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TEST REPORT

Report No.: **GTI20190381F**

FCC ID.....: **2AHVH49355356**

Applicant.....: **Shen Zhen MTC Co., LTD**

Address.....: MTC Industry Park, 1st Lilang Road, Xialilang community,
Nanwan street, Longgang district, Shenzhen, China

Manufacturer.....: Shen Zhen MTC Co., LTD

Address.....: MTC Industry Park, 1st Lilang Road, Xialilang community,
Nanwan street, Longgang district, Shenzhen, China

Product Name.....: **LED TV**

Trade Mark.....: AMTC, Hitachi

Model/Type reference.....: MHAV4960Y-35535

Listed Model(s): MHAV49**Y-35535 (* can from 0 to 9,A to Z); 49C32, C49M3

Standard.....: **47 CFR FCC Part 15 Subpart B - Unintentional Radiators
ANSI C63.4: 2014**

Date of receipt of test sample...: Mar. 07, 2019

Date of testing.....: Mar. 08, 2019 to Mar. 11, 2019

Date of issue.....: Mar. 12, 2019

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

Compiled by:

(Printed name+signature) Terry Su

Supervised by:

(Printed name+signature) Cary Luo

Approved by:

(Printed name+signature) Walter Chen

Testing Laboratory Name..... **CTC Laboratories, Inc.**

Address 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park,
Shenzhen, Guangdong, China

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1. TEST SUMMARY

1.1. Test Standards

The tests were performed according to following standards:

[47 CFR FCC Part 15 Subpart B](#): Unintentional Radiators.

[ANSI C63.4: 2014](#): American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40GHz.

1.2. Report version

Revised No.	Date of issue	Description
01	Mar. 12, 2019	Original



1.3. Test Description

FCC CFR Title 47 FCC Part 15 Subpart B			
Test Item	Standard Section	Result	Test Engineer
Conducted Emissions Test	15.107	Pass	Billie Jiang
Radiated Emission Test	15.109	Pass	Carl Wu
Antenna Power Conduction	15.111	Pass	Billie Jiang
Picture Sensitivity	15.117(f)	Pass	Billie Jiang
Noise figure	15.117(g)	Pass	Billie Jiang

Note: The measurement uncertainty is not included in the test result.



1.4. Test Facility

Address of the report laboratory

CTC Laboratories, Inc.

Add: 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L5365

CTC Laboratories, Inc. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No.: 4340.01

CTC Laboratories, Inc. EMC Laboratory has been accredited by A2LA for Technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

IC Registration No.: 9783A

The 3m alternate test site of CTC Laboratories, Inc. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 9783A on Jan, 2016.

FCC-Registration No.: 951311

CTC Laboratories, Inc. 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 951311, Aug 26, 2017

1.5. 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 TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the Shenzhen General Testing & Inspection 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.

Below is the best measurement capability for CTC Laboratories, Inc.



Test Items	Measurement Uncertainty	Notes
Conducted Emissions 9kHz~30MHz	3.20 dB	(1)
Radiated Emissions 30~1000MHz	4.70 dB	(1)
Radiated Emissions 1~18GHz	5.00 dB	(1)
Radiated Emissions 18~40GHz	5.54 dB	(1)
Antenna Power Conduction Measurement	2.64 dB	(1)
Picture Sensitivity Measurement	1.85 dB	(1)
Noise Figure Measurement	2.30 dB	(1)

Note: (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=1.96$.

1.6. Environmental conditions

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

Normal Temperature:	25°C
Relative Humidity	55 %
Air Pressure	989 hPa



2. GENERAL INFORMATION

2.1. Client Information

Applicant:	Shen Zhen MTC Co., LTD
Address:	MTC Industry Park, 1st Lilang Road, Xialilang community, Nanwan street, Longgang district, Shenzhen, China
Manufacturer:	Shen Zhen MTC Co., LTD
Address:	MTC Industry Park, 1st Lilang Road, Xialilang community, Nanwan street, Longgang district, Shenzhen, China

2.2. General Description of EUT

Product Name:	LED TV
Model/Type reference:	MHAV4960Y-35535
Marketing Name:	AMTC, Hitachi
Listed Model(s):	MHAV49**Y-35535 (* can from 0 to 9,A to Z); 49C32, C49M3
Model Difference:	All these models are identical in the same PCB, layout and electrical circuit, the only difference is model name, appearance and trade mark.
Power supply:	AC100-240V, 50/60Hz, 70W
Hardware version:	N/A
Software version:	N/A

2.3. Accessory Equipment information

Equipment Information			
Name	Model	S/N	Manufacturer
USB disk	DTGE9	---	Kingston
PC	p7-1035cn	---	HP
Keyboard	RFK-613	---	ERYEFU
Mouse	RFK-613	---	ERYEFU
Printer	HP LaserJet P1007	VNFN584036	HP
DVD Player	DV-310NC-K	---	Pioneer
Cable Information			
Name	Shielded Type	Ferrite Core	Length
VGA Cable	YES	YES	1.5M
HDMI Cable	YES	NO	1.2M
AV Cable	YES	YES	1.2M



2.4. Description of Test Modes

Test mode	ATSC	NTSC	AV IN	HDMI	VGA	USB Playing
1	■					
2		■				
3			■			
4				■		
5					■	
6						■

Note:

1. ■ is operation mode.

Pre-scan above all test mode, found below test mode which it was worse case mode.

Test item	Test mode (Worse case mode)
Conducted emission	Mode 2
Radiated emission	Mode 4
Antenna Power Conduction	Mode 1
Picture Sensitivity	Mode 2
Noise figure	Mode 1



2.5. Measurement Instruments List

Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	LISN	R&S	ENV216	101112	Dec. 28, 2019
2	LISN	R&S	ENV216	101113	Dec. 28, 2019
3	EMI Test Receiver	R&S	ESCI	100920	Dec. 28, 2019
4	UNIVERSAL RADIO COMMUNICATION	Rohde & Schwarz	CMU200	114694	Dec. 28, 2019

Radiated Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Log-Bicon Antenna	Schwarzbeck	CBL6141A	4180	Dec. 28, 2019
2	Spectrum Analyzer	HP	8563E	02052	Dec. 28, 2019
3	Horn Antenna	Schwarzbeck	BBHA 9120D	648	Dec. 28, 2019
4	Pre-Amplifier	HP	8447D	1937A03050	Dec. 28, 2019
5	Pre-Amplifier	EMCI	EMC051835	980075	Dec. 28, 2019
6	EMI Test Receiver	R&S	ESCI	100658	Dec. 28, 2019
7	Antenna Mast	UC	UC3000	N/A	N/A
8	Turn Table	UC	UC3000	N/A	N/A
9	UNIVERSAL RADIO COMMUNICATION	Rohde & Schwarz	CMU200	114694	Dec. 28, 2019

Antenna Power Conduction& Picture Sensitivity& Noise figure					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI Test Receiver	R&S	ESCI	100920	Dec. 28, 2019
2	Spectrum Analyzer	R&S	FSU26	100105	Dec. 28, 2019
3	Digital signal generator	R&S	SFC-U	N/A	Dec. 28, 2019
4	Analog signal generator	PHILIPS	YQ-70C-1052 (PM5418)	N/A	Dec. 28, 2019

Note: The Cal. Interval was one year.

3. EMC EMISSION TEST

3.1. Radiated Emission

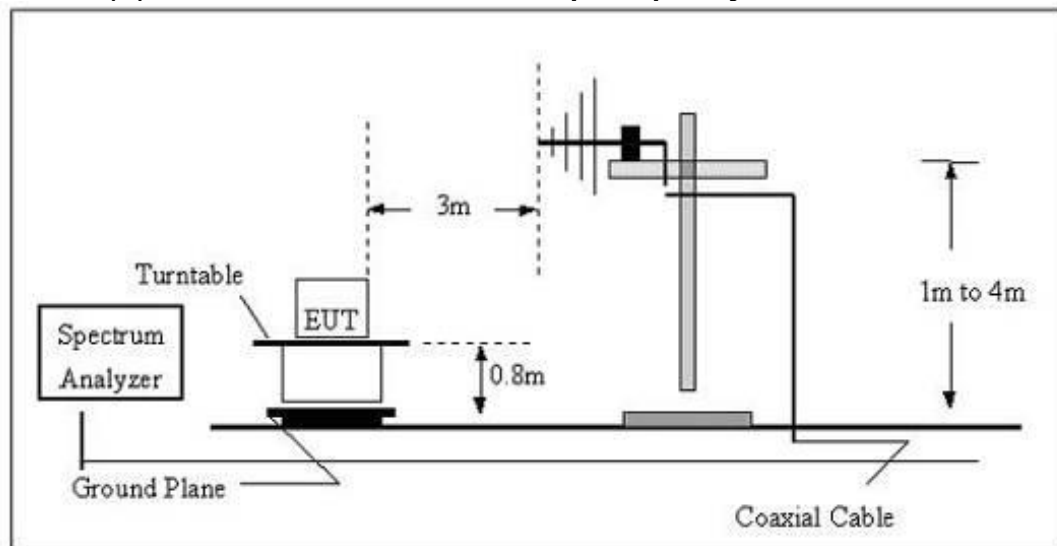
LIMIT

FCC CFR Title 47 Part 15 Subpart B Section 15.109:

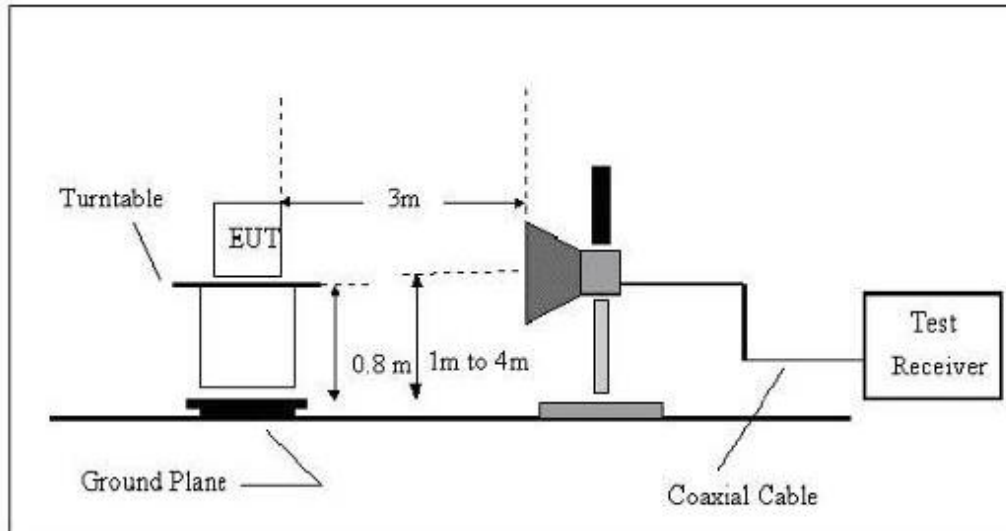
Frequency	Limit (dBuV/m @3m)	Value
30MHz-88MHz	40.00	Quasi-peak
88MHz-216MHz	43.50	Quasi-peak
216MHz-960MHz	46.00	Quasi-peak
960MHz-1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

TEST CONFIGURATION

(B) Radiated Emission Test Set-Up Frequency below 1 GHz



(B) Radiated Emission Test Set-Up Frequency above 1GHz



TEST PROCEDURE

1. The EUT was tested according to ANSI C63.4:2014.
2. The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna.
5. Use the following spectrum analyzer settings
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Below 1GHz, RBW=120KHz, VBW=300KHz, Sweep=auto, Detector function=peak, Trace=max hold; If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
 - (3) Above 1GHz, RBW=1MHz, VBW=3MHz

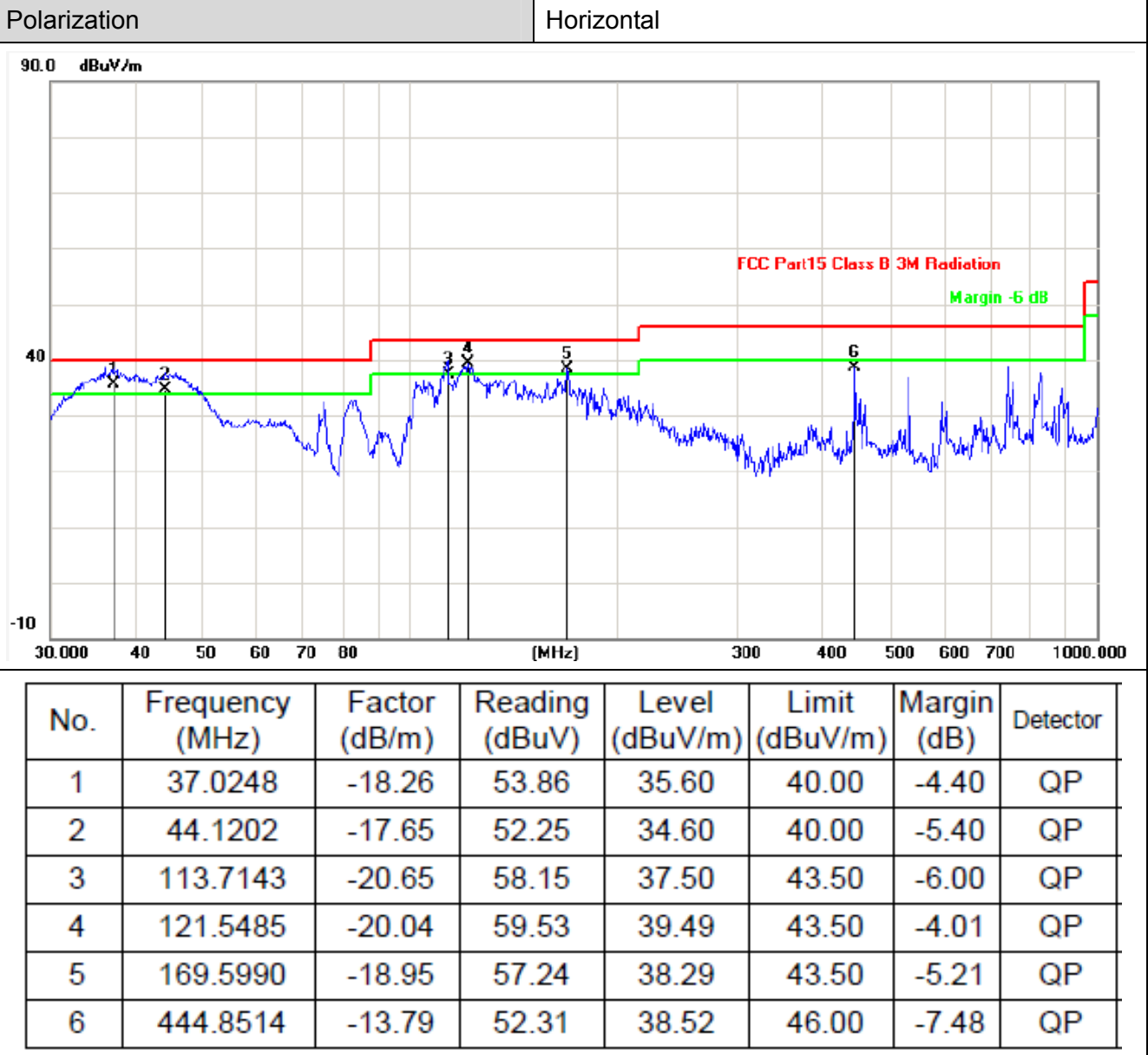
TEST MODE

Please refer to the clause 2.3

TEST RESULTS

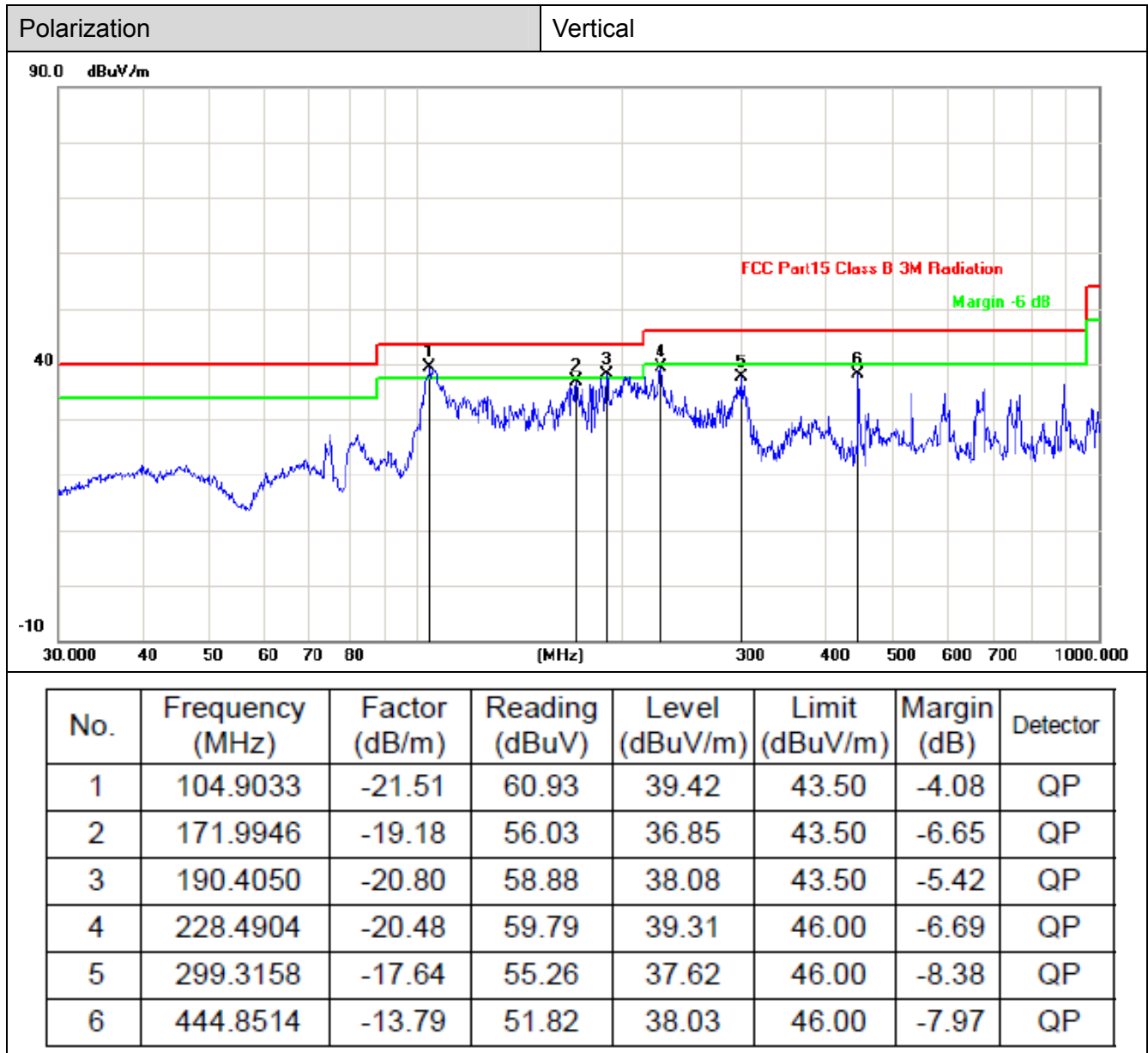


30MHz-1GHz



Remarks:

1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor
2. Margin value = Level - Limit value



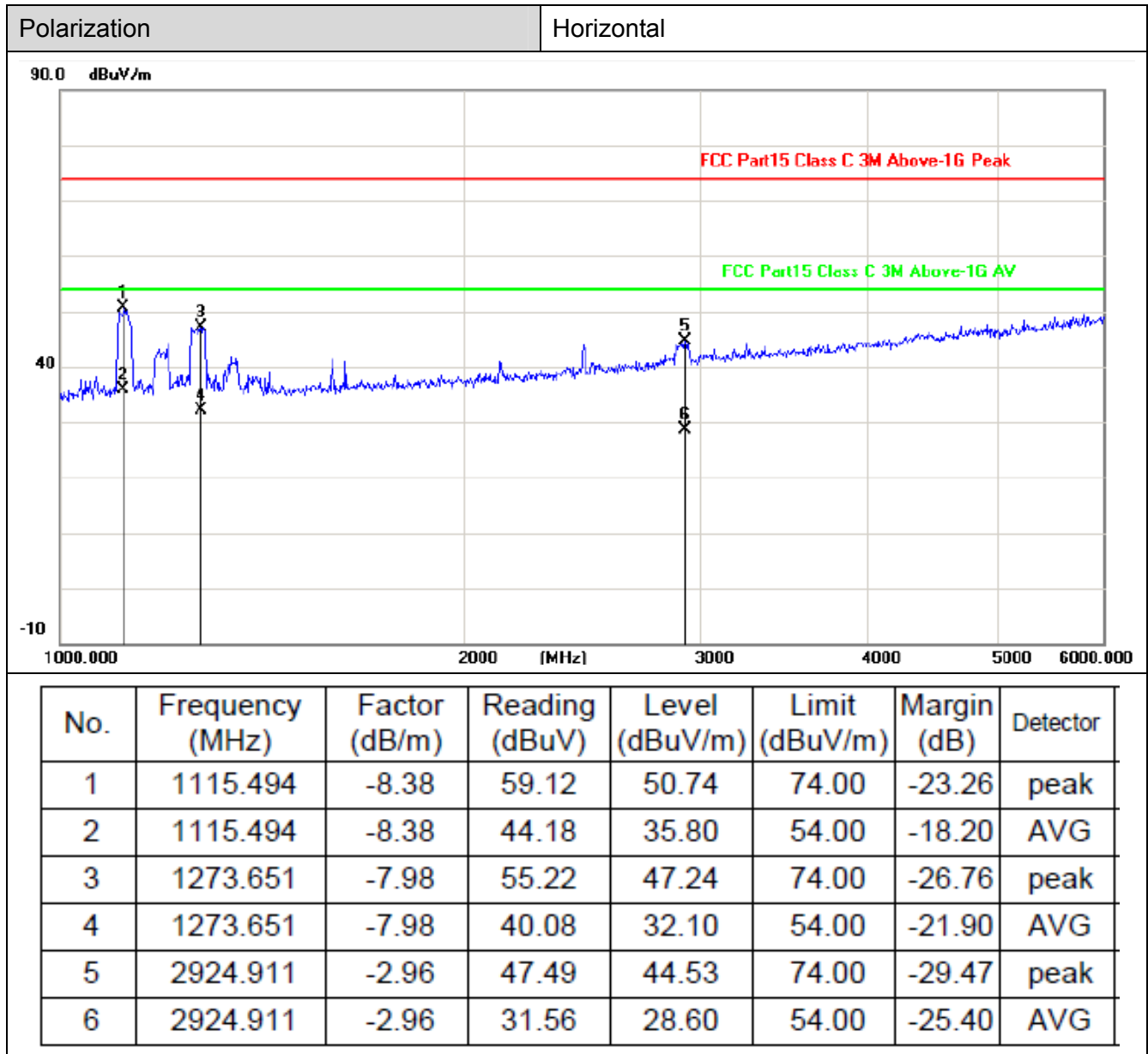
Remarks:

1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor

2. Margin value = Level - Limit value



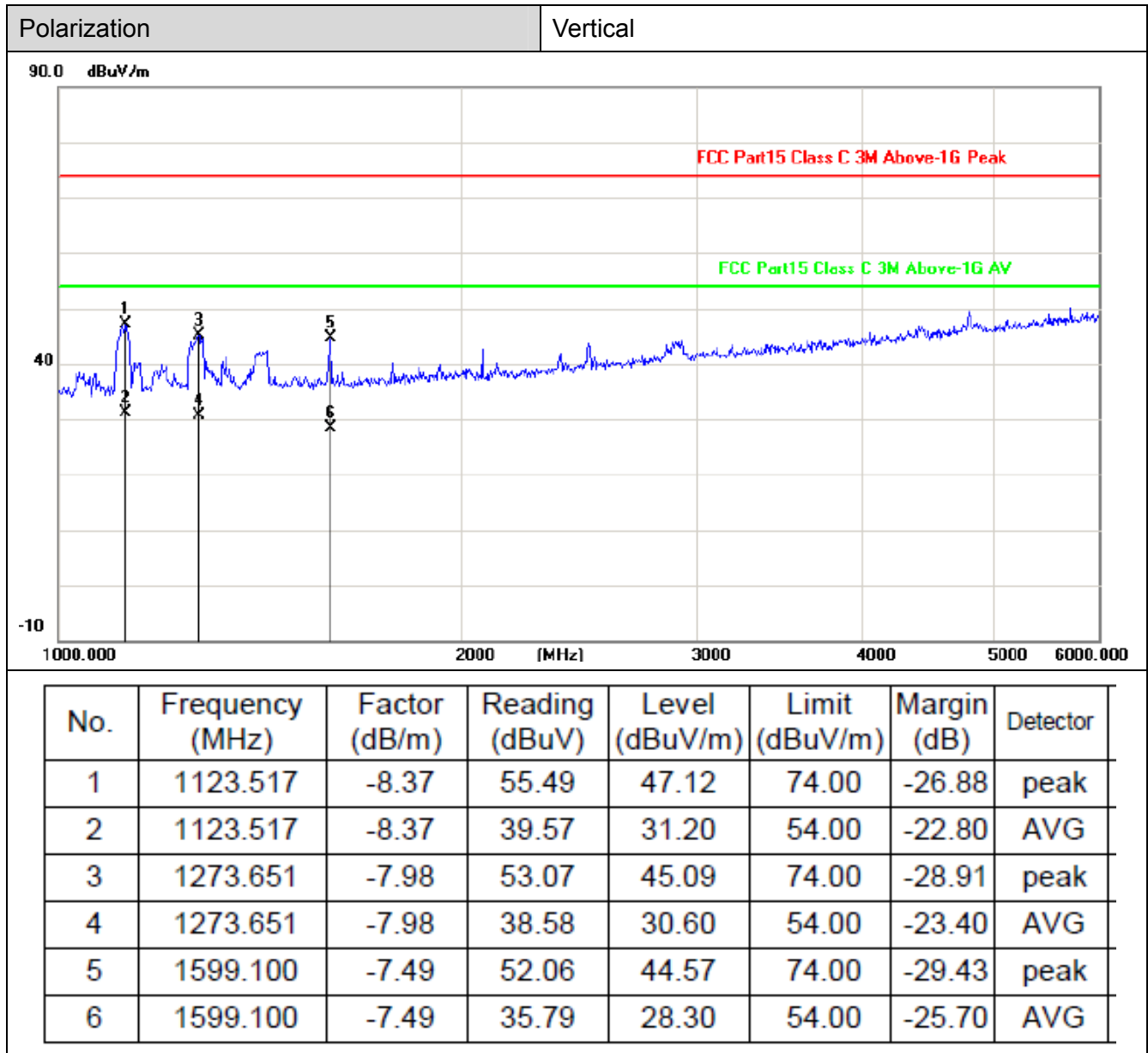
1GHz-6GHz



Remarks:

1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor

2. Margin value = Level - Limit value



Remarks:

1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor

2. Margin value = Level - Limit value

3.2. Conducted Emission (AC Mains)

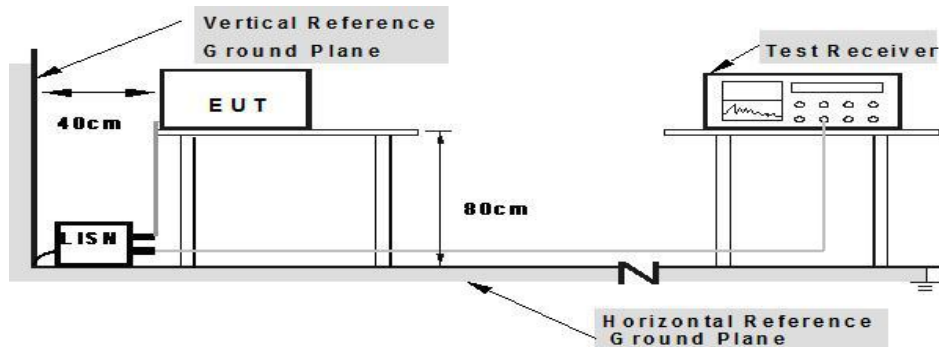
LIMIT

FCC CFR Title 47 Part 15 Subpart B Section 15.107:

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

TEST PROCEDURE

1. The EUT was setup according to ANSI C63.4-2014.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment.
4. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
8. During the above scans, the emissions were maximized by cable manipulation.

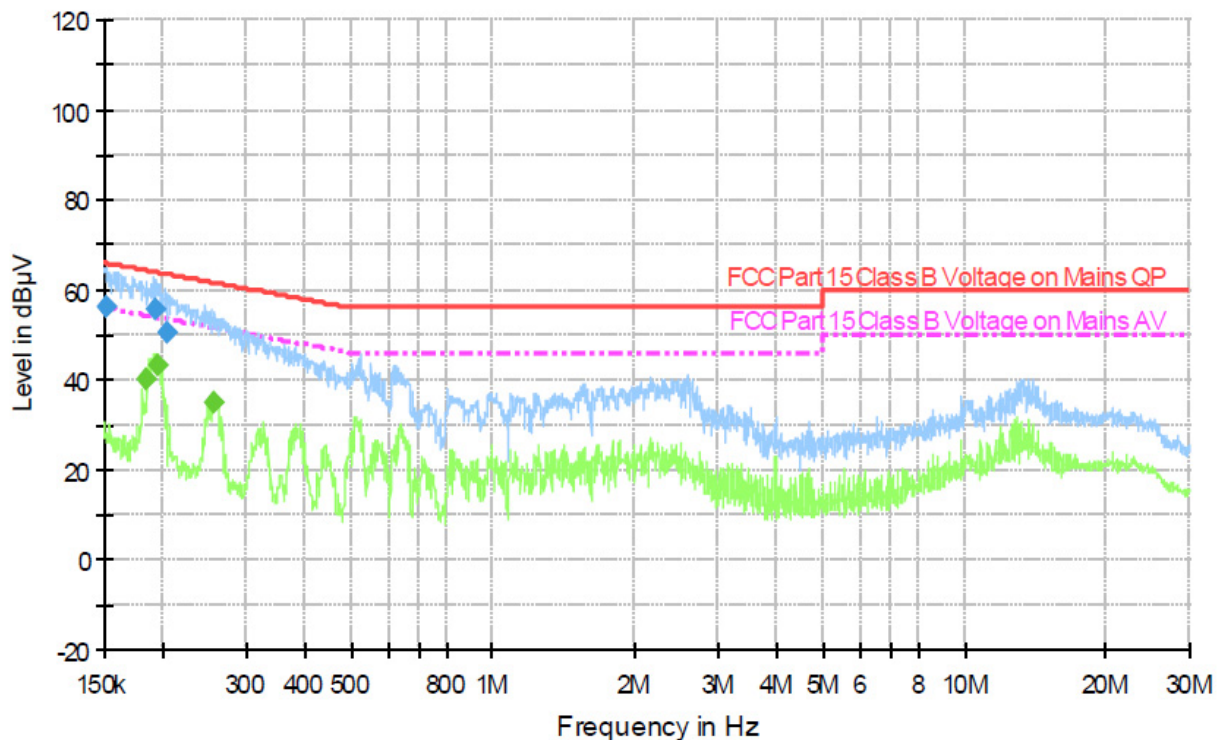
TEST MODE

Please refer to the clause 2.3

**TEST RESULTS**

Polarization

L

**Final Measurement Detector 1**

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150900	56.1	1000.000	9.000	Off	L1	10.0	9.9	66.0	
0.193710	55.5	1000.000	9.000	Off	L1	10.0	8.4	63.9	
0.204040	50.3	1000.000	9.000	Off	L1	10.0	13.1	63.4	

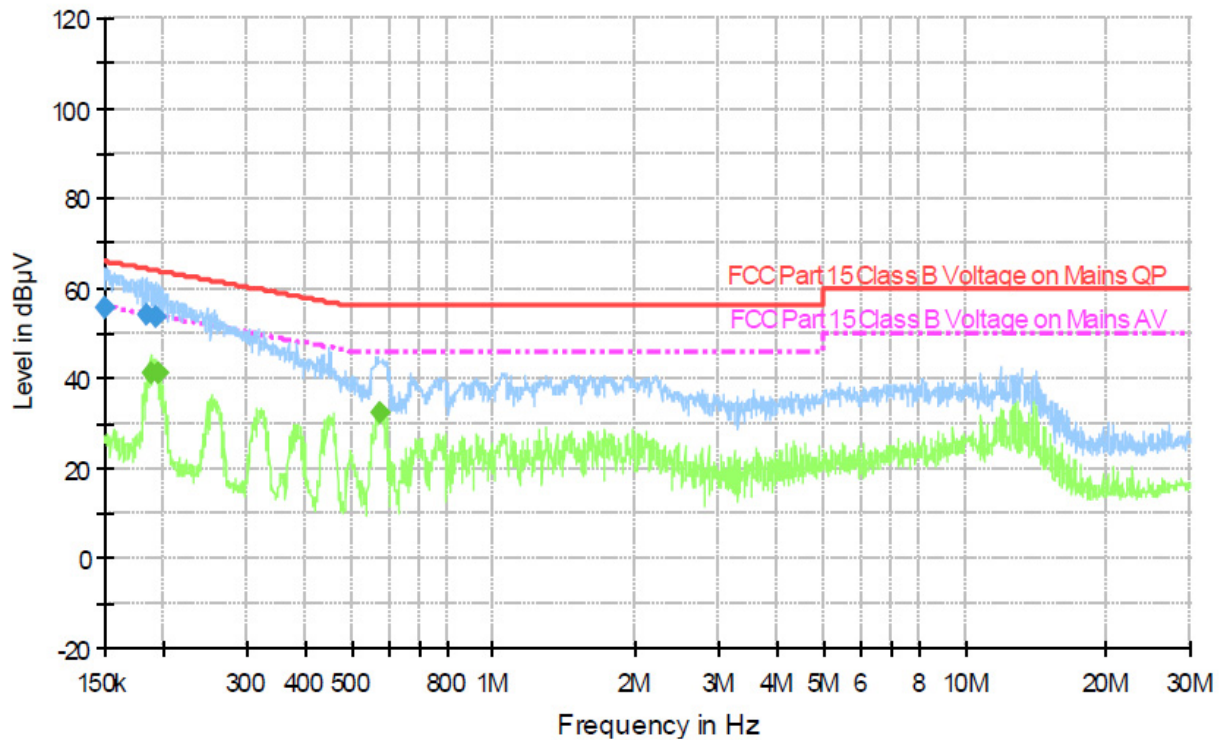
Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.184640	40.1	1000.000	9.000	Off	L1	10.0	14.2	54.3	
0.194880	43.3	1000.000	9.000	Off	L1	10.0	10.5	53.8	
0.256750	35.1	1000.000	9.000	Off	L1	10.0	16.4	51.5	



Polarization

N



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150600	55.9	1000.000	9.000	Off	N	9.5	10.1	66.0	
0.183170	54.1	1000.000	9.000	Off	N	9.5	10.2	64.3	
0.192170	53.9	1000.000	9.000	Off	N	9.5	10.0	63.9	

Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.187620	41.3	1000.000	9.000	Off	N	9.5	12.8	54.1	
0.195270	41.2	1000.000	9.000	Off	N	9.5	12.6	53.8	
0.573230	32.4	1000.000	9.000	Off	N	9.4	13.6	46.0	



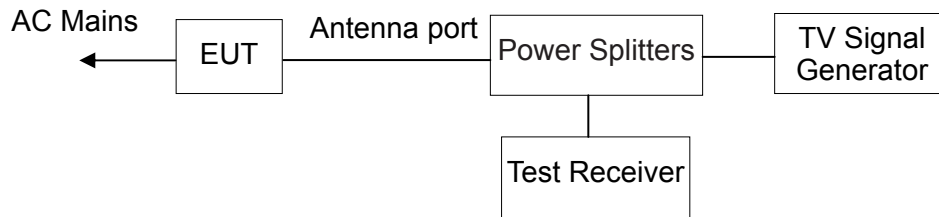
3.3. Antenna Power Conduction Measurement

LIMIT

FCC Part 15, Subpart B, Clause 15.111

Limit(nW)	Limit (dBμV)
2	51.7

TEST CONFIGURATION



TEST PROCEDURE

1. The test item can be in deliver on shielding room.
2. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
3. EUT receives AC power source from the outlet socket. All support equipment, if need, receives 120VAC/60Hz power from another socket.
4. With the 75~50Ω matching network when the connected coaxial cable of impedance not matching.
5. The output level of the auxiliary signal generator shall be set to give the value of 70dB(μV) for TV to the input of the frequency-modulation of television receiver respectively, on a 75Ω impedance, An additional amplifier should be insert at the generator output, if necessary.
6. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
7. The results shall be expressed in the terms of the substitution power in nanowatt(nW), as supplied by the standard signal generator. The specified source impedance of the receiver shall be stated with the results.
8. When measurements are made at the antenna terminals of the equipment under test, an auxiliary signal generator shall be used to feed the equipment under test input with a standard test signal at the receiver tuning frequency.

Test results were obtained from the following equation:

Emission Level (dBμV) = Power splitter Factor (dB) + Cable Loss (dB) + Reading (dBμV)

Margin (dB) = Emission Level (dBμV) - Limit (dBμV)

TEST MODE

Please refer to the clause 2.3

**TEST RESULTS**

Channel	Frequency (MHz)	Measured Frequency (MHz)	Reading (dBμV)	Limit (dBμV)	Margin (dB)
2	101.000	101.000	<30.0	50.0	<20.0
	202.000	202.000	<30.0	50.0	<20.0
3	107.000	107.000	<30.0	50.0	<20.0
	214.000	214.000	<30.0	50.0	<20.0
4	113.000	113.000	<30.0	50.0	<20.0
	226.000	226.000	<30.0	50.0	<20.0
5	123.000	123.000	<30.0	50.0	<20.0
	246.000	246.000	<30.0	50.0	<20.0
6	129.000	129.000	<30.0	50.0	<20.0
	258.000	258.000	<30.0	50.0	<20.0
7	221.000	221.000	<30.0	50.0	<20.0
	442.000	442.000	<30.0	50.0	<20.0
8	227.000	227.000	<30.0	50.0	<20.0
	454.000	454.000	<30.0	50.0	<20.0
9	233.000	233.000	<30.0	50.0	<20.0
	466.000	466.000	<30.0	50.0	<20.0
10	239.000	239.000	<30.0	50.0	<20.0
	478.000	478.000	<30.0	50.0	<20.0
11	245.000	245.000	<30.0	50.0	<20.0
	490.000	490.000	<30.0	50.0	<20.0
12	251.000	251.000	<30.0	50.0	<20.0
	502.000	502.000	<30.0	50.0	<20.0

Note: Negative signs (–) in the margin column signify levels below the limit.
Limit (50dBμV) was converted from the limit (2nW) at the 50Ω measurement impedance.



Channel	Frequency (MHz)	Measured Frequency (MHz)	Reading (dBμV)	Limit (dBμV)	Margin (dB)
13	257.000	257.000	<30.0	50.0	<20.0
	514.000	514.000	<30.0	50.0	<20.0
14	517.000	517.000	<30.0	50.0	<20.0
	1034.000	1034.000	<30.0	50.0	<20.0
15	523.000	523.000	<30.0	50.0	<20.0
	1046.000	1046.000	<30.0	50.0	<20.0
20	553.000	553.000	<30.0	50.0	<20.0
	1106.000	1106.000	<30.0	50.0	<20.0
28	601.000	601.000	<30.0	50.0	<20.0
	1202.000	1202.000	<30.0	50.0	<20.0
36	649.000	649.000	<30.0	50.0	<20.0
	1298.000	1298.000	<30.0	50.0	<20.0
45	703.000	703.000	<30.0	50.0	<20.0
	1406.000	1406.000	<30.0	50.0	<20.0
53	751.000	751.000	<30.0	50.0	<20.0
	1502.000	1502.000	<30.0	50.0	<20.0
61	799.000	799.000	<30.0	50.0	<20.0
	1598.000	1598.000	<30.0	50.0	<20.0
69	847.000	847.000	<30.0	50.0	<20.0
	1694.000	1694.000	<30.0	50.0	<20.0

Note: Negative signs (–) in the margin column signify levels below the limit.
Limit (50dBμV) was converted from the limit (2nW) at the 50Ω measurement impedance.



3.4. Picture Sensitivity Measurement

TEST MODE

Please refer to the clause 2.3

TEST RESULTS

VHF Band		Antenna Input Level (dBμV)	UHF Band		Antenna Input Level (dBμV)
Channel	Frequency Range (MHz)		Channel	Frequency Range (MHz)	
2	55.250	25	14	471.250	33
3	61.250	24	20	507.250	27
4	67.250	23	26	543.250	28
5	77.250	26	32	579.250	28
6	83.250	27	38	615.250	25
7	175.250	25	44	651.250	27
8	181.250	28	50	687.250	26
9	187.250	24	56	723.250	25
10	193.250	25	62	759.250	28
11	199.250	22	69	801.250	25
12	205.250	25	/	/	/
13	211.250	24	/	/	/
Average(VHF)		24.83	Average(UHF)		27.20
Average(UHF)-Average(VHF)=2.37 (Limit 8.0dB)					



3.5. Noise Figure Measurement

TEST MODE

Please refer to the clause 2.3

TEST RESULTS

Channel	Frequency (MHz)	Measured Frequency (MHz)	Gain (dB)	Noise Figure (dB)	Limit (dB)
5	177.5	177.5	>30.0	3.9	14
6	184.5	184.5	>30.0	3.9	14
7	191.5	191.5	>30.0	3.9	14
8	198.5	198.5	>30.0	3.9	14
9	205.5	205.5	>30.0	3.9	14
10	212.5	212.5	>30.0	3.9	14
11	219.5	219.5	>30.0	3.9	14
12	226.5	226.5	>30.0	3.9	14
21	474	474	>30.0	3.9	14
22	482	482	>30.0	3.9	14
23	490	490	>30.0	3.9	14
24	498	498	<30.0	3.9	14
25	506	506	<30.0	3.9	14
26	514	514	<30.0	3.9	14
27	522	522	<30.0	3.9	14
28	530	530	<30.0	3.9	14
29	538	538	<30.0	3.9	14
30	546	546	<30.0	3.9	14
31	554	554	<30.0	3.9	14
32	562	562	<30.0	3.9	14
33	570	570	<30.0	3.9	14
34	578	578	<30.0	3.9	14
35	586	586	<30.0	3.9	14
36	594	594	<30.0	3.9	14
37	602	602	<30.0	3.9	14
38	610	610	<30.0	3.9	14
39	618	618	<30.0	3.9	14
40	626	626	<30.0	3.9	14
41	634	634	<30.0	3.9	14
12	642	642	<30.0	3.9	14
43	650	650	<30.0	3.9	14
44	658	658	<30.0	3.9	14
45	666	666	<30.0	3.9	14

Remark: The specification was provided by tuner manufacturer.



Channel	Frequency (MHz)	Measured Frequency (MHz)	Gain (dB)	Noise Figure (dB)	Limit (dB)
46	674	674	>30.0	3.9	14
47	682	682	>30.0	3.9	14
48	690	690	>30.0	3.9	14
49	698	698	>30.0	3.9	14
50	706	706	>30.0	3.9	14
51	714	714	>30.0	3.9	14
52	722	722	>30.0	3.9	14
53	730	730	>30.0	3.9	14
54	738	738	>30.0	3.9	14
55	746	746	>30.0	3.9	14
56	754	754	>30.0	3.9	14
57	762	762	<30.0	3.9	14
58	770	770	<30.0	3.9	14
59	778	778	<30.0	3.9	14
60	796	796	<30.0	3.9	14
61	794	794	<30.0	3.9	14
62	802	802	<30.0	3.9	14
63	810	810	<30.0	3.9	14
64	818	818	<30.0	3.9	14
65	826	826	<30.0	3.9	14
66	834	834	<30.0	3.9	14
67	842	842	<30.0	3.9	14
68	850	850	<30.0	3.9	14
69	858	858	<30.0	3.9	14

Remark: The specification was provided by tuner manufacturer.