



# Test Report



No.: AJT200801029E-1

Applicant name : SHEN HUA INTERNATIONAL LIMITED  
Applicant address : UNIT 2, 10/F, NEO, 123 HOI BUN ROAD, KWUN TONG, KOWLOON, HONG KONG  
Manufacturer name : SHEN HUA INTERNATIONAL LIMITED  
Manufacturer address : UNIT 2, 10/F, NEO, 123 HOI BUN ROAD, KWUN TONG, KOWLOON, HONG KONG  
Sample Description : RC CAR  
Model No. : 200410  
Additional Model : 200409, 200411  
Client Specified Age Grade : --  
Tested Age Grade : --  
Sample received date : 01 August, 2020  
Testing completed date : 07 August, 2020

Tests conducted: For compliance with application, refer to attached page(s) for details.

Test requested:	Conclusion
FCC part 15, Subpart C, Section 15. 227 & ANSI C63,10-2013	PASS

Tested by: Bob Reviewed by: Fly Liang Approved by: Chandra Jone  
Position: Technical Supervisor  
Date: 2020-08-10





# Test Report



CERTIFICATE #5443.01  
No.: AJT200801029E-1

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## 1 Test Standards

The tests were performed according to following standards:
FCC part 15, Subpart C, Section 15. 227: Operation within the band 26.96-27.28 MHz
ANSI C63,10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

## 2 Summary

### 2.1 General remarks

Date of receipt of test sample	01 August, 2020
Testing commenced on	01 August, 2020 ---- 07 August, 2020
Testing concluded on	07 August, 2020

### 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	RC CAR
Model No.	200410
FCC ID	2AWPN-SHENHUA202005
Power supply voltage	DC 3.0V(AA*2)
Operating Mode	TX mode
Operation frequency	27.141MHz
Number of Channel	1
Modulation	FM
Antenna Type	Dedicated Antenna
Antenna Gain	0
Number of tested samples	1

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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

NO.	Frequency	Test mode description
1	27.141MHz	TX mode
Note: 1. All the test modes can be supply by new battery, and only the data of the worst case recorded in the test report. 2. For radiated emission, 3axis were chosen for testing for each applicable mode.		

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## 4 Test Environment

### 4.1 Address of the test laboratory

Test Laboratory:	AJT Testing Services Limited
Test site:	1F&2F YIFENG BUILDING, CHENGHUA INDUSTRIAL ZONE, CHENGHAI DISTRICT, SHANTOU CITY
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% RH

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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	
Conducted emissions	$\pm 2.14\text{dB}$
Radiated Emission below 1GHz	$\pm 4.88\text{dB}$
Radiated Emission above 1GHz	$\pm 4.65\text{dB}$

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			
Standard section	Test Type	Result	Remark
§15.207	Conducted Emission	N/A	EUT is powered by battery
§15.227 & §15.209	Radiated Emission	Pass	Compliant
§15.215	20dB Bandwidth	Pass	Compliant
§15.203	Antenna Requirement	Pass	No antenna connector is used

Note: The conducted limits are not required for devices which only employ battery power for operation.

## 5 Test Conditions and Results

### 5.1 Radiated emission

For test instruments and accessories used see section 6

#### 5.1.1 Test procedures

The basic test procedure was in accordance with ANSI C63.10 (section 6).

- (1) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m chamber room. The table was rotated 360 degrees to determine the position of the highest radiation. (Below 1000MHz)
- (2) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m chamber room. The table was rotated 360 degrees to determine the position of the highest radiation. (Below 30MHz)
- (3) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- (4) The height of antenna 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.

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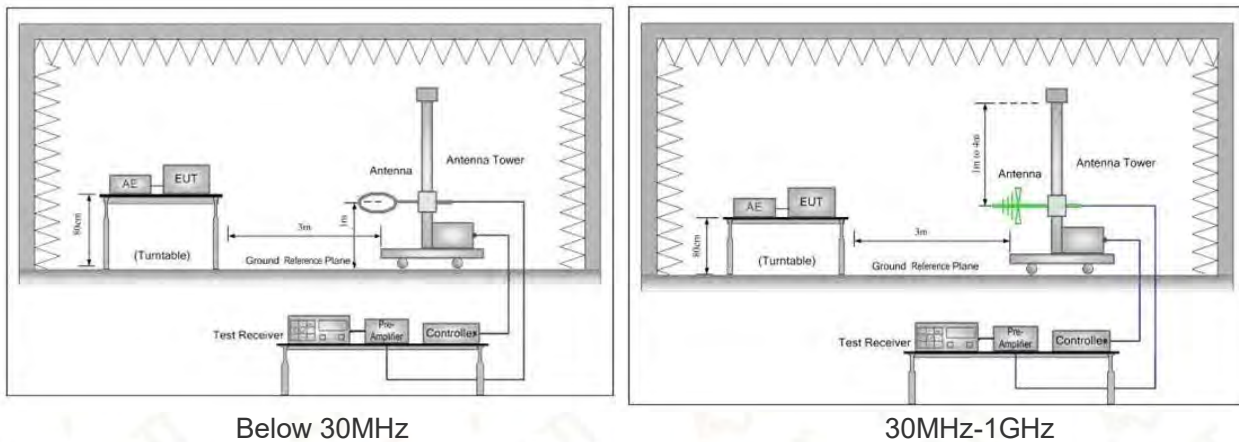


- (5) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- (6) The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1GHz.
- (7) During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X,Y & Z) and considered typical configuration to obtain worst position Y, manipulating interconnecting cables, For battery operated equipment, the equipment tests shall be perform using new battery. The turntable was rotated to maximize the emission level.
- (8) 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.

**Note:**

1. The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. Emission level (dBμV/m) = Raw value (dBμV) + Correction Factor (dB/m)
3. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
4. Margin value = Emission level – Limit value.
5. Fundamental AV value = PK Emission + AV Factor

## 5.1.2 Test setup



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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. 227(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Range of Fundamental (MHz)	Field Strength of Fundamental Emission (Peak) (μV/m)	Field Strength of Fundamental Emission (average) (μV/m)
26.96 ~ 27.28	100,000(100dBμV/m)	10,000(80dBμV/m)

### 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.

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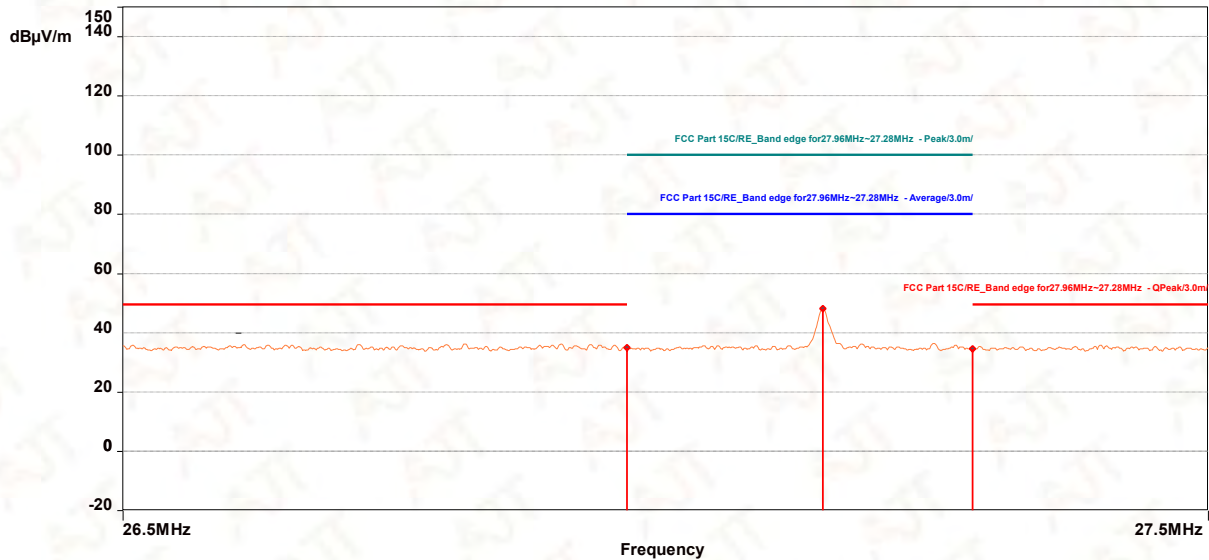
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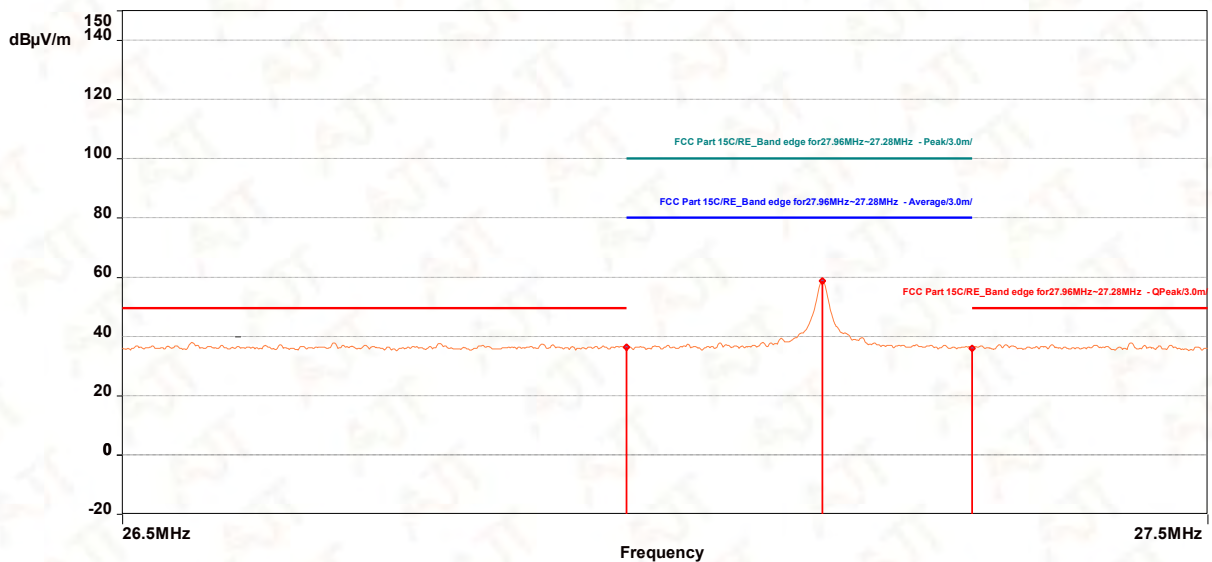
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## 5.1.4 Test results

### 5.1.4.1 Field strength of fundamental



Horizontal



Vertical

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Frequency (MHz)	Reading Level (dBμV/m)	Emission Level (dBμV/m)	Limit. (dBμV/m)	Margin (dB)	Correction Factor(dB)	Polarization
26.96(QP)	14.24	34.95	49.50	-14.55	20.71	Horizontal
26.96(QP)	15.64	36.35	49.50	-13.15	20.71	Vertical
27.28(QP)	13.94	34.59	49.50	-14.91	20.65	Horizontal
27.28(QP)	15.37	36.02	49.50	-13.48	20.65	Vertical
27.141(PK)	27.40	48.08	100.00	-51.92	20.68	Horizontal
27.141(PK)	37.96	58.64	100.00	-41.36	20.68	Vertical
27.141(AV)	--	34.28	80.00	-45.72	-13.80	Horizontal
27.141(AV)	--	44.84	80.00	-35.16	-13.80	Vertical

**Note:**

- 1.Emission Level = Read Level + Correction Factor
- 2.Correction Factor = Antenna Factor + Cable Loss - Preamplifier Gain
- 3.Margin = Emission Level -Limit Value
4. 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 (50.17%) =-13.80dB, please see 5.1.4.2.

## 5.1.4.2 Calculation of Average Factor

The duration of one cycle = 47.36ms

Effective period of the cycle = 1.44ms \*4 + 0.45ms\*40 =23.76ms

Duty Cycle =23.76ms / 47.36ms =50.17%

Averaging factor in dB = 20 log (duty cycle) =20 log (50.17%) =-13.80dB

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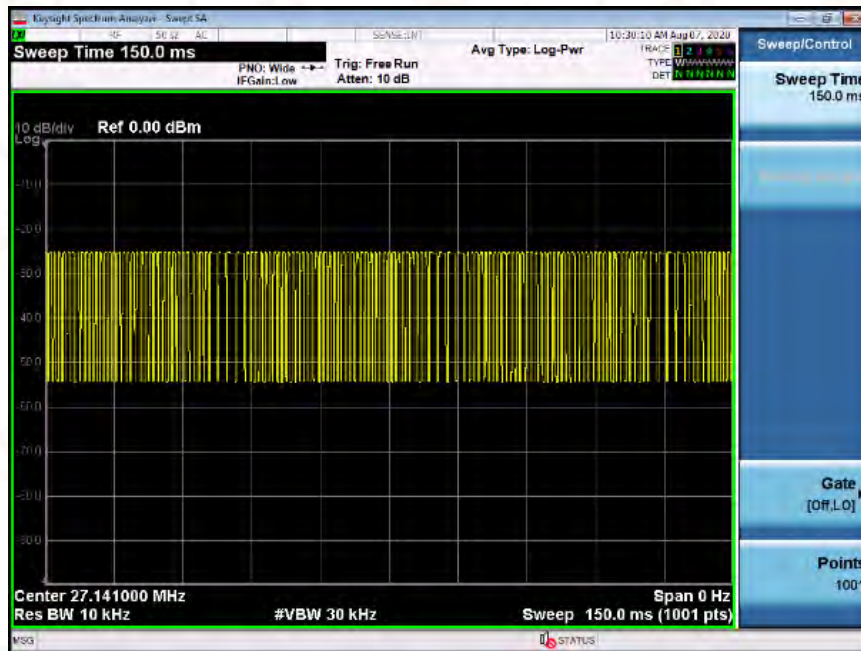
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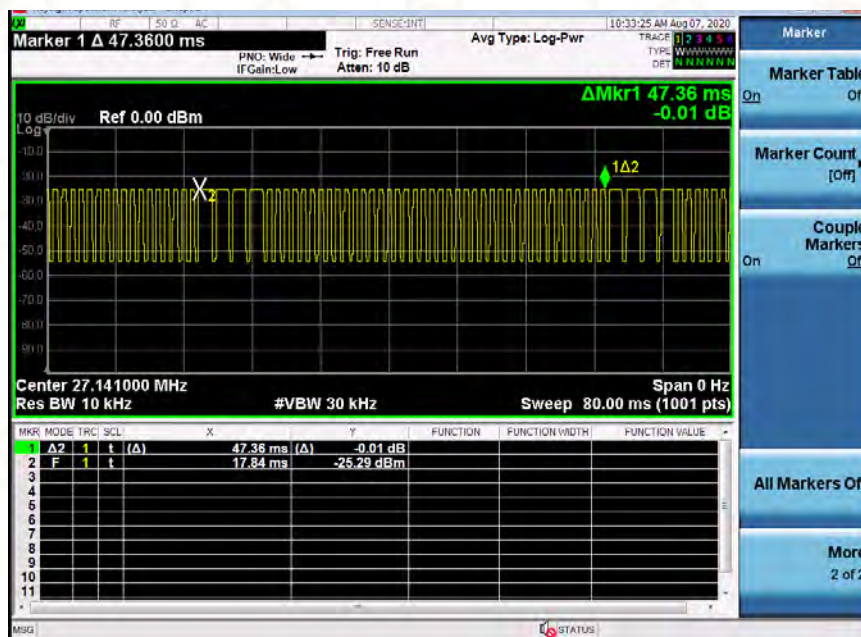
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150ms Duty Cycle



The duration of one cycle



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## Ton1 (Long Pulse)



## Ton2 (Short Pulse)



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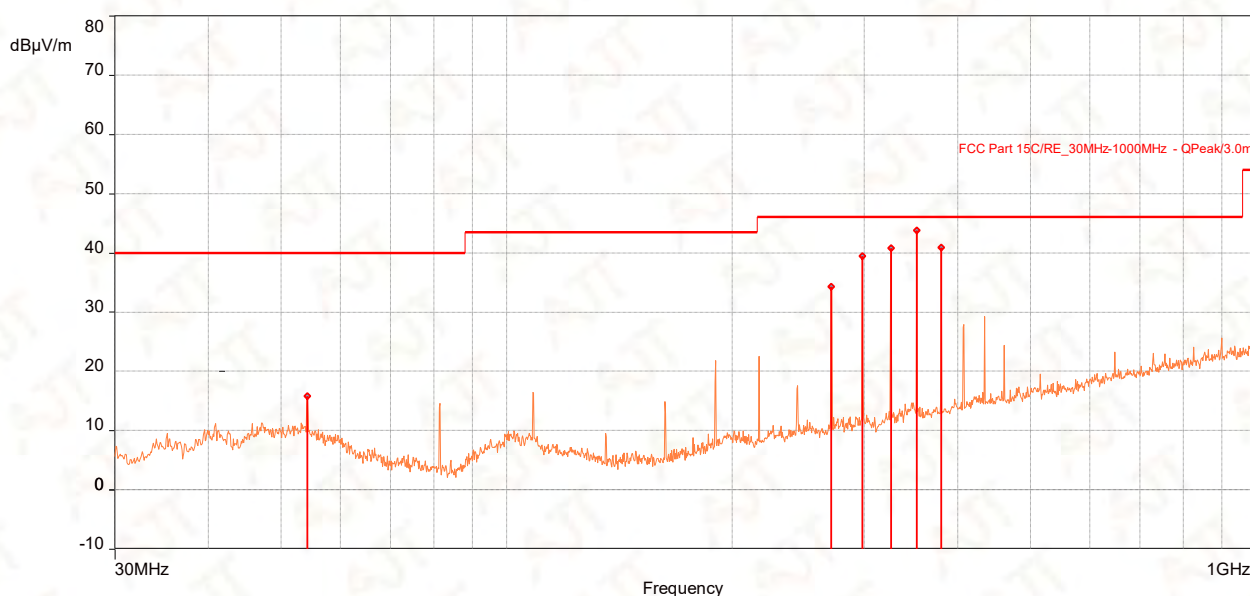


## 5.1.4.3 9kHz-1GHz Radiated Emission Result

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.

Test point	Operation mode	Result
Horizontal	TX mode	Pass

EUT	RC CAR
Operating Condition	DC 3.0V(AA*2)
Test Condition	Ambient Temperature: 24°C Humidity: 46% RH



Frequency (MHz)	Peak (dBμV/m)	QP (dBμV/m)	QP Lim. (dBμV/m)	Margin (dB)	Angle (°)	Height (m)	Polarization
54.25	15.83	--	40.00	-24.17	359.00	1.99	Horizontal
271.336	34.26	--	46.00	-11.74	270.00	1.00	Horizontal
298.496	39.44	--	46.00	-6.56	93.00	1.00	Horizontal
325.656	40.79	--	46.00	-5.21	273.00	1.00	Horizontal
<b>#352.816</b>	<b>43.81</b>	--	<b>46.00</b>	<b>-2.19</b>	<b>95.00</b>	<b>1.00</b>	<b>Horizontal</b>
379.976	40.93	--	46.00	-5.07	88.00	1.00	Horizontal

### Note:

- 1.QP is abbreviation of Quasi-Peak
- 2.Margin = Emission Level -Limit Value
3. #Marginal pass

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Test point	Operation mode	Result
Vertical	TX mode	Pass

EUT	RC CAR
Operating Condition	DC 3.0V(AA*2)
Test Condition	Ambient Temperature: 24°C Humidity: 46% RH



Frequency (MHz)	Peak (dBV/m)	QP (dBμV/m)	QP Lim. (dBμV/m)	Margin (dB)	Angle (°)	Height (m)	Polarization
54.25	28.84	--	40.00	-11.16	257.00	1.01	Vertical
271.336	32.19	--	46.00	-13.81	293.00	2.00	Vertical
298.496	37.69	--	46.00	-8.31	278.00	2.00	Vertical
325.656	38.18	--	46.00	-7.82	265.00	2.00	Vertical
352.816	41.70	--	46.00	-4.30	328.00	1.01	Vertical
379.976	42.19	--	46.00	-3.81	335.00	1.01	Vertical

Note:

1.QP is abbreviation of Quasi-Peak

2.Margin = Emission Level -Limit Value

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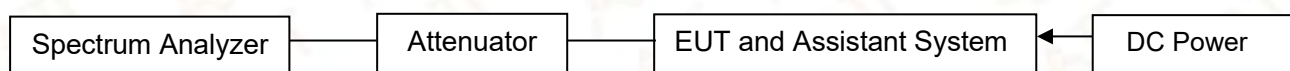
## 5.2 20dB bandwidth

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

The field strength of any emissions appearing between the band edges and out of band shall be attenuated at least 20 dB below the level of the unmodulated carrier or to the general limits in Section 15.209

Frequency (MHz)	Limits (MHz)
27.141	Within 26.96-27.28

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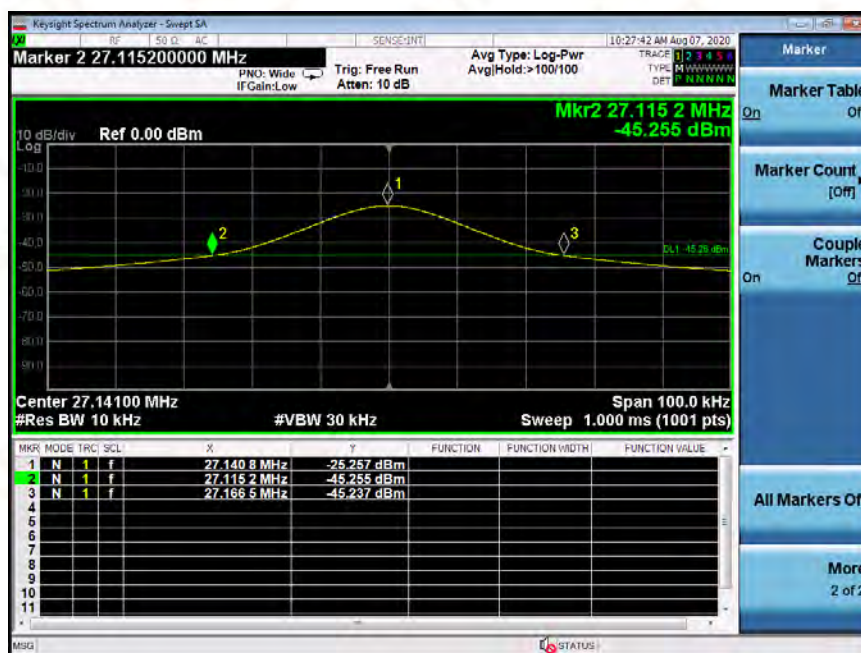
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## 5.2.4 Test results



F <sub>L</sub> (MHz)	F <sub>H</sub> (MHz)	Limit (MHz)	Result
27.1152	27.1665	26.96 MHz -27.28 MHz	PASS

## 5.3 Conducted emission

For test instruments and accessories used see section 6

### 5.3.1 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 FCC Part 15C on Conducted Emission Test.

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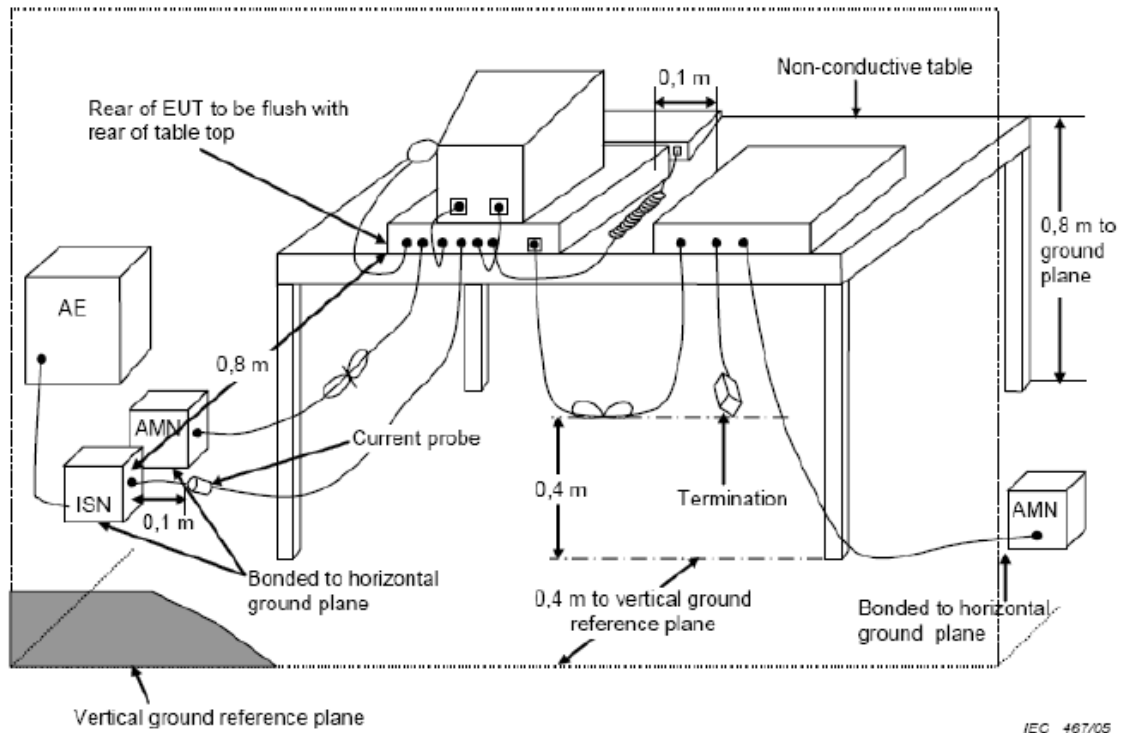
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## 5.3.2 Test setup



## 5.3.3 Test limits

Standard: FCC part 15, Subpart C		
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.

## 5.3.4 Test results

Not Applicable

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# Test Report



CERTIFICATE #5443.01  
No.: AJT200801029E-1

## 6 Test Equipment

Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Test Receiver	ROHDE & SCHWARZ	ESR3	102452	2020/06/22	2021/06/22
Spectrum analyzer	Keysight	N9010A-526	MY51120099	2020/06/22	2021/06/22
Trilog Broadband Antenna	SCHWARZBECK	VULB 9163	9163-1127	2020/06/12	2021/06/12
Horn Antenna	SCHWARZBECK	BBHA 9120D	01829	2020/06/16	2021/06/16
Broadband Preamplifier	SCHWARZBECK	BBV 9743B	00067	2020/03/28	2021/03/28
Broadband Preamplifier	SCHWARZBECK	BBV 9718B	00062	2020/03/28	2021/03/28
Line Impedance Stabilization Network / V LINE	SCHWARZBECK	NSLK 8127 RC	8127-RC 05040	2020/06/04	2021/06/04
Pulse Limiter	SCHWARZBECK	VTSD 9561-F	9561-F N00359	2020/03/28	2021/03/28
DC power supply	SIGLENT	SPD1168X	SPD1XEAD3 R 0167	2020/06/02	2021/06/02
Active loop antenna	DAZE	ZN30900C	15015	2020/03/31	2021/03/31
Double ridged horn antenna	A.H.Systems	SAS-574	588	2020/07/09	2021/07/09
3Meters Semi-anechoic chamber	Shenzhen EMC-united	3mSAC	--	--	--
Conduction control room	Shenzhen EMC-united	SR6	--	--	--
BAT-EMC testing software	NEXIO	3.16.0.74	--	--	--

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# Test Report



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## 7 Test Photographs

Referring to – “Test Setup Photos”.

## 8 Photos of the EUT

Referring to – “External Photos of RC CAR (200410)” and “Internal Photos of RC CAR (200410)”.

## END OF TEST REPORT

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