

# TEST REPORT

ACCORDING TO: FCC 47CFR part 15 subpart C § 15.209

FOR:

**Sensible Medical Innovations Ltd.  
ReDS System**

**Type designation: V2.6**

**FCC ID: 2AONF-26U01**

This report is in conformity with ISO/IEC 17025. The "A2LA Accredited" symbol endorsement applies only to the tests and calibrations that are listed in the scope of Hermon Laboratories accreditation. The test results relate only to the items tested.  
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## 1 Applicant information

**Client name:** Sensible Medical Innovations Ltd.  
**Address:** P.O.Box 8702, Meir Ariel 6, intergama Building 1 , Netanya,4059300, Israel  
**Telephone:** +972 9865 4402  
**Fax:** +972 9865 4472  
**E-mail:** nadav.m@sensible-medical.com  
**Contact name:** Mr. Nadav Mizrahi

## 2 Equipment under test attributes

**Product name:** ReDS System  
**Type designation:** V2.6  
**Part number:** GAS0045  
**Serial number:** 1622TUWFHR  
**Hardware version:** V2.6  
**Software release:** 1.6  
**Receipt date** 24-Aug-17

## 3 Manufacturer information

**Manufacturer name:** Sensible Medical Innovations Ltd.  
**Address:** P.O.Box 8702, Meir Ariel 6, intergama Building 1 , Netanya,4059300, Israel  
**Telephone:** +972 9865 4402  
**Fax:** +972 9865 4472  
**E-Mail:** nadav.m@sensible-medical.com  
**Contact name:** Mr. Nadav Mizrahi

## 4 Test details

**Project ID:** 30018  
**Location:** Hermon Laboratories Ltd. P.O. Box 23, Binyamina 3055001, Israel  
**Test started:** 24-Aug-17  
**Test completed:** 27-Dec-17  
**Test specification(s):** FCC 47CFR part 15, subpart C, §15.209





## 5 Tests summary

Test	Status
<b>Transmitter characteristics</b>	
FCC Part 15, Section 207, Conducted emission	Pass
FCC section 15.209, Field strength of emissions	Pass
FCC section 15.203, Antenna requirement	Pass

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.

This test report supersedes the previously issued test report identified by Doc ID:SENRAD\_FCC.30018\_rev2.

	Name and Title	Date	Signature
<b>Tested by:</b>	Mr. V. Dorofeyev, test engineer Mr. S. Samokha, test engineer	December 27, 2017	 
<b>Reviewed by:</b>	Mrs. M. Cherniavsky, certification engineer	February 6, 2018	
<b>Approved by:</b>	Mr. K. Zushchuk, Projects & Customer Manager, EMC & Radio	February 7, 2018	

## 6 EUT description

### 6.1 General information

The EUT, ReDS System, is a non-invasive bedside monitor connected to a wearable vest and used for the measurement of lung fluid. The ReDS™ System V2.6 is comprised of a Sensor Vest and a Bedside console. The wearable Sensor Vest is a patient wearable vest consists of two sensors. The vest is designed to be adjusted to enable correct fit to an individual patient. The Sensor Vest is controlled and passes the data to the Bedside console via a cable.

In the ReDS system, the tissue being examined is subjected to RF signals generated from a body coupled sensor. It does this by stepping a low power CW signal through 25 different frequencies between 950 MHz and 1.8 GHz (see attached table) the signal is generated in the RF TX-module connected via (fixed) Cable to the TX body matched sensor embedded in the Vest and attached during measurement to the patient thorax. The penetrating EM signal is collected with the RX-sensor, amplified, converted to Baseband, amplified and sampled by an A2D for later processing to detection of fluid content.

The EUT is powered from AC mains via AC/DC adapter. The AC/DC adapter manufactured by Powerbox, part number EXM 80 5120, serial number 123800042 was used during the testing.

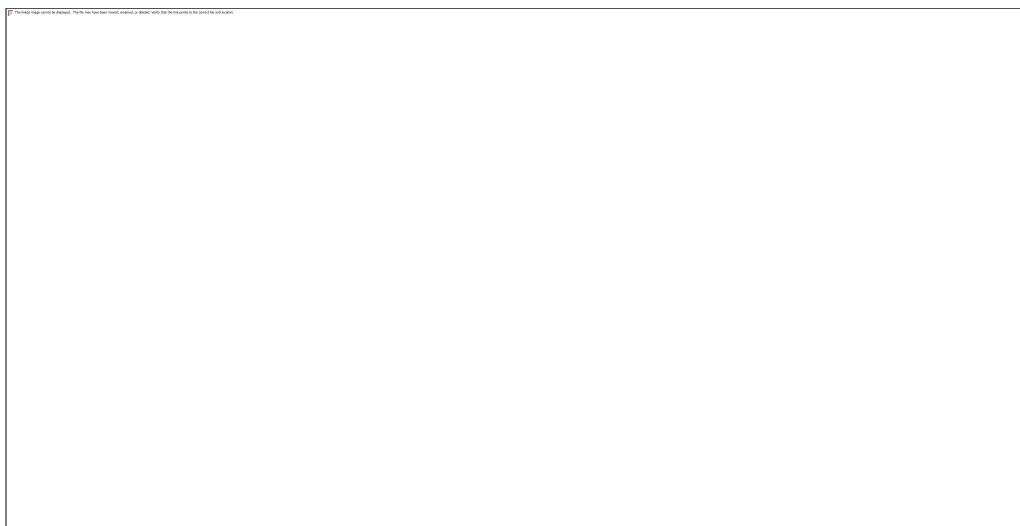
### 6.2 EUT parts

Description	Manufacturer	Part number	Serial number
ReDS system	Sensible Medical	GAS0045	1622TUWFHR

### 6.3 Operating frequencies

Source	Frequency, MHz				
900 MHz band	957	958	NA	NA	NA
	1242	1243	1256	1257	1292
1200-1400 MHz band	1293	1294	1295	1428	1429
	1430	1431	NA	NA	NA
1600 MHz band	1629	1635	1636	1655	1656
	1657	NA	NA	NA	NA
1700 MHz band	1711	1712	1716	1717	1718

### 6.4 Test configuration





## 6.5 Transmitter characteristics

<b>Type of equipment</b>			
<b>V</b>	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)		
<b>Operating frequencies;</b>		Refer to section 6.3	
<b>Maximum field strength</b>		59.83 dB(μV/m) at 3 m test distance	
<b>Is transmitter output power variable?</b>	<b>V</b>	No	
		Yes	continuous variable
			stepped variable with stepsize, software controlled
			dB
<b>Antenna connection</b>			
unique coupling	standard connector	<b>V</b>	Integral
		<b>V</b>	with temporary RF connector without temporary RF connector
<b>Antenna/s technical characteristics</b>			
Type	Manufacturer	Model number	Gain
Internal	Sensible Medical Innovations	Front sensor (Rx sensor): EAS0034 Rev C, Back Sensor (Tx sensor): EAS0035 Rev D	About 10 dBi (in air)
<b>Type of modulation</b>		stepped CW	
<b>Transmitter duty cycle supplied for test</b>		100%	
<b>Transmitter power source</b>			
	Battery	<b>Nominal rated voltage</b>	Battery type
<b>V</b>	AC mains	<b>Nominal rated voltage</b>	120 VAC
	DC	<b>Nominal rated voltage</b>	
<b>Common power source for transmitter and receiver</b>		<b>V</b>	yes no

<b>Test specification:</b>		<b>Section 15.207, Conducted emission at AC power port</b>	
<b>Test procedure:</b>		ANSI C63.10, Section 6.2	
<b>Test mode:</b>		<b>Verdict:</b> PASS	
<b>Date(s):</b>			
27-Aug-17			
<b>Temperature:</b> 24.2 °C	<b>Relative Humidity:</b> 36 %	<b>Air Pressure:</b> 1005 hPa	<b>Power:</b> 120 VAC
<b>Remarks:</b>			

## 7 Unintentional emissions

### 7.1 Conducted emissions

### 7.1.1 General

This test was performed to measure common mode conducted emissions at the mains power port. Specification test limits according are given in Table 7.1.1.

### Table 7.1.1 Limits for conducted emissions

Frequency, MHz	Class B limit, dB(μV)		Class A limit, dB(μV)	
	QP	AVRG	QP	AVRG
0.15 - 0.5	66 - 56*	56 - 46*	79	66
0.5 - 5.0	56	46	73	60
5.0 - 30	60	50	73	60

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

### 7.1.2 Test procedure

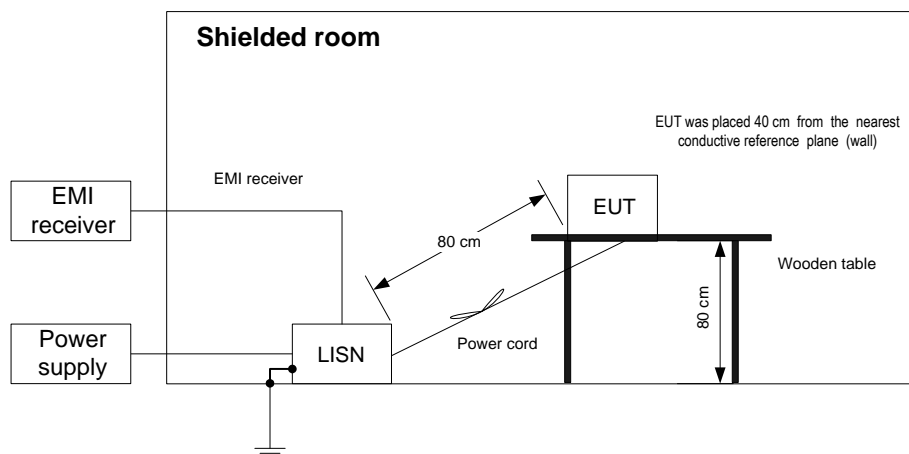
**7.1.2.1** The EUT was set up as shown in Figure 7.1.1 and associated photographs, energized and the performance check was conducted.

**7.1.2.2** The measurements were performed at power terminals with the LISN, connected to a spectrum analyzer while unused coaxial connector of the LISN was terminated with 50 Ohm.

**7.1.2.3** The position of the device cables was varied to determine maximum emission level.

**7.1.2.4** The worst test results (the lowest margins) were recorded in Table 7.1.2 and shown in the associated plots.

**Figure 7.1.1 Setup for conducted emission measurements, table-top equipment**





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Test specification: Section 15.207, Conducted emission at AC power port			
Test procedure: ANSI C63.10, Section 6.2			
Test mode: Compliance		Verdict: PASS	
Date(s): 27-Aug-17			
Temperature: 24.2 °C	Relative Humidity: 36 %	Air Pressure: 1005 hPa	Power: 120 VAC
Remarks:			

Table 7.1.2 Conducted emission test results

LINE: AC mains  
EUT OPERATING MODE: Transmit  
EUT SET UP: TABLE-TOP  
TEST SITE: SHIELDED ROOM  
FREQUENCY RANGE: 150 kHz - 30 MHz  
RESOLUTION BANDWIDTH: 9 kHz

Frequency, MHz	Peak emission, dB(μV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*	Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*		
0.150000	68.25	59.56	66.0	-6.44	28.08	56.0	-27.92	L1	Pass
0.181880	62.87	54.07	64.4	-10.33	34.21	54.4	-20.19		
0.271500	53.88	44.31	61.1	-16.79	36.57	51.1	-14.53		
0.150000	67.74	59.00	66.0	-7.00	27.36	56.0	-28.64	L2	Pass
0.179610	63.07	54.11	64.5	-10.39	34.38	54.5	-20.12		
0.270861	52.66	43.83	61.1	-17.27	35.13	51.1	-15.97		

\*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

HL 0447	HL 0787	HL 0813	HL 1552	HL 3837	HL 4778		
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Full description is given in Appendix A.





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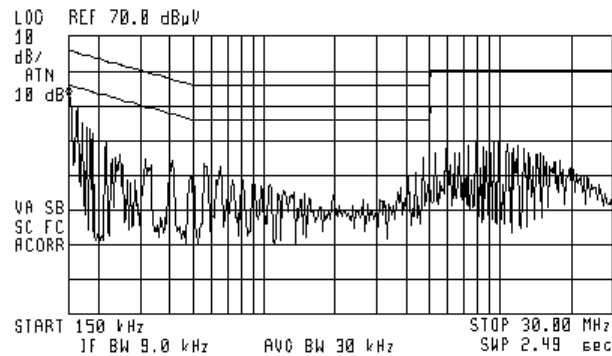
<b>Test specification:</b> Section 15.207, Conducted emission at AC power port			
<b>Test procedure:</b> ANSI C63.10, Section 6.2			
<b>Test mode:</b> Compliance		<b>Verdict:</b> PASS	
<b>Date(s):</b> 27-Aug-17			
<b>Temperature:</b> 24.2 °C	<b>Relative Humidity:</b> 36 %	<b>Air Pressure:</b> 1005 hPa	<b>Power:</b> 120 VAC
<b>Remarks:</b>			

#### Plot 7.1.1 Conducted emission measurements

LINE: L1  
EUT OPERATING MODE: Transmit  
LIMIT: QUASI-PEAK, AVERAGE  
DETECTOR: PEAK



ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
NR 150 kHz  
52.61 dBμV

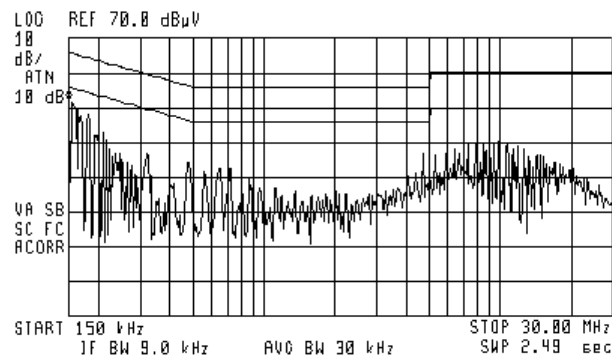


#### Plot 7.1.2 Conducted emission measurements

LINE: L2  
EUT OPERATING MODE: Transmit  
LIMIT: QUASI-PEAK, AVERAGE  
DETECTOR: PEAK



ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
NR 150 kHz  
52.38 dBμV





<b>Test specification:</b> <b>Section 15.209, Field strength of emissions</b>			
<b>Test procedure:</b> ANSI C63.10, Sections 6.4, 6.5			
<b>Test mode:</b> Compliance		<b>Verdict:</b> <b>PASS</b>	
<b>Date(s):</b> 24-Aug-17- 27-Dec-17			
<b>Temperature:</b> 24.3 °C	<b>Relative Humidity:</b> 44 %	<b>Air Pressure:</b> 1006 hPa	<b>Power:</b> 120 VAC
<b>Remarks:</b>			

## 7.2 Field strength of emissions

### 7.2.1 General

This test was performed to measure field strength of fundamental and spurious emissions from the EUT. Specification test limits are given Table 7.2.1.

**Table 7.2.1 Radiated spurious emissions limits**

Frequency, MHz	Field strength at 3 m, dB(μV/m)		
	Within restricted bands		
	Peak	Quasi Peak	Average
0.009 – 0.090	148.5 – 128.5	NA	128.5 – 108.5**
0.090 – 0.110	NA	108.5 – 106.8**	NA
0.110 – 0.490	126.8 – 113.8	NA	106.8 – 93.8**
0.490 – 1.705	NA	73.8 – 63.0**	NA
1.705 – 30.0*		69.5	
30 – 88		40.0	
88 – 216		43.5	
216 – 960		46.0	
960 – 1000		54.0	
1000 – 10 <sup>th</sup> harmonic	74.0	NA	54.0

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

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

where S<sub>1</sub> and S<sub>2</sub> – standard defined and test distance respectively in meters.

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

### 7.2.2 Test procedure for spurious emission field strength measurements in 9 kHz to 30 MHz

**7.2.2.1** The EUT was set up as shown in Figure 7.2.1, energized and the performance check was conducted.

**7.2.2.2** The specified frequency range was investigated with a loop antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna was rotated around its vertical axis. The measuring antenna polarization was switched from vertical to horizontal.

**7.2.2.3** The worst test results (the lowest margins) were recorded in the associated tables and shown in the associated plots.

### 7.2.3 Test procedure for fundamental and spurious emission field strength measurements above 30 MHz

**7.2.3.1** The EUT was set up as shown in Figure 7.2.2, Figure 7.2.3, energized and the performance check was conducted.

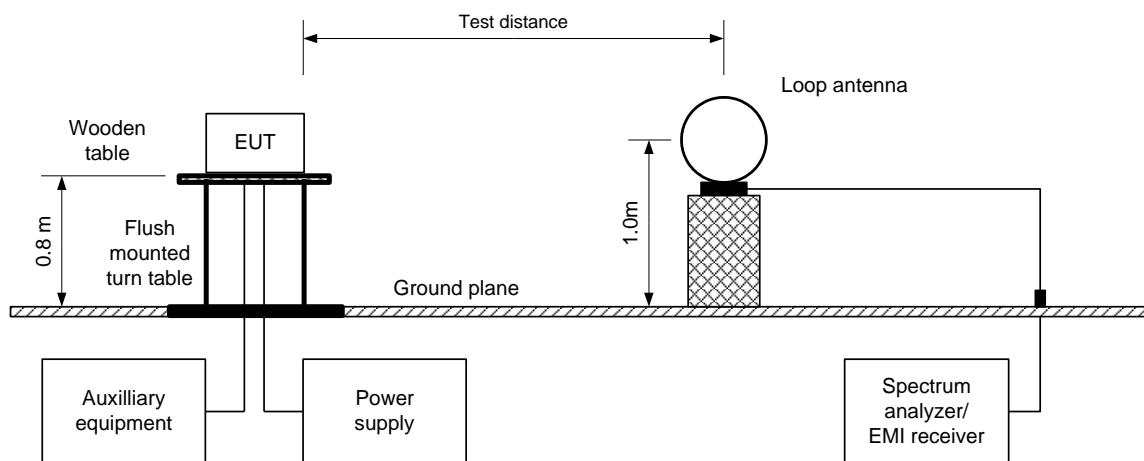
**7.2.3.2** The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal.

**7.2.3.3** The worst test results (the lowest margins) were recorded in the associated tables and shown in the associated plots.



<b>Test specification:</b> <b>Section 15.209, Field strength of emissions</b>			
<b>Test procedure:</b> ANSI C63.10, Sections 6.4, 6.5			
<b>Test mode:</b> Compliance		<b>Verdict:</b> <b>PASS</b>	
<b>Date(s):</b> 24-Aug-17- 27-Dec-17			
<b>Temperature:</b> 24.3 °C	<b>Relative Humidity:</b> 44 %	<b>Air Pressure:</b> 1006 hPa	<b>Power:</b> 120 VAC
<b>Remarks:</b>			

Figure 7.2.1 Setup for spurious emission field strength measurements below 30 MHz



<b>Test specification: Section 15.209, Field strength of emissions</b>			
<b>Test procedure:</b> ANSI C63.10, Sections 6.4, 6.5			
<b>Test mode:</b> Compliance		<b>Verdict:</b> PASS	
<b>Date(s):</b> 24-Aug-17- 27-Dec-17			
<b>Temperature:</b> 24.3 °C	<b>Relative Humidity:</b> 44 %	<b>Air Pressure:</b> 1006 hPa	<b>Power:</b> 120 VAC
<b>Remarks:</b>			

Figure 7.2.2 Setup for spurious emission field strength measurements in 30 – 1000 MHz

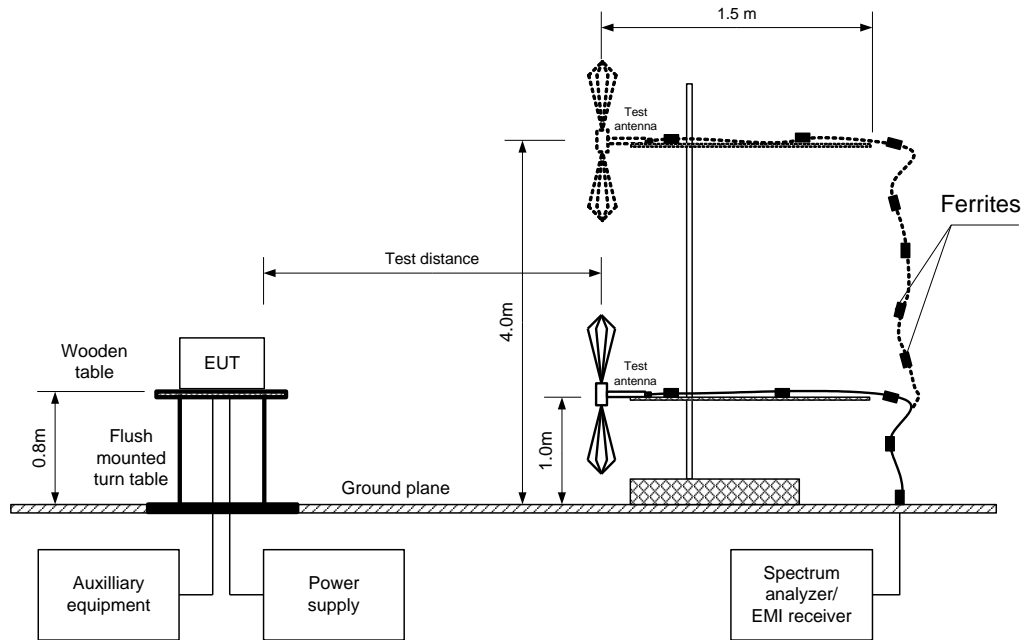
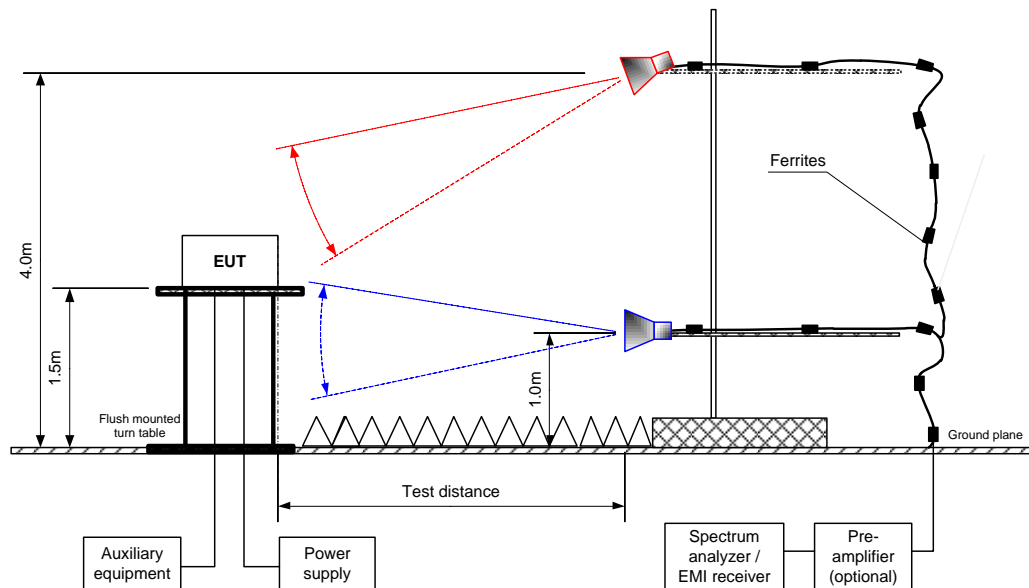


Figure 7.2.3 Setup for spurious emission field strength measurements above 1000 MHz





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<b>Test specification:</b> <b>Section 15.209, Field strength of emissions</b>			
<b>Test procedure:</b> ANSI C63.10, Sections 6.4, 6.5			
<b>Test mode:</b> Compliance		<b>Verdict:</b> <b>PASS</b>	
<b>Date(s):</b> 24-Aug-17- 27-Dec-17			
<b>Temperature:</b> 24.3 °C	<b>Relative Humidity:</b> 44 %	<b>Air Pressure:</b> 1006 hPa	<b>Power:</b> 120 VAC
<b>Remarks:</b>			

Table 7.2.2 Field strength of fundamental emission

TEST DISTANCE: 3 m  
 TEST SITE: Anechoic chamber  
 EUT POSITION: Typical (Vertical)  
 MODULATION: Stepped CW  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum  
 DETECTOR USED: Peak  
 RESOLUTION BANDWIDTH: 120 kHz (30 MHz – 1000 MHz)  
 1000 kHz above 1 GHz  
 VIDEO BANDWIDTH: ≥ Resolution bandwidth

CARRIER FREQUENCY: Below 1 GHz  
 OPERATION MODE: Stepped CW signal

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*				
957.064	47.62	45.71	46.0	-0.29	Vertical	1.0	341	Pass
958.0625	47.26	45.73	46.0	-0.27	Vertical	1.0	341	

OPERATION MODE: Stepping function stopped

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*				
957.0625	45.81	45.00	46	-1.00	Vertical	1.0	350	Pass
958.0625	46.17	45.12	46	-0.88	Vertical	1.3	350	

OPERATION MODE: Stepped CW signal  
 CARRIER FREQUENCY: Above 1 GHz

Frequency, MHz	Antenna		Azimuth, degrees*	Peak field strength			Average field strength			Verdict
	Pol.	Height, m		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	
1242.0625	Hor	1.20	28	55.64	74.0	-18.36	28.35	54	-25.65	Pass
1636.0625	Vert.	1.80	0	59.83	74.0	-14.17	32.48	54	-21.14	Pass
1718.0975	Hor	1.35	0	58.79	74.0	-15.21	31.44	54	-22.23	Pass

OPERATION MODE: Stepping function stopped  
 CARRIER FREQUENCY: Above 1 GHz

Frequency, MHz	Antenna		Azimuth, degrees*	Peak field strength			Average field strength			Verdict
	Pol.	Height, m		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	
1242.0303	Hor	1.2	28	57.04	74.0	-16.96	29.75	54.0	-24.25	Pass
1636.0057	Vert.	1.8	0	60.12	74.0	-13.88	32.77	54.0	-20.91	Pass
1718.0617	Hor	1.35	0	59.79	74.0	-14.21	32.44	54.0	-21.95	Pass

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

\*\*- Margin (dB) = measured result - specification limit.



<b>Test specification:</b> Section 15.209, Field strength of emissions			
<b>Test procedure:</b> ANSI C63.10, Sections 6.4, 6.5			
<b>Test mode:</b> Compliance		<b>Verdict:</b> PASS	
<b>Date(s):</b> 24-Aug-17- 27-Dec-17			
<b>Temperature:</b> 24.3 °C	<b>Relative Humidity:</b> 44 %	<b>Air Pressure:</b> 1006 hPa	<b>Power:</b> 120 VAC
<b>Remarks:</b>			

Table 7.2.3 Average factor calculation

Transmission pulse		Transmission burst		Transmission train duration, ms	Average factor, dB
Duration, ms	Period, ms	Duration, ms	Period, ms		
Carrier frequency 1242 MHz					
4.32	160	NA	NA	NA	-27.29
Carrier frequency 1636 MHz					
4.29	160	NA	NA	NA	-27.35
Carrier frequency 1718 MHz					
4.29	148.5	NA	NA	NA	-27.35

\*- Average factor was calculated as follows

\*- Average factor was calculated as follows

$$\text{Average factor} = 20 \times \log_{10} \left( \frac{\text{Pulse duration}}{\text{Pulse period}} \times \frac{\text{Burst duration}}{\text{Train duration}} \times \text{Number of bursts within pulse train} \right)$$

for pulse train shorter than 100 ms:

**Reference numbers of test equipment used**

HL 0521	HL 0604	HL 2909	HL 3615	HL 3818	HL 3901	HL 4277	HL 4933
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Full description is given in Appendix A.



<b>Test specification:</b> <b>Section 15.209, Field strength of emissions</b>			
<b>Test procedure:</b> ANSI C63.10, Sections 6.4, 6.5			
<b>Test mode:</b> Compliance		<b>Verdict:</b> <b>PASS</b>	
<b>Date(s):</b> 24-Aug-17- 27-Dec-17			
<b>Temperature:</b> 24.3 °C	<b>Relative Humidity:</b> 44 %	<b>Air Pressure:</b> 1006 hPa	<b>Power:</b> 120 VAC
<b>Remarks:</b>			

Table 7.2.4 Field strength of spurious emissions

TEST DISTANCE: 3 m  
 TEST SITE: Anechoic chamber  
 EUT POSITION: Typical (Vertical)  
 MODULATION: Stepped CW  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum  
 INVESTIGATED FREQUENCY RANGE: 0.009 – 1000 MHz  
 DETECTOR USED: Peak  
 RESOLUTION BANDWIDTH: 1 kHz (9 kHz – 150 kHz)  
 9.0 kHz (150 kHz – 30 MHz)  
 120 kHz (30 MHz – 1000 MHz)  
 VIDEO BANDWIDTH: ≥ Resolution bandwidth  
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)  
 Biconilog (30 MHz – 1000 MHz)

Frequency, MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
38.307	31.40	30.49	40.0	-9.51	Vertical	1.06	263	Pass
51.783	31.18	29.56	40.0	-10.44	Vertical	1.24	38	
144.935	36.84	33.96	43.5	-9.54	Vertical	1.13	258	
194.935	43.59	38.95	43.5	-4.55	Horizontal	1.41	0	
359.250	40.71	38.09	46.0	-7.91	Vertical	1.09	144	

\*- Margin = Measured emission - specification limit.

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

**Reference numbers of test equipment used**

HL 0446	HL 0521	HL 0604	HL 2909	HL 3615	HL 3818	HL 3901	HL 4277
HL 4933							

Full description is given in Appendix A.



<b>Test specification:</b> <b>Section 15.209, Field strength of emissions</b>			
<b>Test procedure:</b> ANSI C63.10, Sections 6.4, 6.5			
<b>Test mode:</b> Compliance		<b>Verdict:</b> <b>PASS</b>	
<b>Date(s):</b> 24-Aug-17- 27-Dec-17			
<b>Temperature:</b> 24.3 °C	<b>Relative Humidity:</b> 44 %	<b>Air Pressure:</b> 1006 hPa	<b>Power:</b> 120 VAC
<b>Remarks:</b>			

**Table 7.2.5 Field strength of spurious emissions**

TEST SITE: OATS  
 TEST DISTANCE: 3 m  
 EUT POSITION: Typical (Vertical)  
 MODULATION: Stepped CW  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum  
 DETECTORS USED: PEAK / AVERAGE  
 FREQUENCY RANGE: 1000 MHz – 18000 MHz  
 RESOLUTION BANDWIDTH: 1000 kHz  
 TEST ANTENNA TYPE: Double ridged guide

TEST ANTENNA TYPE: \_\_\_\_\_ Double ended guide

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*				
Carrier frequency 957 MHz										
No spurious emissions were found										Pass
Carrier frequency 958 MHz										
No spurious emissions were found										Pass

\*- Margin = Measured emission - specification limit.

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

**Table 7.2.6 Average factor calculation**

Transmission pulse		Transmission burst		Transmission train duration, ms	Average factor, dB
Duration, ms	Period, ms	Duration, ms	Period, ms		
4.68	89.16	NA	NA	NA	-20.57

\*- Average factor was calculated based on the worst case assumption of 2 pulses within 100ms window as follows:

$$AF = 20 \cdot \log(2 \cdot 4.68 / 100) = -20.57 \text{ dB}$$

**Reference numbers of test equipment used**

HL 0446	HL 0521	HL 0604	HL 2909	HL 3615	HL 3818	HL 3901	HL 4277
HL 4933							

Full description is given in Appendix A.





<b>Test specification:</b> Section 15.209, Field strength of emissions			
<b>Test procedure:</b> ANSI C63.10, Sections 6.4, 6.5			
<b>Test mode:</b> Compliance		<b>Verdict:</b> PASS	
<b>Date(s):</b> 24-Aug-17- 27-Dec-17			
<b>Temperature:</b> 24.3 °C	<b>Relative Humidity:</b> 44 %	<b>Air Pressure:</b> 1006 hPa	<b>Power:</b> 120 VAC
<b>Remarks:</b>			

Table 7.2.7 Field strength of spurious emissions

TEST SITE:	OATS
TEST DISTANCE:	3 m
EUT POSITION:	Typical (Vertical)
MODULATION:	Stepped CW
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum
DETECTORS USED:	PEAK / AVERAGE
FREQUENCY RANGE:	1000 MHz – 18000 MHz
RESOLUTION BANDWIDTH:	1000 kHz
TEST ANTENNA TYPE:	Double ridged guide

Frequency, MHz	Peak			Average			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
	Measured emission, dB(□V/m)	Limit, dB(uV/m)	Margin, dB*	Measured emission, dB(uV/m)	Limit, dB(uV/m)	Margin, dB*				
Carrier frequency 1242 MHz										
No spurious emissions were found										Pass
Carrier frequency 1636 MHz										
No spurious emissions were found										Pass
Carrier frequency 1718 MHz										
No spurious emissions were found										Pass

\*- Margin = Measured emission - specification limit.

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

Table 7.2.8 Average factor calculation

Transmission pulse		Transmission burst		Transmission train duration, ms	Average factor, dB
Duration, ms	Period, ms	Duration, ms	Period, ms		
Carrier frequency 1242 MHz					
4.32	160	NA	NA	NA	-27.29
Carrier frequency 1636 MHz					
4.29	160	NA	NA	NA	-27.35
Carrier frequency 1718 MHz					
4.29	148.5	NA	NA	NA	-27.35

\*- Average factor was calculated as follows

for pulse train shorter than 100 ms:

$$\text{Average factor} = 20 \times \log_{10} \left( \frac{\text{Pulse duration}}{\text{Pulse period}} \times \frac{\text{Burst duration}}{\text{Train duration}} \times \text{Number of bursts within pulse train} \right)$$

#### Reference numbers of test equipment used

HL 0446	HL 0521	HL 0604	HL 2909	HL 3615	HL 3818	HL 3901	HL 4277
HL 4933							

Full description is given in Appendix A.



HERMON LABORATORIES

<b>Test specification:</b> <b>Section 15.209, Field strength of emissions</b>			
<b>Test procedure:</b> ANSI C63.10, Sections 6.4, 6.5			
<b>Test mode:</b> Compliance		<b>Verdict:</b> <b>PASS</b>	
<b>Date(s):</b> 24-Aug-17- 27-Dec-17			
<b>Temperature:</b> 24.3 °C	<b>Relative Humidity:</b> 44 %	<b>Air Pressure:</b> 1006 hPa	<b>Power:</b> 120 VAC
<b>Remarks:</b>			

Table 7.2.9 Restricted bands according to FCC 15, Section 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	12.290 - 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	16.420 - 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	



HERMON LABORATORIES

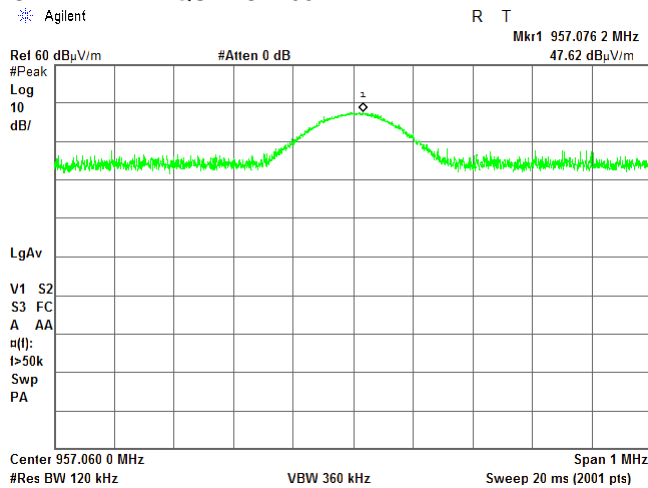
Test specification:		Section 15.209, Field strength of emissions	
Test procedure:		ANSI C63.10, Sections 6.4, 6.5	
Test mode:		Verdict: PASS	
Date(s):			
24-Aug-17- 27-Dec-17			
Temperature: 24.3 °C	Relative Humidity: 44 %	Air Pressure: 1006 hPa	Power: 120 VAC
Remarks:			

Plot 7.2.1 Radiated emission measurements at the fundamental frequency

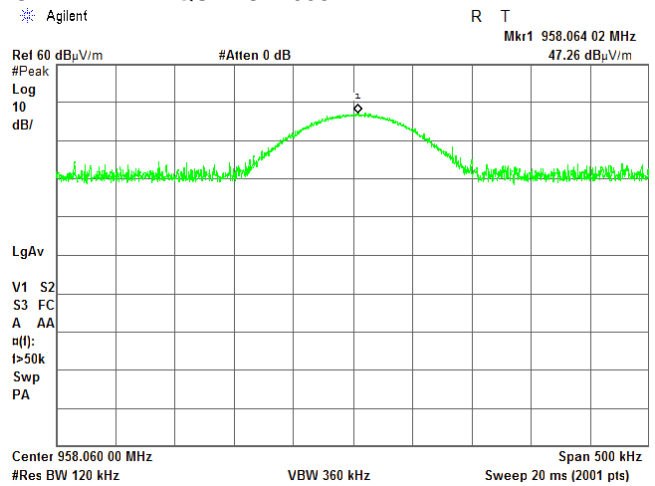
TEST SITE:  
TEST DISTANCE:  
ANTENNA POLARIZATION:  
EUT POSITION:  
OPERATION MODE:

OATS  
3 m  
Vertical  
Typical (Vertical)  
Stepped CW signal

CARRIER FREQUENCY: 957 MHz



CARRIER FREQUENCY: 958 MHz





HERMON LABORATORIES

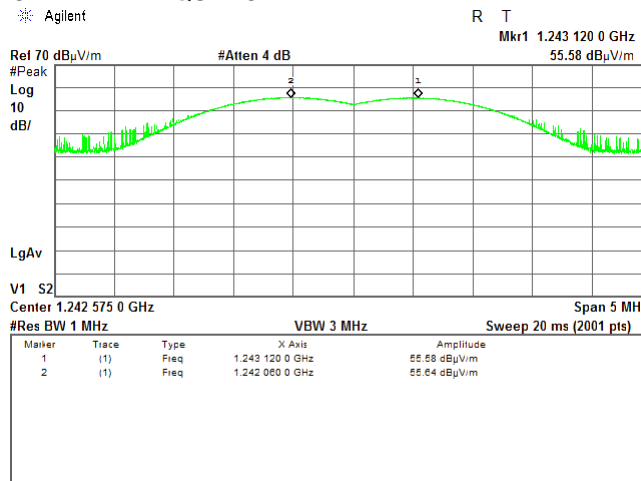
<b>Test specification: Section 15.209, Field strength of emissions</b>			
<b>Test procedure:</b> ANSI C63.10, Sections 6.4, 6.5			
<b>Test mode:</b> Compliance		<b>Verdict:</b> PASS	
<b>Date(s):</b> 24-Aug-17- 27-Dec-17			
<b>Temperature:</b> 24.3 °C	<b>Relative Humidity:</b> 44 %	<b>Air Pressure:</b> 1006 hPa	<b>Power:</b> 120 VAC
<b>Remarks:</b>			

### Plot 7.2.2 Radiated emission measurements at the fundamental frequency

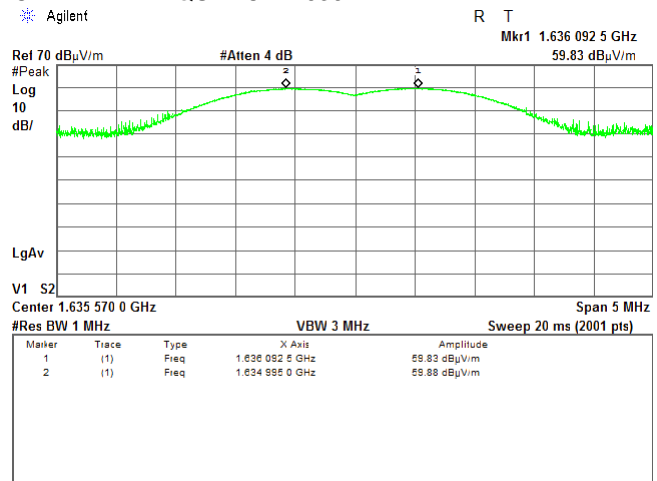
TEST SITE:  
TEST DISTANCE:  
ANTENNA POLARIZATION:  
EUT POSITION:  
OPERATION MODE:

OATS  
3 m  
Vertical  
Typical (Vertical)  
Stepped CW signal

CARRIER FREQUENCY: 1242 MHz



CARRIER FREQUENCY: 1636 MHz

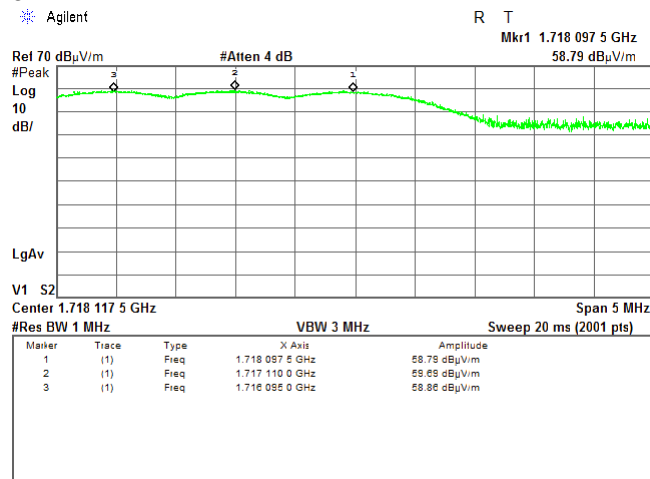


### Plot 7.2.3 Radiated emission measurements at the fundamental frequency

TEST SITE:  
TEST DISTANCE:  
ANTENNA POLARIZATION:  
EUT POSITION:

OATS  
3 m  
Vertical  
Typical (Vertical)

CARRIER FREQUENCY: 1718 MHz





HERMON LABORATORIES

Test specification:		Section 15.209, Field strength of emissions	
Test procedure:		ANSI C63.10, Sections 6.4, 6.5	
Test mode:		Verdict: PASS	
Date(s):			
24-Aug-17- 27-Dec-17			
Temperature: 24.3 °C	Relative Humidity: 44 %	Air Pressure: 1006 hPa	Power: 120 VAC
Remarks:			

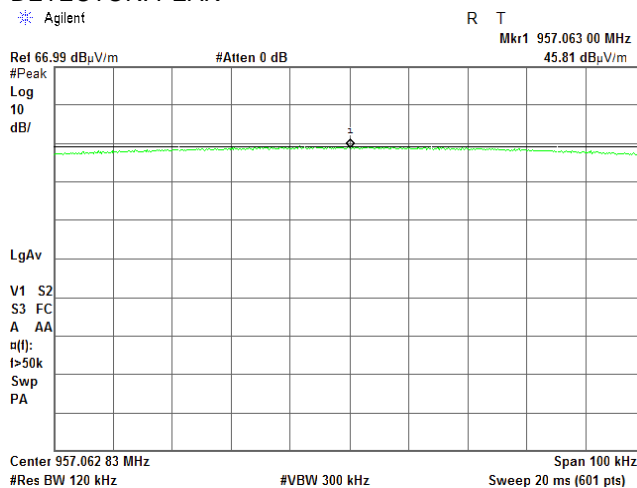
#### Plot 7.2.4 Radiated emission measurements at the fundamental frequency

TEST SITE:  
TEST DISTANCE:  
ANTENNA POLARIZATION:  
EUT POSITION:  
OPERATION MODE:

OATS  
3 m  
Vertical  
Typical (Vertical)  
Stepping function stopped

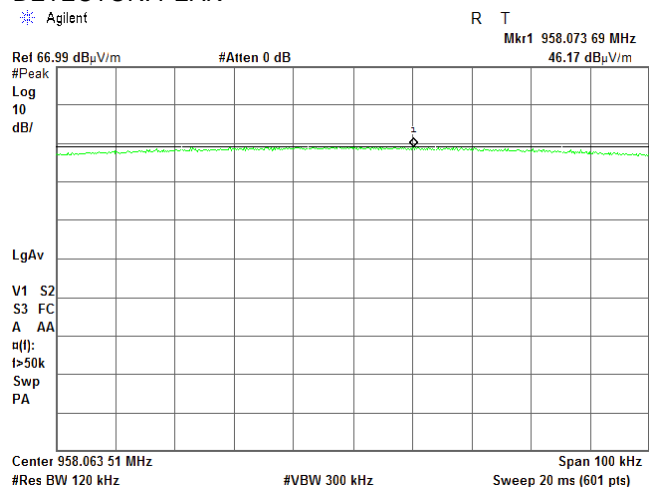
CARRIER FREQUENCY: 957 MHz  
DETECTOR: PEAK

Agilent



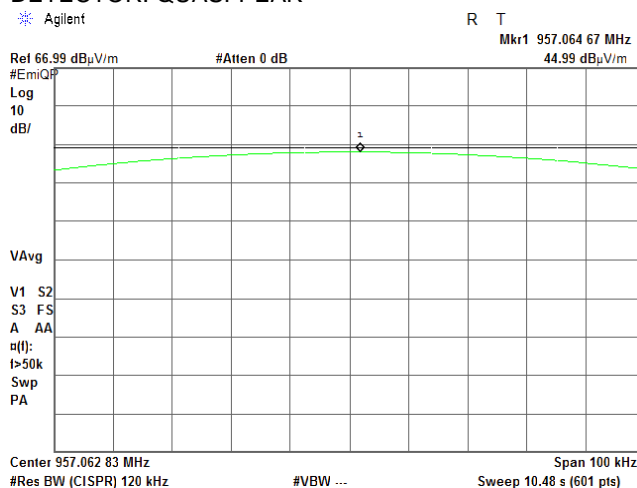
CARRIER FREQUENCY: 958 MHz  
DETECTOR: PEAK

Agilent



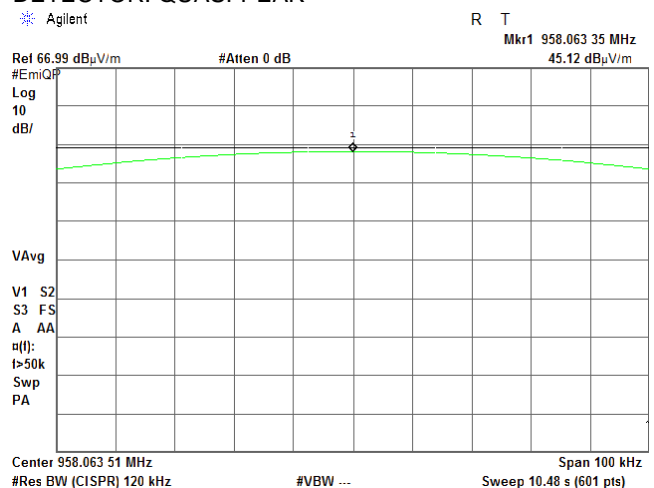
DETECTOR: QUASI-PEAK

Agilent



DETECTOR: QUASI-PEAK

Agilent





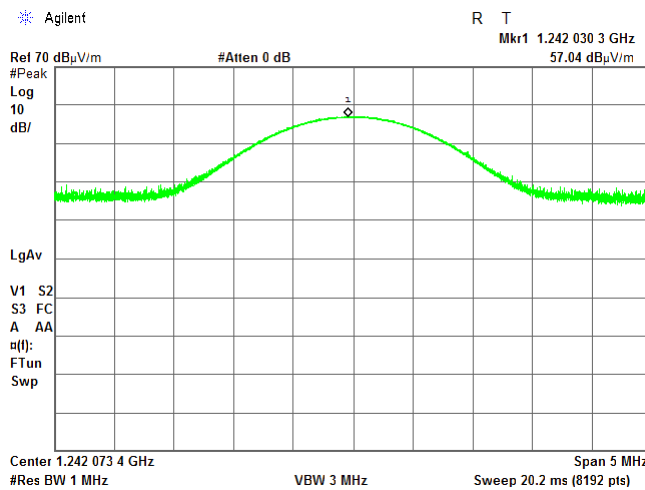
HERMON LABORATORIES

Test specification:		Section 15.209, Field strength of emissions	
Test procedure:		ANSI C63.10, Sections 6.4, 6.5	
Test mode:		Verdict: PASS	
Date(s):			
24-Aug-17- 27-Dec-17			
Temperature: 24.3 °C	Relative Humidity: 44 %	Air Pressure: 1006 hPa	Power: 120 VAC
Remarks:			

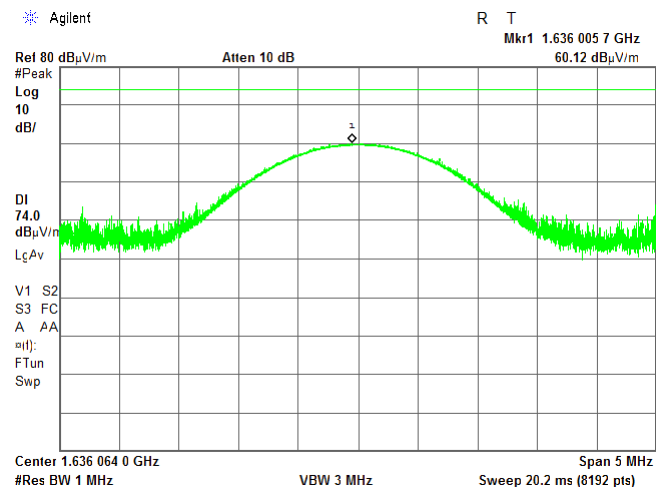
Plot 7.2.5 Radiated emission measurements at the fundamental frequency

TEST SITE:	OATS
TEST DISTANCE:	3 m
ANTENNA POLARIZATION:	Vertical
EUT POSITION:	Typical (Vertical)
OPERATION MODE:	Stepping function stopped

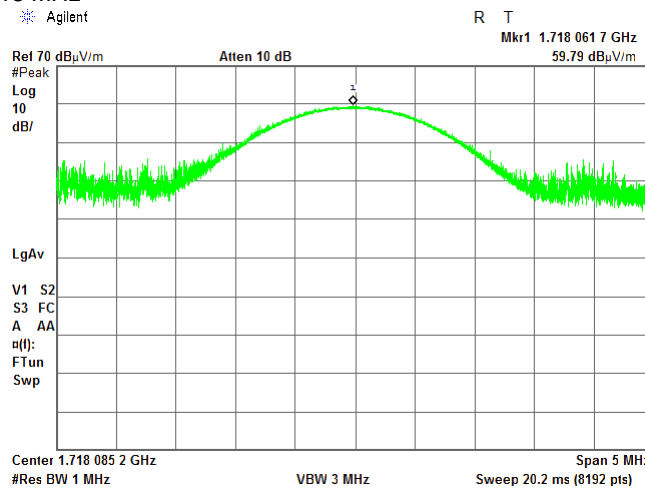
CARRIER FREQUENCY: 1242 MHz



CARRIER FREQUENCY: 1636 MHz



CARRIER FREQUENCY: 1718 MHz



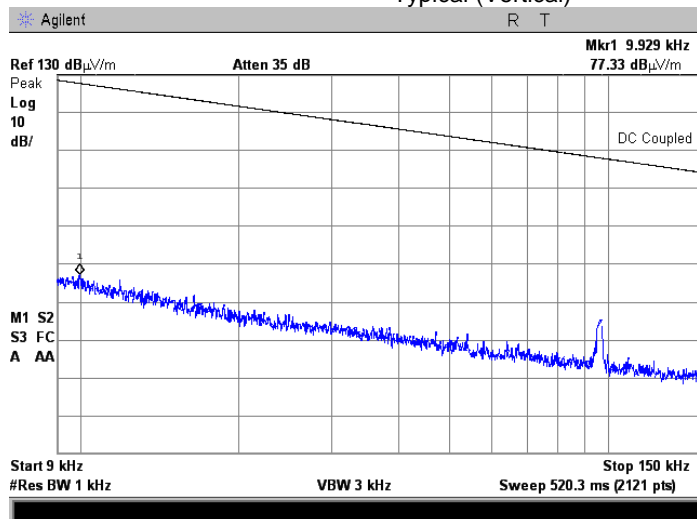


HERMON LABORATORIES

Test specification: Section 15.209, Field strength of emissions			
Test procedure: ANSI C63.10, Sections 6.4, 6.5			
Test mode: Compliance		Verdict: PASS	
Date(s): 24-Aug-17- 27-Dec-17			
Temperature: 24.3 °C	Relative Humidity: 44 %	Air Pressure: 1006 hPa	Power: 120 VAC
Remarks:			

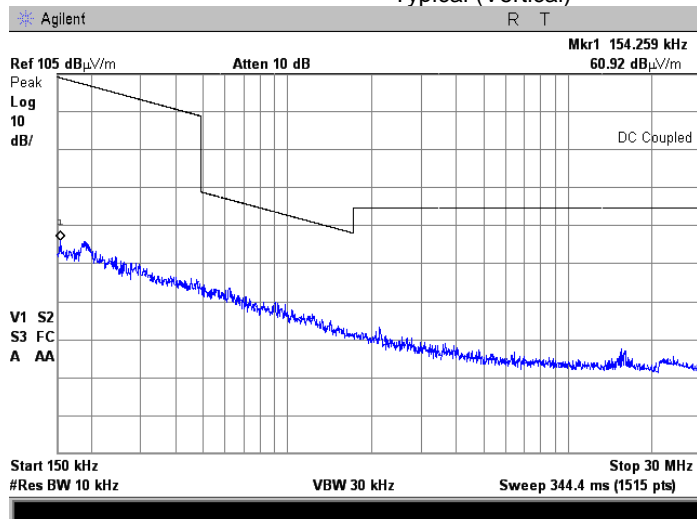
Plot 7.2.6 Radiated emission measurements from 9 to 150 kHz

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



Plot 7.2.7 Radiated emission measurements from 0.15 to 30 MHz

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



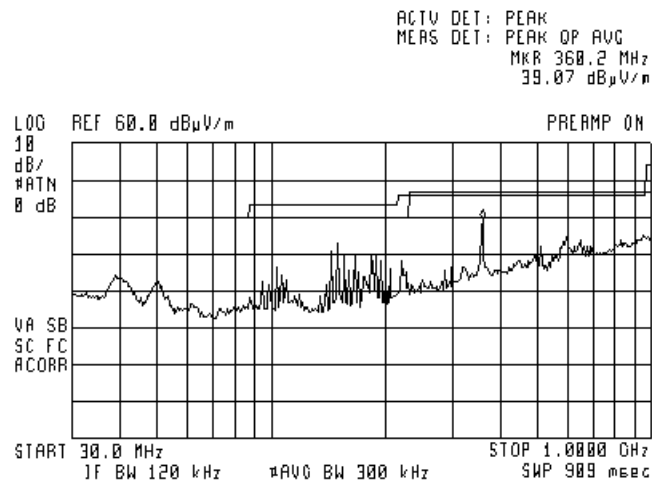


HERMON LABORATORIES

<b>Test specification:</b> Section 15.209, Field strength of emissions			
<b>Test procedure:</b> ANSI C63.10, Sections 6.4, 6.5			
<b>Test mode:</b> Compliance		<b>Verdict:</b> PASS	
<b>Date(s):</b> 24-Aug-17- 27-Dec-17			
<b>Temperature:</b> 24.3 °C	<b>Relative Humidity:</b> 44 %	<b>Air Pressure:</b> 1006 hPa	<b>Power:</b> 120 VAC
<b>Remarks:</b>			

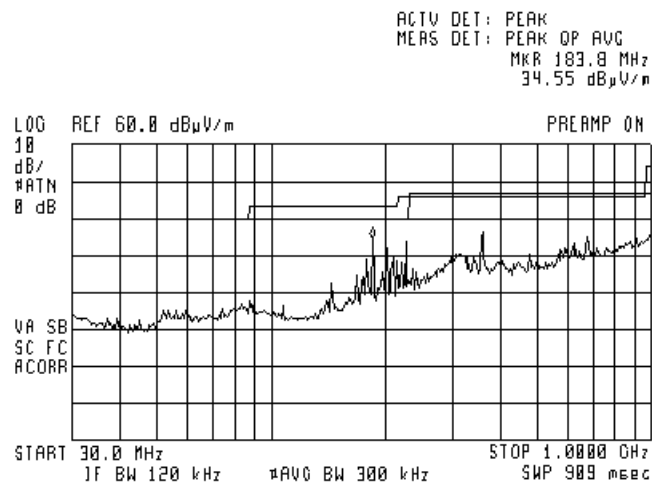
**Plot 7.2.8 Radiated emission measurements from 30 to 1000 MHz**

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



**Plot 7.2.9 Radiated emission measurements from 30 to 1000 MHz**

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







HERMON LABORATORIES

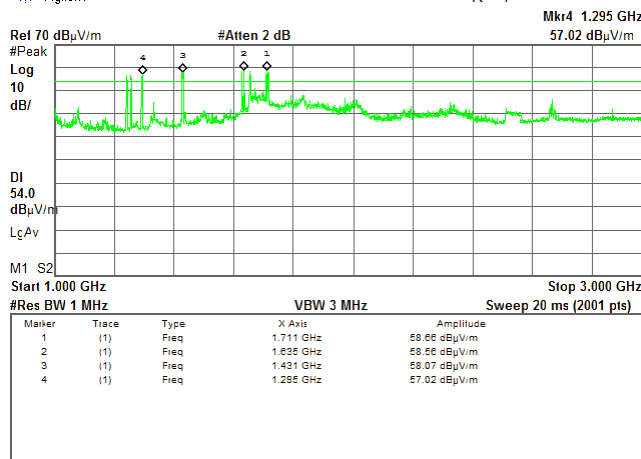
Test specification: Section 15.209, Field strength of emissions			
Test procedure: ANSI C63.10, Sections 6.4, 6.5			
Test mode: Compliance		Verdict: PASS	
Date(s): 24-Aug-17- 27-Dec-17			
Temperature: 24.3 °C	Relative Humidity: 44 %	Air Pressure: 1006 hPa	Power: 120 VAC
Remarks:			

Plot 7.2.10 Radiated emission measurements from 1 to 6 GHz

TEST SITE:  
TEST DISTANCE:  
ANTENNA POLARIZATION:  
EUT POSITION:  
OPERATION MODE:  
DETECTOR PEAK: RBW = 1 MHz; VBW = 3 MHz

\* Agilent

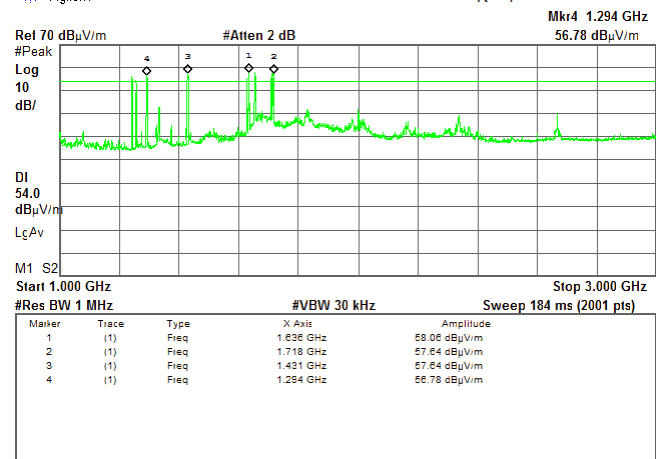
R T



Semi anechoic chamber  
3 m  
Vertical and Horizontal  
Typical (Vertical)  
Stepped CW signal  
DETECTOR AVERAGE: RBW = 1 MHz; VBW = 30 kHz

\* Agilent

R T

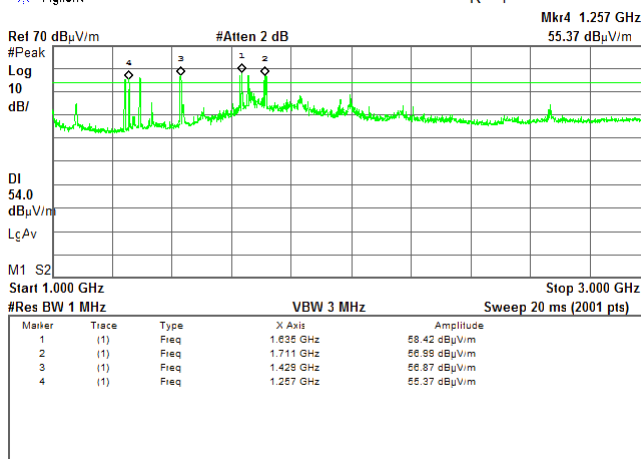


Plot 7.2.11 Radiated emission measurements from 1 to 3 GHz

TEST SITE:  
TEST DISTANCE:  
ANTENNA POLARIZATION:  
EUT POSITION:  
OPERATION MODE:  
DETECTOR PEAK: RBW = 1 MHz; VBW = 3 MHz

\* Agilent

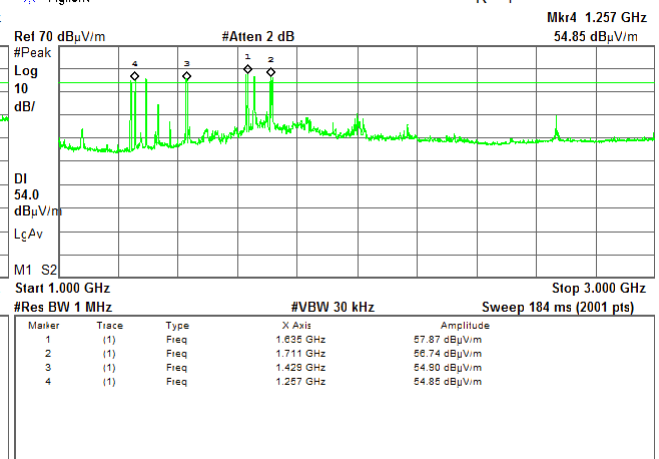
R T



Semi anechoic chamber  
3 m  
Horizontal  
Typical (Vertical)  
Stepped CW signal  
DETECTOR AVERAGE: RBW = 1 MHz; VBW = 30 kHz

\* Agilent

R T





HERMON LABORATORIES

Test specification: Section 15.209, Field strength of emissions			
Test procedure: ANSI C63.10, Sections 6.4, 6.5			
Test mode: Compliance		Verdict: PASS	
Date(s): 24-Aug-17- 27-Dec-17			
Temperature: 24.3 °C	Relative Humidity: 44 %	Air Pressure: 1006 hPa	Power: 120 VAC
Remarks:			

Plot 7.2.12 Radiated emission measurements from 1 to 6 GHz

TEST SITE:

TEST DISTANCE:

ANTENNA POLARIZATION:

EUT POSITION:

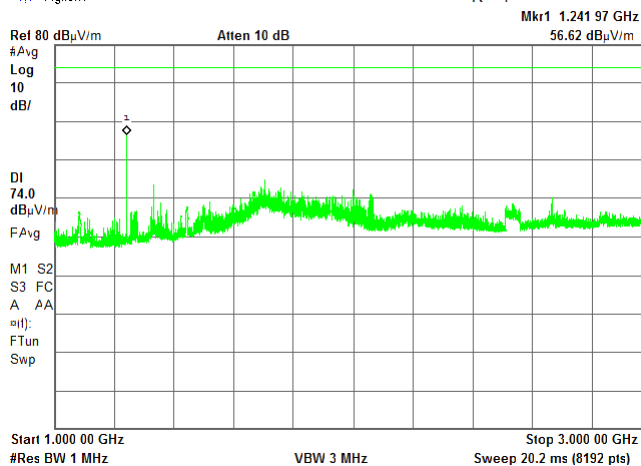
OPERATION MODE:

CARRIER FREQUENCY:

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

Agilent

R T

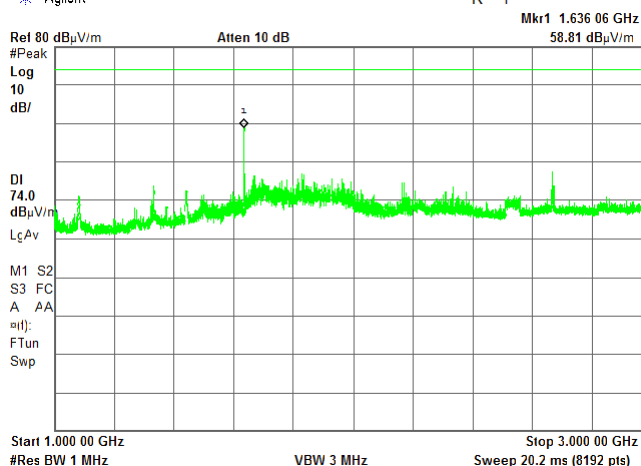


CARRIER FREQUENCY:

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

Agilent

R T



Semi anechoic chamber

3 m

Vertical

Typical (Vertical)

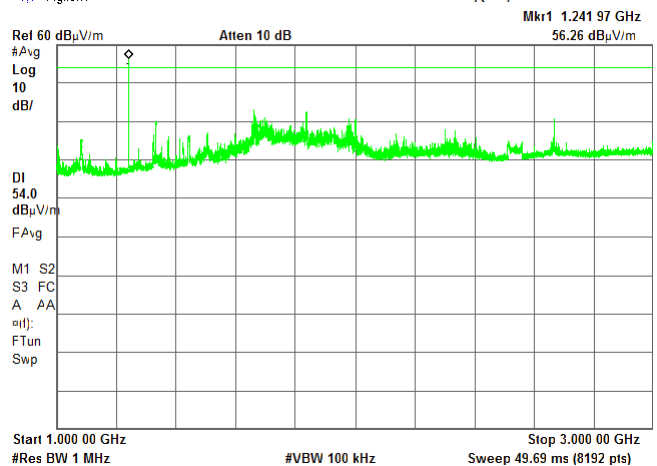
Stepping function stopped

1242 MHz

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

Agilent

R T

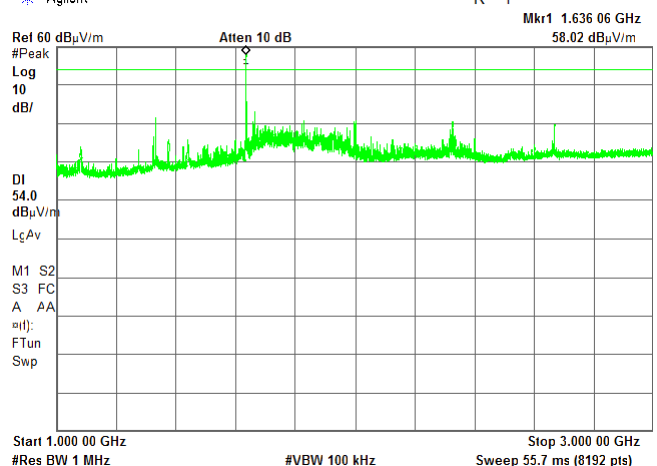


1636MHz

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

Agilent

R T





HERMON LABORATORIES

Report ID: SENRAD\_FCC.30018\_rev5.docx

Date of Issue: 7-Feb-18

Test specification:		Section 15.209, Field strength of emissions	
Test procedure:		ANSI C63.10, Sections 6.4, 6.5	
Test mode:		Verdict: PASS	
Date(s):			
24-Aug-17- 27-Dec-17			
Temperature: 24.3 °C	Relative Humidity: 44 %	Air Pressure: 1006 hPa	Power: 120 VAC
Remarks:			

Plot 7.2.13 Radiated emission measurements from 1 to 6 GHz

TEST SITE:

TEST DISTANCE:

ANTENNA POLARIZATION:

EUT POSITION:

OPERATION MODE:

CARRIER FREQUENCY:

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

✱ Agilent

R T

Semi anechoic chamber

3 m

Vertical

Typical (Vertical)

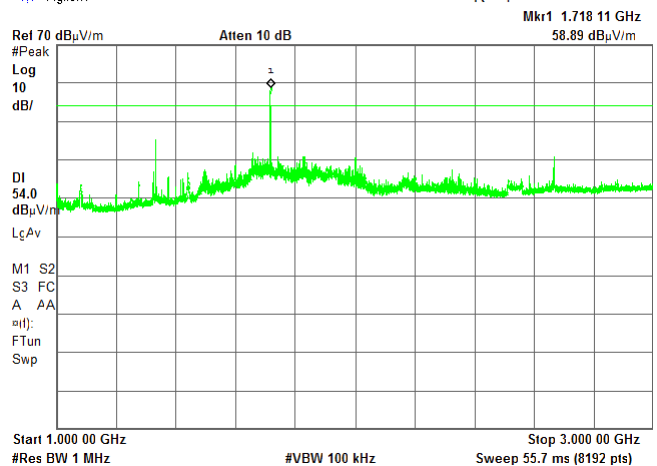
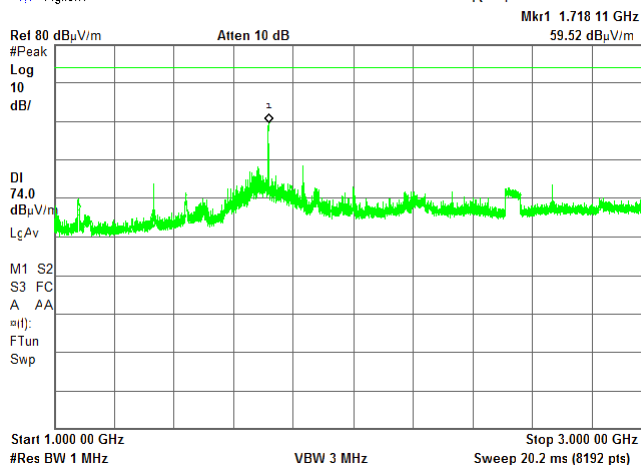
Stepping function stopped

1718 MHz

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

✱ Agilent

R T





HERMON LABORATORIES

Test specification: Section 15.209, Field strength of emissions			
Test procedure: ANSI C63.10, Sections 6.4, 6.5			
Test mode: Compliance		Verdict: PASS	
Date(s): 24-Aug-17- 27-Dec-17			
Temperature: 24.3 °C	Relative Humidity: 44 %	Air Pressure: 1006 hPa	Power: 120 VAC
Remarks:			

Plot 7.2.14 Radiated emission measurements from 1 to 3 GHz

TEST SITE:

TEST DISTANCE:

ANTENNA POLARIZATION:

EUT POSITION:

OPERATION MODE:

CARRIER FREQUENCY:

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

✱ Agilent

R T

Semi anechoic chamber

3 m

Horizontal

Typical (Vertical)

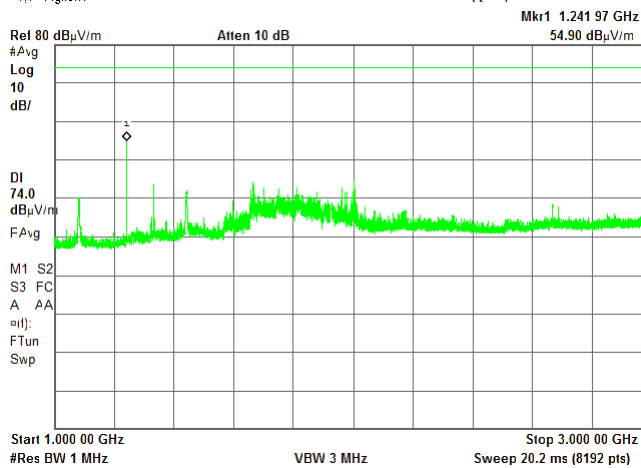
Stepping function stopped

1242 MHz

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

✱ Agilent

R T

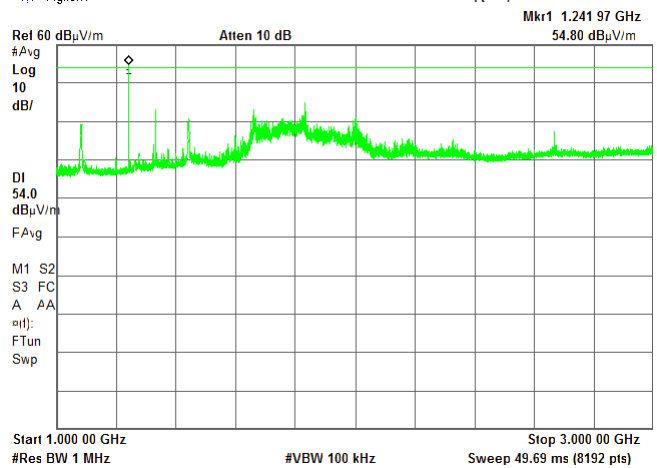


CARRIER FREQUENCY:

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

✱ Agilent

R T

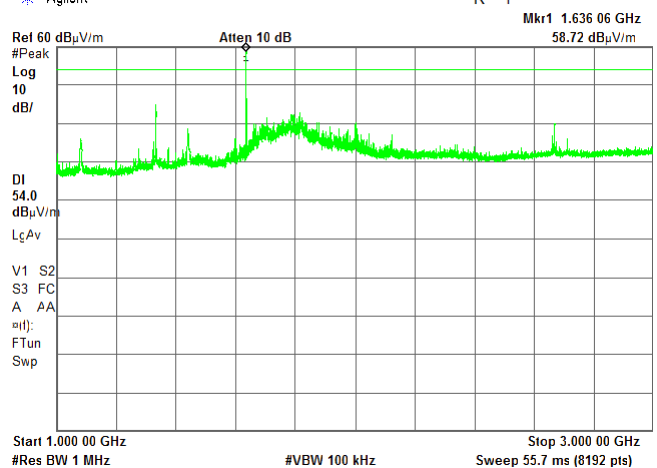
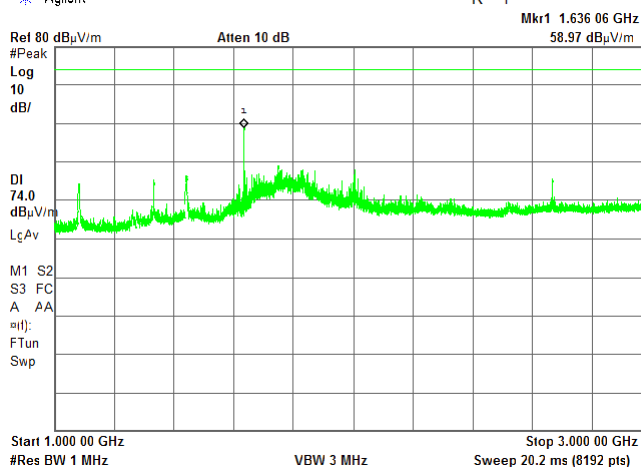


1636MHz

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

✱ Agilent

R T





HERMON LABORATORIES

Report ID: SENRAD\_FCC.30018\_rev5.docx

Date of Issue: 7-Feb-18

<b>Test specification:</b> Section 15.209, Field strength of emissions			
<b>Test procedure:</b> ANSI C63.10, Sections 6.4, 6.5			
<b>Test mode:</b> Compliance		<b>Verdict:</b> PASS	
<b>Date(s):</b> 24-Aug-17- 27-Dec-17			
<b>Temperature:</b> 24.3 °C	<b>Relative Humidity:</b> 44 %	<b>Air Pressure:</b> 1006 hPa	<b>Power:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.2.15 Radiated emission measurements from 1 to 3 GHz

TEST SITE:

TEST DISTANCE:

ANTENNA POLARIZATION:

EUT POSITION:

OPERATION MODE:

CARRIER FREQUENCY:

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

Agilent

R T

Semi anechoic chamber

3 m

Horizontal

Typical (Vertical)

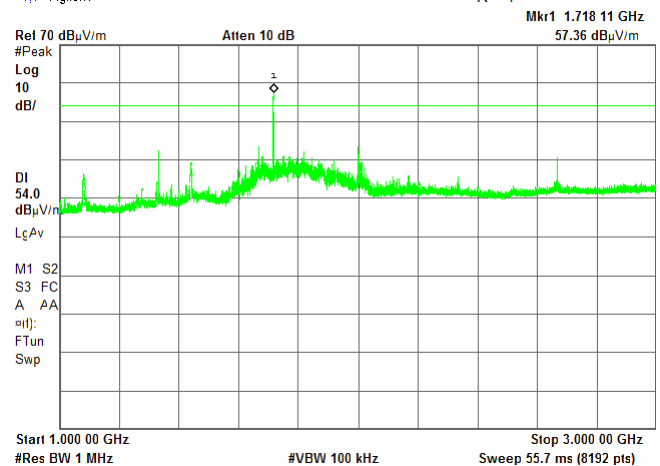
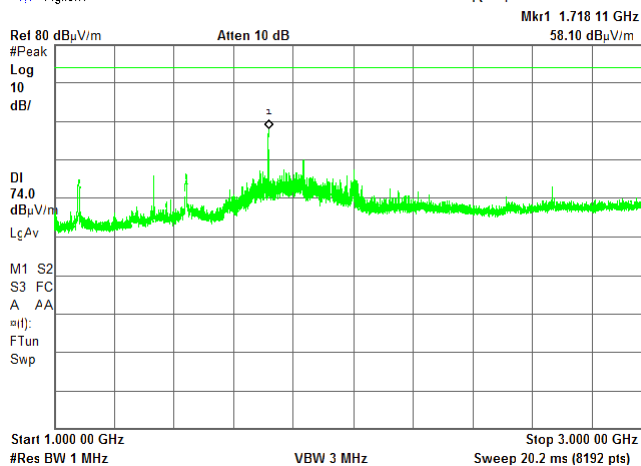
Stepping function stopped

1718 MHz

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

Agilent

R T



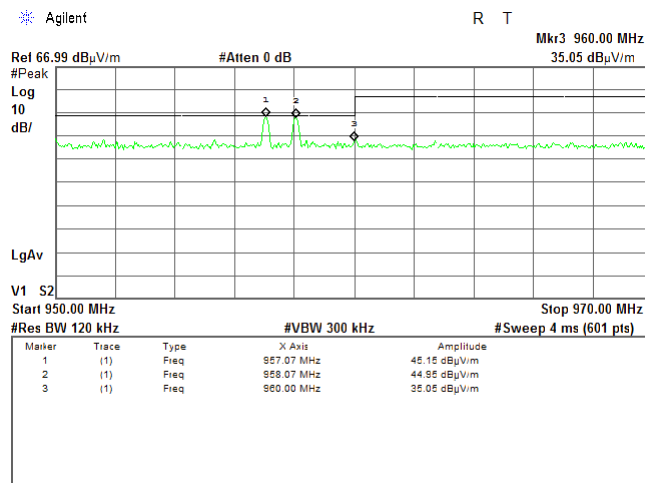


HERMON LABORATORIES

<b>Test specification:</b> Section 15.209, Field strength of emissions			
<b>Test procedure:</b> ANSI C63.10, Sections 6.4, 6.5			
<b>Test mode:</b> Compliance		<b>Verdict:</b> PASS	
<b>Date(s):</b> 24-Aug-17- 27-Dec-17			
<b>Temperature:</b> 24.3 °C	<b>Relative Humidity:</b> 44 %	<b>Air Pressure:</b> 1006 hPa	<b>Power:</b> 120 VAC
<b>Remarks:</b>			

#### Plot 7.2.16 Restricted band radiated emission measurements

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical  
EUT POSITION: Typical (Vertical)  
RESTRICTED BAND: 960 – 1000 MHz





HERMON LABORATORIES

Test specification: Section 15.209, Field strength of emissions			
Test procedure: ANSI C63.10, Sections 6.4, 6.5			
Test mode: Compliance		Verdict: PASS	
Date(s): 24-Aug-17- 27-Dec-17			
Temperature: 24.3 °C	Relative Humidity: 44 %	Air Pressure: 1006 hPa	Power: 120 VAC
Remarks:			

### Plot 7.2.17 Restricted band radiated emission measurements

TEST SITE:

TEST DISTANCE:

ANTENNA POLARIZATION:

EUT POSITION:

Semi anechoic chamber

3 m

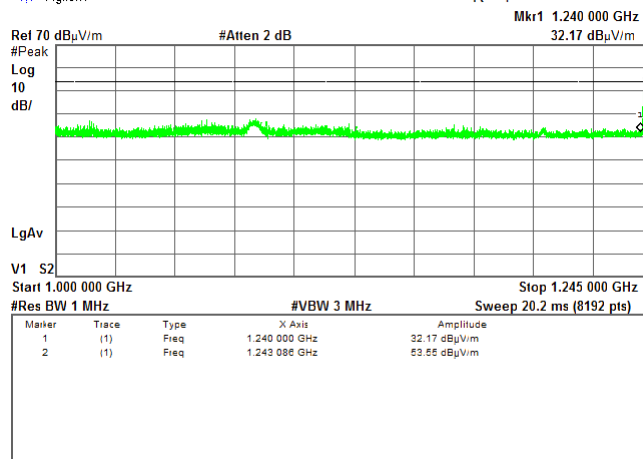
Vertical

Typical (Vertical)

RESTRICTED BAND: 1000 – 1240 MHz

Agilent

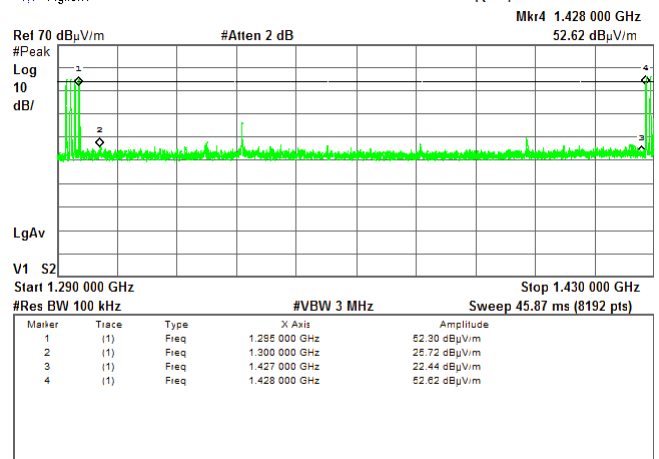
R T



RESTRICTED BAND: 1300 – 1427 MHz

Agilent

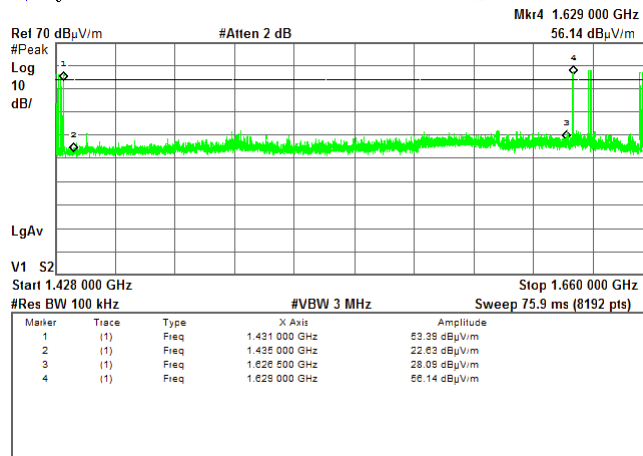
R T



RESTRICTED BAND: 1435 – 1626.5 MHz

Agilent

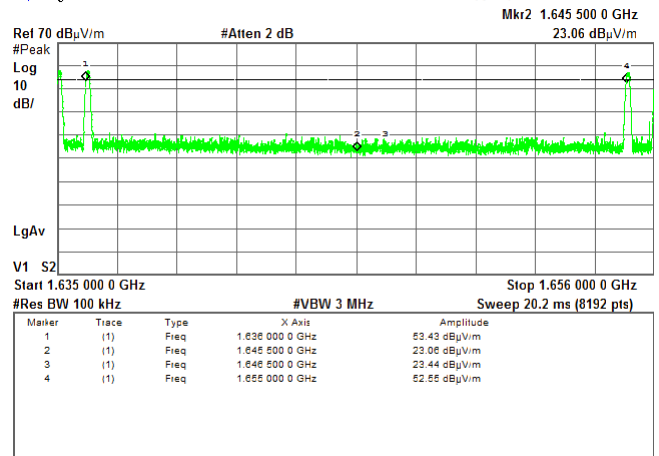
R T



RESTRICTED BAND: 1645.5 – 1646.5 MHz

Agilent

R T





HERMON LABORATORIES

Report ID: SENRAD\_FCC.30018\_rev5.docx

Date of Issue: 7-Feb-18

Test specification:		Section 15.209, Field strength of emissions	
Test procedure:		ANSI C63.10, Sections 6.4, 6.5	
Test mode:		Verdict: PASS	
Date(s):			
24-Aug-17- 27-Dec-17			
Temperature: 24.3 °C	Relative Humidity: 44 %	Air Pressure: 1006 hPa	Power: 120 VAC
Remarks:			

#### Plot 7.2.18 Restricted band radiated emission measurements

TEST SITE:

TEST DISTANCE:

ANTENNA POLARIZATION:

EUT POSITION:

Semi anechoic chamber

3 m

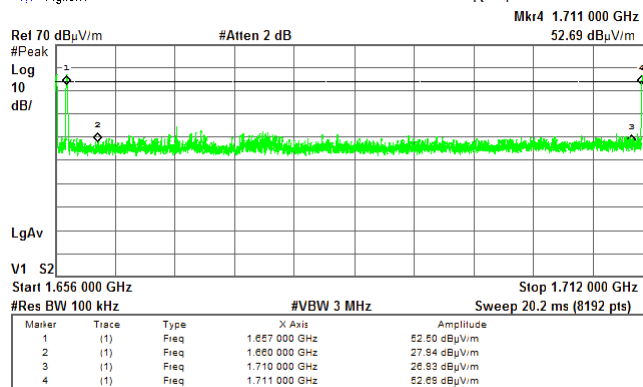
Vertical

Typical (Vertical)

RESTRICTED BAND: 1660 – 1710 MHz

Agilent

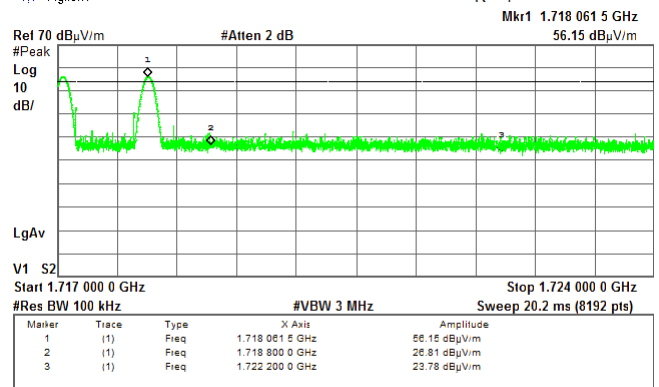
R T



RESTRICTED BAND: 1718.8 – 1722.2 MHz

Agilent

R T







HERMON LABORATORIES

Test specification: Section 15.209, Field strength of emissions			
Test procedure: ANSI C63.10, Sections 6.4, 6.5			
Test mode: Compliance		Verdict: PASS	
Date(s): 24-Aug-17- 27-Dec-17			
Temperature: 24.3 °C	Relative Humidity: 44 %	Air Pressure: 1006 hPa	Power: 120 VAC
Remarks:			

Plot 7.2.19 Restricted band radiated emission measurements

TEST SITE:

TEST DISTANCE:

ANTENNA POLARIZATION:

EUT POSITION:

Semi anechoic chamber

3 m

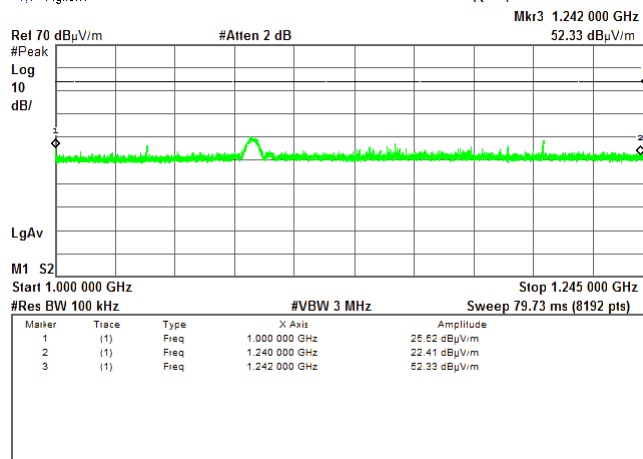
Horizontal

Typical (Vertical)

RESTRICTED BAND: 1000 – 1240 MHz

Agilent

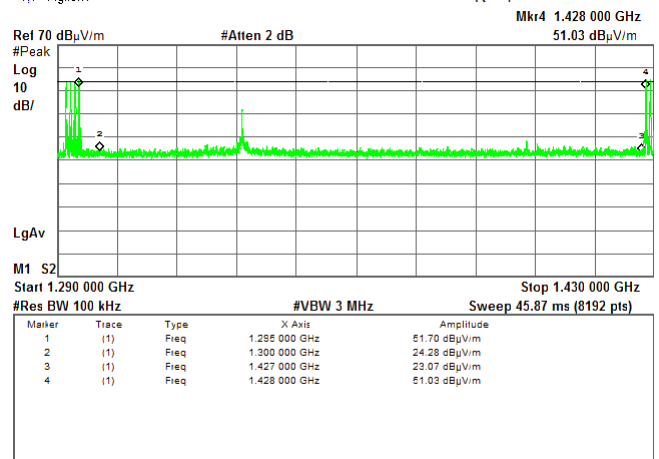
R T



RESTRICTED BAND: 1300 – 1427 MHz

Agilent

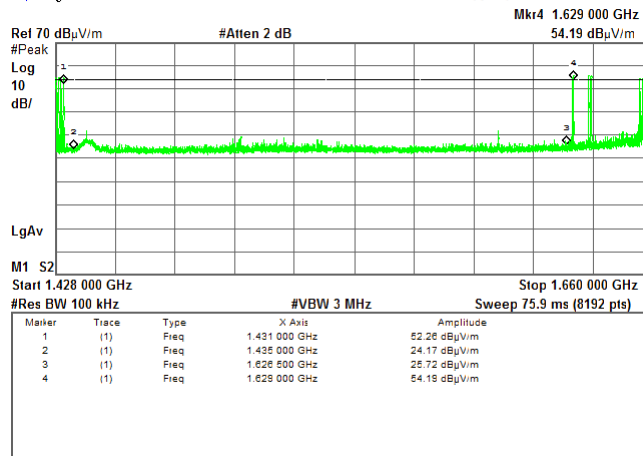
R T



RESTRICTED BAND: 1435 – 1626.5 MHz

Agilent

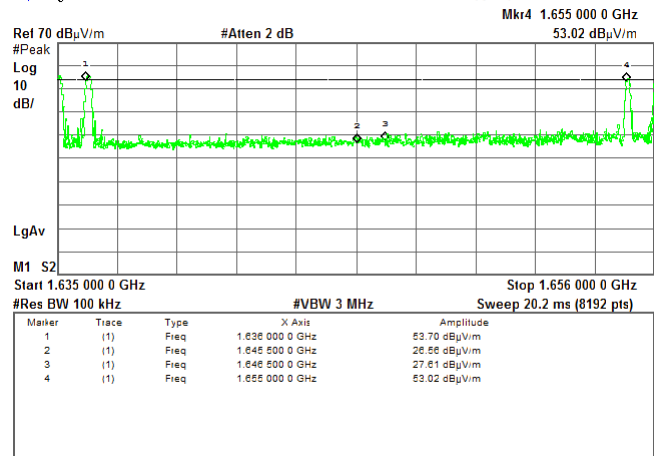
R T



RESTRICTED BAND: 1645.5 – 1646.5 MHz

Agilent

R T





HERMON LABORATORIES

Test specification:		Section 15.209, Field strength of emissions	
Test procedure:		ANSI C63.10, Sections 6.4, 6.5	
Test mode:		Verdict: PASS	
Date(s):			
24-Aug-17- 27-Dec-17			
Temperature: 24.3 °C	Relative Humidity: 44 %	Air Pressure: 1006 hPa	Power: 120 VAC
Remarks:			

#### Plot 7.2.20 Restricted band radiated emission measurements

TEST SITE:

TEST DISTANCE:

ANTENNA POLARIZATION:

EUT POSITION:

Semi anechoic chamber

3 m

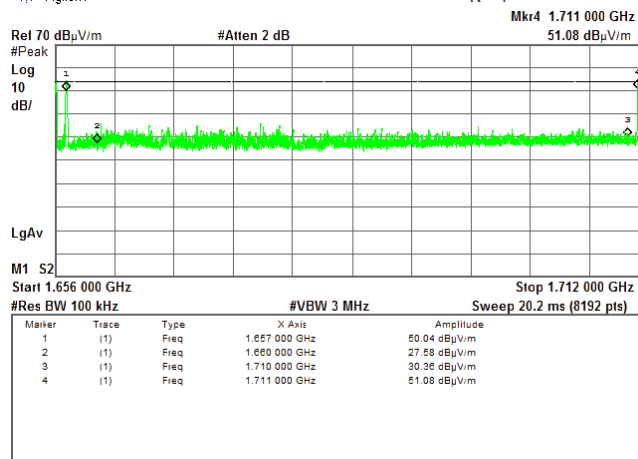
Horizontal

Typical (Vertical)

RESTRICTED BAND: 1660 – 1710 MHz

\* Agilent

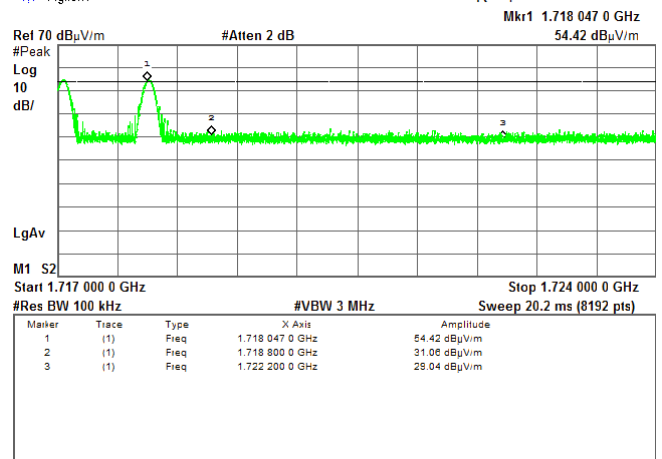
R T



RESTRICTED BAND: 1718.8 – 1722.2 MHz

\* Agilent

R T

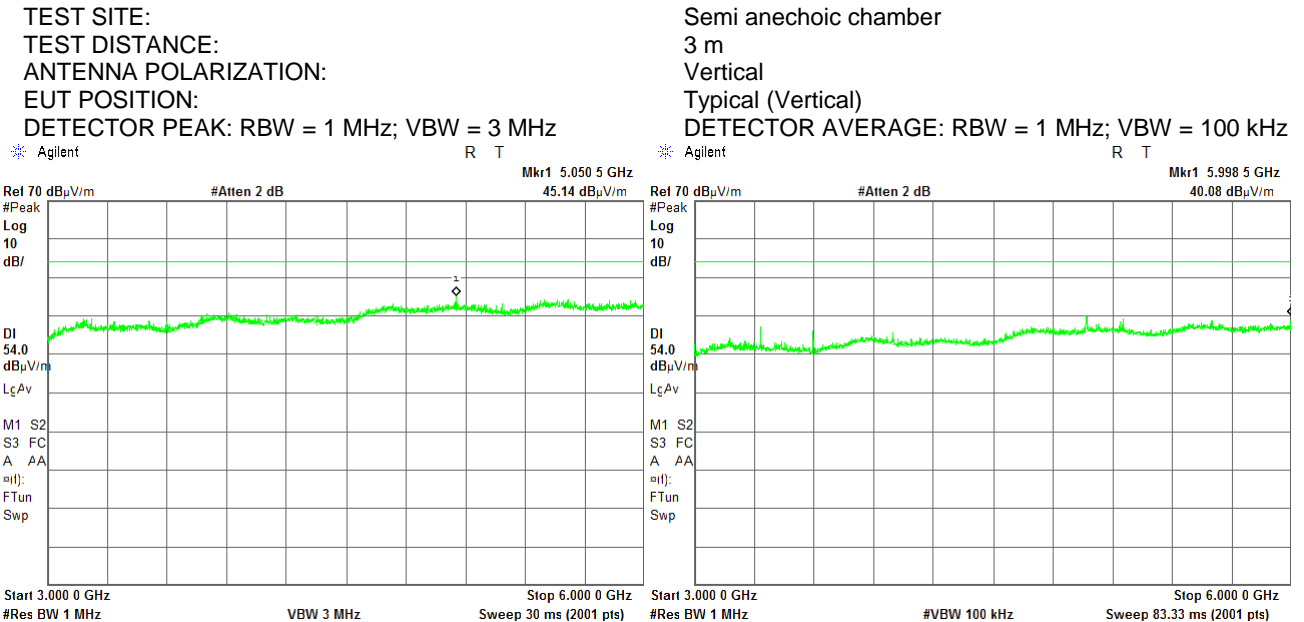




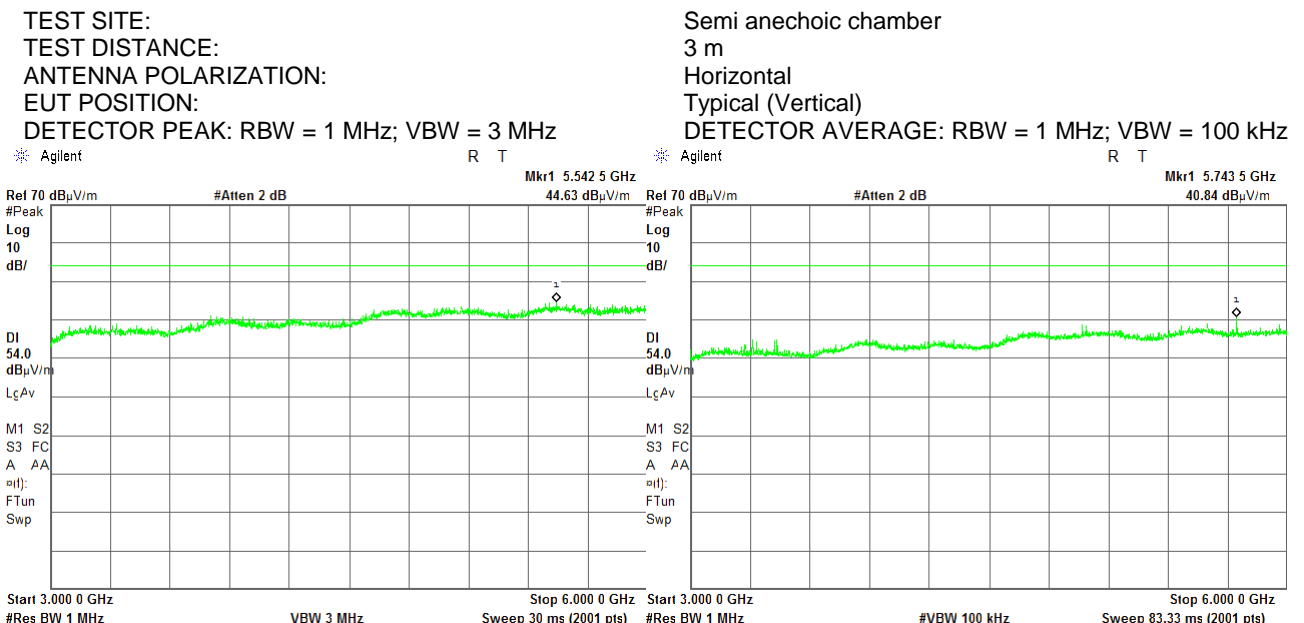
HERMON LABORATORIES

Test specification: Section 15.209, Field strength of emissions			
Test procedure: ANSI C63.10, Sections 6.4, 6.5			
Test mode: Compliance		Verdict: PASS	
Date(s): 24-Aug-17- 27-Dec-17			
Temperature: 24.3 °C	Relative Humidity: 44 %	Air Pressure: 1006 hPa	Power: 120 VAC
Remarks:			

Plot 7.2.21 Radiated emission measurements from 3 to 6 GHz



Plot 7.2.22 Radiated emission measurements from 3 to 6 GHz



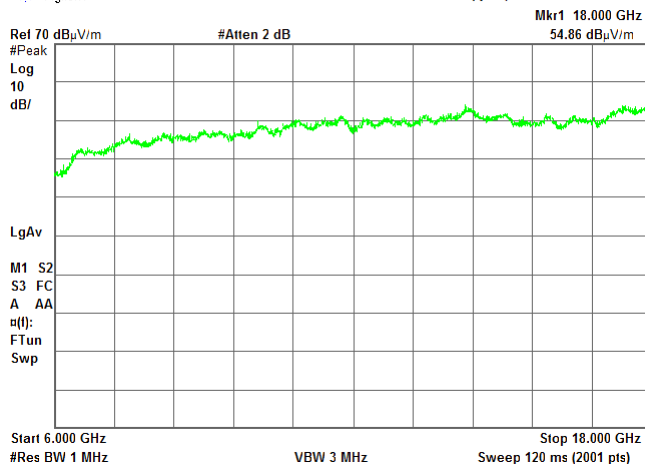


HERMON LABORATORIES

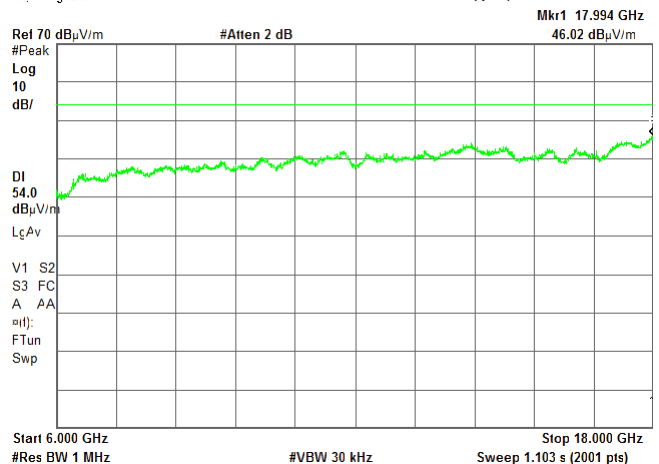
<b>Test specification:</b> <b>Section 15.209, Field strength of emissions</b>			
<b>Test procedure:</b> ANSI C63.10, Sections 6.4, 6.5			
<b>Test mode:</b> Compliance		<b>Verdict:</b> <b>PASS</b>	
<b>Date(s):</b> 24-Aug-17- 27-Dec-17			
<b>Temperature:</b> 24.3 °C	<b>Relative Humidity:</b> 44 %	<b>Air Pressure:</b> 1006 hPa	<b>Power:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.2.23 Radiated emission measurements from 6 to 18 GHz

TEST SITE:  
TEST DISTANCE:  
ANTENNA POLARIZATION:  
EUT POSITION:  
DETECTOR PEAK: RBW = 1 MHz; VBW = 3 MHz  
\* Agilent R T

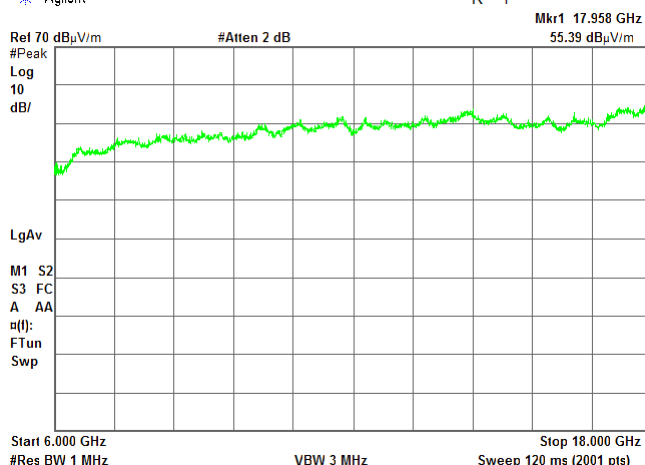


Semi anechoic chamber  
3 m  
Vertical  
Typical (Vertical)  
DETECTOR AVERAGE: RBW = 1 MHz; VBW = 30 kHz  
\* Agilent R T

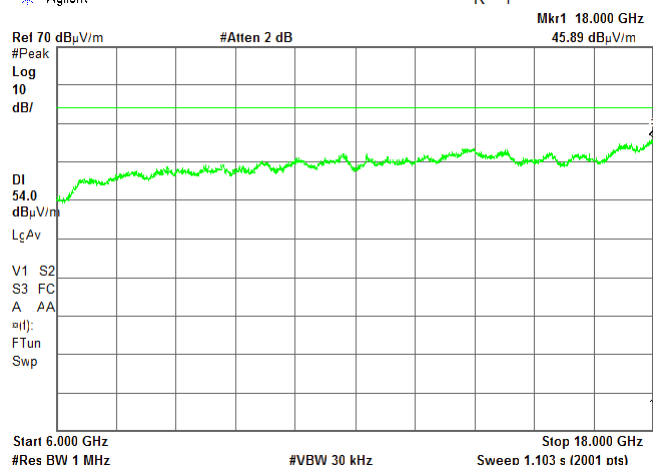


Plot 7.2.24 Radiated emission measurements from 6 to 18 GHz

TEST SITE:  
TEST DISTANCE:  
ANTENNA POLARIZATION:  
EUT POSITION:  
DETECTOR PEAK: RBW = 1 MHz; VBW = 3 MHz  
\* Agilent R T



Semi anechoic chamber  
3 m  
Horizontal  
Typical (Vertical)  
DETECTOR AVERAGE: RBW = 1 MHz; VBW = 30 kHz  
\* Agilent R T





HERMON LABORATORIES

Test specification: Section 15.209, Field strength of emissions			
Test procedure: ANSI C63.10, Sections 6.4, 6.5			
Test mode: Compliance		Verdict: PASS	
Date(s): 24-Aug-17- 27-Dec-17			
Temperature: 24.3 °C	Relative Humidity: 44 %	Air Pressure: 1006 hPa	Power: 120 VAC
Remarks:			

Plot 7.2.25 Radiated emission measurements at the second harmonic frequency

TEST SITE:

TEST DISTANCE:

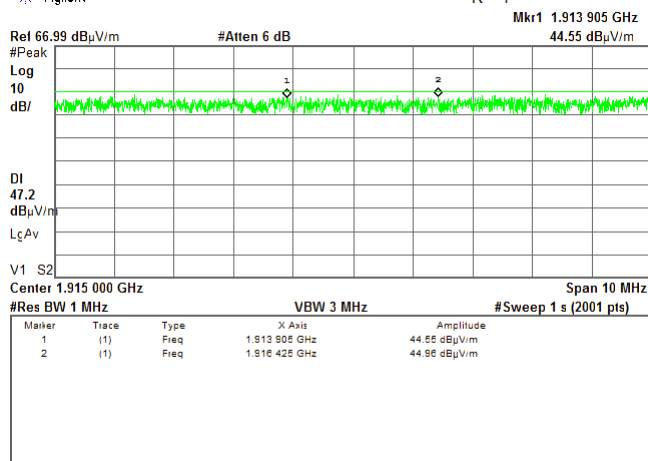
ANTENNA POLARIZATION:

EUT POSITION:

CARRIER FREQUENCY: 957 and 958 MHz

✱ Agilent

R T



OATS

3 m

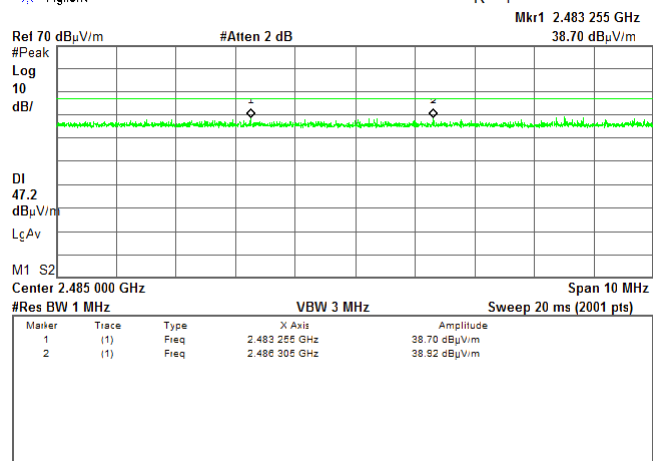
Vertical

Typical (Vertical)

CARRIER FREQUENCY: 1242 MHz

✱ Agilent

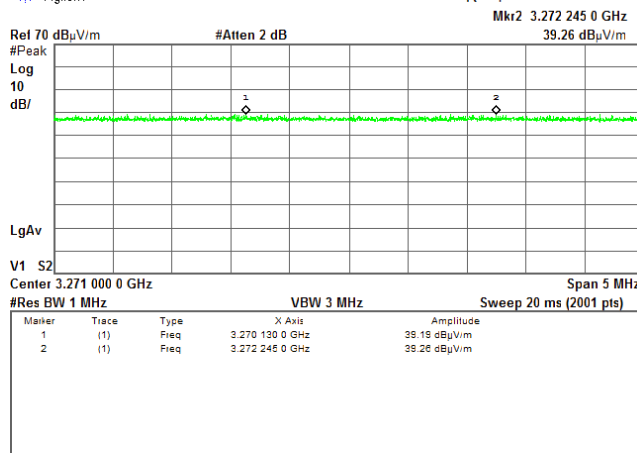
R T



CARRIER FREQUENCY: 1636 MHz

✱ Agilent

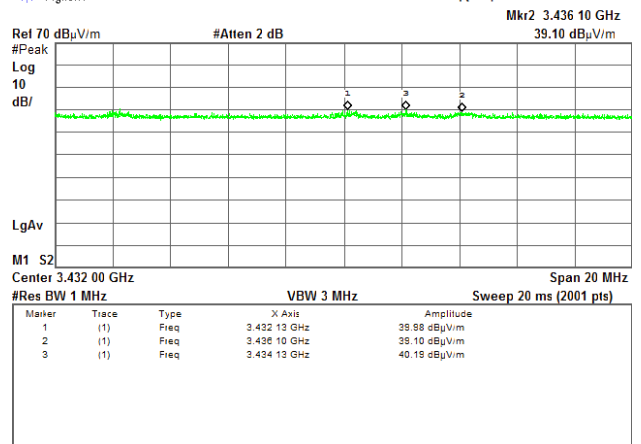
R T



CARRIER FREQUENCY: 1718 MHz

✱ Agilent

R T





HERMON LABORATORIES

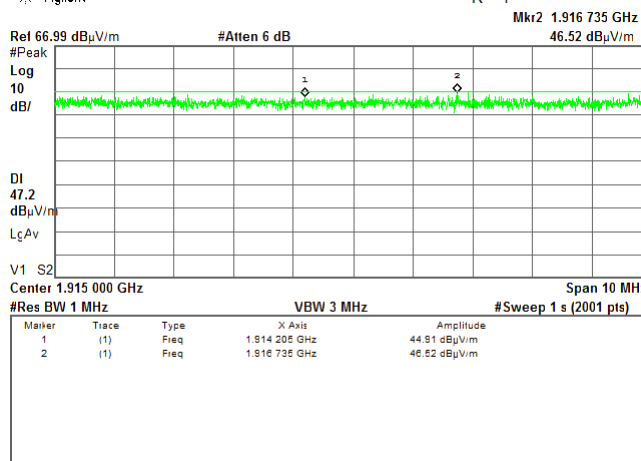
<b>Test specification:</b> Section 15.209, Field strength of emissions			
<b>Test procedure:</b> ANSI C63.10, Sections 6.4, 6.5			
<b>Test mode:</b> Compliance		<b>Verdict:</b> PASS	
<b>Date(s):</b> 24-Aug-17- 27-Dec-17			
<b>Temperature:</b> 24.3 °C	<b>Relative Humidity:</b> 44 %	<b>Air Pressure:</b> 1006 hPa	<b>Power:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.2.26 Radiated emission measurements at the second harmonic frequency

TEST SITE:  
TEST DISTANCE:  
ANTENNA POLARIZATION:  
EUT POSITION:  
CARRIER FREQUENCY: 957 and 958 MHz

✱ Agilent

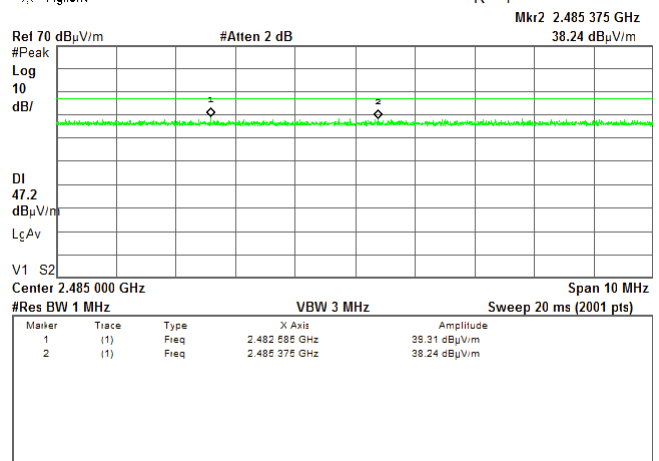
R T



OATS  
3 m  
Horizontal  
Typical (Vertical)  
CARRIER FREQUENCY: 1242 MHz

✱ Agilent

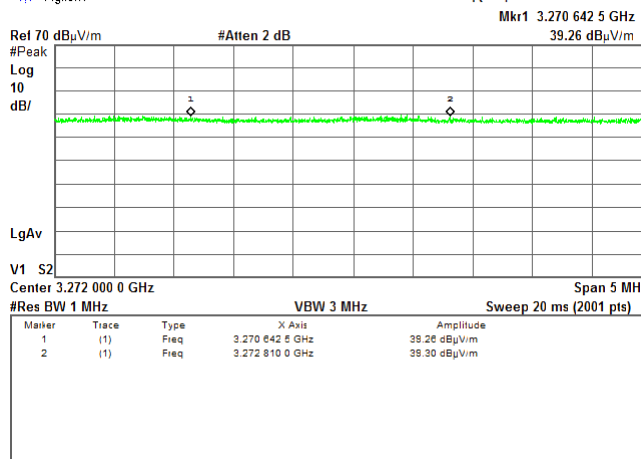
R T



CARRIER FREQUENCY: 1636 MHz

✱ Agilent

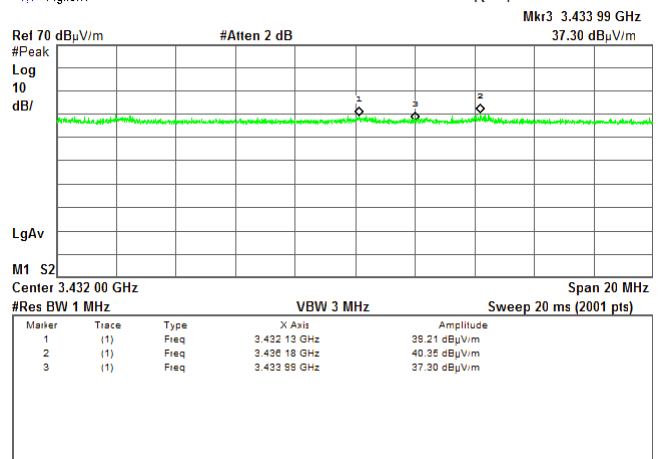
R T



CARRIER FREQUENCY: 1718 MHz

✱ Agilent

R T





HERMON LABORATORIES

Test specification: Section 15.209, Field strength of emissions			
Test procedure: ANSI C63.10, Sections 6.4, 6.5			
Test mode: Compliance		Verdict: PASS	
Date(s): 24-Aug-17- 27-Dec-17			
Temperature: 24.3 °C	Relative Humidity: 44 %	Air Pressure: 1006 hPa	Power: 120 VAC
Remarks:			

Plot 7.2.27 Radiated emission measurements at the third harmonic frequency

TEST SITE:

TEST DISTANCE:

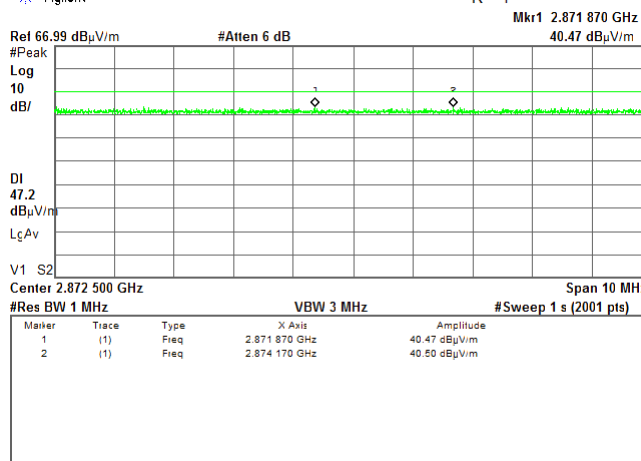
ANTENNA POLARIZATION:

EUT POSITION:

CARRIER FREQUENCY: 957 and 958 MHz

✱ Agilent

R T



OATS

3 m

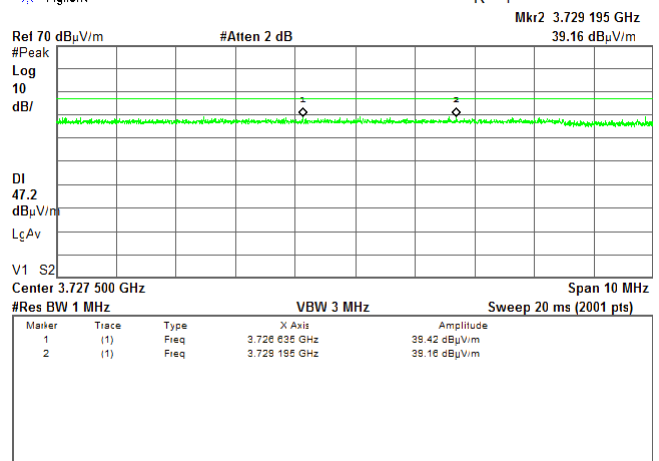
Vertical

Typical (Vertical)

CARRIER FREQUENCY: 1242 MHz

✱ Agilent

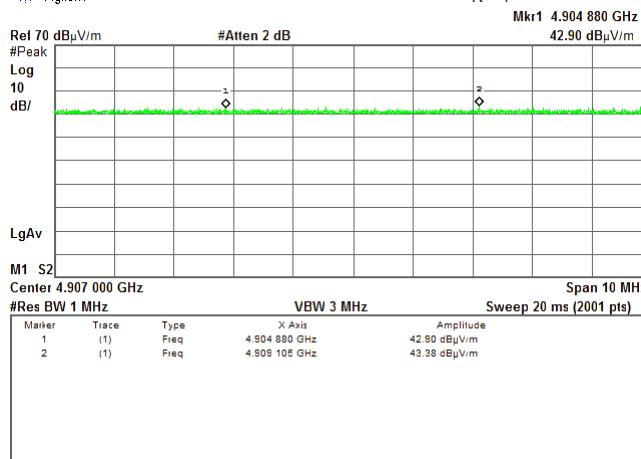
R T



CARRIER FREQUENCY: 1636 MHz

✱ Agilent

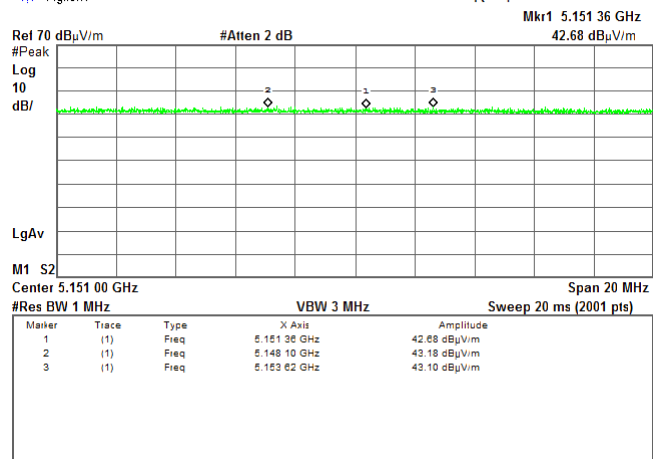
R T



CARRIER FREQUENCY: 1718 MHz

✱ Agilent

R T





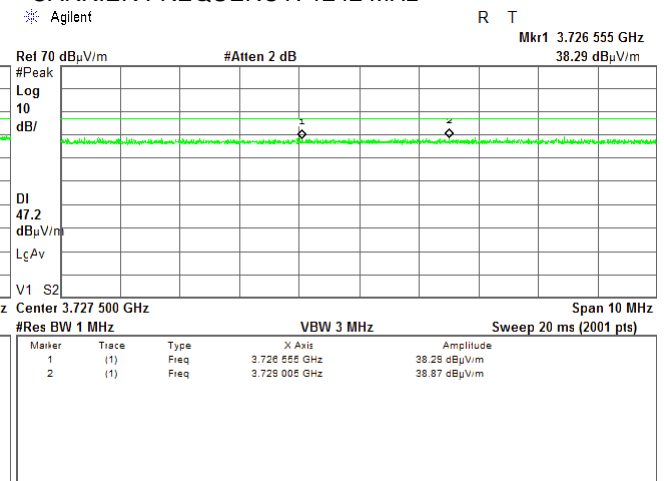
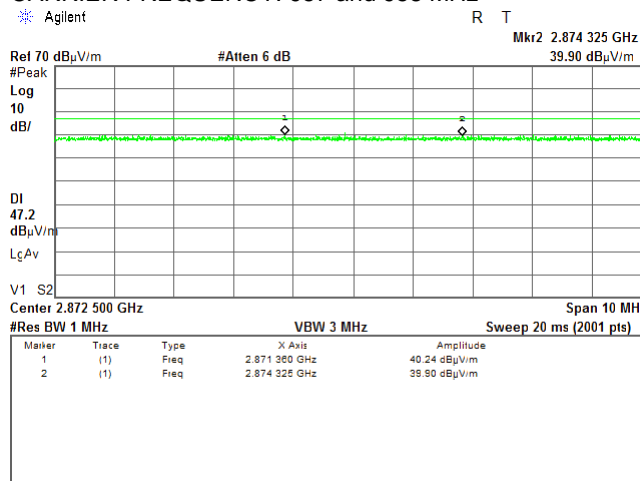
HERMON LABORATORIES

Test specification: Section 15.209, Field strength of emissions			
Test procedure: ANSI C63.10, Sections 6.4, 6.5			
Test mode: Compliance		Verdict: PASS	
Date(s): 24-Aug-17- 27-Dec-17			
Temperature: 24.3 °C	Relative Humidity: 44 %	Air Pressure: 1006 hPa	Power: 120 VAC
Remarks:			

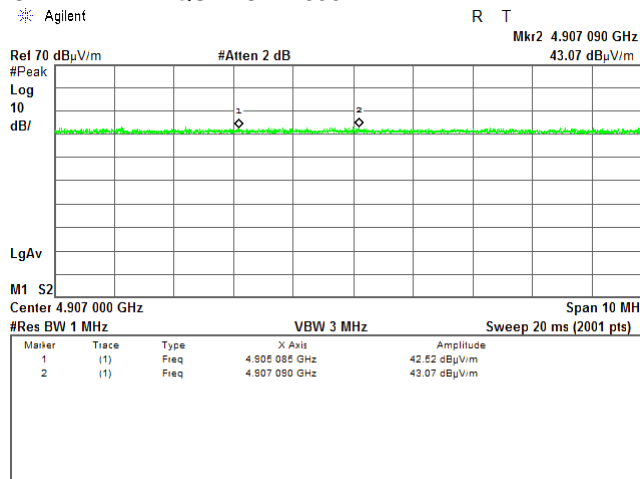
Plot 7.2.28 Radiated emission measurements at the third harmonic frequency

TEST SITE:  
TEST DISTANCE:  
ANTENNA POLARIZATION:  
EUT POSITION:  
CARRIER FREQUENCY: 957 and 958 MHz

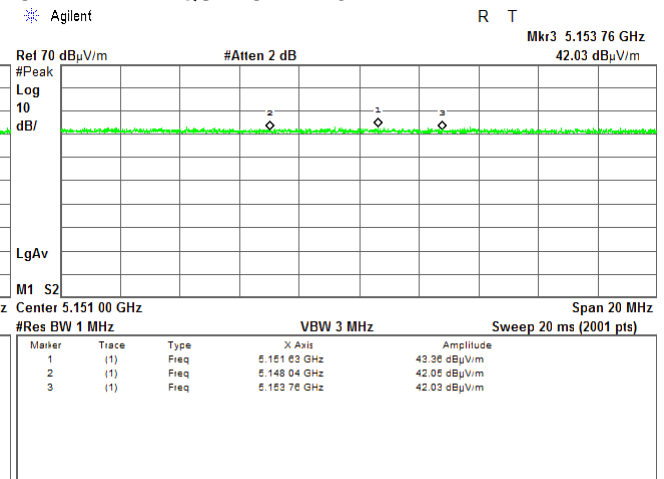
OATS  
3 m  
Horizontal  
Typical (Vertical)  
CARRIER FREQUENCY: 1242 MHz



CARRIER FREQUENCY: 1636 MHz



CARRIER FREQUENCY: 1718 MHz







HERMON LABORATORIES

<b>Test specification:</b> Section 15.209, Field strength of emissions			
<b>Test procedure:</b> ANSI C63.10, Sections 6.4, 6.5			
<b>Test mode:</b> Compliance		<b>Verdict:</b> PASS	
<b>Date(s):</b> 24-Aug-17- 27-Dec-17			
<b>Temperature:</b> 24.3 °C	<b>Relative Humidity:</b> 44 %	<b>Air Pressure:</b> 1006 hPa	<b>Power:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.2.29 Radiated emission measurements at the fourth harmonic frequency

TEST SITE:

TEST DISTANCE:

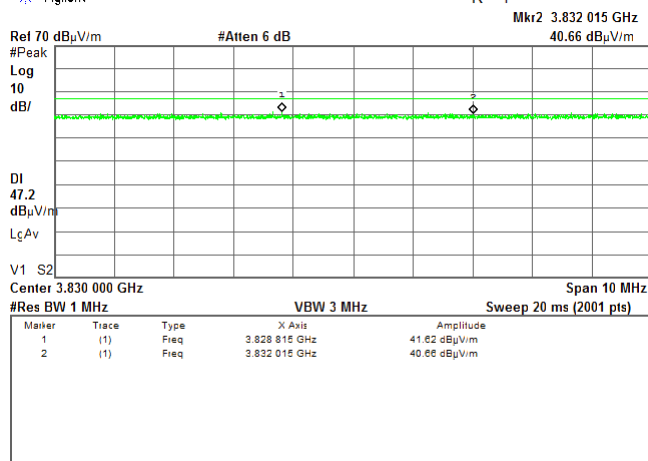
ANTENNA POLARIZATION:

EUT POSITION:

CARRIER FREQUENCY: 957 and 958 MHz

Agilent

R T



OATS

3 m

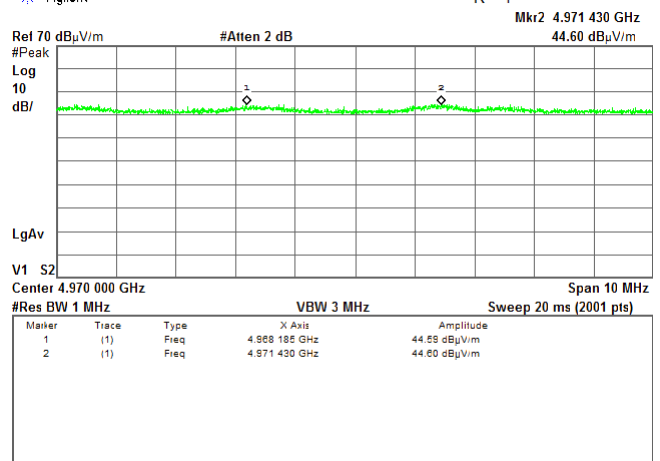
Vertical

Typical (Vertical)

CARRIER FREQUENCY: 1242 MHz

Agilent

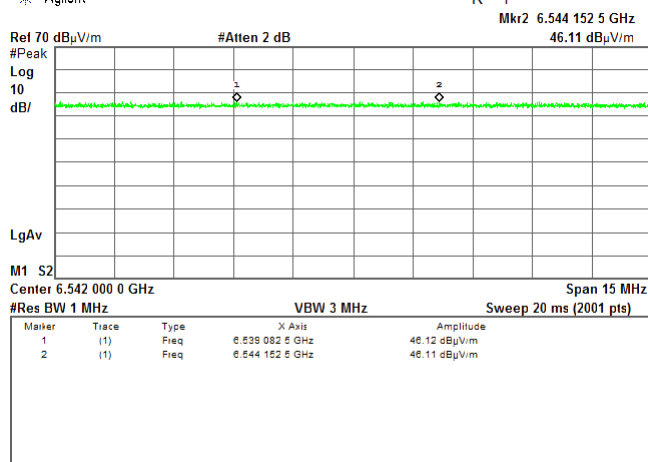
R T



CARRIER FREQUENCY: 1636 MHz

Agilent

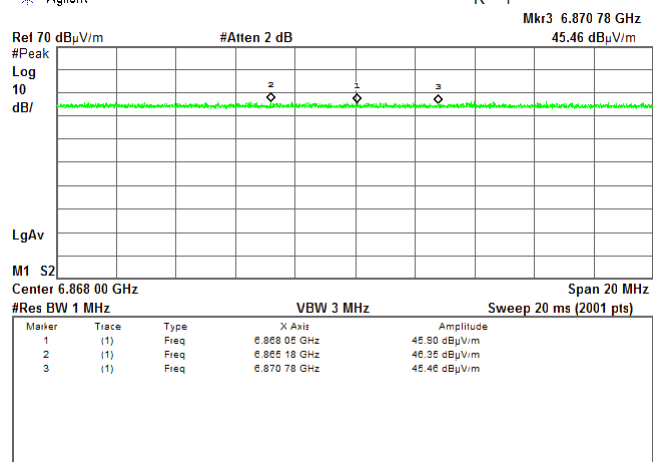
R T



CARRIER FREQUENCY: 1718 MHz

Agilent

R T





HERMON LABORATORIES

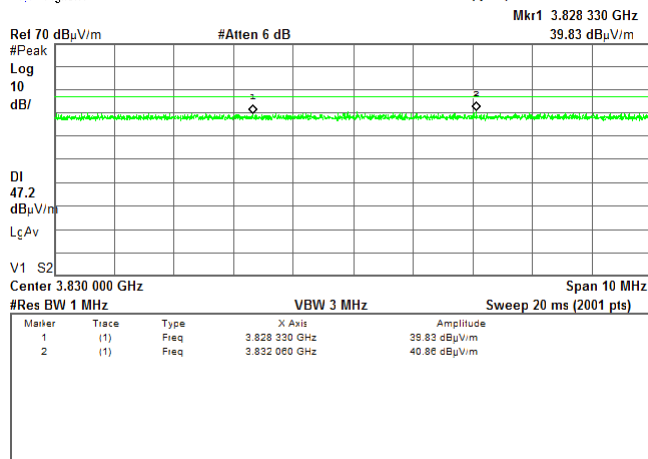
Test specification: Section 15.209, Field strength of emissions			
Test procedure: ANSI C63.10, Sections 6.4, 6.5			
Test mode: Compliance		Verdict: PASS	
Date(s): 24-Aug-17- 27-Dec-17			
Temperature: 24.3 °C	Relative Humidity: 44 %	Air Pressure: 1006 hPa	Power: 120 VAC
Remarks:			

### Plot 7.2.30 Radiated emission measurements at the fourth harmonic frequency

TEST SITE:  
TEST DISTANCE:  
ANTENNA POLARIZATION:  
EUT POSITION:  
CARRIER FREQUENCY: 957 and 958 MHz

✱ Agilent

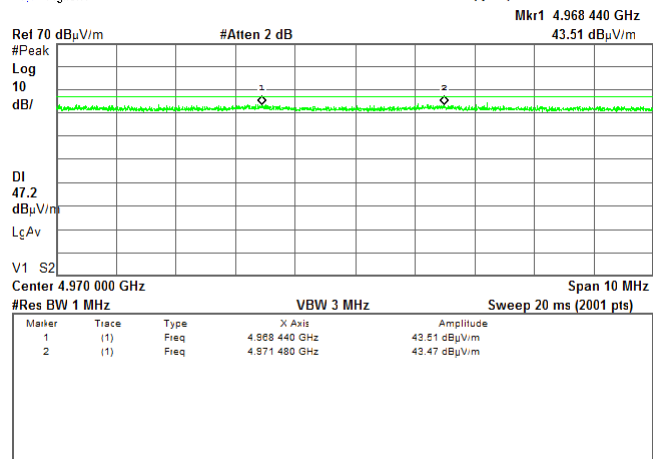
R T



OATS  
3 m  
Horizontal  
Typical (Vertical)  
CARRIER FREQUENCY: 1242 MHz

✱ Agilent

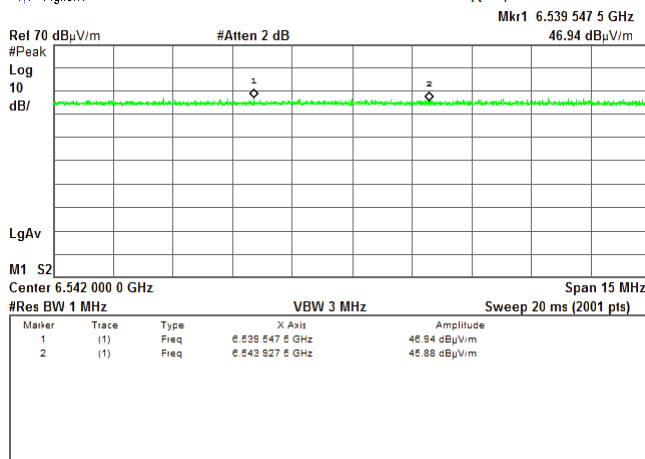
R T



CARRIER FREQUENCY: 1636 MHz

✱ Agilent

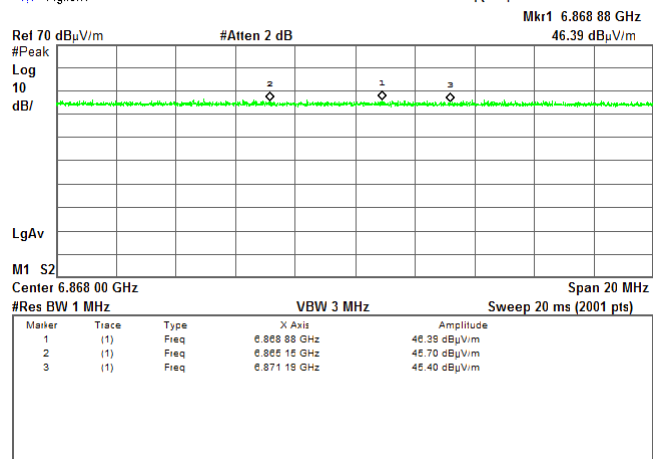
R T



CARRIER FREQUENCY: 1718 MHz

✱ Agilent

R T





HERMON LABORATORIES

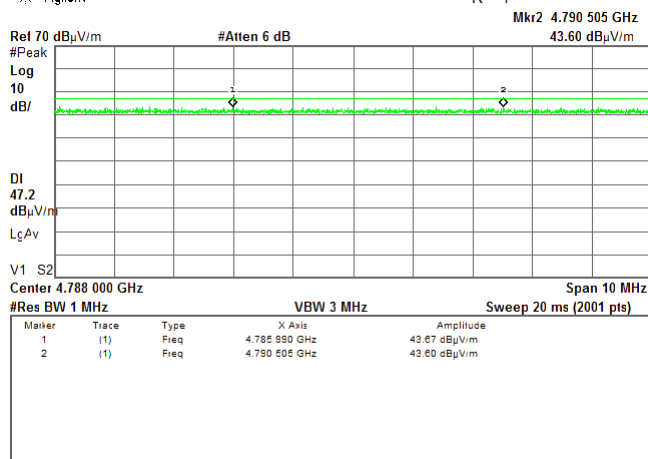
Test specification: Section 15.209, Field strength of emissions			
Test procedure: ANSI C63.10, Sections 6.4, 6.5			
Test mode: Compliance		Verdict: PASS	
Date(s): 24-Aug-17- 27-Dec-17			
Temperature: 24.3 °C	Relative Humidity: 44 %	Air Pressure: 1006 hPa	Power: 120 VAC
Remarks:			

Plot 7.2.31 Radiated emission measurements at the fifth harmonic frequency

TEST SITE:  
TEST DISTANCE:  
ANTENNA POLARIZATION:  
EUT POSITION:  
CARRIER FREQUENCY: 957 and 958 MHz

Agilent

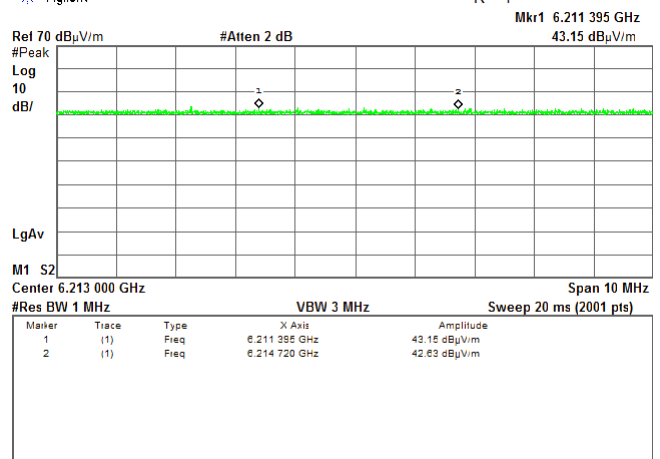
R T



OATS  
3 m  
Vertical  
Typical (Vertical)  
CARRIER FREQUENCY: 1242 MHz

Agilent

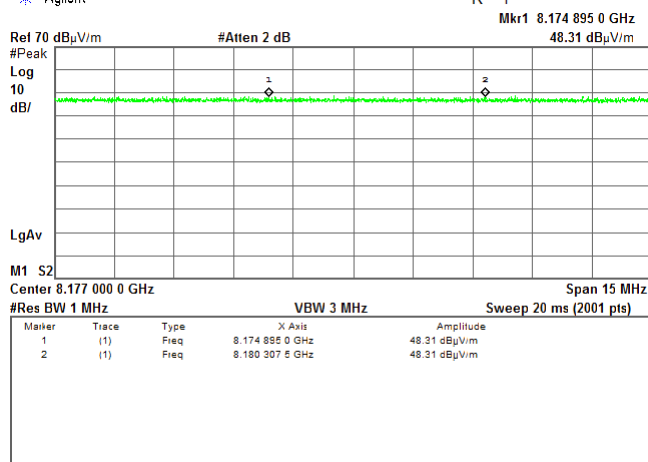
R T



CARRIER FREQUENCY: 1636 MHz

Agilent

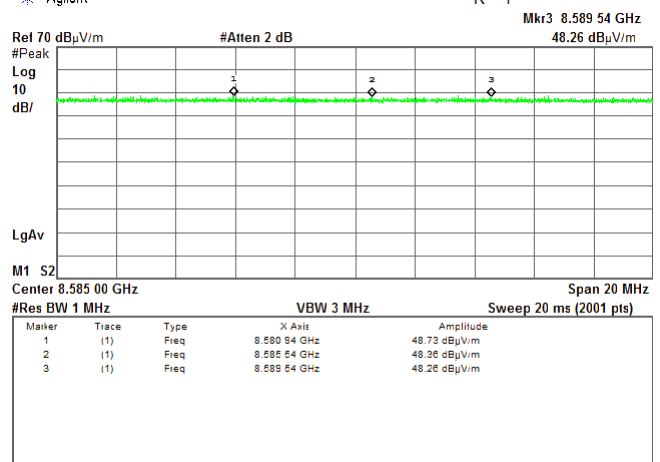
R T



CARRIER FREQUENCY: 1718 MHz

Agilent

R T





HERMON LABORATORIES

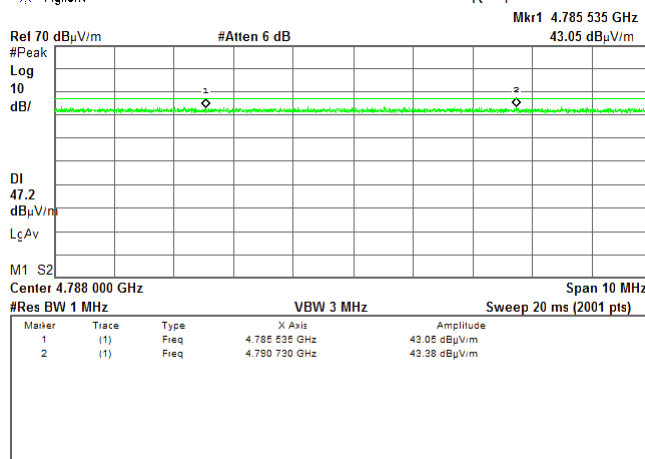
<b>Test specification: Section 15.209, Field strength of emissions</b>			
<b>Test procedure:</b> ANSI C63.10, Sections 6.4, 6.5			
<b>Test mode:</b> Compliance		<b>Verdict:</b> PASS	
<b>Date(s):</b> 24-Aug-17- 27-Dec-17			
<b>Temperature:</b> 24.3 °C	<b>Relative Humidity:</b> 44 %	<b>Air Pressure:</b> 1006 hPa	<b>Power:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.2.32 Radiated emission measurements at the fifth harmonic frequency

TEST SITE:  
TEST DISTANCE:  
ANTENNA POLARIZATION:  
EUT POSITION:  
CARRIER FREQUENCY: 957 and 958 MHz

Agilent

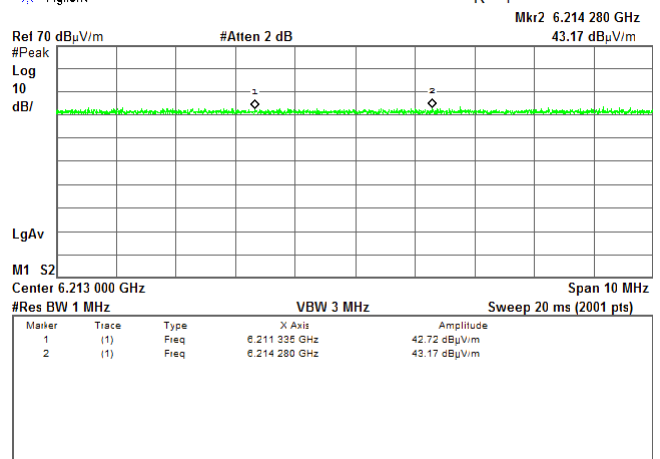
R T



OATS  
3 m  
Horizontal  
Typical (Vertical)  
CARRIER FREQUENCY: 1242 MHz

Agilent

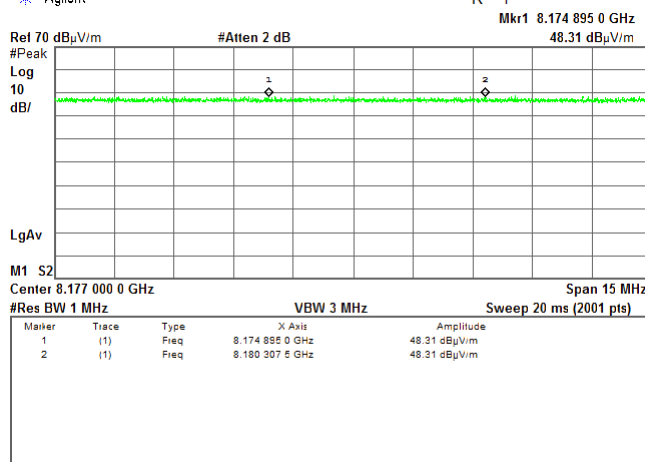
R T



CARRIER FREQUENCY: 1636 MHz

Agilent

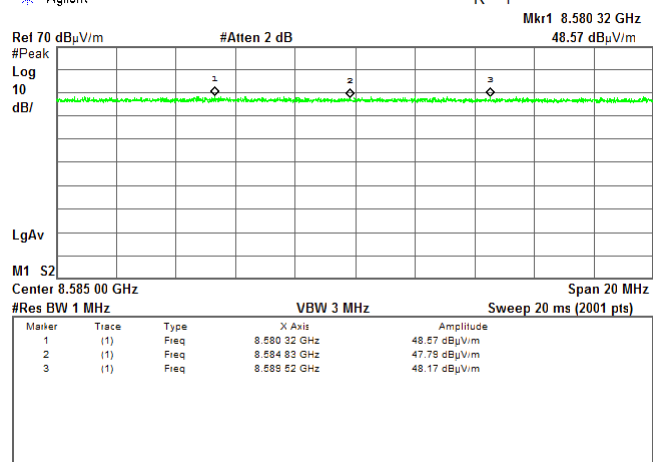
R T



CARRIER FREQUENCY: 1718 MHz

Agilent

R T





HERMON LABORATORIES

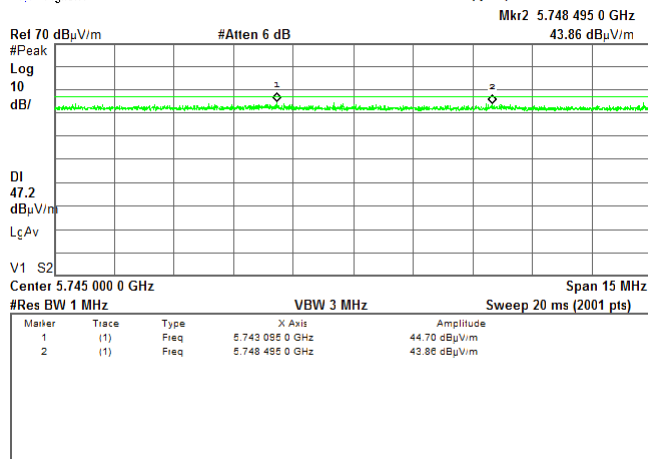
Test specification: Section 15.209, Field strength of emissions			
Test procedure: ANSI C63.10, Sections 6.4, 6.5			
Test mode: Compliance		Verdict: PASS	
Date(s): 24-Aug-17- 27-Dec-17			
Temperature: 24.3 °C	Relative Humidity: 44 %	Air Pressure: 1006 hPa	Power: 120 VAC
Remarks:			

Plot 7.2.33 Radiated emission measurements at the sixth harmonic frequency

TEST SITE:  
TEST DISTANCE:  
ANTENNA POLARIZATION:  
EUT POSITION:  
CARRIER FREQUENCY: 957 and 958 MHz

✱ Agilent

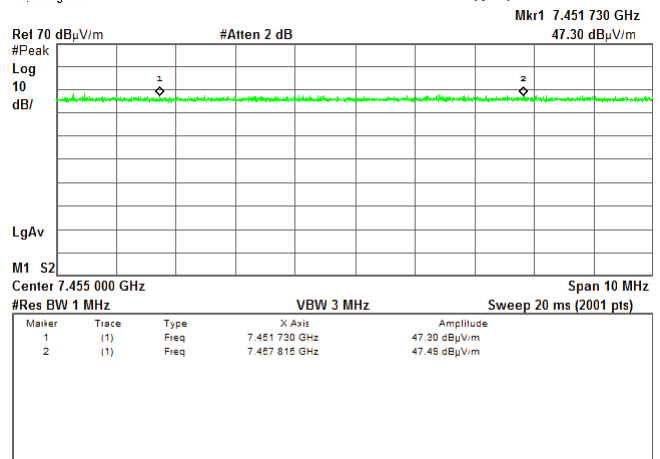
R T



OATS  
3 m  
Vertical  
Typical (Vertical)  
CARRIER FREQUENCY: 1242 MHz

✱ Agilent

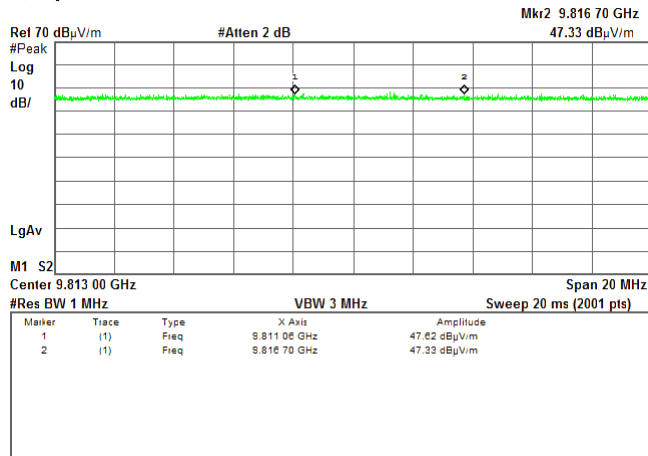
R T



CARRIER FREQUENCY: 1636 MHz

✱ Agilent

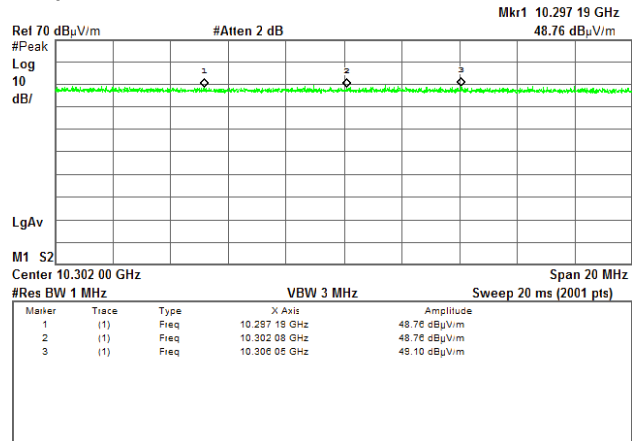
R T



CARRIER FREQUENCY: 1718 MHz

✱ Agilent

R T





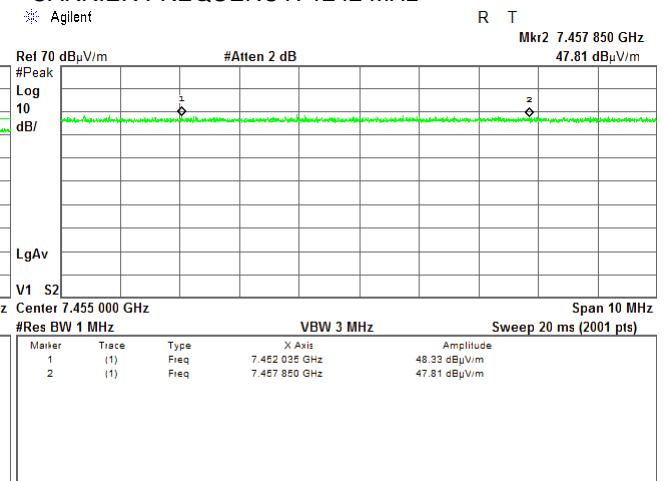
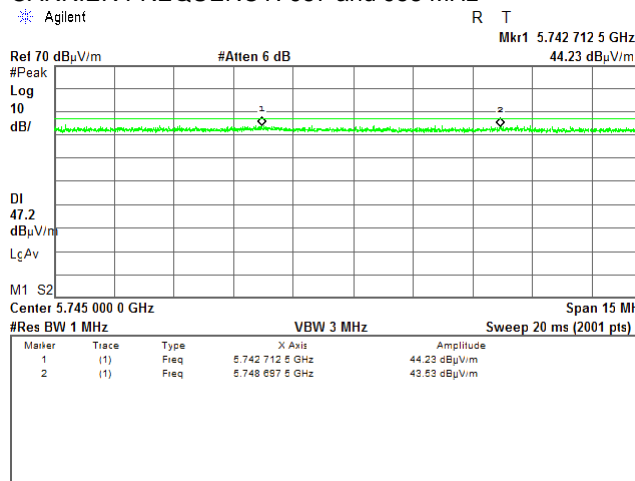
HERMON LABORATORIES

Test specification:		Section 15.209, Field strength of emissions	
Test procedure:		ANSI C63.10, Sections 6.4, 6.5	
Test mode:		Verdict: PASS	
Date(s):			
24-Aug-17- 27-Dec-17			
Temperature: 24.3 °C	Relative Humidity: 44 %	Air Pressure: 1006 hPa	Power: 120 VAC
Remarks:			

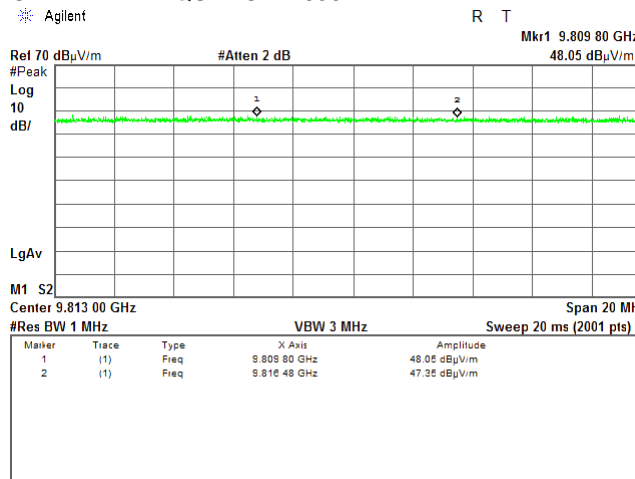
Plot 7.2.34 Radiated emission measurements at the sixth harmonic frequency

TEST SITE:  
TEST DISTANCE:  
ANTENNA POLARIZATION:  
EUT POSITION:  
CARRIER FREQUENCY: 957 and 958 MHz

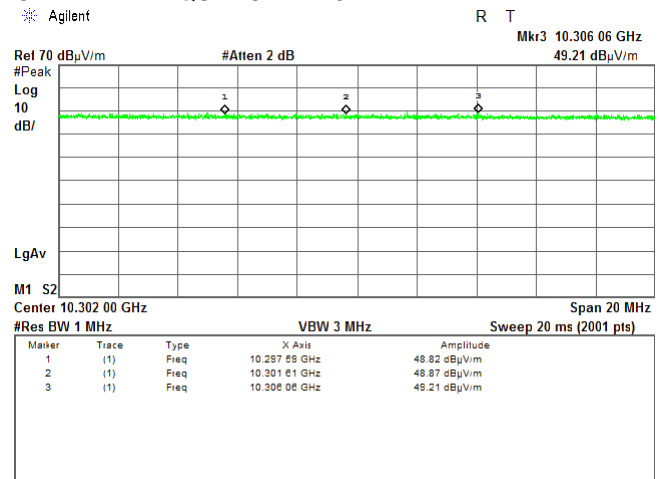
OATS  
3 m  
Horizontal  
Typical (Vertical)  
CARRIER FREQUENCY: 1242 MHz



CARRIER FREQUENCY: 1636 MHz



CARRIER FREQUENCY: 1718 MHz





HERMON LABORATORIES

<b>Test specification: Section 15.209, Field strength of emissions</b>			
<b>Test procedure:</b> ANSI C63.10, Sections 6.4, 6.5			
<b>Test mode:</b> Compliance		<b>Verdict:</b> PASS	
<b>Date(s):</b> 24-Aug-17- 27-Dec-17			
<b>Temperature:</b> 24.3 °C	<b>Relative Humidity:</b> 44 %	<b>Air Pressure:</b> 1006 hPa	<b>Power:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.2.35 Radiated emission measurements at the seventh harmonic frequency

TEST SITE:

TEST DISTANCE:

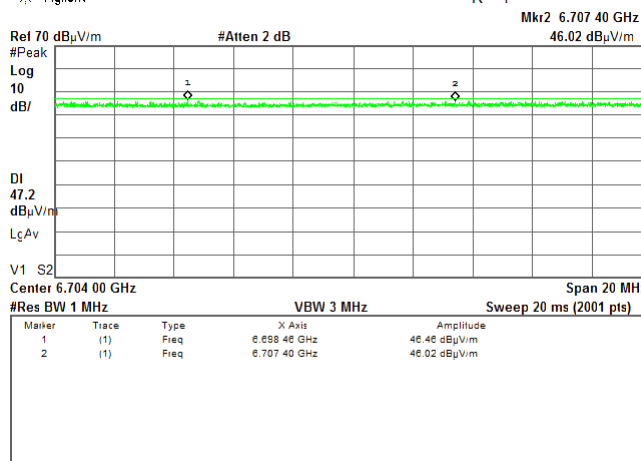
ANTENNA POLARIZATION:

EUT POSITION:

CARRIER FREQUENCY: 957 and 958 MHz

✱ Agilent

R T



OATS

3 m

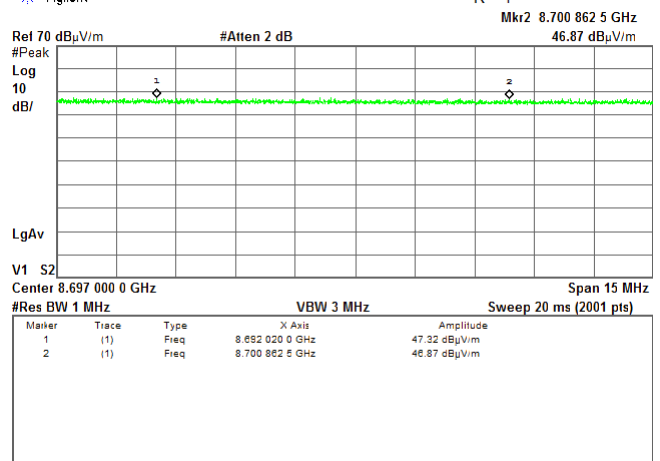
Vertical

Typical (Vertical)

CARRIER FREQUENCY: 1242 MHz

✱ Agilent

R T



Plot 7.2.36 Radiated emission measurements at the seventh harmonic frequency

TEST SITE:

TEST DISTANCE:

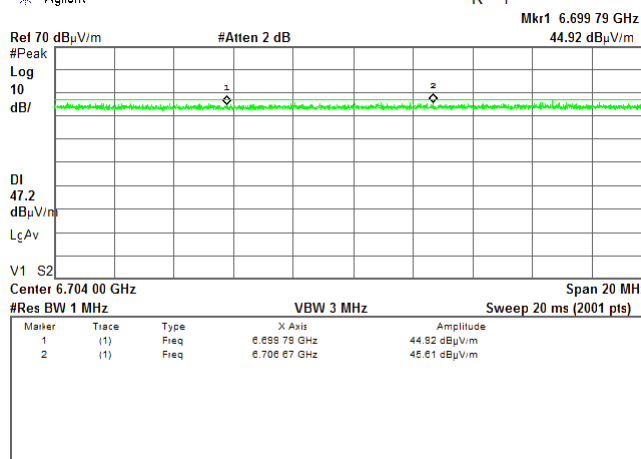
ANTENNA POLARIZATION:

EUT POSITION:

CARRIER FREQUENCY: 957 and 958 MHz

✱ Agilent

R T



OATS

3 m

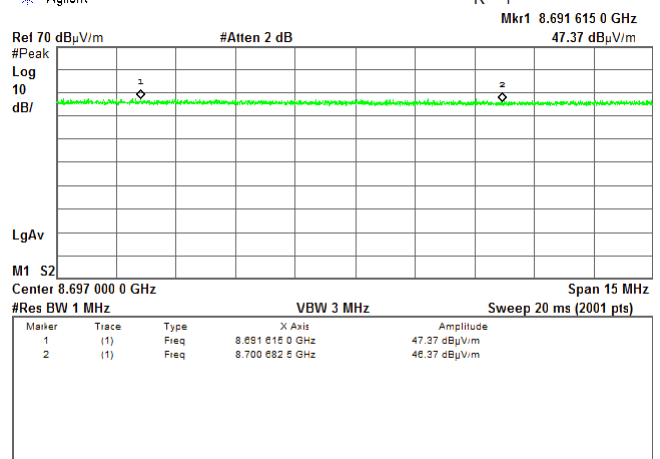
Horizontal

Typical (Vertical)

CARRIER FREQUENCY: 1242 MHz

✱ Agilent

R T





HERMON LABORATORIES

<b>Test specification:</b> Section 15.209, Field strength of emissions			
<b>Test procedure:</b> ANSI C63.10, Sections 6.4, 6.5			
<b>Test mode:</b> Compliance		<b>Verdict:</b> PASS	
<b>Date(s):</b> 24-Aug-17- 27-Dec-17			
<b>Temperature:</b> 24.3 °C	<b>Relative Humidity:</b> 44 %	<b>Air Pressure:</b> 1006 hPa	<b>Power:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.2.37 Radiated emission measurements at the eighth harmonic frequency

TEST SITE:

TEST DISTANCE:

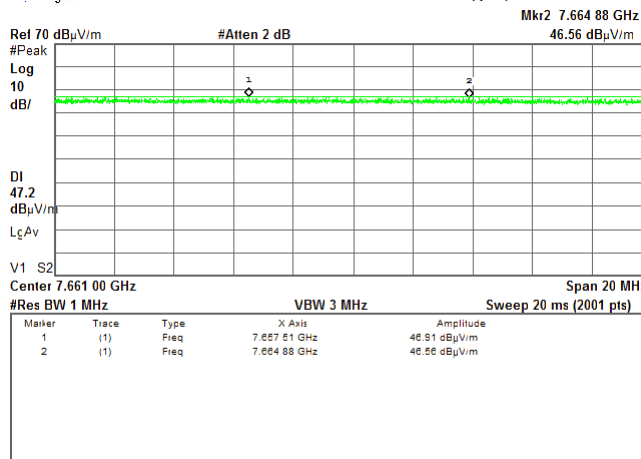
ANTENNA POLARIZATION:

EUT POSITION:

CARRIER FREQUENCY: 957 and 958 MHz

\* Agilent

R T



OATS

3 m

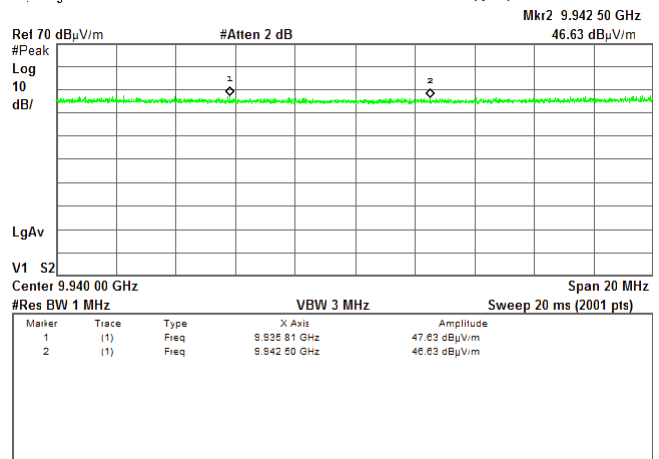
Vertical

Typical (Vertical)

CARRIER FREQUENCY: 1242 MHz

\* Agilent

R T



Plot 7.2.38 Radiated emission measurements at the eighth harmonic frequency

TEST SITE:

TEST DISTANCE:

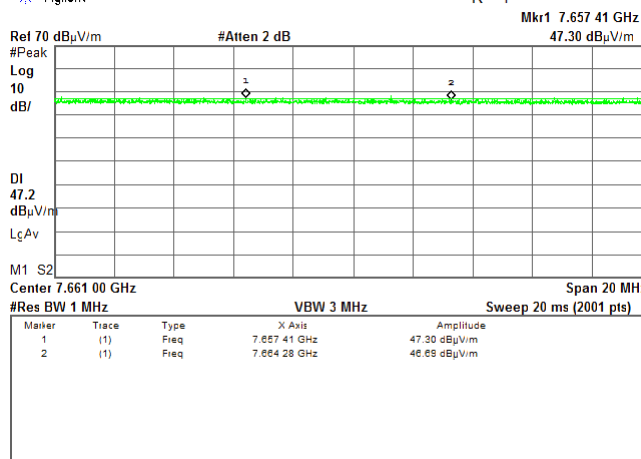
ANTENNA POLARIZATION:

EUT POSITION:

CARRIER FREQUENCY: 957 and 958 MHz

\* Agilent

R T



OATS

3 m

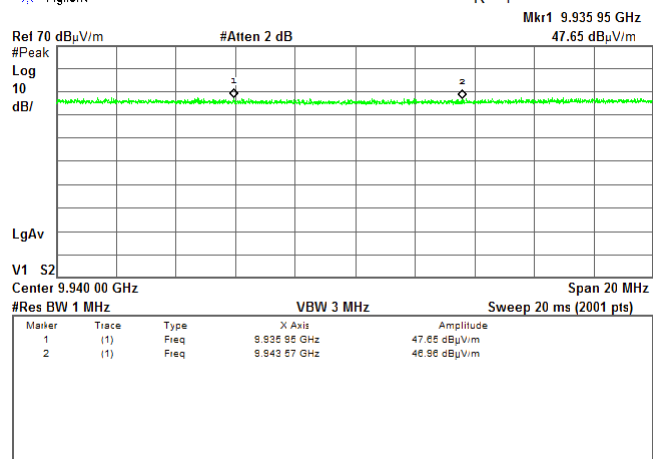
Horizontal

Typical (Vertical)

CARRIER FREQUENCY: 1242 MHz

\* Agilent

R T







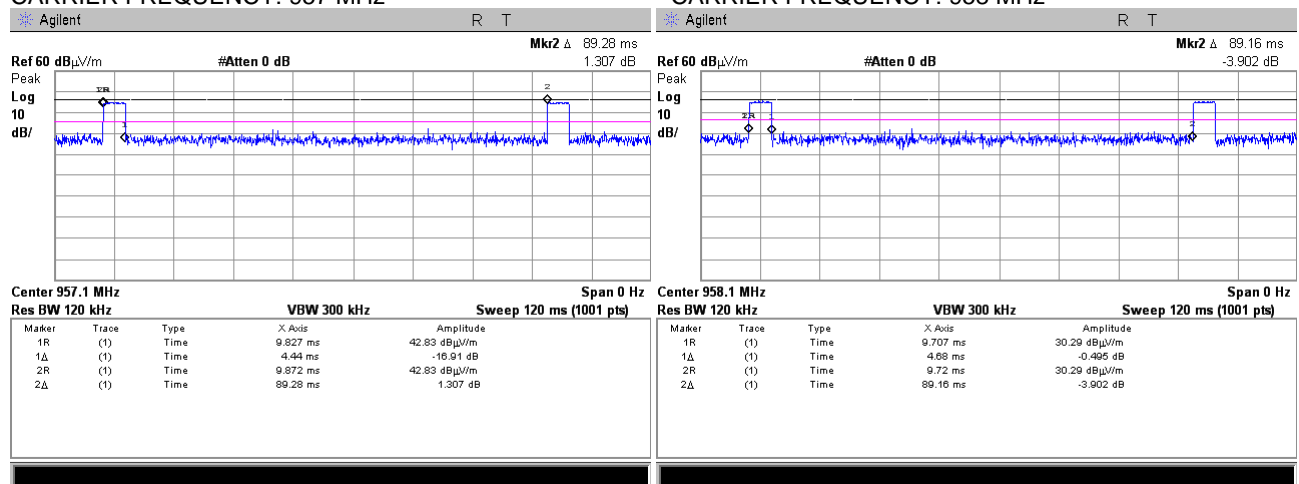
HERMON LABORATORIES

Test specification: Section 15.209, Field strength of emissions			
Test procedure: ANSI C63.10, Sections 6.4, 6.5			
Test mode: Compliance		Verdict: PASS	
Date(s): 24-Aug-17- 27-Dec-17			
Temperature: 24.3 °C	Relative Humidity: 44 %	Air Pressure: 1006 hPa	Power: 120 VAC
Remarks:			

Plot 7.2.39 Transmission pulse duration and pulse period

TEST SITE:  
TEST DISTANCE:  
ANTENNA POLARIZATION:  
EUT POSITION:  
CARRIER FREQUENCY: 957 MHz

OATS  
3 m  
Vertical  
Typical (Vertical)  
CARRIER FREQUENCY: 958 MHz

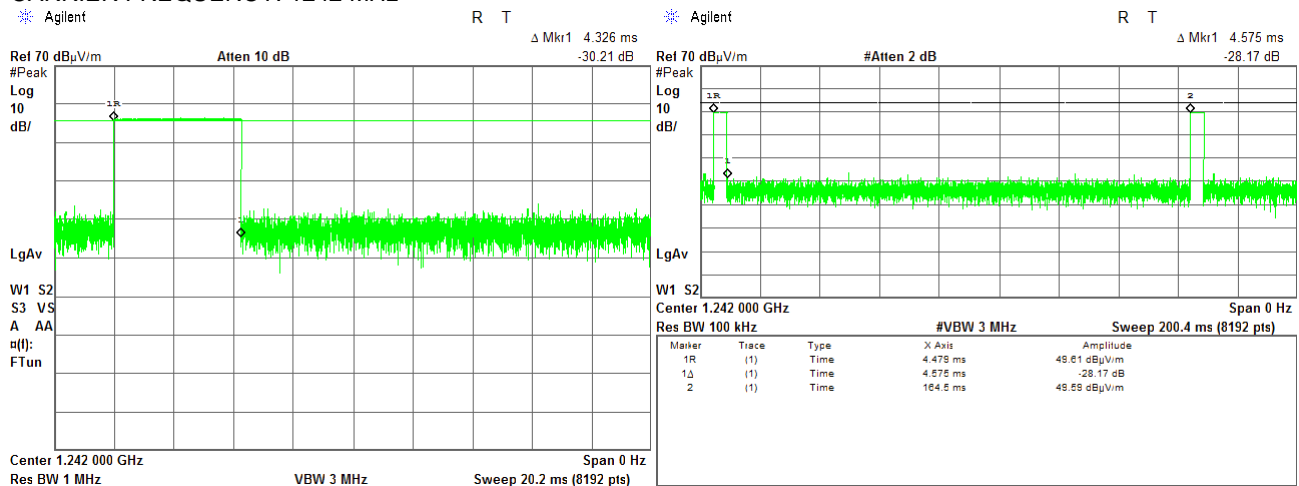


Plot 7.2.40 Transmission pulse duration and pulse period

TEST SITE:  
TEST DISTANCE:  
ANTENNA POLARIZATION:  
EUT POSITION:

OATS  
3 m  
Vertical  
Typical (Vertical)

CARRIER FREQUENCY: 1242 MHz

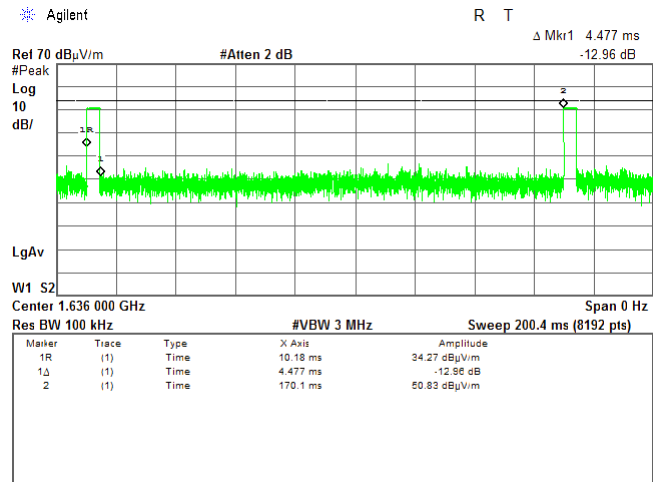
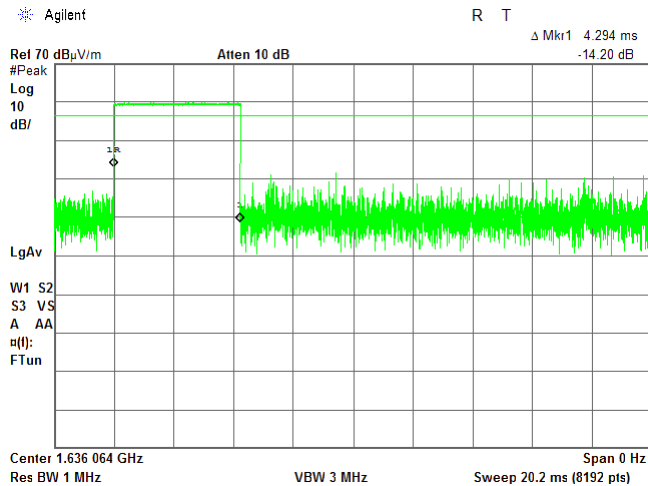




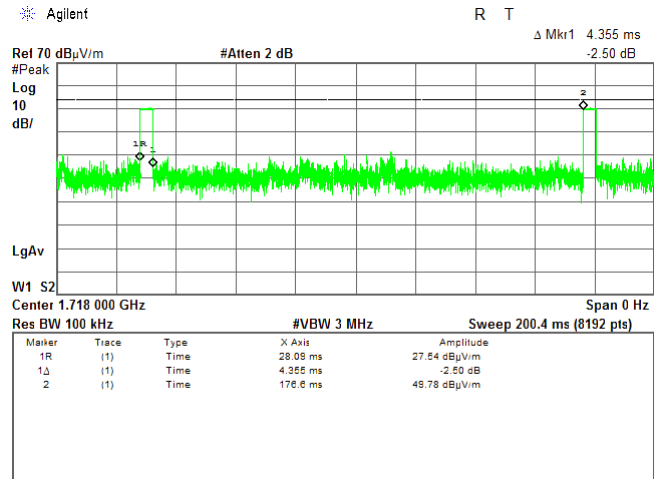
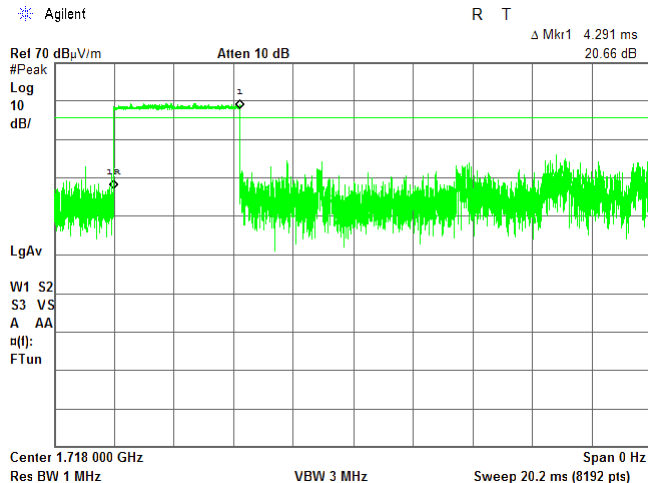
HERMON LABORATORIES

Test specification: Section 15.209, Field strength of emissions			
Test procedure: ANSI C63.10, Sections 6.4, 6.5			
Test mode: Compliance		Verdict: PASS	
Date(s): 24-Aug-17- 27-Dec-17			
Temperature: 24.3 °C	Relative Humidity: 44 %	Air Pressure: 1006 hPa	Power: 120 VAC
Remarks:			

CARRIER FREQUENCY: 1636 MHz



CARRIER FREQUENCY: 1718 MHz





<b>Test specification:</b> Section 15.203, Antenna requirements			
<b>Test procedure:</b> Visual inspection/supplier declaration			
<b>Test mode:</b> Compliance		<b>Verdict:</b> PASS	
<b>Date(s):</b> 05-Sep-17			
<b>Temperature:</b> 24 °C	<b>Relative Humidity:</b> 46 %	<b>Air Pressure:</b> 1006 hPa	<b>Power:</b> 120 VAC
<b>Remarks:</b>			

### 7.3 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 7.3.1.

**Table 7.3.1 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	

## 8 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./ Check	Due Cal./ Check
0446	Antenna, Loop, Active, 10 kHz - 30 MHz	EMCO	6502	2857	19-Jan-17	19-Jan-18
0447	LISN, 16/2, 300V RMS, 50 Ohm/50 uH + 5 Ohm, STD CISPR 16-1	Hermon Laboratories	LISN 16 - 1	066	08-Nov-17	08-Nov-18
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A 00319, 3448A002 53	31-Oct-17	31-Oct-18
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	12-May-17	12-May-18
0787	Transient Limiter 9 kHz-200 MHz	Hewlett Packard	11947A	3107A018 77	24-Oct-17	24-Oct-18
0813	Cable Coax, 12 m, N-type, up to 3.0 GHz	Hermon Laboratories	C214-12	149	18-Dec-16	18-Dec-17
1552	Cable RF, 8 m	Alpha Wire	RG-214	1552	18-Dec-16	18-Dec-17
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY414447 62	09-Mar-17	09-Mar-18
3615	Cable RF, 6.5 m, N type-N type, DC-6 GHz	Suhner Switzerland	RG 214/U	NA	04-Jun-17	04-Jun-18
3818	PSA Series Spectrum Analyzer, 3 Hz- 44 GHz	Agilent Technologies	E4446A	MY482502 88	07-May-17	07-May-18
3837	Load Termination 50 Ohm, 0.5 W, DC-1GHz	RELM	RELM	NA	06-Nov-17	06-Nov-18
3901	Microwave Cable Assembly, 40.0 GHz, 3.5 m, SMA/SMA	Huber-Suhner	SUCOFLE X 102A	1225/2A	20-Feb-17	20-Feb-18
4277	Test Cable , DC-18 GHz, 3.05 m, N/M - N/M	Mini-Circuits	APC-10FT-NMNM+	0748A	10-Sep-17	10-Sep-18
4778	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1431, HL4777	Hewlett Packard	8542E	30807A00 262, 3427A001 23	02-Nov-17	02-Nov-18
4933	Active Horn Antenna, 1 GHz to 18 GHz	Com-Power Corporation	AHA-118	701046	14-Nov -17	14-Nov-18

## 9 APPENDIX B Measurement uncertainties

### Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

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

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.

## 10 APPENDIX C

### Test facility 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 1, 2, 15, 18 parts of Code of Federal Regulations 47 (CFR 47), Test Firm Registration Number is 927748, Designation Number is IL1001; registered by Industry Canada for electromagnetic emissions, file number IC 2186A-1 for OATS, certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, G-869 for RE measurements above 1 GHz, C-845 for conducted emissions site and T-1606 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).

Address:

Telephone:

Fax:

e-mail:

website:

P.O. Box 23, Binyamina 3055001, Israel.

+972 4628 8001

+972 4628 8277

mail@hermonlabs.com

www.hermonlabs.com

Person for contact: Mr. Michael Nikishin, EMC&Radio group manager

## 11 APPENDIX D

### Specification references

FCC 47CFR part 15: 2016

Radio Frequency Devices

ANSI C63.10: 2013

American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

ANSI C63.2: 1996

American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications

## 12 APPENDIX E

## Test equipment correction factors

**Correction factor**  
**Line impedance stabilization network**  
**Model LISN 16 - 1**  
**Hermon Laboratories, HL 0447**

Frequency, kHz	L1, dB	L2, dB
150	0.11	0.09
170	0.10	0.08
200	0.09	0.07
250	0.08	0.07
300	0.07	0.06
350	0.07	0.06
400	0.08	0.05
500	0.07	0.05
600	0.07	0.05
700	0.06	0.06
800	0.07	0.05
900	0.07	0.05
1000	0.07	0.05
1200	0.08	0.05
1500	0.08	0.06
2000	0.08	0.06
2500	0.08	0.06
3000	0.09	0.07
4000	0.09	0.06
5000	0.10	0.08
7000	0.11	0.09
10000	0.14	0.12
15000	0.19	0.17
20000	0.26	0.24
30000	0.45	0.45

The correction factor in dB is to be added to meter readings of an interference analyzer or a spectrum analyzer.

**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( $\mu$ V) to convert it into field strength in dB( $\mu$ V/m).



**Antenna factor**  
**Biconilog antenna EMCO Model 3141**  
**Ser.No.1011, HL 0604**

Frequency, MHz	Antenna factor, dB(1/m)	Frequency, MHz	Antenna factor, dB(1/m)	Frequency, MHz	Antenna factor, dB(1/m)
26	7.8	580	20.6	1320	27.8
28	7.8	600	21.3	1340	28.3
30	7.8	620	21.5	1360	28.2
40	7.2	640	21.2	1380	27.9
60	7.1	660	21.4	1400	27.9
70	8.5	680	21.9	1420	27.9
80	9.4	700	22.2	1440	27.8
90	9.8	720	22.2	1460	27.8
100	9.7	740	22.1	1480	28.0
110	9.3	760	22.3	1500	28.5
120	8.8	780	22.6	1520	28.9
130	8.7	800	22.7	1540	29.6
140	9.2	820	22.9	1560	29.8
150	9.8	840	23.1	1580	29.6
160	10.2	860	23.4	1600	29.5
170	10.4	880	23.8	1620	29.3
180	10.4	900	24.1	1640	29.2
190	10.3	920	24.1	1660	29.4
200	10.6	940	24.0	1680	29.6
220	11.6	960	24.1	1700	29.8
240	12.4	980	24.5	1720	30.3
260	12.8	1000	24.9	1740	30.8
280	13.7	1020	25.0	1760	31.1
300	14.7	1040	25.2	1780	31.0
320	15.2	1060	25.4	1800	30.9
340	15.4	1080	25.6	1820	30.7
360	16.1	1100	25.7	1840	30.6
380	16.4	1120	26.0	1860	30.6
400	16.6	1140	26.4	1880	30.6
420	16.7	1160	27.0	1900	30.6
440	17.0	1180	27.0	1920	30.7
460	17.7	1200	26.7	1940	30.9
480	18.1	1220	26.5	1960	31.2
500	18.5	1240	26.5	1980	31.6
520	19.1	1260	26.5	2000	32.0
540	19.5	1280	26.6		
560	19.8	1300	27.0		

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



HERMON LABORATORIES

Antenna factor, HL 4933

**Active Horn Antenna Factor Calibration**

1 GHz to 18 GHz

<b>Equipment:</b>			<b>ACTIVE HORN ANTENNA</b>		
<b>Model:</b>			<b>AHA-118</b>		
<b>Serial Number:</b>			<b>701046</b>		
<b>Calibration Distance:</b>			<b>3 Meter</b>		
<b>Polarization:</b>			<b>Horizontal</b>		
<b>Calibration Date:</b>			<b>11/12/2014</b>		
Frequency (GHz)	Preamplifier Gain (dB)	Antenna Factor with pre-amp (dB/m)	Frequency (GHz)	Preamplifier Gain (dB)	Antenna Factor with pre-amp (dB/m)
1	40.96	-16.47	10	40.94	-1.97
1.5	41.21	-14.53	10.5	40.63	-1.06
2	41.44	-13.30	11	40.74	-1.50
2.5	41.71	-12.87	11.5	40.65	-0.52
3	41.96	-12.26	12	40.76	-0.15
3.5	42.14	-11.77	12.5	41.03	-0.85
4	42.13	-10.91	13	41.37	-0.81
4.5	41.79	-9.41	13.5	41.18	0.05
5	41.44	-7.54	14	40.98	0.36
5.5	40.91	-6.47	14.5	40.81	1.26
6	40.69	-5.48	15	40.65	0.25
6.5	40.64	-5.53	15.5	40.93	-1.05
7	40.76	-4.12	16	41.31	-1.44
7.5	40.94	-3.12	16.5	40.96	-0.80
8	40.68	-1.69	17	40.64	-0.02
8.5	40.08	-1.71	17.5	40.57	1.81
9	40.41	-1.86	18	40.08	3.63
9.5	41.21	-2.73			
Calibration according to ARP 958					
<b>Antenna Factor to be added to receiver reading:</b>					
Meter Reading (dBuV) + Antenna Factor (dB/m) = Corrected Reading (dBuV/m)					



**Cable loss**  
**Cable coax, RG-214, 12 m, s/n 149, HL 0813**

No.	Frequency, MHz	Cable loss, dB	Measured uncertainty, dB
1	10	0.27	±0.12
2	30	0.51	±0.12
3	50	0.70	±0.12
4	100	1.05	±0.12
5	150	1.30	±0.13
6	200	1.52	±0.13
7	250	1.71	±0.13
8	300	1.91	±0.13
9	400	2.27	±0.13
10	500	2.56	±0.13
11	600	2.85	±0.14
12	700	3.11	±0.14
13	800	3.37	±0.14
14	900	3.64	±0.14
15	1000	3.90	±0.14

**Cable loss**  
**Cable coaxial, RG-214/U, N type-N type, 6.5 m**  
**Suhner Switzerland, HL 3615**

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.13	1750	2.47	3550	4.10	5350	5.76
30	0.24	1800	2.53	3600	4.17	5400	5.84
50	0.31	1850	2.59	3650	4.21	5450	5.88
100	0.47	1900	2.61	3700	4.23	5500	5.90
150	0.58	1950	2.66	3750	4.33	5550	5.96
200	0.68	2000	2.74	3800	4.36	5600	6.02
250	0.77	2050	2.76	3850	4.38	5650	6.02
300	0.86	2100	2.80	3900	4.46	5700	6.09
350	0.94	2150	2.84	3950	4.52	5750	6.14
400	1.01	2200	2.89	4000	4.48	5800	6.15
450	1.08	2250	2.94	4050	4.52	5850	6.22
500	1.16	2300	2.98	4100	4.64	5900	6.29
550	1.21	2350	3.03	4150	4.62	5950	6.32
600	1.28	2400	3.07	4200	4.69	6000	6.39
650	1.35	2450	3.11	4250	4.75	6050	6.40
700	1.41	2500	3.15	4300	4.79	6100	6.48
750	1.48	2550	3.21	4350	4.83	6150	6.57
800	1.54	2600	3.25	4400	4.90	6200	6.62
850	1.58	2650	3.29	4450	4.95	6250	6.68
900	1.65	2700	3.33	4500	4.98	6300	6.74
950	1.67	2750	3.39	4550	5.04	6350	6.79
1000	1.74	2800	3.45	4600	5.08	6400	6.82
1050	1.79	2850	3.48	4650	5.12	6450	6.83
1100	1.84	2900	3.51	4700	5.15	6500	6.91
1150	1.91	2950	3.58	4750	5.22		
1200	1.94	3000	3.62	4800	5.26		
1250	1.99	3050	3.65	4850	5.29		
1300	2.06	3100	3.69	4900	5.33		
1350	2.11	3150	3.75	4950	5.36		
1400	2.16	3200	3.77	5000	5.38		
1450	2.21	3250	3.80	5050	5.46		
1500	2.25	3300	3.85	5100	5.49		
1550	2.30	3350	3.90	5150	5.56		
1600	2.35	3400	3.94	5200	5.58		
1650	2.38	3450	4.00	5250	5.64		
1700	2.42	3500	4.03	5300	5.69		

**Cable loss**  
**Microwave Cable Assembly, Huber-Suhner, 40 GHz, 3.5 m, SMA-SMA, S/N 1225/2A**  
**HL 3901**

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.09	9500	4.29	21000	6.67
100	0.41	10000	4.40	22000	6.92
500	0.93	10500	4.52	23000	7.00
1000	1.33	11000	4.64	24000	7.18
1500	1.63	11500	4.76	25000	7.29
2000	1.90	12000	4.87	26000	7.55
2500	2.12	12500	4.99	27000	7.70
3000	2.33	13000	5.11	28000	7.88
3500	2.50	13500	5.20	29000	8.02
4000	2.67	14000	5.31	30000	8.15
4500	2.82	14500	5.42	31000	8.35
5000	2.99	15000	5.51	32000	8.40
5500	3.16	15500	5.58	33000	8.62
6000	3.32	16000	5.68	34000	8.73
6500	3.51	16500	5.78	35000	8.78
7000	3.65	17000	5.91	36000	8.94
7500	3.79	17500	5.99	37000	9.21
8000	3.92	18000	6.07	38000	9.37
8500	4.04	19000	6.36	39000	9.45
9000	4.18	20000	6.49	40000	9.52



**Cable loss**  
**Test cable, Mini-Circuits, S/N 0748A, 18 GHz, 3.05 m, N/M - N/M**  
**APC-10FT-NMNM+, HL 4277**

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.12	4400	3.19	9000	4.82	13600	5.97
30	0.21	4500	3.24	9100	4.87	13700	6.01
50	0.28	4600	3.29	9200	4.90	13800	6.04
100	0.40	4700	3.34	9300	4.96	13900	6.09
200	0.59	4800	3.37	9400	4.99	14000	6.12
300	0.73	4900	3.41	9500	5.03	14100	6.16
400	0.86	5000	3.45	9600	5.07	14200	6.20
500	0.97	5100	3.48	9700	5.11	14300	6.22
600	1.07	5200	3.52	9800	5.13	14400	6.26
700	1.15	5300	3.56	9900	5.15	14500	6.29
800	1.23	5400	3.58	10000	5.17	14600	6.33
900	1.31	5500	3.62	10100	5.19	14700	6.33
1000	1.39	5600	3.65	10200	5.19	14800	6.35
1100	1.46	5700	3.69	10300	5.21	14900	6.38
1200	1.54	5800	3.72	10400	5.22	15000	6.38
1300	1.60	5900	3.76	10500	5.22	15100	6.40
1400	1.67	6000	3.80	10600	5.22	15200	6.42
1500	1.74	6100	3.84	10700	5.25	15300	6.46
1600	1.79	6200	3.89	10800	5.25	15400	6.51
1700	1.86	6300	3.92	10900	5.26	15500	6.55
1800	1.92	6400	3.96	11000	5.29	15600	6.56
1900	1.98	6500	4.00	11100	5.30	15700	6.59
2000	2.04	6600	4.04	11200	5.31	15800	6.60
2100	2.09	6700	4.07	11300	5.35	15900	6.64
2200	2.14	6800	4.11	11400	5.36	16000	6.65
2300	2.20	6900	4.14	11500	5.39	16100	6.65
2400	2.25	7000	4.17	11600	5.41	16200	6.67
2500	2.31	7100	4.21	11700	5.45	16300	6.69
2600	2.36	7200	4.23	11800	5.48	16400	6.71
2700	2.42	7300	4.27	11900	5.51	16500	6.72
2800	2.46	7400	4.30	12000	5.53	16600	6.73
2900	2.51	7500	4.34	12100	5.56	16700	6.75
3000	2.56	7600	4.37	12200	5.59	16800	6.80
3100	2.60	7700	4.40	12300	5.61	16900	6.82
3200	2.65	7800	4.44	12400	5.62	17000	6.85
3300	2.70	7900	4.47	12500	5.65	17100	6.90
3400	2.75	8000	4.49	12600	5.68	17200	6.96
3500	2.80	8100	4.53	12700	5.71	17300	7.02
3600	2.85	8200	4.57	12800	5.73	17400	7.07
3700	2.90	8300	4.60	12900	5.76	17500	7.06
3800	2.95	8400	4.63	13000	5.80	17600	7.06
3900	2.98	8500	4.67	13100	5.83	17700	7.08
4000	3.02	8600	4.69	13200	5.86	17800	7.09
4100	3.07	8700	4.73	13300	5.88	17900	7.07
4200	3.10	8800	4.76	13400	5.91	18000	7.08
4300	3.14	8900	4.79	13500	5.94		

## 13 APPENDIX F

A  
AC  
AM  
AVRG  
BB  
cm  
dB  
dBm  
dB( $\mu$ V)  
dB( $\mu$ V/m)  
dB( $\mu$ A)  
DC  
EIRP  
ERP  
EUT  
F  
GHz  
GND  
H  
HL  
Hz  
k  
kHz  
LO  
m  
MHz  
min  
mm  
ms  
 $\mu$ s  
NA  
NB  
OATS  
 $\Omega$   
QP  
RE  
RF  
rms  
Rx  
s  
T  
Tx  
V

## Abbreviations and acronyms

ampere  
alternating current  
amplitude modulation  
average (detector)  
broad band  
centimeter  
decibel  
decibel referred to one milliwatt  
decibel referred to one microvolt  
decibel referred to one microvolt per meter  
decibel referred to one microampere  
direct current  
equivalent isotropically radiated power  
effective radiated power  
equipment under test  
frequency  
gigahertz  
ground  
height  
Hermon laboratories  
hertz  
kilo  
kilohertz  
local oscillator  
meter  
megahertz  
minute  
millimeter  
millisecond  
microsecond  
not applicable  
narrow band  
open area test site  
Ohm  
quasi-peak  
radiated emission  
radio frequency  
root mean square  
receive  
second  
temperature  
transmit  
volt

END OF DOCUMENT