HERMON LABORATORIES

ELECTRICAL TESTING
0839.01

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TEST REPORT

ACCORDING TO: FCC 47 CFR part 15 section 15.255;
RSS-210 issue 10 Annex J, RSS-Gen issue 5

FOR:

Siklu Communication Ltd.

Point-to-Multipoint Wireless V-band single sector unit operating in 57-66 GHz

Models:

MH-T265-CCP-PoE-MWB

MH-T265-CNN-PoE-MWB

MH-B166-CCP-PoE-MWB

FCC ID: 2ACYESK-MH60TG-A2

IC:12353A-MH60TGA2

Table of contents

1 Applicant information 3
2 Equipment under test attributes 3
3 Manufacturer information 3
4 Test details 3
5 Tests summary 4
6 EUT description 5
6.1 General information 5
6.2 Ports and lines 5
6.3 Support and test equipment 5
6.4 Changes made in the EUT 5
6.5 Test configuration 6
6.6 Transmitter characteristics 7
7 Transmitter tests 8
7.1 Transmitter power test 8
7.2 Occupied bandwidth test 13
7.3 Field strength of emissions 17
7.4 Out of band radiated emissions above 40 GHz up to 200 GHz 28
7.5 Conducted emissions 58
7.6 Frequency stability test 62
7.7 Antenna requirements 65
8 Emission tests according to 47CFR part 15 subpart B requirements 66
8.1 Conducted emissions 66
8.2 Radiated emission measurements 71
9 APPENDIX A Test equipment and ancillaries used for tests 78
10 APPENDIX B Measurement uncertainties 80
11 APPENDIX C Test laboratory description 81
12 APPENDIX B Specification references 81
13 APPENDIX E Test equipment correction factors 82
14 APPENDIX F Abbreviations and acronyms 94

1 Applicant information

Client name:	Siklu Communication Ltd.
Address:	43 Hasivim street, Petach-Tikva 49517, Israel
Telephone:	+972 3921 4015
Fax:	+972 3921 4162
E-mail:	baruch@siklu.com
Contact name:	Mr. Baruch Schwarz

2 Equipment under test attributes

Product name:	Point-to-Multipoint wireless V-Band single sector unit operating in 57-66 GHz
Product type:	Transceiver
Model(s):	MH-T265-CCP-PoE-MWB
Trademark:	MultiHaul™
Serial number:	S040000012
Hardware version:	A0
Software release:	SW 1.0
Receipt date	03-Dec-20

3 Manufacturer information

Manufacturer name:	Siklu Communication Ltd.
Address:	43 Hasivim street, Petach-Tikva 49517, Israel
Telephone:	+972 3921 4015
Fax:	+972 3921 4162
E-Mail:	baruch@siklu.com
Contact name:	Mr. Baruch Schwarz

4 Test details

Project ID:	40853
Location:	Hermon Laboratories Ltd. P.O. Box 23, Binyamina 3055001, Israel
Test started:	24-Nov-20
Test completed:	4-Feb-21
Test specification(s):	FCC 47 CFR part 15 section 15.255; RSS-210 issue 10 Annex J; RSS-Gen issue 5 with Am.1

5 Tests summary

Test	Status
Transmitter characteristics	
FCC section 15.255(c)(1) (ii),(d)(1) / RSS-210 section J.2.2(b), J.4, Transmitter power and power spectral density	Pass
FCC section 15.215(c)/ RSS-210 section J.4(c), RSS-Gen, Section 6.7, Occupied bandwidth	Pass
FCC section 15.255(d)(2)/ RSS-210 section J.3, Radiated spurious emissions below 40 GHz	Pass
FCC section 15. 255(d)(3)/ RSS-210 section J.3, Radiated emissions outside assigned band and above 40 GHz up to 200 GHz	Pass
FCC section 15.255(f)/ RSS-210 section J.6, Frequency stability	Pass
FCC Section 15.207(a)/ RSS-Gen, section 8.8, Conducted emission	Pass
FCC section 15.255(g)/ RSS-Gen, section 3.4, RF exposure	Pass, exhibit included in Application for certification
RSS-Gen section 7.3, Receiver spurious emission	Pass*
Unintentional emissions	
Section 15.107, Conducted emission at AC power port	Pass
Section 15.109, Radiated emission	Pass

*Note: tested during the transmitter radiated spurious emissions below 40 GHz.

Testing was completed against all relevant requirements of the test standard. The results obtained indicate that the product under test complies in full with the requirements tested.
The test results relate only to the items tested. Pass/ fail decision was based on nominal values.

	Name and Title	Date	Signature
Tested by:	Mrs. E. Pitt, test engineer Mr. A. Morozov, test engineer Mr. I. Zilbestein	February 4, 2021	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	February 8, 2021	
Approved by:	Mr. S. Samokha, Technical Manager, EMC and Radio	February 15, 2021	

6 EUT description

Note: The following data in this clause is provided by the customer and represents his sole responsibility

6.1 General information

The EUT is the MutiHahul™ Terminal Unit, model MH-T265-CCP-PoE-MWB. The unit operates in 57-66 GHz regulated V-band. It communicates to the MH-N366-CCS-PoE-MWB TG Distribution node using the TG protocol, acting as an end point in a fully meshed MutiHahul TG topology.
The same hardware can be used as MH-B166-CCP-PoE-MWB which is a single sector TG Distribution node.
The MH-B166 can be a low cost alternative to the four sector MH-N366.

6.2 Ports and lines

Port type	Port description	Conected from	Connected to	Qty.	Cable type	Cable length, m
Telecom	Ethernet 1-POE	EUT	POE	1	Shielded	100
Telecom	Ethernet 2-PSE	EUT	Laptop	1	Shielded	100
Telecom	Ethernet 3-SFP	EUT	Not connected	1	Fiber optic	100
Telecom	USB	EUT	For maintanance only	1	NA	NA

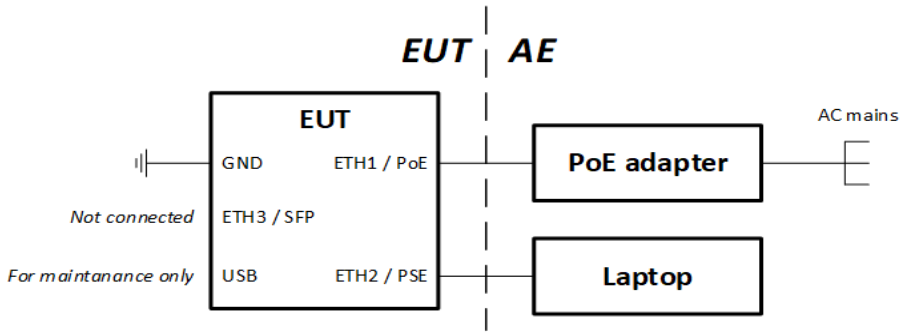
6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
Laptop	Lenovo	X220	R9L080Z
PoE adapter	Power Dsine Microsemi	PD-9501GC/AC	C18466280000000058

6.4 Changes made in the EUT

No changes were performed in the EUT during testing.

6.5 Test configuration



6.6 Transmitter characteristics

Type of equipment	
V	Stand-alone (Equipment with or without its own control provisions)
	Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)
	Plug-in card (Equipment intended for a variety of host systems)

Intended use		Condition of use
V	fixed	Always at a distance more than 2 m from all people
	mobile	Always at a distance more than 20 cm from all people
	portable	May operate at a distance closer than 20 cm to human body

Assigned frequency range	57.0 GHz – 66.0 GHz
Operating frequency range	58320 -64800 MHz
Test frequencies	58320 MHz, 60480 MHz, 64800 MHz
Maximum rated output power	EIRP 40.15 dBm

Is transmitter output power variable?				
V	No			
	Yes		continuous variable	
			stepped variable with stepsize	dB
		minimum RF power		dBm
		maximum RF power		

Antenna connection				
unique coupling	standard connector	V	Integral	with temporary RF connector
				without temporary RF connector

Antenna/s technical characteristics			
Type	Manufacturer	Model number	Gain
Patch antenna array	Siklu Ltd.	PCB240A	22.5 dBi

Transmitter 99% power bandwidth, MHz	Transmitter aggregate data rate/s, Mbps	Type of modulation
2084.3	4600	16QAM

Type of multiplexing	TDD

Transmitter power source					
		Nominal rated voltage		Battery type	
V	DC	Nominal rated voltage	48 V via POE		
		Voltage range			
	AC mains	Nominal rated voltage	120 V	Frequency	60 Hz

Common power source for transmitter and receiver	V yes	no

Test specification:	**FCC Section 15.255(c)(1)(ii),(d)(1), RSS-210 section J.2.2(b), J.4, Transmitter power and power spectral density**		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Sections 9.4, 9.5		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	27-Jan-21		
Temperature: 22 ºC	**Relative Humidity:** 41 %	**Air Pressure:** 1009 hPa	**Power:** 48 VDC
Remarks:			

7 Transmitter tests

7.1 Transmitter power test

7.1.1 General

This test was performed to measure the peak output power. Specification test limits are given in Table 7.1.1.

Table 7.1.1 Output power limits

Assigned frequency range, MHz	Maximum output power			
	Peak conducted output power		EIRP, dBm	
	mW	dBm	Peak	Average
57000 – 71000	500	27.0	43	40

7.1.2 Test procedure

7.1.2.1 The EUT was set up as shown in Figure 7.1.1, energized and its proper operation was checked.

7.1.2.2 The EUT was adjusted to produce maximum available for end user RF output power.

7.1.2.3 The average and peak voltage was measured at the low and high frequency channels with oscilloscope connected to RF detector and provided in the associated plots.

7.1.2.4 The unmodulated signal was applied to Zero-Biased Detector via variable attenuator as shown in Figure 7.1.2.

7.1.2.5 The variable attenuator was adjusted such that the oscilloscope indicated a voltage equal to the peak voltage recorded in the step 7.1.2.3.

7.1.2.6 The variable attenuator was disconnected from the Zero-Biased Detector.

7.1.2.7 Without changing any settings, the variable attenuator was connected to a power meter as shown in Figure 7.1.3.

7.1.2.8 The power was measured and result was recorded in Table 7.1.2 and Table 7.1.3.

7.1.2.9 The steps 7.1.2.4 through 7.1.2.8 were repeated for the average voltage recorded in the step 7.1.2.3 and 7.1.2.4.

Test specification:	FCC Section 15.255(c)(1)(ii),(d)(1), RSS-210 section J.2.2(b), J.4, Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Sections 9.4, 9.5		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-Jan-21		
Temperature: 22 ºC	Relative Humidity: 41 %	Air Pressure: 1009 hPa	Power: 48 VDC
Remarks:			

Figure 7.1.1 Peak output power test setup

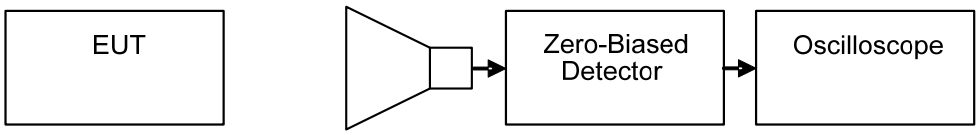


Figure 7.1.2 Peak output power test setup

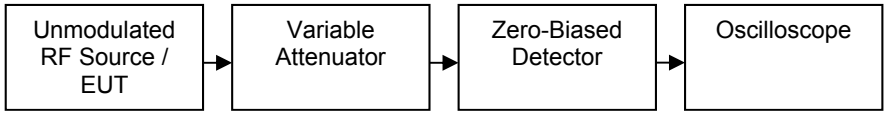
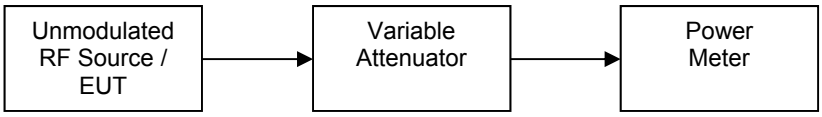


Figure 7.1.3 Peak output power test setup



Test specification:	FCC Section 15.255(c)(1)(ii),(d)(1), RSS-210 section J.2.2(b), J.4, Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Sections 9.4, 9.5		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-Jan-21		
Temperature: 22 ºC	Relative Humidity: 41 %	Air Pressure: 1009 hPa	Power: 48 VDC
Remarks:			

Table 7.1.2 Peak output power test results

ASSIGNED FREQUENCY RANGE: 57.0 – 71.0 GHz
DETECTOR USED: Peak
MEASUREMENTS DISTANCE: 0.5 m
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
EUT ANTENNA GAIN: 24 dBi
MODULATION: 16QAM

Frequency, MHz	λ*, m	DSO, mV	Power measured, dBm	Antenna gain, dBi	E_{meas}**, dBµV/m	EIRP***, dBm	Limit, dBm	Margin****, dB	Verdict
58320	0.0051440	1.49	-2.56	24.0	142.71	38.01	43.0	-4.99	Pass
62640	0.0047892	1.45	-1.03	24.0	144.58	39.88	43.0	-3.12	Pass
64800	0.0046296	1.61	-0.98	24.0	144.85	40.15	43.0	-2.85	Pass

Note: Max peak conducted power is 40.15 dBm – 22.5 dBi =17.65 dBm, where 22.5 dBi is the antenna array gain
* - λ = 300/Frequency(MHz)
** - E_{meas}= 126.8 – 20log(λ) + Power measured – Measurement Antenna Gain (24 dBi)
*** - EIRP= E_{meas} + 20log(Measurements distance) – 104.7
**** - Margin = EIRP – Limit

Table 7.1.3 Average output power test results

ASSIGNED FREQUENCY RANGE: 57.0 – 71.0 GHz
DETECTOR USED: Average
MEASUREMENTS DISTANCE: 0.5 m
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
EUT ANTENNA GAIN: 24 dBi
MODULATION: 16QAM

Frequency, MHz	λ*, m	DSO, mV	Power measured, dBm	Antenna gain, dBi	E_{meas}**, dBµV/m	EIRP***, dBm	Limit, dBm	Margin****, dB	Verdict
58320	0.0051440	0.734	-2.04	24.0	141.73	37.03	40.0	-2.97	Pass
62640	0.0047892	0.682	-0.73	24.0	142.87	38.17	40.0	-1.83	Pass
64800	0.0046296	0.799	-0.51	24.0	142.94	38.24	40.0	-1.76	Pass

* - λ = 300/Frequency(MHz)
** - E_{meas}= 126.8 – 20log(λ) + Power measured – Measurement Antenna Gain (24 dBi)
*** - EIRP= E_{meas} + 20log(Measurements distance) – 104.7
**** - Margin = EIRP – Limit

Reference numbers of test equipment used

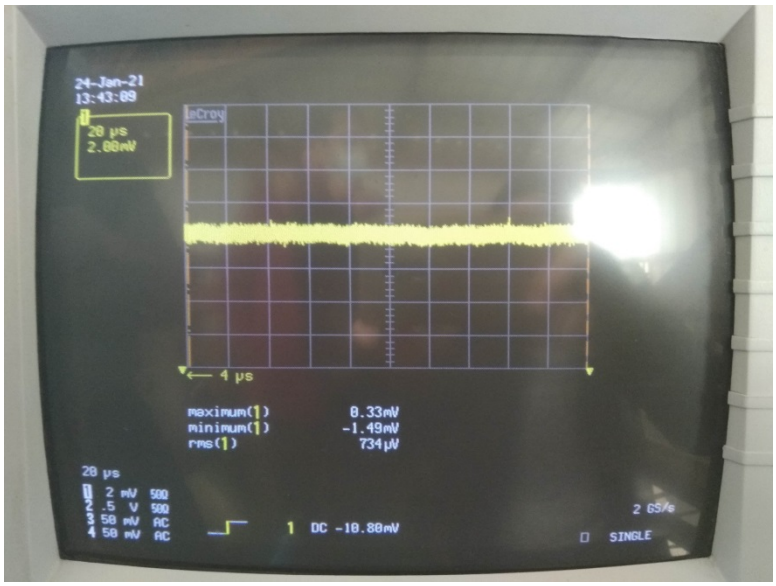
HL 5360	HL 3301	HL 3291	HL 4856	HL 5377	HL 5376
HL 0771	HL 5380	HL 3727	HL 5369	HL 3304	

Full description is given in Appendix A.

Test specification:	FCC Section 15.255(c)(1)(ii),(d)(1), RSS-210 section J.2.2(b), J.4, Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Sections 9.4, 9.5		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	27-Jan-21		
Temperature: 22 ºC	**Relative Humidity:** 41 %	**Air Pressure:** 1009 hPa	**Power:** 48 VDC
Remarks:			

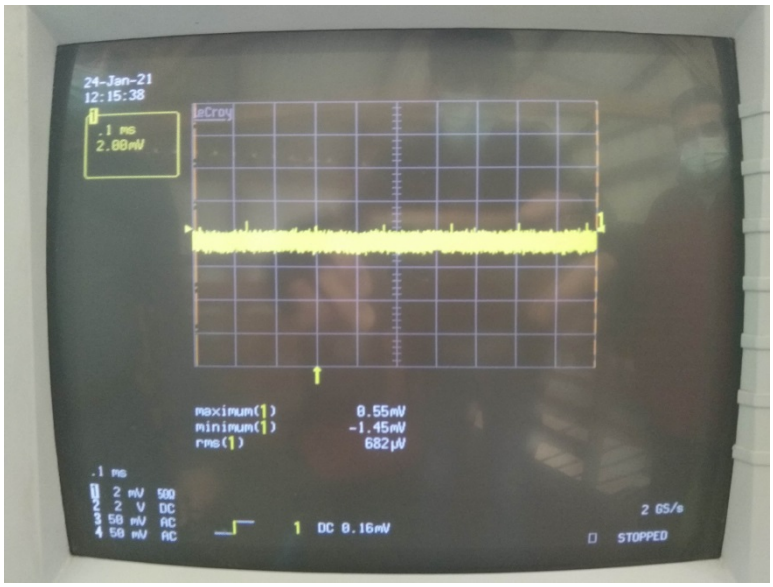
Plot 7.1.1 Output power test result at the 58.32 GHz frequency

DETECTOR:	Peak/Average
MODULATION:	16QAM



Plot 7.1.2 Output power test result at the 62.64 GHz frequency

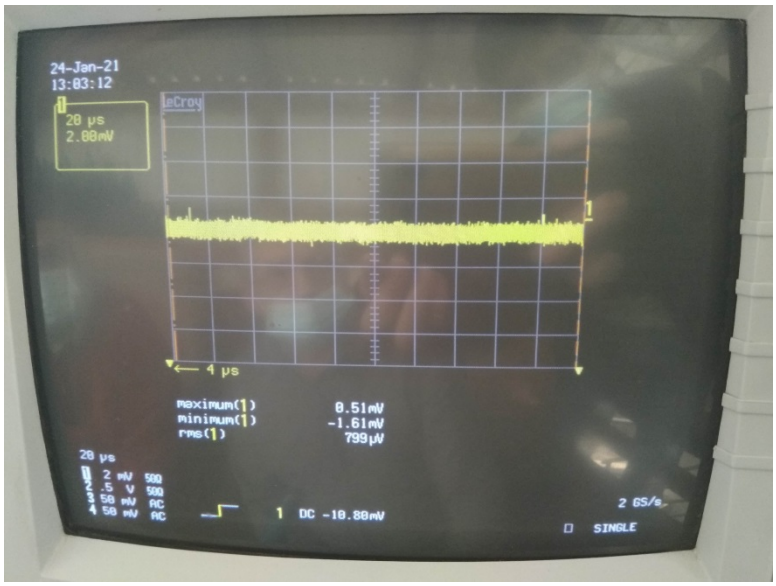
DETECTOR:	Peak/Average
MODULATION:	16QAM



Test specification:	FCC Section 15.255(c)(1)(ii),(d)(1), RSS-210 section J.2.2(b), J.4, Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Sections 9.4, 9.5		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	27-Jan-21		
Temperature: 22 ºC	**Relative Humidity:** 41 %	**Air Pressure:** 1009 hPa	**Power:** 48 VDC
Remarks:			

Plot 7.1.3 Output power test result at the 64.80 GHz frequency

DETECTOR:	Peak/Average
MODULATION:	16QAM



Test specification:	FCC Section 15.215(c), RSS-210 section J.4(c), RSS-Gen section 6.7, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049, ANSI C63.10, Section 9.3		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jan-21		
Temperature: 22 ºC	Relative Humidity: 56 %	Air Pressure: 1013 hPa	Power: 48 VDC
Remarks:			

7.2 Occupied bandwidth test

7.2.1 General

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in Table 7.2.1.

Table 7.2.1 Occupied bandwidth limits

Assigned frequency range, MHz	Modulation envelope reference points	
57000 - 71000	6 dBc	99%

NOTE: Modulation envelope reference points provided in terms of attenuation below unmodulated carrier.

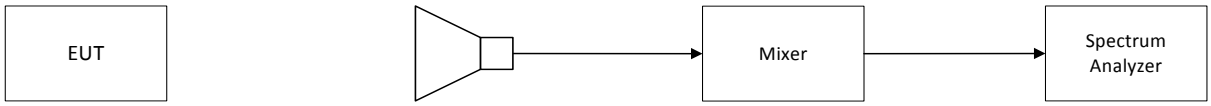
7.2.2 Test procedure

7.2.2.1 The EUT was set up as shown in Figure 7.2.1, energized and its proper operation was checked.

7.2.2.2 The EUT was set to transmit modulated carrier as provided in Table 7.2.2.

7.2.2.3 The transmitter occupied bandwidth was measured with spectrum analyzer as frequency delta between reference points on modulation envelope. The test results are provided in Table 7.2.2 and the associated plots.

Figure 7.2.1 Occupied bandwidth test setup



Test specification:	**FCC Section 15.215(c), RSS-210 section J.4(c), RSS-Gen section 6.7, Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049, ANSI C63.10, Section 9.3		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	19-Jan-21		
Temperature: 22 ºC	**Relative Humidity:** 56 %	**Air Pressure:** 1013 hPa	**Power:** 48 VDC
Remarks:			

Table 7.2.2 Occupied bandwidth test results

ASSIGNED FREQUENCY RANGE: 57000 –71000 MHz
DETECTOR USED: Peak

Frequency, GHz	Occupied bandwidth 6 dBc, MHz	Occupied bandwidth 99%, MHz	Verdict
58.32	1533.0	2097.5	Pass
62.64	1472.0	2065.5	Pass
64.80	1410.0	2016.1	Pass

Reference numbers of test equipment used

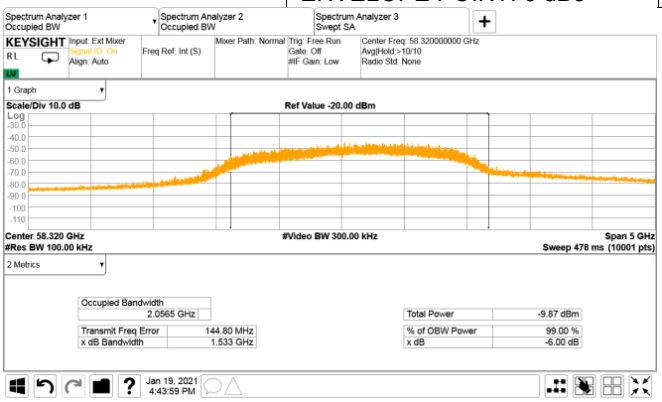
HL 0770	HL 0771	HL 3290	HL 3291	HL 5376	HL 5380		

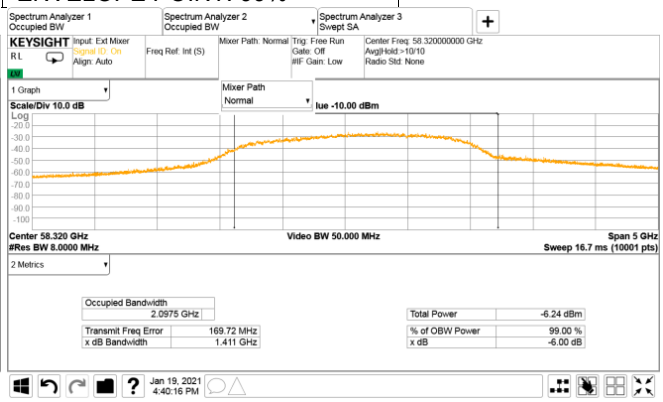
Full description is given in Appendix A.

Test specification:	FCC Section 15.215(c), RSS-210 section J.4(c), RSS-Gen section 6.7, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049, ANSI C63.10, Section 9.3		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jan-21		
Temperature: 22 ºC	Relative Humidity: 56 %	Air Pressure: 1013 hPa	Power: 48 VDC
Remarks:			

Plot 7.2.1 The 6dBc and 99% occupied bandwidth

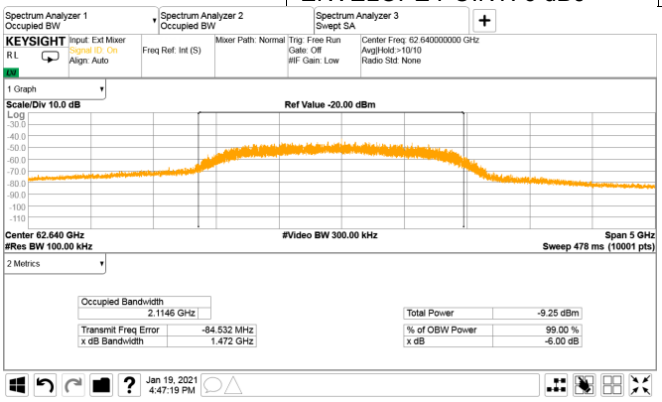
FREQUENCY:	58.32 GHz
MODULATION:	16QAM
ENVELOPE POINT: 6 dBc	ENVELOPE POINT: 99%

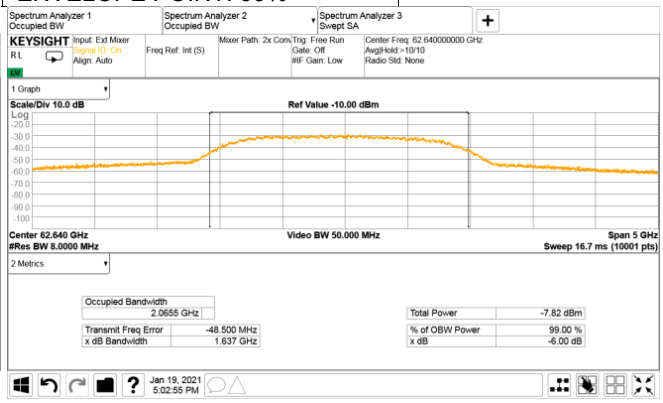




Plot 7.2.2 The 6dBc and 99% occupied bandwidth

FREQUENCY:	62.64 GHz
MODULATION:	16QAM
ENVELOPE POINT: 6 dBc	ENVELOPE POINT: 99%

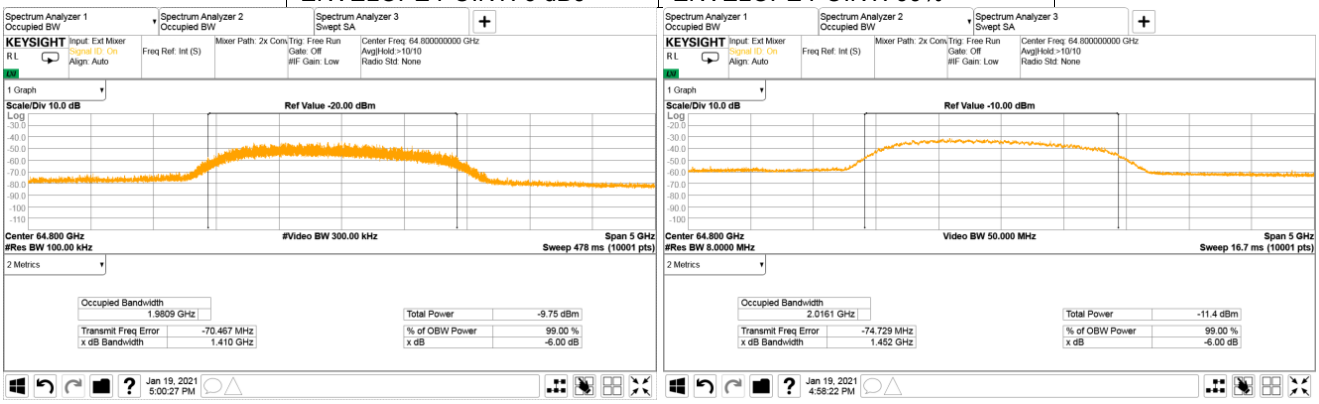




Test specification:	FCC Section 15.215(c), RSS-210 section J.4(c), RSS-Gen section 6.7, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049, ANSI C63.10, Section 9.3		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jan-21		
Temperature: 22 ºC	Relative Humidity: 56 %	Air Pressure: 1013 hPa	Power: 48 VDC
Remarks:			

Plot 7.2.3 The 6dBc and 99% occupied bandwidth

FREQUENCY:	64.80 GHz
MODULATION:	16QAM
ENVELOPE POINT: 6 dBc	ENVELOPE POINT: 99%



Test specification:	FCC Section 15.255(d)(2), RSS-210 section J.3, Out of band radiated emissions below 40 GHz		
Test procedure:	47 CFR, Section 2.1053; ANSI C63.10, Section 9.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	12-Jan-21 - 13-Jan-21		
Temperature: 23 ºC	Relative Humidity: 38 %	Air Pressure: 1012 hPa	Power: 48 VDC
Remarks:			

7.3 Field strength of emissions

7.3.1 General

This test was performed to measure field strength of fundamental and spurious emissions from the EUT. Specification test limits are given in Table 7.3.1.

Table 7.3.1 Radiated spurious emissions limits

Frequency range, 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	
216 – 960		46.0	
960 - 1000		54.0	
1000 – 40000	74.0	NA	54.0

*- The limit for 3 m test distance was calculated using the inverse square distance extrapolation factor as follows:

$$Lim_{S2} = Lim_{S1} + 40 \log (S_1/S_2),$$

where S_1 and S_2 – 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 100 Ghz for intentional radiators operated above 10 GHz.

Test specification:	FCC Section 15.255(d)(2), RSS-210 section J.3, Out of band radiated emissions below 40 GHz		
Test procedure:	47 CFR, Section 2.1053; ANSI C63.10, Section 9.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	12-Jan-21 - 13-Jan-21		
Temperature: 23 ºC	Relative Humidity: 38 %	Air Pressure: 1012 hPa	Power: 48 VDC
Remarks:			

7.3.2 Test procedure for spurious emission field strength measurements in 9 kHz to 30 MHz band

7.3.2.1 The EUT was set up as shown in Figure 7.3.1, energized and the performance check was conducted.

7.3.2.2 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360^0 and the measuring antenna was rotated around its vertical axis.

7.3.2.3 The worst test results (the lowest margins) were recorded in Table 7.3.3 and shown in the associated plots.

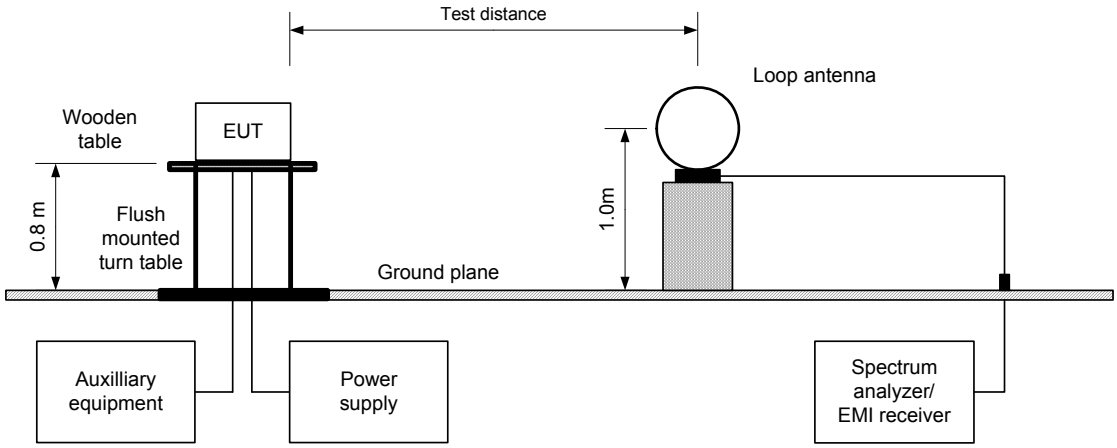
7.3.3 Test procedure for spurious emission field strength measurements above 30 MHz

7.3.3.1 The EUT was set up as shown in Figure 7.3.2, Figure 7.3.3, energized and the performance check was conducted.

7.3.3.2 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360^0, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal.

7.3.3.3 The worst test results (the lowest margins) were recorded in Table 7.3.2 and shown in the associated plots.

Figure 7.3.1 Setup for spurious emission field strength measurements below 30 MHz



Test specification:	FCC Section 15.255(d)(2), RSS-210 section J.3, Out of band radiated emissions below 40 GHz		
Test procedure:	47 CFR, Section 2.1053; ANSI C63.10, Section 9.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	12-Jan-21 - 13-Jan-21		
Temperature: 23 ºC	Relative Humidity: 38 %	Air Pressure: 1012 hPa	Power: 48 VDC
Remarks:			

Figure 7.3.2 Setup for spurious emission field strength measurements in 30 – 1000 MHz

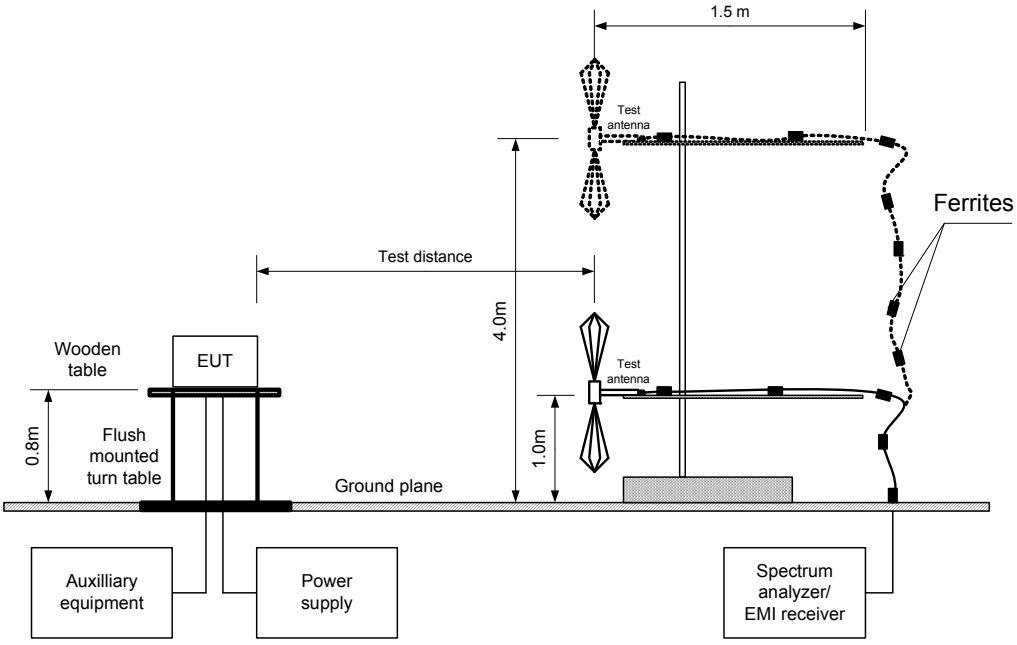
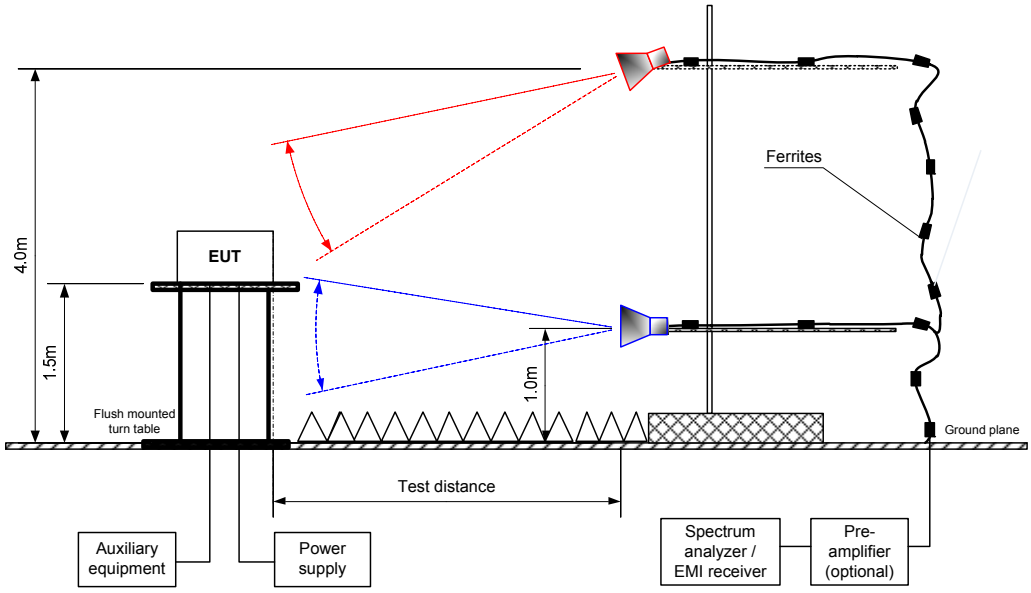


Figure 7.3.3 Setup for spurious emission field strength measurements above1000 MHz



Test specification:	**FCC Section 15.255(d)(2), RSS-210 section J.3, Out of band radiated emissions below 40 GHz**		
Test procedure:	47 CFR, Section 2.1053; ANSI C63.10, Section 9.13		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	12-Jan-21 - 13-Jan-21		
Temperature: 23 ºC	**Relative Humidity:** 38 %	**Air Pressure:** 1012 hPa	**Power:** 48 VDC
Remarks:			

Table 7.3.2 Field strength of spurious emissions at frequencies above 1 GHz

TEST DISTANCE: 3 m
EUT POSITION: Typical (Vertical)
MODULATION: 16QAM
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
INVESTIGATED FREQUENCY RANGE: 0.009 - 40000 MHz
DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 1.0 MHz
VIDEO BANDWIDTH: ≥ Resolution bandwidth
TEST ANTENNA TYPE: Double ridged guide (above 1000 MHz)

F, MHz	Antenna		Azimuth, degrees*	Peak field strength			Avr factor, dB	Average field strength			Verdict
	Pol.	Height, m		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	
Low frequency 58320 MHz											
1178.2	V	1.5	-17	49.1	74	-24.9	NA	40.8	54	-13.2	Pass
4000.0	V	1.5	6	50.5	74	-23.5	NA	44.6	54	-9.4	
16000.0	V	1.8	-2	50.2	74	-23.8	NA	42.0	54	-12.0	
Mid frequency 62640 MHz											Pass
1184.8	V	1.8	-18	49.3	74	-24.7	NA	40.4	54	-13.6	
4000.0	V	1.5	0	50.0	74	-24.0	NA	44.3	54	-9.7	
8000.0	V	1.8	-15	47.2	74	-26.8	NA	38.7	54	-15.3	
High frequency 64800 MHz											Pass
1174.8	V	1.5	-10	49.0	74	-25.0	NA	40.5	54	-13.5	
4000.0	V	1.5	0	51.0	74	-23.0	NA	45.0	54	-9.0	
8100.0	H	1.8	46	51.0	74	-23.0	NA	46.3	54	-7.7	

*- EUT front panel refers to 0 degrees position of turntable.
**- Margin = dB below (negative if above) specification limit.

Test specification:	FCC Section 15.255(d)(2), RSS-210 section J.3, Out of band radiated emissions below 40 GHz		
Test procedure:	47 CFR, Section 2.1053; ANSI C63.10, Section 9.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	12-Jan-21 - 13-Jan-21		
Temperature: 23 ºC	Relative Humidity: 38 %	Air Pressure: 1012 hPa	Power: 48 VDC
Remarks:			

Table 7.3.3 Field strength of emissions below 1 GHz

TEST DISTANCE: 3 m
EUT POSITION: Typical (Vertical)
MODULATION: 16QAM
INVESTIGATED FREQUENCY RANGE: 0.009 – 1000 MHz
DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 0.2 kHz (9 kHz – 150 kHz)
9.0 kHz (150 kHz – 30 MHz)
120 kHz (30 MHz – 1000 MHz)
VIDEO BANDWIDTH: ≥ Resolution bandwidth
TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
Biconilog (30 MHz – 1000 MHz)

Frequency, MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
Low, mid, high frequencies								Pass
33.463	41.05	35.03	40.0	-4.97	Vertical	1.00	322	
55.334	33.31	27.07	40.0	-12.93	Vertical	1.02	325	
74.679	28.34	21.95	40.0	-18.05	Vertical	1.02	125	
100.977	24.98	18.19	43.5	-25.31	Vertical	1.02	213	
375.016	35.27	32.13	46.0	-13.87	Horizontal	1.02	51	
400.001	31.36	27.35	46.0	-18.65	Vertical	1.04	350	
750.027	39.61	36.71	46.0	-9.29	Horizontal	1.02	51	
924.041	39.03	32.93	46.0	-13.07	Vertical	1.02	9	
999.082	37.75	31.24	54.0	-22.76	Vertical	1.34	360	

*- Margin = Measured emission - specification limit.
**- EUT front panel refer to 0 degrees position of turntable.

Reference numbers of test equipment used

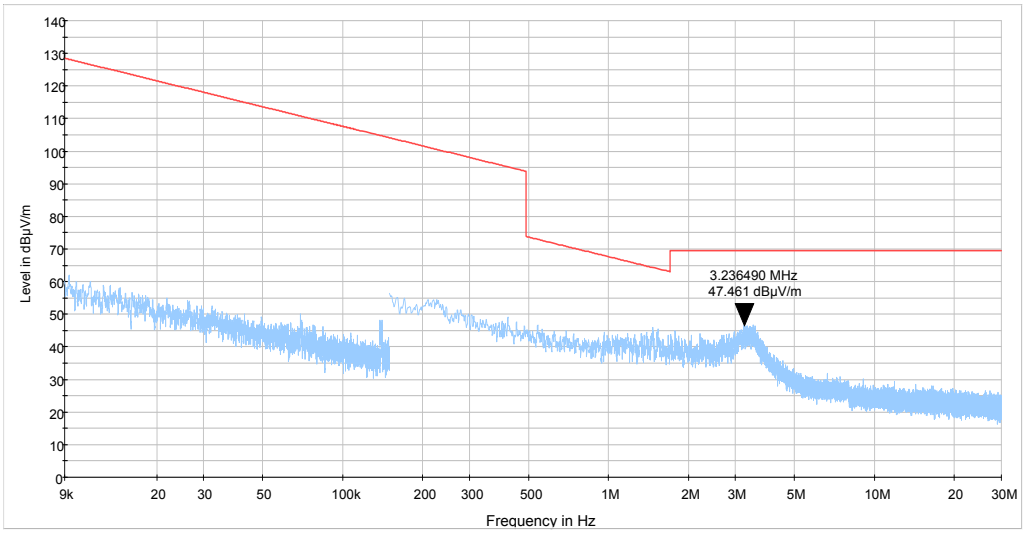
HL 0446	HL 3903	HL 4360	HL 4933	HL 4956	HL 5112	HL 5288	HL 5669
HL 5670							

Full description is given in Appendix A.

Test specification:	FCC Section 15.255(d)(2), RSS-210 section J.3, Out of band radiated emissions below 40 GHz		
Test procedure:	47 CFR, Section 2.1053; ANSI C63.10, Section 9.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	12-Jan-21 - 13-Jan-21		
Temperature: 23 ºC	Relative Humidity: 38 %	Air Pressure: 1012 hPa	Power: 48 VDC
Remarks:			

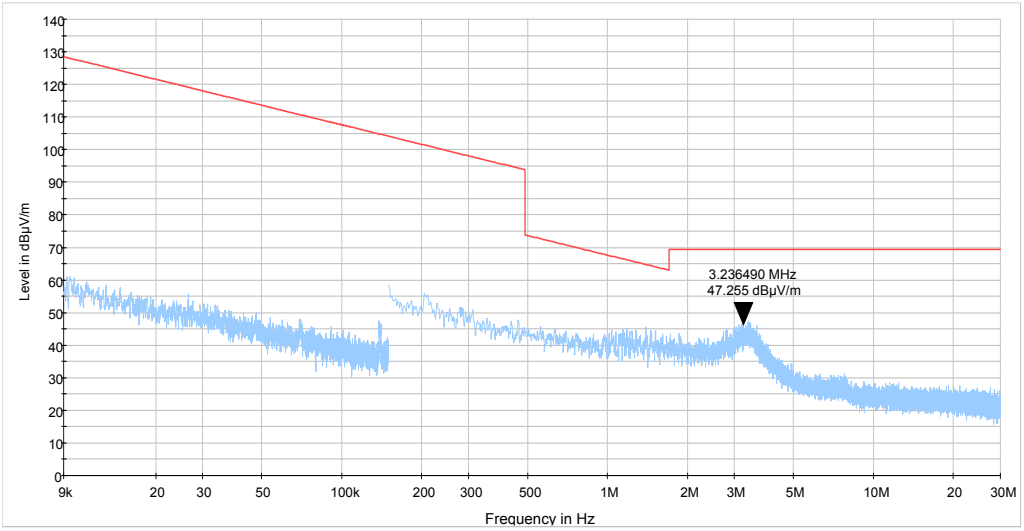
Plot 7.3.1 Radiated emission measurements from 9 KHz to 30 MHz at low frequency

TEST SITE:	Semi anechoic chamber
TEST DISTANCE:	3 m
ANTENNA POLARIZATION:	Vertical and horizontal
EUT POSITION:	Typical (Vertical)



Plot 7.3.2 Radiated emission measurements from 9 KHz to 30 MHz at mid frequency

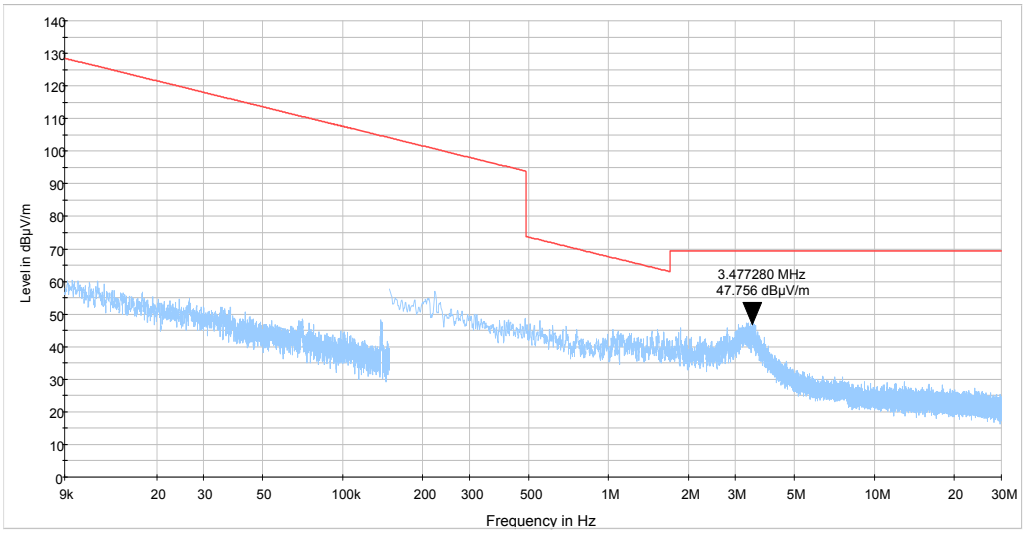
TEST SITE:	Semi anechoic chamber
TEST DISTANCE:	3 m
ANTENNA POLARIZATION:	Vertical and horizontal
EUT POSITION:	Typical (Vertical)



Test specification:	FCC Section 15.255(d)(2), RSS-210 section J.3, Out of band radiated emissions below 40 GHz		
Test procedure:	47 CFR, Section 2.1053; ANSI C63.10, Section 9.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	12-Jan-21 - 13-Jan-21		
Temperature: 23 ºC	Relative Humidity: 38 %	Air Pressure: 1012 hPa	Power: 48 VDC
Remarks:			

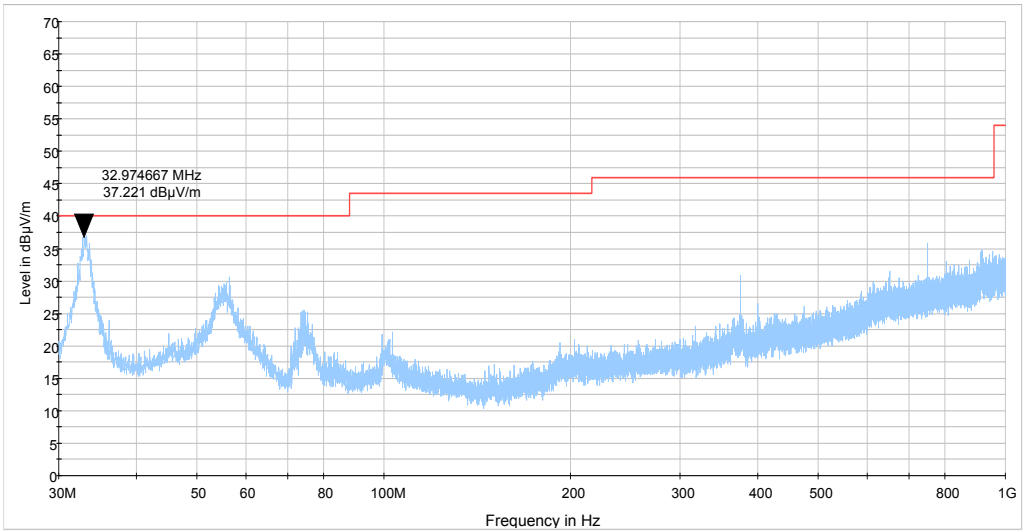
Plot 7.3.3 Radiated emission measurements from 9 KHz to 30 MHz at high frequency

TEST SITE:	Semi anechoic chamber
TEST DISTANCE:	3 m
ANTENNA POLARIZATION:	Vertical and horizontal
EUT POSITION:	Typical (Vertical)



Plot 7.3.4 Radiated emission measurements from 30 to 1000 MHz at low frequency

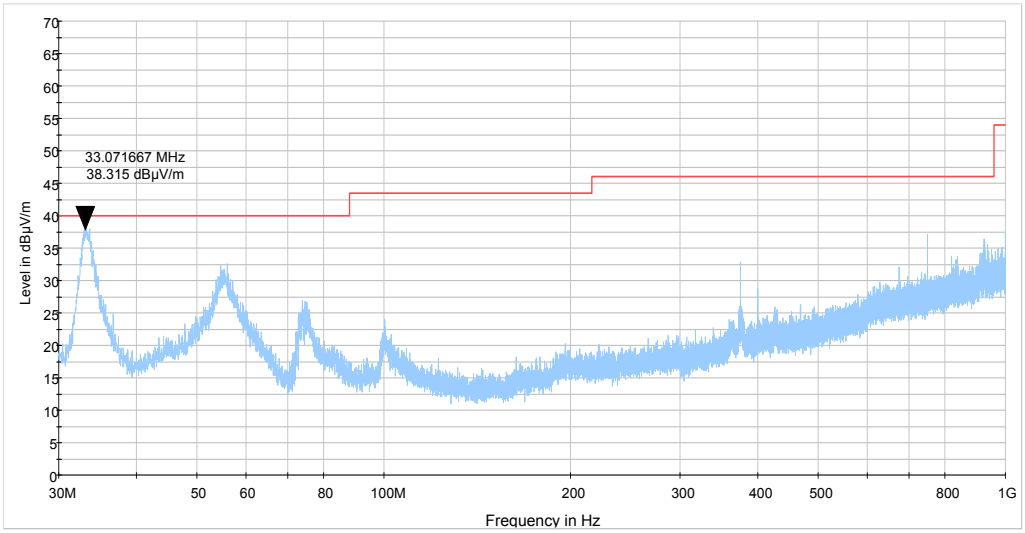
TEST SITE:	Semi anechoic chamber
TEST DISTANCE:	3 m
ANTENNA POLARIZATION:	Vertical and Horizontal
EUT POSITION:	Typical (Vertical)



Test specification:	FCC Section 15.255(d)(2), RSS-210 section J.3, Out of band radiated emissions below 40 GHz		
Test procedure:	47 CFR, Section 2.1053; ANSI C63.10, Section 9.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	12-Jan-21 - 13-Jan-21		
Temperature: 23 ºC	Relative Humidity: 38 %	Air Pressure: 1012 hPa	Power: 48 VDC
Remarks:			

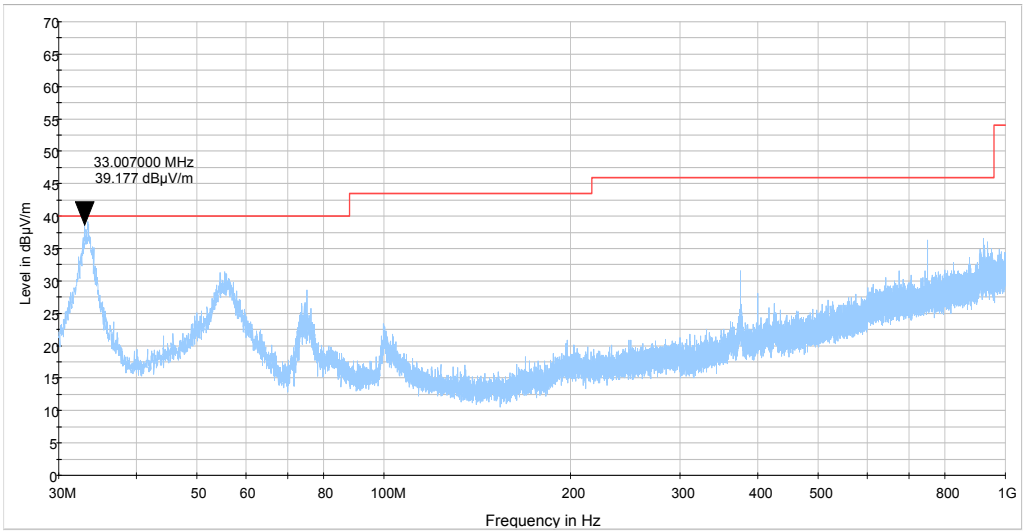
Plot 7.3.5 Radiated emission measurements from 30 to 1000 MHz at mid frequency

TEST SITE:	Semi anechoic chamber
TEST DISTANCE:	3 m
ANTENNA POLARIZATION:	Vertical and Horizontal
EUT POSITION:	Typical (Vertical)



Plot 7.3.6 Radiated emission measurements from 30 to 1000 MHz at high frequency

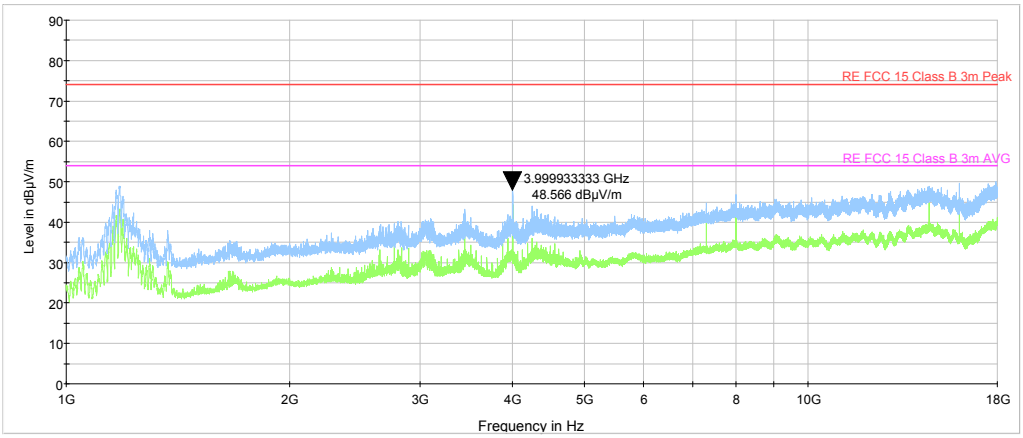
TEST SITE:	Semi anechoic chamber
TEST DISTANCE:	3 m
ANTENNA POLARIZATION:	Vertical and Horizontal
EUT POSITION:	Typical (Vertical)



Test specification:	FCC Section 15.255(d)(2), RSS-210 section J.3, Out of band radiated emissions below 40 GHz		
Test procedure:	47 CFR, Section 2.1053; ANSI C63.10, Section 9.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	12-Jan-21 - 13-Jan-21		
Temperature: 23 ºC	Relative Humidity: 38 %	Air Pressure: 1012 hPa	Power: 48 VDC
Remarks:			

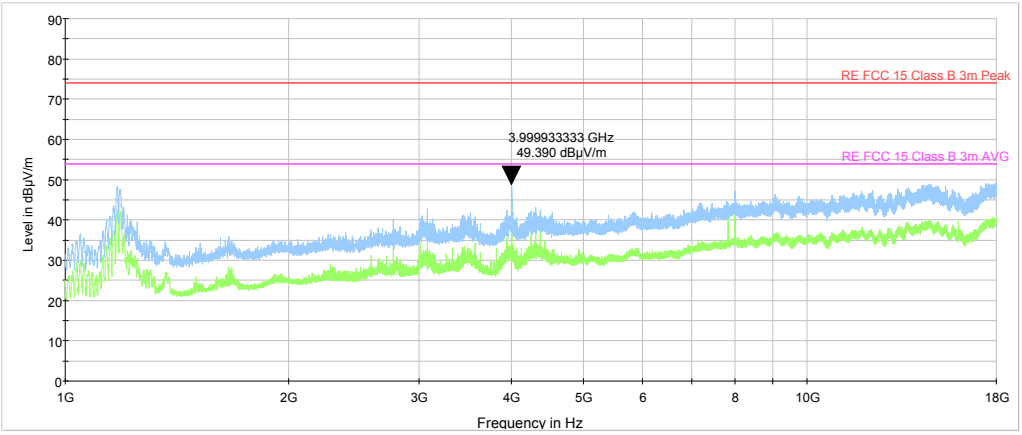
Plot 7.3.7 Radiated emission measurements from 1 to 18 MHz at low frequency

TEST SITE:	Semi anechoic chamber
TEST DISTANCE:	3 m
ANTENNA POLARIZATION:	Vertical and Horizontal
EUT POSITION:	Typical (Vertical)



Plot 7.3.8 Radiated emission measurements from 1 to 18 MHz at mid frequency

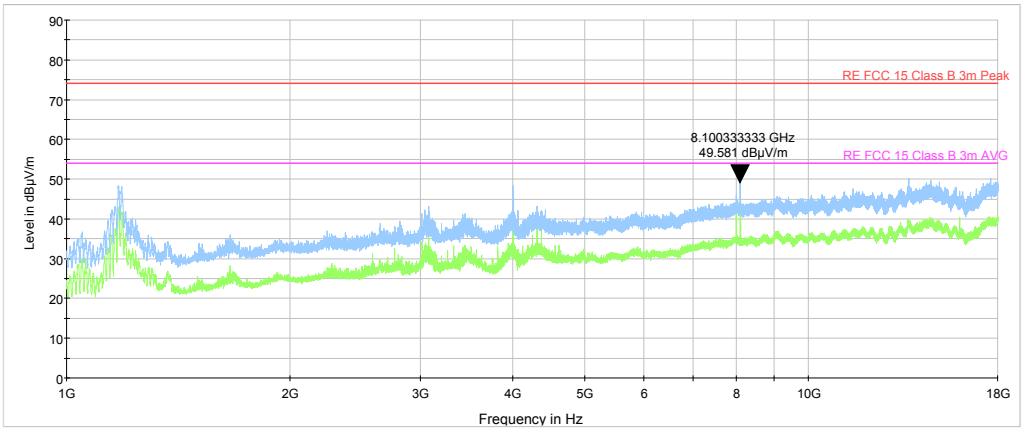
TEST SITE:	Semi anechoic chamber
TEST DISTANCE:	3 m
ANTENNA POLARIZATION:	Vertical and Horizontal
EUT POSITION:	Typical (Vertical)



Test specification:	FCC Section 15.255(d)(2), RSS-210 section J.3, Out of band radiated emissions below 40 GHz		
Test procedure:	47 CFR, Section 2.1053; ANSI C63.10, Section 9.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	12-Jan-21 - 13-Jan-21		
Temperature: 23 ºC	Relative Humidity: 38 %	Air Pressure: 1012 hPa	Power: 48 VDC
Remarks:			

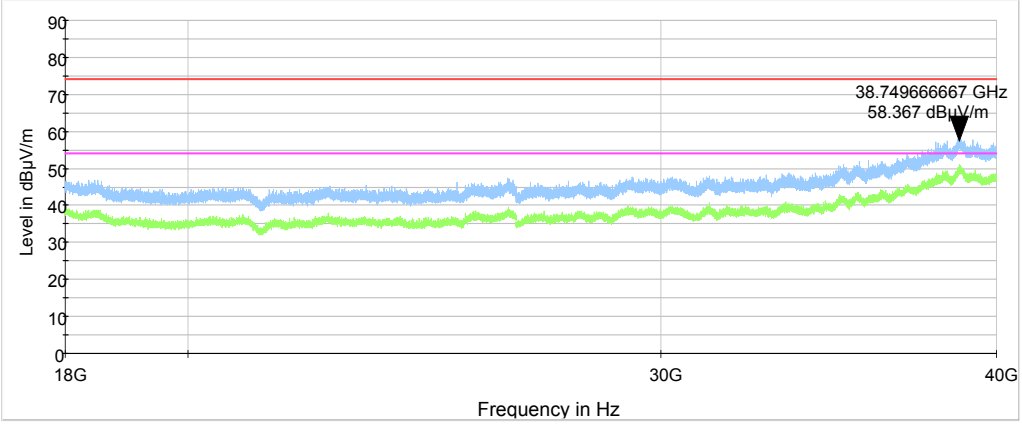
Plot 7.3.9 Radiated emission measurements from 1 to 18 MHz at high frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
EUT POSITION: Typical (Vertical)



Plot 7.3.10 Radiated emission measurements from 18 to 40 GHz at low frequency

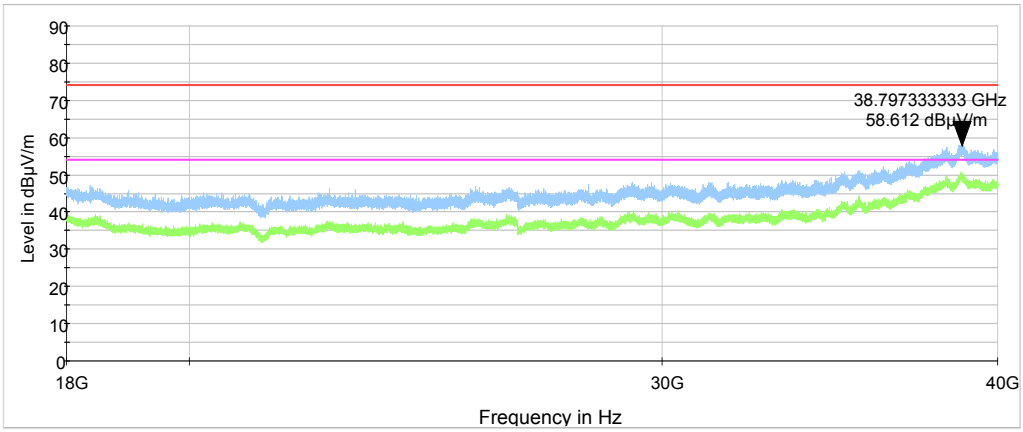
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
EUT POSITION: Typical (Vertical)



Test specification:	FCC Section 15.255(d)(2), RSS-210 section J.3, Out of band radiated emissions below 40 GHz		
Test procedure:	47 CFR, Section 2.1053; ANSI C63.10, Section 9.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	12-Jan-21 - 13-Jan-21		
Temperature: 23 ºC	Relative Humidity: 38 %	Air Pressure: 1012 hPa	Power: 48 VDC
Remarks:			

Plot 7.3.11 Radiated emission measurements from 18 to 40 GHz at mid frequency

TEST SITE:	Semi anechoic chamber
TEST DISTANCE:	3 m
ANTENNA POLARIZATION:	Vertical and Horizontal
EUT POSITION:	Typical (Vertical)



Plot 7.3.12 Radiated emission measurements from 18 to 40 GHz at high frequency

TEST SITE:	Semi anechoic chamber
TEST DISTANCE:	3 m
ANTENNA POLARIZATION:	Vertical and Horizontal
EUT POSITION:	Typical (Vertical)