



FCC RADIO TEST REPORT

FCC ID: ONUSR-RH-G3D

IC ID: 10487A-SRRHG3D

Product : Channel Device

Trade Name : N/A

Model Name : SR-RH-G3D

Serial Model : N/A

Report No. : NTEK-2013NT0420087F

Prepared for

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Prepared by

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TEST RESULT CERTIFICATION**Applicant's name** : SHENZHEN SYNCO TECHNOLOGY CO., LTD.

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Manufacture's Name : SHENZHEN SYNCO TECHNOLOGY CO., LTD.

Address : Room 718, Building 211, Tairan Industry and Trade Park, Futian District, Shenzhen 518040, China

Product description

Product name : Channel Device

Model and/or type reference : SR-RH-G3D

Serial Model : N/A

Rating(s) : 100-240VAC 50/60Hz 1A Max

Standards : FCC Part15.225, RSS-210 Issue 8

Test procedure ANSI C63.4-2003, RSS-Gen Issue 3

This device described above has been tested by NTEK, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test :

Date (s) of performance of tests : 13 Apr. 2013 ~20 Apr. 2013

Date of Issue : 23 Apr. 2013

Test Result : **Pass**

Testing Engineer : _____

Apple Huang

(Apple Huang)

Technical Manager : _____

Tom Zhang

(Tom Zhang)

Authorized Signatory : _____

Bovey Yang

(Bovey Yang)

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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15, Subpart C (15.225) & RSS-Gen Issue 3 & RSS-210 Issue 8			
Standard Section	Test Item	Judgment	Remark
15.207 IC RSS-GEN Clause 7.2.4	Conducted Emission	Pass	
15.203& IC RSS-GEN Clause 7.1.2	Antenna Requirement	Pass	
15.225/ RSS-210 A2.6	Radiated Spurious Emission	Pass	
15.225	Bandwidth Requirement	Pass	
15.225	Frequency stability	Pass	

NOTE:

(1) " N/A" denotes test is not applicable in this Test Report.

1.1 TEST FACILITY

NTEK Testing Technology Co., Ltd

Add. : 1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen P.R. China.

FCC Registration No.:238937; IC Registration No.:9270A-1

CNAS Registration No.:L5516

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 1.38\text{dB}$
2	RF power,conducted	$\pm 0.16\text{dB}$
3	Spurious emissions,conducted	$\pm 0.21\text{dB}$
4	All emissions,radiated(<1G)	$\pm 4.68\text{dB}$
5	All emissions,radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^{\circ}\text{C}$
7	Humidity	$\pm 2\%$

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Channel Device
Model Name	SR-RH-G3D
Serial Model	N/A
Model Difference	N/A
Product Description	The EUT is a Channel Device
	Operation Frequency: 13.56MHz
	Modulation Type: ASK
	Number Of Channel 1CH.
	Antenna Designation: Bulid-in Antenna
	Antenna Gain(Peak) 0dBi
	Output Power: 79.73 dBuV/m (AV Max.)
Channel List	Based on the application, features, or specification exhibited in User's Manual, More details of EUT technical specification, please refer to the User's Manual.
	N/A
Adapter	100-240VAC 50/60Hz 1A Max

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- 2.

Table for Filed Antenna

Ant	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	N/A	N/A	Bulid-in Antenna	NA	0	Antenna

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	TX

For Conducted Emission	
Final Test Mode	Description
Mode 1	TX

For Radiated Emission	
Final Test Mode	Description
Mode 1	TX

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission Test



2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Channel Device	N/A	SR-RH-G3D	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS**Radiation Test equipment**

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	Agilent	E4407B	160400005	Jul. 06. 2013
2	Test Receiver	R&S	ESPI	101318	Jul. 06. 2013
3	Bilog Antenna	TESEQ	CBL6111D	31216	Jul. 06. 2013
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	Jul. 06. 2013
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	Jul. 06. 2013
6	Horn Antenna	EM	EM-AH-10180	2011071402	Jul. 06. 2013
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	Jul. 06. 2013
8	Amplifier	EM	EM-30180	060538	Jul. 06. 2013
9	Loop Antenna	ARA	PLA-1030/B	1029	Jul. 06. 2013
10	Power Meter	R&S	NRVS	100696	Jul. 06. 2013

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Test Receiver	R&S	ESCI	101160	Jul. 06. 2013
2	LISN	R&S	ENV216	101313	Jul. 06. 2013
3	LISN	EMCO	3816/2	00042990	Jul. 06. 2013
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	Jul. 06. 2013
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	Jul. 06. 2013
6	Absorbing clamp	R&S	MOS-21	100423	Jul. 06. 2013

3. ANTENNA REQUIREMENT

3.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 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.

3.2 EUT ANTENNA

The EUT antenna is integral Antenna. It comply with the standard requirement.

3.3 CONDUCTED EMISSION MEASUREMENT

3.3.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

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

0.15 -0.5			66 - 56 *	56 - 46 *	LP002.
0.50 -5.0			56.00	46.00	LP002.
5.0 -30.0			60.00	50.00	LP002.

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

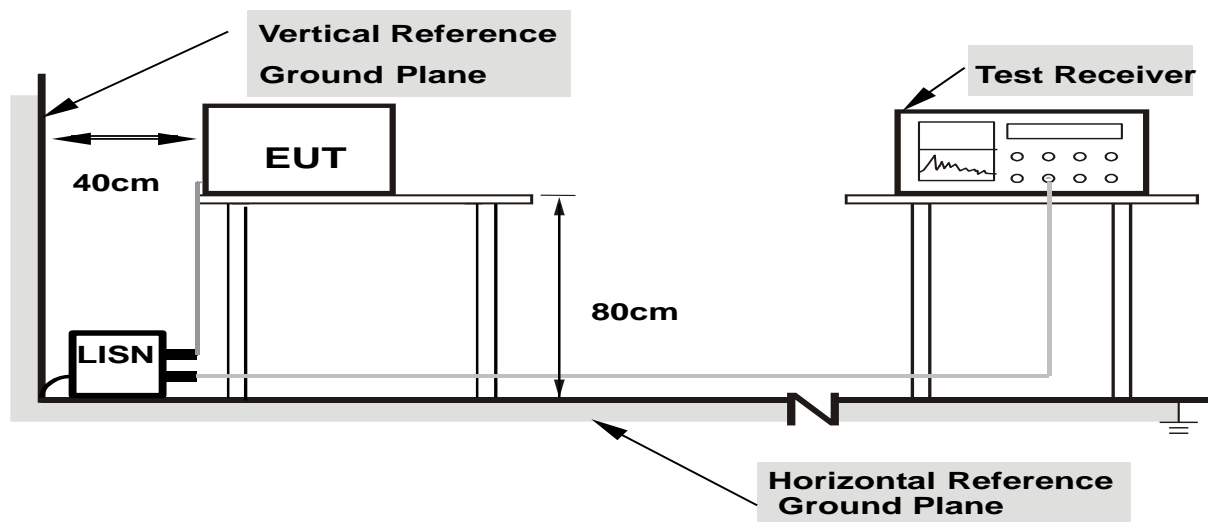
3.3.2 TEST PROCEDURE

- The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.3.3 DEVIATION FROM TEST STANDARD

No deviation

3.3.4 TEST SETUP



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

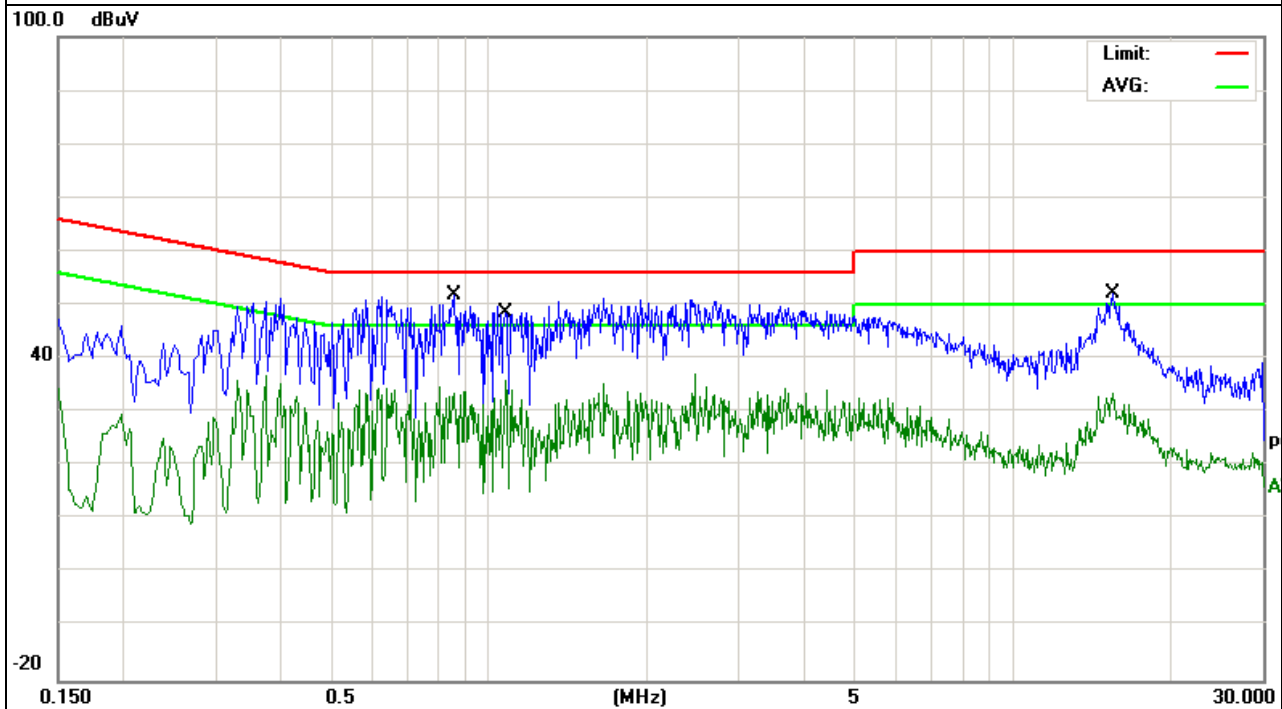
3.2.5 TEST RESULT

EUT :	Channel Device	Model Name. :	SR-RH-G3D
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Mode :	TX

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.858	41.68	10.2	51.88	56	-4.12	QP
1.074	25.75	10.16	35.91	46	-10.09	AVG
15.542	41.67	10.54	52.21	60	-7.79	QP
15.542	23.07	10.54	33.61	50	-16.39	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

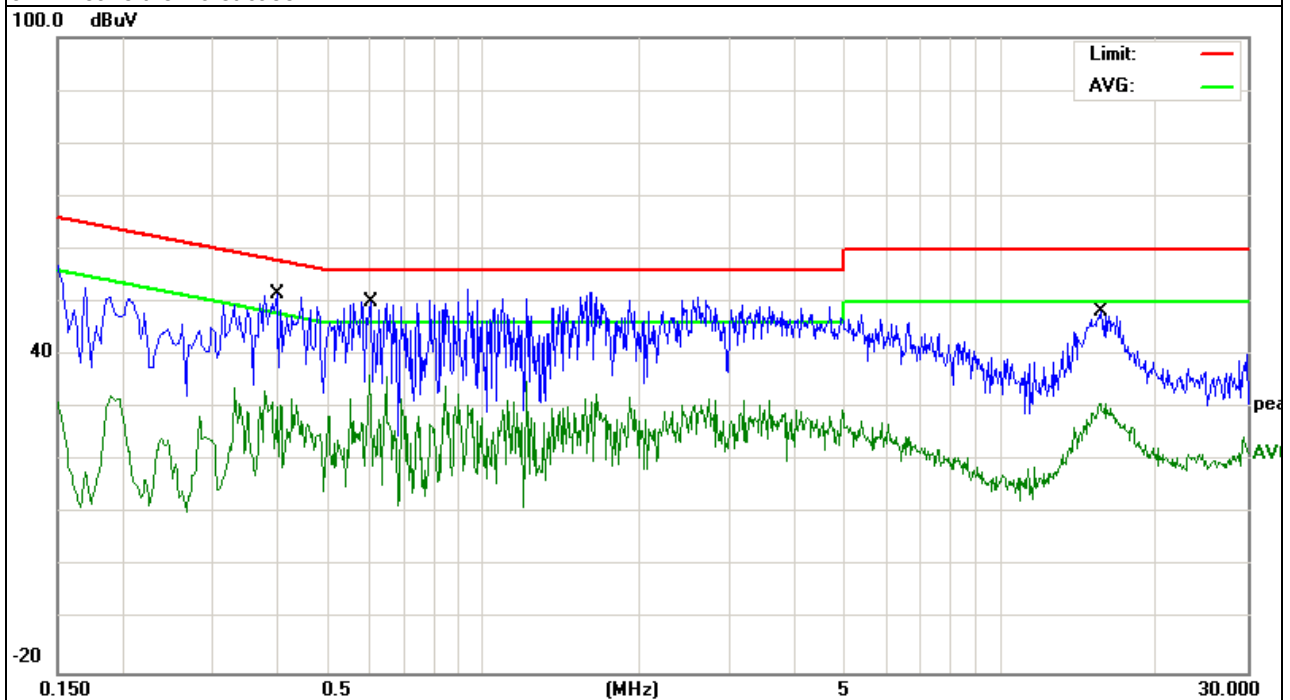


EUT :	Channel Device	Model Name. :	SR-RH-G3D
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode :	TX

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Detector Type
0.398	41.22	10.2	51.42	57.89	-6.47	QP
0.602	25.98	10.22	36.2	46	-9.8	AVG
15.59	37.68	10.55	48.23	60	-11.77	QP
15.59	20.27	10.55	30.82	50	-19.18	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. '*' means the worst case



3.4 RADIATED EMISSION MEASUREMENT

3.4.1 Radiated Emission Limits (FCC 15.209)

Frequencies (MHz)	Field Strength (micorvolts/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

Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission level (dBuV/m)=20log Emission level (uV/m).

LIMITS OF RADIATED EMISSION MEASUREMENT (FCC 15.225)

Please see the section 15.225(b) and 15.225(c)

15.225(b): Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter (50.5dBuV/m)at 30 meters

15.225(c): Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter (40.5dBuV/m) at 30 meters

Note: 30m to 3m correction factor calculation:

$$40 \cdot \text{Log}(30\text{m}/3\text{m})=40$$

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	9 kHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1MHz / 1MHz for Peak

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.4.2 TEST PROCEDURE

- The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m.
- 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 Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

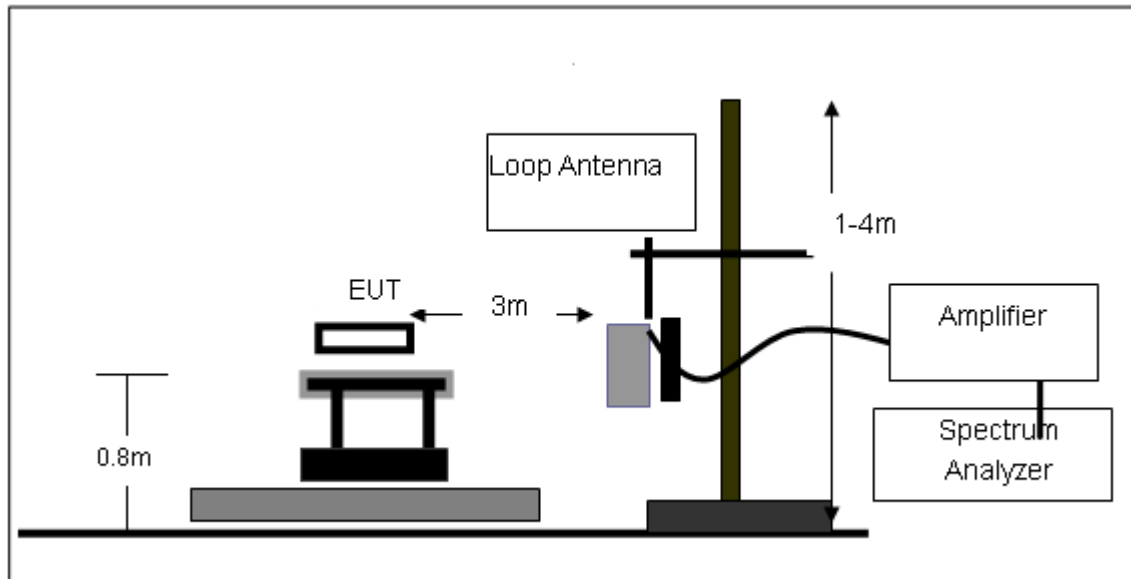
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.4.3 DEVIATION FROM TEST STANDARD

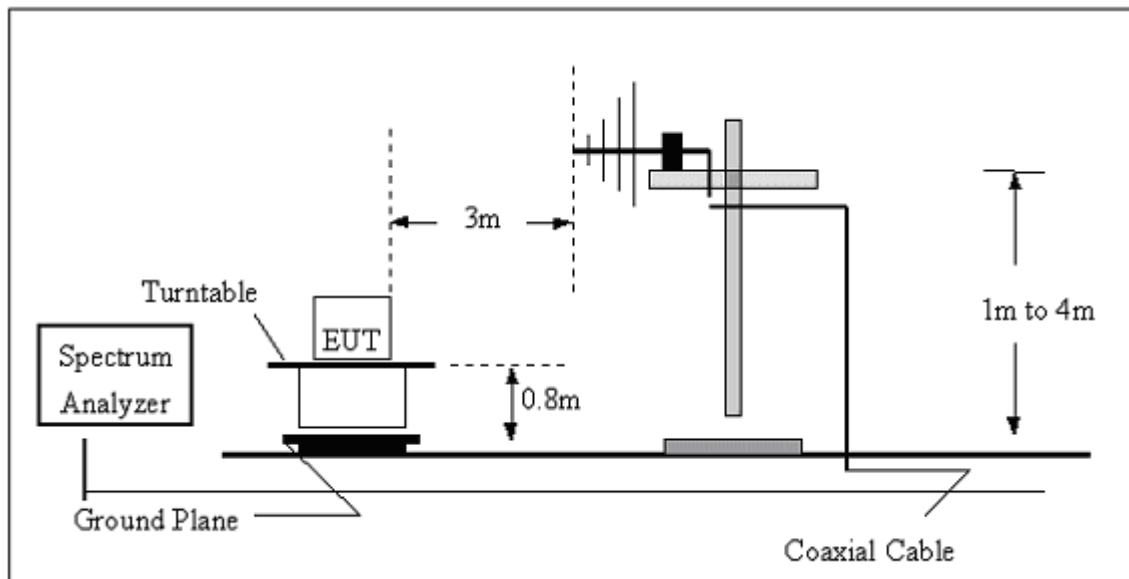
No deviation

3.4.4 TEST SETUP

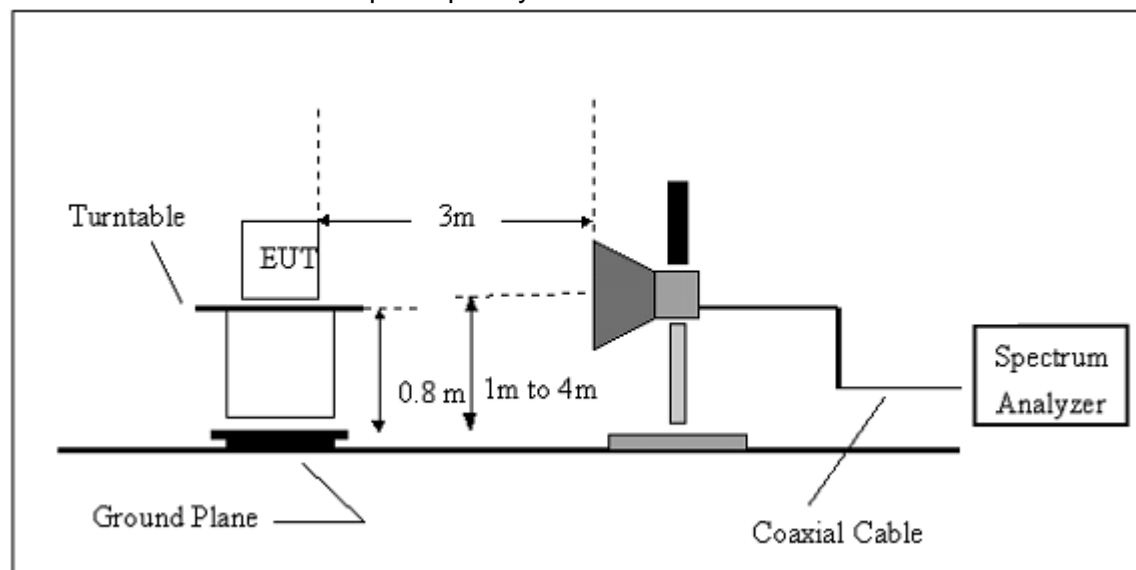
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



3.4.5 TEST RESULTS (BELOW 30MHz)

EUT :	Channel Device	Model Name. :	SR-RH-G3D
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX	Polarization :	--

Radiated Emissions Result of Inside band (13.56MHZ)

Channel (13.56MHZ)									
Fre. MHz	Positio n X/Y/Z	Reading dBuV	Antenna Factor dB	Cable Loss dB	Amplifier Gain dB	Correct Factor dB	Measure Result dBuV/m	Limit dBuV/m	Margin dB
13.56	X	104.52 (PK)	10.4	0.31	24.62	-13.91	90.61	124	-33.39
13.56	X	91.38 (AV)	10.4	0.31	24.62	-13.91	77.47	104	-26.53
--	X	--	--	--	--	--	--	--	--
13.56	Y	105.22 (PK)	10.4	0.31	24.62	-13.91	91.31	124	-32.69
13.56	Y	90.35 (AV)	10.4	0.31	24.62	-13.91	76.44	104	-27.56
--	Y	--	--	--	--	--	--	--	--
13.56	Z	109.48 (PK)	10.4	0.31	24.62	-13.91	95.57	124	-28.43
13.56	Z	93.64 (AV)	10.4	0.31	24.62	-13.91	79.73	104	-24.27
--	Z	--	--	--	--	--	--	--	--

Notes: --Means other frequency and mode comply with standard requirements and at least have 20dB margin.

Correct Factor=Cable Loss+ Antenna Factor- Amplifier Gain

Measurement Result=Reading + Correct Factor

Margin=Measurement Result-Limit

--Spectrum setting:

a. Peak setting RBW=120KHz, VBW=300KHz.

b. AV setting RBW=1MHz, VBW=10Hz.

Field strength

Freq. (MHz)	Position X/Y/Z	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limits 3m (dBuV/m)	Margin (dBuV/m)
13.274	X	Peak	45.62	-13.92	31.70	80.50	-48.80
13.468	X	Peak	46.38	-13.92	32.46	90.50	-58.04
13.513	X	Peak	45.14	-13.92	31.22	90.50	-59.28
13.569	X	Peak	56.63	-13.91	42.72	90.50	-47.78
13.728	X	Peak	45.87	-13.91	31.96	80.50	-48.54
13.896	X	Peak	46.29	-13.91	32.38	80.50	-48.12

Freq. (MHz)	Position X/Y/Z	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limits 3m (dBuV/m)	Margin (dBuV/m)
13.186	Y	Peak	46.48	-13.92	32.56	80.50	-47.94
13.394	Y	Peak	45.74	-13.92	31.82	80.50	-48.68
13.452	Y	Peak	45.32	-13.92	31.40	90.50	-59.10
13.517	Y	Peak	45.81	-13.92	31.89	90.50	-58.61
13.642	Y	Peak	45.52	-13.91	31.61	90.50	-58.89
13.785	Y	Peak	45.49	-13.91	31.58	80.50	-48.92

Freq. (MHz)	Position X/Y/Z	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limits 3m (dBuV/m)	Margin (dBuV/m)
13.219	Z	Peak	45.84	-13.92	31.92	80.50	-48.58
13.357	Z	Peak	46.43	-13.92	32.51	80.50	-47.99
13.436	Z	Peak	46.24	-13.92	32.32	90.50	-58.18
13.603	Z	Peak	45.81	-13.91	31.90	90.50	-58.60
13.752	Z	Peak	45.42	-13.91	31.51	80.50	-48.99
13.846	Z	Peak	45.37	-13.91	31.46	80.50	-49.04

3.4.6 TEST RESULTS (BETWEEN 30 – 1000 MHZ)

EUT :	Channel Device	Model Name :	SR-RH-G3D
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX	Polarization :	Horizontal

Freq. (MHz)	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limits 3m (dBuV/m)	Margin (dBuV/m)
184.90	Peak	47.27	-17.35	29.92	43.50	-13.58
426.06	Peak	42.71	-11.77	30.94	46.00	-15.06
464.41	Peak	33.29	-10.57	22.72	46.00	-23.28
582.24	Peak	32.15	-8.60	23.55	46.00	-22.45
614.62	Peak	35.7	-7.80	27.9	46.00	-18.1
822.13	Peak	36.26	-5.12	31.14	46.00	-14.86

EUT :	Channel Device	Model Name :	SR-RH-G3D
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX	Polarization :	Vertical

Freq. (MHz)	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limits 3m (dBuV/m)	Margin (dBuV/m)
211.29	Peak	44.37	-16.81	27.56	46.00	-18.44
314.81	Peak	42.99	-13.74	29.25	46.00	-16.75
426.26	Peak	52.21	-11.77	40.44	46.00	-5.56
458.42	Peak	43.11	-10.57	32.54	46.00	-13.46
572.13	Peak	32.31	-8.85	23.46	46.00	-22.54
832.12	Peak	32.06	-5.12	26.94	46.00	-19.06

NOTE:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. *: Denotes restricted band of operation.

Measurements were made using a peak detector and average detector. Any emission falling within the restricted bands of FCC Part 15 Section 15.205 were compliance with the emission limit of FCC Part 15 Section 15.209.

EUT :	Channel Device	Model Name :	SR-RH-G3D
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	RX	Polarization :	Horizontal

Freq. (MHz)	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limits 3m (dBuV/m)	Margin (dBuV/m)
189.35	Peak	43.56	-15.39	28.17	43.5	-15.33
563.26	Peak	45.44	-9.48	35.96	46	-10.04

EUT :	Channel Device	Model Name :	SR-RH-G3D
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	RX	Polarization :	Vertical

Freq. (MHz)	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limits 3m (dBuV/m)	Margin (dBuV/m)
365.25	Peak	45.65	-17.68	27.97	43.5	-15.53
522.23	Peak	50.25	-12.14	38.11	46	-7.89

NoTE:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. *: Denotes restricted band of operation.

Measurements were made using a peak detector and average detector. Any emission falling within the restricted bands of FCC Part 15 Section 15.205 were compliance with the emission limit of FCC Part 15 Section 15.209.

4. BANDWIDTH TEST

4.1 TEST PROCEDURE

- a) The bandwidth is measured at an amplitude level reduced 20dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.
- b) The test receiver RBW set 10KHz, VBW set 30KHz

4.2 DEVIATION FROM STANDARD

No deviation.

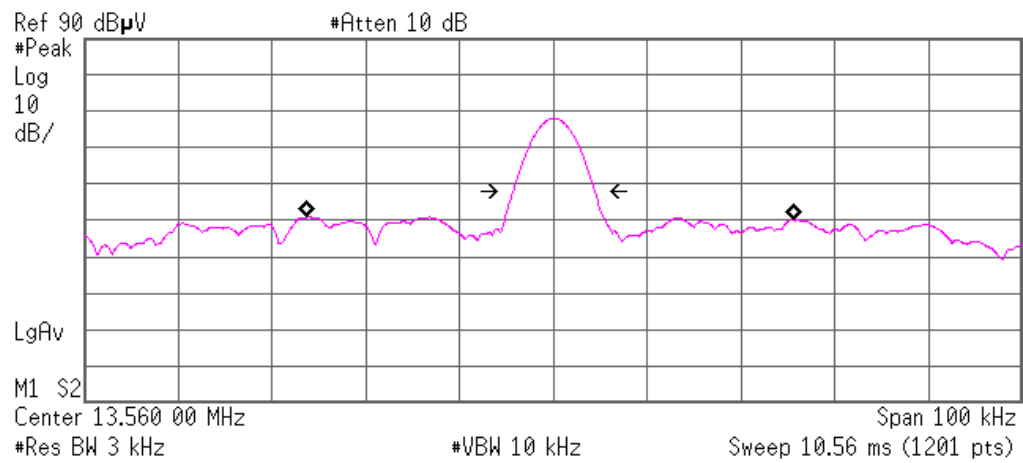
4.3 TEST SETUP



4.4 TEST RESULTS

* Agilent

R T



Occupied Bandwidth
51.9596 kHz

Occ BW % Pwr 99.00 %
x dB -20.00 dB

Transmit Freq Error -317.150 Hz
x dB Bandwidth 8.747 kHz

5. FREQUENCY STABILITY

5.1 REQUIREMENTS

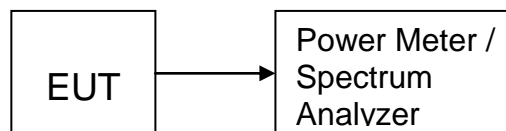
Please refer section 15.225e.

Regulation 15.225(e) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ (± 100 ppm) of the operating frequency over a temperature variation of -20 degrees to $+50$ degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

5.2 TEST PROCEDURE

The following equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application

5.3 TEST SETUP

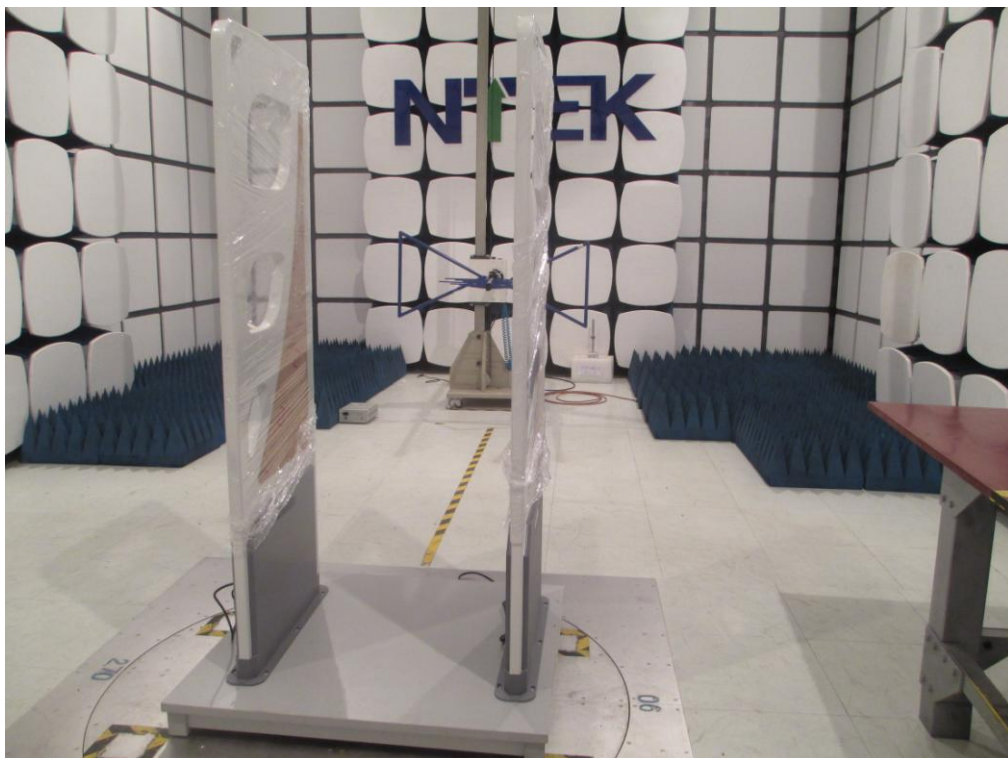
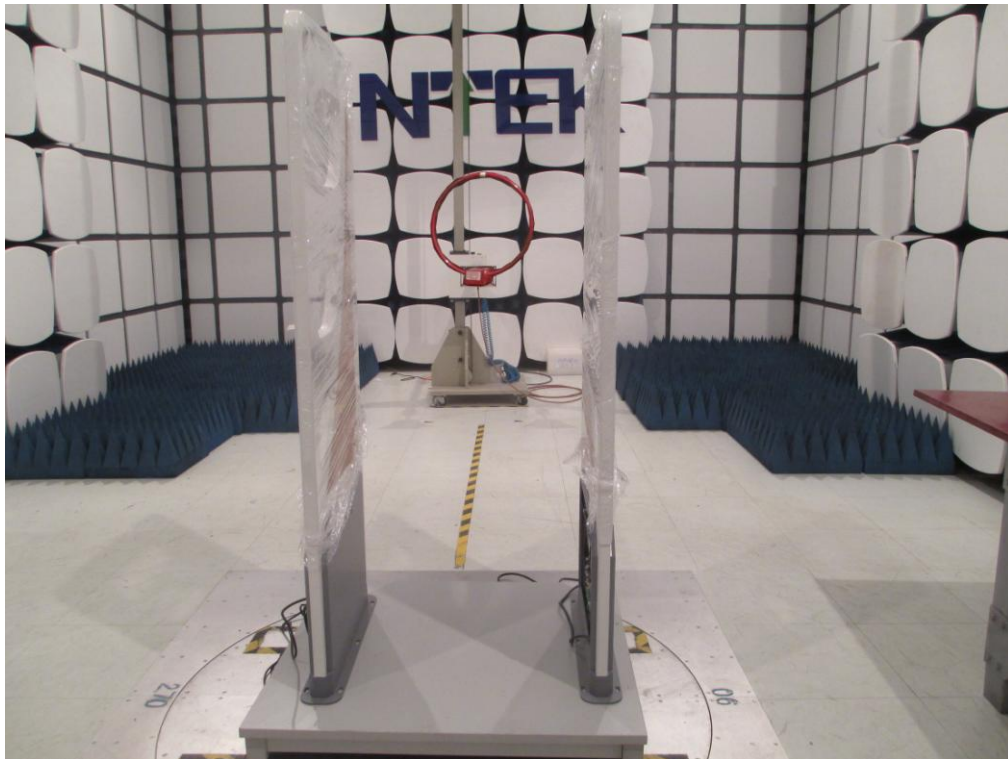


5.4 TEST RESULTS

Assigned Frequency(MHz): 13.56MHz Voltage: AC 120V				
Voltage	Temperature	Measured Frequency (MHz)	Frequency stability	Limit
Low 90V	+20°C	13.56021	0.00021	±100 ppm ±0.001356MHz
Normal 120V	-20°C	13.56081	0.00081	
	-10°C	13.55931	-0.00069	
	0°C	13.56078	0.00078	
	+10°C	13.55949	-0.00051	
	+20°C	13.56023	0.00023	
	+30°C	13.56013	0.00013	
	+40°C	13.55929	-0.00071	
	+50°C	13.55932	-0.00068	
High 132V	+20°C	13.56034	0.00034	

6. EUT TEST PHOTO

Radiated Measurement Photos



Conducted Measurement Photos