



TEST REPORT

Product Name: UHF RFID Reader
Trademark: ATCHIP
Model Number: AT-AR7
Prepared For: ATCHIP IoT (Shanghai) Co.,Ltd
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Sample Received Date: Nov. 17, 2025
Sample tested Date: Nov. 17, 2025 to Dec. 06, 2025
Issue Date: Dec. 19, 2025
Report No.: CTB25120913101RF01
Test Standards: Ordinance Article 2 paragraph 1 item 8
Test Results: PASS
Remark: This is RFID radio test report

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Approved by:

Bin Mei / Director

Note: If there is any objection to the inspection results in this report, please submit a written report to the company within 15 days from the date of receiving the report. The test report is effective only with both signature and specialized stamp. This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen CTB Testing Technology Co., Ltd. this report can't be reproduced except in full. The tested sample(s) and the sample information are provided by the client. "*" indicates the testing items were fulfilled by subcontracted lab. "#" indicates the items are not in CNAS accreditation scope.

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1. TEST SUMMARY

1.1 VERSION

Report No.	Issue Date	Description	Approved
CTB25111707601RF01	Dec. 6, 2025	Original	Valid
CTB25120913101RF01	Dec. 19, 2025	Modification	Valid

Remark:

This report is entrusted by ATCHIP IoT (Shanghai) Co.,Ltd, and the sample in the original report CTB25111707601RF01 is of the same specifications, with only the name and address, trademark and model of the applicant have been changed. The test data and conclusions in this report are based on the original report CTB25111707601RF01.

1.2 Test description

	Test Parameter	Verdict	Remark
Item 8	Antenna power	Compliant	
Item 8	Frequency tolerance	Compliant	
Item 8	Radio channel	Compliant	
Item 8	Occupied Bandwidth	Compliant	
Item 8	Adjacent channel leakage power	Compliant	
Item 8	Spurious Emission	Compliant	
Item 8	Receiver Spurious Emission	Compliant	
Item 8	Radio Interference Prevention Capability	Compliant	
Item 8	Transmission time control equipment	Compliant	
Item 8	Carrier sense	Compliant	
Item 8	Construction Protection, Antenna gain, Reception from a responder	Compliant	
Item 8	Compliance of radiation protection	Compliant	
NOTE1: N/A (Not Applicable)			

1.3 Measurement uncertainty

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

Item	Uncertainty
Occupancy bandwidth	54.3kHz
Conducted output power Above 1G	0.9dB
Conducted output power below 1G	0.9dB
Power Spectral Density , Conduction	0.9dB
Conduction spurious emissions	2.0dB
Out of band emission	2.0dB
3m chamber Radiated spurious emission(30MHz-1GHz)	4.6dB
3m chamber Radiated spurious emission(1GHz-18GHz)	5.1dB
3m chamber Radiated spurious emission(18GHz-40GHz)	3.4dB
Frequency Error	54.3Hz
Adjacent channel power below 1G	2.6dB
Adjacent channel power Above 1G	2.8dB
humidity uncertainty	5.5%
Temperature uncertainty	0.63℃
frequency	1×10^{-7}

2. GENERAL INFORMATION

2.1 General description of EUT

Model(s):	AT-AR7
Model Description:	N/A
Hardware Version:	V1.0
Software Version:	V1.0
Operation Frequency:	916.8-920.8MHz
Rated output power:	40mW
Type of Modulation:	ASK
Antenna installation:	Ceramic antenna
Antenna Gain:	1.0dBi
Ratings:	DC 5 V charging from adapter DC 3.7V by battery

Note: For more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.2 Description of test modes

The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing.

Unit radio channel number	Frequency (MHz)	Unit radio channel number	Frequency (MHz)
5	916.8	23	920.4
11	918.0	24	920.6
17	919.2	25	920.8

Note: Test performed at the lowest/middle/highest frequencies selected in the list above for EUT supported while working on specified mode.

Pretest Mode	Description
Transmitting mode	Low channel: 916.8MHz
	Middle channel: 919.2MHz
	High channel: 920.8MHz
Receiver mode	Low channel: 916.8MHz
	Middle channel: 919.2MHz
	High channel: 920.8MHz

2.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Supply Voltage			
	supply power V	Rated module power V	Tolerance (%)
Normal	3.7	3.3	
+10%	4.07	3.3	0
-10%	3.33	3.3	0
Others			
Temperature (°C)		20-25	
Relative humidity		54 %.	
ATM Pressure:		1010 mbar	
Note 1: When the input voltage is reduced or increased by 10%, the regulator voltage changes of less than 1%. So the following test items are conducted in the normal voltage.			

2.4 Block diagram showing the configuration of system tested

Mode 1:



2.5 Description of support units (conducted mode)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/TypNo.	Note
E-1	UHF RFID Reader	ATCHIP	AT-AR7	EUT

Item	Shielded Type	Ferrite Core	Length	Note

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cmin(Length) column.
- (3) "YES" is means "shielded" "with core"; "NO" is means "unshielded" "without core".

2.6 Measurement equipment list

No.	Equipment	Manufacturer	Type No.	Serial No.	Firmware Version	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY52090073	A.14.16	2026/6/27
2	Power Sensor	Agilent	U2021XA	MY56120032	/	2026/6/27
3	Power Sensor	Agilent	U2021XA	MY56120034	/	2026/6/27
4	Communication test set	R&S	CMW500	108058	V3.5.80	2026/6/27
5	Spectrum Analyzer	KEYSIGHT	N9020A	MY51289897	A.14.16	2026/6/27
6	Signal Generator	Agilent	N5181A	MY50140365	A.01.60	2026/6/27
7	Vector signal generator	Agilent	N5182A	MY47420195	A.01.87	2026/6/27
8	Communication test set	Agilent	E5515C	MY50102567	B.19.07 (E1962B)	2026/6/27
9	2.4 GHz Filter	Shenxiang	MSF2400-24 83.5MS-1154	20181015001	/	2026/6/29
10	5 GHz Filter	Shenxiang	MSF5150-58 50MS-1155	20181015001	/	2026/6/29
11	Filter	Xingbo	XBLBQ-DZA 120	190821-1-1	/	2026/6/29
12	BT&WI-FI Automatic test software	Microwave	MTS8310	Ver. 2.0.0.0	/	/
13	Rohde & Schwarz SFU Broadcast Test System	R&S	SFU	101017	/	2026/6/27
14	Temperature humidity chamber	Hongjing	TH-80CH	DG-15174	/	2026/6/27
15	234G Automatic test software	Microwave	MTS8200	Ver. 2.0.0.0	/	/
16	966 chamber	C.R.T.	966	/	/	2027/6/21
17	Receiver	R&S	ESPI	100362	RF_ATTEN_7 (104489/003)	2026/6/27
18	Amplifier	HP	8447E	2945A02747	/	2026/6/27
19	Amplifier	Agilent	8449B	3008A01838	/	2026/6/27

20	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00869	/	2026/6/27
21	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA9120D	01911	/	2026/6/27
22	EMI test software	Fala	EZ-EMC	FA-03A2 RE	/	/
23	Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-224	/	2026/6/27
24	loop antenna	ZHINAN	ZN30900A	GTS534	/	/
25	40G Horn antenna	A/H/System	SAS-574	588	/	2026/6/27
26	Amplifier	AEROFLEX	Aeroflex	097	/	2026/6/27
27	Power Meter	KEYSIGHT	N1912AP	N/A	A.05.00	2026/6/27
28	DC power supply	Agilent	E3640A	MY53050046	/	2026/6/27

Remark: Calibration institution "GRG METROLOGY & TEST GROUP Co., LTD."

Remark: Calibration based on Article 24-2, paragraph 4 of the Radio Act method c.

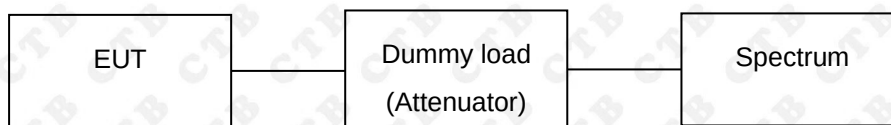
3. TEST CONDITIONS AND RESULTS

3.1 Frequency error

3.1.1 Limit

Item	Limits
Frequency Error	+/-20ppm

3.1.2 Test configuration



3.1.3 Test procedure

The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram as TEST CONFIGURATION shows.

EUT Condition: non-modulation

Spectrum Condition:

Frequency: test frequency

Span: 500 kHz

RBW: 3kHz

VBW: 3kHz

Sweep time: Auto

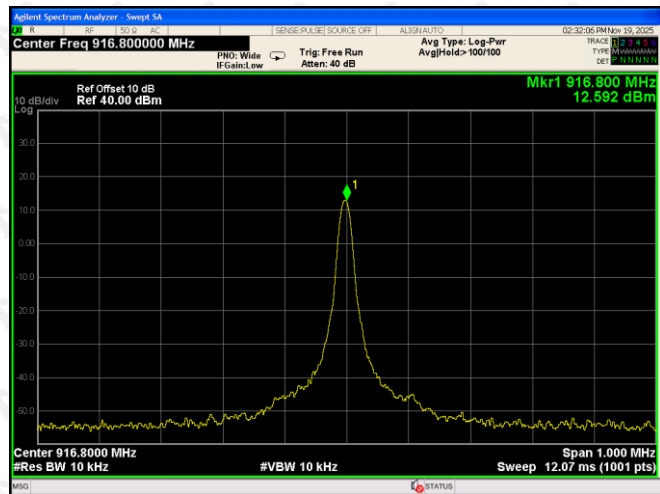
Detector mode: Positive peak

Indication mode: max hold

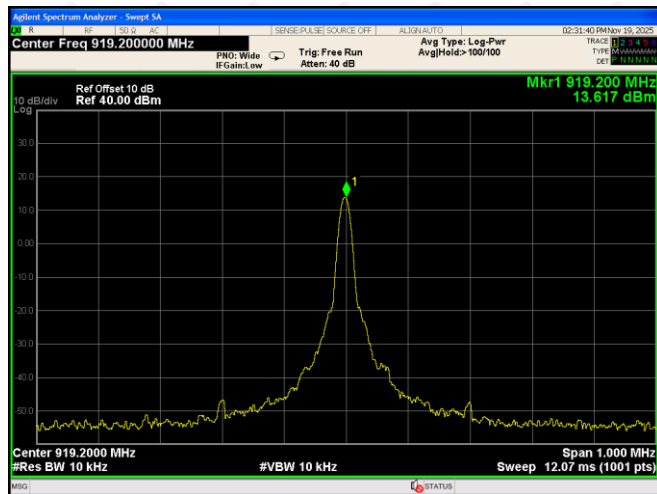
3.1.4 Test results

Test voltage (V)	Frequency (MHz)	Read (MHz)	Deviation (MHz)	Tolerance (ppm)	Limit (ppm)	Result
Normal Voltage	916.8	916.8	0	0	+/-20.00	Pass
	919.2	919.2	0	0		
	920.8	920.8	0	0		

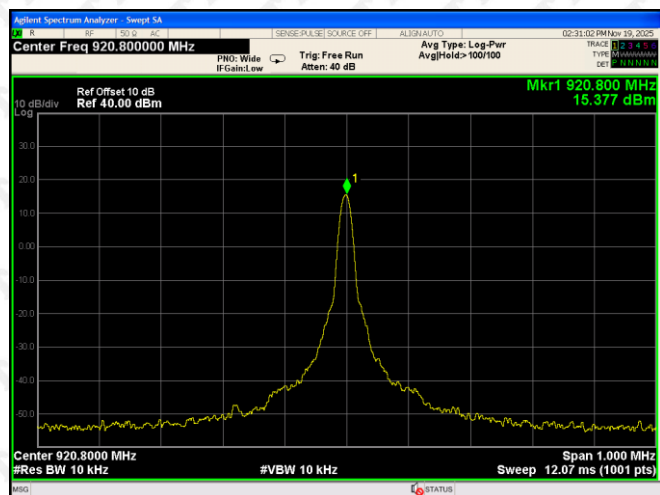
Normal Voltage



916.8MHz



919.2MHz



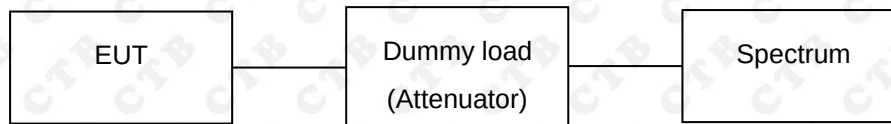
920.8MHz

3.2 Antenna output power and output power tolerance

3.2.1 Limit

Item	Limits
Antenna Power Density	$\leq 250\text{mW}$
Antenna Power Error	+20%, -80% (Base on manufacturer declare antenna power density)

3.2.2 Test configuration



3.2.3 Test procedure

Step 1:

Connect the UUT to the spectrum analyzer as TEST CONFIGURATION and use the following settings:

- Centre Frequency: The centre frequency of the channel under test.
- RBW: 2.0 MHz
- VBW: 6.0 MHz
- Span: Wide enough to cover the complete power envelope of the signal of the UUT.
- Detector: Peak
- Trace Mode: Max Hold

Step 2:

When the trace is complete, find the peak value of the power envelope and record the frequency.

Step 3:

Make the following changes to the settings of the spectrum analyzer:

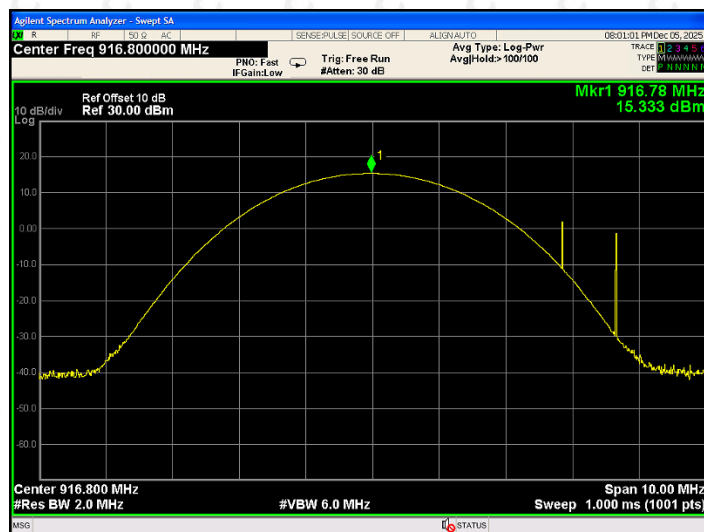
- Centre Frequency: Equal to the frequency recorded in step 2.
- Span: 10 MHz
- RBW: 2 MHz
- VBW: 6MHz
- Detector: RMS
- Trace Mode: Max Hold

3.2.4 Test results

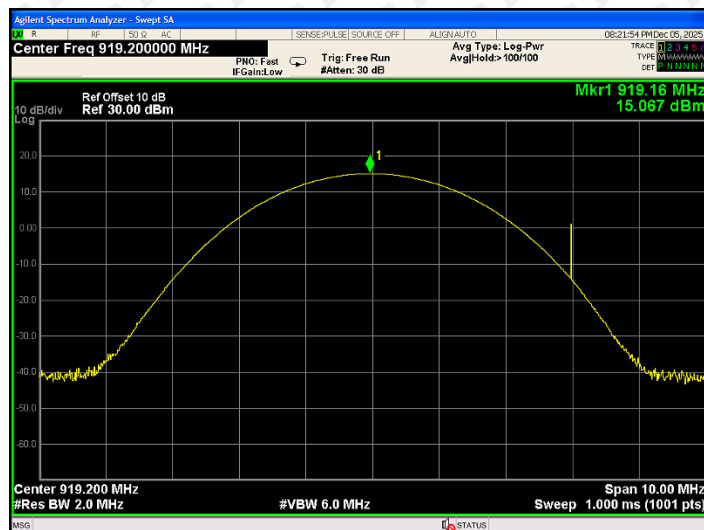
Test modulation	Test Channel	Average burst power(dBm)	Output power (mW)	Rated output power (mW)	Tolerance (%)	Limit	Result
ASK	L	15.333	34.143	40	-14.64	250mW -80%~20%	Pass
	M	15.067	32.114	40	-19.71	250mW -80%~20%	Pass
	H	15.656	36.779	40	-8.05	250mW -80%~20%	Pass

Test voltage (V)	Mode	Channel	Polar	EIRP (dBm)	Limit (dBm)
Normal Voltage	ASK	L	H	16.333	27
		M	H	16.067	
		H	H	16.656	
		L	V	16.228	
		M	V	16.052	
		H	V	15.797	

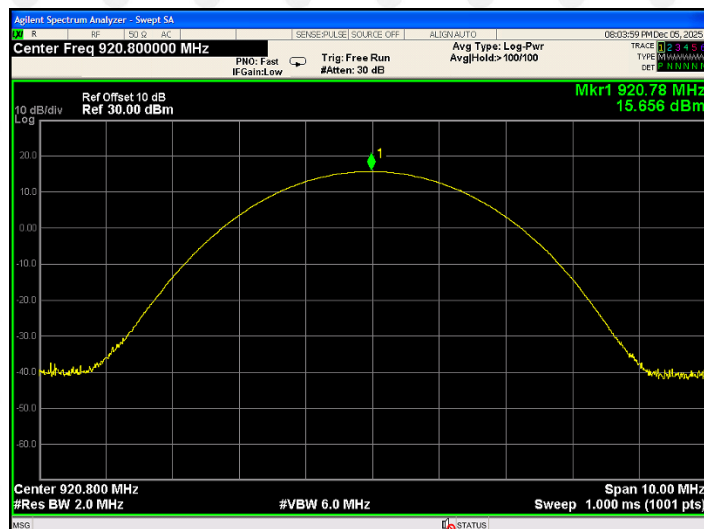
916.8MHz channel



919.2MHz channel



920.8MHz channel

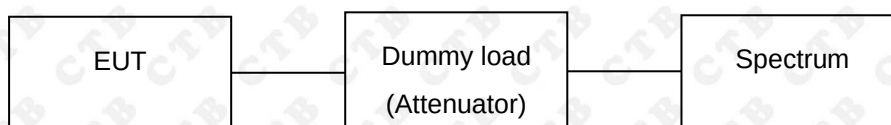


3.3 Occupied bandwidth and spreading bandwidth

3.3.1 Limit

Item	Limits
Occupied BandWidth:	≤200kHz;

3.3.2 Test configuration



3.3.3 Test procedure

1. Setting of SA is following as fellow:

RBW: Less than 3% of the allowable value specified in Equipment Regulations

VBW: Comparable to the resolution bandwidth

Sweep time: Auto

Sweep Mode: Continuous sweep

Detect mode: Positive peak

Trace mode: Max hold

2. EUT have transmitted the maximum modulation signal and fixed channelize. SA set to 99% of occupied bandwidth to measure occupied bandwidth.

3.3.4 Test results

Test modulation	Test Channel	Occupy 99% Bandwidth (kHz)	Limit (MHz)	Result
ASK	L	180.5	≤200kHz	Pass
	M	172.78		
	H	186.29		

99% Bandwidth

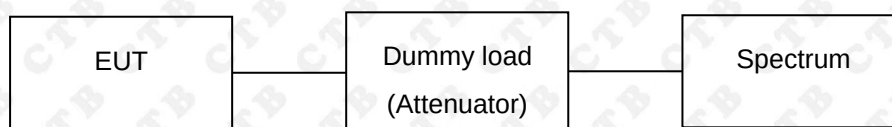


3.4 Unwanted emission strength

3.4.1 Limit

Frequency band	Spurious emission / Unwanted Emission Intensity (average power)	Reference bandwidth
$f \leq 710 \text{ MHz}$	-36 dBm	100 kHz
$710 \text{ MHz} < f \leq 900 \text{ MHz}$	-55 dBm	1 MHz
$900 \text{ MHz} < f \leq 915 \text{ MHz}$	-55 dBm	100 kHz
$915 \text{ MHz} < f \leq 930 \text{ MHz}$ (Except for $ f - f_c \leq (200 + 100 \times n) \text{ kHz}$ if bandwidth of unit channel is 200 kHz, except for $ f - f_c \leq (100 + 50 \times n) \text{ kHz}$ if bandwidth of unit channel is 100 kHz. Except for $ f - f_c \leq (100 + 100 \times n) \text{ kHz}$ if frequency band is $915.9 \text{ MHz} \leq f \leq$ 916.9 MHz and $920.5 \text{ MHz} \leq f \leq$ 922.3 MHz . Where n is a number of unit channels constituting the radio channel and is an integer from 1 to 5)	-36 dBm	100 kHz
$930 \text{ MHz} < f \leq 1,000 \text{ MHz}$	-55 dBm	100 kHz
$1,000 \text{ MHz} < f \leq 1,215 \text{ MHz}$	-45 dBm	1M Hz
$1,215 \text{ MHz} < f$	-30 dBm	1M Hz

3.4.2 Test configuration



3.4.3 Test procedure

Spectrum analyzer set at the time of measurement of firing sub is as follows.

Center frequency	Firing frequency side
Span	From 30MHz to 10GHz
RBW	From 945MHz up to 1GHz and if, 100kHz from 30MHz to 710MHz From 1GHz to 10GHz and if, 1MHz to 945MHz from 710MHz
VBW	Equal to RBW
Y-axis scale	10dB/Div
Sweep time	the minimum time is guaranteed measurement accuracy
Sweep mode	Signal sweep
Detection mode	Sample

(1) Set as 2 (1) spectrum analyzer, to explore the maximum value of the amplitude of the firing side to sweep up to 10GHz from 30MHz.

(2) If the allowable value is the value that you search the Regulations equipment, the measured values and the values that you search.

(3) If you exceed the allowable value is the value that you search the Regulations facilities, asking the frequency of side-firing, set as 2 (2) spectrum analyzer to measure the average power averaging processing is performed.

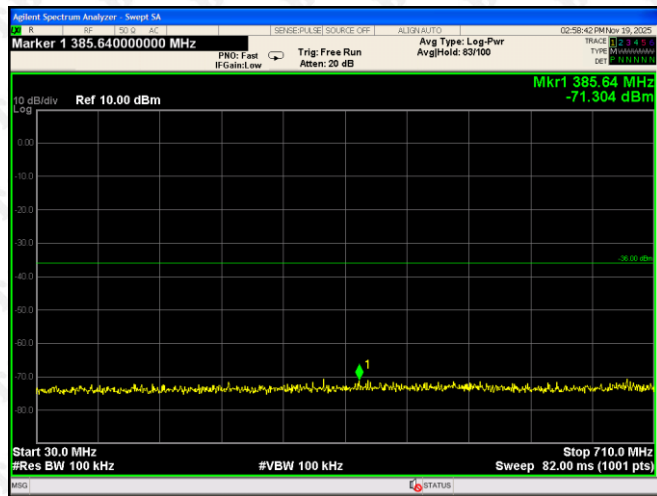
(4) If you cannot set the state of the receive-only facilities receiving radio to use the antenna that are common in the measurement of up to (3), external trigger signal spectrum analyzer using a broadband detector the transmission power of the test equipment from (1) transmission and , except time to measure the transmission time.

3.4.4 Test results

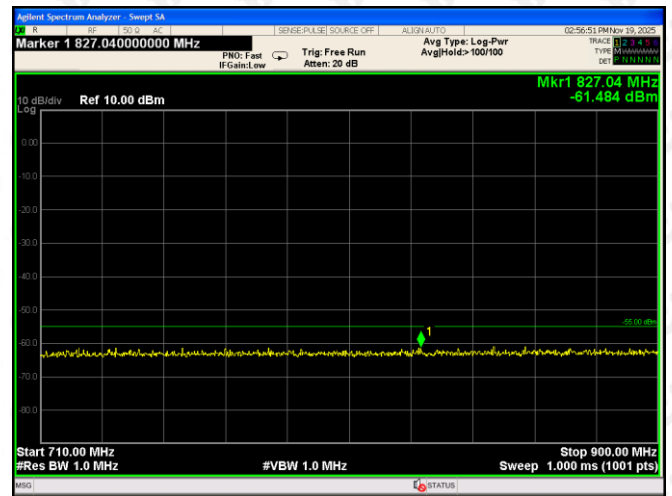
Test modulation	Test freq.	Test freq. range	Emission Frequency (MHz)	Test result (dBm/MHz)	Test result (uW/MHz)	limits (uW/MHz)	Result
ASK	916.8MHz	$30\text{MHz} \leq f \leq 710\text{MHz}$	696.4	-71.304	0.0007	2.512	PASS
		$710\text{MHz} < f \leq 900\text{MHz}$	767.57	-61.484	0.0007	0.003	PASS
		$900\text{MHz} < f \leq 915\text{MHz}$	912.615	-71.475	0.0001	0.003	PASS
		$915\text{MHz} \leq f < 915.7\text{MHz}$	915.697	-72.740	0.0001	0.251	PASS
		$915.7\text{MHz} \leq f < 916.6\text{MHz}$	916.696	-71.681	0.0001	1.259	PASS
		$917.0\text{MHz} \leq f < 923.5\text{MHz}$	916.906	-72.056	0.0001	1.259	PASS
		$923.5\text{MHz} \leq f < 930\text{MHz}$	927.699	-72.313	0.0001	0.251	PASS
		$930\text{MHz} < f \leq 1000\text{MHz}$	975.22	-64.960	0.0003	0.003	PASS
		$1000\text{MHz} < f \leq 1215\text{MHz}$	1205.97	-61.162	0.0008	0.032	PASS
		$1215\text{MHz} \leq f < 5000\text{MHz}$	3588	-57.803	0.0017	1.000	PASS
	919.2MHz	$30\text{MHz} \leq f \leq 710\text{MHz}$	580.80	-72.112	0.0006	2.512	PASS
		$710\text{MHz} < f \leq 900\text{MHz}$	774.60	-61.574	0.0007	0.003	PASS
		$900\text{MHz} < f \leq 915\text{MHz}$	904.260	-72.488	0.0001	0.003	PASS
		$915\text{MHz} \leq f < 915.7\text{MHz}$	915.35	-72.434	0.0001	0.251	PASS
		$915.7\text{MHz} \leq f < 917.8\text{MHz}$	919.1	-72.074	0.0001	1.259	PASS
		$918.2\text{MHz} \leq f < 923.5\text{MHz}$	919.3	-73.366	0.0001	1.259	PASS
		$923.5\text{MHz} \leq f < 930\text{MHz}$	924.2085	-71.885	0.0001	0.251	PASS
		$930\text{MHz} < f \leq 1000\text{MHz}$	940.29	-64.338	0.0004	0.003	PASS
		$1000\text{MHz} < f \leq 1215\text{MHz}$	1193.285	-71.277	0.0001	0.032	PASS
		$1215\text{MHz} \leq f < 5000\text{MHz}$	3274	-61.762	0.0007	1.000	PASS
	920.8MHz	$30\text{MHz} \leq f \leq 710\text{MHz}$	631.80	-41.11	0.7745	2.512	PASS
		$710\text{MHz} < f \leq 900\text{MHz}$	773.46	-60.951	0.0008	0.003	PASS
		$900\text{MHz} < f \leq 915\text{MHz}$	911.550	-73.738	0.00004	0.003	PASS

		$915\text{MHz} \leq f < 915.7\text{MHz}$	915.5124	-71.483	0.0001	0.251	PASS
		$915.7\text{MHz} \leq f < 919\text{MHz}$	920.695	-72.932	0.0001	1.259	PASS
		$919.4\text{MHz} \leq f < 923.5\text{MHz}$	920.900	-72.619	0.0001	1.259	PASS
		$923.5\text{MHz} \leq f < 930\text{MHz}$	929.0965	-71.323	0.0001	0.251	PASS
		$930\text{MHz} < f \leq 1000\text{MHz}$	965.35	-61.944	0.0006	0.003	PASS
		$1000\text{MHz} < f \leq 1215\text{MHz}$	1029.240	-71.551	0.0001	0.032	PASS
		$1215\text{MHz} \leq f < 5000\text{MHz}$	3145	-64.748	0.0003	1.000	PASS

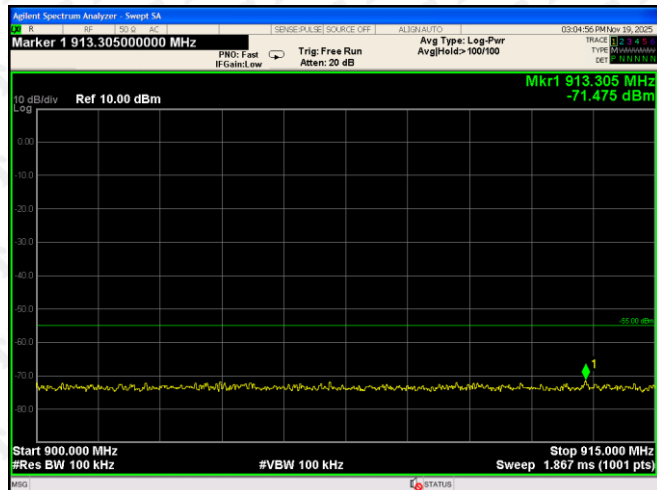
Test channel:



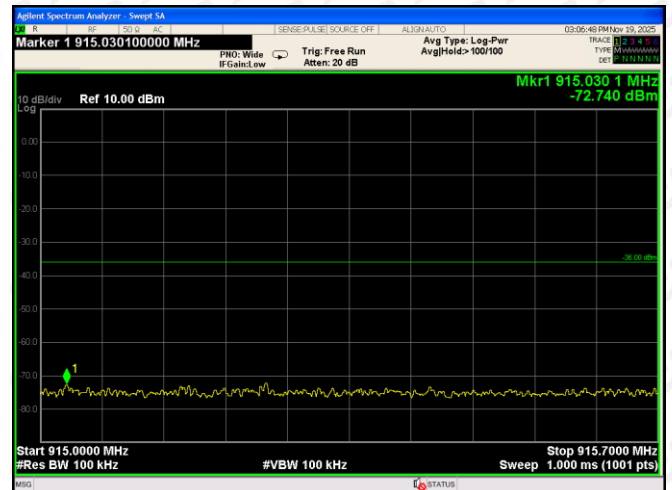
916.8MHz



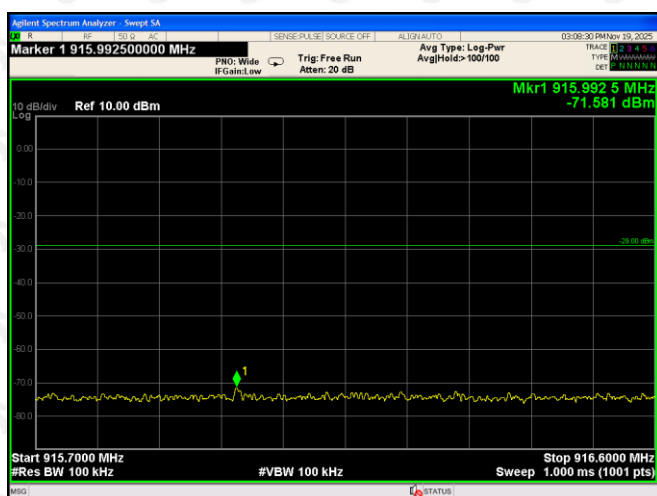
30MHz ≤ f ≤ 710MHz



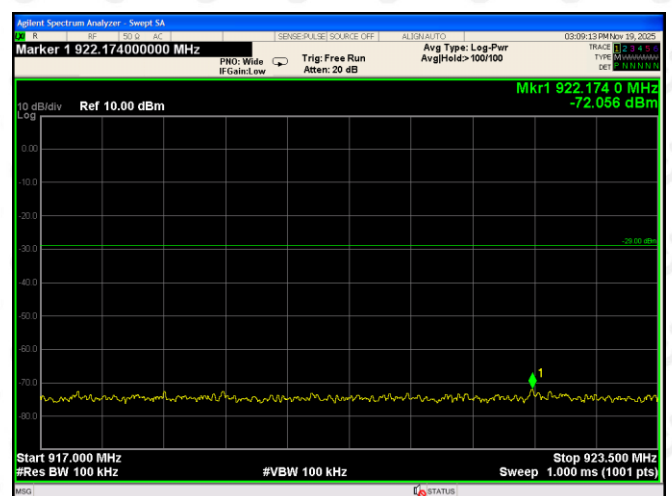
710MHz < f ≤ 900MHz



900MHz < f ≤ 915MHz

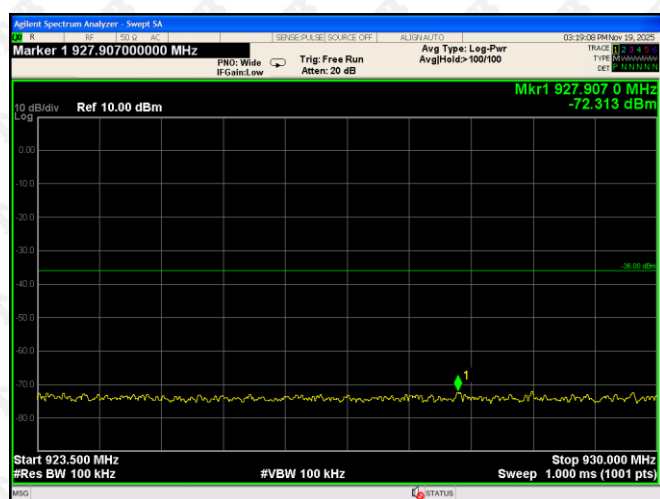
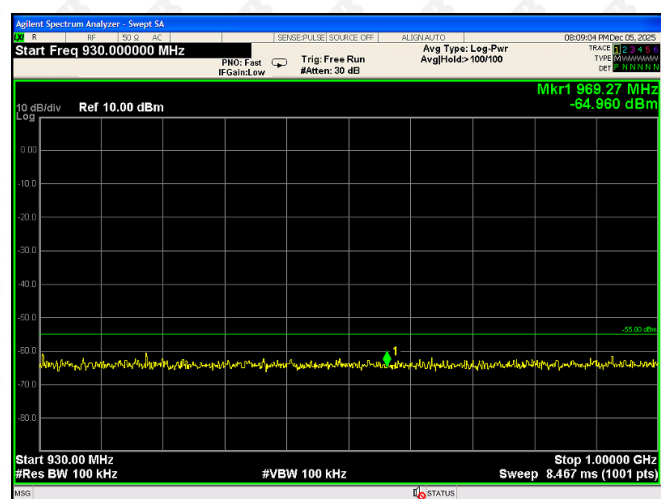
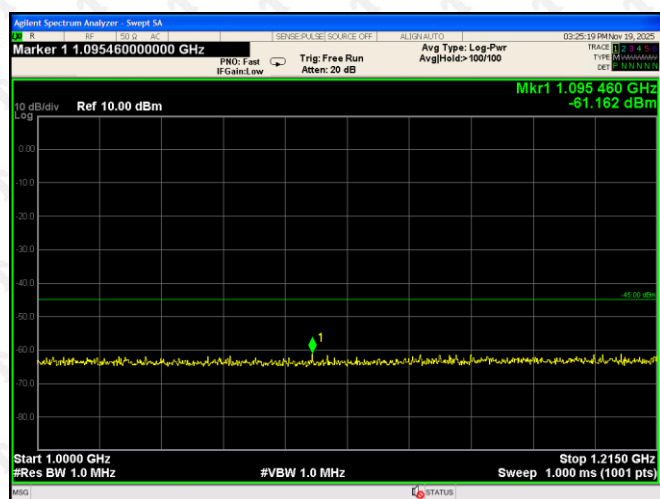
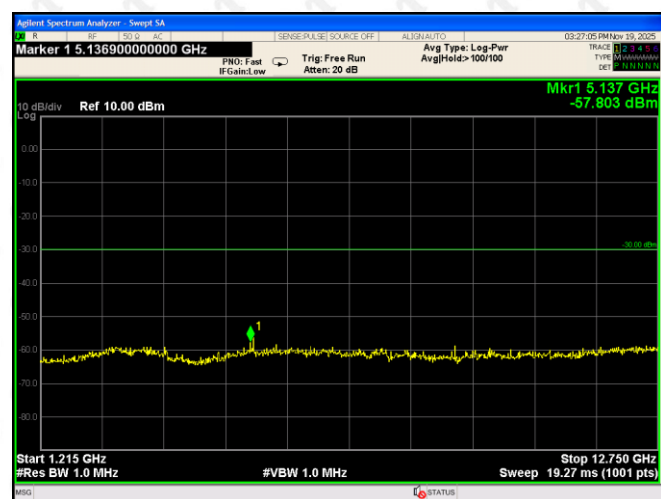


915MHz ≤ f < 915.7MHz



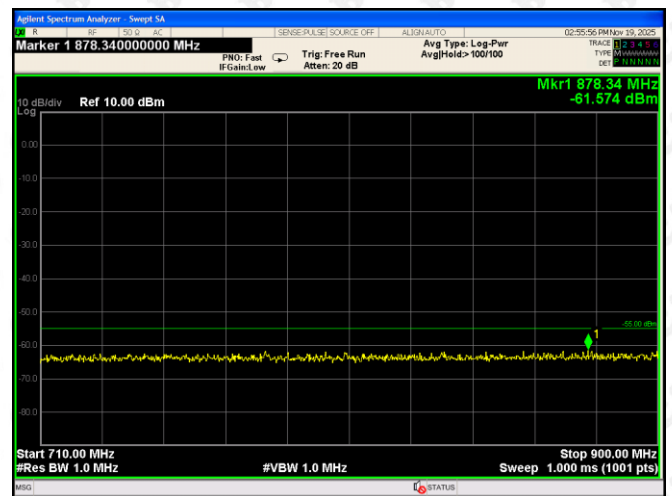
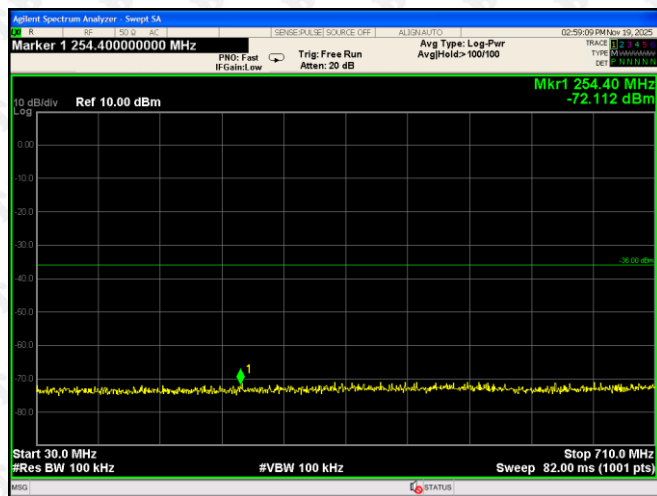
915.7MHz < f ≤ 916.6MHz

917.0MHz < f ≤ 923.5MHz


 $923.5\text{MHz} \leq f < 930\text{MHz}$

 $930\text{MHz} < f \leq 1000\text{MHz}$

 $1000\text{MHz} < f \leq 1215\text{MHz}$

 $1215\text{MHz} \leq f < 12500\text{MHz}$

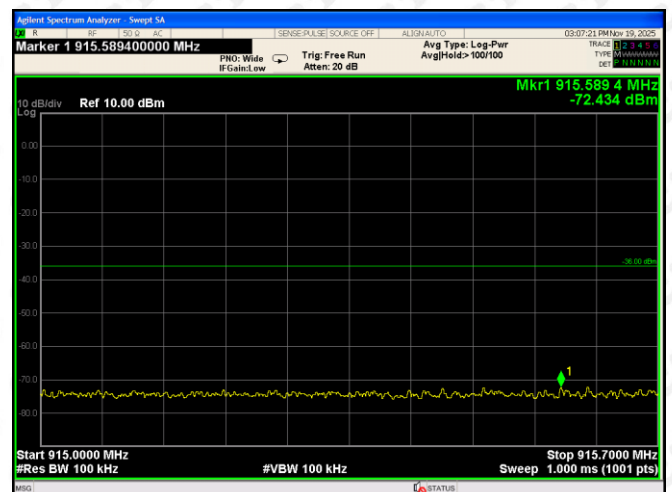
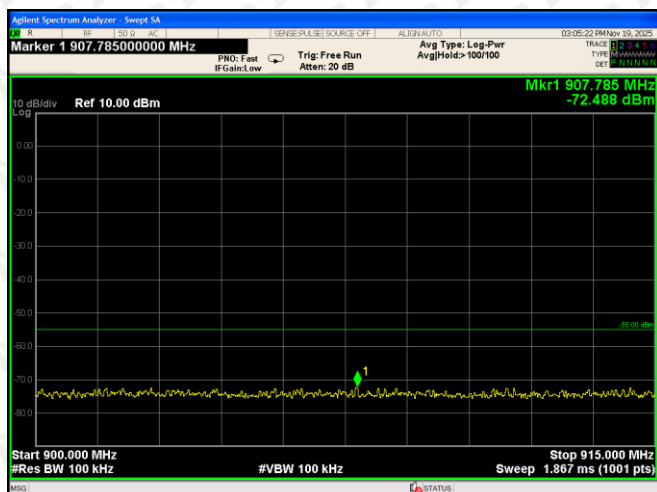
Test channel:

919.2MHz



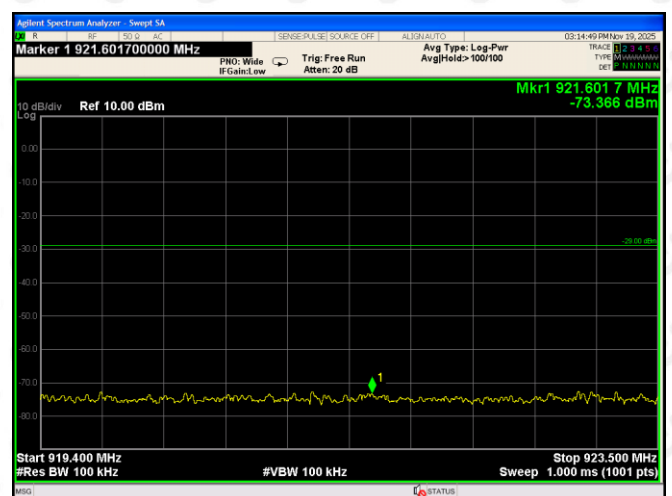
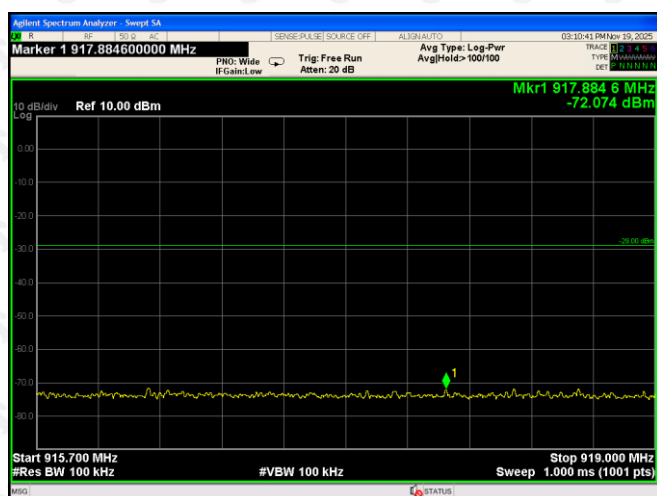
$30\text{MHz} \leq f \leq 710\text{MHz}$

$710\text{MHz} < f \leq 900\text{MHz}$



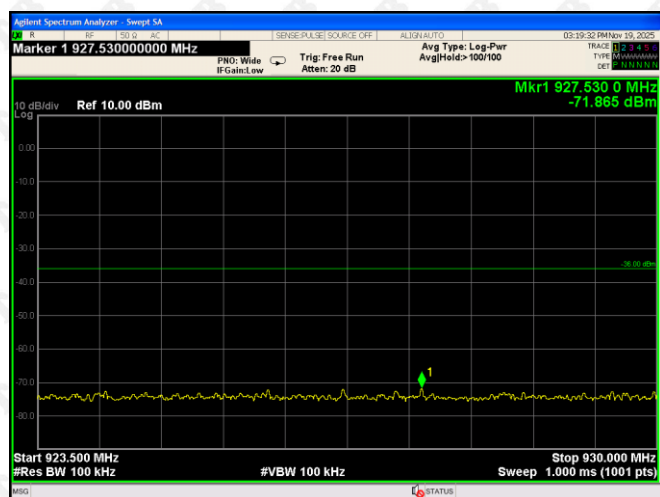
$900\text{MHz} < f \leq 915\text{MHz}$

$915\text{MHz} \leq f < 915.7\text{MHz}$

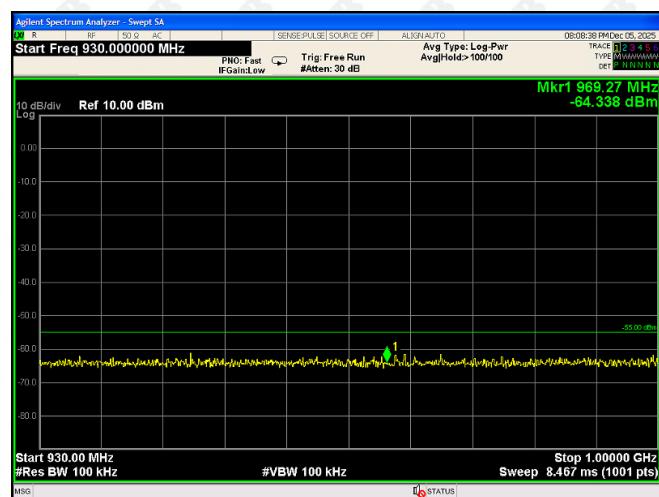


$915.7\text{MHz} < f \leq 920.2\text{MHz}$

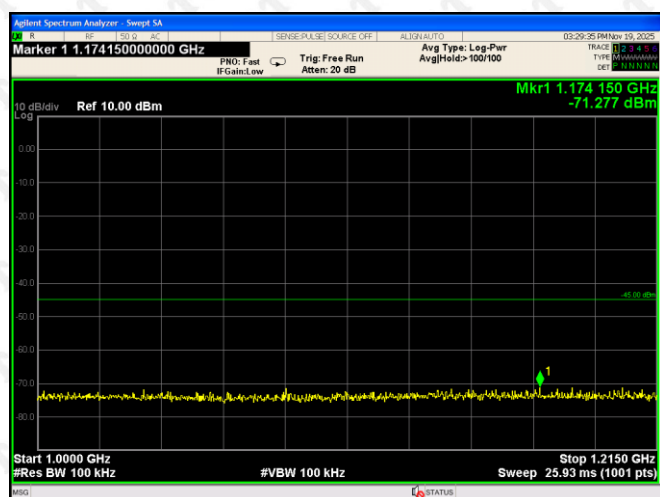
$920.6\text{MHz} < f \leq 923.5\text{MHz}$



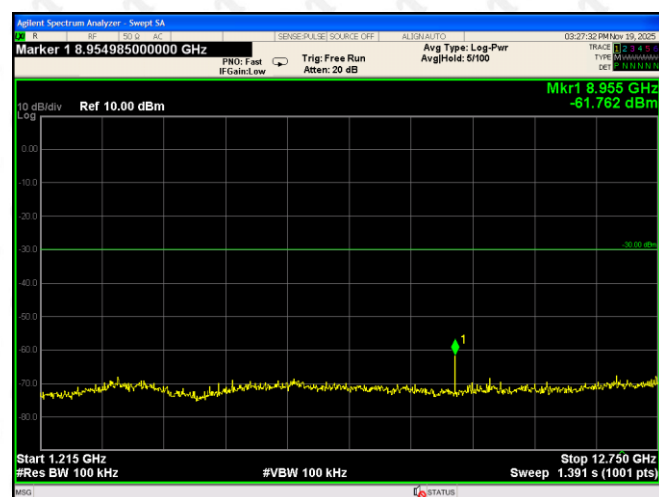
$923.5\text{MHz} \leq f < 930\text{MHz}$



$930\text{MHz} < f \leq 1000\text{MHz}$



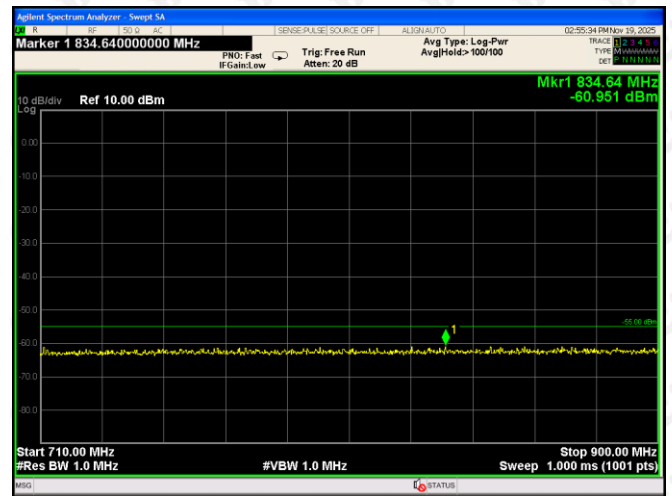
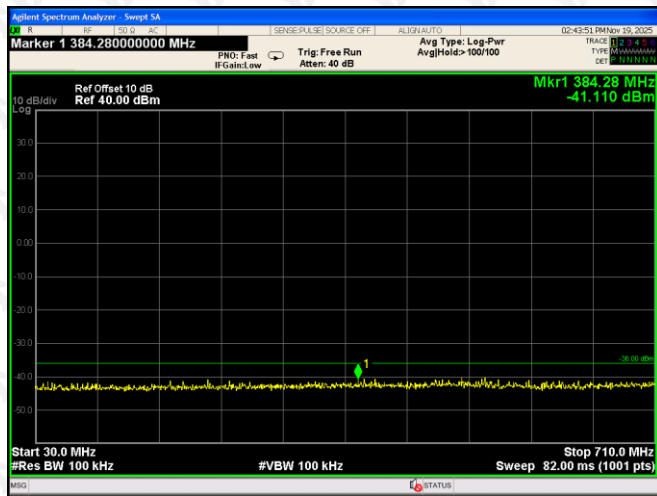
$1000\text{MHz} < f \leq 1215\text{MHz}$



$1215\text{MHz} \leq f < 12500\text{MHz}$

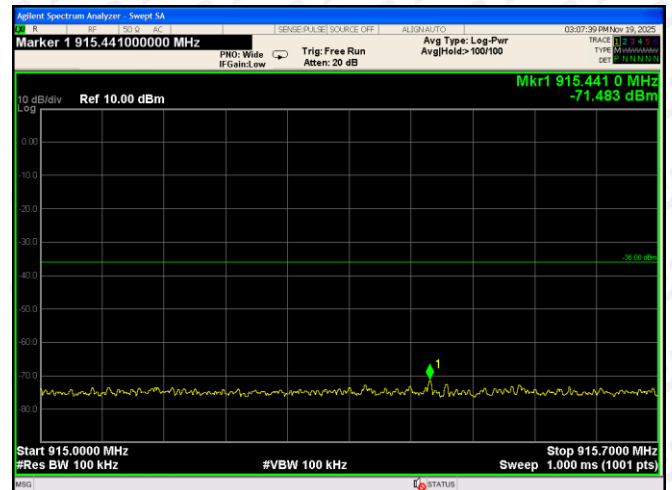
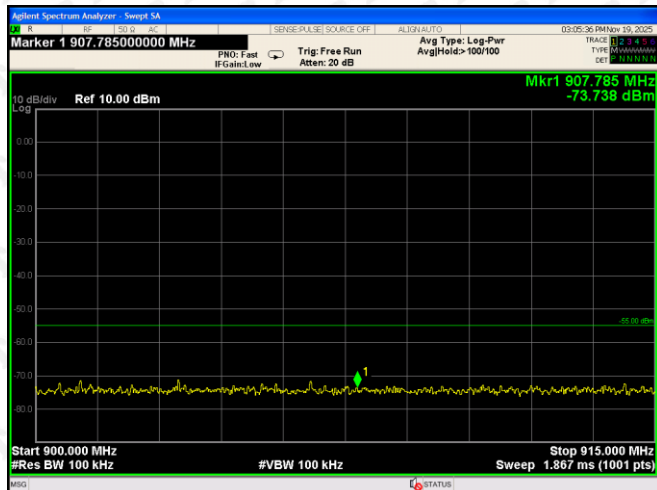
Test channel:

920.8MHz



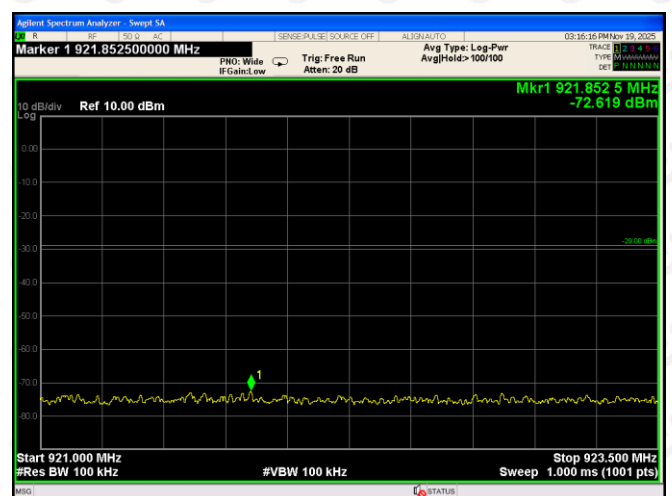
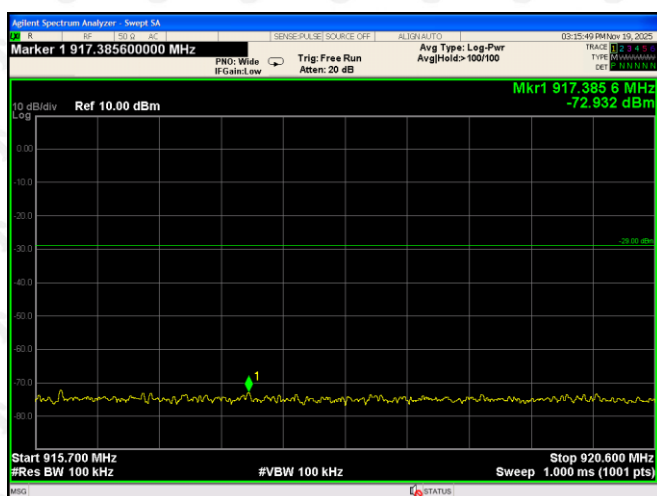
$30\text{MHz} \leq f \leq 710\text{MHz}$

$710\text{MHz} < f \leq 900\text{MHz}$



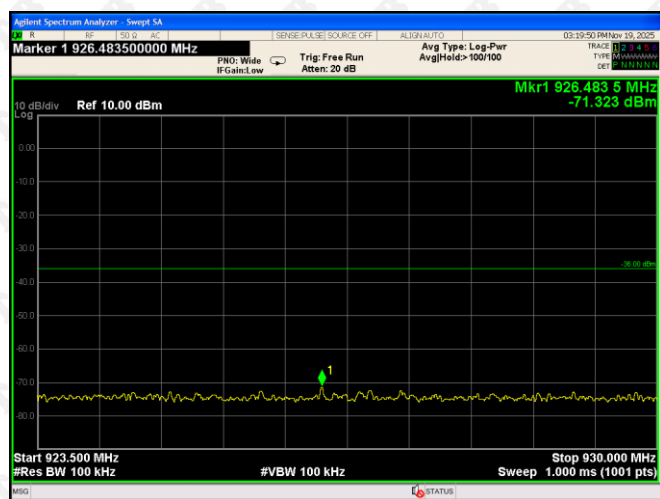
$900\text{MHz} < f \leq 915\text{MHz}$

$915\text{MHz} \leq f < 915.7\text{MHz}$

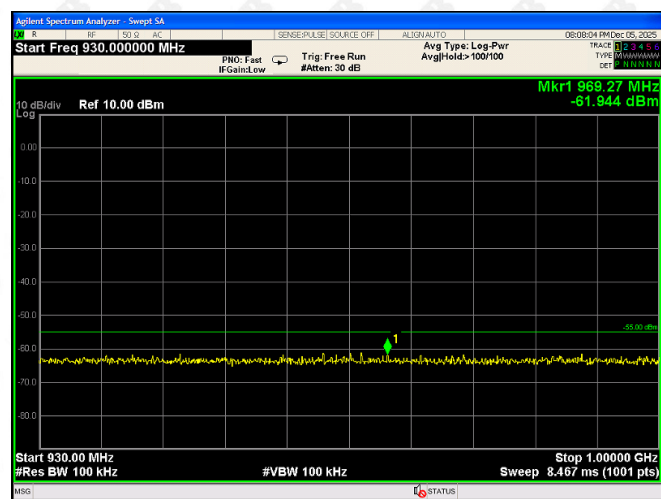


$915.7\text{MHz} < f \leq 920.6\text{MHz}$

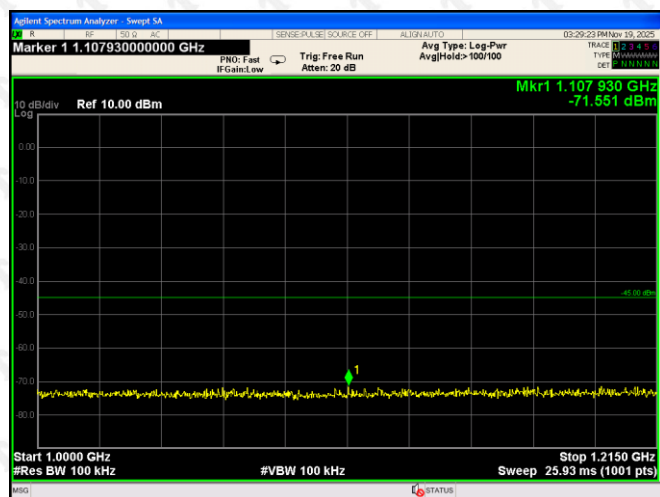
$921.0\text{MHz} < f \leq 923.5\text{MHz}$



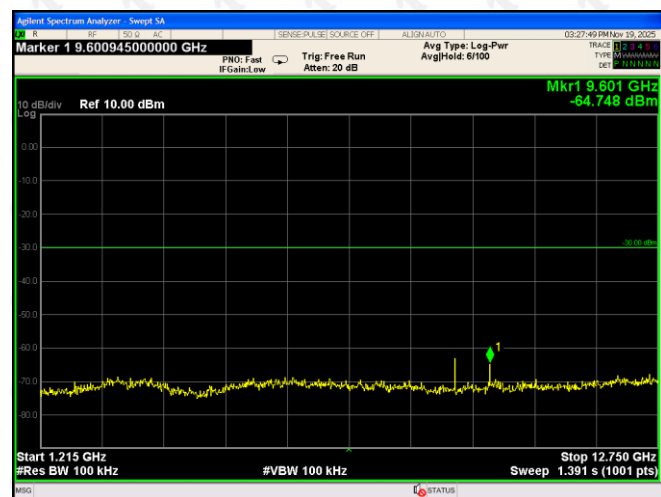
$923.5\text{MHz} \leq f < 930\text{MHz}$



$930\text{MHz} < f \leq 1000\text{MHz}$



$1000\text{MHz} < f \leq 1215\text{MHz}$



$1215\text{MHz} \leq f < 12500\text{MHz}$

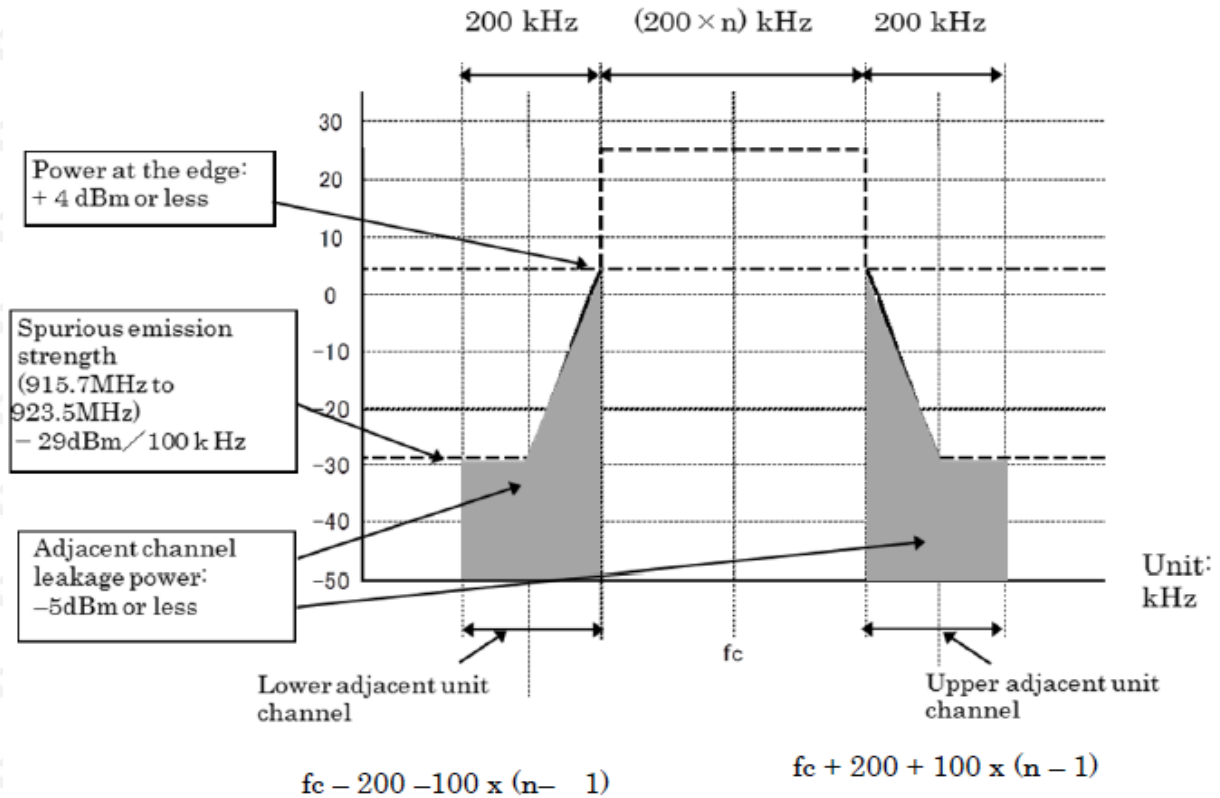
3.5 ADJACENT CHANNEL LEAKAGE POWER

3.5.1 Limit

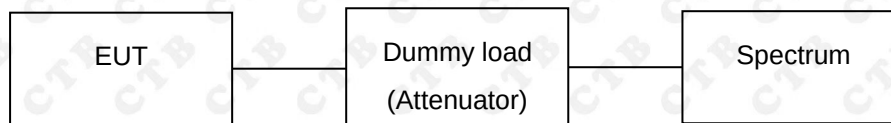
Frequency band of signal in use is from 916.8MHz to 920.8MHz. (Antenna power is 250mW or less (with carrier sense).)

Leakage power in unit channel adjacent to a radio channel: It shall be -5dBm or less.

Unit: dBm/ 100kHz



3.5.2 Test configuration



3.5.3 Test procedure

Spectrum analyzer is set as follows.

Center frequency

Carrier frequency

Carrier frequency $+100\text{kHz} \times (n + 1)$

Carrier frequency $-100\text{kHz} \times (n + 1)$

Span

When measuring the total power (carrier power) : $n \times 200\text{kHz}$

Adjacent channel leakage power measurement when the upper and lower: 199kHz

Resolution bandwidth

100 kHz

Video bandwidth

more than three times the resolution bandwidth

Sweep time

the minimum time is guaranteed measurement accuracy (in the case of

wave

burst, burst duration of one or more per sample)

Sweep mode

Single sweep

Detection mode

RMS

n is the number of channel units used at the same time as a radio channel.

If it takes a long time to sweep a long burst period, continuous sweep sweep mode, as Max Hold the display mode can be measured until there is no variation of the displayed waveform. In this case, it is possible to shorten the time spectrum analyzer sweep.

3.5.4 Test results

916.8MHz channel



919.2MHz channel



920.8MHz channel



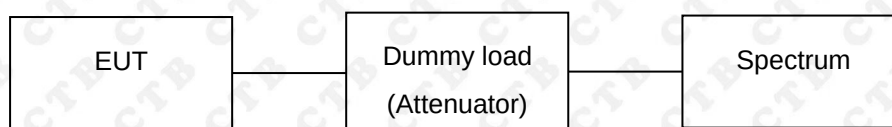
3.6 Secondary radiated emission strength

3.6.1 Limit

Permissible Values for Spurious Emission / Unwanted Emission Intensity at the antenna input shall be less than the value in Table 3-16.

Frequency band	Limit on Secondary Radiated Emissions (Antenna input)	Reference bandwidth
$f \leq 710 \text{ MHz}$	-54 dBm	100 kHz
$710 \text{ MHz} < f \leq 900 \text{ MHz}$	-55 dBm	1 MHz
$900 \text{ MHz} < f \leq 915 \text{ MHz}$	-55 dBm	100 kHz
$915 \text{ MHz} < f \leq 930 \text{ MHz}$	-54 dBm	100 kHz
$930 \text{ MHz} < f \leq 1,000 \text{ MHz}$	-55 dBm	100 kHz
$1,000 \text{ MHz} < f$	-47 dBm	1 MHz

3.6.2 Test configuration



3.6.3 Test procedure

Spectrum analyzer set at the time of measurement of firing sub is as follows.

Center frequency	Firing frequency side
Span	From 30MHz to 10GHz
RBW	From 945MHz up to 1GHz and if, 100kHz from 30MHz to 710MHz frequency
	sweep width
	From 1GHz to 10GHz and if, 1MHz to 945MHz from 710MHz frequency
	sweep width
VBW	Equal to RBW
Y-axis scale	10dB/Div
Sweep time	the minimum time is guaranteed measurement accuracy
Sweep mode	Signal sweep

Detection mode

Sample

(1) Set as 2 (1) spectrum analyzer, to explore the maximum value of the amplitude of the firing side to sweep up to 10GHz from 30MHz.

(2) If the allowable value is the value that you search the Regulations equipment, the measured values and the values that you search.

(3) If you exceed the allowable value is the value that you search the Regulations facilities, asking the frequency of side-firing, set as 2 (2) spectrum analyzer to measure the average power averaging processing is performed.

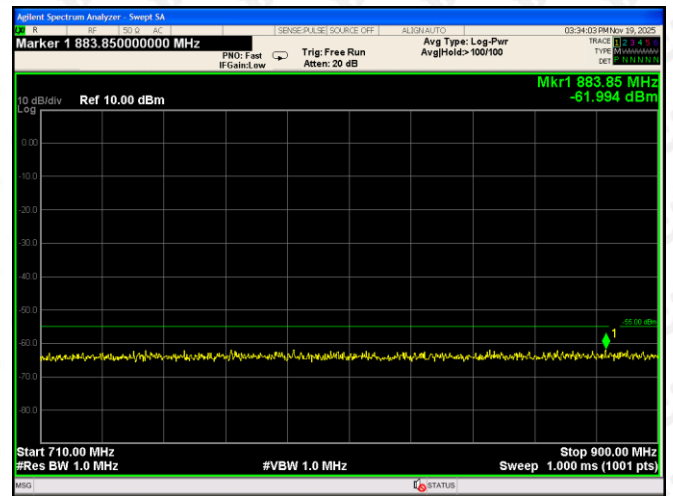
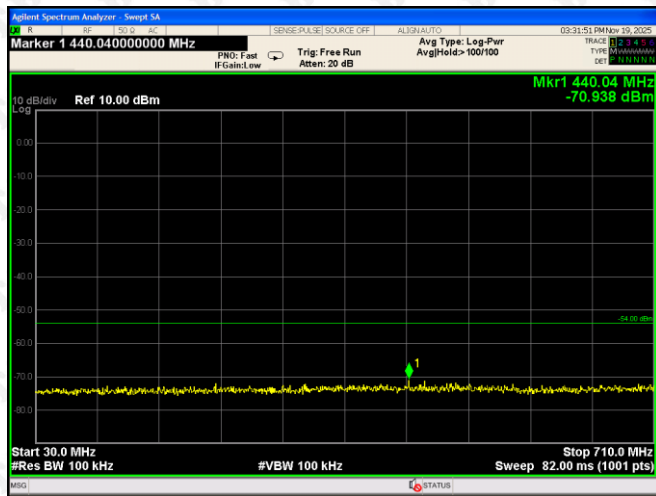
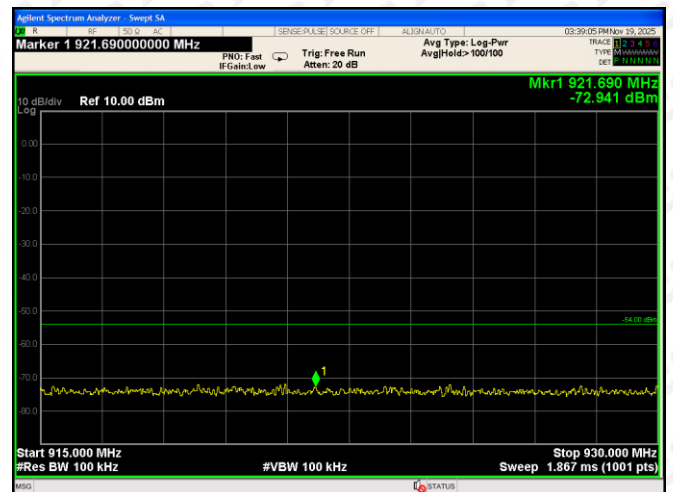
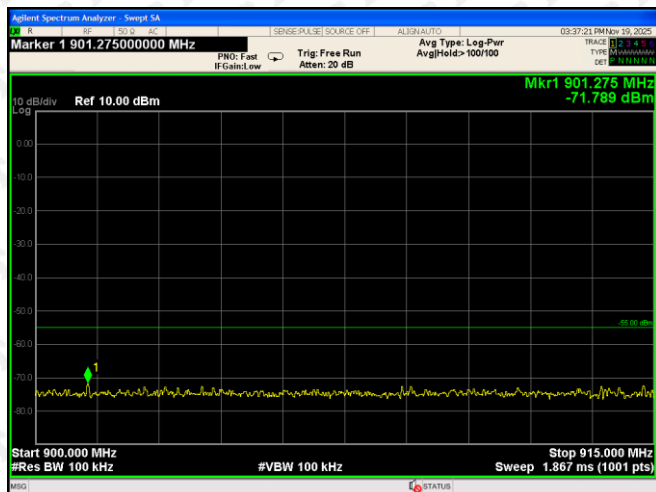
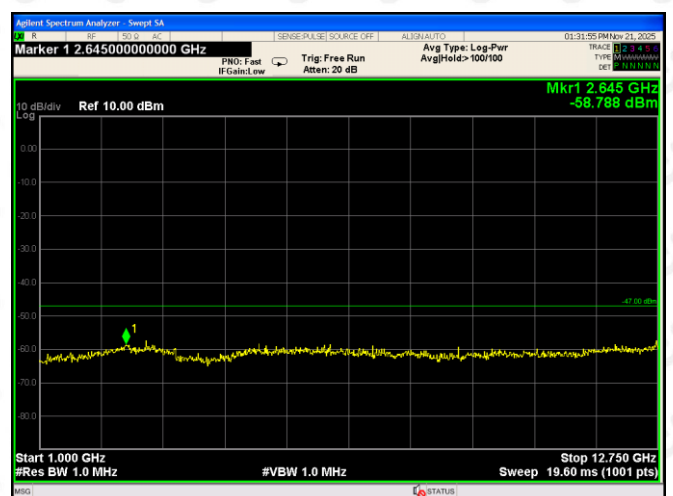
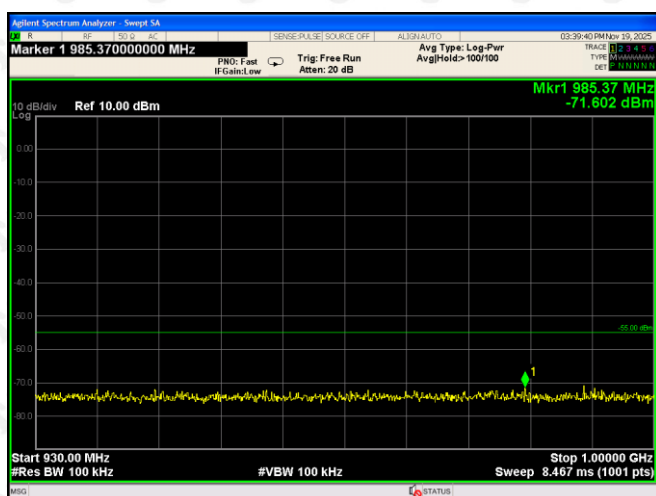
(4) If you cannot set the state of the receive-only facilities receiving radio to use the antenna that are common in the measurement of up to (3), external trigger signal spectrum analyzer using a broadband detector the transmission power of the test equipment from (1) transmission and , except time to measure the transmission time.

3.6.4 Test results

Test modulation	Test freq.	Test freq. range	Emission Frequency (MHz)	Test result dBm	Limit (dBm)	Reference bandwidth	Result
ASK	916.8MHz	$30\text{MHz} \leq f \leq 710\text{MHz}$	440.04	-70.938	-54	100kHz	PASS
		$710\text{MHz} < f \leq 900\text{MHz}$	883.85	-61.664	-55	1MHz	PASS
		$900\text{MHz} < f \leq 915\text{MHz}$	901.275	-71.789	-55	100kHz	PASS
		$915\text{MHz} \leq f < 930\text{MHz}$	921.690	-72.941	-54	100kHz	PASS
		$930\text{MHz} < f \leq 1000\text{MHz}$	985.37	-71.602	-55	100kHz	PASS
		$1000\text{MHz} \leq f < 12750\text{MHz}$	2645	-58.788	-47	1MHz	PASS
	919.2MHz	$30\text{MHz} \leq f \leq 710\text{MHz}$	359.12	-72.238	-54	100kHz	PASS
		$710\text{MHz} < f \leq 900\text{MHz}$	783.15	-61.490	-55	1MHz	PASS
		$900\text{MHz} < f \leq 915\text{MHz}$	903.345	-72.797	-55	100kHz	PASS
		$915\text{MHz} \leq f < 930\text{MHz}$	916.725	-71.670	-54	100kHz	PASS
		$930\text{MHz} < f \leq 1000\text{MHz}$	978.44	-72.121	-55	100kHz	PASS
		$1000\text{MHz} \leq f < 12750\text{MHz}$	3150	-58.897	-47	1MHz	PASS
	920.8MHz	$30\text{MHz} \leq f \leq 710\text{MHz}$	387	-70.618	-54	100kHz	PASS
		$710\text{MHz} < f \leq 900\text{MHz}$	743.06	-62.183	-55	1MHz	PASS
		$900\text{MHz} < f \leq 915\text{MHz}$	905.236	-72.247	-55	100kHz	PASS
		$915\text{MHz} \leq f < 930\text{MHz}$	921.450	-72.533	-54	100kHz	PASS
		$930\text{MHz} < f \leq 1000\text{MHz}$	940.64	-71.747	-55	100kHz	PASS
		$1000\text{MHz} \leq f < 12750\text{MHz}$	7486	-59.048	-47	1MHz	PASS

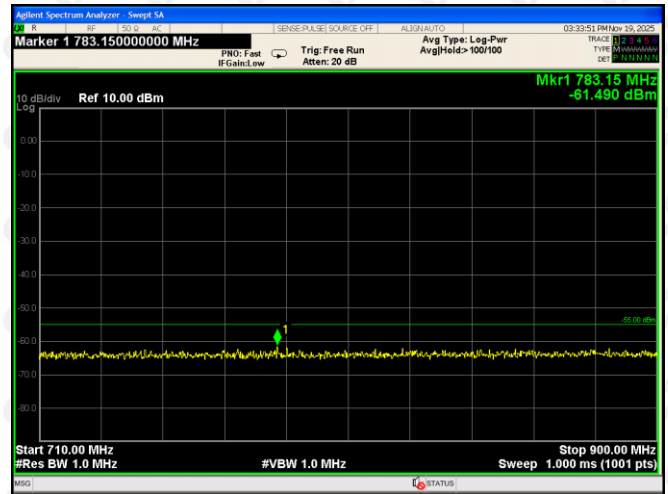
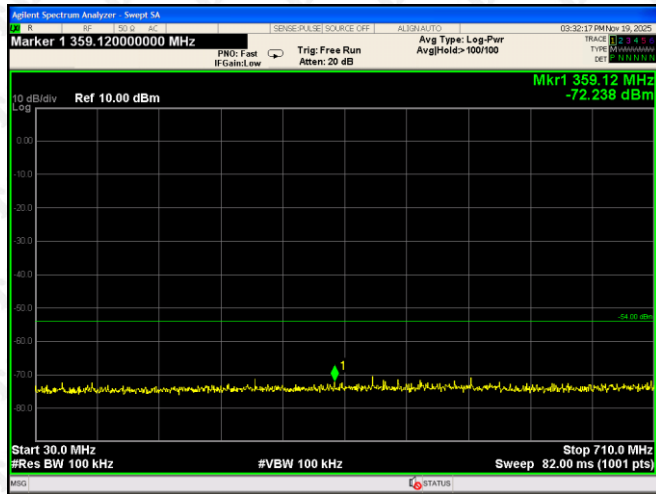
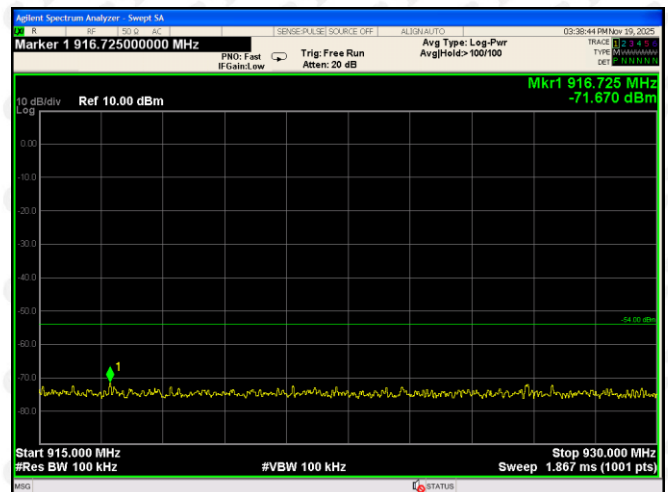
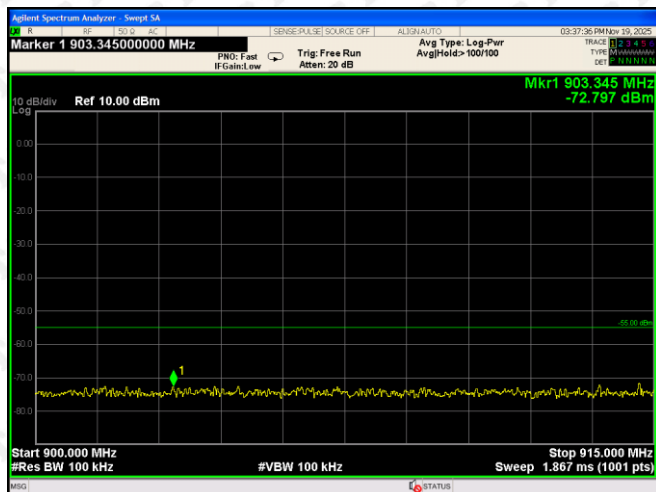
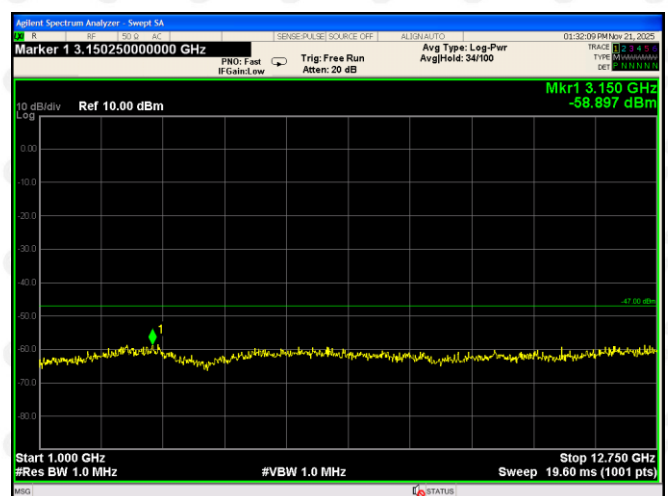
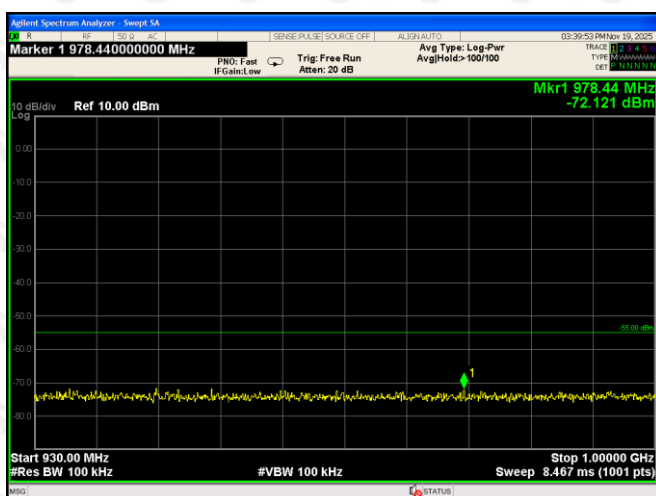
Test channel:

916.8MHz


 $30\text{MHz} \leq f \leq 710\text{MHz}$
 $710\text{MHz} < f \leq 900\text{MHz}$

 $900\text{MHz} < f \leq 915\text{MHz}$
 $915\text{MHz} \leq f < 930\text{MHz}$

 $930\text{MHz} < f \leq 1000\text{MHz}$
 $1000\text{MHz} < f \leq 12750\text{MHz}$

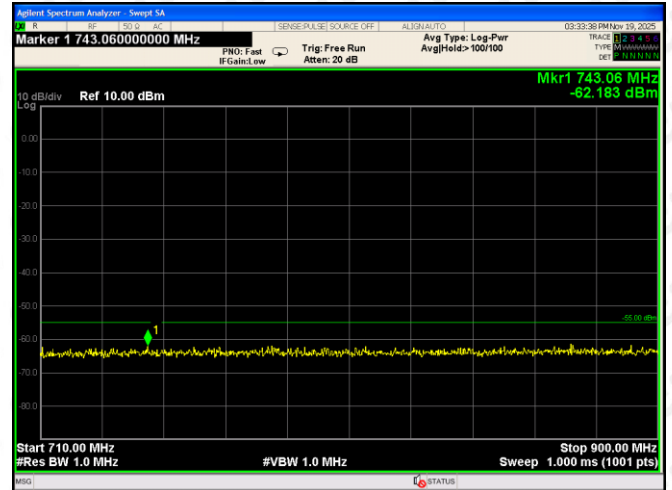
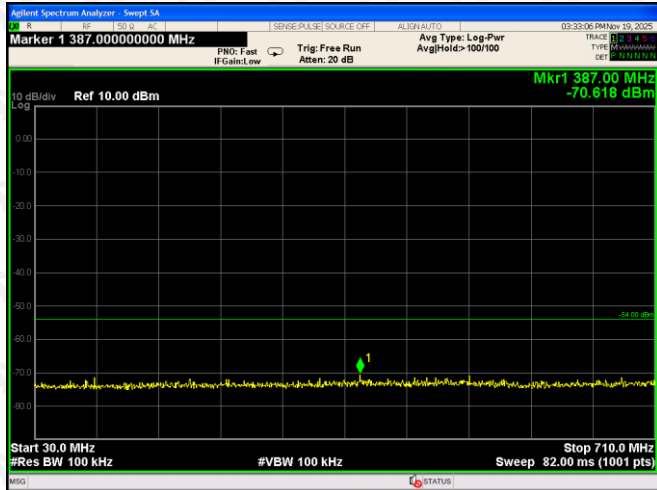
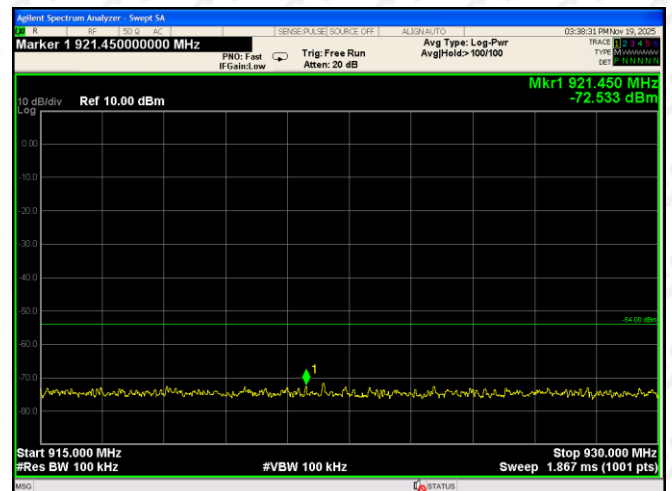
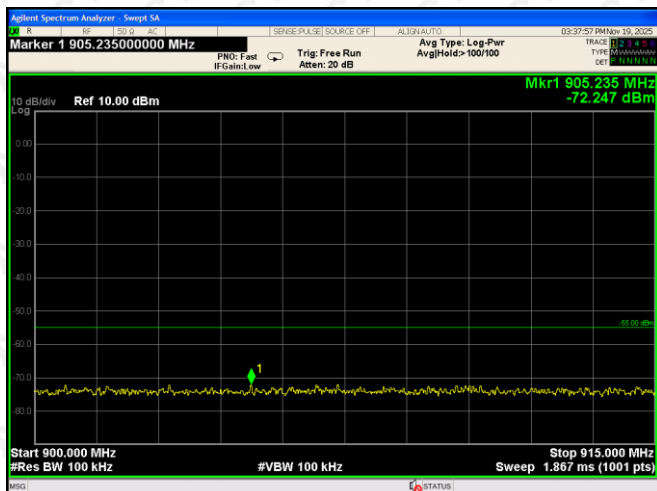
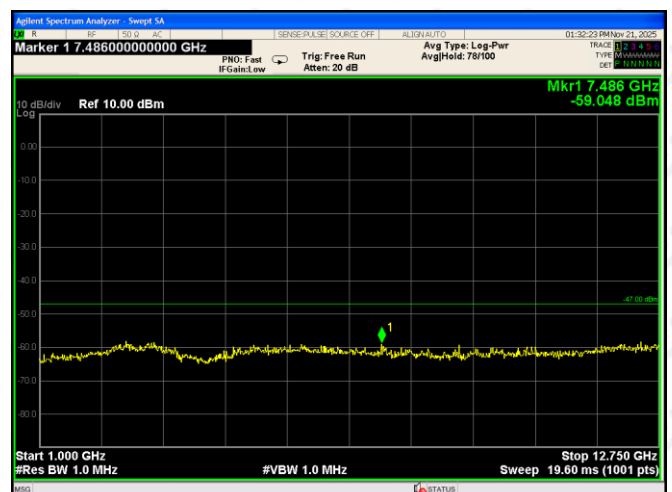
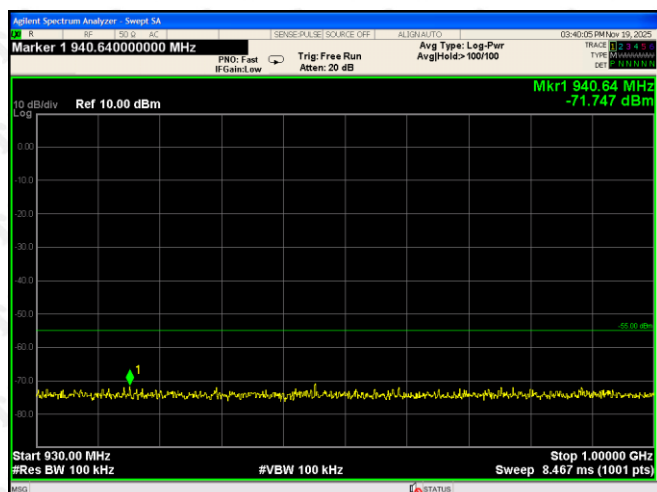
Test channel:

919.2MHz


 $30\text{MHz} \leq f \leq 710\text{MHz}$
 $710\text{MHz} < f \leq 900\text{MHz}$

 $900\text{MHz} < f \leq 915\text{MHz}$
 $915\text{MHz} \leq f < 930\text{MHz}$

 $930\text{MHz} < f \leq 1000\text{MHz}$
 $1000\text{MHz} < f \leq 12750\text{MHz}$

Test channel:

920.8MHz


 $30\text{MHz} \leq f \leq 710\text{MHz}$
 $710\text{MHz} < f \leq 900\text{MHz}$

 $900\text{MHz} < f \leq 915\text{MHz}$
 $915\text{MHz} \leq f < 930\text{MHz}$

 $930\text{MHz} < f \leq 1000\text{MHz}$
 $1000\text{MHz} < f \leq 12750\text{MHz}$

3.7 TRANSMISSION TIME CONTROL EQUIPMENT

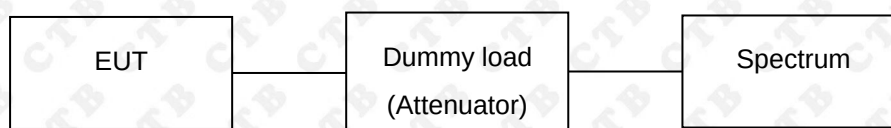
3.7.1 LIMIT

(1) In case the 5ms or more carrier sense is required:

If the center frequency is from 916.0MHz to 928.0MHz, radio equipment shall stop its transmission of radio wave less than 4s after it starts to emit radio wave. It shall wait 50ms or more for the consecutive transmission.

Meanwhile, it may emit radio wave again without waiting 50ms, if the transmission time is less than 4s after its first transmission, and this re-transmission is started after 128μs or more carrier sense, and is finished less than 4s after its first transmission.

3.7.2 Test Setup Block Diagram



3.7.3 TEST PROCEDURES

Setting the spectrum analyzer is as follows.

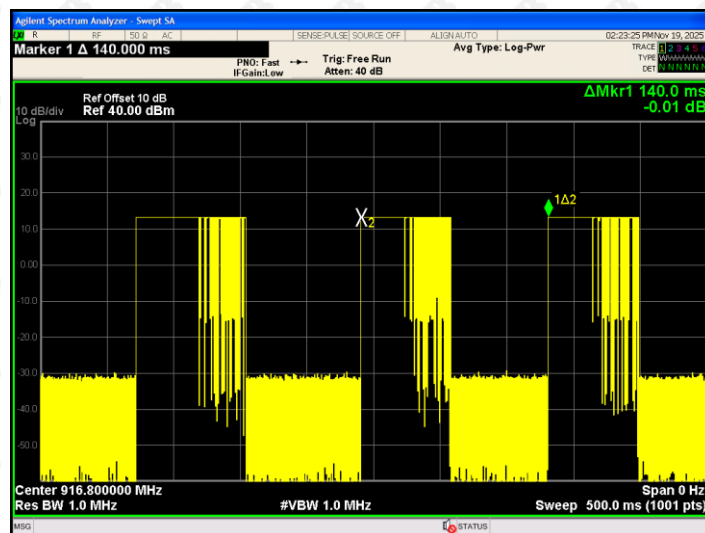
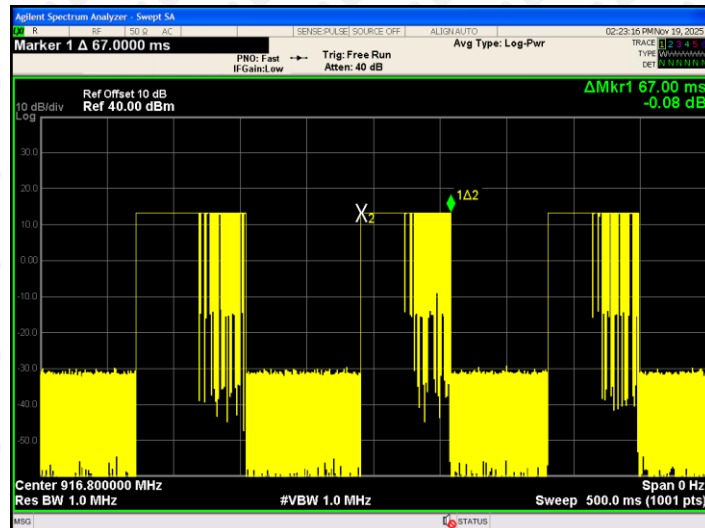
Center frequency	Test frequency
Span	0Hz
RBW	1MHz
VBW	Equal to RBW
Sweep time	Approximately twice the value of equipment acceptable to the Regulations
Detection mode	Positive peak
Triggering condition	Level rise

- 1) As two sets of spectrum analyzer, set to trigger at rising edge trigger conditions, to launch state radio test equipment.
- 2) To verify that, and stopped firing of radio equipment within the time prescribed in the regulations, downtime is greater than or equal to time transmitting equipment to the Regulations.
- 3) If there is not enough time resolution of the spectrum analyzer in the measurement of the transmission pause time, set the trigger down to shorten the time to sweep up the trigger conditions, the time after stopping the firing of test equipment radio equipment prescribed in the regulations ensure that the time is greater than or equal to.

3.7.4 TEST RESULT

Test Item	Carrier sense time	Sending duration	Pause duration
Limit	5ms or more	4s or less	50ms or more
Test Result	>5ms	0.067	0.14s

Test Result: Pass



3.8 CARRIER SENSE

3.8.1 Limit

According to STD-T106, 3.2.3 (2) Carrier sense (ORE: article 49, NT: No.407, 2008)

Controller shall have functions that comply with the conditions A, B and C

A. Carrier sense level

When the amount of the received power at the antenna input is -74 dBm or more, the controller shall prohibit transmission of radio wave in the same channel of the received power.

B. Bandwidth of carrier sense

The receiving bandwidth for carrier sense shall be the same bandwidth of its transmitting radio channel. In this regulation, emission shall be prohibited when the carrier sense level on the intended radio channel is more than -74dBm(200 kHz x n) at the antenna input. (Note: n is the number of the unit radio channels used)

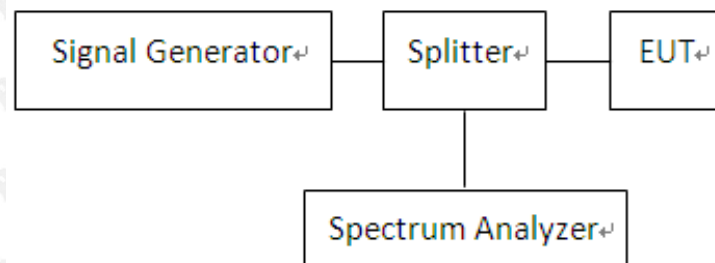
Carrier sense time

C. Time duration shall be more than 5 ms to detect whether the intended radio channel is open or not.

In this regulation, time duration is calculated as follows:

Time $5 + (R \times 0.5)$ ms, where R is a random integer from 0 to 10.

3.8.2 Test Setup Block Diagram



3.8.3 Test Procedure

1. SG adjust the frequency as same as the EUT transmitted signal, unmodulation, power level 0dBm, Then turn off the RF signal.
2. EUT have transmitted the maximum modulation signal and fixed channel
3. Setting of the SA following as RBW/VBW: 1/3MHz SPAN: 50MHz Sweep time: Auto continue PK
4. SG Signal -74dBm(Bandwidth=200kHz) to EUT, EUT prohibit transmission
5. And SG Signal -80dBm(Bandwidth=200kHz) to EUT, EUT prohibit transmission(Frequencies within 920.5MHz or more and 923.5MHz or less STD-108)

3.8.4 Test results

For Require (Level -74dBm)

Test Condition	Frequency(MHz)	Transmitting Power(dBm)
Normal Operating	916.8	15.758
Inject CW(-74dBm, 200kHz Bandwidth)	916.8	-67.22dBm(Base noise, Stop transmission)
Stop Inject CW	916.8	15.269

Test Condition	Frequency(MHz)	Transmitting Power(dBm)
Normal Operating	920.2	14.937
Inject CW(-80dBm, 200kHz Bandwidth)	920.2	-68.63dBm(Base noise, Stop transmission)
Stop Inject CW	920.2	15.024

Test Result: Pass

3.9 Radio Channel

3.9.1 limit

Unit channel: 916.8-920.8MHz (200kHz interval), 200kHz BW

Simultaneous use channels: MAX 3

3.9.2 Test results

Pass

N=1, Frequency allocation 916.8, 919.2, 920.8

3.10 Construction Protection, Antenna gain, Reception from a responder

3.4 Antenna

Antenna gain 6 dBi or less (absolute gain)

Provided that measured EIRP (Equivalent Isotropically Radiated Power) is less than the value of 6dBi plus 1W of antenna power, it is allowed to fill in the gap by the antenna gain.

-Antenna gain=1.0dBi<6dBi

Reception from a responder

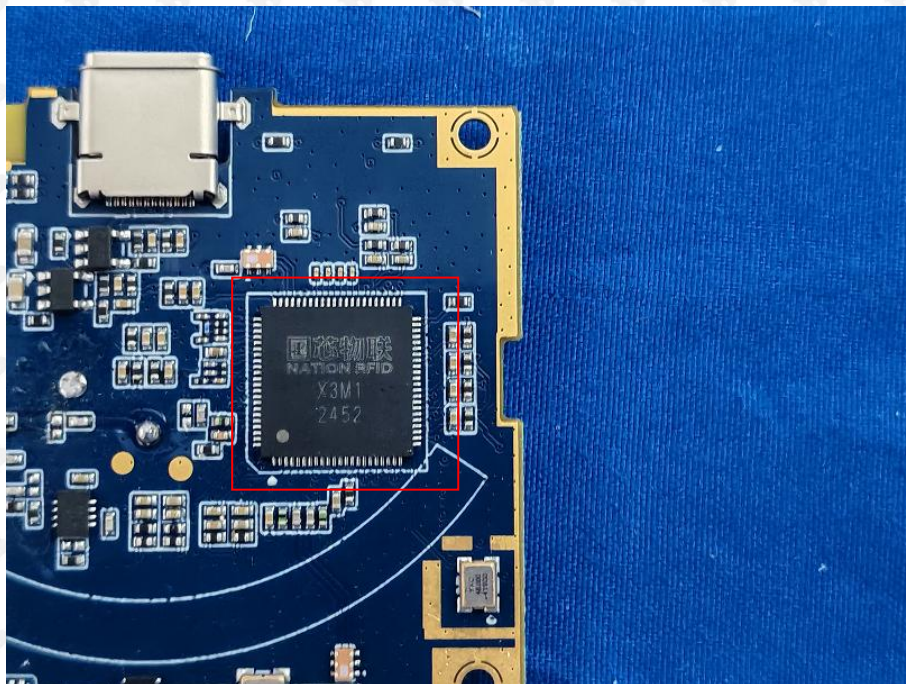
Receiver can receive a radio wave from a responder.

3.11RF SHIELDINGMETHOD

We apply the product for Japan RF certification. The high-frequency section and modulation section of the radio equipment except for the antenna system shall not be capable of being opened easily.

Confirmation method

☐	Sealed with special screws.
☐	Plastic chassis is being welded using ultrasonic wavs.
☐	Chassis is glued using a special adhesive.
☐	Metal covers are spot-fused.
☐	Cover is specially interlocked.
☐	RF and Modulation components are covered with shielding case and this shielding case is soldered.
☐	Shield case is welded ant RF and modulations parts, and ID-ROM is welded using BGA Method.
☐	Shield case is welded ant RF and modulations parts, and ID-ROM is glued at its lead with a special adhesive.
☐	Shield case is welded ant RF and modulations parts, and ID-ROM is glued with a non-transparent laminating agent.
☒	Other: All RF and modulation section packet in one IC, and IC is welded using SMT Method, and RF module is welded on the main board, end-User can't open it easily.



3.12 Compliance of radiation protection

3.12.1 LIMIT

According to Chapter 4 Compliance of radiation protection

Signal intensity means electric field strength, power flux density and magnetic field strength (hereinafter the same)..It is set forth as that the place at which the signal intensity coming from radio equipment exceeds the value shown in table 4-1, protection facilities are required to guardperson who are there except for operator.

Frequency	Electric field strength (V/m)	Magnetic field strength (A/m)	Power flux density (mW/cm ²)	Average Time (minute)
More than 300 MHz and less than 1.5 GHz	$1.585 f^{1/2}$	$f^{1/2} / 237.8$	$f / 1500$	6

Note1: Unit of f is in MHz.

Note2: Electric field strength and Magnetic field strength should be filled in effective values.

3.12.2 TEST RESULT

Manufacturer declare the distance is at least 50cm to other person, test period 6min

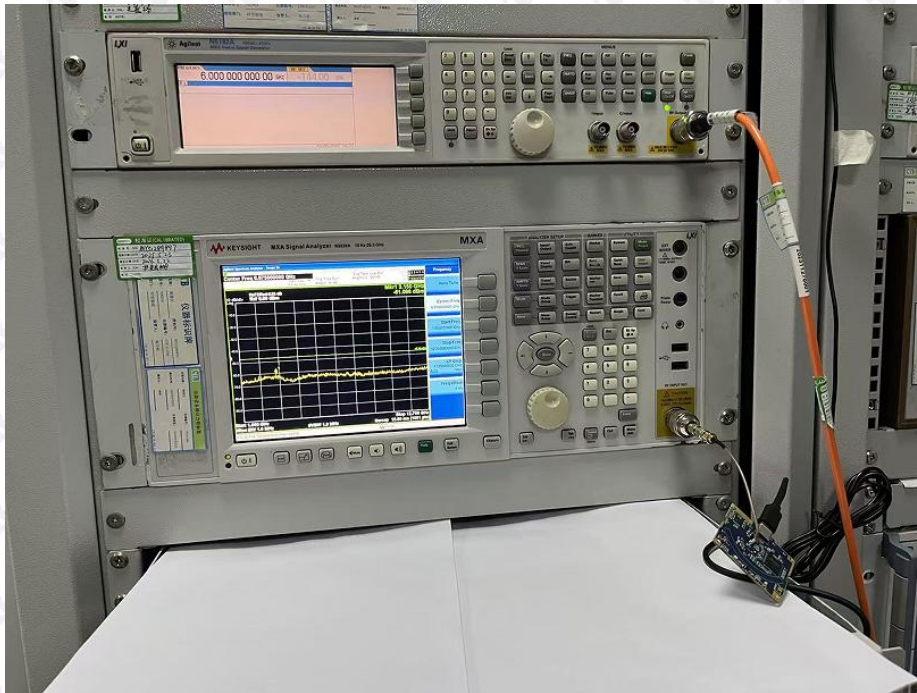
Electric field strength			
Test Position	Measure Value (V/m)	Limit(V/m)	Test Result
Antenna Front Side	4.398	48.10	Compliance
Magnetic field strength			
Test Position	Measure Value (A/m)	Limit(A/m)	Test Result
Antenna Front Side	0.087	0.13	Compliance
Power Flux density			
Test Position	Power flux density (mW/cm ²)	Limit(mW/cm ²)	Test Result
Antenna Front Side	0.094	0.6139	Compliance

$$\text{Limit(V/m)} = 1.585 * f^{1/2} = 1.585 * 920.81^{1/2} = 48.10$$

$$\text{Limit(A/m)} = f^{1/2} / 237.8 = 920.8^{1/2} / 237.8 = 0.13$$

$$\text{Limit(mW/cm}^2\text{)} = f / 1500 = 920.8 / 1500 = 0.61$$

4. TEST SETUP PHOTOS OF EUT



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