

TEST REPORT

Product : SwitchBot Presence Sensor
Trade mark : SwitchBot
Model/Type reference : W8200000 W8200001 W8200002
W8200003 W8200004 W8200005
Serial Number : N/A
Report Number : EED32R80981602
FCC ID : 2AKXB-W8200000
Date of Issue : Jul. 30, 2025
Test Standards : 47 CFR FCC Part 15C §15.255
Test result : PASS

Prepared for:

Woan Technology (Shenzhen) Co., Ltd.

**Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu
Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong,
P.R.China, 518100**

Prepared by:

Centre Testing International Group Co., Ltd.
**Hongwei Industrial Park, Zone 70, Bao'an District,
Shenzhen, Guangdong, China**
TEL: +86-755-3368 3668
FAX: +86-755-3368 3385

Compiled by:

Keven Tan.

Reviewed by:

Frazer. Li

Approved by:

Keven Tan

Date:

Jul. 30, 2025



Report Seal

Aaron Ma

Check No.:1505160625

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2 Test Summary

Test Item	Test Requirement	Test Method	Result
Antenna Requirement	47 CFR Part 15C Section §15.203	N/A	PASS
Operation Restriction and Group Installation	47 CFR Part 15C Section §15.255(a),(b),(h)	N/A	PASS
AC Power Conducted Emissions	47 CFR FCC Part 15C §15.207	ANSI C63.10-2013 Section 6.2	N/A
99% Occupied Bandwidth	47 CFR FCC Part 15C §15.255(e), 47 CFR Part 2, Subpart J Section §2.1049	ANSI C63.10-2013 Section 9.3	PASS
20dB down Emission Bandwidth	47 CFR FCC Part 15C §15.255(e), 47 CFR Part 2, Subpart J Section §2.1049	ANSI C63.10-2013 Section 9.3	PASS
EIRP (Effective Isotropic Radiated Power)	47 CFR FCC Part 15C §15.255(c)	ANSI C63.10-2013 Section 9.5	PASS
Peak Conducted Power	47 CFR FCC Part 15C §15.255(d)	ANSI C63.10-2013 Section 9.7	PASS
Spurious Emissions	47 CFR FCC Part 15C §15.255(d) & §15.209	ANSI C63.10-2013 Section 9.12 & Section 9.13	PASS
Frequency Stability	47 CFR FCC Part 15C §15.255(f)	ANSI C63.10-2013 Section 9.14	PASS

Remark:

N/A: The product is powered by battery.

Model No.: W8200000 W8200001 W8200002 W8200003 W8200004 W8200005

Only the model W8200000 was tested. All model numbers have same electrical, PCB and layout, only the model name are different for marketing requirements.

3 General Information

3.1 Client Information

Applicant:	Woan Technology (Shenzhen) Co., Ltd.
Address of Applicant:	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100
Manufacturer:	Woan Technology (Shenzhen) Co., Ltd.
Address of Manufacturer:	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100
Factory:	Wo'an Technology (Shenzhen) Co., Ltd. Huizhou Branch
Address of Factory:	Building 2, 2nd Floor, Baidi Zhigu Science and Technology Innovation Park, No.263 Chang'an Avenue, Shatian Town, Huiyang District, Huizhou City, Guangdong, China

3.2 General Description of EUT

Product Name:	SwitchBot Presence Sensor
Model No.:	W8200000 W8200001 W8200002 W8200003 W8200004 W8200005
Test model No.:	W8200000
Trade Mark:	SwitchBot
Product Type:	<input type="checkbox"/> Mobile <input type="checkbox"/> Portable <input checked="" type="checkbox"/> Fix Location
Type of Modulation:	FMCW(Frequency Modulated Continuous Wave)
Operating Frequency	60~62GHz
Test Power Grade:	Default
Test Software of EUT:	N/A
Antenna Type:	Antenna in Package
Antenna Gain:	7.43 dBi
Power Supply:	DC 3V
Test Voltage:	DC 3V
Sample Received Date:	Jun. 26, 2025
Sample tested Date:	Jun. 26, 2025 to Jul. 22, 2025

3.3 Test Environment

Operating Environment:

Temperature:	22~25.0 °C
Humidity:	50~55 % RH
Atmospheric Pressure:	1010mbar

3.4 Description of Support Units

The EUT has been tested independently.

3.5 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd

Hongwei Industrial Park, Zone 70, Bao'an District, Shenzhen, Guangdong, China

Telephone: +86 (0) 755 33683668 Fax:+86 (0) 755 33683385

No tests were sub-contracted.

FCC Designation No.: CN1164

3.6 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.9×10^{-8}
2	RF power, conducted	0.46dB (30MHz-1GHz)
		0.55dB (1GHz-18GHz)
	Radiated Spurious emission test	3.3dB (9kHz-30MHz)
		4.3dB (30MHz-1GHz)
		4.5dB (1GHz-18GHz)
		3.4dB (18GHz-40GHz)
		4.62dB (40GHz-60GHz)
		4.80dB (60GHz-90GHz)
		4.90dB (90GHz-140GHz)
		5.11dB (140GHz-220GHz)
		5.14dB (220GHz-325GHz)
4	Conduction emission	3.5dB (9kHz to 150kHz)
		3.1dB (150kHz to 30MHz)
5	Temperature test	0.64°C
6	Humidity test	3.8%
7	DC power voltages	0.026%

4 Equipment List

3M Semi-anechoic Chamber (2)- Radiated disturbance Test					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
				(mm-dd-yyyy)	(mm-dd-yyyy)
3M Chamber & Accessory Equipment	TDK	SAC-3	---	01/13/2024	01/12/2027
Receiver	R&S	ESCI7	100938-003	09/07/2024	09/06/2025
TRILOG Broadband Antenna	schwarzbeck	VULB 9163	9163-618	05/14/2025	05/13/2026
Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-076	04/07/2025	04/06/2026
Microwave Preamplifier	Tonscend	EMC051845SE	980380	12/05/2024	12/04/2025
Horn Antenna	A.H.SYSTEMS	SAS-574	374	07/02/2023	07/01/2026
Horn Antenna	ETS-LINGREN	BBHA 9120D	9120D-1869	04/07/2025	04/06/2026
Preamplifier	Agilent	11909A	12-1	03/03/2025	03/02/2026
Preamplifier	CD	PAP-1840-60	6041.6042	05/26/2025	05/25/2026
Test software	Fara	EZ-EMC	EMEC-3A1-Pre	---	---
Cable line	Fulai(7M)	SF106	5219/6A	01/13/2024	01/12/2027
Cable line	Fulai(6M)	SF106	5220/6A	01/13/2024	01/12/2027
Cable line	Fulai(3M)	SF106	5216/6A	01/13/2024	01/12/2027
Cable line	Fulai(3M)	SF106	5217/6A	01/13/2024	01/12/2027

3M full-anechoic Chamber					
Equipment	Manufacturer	Model No.	Serial Number	Cal. Date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Fully Anechoic Chamber	TDK	FAC-3	---	01-09-2024	01-08-2027
Receiver	Keysight	N9038A	MY57290136	01-04-2025	01-03-2026
Spectrum Analyzer	Keysight	N9020B	MY57111112	01-14-2025	01-13-2026
Spectrum Analyzer	Keysight	N9030B	MY57140871	01-14-2025	01-13-2026
TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	9163-1148	04-12-2025	04-11-2026
Horn Antenna	Schwarzbeck	BBHA 9170	9170-832	04-12-2025	04-11-2026
Horn Antenna	ETS-LINDGREN	3117	57407	06-29-2025	06-28-2026
Preamplifier	EMCI	EMC001330	980563	03-03-2025	03-02-2026
Preamplifier	Tonscend	TAP-011858	AP21B806112	07-18-2024 07-07-2025	07-17-2025 07-06-2026
Preamplifier	Tonscend	EMC051845SE	980380	12-05-2024	12-04-2025
Communication test set	R&S	CMW500	102898	01-04-2025	01-03-2026
Temperature/Humidity Indicator	biaozhi	GM1360	EE1186631	03-31-2025	03-30-2026
RSE Automatic test software	JS Tonscend	JS36-RSE	V4.0.0.0	---	---
Cable line	Times	SFT205-NMSM-2.50M	394812-0001	01-09-2024	01-08-2027
Cable line	Times	SFT205-NMSM-2.50M	394812-0002	01-09-2024	01-08-2027
Cable line	Times	SFT205-NMSM-2.50M	394812-0003	01-09-2024	01-08-2027
Cable line	Times	SFT205-NMSM-2.50M	393495-0001	01-09-2024	01-08-2027
Cable line	Times	EMC104-NMNM-1000	SN160710	01-09-2024	01-08-2027
Cable line	Times	SFT205-NMSM-3.00M	394813-0001	01-09-2024	01-08-2027
Cable line	Times	SFT205-NMNM-1.50M	381964-0001	01-09-2024	01-08-2027
Cable line	Times	SFT205-NMSM-7.00M	394815-0001	01-09-2024	01-08-2027
Cable line	Times	HF160-KMNM-3.00M	393493-0001	01-09-2024	01-08-2027

5 Test results and Measurement Data

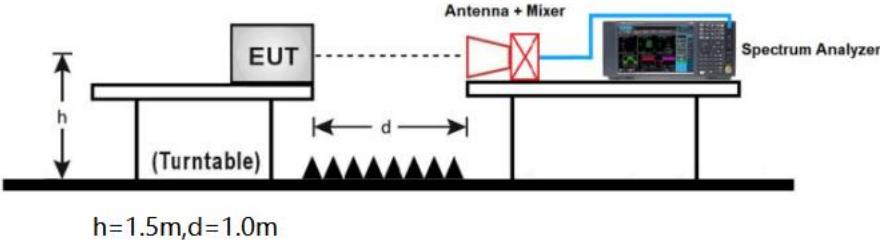
5.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section §15.203
<p>§15.203 requirement:</p> <p>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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</p>	
EUT Antenna:	Please see Internal photos
<p>The antenna is Antenna in Package. Therefore this EUT complies with the requirement of §15.203;</p>	

5.2 Operation Restriction and Group Installation

Standard requirement:	47 CFR Part 15C Section §15.255(a),(b),(h)
<p>§15.255(a),(b) requirement:</p> <p>Operation is not permitted for the following products:</p> <p>(1)Equipment used on aircraft or satellites.</p> <p>(2)Field disturbance sensors, including vehicle radar systems, unless the field disturbance sensors are employed for fixed operation.</p>	
<p>§15.255(h) requirement:</p> <p>Operation is not permitted for the following products:</p> <p>(1)External phase-locking.</p>	
<p>Conclusion:</p> <p>(1)Manufacturer declares that EUT will not been used on aircraft or satellites. Then user manual will include a statement to caution EUT is not permitted for used on aircraft or satellites.</p> <p>(2)The frequency, amplitude and phase of the transmit signal are set within the EUT. There are no external phase-locking inputs or any other means of combining two or more units together to realize a beam-forming array.</p>	

5.3 99% Occupied Bandwidth

Test Requirement:	47 CFR FCC Part 15C §15.255(e), 47 CFR Part 2, Subpart J Section §2.1049
Test Method:	ANSI C63.10-2013 Section 9.3
Limit:	Within the designated 57GHz ~ 71GHz frequency band
Test Setup:	 <p>h=1.5m, d=1.0m</p>
Test Procedure:	<p>a) The following procedure shall be used for measuring 99% Occupied Bandwidth: Use the following spectrum analyzer settings:</p> <ol style="list-style-type: none"> 1) Span equal to approximately 1.5 times the OBW, centered on the carrier frequency. 2) RBW, prefer 1% to 5% of OBW, or a minimum of 1 MHz if this is not possible due to a large OBW. 3) VBW approximately $3 \times$ RBW. 4) Set the reference level of the instrument as required to reduce the chance of the signal amplitude exceeding the maximum spectrum analyzer input mixer level for linear operation. 5) Sweep = No faster than coupled (auto) time. 6) Detector function = peak. 7) Trace = max-hold. <p>b) The EUT shall be transmitting at its maximum data rate. Allow the trace to stabilize.</p> <p>c) Use the 99% channel power function to measure the signal power.</p> <p>d) Repeat this test for each modulation scheme.</p>
Test Mode:	TX mode _ Make EUT continuously emit radar signals.

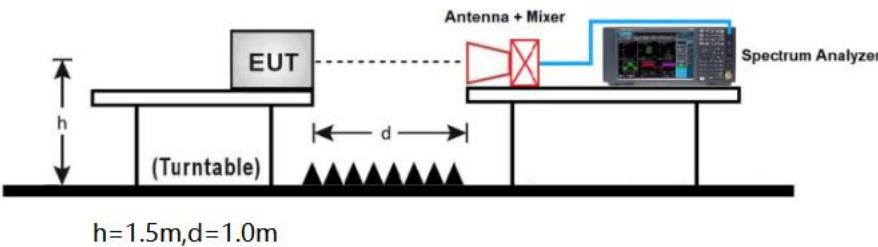
Test data:

99% emission bandwidth (MHz)	Lowest Frequency (GHz)	Highest Frequency (GHz)	Limit (GHz)	Result
2295.68	60.02854	62.32422	57 to 71	Pass

Test graph:



5.4 20dB down Emission Bandwidth

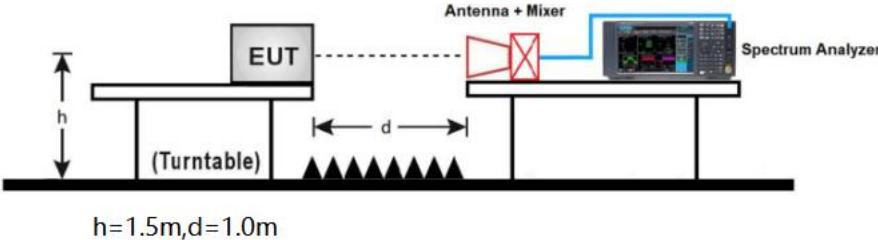
Test Requirement:	47 CFR FCC Part 15C §15.255(e), 47 CFR Part 2, Subpart J Section §2.1049
Test Method:	ANSI C63.10-2013 Section 9.3
Limit:	Within the designated 57GHz ~ 71GHz frequency band
Test Setup:	 <p>h=1.5m, d=1.0m</p>
Test Procedure:	<p>The following procedure shall be used for measurement of the bandwidth for millimeter-wave devices.</p> <p>a) Use the following spectrum analyzer settings:</p> <ol style="list-style-type: none"> 1) Span equal to approximately 2~3 times the 20dB down Emission Bandwidth, centered on the carrier frequency. 2) RBW, as specified in the requirement. 3) VBW, as specified in the requirement, or $VBW \geq RBW$ if not specified. 4) Sweep = auto. 5) Detector function = peak. 6) Trace = max hold. <p>b) The EUT shall be transmitting at its maximum data rate. Allow the trace to stabilize.</p> <p>c) Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure the specified 20dB down one side of the emission.</p> <p>d) Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.</p> <p>e) If this value varies with different modes of operation (data rate, modulation format, etc.), then repeat this test for each variation.</p>
Test Mode:	TX mode_Make EUT continuously emit radar signals.

Test data:

20dB down Emission Bandwidth (MHz)	Lowest Frequency (GHz)	Highest Frequency (GHz)	Limit (GHz)	Result
1119.0	60.014	61.133	57 to 71	Pass

Test graph:


5.5 EIRP(Effective Isotropic Radiated Power) & Peak Conducted Power

Test Requirement:	47 CFR FCC Part 15C §15.255(c),(e)																				
Test Method:	ANSI C63.10-2013 Section 9.5 & Section 9.7																				
Limit:	EIRP Power Limit <table border="1"> <thead> <tr> <th>Use Condition</th> <th>EIRP Peak Power</th> <th>EIRP Average Power</th> </tr> </thead> <tbody> <tr> <td>Fixed field disturbance sensors at within the frequency band 61-61.5GHz</td> <td>43dBm</td> <td>40dBm</td> </tr> <tr> <td>Fixed field disturbance sensors at outside of the band 61-61.5GHz</td> <td>13dBm</td> <td>10dBm</td> </tr> <tr> <td>Except fixed field disturbance sensors at 61-61.5GHz</td> <td>10dBm</td> <td>N/A</td> </tr> <tr> <td>Except outdoor fixed Point-to-Point</td> <td>43dBm</td> <td>40dBm</td> </tr> <tr> <td>Outdoor fixed Point-to-Point</td> <td>85dBm</td> <td>82dBm</td> </tr> </tbody> </table>			Use Condition	EIRP Peak Power	EIRP Average Power	Fixed field disturbance sensors at within the frequency band 61-61.5GHz	43dBm	40dBm	Fixed field disturbance sensors at outside of the band 61-61.5GHz	13dBm	10dBm	Except fixed field disturbance sensors at 61-61.5GHz	10dBm	N/A	Except outdoor fixed Point-to-Point	43dBm	40dBm	Outdoor fixed Point-to-Point	85dBm	82dBm
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Except fixed field disturbance sensors at 61-61.5GHz	10dBm	N/A																			
Except outdoor fixed Point-to-Point	43dBm	40dBm																			
Outdoor fixed Point-to-Point	85dBm	82dBm																			
			<p>Note:For fixed point-to-point transmitters located outdoors, the average power of any emission shall not exceed 82dBm, and shall be reduced by 2dB for every dB that the antenna gain is less than 51dBi.</p> <p>The peak power of any emission shall not exceed 85dBm, and shall be reduced by 2dB for every dB that the antenna gain is less than 51dBi.</p>																		
	Peak Conducted Power Limit <table border="1"> <thead> <tr> <th>20dB down Emission Bandwidth</th> <th>Peak Conducted Power</th> </tr> </thead> <tbody> <tr> <td>> 100MHz</td> <td>500mW (Equivalent 26.99dBm)</td> </tr> <tr> <td>≤ 100MHz</td> <td>500mW*(BW/100) (Equivalent 10*lg(5*BW)dBm)</td> </tr> </tbody> </table>			20dB down Emission Bandwidth	Peak Conducted Power	> 100MHz	500mW (Equivalent 26.99dBm)	≤ 100MHz	500mW*(BW/100) (Equivalent 10*lg(5*BW)dBm)												
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	<p>Note:BW=20dB down Emission Bandwidth (measured at RBW 100kHz).</p>																				
Test Setup:	 <p>h=1.5m, d=1.0m</p>																				

Test Procedure:	<p>(1)Maximum peak power(EIRP) – Peak detector</p> <ol style="list-style-type: none">1. Set RBW = 1MHz;2. Set VBW \geq 3*RBW;3. Span to 2~3*OBW;4. Detector = Peak;5. Set number of points in sweep \geq 2*Span/RBW;6. Sweep time=Auto couple;7. Trace = Max hold; <p>(2)Maximum power(EIRP) – Averaging detector</p> <p>Note: The maximum power(averaging detector) measurements are performed using the “channel power” measurement capability and integrated over the 99% OBW to obtain the result.</p> <ol style="list-style-type: none">1. Measurement capability of instrument = Channel power;2. Set RBW = 1MHz;3. Set VBW \geq 3*RBW;4. Span to 2~3*OBW;5. Channel bandwidth setting of instrument \geq OBW;6. Detector = Power averaging (RMS);7. Set number of points in sweep \geq 2*Span/RBW;8. Sweep time = Auto couple;9. Trace = Averaging;
Test Mode:	TX mode _Make EUT continuously emit radar signals.

Test data:

Frequency (GHz)	Distance (m)	Polarity	EIRP (dBm)	FMCW Chirps Correction Factor (dB)	Corrected EIRP (dBm)	EIRP Limit (dBm)	Result	Remark
61	1.0	Horizontal	-25.61	0.47	-25.14	≤43.0	Pass	Peak
		Vertical	-7.69	0.47	-7.22	≤43.0	Pass	Peak
		Horizontal	-40.96	0.47	-40.49	≤40.0	Pass	AVG
		Vertical	-36.98	0.47	-36.51	≤40.0	Pass	AVG

Frequency (GHz)	Distance (m)	Polarity	Corrected EIRP (dBm)	Antenna gain (dBi)	Antenna gain (numeric)	Peak Conducted Power (dBm)	Peak Conducted Power Limit (dBm)	Result	Remark
61	1.0	Horizontal	-25.14	7.43	5.53	-4.546	≤26.99	Pass	Peak
		Vertical	-7.22	7.43	5.53	-1.305	≤26.99	Pass	Peak

Remark:

- ①This is a radiated test, and test distance of 1.0m was used for the fundamental emissions measurement.
- ②EIRP(dBm) has added free space loss of 1.0m distance.
- ③The FMCW Chirps Correction Factor was calculated using the formula:

$$CF_{chirp} = 5 * \log \left(1 + K * \left(\frac{Span}{t * RBW^2} \right)^2 \right)$$

With t being the length of the chirp and K a correction factor for the setting process of the gaussian shaped filter (~0.1947).

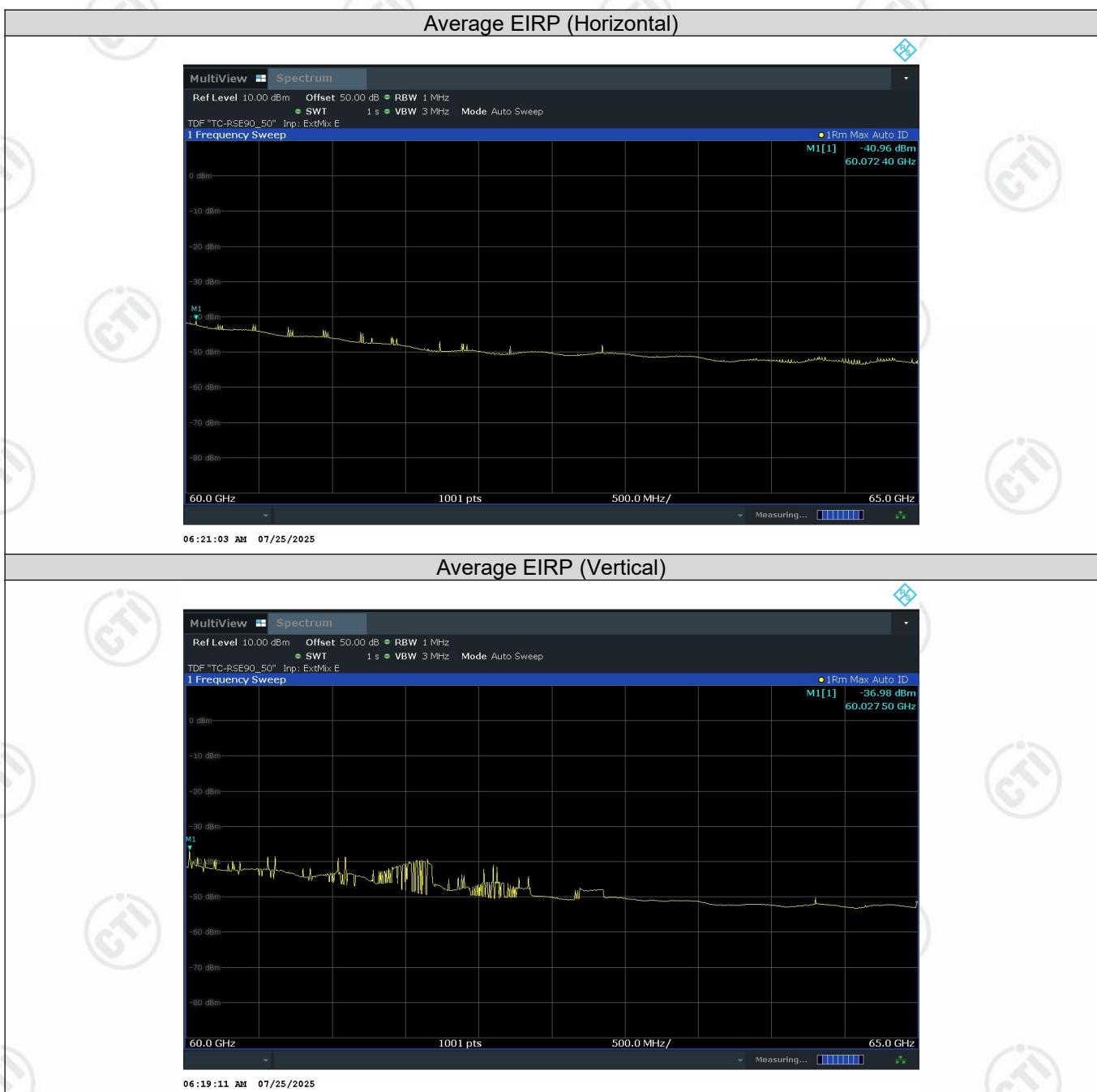
Sample calculation for FMCW chirps correction factor:

$$CF_{chirp} = 5 * \log_{10} \left(1 + 0.1947 * \left(\frac{1119.0 \text{MHz}}{1000000 \mu\text{s} * 1 \text{MHz}^2} \right)^2 \right) = 0.47 \text{dB}$$

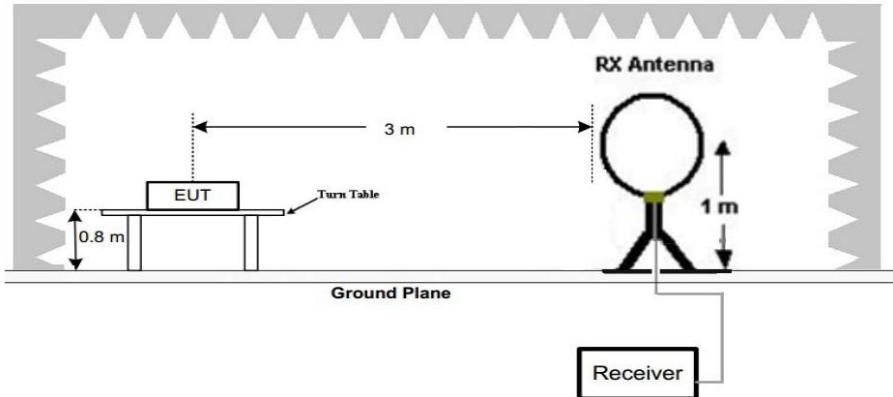
Note: Span is the measured maximum occupied bandwidth, refer to the section of 5.4, t claimed by the customer.

- ④ Guidance for calculating the correction factor is from Application Note 1EF107-1E Rohde & Schwarz Peak and Mean Power measurements on wideband FMCW radar signals.
- ⑤ Corrected EIRP(dBm)=EIRP(dBm)+FMCW Chirps Correction Factor(dB).
- ⑥ Peak Conducted Power(dBm)=10*lg(10^(Corrected EIRP(dBm)/10)/Antenna gain(numeric));
- ⑦ Antenna gain(numeric)=10^(Antenna gain(dBi)/10);
- ⑧ Only the worst case data was recorded in the report.

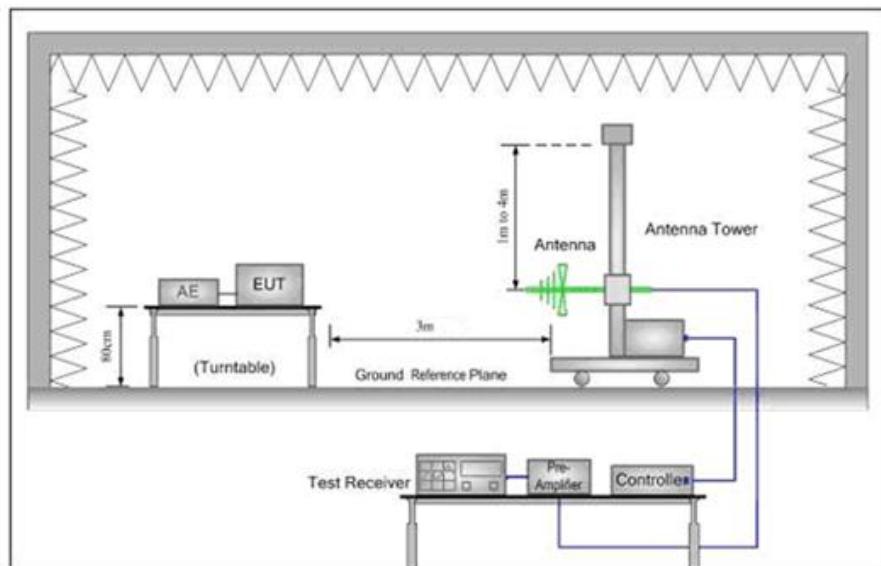
Test graph:



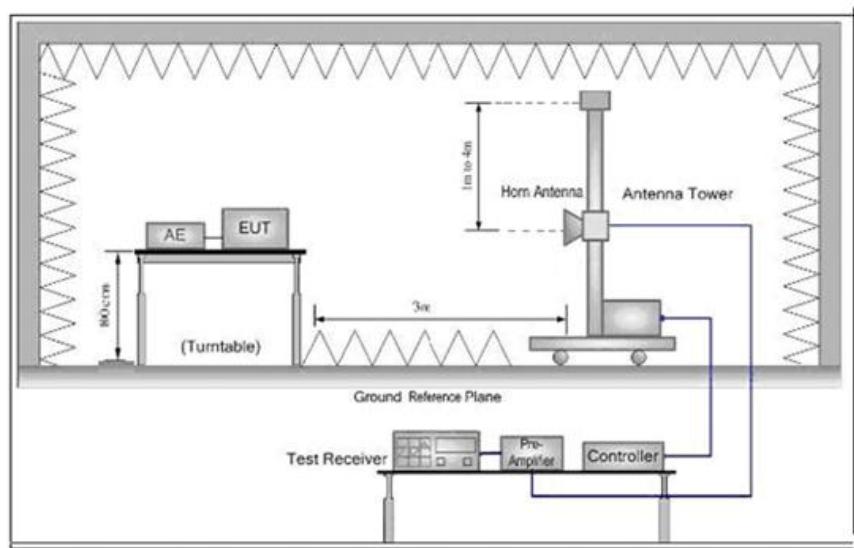
5.6 Spurious Emissions

Test Requirement:	47 CFR FCC Part 15C §15.255(d) & §15.209																																																	
Test Method:	ANSI C63.10-2013 Section 9.12 & Section 9.13																																																	
Limit:	47 CFR FCC Part 15C §15.255(d) Limit: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Frequency Range</th> <th style="text-align: center;">Limit</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Radiated emissions below 40GHz</td> <td style="text-align: center;">47 CFR FCC Part 15C §15.209</td> </tr> <tr> <td style="text-align: center;">Radiated emissions above 40GHz to 200GHz</td> <td style="text-align: center;">90pW/cm²@3m (Equivalent EIRP:101.79uW or -9.92dBm and Electric field strength of 85.33dBuV/m@3m)</td> </tr> </tbody> </table>					Frequency Range	Limit	Radiated emissions below 40GHz	47 CFR FCC Part 15C §15.209	Radiated emissions above 40GHz to 200GHz	90pW/cm ² @3m (Equivalent EIRP:101.79uW or -9.92dBm and Electric field strength of 85.33dBuV/m@3m)																																							
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	Note: (1)For the applicable limit,see 47 CFR FCC Part 15C §15.255(d); (2)Spurious emissions shall not exceed the level of the fundamental emission. (3)Power density(pW/cm ²)= $10^{EIRP/1MHz(dBm)+10} \cdot 10^9 \div [4 \cdot \pi \cdot (3m \cdot 100)^2]$;																																																	
	47 CFR FCC Part 15C §15.209 Limit: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Frequency</th> <th style="text-align: center;">Field strength (microvolt/meter)</th> <th style="text-align: center;">Limit (dBuV/m)</th> <th style="text-align: center;">Remark</th> <th style="text-align: center;">Measurement distance (m)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0.009MHz-0.490MHz</td> <td style="text-align: center;">2400/F(kHz)</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> <td style="text-align: center;">300</td> </tr> <tr> <td style="text-align: center;">0.490MHz-1.705MHz</td> <td style="text-align: center;">24000/F(kHz)</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> <td style="text-align: center;">30</td> </tr> <tr> <td style="text-align: center;">1.705MHz-30MHz</td> <td style="text-align: center;">30</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> <td style="text-align: center;">30</td> </tr> <tr> <td style="text-align: center;">30MHz-88MHz</td> <td style="text-align: center;">100</td> <td style="text-align: center;">40.0</td> <td style="text-align: center;">Quasi-peak</td> <td style="text-align: center;">3</td> </tr> <tr> <td style="text-align: center;">88MHz-216MHz</td> <td style="text-align: center;">150</td> <td style="text-align: center;">43.5</td> <td style="text-align: center;">Quasi-peak</td> <td style="text-align: center;">3</td> </tr> <tr> <td style="text-align: center;">216MHz-960MHz</td> <td style="text-align: center;">200</td> <td style="text-align: center;">46.0</td> <td style="text-align: center;">Quasi-peak</td> <td style="text-align: center;">3</td> </tr> <tr> <td style="text-align: center;">960MHz-1GHz</td> <td style="text-align: center;">500</td> <td style="text-align: center;">54.0</td> <td style="text-align: center;">Quasi-peak</td> <td style="text-align: center;">3</td> </tr> <tr> <td style="text-align: center;">Above 1GHz</td> <td style="text-align: center;">500</td> <td style="text-align: center;">54.0</td> <td style="text-align: center;">Average</td> <td style="text-align: center;">3</td> </tr> </tbody> </table>					Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30	1.705MHz-30MHz	30	-	-	30	30MHz-88MHz	100	40.0	Quasi-peak	3	88MHz-216MHz	150	43.5	Quasi-peak	3	216MHz-960MHz	200	46.0	Quasi-peak	3	960MHz-1GHz	500	54.0	Quasi-peak	3	Above 1GHz	500	54.0	Average	3
Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)																																														
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300																																														
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30																																														
1.705MHz-30MHz	30	-	-	30																																														
30MHz-88MHz	100	40.0	Quasi-peak	3																																														
88MHz-216MHz	150	43.5	Quasi-peak	3																																														
216MHz-960MHz	200	46.0	Quasi-peak	3																																														
960MHz-1GHz	500	54.0	Quasi-peak	3																																														
Above 1GHz	500	54.0	Average	3																																														
	Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.																																																	
Test Setup:	Below 30MHz: 																																																	

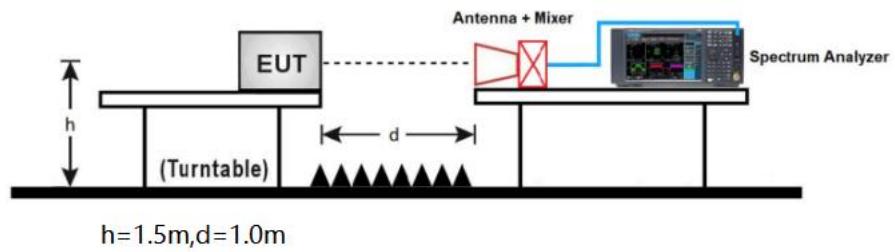
30MHz-1GHz:



1GHz-41GHz:



Above 41GHz:



Test Procedure:	<p>Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground, when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.</p> <p>The turn table is rotated 360 degrees to determine the position of the maximum emission level.</p> <p>The EUT was positioned such that the distance from antenna to the EUT was 3 meters.</p> <p>The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.</p> <p>The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.</p> <p>Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.</p> <p>The measurement is divided into the Preliminary Measurement and the Final Measurement.</p> <p>The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.</p> <p>The measurement frequency range from 9kHz to 200GHz was investigated.</p>
Test Mode:	TX mode_Make EUT continuously emit radar signals.

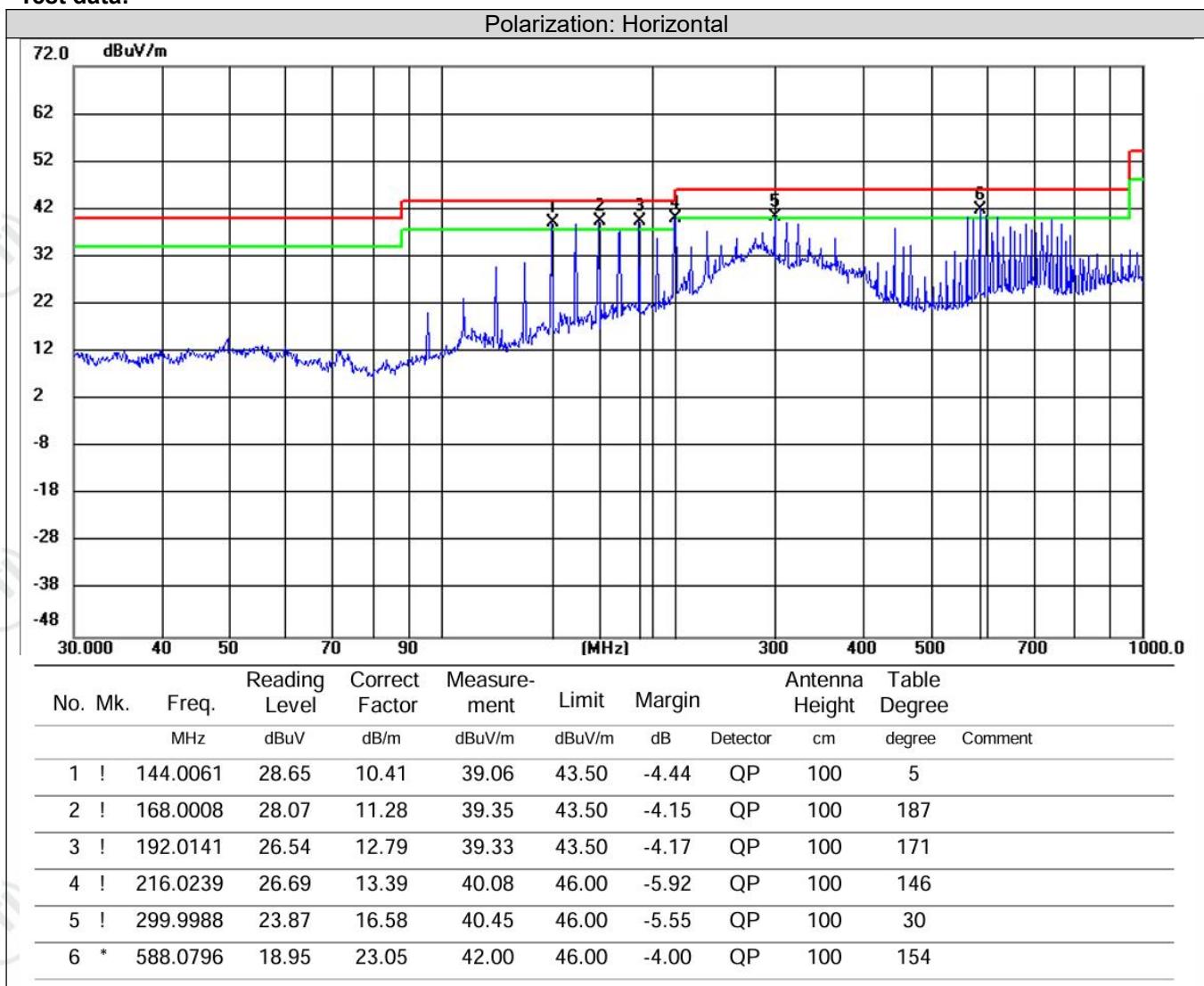
Radiated Spurious Emission below 30MHz:

9 kHz~30 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement

The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

Radiated Spurious Emission 30MHz-1GHz:

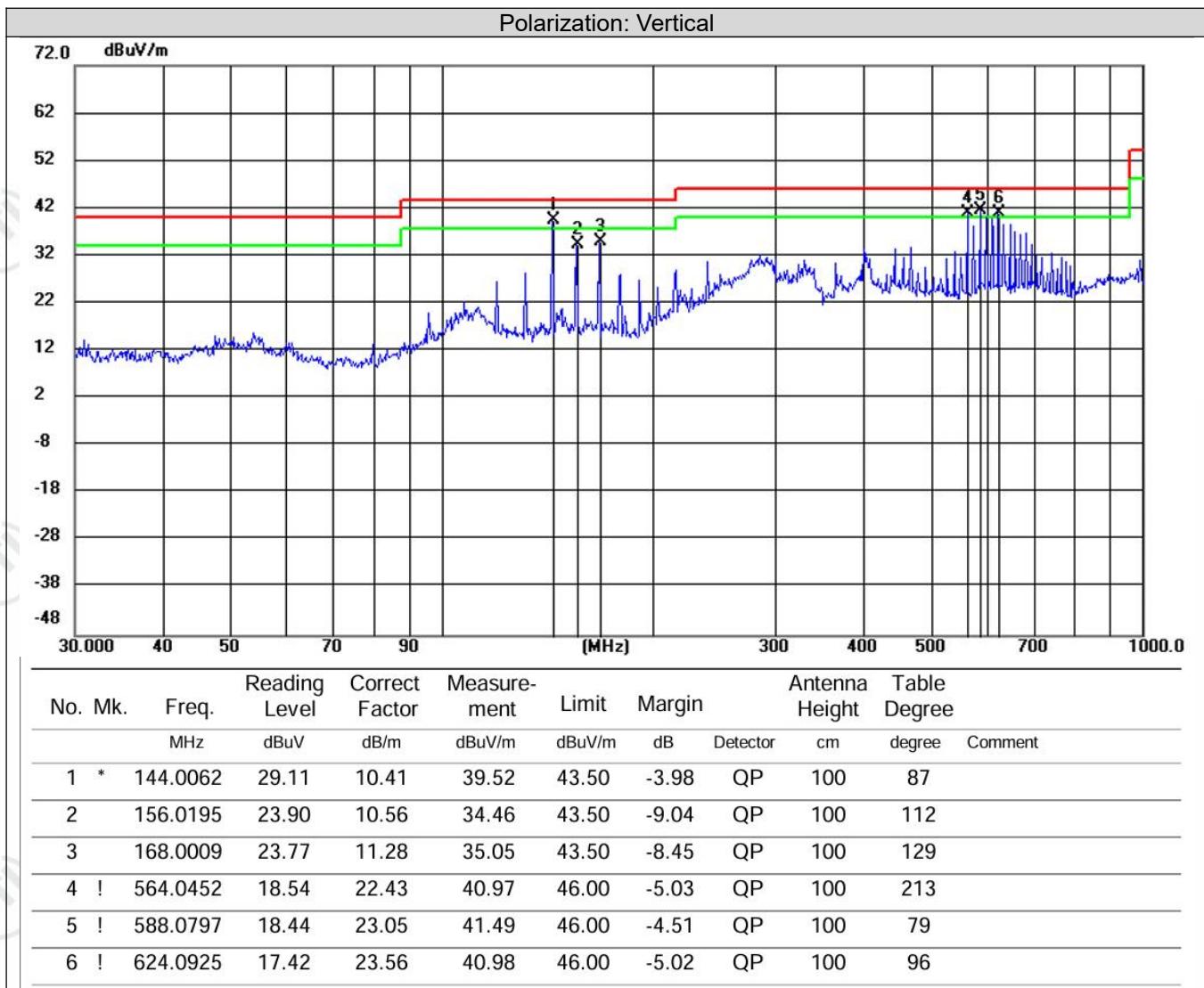
Test data:



Note:

①Measurement(dBuV/m)=Reading Level(dBuV)+Correct Factor(dB);

②Margin(dB)=Measurement(dBuV/m)-Limit(dBuV/m);



Note:

①Measurement(dBuV/m)=Reading Level(dBuV)+Correct Factor(dB);

②Margin(dB)=Measurement(dBuV/m)-Limit(dBuV/m);

Radiated Spurious Emission 1GHz-18GHz:

Test data:

NO	Freq. [MHz]	Factor [dB]	Reading [dB μ V]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Result	Polarity	Remark
1	1080.0053	-22.73	59.71	36.98	74.00	37.02	PASS	Horizontal	PK
2	1660.3774	-20.62	57.23	36.61	74.00	37.39	PASS	Horizontal	PK
3	2461.0974	-17.54	58.39	40.85	74.00	33.15	PASS	Horizontal	PK
4	4939.9293	-8.36	50.42	42.06	74.00	31.94	PASS	Horizontal	PK
5	7746.5164	-1.44	46.93	45.49	74.00	28.51	PASS	Horizontal	PK
6	13240.4827	6.23	45.17	51.40	74.00	22.60	PASS	Horizontal	PK
7	1080.0053	-22.73	58.40	35.67	74.00	38.33	PASS	Vertical	PK
8	1680.0453	-20.57	59.20	38.63	74.00	35.37	PASS	Vertical	PK
9	2356.4238	-18.00	59.15	41.15	74.00	32.85	PASS	Vertical	PK
10	4647.5765	-9.39	50.72	41.33	74.00	32.67	PASS	Vertical	PK
11	7630.5087	-2.20	48.33	46.13	74.00	27.87	PASS	Vertical	PK
12	11895.593	2.73	46.91	49.64	74.00	24.36	PASS	Vertical	PK

Radiated Spurious Emission 18GHz-41GHz:

Test data:

NO	Freq. [MHz]	Factor [dB]	Reading [dB μ V]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Result	Polarity	Remark
1	20337.8135	-25.49	61.50	36.01	74.00	37.99	PASS	Horizontal	PK
2	23448.4579	-23.44	59.63	36.19	74.00	37.81	PASS	Horizontal	PK
3	26629.0252	-21.18	58.39	37.21	74.00	36.79	PASS	Horizontal	PK
4	29655.9462	-20.71	57.28	36.57	74.00	37.43	PASS	Horizontal	PK
5	33477.7791	-17.82	53.98	36.16	74.00	37.84	PASS	Horizontal	PK
6	36623.3849	-15.88	51.50	35.62	74.00	38.38	PASS	Horizontal	PK
7	19776.5911	-25.27	61.15	35.88	74.00	38.12	PASS	Vertical	PK
8	22476.8991	-25.06	60.64	35.58	74.00	38.42	PASS	Vertical	PK
9	27306.1722	-21.76	59.15	37.39	74.00	36.61	PASS	Vertical	PK
10	30840.0336	-19.57	56.31	36.74	74.00	37.26	PASS	Vertical	PK
11	34591.9437	-16.13	51.76	35.63	74.00	38.37	PASS	Vertical	PK
12	36327.1331	-16.73	51.90	35.17	74.00	38.83	PASS	Vertical	PK

Remark:

- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor
- 2) For 40GHz to 41GHz, the limit is 90pW/cm² equivalent to an electric field strength of 85.33dB μ V/m@3m.
Only the worst case data was recorded in the report.

Radiated Spurious Emission 41GHz-200GHz:**Test data:**

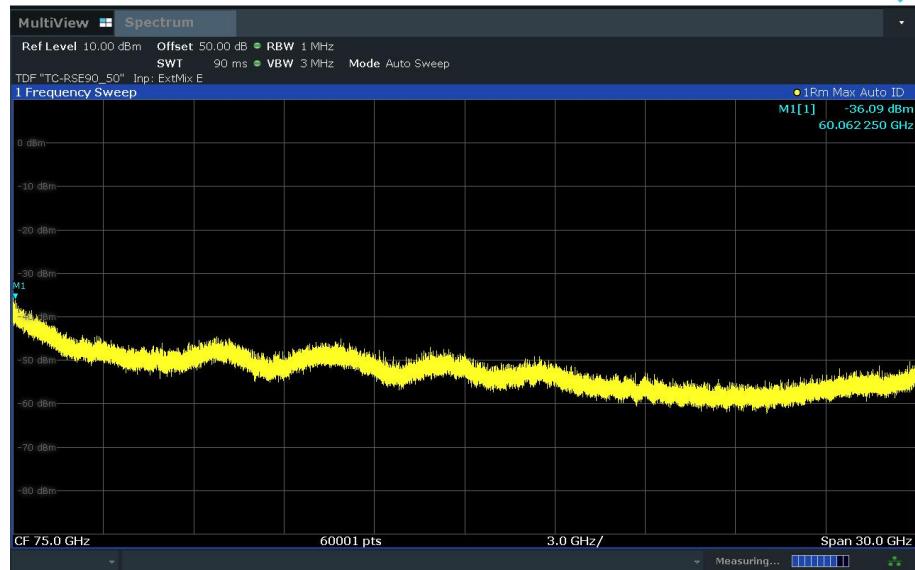
Test Frequency (GHz)	Polarity	EIRP/1MHz (dBm)	Power density(pW/cm ²) @3m distance	Limit of Power density(pW/cm ²) @3m distance	Result
41.0165	Horizontal	-41.11	0.07	≤90	Pass
41.01225	Vertical	-41.39	0.06	≤90	Pass
60.0623	Horizontal	-36.09	0.22	≤90	Pass
60.0523	Vertical	-36.45	0.20	≤90	Pass
104.4126	Horizontal	-38.32	0.13	≤90	Pass
99.2891	Vertical	-38.53	0.12	≤90	Pass
130.6694	Horizontal	-41.52	0.06	≤90	Pass
130.8064	Vertical	-40.97	0.07	≤90	Pass
144.1204	Horizontal	-40.09	0.09	≤90	Pass
143.2095	Vertical	-40.34	0.08	≤90	Pass

Note:

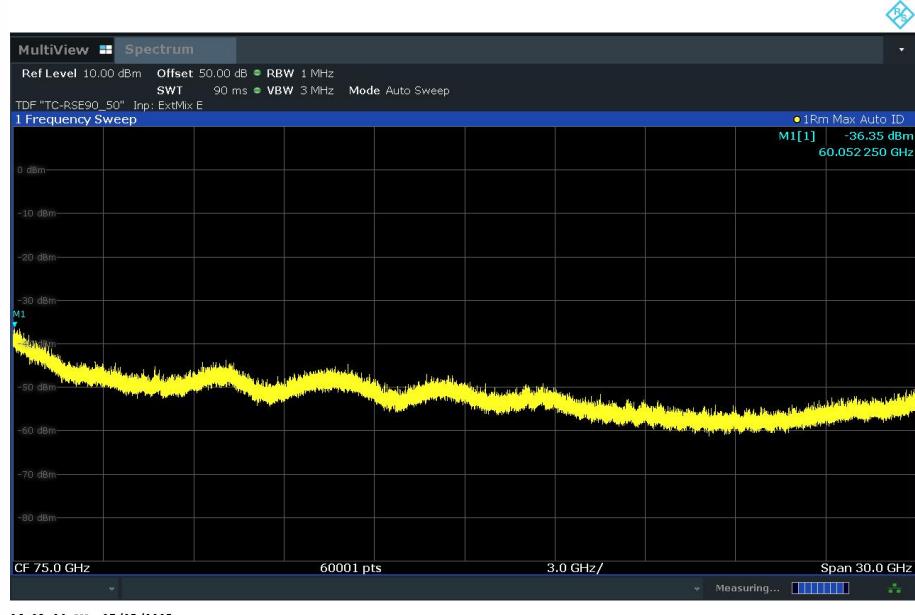
- ①EIRP(dBm/MHz) has added free space loss of 1.0m distance.
- ②Only the worst case data was recorded in the report.
- ③Power density(pW/cm²)=10^{EIRP/1MHz(dBm)+10*10⁹÷[4*π*(3m*100)²];}

Test graph:

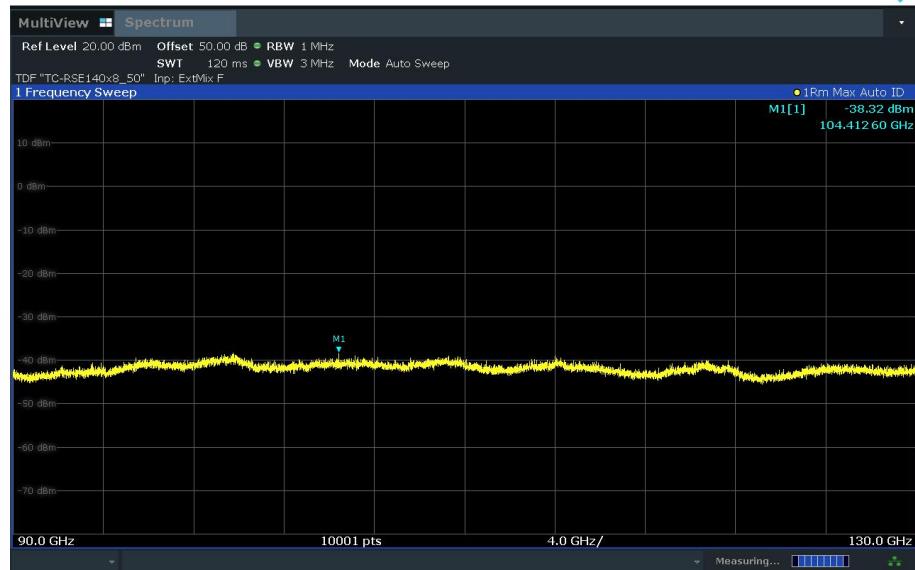
60GHz-90GHz (Horizontal)



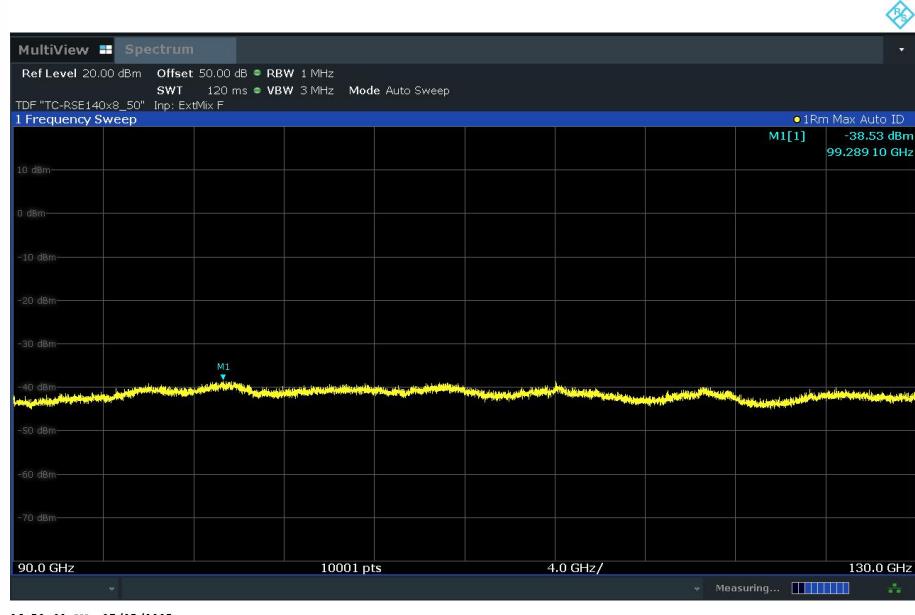
60GHz-90GHz (Vertical)



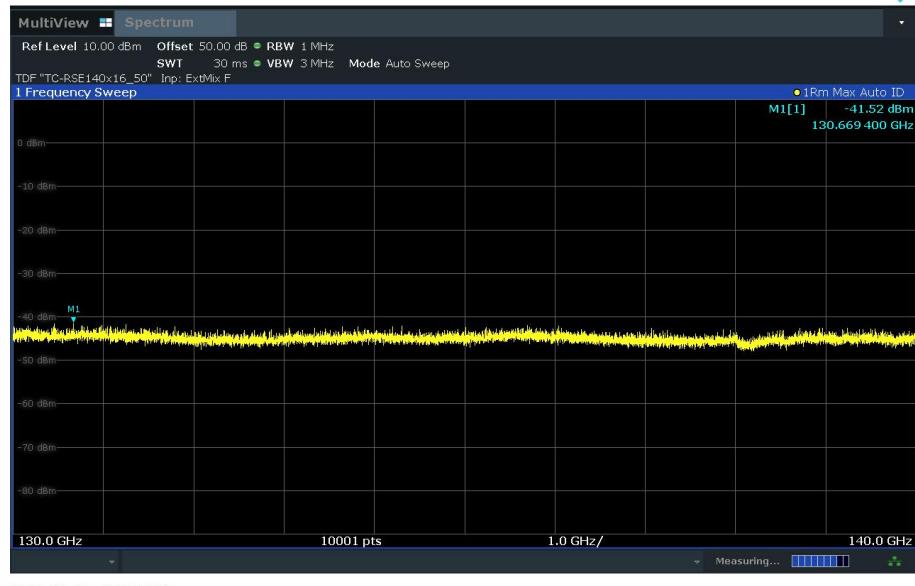
90GHz-130GHz (Horizontal)



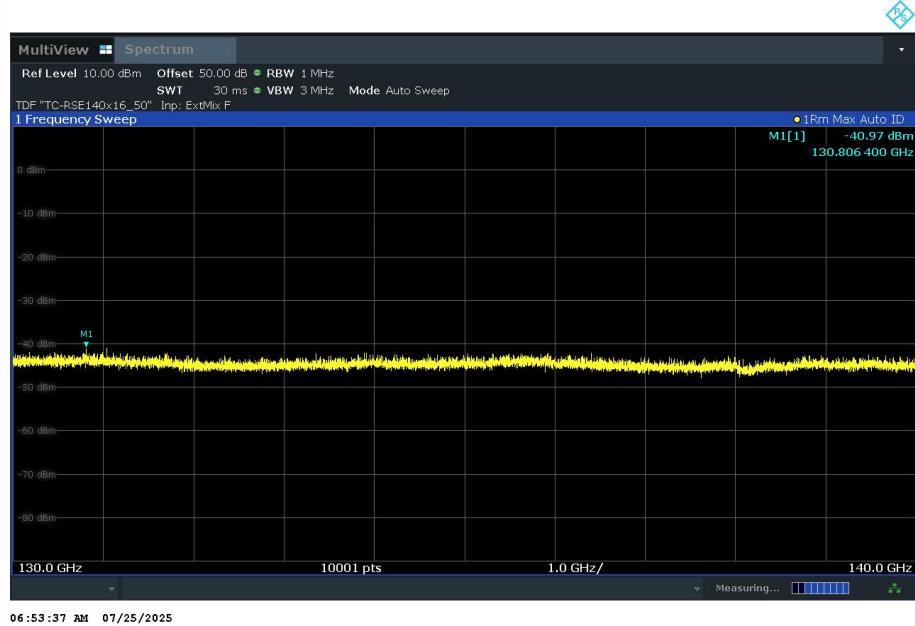
90GHz-130GHz (Vertical)



130GHz-140GHz (Horizontal)

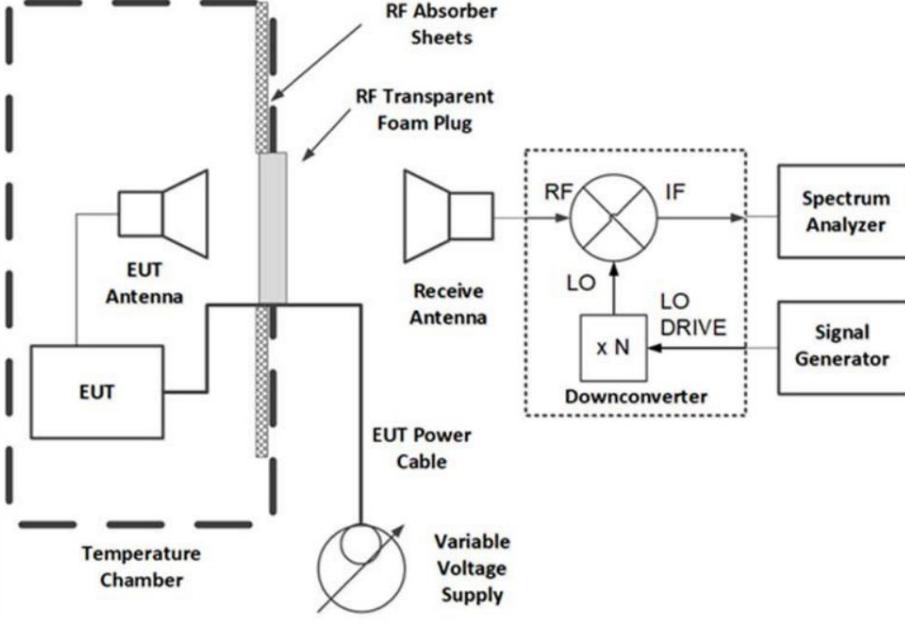


130GHz-140GHz (Vertical)





5.7 Frequency stability

Test Requirement:	47 CFR FCC Part 15C §15.255(f)
Test Method:	ANSI C63.10-2013 Section 9.14
Limit:	Fundamental emissions must be contained within the frequency bands specified in this section during all conditions of operation.
Test Setup:	 <p>Figure 23—Example of a frequency stability setup configuration</p>
Test Procedure:	<p>The carrier frequency of the transmitter is measured at room temperature. (20°C to provide a reference)</p> <p>At 10°C intervals of temperatures between -30°C and +50°C at the manufacturer's rated supply voltage, and At +20°C temperature and ±15% supply voltage variations. If a product is specified to operate over a range of input voltage then the -15% variation is applied to the lowermost voltage and the +15% is applied to the uppermost voltage.</p> <p>Measurement data showing variation in transmitter output frequency from a cold start and the elapsed time necessary for the frequency to stabilize within the applicable tolerance.</p> <p>Tests shall be made after temperature stabilization at each of the ambient temperature levels; the lower temperature limit, 0°C and + 30°C with no primary power applied.</p> <p>Beginning at each temperature level, the frequency shall be measured within one minute after application of primary power to the transmitter and at intervals of no more than one minute thereafter until ten minutes have elapsed or until sufficient measurements are obtained to indicate clearly that the frequency has stabilized within the applicable tolerance, whichever time period is greater.</p> <p>During each test, the ambient temperature shall not be allowed to rise more than 10°C above the respective beginning ambient temperature level.</p>
Test Mode:	TX mode_Make EUT continuously emit radar signals.

Test data:

Voltage (%)	Power (V/DC)	Temperature (°C)	Frequency Left (GHz)	Frequency Right (GHz)	Limit (GHz)	Result
100	3.0	-40	60.12627	62.75883	57 to 71	Pass
		-30	60.73050	62.94646	57 to 71	Pass
		-20	60.44593	62.70268	57 to 71	Pass
		-10	60.57867	62.77868	57 to 71	Pass
		0	60.51131	62.78360	57 to 71	Pass
		+10	60.98599	62.36314	57 to 71	Pass
		+20	60.24281	63.21506	57 to 71	Pass
		+30	60.09195	62.54755	57 to 71	Pass
		+40	60.57042	62.56655	57 to 71	Pass
		+50	60.85861	62.67129	57 to 71	Pass
		+60	60.86602	63.27686	57 to 71	Pass
		+70	60.57013	62.54828	57 to 71	Pass
		+80	60.79183	62.36315	57 to 71	Pass
		+85	60.60221	62.97528	57 to 71	Pass
115	3.45	+20	60.62287	63.07842	57 to 71	Pass
85	2.55	+20	60.66079	62.35082	57 to 71	Pass

Note: The extreme voltage and extreme temperature is specified by the manufacturer.

7 PHOTOGRAPHS OF EUT Constructional Details

Refer to Report No. EED32R80981601 for EUT external and internal photos.



Statement

1. This report is considered invalid without approved signature, special seal and the seal on the perforation;
2. The Company Name shown on Report and Address, the sample(s) and sample information was/were provided by the applicant who should be responsible for the authenticity which CTI hasn't verified;
3. The result(s) shown in this report refer(s) only to the sample(s) tested;
4. Unless otherwise stated, the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule stated in ILAC-G8:09/2019/CNAS-GL015:2022;
5. Without written approval of CTI, this report can't be reproduced except in full;

*** End of Report ***