

TEST REPORT

Report No.	CISRR251010021
Project No.	CISR251010021
FCC ID	2A7KZ-AC221101
Applicant	Ningbo Sunfree Motor Technology Co., Ltd
Address	202, No. 418, Qihang North Road, Yinzhou District, Ningbo, China
Manufacturer	Ningbo Sunfree Motor Technology Co., Ltd
Address	202, No. 418, Qihang North Road, Yinzhou District, Ningbo, China
Product Name	AC2211 series remote control
Trade Mark	-
Model/Type reference	AC2211-01A
Listed Model(s)	AC2211-0X*, (X=1-2., *=A~Z)
Standard	47 CFR Part 15.231
Test date	October 13, 2025 to December 4, 2025
Issue date	December 4, 2025
Test result	Complied

Morgan Tan

Reviewed by: Morgan Tan



Approved by: Hans Hu

The test results relate only to the tested samples.

The test report should not be reproduced except in full without the written approval of Shenzhen Bangce Testing Technology Co., Ltd.

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1. REPORT VERSION

Version No.	Issue date	Description
00	December 4, 2025	Original

2. SUMMARY OF TEST RESULT

Report clause	Test Item	Standard Requirement	Result
5.1	Antenna Requirement	15.203	PASS
5.2	AC Conducted Emission	15.207	--
5.3	20 dB Bandwidth	15.231(c)	PASS
5.4	Transmitter Deactivation Time	15.231(a)(1)	PASS
5.5	Duty cycle Factor	-	PASS
5.6	Radiated field strength of the fundamental signal	15.231 (b)	
5.4	Radiated Spurious Emission	15.231 (b)/15.205/15.209	PASS

Note:

- The measurement uncertainty is not included in the test result.

3. SUMMARY

3.1. Product Description

Main unit information:	
Product Name:	AC2211 series remote control
Trade mark:	-
Model No.:	AC2211-01A
Listed Model(s):	AC2211-0X*, (X=1-2., *=A~Z)
Model difference:	The difference between different models is that in this application, due to different sales channels and different model names.
Power supply:	DC 3V (2* AAA size battery)
Hardware version:	AC2210-01A V1.0
Software version:	AC2211-01A /A00
Accessory unit (AU) information:	
AU-1	-

3.2. Radio Specification Description

Operation frequency:	433.92MHz
Modulation:	FSK
Occupied Bandwidth:	135.35kHz
Channel Number:	1
Type of transmission	Manual transmission
Antenna type:	PCB antenna
Antenna gain:	-10dBi

3.3. Modification of EUT

No modifications are made to the EUT during all test items.

3.4. Testing Site

Laboratory Name	Shenzhen Bangce Testing Technology Co., Ltd.
Laboratory Location	101, building 10, Yunli Intelligent Park, Shutianpu community, Matian Street, Guangming District, Shenzhen, Guangdong, China
Contact information	Tel: 86-755-2319 6848, email: service@cis-cn.net Website: http://www.cis-cn.net/
FCC registration number	736346
FCC designation number	CN1372

4. TEST CONFIGURATION

4.1. Test frequency list

Channel	Frequency (MHz)
CH1	433.92

4.2. Test mode

For RF test items
The engineering test program was provided and enabled to make EUT continuous transmit.
For Radiated spurious emissions test item:
The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (Y axis) data Recorded in the report.

4.3. Support unit used in test configuration and system

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The following peripheral devices and interface cables were connected during the measurement:

Item	Equipment name	Trade Name	Model No.
1	--	--	--

4.4. Test sample information

Type	sample no.
Engineer sample	CISR251010021-1#
Normal sample	CISR251010021-2#

4.5. Testing environmental condition

Type	Requirement	Actual
Temperature:	15~35°C	25°C
Relative Humidity:	25~75%	50%
Air Pressure:	860~1060mbar	1000mbar

4.6. Statement of the measurement uncertainty

No.	Test Items	Measurement Uncertainty
1	AC Conducted Emission	1.63dB
2	Power Spectral Density	1.34dB
3	20dB Bandwidth	0.002%
4	Duty cycle	-
5	Conducted Band Edge and Spurious Emission	1.93dB
6	Radiated Band Edge Emission	3.76dB for 30MHz-1GHz 3.80dB for above 1GHz
7	Radiated Spurious Emission	3.76dB for 30MHz-1GHz 3.80dB for above 1GHz

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=1.96$.

4.7. Equipment Used during the Test

Dwell Time Duty Cycle 20dB Bandwidth						
Item	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	Spectrum analyzer	R&S	FSV-40N	102130	2025-01-08	2026-01-07
2	Vector Signal Generator	Agilent	N5182A	MY50142364	2025-01-08	2026-01-07
3	Power Meter	WCS	WCS-PM	WCSPM230405A	2025-01-08	2026-01-07

Radiated Emission (above 1GHz) Field Strength of The Fundamental Signal Radiated Emission (below 1GHz)						
Item	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	9*6*6 anechoic chamber	SKET	9.3*6.3*6	N/A	2024-09-02	2027-09-01
2	Spectrum analyzer	Agilent	N9020A	MY50530263	2025-01-08	2026-01-07
3	Spectrum analyzer	R&S	FSV-40N	102130	2025-01-08	2026-01-07
4	Bilog Antenna	Schwarzbeck	VULB 9163	1463	2023-01-09	2026-01-08
5	Horn Antenna	SCHWARZBECK	BBHA 9120 D	2487	2023-01-09	2026-01-08
6	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	/	2023-01-09	2026-01-08
7	RF Cable	Tonscend	Cable 1	/	2025-01-08	2026-01-07
8	RF Cable	Tonscend	Cable 2	/	2025-01-08	2026-01-07
9	RF Cable	SKET	Cable 3	/	2025-01-08	2026-01-07
10	L.I.S.N.#1	Schwarzbeck	NSLK8127	/	2025-01-08	2026-01-07
11	L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	/	2025-01-08	2026-01-07
12	Horn Antenna	SCHWARZBECK	BBHA9170	1130	2023-01-09	2026-01-08
13	Preamplifier	Tonscend	TAP18040048	AP21C806126	2025-01-08	2026-01-07
14	Variable-frequency power source	Pinhong	PH1110	/	2025-01-08	2026-01-07
15	6dB Attenuator	SKET	DC-6G	/	2025-01-08	2026-01-07
16	Antenna tower	SKT	Bk-4AT-BS	AT2021040101-V1	2025-01-08	2026-01-07

5. TEST CONDITIONS AND RESULTS

5.1. Antenna Requirement

Standard Applicable

FCC CFR Title 47 Part 15 Subpart C Section 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, 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.

Description

The EUT antenna is PCB antenna, It comply with the standard requirement. In case of replacement of broken antenna the same antenna type must be used. Antenna structure please refer to the EUT internal photographs antenna photo.

5.2. AC Conducted Emission

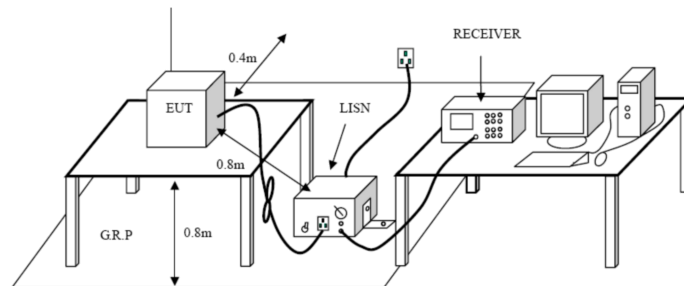
Limit:

FCC CFR Title 47 Part 15 Subpart C Section 15.207

Frequency range (MHz)	Limit (dBuV)	
	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.

Test configuration:



Test procedure:

1. The EUT was setup according to ANSI C63.10 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment.
4. The peripheral devices are also connected to the main power through a LISN. (Refer to the block diagram of the test setup and photographs)
5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
8. During the above scans, the emissions were maximized by cable manipulation.

Test mode:

Refer to the clause 4.2

Result:

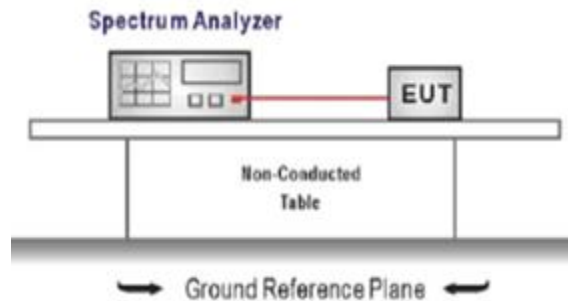
Not Applicable

5.3. 20 dB Bandwidth

Limit:

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. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test configuration:



Test procedure:

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a Test channel
RBW $\geq$ 1% of the 20 dB bandwidth, VBW $\geq$ RBW
Sweep = auto, Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

Test mode:

Refer to the clause 4.2

Result:

Passed

Test Channel	20dB Bandwidth (kHz)	Limit (kHz)	Result
CH1	159.2	1084.8	Pass

NOTE: Limit=0.25%*Center Frequency=1084.8 kHz

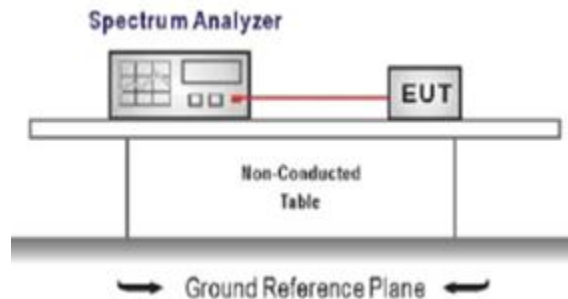


5.4. Transmitter Deactivation Time

Limit:

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

Test configuration:



Test procedure:

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
Frequency=Center carrier frequency
RBW=30kHz, VBW=100kHz, Span= zero,
Sweep time= 10second, Detector function = peak, Trace = single
4. Measure and record the results in the test report.

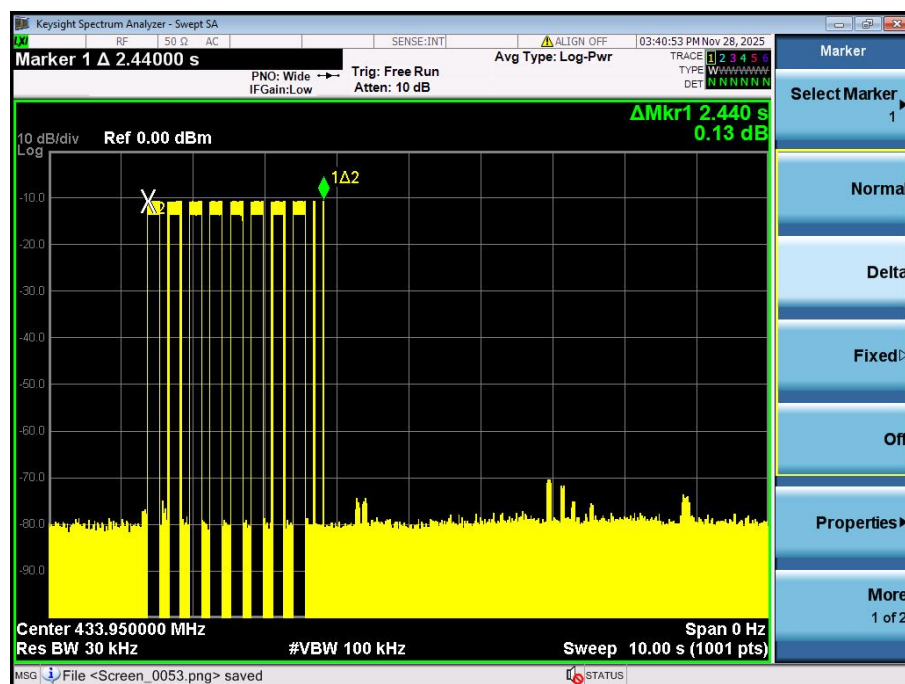
Test mode:

Normal operation mode

Result:

Passed

Transmission time (second)	Limit (second)	Result
2.44	5	Pass

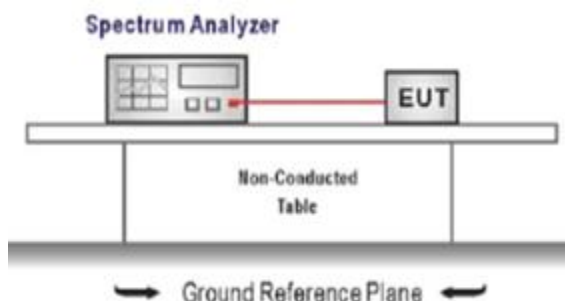


5.5. Duty Cycle Corrected Factor

Limit:

No dedicated limit specified in the Rules.

Test configuration:



Test procedure:

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
Span=zero span, Frequency=centered channel, RBW= 30kHz, VBW ≥ RBW
Sweep time=as necessary to capture the entire dwell time,
Detector function = peak, Trigger mode
4. Measure and record the duty cycle data

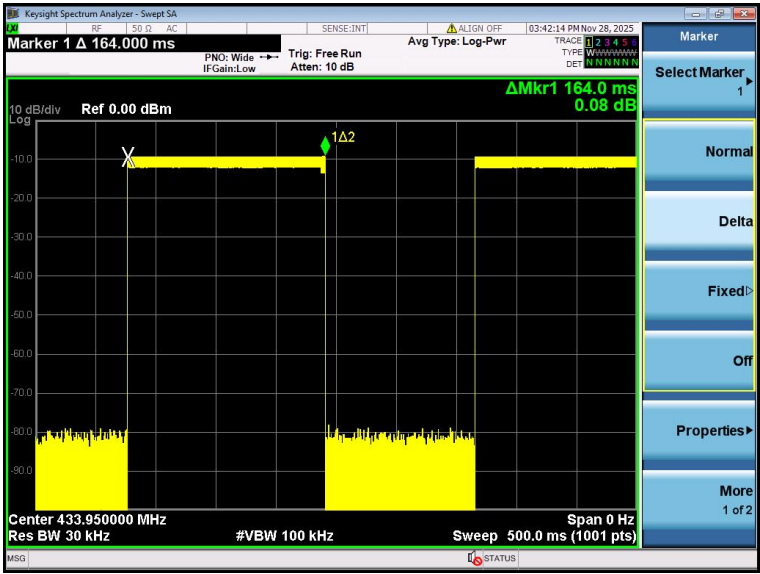
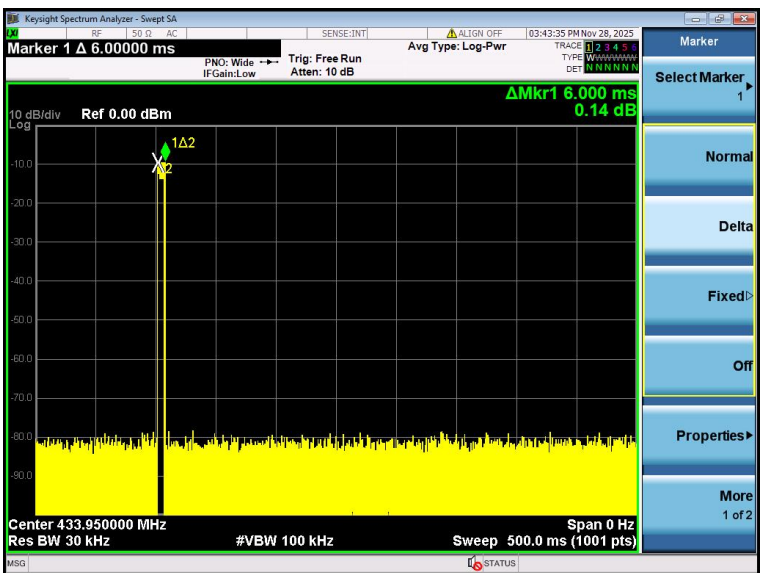
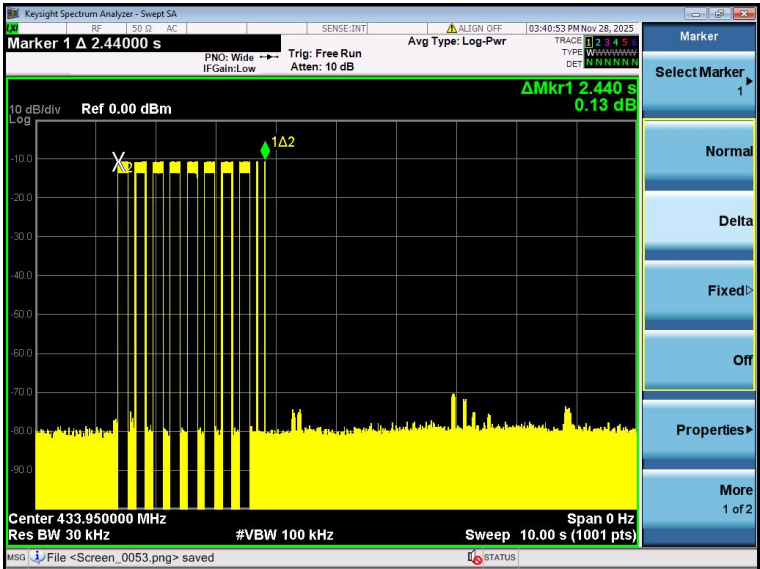
Test mode:

Refer to the clause 4.2

T _{ON1} (ms) :	164
T _{ON1} number	8
T _{ON2} (ms) :	6
T _{ON2} number	2
Period (ms) :	2440
Duty Cycle :	$= (164 \times 8 + 6 \times 2) / 2440 = 0.54$
Duty Cycle Corrected Factor:	$= 20 \times \log(0.54) = -5.32\text{dB}$

Note:

- 1) Duty cycle= $T_{ON1} \times T_{ON1 \text{ number}} + T_{ON2} \times T_{ON2 \text{ number}} / T_{\text{period}}$
- 2) Duty Cycle Corrected Factor/DCCF= $20 \times \log (\text{Duty Cycle})$

T_{ON1} (ms) :	
T_{ON2} (ms) :	
Period (ms) :	

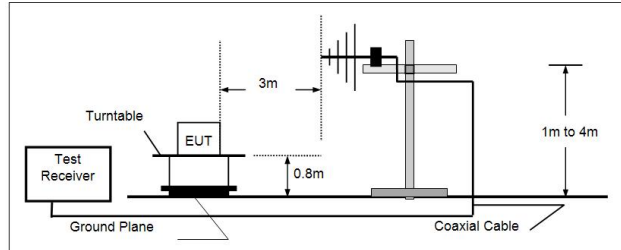
5.6. Radiated field strength of the fundamental signal

Limit:

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

¹Linear interpolations.

Test configuration:



Test procedure:

1. The EUT was setup and tested according to ANSI C63.10.
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, 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 to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;
7. 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.

Test mode:

Refer to the clause 4.2

Result:

Passed

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarity
433.96	80.23	100.83	20.6	Peak	Horizontal
433.96	74.91	80.83	5.92	Average	Horizontal
433.96	80.56	100.83	20.27	Peak	Vertical
433.96	75.24	80.83	5.59	Average	Vertical

Note:

- 1) Level= Reading + Factor/Transd; Factor/Transd =Antenna Factor+ Cable Loss- Preamp Factor
- 2) Margin = Limit – Level
- 3) Average Level = Peak Level+Duty cycle corrected factor
- 4) This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in Y position.

5.7. Radiated Spurious Emission

Limit:

FCC CFR Title 47 Part 15 Subpart C Section 15.209

Frequency	Limit (dBuV/m)	Value
0.009 MHz ~0.49 MHz	2400/F(kHz) @300m	Quasi-peak
0.49 MHz ~ 1.705 MHz	24000/F(kHz) @30m	Quasi-peak
1.705 MHz ~30 MHz	30 @30m	Quasi-peak

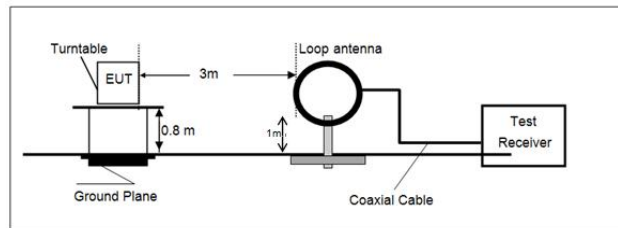
Limit dBuV/m @3m = Limit dBuV/m @300m + 40*log(300/3)

Limit dBuV/m @3m = Limit dBuV/m @30m +40*log(30/3)

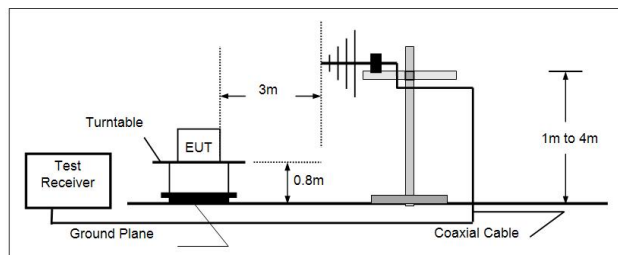
Frequency	Limit (dBuV/m @3m)	Value
30MHz~88MHz	40.00	Quasi-peak
88MHz~216MHz	43.50	Quasi-peak
216MHz~960MHz	46.00	Quasi-peak
960MHz~1GHz	54.00	Quasi-peak
Above 1GHz(Field strength of fundamental)	80.83	Average
	100.83	Peak
Above 1GHz(Field strength of harmonics)	60.83	Average
	80.83	Peak

Test configuration:

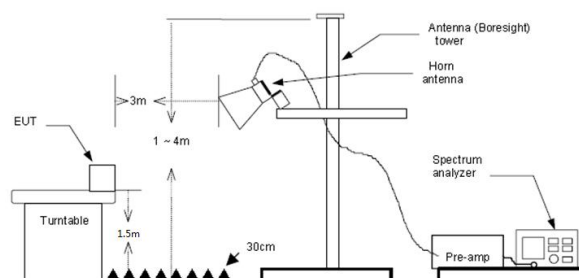
9kHz~30MHz



30 MHz ~ 1 GHz



Above 1 GHz



Test procedure:

1. The EUT was setup and tested according to ANSI C63.10.
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, 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 to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
 - a) Span shall wide enough to fully capture the emission being measured;
 - b) Below 1 GHz:
RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;
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.
 - c) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement
 - d) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement

Test mode:

Refer to the clause 4.2

Result:**Passed**

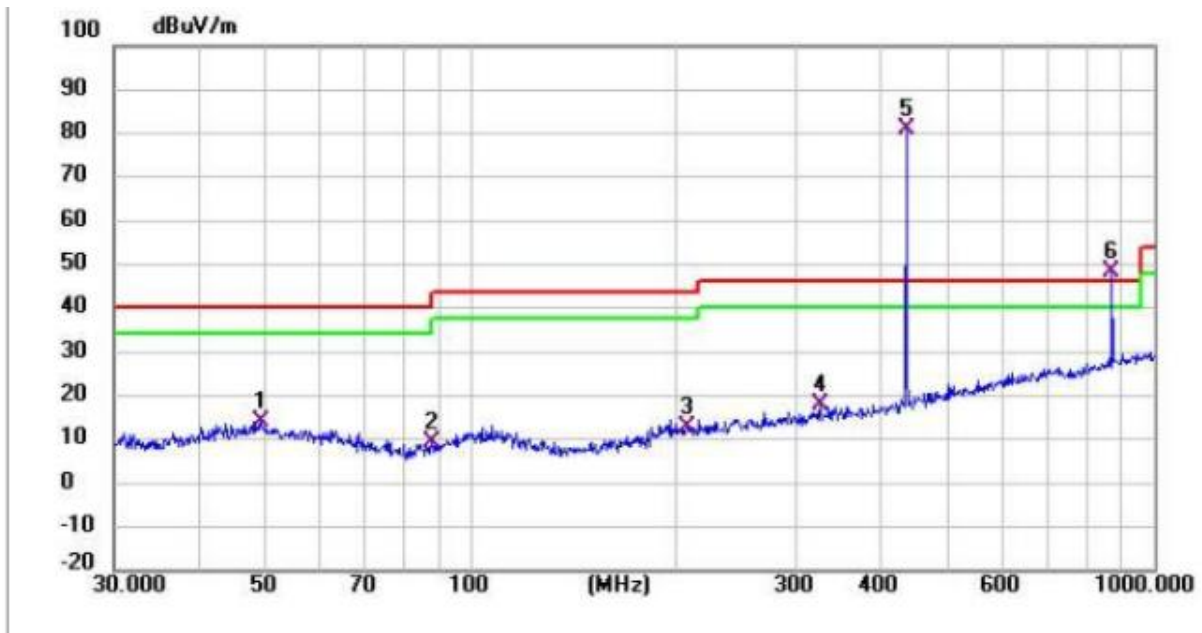
For 9 kHz ~ 30 MHz

The EUT was pre-scanned this frequency band, found the radiated level 20dB lower than the limit, so don't show data on this report.

For 30 MHz ~ 1000 MHz

Polarization:

Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	49.1865	43.34	-29.15	14.19	40.00	25.81	QP
2	87.7246	43.18	-33.65	9.53	40.00	30.47	QP
3	207.8501	42.64	-29.66	12.98	43.50	30.52	QP
4	324.4560	44.44	-26.60	17.84	46.00	28.16	QP
6 X	869.1302	63.59	-15.25	48.34	46.00	-2.34	QP

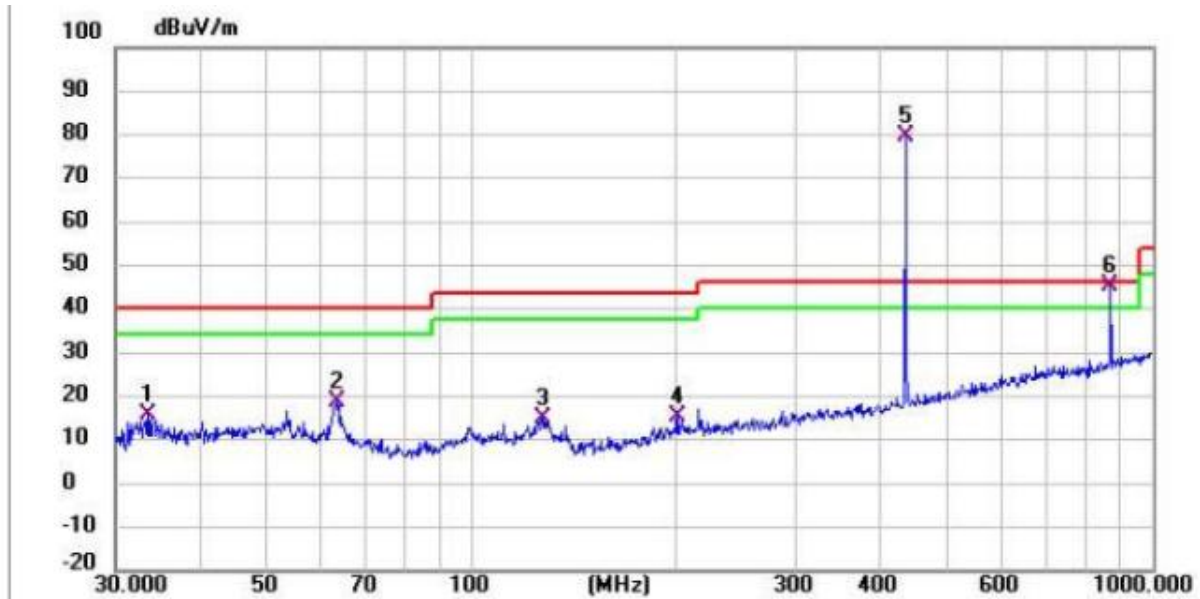
Fundamental and Harmonics Result

Frequency (MHz)	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polarity	Conclusion
869.13	48.34	80.83	32.49	Peak	Horizontal	PASS
869.13	43.02	60.83	17.81	Average	Horizontal	PASS

Note:

- 1) Level= Reading + Factor/Transd; Factor/Transd =Antenna Factor+ Cable Loss- Preamp Factor
- 2) Margin = Limit – Level
- 3) Average Level = Peak Level+Duty cycle corrected factor
- 4) This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in Y position.

Polarization: Vertical



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	33.5624	48.03	-32.04	15.99	40.00	24.01	QP
2	63.3132	50.09	-31.38	18.71	40.00	21.29	QP
3	127.6645	48.39	-33.42	14.97	43.50	28.53	QP
4	201.3930	45.05	-29.79	15.26	43.50	28.24	QP
6 !	869.1302	60.47	-15.25	45.22	46.00	0.78	QP

Fundamental and Harmonics Result

Frequency (MHz)	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polarity	Conclusion
869.13	45.22	80.83	35.61	Peak	Horizontal	PASS
869.13	39.90	60.83	20.93	Average	Horizontal	PASS

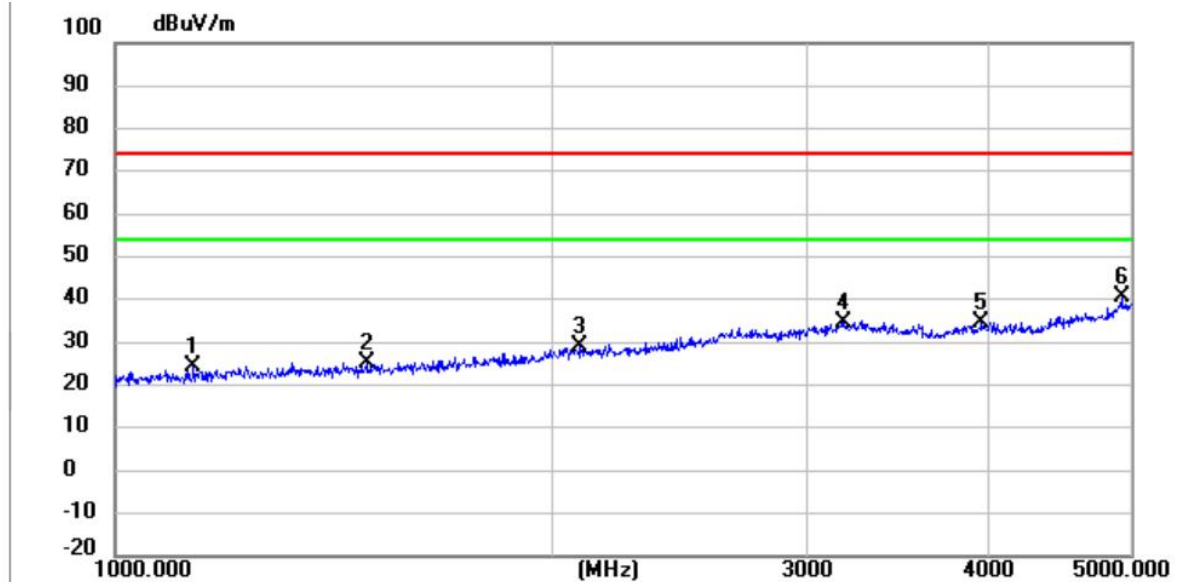
Note:

- 1) Level= Reading + Factor/Transd; Factor/Transd =Antenna Factor+ Cable Loss- Preamp Factor
- 2) Margin = Limit – Level
- 3) Average Level = Peak Level+Duty cycle corrected factor
- 4) This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in Y position.

For 1000 MHz ~ 5000 MHz

Polarization:

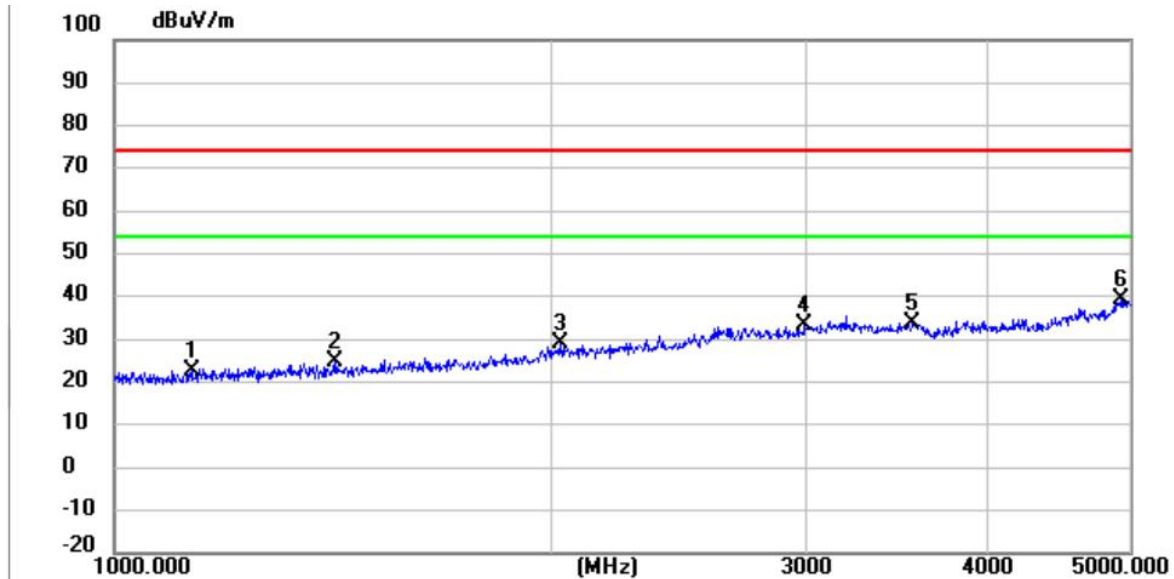
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1133.6000	45.82	-21.67	24.15	74.00	49.85	peak
2	1492.8000	46.12	-20.74	25.38	74.00	48.62	peak
3	2091.6000	47.34	-18.15	29.19	74.00	44.81	peak
4	3175.6000	48.98	-14.13	34.85	74.00	39.15	peak
5	3947.2000	46.98	-12.42	34.56	74.00	39.44	peak
6 *	4930.8000	49.69	-9.20	40.49	74.00	33.51	peak

Polarization:

Vertical



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1130.8000	44.44	-21.68	22.76	74.00	51.24	peak
2	1419.2000	45.71	-20.99	24.72	74.00	49.28	peak
3	2031.6000	47.48	-18.35	29.13	74.00	44.87	peak
4	2990.8000	48.09	-14.65	33.44	74.00	40.56	peak
5	3549.2000	47.56	-13.57	33.99	74.00	40.01	peak
6 *	4929.6000	48.61	-9.20	39.41	74.00	34.59	peak

Note:

- 1) $\text{Level} = \text{Reading} + \text{Factor/Transd}$; $\text{Factor/Transd} = \text{Antenna Factor} + \text{Cable Loss} - \text{Preamp Factor}$
- 2) $\text{Margin} = \text{Limit} - \text{Level}$
- 3) Average measurement was not performed if peak level is lower than average limit (54 dBuV/m) for above 1GHz.
- 4) The other emission levels were very low against the limit.
- 5) This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in Y position.

-----End of the report-----