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Test Report No.: RF2403WDG0180



Certificate # 2951.01

TEST REPORT

Applicant:	Shen Zhen RUIYI Sporting Goods Co., Ltd.
Address:	6-2204 Tianan Yungu Industrial Park, Bantian St., Longgang Dist. ShenZhen, Guangdong, China

Manufacturer or Supplier	Shen Zhen RUIYI Sporting Goods Co., Ltd.
Address	6-2204 Tianan Yungu Industrial Park, Bantian St., Longgang Dist. ShenZhen, Guangdong, China
Product:	SPEED RADAR GUN
Brand Name:	PLAYAPUT, WEEPALM RADAR
Model:	PPSR8888
Additional Model & Model Difference	WRSR8888; see item 3.1
Date of tests:	May 01, 2024 ~ May 23, 2024

The tests have been carried out according to the requirements of the following standard:

FCC Part 15, Subpart C, Section 15.245

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

Tested by Lucas Chen Project Engineer / EMC Department	Approved by Glyn He Assistant Manager / EMC Department
	 Date: Jun. 12, 2024

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF2403WDG0180	Original release	Jun. 12, 2024



1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.249)			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
§15.203	Antenna Requirement	PASS	No antenna connector is used
§15.207 (a)	Conducted Emission	N/A	Powered by battery
§15.205	Restricted Band of Operation	PASS	Compliant
§15.209 §15.245(b)	Radiated Emission	PASS	Compliant
§15.215(c)	20dB Bandwidth Test	PASS	Compliant

2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Radiated emissions	9KHz ~ 30MHz	2.80dB
	30MHz ~ 1GMHz	4.65dB
	1GHz ~ 18GHz	5.01dB
	18GHz ~ 40GHz	4.10dB

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



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3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	SPEED RADAR GUN
MODEL NO.	PPSR8888
ADDITIONAL MODEL	WRSR8888
FCC ID	2BFQ4RUIYI01
NOMINAL VOLTAGE	DC 9V(1.5V*AA*6) from battery
MODULATION TECHNOLOGY	CW
OPERATING FREQUENCY	10.520GHz
ANTENNA TYPE	PCB microstrip Antenna, with 7dBi gain
MAXIMUM FIELD STRENGTH	94.87dBuV/m for Peak; 93.93dBuV/m for Average
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	N/A

NOTES:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. For the test results, the EUT had been tested with all conditions, but only the worst case was shown in test report.
3. Please refer to the EUT photo document (Reference No.: 2403WDG0180-1) for detailed product photo.
4. Additional model WRSR8888 is identical with the test model PPSR8888 except the color of the appearance and model name for trading purpose.



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3.2 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 X 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	√	√	-	√	DC 9V from New Battery

Where

RE<1G: Radiated Emission below 1GHz

RE≥1G: Radiated Emission above 1GHz

PLC: Power Line Conducted Emission

BW: 20db bandwidth

NOTE: No need to concern of Conducted Emission due to the EUT is powered by battery.

Following channel was selected for the test as listed below.

TESTED CHANNEL	TESTED FREQUENCY
1	10.520 GHz

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE	25deg. C, 58%RH	DC 9V from New Battery	Lucius
BW	25deg. C, 58%RH	DC 9V from New Battery	Vincent
PLC	-	-	-



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3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C, Section 15.245

ANSI C63.10-2013

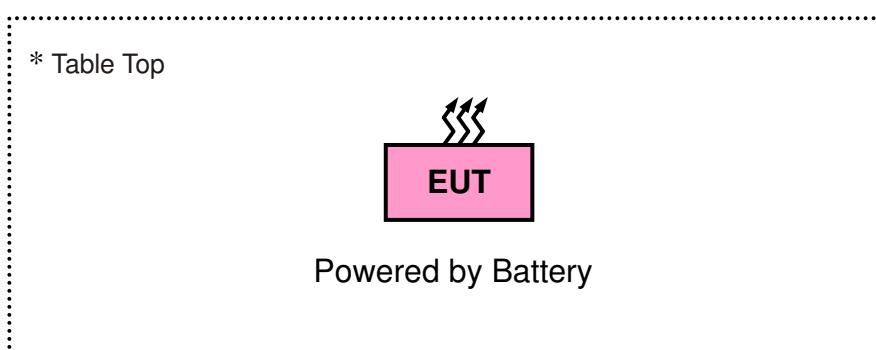
All test items have been performed and recorded as per the above standards.

3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together without any other necessary accessories or support units

3.5 CONFIGURATION OF SYSTEM UNDER TEST

For Radiated Emission Test



Note: For the actual test configuration, please refer to the attached file (Test Setup Photo).

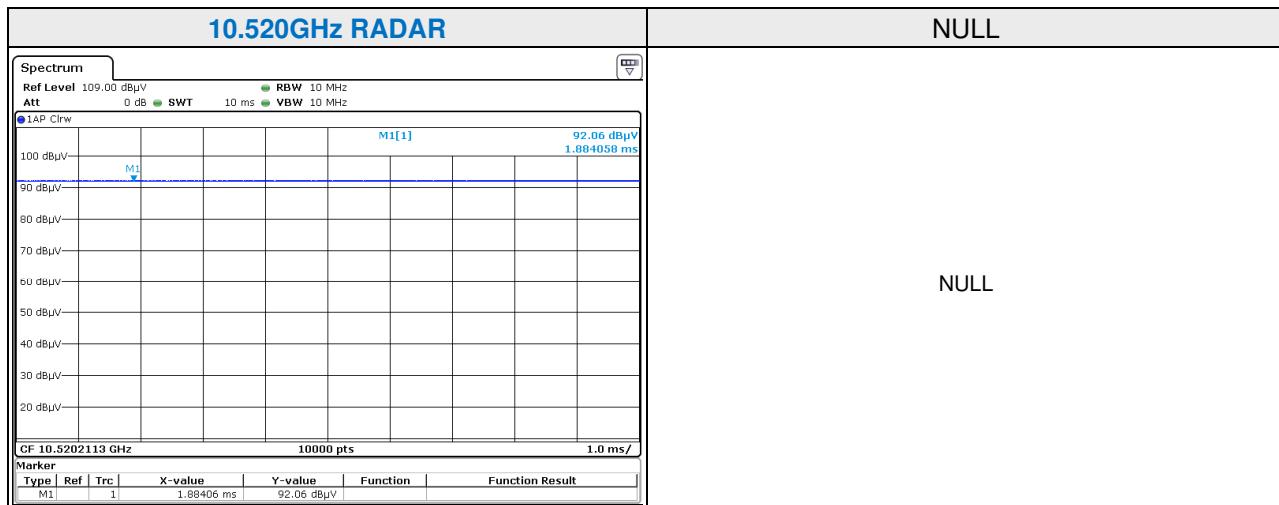


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3.6 DUTY CYCLE OF TESET SIGNAL

Test Mode	On Time (ms)	Period (ms)	Duty Cycle (%)	1/T Min. VBW (KHz)	VBW Setting
10.520GHz RADAR	Not Applicable	Not Applicable	100	Not Applicable	10Hz





4. TEST TYPES AND RESULTS

4.1 RADIATED EMISSION MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

According to §15.245(b), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field strength of fundamental (milli-volts/meter)	Field strength of harmonics (milli-volts/meter)
902-928 MHz	500	1.6
2435-2465 MHz	500	1.6
5785-5815 MHz	500	1.6
10.5-10.55 GHz	2500	25
24.075-24.175 GHz	2500	25

Notes:

1. Field strength limits are specified at a distance of 3 meters.
2. 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.
3. Regardless of the limits shown in the above table, harmonic emissions in the restricted bands below 17.7 GHz, as specified in § 15.205, shall not exceed the field strength limits shown in § 15.209. Harmonic emissions in the restricted bands at and above 17.7 GHz shall not exceed the following field strength limits:
 - (i) For the second and third harmonics of field disturbance sensors operating in the 24075–24175MHz band and for other field disturbance sensors designed for use only within a building or to open building doors, 25.0 mV/m.
 - (ii) For all other field disturbance sensors, 7.5 mV/m.
 - (iii) Field disturbance sensors designed to be used in motor vehicles or aircraft must include features to prevent continuous operation unless their emissions in the restricted bands, other than the second and third harmonics from devices operating in the 24075–24175 MHz band, fully comply with the limits given in § 15.209. Continuous operation of field disturbance sensors designed to be used in farm equipment, vehicles such as fork lifts that are intended primarily for use indoors or for very specialized operations, or railroad locomotives, railroad cars and other equipment which travels on fixed tracks is permitted. A field disturbance sensor will be considered not to be operating in a continuous mode if its operation is limited to specific activities of limited duration (e.g., putting a vehicle into reverse gear, activating a turn signal, etc.).
4. Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.



5. The lower limit shall apply at the transition frequencies.
 6. Emission level (dB_BV/m) = 20 log Emission level (uV/m).

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

For above 18GHz, the measured field strength was extrapolated to distance 1 meter, using the formula that the limit of field strength varies as the inverse distance (20dB per decade of distance)

Example: (Above 18GHz)

$$\begin{aligned}
 7.5\text{mV/m} &= 7500\text{uV/m} & 3\text{m} \\
 &= 77.5\text{dBuV/m} & 3\text{m} \\
 &= 77.5+20\log(3/1) & 1\text{m} \\
 &= 87\text{dBuV/m}
 \end{aligned}$$

Limit for fundamental frequency at 10.5-10.55GHz:

Frequencies		Radiated Emissions Limits at 3 meters (dB _B uV/m)	
Fundamental Frequency (GHz)	Frequencies Range (MHz)	Other	Field strength of fundamental
10.5-10.55	0.009-1000	See above table (§ 15.209)	/
	1000-18000	Avg: 54 Peak: 74	Avg: 128 Peak: 148

Frequencies		Radiated Emissions Limits at 1 meter (dB _B uV/m)	
Fundamental Frequency (GHz)	Frequencies Range (MHz)	Other	Field strength of second harmonics and third harmonics
10.5-10.55	18000-40000	Avg: 63.5 Peak: 83.5	Avg: 87 Peak: 107



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4.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESU40	100449	Jan. 02, 25
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV7	102331	Apr. 07, 25
Active Loop Antenna (9KHz -30MHz)	SCHWARZBECK	FMZB 1519B	1519B-045	Apr. 13, 25
Amplifier (9KHz -1GHz)	Burgeon	BPA-530	100210	Feb. 21, 25
Trilog-Broadband Antenna	SCHWARZBECK	VULB 9168	9168-554	Dec. 25, 25
Horn Antenna (1GHz -18GHz)	ETS -Lindgren	3117	00085519	Oct. 12, 24
Horn Antenna (18GHz -40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170242	Oct. 12, 24
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	NSEMC003	May. 20, 24
Test Software	ADT	ADT_Radiated_V7.6.15.9.2	N/A	N/A
Broadband Preamplifier (1GHz~18GHz)	SCHWARZBECK	BBV9718	305	Apr. 24, 25
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Jan. 02, 25
BLUETOOTH TESTER	Rohde&Schwarz	CBT32	100811	N/A

NOTES:

1. The test was performed in 966 Chamber.
2. Equipment are calibrated by calibration laboratory accredited to ISO/IEC 17025 by a mutually recognized Accreditation.
3. The FCC Site registration No. is 749762, and the designation number is CN1174.



4.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters (Above 1GHz) and 0.1 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.
- b. For below 18GHz, the EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. For above 18GHz, the EUT was set 1 meter away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. 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.
- d. 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.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. 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 1.3m above the ground.
- g. 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.

NOTES:

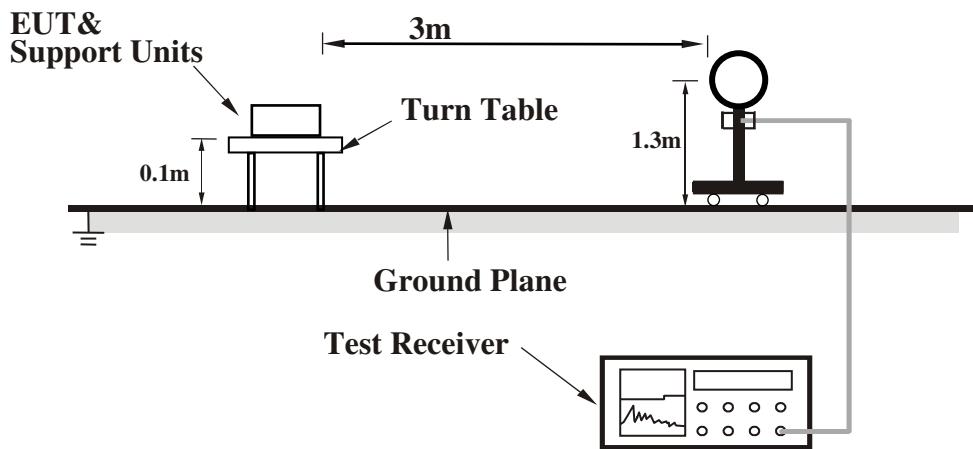
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth are 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz(Duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated, and the worst-case emissions are reported.
5. 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.

4.1.4 DEVIATION FROM TEST STANDARD

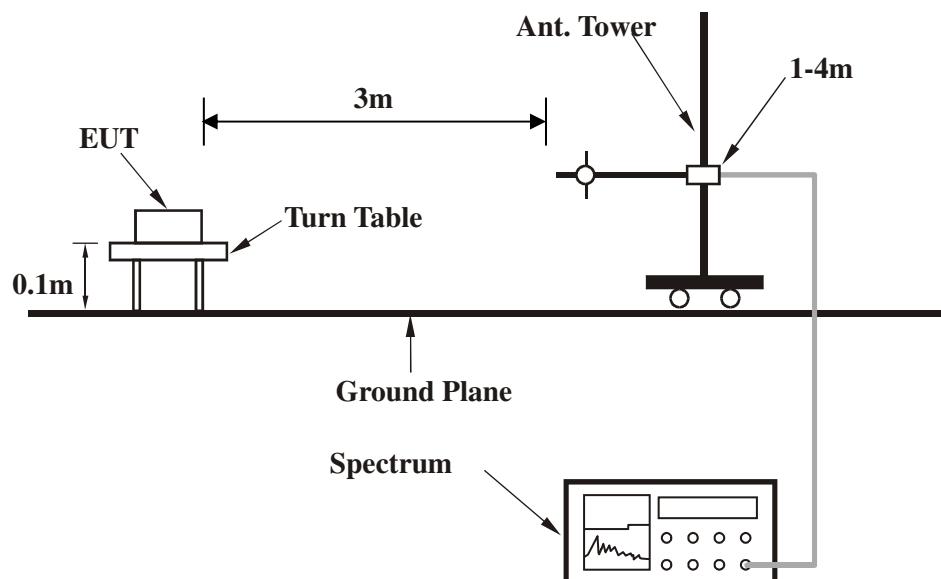
No deviation.

4.1.5 TEST SETUP

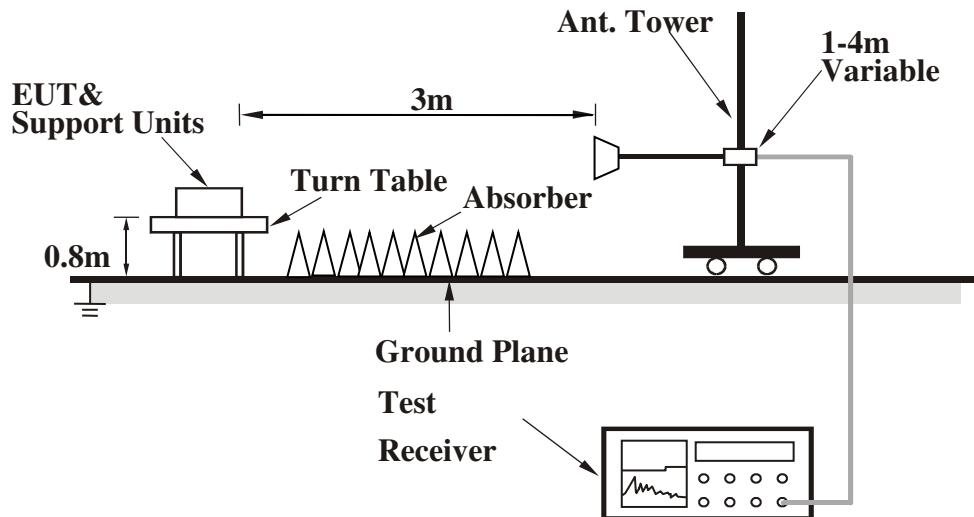
Below 30MHz test setup



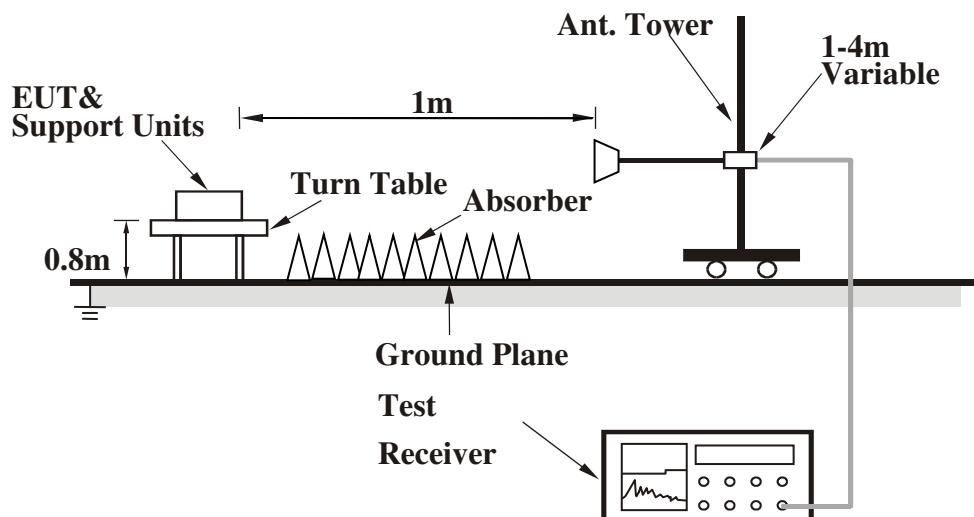
Below 1GHz test setup



1GHz~18GHz test setup



Above 18GHz test setup



Note: For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT OPERATING CONDITIONS

- Turned on the power of all equipment.
- EUT was operated according to the type used was description in manufacturer's specifications or the User's Manual.



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4.1.7 TEST RESULTS

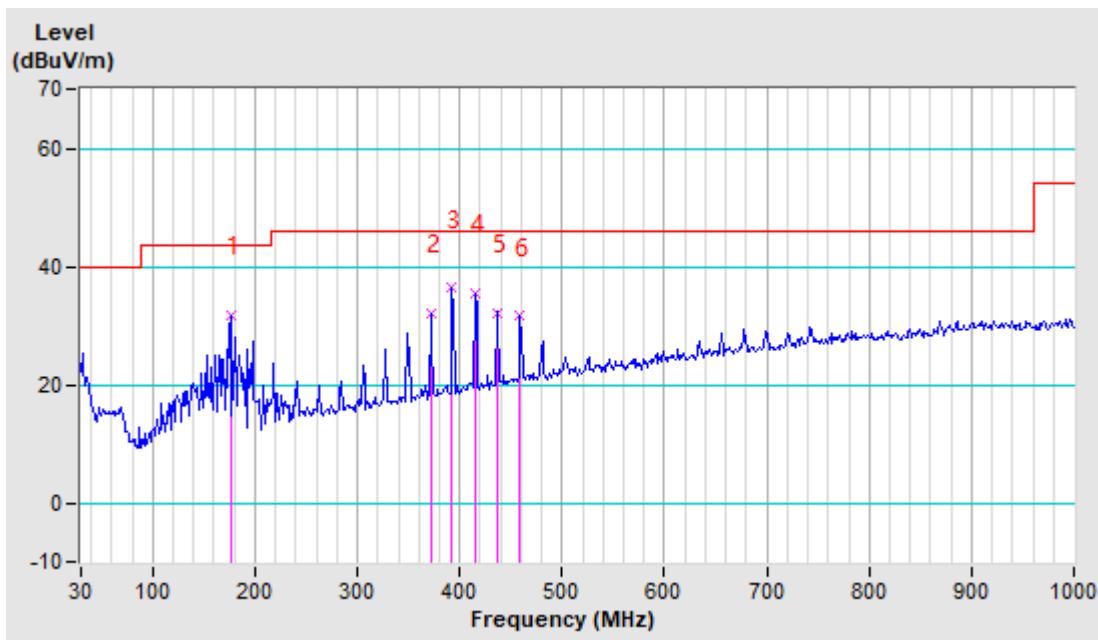
BELow 1GHz DATA

CHANNEL	TX 10.520GHz	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9KHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	176.20	31.69 QP	43.50	-11.81	1.25 H	106	50.04	-18.35
2	371.61	31.95 QP	46.00	-14.05	1.00 H	130	46.04	-14.09
3	392.70	36.30 QP	46.00	-9.70	1.00 H	173	49.77	-13.47
4	415.19	35.50 QP	46.00	-10.50	1.00 H	160	48.23	-12.73
5	437.68	32.13 QP	46.00	-13.87	3.52 H	144	44.07	-11.94
6	458.77	31.57 QP	46.00	-14.43	1.35 H	83	42.91	-11.34

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The emission levels of other frequencies were greater than 20dB margin.
4. 9KHz~30MHz have been test and test data more than 20dB margin.
5. Margin value = Emission level – Limit value.





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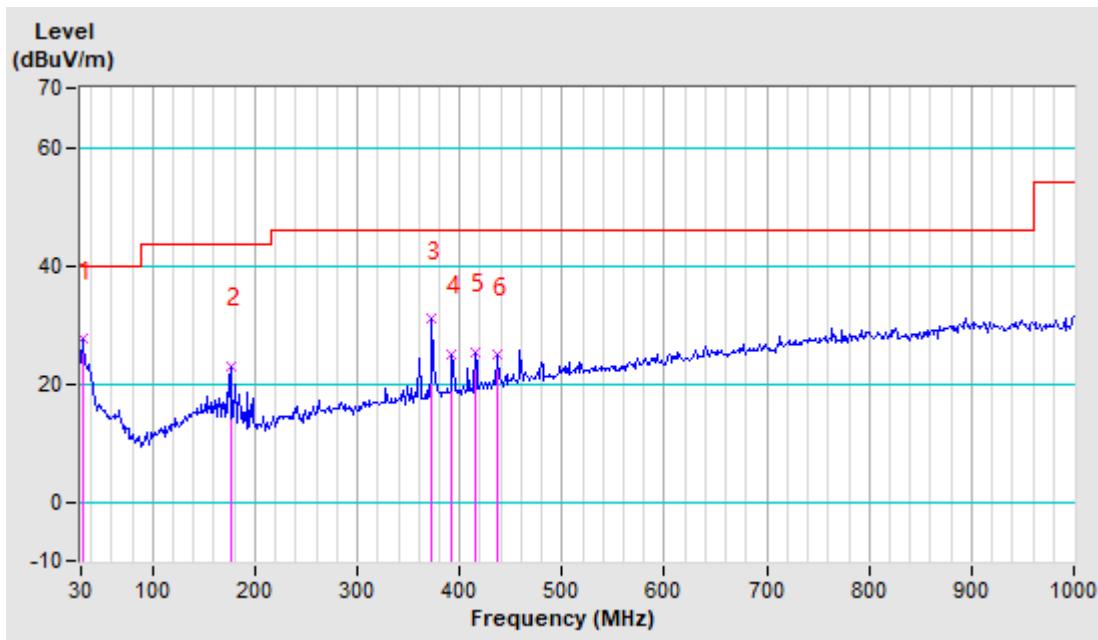
Test Report No.: RF2403WDG0180

CHANNEL	TX 10.520GHz	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9KHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	31.41	27.48 QP	40.00	-12.52	2.26 V	63	46.74	-19.26
2	176.20	22.85 QP	43.50	-20.65	2.37 V	77	41.20	-18.35
3	373.01	30.93 QP	46.00	-15.07	2.48 V	93	44.98	-14.05
4	392.70	24.98 QP	46.00	-21.02	2.50 V	107	38.45	-13.47
5	415.19	25.39 QP	46.00	-20.61	2.50 V	122	38.12	-12.73
6	436.28	24.82 QP	46.00	-21.18	2.50 V	137	36.80	-11.98

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The emission levels of other frequencies were greater than 20dB margin.
4. 9KHz~30MHz have been test and test data more than 20dB margin.
5. Margin value = Emission level – Limit value.





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1~18GHz DATA:

CHANNEL	TX 10.520GHz	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 18GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE : HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	7676.67	60.37 PK	74.00	-13.63	1.00 H	21	49.15	11.22
2	7676.67	39.20 AV	54.00	-14.80	1.00 H	21	27.98	11.22
3	#10500.00	57.97 PK	74.00	-16.03	1.50 H	181	42.58	15.39
4	#10500.00	47.60 AV	54.00	-6.40	1.50 H	181	32.21	15.39
5	*10520.00	83.90 PK	148.00	-64.10	1.50 H	181	68.45	15.45
6	*10520.00	83.01 AV	128.00	-44.99	1.50 H	181	67.56	15.45
7	#10550.00	58.60 PK	74.00	-15.40	1.50 H	184	43.07	15.53
8	#10550.00	47.79 AV	54.00	-6.21	1.50 H	184	32.26	15.53
9	#12905.44	61.26 PK	74.00	-12.74	1.03 H	2	42.82	18.44
10	#12905.44	40.20 AV	54.00	-13.80	1.03 H	2	21.76	18.44
11	#13722.20	62.20 PK	74.00	-11.80	1.04 H	44	42.23	19.97
12	#13722.20	45.65 AV	54.00	-8.35	1.04 H	44	25.68	19.97

ANTENNA POLARITY & TEST DISTANCE : VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#6448.71	59.50 PK	74.00	-14.50	1.35 V	5	50.23	9.27
2	#6448.71	40.32 AV	54.00	-13.68	1.35 V	5	31.05	9.27
3	#10500.00	58.75 PK	74.00	-15.25	1.50 V	18	43.36	15.39
4	#10500.00	47.92 AV	54.00	-6.08	1.50 V	18	32.53	15.39
5	*10520.00	94.87 PK	148.00	-53.13	1.50 V	18	79.42	15.45
6	*10520.00	93.93 AV	128.00	-34.07	1.50 V	18	78.48	15.45
7	#10550.00	59.40 PK	74.00	-14.60	1.05 V	181	43.87	15.53
8	#10550.00	46.17 AV	54.00	-7.83	1.05 V	181	30.64	15.53
9	12251.60	63.30 PK	74.00	-10.70	1.03 V	55	45.98	17.32
10	12251.60	43.25 AV	54.00	-10.75	1.03 V	55	25.93	17.32
11	#16937.50	62.22 PK	74.00	-11.78	1.35 V	2	37.84	24.38
12	#16937.50	45.26 AV	54.00	-8.74	1.35 V	44	20.88	24.38

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The emission levels of other frequencies were greater than 20dB margin.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

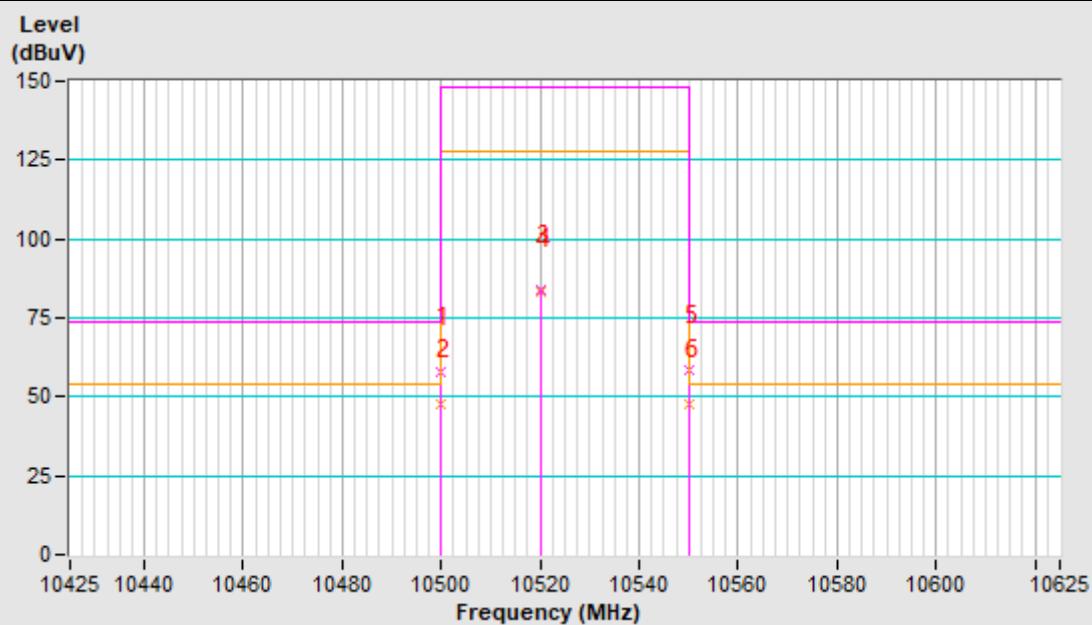


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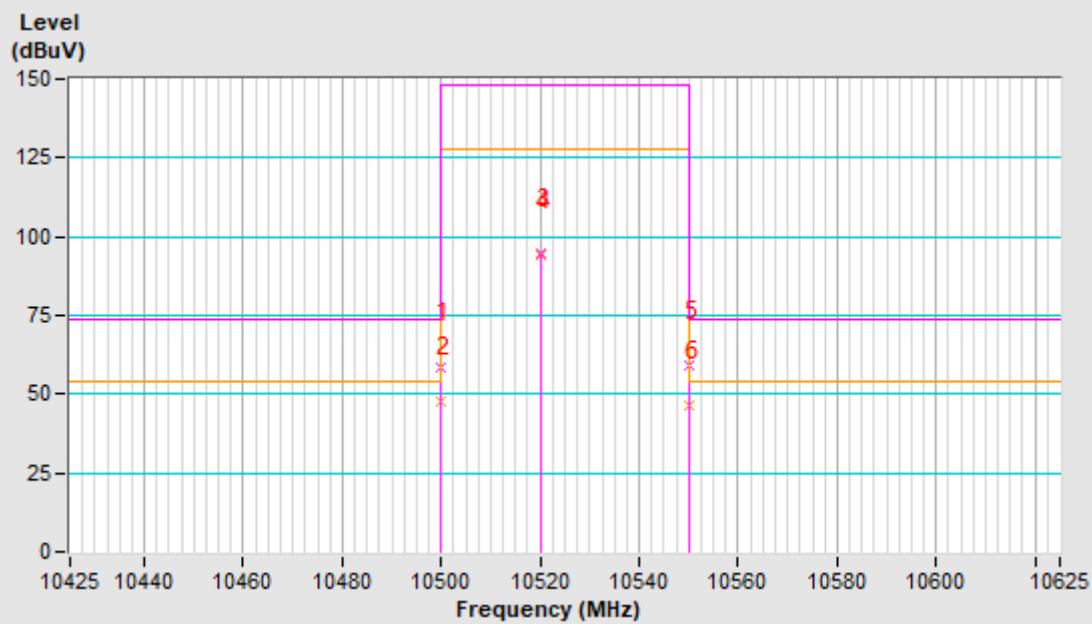
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Band edge Plot

10.520GHz Horizontal



10.520GHz Vertical





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ABOVE 18GHz DATA:

CHANNEL	TX 10.520GHz	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	Above 18GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE : HORIZONTAL AT 1 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	21045.84	94.05 PK	107.00	-12.95	1.50 H	160	97.16	-3.11
2	21045.84	82.75 AV	87.00	-4.25	1.50 H	160	85.86	-3.11
3	31570.14	100.85 PK	107.00	-6.15	1.11 H	158	100.66	0.19
4	31570.14	79.34 AV	87.00	-7.66	1.11 H	158	79.15	0.19

ANTENNA POLARITY & TEST DISTANCE : VERTICAL AT 1 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	21048.15	95.13 PK	107.00	-11.87	1.20 V	130	98.24	-3.12
2	21048.15	83.78 AV	87.00	-3.22	1.20 V	130	86.89	-3.12
3	31568.14	102.26 PK	107.00	-4.74	1.20 V	150	102.07	0.19
4	31568.14	80.36 AV	87.00	-6.64	1.20 V	150	80.17	0.19

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The emission levels of other frequencies were greater than 20dB margin.
4. Margin value = Emission level – Limit value.

4.2 20dB BANDWIDTH MEASUREMENT

4.2.1 LIMITS OF 20dB BANDWIDTH MEASUREMENT

According to FCC 15.215(c), must be designed to ensure that the 20 dB 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.

4.2.2 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

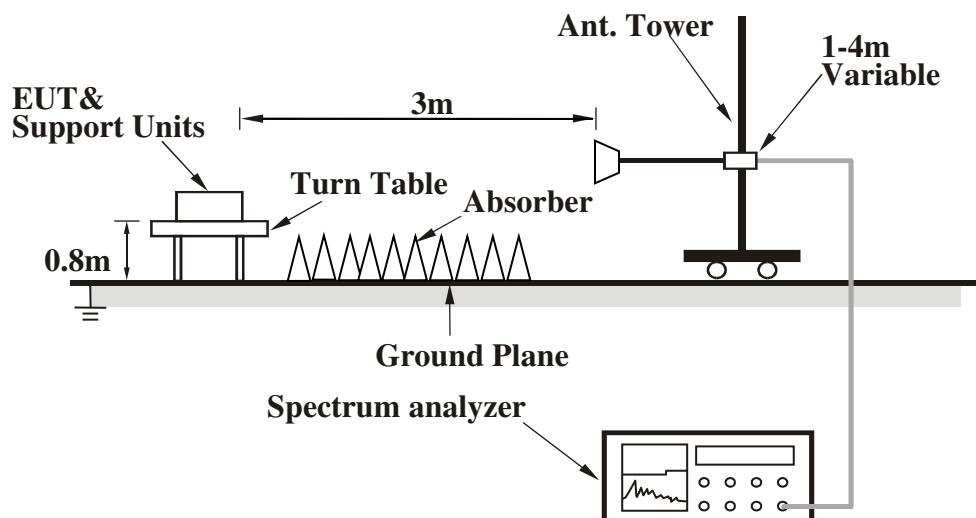
4.2.3 TEST PROCEDURE

- Place the EUT on the table and set it in the transmitting mode.
- SA set RBW=1%~5% OBW, VBW=RBW and Detector=Peak
- Measure and record the result of 20dB bandwidth.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

4.2.5 TEST SETUP



4.2.6 EUT OPERATING CONDITIONS

- Turned on the power of all equipment.
- EUT was operated according to the type used was description in manufacturer's specifications or the User's Manual.

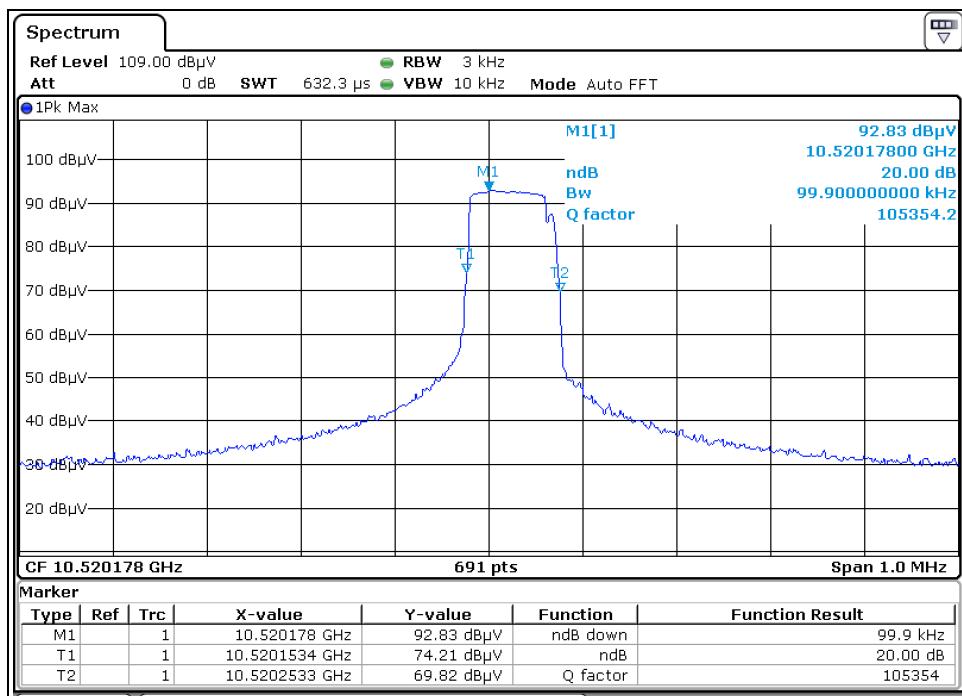


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4.2.7 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (GHz)	20dB BANDWIDTH (KHz)
1	10.520	99.9

Test Data:





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5. PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).



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6. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

---END---