

TEST REPORT

ACCORDING TO: FCC 47CFR part 15 subpart C § 15.247 (DTS) and subpart B,
RSS-247 issue 2, RSS-Gen issue 5, ICES-003 Issue 5:2012

FOR:

Visonic Ltd.

PIR detector with ZigBee protocol

Model: MP-841

FCC ID: WP3MP841

IC: 1467C-MP841

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1 Applicant information

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Telephone: +972 3645 6832
Fax: +972 3645 6788
E-mail: zuri.rubin@jci.com
Contact name: Mr. Zuri Rubin

2 Equipment under test attributes

Product name: PIR detector ZigBee
Product type: Transceiver
Model(s): MP-841
Serial number: NA
Hardware version: 90-207852
Software release: JS-703041
Receipt date 05-Jun-20

3 Manufacturer information

Manufacturer name: Visonic Ltd.
Address: 24 Habarzel street, Tel Aviv 69710, Israel
Telephone: +972 3645 6832
Fax: +972 3645 6788
E-Mail: zuri.rubin@jci.com
Contact name: Mr. Zuri Rubin

4 Test details

Project ID: 39116
Location: Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started: 19-Jun-20
Test completed: 03-Jul-20
Test specification(s): FCC 47CFR part 15 subpart C § 15.247 (DTS);
RSS-247 issue 2, RSS-Gen issue 5

5 Tests summary

Test	Status
Transmitter characteristics	
FCC section 15.247(a)2 / RSS-247 section 5.2(1), 6 dB bandwidth	Pass
FCC section 15.247(b)3/ RSS-247 section 5.4(4), Peak output power	Pass*
FCC section 15.247(i) / RSS-102 section 2.5.2, RF exposure	Pass, the exhibit to the application of certification is provided
FCC section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions	Pass*
FCC section 15.247(d)/ RSS-247 section 5.5, Emissions at band edges	Pass
FCC section 15.247(e) / RSS-247 section 5.2(2), Peak power density	Pass
FCC section 15.203 / RSS-Gen section 8.3, Antenna requirement	Pass
FCC section 15.207(a) / RSS-Gen section 8.8, Conducted emission	Not required
Unintentional emissions	
FCC section 15.107/ ICES-003, Section 6.1, Class B, Conducted emission at AC power port	Not required
FCC section 15.109/ RSS-Gen section 7.1.2 /ICES-003, Section 6.2, Class B, Radiated emission	Pass

This test report is based on the test report VISRAD_FCC.27931_Rev1 issued by Hermon Laboratories assuming that the EUT approved under FCC ID: WP3MP841 and IC: 1467C-MP841.




The EUT were revised with the following changes:

1. The PYRO was changed due to EOL. The change affect the resistor value for ideal PYRO operation.

*The relevant tests (listed above) were performed to support Application for Class II permissive changes certification.

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, EMC & Radio	19-Jun-20 – 03-Jul-20	
Reviewed by:	Mrs. S. Peysahov Sheynin, test engineer, EMC & Radio	08-Jul-20	
Approved by:	Mr. S. Samokha, technical manager, EMC & Radio	16-Jul-20	

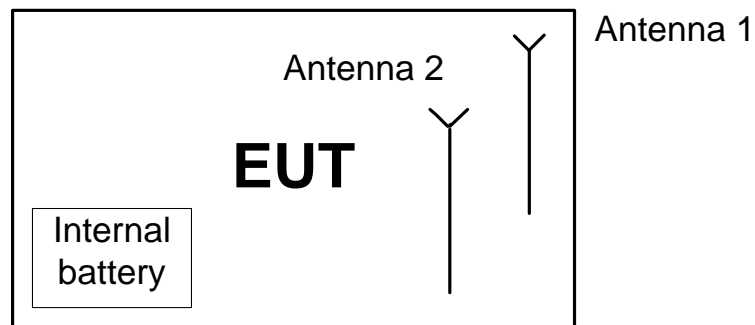


6 EUT description

6.1 General information

The EUT, MP-841, is a wireless PIR detector with RF module using @2.4 GHz ZigBee protocol, and provided with two antennas of transmit/receive diversity - two working separate, collocated antennas for transmit and receive functions.

6.2 Test configuration



6.3 Changes made in the EUT

No changes were implemented in the EUT during the testing.



6.4 Transmitter characteristics

Type of equipment							
X	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					
	fixed	Always at a distance more than 2 m from all people					
X	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 ranges		2400 -2483.5 MHz					
Operating frequencies		2405-2480 MHz					
Maximum rated output power		At transmitter 50 Ω RF output connector		dBm			
		Peak output power		21.5 dBm			
Is transmitter output power variable?		X	No				
			Yes	continuous variable			
				stepped variable with stepsize			dB
				minimum RF power			dBm
	maximum RF power			dBm			
Antenna connection							
unique coupling		standard connector		X	integral		
				X	with temporary RF connector		
					without temporary RF connector		
Antenna/s technical characteristics							
Type	Manufacturer	Model number		Gain			
Integral antenna 1	Visonic	Printed		0 dBi			
Integral antenna 2	Visonic	Printed		0 dBi			
Transmitter aggregate data rate		250 kbps					
Type of modulation		OQPSK					
Transmitter power source							
X	Battery	Nominal rated voltage	3 VDC	Battery type	Two Lithium CR123 batteries		
	DC	Nominal rated voltage					
	AC mains	Nominal rated voltage		Frequency			
Common power source for transmitter and receiver				X	yes	no	



Test specification:	Section 15.247(a)2 / RSS-247 section 5.2(1), 6 dB bandwidth		
Test procedure:	ANSI C63.10 section 11.8.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	18-Feb-16 - 03-Mar-16		
Temperature: 22 °C	Air Pressure: 1019 hPa	Relative Humidity: 43 %	Power Supply: Battery
Remarks:			

7 Transmitter tests according to 47CFR part 15 subpart C and RSS-247 requirements

7.1 Minimum 6 dB bandwidth

7.1.1 General

This test was performed to measure the 6 dB bandwidth of the EUT carrier frequency. Specification test limits are given in Table 7.1.1, Table 7.1.2.

Table 7.1.1 The 6 dB bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points*, dBc	Minimum bandwidth, kHz
902.0 – 928.0	6.0	>500.0
2400.0 – 2483.5		
5725.0 – 5850.0		

* - Modulation envelope reference points provided in terms of attenuation below the peak of modulated carrier.

Table 7.1.2 The 99% bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points	Limit, kHz
902.0 – 928.0	99%	>500.0
2400.0 – 2483.5		
5725.0 – 5850.0		

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 set to transmit modulated carrier.

7.1.2.3 The transmitter minimum 6 dB bandwidth was measured with spectrum analyzer as frequency delta between reference points on modulation envelope and provided in Table 7.1.3 and the associated plots.

7.1.2.4 The 99% bandwidth results are provided in Table 7.1.4 and the associated plots.

Figure 7.1.1 The 6 dB bandwidth test setup





Test specification:	Section 15.247(a)2 / RSS-247 section 5.2(1), 6 dB bandwidth		
Test procedure:	ANSI C63.10 section 11.8.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	18-Feb-16 - 03-Mar-16		
Temperature: 22 °C	Air Pressure: 1019 hPa	Relative Humidity: 43 %	Power Supply: Battery
Remarks:			

Table 7.1.3 The 6 dB bandwidth test results

ASSIGNED FREQUENCY BAND: 2400-2483.5 MHz
DETECTOR USED: Peak
SWEEP MODE: Max hold
SWEEP TIME: Auto
RESOLUTION BANDWIDTH: 100 kHz
VIDEO BANDWIDTH: 3 RBW
MODULATION: OQPSK
BIT RATE: 250 kbps

CONFIGURATION: Antenna 1

Carrier frequency, MHz	6 dB bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
2405	1631.0	500	1131.0	Pass
2445	1612.0	500	1112.0	Pass
2475	1693.0	500	1193.0	Pass
2480	1609.0	500	1109.0	Pass

CONFIGURATION: Antenna 2

Carrier frequency, MHz	6 dB bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
2405	1578.0	500	1078.0	Pass
2445	1589.0	500	1089.0	Pass
2475	1612.0	500	1112.0	Pass
2480	1645.0	500	1145.0	Pass

Table 7.1.4 The 99% bandwidth test results

ASSIGNED FREQUENCY BAND: 2400-2483.5 MHz
DETECTOR USED: Peak
SWEEP MODE: Max hold
SWEEP TIME: Auto
RESOLUTION BANDWIDTH: 100 kHz
VIDEO BANDWIDTH: 3 RBW
MODULATION: OQPSK
BIT RATE: 250 kbps

CONFIGURATION: Antenna 1

Carrier frequency, MHz	99% bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
2405	2429.1	500	1929.1	Pass
2445	2388.2	500	1888.2	Pass
2475	2427.4	500	1927.4	Pass
2480	2410.4	500	1910.4	Pass

CONFIGURATION: Antenna 2

Carrier frequency, MHz	99% bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
2405	2364.4	500	1864.4	Pass
2445	2392.2	500	1892.2	Pass
2475	2377.4	500	1877.4	Pass
2480	2398.3	500	1898.3	Pass

Reference numbers of test equipment used

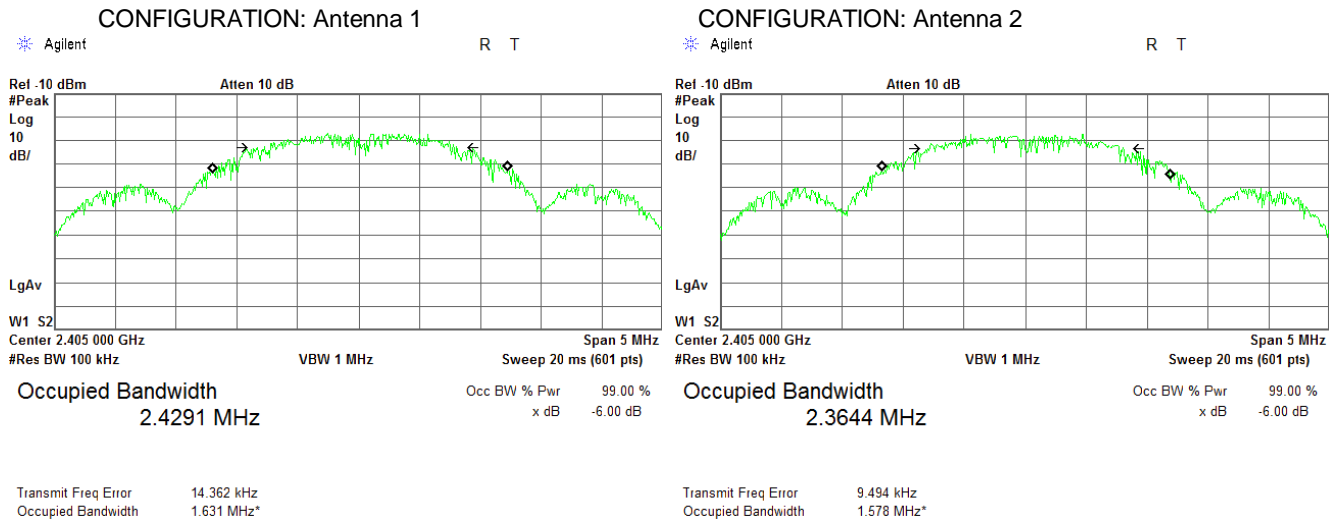
HL 0415	HL 1984	HL 4294	HL 4778				
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Full description is given in Appendix A.

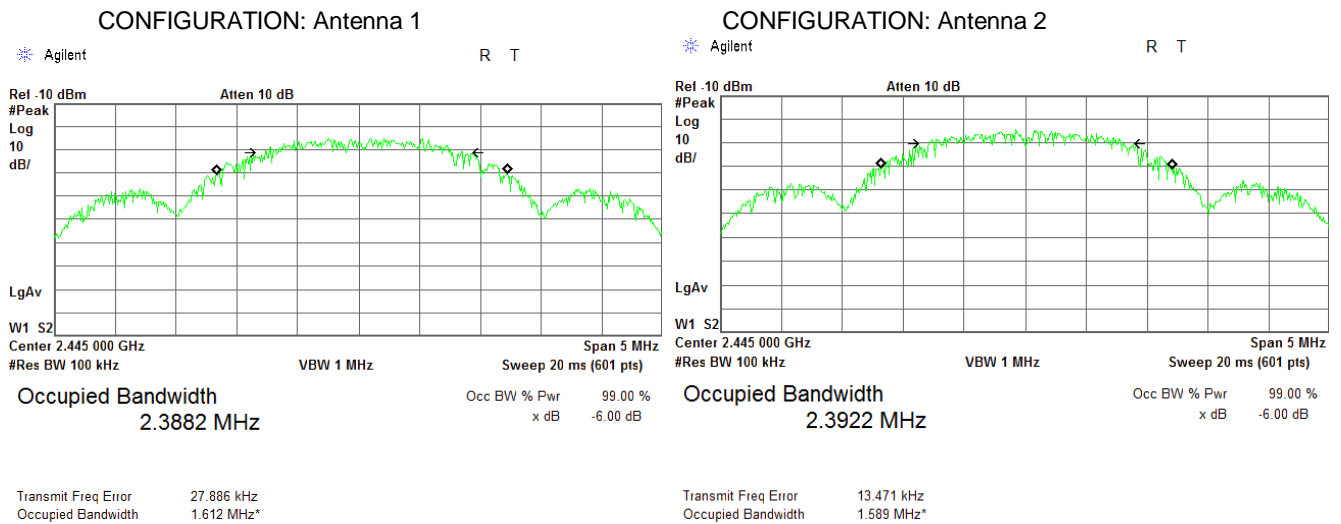


Test specification:	Section 15.247(a)2 / RSS-247 section 5.2(1), 6 dB bandwidth		
Test procedure:	ANSI C63.10 section 11.8.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	18-Feb-16 - 03-Mar-16		
Temperature: 22 °C	Air Pressure: 1019 hPa	Relative Humidity: 43 %	Power Supply: Battery
Remarks:			

Plot 7.1.1 The 6 dB bandwidth test result at low frequency ch.11



Plot 7.1.2 The 6 dB bandwidth test result at mid frequency ch.19

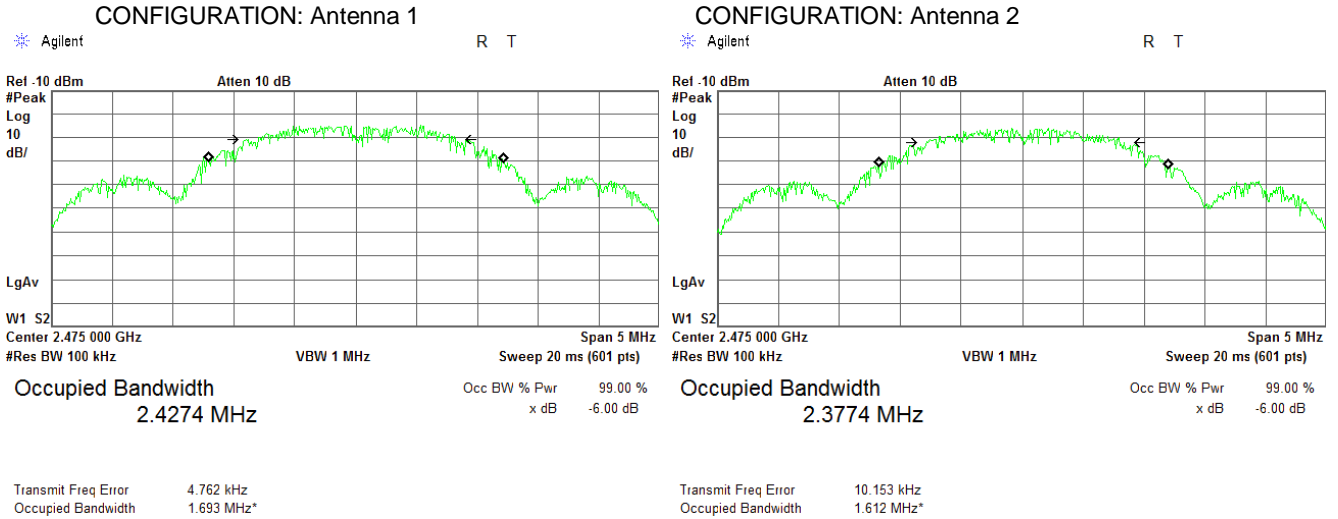




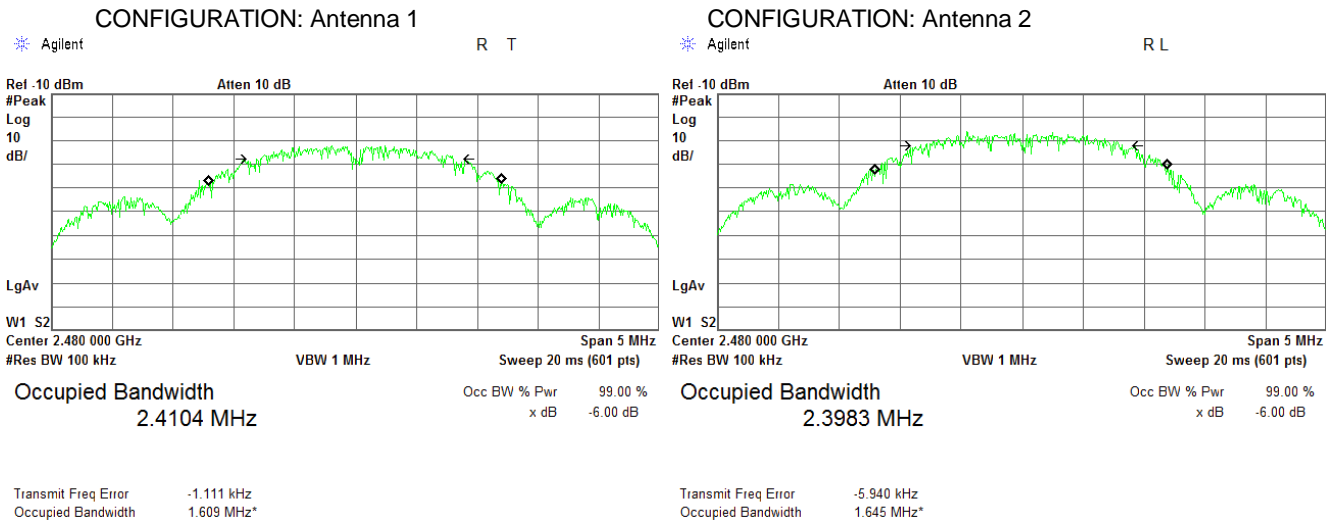
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Test specification: Section 15.247(a)2 / RSS-247 section 5.2(1), 6 dB bandwidth			
Test procedure: ANSI C63.10 section 11.8.1			
Test mode: Compliance	Verdict: PASS		
Date(s): 18-Feb-16 - 03-Mar-16			
Temperature: 22 °C	Air Pressure: 1019 hPa	Relative Humidity: 43 %	Power Supply: Battery
Remarks:			

Plot 7.1.3 The 6 dB bandwidth test result at high frequency ch.25



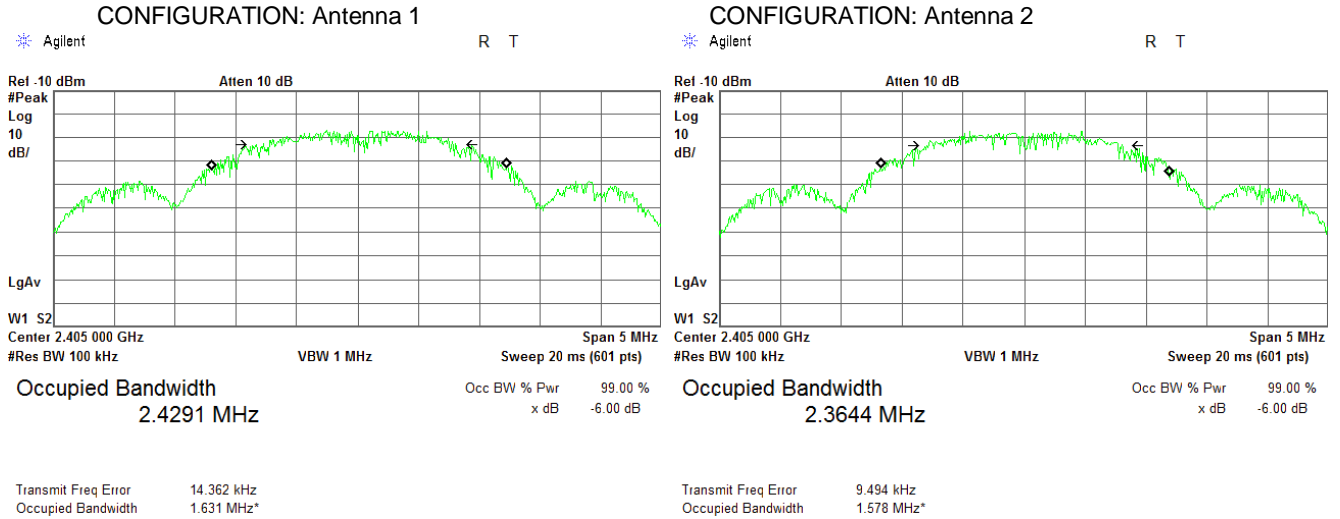
Plot 7.1.4 The 6 dB bandwidth test result at high frequency ch.26



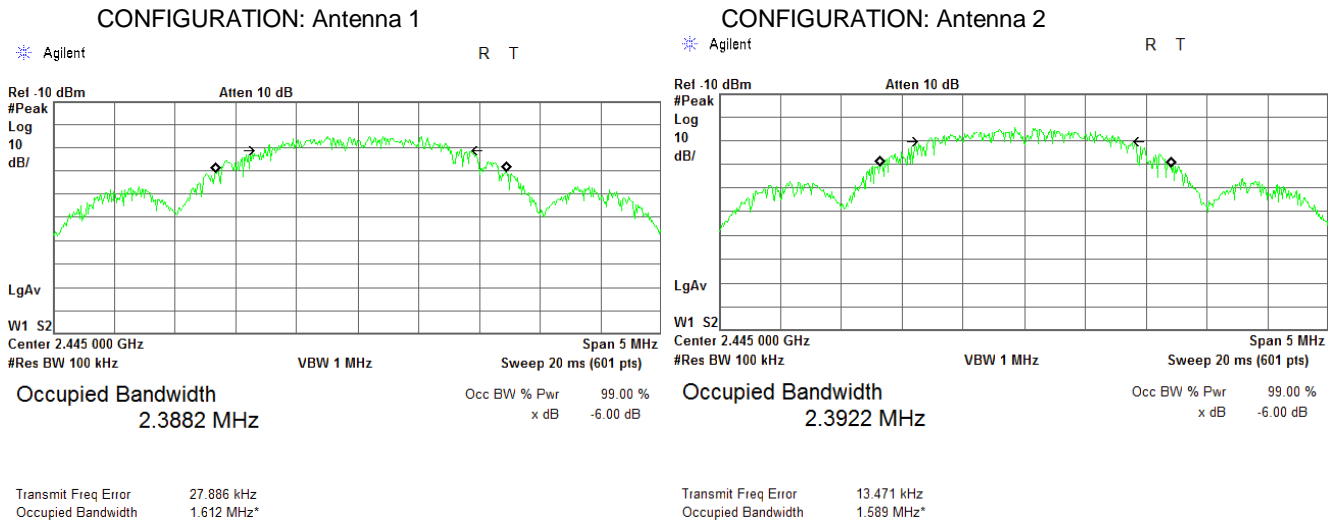


Test specification: Section 15.247(a)2 / RSS-247 section 5.2(1), 6 dB bandwidth			
Test procedure: ANSI C63.10 section 11.8.1			
Test mode: Compliance	Verdict: PASS		
Date(s): 18-Feb-16 - 03-Mar-16			
Temperature: 22 °C	Air Pressure: 1019 hPa	Relative Humidity: 43 %	Power Supply: Battery
Remarks:			

Plot 7.1.5 The 99% bandwidth test result at low frequency ch.11



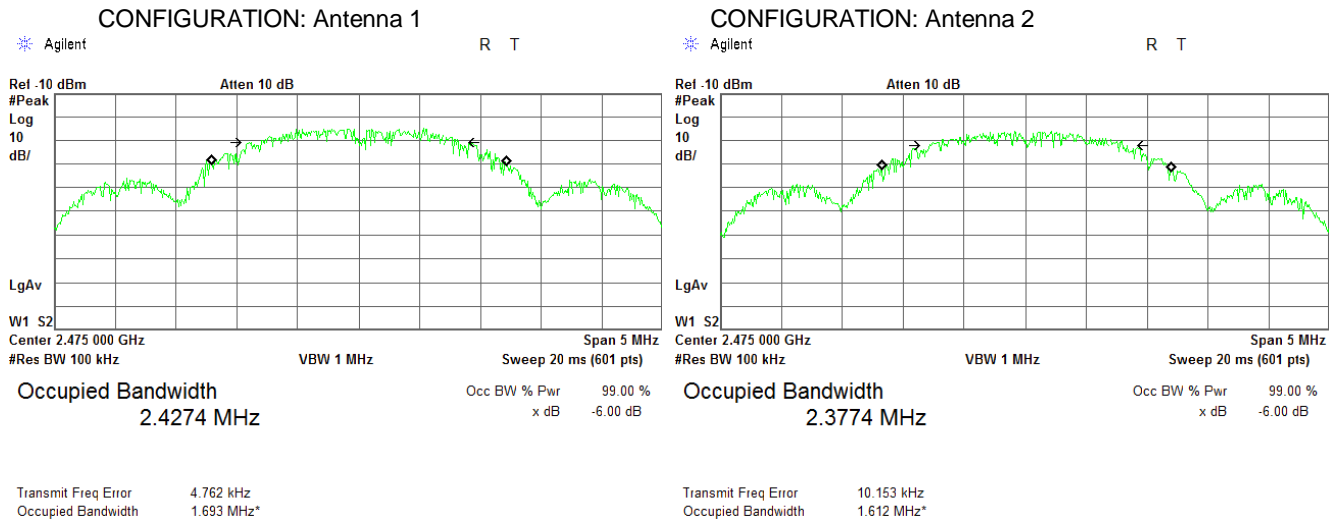
Plot 7.1.6 The 99% bandwidth test result at mid frequency ch.19



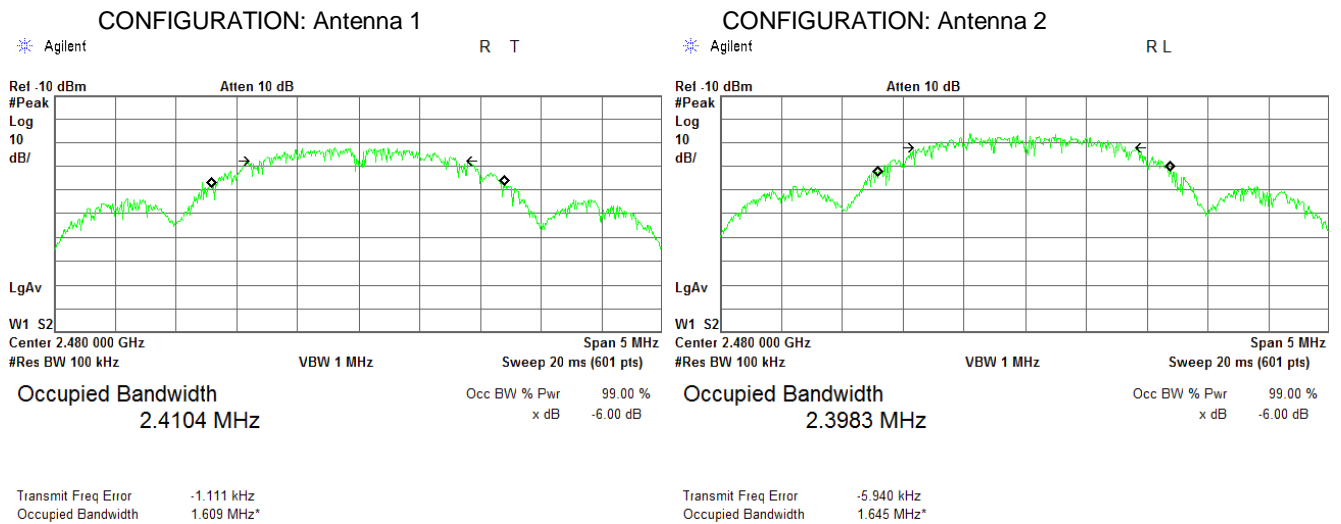


Test specification:		Section 15.247(a)2 / RSS-247 section 5.2(1), 6 dB bandwidth	
Test procedure:		ANSI C63.10 section 11.8.1	
Test mode:		Compliance	
Date(s):		18-Feb-16 - 03-Mar-16	
Temperature: 22 °C		Air Pressure: 1019 hPa	
Relative Humidity: 43 %		Power Supply: Battery	
Remarks:			

Plot 7.1.7 The 99% bandwidth test result at high frequency ch.25



Plot 7.1.8 The 99% bandwidth test result at high frequency ch.26





Test specification:	Section 15.247(b)3 / RSS-247 section 5.4(4), Peak output power		
Test procedure:	ANSI C63.10 section 11.9		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 22.5 °C	Air Pressure: 1018 hPa	Relative Humidity: 43 %	Power Supply: Battery
Remarks:			

7.2 Peak output power

7.2.1 General

This test was performed to measure the maximum peak output power radiated by transmitter. Specification test limits are given in Table 7.2.1.

Table 7.2.1 Peak output power limits

Assigned frequency range, MHz	Maximum antenna gain, dBi	Peak output power*		Equivalent field strength limit @ 3m, dB(μV/m)**
		W	dBm	
902.0 – 928.0	6.0	1.0	30.0	131.2
2400.0 – 2483.5				
5725.0 – 5850.0				

*- The limit is provided in terms of conducted RF power at the antenna connector. If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power limit shall be reduced below the stated value as follows:

by 1 dB for every 3 dB that the directional gain of antenna exceeds 6 dBi for fixed point-to-point transmitters operate in 2400-2483.5 MHz band;

without any corresponding reduction for fixed point-to-point transmitters operate in 5725-5850 MHz band; by the amount in dB that the directional gain of antenna exceeds 6 dBi for the rest of transmitters.

**- Equivalent field strength limit was calculated from the peak output power as follows: $E = \sqrt{30 \times P \times G} / r$, where P is peak output power in Watts, r is antenna to EUT distance in meters and G is transmitter antenna gain in dBi.

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 adjusted to produce maximum available to end user RF output power.

7.2.2.3 The resolution bandwidth of spectrum analyzer was set wider than 6 dB bandwidth of the EUT and the field strength of the EUT carrier frequency was measured with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360° and the measuring antenna height was swept in both vertical and horizontal polarizations.

7.2.2.4 The maximum field strength of the EUT carrier frequency was measured as provided in Table 7.2.2 and associated plots.

7.2.2.5 The maximum peak output power was calculated from the field strength of carrier as follows:

$$P = (E \times d)^2 / (30 \times G),$$

where P is the peak output power in W, E is the field strength in V/m, d is the test distance and G is the transmitter numeric antenna gain over an isotropic radiator.

The above equation was converted in logarithmic units for 3 m test distance:

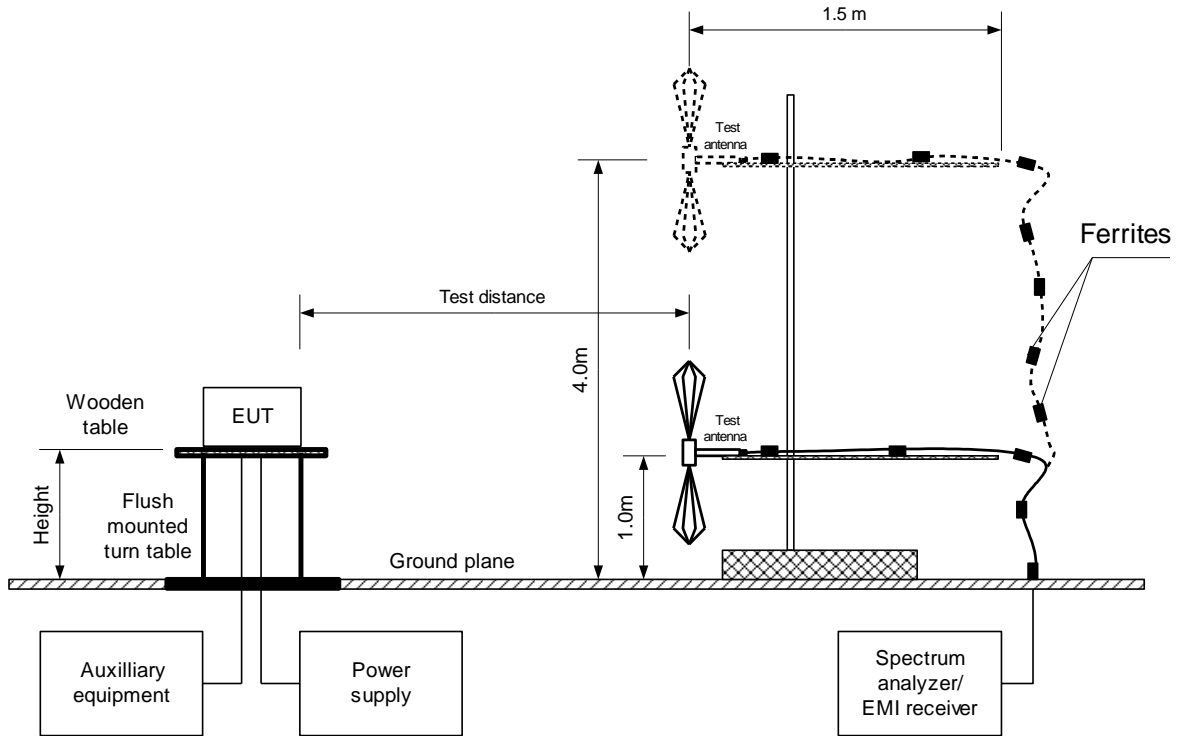
$$\text{Peak output power in dBm} = \text{Field strength in dB}(\mu\text{V/m}) - \text{Transmitter antenna gain in dBi} - 95.23 \text{ dB}$$

7.2.2.6 The worst test results (the lowest margins) were recorded in Table 7.2.2.



Test specification:	Section 15.247(b)3 / RSS-247 section 5.4(4), Peak output power		
Test procedure:	ANSI C63.10 section 11.9		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 22.5 °C	Air Pressure: 1018 hPa	Relative Humidity: 43 %	Power Supply: Battery
Remarks:			

Figure 7.2.1 Setup for carrier field strength measurements





Test specification:	Section 15.247(b)3 / RSS-247 section 5.4(4), Peak output power		
Test procedure:	ANSI C63.10 section 11.9		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 22.5 °C	Air Pressure: 1018 hPa	Relative Humidity: 43 %	Power Supply: Battery
Remarks:			

Table 7.2.2 Peak output power test results

ASSIGNED FREQUENCY: 2400 - 2483.5 MHz
 TEST DISTANCE: 3 m
 TEST SITE: Semi anechoic chamber
 EUT HEIGHT: 1.5 m
 DETECTOR USED: Peak
 TEST ANTENNA TYPE: Biconilog (30 MHz – 1000 MHz)
 Double ridged guide (above 1000 MHz)

MODULATION: OQPSK
 BIT RATE: 250 kbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 DETECTOR USED: Peak
 EUT 6 dB BANDWIDTH: 1.65 MHz
 RESOLUTION BANDWIDTH: 3 MHz
 VIDEO BANDWIDTH: 3 MHz

EUT ANTENNA: 1

Frequency, MHz	Field strength, dB(μV/m)	Antenna polarization	Antenna height, m	Azimuth, degrees*	EUT antenna gain, dBi	Peak output power, dBm**	Limit, dBm	Margin, dB***	Verdict
2405	116.7	Horizontal	1.6	-4	0	21.5	30.0	-8.5	Pass
2445	114.9	Horizontal	1.6	0	0	19.7	30.0	-10.3	Pass
2475	114.4	Horizontal	1.6	0	0	19.2	30.0	-10.8	Pass
2480	100.0	Horizontal	1.5	-10	0	4.8	30.0	-25.2	Pass

EUT ANTENNA: 2

Frequency, MHz	Field strength, dB(μV/m)	Antenna polarization	Antenna height, m	Azimuth, degrees*	EUT antenna gain, dBi	Peak output power, dBm**	Limit, dBm	Margin, dB***	Verdict
2405	113.1	Vertical	1.8	78	0	17.9	30.0	-12.1	Pass
2445	112.8	Vertical	1.6	78	0	17.6	30.0	-12.4	Pass
2475	112.6	Vertical	1.6	78	0	17.4	30.0	-12.6	Pass
2480	99.13	Vertical	1.8	80	0	3.93	30.0	-26.07	Pass

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

** - Peak output power was calculated from the field strength of carrier as follows: $P = (E \times d)^2 / (30 \times G)$, where P is the peak output power in W, E is the field strength in V/m, d is the test distance in meters and G is the transmitter numeric antenna gain over an isotropic radiator. The above equation was converted in logarithmic units for 3 m test distance: *Peak output power in dBm = Field strength in dB(μV/m) - Transmitter antenna gain in dBi - 95.23 dB*

*** - Margin = Peak output power – specification limit.

Reference numbers of test equipment used

HL 2780	HL 2432	HL 3903	HL 5665				
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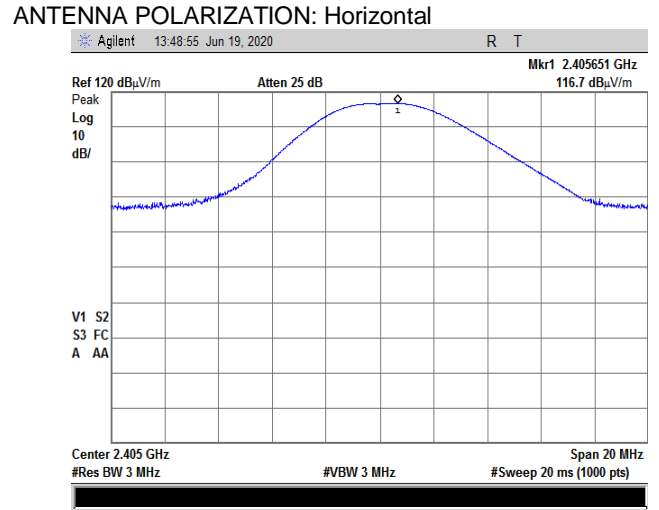
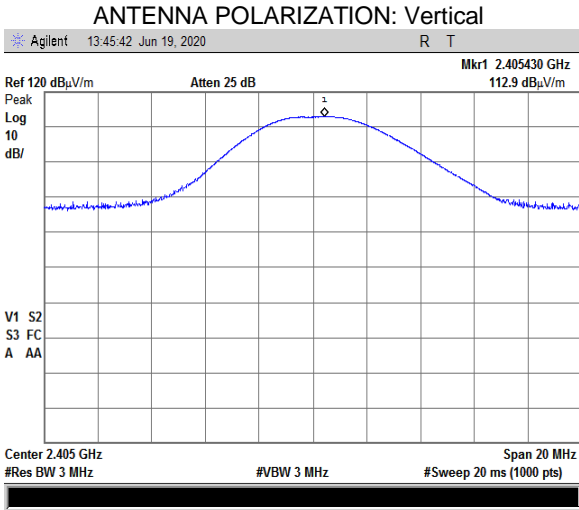
Full description is given in Appendix A.



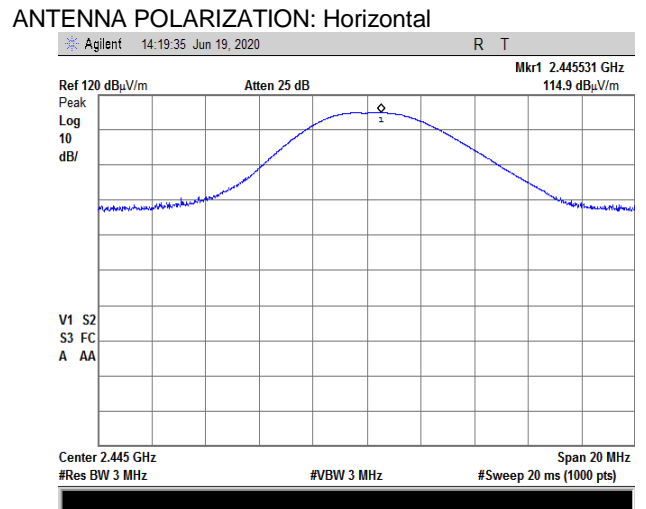
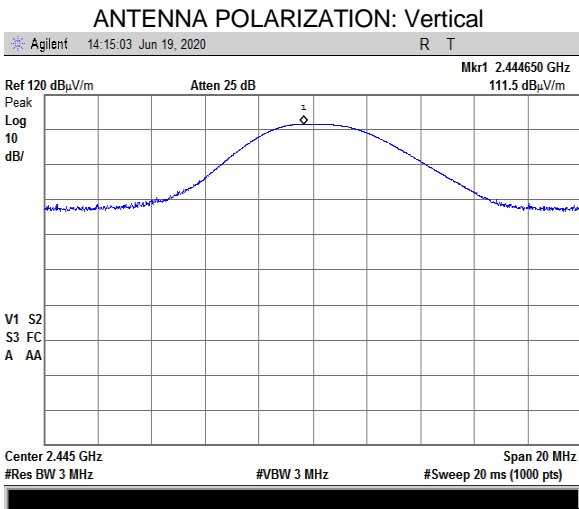
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Test specification: Section 15.247(b)3 / RSS-247 section 5.4(4), Peak output power			
Test procedure: ANSI C63.10 section 11.9			
Test mode: Compliance		Verdict: PASS	
Date(s): 19-Jun-20 - 03-Jul-20			
Temperature: 22.5 °C	Air Pressure: 1018 hPa	Relative Humidity: 43 %	Power Supply: Battery
Remarks:			

Plot 7.2.1 Field strength of carrier at low frequency ch.11, Antenna 1



Plot 7.2.2 Field strength of carrier at mid frequency ch.19, Antenna 1

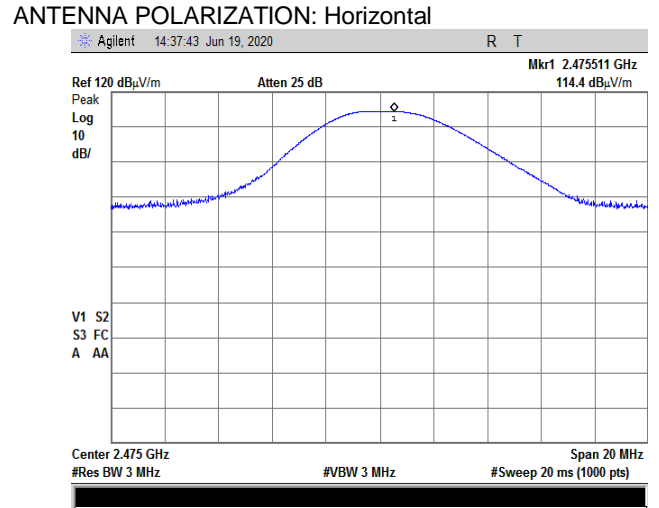
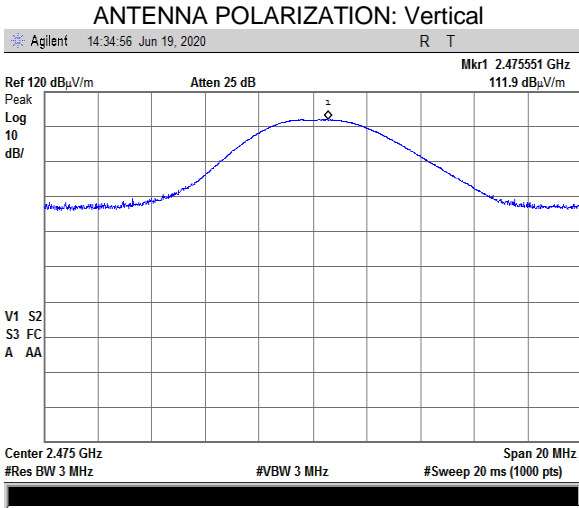




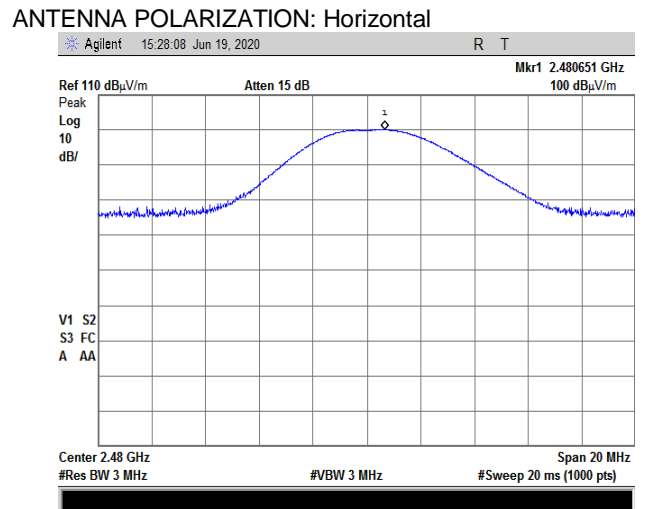
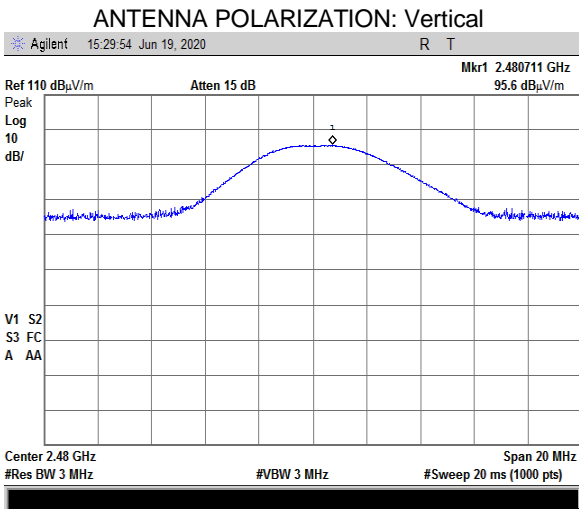
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Test specification: Section 15.247(b)3 / RSS-247 section 5.4(4), Peak output power			
Test procedure: ANSI C63.10 section 11.9			
Test mode: Compliance		Verdict: PASS	
Date(s): 19-Jun-20 - 03-Jul-20			
Temperature: 22.5 °C	Air Pressure: 1018 hPa	Relative Humidity: 43 %	Power Supply: Battery
Remarks:			

Plot 7.2.3 Field strength of carrier at high frequency ch.25, Antenna 1



Plot 7.2.4 Field strength of carrier at high frequency ch.26, Antenna 1

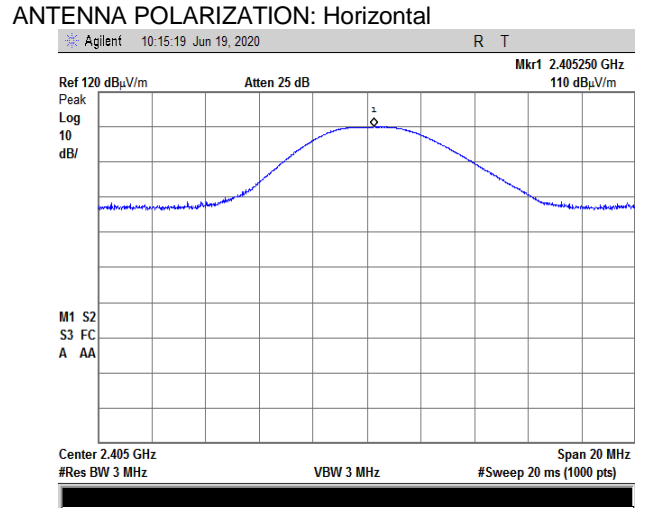
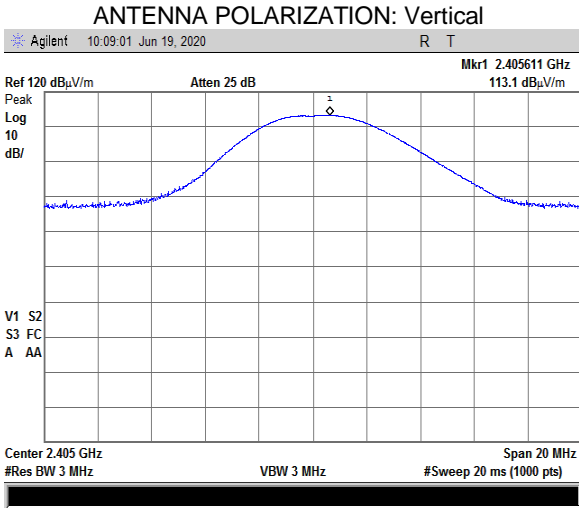




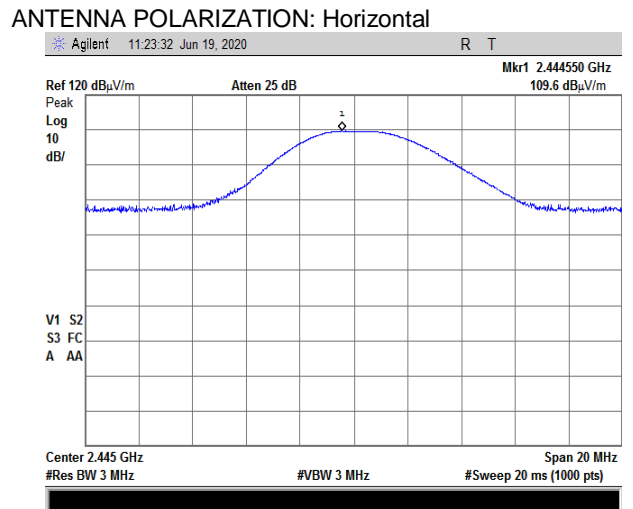
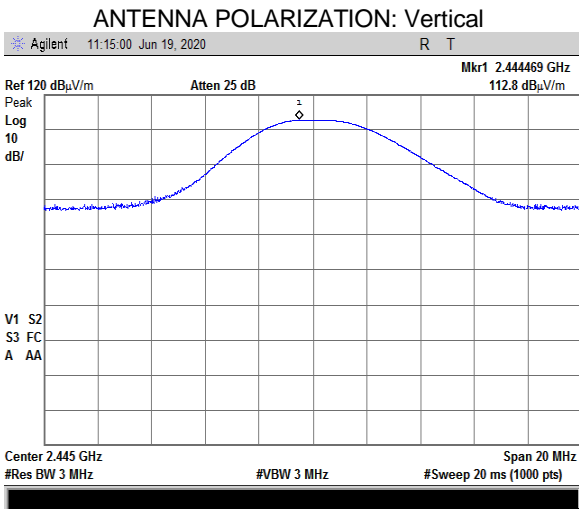
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Test specification: Section 15.247(b)3 / RSS-247 section 5.4(4), Peak output power			
Test procedure: ANSI C63.10 section 11.9			
Test mode: Compliance		Verdict: PASS	
Date(s): 19-Jun-20 - 03-Jul-20			
Temperature: 22.5 °C	Air Pressure: 1018 hPa	Relative Humidity: 43 %	Power Supply: Battery
Remarks:			

Plot 7.2.5 Field strength of carrier at low frequency ch.11, Antenna 2



Plot 7.2.6 Field strength of carrier at low frequency ch.19, Antenna 2

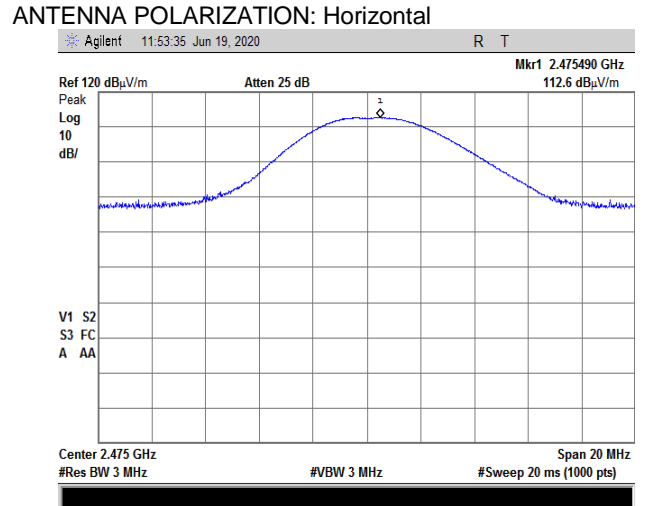
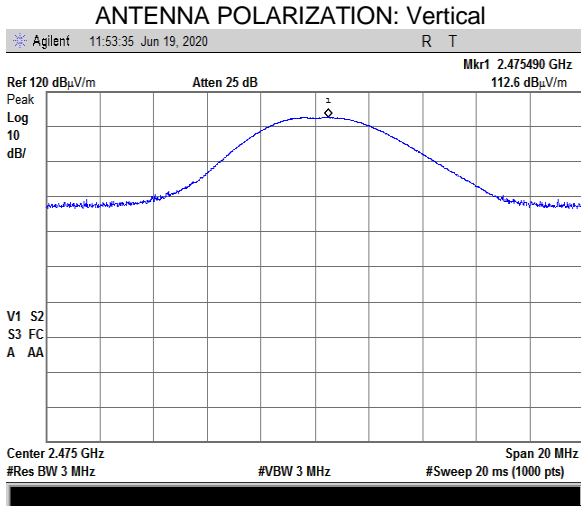




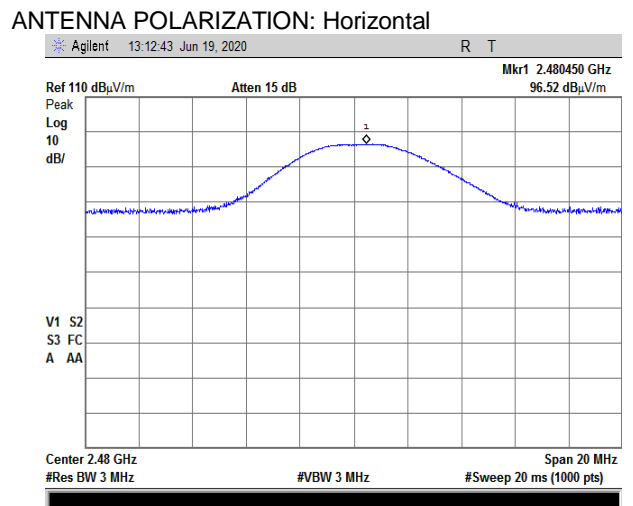
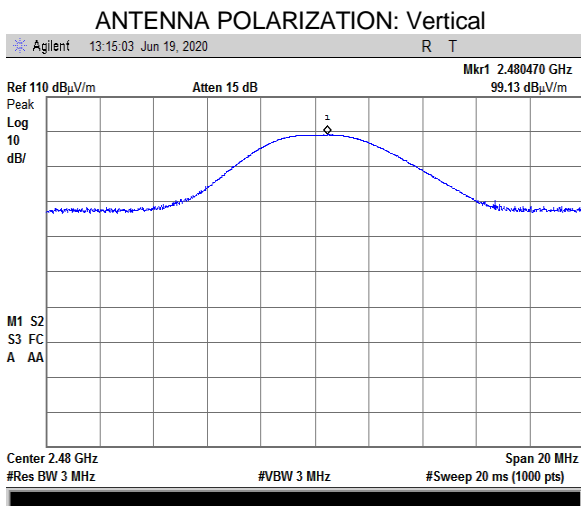
HERMON LABORATORIES

Test specification: Section 15.247(b)3 / RSS-247 section 5.4(4), Peak output power			
Test procedure: ANSI C63.10 section 11.9			
Test mode: Compliance		Verdict: PASS	
Date(s): 19-Jun-20 - 03-Jul-20			
Temperature: 22.5 °C	Air Pressure: 1018 hPa	Relative Humidity: 43 %	Power Supply: Battery
Remarks:			

Plot 7.2.7 Field strength of carrier at low frequency ch.25, Antenna 2



Plot 7.2.8 Field strength of carrier at low frequency ch.26, Antenna 2





Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

7.3 Field strength of spurious emissions

7.3.1 General

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

Table 7.3.1 Radiated spurious emissions limits

Frequency, MHz	Field strength at 3 m within restricted bands, dB(μV/m)*			Attenuation of field strength of spurious versus carrier outside restricted bands, dBc***
	Peak	Quasi Peak	Average	
0.009 – 0.090	148.5 – 128.5	NA	128.5 – 108.5**	20.0
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 – 10 th harmonic	74.0	NA	54.0	

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

$$\text{Lim}_{S_2} = \text{Lim}_{S_1} + 40 \log (S_1/S_2),$$

where S₁ and S₂ – standard defined and test distance respectively in meters.

** - The limit decreases linearly with the logarithm of frequency.

*** - The 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.

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° and the measuring antenna was rotated around its vertical axis.

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



Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

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

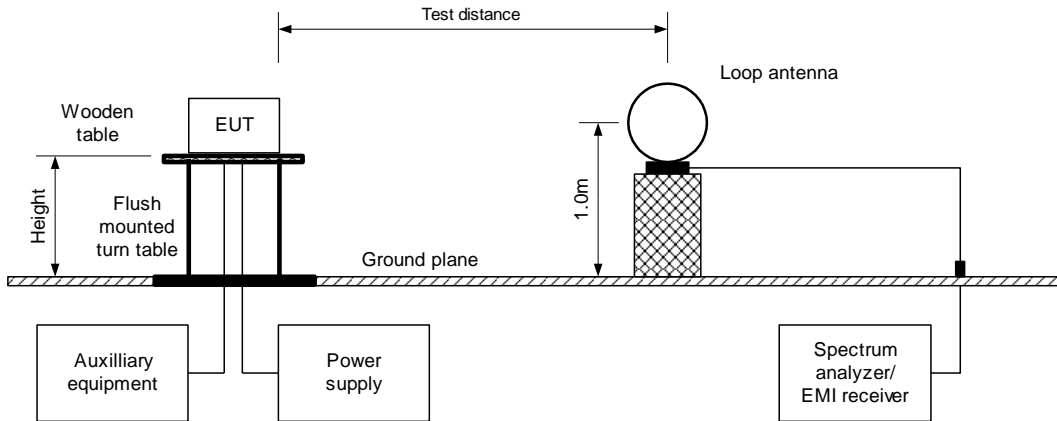
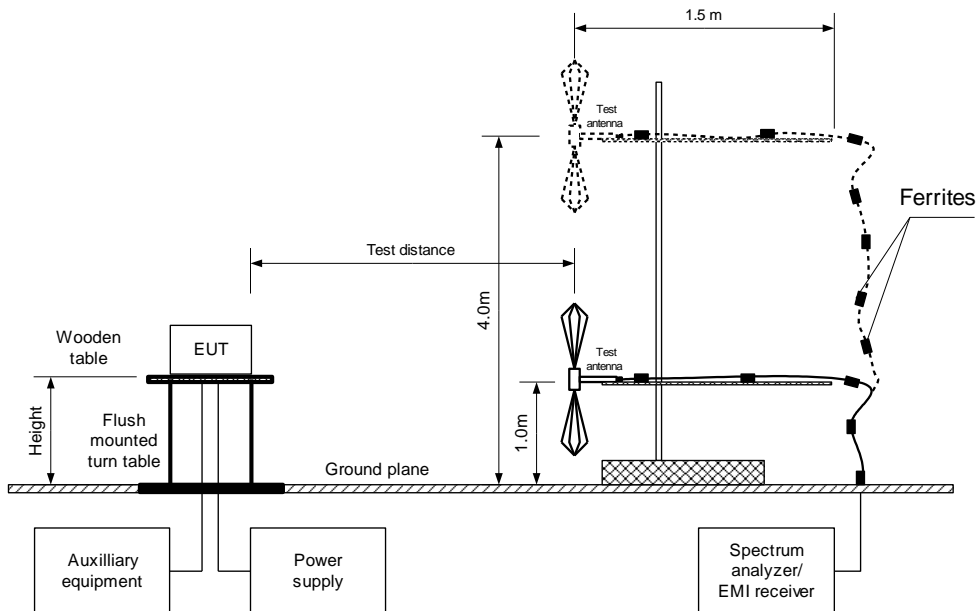


Figure 7.3.2 Setup for spurious emission field strength measurements above 30 MHz





Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

Table 7.3.2 Field strength of emissions outside restricted bands

ASSIGNED FREQUENCY: 2400 – 2483.5 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 - 25000 MHz
 TEST DISTANCE: 3 m
 MODULATION: OQPSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 250 kbps
 DUTY CYCLE: 100 %
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 100 kHz
 VIDEO BANDWIDTH: 300 kHz
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
 Biconilog (30 MHz – 1000 MHz)
 Double ridged guide (above 1000 MHz)
 Antenna 1

EUT CONFIGURATION:

Frequency, MHz	Field strength of spurious, dB(µV/m)	Antenna polarization	Antenna height, m	Azimuth, degrees*	Field strength of carrier, dB(µV/m)	Attenuation below carrier, dBc	Limit, dBc	Margin, dB**	Verdict
Low carrier frequency, Channel 11									
7215	63.16	Vertical	2.3	65	112.8	-49.64	20.0	-29.64	Pass
9620	52.59	Vertical	3.9	130		-60.21		-40.21	
14430	56.51	Vertical	1.0	33		-56.29		-36.29	
16835	56.52	Horizontal	1.3	160		-56.28		-36.28	
Mid carrier frequency, Channel 19									
9780	55.79	Horizontal	1.0	-142	111.0	-55.21	20.0	-35.21	Pass
14670	58.39	Vertical	1.0	30		-52.61		-32.61	
17115	53.49	Horizontal	1.0	143		-57.51		-37.51	
High carrier frequency, Channel 25									
9900	56.92	Horizontal	1.8	-60	110.5	-53.58	20.0	-33.58	Pass
14850	57.31	Vertical	1.1	36		-53.19		-33.19	
17325	49.83	Horizontal	1.3	48		-60.67		-40.67	
High carrier frequency, Channel 26									
No emissions were found									Pass

EUT CONFIGURATION:

Antenna 2

Frequency, MHz	Field strength of spurious, dB(µV/m)	Antenna polarization	Antenna height, m	Azimuth, degrees*	Field strength of carrier, dB(µV/m)	Attenuation below carrier, dBc	Limit, dBc	Margin, dB**	Verdict
Low carrier frequency, Channel 11									
7215	53.67	Horizontal	1.3	-129	109.2	-55.53	20.0	-35.53	Pass
9620	50.57	Horizontal	1.2	-142		-58.63		-38.63	
Mid carrier frequency, Channel 19									
9780	58.00	Vertical	2.0	77	108.9	-50.90	20.0	-30.90	Pass
14670	57.60	Vertical	1.0	-8		-51.30		-31.30	
17115	52.76	Horizontal	1.0	155		-56.14		-36.14	
High carrier frequency, Channel 25									
9900	59.66	Vertical	2.3	83	108.6	-48.94	20.0	-28.94	Pass
14850	59.05	Horizontal	1.3	27		-49.55		-29.55	
17325	48.20	Vertical	3.7	32		-60.40		-40.40	
High carrier frequency, Channel 26									
No emissions were found									Pass

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

**- Margin = Attenuation below carrier – specification limit.



Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

Table 7.3.3 Field strength of spurious emissions above 1 GHz within restricted bands, antenna 1

ASSIGNED FREQUENCY: 2400 – 2483.5 MHz
 INVESTIGATED FREQUENCY RANGE: 1000 - 25000 MHz
 TEST DISTANCE: 3 m
 MODULATION: OQPSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 250 kbps
 DUTY CYCLE: 100 %
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 1000 kHz
 TEST ANTENNA TYPE: Double ridged guide

Frequency, MHz	Antenna		Azimuth, degrees*	Peak field strength			Average field strength				Verdict
	Polarization	Height, m		Measured, dB(µV/m)	Limit, dB(µV/m)	Margin, dB**	Measured, dB(µV/m)	Calculated, dB(µV/m)	Limit, dB(µV/m)	Margin, dB***	
Low carrier frequency 2405 MHz											
4810	Horizontal	1.5	-171	50.45	74.0	-23.55	50.45	38.85	54.0	-15.15	Pass
19240	Horizontal	1.4	57	55.93	74.0	-18.07	55.93	44.33	54.0	-9.67	
Mid carrier frequency 2445 MHz											
4890	Horizontal	1.8	165	52.83	74.0	-21.17	52.83	41.23	54.0	-12.77	Pass
7335	Vertical	2.1	80	64.07	74.0	-9.93	64.07	52.47	54.0	-1.53	
12225	Horizontal	1.0	-158	56.18	74.0	-17.82	56.18	44.58	54.0	-9.42	
22005	Vertical	1.6	62	55.02	74.0	-18.98	55.02	43.42	54.0	-10.58	
High carrier frequency 2475 MHz											
2483.896	Vertical	1.6	78	67.01	74.0	-6.99	58.11	46.51	54.0	-7.49	Pass
4950	Horizontal	1.8	154	53.75	74.0	-20.25	53.75	42.15	54.0	-11.85	
7425	Vertical	1.9	90	65.15	74.0	-8.85	65.15	53.55	54.0	-0.45	
12375	Horizontal	1.1	-160	57.83	74.0	-16.17	57.83	46.23	54.0	-7.77	
19800	Vertical	1.5	-150	54.11	74.0	-19.89	54.11	42.51	54.0	-11.49	
22275	Vertical	1.6	-167	58.32	74.0	-15.68	58.32	46.72	54.0	-7.28	
High carrier frequency 2480 MHz											
2483.500	Vertical	1.6	78	68.52	74.0	-5.48	59.95	48.35	54.0	-5.65	Pass

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

** - Margin = Measured field strength - specification limit.

*** - Margin = Calculated field strength - specification limit,

where Calculated field strength = Measured field strength + average factor.



Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

Table 7.3.4 Field strength of spurious emissions above 1 GHz within restricted bands, antenna 2

ASSIGNED FREQUENCY: 2400 – 2483.5 MHz
 INVESTIGATED FREQUENCY RANGE: 1000 - 25000 MHz
 TEST DISTANCE: 3 m
 MODULATION: OQPSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 250 kbps
 DUTY CYCLE: 100 %
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 1000 kHz
 TEST ANTENNA TYPE: Double ridged guide

Frequency, MHz	Antenna		Azimuth, degrees*	Peak field strength			Average field strength				Verdict
	Polarization	Height, m		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	Measured, dB(μV/m)	Calculated, dB(μV/m)	Limit, dB(μV/m)	Margin, dB***	
Low carrier frequency 2405 MHz											
4810	Vertical	1.8	-129	51.42	74.0	-22.58	51.42	39.82	54.0	-14.18	Pass
12025	Horizontal	1.0	166	53.80	74.0	-20.20	53.80	42.20	54.0	-11.80	
Mid carrier frequency 2445 MHz											
4890	Horizontal	1.8	155	51.94	74.0	-22.06	51.94	40.34	54.0	-13.66	Pass
7335	Vertical	1.3	26	63.58	74.0	-10.42	63.58	51.98	54.0	-2.02	
12225	Horizontal	1.0	180	54.77	74.0	-19.23	54.77	43.17	54.0	-10.83	
19560	Vertical	1.4	53	56.06	74.0	-17.94	56.06	44.46	54.0	-9.54	
22005	Vertical	1.5	56	55.20	74.0	-18.8	55.20	43.60	54.0	-10.40	
High carrier frequency 2475 MHz											
2483.946	Vertical	1.6	78	65.45	74.0	-8.55	57.51	45.91	54.0	-8.09	Pass
4950	Horizontal	1.5	44	51.97	74.0	-22.03	51.97	40.37	54.0	-13.63	
7425	Vertical	1.5	58	65.27	74.0	-8.73	65.27	53.67	54.0	-0.33	
12375	Horizontal	1.0	114	57.35	74.0	-16.65	57.35	45.75	54.0	-8.25	
22275	Vertical	1.6	-121	59.42	74.0	-14.58	59.42	47.82	54.0	-6.18	
High carrier frequency 2480 MHz											
2483.500	Vertical	1.6	78	67.59	74.0	-6.41	57.39	45.79	54.0	-8.20	Pass

*- EUT front panel refers to 0 degrees position of turntable.
 **- Margin = Measured field strength - specification limit.
 ***- Margin = Calculated field strength - specification limit,
 where Calculated field strength = Measured field strength + average factor.

Table 7.3.5 Average factor calculation

Transmission pulse		Transmission burst		Transmission train duration, ms	Average factor, dB
Duration, ms	Period, ms	Duration, ms	Period, ms		
2.18	12	NA	NA	NA	-11.6

*- Average factor was calculated as follows:
 Average factor=20 log (2.18 x 12/100)= -11.6 dB



Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

Table 7.3.6 Field strength of spurious emissions below 1 GHz within restricted bands

ASSIGNED FREQUENCY: 2400 – 2483.5 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 1000 MHz
 TEST DISTANCE: 3 m
 MODULATION: OQPSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 250 kbps
 DUTY CYCLE: 100 %
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 RESOLUTION BANDWIDTH: 1.0 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)
 EUT CONFIGURATION: Antenna 1 and Antenna 2

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 carrier frequency								
No emissions were found								Pass
Mid carrier frequency								
No emissions were found								Pass
High carrier frequency								
No emissions were found								Pass

*- Margin = Measured emission - specification limit.

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

Reference numbers of test equipment used

HL 0446	HL 2432	HL 5288	HL 5111	HL 4956	HL 5665	HL 3903	HL 4933
HL 4338							

Full description is given in Appendix A.



Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions				
Test procedure:	ANSI C63.10 section 11.12.1				
Test mode:	Compliance	Verdict:			PASS
Date(s):	19-Jun-20 - 03-Jul-20				
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery		
Remarks:					

Table 7.3.7 Restricted bands according to FCC section 15.205

MHz	MHz	MHz	MHz	MHz	GHz
0.09 - 0.11	8.37625 - 8.38675	73 - 74.6	399.9 - 410	2690 - 2900	10.6 - 12.7
0.495 - 0.505	8.41425 - 8.41475	74.8 - 75.2	608 - 614	3260 - 3267	13.25 - 13.4
2.1735 - 2.1905	12.29 - 12.293	108 - 121.94	960 - 1240	3332 - 3339	14.47 - 14.5
4.125 - 4.128	12.51975 - 12.52025	123 - 138	1300 - 1427	3345.8 - 3358	15.35 - 16.2
4.17725 - 4.17775	12.57675 - 12.57725	149.9 - 150.05	1435 - 1626.5	3600 - 4400	17.7 - 21.4
4.20725 - 4.20775	13.36 - 13.41	156.52475 - 156.52525	1645.5 - 1646.5	4500 - 5150	22.01 - 23.12
6.215 - 6.218	16.42 - 16.423	156.7 - 156.9	1660 - 1710	5350 - 5460	23.6 - 24
6.26775 - 6.26825	16.69475 - 16.69525	162.0125 - 167.17	1718.8 - 1722.2	7250 - 7750	31.2 - 31.8
6.31175 - 6.31225	16.80425 - 16.80475	167.72 - 173.2	2200 - 2300	8025 - 8500	36.43 - 36.5
8.291 - 8.294	25.5 - 25.67	240 - 285	2310 - 2390	9000 - 9200	Above 38.6
8.362 - 8.366	37.5 - 38.25	322 - 335.4	2483.5 - 2500	9300 - 9500	

Table 7.3.8 Restricted bands according to RSS-Gen

MHz	MHz	MHz	MHz	MHz	GHz
0.09 - 0.11	8.291 - 8.294	16.80425 - 16.80475	399.9 - 410	3260 - 3267	10.6 - 12.7
2.1735 - 2.1905	8.362 - 8.366	25.5 - 25.67	608 - 614	3332 - 3339	13.25 - 13.4
3.020 - 3.026	8.37625 - 8.38675	37.5 - 38.25	960 - 1427	3345.8 - 3358	14.47 - 14.5
4.125 - 4.128	8.41425 - 8.41475	73 - 74.6	1435 - 1626.5	3500 - 4400	15.35 - 16.2
4.17725 - 4.17775	12.29 - 12.293	74.8 - 75.2	1645.5 - 1646.5	4500 - 5150	17.7 - 21.4
4.20725 - 4.20775	12.51975 - 12.52025	108 - 138	1660 - 1710	5350 - 5460	22.01 - 23.12
5.677 - 5.683	12.57675 - 12.57725	156.52475 - 156.52525	1718.8 - 1722.2	7250 - 7750	23.6 - 24
6.215 - 6.218	13.36 - 13.41	156.7 - 156.9	2200 - 2300	8025 - 8500	31.2 - 31.8
6.26775 - 6.26825	16.42 - 16.423	240 - 285	2310 - 2390	9000 - 9200	36.43 - 36.5
6.31175 - 6.31225	16.69475 - 16.69525	322 - 335.4	2655 - 2900	9300 - 9500	Above 38.6

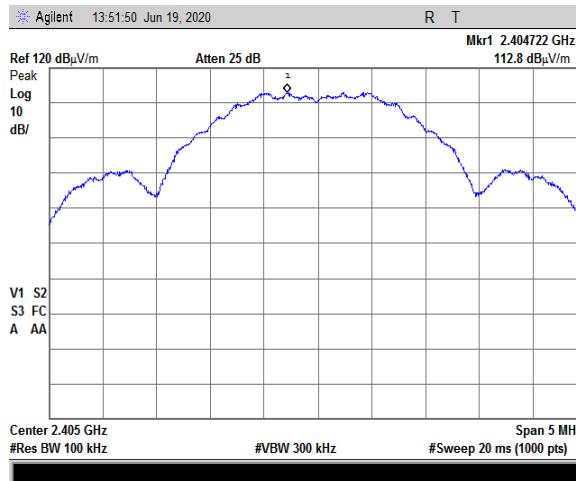


HERMON LABORATORIES

Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

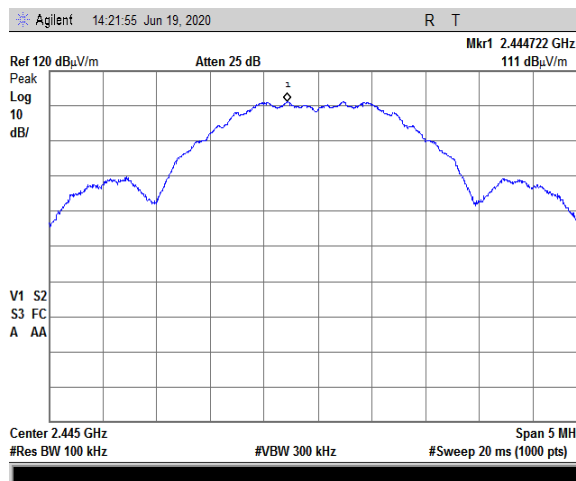
Plot 7.3.1 Radiated emission measurements at the low carrier frequency Ch.11, Antenna 1

TEST SITE: Semi Anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical & Horizontal



Plot 7.3.2 Radiated emission measurements at the mid carrier frequency Ch.19, Antenna 1

TEST SITE: Semi Anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical & Horizontal



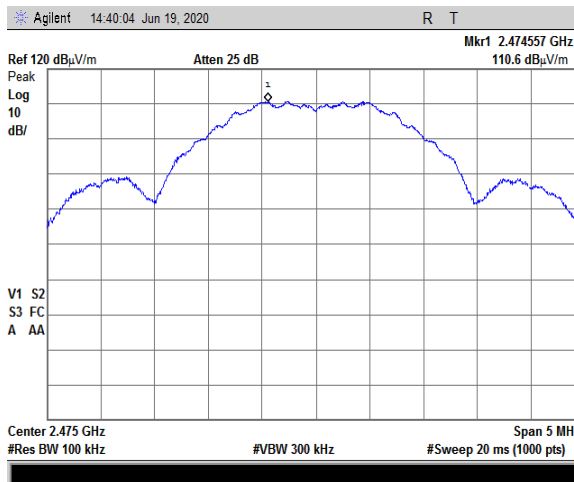


HERMON LABORATORIES

Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

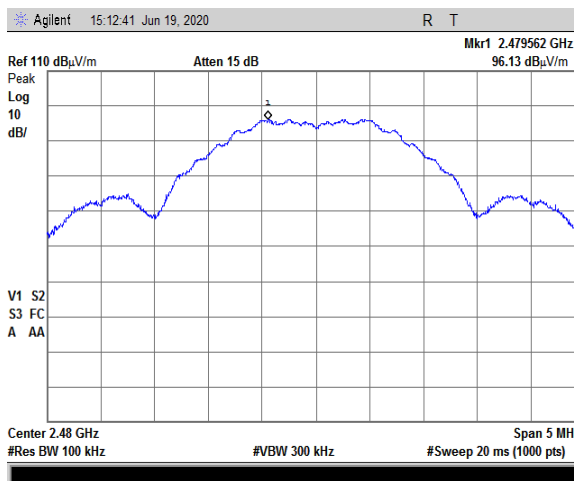
Plot 7.3.3 Radiated emission measurements at the high carrier frequency Ch. 25, Antenna 1

TEST SITE: Semi Anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical & Horizontal



Plot 7.3.4 Radiated emission measurements at the high carrier frequency Ch.26, Antenna 1

TEST SITE: Semi Anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical & Horizontal

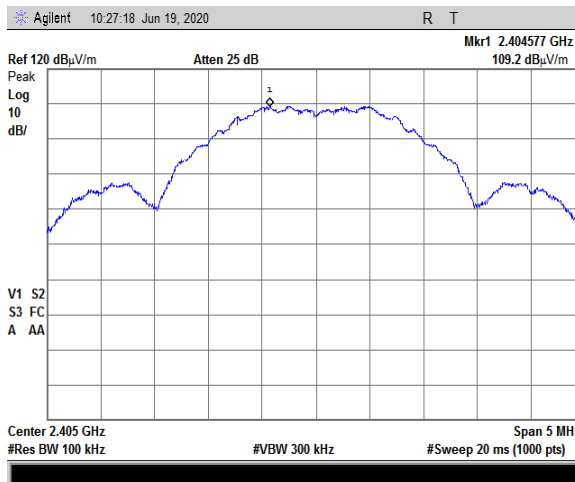




Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

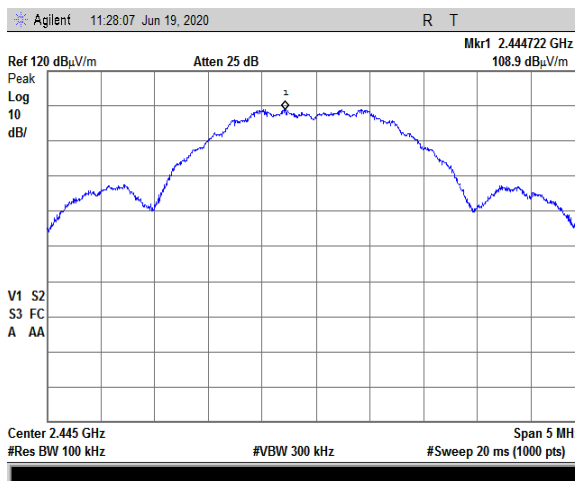
Plot 7.3.5 Radiated emission measurements at the low carrier frequency Ch.11, Antenna 2

TEST SITE: Semi Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical & Horizontal



Plot 7.3.6 Radiated emission measurements at the mid carrier frequency Ch.19, Antenna 2

TEST SITE: Semi Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical & Horizontal

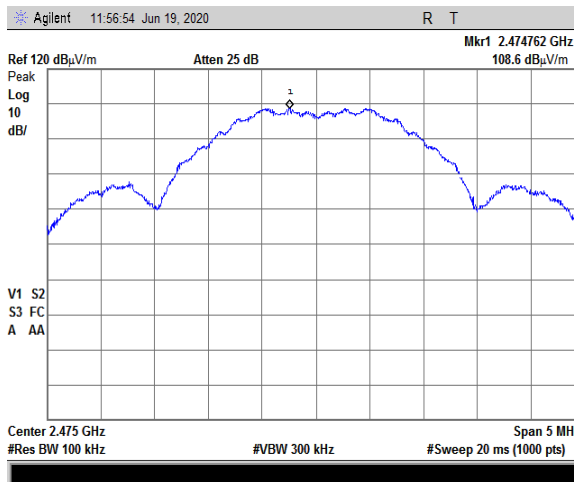




Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

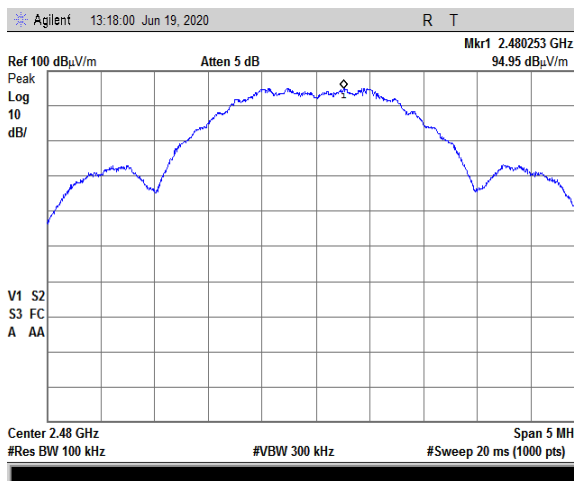
Plot 7.3.7 Radiated emission measurements at the high carrier frequency Ch. 25, Antenna 2

TEST SITE: Semi Anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical & Horizontal



Plot 7.3.8 Radiated emission measurements at the high carrier frequency Ch.26, Antenna 2

TEST SITE: Semi Anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical & Horizontal

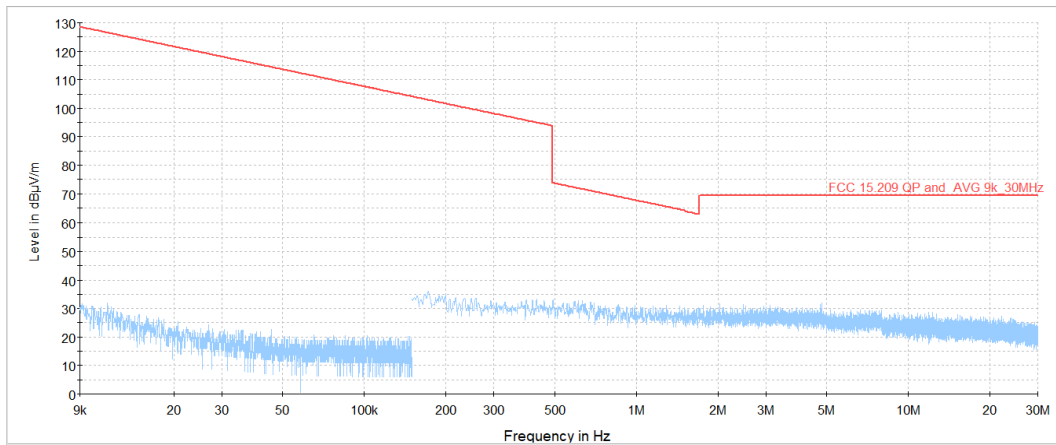




Test specification: Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance	Verdict: PASS		
Date(s): 19-Jun-20 - 03-Jul-20			
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

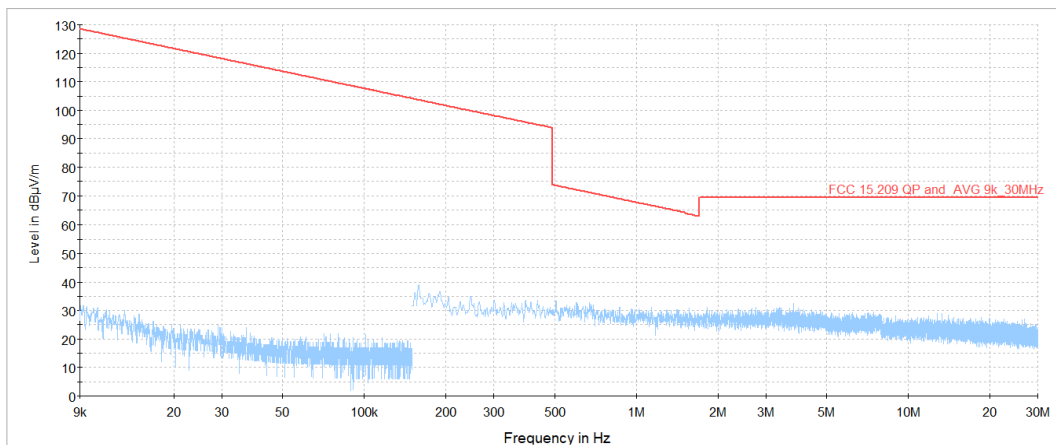
Plot 7.3.9 Radiated emission measurements from 9 kHz to 30 MHz at the low; mid; high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT CONFIGURATION: Antenna 1



Plot 7.3.10 Radiated emission measurements from 9 kHz to 30 MHz at the low; mid; high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT CONFIGURATION: Antenna 2

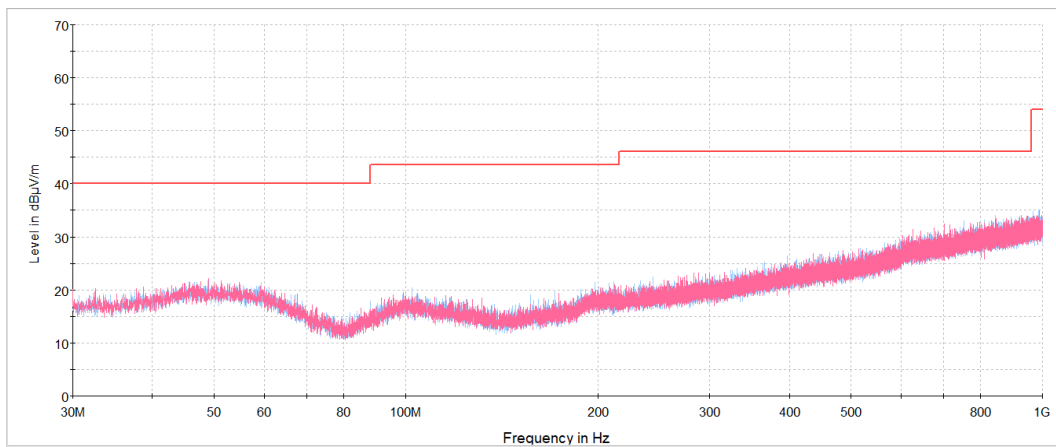




Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

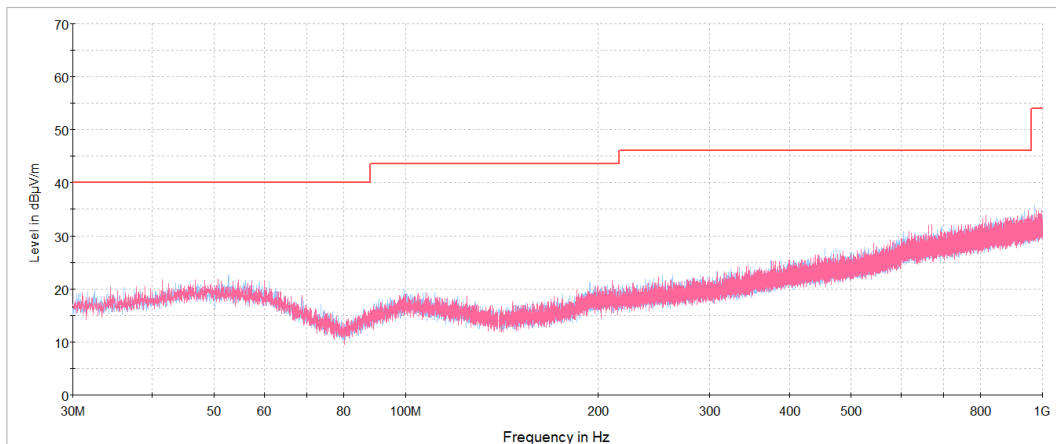
Plot 7.3.11 Radiated emission measurements from 30 to 1000 MHz at the low carrier frequency Antenna 1

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
CHANNEL: 11



Plot 7.3.12 Radiated emission measurements from 30 to 1000 MHz at the mid carrier frequency Antenna 1

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
CHANNEL: 19

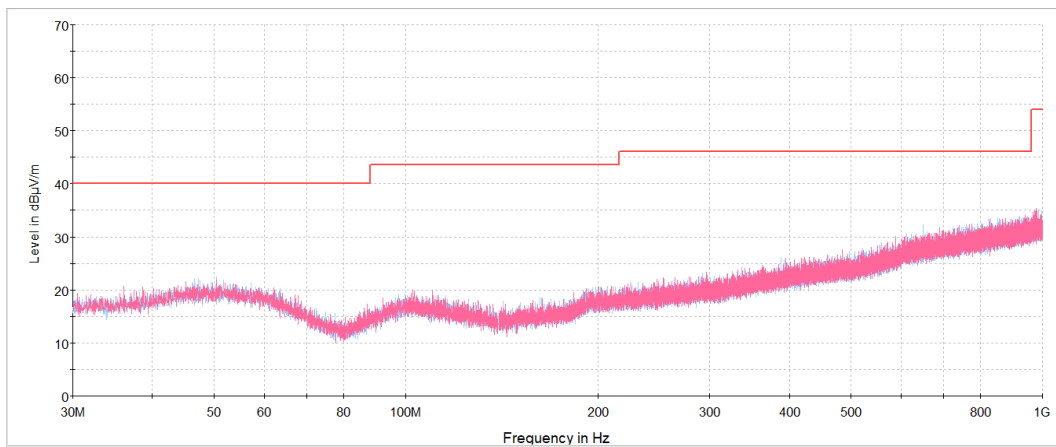




Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

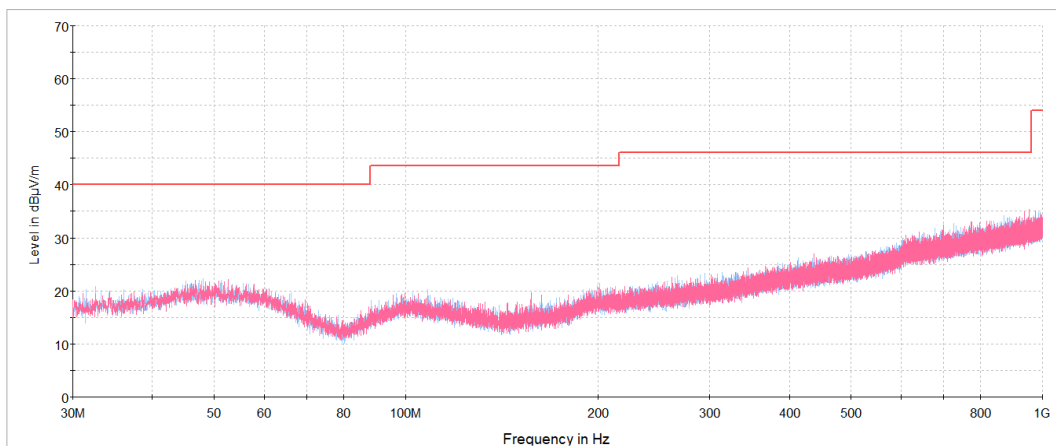
Plot 7.3.13 Radiated emission measurements from 30 to 1000 MHz at the mid carrier frequency Antenna 1

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
CHANNEL: 25



Plot 7.3.14 Radiated emission measurements from 30 to 1000 MHz at the high carrier frequency Antenna 1

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
CHANNEL: 26

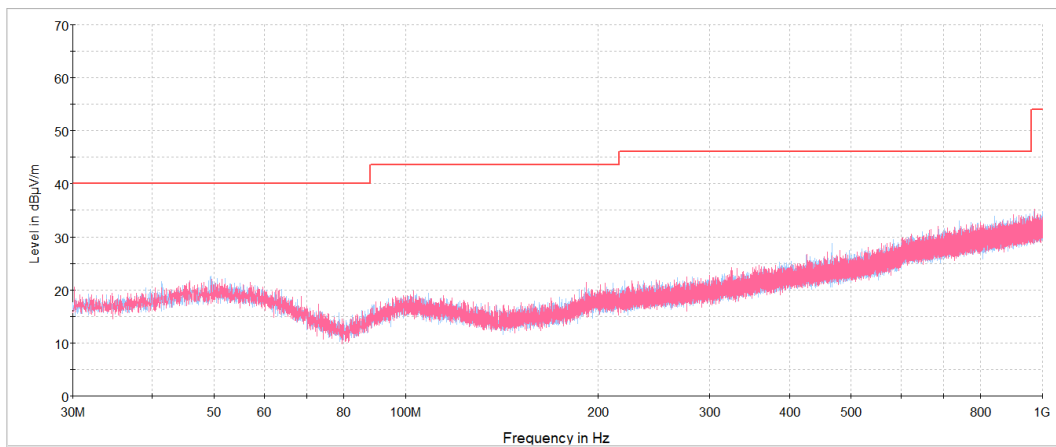




Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

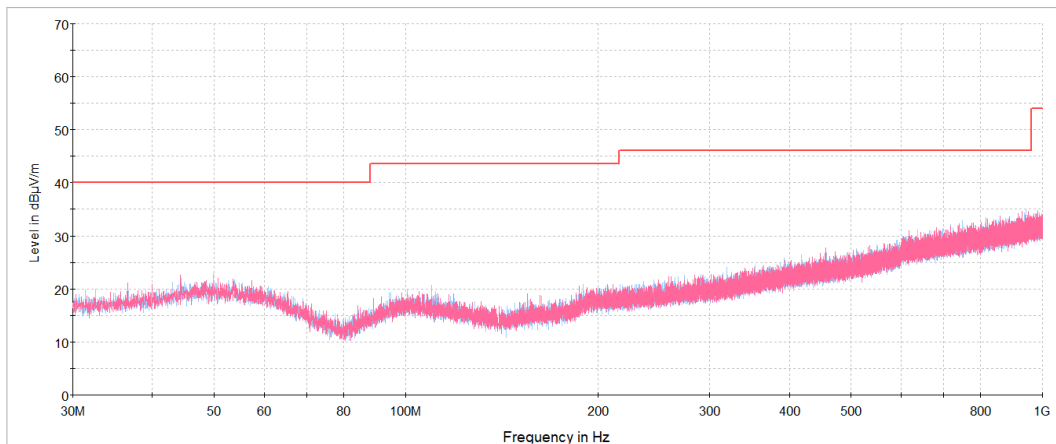
Plot 7.3.15 Radiated emission measurements from 30 to 1000 MHz at the low carrier frequency Antenna 2

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal
 CHANNEL: 11



Plot 7.3.16 Radiated emission measurements from 30 to 1000 MHz at the mid carrier frequency Antenna 2

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal
 CHANNEL: 19

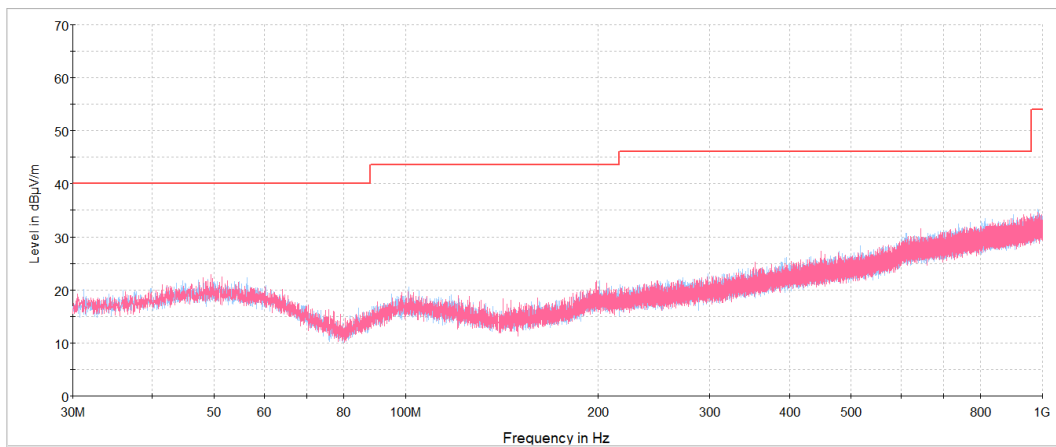




Test specification:		Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions	
Test procedure:		ANSI C63.10 section 11.12.1	
Test mode:		Compliance	
Date(s):		19-Jun-20 - 03-Jul-20	
Temperature: 23.2 °C		Air Pressure: 1017 hPa	Relative Humidity: 48 %
Remarks:		Verdict: PASS	
		Power Supply: Battery	

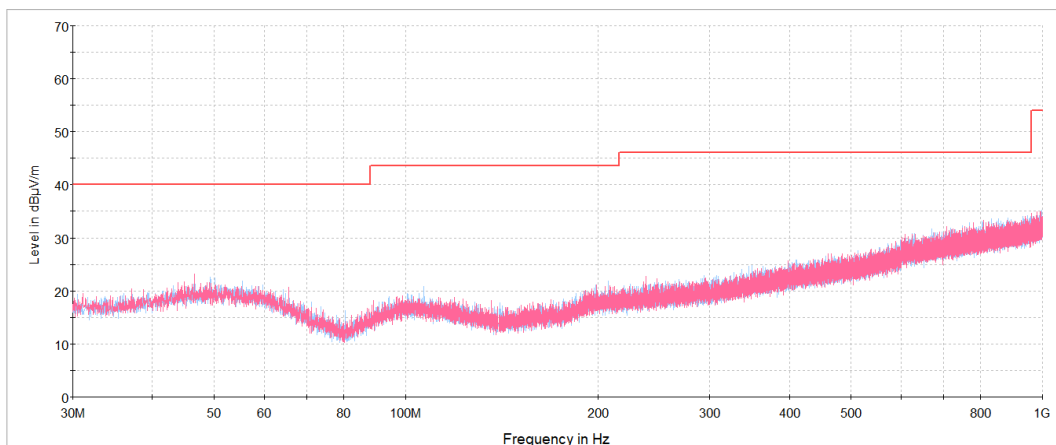
Plot 7.3.17 Radiated emission measurements from 30 to 1000 MHz at the mid carrier frequency Antenna 2

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal
 CHANNEL: 25



Plot 7.3.18 Radiated emission measurements from 30 to 1000 MHz at the high carrier frequency Antenna 2

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal
 CHANNEL: 26





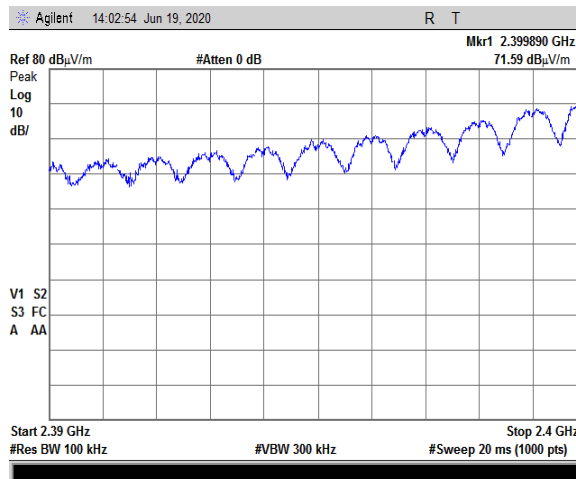
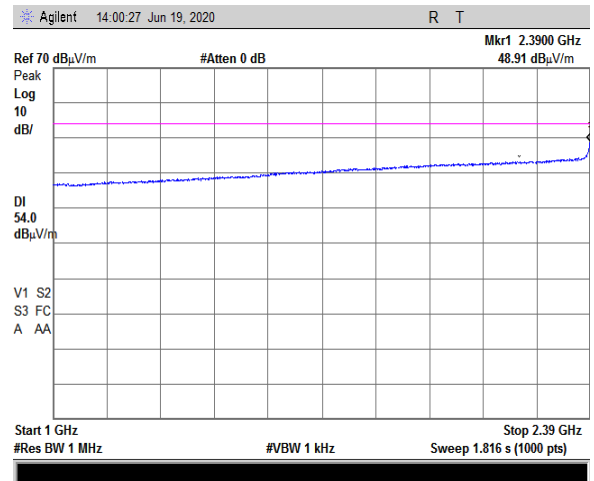
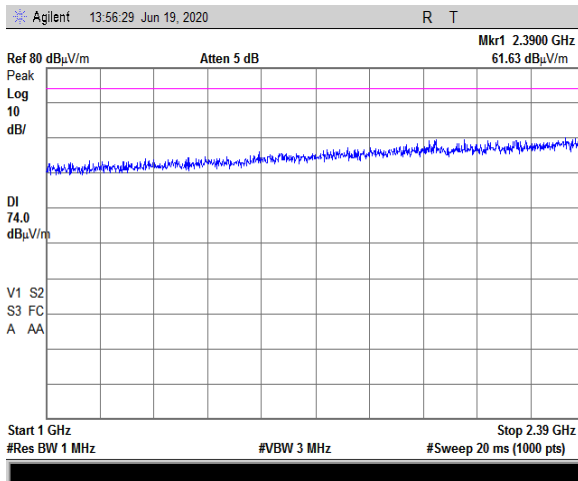
HERMON LABORATORIES

Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

Plot 7.3.19 Radiated emission measurements from 1000 to 2400 MHz at the low carrier frequency Antenna 1

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
CHANNEL:

Semi anechoic chamber
3 m
Vertical and Horizontal
11

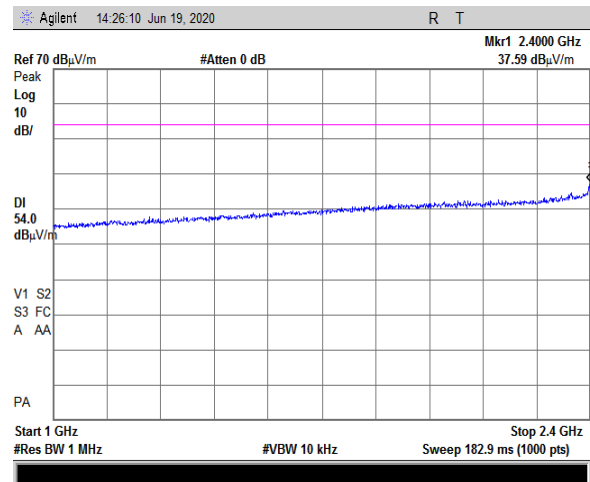
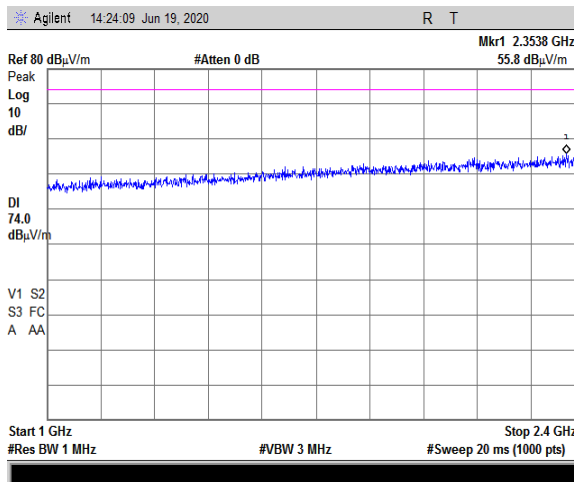




Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

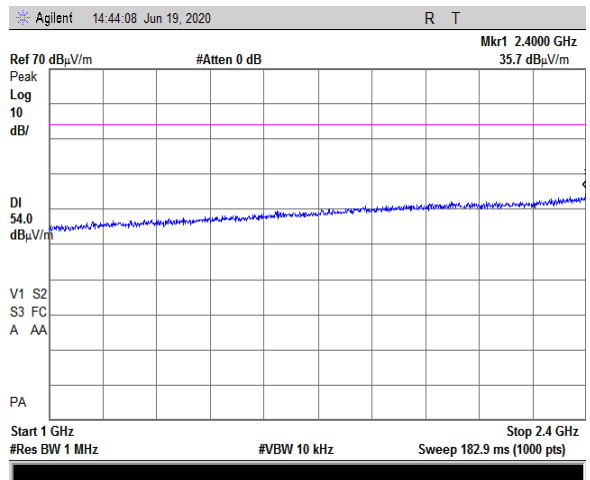
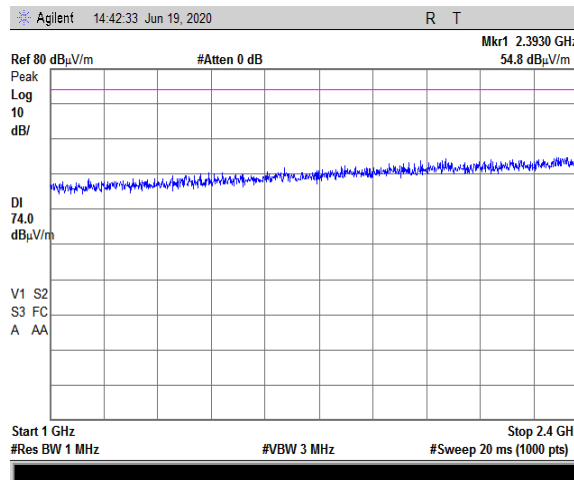
Plot 7.3.20 Radiated emission measurements from 1000 to 2400 MHz at the mid carrier frequency Antenna 1

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
CHANNEL: 19



Plot 7.3.21 Radiated emission measurements from 1000 to 2400 MHz at the mid carrier frequency Antenna 1

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
CHANNEL: 25

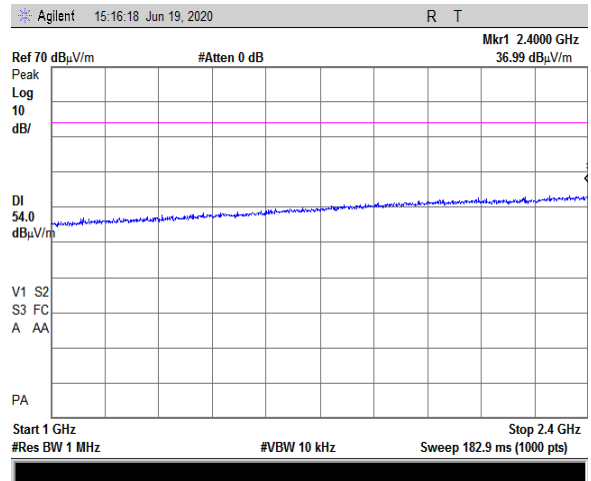
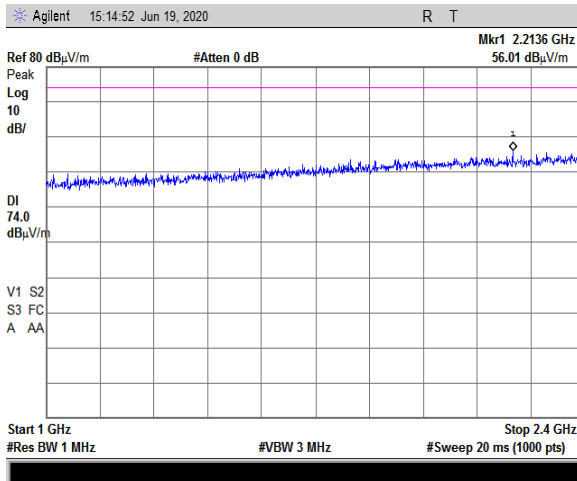




Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

Plot 7.3.22 Radiated emission measurements from 1000 to 2400 MHz at the high carrier frequency Antenna 1

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal
 CHANNEL: 26

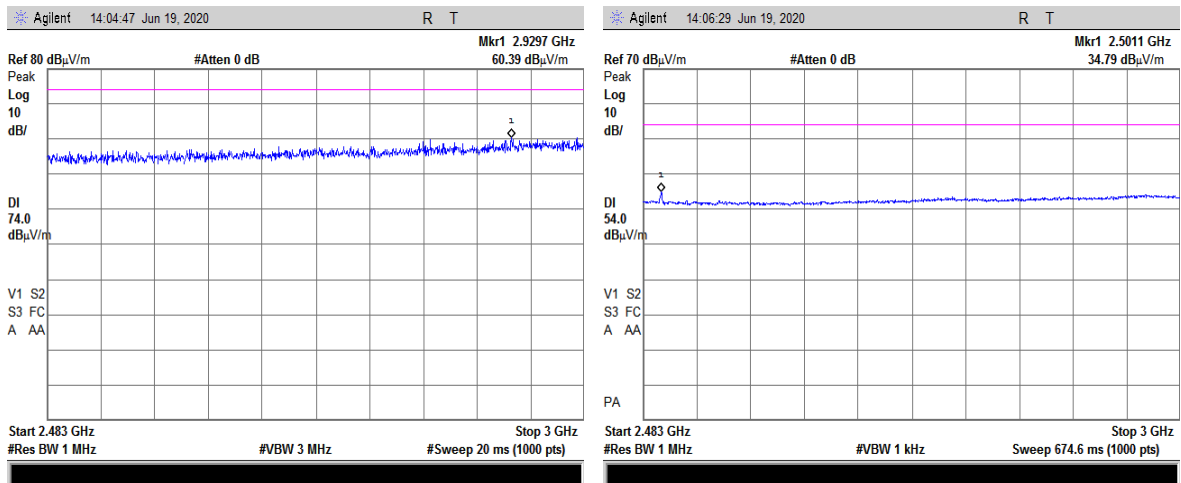




Test specification: Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 19-Jun-20 - 03-Jul-20			
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

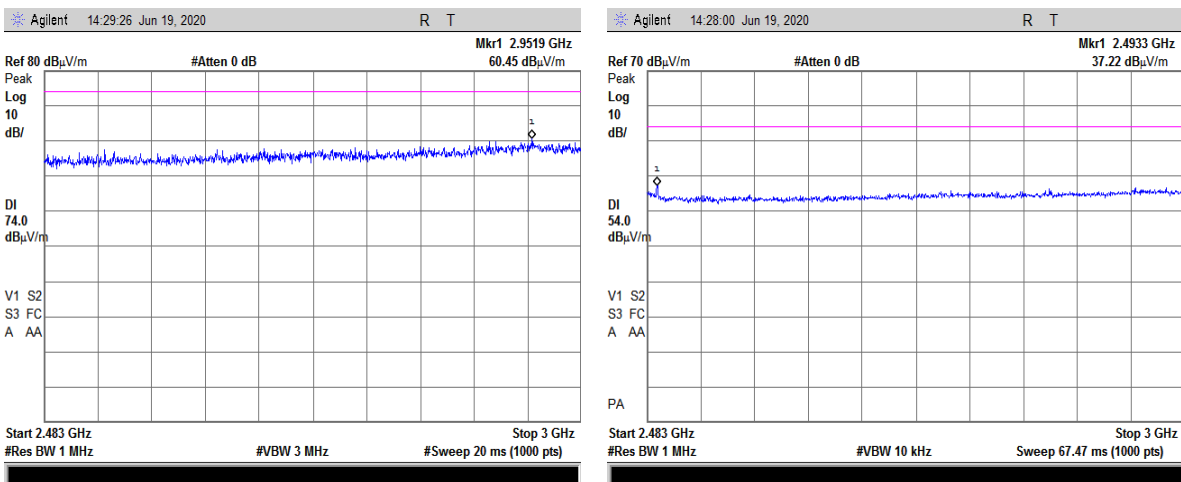
Plot 7.3.23 Radiated emission measurements from 2.4835 to 3000 MHz at the low carrier frequency Antenna 1

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal
 CHANNEL: 11



Plot 7.3.24 Radiated emission measurements from 2.4835 to 3000 MHz at the mid carrier frequency Antenna 1

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal
 CHANNEL: 19

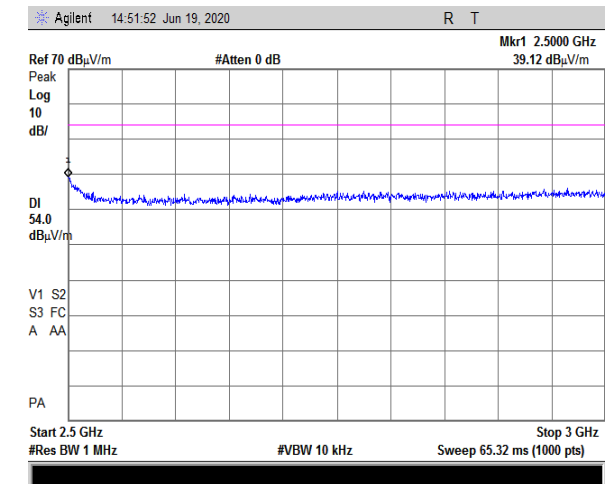
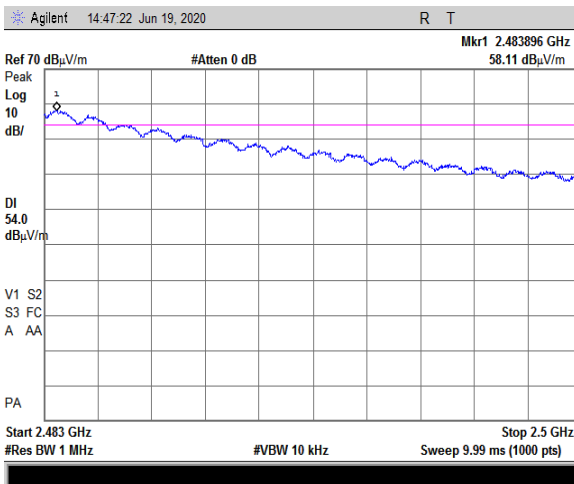
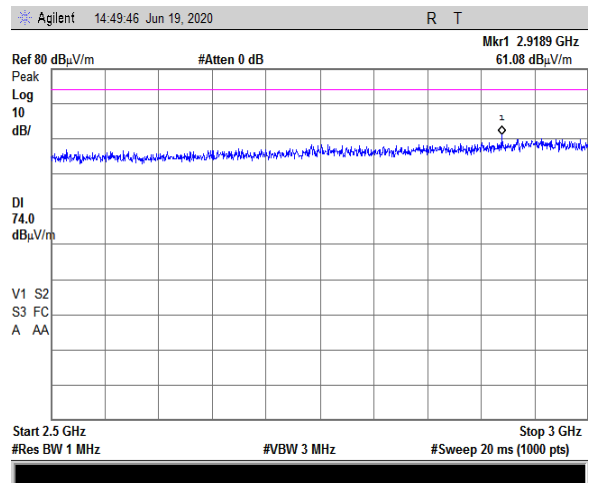
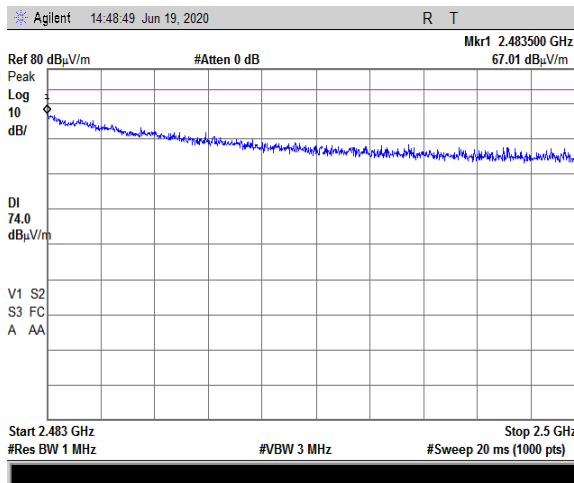




Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

Plot 7.3.25 Radiated emission measurements from 2483.5 to 3000 MHz at the high carrier frequency, Antenna 1

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
CHANNEL: 25



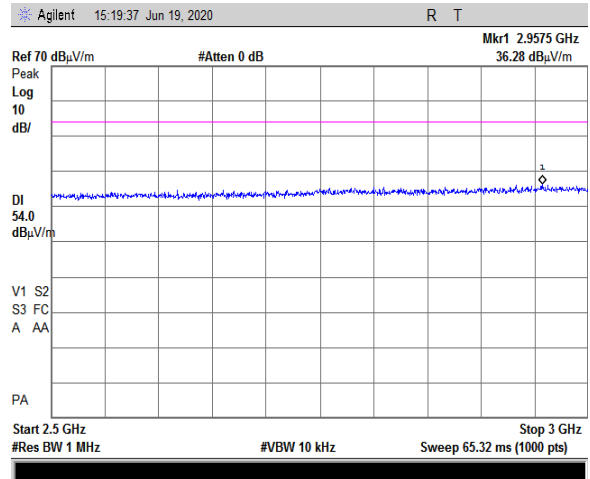
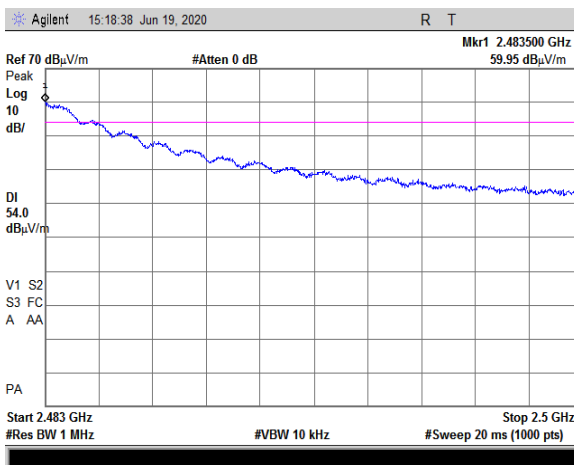
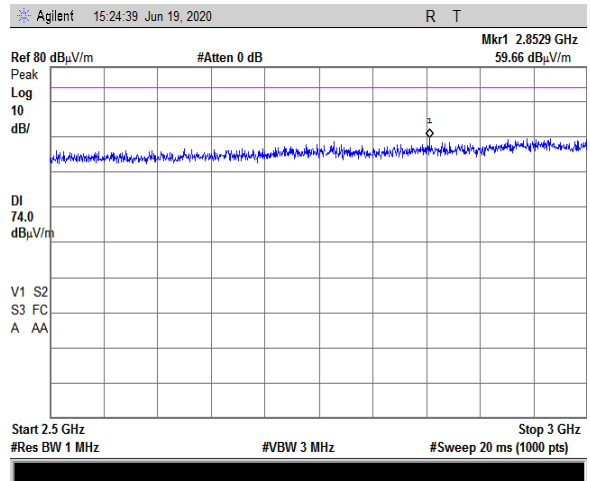
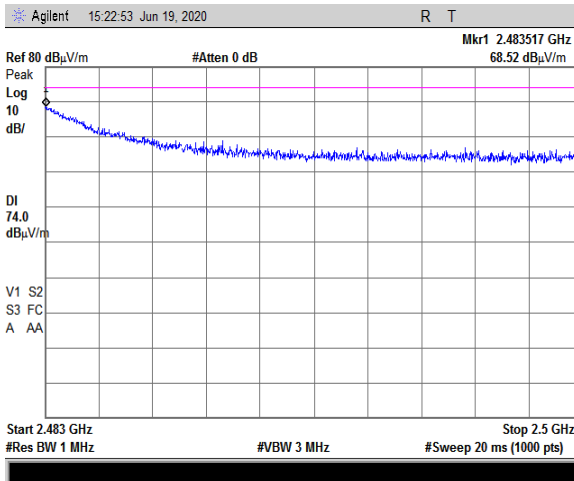


HERMON LABORATORIES

Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

Plot 7.3.26 Radiated emission measurements from 2483.5 to 3000 MHz at the high carrier frequency, Antenna 1

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal
 CHANNEL: 26



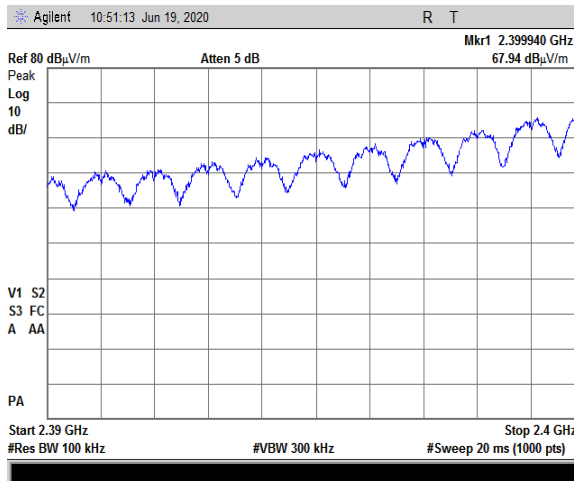
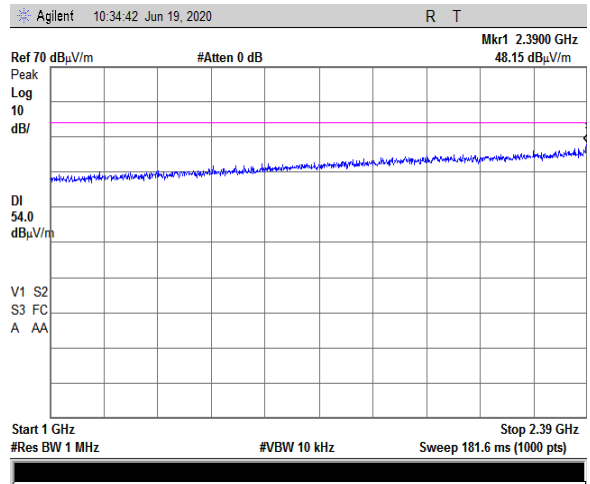
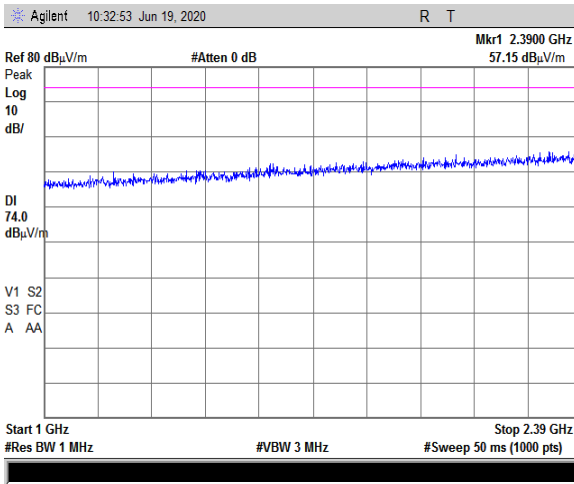


HERMON LABORATORIES

Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

Plot 7.3.27 Radiated emission measurements from 1000 to 2400 MHz at the low carrier frequency ANTENNA 2

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal
 CHANNEL: 11

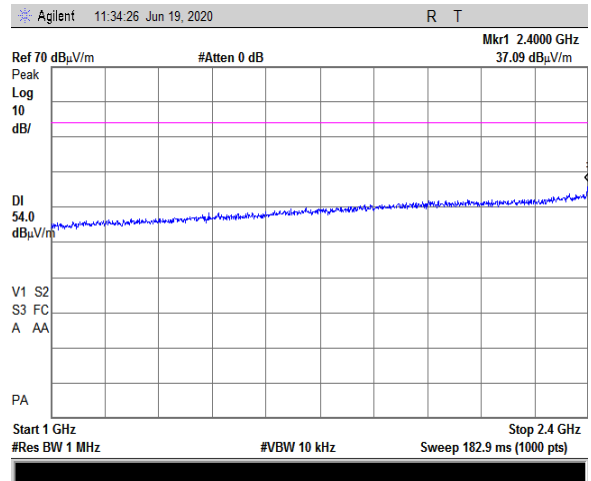
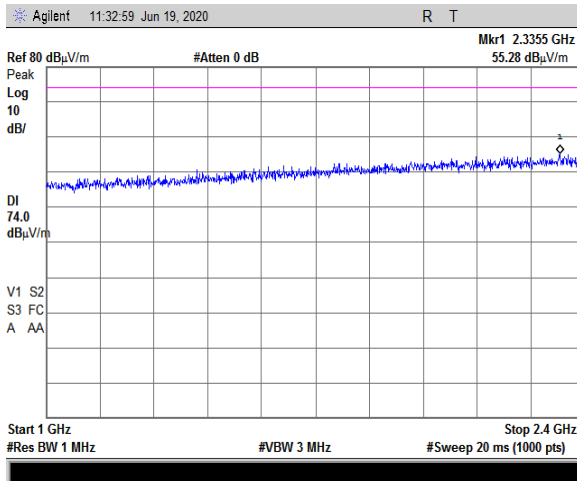




Test specification: Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 19-Jun-20 - 03-Jul-20			
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

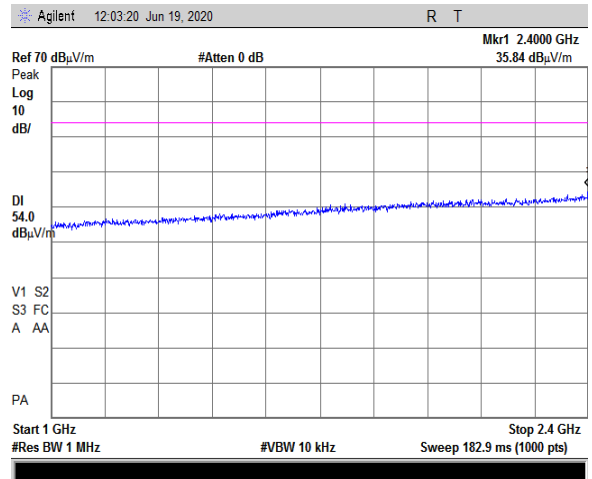
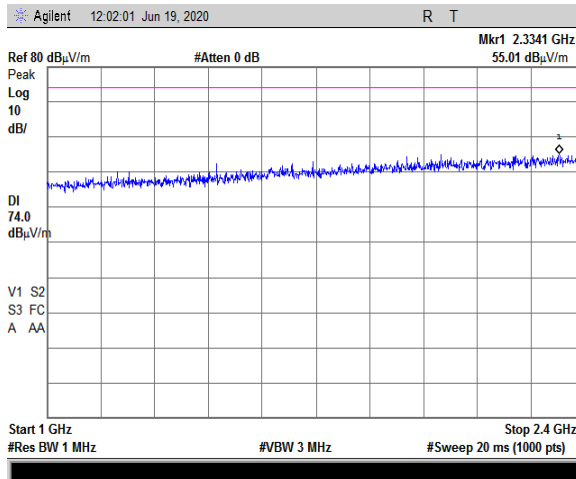
Plot 7.3.28 Radiated emission measurements from 1000 to 2400 MHz at the mid carrier frequency ANTENNA 2

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal
 CHANNEL: 19



Plot 7.3.29 Radiated emission measurements from 1000 to 2400 MHz at the mid carrier frequency ANTENNA 2

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal
 CHANNEL: 25



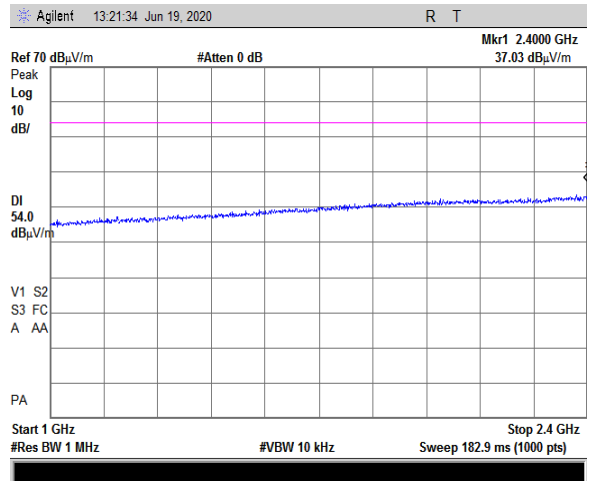
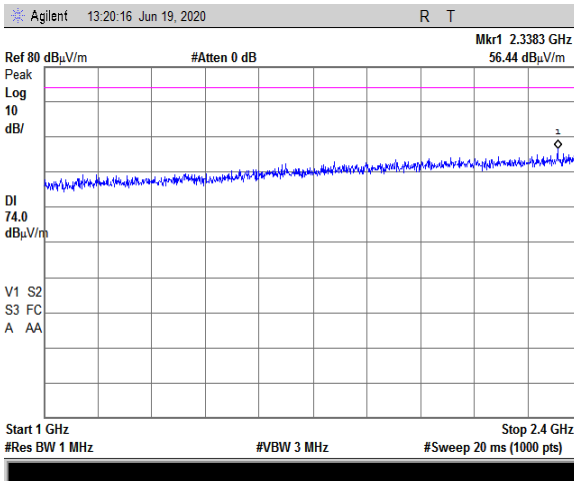


HERMON LABORATORIES

Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

Plot 7.3.30 Radiated emission measurements from 1000 to 2400 MHz at the high carrier frequency ANTENNA 2

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal
 CHANNEL: 26



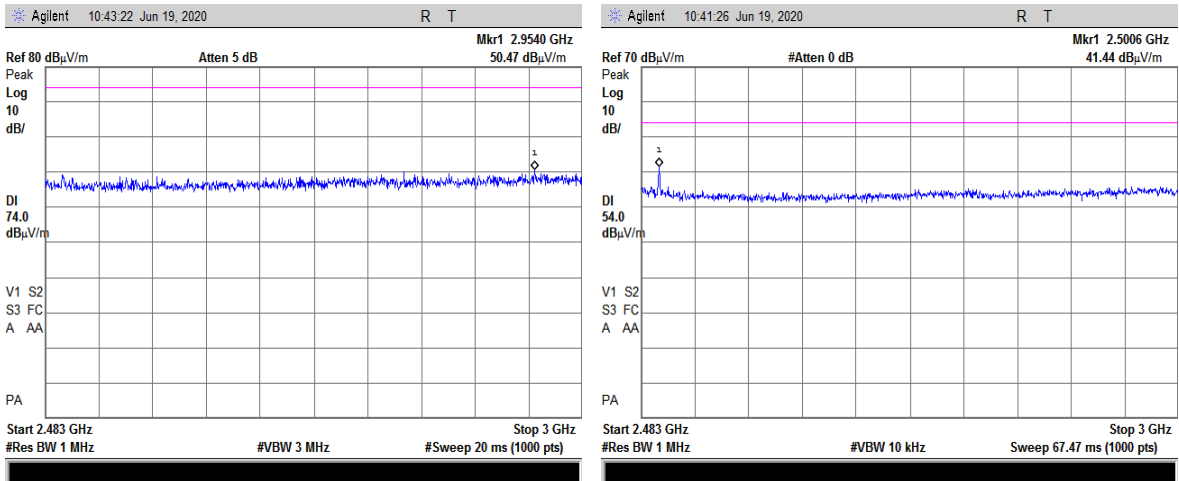


HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance	Verdict: PASS		
Date(s): 19-Jun-20 - 03-Jul-20			
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

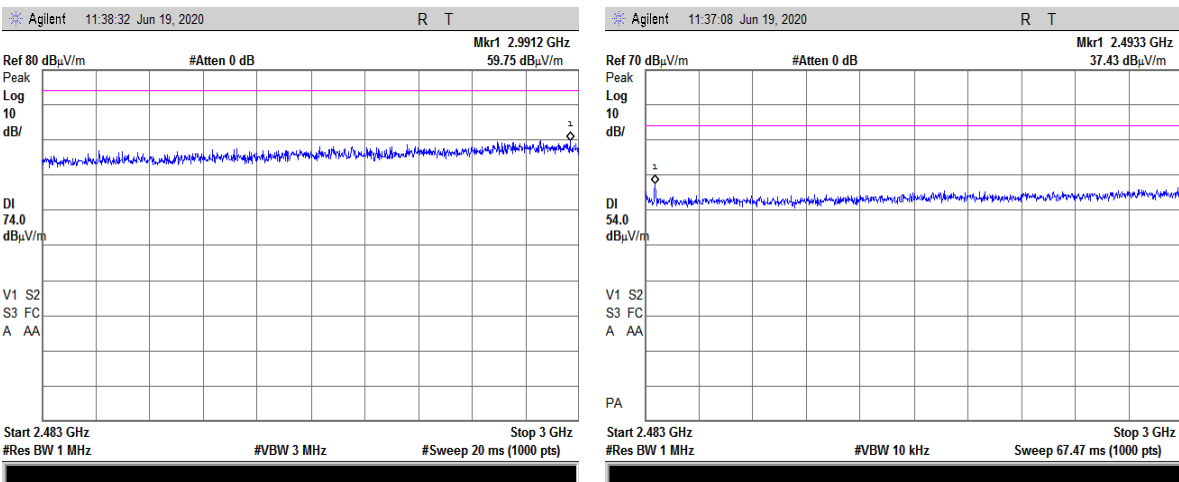
Plot 7.3.31 Radiated emission measurements from 2483.5 to 3000 MHz at the low carrier frequency ANTENNA 2

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
CHANNEL: 11



Plot 7.3.32 Radiated emission measurements from 2483.5 to 3000 MHz at the mid carrier frequency ANTENNA 2

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
CHANNEL: 19



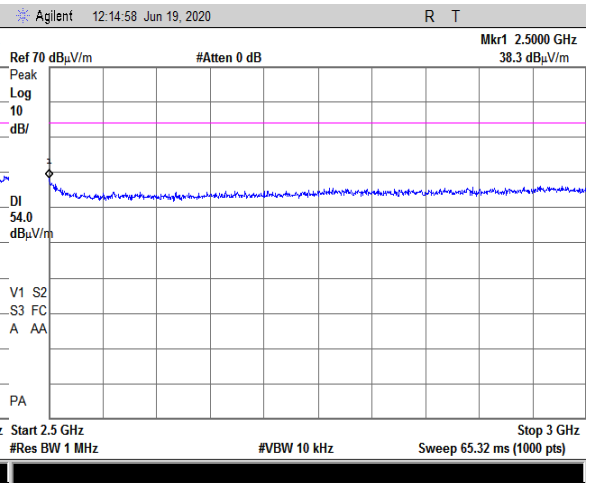
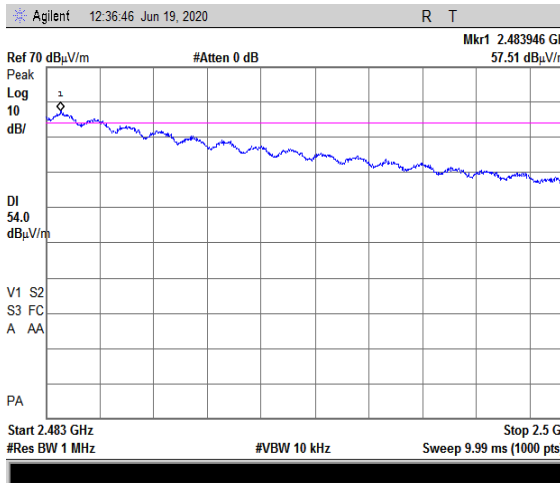
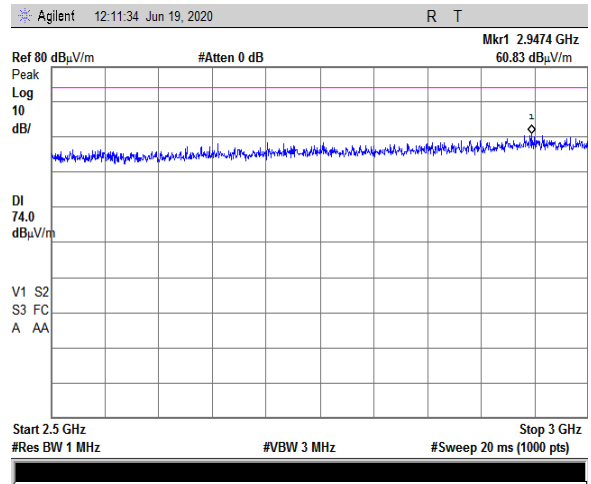
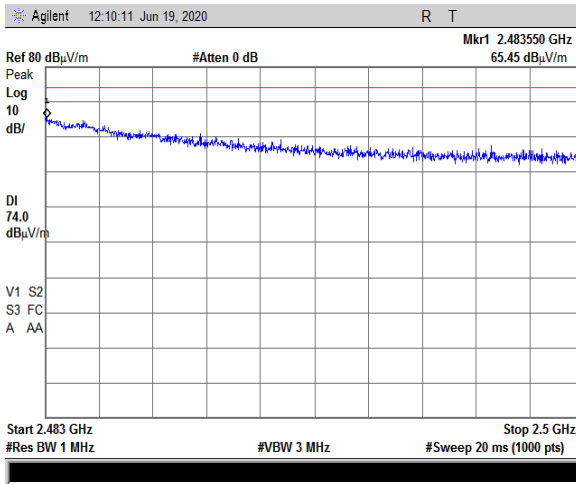


HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance	Verdict: PASS		
Date(s): 19-Jun-20 - 03-Jul-20			
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

Plot 7.3.33 Radiated emission measurements from 2483.5 to 3000 MHz at the mid carrier frequency ANTENNA 2

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal
 CHANNEL: 25



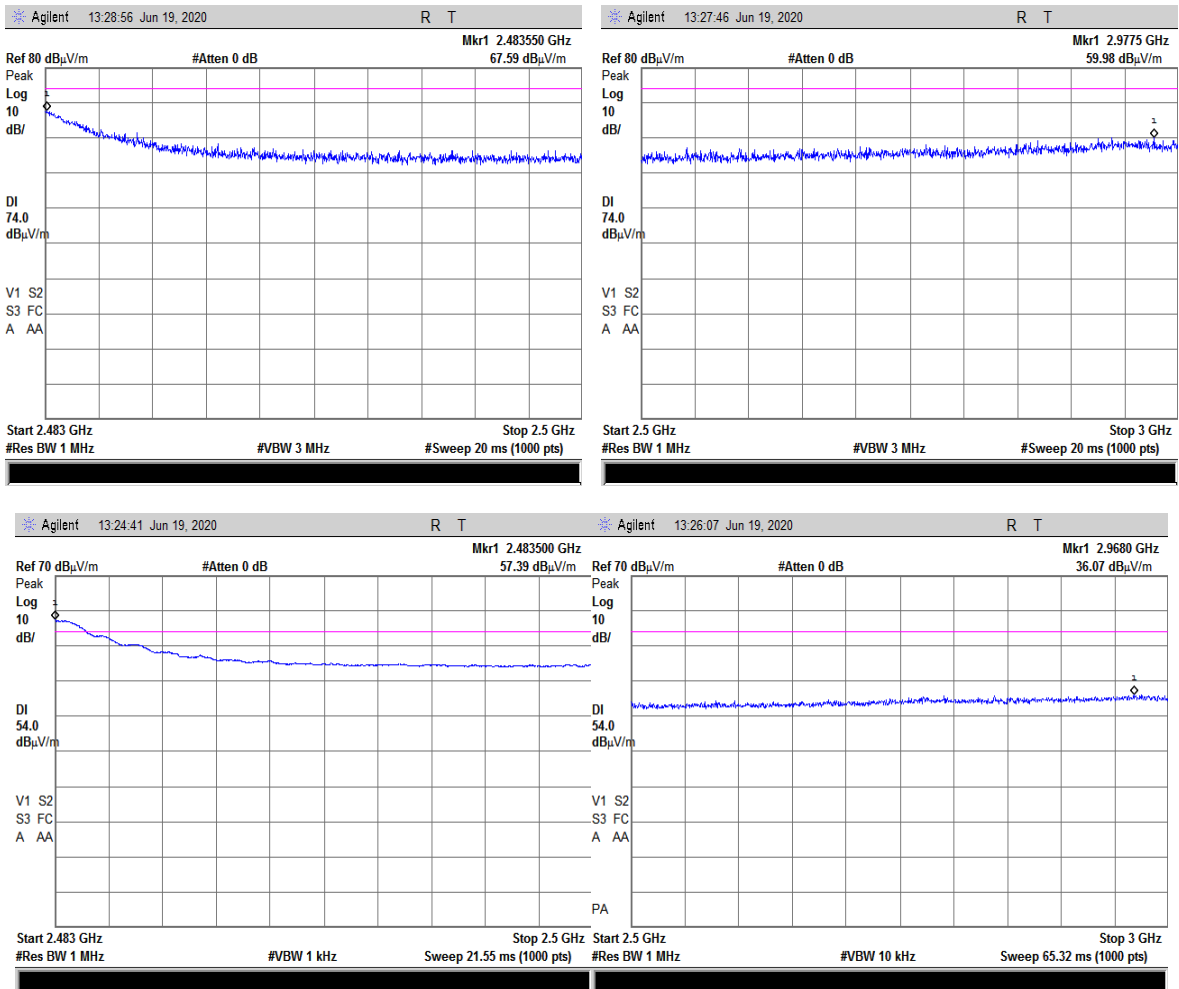


HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance	Verdict: PASS		
Date(s): 19-Jun-20 - 03-Jul-20			
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

Plot 7.3.34 Radiated emission measurements from 2483.5 to 3000 MHz at the high carrier frequency ANTENNA 2

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
CHANNEL: 26

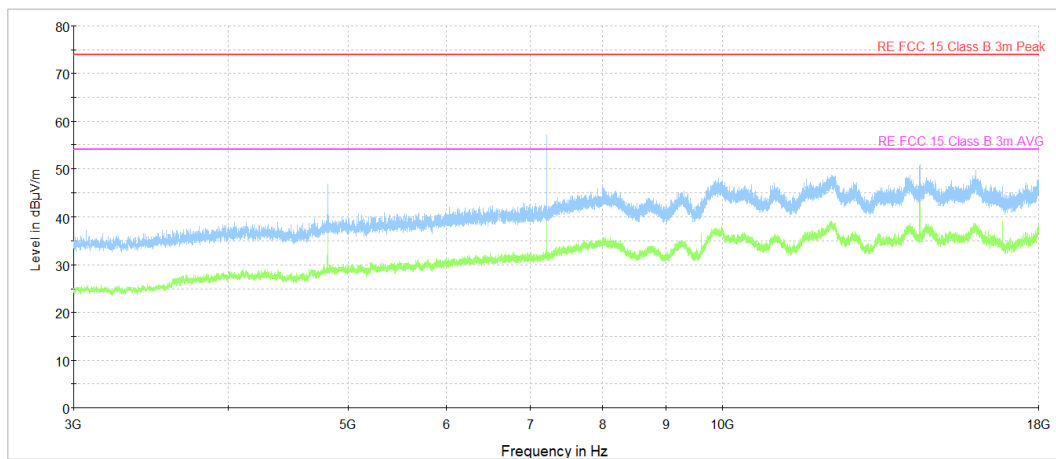




Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

Plot 7.3.35 Radiated emission measurements from 3000 to 18000 MHz at the low carrier frequency, Antenna 1

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
CHANNEL: 11



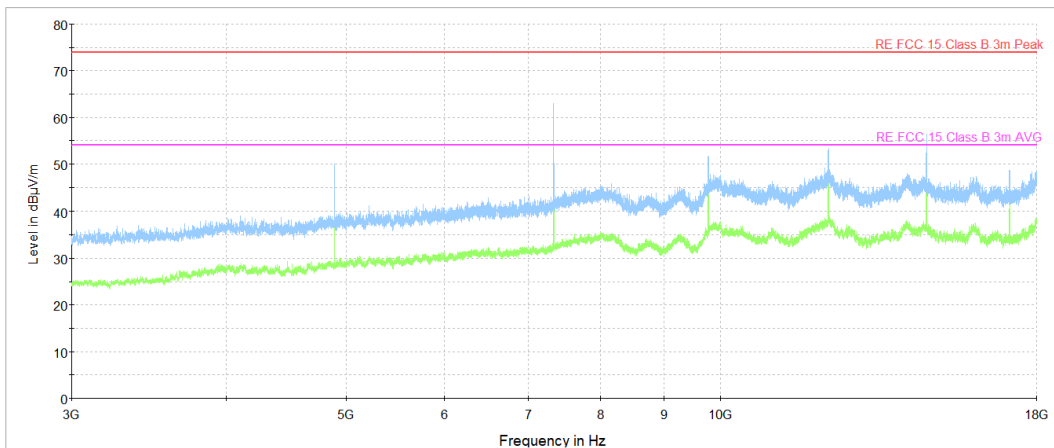


HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance	Verdict: PASS		
Date(s): 19-Jun-20 - 03-Jul-20			
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

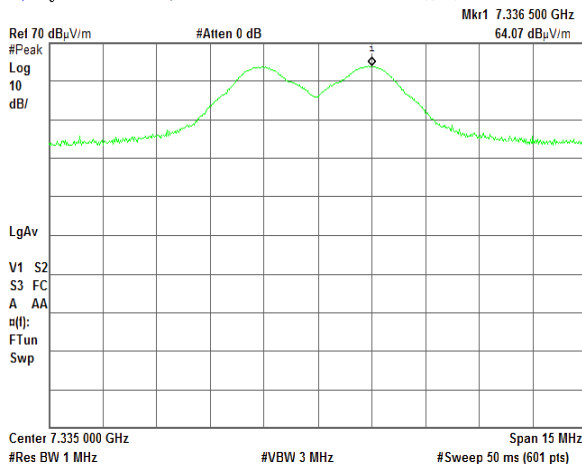
Plot 7.3.36 Radiated emission measurements from 3000 to 18000 MHz at the mid carrier frequency, Antenna 1

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal
 CHANNEL: 19



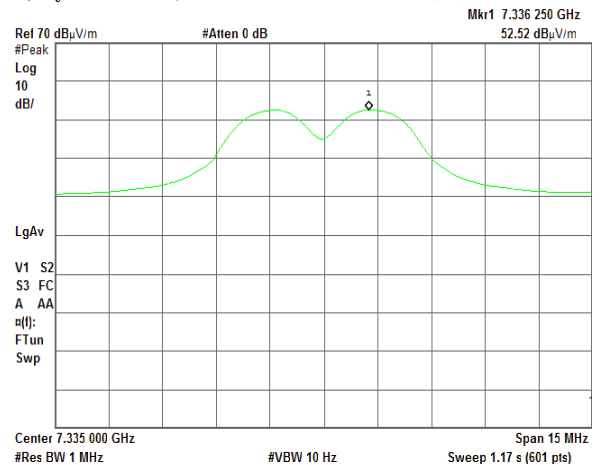
* Agilent 08:02:13 Jun 25, 2020

R T



* Agilent 08:06:53 Jun 25, 2020

R T



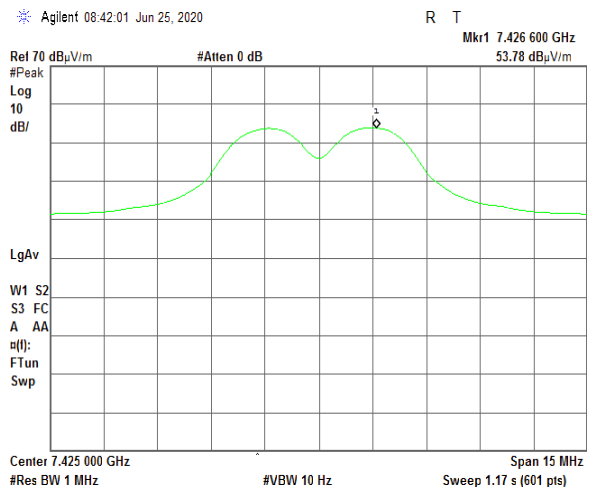
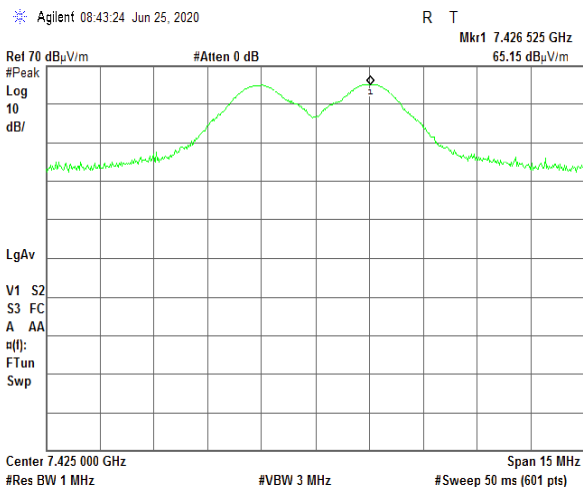
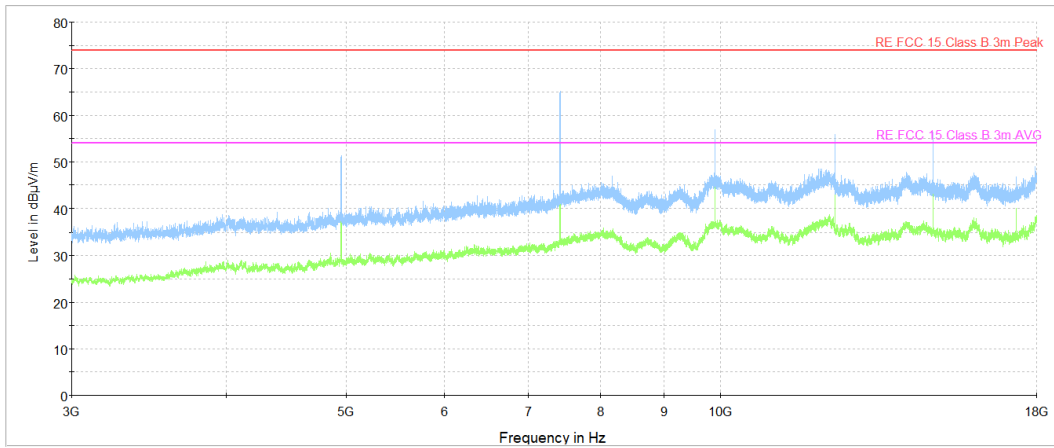


HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 19-Jun-20 - 03-Jul-20			
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

Plot 7.3.37 Radiated emission measurements from 3000 to 18000 MHz at the high carrier frequency, Antenna 1

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal
 CHANNEL: 25

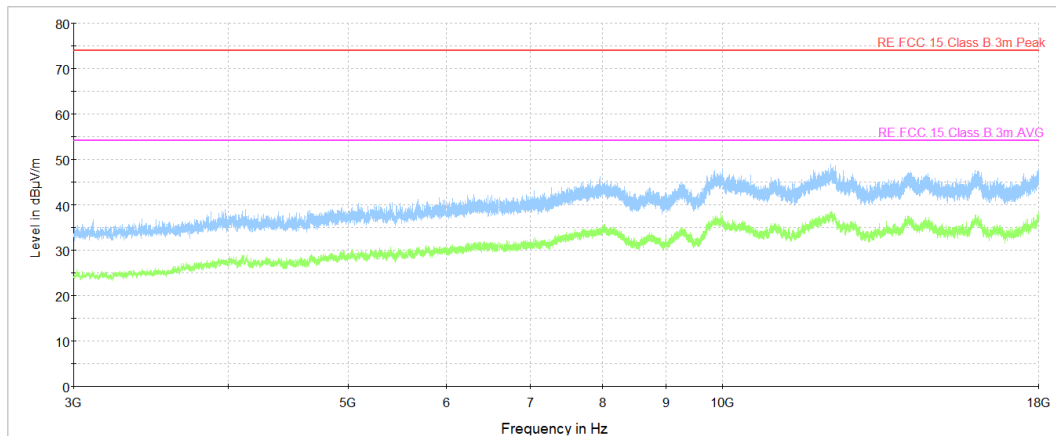




Test specification: Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 19-Jun-20 - 03-Jul-20			
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

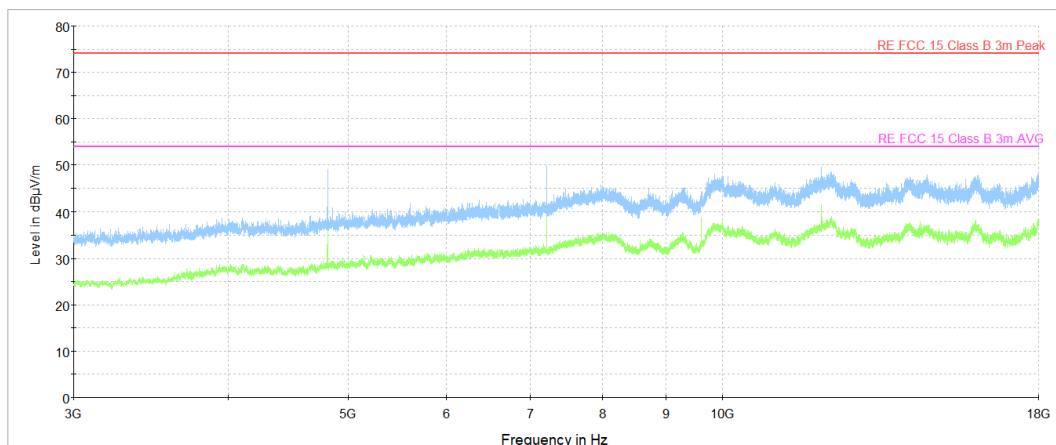
Plot 7.3.38 Radiated emission measurements from 3000 to 18000 MHz at the high carrier frequency, Antenna 1

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal
 CHANNEL: 26



Plot 7.3.39 Radiated emission measurements from 3000 to 18000 MHz at the low carrier frequency, Antenna 2

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal
 CHANNEL: 11



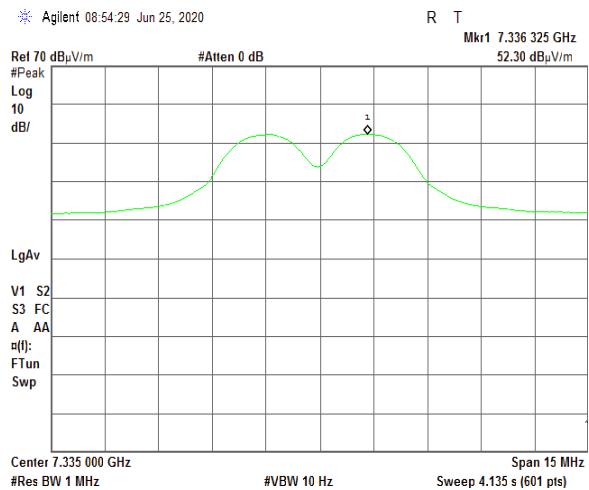
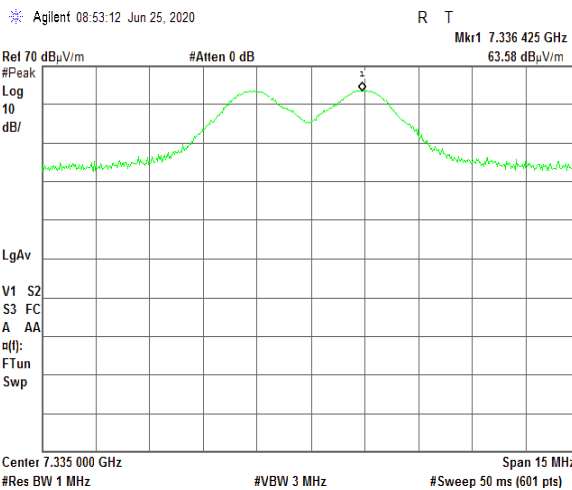
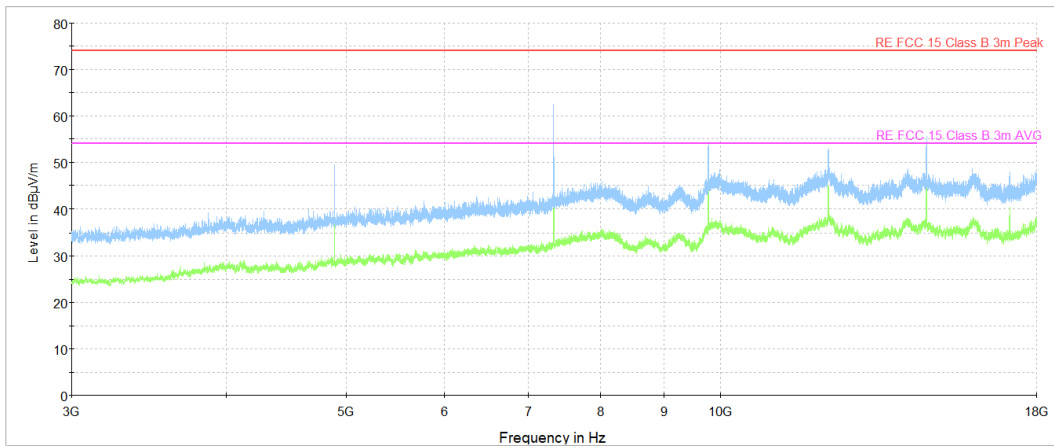


HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance	Verdict: PASS		
Date(s): 19-Jun-20 - 03-Jul-20			
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

Plot 7.3.40 Radiated emission measurements from 3000 to 18000 MHz at the mid carrier frequency, Antenna 2

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
CHANNEL: 19



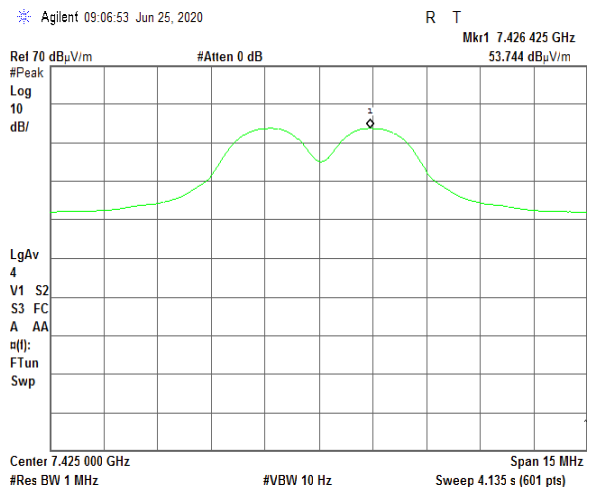
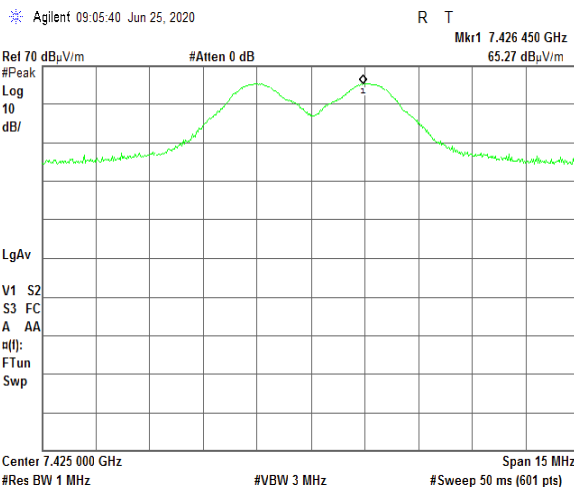
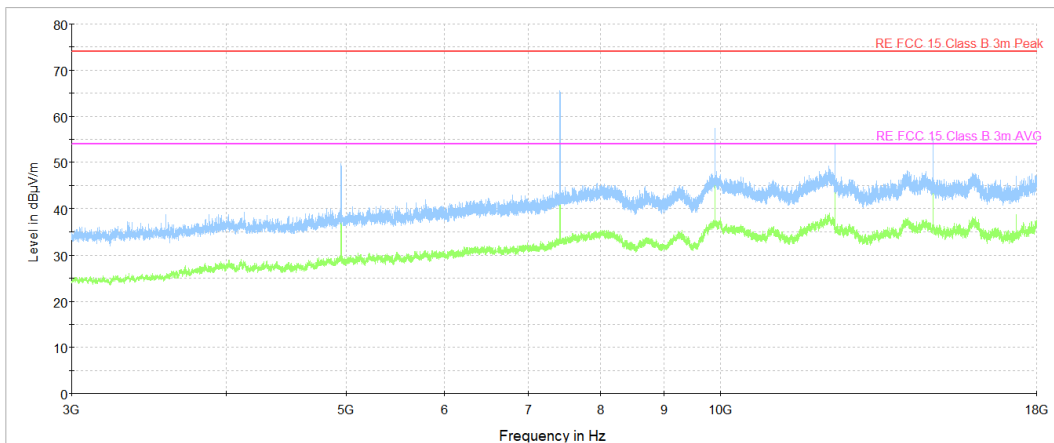


HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 19-Jun-20 - 03-Jul-20			
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

Plot 7.3.41 Radiated emission measurements from 3000 to 18000 MHz at the high carrier frequency, Antenna 2

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal
 CHANNEL: 25

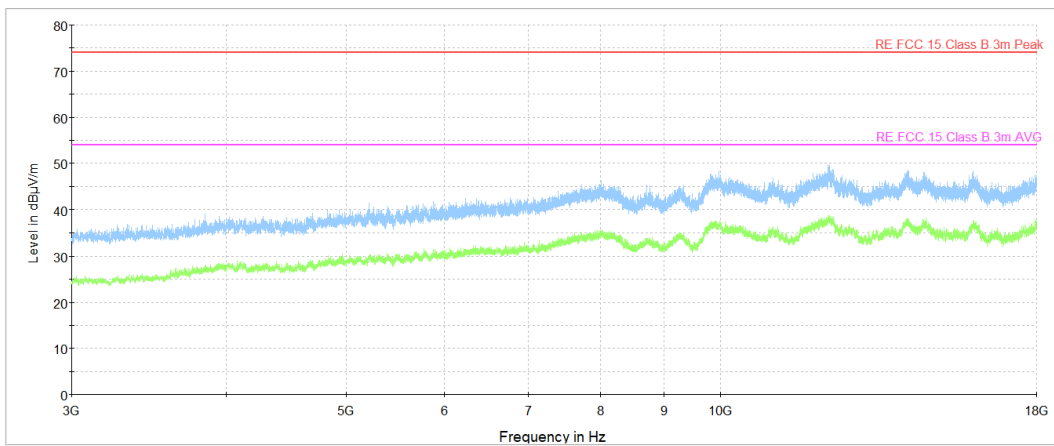




Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

Plot 7.3.42 Radiated emission measurements from 3000 to 18000 MHz at the high carrier frequency, Antenna 2

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
CHANNEL: 26

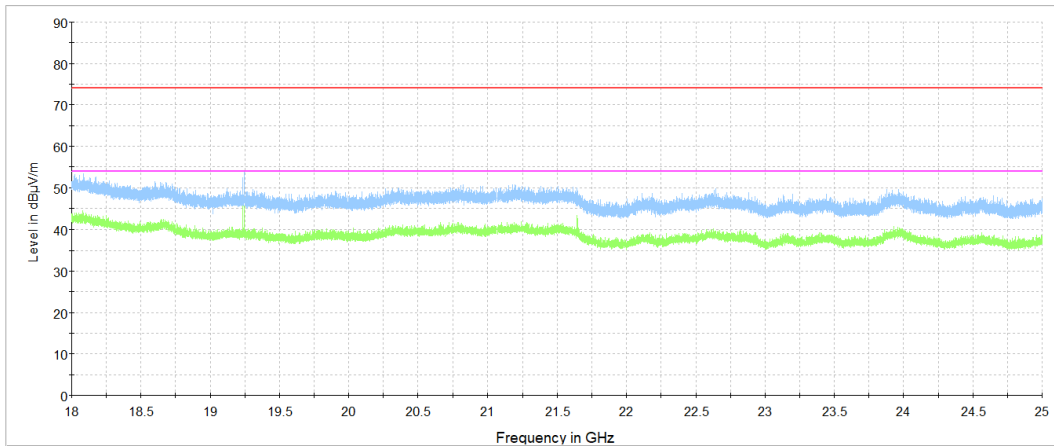




Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

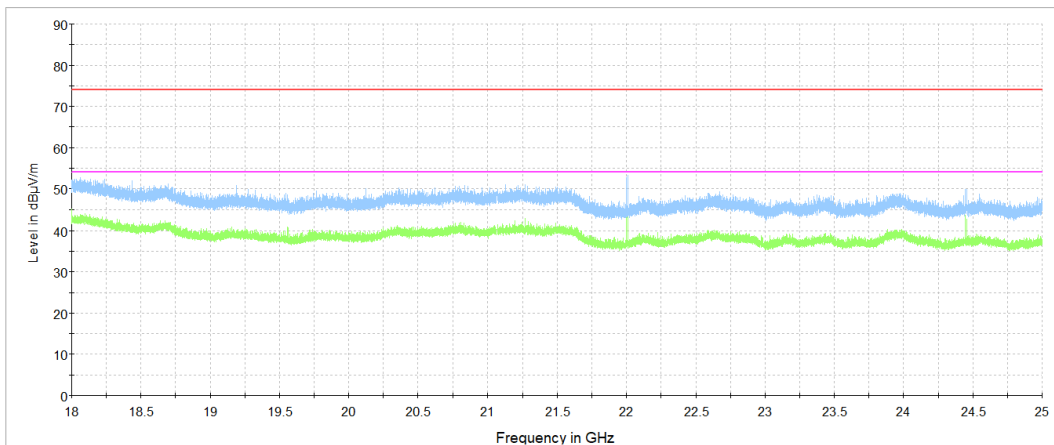
Plot 7.3.43 Radiated emission measurements from 18000 to 25000 MHz at the low carrier frequency Antenna 1

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and horizontal
 CHANNEL: 11



Plot 7.3.44 Radiated emission measurements from 18000 to 25000 MHz at the mid carrier frequency Antenna 1

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and horizontal
 CHANNEL: 19

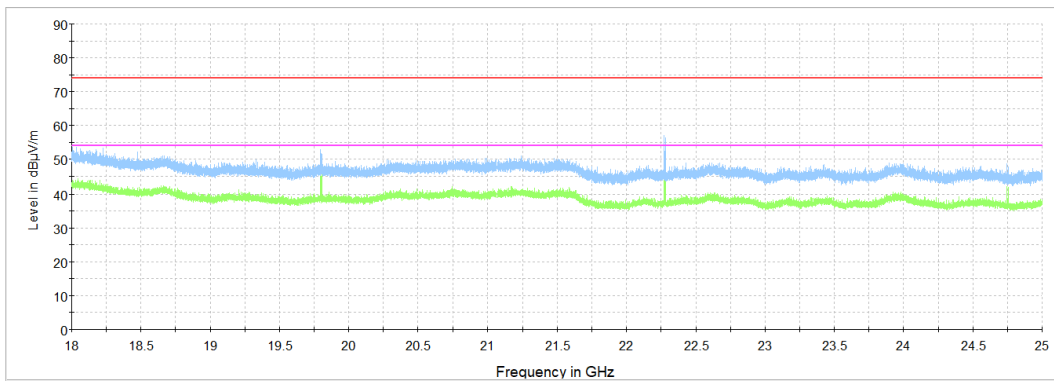




Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

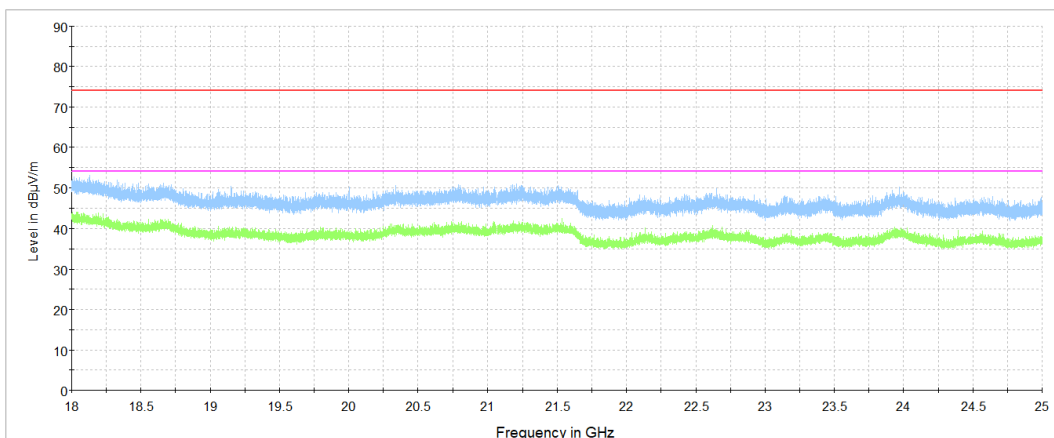
Plot 7.3.45 Radiated emission measurements from 18000 to 25000 MHz at the high carrier frequency Antenna 1

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and horizontal
 CHANNEL: 25



Plot 7.3.46 Radiated emission measurements from 18000 to 25000 MHz at the high carrier frequency Antenna 1

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and horizontal
 CHANNEL: 26

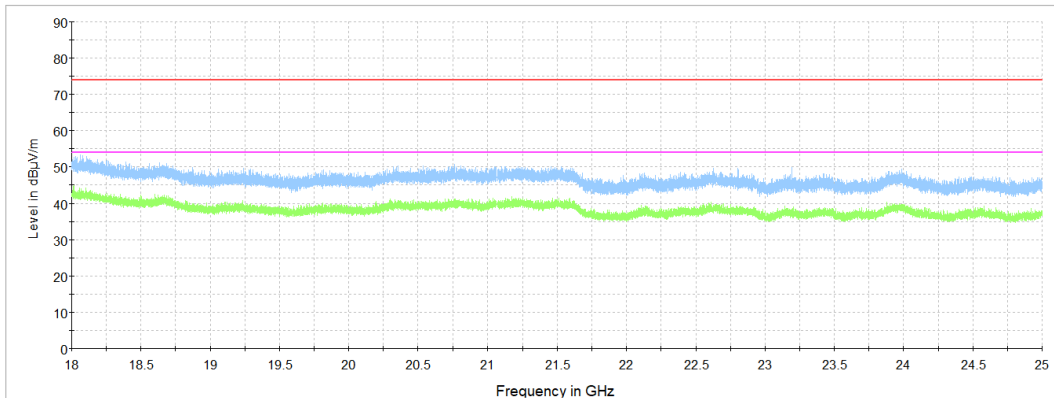




Test specification: Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 19-Jun-20 - 03-Jul-20			
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

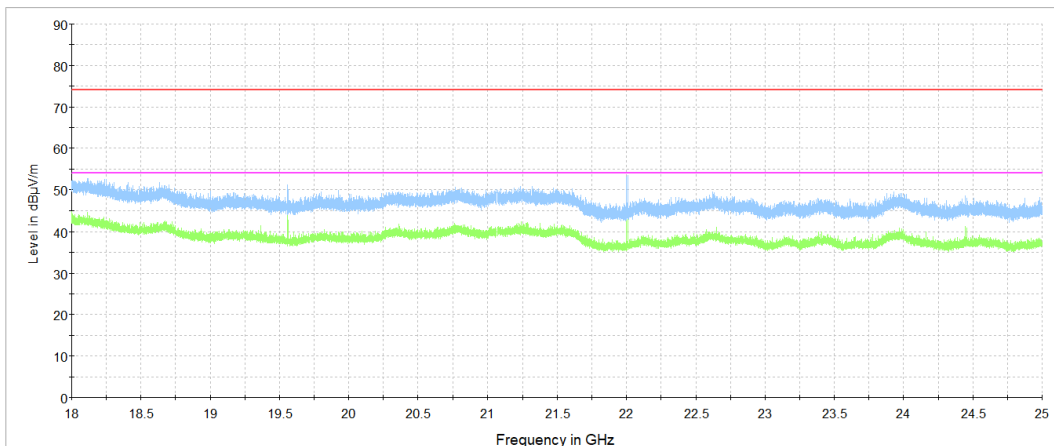
Plot 7.3.47 Radiated emission measurements from 18000 to 25000 MHz at the low carrier frequency Antenna 2

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and horizontal
 CHANNEL: 11



Plot 7.3.48 Radiated emission measurements from 18000 to 25000 MHz at the mid carrier frequency Antenna 2

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and horizontal
 CHANNEL: 19





Test specification:	Section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	19-Jun-20 - 03-Jul-20		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 48 %	Power Supply: Battery
Remarks:			

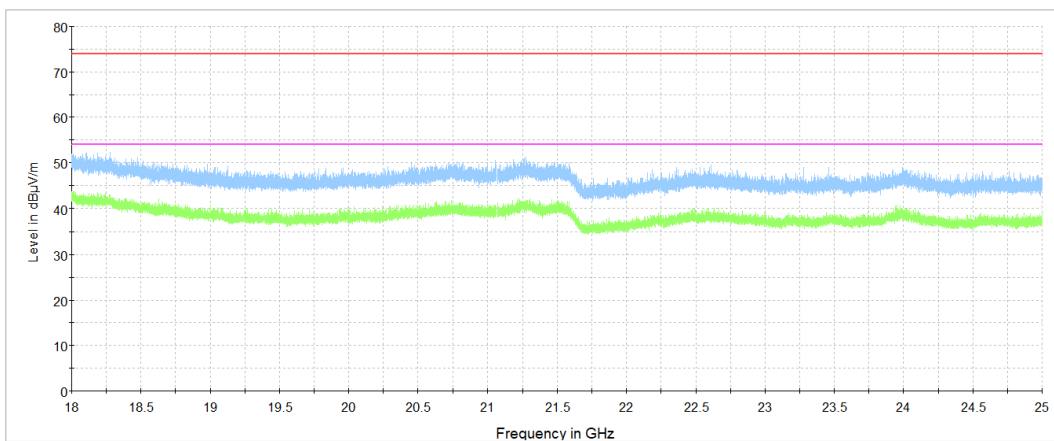
Plot 7.3.49 Radiated emission measurements from 18000 to 25000 MHz at the high carrier frequency Antenna 2

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and horizontal
 CHANNEL: 25



Plot 7.3.50 Radiated emission measurements from 18000 to 25000 MHz at the high carrier frequency 2480 MHz Antenna 2

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and horizontal
 CHANNEL: 26





Test specification:	Section 15.247(d) / RSS-247 section 5.5, Band edge emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	01-Mar-16 - 03-Mar-16		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 47 %	Power Supply: Battery
Remarks:			

7.4 Band edge radiated emissions

7.4.1 General

This test was performed to measure emissions, radiated from the EUT at the assigned frequency band edges. Specification test limits are given in Table 7.4.1.

Table 7.4.1 Band edge emission limits

Output power	Assigned frequency, MHz	Attenuation below carrier*, dBc	Field strength at 3 m within restricted bands, dB(μV/m)	
			Peak	Average
Peak	902.0 – 928.0	20.0	74.0	54.0
	2400.0 – 2483.5			
	5725.0 – 5850.0			
Averaged over a time interval	902.0 – 928.0	30.0	74.0	54.0
	2400.0 – 2483.5			
	5725.0 – 5850.0			

* - Band edge emission limit is provided in terms of attenuation below the peak of modulated carrier measured with the same resolution bandwidth.

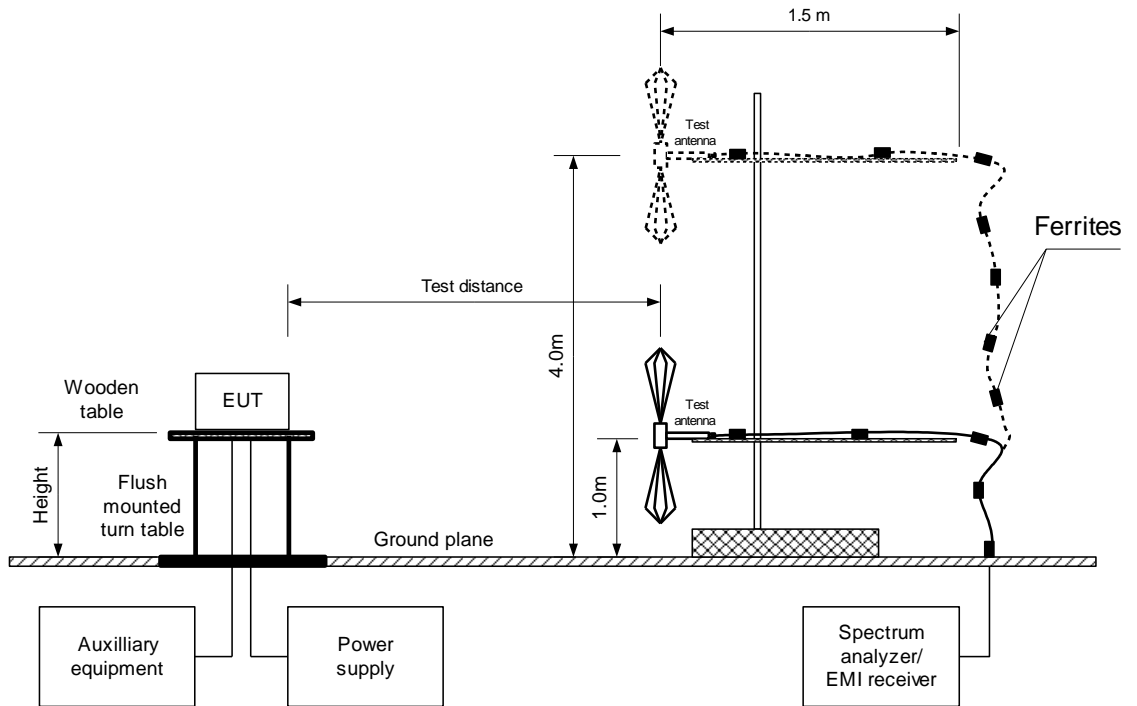
7.4.2 Test procedure

- 7.4.2.1 The EUT was set up as shown in Figure 7.4.1, energized normally modulated at the maximum data rate and its proper operation was checked.
- 7.4.2.2 The EUT was adjusted to produce maximum available to end user RF output power at the lowest carrier frequency.
- 7.4.2.3 The spectrum analyzer span was set to capture the carrier frequency and associated modulation products. The resolution bandwidth was set wider than 1 % of the frequency span.
- 7.4.2.4 The spectrum analyzer was set in max hold mode and allowed trace to stabilize. The highest emission level within the authorized band was measured.
- 7.4.2.5 The maximum band edge emission and modulation product outside of the band were measured as provided in Table 7.4.2 and associated plots and referenced to the highest emission level measured within the authorized band.
- 7.4.2.6 The above procedure was repeated with the EUT adjusted to produce maximum RF output power at the highest carrier frequency.



Test specification:	Section 15.247(d) / RSS-247 section 5.5, Band edge emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	01-Mar-16 - 03-Mar-16		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 47 %	Power Supply: Battery
Remarks:			

Figure 7.4.1 Band edge emission test setup





Test specification:		Section 15.247(d) / RSS-247 section 5.5, Band edge emissions	
Test procedure:		ANSI C63.10 section 11.12.1	
Test mode:		Compliance	
Date(s):		01-Mar-16 - 03-Mar-16	
Temperature: 23.2 °C		Air Pressure: 1017 hPa	Relative Humidity: 47 %
Remarks:		Verdict: PASS	
		Power Supply: Battery	

Table 7.4.2 Band edge emissions test results

ASSIGNED FREQUENCY RANGE: 2400 - 2483.5 MHz
DETECTOR USED: Peak
MODULATION: OQPSK
MODULATING SIGNAL: PRBS
BIT RATE: 250 kbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
RESOLUTION BANDWIDTH: 3 – 100 kHz
VIDEO BANDWIDTH: ≥ RBW

Frequency, MHz	Band edge emission, dB(μV/m)	Emission at carrier, dB(μV/m)	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict
Antenna 1						
2399.980	71.51	111.61	40.10	20.0	20.10	Pass
2399.880	72.30		39.31		19.31	
Antenna 2						
2400.000	71.26	112.34	41.08	20.0	21.08	Pass
2400.000	71.23		41.11		21.11	

*- Margin = Attenuation below carrier – specification limit.



Test specification:		Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure:		ANSI C63.10 section 11.12.1			
Test mode:		Compliance		Verdict: PASS	
Date(s):		01-Mar-16 - 03-Mar-16			
Temperature: 23.2 °C		Air Pressure: 1017 hPa		Relative Humidity: 47 %	
Power Supply:		Battery			
Remarks:					

Table 7.4.3 Band edge emissions above 1 GHz within restricted bands

ASSIGNED FREQUENCY: 2400 - 2483.5 MHz
 TEST DISTANCE: 3 m
 MODULATION: OQPSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 250 kbps
 DUTY CYCLE: 100 %
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 1000 kHz
 TEST ANTENNA TYPE: Double ridged guide

Frequency, MHz	Antenna		Azimuth, degrees*	Peak field strength(VBW=3 MHz)			Average field strength(VBW=10 Hz)				Verdict
	Polarization	Height, m		Measured, dB(µV/m)	Limit, dB(µV/m)	Margin, dB**	Measured, dB(µV/m)	Calculated, dB(µV/m)	Limit, dB(µV/m)	Margin, dB***	
Antenna 1											
Low carrier frequency: Channel 11											
2389.400	Vert	1.8	225	62.89	74.0	-11.11	47.85	36.25	54.0	-17.75	Pass
2389.800	Hor	1.7	185	61.12	74.0	-12.88	52.1	40.50	54.0	-13.50	
High carrier frequency 1: Channel 25											
2483.500	Vert	1.7	270	68.22	74.0	-5.78	56.91	45.31	54.0	-8.69	Pass
2483.500	Hor	1.8	0	68.69	74.0	-5.31	57.51	45.91	54.0	-8.09	
High carrier frequency 1: Channel 26											
2483.500	Vert	1.8	0	73.62	74.0	-0.38	64.15	52.55	54.0	-1.45	Pass
2483.500	Hor	1.3	180	72.79	74.0	-1.21	63.25	51.65	54.0	-2.35	
Antenna 2											
Low carrier frequency: Channel 11											
2389.400	Vert	1.6	315	58.05	74.0	-15.95	47.18	35.58	54.0	-18.42	Pass
2389.800	Hor	1.7	180	54.94	74.0	-19.06	45.44	33.84	54.0	-20.16	
High carrier frequency 1: Channel 25											
2483.500	Vert	1.7	290	70.05	74.0	-3.95	59.05	47.45	54.0	-6.55	Pass
2483.500	Hor	1.9	190	70.65	74.0	-3.35	59.77	48.17	54.0	-5.83	
High carrier frequency 1: Channel 26											
2483.500	Vert	1.8	320	73.74	74.0	-0.26	62.02	50.42	54.0	-3.58	Pass
2483.540	Hor	1.9	170	73.41	74.0	-0.59	60.98	49.38	54.0	-4.62	

*- EUT front panel refers to 0 degrees position of turntable.
 **- Margin = Measured field strength - specification limit.
 ***- Margin = Calculated field strength - specification limit,
 where Calculated field strength = Measured field strength + average factor.

Reference numbers of test equipment used

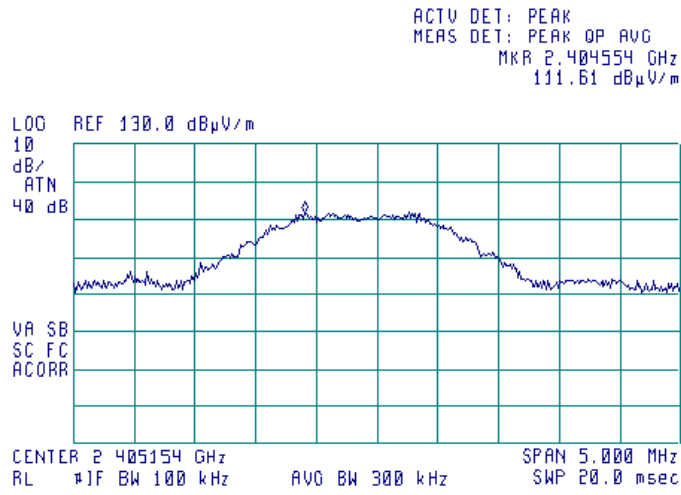
HL 0521	HL 1984	HL 3818	HL 4278	HL 4353		
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Full description is given in Appendix A.

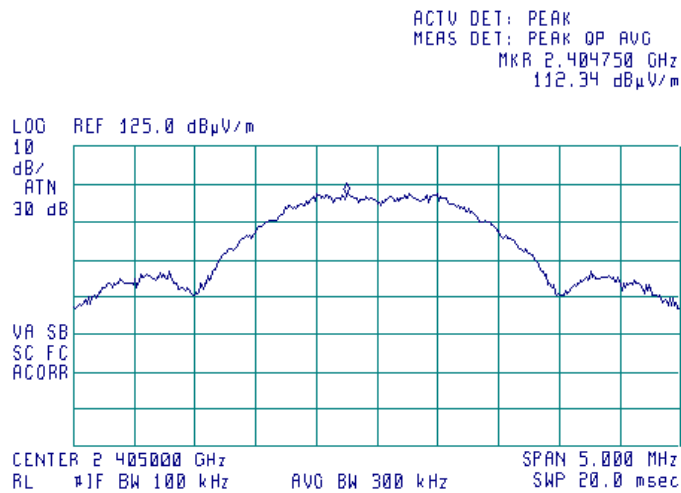


Test specification:	Section 15.247(d) / RSS-247 section 5.5, Band edge emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	01-Mar-16 - 03-Mar-16		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 47 %	Power Supply: Battery
Remarks:			

Plot 7.4.1 The highest emission level within the assigned band at low carrier frequency ch.11, Antenna 1



Plot 7.4.2 The highest emission level within the assigned band at low carrier frequency ch.11, Antenna 2





HERMON LABORATORIES

Test specification:		Section 15.247(d) / RSS-247 section 5.5, Band edge emissions	
Test procedure:		ANSI C63.10 section 11.12.1	
Test mode:		Compliance	
Date(s):		01-Mar-16 - 03-Mar-16	
Temperature: 23.2 °C		Air Pressure: 1017 hPa	
		Relative Humidity: 47 %	
		Power Supply: Battery	
Remarks:			

Plot 7.4.3 The highest band edge emission at low carrier frequency ch.11, Antenna 1

FREQUENCY RANGE:

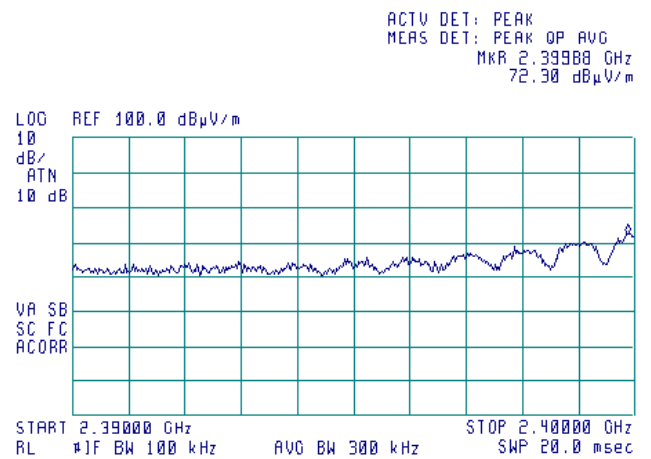
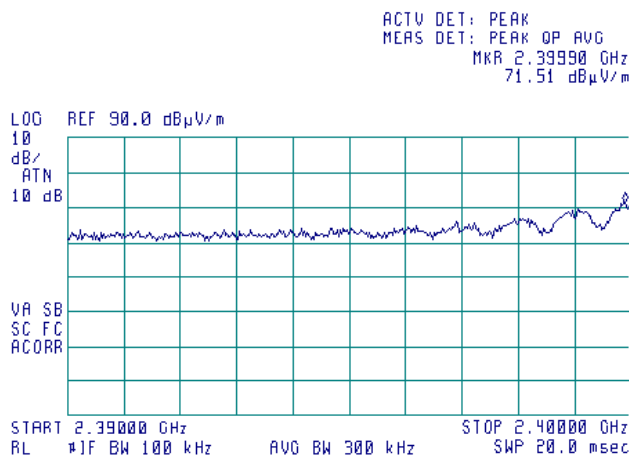
2390 – 2400 MHz

TEST DISTANCE:

3 m

ANTENNA POLARIZATION: Vertical

ANTENNA POLARIZATION: Horizontal





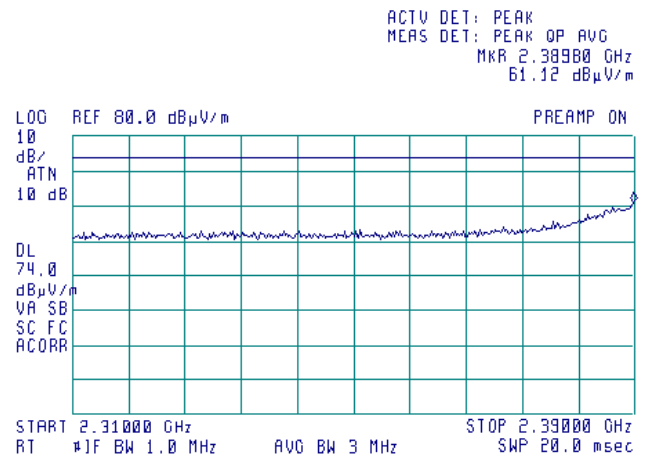
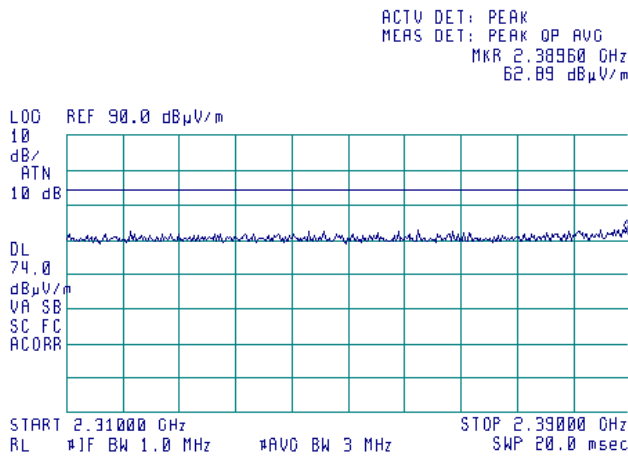
HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions	
Test procedure: ANSI C63.10 section 11.12.1	
Test mode: Compliance	Verdict: PASS
Date(s): 01-Mar-16 - 03-Mar-16	
Temperature: 23.2 °C	Air Pressure: 1017 hPa
Relative Humidity: 47 %	
Power Supply: Battery	
Remarks:	

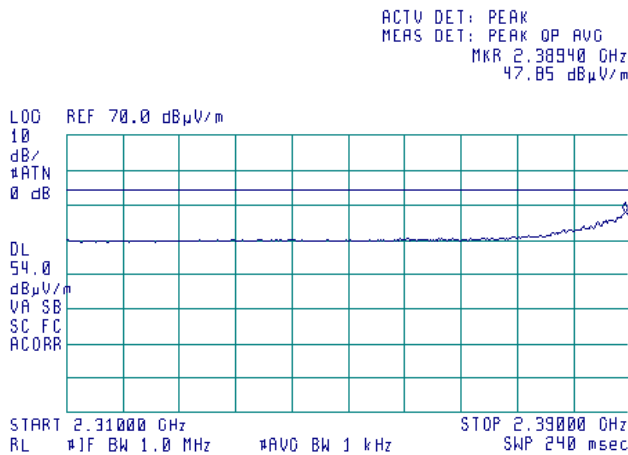
Plot 7.4.4 The highest band edge emission at low carrier frequency ch.11, Antenna 1

FREQUENCY RANGE:
TEST DISTANCE:
ANTENNA POLARIZATION: Vertical
RBW = 1 MHz VBW = 3 MHz

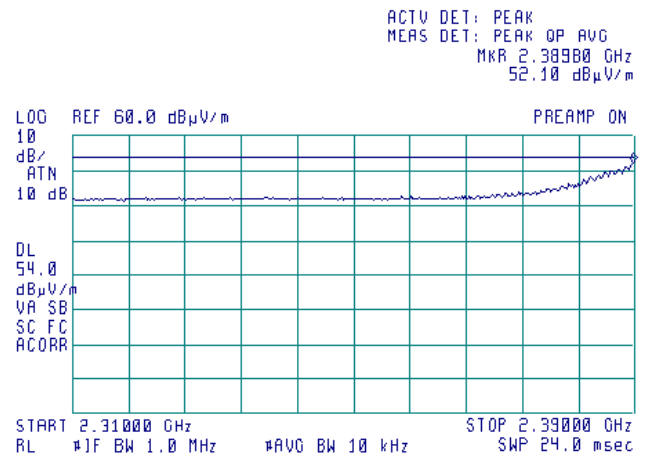
2310 – 2390 MHz
3 m
ANTENNA POLARIZATION: Horizontal
RBW = 1 MHz VBW = 3 MHz



RBW = 1 MHz VBW = 1 kHz



RBW = 1 MHz VBW = 10 kHz



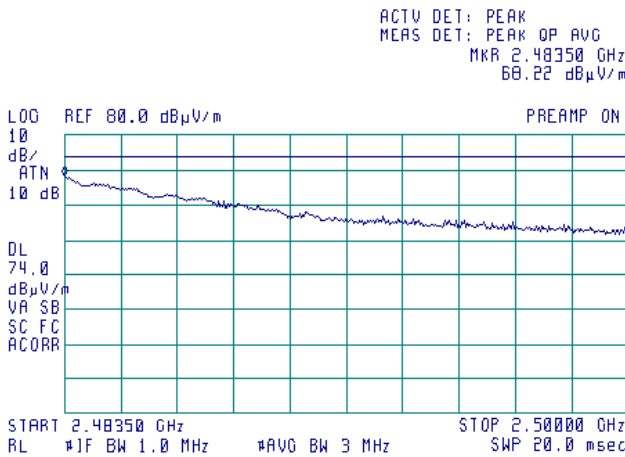


HERMON LABORATORIES

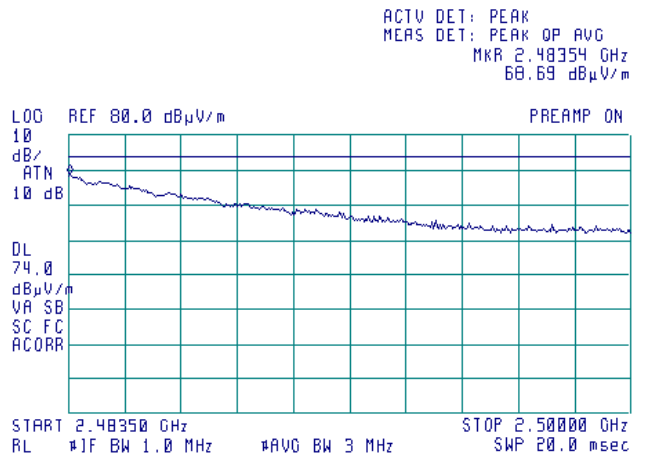
Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 01-Mar-16 - 03-Mar-16			
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 47 %	Power Supply: Battery
Remarks:			

Plot 7.4.5 The highest band edge emission at high carrier frequency ch.25, Antenna 1

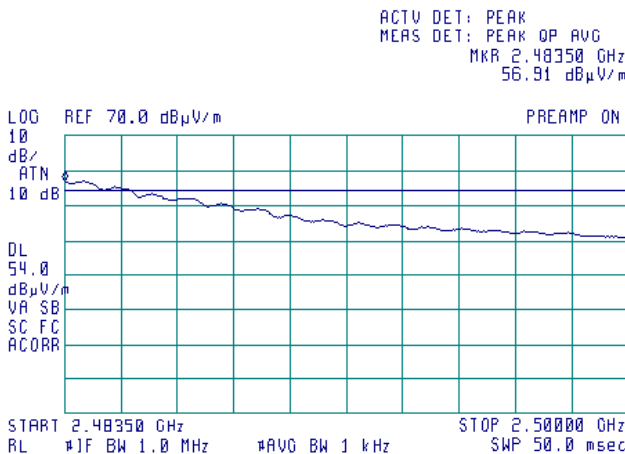
ANTENNA POLARIZATION: Vertical
RBW = 1 MHz VBW = 3 MHz



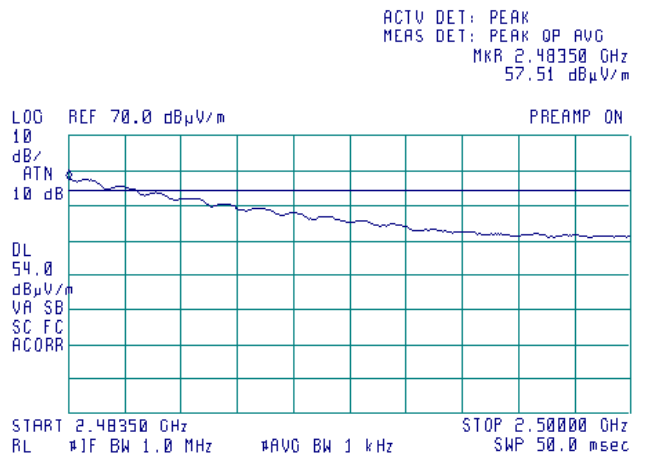
ANTENNA POLARIZATION: Horizontal
RBW = 1 MHz VBW = 3 MHz



RBW = 1 MHz VBW = 1 kHz



RBW = 1 MHz VBW = 1 kHz





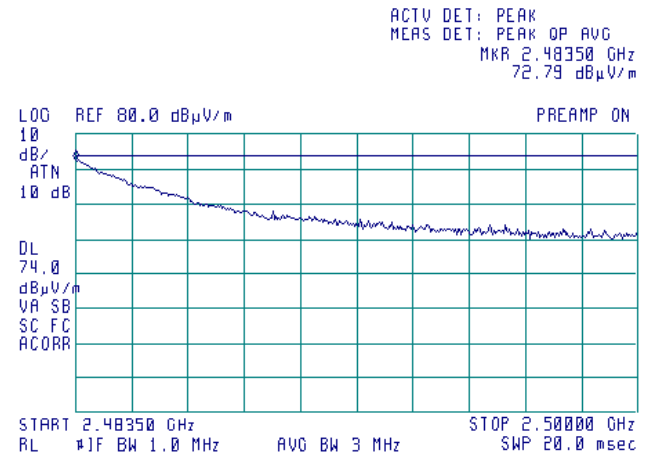
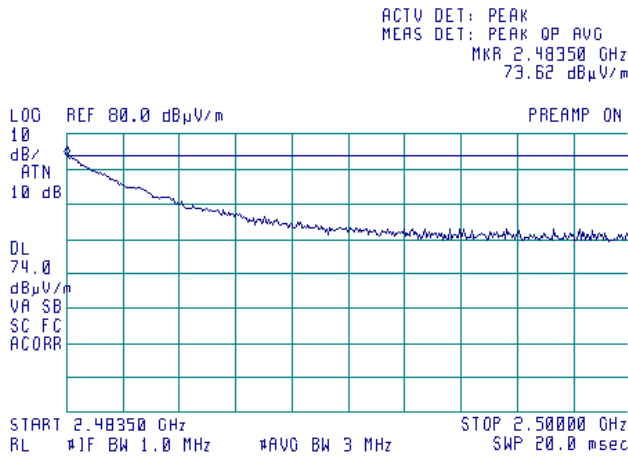
HERMON LABORATORIES

Test specification:		Section 15.247(d) / RSS-247 section 5.5, Band edge emissions	
Test procedure:		ANSI C63.10 section 11.12.1	
Test mode:		Compliance	
Date(s):		01-Mar-16 - 03-Mar-16	
Temperature: 23.2 °C		Air Pressure: 1017 hPa	
Relative Humidity: 47 %		Power Supply: Battery	
Remarks:			

Plot 7.4.6 The highest band edge emission at high carrier frequency ch.26, Antenna 1

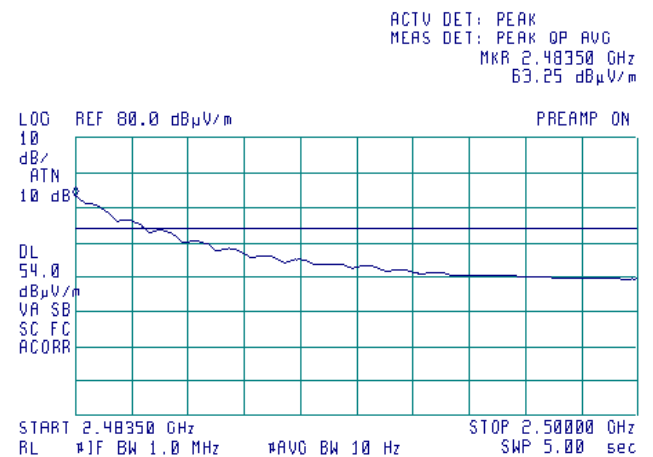
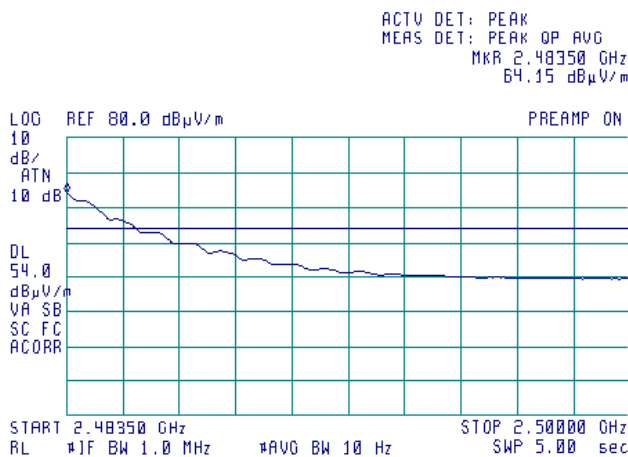
ANTENNA POLARIZATION: Vertical
RBW = 1 MHz VBW = 3 MHz

ANTENNA POLARIZATION: Horizontal
RBW = 1 MHz VBW = 3 MHz



RBW = 1 MHz VBW = 10 Hz

RBW = 1 MHz VBW = 10 Hz





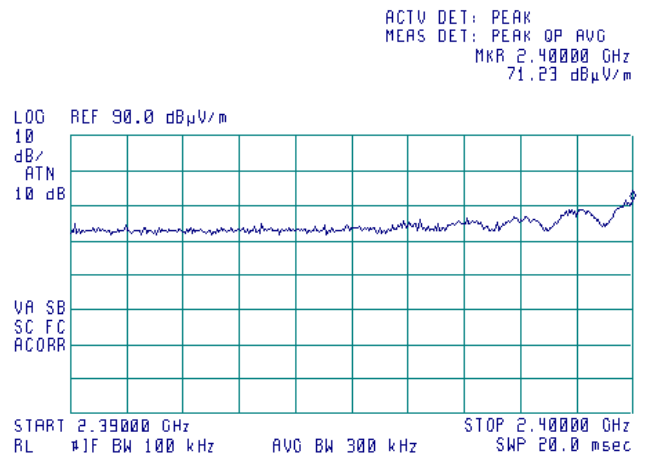
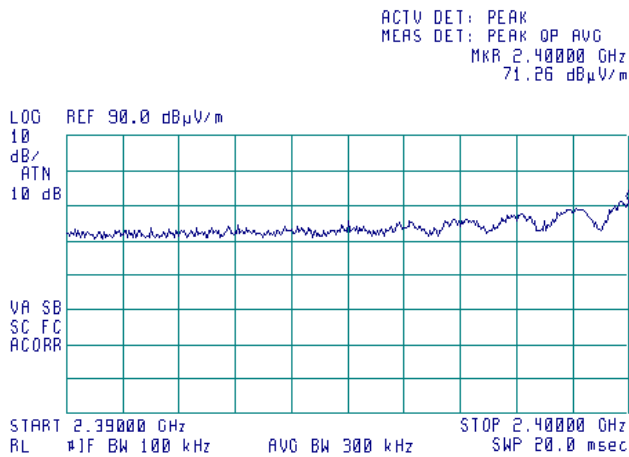
HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance		Verdict: PASS	
Date(s): 01-Mar-16 - 03-Mar-16			
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 47 %	Power Supply: Battery
Remarks:			

Plot 7.4.7 The highest band edge emission at low carrier frequency ch.11, Antenna 2

FREQUENCY RANGE:
TEST DISTANCE:
ANTENNA POLARIZATION: Vertical

2390 – 2400 MHz
3 m
ANTENNA POLARIZATION: Horizontal



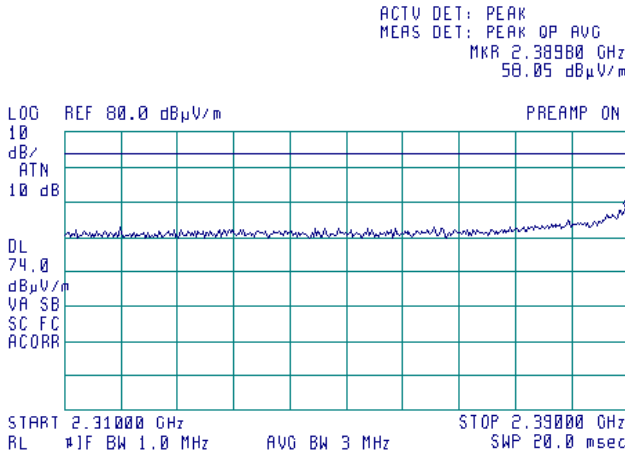


HERMON LABORATORIES

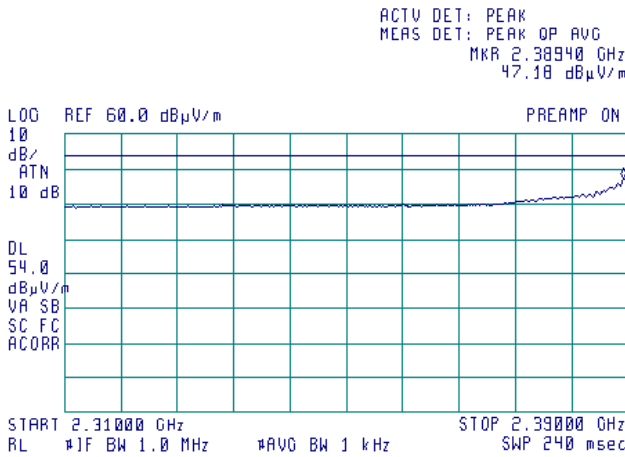
Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance	Verdict: PASS		
Date(s): 01-Mar-16 - 03-Mar-16			
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 47 %	Power Supply: Battery
Remarks:			

Plot 7.4.8 The highest band edge emission at low carrier frequency ch.11, Antenna 2

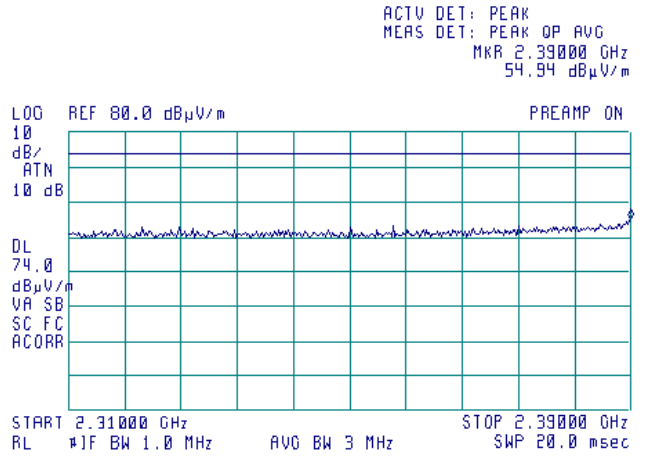
ANTENNA POLARIZATION: Vertical
RBW = 1 MHz VBW = 3 MHz



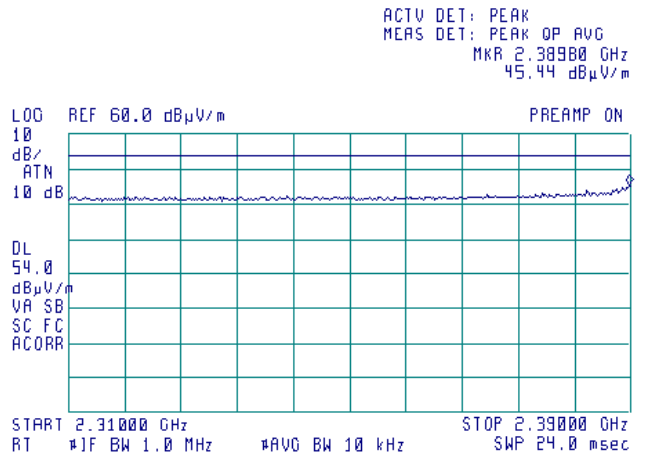
RBW = 1 MHz VBW = 1 kHz



ANTENNA POLARIZATION: Horizontal
RBW = 1 MHz VBW = 3 MHz



RBW = 1 MHz VBW = 10 kHz





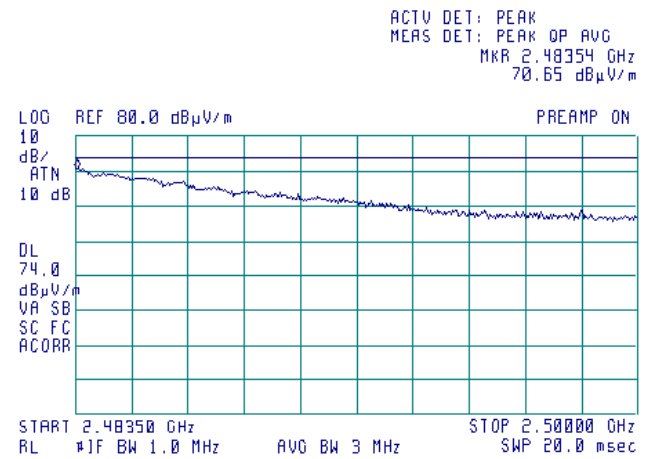
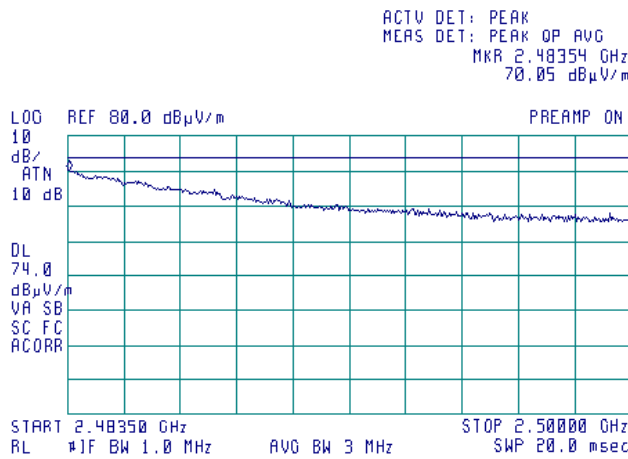
HERMON LABORATORIES

Test specification: Section 15.247(d) / RSS-247 section 5.5, Band edge emissions			
Test procedure: ANSI C63.10 section 11.12.1			
Test mode: Compliance	Verdict: PASS		
Date(s): 01-Mar-16 - 03-Mar-16			
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 47 %	Power Supply: Battery
Remarks:			

Plot 7.4.9 The highest band edge emission at high carrier frequency ch.25, Antenna 2

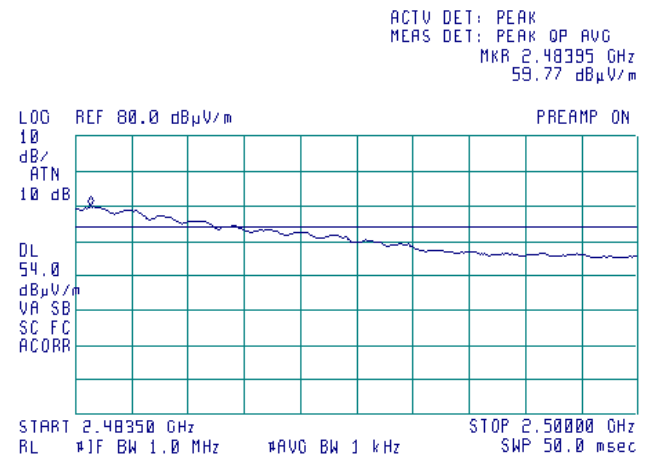
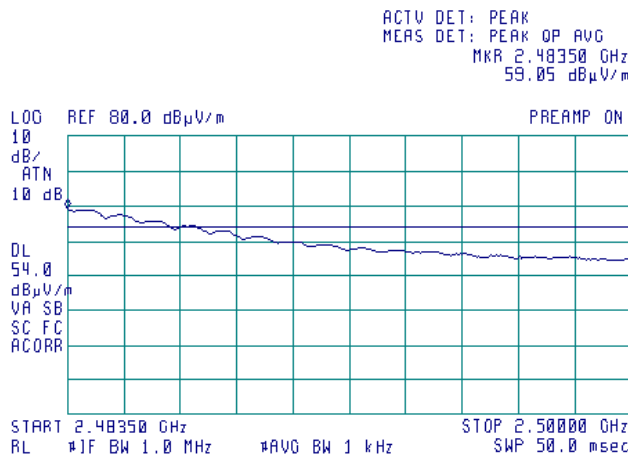
ANTENNA POLARIZATION: Vertical
RBW = 1 MHz VBW = 3 MHz

ANTENNA POLARIZATION: Horizontal
RBW = 1 MHz VBW = 3 MHz



RBW = 1 MHz VBW = 1 kHz

RBW = 1 MHz VBW = 1 kHz



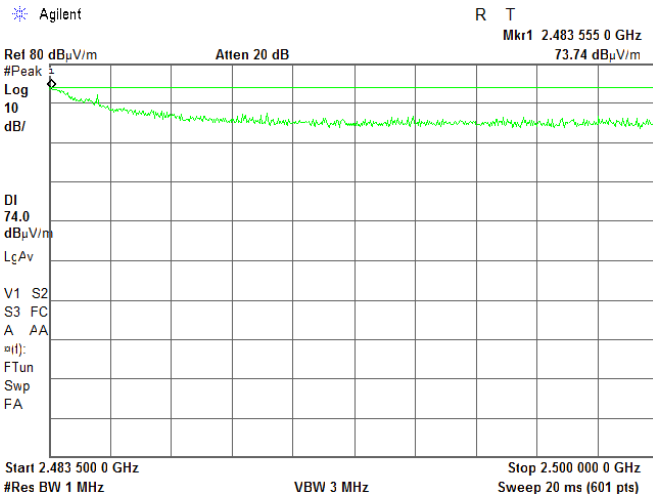


HERMON LABORATORIES

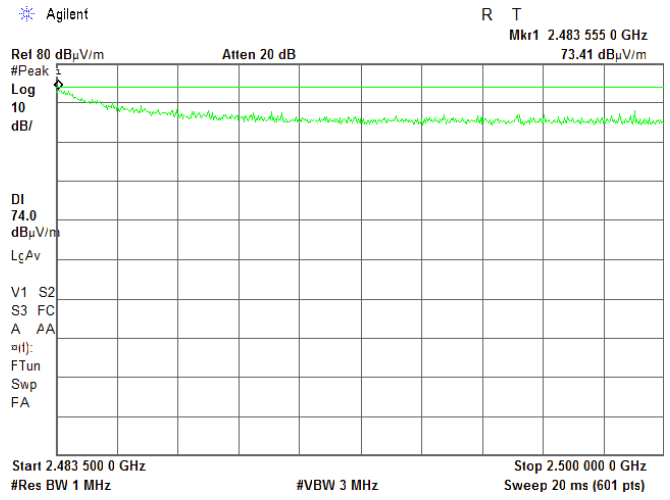
Test specification:	Section 15.247(d) / RSS-247 section 5.5, Band edge emissions		
Test procedure:	ANSI C63.10 section 11.12.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	01-Mar-16 - 03-Mar-16		
Temperature: 23.2 °C	Air Pressure: 1017 hPa	Relative Humidity: 47 %	Power Supply: Battery
Remarks:			

Plot 7.4.10 The highest band edge emission at high carrier frequency ch.26, Antenna 2

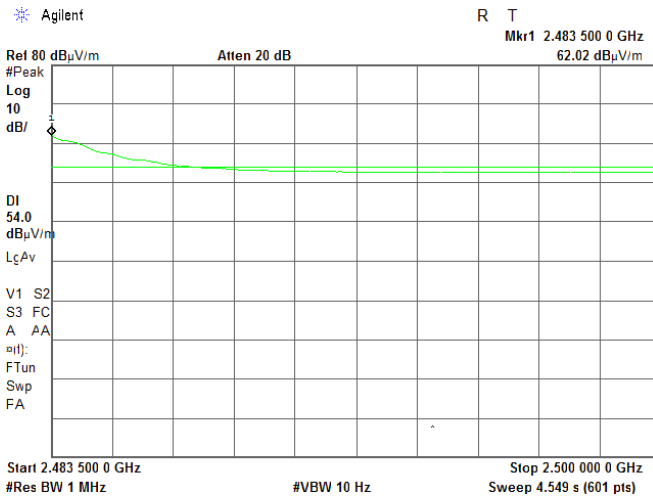
ANTENNA POLARIZATION: Vertical
RBW = 1 MHz VBW = 3 MHz



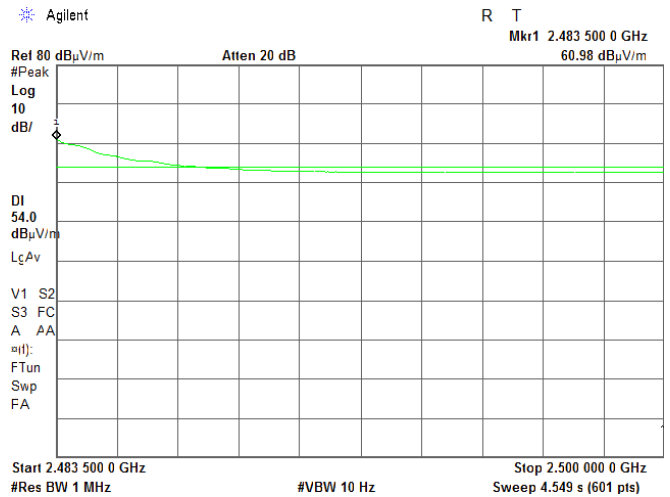
ANTENNA POLARIZATION: Horizontal
RBW = 1 MHz VBW = 3 MHz



RBW = 1 MHz VBW = 10 Hz



RBW = 1 MHz VBW = 10 Hz





Test specification:	Section 15.247(e) / RSS-247 section 5.2(2), Peak power density		
Test procedure:	ANSI C63.10 section 11.10.2		
Test mode:	Compliance	Verdict:	PASS
Date(s):	18-Feb-16 - 01-Mar-16		
Temperature: 22.51 °C	Air Pressure: 1018 hPa	Relative Humidity: 43 %	Power Supply: Battery
Remarks:			

7.5 Peak spectral power density

7.5.1 General

This test was performed to measure the peak spectral power density radiated by the transmitter RF antenna. Specification test limits are given in Table 7.5.1.

Table 7.5.1 Peak spectral power density limits

Assigned frequency range, MHz	Measurement bandwidth, kHz	Peak spectral power density, dBm	Equivalent field strength limit @ 3m, dB(µV/m)*
902.0 – 928.0	3.0	8.0	103.2
2400.0 – 2483.5			
5725.0 – 5850.0			

* - Equivalent field strength limit was calculated from the peak spectral power density as follows: $E = \sqrt{30 \times P} / r$, where P is peak spectral power density and r is antenna to EUT distance in meters.

7.5.2 Test procedure for field strength measurements

7.5.2.1 The EUT was set up as shown in Figure 7.5.1, energized and its proper operation was checked.

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

7.5.2.3 The field strength of the EUT carrier frequency was measured with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360° and the measuring antenna height was swept in both vertical and horizontal polarizations.

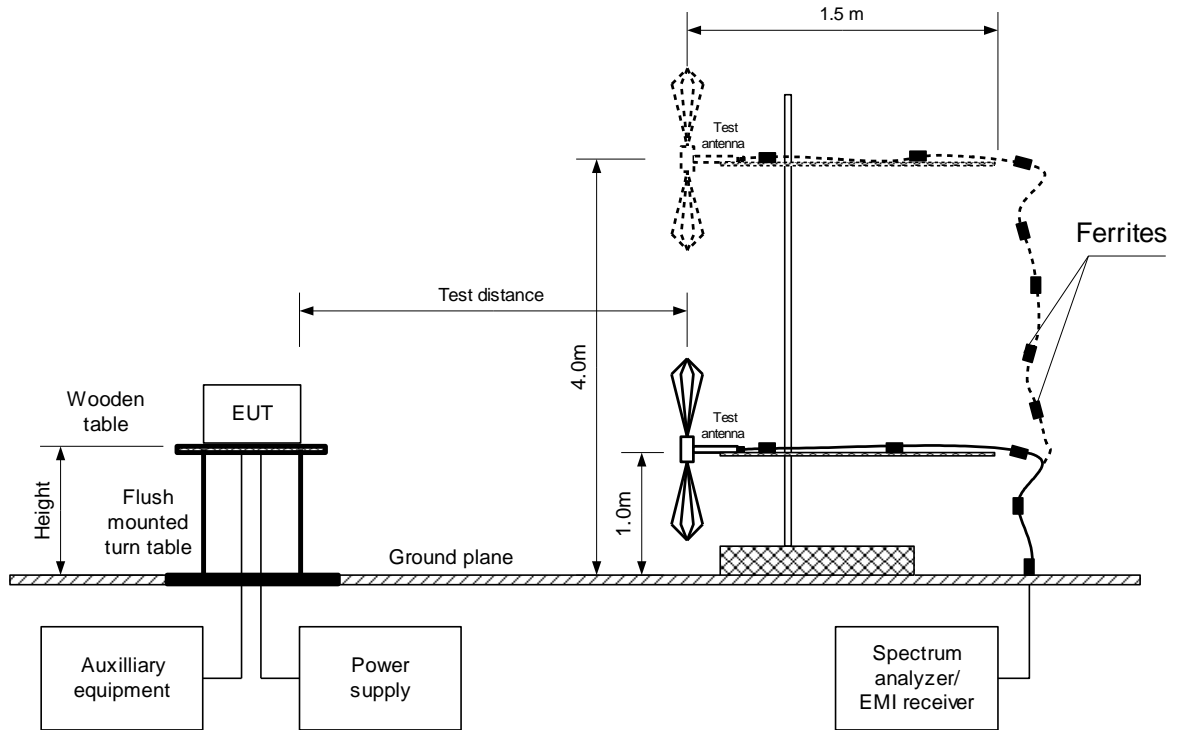
7.5.2.4 The frequency span of spectrum analyzer was set to capture the entire 6 dB band of the transmitter, in peak hold mode with resolution bandwidth set to 3.0 kHz, video bandwidth wider than resolution bandwidth, auto sweep time and sufficient number of sweeps was allowed for trace stabilization.

7.5.2.5 Spectrum analyzer was set in peak hold mode, sufficient number of sweeps was allowed for trace stabilization and peak spectral power density was measured as provided in Table 7.5.2 and associated plots.



Test specification:	Section 15.247(e) / RSS-247 section 5.2(2), Peak power density		
Test procedure:	ANSI C63.10 section 11.10.2		
Test mode:	Compliance	Verdict:	PASS
Date(s):	18-Feb-16 - 01-Mar-16		
Temperature: 22.51 °C	Air Pressure: 1018 hPa	Relative Humidity: 43 %	Power Supply: Battery
Remarks:			

Figure 7.5.1 Setup for carrier field strength measurements





Test specification:	Section 15.247(e) / RSS-247 section 5.2(2), Peak power density		
Test procedure:	ANSI C63.10 section 11.10.2		
Test mode:	Compliance	Verdict:	PASS
Date(s):	18-Feb-16 - 01-Mar-16		
Temperature: 22.51 °C	Air Pressure: 1018 hPa	Relative Humidity: 43 %	Power Supply: Battery
Remarks:			

Table 7.5.2 Field strength measurement of peak spectral power density

ASSIGNED FREQUENCY: 2400 - 2483.5 MHz
TEST DISTANCE: 3 m
TEST SITE: Semi anechoic chamber
EUT HEIGHT: 1.5 m
DETECTOR USED: Peak
TEST ANTENNA TYPE: Double ridged guide (above 1000 MHz)
MODULATION: OQPSK
BIT RATE: 250 kbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
DETECTOR USED: Peak
EUT 6 dB BANDWIDTH: 1.65 MHz
RESOLUTION BANDWIDTH: 3 kHz
VIDEO BANDWIDTH: 10 kHz

Frequency, MHz	Field strength, dB(μV/m)	EUT antenna gain, dBi	Limit, dB(μV/m)	Margin, dB*	Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
Antenna 1								
2404.581	103.16	0	103.23	-0.07	Horizontal	1.5	185	Pass
2445.150	102.00	0	103.23	-1.23	Vertical	1.3	0	Pass
2474.563	101.01	0	103.23	-2.22	Horizontal	1.1	200	Pass
2479.575	89.66	0	103.23	-13.57	Horizontal	1.8	120	Pass
Antenna 2								
2405.456	100.93	0	103.23	-2.30	Vertical	1.6	315	Pass
2444.563	101.97	0	103.23	-1.26	Horizontal	1.4	35	Pass
2475.456	101.55	0	103.23	-1.68	Vertical	1.9	270	Pass
2480.125	92.39	0	103.23	-10.84	Horizontal	1.1	330	Pass

*- Margin = Field strength - EUT antenna gain - calculated field strength limit.

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

Reference numbers of test equipment used

HL 0521	HL 1984	HL 4278	HL 4353				
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Full description is given in Appendix A.

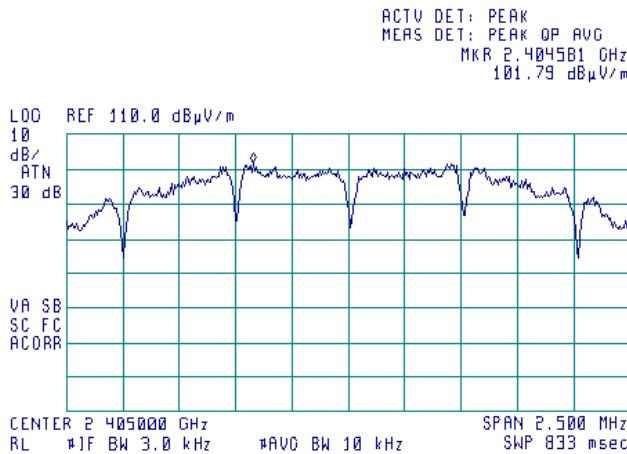


HERMON LABORATORIES

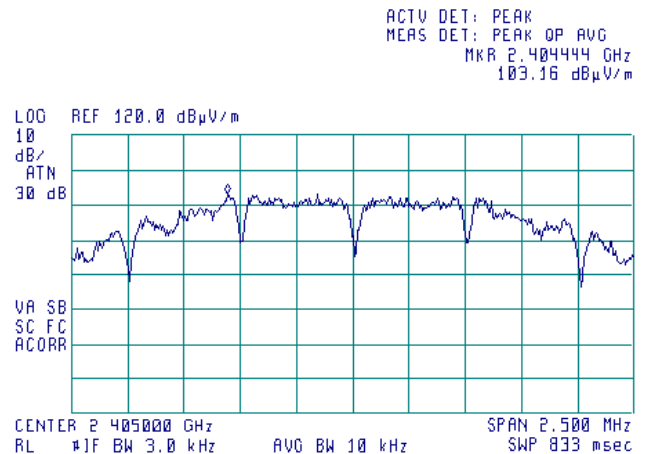
Test specification: Section 15.247(e) / RSS-247 section 5.2(2), Peak power density			
Test procedure: ANSI C63.10 section 11.10.2			
Test mode: Compliance	Verdict: PASS		
Date(s): 18-Feb-16 - 01-Mar-16			
Temperature: 22.51 °C	Air Pressure: 1018 hPa	Relative Humidity: 43 %	Power Supply: Battery
Remarks:			

Plot 7.5.1 Peak spectral power density at low frequency zoomed at the peak, ch.11, Antenna 1

ANTENNA POLARIZATION: Vertical
RBW = 3 kHz

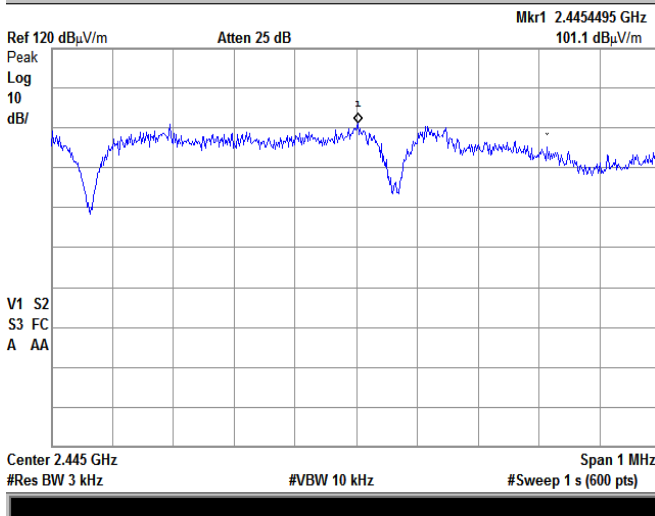


ANTENNA POLARIZATION: Horizontal
RBW = 3 kHz

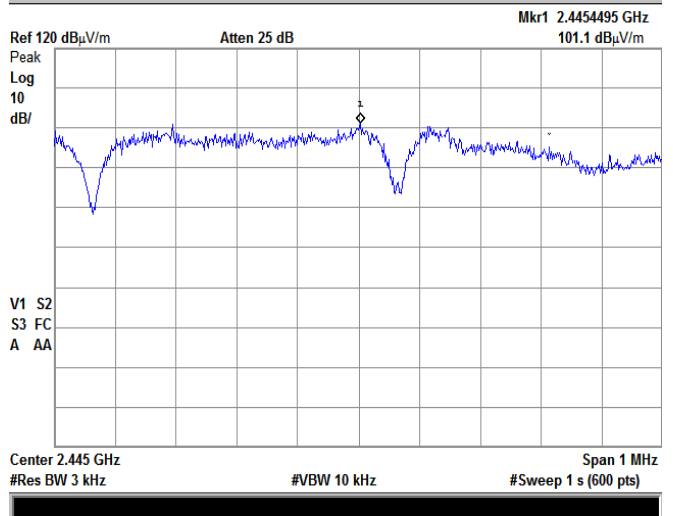


Plot 7.5.2 Peak spectral power density at mid frequency zoomed at the peak, ch.19, Antenna 1

ANTENNA POLARIZATION: Vertical
RBW = 3 kHz



ANTENNA POLARIZATION: Horizontal
RBW = 3 kHz



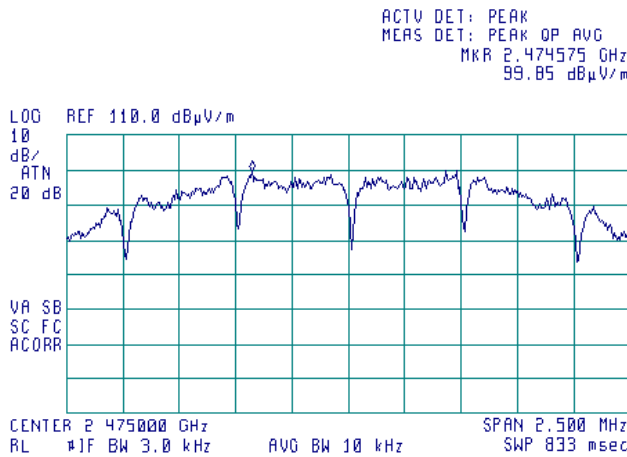


HERMON LABORATORIES

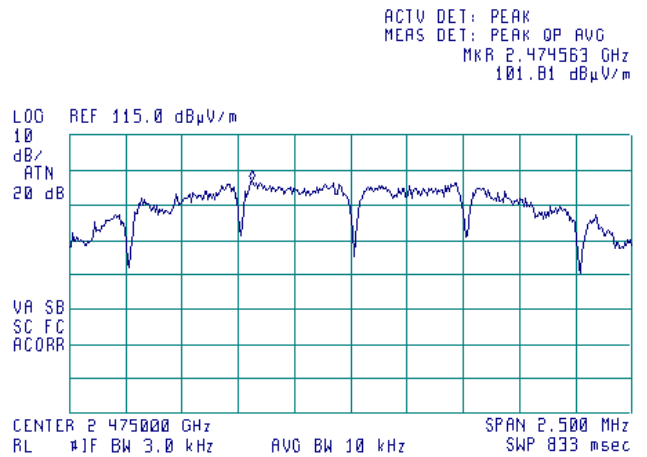
Test specification: Section 15.247(e) / RSS-247 section 5.2(2), Peak power density	
Test procedure: ANSI C63.10 section 11.10.2	
Test mode: Compliance	Verdict: PASS
Date(s): 18-Feb-16 - 01-Mar-16	
Temperature: 22.51 °C	Air Pressure: 1018 hPa
Relative Humidity: 43 %	
Power Supply: Battery	
Remarks:	

Plot 7.5.3 Peak spectral power density at high frequency zoomed at the peak, ch.25, Antenna 1

ANTENNA POLARIZATION: Vertical
RBW = 3 kHz

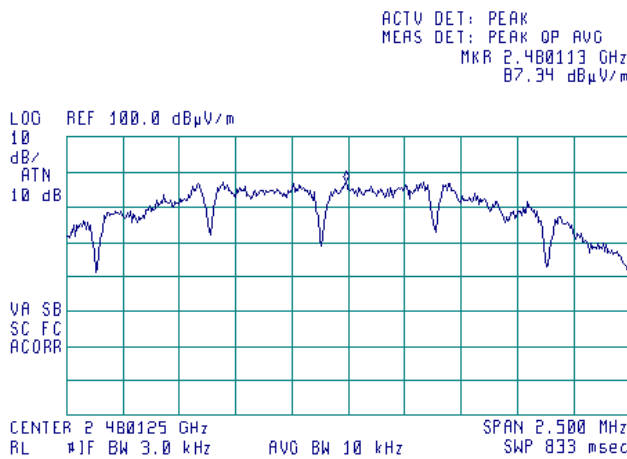


ANTENNA POLARIZATION: Horizontal
RBW = 3 kHz

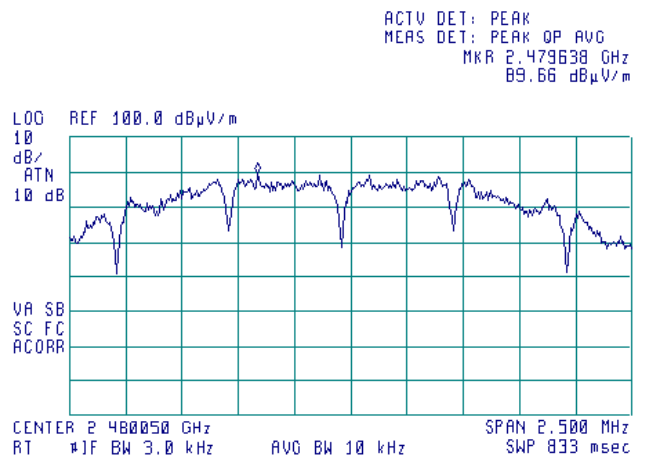


Plot 7.5.4 Peak spectral power density at high frequency zoomed at the peak, ch.26, Antenna 1

ANTENNA POLARIZATION: Vertical
RBW = 3 kHz



ANTENNA POLARIZATION: Horizontal
RBW = 3 kHz



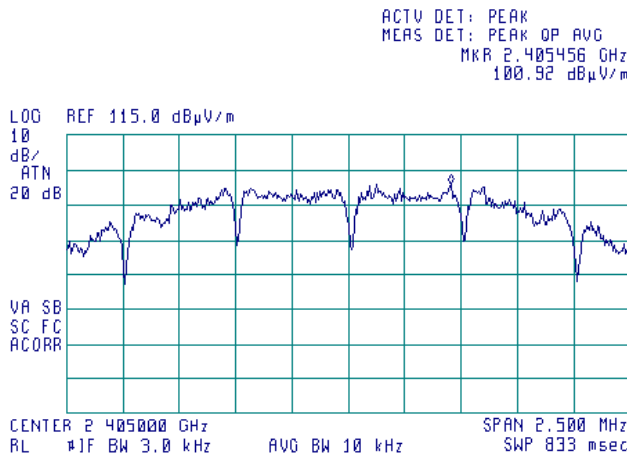


HERMON LABORATORIES

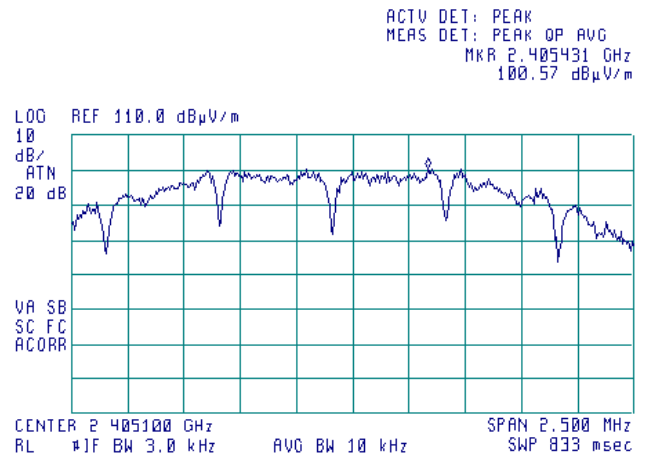
Test specification: Section 15.247(e) / RSS-247 section 5.2(2), Peak power density			
Test procedure: ANSI C63.10 section 11.10.2			
Test mode: Compliance		Verdict: PASS	
Date(s): 18-Feb-16 - 01-Mar-16			
Temperature: 22.51 °C	Air Pressure: 1018 hPa	Relative Humidity: 43 %	Power Supply: Battery
Remarks:			

Plot 7.5.5 Peak spectral power density at low frequency zoomed at the peak, ch.11, Antenna 2

ANTENNA POLARIZATION: Vertical
RBW = 3 kHz

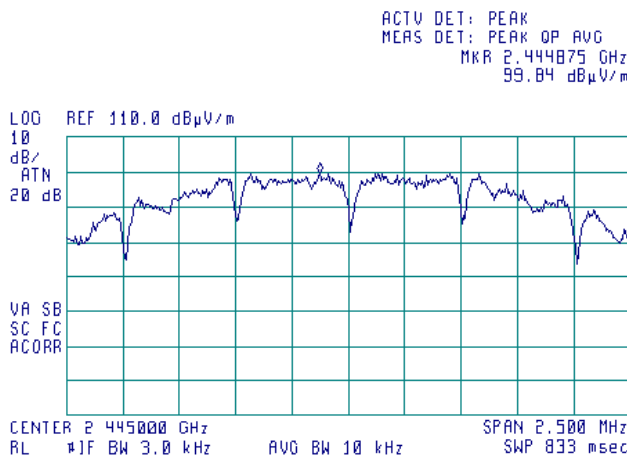


ANTENNA POLARIZATION: Horizontal
RBW = 3 kHz

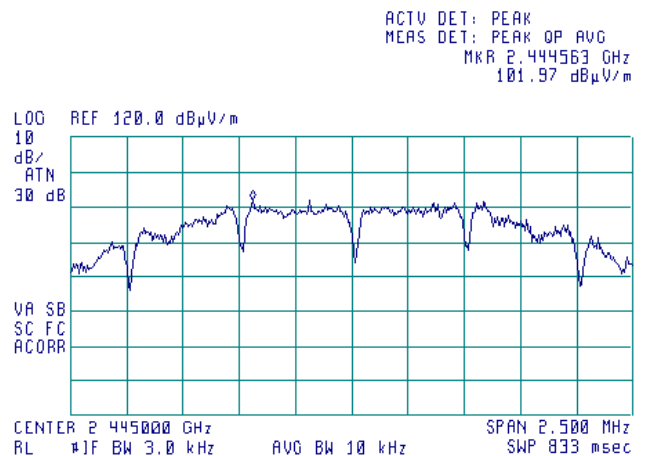


Plot 7.5.6 Peak spectral power density at mid frequency zoomed at the peak, ch.19, Antenna 2

ANTENNA POLARIZATION: Vertical
RBW = 3 kHz



ANTENNA POLARIZATION: Horizontal
RBW = 3 kHz



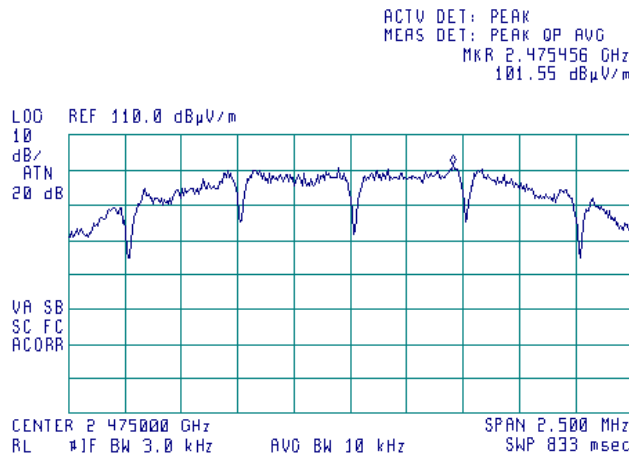


HERMON LABORATORIES

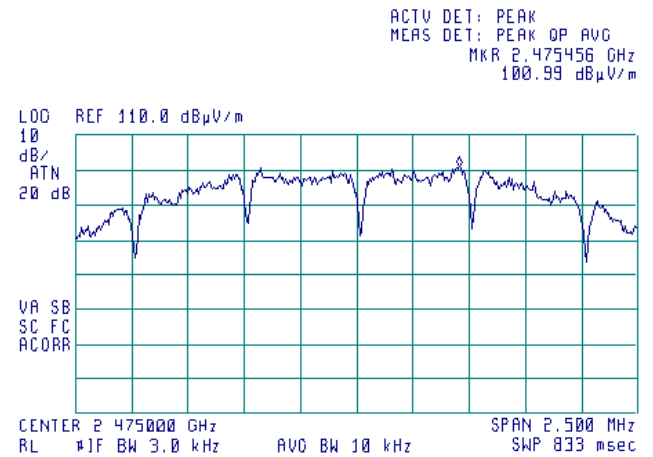
Test specification: Section 15.247(e) / RSS-247 section 5.2(2), Peak power density			
Test procedure: ANSI C63.10 section 11.10.2			
Test mode: Compliance	Verdict: PASS		
Date(s): 18-Feb-16 - 01-Mar-16			
Temperature: 22.51 °C	Air Pressure: 1018 hPa	Relative Humidity: 43 %	Power Supply: Battery
Remarks:			

Plot 7.5.7 Peak spectral power density at high frequency zoomed at the peak, ch.25, Antenna 2

ANTENNA POLARIZATION: Vertical
RBW = 3 kHz

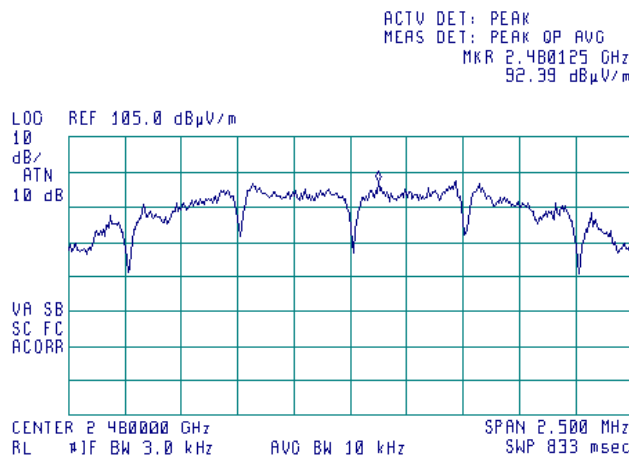


ANTENNA POLARIZATION: Horizontal
RBW = 3 kHz

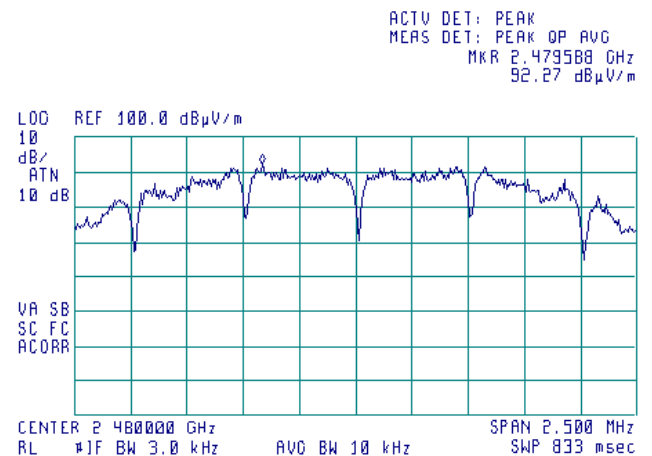


Plot 7.5.8 Peak spectral power density at high frequency zoomed at the peak, ch.26, Antenna 2

ANTENNA POLARIZATION: Vertical
RBW = 3 kHz



ANTENNA POLARIZATION: Horizontal
RBW = 3 kHz





Test specification: Section 15.203, RSS-Gen section 6.8, Antenna requirements	
Test procedure:	
Test mode: Compliance	Verdict: PASS
Date(s): 22-Apr-15	
Temperature: 23 °C	Air Pressure: 1010 hPa
Relative Humidity: 60 %	
Power Supply: Battery	
Remarks:	

7.6 Antenna requirements

The EUT was verified for compliance with antenna requirements. A transmitter shall be designed to ensure that no antenna other than that furnished by the responsible party will be used with the device. It may be either permanently attached or employs a unique antenna connector for every antenna proposed for use with the EUT. This requirement does not apply to professionally installed transmitters.

The rationale for compliance with the above requirements was either visual inspection results or supplier declaration. The summary of results is provided in Table 7.6.1.

Table 7.6.1 Antenna requirements

Requirement	Rationale	Verdict
The transmitter antenna is permanently attached	Visual inspection	Comply
The transmitter employs a unique antenna connector	NA	
The transmitter requires professional installation	NA	



Test specification:	FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2 / ICES-003, Section 6.2, Class B, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	18-Feb-16 - 22-Feb-16		
Temperature: 23 °C	Air Pressure: 1024 hPa	Relative Humidity: 41 %	Power Supply: Battery
Remarks:			

8 Unintentional emissions

8.1 Radiated emission measurements

8.1.1 General

This test was performed to measure radiated emissions from the EUT enclosure. Specification test limits are given in Table 8.1.1, Table 8.1.2.

Table 8.1.1 Radiated emission test limits

Frequency, MHz	Class B limit, dB(μV/m)		Class A limit, dB(μV/m)	
	10 m distance	3 m distance	10 m distance	3 m distance
30 - 88	29.5*	40.0	39.0	49.5*
88 - 216	33.0*	43.5	43.5	54.0*
216 - 960	35.5*	46.0	46.4	56.9*
Above 960	43.5*	54.0	49.5	60.0*

* The limit for test distance other than specified was calculated using the inverse linear distance extrapolation factor as follows: $Lim_{S2} = Lim_{S1} + 20 \log(S1/S2)$, where $S1$ and $S2$ – standard defined and test distance respectively in meters.

Table 8.1.2 Radiated emission limits according to RSS-Gen, Section 7.1.2

Frequency, MHz	Field strength limit at 3 m test distance, dB(μV/m)
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
960 - 5 th harmonic**	54.0

** - harmonic of the highest frequency the EUT generates, uses, operates or tunes to.

8.1.2 Test procedure

8.1.2.1 The EUT was set up as shown in Figure 8.1.1 and associated photograph/s, energized and the performance check was conducted.

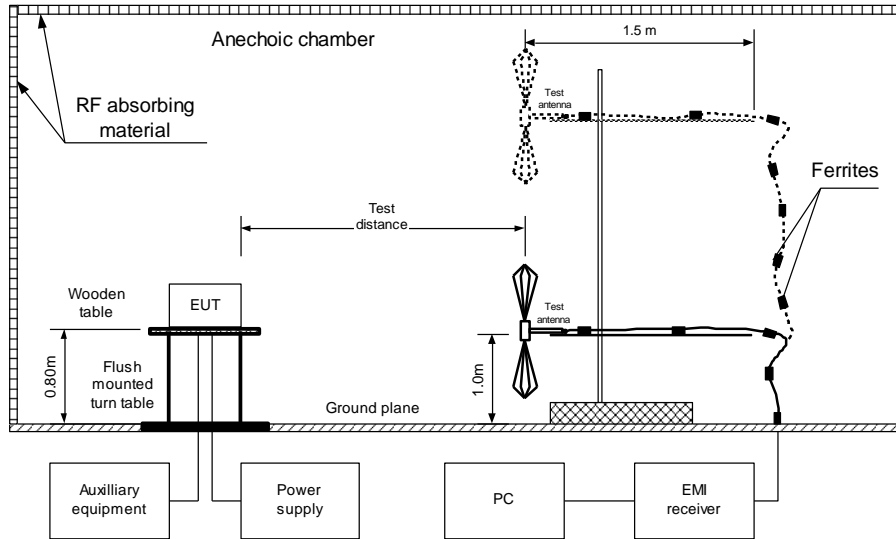
8.1.2.2 The specified frequency range was investigated with biconilog antenna connected to EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal and the EUT cables position was varied.

8.1.2.3 The worst test results (the lowest margins) were recorded in Table 8.1.3 and shown in the associated plots.



Test specification:	FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2 / ICES-003, Section 6.2, Class B, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	18-Feb-16 - 22-Feb-16		
Temperature: 23 °C	Air Pressure: 1024 hPa	Relative Humidity: 41 %	Power Supply: Battery
Remarks:			

Figure 8.1.1 Setup for radiated emission measurements in anechoic chamber, table-top equipment



Photograph 8.1.1 Setup for radiated emission measurements





Test specification:	FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2 / ICES-003, Section 6.2, Class B, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	18-Feb-16 - 22-Feb-16		
Temperature: 23 °C	Air Pressure: 1024 hPa	Relative Humidity: 41 %	Power Supply: Battery
Remarks:			

Table 8.1.3 Radiated emission test results

EUT SET UP: TABLE-TOP
LIMIT: Class B
EUT OPERATING MODE: Receive
TEST SITE: ANECHOIC CHAMBER
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / QUASI-PEAK
FREQUENCY RANGE: 30 MHz – 1000 MHz
RESOLUTION BANDWIDTH: 120 kHz

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*				
No signals were found								Pass

TEST SITE: ANECHOIC CHAMBER
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / AVERAGE
FREQUENCY RANGE: 1000 MHz – 13000 MHz
RESOLUTION BANDWIDTH: 1000 kHz

Frequency, MHz	Peak			Average			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
	Measured emission, dB(µV/m)	Limit, dB(µV/m)	Margin, dB*	Measured emission, dB(µV/m)	Limit, dB(µV/m)	Margin, dB*				
No signals were found										Pass

*- Margin = Measured emission - specification limit.

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

Reference numbers of test equipment used

HL 2697	HL 4720	HL 4276	HL 4933				
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Full description is given in Appendix A.

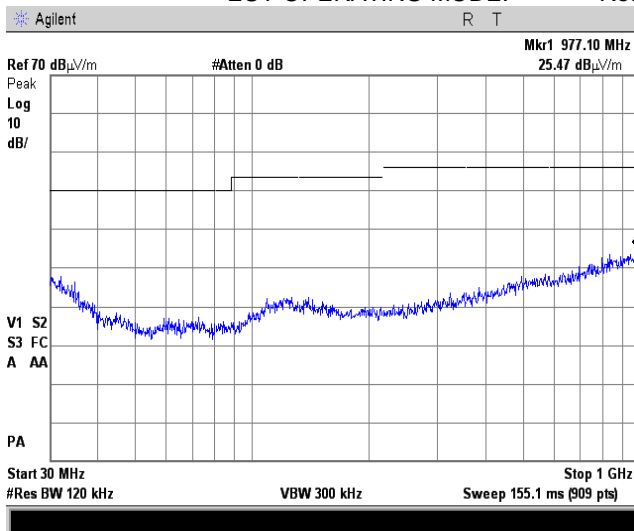


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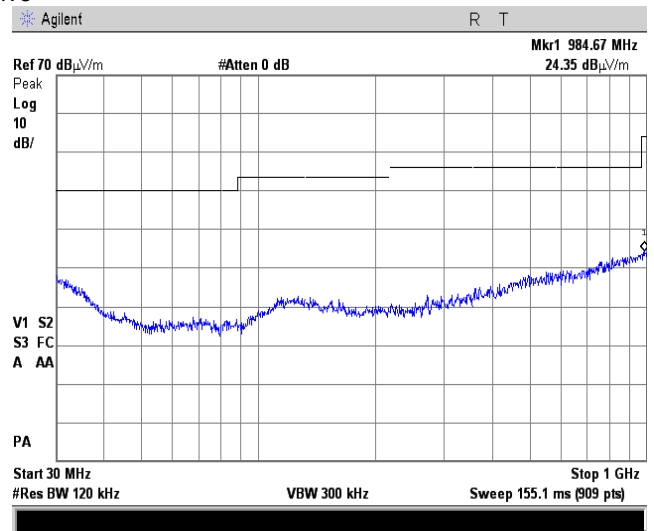
Test specification:	FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2 / ICES-003, Section 6.2, Class B, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	18-Feb-16 - 22-Feb-16		
Temperature: 23 °C	Air Pressure: 1024 hPa	Relative Humidity: 41 %	Power Supply: Battery
Remarks:			

Plot 8.1.1 Radiated emission measurements in 30 - 1000 MHz range, vertical & horizontal antenna polarization

TEST SITE: Anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive



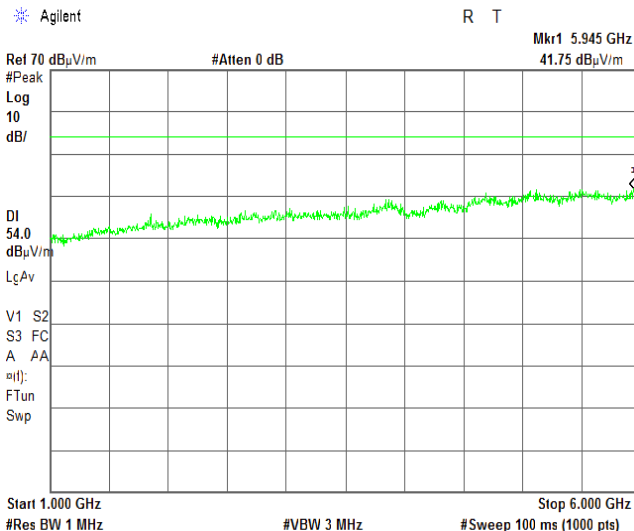
EUT Ant.1



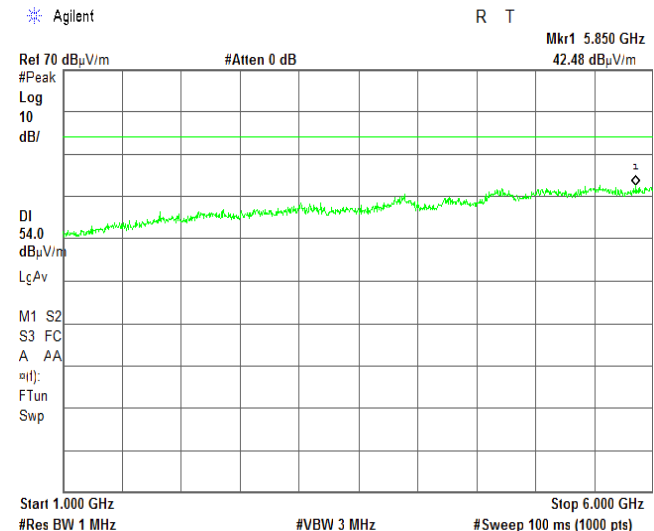
EUT Ant.2

Plot 8.1.2 Radiated emission measurements in 1-6 GHz range, vertical & horizontal antenna polarization

TEST SITE: Anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive



EUT Ant.1



EUT Ant.2

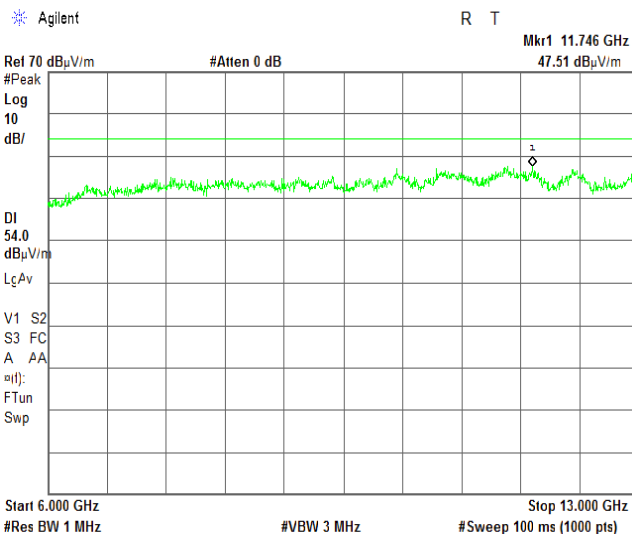


HERMON LABORATORIES

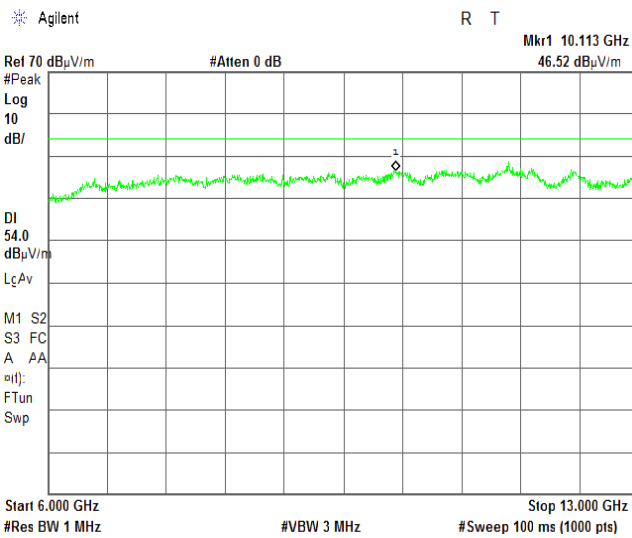
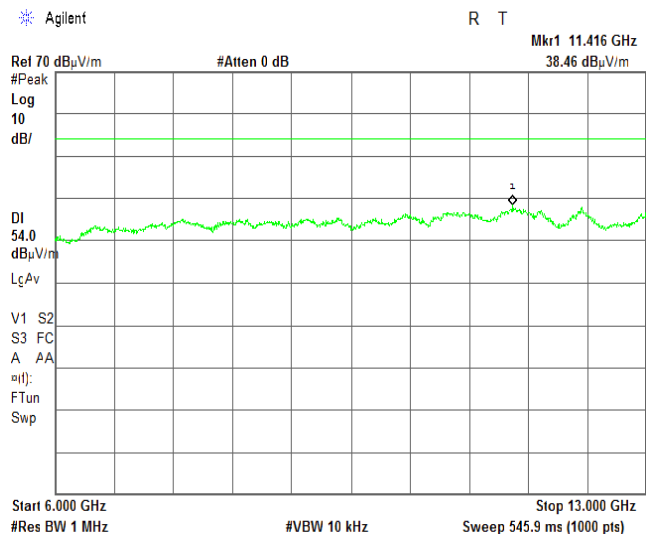
Test specification:	FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2 / ICES-003, Section 6.2, Class B, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	18-Feb-16 - 22-Feb-16		
Temperature: 23 °C	Air Pressure: 1024 hPa	Relative Humidity: 41 %	Power Supply: Battery
Remarks:			

Plot 8.1.3 Radiated emission measurements in 6 – 13 GHz range, vertical & horizontal antenna polarization

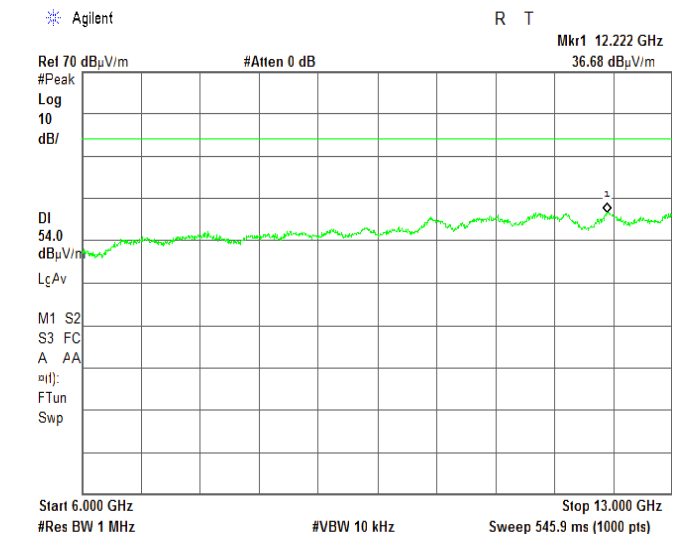
TEST SITE: Anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive



EUT Ant.1



EUT Ant.2



**9 APPENDIX A Test equipment and ancillaries used for tests**

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./ Check	Due Cal./ Check
0415	Cable, Coax, RF, RG-214, 12.3 m	Hermon Laboratories	CC-3	056	07-Dec-15	07-Dec-16
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A 00319, 3448A002 53	27-Oct-15	27-Oct-16
1984	Antenna, Double-Ridged Waveguide Horn, 1 to 18 GHz, 300 W	EMC Test Systems	3115	9911-5964	17-Apr-15	17-Apr-16
2697	Antenna, 30 MHz - 3.0 GHz	Sunol Sciences. Corp. Pleasanton, California USA	JB3	A022805	15-May-15	15-May-16
3818	PSA Series Spectrum Analyzer, 3 Hz- 44 GHz	Agilent Technologies	E4446A	MY482502 88	29-Apr-15	29-Apr-16
4276	Test Cable , DC-18 GHz, 3.05 m, N/M - N/M	Mini-Circuits	APC-10FT-NMNM+	0747A	22-Nov-15	22-Nov-16
4278	Test Cable , DC-18 GHz, 4.6 m, N/M - N/M	Mini-Circuits	APC-15FT-NMNM+	0755A	22-Nov-15	22-Nov-16
4294	Microwave Cable Assembly, 18.0 GHz, 3.4 m, SMA/SMA	Huber-Suhner	Sucoflex P103	NA	07-Dec-15	07-Dec-16
4353	Low Loss Armored Test Cable, DC - 18 GHz, 6.2 m, N type-M/N type-M	MegaPhase	NC29-N1N1-244	12025101 003	15-Mar-15	15-Mar-16
4720	Low Loss Armored Test Cable, DC - 18 GHz, 4.5 m, N type-M/N type-M	MegaPhase	NC29-N1N1-177	51300101 002	30-Dec-15	30-Dec-16
4778	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1431, HL4777	Hewlett Packard	8542E	30807A00 262, 3427A001 23	05-Nov-15	05-Nov-16



HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./ Check	Due Cal./ Check
0446	Antenna, Loop, Active, 10 (9) kHz - 30 MHz	EMCO	6502	2857	24-Feb-20	24-Feb-21
2432	Antenna, Double-Ridged Waveguide Horn 1 to 18 GHz	EMC Test Systems	3115	00027177	15-Sep-19	15-Sep-20
2780	EMC analyzer, 100 Hz to 26.5 GHz	Agilent Technologies	E7405A	MY45102462	23-Feb-20	23-Feb-21
3903	Microwave Cable Assembly, 40.0 GHz, 1.5 m, SMA/SMA	Huber-Suhner	SUCOFL EX 102A	1226/2A	06-Apr-20	06-Apr-21
4338	Reject Band Filter, 50 Ohm, 0 to 2170 and 3000 to 18000 MHz, SMA-FM / SMA-M	Micro-Tronics	BRM 50702-02	023	05-Jun-19	05-Jun-21
4933	Active Horn Antenna, 1 GHz to 18 GHz	COM-POWER CORPORATION	AHA-118	701046	06-Jan-20	06-Jan-21
4956	Active horn antenna, 18 to 40 GHz	COM-POWER CORPORATION	AHA-840	105004	29-Jan-20	29-Jan-21
5111	RF cable, 40 GHz, 5.5 m, K-type	Huber-Suhner	SF102EA/11SK/11SK/5500MM	502493/2EA	14-Aug-19	14-Aug-20
5288	Trilog Antenna, 25 MHz - 8 GHz, 100W	Frankonia	ALX-8000E	00809	08-Feb-19	08-Feb-22
5665	Cable SF118/11N(x2)/6M, 18 GHz, 11N/11N	Huber-Suhner	SF118	501644/118	19-Apr-20	19-Apr-21



10 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Conducted carrier power at RF antenna connector	Below 12.4 GHz: ± 1.7 dB 12.4 GHz to 40 GHz: ± 2.3 dB
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB
Occupied bandwidth	± 8.0 %
Duty cycle, timing (Tx ON / OFF) and average factor measurements	± 1.0 %
Conducted emissions with LISN	9 kHz to 150 kHz: ± 3.9 dB 150 kHz to 30 MHz: ± 3.8 dB
Radiated emissions at 3 m measuring distance Horizontal polarization Vertical polarization	Biconilog antenna: ± 5.3 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.3 dB Double ridged horn antenna: ± 5.3 dB Biconilog antenna: ± 6.0 dB Biconical antenna: ± 5.7 dB Log periodic antenna: ± 6.0 dB Double ridged horn antenna: ± 6.0 dB

Hermon Laboratories is accredited by A2LA for calibration according to present requirements of ISO/IEC 17025 and NCSL Z540-1. The accreditation is granted to perform calibration of parameters that are listed in the Scope of Hermon Laboratories Accreditation.

Hermon Laboratories calibrates its reference and transfer standards by calibration laboratories accredited to ISO/IEC 17025 by a mutually recognized Accreditation Body or by a recognized national metrology institute. All reference and transfer standards used in the calibration system are traceable to national or international standards.

In-house calibration of all test and measurement equipment is performed on a regular basis according to Hermon Laboratories calibration procedures, manufacturer calibration/verification procedures or procedures defined in the relevant standards. The Hermon Laboratories test and measurement equipment is calibrated within the tolerances specified by the manufacturers and/or by the relevant standards.



11 APPENDIX C Test laboratory description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, Radio, Safety, Environmental and Telecommunication testing facility.

Hermon Laboratories is recognized and accredited by the Federal Communications Commission (USA) for relevant parts of Code of Federal Regulations 47 (CFR 47), Test Firm Registration Number is 927748, Designation Number is IL1001; Recognized by Innovation, Science and Economic Development Canada for wireless and terminal testing (ISED), CAB identifier is IL1001, ISED# number 2186A; Certified by VCCI, Japan (the registration numbers are R-10808 for OATS, R-1082 for anechoic chamber, G-10869 for RE measurements above 1 GHz, C-10845 for conducted emissions site and T-11606 for conducted emissions at telecommunication ports).

The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing, environmental simulation and calibration (for exact scope please refer to Certificate No. 839.01, 839.03 and 839.04).

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e-mail: mail@hermonlabs.com
website: www.hermonlabs.com

Person for contact: Mr. M. Nikishin, EMC and radio group leader

12 APPENDIX D Specification references

FCC 47CFR part 15: 2019	Radio Frequency Devices
ANSI C63.10: 2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
ANSI C63.4: 2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
RSS-247 Issue 2: 2017	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence- Exempt Local Area Network (LE-LAN) Devices
RSS-Gen Issue 5: 2019	General Requirements for Compliance of Radio Apparatus



13 APPENDIX E Test equipment correction factors

HL 0446: Active Loop Antenna
EMCO, model: 6502, s/n 2857

Frequency,	Measured antenna factor, dBS/m	Measurement uncertainty, dB
10	-33.4	±1.0
20	-37.8	±1.0
50	-40.5	±1.0
75	-41.0	±1.0
100	-41.2	±1.0
150	-41.2	±1.0
250	-41.1	±1.0
500	-41.2	±1.0
750	-41.3	±1.0
1000	-41.3	±1.0

Frequency,	Measured antenna factor, dBS/m	Measurement uncertainty, dB
2000	-41.4	±1.0
3000	-41.4	±1.0
4000	-41.5	±1.0
5000	-41.5	±1.0
10000	-41.7	±1.0
15000	-42.1	±1.0
20000	-42.7	±1.0
25000	-44.2	±1.0
30000	-45.8	±1.0

The antenna factor shall be added to receiver reading in dB μ V to obtain field strength in dB μ A/m.



**HL 2432: Antenna, Double-Ridged Waveguide Horn
EMC Test Systems, model: 3115, s/n 00027177**

Frequency, MHz	Antenna factor, dB/m
1000	24.1
1500	25.4
2000	27.7
2500	29.0
3000	30.7
3500	31.8
4000	33.0
4500	32.7
5000	34.2
5500	35.1
6000	35.1
6500	35.1
7000	36.1
7500	37.3
8000	37.3
8500	37.9
9000	38.2
9500	38.1

Frequency, MHz	Antenna factor, dB/m
10000	38.6
10500	38.3
11000	38.6
11500	39.3
12000	39.5
12500	39.4
13000	40.2
13500	41.1
14000	41.7
14500	41.8
15000	41.0
15500	38.5
16000	38.2
16500	40.2
17000	41.9
17500	46.5
18000	50.2

The antenna factor shall be added to receiver reading in dB μ V to obtain field strength in dB μ V/m.



HL 4933: Active Horn Antenna
COM-POWER CORPORATION, model: AHA-118, s/n 701046

Frequency, MHz	Measured antenna factor (with preamplifier), dB/m
1000	-16.1
1500	-15.1
2000	-10.9
2500	-11.9
3000	-11.1
3500	-10.6
4000	-8.6
4500	-8.3
5000	-5.9
5500	-5.7
6000	-3.3
6500	-4.0
7000	-2.2
7500	-1.7
8000	1.1
8500	-0.8
9000	-1.5
9500	-0.2

Frequency, MHz	Measured antenna factor (with preamplifier), dB/m
10000	1.8
10500	1.0
11000	0.3
11500	-0.5
12000	3.1
12500	1.4
13000	-0.3
13500	-0.4
14000	2.5
14500	2.2
15000	1.9
15500	0.5
16000	2.1
16500	1.2
17000	0.6
17500	3.1
18000	4.2

The antenna factor shall be added to receiver reading in dB μ V to obtain field strength in dB μ V/m.



HL 4956: Active horn antenna
COM-POWER Corp., model: AHA-840, s/n 105004

Frequency, MHz	Measured antenna factor, dB/m
18000	5.1
18500	3.6
19000	2.2
19500	0.7
20000	0.7
20500	0.8
21000	0.5
21500	-1.3
22000	-2.1
22500	-2.0
23000	-1.6
23500	-2.9
24000	-2.3
24500	-2.6
25000	-1.8
25500	-1.2
26000	-0.5
26500	-1.2
27000	-0.1
27500	-1.0
28000	-0.7
28500	0.5

Frequency, MHz	Measured antenna factor, dB/m
29500	1.4
30000	2.9
30500	2.9
31000	2.9
31500	1.2
32000	0.7
32500	0.2
33000	-1.7
33500	-2.2
34000	2.3
34500	-1.1
35000	0.7
35500	-1.1
36000	0.1
36500	1.4
37000	3.7
37500	5.8
38000	6.6
38500	7.3
39000	6.5
39500	7.3
40000	7.1

The antenna factor shall be added to receiver reading in dB μ V to obtain field strength in dB μ V/m.



HL 5288: Trilog Antenna
Frankonia, model: ALX-8000E, s/n: 00809
30-1000 MHz

Frequency, MHz	Antenna factor, dB/m
30	14.96
35	15.33
40	16.37
45	17.56
50	17.95
60	16.87
70	13.22
80	10.56
90	13.61
100	15.46
120	14.03
140	12.23

Frequency, MHz	Antenna factor, dB/m
160	12.67
180	13.34
200	15.40
250	16.42
300	17.28
400	19.98
500	21.11
600	22.90
700	24.13
800	25.25
900	26.35
1000	27.18

The antenna factor shall be added to receiver reading in dB μ V to obtain field strength in dB μ V/m.

above 1000 MHz

Frequency, MHz	Antenna factor, dB/m
1000	26.9
1100	28.1
1200	28.4
1300	29.6
1400	29.1
1500	30.4
1600	30.7
1700	31.5
1800	32.3
1900	32.6
2000	32.5
2100	32.9
2200	33.5
2300	33.2
2400	33.7
2500	34.6
2600	34.7
2700	34.6
2800	35.0
2900	35.5
3000	36.2
3100	36.8
3200	36.8
3300	37.0
3400	37.5
3500	38.2

Frequency, MHz	Antenna factor, dB/m
3600	38.9
3700	39.4
3800	39.4
3900	39.6
4000	39.7
4100	39.8
4200	40.5
4300	40.9
4400	41.1
4500	41.4
4600	41.3
4700	41.6
4800	41.9
4900	42.3
5000	42.7
5100	43.0
5200	42.9
5300	43.5
5400	43.6
5500	44.3
5600	44.7
5700	45.0
5800	45.0
5900	45.3
6000	45.9

The antenna factor shall be added to receiver reading in dB μ V to obtain field strength in dB μ V/m.



**Antenna factor
Active loop antenna
Model 6502, S/N 2857, HL 0446**

Frequency, MHz	Magnetic antenna factor, dB	Electric antenna factor, dB
0.009	-32.8	18.7
0.010	-33.8	17.7
0.020	-38.3	13.2
0.050	-41.1	10.4
0.075	-41.3	10.2
0.100	-41.6	9.9
0.150	-41.7	9.8
0.250	-41.6	9.9
0.500	-41.8	9.8
0.750	-41.9	9.7
1.000	-41.4	10.1
2.000	-41.5	10.0
3.000	-41.4	10.2
4.000	-41.4	10.1
5.000	-41.5	10.1
10.000	-41.9	9.6
15.000	-41.9	9.6
20.000	-42.2	9.3
25.000	-42.8	8.7
30.000	-44.0	7.5

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μ V) to convert it into field strength in dB(μ V/m).



Antenna factor
Double-ridged wave guide horn antenna
Model 3115, S/N 9911-5964, HL1984

Frequency, MHz	Antenna factor, dB(1/m)
1000.0	24.7
1500.0	25.7
2000.0	27.6
2500.0	28.9
3000.0	31.2
3500.0	32.0
4000.0	32.5
4500.0	32.7
5000.0	33.6
5500.0	35.1
6000.0	35.4
6500.0	34.9
7000.0	36.1
7500.0	37.8
8000.0	38.0
8500.0	38.1
9000.0	39.1
9500.0	38.3
10000.0	38.6
10500.0	38.2
11000.0	38.7
11500.0	39.5
12000.0	40.0
12500.0	40.4
13000.0	40.5
13500.0	41.1
14000.0	41.6
14500.0	41.7
15000.0	38.7
15500.0	38.2
16000.0	38.8
16500.0	40.5
17000.0	42.5
17500.0	45.9
18000.0	49.4

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μ V) to convert it into field strength in dB(μ V/m).



Antenna calibration
Sunlo Sciences Inc., model JB3, serial number A022805, HL 2697

Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain
30	22.2	-22.5	0.01	620	19.7	6.3	4.27	1215	24.9	7.0	5.05	1810	28.3	7.1	5.08	2405	30.9	6.9	4.93	3000	32.4	6.4	4.41	3595	34.9	6.4	4.36	4190	37.5	6.1	4.07
35	18.5	-17.4	0.02	625	19.7	6.5	4.42	1220	24.9	7.0	4.99	1815	28.5	6.9	4.91	2410	30.9	6.9	4.89	3005	32.4	6.4	4.41	3600	34.9	6.4	4.36	4195	37.5	6.1	4.07
40	14.7	-12.5	0.06	630	19.6	6.6	4.57	1225	25.1	6.9	4.91	1820	28.6	6.8	4.74	2415	31.0	6.9	4.85	3010	32.4	6.4	4.41	3605	34.9	6.4	4.36	4200	37.5	6.1	4.07
45	11.3	-8.1	0.16	635	19.7	6.5	4.48	1230	25.2	6.8	4.82	1825	28.7	6.8	4.75	2420	31.0	6.8	4.82	3015	32.4	6.4	4.41	3610	34.9	6.4	4.36	4205	37.5	6.1	4.07
50	8.9	-4.7	0.34	640	19.9	6.4	4.40	1235	25.1	7.0	4.96	1830	28.7	6.8	4.76	2425	31.1	6.8	4.81	3020	32.4	6.4	4.41	3615	34.9	6.4	4.36	4210	37.5	6.1	4.07
55	7.9	-2.8	0.52	645	19.9	6.5	4.51	1240	25.0	7.1	5.09	1835	28.7	6.7	4.72	2430	31.0	6.9	4.87	3025	32.4	6.4	4.41	3620	34.9	6.4	4.36	4215	37.5	6.1	4.07
60	7.8	-2.1	0.82	650	19.9	6.6	4.57	1245	25.0	7.1	5.12	1840	28.8	6.7	4.69	2435	31.0	6.9	4.86	3030	32.4	6.4	4.41	3625	34.9	6.4	4.36	4220	37.5	6.1	4.07
65	8.5	-2.0	0.63	655	19.9	6.6	4.50	1250	25.0	7.1	5.15	1845	28.6	6.9	4.90	2440	31.2	7.0	4.94	3035	32.4	6.4	4.41	3630	34.9	6.4	4.36	4225	37.5	6.1	4.07
70	9.0	-1.9	0.64	660	19.9	6.7	4.69	1255	25.0	7.2	5.25	1850	28.4	7.1	5.12	2445	31.1	6.9	4.91	3040	32.4	6.4	4.41	3635	34.9	6.4	4.36	4230	37.5	6.1	4.07
75	8.8	-1.1	0.78	665	19.9	6.7	4.70	1260	24.9	7.3	5.36	1855	28.5	7.0	5.07	2450	31.0	7.0	4.96	3045	32.4	6.4	4.41	3640	34.9	6.4	4.36	4235	37.5	6.1	4.07
80	8.4	-0.2	0.97	670	20.0	6.7	4.71	1265	25.0	7.3	5.31	1860	28.6	7.0	5.01	2455	31.0	7.0	5.01	3050	32.4	6.4	4.41	3645	34.9	6.4	4.36	4240	37.5	6.1	4.07
85	8.0	0.8	1.20	675	20.1	6.7	4.71	1270	25.1	7.2	5.26	1865	28.5	7.1	5.17	2460	30.9	7.2	5.19	3055	32.4	6.4	4.41	3650	34.9	6.4	4.36	4245	37.5	6.1	4.07
90	8.2	1.1	1.29	680	20.1	6.7	4.71	1275	25.3	7.0	5.05	1870	28.4	7.3	5.33	2465	31.1	6.9	4.95	3060	32.4	6.4	4.41	3655	34.9	6.4	4.36	4250	37.5	6.1	4.07
95	9.2	0.5	1.13	685	20.1	6.8	4.79	1280	25.5	6.8	4.84	1875	28.4	7.2	5.28	2470	31.3	6.8	4.76	3065	32.4	6.4	4.41	3660	34.9	6.4	4.36	4255	37.5	6.1	4.07
100	10.6	-0.4	0.92	690	20.1	6.9	4.88	1285	25.4	7.0	4.97	1880	28.5	7.2	5.22	2475	31.4	6.7	4.69	3070	32.4	6.4	4.41	3665	34.9	6.4	4.36	4260	37.5	6.1	4.07
110	12.6	-1.6	0.70	695	20.2	6.8	4.82	1290	25.3	7.1	5.10	1885	28.5	7.2	5.22	2480	31.3	6.8	4.79	3075	32.4	6.4	4.41	3670	34.9	6.4	4.36	4265	37.5	6.1	4.07
120	13.9	-2.1	0.62	700	20.4	6.8	4.75	1300	25.2	7.3	5.33	1895	28.6	7.2	5.24	2490	31.1	7.0	4.99	3080	32.4	6.4	4.41	3675	34.9	6.4	4.36	4270	37.5	6.1	4.07
125	14.2	-2.0	0.63	705	20.5	6.8	4.80	1310	25.5	7.1	5.09	1905	28.5	7.3	5.36	2500	30.9	7.2	5.27	3085	32.4	6.4	4.41	3680	34.9	6.4	4.36	4275	37.5	6.1	4.07
130	14.2	-1.7	0.68	710	20.5	6.9	4.85	1315	25.4	7.2	5.23	1910	28.5	7.4	5.45	2505	31.1	7.1	5.15	3090	32.4	6.4	4.41	3685	34.9	6.4	4.36	4280	37.5	6.1	4.07
135	14.4	-1.4	0.77	715	20.6	6.9	4.81	1320	25.3	7.3	5.36	1915	28.5	7.3	5.38	2510	31.0	7.2	5.22	3095	32.4	6.4	4.41	3690	34.9	6.4	4.36	4285	37.5	6.1	4.07
140	13.9	-0.9	0.94	720	20.9	6.7	4.65	1325	25.6	7.0	5.08	1925	28.6	7.3	5.38	2520	31.2	7.0	5.05	3100	32.4	6.4	4.41	3695	34.9	6.4	4.36	4290	37.5	6.1	4.07
150	12.9	0.8	1.21	725	21.0	6.6	4.59	1330	25.7	7.1	5.09	1935	28.5	7.4	5.54	2530	31.0	7.3	5.37	3105	32.4	6.4	4.41	3700	34.9	6.4	4.36	4295	37.5	6.1	4.07
160	12.7	1.6	1.44	730	21.0	6.8	4.74	1340	25.7	7.1	5.17	1945	28.5	7.5	5.59	2540	31.2	7.1	5.09	3110	32.4	6.4	4.41	3705	34.9	6.4	4.36	4300	37.5	6.1	4.07
165	12.5	2.0	1.59	735	21.0	6.8	4.83	1355	25.8	7.0	5.06	1950	28.6	7.4	5.48	2545	31.0	7.3	5.43	3115	32.4	6.4	4.41	3710	34.9	6.4	4.36	4305	37.5	6.1	4.07
170	12.2	2.6	1.83	740	21.1	6.8	4.73	1360	25.9	6.9	4.95	1955	28.6	7.5	5.57	2550	31.0	7.3	5.39	3120	32.4	6.4	4.41	3715	34.9	6.4	4.36	4310	37.5	6.1	4.07
175	11.8	3.3	2.13	745	21.3	6.7	4.64	1365	26.0	6.9	4.95	1960	28.6	7.5	5.65	2555	31.1	7.2	5.30	3125	32.4	6.4	4.41	3720	34.9	6.4	4.36	4315	37.5	6.1	4.07
180	11.8	3.7	2.36	750	21.3	6.7	4.68	1370	26.0	7.0	4.96	1965	28.7	7.4	5.47	2560	31.0	7.4	5.47	3130	32.4	6.4	4.41	3725	34.9	6.4	4.36	4320	37.5	6.1	4.07
185	11.5	4.0	2.54	755	21.3	6.7	4.72	1375	26.0	7.0	4.96	1970	28.5	7.2	5.32	2565	31.0	7.4	5.49	3135	32.4	6.4	4.41	3730	34.9	6.4	4.36	4325	37.5	6.1	4.07
190	11.6	4.2	2.61	760	21.3	6.8	4.77	1380	26.0	7.0	5.06	1975	28.9	7.2	5.22	2570	31.1	7.3	5.37	3140	32.4	6.4	4.41	3735	34.9	6.4	4.36	4330	37.5	6.1	4.07
200	13.1	3.2	2.07	765	21.4	6.8	4.79	1390	26.1	6.9	4.92	1985	29.1	7.1	5.11	2580	31.6	6.9	4.87	3145	32.4	6.4	4.41	3740	34.9	6.4	4.36	4335	37.5	6.1	4.07
205	12.0	4.4	2.76	770	21.5	6.8	4.77	1395	26.2	6.9	4.94	1990	29.1	7.0	5.06	2585	31.6	6.8	4.79	3150	32.4	6.4	4.41	3745	34.9	6.4	4.36	4340	37.5	6.1	4.07
210	11.0	5.6	3.66	775	21.6	6.7	4.71	1400	26.2	7.0	4.96	1995	29.1	7.1	5.09	2590	31.6	6.9	4.88	3155	32.4	6.4	4.41	3750	34.9	6.4	4.36	4345	37.5	6.1	4.07
215	11.3	5.6	3.59	780	21.7	6.7	4.65	1405	26.1	7.0	5.02	2000	29.1	7.1	5.11	2595	31.5	7.0	4.97	3160	32.4	6.4	4.41	3755	34.9	6.4	4.36	4350	37.5	6.1	4.07
220	11.6	5.5	3.52	785	21.7	6.7	4.72	1410	26.1	7.1	5.09	2005	29.1	7.1	5.16	2600	31.6	6.9	4.86	3165	32.4	6.4	4.41	3760	34.9	6.4	4.36	4355	37.5	6.1	4.07
225	11.7	5.5	3.35	790	21.7	6.8	4.80	1415	26.2	7.0	5.02	2010	29.1	7.1	5.15	2605	31.3	7.2	5.15	3170	32.4	6.4	4.41	3765	34.9	6.4	4.36	4360	37.5	6.1	4.07
230	11.9	5.6	3.57	795	21.7	6.8	4.82	1420	26.3	6.9	4.96	2015	29.2	7.1	5.18	2610	31.2	7.1	5.10	3175	32.4	6.4	4.41	3770	34.9	6.4	4.36	4365	37.5	6.1	4.07
235	12.1	5.5	3.56	800	21.7	6.9	4.85	1425	26.2	7.1	5.10	2020	29.2	7.1	5.18	2615	31.7	6.9	4.88	3180	32.4	6.4	4.41	3775	34.9	6.4	4.36	4370	37.5	6.1	4.07
240	12.3	5.5	3.54	805	21.8	6.8	4.82	1430	26.1	7.2	5.25	2025	29.3	7.1	5.08	2620	31.6	7.0	4.97	3185	32.4	6.4	4.41	3780	34.9	6.4	4.36	4375	37.5	6.1	4.07
245	12.3	5.7	3.71	810	21.9	6.8	4.80	1435	26.1	7.2	5.24	2030	29.3	7.0	5.05	2625	31.4	7.1	5.17	3190	32.4	6.4	4.41	3785	34.9	6.4	4.36	4380	37.5	6.1	4.07
250	12.3	5.9	3.88	815	21.9	6.8	4.83	1440	26.2	7.2	5.24	2035	29.3	7.1	5.07	2630	31.6	7.0	5.00	3195	32.4	6.4	4.41	3790	34.9	6.4	4.36	4385	37.5	6.1	4.07
255	12.5	5.9	3.85	820	21.9	6.9	4.86	1445	26.3	1	5.11	2040	29.3	7.1	5.13	2635	31.8	6.8	4.82	3200	32.4	6.4	4.41	3795	34.9	6.4	4.36	4390	37.5	6.1	4.07
260	12.7	5.8	3.83	825	22.0	6.8	4.80	1450	26.5	7.0	4.98	2045	29.2	7.2	5.23	2640	31.7	7.0	4.98	3205	32.4	6.4	4.41	3800	34.9	6.4	4.36	4395	37.5	6.1	4.07
265	13.2	5.5	3.54	830																											



Cable loss
Test cable, Mini-Circuits, S/N 0747A, 18 GHz, 3.05 m, N/M - N/M
APC-10FT-NMNM+, HL 4276

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.11	4500	2.81	9300	4.30	14100	5.59
30	0.19	4600	2.85	9400	4.33	14200	5.61
50	0.25	4700	2.88	9500	4.36	14300	5.63
100	0.36	4800	2.92	9600	4.39	14400	5.66
150	0.44	4900	2.95	9700	4.42	14500	5.68
200	0.52	5000	3.00	9800	4.46	14600	5.70
300	0.64	5100	3.03	9900	4.49	14700	5.72
400	0.75	5200	3.08	10000	4.53	14800	5.75
500	0.84	5300	3.11	10100	4.56	14900	5.77
600	0.93	5400	3.13	10200	4.60	15000	5.80
700	1.01	5500	3.16	10300	4.64	15100	5.82
800	1.08	5600	3.20	10400	4.66	15200	5.85
900	1.15	5700	3.22	10500	4.68	15300	5.88
1000	1.22	5800	3.26	10600	4.70	15400	5.91
1100	1.28	5900	3.30	10700	4.73	15500	5.93
1200	1.34	6000	3.34	10800	4.75	15600	5.97
1300	1.40	6100	3.39	10900	4.77	15700	5.99
1400	1.46	6200	3.42	11000	4.80	15800	6.02
1500	1.51	6300	3.47	11100	4.83	15900	6.07
1600	1.57	6400	3.50	11200	4.86	16000	6.08
1700	1.62	6500	3.52	11300	4.88	16100	6.11
1800	1.68	6600	3.55	11400	4.90	16200	6.12
1900	1.72	6700	3.58	11500	4.92	16300	6.14
2000	1.77	6800	3.60	11600	4.94	16400	6.17
2100	1.82	6900	3.62	11700	4.96	16500	6.19
2200	1.87	7000	3.64	11800	4.98	16600	6.21
2300	1.92	7100	3.66	11900	5.01	16700	6.22
2400	1.96	7200	3.68	12000	5.03	16800	6.24
2500	2.01	7300	3.71	12100	5.06	16900	6.26
2600	2.05	7400	3.74	12200	5.09	17000	6.28
2700	2.10	7500	3.78	12300	5.12	17100	6.31
2800	2.14	7600	3.81	12400	5.15	17200	6.33
2900	2.18	7700	3.84	12500	5.17	17300	6.36
3000	2.23	7800	3.87	12600	5.20	17400	6.39
3100	2.27	7900	3.90	12700	5.22	17500	6.42
3200	2.31	8000	3.93	12800	5.25	17600	6.45
3300	2.35	8100	3.96	12900	5.28	17700	6.48
3400	2.39	8200	4.00	13000	5.32	17800	6.50
3500	2.42	8300	4.03	13100	5.35	17900	6.52
3600	2.46	8400	4.06	13200	5.38	18000	6.55
3700	2.50	8500	4.08	13300	5.40		
3800	2.54	8600	4.11	13400	5.42		
3900	2.58	8700	4.13	13500	5.44		
4000	2.61	8800	4.16	13600	5.46		
4100	2.65	8900	4.18	13700	5.48		
4200	2.69	9000	4.21	13800	5.51		
4300	2.73	9100	4.24	13900	5.53		
4400	2.77	9200	4.27	14000	5.56		



Cable loss
Test cable, Mini-Circuits, S/N 0755A, 18 GHz, 4.6 m, N/M - N/M
APC-15FT-NMNM+, HL 4278

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.24	4900	4.19	10000	6.47	15100	8.33
30	0.26	5000	4.25	10100	6.50	15200	8.35
50	0.34	5100	4.29	10200	6.52	15300	8.37
100	0.50	5200	4.32	10300	6.57	15400	8.40
200	0.72	5300	4.38	10400	6.59	15500	8.42
300	0.90	5400	4.41	10500	6.61	15600	8.46
400	1.06	5500	4.46	10600	6.64	15700	8.50
500	1.20	5600	4.51	10700	6.64	15800	8.52
600	1.32	5700	4.56	10800	6.65	15900	8.56
700	1.44	5800	4.59	10900	6.68	16000	8.61
800	1.54	5900	4.64	11000	6.68	16100	8.64
900	1.64	6000	4.69	11100	6.69	16200	8.66
1000	1.74	6100	4.72	11200	6.70	16300	8.70
1100	1.83	6200	4.77	11300	6.74	16400	8.73
1200	1.92	6300	4.80	11400	6.78	16500	8.74
1300	2.01	6400	4.83	11500	6.81	16600	8.75
1400	2.09	6500	4.89	11600	6.84	16700	8.78
1500	2.18	6600	4.90	11700	6.87	16800	8.79
1600	2.25	6700	4.95	11800	6.92	16900	8.81
1700	2.33	6800	5.01	11900	6.98	17000	8.85
1800	2.39	6900	4.99	12000	7.02	17100	8.90
1900	2.47	7000	5.04	12100	7.08	17200	8.95
2000	2.53	7100	5.11	12200	7.15	17300	8.99
2100	2.60	7200	5.14	12300	7.20	17400	9.03
2200	2.67	7300	5.21	12400	7.26	17500	9.07
2300	2.73	7400	5.29	12500	7.31	17600	9.11
2400	2.80	7500	5.33	12600	7.36	17700	9.15
2500	2.87	7600	5.38	12700	7.41	17800	9.19
2600	2.93	7700	5.46	12800	7.46	17900	9.24
2700	3.00	7800	5.52	12900	7.51	18000	9.28
2800	3.06	7900	5.58	13000	7.55		
2900	3.12	8000	5.64	13100	7.59		
3000	3.18	8100	5.69	13200	7.65		
3100	3.24	8200	5.75	13300	7.69		
3200	3.30	8300	5.80	13400	7.72		
3300	3.35	8400	5.84	13500	7.78		
3400	3.42	8500	5.90	13600	7.82		
3500	3.46	8600	5.97	13700	7.86		
3600	3.52	8700	5.99	13800	7.91		
3700	3.57	8800	6.04	13900	7.96		
3800	3.61	8900	6.10	14000	8.01		
3900	3.67	9000	6.13	14100	8.06		
4000	3.71	9100	6.17	14200	8.10		
4100	3.77	9200	6.23	14300	8.13		
4200	3.83	9300	6.27	14400	8.16		
4300	3.89	9400	6.30	14500	8.19		
4400	3.94	9500	6.35	14600	8.21		
4500	4.00	9600	6.37	14700	8.23		
4600	4.05	9700	6.40	14800	8.26		
4700	4.10	9800	6.44	14900	8.28		
4800	4.16	9900	6.45	15000	8.30		



Cable loss
Microwave Cable Assembly, 18.0 GHz, 3.4 m, SMA/SMA, Huber-Suhner,
Sucoflex P103, HL 4294

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.11	4900	2.09	10000	2.90	15100	3.61
30	0.17	5000	2.10	10100	2.92	15200	3.67
50	0.22	5100	2.14	10200	2.95	15300	3.63
100	0.30	5200	2.16	10300	2.96	15400	3.64
200	0.42	5300	2.17	10400	2.99	15500	3.68
300	0.51	5400	2.19	10500	2.99	15600	3.71
400	0.59	5500	2.19	10600	3.03	15700	3.74
500	0.66	5600	2.22	10700	3.03	15800	3.71
600	0.72	5700	2.24	10800	3.04	15900	3.74
700	0.77	5800	2.23	10900	3.05	16000	3.71
800	0.82	5900	2.26	11000	3.09	16100	3.73
900	0.88	6000	2.27	11100	3.07	16200	3.76
1000	0.93	6100	2.26	11200	3.08	16300	3.82
1100	0.98	6200	2.29	11300	3.11	16400	3.90
1200	1.02	6300	2.30	11400	3.12	16500	3.81
1300	1.06	6400	2.34	11500	3.11	16600	3.88
1400	1.10	6500	2.34	11600	3.15	16700	3.87
1500	1.14	6600	2.36	11700	3.16	16800	3.89
1600	1.19	6700	2.36	11800	3.18	16900	3.95
1700	1.23	6800	2.39	11900	3.19	17000	4.02
1800	1.27	6900	2.39	12000	3.23	17100	4.04
1900	1.30	7000	2.44	12100	3.25	17200	3.99
2000	1.35	7100	2.46	12200	3.22	17300	4.03
2100	1.38	7200	2.44	12300	3.25	17400	4.03
2200	1.42	7300	2.48	12400	3.25	17500	4.06
2300	1.45	7400	2.47	12500	3.28	17600	4.05
2400	1.48	7500	2.48	12600	3.27	17700	4.12
2500	1.51	7600	2.50	12700	3.27	17800	4.14
2600	1.55	7700	2.53	12800	3.30	17900	4.18
2700	1.59	7800	2.56	12900	3.30	18000	4.14
2800	1.62	7900	2.55	13000	3.27		
2900	1.65	8000	2.56	13100	3.32		
3000	1.66	8100	2.56	13200	3.32		
3100	1.69	8200	2.57	13300	3.32		
3200	1.71	8300	2.59	13400	3.35		
3300	1.74	8400	2.62	13500	3.38		
3400	1.76	8500	2.67	13600	3.39		
3500	1.78	8600	2.65	13700	3.42		
3600	1.80	8700	2.68	13800	3.47		
3700	1.85	8800	2.68	13900	3.45		
3800	1.88	8900	2.68	14000	3.49		
3900	1.90	9000	2.74	14100	3.50		
4000	1.91	9100	2.74	14200	3.55		
4100	1.93	9200	2.76	14300	3.59		
4200	1.96	9300	2.78	14400	3.58		
4300	1.97	9400	2.79	14500	3.56		
4400	1.99	9500	2.80	14600	3.57		
4500	2.02	9600	2.83	14700	3.57		
4600	2.02	9700	2.84	14800	3.57		
4700	2.04	9800	2.86	14900	3.64		
4800	2.05	9900	2.92	15000	3.64		



Cable loss
Low Loss Armored Test Cable, MegaPhase, 18 GHz, 6.2 m, N type-M/N type-M,
NC29-N1N1-244S/N 12025101 003,
HL 4353

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
50	0.20	9000	2.71
100	0.27	9500	2.81
300	0.47	10000	2.90
500	0.61	10500	2.97
1000	0.87	11000	3.06
1500	1.07	11500	3.13
2000	1.24	12000	3.20
2500	1.39	12500	3.26
3000	1.53	13000	3.34
3500	1.65	13500	3.39
4000	1.77	14000	3.47
4500	1.89	14500	3.54
5000	1.99	15000	3.62
5500	2.07	15500	3.69
6000	2.20	16000	3.76
6500	2.30	16500	3.83
7000	2.39	17000	3.86
7500	2.51	17500	3.94
8000	2.58	18000	4.02
8500	2.65		



Cable loss
Low Loss Armored Test Cable, MegaPhase, 18 GHz, 4.5 m, N type-M/N type-M,
NC29-N1N1-177, S/N 51300101 002
HL 4720

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
50	0.14	9000	2.10
100	0.21	9500	2.26
300	0.36	10000	2.39
500	0.46	10500	2.36
1000	0.66	11000	2.36
1500	0.81	11500	2.44
2000	0.93	12000	2.51
2500	1.05	12500	2.71
3000	1.15	13000	2.71
3500	1.25	13500	2.69
4000	1.34	14000	2.78
4500	1.42	14500	2.84
5000	1.52	15000	2.85
5500	1.60	15500	2.98
6000	1.66	16000	3.02
6500	1.78	16500	3.09
7000	1.82	17000	3.11
7500	1.86	17500	3.16
8000	1.95	18000	3.32
8500	2.01		



14 APPENDIX F Abbreviations and acronyms

A	ampere
AC	alternating current
AM	amplitude modulation
AVRG	average (detector)
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μ V)	decibel referred to one microvolt
dB(μ V/m)	decibel referred to one microvolt per meter
dB(μ A)	decibel referred to one microampere
DC	direct current
EIRP	equivalent isotropically radiated power
ERP	effective radiated power
EUT	equipment under test
F	frequency
GHz	gigahertz
GND	ground
H	height
HL	Hermon laboratories
Hz	hertz
k	kilo
kHz	kilohertz
LO	local oscillator
m	meter
MHz	megahertz
min	minute
mm	millimeter
ms	millisecond
μ s	microsecond
NA	not applicable
NB	narrow band
OATS	open area test site
Ω	Ohm
PM	pulse modulation
PS	power supply
ppm	part per million (10^{-6})
QP	quasi-peak
RE	radiated emission
RF	radio frequency
rms	root mean square
Rx	receive
s	second
T	temperature
Tx	transmit
V	volt
WB	wideband

END OF DOCUMENT