


Report No.: SEWM2307000279RG01  
 Rev.: 01  
 Page: 1 of 50

# TEST REPORT

**Application No.:** SEWM2307000279RG  
**Applicant:** Siklu Communication Ltd.  
**Address of Applicant:** 43 Hasivim St. Petach-Tikva 4959501, Israel  
**Manufacturer:** Siklu Communication Ltd.  
**Address of Manufacturer:** 43 Hasivim St. Petach-Tikva 4959501, Israel  
**EUT Description:** Terminal unit of point-to-multipoint high BW system operating in 57-66GHz  
**Model No.:** MH-T261-CNN-N-MWB  
**Trade Mark:**   
**FCC ID:** 2ACYESK-MH60TG-A8  
**Standards:** FCC 47 CFR Part 15, Subpart C 15.255  
**Date of Receipt:** 2023/06/05  
**Date of Test:** 2023/07/05 to 2023/07/23  
**Date of Issue:** 2023/07/28

<b>Test Result :</b>	<b>PASS *</b>
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\* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Authorized Signature:

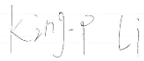
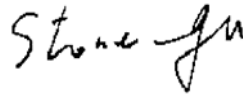
Well Wei  
 Wireless Laboratory Manager



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# 1 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2023/07/28		Original

<b>Prepared By</b>		 <hr/> <b>(King-p Li) / Test Engineer</b>
<b>Checked By</b>		 <hr/> <b>(Stone Gu) / Reviewer</b>



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## 2 Test Summary

Test Item	FCC Rule No.	Test Method	Test Result	Result
Antenna Requirement	15.203	--	Clause 4.1	PASS
AC Power Line Conducted Emission	15.207	ANSI C63.10-2013 Section 6.2	Clause 4.2	PASS
Transmitter power and power spectral density	15.255 (c)(1)(ii)&(e)	ANSI C63.10-2013 Section 9.5/9.6	Clause 4.3	PASS
Occupied bandwidth	15.215 (c), 15.255 (e2)	ANSI C63.10-2013 Section 9.3	Clause 4.4	PASS
Radiated spurious emissions below 40 GHz	15.255 (d)(2)	ANSI C63.10-2013 Section 9.13	Clause 4.5	PASS
Radiated emissions outside assigned band and above 40 GHz up to 200 GHz	15.255 (d)(3)	ANSI C63.10-2013 Section 9.9/9.12	Clause 4.6	PASS
Frequency stability	15.255 (f)	ANSI C63.10-2013 Section 9.14	Clause 4.7	PASS



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## Contents

1	Version .....	2
2	Test Summary .....	3
3	General Information .....	5
3.1	Details of Client .....	5
3.2	Test Location .....	5
3.3	Test Facility .....	5
3.4	General Description of EUT .....	6
3.5	Test Environment .....	7
3.6	Description of Support Units .....	7
4	Test results and Measurement Data .....	8
4.1	Antenna Requirement .....	8
4.2	AC Power Line Conducted Emissions .....	9
4.3	Transmitter power and power spectral density .....	13
4.4	Occupied Bandwidth .....	14
4.5	Radiated spurious emissions below 40 GHz .....	15
4.6	Radiated emissions outside assigned band and above 40 GHz up to 200 GHz 18	
4.7	Frequency Stability .....	20
5	Measurement Uncertainty (95% confidence levels, k=2) .....	21
6	Equipment List .....	22
7	Photographs - Setup Photos .....	24



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### 3 General Information

#### 3.1 Details of Client

Applicant:	Siklu Communication Ltd.
Address of Applicant:	43 Hasivim St. Petach-Tikva 4959501, Israel
Manufacturer:	Siklu Communication Ltd.
Address of Manufacturer:	43 Hasivim St. Petach-Tikva 4959501, Israel

#### 3.2 Test Location

Company:	SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd.
Address:	South of No. 6 Plant, No. 1, Runsheng Road, Suzhou Industrial Park, Suzhou Area, China (Jiangsu) Pilot Free Trade Zone
Post code:	215000
Test engineer:	King-p Li

#### 3.3 Test Facility

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

- **A2LA (Certificate No. 6336.01)**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 6336.01.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0120.

IC#: 27594.

- **FCC –Designation Number: CN1312**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized as an accredited testing laboratory.

Designation Number: CN1312.

Test Firm Registration Number: 717327



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### 3.4 General Description of EUT

EUT Description:	Terminal unit of point-to-multipoint high BW system operating in 57-66GHz			
Model No.:	MH-T261-CNN-N-MWB			
Trade Mark:				
Software Version:	2.1.2			
Power Supply:	42-57VDC,0.31A Max			
SN:	AD26100007			
Frequency Range:	58320MHz-64800MHz			
Operation Frequency:	Channel Number	Center Frequency(MHz)	Channel Number	Center Frequency(MHz)
	0	58320	2	62640
	1	60480	3	64800
Modulation Technique:	BPSK, QPSK, 16QAM			
Wireless network protocol:	802.11ay			
Crystal:	38.4MHz			
Antenna Type:	PCB Antenna			
Antenna Gain:	22.5dBi			
	Note: The antenna gain are derived from the gain information report provided by the manufacturer.			
Remark:	As above information is provided and confirmed by the applicant. SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.			



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## 4 Test results and Measurement Data

### 4.1 Antenna Requirement

<b>Standard requirement:</b>	47 CFR Part 15C Section 15.203
<p>15.203 requirement: 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>	
<p>The antenna is PCB Antenna and no consideration of replacement. The best case gain of the antenna is 22.5dBi.</p>	
<p><i>Note:</i>  <i>The antenna gain are derived from the gain information report provided by the manufacturer.</i></p>	
<p><i>Remark:</i>  <i>As above information is provided and confirmed by the applicant. SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.</i></p>	



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### 4.2 AC Power Line Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.207		
Test Method:	ANSI C63.10-2013 Section 6.2		
Test Frequency Range:	150kHz to 30MHz		
Receiver Setup:	RBW = 9kHz, VBW = 30kHz		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
	* Decreases with the logarithm of the frequency.		
Test Procedure:	<ol style="list-style-type: none"> <li>1) The mains terminal disturbance voltage test was conducted in a shielded room.</li> <li>2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.</li> <li>3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.</li> <li>4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.</li> <li>5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10-2013 on conducted measurement.</li> </ol>		



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<p>Test Setup:</p>	
<p>Test Mode:</p>	<p>TX mode _ Keep the EUT in continuously transmitting mode</p>
<p>Instruments Used:</p>	<p>Refer to section 6 for details.</p>
<p>Test Results:</p>	<p>Pass</p>



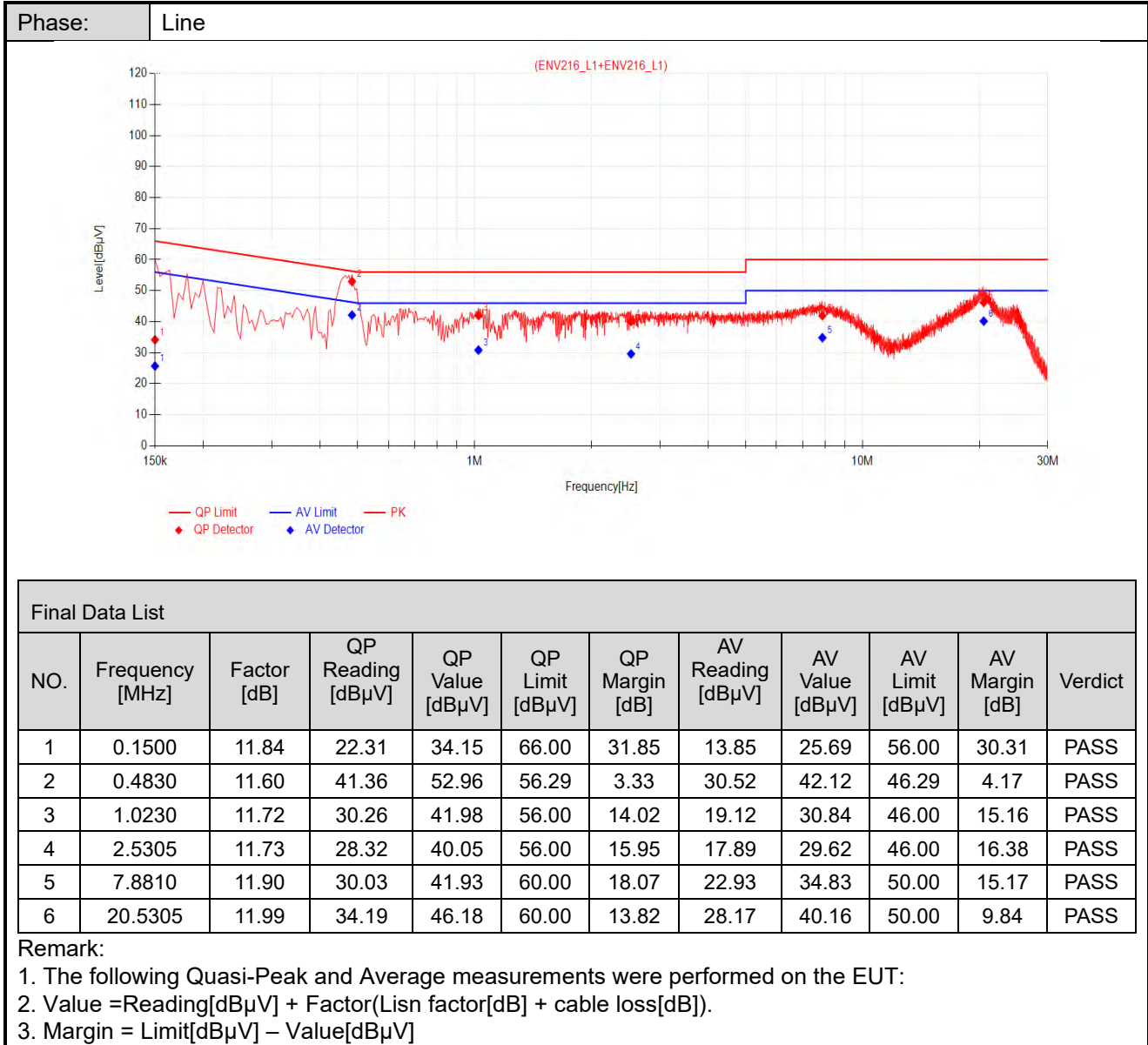
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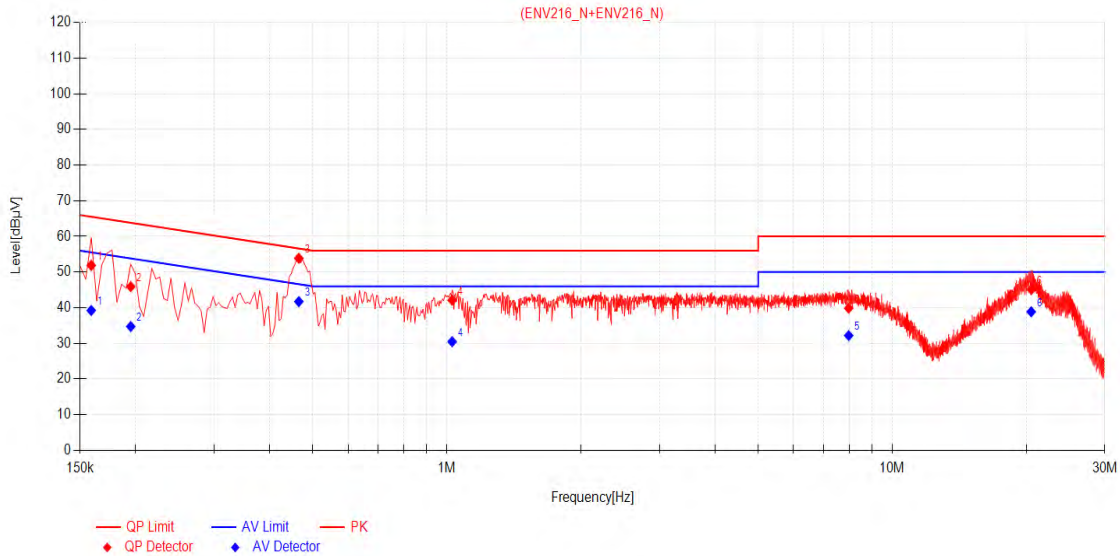
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Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.



Phase: Neutral



Final Data List											
NO.	Frequency [MHz]	Factor [dB]	QP Reading [dBµV]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Reading [dBµV]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	Verdict
1	0.1590	11.82	40.06	51.88	65.52	13.64	27.41	39.23	55.52	16.29	PASS
2	0.1950	11.67	34.24	45.91	63.82	17.91	23.06	34.73	53.82	19.09	PASS
3	0.465	11.60	42.26	53.86	56.60	2.74	30.12	41.72	46.60	4.88	PASS
4	1.0275	11.73	30.36	42.09	56.00	13.91	18.73	30.46	46.00	15.54	PASS
5	7.9845	11.89	28.00	39.89	60.00	20.11	20.30	32.19	50.00	17.81	PASS
6	20.5170	11.99	33.11	45.10	60.00	14.90	26.86	38.85	50.00	11.15	PASS

Remark:

- The following Quasi-Peak and Average measurements were performed on the EUT:
- Value = Reading[dBµV] + Factor(Lin factor[dB] + cable loss[dB]).
- Margin = Limit[dBµV] – Value[dBµV]



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### 4.3 Transmitter power and power spectral density

Test Requirement:	47 CFR Part 15C Section 15.255 (c)(1)(i)&(e)
Test Method:	ANSI C63.10-2013 Section 9.5, 9.6
Test Setup:	<p>The diagram illustrates the test setup. An EUT (Equipment Under Test) is placed on a turntable at a height <math>h = 1.5\text{m}</math>. An Antenna + Mixer is positioned at a distance <math>d = 0.5\text{m}</math> from the EUT. A Spectrum Analyzer is connected to the Antenna + Mixer. The ground plane is indicated by a series of triangles below the turntable.</p>
Test Instruments:	Refer to section 6 for details
Test Procedure:	<ol style="list-style-type: none"> <li>1. Place the EUT on the table and set it in the transmitting mode.</li> <li>2. Set The SA to Channel Power Function and SA set RBW=1MHz , VBW=3*RBW , Span=5GHz, Detector=Peak /Average Trace: Mask Hold.</li> <li>3. The EUT was turned from 0 degrees to 360 degrees to find the maximum reading.</li> </ol>
Test Mode:	TX mode _ Keep the EUT in continuously transmitting mode
Limit:	<p>The average power of any emission shall not exceed 40 dBm and the peak power of any emission shall not exceed 43 dBm</p> <p>The peak transmitter conducted output power of devices other than field disturbance sensors/radars shall not exceed 500 mW.(27dbm)</p>
Test Results:	Pass
The detailed test data see: <b>Appendix</b>	



### 4.4 Occupied Bandwidth

Test Requirement:	47 CFR Part 15C Section 15.215(c), 15.255 (e2)
Test Method:	ANSI C63.10-2013 Section 9.3
Test Setup:	
Instruments Used:	Refer to section 6 for details
Test Procedure:	<ol style="list-style-type: none"> <li>Place the EUT on the table and set it in the transmitting mode.</li> <li>For 20dB and 99% bandwidth, RBW=1%~5% OBW, VBW≈3*RBW; For 6dB bandwidth, RBW=100KHz, VBW≈3*RBW, and Detector=Peak.</li> <li>Measure and record the result of 6dB, 20dB and 99% bandwidth.</li> </ol>
Test Mode:	TX mode _ Keep the EUT in continuously transmitting mode
Limit:	57-71GHz
Test Results:	Pass
The detailed test data see: <b>Appendix</b>	



### 4.5 Radiated spurious emissions below 40 GHz

Test Requirement:	47 CFR Part 15C Section 15.225 (d)(2)			
Test Method:	ANSI C63.10-2013 Section 9.13			
Limit:	<b>Below 30MHz:</b>			
	Frequency	Field Strength (µV/m)	Measurement Distance (metres)	
	9 - 490 kHz	2,400/F (kHz)	300	
	490 - 1,705 kHz	24,000/F (kHz)	30	
	1.705-30 MHz	30	30	
	Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.			
	<b>Above 30MHz:</b>			
	Frequency (MHz)	Field Strength (µV/m)	Measurement Distance (metres)	
	30-88	100**	3	
	88-216	150**	3	
216-960	200**	3		
Above 960	500	3		
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.				
Frequency (MHz)	Field strength at 3 m, dB(µV/m)*			
	Within restricted bands			
	Peak	Quasi Peak	Average	
	0.009 - 0.090	148.5 - 128.5	NA	128.5 - 108.5**
	0.090 - 0.110	NA	108.5 - 106.8**	NA
	0.110 - 0.490	126.8 - 113.8	NA	106.8 - 93.8**
	0.490 - 1.705	NA	73.8 - 63.0**	NA
1.705 - 30.0*	69.5			
30 - 88	40.0			
88 - 216	43.5			



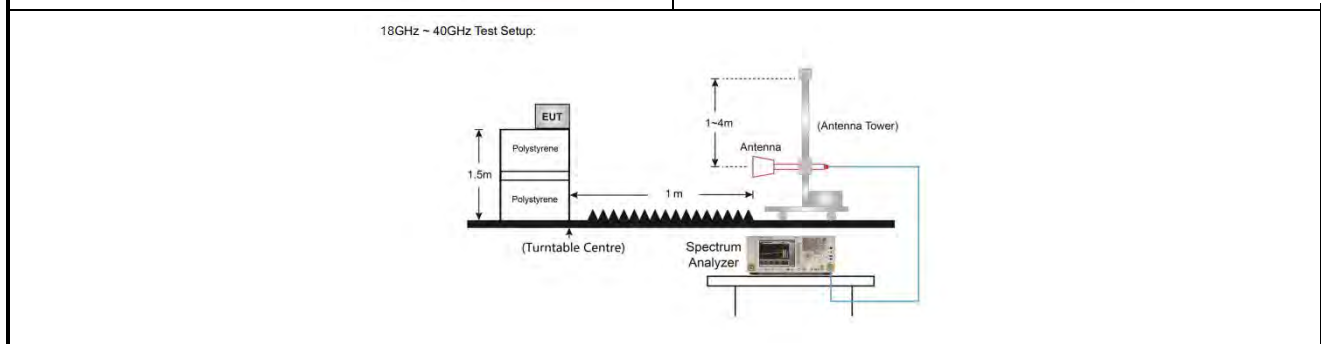
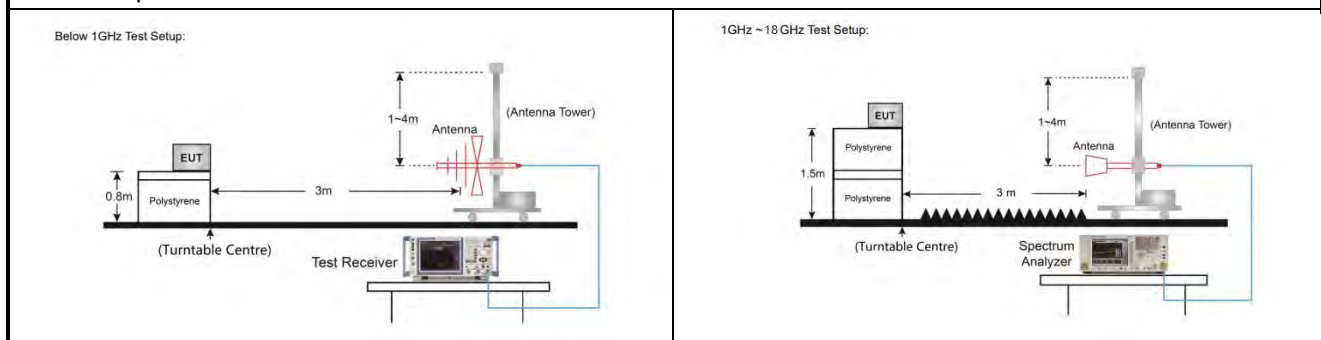
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	216 - 960		46.0	
	Above 960		54.0	
	1000 - 200000	74.0	N/A	54.0
<p>*- The limit for 3 m test distance was calculated using the inverse square distance extrapolation factor as follows:  <math>LimS2 = LimS1 + 20 \log (S1/S2)</math>,          where S1 and S2 - standard defined and test distance respectively in meters.          **- The limit decreases linearly with the logarithm of frequency.          Note: The above field strength limits applied from the lowest radio frequency generated in the device, without going below 9 kHz up to the tenth harmonic of the highest fundamental frequency but not exceeding 40 GHz for intentional radiators operated below 10 GHz and up to the fifth harmonic of the highest fundamental frequency but not exceeding 200 GHz for intentional radiators operated above 30 GHz.</p>				
		Field strength at 1 m, dB(uV/m)* Within restricted bands		
Frequency (MHz)		Peak	Quasi Peak	Average
1000 - 200000		83.5	N/A	63.5

Test Setup:



Instruments Used:	Refer to section 6 for details
Test Procedure:	a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest





	<p>radiation.</p> <p>b. For 1-18GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</p> <p>c. For 18-40GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 1 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</p> <p>d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</p> <p>e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was t tuned to the same hight (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.</p> <p>f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</p> <p>h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.</p> <p>i. Repeat above procedures until all frequencies measured was complete.</p> <p>Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor</p> <p>Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.</p> <p>Remark 3: Scan from 9kHz to 40GHz, the disturbance below 30MHz was very low. The points marked on and above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.</p>
Final Test Mode:	TX mode _ Keep the EUT in continuously transmitting mode
Test Results:	Pass
The detailed test data see: <b>Appendix</b>	



### 4.6 Radiated emissions outside assigned band and above 40 GHz up to 200 GHz

Test Requirement:	47 CFR Part 15C Section 15.225 (d)(3)															
Test Method:	ANSI C63.10-2013 Section 9.9,9.12															
Limit:	<p><b>Above 40GHz:</b></p> <table border="1"> <thead> <tr> <th>Frequency (GHz)</th> <th>Power density at 3 m distance (pW/cm<sup>2</sup>)</th> <th>Distance (m)</th> <th>Field strength (dBuV/m)*, peak</th> <th>Field strength (dBuV/m)*, average</th> </tr> </thead> <tbody> <tr> <td>40 - 200</td> <td>90</td> <td>3.0</td> <td>105.31</td> <td>85.31</td> </tr> <tr> <td>40 - 200</td> <td>90</td> <td>0.5</td> <td>120.87**</td> <td>100.87**</td> </tr> </tbody> </table>	Frequency (GHz)	Power density at 3 m distance (pW/cm <sup>2</sup> )	Distance (m)	Field strength (dBuV/m)*, peak	Field strength (dBuV/m)*, average	40 - 200	90	3.0	105.31	85.31	40 - 200	90	0.5	120.87**	100.87**
	Frequency (GHz)	Power density at 3 m distance (pW/cm <sup>2</sup> )	Distance (m)	Field strength (dBuV/m)*, peak	Field strength (dBuV/m)*, average											
40 - 200	90	3.0	105.31	85.31												
40 - 200	90	0.5	120.87**	100.87**												
<p>* - Field strength was calculated per equation (26) of ANSI C63.10-2013 section 9 as follows: <math>E = \sqrt{PD \times 377}</math>, where PD is the power density at the distance specified by the limit in W/m<sup>2</sup>, E- field strength in V/m.</p> <p>** - The limit for other test distance was calculated using the inverse distance extrapolation factor as follows:  <math>LimS2 = LimS1 + 20 \log (S1/S2)</math>, where S1 and S2 - standard defined and test distance respectively in meters.</p>																
Test Setup:																
Instruments Used:	Refer to section 6 for details															
Test Procedure:	<p>a. For above 40GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 0.5 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation</p> <p>b. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</p> <p>c. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to the same height (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.</p> <p>d. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p>															



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Report No.: SEWM2307000279RG01  
 Rev.: 01  
 Page: 19 of 50

	<p>e. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</p> <p>f. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.</p> <p>g. Repeat above procedures until all frequencies measured was complete.</p> <p>Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor</p> <p>Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.</p>
Final Test Mode:	TX mode _ Keep the EUT in continuously transmitting mode
Test Results:	Pass
The detailed test data see: <b>Appendix</b>	



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### 4.7 Frequency Stability

Test Requirement:	47 CFR Part 15C Section 15.255 (f)	
Test Method:	ANSI C63.10-2013 Section 9.14	
Test Setup:		
Instruments Used:	Refer to section 6 for details	
Test Procedure:	<p>1. Temperature conditions:</p> <ul style="list-style-type: none"> <li>a) The RF output port of the EUT was connected to Frequency Meter;</li> <li>b) Set the working Frequency in the middle channel;</li> <li>c) record the 20°C and nominal voltage frequency value as reference point;</li> <li>d) vary the temperature from -20°C to 50°C with step 10°C</li> <li>e) when reach a temperature point, keep the temperature balance at least 1 hour to make the product working in this status;</li> <li>f) read the frequency at the relative temperature.</li> </ul> <p>2. Voltage conditions:</p> <ul style="list-style-type: none"> <li>a) record the 20°C and nominal voltage frequency value as reference point;</li> <li>b) vary the voltage from -15% nominal voltage to +15% voltage;</li> </ul> <p>read the frequency at the relative voltage.</p>	
Test Mode:	TX mode _ Keep the EUT in continuously transmitting mode	
Limit:	Frequency (GHz)	Limit
	57 - 71	The signal must be contained within assigned frequency band.
Test Results:	Pass	
The detailed test data see: <b>Appendix</b>		



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

No.	Item	Measurement Uncertainty
1	Total RF power	±0.54dB
2	Occupied Bandwidth	±1.0 %
3	Radio Frequency	±1.0 %
4	Conduction Emission	± 2.90dB (150kHz to 30MHz)
5	Radiated Emission	± 3.13dB (9k -30MHz)
		± 4.80dB (30M -1GHz)
		± 4.80dB (1GHz to 18GHz)
		± 4.80dB (Above 18GHz)

Remark:

The  $U_{lab}$  (lab Uncertainty) is less than  $U_{CISPR/ETSI}$  (CISPR/ETSI Uncertainty), so the test results  
 – compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;  
 – non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.



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## 6 Equipment List

9*6*6 Test Equipment					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Semi-Anechoic Chamber	Brilliant-emc	N/A	SUWI-04-02-01	2021/05/08	2024/05/07
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-05	2023/02/07	2024/02/06
Signal Analyzer	ROHDE&SCHWARZ	FSW43	SUWI-01-02-04	2023/05/11	2024/05/10
Signal Analyzer	KEYSIGHT	N9020A	SUWI-01-02-05	2022/11/23	2023/11/22
PXA Spectrum Analyzer	KEYSIGHT	N9030B	SUWI-01-62-01	2023/01/29	2024/01/28
Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2023/02/08	2024/02/07
DC Power Supply	HYELEC	HY3005B	SUWI-01-18-01	2023/02/06	2024/02/05
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	VULB 9163	SUWI-01-11-01	2023/05/13	2024/05/12
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9120D	SUWI-01-11-02	2023/05/13	2024/05/12
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9170	SUWI-01-11-03	2023/05/12	2024/05/11
Active Loop Antenna	SCHWEZBECK MESS-ELEKTRONIK	FMZB 1519B	SUWI-01-21-01	2023/05/13	2024/05/12
Amplifier	Tonscend	TAP9K3G40	SUWI-01-14-01	2023/02/06	2024/02/05
Amplifier	Tonscend	TAP01018050	SUWI-01-14-02	2023/02/06	2024/02/05
Amplifier	Tonscend	TAP18040048	SUWI-01-14-03	2023/02/08	2024/02/07
Measurement Software	Tonscend	JS32-RE	SUWI-02-09-04	NCR	NCR
		V4.0.0.0			
Horn-antenna(40-60GHz)	REBES	SAZ-2410-19-S1	SUWI-03-49-01	NCR	NCR
Horn-antenna(50-75GHz)	REBES	SAZ-2410-15-S1	SUWI-03-49-02	NCR	NCR
Horn-antenna(75-110GHz)	REBES	SAZ-2410-10-S1	SUWI-03-49-03	NCR	NCR
Horn-antenna(110-170GHz)	REBES	SAZ-2410-06-S1	SUWI-03-49-04	NCR	NCR
Horn-antenna(140-220GHz)	REBES	SAZ-2410-05-S1	SUWI-03-49-05	NCR	NCR
Horn-antenna(220-325GHz)	REBES	SAR-2309-03-S2	SUWI-03-49-06	NCR	NCR
Extended waveguide(40-60GHz)	REBES	SWG-19025-FB	SUWI-03-50-01	NCR	NCR



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Extended waveguide(50-75GHz)	REBES	SWG-15025-FB	SUWI-03-50-02	NCR	NCR
Extended waveguide(75-110GHz)	REBES	SWG-10025-FB	SUWI-03-50-03	NCR	NCR
Extended waveguide(110-170GHz)	REBES	SWG-06025-FB	SUWI-03-51-01	NCR	NCR
Extended waveguide(140-220GHz)	REBES	SWG-05025-FB	SUWI-03-51-02	NCR	NCR
Extended waveguide(220-325GHz)	REBES	SWG-03025-FB	SUWI-03-51-03	NCR	NCR
Harmonic mixer(110-170GHz)	REBES	STH-06SF-S1	SUWI-03-52-01	NCR	NCR
Harmonic mixer(40-60GHz)	REBES	STH-19SF-S1	SUWI-03-52-02	NCR	NCR
Harmonic mixer(140-220GHz)	REBES	STH-06SF-S1	SUWI-03-52-03	NCR	NCR
Harmonic mixer(220-325GHz)	REBES	STH-19SF-S1	SUWI-03-52-04	NCR	NCR
Waveguide Harmonic Mixer(50-75GHz)	KEYSIGHT	M1970V	SUWI-03-53-01	NCR	NCR
Waveguide Harmonic Mixer(75-110GHz)	KEYSIGHT	M1970W	SUWI-03-53-02	NCR	NCR
Waveguide Harmonic Mixer(50-75GHz) cable	Silverline	SLU18-SMSM-01.00M	SUWI-03-54-01	NCR	NCR
Waveguide Harmonic Mixer(75-110GHz) cable	Silverline	SLU18-SMSM-01.00M	SUWI-03-54-02	NCR	NCR
Waveguide Harmonic Mixer(40-60GHz) cable	Silverline	SLU18-SMSM-01.00M	SUWI-03-54-03	NCR	NCR
Waveguide Harmonic Mixer(110-170GHz) cable	Silverline	SLU18-SMSM-01.00M	SUWI-03-54-04	NCR	NCR
Waveguide Harmonic Mixer(140-220GHz) cable	Silverline	SLU18-SMSM-01.00M	SUWI-03-54-05	NCR	NCR
Waveguide Harmonic Mixer(220-325GHz) cable	Silverline	SLU18-SMSM-01.00M	SUWI-03-54-06	NCR	NCR



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Report No.: SEWM2307000279RG01

Rev.: 01

Page: 24 of 50

## 7 Photographs - Setup Photos

Refer to Appendix A.1 FCC Setup Photos.



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Page: 25 of 50

# Appendix



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**Transmitter power and power spectral density  
Test Result**

Channel (GHz)	Distance (cm)	Polarity	dBuV/m @ 0.5m	E.I.R.P. Power (dBm)	E.I.R.P. Limit (dBm)	Gain (dBi)	Conducted Power (dBm)	Limit (dBm)	Result	Remark
58.32	50	Horizontal	149.6	38.84	43	22.5	16.34	27	Pass	peak
		Vertical	149.3	38.54	43	22.5	16.04	27	Pass	peak
		Horizontal	144.6	33.84	40	22.5	/	/	Pass	Average
		Vertical	144.8	34.04	40	22.5	/	/	Pass	Average
60.48	50	Horizontal	149.2	38.44	43	22.5	15.94	27	Pass	peak
		Vertical	148.5	37.74	43	22.5	15.24	27	Pass	peak
		Horizontal	142.0	31.24	40	22.5	/	/	Pass	Average
		Vertical	142.1	31.34	40	22.5	/	/	Pass	Average
62.64	50	Horizontal	149.3	38.54	43	22.5	16.04	27	Pass	peak
		Vertical	149.3	38.54	43	22.5	16.04	27	Pass	peak
		Horizontal	143.5	32.74	40	22.5	/	/	Pass	Average
		Vertical	143.3	32.54	40	22.5	/	/	Pass	Average
64.80	50	Horizontal	149.4	38.64	43	22.5	16.14	27	Pass	peak
		Vertical	148.5	37.74	43	22.5	15.24	27	Pass	peak
		Horizontal	142.6	31.84	40	22.5	/	/	Pass	Average
		Vertical	142.8	32.04	40	22.5	/	/	Pass	Average

Remark:

$E[dB\mu V/m] = EIRP [dBm] - 20 \log(d[meters]) + 104.77$ , where E = field strength and d = distance at which field strength limit is specified in the rules

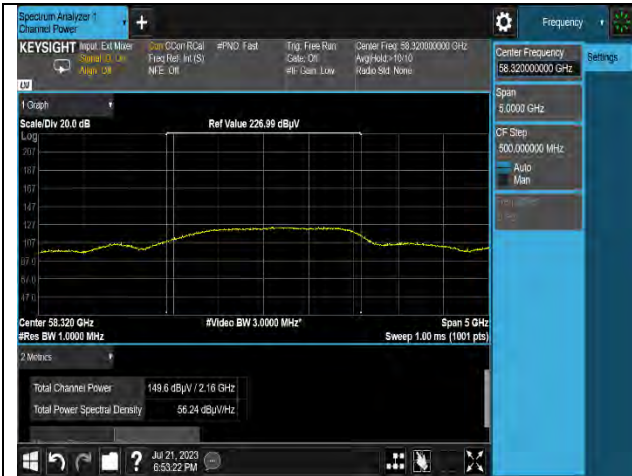
$EIRP [dBm] = E[dB\mu V/m] + 20 \log(d[meters]) - 104.77$



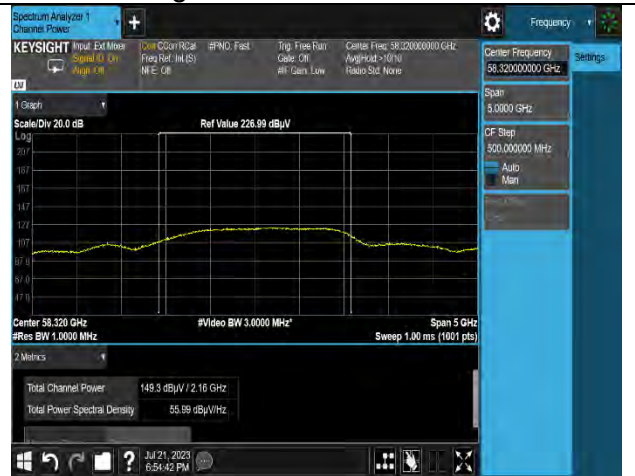
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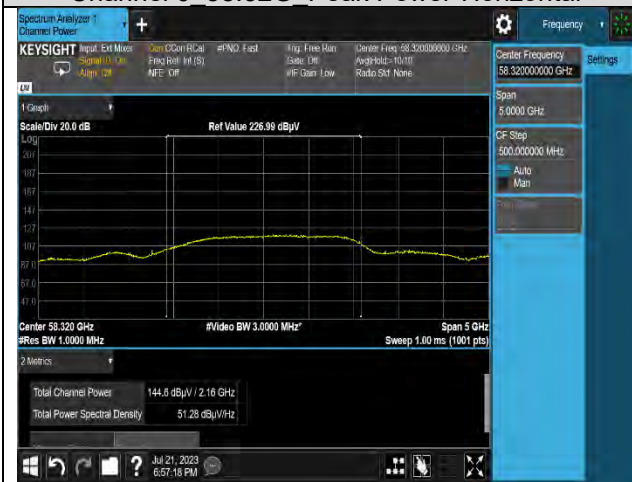
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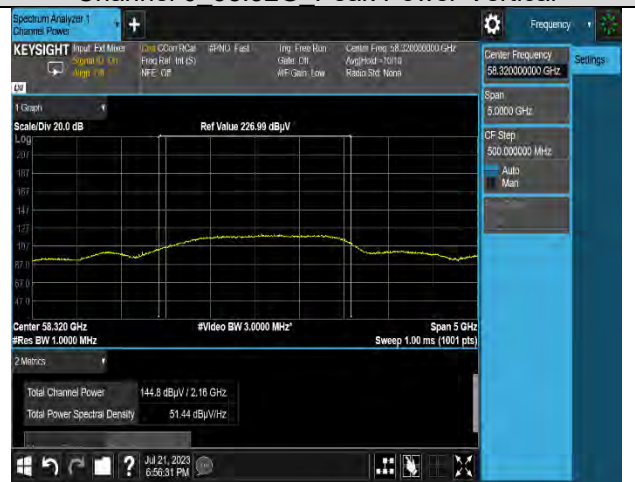
Channel 0 58.32G Peak Power-Horizontal



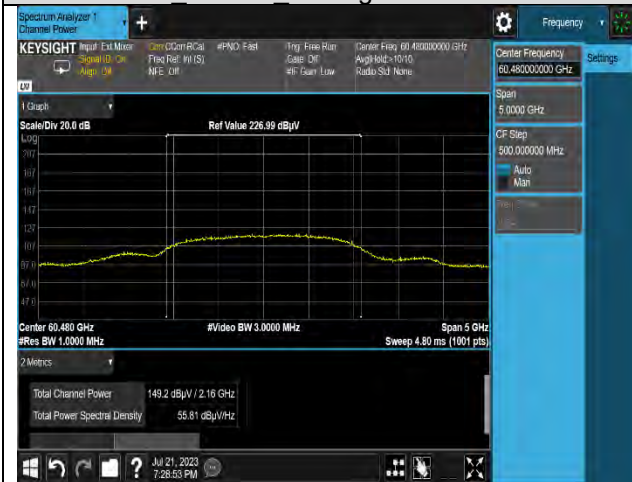
Channel 0 58.32G Peak Power-Vertical



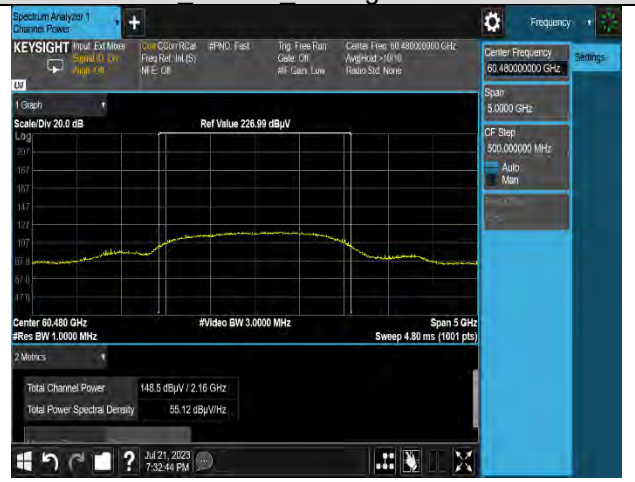
Channel 0 58.32G Average Power-Horizontal



Channel 0 58.32G Average Power-Vertical



Channel 1 60.48G Peak Power-Horizontal

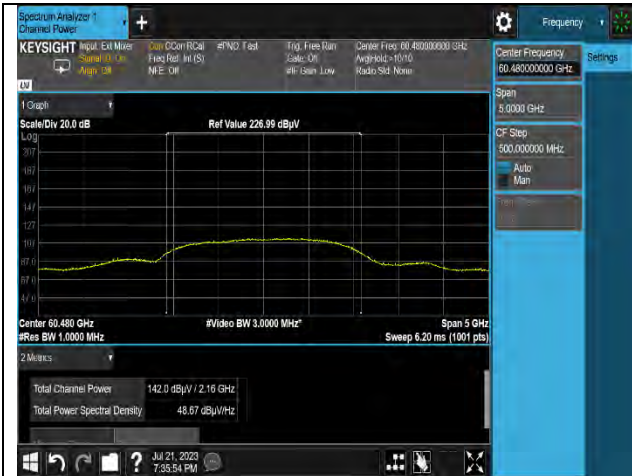


Channel 1 60.48G Peak Power-Vertical

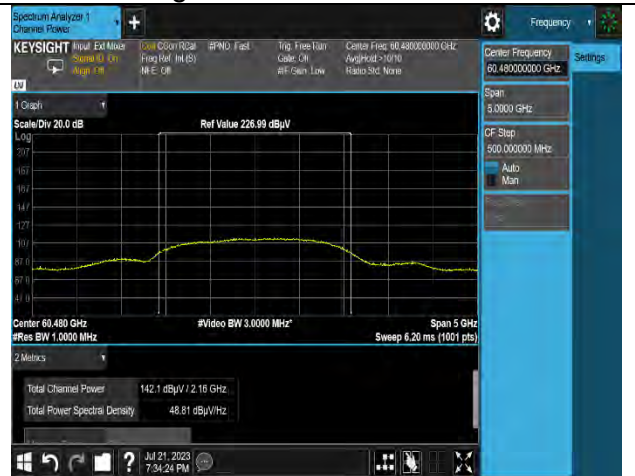


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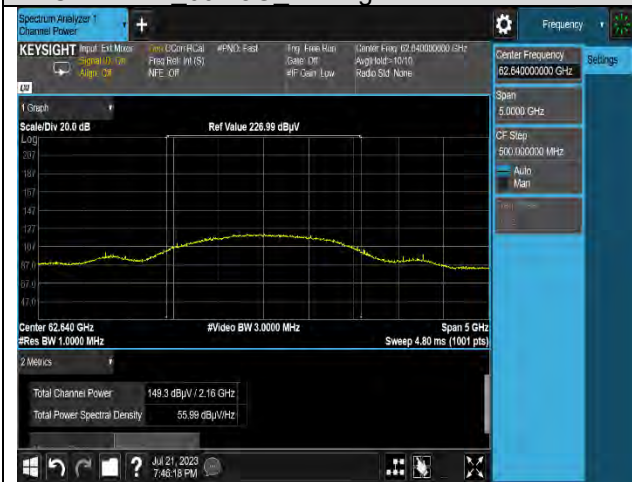
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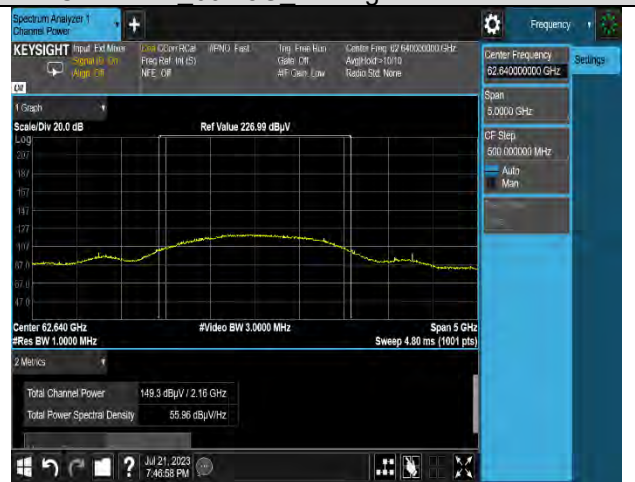
Channel 1 60.48G Average Power-Horizontal



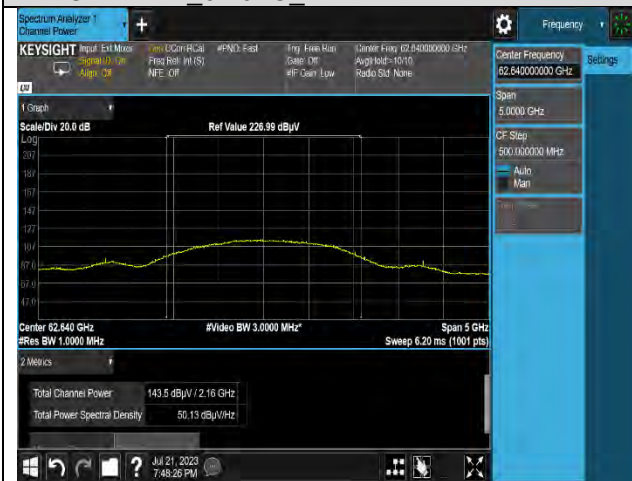
Channel 1 60.48G Average Power-Vertical



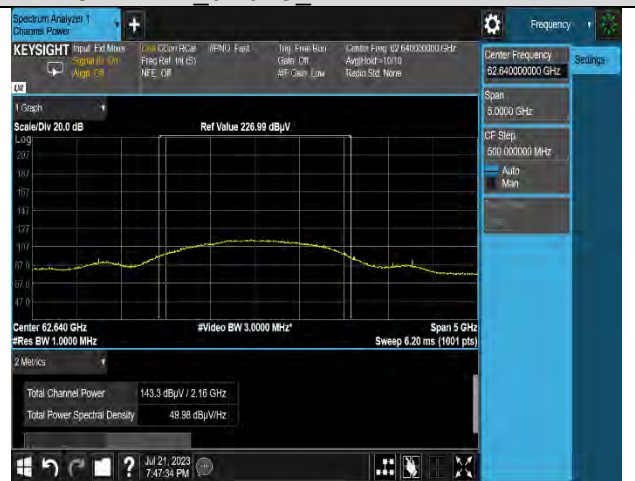
Channel 2 62.64G Peak Power- Horizontal



Channel 2 62.64G Peak Power- Vertical



Channel 2 62.64G Average Power- Horizontal



Channel 2 62.64G Average Power- Vertical

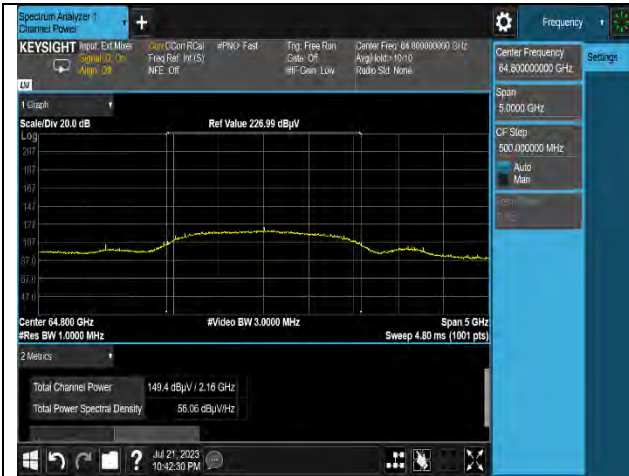


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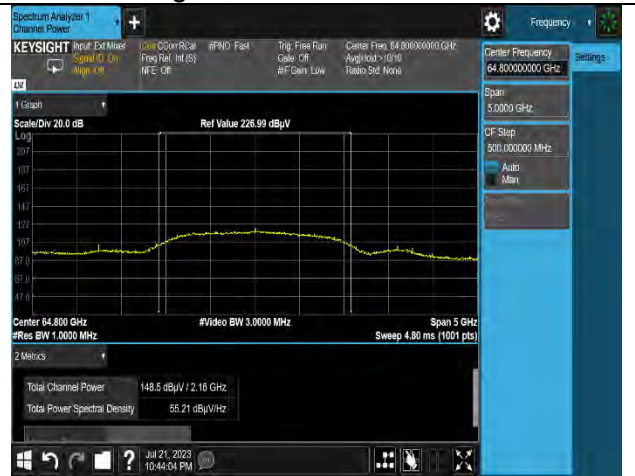
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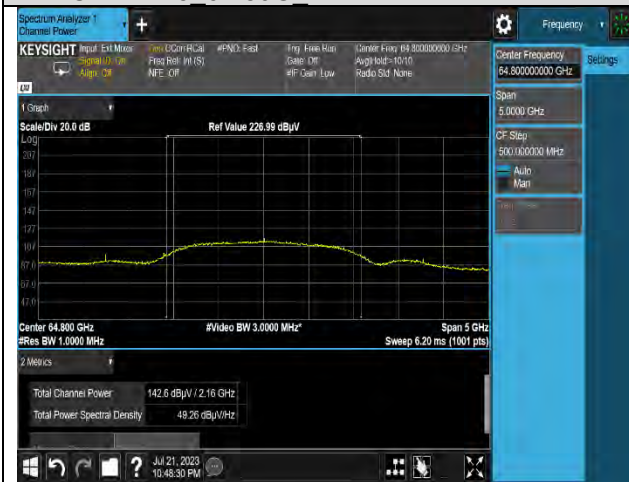
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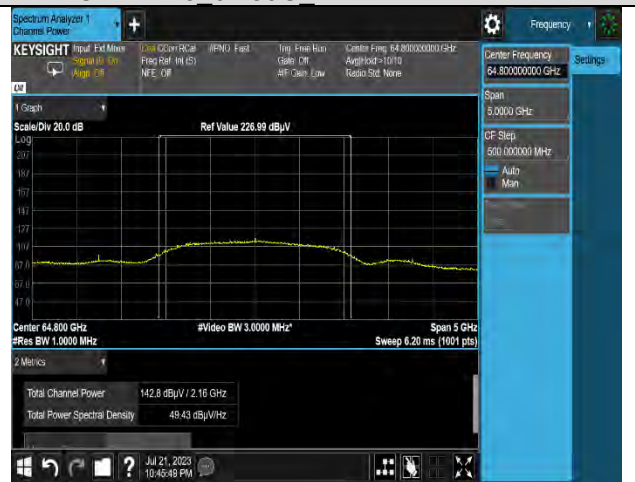
Channel 3 64.80G Peak Power-Horizontal



Channel 3 64.80G Peak Power-Vertical



Channel 3 64.80G Average Power- Horizontal



Channel 3 64.80G Average Power- Vertical



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**Occupied bandwidth  
Test Result**

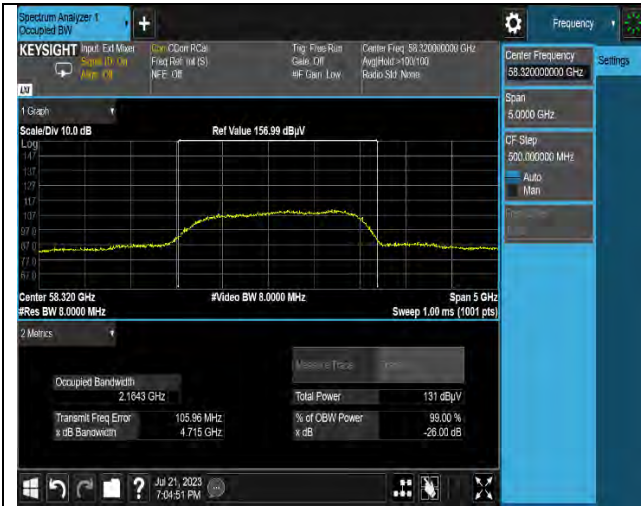
Channel (GHz)	99% OCW (MHz)	-20dB OCW (MHz)	-6dB OCW (MHz)
58.32	2164.3	2400	1765
60.48	2165.8	2290	1655
62.64	2162.8	2240	1690
64.80	2162.1	2325	1610



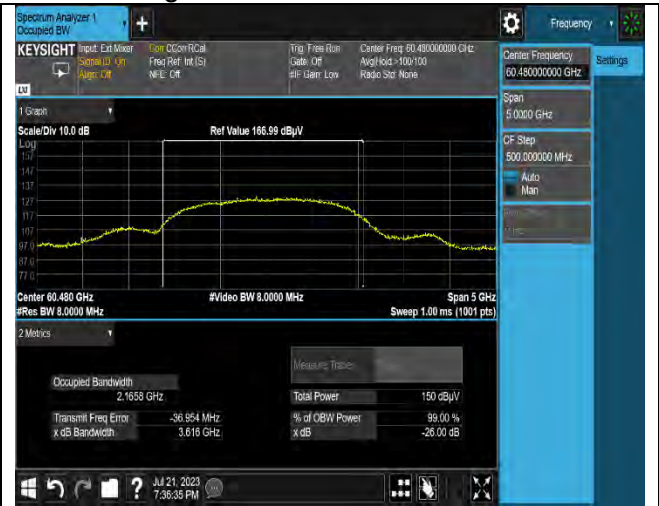
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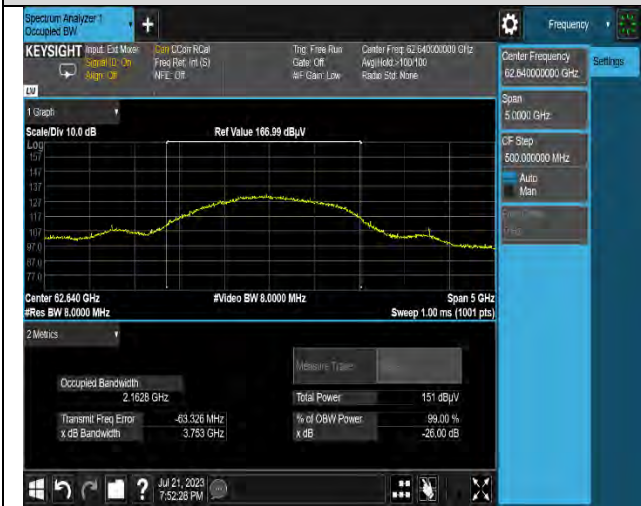
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Channel 0\_58.32GHz\_99%



Channel 1\_60.48GHz\_99%



Channel 2\_62.64GHz\_99%



Channel 3\_64.80GHz\_99%

Remark: Because the 1% -5% OBW is much larger than the maximum RBW of the spectrum analyzer, the maximum RBW of the spectrum analyzer is tested at 8MHz



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Channel 0\_58.32GHz\_20dB



Channel 1\_60.48GHz\_20dB



Channel 2\_62.64GHz\_20dB



Channel 3\_64.8GHz\_20dB

Remark: Because the 1% -5% OBW is much larger than the maximum RBW of the spectrum analyzer, the maximum RBW of the spectrum analyzer is tested at 8MHz



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Channel 0\_58.32GHz\_6dB



Channel 1\_60.48GHz\_6dB



Channel 2\_62.64GHz\_6dB



Channel 3\_64.8GHz\_6dB

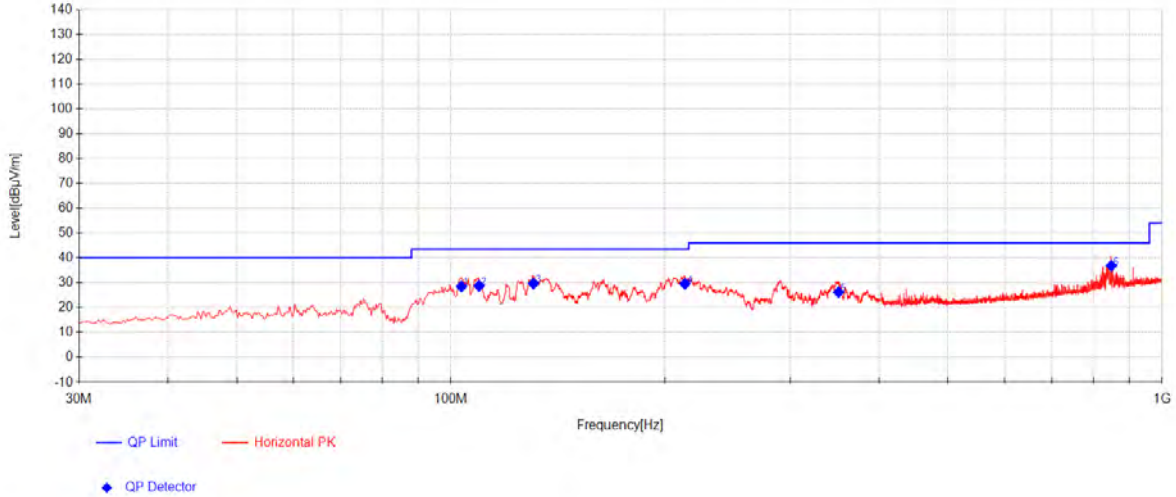


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## Radiated spurious emissions below 40 GHz Test Result

### Below 1GHz-Horizontal



Final Data List										
NO.	Frequency [MHz]	Reading [dBµV]	AF [dB/m]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	103.4775	46.22	15.81	-33.45	28.58	43.50	14.92	142	123	Horizontal
2	109.54	45.83	16.36	-33.39	28.79	43.50	14.71	159	123	Horizontal
3	130.6375	45.02	17.99	-33.29	29.72	43.50	13.78	185	267	Horizontal
4	213.33	46.29	15.93	-32.61	29.62	43.50	13.88	172	360	Horizontal
5	350.8275	38.19	19.92	-31.85	26.26	46.00	19.74	136	228	Horizontal
6	848.4375	37.33	29.18	-29.61	36.90	46.00	9.10	255	22	Horizontal



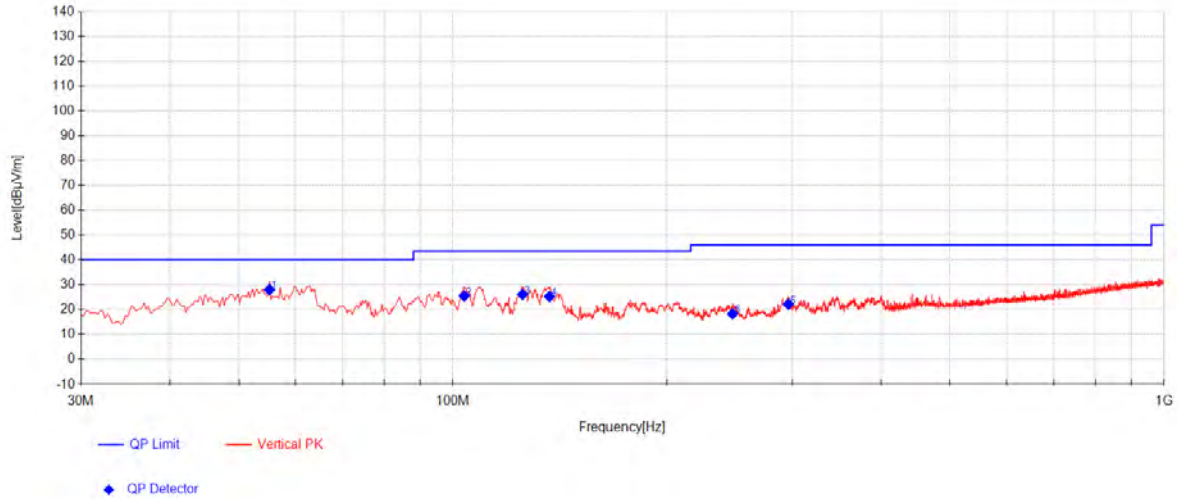
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Below 1GHz-Vertical



Final Data List										
NO.	Frequency [MHz]	Reading [dBµV]	AF [dB/m]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	55.22	43.02	18.99	-33.92	28.09	40.00	11.91	148	225	Vertical
2	103.72	43.19	15.83	-33.45	25.58	43.50	17.92	128	32	Vertical
3	125.3025	41.85	17.64	-33.31	26.18	43.50	17.32	177	360	Vertical
4	136.7	40.22	18.39	-33.26	25.35	43.50	18.15	186	71	Vertical
5	247.28	33.59	17.23	-32.47	18.35	46.00	27.65	196	359	Vertical
6	296.265	36.03	18.39	-32.19	22.22	46.00	23.78	152	225	Vertical

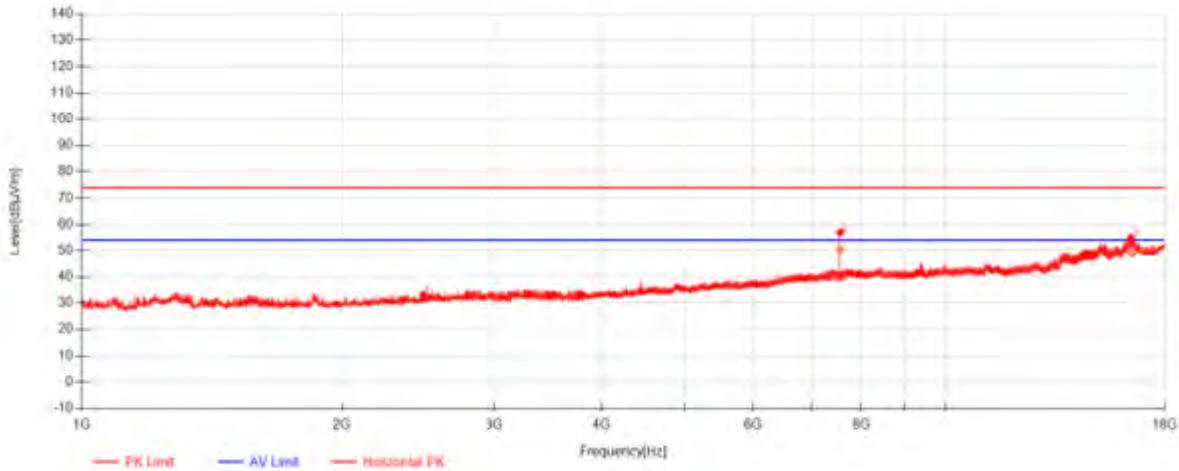


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1G~18GHz-Horizontal



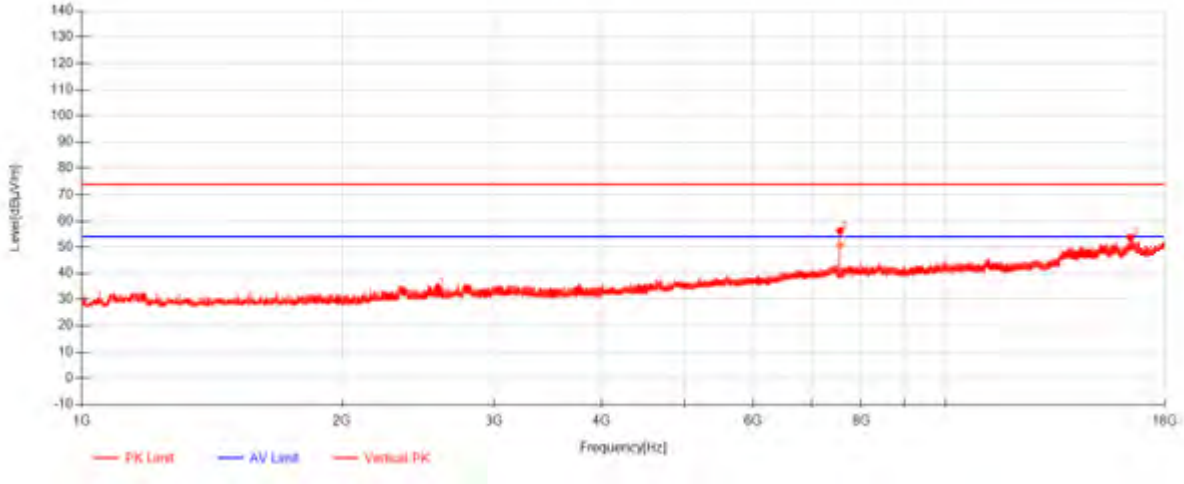
Data List										
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1	2484.5	53.62	27.26	-47.57	33.30	74.00	40.70	142	37	Horizontal
2	7561	63.76	36.62	-43.48	56.90	74.00	17.10	306	343	Horizontal
3	16426.5	49.55	40.52	-35.26	54.82	74.00	19.18	224	360	Horizontal
NO.	Frequency [MHz]	AV Reading [dBµV]	AF [dB/m]	Factor [dB]	AV Level [dBµV/m]	Limit [dBµV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
2	7561	57.21	36.62	-43.48	50.35	54.00	3.65	306	343	Horizontal
3	16426.5	47.38	40.52	-35.26	52.64	54.00	1.36	224	360	Horizontal



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1G~18GHz-Vertical



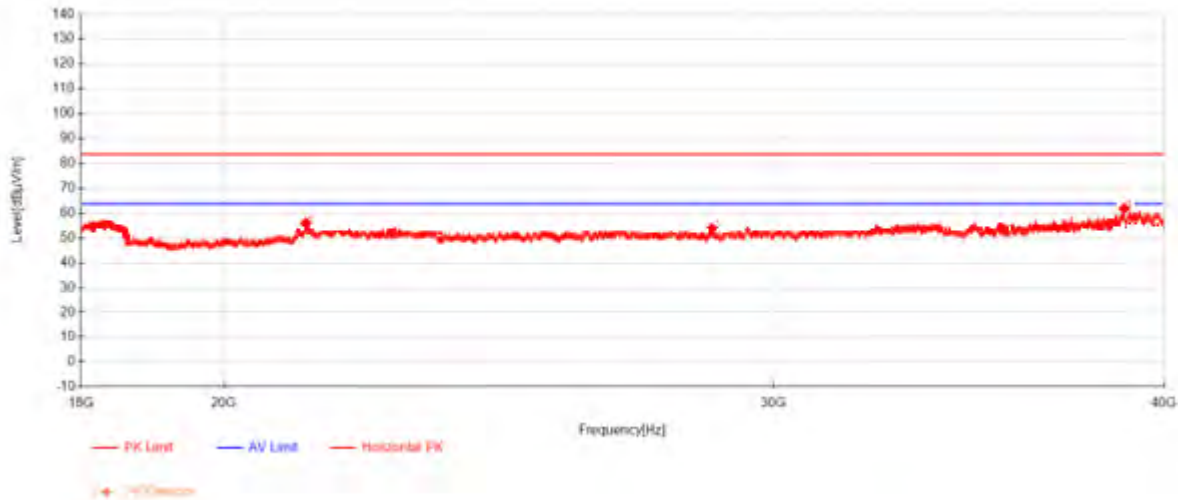
Data List										
NO.	Frequency [MHz]	Reading [dBµV]	AF [dB/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2583.5	54.55	27.47	-47.34	34.67	74.00	39.33	152	0	Vertical
2	7561	63.02	36.62	-43.48	56.16	74.00	17.84	142	11	Vertical
3	16404.5	48.70	40.45	-35.45	53.70	74.00	20.30	226	356	Vertical
NO.	Frequency [MHz]	AV Reading [dBµV]	AF [dB/m]	Factor [dB]	AV Level [dBµV/m]	Limit [dBµV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
2	7561	57.55	36.62	-43.48	50.69	54.00	3.31	142	11	Vertical



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18G~40GHz-Horizontal



Data List										
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	21245.55	54.03	37.80	-35.99	55.83	83.50	27.67	109	240	Horizontal
2	28656.25	50.75	39.43	-36.55	53.62	83.50	29.88	198	50	Horizontal
3	38840.6	51.12	43.14	-32.48	61.78	83.50	21.72	240	200	Horizontal

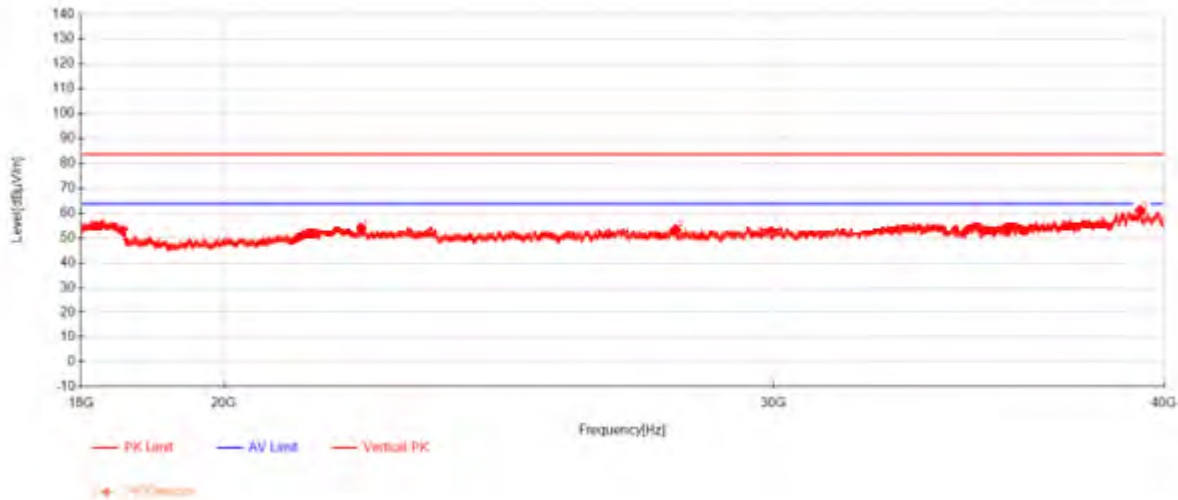


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18G~40GHz -Vertical



Data List										
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	22126.65	52.27	37.85	-36.17	53.95	83.50	29.55	109	250	Vertical
2	27898.9	49.69	39.00	-35.48	53.21	83.50	30.29	256	100	Vertical
3	39307.55	50.34	43.05	-32.38	61.00	83.50	22.50	269	70	Vertical

Remark: All channels have test and only the worst data showed in the report.



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## Radiated emissions outside assigned band and above 40 GHz up to 200 GHz Test Result



Channel 0 40-50GHz-Horizontal



Channel 0 40-50GHz-Vertical



Channel 0 50-75GHz-Horizontal



Channel 0 50-75GHz-Vertical

Frequency (GHz)	Distance (M)	Peak Value (dBuV/m)	AV Limit (dBuV/m)	Polarization	Result
42.53	0.5	84.22	100.87	H	PASS
42.51	0.5	96.55	100.87	V	PASS
60.700	0.5	80.84	100.87	H	PASS
60.375	0.5	83.06	100.87	V	PASS



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Channel 0 75-110GHz-Horizontal



Channel 0 75-110GHz-Vertical



Channel 0 110-170GHz-Horizontal



Channel 0 110-170GHz-Vertical

Frequency (GHz)	Distance (M)	Peak Value (dBuV/m)	AV Limit (dBuV/m)	Polarization	Result
83.575	0.5	79.88	100.87	H	PASS
84.485	0.5	80.02	100.87	V	PASS
115.88	0.5	80.99	100.87	H	PASS
115.88	0.5	80.85	100.87	V	PASS



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Channel 0\_170-220GHz-Horizontal



Channel 0\_170-220GHz-Vertical



Channel 1\_40-50GHz-Horizontal



Channel 1\_40-50GHz-Vertical

Frequency (GHz)	Distance (M)	Peak Value (dBuV/m)	AV Limit (dBuV/m)	Polarization	Result
216.65	0.5	88.50	100.87	H	PASS
217.00	0.5	88.47	100.87	V	PASS
43.85	0.5	84.96	100.87	H	PASS
43.88	0.5	94.35	100.87	V	PASS



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Channel 1\_50-75GHz-Horizontal



Channel 1\_50-75GHz-Vertical



Channel 1\_75-110GHz-Horizontal



Channel 1\_75-110GHz-Vertical

Frequency (GHz)	Distance (M)	Peak Value (dBuV/m)	AV Limit (dBuV/m)	Polarization	Result
60.300	0.5	80.93	100.87	H	PASS
60.200	0.5	77.44	100.87	V	PASS
81.720	0.5	89.06	100.87	H	PASS
81.720	0.5	86.86	100.87	V	PASS



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Channel 1\_110-170GHz-Horizontal

Channel 1\_110-170GHz-Vertical



Channel 1\_170-220GHz-Horizontal

Channel 1\_170-220GHz-Vertical

Frequency (GHz)	Distance (M)	Peak Value (dBuV/m)	AV Limit (dBuV/m)	Polarization	Result
116.00	0.5	81.66	100.87	H	PASS
116.00	0.5	81.55	100.87	V	PASS
214.95	0.5	88.28	100.87	H	PASS
209.45	0.5	88.31	100.87	V	PASS



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Channel 2 40-50GHz-Horizontal



Channel 2 40-50GHz-Vertical



Channel 2 50-75GHz-Horizontal



Channel 2 50-75GHz-Vertical

Frequency (GHz)	Distance (M)	Peak Value (dBuV/m)	AV Limit (dBuV/m)	Polarization	Result
45.68	0.5	84.10	100.87	H	PASS
45.51	0.5	94.06	100.87	V	PASS
60.225	0.5	81.88	100.87	H	PASS
60.300	0.5	82.76	100.87	V	PASS



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Channel 2\_75-110GHz-Horizontal



Channel 2\_75-110GHz-Vertical



Channel 2\_110-170GHz-Horizontal



Channel 2\_110-170GHz-Vertical

Frequency (GHz)	Distance (M)	Peak Value (dBuV/m)	AV Limit (dBuV/m)	Polarization	Result
84.555	0.5	84.88	100.87	H	PASS
83.435	0.5	85.82	100.87	V	PASS
115.94	0.5	80.60	100.87	H	PASS
116.00	0.5	80.38	100.87	V	PASS



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Channel 2 170-220GHz-Horizontal

Channel 2 170-220GHz-Vertical



Channel 3 40-50GHz-Horizontal

Channel 3 40-50GHz-Vertical

Frequency (GHz)	Distance (M)	Peak Value (dBuV/m)	AV Limit (dBuV/m)	Polarization	Result
219.20	0.5	88.39	100.87	H	PASS
219.05	0.5	88.42	100.87	V	PASS
47.59	0.5	82.34	100.87	H	PASS
47.08	0.5	78.72	100.87	V	PASS



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Channel 3\_50-75GHz-Horizontal



Channel 3\_50-75GHz-Vertical



Channel 3\_75-110GHz-Horizontal



Channel 3\_75-110GHz-Vertical

Frequency (GHz)	Distance (M)	Peak Value (dBuV/m)	AV Limit (dBuV/m)	Polarization	Result
60.700	0.5	82.77	100.87	H	PASS
60.250	0.5	83.11	100.87	V	PASS
85.535	0.5	84.39	100.87	H	PASS
85.640	0.5	83.63	100.87	V	PASS



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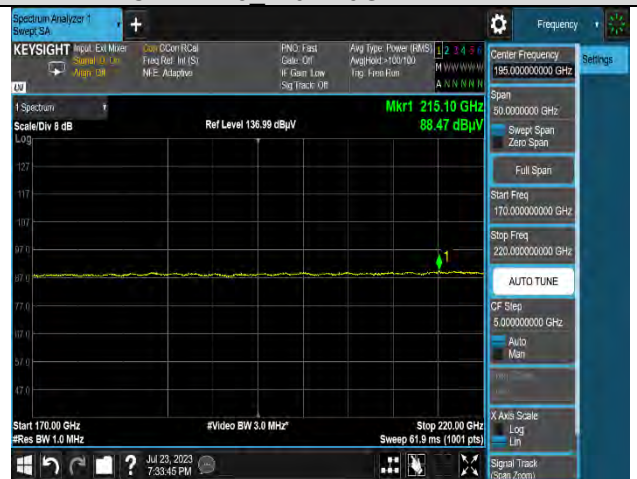
Channel 3 11-170GHz-Horizontal



Channel 3 110-170GHz-Vertical



Channel 3 170-220GHz-Horizontal



Channel 3 170-220GHz-Vertical

Frequency (GHz)	Distance (M)	Peak Value (dBuV/m)	AV Limit (dBuV/m)	Polarization	Result
116.00	0.5	79.37	100.87	H	PASS
116.00	0.5	79.60	100.87	V	PASS
216.75	0.5	88.42	100.87	H	PASS
215.10	0.5	88.47	100.87	V	PASS



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**Frequency stability  
 Test Result**

Frequency Stability vs temperature:

Frequency (GHz)	Temperature (°C)	Voltage (V ac)	F <sub>L</sub> (GHz)	Limit (GHz)	F <sub>H</sub> (GHz)	Limit (GHz)	Result
57-66	50	120	57.151	57	65.941	71	Pass
	40	120	57.148	57	65.959	71	Pass
	30	120	57.149	57	65.943	71	Pass
	20	120	57.152	57	65.960	71	Pass
	10	120	57.145	57	65.955	71	Pass
	0	120	57.155	57	65.958	71	Pass
	-10	120	57.141	57	65.955	71	Pass
	-20	120	57.147	57	65.946	71	Pass

Frequency Stability vs voltage:

Frequency (GHz)	Voltage (V ac)	Temperature (°C)	F <sub>L</sub> (GHz)	Limit (GHz)	F <sub>H</sub> (GHz)	Limit (GHz)	Result
57-66	102	20	57.142	57	65.946	71	Pass
	120	20	57.153	57	65.953	71	Pass
	138	20	57.149	57	65.947	71	Pass

---End of Report---



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