

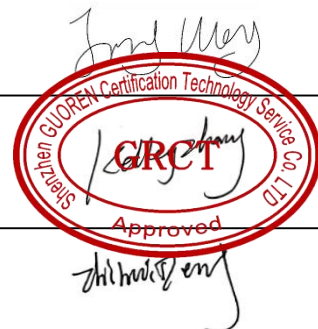


Shenzhen GUOREN Certification Technology Service Co., Ltd.

101#, Building K & Building T, The Second Industrial Zone, Jiazitang Community,
Fenghuang Street, Guangming District, Shenzhen, China

FCC PART 95 SUBPART M TEST REPORT

Report Reference No.....: GRCTR260302010-01
FCC ID.....: 2BGFX-CTLRR620A510
Compiled by
(position+printed name+signature)..: Testing Engineer Jimmy Wang
Supervised by
(position+printed name+signature)..: Project Engineer Kelley Zhang
Approved by
(position+printed name+signature)..: Manager Zhihui Deng
Date of issue.....: Jun. 23, 2026



Testing Laboratory Name.....: **Shenzhen GUOREN Certification Technology Service Co., Ltd.**
Address.....: 101#, Building K & Building T, The Second Industrial Zone,
Jiazitang Community, Fenghuang Street, Guangming District,
Shenzhen, China

Applicant's name.....: **Shenzhen Cheng-Tech Co., Ltd.**
Address.....: 3F, 4F, 5F, Building C, Pingshan, Chengtouzhi Park, No. 37,
Cuijing Road, Zhukeng Community, Longtian Street, Pingshan
District, Shenzhen, Guangdong, P. R. China

Test specification.....:
Standard.....: **FCC Part 95 Subpart M**

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Test item description.....: Millimeter Wave Radar
Trade Mark.....: Cheng-Tech
Manufacturer.....: **Shenzhen Cheng-Tech Co., Ltd.**
Model/Type reference.....: CTLRR-620 A510
Listed Models /
Firmware Version.....: /
Hardware Version.....: /
Modulation FMCW
Frequency..... 77 GHz -79 GHz
Ratings.....: DC 13V
Result.....: **PASS**

TEST REPORT

Equipment under Test : Millimeter Wave Radar

Model /Type : CTLRR-620 A510

Listed Models : /

Applicant : **Shenzhen Cheng-Tech Co., Ltd.**

Address : 3F, 4F, 5F, Building C, Pingshan, Chengtouzhi Park, No. 37,
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Pingshan District, Shenzhen, Guangdong, P. R. China

Test Result:	PASS
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The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1 TEST STANDARDS

The tests were performed according to following standards:

[FCC Rules Part 95M](#): The 76-81 GHz Band Radar Service

[ANSI C63.10-2020+COR. 1-2023](#): American National Standard for Testing Unlicensed Wireless Devices

[ANSI C63.26-2015](#): American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

[KDB 653005 D01, V01, R02](#): Equipment Authorization Guidance for 71 – 81 GHz Radar Devices

2 SUMMARY

2.1 General Remarks

Date of receipt of test sample	:	Feb. 6, 2026
Testing commenced on	:	Mar.17, 2026
Testing concluded on	:	Jun. 22, 2026

2.2 Product Description

Product Name:	Millimeter Wave Radar
Model/Type reference:	CTLRR-620 A510
Listed Models:	/
Power supply:	DC 13V
Sample ID:	CTLRR-620 A510-1#
Millimeter Wave Radar	
Operation frequency:	77G-79G
Modulation:	FMCW
Antenna type:	Waveguide Slot Antenna
Antenna gain*(Supplied by the customer):	15.15 dBi
Remark:*When the information provided by the customer was used to calculate test results, if the information provided by the customer is not accurate, Shenzhen GUOREN Certification Technology Service Co., Ltd. does not assume any responsibility.	

2.3 Equipment Under Test

Power supply system utilised

Power supply voltage	:	☐ 230V / 50 Hz	☐ 120V / 60Hz
		☐ 12 V DC	☐ 24 V DC
		☒ Other (13V DC)	

2.4 Short description of the Equipment under Test (EUT)

This is a Millimeter Wave Radar.

For more details, refer to the user's manual of the EUT.

2.5 EUT operation mode

EUT operating mode	Description of operating modes	Additional information
1	Continuously transmitting and receiving mode	8T8R

2.6 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended to comply with FCC Part 95, Subpart M Rules.

2.7 Modifications

No modifications were implemented to meet testing criteria.

3 TEST ENVIRONMENT

3.1 Address of the test laboratory

Shenzhen GUOREN Certification Technology Service Co., Ltd.

101#, Building K & Building T, The Second Industrial Zone, Jiazitang Community, Fenghuang Street, Guangming District, Shenzhen, China

3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 920798 Designation Number: CN1304

Shenzhen GUOREN Certification Technology Service Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

A2LA-Lab Cert. No.: 6202.01

Shenzhen GUOREN Certification Technology Service Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

ISED#: 27264 CAB identifier: CN0115

Shenzhen GUOREN Certification Technology Service Co., Ltd. has been listed by Innovation, Science and Economic Development Canada to perform electromagnetic emission measurement.

CNAS-Lab Code: L15631

Shenzhen GUOREN Certification Technology Service Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories for the Competence of Testing and Calibration Laboratories.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010.

3.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature	15-35 °C
Relative Humidity	30-60 %
Air Pressure	950-1050mbar

3.4 Test Description

FCC Requirement		
§ 95.3367 § 2.1046	Equivalent Isotropically Radiated Power (EIRP)	PASS
§ 95.3379 § 2.1053	Unwanted Emissions	PASS
§ 95.3379 § 2.1055	Frequency Stability	PASS
§ 2.1049	Occupied Bandwidth	PASS
§ 2.1047	Modulation characteristics	PASS

3.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2" and is documented in the Shenzhen GUOREN Certification Technology Service Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen GUOREN Certification Technology Service Co., Ltd.:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	0.009~30MHz	2.23 dB	(1)
Radiated Emission	30~1000MHz	4.06 dB	(1)
Radiated Emission	1~18GHz	5.14 dB	(1)
Radiated Emission	18-40GHz	5.38 dB	(1)
Radiated Emission	Above 40GHz	5.49 dB	(1)
Max output power	75~110GHz	2.87 dB	(1)
Power spectral density	/	0.56 dB	(1)
Spectrum bandwidth	/	1.20%	(1)

- (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.6 Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Equipment No.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESCI	GRCTEE008	2025/09/11	2026/09/10
Vector Signal generator	Agilent	N5181A	GRCTEE007	2025/09/11	2026/09/10
Analog Signal Generator	R&S	SML03	GRCTEE006	2025/09/11	2026/09/10
Ultra-Broadband Antenna	Schwarzbeck	VULB9163	GRCTEE018	2023/09/28	2026/09/27
Horn Antenna	Schwarzbeck	BBHA 9120D	GRCTEE019	2023/09/28	2026/09/27
Loop Antenna	Zhinan	ZN30900C	GRCTEE020	2023/10/15	2026/10/14
18-40G Mixer Module	ShenZhen IC-MT	24D806RTRU0842	GRCTEX001	2025/07/31	2026/07/30
40-60G Mixer Module	ShenZhen IC-MT	24D806MMFC0843	GRCTEX002	2025/07/31	2026/07/30
50-75G Mixer Module	ShenZhen IC-MT	24D806MMFC0844	GRCTEX003	2025/07/31	2026/07/30
75-110G Mixer Module	ShenZhen IC-MT	24D806MMFC0845	GRCTEX004	2025/07/31	2026/07/30

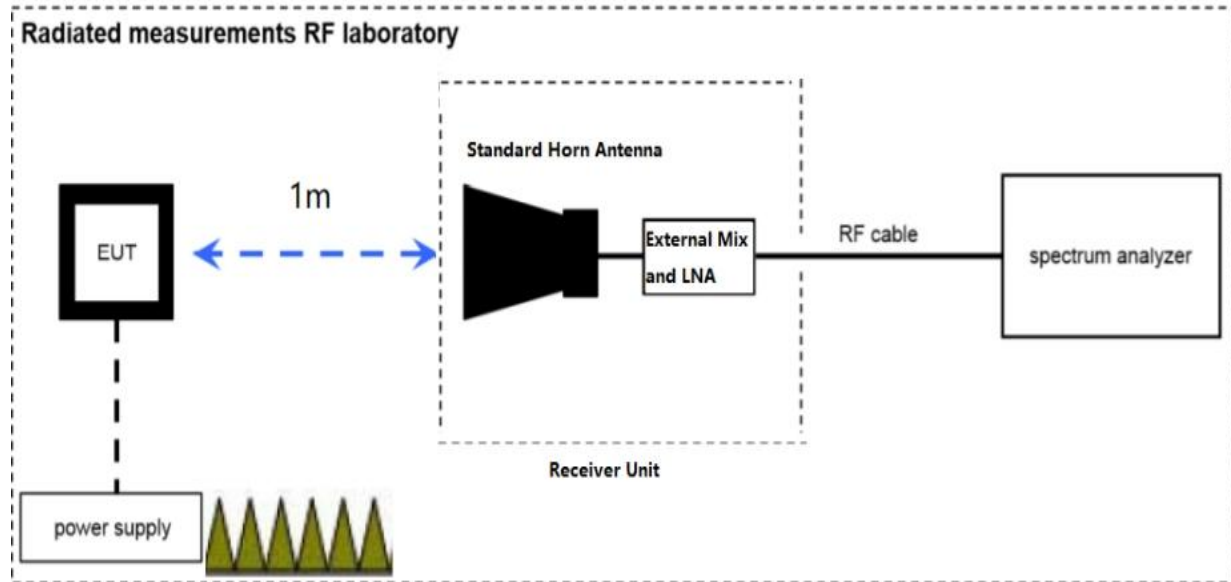
110-170G Mixer Module	ShenZhen IC-MT	24F806MMFC872	GRCTEX005	2025/07/31	2026/07/30
170-260G Mixer Module	ShenZhen IC-MT	24F806MMFC873	GRCTEX006	2025/07/31	2026/07/30
Climate Chamber	QIYA	LCD-9530	GRCTES016	2025/09/11	2026/09/10
Amplifier	Schwarzbeck	BBV 9745	GRCTEE021	2025/09/11	2026/09/10
Amplifier	Taiwan chengyi	EMC051845B	GRCTEE022	2025/09/11	2026/09/10
Temperature/Humidity Meter	Huaguan	HG-308	GRCTES037	2025/09/11	2026/09/10
Directional coupler	NARDA	4226-10	GRCTEE004	2025/09/11	2026/09/10
High-Pass Filter	XingBo	XBLBQ-GTA18	GRCTEE053	2025/09/11	2026/09/10
High-Pass Filter	XingBo	XBLBQ-GTA27	GRCTEE054	2025/09/11	2026/09/10
Automated filter bank	Tonscend	JS0806-F	GRCTEE055	2025/09/11	2026/09/10
Power Sensor	Agilent	U2021XA	GRCTEE070	2025/09/11	2026/09/10
Cable	Times	Cable-CE	GRCTEE086	2025/09/11	2026/09/10
Cable	Times	Cable-RE-1	GRCTEE087	2025/09/11	2026/09/10
Cable	Times	Cable-RE-2	GRCTEE088	2025/09/11	2026/09/10
EMI Test Software	Fera	EZ-EMC	GRCTEE061	N/A	N/A
ADAPTER	Huntkey	HKA06012050	0A7	N/A	N/A
RocketStor	Technologies	VM16	E000372	N/A	N/A

Note: This device includes an antenna and a mixer.

4 TEST CONDITIONS AND RESULTS

4.1 Equivalent Isotropically Radiated Power (EIRP)

TEST CONFIGURATION



TEST PROCEDURE

Mean Power

Method with spectrum analyzer with external mixer

A spectrum analyzer with the following settings is used as measuring receiver in the test setup:

- Start frequency: lower than the lower edge of the operating frequency range.
- Stop frequency: higher than the upper edge of the operating frequency range.
- Resolution bandwidth: 1 MHz
- Video bandwidth: 3 MHz
- Detector mode: RMS
- Display mode: clear write
- Averaging time: averaging time $\times$ number of sweep points

Channel Power Function needs to be used to calculate the average power. Boundaries for the calculation needs to be defined. This is typically the operating frequency range.

Method with Power Meter

The power meter shall be connected to the measurement antenna. The frequency correction factor shall be taken into account. The power meter shall be a true RMS power meter. The measurement time shall be equal or longer than the EUT cycle time.

The maximum fundamental emission power (EIRP) shall be measured using a power averaging (rms) detector with a 1 MHz resolution bandwidth (RBW) and integrated over the full 99% occupied bandwidth (OBW) to obtain the data necessary to demonstrate compliance to the 50 dBm limit.

Peak Power

Method with spectrum analyzer with external mixer

- Start frequency: lower than the lower edge of the operating frequency range.
- Stop frequency: higher than the upper edge of the operating frequency range.
- Resolution bandwidth: 1 MHz
- Video bandwidth: 3 MHz
- Detector mode: Peak detector
- Display mode: Max Hold
- Sweep time: EUT cycle time $\times$ number of sweep points
- Measurement is done until trace is stabilized.

The peak power to be considered is the maximum value recorded.

KDB 653005 D01 76 – 81 GHz Radar v01r02, 4.b)

The maximum peak fundamental emission power (EIRP) measurement shall be performed by sweeping over the transmitted occupied bandwidth using a positive peak power detector with peak hold activated and a 1 MHz RBW. Power integration is not to be used in performing this measurement. The resultant peak power spectral density (maximum in any 1 MHz) data shall be used to demonstrate compliance to the 55 dBm/MHz limit. Peak power measurements of swept frequency radar implementations (e.g. higher sweep rate FMCW) may require a desensitization correction factor to be applied to the measurement results.

The test report used test procedure: Method with spectrum analyzer with external mixer.

LIMIT

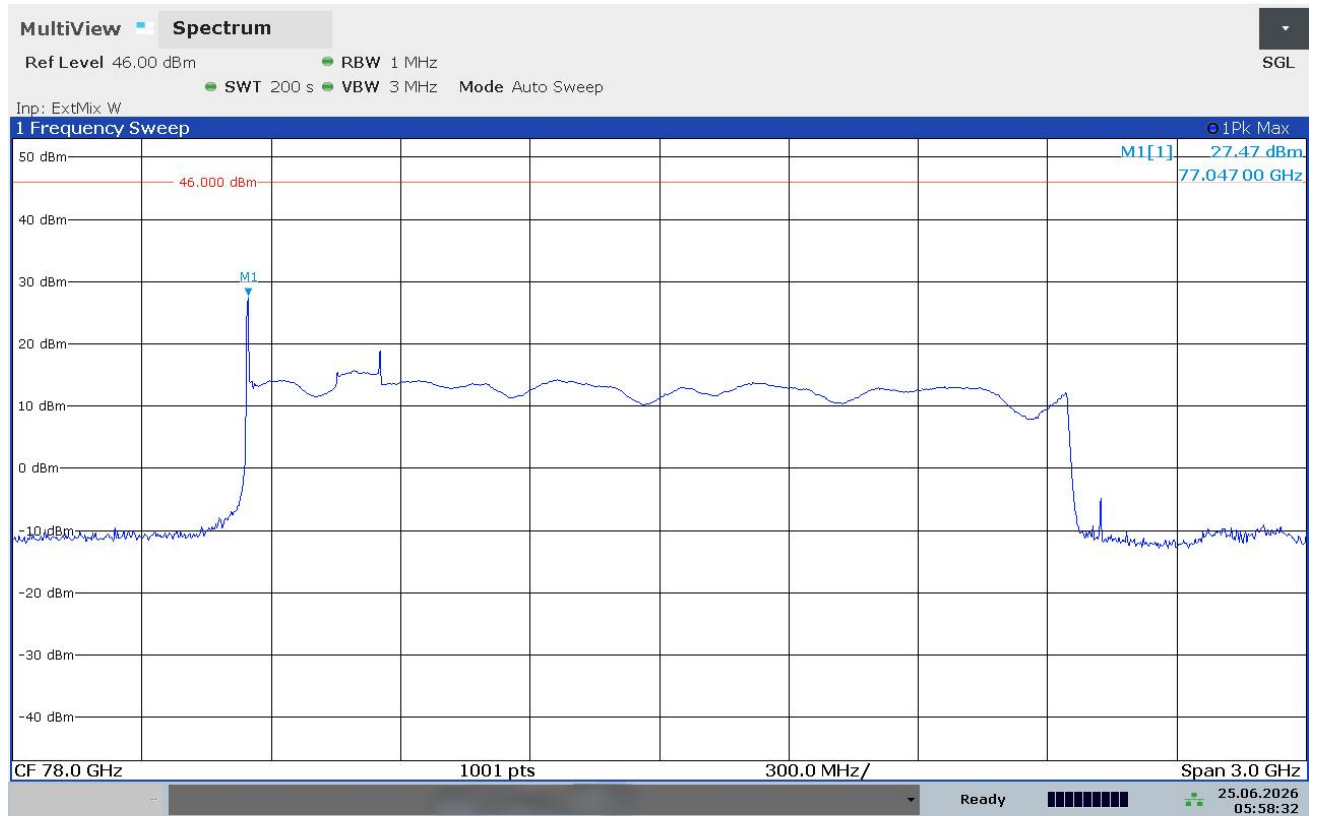
According to § 2.1046 & § 95.3367

The fundamental radiated emission limits within the 76-81 GHz band are expressed in terms of Equivalent Isotropically Radiated Power (EIRP) and are as follows:

- (a) The maximum power (EIRP) within the 76-81 GHz band shall not exceed 50 dBm based on measurements employing a power averaging detector with a 1 MHz Resolution Bandwidth (RBW).
- (b) The maximum peak power (EIRP) within the 76-81 GHz band shall not exceed 55 dBm based on measurements employing a peak detector with a 1 MHz RBW

TEST RESULTS

Test Distance [m]	Radiated Mean Power (EIRP) [dBm]	Radiated Peak Power (EIRP) [dBm]	Radiated Mean Power Limit (EIRP) [dBm]	Radiated Peak Power Limit (EIRP) [dBm]	Verdict
1	22.33	27.47	50.00	55.00	PASS



05:58:32 25.06.2026



Peak Power Desensitization Factor Specification

Pursuant to Annex L of ANSI C63.10-2020, the sweep time shall be set to a value greater than (signal period) $\times$ (frequency span / Span) / (Resolution Bandwidth / RBW).

200s (sweep time) > 33.3ms(signal period)*3000MHZ/1MHZ=99.9s.

This ensures the spectrum analyzer dwells at each frequency point for at least one full signal period, so as to achieve 100% probability of detection.

4.2 Unwanted Emissions**LIMIT**

According to § 95.3379 76 – 81 GHz Band Radar Service unwanted emissions limits.

- (a) The power density of any emissions outside the 76 – 81 GHz band shall consist solely of spurious emissions and shall not exceed the following:

- (1) Radiated emission below 40 GHz shall not exceed the field strength as shown in the following emissions table.

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	$20\log(2400/F(\text{KHz}))+40\log(300/3)$	$2400/F(\text{KHz})$
0.49-1.705	3	$20\log(24000/F(\text{KHz}))+40\log(30/3)$	$24000/F(\text{KHz})$
1.705-30	3	$20\log(30)+40\log(30/3)$	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

- (2) The power density of radiated emissions outside the 76 – 81 GHz band above 40.0 GHz shall not exceed the following, based on measurements employing an average detector with a 1 MHz RBW:
- (i) For radiated emissions outside the 76–81 GHz band between 40 GHz and 200 GHz from field disturbance sensors and radar systems operating in the 76–81 GHz band: 600 pW/cm² at a distance of 3 meters from the exterior surface of the radiating structure.
 - (ii) For field disturbance sensors and radar systems operating in the 76–81 GHz band, the spectrum shall be investigated up to 231.0 GHz.

Frequency Range [GHz]	Power Density / EIRP at Measurement Distance 3 [m]
40 – 200	600 pW/cm ² / -1.686 dBm
200 – 243	1000 pW/cm ² / 0.532 dBm

According to § 2.1053 Measurements required: Field strength of spurious radiation.

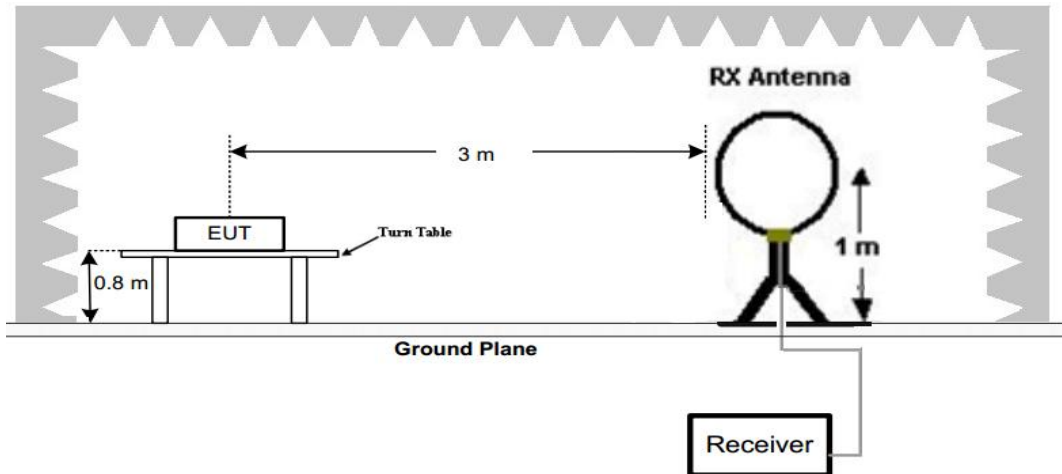
- (a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in [paragraph \(c\) of § 2.1049](#), as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.

Measurements with the peak detector are also suitable to demonstrate compliance of an EUT, as long as the required resolution bandwidth is used, because peak detection will yield amplitudes equal to or greater than

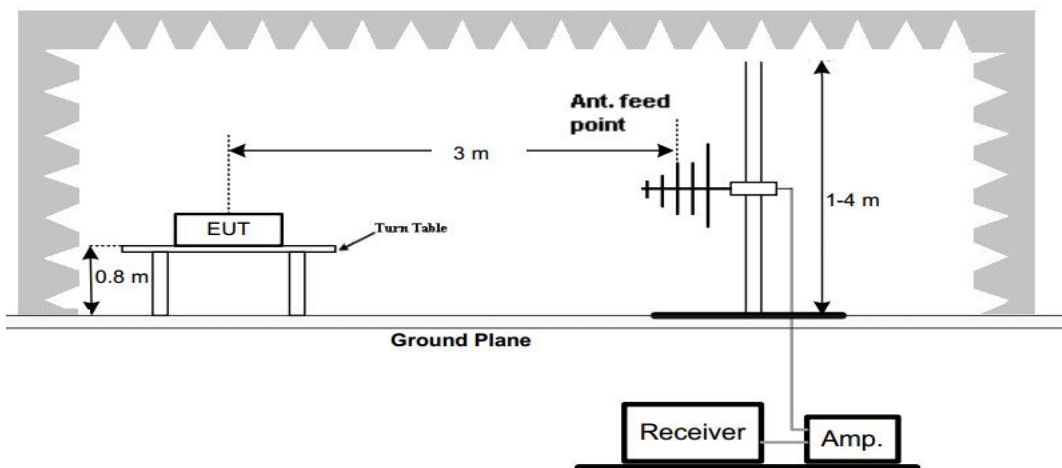
amplitudes measured with RMS detector. The measurement data from a spectrum analyzer peak detector will represent the worst-case results.

TEST CONFIGURATION

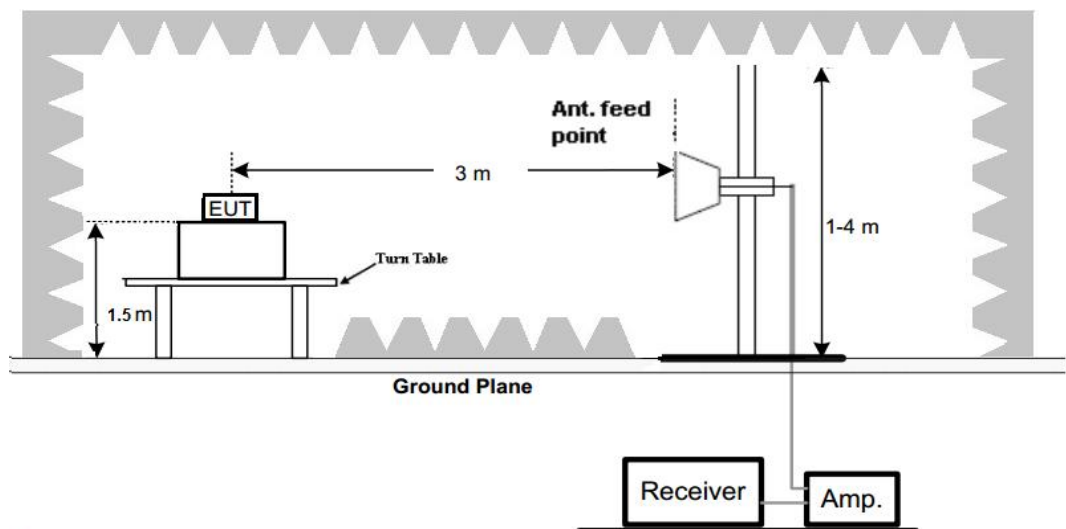
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



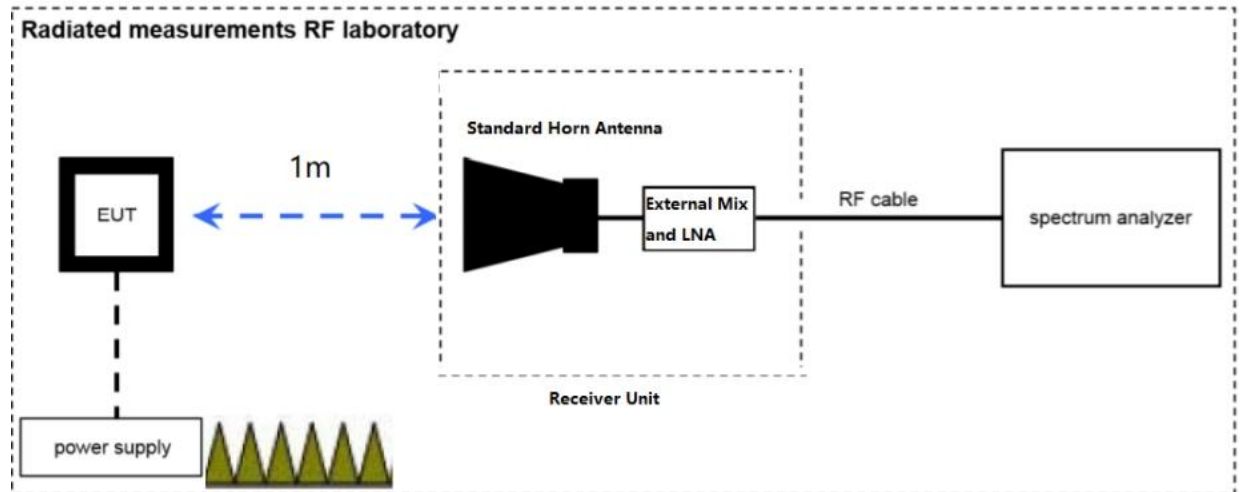
(B) Radiated Emission Test Set-Up, Frequency range 30 - 1000MHz



(C) Radiated Emission Test Set-Up, Frequency range 1 GHz – 18G Hz



(D) Radiated emission test set-up, Frequency range 18GHz – 243 GHz



TEST PROCEDURE

Sequence of testing radiated spurious 9 kHz to 30 MHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer
- If the EUT is a tabletop system, 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turn table.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 3m – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0 degree to 360 degree.
- The antenna height is 1m.
- Set RBW = 200 Hz / VBW = 1 kHz, sweep time: Auto
- At each turntable position the analyzer sweeps with position-peak detector to find the maximum of all emissions.

Final measurement

- Identified emissions during the premeasurement are maximized by the software by rotating the turntable from 0 degree to 360 degree.
- The final measurement is done in the position (turntable and elevation) causing the highest emissions with quasi-peak.
- Final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. A plot with the graph of the measurement and the limit is stored.

Sequence of testing radiated spurious 30 MHz to 1 GHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer
- If the EUT is a tabletop system, 0.8 m height is used, which is placed on the ground place.
- If the EUT is a floor standing device, it is placed directly on the ground plane.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 3m – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0 degree to 360 degree.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1m to 4m.
- Set RBW = 120 kHz/ VBW = 1 MHz, sweep time: Auto
- At each turntable position the analyzer sweeps with position-peak detector to find the maximum of all emissions.

Final measurement

- The final measurement is performed for at least six highest peaks.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable and antenna height between 1 and 4 m.
- The final measurement is done with quasi-peak detector.
- Final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. A plot with the graph of the measurement and the limit is stored.

Sequence of testing radiated spurious 1 GHz to 18 GHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer
- If the EUT is a tabletop system, 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turntable.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 3m – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0 degree to 360 degree.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1m to 4m.
- Set RBW = 1 MHz / VBW = 3 MHz, sweep time: Auto, detector: Peak for Peak, RBW = 1 MHz / VBW = 3 MHz, sweep time: Auto, detector: Average for Average.
- At each turntable position the analyzer sweeps with position-peak detector to find the maximum of all emissions.

Final measurement

- The final measurement is performed for at least six highest peaks.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable and antenna height between 1 and 4 m.
- The final measurement is done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.

- Final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. A plot with the graph of the measurement and the limit is stored.

Sequence of testing radiated spurious 18 GHz – 42 GHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer
- If the EUT is a tabletop system, 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turntable.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 1m – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0 degree to 360 degree.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1m to 4m.
- Set RBW = 1 MHz / VBW = 3 MHz, sweep time: Auto, detector: Peak for Peak, RBW = 1 MHz / VBW = 3 MHz, sweep time: Auto, detector: Average for Average.
- At each turntable position the analyzer sweeps with position-peak detector to find the maximum of all emissions.

Final measurement

- The final measurement is performed for at least six highest peaks.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable and antenna height between 1 and 4 m.
- The final measurement is done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and RMS detector.
- All final levels should consider distance conversion factor as format: Final values (3 m) = Measurement values (1 m) + Distance conversion factor
Distance conversion factor = $20 \times \log_{10} (d/3)$, where d = measurement distance in m
- Distance conversion factor = $20 \times \log_{10} (1/3) = -9.54$ [dB]
- Final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. A plot with the graph of the measurement and the limit is stored.

Sequence of testing radiated spurious above 42 GHz with external mixers

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer
- If the EUT is a tabletop system, 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turntable.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 1m – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0 degree to 360 degree.
- The antenna with external mixer is polarized vertical and horizontal.
- The antenna height changes from 1m to 4m.

- Set RBW = 1 MHz / VBW = 3 MHz, sweep time: Auto, detector: Peak for Peak, RBW = 1 MHz / VBW = 3 MHz, sweep time: Auto, detector: Average for Average.
- At each turntable position the analyzer sweeps with position-peak detector to find the maximum of all emissions.

Final measurement

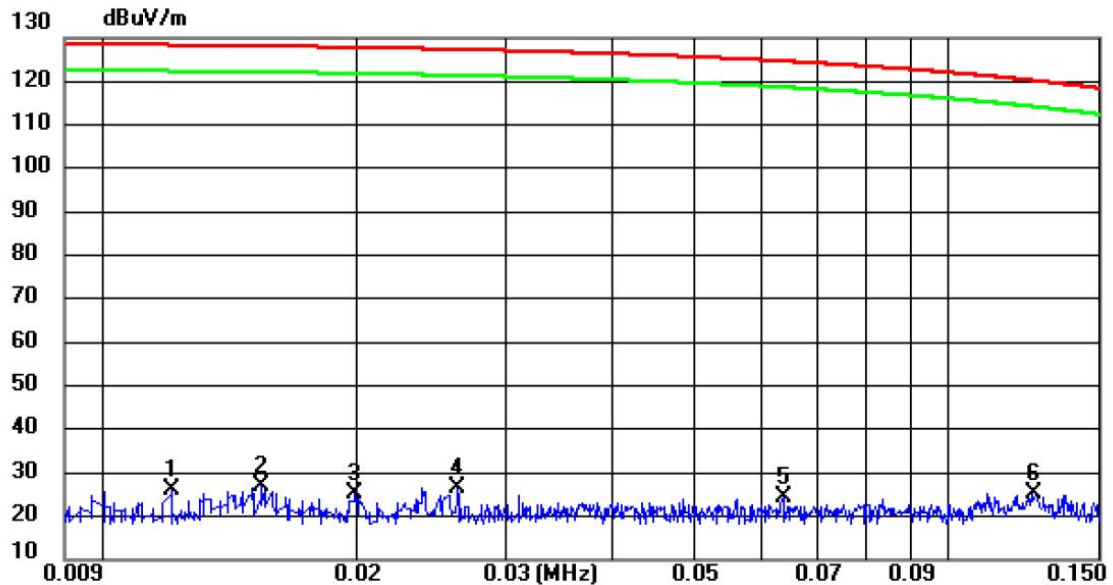
- The final measurement is performed for at least six highest peaks.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable and antenna height between 1 and 4 m.
- The final measurement is done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and RMS detector.
- All final levels should consider distance conversion factor as format: Final values (3 m) = Measurement values (1 m) + Distance conversion factor
Distance conversion factor = $20 \times \text{Log}_{10} (d/3)$, where d = measurement distance in m
 - Distance conversion factor = $20 \times \text{Log}_{10} (1/3) = -9.54 \text{ [dB]}$
- Final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. A plot with the graph of the measurement and the limit is stored.

TEST RESULTS

For 9kHz~ 150kHz

Horizontal

Radiated Emission Measurement



Site LAB

Limit: FCC Part15 RE-Class B

EUT:

M/N:

Mode:

Note:

Polarization: **Horizontal**

Power: AC120V/60Hz

Distance: 3m

Temperature: 25.5 °C

Humidity: 56 %RH

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	0.0120	87.94	-61.73	26.21	128.28	-102.07	peak	100	54	P	
2	0.0154	88.81	-61.76	27.05	128.04	-100.99	peak	100	202	P	
3	0.0198	87.05	-61.80	25.25	127.73	-102.48	peak	100	16	P	
4	0.0262	88.50	-61.86	26.64	127.27	-100.63	peak	100	284	P	
5	0.0635	86.21	-61.87	24.34	124.59	-100.25	peak	100	85	P	
6 *	0.1259	87.86	-62.49	25.37	120.12	-94.75	peak	100	351	P	

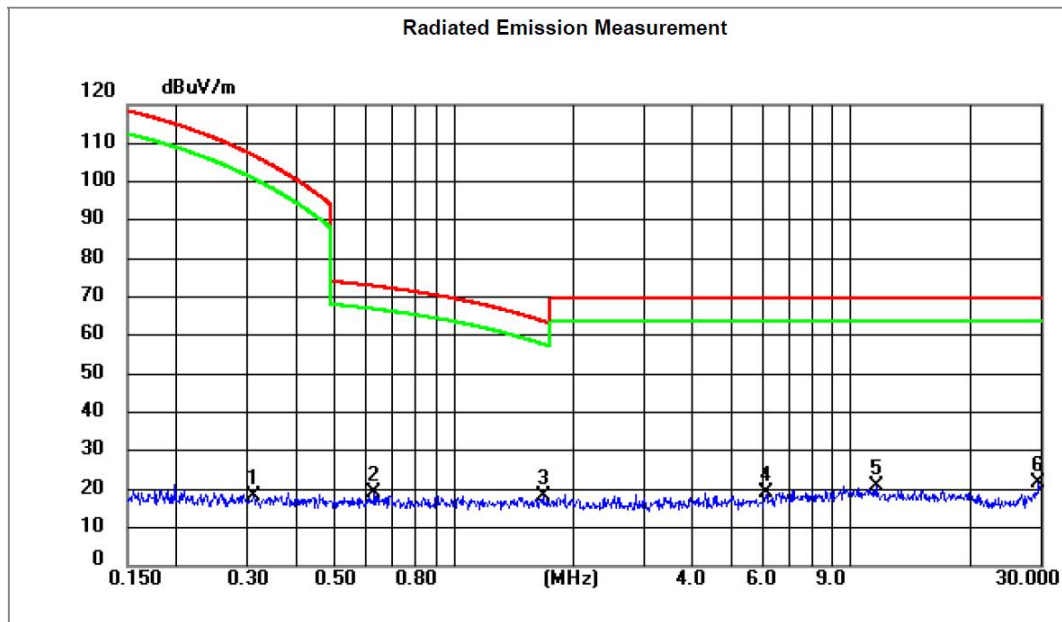
Note:1).Level (dBuV/m)= Reading (dBuV)+ Factor (dB/m)

2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)

3). Margin(dB) = Level (dBuV/m) - Limit (dBuV/m)

For 150kHz~ 30MHz

Horizontal



Site LAB

Limit: FCC Part15 RE-Class B

EUT:

M/N:

Mode:

Note:

Polarization: *Horizontal*

Power: AC120V/60Hz

Distance: 3m

Temperature: 25.5 °C

Humidity: 56 %RH

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	0.3100	80.68	-62.48	18.20	106.91	-88.71	peak	100	56	P	
2	0.6270	81.27	-62.29	18.98	72.80	-53.82	peak	100	248	P	
3 *	1.6713	80.34	-62.27	18.07	63.69	-45.62	peak	100	239	P	
4	6.1531	81.40	-62.18	19.22	69.50	-50.28	peak	100	104	P	
5	11.5594	82.75	-62.12	20.63	69.50	-48.87	peak	100	23	P	
6	29.6837	84.35	-62.71	21.64	69.50	-47.86	peak	100	19	P	

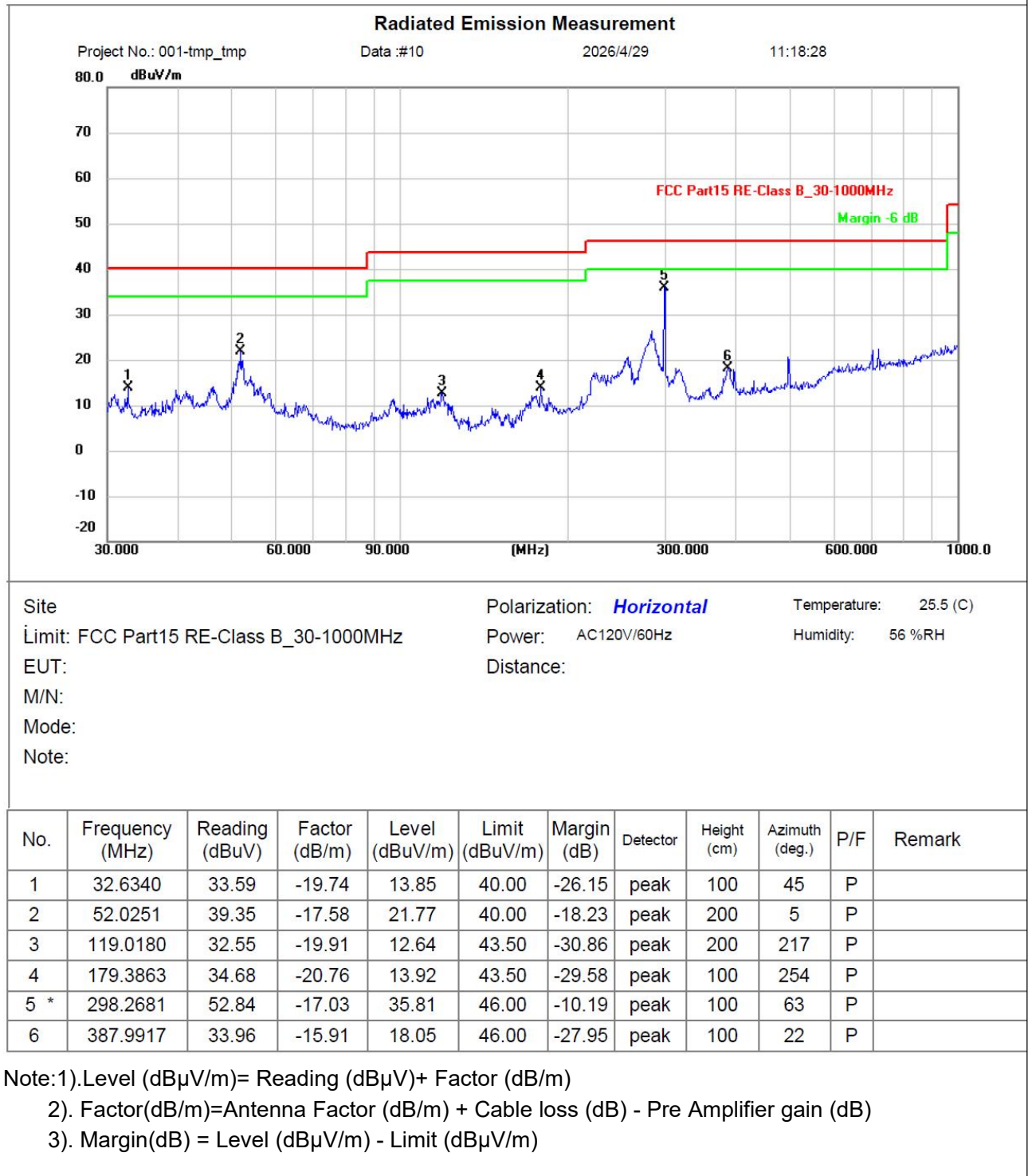
Note:1).Level (dBuV/m)= Reading (dBuV)+ Factor (dB/m)

2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)

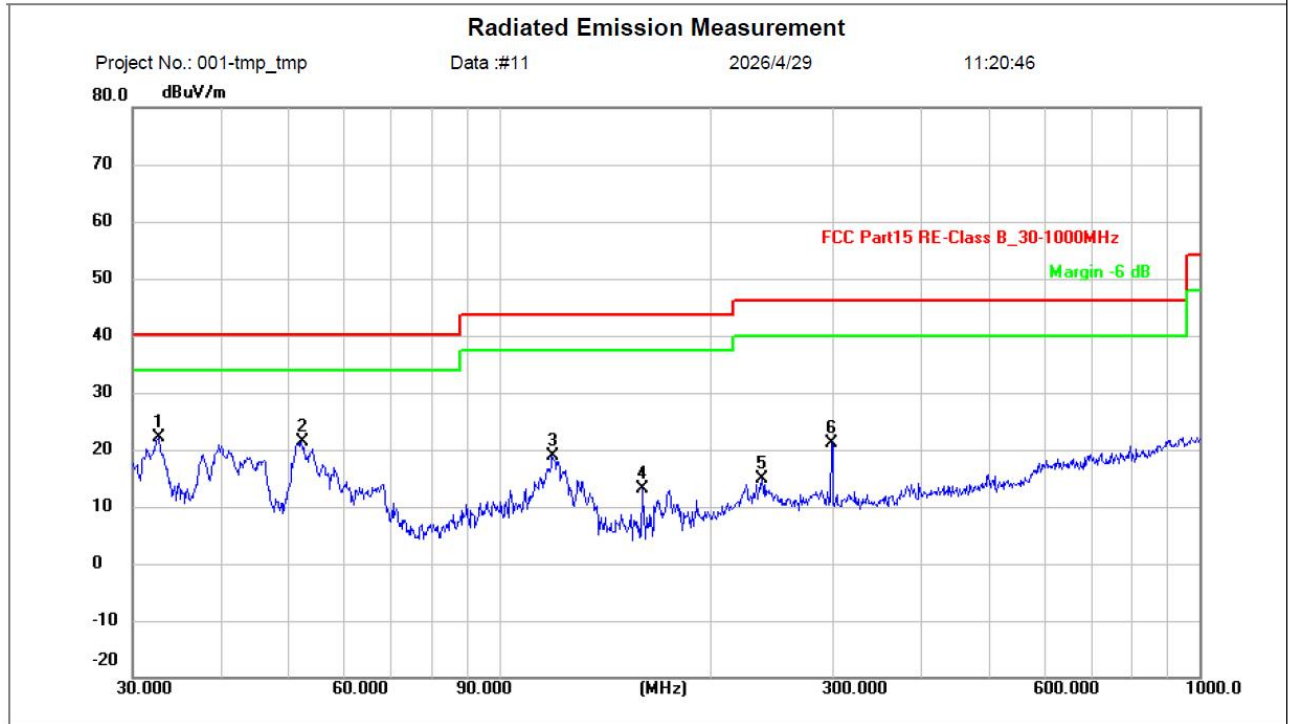
3). Margin(dB) = Level (dBuV/m) - Limit (dBuV/m)

For 30MHz-1GHz

Horizontal



Vertical



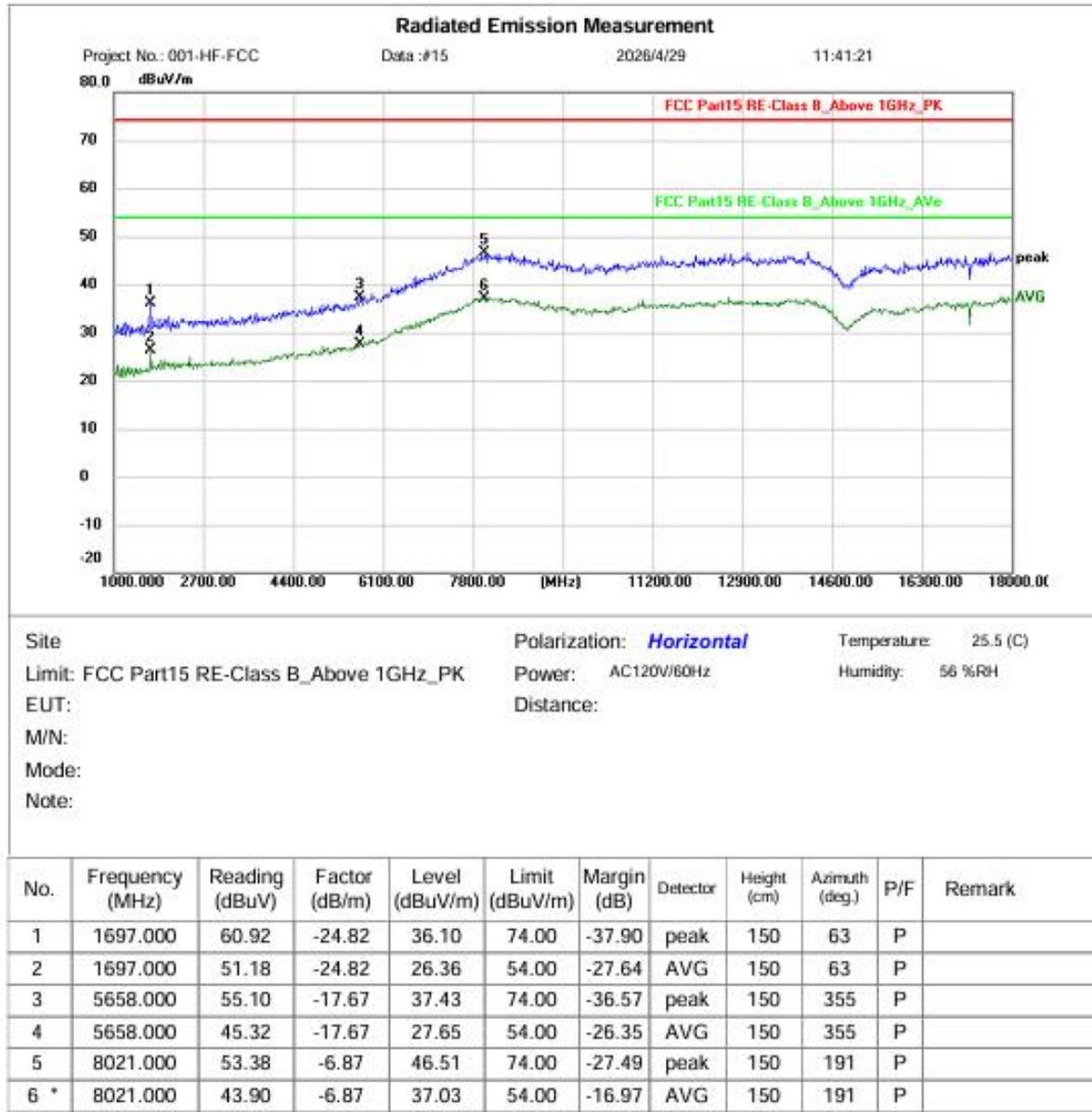
Site: Polarization: **Vertical** Temperature: 25.5 (C)
Limit: FCC Part15 RE-Class B_30-1000MHz Power: AC120V/60Hz Humidity: 56 %RH
EUT: Distance:
M/N:
Mode:
Note:

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1 *	32.6340	41.90	-19.74	22.16	40.00	-17.84	peak	100	60	P	
2	52.2079	38.90	-17.60	21.30	40.00	-18.70	peak	100	28	P	
3	119.0180	38.89	-19.91	18.98	43.50	-24.52	peak	100	298	P	
4	160.3456	34.99	-21.82	13.17	43.50	-30.33	peak	100	35	P	
5	237.4759	33.37	-18.48	14.89	46.00	-31.11	peak	100	221	P	
6	298.2681	38.16	-17.03	21.13	46.00	-24.87	peak	100	57	P	

Note:1). Level (dBuV/m)= Reading (dBuV)+ Factor (dB/m)
2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)
3). Margin(dB) = Level (dBuV/m) - Limit (dBuV/m)

For 1GHz-18GHz

Horizontal

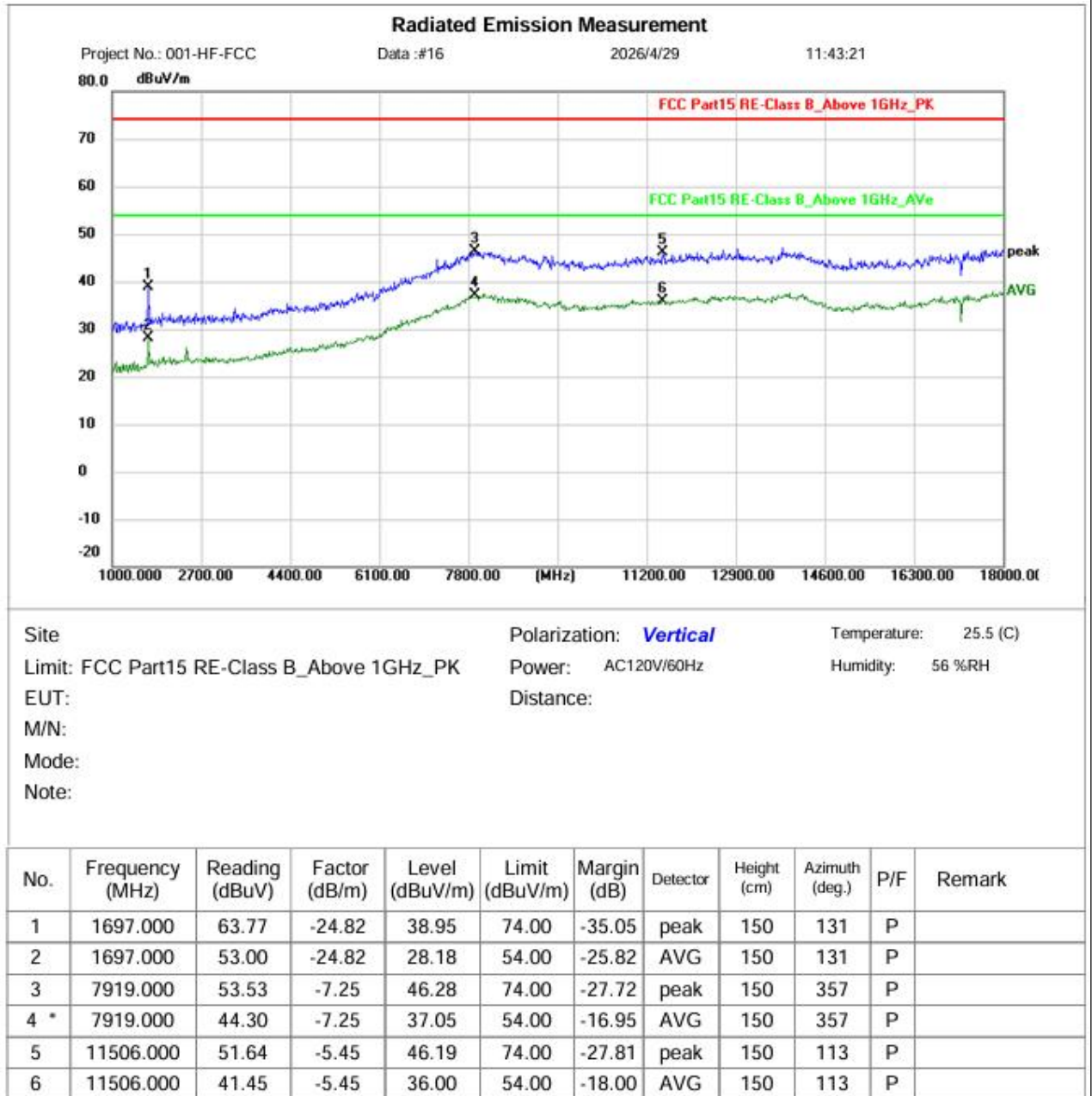


Note:1).Level (dBuV/m)= Reading (dBuV)+ Factor (dB/m)

2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)

3). Margin(dB) = Level (dBuV/m) - Limit (dBuV/m)

Vertical



Note:1).Level (dBuV/m)= Reading (dBuV)+ Factor (dB/m)

2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)

3). Margin(dB) = Level (dBuV/m) - Limit (dBuV/m)

For 18GHz to 40GHz

Frequency(MHz):			18GHz to 40GHz		Polarity:		HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
19458.26	49.26	PK	74	24.74	43.65	44.12	13.26	51.77	5.61
19458.26	41.32	AV	54	12.68	35.71	44.12	13.26	51.77	5.61
23964.12	51.76	PK	74	22.24	44.07	46.98	13.98	53.27	7.69
23964.12	40.80	AV	54	13.20	33.11	46.98	13.98	53.27	7.69
24183.94	48.47	PK	74	25.53	40.64	47.07	14.16	53.40	7.83
24183.94	38.93	AV	54	15.07	31.10	47.07	14.16	53.40	7.83
Frequency(MHz):			18GHz to 40GHz		Polarity:		VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
18778.36	50.53	PK	74	23.47	45.23	44.01	13.16	51.87	5.30
18778.36	42.95	AV	54	11.05	37.65	44.01	13.16	51.87	5.30
20243.62	52.52	PK	74	21.48	46.51	45.27	13.38	52.64	6.01
20243.62	42.63	AV	54	11.37	36.62	45.27	13.38	52.64	6.01
23885.23	51.32	PK	74	22.68	43.66	46.78	14.02	53.14	7.66
23885.23	39.90	AV	54	14.10	32.24	46.78	14.02	53.14	7.66

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier
3. Margin value = Limit value - Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.

Frequency Range [GHz]	Power Density / EIRP at Measurement Distance 3 [m]	Vertical [dBm]	Horizontal [dBm]	Verdict
40-42	600 pW/cm ² / -1.686 dBm	-46.64	-52.63	PASS
42 – 60	600 pW/cm ² / -1.686 dBm	-32.34	-41.13	PASS
60-90	600 pW/cm ² / -1.686 dBm	-10.70	-25.95	PASS
90-130	600 pW/cm ² / -1.686 dBm	-23.96	-34.34	PASS
130-145	600 pW/cm ² / -1.686 dBm	-40.49	-39.90	PASS
145-200	600 pW/cm ² / -1.686 dBm	-43.79	-44.14	PASS
200-220	1000 pW/cm ² / 0.532 dBm	-35.09	-44.81	PASS
220-243	1000 pW/cm ² / 0.532 dBm	-50.87	-50.93	PASS

Note: 1). Level (dBuV/m) = Reading (dBuV) + Factor (dB/m)

2). Factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)

3). Margin (dB) = Level (dBuV/m) - Limit (dBuV/m)

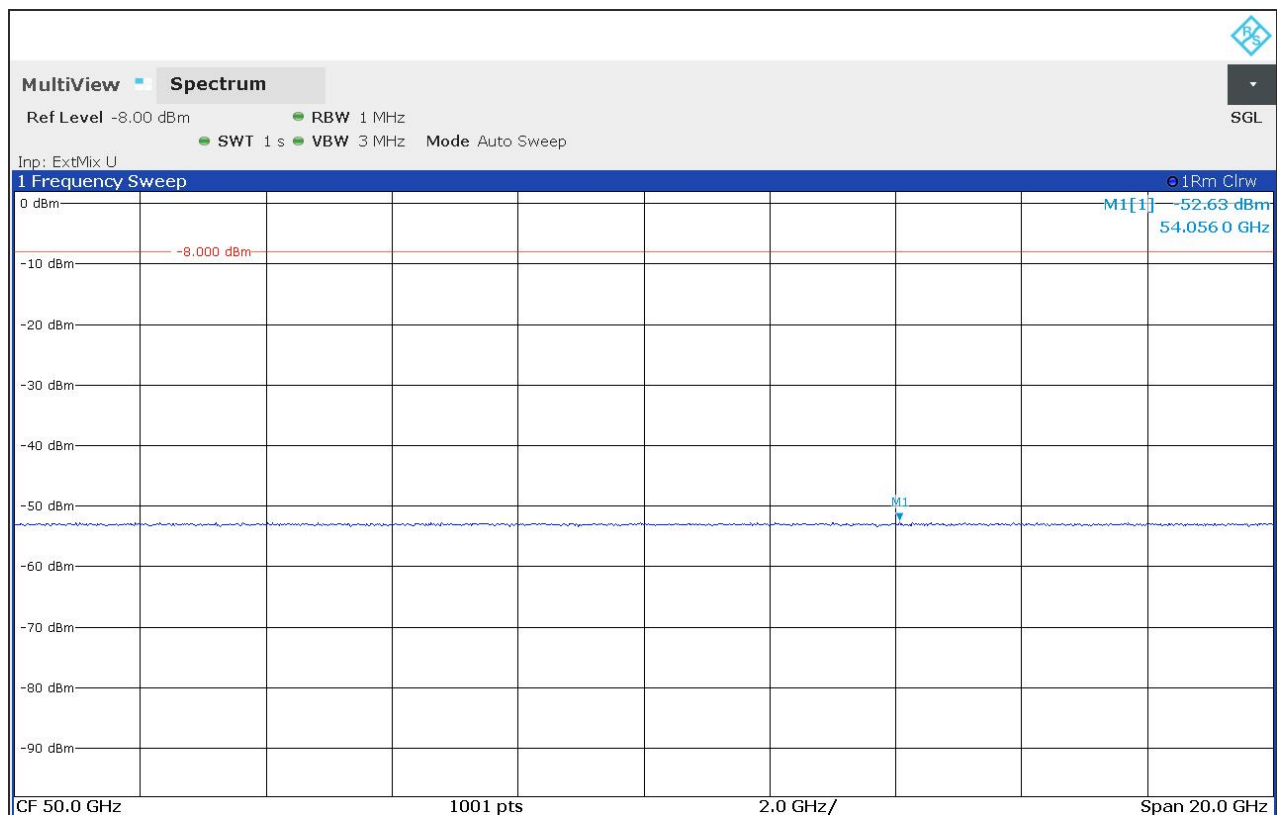


Shenzhen GUOREN Certification Technology Service Co., Ltd.

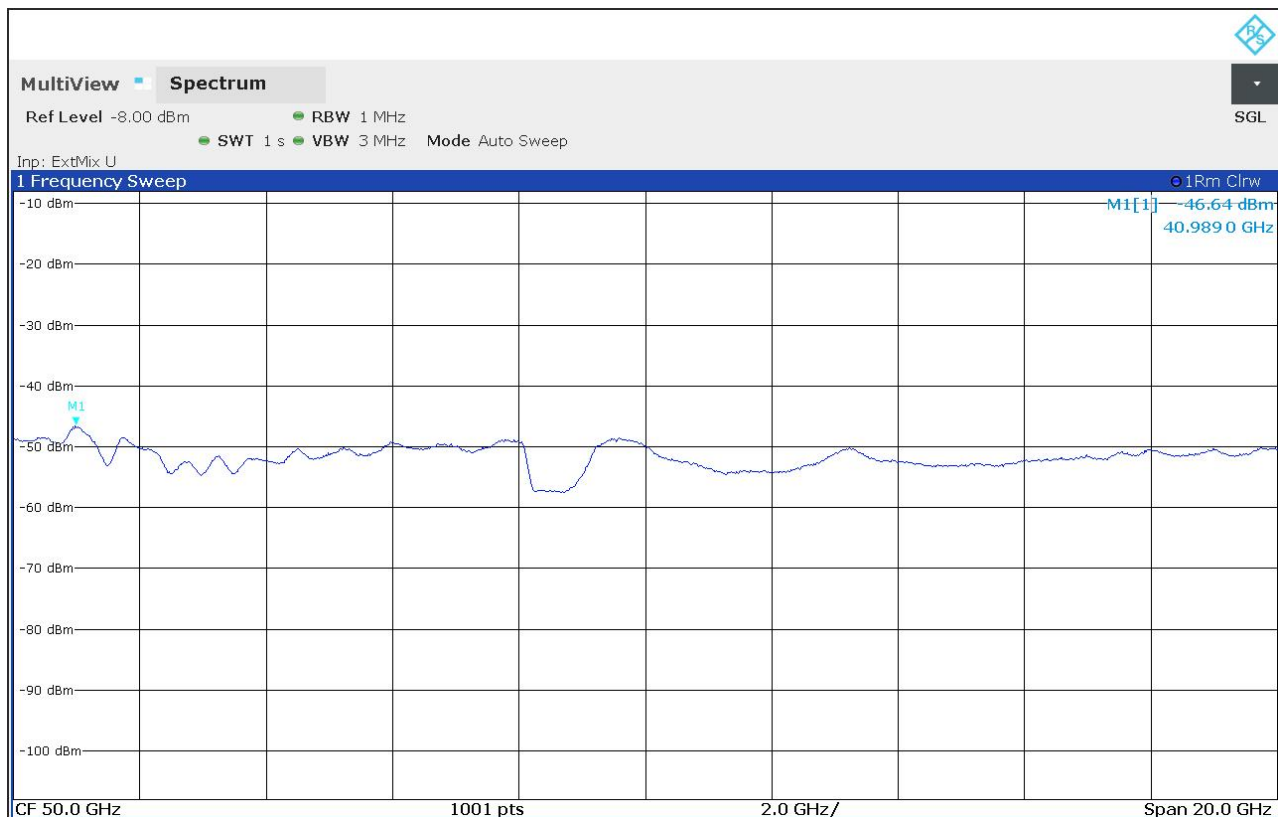
101#, Building K & Building T, The Second Industrial Zone, Jiazitang Community,
Fenghuang Street, Guangming District, Shenzhen, China

For 40 GHz-42 GHz

Horizontal



Vertical



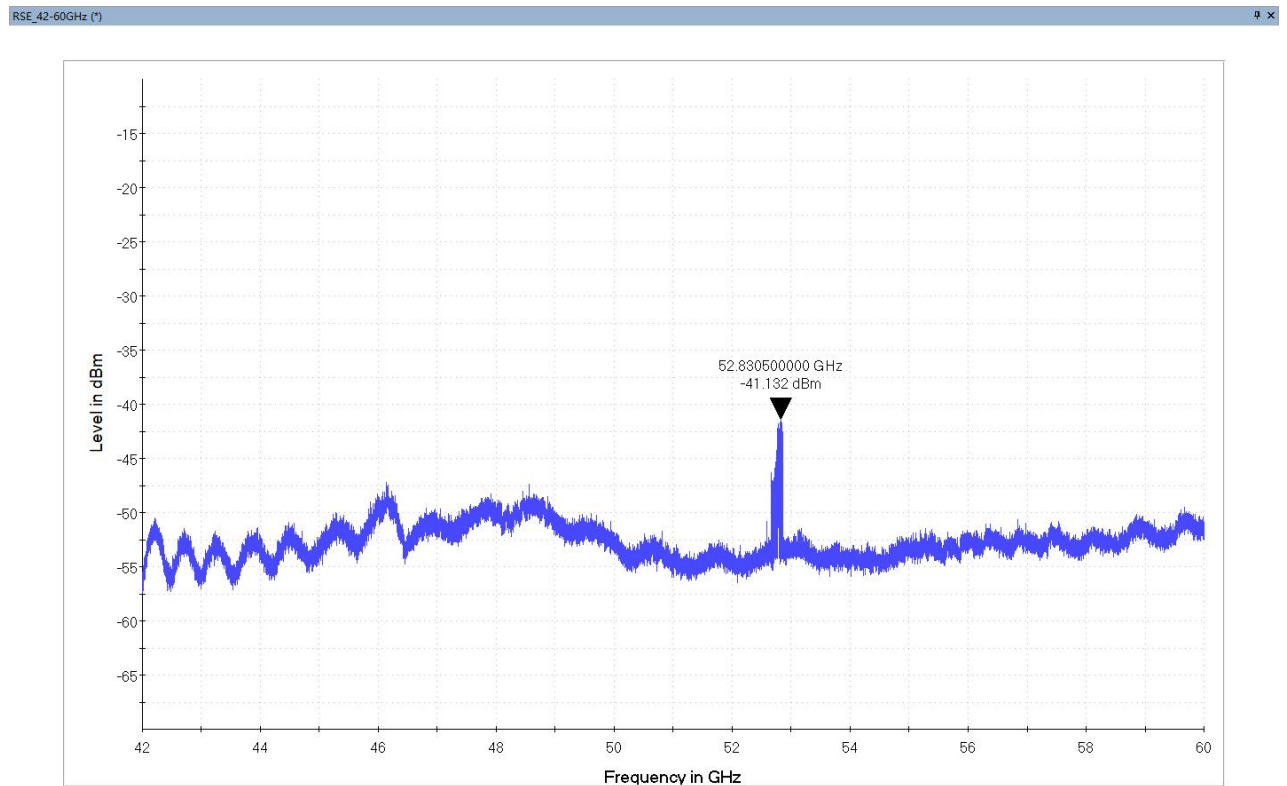


Shenzhen GUOREN Certification Technology Service Co., Ltd.

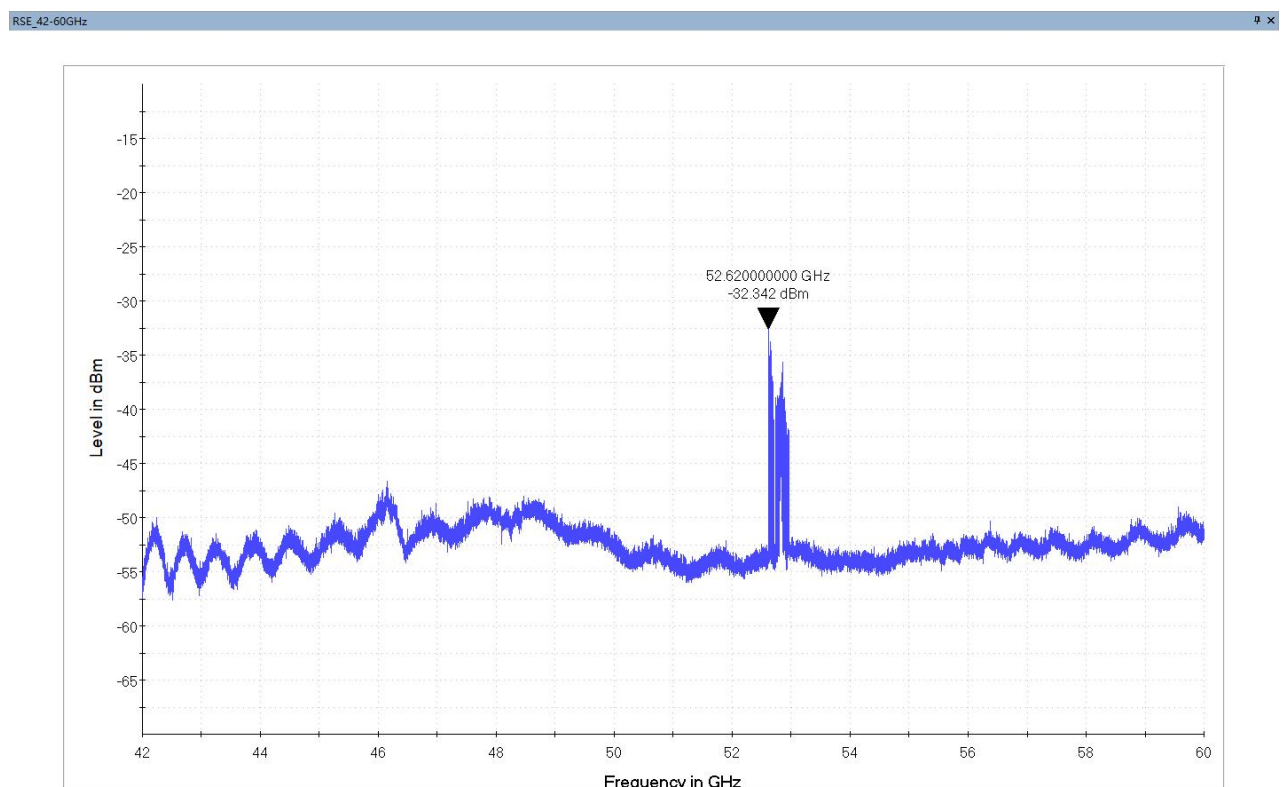
101#, Building K & Building T, The Second Industrial Zone, Jiazitang Community,
Fenghuang Street, Guangming District, Shenzhen, China

For 40 GHz-60 GHz

Horizontal

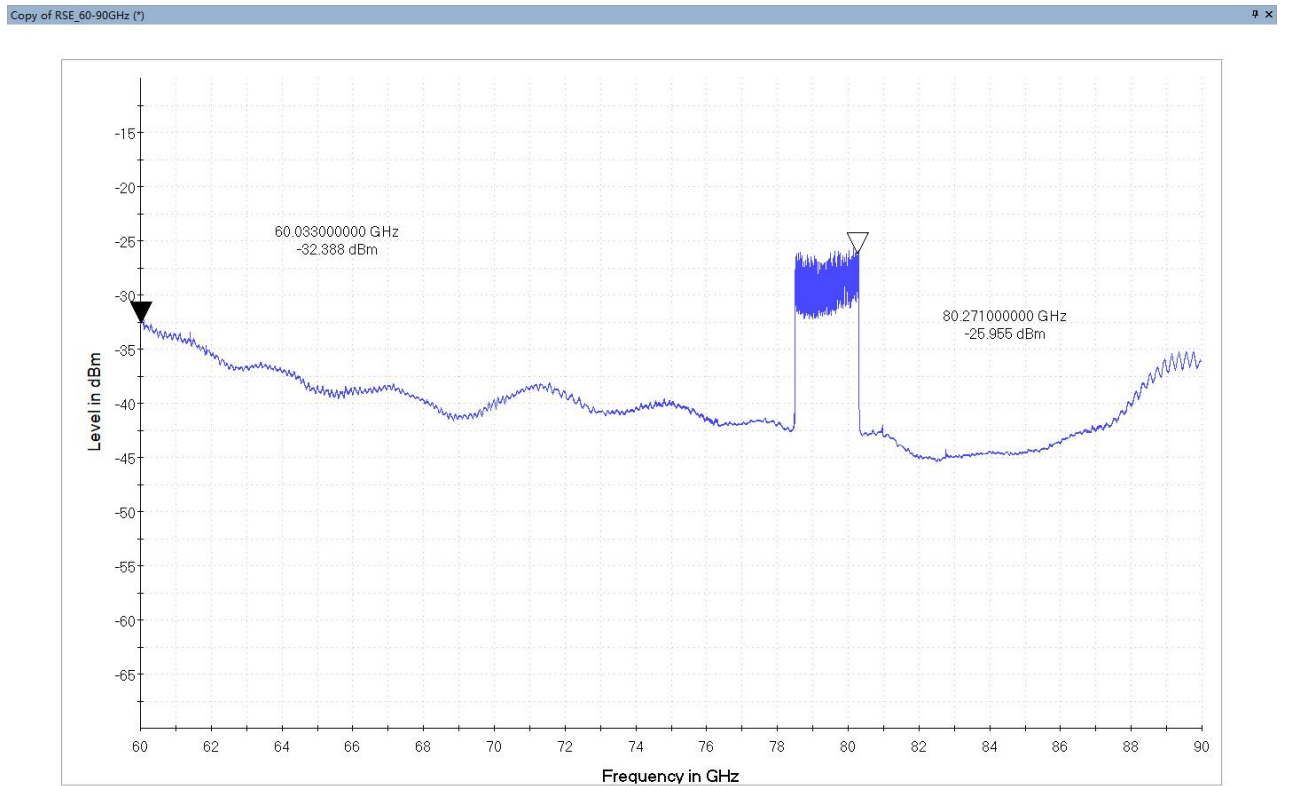


Vertical

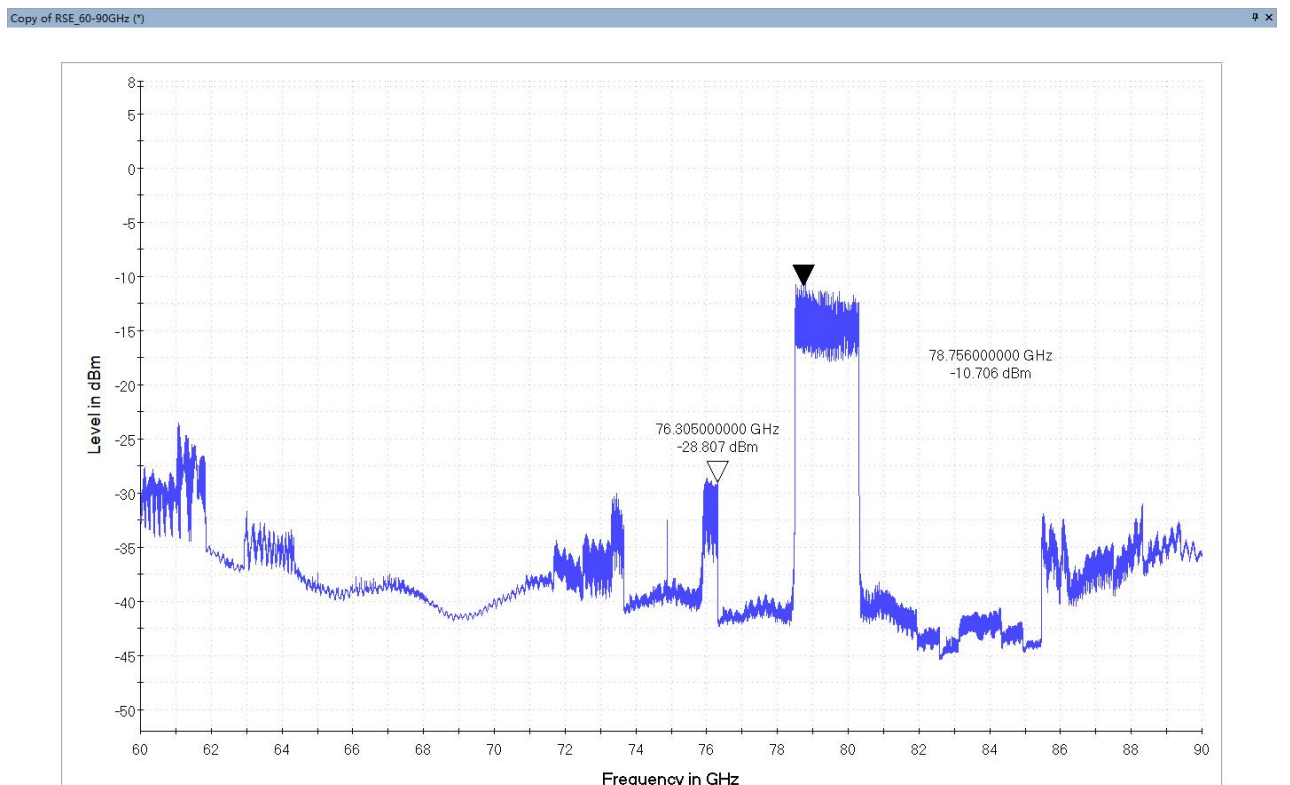


For 60 GHz-90 GHz

Horizontal

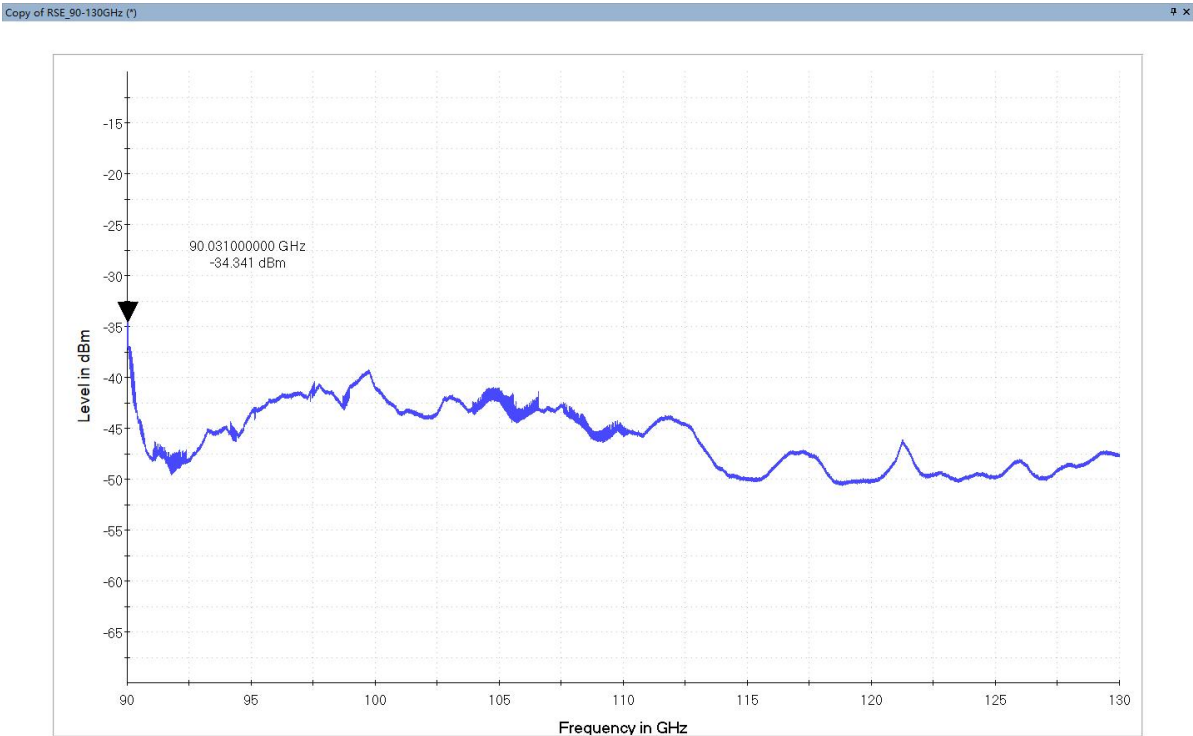


Vertical

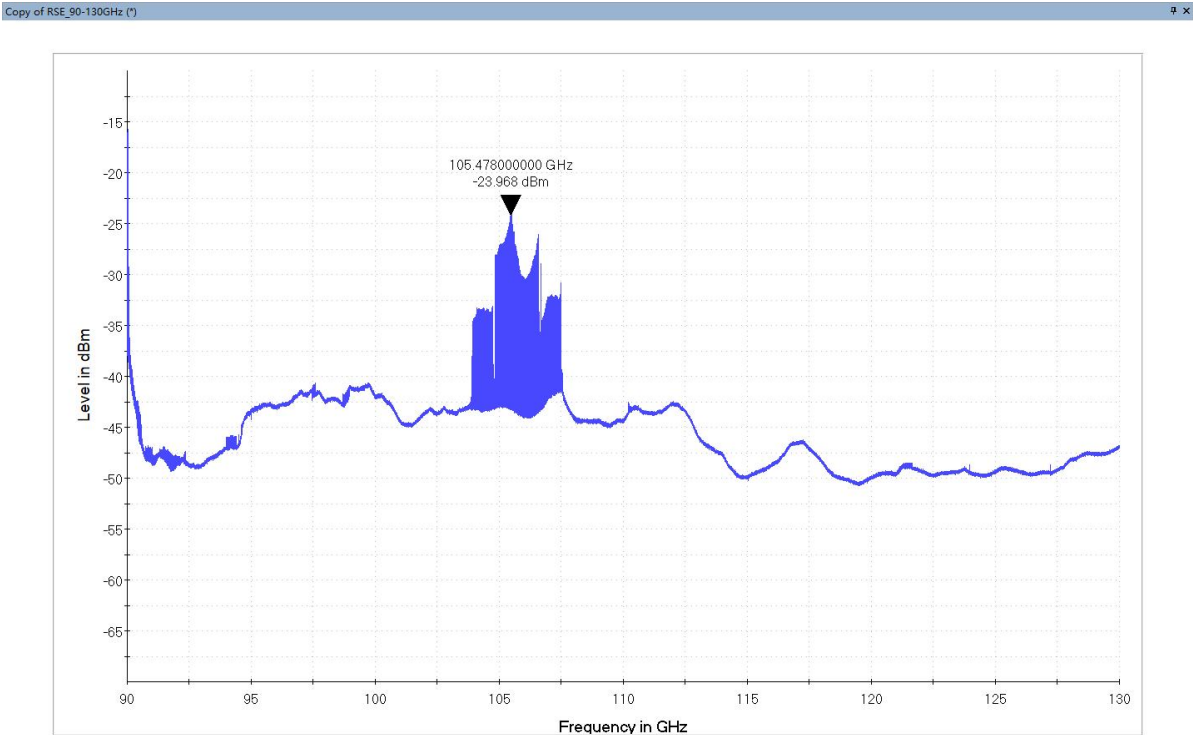


For 90 GHz-130 GHz

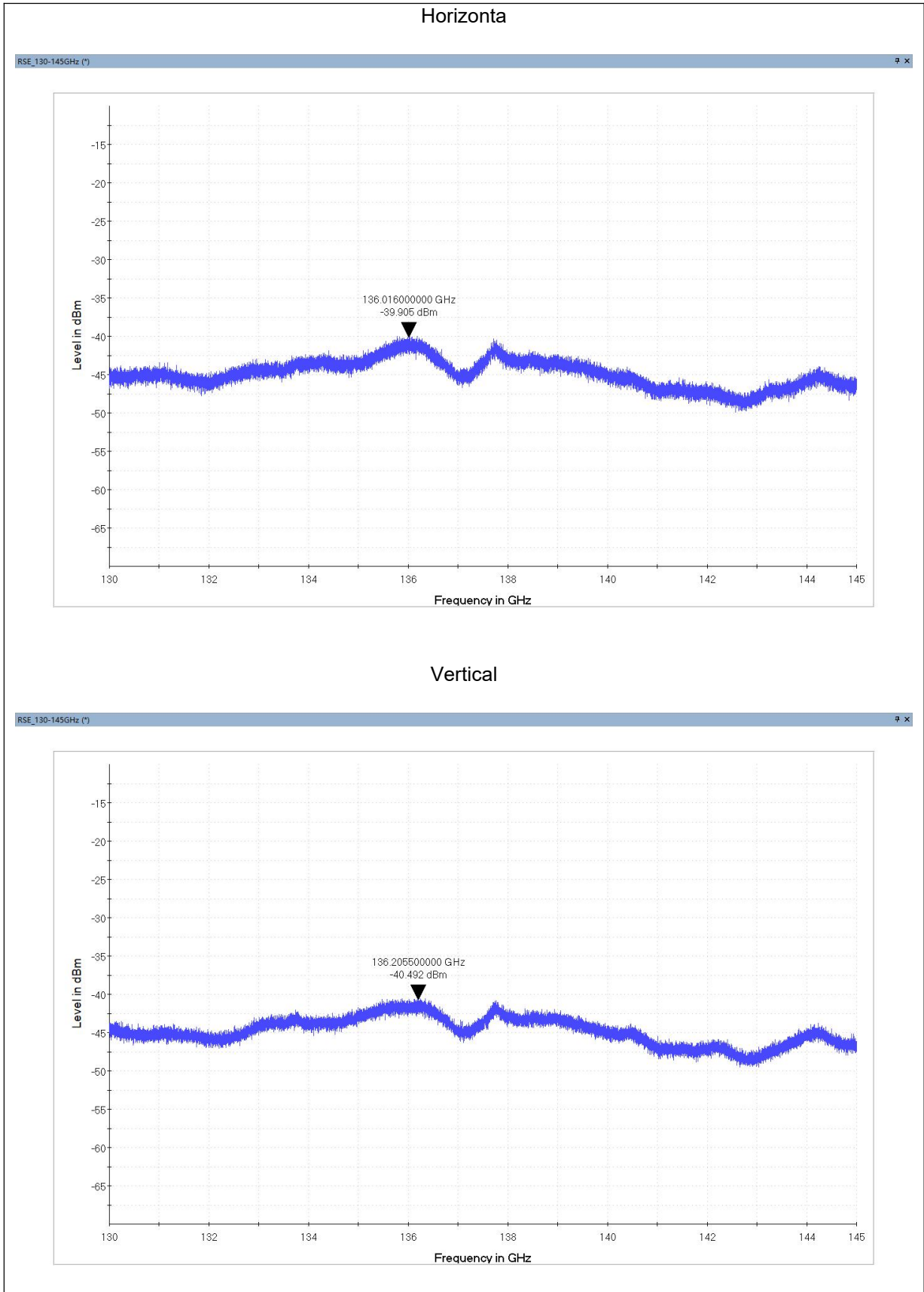
Horizontal



Vertical

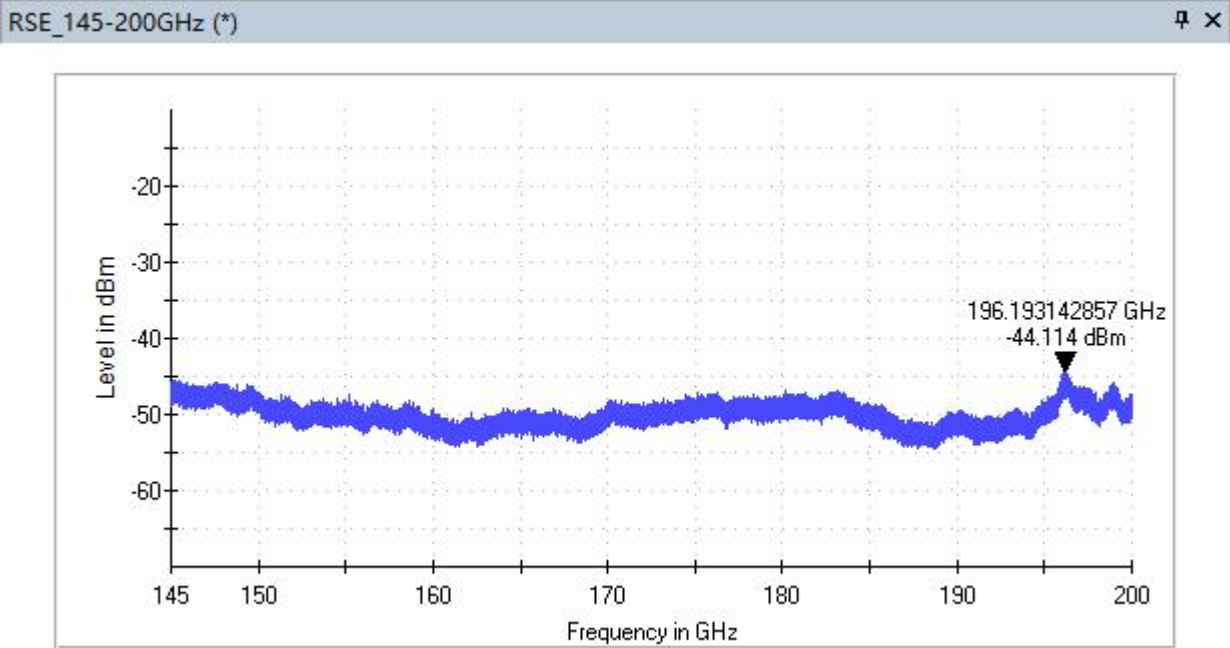


For 130 GHz-145 GHz

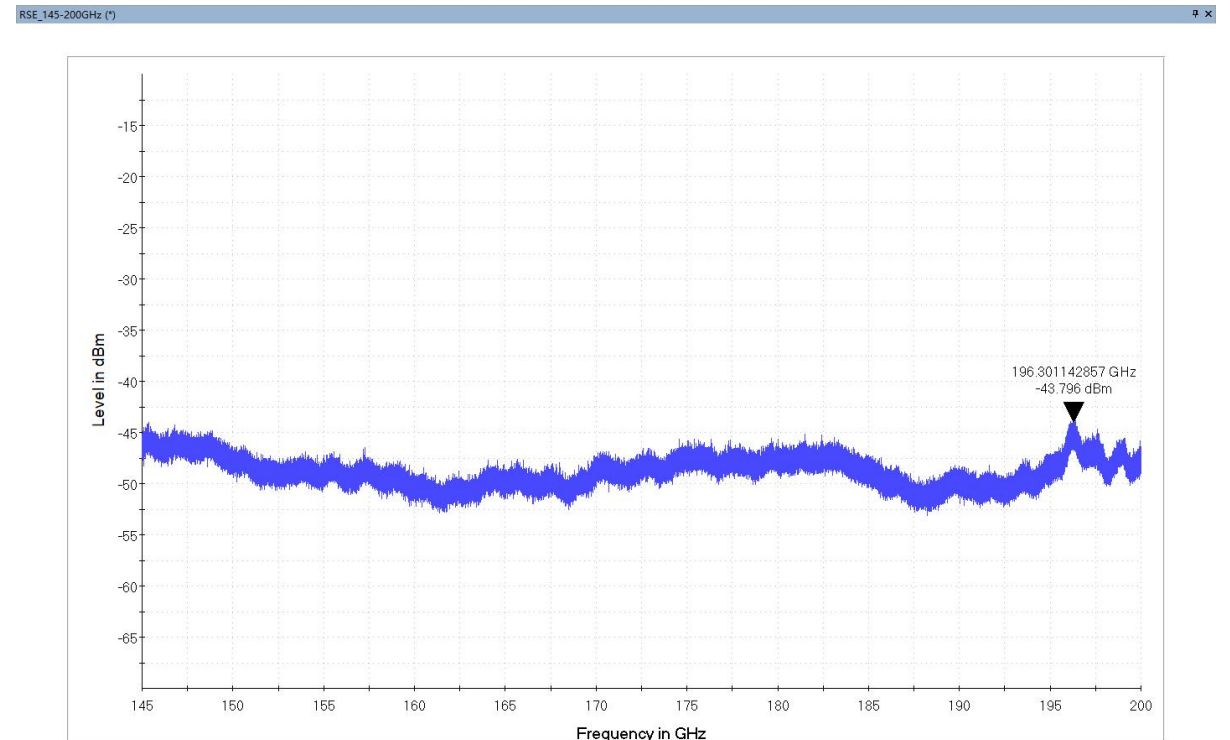


For 145 GHz-200 GHz

Horizonta

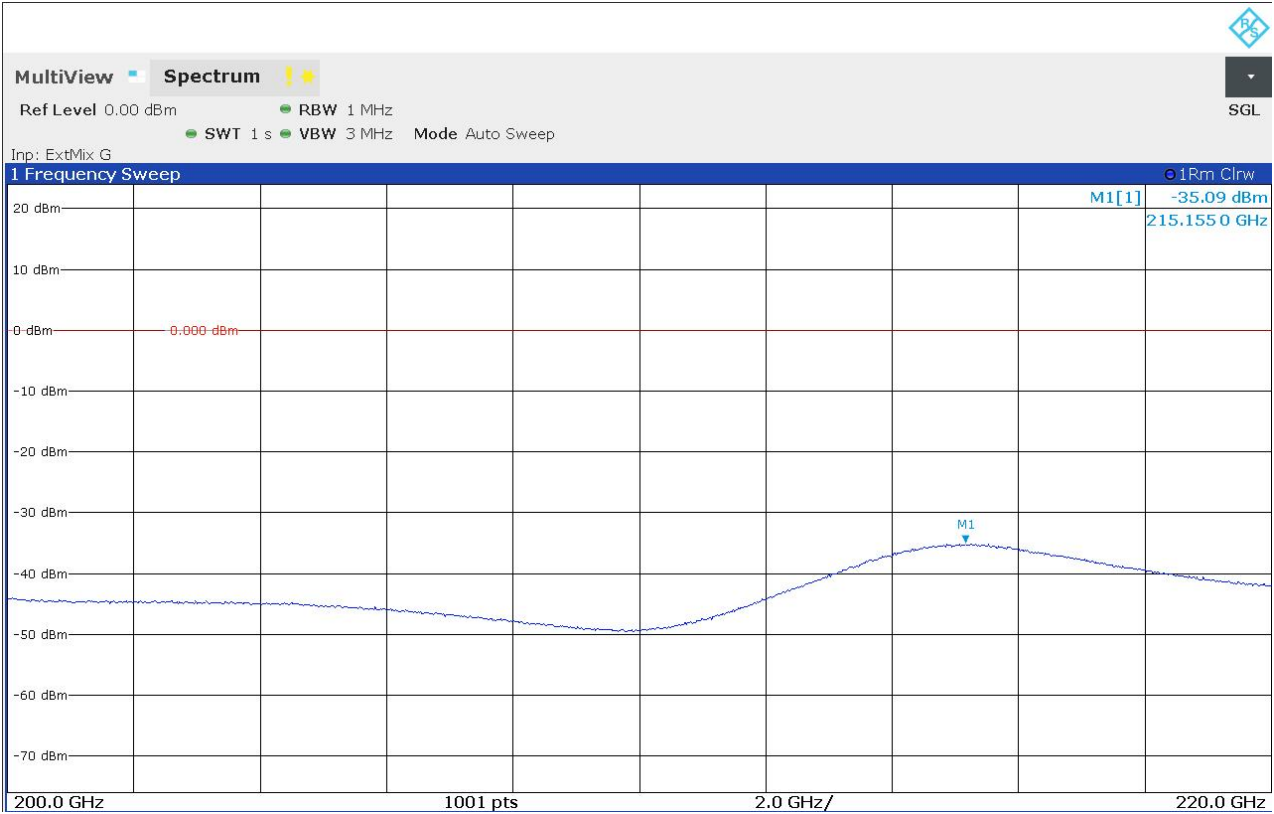


Vertical

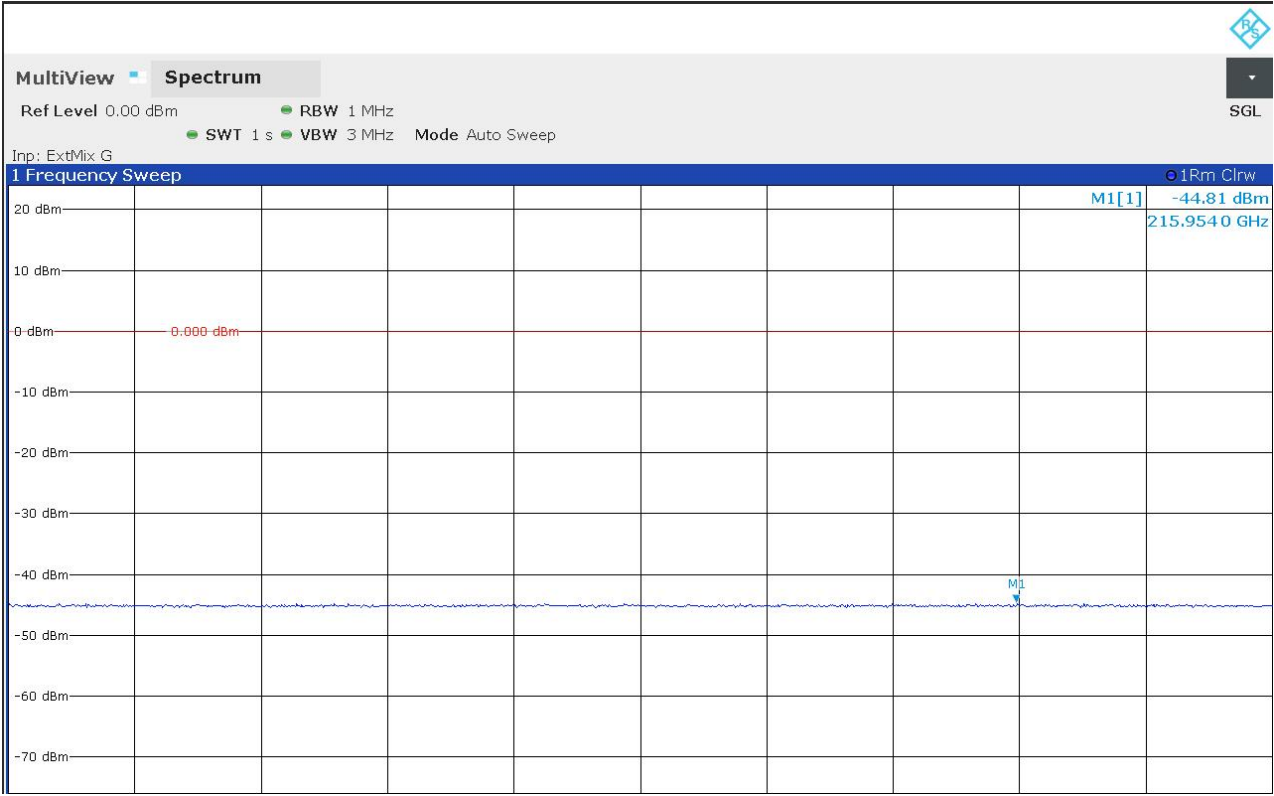


For 200 GHz-220 GHz

Vertical

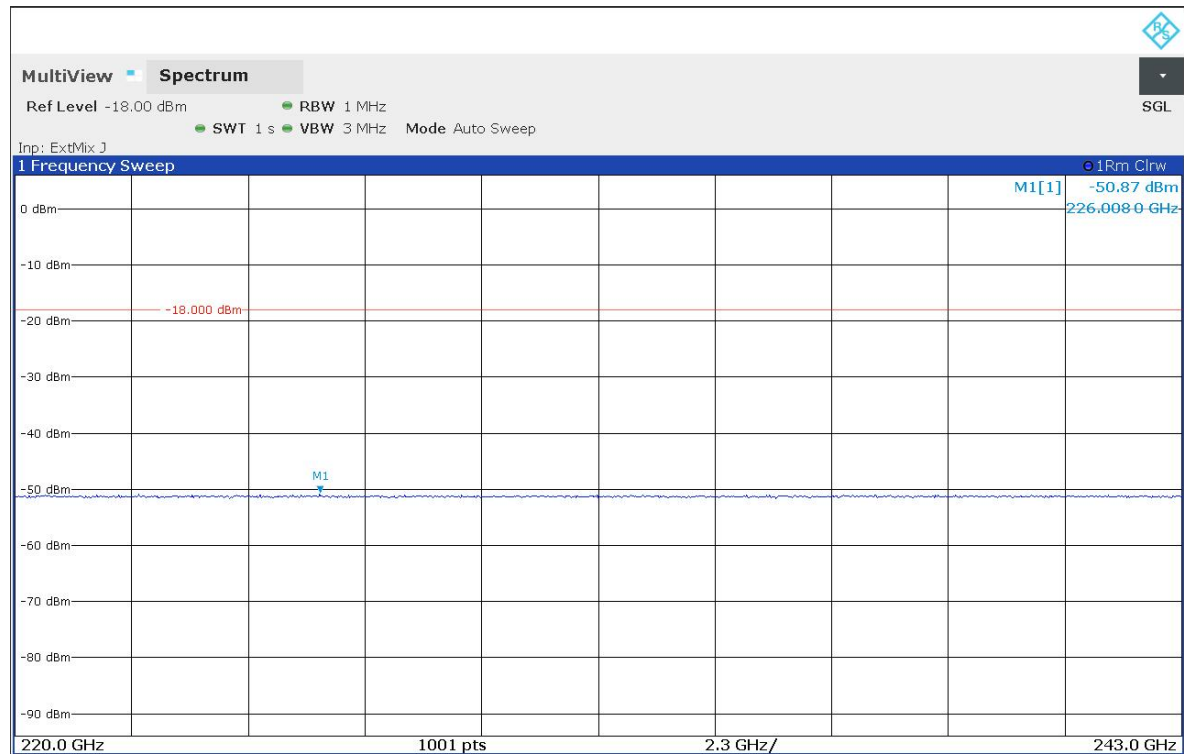


Horizontal

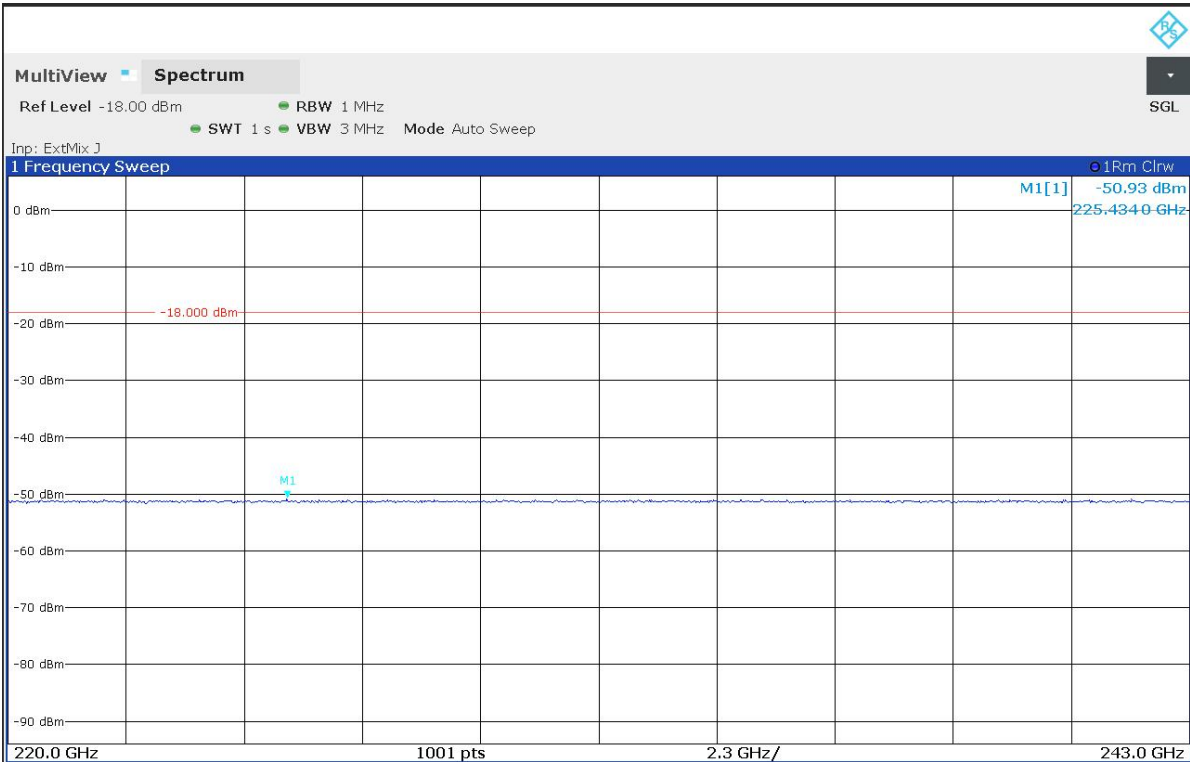


For 220 GHz-243 GHz

Vertical



Horizontal

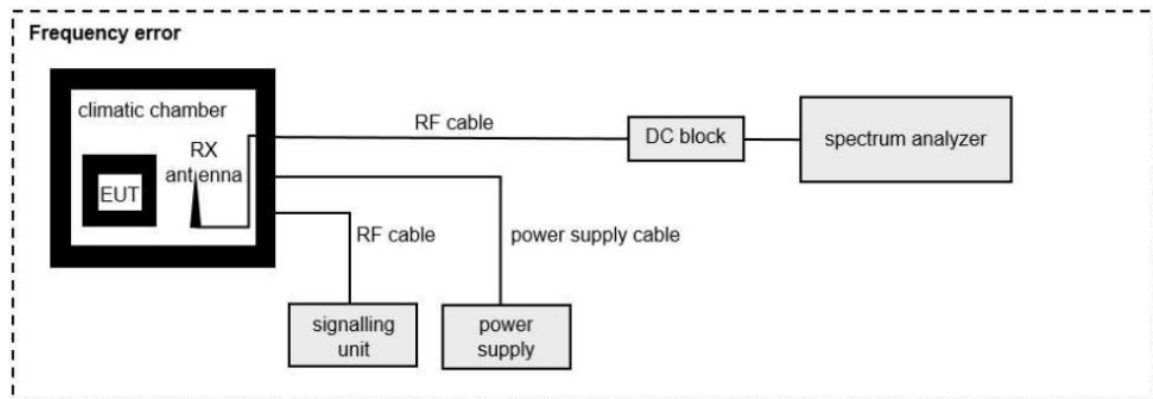


4.3 Frequency Stability

LIMIT

According to § 2.1055 Measurement required: Frequency Stability.

- (a) The frequency stability shall be measured with variation of ambient temperature as follows:
- (1) From -30° to $+50^{\circ}$ centigrade for all equipment except that specified in [paragraphs \(a\) \(2\) and \(3\)](#) of this section.
 - (2) From -20° to $+50^{\circ}$ centigrade for equipment to be licensed for use in the Maritime Services under [part 80 of this chapter](#), except for Class A, B, and S Emergency Position Indicating Radiobeacons (EPIRBS), and equipment to be licensed for use above 952 MHz at operational fixed stations in all services, stations in the Local Television Transmission Service and Point-to-Point Microwave Radio Service under [part 21 of this chapter](#), equipment licensed for use aboard aircraft in the Aviation Services under [part 87 of this chapter](#), and equipment authorized for use in the Family Radio Service under [part 95 of this chapter](#).
 - (3) From 0° to $+50^{\circ}$ centigrade for equipment to be licensed for use in the Radio Broadcast Services under [part 73 of this chapter](#).
- (b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.
- (c) The frequency stability shall be measured with variation of primary supply voltage as follows:
- (1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
 - (2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.
 - (3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

TEST CONFIGURATION**TEST PROCEDURE**

According to ANSI C63.26:2015 section 5.4.4: The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are equal to 0.5% of the total mean power of the given emission.

The following procedure shall be used for measuring 99% power bandwidth:

- The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
- The nominal IF filter bandwidth (3dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
- Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10\log_{10}(\text{OBW}/\text{RBW})]$ below the reference level. Specific guidance is given in 4.1.5.2.
- Set the detection mode to peak, and the trace mode to Max Hold.
- If the instrument does not have 99% OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5% of the total is reached. Recorded that frequency as the lower OBW frequency. Repeat the process until 99.5% of the total is reached and record that frequency as the upper OBW frequency. The 99% power OBW can be determined by computing the difference these two frequencies.
- The OBW shall be reported and plots of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labelled. Tabular data can be reported in addition to the plots.

KDB 653005 D01 76 – 81 GHz Radar v01r02, 4.d)

The occupied bandwidth of the radar device shall be measured, reported, and shown to be fully contained within the designated 76 – 81 GHz frequency band under normal operating conditions as well as under those extreme ambient temperature and input voltage conditions as described in Section 2.1057.

The OBW measurement of an FMCW radar shall be performed with the transmitter operating in normal mode (i.e. with frequency sweep or step active).

Measurement with the peak detector are also suitable to demonstrate compliance of an EUT, as long as the required resolution bandwidth is used, because peak detection will yield amplitudes equal to or greater than amplitudes measured with RMS detector. The measurement data from a spectrum analyzer peak detector will represent the worst-case results.

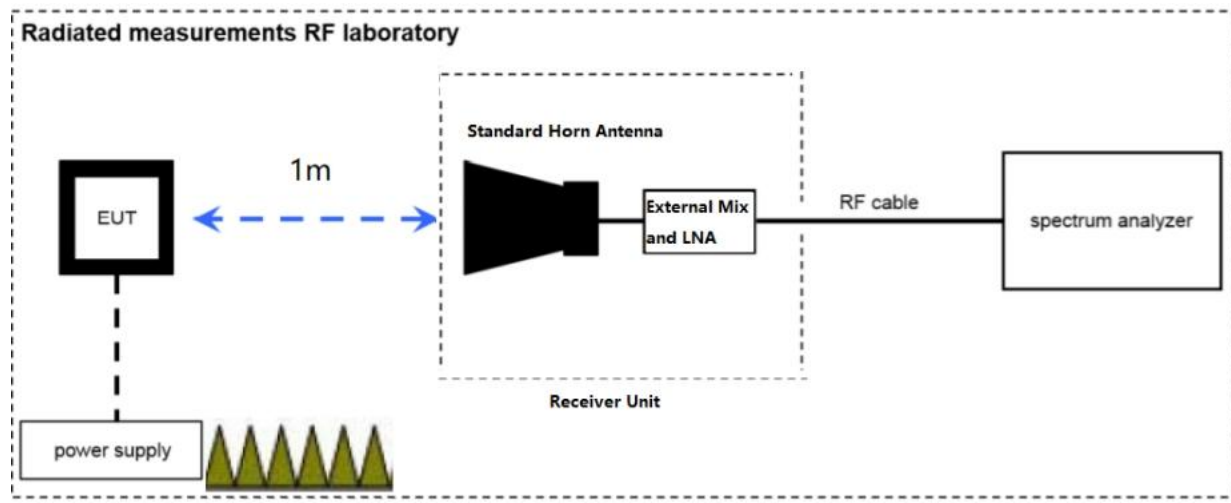
TEST RESULTS

Record worst case as below:

Temperature	Voltage	Frequency (GHz)	Frequency (GHz)	Frequency (GHz)	Frequency (GHz)
°C	V	fL	fH	fL Limit	fH Limit
-30	13	77.043 55	78.936 68	77	81
-20	13	77.043 26	78.935 28	77	81
-10	13	77.043 14	78.936 59	77	81
0	13	77.051 32	78.934 93	77	81
10	13	77.043 16	78.936 18	77	81
20	13	77.044 22	78.93737	77	81
30	13	77.043 82	78.93835	77	81
40	13	77.04367	78.936 34	77	81
50	13	77.043 83	78.937 74	77	81
20	14.95	77.044 12	78.938 03	77	81
20	11.05	77.043 74	78.936 67	77	81

4.4 Occupied Bandwidth

TEST CONFIGURATION



TEST PROCEDURE

According to ANSI C63.26:2015 section 5.4.4: The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are equal to 0.5% of the total mean power of the given emission.

The following procedure shall be used for measuring 99% power bandwidth:

- The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
- The nominal IF filter bandwidth (3dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
- Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $10\log_{10}(\text{OBW}/\text{RBW})$ below the reference level. Specific guidance is given in 4.1.5.2.
- Set the detection mode to peak, and the trace mode to Max Hold.
- If the instrument does not have 99% OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5% of the total is reached. Recorded that frequency as the lower OBW frequency. Repeat the process until 99.5% of the total is reached and record that frequency as the upper OBW frequency. The 99% power OBW can be determined by computing the difference these two frequencies.
- The OBW shall be reported and plots of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labelled. Tabular data can be reported in addition to the plots.

KDB 653005 D01 76 – 81 GHz Radar v01r02, 4.d)

The occupied bandwidth of the radar device shall be measured, reported, and shown to be fully contained within the designated 76 – 81 GHz frequency band under normal operating conditions as well as under those extreme ambient temperature and input voltage conditions as described in Section 2.1057.

The OBW measurement of an FMCW radar shall be performed with the transmitter operating in normal mode (i.e. with frequency sweep or step active).

Measurement with the peak detector are also suitable to demonstrate compliance of an EUT, as long as the required resolution bandwidth is used, because peak detection will yield amplitudes equal to or greater than amplitudes measured with RMS detector. The measurement data from a spectrum analyzer peak detector will represent the worst-case results.

LIMIT

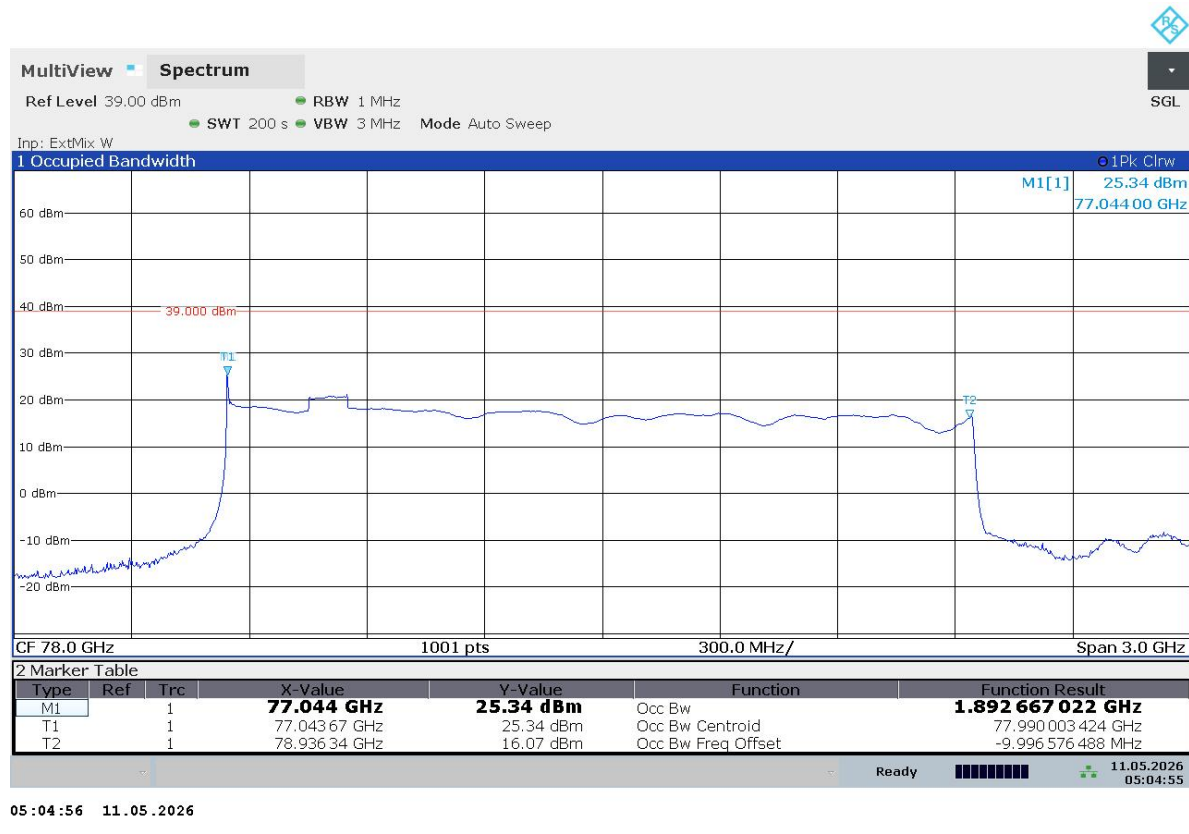
According to § 95.3379 (b): Fundamental emission (i.e. 99% emission bandwidth) must be contained within the frequency bands specified in this section during all conditions of operation.

According to § 2.1049: Measurements required: Occupied bandwidth: The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers

radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

TEST RESULTS

99% Occupied Bandwidth (MHz)	F _L (GHz)	F _L Limit (GHz)	F _H (GHz)	F _H Limit (GHz)
1892.667	77.04367	77	78.93634	79



Note: As required by 63.10, the spectrum cannot achieve 1% OBW; therefore, use 1 MHz for testing.

4.5 Modulation characteristics

TEST DESCRIPTION

According to § 2.1047 Modulation Characteristics

(d) Other types of equipment. A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

KDB 653005 D01 76 – 81 GHz Radar v01r02, 3.g)

Concerning the Section 2.1047 modulation characteristics requirement, the following information should be provided:

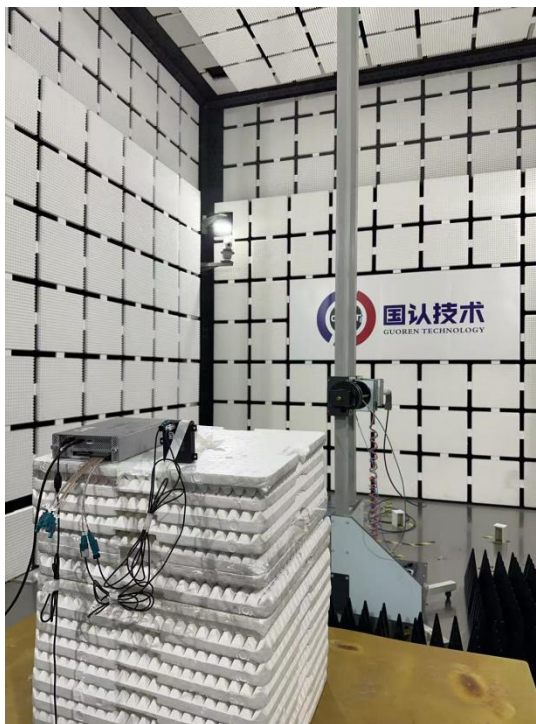
- 1) Pulsed radar: pulse width and pulse repetition frequency (if PRF is variable, then report maximum and minimum values).
- 2) Non-pulsed radar (e.g., FMCW): modulation type (i.e., sawtooth, sinusoid, triangle, or square wave) and sweep characteristics (sweep bandwidth, sweep rate, sweep time).

VERDICT RESULTS

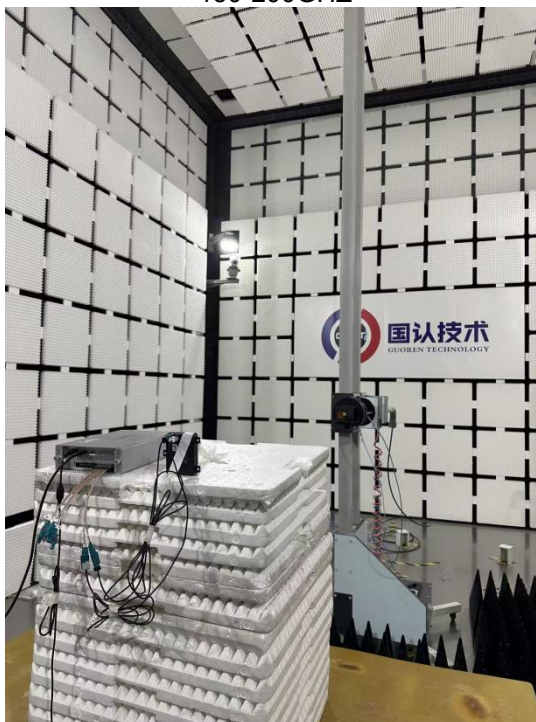
The EUT meets § 2.1047 Modulation Characteristics requirement as declared by the applicant (applicant provide technical documents).

5 Test Setup Photos of the EUT

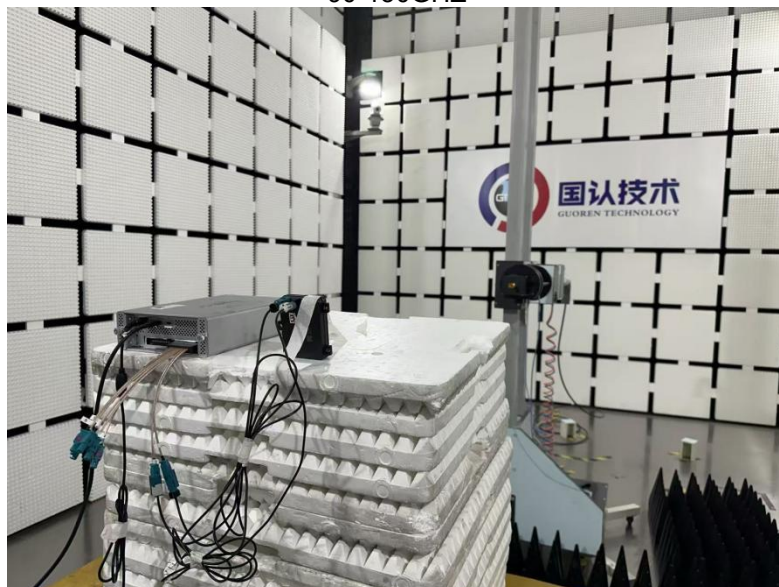
200-243GHZ



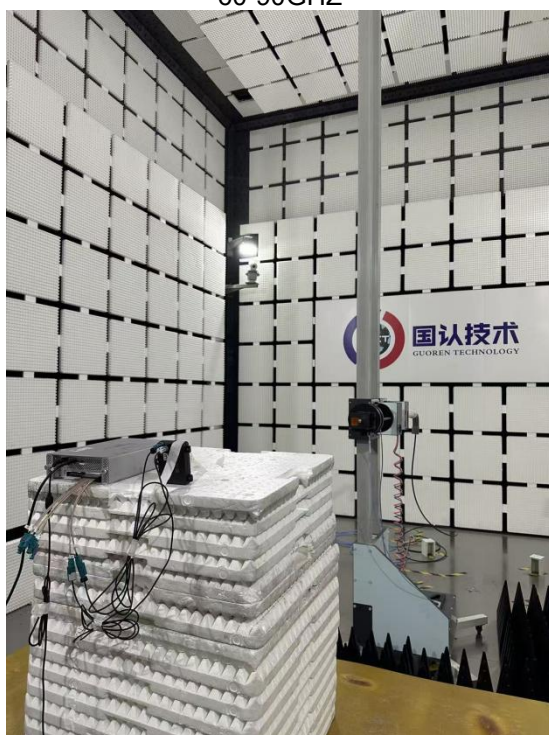
130-200GHZ



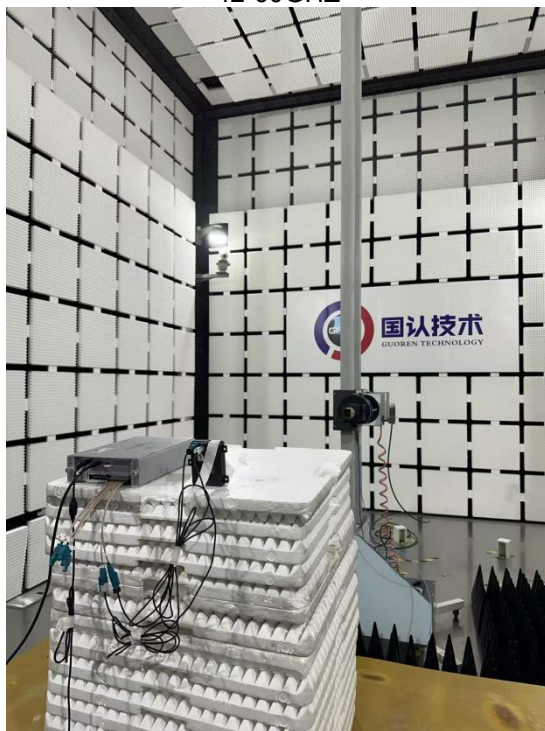
90-130GHZ



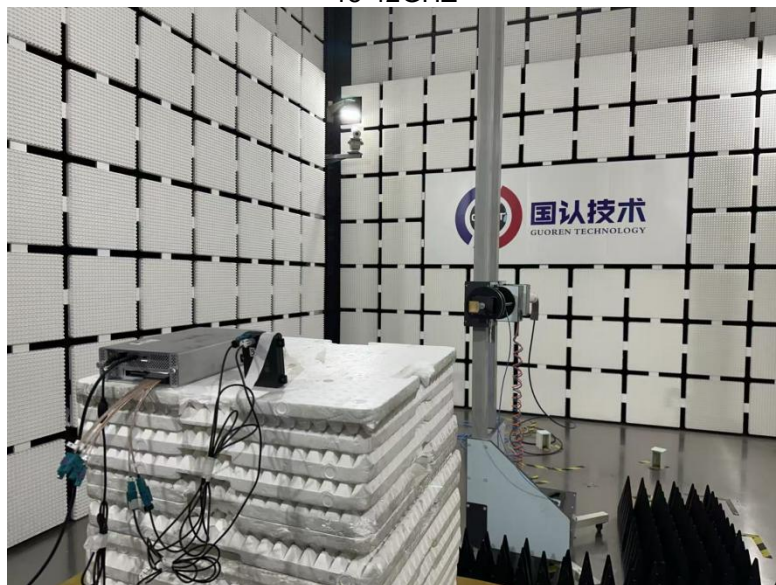
60-90GHZ



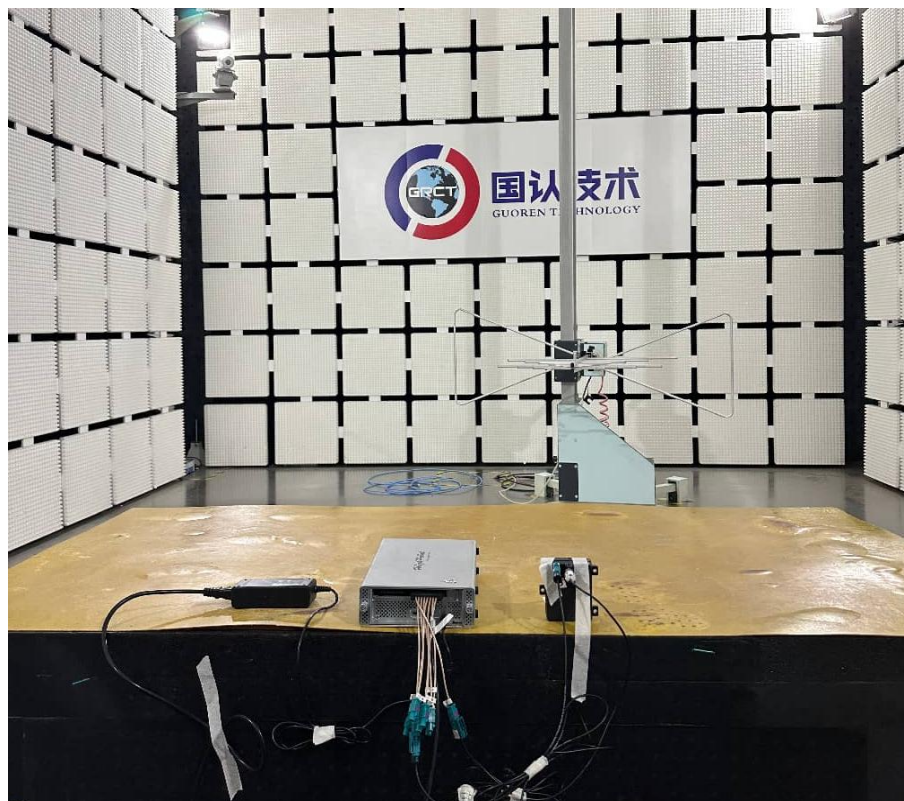
42-60GHZ



18-42GHZ



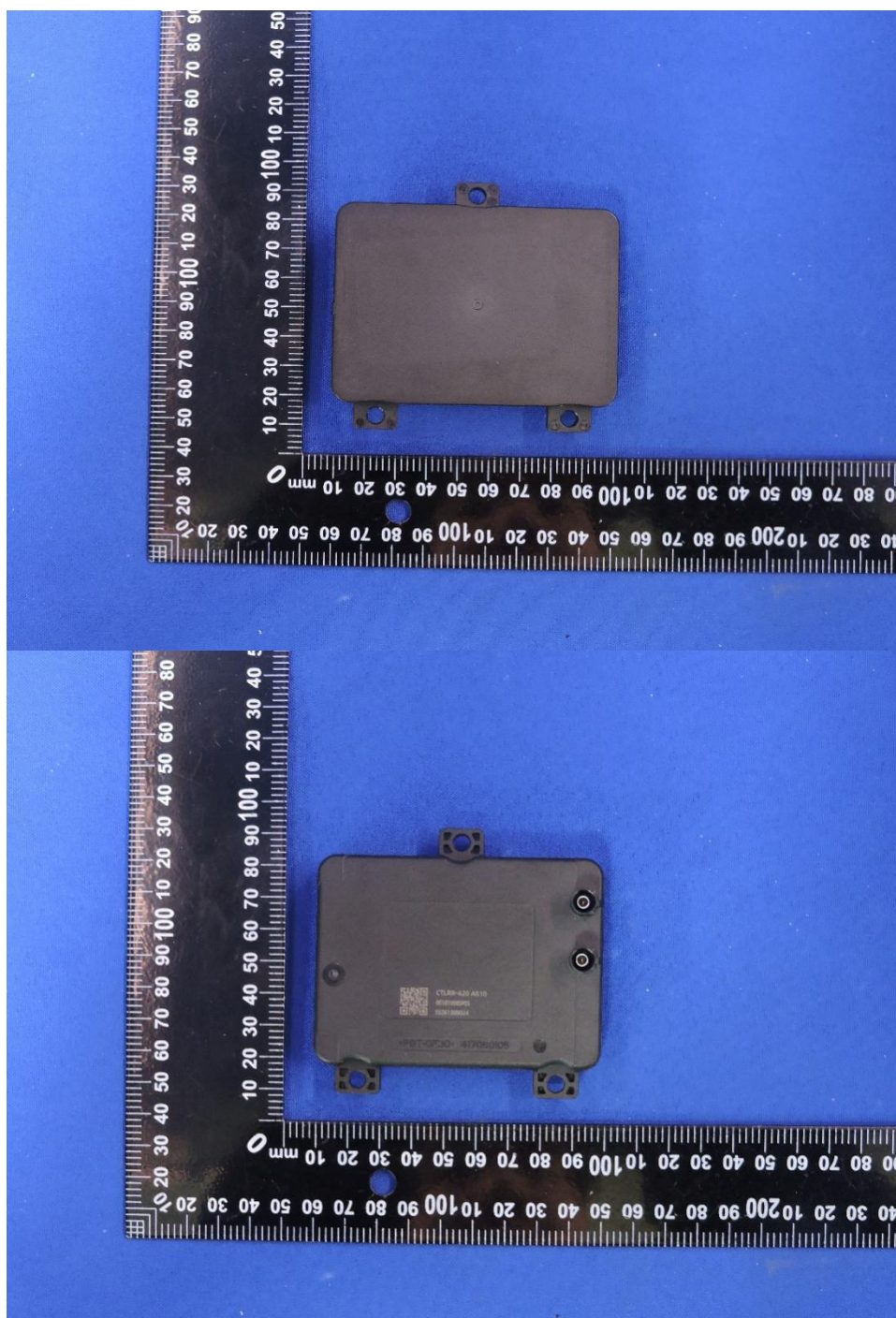
30M-1GHZ

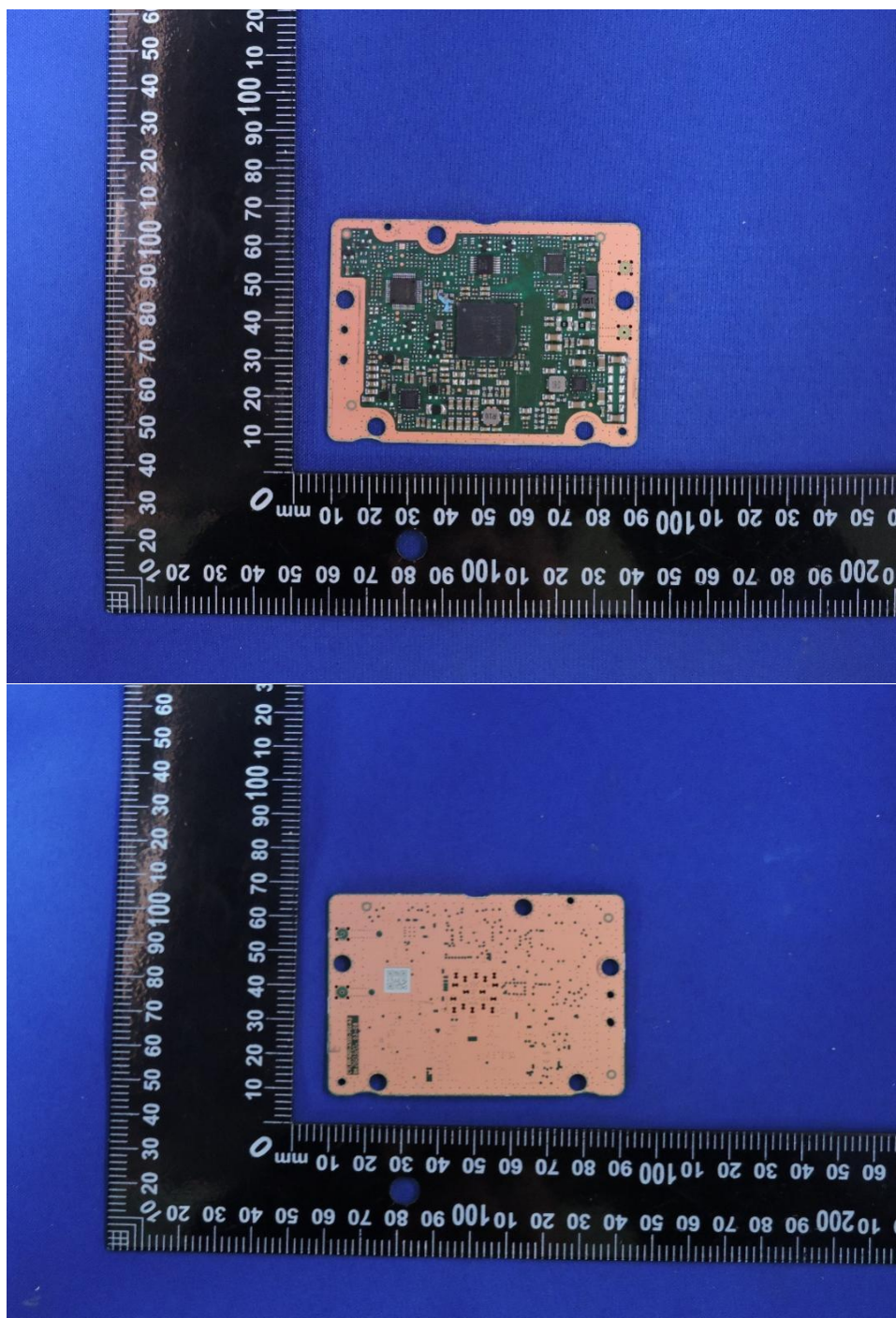


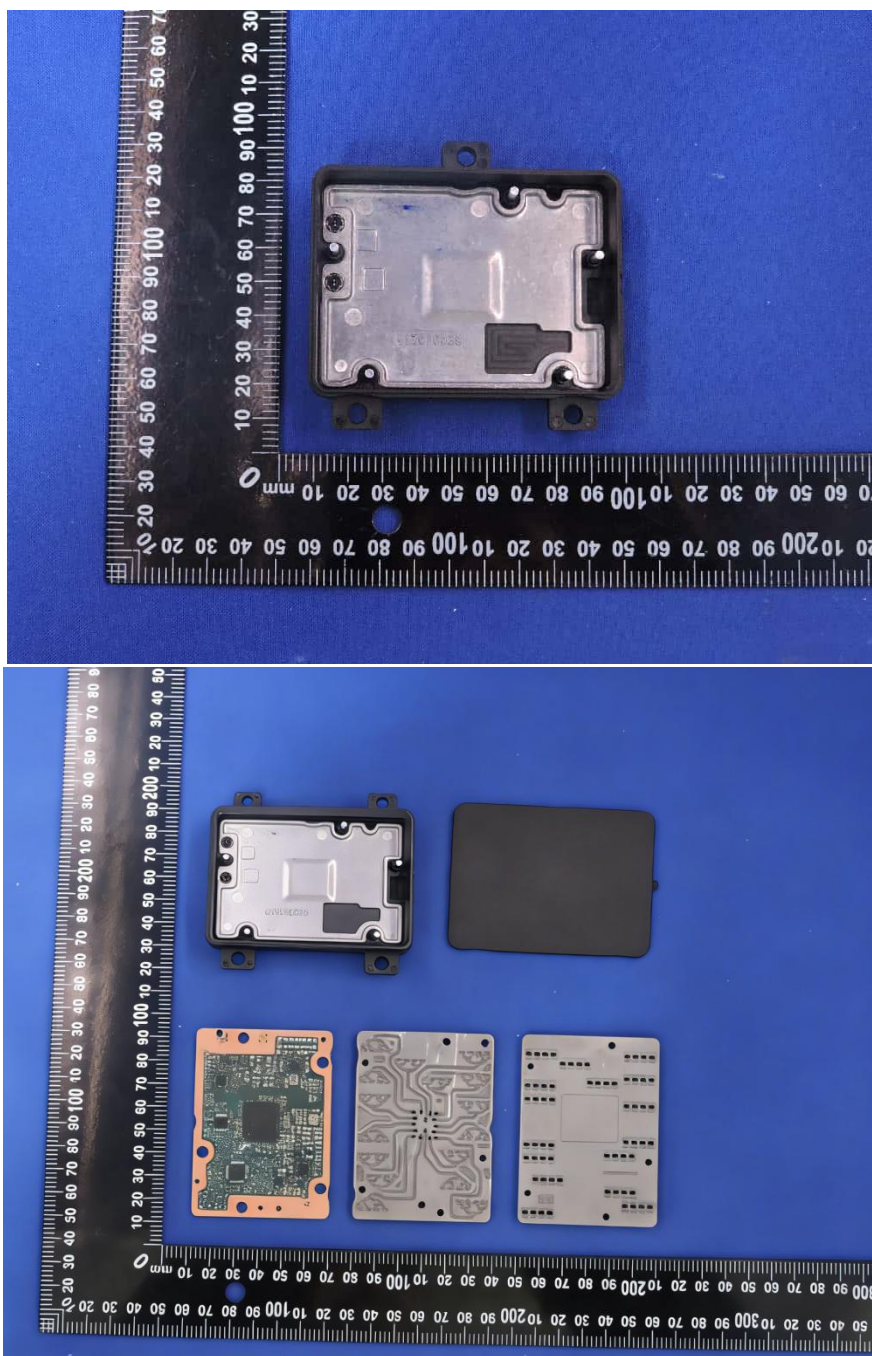
1-18GHZ

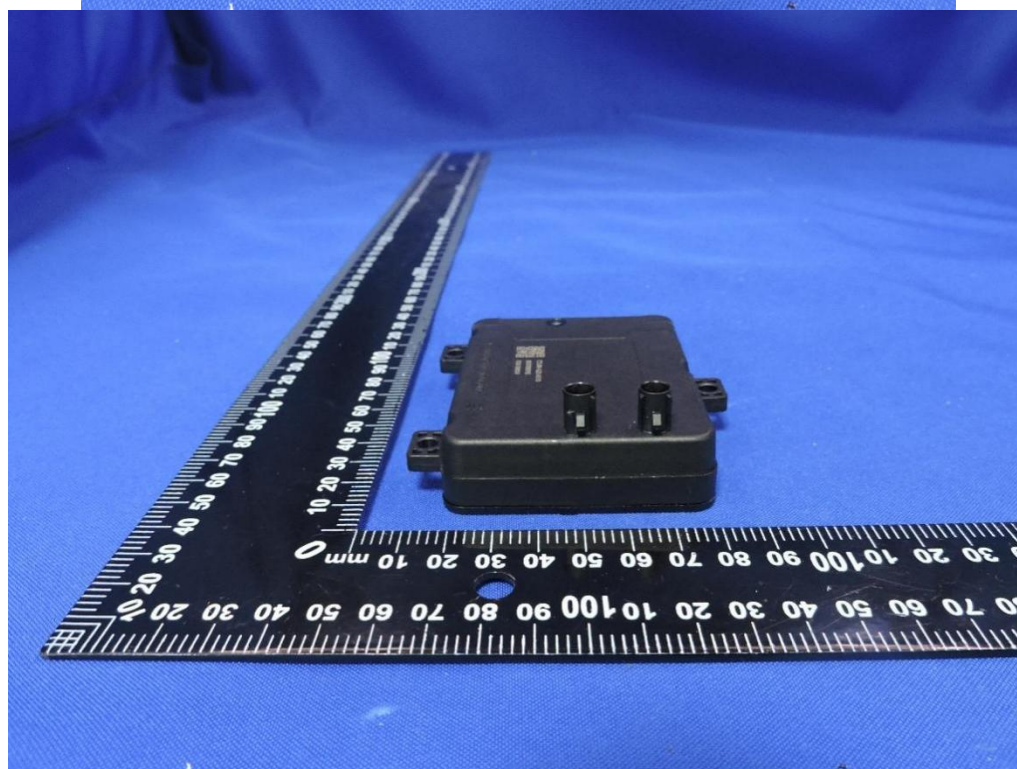
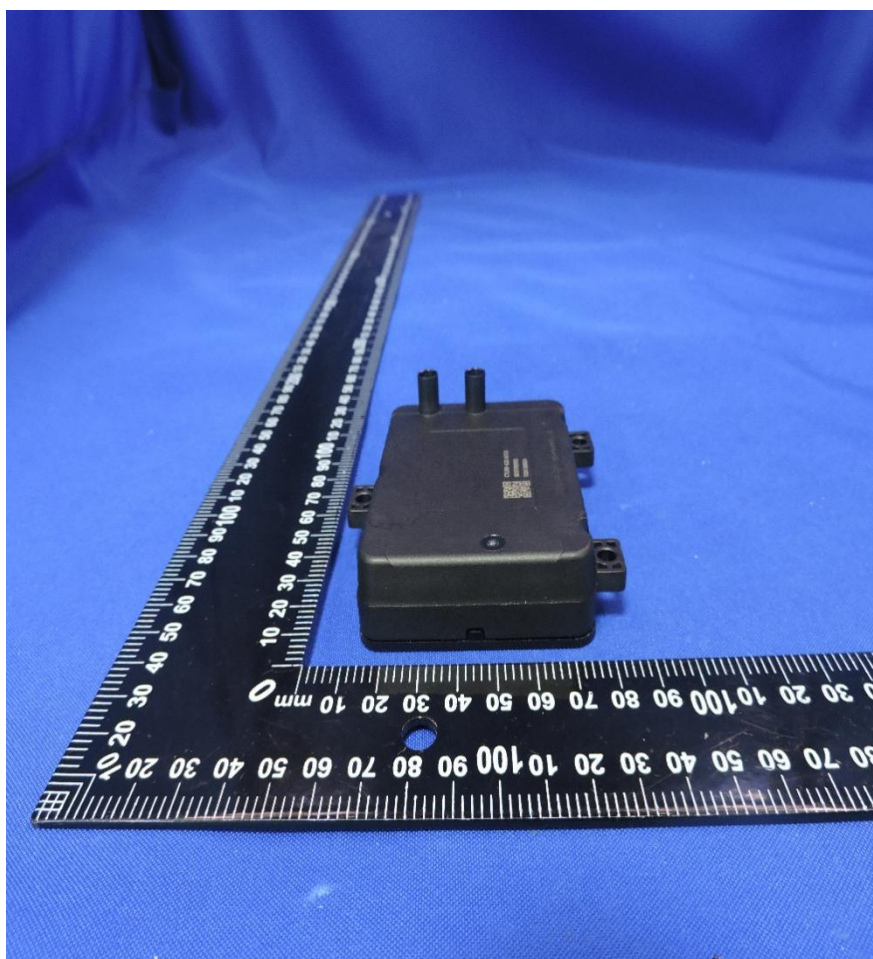


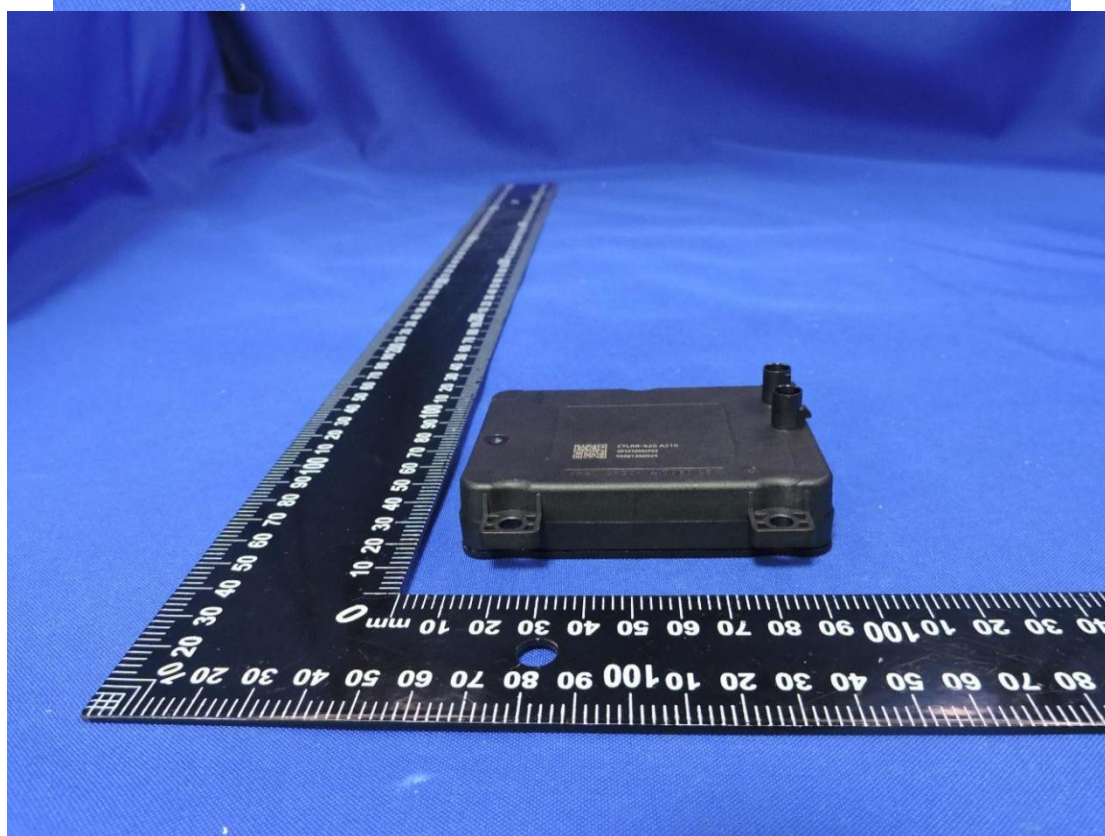
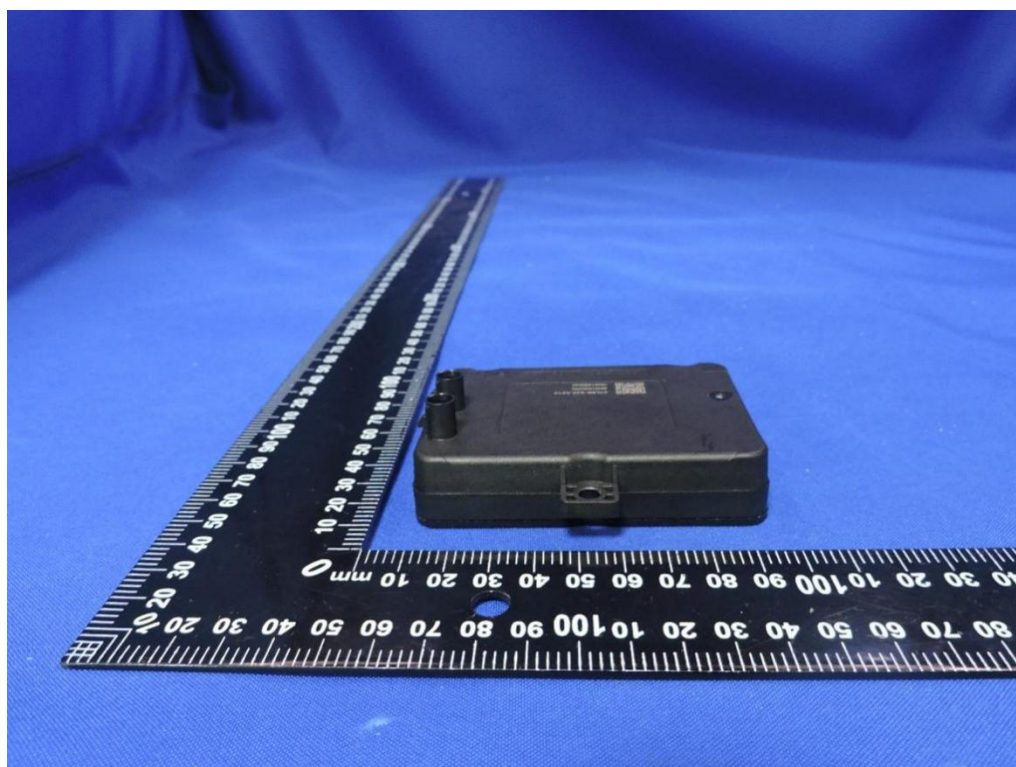
6 Photos of the EUT











***** End of Report *****