
TEST REPORT

Report No.: SRTC2020-9003(F)-0007
Product Name: LTE/WCDMA/GSM(GPRS) Multi-Mode Wireless
Router
Model Name: MF286R
Applicant: ZTE Corporation
Manufacturer: ZTE Corporation
Specification: FCC Part15B (Certification)
(2020 edition)
FCC ID: SRQ-MF286R

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

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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.
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Country or Region: China
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1.3 Applicant's details

Company: ZTE Corporation
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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: 24th February 2020

Date of test: 24th February 2020 to 11th March 2020

1.6 Reference specification

FCC Part 15B, 2020 (Certification)

1.7 Information of EUT

1.7.1 General information

Name of EUT	LTE/WCDMA/GSM (GPRS) Multi-Mode Wireless Router
Model Name	MF286R
Marketing Name	MF286R
FCC ID	SRQ-MF286R
Frequency Range	GSM: GSM850 / PCS1900 WCDMA: FDD II / FDD IV / FDD V LTE: FDD 2/ FDD 4/ FDD 5/ FDD 7/ TDD 38/TDD 40 WiFi: 2.4~2.4835GHz/5.15-5.25GHz/5.725-5.85GHz
Equipment Class	Class B
Power Supply	Charger
Rated Power Supply Voltage	12V
HW Version	dqdA
SW Version	BD_LAMEIMF286RMODULEV1.0.0B02

1.7.2EUT details

Product Name	Model Name	SN
LTE/WCDMA/GSM (GPRS) Multi-Mode Wireless Router	MF286R	867709041132927

1.7.3 Auxiliary equipment details

AE (Auxiliary Equipment) 1#: Laptop

Manufacturer	Lenovo
Model Number	E470c
S/N	PF10VBX6
Input Voltage	100V-240V AC

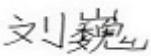
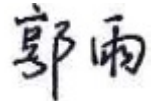
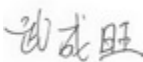
AE (Auxiliary Equipment) 2#: Charger

Manufacturer	RUIJING
Model Number	RJ-AS120150U104-B
S/N	/
Input Voltage	100V-240V AC 1.0A
Output Voltage	12VDC 1.5A

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. Liu Wei Director of the test department 	Checked By: Mr. Guo Yu Vice director of the test department 
Tested By: Mr. Wu Chengwang 	Issued date: 2020.03.11

2.2 Test result

2.2.1 Conducted Emissions-FCC Part15.107

Ambient condition:

Temperature	Relative humidity	Pressure
19.4°C	39.6%	100.8kPa

Test Setup with charger:

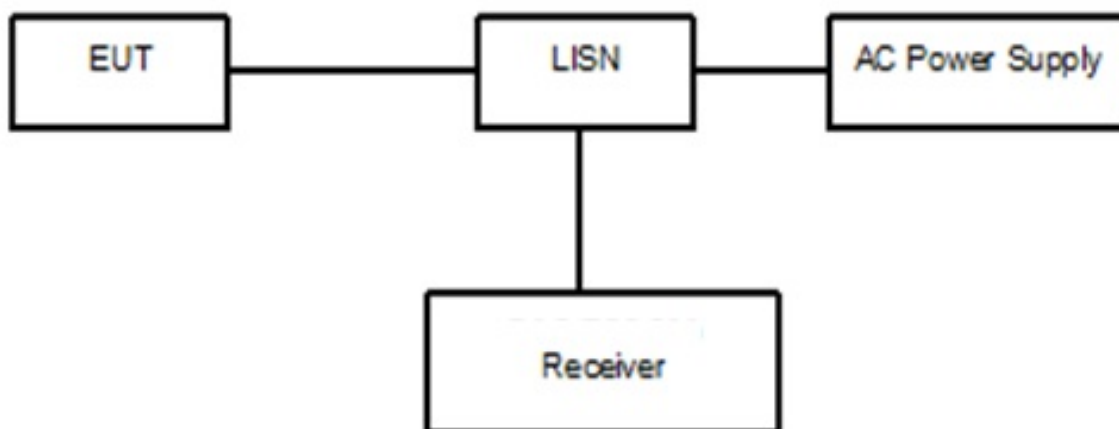


Figure 1

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. The accessories of the EUT are connected with the EUT such as laptop. The data was transferred between the EUT and the laptop via the Ethernet cable.

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: $(37.68 \text{ dB}\mu\text{V}) = (7.98 \text{ dB}\mu\text{V}) + (29.7 \text{ dB})$, the corresponding frequency is 0.186938MHz.

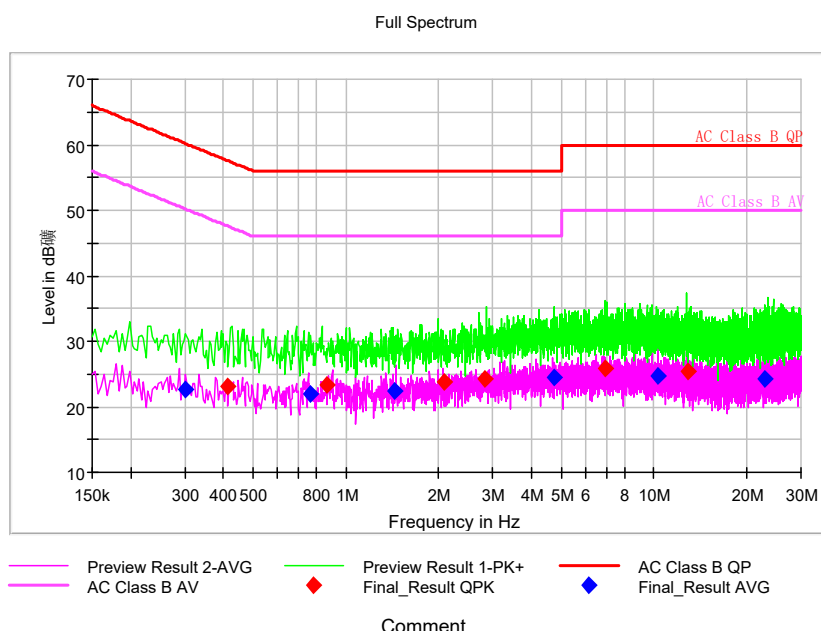
Limit:

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

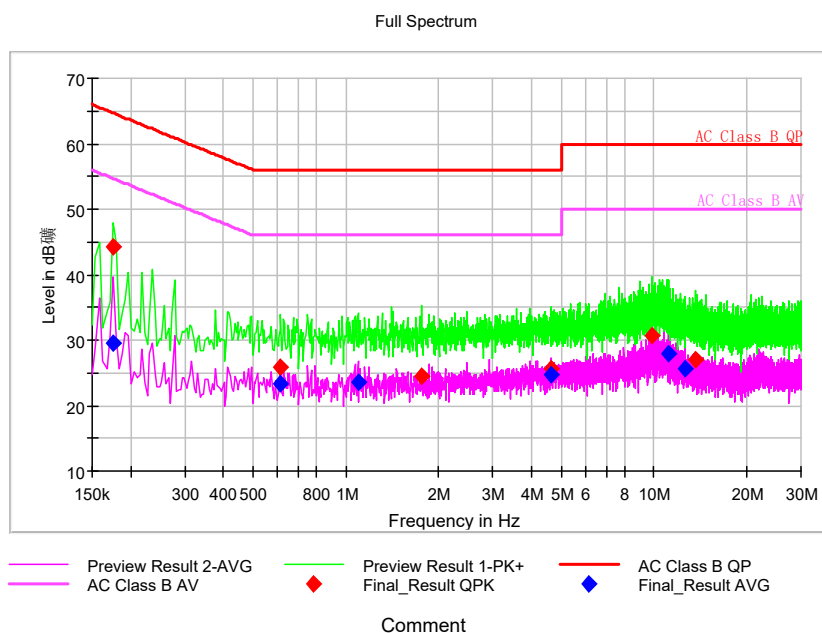
Test result:

Noise Level of the Measuring Instrument



Pic1. Conducted emission L and N Line

EUT + AE1#+ AE2#:



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)
0.175586	---	29.58	54.69	25.11	L1	29.7	---	-0.12
0.175586	44.32	---	64.69	20.37	L1	29.7	14.62	---
0.614807	---	23.23	46.00	22.77	L1	29.7	---	-6.47
0.614807	25.77	---	56.00	30.23	L1	29.7	-3.93	---
1.092407	---	23.50	46.00	22.50	L1	29.7	---	-6.2
1.766164	24.40	---	56.00	31.60	L1	29.8	-5.3	---
4.644557	25.71	---	56.00	30.29	L1	29.8	-4.09	---
4.653086	---	24.68	46.00	21.32	L1	29.8	---	-5.12
9.864043	30.58	---	60.00	29.42	L1	29.9	0.68	---
11.134800	---	27.87	50.00	22.13	L1	29.9	---	-2.03
12.605979	---	25.58	50.00	24.42	L1	29.9	---	-4.32
13.684843	27.11	---	60.00	32.89	L1	29.9	-2.89	---

2.2.2 Radiated Emissions-FCC Part15.109

Ambient condition:

Temperature	Relative humidity	Pressure
19.3°C	38.9%	100.8kPa

Test Setup:

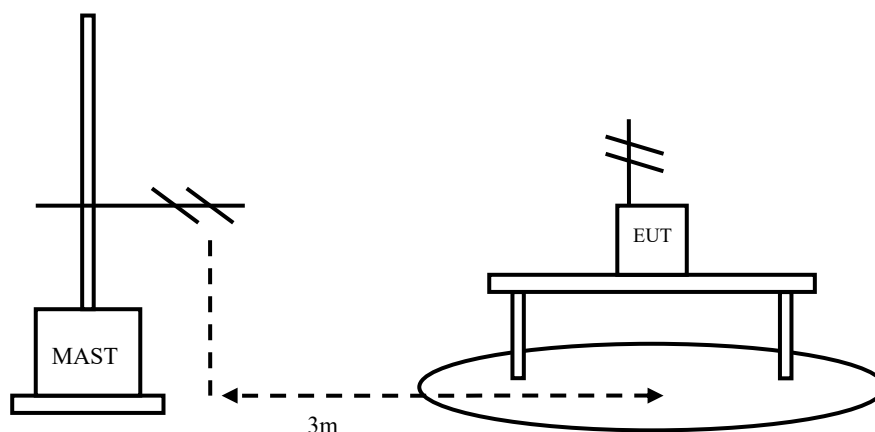


Figure 2

Test Procedure:

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 was connected with a laptop via the RJ45 port. The data was transferred between the EUT and the laptop via the Ethernet cable. 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: $30\text{MHz} < f < 1\text{GHz}$

RBW=1MHz, VBW=3MHz, when the test frequency: $f > 1\text{GHz}$

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:

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

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 Peak	54 74

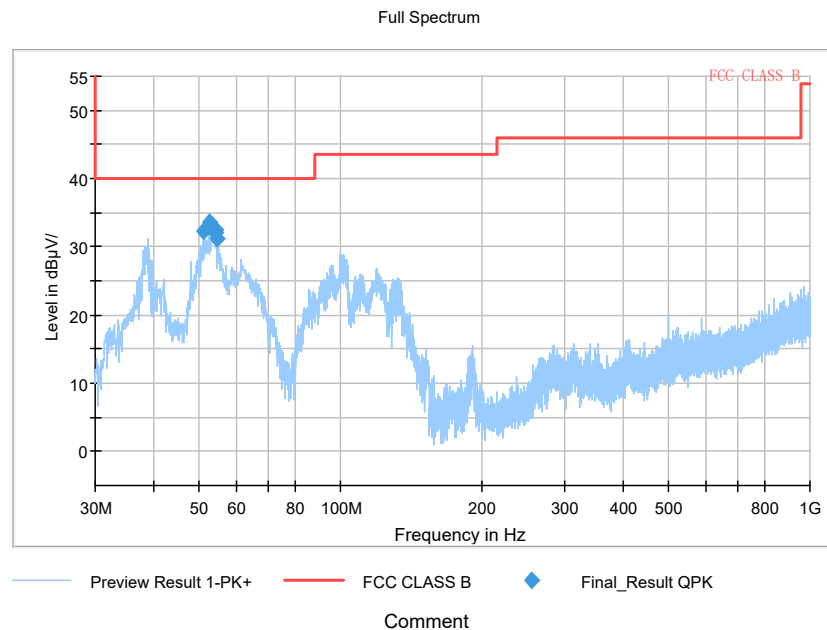
Test result:

Sample calculation: $(32.21 \text{ dB } \mu \text{ V/m}) = (49.41 \text{ dB } \mu \text{ V/m}) + (-17.2\text{dB})$, the corresponding frequency is 50.980500MHz.

EUT +AE #1

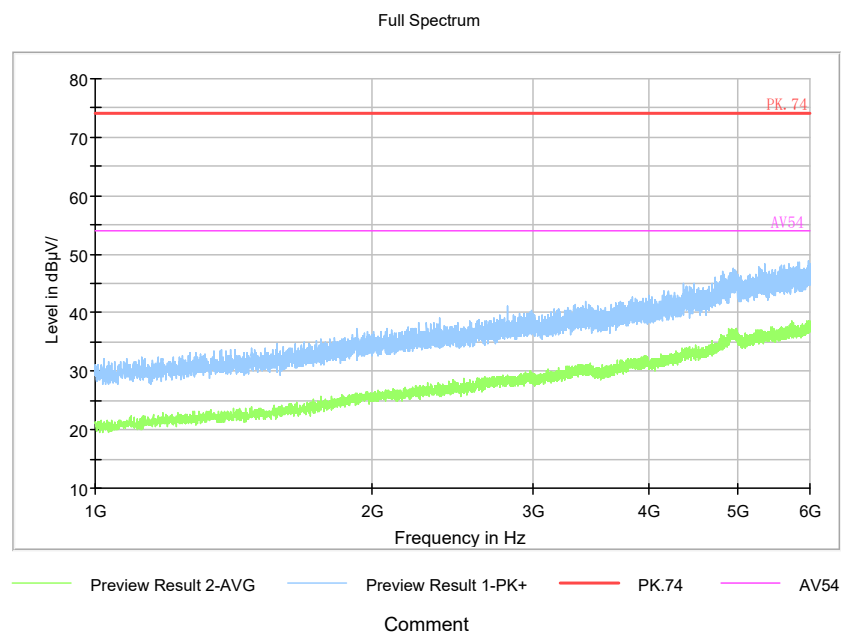
Frequency(MHz)	Result(dB μ V/m)	Limit (dB μ V/m)	A_{Rpl} (dB)	P_{mea} (dB μ V/m)	Polarity
50.980500	32.21	40.00	-17.2	49.41	V
52.467000	33.49	40.00	-17.4	50.89	V
53.945000	32.34	40.00	-17.6	49.94	V
53.979000	32.41	40.00	-17.6	50.01	V
53.998500	32.08	40.00	-17.6	49.68	V
54.453000	31.12	40.00	-17.7	48.82	V

EUT + AE1#+ AE2#:: refer to Pic3, Pic4, Pic5, Pic6, Pic7



Pic3. Radiated emission (30MHz – 1GHz)

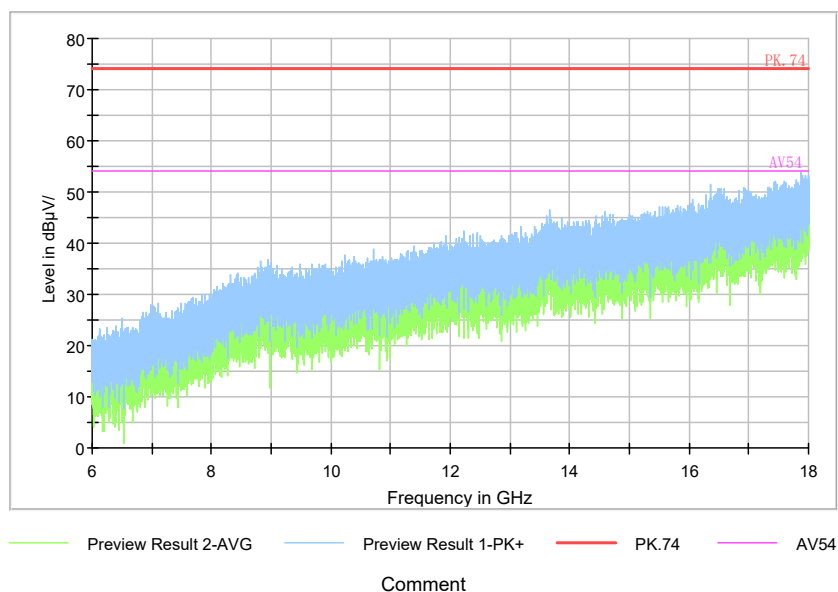
Note: The test data in the graph includes two polarizations: horizontal and vertical



Pic4. Radiated emission (1GHz –6GHz)

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

Full Spectrum

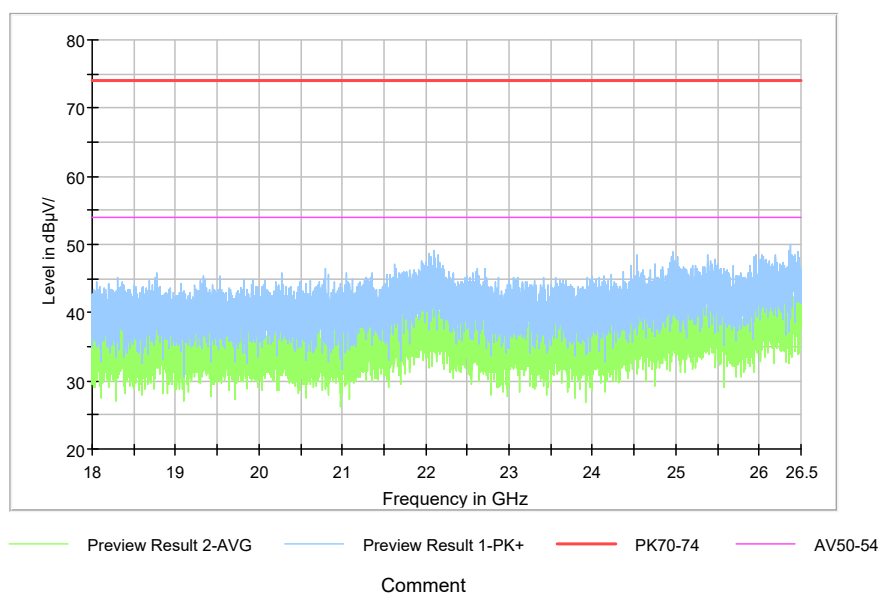


Comment

Pic5. Radiated emission (6GHz –18GHz)

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

Full Spectrum

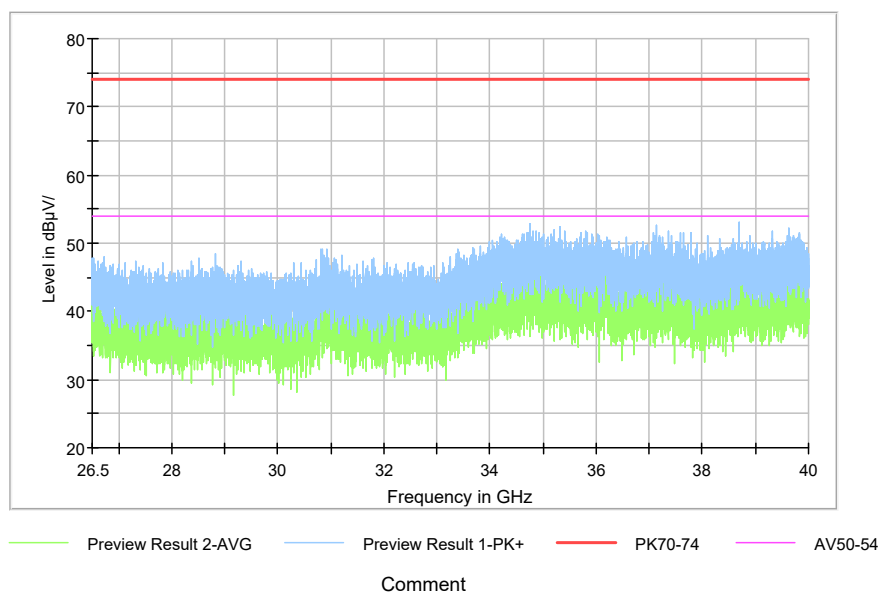


Comment

Pic6. Radiated emission (18GHz –26.5GHz)

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

Full Spectrum



Pic7. Radiated emission (26.5GHz –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. 2020	20th Aug. 2019
3	9.080m×5.255m×3.525m Shielding room	FRANKONIA	-----	5th Sep. 2021	6th Sep. 2016
4	ESR3 EMI test receiver	R&S	102361	20th Aug. 2020	20th Aug. 2019
5	VULB 9163 Ultra log test antenna	schwarzbeck	867	20th Aug. 2020	20th Aug. 2019
6	ENV216 AMN	R&S	3560.6550. 12	20th Aug. 2020	20th Aug. 2019
7	HF 907 Double-Ridged Waveguide Horn Antenna	R&S	100512	20th Aug. 2020	20th Aug. 2019
8	PS2000 Turn Table	FRANKONIA	-----	-----	-----
9	MA260 Antenna Master	FRANKONIA	-----	-----	-----
10	EMC32EMI test software	R&S	-----	-----	-----

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