

FCC TEST REPORT

Product : Mobile Phone
Trade mark : MI
Model/Type reference : 2016117
Report Number : 1608310293EMC-1
Date of Issue : Oct.19, 2016
FCC ID : 2AFZZ-RM6117
Test Standards : See below

Test Standards	Results
☒ 47 CFR Part 15 Subpart B Class B: 2015	PASS

Prepared for:

Xiaomi Communications Co., Ltd.
The Rainbow City of China Resources, NO.68, Qinghe Middle Street,
Haidian District, Beijing, China

Prepared by:

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Version

Version No.	Date	Description
V1.0	Oct.19, 2016	Original



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1 General Information

1.1 Client Information

Applicant:	Xiaomi Communications Co., Ltd.
Address of Applicant:	The Rainbow City of China Resources, NO.68, Qinghe Middle Street, Haidian District, Beijing, China
Manufacturer:	Xiaomi Communications Co., Ltd.
Address of Manufacturer:	The Rainbow City of China Resources, NO.68, Qinghe Middle Street, Haidian District, Beijing, China

1.2 General Description of EUT

Product Name:	Mobile Phone	
Model No.(EUT):	2016117	
Add. Mode No.:	N/A	
Trade Mark:	MI	
Power Supply:	AC adapter	Model:MDY-08-EF Input:100-240V~50/60Hz, 0.35A; Output: 5V $\overline{\text{---}}$ 2A
	Battery1	Model: BN30 Brand: Sunwoda Rated voltage: 3.84Vdc Battery capacity: 3030mAh(Li-on Rechargeable)
	Battery2	Model: BN30 Brand: SCUD Rated voltage: 3.84Vdc Battery capacity: 3030mAh(Li-on Rechargeable)
USB Micro-B Plug cable:	117cm(Shielded)	
Sample Type:	Portable production	
Normal Test voltage:	AC 120V 60Hz	
Lowest Internal Frequency:	19.2MHz	
Highest Internal Frequency:	1.2GHz	
Equipment Emissions Class:	CLASS B	
Software Version:	MIUI8	
Hardware Version:	P3	
Sample Received Date:	Sep. 09, 2016	
Sample tested Date:	Sep. 11, 2016 to Sep. 29, 2016	

1.3 Description of Support Units

The EUT has been tested with associated equipment below.

1) Support equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
Notebook	Lenovo	E450	SL10G10780	UnionTrust

2) Cable

Cable No.	Description	Connector Type	Cable Type/Length	Supplied by
N/A	N/A	N/A	N/A	N/A

1.4 Test Location

All tests were performed at:

Shenzhen Huatongwei International Inspection Co., Ltd.

Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

Telephone: +86 (0) 755 26748019 Fax: +86 (0) 755 26748089

1.5 Test Facility

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

FCC-Registration No.: 317478

Shenzhen Huatongwei International Inspection 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 317478, Renewal date Jul.18, 2014, valid time is until Jul.18, 2017

1.6 Deviation from Standards

None.

1.7 Abnormalities from Standard Conditions

None.

1.8 Other Information Requested by the Customer

None.

1.9 Measurement Uncertainty (95% confidence levels, $k=1.96$)

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=1.96$.

No.	Item	Measurement Uncertainty
1	Conducted emission 9KHz-30MHz	3.6 dB
2	Radiated emission 30MHz-18GHz	4.5 dB

2 Test Summary

Tests for radiated and conducted emissions were performed. All measurements were performed according to the 2014 version of ANSI C63.4

Test Item	Test Requirement	Test method	Result
Conducted Emission	47 CFR Part 15 Subpart B Section 15.107	ANSI C63.4-2014	PASS
Radiated Emissions	47 CFR Part 15 Subpart B Section 15.109	ANSI C63.4-2014	PASS

3 Equipment List

Conducted Emission Test					
Equipment	Manufacturer	Mode No.	Serial Number	Cal date (mm-dd-yyyy)	Due date (mm-dd-yyyy)
EMI Test Receiver	R&S	ESCI	101247	11/1/2015	10/31/2016
Artificial Mains	SCHWARZBECK	NNLK 8121	573	11/1/2015	10/31/2016
Pulse Limiter	R&S	ESH3-Z2	101488	11/1/2015	10/31/2016
EMI Test Receiver	R&S	ESCI	101247	11/1/2015	10/31/2016

3m (Semi-Anechoic Chamber)					
Equipment	Manufacturer	Mode No.	Serial Number	Cal date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Ultra-Broadband Antenna	SCHWARZBECK	VULB9163	538	11/8/2015	11/7/2017
Double-Ridged-Waveguide Horn Antenna	SCHWARZBECK	9120D	1011	11/8/2015	11/7/2017
Emi Test Receiver	R&S	ESCI	101247	11/1/2015	10/31/2016
Spectrum Analyzer	R&S	FSP40	100597	11/1/2015	10/31/2016
Pre-amplifier	SCHWARZBECK	BBV 9743	9743-0022	11/1/2015	10/31/2016
Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-248	11/1/2015	10/31/2016
Turntable	Maturo Germany	TT2.0-1T	N/A	N/A	N/A
Antenna Mast	Maturo Germany	CAM-4.0-P-12	N/A	N/A	N/A
Test Software	R&S	ES-K1	N/A	N/A	N/A

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4 Test Configuration

4.1 Test Mode

Radiated Emission:	Mode1: WCDMA1900 Idle + Bluetooth Idle + WLAN (2.4G) Idle + Camera(Front) + Battery 1 + USB Cable (Charging from Adapter) + SIM 1 Mode2: WCDMA1900 Idle + Bluetooth Idle + WLAN (2.4G) Idle + Camera(Back) + Battery 1 + USB Cable (Charging from Adapter) + SIM 1 Mode3: GSM850 Idle + Bluetooth Idle + WLAN (2.4G) Idle + MP4 + Battery2 + USB Cable (Charging from Adapter3) + SIM 2 Mode4: LTE Band7 Idle + Bluetooth Idle + WLAN (2.4G) Idle + GPS Rx + Battery1 + USB Cable (Data Link with Notebook) + SIM 1
Conducted Emission of AC power input/output ports:	Mode1: WCDMA1900 Idle + Bluetooth Idle + WLAN (2.4G) Idle + Camera(Back) + Battery 1 + USB Cable (Charging from Adapter) + SIM 1 Mode2: GSM850 Idle + Bluetooth Idle + WLAN (2.4G) Idle + MP4 + Battery2 + USB Cable (Charging from Adapter) + SIM 2 Mode3: LTE Band 7 Link + Bluetooth Idle + WLAN (2.4G) Idle + GPS Rx + Battery1 + USB Cable (Data Link with Notebook) + SIM 1
Remark: The coarse font for worst mode	

4.2 Test setup

4.2.1 For Radiated Emissions test setup

Radiated Emissions setup:

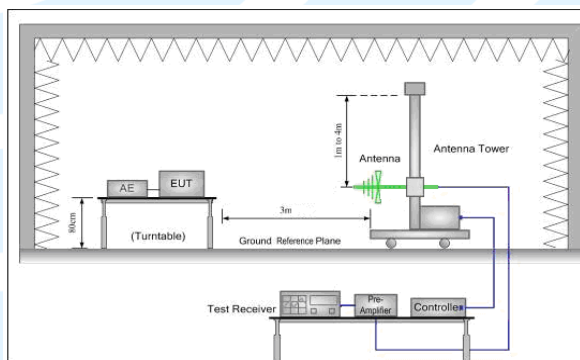


Figure 1. 30MHz to 1GHz

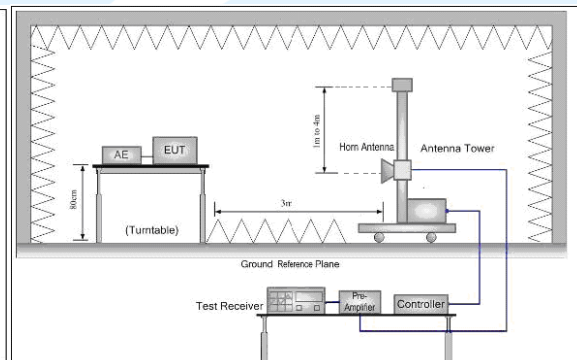
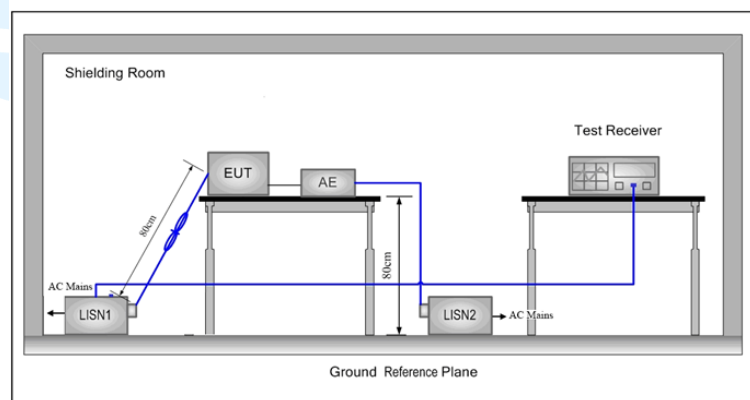


Figure 2. Above 1GHz

4.2.2 For Conducted Emissions test setup

Conducted Emissions setup



4.3 Test Environment

Operating Environment:	
Temperature:	26.3 °C
Humidity:	56 % RH
Atmospheric Pressure:	99.80Kpa

4.4 System Test Configuration

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000MHz. The resolution is 1 MHz or greater for frequencies above 1000MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the fifth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

5 Radio Technical Requirements Specification

Reference documents for testing:

No.	Identity	Document Title
1	47 CFR Part15 Subpart B	Unintentional Radiators
2	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 40 GHz

5.1 Conducted Emission

Test Requirement: 47 CFR Part 15 Subpart B Section15.107

Test Method: ANSI C63.4-2014

Limit:

Limits for Class B devices

Frequency range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz.
1. The Product was placed on a nonconductive table 0.8 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).
2. The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak and AVG detector in Max Hold mode. Run the receiver's pre-scan to record the maximum disturbance generated from Product in all power lines in the full band.
3. For each frequency whose maximum record was higher or close to limit, measure its QP and AVG values and record.

Test Procedure:

Test Setup:

Refer to section 4.2.2 for details.

Instruments Used:

Refer to section 3 for details

Test Mode:

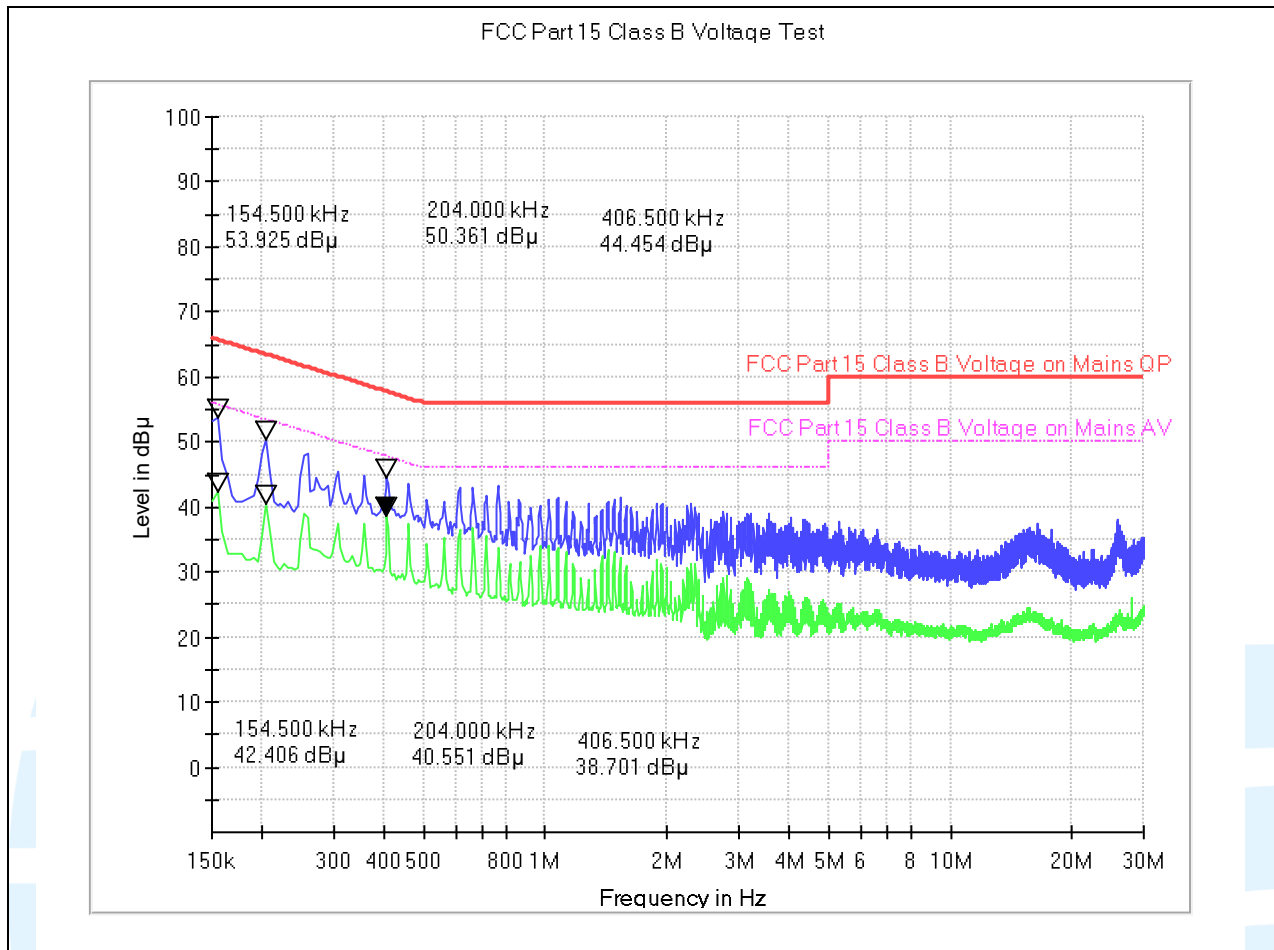
Mode1~3

Test Results:

Pass

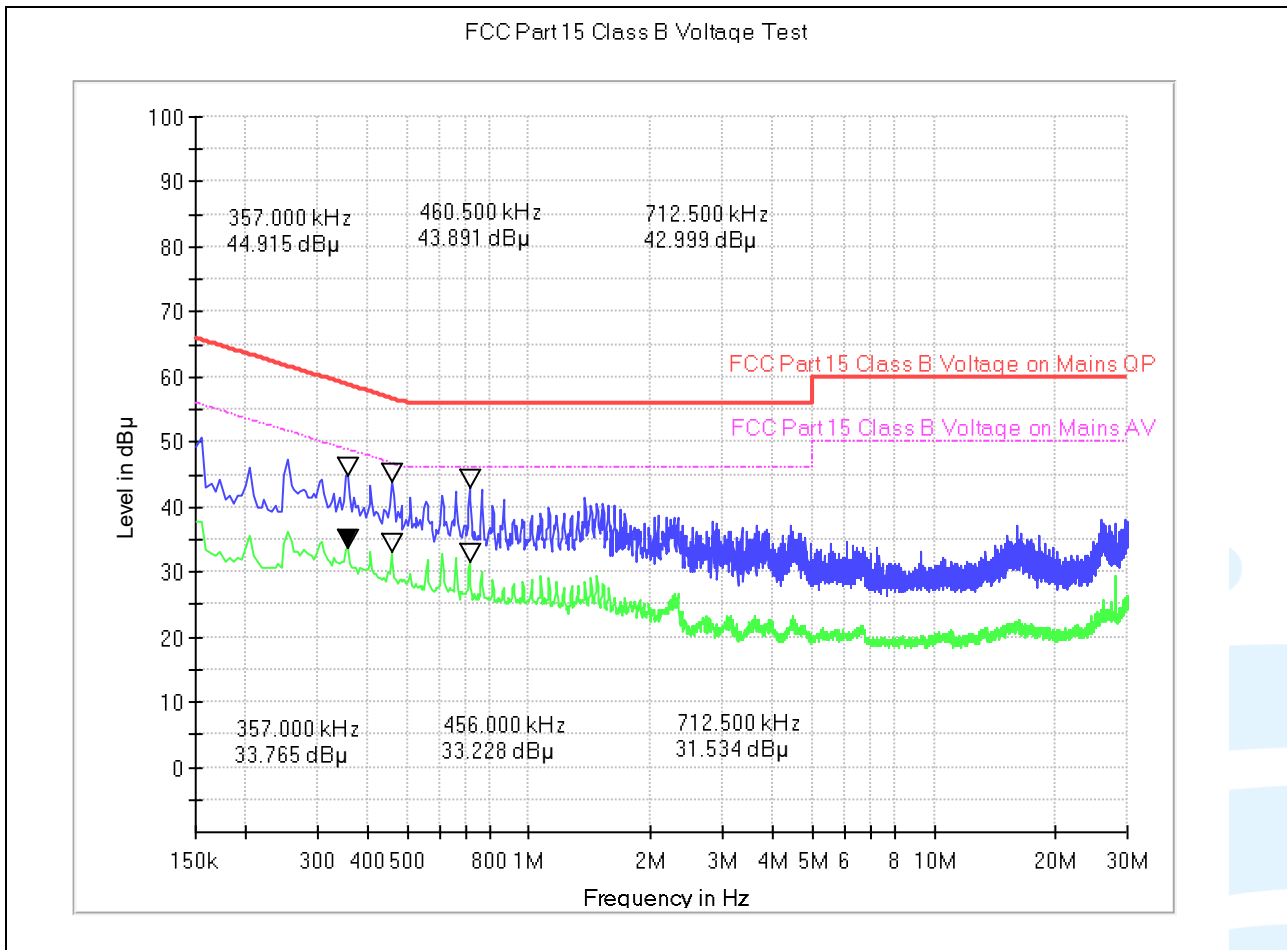
Test Graphs and Data:

The worse mode is mode2_ L line



.No.	Frequency (MHz)	Measurement QP Level (dBuV)	QP Limit (dBuV/m)	Measurement AVg Level (dBuV/m)	Avg Limit (dB)	Result
1	0.1545	51.66	65.8	42.40	55.8	PASS
2	0.204	48.24	63.4	40.61	53.4	PASS
3	0.4065	42.17	57.7	38.70	47.7	PASS

The worse mode is mode2_ N line



.No.	Frequency (MHz)	Measurement QP Level (dBuV)	QP Limit (dBuV/m)	Measurement AVg Level (dBuV/m)	Avg Limit (dB)	Result
1	0.357	42.65	58.8	33.45	48.8	PASS
2	0.4605	41.57	56.0	33.15	46.0	PASS
3	0.7125	40.46	56.0	31.47	46.0	PASS

5.2 Radiated Emissions

Test Requirement:

47 CFR Part 15 Subpart B Section 15.109

Test Method:

ANSI C63.4-2014

Limit:

Limits for Class B devices

Frequency (MHz)	limits at 3m dB(μV/m)		
	QP Detector	PK Detector	AV Detector
30-88	40.0	--	--
88-216	43.5	--	--
216-960	46.0	--	--
960 to 1000	54.0	--	--
Above 1000	--	74.0	54.0

Note:15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

Remark:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

The emissions were measured using the following resolution bandwidths:

Frequency	Detector	RBW	VBW	Remark
30MHz-1GHz	Quasi-peak	100 kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Peak measurements and average measurements are made. All emissions were determined to have a peak-to-average ratio of less than 20dB.

Test Procedure:

Below 1GHz test procedure as below:

- a) The Product was placed on the non-conductive turntable 0.8 m above the ground at a chamber.
- b) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- c) For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum

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Hold Mode, and record the maximum value.

Above 1GHz test procedure as below:

- The Product was placed on the non-conductive turntable 0.8 m above the ground at a chamber.
- Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.

Test Setup:

Refer to section 4.2.2 for details.

Instruments Used:

Refer to section 3 for details

Test Mode:

Mode 1~4

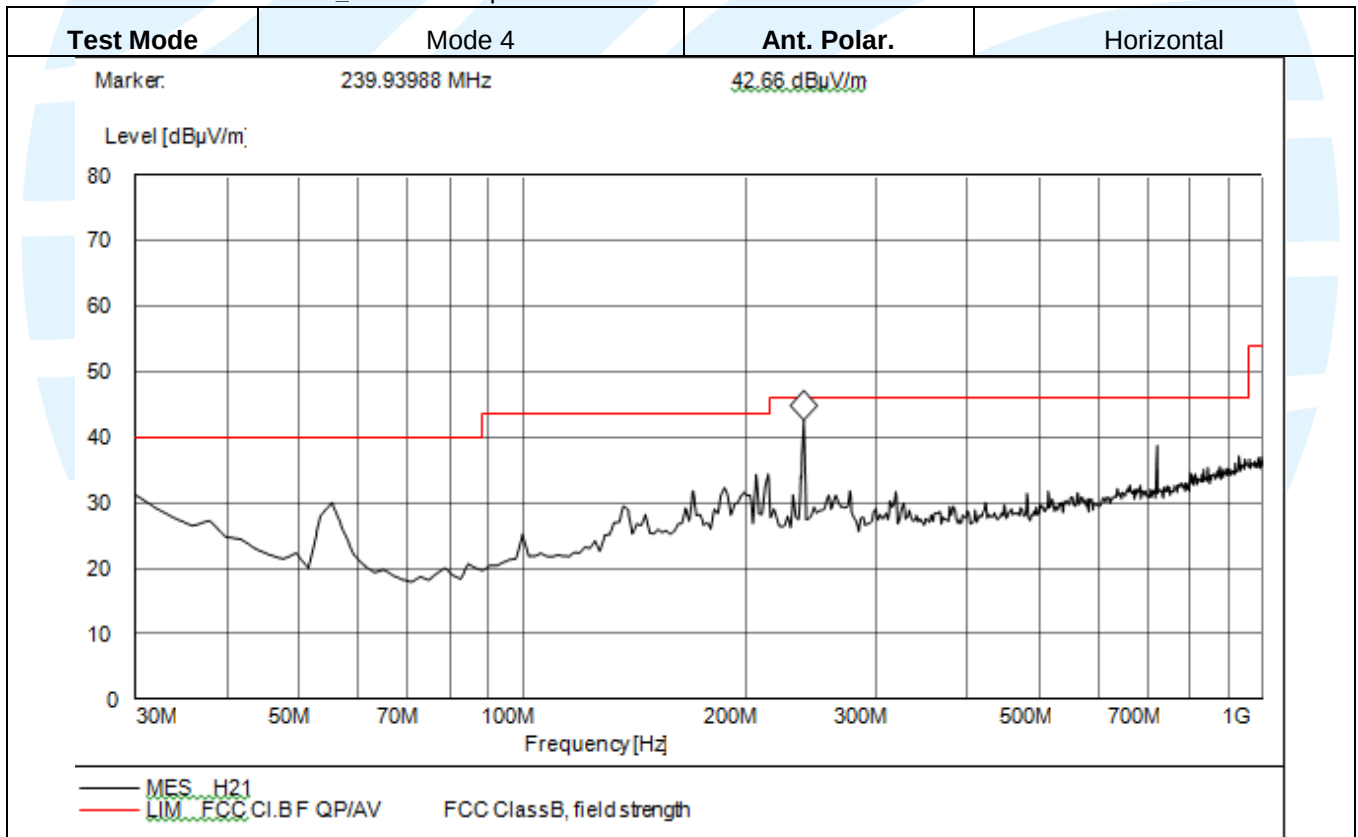
Test Results:

Pass

Test Graphs and Data:

Below 1 GHz:

The worse mode is mode4_ Horizontal polarization

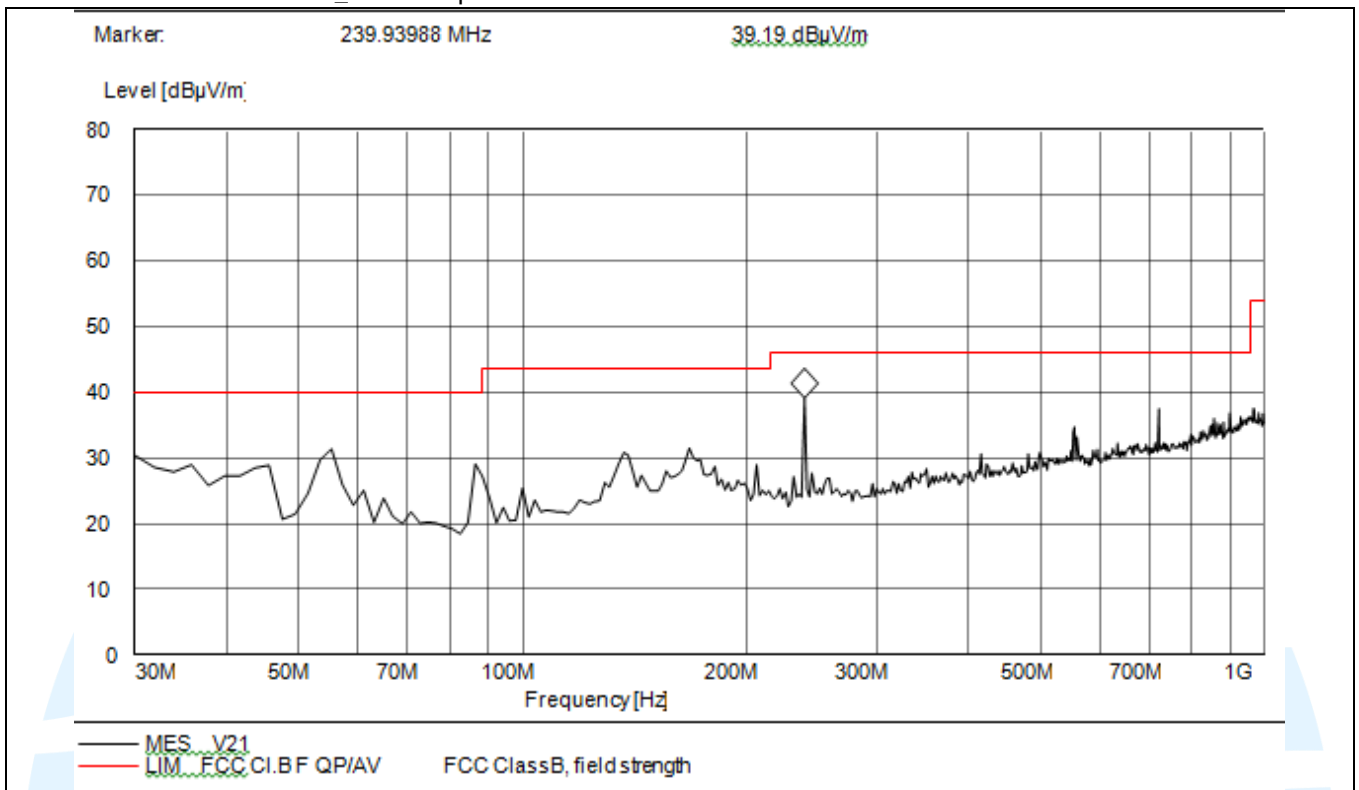


.No.	Frequency	Measurement Level	Limit	Result
	(MHz)	(dBuV/m)	(dBuV/m)	
1	56.24	27.16	40.0	PASS
2	206.43	32.04	43.5	PASS
3	239.85	41.45	46.0	PASS

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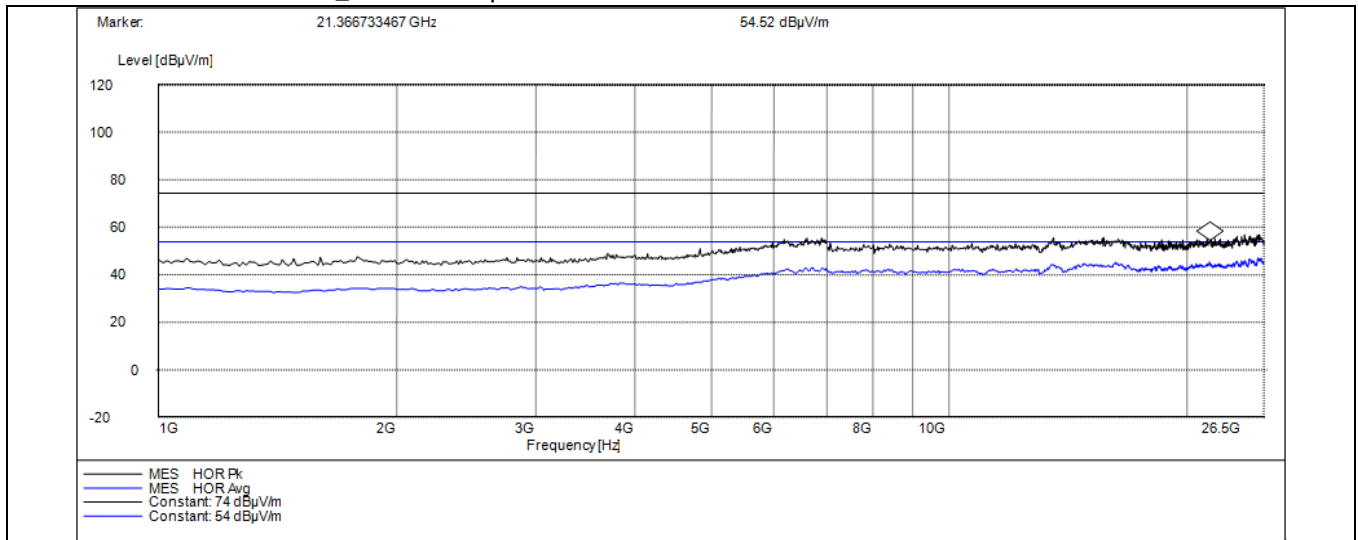
The worse mode is mode4_ Vertical polarization



.No.	Frequency (MHz)	Measurement Level (dBuV)	Limit (dBuV/m)	Result
1	56.71	29.66	40.0	PASS
2	169.54	28.51	43.5	PASS
3	239.85	39.04	46.0	PASS

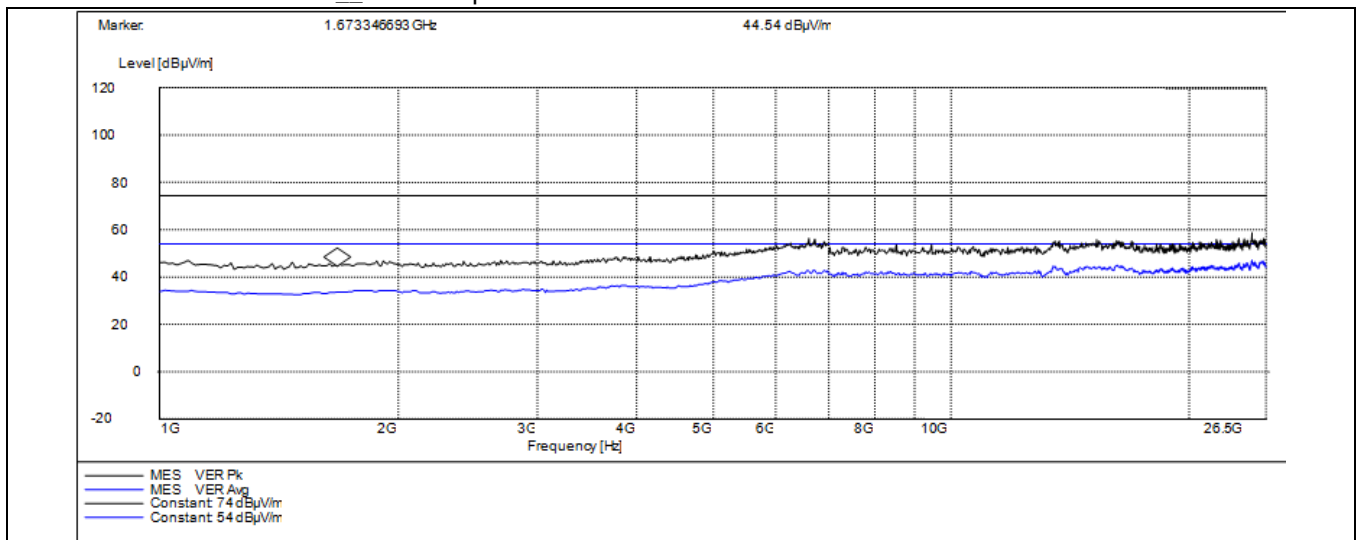
Above 1GHz:

The worse mode is mode4_ Horizontal polarization



.No.	Frequency	Measurement Peak Level	Peak Limit	Measurement Avg Level	Avg Limit	Result
	(MHz)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)	
1	6218.400	53.46	74	42.34	54	PASS
2	13480.900	54.33	74	44.17	54	PASS
3	23975.900	56.67	74	46.18	54	PASS

The worse mode is mode4__ Vertical polarization



.No.	Frequency	Measurement Peak Level	Peak Limit	Measurement Avg Level	Avg Limit	Result
	(MHz)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)	
1	6.7423	56.10	74	42.76	54	PASS
2	13.4589	54.59	74	44.61	54	PASS
3	23.9899	57.21	74	47.07	54	PASS

Note:

- 1) Scan from 9 kHz to 26.5GHz, the disturbance below 30MHz was very low, the amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

See test photographs attached in Appendix 1 for the actual connections between Product and support equipment.

APPENDIX 2 PHOTOGRAPHS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photographs.

*** End of Report ***

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of UnionTrust, this report can't be reproduced except in full.

Labelling Requirements

Each digital device which has been verified as complying with the Class B limits shall have permanently attached in a conspicuous location for the user to observe, a label with the following statement:

This device complies with Part 15 of the FCC Rules.
Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Information to User

The following warning or similar statement shall be provided in a conspicuous location in the operator's manual so that the user of a Class B digital device is aware of its interference potential. Additional information about corrective measures may also be provided to the user at the manufacturer's option.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- **Reorient or relocate the receiving antenna**
- **Increase the separation between the equipment and receiver**
- **Connect the equipment into an outlet on a circuit different from that to which the receiver is connected**
- **Consult the dealer or an experienced radio/TV technician for help**

The instruction manual for a Class B external switching power supply that is separately marketed shall also include sufficient information to insure that the complete system is capable of complying with the requirements for a Class B external switching power supplies. The manual should also caution the user that changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment. Finally, the manual should instruct the user to use any special accessories, i.e. shielded cables, necessary for compliance with the standards.

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In cases where the manual is provided only in a form other than paper, such as on a computer disk or over the Internet, the information required above may be included in the manual in that alternative form, provided that the user can be reasonably expected to have the capability to access information in that form.

