



EMC TEST REPORT

Applicant Huawei Technologies Co., Ltd.
FCC ID QISLIO-LX9
Product Smart Phone
Model LIO-L29, LIO-L09
Report No. R1910H0225-E1V1
Issue Date January 20, 2020

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.

No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China

TEL: +86-021-50791141/2/3

FAX: +86-021-50791141/2/3-8000



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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	Refer to the Original
Test Date: July 20, 2019~ August 11, 2019 and October 31, 2019~ November 2, 2019			

LIO-L29, LIO-L09 (Report No.: 1910H0225-E1V1) is a variant model of LIO-L29, LIO-L09 (Report No.: R1908H0163-E1). Test values partial duplicated from Original for variant. There is only tested Radiated Emission for variant in this report. The detailed product change description please refers to the difference statement of LIO-L29.

LIO-L29, LIO-L09 (Report No.: R1908H0163-E1) is a variant model of LIO-L29, LIO-L09 (Report No.: R1907H0137-E1V1). Test values duplicated from Original for variant. There is no test for variant in this report. The detailed product change description please refers to the difference statement.

Note: This revised report (Report No.: 1910H0225-E1V1) supersedes and replaces the previously issued report (Report No.: 1910H0225-E1). Please discard or destroy the previously issued report and dispose of it accordingly.

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 Testing Location

Company: TA Technology (Shanghai) Co., Ltd.
Address: No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China
City: Shanghai
Post code: 201201
Country: P. R. China
Contact: Xu Kai
Telephone: +86-021-50791141/2/3
Fax: +86-021-50791141/2/3-8000
Website: <http://www.ta-shanghai.com>
E-mail: xukai@ta-shanghai.com

2 General Description of Equipment under Test

2.1 Client Information

Applicant	Huawei Technologies Co., Ltd.
Applicant address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
Manufacturer	Huawei Technologies Co., Ltd.
Manufacturer address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

2.2 General information

EUT Description			
Device Type:	Portable Device		
Model:	LIO-L29, LIO-L09		
SN:	YDM0119625000032		
HW Version:	HL1LIONM		
SW Version:	10.0.0.152(C432E152R4P1)		
Antenna Type:	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 12	699 ~ 716	729 ~ 746
	LTE Band 17	777 ~ 787	746 ~ 756
	LTE Band 26	824 ~ 849	869 ~ 894
	LTE Band 38	2570 ~ 2620	2570 ~ 2620
	LTE Band 41	2496 ~ 2690	2496 ~ 2690
	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 ~ 5850	5725 ~ 5850
	NFC	13.56	13.56
	Wireless Charging	0.110 ~0.148	0.110 ~0.148
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, $\pi/4$ -DQPSK, 8-DPSK Bluetooth v5.1 LE: GFSK Bluetooth UHD: GFSK, $\pi/4$ -DQPSK, 8-DPSK WLAN 802.11b: DSSS WLAN 802.11a/g/n/ac: OFDM NFC: ASK		
EUT Accessory			
Adapter 1	Manufacturer: HUAWEI Technologies Co., Ltd. Model: HW-100400E00		
Adapter 2	Manufacturer: HUAWEI Technologies Co., Ltd. Model: HW-100400B00		
Adapter 3	Manufacturer: HUAWEI Technologies Co., Ltd. Model: HW-100400U00		
Adapter 4	Manufacturer: HUAWEI Technologies Co., Ltd. Model: HW-100400A00		
Adapter 5	Manufacturer: HUAWEI Technologies Co., Ltd. Model: HW-100400J00		
Adapter 6	Manufacturer: HUAWEI Technologies Co., Ltd. Model: HW-100400R00		
Adapter 7	Manufacturer: HUAWEI Technologies Co., Ltd. Model: HW-100400Z00		
Adapter 8	Manufacturer: HUAWEI Technologies Co., Ltd. Model: HW-100400I00		
Adapter 9	Manufacturer: HUAWEI Technologies Co., Ltd. Model: HW-100400E01		
Adapter 10	Manufacturer: HUAWEI Technologies Co., Ltd. Model: HW-100400B01		
Adapter 11	Manufacturer: HUAWEI Technologies Co., Ltd.		



	Model: HW-100400U01
Adapter 12	Manufacturer: HUAWEI Technologies Co., Ltd. Model: HW-100400A01
Adapter 13	Manufacturer: HUAWEI Technologies Co., Ltd. Model: HW-100400J01
Adapter 14	Manufacturer: HUAWEI Technologies Co., Ltd. Model: HW-100400K01
Battery 1	Manufacturer: HUAWEI Technologies Co., Ltd. (Sunwoda, Murata) Model: HB555591EEW
Battery 2	Manufacturer: HUAWEI Technologies Co., Ltd. (Sunwoda, ATL) Model: HB555591EEW
Battery 3	Manufacturer: HUAWEI Technologies Co., Ltd. (SCUD) Model: HB555591EEW
Earphone 1	Manufacturer: Jiangxi Lianchuang Hongsheng Electronic Co., LTD Model: MEND1632B729001
Earphone 2	Manufacturer: Jiangxi Lianchuang Hongsheng Electronic Co., LTD Model: MEND1632B729000
Earphone 3	Manufacturer: GoerTek Inc Model: WINDY-C
Earphone 4	Manufacturer: Boluo County Quancheng Electronic Co.,Ltd Model: 1331-3301-6001-TC-296
Earphone 5	Manufacturer: Foster Electric Co.,(GuangZhou)LTD.Sales Dep. Model: 618017
USB Cable 1	Manufacturer: Ningbo Broad Telecommunication Co., Ltd Model: WA0009
USB Cable 2	Manufacturer: LUXSHARE Precision Industry Co., Ltd. Model: L99UC117-CS-H
USB Cable 3	Manufacturer: HUIZHOU DEHONG TECHNOLOGY CO.,LTD. Model: 330-50465
USB Cable 4	Manufacturer: FOXCONN INTERCONNECT TECHNOLOGY LIMITED Model: CUDU01B-HC350-EH
Wireless charging base	Model: CP61
Auxiliary test equipment	
PC	PC Manufacturer: Microsoft Corporation Model: L20170076
Note: The information of the EUT is declared by the manufacturer.	

LIO-L29 is dual SIM smart phone. LIO-L09 is single SIM smart phone. The model LIO-L29 and LIO-L09 are identical except for LIO-L09 support single SIM card which deleted by software.



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)

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:	Front camera On +earphone + Idle
Mode 8:	Rear camera On + earphone + Idle
Mode 9:	Earphone+MP3+Idle
Mode 10:	Earphone +Play video+Idle
Mode 11:	base station in stand-by, idle mode
Mode 12:	Communication before charging, adjustment charging mode / position
Mode 13:	Communication
Mode 14:	energy transmission

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:	base station in stand-by, idle mode
Mode 8:	Communication before charging, adjustment charging mode / position
Mode 9:	Communication
Mode 10:	energy transmission

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.

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

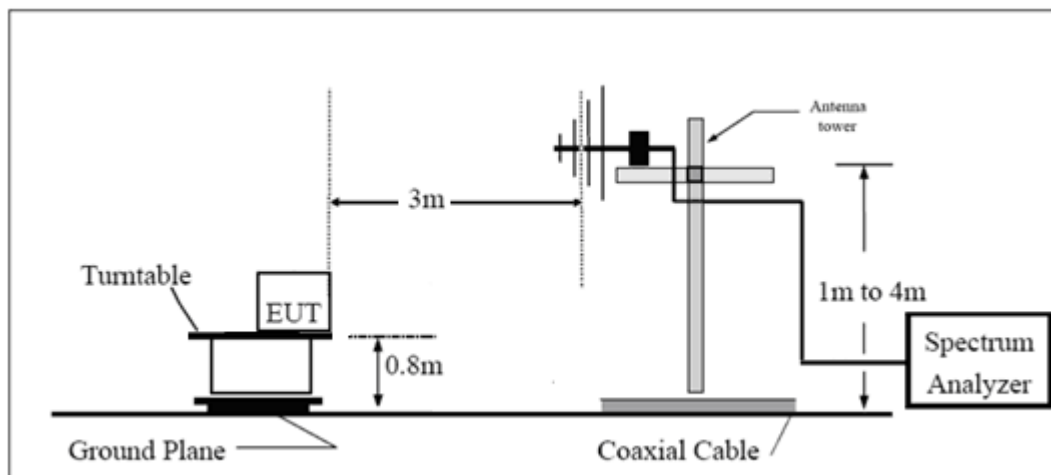
(b) AVERAGE: RBW=1MHz / VBW=3MHz / Sweep=AUTO

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.

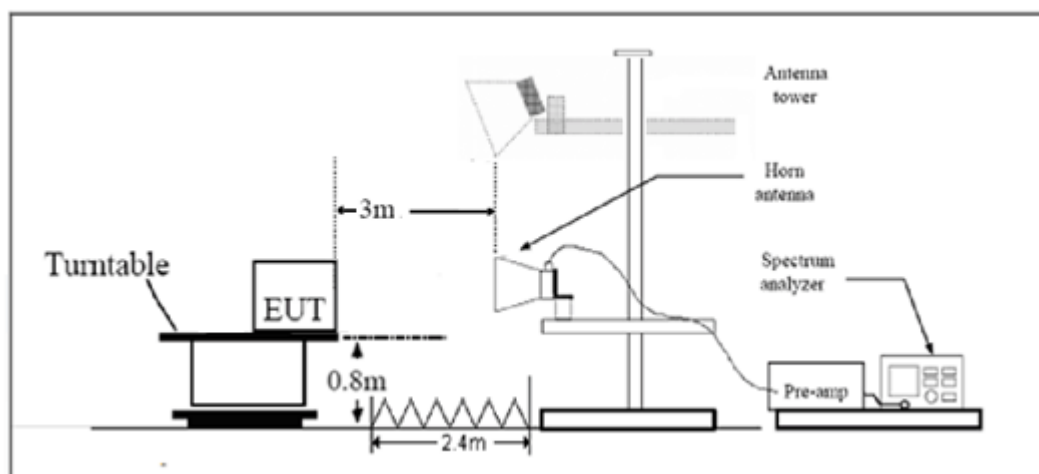
During the test, EUT is connected to a laptop via a USB cable in the case of Transfer Data mode. The EUT is used as the peripheral equipment of the PC. The data is transferred from EUT to PC.

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.

Limits

Frequency (MHz)	Field Strength (dB μ V/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
1000-5 th 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

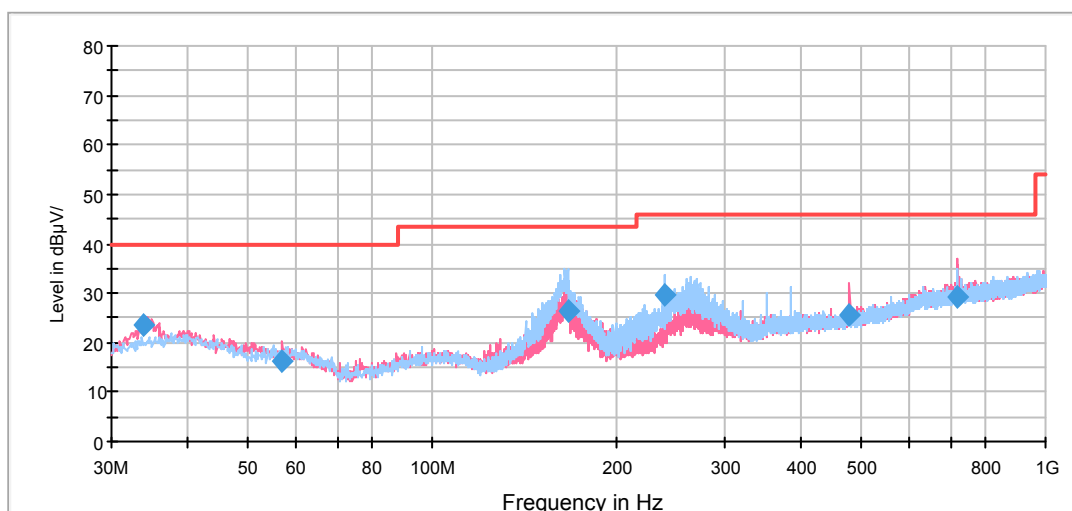
Test Results

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.

Variant

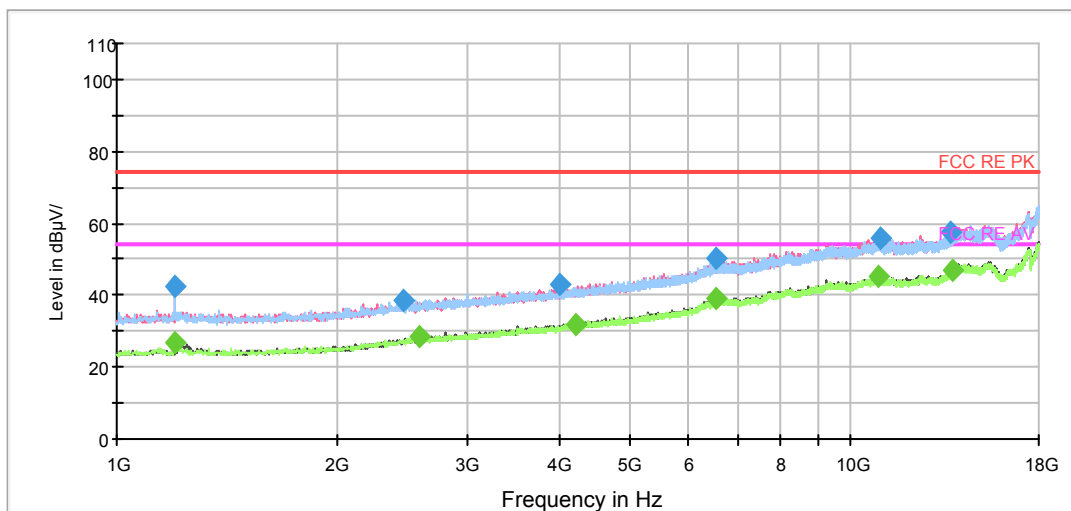


Radiated Emission from 30MHz to 1GHz

Frequency (MHz)	Quasi-Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
33.765000	23.5	125.0	V	220.0	15.8	16.5	40.0
57.038750	16.4	100.0	V	0.0	13.9	23.6	40.0
166.325000	26.5	125.0	H	32.0	10.4	17.0	43.5
240.045000	29.8	125.0	H	280.0	13.6	16.2	46.0
480.000000	25.5	114.0	V	0.0	20.8	20.5	46.0
720.716250	29.2	100.0	V	344.0	24.1	16.8	46.0

Remark: 1. Correction Factor = Antenna factor+ Insertion loss(cable loss+amplifier gain)

2. Margin = Limit – Quasi-Peak

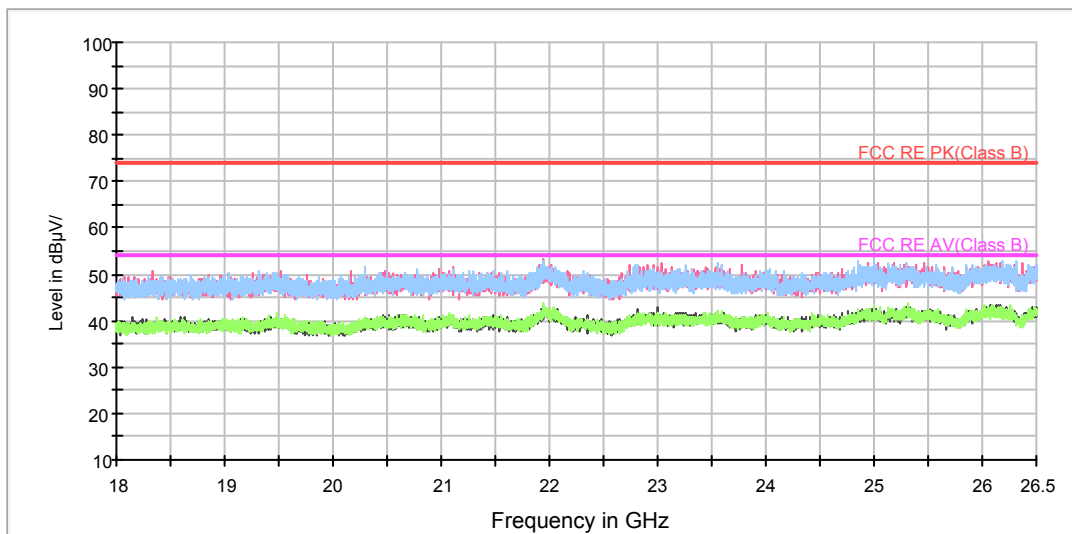


Radiated Emission from 1GHz to 18GHz

Frequency (MHz)	Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1199.750000	42.6	200.0	V	155.0	-11.2	31.4	74.0
2451.375000	38.7	200.0	V	270.0	-6.6	35.3	74.0
4021.750000	42.8	200.0	V	244.0	-2.6	31.2	74.0
6563.250000	50.1	200.0	H	310.0	5.0	23.9	74.0
10934.375000	55.6	200.0	V	66.0	13.5	18.4	74.0
13658.625000	57.4	100.0	V	288.0	15.1	16.6	74.0

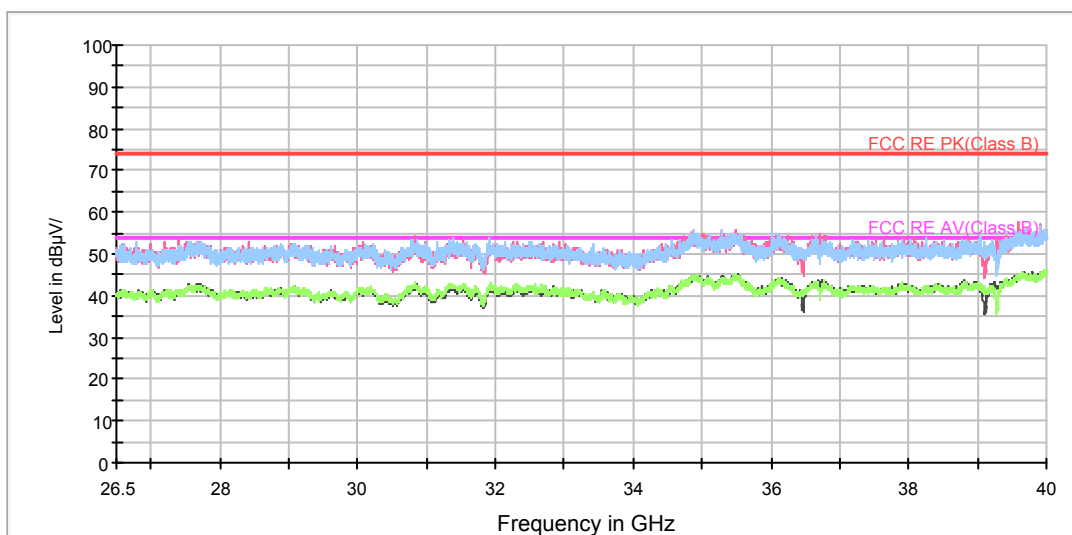
Frequency (MHz)	Average (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1199.750000	26.7	200.0	V	155.0	-11.2	27.3	54.0
2578.875000	28.3	100.0	V	0.0	-6.2	25.7	54.0
4221.500000	31.9	200.0	H	359.0	-2.1	22.1	54.0
6529.250000	39.0	100.0	V	358.0	4.9	15.0	54.0
10894.000000	45.2	200.0	H	322.0	13.5	8.8	54.0
13724.500000	46.8	100.0	V	252.0	15.3	7.2	54.0

RE 18-26.5GHz PK+AV



Radiated Emission from 18GHz to 26.5GHz

RE 26.5-40GHz PK+AV



Radiated Emission from 26.5GHz to 40GHz

3.2 Conducted Emission

Ambient condition

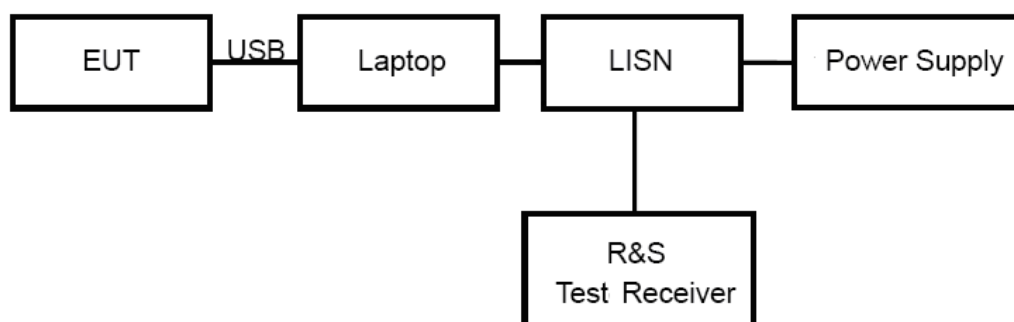
Temperature	Relative humidity	Pressure
24°C ~26°C	50%~55%	102.5kPa

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.

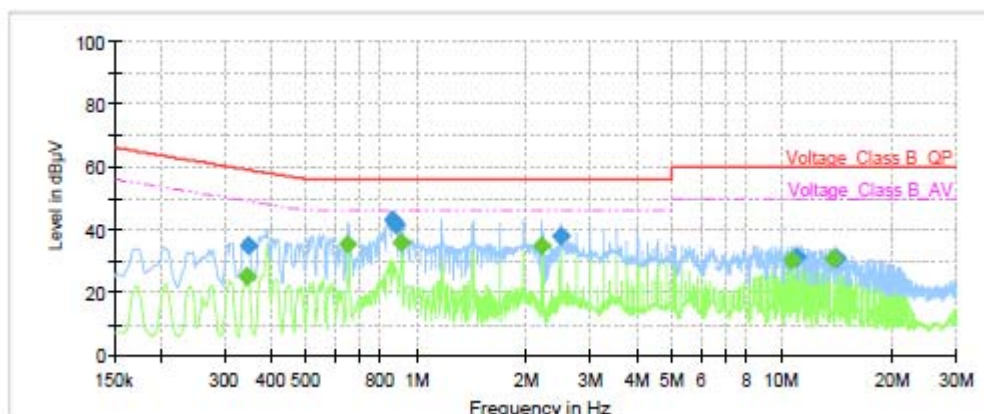
Measurement Uncertainty

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.

Test Results

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

Original

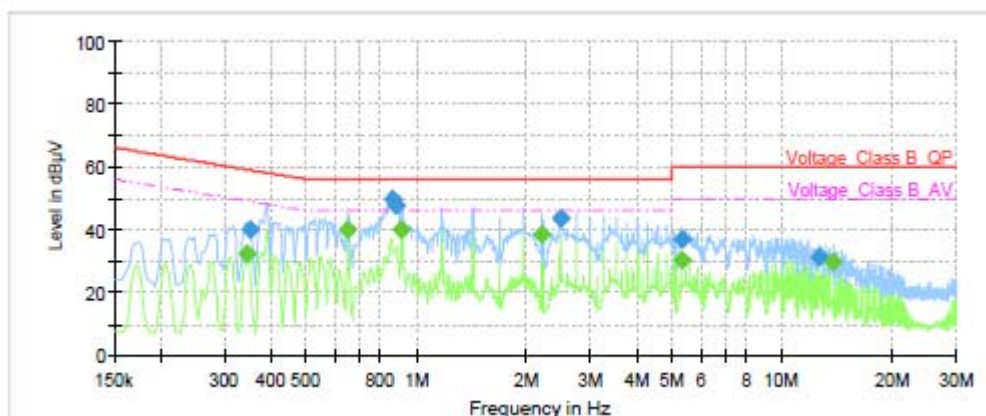


Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.35	---	25.31	49.06	23.75	1000.0	9.000	L1	ON	19.18
0.35	34.73	---	59.01	24.28	1000.0	9.000	L1	ON	19.17
0.65	---	35.43	46.00	10.57	1000.0	9.000	L1	ON	19.28
0.87	43.18	---	56.00	12.82	1000.0	9.000	L1	ON	19.24
0.88	41.53	---	56.00	14.47	1000.0	9.000	L1	ON	19.24
0.91	---	35.87	46.00	10.13	1000.0	9.000	L1	ON	19.24
2.22	---	34.80	46.00	11.20	1000.0	9.000	L1	ON	19.07
2.48	38.16	---	56.00	17.84	1000.0	9.000	L1	ON	19.03
10.68	---	30.23	50.00	19.77	1000.0	9.000	L1	ON	19.36
10.95	31.46	---	60.00	28.54	1000.0	9.000	L1	ON	19.36
13.81	---	30.52	50.00	19.48	1000.0	9.000	L1	ON	19.48
14.07	30.86	---	60.00	29.14	1000.0	9.000	L1	ON	19.48

Remark: Correct factor=cable loss + LISN factor

L line

Conducted Emission from 150 KHz to 30 MHz



Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.34	---	32.52	49.12	16.60	1000.0	9.000	N	ON	19.18
0.35	39.86	---	58.90	19.04	1000.0	9.000	N	ON	19.18
0.65	---	39.97	46.00	6.03	1000.0	9.000	N	ON	19.28
0.86	49.49	---	56.00	6.51	1000.0	9.000	N	ON	19.24
0.88	47.51	---	56.00	8.49	1000.0	9.000	N	ON	19.24
0.91	---	40.06	46.00	5.94	1000.0	9.000	N	ON	19.24
2.22	---	38.69	46.00	7.31	1000.0	9.000	N	ON	19.07
2.48	43.73	---	56.00	12.27	1000.0	9.000	N	ON	19.03
5.34	37.18	---	60.00	22.82	1000.0	9.000	N	ON	19.10
5.34	---	30.47	50.00	19.53	1000.0	9.000	N	ON	19.10
12.64	31.49	---	60.00	28.51	1000.0	9.000	N	ON	19.44
13.81	---	29.67	50.00	20.34	1000.0	9.000	N	ON	19.45

Remark: Correct factor=cable loss + LISN factor

N line

Conducted Emission from 150 KHz to 30 MHz

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 *****