HERMON LABORATORIES

ELECTRICAL TESTING
0839.01

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TEST REPORT

ACCORDING TO: FCC 47CFR part 27

FOR:

Airspan Networks Inc.
EUT: LTE Mobile Digital Station
Model: AirUnity 587(B41HL) BH (B41HL_B25)
FCC ID:PIDAU587ENB25

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 Mobile Digital Station
Product type:	Transceiver
Model(s):	AirUnity 587(B41HL) BH (B41HL_B25)
Serial number:	DA0B246D4808
Hardware version:	B0
Software release:	6_11_2_73
Receipt date	06-May-18

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:	30996
Location:	Hermon Laboratories Ltd. P.O. Box 23, Binyamina 3055001, Israel
Test started:	23-May-18
Test completed:	27-May-18
Test specification(s):	FCC 47CFR part 27

5 Tests summary

Test	Status
Transmitter characteristics	
Section 2.1049, Occupied bandwidth	Pass
Section 27.50(h), Peak output power at RF antenna connector	Pass
Section 2.1091, 27.52, RF safety	Pass, exhibit provided in Application for certification
Section 27.53(m)(2), Spurious emissions at RF antenna connector	Pass
Section 27.53(m)(2), Band edge emissions at RF antenna connector	Pass
Section 27.53(m)(2), Radiated spurious emissions	Pass
Section 27.54, 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.

This test report supersedes the previously issued test report identified by Doc ID:AIRRAD_FCC.30996.

	Name and Title	Date	Signature
Tested by:	Mr. S. Samokha, test engineer Mr. A. Morozov, test engineer	May 27, 2018	
Reviewed by:	Mrs. Y. Rapin, technical writer	May 31, 2018	
Approved by:	Mr. M. Nikishin, EMC and radio group manager	June 6, 2018	

6 EUT description

6.1 General information

The EUT, Mobile Digital station “AirUnity 587(B41HL) BH (B41HL_B25)”, is a user station, part of a LTE broadband Mobile cellular wireless access system. The AirUnity 587 has 2 sectors, one sector transmitting indoor side and the second sector transmitting outdoor side. The system provides a radio link between an end-user (a subscriber) and a network to give high-speed data access. The AirUnity’s transceiver/receiver (Up to 64 QAM modulation, data rate up to 95 Mbps) equipped with a 10.5 dBi external antenna. The maximum total RF output power is 26.92 dBm for the outdoor sector (not including antenna gain) and it can be reduced by software.
The AirUnity 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.

6.2 Ports and lines

Port Type	Port description	Connected from	Connected to	Qty.	Cable type	Cable length, m
Power	AC power	EUT	AC mains	1	Unshielded	3
Signal	USB	EUT	Disk on key	2	Unshielded	2
Signal*	Serial*	Not connected	Not connected	1	NA	NA

*for maintenance only

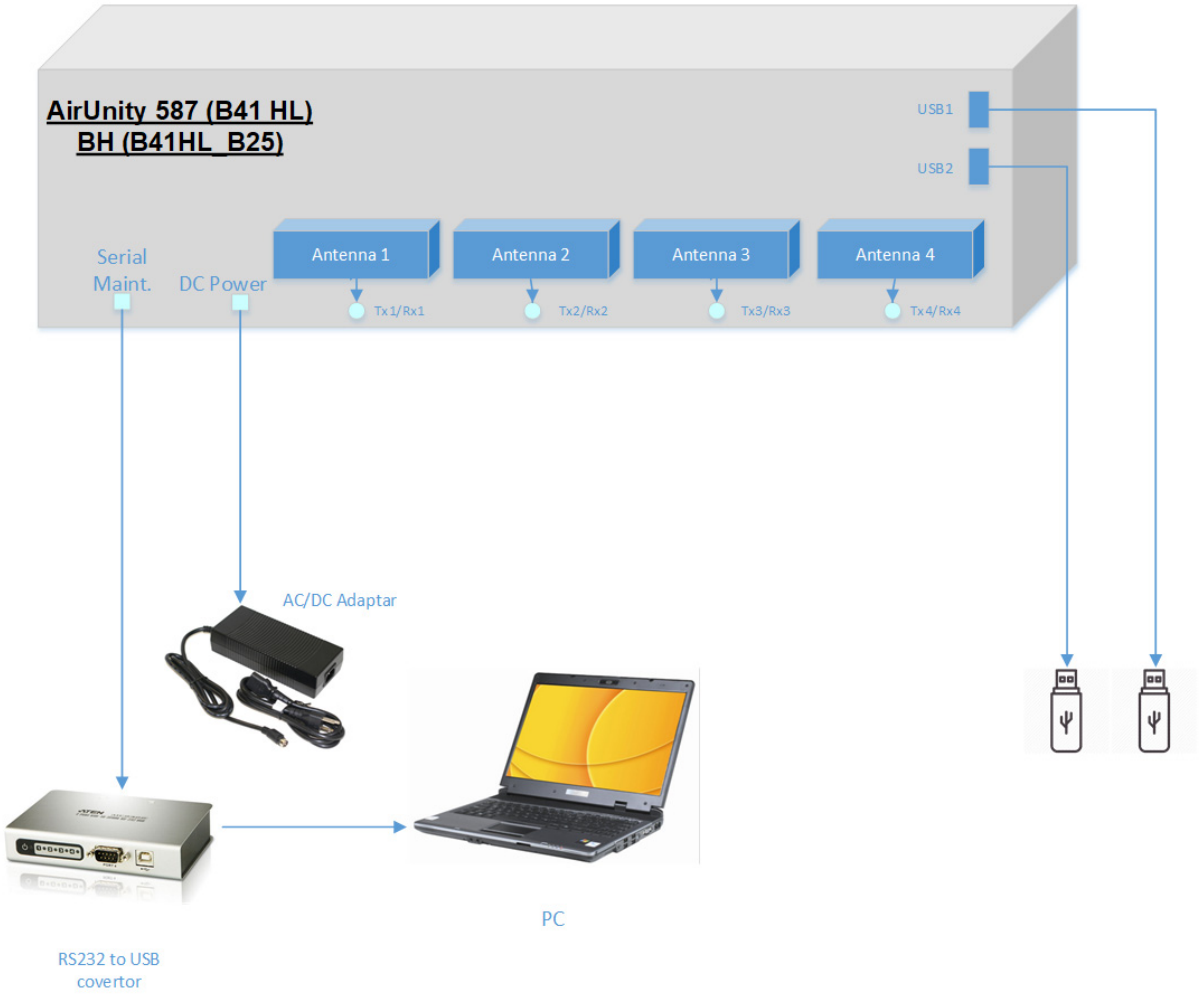
6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
Laptop	Dell	E7450	8TYRP32
USB to RS-232 Adapter	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	2496.0 – 2690.0 MHz
Operating frequency (full bands)	2501.0 – 2685.0 MHz
RF channel spacing	10 MHz, 20 MHz
Maximum rated output power	At transmitter 50 Ω RF output connector (aggregate power of both RF chains): 26.92 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	26.92 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
Internal	ALPHA Wireless Ltd	AW 3646-1-R2	10.5 dBi
Internal	ALPHA Wireless Ltd	AW 3646-3-R1	10.5 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	95.0

Type of multiplexing	TDD
Modulating test signal (baseband)	PRBS
Maximum transmitter duty cycle in normal use	74.28%

Transmitter power source					
V	DC	**Nominal rated voltage**	12 VDC	Battery type	
	DC	**Nominal rated voltage**			
	AC mains	**Nominal rated voltage**		Frequency	

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

Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	23-May-18		
Temperature: 28 ºC	Relative Humidity: 49 %	Air Pressure: 1008 hPa	Power: 12 VDC
Remarks:			

7 Transmitter tests according to 47CFR part 27

7.1 Occupied bandwidth test

7.1.1 General

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in Table 7.1.1.

Table 7.1.1 Occupied bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points*, %	Maximum allowed bandwidth, kHz
2496.0 – 2690.0 MHz	99%	NA

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

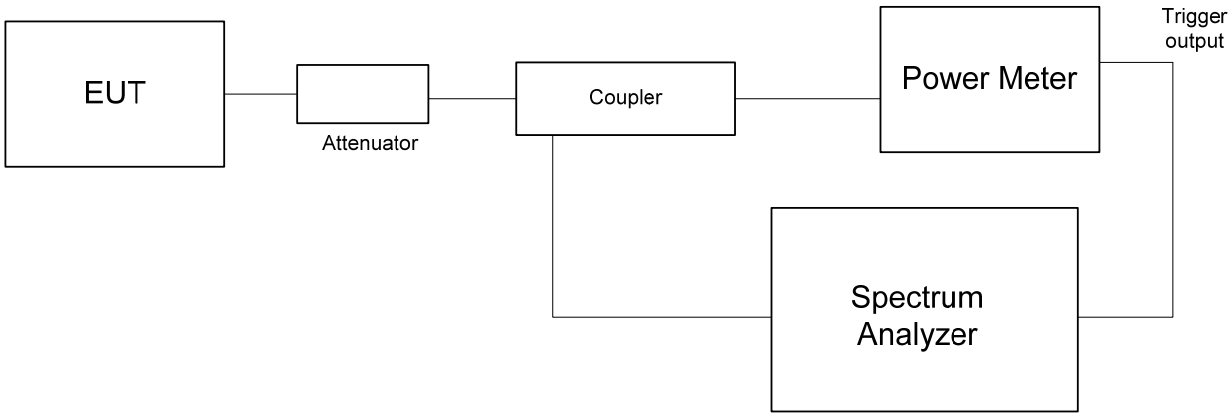
7.1.2 Test procedure

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

7.1.2.2 The EUT was set to transmit the normal modulated signal and actual channel width was measured at the 26 dBc modulation envelope reference points.

7.1.2.3 The transmitter occupied bandwidth was measured with spectrum analyzer as a frequency delta between the reference points on modulation envelope and provided in Table 7.1.2, Table 7.1.3 and the associated plots.

Figure 7.1.1 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):	23-May-18		
Temperature: 28 ºC	Relative Humidity: 49 %	Air Pressure: 1008 hPa	Power: 12 VDC
Remarks:			

Table 7.1.2 Occupied bandwidth test results for 10 MHz EBW

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 300 kHz (1-5% of OBW)
VIDEO BANDWIDTH: 3000 kHz
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc

Carrier frequency, MHz	Occupied bandwidth, chain #12, kHz	Occupied bandwidth, chain #22, kHz	Limit, kHz	Margin, kHz	Verdict
MODULATION: QPSK					
2506.0	9960.0	9860.0	NA	NA	NA
2624.0	9922.5	9878.8	NA	NA	NA
2680.0	9866.3	9810.0	NA	NA	NA
MODULATION: 16QAM					
2506.0	9960.0	9978.8	NA	NA	NA
2624.0	9910.0	9860.0	NA	NA	NA
2680.0	9885.0	9935.0	NA	NA	NA
MODULATION: 64QAM					
2506.0	9791.3	9753.8	NA	NA	NA
2624.0	9797.6	9785.1	NA	NA	NA
2680.0	9816.3	9803.8	NA	NA	NA

Table 7.1.3 Occupied bandwidth test results for 20 MHz EBW

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 300 kHz (1-5% of OBW)
VIDEO BANDWIDTH: 3000 kHz
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc

Carrier frequency, MHz	Occupied bandwidth, chain #12, kHz	Occupied bandwidth, chain #22, kHz	Limit, kHz	Margin, kHz	Verdict
MODULATION: QPSK					
2506.0	19199.0	19255.0	NA	NA	NA
2624.0	19131.0	19188.0	NA	NA	NA
2680.0	19165.0	19030.0	NA	NA	NA
MODULATION: 16QAM					
2506.0	19210.0	19244.0	NA	NA	NA
2624.0	19120.0	18997.0	NA	NA	NA
2680.0	19188.0	19221.0	NA	NA	NA
MODULATION: 64QAM					
2506.0	19165.0	19064.0	NA	NA	NA
2624.0	19019.0	19064.0	NA	NA	NA
2680.0	19109.0	18963.0	NA	NA	NA

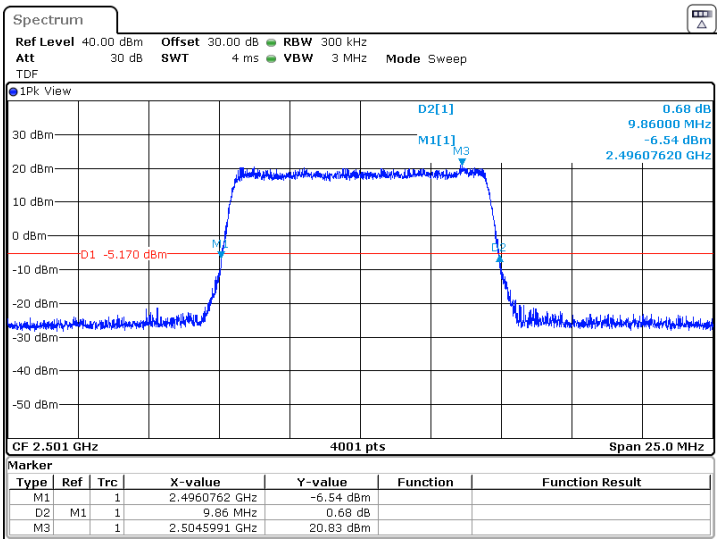
Reference numbers of test equipment used

HL 3903	HL 4355						

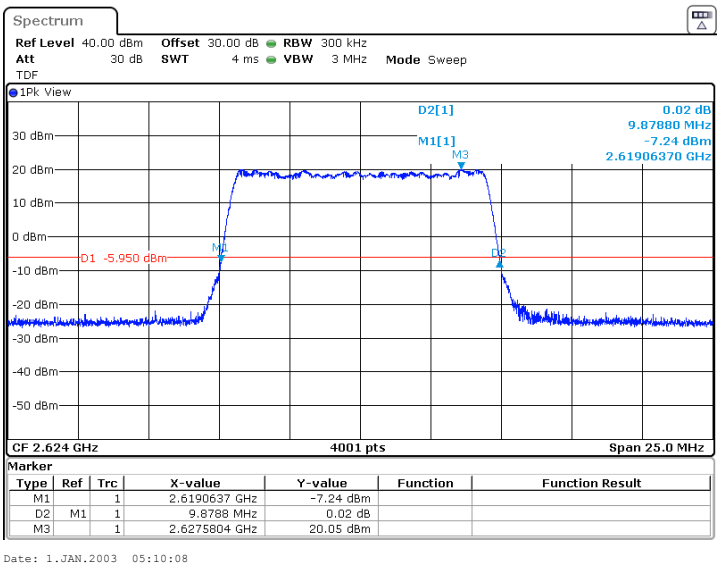
Full description is given in Appendix A.

Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	23-May-18		
Temperature: 28 ºC	Relative Humidity: 49 %	Air Pressure: 1008 hPa	Power: 12 VDC
Remarks:			

Plot 7.1.1 Occupied bandwidth test result at low frequency, 10 MHz EBW, QPSK, RF chain #22

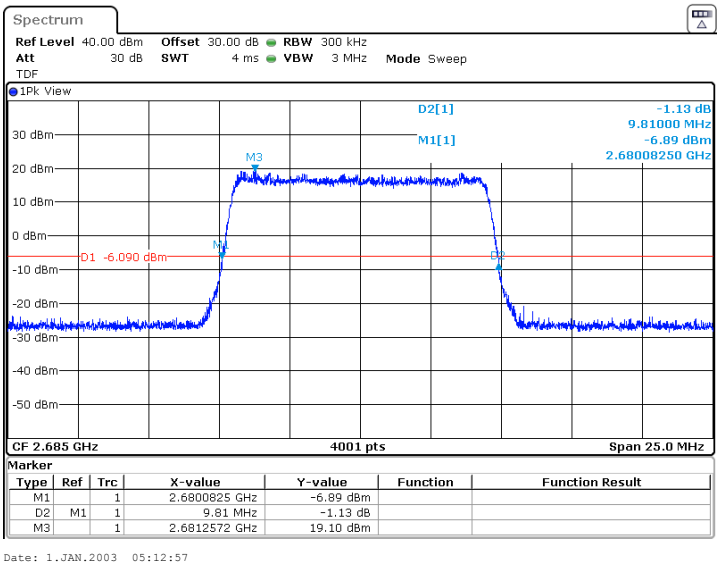


Plot 7.1.2 Occupied bandwidth test result at mid frequency, 10 MHz EBW, QPSK, RF chain #22

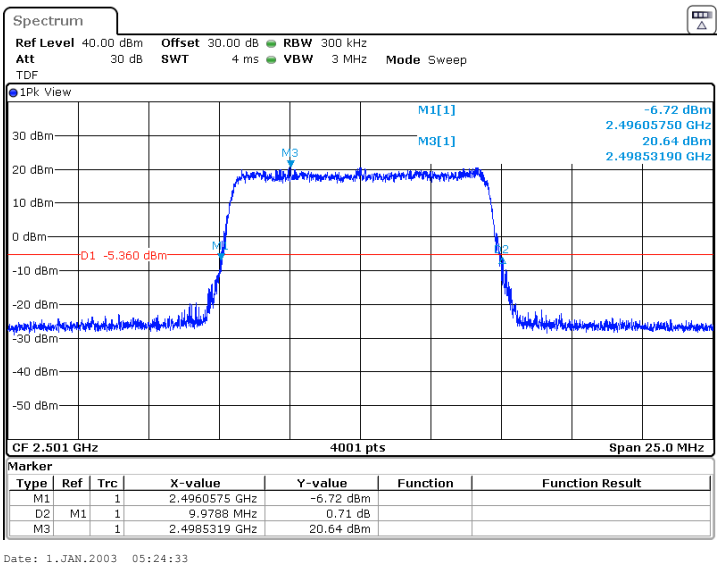


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	23-May-18		
Temperature: 28 ºC	Relative Humidity: 49 %	Air Pressure: 1008 hPa	Power: 12 VDC
Remarks:			

Plot 7.1.3 Occupied bandwidth test result at high frequency, 10 MHz EBW, QPSK, RF chain #22

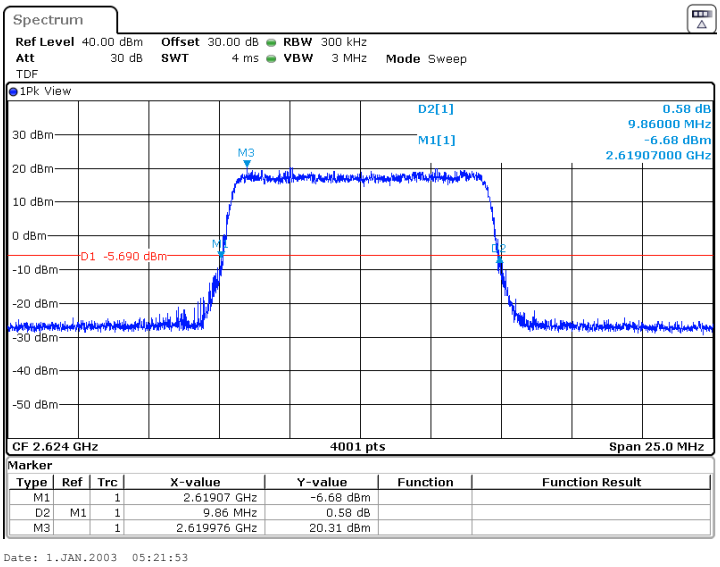


Plot 7.1.4 Occupied bandwidth test result at low frequency, 10 MHz EBW, 16QAM, RF chain #22

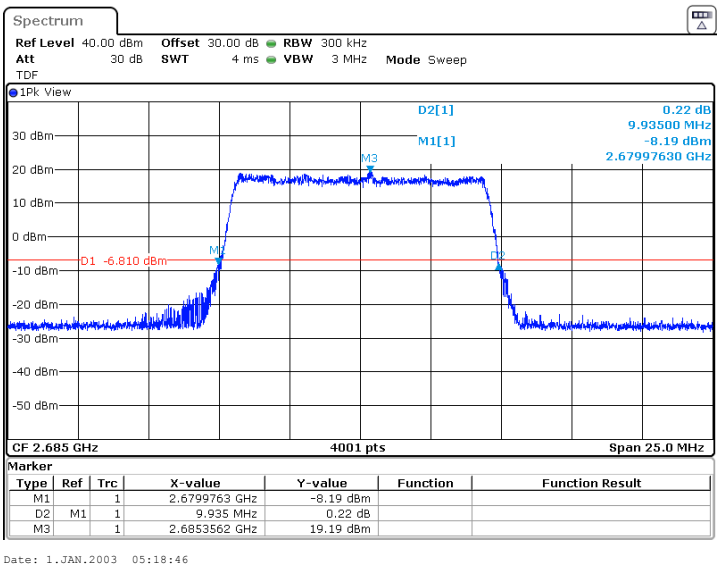


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	23-May-18		
Temperature: 28 ºC	Relative Humidity: 49 %	Air Pressure: 1008 hPa	Power: 12 VDC
Remarks:			

Plot 7.1.5 Occupied bandwidth test result at mid frequency, 10 MHz EBW, 16QAM, RF chain #22

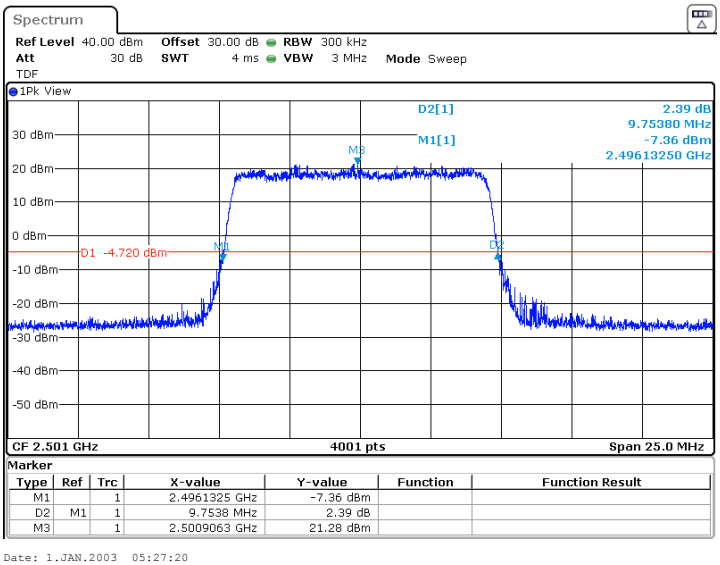


Plot 7.1.6 Occupied bandwidth test result at high frequency, 10 MHz EBW, 16QAM, RF chain #22

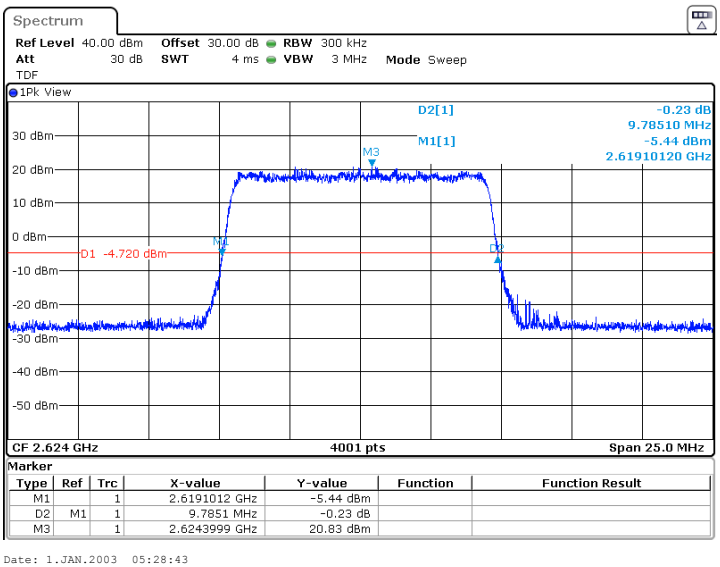


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	23-May-18		
Temperature: 28 ºC	Relative Humidity: 49 %	Air Pressure: 1008 hPa	Power: 12 VDC
Remarks:			

Plot 7.1.7 Occupied bandwidth test result at low frequency, 10 MHz EBW, 64QAM, RF chain #22

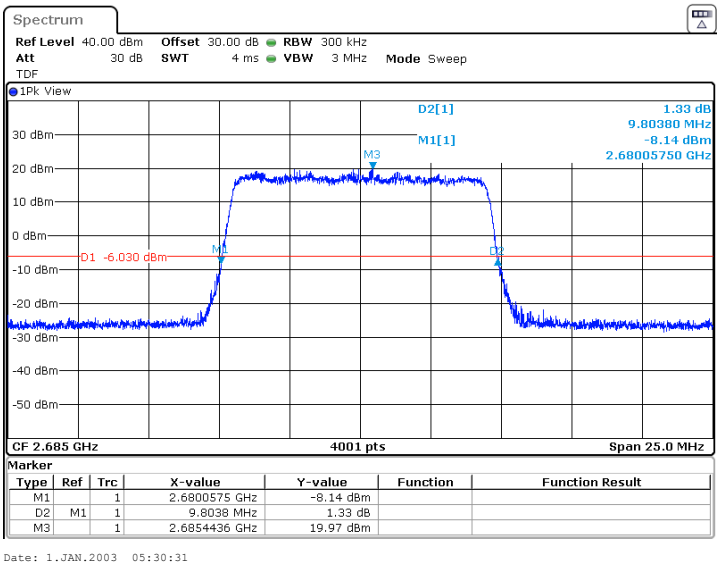


Plot 7.1.8 Occupied bandwidth test result at mid frequency, 10 MHz EBW, 64QAM, RF chain #22

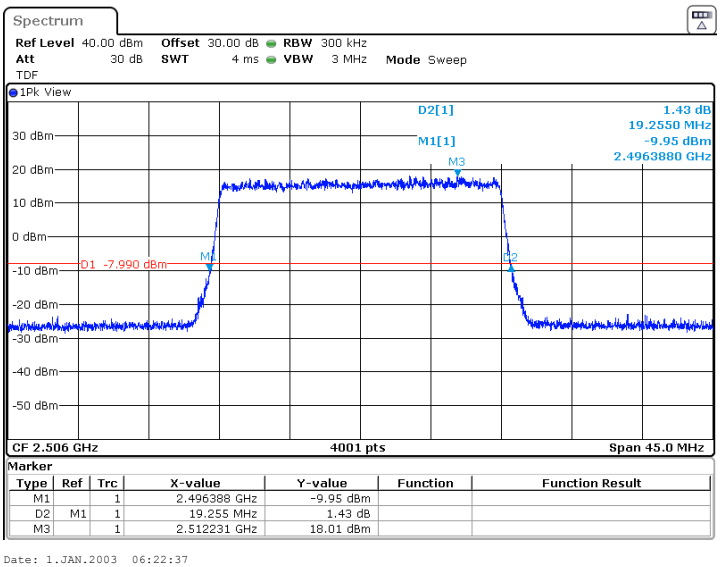


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	23-May-18		
Temperature: 28 ºC	Relative Humidity: 49 %	Air Pressure: 1008 hPa	Power: 12 VDC
Remarks:			

Plot 7.1.9 Occupied bandwidth test result at high frequency, 10 MHz EBW, 64QAM, RF chain #22

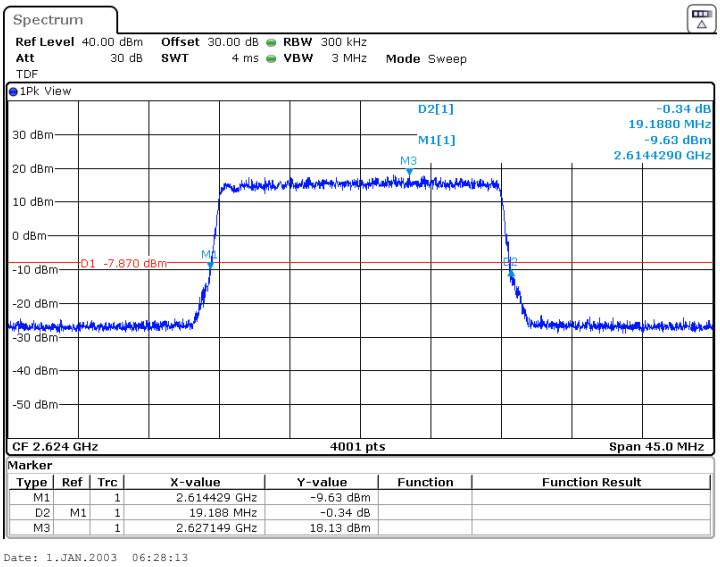


Plot 7.1.10 Occupied bandwidth test result at low frequency, 20 MHz EBW, QPSK, RF chain #22

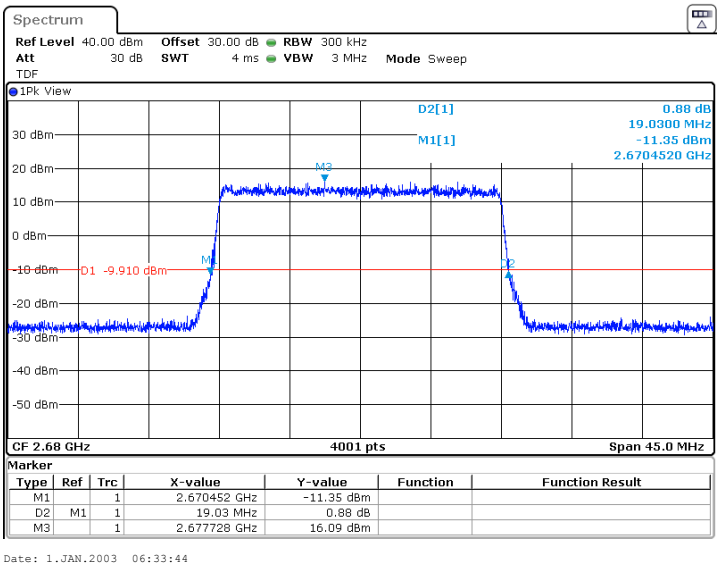


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	23-May-18		
Temperature: 28 ºC	Relative Humidity: 49 %	Air Pressure: 1008 hPa	Power: 12 VDC
Remarks:			

Plot 7.1.11 Occupied bandwidth test result at mid frequency, 20 MHz EBW, QPSK, RF chain #22

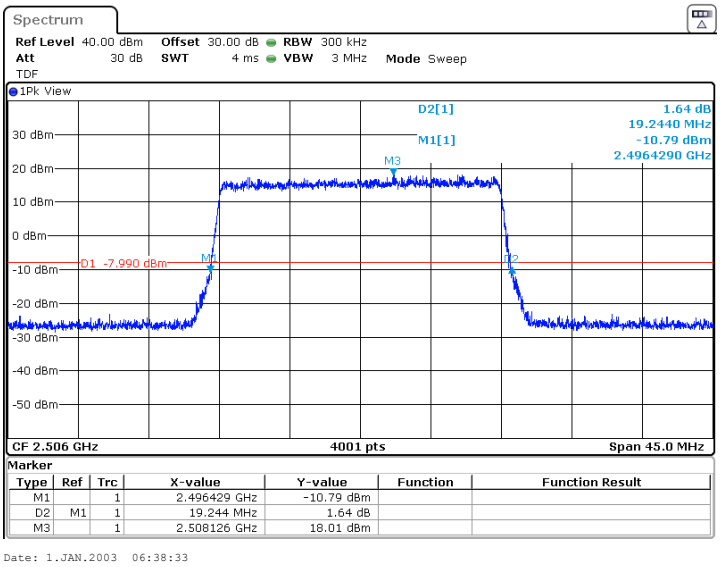


Plot 7.1.12 Occupied bandwidth test result at high frequency, 20 MHz EBW, QPSK, RF chain #22

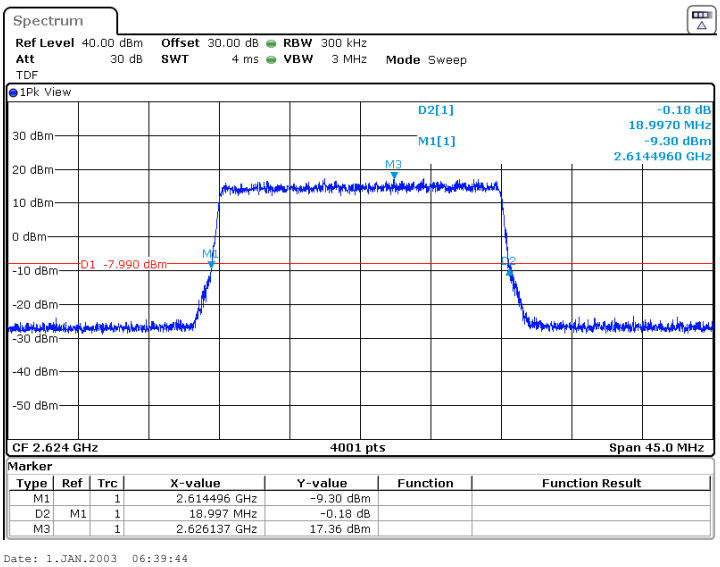


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	23-May-18		
Temperature: 28 ºC	Relative Humidity: 49 %	Air Pressure: 1008 hPa	Power: 12 VDC
Remarks:			

Plot 7.1.13 Occupied bandwidth test result at low frequency, 20 MHz EBW, 16QAM, RF chain #22

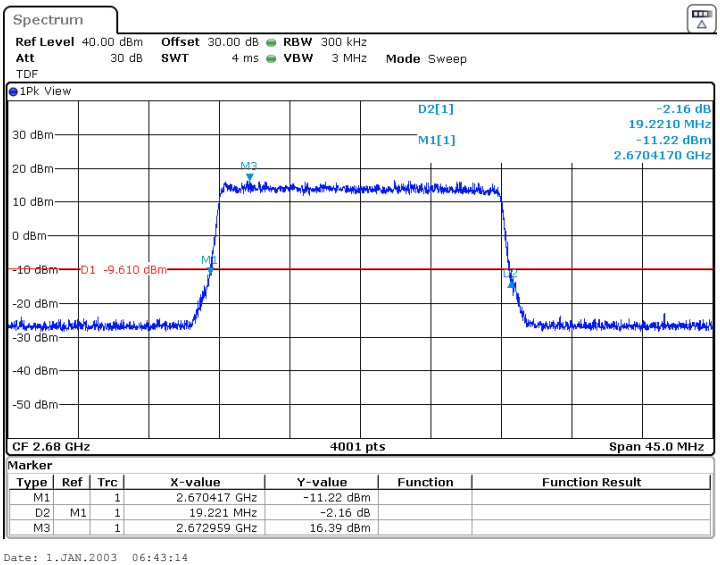


Plot 7.1.14 Occupied bandwidth test result at mid frequency, 20 MHz EBW, 16QAM, RF chain #22

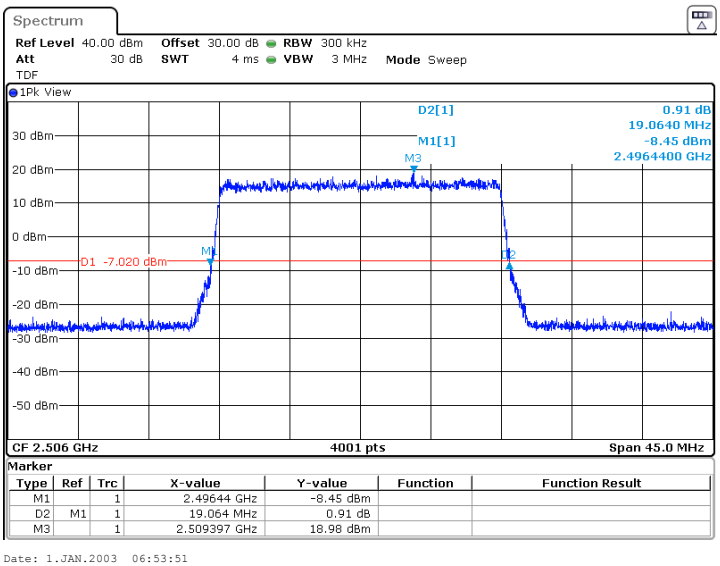


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	23-May-18		
Temperature: 28 ºC	Relative Humidity: 49 %	Air Pressure: 1008 hPa	Power: 12 VDC
Remarks:			

Plot 7.1.15 Occupied bandwidth test result at high frequency, 20 MHz EBW, 16QAM, RF chain #22

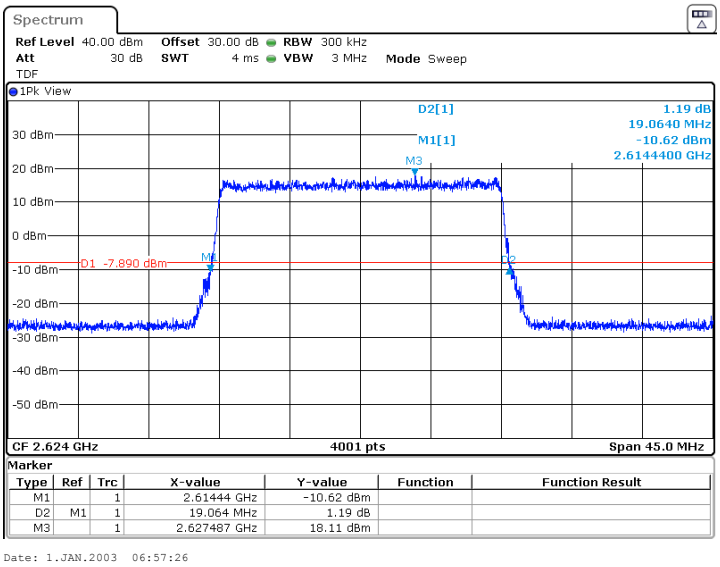


Plot 7.1.16 Occupied bandwidth test result at low frequency, 20 MHz EBW, 64QAM, RF chain #22

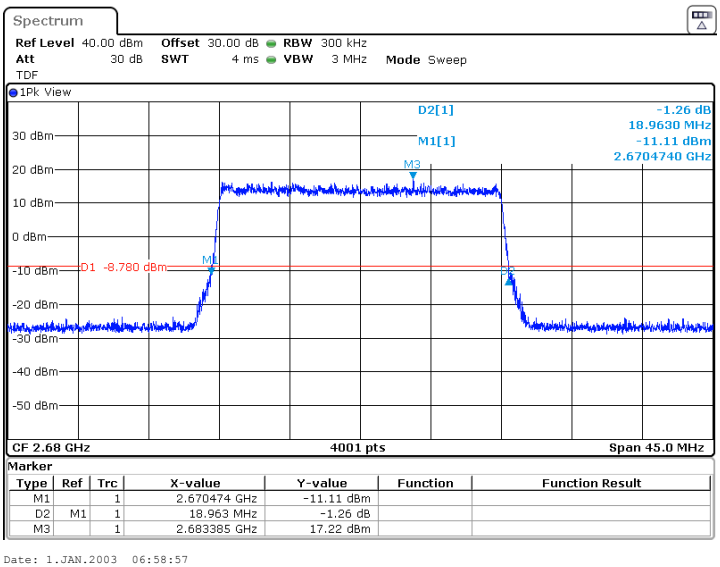


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	23-May-18		
Temperature: 28 ºC	Relative Humidity: 49 %	Air Pressure: 1008 hPa	Power: 12 VDC
Remarks:			

Plot 7.1.17 Occupied bandwidth test result at mid frequency, 20 MHz EBW, 64QAM, RF chain #22

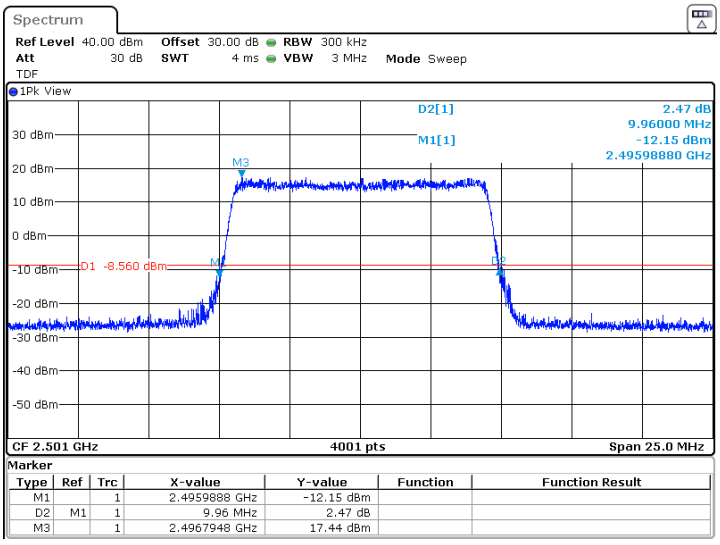


Plot 7.1.18 Occupied bandwidth test result at high frequency, 20 MHz EBW, 64QAM, RF chain #22

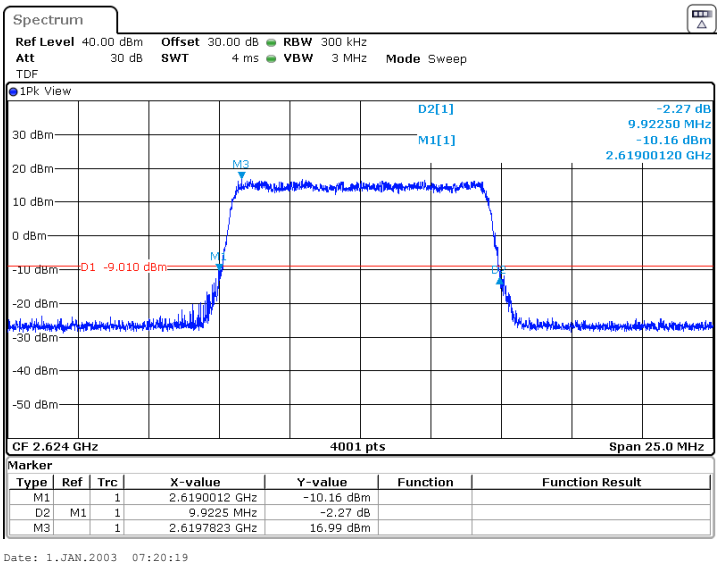


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	23-May-18		
Temperature: 28 ºC	Relative Humidity: 49 %	Air Pressure: 1008 hPa	Power: 12 VDC
Remarks:			

Plot 7.1.19 Occupied bandwidth test result at low frequency, 10 MHz EBW, QPSK, RF chain #12

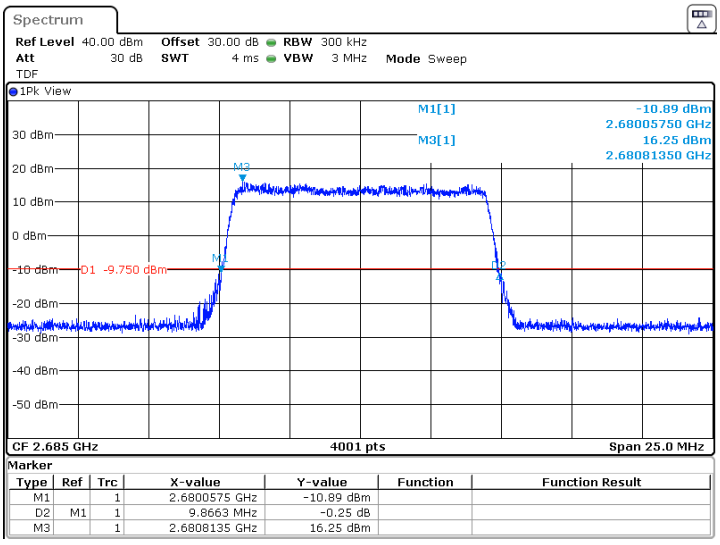


Plot 7.1.20 Occupied bandwidth test result at mid frequency, 10 MHz EBW, QPSK, RF chain #12

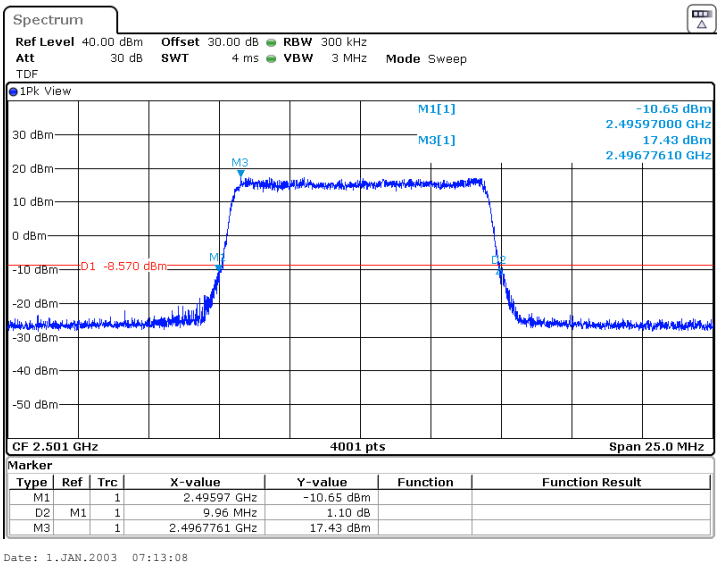


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	23-May-18		
Temperature: 28 ºC	Relative Humidity: 49 %	Air Pressure: 1008 hPa	Power: 12 VDC
Remarks:			

Plot 7.1.21 Occupied bandwidth test result at high frequency, 10 MHz EBW, QPSK, RF chain #12

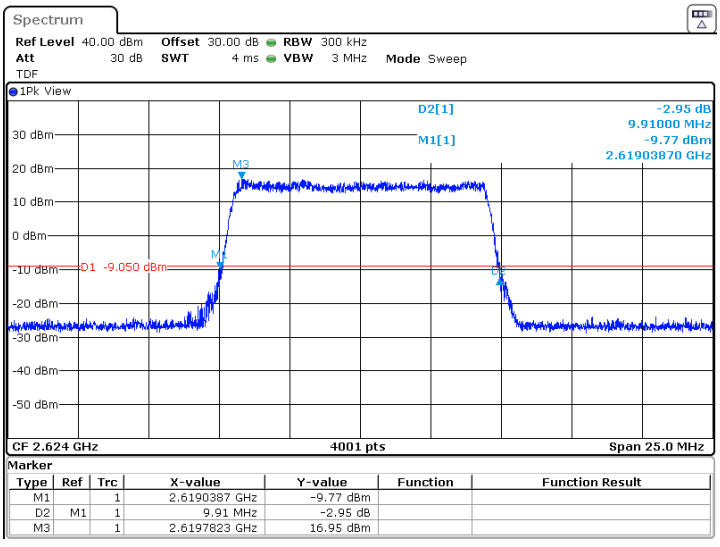


Plot 7.1.22 Occupied bandwidth test result at low frequency, 10 MHz EBW, 16QAM, RF chain #12

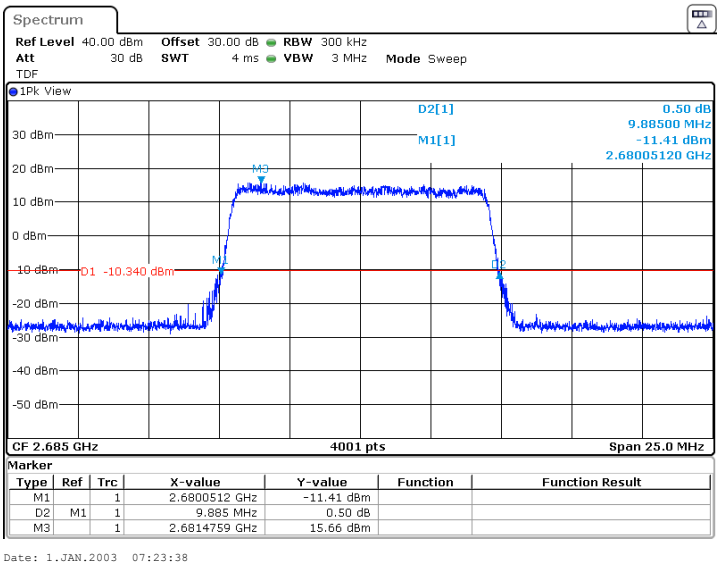


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	23-May-18		
Temperature: 28 ºC	Relative Humidity: 49 %	Air Pressure: 1008 hPa	Power: 12 VDC
Remarks:			

Plot 7.1.23 Occupied bandwidth test result at mid frequency, 10 MHz EBW, 16QAM, RF chain #12

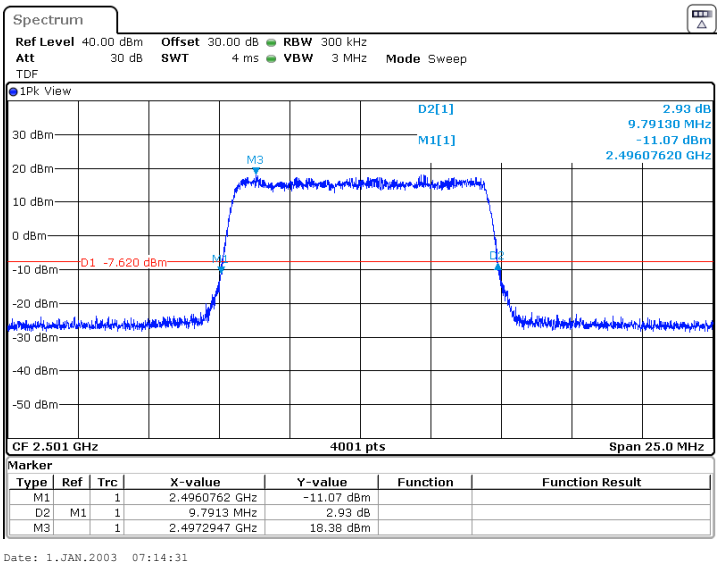


Plot 7.1.24 Occupied bandwidth test result at high frequency, 10 MHz EBW, 16QAM, RF chain #12

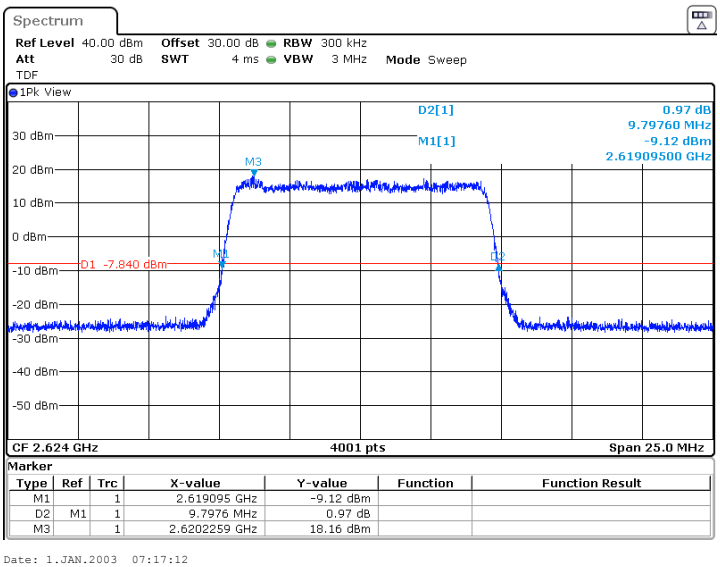


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	23-May-18		
Temperature: 28 ºC	Relative Humidity: 49 %	Air Pressure: 1008 hPa	Power: 12 VDC
Remarks:			

Plot 7.1.25 Occupied bandwidth test result at low frequency, 10 MHz EBW, 64QAM, RF chain #12

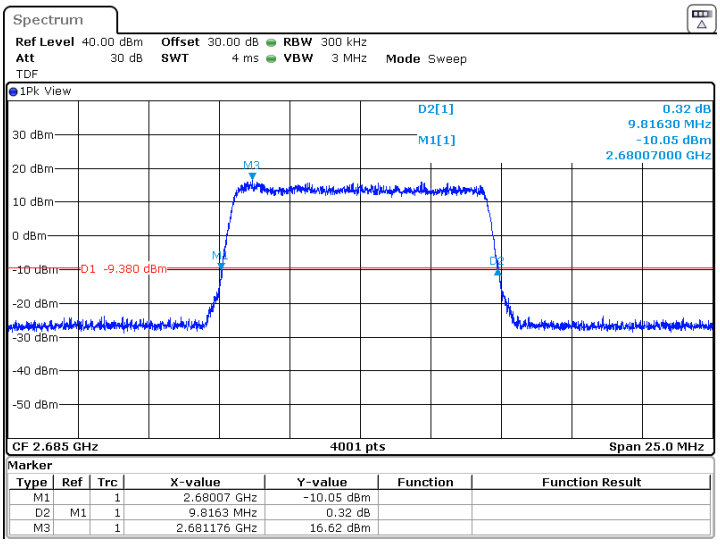


Plot 7.1.26 Occupied bandwidth test result at mid frequency, 10 MHz EBW, 64QAM, RF chain #12

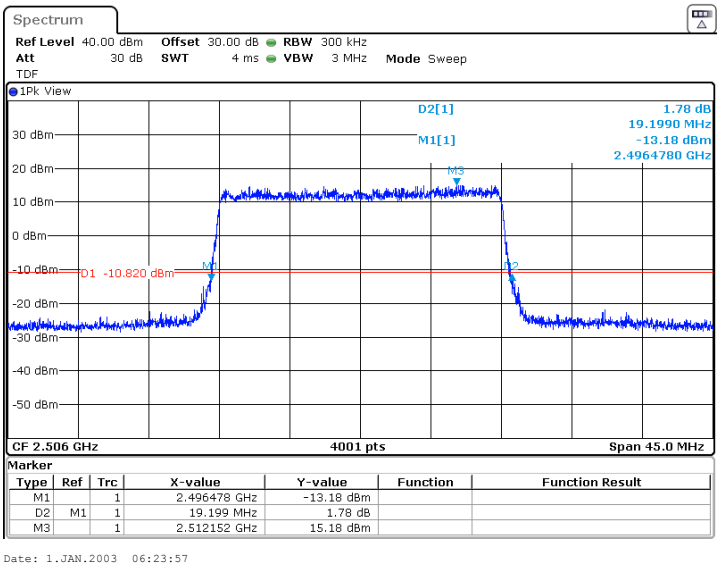


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	23-May-18		
Temperature: 28 ºC	Relative Humidity: 49 %	Air Pressure: 1008 hPa	Power: 12 VDC
Remarks:			

Plot 7.1.27 Occupied bandwidth test result at high frequency, 10 MHz EBW, 64QAM, RF chain #12

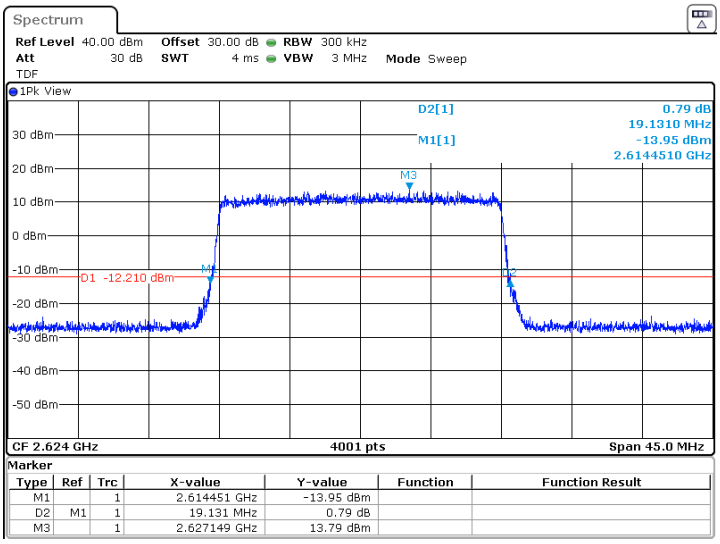


Plot 7.1.28 Occupied bandwidth test result at low frequency, 20 MHz EBW, QPSK, RF chain #12

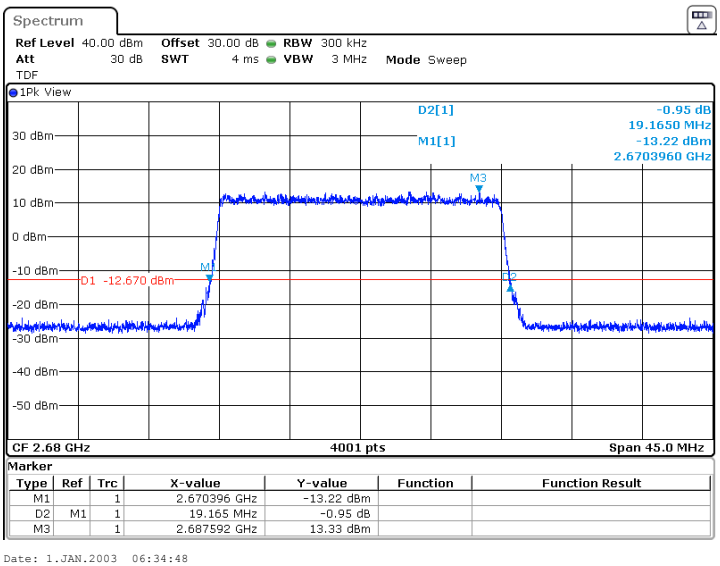


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	23-May-18		
Temperature: 28 ºC	Relative Humidity: 49 %	Air Pressure: 1008 hPa	Power: 12 VDC
Remarks:			

Plot 7.1.29 Occupied bandwidth test result at mid frequency, 20 MHz EBW, QPSK, RF chain #12

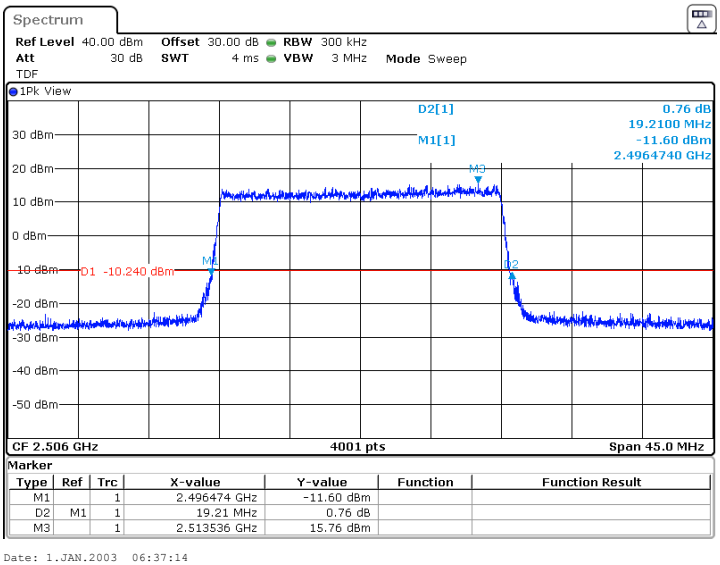


Plot 7.1.30 Occupied bandwidth test result at high frequency, 20 MHz EBW, QPSK, RF chain #12

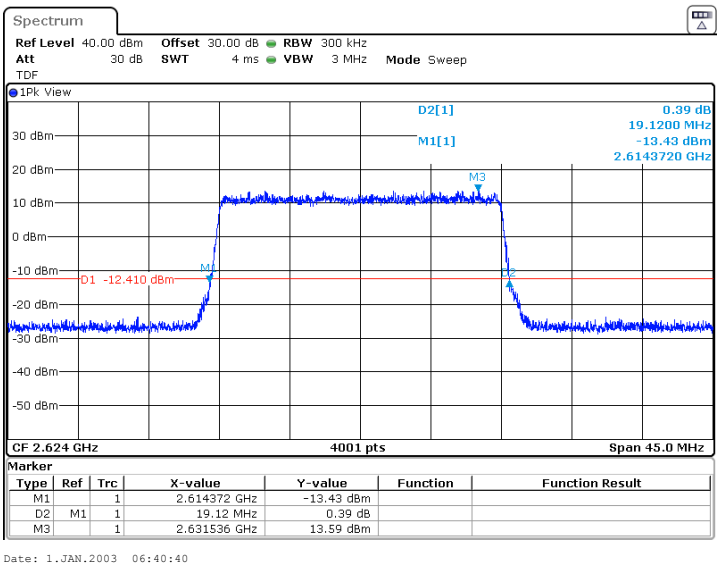


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	23-May-18		
Temperature: 28 ºC	Relative Humidity: 49 %	Air Pressure: 1008 hPa	Power: 12 VDC
Remarks:			

Plot 7.1.31 Occupied bandwidth test result at low frequency, 20 MHz EBW, 16QAM, RF chain #12

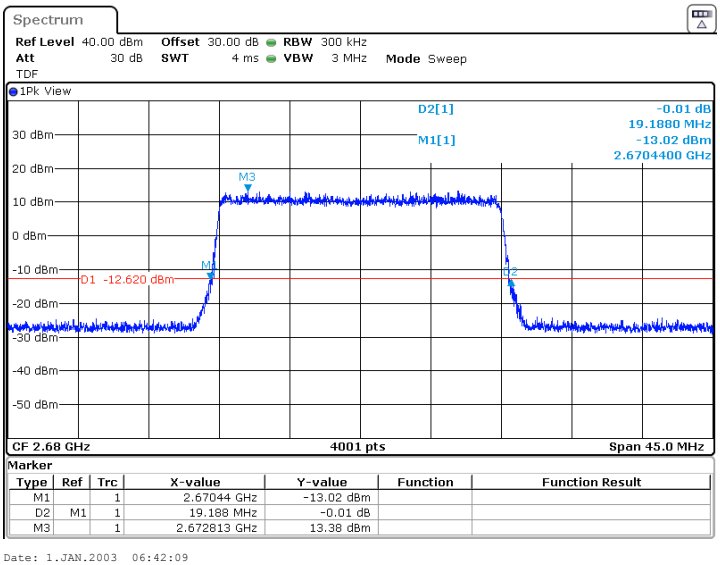


Plot 7.1.32 Occupied bandwidth test result at mid frequency, 20 MHz EBW, 16QAM, RF chain #12

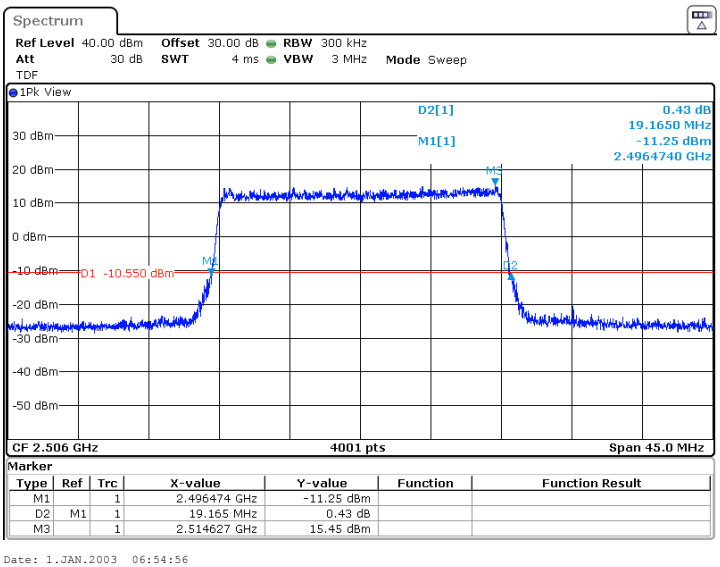


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	23-May-18		
Temperature: 28 ºC	Relative Humidity: 49 %	Air Pressure: 1008 hPa	Power: 12 VDC
Remarks:			

Plot 7.1.33 Occupied bandwidth test result at high frequency, 20 MHz EBW, 16QAM, RF chain #12

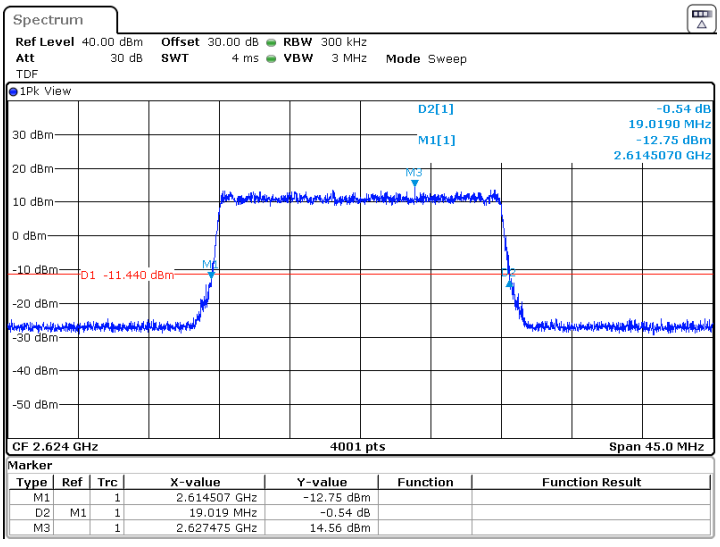


Plot 7.1.34 Occupied bandwidth test result at low frequency, 20 MHz EBW, 64QAM, RF chain #12

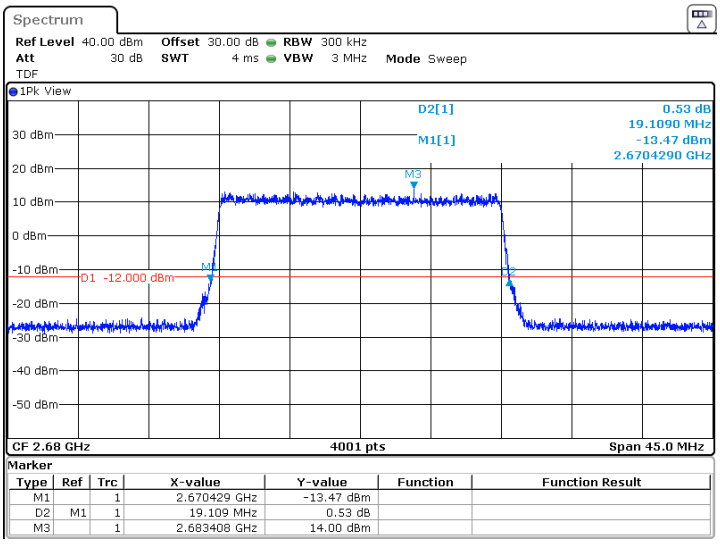


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	23-May-18		
Temperature: 28 ºC	Relative Humidity: 49 %	Air Pressure: 1008 hPa	Power: 12 VDC
Remarks:			

Plot 7.1.35 Occupied bandwidth test result at mid frequency, 20 MHz EBW, 64QAM, RF chain #12



Plot 7.1.36 Occupied bandwidth test result at high frequency, 20 MHz EBW, 64QAM, RF chain #12



Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-E, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	23-May-18		
Temperature: 28 ºC	Relative Humidity: 49 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

7.2 Peak output power test

7.2.1 General

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

Table 7.2.1 Peak output power limits

Transmitter type	Assigned frequency range, MHz	Maximum peak output power,	
		W	dBm
Mobile stations	2496 – 2690	2.0	33.0

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 output power was measured with power meter as provided in Table 7.2.2.

Figure 7.2.1 Peak output power test setup

Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-E, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	23-May-18		
Temperature: 28 ºC	Relative Humidity: 49 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Table 7.2.2 Peak output power test results for 10 MHz EBW

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
TEST METHOD: Wideband power meter
DETECTOR USED: Average within Tx burst
MODULATING SIGNAL: PRBS
DEDICATED ANTENNA GAIN: 10.5 dBi
ANTENNA CHAINS: 2 sectors of two Tx chains

Channel, MHz	Pmeas #11, dBm	Pmeas #12, dBm	Total output power #1*, dBm	Pmeas #21, dBm	Pmeas #22, dBm	Total output power #2**, dBm	Limit, dBm	Margin***, dB	Verdict
MODULATION: QPSK									
2501.00	21.16	21.31	24.25	23.85	23.95	26.91	33.00	-6.09	Pass
2624.00	20.62	20.69	23.67	23.36	23.61	26.50	33.00	-6.50	Pass
2685.00	20.60	20.84	23.73	23.17	23.37	26.28	33.00	-6.72	Pass
MODULATION: 16QAM									
2501.00	20.89	21.47	24.20	23.72	23.98	26.86	33.00	-6.14	Pass
2624.00	20.43	20.32	23.39	23.84	23.61	26.74	33.00	-6.26	Pass
2685.00	20.58	20.47	23.54	23.41	23.31	26.37	33.00	-6.63	Pass
MODULATION: 64QAM									
2501.00	20.93	21.27	24.11	23.61	23.98	26.81	33.00	-6.19	Pass
2624.00	20.48	20.42	23.46	23.88	23.51	26.71	33.00	-6.29	Pass
2685.00	20.50	20.46	23.49	23.25	23.43	26.35	33.00	-6.65	Pass

* - Total output power #1, dBm = 10*log[10^(Pmeas #11 /10) + 10^(Pmeas #12 /10)]
** - Total output power #2, dBm = 10*log[10^(Pmeas #21 /10) + 10^(Pmeas #22 /10)]
*** - Margin, dB = Total output power (#1 or #2 which is the higher) - Limit

Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-E, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	23-May-18		
Temperature: 28 ºC	Relative Humidity: 49 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Table 7.2.3 Peak output power test results for 20 MHz EBW

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
TEST METHOD: Wideband power meter
DETECTOR USED: Average within Tx burst
MODULATING SIGNAL: PRBS
DEDICATED ANTENNA GAIN: 10.5 dBi
ANTENNA CHAINS: 2 sectors of two Tx chains

Channel, MHz	Pmeas #11, dBm	Pmeas #12, dBm	Total output power #1*, dBm	Pmeas #21, dBm	Pmeas #22, dBm	Total output power #2**, dBm	Limit, dBm	Margin***, dB	Verdict
MODULATION: QPSK									
2506.00	20.97	21.36	24.18	23.81	23.51	26.67	33.00	-6.33	Pass
2624.00	20.83	20.57	23.71	23.72	23.96	26.85	33.00	-6.15	Pass
2680.00	20.11	20.68	23.41	23.32	23.86	26.61	33.00	-6.39	Pass
MODULATION: 16QAM									
2506.00	21.20	21.30	24.26	23.89	23.50	26.71	33.00	-6.29	Pass
2624.00	20.43	20.97	23.72	23.84	23.93	26.90	33.00	-6.10	Pass
2680.00	20.16	20.54	23.36	23.55	23.14	26.36	33.00	-6.64	Pass
MODULATION: 64QAM									
2506.00	21.36	21.32	24.35	23.78	23.92	26.86	33.00	-6.14	Pass
2624.00	20.45	20.69	23.58	23.88	23.93	26.92	33.00	-6.08	Pass
2680.00	20.38	20.85	23.63	23.64	23.04	26.36	33.00	-6.64	Pass

* - Total output power #1, dBm = 10*log[10^(Pmeas #11 /10) + 10^(Pmeas #12 /10)]
** - Total output power #2, dBm = 10*log[10^(Pmeas #21 /10) + 10^(Pmeas #22 /10)]
*** - Margin, dB = Total output power (#1 or #2 which is the higher) - Limit

Reference numbers of test equipment used

HL 3301							

Full description is given in Appendix A.

Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

7.3 Band edge emissions at RF connector test

7.3.1 General

This test was performed to measure spurious emissions at the channel edge at the RF antenna connector. Specification test limits are given in Table 7.3.1.

Table 7.3.1 Spurious emission limits at band edges

For operation in 2496 – 2690 MHz, mobile digital station with 10 MHz EBW

Channel, MHz	Frequency range, MHz	RBW, kHz	Attenuation below carrier, dBc	Limit, dBm
2496.0 – 2507.5	Below 2490.5	1000	55+ 10*Log (P*)	-25.0
	2490.5 -2495.0	1000	43+ 10*Log (P*)	-13.0
	2495.0 – 2496.0	200	43+ 10*Log (P*)	-13.0
	2507.5 – 2508.5	200	40+ 10*Log (P*)	-10.0
	2508.5 – 2512.5	1000	40+ 10*Log (P*)	-10.0
	2512.5 – 2513.5	1000	43+ 10*Log (P*)	-13.0
	Above 2513.5	1000	55+ 10*Log (P*)	-25.0
2618.0 – 2629.5	Below 2612.0	1000	55+ 10*Log (P*)	-25.0
	2612.0 – 2613.0	1000	43+ 10*Log (P*)	-13.0
	2613.0 – 2617.0	1000	40+ 10*Log (P*)	-10.0
	2617.0 – 2618.0	200	40+ 10*Log (P*)	-10.0
	2629.5 – 2630.5	200	40+ 10*Log (P*)	-10.0
	2630.5 – 2634.5	1000	40+ 10*Log (P*)	-10.0
	2634.5 – 2635.5	1000	43+ 10*Log (P*)	-13.0
	Above 2635.5	1000	55+ 10*Log (P*)	-25.0
2679.0 – 2690.0	Below 2673.0	1000	55+ 10*Log (P*)	-25.0
	2673.0 – 2674.0	1000	43+ 10*Log (P*)	-13.0
	2674.0 – 2678.0	1000	40+ 10*Log (P*)	-10.0
	2678.0 – 2679.0	200	40+ 10*Log (P*)	-10.0
	2690.0 – 2691.0	200	40+ 10*Log (P*)	-10.0
	2691.0 – 2695.0	1000	40+ 10*Log (P*)	-10.0
	2695.0 – 2696.0	1000	43+ 10*Log (P*)	-13.0
	Above 2696.0	1000	55+ 10*Log (P*)	-25.0

* - P is transmitter output power in Watts

For operation in 2496 – 2690 MHz, mobile digital station with 20 MHz EBW

Channel, MHz	Frequency range	RBW, kHz	Attenuation below carrier, dBc	Limit, dBm
2496.0 – 2518.5	Below 2490.5	1000	55+ 10*Log (P*)	-25.0
	2490.5 -2495.0	1000	43+ 10*Log (P*)	-13.0
	2495.0 – 2496.0	500	43+ 10*Log (P*)	-13.0
	2518.5 – 2519.5	500	40+ 10*Log (P*)	-10.0
	2519.5 – 2523.5	1000	40+ 10*Log (P*)	-10.0
	2523.5 – 2524.5	1000	43+ 10*Log (P*)	-13.0
	Above 2524.5	1000	55+ 10*Log (P*)	-25.0
2614.0 – 2635.0	Below 2609.0	1000	55+ 10*Log (P*)	-25.0
	2608.0 – 2609.0	1000	43+ 10*Log (P*)	-13.0
	2609.0 – 2613.0	1000	40+ 10*Log (P*)	-10.0
	2613.0 – 2614.0	500	40+ 10*Log (P*)	-10.0
	2635.0 – 2636.0	500	40+ 10*Log (P*)	-10.0
	2636.0 – 2639.0	1000	40+ 10*Log (P*)	-10.0
	2639.0 – 2640.0	1000	43+ 10*Log (P*)	-13.0
	Above 2640.0	1000	55+ 10*Log (P*)	-25.0
2668.0 – 2690.0	Below 2658.0	1000	55+ 10*Log (P*)	-25.0
	2658.0 – 2659.0	1000	43+ 10*Log (P*)	-13.0
	2659.0 – 2667.0	1000	40+ 10*Log (P*)	-10.0
	2667.0 – 2668.0	500	40+ 10*Log (P*)	-10.0
	2690.0 – 2691.0	500	40+ 10*Log (P*)	-10.0
	2691.0 – 2695.0	1000	40+ 10*Log (P*)	-10.0
	2695.0 – 2696.0	1000	43+ 10*Log (P*)	-13.0
	Above 2696.0	1000	55+ 10*Log (P*)	-25.0

* - P is transmitter output power in Watts

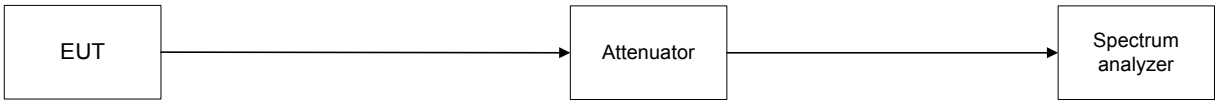
Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

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 spurious emission was measured with spectrum analyzer and the results were recorded in Table 7.3.2 and shown in the associated plots.

Figure 7.3.1 Spurious emission test setup for single output



Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Table 7.3.2 Spurious emission at the low band edge test results

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average (gated)
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 10 MHz
NUMBER OF ANTENNAS: 2
ANTENNA PORT: #11

Frequency MHz	Band edge	SA reading over 1 chain, dBm	Total band edge*, dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
QPSK							
Low frequency 2501.0 MHz							
2496.00	Low	-36.65	-33.65	200	NA	-13.0	Pass
2490.00	Low	-40.14	-37.14	1000	NA	-25.0	
2495.00	Low	-25.36	-22.36	1000	NA	-13.0	
2507.50	High	-40.00	-37.00	200	NA	-10.0	
2508.50	High	-35.75	-32.75	1000	NA	-10.0	
2513.50	High	-40.03	-37.03	1000	NA	-25.0	
Mid frequency 2624.0 MHz							
2618.00	Low	-44.72	-41.72	200	NA	-10.0	Pass
2617.00	Low	-37.65	-34.65	1000	NA	-10.0	
2612.00	Low	-40.96	-37.96	1000	NA	-25.0	
2629.50	High	-41.96	-38.96	200	NA	-10.0	
2630.50	High	-36.96	-33.96	1000	NA	-10.0	
2635.50	High	-40.73	-37.73	1000	NA	-25.0	
High frequency 2685.0 MHz							
2679.00	Low	-43.11	-40.11	200	NA	-10.0	Pass
2678.00	Low	-38.05	-35.05	1000	NA	-10.0	
2673.00	Low	-39.76	-36.76	1000	NA	-25.0	
2690.00	High	-39.00	-36.00	200	NA	-10.0	
2691.00	High	-27.66	-24.66	1000	NA	-10.0	
2696.00	High	-40.50	-37.50	1000	NA	-25.0	
16QAM							
Low frequency 2501.0 MHz							
2496.00	Low	-35.80	-32.80	200	NA	-13.0	Pass
2490.00	Low	-40.55	-37.55	1000	NA	-25.0	
2495.00	Low	-24.58	-21.58	1000	NA	-13.0	
2507.50	High	-42.74	-39.74	200	NA	-10.0	
2508.50	High	-35.45	-32.45	1000	NA	-10.0	
2513.50	High	-39.87	-36.87	1000	NA	-25.0	
Mid frequency 2624.0 MHz							
2618.00	Low	-44.98	-41.98	200	NA	-10.0	Pass
2617.00	Low	-40.16	-37.16	1000	NA	-10.0	
2612.00	Low	-41.20	-38.20	1000	NA	-25.0	
2629.50	High	-42.34	-39.34	200	NA	-10.0	
2630.50	High	-37.87	-34.87	1000	NA	-10.0	
2635.50	High	-40.94	-37.94	1000	NA	-25.0	
High frequency 2685.0 MHz							
2679.00	Low	-43.29	-40.29	200	NA	-10.0	Pass
2678.00	Low	-38.84	-35.84	1000	NA	-10.0	
2673.00	Low	-40.39	-37.39	1000	NA	-25.0	
2690.00	High	-38.45	-35.45	200	NA	-10.0	
2691.00	High	-27.03	-24.03	1000	NA	-10.0	
2696.00	High	-40.50	-37.50	1000	NA	-25.0	

*- Total band edge, dBm = SA Reading band edge, dBm + 10*log(N) = SA Reading band edge, dBm + 3 dB

Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Table 7.3.2 Spurious emission at the low band edge test results (continued)

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average (gated)
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 10 MHz
NUMBER OF ANTENNAS: 2
ANTENNA PORT: #11

Frequency MHz	Band edge	SA reading over 1 chain, dBm	Total band edge*, dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
64QAM							
Low frequency 2501.0 MHz							
2496.00	Low	-36.61	-33.61	200	NA	-13.0	Pass
2490.00	Low	-40.30	-37.30	1000	NA	-25.0	
2495.00	Low	-24.79	-21.79	1000	NA	-13.0	
2507.50	High	-40.40	-37.40	200	NA	-10.0	
2508.50	High	-36.25	-33.25	1000	NA	-10.0	
2513.50	High	-40.60	-37.60	1000	NA	-25.0	
Mid frequency 2624.0 MHz							
2618.00	Low	-43.46	-40.46	200	NA	-10.0	Pass
2617.00	Low	-39.95	-36.95	1000	NA	-10.0	
2612.00	Low	-40.82	-37.82	1000	NA	-25.0	
2629.50	High	-45.63	-42.63	200	NA	-10.0	
2630.50	High	-38.67	-35.67	1000	NA	-10.0	
2635.50	High	-40.45	-37.45	1000	NA	-25.0	
High frequency 2685.0 MHz							
2679.00	Low	-45.85	-42.85	200	NA	-10.0	Pass
2678.00	Low	-38.49	-35.49	1000	NA	-10.0	
2673.00	Low	-40.03	-37.03	1000	NA	-25.0	
2690.00	High	-41.05	-38.05	200	NA	-10.0	
2691.00	High	-29.12	-26.12	1000	NA	-10.0	
2696.00	High	-40.94	-37.94	1000	NA	-25.0	

*- Total band edge, dBm = SA Reading band edge, dBm + 10*log(N) = SA Reading band edge, dBm + 3 dB

Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Table 7.3.3 Spurious emission at the low band edge test results

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average (gated)
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 20 MHz
NUMBER OF ANTENNAS: 2
ANTENNA PORT: #11

Frequency MHz	Band edge	SA reading over 1 chain, dBm	Total band edge*, dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
QPSK							
Low frequency 2506.0 MHz							
2496.00	Low	-31.96	-28.96	500	NA	-13.0	Pass
2490.00	Low	-37.95	-34.95	1000	NA	-25.0	
2495.00	Low	-32.26	-29.26	1000	NA	-13.0	
2518.50	High	-34.63	-31.63	500	NA	-10.0	
2519.50	High	-32.08	-29.08	1000	NA	-10.0	
2524.50	High	-34.95	-31.95	1000	NA	-25.0	
Mid frequency 2624.0 MHz							
2614.00	Low	-34.53	-31.53	500	NA	-10.0	Pass
2613.00	Low	-37.58	-34.58	1000	NA	-10.0	
2608.00	Low	-40.31	-37.31	1000	NA	-25.0	
2635.00	High	-41.25	-38.25	500	NA	-10.0	
2636.00	High	-38.34	-35.34	1000	NA	-10.0	
2641.00	High	-40.38	-37.38	1000	NA	-25.0	
High frequency 2680.0 MHz							
2668.00	Low	-43.32	-40.32	500	NA	-10.0	Pass
2667.00	Low	-40.42	-37.42	1000	NA	-10.0	
2662.00	Low	-40.27	-37.27	1000	NA	-25.0	
2690.00	High	-36.50	-33.50	500	NA	-10.0	
2691.00	High	-37.68	-34.68	1000	NA	-10.0	
2696.00	High	-39.45	-36.45	1000	NA	-25.0	
16QAM							
Low frequency 2506.0 MHz							
2496.00	Low	-31.55	-28.55	500	NA	-13.0	Pass
2490.00	Low	-37.11	-34.11	1000	NA	-25.0	
2495.00	Low	-32.09	-29.09	1000	NA	-13.0	
2518.50	High	-34.97	-31.97	500	NA	-10.0	
2519.50	High	-31.84	-28.84	1000	NA	-10.0	
2524.50	High	-34.49	-31.49	1000	NA	-25.0	
Mid frequency 2624.0 MHz							
2614.00	Low	-34.97	-31.97	500	NA	-10.0	Pass
2613.00	Low	-38.02	-35.02	1000	NA	-10.0	
2608.00	Low	-39.67	-36.67	1000	NA	-25.0	
2635.00	High	-40.13	-37.13	500	NA	-10.0	
2636.00	High	-38.64	-35.64	1000	NA	-10.0	
2641.00	High	-39.34	-36.34	1000	NA	-25.0	
High frequency 2680.0 MHz							
2668.00	Low	-42.21	-39.21	500	NA	-10.0	Pass
2667.00	Low	-40.96	-37.96	1000	NA	-10.0	
2662.00	Low	-41.22	-38.22	1000	NA	-25.0	
2690.00	High	-36.42	-33.42	500	NA	-10.0	
2691.00	High	-38.18	-35.18	1000	NA	-10.0	
2696.00	High	-40.08	-37.08	1000	NA	-25.0	

*- Total band edge, dBm = SA Reading band edge, dBm + 10*log(N) = SA Reading band edge, dBm + 3 dB

Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Table 7.3.3 Spurious emission at the low band edge test results (continued)

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average (gated)
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 20 MHz
NUMBER OF ANTENNAS: 2
ANTENNA PORT: #11

Frequency MHz	Band edge	SA reading over 1 chain, dBm	Total band edge*, dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
64QAM							
Low frequency 2506.0 MHz							
2496.00	Low	-32.01	-29.01	500	NA	-13.0	Pass
2490.00	Low	-37.28	-34.28	1000	NA	-25.0	
2495.00	Low	-32.34	-29.34	1000	NA	-13.0	
2518.50	High	-35.53	-32.53	500	NA	-10.0	
2519.50	High	-33.08	-30.08	1000	NA	-10.0	
2524.50	High	-34.24	-31.24	1000	NA	-25.0	
Mid frequency 2624.0 MHz							
2614.00	Low	-36.27	-33.27	500	NA	-10.0	Pass
2613.00	Low	-38.16	-35.16	1000	NA	-10.0	
2608.00	Low	-40.20	-37.20	1000	NA	-25.0	
2635.00	High	-41.73	-38.73	500	NA	-10.0	
2636.00	High	-39.30	-36.30	1000	NA	-10.0	
2641.00	High	-40.12	-37.12	1000	NA	-25.0	
High frequency 2680.0 MHz							
2668.00	Low	-43.39	-40.39	500	NA	-10.0	Pass
2667.00	Low	-40.22	-37.22	1000	NA	-10.0	
2662.00	Low	-40.49	-37.49	1000	NA	-25.0	
2690.00	High	-35.98	-32.98	500	NA	-10.0	
2691.00	High	-38.54	-35.54	1000	NA	-10.0	
2696.00	High	-39.53	-36.53	1000	NA	-25.0	

*- Total band edge, dBm = SA Reading band edge, dBm + 10*log(N) = SA Reading band edge, dBm + 3 dB

Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Table 7.3.4 Spurious emission at the low band edge test results

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average (gated)
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 10 MHz
NUMBER OF ANTENNAS: 2
ANTENNA PORT: #22

Frequency MHz	Band edge	SA reading over 1 chain, dBm	Total band edge*, dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
QPSK							
Low frequency 2501.0 MHz							
2496.00	Low	-37.65	-34.65	200	NA	-13.0	Pass
2490.00	Low	-40.62	-37.62	1000	NA	-25.0	
2495.00	Low	-22.18	-19.18	1000	NA	-13.0	
2507.50	High	-41.00	-38.00	200	NA	-10.0	
2508.50	High	-34.50	-31.50	1000	NA	-10.0	
2513.50	High	-39.13	-36.13	1000	NA	-25.0	
Mid frequency 2624.0 MHz							
2618.00	Low	-40.62	-37.62	200	NA	-10.0	Pass
2617.00	Low	-35.87	-32.87	1000	NA	-10.0	
2612.00	Low	-40.47	-37.47	1000	NA	-25.0	
2629.50	High	-39.46	-36.46	200	NA	-10.0	
2630.50	High	-34.69	-31.69	1000	NA	-10.0	
2635.50	High	-38.47	-35.47	1000	NA	-25.0	
High frequency 2685.0 MHz							
2679.00	Low	-44.43	-41.43	200	NA	-10.0	Pass
2678.00	Low	-38.61	-35.61	1000	NA	-10.0	
2673.00	Low	-41.51	-38.51	1000	NA	-25.0	
2690.00	High	-36.55	-33.55	200	NA	-10.0	
2691.00	High	-23.91	-20.91	1000	NA	-10.0	
2696.00	High	-39.22	-36.22	1000	NA	-25.0	
16QAM							
Low frequency 2501.0 MHz							
2496.00	Low	-33.37	-30.37	200	NA	-13.0	Pass
2490.00	Low	-38.70	-35.70	1000	NA	-25.0	
2495.00	Low	-21.10	-18.10	1000	NA	-13.0	
2507.50	High	-39.96	-36.96	200	NA	-10.0	
2508.50	High	-33.37	-30.37	1000	NA	-10.0	
2513.50	High	-38.45	-35.45	1000	NA	-25.0	
Mid frequency 2624.0 MHz							
2618.00	Low	-42.90	-39.90	200	NA	-10.0	Pass
2617.00	Low	-36.00	-33.00	1000	NA	-10.0	
2612.00	Low	-39.99	-36.99	1000	NA	-25.0	
2629.50	High	-40.96	-37.96	200	NA	-10.0	
2630.50	High	-36.81	-33.81	1000	NA	-10.0	
2635.50	High	-39.60	-36.60	1000	NA	-25.0	
High frequency 2685.0 MHz							
2679.00	Low	-44.24	-41.24	200	NA	-10.0	Pass
2678.00	Low	-35.71	-32.71	1000	NA	-10.0	
2673.00	Low	-40.42	-37.42	1000	NA	-25.0	
2690.00	High	-36.31	-33.31	200	NA	-10.0	
2691.00	High	-23.49	-20.49	1000	NA	-10.0	
2696.00	High	-39.03	-36.03	1000	NA	-25.0	

*- Total band edge, dBm = SA Reading band edge, dBm + 10*log(N) = SA Reading band edge, dBm + 3 dB

Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Table 7.3.4 Spurious emission at the low band edge test results (continued)

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average (gated)
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 10 MHz
NUMBER OF ANTENNAS: 2
ANTENNA PORT: #22

Frequency MHz	Band edge	SA reading over 1 chain, dBm	Total band edge*, dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
64QAM							
Low frequency 2501.0 MHz							
2496.00	Low	-33.00	-30.00	200	NA	-13.0	Pass
2490.00	Low	-37.36	-34.36	1000	NA	-25.0	
2495.00	Low	-22.35	-19.35	1000	NA	-13.0	
2507.50	High	-41.51	-38.51	200	NA	-10.0	
2508.50	High	-34.67	-31.67	1000	NA	-10.0	
2513.50	High	-39.30	-36.30	1000	NA	-25.0	
Mid frequency 2624.0 MHz							
2618.00	Low	-41.76	-38.76	200	NA	-10.0	Pass
2617.00	Low	-36.44	-33.44	1000	NA	-10.0	
2612.00	Low	-41.13	-38.13	1000	NA	-25.0	
2629.50	High	-41.82	-38.82	200	NA	-10.0	
2630.50	High	-35.34	-32.34	1000	NA	-10.0	
2635.50	High	-40.04	-37.04	1000	NA	-25.0	
High frequency 2685.0 MHz							
2679.00	Low	-41.53	-38.53	200	NA	-10.0	Pass
2678.00	Low	-35.84	-32.84	1000	NA	-10.0	
2673.00	Low	-39.73	-36.73	1000	NA	-25.0	
2690.00	High	-34.67	-31.67	200	NA	-10.0	
2691.00	High	-25.46	-22.46	1000	NA	-10.0	
2696.00	High	-38.45	-35.45	1000	NA	-25.0	

*- Total band edge, dBm = SA Reading band edge, dBm + 10*log(N) = SA Reading band edge, dBm + 3 dB

Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Table 7.3.5 Spurious emission at the low band edge test results

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average (gated)
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 20 MHz
NUMBER OF ANTENNAS: 2
ANTENNA PORT: #22

Frequency MHz	Band edge	SA reading over 1 chain, dBm	Total band edge*, dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
QPSK							
Low frequency 2506.0 MHz							
2496.00	Low	-31.73	-28.73	500	NA	-13.0	Pass
2490.00	Low	-40.58	-37.58	1000	NA	-25.0	
2495.00	Low	-34.69	-31.69	1000	NA	-13.0	
2518.50	High	-36.88	-33.88	500	NA	-10.0	
2519.50	High	-34.68	-31.68	1000	NA	-10.0	
2524.50	High	-36.03	-33.03	1000	NA	-25.0	
Mid frequency 2624.0 MHz							
2614.00	Low	-32.28	-29.28	500	NA	-10.0	Pass
2613.00	Low	-36.68	-33.68	1000	NA	-10.0	
2608.00	Low	-40.19	-37.19	1000	NA	-25.0	
2635.00	High	-41.08	-38.08	500	NA	-10.0	
2636.00	High	-38.17	-35.17	1000	NA	-10.0	
2641.00	High	-37.48	-34.48	1000	NA	-25.0	
High frequency 2680.0 MHz							
2668.00	Low	-40.61	-37.61	500	NA	-10.0	Pass
2667.00	Low	-37.76	-34.76	1000	NA	-10.0	
2662.00	Low	-39.60	-36.60	1000	NA	-25.0	
2690.00	High	-35.30	-32.30	500	NA	-10.0	
2691.00	High	-36.32	-33.32	1000	NA	-10.0	
2696.00	High	-39.35	-36.35	1000	NA	-25.0	
16QAM							
Low frequency 2506.0 MHz							
2496.00	Low	-31.99	-28.99	500	NA	-13.0	Pass
2490.00	Low	-40.28	-37.28	1000	NA	-25.0	
2495.00	Low	-34.48	-31.48	1000	NA	-13.0	
2518.50	High	-36.75	-33.75	500	NA	-10.0	
2519.50	High	-35.08	-32.08	1000	NA	-10.0	
2524.50	High	-36.32	-33.32	1000	NA	-25.0	
Mid frequency 2624.0 MHz							
2614.00	Low	-32.28	-29.28	500	NA	-10.0	Pass
2613.00	Low	-36.22	-33.22	1000	NA	-10.0	
2608.00	Low	-39.26	-36.26	1000	NA	-25.0	
2635.00	High	-37.86	-34.86	500	NA	-10.0	
2636.00	High	-35.89	-32.89	1000	NA	-10.0	
2641.00	High	-37.47	-34.47	1000	NA	-25.0	
High frequency 2680.0 MHz							
2668.00	Low	-40.79	-37.79	500	NA	-10.0	Pass
2667.00	Low	-39.64	-36.64	1000	NA	-10.0	
2662.00	Low	-40.58	-37.58	1000	NA	-25.0	
2690.00	High	-33.08	-30.08	500	NA	-10.0	
2691.00	High	-35.93	-32.93	1000	NA	-10.0	
2696.00	High	-38.74	-35.74	1000	NA	-25.0	

*- Total band edge, dBm = SA Reading band edge, dBm + 10*log(N) = SA Reading band edge, dBm + 3 dB

Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Table 7.3.5 Spurious emission at the low band edge test results (continued)

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average (gated)
VIDEO BANDWIDTH: ≥ Resolution bandwidth
EBW: 20 MHz
NUMBER OF ANTENNAS: 2
ANTENNA PORT: #22

Frequency MHz	Band edge	SA reading over 1 chain, dBm	Total band edge*, dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
64QAM							
Low frequency 2506.0 MHz							
2496.00	Low	-31.30	-28.30	500	NA	-13.0	Pass
2490.00	Low	-39.91	-36.91	1000	NA	-25.0	
2495.00	Low	-35.19	-32.19	1000	NA	-13.0	
2518.50	High	-38.72	-35.72	500	NA	-10.0	
2519.50	High	-35.75	-32.75	1000	NA	-10.0	
2524.50	High	-36.39	-33.39	1000	NA	-25.0	
Mid frequency 2624.0 MHz							
2614.00	Low	-33.91	-30.91	500	NA	-10.0	Pass
2613.00	Low	-36.65	-33.65	1000	NA	-10.0	
2608.00	Low	-39.38	-36.38	1000	NA	-25.0	
2635.00	High	-40.76	-37.76	500	NA	-10.0	
2636.00	High	-37.48	-34.48	1000	NA	-10.0	
2641.00	High	-38.09	-35.09	1000	NA	-25.0	
High frequency 2680.0 MHz							
2668.00	Low	-40.90	-37.90	500	NA	-10.0	Pass
2667.00	Low	-38.36	-35.36	1000	NA	-10.0	
2662.00	Low	-39.62	-36.62	1000	NA	-25.0	
2690.00	High	-38.23	-35.23	500	NA	-10.0	
2691.00	High	-37.48	-34.48	1000	NA	-10.0	
2696.00	High	-39.09	-36.09	1000	NA	-25.0	

*- Total band edge, dBm = SA Reading band edge, dBm + 10*log(N) = SA Reading band edge, dBm + 3 dB

Reference numbers of test equipment used

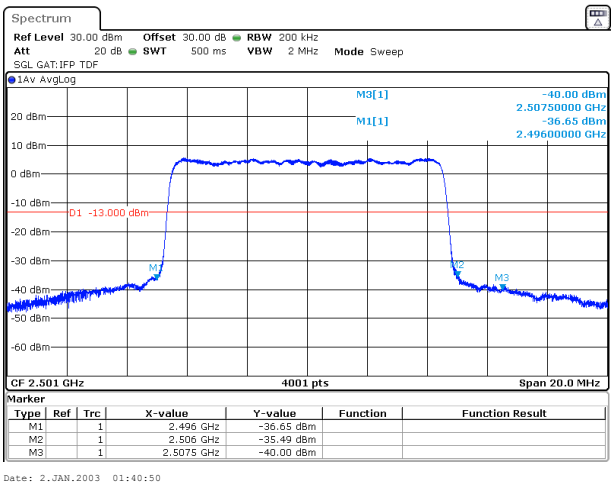
HL 3903	HL 4355						

Full description is given in Appendix A.

Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.3.1 Spurious emission at band edges test results at low carrier frequency

ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: QPSK
EBW: 10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #11



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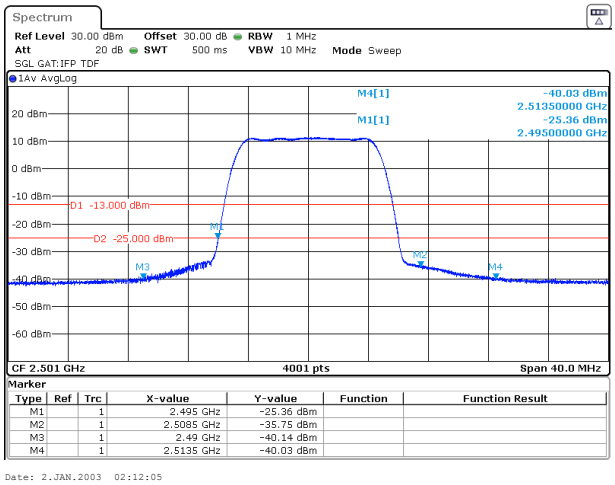

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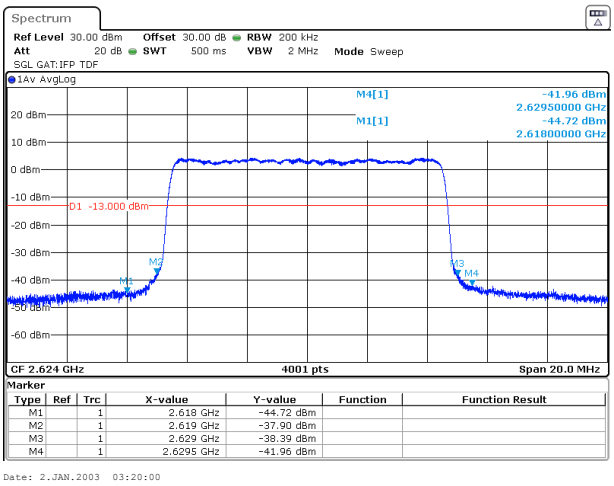
Plot 7.3.2 Spurious emission at band edges test results at mid carrier frequency

ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: QPSK
EBW: 10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #11



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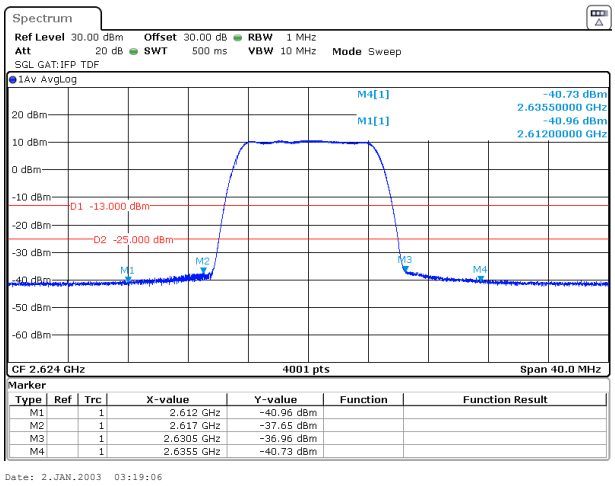
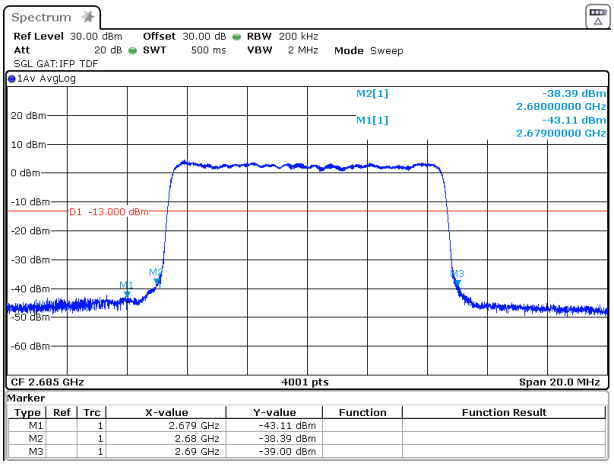


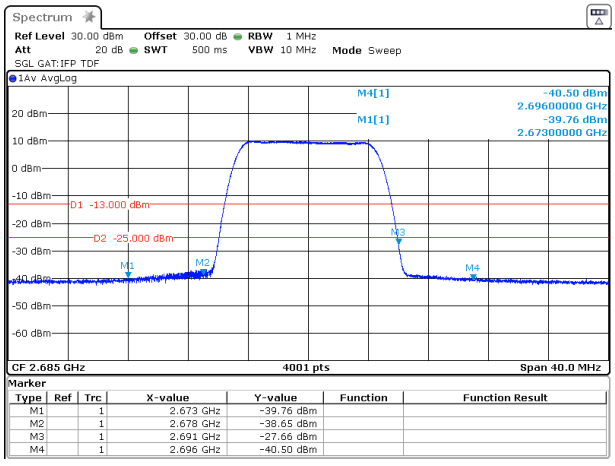
Date: 2.JAN.2003 03:19:06

Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.3.3 Spurious emission at band edges test results at high carrier frequency

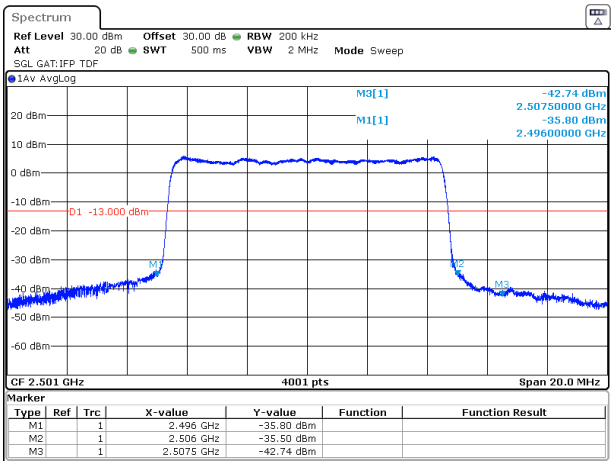
ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: QPSK
EBW: 10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #11

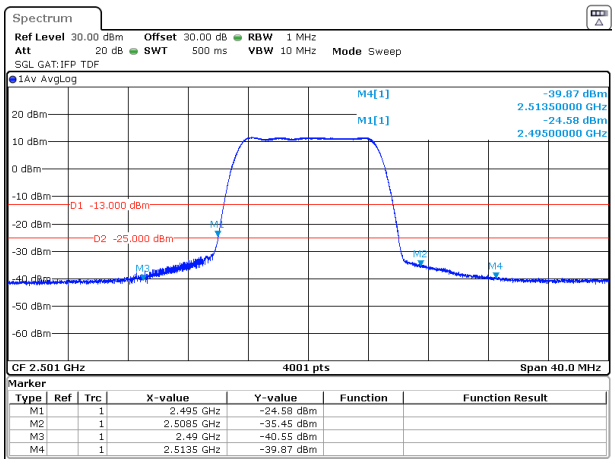




Plot 7.3.4 Spurious emission at band edges test results at low carrier frequency

ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: 16QAM
EBW: 10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #11

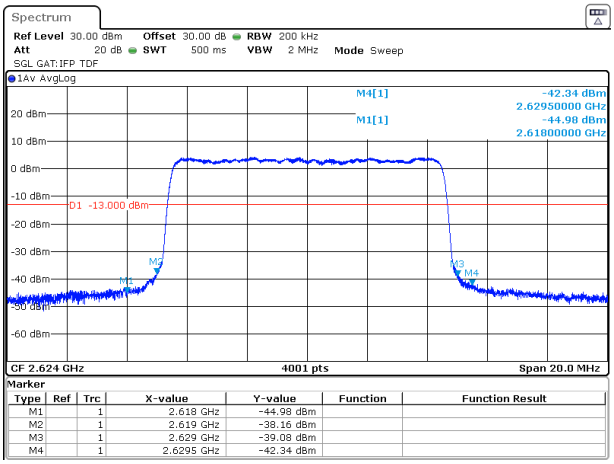


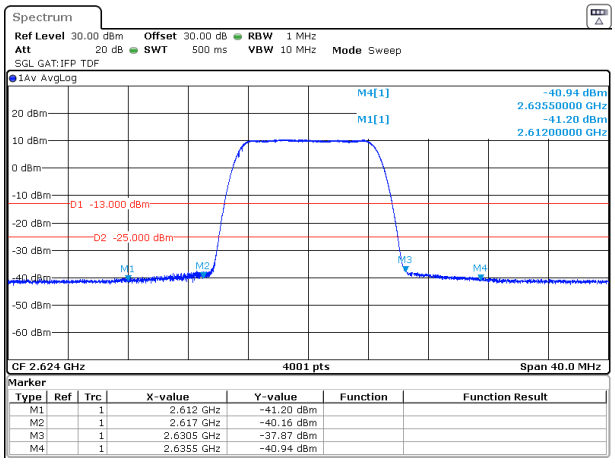


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.3.5 Spurious emission at band edges test results at mid carrier frequency

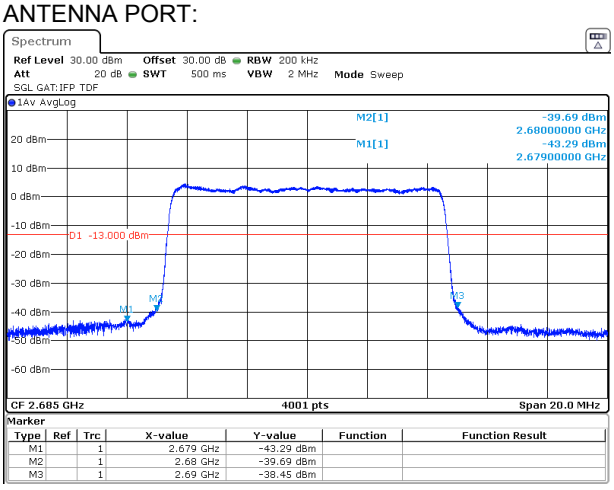
ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: 16QAM
EBW: 10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #11

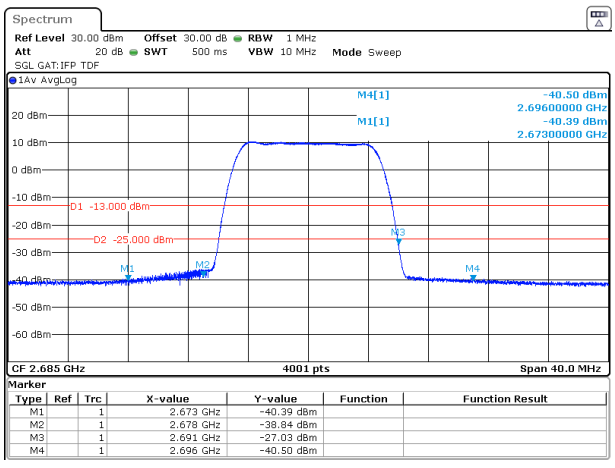




Plot 7.3.6 Spurious emission at band edges test results at high carrier frequency

ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: 16QAM
EBW: 10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #11

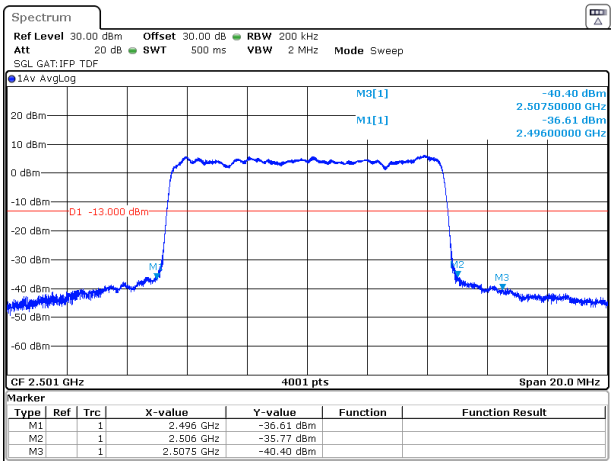


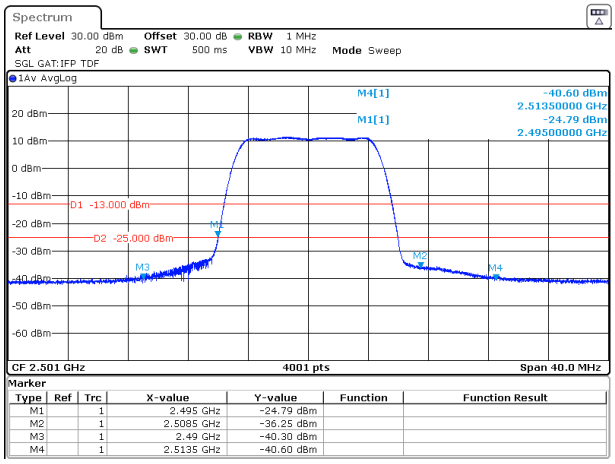


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.3.7 Spurious emission at band edges test results at low carrier frequency

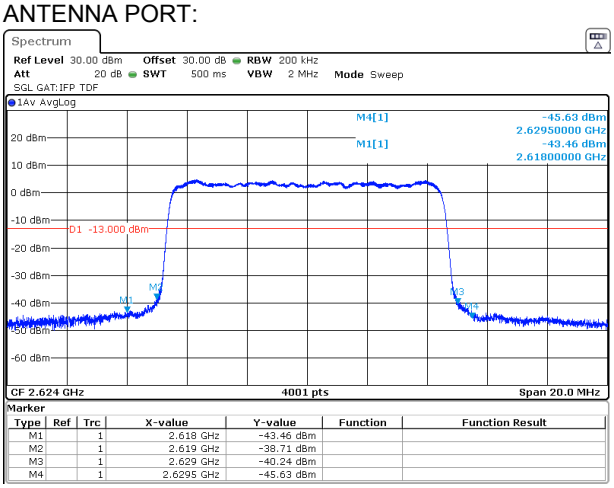
ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: 64QAM
EBW: 10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #11

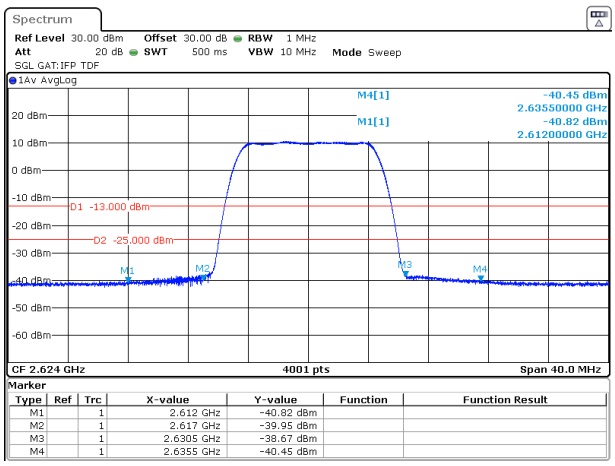




Plot 7.3.8 Spurious emission at band edges test results at mid carrier frequency

ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: 64QAM
EBW: 10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #11

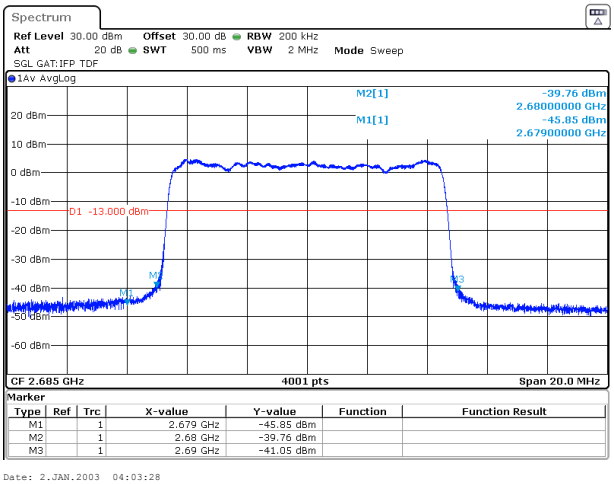


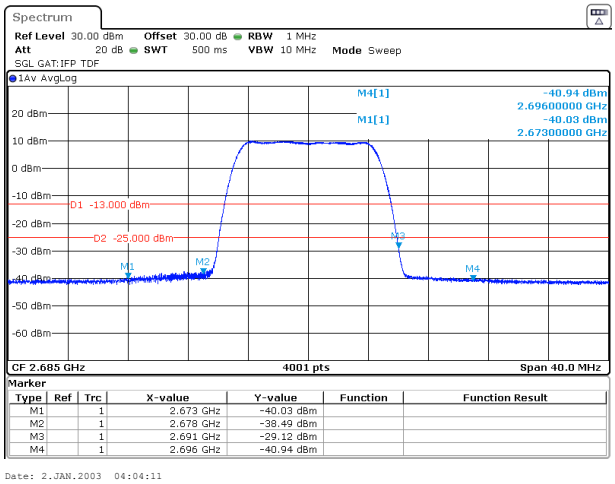


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.3.9 Spurious emission at band edges test results at high carrier frequency

ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: 64QAM
EBW: 10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #11

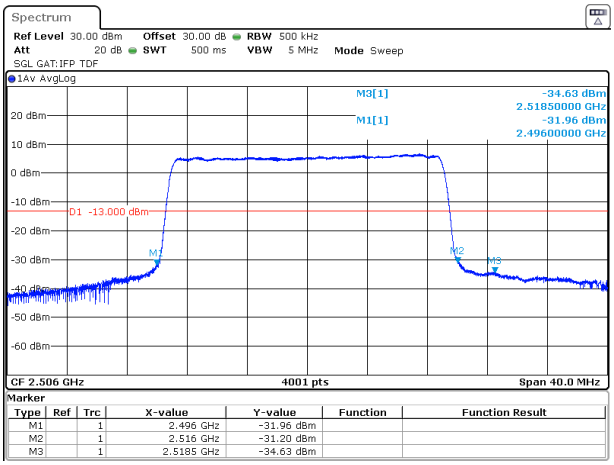


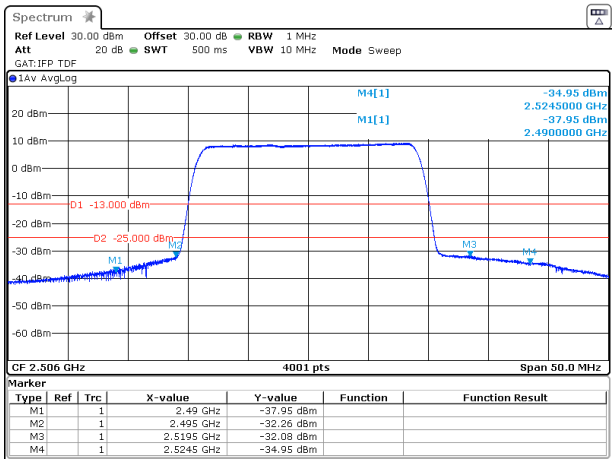


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.3.10 Spurious emission at band edges test results at low carrier frequency

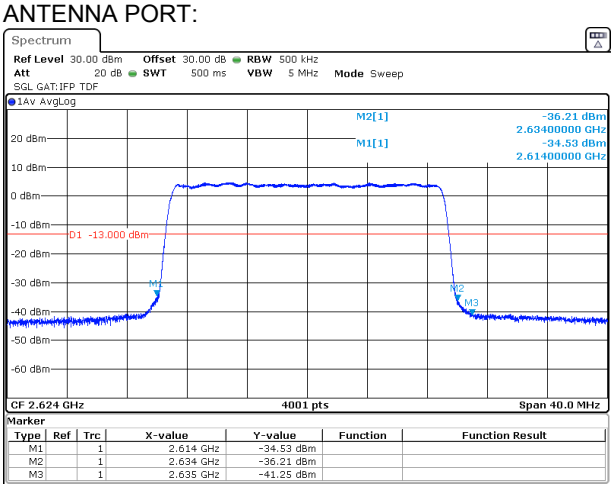
ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: QPSK
EBW: 20 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #11

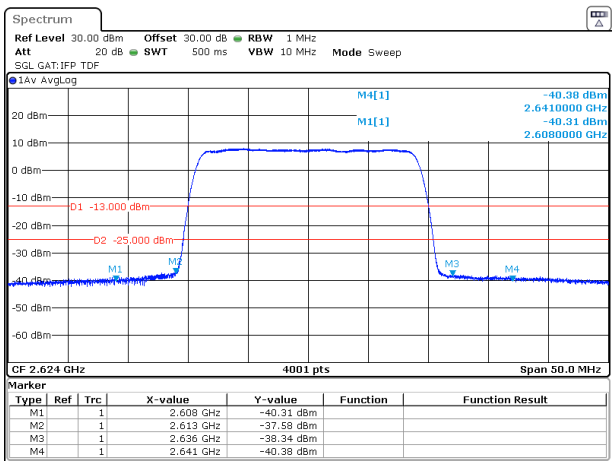




Plot 7.3.11 Spurious emission at band edges test results at mid carrier frequency

ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: QPSK
EBW: 20 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #11

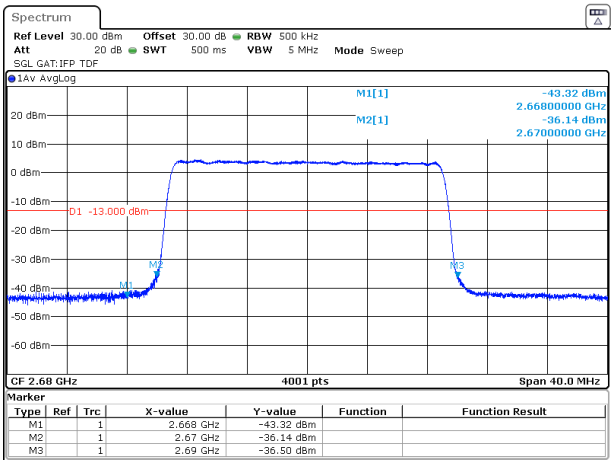


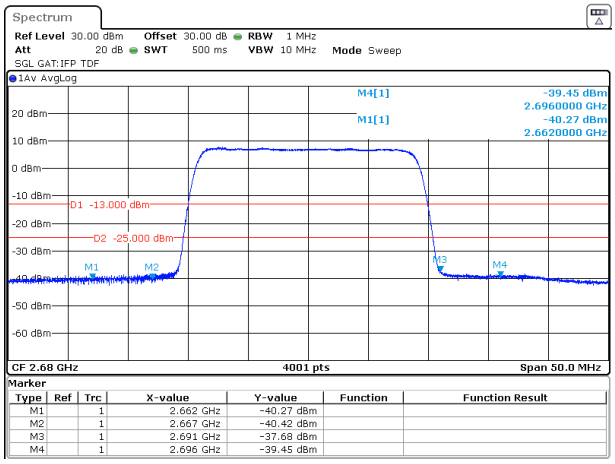


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.3.12 Spurious emission at band edges test results at high carrier frequency

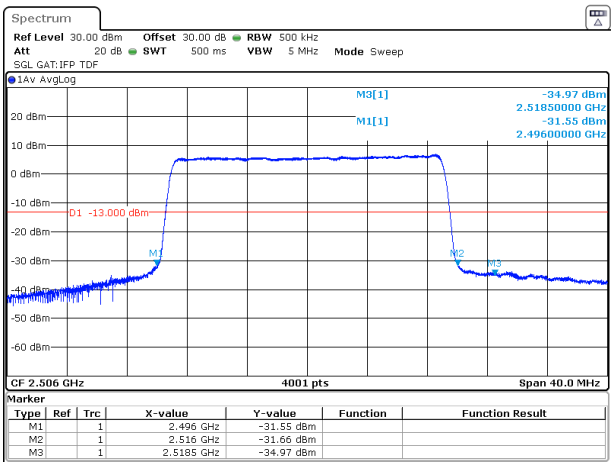
ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: QPSK
EBW: 20 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #11

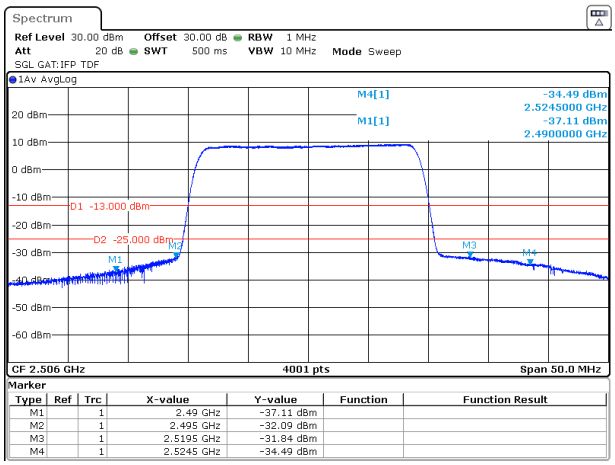




Plot 7.3.13 Spurious emission at band edges test results at low carrier frequency

ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: 16QAM
EBW: 20 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #11

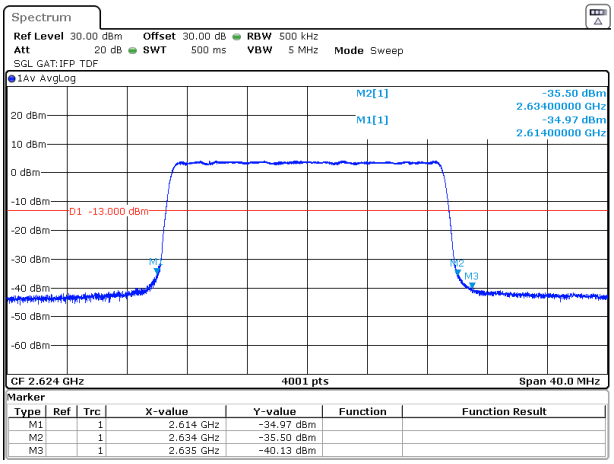


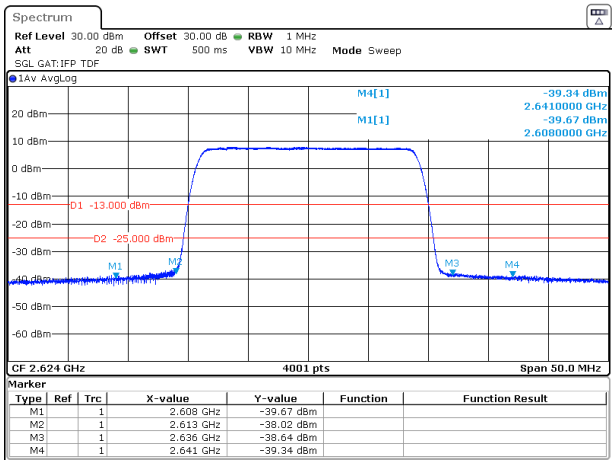


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.3.14 Spurious emission at band edges test results at mid carrier frequency

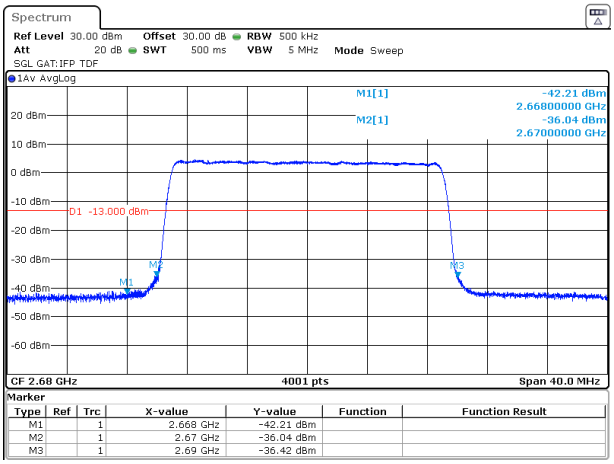
ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: 16QAM
EBW: 20 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #11

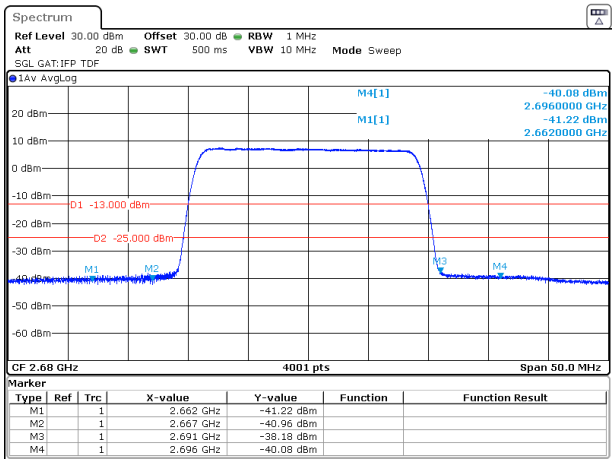




Plot 7.3.15 Spurious emission at band edges test results at high carrier frequency

ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: 16QAM
EBW: 20 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #11

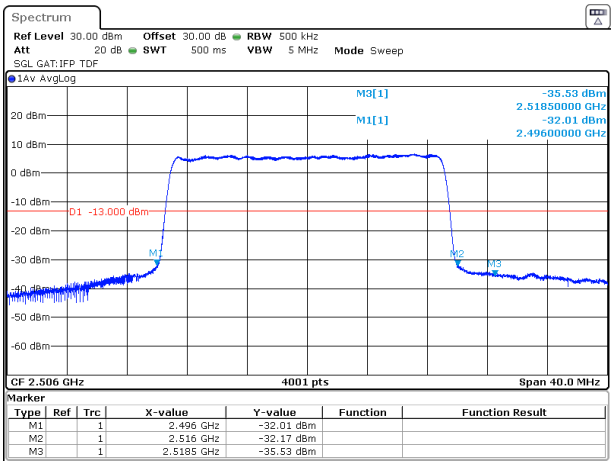


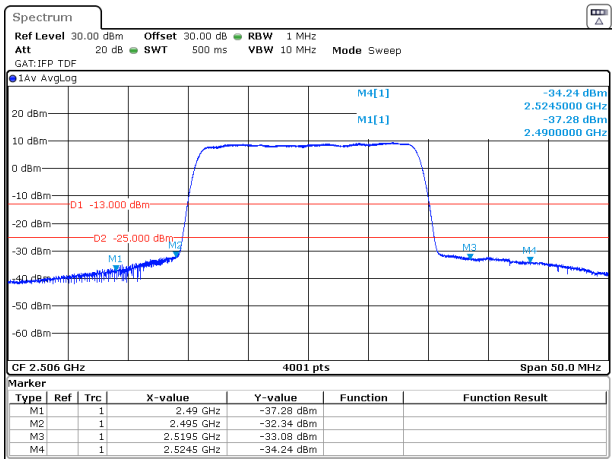


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.3.16 Spurious emission at band edges test results at low carrier frequency

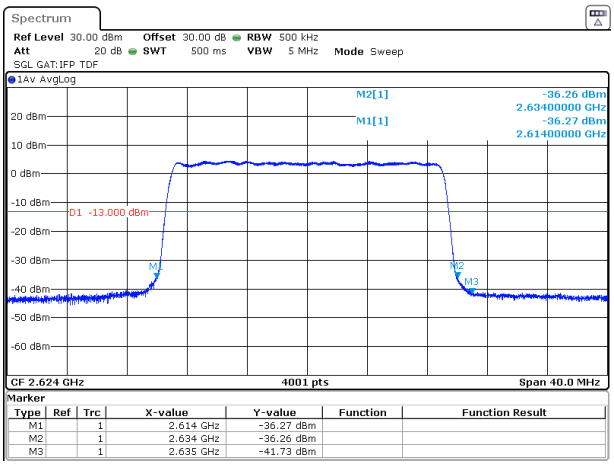
ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: 64QAM
EBW: 20 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #11

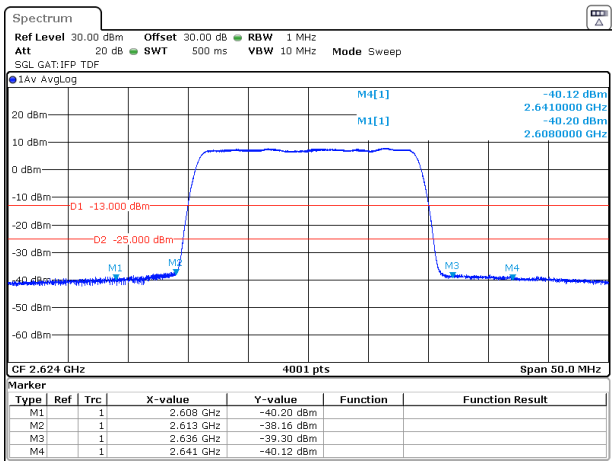




Plot 7.3.17 Spurious emission at band edges test results at mid carrier frequency

ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: 64QAM
EBW: 20 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #11

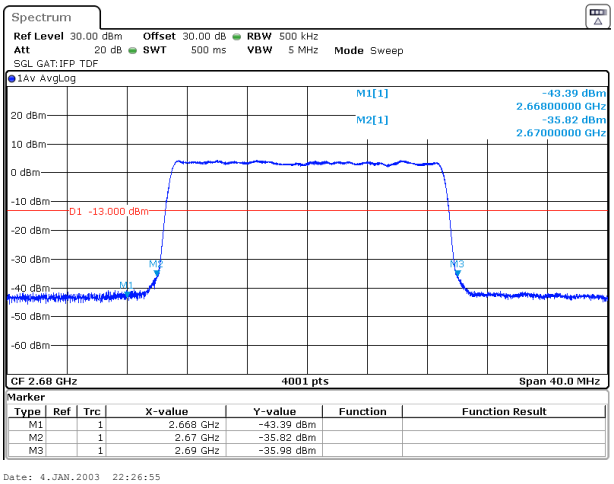


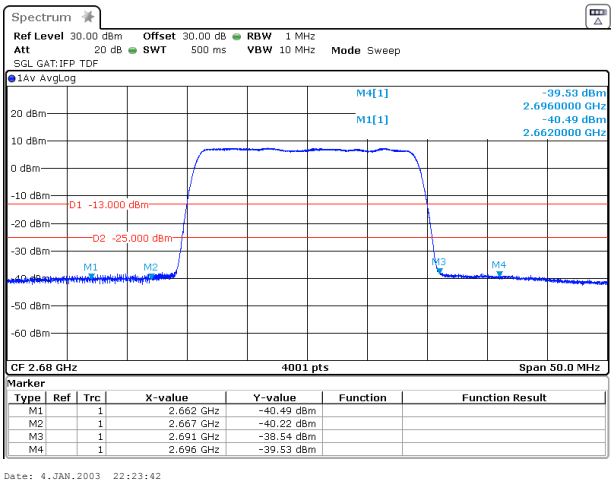


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.3.18 Spurious emission at band edges test results at high carrier frequency

ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: 64QAM
EBW: 20 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #11

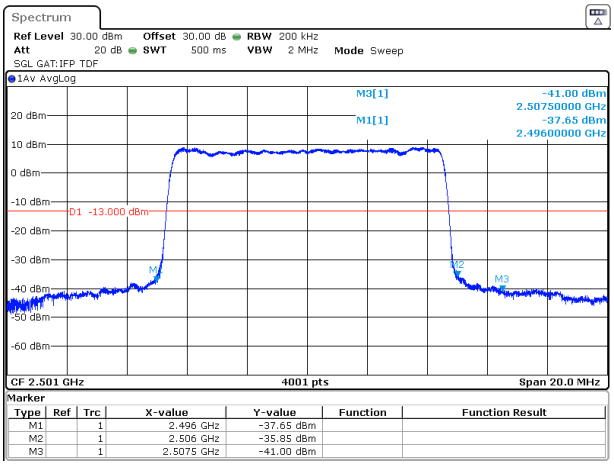


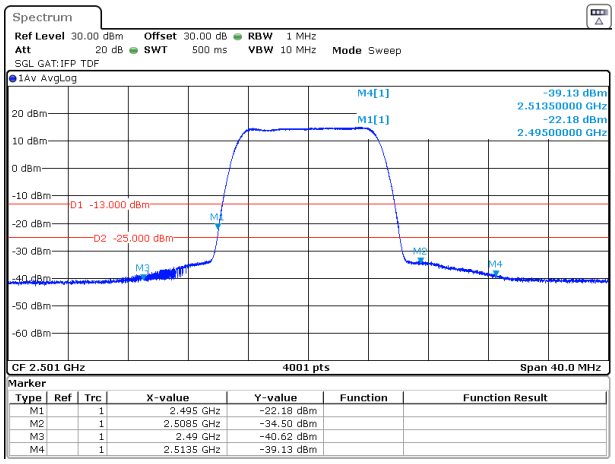


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.3.19 Spurious emission at band edges test results at low carrier frequency

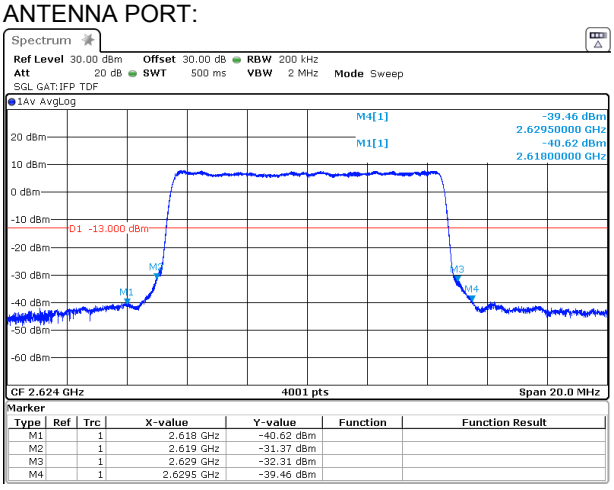
ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: QPSK
EBW: 10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #22

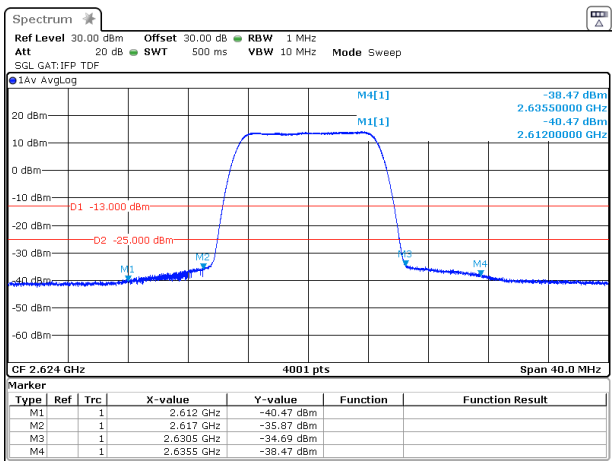




Plot 7.3.20 Spurious emission at band edges test results at mid carrier frequency

ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: QPSK
EBW: 10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #22

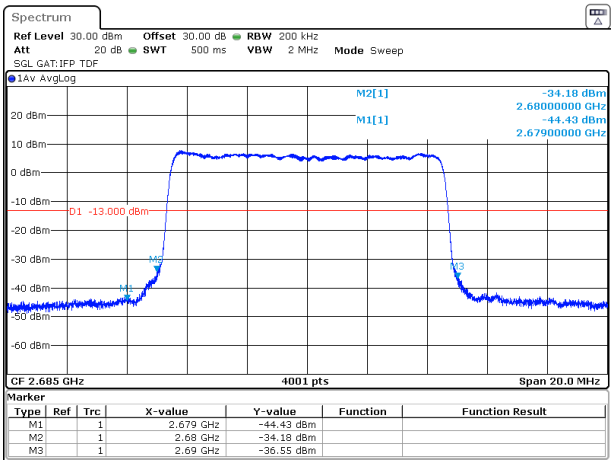


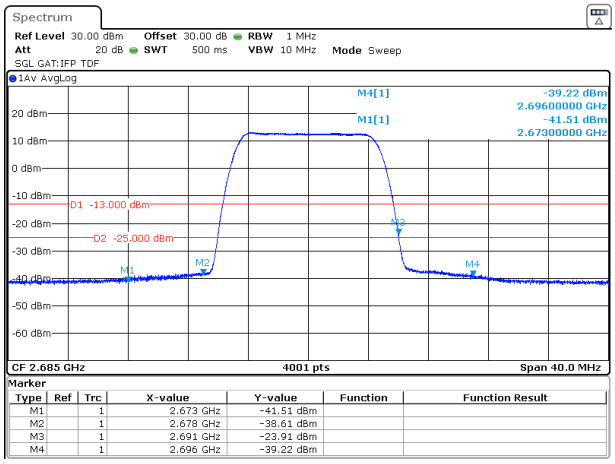


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.3.21 Spurious emission at band edges test results at high carrier frequency

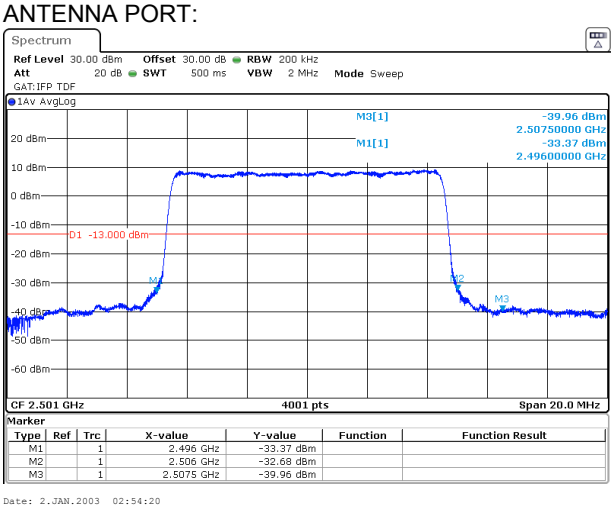
ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: QPSK
EBW: 10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #22

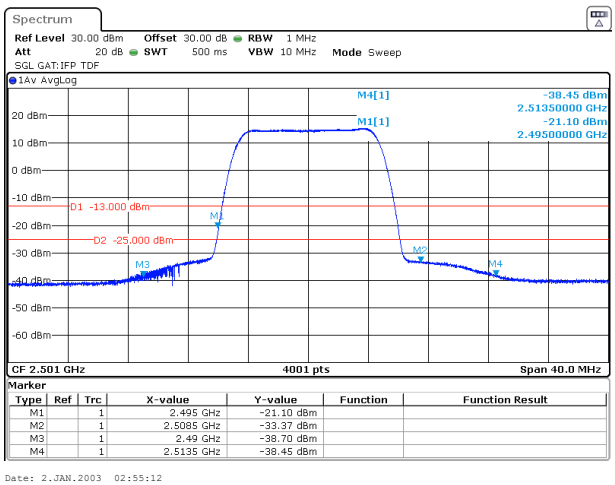




Plot 7.3.22 Spurious emission at band edges test results at low carrier frequency

ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: 16QAM
EBW: 10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #22

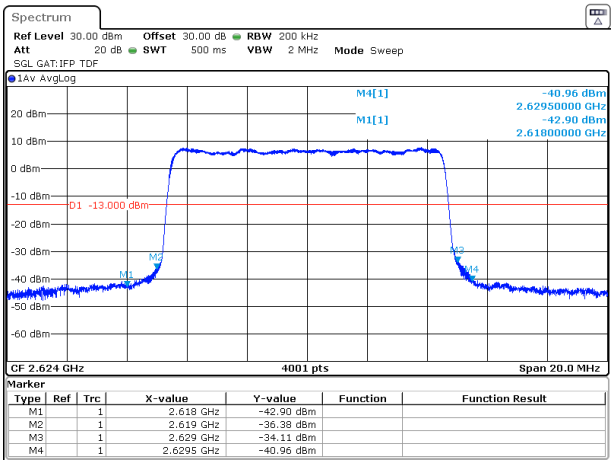


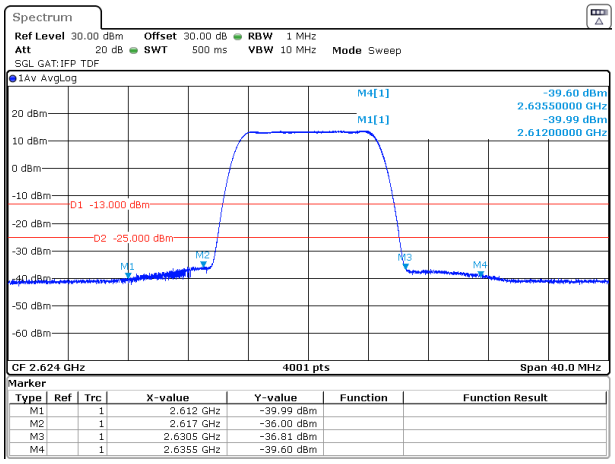


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.3.23 Spurious emission at band edges test results at mid carrier frequency

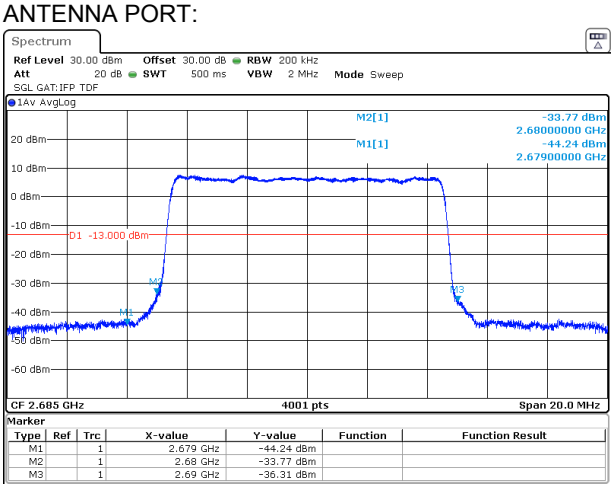
ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: 16QAM
EBW: 10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #22

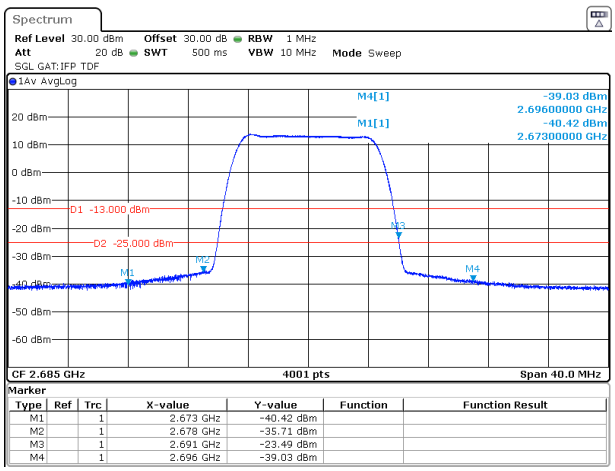




Plot 7.3.24 Spurious emission at band edges test results at high carrier frequency

ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: 16QAM
EBW: 10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #22

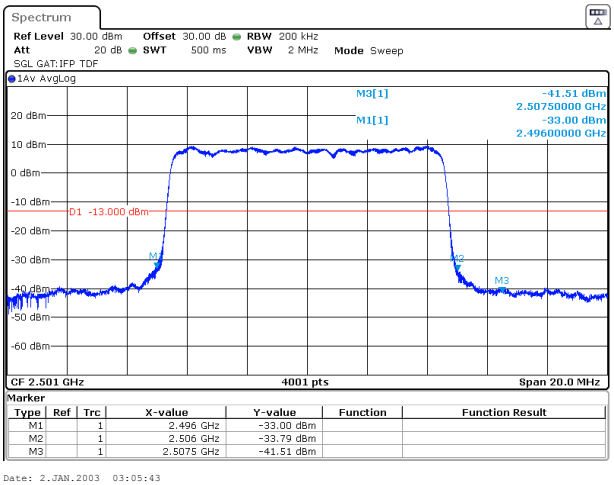


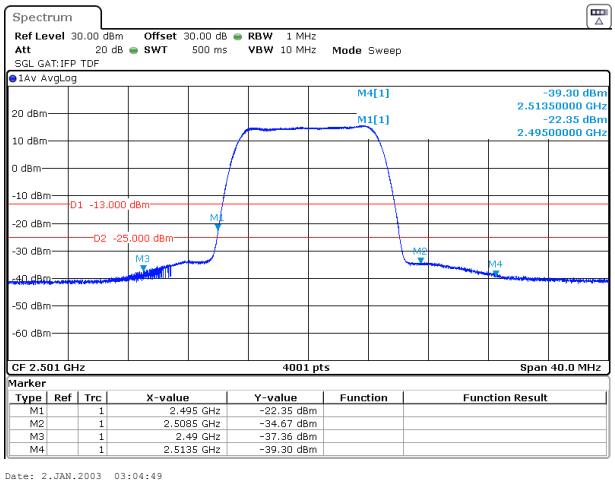


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.3.25 Spurious emission at band edges test results at low carrier frequency

ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: 64QAM
EBW: 10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #22

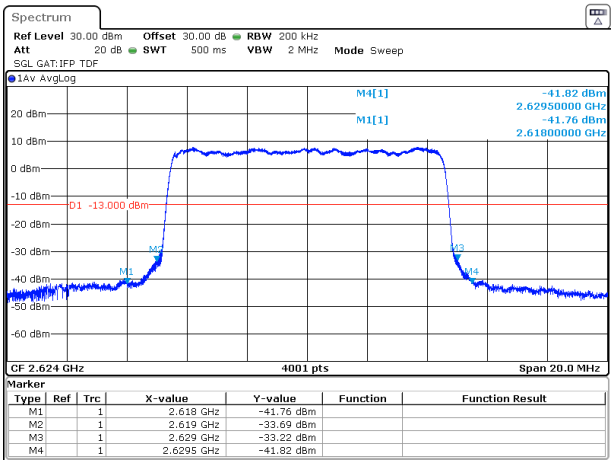


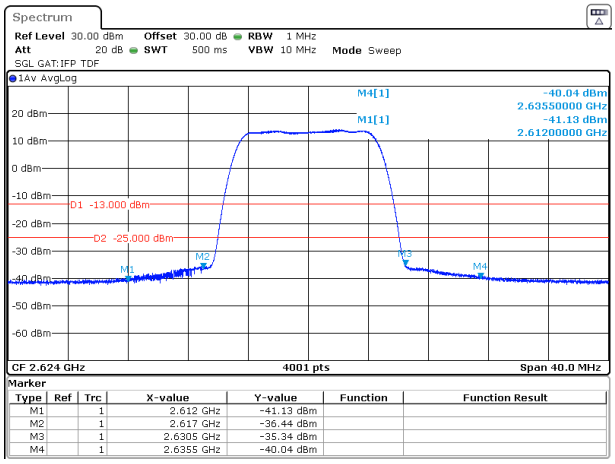


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.3.26 Spurious emission at band edges test results at mid carrier frequency

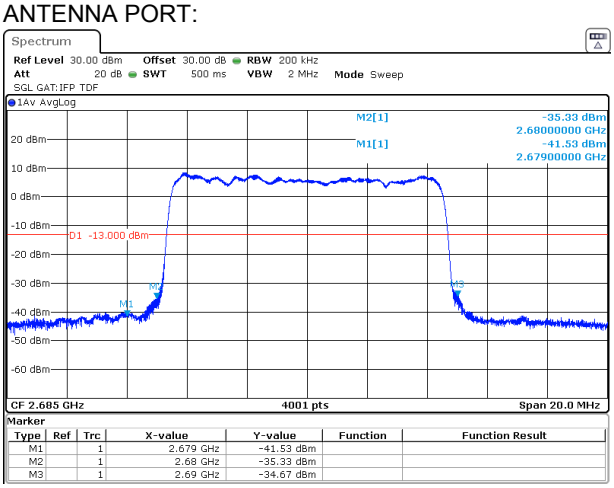
ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: 64QAM
EBW: 10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #22

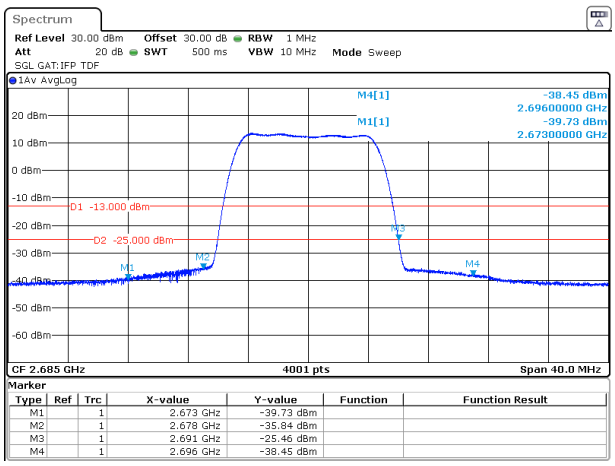




Plot 7.3.27 Spurious emission at band edges test results at high carrier frequency

ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: 64QAM
EBW: 10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #22

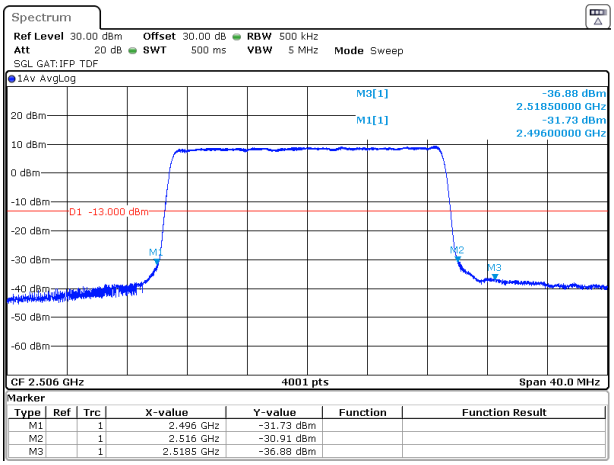


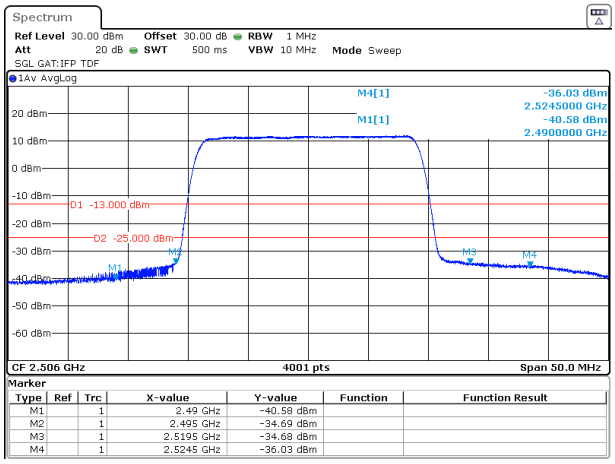


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.3.28 Spurious emission at band edges test results at low carrier frequency

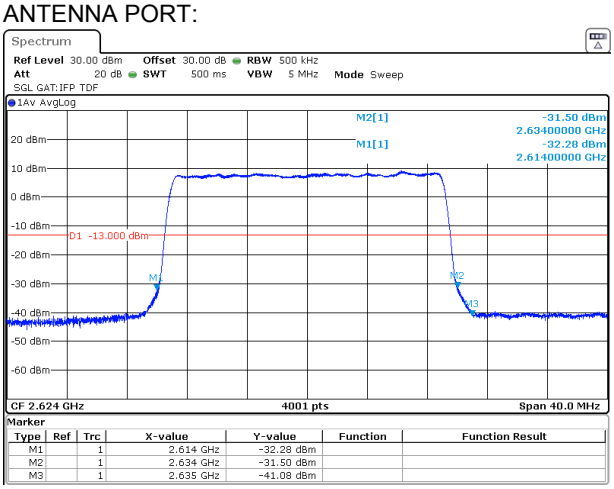
ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: QPSK
EBW: 20 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #22

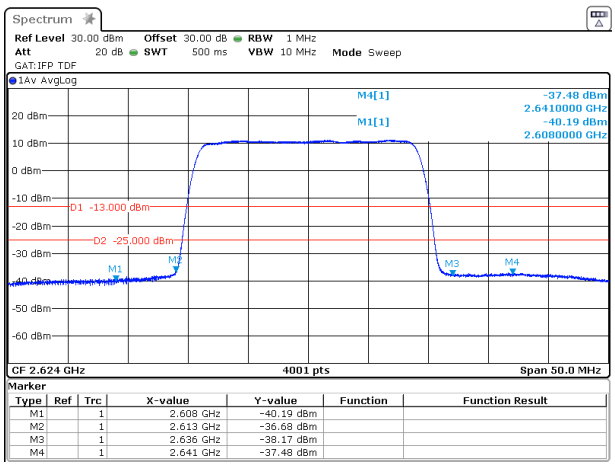




Plot 7.3.29 Spurious emission at band edges test results at mid carrier frequency

ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: QPSK
EBW: 20 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #22

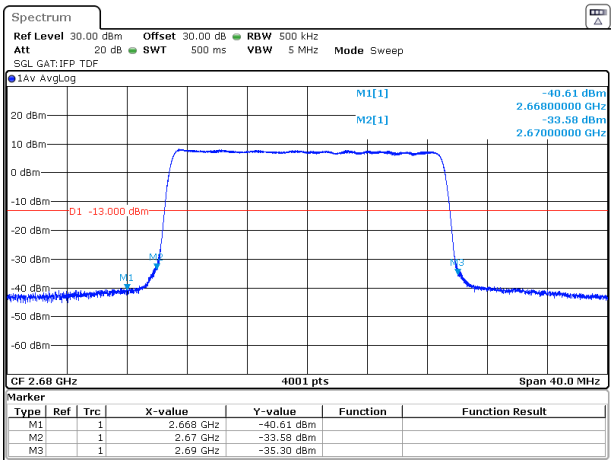


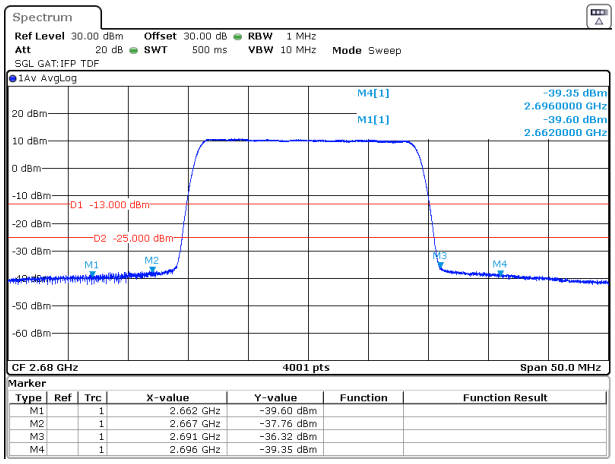


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.3.30 Spurious emission at band edges test results at high carrier frequency

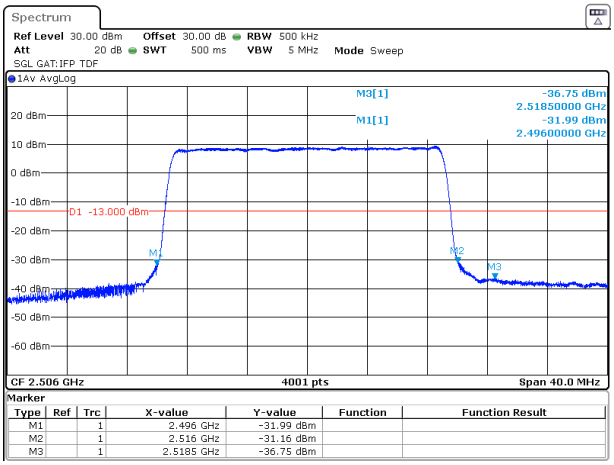
ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: QPSK
EBW: 20 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #22

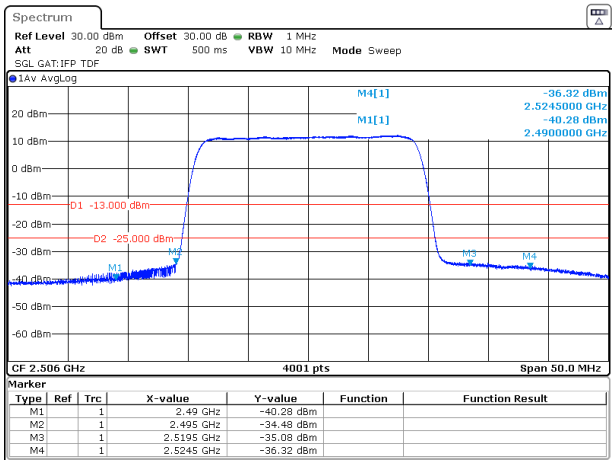




Plot 7.3.31 Spurious emission at band edges test results at low carrier frequency

ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: 16QAM
EBW: 20 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #22

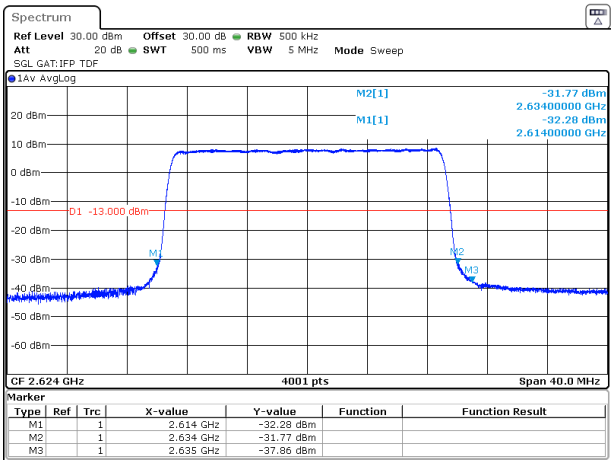


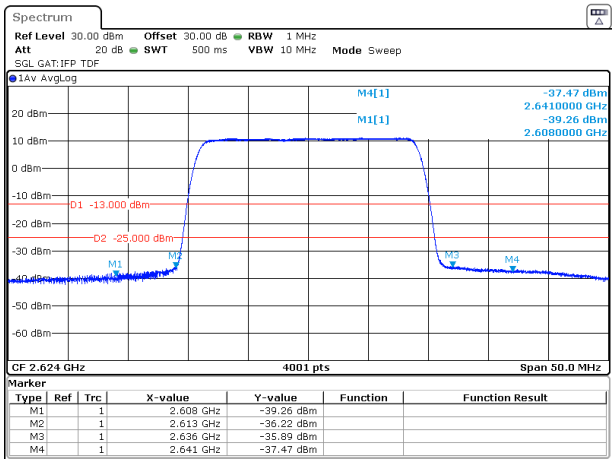


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.3.32 Spurious emission at band edges test results at mid carrier frequency

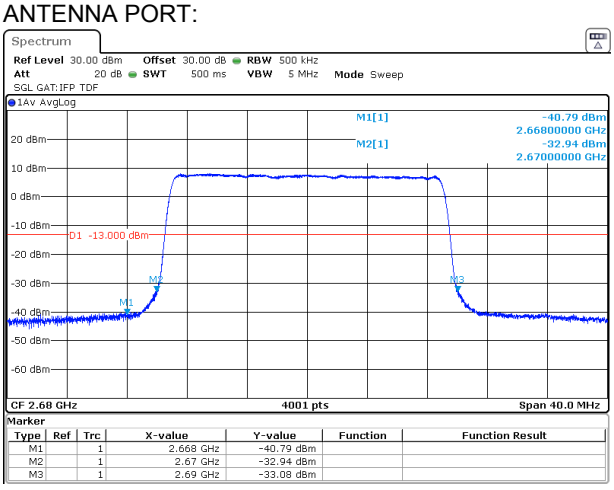
ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: 16QAM
EBW: 20 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #22

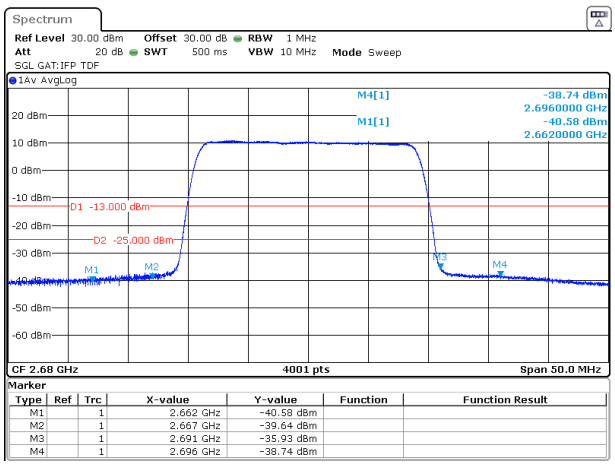




Plot 7.3.33 Spurious emission at band edges test results at high carrier frequency

ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: 16QAM
EBW: 20 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #22

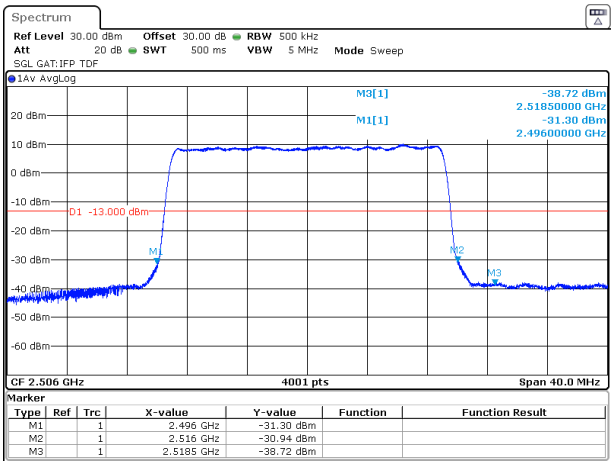


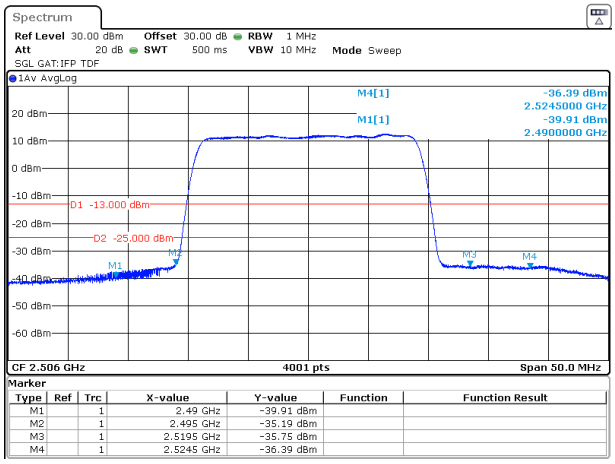


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.3.34 Spurious emission at band edges test results at low carrier frequency

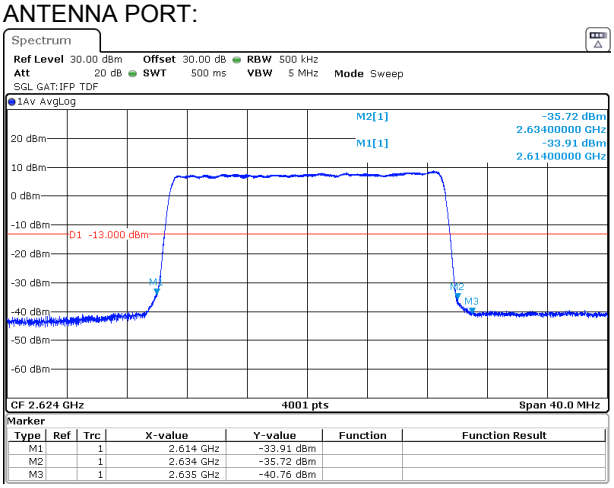
ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: 64QAM
EBW: 20 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #22

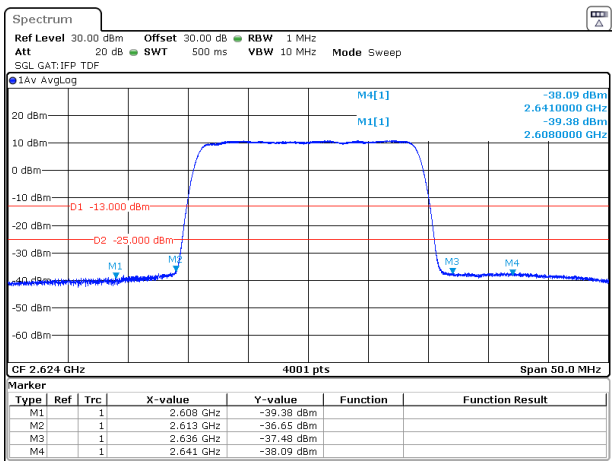




Plot 7.3.35 Spurious emission at band edges test results at mid carrier frequency

ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: 64QAM
EBW: 20 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #22

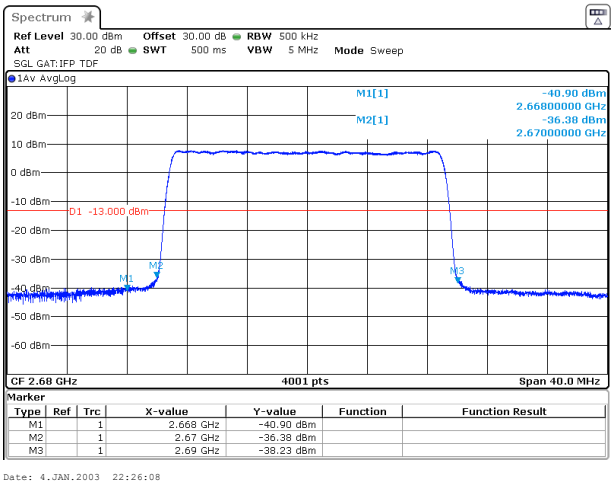


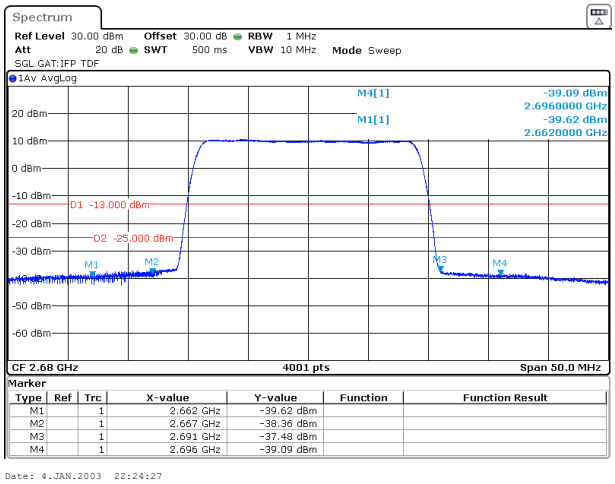


Test specification:	Section 27.53, Band edge emissions		
Test procedure:	47 CFR, Sections 2.1051, 27.53; TIA/EIA-603-E, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	24-May-18		
Temperature: 27 ºC	Relative Humidity: 51 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.3.36 Spurious emission at band edges test results at high carrier frequency

ASSIGNED FREQUENCY RANGE: 2496 – 2690 MHz
DETECTOR USED: Average
MODULATION: 64QAM
EBW: 20 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #22





Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 28 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

7.4 Spurious emissions at RF antenna connector test

7.4.1 General

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

Table 7.4.1 Spurious emission limits

Frequency, MHz	Attenuation below carrier, dBc	Spurious emissions, dBm
Base and fixed user stations		
0.009 – 10th harmonic	43+10logP(W)**	-13.0
Mobile stations		
0.009 – 10th harmonic*	**55+10logP(W)****	**-25.0**

* - spurious emission limits do not apply to the channel edge emission investigated in course of band edge emission testing
** - P is transmitter output power in watts

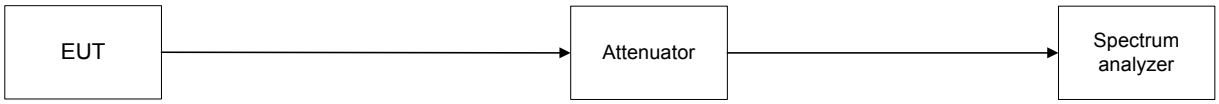
7.4.2 Test procedure

7.4.2.1 The EUT was set up as shown in Figure 7.4.1, energized and its proper operation was checked.

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

7.4.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.4.2 and associated plots.

Figure 7.4.1 Spurious emission test setup, single output



Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 28 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Table 7.4.2 Spurious emission test results with 10 MHz EBW

ASSIGNED FREQUENCY RANGE: 2496-2690 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 – 27000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #11

Frequency, MHz	SA reading, dBm	Attenuation, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm	Limit, dBm	Margin, dB*	Verdict
Low carrier frequency								
0.011	-41.05	included	included	1	-41.05	-25.0	-16.05	Pass
2521.0	-35.48	included	included	1000	-35.48	-25.0	-10.48	Pass
Mid carrier frequency								
0.010	-41.66	included	included	1	-41.66	-25.0	-16.66	Pass
2604.0	-43.08	included	included	1000	-43.08	-25.0	-18.08	Pass
2644.0	-41.09	included	included	1000	-41.09	-25.0	-16.09	Pass
High carrier frequency								
0.010	-40.83	included	included	1	-40.83	-25.0	-16.66	Pass
2665.0	-37.87	included	included	1000	-37.87	-25.0	-15.83	Pass

ANTENNA PORT: #21

Frequency, MHz	SA reading, dBm	Attenuation, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm	Limit, dBm	Margin, dB*	Verdict
Low carrier frequency								
0.010	-40.41	included	included	1	-40.41	-25.0	-15.41	Pass
2521.0	-36.10	included	included	1000	-36.10	-25.0	-11.10	Pass
Mid carrier frequency								
0.009	-40.49	included	included	1	-40.49	-25.0	-15.49	Pass
2604.0	-42.82	included	included	1000	-42.82	-25.0	-17.82	Pass
2644.0	-39.42	included	included	1000	-39.42	-25.0	-14.42	Pass
High carrier frequency								
0.011	-40.54	included	included	1	-40.54	-25.0	-15.54	Pass
2665.0	-36.20	included	included	1000	-36.20	-25.0	-11.2	Pass

*- Margin = Spurious emission – specification limit.

Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 28 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Table 7.4.3 Spurious emission test results with 20 MHz EBW

ASSIGNED FREQUENCY RANGE: 2496-2690 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 – 27000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA PORT: #11

Frequency, MHz	SA reading, dBm	Attenuation, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm	Limit, dBm	Margin, dB*	Verdict
Low carrier frequency								
0.010	-40.70	included	included	1	-41.05	-25.0	-16.05	Pass
2531.0	-31.42	included	included	1000	-31.42	-25.0	-6.42	Pass
Mid carrier frequency								
0.010	-41.11	included	included	1	-41.11	-25.0	-16.11	Pass
2599.0	-38.62	included	included	1000	-38.62	-25.0	-13.62	Pass
2649.0	-38.21	included	included	1000	-38.21	-25.0	-13.21	Pass
High carrier frequency								
0.010	-40.95	included	included	1	-40.95	-25.0	-15.95	Pass
2655.0	-35.18	included	included	1000	-35.18	-25.0	-10.18	Pass
2705.0	-43.63	included	included	1000	-43.63	-25.0	-18.63	Pass

ANTENNA PORT: #21

Frequency, MHz	SA reading, dBm	Attenuation, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm	Limit, dBm	Margin, dB*	Verdict
Low carrier frequency								
0.010	-40.67	included	included	1	-40.67	-25.0	-15.67	Pass
2531.0	-3174	included	included	1000	-3174	-25.0	-3149	Pass
Mid carrier frequency								
0.009	-41.60	included	included	1	-41.60	-25.0	-16.60	Pass
2599.0	-38.32	included	included	1000	-38.32	-25.0	-13.32	Pass
2649.0	-32.01	included	included	1000	-32.01	-25.0	-7.01	Pass
High carrier frequency								
0.010	-41.24	included	included	1	-41.24	-25.0	-16.24	Pass
2655.0	-34.01	included	included	1000	-34.01	-25.0	-9.01	Pass
2705.0	-39.86	included	included	1000	-39.86	-25.0	-14.86	Pass

*- Margin = Spurious emission – specification limit.

Reference numbers of test equipment used

HL 3903	HL 4355	HL 4360					

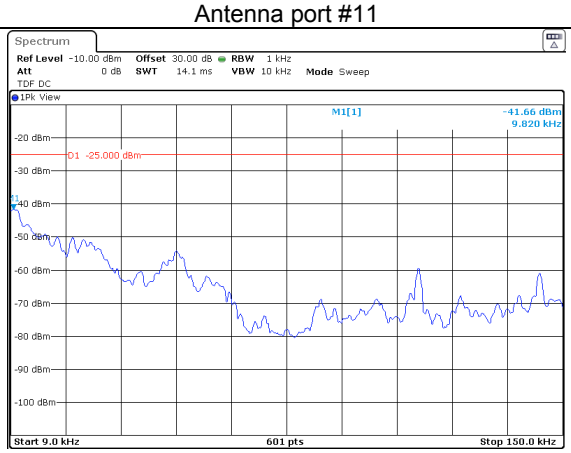
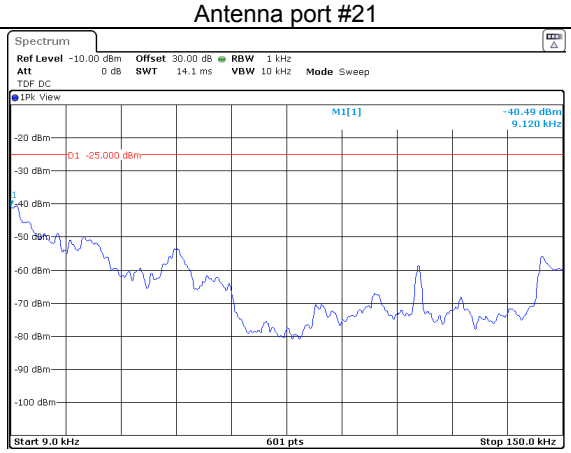
Full description is given in Appendix A.

Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 28 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.4.1 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency, 10 MHz EBW

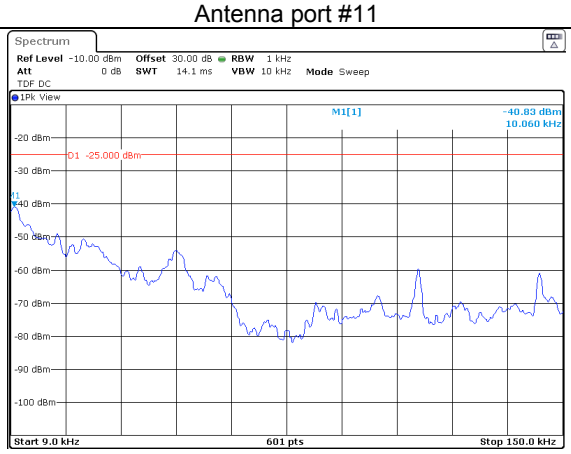
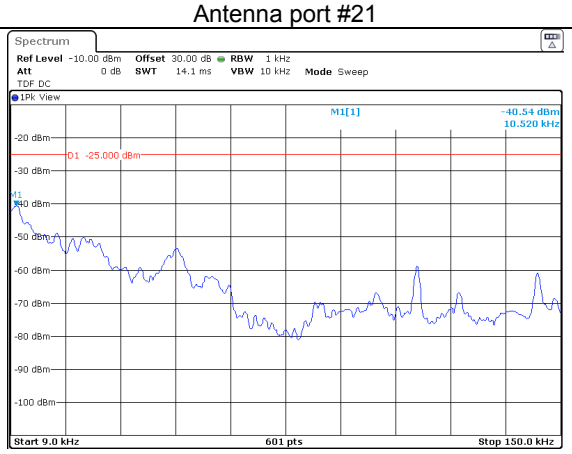
Antenna port #11	Antenna port #21
	

Plot 7.4.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency, 10 MHz EBW

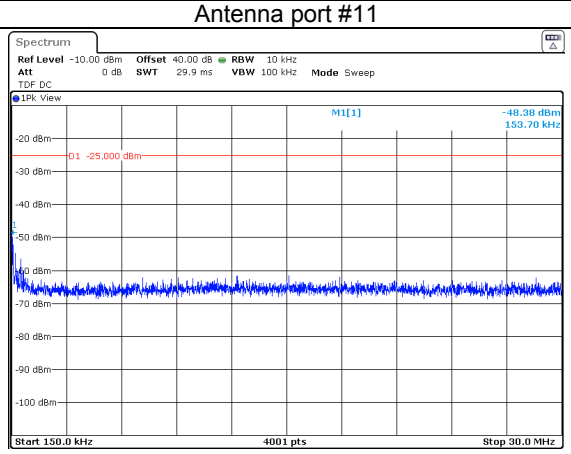
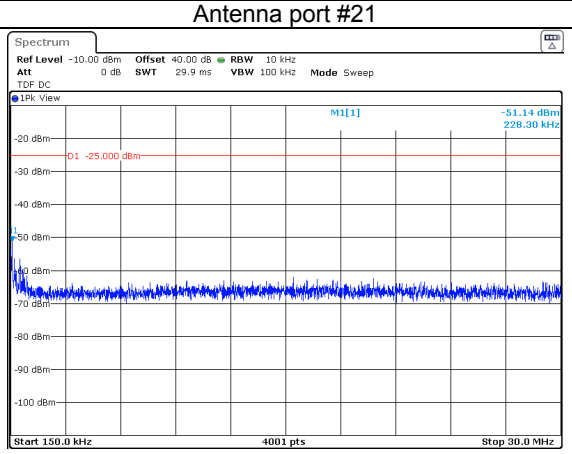
Antenna port #11	Antenna port #21
	

Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 28 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.4.3 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency, 10 MHz EBW

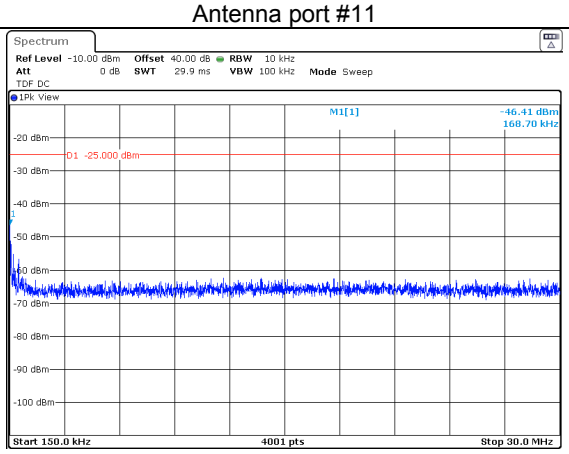
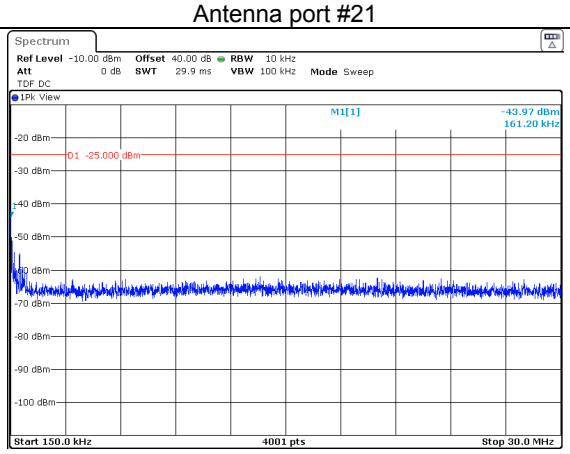
Antenna port #11	Antenna port #21
	

Plot 7.4.4 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency, 10 MHz EBW

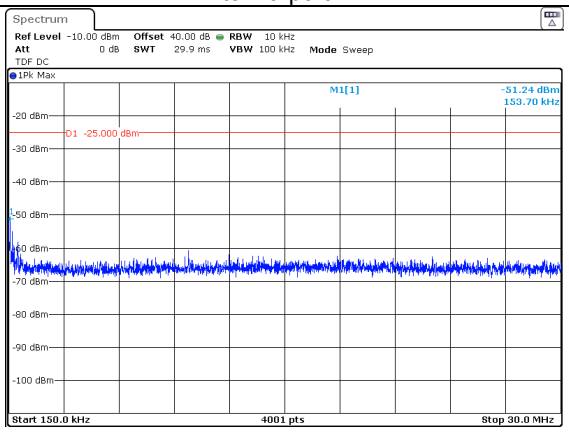
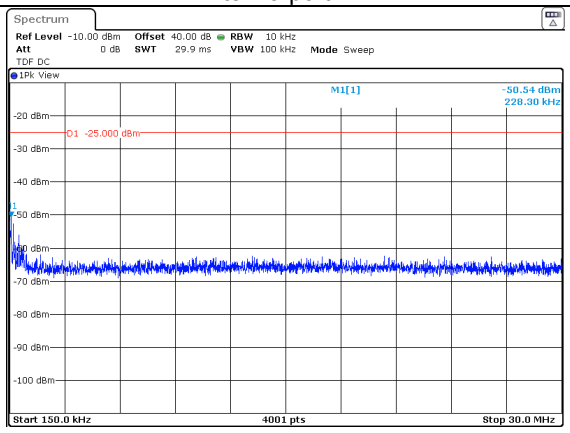
Antenna port #11	Antenna port #21
	

Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 28 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.4.5 Spurious emission measurements in 0.15 - 30.0 MHz range at mid carrier frequency, 10 MHz EBW

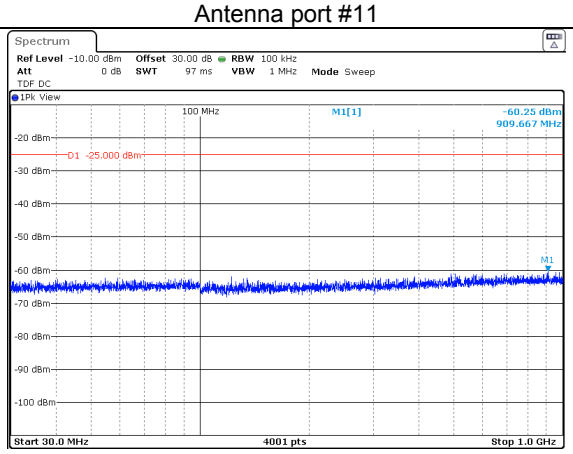
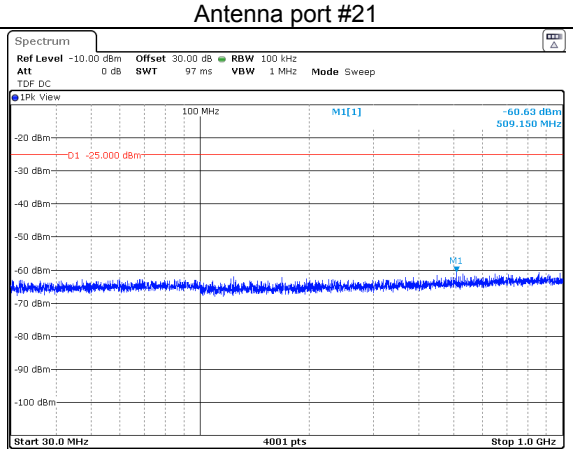
Antenna port #11	Antenna port #21
	

Plot 7.4.6 Spurious emission measurements in 0.15 - 30.0 MHz range at high carrier frequency, 10 MHz EBW

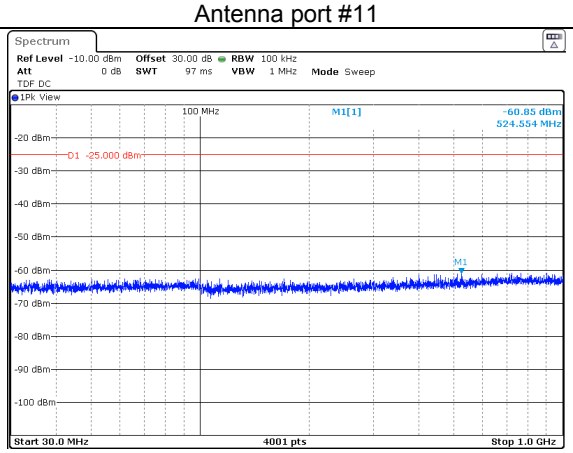
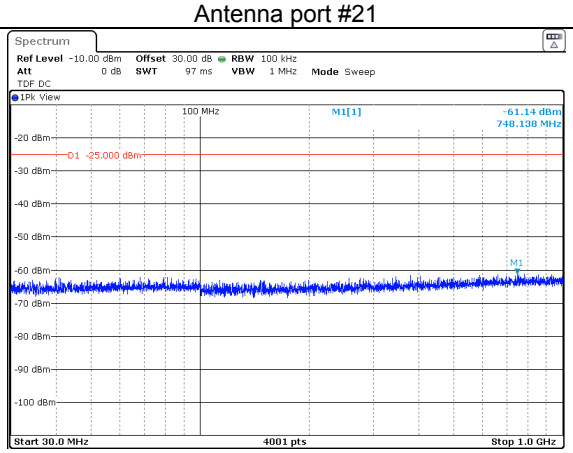
Antenna port #11	Antenna port #21
	

Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 28 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.4.7 Spurious emission measurements in 30 - 1000 MHz range at low carrier frequency, 10 MHz EBW

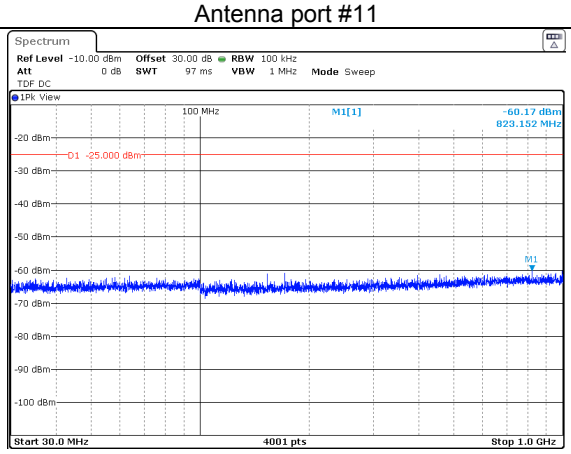
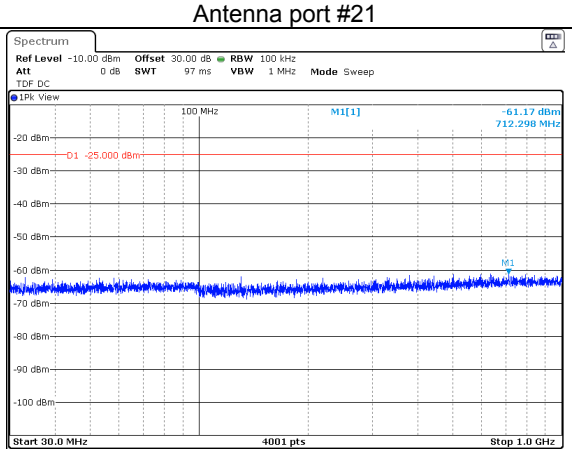
Antenna port #11	Antenna port #21
	

Plot 7.4.8 Spurious emission measurements in 30 - 1000 MHz range at mid 10 carrier frequency, 10 MHz EBW

Antenna port #11	Antenna port #21
	

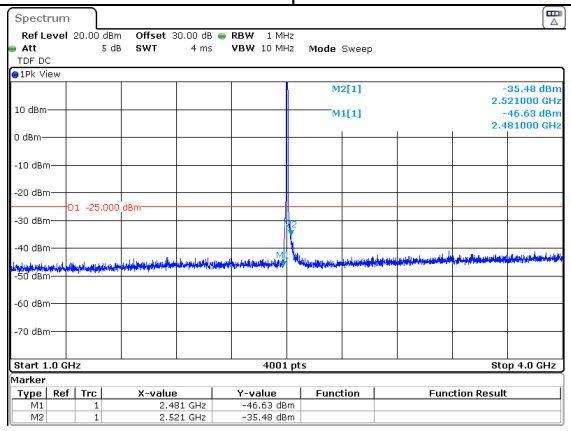
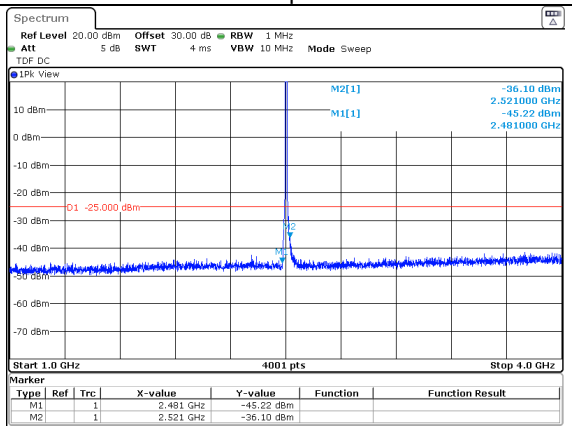
Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 28 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.4.9 Spurious emission measurements in 30 - 1000 MHz range at high carrier frequency, 10 MHz EBW

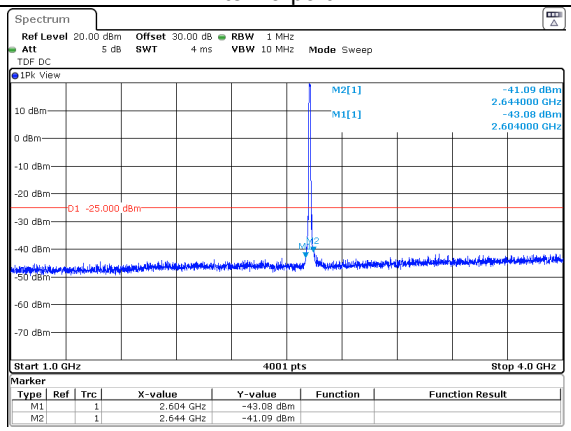
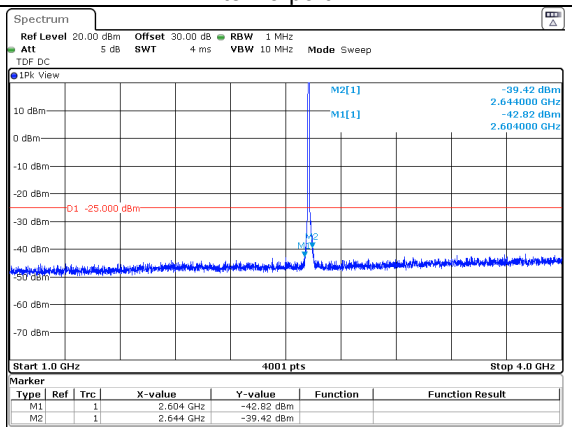
Antenna port #11	Antenna port #21
	

Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 28 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.4.10 Spurious emission measurements in 1000 - 4000 MHz range at low carrier frequency, 10 MHz EBW

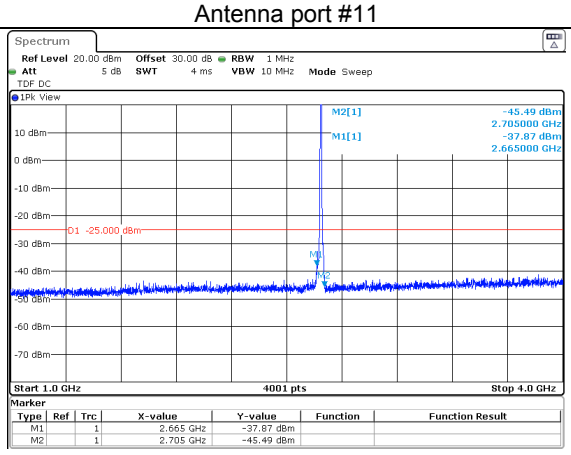
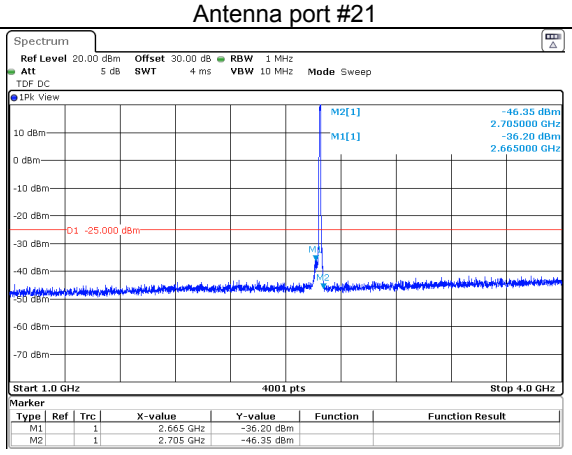
Antenna port #11	Antenna port #21
	

Plot 7.4.11 Spurious emission measurements in 1000 - 4000 MHz range at mid carrier frequency, 10 MHz EBW

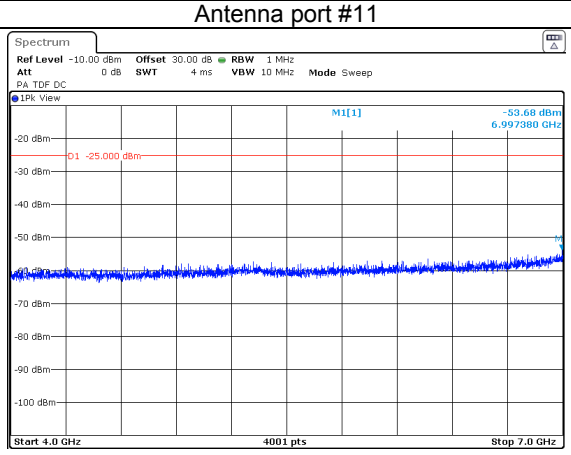
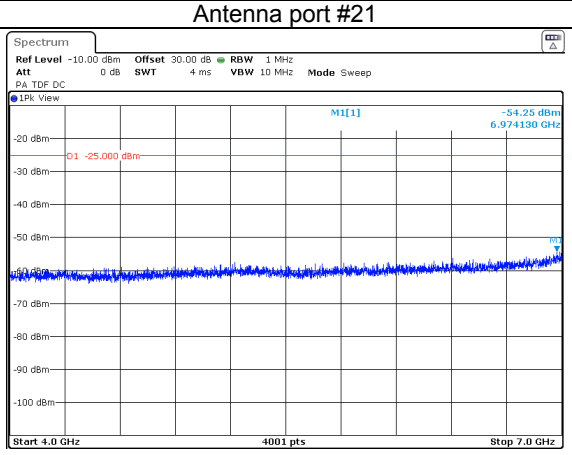
Antenna port #11	Antenna port #21
	

Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 28 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.4.12 Spurious emission measurements in 1000 - 4000 MHz range at high carrier frequency, 10 MHz EBW

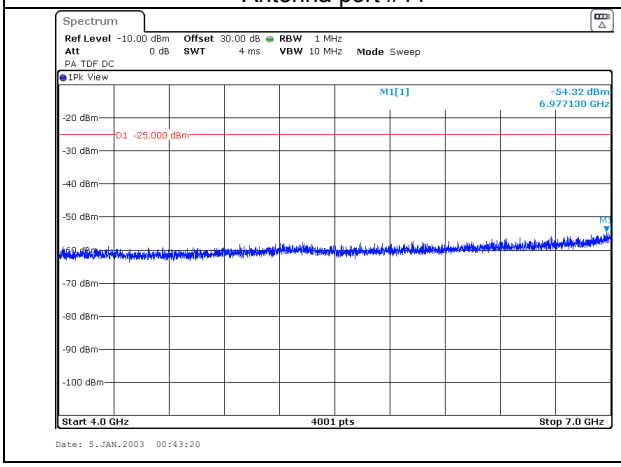
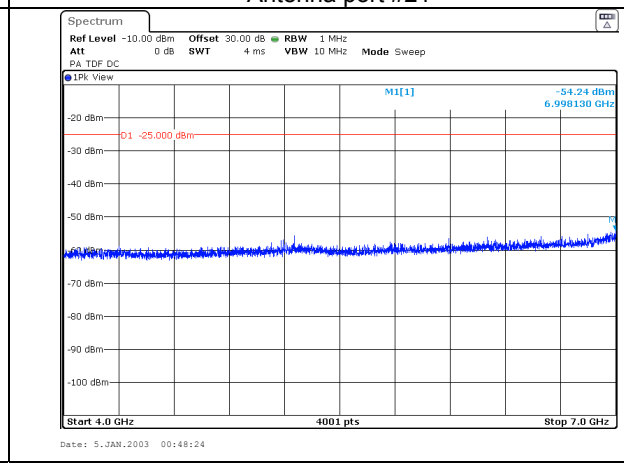
Antenna port #11	Antenna port #21
	

Plot 7.4.13 Spurious emission measurements in 4000 - 7000 MHz range at low carrier frequency, 10 MHz EBW

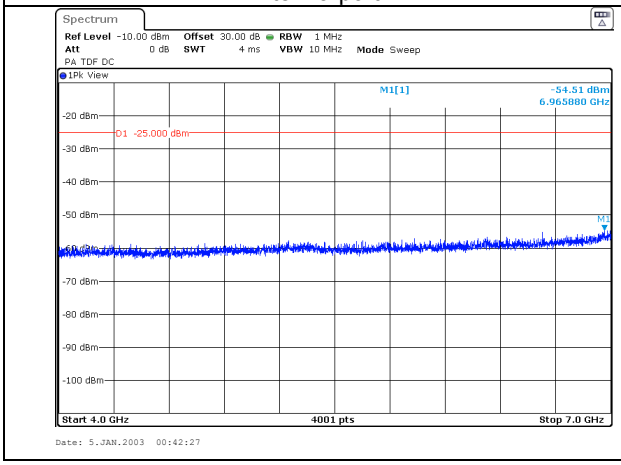
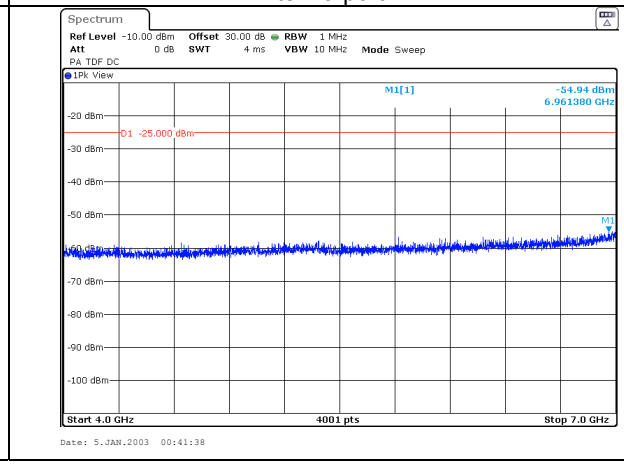
Antenna port #11	Antenna port #21
	

Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 28 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.4.14 Spurious emission measurements in 4000 - 7000 MHz at mid carrier frequency, 10 MHz EBW

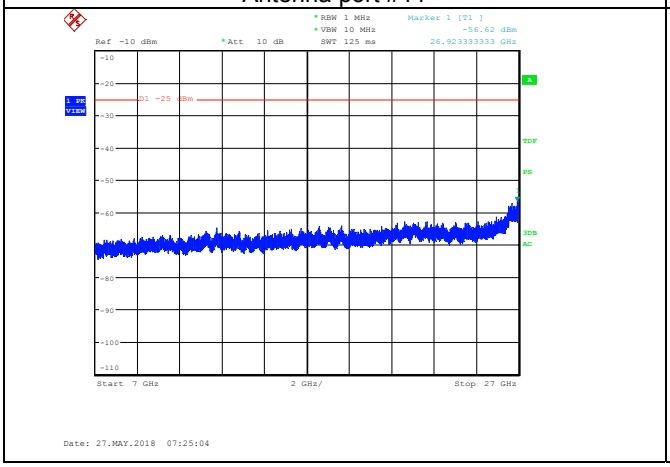
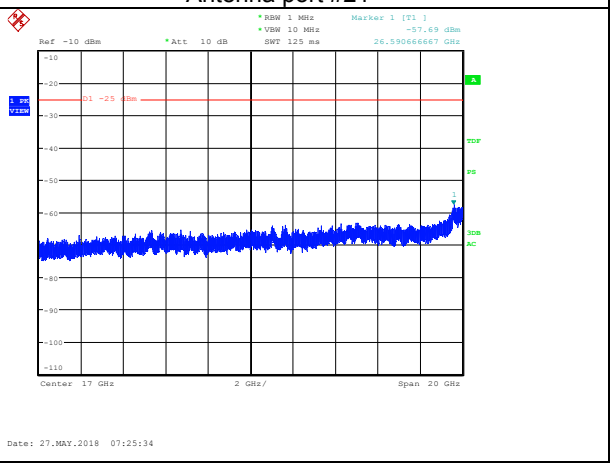
Antenna port #11	Antenna port #21
	

Plot 7.4.15 Spurious emission measurements in 4000 - 7000 MHz at high carrier frequency, 10 MHz EBW

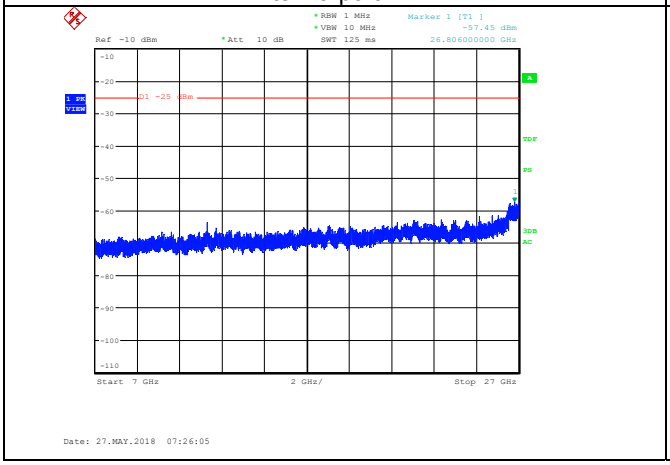
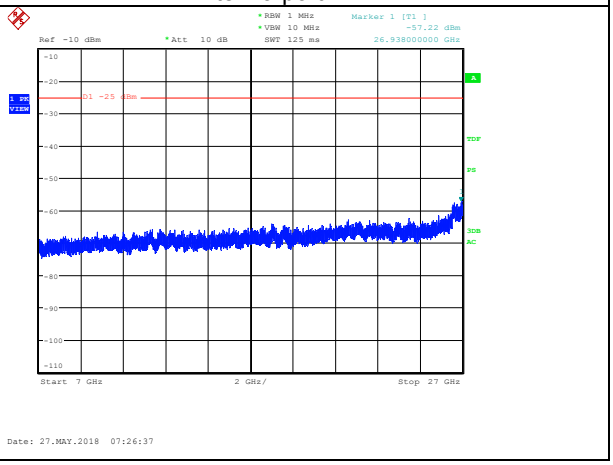
Antenna port #11	Antenna port #21
	

Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 28 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.4.16 Spurious emission measurements in 7000 - 27000 MHz range at low carrier frequency, 10 MHz EBW

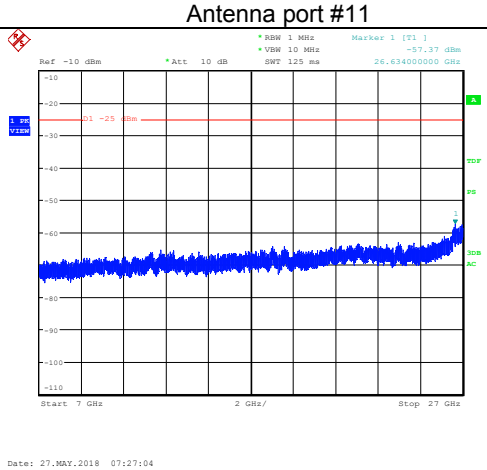
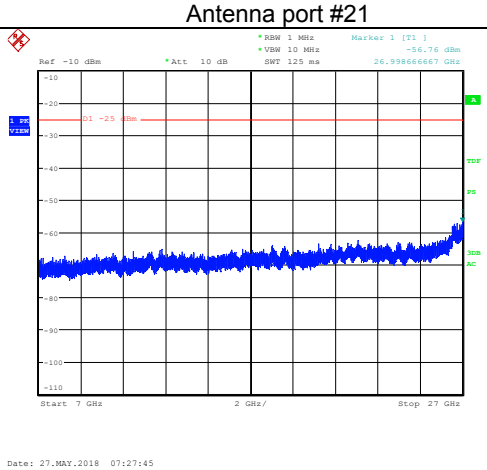
Antenna port #11	Antenna port #21
	

Plot 7.4.17 Spurious emission measurements in 7000 - 27000 MHz at mid carrier frequency, 10 MHz EBW

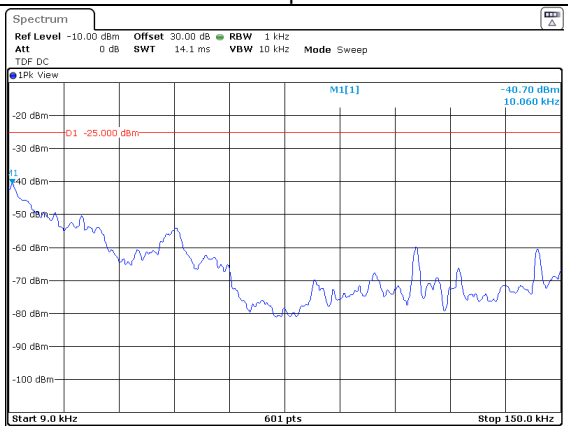
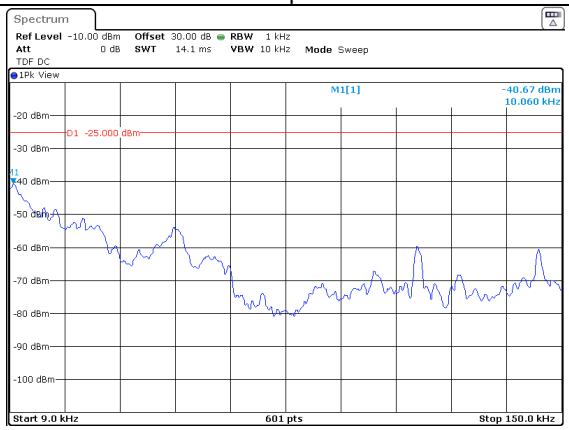
Antenna port #11	Antenna port #21
	

Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 28 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.4.18 Spurious emission measurements in 7000 - 27000 MHz at high carrier frequency, 10 MHz EBW

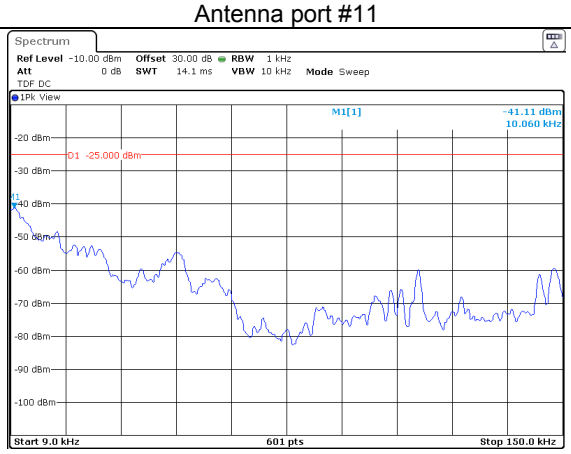
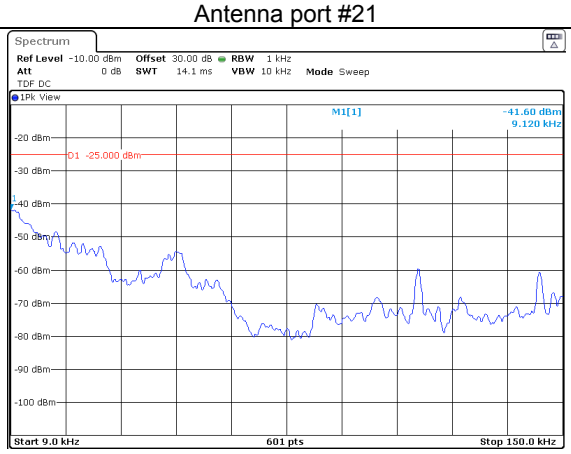
Antenna port #11	Antenna port #21
	

Plot 7.4.19 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency, 20 MHz EBW

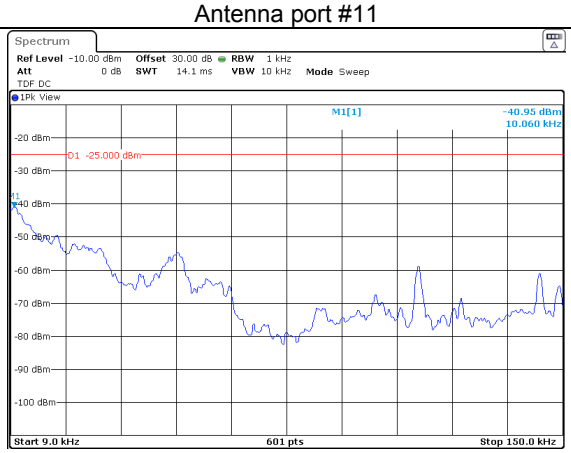
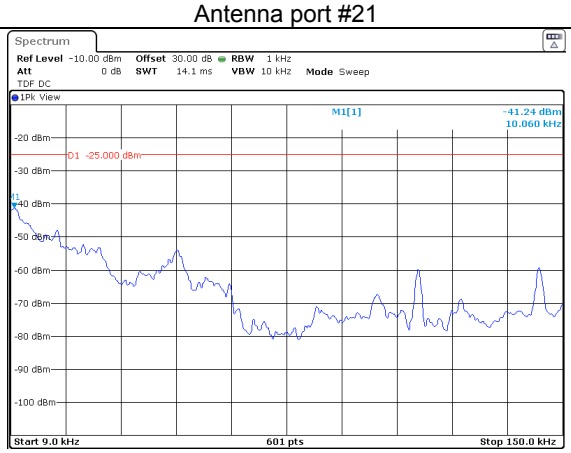
Antenna port #11	Antenna port #21
	

Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 28 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.4.20 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency, 20 MHz EBW

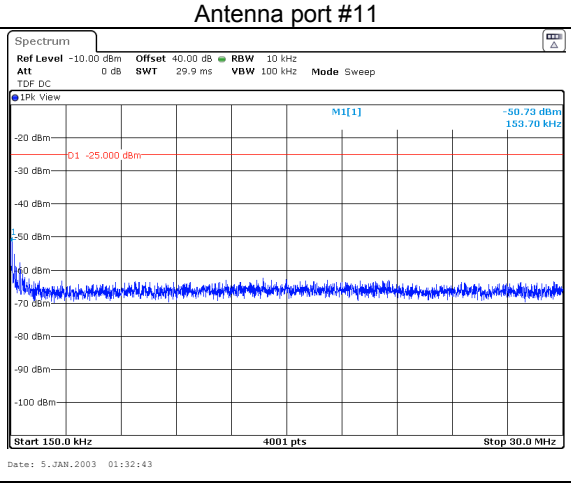
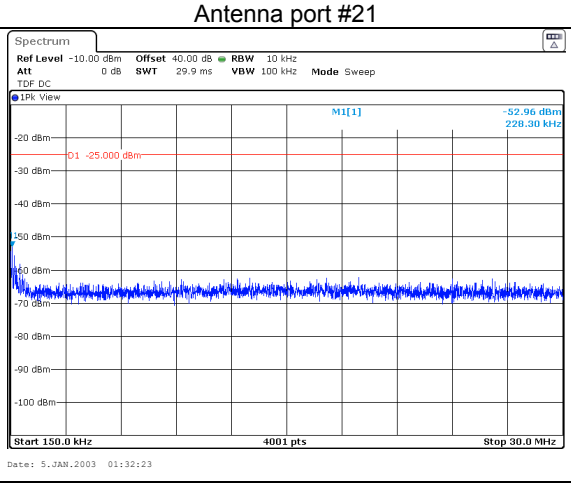
Antenna port #11	Antenna port #21
	

Plot 7.4.21 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency, 20 MHz EBW

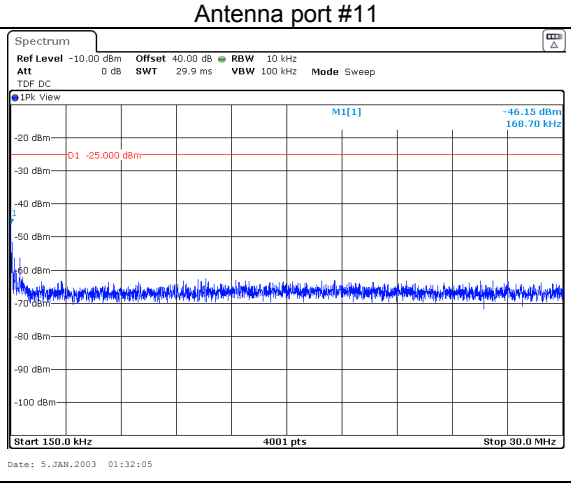
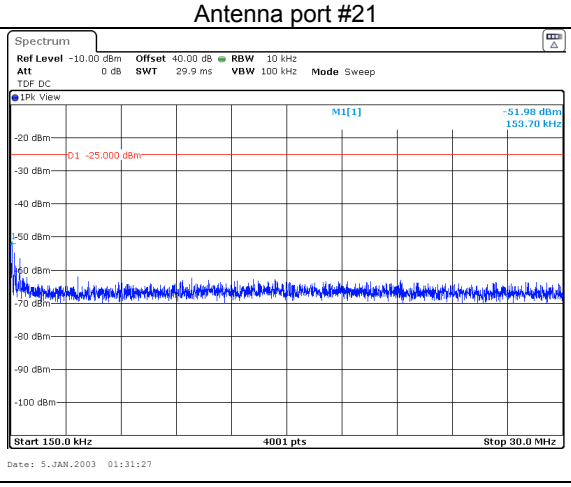
Antenna port #11	Antenna port #21
	

Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 28 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.4.22 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency, 20 MHz EBW

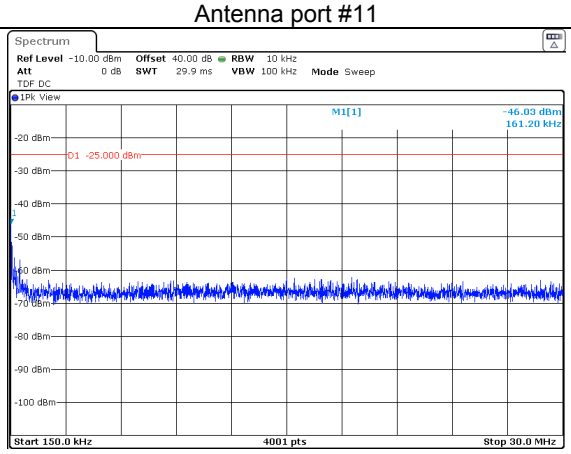
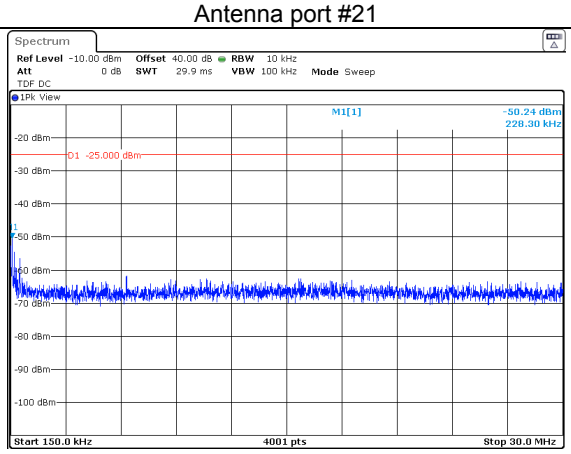
Antenna port #11	Antenna port #21
	

Plot 7.4.23 Spurious emission measurements in 0.15 - 30.0 MHz range at mid carrier frequency, 20 MHz EBW

Antenna port #11	Antenna port #21
	

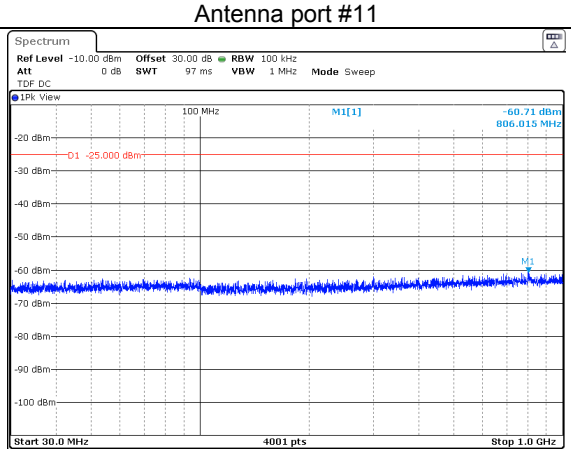
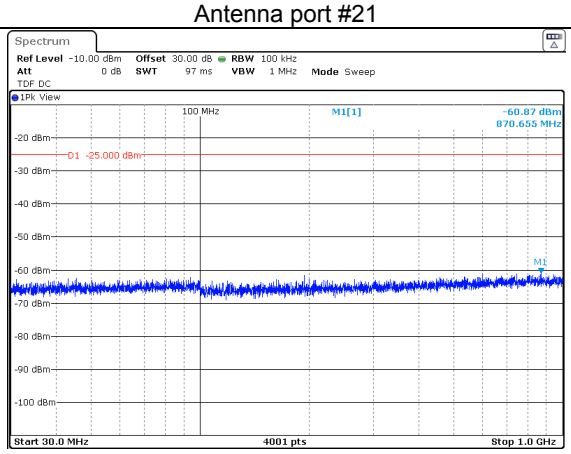
Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 28 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.4.24 Spurious emission measurements in 0.15 - 30.0 MHz range at high carrier frequency, 20 MHz EBW

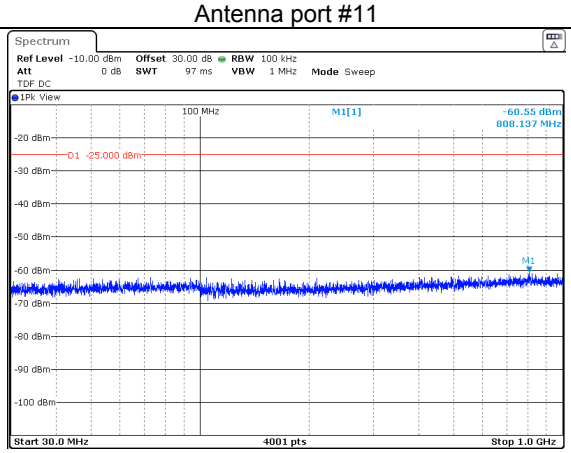
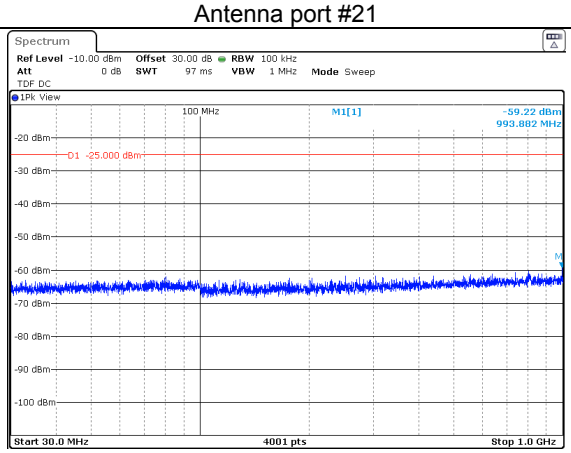
Antenna port #11	Antenna port #21
	

Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 28 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.4.25 Spurious emission measurements in 30 - 1000 MHz range at low carrier frequency, 20 MHz EBW

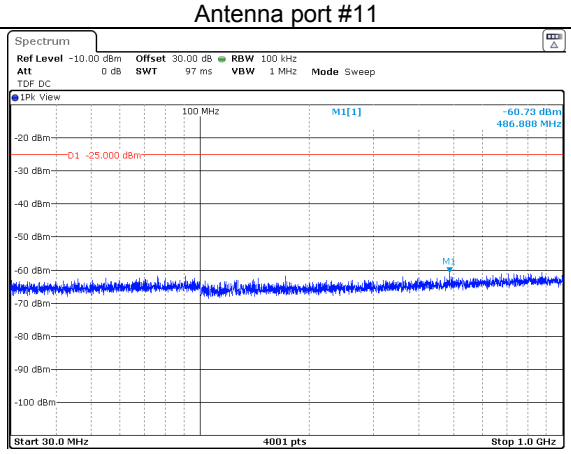
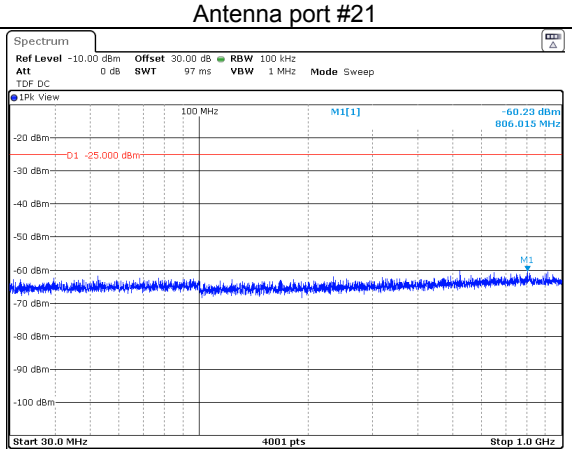
Antenna port #11	Antenna port #21
	

Plot 7.4.26 Spurious emission measurements in 30 - 1000 MHz range at mid carrier frequency, 20 MHz EBW

Antenna port #11	Antenna port #21
	

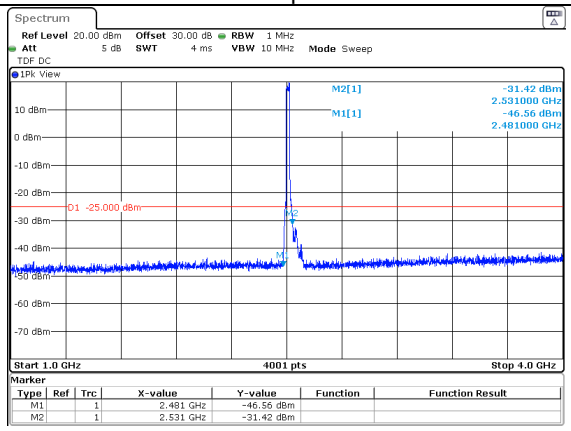
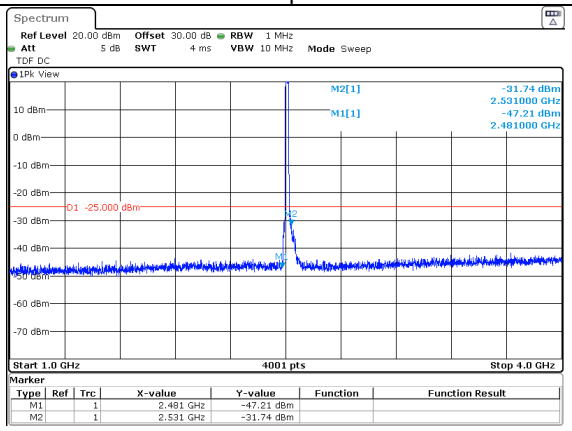
Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 28 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.4.27 Spurious emission measurements in 30 - 1000 MHz range at high carrier frequency, 20 MHz EBW

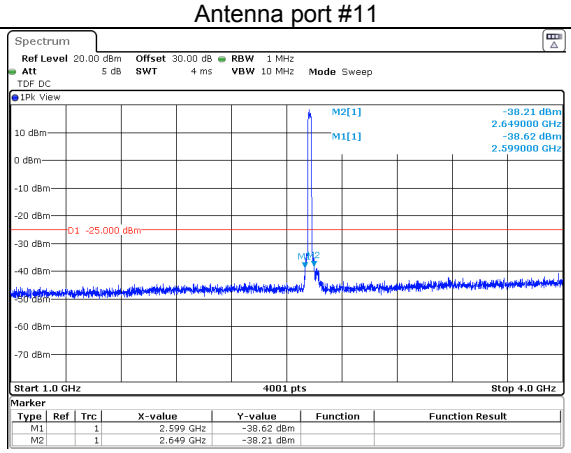
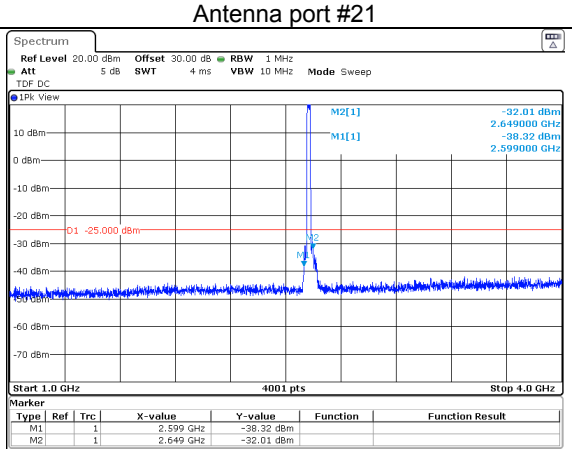
Antenna port #11	Antenna port #21
	

Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 28 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.4.28 Spurious emission measurements in 1000 - 4000 MHz range at low carrier frequency, 20 MHz EBW

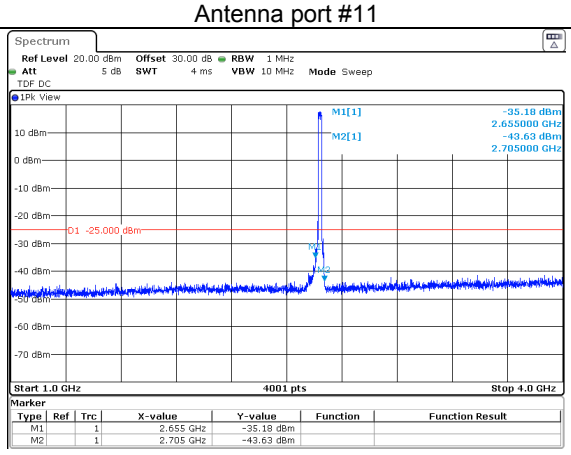
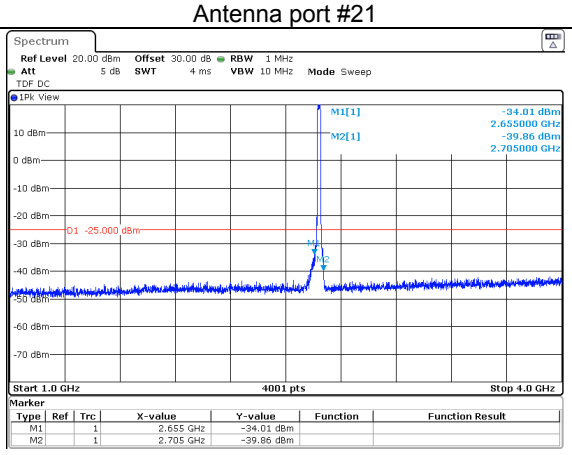
Antenna port #11	Antenna port #21
	

Plot 7.4.29 Spurious emission measurements in 1000 - 4000 MHz range at mid carrier frequency, 20 MHz EBW

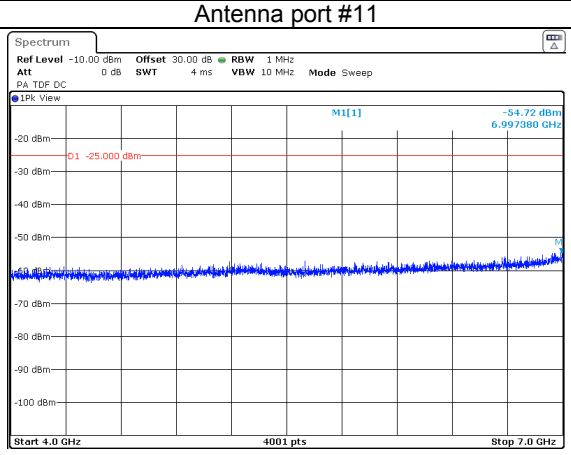
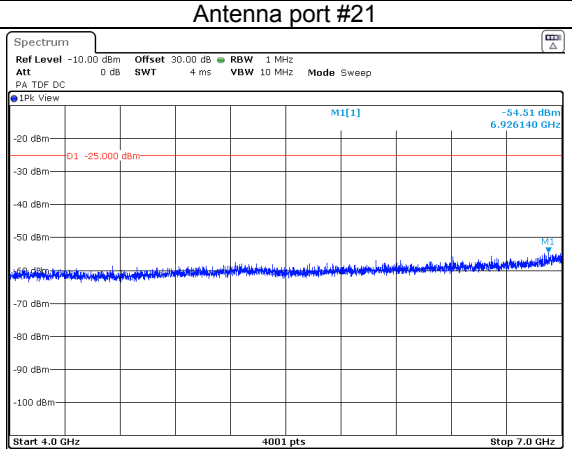
Antenna port #11	Antenna port #21
	

Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 28 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.4.30 Spurious emission measurements in 1000 - 4000 MHz range at high carrier frequency, 20 MHz EBW

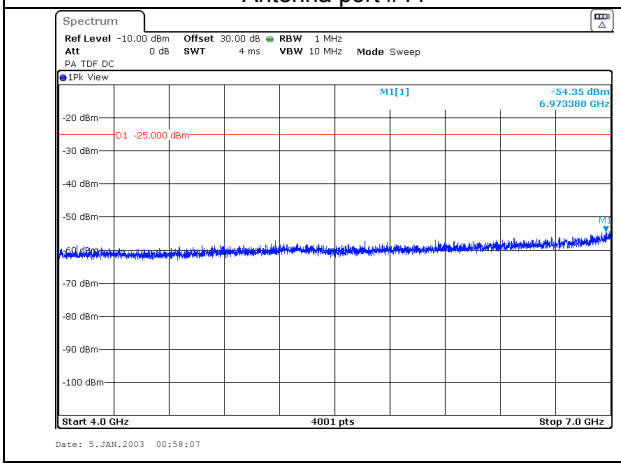
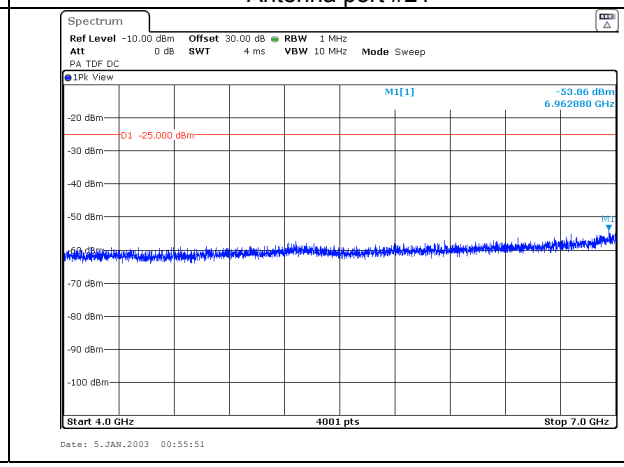
Antenna port #11	Antenna port #21
	

Plot 7.4.31 Spurious emission measurements in 4000 - 7000 MHz range at low carrier frequency, 20 MHz EBW

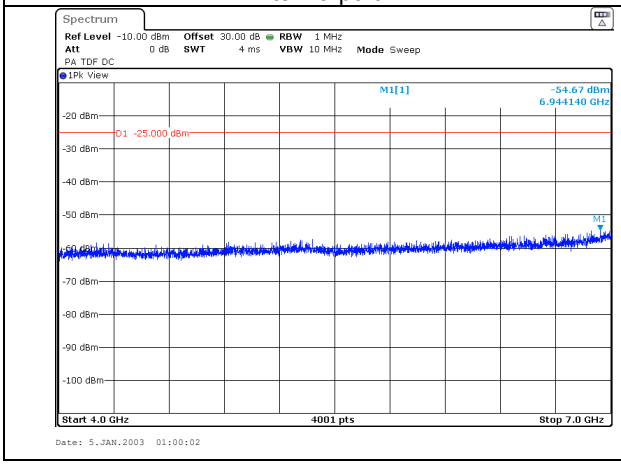
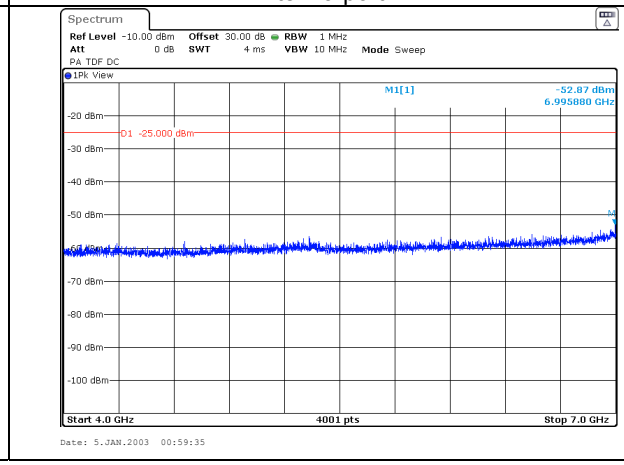
Antenna port #11	Antenna port #21
	

Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 28 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.4.32 Spurious emission measurements in 4000 - 7000 MHz at mid carrier frequency, 20 MHz EBW

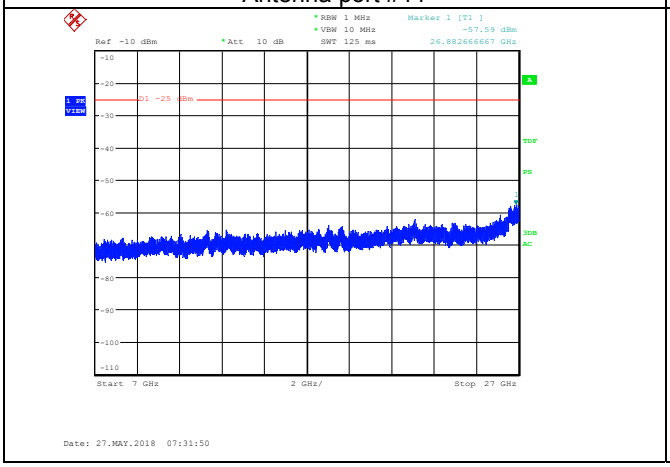
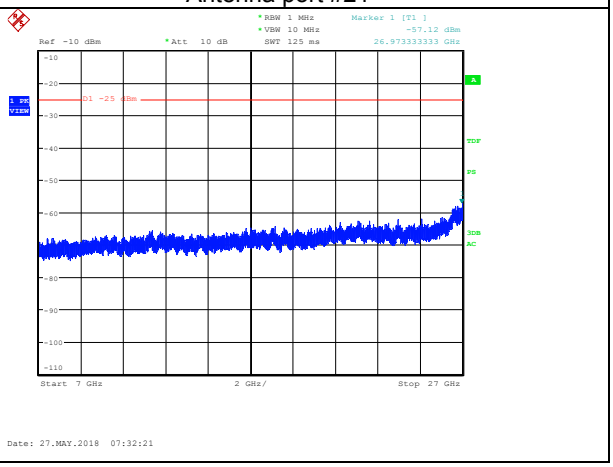
Antenna port #11	Antenna port #21
	

Plot 7.4.33 Spurious emission measurements in 4000 - 7000 MHz at high carrier frequency, 20 MHz EBW

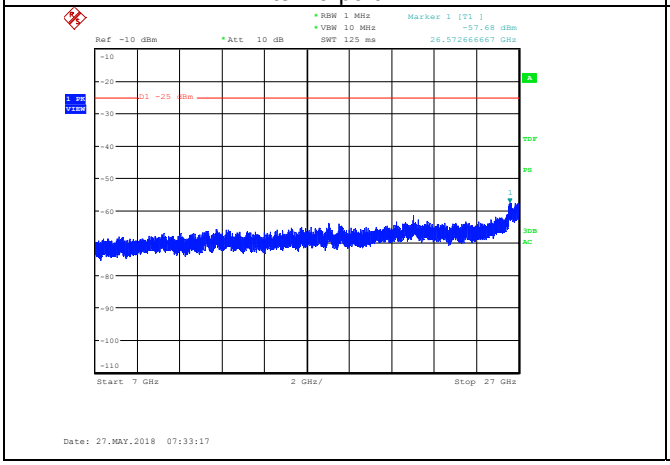
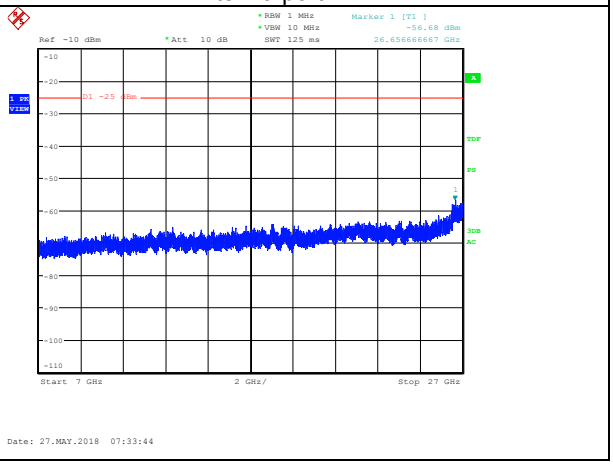
Antenna port #11	Antenna port #21
	

Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 28 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.4.34 Spurious emission measurements in 7000 - 27000 MHz range at low carrier frequency, 20 MHz EBW

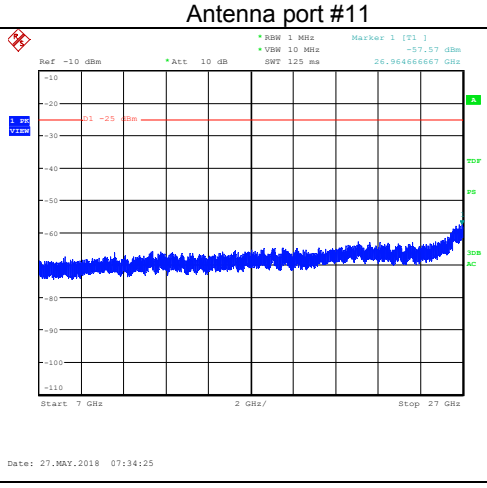
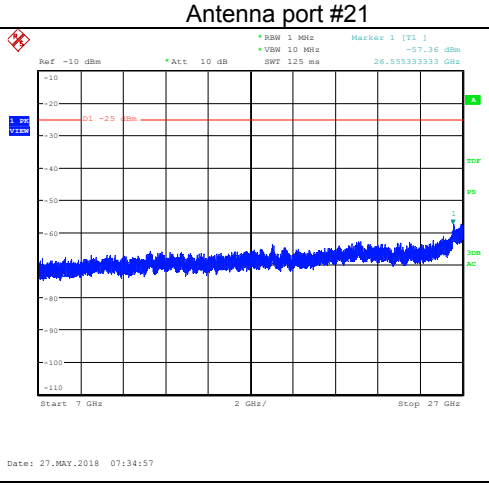
Antenna port #11	Antenna port #21
	

Plot 7.4.35 Spurious emission measurements in 7000 - 27000 MHz at mid carrier frequency, 20 MHz EBW

Antenna port #11	Antenna port #21
	

Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 28 ºC	Relative Humidity: 52 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Plot 7.4.36 Spurious emission measurements in 7000 - 27000 MHz at high carrier frequency, 20 MHz EBW

Antenna port #11	Antenna port #21
	

Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-E, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	16-May-18		
Temperature: 27 ºC	Relative Humidity: 46 %	Air Pressure: 1011 hPa	Power: 12 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

For operation in 2496-2690 MHz

Frequency, MHz	Attenuation below carrier, dBc	ERP of spurious, dBm	Equivalent field strength limit @ 3m, dB(μV/m)***
0.009 – 10th harmonic*	55+10logP** mobile	-25	72.4

* - Excluding the band emission
** - P is transmitter output power in Watts
*** - Equivalent field strength limit was calculated from maximum allowed ERP of spurious as follows:

$$E=sqrt(30\times P\times 1.64)/r,$$

where P is ERP in Watts, 1.64 is numeric gain of ideal dipole and r is antenna to EUT distance in meters

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° 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° 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.

7.5.4 Test procedure for substitution ERP measurements of spurious

7.5.4.1 The test equipment was set up as shown in Figure 7.5.3 and energized.

7.5.4.2 RF signal generator was set to the frequency of investigated spurious emission and the RF output level was preliminary adjusted to produce the same field strength as it was measured from the EUT.

7.5.4.3 The test antenna height was swept from 1 to 4 m to find maximum emission from substitution antenna and RF signal generator output was fine adjusted to produce the same field strength as it was measured from the EUT.

7.5.4.4 The above procedure was performed in both, horizontal and vertical, polarizations of the test and substitution antennas.

7.5.4.5 The ERP of spurious emissions was calculated as a sum of signal generator output power in dBm and antenna gain in dBd reduced by cable loss in dB.

7.5.4.6 The above procedure was repeated at the rest of investigated frequencies.

7.5.4.7 The worst test results (the lowest margins) were recorded in Table 7.5.3 and shown in the associated plots.

Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-E, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	16-May-18		
Temperature: 27 ºC	Relative Humidity: 46 %	Air Pressure: 1011 hPa	Power: 12 VDC
Remarks:			

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

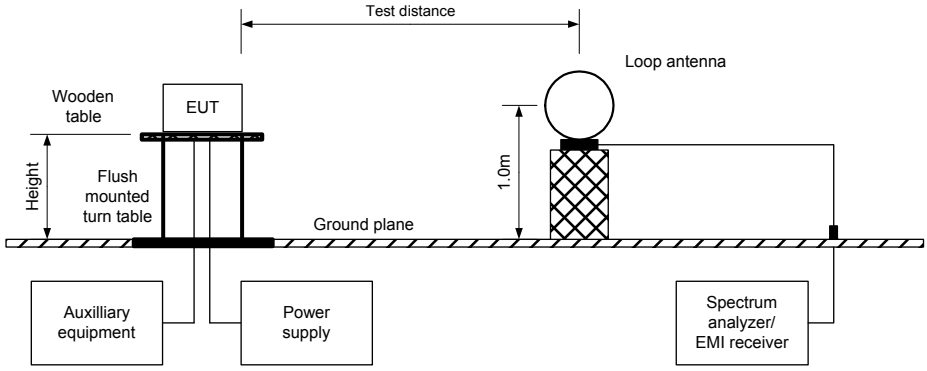
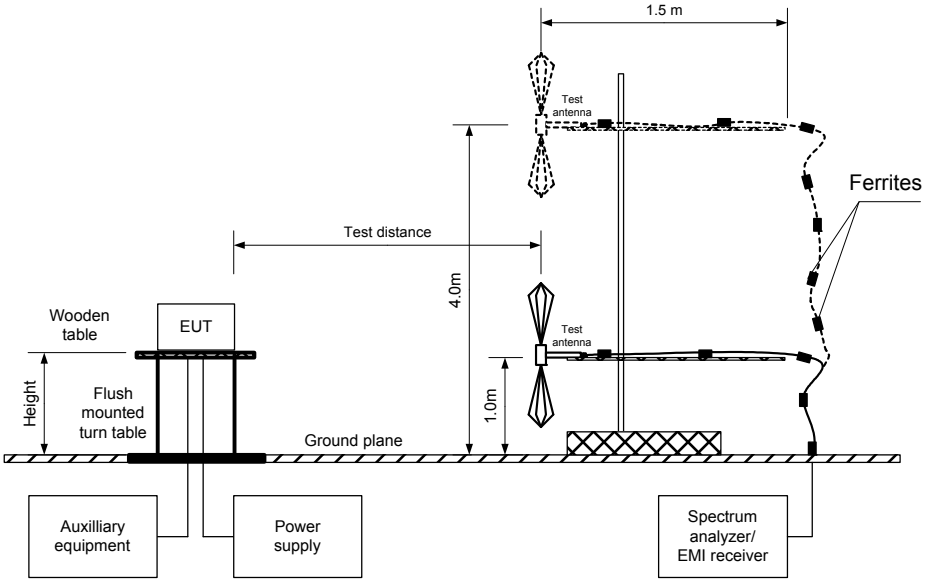
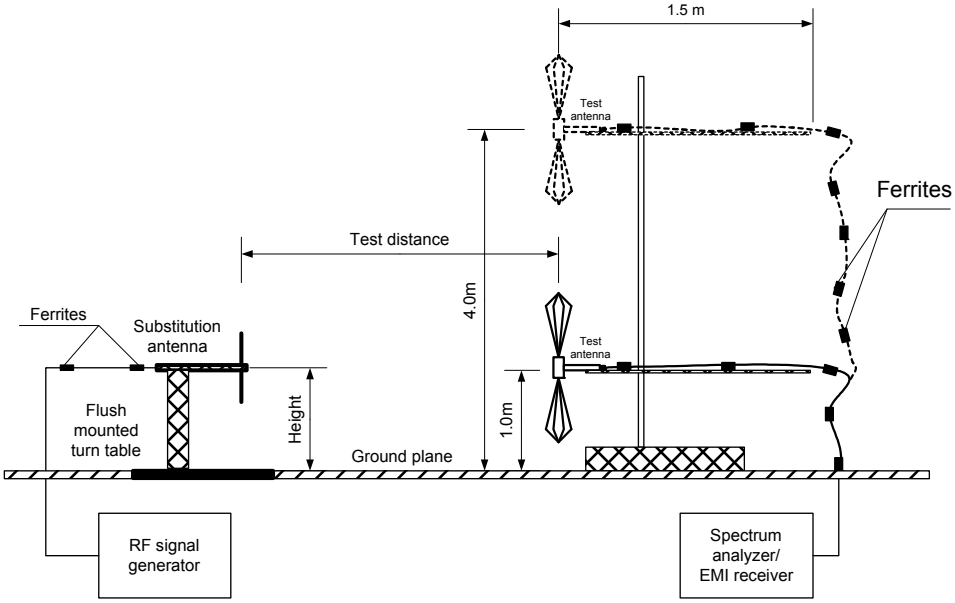


Figure 7.5.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-E, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	16-May-18		
Temperature: 27 ºC	Relative Humidity: 46 %	Air Pressure: 1011 hPa	Power: 12 VDC
Remarks:			

Figure 7.5.3 Setup for substitution ERP measurements of spurious



Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-E, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	16-May-18		
Temperature: 27 ºC	Relative Humidity: 46 %	Air Pressure: 1011 hPa	Power: 12 VDC
Remarks:			

Table 7.5.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
TEST DISTANCE: 3 m
TEST SITE: Semi anechoic chamber
EUT HEIGHT: 0.8 m
INVESTIGATED FREQUENCY RANGE: 0.009 – 27000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: > Resolution bandwidth
TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
Biconilog (30 MHz – 1000 MHz)
Double ridged guide (above 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, m	Turn-table position**, degrees
Low carrier frequency 2501 MHz							
234.476000	62.35	72.4	-10.05	100	Vert	1.14	117
Mid carrier frequency 2624 MHz							
234.476000	62.47	72.4	-9.93	100	Vert	1.15	114
High carrier frequency 2685 MHz							
234.476000	63.26	72.4	-9.14	100	Vert	1.17	112

*- Margin = Field strength of spurious – calculated field strength limit.
**- EUT front panel refers to 0 degrees position of turntable.

Table 7.5.3 Substitution ERP of spurious test results

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
SUBSTITUTION ANTENNA HEIGHT: 0.8 m
DETECTOR USED: Peak
VIDEO BANDWIDTH: > Resolution bandwidth
SUBSTITUTION ANTENNA TYPE: Tunable dipole (30 MHz – 1000 MHz)

Frequency, MHz	Field strength, dB(μV/m)	RBW, kHz	Antenna polarization	RF generator output, dBm	Ant gain, dBd	Cable loss, dB	ERP, dBm	Limit, dBm	Margin, dB*	Verdict
Low carrier frequency										
234.47600	62.35	100	Vert	-33.30	-0.58	1.04	-34.92	-25.0	-9.92	Pass
Mid carrier frequency										
234.47600	62.47	100	Vert	-33.18	-0.58	1.04	-34.80	-25.0	-9.80	Pass
High carrier frequency										
234.47600	63.26	100	Vert	-32.39	-0.58	1.04	-34.01	-25.0	-9.01	Pass

*- Margin = Spurious emission – specification limit.

Reference numbers of test equipment used

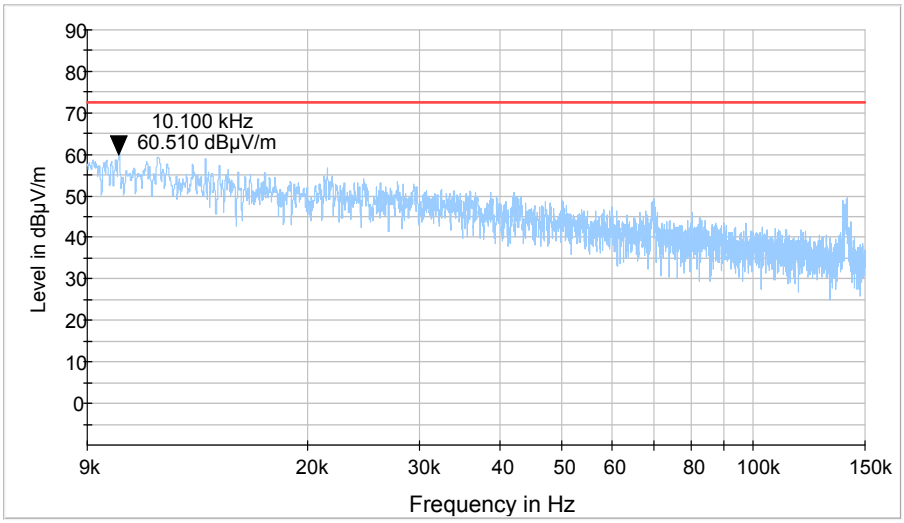
HL 0446	HL 0604	HL 0661	HL 4278	HL 4360	HL 4933	HL 4956	HL 5110
HL 5111	HL 5112						

Full description is given in Appendix A.

Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-E, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	16-May-18		
Temperature: 27 ºC	Relative Humidity: 46 %	Air Pressure: 1011 hPa	Power: 12 VDC
Remarks:			

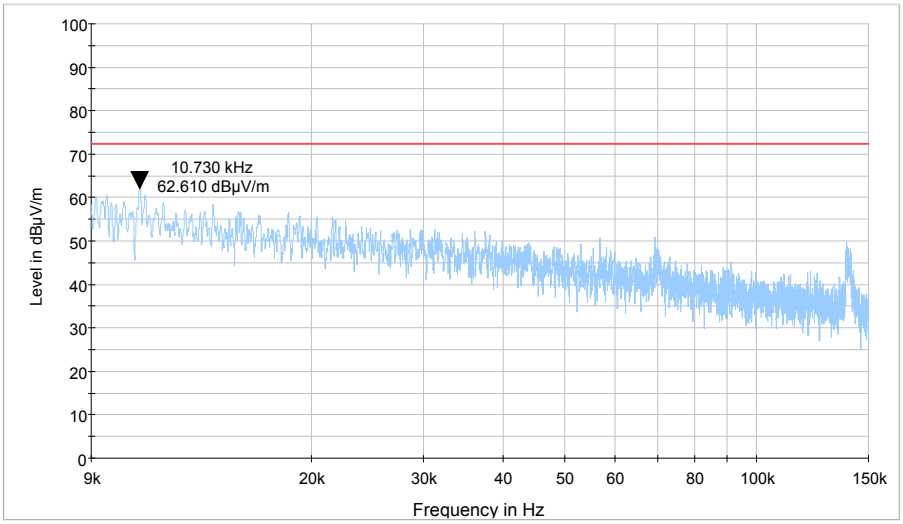
Plot 7.5.1 Radiated emission measurements in 9 - 150 kHz range

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 - 150 kHz range

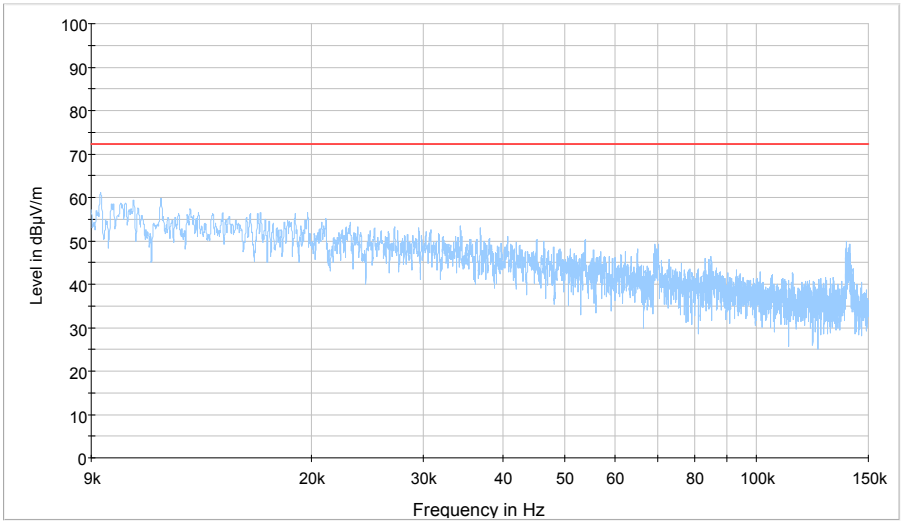
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-E, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	16-May-18		
Temperature: 27 ºC	Relative Humidity: 46 %	Air Pressure: 1011 hPa	Power: 12 VDC
Remarks:			

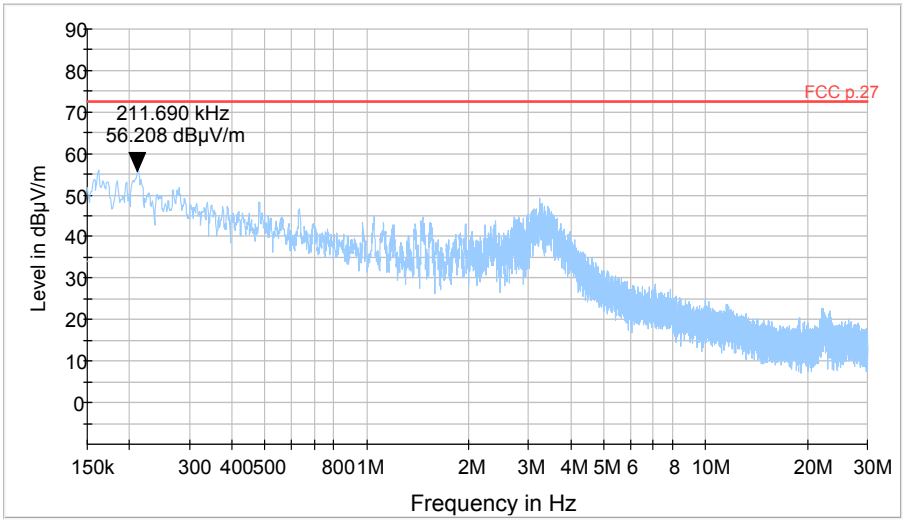
Plot 7.5.3 Radiated emission measurements in 9 - 150 kHz range

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 0.15 - 30 MHz range

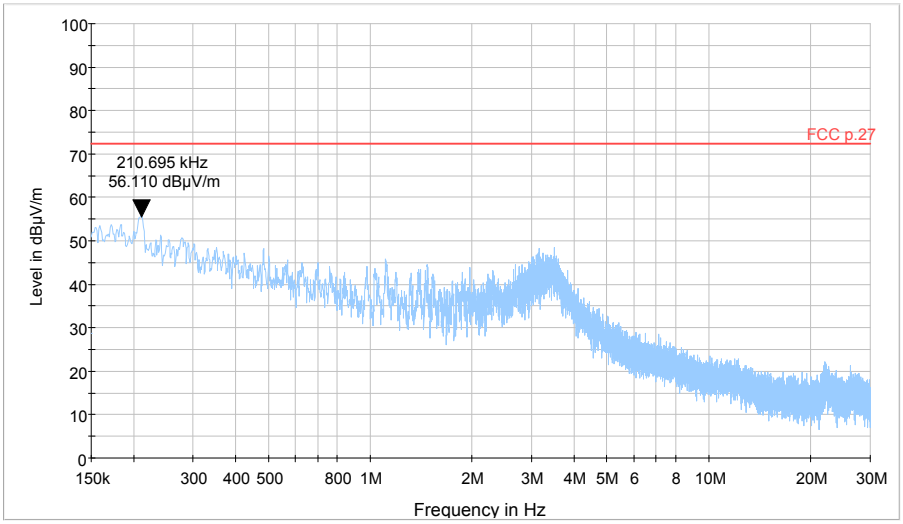
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-E, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	16-May-18		
Temperature: 27 ºC	Relative Humidity: 46 %	Air Pressure: 1011 hPa	Power: 12 VDC
Remarks:			

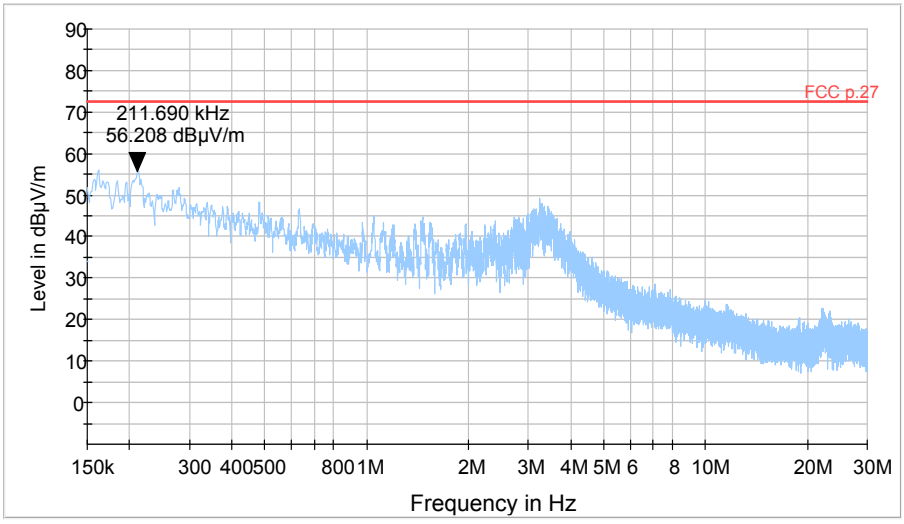
Plot 7.5.5 Radiated emission measurements in 0.15 - 30 MHz range

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 0.15 - 30 MHz range

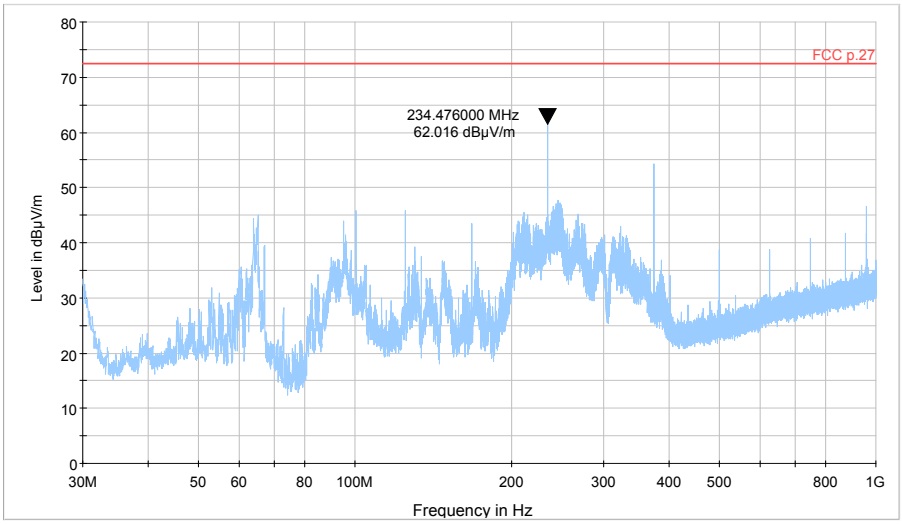
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-E, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	16-May-18		
Temperature: 27 ºC	Relative Humidity: 46 %	Air Pressure: 1011 hPa	Power: 12 VDC
Remarks:			

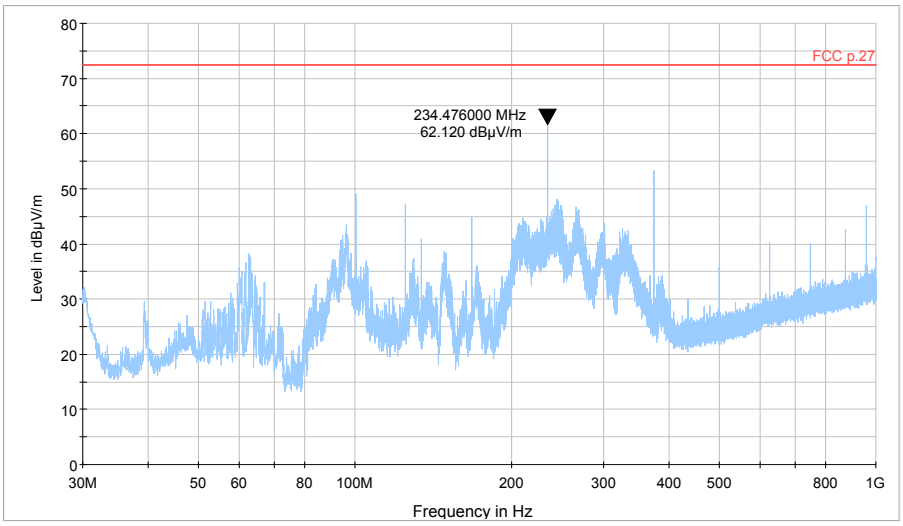
Plot 7.5.7 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.5.8 Radiated emission measurements in 30 - 1000 MHz range

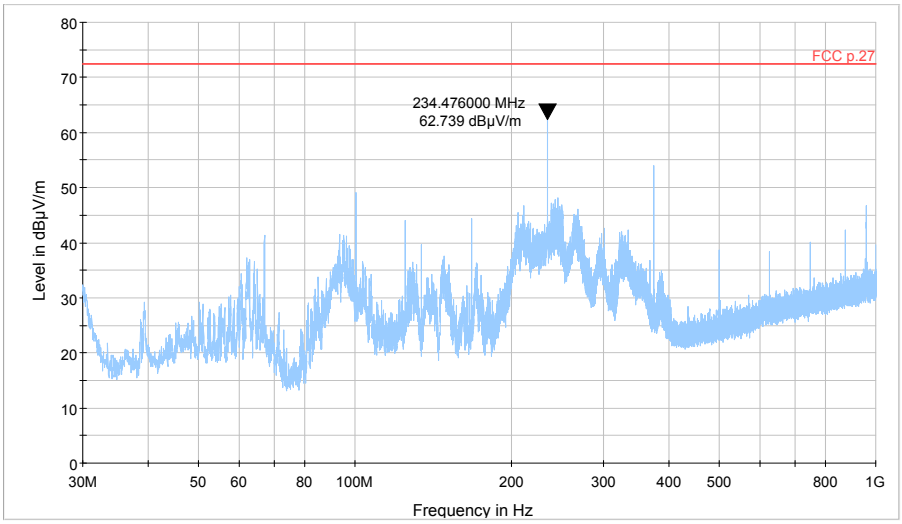
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-E, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	16-May-18		
Temperature: 27 ºC	Relative Humidity: 46 %	Air Pressure: 1011 hPa	Power: 12 VDC
Remarks:			

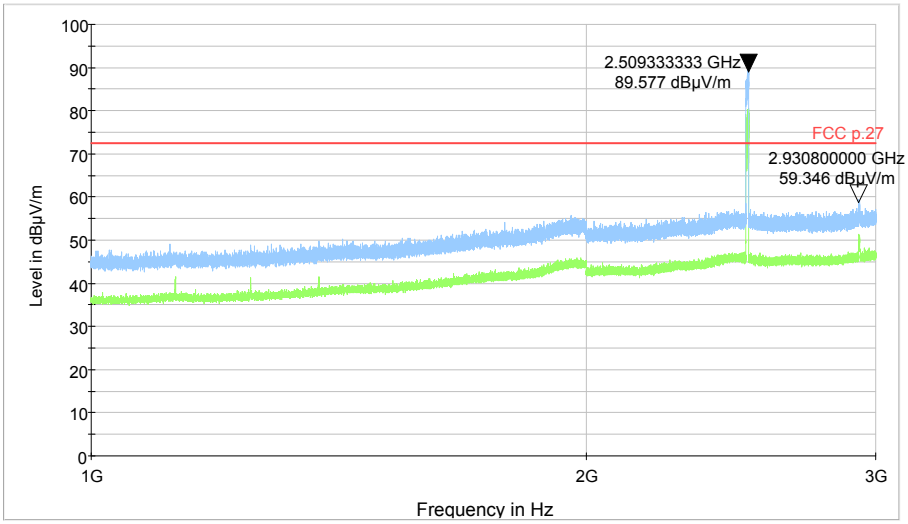
Plot 7.5.9 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.5.10 Radiated emission measurements in 1000 – 3000 MHz range

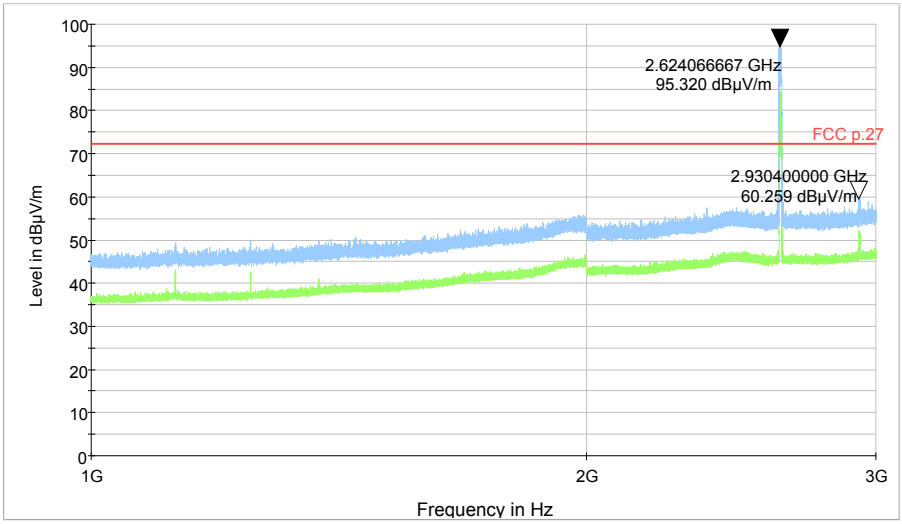
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-E, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	16-May-18		
Temperature: 27 ºC	Relative Humidity: 46 %	Air Pressure: 1011 hPa	Power: 12 VDC
Remarks:			

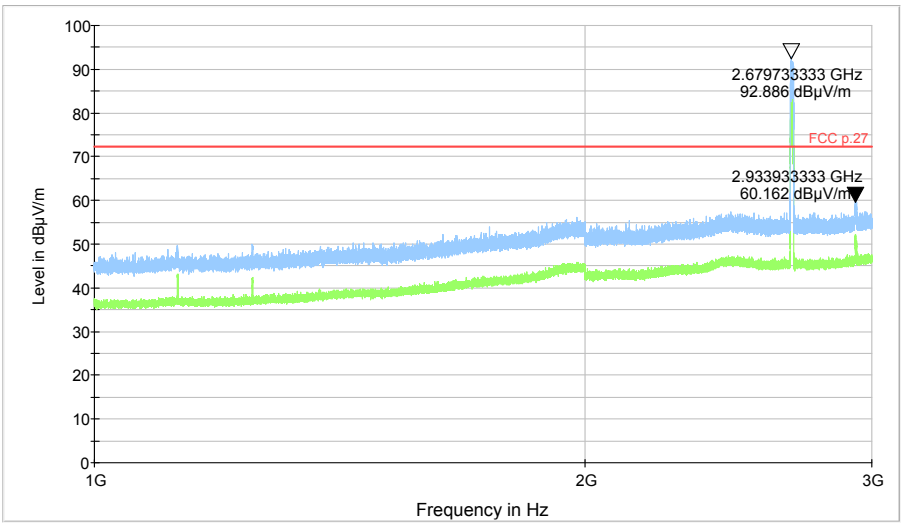
Plot 7.5.11 Radiated emission measurements in 1000 – 3000 MHz range

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 1000 – 3000 MHz range

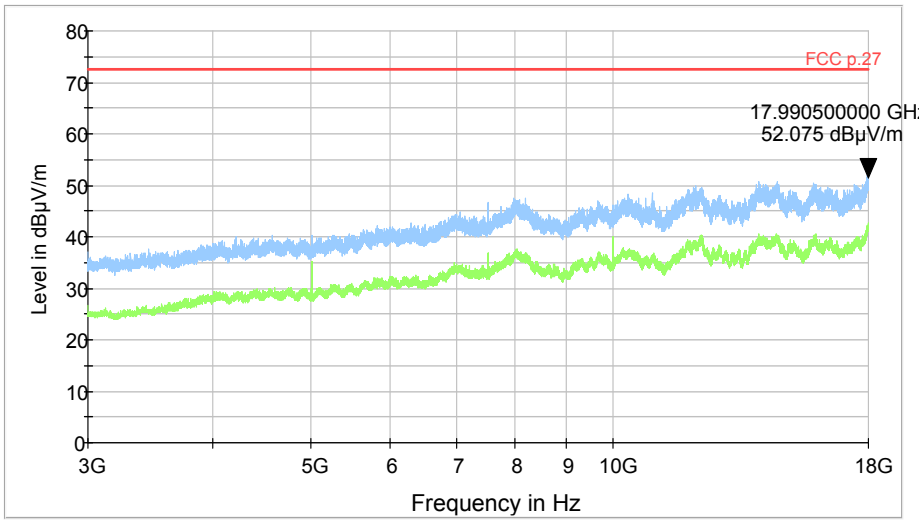
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-E, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	16-May-18		
Temperature: 27 ºC	Relative Humidity: 46 %	Air Pressure: 1011 hPa	Power: 12 VDC
Remarks:			

Plot 7.5.13 Radiated emission measurements in 3000 – 18000 MHz range

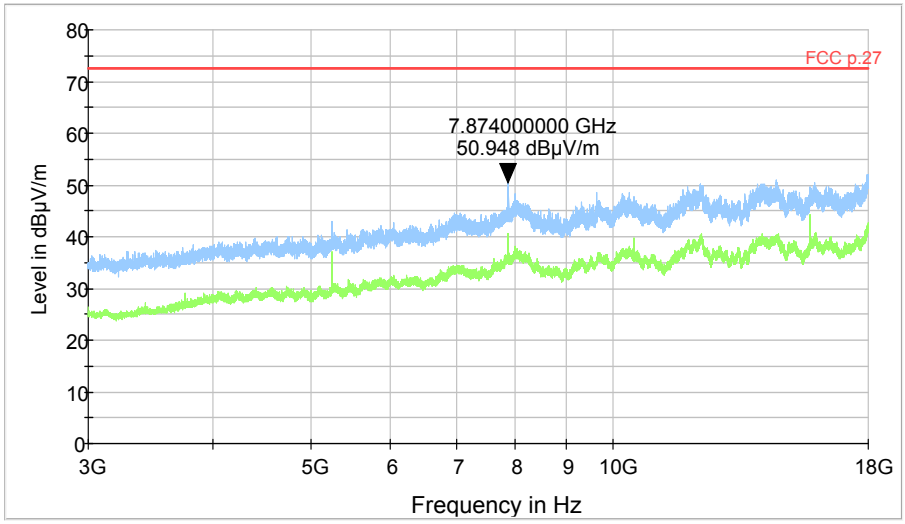
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-E, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	16-May-18		
Temperature: 27 ºC	Relative Humidity: 46 %	Air Pressure: 1011 hPa	Power: 12 VDC
Remarks:			

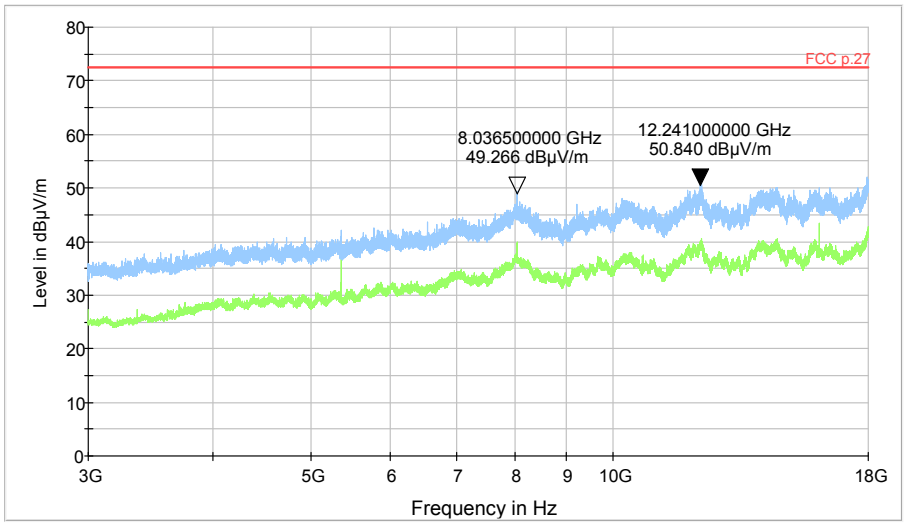
Plot 7.5.14 Radiated emission measurements in 3000 – 18000 MHz range

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



Plot 7.5.15 Radiated emission measurements in 3000 – 18000 MHz range

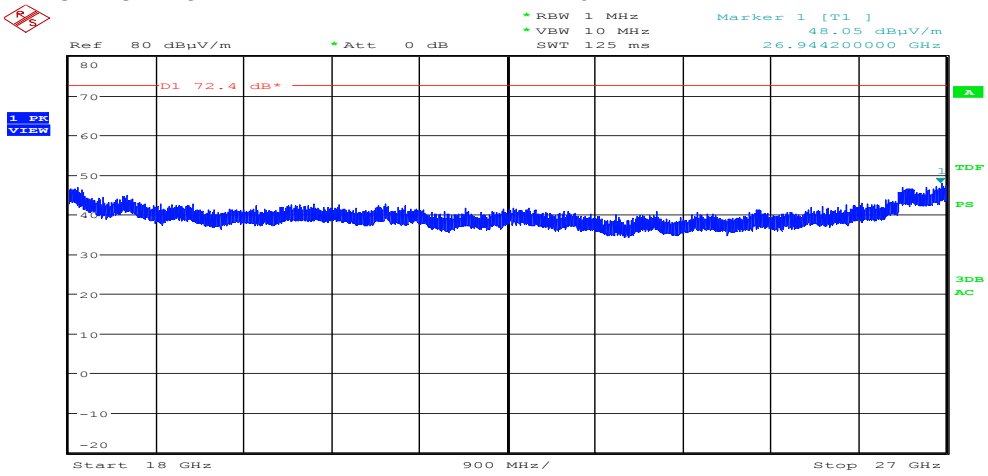
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-E, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	16-May-18		
Temperature: 27 ºC	Relative Humidity: 46 %	Air Pressure: 1011 hPa	Power: 12 VDC
Remarks:			

Plot 7.5.16 Radiated emission measurements in 18000 – 27000 MHz range

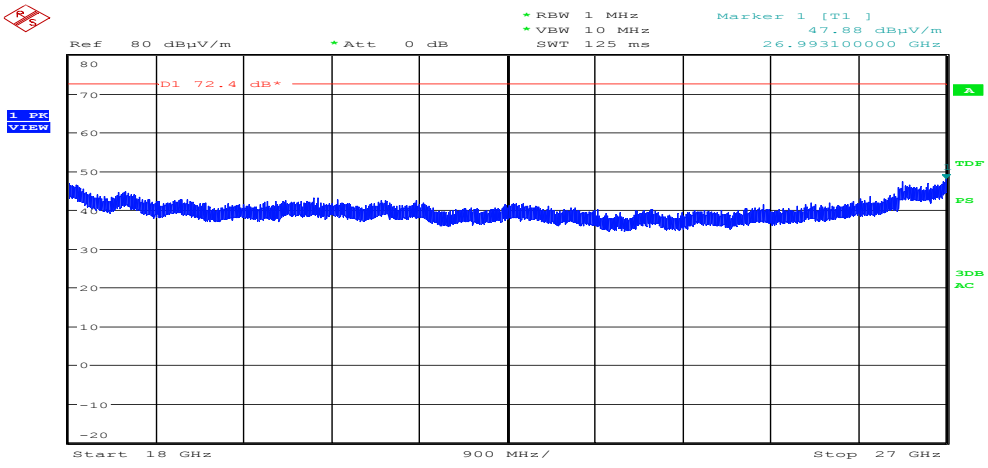
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Date: 27.MAY.2018 08:57:57

Plot 7.5.17 Radiated emission measurements in 18000 – 27000 MHz range

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

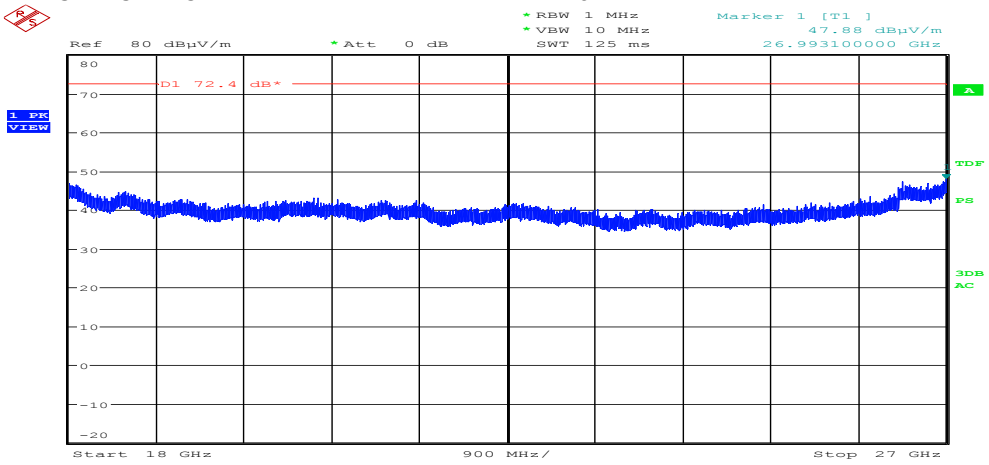


Date: 27.MAY.2018 09:02:09

Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-E, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	16-May-18		
Temperature: 27 ºC	Relative Humidity: 46 %	Air Pressure: 1011 hPa	Power: 12 VDC
Remarks:			

Plot 7.5.18 Radiated emission measurements in 18000 – 27000 MHz range

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



Date: 27.MAY.2018 09:02:09

Test specification:	Section 27.54, Frequency stability		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-E Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 26 ºC	Relative Humidity: 49 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

7.6 Frequency stability test

7.6.1 General

This test was performed to measure frequency stability of transmitter RF carrier. Specification test limits are given in Table 7.6.1.

Table 7.6.1 Frequency stability limits

Assigned frequency, MHz	Maximum allowed frequency displacement
2496.0 - 2690.0	The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

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 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.

7.6.2.3 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.

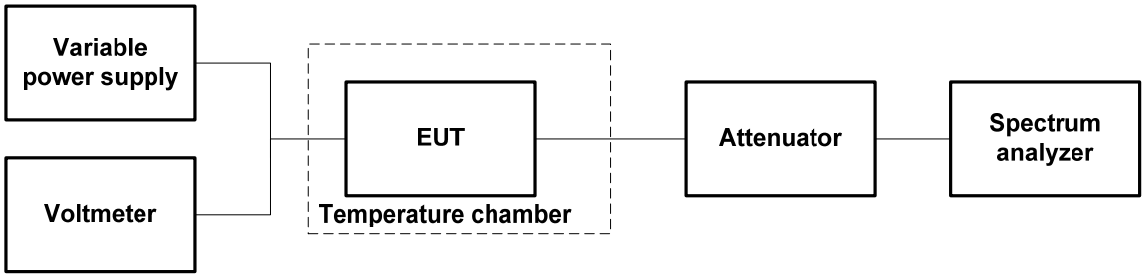
7.6.2.4 The above procedure was repeated at 0°C and at the lowest test temperature.

7.6.2.5 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.

7.6.2.6 Frequency displacement was calculated and provided in Table 7.6.2.

7.6.2.7 The test results recorded in Table 7.6.3, Table 7.6.4.

Figure 7.6.1 Frequency stability test setup



Test specification:	Section 27.54, Frequency stability		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-E Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 26 ºC	Relative Humidity: 49 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Table 7.6.2 Frequency stability test results

OPERATING FREQUENCY: 2496.0 – 2690.0 MHz
NOMINAL POWER VOLTAGE: 12 VDC
TEMPERATURE STABILIZATION PERIOD: 20 min
POWER DURING TEMPERATURE TRANSITION: Off
SPECTRUM ANALYZER MODE: Counter
RESOLUTION BANDWIDTH: 10 Hz
VIDEO BANDWIDTH: 30 Hz
MODULATION: Unmodulated

T, ºC	Voltage, V	Frequency, MHz							Max frequency drift, Hz	
		Start up	1st min	2nd min	3rd min	4th min	5th min	10th min	Positive	Negative
Low carrier frequency										
-30	nominal	2501.000002	2501.000004	2501.000006	2501.000003	2501.000000	2501.000011	2501.000002	5	-6
-20	nominal	2501.000005	NA	NA	NA	NA	NA	2501.000004	-1	-6
-10	nominal	2501.000011	NA	NA	NA	NA	NA	2500.999993	5	-13
0	nominal	2501.000008	2501.000003	2501.000004	2501.000003	2501.000002	2501.000007	2501.000000	2	-13
10	nominal	2501.000006	NA	NA	NA	NA	NA	2501.000008	2	-6
20	15%	2500.999998	NA	NA	NA	NA	NA	2500.999997	-8	-9
20	nominal	2501.000006	NA	NA	NA	NA	NA	2501.000006	0	-9
20	-15%	2500.999997	NA	NA	NA	NA	NA	2501.000006	0	-9
30	nominal	2500.999996	2501.000008	2501.000002	2500.999999	2501.000011	2501.000008	2500.999992	5	-14
40	nominal	2501.000001	NA	NA	NA	NA	NA	2501.000006	0	-14
50	nominal	2501.000005	NA	NA	NA	NA	NA	2501.000004	-1	0
Mid carrier frequency										
-30	nominal	2624.000000	2624.000001	2624.000007	2624.000008	2624.000004	2624.000008	2624.000001	0	-8
-20	nominal	2624.000007	NA	NA	NA	NA	NA	2624.000006	-1	-2
-10	nominal	2624.000007	NA	NA	NA	NA	NA	2624.000000	-1	-8
0	nominal	2624.000001	2624.000006	2624.000009	2624.000007	2624.000006	2624.000007	2624.000001	1	-7
10	nominal	2623.999995	NA	NA	NA	NA	NA	2624.000005	-3	-13
20	15%	2624.000001	NA	NA	NA	NA	NA	2624.000003	-5	-7
20	nominal	2623.999996	NA	NA	NA	NA	NA	2624.000008	0	-12
20	-15%	2623.999999	NA	NA	NA	NA	NA	2624.000001	-7	-9
30	nominal	2624.000000	2624.000007	2624.000005	2623.999994	2624.000003	2624.000003	2624.000009	1	-14
40	nominal	2624.000005	NA	NA	NA	NA	NA	2623.999997	-3	-11
50	nominal	2624.000002	NA	NA	NA	NA	NA	2623.999995	-6	-13
High carrier frequency										
-30	nominal	2685.000001	2685.000003	2685.000004	2685.000000	2685.000007	2685.000000	2685.000002	4	-3
-20	nominal	2685.000004	NA	NA	NA	NA	NA	2685.000005	2	1
-10	nominal	2685.000007	NA	NA	NA	NA	NA	2684.999997	4	-6
0	nominal	2685.000001	2685.000004	2685.000006	2685.000003	2685.000007	2685.000005	2685.000009	6	-2
10	nominal	2685.000008	NA	NA	NA	NA	NA	2685.000005	5	2
20	15%	2685.000006	NA	NA	NA	NA	NA	2684.999999	3	-4
20	nominal	2685.000002	NA	NA	NA	NA	NA	2685.000003	0	-1
20	-15%	2685.000006	NA	NA	NA	NA	NA	2684.999999	3	-4
30	nominal	2685.000009	2685.000007	2685.000007	2685.000006	2684.999995	2685.000007	2685.000006	6	-8
40	nominal	2685.000005	NA	NA	NA	NA	NA	2685.000006	3	2
50	nominal	2685.000005	NA	NA	NA	NA	NA	2685.000006	3	2

* - Reference frequency

Test specification:	Section 27.54, Frequency stability		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-E Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date(s):	27-May-18		
Temperature: 26 ºC	Relative Humidity: 49 %	Air Pressure: 1009 hPa	Power: 12 VDC
Remarks:			

Table 7.6.3 Maximum frequency displacement

Channel	Maximum frequency displacement			
	ppm		Hz	
	Negative	Positive	Negative	Positive
Low	0.0056	0.0020	14	5
Mid	0.0053	0.0004	14	1
High	0.0030	0.0022	8	6

Table 7.6.4 Transmission occupied bandwidth with frequency drift test results

Lower measured* band edge, MHz	Upper measured* band edge, MHz	Lower calculated** band edge, MHz	Upper calculated** band edge, MHz	Lower specified band edge, MHz	Upper specified band edge, MHz	Lower margin***, MHz	Upper margin***, MHz	Verdict
Low frequency 2501 MHz								
2496.076200	2505.917500	2496.076186	2505.917505	2496.000000	2507.500000	-0.076186	-1.582495	Pass
Mid frequency 2624 MHz								
2619.11370	2628.905000	2619.113686	2628.905001	2618.000000	2629.500000	-1.113686	-0.594999	Pass
High frequency 2685 MHz								
2680.082500	2689.873630	2680.082492	2689.873636	2679.000000	2690.000000	-1.082492	-0.126364	Pass
Low frequency 2506 MHz								
2496.206000	2516.064000	2496.205986	2516.064005	2496.000000	2518.500000	-0.205986	-2.435995	Pass
Mid frequency 2624 MHz								
2614.406500	2634.376500	2614.406486	2634.376501	2614.000000	2635.000000	-0.406486	-0.623499	Pass
High frequency 2680 MHz								
2670.102000	2689.997000	2670.101992	2689.997006	2668.000000	2690.000000	-2.101992	-0.002994	Pass

* - Measured under normal test conditions at -10 dBm points
** - Measured band edge with proper drift addition
*** - Margin = Calculated band edge – specified band edge

Reference numbers of test equipment used

HL 0493	HL 2171	HL 3901	HL 4164	HL 4355			

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 kHz - 30 MHz	EMCO	6502	2857	11-Feb-18	11-Feb-19
0493	Temperature Chamber -45…175 deg C	Thermotron	S-1.2 Mini-Max	14016	04-Jun-17	04-Jun-18
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	12-May-17	12-Jun-18
0661	Generator Swept Signal, 10 MHz to 40 GHz, + 10 dBm	Hewlett Packard	83640B	3614A00266	10-May-17	10-Jun-18
2171	Multimeter	Fluke	177	79960418	19-Jul-17	19-Nov-18
3301	Power Meter, P-series, 50 MHz to 40 GHz	Agilent Technologies	N1911A	MY45101057	02-May-18	02-May-19
3901	Microwave Cable Assembly, 40.0 GHz, 3.5 m, SMA/SMA	Huber-Suhner	SUCOFLEX 102A	1225/2A	07-Feb-18	07-Feb-19
3903	Microwave Cable Assembly, 40.0 GHz, 1.5 m, SMA/SMA	Huber-Suhner	SUCOFLEX 102A	1226/2A	07-Feb-18	07-Feb-19
4164	DC Power Supply, 60V, 5A	Standig	605D	NA	16-Jan-18	16-Jan-19
4278	Test Cable , DC-18 GHz, 4.6 m, N/M - N/M	Mini-Circuits	APC-15FT-NMNM+	0755A	24-Aug-17	24-Aug-18
4355	Signal and Spectrum Analyzer, 9 kHz to 7 GHz	Rohde & Schwarz	FSV 7	191000086881	20-Apr-17	20-May-18
4360	EMI Test Receiver, 20 Hz to 40 GHz.	Rohde & Schwarz	ESU40	100322	26-Dec-17	26-Dec-18
4933	Active Horn Antenna, 1 GHz to 18 GHz	COM-POWER CORPORATION	AHA-118	701046	04-Jan-18	04-Jan-19
4956	Active horn antenna, 18 to 40 GHz	COM-POWER CORPORATION	AHA-840	105004	11-Jan-18	11-Jan-19
5110	RF cable, 18 GHz, 3 m, N-type	Huber-Suhner	ST18A/Nm/Nm/3000	600818/18A	27-Jul-17	27-Jul-18
5111	RF cable, 40 GHz, 5.5 m, K-type	Huber-Suhner	SF102EA/11SK/11SK/5500MM	502493/2EA	09-Apr-18	09-Apr-19
5112	RF cable, 40 GHz, 5.5 m, K-type	Huber-Suhner	SF102EA/11SK/11SK/5500MM	502494/2EA	27-Jul-17	27-Jul-18

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 %

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 equipment correction factors

Antenna, Loop, Active, 10 kHz - 30 MHz
EMCO, model: 6502, s/n 2857

HL 0446: Antenna factor

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

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

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

Antenna BiconiLog Log-Periodic/T Bow-TIE,
EMCO, model 3141, serial number 9611-1011

HL 0604: Antenna factor

Frequency, MHz	Antenna factor, dB/m		
	Measured	Last	Deviation
30	12.1	12.6	-0.5
35	9.1	9.5	-0.4
40	8.0	8.3	-0.3
45	8.3	8.6	-0.3
50	9.0	9.1	-0.1
60	10.5	10.7	-0.2
70	11.4	11.3	0.1
80	12.3	12.2	0.1
90	13.4	13.2	0.2
100	13.0	13.0	0.0
120	11.4	11.4	0.0
140	12.5	12.4	0.1
160	14.9	14.8	0.1
180	14.4	14.0	0.4
200	13.7	13.9	-0.2
250	16.3	16.4	-0.1
300	17.2	17.5	-0.3
400	19.8	20.2	-0.4
500	22.0	22.4	-0.4
600	24.3	24.5	-0.2
700	25.8	25.6	0.2
800	26.9	26.6	0.3
900	27.3	28.0	-0.7
1000	28.5	29.3	-0.8

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

Active Horn Antenna, 1 GHz to 18 GHz
COM-POWER CORPORATION, model: AHA-118, s/n 701046

HL 4933: Antenna factor

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.

Active horn antenna, 18 to 40 GHz
COM-POWER Corp., model: AHA-840, s/n 105004

HL4956: Antenna factor

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

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

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

Microwave Cable Assembly, 40.0 GHz, 3.5 m, SMA/SMA
Huber-Suhner, model: SUCOFLEX 102A, s/n: 1225/2A

HL 3901: Insertion loss

Set / Applied, MHz	Measured, dB	Uncertainty, dB
50	0.34	±0.06
100	0.47	±0.06
150	0.58	±0.07
200	0.67	±0.07
300	0.82	±0.07
400	0.94	±0.07
500	1.05	±0.07
600	1.15	±0.07
700	1.24	±0.07
800	1.33	±0.07
900	1.41	±0.07
1000	1.49	±0.07
1100	1.56	±0.07
1200	1.62	±0.07
1300	1.69	±0.07
1400	1.76	±0.07
1500	1.82	±0.07
1600	1.88	±0.07
1700	1.94	±0.07
1800	2.00	±0.07
1900	2.05	±0.07
2000	2.11	±0.07
2100	2.16	±0.07
2200	2.21	±0.07
2300	2.26	±0.07
2400	2.32	±0.07
2500	2.36	±0.09
2600	2.42	±0.09
2700	2.47	±0.09
2800	2.52	±0.09
2800	2.52	±0.09
2900	2.57	±0.09
3000	2.62	±0.09
3100	2.67	±0.09
3200	2.72	±0.09
3300	2.76	±0.09
3400	2.80	±0.09
3500	2.84	±0.09
3600	2.88	±0.09
3700	2.93	±0.09
3800	2.96	±0.09
3900	3.00	±0.09
4000	3.04	±0.09
4100	3.08	±0.13
4200	3.11	±0.13
4300	3.15	±0.13
4400	3.19	±0.13
4500	3.22	±0.13
4600	3.26	±0.13

Set / Applied, MHz	Measured, dB	Uncertainty, dB
4700	3.29	±0.13
4800	3.33	±0.13
4900	3.36	±0.13
5000	3.40	±0.13
5100	3.43	±0.13
5200	3.46	±0.13
5300	3.50	±0.13
5400	3.53	±0.13
5500	3.56	±0.13
5600	3.59	±0.13
5700	3.62	±0.13
5800	3.65	±0.13
5900	3.68	±0.13
6000	3.71	±0.13
6100	3.74	±0.13
6200	3.78	±0.13
6300	3.81	±0.13
6400	3.84	±0.13
6500	3.88	±0.13
6600	3.91	±0.13
6700	3.95	±0.13
6800	3.99	±0.13
6900	4.02	±0.13
7000	4.05	±0.13
7100	4.09	±0.13
7200	4.12	±0.13
7300	4.16	±0.13
7400	4.19	±0.13
7500	4.23	±0.13
7600	4.26	±0.13
7700	4.30	±0.13
7800	4.33	±0.13
7900	4.36	±0.13
8000	4.39	±0.13
8100	4.42	±0.13
8200	4.45	±0.13
8300	4.48	±0.13
8400	4.50	±0.13
8500	4.53	±0.13
8600	4.56	±0.13
8700	4.58	±0.13
8800	4.61	±0.13
8900	4.63	±0.13
9000	4.66	±0.13
9100	4.67	±0.13
9200	4.69	±0.13
9300	4.72	±0.13
9400	4.75	±0.13
9500	4.77	±0.13

HL 3901: Insertion loss (continued)

Set / Applied, MHz	Measured, dB	Uncertainty, dB
9600	4.79	±0.13
9700	4.81	±0.13
9800	4.84	±0.13
9900	4.87	±0.13
10000	4.89	±0.13
10100	4.92	±0.13
10200	4.94	±0.13
10300	4.96	±0.13
10400	4.98	±0.13
10500	5.01	±0.13
10600	5.02	±0.13
10700	5.05	±0.13
10800	5.07	±0.13
10900	5.10	±0.13
11000	5.12	±0.13
11100	5.15	±0.13
11200	5.18	±0.13
11300	5.21	±0.13
11400	5.23	±0.13
11500	5.26	±0.13
11600	5.30	±0.13
11700	5.33	±0.13
11800	5.36	±0.13
11900	5.39	±0.13
12000	5.42	±0.13
12100	5.45	±0.16
12200	5.48	±0.16
12300	5.52	±0.16
12400	5.56	±0.16
12500	5.59	±0.22
12600	5.61	±0.22
12700	5.65	±0.22
12800	5.69	±0.22
12900	5.72	±0.22
13000	5.74	±0.22
13100	5.78	±0.22
13200	5.80	±0.22
13300	5.83	±0.22
13400	5.85	±0.22
13500	5.87	±0.22
13600	5.89	±0.22
13700	5.91	±0.22
13800	5.94	±0.22
13900	5.95	±0.22
14000	5.97	±0.22
14100	5.99	±0.22
14200	6.02	±0.22
14300	6.02	±0.22
14400	6.04	±0.22
14500	6.06	±0.22

Set / Applied, MHz	Measured, dB	Uncertainty, dB
14600	6.08	±0.22
14700	6.09	±0.22
14800	6.12	±0.22
14900	6.14	±0.22
15000	6.15	±0.22
15100	6.18	±0.22
15200	6.21	±0.22
15300	6.23	±0.22
15400	6.25	±0.22
15500	6.28	±0.22
15600	6.31	±0.22
15700	6.33	±0.22
15800	6.36	±0.22
15900	6.39	±0.22
16000	6.40	±0.22
16100	6.43	±0.22
16200	6.47	±0.22
16300	6.50	±0.22
16400	6.52	±0.22
16500	6.55	±0.22
16600	6.58	±0.22
16700	6.62	±0.22
16800	6.63	±0.22
16900	6.67	±0.22
17000	6.69	±0.22
17100	6.72	±0.22
17200	6.74	±0.22
17300	6.74	±0.22
17400	6.76	±0.22
17500	6.79	±0.22
17600	6.82	±0.22
17700	6.80	±0.22
17800	6.81	±0.22
17900	6.82	±0.22
17200	6.74	±0.22
17300	6.74	±0.22
17400	6.76	±0.22
17500	6.79	±0.22
17600	6.82	±0.22
17700	6.80	±0.22
17800	6.81	±0.22
17900	6.82	±0.22
18000	6.85	±0.22
18500	6.95	±0.42
19000	7.08	±0.42
19500	7.15	±0.42
20000	7.19	±0.42
20500	7.24	±0.42
21000	7.32	±0.42
21500	7.42	±0.42

HL 3901: Insertion loss (continued)

Set / Applied, MHz	Measured, dB	Uncertainty, dB
22000	7.57	±0.42
22500	7.70	±0.42
23000	7.81	±0.42
23500	7.85	±0.42
24000	7.86	±0.42
24500	7.94	±0.42
25000	8.02	±0.42
25500	8.12	±0.42
26000	8.23	±0.42
26500	8.33	±0.42
27000	8.39	±0.57
27500	8.42	±0.57
28000	8.43	±0.57
28500	8.48	±0.57
29000	8.57	±0.57
29500	8.65	±0.57
30000	8.70	±0.57
30500	8.77	±0.57

Set / Applied, MHz	Measured, dB	Uncertainty, dB
31000	8.84	±0.57
31500	8.93	±0.57
32000	9.07	±0.57
33500	9.25	±0.57
34000	9.32	±0.57
34500	9.39	±0.57
35000	9.49	±0.57
35500	9.59	±0.57
36000	9.68	±0.57
36500	9.76	±0.57
37000	9.85	±0.57
37500	9.98	±0.57
38000	10.07	±0.57
38500	10.12	±0.57
39000	10.19	±0.57
39500	10.29	±0.57
40000	10.36	±0.57

Microwave Cable Assembly, 40.0 GHz, 1.5 m, SMA/SMA
Huber-Suhner, model: SUCOFLEX 102A, s/n: 1226/2A

HL 3903: Insertion loss

Set / Applied, MHz	Measured, dB	Uncertainty, dB
50	0.14	±0.06
100	0.19	±0.06
150	0.24	±0.07
200	0.28	±0.07
300	0.34	±0.07
400	0.39	±0.07
500	0.44	±0.07
600	0.49	±0.07
700	0.52	±0.07
800	0.56	±0.07
900	0.59	±0.07
1000	0.62	±0.07
1100	0.65	±0.07
1200	0.68	±0.07
1300	0.71	±0.07
1400	0.74	±0.07
1500	0.76	±0.07
1600	0.78	±0.07
1700	0.81	±0.07
1800	0.83	±0.07
1900	0.86	±0.07
2000	0.88	±0.07
2100	0.90	±0.07
2200	0.92	±0.07
2300	0.94	±0.07
2400	0.96	±0.07
2500	0.98	±0.09
2600	1.00	±0.09
2700	1.02	±0.09
2800	1.04	±0.09
2900	1.06	±0.09
3000	1.08	±0.09
3100	1.10	±0.09
3200	1.11	±0.09
3300	1.14	±0.09
3400	1.15	±0.09
3500	1.17	±0.09
3600	1.19	±0.09
3700	1.20	±0.09
3800	1.21	±0.09
3900	1.23	±0.09
4000	1.25	±0.09
4100	1.27	±0.13
4200	1.28	±0.13
4300	1.30	±0.13
4400	1.31	±0.13
4500	1.33	±0.13
4600	1.34	±0.13
4700	1.36	±0.13

Set / Applied, MHz	Measured, dB	Uncertainty, dB
4800	1.37	±0.13
4900	1.39	±0.13
5000	1.40	±0.13
5100	1.41	±0.13
5200	1.43	±0.13
5300	1.45	±0.13
5400	1.46	±0.13
5500	1.47	±0.13
5600	1.48	±0.13
5700	1.50	±0.13
5800	1.51	±0.13
5900	1.52	±0.13
6000	1.54	±0.13
6100	1.55	±0.13
6200	1.56	±0.13
6300	1.58	±0.13
6400	1.59	±0.13
6500	1.60	±0.13
6600	1.61	±0.13
6700	1.63	±0.13
6800	1.64	±0.13
6900	1.65	±0.13
7000	1.66	±0.13
7100	1.68	±0.13
7200	1.69	±0.13
7300	1.70	±0.13
7400	1.71	±0.13
7500	1.73	±0.13
7600	1.74	±0.13
7700	1.76	±0.13
7800	1.76	±0.13
7900	1.78	±0.13
8000	1.78	±0.13
8100	1.80	±0.13
8200	1.81	±0.13
8300	1.82	±0.13
8400	1.82	±0.13
8500	1.85	±0.13
8600	1.86	±0.13
8700	1.87	±0.13
8800	1.87	±0.13
8900	1.89	±0.13
9000	1.90	±0.13
9100	1.91	±0.13
9200	1.92	±0.13
9300	1.93	±0.13
9400	1.95	±0.13
9500	1.95	±0.13
9600	1.97	±0.13

HL 3903: Insertion loss (continued)

Set / Applied, MHz	Measured, dB	Uncertainty, dB
9700	1.98	±0.13
9800	1.99	±0.13
9900	2.00	±0.13
10000	2.01	±0.13
10100	2.02	±0.13
10200	2.02	±0.13
10300	2.04	±0.13
10400	2.05	±0.13
10500	2.06	±0.13
10600	2.07	±0.13
10700	2.08	±0.13
10800	2.09	±0.13
10900	2.10	±0.13
11000	2.11	±0.13
11100	2.12	±0.13
11200	2.13	±0.13
11300	2.14	±0.13
11400	2.15	±0.13
11500	2.15	±0.13
11600	2.17	±0.13
11700	2.17	±0.13
11800	2.19	±0.13
11900	2.19	±0.13
12000	2.20	±0.13
12100	2.21	±0.16
12200	2.22	±0.16
12300	2.23	±0.16
12400	2.25	±0.16
12500	2.26	±0.22
12600	2.26	±0.22
12700	2.27	±0.22
12800	2.29	±0.22
12900	2.30	±0.22
13000	2.30	±0.22
13100	2.31	±0.22
13200	2.32	±0.22
13300	2.33	±0.22
13400	2.34	±0.22
13500	2.35	±0.22
13600	2.36	±0.22
13700	2.36	±0.22
13800	2.38	±0.22
13900	2.38	±0.22
14000	2.40	±0.22
14100	2.40	±0.22
14200	2.41	±0.22
14300	2.42	±0.22
14400	2.43	±0.22
14500	2.44	±0.22
14600	2.45	±0.22

Set / Applied, MHz	Measured, dB	Uncertainty, dB
14700	2.46	±0.22
14800	2.47	±0.22
14900	2.48	±0.22
15000	2.49	±0.22
15100	2.49	±0.22
15200	2.51	±0.22
15300	2.51	±0.22
15400	2.52	±0.22
15500	2.53	±0.22
15600	2.54	±0.22
15700	2.54	±0.22
15800	2.55	±0.22
15900	2.56	±0.22
16000	2.57	±0.22
16100	2.58	±0.22
16200	2.59	±0.22
16300	2.60	±0.22
16400	2.61	±0.22
16500	2.62	±0.22
16600	2.63	±0.22
16700	2.63	±0.22
16800	2.63	±0.22
16900	2.65	±0.22
17000	2.66	±0.22
17100	2.66	±0.22
17200	2.67	±0.22
17300	2.68	±0.22
17400	2.69	±0.22
17500	2.70	±0.22
17600	2.71	±0.22
17700	2.71	±0.22
17800	2.72	±0.22
17900	2.74	±0.22
18000	2.74	±0.22
18500	2.76	±0.42
19000	2.80	±0.42
19500	2.85	±0.42
20000	2.90	±0.42
20500	2.95	±0.42
21000	2.98	±0.42
21500	3.01	±0.42
22000	3.05	±0.42
22500	3.09	±0.42
23000	3.15	±0.42
23500	3.19	±0.42
24000	3.23	±0.42
24500	3.22	±0.42
25000	3.27	±0.42
25500	3.31	±0.42
26000	3.37	±0.42

HL 3903: Insertion loss (continued)

Set / Applied, MHz	Measured, dB	Uncertainty, dB
26500	3.43	±0.42
27000	3.47	±0.57
27500	3.46	±0.57
28000	3.49	±0.57
28500	3.52	±0.57
29000	3.58	±0.57
29500	3.62	±0.57
30000	3.63	±0.57
30500	3.62	±0.57
31000	3.63	±0.57
31500	3.69	±0.57
32000	3.80	±0.57
32500	3.81	±0.57
33000	3.88	±0.57

Set / Applied, MHz	Measured, dB	Uncertainty, dB
33500	3.87	±0.57
34000	3.88	±0.57
34500	3.92	±0.57
35000	4.00	±0.57
35500	4.00	±0.57
36000	4.00	±0.57
36500	4.01	±0.57
37000	4.05	±0.57
37500	4.11	±0.57
38000	4.19	±0.57
38500	4.19	±0.57
39000	4.24	±0.57
39500	4.27	±0.57
40000	4.33	±0.57

Test Cable , DC-18 GHz, 4.6 m, N/M - N/M
Mini-Circuits, model: APC-15FT-NMNM+, s/n 0755A

HL 4278: Insertion loss

Set / Applied, MHz	Measured, dB	Uncertainty, dB
0.1	0.03	+0.07 / -0.07 dB
50	0.40	+0.07 / -0.07 dB
100	0.59	+0.07 / -0.07 dB
200	0.85	+0.07 / -0.07 dB
300	1.05	+0.08 / -0.09 dB
400	1.23	+0.08 / -0.09 dB
500	1.38	+0.08 / -0.09 dB
600	1.52	+0.08 / -0.09 dB
700	1.64	+0.08 / -0.09 dB
800	1.77	+0.08 / -0.09 dB
900	1.88	+0.08 / -0.09 dB
1000	1.99	+0.08 / -0.09 dB
1100	2.09	+0.12 / -0.13 dB
1200	2.19	+0.12 / -0.13 dB
1300	2.29	+0.12 / -0.13 dB
1400	2.38	+0.12 / -0.13 dB
1500	2.47	+0.12 / -0.13 dB
1600	2.56	+0.12 / -0.13 dB
1700	2.64	+0.12 / -0.13 dB
1800	2.72	+0.12 / -0.13 dB
1900	2.80	+0.12 / -0.13 dB
2000	2.89	+0.12 / -0.13 dB
2100	2.96	+0.12 / -0.13 dB
2200	3.04	+0.12 / -0.13 dB
2300	3.12	+0.12 / -0.13 dB
2400	3.19	+0.12 / -0.13 dB
2500	3.26	+0.17 / -0.18 dB
2600	3.33	+0.17 / -0.18 dB
2700	3.40	+0.17 / -0.18 dB
2800	3.47	+0.17 / -0.18 dB
2900	3.54	+0.17 / -0.18 dB
3000	3.61	+0.17 / -0.18 dB
3100	3.67	+0.19 / -0.2 dB
3200	3.74	+0.19 / -0.2 dB
3300	3.80	+0.19 / -0.2 dB
3400	3.87	+0.19 / -0.2 dB
3500	3.94	+0.19 / -0.2 dB
3600	4.00	+0.19 / -0.2 dB
3700	4.06	+0.19 / -0.2 dB
3800	4.12	+0.19 / -0.2 dB
3900	4.19	+0.19 / -0.2 dB
4000	4.25	+0.19 / -0.2 dB

Set / Applied, MHz	Measured, dB	Uncertainty, dB
4100	4.30	+0.3 / -0.33 dB
4200	4.38	+0.3 / -0.33 dB
4300	4.43	+0.3 / -0.33 dB
4400	4.48	+0.3 / -0.33 dB
4500	4.54	+0.3 / -0.33 dB
4600	4.60	+0.3 / -0.33 dB
4700	4.65	+0.3 / -0.33 dB
4800	4.71	+0.3 / -0.33 dB
4900	4.76	+0.3 / -0.33 dB
5000	4.83	+0.3 / -0.33 dB
5100	4.88	+0.3 / -0.33 dB
5200	4.93	+0.3 / -0.33 dB
5300	4.99	+0.3 / -0.33 dB
5400	5.05	+0.3 / -0.33 dB
5500	5.10	+0.3 / -0.33 dB
5600	5.15	+0.3 / -0.33 dB
5700	5.20	+0.3 / -0.33 dB
5800	5.26	+0.3 / -0.33 dB
5900	5.31	+0.3 / -0.33 dB
6000	5.37	+0.3 / -0.33 dB
6100	5.41	+0.3 / -0.33 dB
6200	5.47	+0.3 / -0.33 dB
6300	5.52	+0.3 / -0.33 dB
6400	5.58	+0.3 / -0.33 dB
6500	5.62	+0.3 / -0.33 dB
6600	5.68	+0.3 / -0.33 dB
6700	5.73	+0.3 / -0.33 dB
6800	5.79	+0.3 / -0.33 dB
6900	5.83	+0.3 / -0.33 dB
7000	5.89	+0.3 / -0.33 dB
7100	5.94	+0.3 / -0.33 dB
7200	5.98	+0.3 / -0.33 dB
7300	6.04	+0.3 / -0.33 dB
7400	6.08	+0.3 / -0.33 dB
7500	6.14	+0.3 / -0.33 dB
7600	6.18	+0.3 / -0.33 dB
7700	6.23	+0.3 / -0.33 dB
7800	6.28	+0.3 / -0.33 dB
7900	6.33	+0.3 / -0.33 dB
8000	6.38	+0.3 / -0.33 dB
8100	6.43	+0.34 / -0.36 dB
8200	6.49	+0.34 / -0.36 dB

HL 4278: Insertion loss (continued)

Set / Applied, MHz	Measured, dB	Uncertainty, dB
8300	6.54	+0.34 / -0.36 dB
8400	6.60	+0.34 / -0.36 dB
8500	6.65	+0.34 / -0.36 dB
8600	6.71	+0.34 / -0.36 dB
8700	6.75	+0.34 / -0.36 dB
8800	6.81	+0.34 / -0.36 dB
8900	6.85	+0.34 / -0.36 dB
9000	6.89	+0.34 / -0.36 dB
9100	6.95	+0.34 / -0.36 dB
9200	6.98	+0.34 / -0.36 dB
9300	7.03	+0.34 / -0.36 dB
9400	7.07	+0.34 / -0.36 dB
9500	7.11	+0.34 / -0.36 dB
9600	7.16	+0.34 / -0.36 dB
9700	7.21	+0.34 / -0.36 dB
9800	7.25	+0.34 / -0.36 dB
9900	7.32	+0.34 / -0.36 dB
10000	7.37	+0.34 / -0.36 dB
10100	7.40	+0.4 / -0.44 dB
10200	7.47	+0.4 / -0.44 dB
10300	7.53	+0.4 / -0.44 dB
10400	7.55	+0.4 / -0.44 dB
10500	7.62	+0.4 / -0.44 dB
10600	7.66	+0.4 / -0.44 dB
10700	7.68	+0.4 / -0.44 dB
10800	7.74	+0.4 / -0.44 dB
10900	7.76	+0.4 / -0.44 dB
11000	7.81	+0.4 / -0.44 dB
11100	7.86	+0.4 / -0.44 dB
11200	7.89	+0.4 / -0.44 dB
11300	7.94	+0.4 / -0.44 dB
11400	7.99	+0.4 / -0.44 dB
11500	8.02	+0.4 / -0.44 dB
11600	8.07	+0.4 / -0.44 dB
11700	8.14	+0.4 / -0.44 dB
11800	8.17	+0.4 / -0.44 dB
11900	8.22	+0.4 / -0.44 dB
12000	8.27	+0.4 / -0.44 dB
12100	8.30	+0.4 / -0.44 dB
12200	8.35	+0.4 / -0.44 dB
12300	8.38	+0.4 / -0.44 dB
12400	8.41	+0.4 / -0.44 dB
12500	8.47	+0.47 / -0.52 dB
12600	8.47	+0.47 / -0.52 dB
12700	8.52	+0.47 / -0.52 dB
12800	8.57	+0.47 / -0.52 dB
12900	8.60	+0.47 / -0.52 dB
13000	8.65	+0.47 / -0.52 dB
13100	8.68	+0.47 / -0.52 dB

Set / Applied, MHz	Measured, dB	Uncertainty, dB
13200	8.74	+0.47 / -0.52 dB
13300	8.77	+0.47 / -0.52 dB
13400	8.83	+0.47 / -0.52 dB
13500	8.87	+0.47 / -0.52 dB
13600	8.90	+0.47 / -0.52 dB
13700	8.95	+0.47 / -0.52 dB
13800	8.99	+0.47 / -0.52 dB
13900	9.02	+0.47 / -0.52 dB
14000	9.07	+0.47 / -0.52 dB
14100	9.11	+0.47 / -0.52 dB
14200	9.16	+0.47 / -0.52 dB
14300	9.19	+0.47 / -0.52 dB
14400	9.24	+0.47 / -0.52 dB
14500	9.29	+0.47 / -0.52 dB
14600	9.33	+0.47 / -0.52 dB
14700	9.37	+0.47 / -0.52 dB
14800	9.42	+0.47 / -0.52 dB
14900	9.47	+0.47 / -0.52 dB
15000	9.51	+0.47 / -0.52 dB
15100	9.56	+0.47 / -0.52 dB
15200	9.62	+0.47 / -0.52 dB
15300	9.65	+0.47 / -0.52 dB
15400	9.71	+0.47 / -0.52 dB
15500	9.74	+0.47 / -0.52 dB
15600	9.75	+0.47 / -0.52 dB
15700	9.82	+0.47 / -0.52 dB
15800	9.84	+0.47 / -0.52 dB
15900	9.90	+0.47 / -0.52 dB
16000	9.90	+0.47 / -0.52 dB
16100	9.97	+0.47 / -0.52 dB
16200	10.02	+0.47 / -0.52 dB
16300	10.05	+0.47 / -0.52 dB
16400	10.09	+0.47 / -0.52 dB
16500	10.13	+0.47 / -0.52 dB
16600	10.18	+0.47 / -0.52 dB
16700	10.21	+0.47 / -0.52 dB
16800	10.26	+0.47 / -0.52 dB
16900	10.29	+0.47 / -0.52 dB
17000	10.35	+0.47 / -0.52 dB
17100	10.36	+0.47 / -0.52 dB
17200	10.42	+0.47 / -0.52 dB
17300	10.46	+0.47 / -0.52 dB
17400	10.49	+0.47 / -0.52 dB
17500	10.53	+0.47 / -0.52 dB
17600	10.56	+0.47 / -0.52 dB
17700	10.65	+0.47 / -0.52 dB
17800	10.68	+0.47 / -0.52 dB
17900	10.72	+0.47 / -0.52 dB
18000	10.76	+0.47 / -0.52 dB

RF cable, 18 GHz, 3 m, N-type
Huber-Suhner, ST18A/Nm/Nm/3000, s/n 600818/18A, HL 5110

HL 5110: Insertion loss

Set / Applied, MHz	Measured, dB	Uncertainty, dB
0.1	0.00	±0.07
50	0.17	±0.07
100	0.25	±0.07
200	0.35	±0.08
300	0.43	±0.08
400	0.49	±0.08
500	0.55	±0.08
600	0.61	±0.08
700	0.66	±0.08
800	0.71	±0.08
900	0.76	±0.08
1000	0.79	±0.08
1100	0.84	±0.08
1200	0.87	±0.08
1300	0.92	±0.08
1400	0.95	±0.08
1500	0.99	±0.08
1600	1.02	±0.08
1700	1.05	±0.08
1800	1.09	±0.08
1900	1.13	±0.08
2000	1.15	±0.08
2500	1.31	±0.10
3000	1.45	±0.10
3500	1.58	±0.10
4000	1.71	±0.10
4500	1.83	±0.10

Set / Applied, MHz	Measured, dB	Uncertainty, dB
5000	1.96	±0.10
5500	2.08	±0.10
6000	2.17	±0.10
6500	2.28	±0.10
7000	2.40	±0.13
7500	2.53	±0.13
8000	2.65	±0.13
8500	2.76	±0.13
9000	2.80	±0.13
9500	2.85	±0.13
10000	2.90	±0.13
10500	2.98	±0.13
11000	3.06	±0.13
11500	3.12	±0.13
12000	3.20	±0.13
12500	3.30	±0.18
13000	3.38	±0.18
13500	3.51	±0.18
14000	3.58	±0.18
14500	3.61	±0.18
15000	3.66	±0.22
15500	3.74	±0.22
16000	3.80	±0.22
16500	3.88	±0.22
17000	3.99	±0.22
17500	4.04	±0.22
18000	4.01	±0.27

RF cable, 40 GHz, 5.5 m, K-type
Huber-Suhner, SF102EA/11SK/11SK/5500MM, s/n 502493/2EA

HL 5111: Insertion loss

Set / Applied, MHz	Measured, dB	Uncertainty, dB
100	0.70	±0.07
200	0.99	±0.08
300	1.21	±0.08
500	1.56	±0.08
1000	2.20	±0.08
1500	2.69	±0.08
2000	3.11	±0.08
2500	3.50	±0.10
3000	3.85	±0.10
3500	4.16	±0.10
4000	4.47	±0.10
4500	4.74	±0.10
5000	5.03	±0.10
5500	5.30	±0.10
6000	5.57	±0.10
6500	5.76	±0.10
7000	6.00	±0.10
7500	6.20	±0.10
8000	6.44	±0.10
8500	6.67	±0.10
9000	6.82	±0.10
9500	7.04	±0.10
10000	7.18	±0.10
10500	7.36	±0.10
11000	7.55	±0.10
11500	7.75	±0.10
12000	7.90	±0.10
12500	8.08	±0.13
13000	8.19	±0.13
13500	8.39	±0.13
14000	8.58	±0.13
14500	8.76	±0.18
15000	8.92	±0.18
15500	9.03	±0.18
16000	9.18	±0.18
16500	9.34	±0.18
17000	9.51	±0.18
17500	9.66	±0.18
18000	9.80	±0.18
18500	9.94	±0.23
19000	10.05	±0.23
19500	10.22	±0.23

Set / Applied, MHz	Measured, dB	Uncertainty, dB
20000	10.32	±0.23
20500	10.48	±0.23
21000	10.60	±0.23
21500	10.73	±0.23
22000	10.87	±0.23
22500	10.97	±0.29
23000	11.09	±0.29
23500	11.26	±0.29
24000	11.37	±0.29
24500	11.50	±0.29
25000	11.61	±0.23
25500	11.72	±0.23
26000	11.87	±0.23
26500	11.99	±0.23
27000	12.09	±0.33
27500	12.24	±0.33
28000	12.34	±0.40
28500	12.47	±0.40
29000	12.61	±0.40
29500	12.70	±0.40
30000	12.86	±0.40
30500	12.92	±0.33
31000	13.09	±0.33
31500	13.16	±0.33
32000	13.33	±0.33
32500	13.40	±0.33
33000	13.62	±0.33
33500	13.70	±0.33
34000	13.88	±0.33
34500	13.97	±0.40
35000	14.05	±0.40
35500	14.23	±0.40
36000	14.25	±0.40
36500	14.46	±0.40
37000	14.49	±0.33
37500	14.72	±0.33
38000	14.77	±0.33
38500	14.97	±0.33
39000	15.04	±0.33
39500	15.22	±0.33
40000	15.63	±0.47

RF cable, 40 GHz, 5.5 m, K-type,
Huber-Suhner, SF102EA/11SK/11SK/5500MM, s/n 502494/2EA, HL 5112

HL 5112: Insertion loss

Set / Applied, MHz	Measured, dB	Uncertainty, dB
100	0.70	±0.07
200	0.99	±0.08
300	1.21	±0.08
500	1.55	±0.08
1000	2.18	±0.08
1500	2.67	±0.08
2000	3.09	±0.08
2500	3.46	±0.10
3000	3.80	±0.10
3500	4.12	±0.10
4000	4.41	±0.10
4500	4.69	±0.10
5000	4.95	±0.10
5500	5.20	±0.10
6000	5.45	±0.10
6500	5.68	±0.10
7000	5.91	±0.10
7500	6.13	±0.10
8000	6.34	±0.10
8500	6.56	±0.10
9000	6.76	±0.10
9500	6.95	±0.10
10000	7.16	±0.10
10500	7.33	±0.10
11000	7.51	±0.10
11500	7.68	±0.10
12000	7.85	±0.10
12500	8.02	±0.13
13000	8.17	±0.13
13500	8.31	±0.13
14000	8.46	±0.13
14500	8.61	±0.18
15000	8.76	±0.18
15500	8.91	±0.18
16000	9.07	±0.18
16500	9.22	±0.18
17000	9.36	±0.18
17500	9.51	±0.18
18000	9.66	±0.18
18500	9.81	±0.23
19000	9.95	±0.23
19500	10.10	±0.23

Set / Applied, MHz	Measured, dB	Uncertainty, dB
20000	10.25	±0.23
20500	10.38	±0.23
21000	10.52	±0.23
21500	10.67	±0.23
22000	10.84	±0.23
22500	11.00	±0.29
23000	11.10	±0.29
23500	11.20	±0.29
24000	11.32	±0.29
24500	11.42	±0.29
25000	11.59	±0.23
25500	11.70	±0.23
26000	11.85	±0.23
26500	11.97	±0.23
27000	12.07	±0.33
27500	12.17	±0.33
28000	12.26	±0.40
28500	12.38	±0.40
29000	12.50	±0.40
29500	12.63	±0.40
30000	12.75	±0.40
30500	12.82	±0.33
31000	12.93	±0.33
31500	13.09	±0.33
32000	13.22	±0.33
32500	13.35	±0.33
33000	13.48	±0.33
33500	13.60	±0.33
34000	13.72	±0.33
34500	13.80	±0.40
35000	13.92	±0.40
35500	14.01	±0.40
36000	14.12	±0.40
36500	14.23	±0.40
37000	14.34	±0.33
37500	14.44	±0.33
38000	14.57	±0.33
38500	14.72	±0.33
39000	14.82	±0.33
39500	14.94	±0.33
40000	15.08	±0.47

11 APPENDIX D Test facility description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, Radio, Safety, Environmental and Telecommunication testing facility.
Hermon Laboratories is recognized and accredited by the Federal Communications Commission (USA) for 1, 2, 15, 18 parts of Code of Federal Regulations 47 (CFR 47), Test Firm Registration Number is 927748, Designation Number is IL1001; registered by Industry Canada for electromagnetic emissions, file number IC 2186A-1 for OATS, certified by VCCI, Japan (the registration numbers are R-10808 for OATS, R-1082 for anechoic chamber, G-869 for RE measurements above 1 GHz, C-10845 for conducted emissions site and T-1606 for conducted emissions at telecommunication ports).
The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing, environmental simulation and calibration (for exact scope please refer to Certificate No. 839.01, 839.03 and 839.04).

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12 APPENDIX E Specification references

47CFR part 27: 2017	Private land mobile radio services
47CFR part 1: 2017	Practice and procedure
47CFR part 2: 2017	Frequency allocations and radio treaty matters; general rules and regulations
ANSI C63.2: 2006	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.
ANSI/TIA/EIA-603-E:2016	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

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