
TEST REPORT

Report No.: SRTC2020-9003(F)-0051
Product Name: LTE Ufi
Model Name: MF971R
Applicant: ZTE Corporation
Manufacturer: ZTE Corporation
Specification: FCC Part15B (Certification)
(2020 edition)
FCC ID: SRQ-MF971R

The State Radio_monitoring_center Testing Center (SRTC)
15th Building, No.30 Shixing Street, Shijingshan District,
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1. General information

1.1 Notes of the test report

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written permission of The State Radio_monitoring_center Testing Center (SRTC).

The test results relate only to individual items of the samples which have been tested.

1.2 Information about the testing laboratory

Company: The State Radio_monitoring_center Testing Center (SRTC)
Address: 15th Building, No.30 Shixing Street, Shijingshan District
Testing location: No.80, Zhaojiachang, BeizangCun, Daxing District, Beijing, China.
City: Beijing
Country or Region: China
Contacted person: Liu Jia
Tel: +86 10 57996183
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Email: liujiaf@srtc.org.cn

1.3 Applicant's details

Company: ZTE Corporation
Address: ZTE Plaza, Keji Road South,Hi-Tech, Industrial Park, Nanshan District,Shenzhen, P.R.China,
City: Shenzhen
Country or Region: P.R.China
Contacted person: Gong Yu
Tel: +86-21-68895397
Email: gongyu@zte.com.cn

1.4 Manufacturer's details

Company: ZTE Corporation
Address: ZTE Plaza, Keji Road South,Hi-Tech, Industrial Park, Nanshan District,Shenzhen, P.R.China
City: Shenzhen
Country or Region: P.R.China
Contacted person: Gong Yu
Tel: +86-21-68895397
Email: gongyu@zte.com.cn

1.5 Application details

Date of reception of test sample: 16th Oct. 2020

Date of test: 16th Oct. 2020 to 16th Dec. 2020

1.6 Reference specification

FCC Part 15B, 2020 (Certification)

1.7 Information of EUT

1.7.1 General information

Name of EUT	LTE Ufi
Model Name	MF971R
FCC ID	SRQ-MF971R
Frequency Range	GSM: GSM850/PCS1900 WCDMA: FDD II / FDD V LTE: FDD 2/ FDD 4/ FDD 5/ FDD 7 / TDD 40/TDD 41 WiFi: 2.4~2.4835GHz/5.15-5.25GHz/5.725-5.825GHz
Equipment Class	Class B
Power Supply	Battery or Charger
Rated Power Supply Voltage	3.8V
Extreme Temperature	Lowest: -10°C Highest: +35°C
Extreme Voltage	Minimum: 3.6V Maximum: 4.35V
HW Version	dwbC
SW Version	BD_ZTE_MF971RV1.0.0B01

1.7.2 EUT details

Product Name	Model Name	IMEI
LTE Ufi	MF971R	860832040014198

1.7.3 Auxiliary equipment details

AE (Auxiliary Equipment) 1#: Laptop

Manufacturer	Lenovo
Model Number	E7000
S/N	MP1965WU
Input Voltage	100V-240V AC

AE (Auxiliary Equipment) 2#: USB Cable

Manufacturer	Dongguan Guojun Plastic Electronic Co.,Ltd
Model Number	USB-MU5-B-70-M-L

AE (Auxiliary Equipment) 3#: Battery

Type	Li-Lon
Manufacturer	ZHONGSHAN TIANMAO BATTERY CO.,LTD.
Model Number	Li3820T43P3h715345

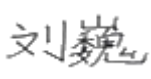
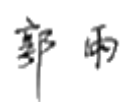
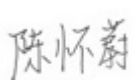
AE (Auxiliary Equipment) 4#: Charger

Manufacturer	SHENZHEN RUIJING INDUSTRIAL CO LTD
Model Number	STC-A51D-Z

2. Test information

2.1 Summary of the test results

No.	Test case	FCC reference	Verdict
1	Conducted emissions	15.107	Pass
2	Radiated emissions	15.109	Pass

Approved By: Mr. LiuWei Director of the test department 	Checked By: Mr. Guo Yu Vice director of the test department 
Tested By: Mr Chen Huaiwei 	Issued date: 2020.12.16

2.2 Test result

2.2.1 Conducted Emissions-FCC Part15.107

Ambient condition:

Temperature	Relative humidity	Pressure
24.7°C	41.1%	100.3kPa

Test Setup with laptop:

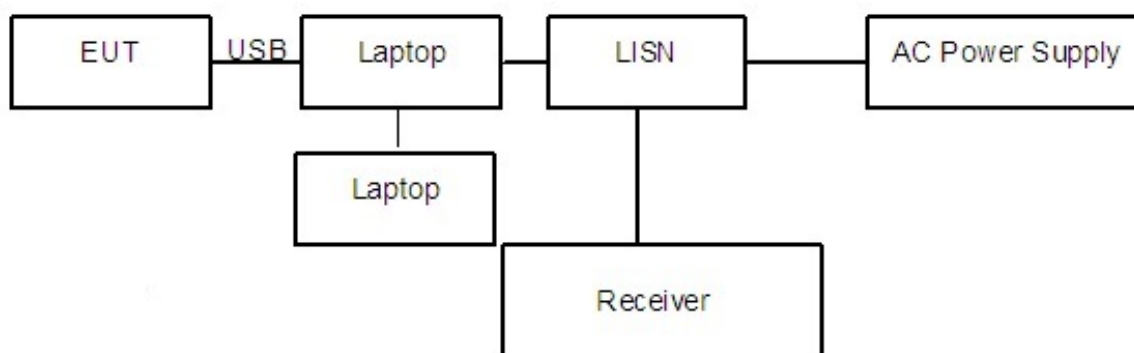


Figure 1

Test Procedure:

The EUT is placed on a non-metallic table 0.8m above the horizontal metal reference ground plane. The EUT was connected with a laptop via the USB cable and transferred the data from laptop to the EUT. The laptop's LAN port is connected with another laptop via cable. And the data transferring between two laptops is maintained.

The AC main power supply of the laptop is connected to LISN and LISN is connected to the reference ground. The test set-up and the test methods are performed according to ANSI C63.4:2014.

Then start the test software EMC32. Sweep the whole frequency band through the range from 150 KHz to 30 MHz with RBW 9kHz, VBW 30kHz. The measurement should be done for both L line and N line. During pre-test, the receiver uses both peak detector and average detector. And the final test, the receiver uses both average detector and Quasi-peak detector.

The data of cable loss has been calibrated in full testing frequency range before the testing.

Test Setup with charger:

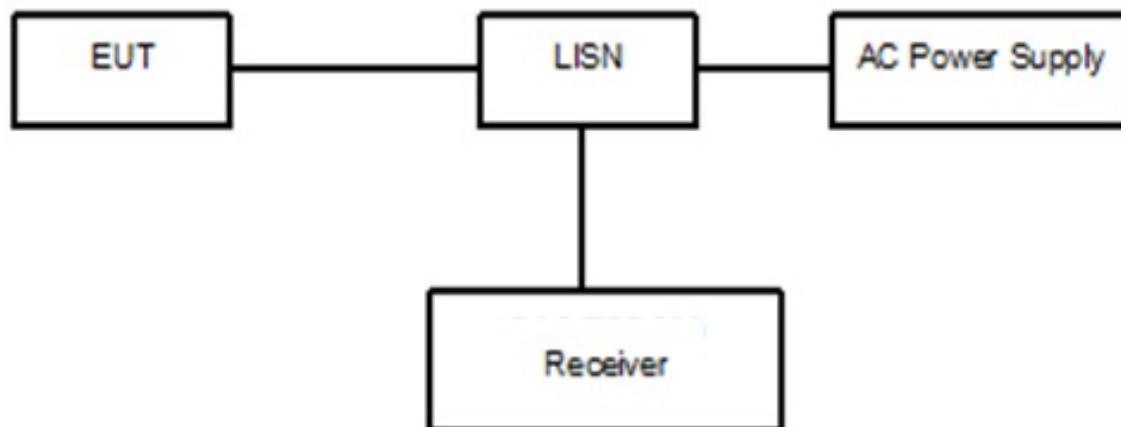


Figure 2

Test Procedure:

The EUT is placed on a non-metallic table 0.8m above the horizontal metal reference ground plane. The EUT is connected with LISN via the charger. The LISN is connected to the reference ground. Open the functions of EUT.

The test set-up and the test methods are performed according to ANSI C63.4:2014. Then start the test software EMC32. Sweep the whole frequency band through the range from 150 KHz to 30 MHz with RBW 9kHz, VBW 30kHz. The measurement should be done for both L line and N line. During pre-test, the receiver uses both peak detector and average detector. And the final test, the receiver uses both average detector and Quasi-peak detector.

The data of cable loss has been calibrated in full testing frequency range before the testing.

A "reference path loss" Corr.(dB) is established and the $L_{\text{cable}} + \text{ATT} + \text{VDF}$ is the attenuation of "reference path loss", and including the cable loss, the attenuation of the attenuator, the voltage division factor of AMN.

The measurement results are obtained as described below:

$$P_{\text{result}} = P_{\text{mea}} + \text{Corr. (dB)}$$

Sample calculation: $(41.98 \text{ dB}\mu\text{V}) = (12.28 \text{ dB}\mu\text{V}) + (29.7 \text{ dB})$, the corresponding frequency is 4.184414MHz.

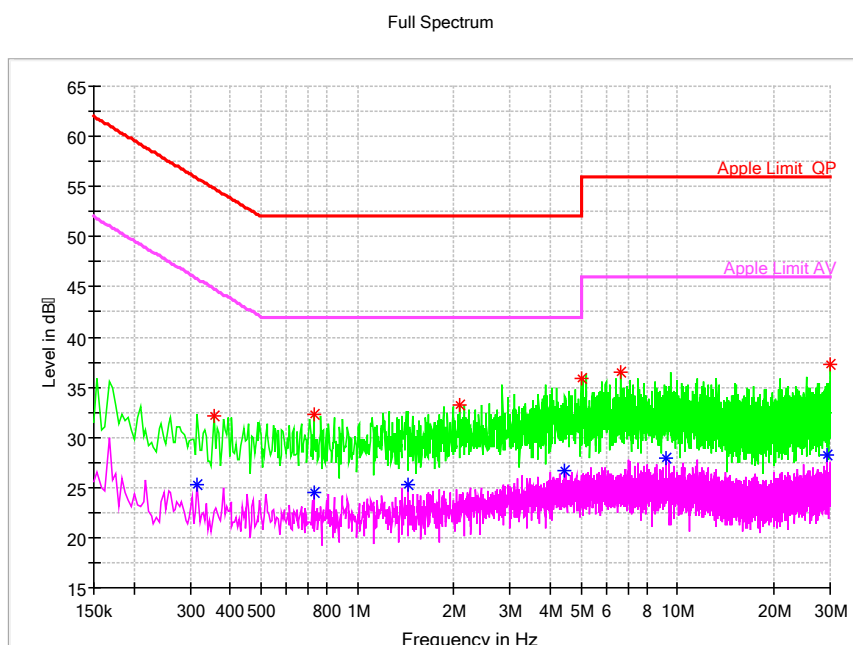
Limit:

Frequency of Emission(MHz)	Limits(dB μ V)	
	Quasi-peak	Average
0.15~0.5	66 to 56*	56 to 46*
0.5~5	56	46
5~30	60	50

Note: * Decreases with the logarithm of the frequency

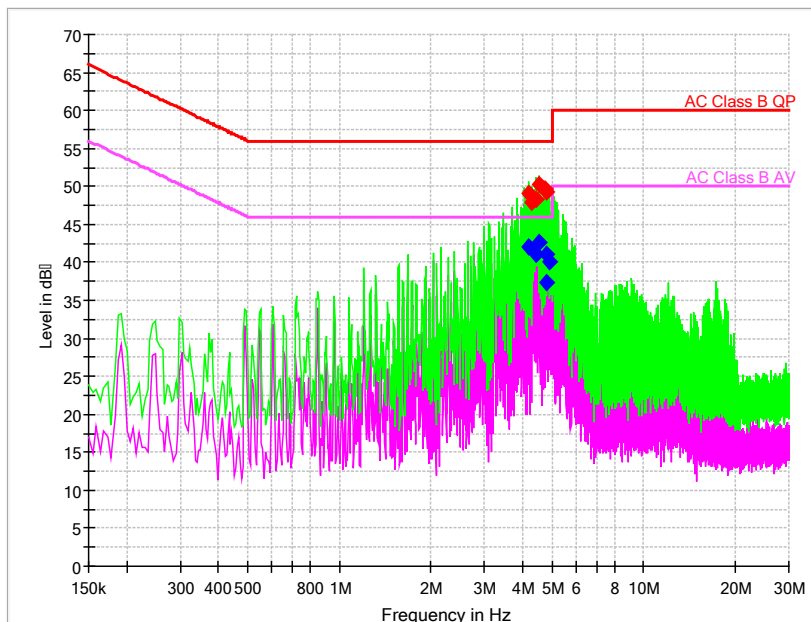
Test result:

Noise Level of the Measuring Instrument



Pic1. Conducted emission L and N Line

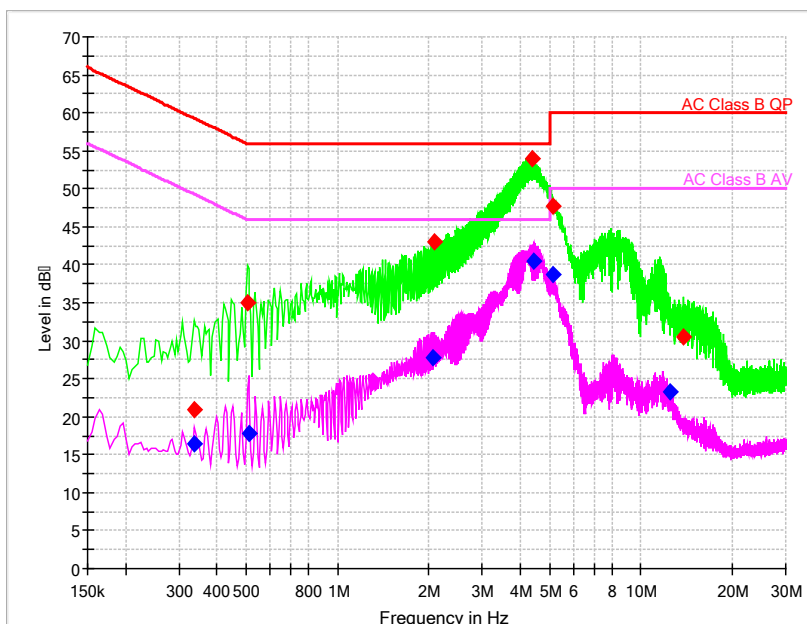
EUT+3#Battery+4#Charger+2#USB Cable: (240V)



Pic2. Conducted emission L&N Line

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)	Pmea QuasiPeak (dBμV)	Pmea Average (dBμV)
4.184414	---	41.98	46.00	4.02	L	29.7	---	12.28
4.184414	49.07	---	56.00	6.93	L	29.7	19.37	---
4.301016	47.99	---	56.00	8.01	L	29.7	18.29	---
4.426945	---	40.97	46.00	5.03	L	29.7	---	11.27
4.426945	48.25	---	56.00	7.75	L	29.7	18.55	---
4.538883	50.24	---	56.00	5.76	L	29.7	20.54	---
4.538883	---	42.54	46.00	3.46	L	29.7	---	12.84
4.730109	49.65	---	56.00	6.35	L	29.7	19.95	---
4.786078	---	40.98	46.00	5.02	L	29.7	---	11.28
4.786078	49.28	---	56.00	6.72	N	29.7	19.58	---
4.795406	---	37.41	46.00	8.59	N	29.7	---	7.71
4.898016	---	40.14	46.00	5.86	N	29.7	---	10.44

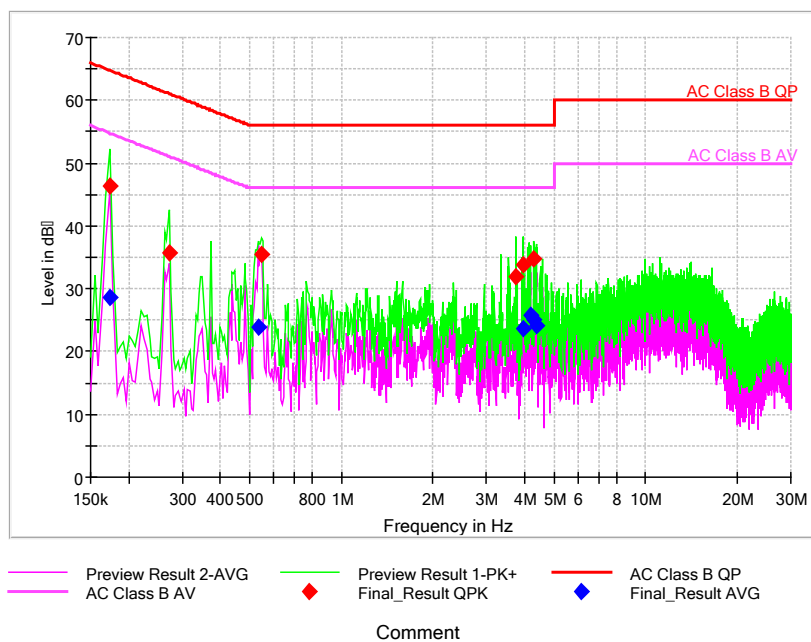
EUT+3#Battery+4#Charger+2#USB Cable: (120V)



Pic3. Conducted emission L&N Line

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)	Pmea QuasiPeak (dBμV)	Pmea Average (dBμV)
0.336562	---	16.47	49.29	32.82	L1	29.6	---	-13.13
0.336562	20.97	---	59.29	38.32	L1	29.6	-8.63	---
0.504469	35.06	---	56.00	20.94	L1	29.6	5.46	---
0.509133	---	17.76	46.00	28.24	N	29.6	---	-11.84
2.057602	---	27.72	46.00	18.28	N	29.7	---	-1.98
2.085586	43.04	---	56.00	12.96	L1	29.7	13.34	---
4.375641	53.96	---	56.00	2.04	L1	29.7	24.26	---
4.436273	---	40.45	46.00	5.55	N	29.7	---	10.75
5.145211	---	38.77	50.00	11.23	L1	29.7	---	9.07
5.154539	47.64	---	60.00	12.36	N	29.7	17.94	---
12.481781	---	23.30	50.00	26.70	L1	29.8	---	-6.5
13.792383	30.49	---	60.00	29.51	L1	29.8	0.69	---

EUT + 2#USB Cable+3#Battery +Laptop:



Pic4. Conducted emission L&N Line

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)	Pmea QuasiPeak (dBμV)	Pmea Average (dBμV)
0.173320	46.27	---	64.80	18.53	L	29.6	16.67	---
0.173320	---	28.64	54.80	26.16	L	29.6	---	-0.96
0.271266	35.61	---	61.08	25.46	N	29.6	6.01	---
0.532453	---	23.90	46.00	22.10	L	29.6	---	-5.7
0.546445	35.49	---	56.00	20.51	L	29.6	5.89	---
3.741328	32.00	---	56.00	24.00	N	29.7	2.3	---
3.955875	---	23.66	46.00	22.34	L	29.7	---	-6.04
3.955875	33.87	---	56.00	22.13	L	29.7	4.17	---
4.179750	---	25.77	46.00	20.23	L	29.7	---	-3.93
4.305680	---	25.07	46.00	20.93	L	29.7	---	-4.63
4.305680	34.82	---	56.00	21.18	L	29.7	5.12	---
4.375641	---	24.22	46.00	21.78	L	29.7	---	-5.48

2.2.2 Radiated Emissions-FCC Part15.109

Ambient condition:

Temperature	Relative humidity	Pressure
24.7°C	41.1%	100.3kPa

Test Setup:

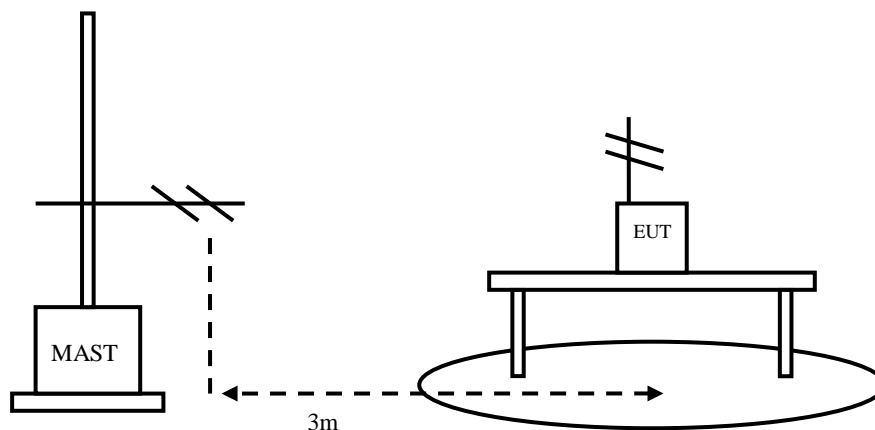


Figure 3

Test Procedure:

EUT+Laptop:

The EUT should be placed on a non-metallic table 80cm above the ground plane. The receive antennas shall be moved from 1 to 4 meters. The distance between EUT and receive antenna should be 3 meters.

The EUT was connected with a laptop via the USB cable and transferred the data from laptop to the EUT. The test set-up and the test methods are performed according to ANSI C63.4:2014

Then start the test software EMC32. Sweep the whole frequency band through the range from 30MHz to 1GHz, using receive log period antenna VULB 9163.

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 spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna. The EUT is laid in two modes as follow:
1. put the EUT in horizontal direction; 2. put the EUT in vertical direction.

The data of cable loss and antenna factor have been calibrated in full testing frequency range before the testing.

EUT+Charger:

The EUT should be placed on a non-metallic table 80cm above the ground plane. The receive antennas shall be moved from 1 to 4 meters. The distance between EUT and receive antenna should be 3 meters.

The EUT should work in idle mode. Open the functions of EUT. The test set-up and the test methods are performed according to ANSI C63.4:2014.

Then start the test software EMC32. Sweep the whole frequency band through the range from 30MHz to 1GHz, using receive log period antenna VULB 9163.

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 spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna. The EUT is laid in two modes as follow:
1. put the EUT in horizontal direction; 2. put the EUT in vertical direction.

The data of cable loss and antenna factor have been calibrated in full testing frequency range before the testing. All test results are performed with max hold at the horizontal and vertical polarity.

RBW=120kHz, VBW=300kHz, when the test frequency: 30MHz<f<1GHz

RBW=1MHz, VBW=3MHz, when the test frequency: f>1GHz

A “reference path loss” is established and the A_{Rpl} is the attenuation of “reference path loss”, and including the gain of receive antenna, the gain of the preamplifier, the cable loss.

The measurement results are obtained as described below:

$$\text{Result} = P_{\text{mea}} + A_{Rpl}$$

Limit:

Frequency of Emission(MHz)	Limits	
	Detector	Unit (dB μ V/m)
30~88	Quasi-peak	40
88~216	Quasi-peak	43.5
216~960	Quasi-peak	46
960~1000	Quasi-peak	54
1000~5th harmonic of the highest frequency or 40GHz, whichever is lower	Average	54
	Peak	74

Test result:

Sample calculation: (3.97 dB μ V/m) = (26.87 dB μ V/m) + (-22.9 dB), the corresponding frequency is 83.156000MHz.

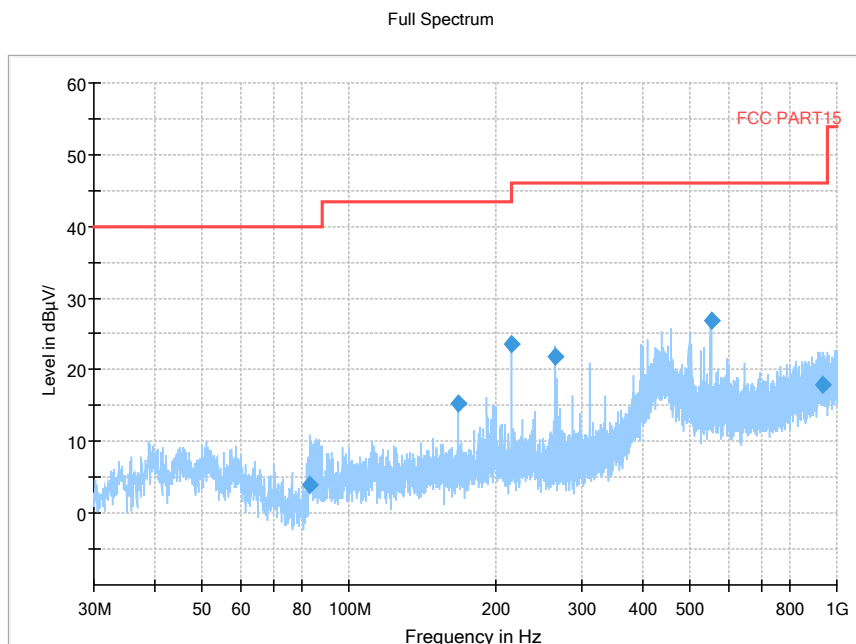
EUT + 2#USB Cable+3#Battery +Laptop:

Frequency(MHz)	Result(dB μ V/m)	Limit (dB μ V/m)	ARpl (dB)	Pmea (dB μ V/m)	Polarity
83.156000	3.97	40.00	-22.9	26.87	V
167.982500	15.38	43.50	-20.8	36.18	V
215.997500	23.58	43.50	-18.0	41.58	V
263.964000	21.77	46.00	-16.1	37.87	V
552.005500	26.93	46.00	-7.9	34.83	V
937.726000	17.82	46.00	-1.0	18.82	V

EUT+3#Battery+4#Charger+2# USB Cable:

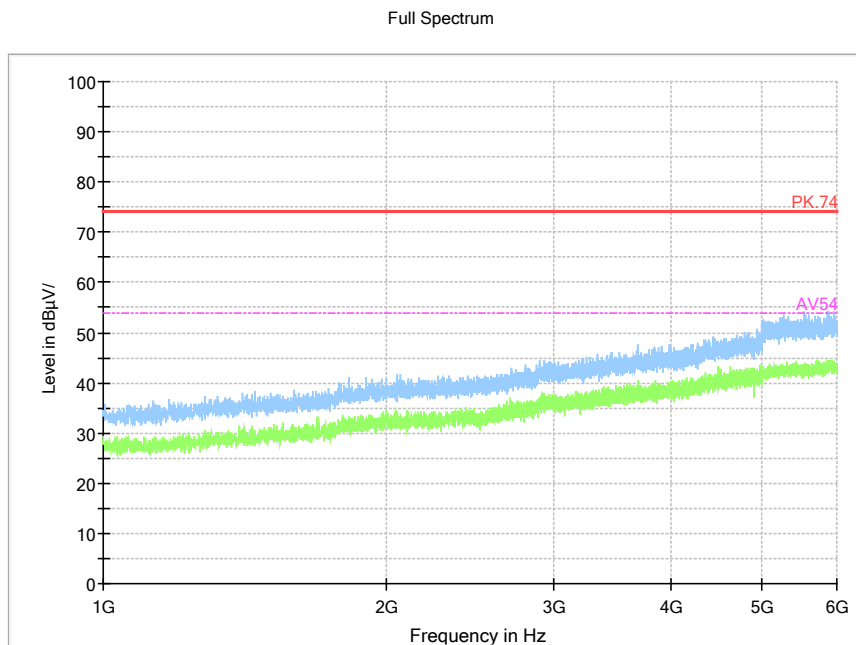
Frequency(MHz)	Result(dB μ V/m)	Limit (dB μ V/m)	ARpl (dB)	Pmea (dB μ V/m)	Polarity
34.416500	26.72	40.00	-19.9	46.62	V
74.774500	15.84	40.00	-22.7	38.54	V
124.384000	29.46	43.50	-20.9	50.36	V
276.856000	17.11	46.00	-15.8	32.91	V
546.009000	14.88	46.00	-8.0	22.88	V
937.126500	21.00	46.00	-1.0	22.00	V

EUT + 2#USB Cable1+4#Battery +Laptop: refer to Pic5, Pic6, Pic7, Pic8



Pic5. Radiated emission(30MHz – 1GHz)

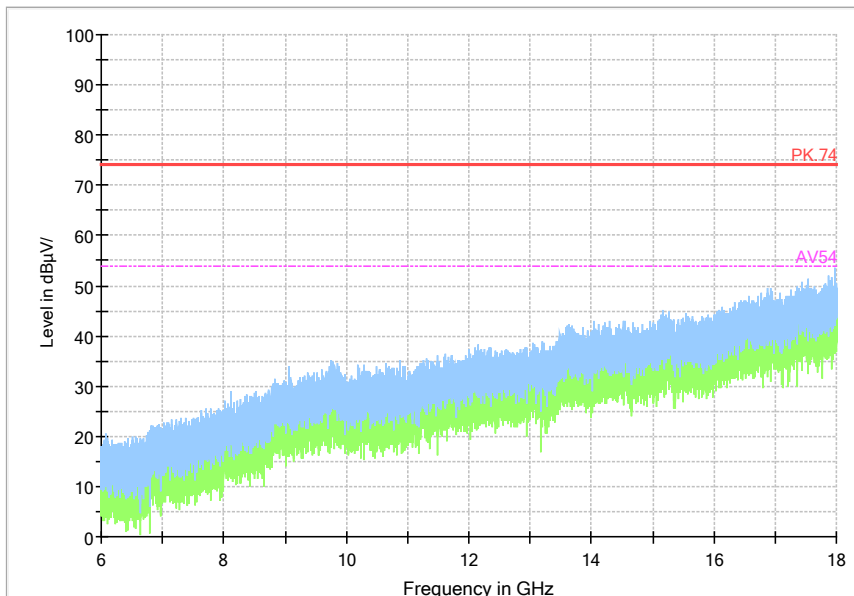
Note: The test data in the graph includes two polarizations: horizontal and vertical



Pic6. Radiated emission (1GHz –6GHz)

Note: The test data in the graph includes two polarizations: horizontal and vertical.

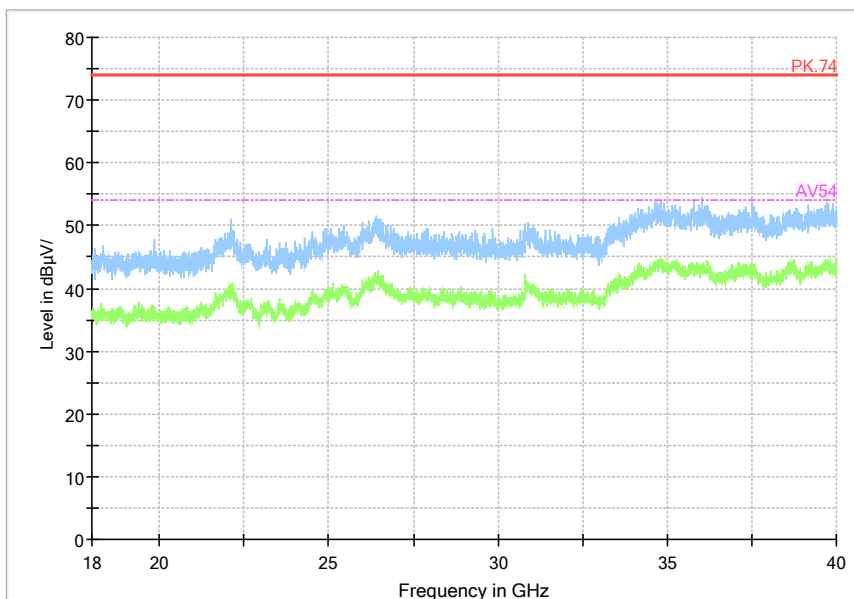
Full Spectrum



Pic7. Radiated emission (6GHz –18GHz)

Note: The test data in the graph includes two polarizations: horizontal and vertical.

Full Spectrum

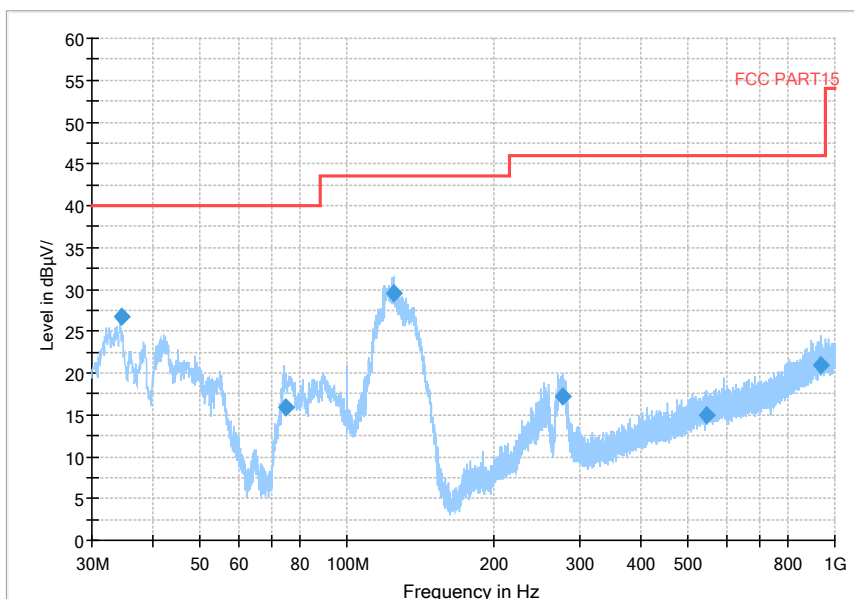


Pic8. Radiated emission (18GHz –40GHz)

Note: The test data in the graph includes two polarizations: horizontal and vertical.

EUT+3#Battery+4#Charger+2# USB Cable: refer to Pic9, Pic10, Pic11, Pic12

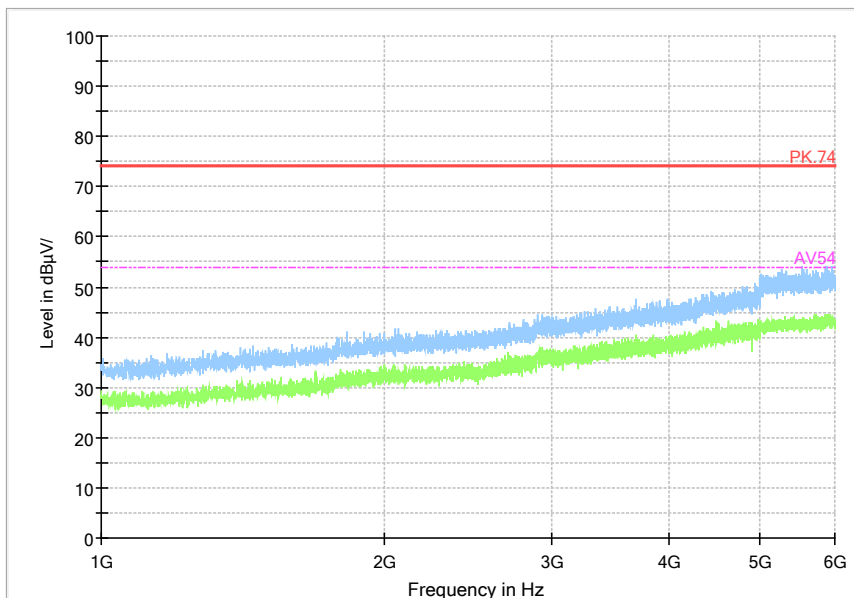
Full Spectrum



Pic9. Radiated emission(30MHz – 1GHz)

Note: The test data in the graph includes two polarizations: horizontal and vertical

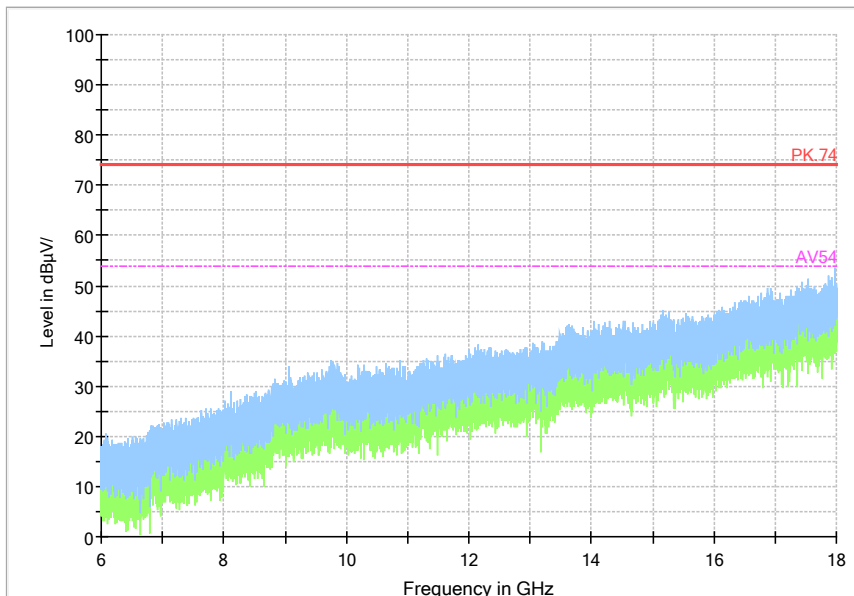
Full Spectrum



Pic10. Radiated emission (1GHz –6GHz)

Note: The test data in the graph includes two polarizations: horizontal and vertical.

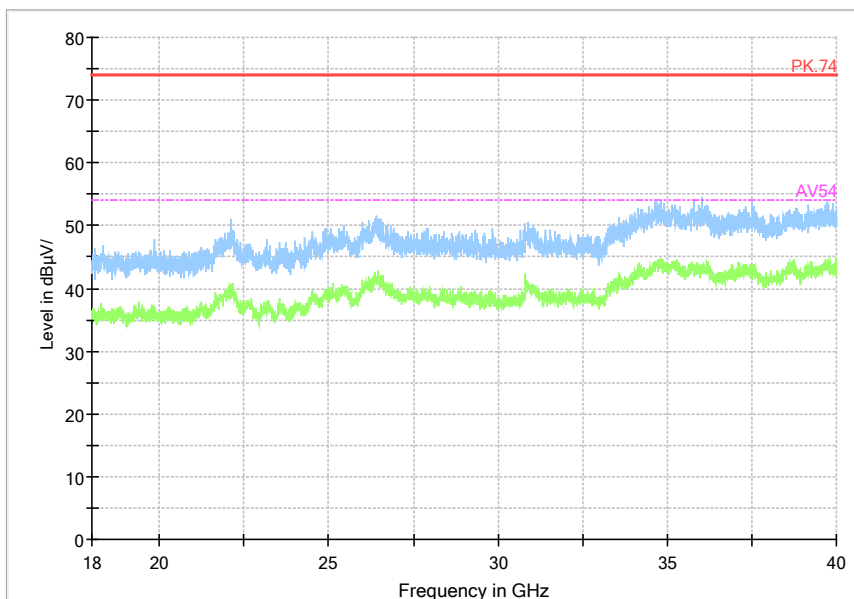
Full Spectrum



Pic11. Radiated emission (6GHz –18GHz)

Note: The test data in the graph includes two polarizations: horizontal and vertical.

Full Spectrum



Pic12. Radiated emission (18GHz –40GHz)

Note: The test data in the graph includes two polarizations: horizontal and vertical.

2.3. List of test equipments

No.	Name/Model	Manufacturer	S/N	Calibration Due Date	Calibration Date
1	23.18m×16.88m×9.60mS emi-AnechoicChamber	FRANKONIA	-----	5th Sep. 2021	6th Sep. 2016
2	ESW EMI test receiver	R&S	101574	20th Aug. 2021	20th Aug. 2020
3	9.080m×5.255m×3.525m Shielding room	FRANKONIA	-----	5th Sep. 2021	6th Sep. 2016
4	ESR3 EMI test receiver	R&S	102361	21th Apr. 2021	20th Apr. 2020
5	VULB 9163 Ultra log test antenna	schwarzbeck	867	25th Mar. 2021	25th Mar. 2020
6	ENV216 AMN	R&S	3560.6550. 12	20th Aug. 2021	20th Aug. 2020
7	HF 907 Double-Ridged Waveguide Horn Antenna	R&S	100512	25th Mar. 2021	25th Mar. 2020
8	SAS-574 Horn Antenna	R&S	535	21th Apr. 2023	22th Apr. 2020
9	PS2000 Turn Table	FRANKONIA	-----	-----	-----
10	MA260 Antenna Master	FRANKONIA	-----	-----	-----
11	EMC32EMI test software Version 10.20.01	R&S	-----	-----	-----

-----The End-----