FCC 47 CFR PART 15 SUBPART C
ISED RSS-210 ISSUE 11

TEST REPORT

For

Remote Control

MODEL NUMBER: 827SE200

SERIES MODEL NUMBER: 827SE201, 827SE202

PROJECT NUMBER: 4791511984

REPORT NUMBER: 4791511984-1

FCC ID: 2BK3WLS1500924TF

IC: 33029-LS246PT01TF

ISSUE DATE: Nov. 22, 2024

Prepared for

Suzhou Lishen Energy Science & Technology Co., Ltd.

Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	11/22/2024	Initial Issue	

Summary of Test Results			
Clause	**Test Items**	**FCC/ISED Rules**	**Test Results**
1	Transmitter Timeout	FCC 47 CFR §15.231 (a) (1) ISED RSS-210 Annex A.1.1	Pass
2	20 dB Bandwidth and 99 % Occupied Bandwidth	FCC 47 CFR §15.231 (c) ISED RSS-210 Annex A.1.3	Pass
3	Radiated Emission	FCC 47 CFR §15.231 (b)(e) FCC 47 CFR §15.205 and §15.209 RSS-210 Annex A.1.2 RSS-GEN Clause 8.9 RSS-GEN Clause 8.10	Pass
4	Conducted Emission Test for AC Power Port	FCC 47 CFR §15.207 RSS-GEN Clause 8.8	N/A (See Note 1)
5	Antenna Requirement	FCC 47 CFR §15.203 ISED RSS-Gen Clause 6.8	Pass

Note 1: The product was powered by battery, so this test item is no need to test.
Note 2: The measurement result for the sample received is < Pass > according to < ANSI C63.10-2013, FCC 47 CFR Part 2, FCC 47 CFR Part 15C, ISED RSS-210 Issue 11 and ISED RSS-Gen Issue 5 > when < Simple Acceptance > decision rule is applied.

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name:	Suzhou Lishen Energy Science & Technology Co., Ltd.
Address:	Room 301-1, Floor 3, Plant Building 4, No.588 Wutaishan Road, High-tech Zone, Suzhou City, Jiangsu Province, China

Manufacturer Information

Company Name:	Suzhou Lishen Energy Science & Technology Co., Ltd.
Address:	Room 301-1, Floor 3, Plant Building 4, No.588 Wutaishan Road, High-tech Zone, Suzhou City, Jiangsu Province, China

Factory Information

Company Name:	Suzhou Lishen Energy Science & Technology Co., Ltd.
Address:	Room 301-1, Floor 3, Plant Building 4, No.588 Wutaishan Road, High-tech Zone, Suzhou City, Jiangsu Province, China

EUT Description

Product Name:	Remote Control
Model Name:	827SE200
Series Model Name:	827SE201, 827SE202
Model Difference:	All the models have the same technical construction, including the circuit diagram, PCB layout, components, and component layout, as well as all electrical and mechanical constructions. The only difference is the model numbers, which represent different colors of the appearance.
Sample Number:	7690685
Data of Receipt Sample:	Oct. 10, 2024
Test Date:	Oct.10, 2024~ Nov. 21, 2024

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC 47 CFR PART 15 SUBPART C	PASS
ISED RSS-210 Issue 11	PASS
ISED RSS-GEN Issue 5	PASS

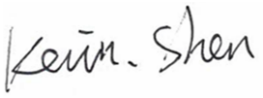
Prepared By:

Tom Tang

Reviewed By:

Emily Wang

Authorized By:



Kevin Shen

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with KDB 414788 D01 Radiated Test Site v01r01, FCC 47 CFR Part 2, FCC 47 CFR Part 15, ANSI C63.10-2013, ISED RSS-210 Issue 11 and RSS-GEN Issue 5.

3. FACILITIES AND ACCREDITATION

Accreditation Certificate	**A2LA (Certificate No.: 4829.01)** **UL-CCIC COMPANY LIMITED has been assessed and proved to be in compliance with A2LA.** **FCC (FCC Designation No.: CN1247)** **UL-CCIC COMPANY LIMITED has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules.** **IC (IC Designation No.: 25056; CAB No.: CN0073)** **UL-CCIC COMPANY LIMITED has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules.**

Note 1: All tests measurement facilities use to collect the measurement data are located at No. 2, Chengwan Road, Suzhou Industrial Park, Suzhou 215122, China.

Note 2: For below 30MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. These measurements below 30MHz had been correlated to measurements performed on an OFS.

Note 3: The test anechoic chamber in UL-CCIC COMPANY LIMITED had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognize national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Uncertainty
Conduction emission	3.1 dB
DTS Bandwidth	1.9 %
Maximum Conducted Output Power	1.3 dB
Maximum Power Spectral Density Level	1.5 dB
Band-edge Compliance	1.9%
Unwanted Emissions in Non-restricted Freq Bands	9kHz-30MHz: ±0.90dB 30MHz-1GHz: ±1.5 dB 1GHz-12.75GHz: ±1.9dB 12.75GHz-26.5GHz: ±2.1dB
Radiation Emission test (include Fundamental emission) (9kHz-30MHz)	3.4dB
Radiation Emission test (include Fundamental emission) (30MHz-1GHz)	3.4dB
Radiation Emission test (1GHz to 26GHz) (include Fundamental emission)	3.5dB (1GHz-18GHz)
	3.9dB (18GHz-26.5GHz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

EUT Name	Remote Control	
EUT Description	The device is a remote control.	
Model	827SE200	
Product Description	Operation Frequency	433.92 MHz
	Modulation Type	OOK
Power Supply	Battery	DC 3.0V

5.2. MAXIMUM FIELD STRENGTH

Frequency (MHz)	Max AVG field strength (dBμV/m)
433.9215	57.52

5.3. TEST CHANNEL CONFIGURATION

Test Mode	Frequency
ASK	433.92 MHz

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
433.92	PCB antenna	0

5.5. TEST ENVIRONMENT

Environment Parameter	Selected Values During Tests	
Relative Humidity	55 ~ 65%	
Atmospheric Pressure:	101kPa	
Temperature	TN	20 ~ 30°C
Voltage:	VL	N/A
	VN	DC 3.0V
	VH	N/A

Note: VL= Lower Extreme Test Voltage
VN= Nominal Voltage
VH= Upper Extreme Test Voltage
TN= Normal Temperature

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	P/N
1	/	/	/	/

I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
4	/	/	/	/	/

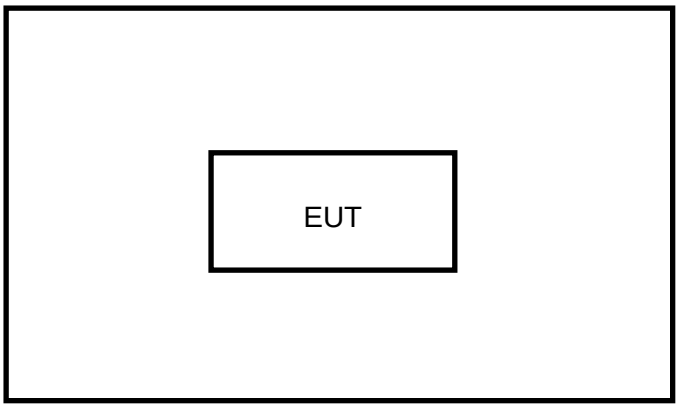
ACCESSORIES

Item	Accessory	Brand Name	Model Name	Description
1	/	/	/	/

TEST SETUP

1. A fully charged battery was used for all tests.
2. The test sample can be into a transmission mode through the power on.

SETUP DIAGRAM FOR TESTS



5.7. MEASURING INSTRUMENT AND SOFTWARE USED

Conducted Emissions Test (Instrument)							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
☑	EMI Test Receiver	R&S	ESR3	126700	2022-11-26	2023-11-25	2024-11-24
☑	Two-Line V-Network	R&S	ENV216	126701	2022-11-26	2023-11-25	2024-11-24

Conducted Emissions Test (Software)					
Used	Description	Manufacturer	Name	Version	
☑	Software for Conducted Emissions Test	R&S	EMC32	9.25.00	

Radiated Emissions Test (Instrument)							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
☑	EMI test receiver	R&S	ESR7	222993	2023-04-08	2024-03-23	2025-03-22
☑	EMI test receiver	R&S	ESR26	126703	2022-11-26	2023-11-25	2024-11-24
☑	Spectrum Analyzer	R&S	FSV3044	222992	2023-04-08	2024-03-23	2025-03-22
☑	Receiver Antenna (9kHz-30MHz)	Schwarzbeck	FMZB 1513	155456	2021-06-03	2024-05-27	2027-05-26
☑	Receiver Antenna (30MHz-1GHz)	Schwarzbeck	VULB 9168	171952	2022-01-18	2024-07-04	2027-07-03
☑	Receiver Antenna (1GHz-18GHz)	R&S	HF907	126705	2019-01-27	2022-02-28	2025-02-27
☑	Receiver Antenna (18GHz-26.5GHz)	Schwarzbeck	BBHA9170	126706	2019-02-29	2022-02-28	2025-02-27
☑	Pre-amplification (To 18GHz)	Tonscned	TAP01018050	224539	2022-10-11	2023-10-10	2024-10-09
☑	Pre-amplification (To 18GHz)	R&S	SCU-18D	134667	2022-11-26	2023-11-25	2024-11-24
☑	Pre-amplification (To 26.5GHz)	R&S	SCU-26D	135391	2022-11-26	2023-11-25	2024-11-24
☑	Band Reject Filter	Wainwright	WRCGV12-2375-2400-2485-2510-40SS	1	2022-12-19	2023-12-18	2024-12-17
☑	High Pass Filter	COM-MW	ZBF13-3-18G-01	2	2022-12-19	2023-12-18	2024-12-17

Radiated Emissions Test (Software)					
Used	Description	Manufacturer	Name	Version	
☑	Software for Radiated Emissions Test	Tonscend	JS32-RE	5.0.0.2	

Antenna Port Test (Instrument)							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
☑	Spectrum Analyzer	Keysight	N9010B	155368	2023-04-08	2024-03-23	2025-03-22
☑	Power Meter	MWT	MW100-RFCB	221694	2023-04-08	2024-03-23	2025-03-22
☑	Attenuator	PASTERNACK	PE7087-6	1624	2023-04-08	2024-03-23	2025-03-22

Antenna Port Test (Software)					
Used	Description	Manufacturer	Name	Version	
☑	Software for Antenna Port Test	Tonscend	JS1120-3 Test System	V3.2.22	

6. ANTENNA PORT TEST RESULTS

6.1. ON TIME AND DUTY CYCLE

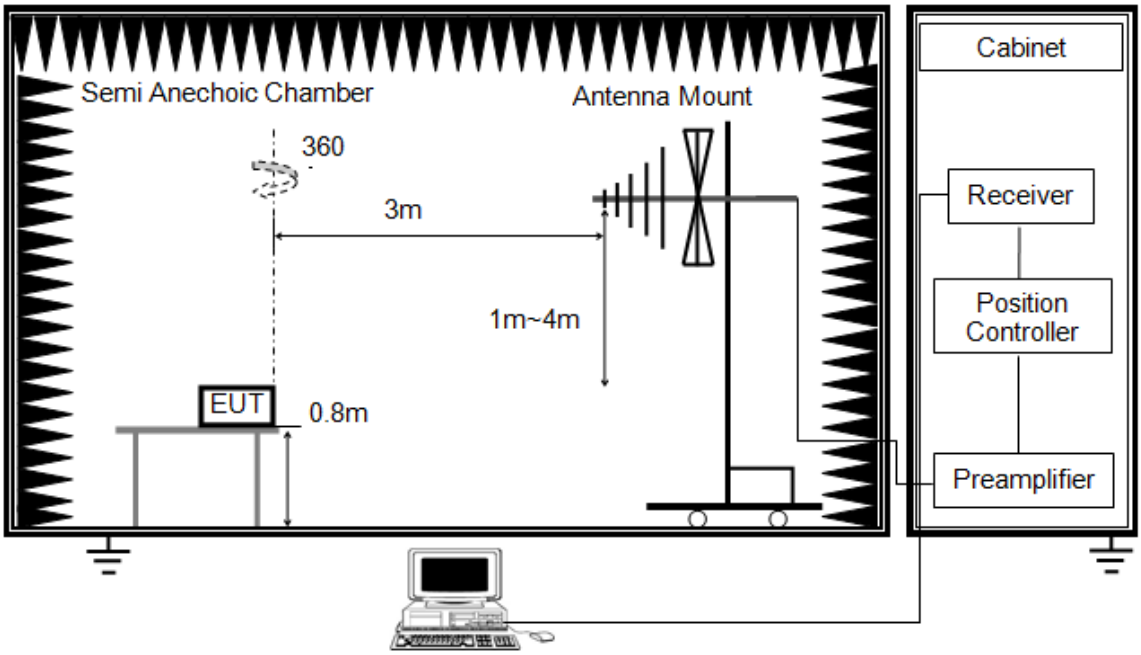
LIMITS

None; for reporting purposes only

PROCEDURE

FCC Reference:	FCC 47 CFR §15.35(c)
Test Method Used:	ANSI C63.10 Section 7.5

TEST SETUP



a. Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz.
b. Use a video trigger with the trigger level set to enable triggering only on full pulses.
c. Sweep Time is at least a 100 ms.
d. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
e. Measure the maximum time duration of one single pulse.

TEST ENVIRONMENT

Temperature	20°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.0V

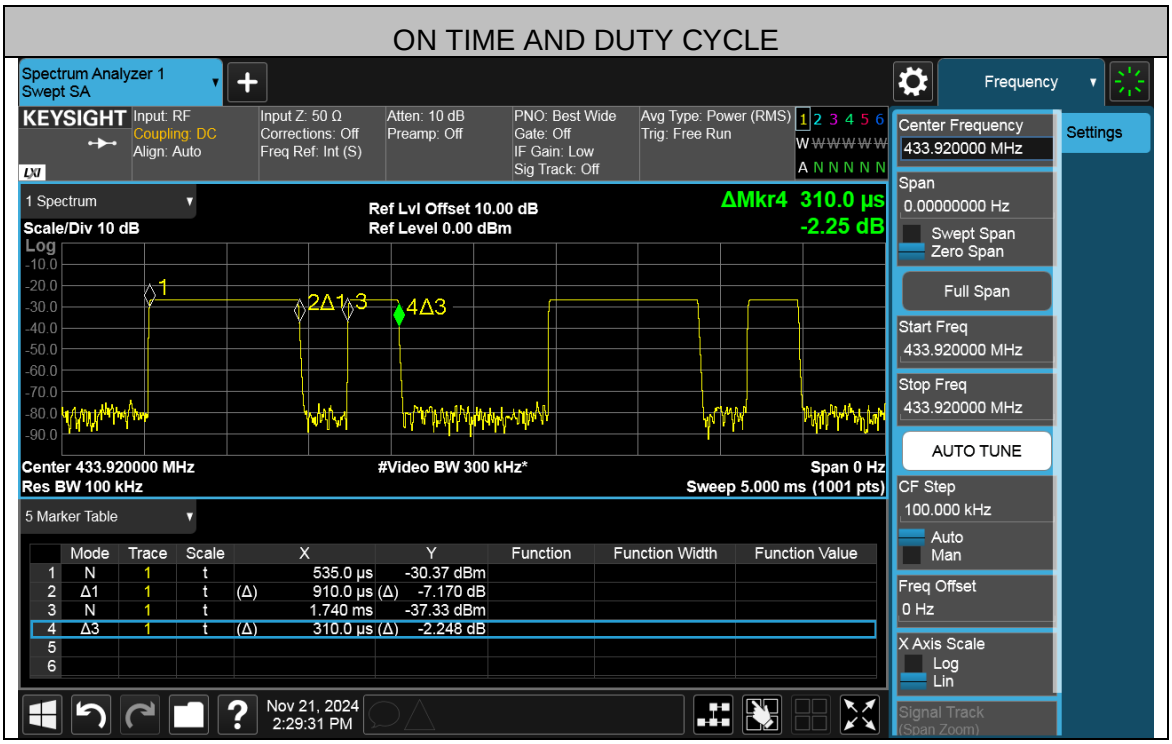
RESULTS

Ton	On Time (ms)	Times	Total Ton-1 Times (ms)	Total Ton-2 Times (ms)	Total Ton Times (ms)
Ton-1	0.910	9	8.19	/	18.11
Ton-2	0.310	32	/	9.92	

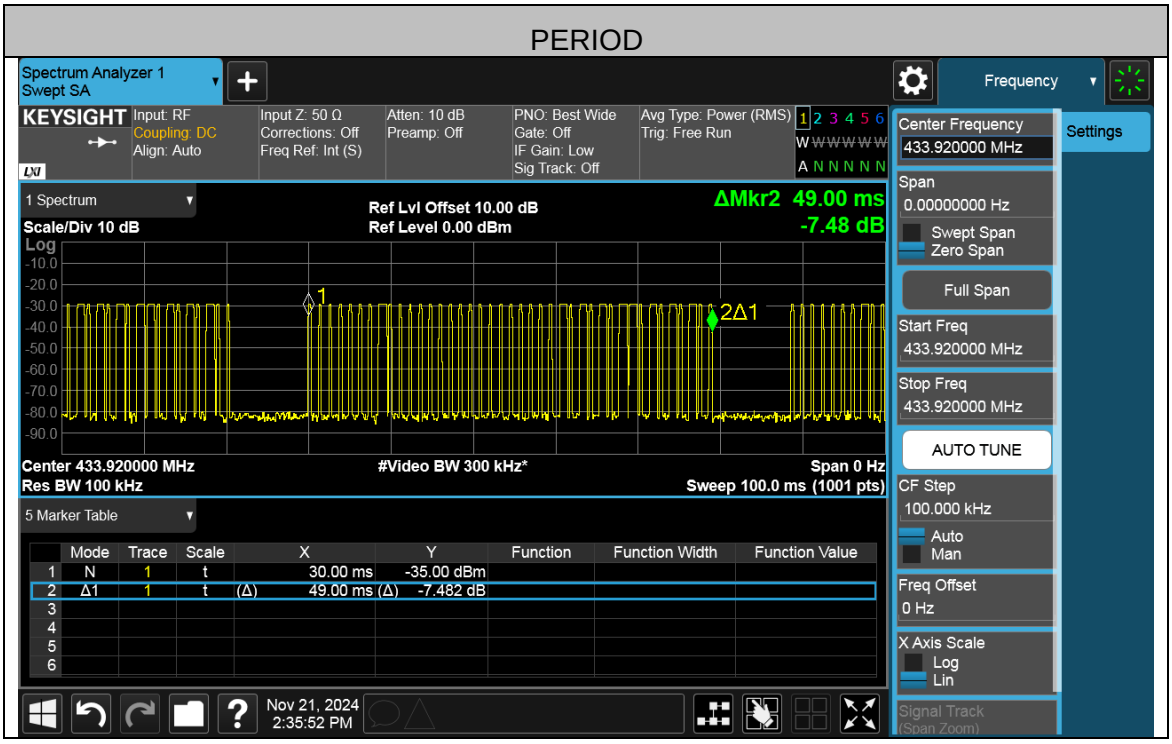
On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
18.11	49	0.3696	36.96%	-8.65

Note:
Total Ton Times = Total Ton-1 Times + Total Ton-2 Times
Duty Cycle Correction Factor=20log (x).
Where: x is Duty Cycle (Linear)
Where: T is On Time
The EUT has nine buttons, all the buttons are used to activate the signals with the same duty cycle.

ON TIME AND DUTY CYCLE



PERIOD



Note: All test mode had been tested, only the worst data record in the report.

6.2. TANSMITTER TIMEOUT

LIMITS

FCC 47 CFR §15.231(a):

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

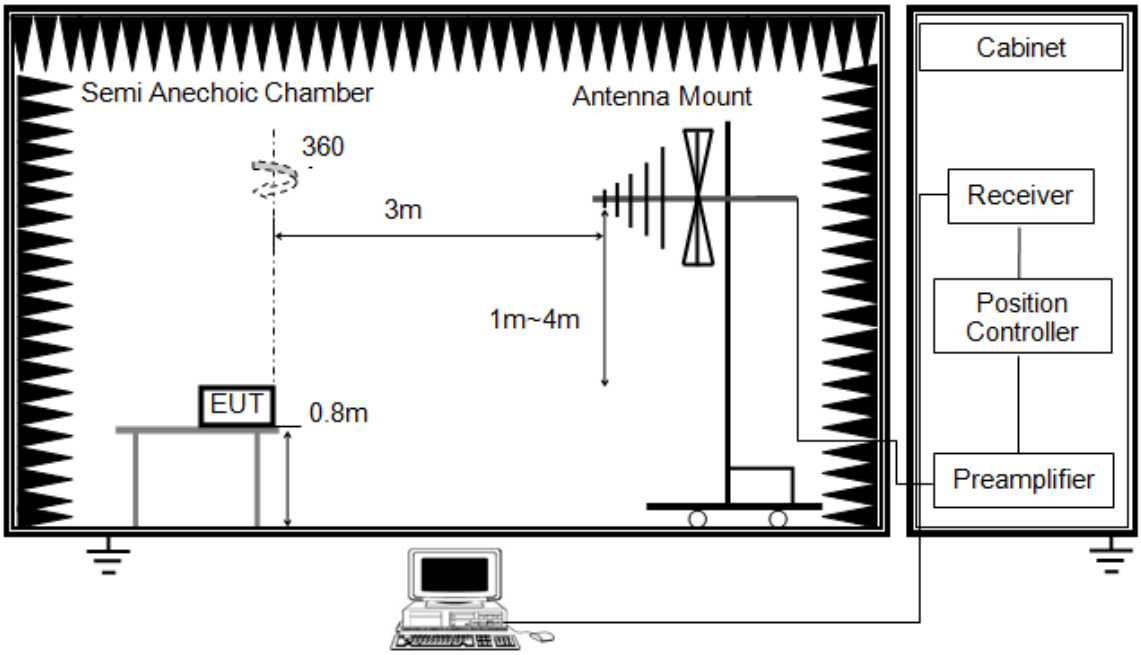
RSS-210 Issue 11 Annex A.1.1 Types of Momentarily Operated Devices

Devices shall comply with the following for momentary operation:
a. A manually operated transmitter shall be equipped with a push-to-operate switch and be under manual control at all times during transmission. When released, the transmitter shall cease transmission within no more than 5 seconds of being released.
b. A transmitter that has been activated automatically shall cease transmission within 5 seconds of activation.
c. Periodic transmissions at regular, predetermined intervals are not permitted, except as specified in Section A.1.4. However, polling or supervision transmissions that determine system integrity of transmitters used in security or safety applications are permitted, provided the total duration of transmission does not exceed 2 seconds per hour for each transmitter.
d. Intentional radiators used for radio control during emergencies involving fire, security of goods (e.g. burglar alarms), and safety-of-life, when activated to signal an alarm, may operate during the interval of the alarm condition.

TEST PROCEDURE

FCC Reference:	FCC 47 CFR §15.231(a)
Test Method Used:	The EUT transmitter was activated and monitored using a spectrum analyser for a period of 10 seconds.

TEST SETUP



a. Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz.
b. Use a video trigger with the trigger level set to enable triggering only on full pulses.
c. Sew Sweep Time to 10 s.
d. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
e. Measure the maximum time duration of one single pulse.

TEST ENVIRONMENT

Temperature	20°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.0V

RESULTS

Manually transmitting mode			
Deactivation Time (seconds)	Limit (seconds)	Margin (seconds)	Result
0.3	5.000	4.7	PASS

On Time

6.3. 20dB BANDWIDTH AND 99 % OCCUPIED BANDWIDTH

LIMITS

FCC 47 CFR §15.231 (c)

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5 % of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

RSS-210 Issue 11 Annex A.1.3 Bandwidth of Momentary Signals

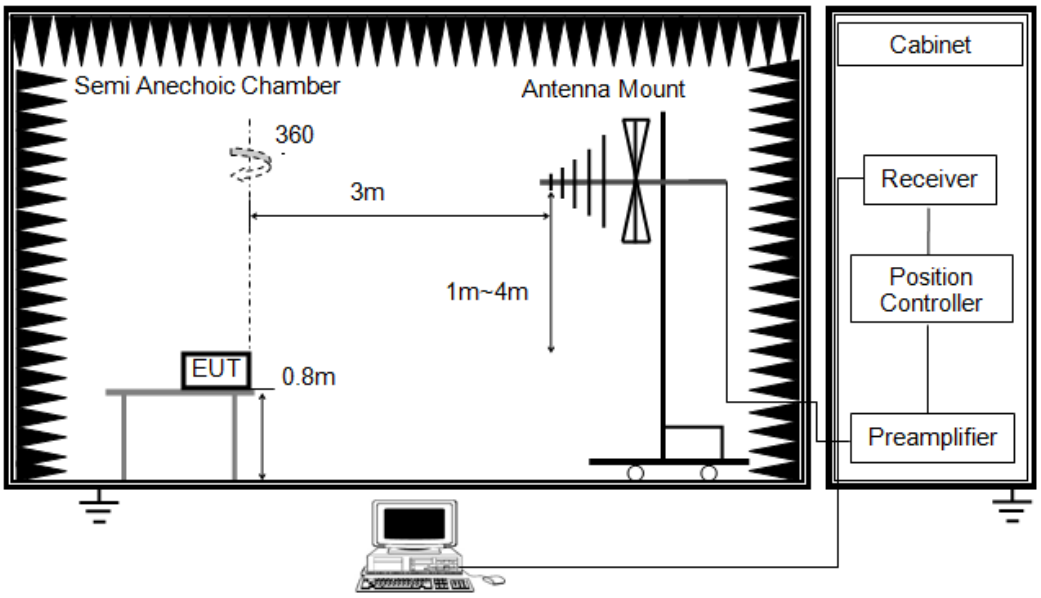
The 99 % bandwidth of momentarily operated devices shall be less or equal to 0.25 % of the centre frequency for devices operating between 70 MHz and 900MHz. For devices operating above 900 MHz, the 99 % bandwidth shall be less or equal to 0.5 % of the centre frequency.

So, the limit calculated as: 0.0025 * 433.92 MHz = 1.0848 MHz

TEST PROCEDURE

FCC Reference:	FCC 47 CFR Part 15.231(c)
Test Method Used:	ANSI C63.10 Section 6.9.2

TEST SETUP



1. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.

2. The EUT was placed on a turntable with 0.8 meter above ground.

3. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower

4. Set the spectrum analyzer in the following setting as:

RBW is set to 1% to 5% of the OBW and VBW is set 3 * RBW.

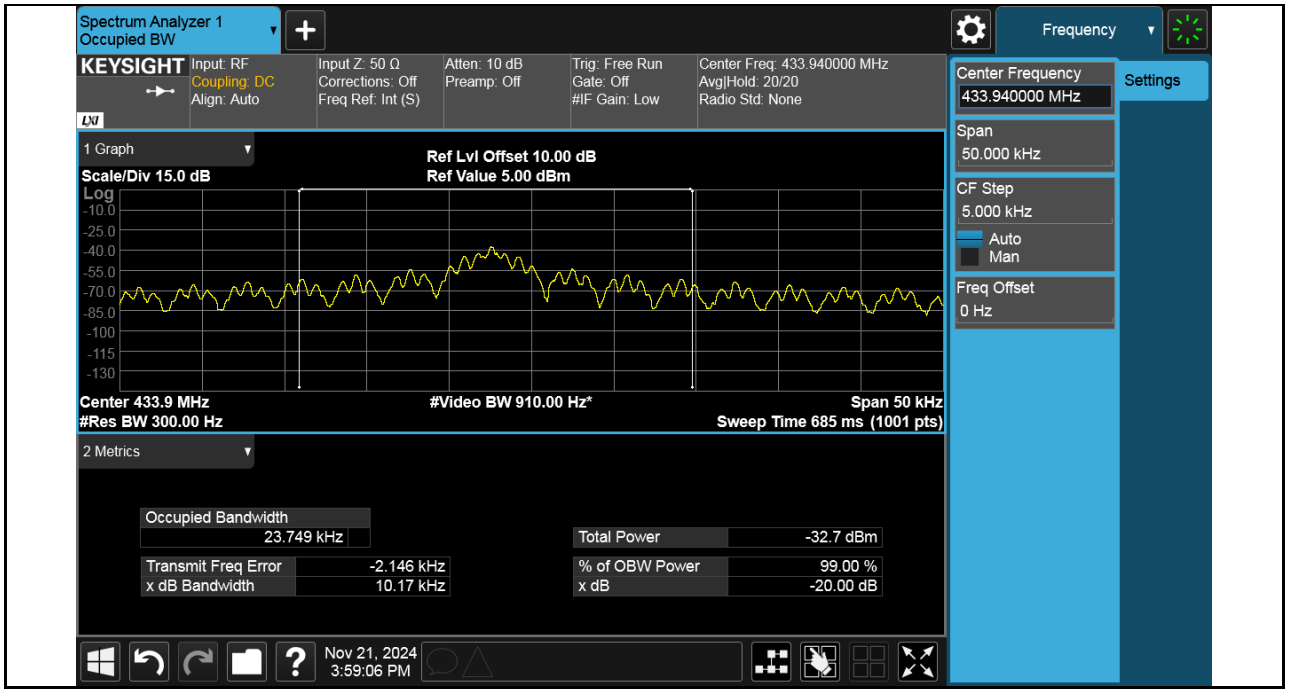
TEST ENVIRONMENT

Temperature	20°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.0V

RESULTS

20 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	Limit (MHz)	Result
0.01017	0.023749	1.0848	Pass

Test Graphs:



7. RADIATED TEST RESULTS

LIMITS

FCC 47 CFR §15.231 (b)(e)

FCC 47 CFR §15.205 and §15.209

ISED RSS-210 Issue 11 Annex A.1.3 Field Strengths

ISED RSS-GEN Clause 8.9

1. In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	[1]1,250 to 3,750	[1]125 to 375
174-260	3,750	375
260-470	[1]3,750 to 12,500	[1]375 to 1,250
Above 470	12,500	1,250

Note:
1. To obtain the average limit at the test frequency the values given in the table of FCC part 15.231(b) have to be linear interpolated and then converted to dBµV/m. The limit at 260 MHz is 3750 µV/m and at 470 MHz it is 12500 µV/m. Limit at 433.92 MHz is calculated as shown in ANSI C63.10 Section 7.6.2:

Limit [µV/m] = Limlower + ΔF [(Limupper – Limlower) / ($f$upper – $f$lower)]
where ΔF = fc – $f$lower = 433.92 – 260 = 173.92

Limit = 3750 + 173.92 * [(12500 – 3750) / (470 -260)]
= 3750 + 173.92 * [8750 / 210]
= 10996.7 µV/m

dBµV/m = 20 * log (µV/m)
= 20 * log (10996.7)

Average Limit at 433.92 MHz = 80.83 dBµV/m

2. If the average limit is specified for the EUT, the peak limit is 20 dB above the average limit as specified in FCC 15.35 (b)

2. Please refer to FCC 47 CFR part 15.231(e)

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emission (microvolts/meter)
40.66-40.70	1,000	100
70-130	500	50
130-174	500 to 1,500[1]	50 to 150[1]
174-260	1,500	150
260-470	1,500 to 5,000[1]	150 to 500[1]
Above 470	5,000	500

Note:
1. To obtain the average limit at the test frequency the values given in the table of FCC part 15.231(b) have to be linear interpolated and then converted to dBµV/m. The limit at 260 MHz is 3750 µV/m and at 470 MHz it is 12500 µV/m. Limit at 433.92 MHz is calculated as shown in ANSI C63.10 Section 7.6.2:

Limit [µV/m] = Limlower + ΔF [(Limupper – Limlower) / ($f$upper – $f$lower)]
where ΔF = fc – $f$lower = 433.92 – 260 = 173.92

Limit = 1500 + 173.92 * [(5000 – 1500) / (470 -260)]
= 1500 + 173.92 * [3500 / 210]
= 4398.7 µV/m

dBµV/m = 20 * log (µV/m)
= 20 * log (4398.7)

Average Limit at 433.92 MHz = 72.87 dBµV/m

If the average limit is specified for the EUT, the peak limit is 20 dB above the average limit as specified in FCC 15.35 (b)

3. Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

4. Radiation Disturbance Test Limit for FCC (Class B) (9 kHz-1 GHz)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

Note: (1) At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).
Note: (2) At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). This paragraph (f) shall not apply to Access BPL devices operating below 30 MHz.

Restricted bands of operation

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

Note: [1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2]Above 38.6c

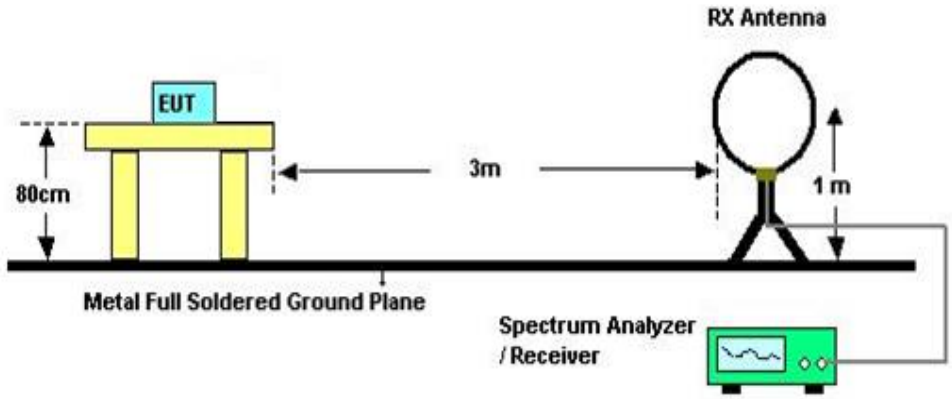
IC Restricted bands please refer to ISED RSS-GEN Clause 8.10

Table 7 – Restricted frequency bands[Note 1]		
MHz	**MHz**	**GHz**
0.090 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.52525	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 – 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	
8.37625 - 8.38675	1718.8 - 1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 - 2390	
12.51975 - 12.52025	2483.5 - 2500	
12.57675 - 12.57725	2655 - 2900	
13.36 - 13.41	3260 – 3267	
16.42 - 16.423	3332 - 3339	
16.69475 - 16.69525	3345.8 - 3358	
16.80425 - 16.80475	3500 - 4400	
25.5 - 25.67	4500 - 5150	
37.5 - 38.25	5350 - 5460	
73 - 74.6	7250 - 7750	
74.8 - 75.2	8025 – 8500	
108 – 138		

Note 1: Certain frequency bands listed in table 7 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

TEST SETUP AND PROCEDURE

Below 30MHz



The setting of the spectrum analyser

RBW	200 Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
VBW	200 Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
Sweep	Auto
Detector	Peak/QP/ Average
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013

2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both Horizontal, Face-on and Face-off polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 0.8 meter above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a 1m height antenna tower.

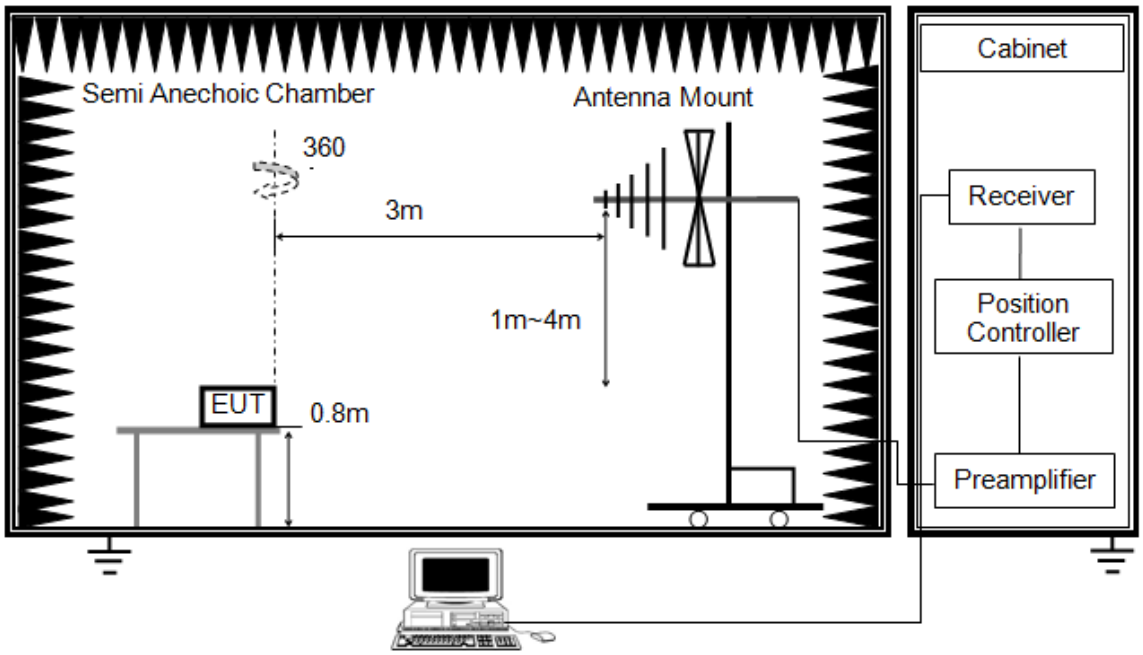
5. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector

6. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

7. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

8. The limits in 47 CFR, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377 Ω. For example, the measurement frequency X kHz resulted in a level of Y dBuV/m, which is equivalent to Y-51.5 = Z dBuA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to be 15.209(a) limit.

Below 1G



The setting of the spectrum analyser

RBW	120 kHz
VBW	300 kHz
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

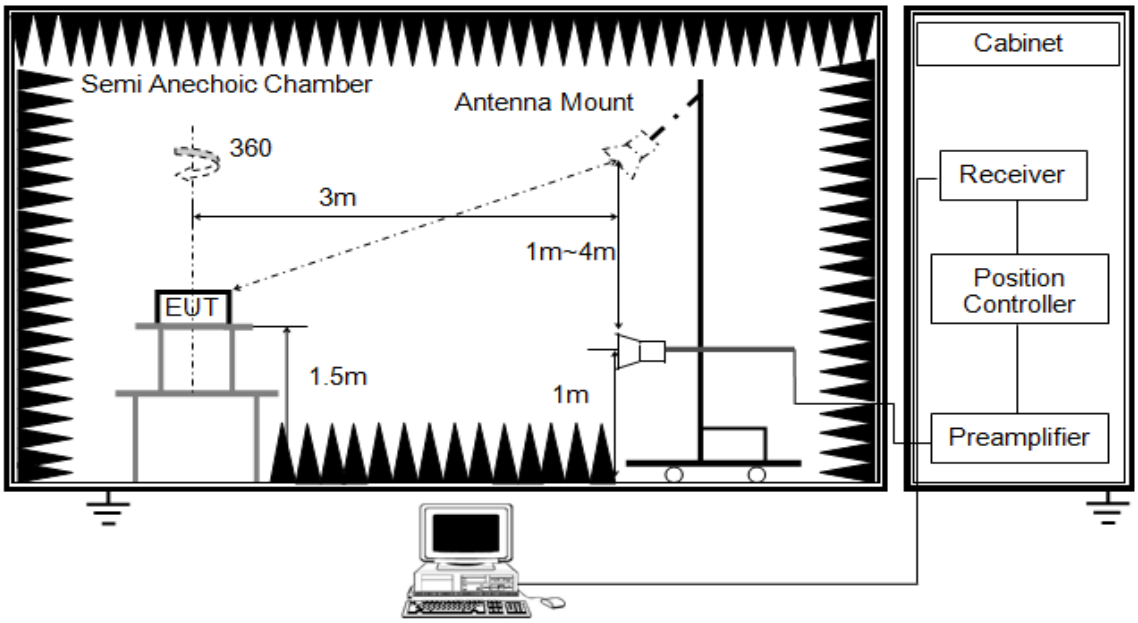
3. The EUT was placed on a turntable with 0.8 meter above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a 1m height antenna tower.

5. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

6. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

Above 1G



The setting of the spectrum analyser

RBW	1 MHz
VBW	PEAK: 3MHz AVG: see note 6
Sweep	Auto
Detector	Peak
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 1.5m above ground.

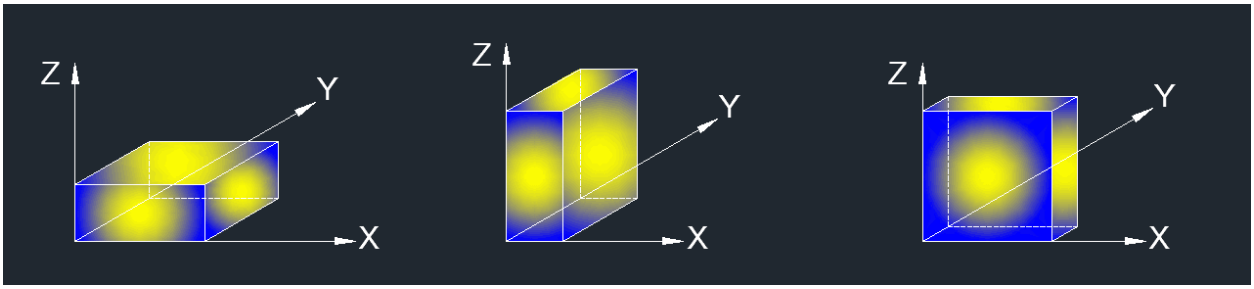
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement above 1GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.

6. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 6.1. ON TIME AND DUTY CYCLE.

7. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

X axis, Y axis, Z axis positions:



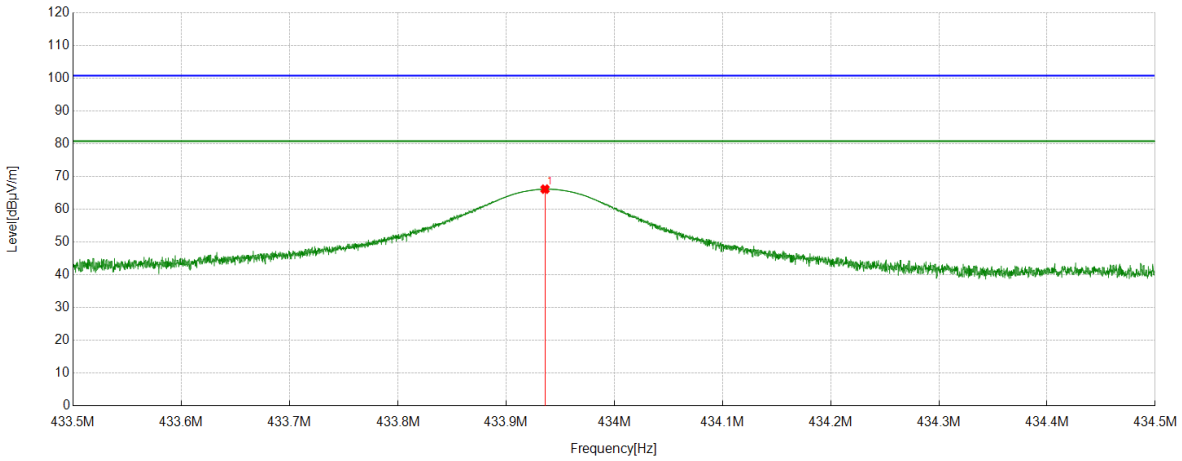
Note: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (Y axis) data recorded in the report.

TEST ENVIRONMENT

Temperature	20°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.0V

7.1. FIELD STRENGTH OF INTENTIONAL EMISSIONS

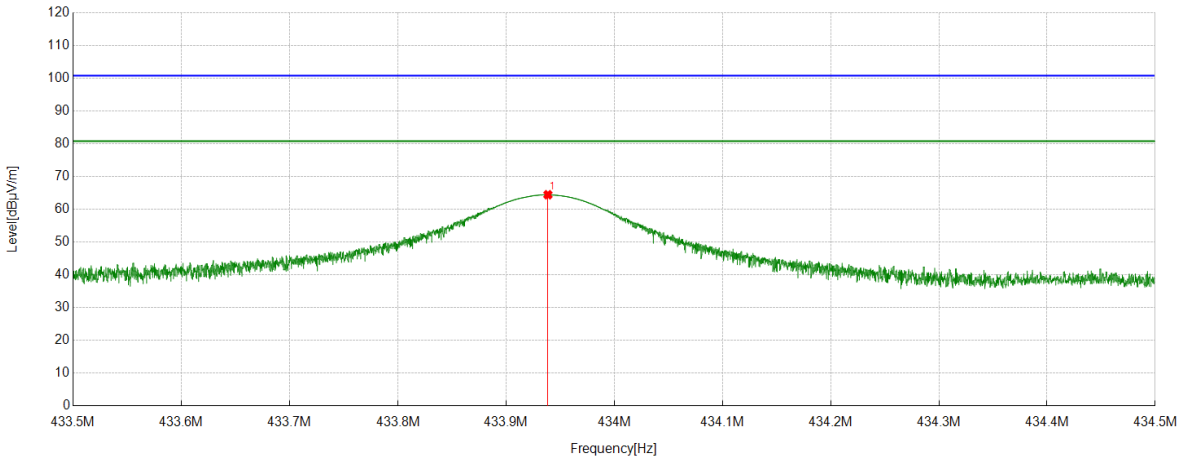
FIELD STRENGTH OF INTENTIONAL EMISSIONS (HORIZONTAL)



No.	Frequency	Reading Level	Correct Factor	PK Result	Duty Correction Factor	AV Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	433.9359	41.42	24.75	66.17	/	/	100.83	-34.66	peak
		/	/	/	-8.65	57.52	80.83	-23.31	average

Note: 1. Measurement = Reading Level + Correct Factor.
2. Peak: Peak detector.
3. Average Result = Peak Result + Duty Correction Factor.

FIELD STRENGTH OF INTENTIONAL EMISSIONS (VERTICAL)

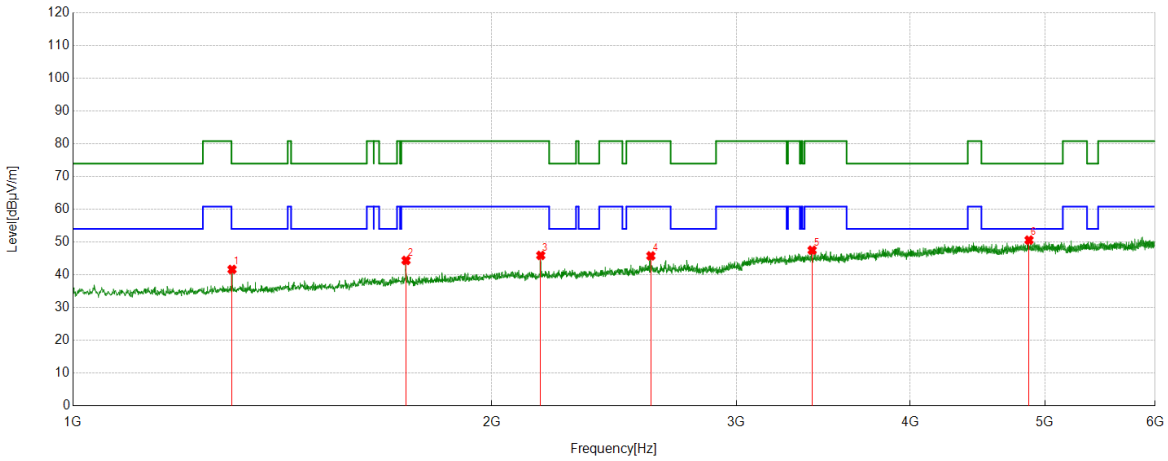


No.	Frequency	Reading Level	Correct Factor	PK Result	Duty Correction Factor	AV Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	433.9386	39.71	24.75	64.46	/	/	100.83	-36.37	peak
		/	/	/	-8.65	55.81	80.83	-25.02	average

Note: 1. Measurement = Reading Level + Correct Factor.
2. Peak: Peak detector.
3. Peak: Average Result = Peak Result - Duty Correction Factor.

7.2. SPURIOUS EMISSIONS (1~6GHz)

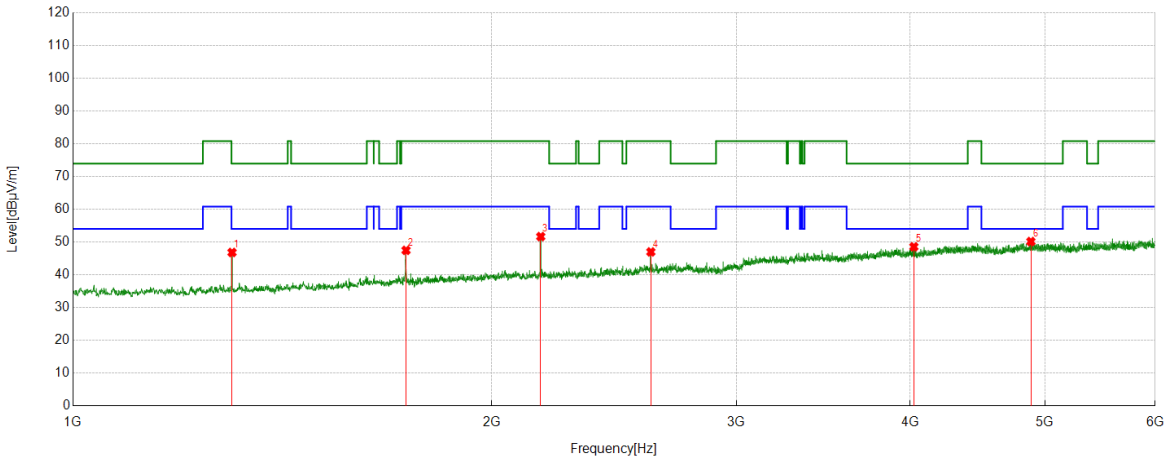
HARMONICS AND SPURIOUS EMISSIONS (HORIZONTAL)



No.	Frequency	Reading Level	Correct Factor	PK Result	Duty Correction Factor	AV Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	1301.2877	43.69	-2.06	41.63	/	/	74.00	-32.37	peak
		/	/	/	-8.65	32.98	54.00	-21.02	average
2	1735.7170	44.11	0.29	44.40	/	/	80.83	-36.43	peak
		/	/	/	-8.65	35.75	60.83	-25.08	average
3	2169.5212	43.20	2.72	45.92	/	/	80.83	-34.91	peak
		/	/	/	-8.65	37.27	60.83	-23.56	average
4	2603.3254	40.69	5.08	45.77	/	/	80.83	-35.06	peak
		/	/	/	-8.65	37.12	60.83	-23.71	average
5	3400.3000	38.88	8.62	47.50	/	/	80.83	-33.33	peak
		/	/	/	-8.65	38.85	60.83	-21.98	average
6	4869.2337	37.62	12.99	50.61	/	/	74.00	-23.39	peak
		/	/	/	-8.65	41.96	54.00	-12.04	average

Note: 1. Measurement = Reading Level + Correct Factor.
2. Peak: Peak detector.
3. Average Result = Peak Result + Duty Correction Factor.
4. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

HARMONICS AND SPURIOUS EMISSIONS (VERTICAL)

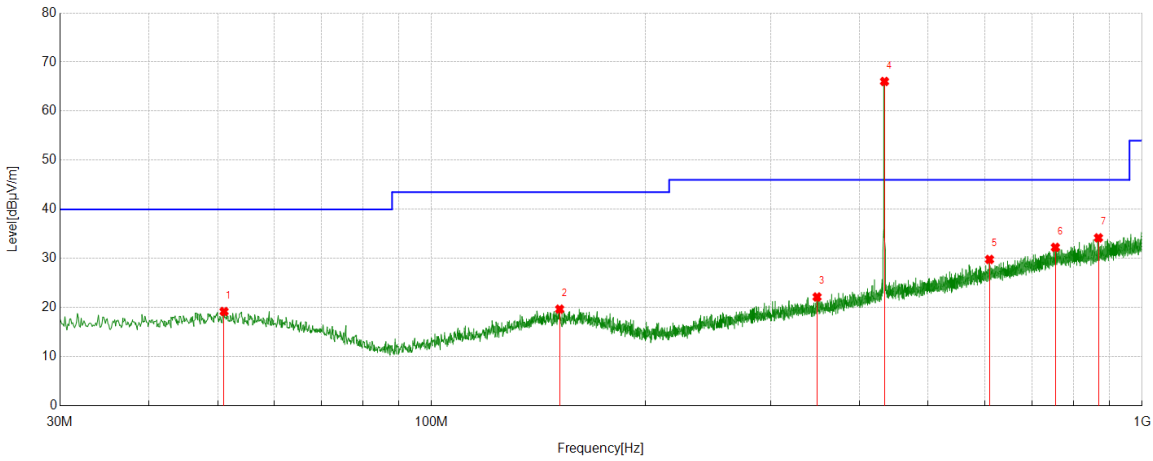


No.	Frequency	Reading Level	Correct Factor	PK Result	Duty Correction Factor	AV Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	1301.2877	48.88	-2.06	46.82	/	/	74.00	-27.18	peak
		/	/	/	-8.65	38.17	54.00	-15.83	average
2	1735.7170	47.18	0.29	47.47	/	/	80.83	-33.36	peak
		/	/	/	-8.65	38.82	60.83	-22.01	average
3	2169.5212	48.95	2.72	51.67	/	/	80.83	-29.16	peak
		/	/	/	-8.65	43.02	60.83	-17.81	average
4	2603.3254	41.91	5.08	46.99	/	/	80.83	-33.84	peak
		/	/	/	-8.65	38.34	60.83	-22.49	average
5	4024.1280	37.52	11.04	48.56	/	/	74.00	-25.44	peak
		/	/	/	-8.65	39.91	54.00	-14.09	average
6	4884.2355	37.04	13.12	50.16	/	/	74.00	-23.84	peak
		/	/	/	-8.65	41.51	54.00	-12.49	average

Note: 1. Measurement = Reading Level + Correct Factor.
2. Peak: Peak detector.
3. Average Result = Peak Result + Duty Correction Factor.
4. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
5. No burst found in Restricted bands.

7.3. SPURIOUS EMISSIONS (0.03~1 GHz)

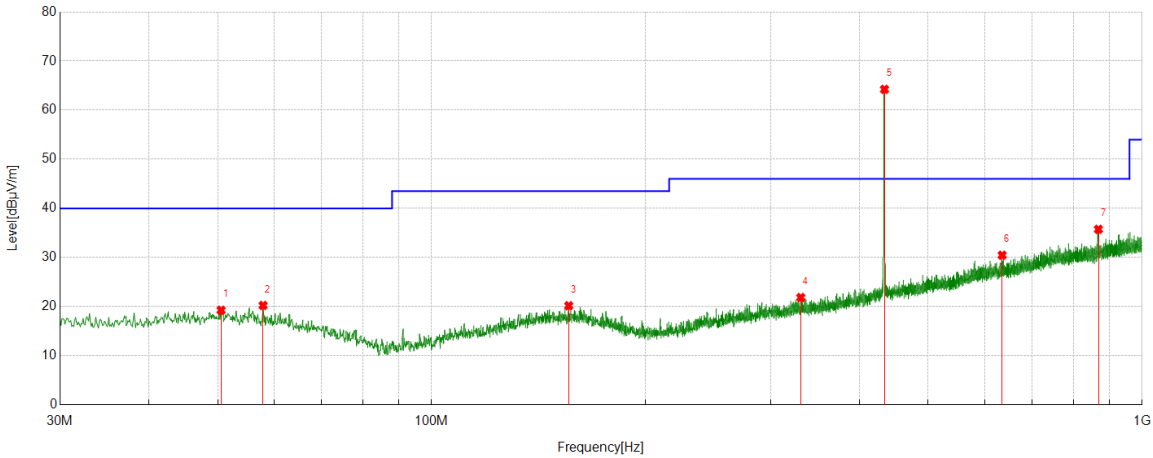
SPURIOUS EMISSIONS (HORIZONTAL)



No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	51.0511	-1.34	20.53	19.19	40.00	20.81	peak
2	151.4561	-0.82	20.48	19.66	43.50	23.84	peak
3	348.7739	0.01	22.14	22.15	46.00	23.85	peak
4 (fundamental frequency)	433.9484	41.30	24.75	66.05	/	/	peak
5	609.8270	1.23	28.56	29.79	46.00	16.21	peak
6	754.8565	1.18	31.07	32.25	46.00	13.75	peak
7	867.9698	2.46	31.73	34.19	46.00	11.81	peak

Note: 1. Result Level = Read Level + Correct Factor.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

SPURIOUS EMISSIONS (CH19, WORST-CASE CONFIGURATION, VERTICAL)



No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	50.5661	-1.27	20.51	19.24	40.00	20.76	peak
2	57.9388	0.03	20.19	20.22	40.00	19.78	peak
3	156.0156	-0.38	20.54	20.16	43.50	23.34	peak
4	330.8271	-0.17	22.00	21.83	46.00	24.17	peak
5 (fundamental frequency)	433.9484	39.49	24.75	64.24	/	/	peak
6	635.3405	1.60	28.85	30.45	46.00	15.55	peak
7	867.9698	4.00	31.73	35.73	46.00	10.27	peak

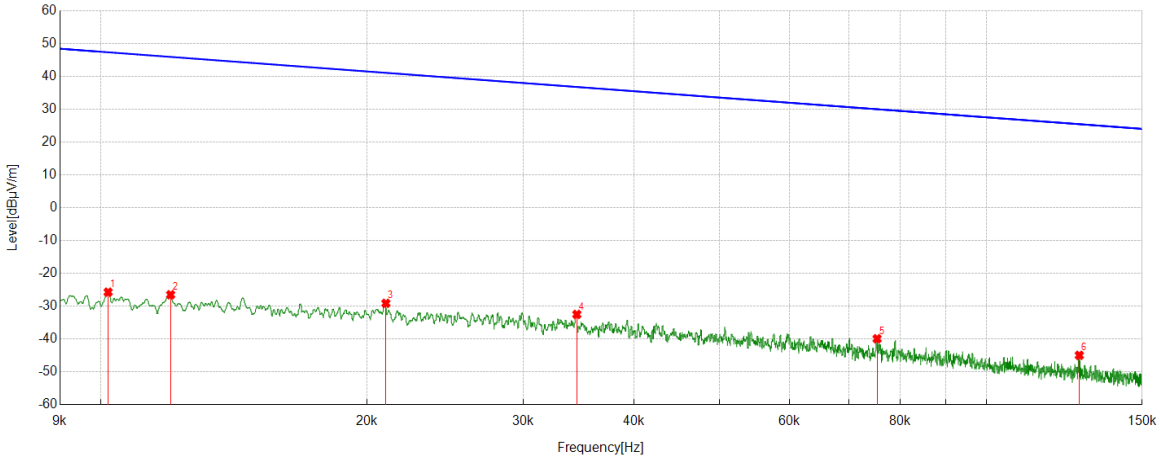
Note: 1. Result Level = Read Level + Correct Factor.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

Note: All constructions and test modes have been tested, only the worst data record in the report.

7.4. SPURIOUS EMISSIONS BELOW 30M

SPURIOUS EMISSIONS (Face-on)

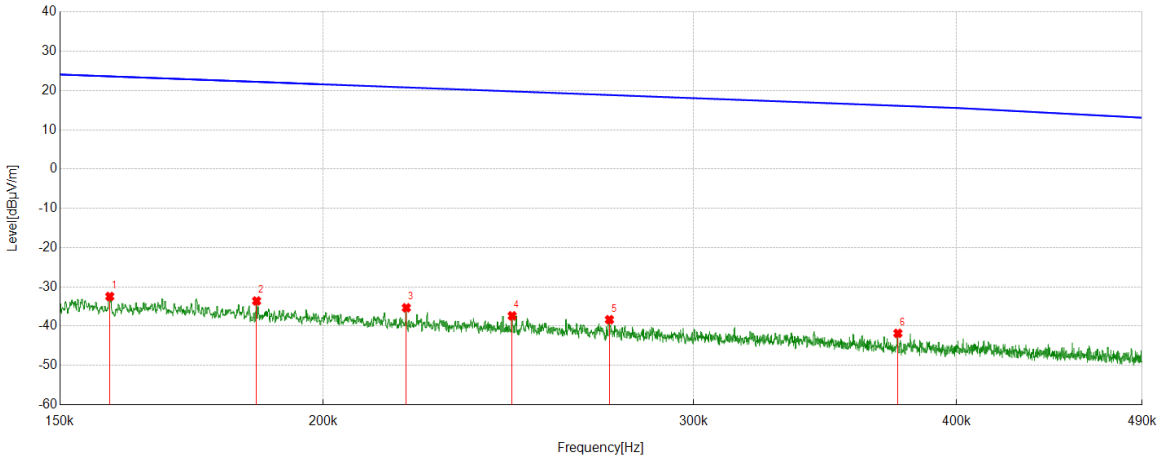
9kHz ~ 150kHz



No.	Frequency	Reading Level	Correct Factor	FCC Result	FCC Limit	ISED Result	ISED Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dBuA/m]	[dBuA/m]	[dB]	
1	0.0102	36.16	-61.90	-25.74	47.43	-77.24	-4.07	-73.17	Peak
2	0.0120	35.35	-61.87	-26.52	46.03	-78.02	-5.47	-72.55	Peak
3	0.0210	32.59	-61.74	-29.15	41.18	-80.65	-10.32	-70.33	Peak
4	0.0345	29.08	-61.60	-32.52	36.85	-84.02	-14.65	-69.37	Peak
5	0.0753	21.66	-61.61	-39.95	30.07	-91.45	-21.43	-70.02	Peak
6	0.1274	16.71	-61.72	-45.01	25.50	-96.51	-26.00	-70.51	Peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.
3. All 3 polarizations(Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report

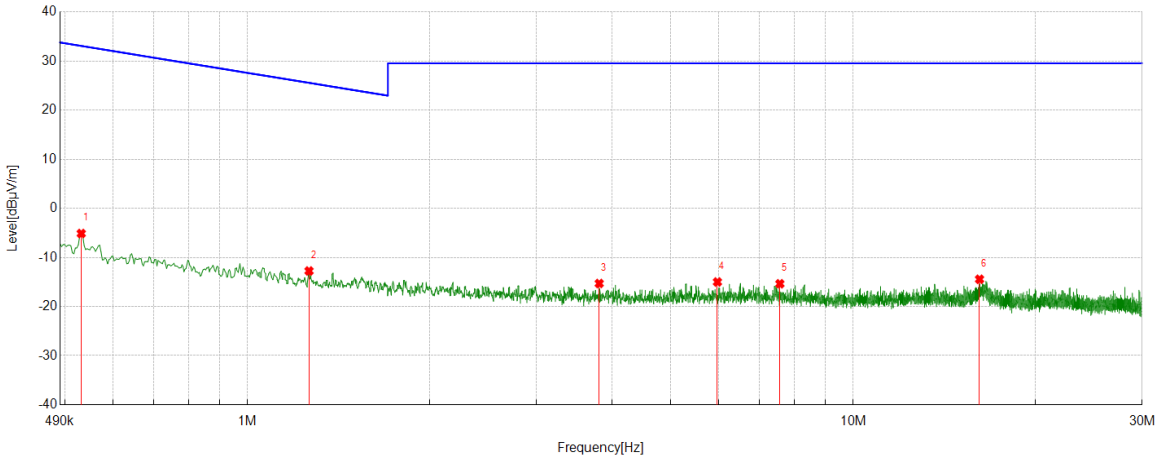
150kHz ~ 490kHz



No.	Frequency	Reading Level	Correct Factor	FCC Result	FCC Limit	ISED Result	ISED Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dBuA/m]	[dBuA/m]	[dB]	
1	0.1584	29.30	-61.74	-32.44	23.61	-83.94	-27.89	-56.05	Peak
2	0.1860	28.17	-61.76	-33.59	22.21	-85.09	-29.29	-55.80	Peak
3	0.2191	26.45	-61.78	-35.33	20.79	-86.83	-30.71	-56.12	Peak
4	0.2460	24.41	-61.79	-37.38	19.78	-88.88	-31.72	-57.16	Peak
5	0.2736	23.46	-61.81	-38.35	18.86	-89.85	-32.64	-57.21	Peak
6	0.3751	20.00	-61.83	-41.83	16.12	-93.33	-35.38	-57.95	Peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.
3. All 3 polarizations(Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report

490kHz ~ 30MHz



No.	Frequency	Reading Level	Correct Factor	FCC Result	FCC Limit	ISED Result	ISED Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dBuA/m]	[dBuA/m]	[dB]	
1	0.5313	16.76	-21.89	-5.13	33.10	-56.63	-18.40	-38.23	Peak
2	1.2632	9.08	-21.84	-12.76	25.58	-64.26	-25.92	-38.34	Peak
3	3.8073	6.45	-21.76	-15.31	29.54	-66.81	-21.96	-44.85	Peak
4	5.9676	6.84	-21.84	-15.00	29.54	-66.50	-21.96	-44.54	Peak
5	7.5672	6.35	-21.72	-15.37	29.54	-66.87	-21.96	-44.91	Peak
6	16.1673	7.08	-21.53	-14.45	29.54	-65.95	-21.96	-43.99	Peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.
3. All 3 polarizations(Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report

Note: All constructions and test modes and channels have been tested, only the worst data record in the report.

8. ANTENNA REQUIREMENTS

APPLICABLE REQUIREMENTS

Please refer 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.

Please refer to FCC §15.247(b)(4)
The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

RESULTS

Complies

END OF REPORT