REPORT No.: SZ24030142W03

TEST REPORT

APPLICANT	:	PIN GENIE, INC. DBA LOCKLY
PRODUCT NAME	:	Lockly Visage Zeno Series Deadbolt Edition
MODEL NAME	:	PGK728WRHK
BRAND NAME	:	LOCKLY
FCC ID	:	2ASIVPGK728WRHK
STANDARD(S)	:	47 CFR Part 15 Subpart C
RECEIPT DATE	:	2024-05-07
TEST DATE	:	2024-05-23 to 2024-05-31
ISSUE DATE	:	2024-06-13

Edited by: Peng Mi (Rapporteur)

Approved by: Shen Junsheng (Supervisor)

MORLAB

Shenzhen Morlab Communications Technology Co., Ltd.
FL.1-3, Building A, FeiYang Science Park, No.8 LongChang Road,
Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China

Tel: 86-755-36698555 Fax: 86-755-36698525
Http://www.morlab.cn E-mail: service@morlab.cn

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Change History		
Version	Date	Reason for change
1.0	2024-06-06	First edition
2.0	2024-06-13	Modified the Applicant information and 20 dB Bandwidth and replaced the test report version 1.0.

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	PIN GENIE, INC. DBA LOCKLY
Applicant Address:	676 Transfer Rd.,St. Paul,Minnesota,United States,55114
Manufacturer:	Smart Electronic Industrial (Dongguan) Co., Ltd
Manufacturer Address:	Room 101, 10 Qinglong Road Huangjiang Town,Dong Guan ,Guang Dong, China

1.2. Equipment Under Test (EUT) Description

Product Name:	Lockly Visage Zeno Series Deadbolt Edition	
Sample No.:	10#	
Hardware Version:	00	
Software Version:	V1	
Operating Frequency Range:	10.5GHz~10.55GHz	
Antenna Type:	PCB Antenna	
Accessory Information:	Battery	
	Brand Name:	LOCKLY
	Model No.:	PGA735
	Serial No.:	N/A
	Capacity:	10000mAh
	Rated Voltage:	3.7V
	Charge Limit:	5V
	Manufacturer:	Smart Electronic Industrial(Dongguan)Co,Ltd.

Note 1: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.3. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C for the EUT FCC ID Certification:

No.	Identity	Document Title
1	47 CFR Part 15	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Test Date	Test Engineer	Result	Method Determination /Remark
1	15.203	Antenna Requirement	N/A	N/A	PASS	No deviation
2	15.215(c)	20 dB Bandwidth	May 30, 2024	He Yuyang	PASS	No deviation
3	15.207	Conducted Emission	May 24, 2024	Wang Deyong	PASS	No deviation
4	15.245(b)	Field Strength of Fundamental	May 25 to 31, 2024	Li Hanbin	PASS	No deviation
5	15.245(b)	Radiated Emission and Field Strength of Harmonic	May 25 to 31, 2024	Li Hanbin	PASS	No deviation
6	15.245(b)(3) 15.205, 15.209	Restricted Bands	May 30, 2024	Li Hanbin	PASS	No deviation

Note 1: The tests were performed according to the method of measurements prescribed in ANSI C63.10-2013.

Note 2: Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.

Note 3: When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.

1.4. Environmental Conditions

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

Temperature (°C):	15-35
Relative Humidity (%):	30-60
Atmospheric Pressure (kPa):	86-106

2. 47 CFR Part 15C Requirements

2.1. Antenna Requirement

2.1.1. Applicable Standard

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

2.1.2. Result: Compliant

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

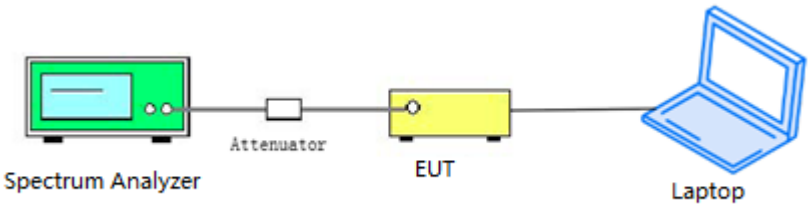
2.2. Bandwidth

2.2.1. Requirement

Refer to FCC 15.215

2.2.2. Test Description

Test Setup:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) in the range of 1% to 5% of the measured bandwidth and video bandwidth (VBW) shall be approximately three times RBW.

2.2.3. Test Result

A.Test Verdict:

Frequency (GHz)	20 dB Bandwidth (MHz)	Result
10.549	1.128	PASS

B.Test Plot:

(10.549GHz)

2.3. Conducted Emission

2.3.1. Requirement

According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

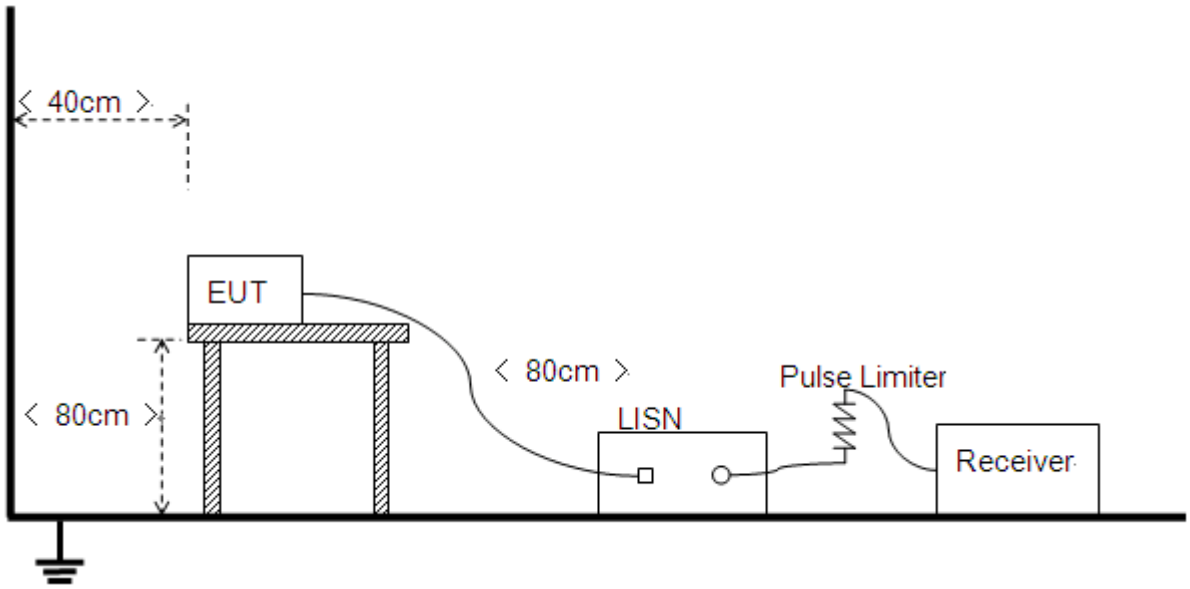
Frequency Range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

Note:

1) The lower limit shall apply at the band edges.
2) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

2.3.2. Test Description

Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10: 2013.

2.3.3. Test Procedure

Use the following receiver settings:

Span = wide enough to fully capture the emission being measured
RBW = 9 kHz
VBW = 30 kHz
Sweep = auto
Detector function = Quasi peak and Average
Trace = max hold

2.3.4. Test Result

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the Average and Quasi peak limits, and that have narrow margins from the Average and Quasi peak limits will be re-measured with Average and Quasi peak detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

Note: Both of the test voltage AC 120V/60Hz and AC 230V/50Hz were considered and tested respectively, only the results of the worst case AC 120V/60Hz were recorded in this report.

A.Test Setup:

Test Mode: EUT + PC + PC Adapter + 10.549GHz TX

Test voltage: AC 120V/60Hz

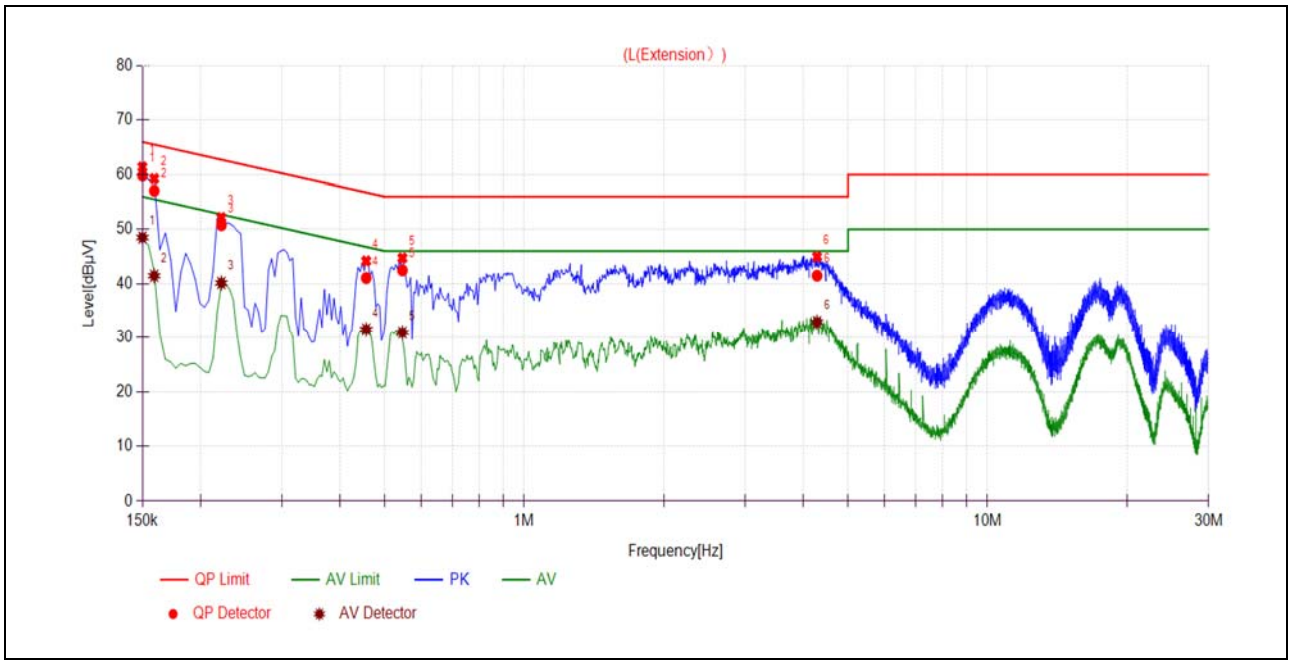
The measurement results are obtained as below:

$E\ [dB\mu V] = U_R[dB\mu V] + L_{Cable\ loss}\ [dB] + A_{Factor}\ [dB]$

U_R: Receiver Reading

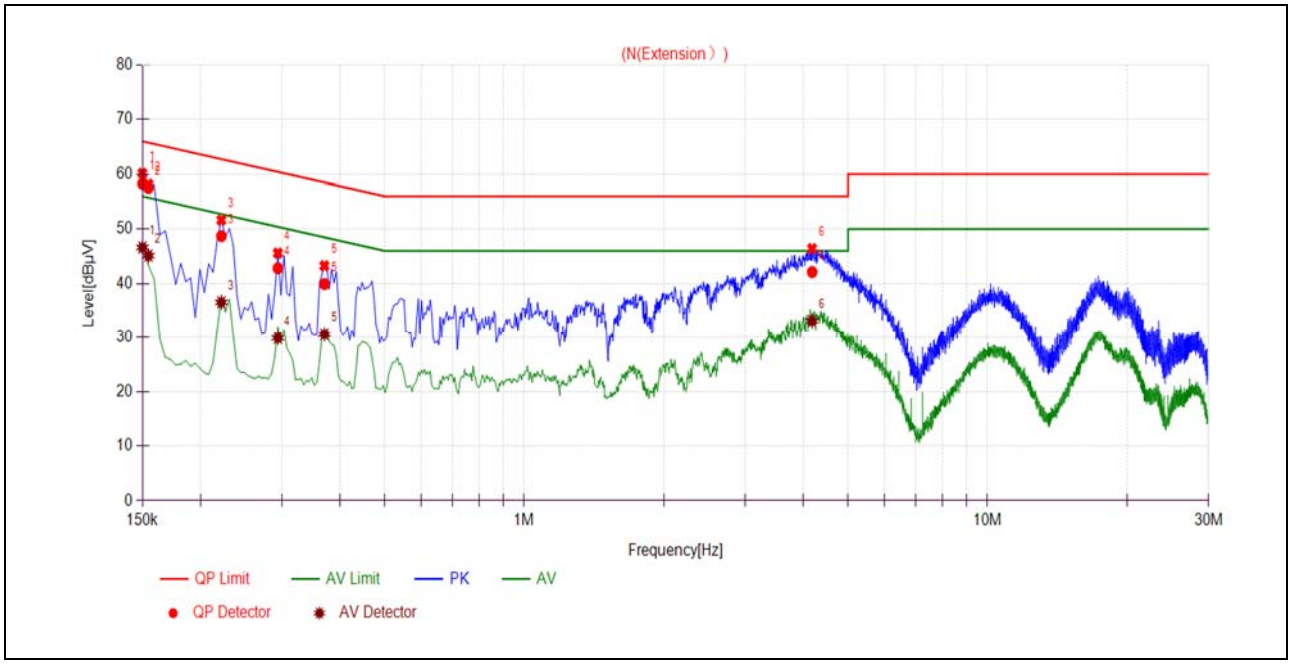
A_{Factor}: Voltage division factor of LISN

B.Test Plot:



(L Phase)

No.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1500	59.81	48.51	66.00	56.00	Line	PASS
2	0.1590	57.09	41.46	65.52	55.52		PASS
3	0.2220	50.78	40.14	62.74	52.74		PASS
4	0.4560	41.06	31.51	56.77	46.77		PASS
5	0.5460	42.47	30.93	56.00	46.00		PASS
6	4.2859	41.48	32.90	56.00	46.00		PASS



(N Phase)

No.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1500	58.29	46.63	66.00	56.00	Neutral	PASS
2	0.1545	57.53	45.13	65.75	55.75		PASS
3	0.2220	48.72	36.57	62.74	52.74		PASS
4	0.2940	42.83	29.90	60.41	50.41		PASS
5	0.3705	39.93	30.60	58.49	48.49		PASS
6	4.1824	42.13	33.15	56.00	46.00		PASS

2.4. Field Strength of Fundamental

2.4.1. Requirement

According to FCC section 15.245(b), the field strength of fundamental and harmonics from intentional radiators operated within these frequency bands shall comply with the following:

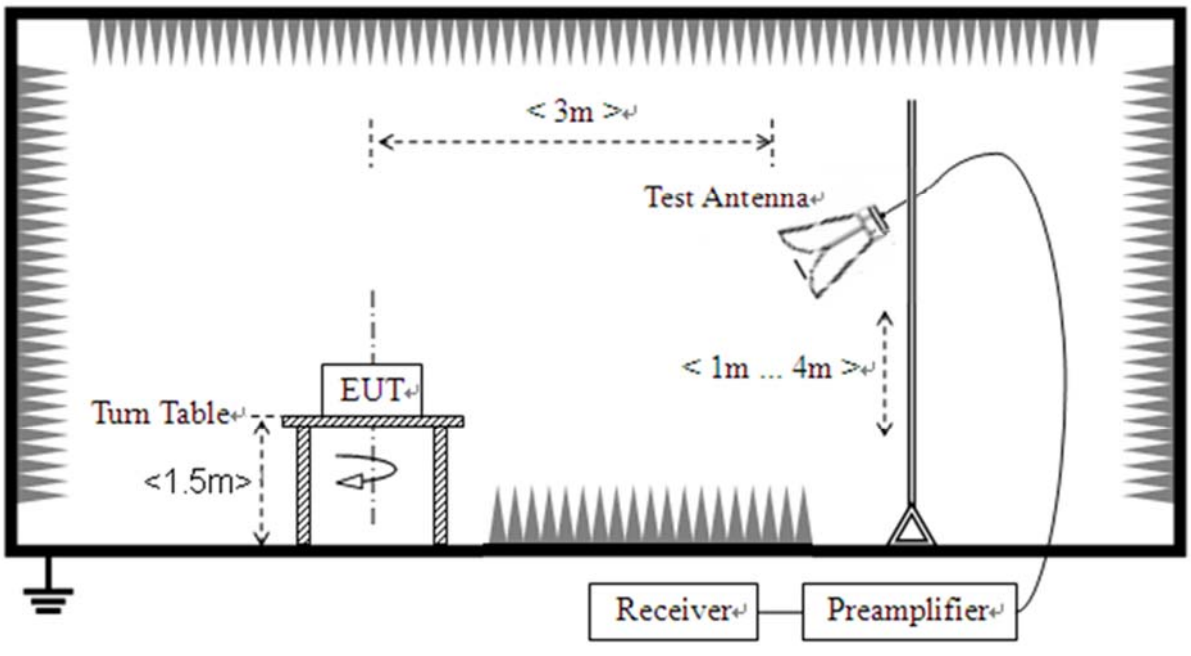
Fundamental frequency(MHz)	Field strength of fundamental (millivolts/meter)	Field strength of fundamental (dBuV/m)
10500-10550	2500	128

Note:

1) Limitation expressed in dBuV/m is calculated by 20log Emission Level(1000*mV/m).
2) Field strength limits are specified at a distance of 3 meters.
3) The emission limits shown above are based on measurement instrumentation employing an average detector. The provisions in Section 15.35 for limiting peak emissions apply.

2.4.2. Test Description

Test Setup:



The EUT is placed on a non-conducting table 1.5 m above the ground plane for measurement above 1GHz.The antenna to EUT distance is 3meters. The EUT is configured in accordance with

ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements above 1GHz the resolution bandwidth is set to 1MHz, the video band width is set to 3MHz for peak measurements and as applicable for average measurements.

The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions. For measurements above 1 GHz, keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.

2.4.3. Test Procedure

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured
RBW = 1 MHz
VBW = 3 MHz
Sweep = auto
Detector function = Peak or Average
Trace = max hold

2.4.4. Test Result

The measurement results are obtained as below:

$E\ [dB\mu V/m] = U_R[dB\ \mu\ V] + A_T[dB] + A_{Factor}\ [dB/m]$; $A_T = L_{Cable\ loss}\ [dB] - G_{preamp}\ [dB]$

A_T: Total correction Factor except Antenna

U_R: Receiver Reading

G_{preamp}: Preamplifier Gain

A_{Factor}: Antenna Factor at 3m

During the test, the total correction Factor AT and A_{Factor} were built in test software.

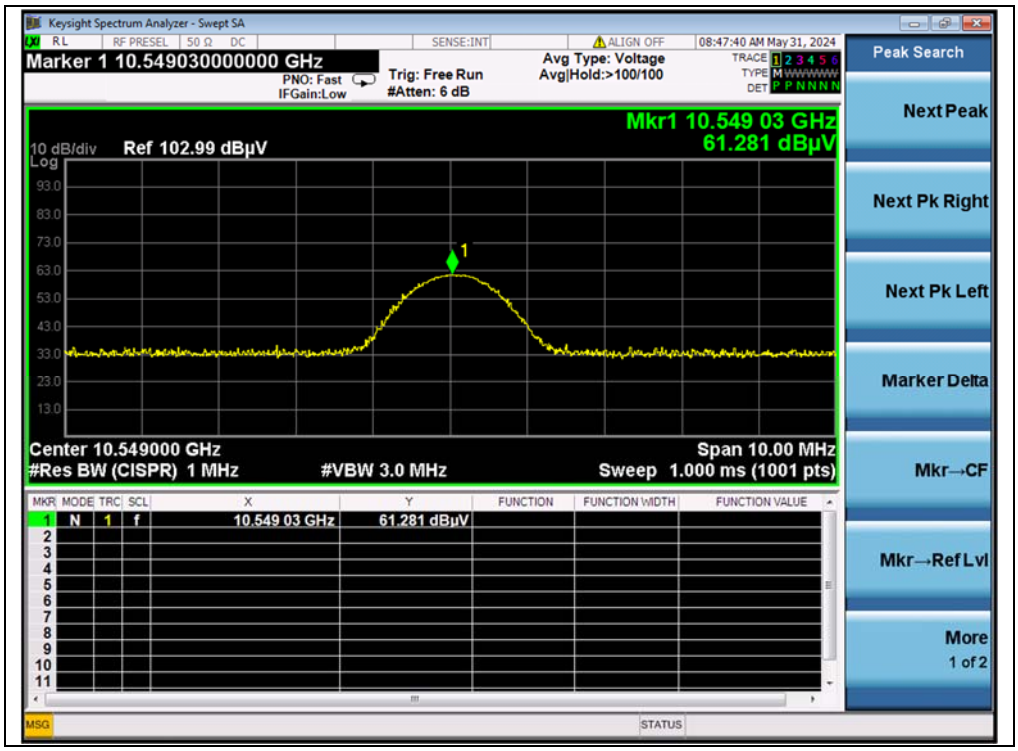
Note: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis(X and Y) test condition was recorded in this test report

A.Test Verdict:

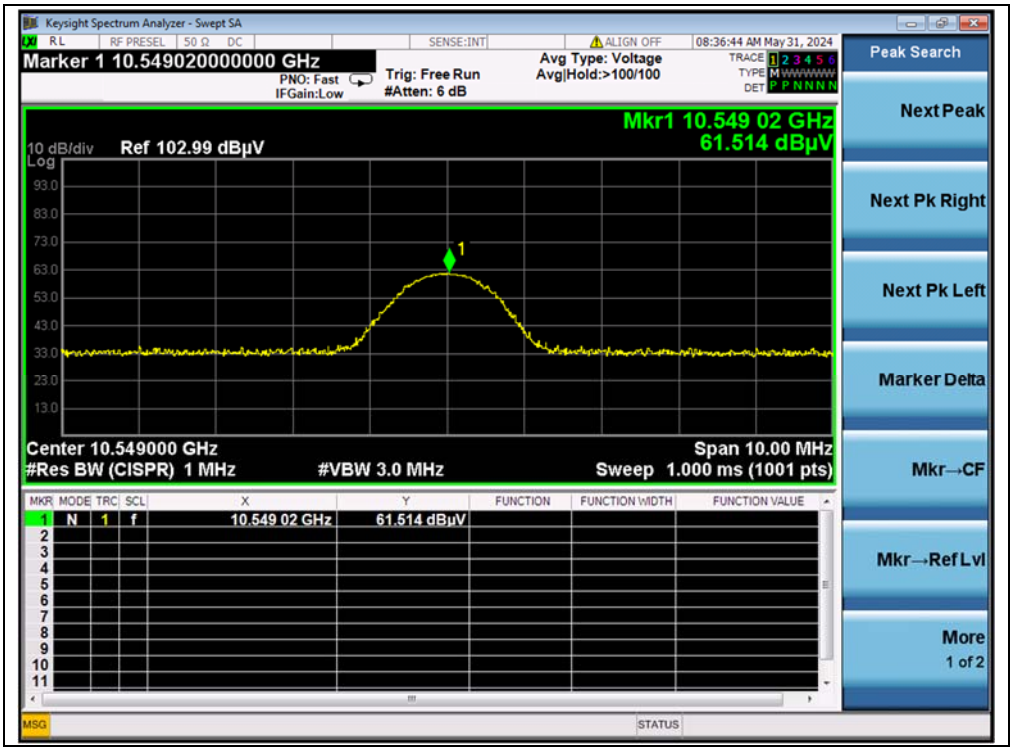
Field Strength of Fundamental

Frequency (GHz)	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Final Emission E (dBμV/m)	Limit (dBμV/m)	ANT	Detector	Verdict
10.549	61.281	-6.642	39.4	94.039	147.96	H	Peak	PASS
	60.704	-6.642	39.4	93.462	147.96	V	Peak	PASS
10.549	61.514	-6.642	39.4	94.272	147.96	H	Average	PASS
	61.551	-6.642	39.4	94.309	147.96	V	Average	PASS

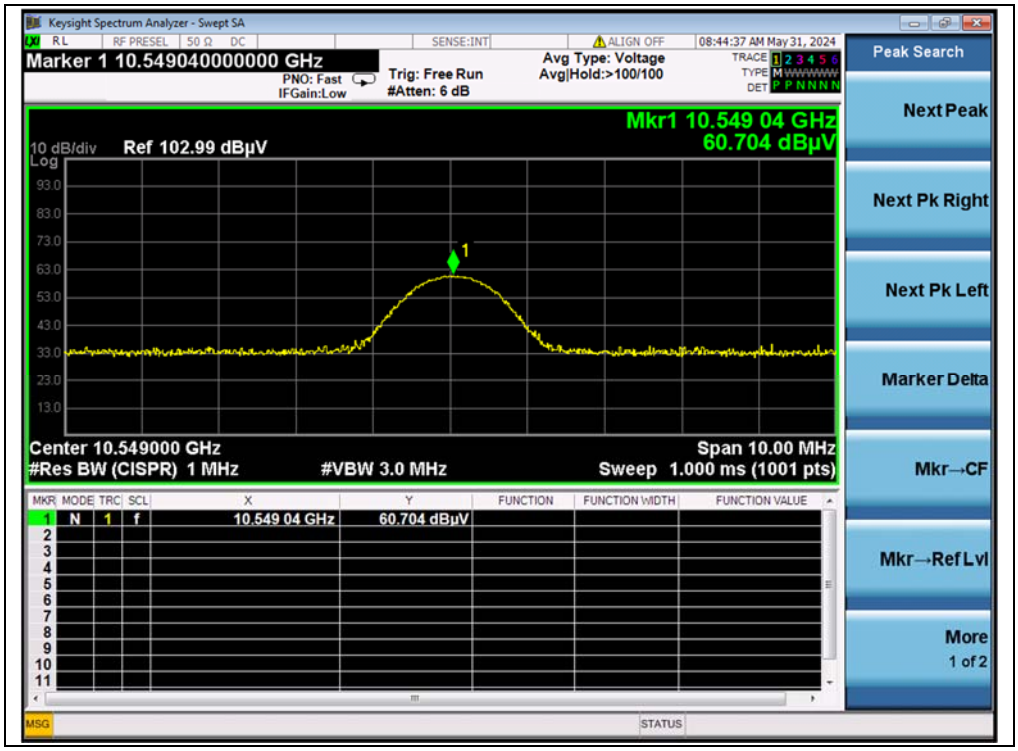
B.Test Plot:



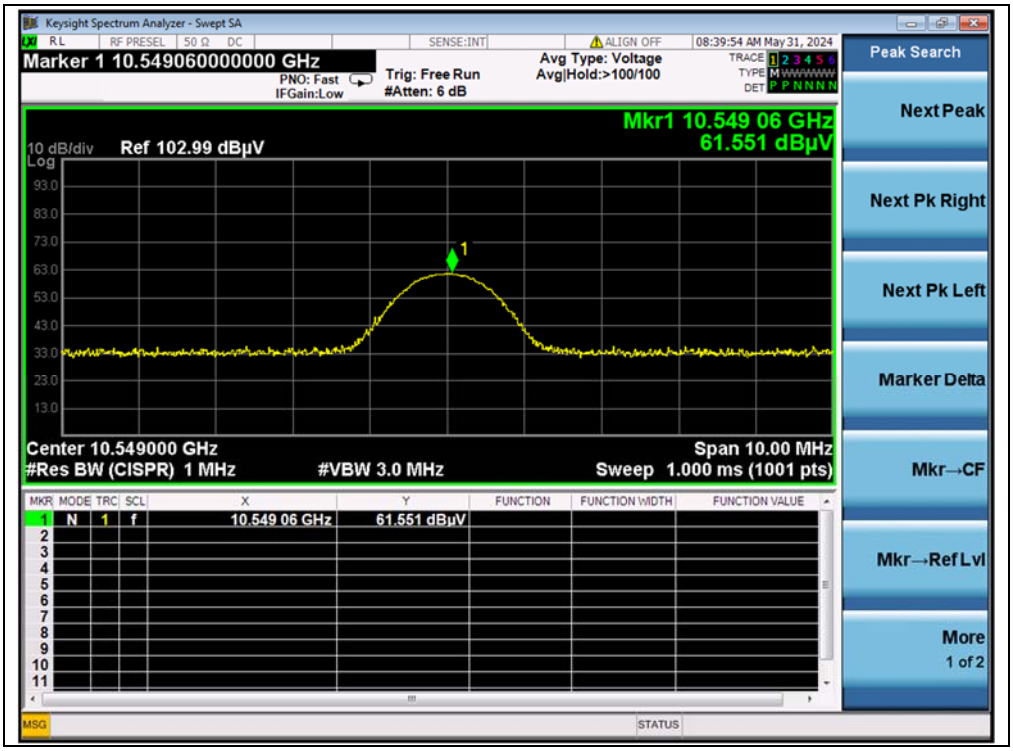
(PEAK)



(AVERAGE)



(PEAK)


Keysight Spectrum Analyzer - Swept SA
RL
RF PRESEL
50 Ω
DC
SENSE:INT
ALIGN OFF
08:39:54 AM May 31, 2024
Marker 1 10.549060000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 6 dB
Avg Type: Voltage
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET P P N N N N
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
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Mkr→Ref Lvl
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Mkr1 10.549 06 GHz
61.551 dBµV
10 dB/div
Ref 102.99 dBµV
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1
Center 10.549000 GHz
#Res BW (CISPR) 1 MHz
#VBW 3.0 MHz
Span 10.00 MHz
Sweep 1.000 ms (1001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 10.549 06 GHz 61.551 dBµV
2
3
4
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10
11
MSG
STATUS

(AVERAGE)

2.5. Radiated Emission and Field Strength of Harmonic

2.5.1. Requirement

According to section 15.245(b), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency(MHz)	Field strength of Harmonic (millivolts/meter)	Field strength of harmonic (dBuV/m)
10500-10550	25	88

Note:

1) Limitation expressed in dBuV/m is calculated by 20log Emission Level(1000*mV/m).
2) Field strength limits are specified at a distance of 3 meters.
3) The emission limits shown above are based on measurement instrumentation employing an average detector. The provisions in Section 15.35 for limiting peak emissions apply.

According to section 15.245(b)(3), Emission Radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in Section 15.209:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)	Field Strength Limitation at 3m Measurement Distance	
			(uV/m)	(dBuV/m)
0.009 - 0.490	2400/F(kHz)	300	10000* 2400/F(KHz)	20log 2400/F(KHz) + 80
0.490 - 1.705	24000/F(kHz)	30	100* 2400/F(KHz)	20log 2400/F(KHz) + 40
1.705 - 30.0	30	30	100*30	20log 30 + 40
30 - 88	100	3	100	20log 100
88 - 216	150	3	150	20log 150
216 - 960	200	3	200	20log 200
Above 960	500	3	500	20log 500

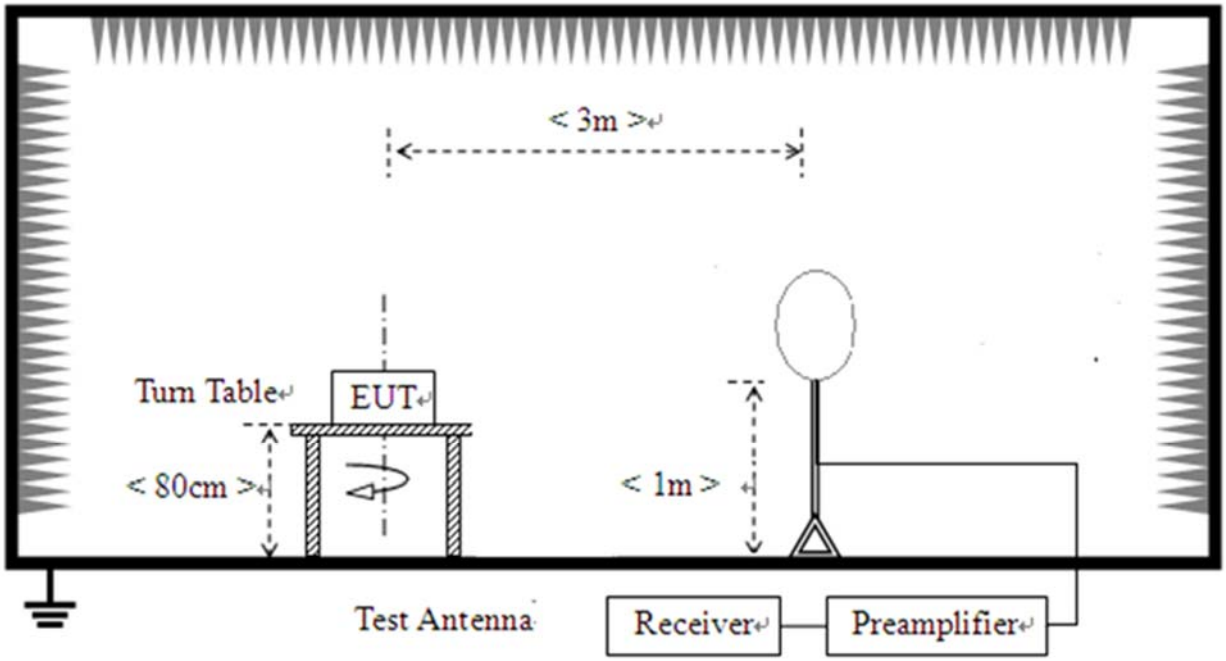
Note:

1) In the emission table above, the tighter limit applies at the band edges.
2) Limitation expressed in dBuV/m is calculated by 20log Emission Level(uV/m).
3) If measurement is made at other distance, then F.S Limitation is adjusted by using the formula of $L_{d1} = L_{d2} * (d2/d1)$.
4) Field strength limits are specified at a distance of 3 meters.
5) The provisions in Section 15.35 for limiting peak emissions apply.

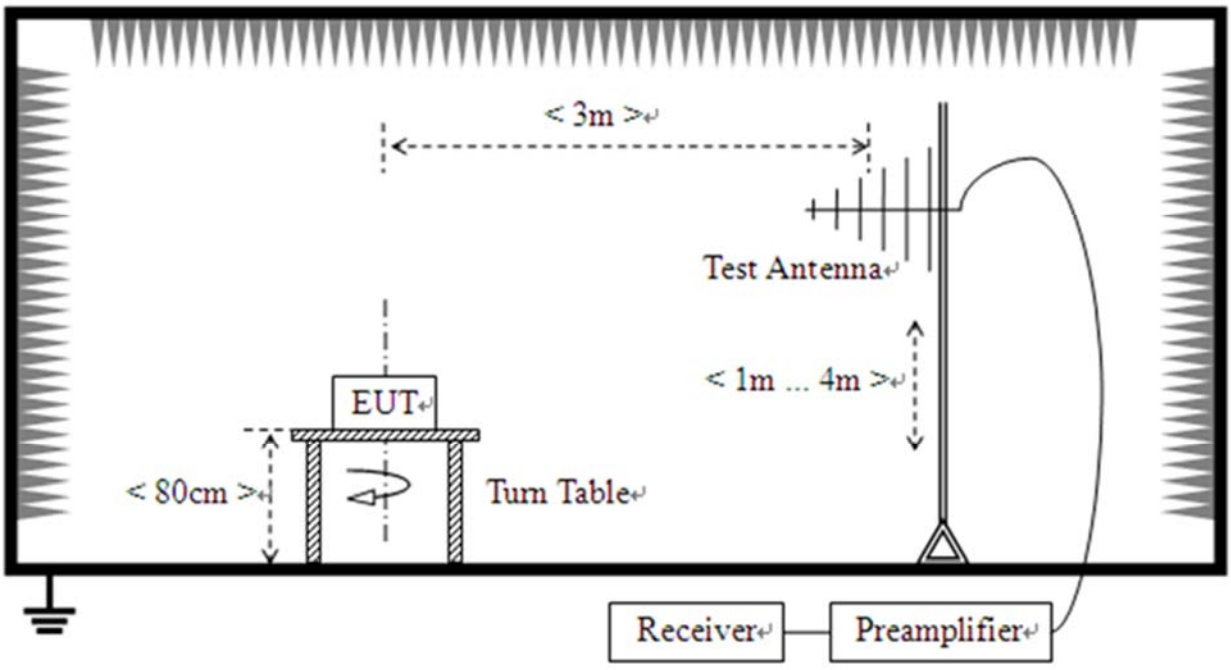
2.5.2. Test Description

A.Test Setup:

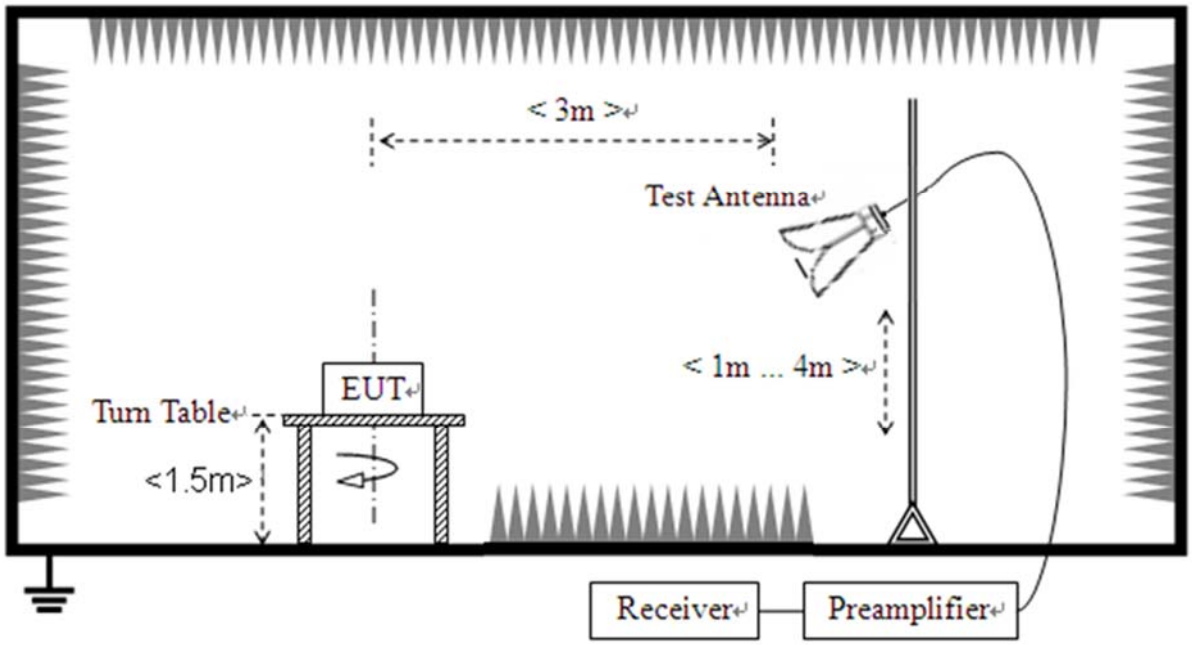
1) For radiated emissions from 9kHz to 30MHz



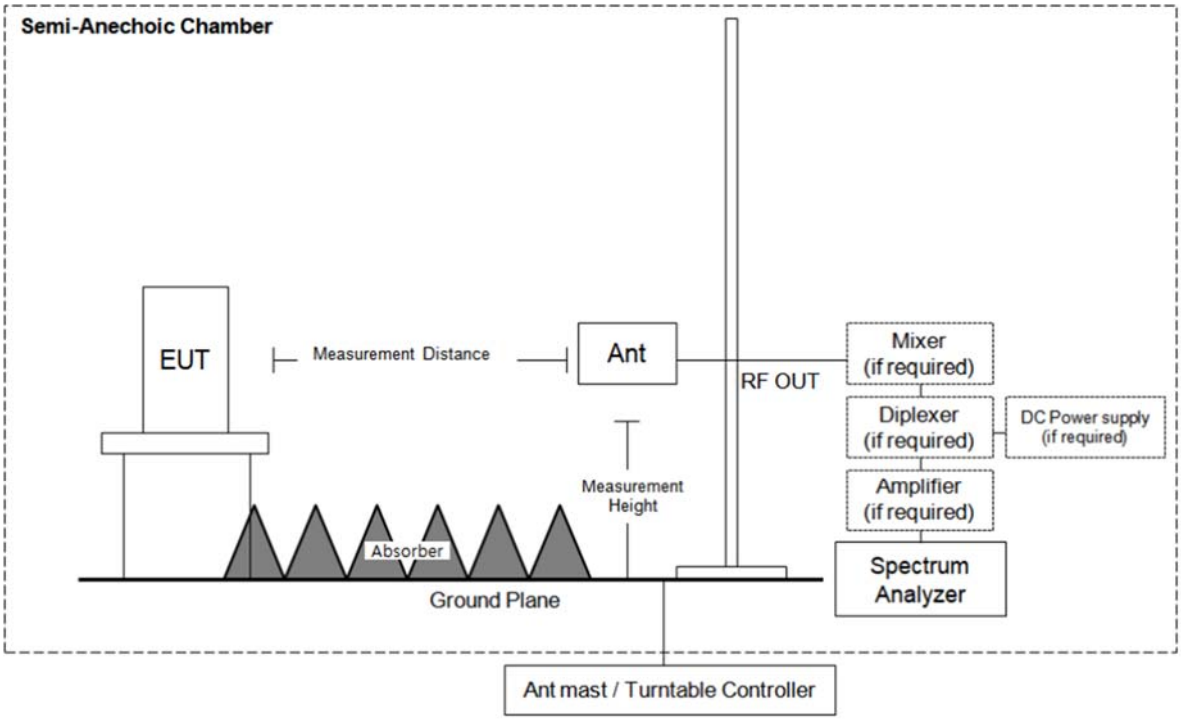
2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions from 1GHz to 40GHz



4) For radiated emissions above 40GHz



The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement

below 1GHz; 1.5 m above the ground plane for measurement above 1GHz.The antenna to EUT distance is 3meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

2.5.3. Test Procedure

For measurements below 30MHz, the emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9kHz-90 kHz, 110kHz-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.For measurements below 150kHz the resolution bandwidth is set to 200Hz for peak detection measurements or quasi-peak detection measurements. For measurements above 150kHz the resolution bandwidth is set to 9kHz for peak detection measurements or quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements below 1GHz the resolution bandwidth is set to 100kHz for peak detection measurements or 120kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1GHz the resolution bandwidth is set to 1MHz, the video band width is set to 3MHz for peak measurements and as applicable for average measurements.

The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions. For measurements above 1 GHz, keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.

2.5.4. Test Result

According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak (or average) limit, it is unnecessary to perform an quasi-peak measurement (or average).

The measurement results are obtained as below:

$E\ [dB\mu V/m] = U_R[dB\ \mu\ V] + A_T[dB] + A_{Factor}\ [dB/m]$; $A_T = L_{Cable\ loss}\ [dB] - G_{preamp}\ [dB]$

$L_{Cable\ loss}\ [dB] = L_{Mixer}[dB] + L_{IF}[dB]$

A_T: Total correction Factor except Antenna

U_R: Receiver Reading

G_{preamp}: Preamplifier Gain

A_{Factor}: Antenna Factor at 3m

When testing above 40GHz:

L_{mixer}[dB]: Conversion Loss of Mixer.

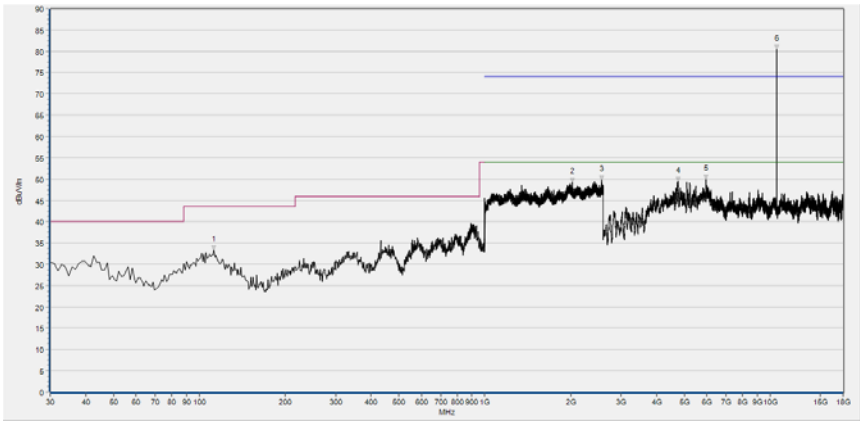
L_{IF}[dB]: Cable loss of the RF cable that connects the IF output of the mixer to the IF input of the spectrum.

During the test, the total correction Factor A_T and A_{Factor} were built in test software.

Note 1: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition(X/Y) was recorded in this test report.

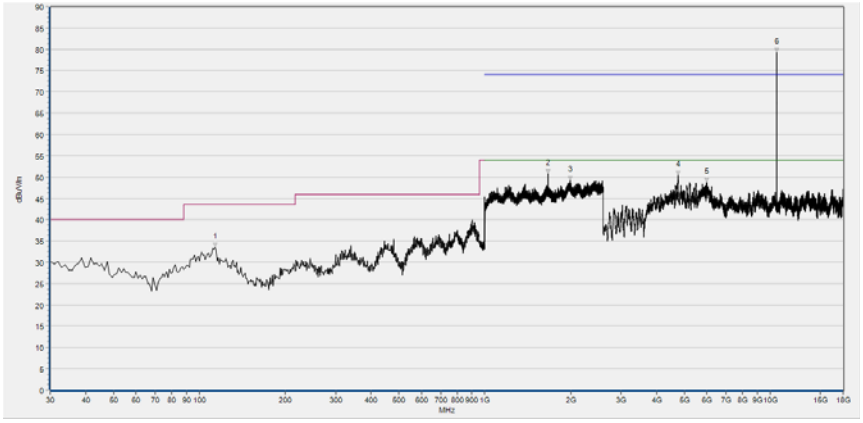
Note 2: The low frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

30MHz-18GHz



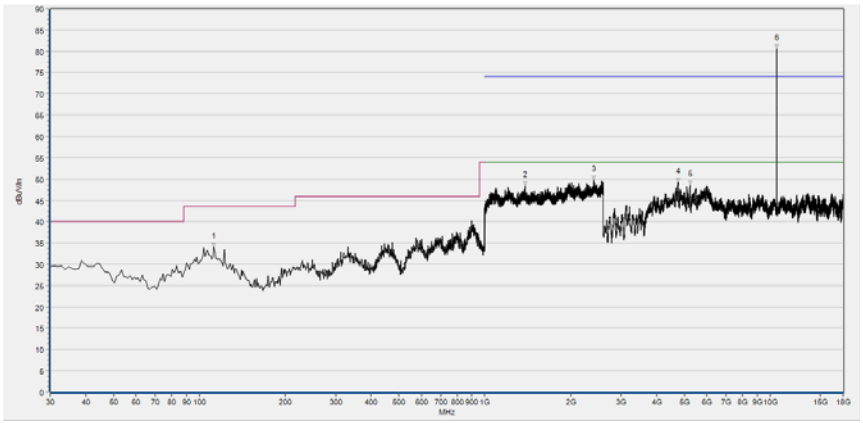
Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
112.450	33.42	N/A	N/A	N/A	43.5	N/A	Horizontal	PASS
2027.200	49.26	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
2571.200	49.84	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4749.840	49.50	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5966.440	49.87	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
10549.480	80.47	N/A	N/A	74.00	N/A	54.00	Horizontal	N/A

(Antenna Horizontal, X axis, 30MHz to 18GHz)



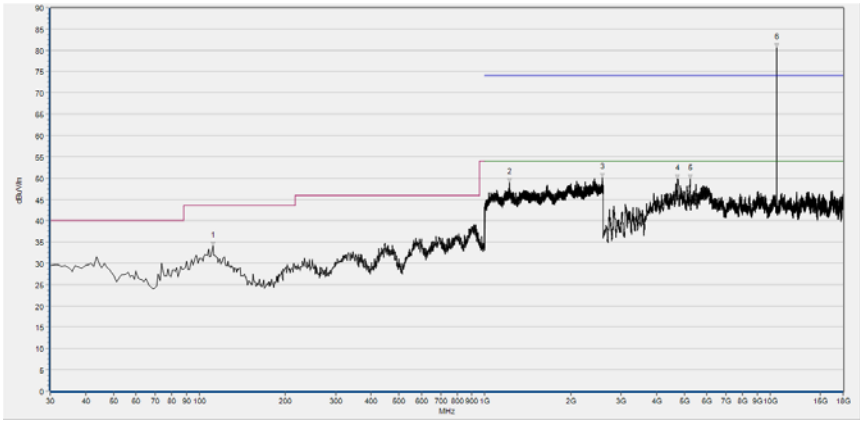
Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
113.420	33.53	N/A	N/A	N/A	43.5	N/A	Horizontal	PASS
1662.400	50.76	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
1986.133	49.34	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4746.760	50.43	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5981.840	48.75	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
10549.480	79.20	N/A	N/A	74.00	N/A	54.00	Horizontal	N/A

(Antenna Vertical, X axis, 30MHz to 18GHz)



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
112.450	33.94	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
1381.333	48.49	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
2413.333	49.75	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4749.840	49.34	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5230.320	48.65	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
10549.480	80.56	N/A	N/A	74.00	N/A	54.00	Horizontal	N/A

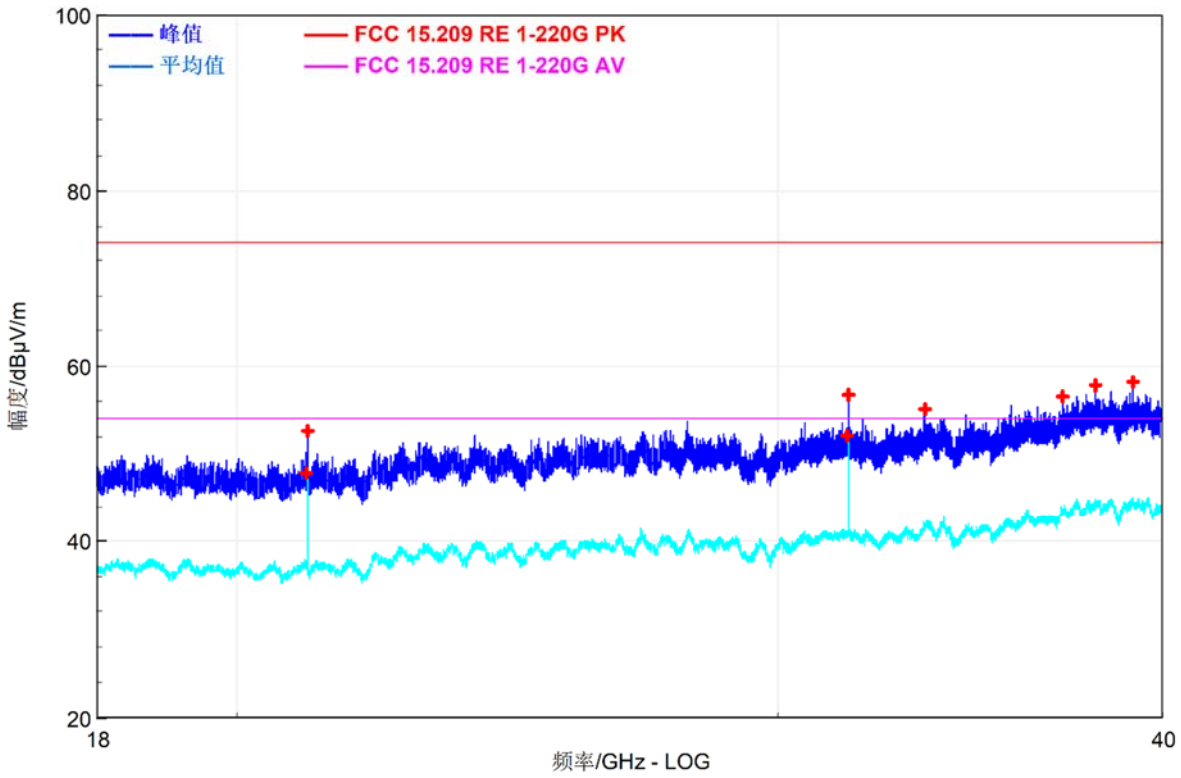
(Antenna Horizontal, Y axis, 30MHz to 18GHz)



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
111.480	34.07	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
1218.667	49.01	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
2578.133	50.16	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4740.600	49.71	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5233.400	49.74	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
10549.480	80.54	N/A	N/A	74.00	N/A	54.00	Horizontal	N/A

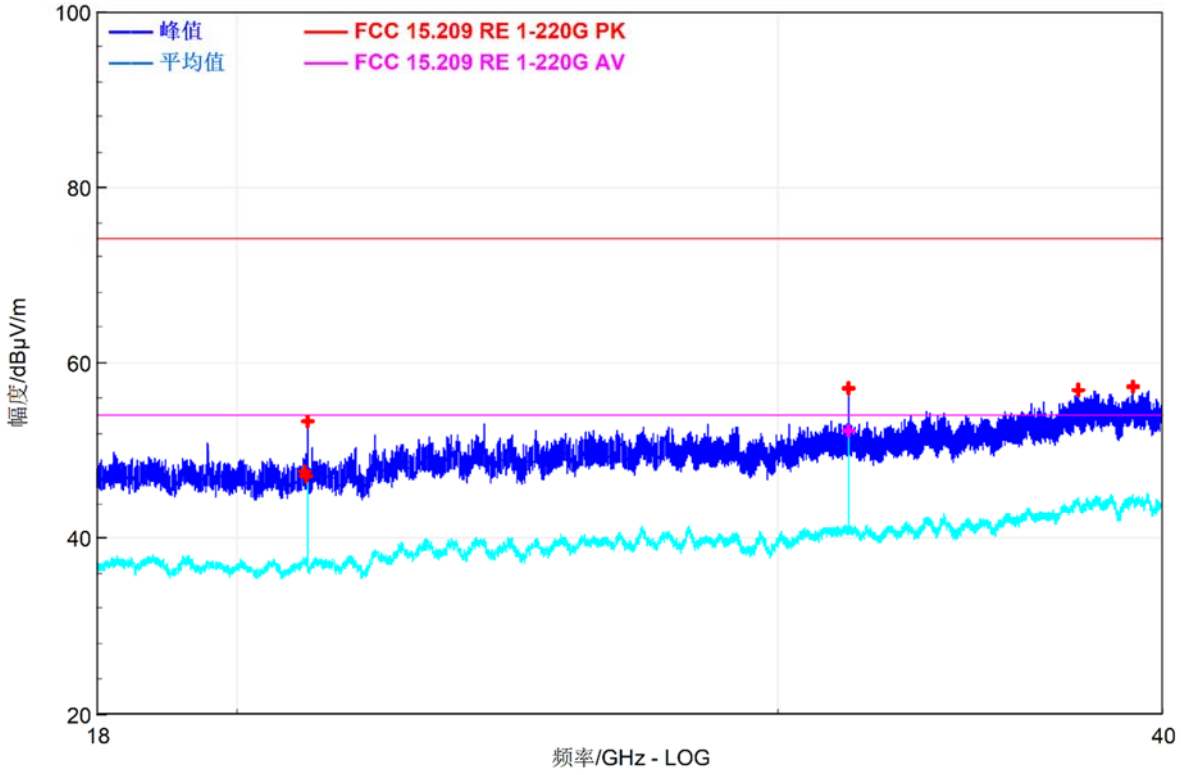
(Antenna Vertical, Y axis, 30MHz to 18GHz)

18GHz-40GHz



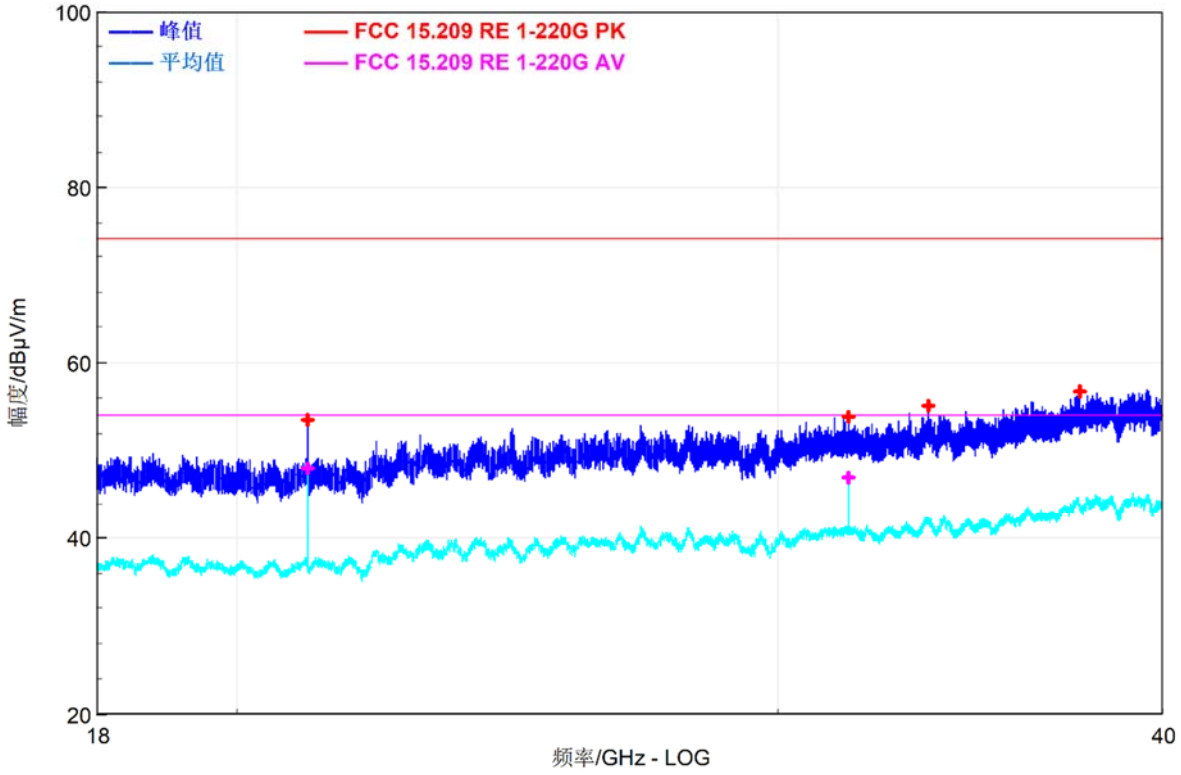
No.	Fre.	E	Limit	EUT Axial	ANT Pol.	Remark	Verdict
	GHz	dBμV/m	dBμV/m				
1	21.07614	47.73	88	X	H	Average	Pass
2	21.099141	52.58	108	X	H	Peak	Pass
3	31.603618	51.97	88	X	H	Average	Pass
4	31.64962	56.67	108	X	H	Peak	Pass
5	33.500705	55.11	74	X	H	Peak	Pass
6	37.167871	56.5	74	X	H	Peak	Pass
7	38.077913	57.69	74	X	H	Peak	Pass
8	39.151961	58.11	74	X	H	Peak	Pass

(10.549GHz, 18GHz to 40GHz)



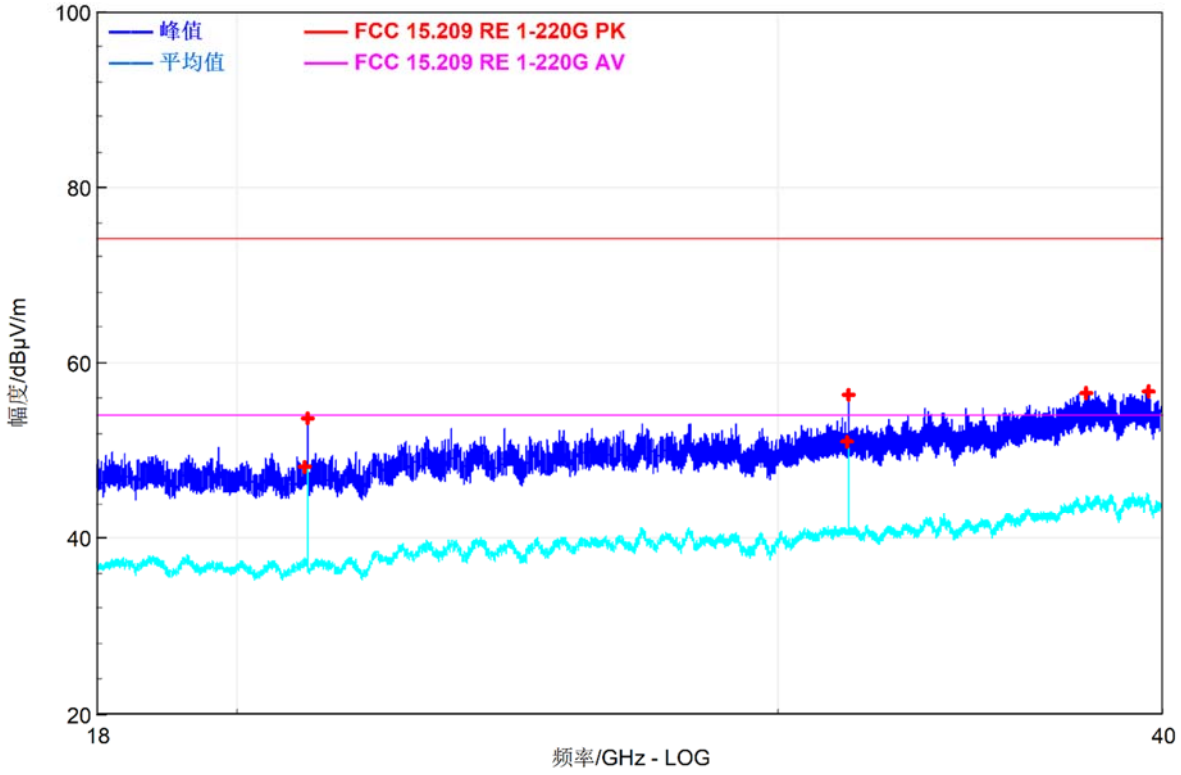
No.	Fre.	E	Limit	EUT Axial	ANT Pol.	Remark	Verdict
	GHz	dBμV/m	dBμV/m				
1	21.061139	47.57	88	X	V	Average	Pass
2	21.082140	47.08	88	X	V	Average	Pass
3	21.099141	53.33	108	X	V	Peak	Pass
4	31.64962	57.05	108	X	V	Peak	Pass
5	37.58389	56.77	74	X	V	Peak	Pass
6	39.151961	57.08	74	X	V	Peak	Pass
7	31.64962	52.11	88	X	V	Average	Pass

(10.549GHz, 18GHz to 40GHz)



No.	Fre.	E	Limit	EUT Axial	ANT Pol.	Remark	Verdict
	GHz	dBμV/m	dBμV/m				
1	21.099141	53.45	108	Y	H	Peak	Pass
2	31.64962	53.71	108	Y	H	Peak	Pass
3	33.575708	55.1	74	Y	H	Peak	Pass
4	37.625892	56.68	74	Y	H	Peak	Pass
5	21.099141	47.86	88	Y	H	Average	Pass
6	31.64962	46.88	88	Y	H	Average	Pass

(10.549GHz, 18GHz to 40GHz)



No.	Fre.	E	Limit	EUT Axial	ANT Pol.	Remark	Verdict
	GHz	dBμV/m	dBμV/m				
1	21.066139	48.12	88	Y	V	Average	Pass
2	21.099141	53.59	108	Y	V	Peak	Pass
3	31.615619	50.85	88	Y	V	Average	Pass
4	31.64962	56.19	108	Y	V	Peak	Pass
5	37.7989	56.43	74	Y	V	Peak	Pass
6	39.598982	56.63	74	Y	V	Peak	Pass

(10.549GHz, 18GHz to 40GHz)

Above 40GHz:

Fre.	U_R	A_{Factor}	A_T	L_C	E	Limit	Margin	EUT Axial	ANT Pol.	Remark	Verdict
GHz	dBμV	dB/m	dB	dB	dBμV/m	dBμV/m	dB				
47.65975	32.35	42.67	-40	5.52	40.54	54	13.46	X	H	AV	Pass
49.13125	46.61	42.88	-40	5.86	55.35	74	18.65	X	H	PK	Pass
50.23275	32.23	42.9	-39.89	5.78	41.02	54	12.98	X	H	AV	Pass
42.19625	35.94	42.53	-38.7	6.51	46.28	54	7.72	X	V	AV	Pass
44.83025	36.16	42.72	-39.83	7.11	46.16	54	7.84	X	V	AV	Pass
48.94125	45.85	42.88	-40	5.86	54.59	74	19.41	X	V	PK	Pass
42.19625	34.52	42.53	-38.7	6.51	44.86	54	9.14	Y	H	AV	Pass
44.83025	34.61	42.72	-39.83	7.11	44.61	54	9.39	Y	H	AV	Pass
48.86975	46.48	42.88	-40	5.86	55.22	74	18.78	Y	H	PK	Pass
42.19625	34.92	42.53	-38.7	6.51	45.26	54	8.74	Y	V	AV	Pass
44.83025	35.03	42.72	-39.83	7.11	45.03	54	8.97	Y	V	AV	Pass
47.45825	46.62	42.67	-40	5.52	54.81	74	19.19	Y	V	PK	Pass

2.6. Restricted Bands

2.6.1. Requirement

According to section 15.245(b)(3), Emission Radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in Section 15.209:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)	Field Strength Limitation at 3m Measurement Distance	
			(uV/m)	(dBuV/m)
0.009 - 0.490	2400/F(kHz)	300	10000* 2400/F(KHz)	20log 2400/F(KHz) + 80
0.490 - 1.705	24000/F(kHz)	30	100* 2400/F(KHz)	20log 2400/F(KHz) + 40
1.705 - 30.0	30	30	100*30	20log 30 + 40
30 - 88	100	3	100	20log 100
88 - 216	150	3	150	20log 150
216 - 960	200	3	200	20log 200
Above 960	500	3	500	20log 500

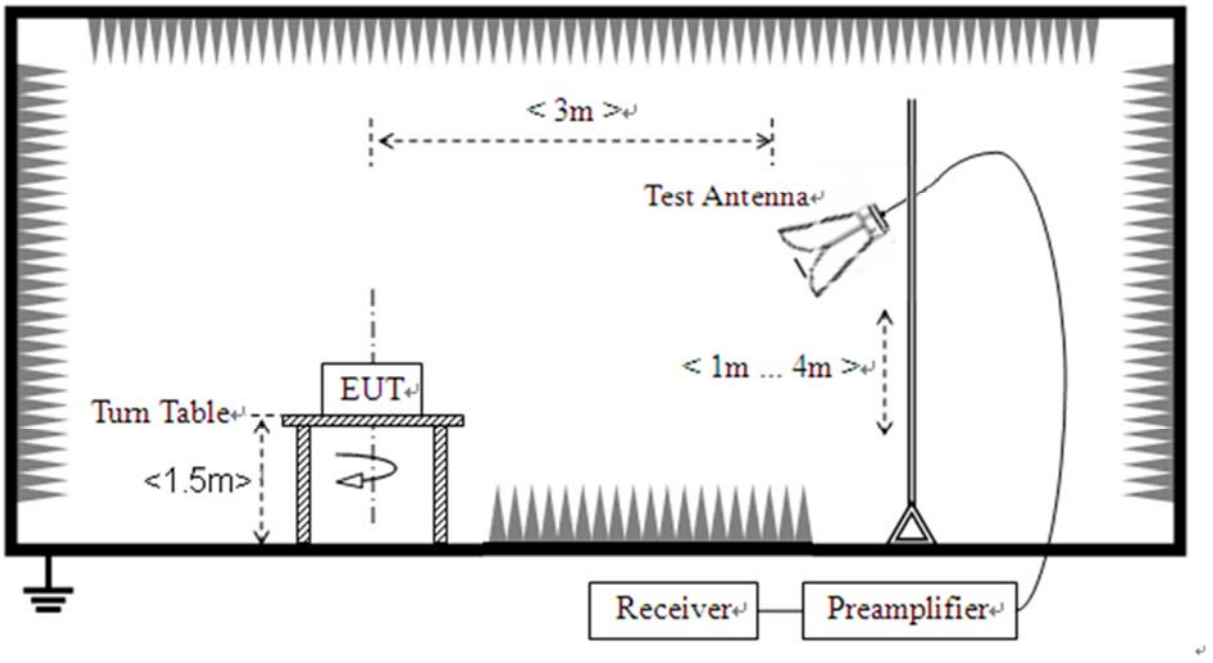
Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions.

Note:

1) In the emission table above, the tighter limit applies at the band edges.
2) Limitation expressed in dBuV/m is calculated by 20log Emission Level(uV/m).
1) If measurement is made at other distance, then F.S Limitation is adjusted by using the formula of $L_{d1} = L_{d2} * (d2/d1)$.
2) Field strength limits are specified at a distance of 3 meters.
3) The provisions in Section 15.35 for limiting peak emissions apply.

2.6.2. Test Description

A.Test Setup:



The EUT is placed on a non-conducting table 1.5 m above the ground plane for measurement above 1GHz.The antenna to EUT distance is 3meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

2.6.3. Test Procedure

For measurements above 1GHz the resolution bandwidth is set to 1MHz, the video band width is set to 3MHz for peak measurements and as applicable for average measurements.

The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions. For measurements above 1 GHz, keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.

2.6.4. Test Result

According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the average detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the average limit, it is unnecessary to perform an average measurement .

The measurement results are obtained as below:

$E\ [dB\mu V/m] = U_R[dB\ \mu\ V] + A_T[dB] + A_{Factor}\ [dB/m]$; $A_T = L_{Cable\ loss}\ [dB] - G_{preamp}\ [dB]$

A_T: Total correction Factor except Antenna

U_R: Receiver Reading

G_{preamp}: Preamplifier Gain

A_{Factor}: Antenna Factor at 3m

During the test, the total correction Factor A_T and A_{Factor} were built in test software.

Note 1: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition(X/Y) was recorded in this test report.

Freq.	E	Limit	EUT Axial	ANT Pol.	Remark	Verdict
GHz	dBμV/m	dBμV/m				
9.3725	45.66	74	X	H	Peak	PASS
9.5	45.95	74	X	H	Peak	PASS
10.55	91.94	N/A	X	H	Peak	PASS
10.5484	92.09	N/A	X	H	Peak	PASS
10.9422	47.66	74	X	H	Peak	PASS
11.2414	48.23	74	X	H	Peak	PASS
9.40625	46.48	74	X	V	Peak	PASS
9.49375	45.61	74	X	V	Peak	PASS
10.55	92.63	N/A	X	V	Peak	PASS
10.5484	92.63	N/A	X	V	Peak	PASS
11.4988	48.22	74	X	V	Peak	PASS
12.3898	48.06	74	X	V	Peak	PASS
9.305	43.04	74	Y	H	Peak	PASS
9.46375	43.65	74	Y	H	Peak	PASS
10.55	95.45	N/A	Y	H	Peak	PASS
10.5484	92.55	N/A	Y	H	Peak	PASS
10.8388	47.7	74	Y	H	Peak	PASS

11.4988	49.74	74	Y	H	Peak	PASS
9.365	42.85	74	Y	V	Peak	PASS
9.45	42.52	74	Y	V	Peak	PASS
10.55	92.44	N/A	Y	V	Peak	PASS
10.5484	92.21	N/A	Y	V	Peak	PASS
11.2216	48.02	74	Y	V	Peak	PASS
12.3326	47.41	74	Y	V	Peak	PASS

Annex A Test Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.:

Uncertainty of Radiated Emission Measurement

Test Items	Uncertainty
Measuring Uncertainty for a Level of Confidence of 95%(U=2Uc(y))	±5%

Uncertainty of Radiated Emission Measurement

Test Items	Uncertainty	
Measuring Uncertainty for a Level of Confidence of 95%(U=2Uc(y))	30MHz-200MHz	±5.06dB
	200MHz-1000MHz	±5.04dB
	1GHz-6GHz	±5.18dB
	6GHz-18GHz	±5.48dB

Annex B Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

Laboratory Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Laboratory Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

3. Facilities and Accreditations

All measurement facilities used to collect the measurement data are located at FL.3, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10-2013 and CISPR Publication 22; the FCC designation number is CN1192, the test firm registration number is 226174.

4. Test Equipment Utilized

4.1 Radiated Test Equipment

Equipment	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	MY54130016	N9038A	Agilent	2023.06.21	2024.06.20
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2023.07.01	2024.06.30
Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2023.06.26	2024.06.25
Test Antenna – Horn	01774	BBHA 9120D	Schwarzbeck	2023.07.01	2024.06.30
Test Antenna – Horn	BBHA9170 #773	BBHA9170	Schwarzbeck	2023.07.01	2024.06.30
Preamplifier (10MHz-6GHz)	46732	S10M100L3802	LUCIX CORP.	2023.06.27	2024.06.26
Preamplifier (2GHz-18GHz)	61171/61172	S020180L3203	LUCIX CORP.	2023.06.27	2024.06.26
Preamplifier (18GHz-40GHz)	DS77209	DCLNA0118-40C-S	Decentest	2023.07.04	2024.07.03
RF Coaxial Cable (DC-18GHz)	MRE001	PE330	Pasternack	2023.06.27	2024.06.26
RF Coaxial Cable (DC-18GHz)	MRE002	CLU18	Pasternack	2023.06.27	2024.06.26
RF Coaxial Cable (DC-18GHz)	MRE003	CLU18	Pasternack	2023.06.27	2024.06.26
RF Coaxial Cable (DC-40GHz)	22290045	QA360-40-KK-0.5	Qualwave	2023.07.04	2024.07.03
RF Coaxial Cable (DC-40GHz)	22290046	QA360-40-KKF-2	Qualwave	2023.07.04	2024.07.03
RF Coaxial Cable (DC-18GHz)	22120181	QA500-18-NN-5	Qualwave	2023.07.04	2024.07.03
Notch Filter	N/A	WRCG-2400-2483.5-60SS	Wainwright	N/A	N/A
Anechoic Chamber	N/A	9m*6m*6m	CRT	2022.05.10	2025.05.09
Low Noise Amplifier(40GHz-60GHz)	ADSE01	OQ-LNA-4060-3805C	Shanghai Ouqiao Electronics	2022/9/19	2024/9/18

			Technology Co., Ltd		
Horn Antenna(40GHz-60GHz)	2020036000036	LB-19-20-A	A-INFOMW	2022/6/16	2024/6/15
Spectrum Analyzer Frequency Conversion Module(40GHz-60GHz)	2022081902	SAFC19	Nanjing Nuozhijie Electronic Technology Co.,Ltd	2023/6/11	2025/6/10
Signal&Spectrum Analyzer	1406.6000K03-183151-sS	FSW	R&S	2023/7/4	2024/7/3
RF Coaxial Cable（DC-40GHz）	158230831	RAC360-40MM-1000	RFTOP	N/A	N/A
RF Coaxial Cable（DC-40GHz）	158230832	RAC360-40MM-1000	RFTOP	N/A	N/A
RF Coaxial Cable（DC-40GHz）	NA	2.92J-2m	NA	N/A	N/A
RF Coaxial Cable（DC-40GHz）	#01	NYK360-29M29-1500	Decentest	N/A	N/A
RF Coaxial Cable（DC-40GHz）	#02	NYK360-29M29-1500	Decentest	N/A	N/A
RF Coaxial Cable（DC-40GHz）	#03	NYK360-29M29-1500	Decentest	N/A	N/A

4.2 Conducted Emission Test Equipment

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	MY56400093	N9038A	KEYSIGHT	2024.01.25	2025.01.24
LISN	812744	NSLK 8127	Schwarzbeck	2024.02.02	2025.02.01
Pulse Limiter (10dB)	VTSD 9561 F-B #206	VTSD 9561-F	Schwarzbeck	2023.06.27	2024.06.26
RF Coaxial Cable(DC-100MHz)	MRE04	BNC	Qualwave	N/A	N/A

4.3 Test Software Utilized

Model	Version Number	Producer
MORLAB EMCR	V1.2	MORLAB
TS+ -[JS32-CE]	2.5.0.0	Tonscend

END OF REPORT