



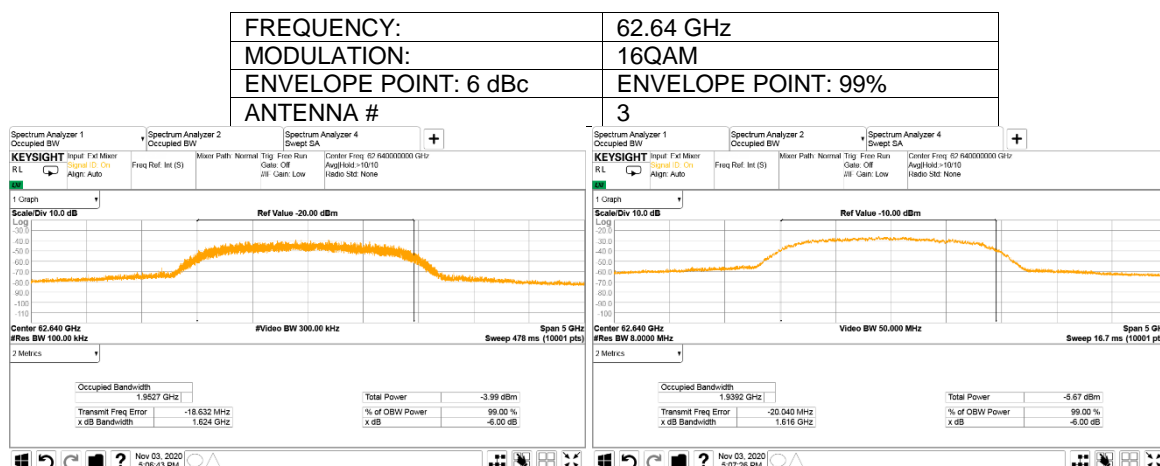
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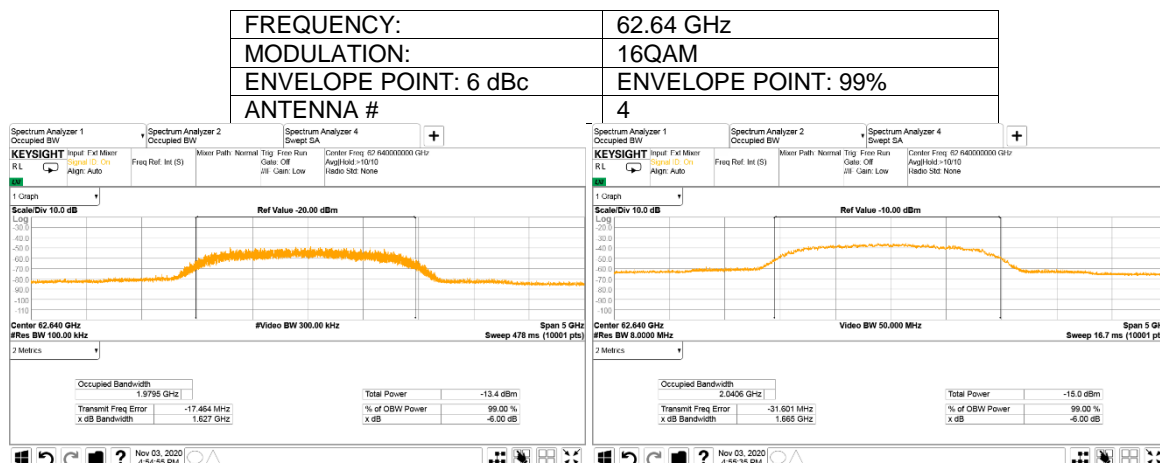
Date of Issue: 8-Feb-21

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):		11-Mar-20	
Temperature: 25 °C	Relative Humidity: 43 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.2.7 The 6dBc and 99% occupied bandwidth



Plot 7.2.8 The 6dBc and 99% occupied bandwidth





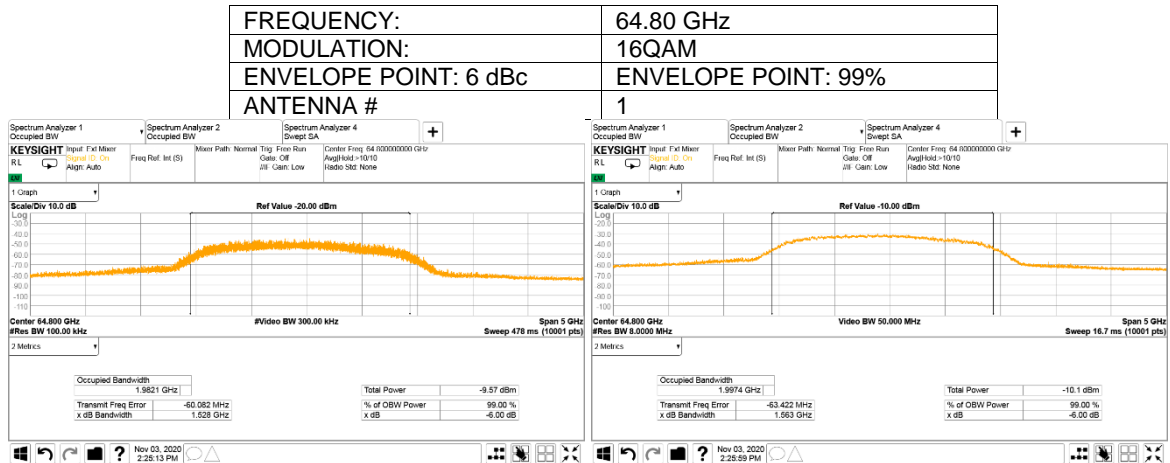
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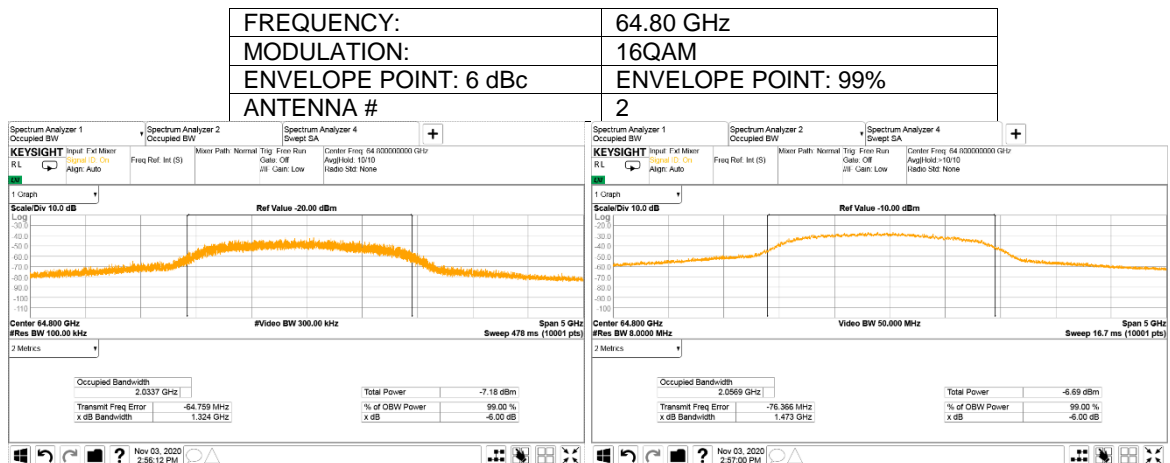
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Test specification:		FCC Section 15.215(c), RSS-210 section J.4(c), RSS-Gen section 6.7, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049, ANSI C63.10, Section 9.3	
Test mode:		Compliance	Verdict: PASS
Date(s):		11-Mar-20	
Temperature: 25 °C	Relative Humidity: 43 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.2.9 The 6dBc and 99% occupied bandwidth



Plot 7.2.10 The 6dBc and 99% occupied bandwidth





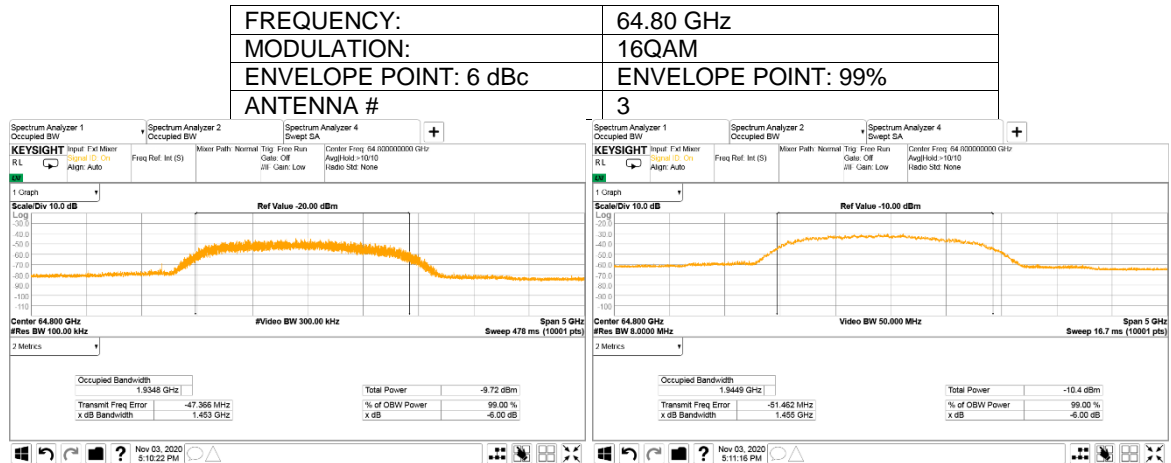
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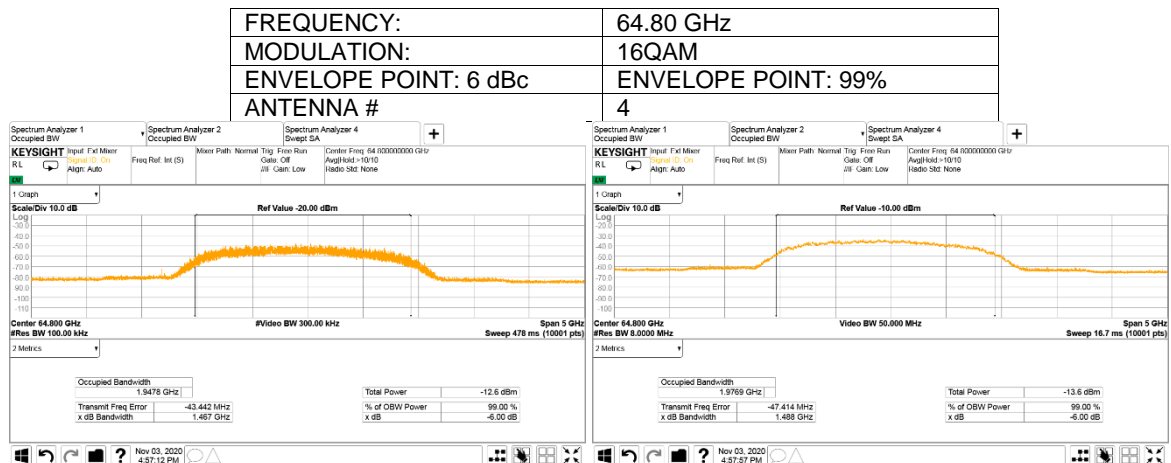
Date of Issue: 8-Feb-21

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):		11-Mar-20	
Temperature: 25 °C	Relative Humidity: 43 %	Air Pressure: 1015 hPa	Power: 48 VDC
Remarks:			

Plot 7.2.11 The 6dBc and 99% occupied bandwidth



Plot 7.2.12 The 6dBc and 99% occupied bandwidth





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:		Verdict: PASS	
Date(s):			
16-Nov-20			
Temperature: 23 °C	Relative Humidity: 58 %	Air Pressure: 1010 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:

$$\text{Lims}_2 = \text{Lims}_1 + 40 \log (S_1/S_2),$$

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): 16-Nov-20			
Temperature: 23 °C	Relative Humidity: 58 %	Air Pressure: 1010 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 7.2.1, 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° 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.

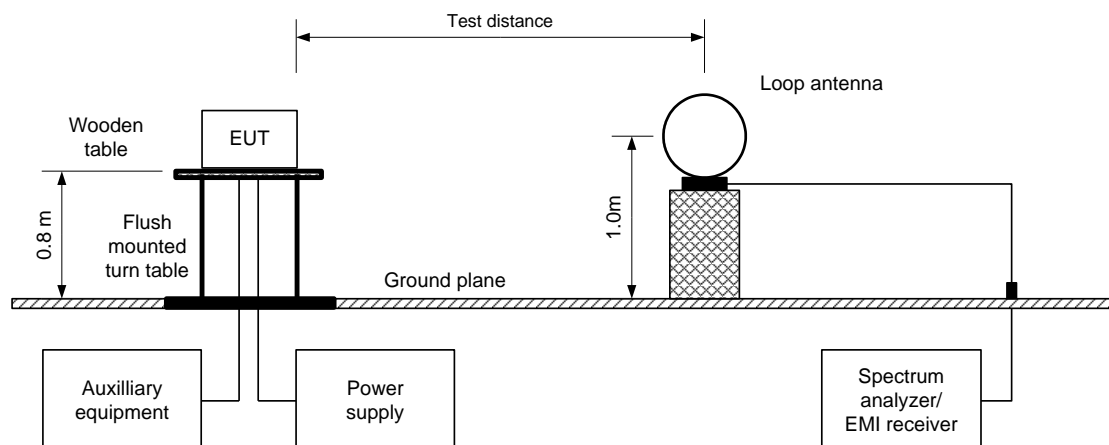
7.3.3 Test procedure for spurious emission field strength measurements above 30 MHz

7.3.3.1 The EUT was set up as shown in Figure 7.2.2, Figure 7.2.3, 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°, 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 Table 7.3.3 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): 16-Nov-20			
Temperature: 23 °C	Relative Humidity: 58 %	Air Pressure: 1010 hPa	Power: 48 VDC
Remarks:			

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

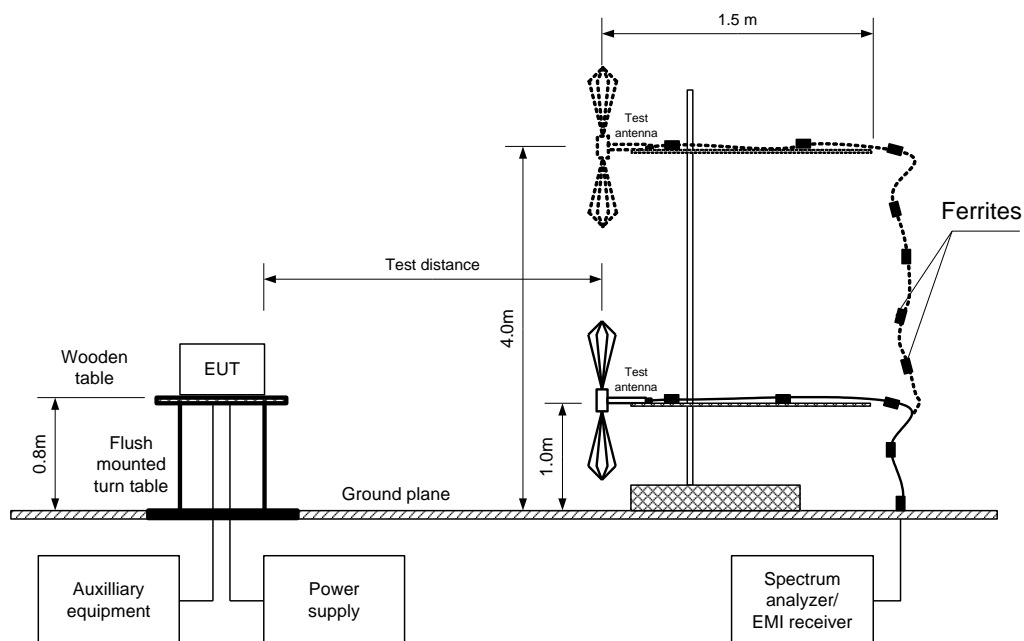
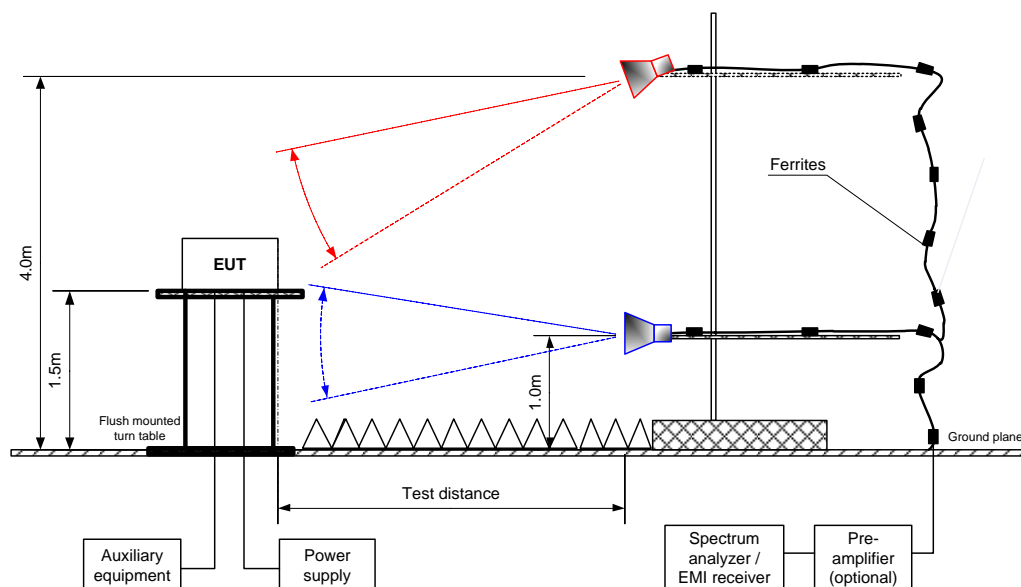


Figure 7.3.3 Setup for spurious emission field strength measurements above 1000 MHz





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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): 16-Nov-20			
Temperature: 23 °C	Relative Humidity: 58 %	Air Pressure: 1010 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)

ELECT ANTENNA TYPE: Double ridge 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 58.32 GHz											
1034.7	H	1.94	14	48.01	74.0	-25.99	NA	37.88	54.0	-16.12	Pass
1600.1	H	1.93	267	47.97	74.0	-26.03	NA	39.46	54.0	-14.54	
3999.9	H	1.94	157	51.58	74.0	-22.42	NA	48.15	54.0	-5.85	
7290.0	V	1.32	111	54.59	74.0	-19.41	NA	49.84	54.0	-4.16	
8000.0	H	1.95	279	56.96	74.0	-17.04	NA	53.16	54.0	-0.84	
12000.1	H	2.26	180	57.49	74.0	-16.51	NA	48.41	54.0	-5.59	
14580.2	H	2.24	308	57.49	74.0	-16.51	NA	51.90	54.0	-2.10	
16000.3	H	1.92	182	59.78	74.0	-14.22	NA	51.79	54.0	-2.21	
29159.9	H	1.92	286	49.12	74.0	-24.88	NA	44.81	54.0	-9.19	
Mid frequency 62.64 GHz											
1035.3	H	1.95	360	47.41	74.0	-26.59	NA	37.81	54.0	-16.19	Pass
1134.7	H	1.64	325	47.21	74.0	-26.79	NA	36.63	54.0	-17.37	
1600.1	H	1.95	263	47.63	74.0	-26.37	NA	39.34	54.0	-14.66	
3999.9	H	1.64	156	51.79	74.0	-22.21	NA	48.18	54.0	-5.82	
7830.0	V	1.72	214	56.69	74.0	-17.31	NA	51.64	54.0	-2.36	
8000.0	H	1.94	280	56.51	74.0	-17.49	NA	52.41	54.0	-1.59	
12000.1	H	2.24	180	56.62	74.0	-17.38	NA	48.18	54.0	-5.82	
15660.2	H	1.64	352	58.53	74.0	-15.47	NA	49.72	54.0	-4.28	
16000.2	H	1.95	172	60.47	74.0	-13.53	NA	53.45	54.0	-0.55	
High frequency 64.80 GHz											
1034.1	H	1.94	14	47.69	74.0	-26.31	NA	37.88	54.0	-16.12	Pass
1132.7	H	1.94	331	46.08	74.0	-27.92	NA	36.03	54.0	-17.97	
1600.0	H	1.95	265	46.31	74.0	-27.69	NA	36.26	54.0	-17.74	
3999.9	H	2.02	159	50.79	74.0	-23.21	NA	47.22	54.0	-6.78	
8000.0	H	2.25	281	55.52	74.0	-18.48	NA	49.78	54.0	-4.22	
8099.8	V	1.63	227	57.98	74.0	-16.02	NA	52.63	54.0	-1.37	
12000.1	H	2.25	206	57.28	74.0	-16.72	NA	49.92	54.0	-4.08	
16000.2	H	1.72	347	60.48	74.0	-13.52	NA	52.36	54.0	-1.64	
16199.8	H	1.63	14	57.20	74.0	-16.80	NA	47.89	54.0	-6.11	

*- EUT front panel refers to 0 degrees position of turntable.

** - Margin = dB below (negative if above) specification limit.

Reference numbers of test equipment used

HL 4360	HL 4933	HL 5404	HL 4360	HL 3903	HL 4956		
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Full description is given in Appendix A.



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Report ID: SIKRAD_FCC.40852

Date of Issue: 8-Feb-21

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): 16-Nov-20			
Temperature: 23 °C	Relative Humidity: 58 %	Air Pressure: 1010 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)

Decision (50 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								
33.632	36.00	29.47	40.0	-10.53	Vertical	1.01	301	Pass
55.537	34.18	27.97	40.0	-12.03	Vertical	1.03	125	
70.354	37.51	31.30	40.0	-8.70	Vertical	1.02	100	
87.537	34.75	28.01	40.0	-11.99	Vertical	1.03	90	
165.571	27.96	21.82	43.5	-21.68	Vertical	1.02	113	
558.192	36.96	30.49	46.0	-15.51	Vertical	1.04	239	
844.311	37.82	31.79	46.0	-14.21	Vertical	1.00	150	
957.432	39.89	33.77	46.0	-12.23	Horizontal	1.01	214	

*- 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							

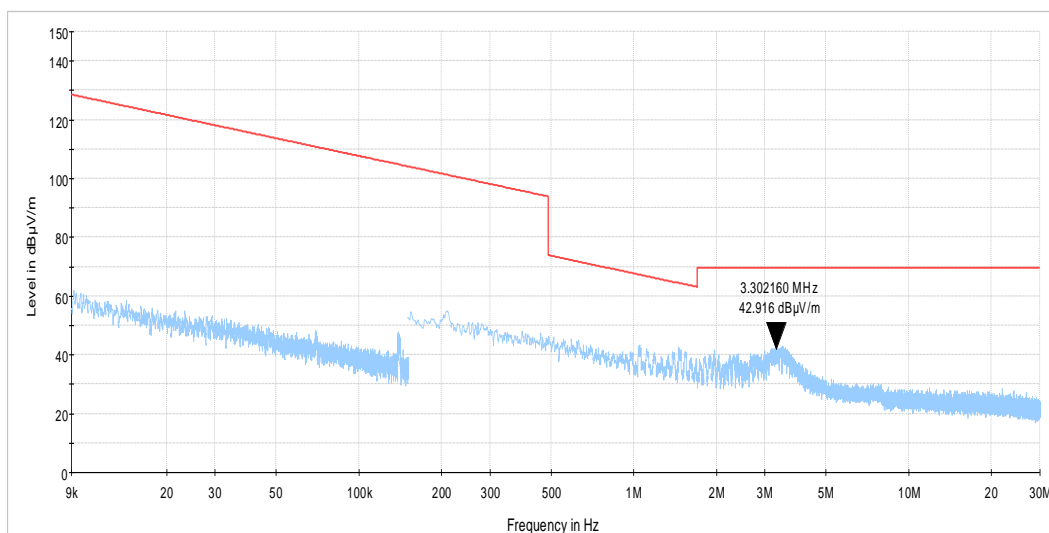
Full description is given in Appendix A.



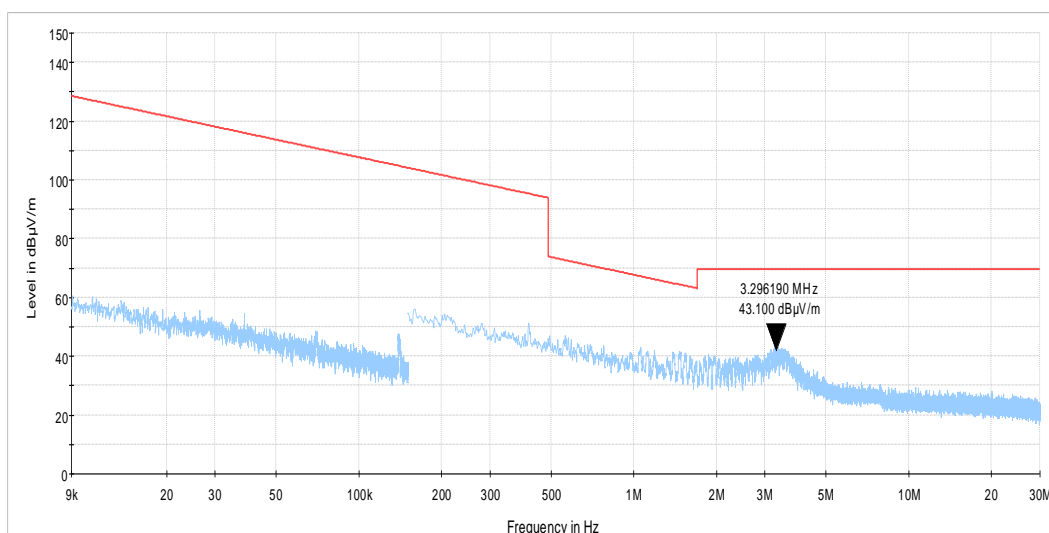
Test specification: FCC Section 15.255(d)(2), RSS-210 section J.3, Out of band radiated emissions below 40 GHz			
Test procedure: 47 CFR, Section 2.1053; ANSI C63.10, Section 9.13			
Test mode: Compliance		Verdict: PASS	
Date(s): 16-Nov-20			
Temperature: 23 °C	Relative Humidity: 58 %	Air Pressure: 1010 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)

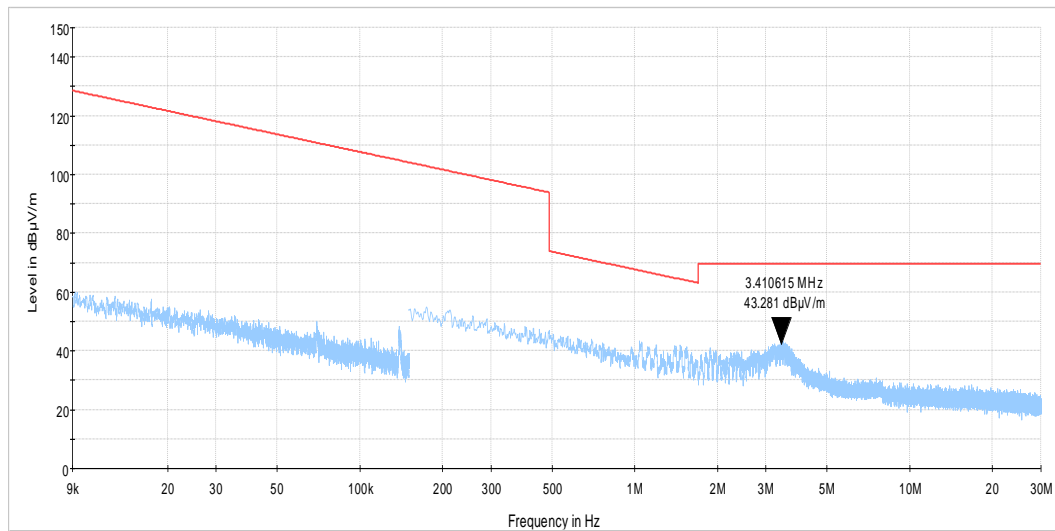




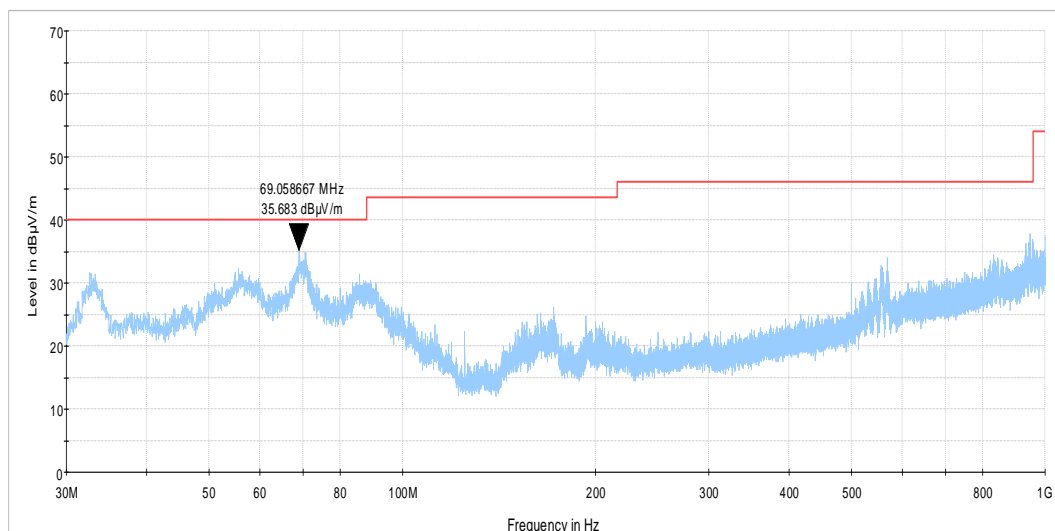
Test specification:		FCC Section 15.255(d)(2), RSS-210 section J.3, Out of band radiated emissions below 40 GHz	
Test procedure:		47 CFR, Section 2.1053; ANSI C63.10, Section 9.13	
Test mode:		Verdict: PASS	
Date(s):			
16-Nov-20			
Temperature: 23 °C	Relative Humidity: 58 %	Air Pressure: 1010 hPa	Power: 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)

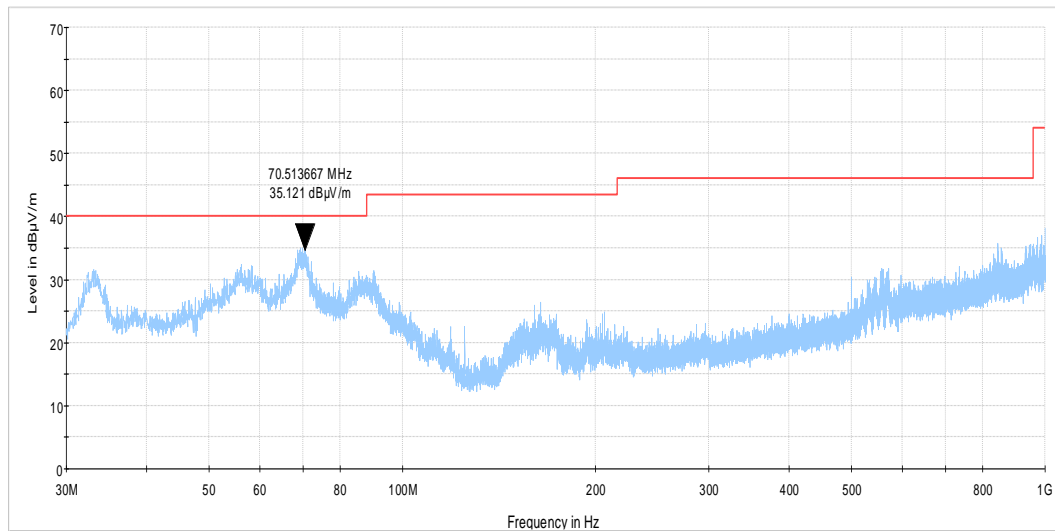




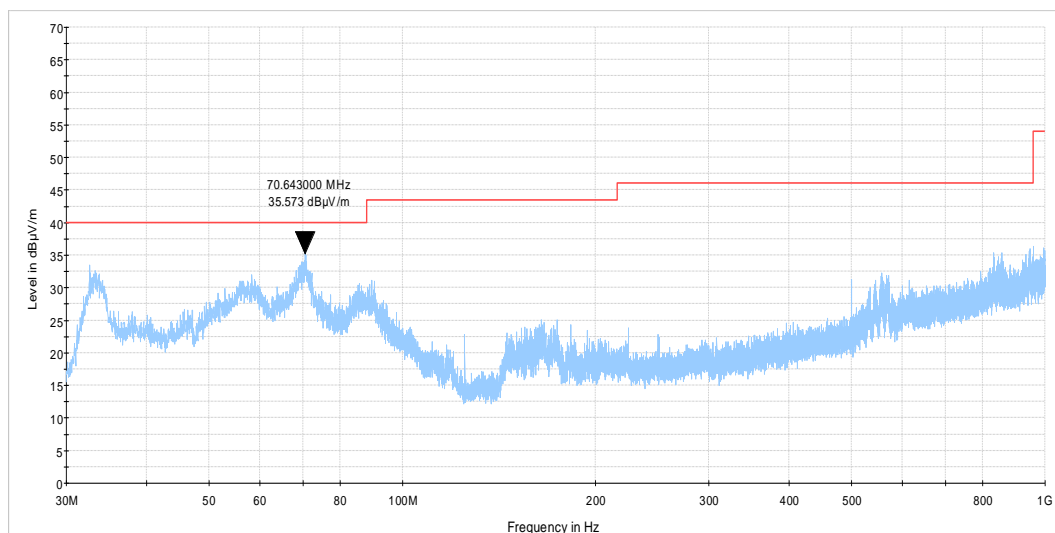
Test specification:		FCC Section 15.255(d)(2), RSS-210 section J.3, Out of band radiated emissions below 40 GHz	
Test procedure:		47 CFR, Section 2.1053; ANSI C63.10, Section 9.13	
Test mode:		Verdict: PASS	
Date(s):			
16-Nov-20			
Temperature: 23 °C	Relative Humidity: 58 %	Air Pressure: 1010 hPa	Power: 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)

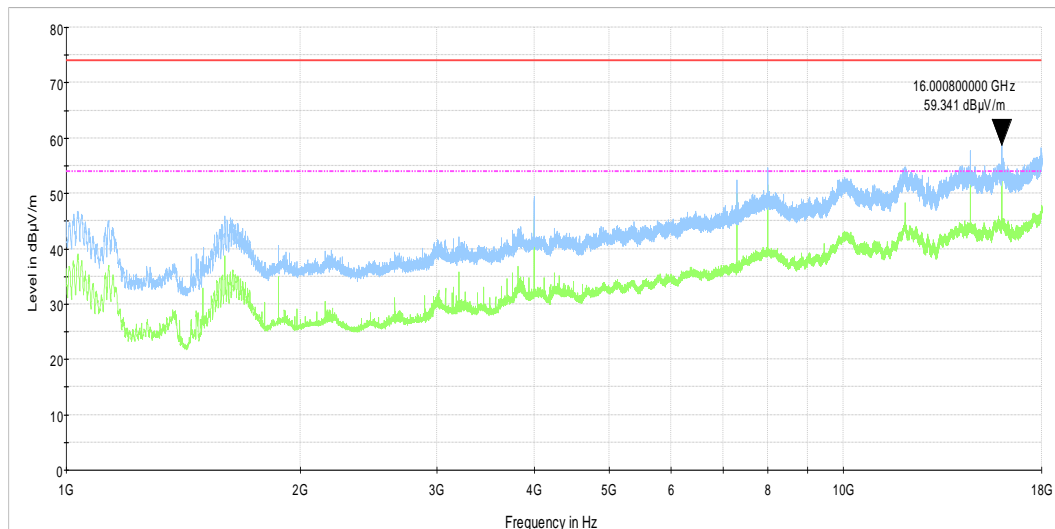




Test specification:		FCC Section 15.255(d)(2), RSS-210 section J.3, Out of band radiated emissions below 40 GHz	
Test procedure:		47 CFR, Section 2.1053; ANSI C63.10, Section 9.13	
Test mode:		Verdict: PASS	
Date(s):			
16-Nov-20			
Temperature: 23 °C	Relative Humidity: 58 %	Air Pressure: 1010 hPa	Power: 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)

