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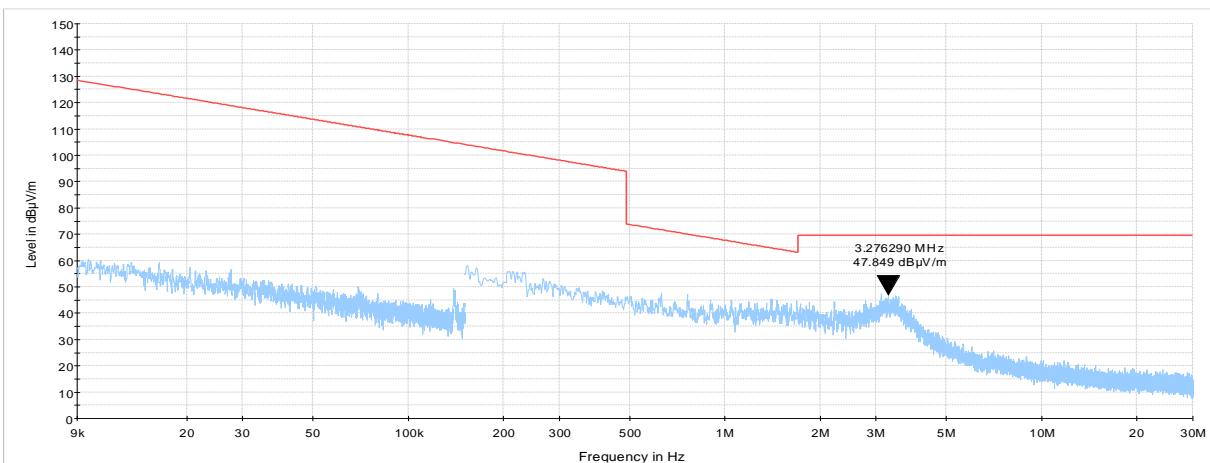
Report ID: NETRAD_FCC.41599_Rev2

Date of Issue: 8-Apr-21

Test specification: Section 15.258(c)(2), Out of band radiated emissions below 40 GHz			
Test procedure: ANSI C63.10, Section 9.13			
Test mode: Compliance		Verdict: PASS	
Date(s): 18-Jan-21			
Temperature: 24 °C	Relative Humidity: 48 %	Air Pressure: 1015 hPa	Power: 5 VDC
Remarks:			

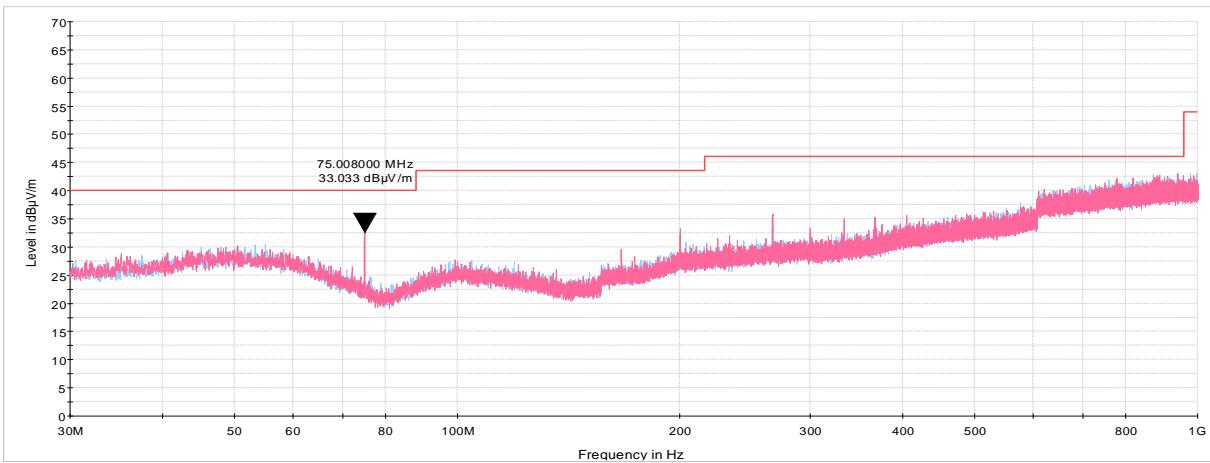
Plot 7.4.3 Radiated emission measurements from 9 KHz to 30 MHz at high frequency

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



Plot 7.4.4 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)





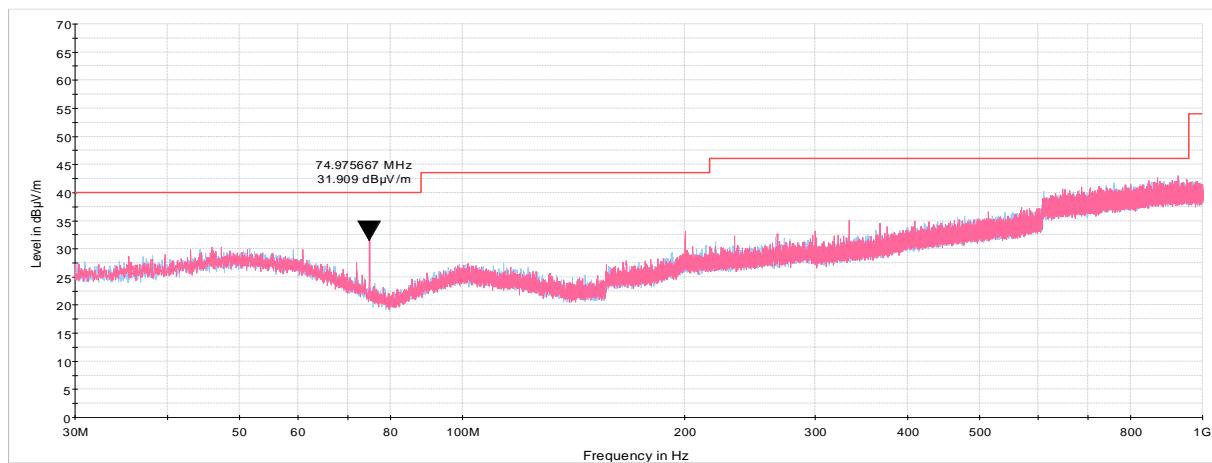
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Test mode: Compliance		Verdict: PASS	
Date(s): 18-Jan-21			
Temperature: 24 °C	Relative Humidity: 48 %	Air Pressure: 1015 hPa	Power: 5 VDC
Remarks:			

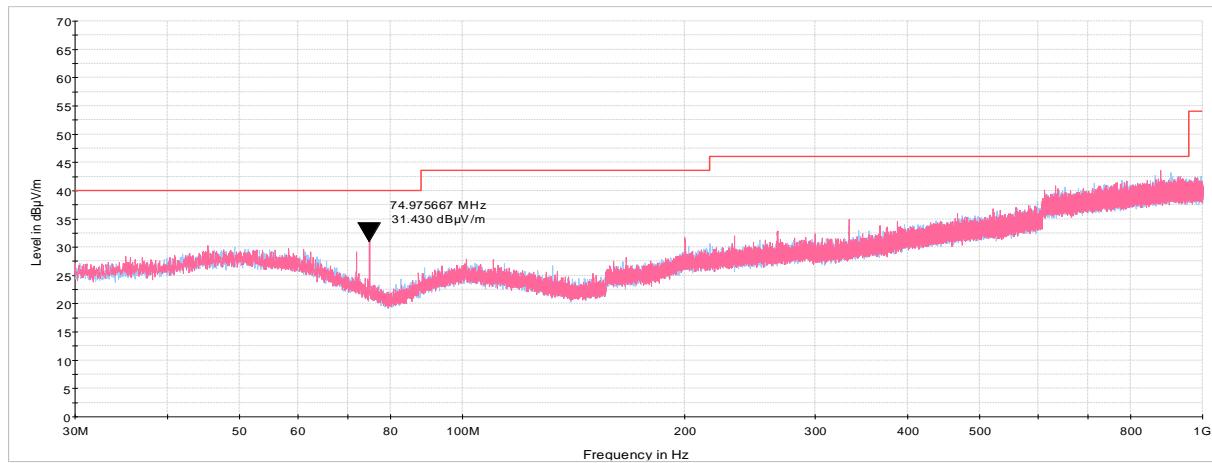
Plot 7.4.5 Radiated emission measurements from 30 to 1000 MHz at mid frequency

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



Plot 7.4.6 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)





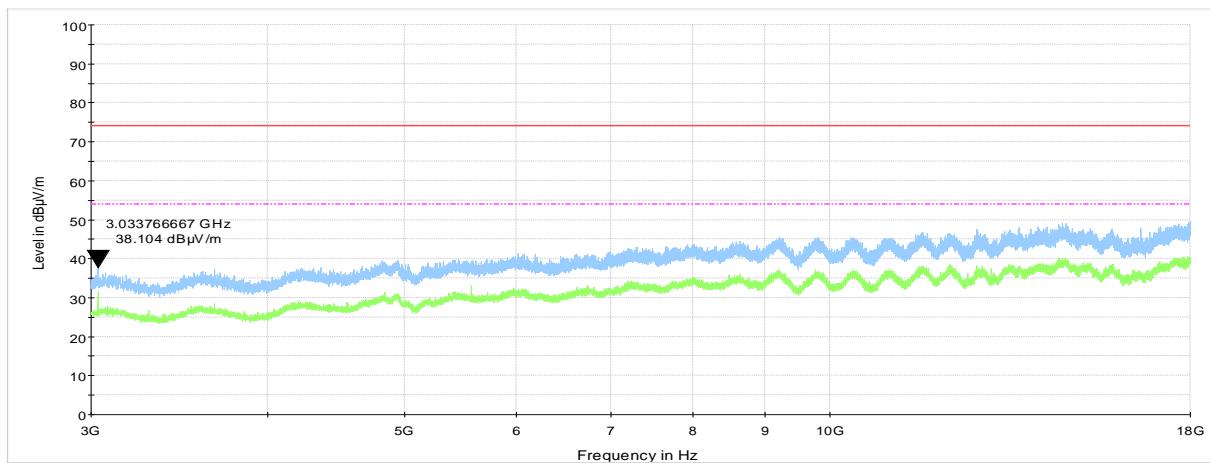
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Test procedure: ANSI C63.10, Section 9.13			
Test mode: Compliance		Verdict: PASS	
Date(s): 18-Jan-21			
Temperature: 24 °C	Relative Humidity: 48 %	Air Pressure: 1015 hPa	Power: 5 VDC
Remarks:			

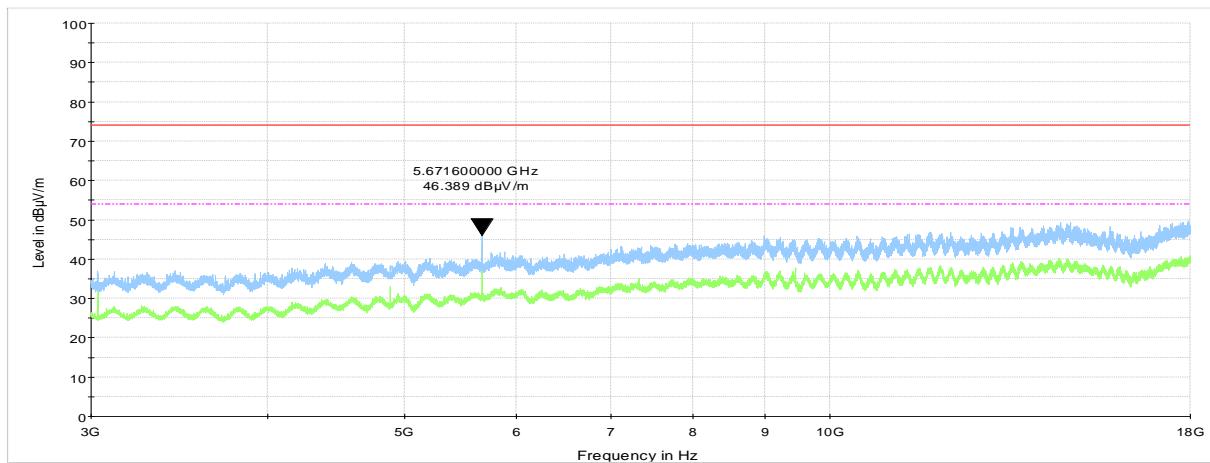
Plot 7.4.7 Radiated emission measurements from 1 to 18 MHz at low frequency

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



Plot 7.4.8 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)





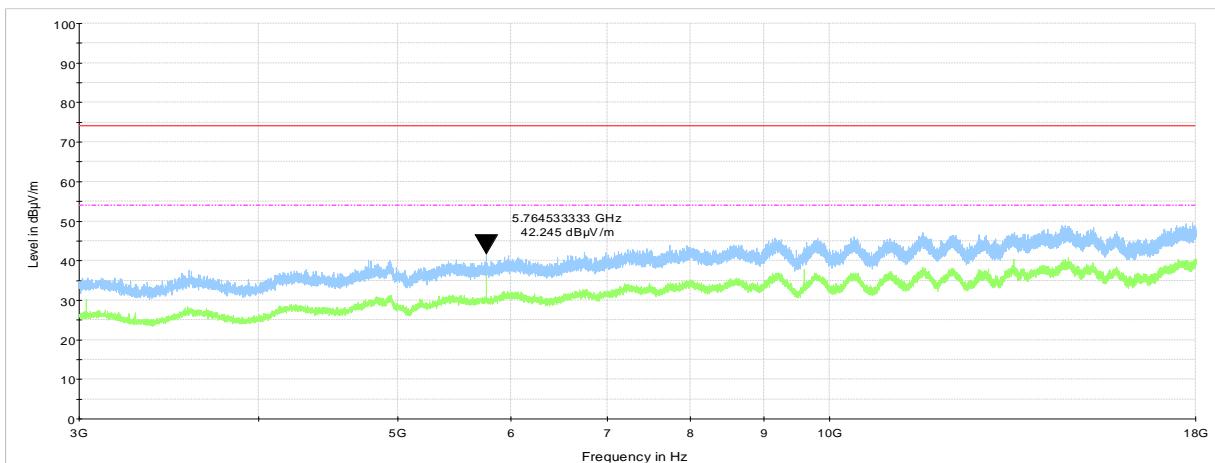
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Test specification: Section 15.258(c)(2), Out of band radiated emissions below 40 GHz			
Test procedure: ANSI C63.10, Section 9.13			
Test mode: Compliance		Verdict: PASS	
Date(s): 18-Jan-21			
Temperature: 24 °C	Relative Humidity: 48 %	Air Pressure: 1015 hPa	Power: 5 VDC
Remarks:			

Plot 7.4.9 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)





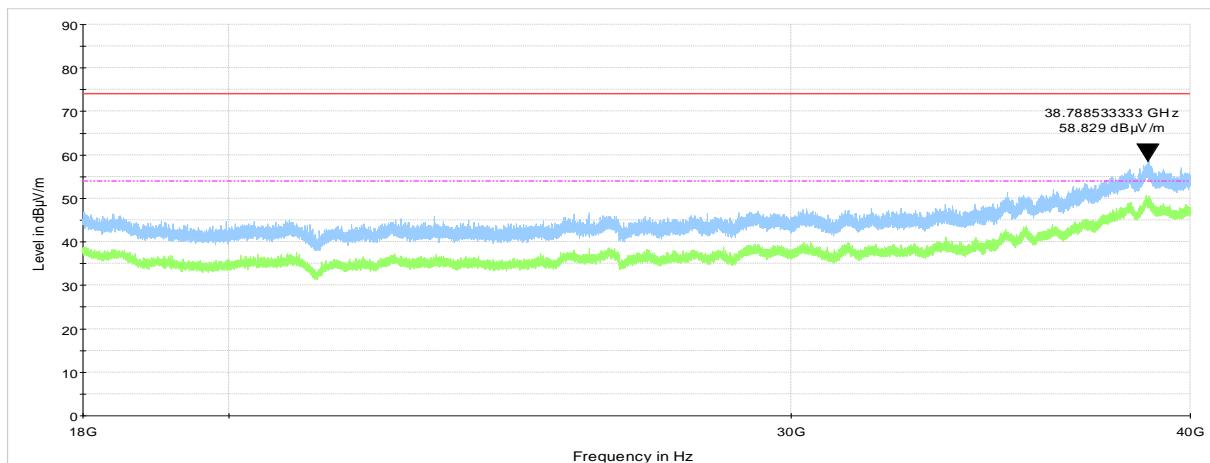
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Test specification: Section 15.258(c)(2), Out of band radiated emissions below 40 GHz			
Test procedure:	ANSI C63.10, Section 9.13		
Test mode:	Compliance		
Date(s):	18-Jan-21		
Temperature: 24 °C	Relative Humidity: 48 %	Air Pressure: 1015 hPa	Power: 5 VDC
Remarks:			

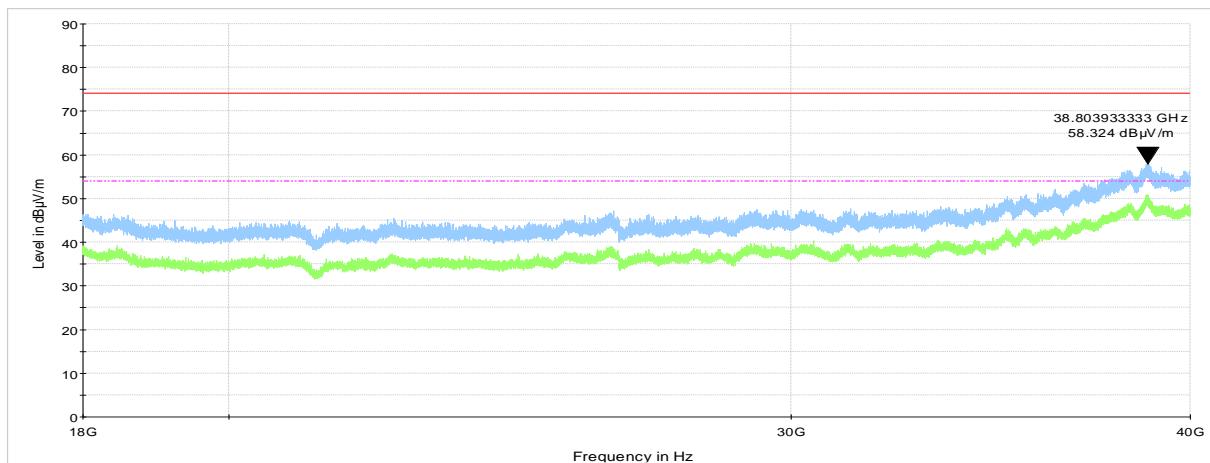
Plot 7.4.10 Radiated emission measurements from 18 to 40 GHz at low frequency

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



Plot 7.4.11 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)





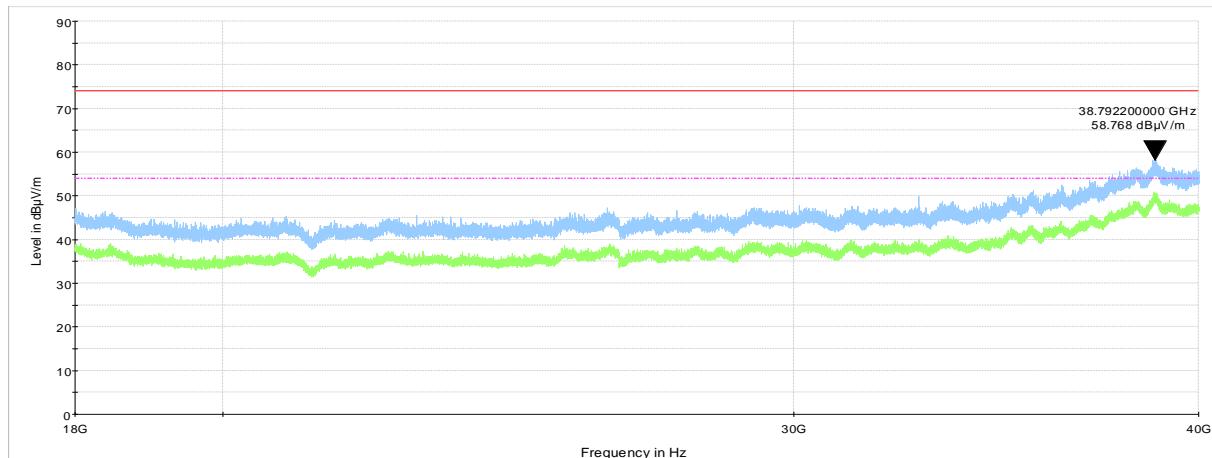
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Test procedure: ANSI C63.10, Section 9.13			
Test mode: Compliance		Verdict: PASS	
Date(s): 18-Jan-21			
Temperature: 24 °C	Relative Humidity: 48 %	Air Pressure: 1015 hPa	Power: 5 VDC
Remarks:			

Plot 7.4.12 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)





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Test specification:	Section 15.258(c)(3), Out of band radiated emissions above 40 GHz up to 370 GHz		
Test procedure:	ANSI C63.10, Sections 9.9, 9.12		
Test mode:	Compliance		
Date(s):	04-Jan-21	Verdict:	PASS
Temperature: 22 °C	Relative Humidity: 48 %	Air Pressure: 1014 hPa	Power: 5 VDC
Remarks:			

7.5 Out of band radiated emissions above 40 GHz up to 370 GHz

7.5.1 General

This test was performed to measure radiated spurious emissions from the EUT. Specification test limits are given in Table 7.5.1.

Table 7.5.1 Spurious emission field strength limits

Frequency, GHz	Power density at 3 m distance pW/cm ²	Distance, m	Field strength dB(µV/m)*, peak	Field strength dB(µV/m)*, average
40 – 370	90.0	3.0	105.30	85.30
90 - 140	90.0	0.10	134.80**	114.80**
140 - 220	90.0	0.01	154.80**	134.80**
220 - 370	90.0	1.0	114.84**	94.84**

*- The limit is provided in average values.

**- The limit for 1 m and other test distance was calculated using the inverse distance extrapolation factor as follows:

for far field: $Lims_2 = Lims_1 + 20 \log (S_1/S_2)$,
where S_1 – standard defined distance in meters;
 S_2 – measurement distance in meters (according to ANSI C63.10)

7.5.2 Test procedure for spurious emission field strength measurements

- 7.5.2.1 The EUT was set up as shown in Figure 7.4.1, energized and the performance check was conducted.
- 7.5.2.2 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal.
- 7.5.2.3 The test results were recorded in Table 7.4.2 and are shown in the associated plots.

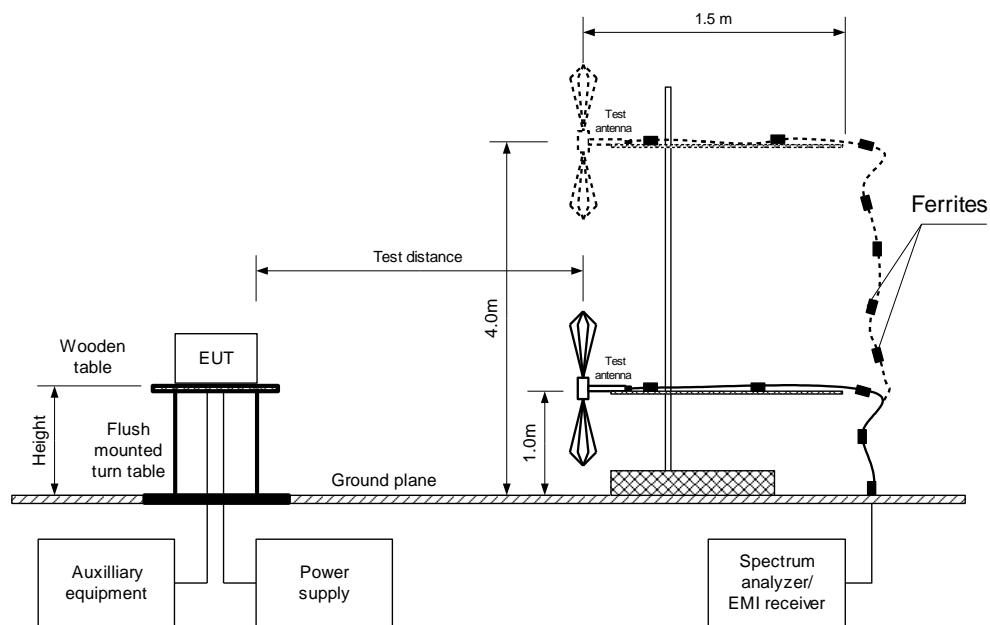


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Test procedure:	ANSI C63.10, Sections 9.9, 9.12		
Test mode:	Compliance		
Date(s):	04-Jan-21	Verdict:	PASS
Temperature: 22 °C	Relative Humidity: 48 %	Air Pressure: 1014 hPa	Power: 5 VDC
Remarks:			

Figure 7.5.1 Spurious emission field strength above 40 GHz test set up





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Test procedure:		ANSI C63.10, Sections 9.9, 9.12	
Test mode:	Compliance		Verdict:
Date(s):	04-Jan-21		PASS
Temperature: 22 °C	Relative Humidity: 48 %	Air Pressure: 1014 hPa	Power: 5 VDC
Remarks:			

Table 7.5.2 Spurious emission field strength test results

TEST DISTANCE:	0.01 - 3 m
EUT POSITION:	Typical (Vertical)
MODULATION:	CW
TRANSMITTER OUTPUT POWER:	Maximum
INVESTIGATED FREQUENCY RANGE:	40 – 370 GHz
RESOLUTION BANDWIDTH:	1000 kHz
VIDEO BANDWIDTH:	≥ Resolution bandwidth
TEST ANTENNA TYPE:	Standard Gain Horn 24dB (40-60 GHz) Standard Gain Horn 24dB (50-75 GHz) Standard Gain Horn 24dB (75-110 GHz) Standard Gain Horn 24dB (90-140 GHz) Standard Gain Horn 24dB (140-220 GHz) Standard Gain Horn 24dB (220-330 GHz)... Standard Gain Horn 24dB (330-370 GHz)...

Frequency, MHz	Antenna		Azimuth, degrees*	Peak field strength(VBW=3 MHz)			Average field strength(VBW=100 kHz)			Verdict
	Polariz.	Height, m		Measured, dB(µV/m)	Limit, dB(µV/m)	Margin, dB**	Measured, dB(µV/m)	Limit, dB(µV/m)	Margin, dB**	
Low frequency 119.000 GHz										
237998.0	V	1.0	0	83.09	114.84	-31.75	83.09	94.84	-11.75	Pass
237998.0	H	1.0	0	83.93	114.84	-30.91	83.93	94.84	-10.91	Pass
Mid frequency 121.000 GHz										
241998.7	V	1.0	0	84.78	114.84	-30.06	84.78	94.84	-10.06	Pass
241998.3	H	1.0	0	82.02	114.84	-32.82	82.02	94.84	-12.82	Pass
High frequency 122.980 GHz										
246957.3	V	1.0	0	79.89	114.84	-34.95	79.89	94.84	-14.95	Pass
245957.0	H	1.0	0	78.87	114.84	-35.97	78.87	94.84	-15.97	Pass

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

**- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

HL 5376	HL 3433	HL 747	HL 3536	HL 1312	HL 3329	HL 3235	HL 770
HL 4023	HL 748	HL 771	HL 5380	HL 5409			

Full description is given in Appendix A.



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Test specification: Section 15.258(c)(3), Out of band radiated emissions above 40 GHz up to 370 GHz			
Test procedure: ANSI C63.10, Sections 9.9, 9.12			
Test mode: Compliance			
Date(s): 04-Jan-21			Verdict: PASS
Temperature: 22 °C	Relative Humidity: 48 %	Air Pressure: 1014 hPa	Power: 5 VDC
Remarks:			

Plot 7.5.1 Spurious emission measurements in 40 - 50 GHz range

TEST SITE:

OATS

TEST DISTANCE:

3 m

MODULATION:

CW

ANTENNA POLARIZATION:

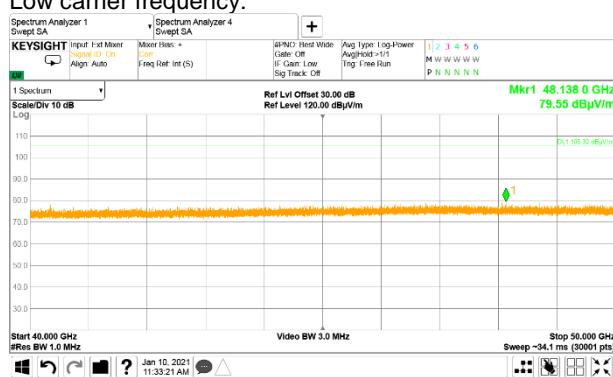
Vertical and Horizontal

DETECTOR: Peak RBW = 1 MHz; VBW = 3 MHz

DETECTOR: Peak RBW = 1 MHz; VBW = 100 kHz

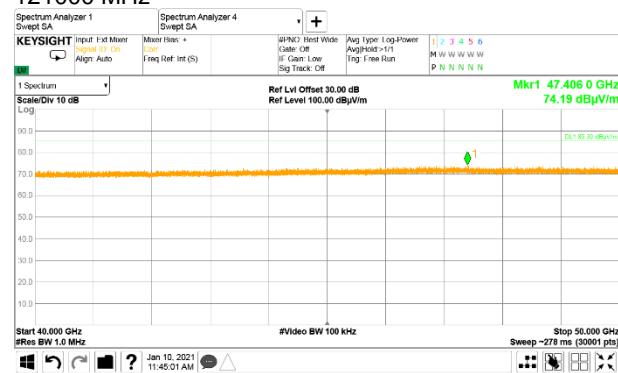
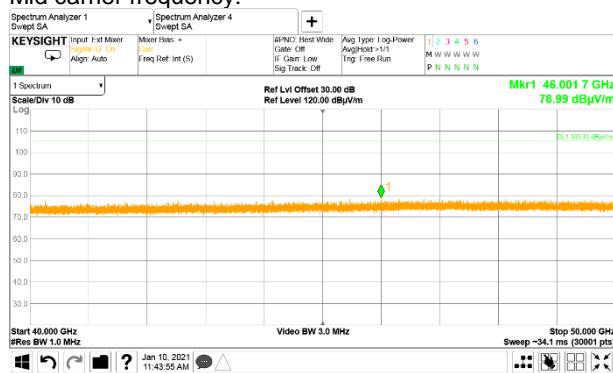
Low carrier frequency:

119000 MHz



Mid carrier frequency:

121000 MHz



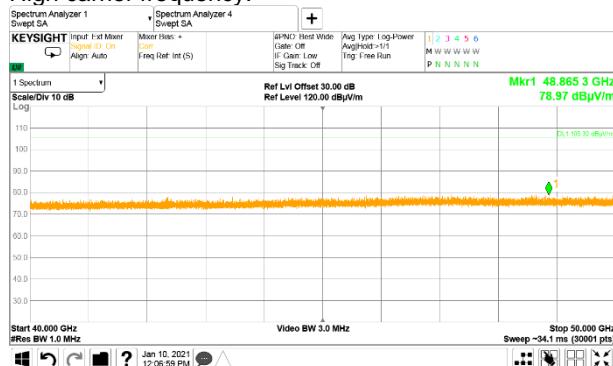


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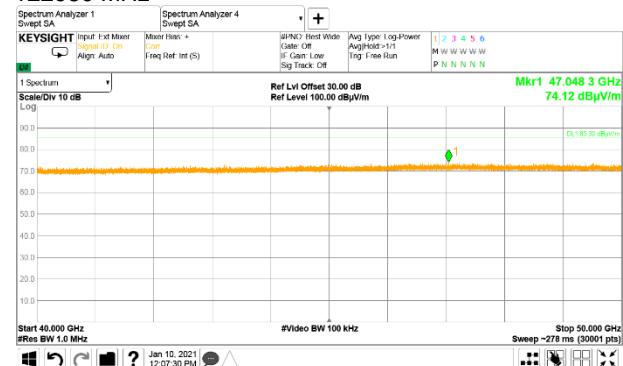
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Test procedure:	ANSI C63.10, Sections 9.9, 9.12		
Test mode:	Compliance		
Date(s):	04-Jan-21	Verdict:	PASS
Temperature: 22 °C	Relative Humidity: 48 %	Air Pressure: 1014 hPa	Power: 5 VDC
Remarks:			

High carrier frequency:



122980 MHz





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Test specification: Section 15.258(c)(3), Out of band radiated emissions above 40 GHz up to 370 GHz			
Test procedure: ANSI C63.10, Sections 9.9, 9.12			
Test mode: Compliance			
Date(s): 04-Jan-21			Verdict: PASS
Temperature: 22 °C	Relative Humidity: 48 %	Air Pressure: 1014 hPa	Power: 5 VDC
Remarks:			

Plot 7.5.2 Spurious emission measurements in 50 - 60 GHz range

TEST SITE:

OATS

TEST DISTANCE:

3 m

MODULATION:

CW

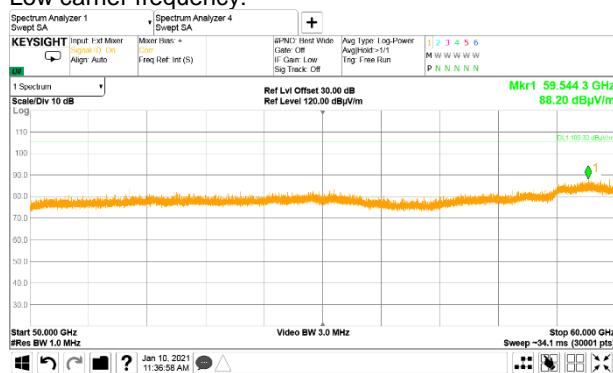
ANTENNA POLARIZATION:

Vertical and Horizontal

DETECTOR: Peak RBW = 1 MHz; VBW = 3 MHz

DETECTOR: Peak RBW = 1 MHz; VBW = 100 kHz

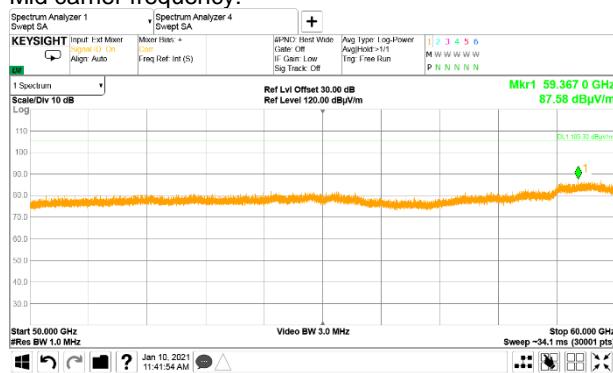
Low carrier frequency:



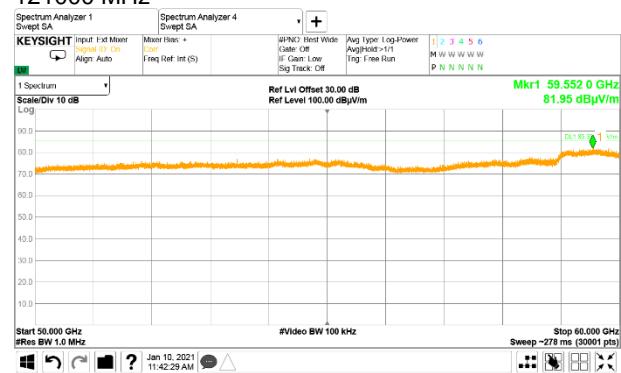
119000 MHz



Mid carrier frequency:



121000 MHz



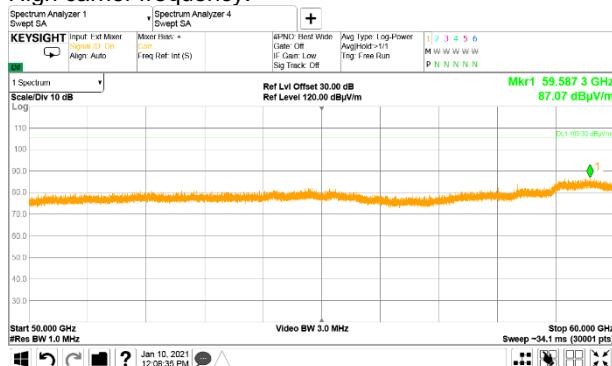


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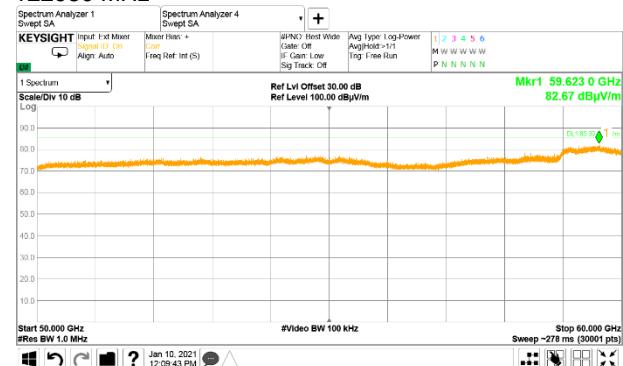
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Test procedure:	ANSI C63.10, Sections 9.9, 9.12
Test mode:	Compliance
Date(s):	04-Jan-21
Temperature: 22 °C	Relative Humidity: 48 %
Air Pressure: 1014 hPa	Power: 5 VDC
Remarks:	

High carrier frequency:



122980 MHz





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Test procedure:	ANSI C63.10, Sections 9.9, 9.12
Test mode:	Compliance
Date(s):	04-Jan-21
Temperature: 22 °C	Relative Humidity: 48 %
Air Pressure: 1014 hPa	Power: 5 VDC
Remarks:	

Plot 7.5.3 Spurious emission measurements in 60 - 70 GHz range

TEST SITE:

OATS

TEST DISTANCE:

3 m

MODULATION:

CW

ANTENNA POLARIZATION:

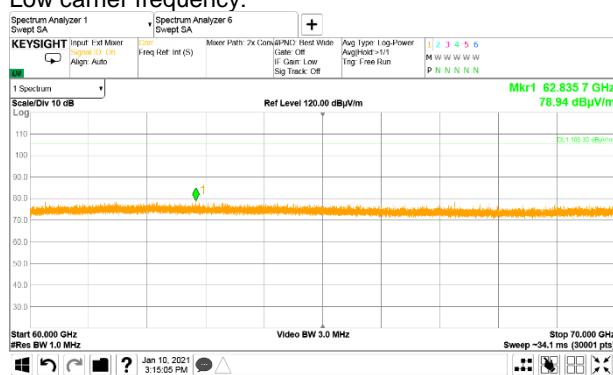
Vertical and Horizontal

DETECTOR: Peak RBW = 1 MHz; VBW = 3 MHz

DETECTOR: Peak RBW = 1 MHz; VBW = 100 kHz

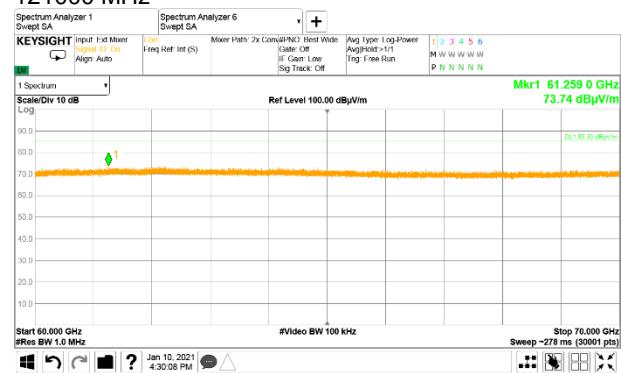
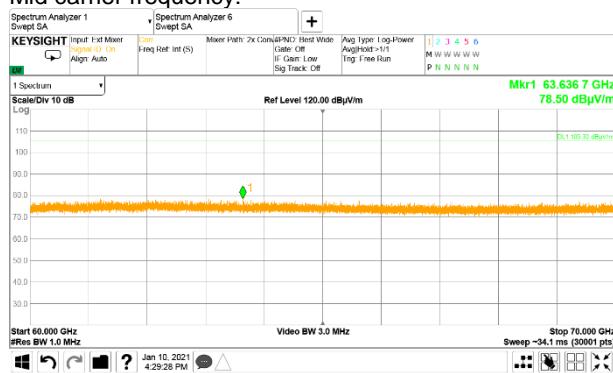
Low carrier frequency:

119000 MHz



Mid carrier frequency:

121000 MHz



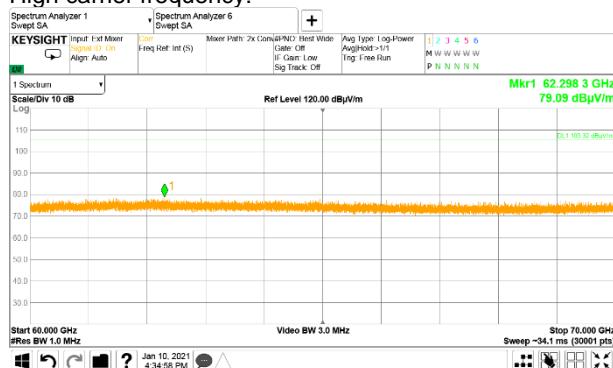


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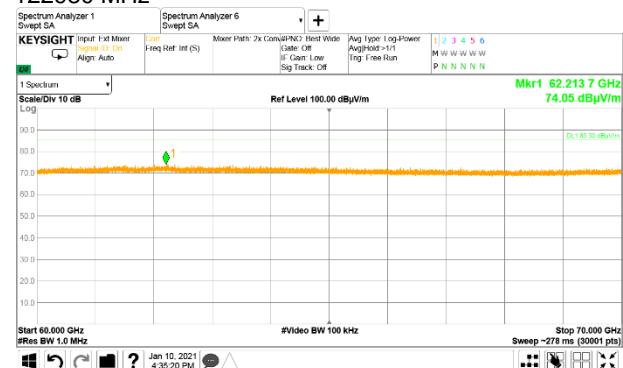
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Test procedure:	ANSI C63.10, Sections 9.9, 9.12		
Test mode:	Compliance		
Date(s):	04-Jan-21	Verdict:	PASS
Temperature: 22 °C	Relative Humidity: 48 %	Air Pressure: 1014 hPa	Power: 5 VDC
Remarks:			

High carrier frequency:



122980 MHz





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Test specification: Section 15.258(c)(3), Out of band radiated emissions above 40 GHz up to 370 GHz			
Test procedure: ANSI C63.10, Sections 9.9, 9.12			
Test mode: Compliance			
Date(s): 04-Jan-21			Verdict: PASS
Temperature: 22 °C	Relative Humidity: 48 %	Air Pressure: 1014 hPa	Power: 5 VDC
Remarks:			

Plot 7.5.4 Spurious emission measurements in 70 - 80 GHz range

TEST SITE:

OATS

TEST DISTANCE:

3 m

MODULATION:

CW

ANTENNA POLARIZATION:

Vertical and Horizontal

DETECTOR: Peak RBW = 1 MHz; VBW = 3 MHz

DETECTOR: Peak RBW = 1 MHz; VBW = 100 kHz

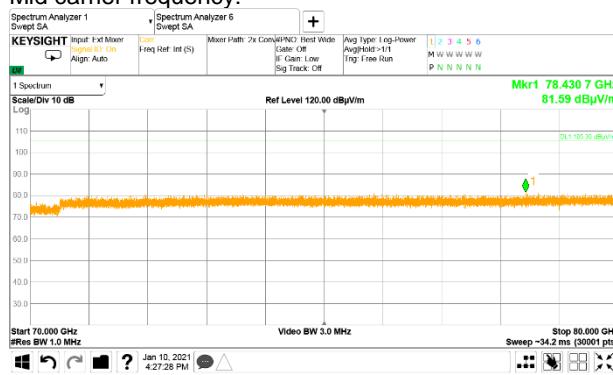
Low carrier frequency:

119000 MHz



Mid carrier frequency:

121000 MHz



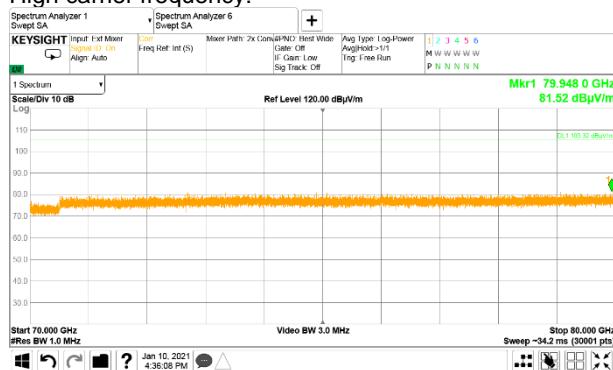


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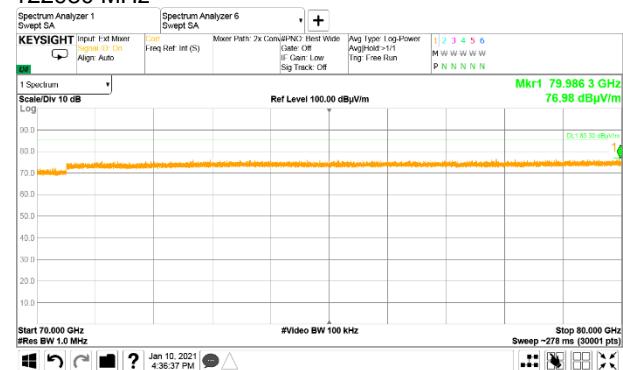
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Test procedure:	ANSI C63.10, Sections 9.9, 9.12		
Test mode:	Compliance		
Date(s):	04-Jan-21	Verdict:	PASS
Temperature: 22 °C	Relative Humidity: 48 %	Air Pressure: 1014 hPa	Power: 5 VDC
Remarks:			

High carrier frequency:



122980 MHz





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Test specification: Section 15.258(c)(3), Out of band radiated emissions above 40 GHz up to 370 GHz			
Test procedure: ANSI C63.10, Sections 9.9, 9.12			
Test mode: Compliance			
Date(s): 04-Jan-21			Verdict: PASS
Temperature: 22 °C	Relative Humidity: 48 %	Air Pressure: 1014 hPa	Power: 5 VDC
Remarks:			

Plot 7.5.5 Spurious emission measurements in 80 - 90 GHz range

TEST SITE:

OATS

TEST DISTANCE:

3 m

MODULATION:

CW

ANTENNA POLARIZATION:

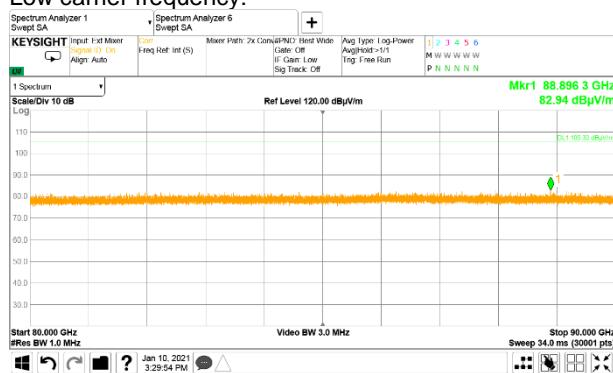
Vertical and Horizontal

DETECTOR: Peak RBW = 1 MHz; VBW = 3 MHz

DETECTOR: Peak RBW = 1 MHz; VBW = 100 kHz

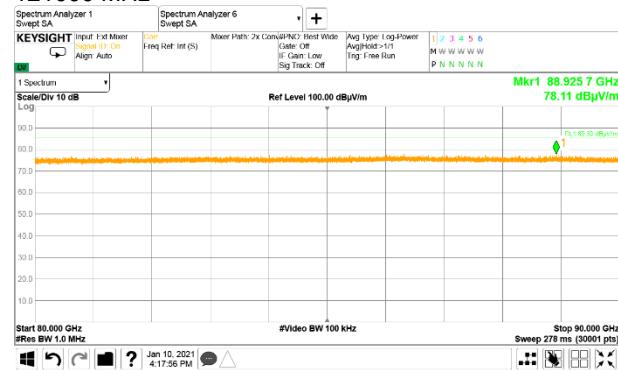
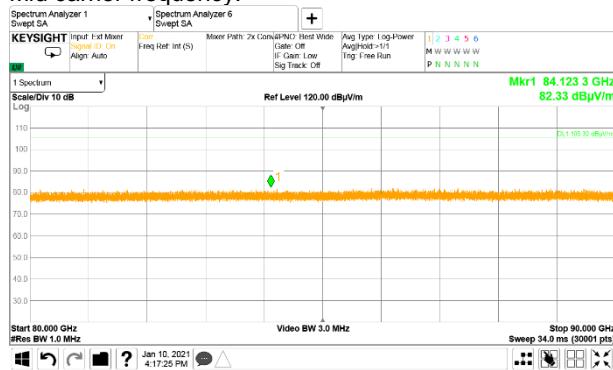
Low carrier frequency:

119000 MHz



Mid carrier frequency:

121000 MHz



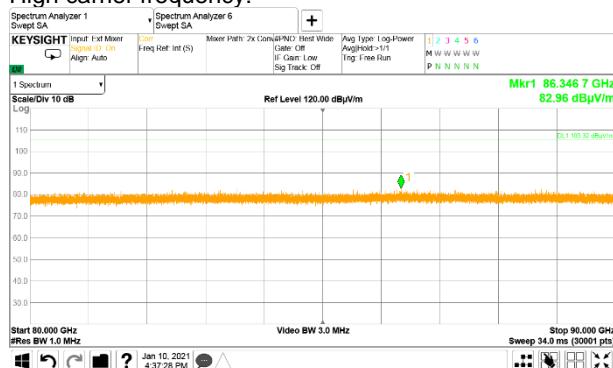


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Test procedure:	ANSI C63.10, Sections 9.9, 9.12		
Test mode:	Compliance		
Date(s):	04-Jan-21		
Temperature: 22 °C	Relative Humidity: 48 %	Air Pressure: 1014 hPa	Power: 5 VDC
Remarks:			

High carrier frequency:



122980 MHz

