HERMON LABORATORIES

ELECTRICAL TESTING
0839.01

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TEST REPORT

ACCORDING TO: FCC 47 CFR PART 15 subpart C, section 15.249;
RSS-310 issue 4

FOR:

CERAGON Networks Inc.
IP-20 all outdoor unit
Model: FibeAir IP-20C 24
FCC ID:NZ4IP20C24

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. This test report shall not be reproduced in any form except in full with the written approval of Hermon Laboratories Ltd.

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1 Applicant information

Client name:	CERAGON Networks Ltd.
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Telephone:	+972 3543 1653
Fax:	+972 3543 1008
E-mail:	sergeys@ceragon.com
Contact name:	Mr. Sergey Shkolnik

2 Equipment under test attributes

Product name:	IP-20 all outdoor unit
Product type:	Transceiver
Model(s):	FibeAir IP-20C 24
Serial number:	F107T02707
Hardware version:	FCN
Software release:	9.0.0.0.0.296
Receipt date	08-Aug-17

3 Manufacturer information

Manufacturer name:	Flex Ltd.

4 Test details

Project ID:	29773
Location:	Hermon Laboratories Ltd. P.O. Box 23, Binyamina 3055001, Israel
Test started:	08-Aug-17
Test completed:	21-Feb-18
Test specification(s):	FCC 47 CFR Part 15, subpart C, §15.249; RSS-310 issue 4

5 Tests summary

Test	Status
Transmitter characteristics	
FCC section 15.249(a)(d) / RSS-310, section 3.10, Field strength of emissions	Pass
FCC section 15.215(c) / RSS-Gen, section 6.6, Occupied bandwidth	Pass
FCC section 15.249(d) / RSS-310, section 3.10, Band edge emissions	Pass
FCC section 15.207(a) / RSS-Gen, section 8.8, Conducted emission	Pass
FCC section 15.203/ RSS-Gen, section 8.3, 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:CERRAD_FCC.29773_20C.

	Name and Title	Date	Signature
Tested by:	Mr. S. Samokha, test engineer	February 11, 2018	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	February 21, 2018	
Approved by:	Mr. M. Nikishin, EMC and Radio group manager	April 25, 2018	

6 EUT description

6.1 General information

The EUT, IP-20C 24 is an all outdoor unit of point to point radio terminal with dual carrier. The IP-20C 24 is powered from -48 VDC.
The IP-20C 24 is designed to support the MultiCore 2+0 Single/Dual Polarization.
A MultiCore 2+0 direct mount configuration. For single polarization, a splitter is used to combine the two cores at the different channels.
For dual polarization, an OMT (orthomode transducer) is used to combine the two cores at the same channel.
When operating with two cores in a single IP-20C unit, users can configure different scripts independently for each core. Configuring a script in one core has no impact on the other core's traffic.
Two power measurements were performed with two mediation devices Splitter and OMT to find worst case configuration.
The configuration with OMT was defined as worst configuration, therefore all other tests were performed accordingly.

6.2 Ports and lines

Port type	Port description	Connected from	Connected to	Qty.	Cable type	Cable length
Telecom&power	Ethernet (ETH1/PoE)	EUT	Not connected	1	FTP	10 m*
Telecom	Ethernet (ETH2)	EUT	Not connected	1	NA	NA
Signal	MGT**	EUT	Laptop	1	FTP	10 m
GND	GND	EUT	GND	1	Unshielded	1 m
Telecom	Ethernet (ETH3)	EUT	Not connected	1	NA	NA
Power	DC	-48 VDC	EUT	1	Unshielded	5 m

* May be longer than 10 m.
** For maintenance only.

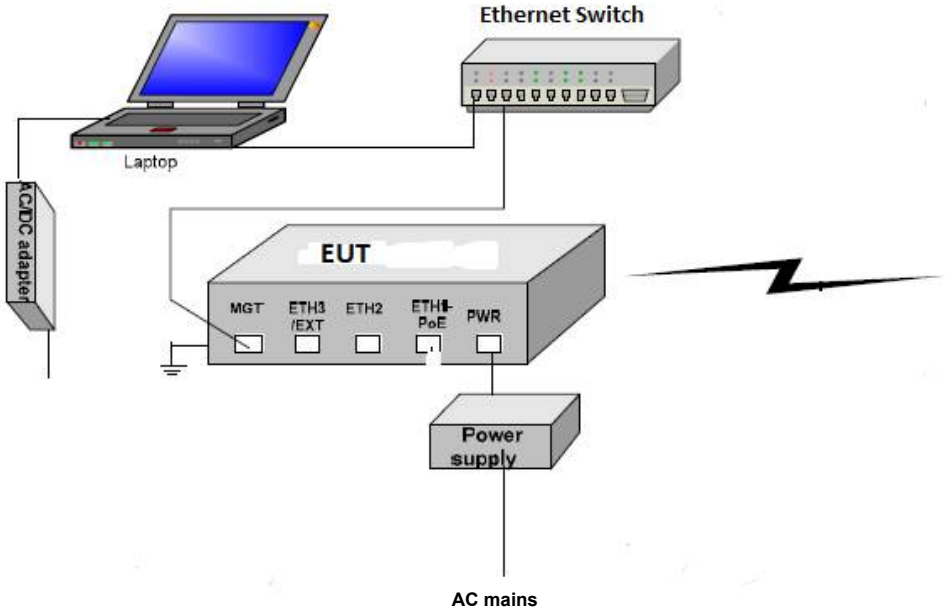
6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
Laptop	Dell	Latitude E6400	F553CA00
Power supply 48VDC/7AMP	Advice	ASB-4807T	AD8844, AD18659
Ethernet Switch	D-Link	DES-108A	QSOV1C-1858

6.4 Changes made in the EUT

No changes were implemented in the EUT during testing.

6.5 Test configuration



6.6 Transmitter characteristics

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

Assigned frequency range	24000 – 24250 MHz
Operating frequency range	24012.6 – 24236.7 MHz
RF channel spacing	20/30/40/50/60 MHz
Maximum field strength of carrier at 3 m distance	120.96 dBµV/m (peak) at 20 MHz BW , with 37.1 dBi antenna gain 107.89 dBµV/m (average) at 20 MHz BW with 42.4 dBi antenna gain

Is transmitter output power variable?					
		No			
	V	Yes		continuous variable	
			V	stepped variable with stepsize	1.0 dB
				minimum RF power	
				maximum RF power	

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

Antenna/s technical characteristics

Type	Manufacturer	Model number	Gain
External	Ceragon	Am-1-26-CR	37.1 dBi
External	Ceragon	Am-1-26-CR1	37.0 dBi
External	Ceragon	Am-2-26-CR1	42.4 dBi
External	Ceragon	Am-2-26-CR	41.8 dBi

Transmitter aggregate data rate/s, Mbps										
BW	Type of modulation									
	QPSK	8 QAM	16QAM	32QAM	64QAM	128QAM	256QAM	512QAM	1024QAM	2048QAM
20 MHz	28.520	42.319	57.456	75.511	92.601	11.500	126.229	137.849	155.447	165.740
30 MHz	43.389	62.566	87.496	114.825	141.114	169.562	194.851	207.597	239.656	261.357
40 MHz	58.224	86.310	117.129	153.976	188.840	228.190	245.223	268.515	304.360	349.341
50 MHz	70.683	109.035	147.476	185059	238.579	278.225	329.425	357.474	388.816	445.020
60 MHz	87.122	126.513	175.249	230.251	282.473	341.234	393.553	423.211	488.730	529.505

Type of multiplexing	FDD
Modulating test signal (baseband)	PRBS
Maximum transmitter duty cycle in normal use	100 %

Transmitter power source			
V	DC	Nominal rated voltage	-48 VDC
V	AC	Nominal rated voltage	NA

Common power source for transmitter and receiver	V	Yes	no

Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

7 Transmitter tests according to 47CFR part 15 subpart C and RSS-310 issue 4 requirements

7.1 Field strength of emissions with 42.4 dBi antenna gain

7.1.1 General

This test was performed to measure field strength of fundamental and spurious emissions from the EUT. Specification test limits are given in Table 7.1.1, Table 7.1.2, Table 7.1.3, and Table 7.1.4 .

Table 7.1.1 Radiated fundamental emission limits

Fundamental frequency, MHz	Field strength at 3 m, dB(μV/m)		
	Peak	Average	Quasi-Peak
24000 – 24250*	**128.0**	**108.0**	**NA**

* The band is not used according to RSS-210 section A2.9

Table 7.1.2 Harmonics limits

Fundamental frequency, MHz	Field strength at 3 m, dB(μV/m)	
	Peak	Average
24000 – 24250*	**88.0**	**68.0**

* The band is not used according to RSS-210 section A2.9

Table 7.1.3 Radiated spurious emissions limits (other than harmonics)

Frequency, MHz	Field strength at 3 m, dB(μV/m)*			
	Peak	Quasi Peak	Average	Attenuation below carrier
0.009 – 0.090	148.5 – 128.5	NA	128.5 – 108.5**	50 dBc (whichever is the less stringent)
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		
Above 1000	74.0	NA	54.0	

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

$$Lim_{S2} = Lim_{S1} + 20 \log (S_1/S_2),$$

where S_1 and S_2 – standard defined and test distance respectively in meters.

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

Note: The above field strength limits applied from the lowest radio frequency generated in the device, without going below 9 kHz up to the tenth harmonic of the highest fundamental frequency but not exceeding 40 GHz for intentional radiators operated below 10 GHz and up to the fifth harmonic of the highest fundamental frequency but not exceeding 100 GHz for intentional radiators operated above 10 GHz.

Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

Table 7.1.4 Radiated spurious emissions limits (other than harmonics)

Frequency, GHz	Distance, m	Field strength dB(μV/m)*, peak	Field strength dB(μV/m)*, average
40 - 60	0.50	89.56*	69.56*
60 - 75	0.10	103.54*	83.54*
75 - 100	0.05	109.60*	89.60*

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

$$LimS2 = LimS1 + 20 \log (S1/S2),$$

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

Test specification:	Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	Relative Humidity: 39 %	Air Pressure: 1011 hPa	Power: 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

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

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

7.1.2.2 The measurements were performed in the typical position.

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

7.1.2.4 The worst test results (the lowest margins) were found in in typical position, recorded in the associated tables and shown in the associated plots.

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

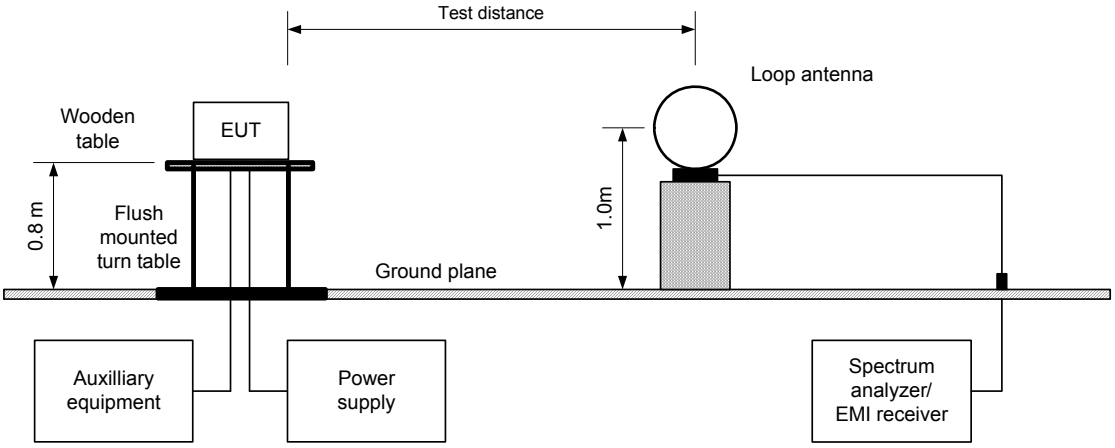
7.1.3.1 The EUT was set up as shown in Figure 7.1.2, Figure 7.1.3, energized and the performance check was conducted.

7.1.3.2 The measurements were performed in the typical position.

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

7.1.3.4 The worst test results (the lowest margins) were found in in typical position, recorded in the associated tables and shown in the associated plots

Figure 7.1.1 Setup for spurious emission field strength measurements below 30 MHz



Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

Figure 7.1.2 Setup for spurious emission field strength measurements in 30 -1000 MHz

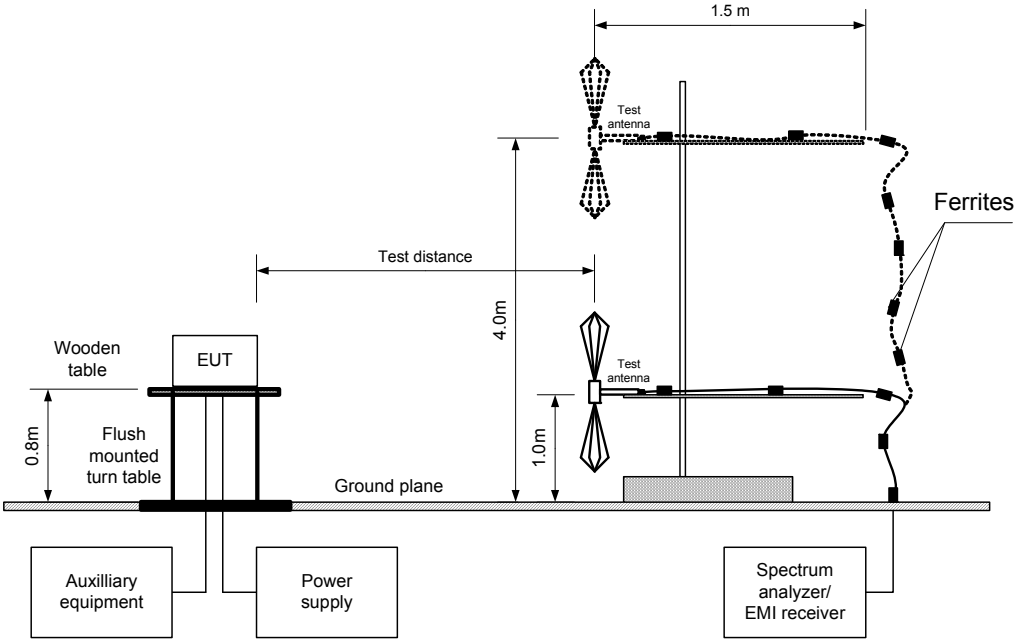
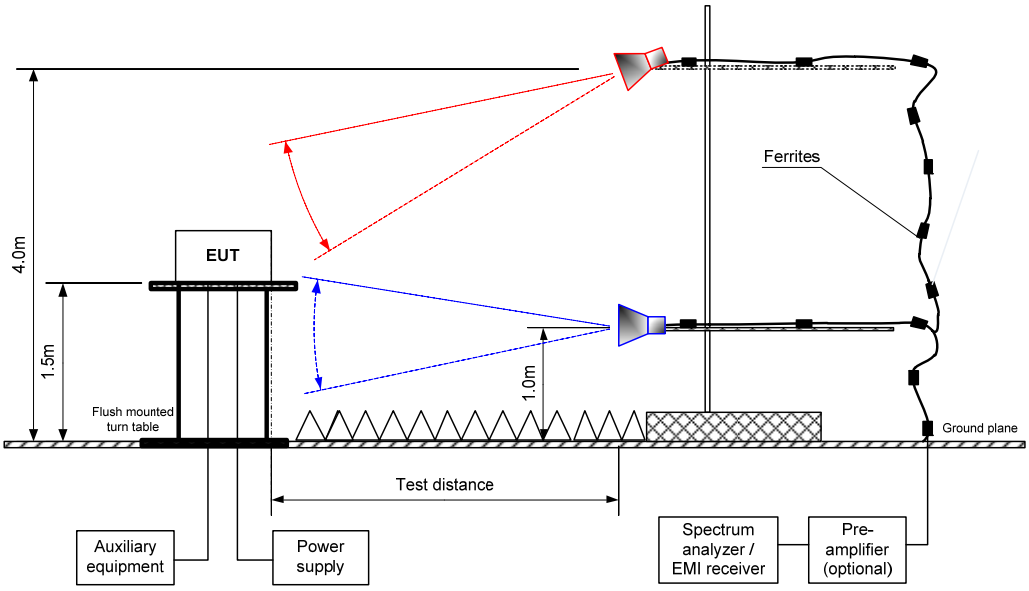


Figure 7.1.3 Setup for spurious emission field strength measurements above1000 MHz



Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

Table 7.1.5 Field strength of fundamental emission

TEST DISTANCE:	3 m
EUT POSITION:	Typical
MODULATING SIGNAL:	PRBS
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum
INVESTIGATED FREQUENCY RANGE:	0.009 – 100 000 MHz
DETECTOR USED:	Peak
RESOLUTION BANDWIDTH:	1.0 kHz (9 kHz – 150 kHz) 9.0 kHz (150 kHz – 30 MHz) 120 kHz (30 MHz – 1000 MHz) 1.0 MHz (above 1000 MHz)
VIDEO BANDWIDTH:	≥ Resolution bandwidth
TEST ANTENNA TYPE:	Double ridged guide (above 1000 MHz)

Fundamental emission

Frequency, MHz	Antenna		Azimuth, degrees*	Peak field strength			Avr factor, dB	Average field strength			Verdict
	Pol.	Height, m		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	
Channel bandwidth 20 MHz											
Modulation QPSK											
24010.0	Vert	1.5	0	120.33	128.0	-7.67	0	107.44	108.0	-0.56	Pass
24070.0	Vert	1.5	0	119.96	128.0	-8.04	0	107.28	108.0	-0.72	
24180.0	Vert	1.5	0	120.42	128.0	-7.58	0	107.68	108.0	-0.32	
24240.0	Vert	1.5	0	120.77	128.0	-7.23	0	107.89	108.0	-0.11	
Modulation 2048 QAM											
24010.0	Vert	1.5	0	120.22	128.0	-7.78	0	107.49	108.0	-0.51	Pass
24070.0	Vert	1.5	0	118.85	128.0	-9.15	0	107.46	108.0	-0.54	
24180.0	Vert	1.5	0	118.86	128.0	-9.14	0	107.44	108.0	-0.56	
24240.0	Vert	1.5	0	119.82	128.0	-8.18	0	107.47	108.0	-0.53	
Modulation QPSK											
24010.0	Hor	1.5	0	120.71	128.0	-7.29	0	107.35	108.0	-0.65	Pass
24070.0	Hor	1.5	0	120.37	128.0	-7.63	0	107.02	108.0	-0.98	
24180.0	Hor	1.5	0	120.38	128.0	-7.62	0	107.21	108.0	-0.79	
24240.0	Hor	1.5	0	120.84	128.0	-7.16	0	106.94	108.0	-1.06	
Modulation 2048 QAM											
24010.0	Hor	1.5	0	118.70	128.0	-9.30	0	107.31	108.0	-0.69	Pass
24070.0	Hor	1.5	0	118.15	128.0	-9.85	0	107.43	108.0	-0.57	
24180.0	Hor	1.5	0	118.76	128.0	-9.24	0	107.36	108.0	-0.64	
24240.0	Hor	1.5	0	118.18	128.0	-9.82	0	106.98	108.0	-1.02	

Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

Table 7.1.6 Field strength of fundamental emission

TEST DISTANCE:	3 m
EUT POSITION:	Typical
MODULATING SIGNAL:	PRBS
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum
INVESTIGATED FREQUENCY RANGE:	0.009 – 100 000 MHz
DETECTOR USED:	Peak
RESOLUTION BANDWIDTH:	1.0 kHz (9 kHz – 150 kHz) 9.0 kHz (150 kHz – 30 MHz) 120 kHz (30 MHz – 1000 MHz) 1.0 MHz (above 1000 MHz)
VIDEO BANDWIDTH:	≥ Resolution bandwidth
TEST ANTENNA TYPE:	Double ridged guide (above 1000 MHz)

Fundamental emission

Frequency, MHz	Antenna		Azimuth, degrees*	Peak field strength			Avr factor, dB	Average field strength			Verdict
	Pol.	Height, m		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	
Channel bandwidth 30 MHz											
Modulation QPSK											
24015.0	Vert	1.5	0	119.66	128.0	-8.34	0	106.45	108.0	-1.55	Pass
24065.0	Vert	1.5	0	118.99	128.0	-9.01	0	106.78	108.0	-1.22	
24185.0	Vert	1.5	0	119.66	128.0	-8.34	0	106.22	108.0	-1.78	
24235.0	Vert	1.5	0	119.63	128.0	-8.37	0	106.64	108.0	-1.36	
Modulation 2048 QAM											
24015.0	Vert	1.5	0	117.46	128.0	-10.54	0	106.35	108.0	-1.65	Pass
24065.0	Vert	1.5	0	117.44	128.0	-10.56	0	106.45	108.0	-1.55	
24185.0	Vert	1.5	0	117.66	128.0	-10.34	0	106.41	108.0	-1.59	
24235.0	Vert	1.5	0	117.64	128.0	-10.36	0	106.64	108.0	-1.36	
Modulation QPSK											
24015.0	Hor	1.5	0	119.06	128.0	-8.94	0	105.82	108.0	-2.18	Pass
24065.0	Hor	1.5	0	118.48	128.0	-9.52	0	105.13	108.0	-2.87	
24185.0	Hor	1.5	0	118.27	128.0	-9.73	0	104.89	108.0	-3.11	
24235.0	Hor	1.5	0	119.11	128.0	-8.89	0	105.74	108.0	-2.26	
Modulation 2048 QAM											
24015.0	Hor	1.5	0	116.91	128.0	-11.09	0	105.73	108.0	-2.27	Pass
24065.0	Hor	1.5	0	116.50	128.0	-11.50	0	105.91	108.0	-2.09	
24185.0	Hor	1.5	0	116.92	128.0	-11.08	0	105.64	108.0	-2.36	
24235.0	Hor	1.5	0	116.37	128.0	-11.63	0	105.25	108.0	-2.75	

Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

Table 7.1.7 Field strength of fundamental emission

TEST DISTANCE: 3 m
EUT POSITION: Typical
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
INVESTIGATED FREQUENCY RANGE: 0.009 – 100 000 MHz
DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 1.0 kHz (9 kHz – 150 kHz)
9.0 kHz (150 kHz – 30 MHz)
120 kHz (30 MHz – 1000 MHz)
1.0 MHz (above 1000 MHz)
VIDEO BANDWIDTH: ≥ Resolution bandwidth
TEST ANTENNA TYPE: Double ridged guide (above 1000 MHz)

Fundamental emission

Frequency, MHz	Antenna		Azimuth, degrees*	Peak field strength			Avr factor, dB	Average field strength			Verdict
	Pol.	Height, m		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	
Channel bandwidth 40 MHz											
Modulation QPSK											
24020.0	Vert	1.5	0	119.82	128.0	-8.18	0	105.64	108.0	-2.36	Pass
24060.0	Vert	1.5	0	119.63	128.0	-8.37	0	105.54	108.0	-2.46	
24190.0	Vert	1.5	0	118.76	128.0	-9.24	0	104.55	108.0	-3.45	
24230.0	Vert	1.5	0	119.58	128.0	-8.42	0	104.45	108.0	-3.55	
Modulation 2048 QAM											
24020.0	Vert	1.5	0	116.44	128.0	-11.56	0	105.23	108.0	-2.77	Pass
24060.0	Vert	1.5	0	116.55	128.0	-11.45	0	105.46	108.0	-2.54	
24190.0	Vert	1.5	0	115.55	128.0	-12.45	0	104.69	108.0	-3.31	
24230.0	Vert	1.5	0	115.52	128.0	-12.48	0	104.8	108.0	-3.20	
Modulation QPSK											
24020.0	Hor	1.5	0	117.83	128.0	-10.17	0	104.05	108.0	-3.95	Pass
24060.0	Hor	1.5	0	118.35	128.0	-9.65	0	104.21	108.0	-3.79	
24190.0	Hor	1.5	0	118.26	128.0	-9.74	0	104.47	108.0	-3.53	
24230.0	Hor	1.5	0	117.72	128.0	-10.28	0	103.99	108.0	-4.01	
Modulation 2048 QAM											
24020.0	Hor	1.5	0	114.70	128.0	-13.30	0	104.05	108.0	-3.95	Pass
24060.0	Hor	1.5	0	115.55	128.0	-12.45	0	104.16	108.0	-3.84	
24190.0	Hor	1.5	0	116.02	128.0	-11.98	0	104.64	108.0	-3.36	
24230.0	Hor	1.5	0	115.35	128.0	-12.65	0	104.72	108.0	-3.28	

Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

Table 7.1.8 Field strength of fundamental emission

TEST DISTANCE:	3 m
EUT POSITION:	Typical
MODULATING SIGNAL:	PRBS
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum
INVESTIGATED FREQUENCY RANGE:	0.009 – 100 000 MHz
DETECTOR USED:	Peak
RESOLUTION BANDWIDTH:	1.0 kHz (9 kHz – 150 kHz) 9.0 kHz (150 kHz – 30 MHz) 120 kHz (30 MHz – 1000 MHz) 1.0 MHz (above 1000 MHz)
VIDEO BANDWIDTH:	≥ Resolution bandwidth
TEST ANTENNA TYPE:	Double ridged guide (above 1000 MHz)

Fundamental emission

Frequency, MHz	Antenna		Azimuth, degrees*	Peak field strength			Avr factor, dB	Average field strength			Verdict
	Pol.	Height, m		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	
Channel bandwidth 50 MHz											
Modulation QPSK											
24025.0	Vert	1.5	0	118.99	128.0	-9.01	0	104.77	108.0	-3.23	Pass
24055.0	Vert	1.5	0	119.24	128.0	-8.76	0	104.58	108.0	-3.42	
24195.0	Vert	1.5	0	117.99	128.0	-10.01	0	103.97	108.0	-4.03	
24225.0	Vert	1.5	0	119.22	128.0	-8.78	0	103.89	108.0	-4.11	
Modulation 2048 QAM											
24025.0	Vert	1.5	0	114.66	128.0	-13.34	0	104.53	108.0	-3.47	Pass
24055.0	Vert	1.5	0	115.56	128.0	-12.44	0	104.34	108.0	-3.66	
24195.0	Vert	1.5	0	114.44	128.0	-13.56	0	103.83	108.0	-4.17	
24225.0	Vert	1.5	0	114.84	128.0	-13.16	0	103.55	108.0	-4.45	
Modulation QPSK											
24025.0	Hor	1.5	0	118.32	128.0	-9.68	0	103.45	108.0	-4.55	Pass
24055.0	Hor	1.5	0	117.70	128.0	-10.30	0	103.51	108.0	-4.49	
24195.0	Hor	1.5	0	118.59	128.0	-9.41	0	104.41	108.0	-3.59	
24225.0	Hor	1.5	0	117.75	128.0	-10.25	0	104.05	108.0	-3.95	
Modulation 2048 QAM											
24025.0	Hor	1.5	0	113.95	128.0	-14.05	0	103.37	108.0	-4.63	Pass
24055.0	Hor	1.5	0	114.96	128.0	-13.04	0	103.31	108.0	-4.69	
24195.0	Hor	1.5	0	114.76	128.0	-13.24	0	103.97	108.0	-4.03	
24225.0	Hor	1.5	0	114.59	128.0	-13.41	0	103.50	108.0	-4.50	

Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

Table 7.1.9 Field strength of fundamental emission

TEST DISTANCE:	3 m
EUT POSITION:	Typical
MODULATING SIGNAL:	PRBS
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum
INVESTIGATED FREQUENCY RANGE:	0.009 – 100 000 MHz
DETECTOR USED:	Peak
RESOLUTION BANDWIDTH:	1.0 kHz (9 kHz – 150 kHz) 9.0 kHz (150 kHz – 30 MHz) 120 kHz (30 MHz – 1000 MHz) 1.0 MHz (above 1000 MHz)
VIDEO BANDWIDTH:	≥ Resolution bandwidth
TEST ANTENNA TYPE:	Double ridged guide (above 1000 MHz)

Fundamental emission

Frequency, MHz	Antenna		Azimuth, degrees*	Peak field strength			Avr factor, dB	Average field strength			Verdict
	Pol.	Height, m		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	
Channel bandwidth 60 MHz											
Modulation QPSK											
24030.0	Vert	1.5	0	117.40	128.0	-10.60	0	103.57	108.0	-4.43	Pass
24050.0	Vert	1.5	0	117.68	128.0	-10.32	0	103.45	108.0	-4.55	
24200.0	Vert	1.5	0	116.97	128.0	-11.03	0	103.54	108.0	-4.46	
24220.0	Vert	1.5	0	117.22	128.0	-10.78	0	103.34	108.0	-4.66	
Modulation 2048 QAM											
24030.0	Vert	1.5	0	113.38	128.0	-14.62	0	103.57	108.0	-4.43	Pass
24050.0	Vert	1.5	0	113.38	128.0	-14.62	0	103.48	108.0	-4.52	
24200.0	Vert	1.5	0	113.89	128.0	-14.11	0	103.28	108.0	-4.72	
24220.0	Vert	1.5	0	113.66	128.0	-14.34	0	103.46	108.0	-4.54	
Modulation QPSK											
24030.0	Hor	1.5	0	116.69	128.0	-11.31	0	102.84	108.0	-5.16	Pass
24050.0	Hor	1.5	0	116.59	128.0	-11.41	0	102.68	108.0	-5.32	
24200.0	Hor	1.5	0	117.00	128.0	-11.00	0	103.25	108.0	-4.75	
24220.0	Hor	1.5	0	116.72	128.0	-11.28	0	102.72	108.0	-5.28	
Modulation 2048 QAM											
24030.0	Hor	1.5	0	113.51	128.0	-14.49	0	102.52	108.0	-5.48	Pass
24050.0	Hor	1.5	0	113.65	128.0	-14.35	0	102.51	108.0	-5.49	
24200.0	Hor	1.5	0	113.46	128.0	-14.54	0	102.67	108.0	-5.33	
24220.0	Hor	1.5	0	113.17	128.0	-14.83	0	102.66	108.0	-5.34	

Table 7.1.10 Average factor calculation

Transmission pulse		Transmission burst		Transmission train duration, ms	Average factor, dB
Duration, ms	Period, ms	Duration, ms	Period, ms		
NA	NA	NA	NA	NA	0

*- Average factor was calculated as follows

for pulse train shorter than 100 ms: $$Average\ factor = 20 \times \log_{10}\left(\frac{Pulse\,duration}{Pulse\,period} \times \frac{Burst\,duration}{Train\,duration} \times Number\,of\ bursts\,within\,pulse\,train\right)$$

Reference numbers of test equipment used

HL 0446	HL 0604	HL 0770	HL 0771	HL 0772	HL 1299	HL 1300	HL 2909
HL 3235	HL 3294	HL 3297	HL 3305	HL 3433	HL 3434	HL 3818	HL 4280
HL 4353	HL 4933	HL 4956	HL 5112				

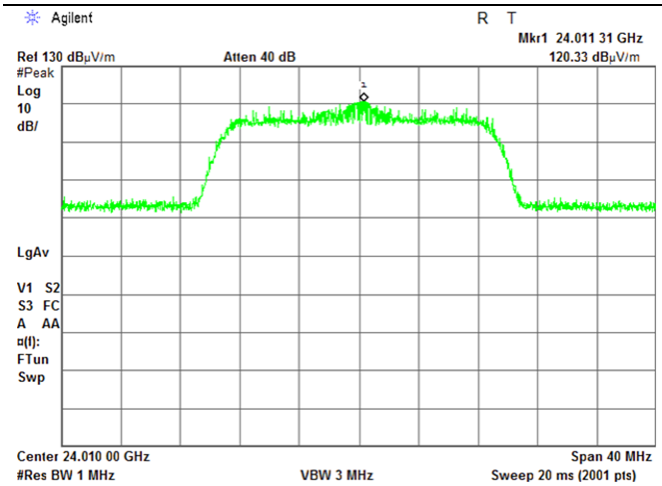
Full description is given in Appendix A.

Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

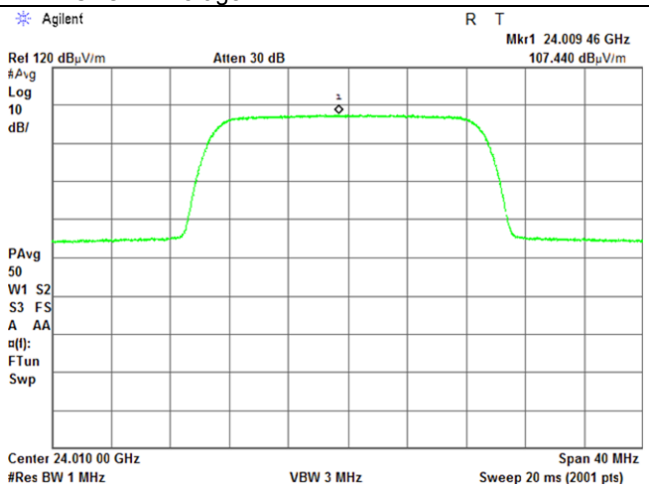
Plot 7.1.1 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 20 MHz
MODULATION: QPSK
CARRIER FREQUENCY: Low

DETECTOR: Peak

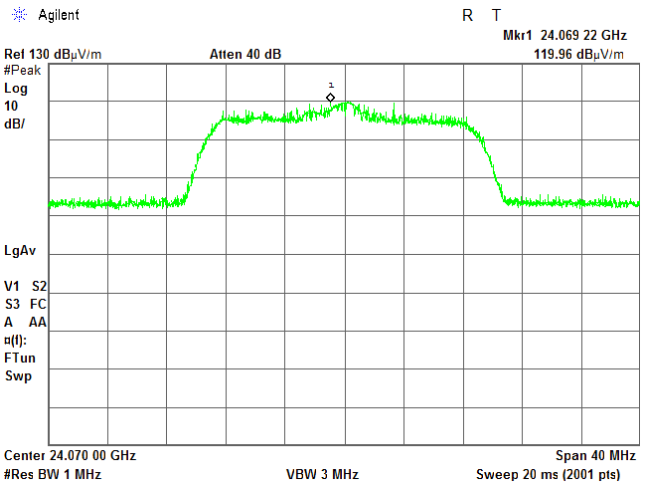


DETECTOR: Average

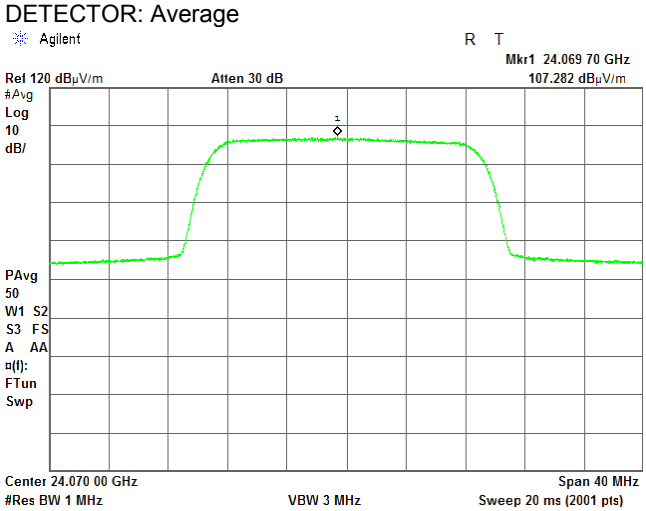


CARRIER FREQUENCY: Mid

DETECTOR: Peak



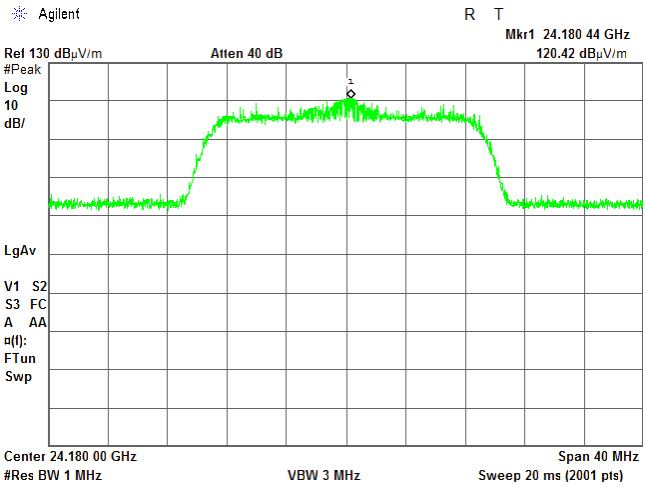
DETECTOR: Average



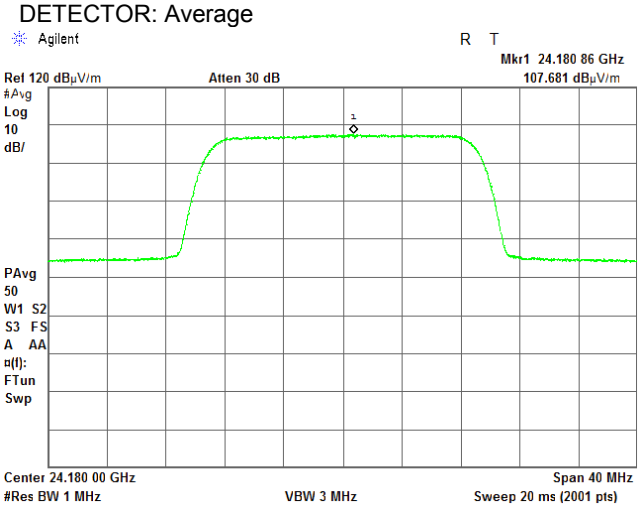
Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

Plot 7.1.2 Radiated emission measurements at the fundamental frequency

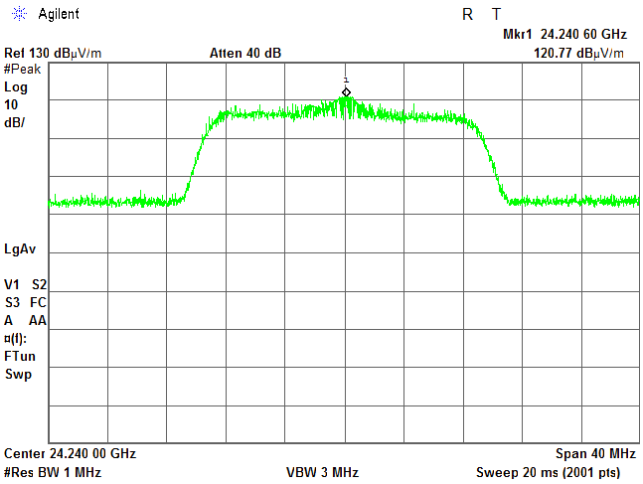
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 20 MHz
MODULATION: QPSK
CARRIER FREQUENCY: Mid
DETECTOR: Peak



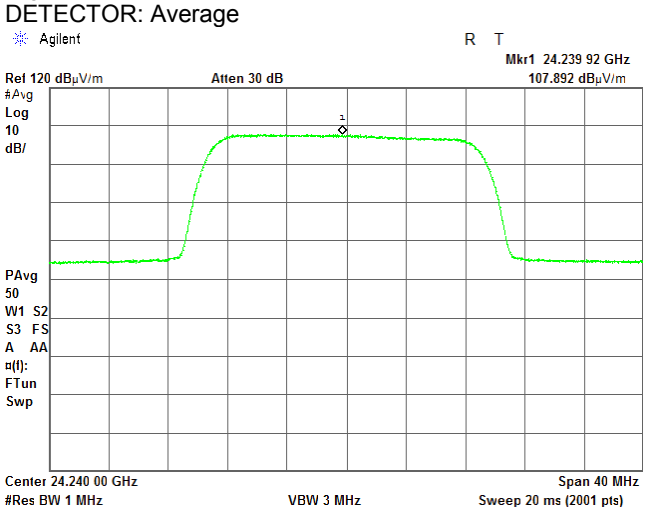
DETECTOR: Average



CARRIER FREQUENCY:
DETECTOR: Peak



High
DETECTOR: Average

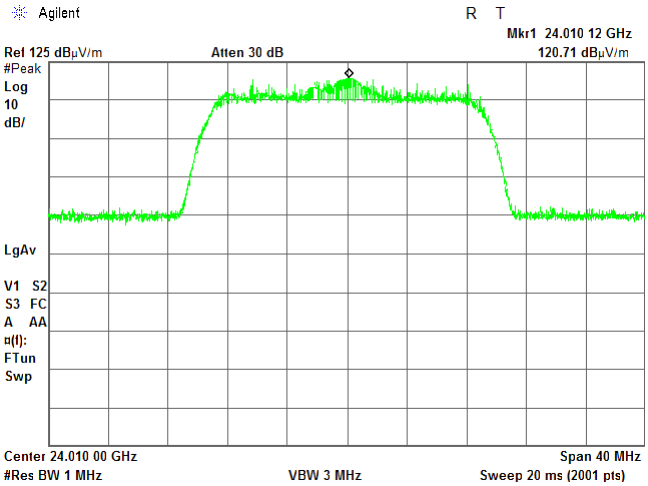


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

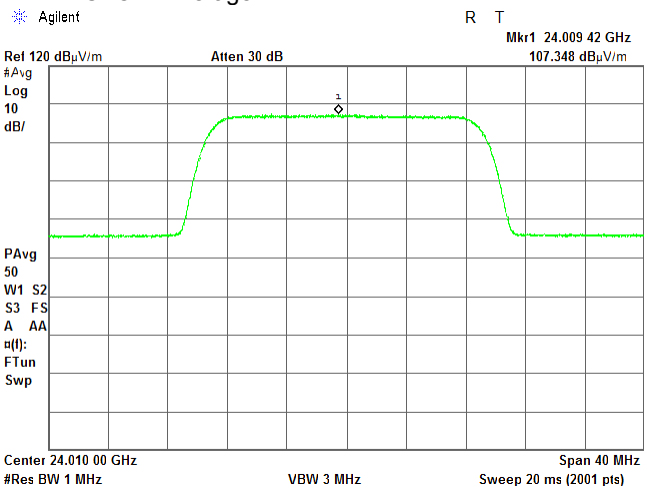
Plot 7.1.3 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 20 MHz
MODULATION: QPSK

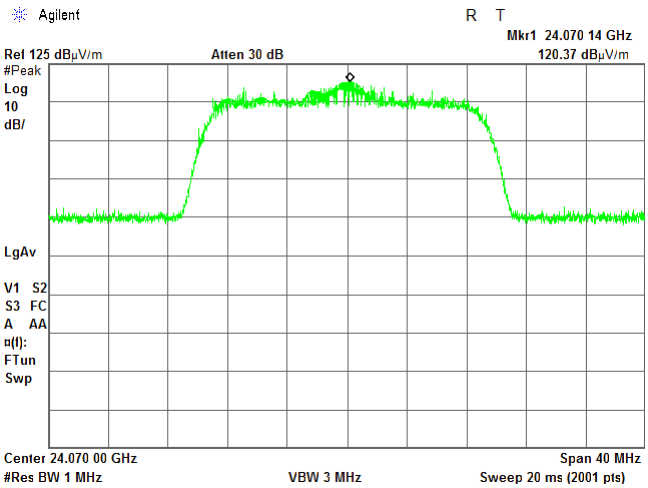
CARRIER FREQUENCY: Low
DETECTOR: Peak



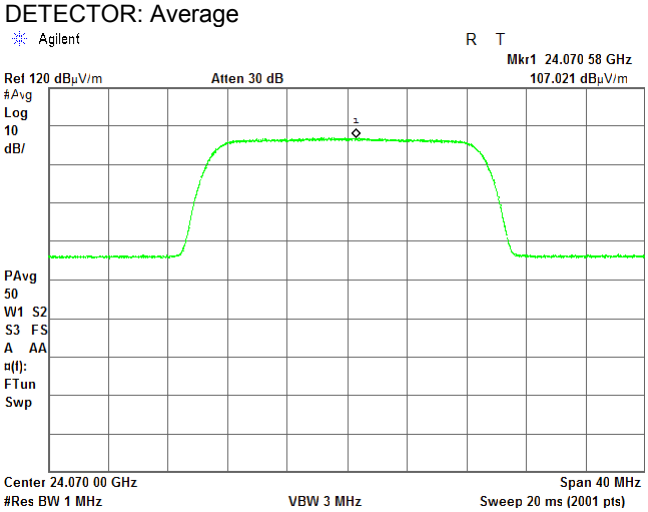
DETECTOR: Average



CARRIER FREQUENCY: Mid
DETECTOR: Peak



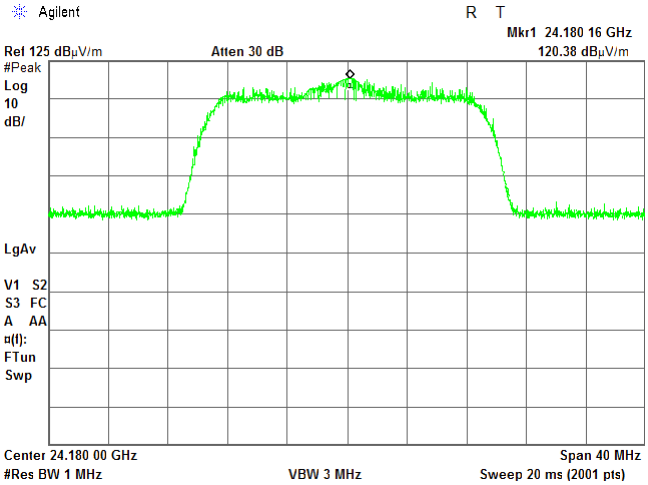
DETECTOR: Average



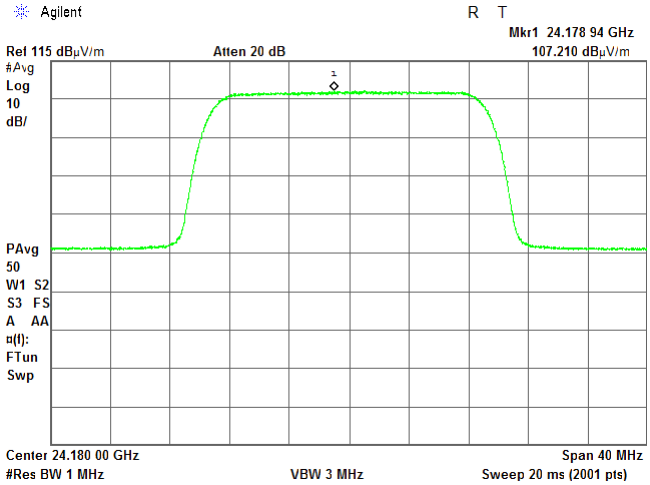
Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

Plot 7.1.4 Radiated emission measurements at the fundamental frequency

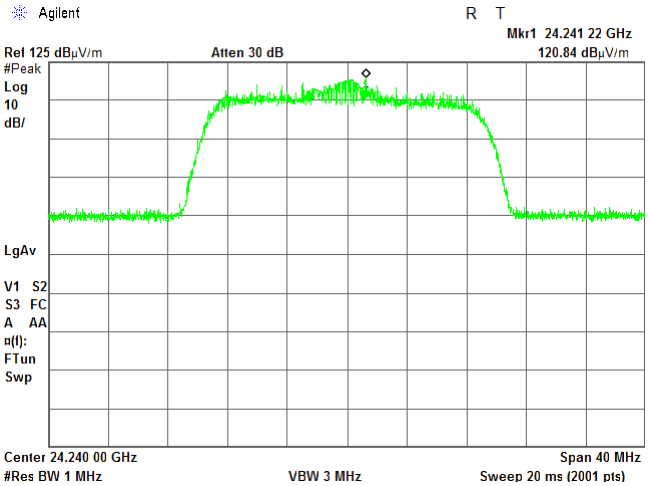
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 20 MHz
MODULATION: QPSK
CARRIER FREQUENCY: Mid
DETECTOR: Peak



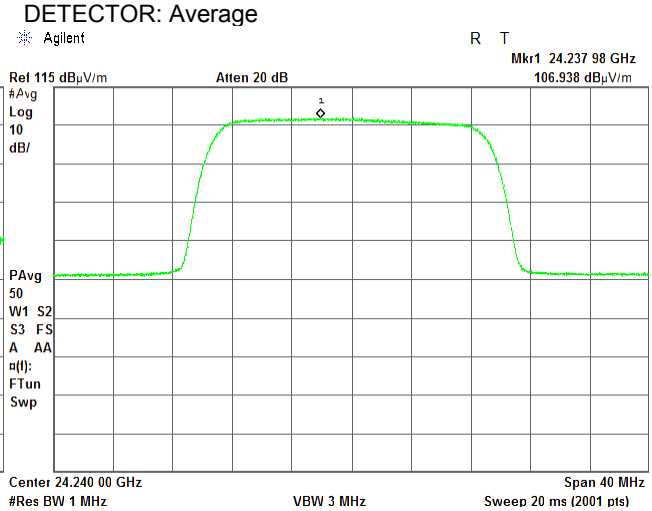
DETECTOR: Average



CARRIER FREQUENCY: High
DETECTOR: Peak



DETECTOR: Average

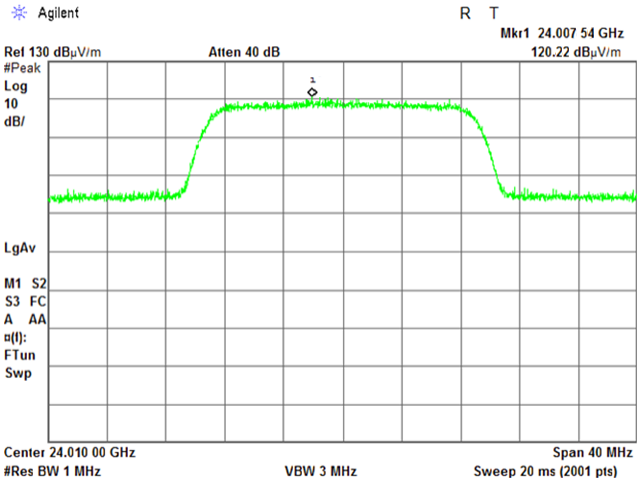


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

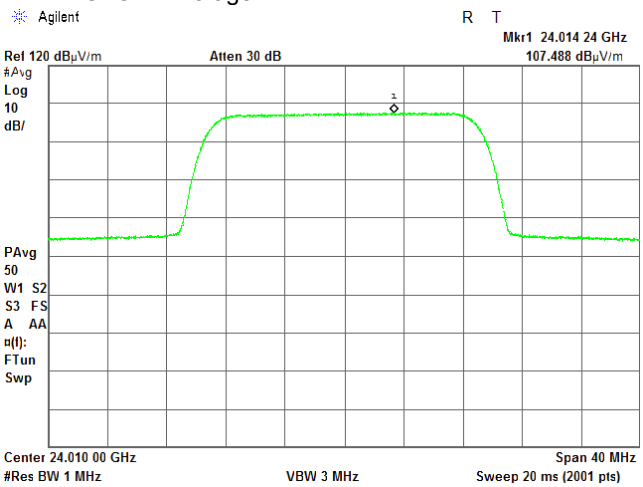
Plot 7.1.5 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 20 MHz
MODULATION: 2048QAM

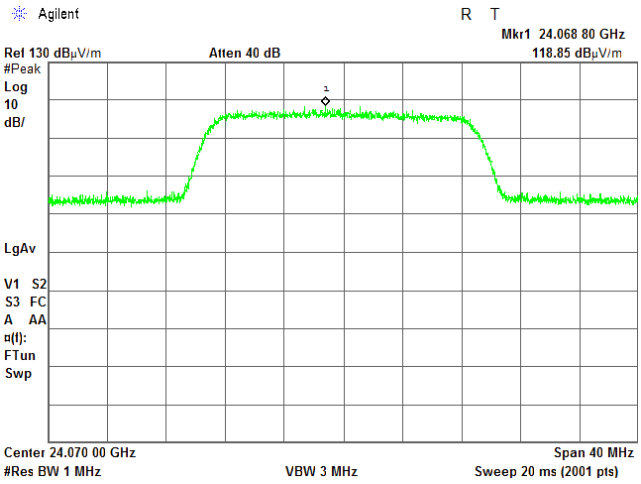
CARRIER FREQUENCY: Low
DETECTOR: Peak



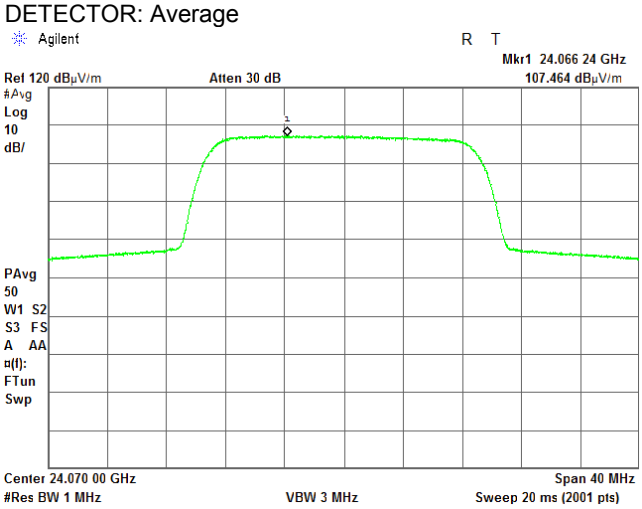
DETECTOR: Average



CARRIER FREQUENCY: Mid
DETECTOR: Peak



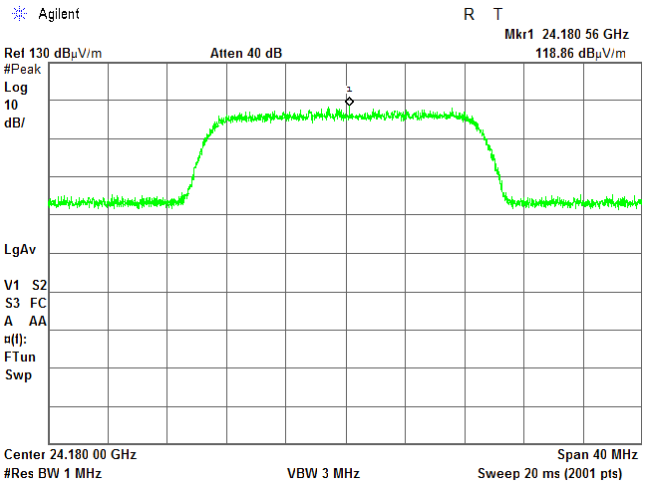
DETECTOR: Average



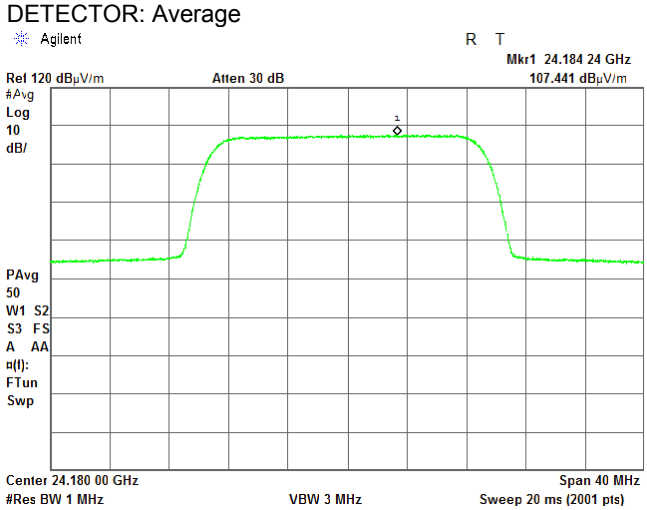
Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

Plot 7.1.6 Radiated emission measurements at the fundamental frequency

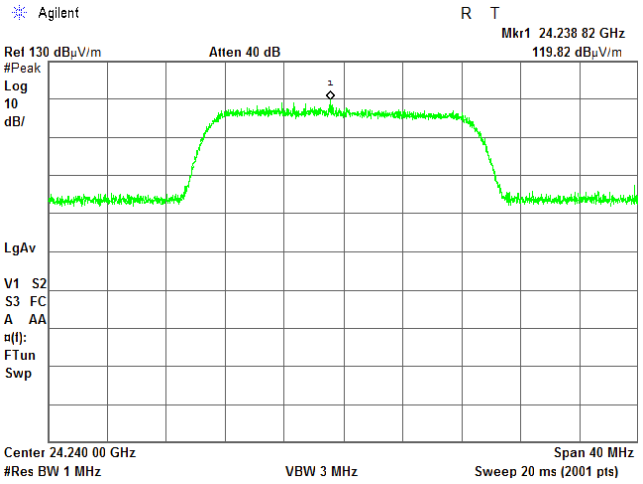
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 20 MHz
MODULATION: 2048QAM
CARRIER FREQUENCY: Mid
DETECTOR: Peak



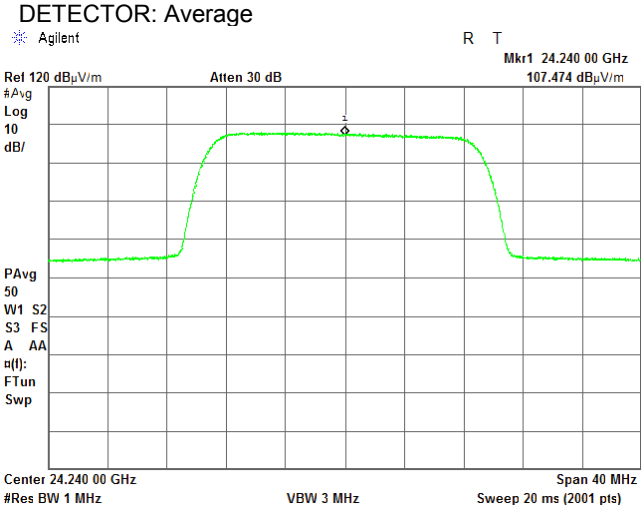
DETECTOR: Average



CARRIER FREQUENCY: High
DETECTOR: Peak



DETECTOR: Average

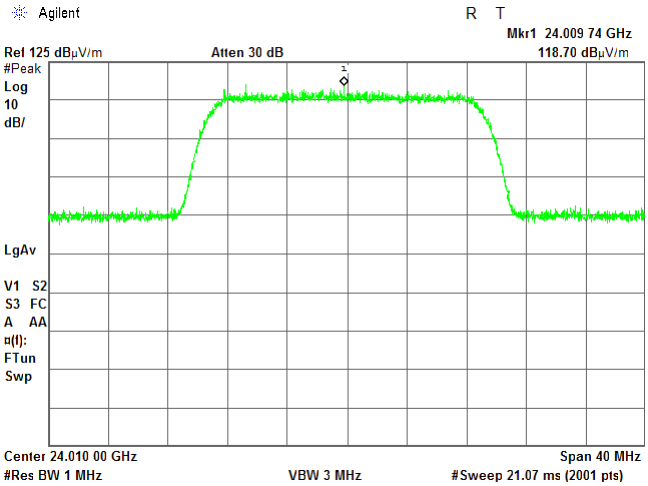


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

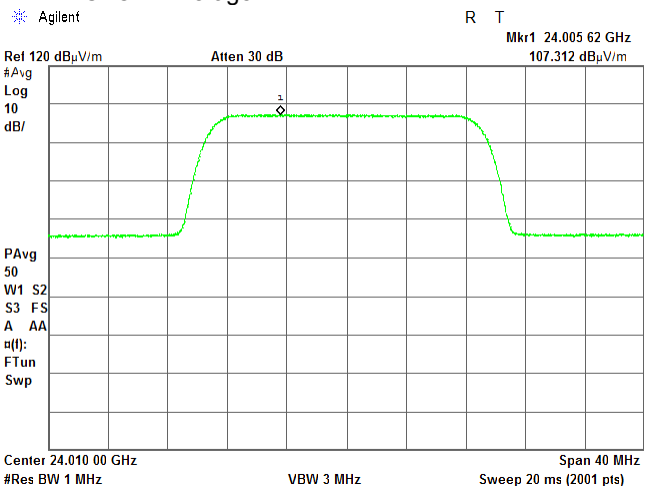
Plot 7.1.7 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 20 MHz
MODULATION: 2048QAM

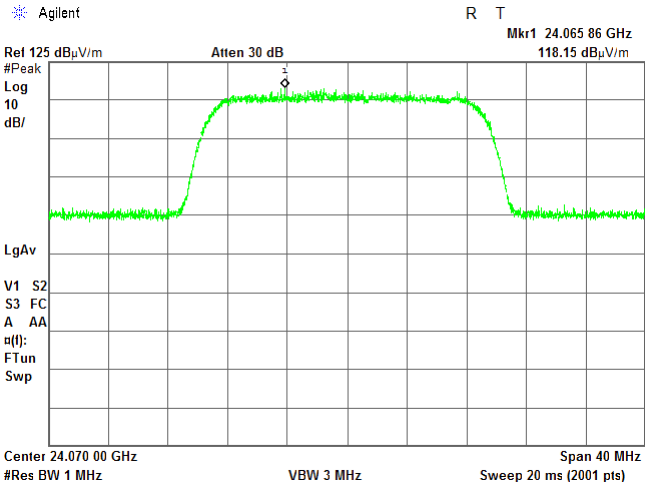
CARRIER FREQUENCY: Low
DETECTOR: Peak



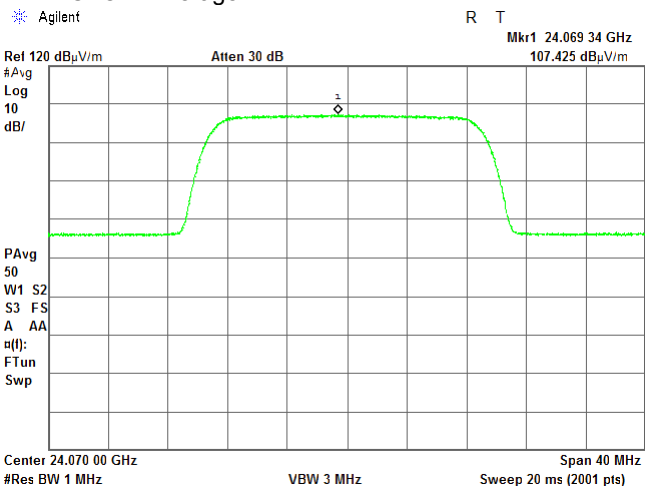
DETECTOR: Average



CARRIER FREQUENCY: Mid
DETECTOR: Peak



DETECTOR: Average

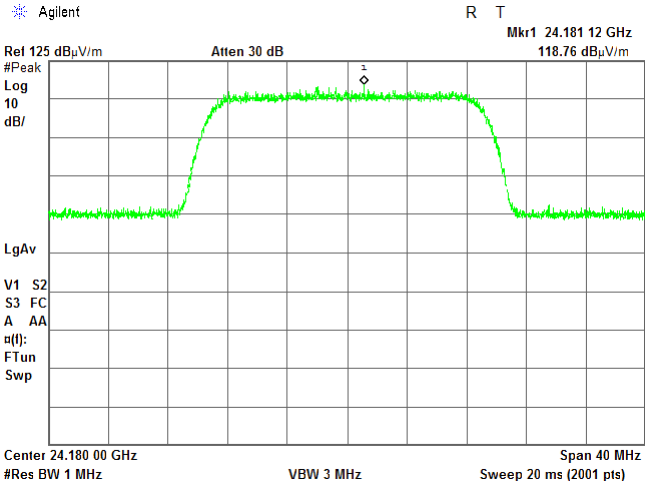


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

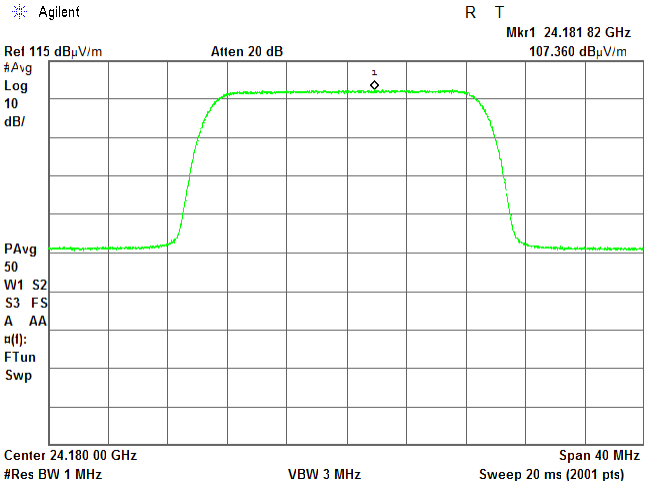
Plot 7.1.8 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 20 MHz
MODULATION: 2048QAM

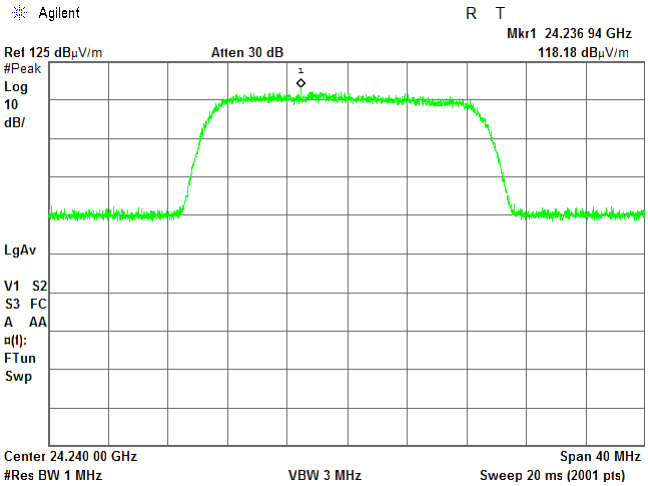
CARRIER FREQUENCY: Mid
DETECTOR: Peak



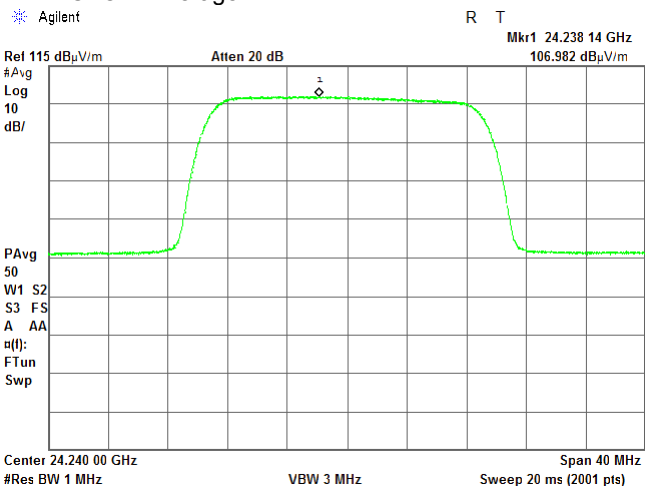
DETECTOR: Average



CARRIER FREQUENCY: High
DETECTOR: Peak



DETECTOR: Average

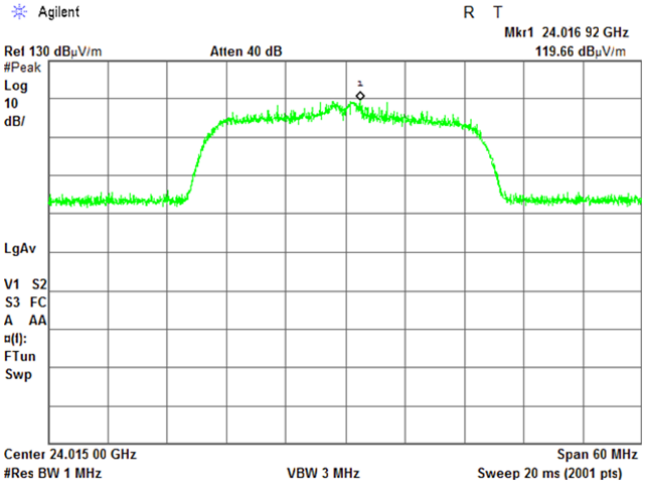


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

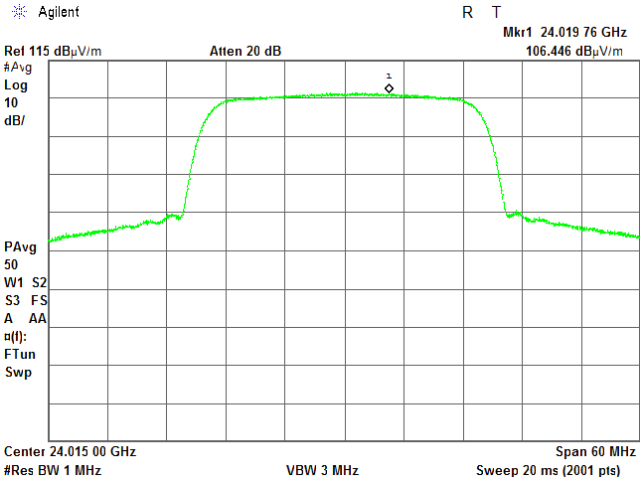
Plot 7.1.9 Radiated emission measurements at the fundamental frequency

TEST SITE:	OATS
TEST DISTANCE:	3 m
ANTENNA POLARIZATION:	Vertical
EUT POSITION:	Typical (Vertical)
EMISSION BANDWIDTH:	30 MHz
MODULATION:	QPSK

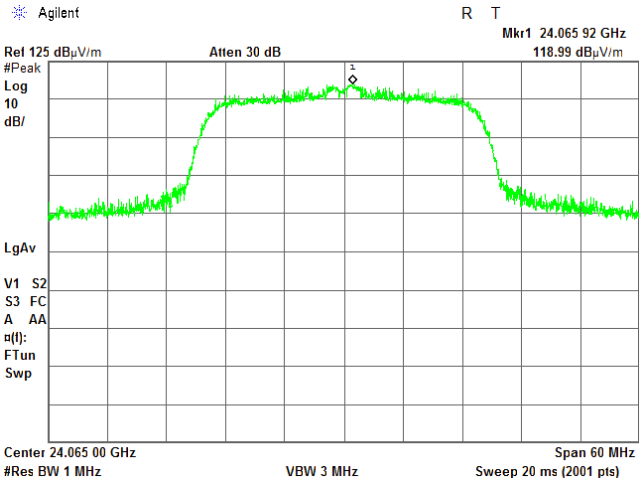
CARRIER FREQUENCY: Low
DETECTOR: Peak



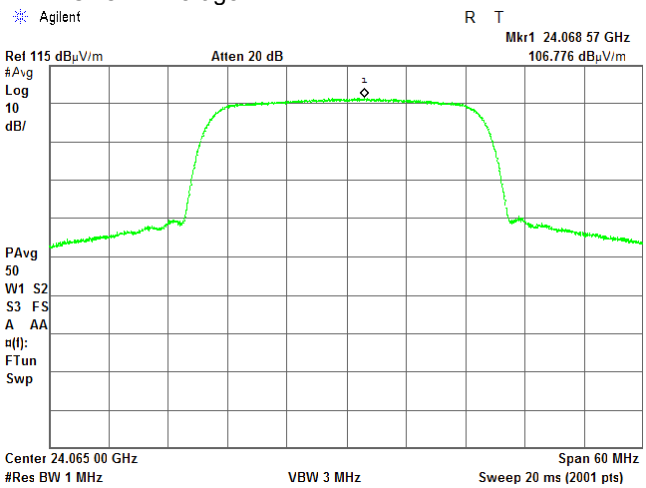
DETECTOR: Average



CARRIER FREQUENCY: Mid
DETECTOR: Peak



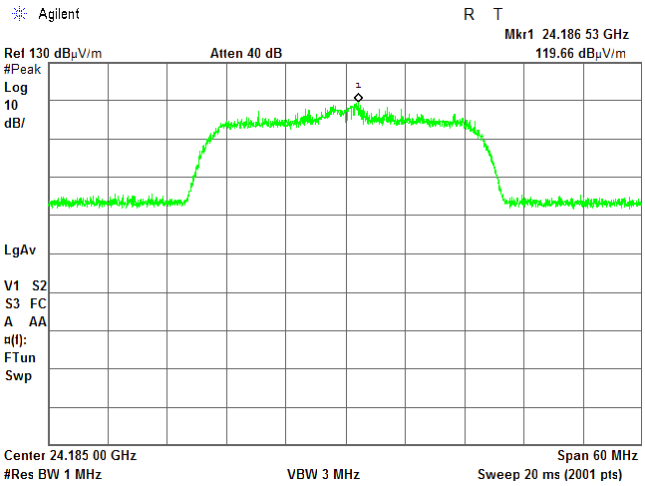
DETECTOR: Average



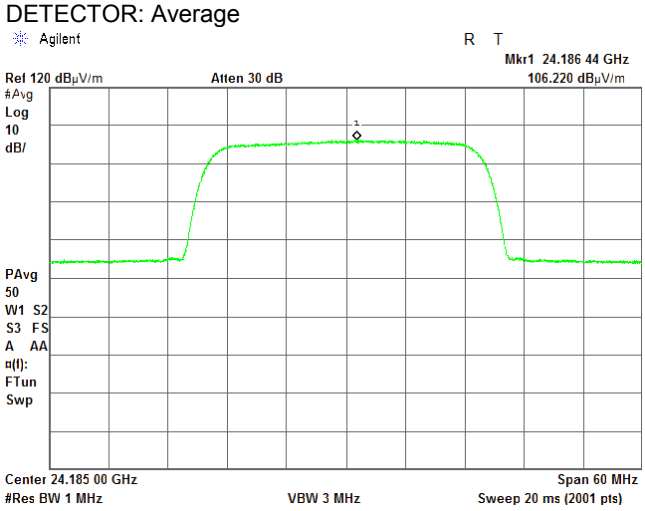
Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

Plot 7.1.10 Radiated emission measurements at the fundamental frequency

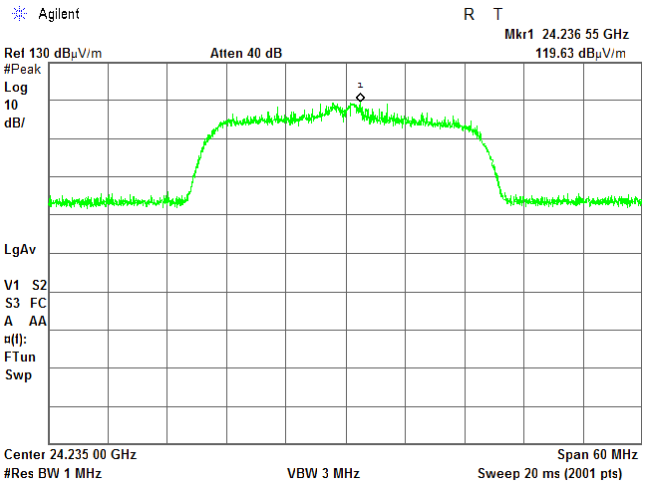
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 30 MHz
MODULATION: QPSK
CARRIER FREQUENCY: Mid
DETECTOR: Peak



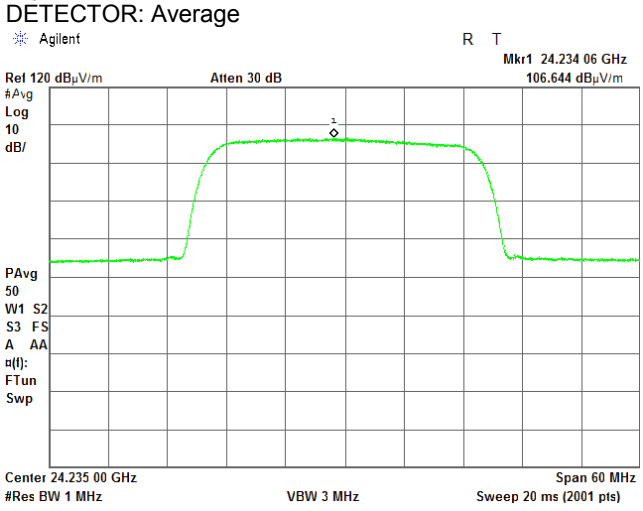
DETECTOR: Average



CARRIER FREQUENCY:
DETECTOR: Peak



High
DETECTOR: Average

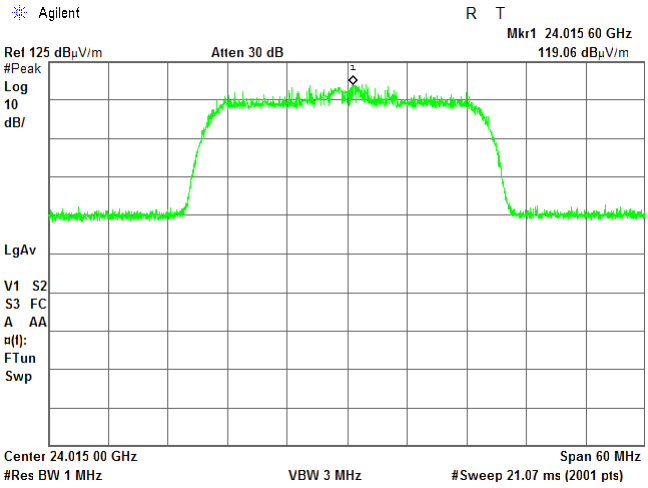


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

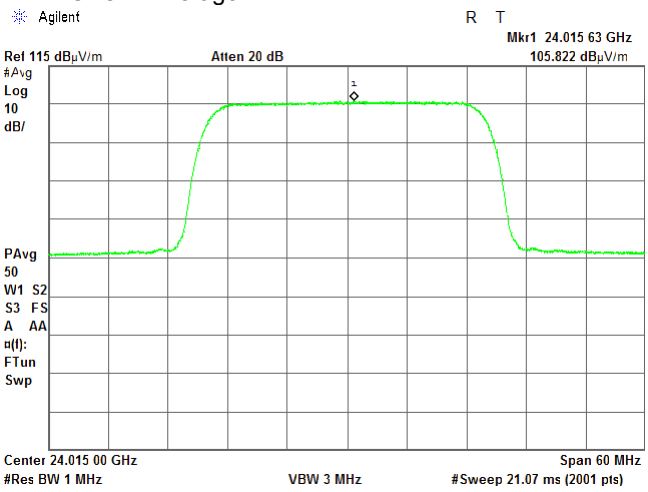
Plot 7.1.11 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 30 MHz
MODULATION: QPSK

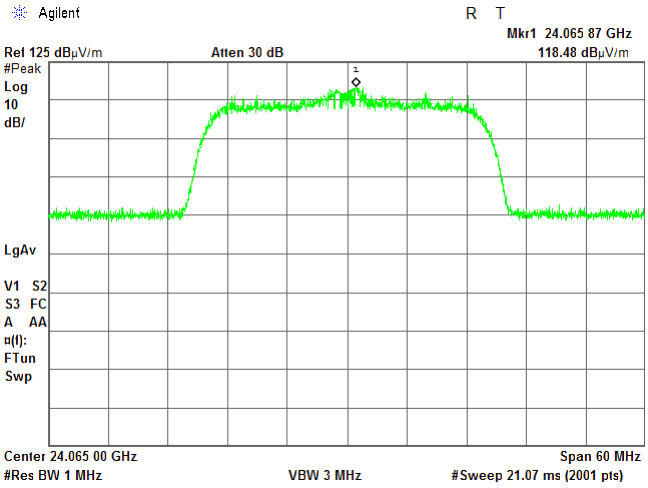
CARRIER FREQUENCY: Low
DETECTOR: Peak



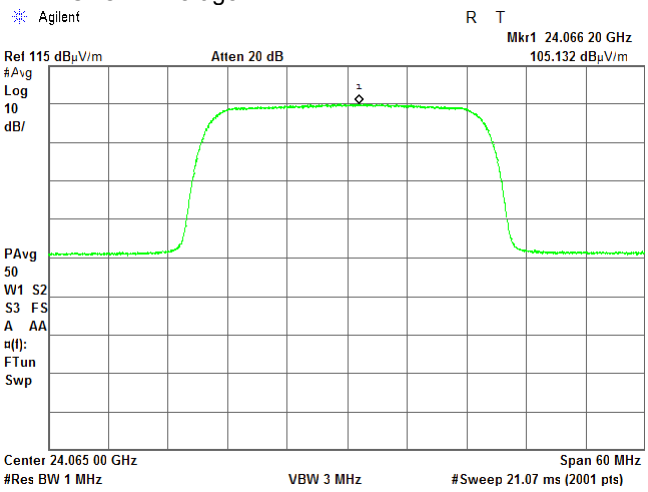
DETECTOR: Average



CARRIER FREQUENCY: Mid
DETECTOR: Peak



DETECTOR: Average

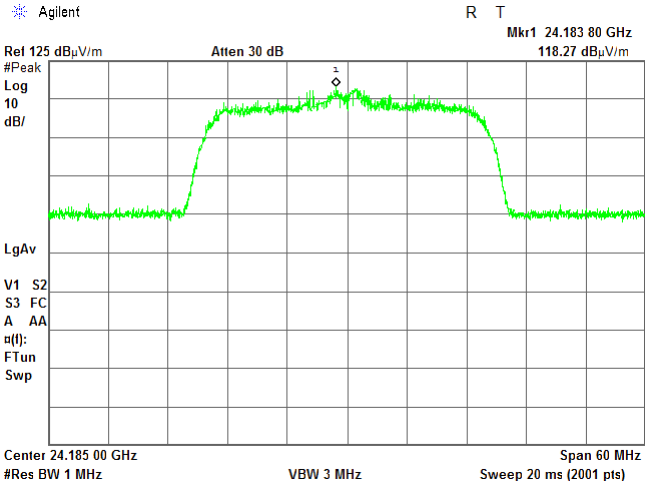


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

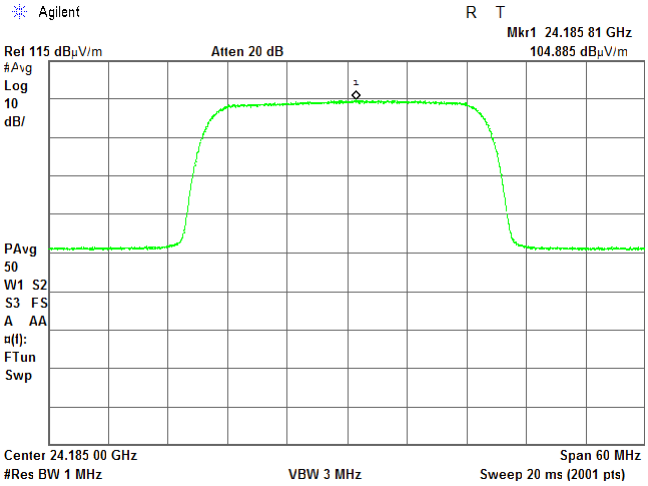
Plot 7.1.12 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 30 MHz
MODULATION: QPSK

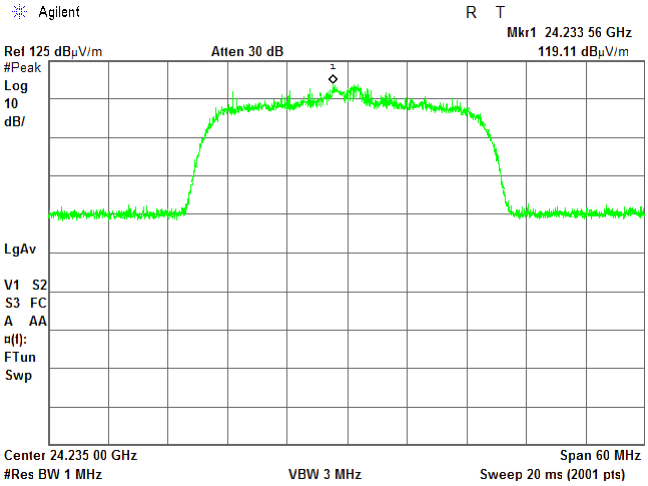
CARRIER FREQUENCY: Mid
DETECTOR: Peak



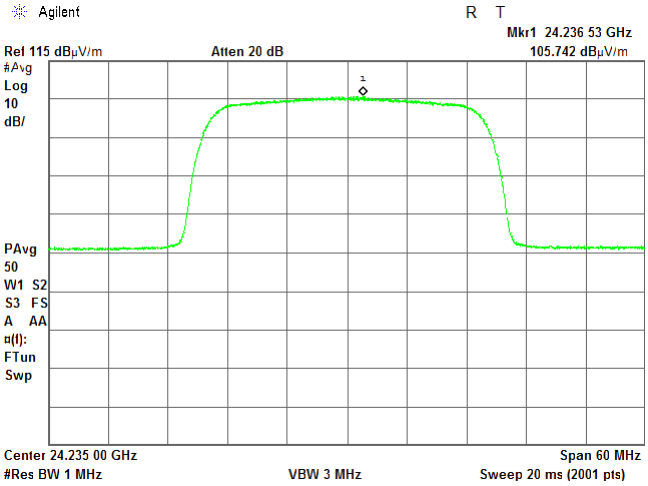
DETECTOR: Average



CARRIER FREQUENCY: High
DETECTOR: Peak



DETECTOR: Average

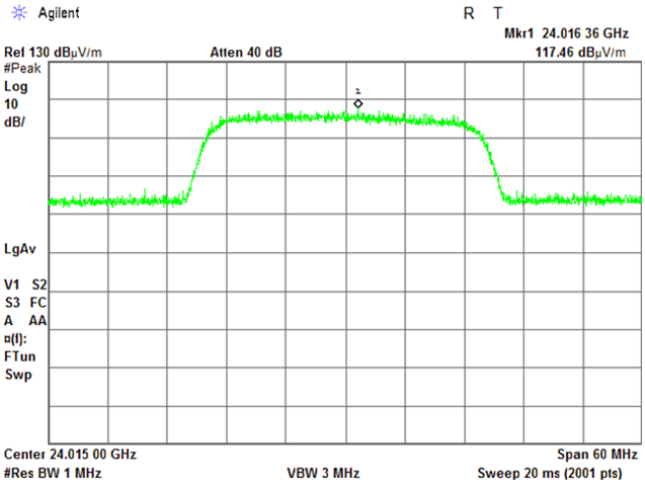


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

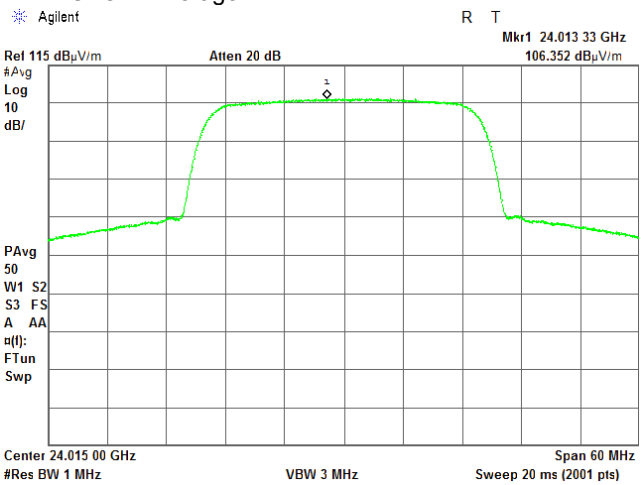
Plot 7.1.13 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 30 MHz
MODULATION: 2048QAM

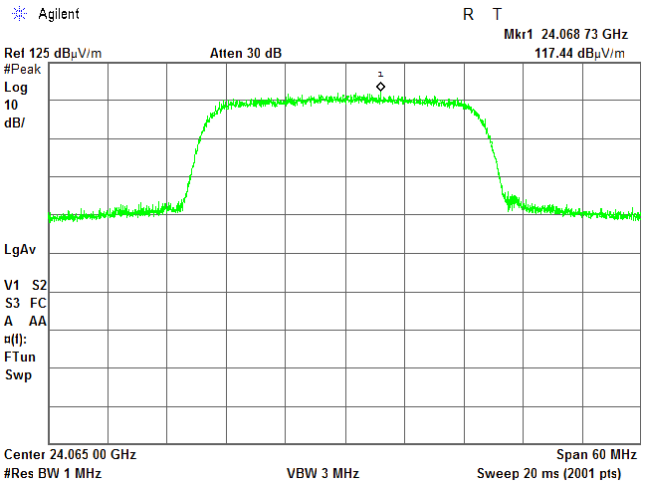
CARRIER FREQUENCY: Low
DETECTOR: Peak



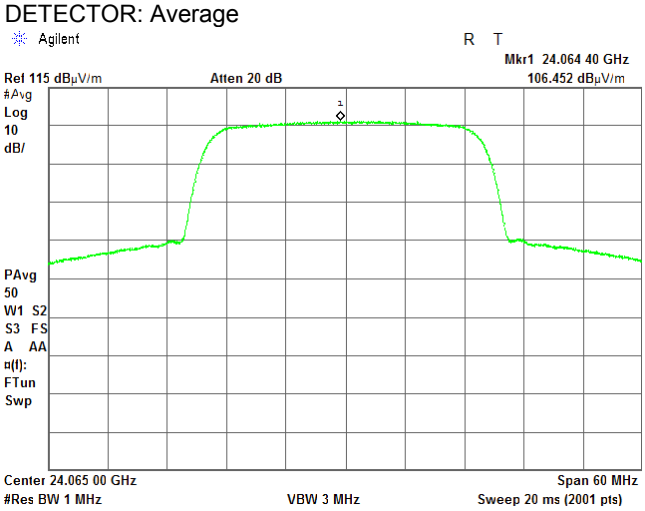
DETECTOR: Average



CARRIER FREQUENCY: Mid
DETECTOR: Peak



DETECTOR: Average

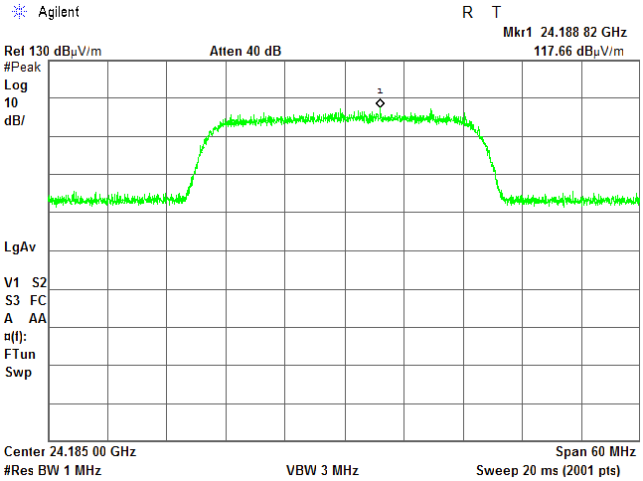


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

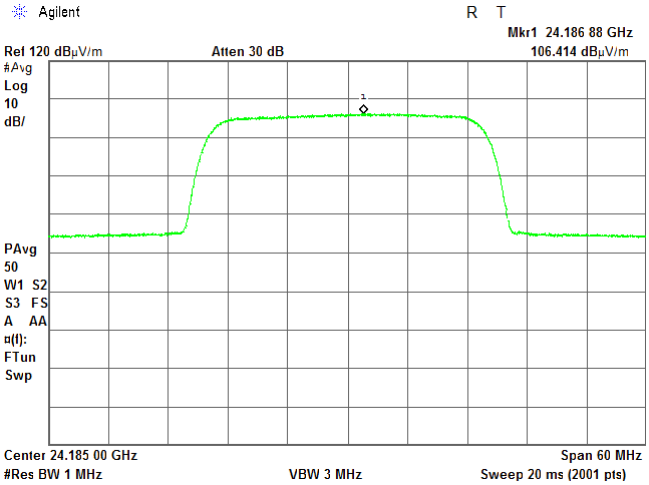
Plot 7.1.14 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 30 MHz
MODULATION: 2048QAM

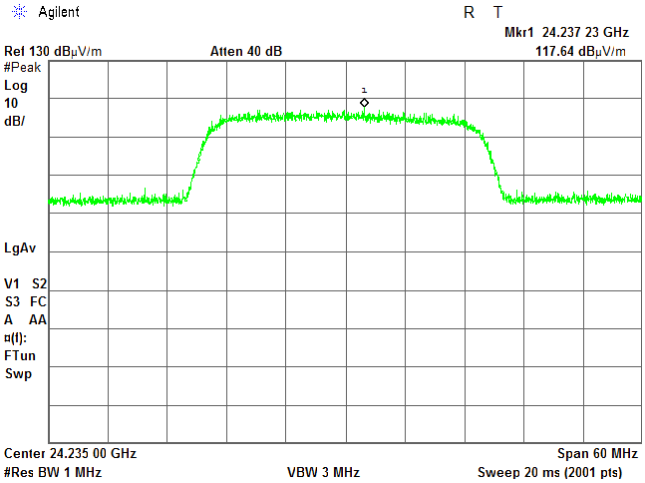
CARRIER FREQUENCY: Mid
DETECTOR: Peak



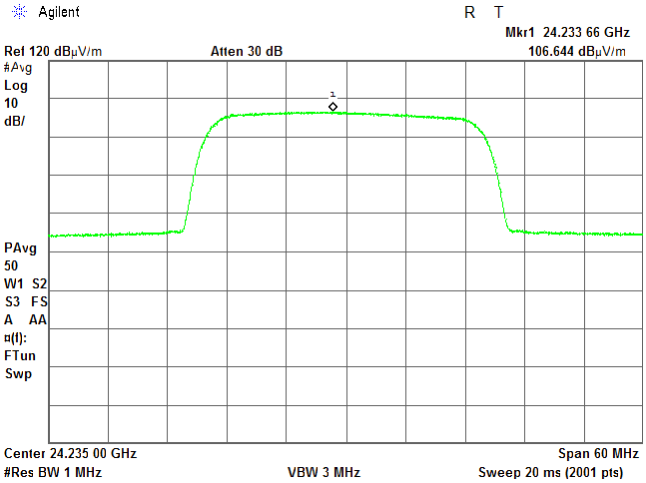
DETECTOR: Average



CARRIER FREQUENCY: High
DETECTOR: Peak



DETECTOR: Average

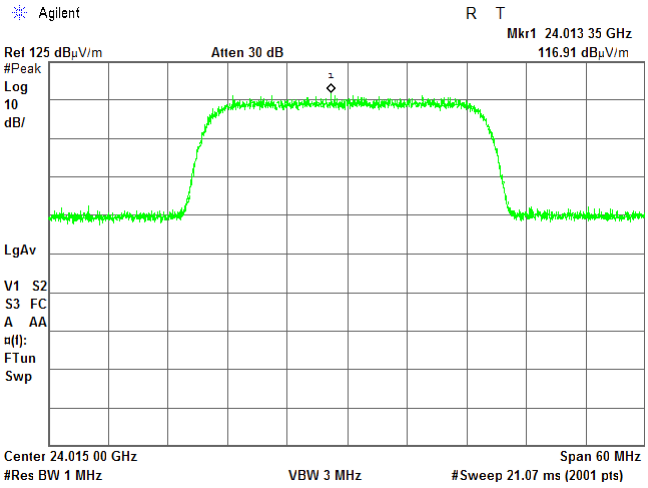


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

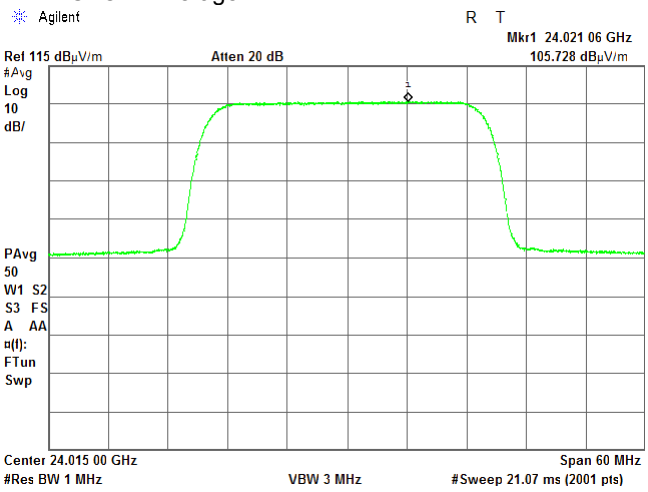
Plot 7.1.15 Radiated emission measurements at the fundamental frequency

TEST SITE:	OATS
TEST DISTANCE:	3 m
ANTENNA POLARIZATION:	Horizontal
EUT POSITION:	Typical (Vertical)
EMISSION BANDWIDTH:	30 MHz
MODULATION:	2048QAM

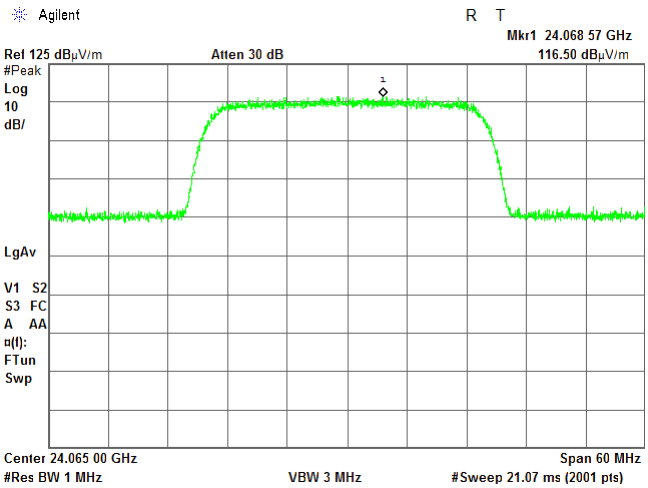
CARRIER FREQUENCY: Low
DETECTOR: Peak



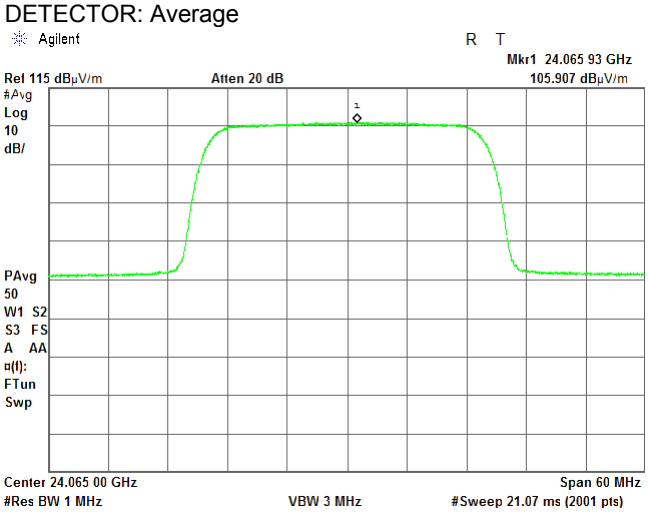
DETECTOR: Average



CARRIER FREQUENCY: Mid
DETECTOR: Peak



DETECTOR: Average

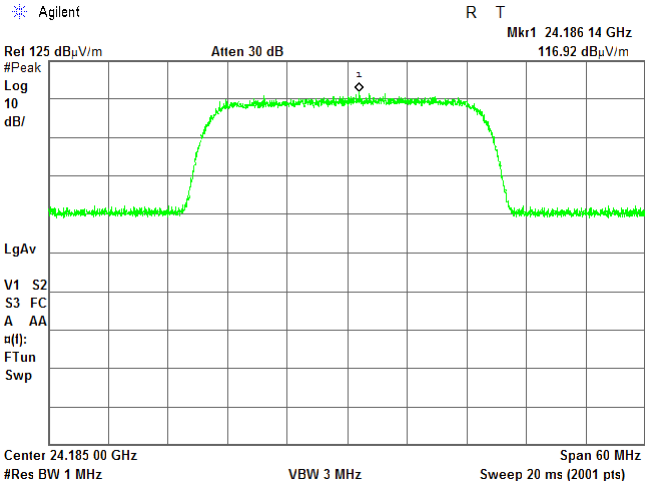


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

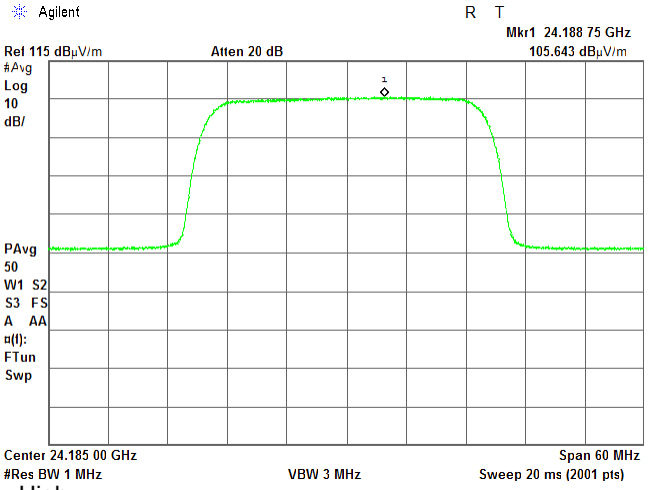
Plot 7.1.16 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 30 MHz
MODULATION: 2048QAM

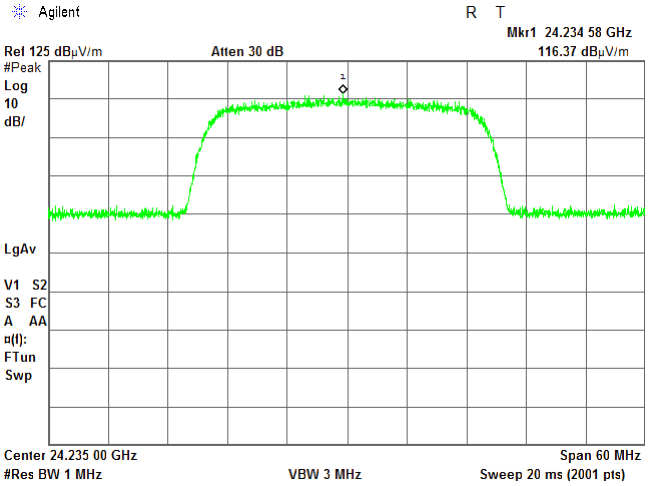
CARRIER FREQUENCY: Mid
DETECTOR: Peak



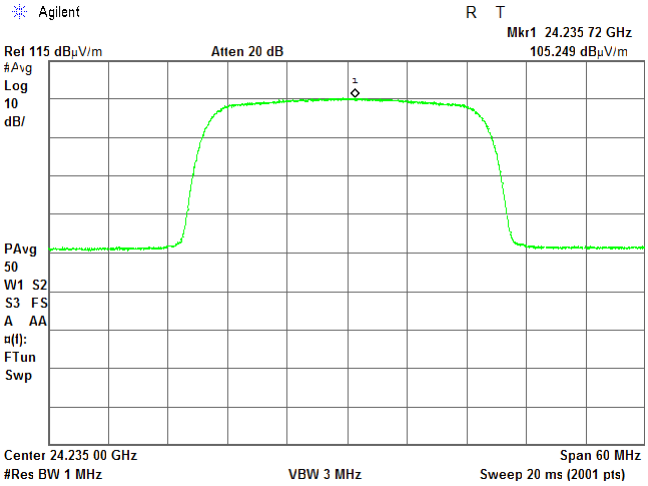
DETECTOR: Average



CARRIER FREQUENCY: High
DETECTOR: Peak



DETECTOR: Average

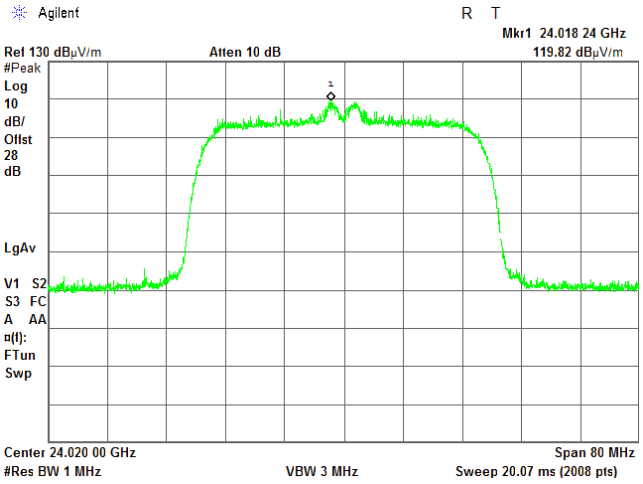


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

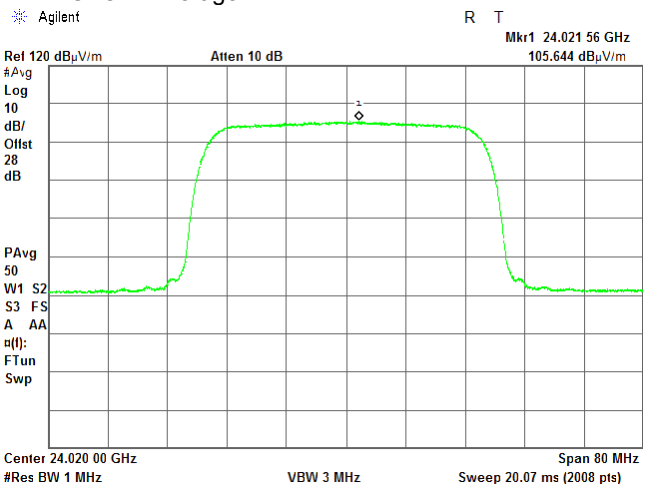
Plot 7.1.17 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 40 MHz
MODULATION: QPSK

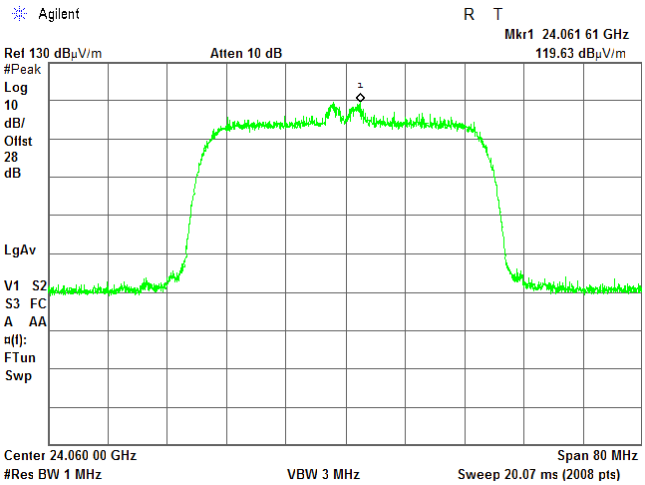
CARRIER FREQUENCY: Low
DETECTOR: Peak



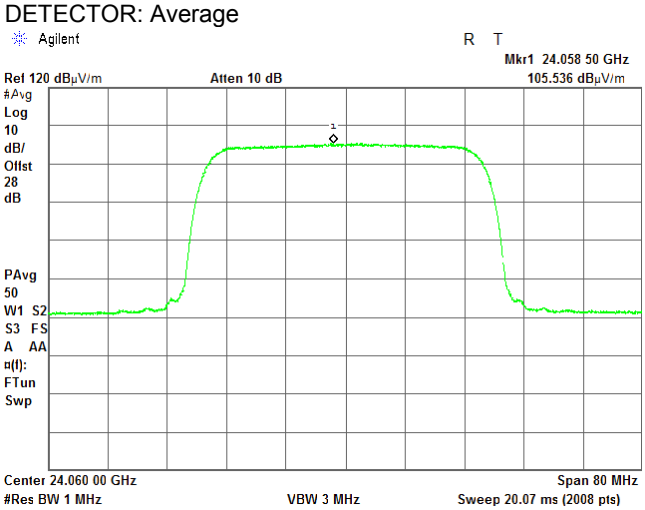
DETECTOR: Average



CARRIER FREQUENCY: Mid
DETECTOR: Peak



DETECTOR: Average

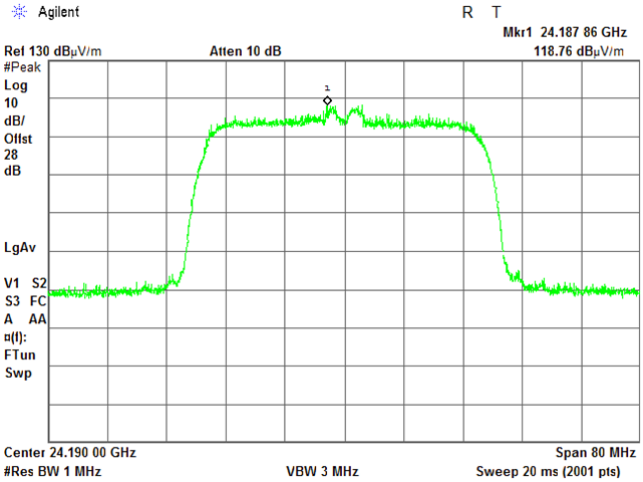


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

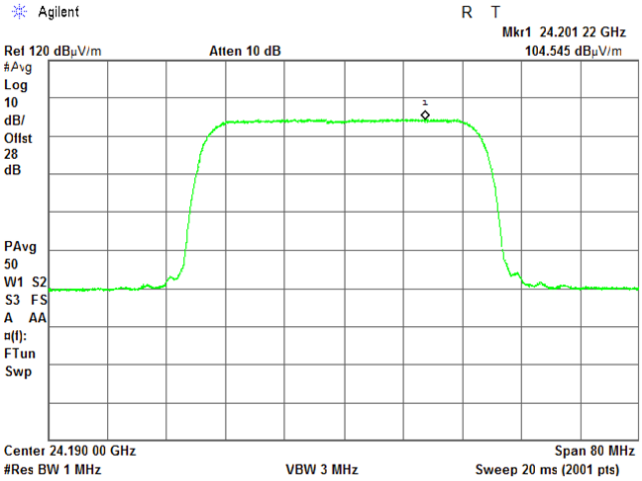
Plot 7.1.18 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 40 MHz
MODULATION: QPSK

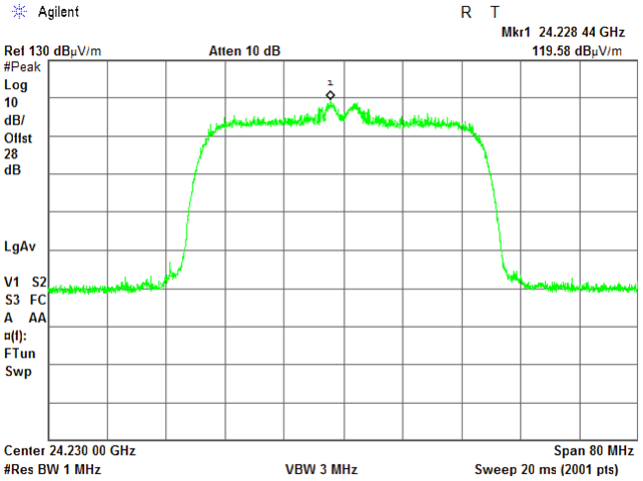
CARRIER FREQUENCY: Mid
DETECTOR: Peak



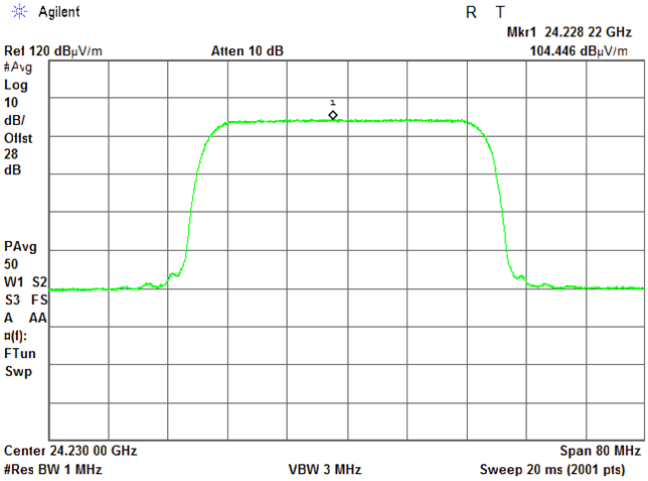
DETECTOR: Average



CARRIER FREQUENCY: High
DETECTOR: Peak



DETECTOR: Average

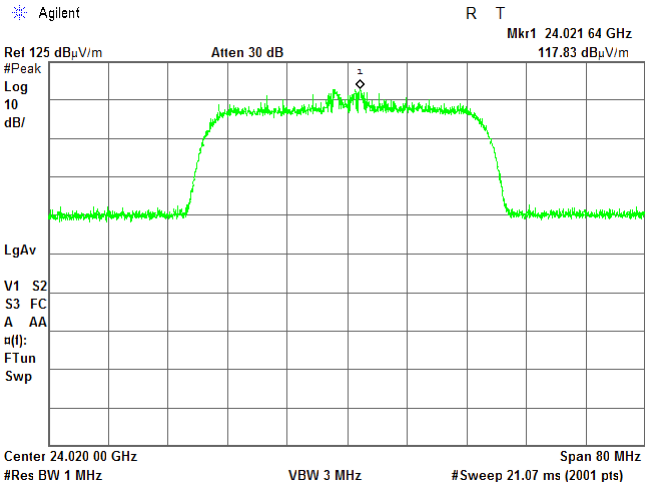


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

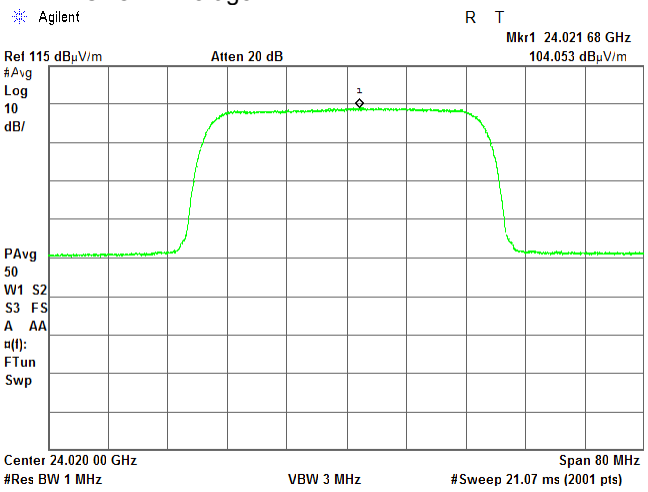
Plot 7.1.19 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 40 MHz
MODULATION: QPSK

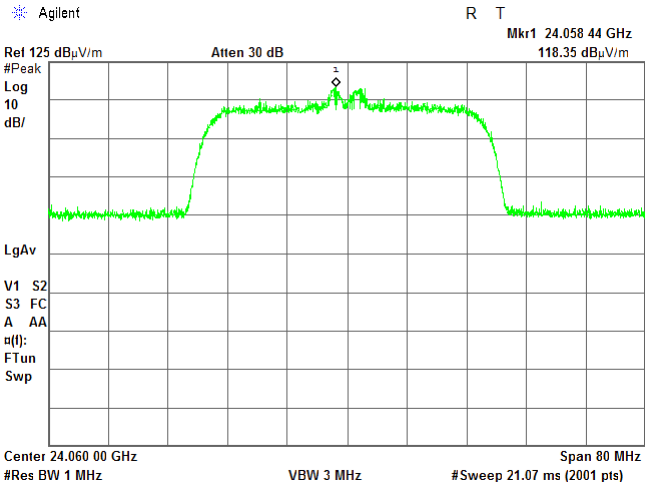
CARRIER FREQUENCY: Low
DETECTOR: Peak



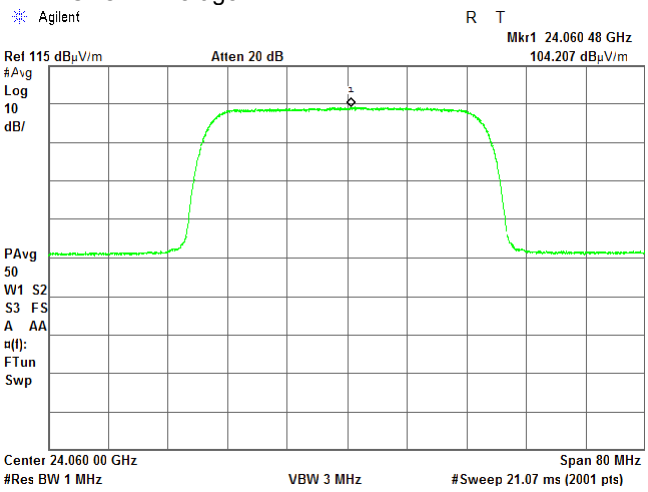
DETECTOR: Average



CARRIER FREQUENCY: Mid
DETECTOR: Peak



DETECTOR: Average

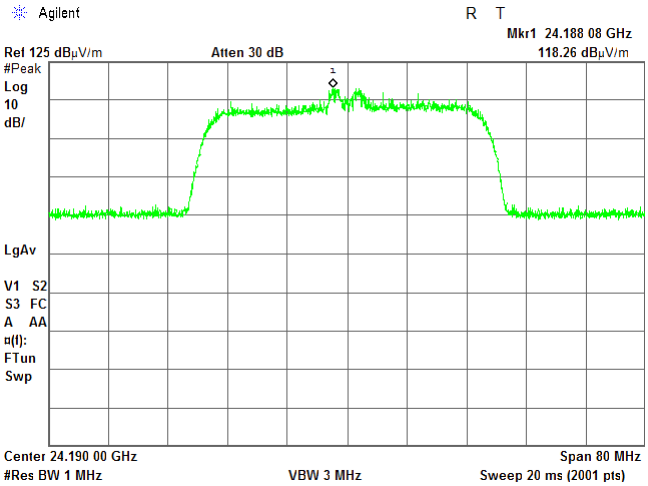


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

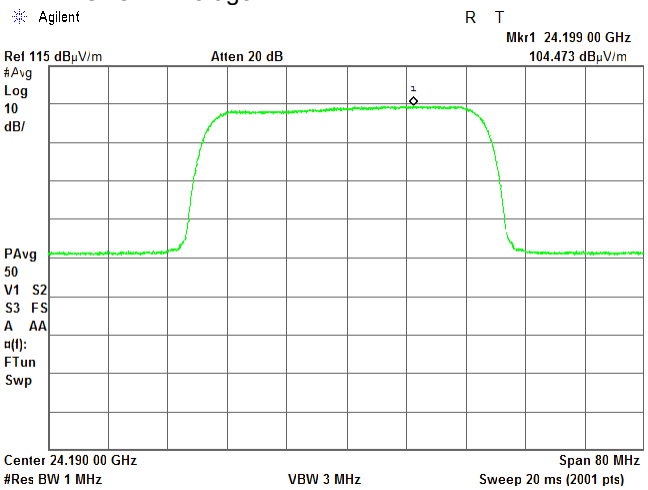
Plot 7.1.20 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 40 MHz
MODULATION: QPSK

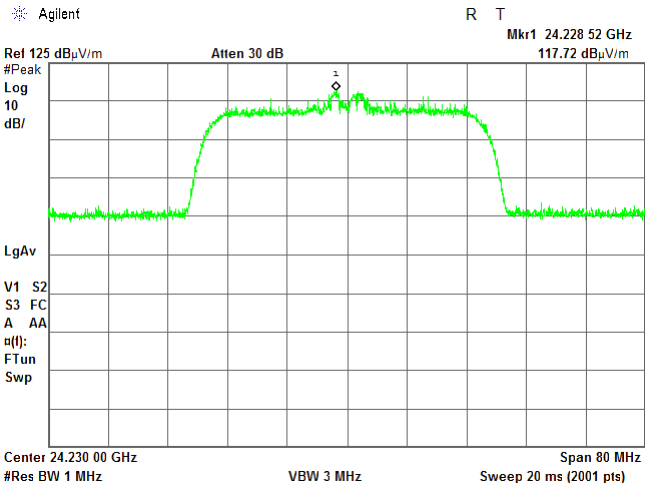
CARRIER FREQUENCY: Mid
DETECTOR: Peak



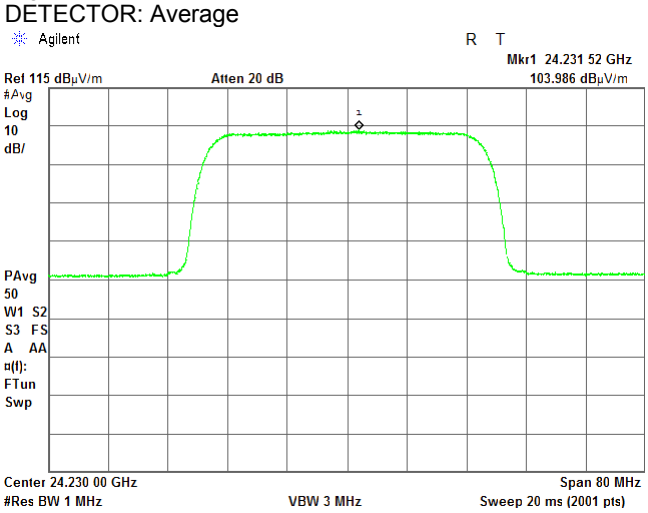
DETECTOR: Average



CARRIER FREQUENCY: High
DETECTOR: Peak



DETECTOR: Average

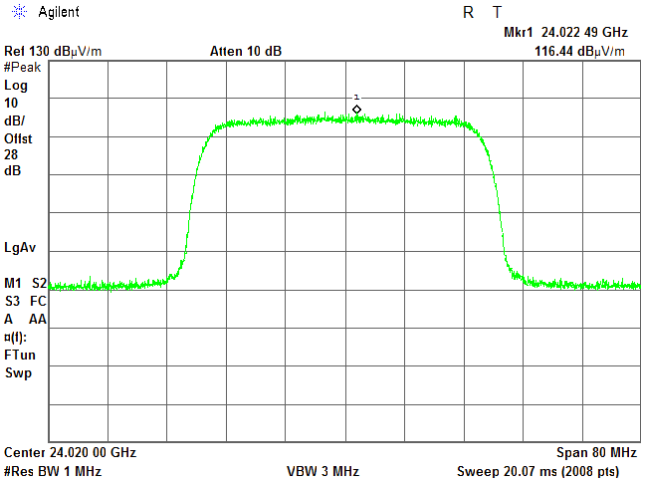


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

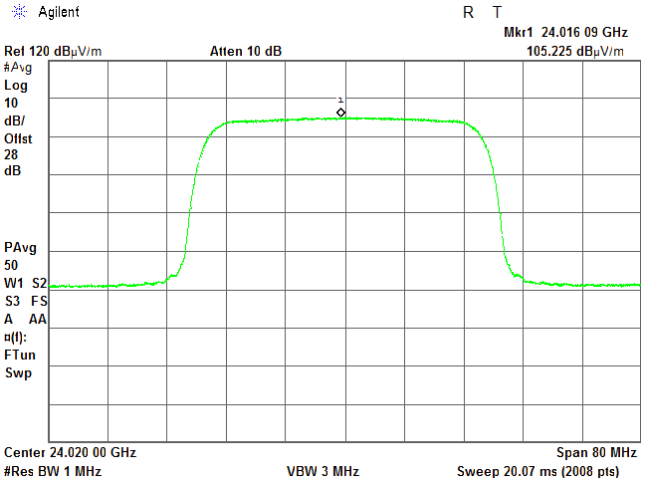
Plot 7.1.21 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 40 MHz 2048QAM

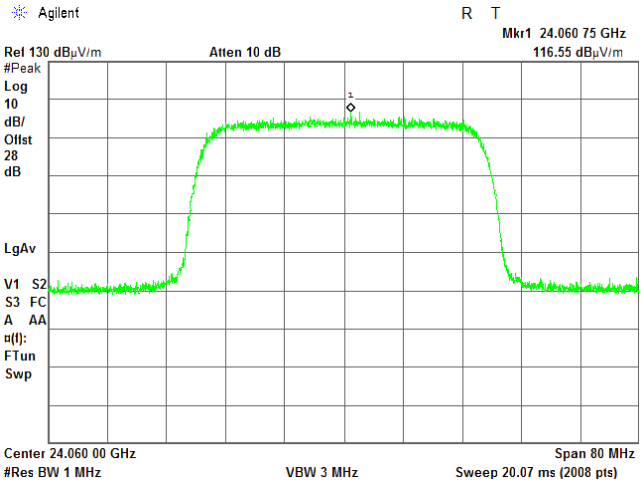
CARRIER FREQUENCY: Low
DETECTOR: Peak



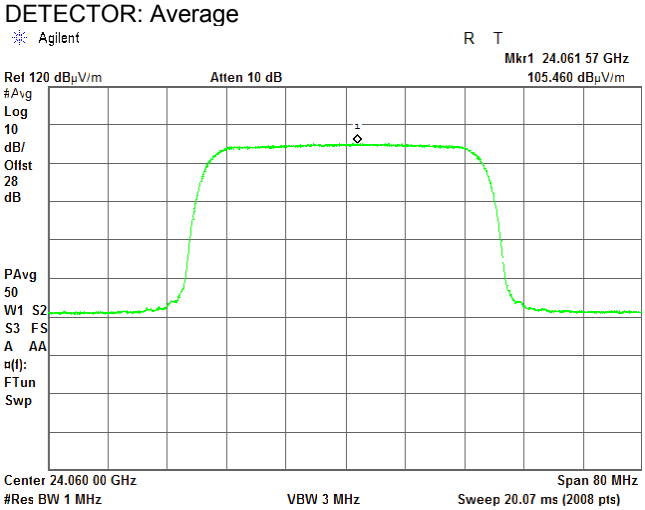
DETECTOR: Average



CARRIER FREQUENCY: Mid
DETECTOR: Peak



DETECTOR: Average

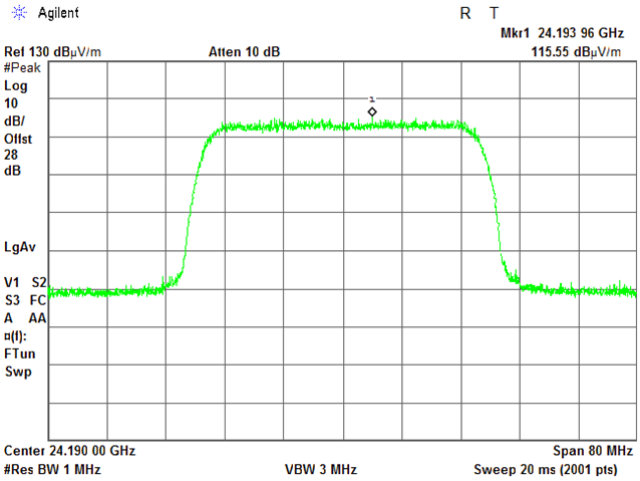


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

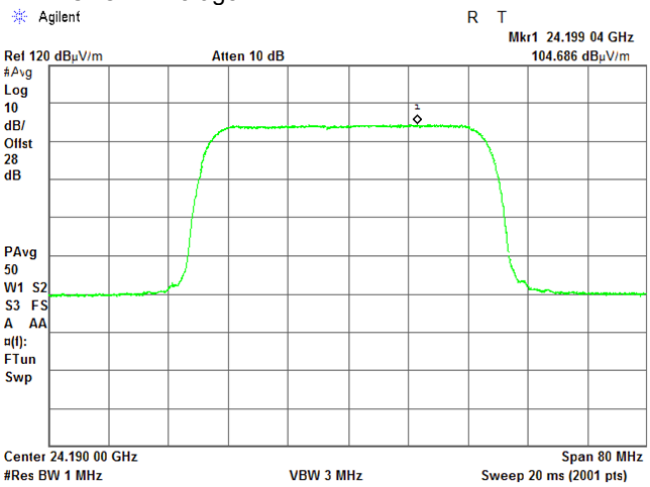
Plot 7.1.22 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 40 MHz 2048QAM

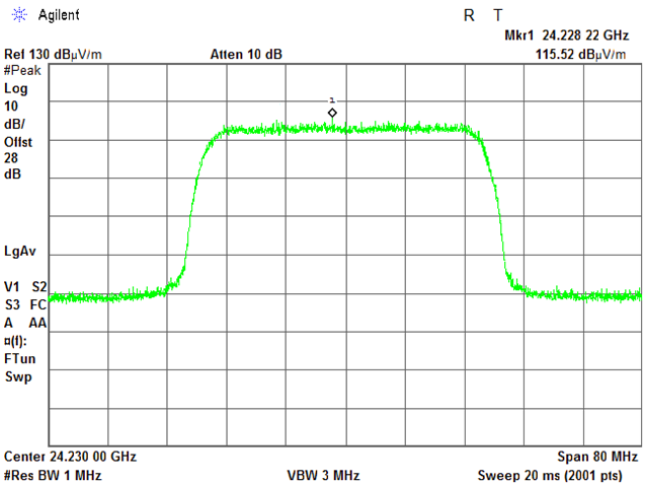
CARRIER FREQUENCY: Mid
DETECTOR: Peak



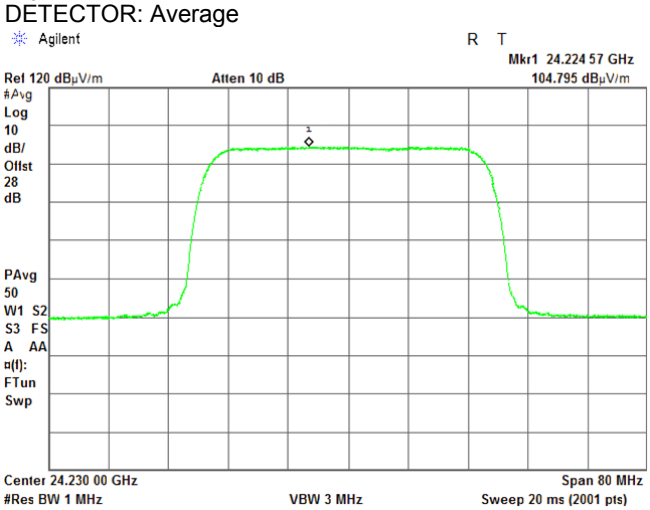
DETECTOR: Average



CARRIER FREQUENCY: High
DETECTOR: Peak



DETECTOR: Average

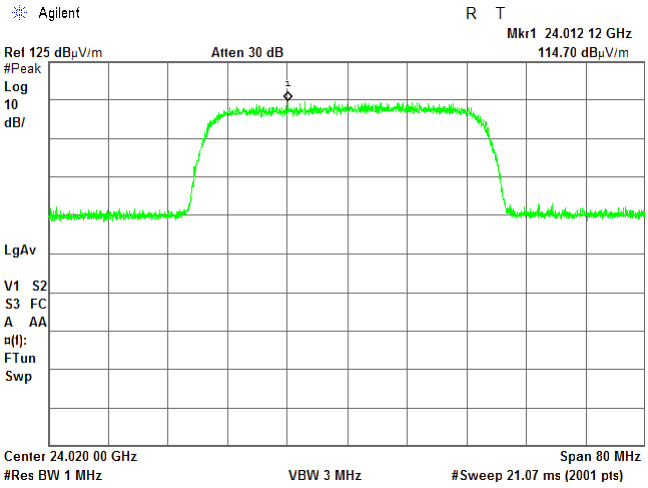


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

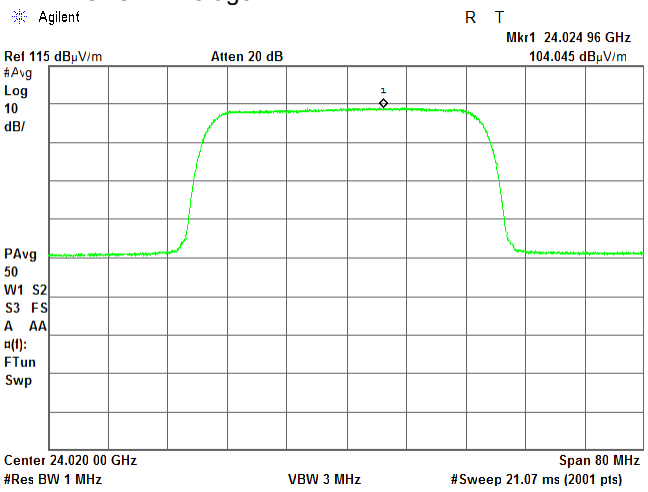
Plot 7.1.23 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 40 MHz
MODULATION: 2048QAM

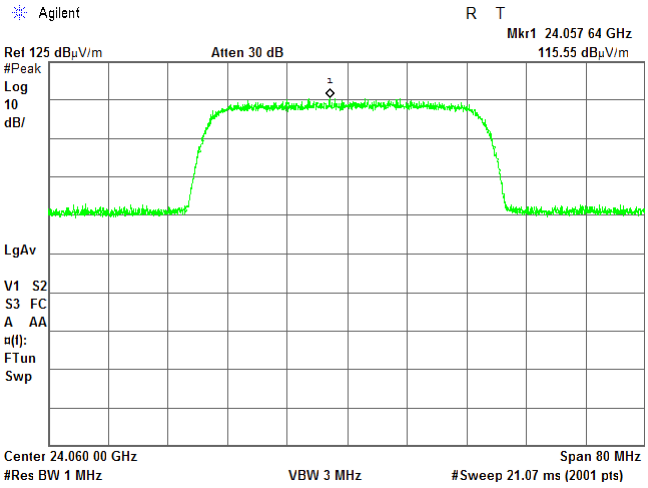
CARRIER FREQUENCY: Low
DETECTOR: Peak



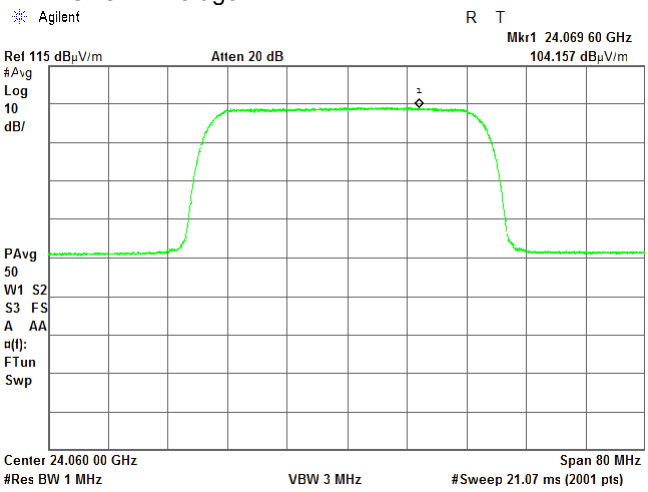
DETECTOR: Average



CARRIER FREQUENCY: Mid
DETECTOR: Peak



DETECTOR: Average

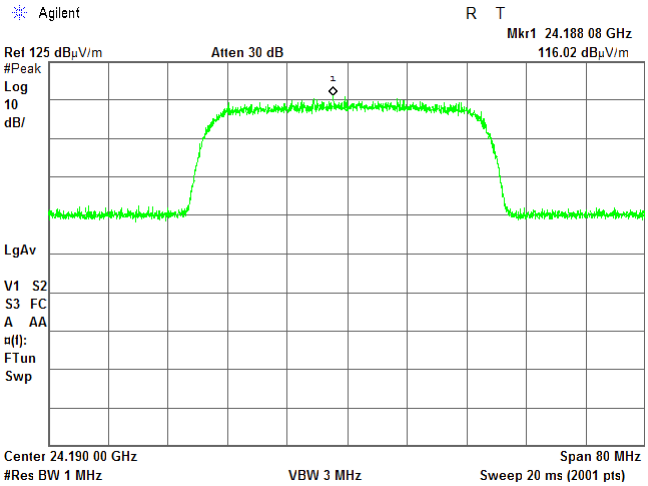


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

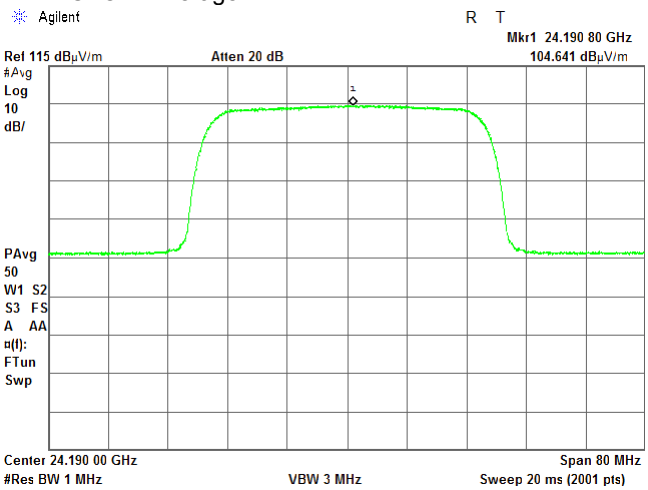
Plot 7.1.24 Radiated emission measurements at the fundamental frequency

TEST SITE:	OATS
TEST DISTANCE:	3 m
ANTENNA POLARIZATION:	Horizontal
EUT POSITION:	Typical (Vertical)
EMISSION BANDWIDTH:	40 MHz
MODULATION:	2048QAM

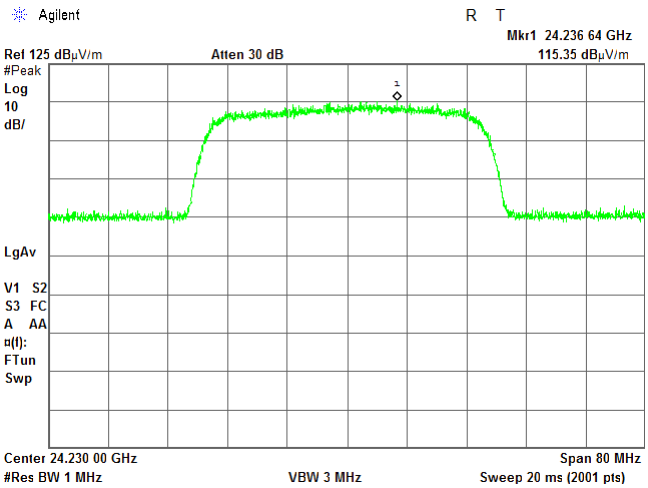
CARRIER FREQUENCY: Mid
DETECTOR: Peak



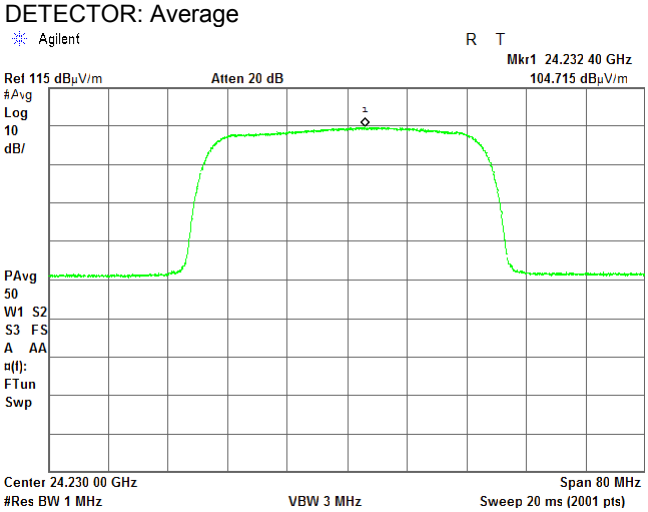
DETECTOR: Average



CARRIER FREQUENCY: High
DETECTOR: Peak



DETECTOR: Average

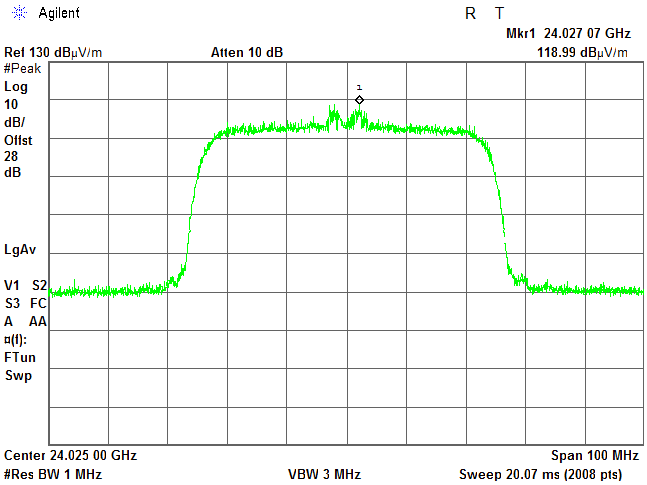


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

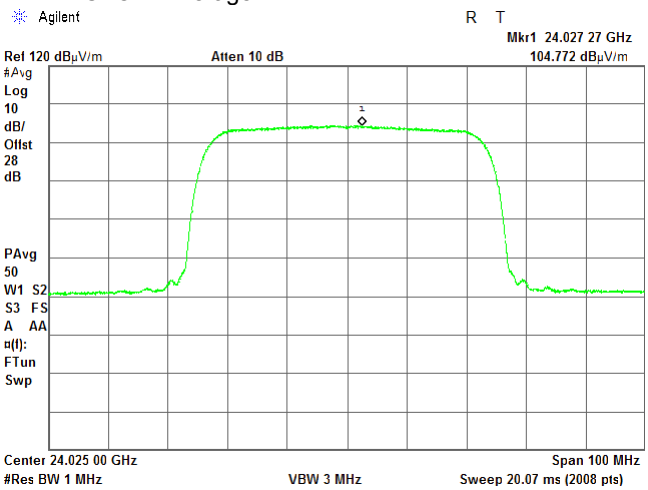
Plot 7.1.25 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 50 MHz
MODULATION: QPSK

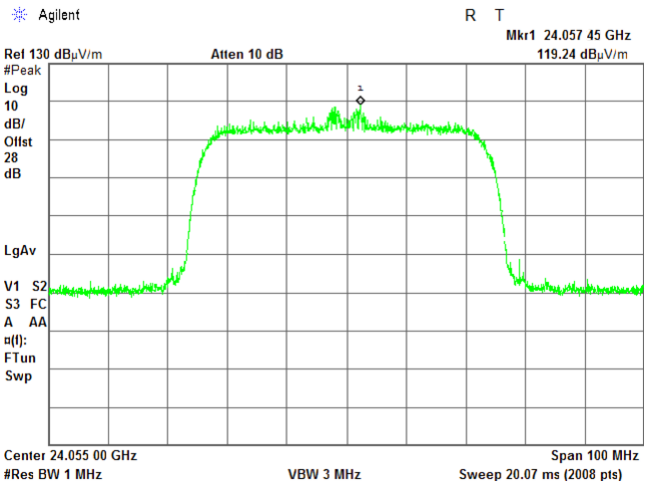
CARRIER FREQUENCY: Low
DETECTOR: Peak



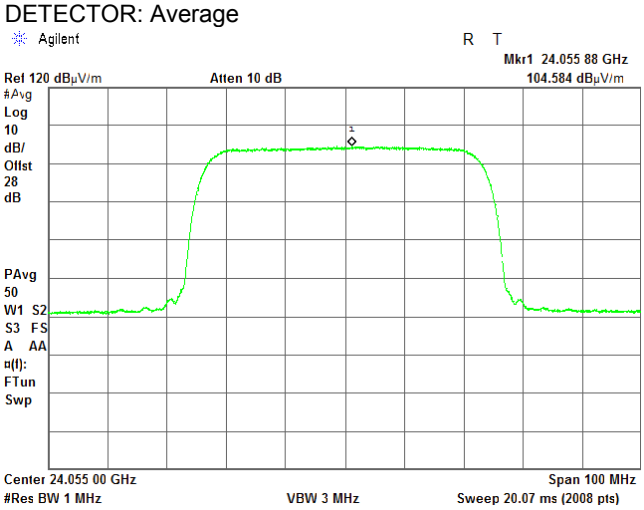
DETECTOR: Average



CARRIER FREQUENCY: Mid
DETECTOR: Peak



DETECTOR: Average

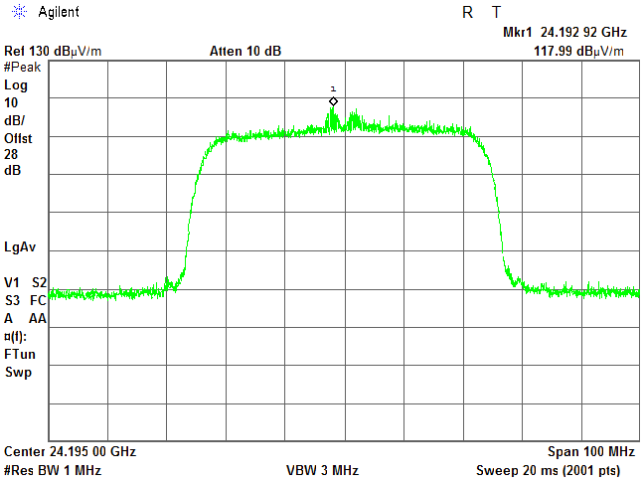


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

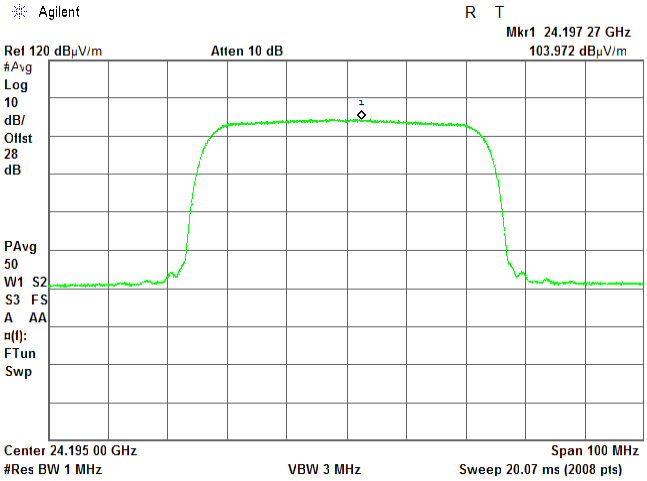
Plot 7.1.26 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 50 MHz
MODULATION: QPSK

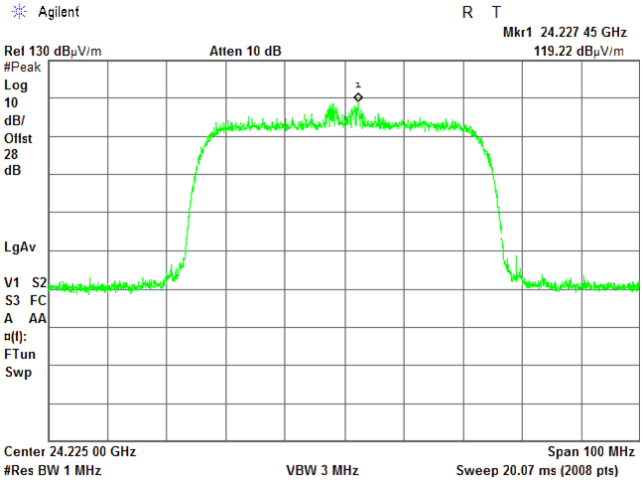
CARRIER FREQUENCY: Mid
DETECTOR: Peak



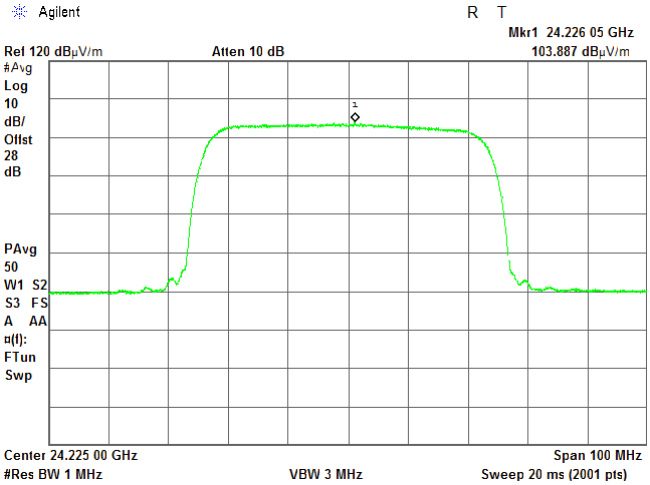
DETECTOR: Average



CARRIER FREQUENCY: High
DETECTOR: Peak



DETECTOR: Average

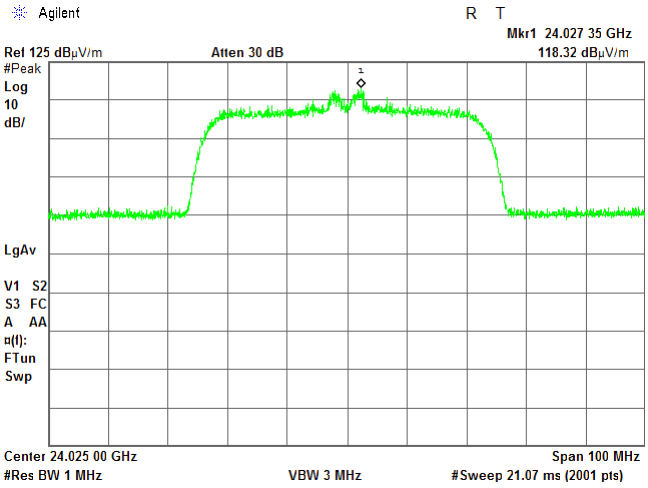


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

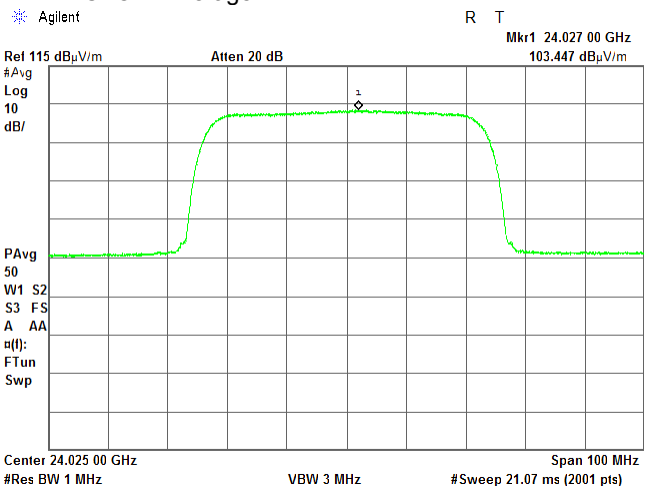
Plot 7.1.27 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 50 MHz
MODULATION: QPSK

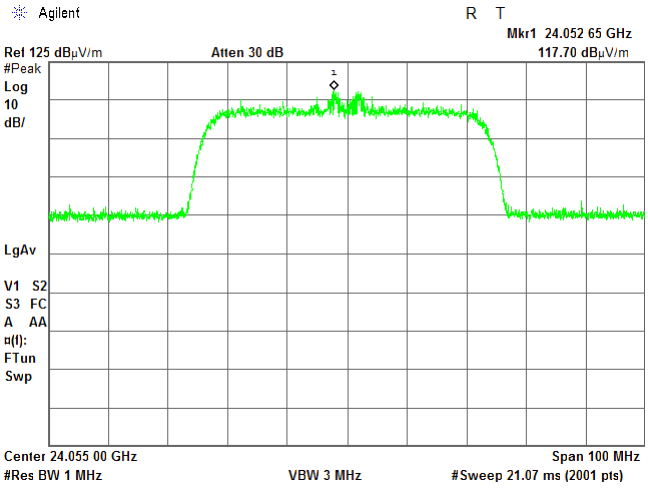
CARRIER FREQUENCY: Low
DETECTOR: Peak



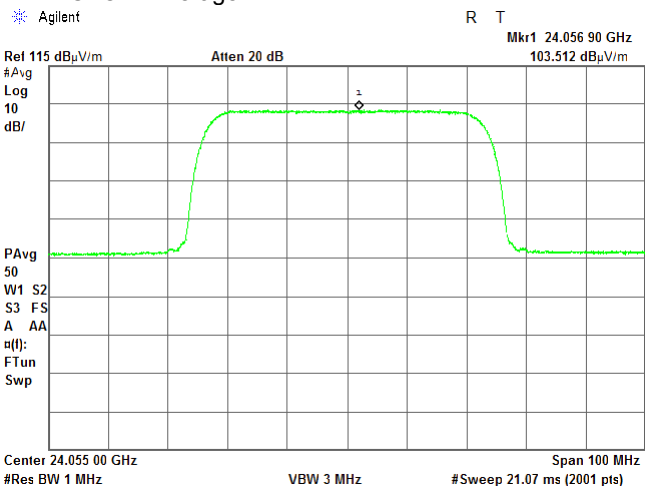
DETECTOR: Average



CARRIER FREQUENCY: Mid
DETECTOR: Peak



DETECTOR: Average

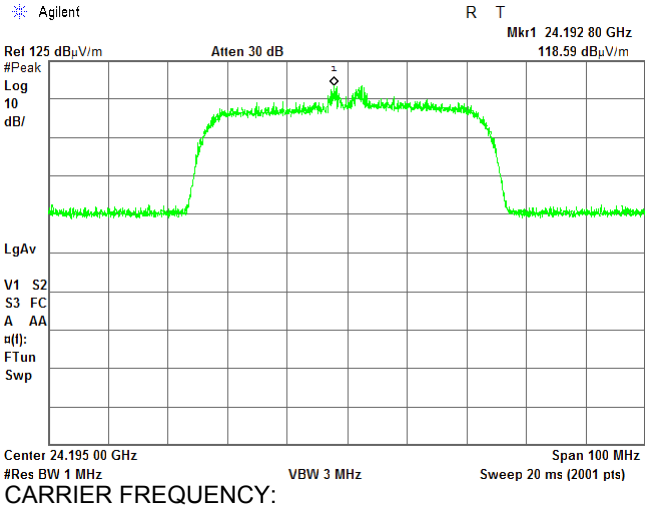


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

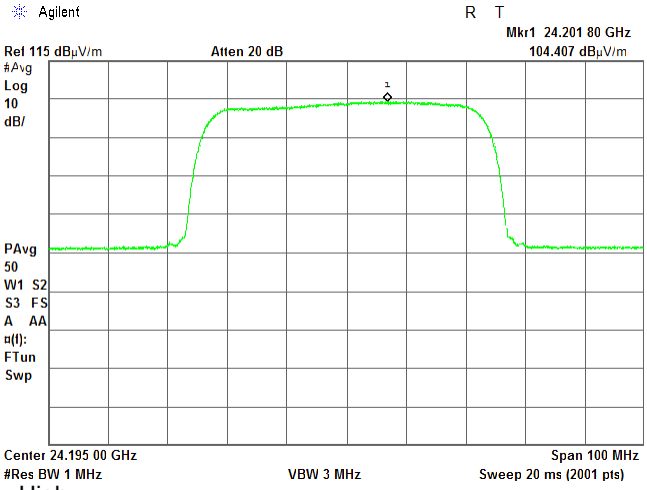
Plot 7.1.28 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 50 MHz
MODULATION: QPSK

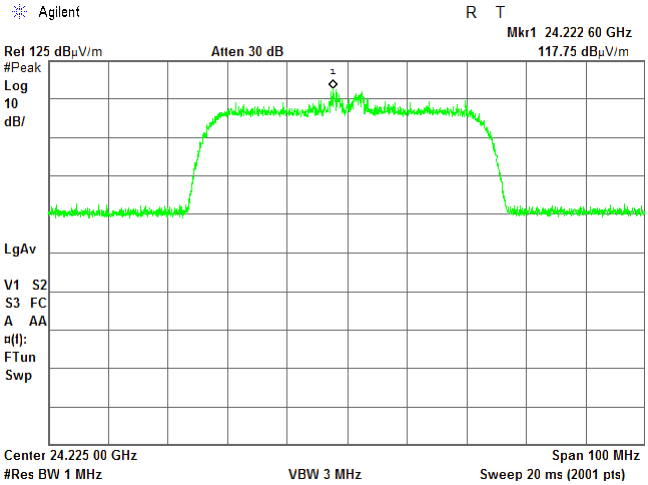
CARRIER FREQUENCY: Mid
DETECTOR: Peak



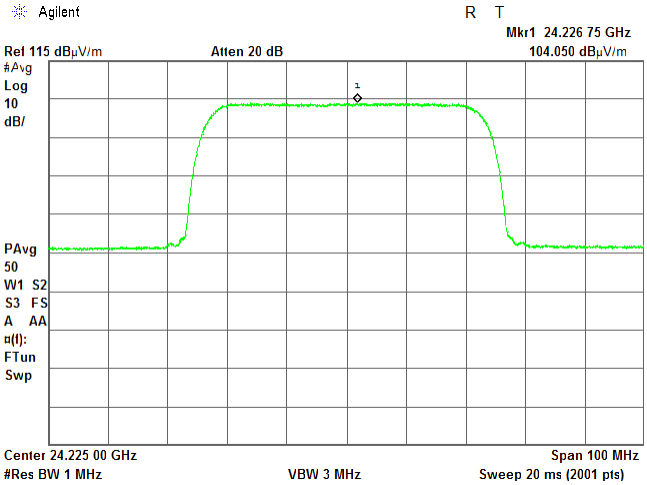
DETECTOR: Average



CARRIER FREQUENCY:
DETECTOR: Peak



High
DETECTOR: Average

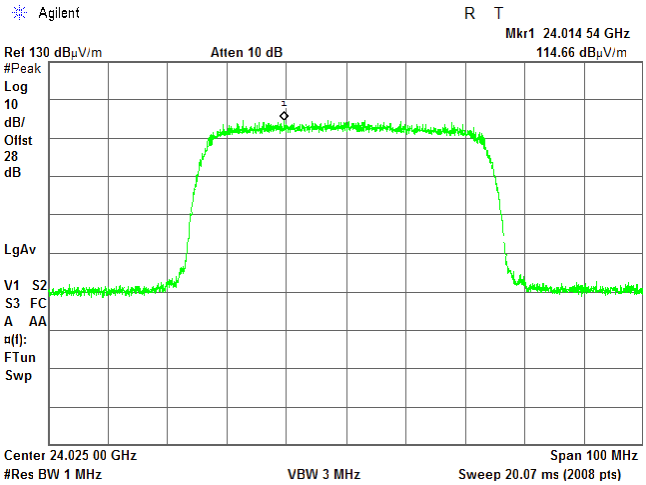


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

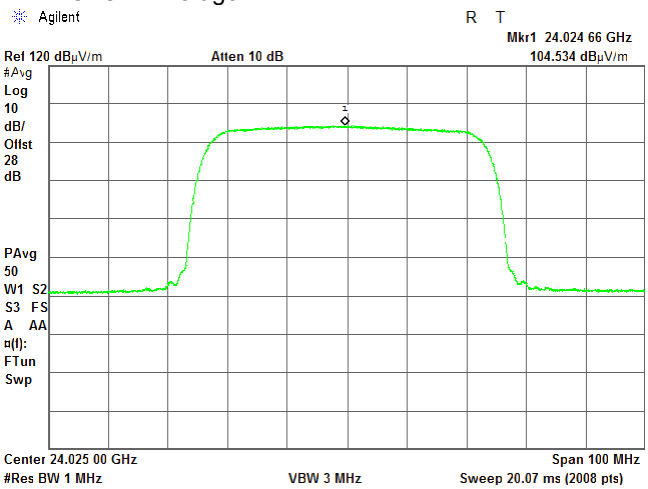
Plot 7.1.29 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 50 MHz
MODULATION: 2048QAM

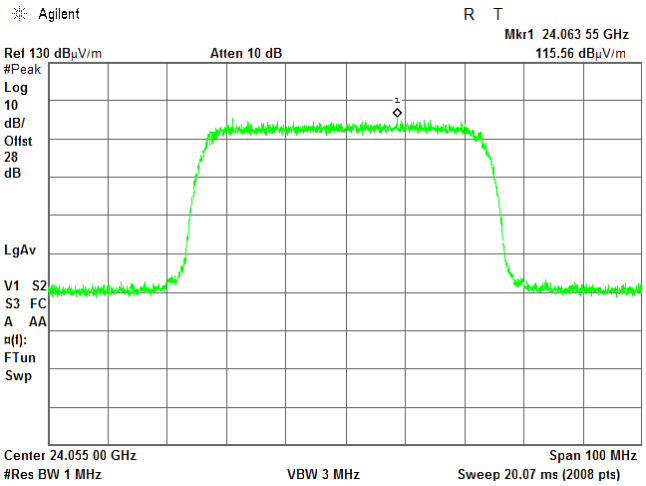
CARRIER FREQUENCY: Low
DETECTOR: Peak



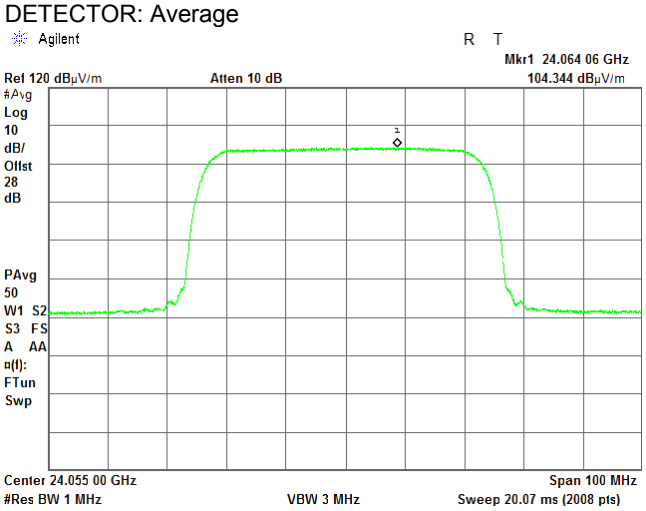
DETECTOR: Average



CARRIER FREQUENCY: Mid
DETECTOR: Peak



DETECTOR: Average

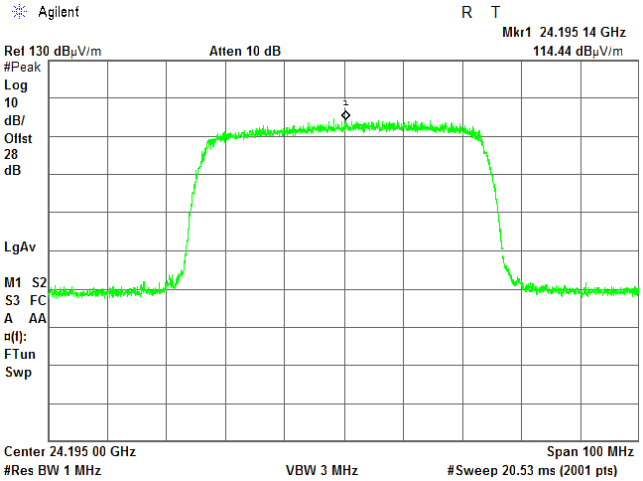


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

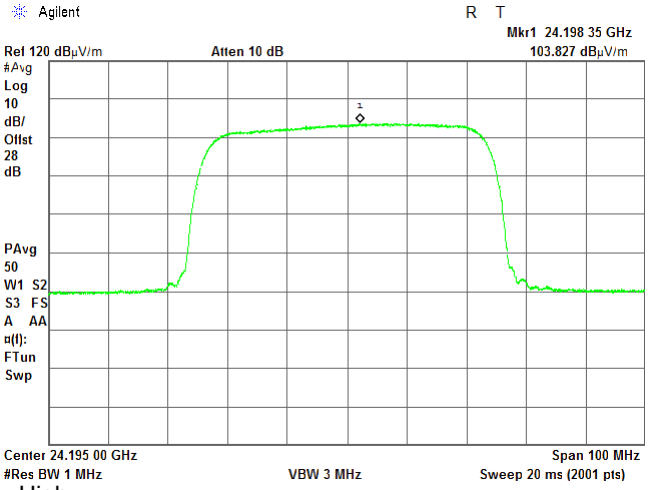
Plot 7.1.30 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 50 MHz
MODULATION: 2048QAM

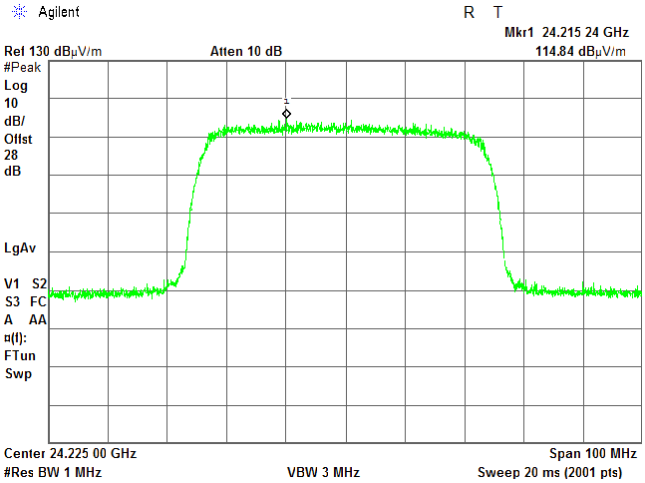
CARRIER FREQUENCY: Mid
DETECTOR: Peak



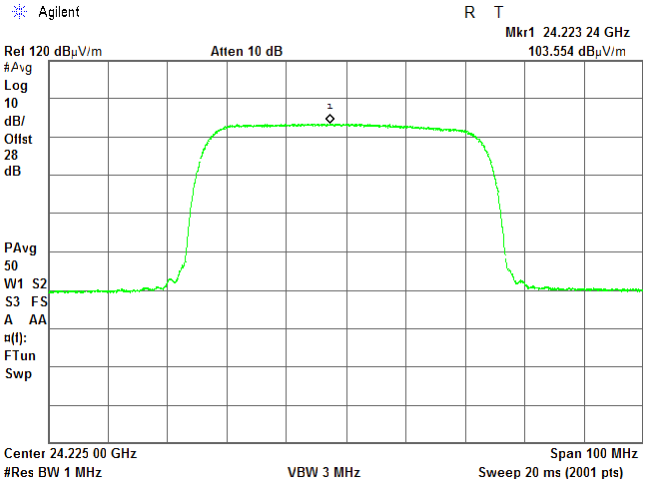
DETECTOR: Average



CARRIER FREQUENCY: High
DETECTOR: Peak



DETECTOR: Average

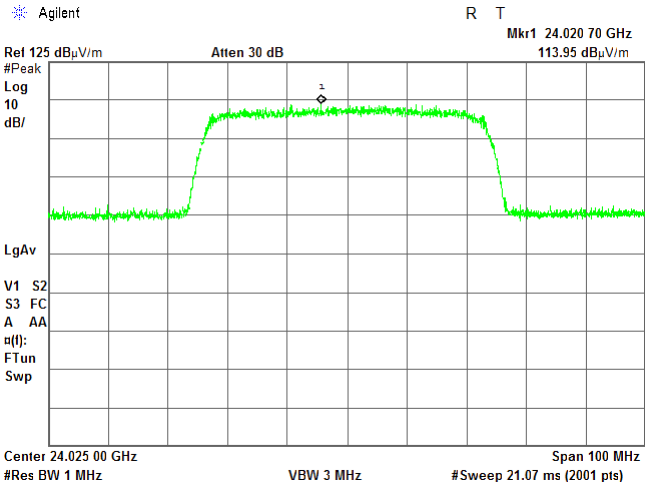


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

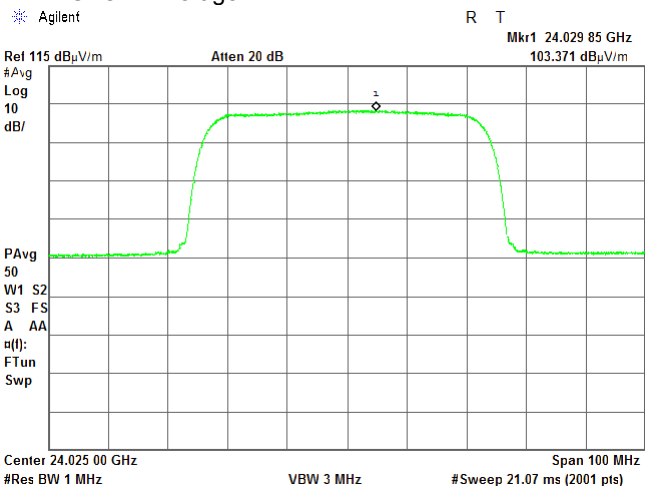
Plot 7.1.31 Radiated emission measurements at the fundamental frequency

TEST SITE:	OATS
TEST DISTANCE:	3 m
ANTENNA POLARIZATION:	Horizontal
EUT POSITION:	Typical (Vertical)
EMISSION BANDWIDTH:	50 MHz
MODULATION:	2048QAM

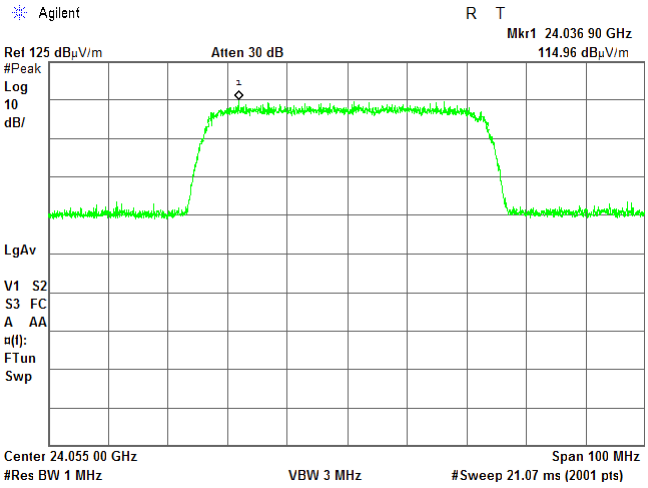
CARRIER FREQUENCY: Low
DETECTOR: Peak



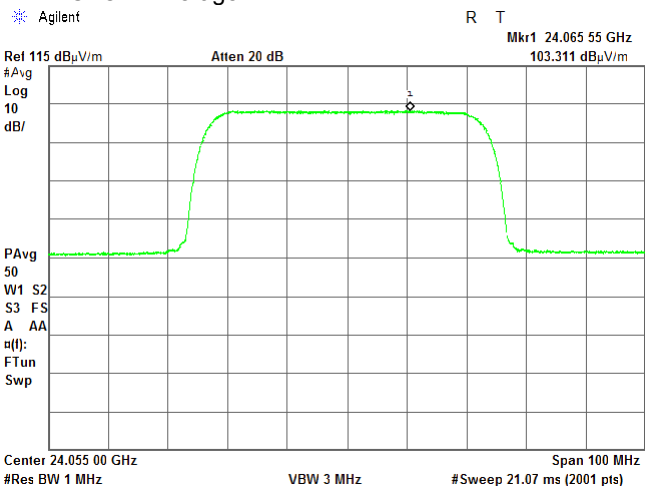
DETECTOR: Average



CARRIER FREQUENCY: Mid
DETECTOR: Peak



DETECTOR: Average

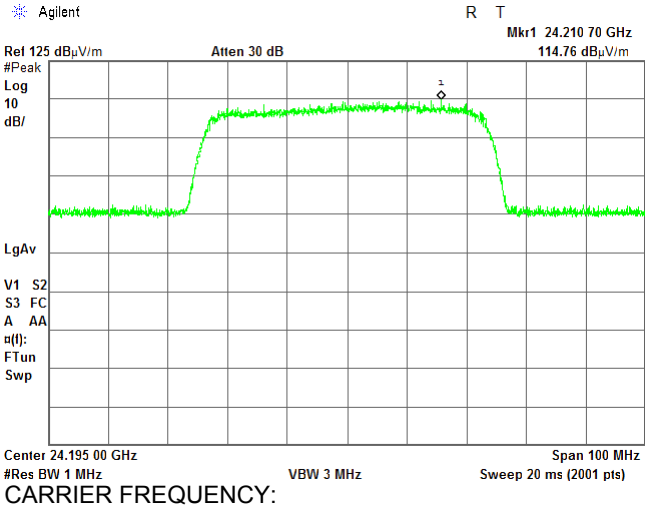


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

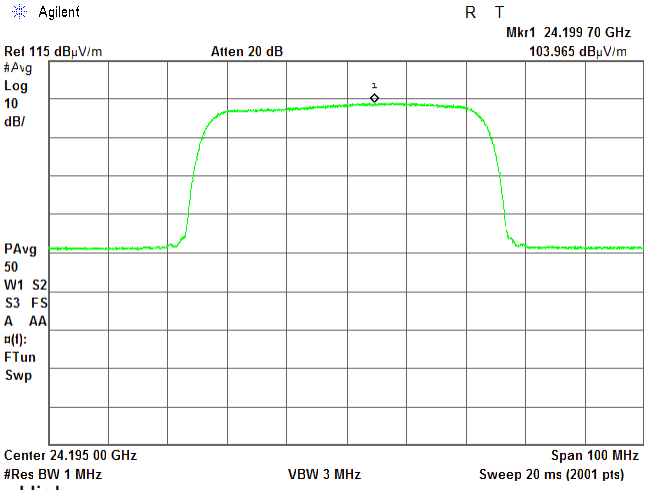
Plot 7.1.32 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 50 MHz
MODULATION: 2048QAM

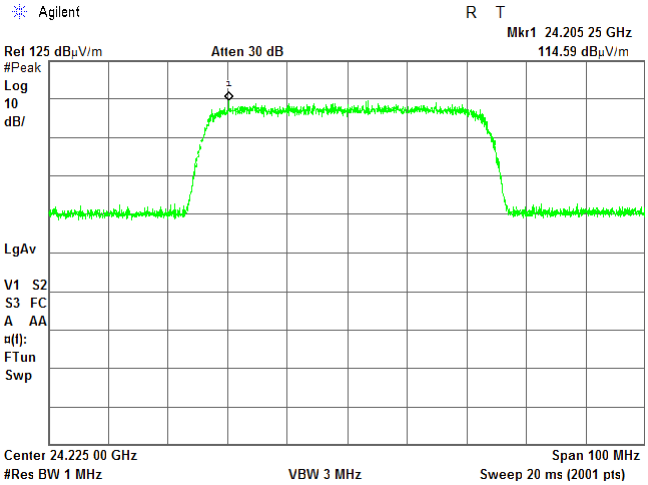
CARRIER FREQUENCY: Mid
DETECTOR: Peak



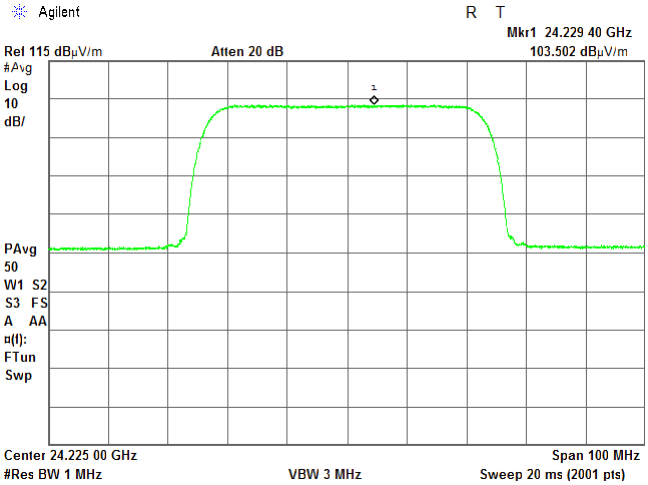
DETECTOR: Average



CARRIER FREQUENCY: High
DETECTOR: Peak



DETECTOR: Average

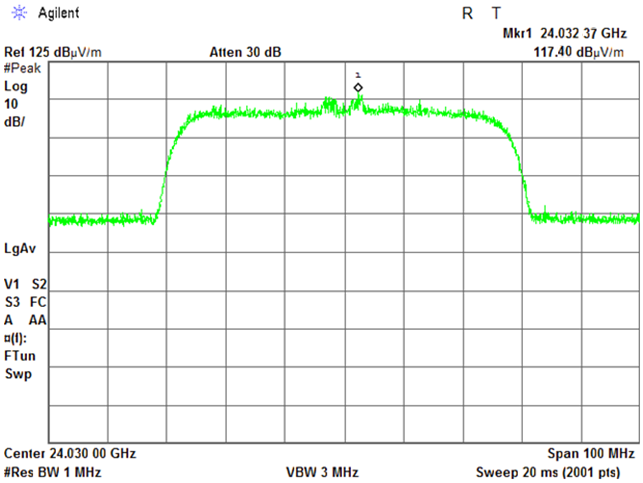


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

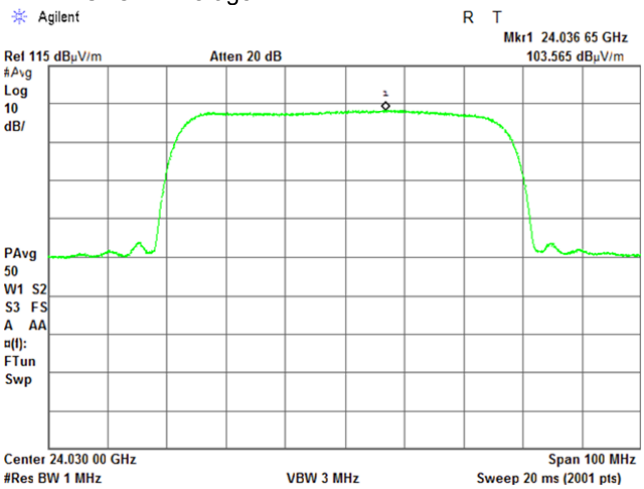
Plot 7.1.33 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 60 MHz
MODULATION: QPSK

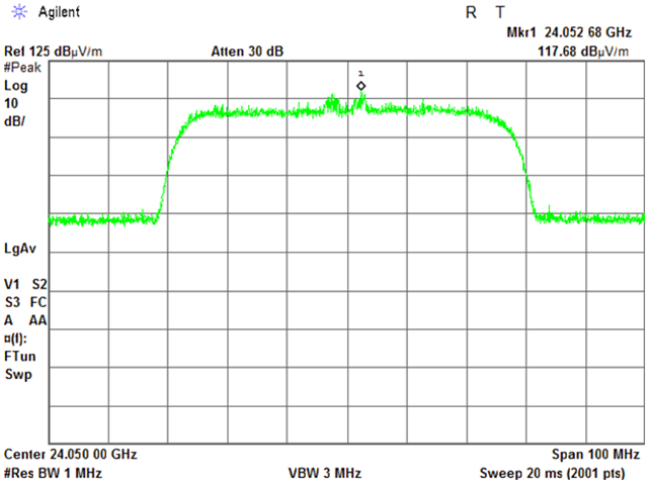
CARRIER FREQUENCY: Low
DETECTOR: Peak



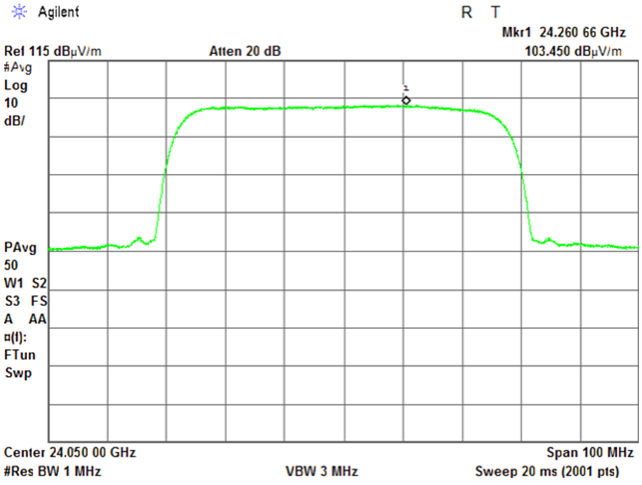
DETECTOR: Average



CARRIER FREQUENCY: Mid
DETECTOR: Peak



DETECTOR: Average

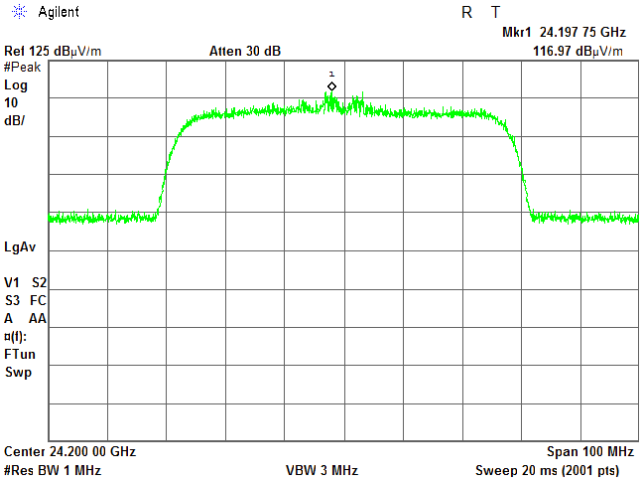


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

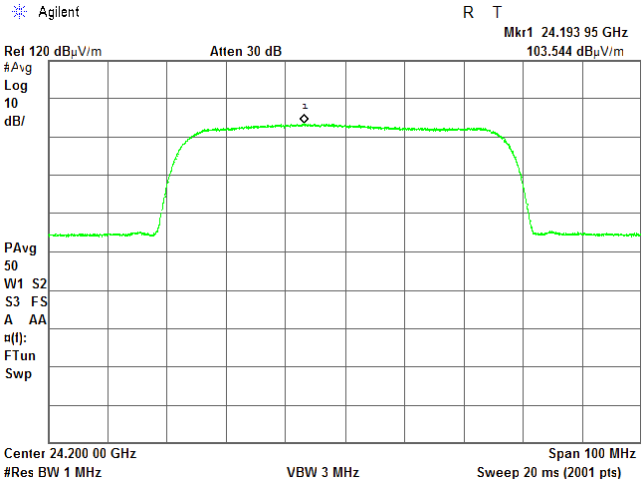
Plot 7.1.34 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 60 MHz
MODULATION: QPSK

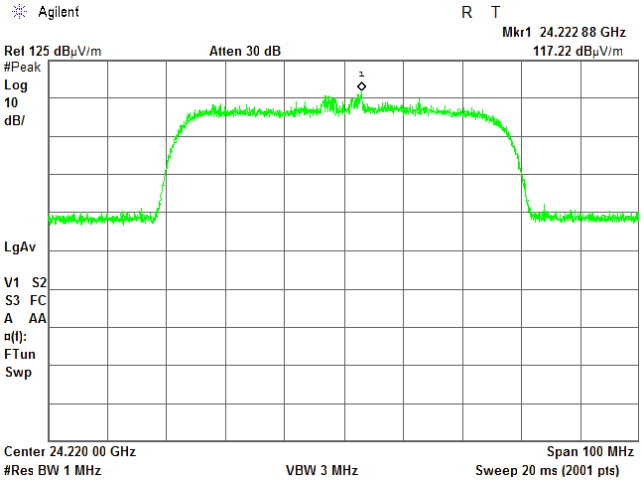
CARRIER FREQUENCY: Mid
DETECTOR: Peak



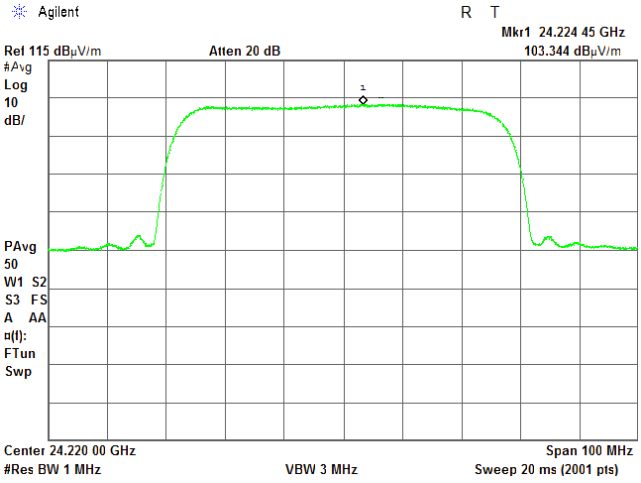
DETECTOR: Average



CARRIER FREQUENCY: High
DETECTOR: Peak



DETECTOR: Average

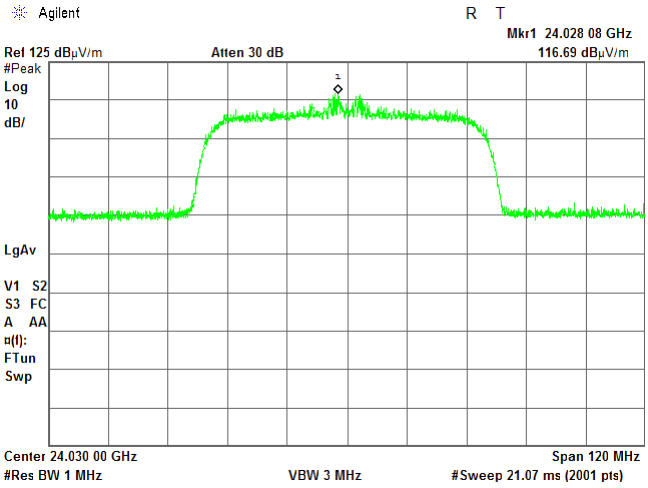


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

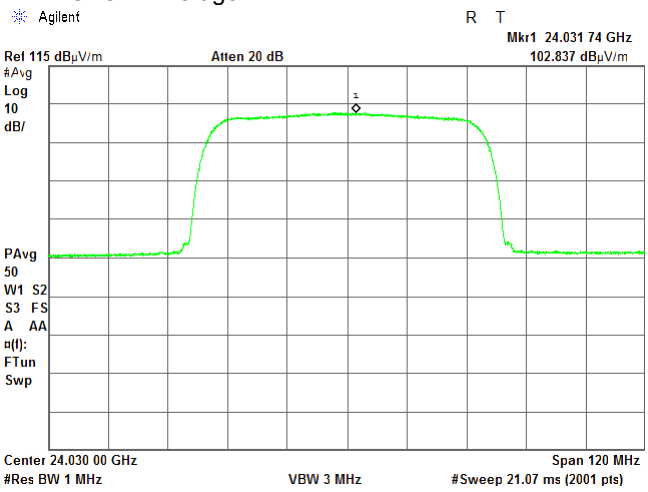
Plot 7.1.35 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 60 MHz
MODULATION: QPSK

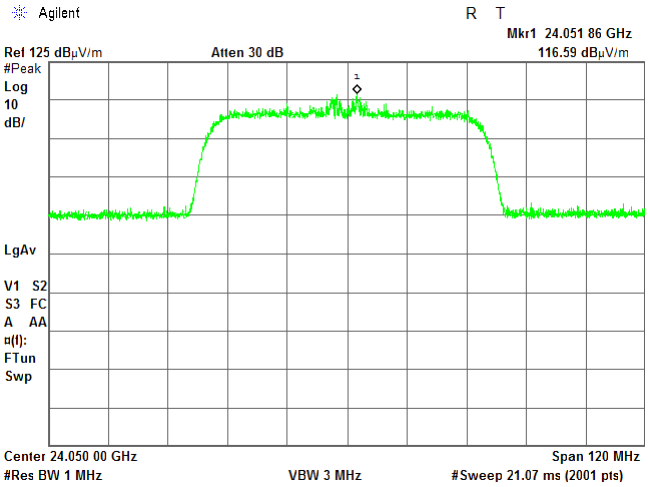
CARRIER FREQUENCY: Low
DETECTOR: Peak



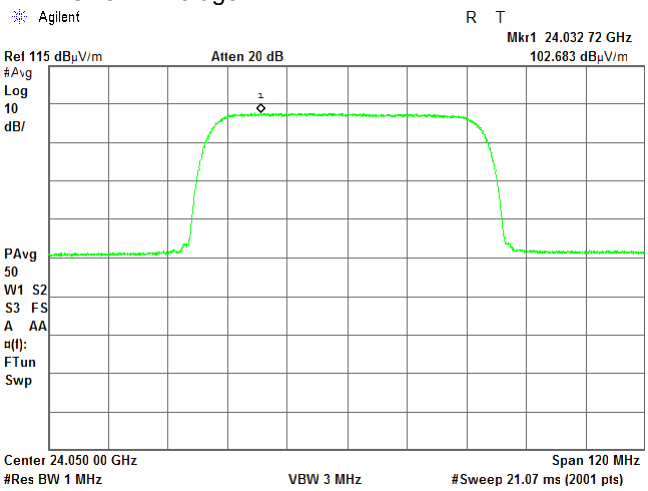
DETECTOR: Average



CARRIER FREQUENCY: Mid
DETECTOR: Peak



DETECTOR: Average

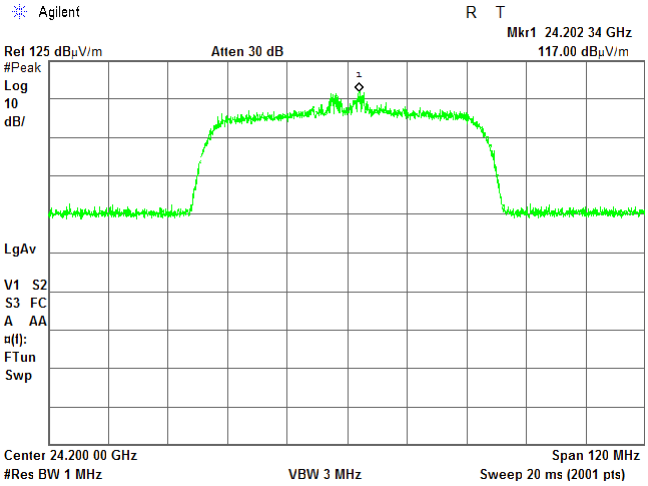


Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

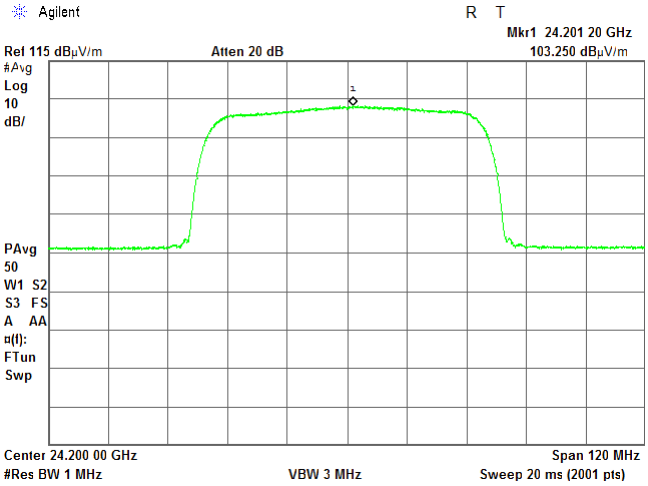
Plot 7.1.36 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 60 MHz
MODULATION: QPSK

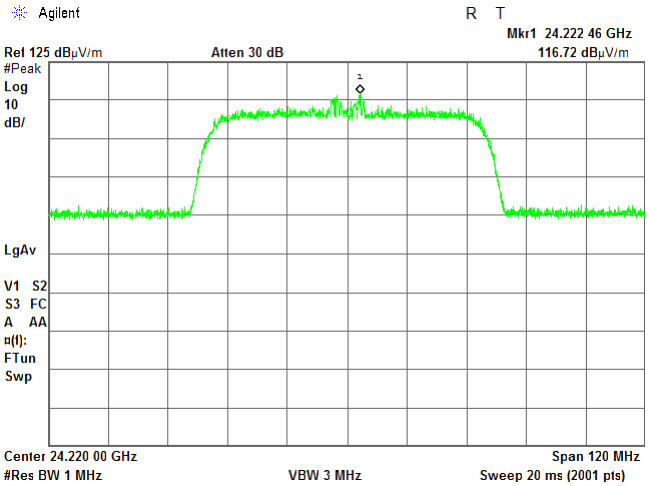
CARRIER FREQUENCY: Mid
DETECTOR: Peak



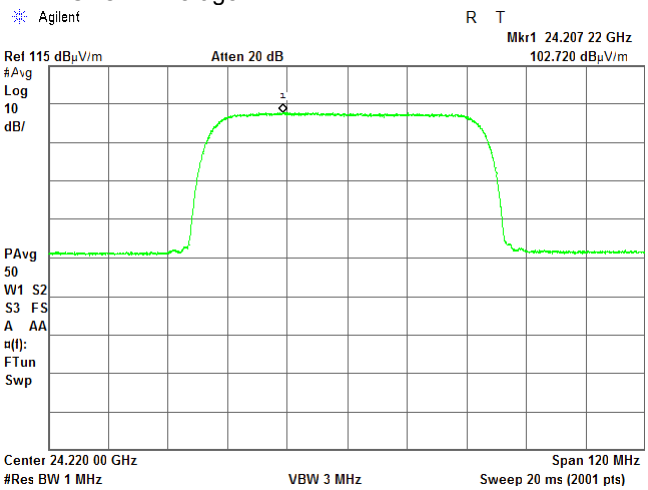
DETECTOR: Average



CARRIER FREQUENCY: High
DETECTOR: Peak



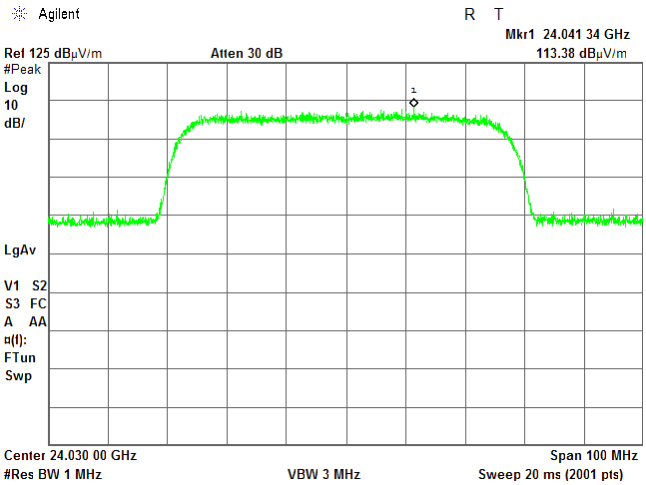
DETECTOR: Average



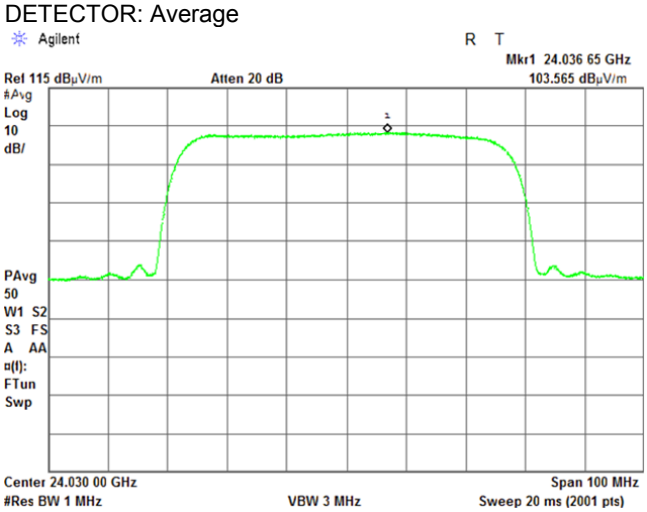
Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

Plot 7.1.37 Radiated emission measurements at the fundamental frequency

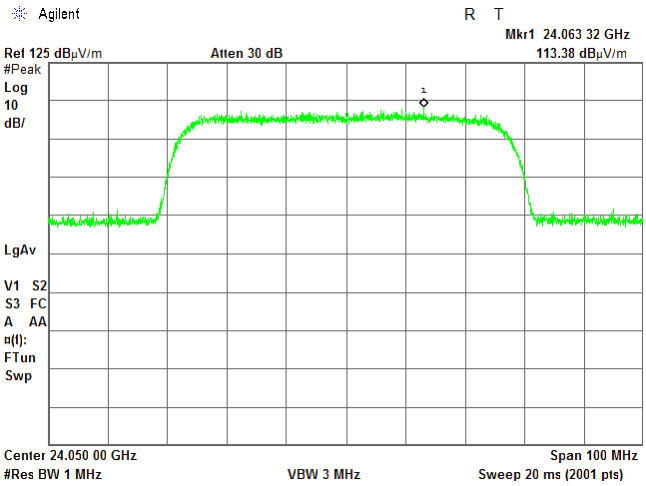
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 60 MHz
MODULATION: 2048QAM
CARRIER FREQUENCY: Low
DETECTOR: Peak



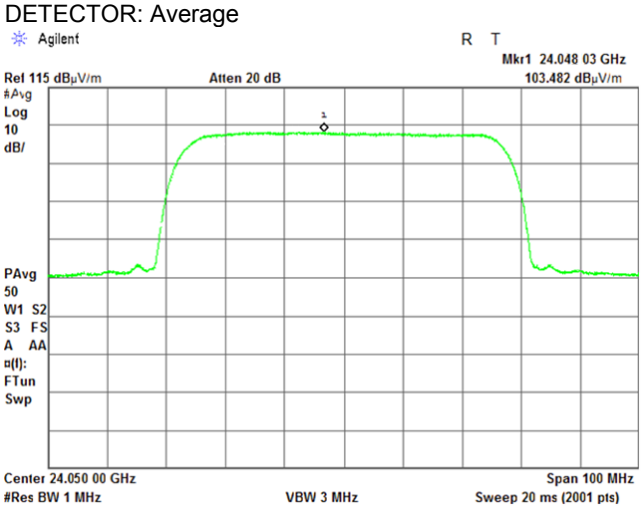
DETECTOR: Average



CARRIER FREQUENCY: Mid
DETECTOR: Peak



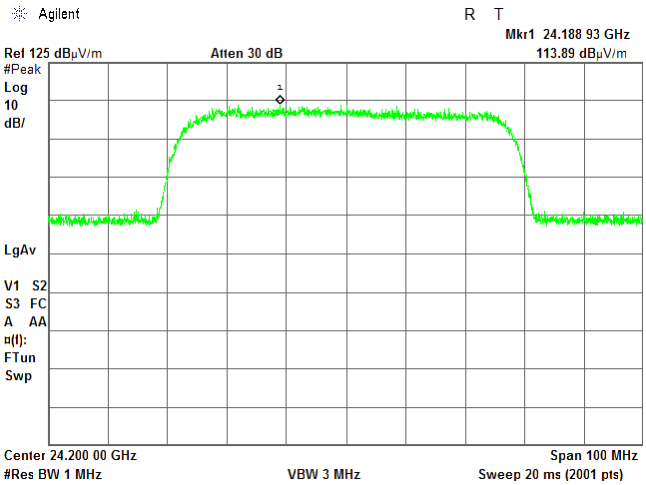
DETECTOR: Average



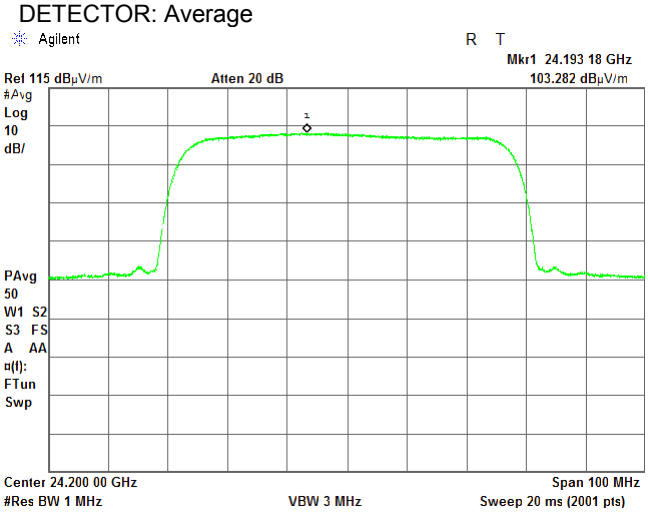
Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

Plot 7.1.38 Radiated emission measurements at the fundamental frequency

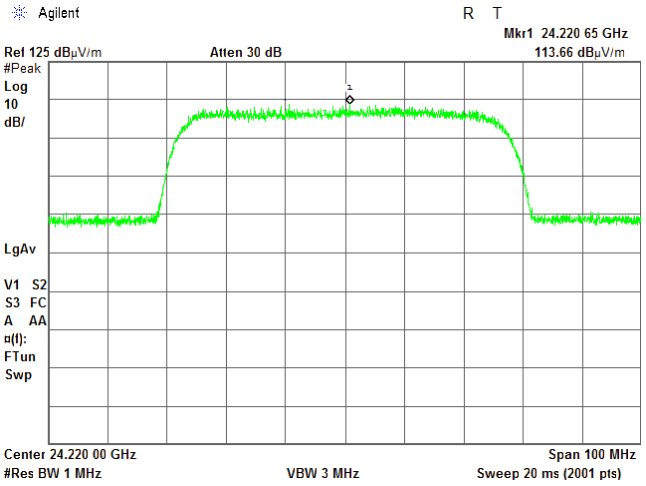
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 60 MHz
MODULATION: 2048QAM
CARRIER FREQUENCY: Mid
DETECTOR: Peak



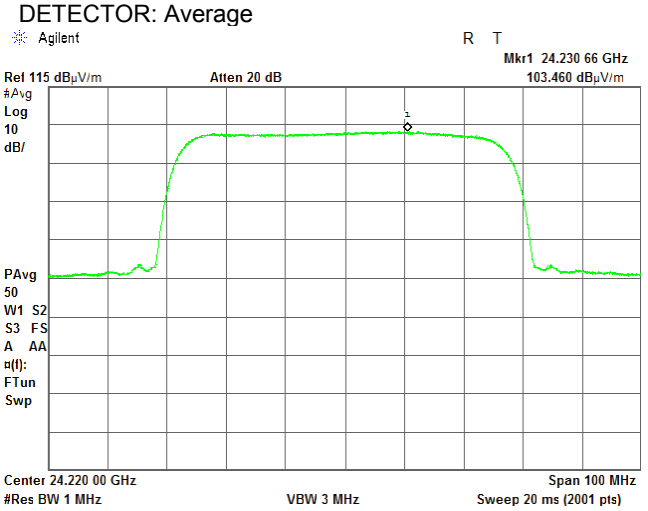
DETECTOR: Average



CARRIER FREQUENCY: High
DETECTOR: Peak



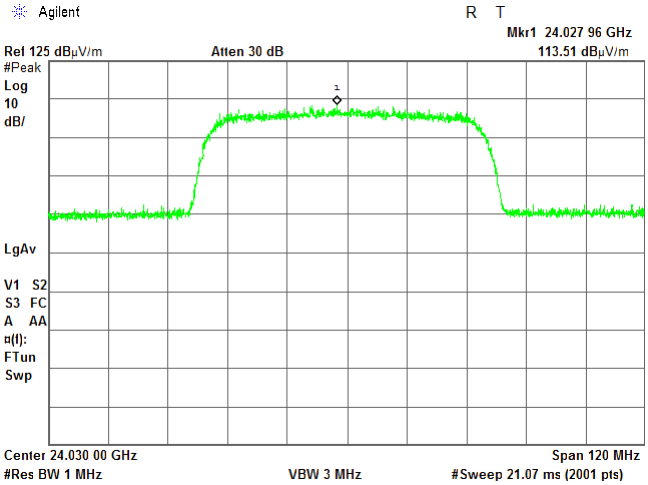
DETECTOR: Average



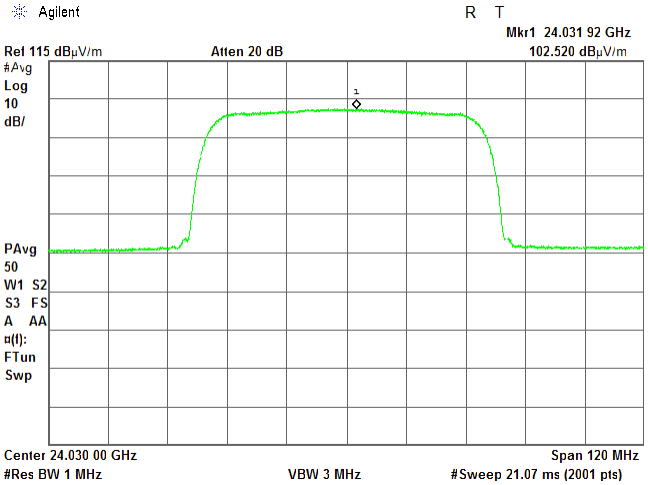
Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

Plot 7.1.39 Radiated emission measurements at the fundamental frequency

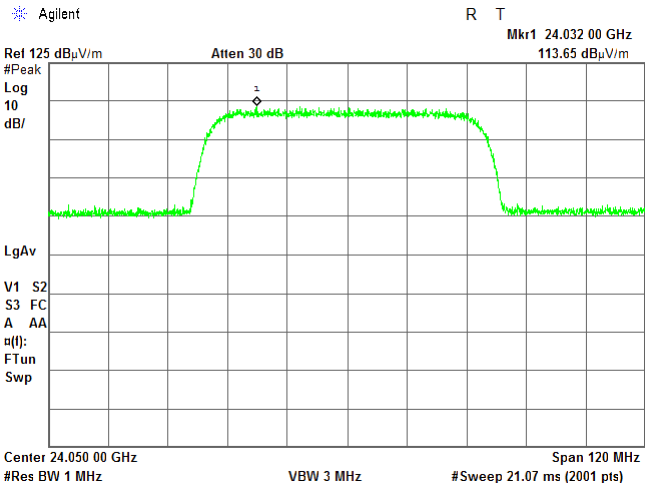
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 60 MHz
MODULATION: 2048QAM
CARRIER FREQUENCY: Low
DETECTOR: Peak



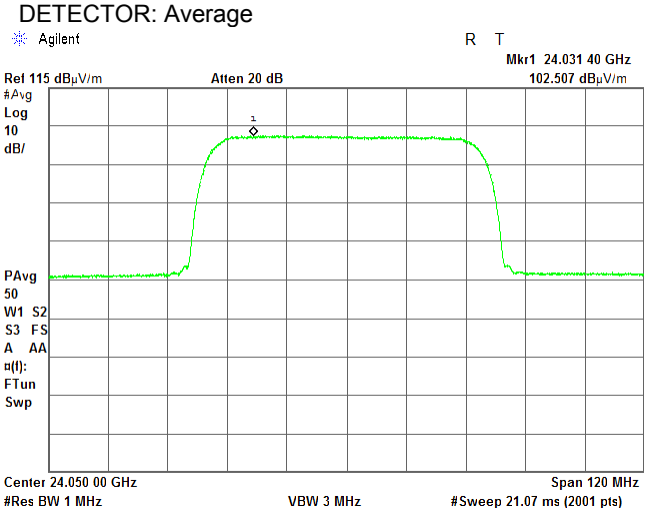
DETECTOR: Average



CARRIER FREQUENCY: Mid
DETECTOR: Peak



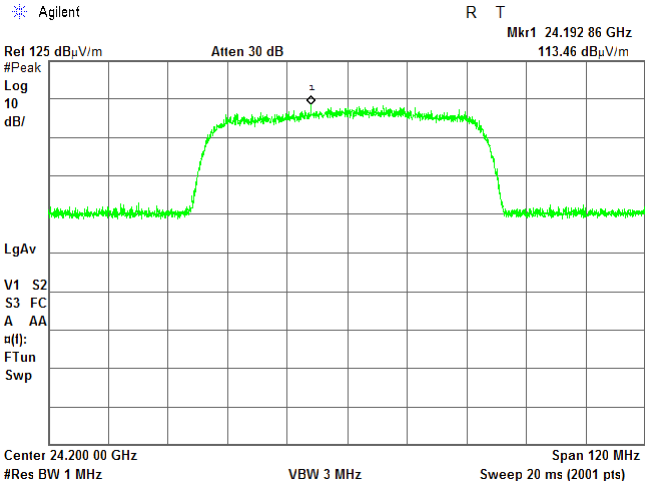
DETECTOR: Average



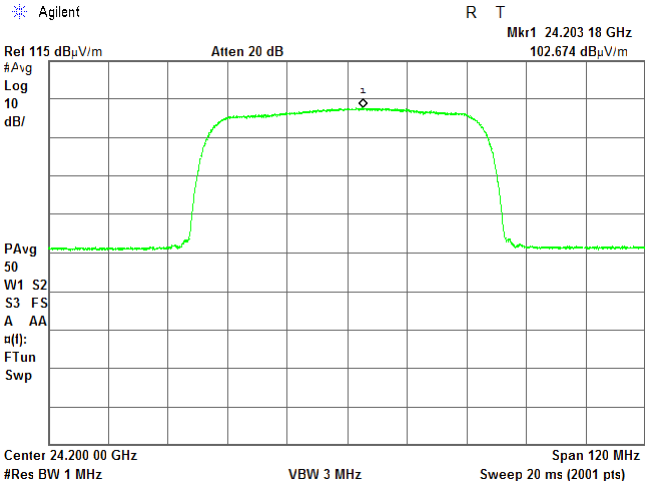
Test specification:	**Section 15.249(a)(d)/RSS-310, section 3.10, Field strength of emissions**		
Test procedure:	ANSI C63.10 sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	10-Aug-17 - 22-Aug-17		
Temperature: 24.3 ºC	**Relative Humidity:** 39 %	**Air Pressure:** 1011 hPa	**Power:** 48 VDC
Remarks: EUT with 42.4 dBi antenna gain			

Plot 7.1.40 Radiated emission measurements at the fundamental frequency

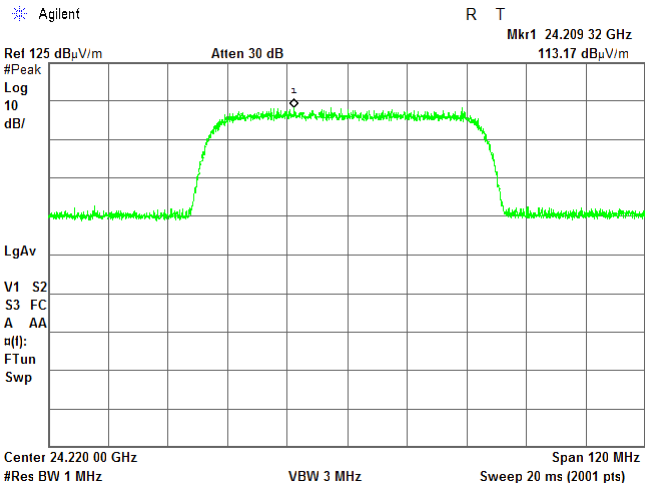
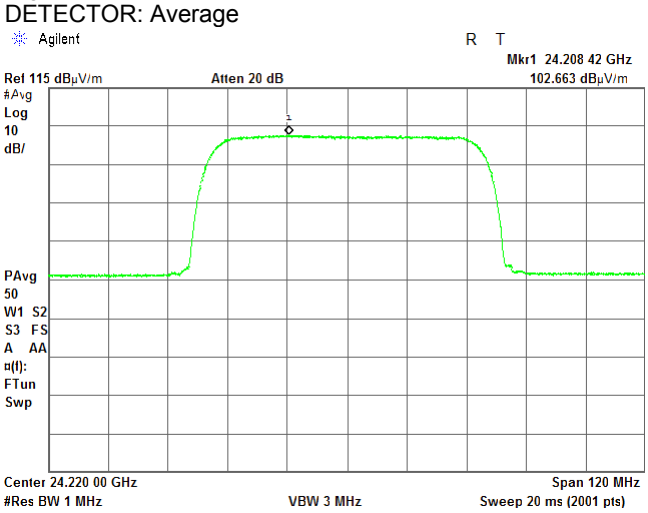
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
EUT POSITION: Typical (Vertical)
EMISSION BANDWIDTH: 60 MHz
MODULATION: 2048QAM
CARRIER FREQUENCY: Mid
DETECTOR: Peak



DETECTOR: Average



CARRIER FREQUENCY:
DETECTOR: Peak



High
DETECTOR: Average