



# EMC TEST REPORT

**Report No.:** SET2015-16961

**Product Name:** GPON SFU

**FCC ID:** 2AGHCHBMT01

**Model No. :** 7281G

**Applicant:** Guangdong Hisense Broadband Technology Co.,Ltd

**Address:** Building 2, No.8, Hisense Road, Tangxia Town, Pengjiang District,  
Jiangmen City, Guangdong Province

**Received Date:** 2015-11-05

**Tested Date:** 2015-11-05—2015-11-13

**Issued by:** CCIC-SET

**Lab Location:** Electronic Testing Building, Shahe Road, Xili, Nanshan District,  
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## Test Report

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**Manufacturer** ..... : Guangdong Hisense Broadband Technology Co.,Ltd

**Manufacturer Address** ..... : Building 2, No.8, Hisense Road, Tangxia Town,  
Pengjiang District, Jiangmen City, Guangdong Province

**Test Standards** ..... : 47 CFR Part 15 Subpart B: Radio Frequency Devices

**Test Result** ..... : PASS

**Tested by** ..... : Xiaolong Zhang 2015.11.17  
Xiaolong Zhang, Test Engineer

**Reviewed by** ..... : Shuangwen Zhang 2015.11.17  
Shuangwen Zhang, Senior Engineer

**Approved by** ..... : Wu Lian 2015.11.17  
Wu Li'an, Manager

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Change History		
Issue	Date	Reason for change
1.0	2015.11.17	First edition



## 1. GENERAL INFORMATION

### 1.1 EUT Description

EUT Name ..... : GPON SFU  
FCC ID ..... : 2AGHCHBMT01  
Trade Name..... : IPHOTONIX  
Brand Name..... : IPHOTONIX  
Hardware Version..... : V2.0  
Software Version ..... : /  
Ancillary Equipment 1 ..... : AC Adapter1  
Model No.: S24B12-120A200-Y4  
Rated Input: 100-240V, 50/60Hz ,0.7A  
Rated Output: 5V=2.0A  
AC Adapter 2  
Model No.: RD1202000-C55-29MG  
Rated Input: 100-240V, 50/60Hz ,0.6A  
Rated Output: 12V=2.0A  
RJ45 cable  
Model No.: CAT5E-2M-YELLOW-AL

*Note1:*The EUT is a GPON SFU, it supports the following operating frequency band: WiFi 2.4G(b/g/n20/n40).

*Note 2:*For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.



## 1.2 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart B:

No.	Identity	Document Title
1	47 CFR Part 15 Subpart B 2014	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Result
1	15.107	Conducted Emission	PASS
2	15.109	Radiated Emission	PASS

NOTE:

(1) The EUT has been tested according to 47 CFR Part 15 Subpart B, Class B. The test procedure is according to ANSI C63.4:2009.



## 1.3 Facilities and Accreditations

### 1.3.1 Facilities

#### **CNAS-Lab Code: L1659**

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. CCIC is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L1659. A 12.8\*6.8\*6.4 (m) fully anechoic chamber was used for the radiated spurious emissions test.

#### **FCC-Registration No.: 406086**

CCIC Southern Electronic Product Testing (Shenzhen) 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 406086, valid time is until October 28, 2017.

### 1.3.2 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15°C - 35°C
Relative Humidity (%):	25% -75%
Atmospheric Pressure (kPa):	86kPa-106kPa

### 1.3.3 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

Uncertainty of Conducted Emission:	Uc = 3.6 dB (k=2)
Uncertainty of Radiated Emission:	Uc = 4.5 dB (k=2)



## 2. TEST CONDITIONS SETTING

### 2.1 Test Peripherals

The following is a listing of the EUT and peripherals utilized during the performance of EMC test:

Description	Brand name	Model	Serial No.	FCCID /DOC
Notebook	ThinkPad	E430C	A131101550	/
Mouse	deiog			DOC

### 2.2 Test Mode

- (1) The first test mode

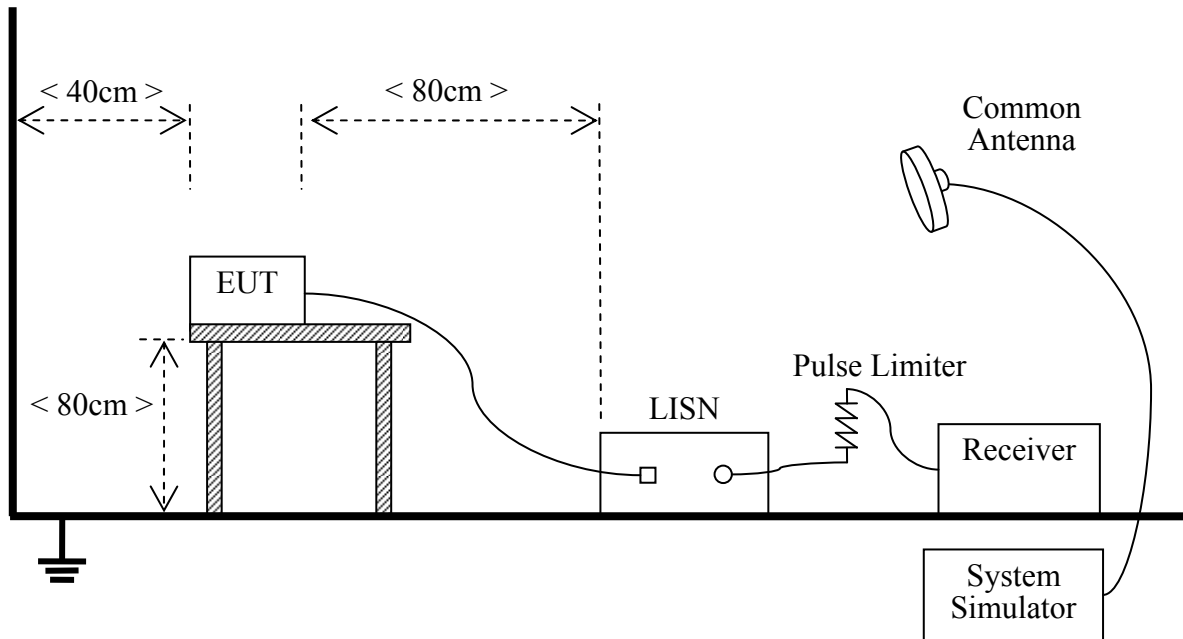
The EUT configuration of the emission tests is EUT + PC+Telephone+Adapter.

Note: The EUT has two adapters, both of them have been tested in this report.

## 2.3 Test Setup and Equipments List

### 2.3.1 Conducted Emission

#### A. Test Setup:



The EUT is placed on a 0.8m high insulating table, which stands on the grounded conducting floor, and keeps 0.4m away from the grounded conducting wall. The EUT is connected to the power mains through a LISN which provides 50Ω/50μH of coupling impedance for the measuring instrument. The Common Antenna is used for the call between the EUT and the System Simulator (SS). A Pulse Limiter is used to protect the measuring instrument. The factors of the whole test system are calibrated to correct the reading.

#### B. Equipments List:

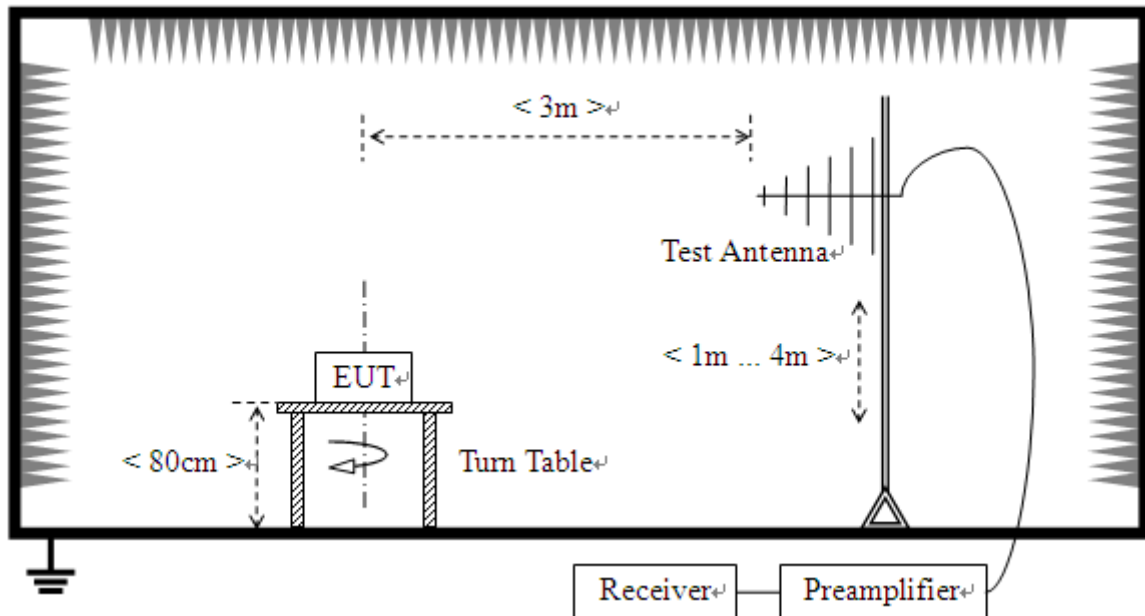
Description	Manufacturer	Model	Serial No.	Calibration Date	Calibration Due. Date
Test Receiver	ROHDE&SCHWARZ	ESCI	A130901475	2015.09.09	2016.09.08
LISN	ROHDE&SCHWARZ	ENV216	/	2015.04.28	2016.04.27
Cable	MATCHING PAD	W7	/	2015.06.05	2016.06.04

### 2.3.2 Radiated Emission

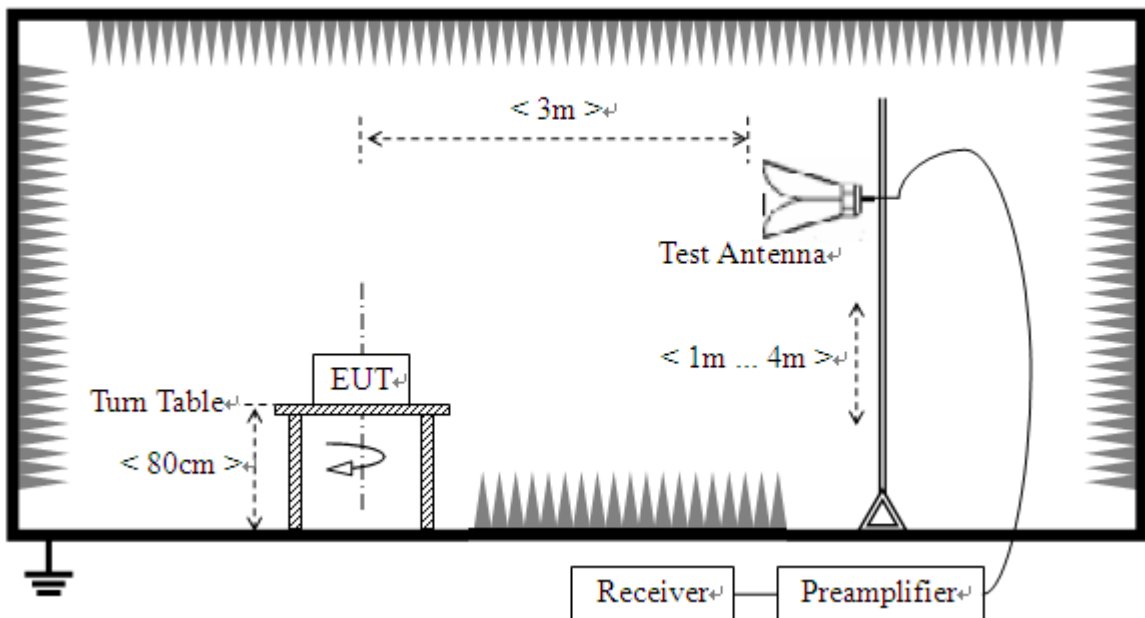
#### A. Test Setup:



- 1) For radiated emissions from 30MHz to 1GHz



- 2) For radiated emissions above 1GHz



## B. Test Procedure

The test is performed in a 3m Semi-Anechoic Chamber; the antenna factor, cable loss and so on of the site (factors) is calculated to correct the reading. The EUT is placed on a 0.8m high insulating Turn Table, and keeps 3m away from the Test Antenna, which is mounted on a

variable-height antenna master tower.

For the test Antenna:

- 1) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested.

### C. Equipments List:

Description	Manufacturer	Model	Serial No.	Calibration Date	Calibration Due. Date
Test Receiver	ROHDE&SCHWARZ	ESIB7	A0501375	2015.06.10	2016.06.09
Test Receiver	ROHDE&SCHWARZ	ESIB26	A0304218	2015.06.10	2016.06.09
Semi-Anechoic Chamber	Albatross	9m*6m*6m	A0412372	2015.03.22	2016.03.21
Test Antenna - Bi-Log	HP	CBL6111A	A9704202	2015.06.10	2016.06.09
Test Antenna – Horn	ROHDE&SCHWARZ	HF906	A0304225	2015.06.10	2016.06.09
Anechoic Chamber	Albatross	SAC-5MAC 12.8x6.8x6.4m	A0304210	2015.03.22	2016.03.21
Amplifier 1G~18GHz	ROHDE&SCHWARZ	MITEQ AFS42-001018 00	A0509366	2015.06.10	2016.06.09
Amplifier 20M~3GHz	Compliance Direction System	PAP-0203H	A0509377	2015.06.10	2016.06.09
Cable	SUNHNER	SUCOFLEX 100	/	2015.06.10	2016.06.09
Cable	SUNHNER	SUCOFLEX 104	MY1758/4	2015.06.10	2016.06.09

### 3. 47 CFR PART 15B REQUIREMENTS

#### 3.1 Conducted Emission

##### 3.1.1 Requirement

According to FCC section 15.107, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50 $\mu$ H/50 $\Omega$  line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

**Note:**

- The limit subjects to the Class B digital device.
- The lower limit shall apply at the band edges.
- The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

##### 3.1.2 Test Description

See section 2.3.1 of this report.

##### 3.1.3 Test Result

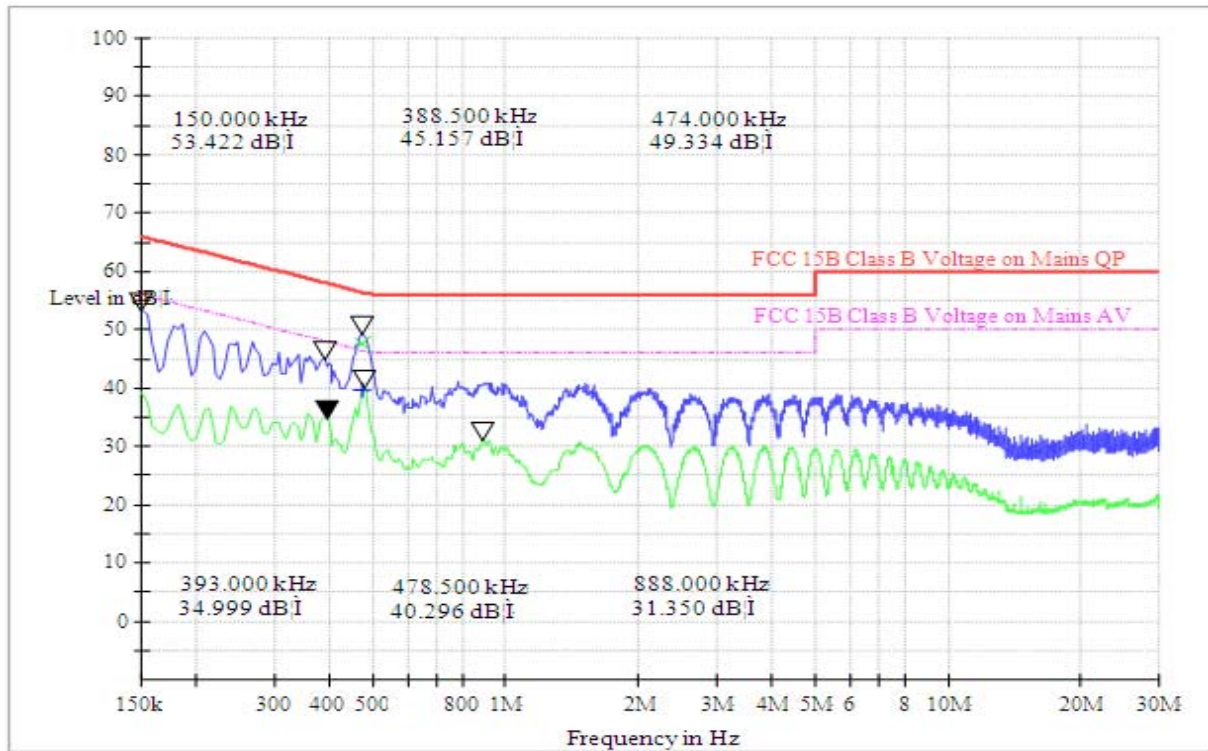
The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. All test modes are considered, refer to recorded points and plots below.

**Note:**

Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a Nominal 120V AC,50/60Hz) for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies.

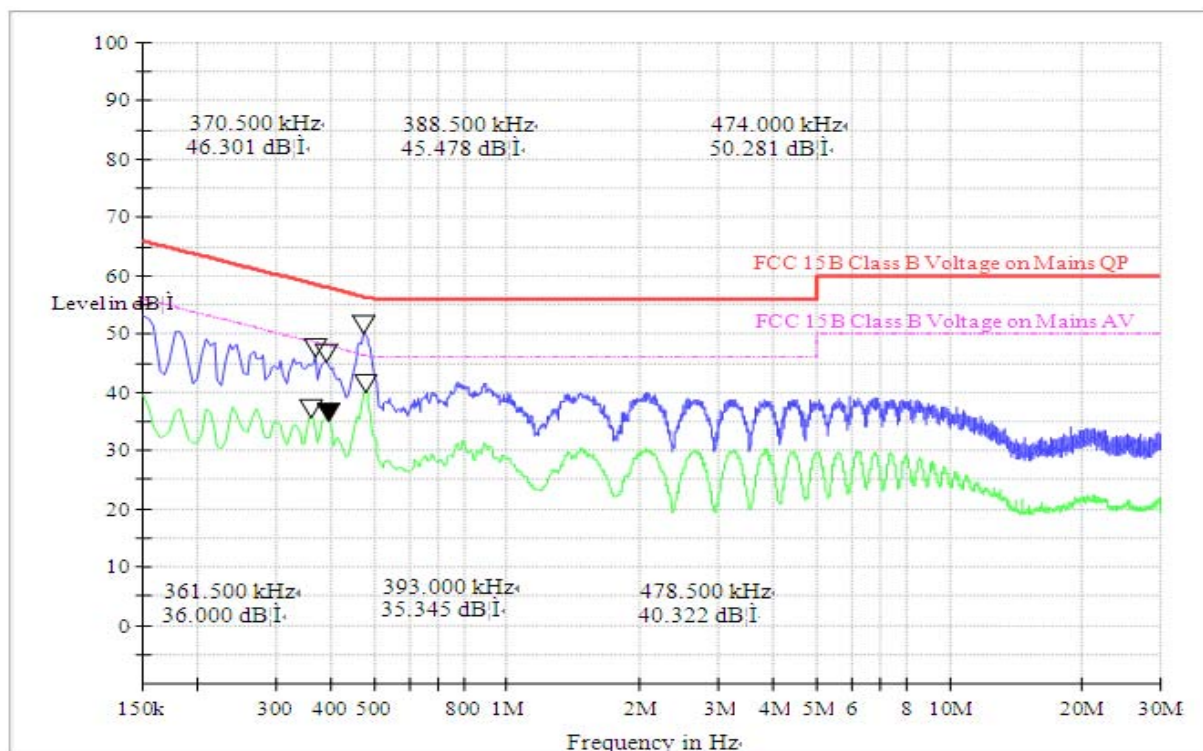
## A. Test Plot and Suspicious Points:

The test result of adapter model S24B12-120A200-Y4



(Plot A: L Phase)

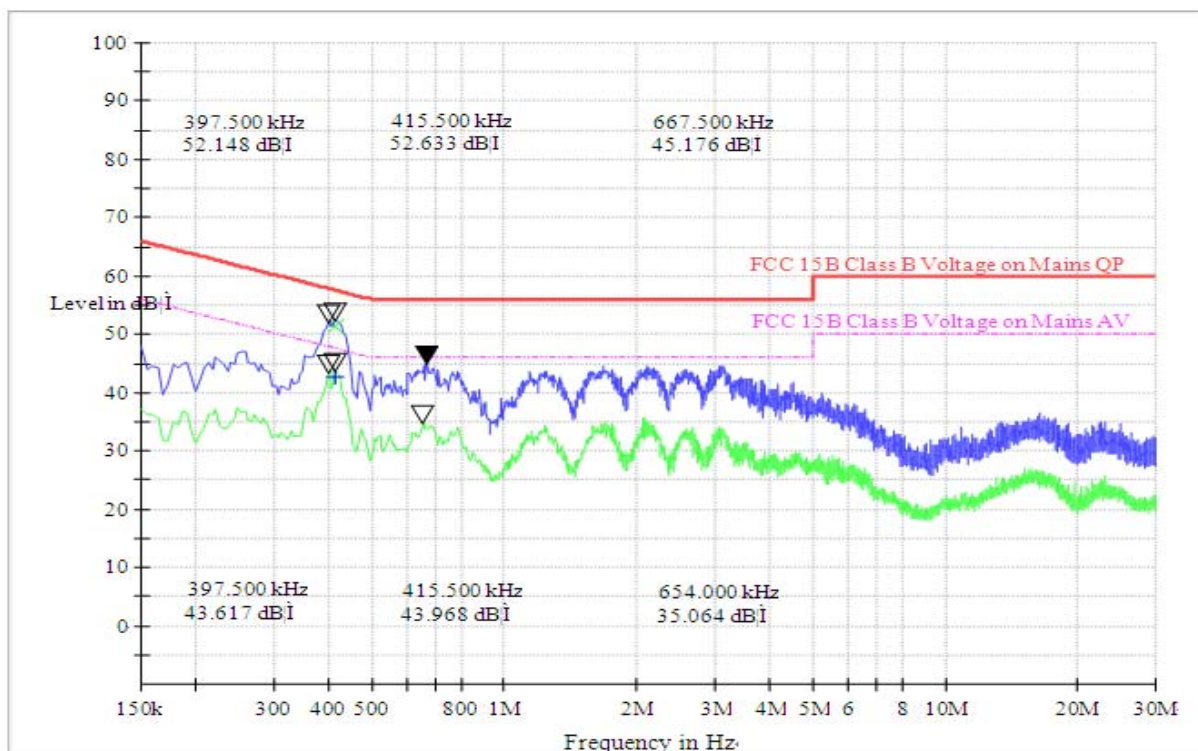
Conducted Disturbance at Mains Terminals							
L Test Data							
QP				AV			
Frequency (MHz)	Limits (dBμV)	Measurement Value (dBμV)	Margin (dB)	Frequency (MHz)	Limits (dBμV)	Measurement Value (dBμV)	Margin (dB)
0.1500	66.00	51.23	14.77	0.1500	56.00	37.05	18.95
0.3885	58.10	43.26	14.84	0.3885	48.10	33.64	14.46
0.4740	56.40	47.65	8.75	0.4740	46.40	39.70	6.70



(Plot B: N Phase)

Conducted Disturbance at Mains Terminals							
N Test Data							
QP				AV			
Frequency (MHz)	Limits (dBμV)	Measurement Value (dBμV)	Margin (dB)	Frequency (MHz)	Limits (dBμV)	Measurement Value (dBμV)	Margin (dB)
0.3705	58.50	44.16	14.34	0.3705	48.50	34.12	14.38
0.3885	58.10	43.34	14.76	0.3385	48.10	33.64	14.46
0.4740	56.40	48.72	7.68	0.4740	46.40	38.49	7.91

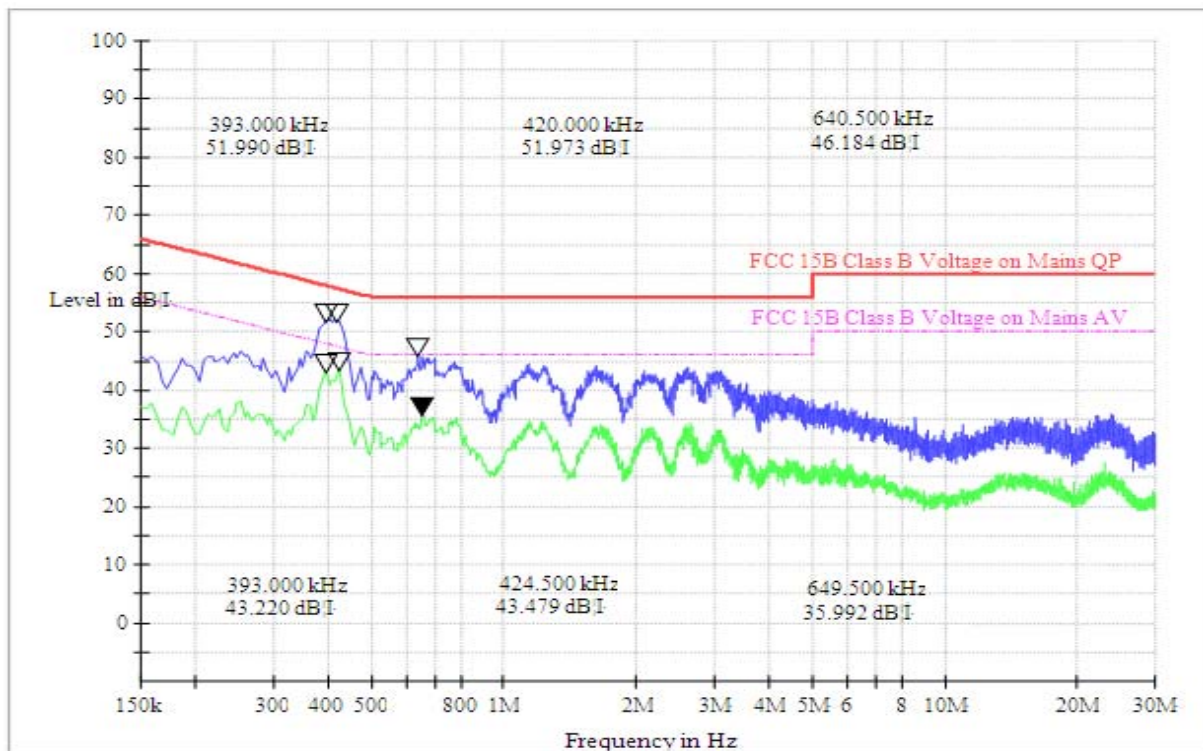
### The test result of adapter model RD1202000-C55-29MG



(Plot C: L Phase)

Conducted Disturbance at Mains Terminals							
L Test Data							
QP				AV			
Frequency (MHz)	Limits (dBμV)	Measurement Value (dBμV)	Margin (dB)	Frequency (MHz)	Limits (dBμV)	Measurement Value (dBμV)	Margin (dB)
0.3975	57.90	51.02	6.88	0.3975	47.90	41.36	6.54
0.4155	57.50	51.42	6.08	0.4155	47.50	42.75	4.75
0.6675	56.00	44.16	11.84	0.6675	46.00	34.05	11.95





(Plot D: N Phase)

Conducted Disturbance at Mains Terminals							
N Test Data							
QP				AV			
Frequency (MHz)	Limits (dB $\mu$ V)	Measurement Value (dB $\mu$ V)	Margin (dB)	Frequency (MHz)	Limits (dB $\mu$ V)	Measurement Value (dB $\mu$ V)	Margin (dB)
0.3930	58.00	50.36	7.64	0.3930	48.00	42.16	5.84
0.4200	57.40	50.13	7.27	0.4200	47.40	42.06	5.34
0.6400	56.00	45.21	10.79	0.6400	46.00	34.14	11.86

**Test Result: PASS**

## 3.2 Radiated Emission

### 3.2.1 Requirement

According to FCC section 15.109, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency range (MHz)	Field Strength		Field Strength Limitation at 3m Measurement Dist	
	$\mu\text{V/m}$	Dist	( $\mu\text{V/m}$ )	( $\text{dBuV/m}$ )
0.009 - 0.490	$2400/F(\text{kHz})$	300m	$10000 * 2400/F(\text{kHz})$	$20\log 2400/F(\text{kHz}) + 80$
0.490 - 1.705	$2400/F(\text{kHz})$	30m	$100 * 2400/F(\text{kHz})$	$20\log 2400/F(\text{kHz}) + 40$
1.705 - 30.00	30	30m	$100 * 30$	$20\log 30 + 40$
30.0 - 88.0	100	3m	100	$20\log 100$
88.0 - 216.0	150	3m	150	$20\log 150$
216.0 - 960.0	200	3m	200	$20\log 200$
Above 960.0	500	3m	500	$20\log 500$

- As shown in FCC section 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector. When average radiated emission measurements are specified in this part, including emission measurements below 1000MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.
- Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.
- For below 1G :QP detector RBW 120kHz ,VBW 300kHz.
- For Above 1G: PK detector RBW 1MHz,VBW 3MHz for PK value ;PK detector RBW 1MHz, VBW 10Hz for AV value.

#### Note:

- The tighter limit shall apply at the boundary between two frequency range.
- Limitation expressed in  $\text{dBuV/m}$  is calculated by  $20\log \text{Emission Level}(\mu\text{V/m})$ .
- If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula of  $Ld1 = Ld2 * (d2/d1)^2$ .

Example:

F.S Limit at 30m distance is  $30\mu\text{V/m}$ , then F.S Limitation at 3m distance is adjusted as

$$Ld1 = L1 = 30\mu\text{V/m} * (10)^2 = 100 * 30\mu\text{V/m}.$$



### **3.2.2 Test Description**

See section 2.3.2 of this report.

### **3.2.3 Test Result**

The maximum radiated emission is searched using PK, QP and AV detectors; the emission levels more than the limits, and that have narrow margins from the limits will be re-measured with AV and QP detectors. Both the vertical and the horizontal polarizations of the Test Antenna are considered to perform the tests. All test modes are considered, refer to recorded points and plots below.

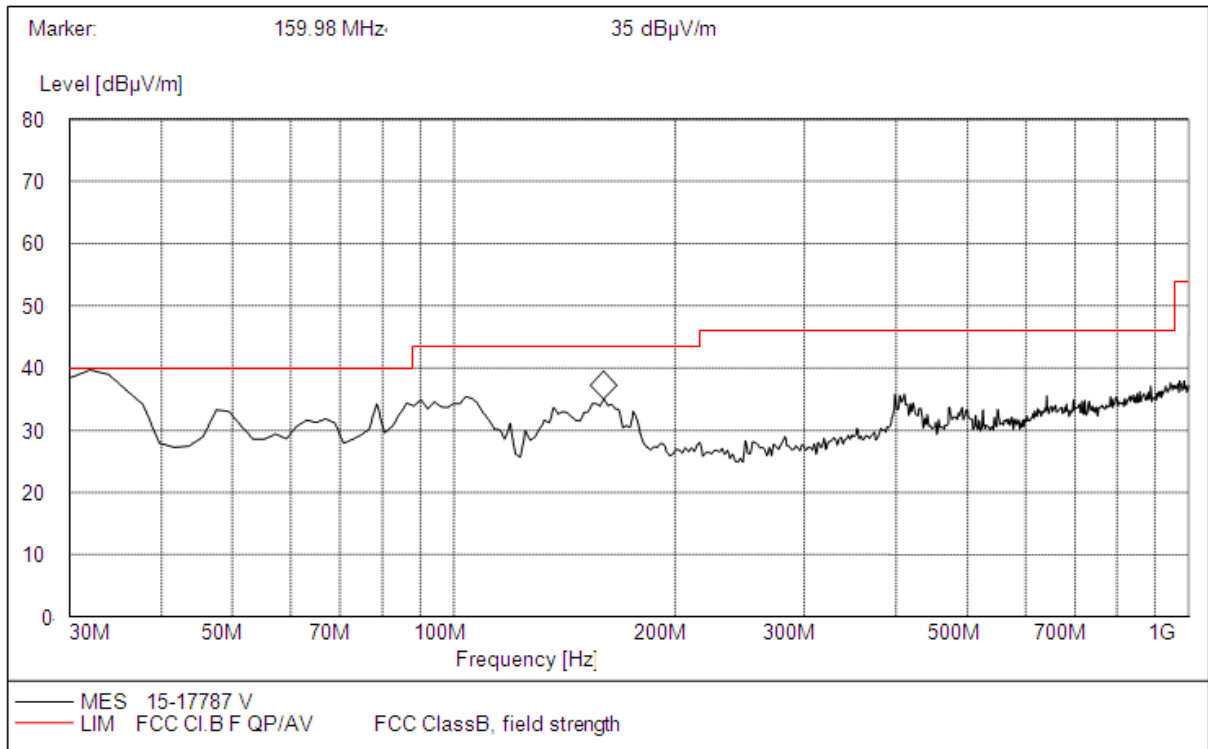
The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

Note: All radiated emission tests were performed in X, Y, Z axis direction, and only the worst axis test condition was recorded in this test report.

## B. Test Plots and Suspicious Points:

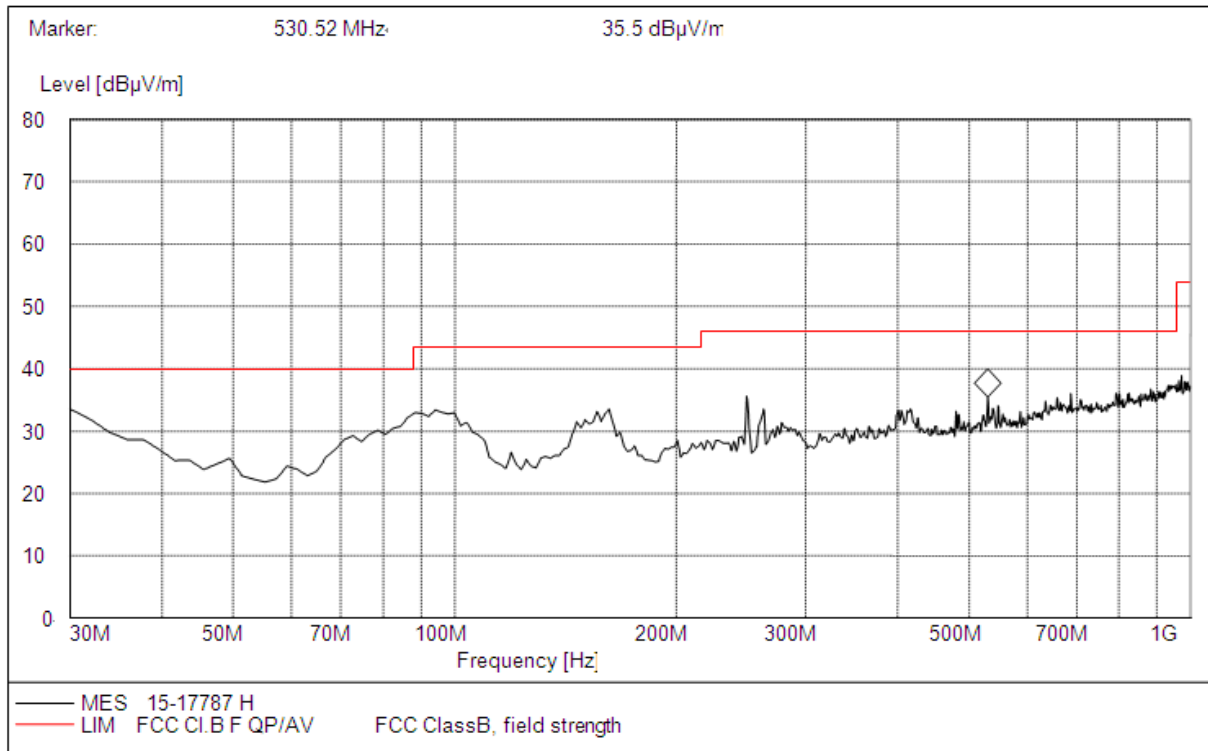
The test result of adapter model S24B12-120A200-Y4

Test result of radiated emission below 1GHz



(Plot E: Test Antenna Vertical 30M - 1G)

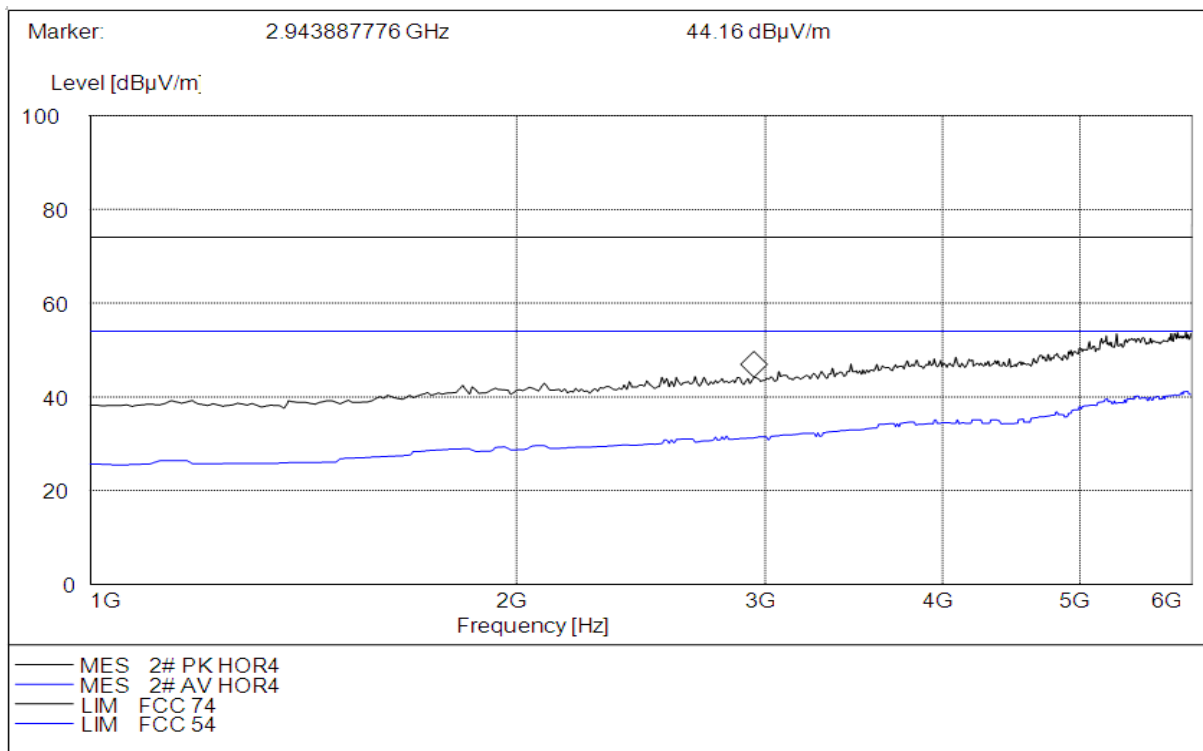
Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dBμV/m)	Margin (dB)	Antenna	Verdict
31.26500	36.24	120.000	214.0	40.00	3.76	Vertical	Pass
103.26000	32.17	120.000	240.0	43.50	11.33	Vertical	Pass
159.34000	33.02	120.000	226.0	43.50	10.48	Vertical	Pass



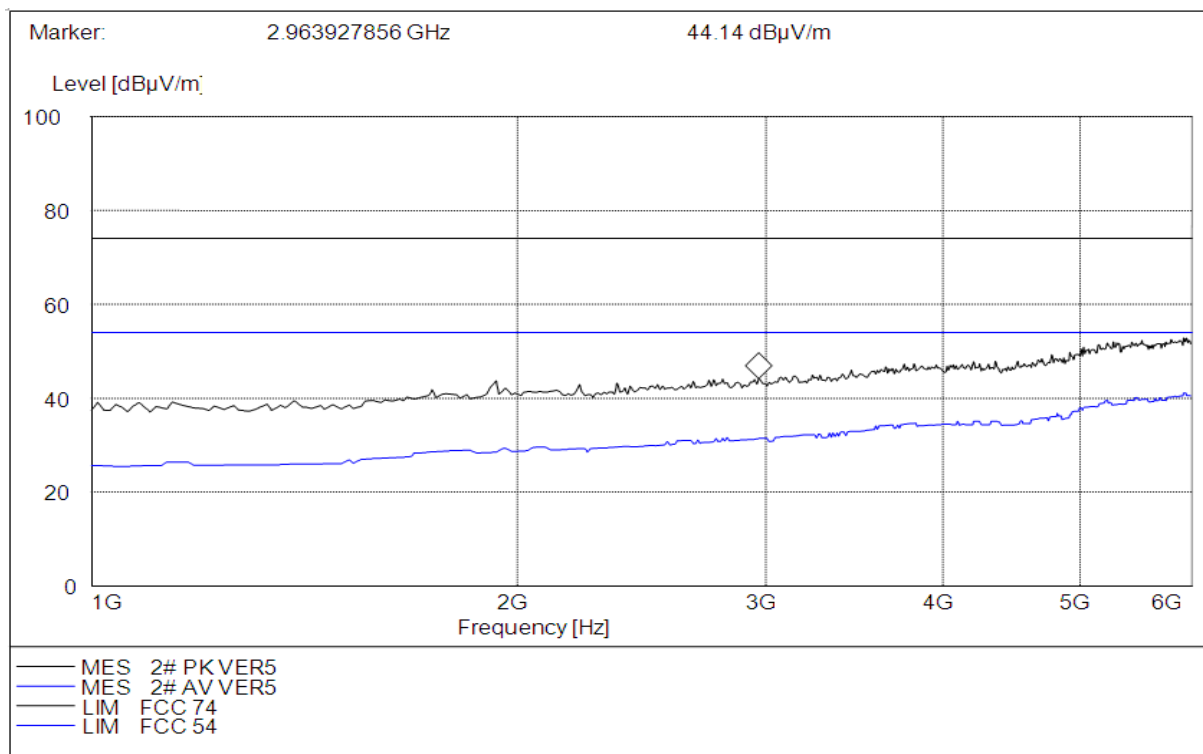
(Plot F: Test Antenna Horizontal 30M - 1G)

Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna	Verdict
161.28000	31.58	120.000	196.0	43.50	11.92	Horizontal	Pass
249.36000	33.58	120.000	236.0	46.00	12.42	Horizontal	Pass
530.52000	33.19	120.000	176.0	46.00	12.81	Horizontal	Pass

### Test result of radiated emission above 1GHz



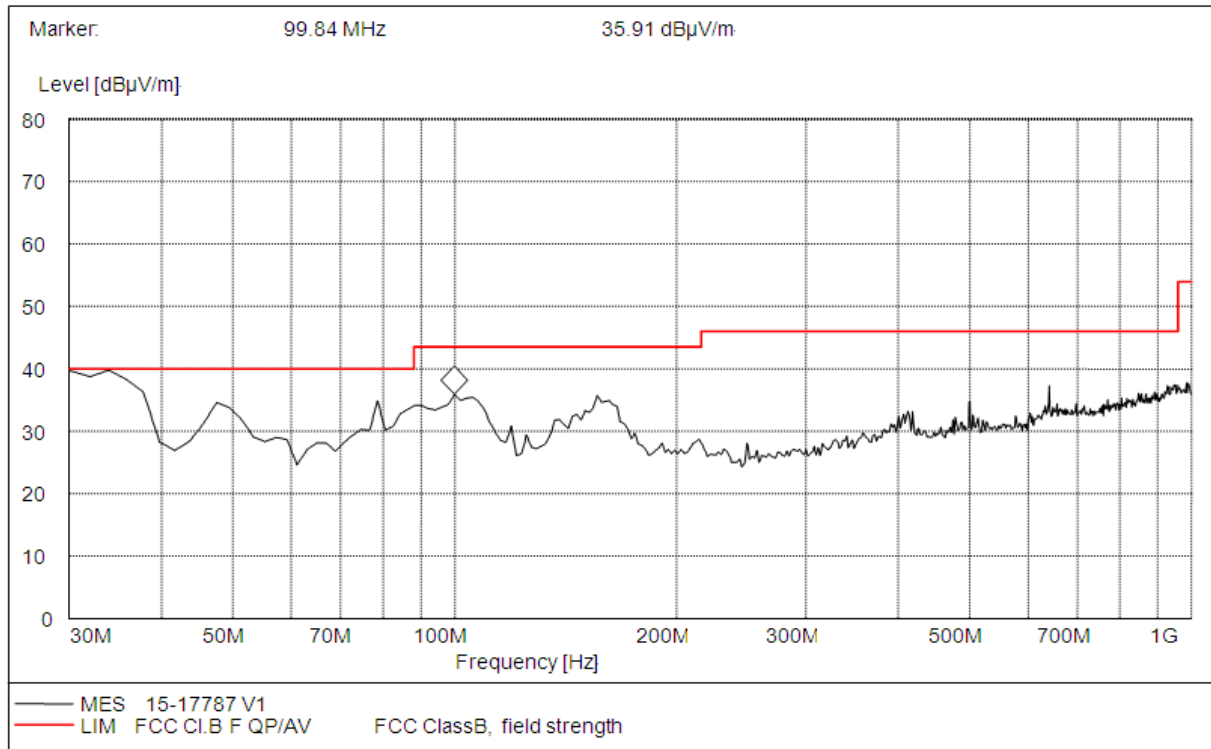
(Plot G: Test Antenna Horizontal 1G – 6G)



(Plot H: Test Antenna Vertical 1G – 6G)

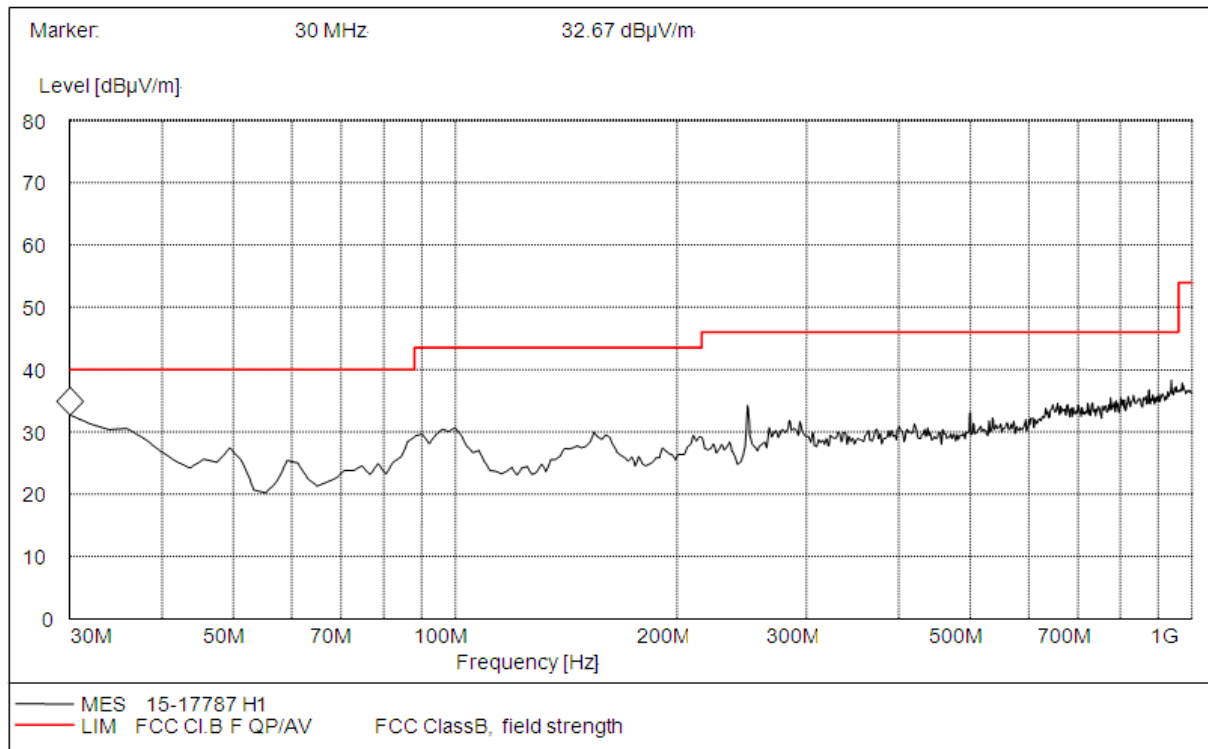
## The test result of adapter model RD1202000-C55-29MG

### Test result of radiated emission below 1GHz



(Plot I: Test Antenna Vertical 30M - 1G)

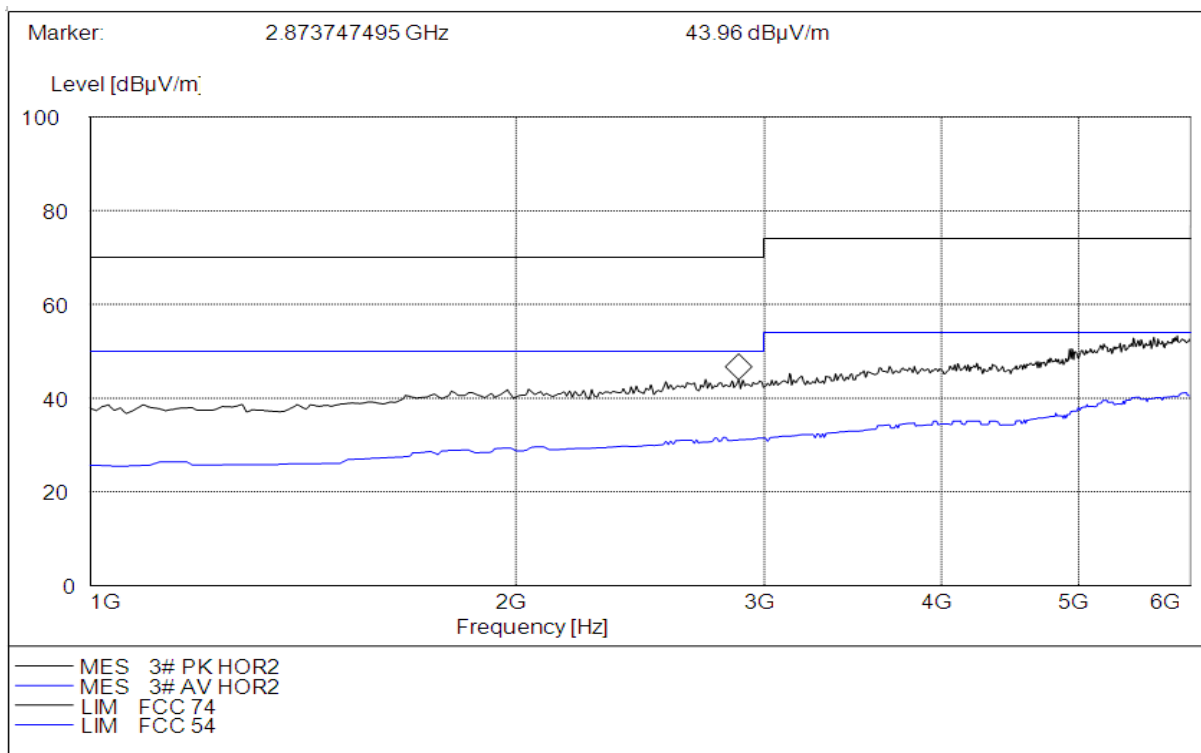
Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dBμV/m)	Margin (dB)	Antenna	Verdict
30.28000	36.21	120.000	256.0	40.00	3.79	Vertical	Pass
33.88000	36.28	120.000	240.0	40.00	3.72	Vertical	Pass
99.24000	33.05	120.000	216.0	43.50	10.45	Vertical	Pass



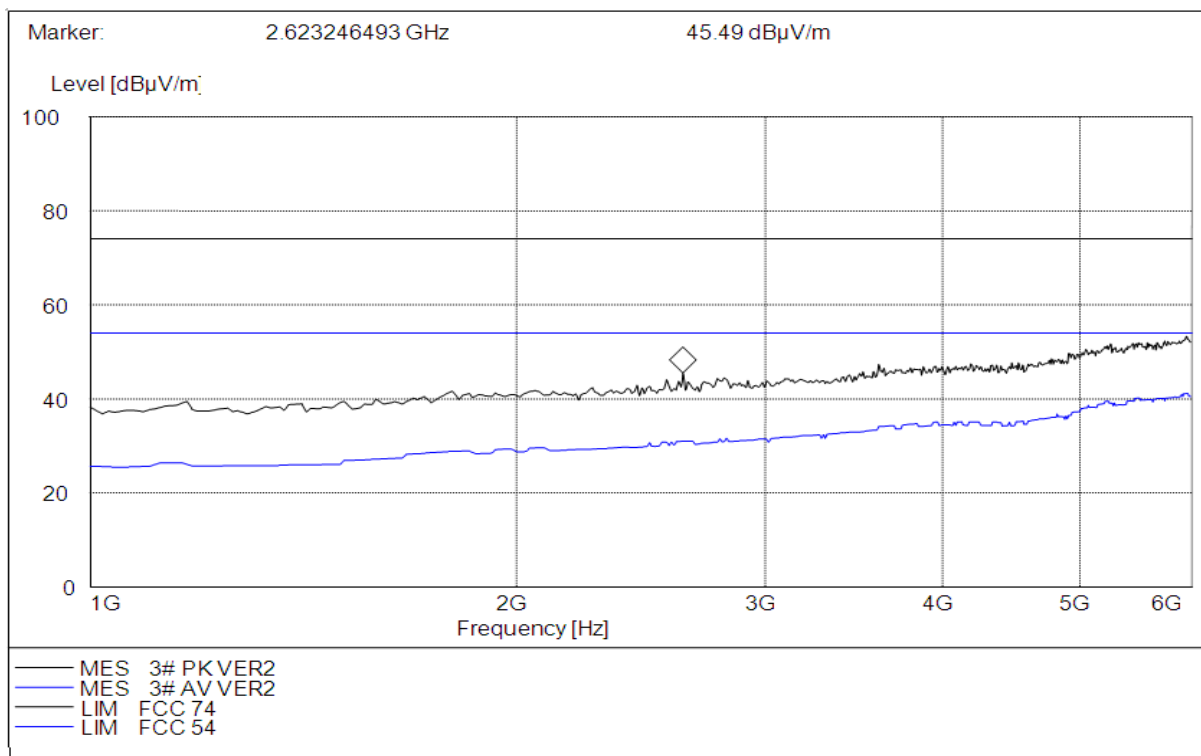
(Plot J: Test Antenna Horizontal 30M - 1G)

Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna	Verdict
30.12500	30.20	120.000	215.0	40.00	9.80	Horizontal	Pass
99.36000	28.16	120.000	148.0	43.50	15.34	Horizontal	Pass
249.36000	32.15	120.000	183.0	46.00	13.85	Horizontal	Pass

### Test result of radiated emission above 1GHz



(Plot K: Test Antenna Horizontal 1G – 6G)



(Plot L: Test Antenna Vertical 1G – 6G)



**Note: The test result margin of radiated emission above 1GHz is more than 20dB.**

**Test Result: PASS**

**\*\* END OF REPORT \*\***