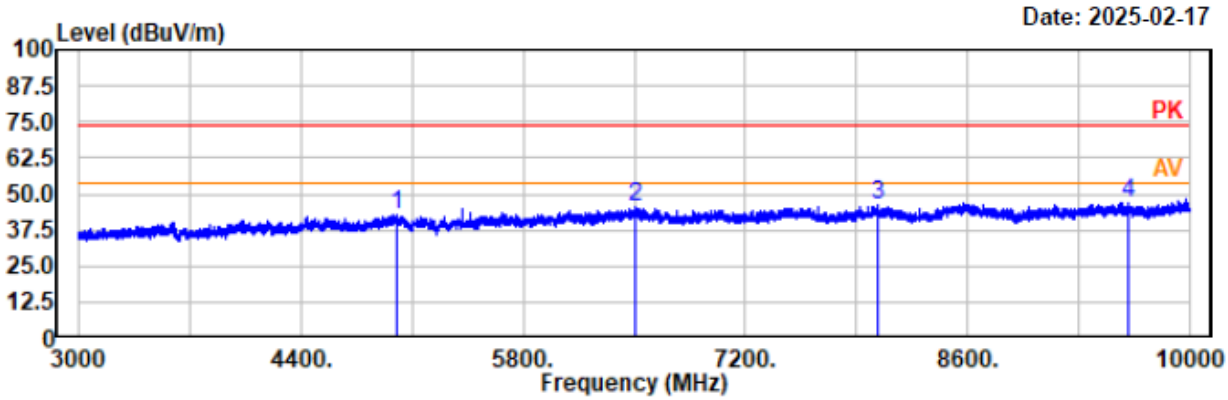


Condition: PK RBW:1MHz VBW:3MHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
1855.20	43.61	-13.08	30.53	74.00	43.47	vertical	Peak
2782.80	44.57	-9.84	34.73	74.00	39.27	vertical	Peak
2848.00	47.50	-9.63	37.87	74.00	36.13	vertical	Peak

Project No.: 2507P40548E-RF
Test Mode: 125K 902.3MHz
EUT Model: WT201-868M/915M
Test distance: 3m

Temp/Humi/ATM: 23.1℃/52%/100.2kPa
Tested by: Wlif Wu
Power Source: AC 24V from adapter(AC 120V/60Hz)

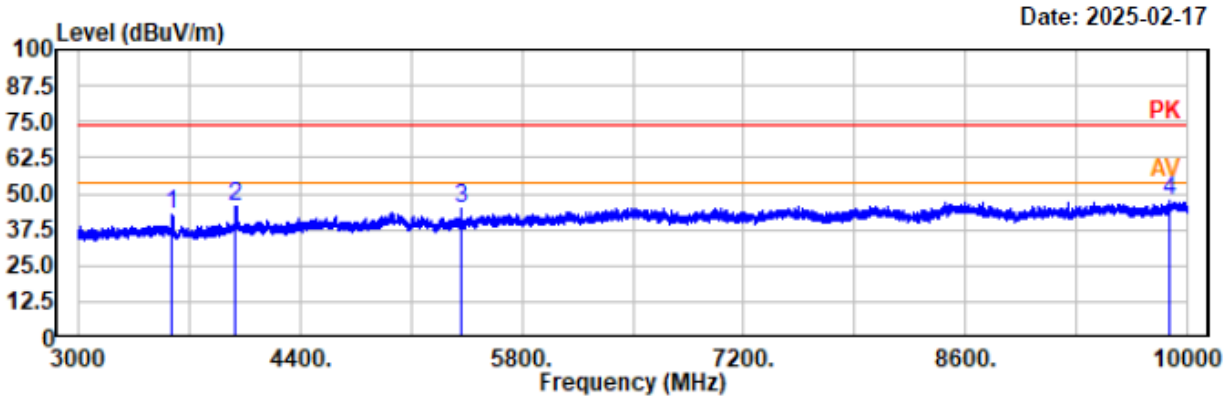


Condition: PK RBW:1MHz VBW:3MHz SWT:auto

Freq	Reading	Factor	Result	Limit	Margin	Polarity	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
4997.10	47.94	-5.00	42.94	74.00	31.06	horizontal	Peak
6508.40	47.47	-1.86	45.61	74.00	28.39	horizontal	Peak
8035.10	47.86	-1.86	46.00	74.00	28.00	horizontal	Peak
9608.70	46.05	1.01	47.06	74.00	26.94	horizontal	Peak

Project No.: 2507P40548E-RF
Test Mode: 125K 902.3MHz
EUT Model: WT201-868M/915M
Test distance: 3m

Temp/Humi/ATM: 23.1℃/52%/100.2kPa
Tested by: Wlif Wu
Power Source: AC 24V from adapter(AC 120V/60Hz)

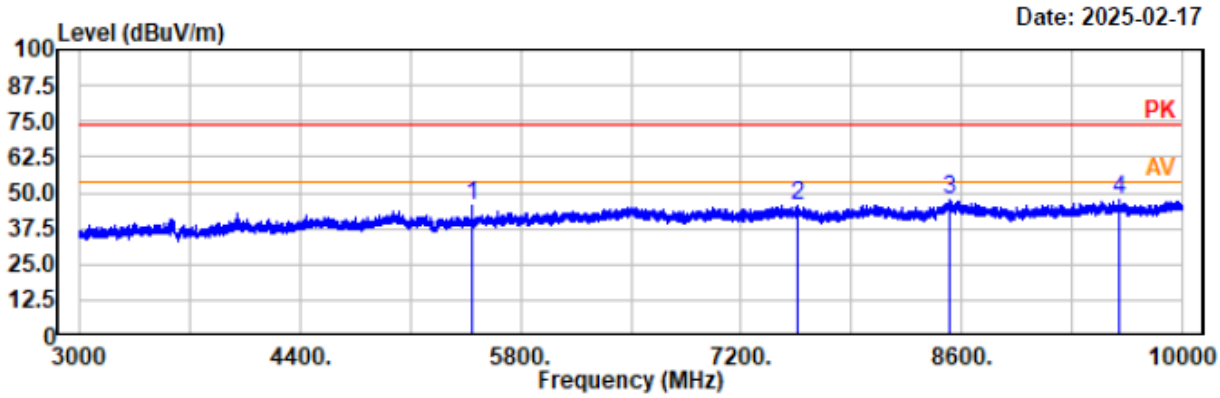


Condition: PK RBW:1MHz VBW:3MHz SWT:auto

Freq	Reading	Factor	Result	Limit	Margin	Polarity	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
3591.50	50.22	-7.70	42.52	74.00	31.48	vertical	Peak
3988.40	52.37	-6.55	45.82	74.00	28.18	vertical	Peak
5413.60	49.52	-4.38	45.14	74.00	28.86	vertical	Peak
9887.30	46.01	1.31	47.32	74.00	26.68	vertical	Peak

Project No.: 2507P40548E-RF
Test Mode: 125K 914.9MHz
EUT Model: WT201-868M/915M
Test distance: 3m

Temp/Humi/ATM: 23.1℃/52%/100.2kPa
Tested by: Wlif Wu
Power Source: AC 24V from adapter(AC 120V/60Hz)

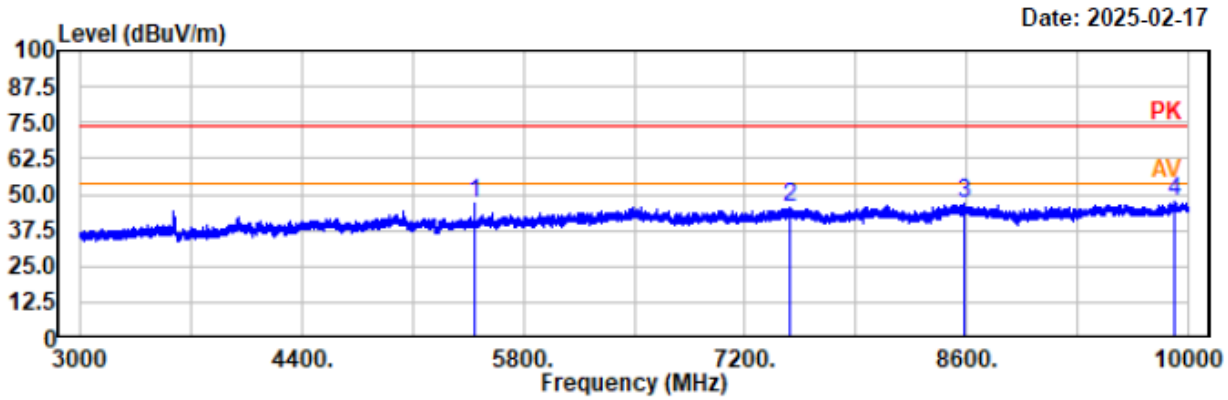


Condition: PK RBW:1MHz VBW:3MHz SWT:auto

Freq	Reading	Factor	Result	Limit	Margin	Polarity	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
5489.20	49.90	-4.34	45.56	74.00	28.44	horizontal	Peak
7561.20	47.27	-1.83	45.44	74.00	28.56	horizontal	Peak
8522.30	47.74	-0.06	47.68	74.00	26.32	horizontal	Peak
9602.40	46.53	1.01	47.54	74.00	26.46	horizontal	Peak

Project No.: 2507P40548E-RF
Test Mode: 125K 914.9MHz
EUT Model: WT201-868M/915M
Test distance: 3m

Temp/Humi/ATM: 23.1℃/52%/100.2kPa
Tested by: Wlif Wu
Power Source: AC 24V from adapter(AC 120V/60Hz)

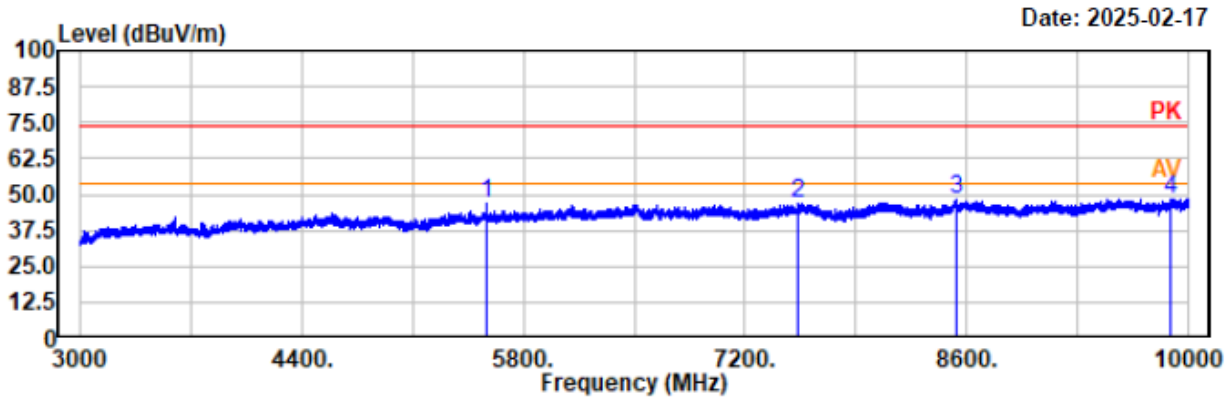


Condition: PK RBW:1MHz VBW:3MHz SWT:auto

Freq	Reading	Factor	Result	Limit	Margin	Polarity	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
5489.90	51.17	-4.34	46.83	74.00	27.17	vertical	Peak
7480.00	47.49	-1.99	45.50	74.00	28.50	vertical	Peak
8586.00	46.91	-0.24	46.67	74.00	27.33	vertical	Peak
9916.70	45.97	1.35	47.32	74.00	26.68	vertical	Peak

Project No.: 2507P40548E-RF
Test Mode: 125K 927.6MHz
EUT Model: WT201-868M/915M
Test distance: 3m

Temp/Humi/ATM: 23.1℃/52%/100.2kPa
Tested by: Wlif Wu
Power Source: AC 24V from adapter(AC 120V/60Hz)

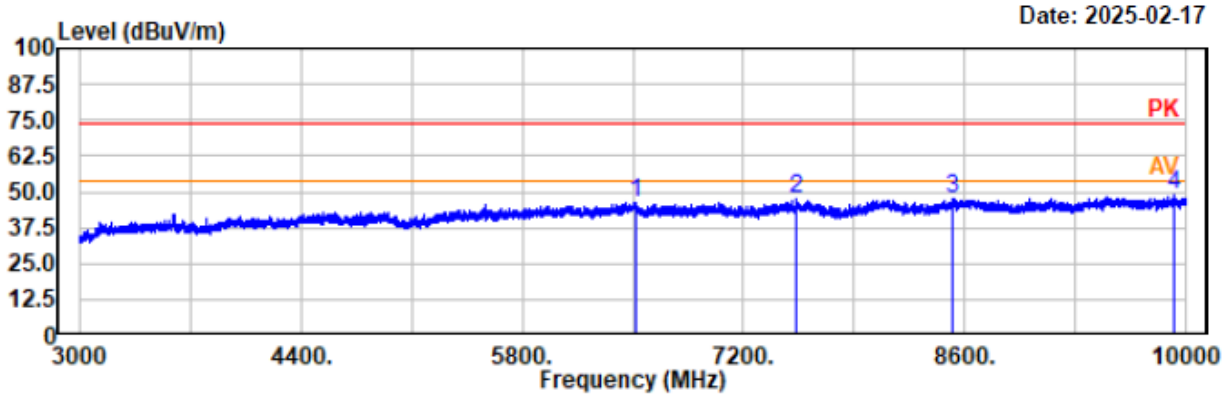


Condition: PK RBW:1MHz VBW:3MHz SWT:auto

Freq	Reading	Factor	Result	Limit	Margin	Polarity	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
5565.50	51.02	-4.16	46.86	74.00	27.14	horizontal	Peak
7535.30	48.73	-1.86	46.87	74.00	27.13	horizontal	Peak
8539.10	48.04	-0.11	47.93	74.00	26.07	horizontal	Peak
9888.70	47.04	1.32	48.36	74.00	25.64	horizontal	Peak

Project No.: 2507P40548E-RF
Test Mode: 125K 927.6MHz
EUT Model: WT201-868M/915M
Test distance: 3m

Temp/Humi/ATM: 23.1℃/52%/100.2kPa
Tested by: Wlif Wu
Power Source: AC 24V from adapter(AC 120V/60Hz)



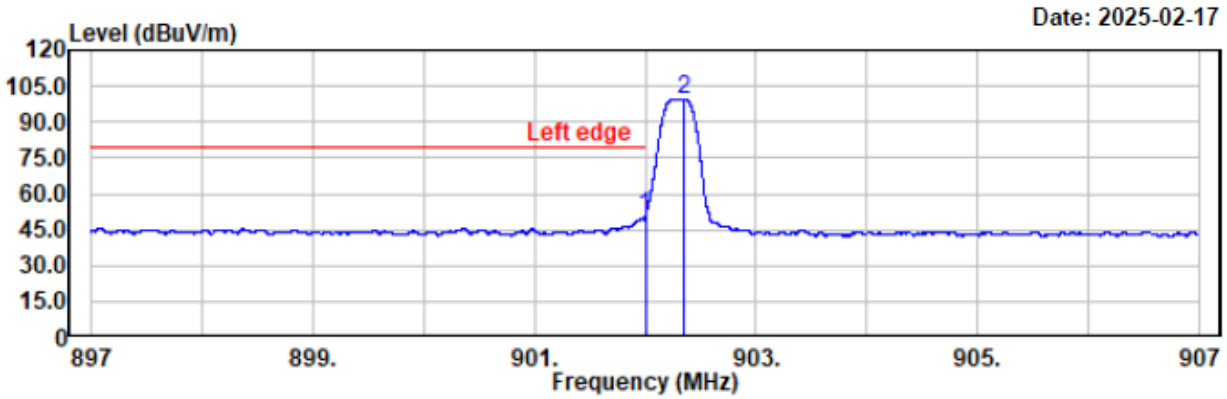
Condition: PK RBW:1MHz VBW:3MHz SWT:auto

Freq	Reading	Factor	Result	Limit	Margin	Polarity	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
6516.80	48.39	-1.90	46.49	74.00	27.51	vertical	Peak
7536.70	49.37	-1.86	47.51	74.00	26.49	vertical	Peak
8525.80	47.71	-0.08	47.63	74.00	26.37	vertical	Peak
9921.60	47.61	1.36	48.97	74.00	25.03	vertical	Peak

Radiated Bands Emissions:

Project No.: 2507P40548E-RF
Test Mode: 125K 902.3MHz
EUT Model: WT201-868M/915M
Test distance: 3m

Temp/Humi/ATM: 23.1℃/52%/100.2kPa
Tested by: Wlif Wu
Power Source: AC 24V from adapter(AC 120V/60Hz)

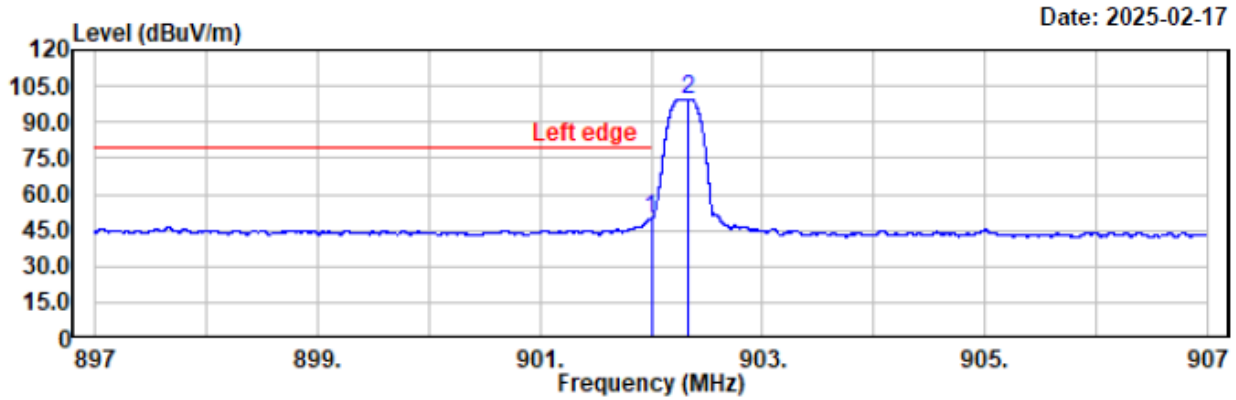


Condition: PK RBW:100kHz VBW:300kHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
902.00	16.17	34.28	50.45	79.59	29.14	Horizontal	Peak
902.35	65.31	34.28	99.59	125.20	25.61	Horizontal	Peak

Project No.: 2507P40548E-RF
Test Mode: 125K 902.3MHz
EUT Model: WT201-868M/915M
Test distance: 3m

Temp/Humi/ATM: 23.1℃/52%/100.2kPa
Tested by: Wlif Wu
Power Source: AC 24V from adapter(AC 120V/60Hz)

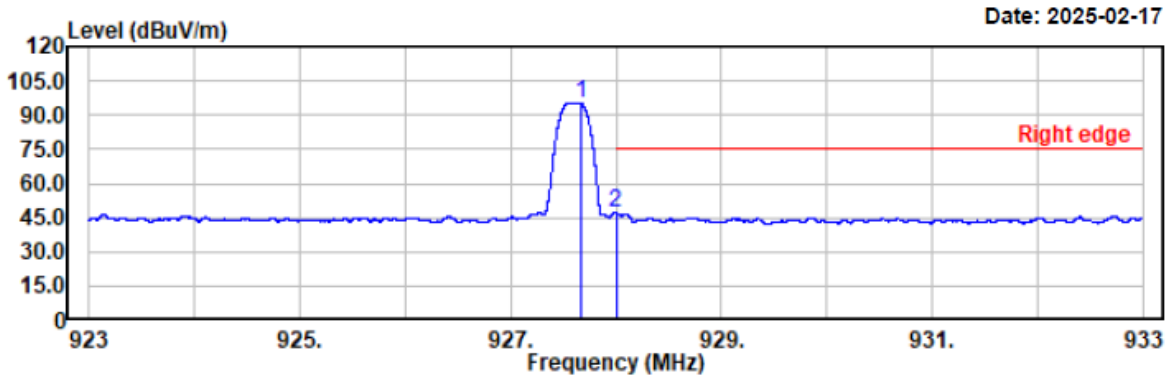


Condition: PK RBW:100kHz VBW:300kHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
902.00	15.17	34.28	49.45	79.41	29.96	Vertical	Peak
902.33	65.13	34.28	99.41	125.20	25.79	Vertical	Peak

Project No.: 2507P40548E-RF
Test Mode: 125K 927.6MHz
EUT Model: WT201-868M/915M
Test distance: 3m

Temp/Humi/ATM: 23.1℃/52%/100.2kPa
Tested by: Wlif Wu
Power Source: AC 24V from adapter(AC 120V/60Hz)

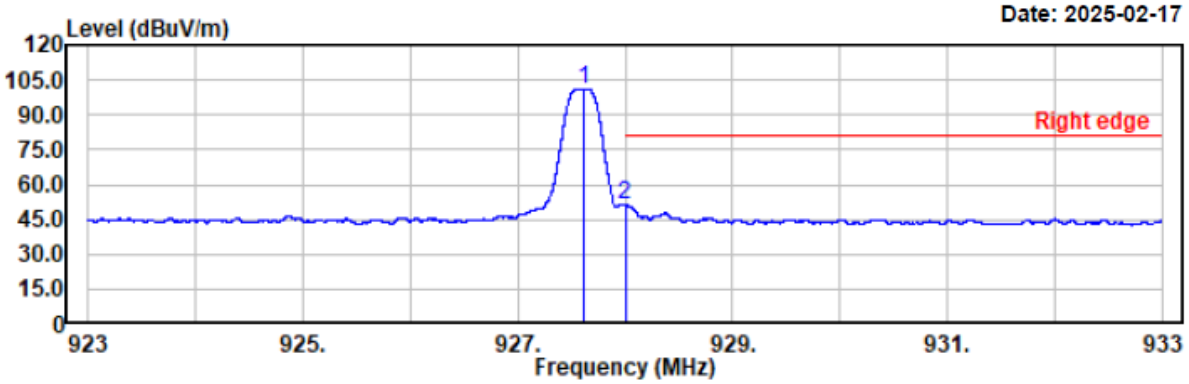


Condition: PK RBW:100kHz VBW:300kHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
927.66	60.60	34.57	95.17	125.20	30.03	Horizontal	Peak
928.00	12.41	34.57	46.98	75.17	28.19	Horizontal	Peak

Project No.: 2507P40548E-RF
Test Mode: 125K 927.6MHz
EUT Model: WT201-868M/915M
Test distance: 3m

Temp/Humi/ATM: 23.1℃/52%/100.2kPa
Tested by: Wlif Wu
Power Source: AC 24V from adapter(AC 120V/60Hz)



Condition: PK RBW:100kHz VBW:300kHz SWT:auto

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
927.62	66.47	34.57	101.04	125.20	24.16	Vertical	Peak
928.00	16.96	34.57	51.53	81.04	29.51	Vertical	Peak

FCC §15.247(a)(1)(i) & RSS-247 Clause 5.1 c) - 20 dB EMISSION BANDWUDTH

Applicable Standard

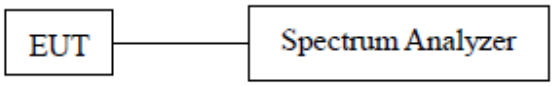
According to FCC §15.247(a)(1)(i)

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 Clause 5.1 c)

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

EUT Setup



Test Procedure

According to ANSI C63.10-2013 Section 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. Specific guidance is given in 4.1.5.2
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 unmodulated 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 unmodulated 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).

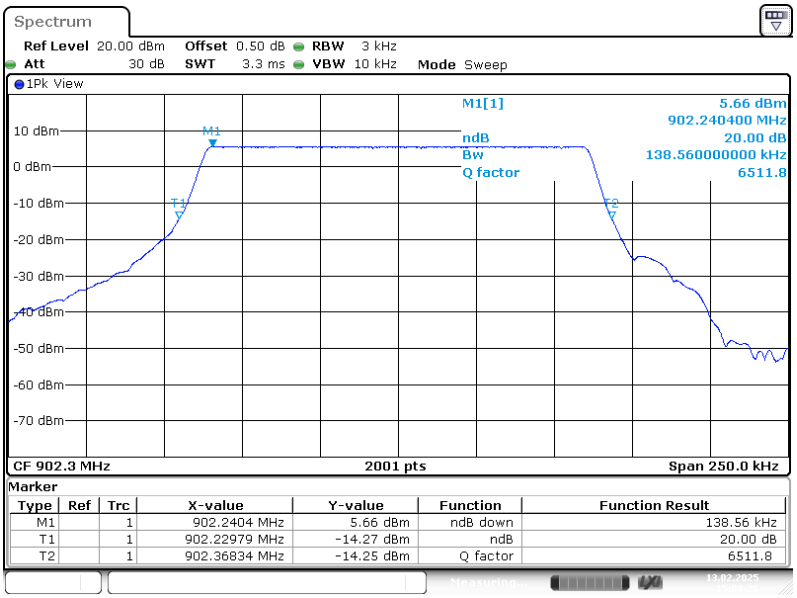
j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the "−xx dB down amplitude" determined in step h). If a marker is below this "−xx dB down amplitude" value, then it shall be 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

Test Mode:	Transmitting	Test Engineer:	Braylon Ma
Test Date:	2025-02-13	Environment:	Temp.: 20.8℃ Humi.: 52% Atm.:100.2kPa
Test Channel	**Test Frequency (MHz)**	**20 dB Bandwidth (MHz)**	**Limit (MHz)**
Lowest	902.3	0.139	<0.25
Middle	914.9	0.139	<0.25
Highest	927.6	0.139	<0.25

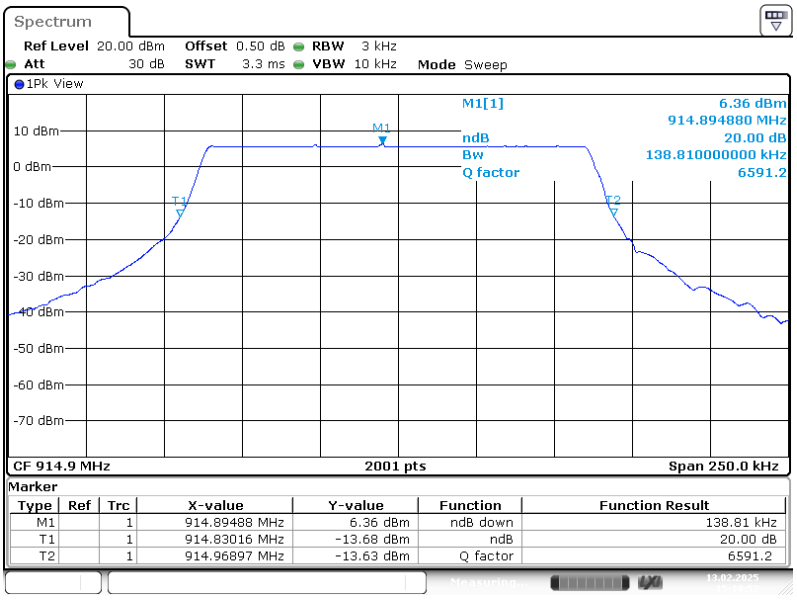
Lowest Channel



ProjectNo.:2507P40548E-RF Tester:Braylon Ma

Date: 13.FEB.2025 15:09:26

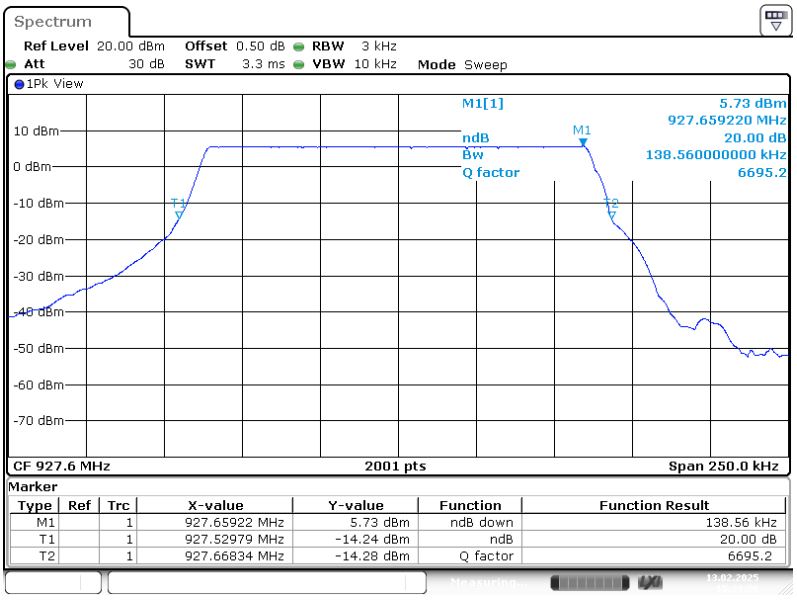
Middle Channel



ProjectNo.:2507P40548E-RF Tester:Braylon Ma

Date: 13.FEB.2025 15:19:52

High Channel



ProjectNo.:2507P40548E-RF Tester:Braylon Ma

Date: 13.FEB.2025 15:21:26

RSS-Gen Clause 6.7 - 99% OCCUPIED BANDWIDTH

Applicable Standard

According to RSS-Gen Clause 6.7

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.

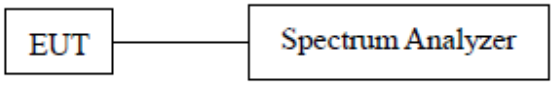
The detector of the spectrum analyzer shall be set to "Sample". However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or "Max Hold") may be necessary to determine 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).

EUT Setup



Test Procedure

RSS-Gen Clause 6.7

Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
Position the EUT on the test table without connection to measurement instrument. Turn on the EUT. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.

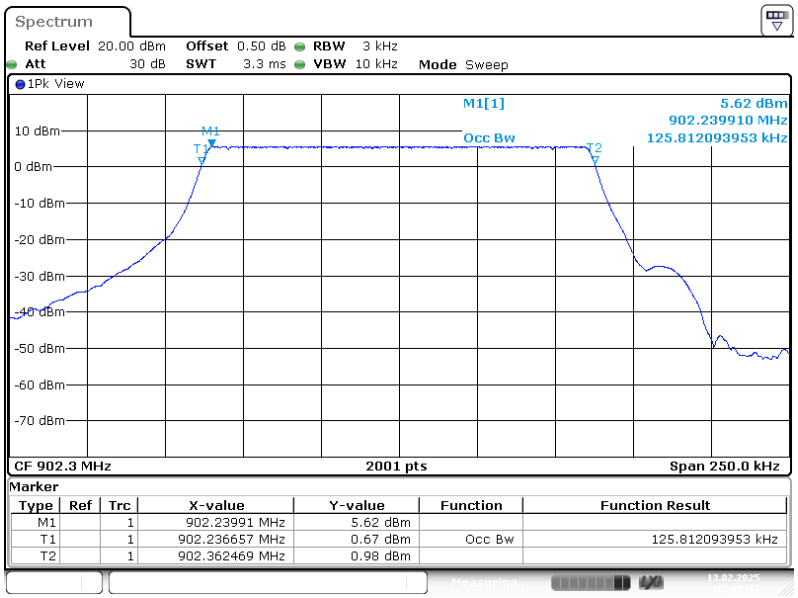
Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level.
Record the frequency difference as the emission bandwidth.
Use Occupied bandwidth test function, measure the 99% Occupied bandwidth.
Repeat above procedures until all frequencies measured were complete.

Test Data

Test Mode:	Transmitting	**Test Engineer:**	Braylon Ma
Test Date:	2025-02-13	**Environment:**	Temp.: 20.8℃ Humi.: 52% Atm.:100.2kPa

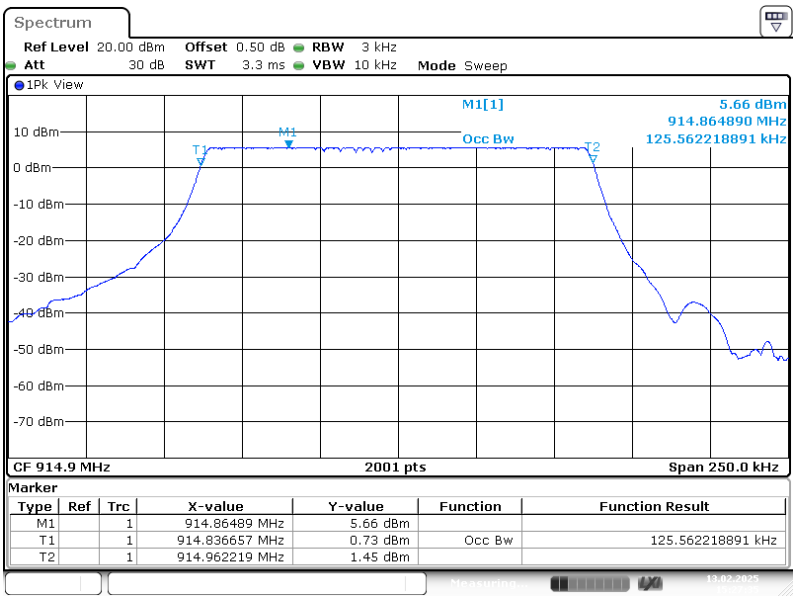
Test Channel	**Test Frequency (MHz)**	**99% Occupied Bandwidth (MHz)**
Lowest	902.3	0.126
Middle	914.9	0.126
Highest	927.6	0.125

Lowest Channel



ProjectNo.:2507P40548E-RF Tester:Braylon Ma
Date: 13.FEB.2025 15:26:15

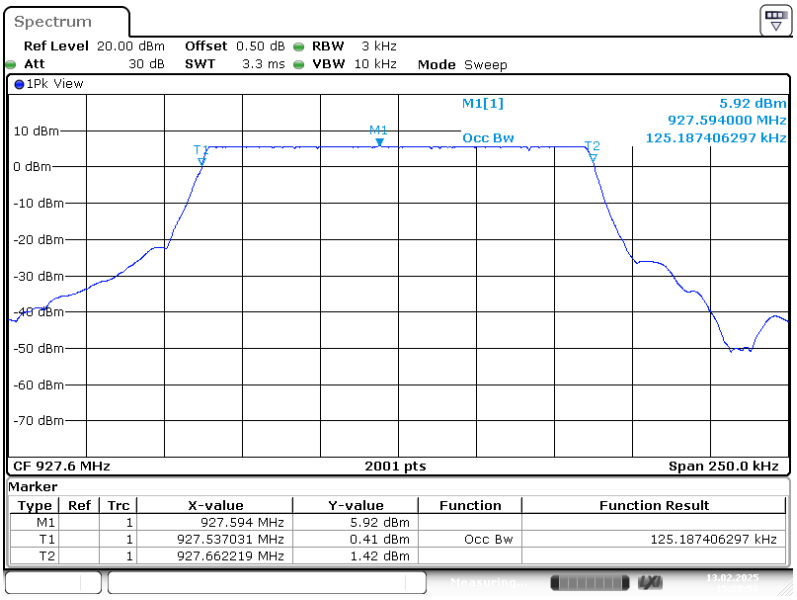
Middle Channel



ProjectNo.:2507P40548E-RF Tester:Braylon Ma

Date: 13.FEB.2025 15:27:35

Highest Channel



ProjectNo.:2507P40548E-RF Tester:Braylon Ma

Date: 13.FEB.2025 15:28:58

FCC §15.247(a)(1) & RSS-247 Clause 5.1 b) - CHANNEL SEPARATION

Applicable Standard

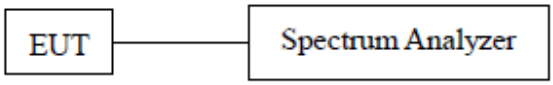
According to FCC §15.247(a)(1)

Frequency hopping systems shall have hopping 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. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. 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.

According to RSS-247 Clause 5.1 b)

Frequency hopping systems shall have hoping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.50 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater provided the systems operate with an output power no greater than 125 mW.

EUT Setup



Test Procedure

According to ANSI C63.10-2013 Section 7.8.2

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

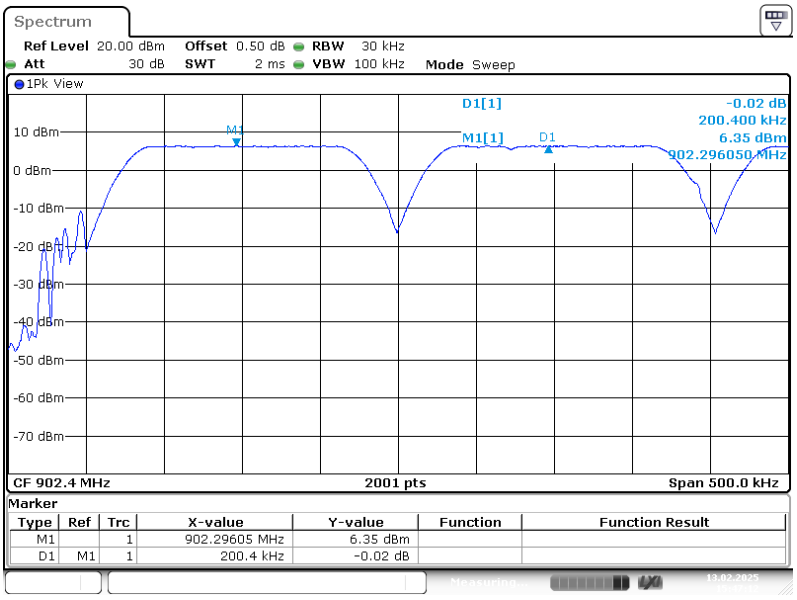
a) Span: Wide enough to capture the peaks of two adjacent channels.
b) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
c) Video (or average) bandwidth (VBW) ≥ RBW.
d) Sweep: Auto.
e) Detector function: 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. A plot of the data shall be included in the test report.

Test Data

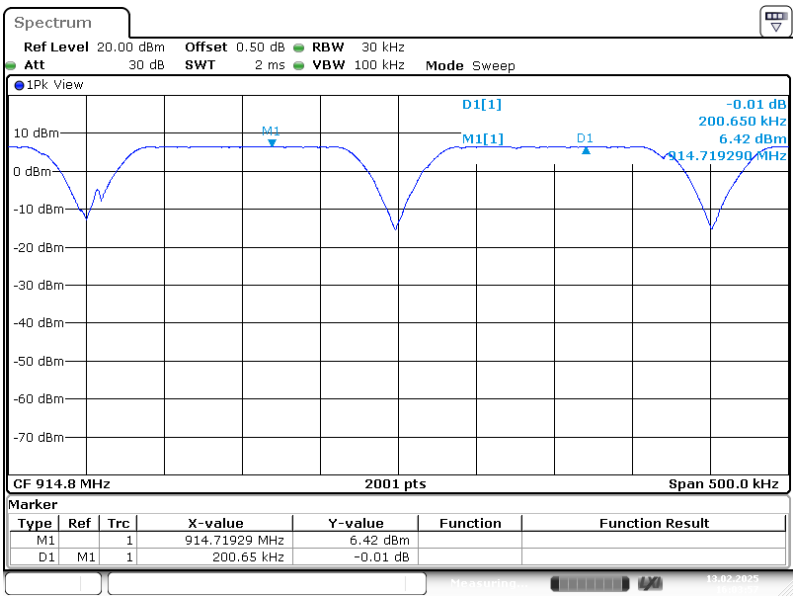
Test Mode:	Transmitting	Test Engineer:	Braylon Ma
Test Date:	2025-02-13	Environment:	Temp.: 20.8℃ Humi.: 52% Atm.:100.2kPa
Test Channel	**Test Frequency (MHz)**	**Channel Separation (MHz)**	**Limits (MHz)**
Lowest	902.3	0.200	0.139
Middle	914.9	0.201	0.139
Highest	927.6	0.200	0.139

Lowest Channel



ProjectNo.:2507P40548E-RF Tester:Braylon Ma
Date: 13.FEB.2025 15:47:13

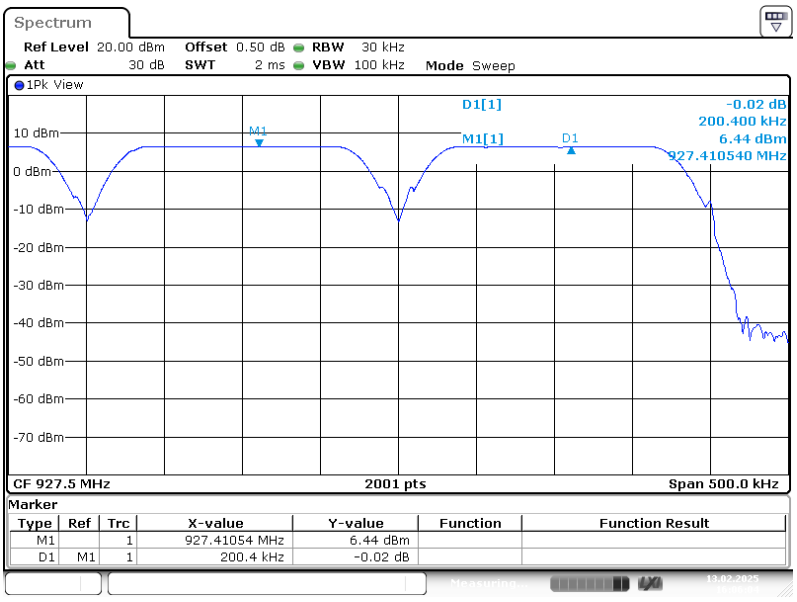
Middle Channel



ProjectNo.:2507P40548E-RF Tester:Braylon Ma

Date: 13.FEB.2025 16:03:57

Highest Channel



ProjectNo.:2507P40548E-RF Tester:Braylon Ma

Date: 13.FEB.2025 16:06:03

FCC §15.247(a)(1)(i) & RSS-247 Clause 5.1 c) - NUMBER OF HOPPING FREQUENCY

Applicable Standard

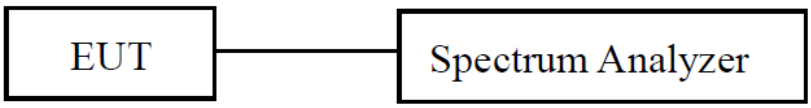
According to FCC §15.247(a)(1)(i)

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 Clause 5.1 c)

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

EUT Setup



Test Procedure

According to ANSI C63.10-2013 Section 7.8.3

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

a) Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
b) RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
c) VBW ≥ RBW.
d) Sweep: Auto.
e) Detector function: Peak.
f) Trace: Max hold.
g) Allow the trace to stabilize

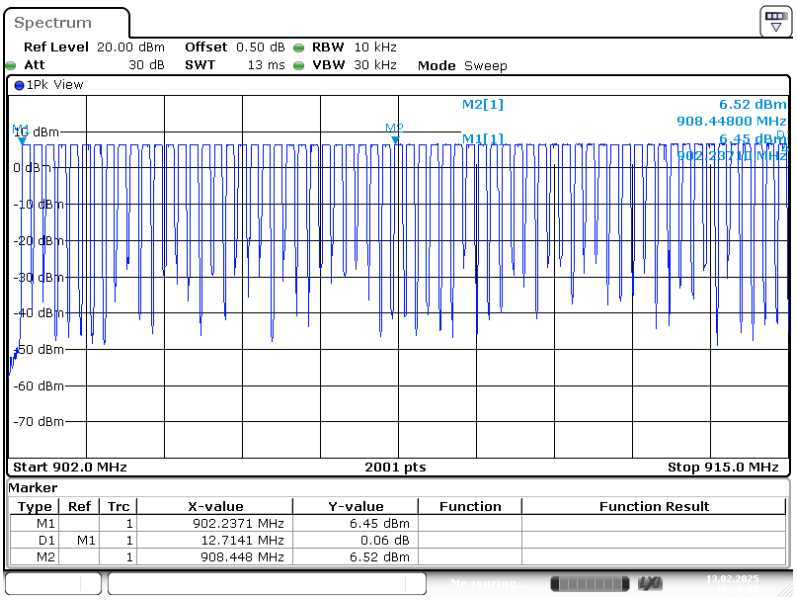
It might prove necessary to break the span up into subranges to show clearly all of the hopping frequencies. Compliance of an EUT with the appropriate regulatory limit shall be determined for the number of hopping channels. A plot of the data shall be included in the test report.

Test Data

Test Mode:	Transmitting	Test Engineer:	Braylon Ma
Test Date:	2025-02-13	Environment:	Temp.: 20.8℃ Humi.: 52% Atm.:100.2kPa

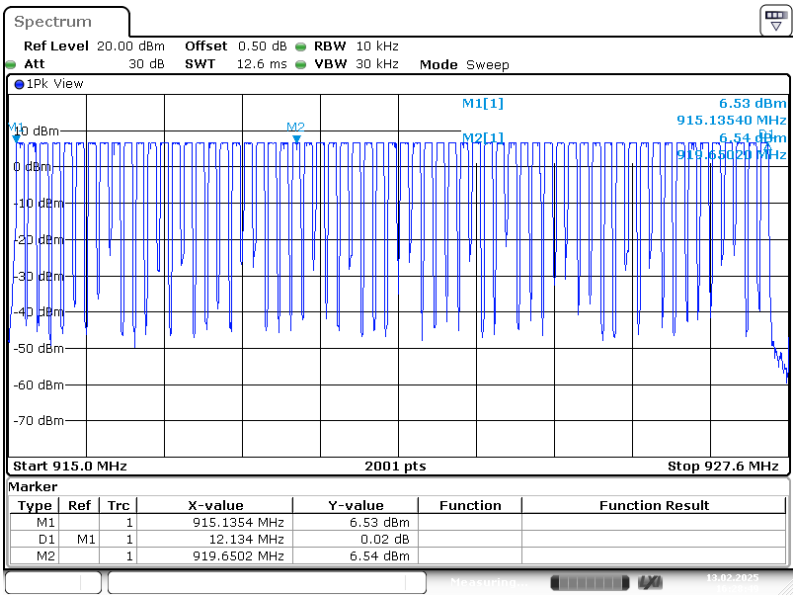
Frequency Range (MHz)	Number of Hopping Channel	Limits
902-928	127	⩾50

902-915MHz



ProjectNo.:2507P40548E-RF Tester:Braylon Ma
Date: 13.FEB.2025 16:20:05

915-928MHz



ProjectNo.:2507P40548E-RF Tester:Braylon Ma

Date: 13.FEB.2025 16:28:48

FCC §15.247(f) & RSS-247 Clause 5.3 a) - TIME OF OCCUPANCY (DWELL TIME)

Applicable Standard

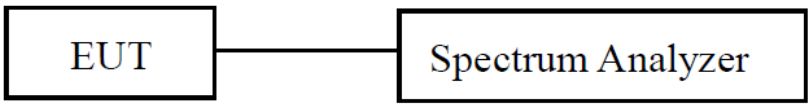
According to FCC §15.247(f)

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 0.4seconds 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 Clause 5.3 a)

With the digital transmission operation of the hybrid system turned off, the frequency hopping operation shall have an average time of occupancy on any frequency not exceeding 0.4 seconds within a duration in seconds equal to the number of hopping frequencies multiplied by 0.4.

EUT Setup



Test Procedure

According to ANSI C63.10-2013 Section 7.8.4

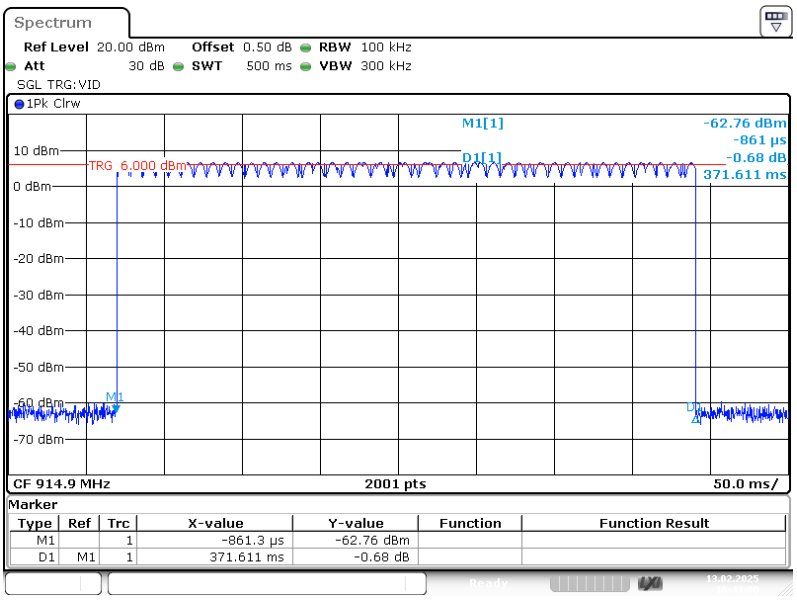
The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:
a) Span: Zero span, centered on a hopping channel.
b) RBW shall be ≤ channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.
c) Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.
d) Detector function: Peak.
e) Trace: Max hold.
Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time.
Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation:
(Number of hops in the period specified in the requirements) = (number of hops on spectrum analyzer) × (period specified in the requirements / analyzer sweep time)
The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements. If the number of hops in a specific time varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation.
The measured transmit time and time between hops shall be consistent with the values described in the operational description for the EUT.

Test Data

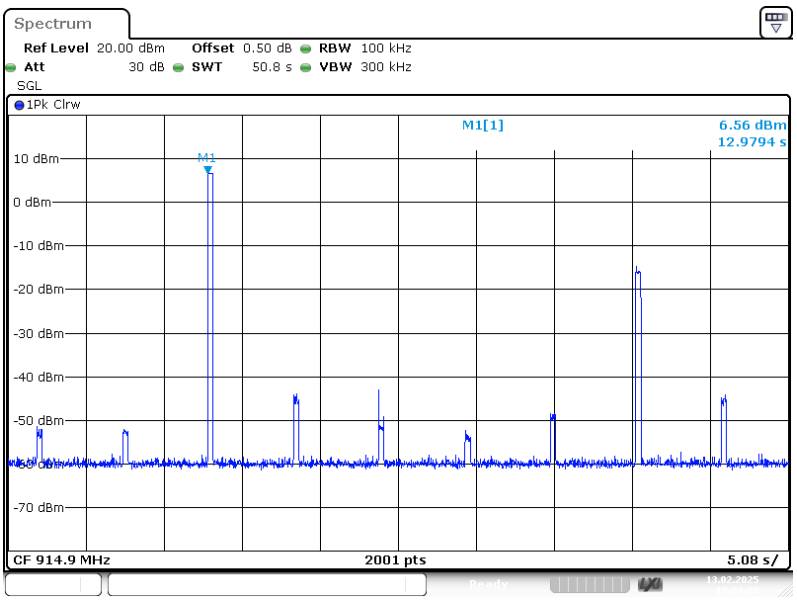
Test Mode:	Transmitting	Test Engineer:	Braylon Ma
Test Date:	2025-02-13	Environment:	Temp.: 20.8℃ Humi.: 52% Atm.:100.2kPa

Test Frequency (MHz)	Pulse width (ms)	Observation time (s)	Hopping Numbers in Observation time	Dwell Time (s)	Limit (s)
914.9	371.611	50.8	1	0.372	0.400
Note: Observation time=127*0.4=50.8s					

Pulse width



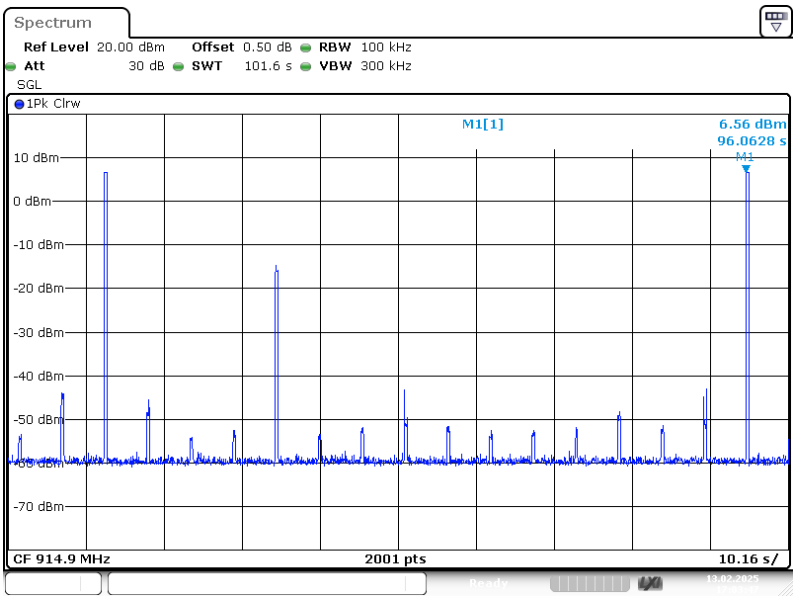
Hopping Numbers in Observation time (50.8s)



ProjectNo.:2507P40548E-RF Tester:Braylon Ma

Date: 13.FEB.2025 17:01:01

Hopping Numbers in Observation time (101.6s)



ProjectNo.:2507P40548E-RF Tester:Braylon Ma

Date: 13.FEB.2025 17:03:47

FCC §15.247(b)(2) & RSS-247 Clause 5.4 a) – MAXIMUNM CONDUCTED OUTPUT POWER

Applicable Standard

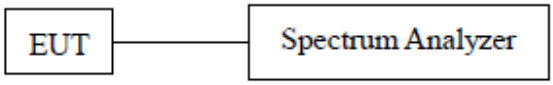
According to FCC §15.247(b)(2)

For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

According to RSS-247 Clause 5.4 a)

For FHSs operating in the band 902-928 MHz, the maximum peak conducted output power shall not exceed 1.0 W, and the e.i.r.p. shall not exceed 4 W if the hopset uses 50 or more hopping channels; the maximum peak conducted output power shall not exceed 0.25 W and the e.i.r.p. shall not exceed 1W if the hopset uses less than 50 hopping channels.

EUT Setup



Test Procedure

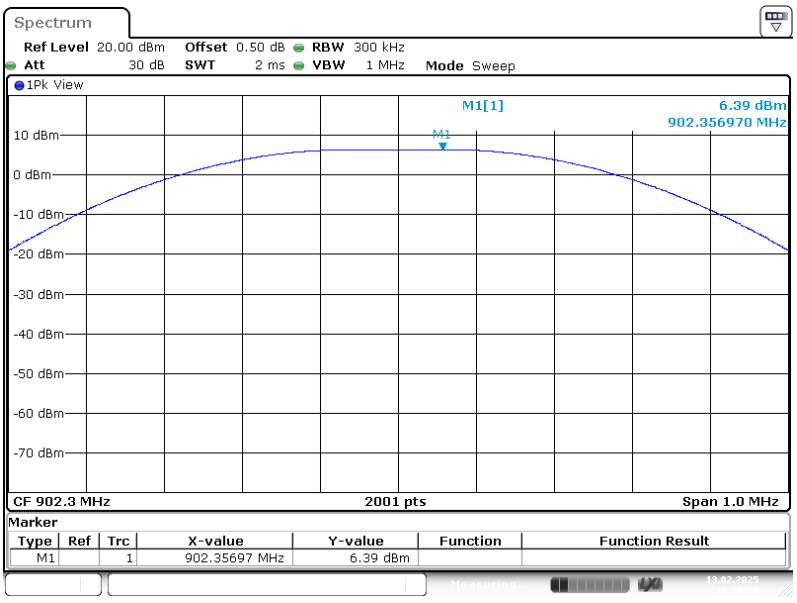
According to ANSI C63.10-2013 Section 7.8.5
The hopping shall be disabled for this test:
a) Use the following spectrum analyzer settings:
1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
2) RBW > 20 dB bandwidth of the emission being measured.
3) VBW ⩾ RBW.
4) Sweep: Auto.
5) Detector function: Peak.
6) Trace: Max hold.
b) Allow trace to stabilize.
c) Use the marker-to-peak function to set the marker to the peak of the emission.

Test Data

Test Mode:	Transmitting	**Test Engineer:**	Braylon Ma
Test Date:	2025-02-13	**Environment:**	Temp.: 20.8℃ Humi.: 52% Atm.:100.2kPa

Test Channel	**Test Frequency (MHz)**	**Peak Conducted Output Power (dBm)**	**Limits (dBm)**
Lowest	902.3	6.39	30
Middle	914.9	6.47	30
Highest	927.6	6.49	30
Antenna Gain(dBi):	1.46	Max.EIRP(dBm):	7.95
EIRP Limit for RSS-247:36 dBm			

Lowest Channel



ProjectNo.:2507P40548E-RF Tester:Braylon Ma

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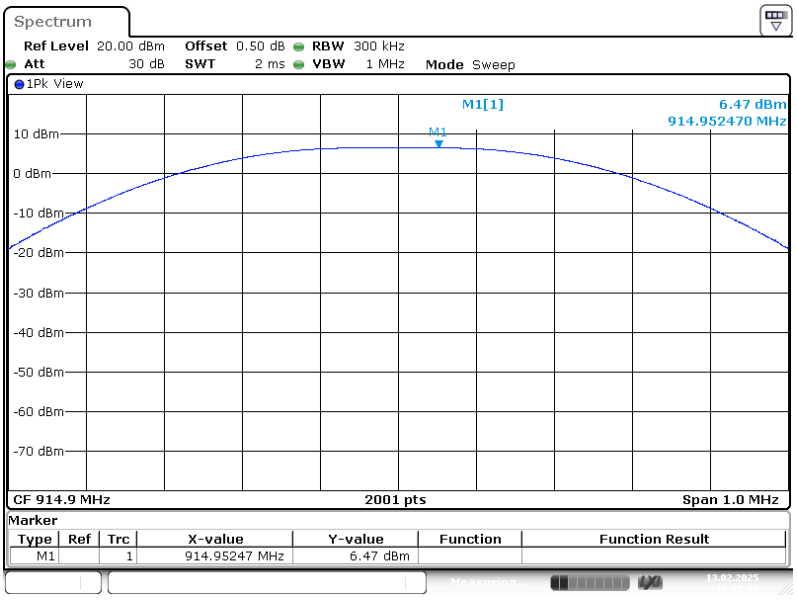
Middle Channel



ProjectNo.:2507P40548E-RF Tester:Braylon Ma

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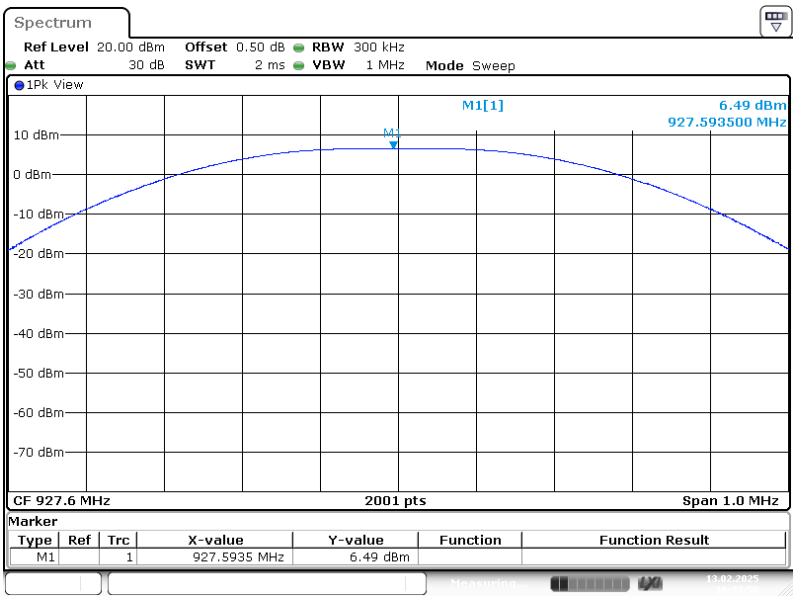
Highest Channel



ProjectNo.:2507P40548E-RF Tester:Braylon Ma

Date: 13.FEB.2025 16:32:55

FCC §15.247(d) & RSS-247 Clause 5.5 - 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

Applicable Standard

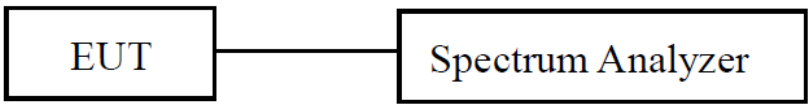
According to FCC §15.247(d)

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 Clause 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device 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 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

EUT Setup



Test Procedure

According to ANSI C63.10-2013 Section 7.8.6

For band-edge measurements, use the band-edge procedure in 6.10. Band-edge measurements shall be tested both on single channels, and with the EUT hopping.

a) Set the center frequency and span to encompass frequency range to be measured.
b) Set the RBW = 100 kHz.
c) Set the VBW ≥ [3 × RBW].
d) Detector = peak.
e) Sweep time = auto couple.
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. Report the three highest emissions relative to the limit.

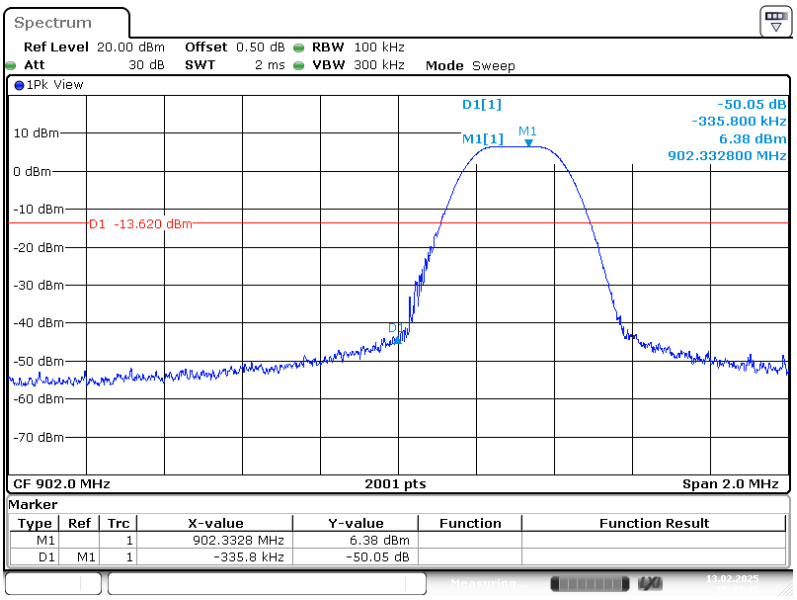
Test Data

Test Mode:	Transmitting	Test Engineer:	Braylon Ma
Test Date:	2025-02-13	Environment:	Temp.: 20.8℃ Humi.: 52% Atm.:100.2kPa

Please refer to the below plots:

Single Mode

Band Edge-Left Side



ProjectNo.:2507P40548E-RF Tester:Braylon Ma

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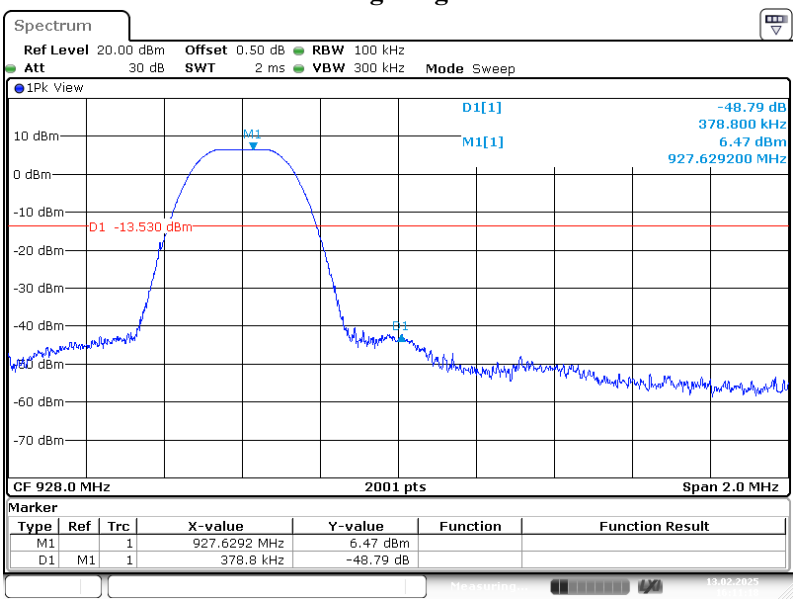
Band Edge-Right Side

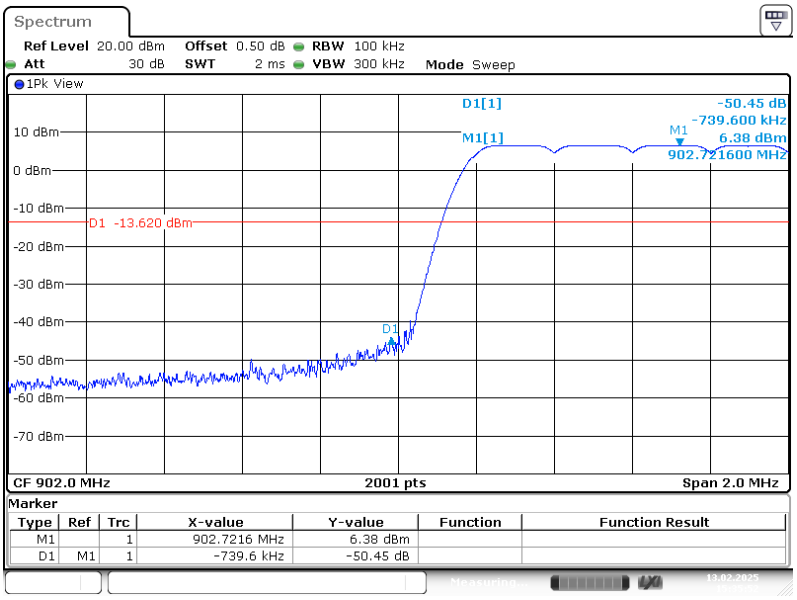


ProjectNo.:2507P40548E-RF Tester:Braylon Ma

Date: 13.FEB.2025 16:11:17

Hopping Mode

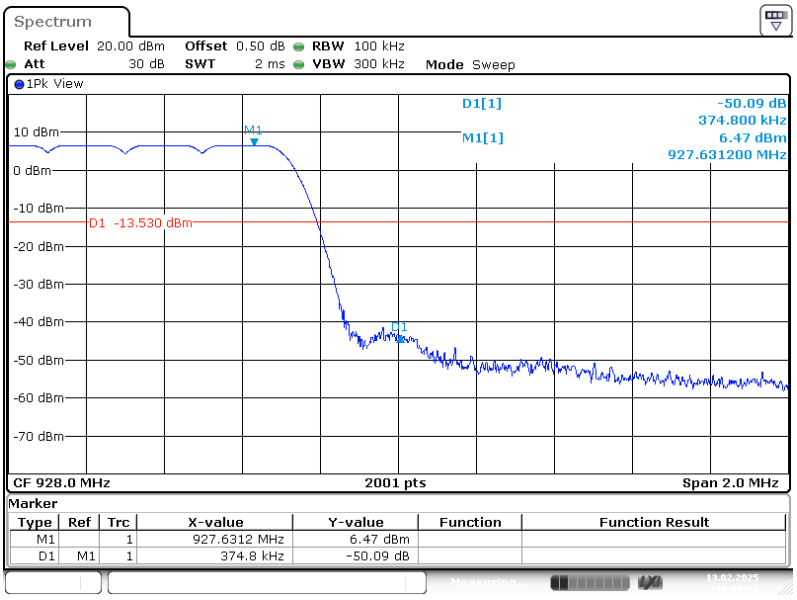
Band Edge-Left Side



ProjectNo.:2507P40548E-RF Tester:Braylon Ma

Date: 13.FEB.2025 15:35:52

Band Edge-Right Side



ProjectNo.:2507P40548E-RF Tester:Braylon Ma

Date: 13.FEB.2025 16:09:51

FCC §15.247(f) & RSS-247 Clause 5.3 a) - Power Spectral Density

Applicable Standard

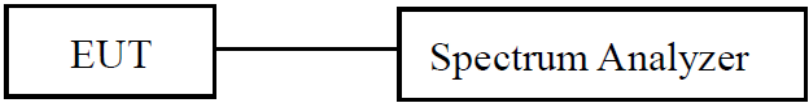
According to FCC §15.247(f)

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 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 Clause 5.3 a)

With the digital transmission operation of the hybrid system turned off, the frequency hopping operation shall have an average time of occupancy on any frequency not exceeding 0.4 seconds within a duration in seconds equal to the number of hopping frequencies multiplied by 0.4.

EUT Setup



Test Procedure

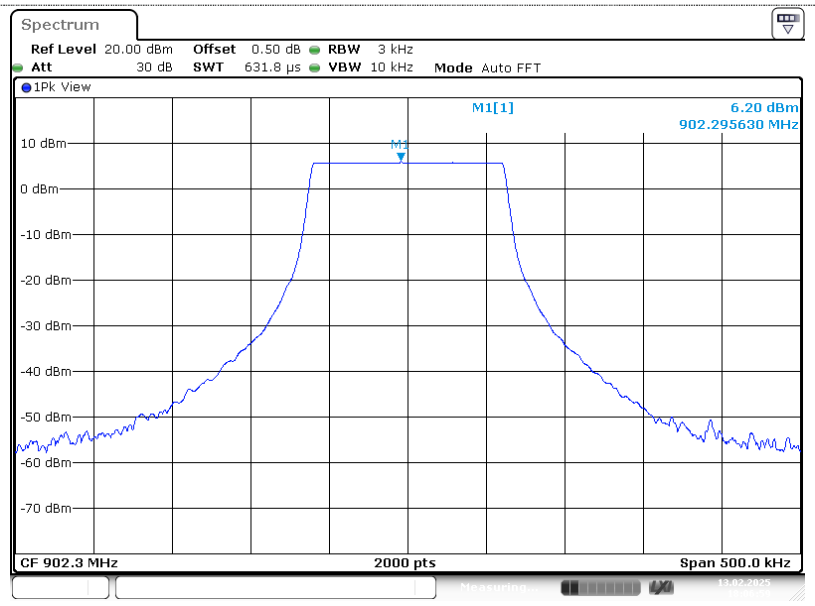
Test Method: ANSI C63.10-2013 Clause 11.10.2

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW to: 3kHz≤ RBW≤100 kHz.
3. Set the VBW ≥ 3×RBW.
4. Set the span to 1.5 times the DTS bandwidth.
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 Result within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

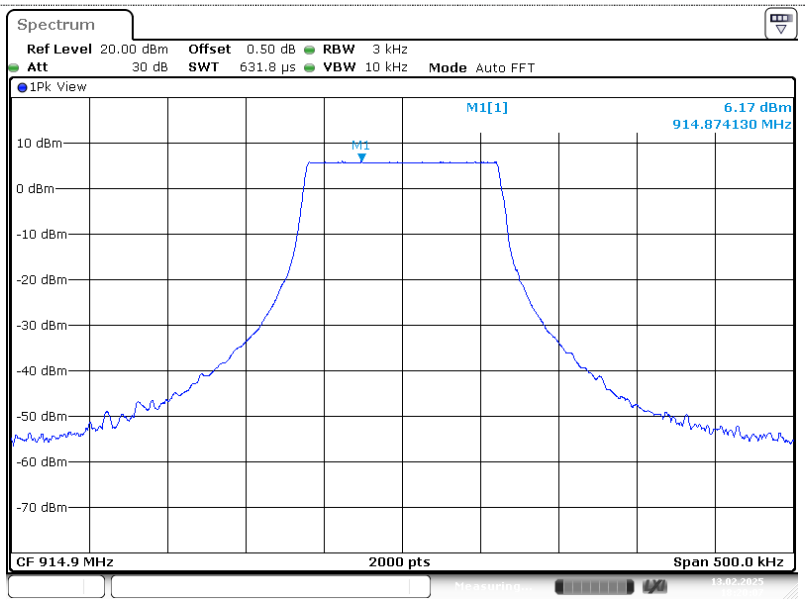
Test Data

Test Mode:	Transmitting	Test Engineer:	Braylon Ma
Test Date:	2025-02-13	Environment:	Temp.: 20.8℃ Humi.: 52% Atm :100.2kPa
Test Channel	**Test Frequency (MHz)**	**Power Spectral Density (dBm/3kHz)**	**Limit (dBm/3kHz)**
Lowest	902.3	6.20	≤8.00
Middle	914.9	6.17	≤8.00
Highest	927.6	6.30	≤8.00

Lowest Channel



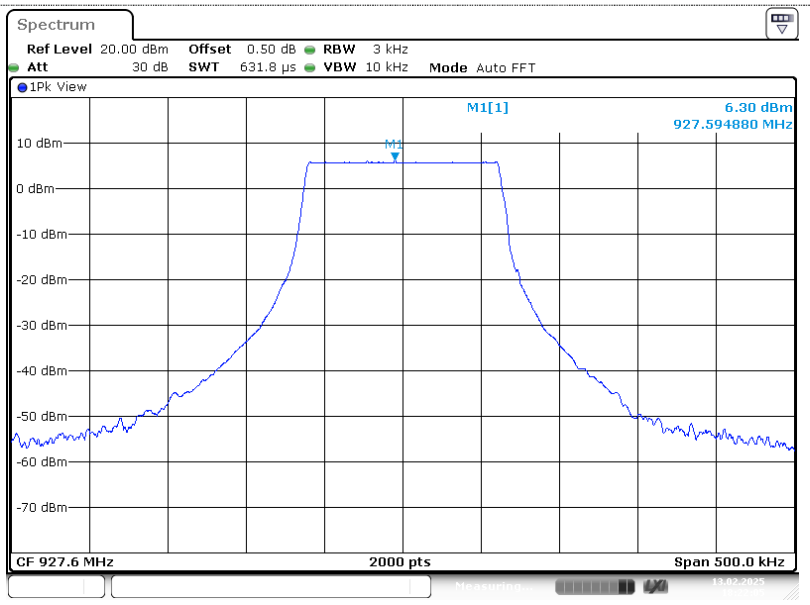
Middle Channel



ProjectNo.:2507P40548E-RF Tester:Braylon Ma

Date: 13.FEB.2025 18:20:07

Highest Channel



ProjectNo.:2507P40548E-RF Tester:Braylon Ma

Date: 13.FEB.2025 18:22:05

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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§15.211, 15.213, 15.217, 15.219, 15.221, or §15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

According to RSS-Gen §6.8

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.
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 one PCB Antenna and the antenna gain is 1.46 dBi and antenna impedance is 50Ω, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance

APPENDIX A - EUT PHOTOGRAPHS

Please refer to the attachment 2507P40548E-RF-EXP EUT EXTERNAL PHOTOGRAPHS and 2507P40548E-RF-INP EUT INTERNAL PHOTOGRAPHS.

APPENDIX B - TEST SETUP PHOTOGRAPHS

Please refer to the attachment 2507P40548E-RF-TSP TEST SETUP PHOTOGRAPHS.

Declarations

1. Bay Area Compliance Laboratories Corp. (Xiamen) is not responsible for authenticity of any information provided by the applicant. Information from the applicant that may affect test results are marked with an asterisk "★".

2. Unless otherwise stated, the results shown in this test report refer only to the sample(s) tested.

3. Unless required by the rule provided by the applicant or product regulations, then decision rule in this report did not consider the uncertainty.

4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor k=2 with the 95% confidence interval.

5. This report cannot be reproduced except in full, without prior written approval of Bay Area Compliance Laboratories Corp. (Xiamen).

6. This report is valid only with a valid digital signature. The digital signature may be available only under the adobe software above version 7.0.

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