Test Report of FCC CFR 47 Part 15 Subpart C

On Behalf of

gridComm Pte Ltd

71 Ayer Rajah Crescent Unit 03-23 Singapore 139951

Product Name:	**PLC-RF DIN RAIL MODEM**
Model/Type No.:	**GC9838-VE**
FCC ID:	**2ALW7-GC9838VE**
Prepared By:	**Shenzhen Hongcai Testing Technology Co., Ltd.** 1st-3rd Floor, Building C, Shuanghuan Xin Yi Dai Hi-Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen, Guangdong, China Tel: +86-755-86337020 Fax:+86-755-86337028
Report Number:	HCT17DR093E-1
Tested Date:	April 11~26, 2017
Issued Date:	April 26, 2017
Tested By:	Jerry Zhao/

Reviewed By: Owen.Yang / EMC Technical Supervisor

Approved By: Tony Wu / EMC Technical Manager

TABLE OF CONTENTS

HONGCAI TESTING

Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel : +86 755 86337020(60Lines) Fax : +86 755 86337028 Web : www.hct-test.com

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	gridComm Pte Ltd
Address of Applicant:	71 Ayer Rajah Crescent Unit 03-23 Singapore 139951
Manufacturer:	Shenzhen Ju Yang Electronics Technology Co. Ltd.
Address of Manufacturer:	Room 384, FuYong Information Building, BaoAn District, ShenZhen City

General Description of E.U.T

Items	Description
EUT Description:	PLC-RF DIN RAIL MODEM
Model No.:	GC9838-VE
Supplementary Model:	N/A
Trade Mark:	gridComm
Frequency Band:	914MHz~927.5MHz
Modulation Type:	FSK
Channel Spacing:	500KHz
Number of Channels:	27 Channels
Antenna Type:	Terminal Antenna
Antenna Gain:	2.5dBi
Power Rating:	Input: AC 100~240V, 0.05A, 2W Output: AC 100~240V

Remark:* *The test data gathered are from the production sample provided by the manufacturer.*

HONGCAI TESTING

Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel : +86 755 86337020(60Lines) Fax : +86 755 86337028 Web : www.hct-test.com

1.2 Test standards

This submittal(s) is a test report based on the Electromagnetic Interference (EMI) tests performed on the EUT. The EMI measurements were performed according to the measurement procedure described in ANSI C63.10 - 2013.

The tests were performed in order to determine compliance with Section 15.203,15.205,15.207 15.209, 15.215,15.249 under the FCC Rules Part 15 Subpart C.

1.3 Test Facility

All measurement required was performed at laboratory of Shenzhen CTL Testing Technology Co., Ltd. Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen 518055 China. There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.10-2013 and CISPR 22/EN 55022 requirements.

FCC – Registration No.: 970318
Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 970318, December, 2013.

IC Registration No.: 9618B
The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 9618B on November 13, 2013.

HONGCAI TESTING

1.4 Test Methodology

The tests documented in this report were performed in accordance with ANSI C63.10:2013 and FCC Part 15 C, Paragraph 15.249.

Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel : +86 755 86337020(60Lines) Fax : +86 755 86337028 Web : www.hct-test.com

2. SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The calibrated antennas used to sample the radiated field strength are mounted on a non-conductive, motorized antenna mast 3 or 10 meters from the leading edge of the turntable.

2.3 General Test Procedures

Conducted Emissions: The EUT is placed on the table, which is 0.8 m above ground plane According to the requirements in ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak detector mode.

Radiated Emissions: The EUT is a placed on as turntable, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in ANSI C63.10-2013.

2.4 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. to CISPR 16 - 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

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

Parameter	Uncertainty
Transmitter power conducted	+/- 0.57 dB
Transmitter power Radiated	+/- 2.20 dB
Conducted spurious emission 9KHz-40 GHz	+/- 2.20 dB
Occupied Bandwidth	+/- 0.01 dB
Power Line Conducted Emission	+/- 3.20 dB
Radiated Emission	+/- 4.32 dB

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

Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel : +86 755 86337020(60Lines) Fax : +86 755 86337028 Web : www.hct-test.com

2.5 Measure Results Explanation Example

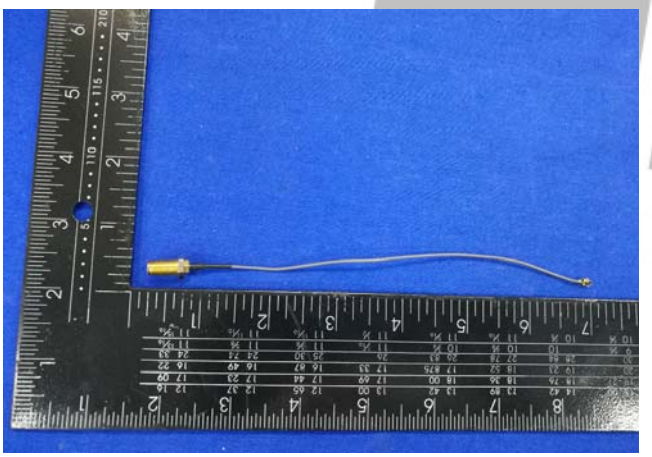
For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable less and attenuator factor.
Offset= RF cable less+ attenuator factor.

Note: Using a temporary antenna connector for the EUT when the conducted measurements are performed.

Equipment	Manufacturer	Model No.	Frequency range(GHz)	Attenuation values(dBm)
Line	Zhenjiang south electronic	RG316	1-12	0.07
			<1G	0.02
			>12G	0.95
Connector	Zhenjiang south electronic	SMA-K/N-J	1-12	0.01
			<1G	0.005
			>12G	0.03



Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel : +86 755 86337020(60Lines) Fax : +86 755 86337028 Web : www.hct-test.com

2.6. Block diagram of EUT configuration for test

The EUT has been tested under operating condition. Manual control the EUT for staying in continuous transmitting mode. Channel Low(914.5MHz),Channel Middle(921MHz) and Channel High(927.5MHz) are chosen for the final testing.

Channels List:

Channel	Freq.(MHz)	Channel	Freq.(MHz)
1	914.5	15	921.5
2	915	16	922
3	915.5	17	922.5
4	916	18	923
5	916.5	19	923.5
6	917	20	924
7	917.5	21	924.5
8	918	22	925
9	918.5	23	925.5
10	919	24	926
11	919.5	25	926.5
12	920	26	927
13	920.5	27	927.5
14	921		

HONGCAI TESTING

Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel : +86 755 86337020(60Lines) Fax : +86 755 86337028 Web : www.hct-test.com

2.7 List of Measuring Equipments Used

Test equipments list of Shenzhen CTL Testing Technology Co., Ltd.

No.	Equipment	Manufacturer	Model No.	S/N	Last Calculator	Due Calculator
1	EMI Test Receiver	R&S	ESCI	100687	2016-7-25	2017-7-24
2	EMI Test Receiver	R&S	ESPI	100097	2016-10-1	2017-10-31
3	Amplifier	HP	8447D	1937A02492	2016-7-25	2017-7-24
4	TRILOG Broadband Test-Antenna	SCHWARZBECK	VULB9163	9163-324	2016-7-25	2017-7-24
5	Triple-Loop Antenna	EVERFINE	LLA-2	711002	2016-10-1	2017-10-31
6	RF POWER AMPLIFIER	FRANKONIA	FLL-75	1020A1109	2016-7-25	2017-7-24
7	6DB Attenuator	FRANKONIA	N/A	1001698	2016-7-25	2017-7-24
8	10dB attenuator	ELECTRO-METRICS	EM-7600	836	2016-7-25	2017-7-24
9	Spectrum Analyzer	R&S	FSP	100397	2016-10-1	2017-10-31
10	Broadband preamplifier	SCH WARZBECK	BBV9718	9718-182	2016-7-25	2017-7-24
11	Horn Antenna	SCHWARZBECK	BBHA 9120D	0437	2016-7-25	2017-7-24
12	Horn Antenna	SCHWARZBECK	BBHA9170	0483	2016-7-25	2017-7-24

HONGCAI TESTING

3. SUMMARY OF TEST RESULTS

Standard	Description of Test	Result
§ 15.207	Conducted Emission	Pass
§ 15.205	Restricted Band of Operation	Pass
§ 15.249	Band Edges Measurement	Pass
§ 15.209 § 15.249	Spurious Emission	Pass
§ 15.215	20dB Bandwidth	Pass
§ 15.203	Antenna Requirement	Pass

Note: N/A is not applicable.

Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel : +86 755 86337020(60Lines) Fax : +86 755 86337028 Web : www.hct-test.com

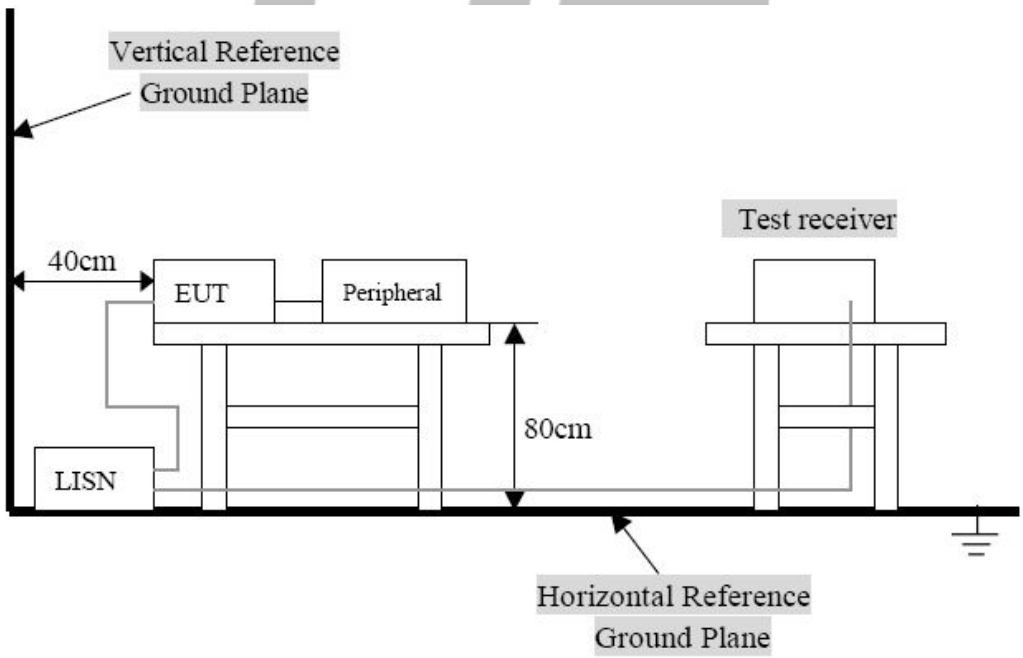
4. TEST OF CONDUCTED EMISSION

4.1 Applicable Standard

Section 15.207: For a Low-power Radio-frequency Device is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

Frequency Range (MHz)	Limits (dBuV)	
	Quasi-Peak	Average
0.150～0.500	66～56	56～46
0.500～5.000	56	46
5.000～30.00	60	50

4.2 Test Setup Diagram



Remark: 1. The setup of EUT is according with per ANSI C63.10:2013 measurement procedure.
The specification used was with the FCC 15.207 limits.

Notes: PASS

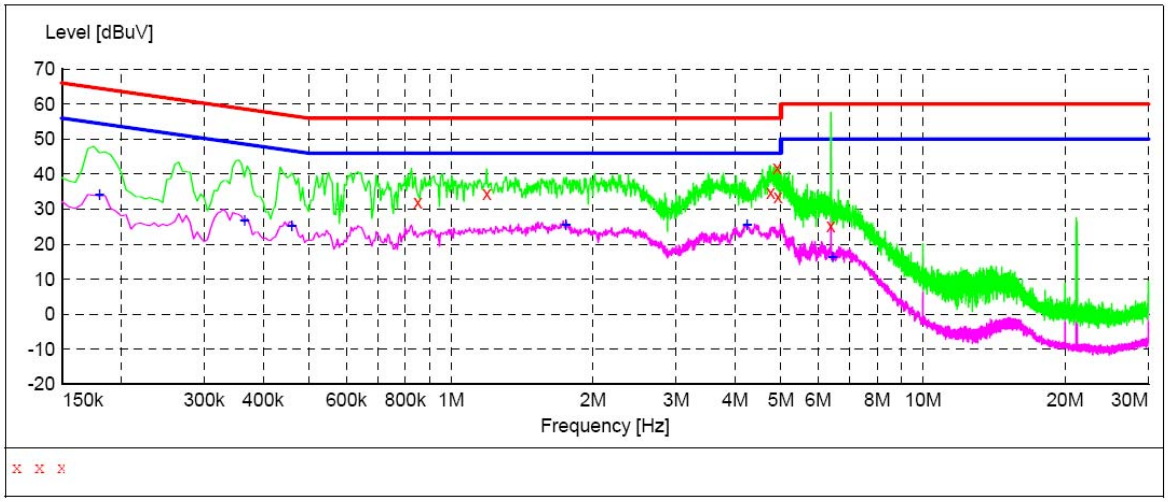
Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel : +86 755 86337020(60Lines) Fax : +86 755 86337028 Web : www.hct-test.com

Conducted Emission Test Data

EUT:	PLC-RF DIN RAIL MODEM
M/N:	GC9838-VE
Operating Condition:	Tx Mode
Test Site:	Shielded Room
Operator:	Li
Test Specification:	AC 120V/60Hz
Comment:	Live Line
Start of Test:	Tem:25℃ Hum:50%

SCAN TABLE: "Voltage(150K-30M)FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT:

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.850000	31.90	10.3	56	24.1	QP	L1	GND
1.190000	34.30	11.1	56	21.7	QP	L1	GND
4.755000	34.80	13.4	56	21.2	QP	L1	GND
4.905000	41.80	13.5	56	14.2	QP	L1	GND
4.925000	33.50	13.5	56	22.5	QP	L1	GND
6.380000	25.30	12.9	60	34.7	QP	L1	GND

MEASUREMENT RESULT:

Frequency MHz	Level dB	Transd dB	Limit dB	Margin dB	Detector	Line	PE
0.180000	34.10	12.0	55	20.4	AV	L1	GND
0.365000	26.70	11.0	49	21.9	AV	L1	GND
0.460000	25.20	10.8	47	21.5	AV	L1	GND
1.750000	25.50	12.7	46	20.5	AV	L1	GND
4.240000	25.50	13.3	46	20.5	AV	L1	GND
6.430000	16.30	12.9	50	33.7	AV	L1	GND

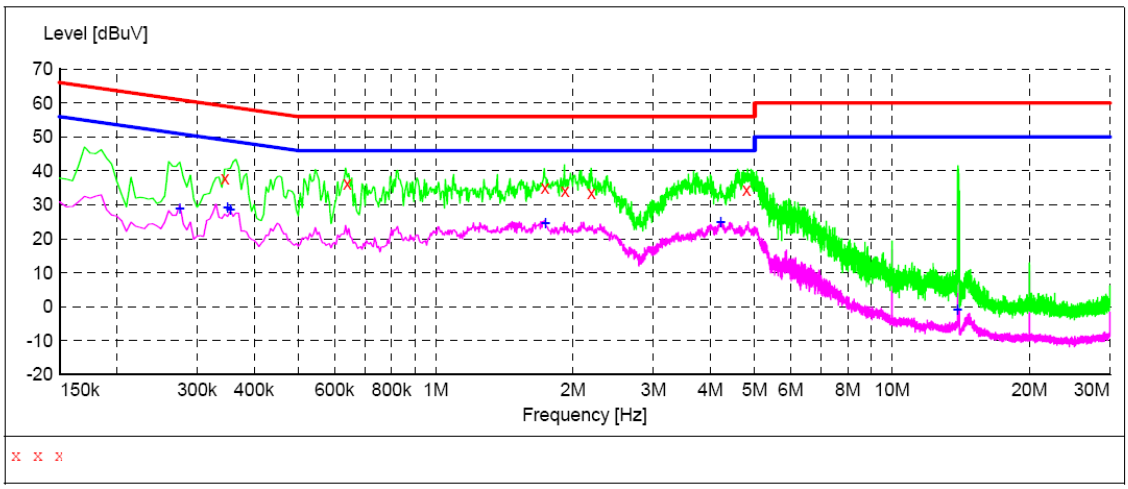
Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel : +86 755 86337020(60Lines) Fax : +86 755 86337028 Web : www.hct-test.com

Conducted Emission Test Data

EUT:	PLC-RF DIN RAIL MODEM
M/N:	GC9838-VE
Operating Condition:	Tx Mode
Test Site:	Shielded Room
Operator:	Li
Test Specification:	AC 120V/60Hz
Comment:	Neutral Line
Start of Test:	Tem:25℃ Hum:50%

SCAN TABLE: "Voltage(150K-30M)FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT:

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.345000	37.80	11.0	59	21.3	QP	N	GND
0.640000	36.40	10.4	56	19.6	QP	N	GND
1.735000	35.00	12.7	56	21.0	QP	N	GND
1.920000	34.20	13.1	56	21.8	QP	N	GND
2.195000	33.50	13.1	56	22.5	QP	N	GND
4.800000	34.50	13.4	56	21.5	QP	N	GND

MEASUREMENT RESULT:

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.275000	29.00	12.4	51	22.0	AV	N	GND
0.350000	29.20	11.0	49	19.8	AV	N	GND
0.355000	28.50	11.0	49	20.3	AV	N	GND
1.740000	24.70	12.7	46	21.3	AV	N	GND
4.210000	25.00	13.3	46	21.0	AV	N	GND
13.920000	-1.00	13.5	50	51.0	AV	N	GND

Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel : +86 755 86337020(60Lines) Fax : +86 755 86337028 Web : www.hct-test.com

5. BAND EDGES MEASUREMENT

5.1 Limit of Band Edges Measurement

1. In the above emission table, the tighter limit applies at the band edges.

2. As shown in Section 15.35(b), for frequencies above 1000 MHz, the above field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

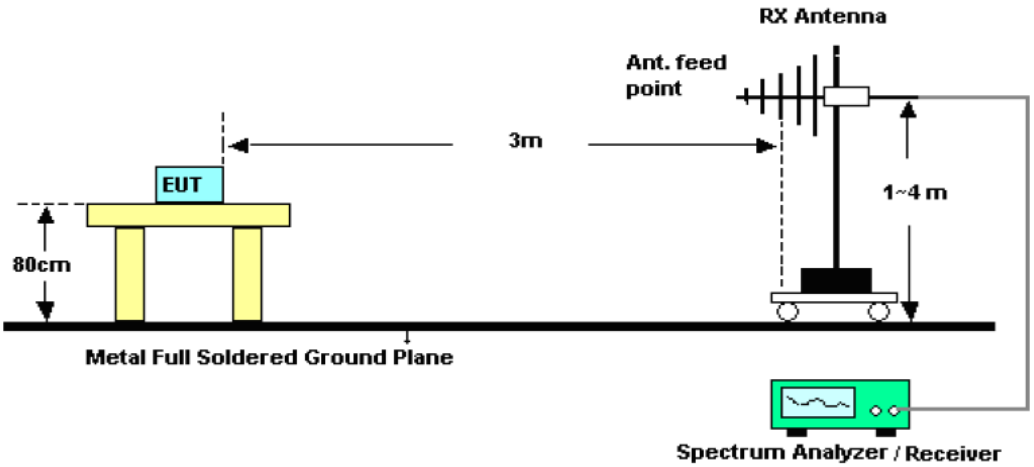
Frequency (MHz)	Field Strength (μV/m at 3-meter)	Field Strength (dBμV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Note: (1) The tighter limit shall apply at the edge between two frequency bands.

(2) The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

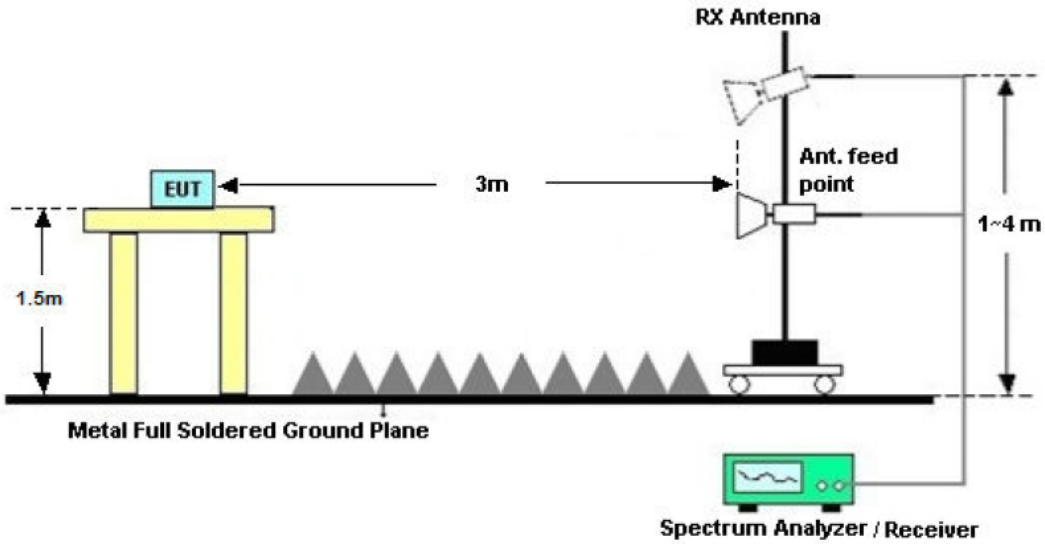
5.2 EUT Setup

For radiated emission from 30MHz to1GHz



Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel : +86 755 86337020(60Lines) Fax : +86 755 86337028 Web : www.hct-test.com

For radiated emission from above1GHz



5.3 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

1). Configure the EUT according to ANSI C63.10:2013.

2). The EUT was placed on the top of the turntable 0.8 meter above ground.

3). The receiving antenna was placed 3 meters far away from the turntable.

4). The turntable was rotated by 360 degrees to determine the position of the highest radiation.

5). The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization. For each suspected emission, the antenna tower was scanned (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.

5.4 Test Result

Temperature (℃) : 22~23	EUT: PLC-RF DIN RAIL MODEM
Humidity (%RH): 50~54	M/N: GC9838-VE
Barometric Pressure (mbar): 950~1000	Operation Condition: Continuous transmitting

PASS

Channel	Freq.(MHz)	Level(dBuV)	Limit(dBuV)	Margin(dB)	Detector
LOW	902	48.35	74	-25.65	Peak
	902	36.16	54	-17.84	Average
HIGH	928	47.39	74	-26.61	Peak
	928	35.96	54	-18.04	Average

Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel : +86 755 86337020(60Lines) Fax : +86 755 86337028 Web : www.hct-test.com

6. SPURIOUS EMISSIONS

6.1 Limit of Spurious Emissions

1. In the section 15.249(a): Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

2. Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Fundamental Frequency (MHz)	Field Strength of Fundamental Field Strength (mV/m)	Field Strength of Harmonics (μmV/m)
902-928 MHz	50	500
2400 - 2483.5 MHz	50	500
5725 - 5875 MHz	50	500
24.0 - 24.25 GHz	250	2500

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

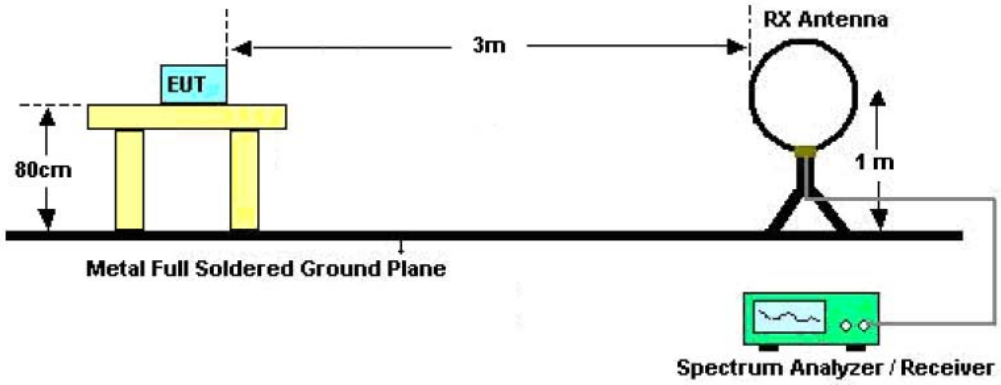
3. In the above emission table, the tighter limit applies at the band edges.

Frequency (MHz)	Field Strength (μV/m at 3-meter)	Field Strength (dBμV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

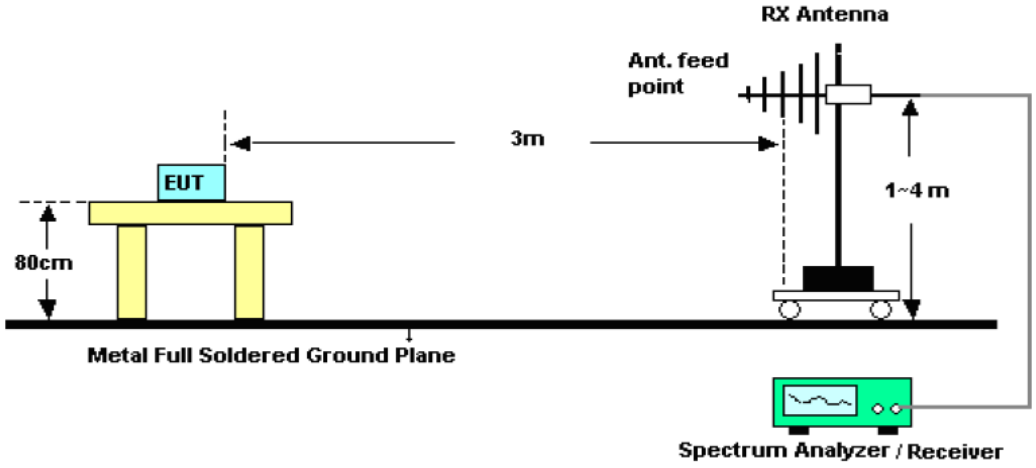
Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel : +86 755 86337020(60Lines) Fax : +86 755 86337028 Web : www.hct-test.com

6.2 EUT Setup

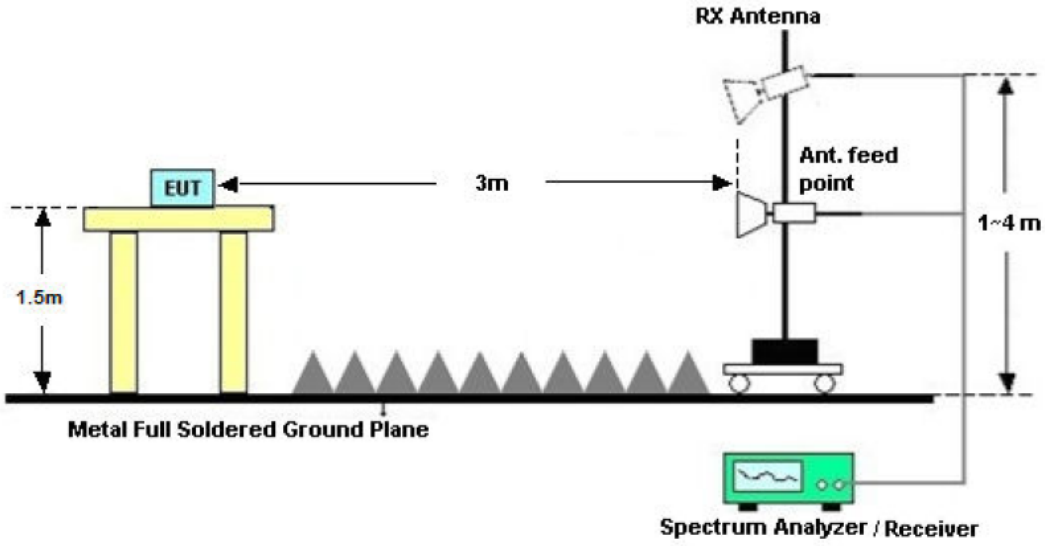
For radiated emission below 30MHz



For radiated emission from 30MHz to1GHz



For radiated emission above1GHz



Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel : +86 755 86337020(60Lines) Fax : +86 755 86337028 Web : www.hct-test.com

6.3 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

1). Configure the EUT according to ANSI C63.10:2013

2). The EUT was placed on the top of the turntable 0.8 meter above ground.

3). The receiving antenna was placed 3 meters far away from the turntable.

4). The turntable was rotated by 360 degrees to determine the position of the highest radiation.

5). The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization. For each suspected emission, the antenna tower was scanned (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.

6）For radiated emission above1GHz,the test range of radiated emission is 1GHz~40GHz.

6.4 Spurious Emissions Test Result

Temperature (℃) : 22~23	EUT: PLC-RF DIN RAIL MODEM
Humidity (%RH): 50~54	M/N: GC9838-VE
Barometric Pressure (mbar): 950~1000	Operation Condition: Continuous transmitting

HONGCAI TESTING

Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel : +86 755 86337020(60Lines) Fax : +86 755 86337028 Web : www.hct-test.com

RADIATED EMISSION BELOW 30 MHz

(CH Low) operating Mode:914.5MHz

Frequency	Meter Reading	Antenna Factor	Cable Loss	Emission Levels	Limits	Margin	Detector Mode
(MHz)	(dBμV)	(dB/M)	(dB)	(dBμV/M)	(dBμV/M)	(dB)	PK/QP
5.39	21.98	8.24	1.03	31.25	72.9	-38.65	QP
17.25	21.14	9.36	1.08	31.58	69.5	-37.92	QP
24.36	20.69	9.24	1.06	30.99	69.5	-38.51	QP
28.21	24.21	9.12	1.09	34.42	69.5	-35.08	QP

(CH Middle) operating Mode:921MHz

Frequency	Meter Reading	Antenna Factor	Cable Loss	Emission Levels	Limits	Margin	Detector Mode
(MHz)	(dBμV)	(dB/M)	(dB)	(dBμV/M)	(dBμV/M)	(dB)	PK/QP
5.02	22.88	8.26	1.01	32.15	73.5	-41.35	QP
16.89	20.13	9.19	1.06	30.38	69.5	-39.12	QP
23.68	20.36	9.18	1.07	30.61	69.5	-38.89	QP
27.13	23.69	9.10	1.04	33.83	69.5	-35.67	QP

(CH High) operating Mode:927.5MHz

Frequency	Meter Reading	Antenna Factor	Cable Loss	Emission Levels	Limits	Margin	Detector Mode
(MHz)	(dBμV)	(dB/M)	(dB)	(dBμV/M)	(dBμV/M)	(dB)	PK/QP
5.31	21.31	8.15	1.06	30.52	73.1	-42.58	QP
17.25	20.69	9.30	1.05	31.04	69.5	-38.46	QP
21.65	20.48	9.02	1.06	30.56	69.5	-38.94	QP
29.32	23.41	9.14	1.04	33.59	69.5	-35.91	QP

Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel : +86 755 86337020(60Lines) Fax : +86 755 86337028 Web : www.hct-test.com

RADIATED EMISSION 30 MHz-1000MHz

Low Channel:914.5MHz

Horizontal

Frequency	Meter Reading	Tansd	Limits	Margin	Detector Mode
(MHz)	(dBμV)	(dB)	(dBμV/M)	(dB)	PK/QP
36.76	27.80	13.6	40	-12.2	QP
86.26	25.60	13.8	40	-14.4	QP
101.78	27.80	16.1	43.5	-15.7	QP
187.14	25.60	13.7	43.5	-17.9	QP
549.92	32.70	20.9	46	-13.3	QP
914.50	88.26	25.4	94	-5.74	QP
N/A	----	----	----	----	----

Vertical

Frequency	Meter Reading	Tansd	Limits	Margin	Detector Mode
(MHz)	(dBμV)	(dB)	(dBμV/M)	(dB)	PK/QP
33.88	35.40	13.8	40	-4.6	QP
107.6	33.70	15.5	43.5	-9.8	QP
121.18	36.00	13.4	43.5	-7.5	QP
134.76	37.60	11.8	43.5	-5.9	QP
148.34	36.10	11.6	43.5	-7.4	QP
914.50	87.59	25.9	94	-6.41	QP
N/A	----	**----**	----	----	----

Note: 1. Transd.=Antenna Factor+Cable Loss-Pre-amplifier
Margin = Level-Limit

Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel : +86 755 86337020(60Lines) Fax : +86 755 86337028 Web : www.hct-test.com

Middle Channel:921MHz

Horizontal

Frequency	Meter Reading	Tansd	Limits	Margin	Detector Mode
(MHz)	(dBμV)	(dB)	(dBμV/M)	(dB)	PK/QP
35.7	28.86	13.86	40	-11.14	QP
85.2	26.66	14.06	40	-13.34	QP
100.72	28.86	16.36	43.5	-14.64	QP
186.08	26.66	13.96	43.5	-16.84	QP
548.86	33.76	21.16	46	-12.24	QP
921	85.29	24.64	94	-8.71	QP
N/A	----	----	----	----	----

Vertical

Frequency	Meter Reading	Tansd	Limits	Margin	Detector Mode
(MHz)	(dBμV)	(dB)	(dBμV/M)	(dB)	PK/QP
32.82	36.46	14.06	40	-3.54	QP
106.54	34.76	15.76	40	-5.24	QP
120.12	37.06	13.66	43.5	-6.44	QP
133.7	38.66	12.06	43.5	-4.84	QP
147.28	37.16	11.86	46	-8.84	QP
921	85.55	25.9	94	-8.45	QP
N/A	----	**----**	----	----	----

Note: 1. Transd.=Antenna Factor+Cable Loss-Pre-amplifier
Margin = Level-Limit

Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel : +86 755 86337020(60Lines) Fax : +86 755 86337028 Web : www.hct-test.com

High Channel:927.5MHz

Horizontal

Frequency	Meter Reading	Tansd	Limits	Margin	Detector Mode
(MHz)	(dBμV)	(dB)	(dBμV/M)	(dB)	PK/QP
34.64	29.92	14.12	40	-10.08	QP
84.14	27.72	14.32	40	-12.28	QP
99.66	29.92	16.62	43.5	-13.58	QP
185.02	27.72	14.22	43.5	-15.78	QP
547.8	34.82	21.42	46	-11.18	QP
927.50	86.60	25.4	94	-7.40	QP
N/A	----	----	----	----	----

Vertical

Frequency	Meter Reading	Tansd	Limits	Margin	Detector Mode
(MHz)	(dBμV)	(dB)	(dBμV/M)	(dB)	PK/QP
31.76	37.52	14.32	40	-2.48	QP
105.48	35.82	16.02	40	-4.18	QP
119.06	38.12	13.92	43.5	-5.38	QP
132.64	39.72	12.32	43.5	-3.78	QP
146.22	38.22	12.12	46	-7.78	QP
927.50	86.91	25.9	94	-7.09	QP
N/A	----	----	----	----	----

Note: 1. Transd.=Antenna Factor+Cable Loss-Pre-amplifier
Margin = Level-Limit

Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel : +86 755 86337020(60Lines) Fax : +86 755 86337028 Web : www.hct-test.com

RADIATED EMISSION ABOVE 1 GHz

CH Low

Channel Low（914.5MHz）								
Maximum Frequency (MHz)	Polarity and Level					Limit (dBμV/m)	Margin (dBμV/m)	Mark (P/Q/A)
	Polarity	Height (m)	Reading dBμV	Transd	Result dBμV/m			
1829	H	1	47.52	-7.17	40.35	74	-33.65	P
			32.54	-7.17	25.37	54	-28.63	A
1829	V	1	49.12	-7.17	41.95	74	-32.05	P
			32.15	-7.17	24.98	54	-29.02	A
2743.5	H	1	40.21	1.32	41.53	74	-32.47	P
			32.25	1.32	33.57	54	-20.43	A
2743.5	V	1	39.21	1.32	40.53	74	-33.47	P
			31.26	1.32	32.58	54	-21.42	A
3658	H	1	46.28	8.21	54.49	74	-19.51	P
			31.26	8.21	39.47	54	-14.53	A
3658	V	1	41.36	8.21	49.57	74	-24.43	P
			35.24	8.21	43.45	54	-10.55	A
11145.34	H	1	----	----	----	----	----	----
			----	----	----	----	----	----
16327.65	----	----	----	----	----	----	----	----
25376.32	----	----	----	----	----	----	----	----

Remark: 1.Transd=Antenna Factor + Cable Loss - Pre-amplifier
Margin = Level-Limit
Mark: P means Peak Value, Q means Quasi Peak Value, A means Average Value
2. Data of measurement within this frequency range shown " -" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
3. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz, A(Average): RBW=1MHz, VBW=10Hz.
4. The test limit distance is 3m limit

Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel：+86 755 86337020(60Lines) Fax：+86 755 86337028 Web：www.hct-test.com

CH Middle

Channel Middle（921MHz）								
Maximum Frequency (MHz)	Polarity and Level					Limit (dBμV/m)	Margin (dBμV/m)	Mark (P/Q/A)
	Polarity	Height (m)	Reading dBμV	Transd	Result dBμV/m			
1848	H	1	46.22	-7.18	39.04	74	-34.96	P
			33.21	-7.18	26.03	54	-27.97	A
1848	V	1	46.21	-7.18	39.03	74	-34.97	P
			33.11	-7.18	25.93	54	-28.07	A
2763	H	1	39.21	1.31	40.52	74	-33.48	P
			30.15	1.31	31.46	54	-22.54	A
2763	V	1	37.26	1.31	38.57	74	-35.43	P
			33.11	1.31	34.42	54	-19.58	A
3684	H	1	44.26	8.2	52.46	74	-21.54	P
			30.15	8.2	38.35	54	-15.65	A
3684	V	1	42.31	8.2	50.51	74	-23.49	P
			34.26	8.2	42.46	54	-11.54	A
11238.52	H	1	----	----	----	----	----	----
			----	----	----	----	----	----
16327.71	----	----	----	----	----	----	----	----
25376.58	----	----	----	----	----	----	----	----

Remark: 1.Transd=Antenna Factor + Cable Loss - Pre-amplifier
Margin = Level-Limit
Mark: P means Peak Value, Q means Quasi Peak Value, A means Average Value
2. Data of measurement within this frequency range shown " -" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
3. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz, A(Average): RBW=1MHz, VBW=10Hz.
4. The test limit distance is 3m limit

Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel：+86 755 86337020(60Lines) Fax：+86 755 86337028 Web：www.hct-test.com

(CH High)

Channel High（927.5MHz）								
Maximum Frequency (MHz)	Polarity and Level					Limit (dBμV/m)	Margin (dBμV/m)	Mark (P/Q/A)
	Polarity	Height (m)	Reading dBμV	Transd	Result dBμV/m			
1855	H	1	47.23	-8.77	38.46	74	-35.54	P
			34.21	-8.77	25.44	54	-28.56	A
1855	V	1	48.12	-8.77	39.35	74	-34.65	P
			36.21	-8.77	27.44	54	-26.56	A
2782.5	H	1	42.21	0.43	42.64	74	-31.36	P
			32.61	0.43	33.04	54	-20.96	A
2782.5	V	1	48.21	0.43	48.64	74	-25.36	P
			32.65	0.43	33.08	54	-20.92	A
3710	H	1	41.89	7.02	48.91	74	-25.09	P
			30.63	7.02	37.65	54	-16.35	A
3710	V	1	41.28	7.02	48.3	74	-25.70	P
			31.29	7.02	38.31	54	-15.69	A
11243.58	H	1	----	----	----	----	----	----
			----	----	----	----	----	----
16327.45	----	----	----	----	----	----	----	----
25376.26	----	----	----	----	----	----	----	----

Remark: 1.Transd=Antenna Factor + Cable Loss - Pre-amplifier
Margin = Level-Limit
Mark: P means Peak Value, Q means Quasi Peak Value, A means Average Value
2. Data of measurement within this frequency range shown " -" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
3. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz, A(Average): RBW=1MHz, VBW=10Hz.
4. The test limit distance is 3m limit

Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel：+86 755 86337020(60Lines) Fax：+86 755 86337028 Web：www.hct-test.com

7. 20DB BANDWIDTH

7.1. Limits

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, 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.

7.2. Test setup

1. Set the RBW =30kHz.

2. Set the VBW = 100kHz

3. Span=3MHz

4. Detector = peak.

5. Sweep time = auto couple.

6. Allow trace to fully stabilize, and view the plot.

7. Measure and record the result in the test report.

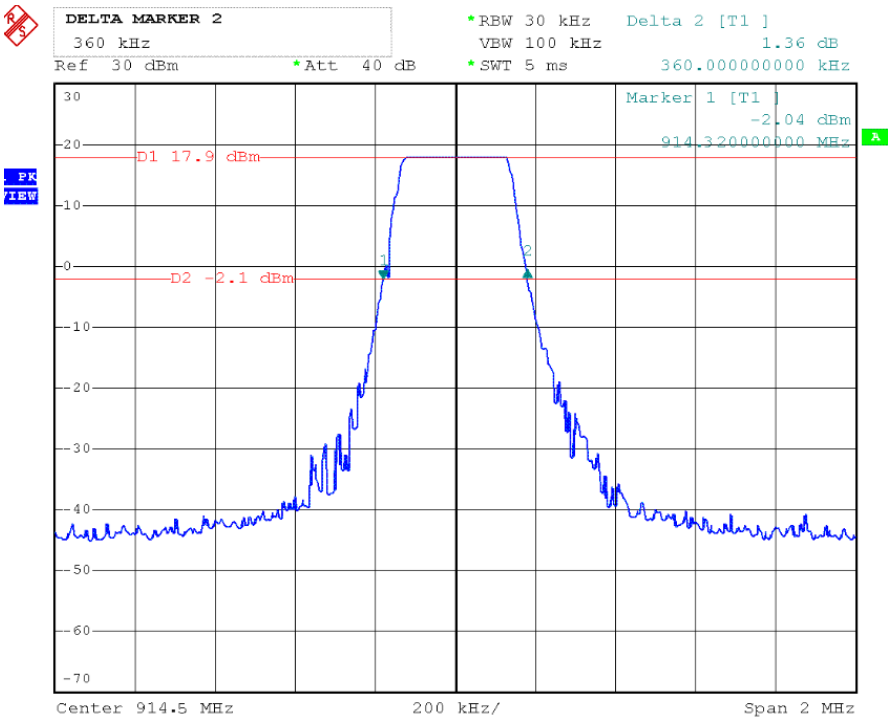
7.3 Test Result

Channel	Channel Frequency (MHz)	20dB Bandwidth (MHz)	Frequency range MHz (20dB Down) fL ＞ 902 MHz	Frequency range MHz (20dB Down) fH ＜ 928 MHz	Pass / Fail
Low	914.5	0.360	914.5MHz	/	PASS
Middle	921	0.357	/	/	PASS
High	927.5	0.352	/	927.5MHz	PASS

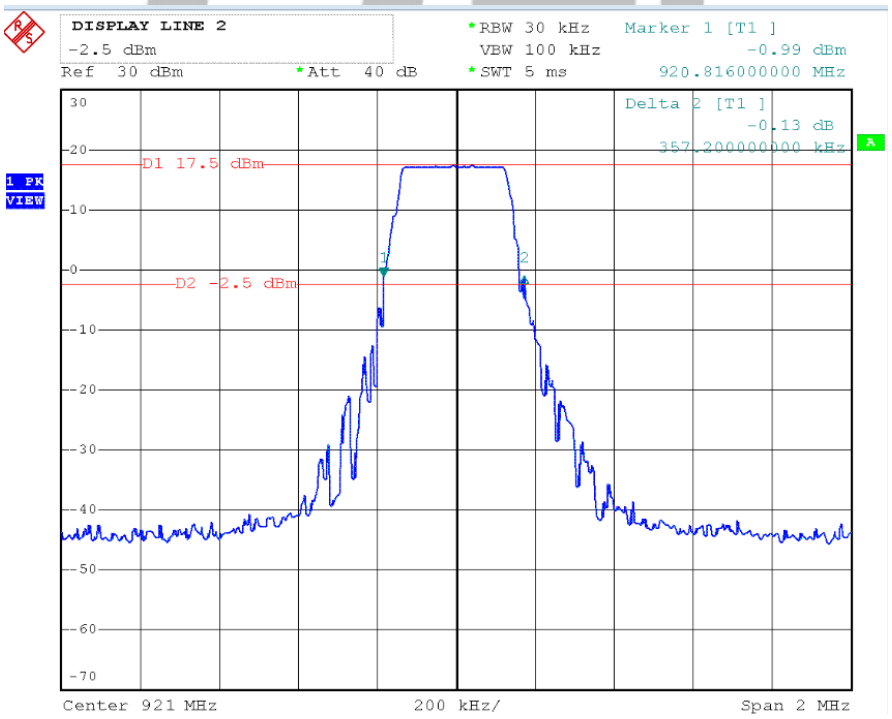
Test plot as follows:

Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel：+86 755 86337020(60Lines) Fax：+86 755 86337028 Web：www.hct-test.com

Low Channel:

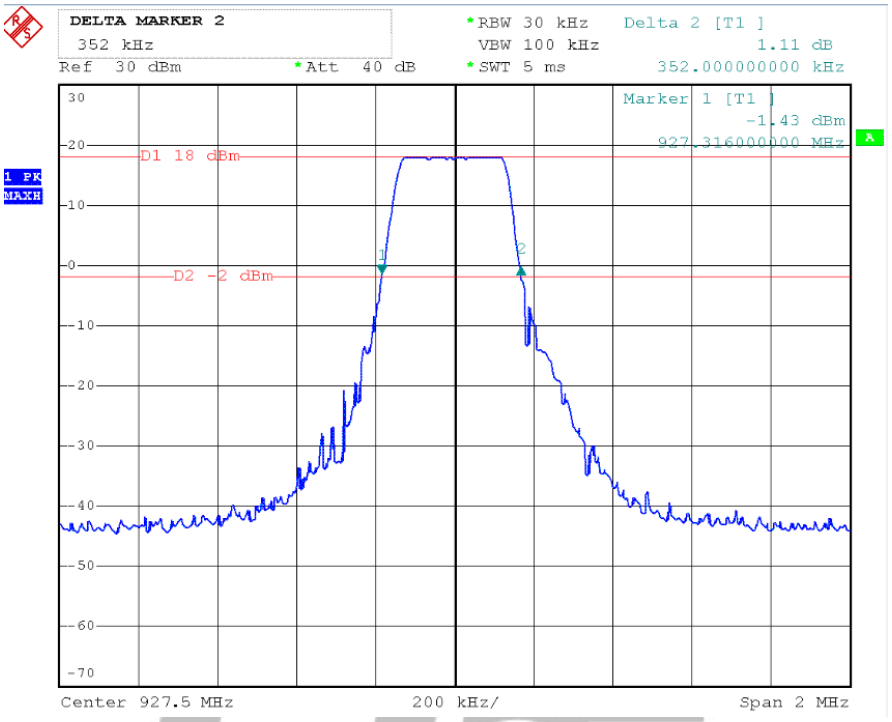


Middle Channel:



Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel : +86 755 86337020(60Lines) Fax : +86 755 86337028 Web : www.hct-test.com

High Channel:



HONGCAI TESTING

Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel : +86 755 86337020(60Lines) Fax : +86 755 86337028 Web : www.hct-test.com

8. ANTENNA REQUIREMENT

8.1 Standard Applicable

Section 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. 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.

8.2 Antenna Connected Construction

The antenna connector is designed with permanent attachment and no consideration of replacement.

HONGCAI TESTING

Shenzhen Hongcai Testing Technology Co.,Ltd.
1st—3rd Floor, Building C,Shuanghuan Xin Yi Dai Hi—Tech Industrial Park, No.8 Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen City, P.R.China 518053
Tel : +86 755 86337020(60Lines) Fax : +86 755 86337028 Web : www.hct-test.com