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检测
TESTING
CNAS L2264

EMC TEST REPORT

Applicant Huawei Technologies Co., Ltd.
FCC ID QISR227H
Product Mobile WiFi
Brand HUAWEI
Model R227h
Report No. RHA1705-0046EMC01R1
Issue Date June 8, 2017

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC Code CFR47 Part15B (2016)/ 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

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Summary of measurement results

Number	Test Case	Clause in FCC Rules	Conclusion
1	Radiated Emission	15.109, ANSI C63.4-2014	PASS
2	Conducted Emission	15.107, ANSI C63.4-2014	PASS
Date of Testing: May 9, 2017~ May 18, 2017			

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. This report must not be used by the client to claim product certification, approval, or endorsement by any government agencies.

1.2 Test facility

CNAS (accreditation number: L2264)

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

FCC (recognition number is 428261)

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-766)

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.



1.3 Testing Location

Company: TA Technology (Shanghai) Co., Ltd.
Address: No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China
City: Shanghai
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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.China
Manufacturer	Huawei Technologies Co., Ltd.
Manufacturer address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District Shenzhen 518129 P.R.China

2.2 General information

EUT Description	
Device Type:	Portable Device
Product Name:	Mobile WiFi
Model Number:	R227h
HW Version:	CL1E5785SM06
SW Version:	21.130.00.00.00
IMEI:	/
Antenna Type:	Internal Antenna
Used Host Product:	PC Manufacturer: lenovo Model: Thinkpad T540p (SN : SL10E37685)
Test Mode:	Transfer Data Mode
EUT Accessory	
Adapter 1	Manufacturer: Huizhou BYD Electronic Co., Ltd Model: HW-050200E01
Adapter 2	Manufacturer: Shenzhen Huntkey Electronic Co., Ltd Model: HW-050200E01
Adapter 3	Manufacturer: Huizhou BYD Electronic Co., Ltd Model: HW-050200U01
Adapter 4	Manufacturer: Shenzhen Huntkey Electronic Co., Ltd Model: HW-050200U01
Adapter 5	Manufacturer: Dongguan Phitek Electronic Co., Ltd Model: HW-050200U01
Adapter 6	Manufacturer: Huizhou BYD Electronic Co., Ltd Model: HW-050200B01
Adapter 7	Manufacturer: Shenzhen Huntkey Electronic Co., Ltd Model: HW-050200B01
Adapter 8	Manufacturer: Dongguan Phitek Electronic Co., Ltd Model: HW-050200B01
Adapter 9	Manufacturer: Huizhou BYD Electronic Co., Ltd Model: HW-050200A01
Adapter 10	Manufacturer: Shenzhen Huntkey Electronic Co., Ltd Model: HW-050200A01
Adapter 11	Manufacturer: Dongguan Phitek Electronic Co., Ltd Model: HW-050200A01
Battery	Manufacturer: Huawei Technologies Co., Ltd. Model: HB824666RBC Power Rating: DC 3.8V, 3000mAh, Li-ion



USB Extend Cable

100m Cable, Shielded

Remark: The information of the EUT is declared by the manufacturer. Please refer to the specifications or user manual for details.



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 (2016)

ANSI C63.4 (2014)

2.4 Test Mode

Test Mode	
Mode 1:	Adapter + USB cable+ Idle
Mode 2:	USB Copy(EUT with PC) + USB cable + Idle
Mode 3:	Idle

During the test, the preliminary test was performed in all modes with all frequency bands, mode 2 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

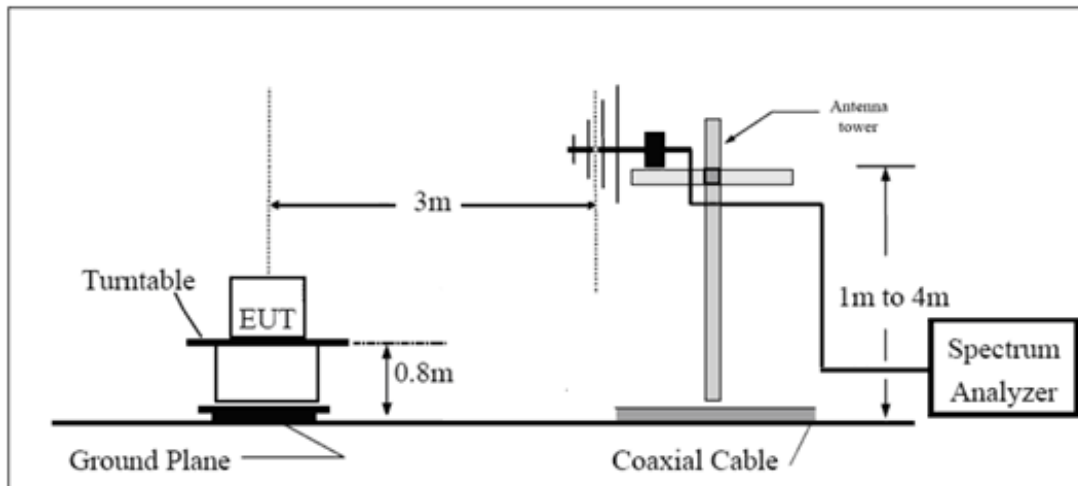
(b) AVERAGE: RBW=1MHz / VBW=3MHz / Sweep=AUTO

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 stand-up position (Z axis) and the worst case was recorded.

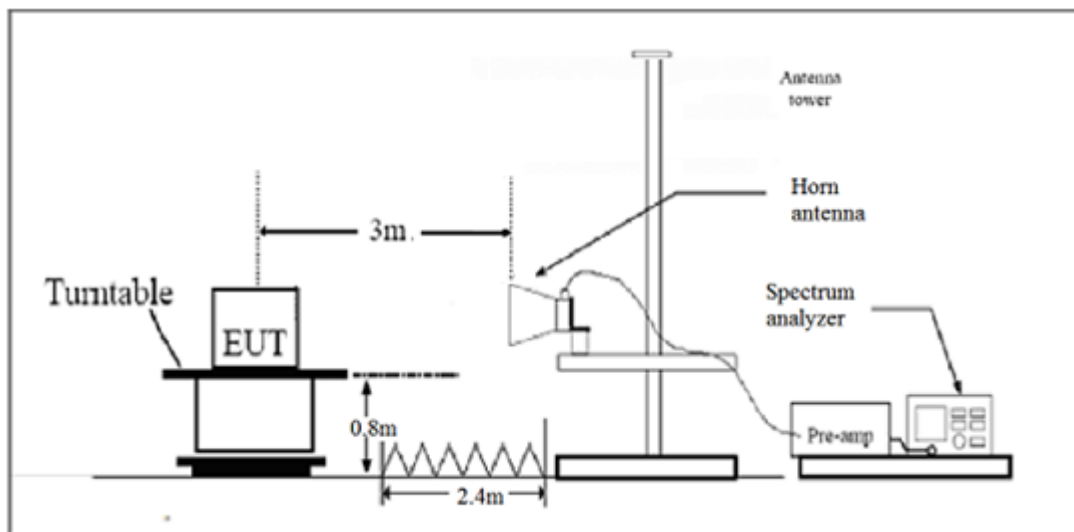
During the test, EUT is connected to a laptop via a USB cable in the case of Transfer Data mode. The EUT is used as the peripheral equipment of the PC. The data is transferred from EUT to PC; PC is connected to server via a long LAN cable.

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

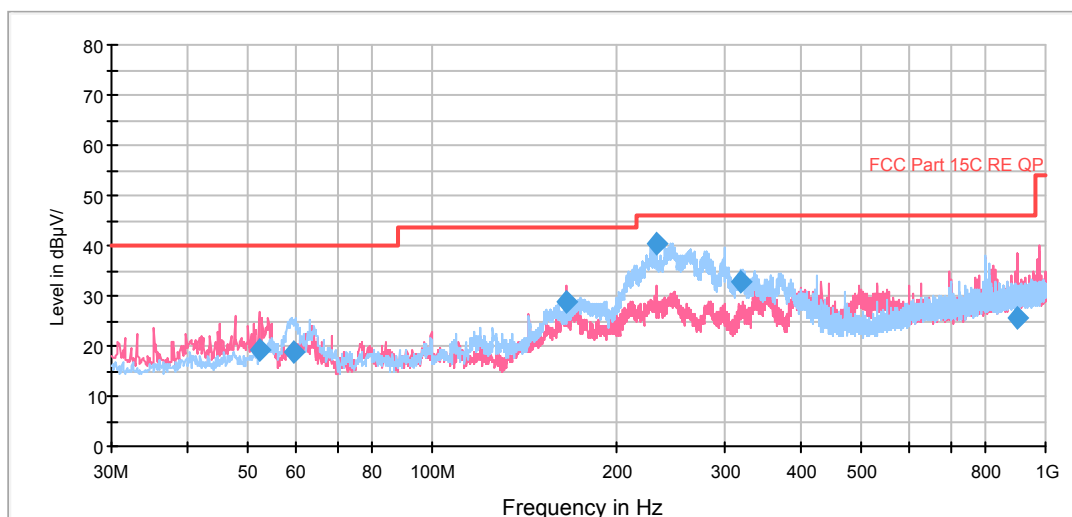
Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$. $U = 3.92$ dB.

Test Results

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.

FCC RE 0.03-1GHz QP Class B

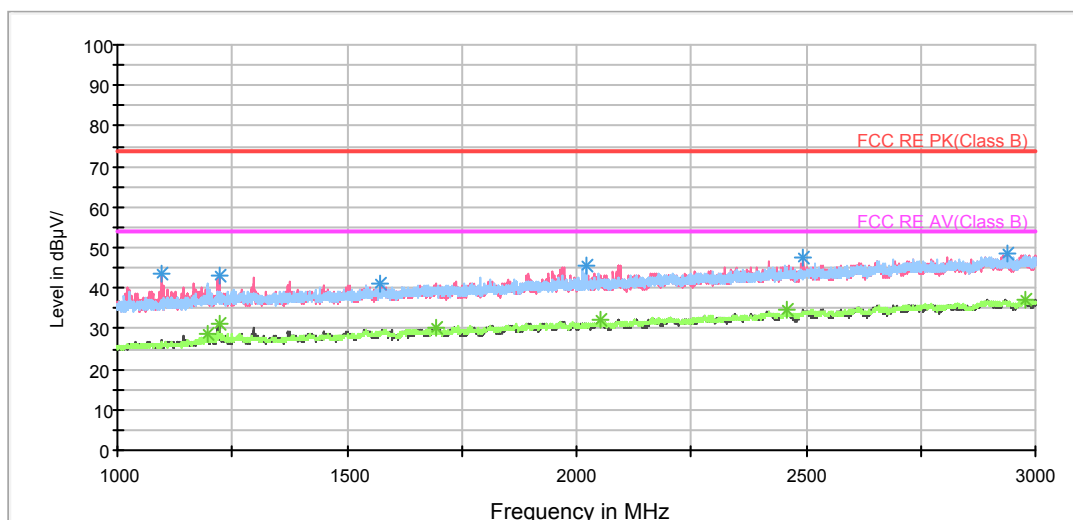


Radiated Emission from 30MHz to 1GHz

Frequency (MHz)	Quasi-Peak (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
52.548750	19.3	32.3	100.0	V	74.0	-13.0	20.7	40.0
59.700000	18.7	31.3	125.0	H	153.0	-12.6	21.3	40.0
166.001250	28.9	38.9	100.0	V	22.0	-10.0	14.6	43.5
232.366250	40.4	53.8	125.0	H	84.0	-13.4	5.6	46.0
319.712500	32.8	49.1	100.0	H	52.0	-16.3	13.2	46.0
899.368750	25.7	52.5	100.0	V	309.0	-26.8	20.3	46.0

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

RE 1G-3GHz PK+AV

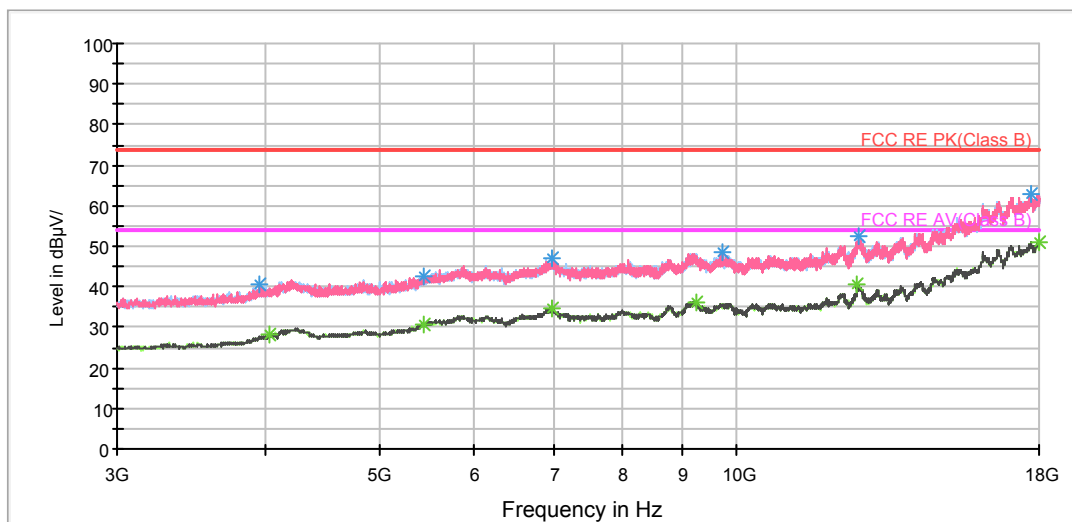


Radiated Emission from 1GHz to 3GHz

Frequency (MHz)	Peak (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1096.750000	43.4	52.3	100.0	V	212.0	-8.9	30.6	74
1222.500000	43.2	51.0	100.0	V	229.0	-7.8	30.8	74
1574.000000	41.1	47.5	100.0	V	265.0	-6.4	32.9	74
2021.250000	45.5	49.1	100.0	H	244.0	-3.6	28.5	74
2495.500000	47.4	47.3	100.0	V	229.0	0.1	26.6	74
2937.750000	48.4	46.5	100.0	V	96.0	1.9	25.6	74

Frequency (MHz)	Average (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1196.500000	28.8	37.0	100.0	H	222.0	-8.2	25.2	54
1221.500000	31.3	39.1	100.0	V	229.0	-7.8	22.7	54
1696.000000	30.1	35.1	100.0	V	247.0	-5.0	23.9	54
2052.750000	32.0	35.2	100.0	V	229.0	-3.2	22.0	54
2457.000000	34.5	35.0	100.0	V	335.0	-0.5	19.5	54
2980.000000	37.1	34.9	100.0	V	0.0	2.2	16.9	54

RE 3-18GHz PK+AV

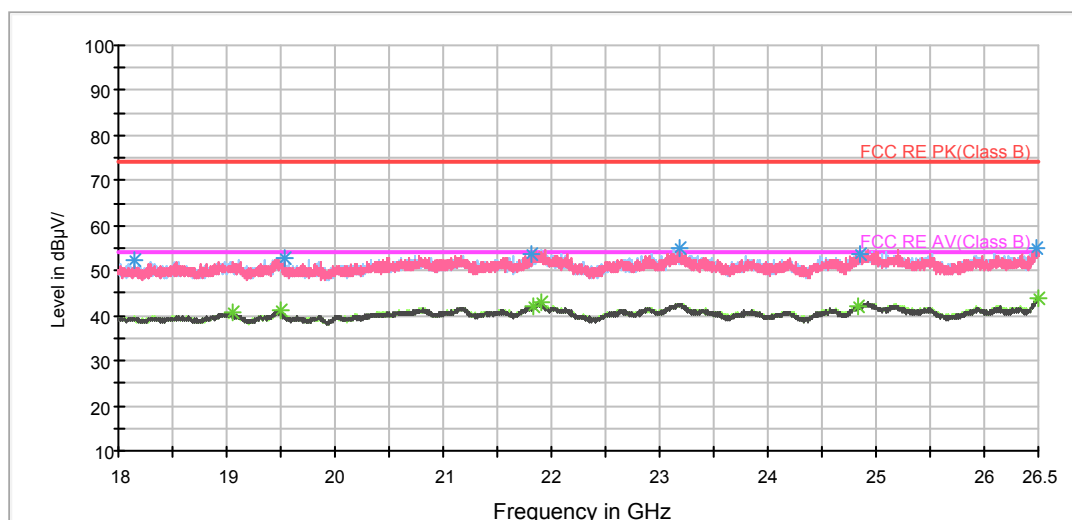


Radiated Emission from 3GHz to 18GHz

Frequency (MHz)	Peak (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
3954.375000	40.4	41.4	100.0	V	100.0	-1.0	33.6	74
5446.875000	42.7	39.9	100.0	H	111.0	2.8	31.3	74
6995.625000	47.0	40.5	100.0	V	9.0	6.5	27.0	74
9744.375000	48.5	38.6	100.0	V	119.0	9.9	25.5	74
12660.000000	52.2	38.4	100.0	H	36.0	13.8	21.8	74
17701.875000	63.1	38.4	100.0	V	137.0	24.7	10.9	74

Frequency (MHz)	Average (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
4036.875000	28.1	29.1	100.0	H	74.0	-1.0	25.9	54
5443.125000	30.9	28.0	100.0	H	186.0	2.9	23.1	54
6995.625000	34.8	28.3	100.0	V	9.0	6.5	19.2	54
9240.000000	36.3	26.4	100.0	H	130.0	9.9	17.7	54
12639.375000	40.4	25.9	100.0	V	82.0	14.5	13.6	54
17996.250000	51.1	25.7	100.0	V	63.0	25.4	2.9	54

RE 18-26.5GHz PK+AV



Radiated Emission from 18GHz to 26.5GHz

Frequency (MHz)	Peak (dBuV/m)	Reading value (dBuV/m)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
18140.250000	52.3	51.0	H	246.0	1.3	21.7	74
19532.125000	52.7	52.7	H	201.0	0.0	21.3	74
21806.937500	53.6	55.6	V	90.0	-2.0	20.4	74
23178.625000	55.0	55.1	V	102.0	-0.1	19.0	74
24844.625000	53.5	53.2	H	255.0	0.3	20.5	74
26486.187500	55.1	54.0	H	255.0	1.1	18.9	74

Frequency (MHz)	Average (dBuV/m)	Reading value (dBuV/m)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
19054.000000	40.5	40.9	V	129.0	-0.4	13.5	54
19496.000000	41.3	41.2	V	147.0	0.1	12.7	54
21839.875000	42.1	44.0	V	90.0	-1.9	11.9	54
21912.125000	43.1	44.6	V	90.0	-1.5	10.9	54
24838.250000	42.0	41.7	H	255.0	0.3	12.0	54
26498.937500	44.1	43.0	H	156.0	1.1	9.9	54

3.2 Conducted Emission

Ambient condition

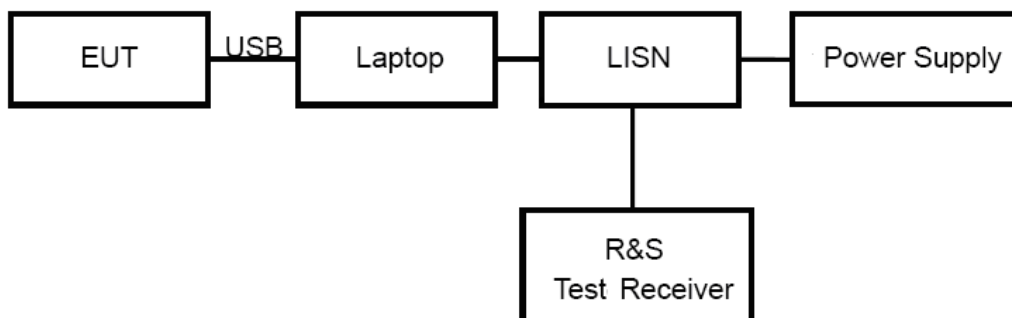
Temperature	Relative humidity	Pressure
24°C ~26°C	50%~55%	102.5kPa

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; PC is connected to server via a long LAN cable.

Test Setup



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

Limits

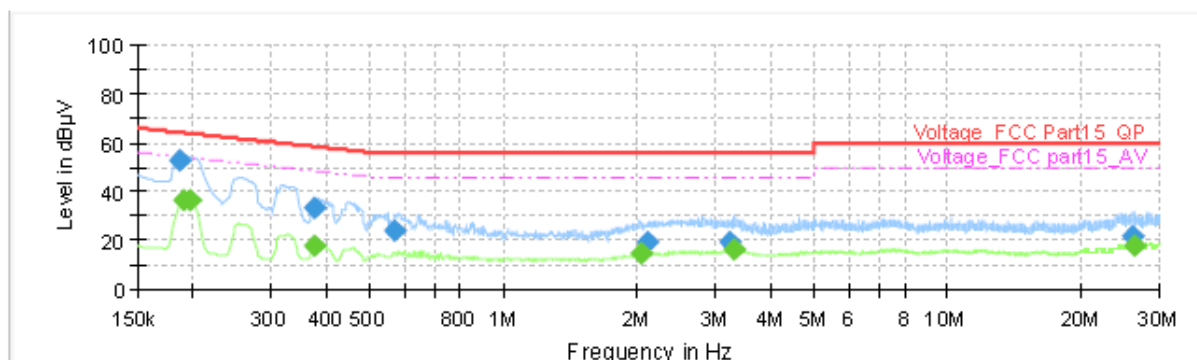
Frequency (MHz)	Conducted Limits(dBμV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 *	56 to 46 *
0.5 - 5	56	46
5 - 30	60	50
*: Decreases with the logarithm of the frequency.		

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$. $U = 2.69$ dB.

Test Results

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

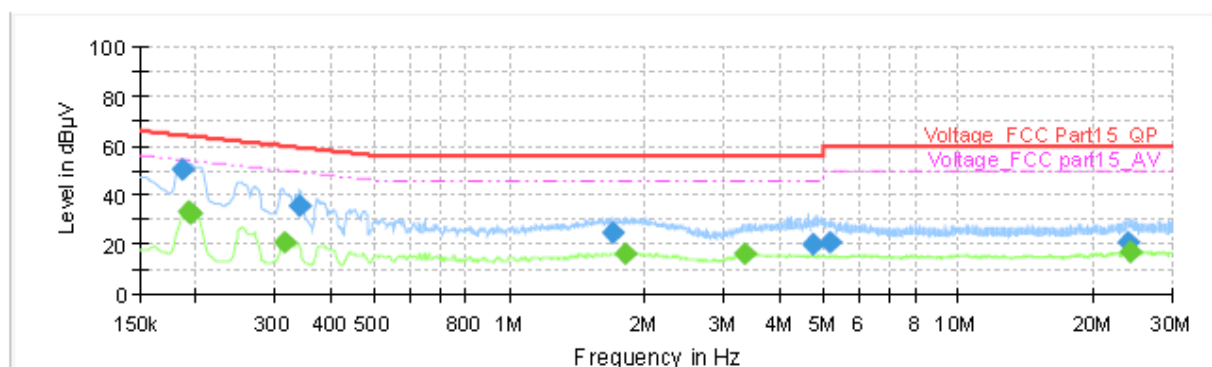


Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.186000	52.75	---	64.21	11.47	1000.0	9.000	L1	ON	19.2
0.190500	---	36.59	54.02	17.43	1000.0	9.000	L1	ON	19.2
0.197250	---	36.16	53.73	17.56	1000.0	9.000	L1	ON	19.2
0.377250	33.00	---	58.34	25.34	1000.0	9.000	L1	ON	19.2
0.377250	---	18.22	48.34	30.12	1000.0	9.000	L1	ON	19.2
0.568500	23.97	---	56.00	32.03	1000.0	9.000	L1	ON	19.3
2.051250	---	14.48	46.00	31.52	1000.0	9.000	L1	ON	19.1
2.100750	19.68	---	56.00	36.32	1000.0	9.000	L1	ON	19.1
3.243750	19.66	---	56.00	36.34	1000.0	9.000	L1	ON	19.1
3.306750	---	15.98	46.00	30.02	1000.0	9.000	L1	ON	19.1
26.011500	21.54	---	60.00	38.46	1000.0	9.000	L1	ON	19.9
26.261250	---	17.66	50.00	32.34	1000.0	9.000	L1	ON	19.9

L line

Conducted Emission from 150 KHz to 30 MHz



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.186000	50.63	---	64.21	13.58	1000.0	9.000	N	ON	19.2
0.192750	---	32.98	53.92	20.93	1000.0	9.000	N	ON	19.2
0.195000	---	32.48	53.82	21.34	1000.0	9.000	N	ON	19.2
0.316500	---	20.63	49.80	29.17	1000.0	9.000	N	ON	19.2
0.341250	35.43	---	59.17	23.75	1000.0	9.000	N	ON	19.2
1.686750	24.53	---	56.00	31.47	1000.0	9.000	N	ON	19.2
1.817250	---	16.01	46.00	29.99	1000.0	9.000	N	ON	19.2
3.351750	---	16.59	46.00	29.41	1000.0	9.000	N	ON	19.1
4.722000	20.05	---	56.00	35.95	1000.0	9.000	N	ON	19.1
5.147250	21.15	---	60.00	38.85	1000.0	9.000	N	ON	19.1
23.889750	20.66	---	60.00	39.34	1000.0	9.000	N	ON	19.6
24.207000	---	17.01	50.00	32.99	1000.0	9.000	N	ON	19.6

N line

Conducted Emission from 150 KHz to 30 MHz

4 Main Test Instrument

Name	Type	Manufacturer	Serial Number	Last Cal.	Cal. Due Date
EMI Test Receiver	ESCI3	R&S	100948	2016-06-01	2017-05-31
Signal Analyzer	FSV30	R&S	100815	2016-12-16	2017-12-15
Trilog Antenna	VULB 9163	SCHWARZBECK	9163-201	2014-12-06	2017-12-05
Horn Antenna	HF907	R&S	100126	2014-12-06	2017-12-05
Horn Antenna	3160-09	ETS-Lindgren	00102643	2015-01-30	2018-01-29
EMI Test Receiver	ESCS30	R&S	100138	2016-12-16	2017-12-15
LISN	ENV216	R&S	101171	2016-12-16	2019-12-15
Bore Sight Antenna mast	2171B	ETS	00058752	NA	NA