



TEST REPORT NUMBER: (8521)065-0181

TEST REPORT

Applicant:	GOODLY TOYS LIMITED	Fax:	/
		E-mail:	sales@goodlytoys.com
Address:	ROOM 1109, TOWER A, NEW MANDARIN PLAZA, 14 SCIENCE MUSEUM ROAD, TST EAST, KOWLOON, HONG KONG		
Test Date:	26 March, 2021 ---- 14 April, 2021		

Manufacturer or Supplier:	MEKBOA PLASTIC ELECTRONIC INDUSTRIAL CO., LTD
Address:	JIAOXI INDUSTRY AREAS, LIANXIA, CHENGHAI, SHANTOU
Sample Description:	2.4G ALL TERRAIN TORNADO
Model number:	5588-622
Additional Model:	5588-617
Rated Voltage:	DC 3.0V(AA*2)
FCC ID	2APSK-5588008
IC	24953-5588008

The submitted sample of the above equipment has been tested according to following standard(s)

FCC Part 15, Subpart C, Section 15.249: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz

RSS-210 Issue 10 (December 2019): Licence-Exempt Radio Apparatus: Category I Equipment

ANSI C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

RSS-Gen Issue 5 (March 2019): General Requirements for Compliance of Radio Apparatus

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

Assistant Manager

Name: Nick Lung
Date: 16 APR, 2021



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1 Test Standards

The tests were performed according to following standards:
FCC Part 15, Subpart C, Section 15.249: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz
RSS-210 Issue 10 (December 2019): Licence-Exempt Radio Apparatus: Category I Equipment
ANSI C63,10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
RSS-Gen Issue 5 (March 2019): General Requirements for Compliance of Radio Apparatus

2 Summary

2.1 General Remarks

Date of receipt of test sample	26 March, 2021
Testing commenced on	26 March, 2021 ---- 14 April, 2021
Testing concluded on	14 April, 2021

2.2 Final Assessment

Test Content:	Assessment
The RF requirements pertaining to the technical standards and tested operation modes are	Fulfilled
The equipment under test	Fulfilled the RF requirements

3 Equipment Under Test

3.1 Short description of the Equipment Under Test (EUT)

EUT Name	2.4G ALL TERRAIN TORNADO
Model No.	5588-622
Additional Model	5588-617
FCC ID	2APSK-5588008
ISED ID	24953-5588008
Number of Tested Samples	1
Power Supply Voltage	DC 3.0V(AA*2)
Operating Mode	TX Mode
Operation Frequency	2408-2475MHz
Number of Channel	68
Modulation	GFSK
Antenna Type	Integral Antenna



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Antenna Gain	0dBi
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3.2 EUT Configuration

(The CDF filled by the applicant can be viewed at the test laboratory.)

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

Not Applicable



3.3 Description of Test Modes

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and packet type. The worst case was found when the EUT was positioned on Y axis for radiated emission. The EUT was tested under the following mode.

EUT Configure Mode	Applicable to				Description
	RE < 1G	RE ≥ 1G	PLC	BW	
A	√	√	N/A	√	DC 3.0V from battery

Where RE<1G: Radiated Emission below 1GHz

RE ≥ 1G: Radiated Emission above 1GHz

PLC: Power Line Conducted Emission

BW: 20dB bandwidth for FCC part15C/99%
bandwidth for RSS-210

Following channel(s) was (were) selected for the test as listed below.

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2408	20	2427	39	2446	58	2465
2	2409	21	2428	40	2447	59	2466
3	2410	22	2429	41	2448	60	2467
4	2411	23	2430	42	2449	61	2468
5	2412	24	2431	43	2450	62	2469
6	2413	25	2432	44	2451	63	2470
7	2414	26	2433	45	2452	64	2471
8	2415	27	2434	46	2453	65	2472
9	2416	28	2435	47	2454	66	2473
10	2417	29	2436	48	2455	67	2474
11	2418	30	2437	49	2456	68	2475
12	2419	31	2438	50	2457		
13	2420	32	2439	51	2458		
14	2421	33	2440	52	2459		
15	2422	34	2441	53	2460		
16	2423	35	2442	54	2461		
17	2424	36	2443	55	2462		
18	2425	37	2444	56	2463		
19	2426	38	2445	57	2464		



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Channel List

Channel	Frequency (MHz)
The lowest channel	2408
The middle channel	2442
The highest channel	2475

Note: The more detailed channel, please refer to the product specifications

4 Test Environment

4.1 Address of the test Laboratory

Test Laboratory:	AJT Testing Services Limited
Test Site:	1/F, No.1, Wenhua South Road, Chenghua Industrial Zone, Chenghai District, Guangdong, People's Republic of China
Tel:	86-754-85860999
Fax:	86-754-86984098

4.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:	
CNAS Accreditation NO.:	L4735
A2LA Accreditation NO.:	5443.01
Designation Number:	CN1263
Test Firm Registration Number:	127385
Industry Canada Site Registration Number:	25345
FCC Registration NO.:	0028094555

4.3 Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:	
Temperature	15~35°C
Humidity	30~75%



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4.4 Statement of the Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. Furthermore, component and process variability of devices are similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Measurement Uncertainty (Standard: ETSI TR 100 028)	
Conducted Emissions (CE)	$\pm 2.14\text{dB}$
Radiated Emission below 1GHz	$\pm 4.44\text{dB}$
Radiated Emission above 1GHz	$\pm 5.26\text{dB}$

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

4.5 Test Types and Results

Standard: FCC PART 15, SUBPART C (SECTION 15.249) & RSS-210 Issue 10		
Standard Section	Test Type	Result
FCC Part 15 §15.209 & §15.249(a)	Radiated Emission (RE)	PASS
RSS-210 Issue 10/RSS-Gen Issue 5		
FCC Part 15 §15.215(c)	20dB Bandwidth	PASS
RSS-Gen Issue 5	Occupied Bandwidth	PASS
FCC Part 15 §15.207(a)	Conducted Emission (CE)	N/A
RSS-Gen Issue 5		
FCC Part 15 §15.203	Antenna Requirement	PASS
RSS-Gen Issue 5		
FCC Part 15 §15.205	Restricted Band Around Fundamental Frequency	PASS
RSS-210 Issue 10/RSS-Gen Issue 5		

5 Test Conditions and Results

5.1 Radiated Emission (RE)

For test instruments and accessories used see section 6

5.1.1 Test Procedures

- (1) The EUT was placed on the top of a rotating table 1.5 meters (above 1GHz) and 0.8 meters (below 1GHz) above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- (2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

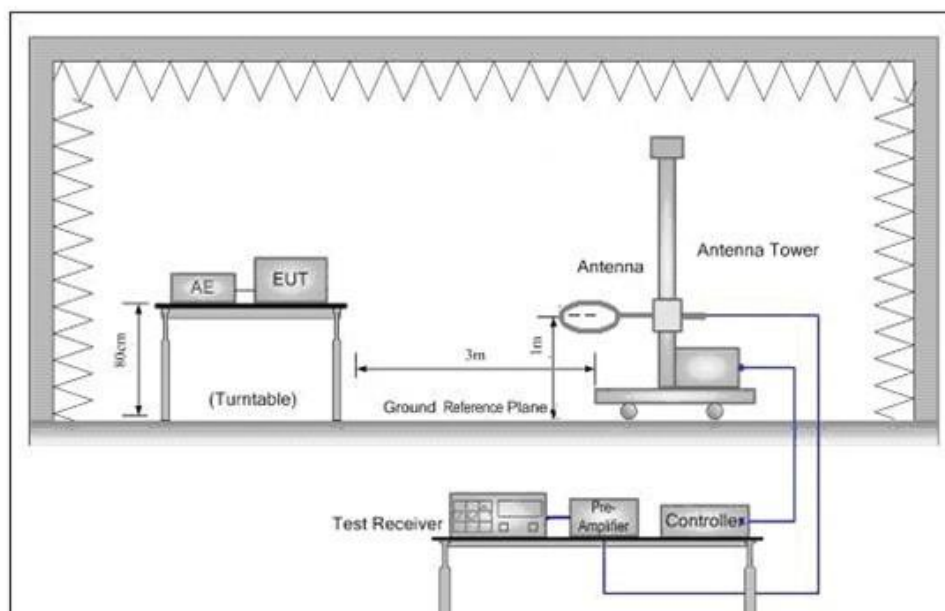
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- (3) The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- (4) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- (5) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- (6) For below 30MHz, a loop antenna with its vertical plane is place 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1m above the ground.
- (7) If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Note:

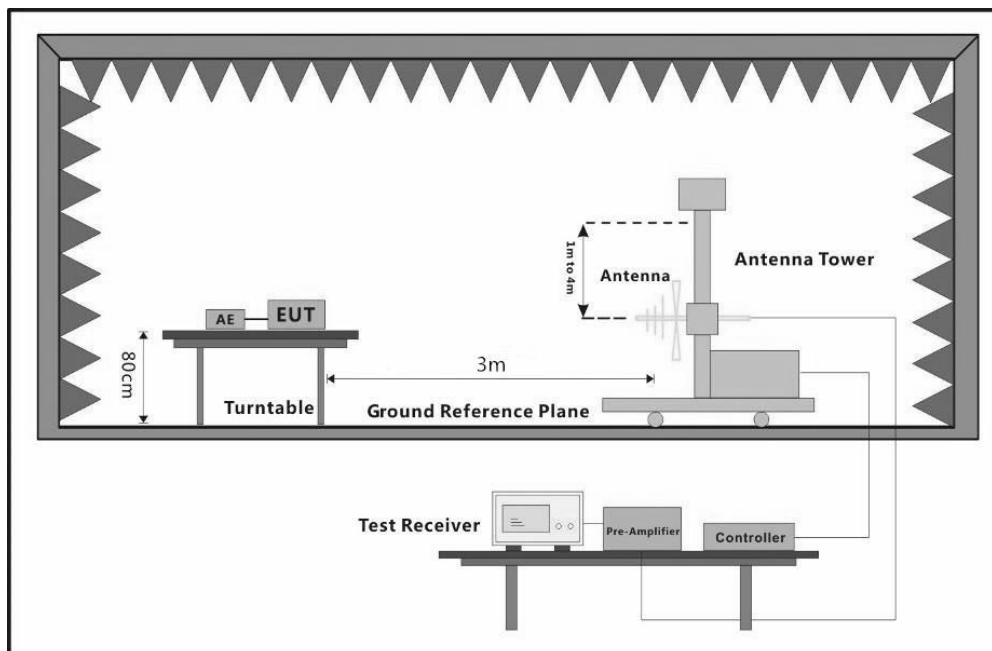
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. All modes of operation were investigated and the worst-case emissions are reported
4. The testing of the EUT was performed on all 3 orthogonal axes; the worst-case test configuration was reported on the file test setup photo.

5.1.2 Test Setup

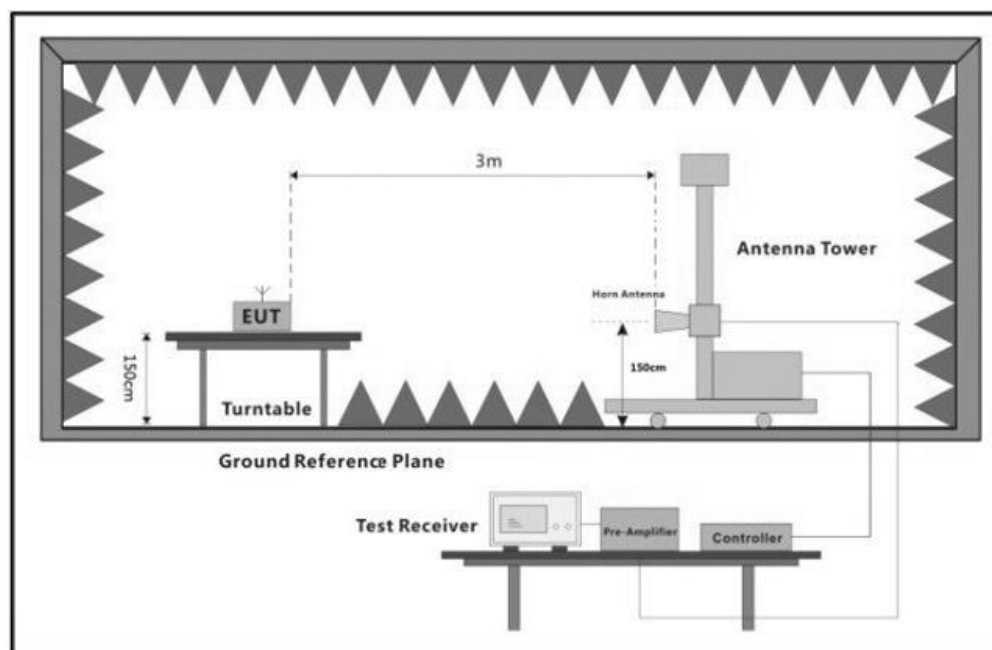


Below 30MHz

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30MHz-1000MHz



Above 1GHz



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5.1.3 Test Limits

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Frequencies (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

According to §15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Filed Strength of Fundamental (milli-volts/meter)	Field Strength of Harmonics (micro-volts/meter)
902 ~ 928 MHz	50	500
2400 ~ 2483.5 MHz	50	500
5725 ~5875 MHz	50	500
24.0 ~24.25 GHz	250	2500

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBμV/m) = 20 log Emission level (μV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.
4. Emission from 9kHz to 30MHz is more than 20dB below the limit.

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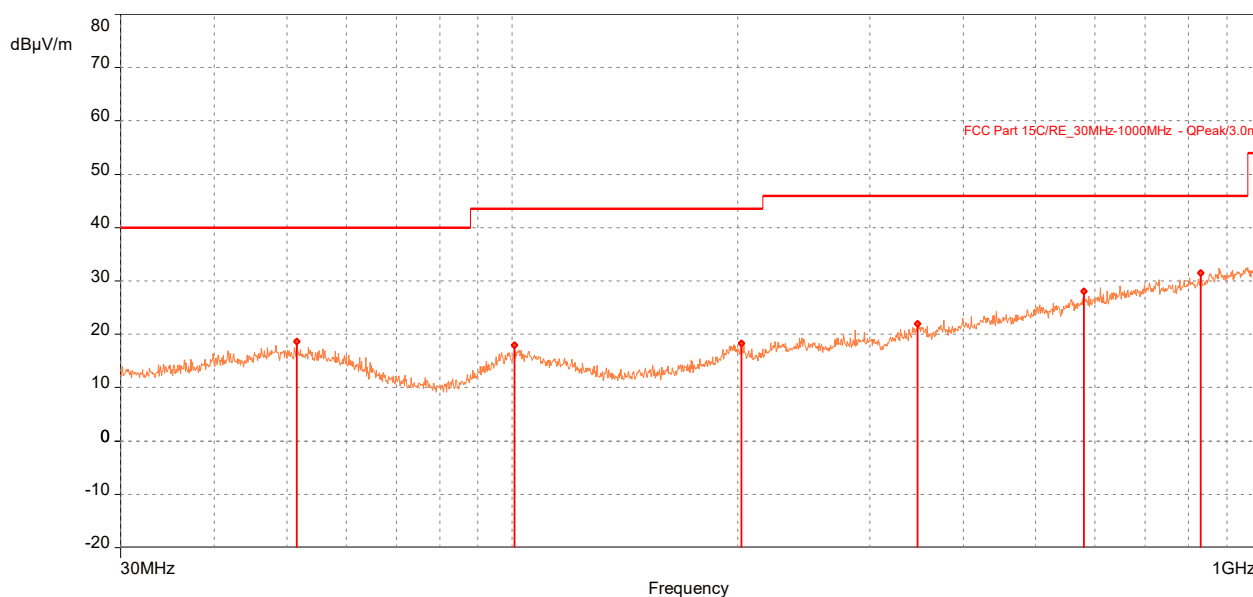
5.1.4 Test Results

The disturbance below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

5.1.4.1 Radiated Emissions Test (Below 1GHz)

Test Point	Operation Mode	Result
Horizontal	TX mode (The lowest channel: 2408MHz)	PASS

EUT Name	2.4G ALL TERRAIN TORNADO
Operating Condition	DC: 3.0V(AA*2)
Test Condition	Ambient Temperature: 20°C Humidity: 61%RH



Frequency (MHz)	Peak (dBμV/m)	QP (dBμV/m)	QP Lim. (dBμV/m)	Margin (dB)	Angle (°)	Height (m)	Polarization
51.5825	18.62	/	40.00	-21.38	131.00	1.00	Horizontal
100.616	17.94	/	43.50	-25.56	82.00	1.00	Horizontal
202.4175	18.28	/	43.50	-25.22	216.00	1.98	Horizontal
347.6265	22.00	/	46.00	-24.00	35.00	1.98	Horizontal
579.8445	28.11	/	46.00	-17.89	179.00	1.00	Horizontal
830.832	31.49	/	46.00	-14.51	23.00	1.98	Horizontal

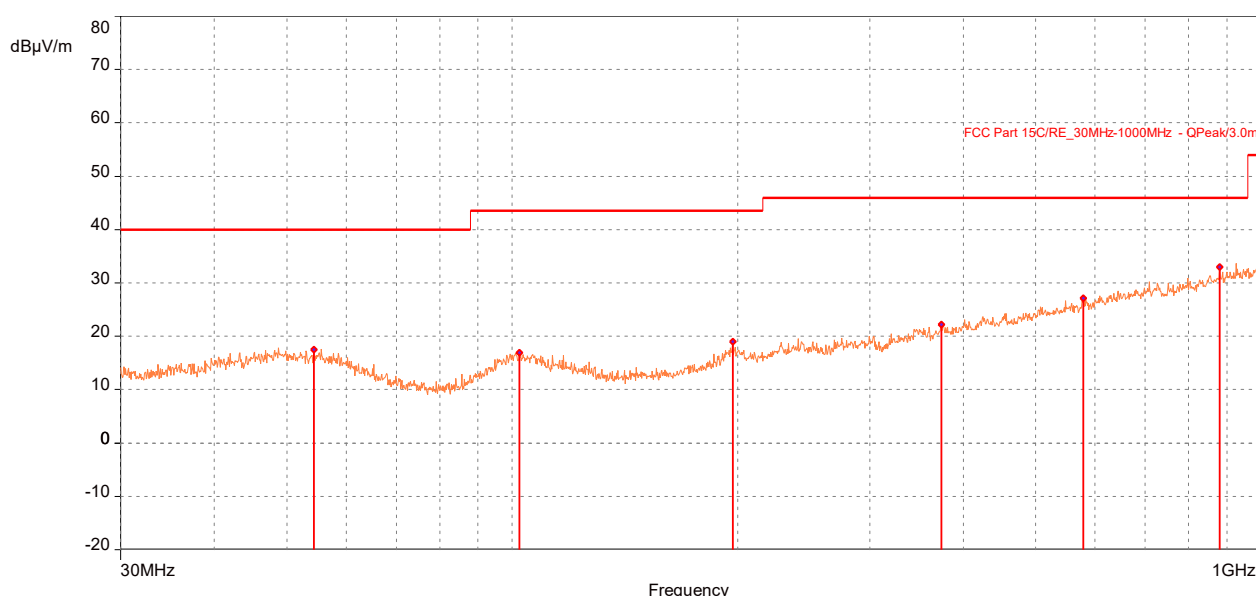
- 1.QP is abbreviation of Quasi-Peak
- 2.Margin = Emission Level - Limit Value
- 3.The emission levels of other frequencies were more than 20dB margin against the limit



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Test Point	Operation Mode	Result
Vertical	TX mode (The lowest channel: 2408MHz)	PASS

EUT Name	2.4G ALL TERRAIN TORNADO
Operating Condition	DC: 3.0V(AA*2)
Test Condition	Ambient Temperature: 20°C Humidity: 61%RH



Frequency (MHz)	Peak (dBμV/m)	QP (dBμV/m)	QP Lim. (dBμV/m)	Margin (dB)	Angle (°)	Height (m)	Polarization
54.2985	17.51	/	40.00	-22.49	52.00	2.00	Vertical
102.2165	16.98	/	43.50	-26.52	160.00	1.01	Vertical
197.131	19.04	/	43.50	-24.46	76.00	2.00	Vertical
373.962	22.23	/	46.00	-23.77	76.00	2.00	Vertical
578.4865	27.16	/	46.00	-18.84	1.00	2.00	Vertical
880.011	32.94	/	46.00	-13.06	241.00	1.01	Vertical

- 1.QP is abbreviation of Quasi-Peak
- 2.Margin = Emission Level - Limit Value
- 3.The emission levels of other frequencies were more than 20dB margin against the limit



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5.1.4.2 Radiated Emissions Test (Above 1GHz)

EUT Name	2.4G ALL TERRAIN TORNADO		
Channel	The Lowest Channel (2408MHz)	Detector Function	Peak (PK) Average (AV)
Frequency Range	Above 1GHz	Result	PASS

Antenna Polarity & Test Distance: Horizontal At 3m								
Frequency (MHz)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (m)	Angle (°)	Polarization	Correction (dB)	Detector
2390.04	37.97	54.00	-16.03	1.48	165.00	Horizontal	-15.07	Average
2400	45.05	54.00	-8.95	1.48	168.00	Horizontal	-15.07	Average
*2408.04	76.07	94.00	-17.93	1.48	266.00	Horizontal	-15.07	Average
4816.85	30.66	54.00	-23.34	1.99	46.00	Horizontal	-15.07	Average
7224.95	31.29	54.00	-22.71	1.99	308.00	Horizontal	-15.07	Average
2390.04	53.04	74.00	-20.96	1.48	165.00	Horizontal	-2.58	Peak
2400	60.12	74.00	-13.88	1.48	168.00	Horizontal	-2.53	Peak
*2408.04	91.14	114.00	-22.86	1.48	266.00	Horizontal	-2.45	Peak
4816.85	45.73	74.00	-28.27	1.99	46.00	Horizontal	2.49	Peak
7224.95	46.36	74.00	-27.64	1.99	308.00	Horizontal	8.03	Peak
Antenna Polarity & Test Distance: Vertical At 3m								
Frequency (MHz)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (m)	Angle (°)	Polarization	Correction (dB)	Detector
2390.04	35.64	54.00	-18.36	1.50	82.00	Vertical	-15.07	Average
2400	43.17	54.00	-10.83	1.50	45.00	Vertical	-15.07	Average
*2408.04	73.72	94.00	-20.28	1.50	40.00	Vertical	-15.07	Average
4816.85	28.15	54.00	-25.85	2.00	84.00	Vertical	-15.07	Average
7224.95	30.22	54.00	-23.78	2.00	79.00	Vertical	-15.07	Average
2390.04	50.71	74.00	-23.29	1.50	82.00	Vertical	-2.58	Peak
2400	58.24	74.00	-15.76	1.50	45.00	Vertical	-2.53	Peak
*2408.04	88.79	114.00	-25.21	1.50	40.00	Vertical	-2.45	Peak
4816.85	43.22	74.00	-30.78	2.00	84.00	Vertical	2.49	Peak
7224.95	45.29	74.00	-28.71	2.00	79.00	Vertical	8.03	Peak

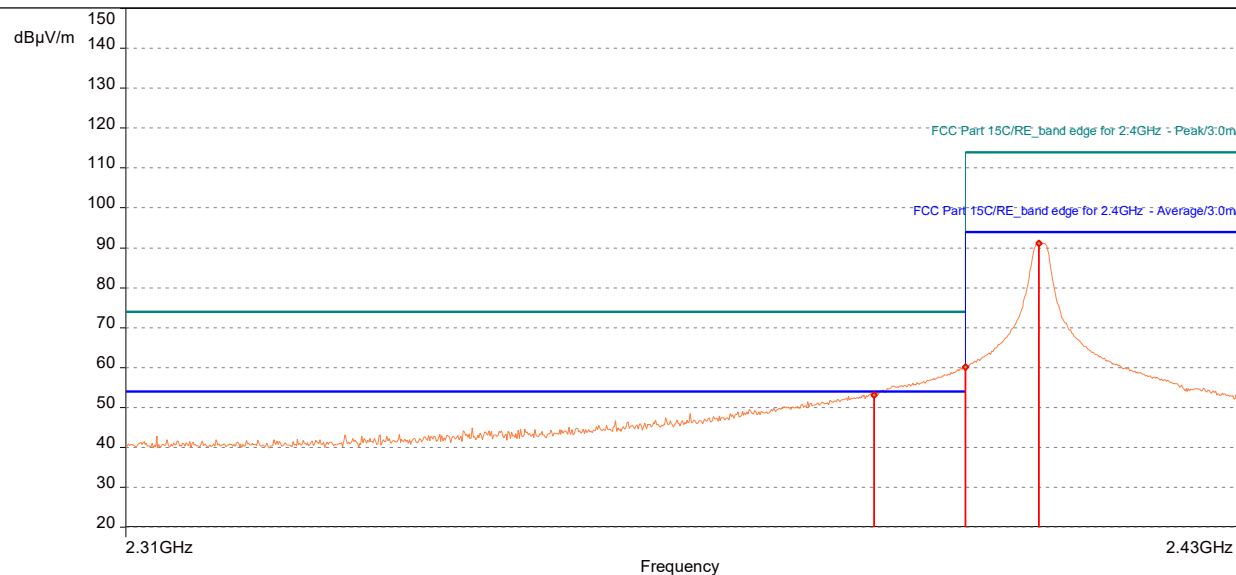
Remarks:

1. Emission level (dBμV/m) = Raw Value (dBμV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The emission levels of other frequencies were more than 20dB margin against the limit.
4. Margin = Emission level - Limit value
5. " * ": Fundamental frequency.
6. The average value of fundamental frequency is: Average value = Peak value +AV factor, where the AV factor is calculated from following formula: AV factor=20 log (Duty cycle) = 20 log (17.64%) = -15.07dB, please see 5.1.4.3.

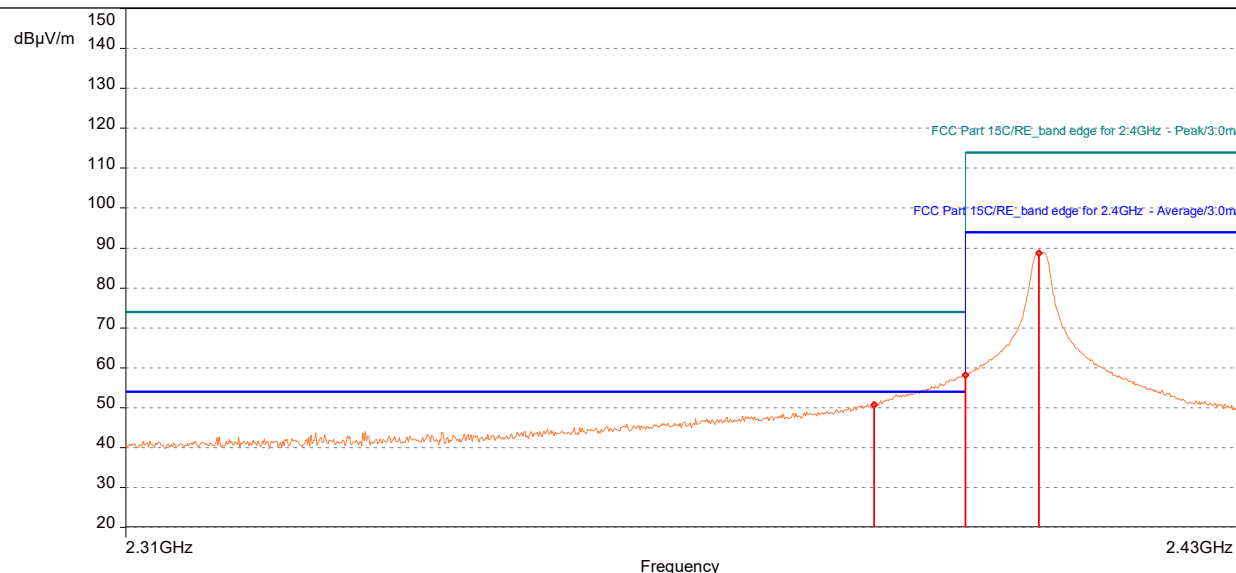
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Band Edge Plot

2408MHz Horizontal



2408MHz Vertical





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EUT Name	2.4G ALL TERRAIN TORNADO		
Channel	The Middle Channel (2442mhz)	Detector Function	Peak (PK) Average (AV)
Frequency Range	Above 1GHz	Result	PASS

Antenna Polarity & Test Distance: Horizontal At 3m								
Frequency (MHz)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (m)	Angle (°)	Polarization	Correction (dB)	Detector
*2442.0005	76.09	94.00	-17.91	1.51	312.00	Horizontal	-15.07	Average
4884.7	30.98	54.00	-23.02	1.98	42.00	Horizontal	-15.07	Average
7326.15	31.85	54.00	-22.15	1.98	298.00	Horizontal	-15.07	Average
*2442.0005	91.16	114.00	-22.84	1.51	312.00	Horizontal	-2.63	Peak
4884.7	46.05	74.00	-27.95	1.98	42.00	Horizontal	1.85	Peak
7326.15	46.92	74.00	-27.08	1.98	298.00	Horizontal	8.20	Peak
Antenna Polarity & Test Distance: Vertical At 3m								
Frequency (MHz)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (m)	Angle (°)	Polarization	Correction (dB)	Detector
*2442.0005	74.13	94.00	-19.87	1.50	51.00	Vertical	-15.07	Average
4884.7	27.88	54.00	-26.12	1.99	89.00	Vertical	-15.07	Average
7326.15	32.12	54.00	-21.88	1.99	99.00	Vertical	-15.07	Average
*2442.0005	89.20	114.00	-24.80	1.50	51.00	Vertical	-2.63	Peak
4884.7	42.95	74.00	-31.05	1.99	89.00	Vertical	1.85	Peak
7326.15	47.19	74.00	-26.81	1.99	99.00	Vertical	8.20	Peak

Remarks:

1. Emission level (dBμV/m) = Raw Value (dBμV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The emission levels of other frequencies were more than 20dB margin against the limit.
4. Margin = Emission level - Limit value
5. " * ": Fundamental frequency.
6. The average value of fundamental frequency is: Average value = Peak value +AV factor, where the AV factor is calculated from following formula: AV factor=20 log (Duty cycle) = 20 log (17.64%) = -15.07dB, please see 5.1.4.3.



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EUT Name	2.4G ALL TERRAIN TORNADO		
Channel	The Highest Channel (2475MHz)	Detector Function	Peak (PK) Average (AV)
Frequency Range	Above 1GHz	Result	PASS

Antenna Polarity & Test Distance: Horizontal At 3m								
Frequency (MHz)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (m)	Angle (°)	Polarization	Correction (dB)	Detector
*2475	77.21	94.00	-16.79	1.51	4.00	Horizontal	-15.07	Average
2483.5	46.60	54.00	-7.40	1.51	10.00	Horizontal	-15.07	Average
4950.25	30.26	54.00	-23.74	1.99	21.00	Horizontal	-15.07	Average
7425.05	31.20	54.00	-22.80	1.99	109.00	Horizontal	-15.07	Average
*2475	92.28	114.00	-21.72	1.51	4.00	Horizontal	-2.63	Peak
2483.5	61.67	74.00	-12.33	1.51	10.00	Horizontal	-2.67	Peak
4950.25	45.33	74.00	-28.67	1.99	21.00	Horizontal	2.18	Peak
7425.05	46.27	74.00	-27.73	1.99	109.00	Horizontal	8.37	Peak
Antenna Polarity & Test Distance: Vertical At 3m								
Frequency (MHz)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (m)	Angle (°)	Polarization	Correction (dB)	Detector
*2475	73.14	94.00	-20.86	1.50	134.00	Vertical	-15.07	Average
2483.5	42.79	54.00	-11.21	1.50	134.00	Vertical	-15.07	Average
4950.25	28.13	54.00	-25.87	1.99	81.00	Vertical	-15.07	Average
7425.05	33.66	54.00	-20.34	1.00	100.00	Vertical	-15.07	Average
*2475	88.21	114.00	-25.79	1.50	134.00	Vertical	-2.63	Peak
2483.5	57.86	74.00	-16.14	1.50	134.00	Vertical	-2.67	Peak
4950.25	43.20	74.00	-30.80	1.99	81.00	Vertical	2.18	Peak
7425.05	48.73	74.00	-25.27	1.00	100.00	Vertical	8.37	Peak

Remarks:

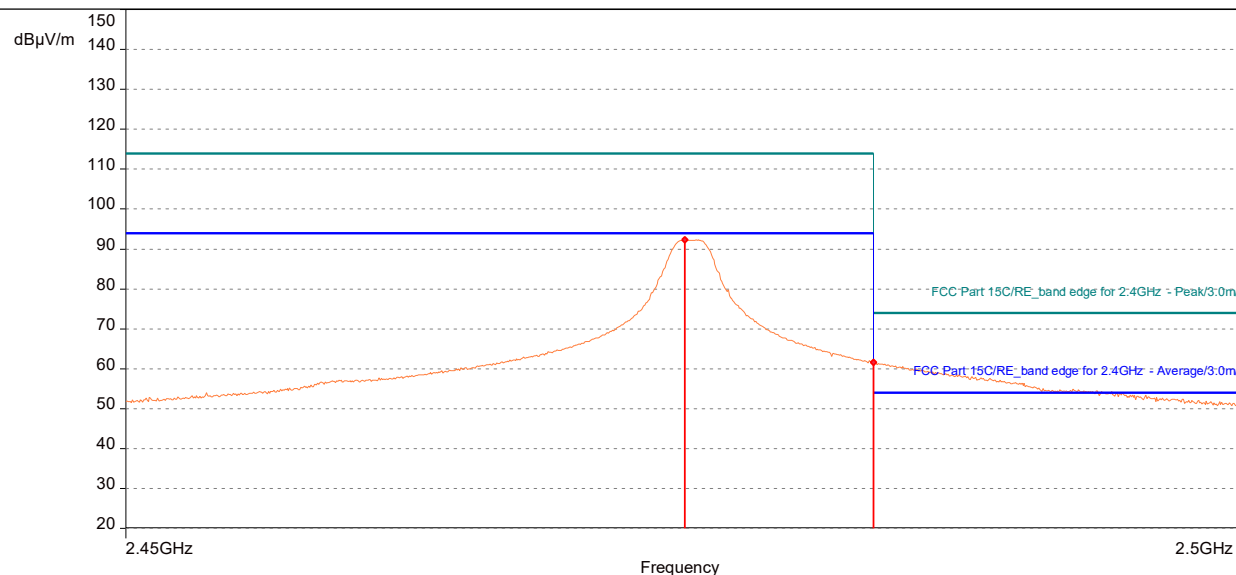
1. Emission level (dBμV/m) = Raw Value (dBμV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The emission levels of other frequencies were more than 20dB margin against the limit.
4. Margin = Emission level - Limit value
5. " * " : Fundamental frequency.
6. The average value of fundamental frequency is: Average value = Peak value +AV factor, where the AV factor is calculated from following formula: AV factor=20 log (Duty cycle) = 20 log (17.64%) = -15.07dB, please see 5.1.4.3.



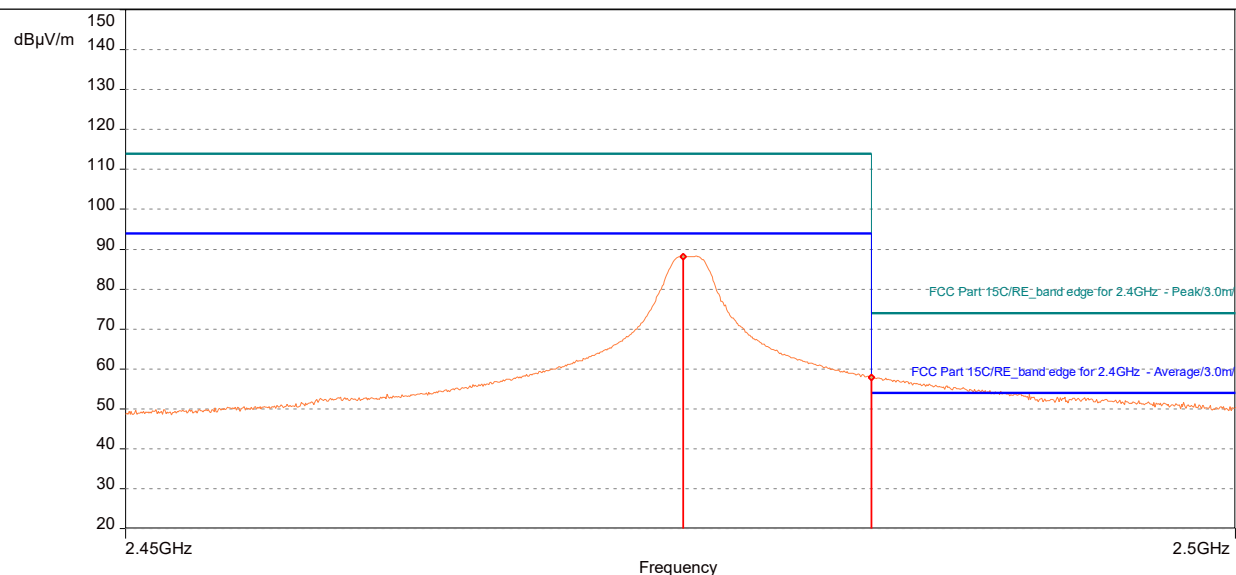
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Band Edge Plot

2475MHz Horizontal



2475MHz Vertical



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5.1.4.3 Calculation of Average Factor

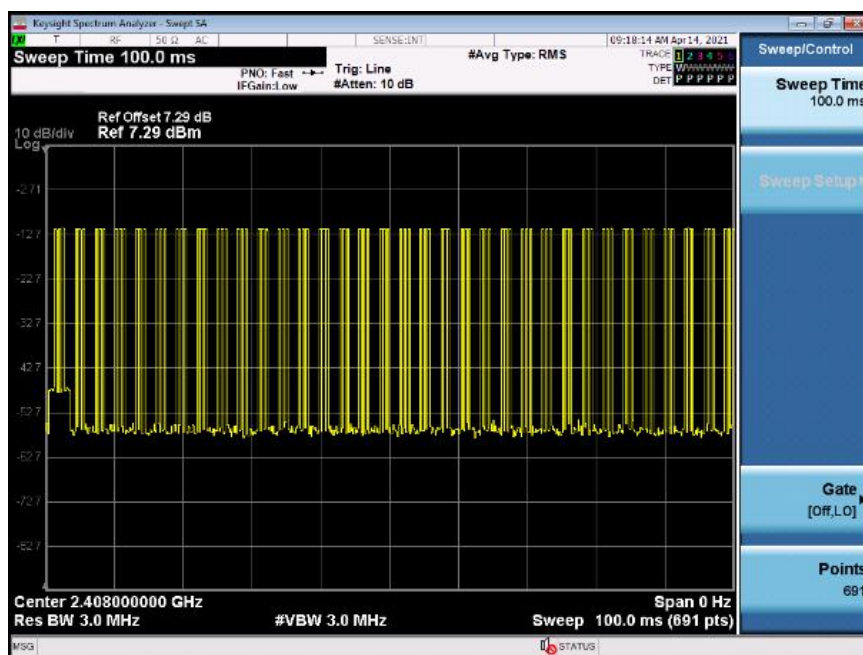
Effective period of the cycle = 0.522ms

The duration of one cycle = 2.960ms

Duty Cycle = 0.522ms / 2.960ms = 17.64%

Averaging factor in dB = 20 log (duty cycle) = 20 log (17.64%) = -15.07dB

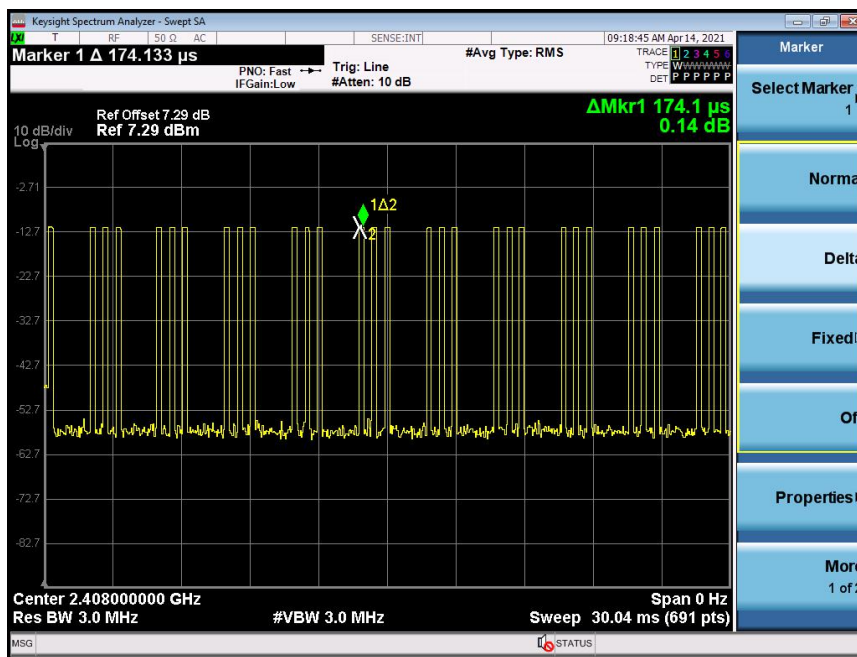
100ms Duty Cycle



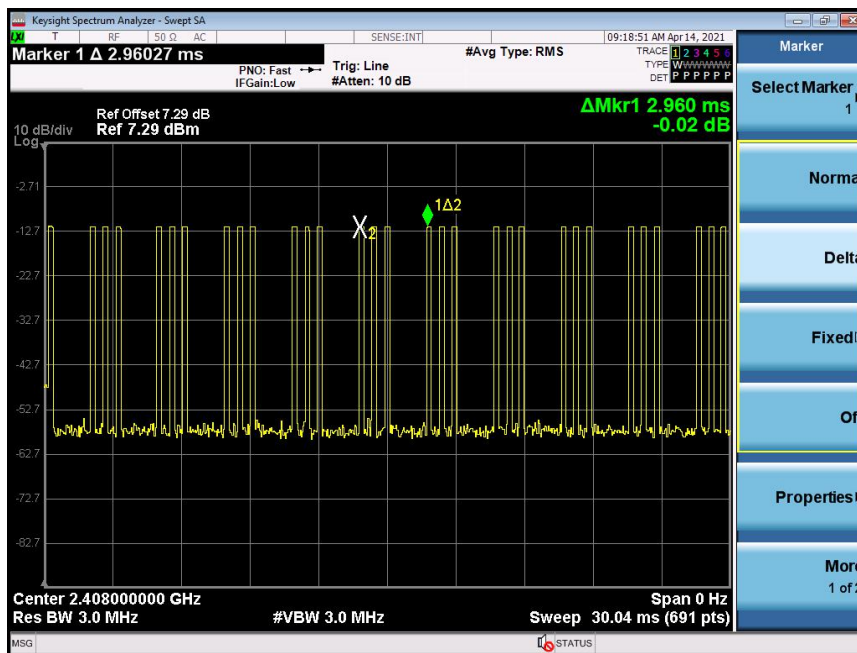


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Ton of one cycle



The duration of one cycle





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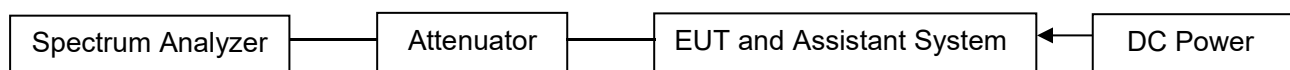
5.2 20dB Bandwidth

For test instruments and accessories used see section 6

5.2.1 Test Procedures

- (1) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- (2) Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- (3) Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- (4) Repeat above procedures until all frequencies measured were complete.

5.2.2 Test Setup



5.2.3 Test Limits

According to FCC 15.215(c), must be designed to ensure that the 20dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

5.2.4 Test Results

Channel	Frequency (MHz)	F _L (MHz)	F _H (MHz)	20dB Bandwidth (MHz)
The lowest channel	2408	2407.612	2408.860	1.248
The middle channel	2442	2441.612	2442.864	1.252
The highest channel	2475	2474.612	2475.868	1.256

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2408MHz



2442MHz



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2475MHz



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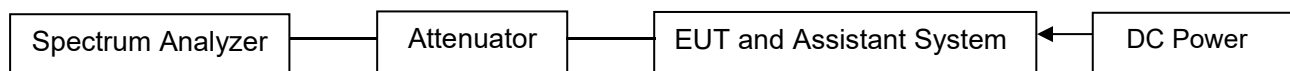
5.3 Occupied Bandwidth

For test instruments and accessories used see section 6

5.3.1 Test Procedures

- (1) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- (2) Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- (3) The resolution bandwidth shall be set to the range of 1% to 5% of the anticipated emission bandwidth. and a video bandwidth at least 3 x the resolution bandwidth. Below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission. Record the frequency difference as the emission bandwidth.
- (4) Repeat above procedures until all frequencies measured were complete.

5.3.2 Test Setup



5.3.3 Test Limits

The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSS.

5.3.4 Test Results

Channel	Frequency (MHz)	F _L (MHz)	F _H (MHz)	99% Bandwidth (MHz)
Low	2408	2407.645	2408.842	1.197
Middle	2442	2441.634	2442.863	1.229
High	2475	2474.632	2475.911	1.279



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2408MHz



2442MHz



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2475MHz

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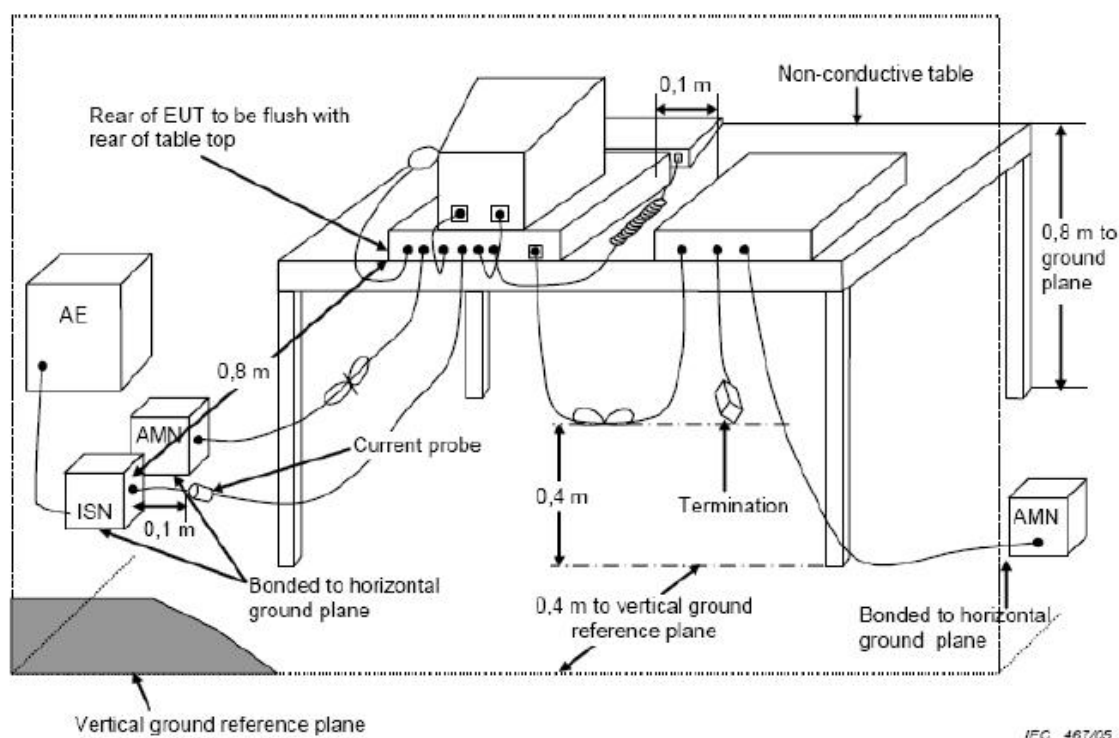
5.4 Conducted Emission

For test instruments and accessories used see section 6

5.4.1 Test Procedures

The PC Power connected to the power mains through a line impedance stabilization network (L.I.S.N.#2). This provides a 50 ohm coupling impedance for the EUT. Please refer the block diagram of the test setup and photographs. The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N.#1). Power on the PC and let it work normally, we use a keyboard test software, let EUT working in test mode, then test it. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to RSS-Gen issue 5 on Conducted Emission Test.

5.4.2 Test Setup





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5.4.3 Test Limits

Standard: RSS-Gen Issue 5 clause 8.8		
Frequency of emission (MHz)	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μV)	Average Level dB(μV)
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

Notes: 1. * Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

5.4.4 Test Results

Not Applicable

Note: The device is a DC power supply and does not apply to conducted emissions.

5.5 Antenna Requirements

5.5.1 Test Standard:

FCC Part 15, Subpart C 15.203 & RSS-Gen Issue 5 Clause 6.8

5.5.2 Standard Requirement:

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.

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropic ally radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

5.5.3 EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0dBi. Antenna location: Refer to Appendix (Internal photos).



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6 Test Equipment

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1	Spectrum Analyzer	Keysight	N9010A	MY51120099	2020/06/22	2021/06/22
2	JS0806-2 RF Control Unit	Tonscend	JS0806-2	188060124	2020/12/18	2021/12/17
3	Broadband Preamplifier	SCHWARZBECK	BBV 9743B	00067	2021/03/28	2022/03/28
4	Broadband Preamplifier	SCHWARZBECK	BBV 9718B	00002	2021/03/28	2022/03/28
5	EMI Test Receiver	ROHDE & SCHWARZ	ESR3	102452	2020/06/22	2021/06/22
6	Trilog Broadband Antenna	SCHWARZBECK	VULB 9163	9163-1127	2020/06/12	2021/06/12
7	Horn Antenna	SCHWARZBECK	BBHA 9120D	01829	2020/06/16	2021/06/16
8	DC Power Supply	SIGLENT	SPD1168X	SPD1XEAD3 R 0167	2020/06/02	2021/06/02
9	Vector Signal Generator	Keysight	N5172B	MY53052255	2020/06/22	2021/06/22
10	Analog Signal Generator	Keysight	N5171B	MY53051692	2020/06/22	2021/06/22
11	Temperature Humidity Chamber	Yiheng	BPS-50CB	191005684	2020/12/07	2021/12/06
12	Temperature and Humidity Indicator	JianDaRenKe	Cos-03	612058	2020/07/01	2021/07/01
13	BAT-EMC Testing (Test Software)	NEXIO	BAT-EMC	Version: 3.16.0.74	N/A	N/A
14	JS1120-3 Test System (Test Software)	Tonscend	JS1120-3	Version: 2.5.77.0418	N/A	N/A
15	Double Ridge Guide Horn Antennas	A.H.Systems	SAS-574	588	2020/07/09	2021/07/09
16	Active Loop Antenna	BeiJing DaZe technology co. LTD	ZN30900C	15015	2021/03/31	2022/03/31



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7 Test Photographs

Referring to – “(8521)065-0181(C)”.

8 Photos of the EUT

Referring to – “(8521)065-0181(A)” and “(8521)065-0181(B)”.

END OF TEST REPORT