



**FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-310 ISSUE 1**

CERTIFICATION TEST REPORT

For

**Tornado tumber
MODEL NUMBER: 10012**

FCC ID: XHT-100121610

REPORT NUMBER: 4787639710.1-1

ISSUE DATE: November 14, 2016

Prepared for

**Guangdong Yinrun Industry Co., LTD.
Yinrun Ind. Garden, Laimei Zone, Chenghai, Shantou Guangdong, China**

Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
--	Nov.14, 2016	Initial Issue	

Summary of Test Results			
Clause	Test Items	FCC/IC Rules	Test Results
1	Radiated Emission	47 CFR Part 15, Subpart C Section 15.227 FCC 15.209 RSS-310 Issue 4 Clause 3.8	Complied
2	Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.215 RSS-Gen Issue 4 Clause 6.6	Complied
3	Conducted Emission Test For AC Power Port	FCC 15.207 RSS-GEN Clause 8.8	N/A
4	Antenna Requirement	FCC 15.203 RSS-GEN Clause 8.3	Complied

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: Guangdong Yinrun Industry Co., LTD.
Address: Yinrun Ind. Garden, Laimei Zone, Chenghai, Shantou Guangdong, China

Manufacturer Information

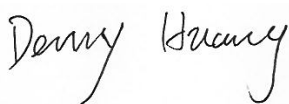
Company Name: Guangdong Yinrun Industry Co., LTD.
Address: Yinrun Ind. Garden, Laimei Zone, Chenghai, Shantou Guangdong, China

EUT Description

Product Name Tornado tumber
Brand Name N/A
Model Name 10012
FCC ID XHT-100121610
IC 21045-100121610
Date Tested October 28, 2016 ~ November 8, 2016

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	PASS
INDUSTRY CANADA RSS-310 Issue 4	PASS
INDUSTRY CANADA RSS-GEN Issue 4	PASS

Tested By:



Denny Huang
Engineer Project Associate
Approved By:



Stephen Guo
Laboratory Manager

Check By:



Shawn Wen
Laboratory Leader

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 4, and RSS-310 Issue 4.

3. FACILITIES AND ACCREDITATION

Test Location	Dongguan Dongdian Testing Service Co., Ltd
Address	Add: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808
Accreditation Certificate	Dongguan Dongdian Testing Service Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. Valid time is until January 31, 2018. Dongguan Dongdian Testing Service Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 270092, Renewal date March 11, 2015, valid time is until March 11, 2018. The 3m Alternate Test Site of Dongguan Dongdian Testing Service Co., Ltd. Has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No.10288A on April 23, 2015, valid time is until April 23, 2018.

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 recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.32dB
Radiated Disturbance, 9k to 30 MHz	2.76dB (9KHz-150KHz) 2.45dB(150KHz-30MHz)
Radiated Disturbance, 30 to 1000 MHz	4.70 dB (Antenna Polarize: V) 4.84 dB (Antenna Polarize: H)
Radiated Disturbance, 1 to 18 GHz	4.10dB(1-6GHz) 4.40dB (6GHz-18Gz)
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

Equipment	Tornado tumber		
Model Name	10012		
Product Description	Operation Frequency	27.145 MHz	
	Channel Number	1	
	Antenna Type	Integral	
Power Supply	DC 9V		
Battery	DC 9V (by 9V 6LR61 Battery)		

5.2. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel	Frequency
TX mode	/	27.145

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1	27.145	Integral Antenna	3.0

5.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	FCC ID
1	N/A	N/A	N/A	N/A

I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	N/A	N/A	N/A	N/A	N/A

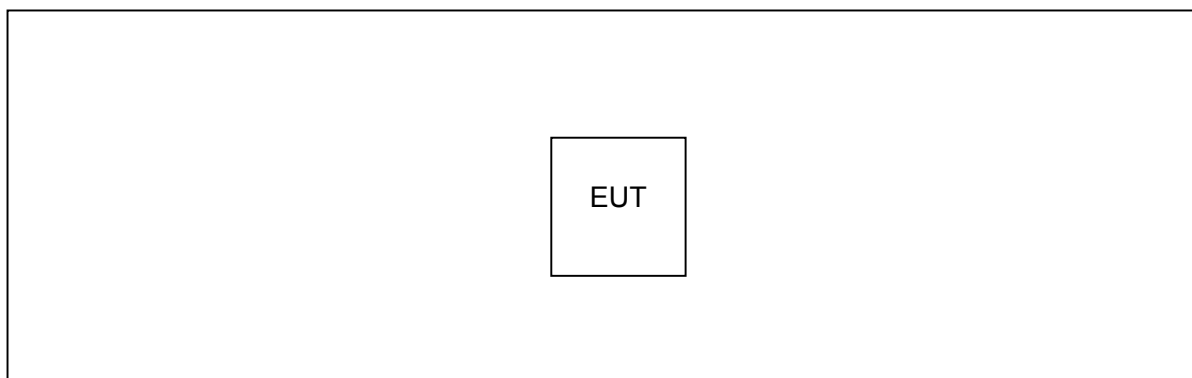
ACCESSORY

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

TEST SETUP

The EUT has been tested independent unit.

SETUP DIAGRAM FOR TESTS



5.5. MEASURING INSTRUMENT AND SOFTWARE USED

Instrument(Conducted for RF Port)						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
☒	Spectrum analyzer	R&S	FSU26	1166.1660.26	2016/10/16	2017/10/16
Instrument (Radiated Tests)						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
☒	EMI Test Receiver	R&S	ESU8	100316	2016/10/16	2017/10/16
☒	Spectrum analyzer	R&S	FSU26	1166.1660.26	2016/10/16	2017/10/16
☒	Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	2016/10/27	2017/10/27
☒	Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	2016/10/27	2017/10/27
☒	Pre-amplifier	A.H.	PAM-0118	360	2016/10/16	2017/10/16
☒	RF Cable	HUBSER	CP-X2	W11.03	2016/10/16	2017/10/16
☒	RF Cable	HUBSER	CP-X1	W12.02	2016/10/16	2017/10/16
☒	MI Cable	HUBSER	C10-01-01-1M	1091629	2016/10/16	2017/10/16
☒	Test software	Audix	E3	V 6.11111b	/	/

6. ANTENNA PORT TEST RESULTS

6.1. 20 dB BANDWIDTH

LIMITS

Section	Test Item	Limit
47 CFR Part 15C Section 15.215 (C)	20 dB Bandwidth	Operation within the band 26.960 – 27.280 MHz

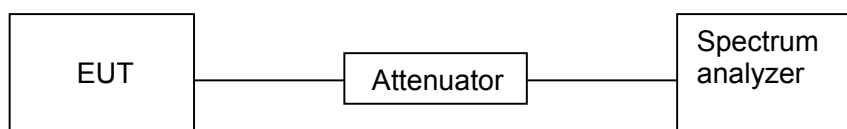
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	1K
VBW	$\geq 3 \times \text{RBW}$
Trace	Max hold
Sweep	Auto couple

Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

TEST SETUP



TEST CONDITIONS

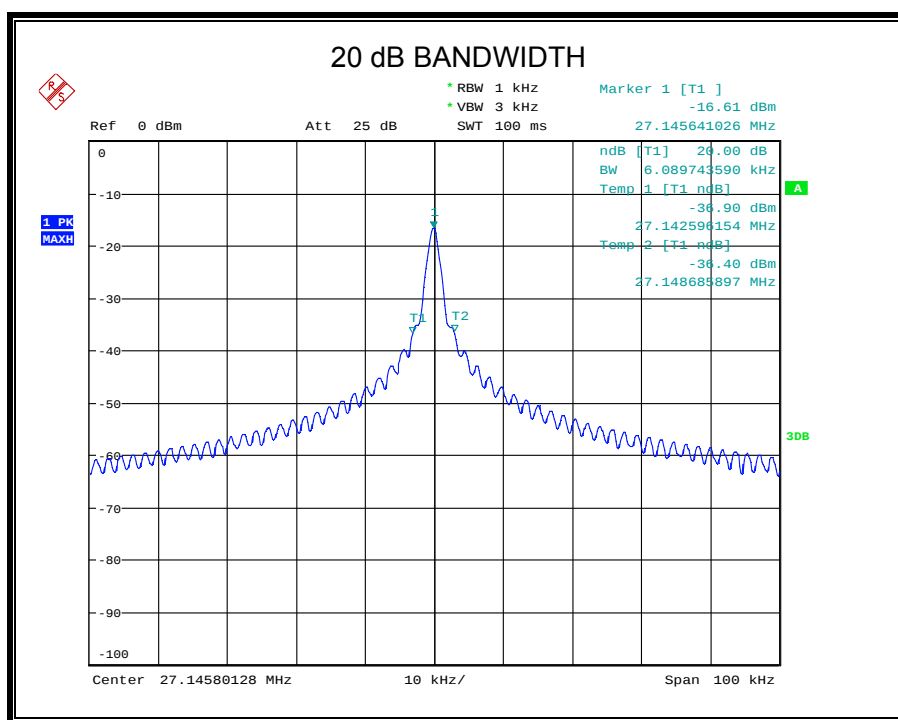
Temperature: 26.6°C

Relative Humidity: 58%

Test Voltage: DC 9V

RESULTS

Mode	Frequency (MHz)	20dB bandwidth (kHz)	Result
TX	27.145	6.09	Pass



6.2. 99% BANDWIDTH**LIMITS**

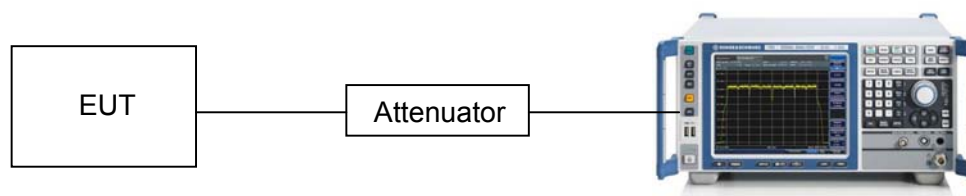
None; for reporting purposes only.

TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	1K
VBW	$\geq 3 \times \text{RBW}$
Trace	Max hold
Sweep	Auto couple

Use the 99% bandwidth function in the spectrum analyser and allow the trace to stabilize, then recorded the measurement data.

TEST SETUP**TEST CONDITIONS**

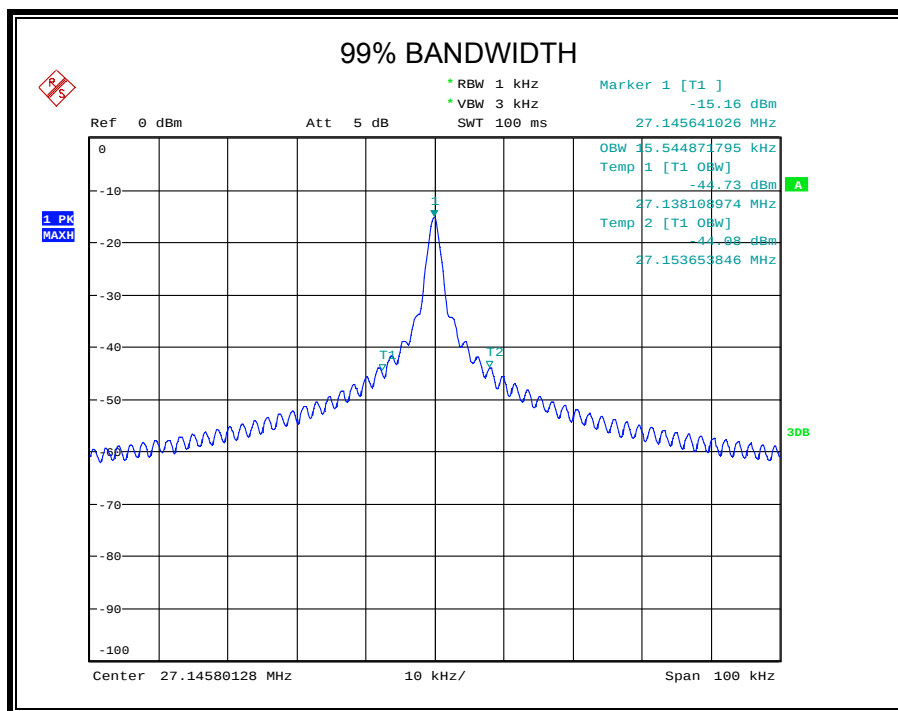
Temperature: 26.6°C

Relative Humidity: 58%

Test Voltage: DC 9V

RESULTS

Mode	Frequency (MHz)	99% Bandwidth (kHz)	Result
TX	27.145	15.54	Pass



7. RADIATED TEST RESULTS

7.1. LIMITS AND PROCEDURE

LIMITS

Please refer to FCC §15.205 and §15.209

Please refer to IC RSS-GEN Clause 8.9 (Transmitter)

Radiation Disturbance Test Limit for FCC (Class B) (9KHz-1GHz)

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
Remark: Carrier Power will not exceed 80dB μ V/m at 3m (Average).		

The radiated emission limit in 3m distance:

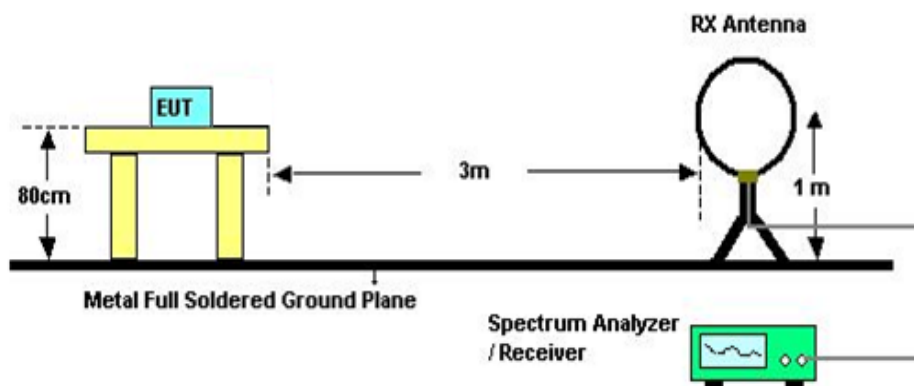
Frequency (MHz)	Field strength limit (dB μ V/m)	Measurement Distance (meters)
0.009~0.490	128.5 ~ 93.8	3
0.490~1.705	73.8 ~ 63.0	3
1.705~30.0	69.5	3
30~88	40.0	3
88~216	43.5	3
216~960	46.0	3
960~1000	54.0	3
Remark: Carrier Power will not exceed 80dBuV/m at 3m (Average).		

Radiation Disturbance Test Limit for FCC (Above 1G)

Frequency (MHz)	dB(uV/m) (at 3 meters)	
	Peak	Average
Above 1000	74	54

TEST SETUP AND PROCEDURE

Below 30MHz

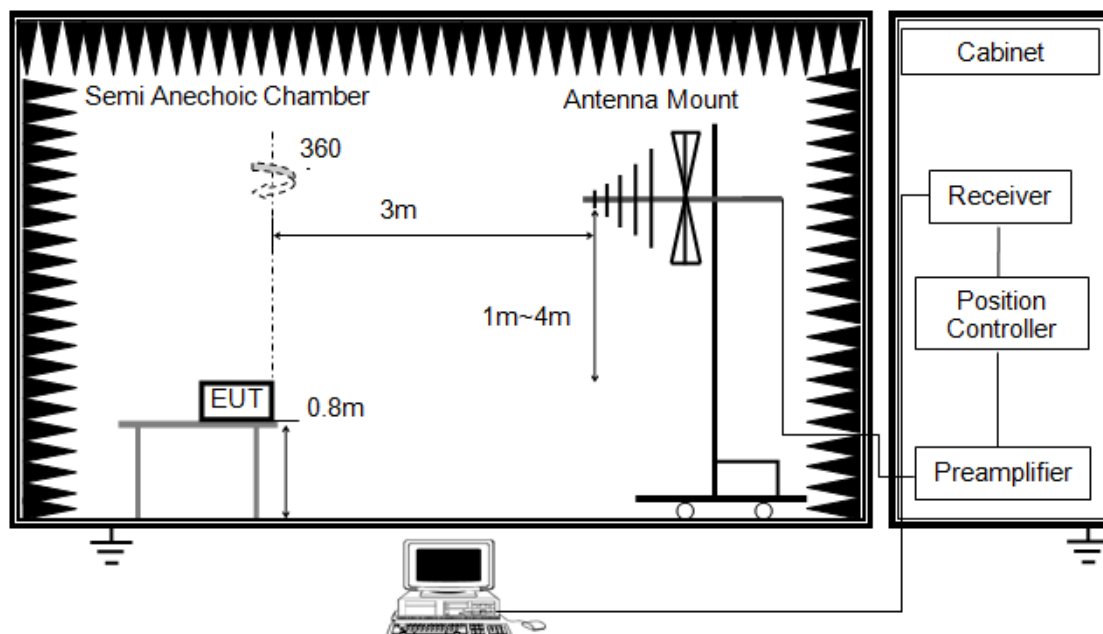


The setting of the spectrum analyser

RBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
VBW	200Hz (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 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 variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
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)

Below 1G

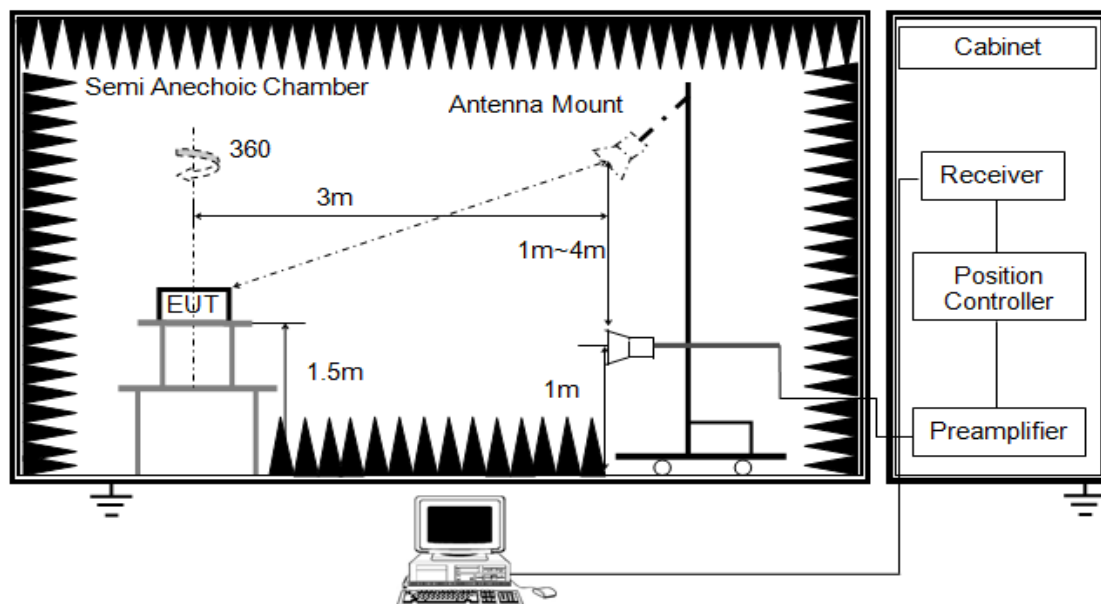


The setting of the spectrum analyser

RBW	120K
VBW	300K
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 variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
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)

ABOVE 1G



The setting of the spectrum analyser

RBW	1M
VBW	3M
Sweep	Auto
Detector	Peak and CISPR 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 tune the antenna tower (1.5 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 1.5 meter 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. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement above 1GHz, the emission measurement will be measured by the peak detector and the AV detector.
7. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration)

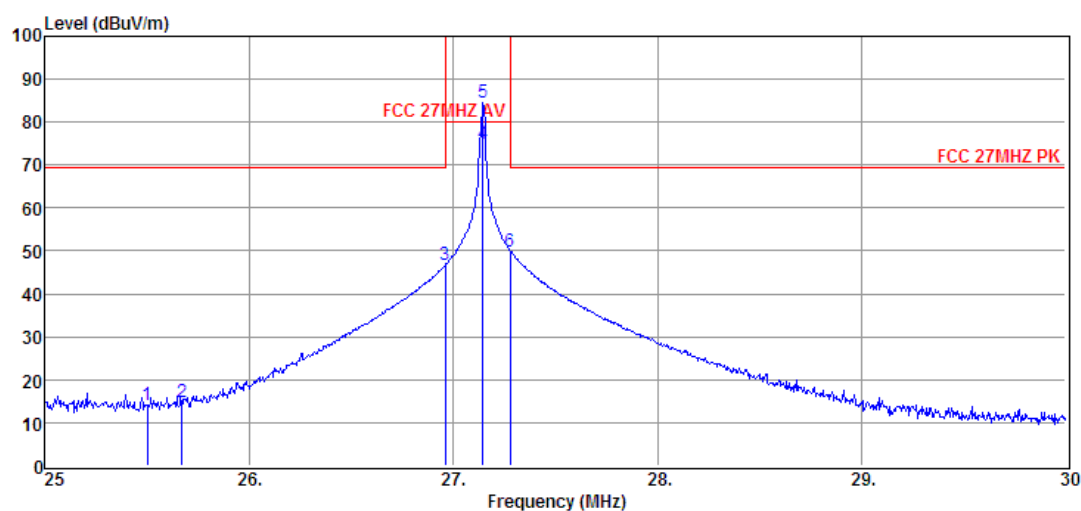
TEST CONDITIONS

Temperature: 23.5°C
Relative Humidity: 59.2%
Test Voltage: DC 9V

7.2. RESTRICTED BANDEGE

7.2.1. TX MODE

EUT:	Tornado tumber	Model Name:	10012
Temperature:	23.5°C	Relative Humidity:	59.2%
Pressure:	100.1kPa	Test Voltage:	DC 9V
Polarization :	Vertical	Result:	Pass

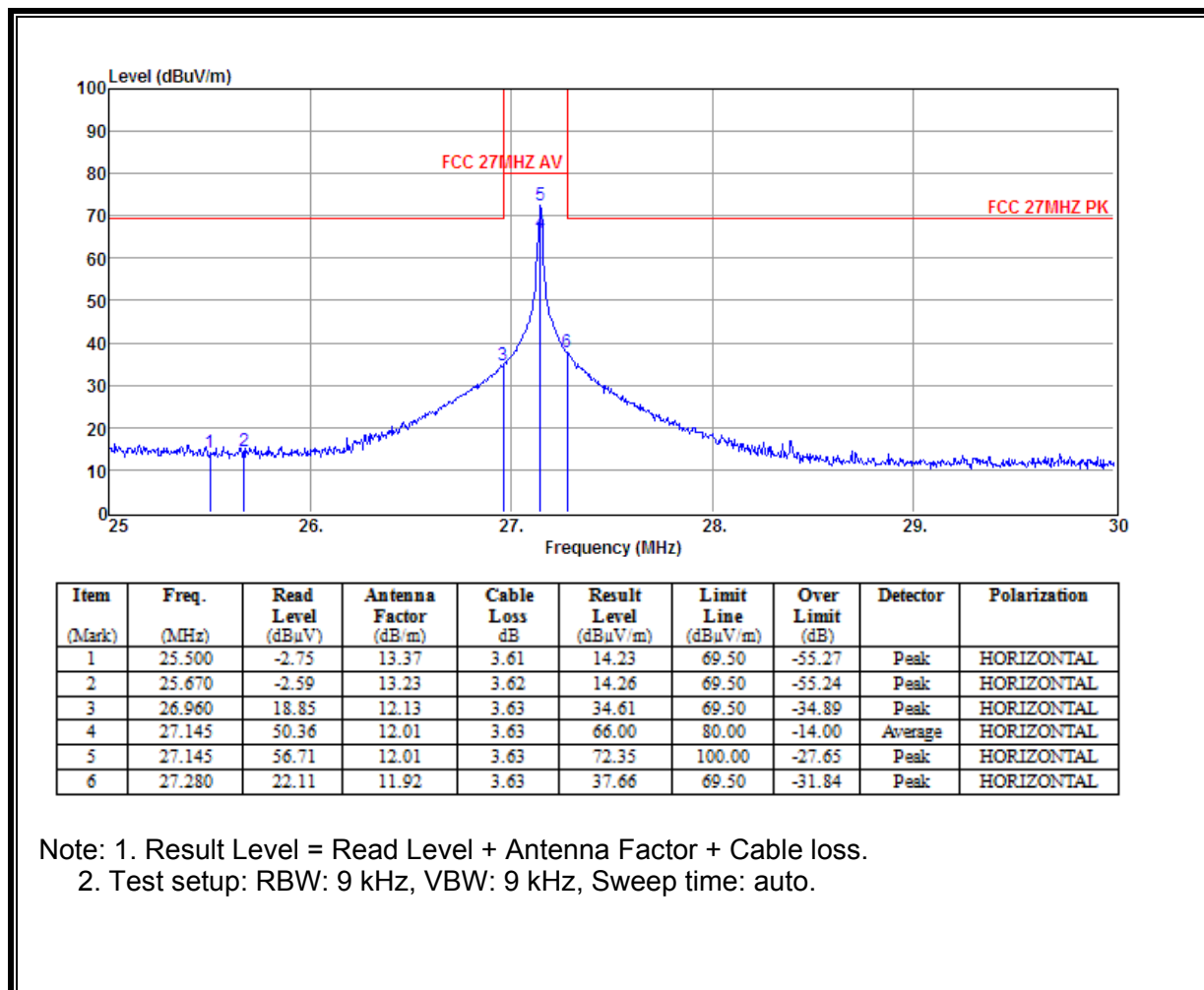


Item (Mark)	Freq. (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	25.500	-2.75	13.37	3.61	14.23	69.50	-55.27	Peak	VERTICAL
2	25.670	-2.20	13.23	3.62	14.65	69.50	-54.85	Peak	VERTICAL
3	26.960	30.95	12.13	3.63	46.71	69.50	-22.79	Peak	VERTICAL
4	27.145	59.20	12.01	3.63	74.84	80.00	-5.16	Average	VERTICAL
5	27.145	68.93	12.01	3.63	84.57	100.00	-15.43	Peak	VERTICAL
6	27.280	34.42	11.92	3.63	49.97	69.50	-19.53	Peak	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.

2. Test setup: RBW: 9 kHz, VBW: 9 kHz, Sweep time: auto.

EUT:	Tornado tumber	Model Name:	10012
Temperature:	23.5°C	Relative Humidity:	59.2%
Pressure:	100.1kPa	Test Voltage:	DC 9V
Polarization :	Horizontal	Result:	Pass

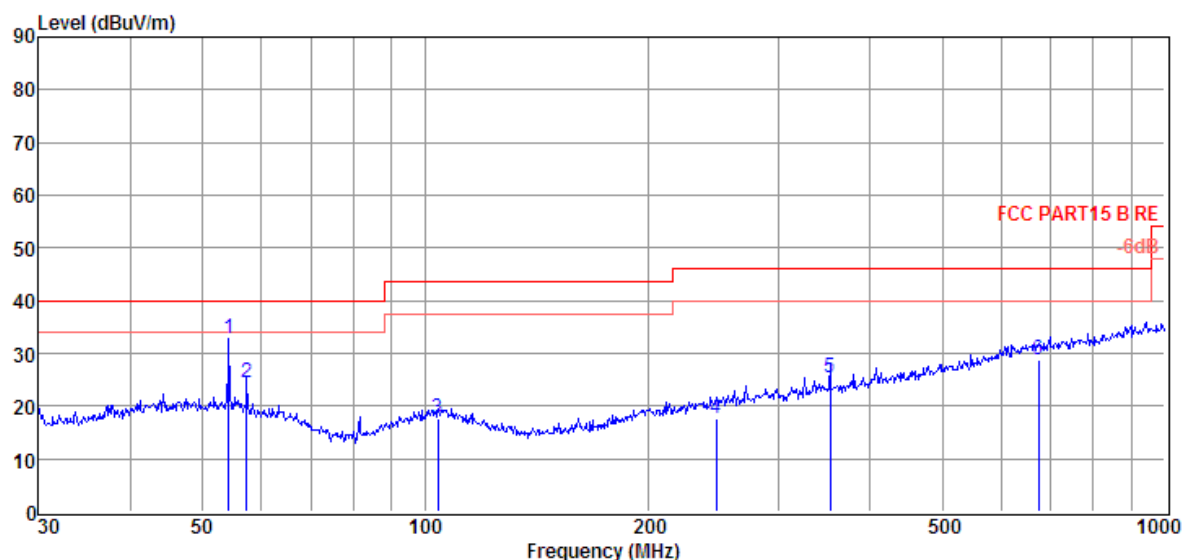


Note: EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

7.3. SPURIOUS EMISSIONS 30M ~ 1 GHz

7.3.1. TX MODE

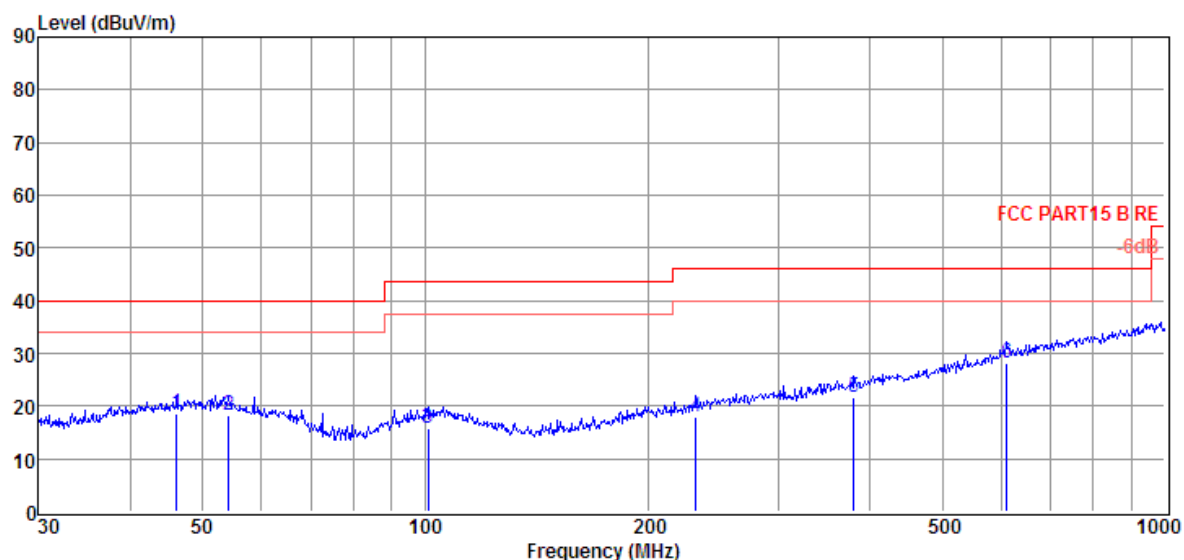
EUT:	Tornado tumber	Model Name:	10012
Temperature:	23.5°C	Relative Humidity:	59.2%
Pressure:	100.1kPa	Test Voltage:	DC 9V
Polarization :	Vertical	Result:	Pass



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	54.26	15.80	12.99	3.93	32.72	40.00	-7.28	QP	VERTICAL
2	57.39	8.21	12.12	3.95	24.28	40.00	-15.72	QP	VERTICAL
3	104.17	2.00	11.24	4.32	17.56	43.50	-25.94	QP	VERTICAL
4	247.68	0.47	12.11	5.13	17.71	46.00	-28.29	QP	VERTICAL
5	352.94	4.82	14.79	5.60	25.21	46.00	-20.79	QP	VERTICAL
6	675.21	2.53	19.60	6.75	28.88	46.00	-17.12	QP	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
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.

EUT:	Tornado tumber	Model Name:	10012
Temperature:	23.5°C	Relative Humidity:	59.2%
Pressure:	100.1kPa	Test Voltage:	DC 9V
Polarization :	Horizontal	Result:	Pass



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	46.18	1.44	13.26	3.85	18.55	40.00	-21.45	QP	HORIZONTAL
2	54.26	1.19	12.99	3.93	18.11	40.00	-21.89	QP	HORIZONTAL
3	100.93	0.47	11.06	4.31	15.84	43.50	-27.66	QP	HORIZONTAL
4	232.53	1.13	11.69	5.06	17.88	46.00	-28.12	QP	HORIZONTAL
5	379.91	0.96	14.96	5.72	21.64	46.00	-24.36	QP	HORIZONTAL
6	612.06	2.56	19.07	6.55	28.18	46.00	-17.82	QP	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.

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: EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

7.4. SPURIOUS EMISSIONS BELOW 30M

Note: The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

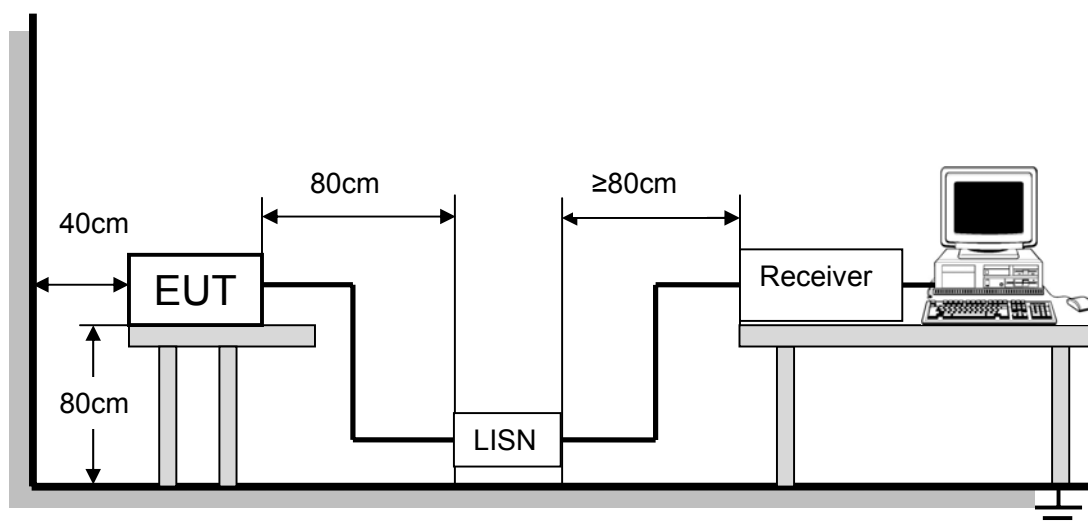
8. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

Please refer to FCC §15.207 (a) and RSS-Gen Clause 8.8

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	60.00	50.00

TEST SETUP AND PROCEDURE



The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 7 and 13 of ANSI C63.4-2014. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9kHz.

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

TEST RESULTS

Not Applicable

9. ANTENNA REQUIREMENTS

APPLICABLE REQUIREMENTS

Please refer to FCC §15.203

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. 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 FCC rule.

ANTENNA CONNECTOR

EUT has an Integrated antenna without antenna connector.

ANTENNA GAIN

The antenna gain of EUT is less than 6 dBi.

END OF REPORT

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