EMC TEST REPORT

Applicant	Xiaomi Communications Co., Ltd.
FCC ID	2AFZZC3JG
Product	Mobile Phone
Brand	Redmi
Model	M1908C3JG
Report No.	R1907A0357-E1V1
Issue Date	August 14, 2019

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC Code CFR47 Part15B (2018)/ ANSI C63.4 (2014)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Wei Liu

Performed by: Wei Liu/ Manager

Guangchang Fan

Approved by: Guangchang Fan/ Director

TA Technology (Shanghai) Co., Ltd.

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Summary of measurement results

Number	Test Case	Clause in FCC Rules	Conclusion
1	Radiated Emission	FCC Part15.109, ANSI C63.4-2014	PASS
2	Conducted Emission	FCC Part15.107, ANSI C63.4-2014	PASS
Test Date: June 2, 2019 ~July 30, 2019			

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1 Test Laboratory

1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

1.2 Test facility

FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

IC (recognition number is 8510A)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement.

VCCI (recognition number is C-4595, T-2154, R-4113, G-10766)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Japan to perform electromagnetic emission measurement.

A2LA (Certificate Number: 3857.01)

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

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1.3 Testing Location

Company:	TA Technology (Shanghai) Co., Ltd.
Address:	No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China
City:	Shanghai
Post code:	201201
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2 General Description of Equipment under Test

2.1 Client Information

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

2.2 General information

EUT Description			
Device Type:	Portable Device		
Model:	M1908C3JG		
IMEI:	IMEI 1: 862384040009404 IMEI 2: 862384040012994		
HW Version:	P1.1		
SW Version:	MIUI 10		
Antenna Type:	Fixed Internal Antenna		
Frequency:	Band	Tx (MHz)	Rx (MHz)
	GSM 850	824 ~ 849	869 ~ 894
	GSM 1900	1850 ~ 1910	1930 ~ 1990
	WCDMA Band II	1850 ~ 1910	1930 ~ 1990
	WCDMA Band IV	1710 ~ 1755	2110 ~ 2155
	WCDMA Band V	824 ~ 849	869 ~ 894
	LTE Band 2	1850 ~ 1910	1930 ~ 1990
	LTE Band 4	1710 ~ 1755	2110 ~ 2155
	LTE Band 5	824 ~ 849	869 ~ 894
	LTE Band 7	2500 ~ 2570	2620 ~ 2690
	LTE Band 38	2570 ~ 2620	2570 ~ 2620
	Bluetooth:	2402 ~ 2480	2402 ~ 2480
	WIFI 2.4G:	2412 ~ 2462	2412 ~ 2462
	WIFI 5G(U-NII-1):	5150 ~ 5250	5150 ~ 5250
	WIFI 5G(U-NII-2A):	5250 ~ 5350	5250 ~ 5350
	WIFI 5G(U-NII-2C):	5470 ~ 5725	5470 ~ 5725
	WIFI 5G(U-NII-3):	5725 ~ 5825	5725 ~ 5825

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	FM(VHF band II)	/	87,5 MHz to 108 MHz
Modulation:	GSM: GMSK GPRS: GMSK EGPRS: GMSK/8PSK WCDMA RMC: QPSK HSDPA: QPSK HSUPA: QPSK DC-HSDPA:64QAM HSPA+: 16QAM LTE: QPSK / 16QAM/64QAM Bluetooth: GFSK, π/4-DQPSK, 8-DPSK Bluetooth v4.2 LE: GFSK WLAN 802.11b: DSSS WLAN 802.11a/g/n/ac: OFDM		
EUT Accessory			
Adapter	Manufacturer: Jiangsu Chenyang Electron Co., Ltd. Model: MDY-09-EQ		
Battery	Manufacturer: CosMX Model: BN46		
USB Cable 1	Manufacturer: LUXSHARE Precision Industry Co., Ltd. Model: L23312 100cm Cable, Shielded		
USB Cable 2	Manufacturer: SU ZHOU KELI SCIENCE&TECHNOLOGY DEVELOPMENT CO.,LTD Model: K23312 100cm Cable, Shielded		
Auxiliary test equipment			
PC	PC Manufacturer: Microsoft Corporation Model: L20170076		
Note: The information of the EUT is declared by the manufacturer.			

Item	Configure 1	Configure 2
Software	The same	The same
Hardware	The same	The same
Flash	3+32	4+64
Other	The same	The same
Note: Customer declaration, two configures is the same, except for flash. There are more than one Configure, each one should be applied throughout the compliance test respectively, however, only the worst case (Configure 1) will be recorded in this report.		

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2.3 Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

Test standards
FCC Code CFR47 Part15B (2018)
ANSI C63.4 (2014)

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2.4 Test Mode

Test Mode for RE	
Mode 1:	USB Copy(EUT with PC) + USB cable + earphone + rear camera On + MP3 +Idle
Mode 2:	USB Copy(EUT with PC) + USB cable + earphone +front camera On + MP3 +Idle
Mode 3:	Adapter +USB cable+ earphone + front camera On +Idle
Mode4:	Adapter +USB cable + earphone + rear camera On +Idle
Mode 5:	Adapter + USB cable+ earphone + Mp3 +Idle
Mode 6:	Adapter + USB cable+ earphone +play video+Idle
Mode 7:	Adapter + USB cable + earphone + FM(98MHz)
Mode 8:	Front camera On +earphone + Idle
Mode 9:	Rear camera On + earphone + Idle
Mode 10:	Earphone+MP3+Idle
Mode 11:	Earphone +Play video+Idle

During the test, the preliminary test was performed in all modes with all adapters, USB and batteries, mode 1 with Battery 1 and USB cable 2 is selected as the worst condition. The test data of the worst-case condition was recorded in this report.

Test Mode for CE	
Mode 1:	USB Copy(EUT with PC) + USB cable + earphone + rear camera On + MP3 +Idle
Mode 2:	USB Copy(EUT with PC) + USB cable + earphone +front camera On + MP3 +Idle
Mode 3:	Adapter +USB cable+ earphone + front camera On +Idle
Mode4:	Adapter +USB cable + earphone + rear camera On +Idle
Mode 5:	Adapter + USB cable+ earphone + Mp3 +Idle
Mode 6:	Adapter + USB cable+ earphone +play video+Idle
Mode 7:	Adapter + USB cable + earphone + FM(98MHz)

During the test, the preliminary test was performed in all modes with all adapters, USB and batteries, mode 1 with Battery 1 and USB cable 2 is selected as the worst condition. The test data of the worst-case condition was recorded in this report.

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3 Test Case Results

3.1 Radiated Emission

Ambient condition

Temperature	Relative humidity	Pressure
24°C~26°C	45%~50%	102.5kPa

Methods of Measurement

The EUT is placed on a non-metallic table 0.8m above the horizontal metal reference ground plane. The distance between EUT and receive antenna should be 3 meters. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.4-2014. Sweep the whole frequency band through the range from 30MHz to the 5th harmonic of the carrier. During the test, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum of radiated signal level.
The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing. During the test, the EUT is worked at maximum output power.
Set the spectrum analyzer in the following:
Below 1GHz:
RBW=100 kHz / VBW=300 kHz / Sweep=AUTO
Above 1GHz:
(a) PEAK: RBW=1MHz / VBW=3MHz/ Sweep=AUTO
(b) AVERAGE: RBW=1MHz / VBW=3MHz / Sweep=AUTO

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in lie-down position (X axis) and the worst case was recorded.

During the test, EUT is connected to a laptop via a USB cable in the case of Transfer Data mode. The EUT is used as the peripheral equipment of the PC. The data is transferred from EUT to PC;

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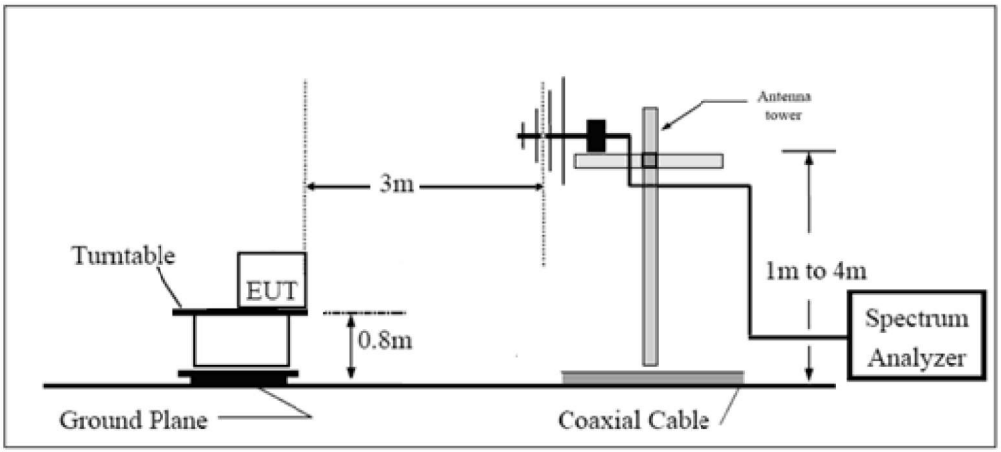
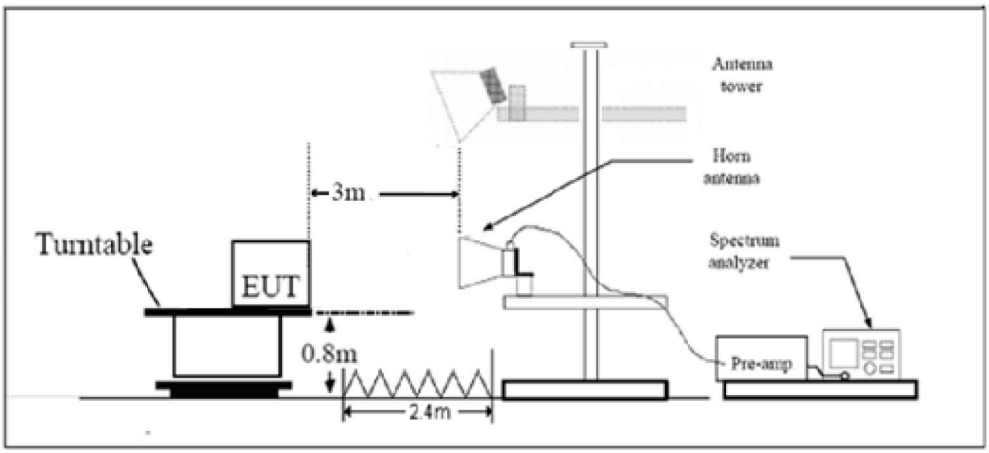
Test Setup

Below 1GHz



Above 1GHz



Note: Area side:2.4mX3.6m

Antenna Tower meets ANSI C63.4 requirements for measurements above 1 GHz by keeping the antenna aimed at the EUT during the antenna's ascent/ descent along the antenna mast.

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Limits

Frequency (MHz)	Field Strength (dBμV/m)	Detector
30 -88	40.0	Quasi-peak
88-216	43.5	Quasi-peak
216 – 960	46.0	Quasi-peak
960-1000	54.0	Quasi-peak
1000-5th harmonic of the highest frequency or 40GHz,which is lower	54 74	Average Peak

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor *k* = 1.96.

Frequency	Uncertainty
30MHz~200MHz	4.02 dB
200MHz~1000MHz	3.28 dB
1GHz~18GHz	3.70 dB
18GHz~26.5GHz	5.78 dB
26.5GHz~40GHz	5.82 dB

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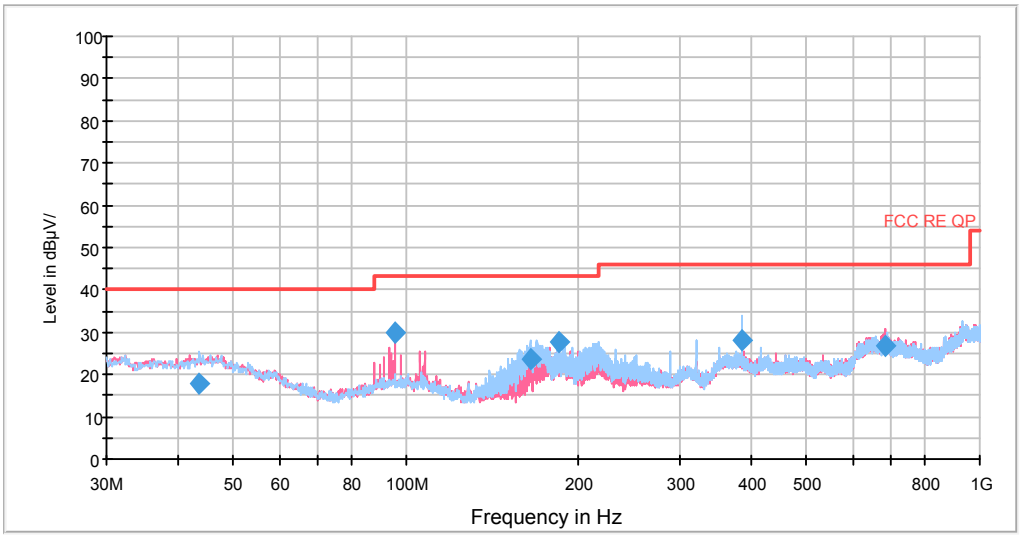
Test Results

Sweep the whole frequency band through the range from 30MHz to the 5th harmonic of the carrier, the Emissions in the frequency band 18GHz- 40GHz is more than 20dB below the limit are not reported.

The following graphs display the maximum values of horizontal and vertical by software.
For above 1GHz, Blue trace uses the peak detection, Green trace uses the average detection.



Radiated Emission from 30MHz to 1GHz

Frequency (MHz)	Quasi-Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
43.580000	17.8	100.0	H	269.0	-3.7	22.2	40.0
95.475000	30.0	100.0	V	92.0	-10.2	13.5	43.5
164.345000	23.7	175.0	H	46.0	-13.8	19.8	43.5
184.230000	27.8	100.0	V	51.0	-13.0	15.8	43.5
384.050000	28.3	100.0	H	199.0	-5.9	17.7	46.0
685.235000	26.8	100.0	V	143.0	-1.2	19.2	46.0

Remark: 1. Correction Factor = Antenna factor+ Insertion loss(cable loss+amplifier gain)
2. Margin = Limit – Quasi-Peak

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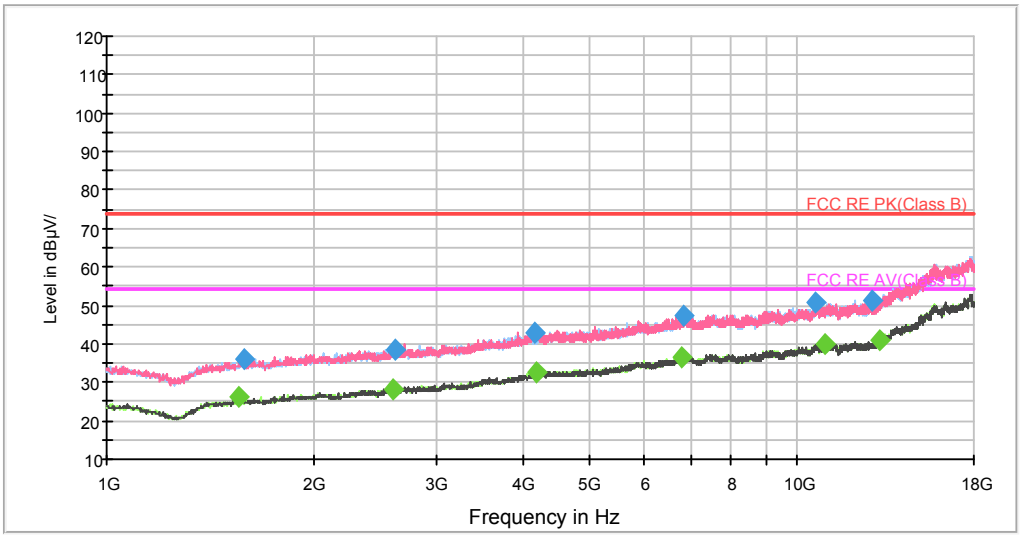

Radiated Emission from 1GHz to 18GHz

Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1584.375000	35.8	100.0	H	99.0	-7.5	38.2	74.0
2612.875000	38.6	100.0	H	106.0	-3.3	35.4	74.0
4155.625000	43.1	100.0	H	340.0	2.0	30.9	74.0
6858.625000	47.5	200.0	V	247.0	7.7	26.5	74.0
10590.125000	50.5	200.0	V	273.0	11.8	23.5	74.0
12783.125000	51.0	200.0	V	215.0	13.0	23.0	74.0

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1552.500000	26.0	200.0	V	319.0	-7.7	28.0	54.0
2593.750000	28.3	100.0	H	184.0	-3.4	25.7	54.0
4181.125000	32.6	200.0	V	353.0	2.1	21.4	54.0
6792.750000	36.6	100.0	H	340.0	7.7	17.4	54.0
10949.250000	39.8	100.0	H	307.0	12.6	14.2	54.0
13123.125000	41.1	200.0	H	168.0	14.1	12.9	54.0

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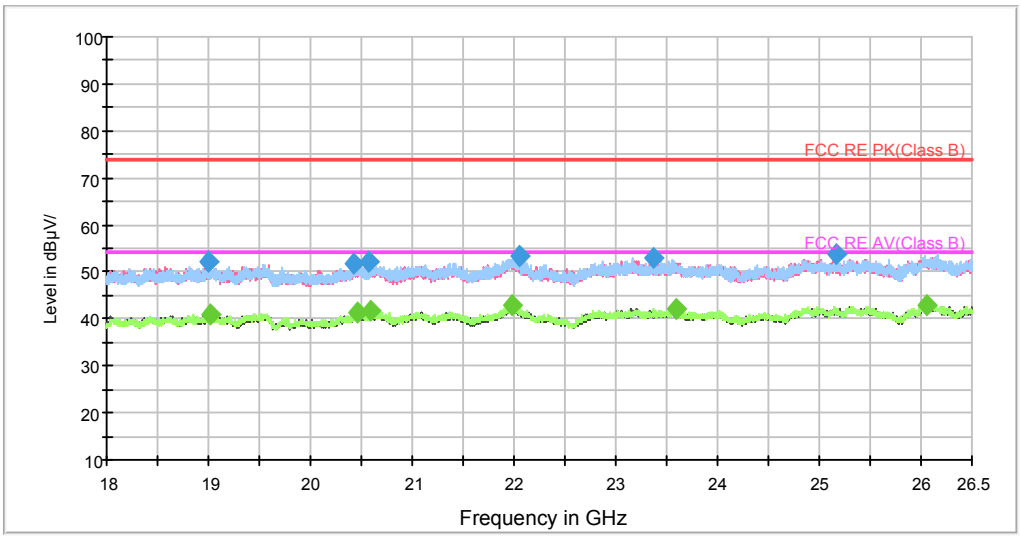

Radiated Emission from 18GHz to 26.5GHz

Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
18996.625000	52.1	100.0	V	264.0	-0.2	21.9	74.0
20420.375000	51.6	100.0	H	146.0	-0.9	22.4	74.0
20578.687500	52.2	200.0	H	346.0	-1.0	21.8	74.0
22049.187500	53.6	200.0	V	49.0	-1.4	20.4	74.0
23365.625000	52.9	200.0	H	113.0	-0.1	21.1	74.0
25162.312500	53.9	100.0	V	78.0	0.7	20.1	74.0

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
19013.625000	40.9	100.0	V	125.0	-0.2	13.1	54.0
20455.437500	41.4	200.0	H	339.0	-0.9	12.6	54.0
20598.875000	41.6	100.0	V	58.0	-1.1	12.4	54.0
21974.812500	42.8	200.0	H	0.0	-1.3	11.2	54.0
23585.562500	42.2	100.0	V	0.0	-0.3	11.8	54.0
26058.000000	43.1	200.0	H	222.0	0.9	10.9	54.0

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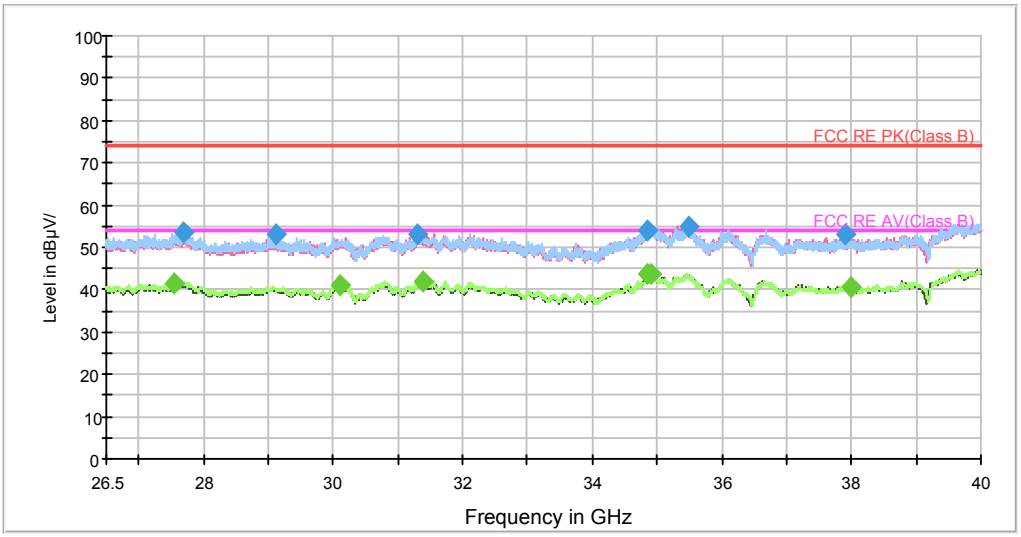

Radiated Emission from 26.5GHz to 40GHz

Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
27681.250000	53.8	200.0	V	109.0	0.2	20.2	74.0
29129.125000	53.3	200.0	H	0.0	-0.2	20.7	74.0
31312.750000	53.3	100.0	V	343.0	-0.5	20.7	74.0
34856.500000	54.2	100.0	V	242.0	1.6	19.8	74.0
35491.000000	55.0	200.0	V	3.0	1.5	19.0	74.0
37905.812500	53.0	200.0	H	0.0	0.3	21.0	74.0

Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
27544.562500	41.7	100.0	H	125.0	0.4	12.3	54.0
30106.187500	41.0	200.0	H	69.0	-1.9	13.0	54.0
31400.500000	41.9	200.0	H	169.0	-0.5	12.1	54.0
34856.500000	43.6	200.0	V	70.0	1.6	10.4	54.0
34898.687500	43.8	200.0	V	61.0	1.9	10.2	54.0
38005.375000	40.8	200.0	V	70.0	0.3	13.2	54.0

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3.2 Conducted Emission

Ambient condition

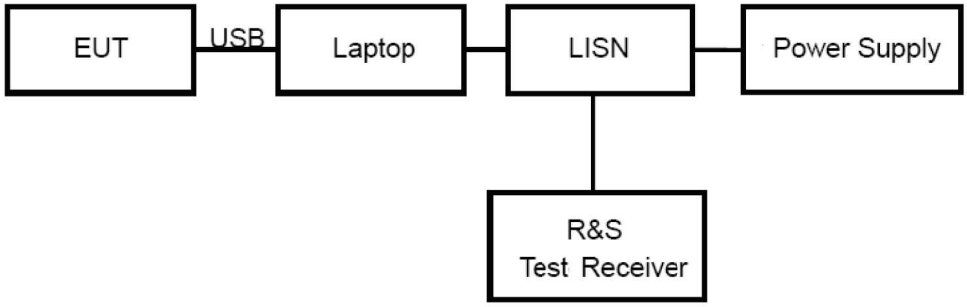
Temperature	Relative humidity	Pressure
24°C ~26°C	50%~55%	102.5kPa

Methods of Measurement

The EUT is placed on a non-metallic table of 80cm height above the horizontal metal reference ground plane. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.4-2014. Connect the AC power line of the EUT to the L.I.S.N. Use EMI receiver to detect the average and Quasi-peak value. RBW is set to 9 kHz, VBW is set to 30kHz. The measurement result should include both L line and N line.

During the test, EUT is connected to a laptop via a USB cable in the case of Transfer Data mode. The EUT is used as the peripheral equipment of the PC. The data is transferred from EUT to PC;

Test Setup



Note: Power Supply is AC Power source and it is used to change the voltage 120V/60Hz.

Limits

Frequency (MHz)	Conducted Limits(dBμV)	
	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.		

Measurement Uncertainty

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The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor *k* = 1.96. U= 2.57 dB.

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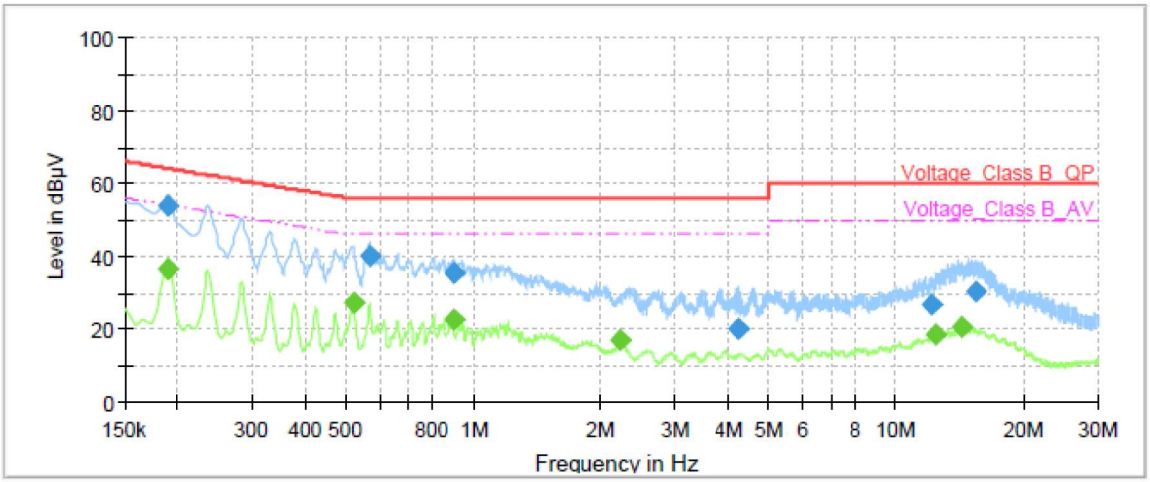
Test Results

Following plots, Blue trace uses the peak detection; Green trace uses the average detection.



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.19	---	36.55	54.11	17.56	1000.0	9.000	L1	ON	19.17
0.19	53.83	---	64.11	10.28	1000.0	9.000	L1	ON	19.17
0.52	---	27.25	46.00	18.75	1000.0	9.000	L1	ON	19.24
0.57	39.99	---	56.00	16.01	1000.0	9.000	L1	ON	19.26
0.90	---	22.68	46.00	23.32	1000.0	9.000	L1	ON	19.24
0.90	35.16	---	56.00	20.84	1000.0	9.000	L1	ON	19.24
2.24	---	16.78	46.00	29.22	1000.0	9.000	L1	ON	19.06
4.23	19.76	---	56.00	36.24	1000.0	9.000	L1	ON	19.10
12.10	26.80	---	60.00	33.20	1000.0	9.000	L1	ON	19.41
12.40	---	18.63	50.00	31.37	1000.0	9.000	L1	ON	19.43
14.23	---	20.46	50.00	29.54	1000.0	9.000	L1	ON	19.48
15.37	30.47	---	60.00	29.53	1000.0	9.000	L1	ON	19.46

Remark: Correct factor=cable loss + LISN factor

L line

Conducted Emission from 150 KHz to 30 MHz

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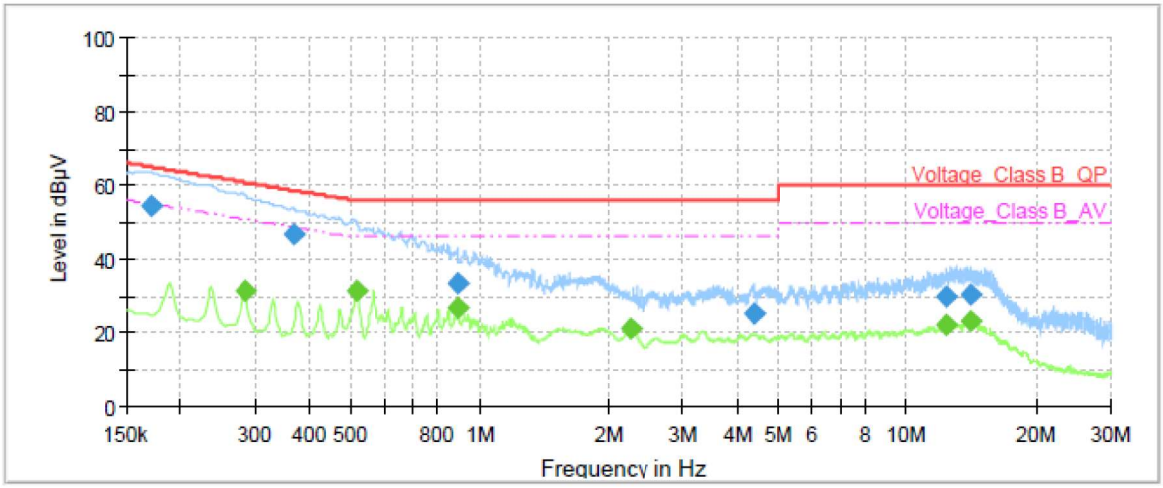

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.17	54.45	---	64.95	10.50	1000.0	9.000	N	ON	19.16
0.28	---	31.52	50.74	19.22	1000.0	9.000	N	ON	19.18
0.37	46.48	---	58.59	12.11	1000.0	9.000	N	ON	19.19
0.52	---	31.45	46.00	14.55	1000.0	9.000	N	ON	19.24
0.89	33.52	---	56.00	22.48	1000.0	9.000	N	ON	19.24
0.89	---	26.46	46.00	19.54	1000.0	9.000	N	ON	19.24
2.26	---	20.91	46.00	25.09	1000.0	9.000	N	ON	19.06
4.37	25.31	---	56.00	30.69	1000.0	9.000	N	ON	19.10
12.32	---	22.02	50.00	27.98	1000.0	9.000	N	ON	19.39
12.35	29.81	---	60.00	30.19	1000.0	9.000	N	ON	19.40
14.06	---	23.08	50.00	26.92	1000.0	9.000	N	ON	19.45
14.19	30.34	---	60.00	29.66	1000.0	9.000	N	ON	19.44

Remark: Correct factor=cable loss + LISN factor

N line

Conducted Emission from 150 KHz to 30 MHz

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4 Main Test Instrument

Name	Manufacturer	Type	Serial Number	Calibration Date	Expiration Time
Spectrum Analyzer	R&S	FSV40	15195-01-00	2019-05-19	2020-05-18
EMI Test Receiver	R&S	ESCI	100948	2019-05-19	2020-05-18
Trilog Antenna	SCHWARZBECK	VULB 9163	9163-201	2017-11-18	2019-11-17
Horn Antenna	R&S	HF907	100126	2018-07-07	2020-07-06
Standard Gain Horn	ETS-Lindgren	3160-09	00102643	2018-06-20	2020-06-19
Standard Gain Horn	STEATITE	QSH-SL-26-40-K-15	16779	2017-07-20	2020-07-19
EMI Test Receiver	R&S	ESR	101667	2019-05-19	2020-05-18
LISN	R&S	ENV216	101171	2016-12-16	2019-12-15
Bore Sight Antenna mast	ETS	2171B	00058752	/	/
Test software	EMC32	R&S	9.26.0	/	/

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

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