HERMON LABORATORIES

ELECTRICAL TESTING
0839.01

Hermon Laboratories Ltd.
P.O. Box 23, Binyamina 3055001, Israel
Tel. +972 4628 8001
Fax. +972 4628 8277
E-mail: mail@hermonlabs.com

TEST REPORT

ACCORDING TO: FCC 47CFR part 96

FOR:

Airspan Networks Inc.
LTE Base Station Radio
Models:AirVelocity 1500 3550-3700MHz (B48)
FCC ID:PIDAV1500

Table of contents

1 Applicant information

Client name:	Airspan Networks Inc.
Address:	777 Yamato, Road Suite 310 Boca Raton, FL 33431, USA
Telephone:	+1 561 893 8670
Fax:	+1 561 893 8671
E-mail:	zlevi@airspan.com
Contact name:	Mr. Zion Levi

2 Equipment under test attributes

Product name:	LTE Base Station Radio
Product type:	Transceiver
Model(s):	AirVelocity 1500 3550-3700MHz (B48)
Serial number:	E2DA330108C2
Hardware version:	A9
Software release:	SR-16.50
Receipt date	04-Apr-19

3 Manufacturer information

Manufacturer name:	Airspan Networks Inc.
Address:	777 Yamato, Road Suite 310 Boca Raton, FL 33431, USA
Telephone:	+1 561 893 8670
Fax:	+1 561 893 8671
E-Mail:	zlevi@airspan.com
Contact name:	Mr. Zion Levi

4 Test details

Project ID:	32229
Location:	Hermon Laboratories Ltd. P.O. Box 23, Binyamina 3055001, Israel
Test started:	04-Apr-19
Test completed:	14-Apr-19
Test specification(s):	FCC 47CFR part 96

5 Tests summary

Test	Status
Transmitter characteristics	
Section 96.41(b), Maximum EIRP and maximum power spectral density	Pass
Section 96.41(g), Peak-to- average power ratio	Pass
Section 2.1049, Occupied bandwidth	Pass
Section 96.41(e)(1), Emission mask	Pass
Section 96.41(e)(2), Radiated spurious emissions	Pass
Section 96.41(e)(3), Conducted spurious emissions	Pass
Section 2.1055, Frequency stability	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.

	Name and Title	Date	Signature
Tested by:	Mr. S. Samokha, test engineer	April 14, 2019	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	April 29, 2019	
Approved by:	Mr. M. Nikishin, EMC and Radio group manager	May 7, 2019	

6 EUT description

6.1 General information

The EUT, Mobile Digital station, AirVelocity 1500 3550-3700 MHz, Band 48, is part of a LTE broadband fixed cellular wireless access system. The system provides a radio link between an end-user (a subscriber) and a network to give high-speed data access. The AirVelocity's transceiver/receiver (up to 64 QAM modulation, data rate up to 95 Mbps) equipped with a 9 dBi internal antenna. The Advanced Antenna Techniques 2x2 MIMO are supported. The maximum RF output power (not including antenna gain) is 20.99 dBm for 9 dBi and it can be reduced by software.
Antennas 1/2 is one sector and antennas 3/4 is another sector.
The AirVelocity is installed indoors. The Subscriber transmits and receives traffic to and from the base station respectively. The transceiver provides subscribers with "always-on" Internet, high speed data only, or data and voice (VoIP) services and is configured with a unique base station reference number, preventing the LTE UE from relocating to another subscriber premises without authorization.
AV1500 equipment defined as Category A CBSD (Citizens Broadband Radio Service Device).

6.2 Ports and lines

Port type	Port description	Connected from	Connected to	Qty.	Cable type	Cable length, m
Control	Ethernet	EUT	PoE	1	FTP	20

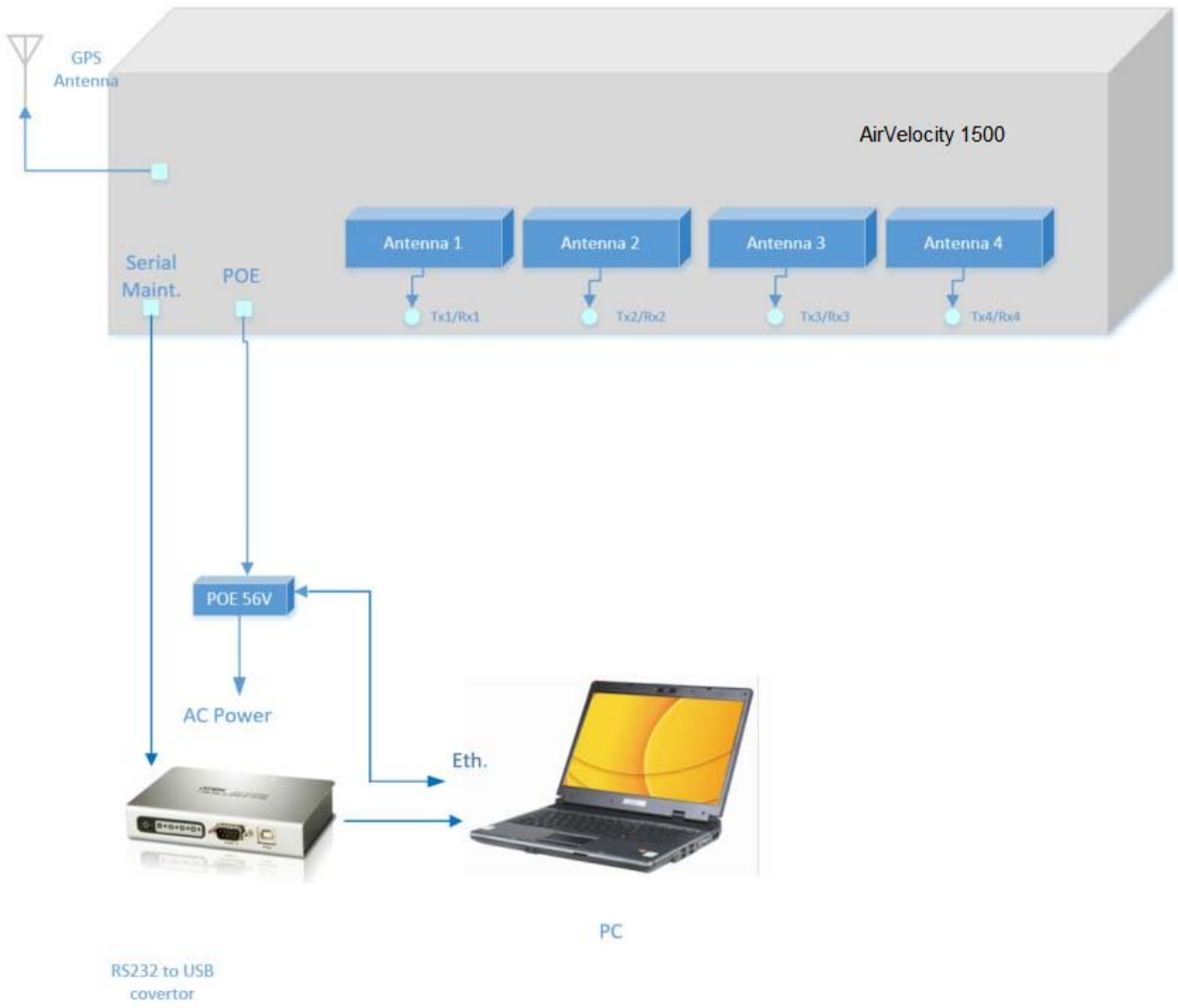
6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
Laptop	Dell	E7450	8TYRP32
USB to RS-232 convertor	ATEN	UC2324	NA

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)

Intended use		Condition of use
	fixed	Always at a distance more than 2 m from all people
V	mobile	Always at a distance more than 20 cm from all people
	portable	May operate at a distance closer than 20 cm to human body

Assigned frequency range	3550.0 – 3700.0 MHz
Operating frequency (full bands)	3555.0 – 3695.0 MHz
RF channel spacing	10 MHz, 20 MHz
Maximum rated output power	At transmitter 50 Ω RF output connector (per port) @10 MHz CBW: 20.99 dBm At transmitter 50 Ω RF output connector (per port) @20 MHz CBW: 23.99 dBm

Is transmitter output power variable?				
	No			
V	Yes		continuous variable	
		V	stepped variable with step size	0.25 dB
			minimum RF power	-30 dBm
			maximum RF power at antenna connector	dBm

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

Antenna/s technical characteristics			
Type	Manufacturer	Model number	Gain
External	MTI Wireless Edge Ltd.	MT-402022/CD/A	9 dBi

Transmitter aggregate data rate/s, Mbps			
Transmitter 26dBc power bandwidth	Type of modulation		
	QPSK	16QAM	64QAM
10 MHz	10.7	22.7	47.3
20 MHz	23.4	45.4	95

Type of multiplexing	TDD
Modulating test signal (baseband)	PRBS
Maximum transmitter duty cycle in normal use	0.74

Transmitter power source					
		Nominal rated voltage		Battery type	
V	DC	**Nominal rated voltage**	56 VDC		
	AC mains	**Nominal rated voltage**		Frequency	

Common power source for transmitter and receiver	**V**	yes	no

Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

7 Transmitter tests according to 47CFR part 96

7.1 Maximum EIRP and maximum power spectral density

7.1.1 General

This test was performed to measure the maximum EIRP and maximum spectral power density at the transmitter RF antenna connector. Specification test limits are given in Table 7.1.1, Table 7.1.2.

Table 7.1.1 Peak output power limits

Assigned frequency range, MHz	EIRP	
	W/10 MHz	dBm/10 MHz
3550 - 3700	1.0	30.0

Table 7.1.2 Peak spectral power density limits

Assigned frequency range, MHz	Measurement bandwidth, MHz	Peak spectral power density, dBm
3550 - 3700	1.0	20.0

7.1.2 Test procedure

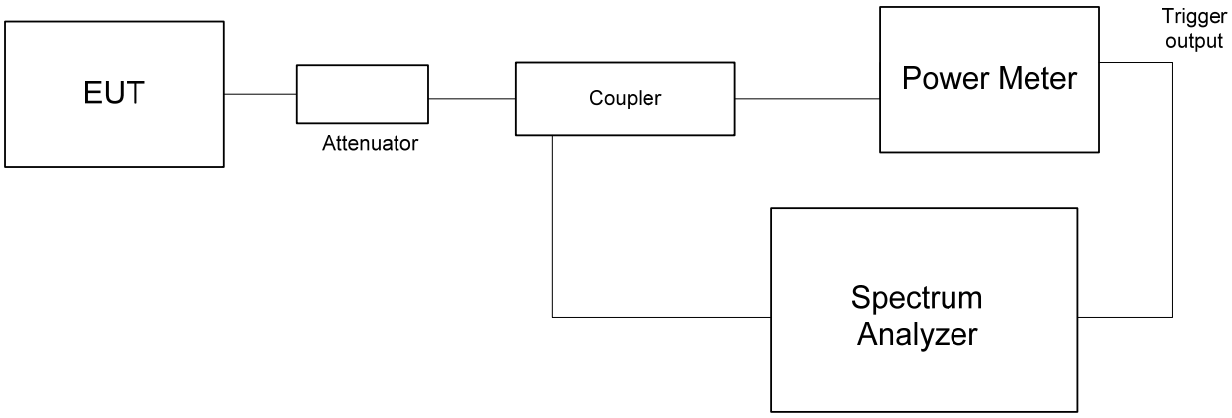
7.1.2.1 The EUT was set up as shown in Figure 7.1.1, energized and its proper operation was checked.

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

7.1.2.3 The peak output power was measured with power meter as provided in Table 7.1.3.

7.1.2.4 Spectrum analyzer was set in average mode, sufficient number of sweeps was allowed for trace stabilization and peak spectral power density was measured as provided in Table 7.1.4 to Table 7.1.7 and the associated plots.

Figure 7.1.1 Peak output power and spectral power density test setup



Test specification:	**Section 96.41(b), Maximum EIRP and maximum power spectral density**		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1010 hPa	**Power:** 56 VDC
Remarks:			

Table 7.1.3 Maximum EIRP test results

ASSIGNED FREQUENCY RANGE: 3550.0 – 3700.0 MHz
DETECTOR USED: Average (gated)
VIDEO BANDWIDTH: ≥ Resolution bandwidth
NUMBER OF CHAINS: 2
CHANNEL SPACING: 10 MHz

ANTENNA CONFIGURATION: Antenna Chain RF #1 / #2

Frequency, MHz	RF Output power		Total RF power*, dBm	Antenna gain, dBi	EIRP**, dBm	Limit, dBm/10 MHz	Margin, dB	Verdict
	Chain RF#1, dBm	Chain RF#2, dBm						
Modulation QPSK								
3555.0	20.87	20.81	20.87	9	29.87	30	-0.13	Pass
3625.0	20.75	20.78	20.78	9	29.78	30	-0.22	Pass
3695.0	20.70	20.99	20.99	9	29.99	30	-0.01	Pass
Modulation 16QAM								
3555.0	20.69	20.99	20.99	9	29.99	30	-0.01	Pass
3625.0	20.71	20.85	20.85	9	29.85	30	-0.15	Pass
3695.0	20.99	20.88	20.99	9	29.99	30	-0.01	Pass
Modulation 64QAM								
3555.0	20.90	20.78	20.90	9	29.90	30	-0.10	Pass
3625.0	20.99	20.81	20.99	9	29.99	30	-0.01	Pass
3695.0	20.95	20.99	20.99	9	29.99	30	-0.01	Pass

* - Total RF power, dBm = Maximum result from Chain #1 or Chain #2
** EIRP (dBm)=Total RF power (dBm) + Antenna gain (dBi)

ANTENNA CONFIGURATION: Antenna Chain RF #3 / #4

Frequency, MHz	RF Output power		Total RF power*, dBm	Antenna gain, dBi	EIRP**, dBm	Limit, dBm/10 MHz	Margin, dB	Verdict
	Chain RF#3, dBm	Chain RF#4, dBm						
Modulation QPSK								
3555.0	20.82	20.80	20.82	9	29.82	30	-0.18	Pass
3625.0	20.80	20.98	20.98	9	29.98	30	-0.02	Pass
3695.0	20.85	20.99	20.99	9	29.99	30	-0.01	Pass
Modulation 16QAM								
3555.0	20.74	20.83	20.83	9	29.83	30	-0.17	Pass
3625.0	20.92	20.92	20.92	9	29.92	30	-0.08	Pass
3695.0	20.86	20.99	20.99	9	29.99	30	-0.01	Pass
Modulation 64QAM								
3555.0	20.99	20.80	20.99	9	29.99	30	-0.01	Pass
3625.0	20.90	20.72	20.90	9	29.90	30	-0.10	Pass
3695.0	20.82	20.96	20.96	9	29.96	30	-0.04	Pass

* - Total RF power, dBm = Maximum result from Chain #3 or Chain #4
** EIRP (dBm)=Total RF power (dBm) + Antenna gain (dBi)

Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

Table 7.1.3 Maximum EIRP test results (continued)

ASSIGNED FREQUENCY RANGE: 3550.0 – 3700.0 MHz
DETECTOR USED: Average (gated)
VIDEO BANDWIDTH: ≥ Resolution bandwidth
NUMBER OF CHAINS: 2
CHANNEL SPACING: 20 MHz
ANTENNA CONFIGURATION: Antenna Chain RF #1 / #2

Frequency, MHz	RF Output power		Total RF power*, dBm	Antenna gain, dBi	EIRP** dBm	Limit, dBm/10 MHz	Margin, dB	Verdict
	Chain RF#1, dBm	Chain RF#2, dBm						
Modulation QPSK								
3560.0	23.94	23.70	20.94	9	29.94	30	-0.06	Pass
3625.0	23.99	23.74	20.99	9	29.99	30	-0.01	Pass
3690.0	23.98	23.99	20.99	9	29.99	30	-0.01	Pass
Modulation 16QAM								
3560.0	23.89	23.86	20.89	9	29.89	30	-0.11	Pass
3625.0	23.99	23.84	20.99	9	29.99	30	-0.01	Pass
3690.0	23.80	23.99	20.99	9	29.99	30	-0.01	Pass
Modulation 64QAM								
3560.0	23.82	23.81	20.82	9	29.82	30	-0.18	Pass
3625.0	23.99	23.98	20.99	9	29.99	30	-0.01	Pass
3690.0	23.80	23.99	20.99	9	29.99	30	-0.01	Pass

* - Total RF power, dBm = Maximum result from Chain #1 or Chain #2 – correction factor, where
correction factor = 10 log [10 MHz/OBW (MHz)] = 3 dB
** EIRP (dBm)=Total RF power (dBm) + Antenna gain (dBi)

ANTENNA CONFIGURATION: Antenna Chain RF #3 / #4

Frequency, MHz	RF Output power		Total RF power*, dBm	Antenna gain, dBi	EIRP**, dBm	Limit, dBm/10 MHz	Margin, dB	Verdict
	Chain RF#3, dBm	Chain RF#4, dBm						
Modulation QPSK								
3560.0	23.99	23.92	20.99	9	29.99	30	-0.01	Pass
3625.0	23.87	23.99	20.99	9	29.99	30	-0.01	Pass
3690.0	23.98	23.95	20.98	9	29.98	30	-0.02	Pass
Modulation 16QAM								
3560.0	23.88	23.70	20.88	9	29.88	30	-0.12	Pass
3625.0	23.96	23.99	20.99	9	29.99	30	-0.01	Pass
3690.0	23.99	23.96	20.99	9	29.99	30	-0.01	Pass
Modulation 64QAM								
3560.0	23.80	23.82	20.82	9	29.82	30	-0.18	Pass
3625.0	23.75	23.99	20.99	9	29.99	30	-0.01	Pass
3690.0	23.84	23.98	20.98	9	29.98	30	-0.02	Pass

* - Total RF power, dBm = Maximum result from Chain #3 or Chain #4 - – correction factor, where
correction factor = 10 log [10 MHz/OBW (MHz)] = 3 dB
** EIRP (dBm)=Total RF power (dBm) + Antenna gain (dBi)

Test specification:	**Section 96.41(b), Maximum EIRP and maximum power spectral density**		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1010 hPa	**Power:** 56 VDC
Remarks:			

Table 7.1.4 Peak spectral power density test results

ASSIGNED FREQUENCY RANGE: 3550.0 – 3700.0 MHz
DETECTOR USED: Average (gated)
VIDEO BANDWIDTH: ≥ Resolution bandwidth
NUMBER OF CHAINS: 2
ANTENNA CONFIGURATION: Antenna Chain RF #1

Frequency MHz	Band edge	SA reading over chain #1, dBm	Total PSD*, dBm	Limit, dBm	Margin, dB	Verdict
Channel spacing 10 MHz						
3555.00	QPSK	10.53	13.53	20	-6.47	Pass
3625.00		11.28	14.28	20	-5.72	Pass
3695.00		10.78	13.78	20	-6.22	Pass
3555.00	16QAM	8.60	11.60	20	-8.40	Pass
3625.00		9.41	12.41	20	-7.59	Pass
3695.00		11.35	14.35	20	-5.65	Pass
3555.00	64QAM	11.73	14.73	20	-5.27	Pass
3625.00		11.34	14.34	20	-5.66	Pass
3695.00		10.28	13.28	20	-6.72	Pass
Channel spacing 20 MHz						
3560.00	QPSK	10.89	13.89	20	-6.11	Pass
3625.00		10.70	13.70	20	-6.30	Pass
3690.00		11.85	14.85	20	-5.15	Pass
3560.00	16QAM	11.85	14.85	20	-5.15	Pass
3625.00		10.38	13.38	20	-6.62	Pass
3690.00		12.56	15.56	20	-4.44	Pass
3560.00	64QAM	9.97	12.97	20	-7.03	Pass
3625.00		9.50	12.50	20	-7.50	Pass
3690.00		11.25	14.25	20	-5.75	Pass

* - Total PSD = SA reading + 10*log(N) = SA reading +3 dB
** - Margin = Total PSD, dBm – specification limit.

Test specification:	**Section 96.41(b), Maximum EIRP and maximum power spectral density**		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1010 hPa	**Power:** 56 VDC
Remarks:			

Table 7.1.5 Peak spectral power density test results

ASSIGNED FREQUENCY RANGE: 3550.0 – 3700.0 MHz
DETECTOR USED: Average (gated)
VIDEO BANDWIDTH: ≥ Resolution bandwidth
NUMBER OF CHAINS: 2
ANTENNA CONFIGURATION: Antenna Chain RF #2

Frequency MHz	Band edge	SA reading over chain #2, dBm	Total PSD*, dBm	Limit, dBm	Margin, dB	Verdict
Channel spacing 10 MHz						
3555.00	QPSK	10.84	13.84	20	-6.16	Pass
3625.00		11.32	14.32	20	-5.68	Pass
3695.00		11.34	14.34	20	-5.66	Pass
3555.00	16QAM	9.51	12.51	20	-7.49	Pass
3625.00		10.02	13.02	20	-6.98	Pass
3695.00		9.67	12.67	20	-7.33	Pass
3555.00	64QAM	11.67	14.67	20	-5.33	Pass
3625.00		11.19	14.19	20	-5.81	Pass
3695.00		11.49	14.49	20	-5.51	Pass
Channel spacing 20 MHz						
3560.00	QPSK	10.88	13.88	20	-6.12	Pass
3625.00		10.74	13.74	20	-6.26	Pass
3690.00		12.17	15.17	20	-4.83	Pass
3560.00	16QAM	11.95	14.95	20	-5.05	Pass
3625.00		10.23	13.23	20	-6.77	Pass
3690.00		10.66	13.66	20	-6.34	Pass
3560.00	64QAM	10.36	13.36	20	-6.64	Pass
3625.00		10.31	13.31	20	-6.69	Pass
3690.00		10.46	13.46	20	-6.54	Pass

* - Total PSD = SA reading + 10*log(N) = SA reading +3 dB
** - Margin = Total PSD, dBm – specification limit.

Test specification:	**Section 96.41(b), Maximum EIRP and maximum power spectral density**		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1010 hPa	**Power:** 56 VDC
Remarks:			

Table 7.1.6 Peak spectral power density test results

ASSIGNED FREQUENCY RANGE: 3550.0 – 3700.0 MHz
DETECTOR USED: Average (gated)
VIDEO BANDWIDTH: ≥ Resolution bandwidth
NUMBER OF CHAINS: 2
ANTENNA CONFIGURATION: Antenna Chain RF #3

Frequency MHz	Band edge	SA reading over chain #3, dBm	Total PSD*, dBm	Limit, dBm	Margin, dB	Verdict
Channel spacing 10 MHz						
3555.00	QPSK	9.19	12.19	20	-7.81	Pass
3625.00		9.99	12.99	20	-7.01	Pass
3695.00		8.85	11.85	20	-8.15	Pass
3555.00	16QAM	10.65	13.65	20	-6.35	Pass
3625.00		10.92	13.92	20	-6.08	Pass
3695.00		10.20	13.20	20	-6.80	Pass
3555.00	64QAM	11.09	14.09	20	-5.91	Pass
3625.00		10.96	13.96	20	-6.04	Pass
3695.00		11.85	14.85	20	-5.15	Pass
Channel spacing 20 MHz						
3560.00	QPSK	9.77	12.77	20	-7.23	Pass
3625.00		10.52	13.52	20	-6.48	Pass
3690.00		10.80	13.80	20	-6.20	Pass
3560.00	16QAM	10.89	13.89	20	-6.11	Pass
3625.00		11.06	14.06	20	-5.94	Pass
3690.00		12.33	15.33	20	-4.67	Pass
3560.00	64QAM	10.24	13.24	20	-6.76	Pass
3625.00		11.20	14.20	20	-5.80	Pass
3690.00		11.49	14.49	20	-5.51	Pass

* - Total PSD = SA reading + 10*log(N) = SA reading +3 dB
** - Margin = Total PSD, dBm – specification limit.

Test specification:	**Section 96.41(b), Maximum EIRP and maximum power spectral density**		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	**Relative Humidity:** 51 %	**Air Pressure:** 1010 hPa	**Power:** 56 VDC
Remarks:			

Table 7.1.7 Peak spectral power density test results

ASSIGNED FREQUENCY RANGE: 3550.0 – 3700.0 MHz
DETECTOR USED: Average (gated)
VIDEO BANDWIDTH: ≥ Resolution bandwidth
NUMBER OF CHAINS: 2
ANTENNA CONFIGURATION: Antenna Chain RF #4

Frequency MHz	Band edge	SA reading over chain #4, dBm	Total PSD*, dBm	Limit, dBm	Margin, dB	Verdict
Channel spacing 10 MHz						
3555.00	QPSK	9.12	12.12	20	-7.88	Pass
3625.00		10.03	13.03	20	-6.97	Pass
3695.00		10.66	13.66	20	-6.34	Pass
3555.00	16QAM	11.36	14.36	20	-5.64	Pass
3625.00		10.31	13.31	20	-6.69	Pass
3695.00		10.78	13.78	20	-6.22	Pass
3555.00	64QAM	11.64	14.64	20	-5.36	Pass
3625.00		10.56	13.56	20	-6.44	Pass
3695.00		11.39	14.39	20	-5.61	Pass
Channel spacing 20 MHz						
3560.00	QPSK	11.35	14.35	20	-5.65	Pass
3625.00		11.78	14.78	20	-5.22	Pass
3690.00		11.35	14.35	20	-5.65	Pass
3560.00	16QAM	12.06	15.06	20	-4.94	Pass
3625.00		11.53	14.53	20	-5.47	Pass
3690.00		11.41	14.41	20	-5.59	Pass
3560.00	64QAM	11.67	14.67	20	-5.33	Pass
3625.00		11.92	14.92	20	-5.08	Pass
3690.00		11.39	14.39	20	-5.61	Pass

* - Total PSD = SA reading + 10*log(N) = SA reading +3 dB
** - Margin = Total PSD, dBm – specification limit.

Reference numbers of test equipment used

HL 3301	HL 3433	HL 3818	HL 5409				

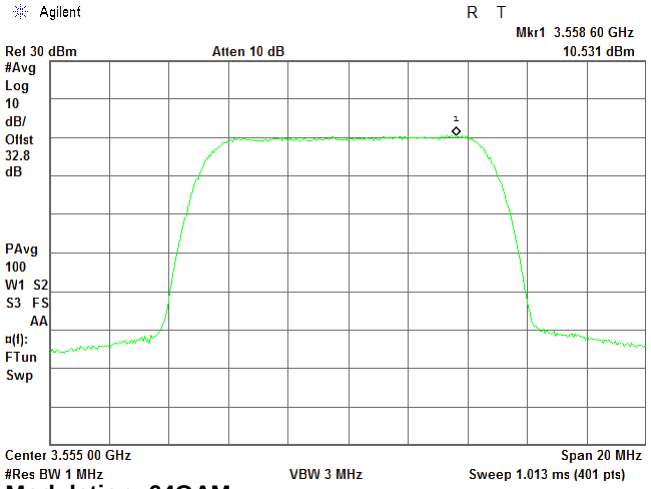
Full description is given in Appendix A.

Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

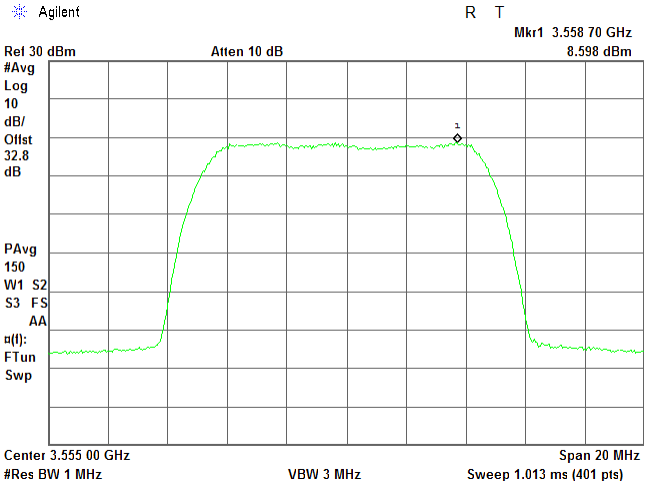
Plot 7.1.1 Peak spectral power density at low frequency

MODULATION: QPSK
CHANNEL SPACING: 10 MHz
ANTENNA CHAIN: 1

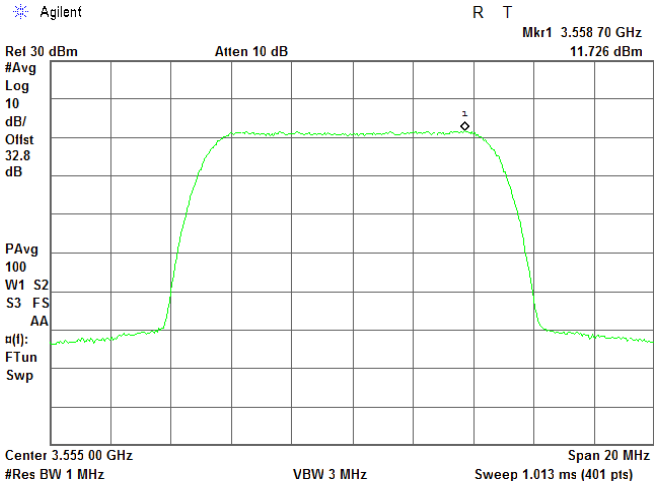
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

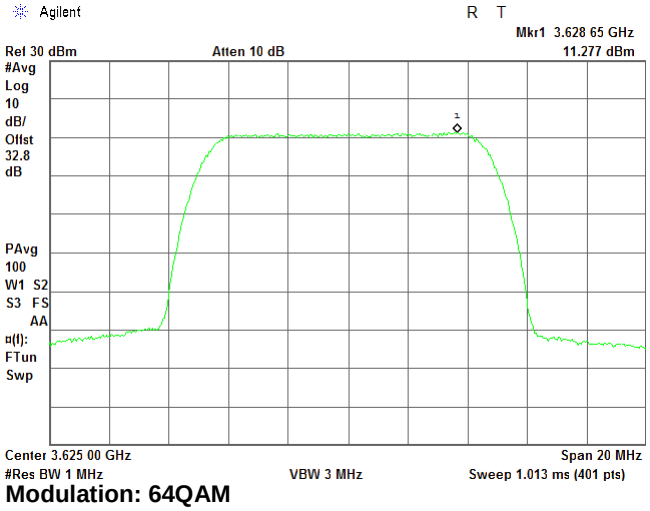


Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

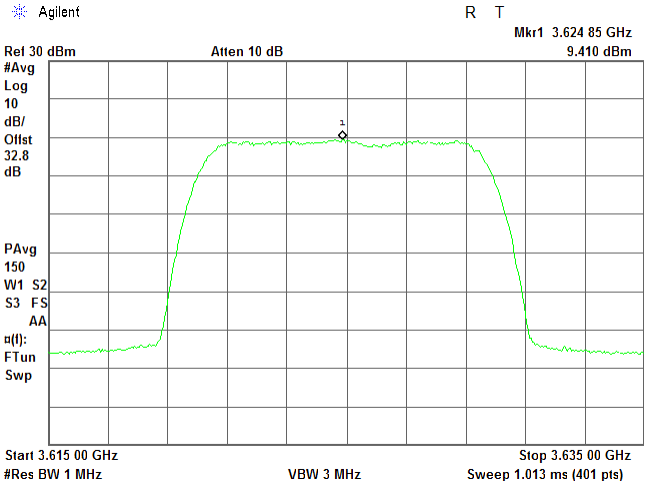
Plot 7.1.2 Peak spectral power density at mid frequency

MODULATION: QPSK
CHANNEL SPACING: 10 MHz
ANTENNA CHAIN: 1

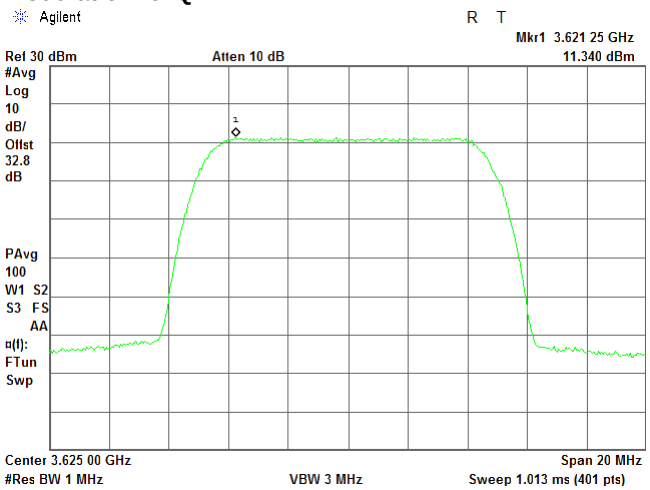
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

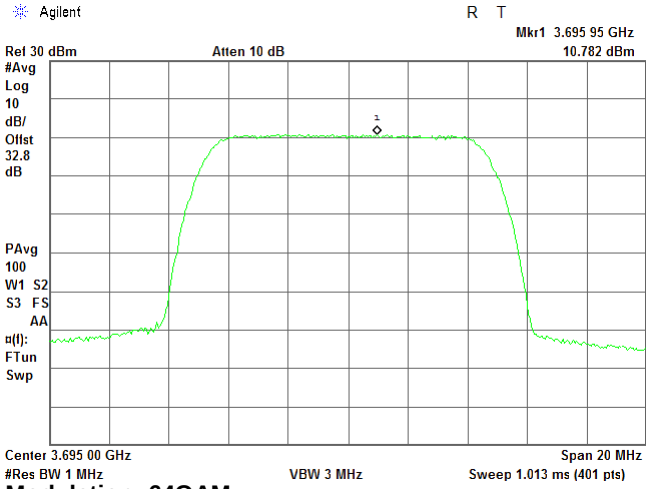


Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

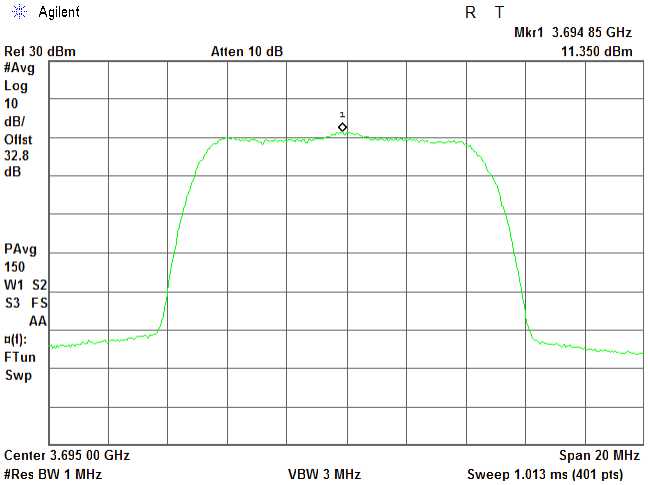
Plot 7.1.3 Peak spectral power density at high frequency

MODULATION: QPSK
CHANNEL SPACING: 10 MHz
ANTENNA CHAIN: 1

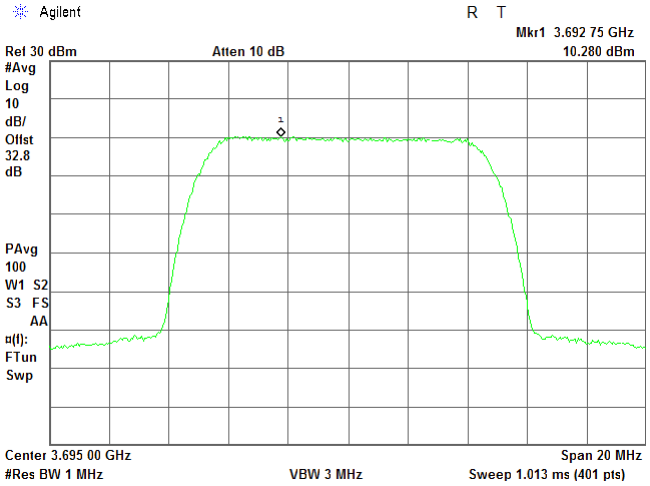
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

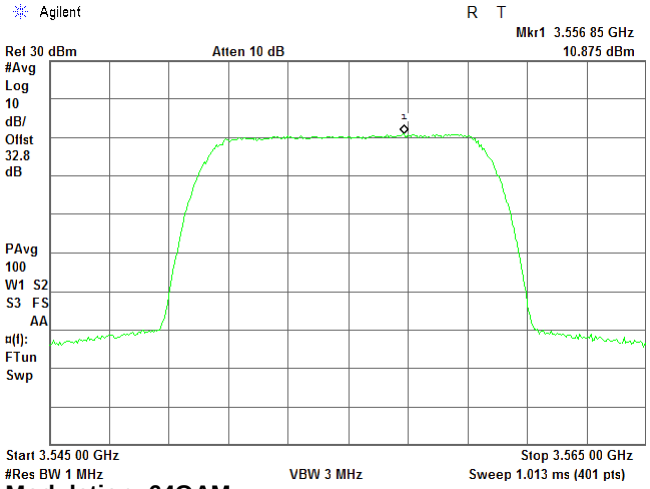


Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

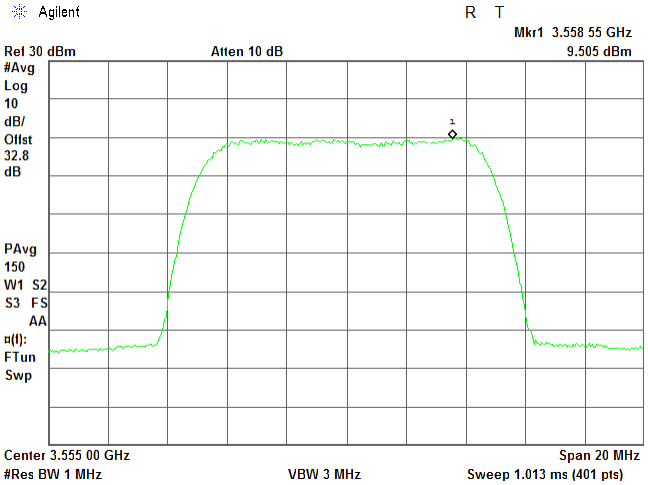
Plot 7.1.4 Peak spectral power density at low frequency

MODULATION: QPSK
CHANNEL SPACING: 10 MHz
ANTENNA CHAIN: 2

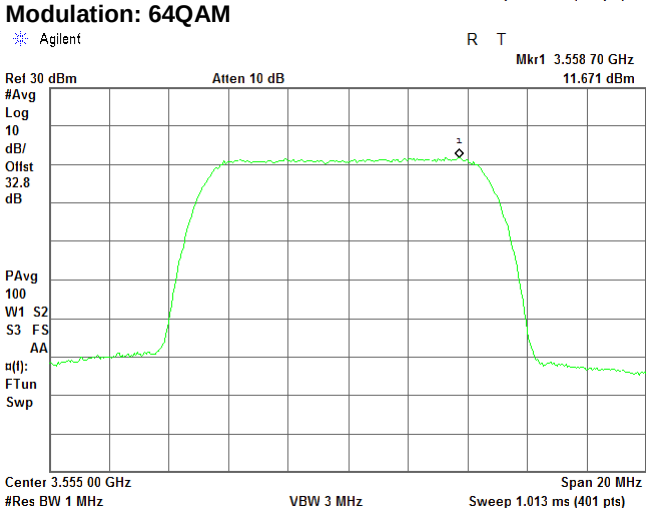
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

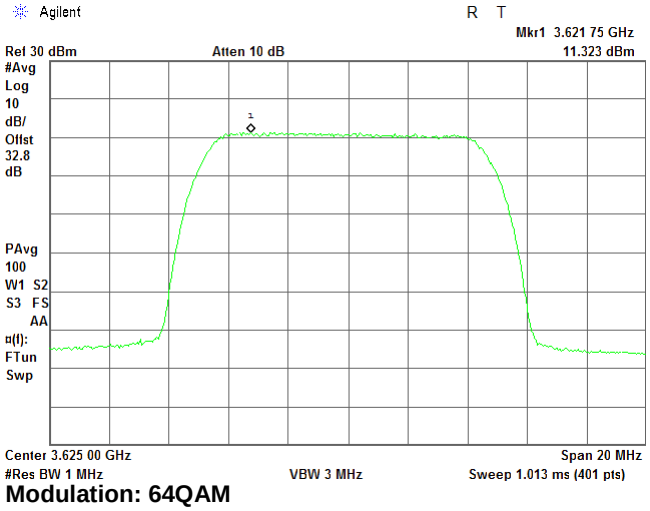


Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

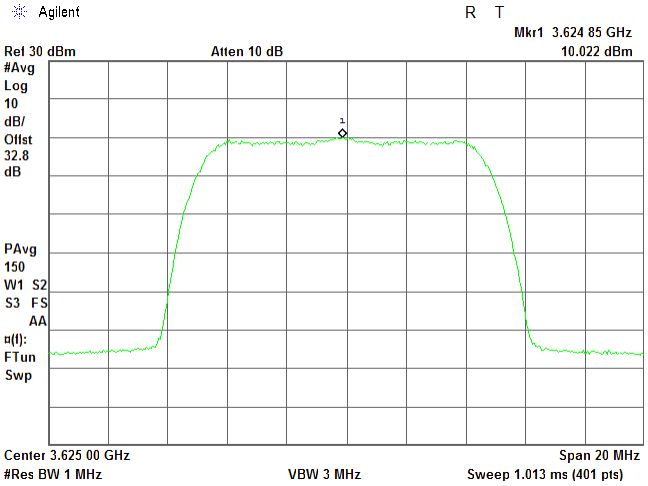
Plot 7.1.5 Peak spectral power density at mid frequency

MODULATION: QPSK
CHANNEL SPACING: 10 MHz
ANTENNA CHAIN: 2

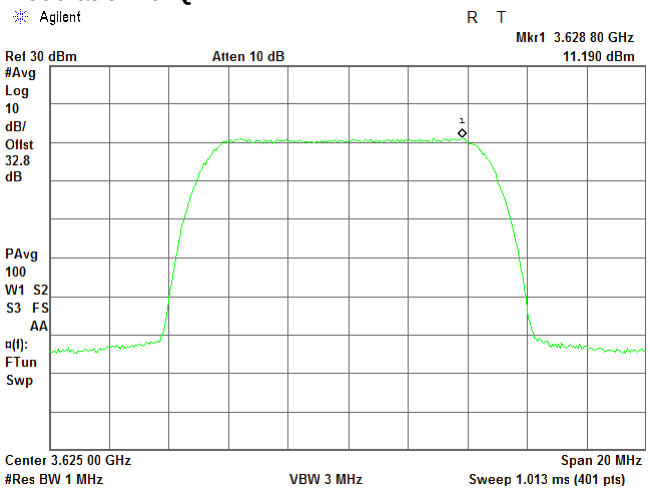
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

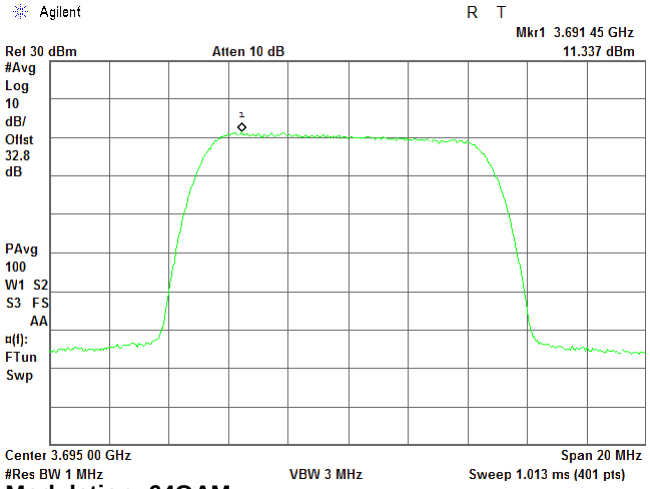


Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

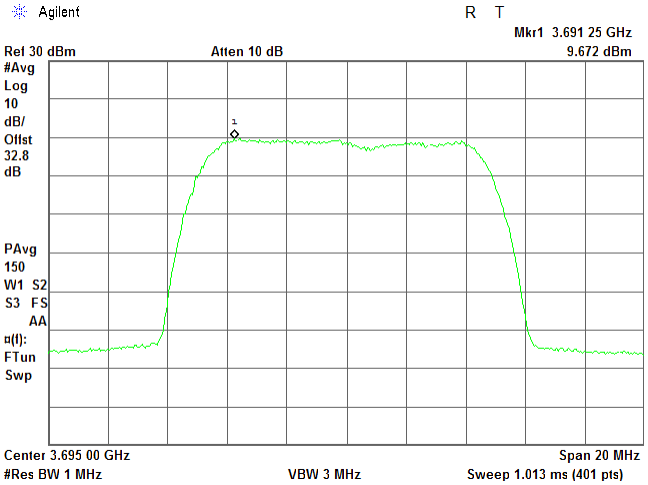
Plot 7.1.6 Peak spectral power density at high frequency

MODULATION: QPSK
CHANNEL SPACING: 10 MHz
ANTENNA CHAIN: 2

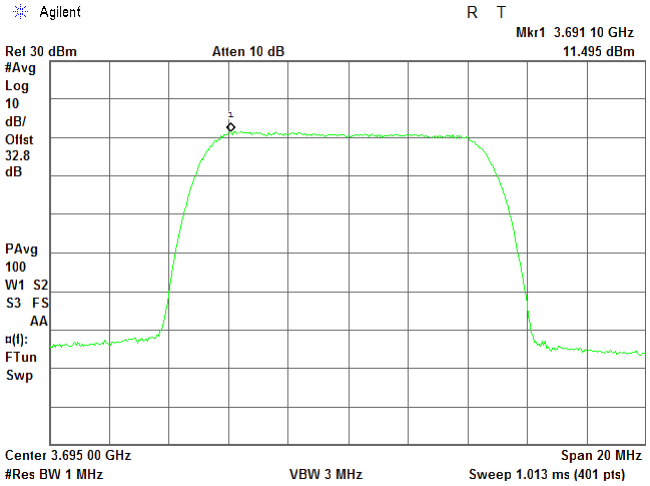
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

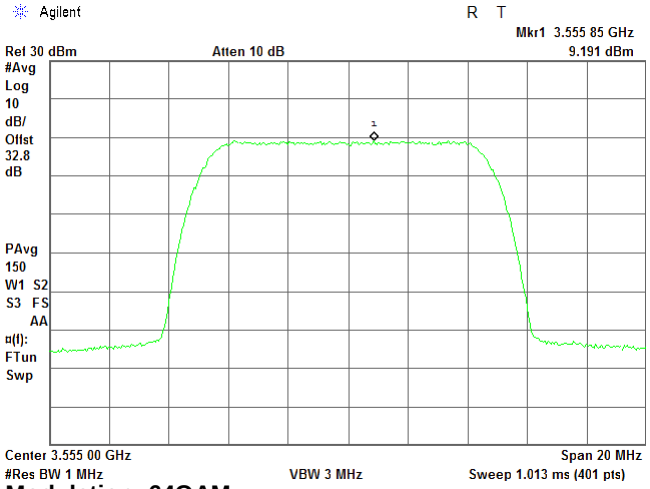


Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

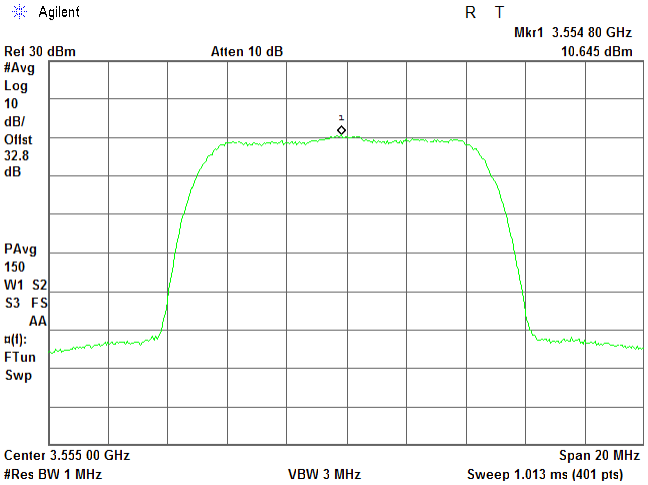
Plot 7.1.7 Peak spectral power density at low frequency

MODULATION: QPSK
CHANNEL SPACING: 10 MHz
ANTENNA CHAIN: 3

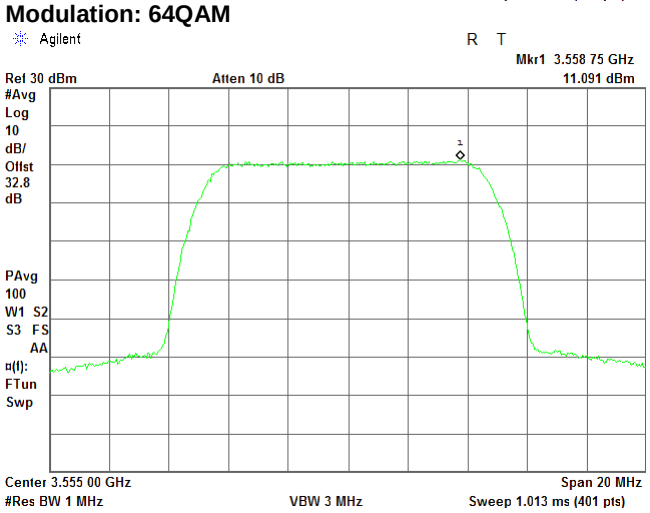
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

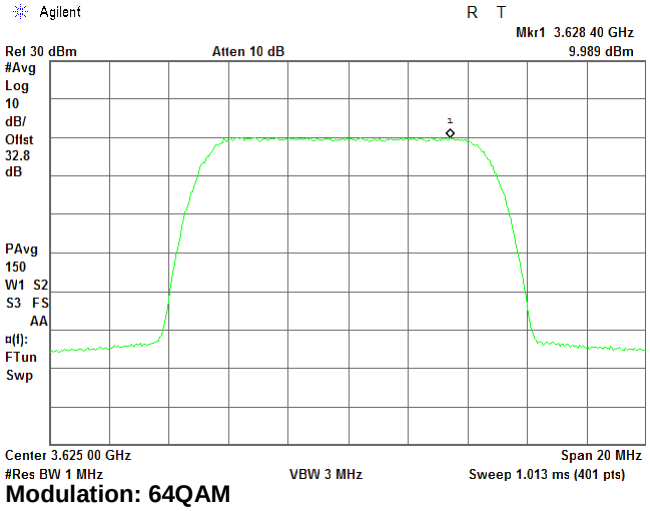


Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

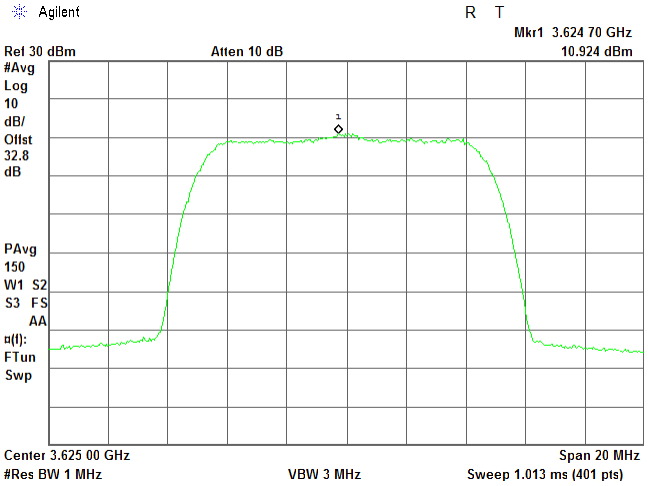
Plot 7.1.8 Peak spectral power density at mid frequency

MODULATION: QPSK
CHANNEL SPACING: 10 MHz
ANTENNA CHAIN: 3

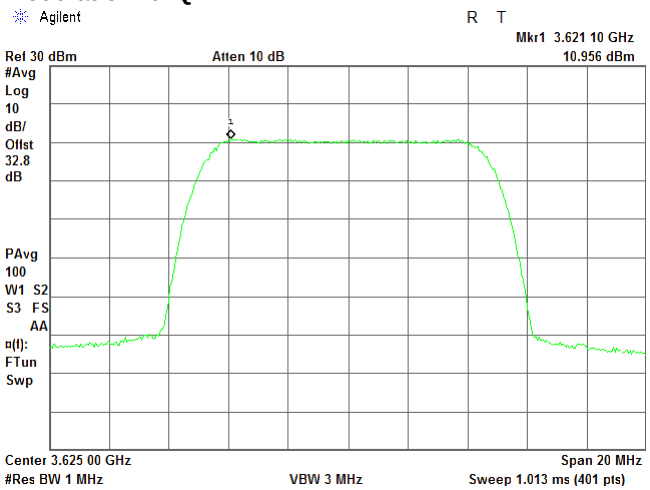
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

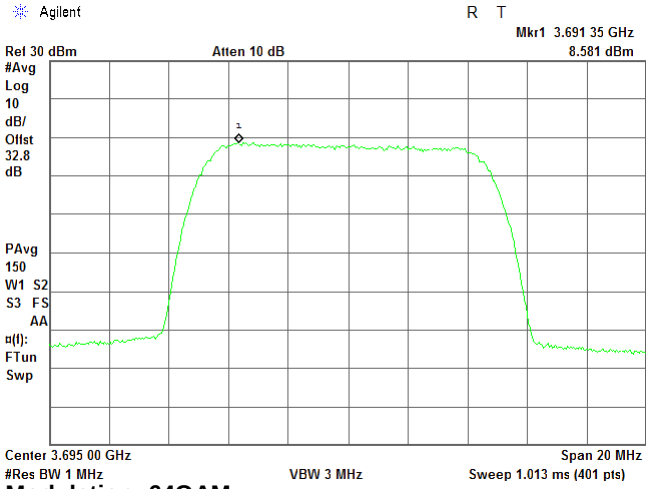


Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

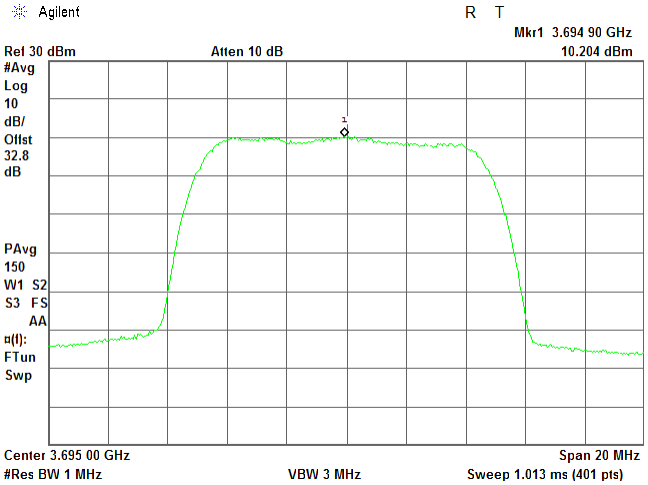
Plot 7.1.9 Peak spectral power density at high frequency

MODULATION: QPSK
CHANNEL SPACING: 10 MHz
ANTENNA CHAIN: 3

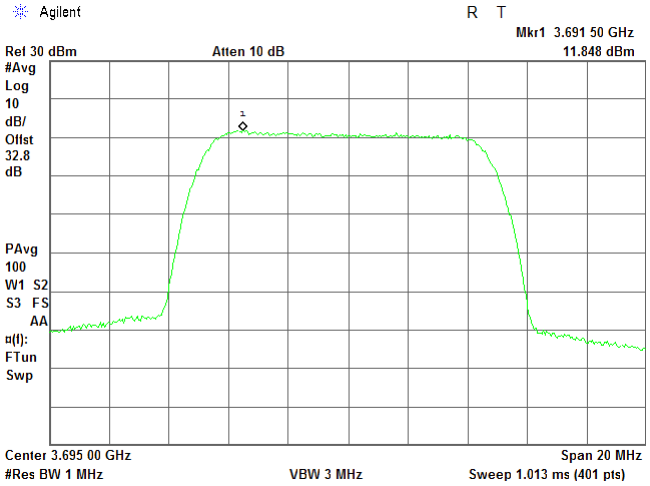
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

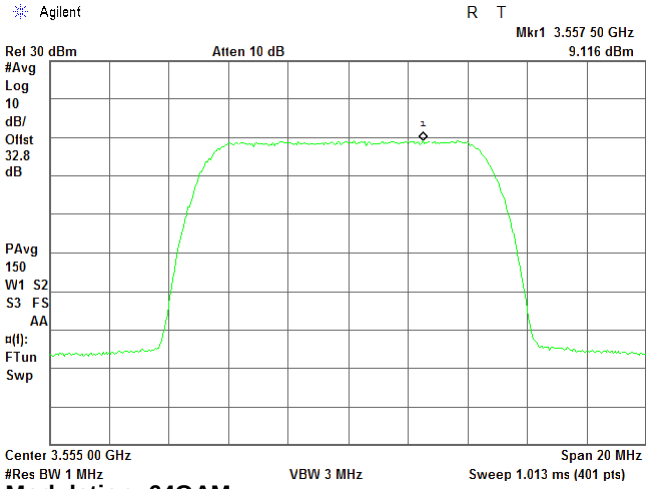


Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

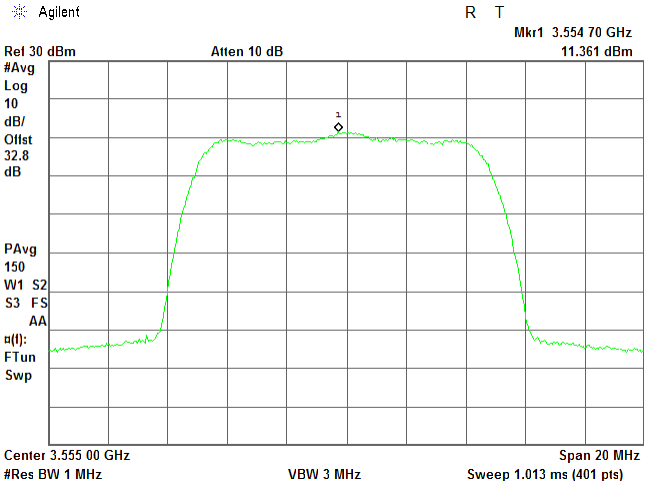
Plot 7.1.10 Peak spectral power density at low frequency

MODULATION: QPSK
CHANNEL SPACING: 10 MHz
ANTENNA CHAIN: 4

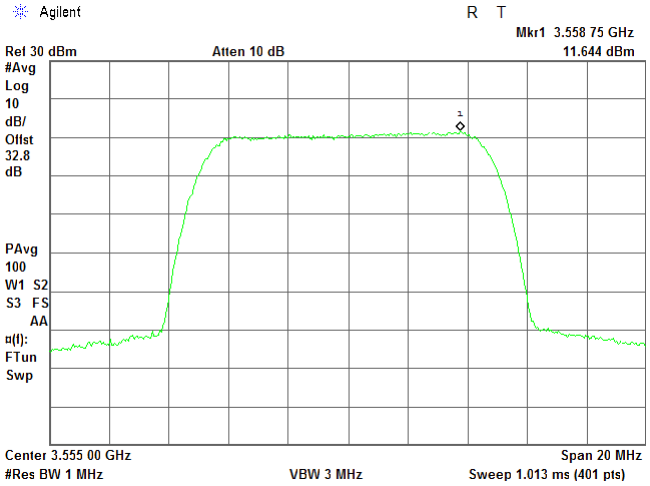
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

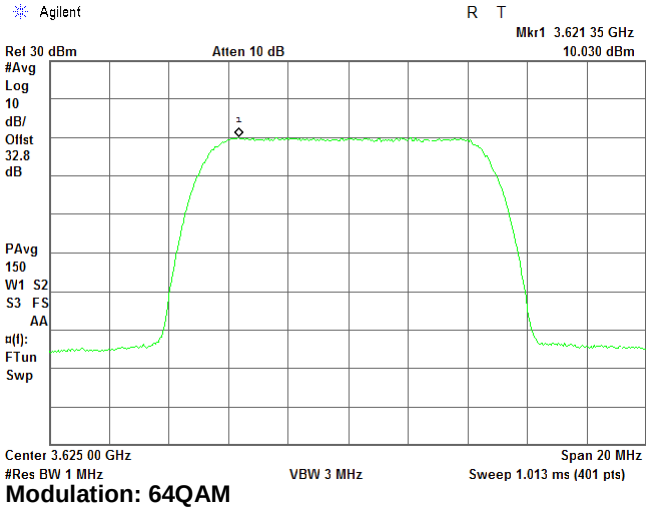


Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

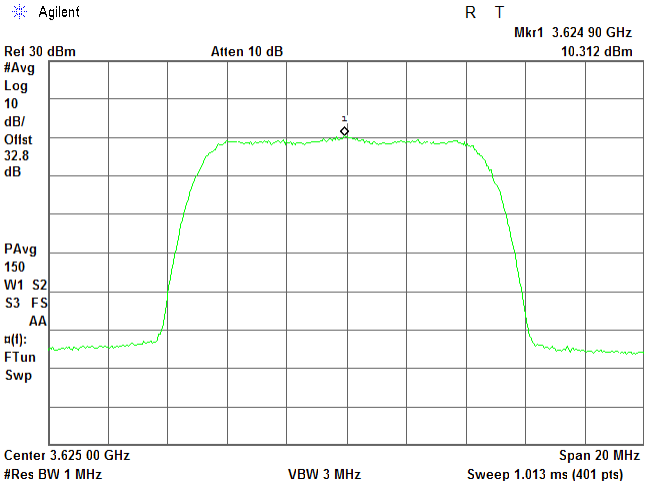
Plot 7.1.11 Peak spectral power density at mid frequency

MODULATION: QPSK
CHANNEL SPACING: 10 MHz
ANTENNA CHAIN: 4

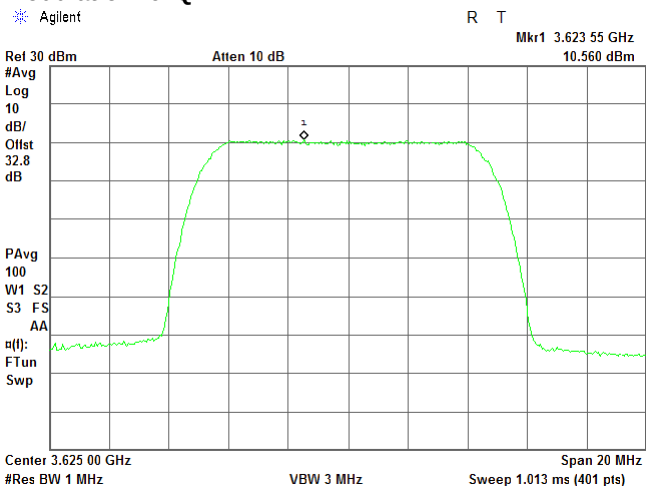
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

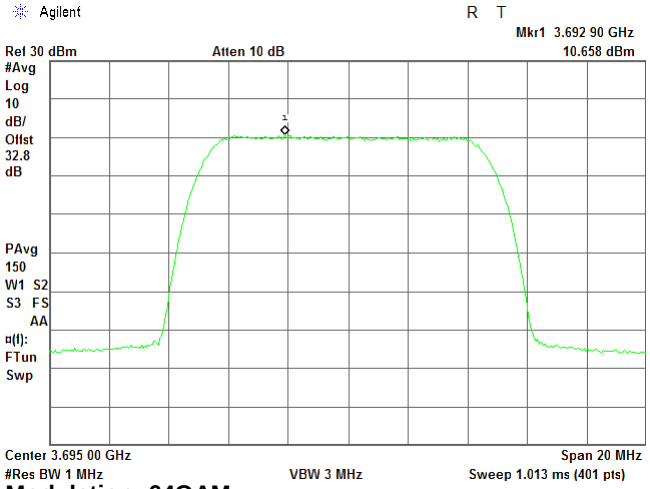


Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

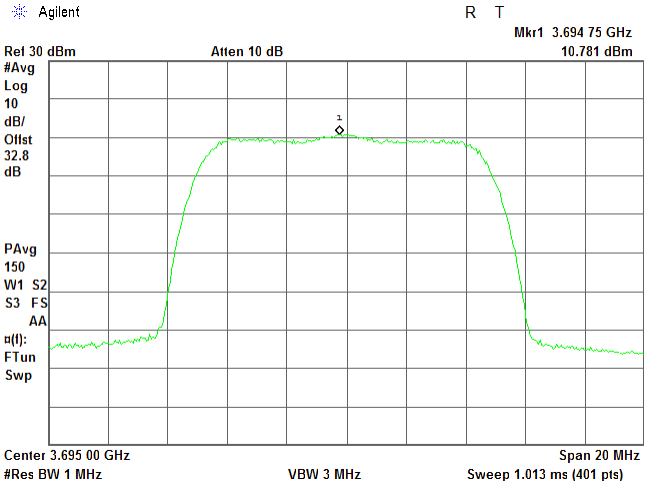
Plot 7.1.12 Peak spectral power density at high frequency

MODULATION: QPSK
CHANNEL SPACING: 10 MHz
ANTENNA CHAIN: 4

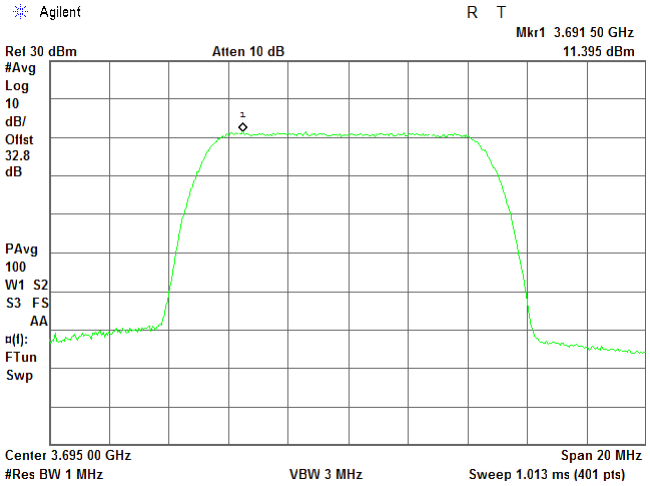
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

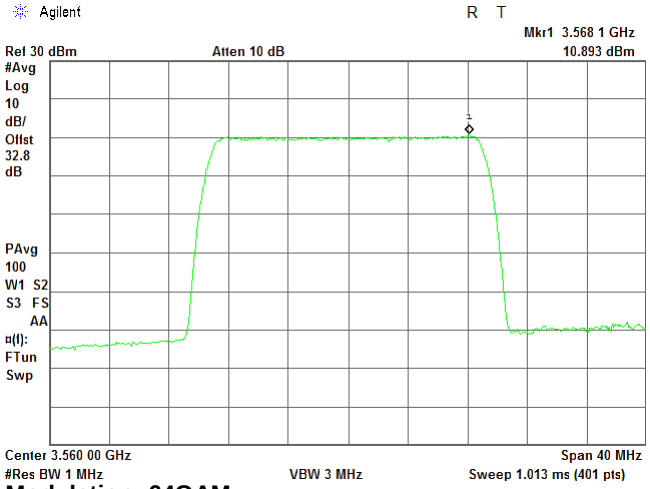


Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

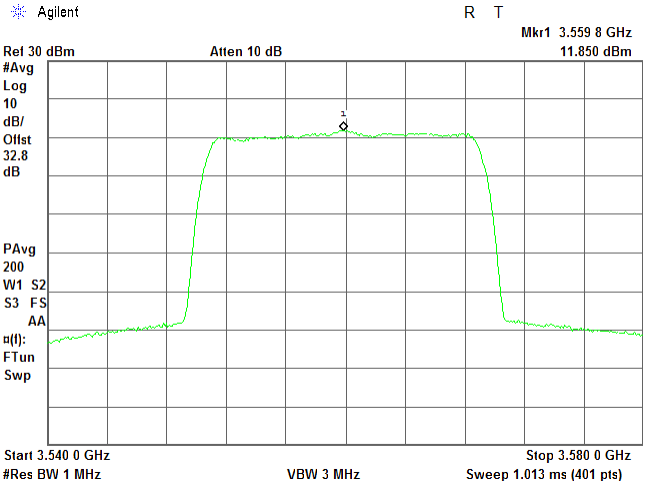
Plot 7.1.13 Peak spectral power density at low frequency within

MODULATION: QPSK
CHANNEL SPACING: 20 MHz
ANTENNA CHAIN: 1

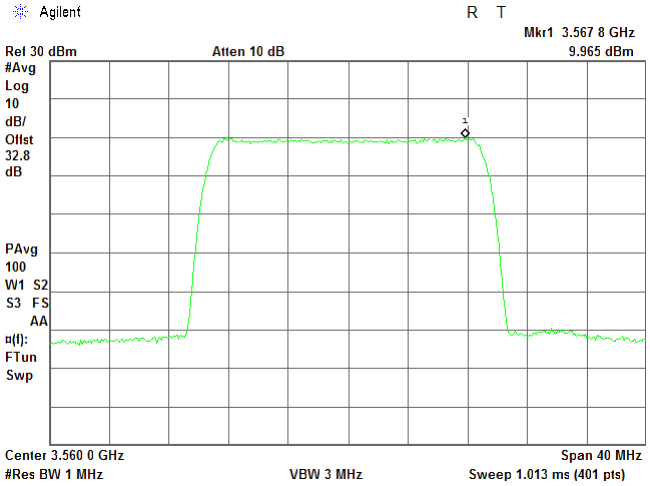
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

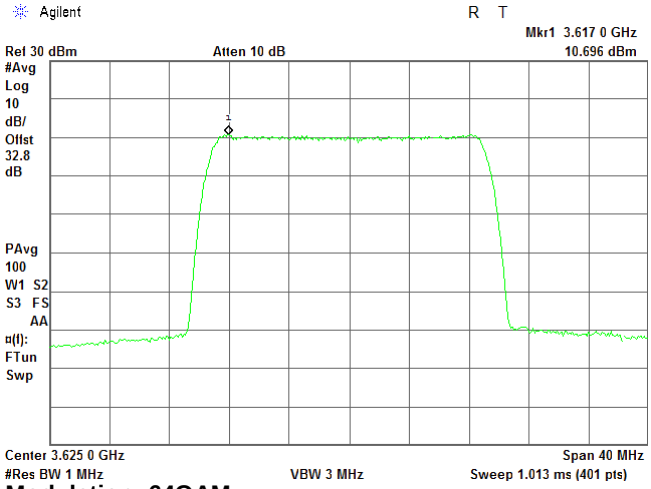


Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

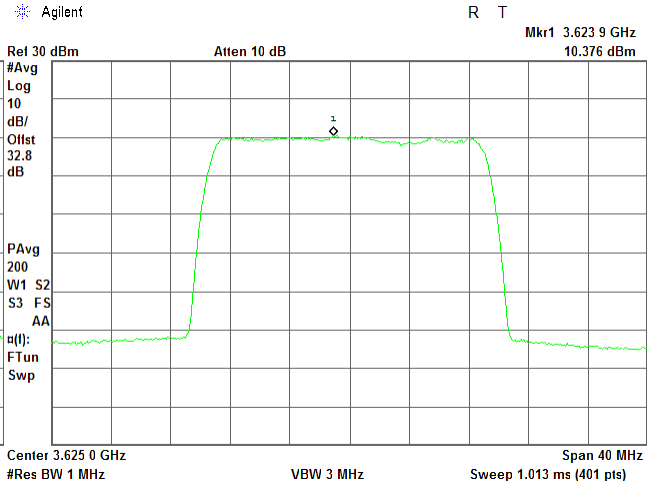
Plot 7.1.14 Peak spectral power density at mid frequency

MODULATION: QPSK
CHANNEL SPACING: 20 MHz
ANTENNA CHAIN: 1

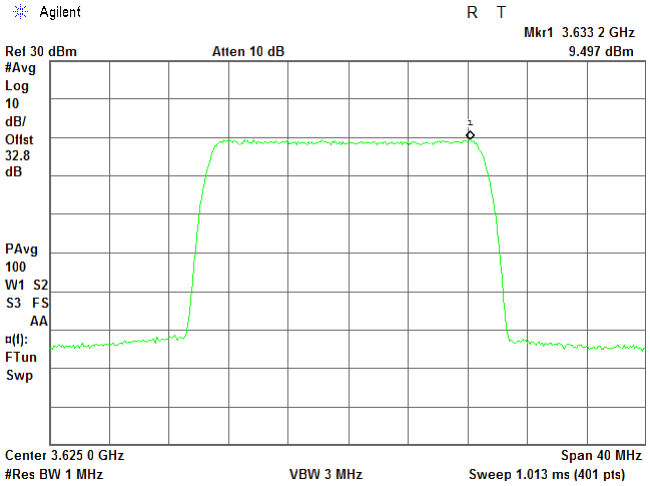
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

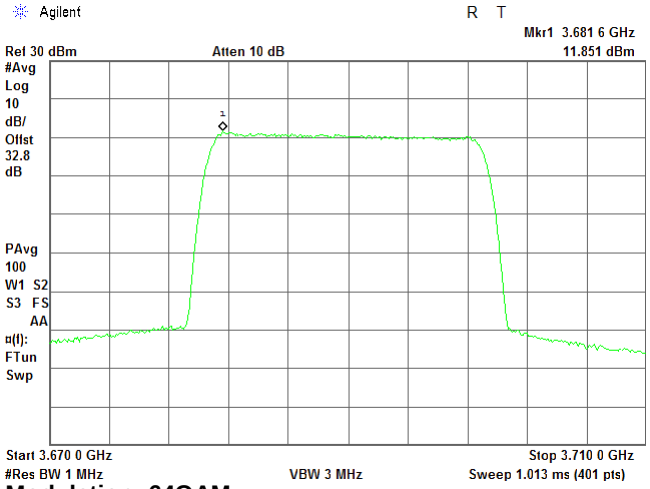


Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

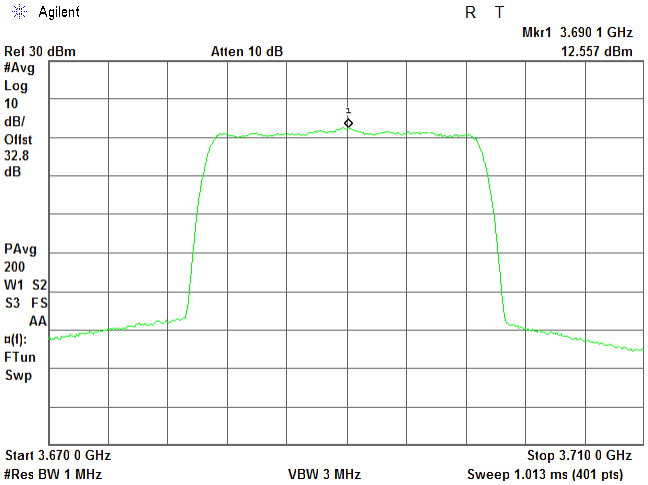
Plot 7.1.15 Peak spectral power density at high frequency

MODULATION: QPSK
CHANNEL SPACING: 20 MHz
ANTENNA CHAIN: 1

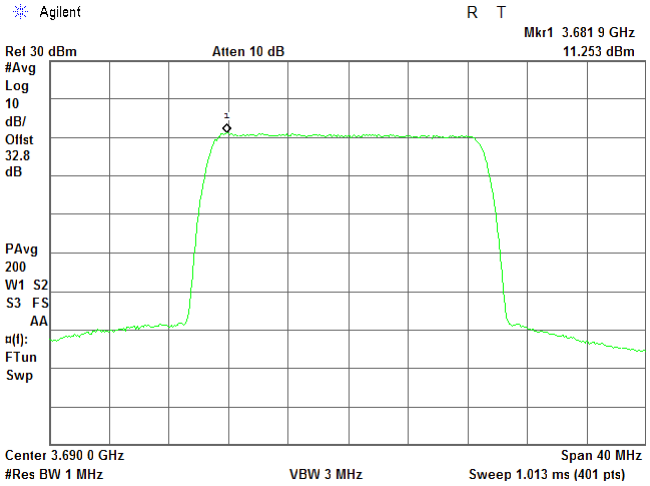
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

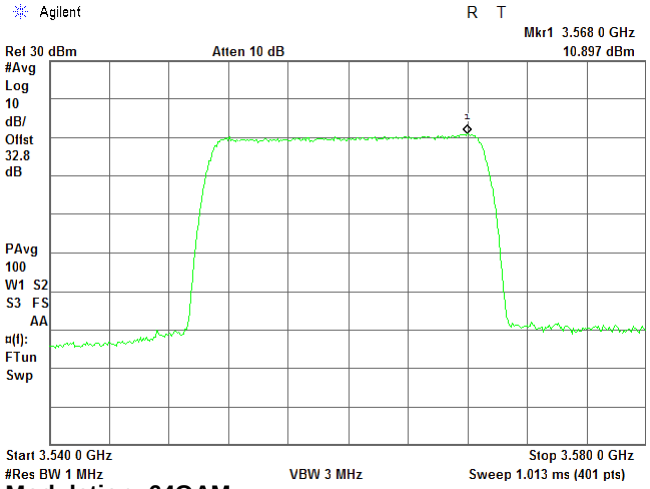


Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

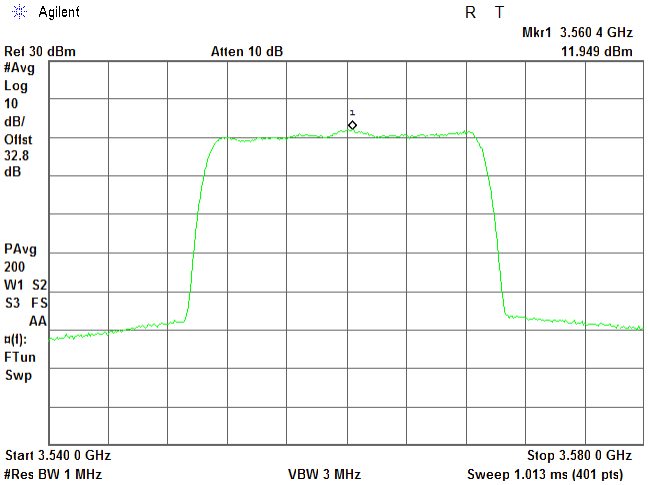
Plot 7.1.16 Peak spectral power density at low frequency within

MODULATION: QPSK
CHANNEL SPACING: 20 MHz
ANTENNA CHAIN: 2

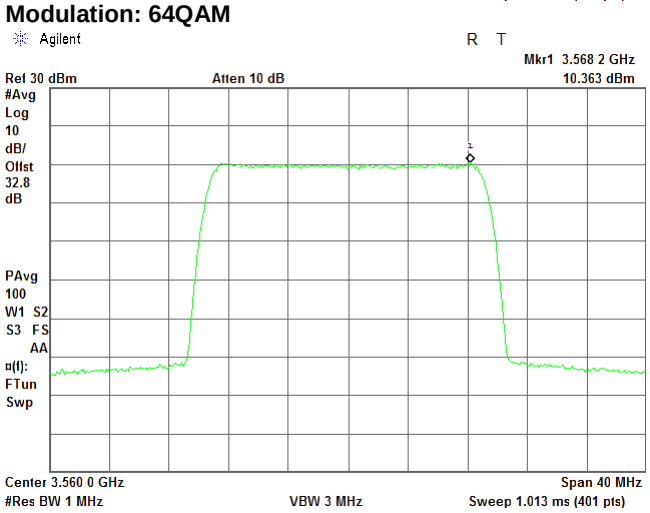
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

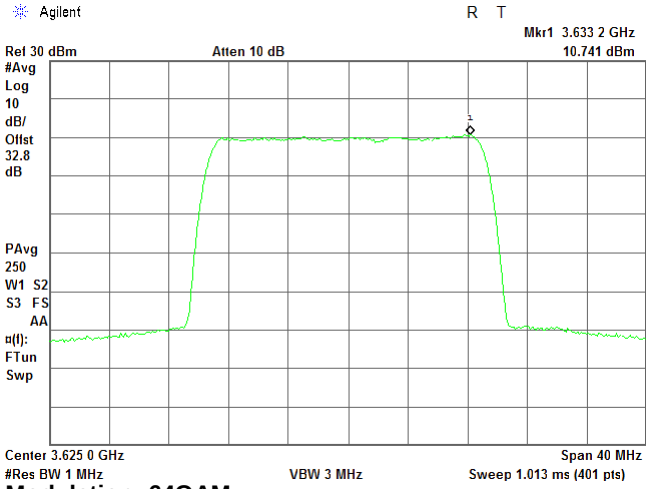


Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

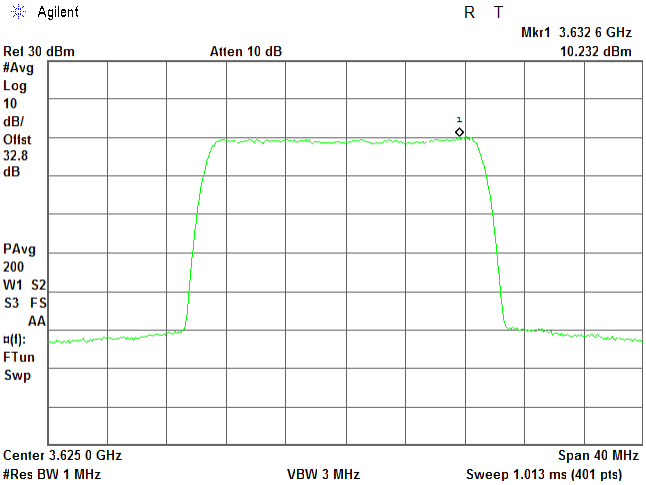
Plot 7.1.17 Peak spectral power density at mid frequency

MODULATION: QPSK
CHANNEL SPACING: 20 MHz
ANTENNA CHAIN: 2

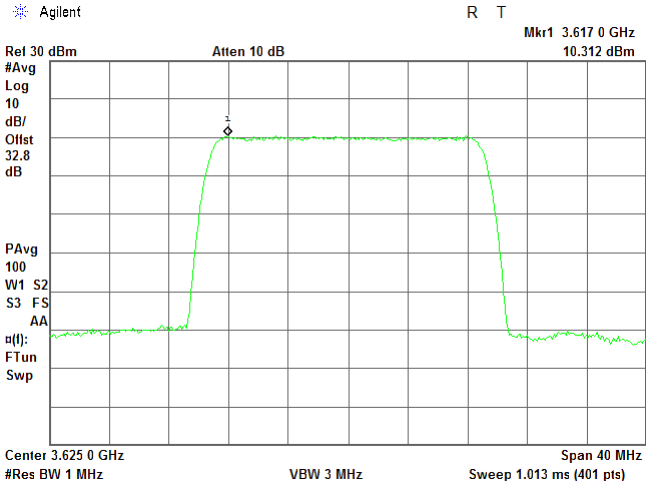
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

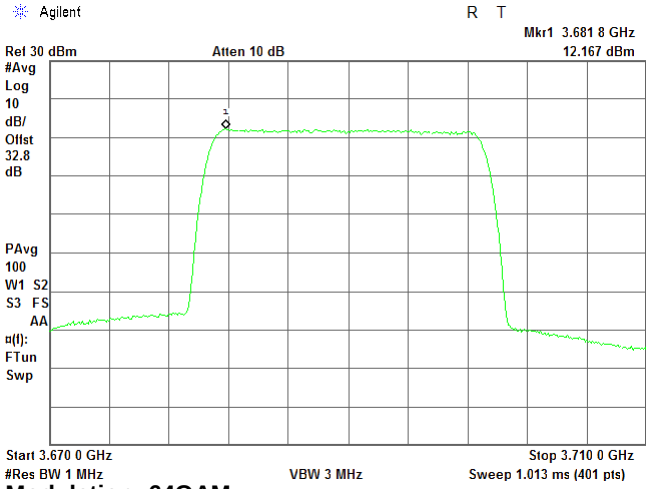


Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

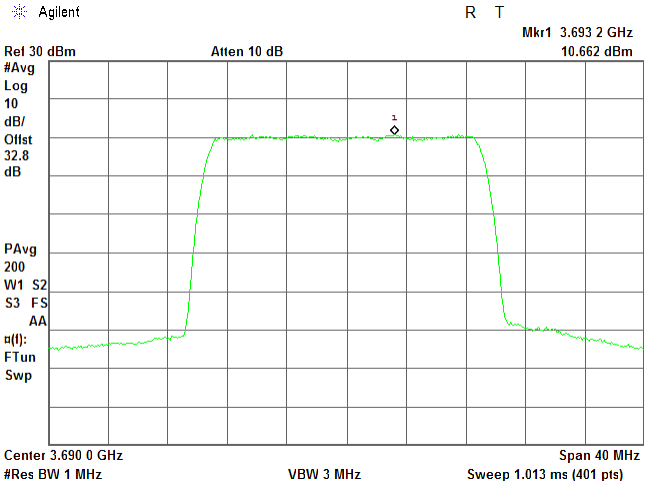
Plot 7.1.18 Peak spectral power density at high frequency

MODULATION: QPSK
CHANNEL SPACING: 20 MHz
ANTENNA CHAIN: 2

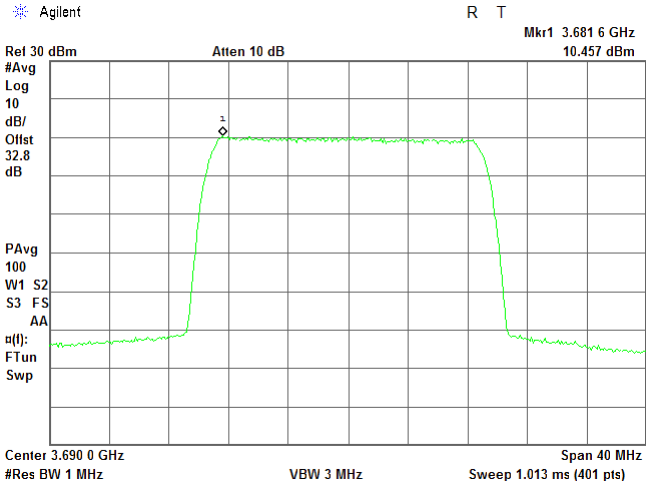
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

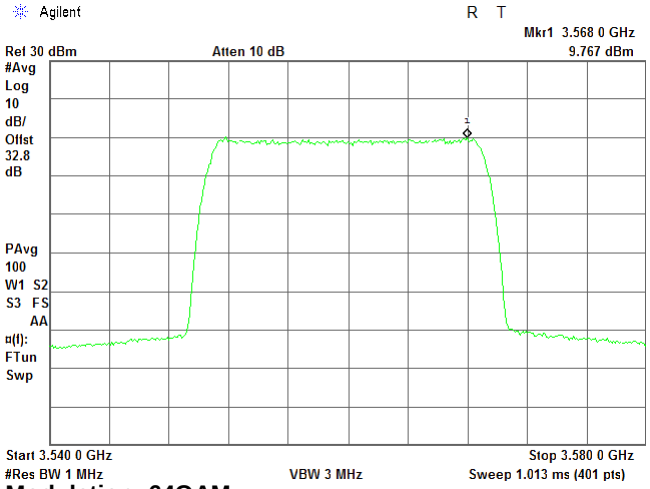


Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

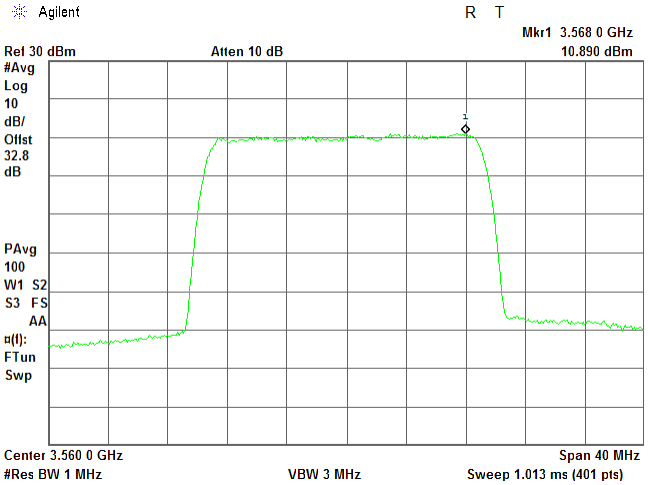
Plot 7.1.19 Peak spectral power density at low frequency within

MODULATION: QPSK
CHANNEL SPACING: 20 MHz
ANTENNA CHAIN: 3

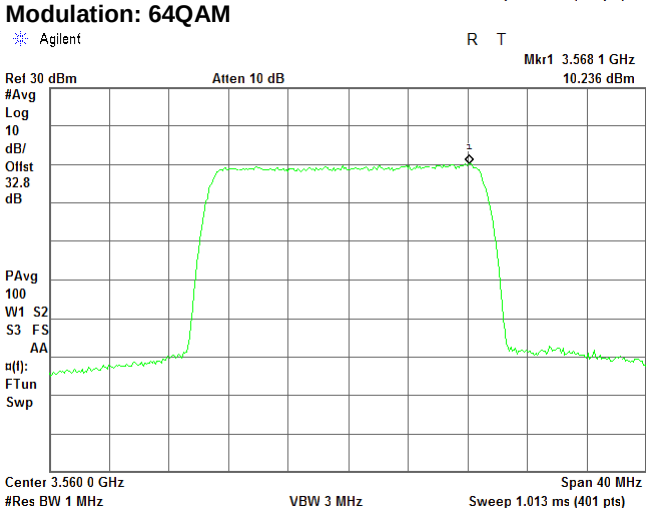
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

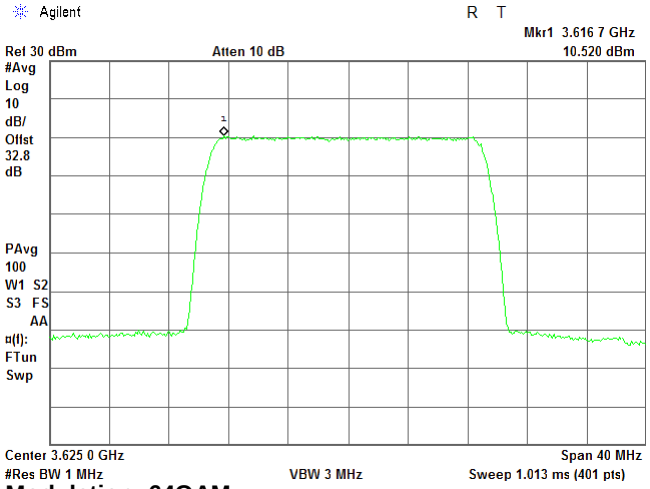


Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

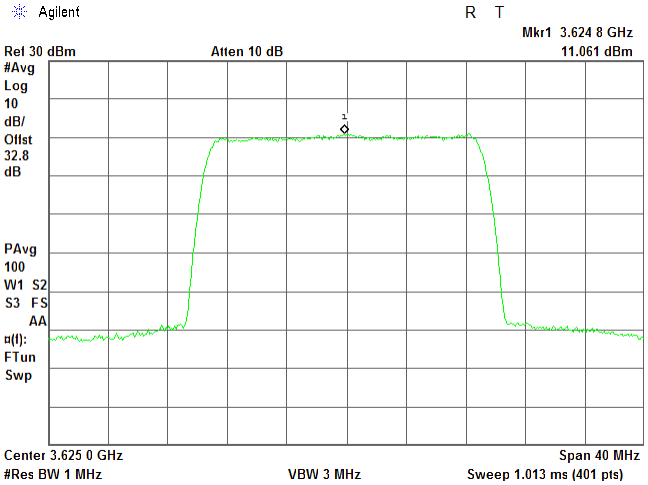
Plot 7.1.20 Peak spectral power density at mid frequency

MODULATION: QPSK
CHANNEL SPACING: 20 MHz
ANTENNA CHAIN: 3

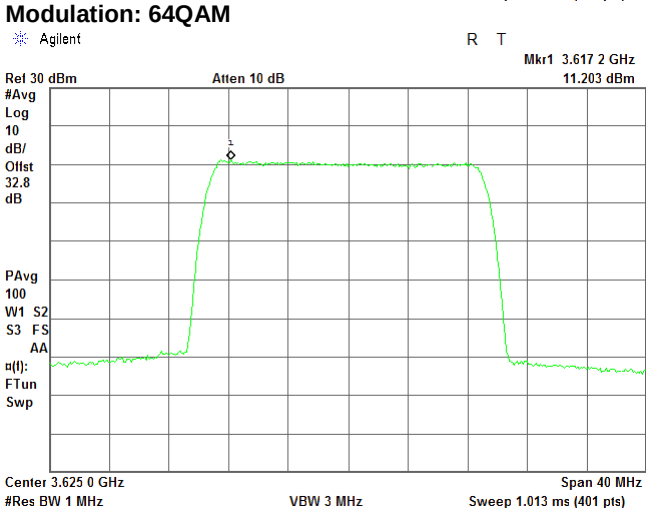
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

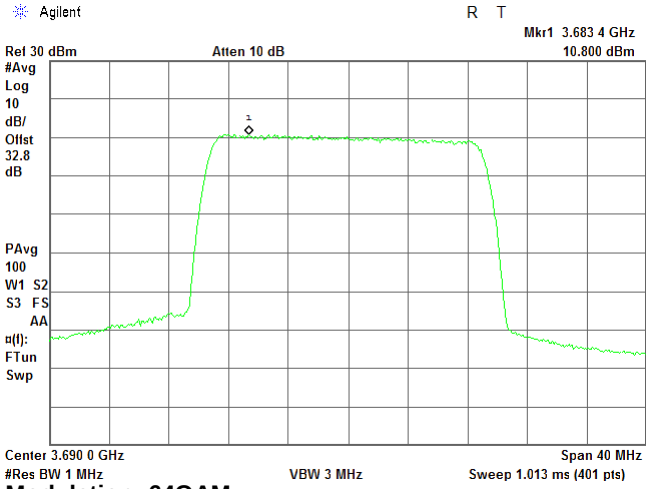


Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

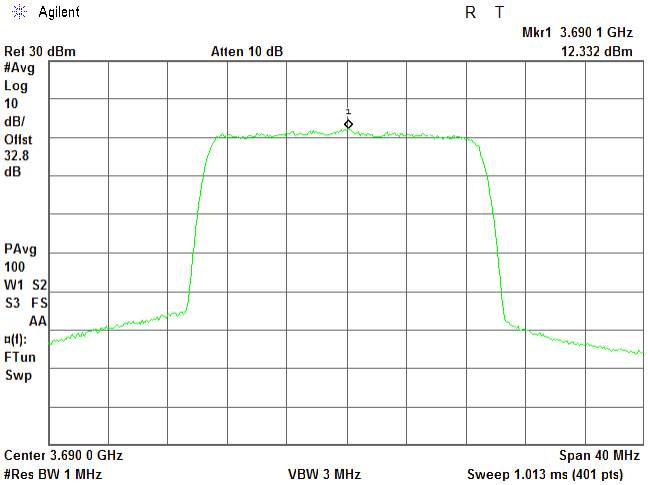
Plot 7.1.21 Peak spectral power density at high frequency

MODULATION: QPSK
CHANNEL SPACING: 20 MHz
ANTENNA CHAIN: 3

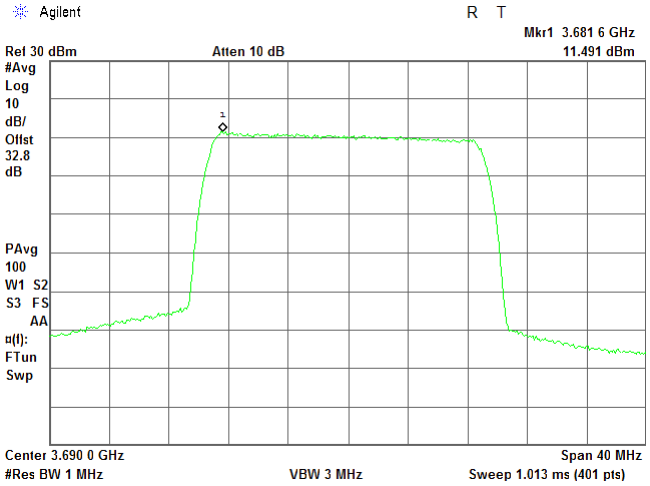
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

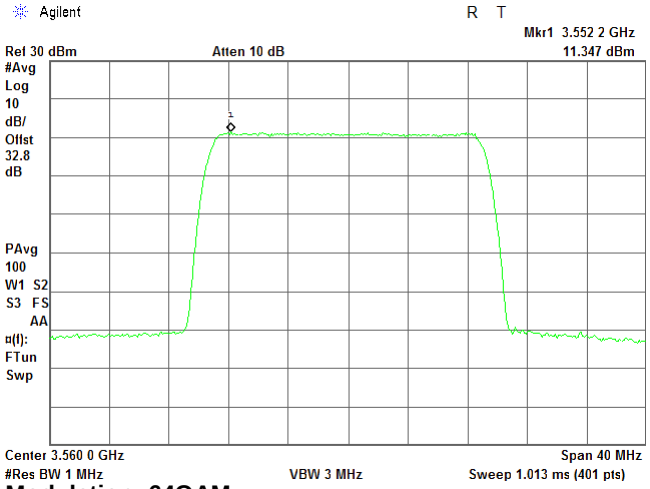


Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

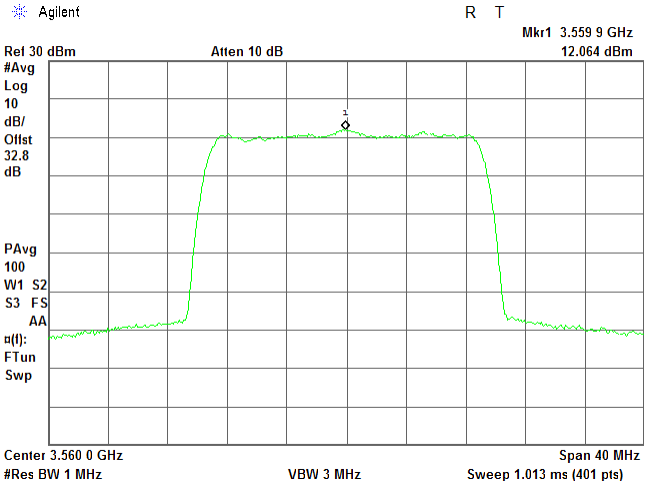
Plot 7.1.22 Peak spectral power density at low frequency within

MODULATION: QPSK
CHANNEL SPACING: 20 MHz
ANTENNA CHAIN: 4

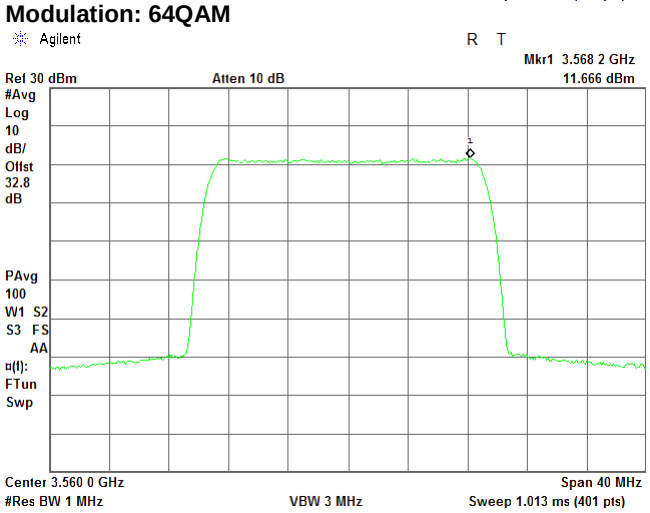
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

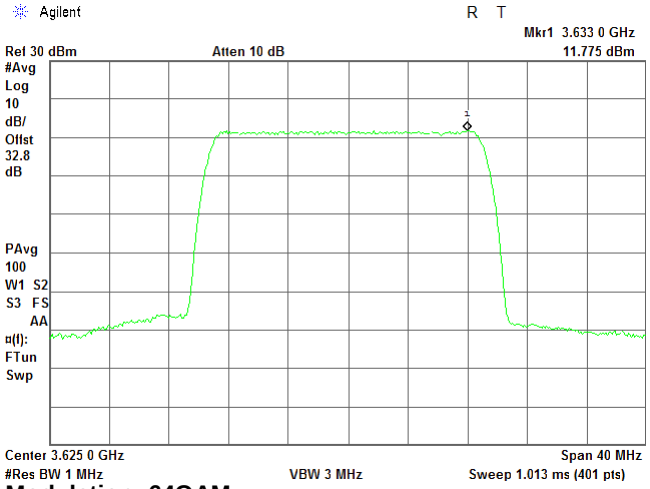


Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

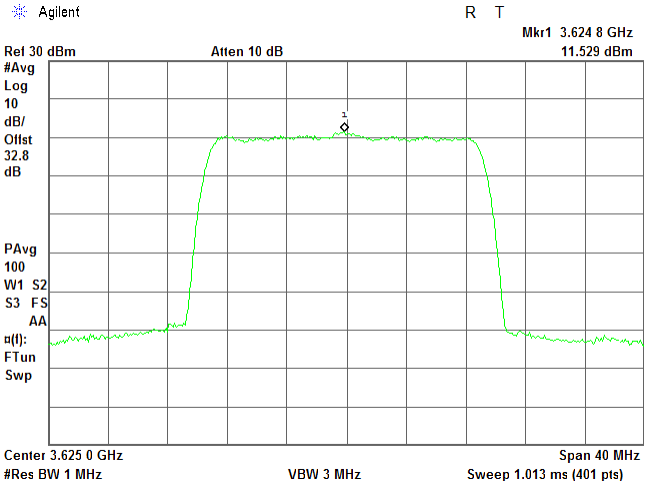
Plot 7.1.23 Peak spectral power density at mid frequency

MODULATION: QPSK
CHANNEL SPACING: 20 MHz
ANTENNA CHAIN: 4

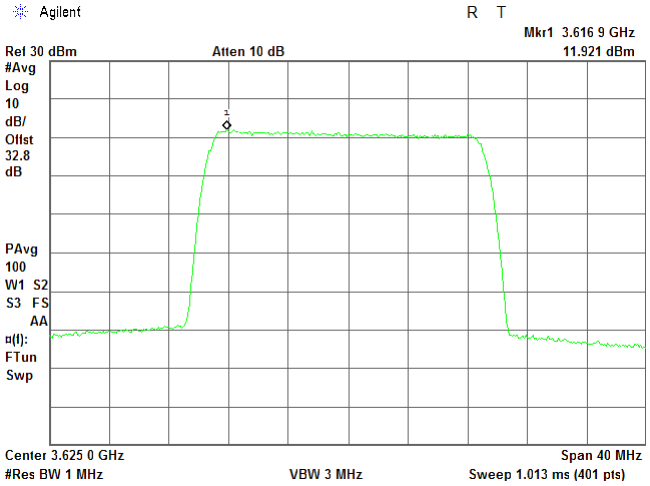
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

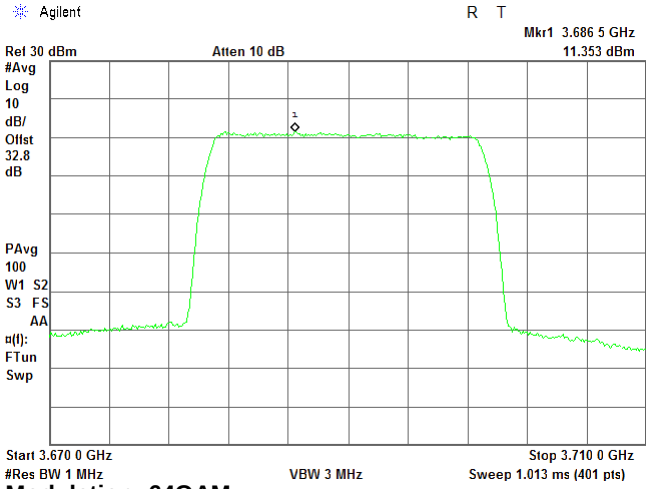


Test specification:	Section 96.41(b), Maximum EIRP and maximum power spectral density		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 51 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

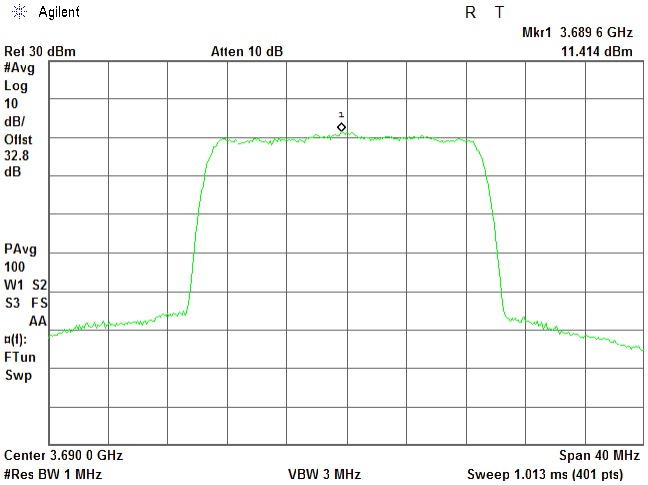
Plot 7.1.24 Peak spectral power density at high frequency

MODULATION: QPSK
CHANNEL SPACING: 20 MHz
ANTENNA CHAIN: 4

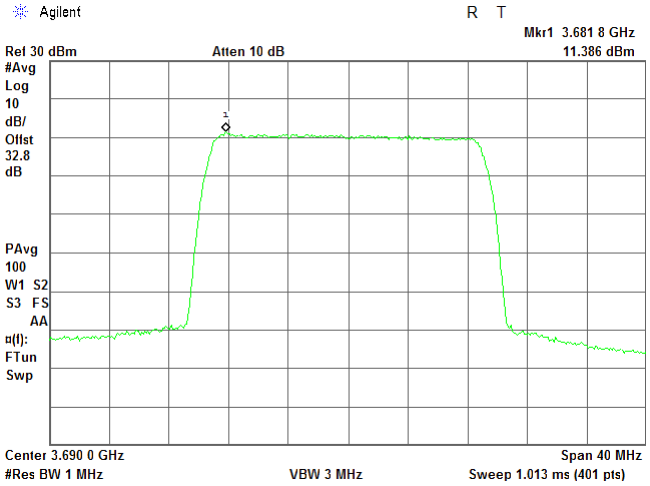
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM



Test specification:	Section 96.41(g), Peak-to-average power ratio		
Test procedure:	Section 96.41(g)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 54 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

7.2 Peak to average power ratio test

7.2.1 General

This test was performed to measure the peak to average power ratio at RF antenna connector. Specification test limits are given in Table 7.2.1.

Table 7.2.1 Peak to average power ratio limits

Assigned frequency range, MHz	Peak to average power ratio limit	
	Probability, %	dB
3550.0 – 3700.0	0.1	13.0

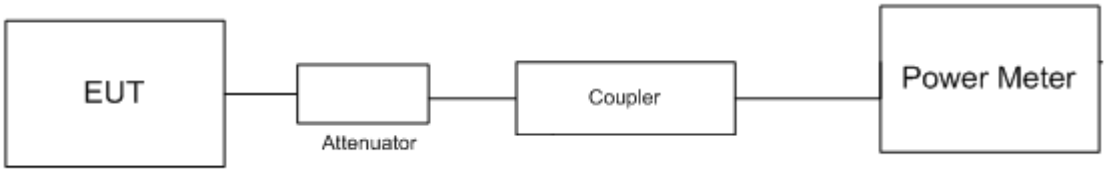
7.2.2 Test procedure

7.2.2.1 The EUT was set up as shown in Figure 7.2.1, energized and its proper operation was checked.

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

7.2.2.3 The peak to average power ratio was measured with power meter as provided in Table 7.2.2 and the associated plots.

Figure 7.2.1 Peak output power test setup



Test specification:	**Section 96.41(g), Peak-to-average power ratio**		
Test procedure:	Section 96.41(g)		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	**Relative Humidity:** 54 %	**Air Pressure:** 1010 hPa	**Power:** 56 VDC
Remarks:			

Table 7.2.2 Peak-to-average power test results

OPERATING FREQUENCY RANGE: 3550 – 3700 MHz
DETECTOR USED: Peak/Average
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Carrier frequency, MHz	Peak to average ratio, dB	Limit, dBm	Margin, dB	Verdict
Channel Spacing 10 MHz				
Modulation QPSK				
3555.0	9.12	13.0	-3.88	Pass
3625.0	9.11	13.0	-3.89	Pass
3695.0	9.09	13.0	-3.91	Pass
Modulation 16QAM				
3555.0	9.03	13.0	-3.97	Pass
3625.0	9.00	13.0	-4.00	Pass
3695.0	8.95	13.0	-4.05	Pass
Modulation 64QAM				
3555.0	8.97	13.0	-4.03	Pass
3625.0	9.03	13.0	-3.97	Pass
3695.0	8.96	13.0	-4.04	Pass
Channel Spacing 20 MHz				
Modulation QPSK				
3560.0	9.45	13.0	-3.55	Pass
3625.0	9.48	13.0	-3.52	Pass
3690.0	9.45	13.0	-3.55	Pass
Modulation 16QAM				
3560.0	9.54	13.0	-3.46	Pass
3625.0	9.69	13.0	-3.31	Pass
3690.0	9.42	13.0	-3.58	Pass
Modulation 64QAM				
3560.0	9.54	13.0	-3.46	Pass
3625.0	9.60	13.0	-3.40	Pass
3690.0	9.54	13.0	-3.46	Pass

Reference numbers of test equipment used

HL 3301	HL 3302				

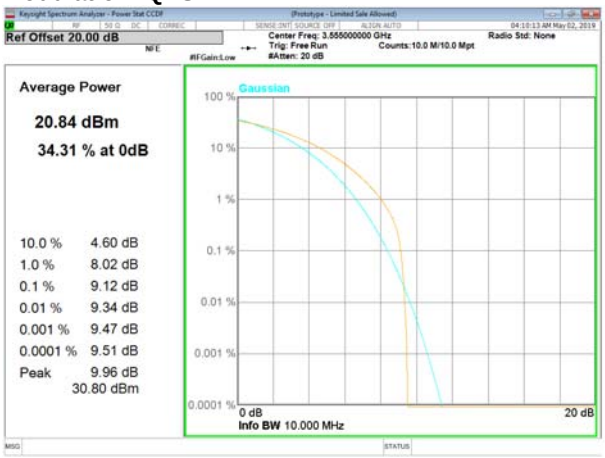
Full description is given in Appendix A.

Test specification:	Section 96.41(g), Peak-to-average power ratio		
Test procedure:	Section 96.41(g)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 54 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

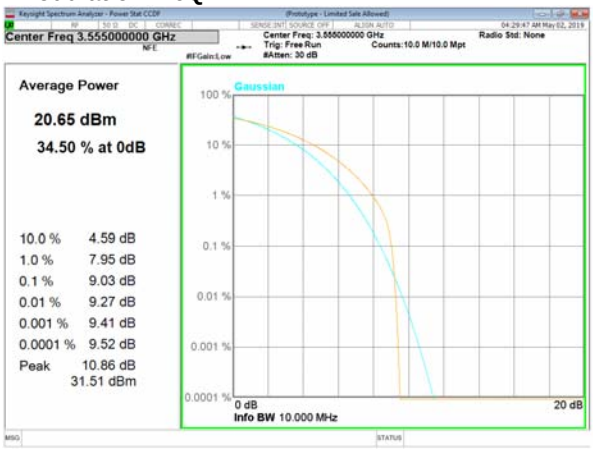
Plot 7.2.1 Peak to average power ratio test results at low frequency

CHANNEL SPACING: 10 MHz
ANTENNA PORT: 1

Modulation: QPSK



Modulation: 16QAM



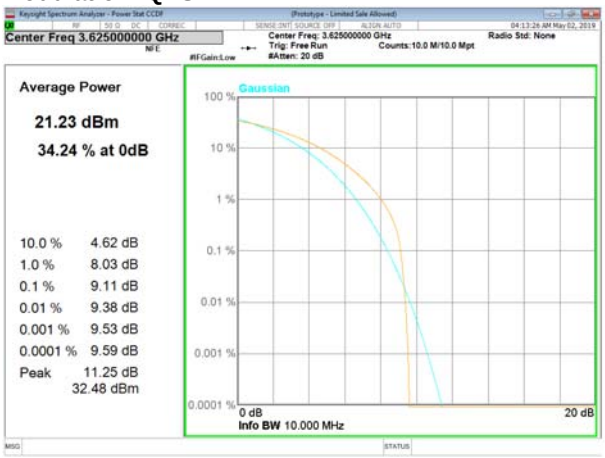
Modulation: 64QAM

Test specification:	Section 96.41(g), Peak-to-average power ratio		
Test procedure:	Section 96.41(g)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 54 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

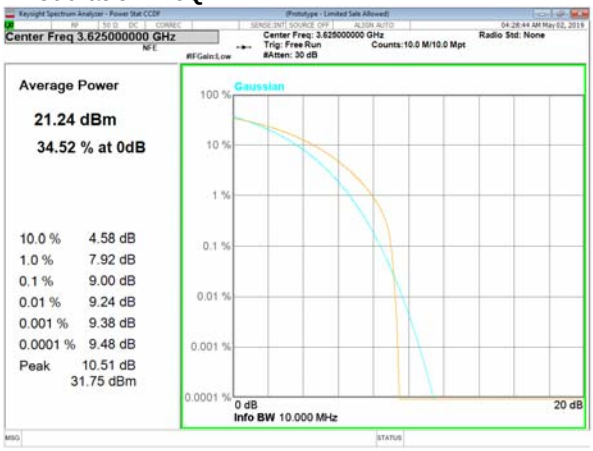
Plot 7.2.2 Peak output power test results at mid frequency

CHANNEL SPACING: 10 MHz
ANTENNA PORT: 1

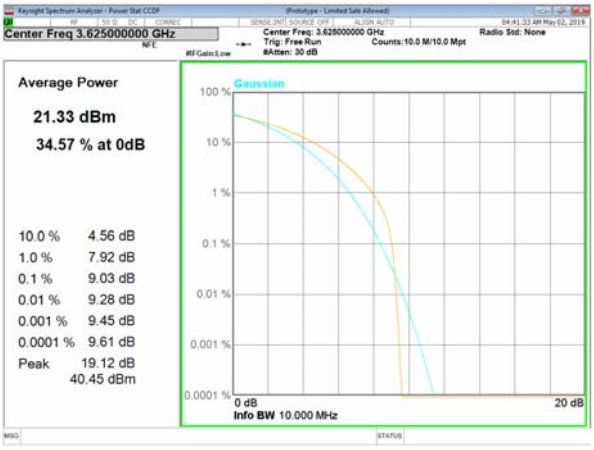
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

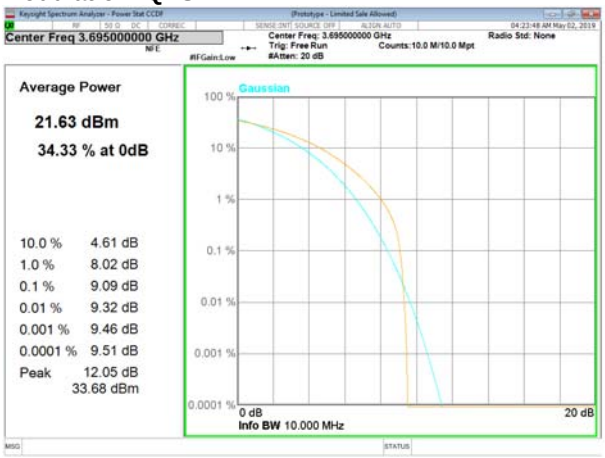


Test specification:	Section 96.41(g), Peak-to-average power ratio		
Test procedure:	Section 96.41(g)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 54 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

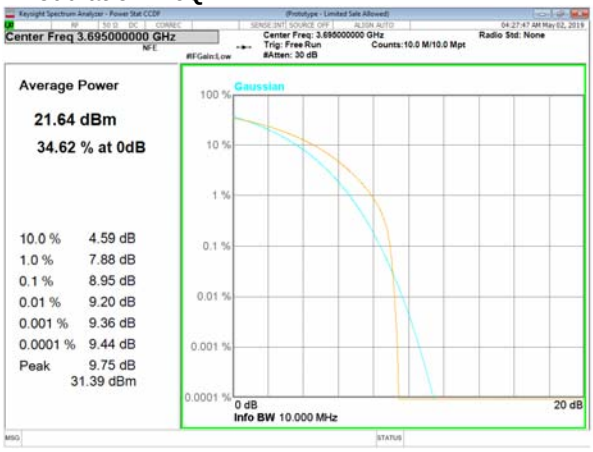
Plot 7.2.3 Peak output power test results at high frequency

CHANNEL SPACING: 10 MHz
ANTENNA PORT: 1

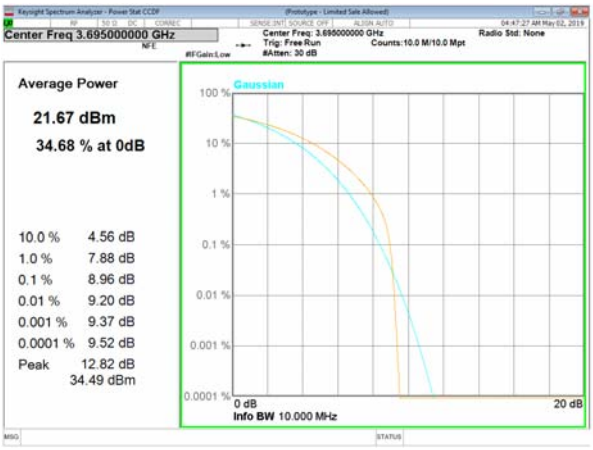
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

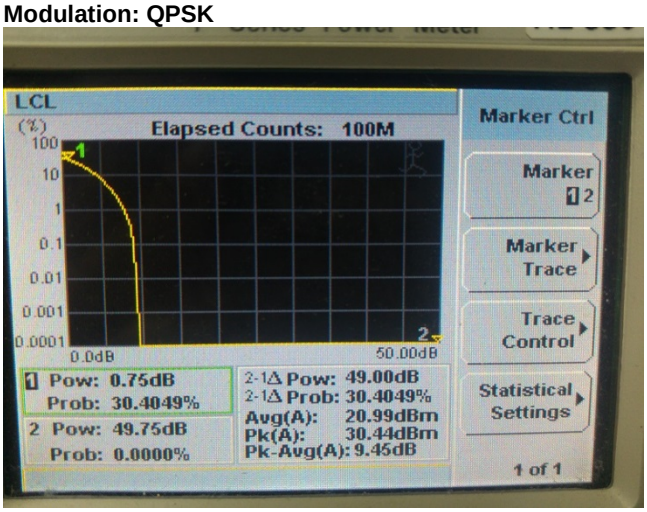


Test specification:	Section 96.41(g), Peak-to-average power ratio		
Test procedure:	Section 96.41(g)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 54 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

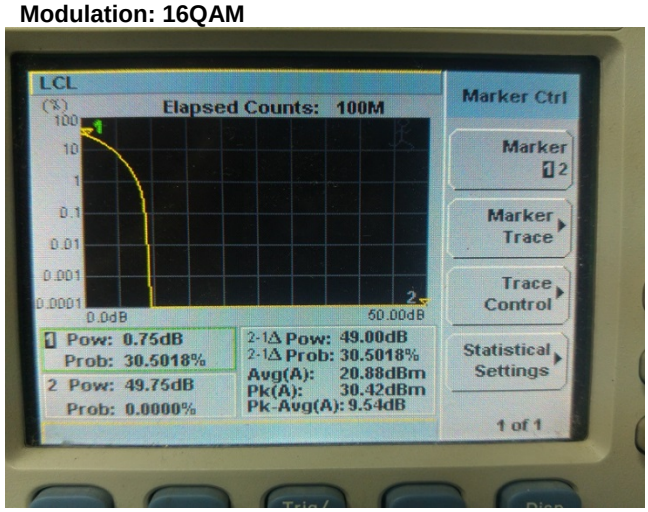
Plot 7.2.4 Peak to average power ratio test results at low frequency

CHANNEL SPACING: 20 MHz
ANTENNA PORT: 1

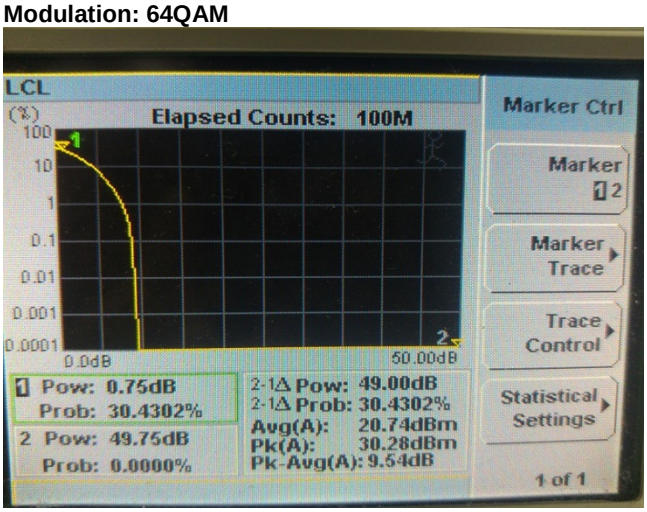
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

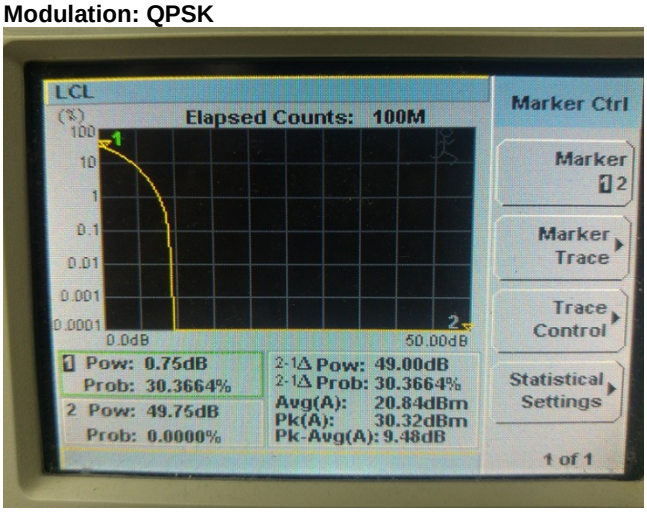


Test specification:	Section 96.41(g), Peak-to-average power ratio		
Test procedure:	Section 96.41(g)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 54 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

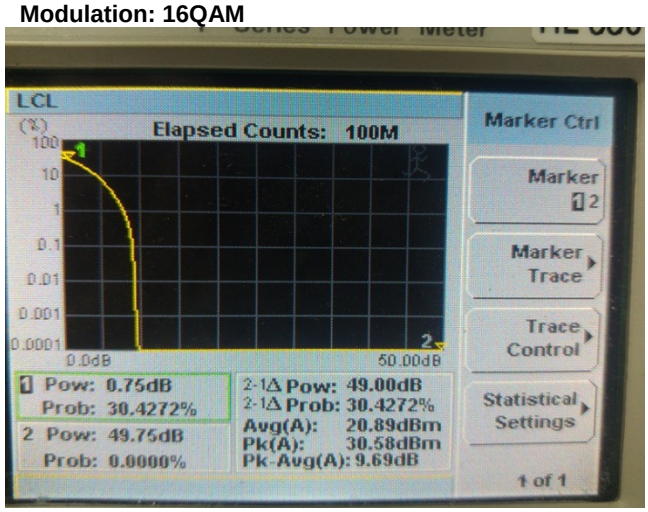
Plot 7.2.5 Peak output power test results at mid frequency

CHANNEL SPACING: 20 MHz
ANTENNA PORT: 1

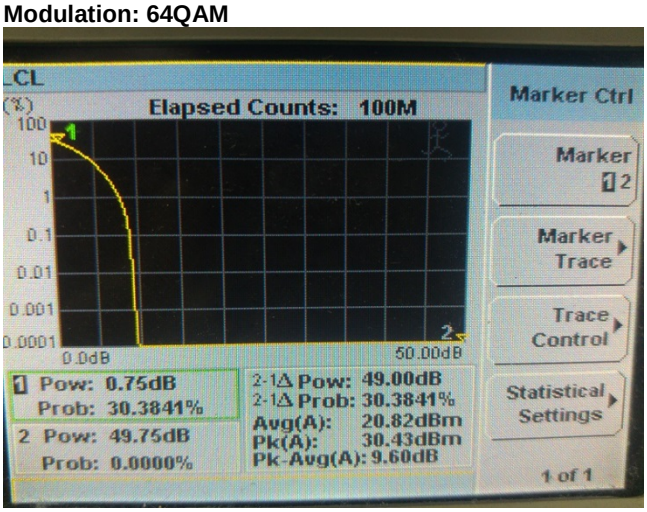
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM

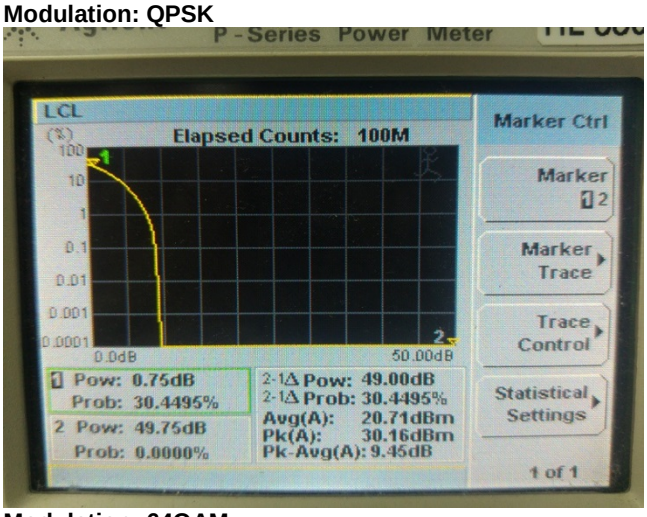


Test specification:	Section 96.41(g), Peak-to-average power ratio		
Test procedure:	Section 96.41(g)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 54 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

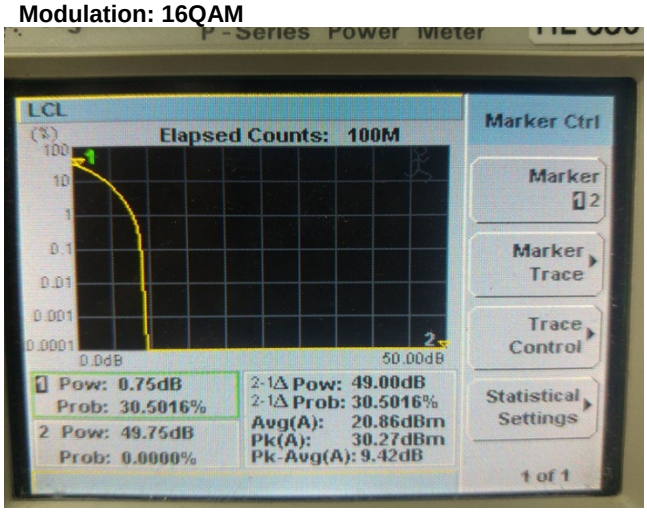
Plot 7.2.6 Peak output power test results at high frequency

CHANNEL SPACING: 20 MHz
ANTENNA PORT: 1

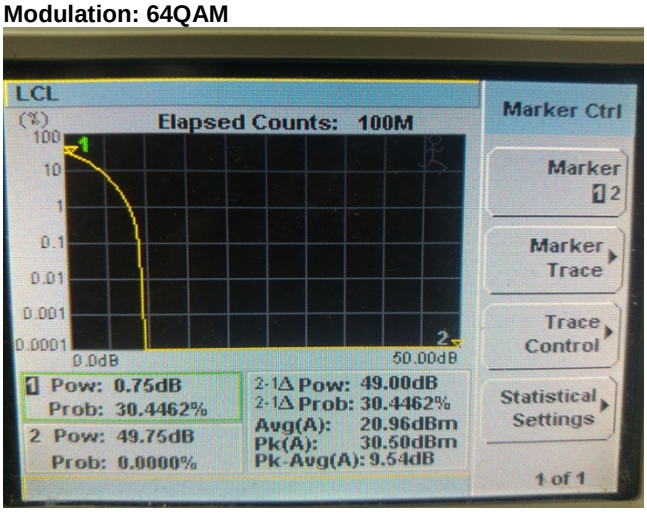
Modulation: QPSK



Modulation: 16QAM



Modulation: 64QAM



Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	11-Apr-19		
Temperature: 24 ºC	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

7.3 Occupied bandwidth test

7.3.1 General

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in Table 7.3.1.

Table 7.3.1 Occupied bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points*, %	Maximum allowed bandwidth, MHz
3550-3700	99	10/20

* - Modulation envelope reference points are provided in terms of attenuation below the unmodulated carrier.

7.3.2 Test procedure

7.3.2.1 The EUT was set up as shown in Figure 7.3.1, energized and its proper operation was checked.

7.3.2.2 The EUT was set to transmit the unmodulated carrier and the reference peak power level was measured.

7.3.2.3 The EUT was set to transmit the normally modulated carrier.

7.3.2.4 The transmitter occupied bandwidth was measured with spectrum analyzer as a frequency delta between the reference points on modulation envelope and provided in Table 7.3.2 and the associated plots.

Figure 7.3.1 Occupied bandwidth test setup

Test specification:	**Section 2.1049, Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	11-Apr-19		
Temperature: 24 ºC	**Relative Humidity:** 55 %	**Air Pressure:** 1010 hPa	**Power:** 56 VDC
Remarks:			

Table 7.3.2 Occupied bandwidth test results

DETECTOR USED: AVR
RESOLUTION BANDWIDTH: 300 kHz
VIDEO BANDWIDTH: 3 MHz
MODULATION ENVELOPE REFERENCE POINTS: 99%

CS=10 MHz

Modulation	Carrier frequency, MHz	Occupied bandwidth, MHz	Limit, MHz	Margin, MHz	Verdict
QPSK	3555	8.9984	10	-1.0011	Pass
	3625	9.0004	10	-0.9996	Pass
	3695	9.0037	10	-0.9963	Pass
16 QAM	3555	9.0031	10	-0.9969	Pass
	3625	8.9772	10	-1.0228	Pass
	3695	8.9882	10	-1.0118	Pass
64 QAM	3555	9.0040	10	-0.9960	Pass
	3625	8.9972	10	-1.0028	Pass
	3695	8.9691	10	-1.0309	Pass

CS=20 MHz

Modulation	Carrier frequency, MHz	Occupied bandwidth, MHz	Limit, MHz	Margin, kHz	Verdict
QPSK	3560	17.8031	20	-2.1969	Pass
	3625	17.8412	20	-2.1588	Pass
	3690	17.8134	20	-2.1866	Pass
16 QAM	3560	17.8334	20	-2.1666	Pass
	3625	17.7827	20	-2.2173	Pass
	3690	17.8007	20	-2.1993	Pass
64 QAM	3560	17.8493	20	-2.1507	Pass
	3625	17.8437	20	-2.1563	Pass
	3690	17.7972	20	-2.2028	Pass

Reference numbers of test equipment used

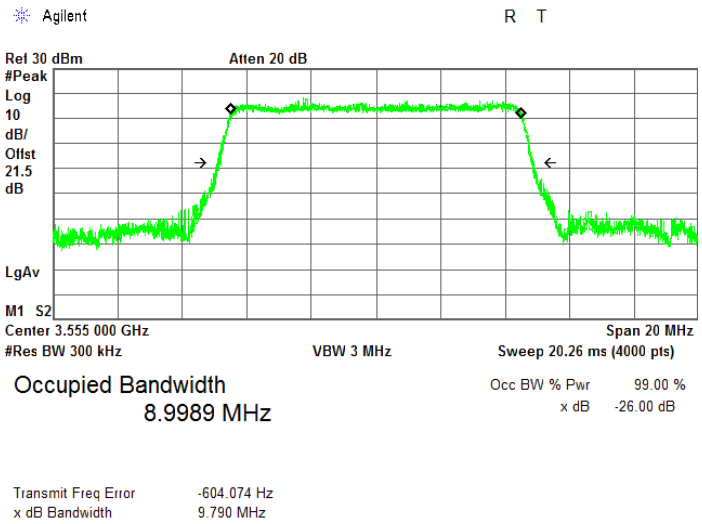
HL 3818							

Full description is given in Appendix A.

Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	11-Apr-19		
Temperature: 24 ºC	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

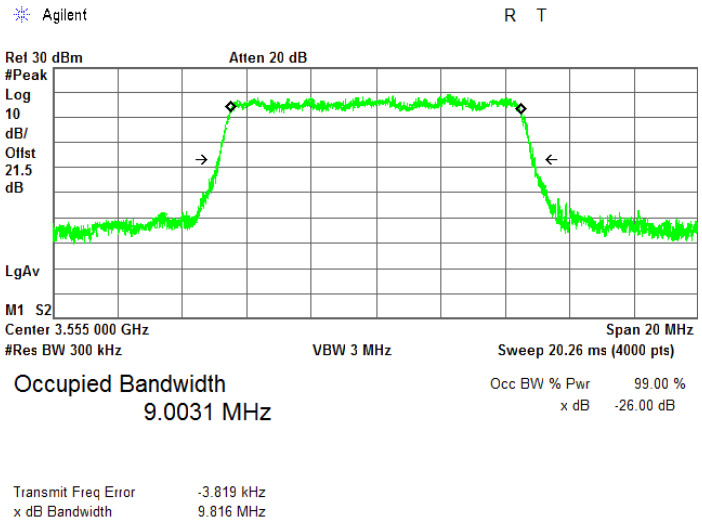
Plot 7.3.1 Occupied bandwidth test result at low frequency

MODULATION: QPSK
CHANNEL SPACING: 10 MHz



Plot 7.3.2 Occupied bandwidth test result at low frequency

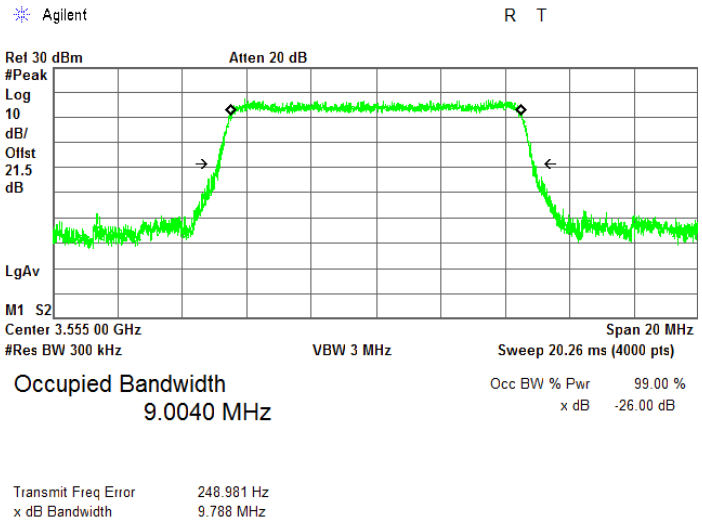
MODULATION: 16QAM
CHANNEL SPACING: 10 MHz



Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	11-Apr-19		
Temperature: 24 ºC	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

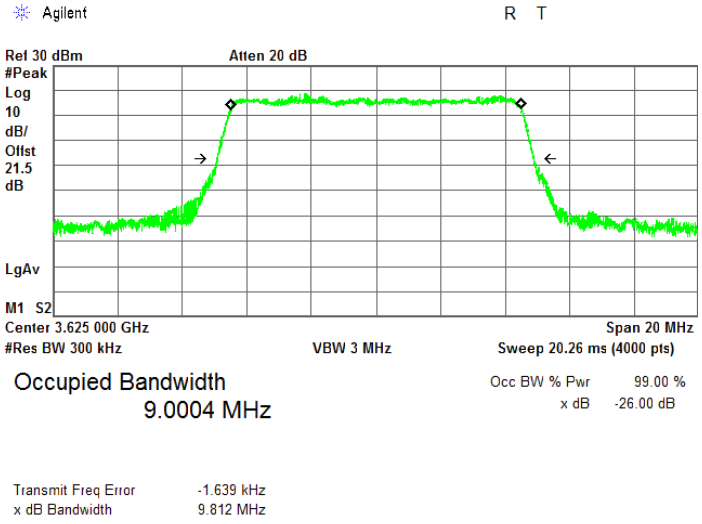
Plot 7.3.3 Occupied bandwidth test result at low frequency

MODULATION: 64QAM
CHANNEL SPACING: 10 MHz



Plot 7.3.4 Occupied bandwidth test result at mid frequency

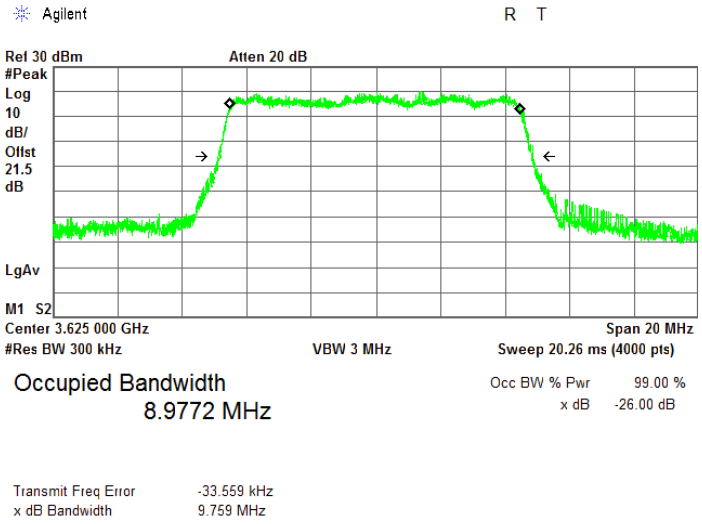
MODULATION: QPSK
CHANNEL SPACING: 10 MHz



Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	11-Apr-19		
Temperature: 24 ºC	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

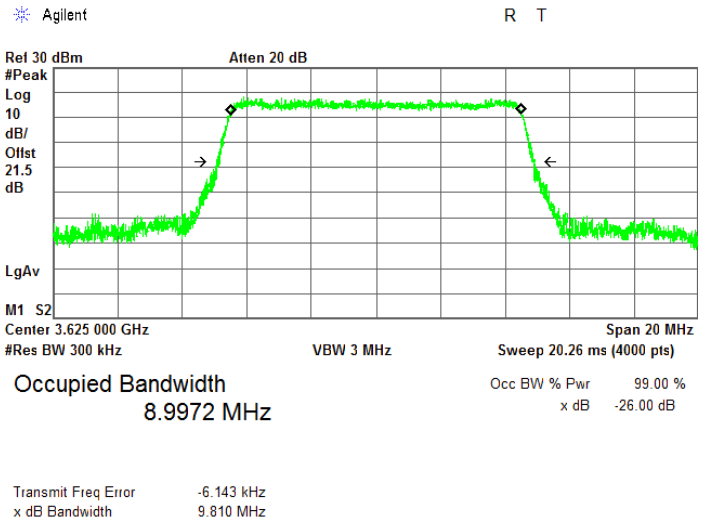
Plot 7.3.5 Occupied bandwidth test result at mid frequency

MODULATION: 16QAM
CHANNEL SPACING: 10 MHz



Plot 7.3.6 Occupied bandwidth test result at mid frequency

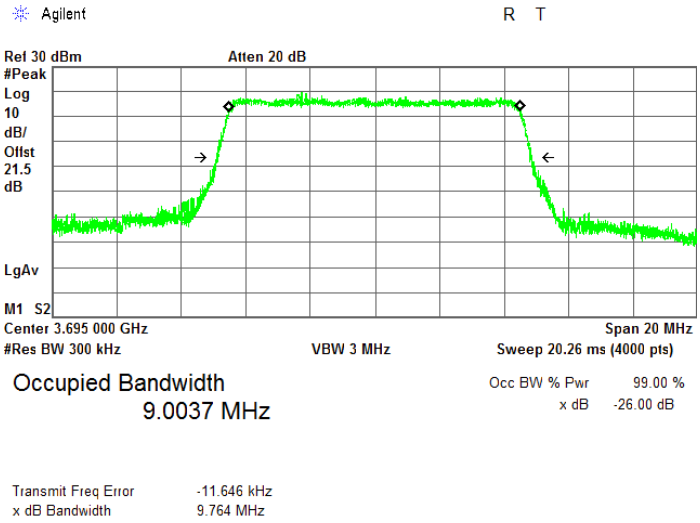
MODULATION: 64QAM
CHANNEL SPACING: 10 MHz



Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	11-Apr-19		
Temperature: 24 ºC	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

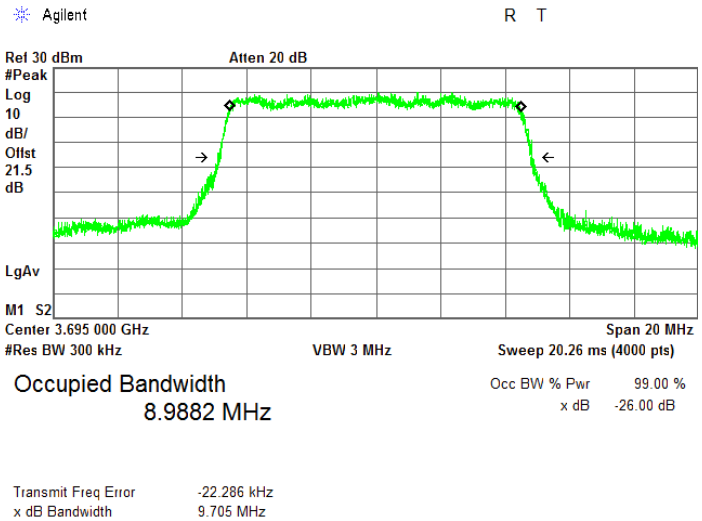
Plot 7.3.7 Occupied bandwidth test result at high frequency

MODULATION: QPSK
CHANNEL SPACING: 10 MHz



Plot 7.3.8 Occupied bandwidth test result at high frequency

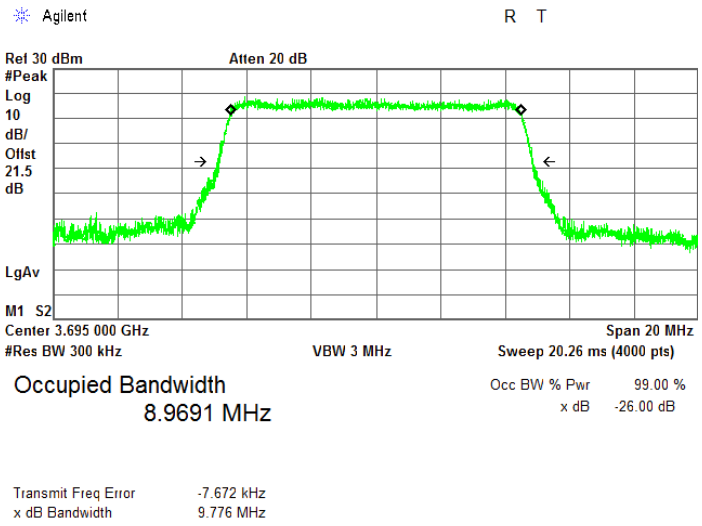
MODULATION: 16QAM
CHANNEL SPACING: 10 MHz



Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	11-Apr-19		
Temperature: 24 ºC	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

Plot 7.3.9 Occupied bandwidth test result at high frequency

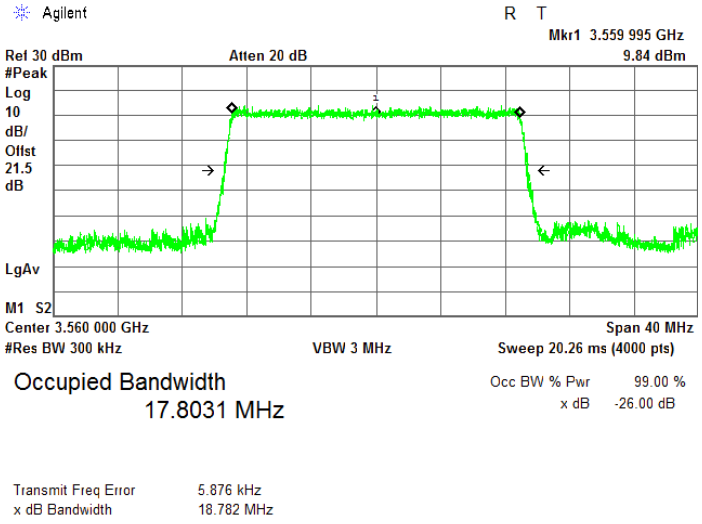
MODULATION: 64QAM
CHANNEL SPACING: 10 MHz



Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	11-Apr-19		
Temperature: 24 ºC	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

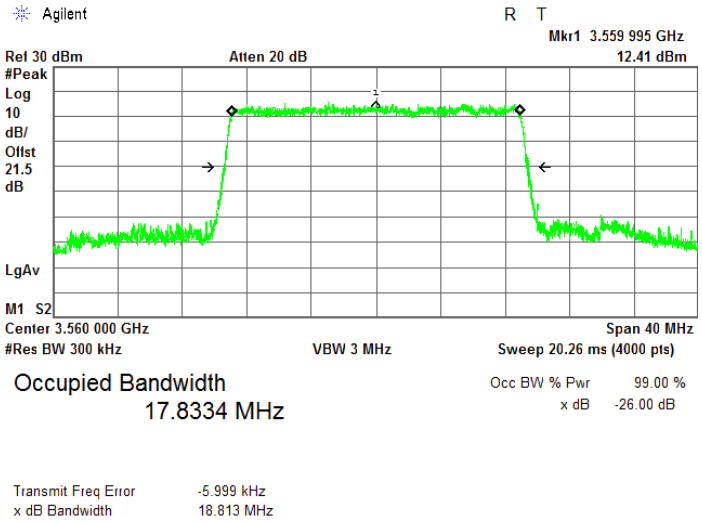
Plot 7.3.10 Occupied bandwidth test result at low frequency

MODULATION: QPSK
CHANNEL SPACING: 20 MHz



Plot 7.3.11 Occupied bandwidth test result at low frequency

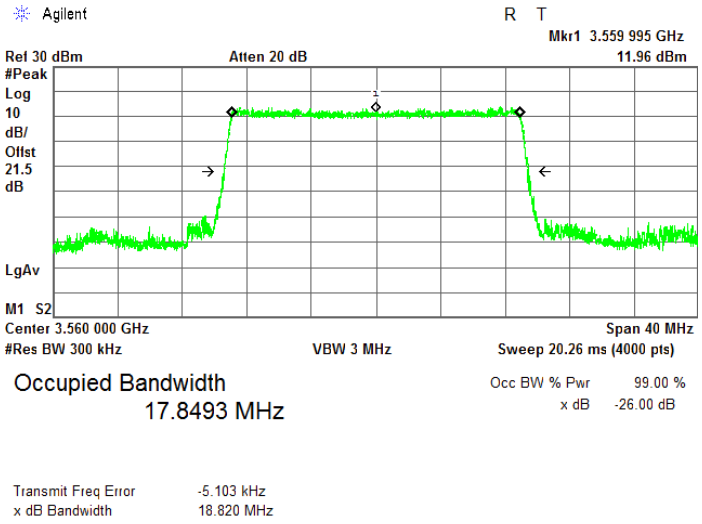
MODULATION: 16QAM
CHANNEL SPACING: 20 MHz



Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	11-Apr-19		
Temperature: 24 ºC	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

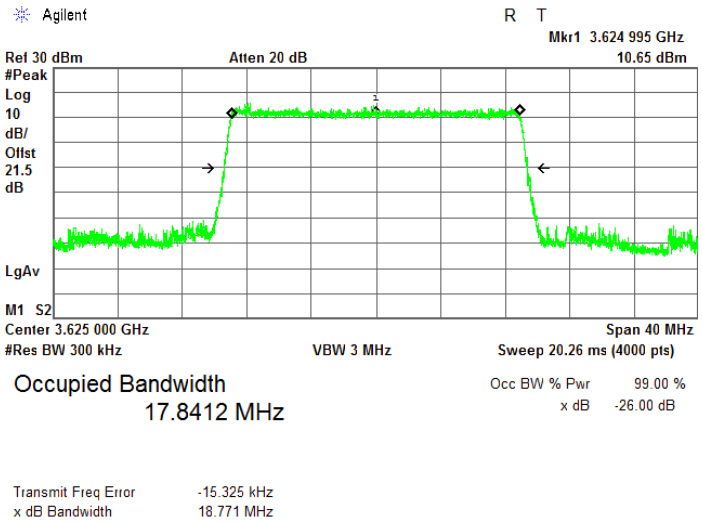
Plot 7.3.12 Occupied bandwidth test result at low frequency

MODULATION: 64QAM
CHANNEL SPACING: 20 MHz



Plot 7.3.13 Occupied bandwidth test result at mid frequency

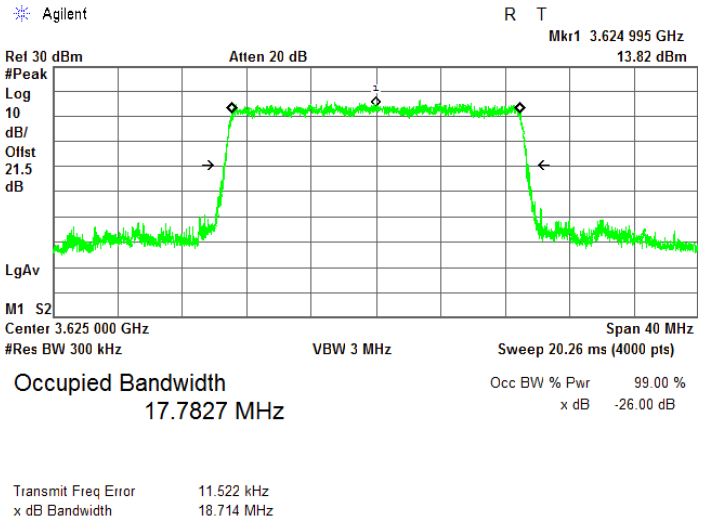
MODULATION: QPSK
CHANNEL SPACING: 20 MHz



Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	11-Apr-19		
Temperature: 24 ºC	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

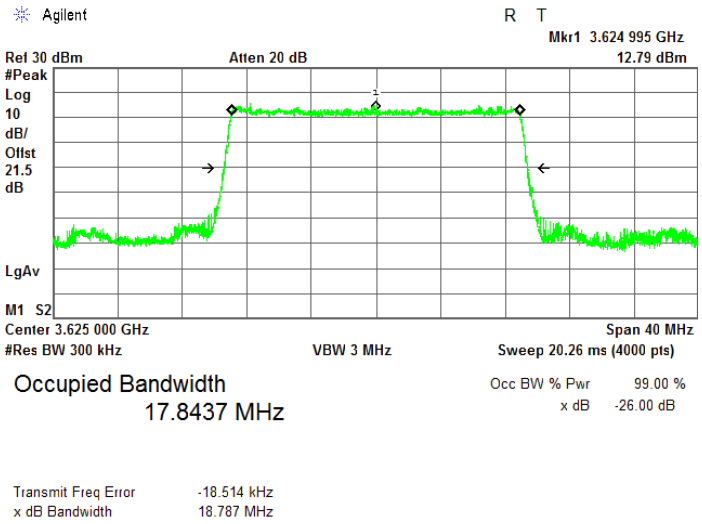
Plot 7.3.14 Occupied bandwidth test result at mid frequency

MODULATION: 16QAM
CHANNEL SPACING: 20 MHz



Plot 7.3.15 Occupied bandwidth test result at mid frequency

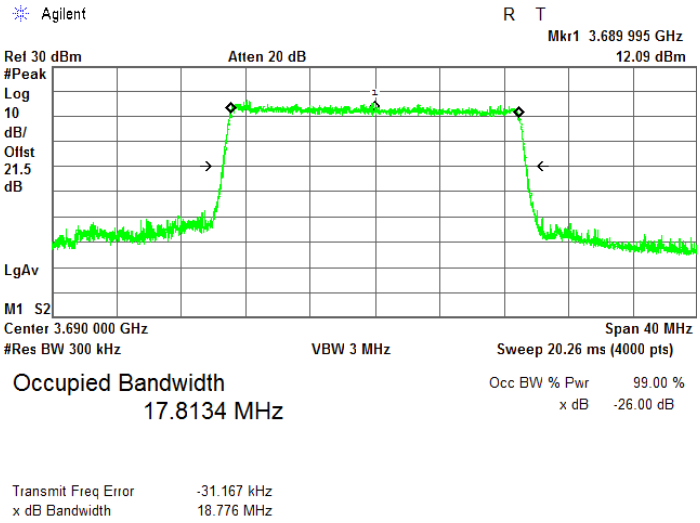
MODULATION: 64QAM
CHANNEL SPACING: 20 MHz



Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	11-Apr-19		
Temperature: 24 ºC	Relative Humidity: 55 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

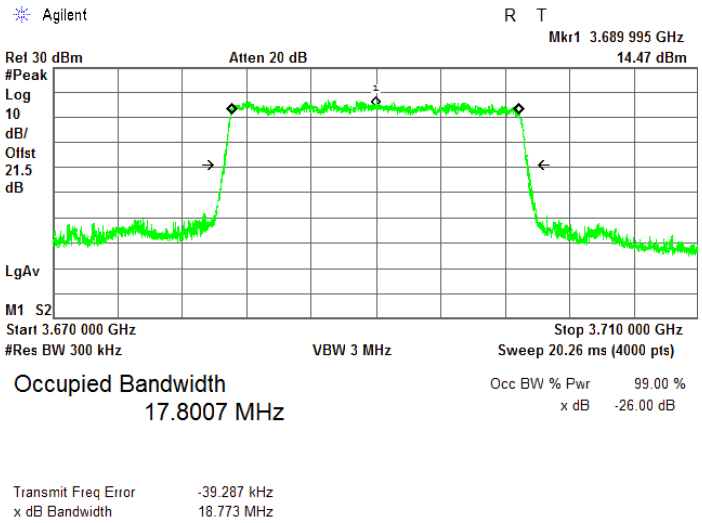
Plot 7.3.16 Occupied bandwidth test result at high frequency

MODULATION: QPSK
CHANNEL SPACING: 20 MHz



Plot 7.3.17 Occupied bandwidth test result at high frequency

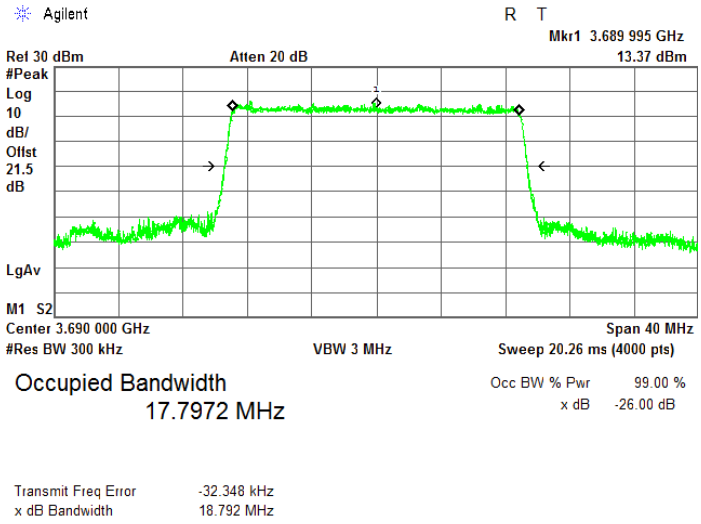
MODULATION: 16QAM
CHANNEL SPACING: 20 MHz



Test specification:	**Section 2.1049, Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	11-Apr-19		
Temperature: 24 ºC	**Relative Humidity:** 55 %	**Air Pressure:** 1010 hPa	**Power:** 56 VDC
Remarks:			

Plot 7.3.18 Occupied bandwidth test result at high frequency

MODULATION: 64QAM
CHANNEL SPACING: 20 MHz



Test specification:	Section 96.41(e)(1), Emission mask		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 55 %	Air Pressure: 1011 hPa	Power: 56 VDC
Remarks:			

7.4 Emission mask test

7.4.1 General

This test was performed to measure emission mask at RF antenna connector. Specification test limits are given in Table 7.4.1.

Table 7.4.1 Emission mask limits

Frequency displacement from frequency block	Limit*, dBm/MHz	RBW, kHz
Channel Spacing 10 MHz		
0 – 1 MHz	- 13	100
0 – 10 MHz	- 13	1000
10 – 20 MHz	- 25	1000
Above 3530 MHz and below 3720 MHz	- 25	1000
Below 3530 MHz and above 3720 MHz	- 40	1000
Channel Spacing 20 MHz		
0 – 1 MHz	- 13	200
0 – 10 MHz	- 13	1000
10 – 20 MHz	- 25	1000
Above 3530 MHz and below 3720 MHz	- 25	1000
Below 3530 MHz and above 3720 MHz	- 40	1000

* - Limit at each antenna connector (amount of antennas N = 2)

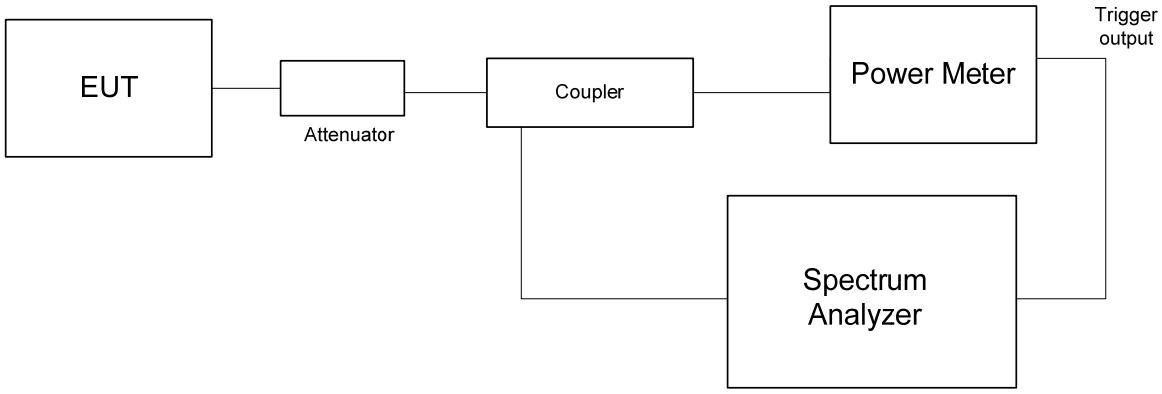
7.4.2 Test procedure

7.4.2.1 The EUT was set up as shown in Figure 7.3.1, energized and its proper operation was checked.

7.4.2.2 The emission mask was measured with spectrum analyzer as provided in Table 7.3.2, Table 7.3.3 and the the associated plots.

Test specification:	Section 96.41(e)(1), Emission mask		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 55 %	Air Pressure: 1011 hPa	Power: 56 VDC
Remarks:			

Figure 7.4.1 Emission mask test setup



Test specification:	**Section 96.41(e)(1), Emission mask**		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	**Relative Humidity:** 55 %	**Air Pressure:** 1011 hPa	**Power:** 56 VDC
Remarks:			

Table 7.4.2 Emission mask test results, CS=10 MHz

Modulation	Carrier frequency, MHz	Frequency displacement from EA frequency block	Meas result, dBm/MHz	Test result**, dBm/MHz	Limit*, dBm/MHz	Verdict
QPSK	Low	Within 0 to 10 MHz	-33.42	-31.75	-16	Pass
		Greater than 10 MHz	-52.86	-51.19	-28	Pass
		Below 3530 MHz	-58.10	-56.43	-43	Pass
	Mid	Within 0 to 10 MHz	-33.68	-32.01	-16	Pass
		Greater than 10 MHz	-53.21	-51.54	-28	Pass
	High	Within 0 to 10 MHz	-32.24	-30.57	-16	Pass
		Greater than 10 MHz	-52.20	-50.53	-28	Pass
		Above 3720 MHz	-58.46	-56.79	-43	Pass
16 QAM	Low	Within 0 to 10 MHz	-33.39	-31.72	-16	Pass
		Greater than 10 MHz	-52.05	-50.38	-28	Pass
		Below 3530 MHz	-57.68	-56.01	-43	Pass
	Mid	Within 0 to 10 MHz	-33.27	-31.60	-16	Pass
		Greater than 10 MHz	-53.23	-51.56	-28	Pass
	High	Within 0 to 10 MHz	-32.00	-30.33	-16	Pass
		Greater than 10 MHz	-53.11	-51.44	-28	Pass
		Above 3720 MHz	-58.44	-56.77	-43	Pass
64 QAM	Low	Within 0 to 10 MHz	-33.40	-31.73	-16	Pass
		Greater than 10 MHz	-53.35	-51.68	-28	Pass
		Below 3530 MHz	-57.99	-56.32	-43	Pass
	Mid	Within 0 to 10 MHz	-33.11	-31.44	-16	Pass
		Greater than 10 MHz	-54.12	-52.45	-28	Pass
	High	Within 0 to 10 MHz	-32.21	-30.54	-16	Pass
		Greater than 10 MHz	-52.51	-50.84	-28	Pass
		Above 3720 MHz	-58.41	-56.74	-43	Pass

*The limit was reduced 3 dB due to 2 antennae.
DC factor=10 x log (1/duty cycle)= 10 x log(1/0.68) = 1.67 dB
** Test result = Meas result + DC factor

Test specification:	**Section 96.41(e)(1), Emission mask**		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	**Relative Humidity:** 55 %	**Air Pressure:** 1011 hPa	**Power:** 56 VDC
Remarks:			

Table 7.4.3 Emission mask test results, CS=20 MHz

Modulation	Carrier frequency, MHz	Frequency displacement from EA frequency block	Meas result, dBm/MHz	Test result**, dBm/MHz	Limit*, dBm/MHz	Verdict
QPSK	Low	Within 0 to 10 MHz	-43.14	-41.47	-16	Pass
		Greater than 10 MHz	-49.06	-47.39	-28	Pass
		Below 3530 MHz	-58.94	-57.27	-43	Pass
	Mid	Within 0 to 10 MHz	-42.63	-40.96	-16	Pass
		Greater than 10 MHz	-50.05	-48.38	-28	Pass
	High	Within 0 to 10 MHz	-42.16	-40.49	-16	Pass
		Greater than 10 MHz	-50.90	-49.23	-28	Pass
		Above 3720 MHz	-51.93	-60.26	-43	Pass
16 QAM	Low	Within 0 to 10 MHz	-42.19	-40.52	-16	Pass
		Greater than 10 MHz	-47.89	-46.22	-28	Pass
		Below 3530 MHz	-58.83	-57.66	-43	Pass
	Mid	Within 0 to 10 MHz	-44.54	-42.87	-16	Pass
		Greater than 10 MHz	-50.43	-48.76	-28	Pass
	High	Within 0 to 10 MHz	-41.42	-39.75	-16	Pass
		Greater than 10 MHz	-49.35	-47.68	-28	Pass
		Above 3720 MHz	-61.89	-60.22	-43	Pass
64 QAM	Low	Within 0 to 10 MHz	-43.47	-41.8	-16	Pass
		Greater than 10 MHz	-46.86	-45.19	-28	Pass
		Below 3530 MHz	-55.54	-53.87	-43	Pass
	Mid	Within 0 to 10 MHz	-43.44	-41.77	-16	Pass
		Greater than 10 MHz	-50.13	-48.46	-28	Pass
	High	Within 0 to 10 MHz	-42.37	-40.70	-16	Pass
		Greater than 10 MHz	-49.86	-48.19	-28	Pass
		Above 3720 MHz	-62.14	-60.47	-43	Pass

*The limit was reduced 3 dB due to 2 antennae.
DC factor=10 x log (1/duty cycle)= 10 x log(1/0.68) = 1.67 dB
** Test result = Meas result + DC factor

Reference numbers of test equipment used

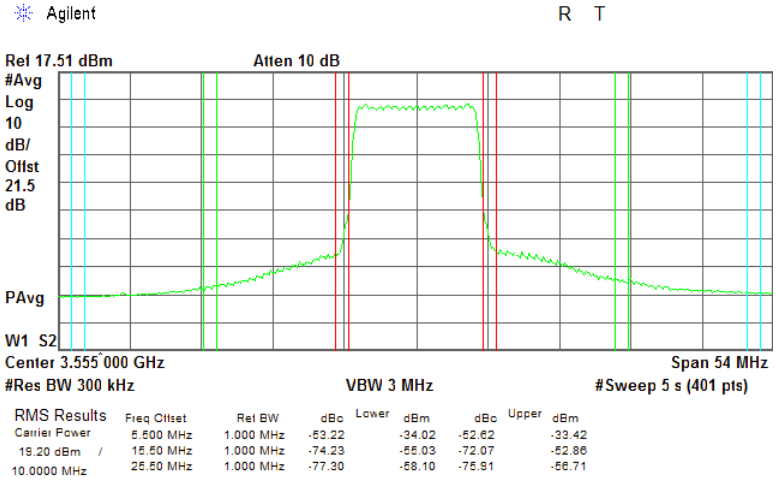
HL 3818	HL 3903						

Full description is given in Appendix A.

Test specification:	Section 96.41(e)(1), Emission mask		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 55 %	Air Pressure: 1011 hPa	Power: 56 VDC
Remarks:			

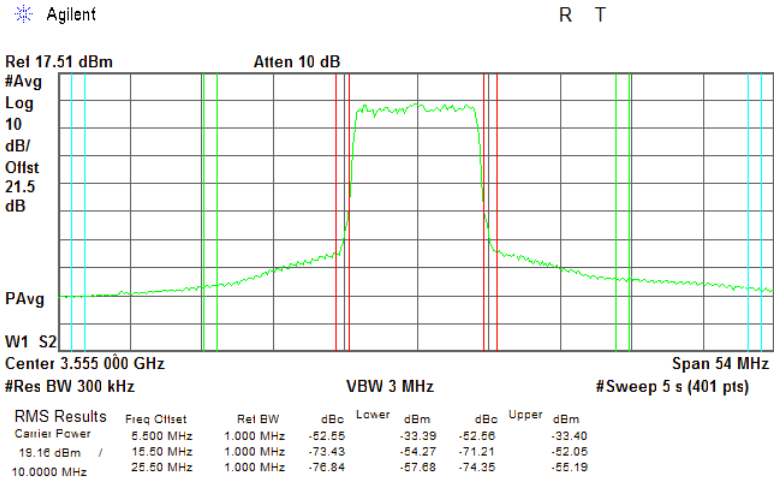
Plot 7.4.1 Emission mask test results at low carrier frequency

MODULATION: QPSK
CHANNEL SPACING: 10 MHz
ANTENNA CHAIN: 1



Plot 7.4.2 Emission mask test results at low carrier frequency

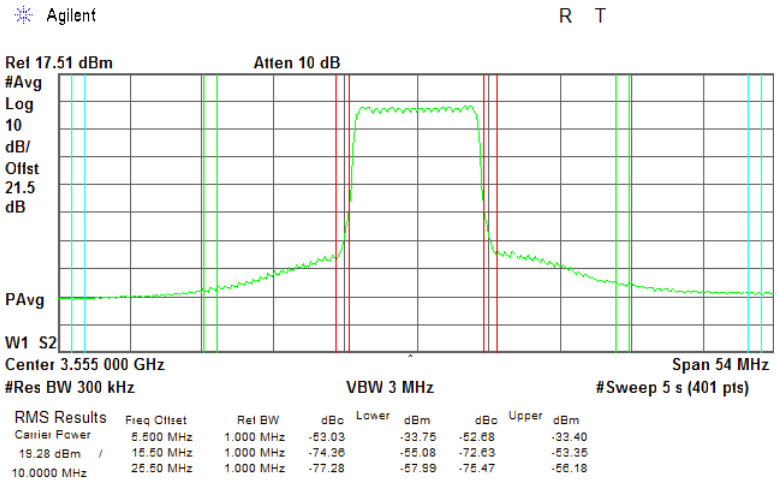
MODULATION: 16QAM
CHANNEL SPACING: 10 MHz
ANTENNA CHAIN: 1



Test specification:	Section 96.41(e)(1), Emission mask		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 55 %	Air Pressure: 1011 hPa	Power: 56 VDC
Remarks:			

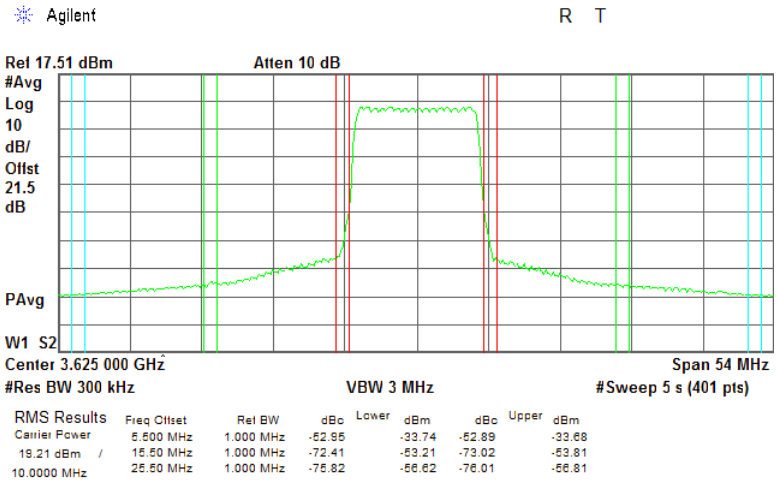
Plot 7.4.3 Emission mask test results at low carrier frequency

MODULATION: 64QAM
CHANNEL SPACING: 10 MHz
ANTENNA CHAIN: 1



Plot 7.4.4 Emission mask test results at mid carrier frequency

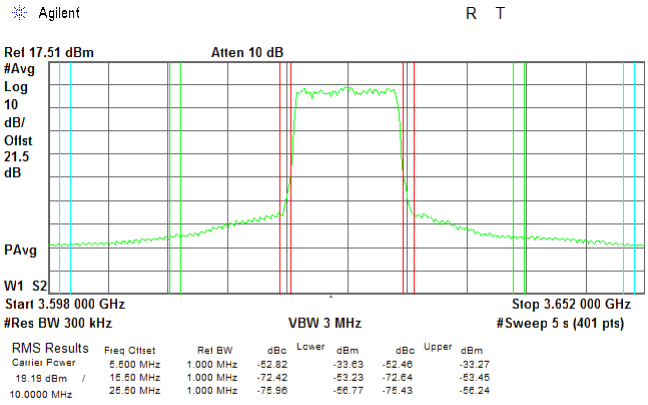
MODULATION: QPSK
CHANNEL SPACING: 10 MHz
ANTENNA CHAIN: 1



Test specification:	Section 96.41(e)(1), Emission mask		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 55 %	Air Pressure: 1011 hPa	Power: 56 VDC
Remarks:			

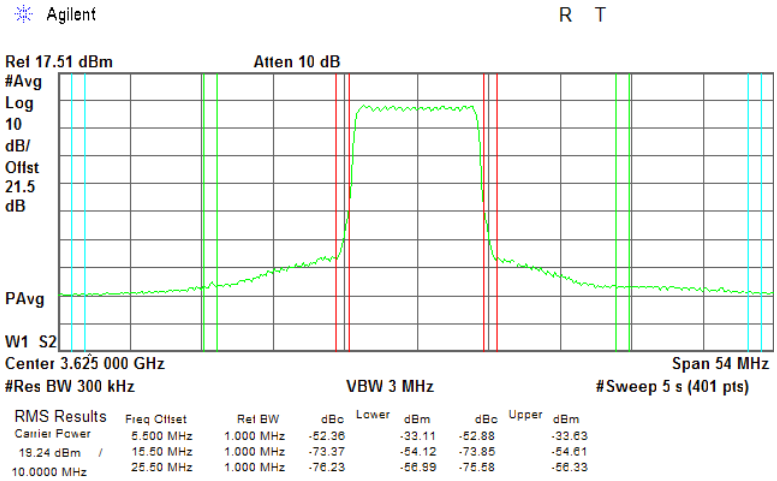
Plot 7.4.5 Emission mask test results at mid carrier frequency

MODULATION: 16QAM
CHANNEL SPACING: 10 MHz
ANTENNA CHAIN: 1



Plot 7.4.6 Emission mask test results at mid carrier frequency

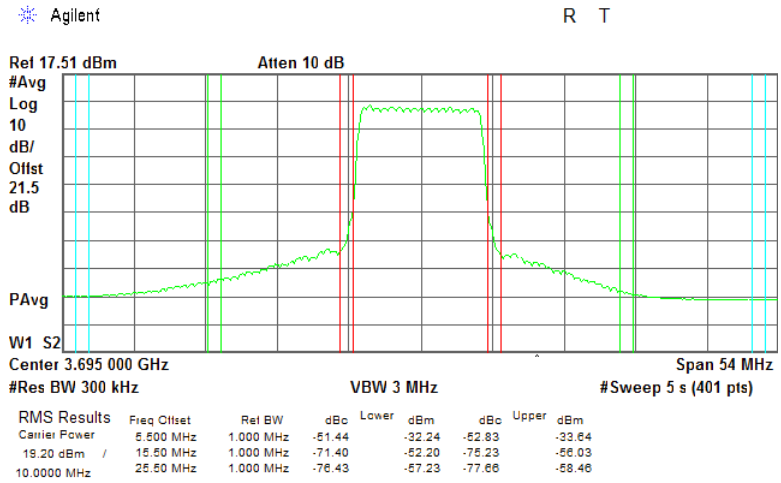
MODULATION: 64QAM
CHANNEL SPACING: 10 MHz
ANTENNA CHAIN: 1



Test specification:	Section 96.41(e)(1), Emission mask		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 55 %	Air Pressure: 1011 hPa	Power: 56 VDC
Remarks:			

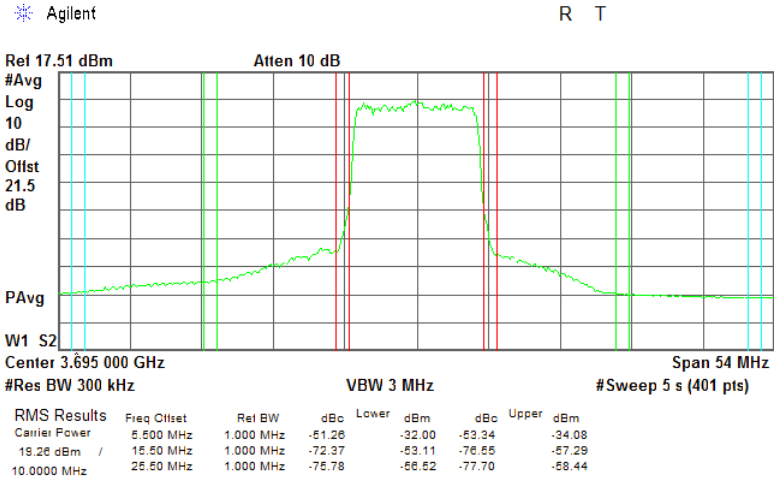
Plot 7.4.7 Emission mask test results at high carrier frequency

MODULATION: QPSK
CHANNEL SPACING: 10 MHz
ANTENNA CHAIN: 1



Plot 7.4.8 Emission mask test results at high carrier frequency

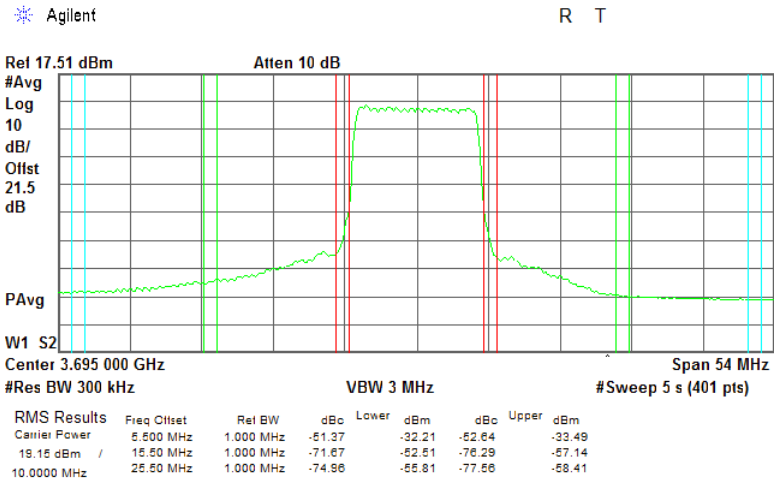
MODULATION: 16QAM
CHANNEL SPACING: 10 MHz
ANTENNA CHAIN: 1



Test specification:	Section 96.41(e)(1), Emission mask		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 55 %	Air Pressure: 1011 hPa	Power: 56 VDC
Remarks:			

Plot 7.4.9 Emission mask test results at high carrier frequency

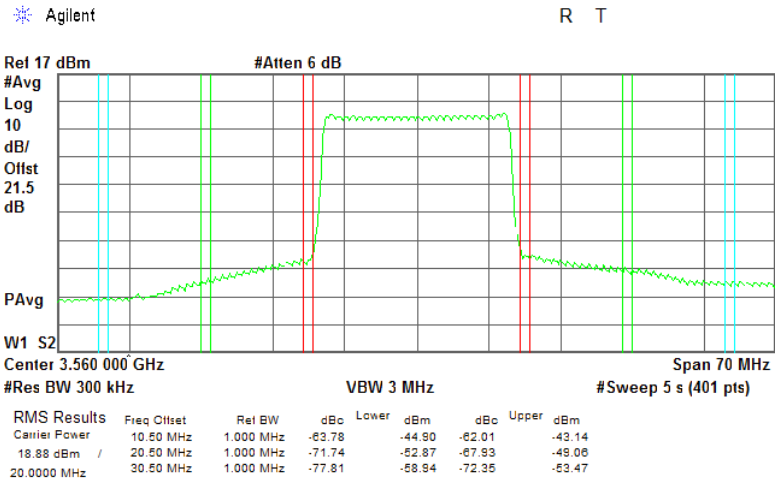
MODULATION: 64QAM
CHANNEL SPACING: 10 MHz
ANTENNA CHAIN: 1



Test specification:	Section 96.41(e)(1), Emission mask		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 55 %	Air Pressure: 1011 hPa	Power: 56 VDC
Remarks:			

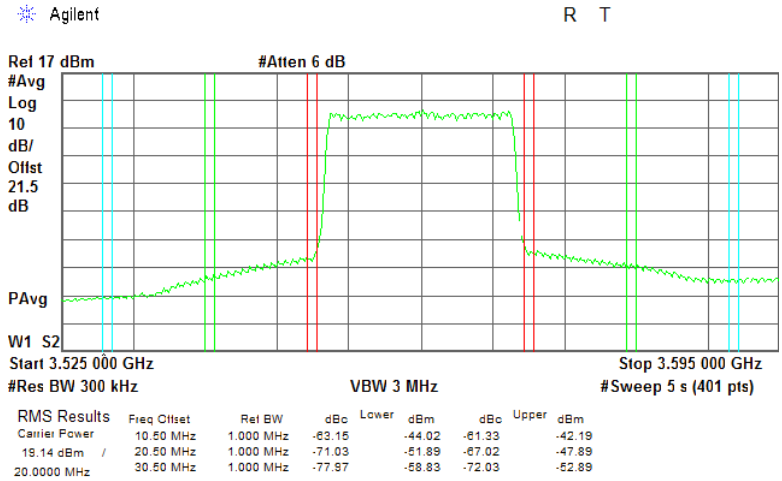
Plot 7.4.10 Emission mask test results at low carrier frequency

MODULATION: QPSK
CHANNEL SPACING: 20 MHz
ANTENNA CHAIN: 1



Plot 7.4.11 Emission mask test results at low carrier frequency

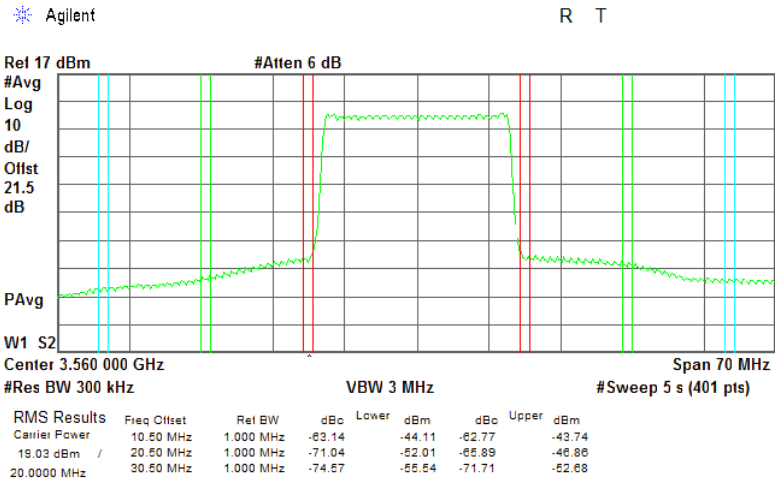
MODULATION: 16QAM
CHANNEL SPACING: 20 MHz
ANTENNA CHAIN: 1



Test specification:	Section 96.41(e)(1), Emission mask		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 55 %	Air Pressure: 1011 hPa	Power: 56 VDC
Remarks:			

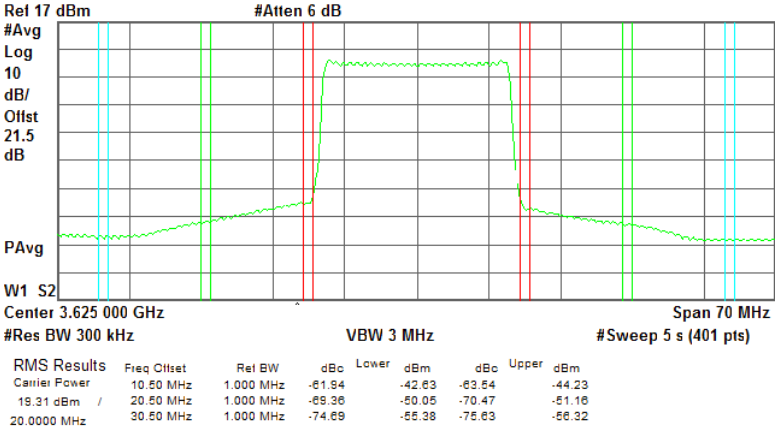
Plot 7.4.12 Emission mask test results at low carrier frequency

MODULATION: 64QAM
CHANNEL SPACING: 20 MHz
ANTENNA CHAIN: 1



Plot 7.4.13 Emission mask test results at mid carrier frequency

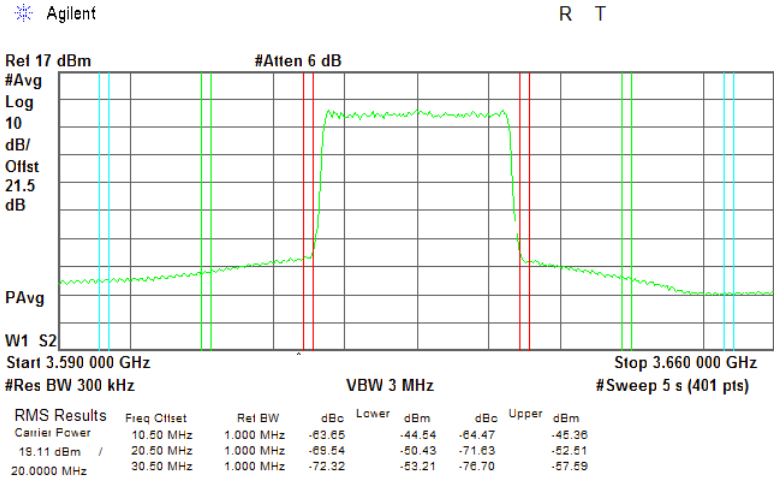
MODULATION: QPSK
CHANNEL SPACING: 20 MHz
ANTENNA CHAIN: 1



Test specification:	Section 96.41(e)(1), Emission mask		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 55 %	Air Pressure: 1011 hPa	Power: 56 VDC
Remarks:			

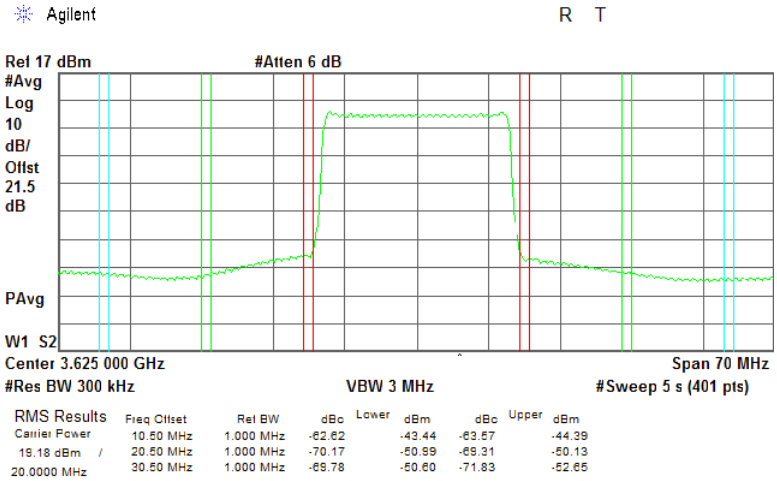
Plot 7.4.14 Emission mask test results at mid carrier frequency

MODULATION: 16QAM
CHANNEL SPACING: 20 MHz
ANTENNA CHAIN: 1



Plot 7.4.15 Emission mask test results at mid carrier frequency

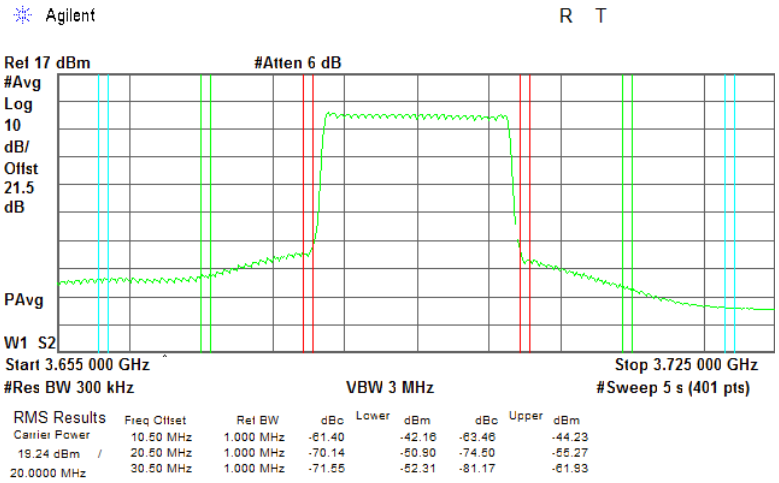
MODULATION: 64QAM
CHANNEL SPACING: 20 MHz
ANTENNA CHAIN: 1



Test specification:	Section 96.41(e)(1), Emission mask		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 55 %	Air Pressure: 1011 hPa	Power: 56 VDC
Remarks:			

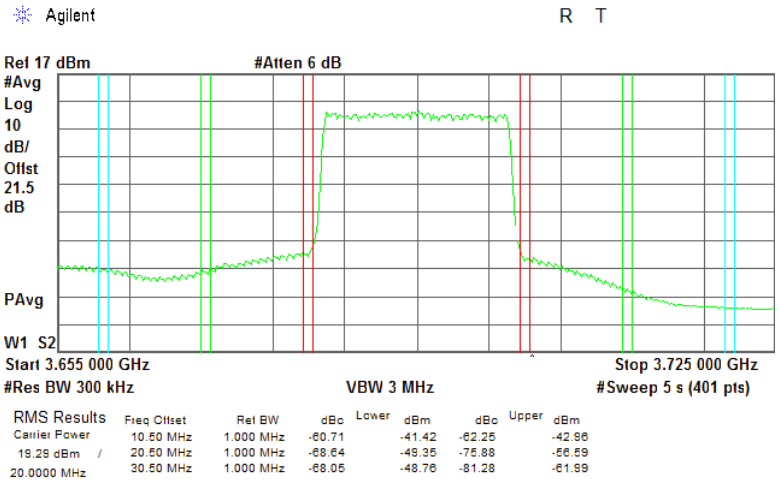
Plot 7.4.16 Emission mask test results at high carrier frequency

MODULATION: QPSK
CHANNEL SPACING: 20 MHz
ANTENNA CHAIN: 1



Plot 7.4.17 Emission mask test results at high carrier frequency

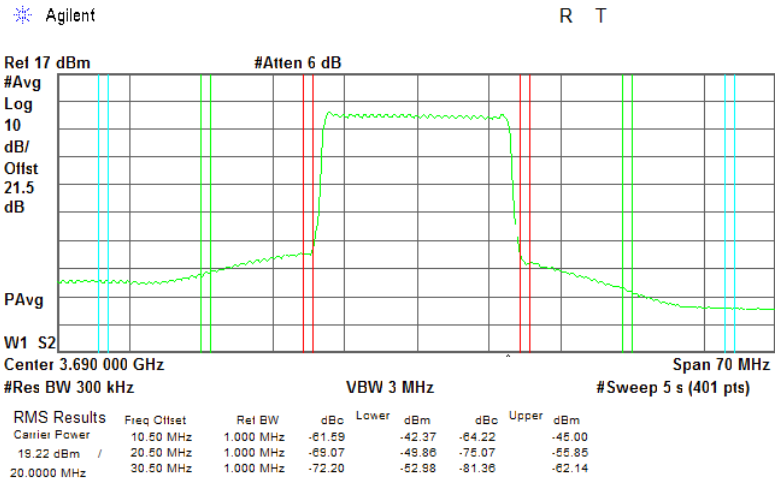
MODULATION: 16QAM
CHANNEL SPACING: 20 MHz
ANTENNA CHAIN: 1



Test specification:	**Section 96.41(e)(1), Emission mask**		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	14-Apr-19		
Temperature: 24 ºC	**Relative Humidity:** 55 %	**Air Pressure:** 1011 hPa	**Power:** 56 VDC
Remarks:			

Plot 7.4.18 Emission mask test results at high carrier frequency

MODULATION: 64QAM
CHANNEL SPACING: 20 MHz
ANTENNA CHAIN: 1



Test specification:	Section 96.41(e)(2), Radiated spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Apr-19 - 14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 56 VDC
Remarks:			

7.5 Radiated spurious emission measurements

7.5.1 General

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

Table 7.5.1 Radiated spurious emission test limits

Frequency, MHz	EIRP of spurious, dBm	Equivalent field strength limit @ 3m, dB(μV/m)*
0.09 – below 3530.0	-40.0	55.2
3720.0 – 10th harmonic*	-40.0	55.2

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

7.5.2.1 The EUT was set up as shown in Figure 7.5.1, energized and the performance check was conducted.

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

7.5.2.3 The worst test results (the lowest margins) were recorded in Table 7.5.2 and shown in the associated plots.

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

7.5.3.1 The EUT was set up as shown in Figure 7.5.2, energized and the performance check was conducted.

7.5.3.2 The specified frequency range was investigated with antenna connected to spectrum analyzer. To find maximum radiation the turntable was rotated 360^0 and the measuring antenna height was swept from 1 to 4 m in both, vertical and horizontal, polarizations.

7.5.3.3 The worst test results (the lowest margins) were recorded in Table 7.5.2 and shown in the associated plots.

Test specification:	Section 96.41(e)(2), Radiated spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Apr-19 - 14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 56 VDC
Remarks:			

Figure 7.5.1 Setup for spurious emission field strength measurements in 9 kHz to 30 MHz band

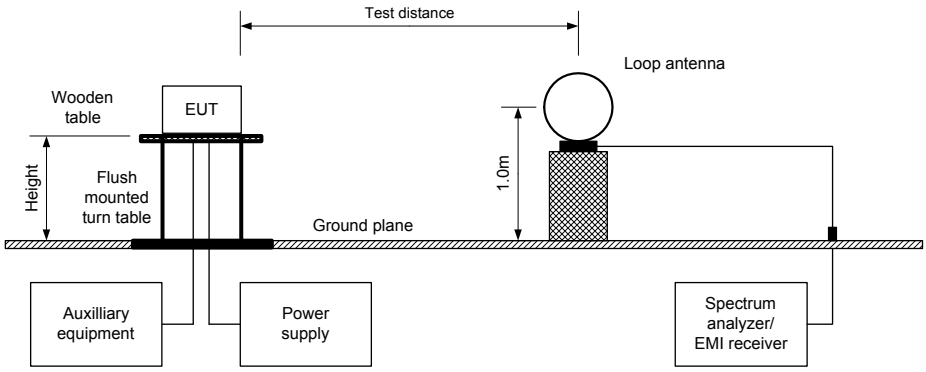
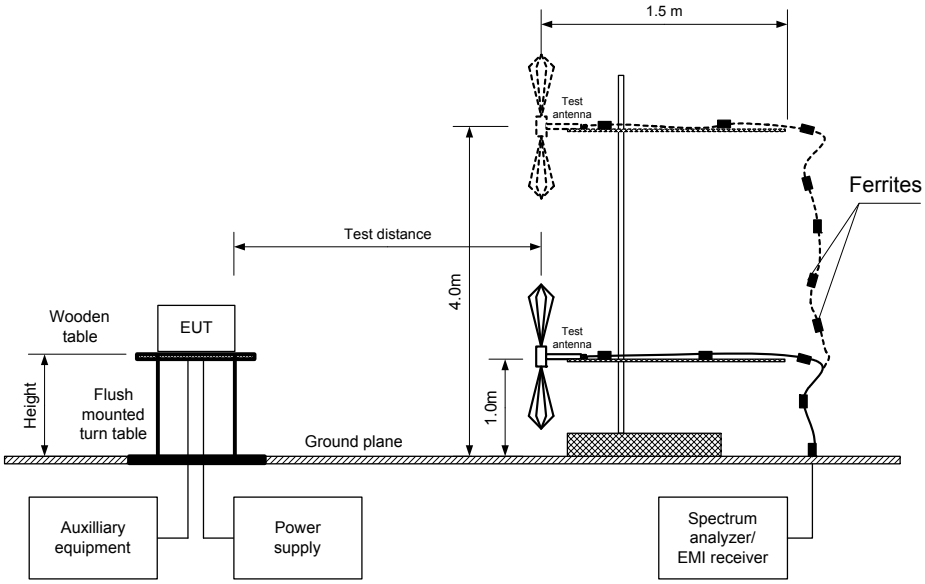


Figure 7.5.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	**Section 96.41(e)(2), Radiated spurious emissions**		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	04-Apr-19 - 14-Apr-19		
Temperature: 24 ºC	**Relative Humidity:** 52 %	**Air Pressure:** 1009 hPa	**Power:** 56 VDC
Remarks:			

Table 7.5.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE: 3550 - 3700 MHz
TEST DISTANCE: 3 m
TEST SITE: Semi anechoic chamber
EUT HEIGHT: 0.8 m
INVESTIGATED FREQUENCY RANGE: 0.009 –1000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: > Resolution bandwidth
TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
Biconilog (30 MHz – 1000 MHz)
MODULATION: QPSK
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	Field strength, dB(μV/m)	Limit ***, dB(μV/m)	Margin, dB*	RBW, kHz	Antenna polarization	Antenna height, cm	Turn-table position**, degrees	Verdict
Low carrier frequency 3555 MHz								
112.666783	38.65	55.20	-16.55	100	V	104.0	149.0	Pass
114.969645	38.88	55.20	-16.32	100	V	102.0	-156.0	Pass
143.008957	35.66	55.20	-19.54	100	V	102.0	-180.0	Pass
499.985666	33.69	55.20	-21.51	100	V	102.0	-180.0	Pass
999.977500	36.32	55.20	-18.88	100	V	104.0	149.0	Pass
Mid carrier frequency 3625 MHz								
116.610090	36.36	55.20	-18.84	100	V	100.0	149.0	Pass
144.061698	34.23	55.20	-20.97	100	V	100.0	-156.0	Pass
699.994999	37.90	55.20	-17.30	100	V	102.0	-180.0	Pass
824.982417	38.66	55.20	-16.54	100	V	132.0	-180.0	Pass
High carrier frequency 3695 MHz								
114.539335	37.45	55.20	-17.75	100	V	102.0	-180.0	Pass
143.026927	35.18	55.20	-20.02	100	V	100.0	-180.0	Pass
699.987999	38.00	55.20	-17.20	100	V	100.0	180.0	Pass
964.442159	34.21	55.20	-20.99	100	H	268.0	-78.0	Pass

*****- Margin = Field strength of spurious – calculated field strength limit.
******- EUT front panel refers to 0 degrees position of turntable.
*** - Limit was calculated according to ANSI C63.26 Section 5.2.7 requirements [(the relationship 5.2.7 c)] at the measured distance 3 m.

Test specification:	Section 96.41(e)(2), Radiated spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Apr-19 - 14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 56 VDC
Remarks:			

Table 7.5.2 Spurious emission field strength test results (continued)

TEST SITE: SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / AVERAGE
FREQUENCY RANGE: 1000 MHz – 37000 MHz
Double ridged guide (above 1000 MHz)
RESOLUTION BANDWIDTH: 1000 kHz

Frequency, MHz	Peak			Average			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
	Measured emission, dB(μV/m)	Limit***, dB(μV/m)	Margin, dB*	Measured emission, dB(μV/m)	Limit***, dB(μV/m)	Margin, dB*				
Low carrier frequency 3555 MHz										Pass
7110.617500	62.48	75.20	-12.72	46.71	55.20	-8.49	H	154.0	-136.0	
Mid carrier frequency 3625 MHz										
7251.042500	60.93	75.20	-14.27	44.95	55.20	-10.25	H	179.0	180.0	
10876.6000	57.98	75.20	-17.22	42.03	55.20	-13.17	H	179.0	-136.0	
14303.4677	51.40	75.20	-23.80	37.81	55.20	-17.39	H	128.0	-102.0	
High carrier frequency 3695 MHz										
7391.854833	63.29	75.20	-11.91	47.08	55.20	-8.12	H	155.0	-110.0	

*****- Margin = Field strength of spurious – calculated field strength limit.
******- EUT front panel refers to 0 degrees position of turntable.
*** - Limit was calculated according to ANSI C63.26 Section 5.2.7 requirements [(the relationship 5.2.7 c)] at the measured distance 3 m.

Reference numbers of test equipment used

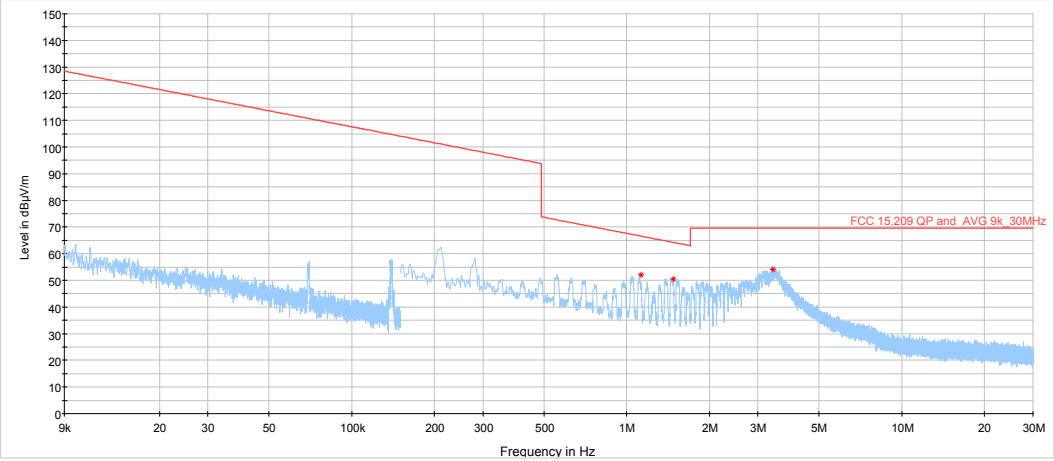
HL 3903	HL 4360	HL 4933	HL 4956	HL 5112	HL 5288	HL 5405	

Full description is given in Appendix A.

Test specification:	Section 96.41(e)(2), Radiated spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Apr-19 - 14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 56 VDC
Remarks:			

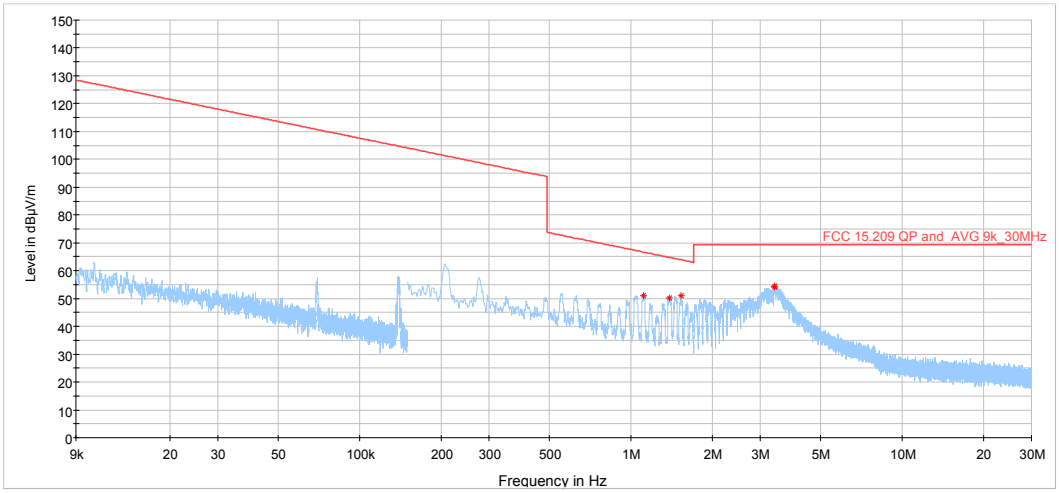
Plot 7.5.1 Radiated emission measurements in 9 kHz – 30 MHz range

TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Plot 7.5.2 Radiated emission measurements in 9 kHz – 30 MHz range

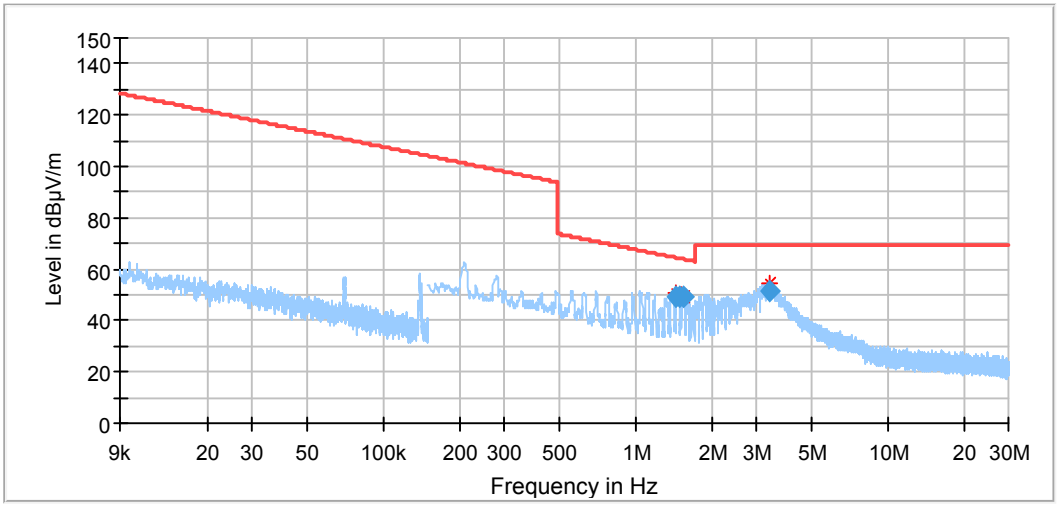
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 96.41(e)(2), Radiated spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Apr-19 - 14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 56 VDC
Remarks:			

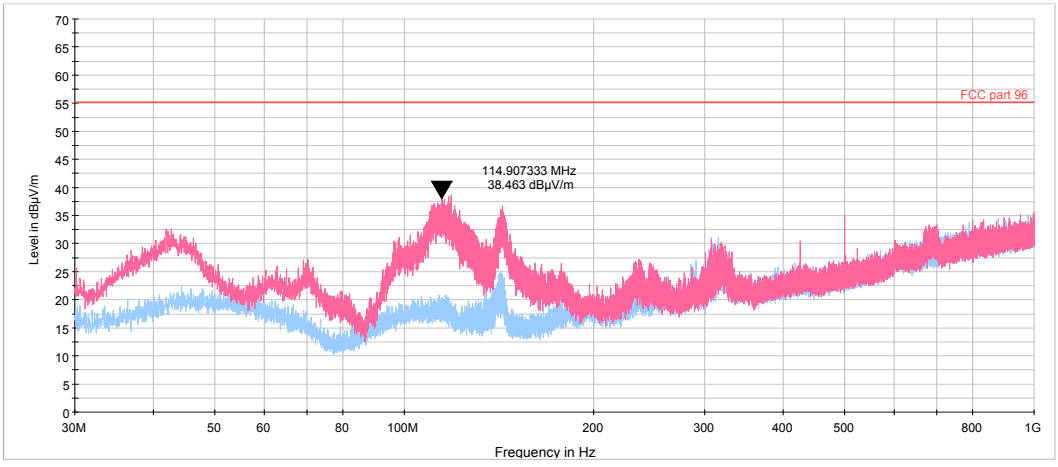
Plot 7.5.3 Radiated emission measurements in 9 kHz – 30 MHz range

TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Plot 7.5.4 Radiated emission measurements in 30 - 1000 MHz range

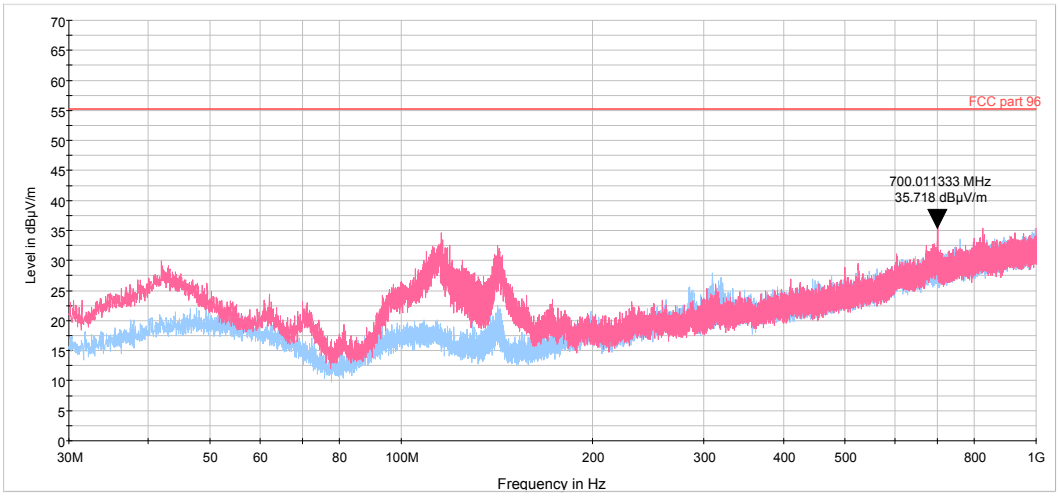
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 96.41(e)(2), Radiated spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Apr-19 - 14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 56 VDC
Remarks:			

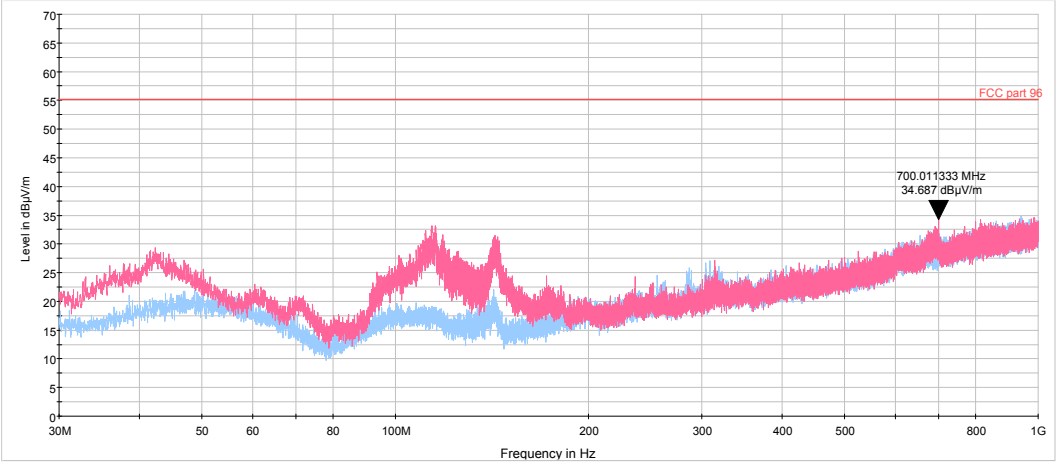
Plot 7.5.5 Radiated emission measurements in 30 - 1000 MHz range

TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Plot 7.5.6 Radiated emission measurements in 30 - 1000 MHz range

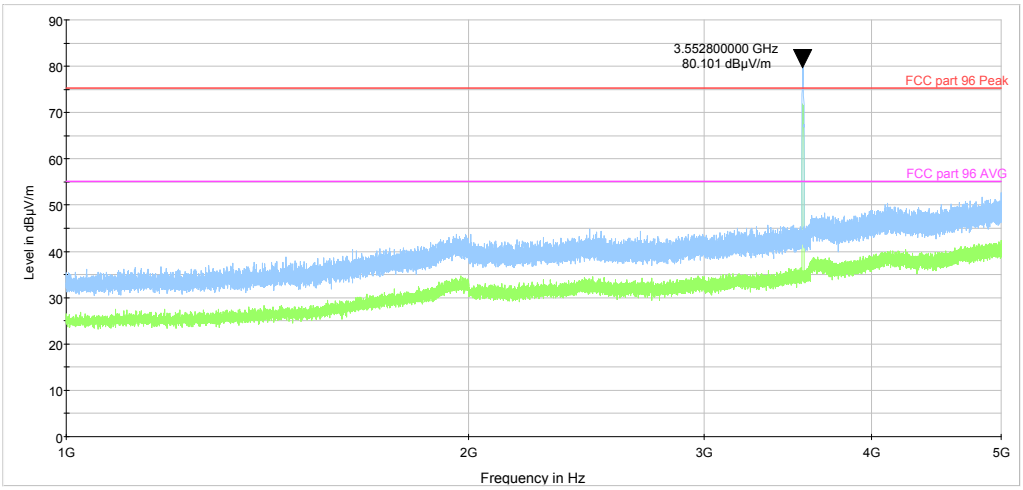
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 96.41(e)(2), Radiated spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Apr-19 - 14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 56 VDC
Remarks:			

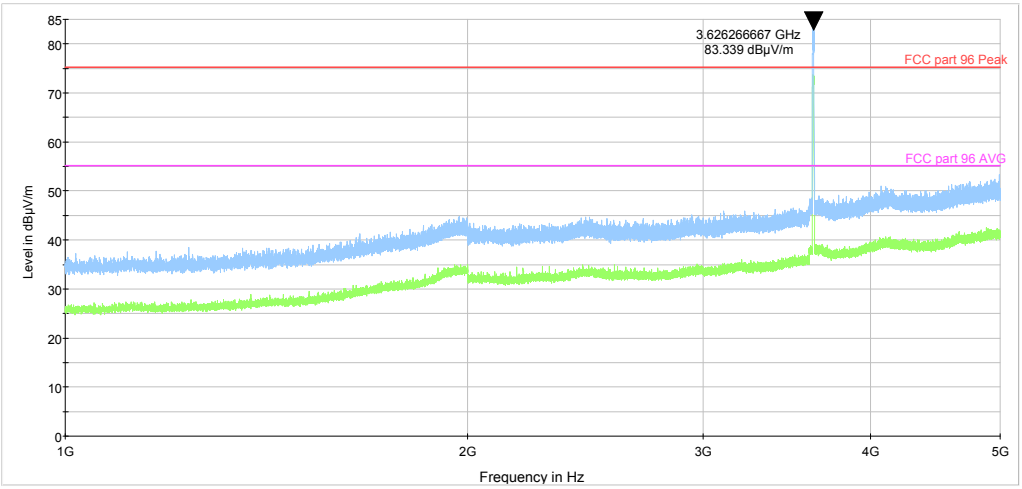
Plot 7.5.7 Radiated emission measurements in 1000 – 5000 MHz range

TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Plot 7.5.8 Radiated emission measurements in 1000 – 5000 MHz range

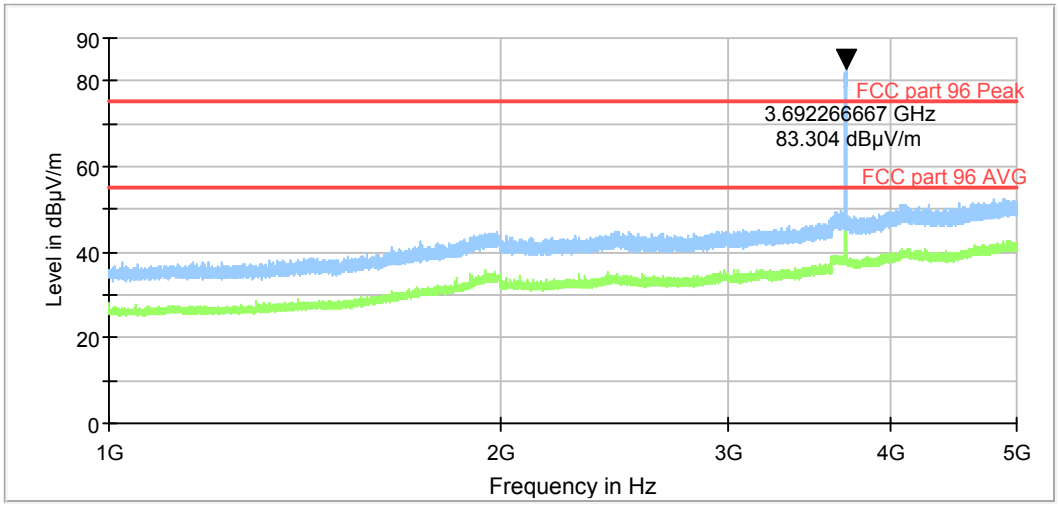
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 96.41(e)(2), Radiated spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Apr-19 - 14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 56 VDC
Remarks:			

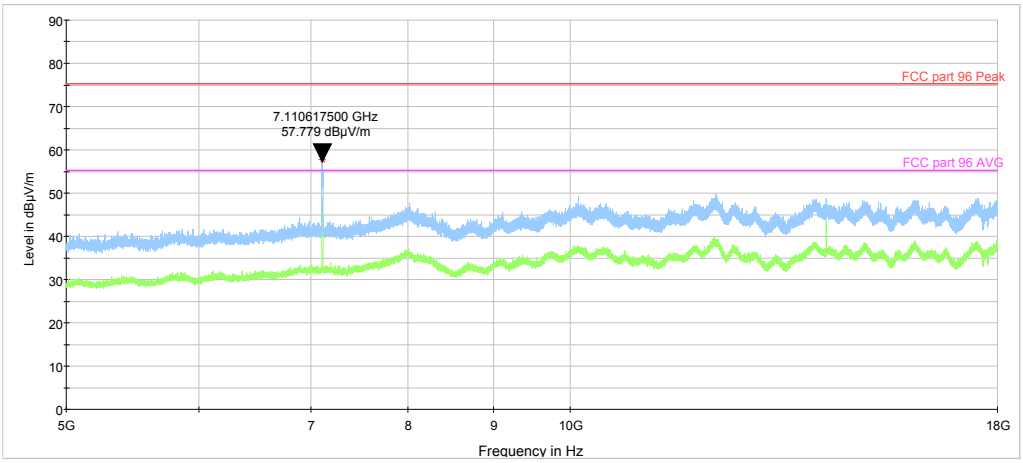
Plot 7.5.9 Radiated emission measurements in 1000 – 5000 MHz range

TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Plot 7.5.10 Radiated emission measurements in 5000 – 18000 MHz range

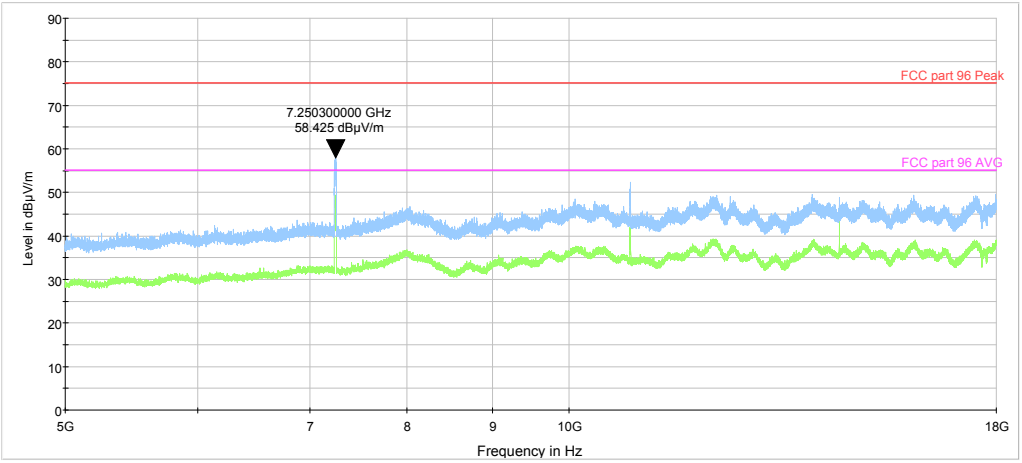
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 96.41(e)(2), Radiated spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Apr-19 - 14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 56 VDC
Remarks:			

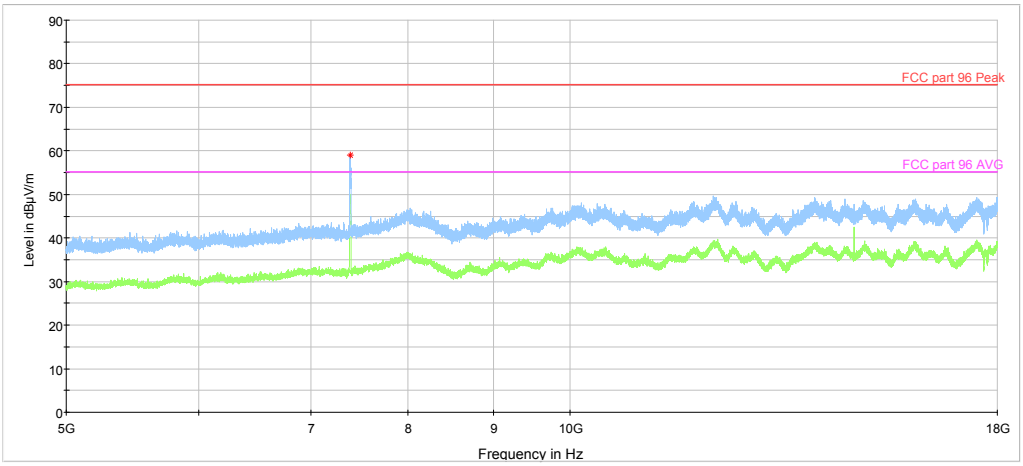
Plot 7.5.11 Radiated emission measurements in 5000 – 18000 MHz range

TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Plot 7.5.12 Radiated emission measurements in 5000 – 18000 MHz range

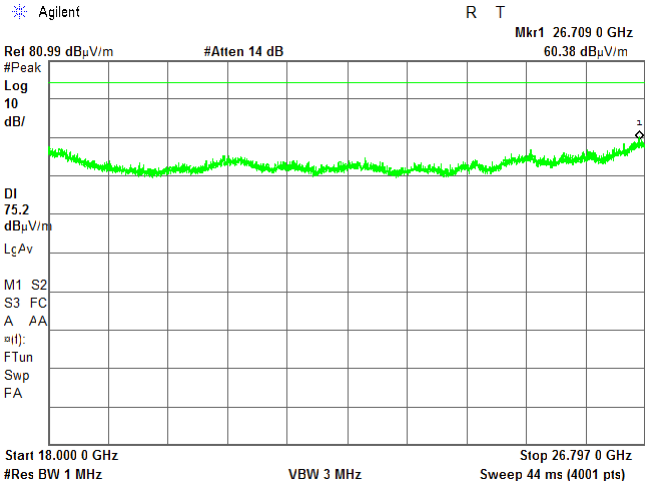
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



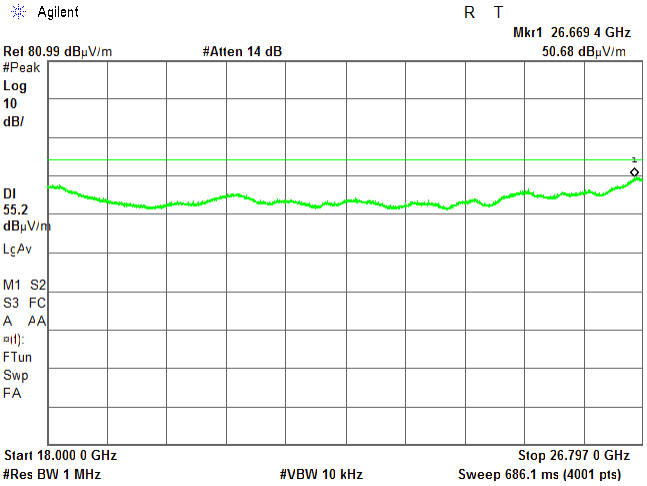
Test specification:	Section 96.41(e)(2), Radiated spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Apr-19 - 14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 56 VDC
Remarks:			

Plot 7.5.13 Radiated emission measurements in 18000 – 26797 MHz range

TEST SITE: OATS
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m
RBW = 1 MHz; VBW = 3 MHz



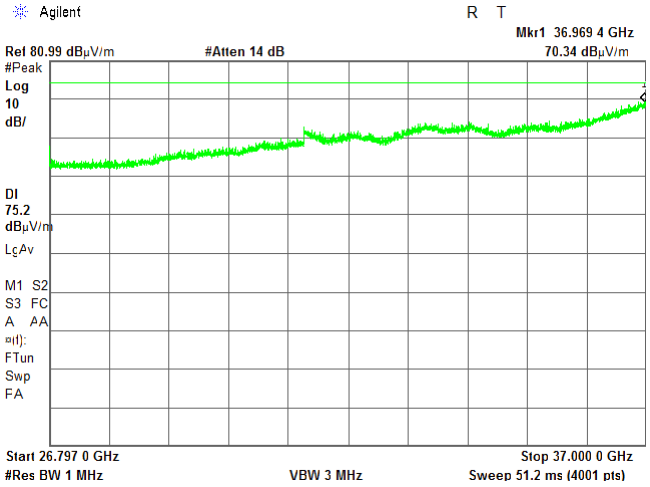
RBW = 1 MHz; VBW = 10 kHz



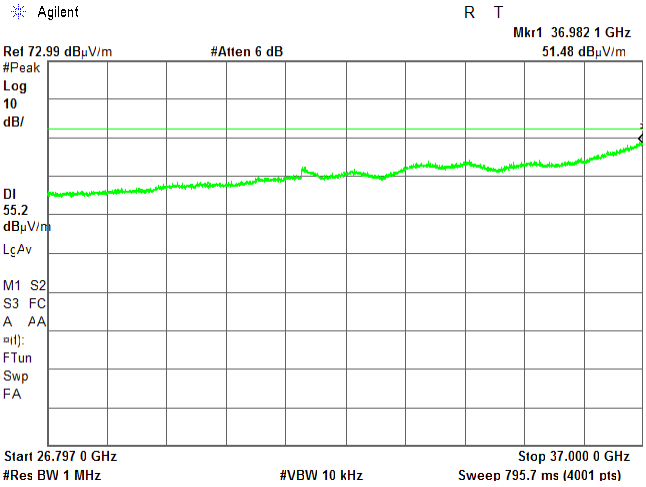
Plot 7.5.14 Radiated emission measurements in 26797 – 37000 MHz range

TEST SITE: OATS
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal

TEST DISTANCE: 3 m
RBW = 1 MHz; VBW = 3 MHz



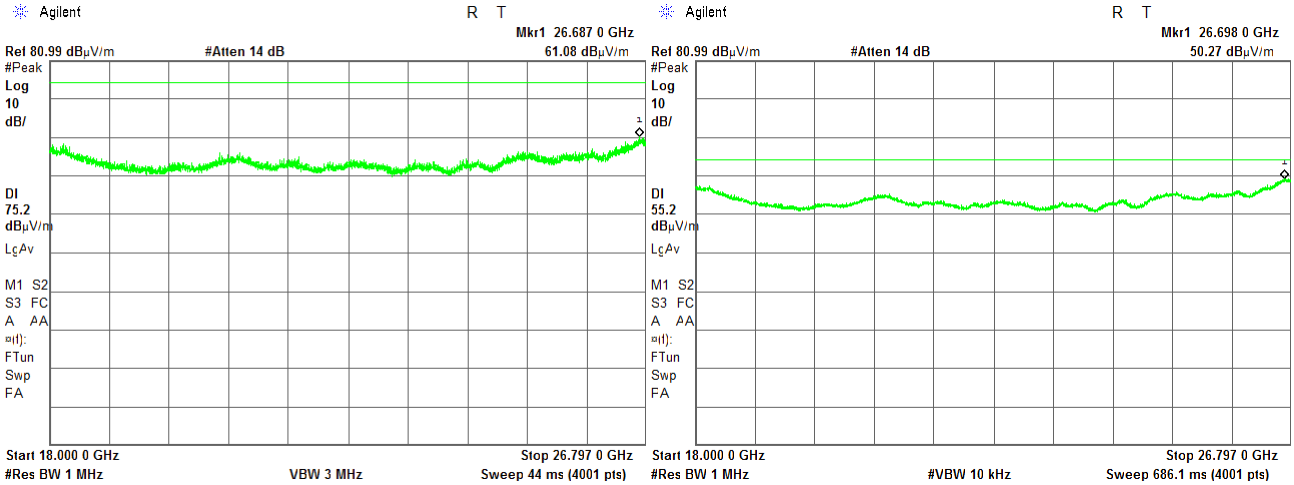
RBW = 1 MHz; VBW = 10 kHz



Test specification:	Section 96.41(e)(2), Radiated spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Apr-19 - 14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 56 VDC
Remarks:			

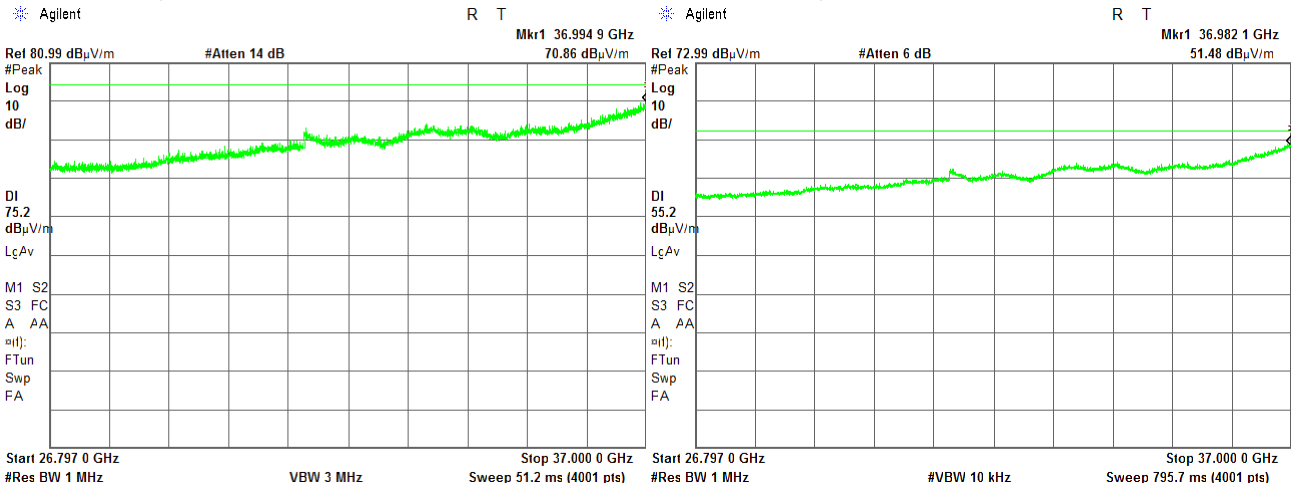
Plot 7.5.15 Radiated emission measurements in 18000 – 26797 MHz range

TEST SITE: OATS
CARRIER FREQUENCY: Mid
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m
RBW = 1 MHz; VBW = 3 MHz
RBW = 1 MHz; VBW = 10 kHz



Plot 7.5.16 Radiated emission measurements in 26797 – 37000 MHz range

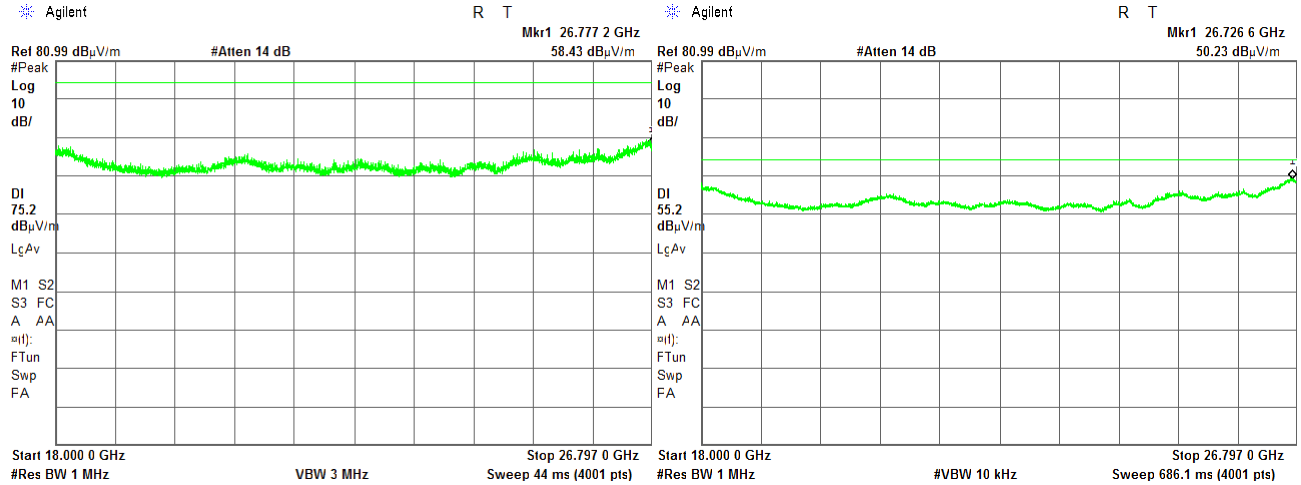
TEST SITE: OATS
CARRIER FREQUENCY: Mid
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m
RBW = 1 MHz; VBW = 3 MHz
RBW = 1 MHz; VBW = 10 kHz



Test specification:	Section 96.41(e)(2), Radiated spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	04-Apr-19 - 14-Apr-19		
Temperature: 24 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 56 VDC
Remarks:			

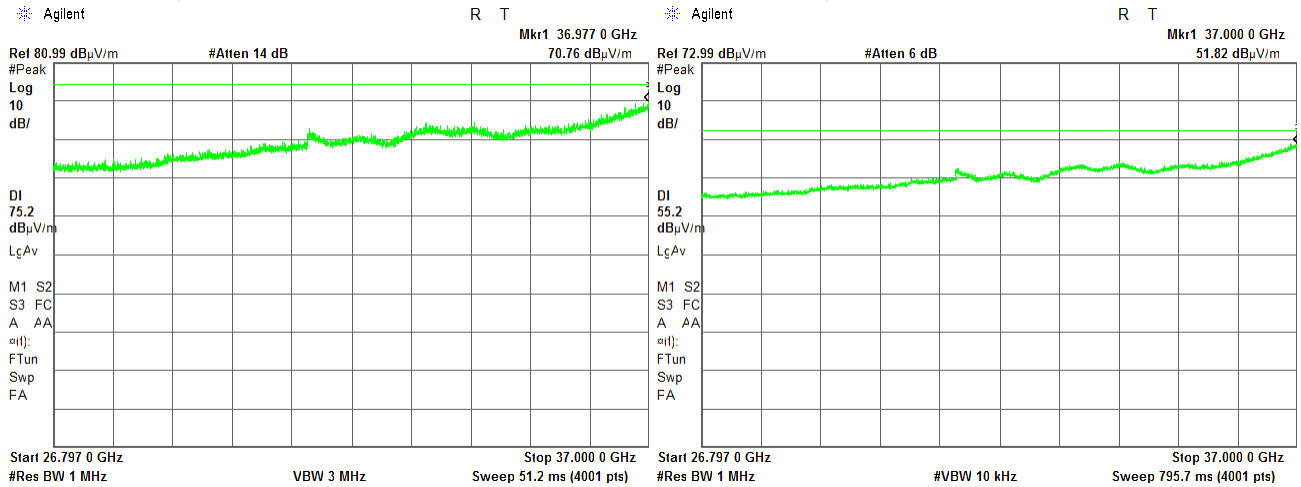
Plot 7.5.17 Radiated emission measurements in 18000 – 26797 MHz range

TEST SITE: OATS
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m
RBW = 1 MHz; VBW = 3 MHz
RBW = 1 MHz; VBW = 10 kHz



Plot 7.5.18 Radiated emission measurements in 26797 – 37000 MHz range

TEST SITE: OATS
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m
RBW = 1 MHz; VBW = 3 MHz
RBW = 1 MHz; VBW = 10 kHz



Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2-May-19 - 5-May-19		
Temperature: 24.2 ºC	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

7.6 Spurious emissions at RF antenna connector test

7.6.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 7.6.1.

Table 7.6.1 Spurious emission limits

Frequency offset from channel band edge, MHz	Attenuation below carrier, dBc	ERP of spurious, dBm
0 – 10	NA	-13.0
10 – 20	NA	-25.0
More than 20	NA	-40.0

* - spurious emission limits do not apply to the in band emission within ± 250 % of the authorized bandwidth from the carrier; investigated in course of emission mask testing
** - P is transmitter output power in Watts

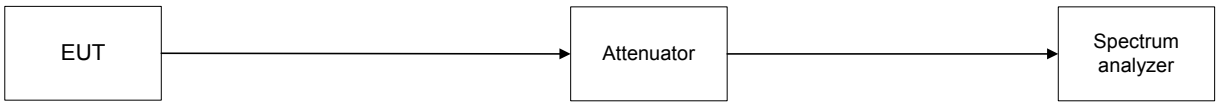
7.6.2 Test procedure

7.6.2.1 The EUT was set up as shown in Figure 7.6.1, energized and its proper operation was checked.

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

7.6.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.6.2 and associated plots.

Figure 7.6.1 Spurious emission test setup



Test specification:	**Section 96.41(e)(3), Conducted spurious emissions**		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	2-May-19 - 5-May-19		
Temperature: 24.2 ºC	**Relative Humidity:** 48 %	**Air Pressure:** 1010 hPa	**Power:** 56 VDC
Remarks:			

Table 7.6.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 3550 - 3700 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 – 37000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATION: QPSK
MODULATING SIGNAL: PRBS
CHANNEL SPACING: 10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict
Low carrier frequency 3555 MHz									
No emissions were found									Pass
Mid carrier frequency 3625 MHz									
No emissions were found									Pass
High carrier frequency 3695 MHz									
No emissions were found									Pass

*****- Margin = Spurious emission – specification limit.

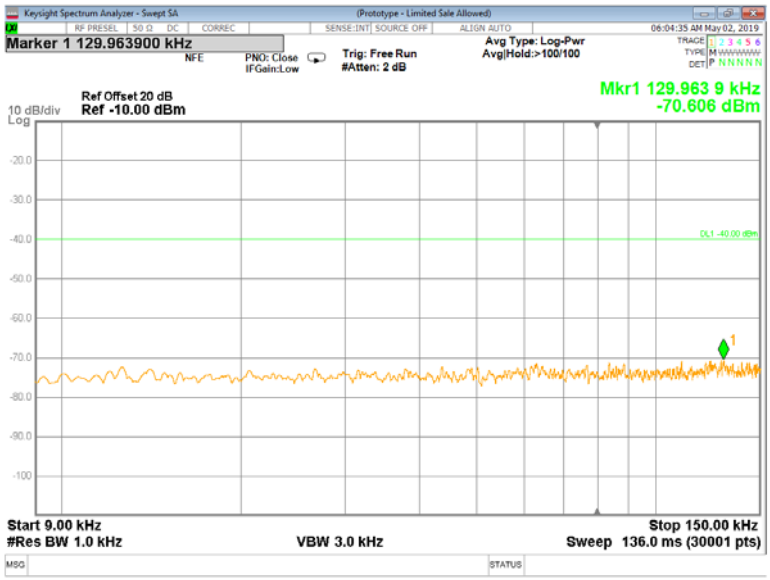
Reference numbers of test equipment used

HL 3435	HL 3818	HL 5372	HL 5409		

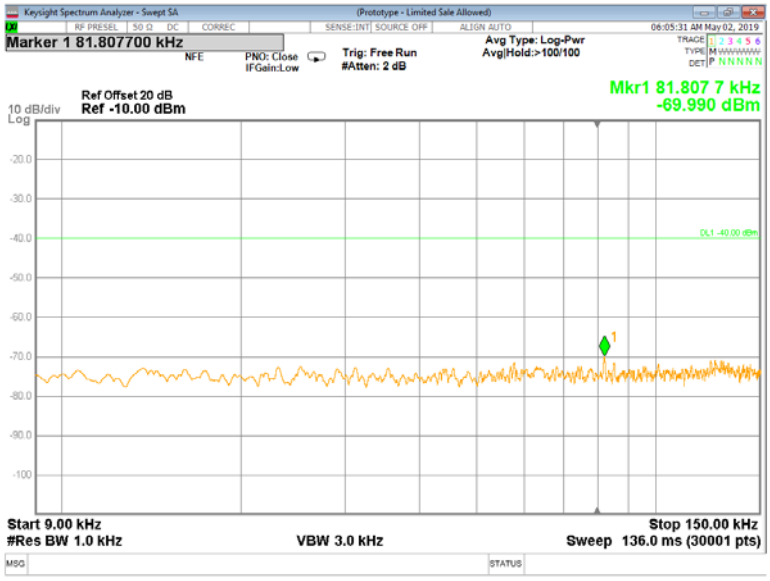
Full description is given in Appendix A.

Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2-May-19 - 5-May-19		
Temperature: 24.2 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

Plot 7.6.1 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency

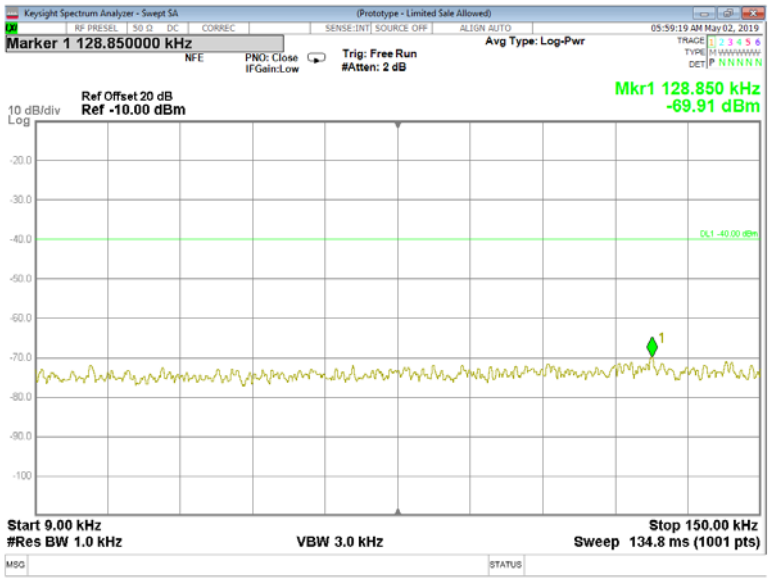


Plot 7.6.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency

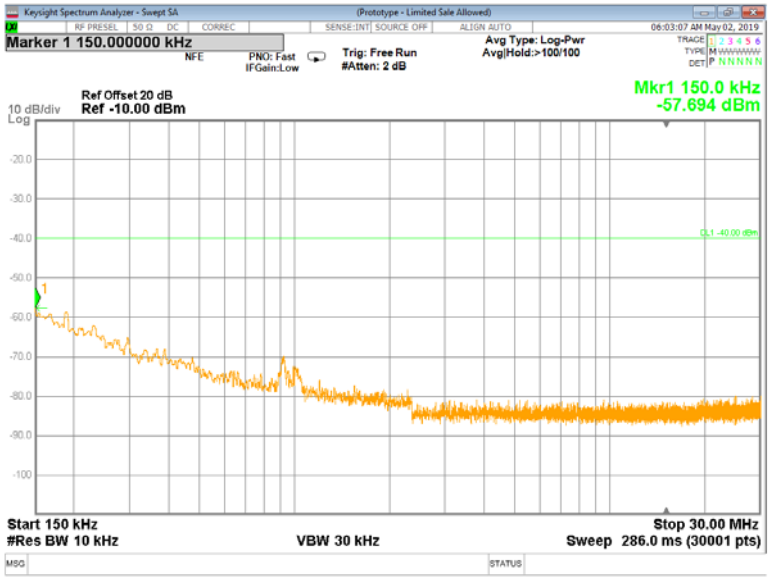


Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2-May-19 - 5-May-19		
Temperature: 24.2 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

Plot 7.6.3 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency

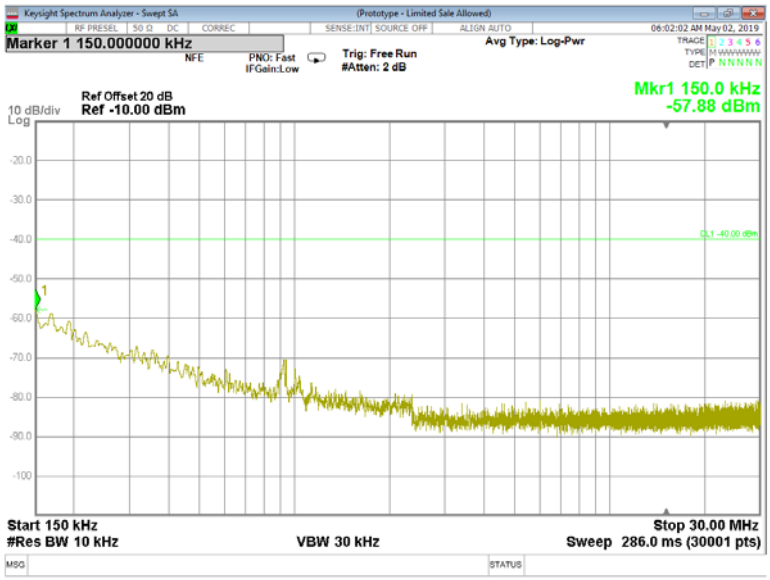


Plot 7.6.4 Spurious emission measurements in 0.15 – 30 MHz range at low carrier frequency

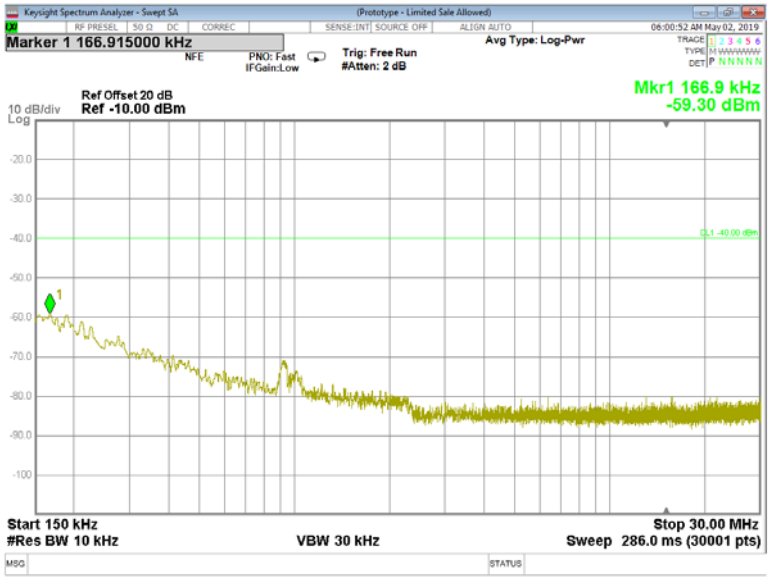


Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2-May-19 - 5-May-19		
Temperature: 24.2 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

Plot 7.6.5 Spurious emission measurements in 0.15 – 30 MHz range at mid carrier frequency

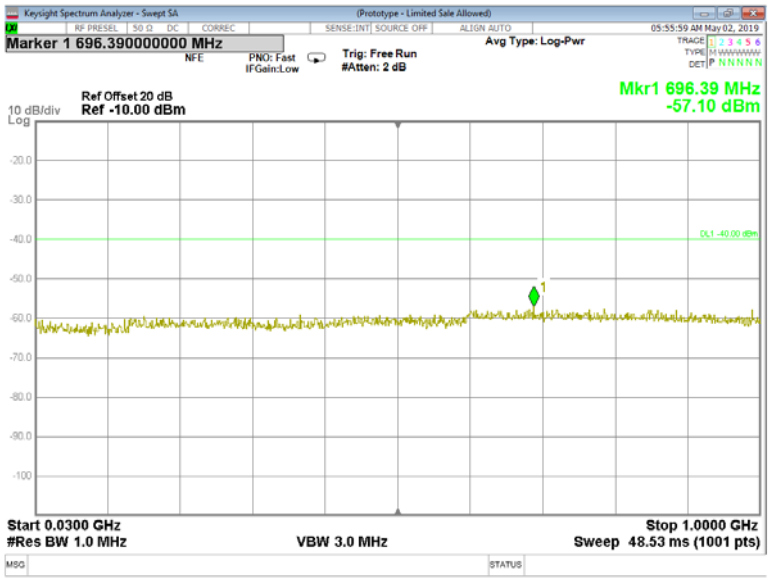


Plot 7.6.6 Spurious emission measurements in 0.15 – 30 MHz range at high carrier frequency

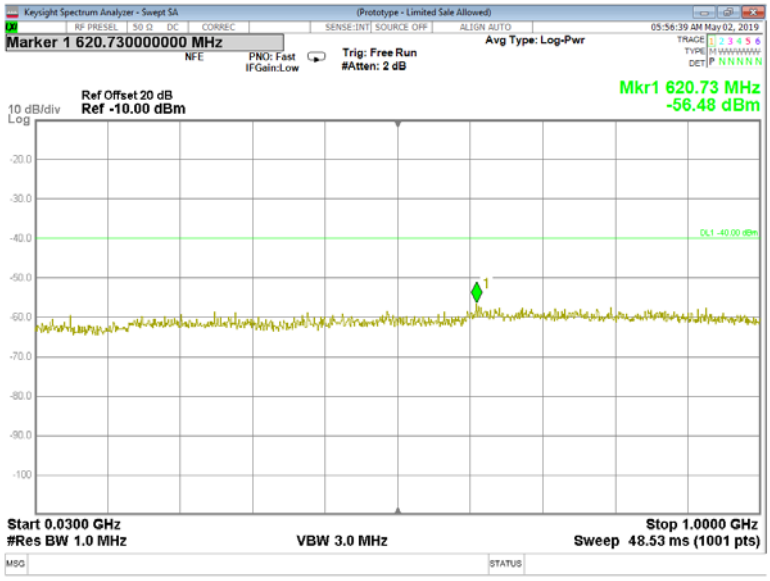


Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2-May-19 - 5-May-19		
Temperature: 24.2 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

Plot 7.6.7 Spurious emission measurements in 30.0 - 1000 MHz range at low carrier frequency

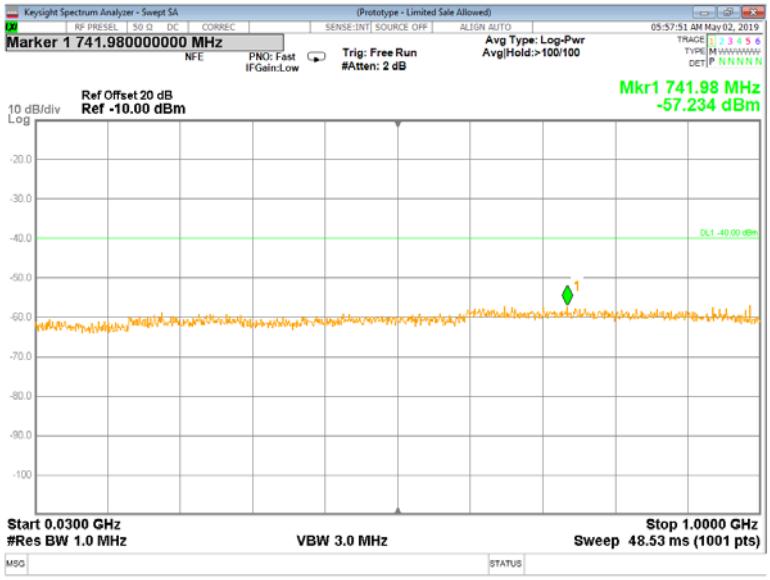


Plot 7.6.8 Spurious emission measurements in 30.0 - 1000 MHz range at mid carrier frequency

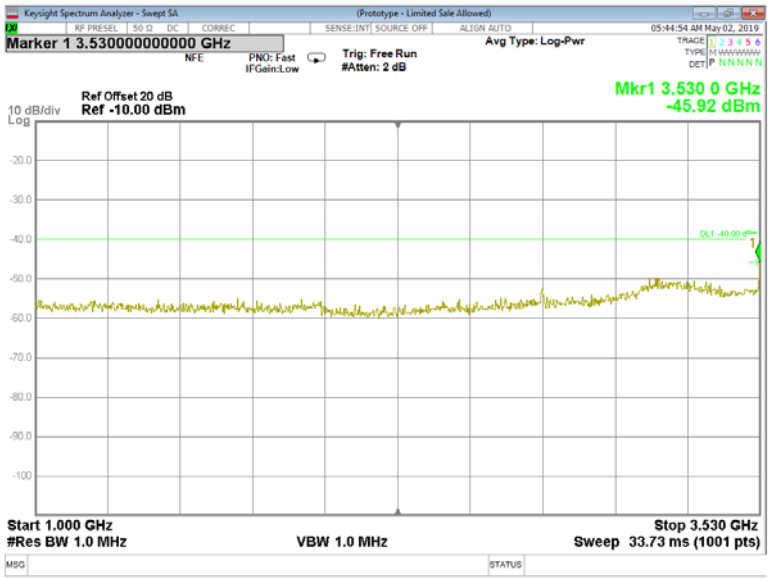


Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2-May-19 - 5-May-19		
Temperature: 24.2 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

Plot 7.6.9 Spurious emission measurements in 30.0 - 1000 MHz range at high carrier frequency

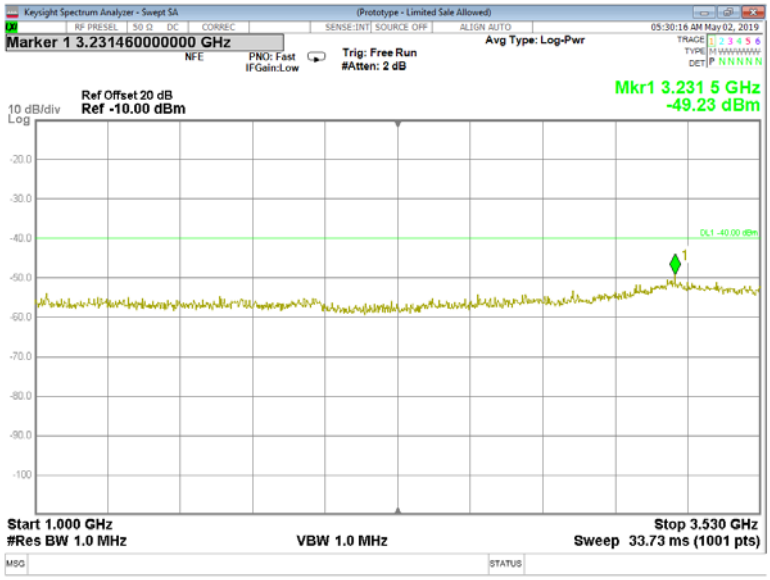


Plot 7.6.10 Spurious emission measurements in 1000 - 3530 MHz range at low carrier frequency

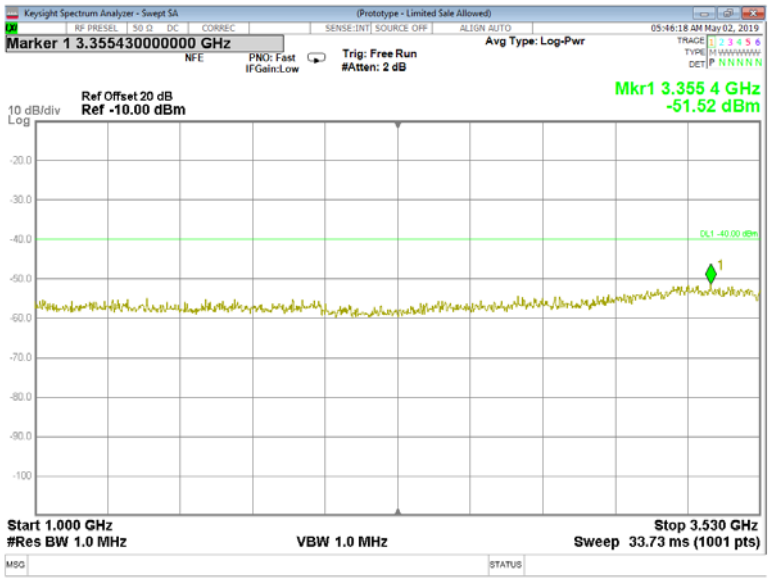


Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2-May-19 - 5-May-19		
Temperature: 24.2 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

Plot 7.6.11 Spurious emission measurements in 1000 - 3530 MHz at mid carrier frequency

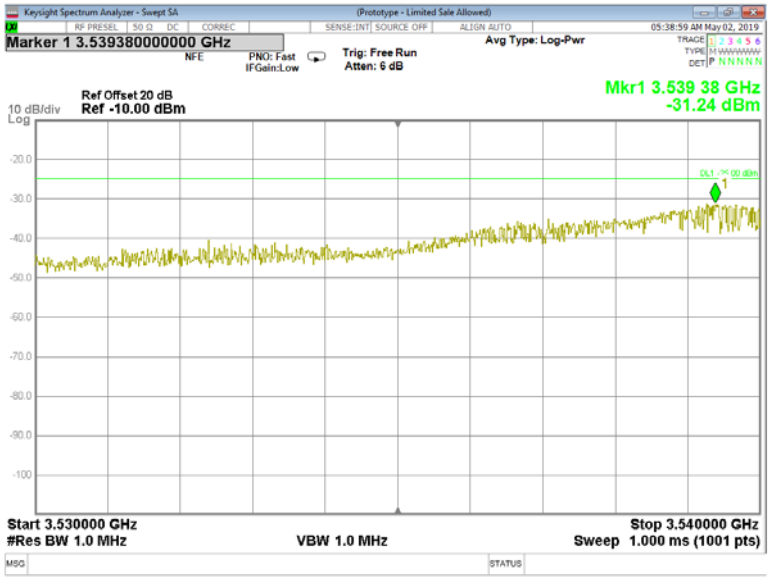


Plot 7.6.12 Spurious emission measurements in 1000 - 3530 MHz at high carrier frequency

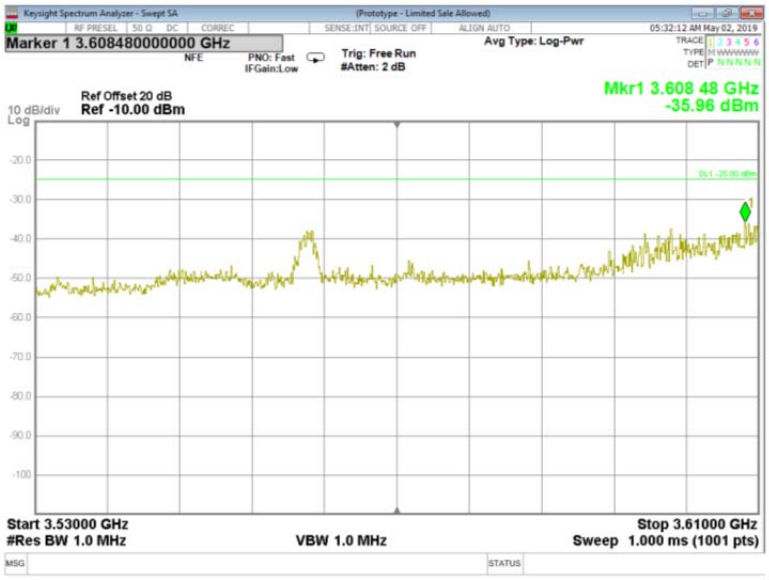


Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2-May-19 - 5-May-19		
Temperature: 24.2 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

Plot 7.6.13 Spurious emission measurements in 3530 - 3540 MHz range at low carrier frequency

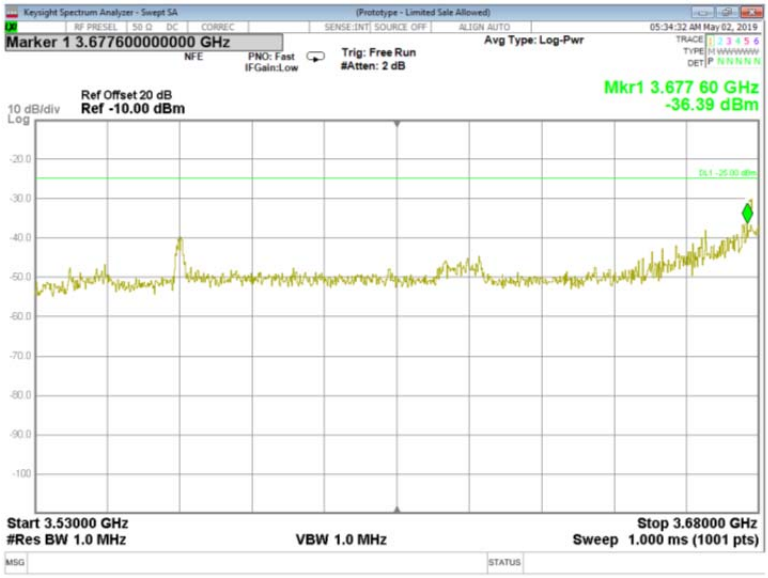


Plot 7.6.14 Spurious emission measurements in 3530 - 3610 MHz at mid carrier frequency

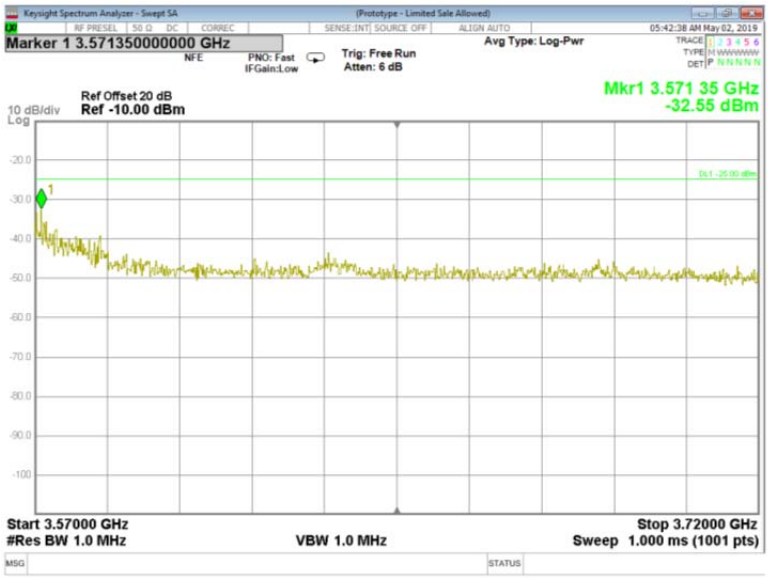


Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2-May-19 - 5-May-19		
Temperature: 24.2 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

Plot 7.6.15 Spurious emission measurements in 3530 - 3680 MHz at high carrier frequency

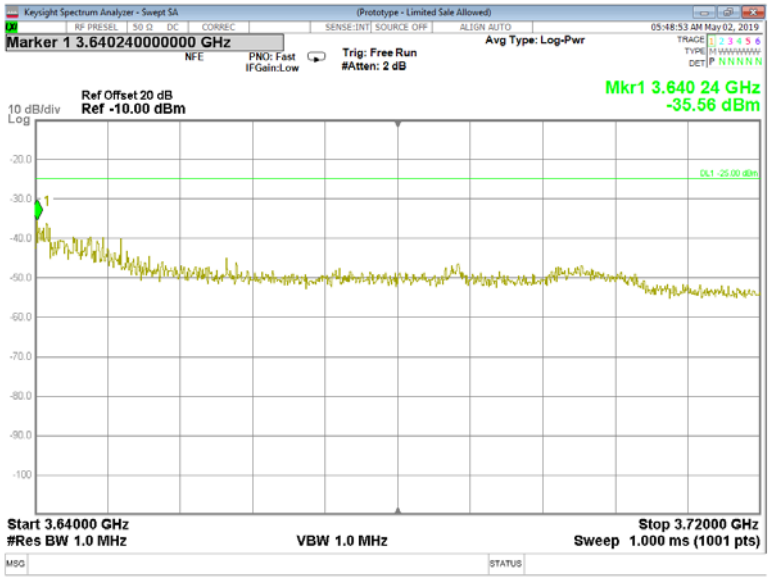


Plot 7.6.16 Spurious emission measurements in 3570 - 3720 MHz range at low carrier frequency

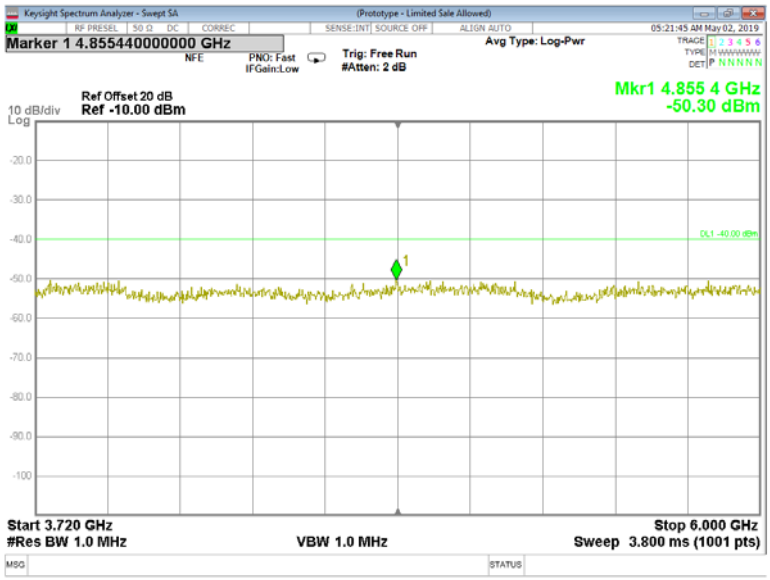


Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2-May-19 - 5-May-19		
Temperature: 24.2 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

Plot 7.6.17 Spurious emission measurements in 3640 - 3720 MHz range at mid carrier frequency

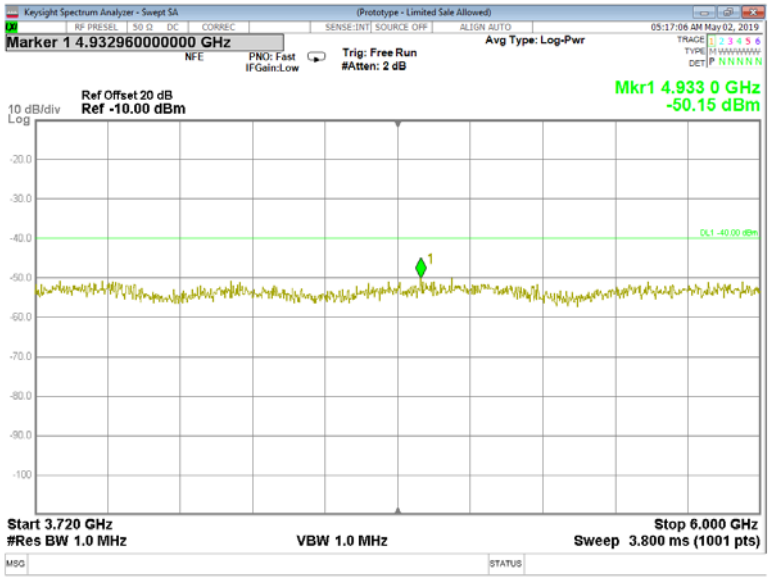


Plot 7.6.18 Spurious emission measurements in 3720 - 6000 MHz range at low carrier frequency

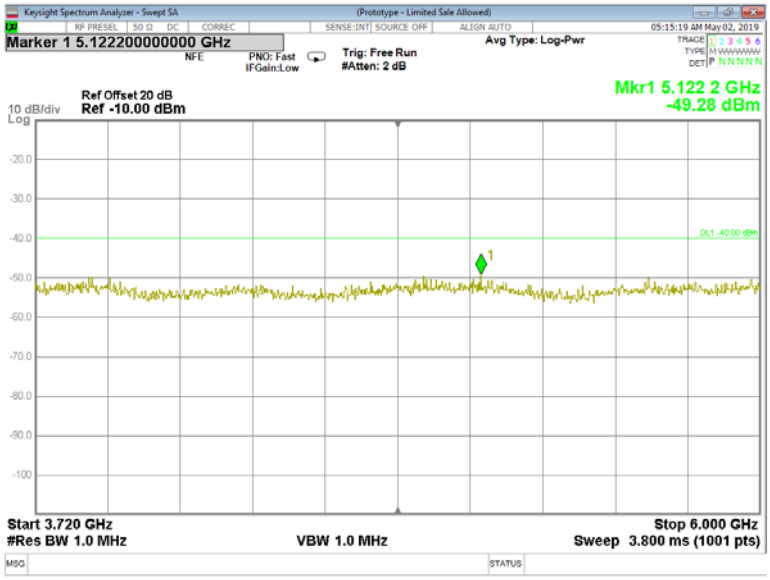


Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2-May-19 - 5-May-19		
Temperature: 24.2 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

Plot 7.6.19 Spurious emission measurements in 3720 - 6000 MHz at mid carrier frequency

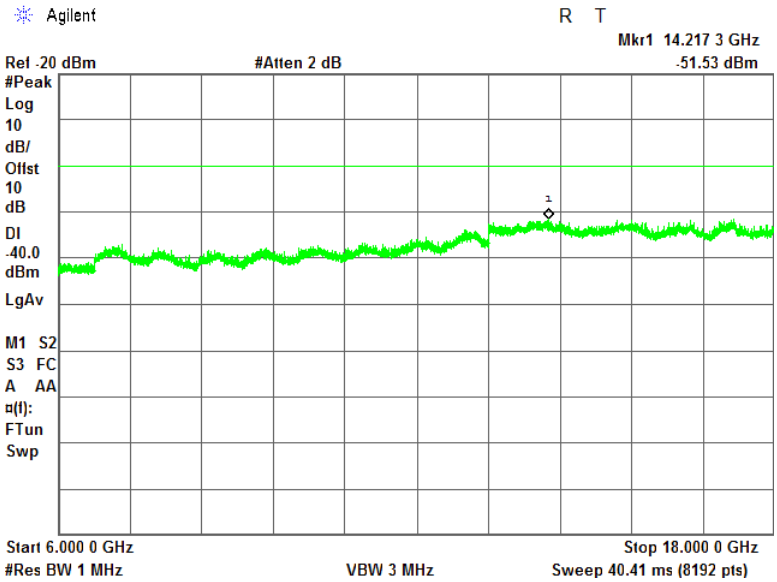


Plot 7.6.20 Spurious emission measurements in 3720 - 6000 MHz at high carrier frequency

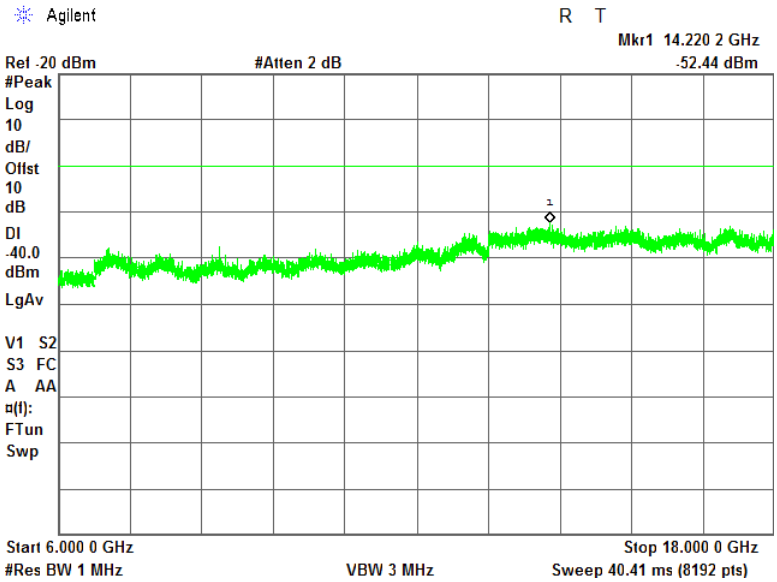


Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2-May-19 - 5-May-19		
Temperature: 24.2 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

Plot 7.6.21 Spurious emission measurements in 6000 - 18000 MHz range at low carrier frequency

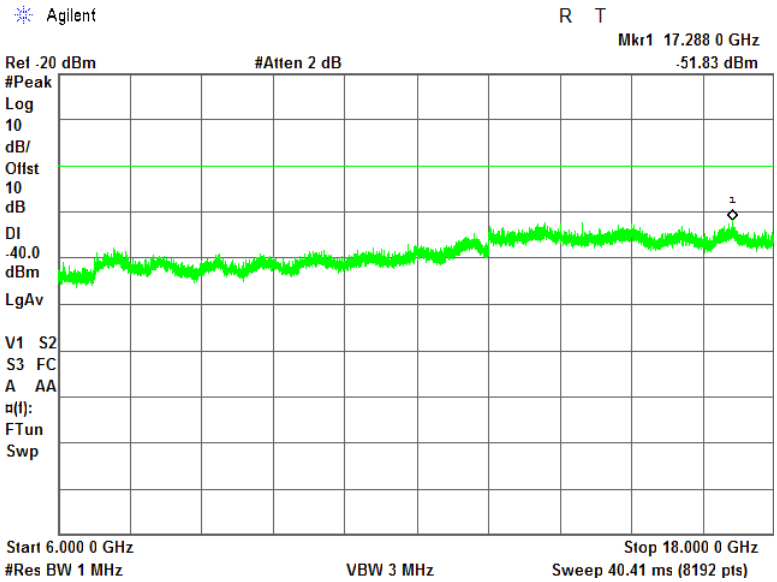


Plot 7.6.22 Spurious emission measurements in 6000 - 18000 MHz at mid carrier frequency

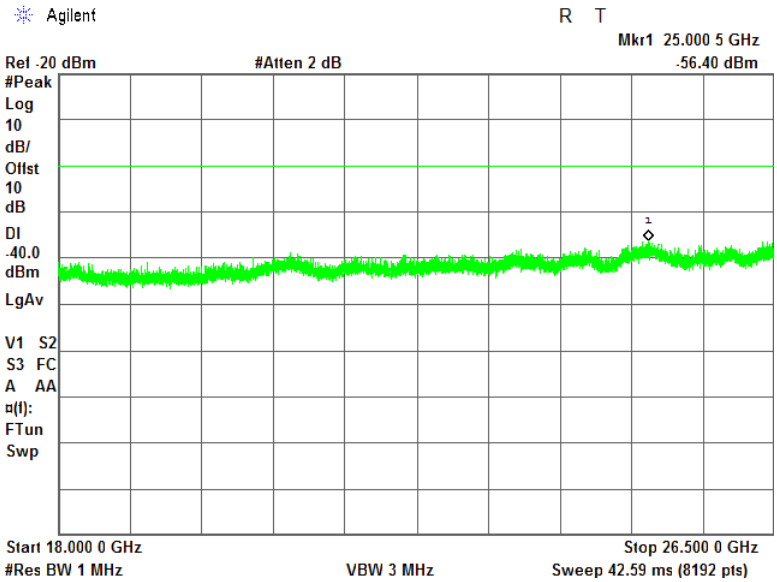


Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2-May-19 - 5-May-19		
Temperature: 24.2 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

Plot 7.6.23 Spurious emission measurements in 6000 - 18000 MHz at high carrier frequency

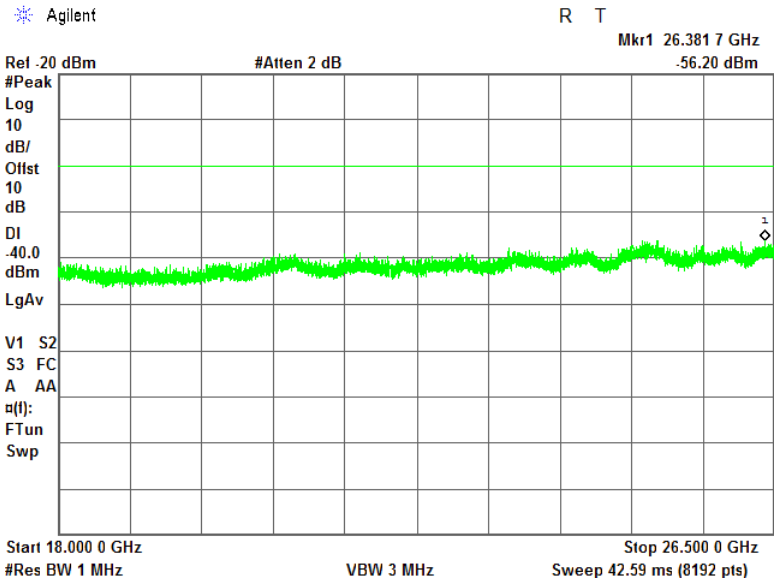


Plot 7.6.24 Spurious emission measurements in 18000 - 26500 MHz range at low carrier frequency

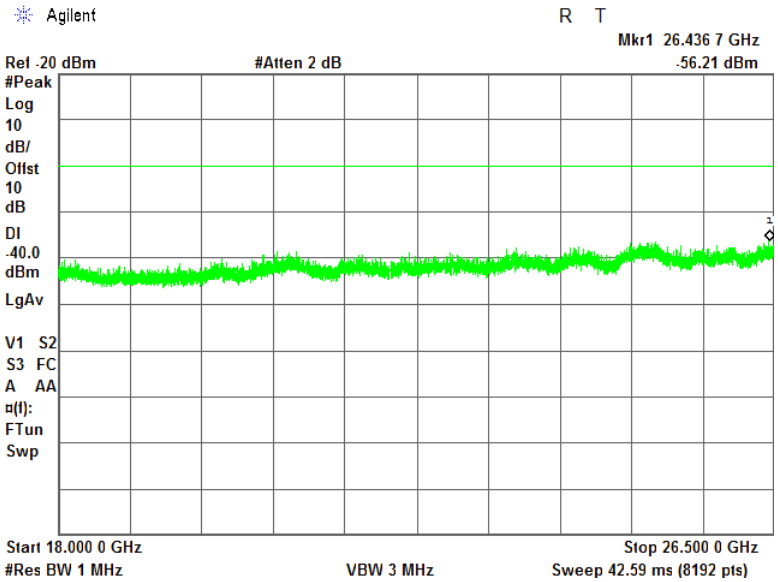


Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2-May-19 - 5-May-19		
Temperature: 24.2 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

Plot 7.6.25 Spurious emission measurements in 18000 - 26500 MHz at mid carrier frequency

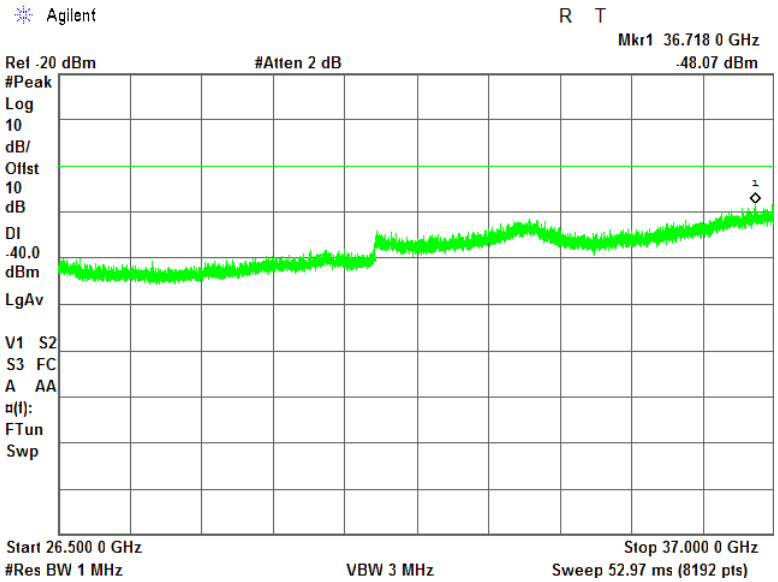


Plot 7.6.26 Spurious emission measurements in 18000 - 26500 MHz at high carrier frequency

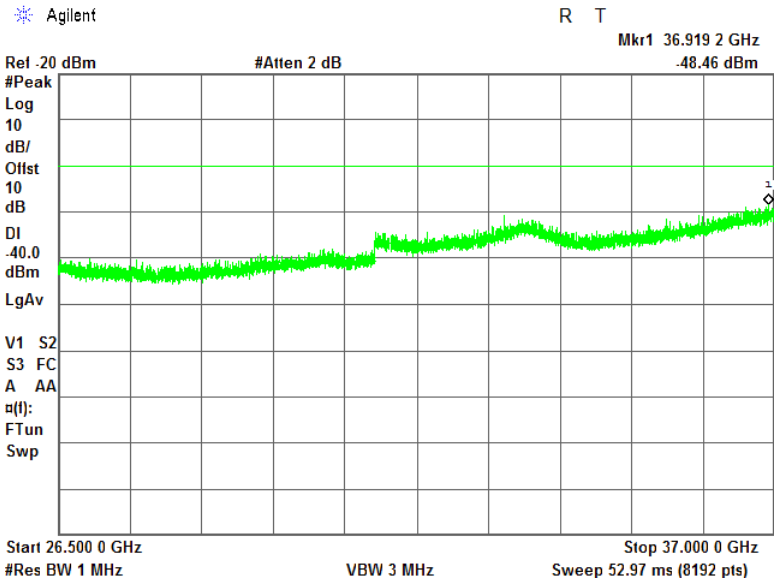


Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2-May-19 - 5-May-19		
Temperature: 24.2 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

Plot 7.6.27 Spurious emission measurements in 26500 - 37000 MHz range at low carrier frequency

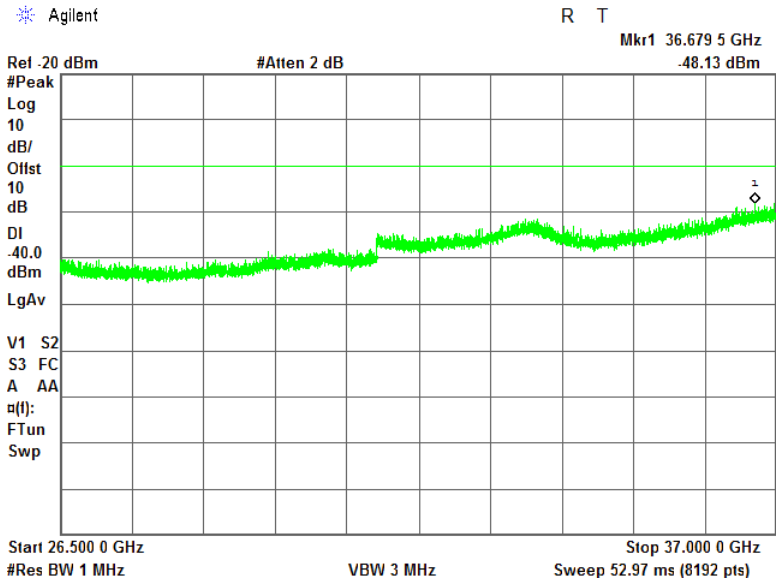


Plot 7.6.28 Spurious emission measurements in 26500 - 37000 MHz at mid carrier frequency



Test specification:	Section 96.41(e)(3), Conducted spurious emissions		
Test procedure:	Section 96.41(e)(3)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2-May-19 - 5-May-19		
Temperature: 24.2 °C	Relative Humidity: 48 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

Plot 7.6.29 Spurious emission measurements in 26500 - 37000 MHz at high carrier frequency



Test specification:	Section 2.1055, Frequency stability		
Test procedure:	47 CFR, Section 2.1055		
Test mode:	Compliance	Verdict:	PASS
Date(s):	11-Apr-19 - 14-Apr-19		
Temperature: 24.1 ºC	Relative Humidity: 47 %	Air Pressure: 1010 hPa	Power: 56 VDC
Remarks:			

7.7 Frequency stability test

7.7.1 General

This test was performed to measure frequency stability of transmitter RF carrier. Specification test limits are given in Table 7.7.1.

Table 7.7.1 Frequency stability limits

Assigned frequency, MHz	Maximum allowed frequency displacement	
	ppm	Hz
3555.0	NA	NA
3625.0		NA
3695.0		NA

7.7.2 Test procedure

7.7.2.1 The EUT was set up as shown in Figure 7.7.1, energized and its proper operation was checked.

7.7.2.2 The EUT power was turned off. Temperature within test chamber was set to +30˚C and a period of time sufficient to stabilize all of the oscillator circuit components was allowed.

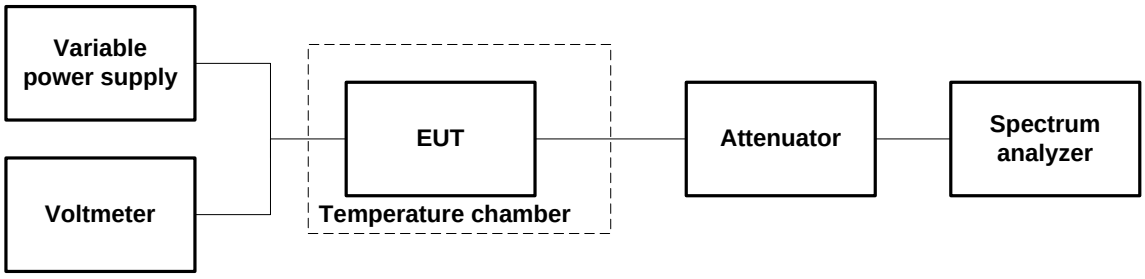
7.7.2.3 The EUT was powered on and carrier frequency was measured at start up moment and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.

7.7.2.4 The above procedure was repeated at 0˚C and at the lowest test temperature.

7.7.2.5 The EUT was powered on and carrier frequency was measured at start up moment and at the end of stabilization period at the rest of test temperatures and voltages. The EUT was powered off.

7.7.2.6 Frequency displacement was calculated and compared with the limit as provided in Table 7.7.2.

Figure 7.7.1 Frequency stability test setup



Test specification:	**Section 2.1055, Frequency stability**		
Test procedure:	47 CFR, Section 2.1055		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	11-Apr-19 - 14-Apr-19		
Temperature: 24.1 ºC	**Relative Humidity:** 47 %	**Air Pressure:** 1010 hPa	**Power:** 56 VDC
Remarks:			

Table 7.7.2 Frequency stability test results

OPERATING FREQUENCY: 3550 – 3700 MHz
NOMINAL POWER VOLTAGE: 56 VDC
TEMPERATURE STABILIZATION PERIOD: 20 min
POWER DURING TEMPERATURE TRANSITION: Off
SPECTRUM ANALYZER MODE: Counter
RESOLUTION BANDWIDTH: 1 kHz
VIDEO BANDWIDTH: 1 kHz
MODULATION: Unmodulated

T, ºC	Voltage, V	Frequency, MHz							Max frequency drift, Hz		Verdict
		Start up	1st min	2nd min	3rd min	4th min	5th min	10th min	Positive	Negative	
Low frequency 3555.0 MHz											
-30	nominal	3554.99999	3554.99997	3554.99998	3554.99998	3555.00000	3554.99999	3554.99999	20	-5	Comply
-20	nominal	3554.99999	NA	NA	NA	NA	NA	3554.99999	14	0	Comply
-10	nominal	3554.99998	NA	NA	NA	NA	NA	3554.99998	7	0	Comply
0	nominal	3554.99999	3554.99999	3554.99999	3554.99998	3554.99998	3554.99998	3554.99999	14	0	Comply
10	nominal	3554.99998	NA	NA	NA	NA	NA	3554.99999	8	-2	Comply
20	15%	3554.99999	NA	NA	NA	NA	NA	3554.99999	12	0	Comply
20	nominal	3555.00005	NA	NA	NA	NA	NA	3554.99998	68	0	Comply
20	-15%	3554.99999	NA	NA	NA	NA	NA	3554.99998	13	0	Comply
30	nominal	3554.99999	3554.99998	3554.99998	554.999998	3554.99999	3554.99999	3555.00000	19	0	Comply
40	nominal	3554.99999	NA	NA	NA	NA	NA	3554.99999	12	0	Comply
50	nominal	3554.99999	NA	NA	NA	NA	NA	3554.99999	16	0	Comply
Mid frequency 3625.0 MHz											
-30	nominal	3624.99998	3624.99999	3625.00000	3624.99999	3624.99998	3625.00000	3625.00000	3	-20	Comply
-20	nominal	3625.00000	NA	NA	NA	NA	NA	3624.99999	0	-9	Comply
-10	nominal	3625.00000	NA	NA	NA	NA	NA	3625.00000	1	-4	Comply
0	nominal	3624.99999	3624.99999	3625.000000	3625.00000	3624.99999	3624.99999	3624.99998	0	-17	Comply
10	nominal	3624.99999	NA	NA	NA	NA	NA	3624.99999	0	-9	Comply
20	15%	3624.99999	NA	NA	NA	NA	NA	3625.00000	0	-10	Comply
20	nominal	3624.99999	NA	NA	NA	NA	NA	3625.00000	0	-5	Comply
20	-15%	3624.99999	NA	NA	NA	NA	NA	3624.99999	0	-8	Comply
30	nominal	3624.99998	3624.99999	3625.000.00	3624.99998	3625.00000	3624.99999	3624.99999	0	-21	Comply
40	nominal	3624.99998	NA	NA	NA	NA	NA	3625.00001	9	-24	Comply
50	nominal	3625.00000	NA	NA	NA	NA	NA	3625.00000	2	0	Comply
High frequency 3695.0 MHz											
-30	nominal	3694.99998	3694.99998	3694.99999	3694.99999	3694.99999	3694.99998	3694.99999	0	-10	Comply
-20	nominal	3694.99999	NA	NA	NA	NA	NA	3694.99998	0	-9	Comply
-10	nominal	3694.99999	NA	NA	NA	NA	NA	3694.99999	2	0	Comply
0	nominal	3694.99998	3694.99998	3694.99998	3694.99998	3694.99998	3694.99998	3694.99999	0	-11	Comply
10	nominal	3694.99998	NA	NA	NA	NA	NA	3694.99999	3	-7	Comply
20	15%	3694.99999	NA	NA	NA	NA	NA	3694.99997	0	-22	Comply
20	nominal	3694.99999	NA	NA	NA	NA	NA	3694.99999	4	0	Comply
20	-15%	3695.00000	NA	NA	NA	NA	NA	3694.99999	6	0	Comply
30	nominal	3694.99999	3694.99999	3694.99999	3694.99999	3694.99999	3694.99999	3694.99999	0	-5	Comply
40	nominal	3694.99999	NA	NA	NA	NA	NA	3695.00000	6	-1	Comply
50	nominal	3694.99998	NA	NA	NA	NA	NA	3694.99999	0	-7	Comply

* - Reference frequency

Reference numbers of test equipment used

HL 2909	HL 2358	HL 5391					

Full description is given in Appendix A.

8 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./ Check	Due Cal./ Check
0446	Antenna, Loop, Active, 10 (9) kHz - 30 MHz	EMCO	6502	2857	24-Feb-19	24-Feb-20
2358	Power Supply, 2 X 0-36VDC / 5A, 5VDC / 5A	Horizon Electronics	DHR3655 D	767469	03-Jun-18	03-Jun-19
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY41444762	04-Apr-19	04-Apr-20
3301	Power Meter, P-series, 50 MHz to 40 GHz	Agilent Technologies	N1911A	MY45101057	28-Apr-19	28-Apr-20
3302	Power sensor, P-Series, 50 MHz to 40 GHz, -35/30 to 20 dBm	Agilent Technologies	N1922A	MY45240586	28-Apr-19	28-Apr-20
3433	Test Cable , DC-18 GHz, 1.5 m, SMA - SMA	Mini-Circuits	CBL-5FT-SMSM+	25679	15-Apr-19	15-Apr-20
3435	Precision Fixed Attenuator, 50 Ohm, 5 W, 10 dB, DC to 18 GHz	Mini-Circuits	BW-S10W5+	NA	04-Mar-19	04-Mar-20
3818	PSA Series Spectrum Analyzer, 3 Hz- 44 GHz	Agilent Technologies	E4446A	MY48250288	24-Apr-19	24-Apr-20
3903	Microwave Cable Assembly, 40.0 GHz, 1.5 m, SMA/SMA	Huber-Suhner	SUCOFLEX 102A	1226/2A	07-Apr-19	07-Apr-20
4360	EMI Test Receiver, 20 Hz to 40 GHz.	Rohde & Schwarz	ESU40	100322	31-Dec-18	31-Dec-19
4933	Active Horn Antenna, 1 GHz to 18 GHz	COM-POWER CORPORATION	AHA-118	701046	06-Jan-19	06-Jan-20
4956	Active horn antenna, 18 to 40 GHz	COM-POWER CORPORATION	AHA-840	105004	25-Jan-19	25-Jan-20
5112	RF cable, 40 GHz, 5.5 m, K-type	Huber-Suhner	SF102EA/11SK/11SK/5500MM	502494/2EA	18-Apr-19	18-Apr-20
5288	Trilog Antenna, 25 MHz - 8 GHz, 100W	Frankonia	ALX-8000E	00809	08-Feb-19	08-Feb-22
5372	MXE EMI receiver, 3 Hz to 44 GHz	Keysight Technologies	N9038A	MY57290155	21-May-18	21-May-19
5391	Temperature/Humidity Cycle Chamber, -77 - +177 deg., Humidity Range 20% RH to 95% RH	Thermotron	SM-8C	27737	22-Jul-18	22-Jul-19
5405	RF cable, 18 GHz, N-N, 6 m	Huber-Suhner	SF118/11N(x2)	500023/118	01-Aug-18	01-Aug-19
5409	RF cable, 40 GHz, SMA-SMA, 2 m	Huber-Suhner	SF102EA/11SK/11SK/2000MM	503973/2EA	19-Aug-18	19-Aug-19

9 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Transmitter tests	
Carrier power conducted at antenna connector	± 1.7 dB
Carrier power radiated (substitution method)	± 4.5 dB
Occupied bandwidth	±8%
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB
Spurious emissions radiated 30 MHz – 40 GHz (substitution method)	± 4.5 dB
Frequency error	30 – 300 MHz: ± 50.5 Hz (1.68 ppm) 300 – 1000 MHz: ± 168 Hz (0.56 ppm)
Transient frequency behaviour	187 Hz ± 13.9 %
Duty cycle, timing (Tx ON / OFF) and average factor measurements	± 1.0 %
Unintentional radiator tests	
Conducted emissions with LISN	9 kHz to 150 kHz: ± 3.9 dB 150 kHz to 30 MHz: ± 3.8 dB
Radiated emissions at 3 m measuring distance Horizontal polarization Vertical polarization	 Biconilog antenna: ± 5.3 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.3 dB Double ridged horn antenna: ± 5.3 dB Biconilog antenna: ± 6.0 dB Biconical antenna: ± 5.7 dB Log periodic antenna: ± 6.0 dB Double ridged horn antenna: ± 6.0 dB

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

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

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

10 APPENDIX C Test facility description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, Radio, Safety, Environmental and Telecommunication testing facility.
Hermon Laboratories is recognized and accredited by the Federal Communications Commission (USA) for relevant parts of Code of Federal Regulations 47 (CFR 47), Test Firm Registration Number is 927748, Designation Number is IL1001; Recognized by Innovation, Science and Economic Development Canada for wireless and terminal testing (ISED), ISED #2186A, CAB identifier is IL1001; Certified by VCCI, Japan (the registration numbers are R-10808 for OATS, R-1082 for anechoic chamber, G-10869 for RE measurements above 1 GHz, C-10845 for conducted emissions site and T-11606 for conducted emissions at telecommunication ports).
The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing, environmental simulation and calibration (for exact scope please refer to Certificate No. 839.01, 839.03 and 839.04).

Address: P.O. Box 23, Binyamina 3055001, Israel.
Telephone: +972 4628 8001
Fax: +972 4628 8277
e-mail: mail@hermonlabs.com
website: www.hermonlabs.com

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

11 APPENDIX D Specification references

FCC 47CFR part 96: 2018	Citizens Broaband Radio Service
FCC 47CFR part 1: 2018	Practice and procedure
FCC 47CFR part 2: 2018	Frequency allocations and radio treaty matters; general rules and regulations
ANSI C63.26:2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
ANSI C63.2: 1996	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4: 2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
KDB 971168 D01 v03r01	Measurement Guidance for Certification of Licensed Digital Transmitters
KDB 940660 D01 v01	Certification and Test Procedures for Citizens Broadband Radio Service Devices Authorized under Part 96
KDB 662911 D01 v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band
KDB 662911 D02 v01	MIMO with Cross-Polarized Antenna

12 APPENDIX E Test equipment correction factors

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

Frequency, MHz	Measured antenna factor, dBS/m
0.009	-32.5
0.010	-33.4
0.020	-37.9
0.050	-40.6
0.075	-41.0
0.100	-41.2
0.150	-41.2
0.250	-41.2
0.500	-41.3
0.750	-41.3
1.000	-41.4
2.000	-41.4
3.000	-41.4
4.000	-41.5
5.000	-41.5
10.000	-41.8
15.000	-42.2
20.000	-42.9
25.000	-43.9
30.000	-45.4

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

Antenna factor
Trilog antenna
Model ALX-8000E, Frankonia, S/N 00809, HL 5288, 30-1000 MHz

Frequency, MHz	Antenna factor, dB/m		
	Vert Up	Vert Down	Delta
30	-51.19	-51.28	0.09
35	-44.03	-44.12	0.09
40	-43.07	-43.12	0.05
45	-39.61	-39.79	0.18
50	-37.84	-38.14	0.3
60	-34.93	-34.9	0.03
70	-29.76	-29.66	0.1
80	-27.69	-27.82	0.13
90	-29.05	-29.07	0.02
100	-31.19	-31.19	0
120	-31.61	-31.6	0.01
140	-28.13	-28.06	0.07
160	-27.71	-27.75	0.04
180	-26.19	-26.15	0.04
200	-28.2	-28.15	0.05
250	-27.45	-27.47	0.02
300	-29.61	-29.63	0.02
400	-31.77	-31.78	0.01
500	-32.81	-32.81	0
600	-33.64	-33.61	0.03
700	-34.21	-34.21	0
800	-35.66	-35.66	0
900	-36.99	-36.91	0.08
1000	-38	-37.91	0.09

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

Antenna factor
Active Horn Antenna,
Com-Power Corporation, model: AHA-118, s/n 701046, HL 4933

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

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

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

Antenna factor
Active Horn Antenna,
Com-Power Corporation, model: AHA-840, s/n 105004, HL 4956

Frequency, MHz	Measured antenna factor (with preamplifier), dB/m
18000	2.5
18500	0.5
19000	-1.0
19500	-2.4
20000	-2.5
20500	-2.2
21000	-2.0
21500	-2.7
22000	-3.7
22500	-3.8
23000	-3.7
23500	-5.0
24000	-4.5
24500	-5.0
25000	-4.7
25500	-4.4
26000	-4.3
26500	-5.6
27000	-4.3
27500	-4.9
28000	-5.2
28500	-4.4

Frequency, MHz	Measured antenna factor (with preamplifier), dB/m
29000	-2.7
29500	-2.6
30000	-1.4
30500	-1.5
31000	-1.0
31500	-2.6
32000	-3.3
32500	-3.3
33000	-5.1
33500	-5.2
34000	-1.5
34500	-5.4
35000	-3.3
35500	-4.2
36000	-2.8
36500	-2.6
37000	-1.0
38000	1.8
38500	2.8
39000	1.3
39500	1.3
40000	0.3

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

Cable loss
Test Cable, Mini-Circuits, CBL-5FT-SMSM+, SMA-SMA, 18 GHz, 1.5 m, S/N 25679
Mini-Circuits, HL 3433

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10.0	0.06	9000	2.01
100	0.17	9500	2.06
500	0.41	10000	2.05
1000	0.58	10500	2.18
1500	0.72	11000	2.26
2000	0.86	11500	2.28
2500	0.96	12000	2.43
3000	1.04	12500	2.53
3500	1.13	13000	2.52
4000	1.23	13500	2.56
4500	1.31	14000	2.60
5000	1.41	14500	2.59
5500	1.49	15000	2.67
6000	1.55	15500	2.76
6500	1.63	16000	2.86
7000	1.71	16500	2.91
7500	1.78	17000	2.95
8000	1.86	17500	3.02
8500	1.92	18000	3.07

Cable loss
Microwave Cable Assembly, Huber-Suhner, 40 GHz, 1.5 m, SMA-SMA, S/N 1226/2A
HL 3903

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	-0.02	9500	1.84	21000	2.98
100	0.15	10000	1.86	22000	3.07
500	0.38	10500	1.93	23000	3.13
1000	0.56	11000	1.99	24000	3.21
1500	0.69	11500	2.04	25000	3.26
2000	0.82	12000	2.10	26000	3.48
2500	0.90	12500	2.15	27000	3.44
3000	0.98	13000	2.21	28000	3.53
3500	1.06	13500	2.25	29000	3.59
4000	1.11	14000	2.29	30000	3.66
4500	1.17	14500	2.34	31000	3.70
5000	1.24	15000	2.36	32000	3.79
5500	1.32	15500	2.40	33000	3.88
6000	1.40	16000	2.45	34000	3.94
6500	1.50	16500	2.48	35000	3.91
7000	1.56	17000	2.56	36000	4.05
7500	1.62	17500	2.58	37000	4.22
8000	1.68	18000	2.60	38000	4.25
8500	1.74	19000	2.84	39000	4.27
9000	1.78	20000	2.88	40000	4.33

Cable loss
RF Cable, Huber-Suhner, 40 GHz, 5.5 m, K type,
SF102EA/11SK/11SK/5500MM, S/N 502494/2EA
HL 5112

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
100	0.69	20500	10.18
200	0.97	21000	10.32
300	1.18	21500	10.47
500	1.52	22000	10.60
1000	2.14	22500	10.75
1500	2.62	23000	10.87
2000	3.03	23500	11.00
2500	3.40	24000	11.12
3000	3.73	24500	11.23
3500	4.04	25000	11.35
4000	4.33	25500	11.52
4500	4.60	26000	11.64
5000	4.86	26500	11.73
5500	5.10	27000	11.84
6000	5.34	27500	11.93
6500	5.57	28000	12.05
7000	5.79	28500	12.19
7500	6.00	29000	12.33
8000	6.21	29500	12.44
8500	6.43	30000	12.53
9000	6.62	30500	12.58
9500	6.82	31000	12.71
10000	7.01	31500	12.86
10500	7.17	32000	13.00
11000	7.34	32500	13.11
11500	7.51	33000	13.24
12000	7.68	33500	13.33
12500	7.84	34000	13.44
13000	8.00	34500	13.58
13500	8.16	35000	13.69
14000	8.32	35500	13.81
14500	8.48	36000	13.93
15000	8.63	36500	14.05
15500	8.77	37000	14.24
16000	8.92	37500	14.28
16500	9.08	38000	14.38
17000	9.23	38500	14.50
17500	9.37	39000	14.61
18000	9.51	39500	14.70
18500	9.66	40000	14.83
19000	9.78		
19500	9.92		
20000	10.07		

Cable loss
RF Cable, Huber-Suhner, 18 GHz, 6 m,
SF118/11N(x2), S/N 500023/118
HL 5405

5405

Specific Test Report

Frequency Range [GHz]	IL min S21 [dB]	IL min S12 [dB]	RL max S11 [dB]	RL max S22 [dB]
0.040 - 1.836	-1.431	-1.431	-37.037	-37.704
1.836 - 3.632	-2.062	-2.066	-33.573	-32.848
3.632 - 5.428	-2.576	-2.576	-28.548	-29.602
5.428 - 7.224	-3.013	-3.014	-30.738	-32.523
7.224 - 9.020	-3.415	-3.416	-33.728	-32.257
9.020 - 10.816	-3.772	-3.772	-29.302	-30.735
10.816 - 12.612	-4.138	-4.138	-28.768	-26.255
12.612 - 14.408	-4.456	-4.462	-27.109	-26.151
14.408 - 16.204	-4.786	-4.786	-26.056	-27.116
16.204 - 18.000	-5.113	-5.111	-27.762	-28.508

Type:	SF118/11N/11N/6000MM
Sales no.:	10497130
Serial no.:	500023 /118
PA no.:	1956306
Ring no.:	
Cable length:	6 m
Test length:	
Connector 1:	SF_11_N-656
Connector 2:	SF_11_N-656
Cable:	SUCOFLEX_118
Meas. System:	N5230C,MY49001834,A.09.42.22
Time:	7:04:21 AM
Date:	6/6/2018
Inspected by:	AZ /111
Start Freq.:	0.04000 GHz
Stop Freq.:	18.00000 GHz
Meas Points:	801
Source Power:	-5 dBm

Cable loss
RF Cable, Huber-Suhner, 40 GHz, 2 m, ,
SF102EA/11SK/11SK/2000MM, S/N 503973/2EA
HL 5409

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
100	0.26	20500	3.75
200	0.36	21000	3.80
300	0.45	21500	3.85
500	0.58	22000	3.90
1000	0.82	22500	3.95
1500	0.99	23000	4.00
2000	1.15	23500	4.04
2500	1.28	24000	4.09
3000	1.40	24500	4.13
3500	1.51	25000	4.19
4000	1.61	25500	4.25
4500	1.71	26000	4.30
5000	1.80	26500	4.37
5500	1.89	27000	4.45
6000	1.98	27500	4.47
6500	2.06	28000	4.45
7000	2.14	28500	4.49
7500	2.22	29000	4.57
8000	2.29	29500	4.60
8500	2.36	30000	4.59
9000	2.43	30500	4.63
9500	2.50	31000	4.68
10000	2.58	31500	4.74
10500	2.63	32000	4.81
11000	2.70	32500	4.89
11500	2.76	33000	4.89
12000	2.82	33500	4.92
12500	2.87	34000	4.94
13000	2.94	34500	4.99
13500	3.00	35000	5.07
14000	3.06	35500	5.12
14500	3.11	36000	5.14
15000	3.17	36500	5.22
15500	3.23	37000	5.28
16000	3.29	37500	5.30
16500	3.35	38000	5.39
17000	3.41	38500	5.48
17500	3.47	39000	5.44
18000	3.51	39500	5.45
18500	3.56	40000	5.51
19000	3.60		
19500	3.66		
20000	3.71		

13 APPENDIX F Abbreviations and acronyms

A	ampere
AC	alternating current
A/m	ampere per meter
AM	amplitude modulation
AVRG	average (detector)
BB	broad band
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μV)	decibel referred to one microvolt
dB(μV/m)	decibel referred to one microvolt per meter
dB(μA)	decibel referred to one microampere
dBΩ	decibel referred to one Ohm
DC	direct current
EIRP	equivalent isotropically radiated power
ERP	effective radiated power
EUT	equipment under test
F	frequency
GHz	gigahertz
GND	ground
H	height
HL	Hermon laboratories
Hz	hertz
ITE	information technology equipment
k	kilo
kHz	kilohertz
LISN	line impedance stabilization network
LO	local oscillator
m	meter
MHz	megahertz
min	minute
mm	millimeter
ms	millisecond
μs	microsecond
NA	not applicable
NB	narrow band
NT	not tested
OATS	open area test site
Ω	Ohm
QP	quasi-peak
PM	pulse modulation
PS	power supply
RE	radiated emission
RF	radio frequency
rms	root mean square
Rx	receive
s	second
T	temperature
Tx	transmit
V	volt
VA	volt-ampere

END OF DOCUMENT