HERMON LABORATORIES

ELECTRICAL TESTING
0839.01

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TEST REPORT

ACCORDING TO: FCC 47CFR part 27

FOR:

Airspan Networks Inc.

Terminal station

Model: SSRM 2.5GHz

Table of contents

1 Applicant information

Client name:	Airspan Networks Inc.
Address:	777 Yamato Rd, Suite 310, Boca Raton 33431, Florida, USA
Telephone:	+1 561 893 8684
Fax:	+1 561 893 8671
E-mail:	zlevi@airspan.com
Contact name:	Mr. Zion Levi

2 Equipment under test attributes

Product name:	Terminal station
Product type:	Transceiver
Model(s):	SSRM 2.5GHz
Serial number:	9EC111154BB7
Hardware version:	E1
Software release:	1.1.2.4
Receipt date	1/17/2012

3 Manufacturer information

Manufacturer name:	Airspan Networks Inc.
Address:	777 Yamato Rd, Suite 310, Boca Raton 33431, Florida, USA
Telephone:	+1 561 893 8684
Fax:	+1 561 893 8671
E-Mail:	zlevi@airspan.com
Contact name:	Mr. Zion Levi

4 Test details

Project ID:	22840
Location:	Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started:	1/17/2012
Test completed:	1/29/2012
Test specification(s):	FCC 47CFR part 27

5 Tests summary

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

	Name and Title	Date	Signature
Tested by:	Mr. S. Samokha, test engineer	January 29, 2012	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	January 31, 2012	
Approved by:	Mr. M. Nikishin, EMC and Radio group manager	April 12, 2012	

6 EUT description

6.1 General information

The EUT, terminal station, is a fixed customer premises device.

6.2 Ports and lines

Port type	Port description	Connected from	Connected to	Qty.	Cable type	Cable length, m
Power	DC	Power supply	PCI Extender	1	Shielded	1.5
Signal	Data/Power	PCI Extender	EUT	1	Flat cable 2x26	0.15
RF	Antenna	EUT	Open circuit	2	NA	NA

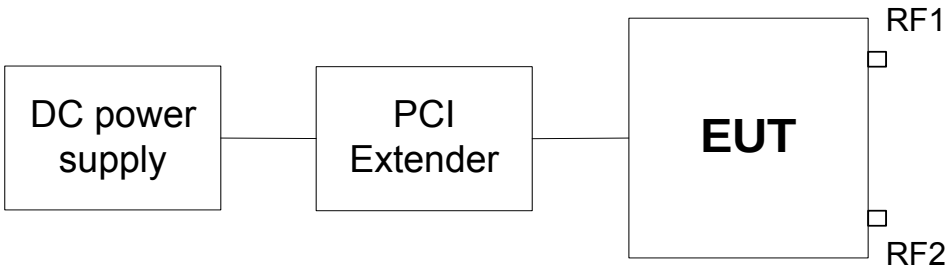
6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
5.5 VDC power supply	Fuhua	UE15WCP	0000298
Mini PCI Express Male to Female Extender	Orbit Micro	DRU-149-81772	NA

6.4 Changes made in EUT

No changes were implemented.

6.5 Test configuration



6.6 Transmitter characteristics

Type of equipment	
	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)
V	Plug-in card (Equipment intended for a variety of host systems)

Intended use		**Condition of use**
V	fixed	Always at a distance more than 2 m from all people
	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	2500.0 – 2686.0 MHz
Operating frequency	2503.0 – 2683.0 MHz for 3.5 MHz OBW and 5 MHz OBW 2506.0 – 2680.0 MHz for 7 MHz OBW and 10 MHz OBW
RF channel spacing	3.5, 5, 7, 10 MHz

Maximum rated output power	At transmitter 50 Ω RF output connector			26.36 dBm – 3.5 MHz OBW 26.94 dBm – 5 MHz OBW 26.64 dBm – 7 MHz OBW 26.40 dBm – 10 MHz OBW
Is transmitter output power variable?		No		
	V	Yes		continuous variable
			V	stepped variable with stepsize: 0.5 dB
				minimum RF power: 0 dBm
				maximum RF power at antenna connector: 26.94 dBm

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

Antenna/s technical characteristics

Type	Manufacturer	Model number	Gain
Directional Dual-Polarized Panel Antenna	PCTEL Inc.	07-1160-01	17.5 dBi

Transmitter aggregate data rate/s, Mbps			
Transmitter 99% power bandwidth	Type of modulation		
	QPSK	16QAM	64QAM
3.5 MHz	4	9	14
5 MHz	7	14	23
7 MHz	8	17	28
10 MHz	13	27	46

Type of multiplexing	OFDMA/TDD
Modulating test signal (baseband)	PRBS
Maximum transmitter duty cycle in normal use	30.4-42.8 %

Transmitter power source						
V	DC	Nominal rated voltage	5.4 VDC via PC MCI slot			
Common power source for transmitter and receiver				V	yes	no

Test specification:	Section 27.50(h)(2), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 ºC	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

7 Transmitter tests according to 47CFR part 27

7.1 Peak output power test

7.1.1 General

This test was performed to measure the peak output power at RF antenna connector. Specification test limits are given in Table 7.1.1.

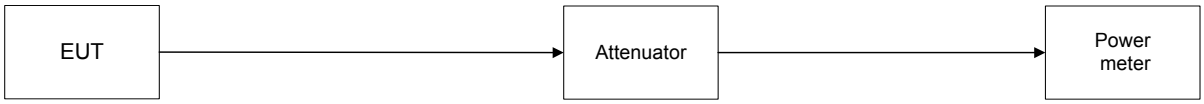
Table 7.1.1 Peak output power limits

Assigned frequency range, MHz	Maximum peak output power	
	W	dBm
2500.0 – 2686.0	2.0	33.0

7.1.2 Test procedure

7.1.2.1 The EUT was set up as shown in Figure 7.1.1, energized and its proper operation was checked.
7.1.2.2 The EUT was adjusted to produce maximum available to the end user RF output power.
7.1.2.3 The peak output power was measured with spectrum analyzer as provided in Table 7.1.2.

Figure 7.1.1 Peak output power test setup



Test specification:	Section 27.50(h)(2), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 ºC	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

Table 7.1.2 Peak output power test results

ASSIGNED FREQUENCY RANGE: 2500.0 – 2686.0 MHz
DETECTOR USED: Average (Power Average during the burst)
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
DUTY CYCLE: 42.8% Txon=2.14ms/5ms
EBW: 3.5 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Carrier frequency, MHz	Power Meter reading RF#1, dBm	Power Meter reading RF#2, dBm	Total RF power*, dBm	Limit, dBm	Margin, dB	Verdict
QPSK 4 Mbps						
2503.00	23.64	23.03	26.36	33.0	-6.64	Pass
2593.00	23.15	22.98	26.08	33.0	-6.92	Pass
2683.00	22.86	22.46	25.67	33.0	-7.33	Pass
64QAM 14 Mbps						
2503.00	23.43	22.76	26.13	33.0	-6.87	Pass
2593.00	23.10	22.39	25.77	33.0	-7.23	Pass
2683.00	22.72	22.12	25.46	33.0	-7.54	Pass

* - Total RF power , dBm = 10 log{10^[P(dBm,RF#1)/10]+ 10^([P(dBm, RF#2)/10]}

Table 7.1.3 Peak output power test results

ASSIGNED FREQUENCY RANGE: 2500.0 – 2686.0 MHz
DETECTOR USED: Average (Power Average during the burst)
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
DUTY CYCLE: 34.4% Txon=1.72ms/5ms
EBW: 5 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Carrier frequency, MHz	Power Meter reading RF#1, dBm	Power Meter reading RF#2, dBm	Total RF power*, dBm	Limit, dBm	Margin, dB	Verdict
QPSK 7 Mbps						
2503.00	24.39	23.36	26.92	33.0	-6.08	Pass
2593.00	24.45	23.30	26.94	33.0	-6.06	Pass
2683.00	23.75	22.88	26.35	33.0	-6.65	Pass
64QAM 23 Mbps						
2503.00	22.88	22.76	25.85	33.0	-7.15	Pass
2593.00	22.92	22.74	25.84	33.0	-7.16	Pass
2683.00	22.54	22.45	25.52	33.0	-7.48	Pass

* - Total RF power , dBm = 10 log{10^[P(dBm,RF#1)/10]+ 10^([P(dBm, RF#2)/10]}

Test specification:	Section 27.50(h)(2), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 ºC	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

Table 7.1.4 Peak output power test results

ASSIGNED FREQUENCY RANGE: 2500.0 – 2686.0 MHz
DETECTOR USED: Average (Power Average during the burst)
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
DUTY CYCLE: 42.6% Txon=2.13ms/5ms
EBW: 7 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Carrier frequency, MHz	Power Meter reading RF#1, dBm	Power Meter reading RF#2, dBm	Total RF power*, dBm	Limit, dBm	Margin, dB	Verdict
QPSK 7 Mbps						
2506.00	23.83	23.41	26.64	33.0	-6.36	Pass
2596.00	22.56	22.67	25.64	33.0	-7.36	Pass
2680.00	22.46	22.33	25.41	33.0	-7.59	Pass
64QAM 23 Mbps						
2506.00	23.85	23.13	26.53	33.0	-6.47	Pass
2596.00	22.53	22.01	25.29	33.0	-7.71	Pass
2680.00	22.32	22.13	25.25	33.0	-7.75	Pass

* - Total RF power , dBm = 10 log{10^[P(dBm,RF#1)/10]+ 10^([P(dBm, RF#2)/10]}

Table 7.1.5 Peak output power test results

ASSIGNED FREQUENCY RANGE: 2500.0 – 2686.0 MHz
DETECTOR USED: Average (Power Average during the burst)
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
DUTY CYCLE: 30.4% Txon=1.52ms/5ms
EBW: 10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Carrier frequency, MHz	Power Meter reading RF#1, dBm	Power Meter reading RF#2, dBm	Total RF power*, dBm	Limit, dBm	Margin, dB	Verdict
QPSK 7 Mbps						
2506.00	23.32	23.45	26.40	33.0	-6.60	Pass
2596.00	22.94	23.06	26.03	33.0	-6.97	Pass
2680.00	22.80	22.76	25.79	33.0	-7.21	Pass
64QAM 23 Mbps						
2506.00	23.44	22.89	26.20	33.0	-6.80	Pass
2596.00	22.91	22.22	25.59	33.0	-7.41	Pass
2680.00	22.69	22.45	25.60	33.0	-7.40	Pass

* - Total RF power , dBm = 10 log{10^[P(dBm,RF#1)/10]+ 10^([P(dBm, RF#2)/10]}

Reference numbers of test equipment used

HL 3301	HL 3302	HL 3768					

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):	1/17/2012		
Temperature: 21.2 ºC	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

7.2 Occupied bandwidth test

7.2.1 General

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in Table 7.2.1.

Table 7.2.1 Occupied bandwidth limits

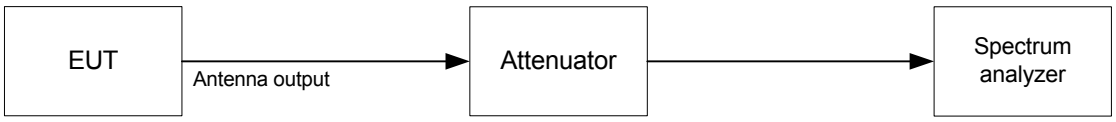
Assigned frequency, MHz	Modulation envelope reference points*, dBc	Maximum allowed bandwidth, kHz
2503.0 – 2683.0	26	NA

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

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 set to transmit the unmodulated carrier and the reference peak power level was measured.
7.2.2.3 The EUT was set to transmit the normally modulated carrier.
7.2.2.4 The transmitter occupied bandwidth was measured with spectrum analyzer as a frequency delta between the reference points on modulation envelope and provided in **Table 7.2.2** and the associated plots.

Figure 7.2.1 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):	1/17/2012		
Temperature: 21.2 ºC	**Air Pressure:** 1018 hPa	**Relative Humidity:** 41 %	**Power Supply:** 5.4VDC
Remarks:			

Table 7.2.2 Occupied bandwidth test results

DETECTOR USED: Average
RESOLUTION BANDWIDTH: 36 kHz
VIDEO BANDWIDTH: 360 kHz
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
MODULATING SIGNAL: PRBS
EBW: 3.5 MHz

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
QPSK 4 Mbps				
2503.000	3293	NA	NA	Pass
2593.000	3302	NA	NA	Pass
2683.000	3302	NA	NA	Pass
64QAM 14 Mbps				
2503.000	3468	NA	NA	Pass
2593.000	3432	NA	NA	Pass
2683.000	3537	NA	NA	Pass

DETECTOR USED: Average
RESOLUTION BANDWIDTH: 51 kHz
VIDEO BANDWIDTH: 510 kHz
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
MODULATING SIGNAL: PRBS
EBW: 5 MHz

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
QPSK 7 Mbps				
2503.000	4987	NA	NA	Pass
2593.000	4883	NA	NA	Pass
2683.000	4681	NA	NA	Pass
64QAM 23 Mbps				
2503.000	4826	NA	NA	Pass
2593.000	4875	NA	NA	Pass
2683.000	4831	NA	NA	Pass

Test specification:	**Section 2.1049, Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	1/17/2012		
Temperature: 21.2 ºC	**Air Pressure:** 1018 hPa	**Relative Humidity:** 41 %	**Power Supply:** 5.4VDC
Remarks:			

Table 7.2.2 Occupied bandwidth test results (continued)

DETECTOR USED: Average
RESOLUTION BANDWIDTH: 75 kHz
VIDEO BANDWIDTH: 750 kHz
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
MODULATING SIGNAL: PRBS
EBW: 7 MHz

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
QPSK 8 Mbps				
2506.000	6960	NA	NA	Pass
2596.000	6733	NA	NA	Pass
2680.000	7119	NA	NA	Pass
64QAM 28 Mbps				
2506.000	6774	NA	NA	Pass
2596.000	6797	NA	NA	Pass
2680.000	6964	NA	NA	Pass

DETECTOR USED: Average
RESOLUTION BANDWIDTH: 100 kHz
VIDEO BANDWIDTH: 1000 kHz
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
MODULATING SIGNAL: PRBS
EBW: 10 MHz

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
QPSK 13 Mbps				
2506.000	9870	NA	NA	Pass
2596.000	9647	NA	NA	Pass
2680.000	9781	NA	NA	Pass
64QAM 46 Mbps				
2506.000	9394	NA	NA	Pass
2596.000	9412	NA	NA	Pass
2680.000	9639	NA	NA	Pass

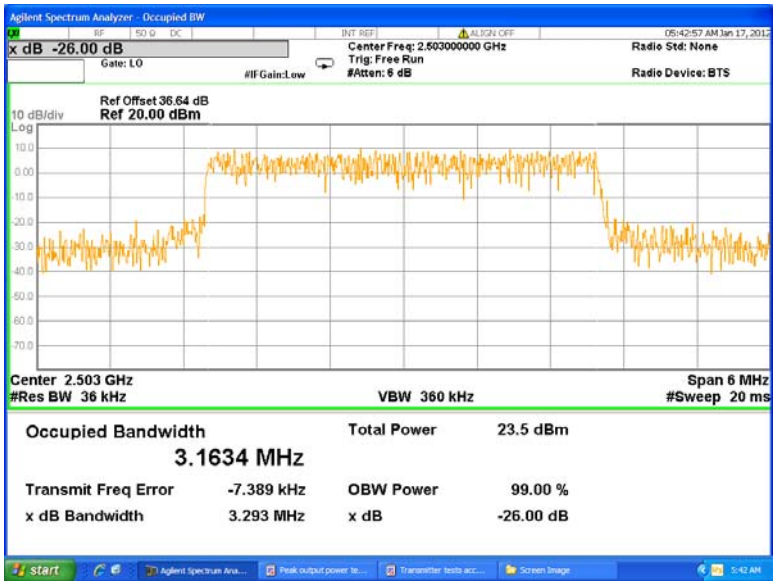
Reference numbers of test equipment used

HL 2909	HL 3787	HL 3902					

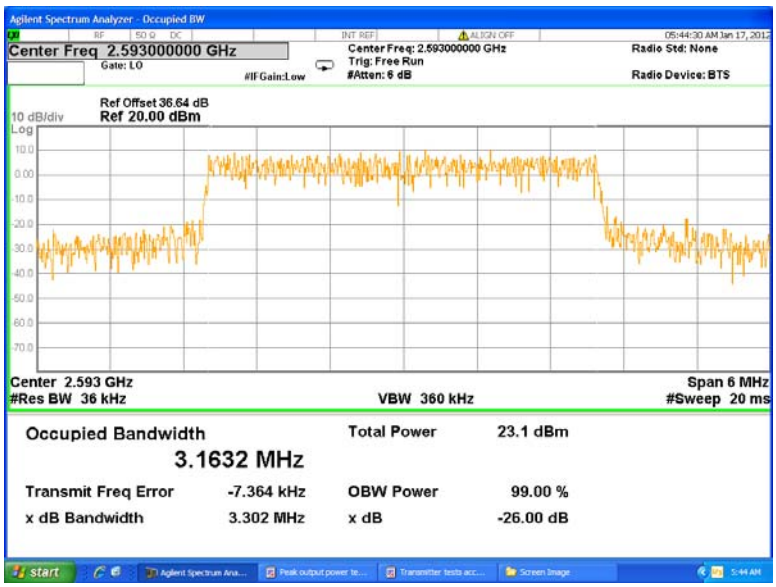
Full description is given in Appendix A.

Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 °C	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

Plot 7.2.1 Occupied bandwidth test results at low frequency, 3.5 MHz EBW, QPSK

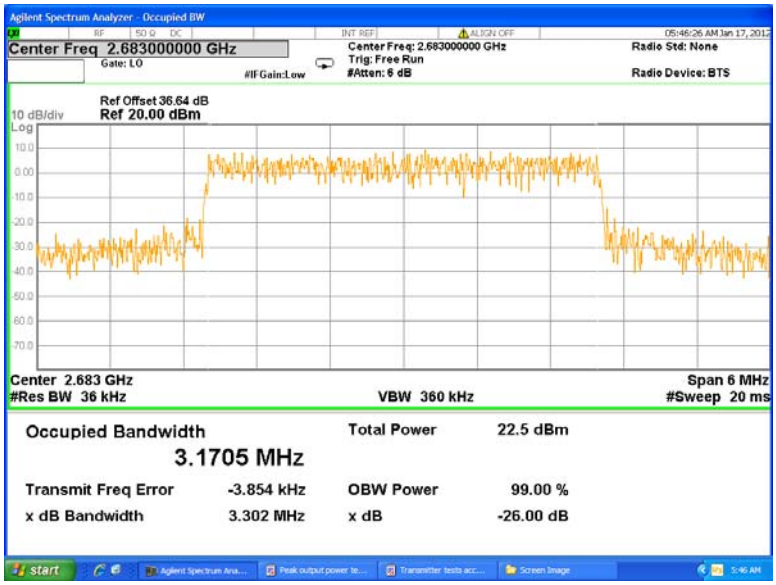


Plot 7.2.2 Occupied bandwidth test results at mid frequency, 3.5 MHz EBW, QPSK

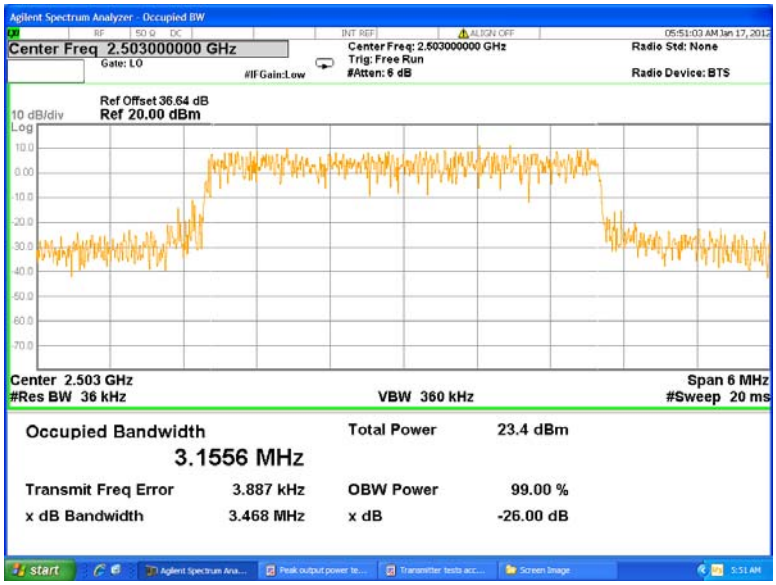


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 °C	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

Plot 7.2.3 Occupied bandwidth test results at high frequency, 3.5 MHz EBW, QPSK

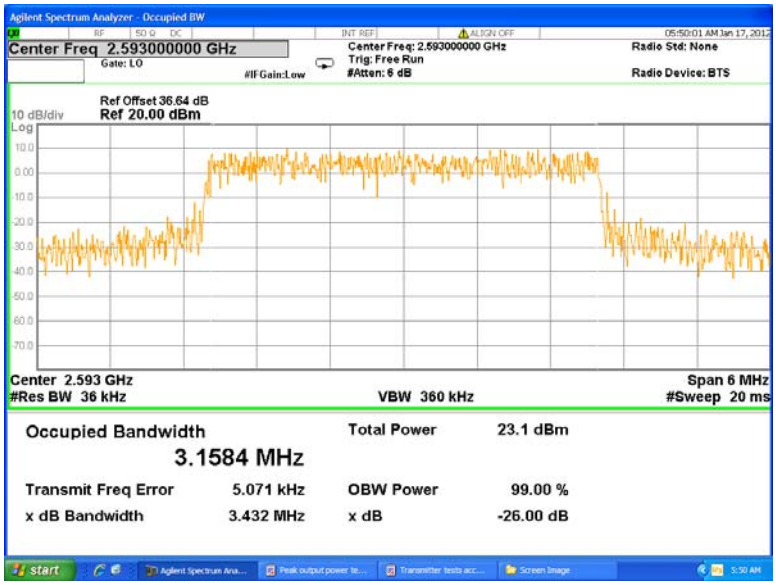


Plot 7.2.4 Occupied bandwidth test results at low frequency, 3.5 MHz EBW, 64QAM

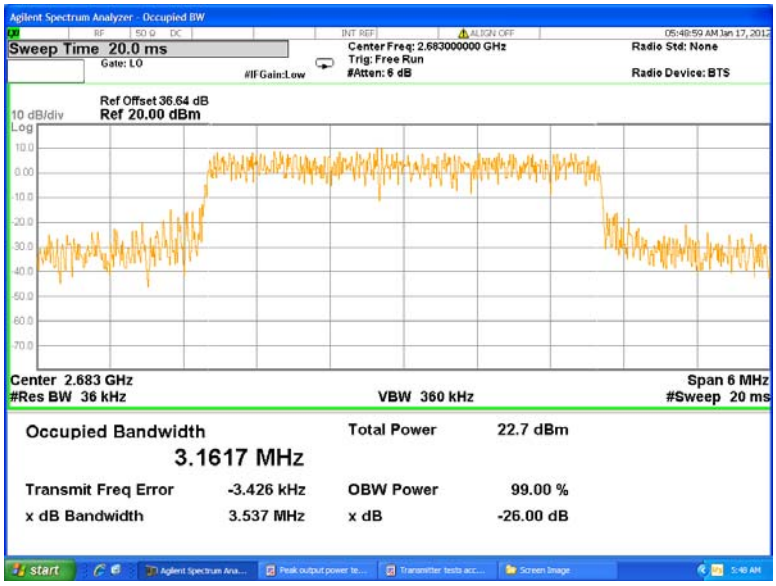


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 °C	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

Plot 7.2.5 Occupied bandwidth test results at mid frequency, 3.5 MHz EBW, 64QAM

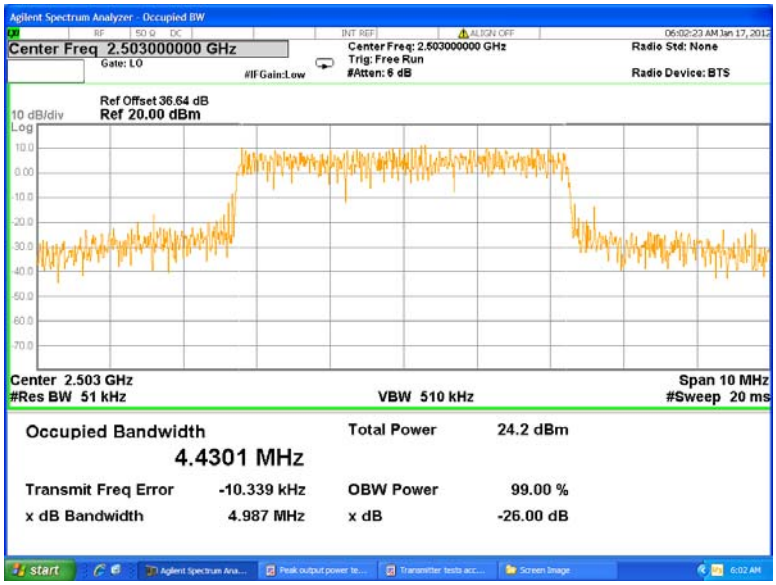


Plot 7.2.6 Occupied bandwidth test results at high frequency, 3.5 MHz EBW, 64QAM

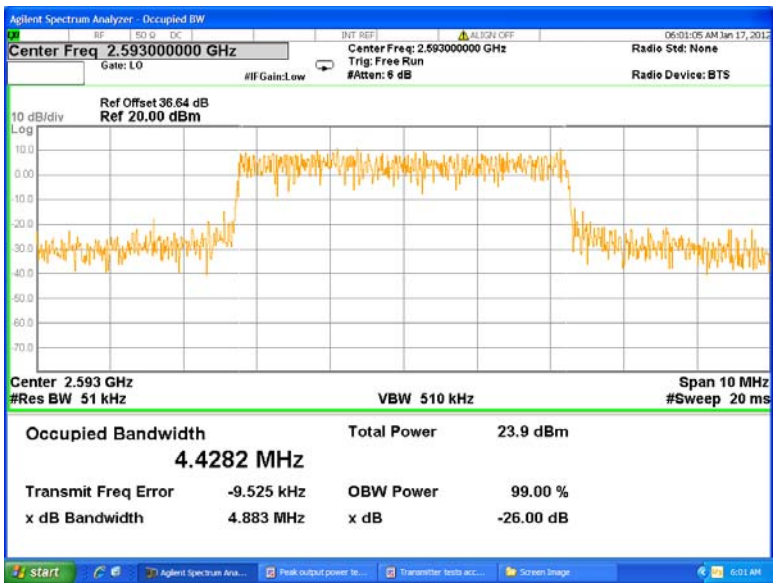


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 °C	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

Plot 7.2.7 Occupied bandwidth test results at low frequency, 5 MHz EBW, QPSK

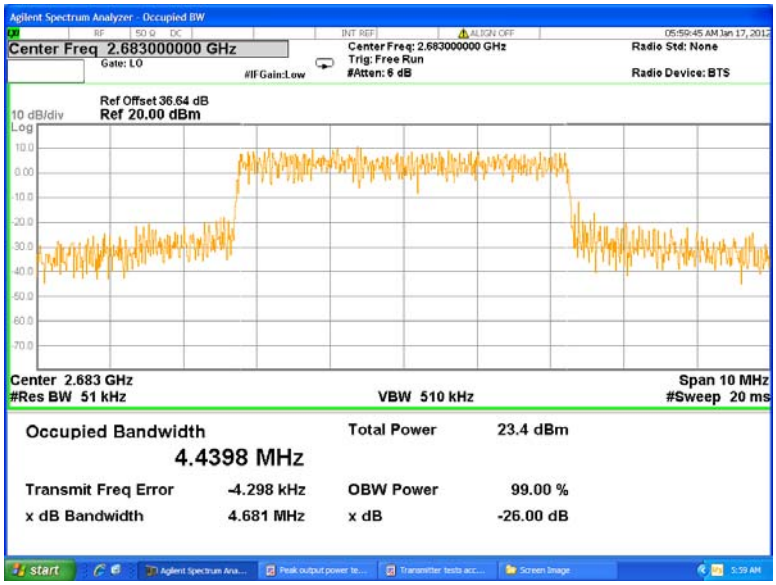


Plot 7.2.8 Occupied bandwidth test results at mid frequency, 5 MHz EBW, QPSK

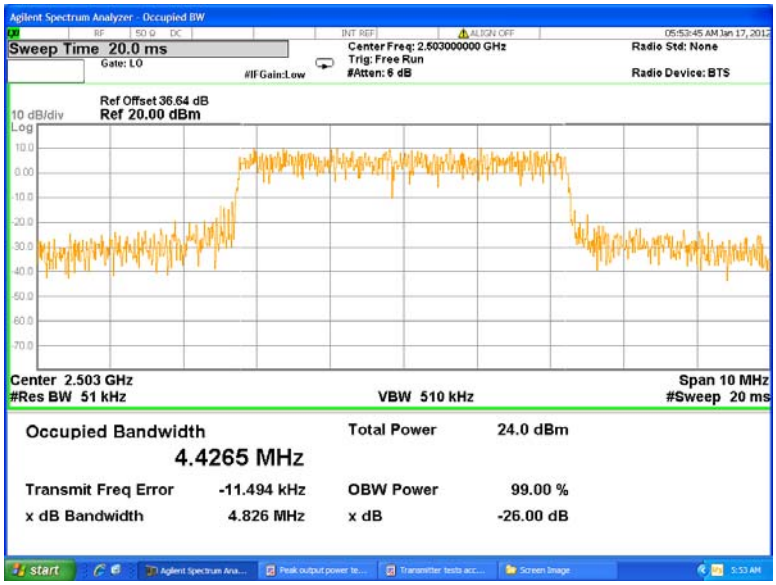


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 °C	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

Plot 7.2.9 Occupied bandwidth test results at high frequency, 5 MHz EBW, QPSK

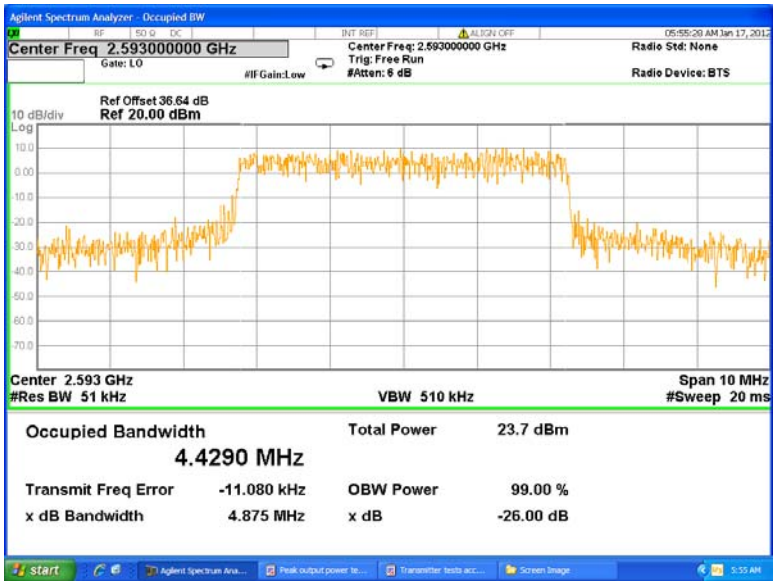


Plot 7.2.10 Occupied bandwidth test results at low frequency, 5 MHz EBW, 64QAM

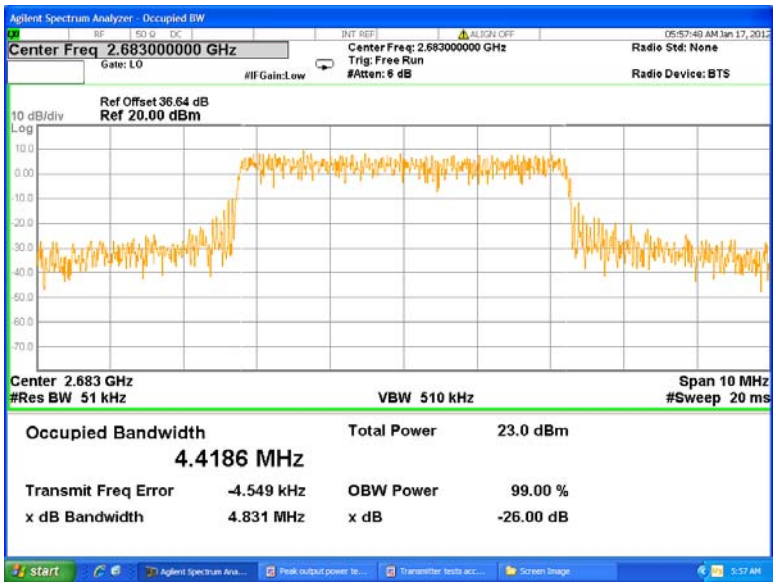


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 °C	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

Plot 7.2.11 Occupied bandwidth test results at mid frequency, 5 MHz EBW, 64QAM

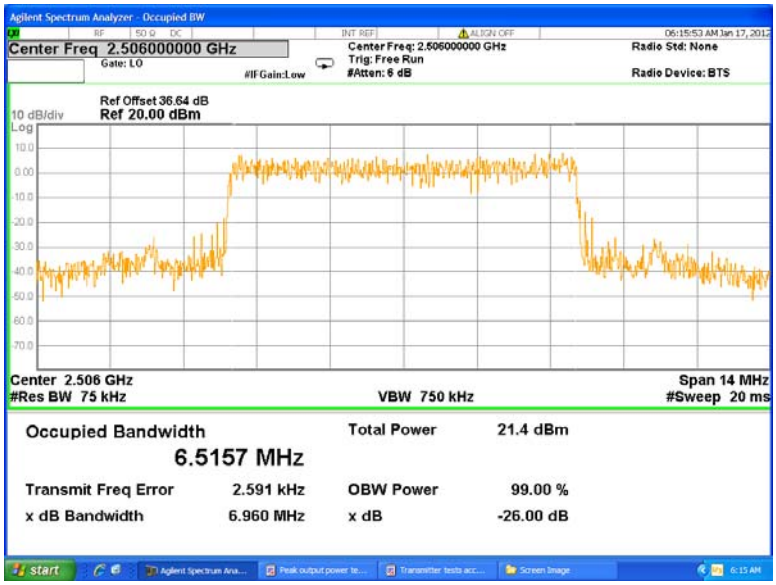


Plot 7.2.12 Occupied bandwidth test results at high frequency, 5 MHz EBW, 64QAM

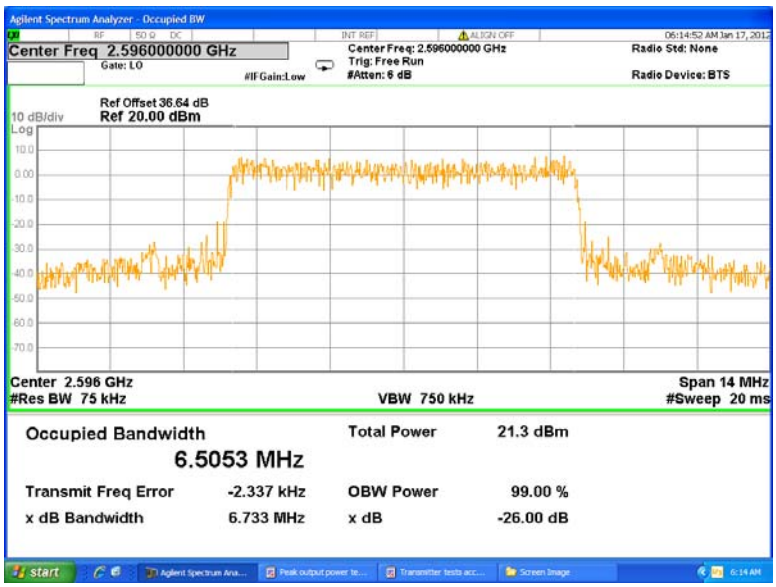


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 °C	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

Plot 7.2.13 Occupied bandwidth test results at low frequency, 7 MHz EBW, QPSK

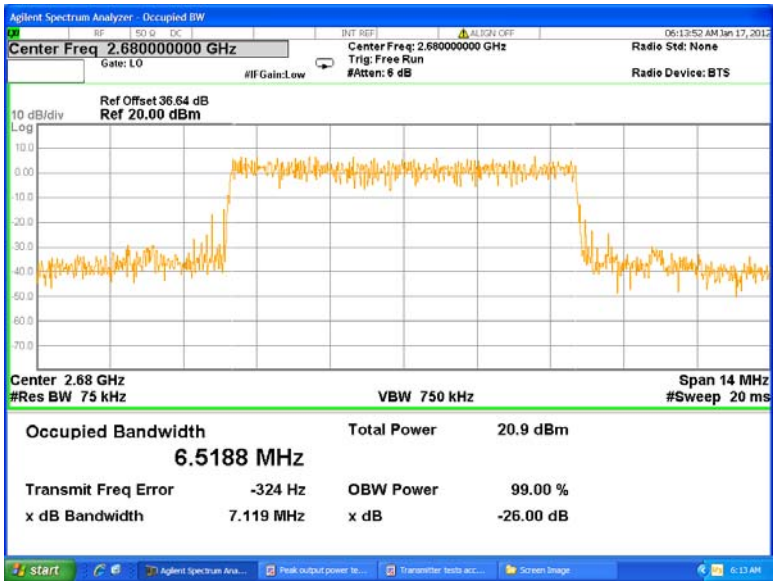


Plot 7.2.14 Occupied bandwidth test results at mid frequency, 7 MHz EBW, QPSK

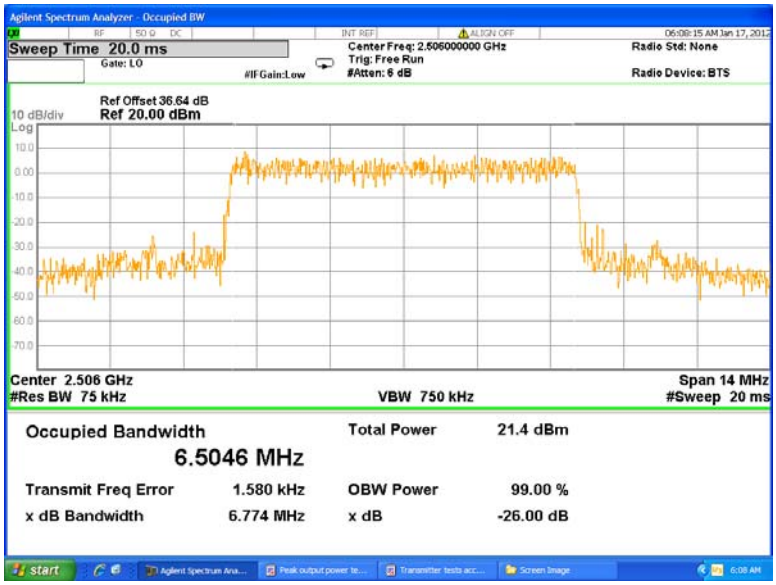


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 °C	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

Plot 7.2.15 Occupied bandwidth test results at high frequency, 7 MHz EBW, QPSK

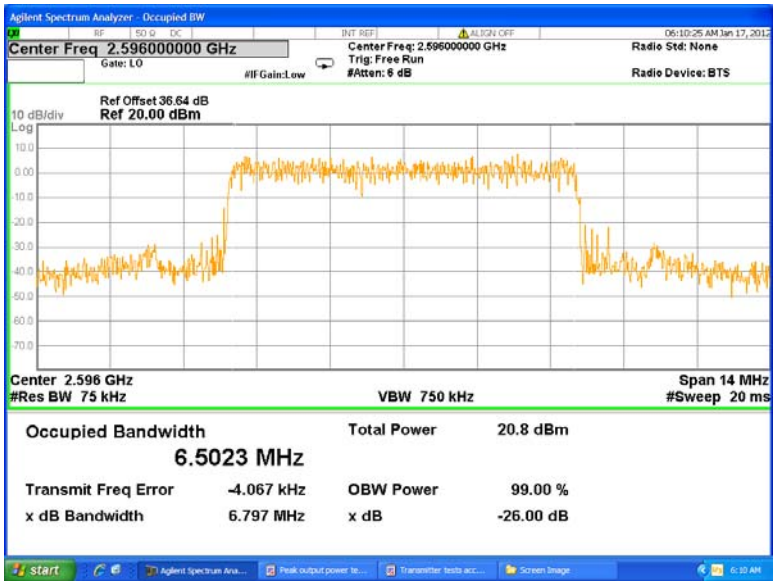


Plot 7.2.16 Occupied bandwidth test results at low frequency, 7 MHz EBW, 64QAM

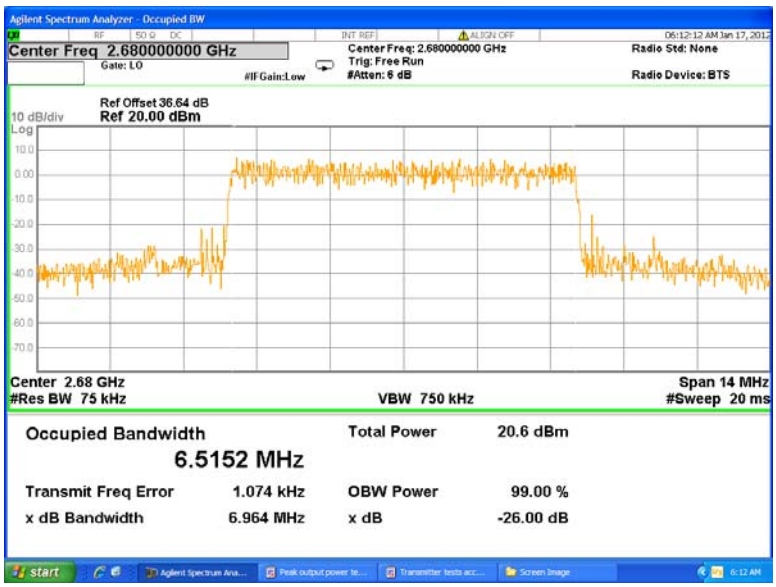


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 °C	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

Plot 7.2.17 Occupied bandwidth test results at mid frequency, 7 MHz EBW, 64QAM

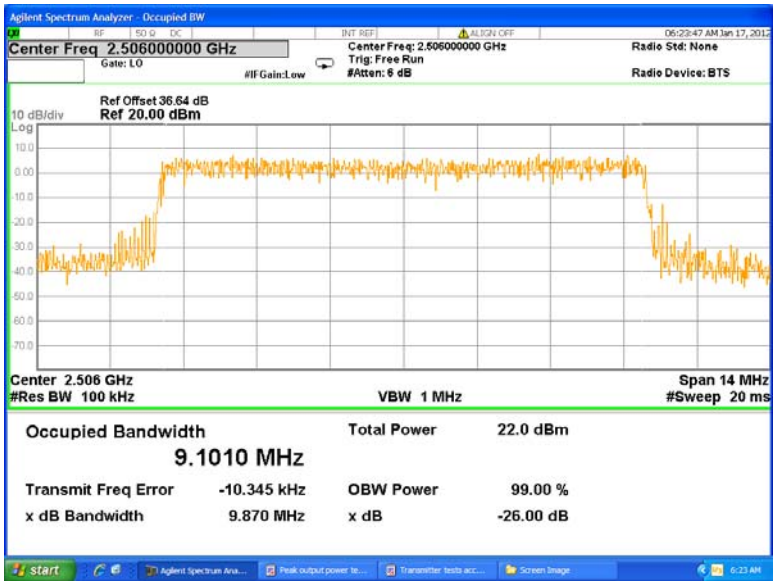


Plot 7.2.18 Occupied bandwidth test results at high frequency, 7 MHz EBW, 64QAM

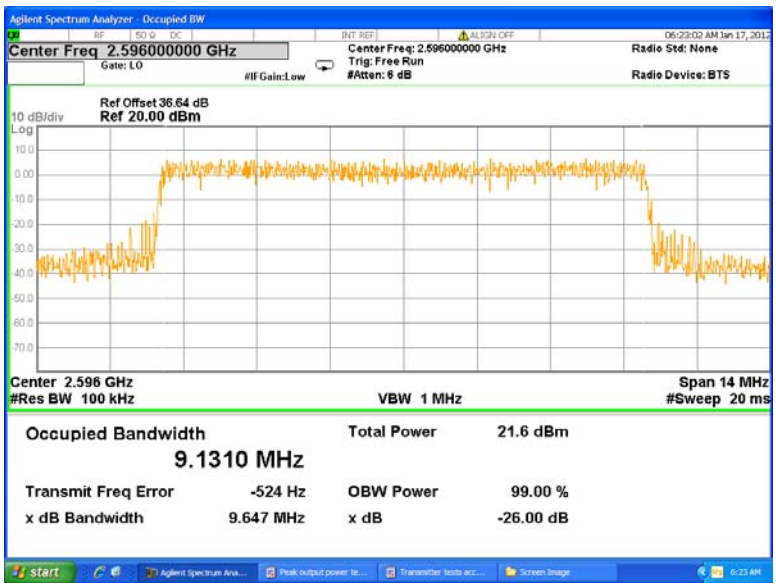


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 °C	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

Plot 7.2.19 Occupied bandwidth test results at low frequency, 10 MHz EBW, QPSK

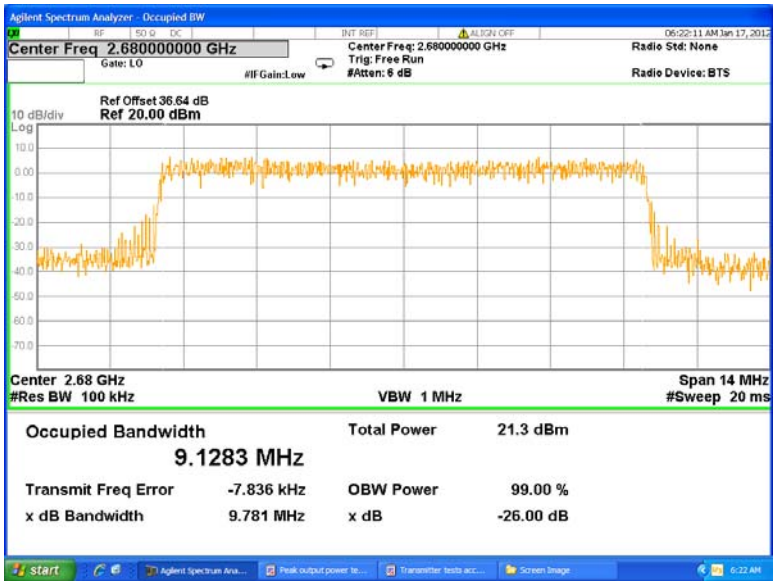


Plot 7.2.20 Occupied bandwidth test results at mid frequency, 10 MHz EBW, QPSK

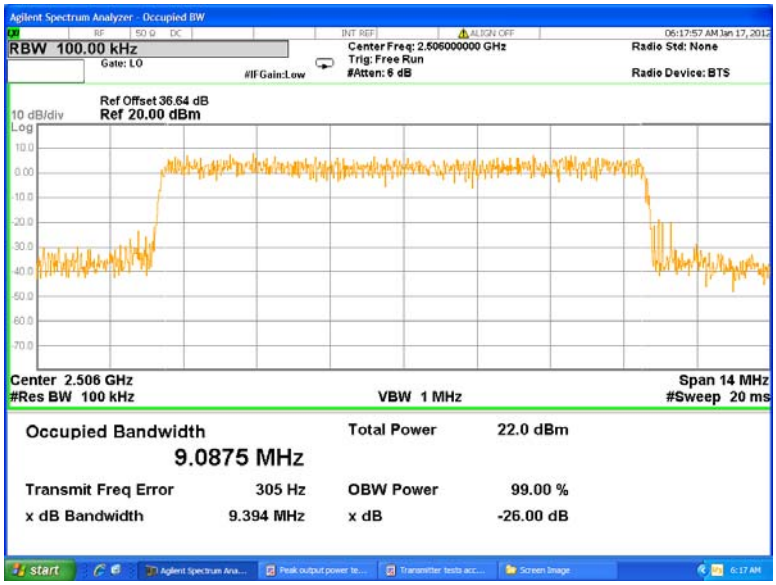


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 °C	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

Plot 7.2.21 Occupied bandwidth test results at high frequency, 10 MHz EBW, QPSK

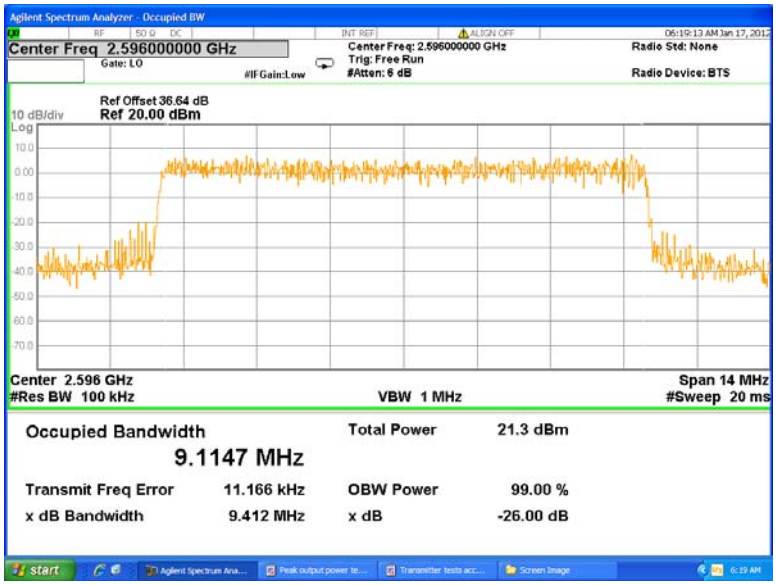


Plot 7.2.22 Occupied bandwidth test results at low frequency, 10 MHz EBW, 64QAM

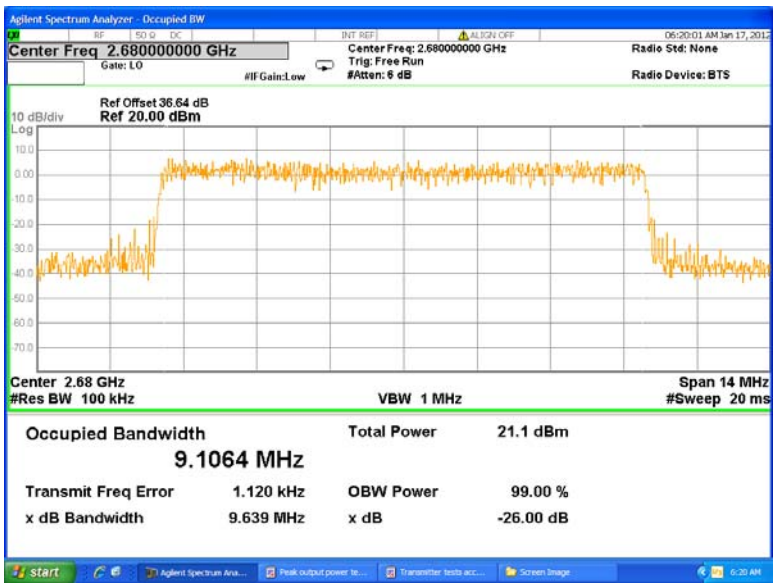


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 °C	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

Plot 7.2.23 Occupied bandwidth test results at mid frequency, 10 MHz EBW, 64QAM



Plot 7.2.24 Occupied bandwidth test results at high frequency, 10 MHz EBW, 64QAM



Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 ºC	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

7.3 Emission mask test

7.3.1 General

This test was performed to measure emission mask at RF antenna connector. Specification test limits are given in Table 7.3.1.

Table 7.3.1 Emission mask limits

Channel	Frequency range	Attenuation below carrier, dBc	Limit, dBm
Channel bandwidth 3.5 MHz			
2503.0	2496.0 – 2500.0 2506.0 – 2510.0	43+ 10*Log (P*)	-13.0
2593.0	2586.0 – 2590.0 2596.0 – 2600.0	43+ 10*Log (P*)	-13.0
2683.0	2676.0 – 2680.0 2686.0 – 2690.0	43+ 10*Log (P*)	-13.0
Channel bandwidth 5 MHz			
2503.0	2496.0 – 2500.0 2506.0 – 2510.0	43+ 10*Log (P*)	-13.0
2593.0	2586.0 – 2590.0 2596.0 – 2600.0	43+ 10*Log (P*)	-13.0
2683.0	2676.0 – 2680.0 2686.0 – 2690.0	43+ 10*Log (P*)	-13.0
Channel bandwidth 7 MHz			
2506.0	2496.0 – 2500.0 2512.0 – 2516.0	43+ 10*Log (P*)	-13.0
2596.0	2586.0 – 2590.0 2602.0 – 2606.0	43+ 10*Log (P*)	-13.0
2680.0	2670.0 – 2674.0 2686.0 – 2690.0	43+ 10*Log (P*)	-13.0
Channel bandwidth 10 MHz			
2506.0	2496.0 – 2500.0 2512.0 – 2516.0	43+ 10*Log (P*)	-13.0
2596.0	2586.0 – 2590.0 2602.0 – 2606.0	43+ 10*Log (P*)	-13.0
2680.0	2670.0 – 2674.0 2686.0 – 2690.0	43+ 10*Log (P*)	-13.0

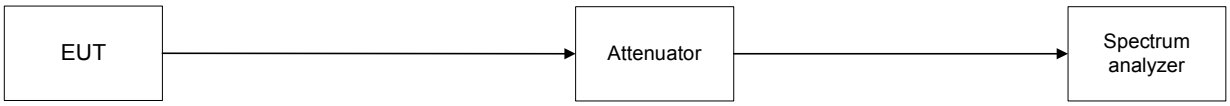
* - P is transmitter output power in Watts

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 emission mask was measured with spectrum analyzer as provided in the associated plots.
7.3.2.3 The worst case results are provided in the associated tables and shown in the associated plots.

Test specification:	**Section 27.53(m)(2), Conducted spurious emissions at the band edges**		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	1/17/2012		
Temperature: 21.2 ºC	**Air Pressure:** 1018 hPa	**Relative Humidity:** 41 %	**Power Supply:** 5.4VDC
Remarks:			

Figure 7.3.1 Emission mask test setup



Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 ºC	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

Table 7.3.2 Spurious emission at the band edges test results

ASSIGNED FREQUENCY RANGE: 2500.0 – 2686.0 MHz
INVESTIGATED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER: Maximum
CONFIGURATION: Single output
THE NUMBER OF OUTPUTS: 2
EBW: 3.5 MHz

Frequency offset, ± MHz	Low range SA reading, dBm	Low range total power, dBm	High range SA reading, dBm	High range total power, dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
Low carrier frequency 2563.0 MHz, QPSK								
3.5	-22.02	-19.02	-21.68	-18.68	100	1000	-13.0	Pass
4.5	-26.72	-23.72	-26.96	-23.96	100	1000	-13.0	
5.5	-30.54	-27.54	-30.76	-27.76	100	1000	-13.0	
6.5	-33.40	-30.40	-33.36	-30.36	100	1000	-13.0	
Low carrier frequency 2563.0 MHz, 64QAM								
3.5	-22.66	-19.66	-22.84	-19.84	100	1000	-13.0	Pass
4.5	-27.63	-24.63	-27.46	-24.46	100	1000	-13.0	
5.5	-30.83	-27.83	-30.97	-27.97	100	1000	-13.0	
6.5	-33.68	-30.68	-33.67	-30.67	100	1000	-13.0	
Mid carrier frequency 2593.0 MHz, QPSK								
3.5	-21.72	-18.72	-21.56	-18.56	100	1000	-13.0	Pass
4.5	-25.85	-22.85	-26.14	-23.14	100	1000	-13.0	
5.5	-29.27	-26.27	-29.29	-26.29	100	1000	-13.0	
6.5	-31.97	-28.97	-32.12	-29.12	100	1000	-13.0	
Mid carrier frequency 2593.0 MHz, 64QAM								
3.5	-22.00	-19.00	-22.27	-19.27	100	1000	-13.0	Pass
4.5	-26.56	-23.56	-26.6	-23.60	100	1000	-13.0	
5.5	-29.49	-26.49	-29.91	-26.91	100	1000	-13.0	
6.5	-32.20	-29.20	-32.37	-29.37	100	1000	-13.0	
High carrier frequency 2629.0 MHz, QPSK								
3.5	-23.60	-20.60	-21.85	-18.85	100	1000	-13.0	Pass
4.5	-27.91	-24.91	-26.06	-23.06	100	1000	-13.0	
5.5	-30.88	-27.88	-29.53	-26.53	100	1000	-13.0	
6.5	-33.58	-30.58	-32.51	-29.51	100	1000	-13.0	
High carrier frequency 2629.0 MHz, 64QAM								
3.5	-23.78	-20.78	-24.15	-21.15	100	1000	-13.0	Pass
4.5	-27.84	-24.84	-28.31	-25.31	100	1000	-13.0	
5.5	-30.82	-27.82	-31.24	-28.24	100	1000	-13.0	
6.5	-33.73	-30.73	-33.87	-30.87	100	1000	-13.0	

* - Total power = SA Reading + 10*log(N), where N is the number of outputs

Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 ºC	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

Table 7.3.3 Spurious emission at the band edges test results

ASSIGNED FREQUENCY RANGE: 2500.0 – 2686.0 MHz
INVESTIGATED FREQUENCY RANGE: See Table 7.3.1
DETECTOR USED: Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER: Maximum
CONFIGURATION: Single output
THE NUMBER OF OUTPUTS: 2
EBW: 5 MHz

Frequency offset, ± MHz	Low range SA reading, dBm	Low range total power, dBm	High range SA reading, dBm	High range total power, dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
Low carrier frequency 2563.0 MHz, QPSK								
3.5	-19.43	-16.43	-19.19	-16.19	100	1000	-13.0	Pass
4.5	-22.26	-19.26	-21.89	-18.89	100	1000	-13.0	
5.5	-24.85	-21.85	-25.43	-22.43	100	1000	-13.0	
6.5	-28.80	-25.80	-28.94	-25.94	100	1000	-13.0	
Low carrier frequency 2563.0 MHz, 64QAM								
3.5	-20.20	-17.20	-20.34	-17.34	100	1000	-13.0	Pass
4.5	-22.59	-19.59	-22.64	-19.64	100	1000	-13.0	
5.5	-25.91	-22.91	-25.95	-22.95	100	1000	-13.0	
6.5	-29.24	-26.24	-29.61	-26.61	100	1000	-13.0	
Mid carrier frequency 2593.0 MHz, QPSK								
3.5	-19.25	-16.25	-18.91	-15.91	100	1000	-13.0	Pass
4.5	-21.33	-18.33	-21.90	-18.90	100	1000	-13.0	
5.5	-24.31	-21.31	-24.52	-21.52	100	1000	-13.0	
6.5	-27.88	-24.88	-27.92	-24.92	100	1000	-13.0	
Mid carrier frequency 2593.0 MHz, 64QAM								
3.5	-19.33	-16.33	-19.39	-16.39	100	1000	-13.0	Pass
4.5	-21.58	-18.58	-21.92	-18.92	100	1000	-13.0	
5.5	-24.90	-21.90	-24.68	-21.68	100	1000	-13.0	
6.5	-28.09	-25.09	-28.21	-25.21	100	1000	-13.0	
High carrier frequency 2629.0 MHz, QPSK								
3.5	-21.10	-18.10	-19.7	-16.70	100	1000	-13.0	Pass
4.5	-23.71	-20.71	-22.07	-19.07	100	1000	-13.0	
5.5	-26.31	-23.31	-25.16	-22.16	100	1000	-13.0	
6.5	-29.57	-26.57	-28.3	-25.30	100	1000	-13.0	
High carrier frequency 2629.0 MHz, 64QAM								
3.5	-21.10	-18.10	-22.08	-19.08	100	1000	-13.0	Pass
4.5	-23.78	-20.78	-24.28	-21.28	100	1000	-13.0	
5.5	-26.67	-23.67	-27.27	-24.27	100	1000	-13.0	
6.5	-29.41	-26.41	-29.78	-26.78	100	1000	-13.0	

* - Total power = SA Reading + 10*log(N), where N is the number of outputs

Test specification:	**Section 27.53(m)(2), Conducted spurious emissions at the band edges**		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	1/17/2012		
Temperature: 21.2 ºC	**Air Pressure:** 1018 hPa	**Relative Humidity:** 41 %	**Power Supply:** 5.4VDC
Remarks:			

Table 7.3.4 Spurious emission at the band edges test results

ASSIGNED FREQUENCY RANGE: 2500.0 – 2686.0 MHz
INVESTIGATED FREQUENCY RANGE: See Table 7.3.1
DETECTOR USED: Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER: Maximum
CONFIGURATION: Single output
THE NUMBER OF OUTPUTS: 2
EBW: 7 MHz

Frequency offset, ± MHz	Low range SA reading, dBm	Low range total power, dBm	High range SA reading, dBm	High range total power, dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
Low carrier frequency 2566.0 MHz, QPSK								
3.5	-27.77	-24.77	-29.37	-26.37	100	1000	-13.0	Pass
4.5	-28.89	-25.89	-32.58	-29.58	100	1000	-13.0	
5.5	-32.11	-29.11	-33.85	-30.85	100	1000	-13.0	
6.5	-34.82	-31.82	-35.49	-32.49	100	1000	-13.0	
Low carrier frequency 2566.0 MHz, 64QAM								
3.5	-28.50	-25.50	-30.16	-27.16	100	1000	-13.0	Pass
4.5	-29.48	-26.48	-31.65	-28.65	100	1000	-13.0	
5.5	-33.91	-30.91	-33.98	-30.98	100	1000	-13.0	
6.5	-35.82	-32.82	-35.72	-32.72	100	1000	-13.0	
Mid carrier frequency 2596.0 MHz, QPSK								
3.5	-28.98	-25.98	-27.98	-24.98	100	1000	-13.0	Pass
4.5	-30.68	-27.68	-30.00	-27.00	100	1000	-13.0	
5.5	-31.17	-28.17	-31.64	-28.64	100	1000	-13.0	
6.5	-33.53	-30.53	-33.48	-30.48	100	1000	-13.0	
Mid carrier frequency 2596.0 MHz, 64QAM								
3.5	-29.18	-26.18	-28.84	-25.84	100	1000	-13.0	Pass
4.5	-31.26	-28.26	-31.16	-28.16	100	1000	-13.0	
5.5	-33.38	-30.38	-32.33	-29.33	100	1000	-13.0	
6.5	-34.72	-31.72	-33.77	-30.77	100	1000	-13.0	
High carrier frequency 2680.0 MHz, QPSK								
3.5	-27.09	-24.09	-28.32	-25.32	100	1000	-13.0	Pass
4.5	-28.16	-25.16	-30.33	-27.33	100	1000	-13.0	
5.5	-31.54	-28.54	-32.24	-29.24	100	1000	-13.0	
6.5	-33.02	-30.02	-33.02	-30.02	100	1000	-13.0	
High carrier frequency 2680.0 MHz, 64QAM								
3.5	-27.15	-24.15	-28.40	-25.40	100	1000	-13.0	Pass
4.5	-29.16	-26.16	-29.97	-26.97	100	1000	-13.0	
5.5	-30.73	-27.73	-31.34	-28.34	100	1000	-13.0	
6.5	-33.21	-30.21	-33.70	-30.70	100	1000	-13.0	

* - Total power = SA Reading + 10*log(N), where N is the number of outputs

Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 ºC	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

Table 7.3.5 Spurious emission at the band edges test results

ASSIGNED FREQUENCY RANGE: 2500.0 – 2686.0 MHz
INVESTIGATED FREQUENCY RANGE: See Table 7.3.1
DETECTOR USED: Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER: Maximum
CONFIGURATION: Single output
THE NUMBER OF OUTPUTS: 2
EBW: 10 MHz

Frequency offset, ± MHz	Low range SA reading, dBm	Low range total power, dBm	High range SA reading, dBm	High range total power, dBm	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
Low carrier frequency 2566.0 MHz, QPSK								
3.5	-26.22	-23.22	-27.83	-24.83	100	1000	-13.0	Pass
4.5	-27.00	-24.00	-28.86	-25.86	100	1000	-13.0	
5.5	-27.91	-24.91	-30.98	-27.98	100	1000	-13.0	
6.5	-28.82	-25.82	-31.49	-28.49	100	1000	-13.0	
Low carrier frequency 2566.0 MHz, 64QAM								
3.5	-26.12	-23.12	-28.06	-25.06	100	1000	-13.0	Pass
4.5	-26.94	-23.94	-29.46	-26.46	100	1000	-13.0	
5.5	-28.06	-25.06	-31.05	-28.05	100	1000	-13.0	
6.5	-29.07	-26.07	-32.18	-29.18	100	1000	-13.0	
Mid carrier frequency 2596.0 MHz, QPSK								
3.5	-27.21	-24.21	-27.16	-24.16	100	1000	-13.0	Pass
4.5	-28.24	-25.24	-29.01	-26.01	100	1000	-13.0	
5.5	-27.80	-24.80	-29.5	-26.50	100	1000	-13.0	
6.5	-28.53	-25.53	-30.14	-27.14	100	1000	-13.0	
Mid carrier frequency 2596.0 MHz, 64QAM								
3.5	-27.79	-24.79	-28.47	-25.47	100	1000	-13.0	Pass
4.5	-28.81	-25.81	-29.77	-26.77	100	1000	-13.0	
5.5	-29.85	-26.85	-30.70	-27.70	100	1000	-13.0	
6.5	-30.60	-27.60	-31.47	-28.47	100	1000	-13.0	
High carrier frequency 2680.0 MHz, QPSK								
3.5	-25.37	-22.37	-27.77	-24.77	100	1000	-13.0	Pass
4.5	-26.67	-23.67	-28.98	-25.98	100	1000	-13.0	
5.5	-27.39	-24.39	-29.85	-26.85	100	1000	-13.0	
6.5	-28.84	-25.84	-30.71	-27.71	100	1000	-13.0	
High carrier frequency 2680.0 MHz, 64QAM								
3.5	-26.28	-23.28	-28.26	-25.26	100	1000	-13.0	Pass
4.5	-26.79	-23.79	-29.30	-26.30	100	1000	-13.0	
5.5	-27.92	-24.92	-30.56	-27.56	100	1000	-13.0	
6.5	-28.70	-25.70	-31.37	-28.37	100	1000	-13.0	

* - Total power = SA Reading + 10*log(N), where N is the number of outputs

Reference numbers of test equipment used

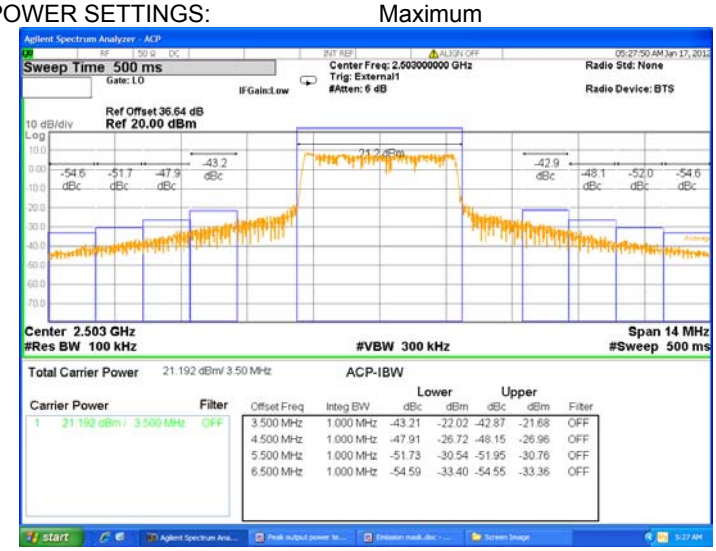
HL 3455	HL 3901	HL 4289					

Full description is given in Appendix A.

Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 ºC	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

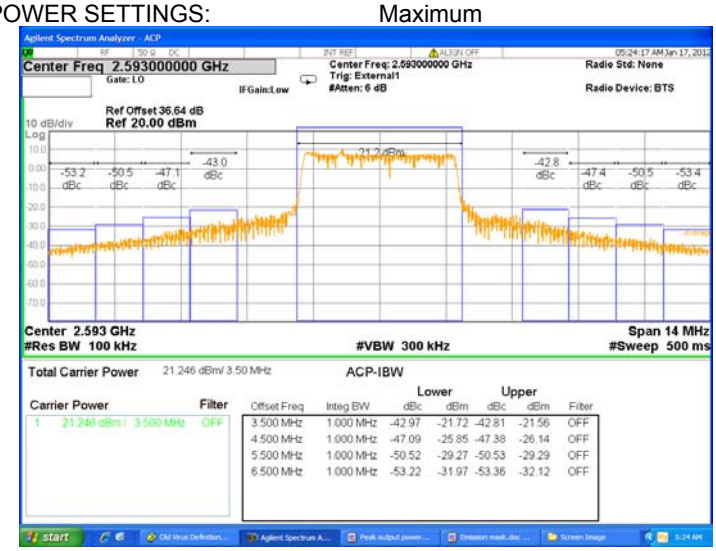
Plot 7.3.1 Emission mask test results at low carrier frequency, 3.5 MHz EBW

ASSIGNED FREQUENCY RANGE:	2500.0 – 2686.0 MHz
DETECTOR USED:	Average
MODULATION:	QPSK
MODULATING SIGNAL:	PRBS
BIT RATE:	4 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum



Plot 7.3.2 Emission mask test results at mid carrier frequency, 3.5 MHz EBW

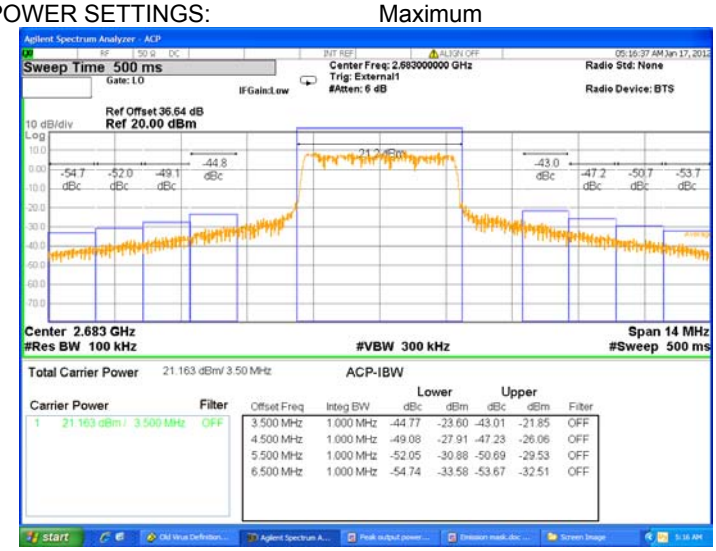
ASSIGNED FREQUENCY RANGE:	2500.0 – 2686.0 MHz
DETECTOR USED:	Average
MODULATION:	QPSK
MODULATING SIGNAL:	PRBS
BIT RATE:	4 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum



Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 ºC	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

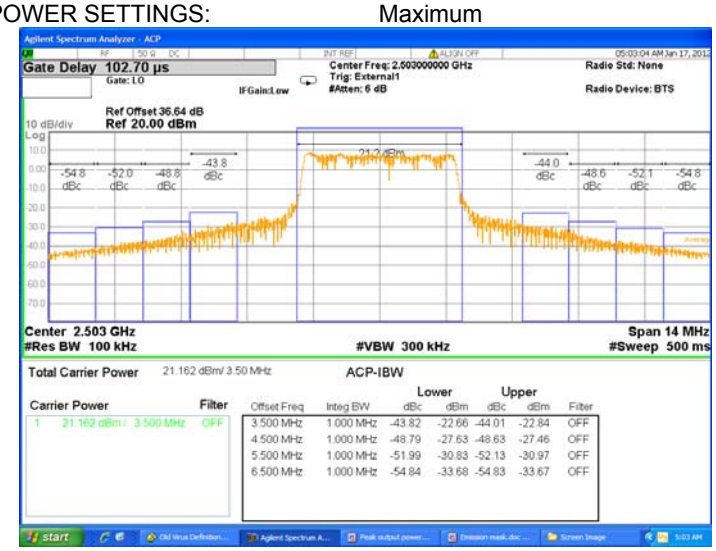
Plot 7.3.3 Emission mask test results at high carrier frequency, 3.5 MHz EBW

ASSIGNED FREQUENCY RANGE: 2500.0 – 2686.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 4 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.4 **Emission mask test results at low carrier frequency, 3.5 MHz EBW**

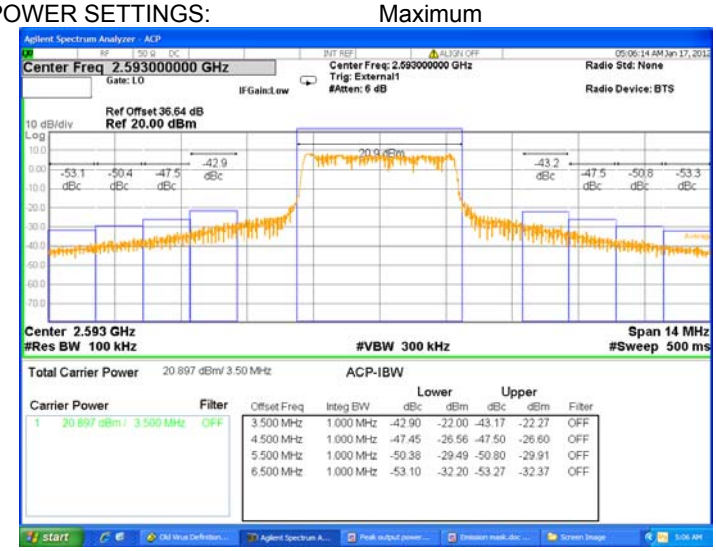
ASSIGNED FREQUENCY RANGE: 2500.0 – 2686.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 14 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 °C	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

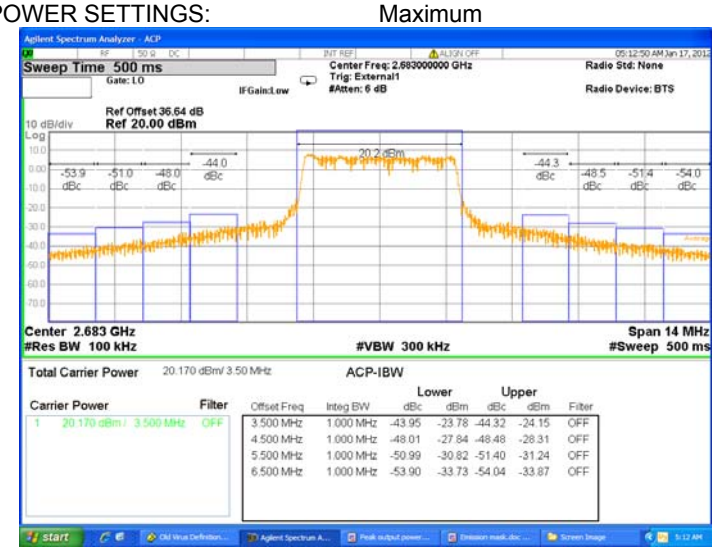
Plot 7.3.5 Emission mask test results at mid carrier frequency, 3.5 MHz EBW

ASSIGNED FREQUENCY RANGE:	2500.0 – 2686.0 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
BIT RATE:	14 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum



Plot 7.3.6 Emission mask test results at high carrier frequency, 3.5 MHz EBW

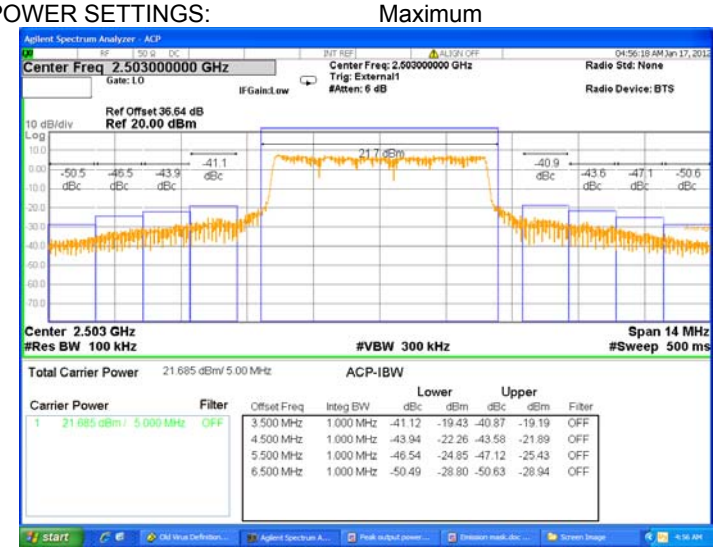
ASSIGNED FREQUENCY RANGE:	2500.0 – 2686.0 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
BIT RATE:	14 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum



Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 ºC	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

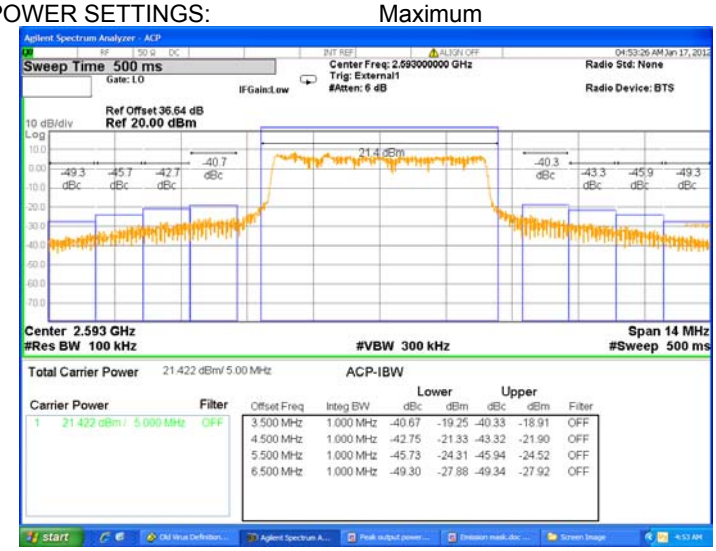
Plot 7.3.7 Emission mask test results at low carrier frequency, 5 MHz EBW

ASSIGNED FREQUENCY RANGE:	2500.0 – 2686.0 MHz
DETECTOR USED:	Average
MODULATION:	QPSK
MODULATING SIGNAL:	PRBS
BIT RATE:	7 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum



Plot 7.3.8 Emission mask test results at mid carrier frequency, 5 MHz EBW

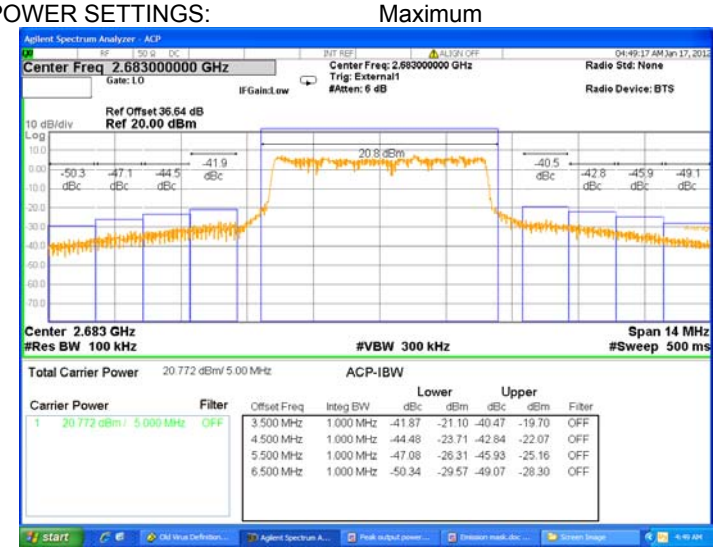
ASSIGNED FREQUENCY RANGE:	2500.0 – 2686.0 MHz
DETECTOR USED:	Average
MODULATION:	QPSK
MODULATING SIGNAL:	PRBS
BIT RATE:	7 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum



Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 ºC	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

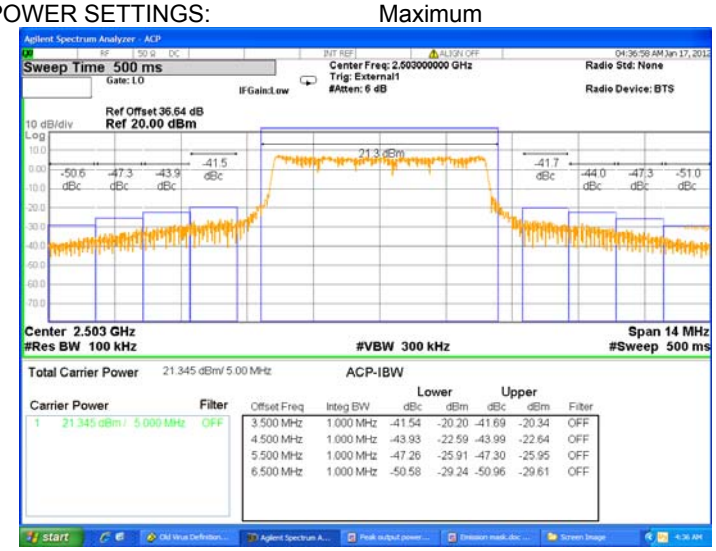
Plot 7.3.9 Emission mask test results at high carrier frequency, 5 MHz EBW

ASSIGNED FREQUENCY RANGE:	2500.0 – 2686.0 MHz
DETECTOR USED:	Average
MODULATION:	QPSK
MODULATING SIGNAL:	PRBS
BIT RATE:	7 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum



Plot 7.3.10 Emission mask test results at low carrier frequency, 5 MHz EBW

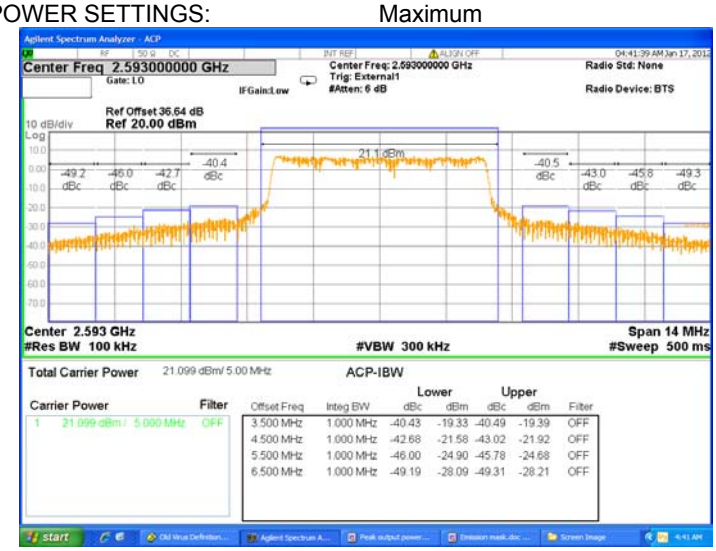
ASSIGNED FREQUENCY RANGE:	2500.0 – 2686.0 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
BIT RATE:	23 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum



Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 °C	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

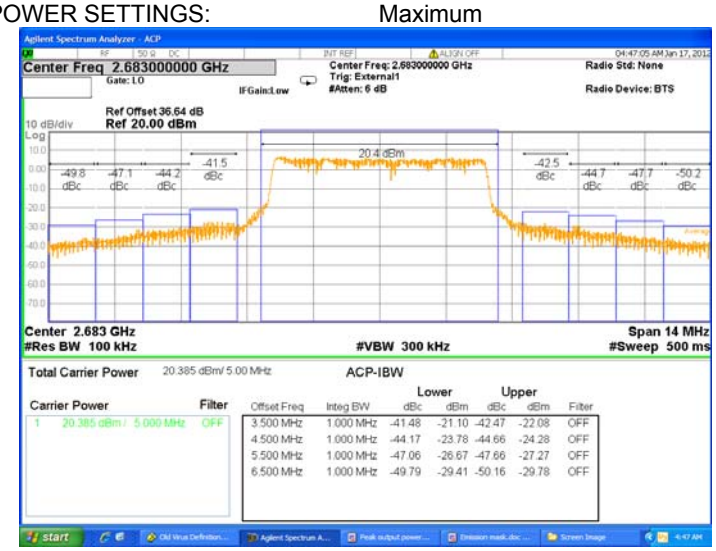
Plot 7.3.11 Emission mask test results at mid carrier frequency, 5 MHz EBW

ASSIGNED FREQUENCY RANGE:	2500.0 – 2686.0 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
BIT RATE:	23 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum



Plot 7.3.12 Emission mask test results at high carrier frequency 5 MHz EBW

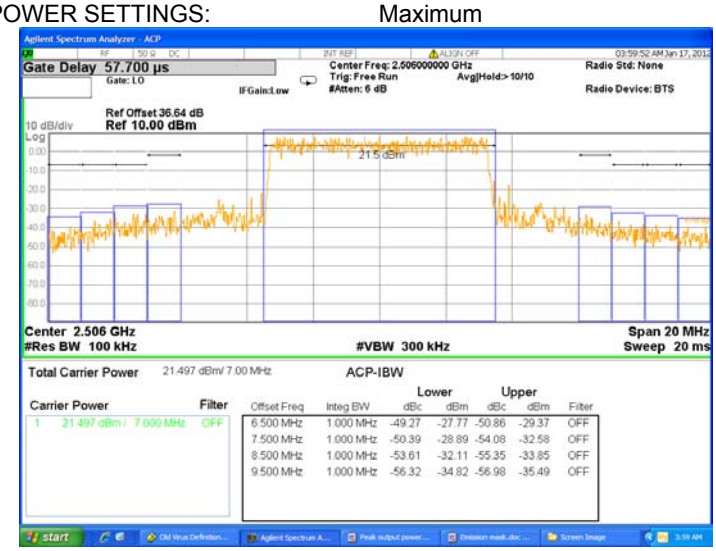
ASSIGNED FREQUENCY RANGE:	2500.0 – 2686.0 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
BIT RATE:	23 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum



Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 ºC	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

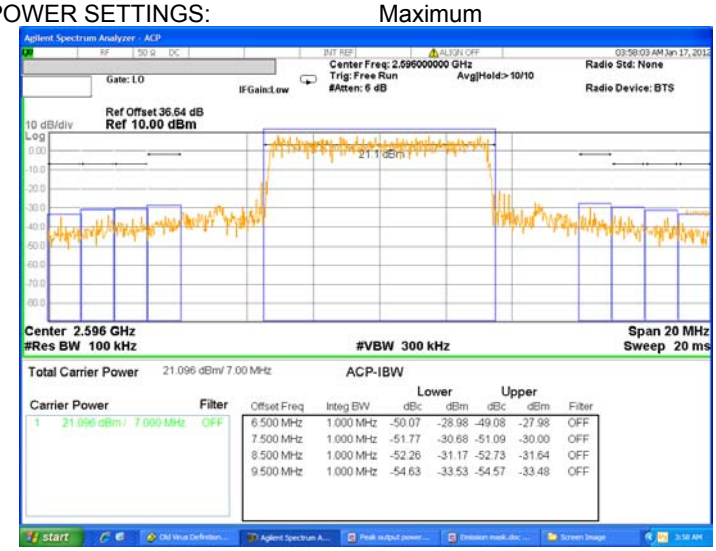
Plot 7.3.13 Emission mask test results at low carrier frequency, 7 MHz EBW

ASSIGNED FREQUENCY RANGE:	2500.0 – 2686.0 MHz
DETECTOR USED:	Average
MODULATION:	QPSK
MODULATING SIGNAL:	PRBS
BIT RATE:	8 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum



Plot 7.3.14 Emission mask test results at mid carrier frequency, 7 MHz EBW

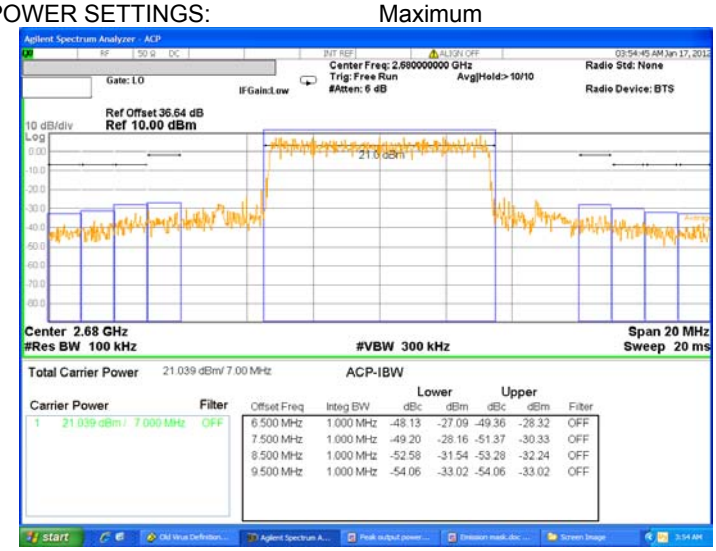
ASSIGNED FREQUENCY RANGE:	2500.0 – 2686.0 MHz
DETECTOR USED:	Average
MODULATION:	QPSK
MODULATING SIGNAL:	PRBS
BIT RATE:	8 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum



Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 ºC	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

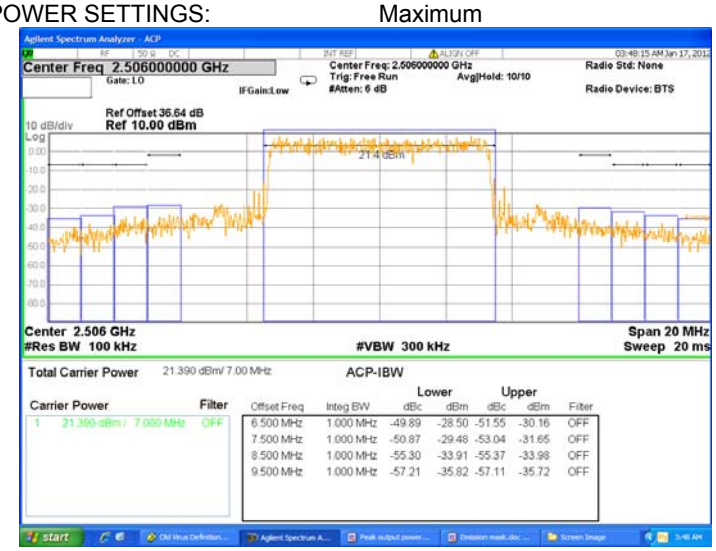
Plot 7.3.15 Emission mask test results at high carrier frequency, 7 MHz EBW

ASSIGNED FREQUENCY RANGE:	2500.0 – 2686.0 MHz
DETECTOR USED:	Average
MODULATION:	QPSK
MODULATING SIGNAL:	PRBS
BIT RATE:	8 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum



Plot 7.3.16 Emission mask test results at low carrier frequency, 7 MHz EBW

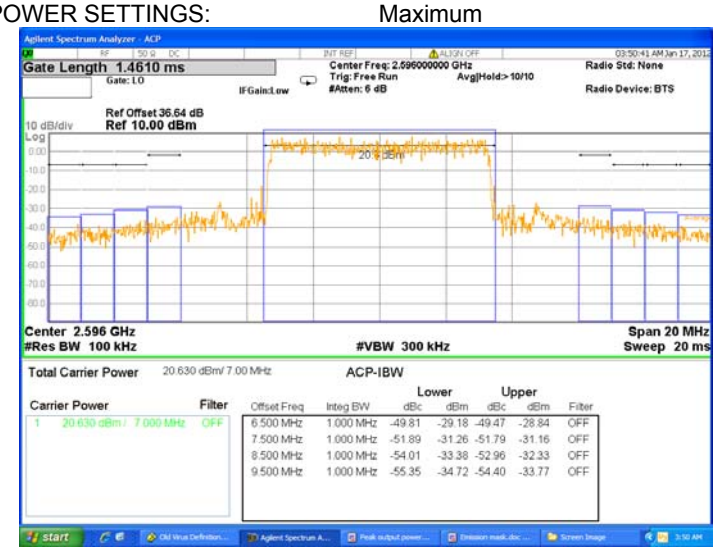
ASSIGNED FREQUENCY RANGE:	2500.0 – 2686.0 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
BIT RATE:	28 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum



Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 °C	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

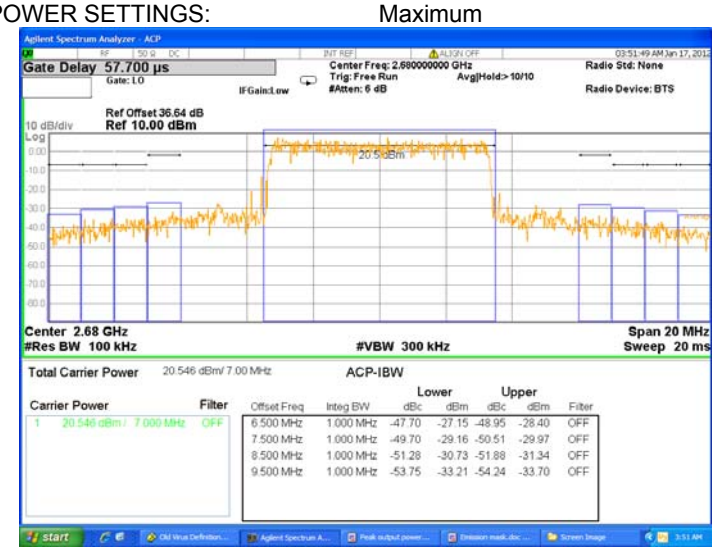
Plot 7.3.17 Emission mask test results at mid carrier frequency, 7 MHz EBW

ASSIGNED FREQUENCY RANGE:	2500.0 – 2686.0 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
BIT RATE:	28 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum



Plot 7.3.18 Emission mask test results at high carrier frequency, 10 MHz EBW

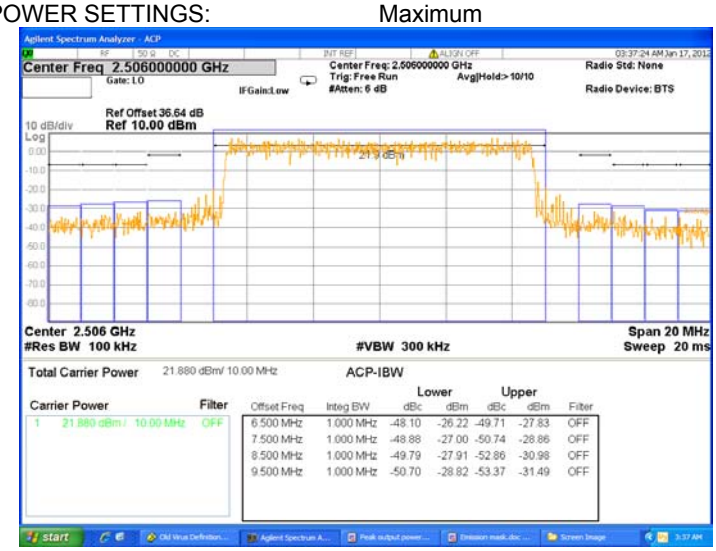
ASSIGNED FREQUENCY RANGE:	2500.0 – 2686.0 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
BIT RATE:	28 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum



Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 ºC	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

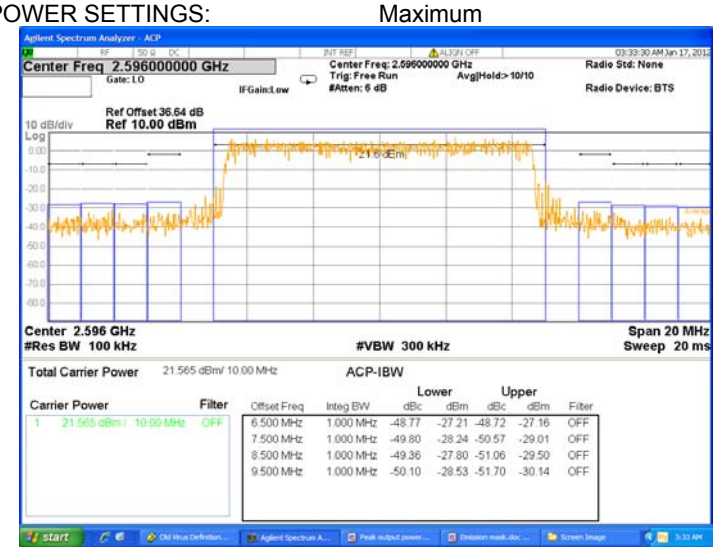
Plot 7.3.19 Emission mask test results at low carrier frequency, 10 MHz EBW

ASSIGNED FREQUENCY RANGE:	2500.0 – 2686.0 MHz
DETECTOR USED:	Average
MODULATION:	QPSK
MODULATING SIGNAL:	PRBS
BIT RATE:	13 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum



Plot 7.3.20 Emission mask test results at mid carrier frequency, 10 MHz EBW

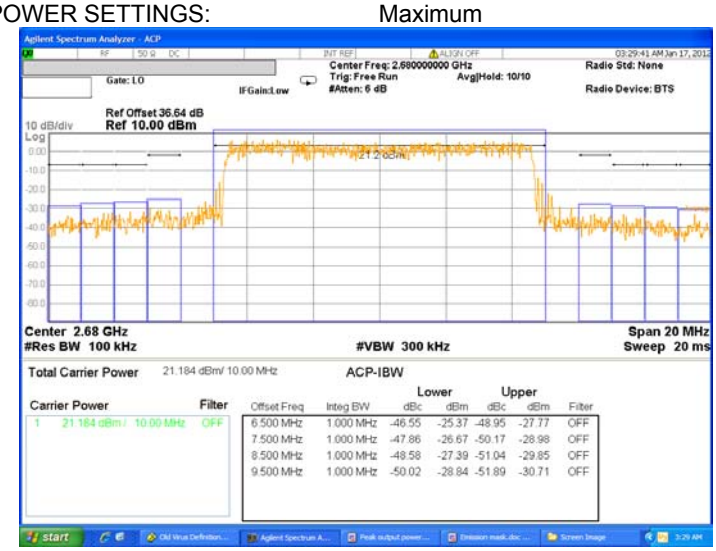
ASSIGNED FREQUENCY RANGE:	2500.0 – 2686.0 MHz
DETECTOR USED:	Average
MODULATION:	QPSK
MODULATING SIGNAL:	PRBS
BIT RATE:	13 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum



Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 ºC	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

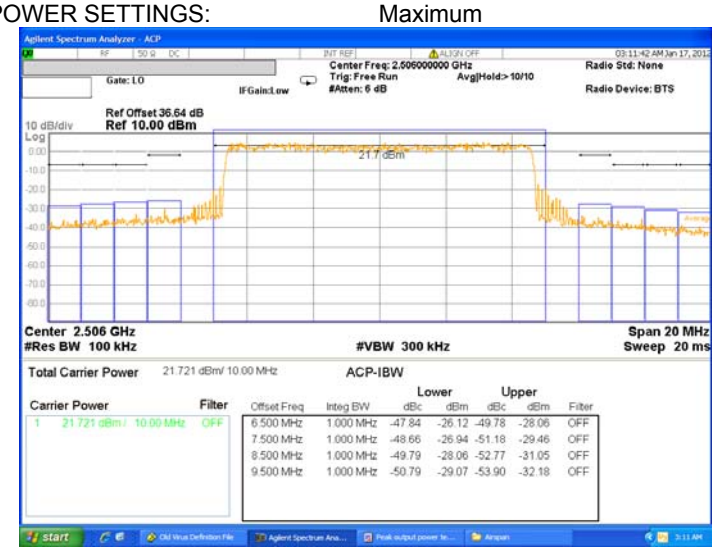
Plot 7.3.21 Emission mask test results at high carrier frequency, 10 MHz EBW

ASSIGNED FREQUENCY RANGE:	2500.0 – 2686.0 MHz
DETECTOR USED:	Average
MODULATION:	QPSK
MODULATING SIGNAL:	PRBS
BIT RATE:	13 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum



Plot 7.3.22 Emission mask test results at low carrier frequency, 10 MHz EBW

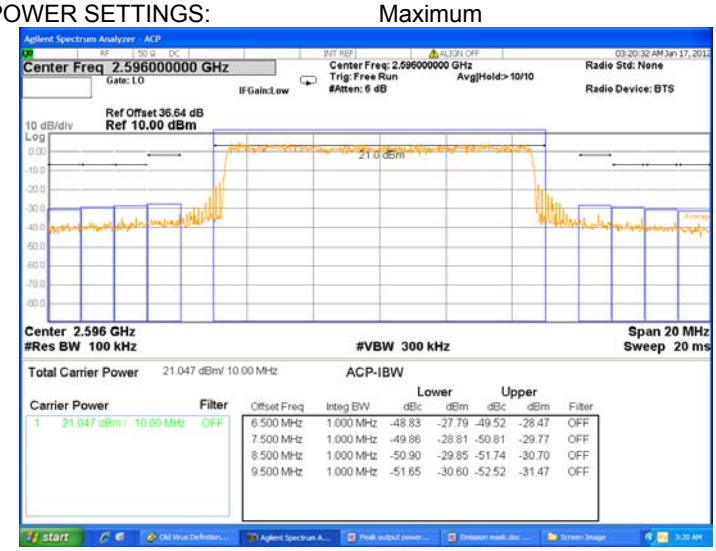
ASSIGNED FREQUENCY RANGE:	2500.0 – 2686.0 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
BIT RATE:	46 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum



Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/17/2012		
Temperature: 21.2 ºC	Air Pressure: 1018 hPa	Relative Humidity: 41 %	Power Supply: 5.4VDC
Remarks:			

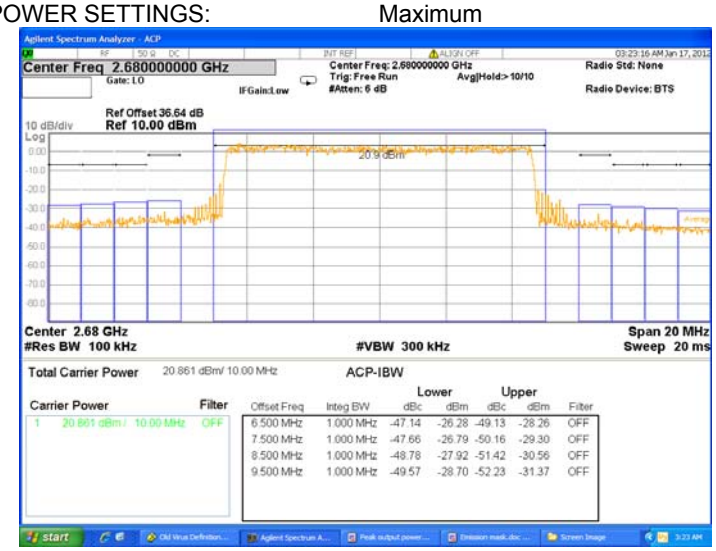
Plot 7.3.23 Emission mask test results at mid carrier frequency, 10 MHz EBW

ASSIGNED FREQUENCY RANGE:	2500.0 – 2686.0 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
BIT RATE:	46 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum



Plot 7.3.24 Emission mask test results at high carrier frequency, 10 MHz EBW

ASSIGNED FREQUENCY RANGE:	2500.0 – 2686.0 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
BIT RATE:	46 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum



Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/19/2012 - 1/22/2012		
Temperature: 19.1 ºC	Air Pressure: 1016 hPa	Relative Humidity: 43 %	Power Supply: 5.4VDC
Remarks:			

7.4 Radiated spurious emission measurements

7.4.1 General

This test was performed to measure radiated spurious emissions from the EUT. Specification test limits are given in Table 7.4.1.

Table 7.4.1 Radiated spurious emission test limits

Frequency, MHz	Attenuation below carrier, dBc	ERP of spurious, dBm	Equivalent field strength limit @ 3m, dB(μV/m)***
0.009 – 10th harmonic*	43+10logP**	-13	84.4

* - Excluding the in band emission within ± 250 % of the authorized bandwidth from the carrier
** - P is transmitter output power in Watts
*** - Equivalent field strength limit was calculated from maximum allowed ERP of spurious as follows: E=sqrt(30×P×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

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

7.4.2.1 The EUT was set up as shown in Figure 7.4.1, energized and the performance check was conducted.

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

7.4.2.3 The worst test results (the lowest margins) were recorded in Table 7.4.2 and shown in the associated plots.

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

7.4.3.1 The EUT was set up as shown in Figure 7.4.2, energized and the performance check was conducted.

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

7.4.3.3 The worst test results (the lowest margins) were recorded in Table 7.4.2 and shown in the associated plots.

Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/19/2012 - 1/22/2012		
Temperature: 19.1 ºC	Air Pressure: 1016 hPa	Relative Humidity: 43 %	Power Supply: 5.4VDC
Remarks:			

Figure 7.4.1 Setup for spurious emission field strength measurements in 9 kHz to 30 MHz band

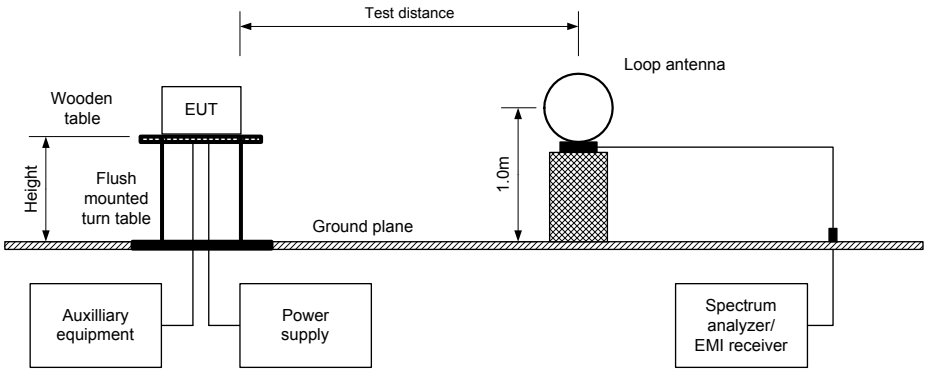
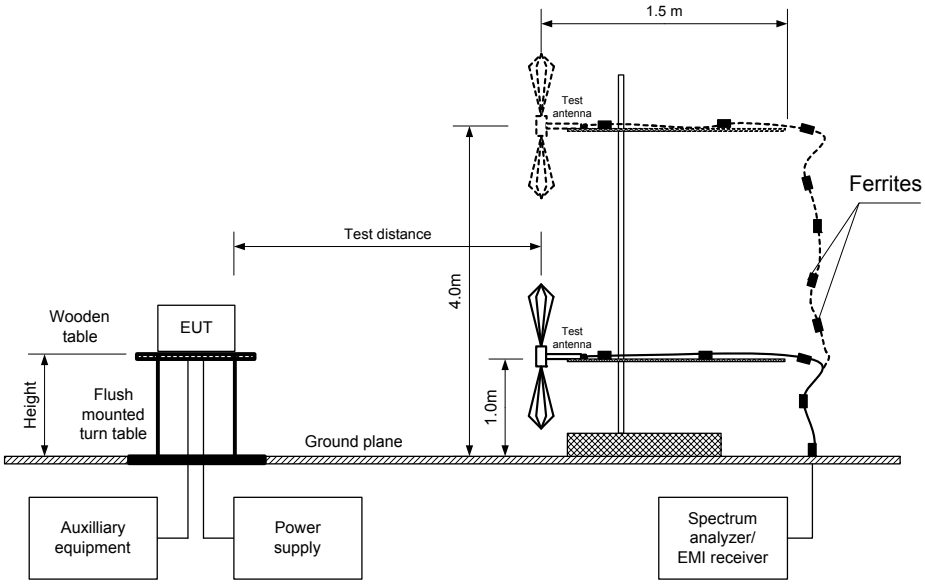


Figure 7.4.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	**Section 27.53(m)(2), Radiated spurious emissions**		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	1/19/2012 - 1/22/2012		
Temperature: 19.1 ºC	**Air Pressure:** 1016 hPa	**Relative Humidity:** 43 %	**Power Supply:** 5.4VDC
Remarks:			

Table 7.4.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE: 2500.0 – 2686.0 MHz
TEST DISTANCE: 3 m
TEST SITE: OATS
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: OFDM
MODULATING SIGNAL: PRBS
BIT RATE: 4 Mbps
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	Verdict
Low carrier frequency								
7511.110	60.52	84.4	-23.88	1000	Hor	1.0	182	Pass
10010.500	64.25	84.4	-20.15	1000	Vert	1.5	90	Pass
17517.500	67.05	84.4	-17.35	1000	Vert	1.0	191	Pass
Mid carrier frequency								
7777.450	61.60	84.4	-22.80	1000	Vert	1.0	190	Pass
10370.125	67.02	84.4	-17.38	1000	Vert	1.5	171	Pass
18150.875	62.27	84.4	-22.13	1000	Vert	1.0	191	Pass
High carrier frequency								
5365.950	61.26	84.4	-23.14	1000	Vert	1.1	99	Pass
8046.900	61.74	84.4	-22.66	1000	Hor	1.0	182	Pass

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

Reference numbers of test equipment used

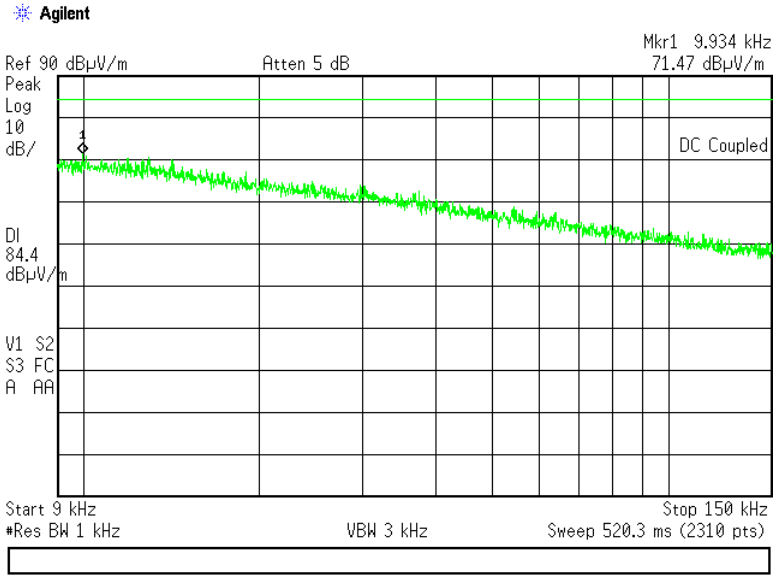
HL 0446	HL 0768	HL 2697	HL 2882	HL 2909	HL 3390	HL 3531	HL 3533
HL 3535	HL 3901	HL 4114	HL 4150				

Full description is given in Appendix A.

Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/19/2012 - 1/22/2012		
Temperature: 19.1 ºC	Air Pressure: 1016 hPa	Relative Humidity: 43 %	Power Supply: 5.4VDC
Remarks:			

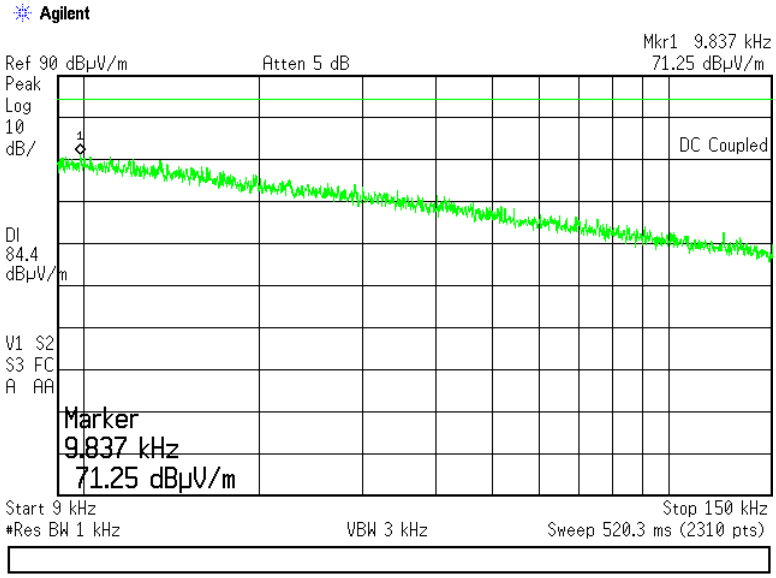
Plot 7.4.1 Radiated emission measurements in 9 - 150 kHz range

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



Plot 7.4.2 Radiated emission measurements in 9 - 150 kHz range

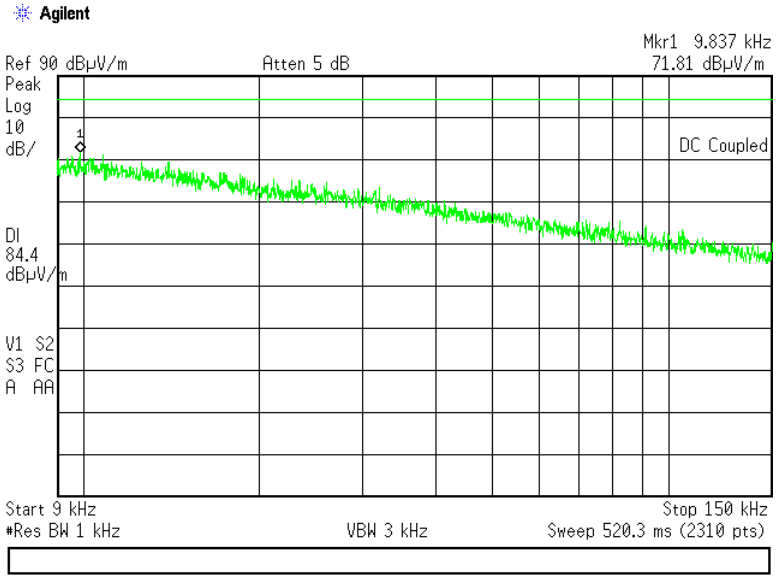
TEST SITE: Anechoic chamber
CARRIER FREQUENCY: Mid
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/19/2012 - 1/22/2012		
Temperature: 19.1 ºC	Air Pressure: 1016 hPa	Relative Humidity: 43 %	Power Supply: 5.4VDC
Remarks:			

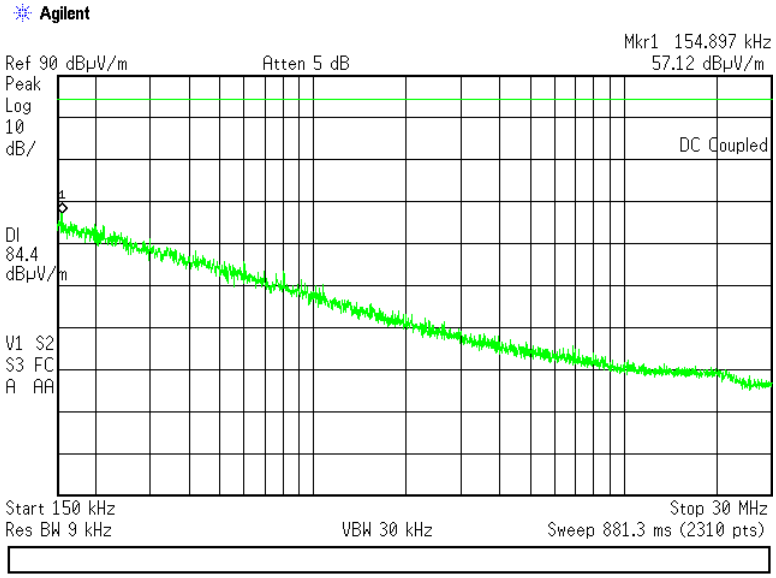
Plot 7.4.3 Radiated emission measurements in 9 - 150 kHz range

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



Plot 7.4.4 Radiated emission measurements in 0.15 - 30 MHz range

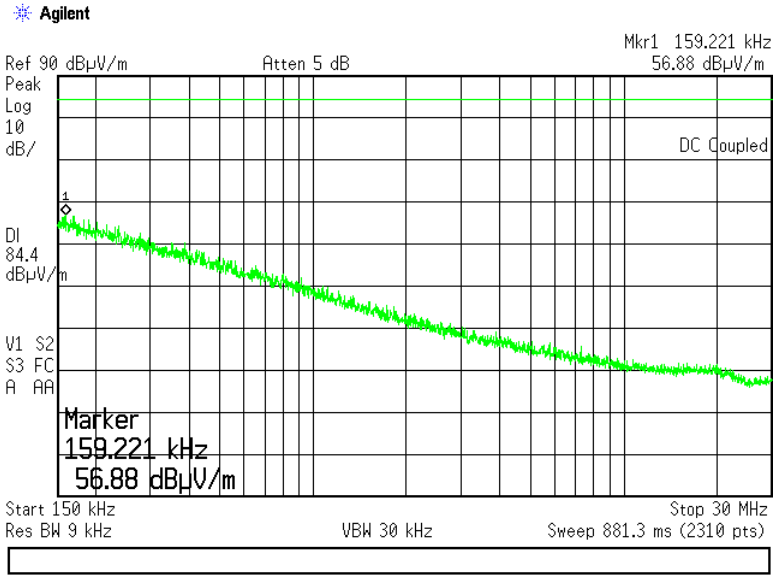
TEST SITE: Anechoic chamber
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/19/2012 - 1/22/2012		
Temperature: 19.1 ºC	Air Pressure: 1016 hPa	Relative Humidity: 43 %	Power Supply: 5.4VDC
Remarks:			

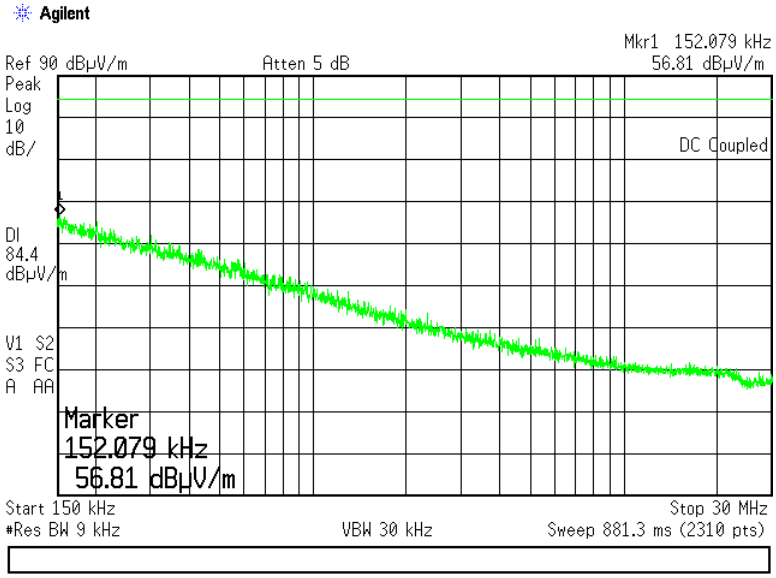
Plot 7.4.5 Radiated emission measurements in 0.15 - 30 MHz range

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



Plot 7.4.6 Radiated emission measurements in 0.15 - 30 MHz range

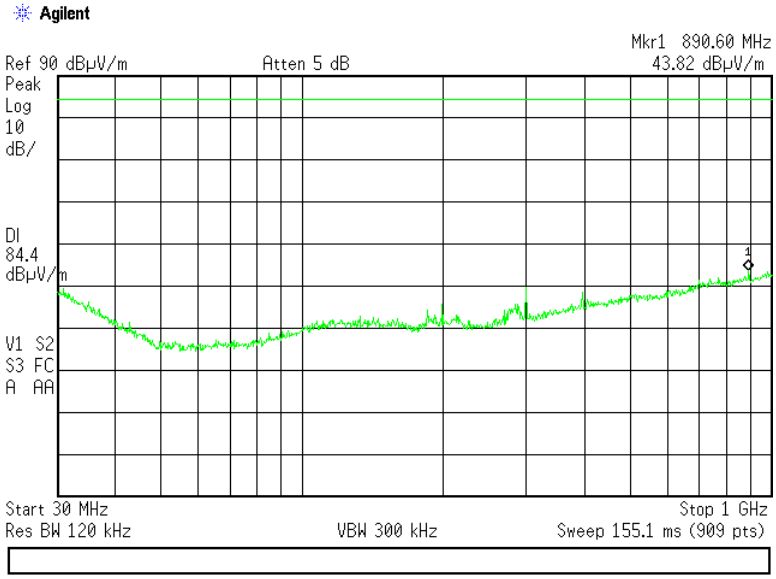
TEST SITE:	Anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/19/2012 - 1/22/2012		
Temperature: 19.1 ºC	Air Pressure: 1016 hPa	Relative Humidity: 43 %	Power Supply: 5.4VDC
Remarks:			

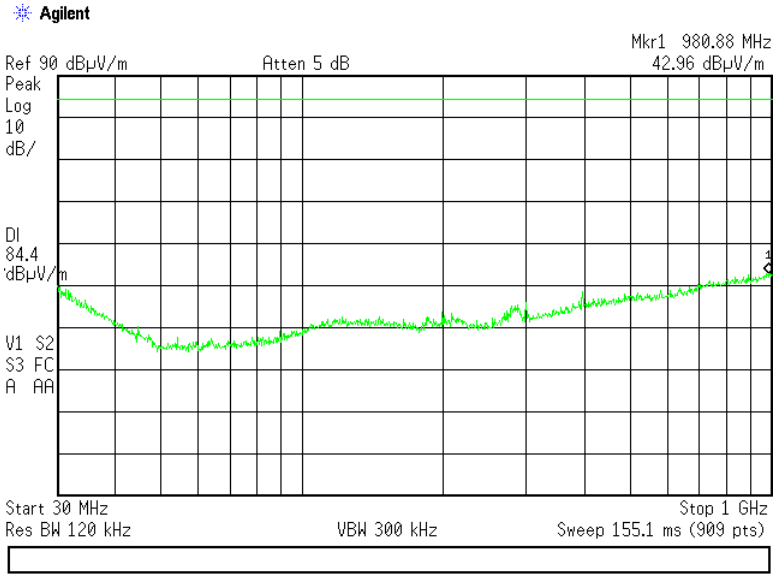
Plot 7.4.7 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.4.8 Radiated emission measurements in 30 - 1000 MHz range

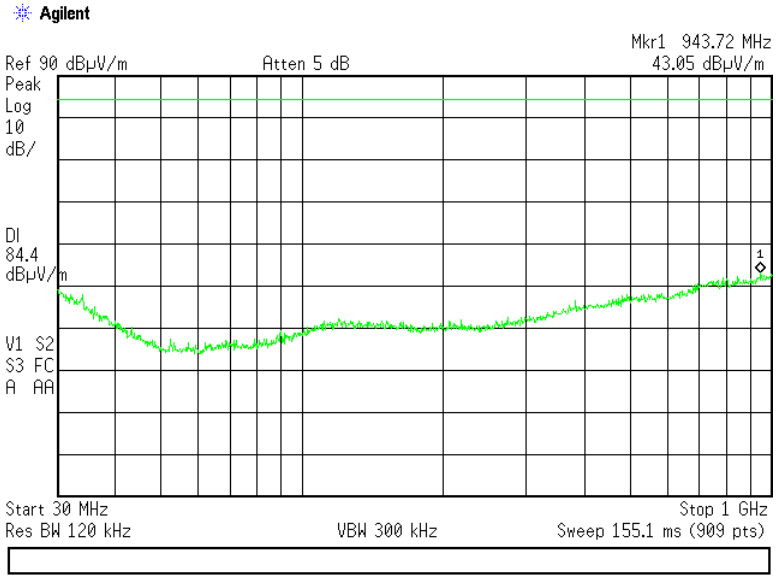
TEST SITE:	Anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/19/2012 - 1/22/2012		
Temperature: 19.1 ºC	Air Pressure: 1016 hPa	Relative Humidity: 43 %	Power Supply: 5.4VDC
Remarks:			

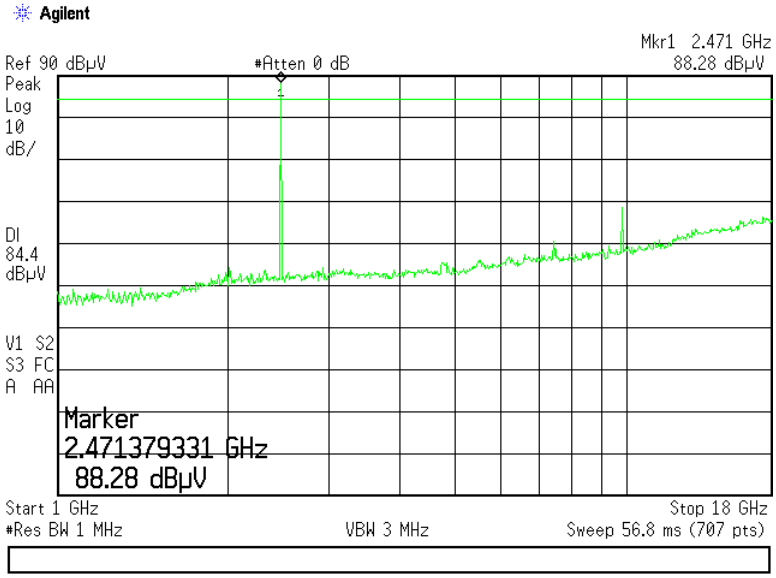
Plot 7.4.9 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.4.10 Radiated emission measurements in 1000 – 18000 MHz range

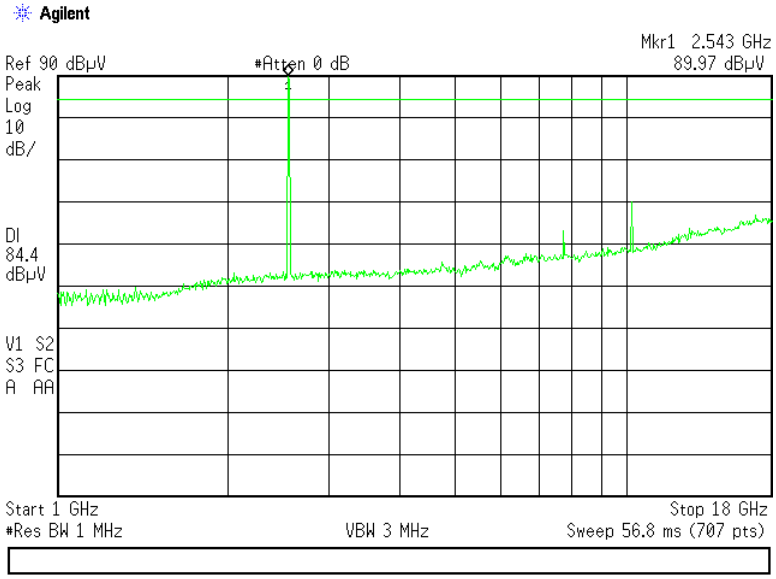
TEST SITE:	Anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/19/2012 - 1/22/2012		
Temperature: 19.1 ºC	Air Pressure: 1016 hPa	Relative Humidity: 43 %	Power Supply: 5.4VDC
Remarks:			

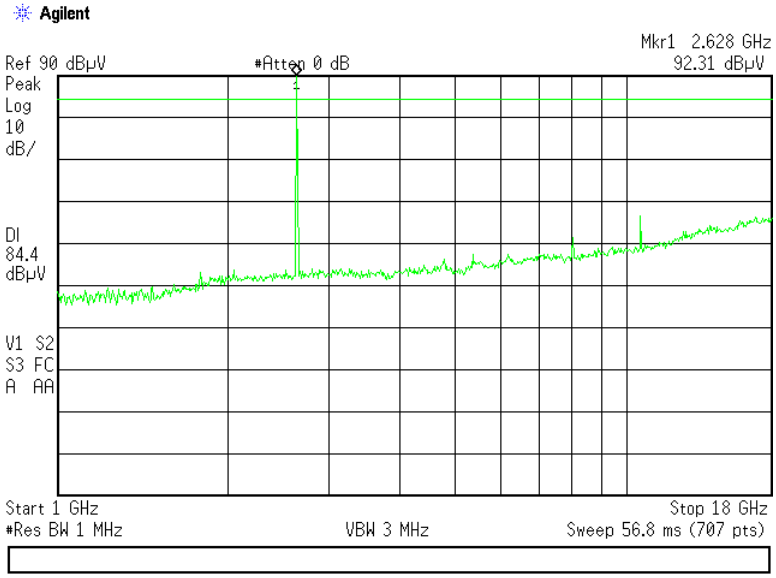
Plot 7.4.11 Radiated emission measurements in 1000 – 18000 MHz range

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



Plot 7.4.12 Radiated emission measurements in 1000 – 18000 MHz range

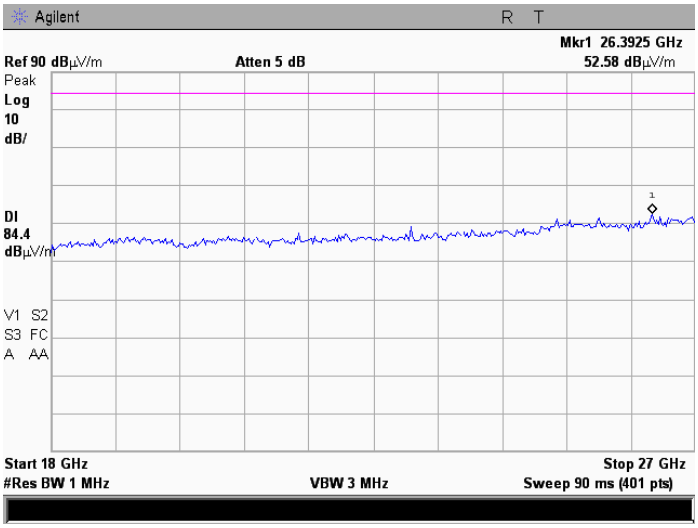
TEST SITE:	Anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/19/2012 - 1/22/2012		
Temperature: 19.1 ºC	Air Pressure: 1016 hPa	Relative Humidity: 43 %	Power Supply: 5.4VDC
Remarks:			

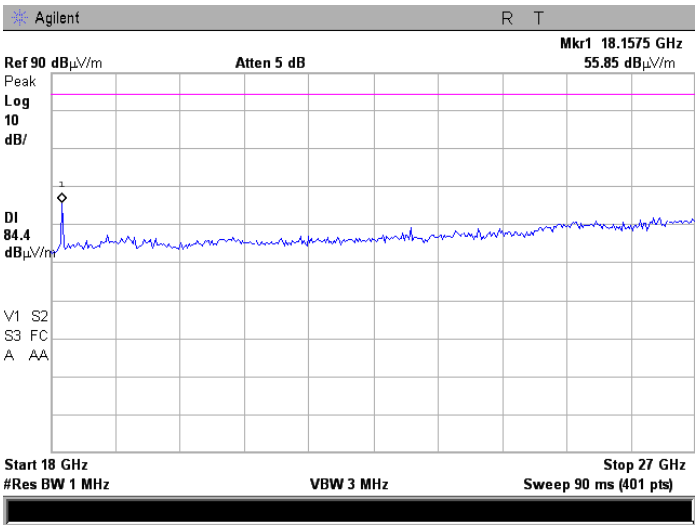
Plot 7.4.13 Radiated emission measurements in 18000 – 27000 MHz range

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



Plot 7.4.14 Radiated emission measurements in 18000 – 27000 MHz range

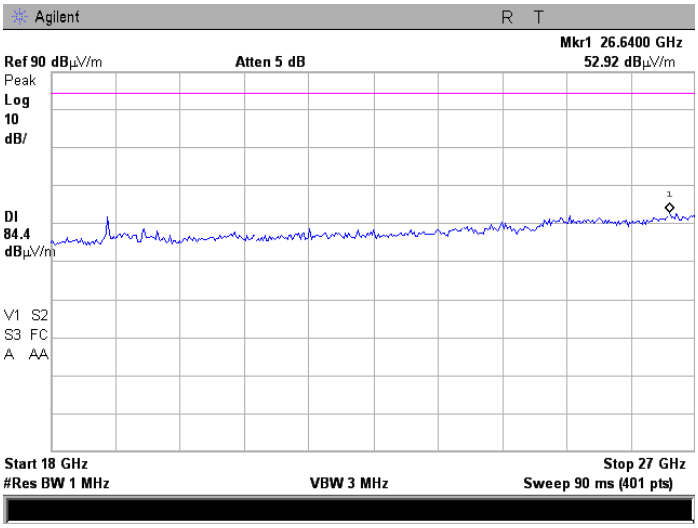
TEST SITE:	Anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/19/2012 - 1/22/2012		
Temperature: 19.1 ºC	Air Pressure: 1016 hPa	Relative Humidity: 43 %	Power Supply: 5.4VDC
Remarks:			

Plot 7.4.15 Radiated emission measurements in 18000 – 27000 MHz range

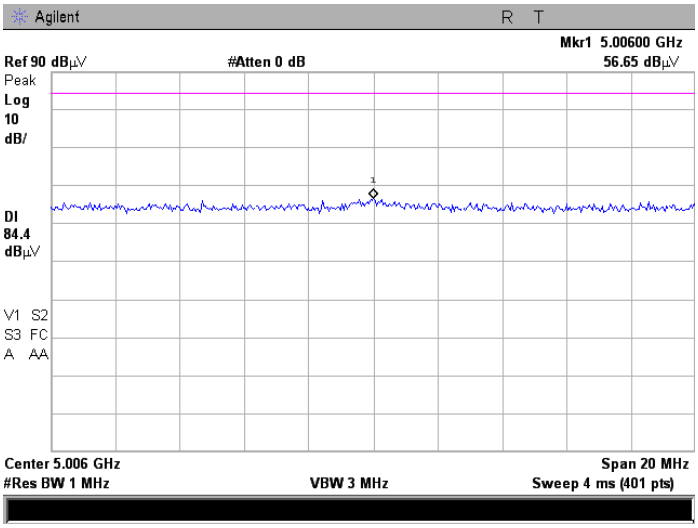
TEST SITE:	Anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/19/2012 - 1/22/2012		
Temperature: 19.1 ºC	Air Pressure: 1016 hPa	Relative Humidity: 43 %	Power Supply: 5.4VDC
Remarks:			

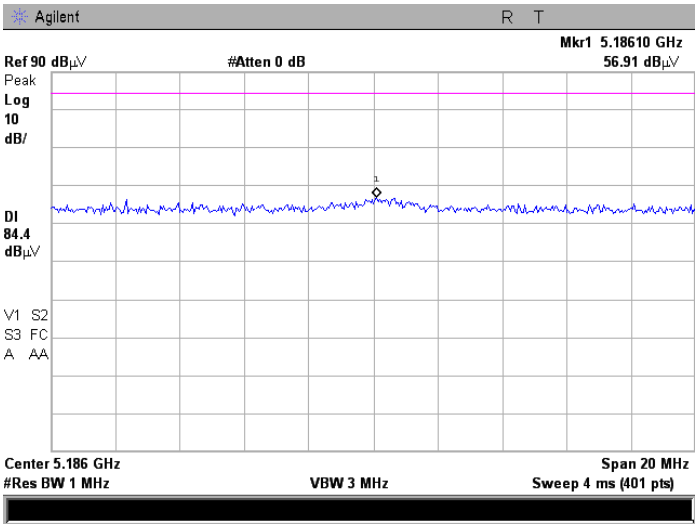
Plot 7.4.16 Radiated emission measurements at the 2nd harmonic

TEST SITE:	OATS
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Plot 7.4.17 Radiated emission measurements at the 2nd harmonic

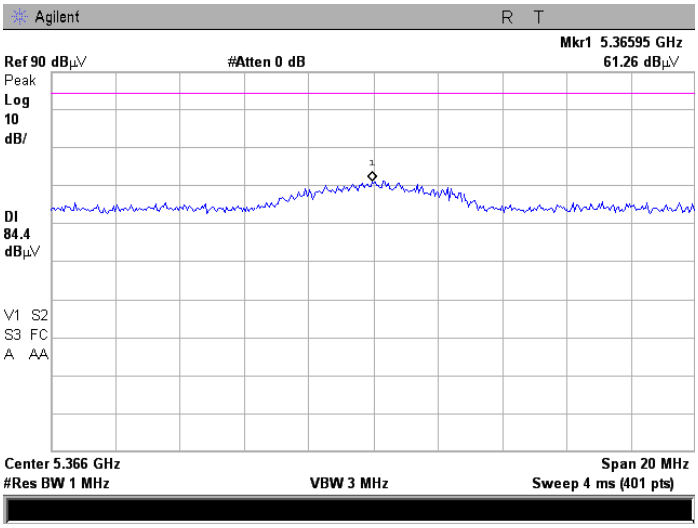
TEST SITE:	OATS
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/19/2012 - 1/22/2012		
Temperature: 19.1 ºC	Air Pressure: 1016 hPa	Relative Humidity: 43 %	Power Supply: 5.4VDC
Remarks:			

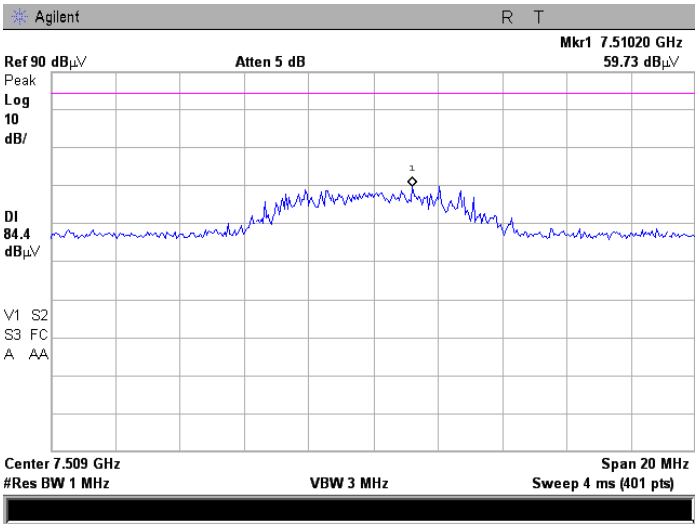
Plot 7.4.18 Radiated emission measurements at the 2nd harmonic

TEST SITE:	OATS
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Plot 7.4.19 Radiated emission measurements at the 3rd harmonic

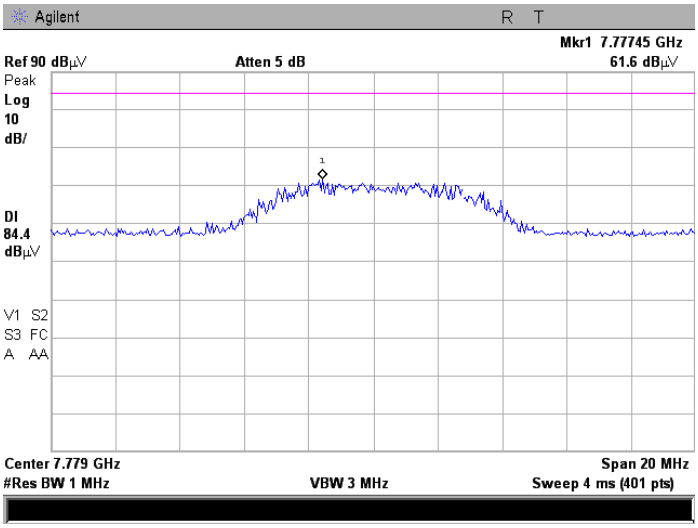
TEST SITE:	OATS
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical
TEST DISTANCE:	3 m



Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/19/2012 - 1/22/2012		
Temperature: 19.1 ºC	Air Pressure: 1016 hPa	Relative Humidity: 43 %	Power Supply: 5.4VDC
Remarks:			

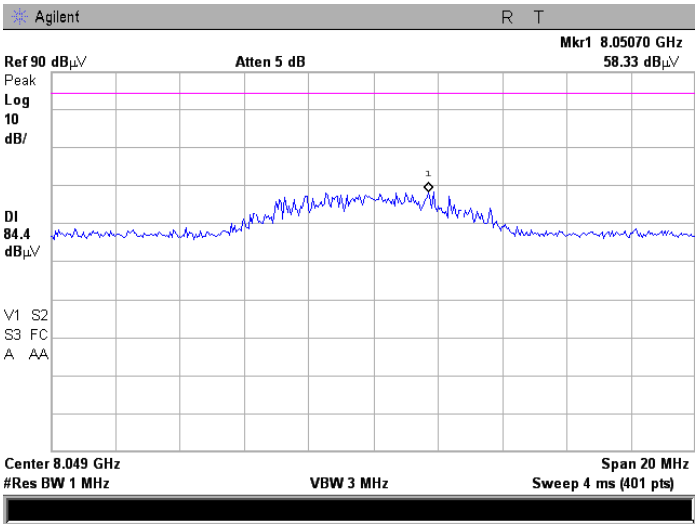
Plot 7.4.20 Radiated emission measurements at the 3rd harmonic

TEST SITE:	OATS
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical
TEST DISTANCE:	3 m



Plot 7.4.21 Radiated emission measurements at the 3rd harmonic

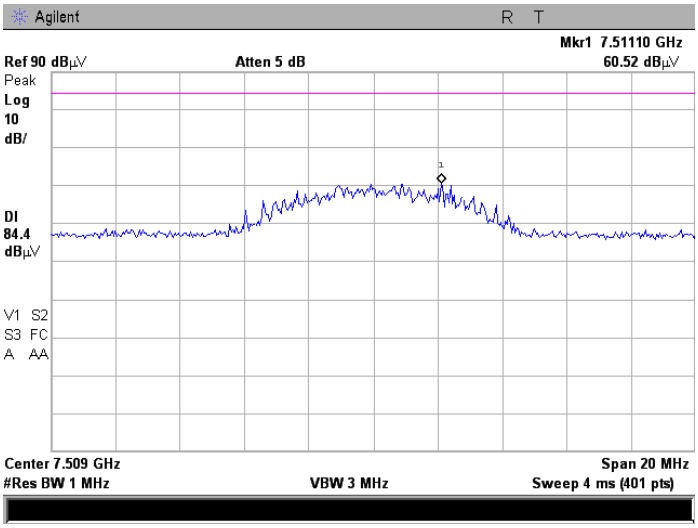
TEST SITE:	OATS
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical
TEST DISTANCE:	3 m



Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/19/2012 - 1/22/2012		
Temperature: 19.1 ºC	Air Pressure: 1016 hPa	Relative Humidity: 43 %	Power Supply: 5.4VDC
Remarks:			

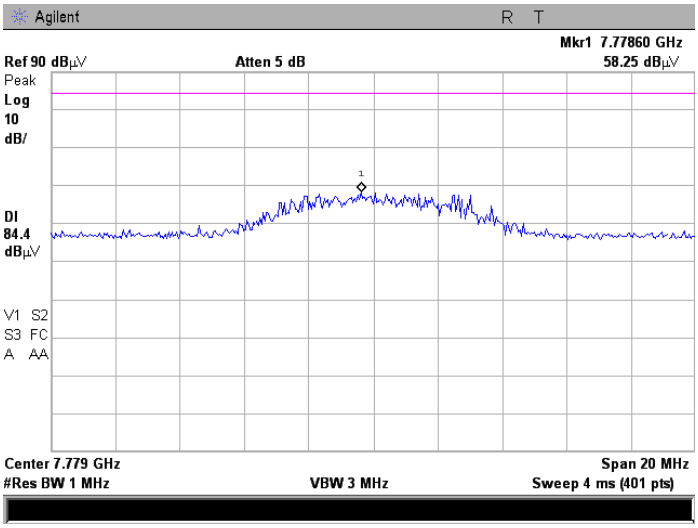
Plot 7.4.22 Radiated emission measurements at the 3rd harmonic

TEST SITE:	OATS
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Horizontal
TEST DISTANCE:	3 m



Plot 7.4.23 Radiated emission measurements at the 3rd harmonic

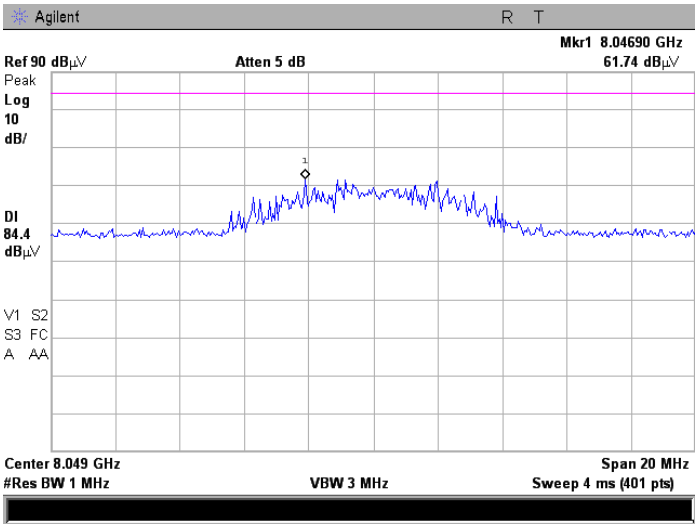
TEST SITE:	OATS
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/19/2012 - 1/22/2012		
Temperature: 19.1 ºC	Air Pressure: 1016 hPa	Relative Humidity: 43 %	Power Supply: 5.4VDC
Remarks:			

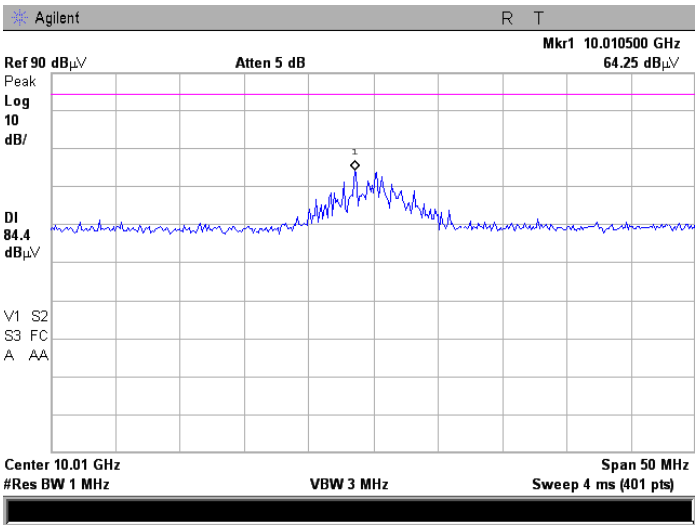
Plot 7.4.24 Radiated emission measurements at the 3rd harmonic

TEST SITE:	OATS
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Horizontal
TEST DISTANCE:	3 m



Plot 7.4.25 Radiated emission measurements at the 4th harmonic

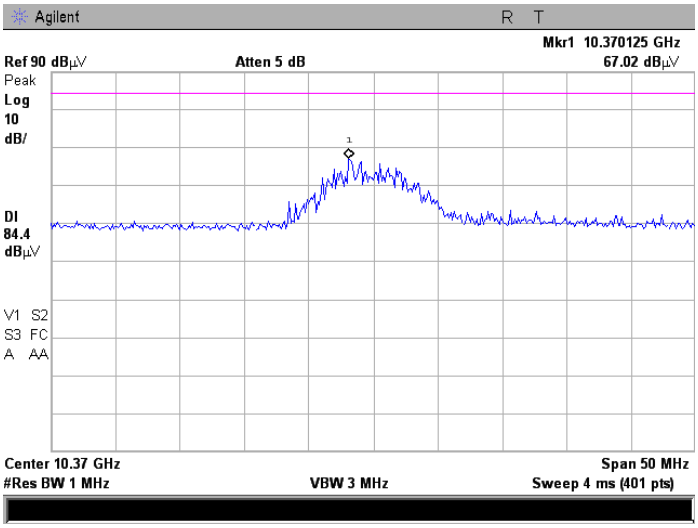
TEST SITE:	OATS
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical
TEST DISTANCE:	3 m



Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/19/2012 - 1/22/2012		
Temperature: 19.1 ºC	Air Pressure: 1016 hPa	Relative Humidity: 43 %	Power Supply: 5.4VDC
Remarks:			

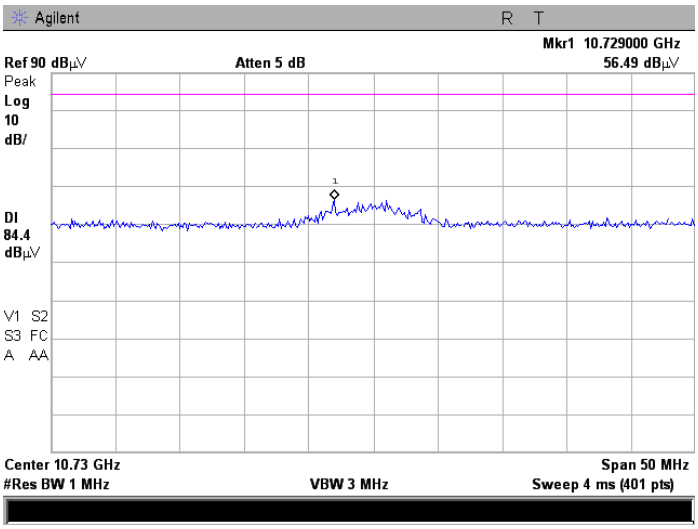
Plot 7.4.26 Radiated emission measurements at the 4th harmonic

TEST SITE:	OATS
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical
TEST DISTANCE:	3 m



Plot 7.4.27 Radiated emission measurements at the 4th harmonic

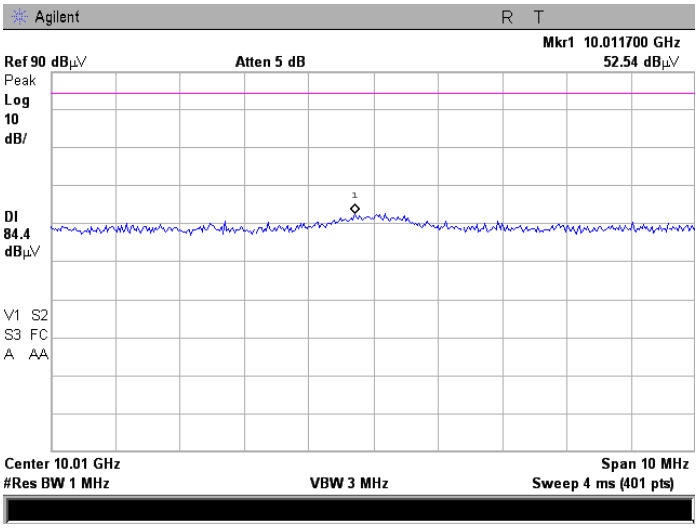
TEST SITE:	OATS
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical
TEST DISTANCE:	3 m



Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/19/2012 - 1/22/2012		
Temperature: 19.1 ºC	Air Pressure: 1016 hPa	Relative Humidity: 43 %	Power Supply: 5.4VDC
Remarks:			

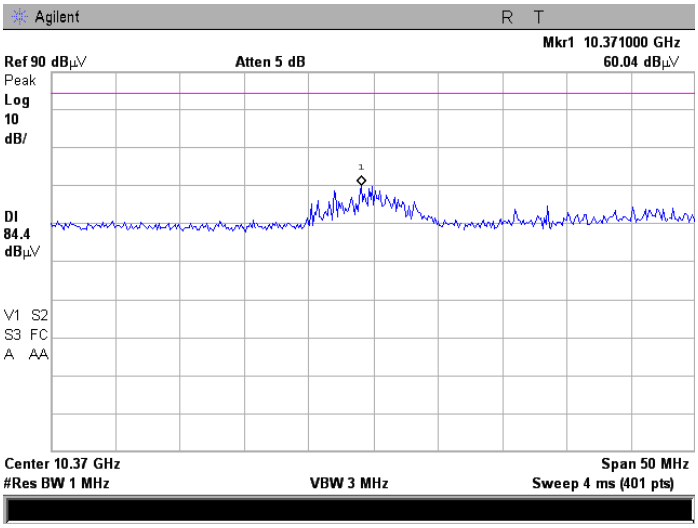
Plot 7.4.28 Radiated emission measurements at the 4th harmonic

TEST SITE:	OATS
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Horizontal
TEST DISTANCE:	3 m



Plot 7.4.29 Radiated emission measurements at the 4th harmonic

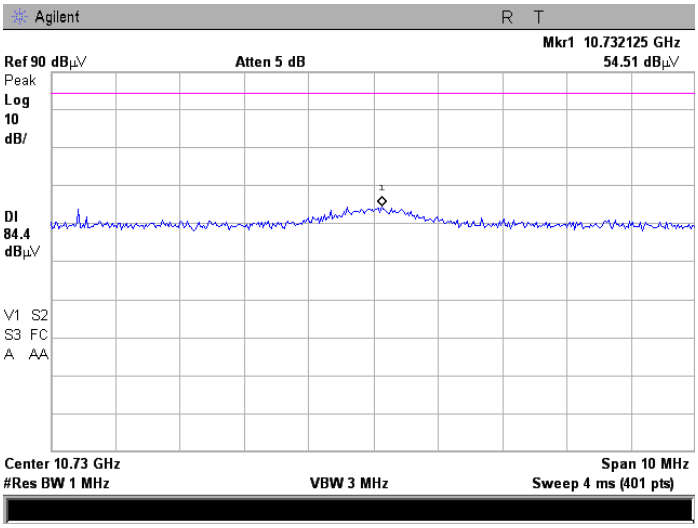
TEST SITE:	OATS
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/19/2012 - 1/22/2012		
Temperature: 19.1 ºC	Air Pressure: 1016 hPa	Relative Humidity: 43 %	Power Supply: 5.4VDC
Remarks:			

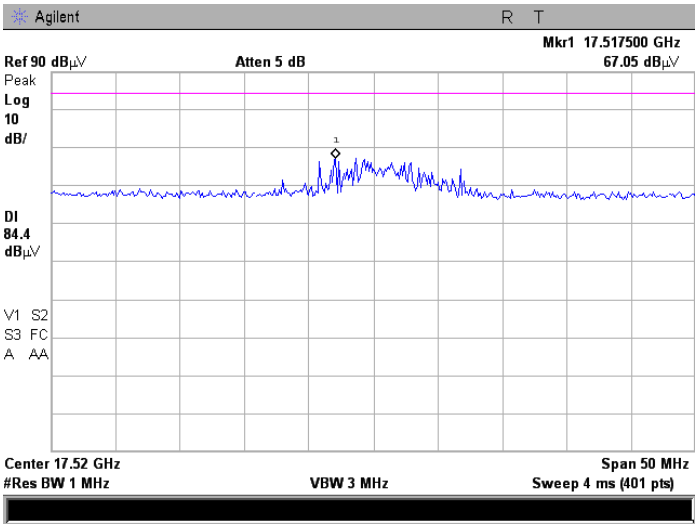
Plot 7.4.30 Radiated emission measurements at the 4th harmonic

TEST SITE:	OATS
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Horizontal
TEST DISTANCE:	3 m



Plot 7.4.31 Radiated emission measurements at the 7th harmonic

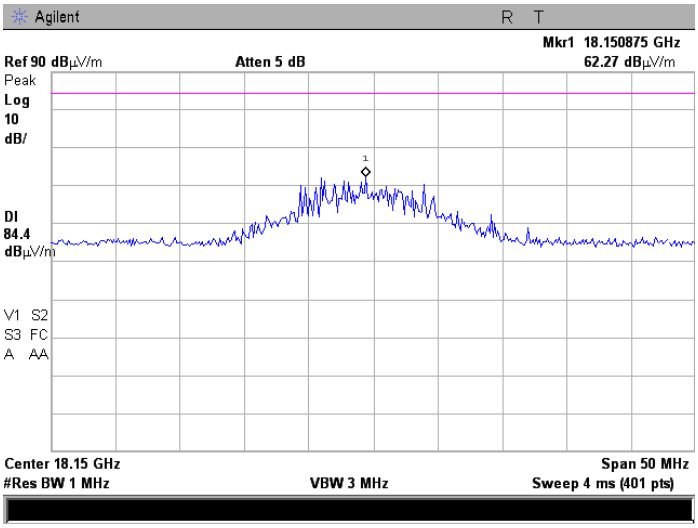
TEST SITE:	OATS
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/19/2012 - 1/22/2012		
Temperature: 19.1 ºC	Air Pressure: 1016 hPa	Relative Humidity: 43 %	Power Supply: 5.4VDC
Remarks:			

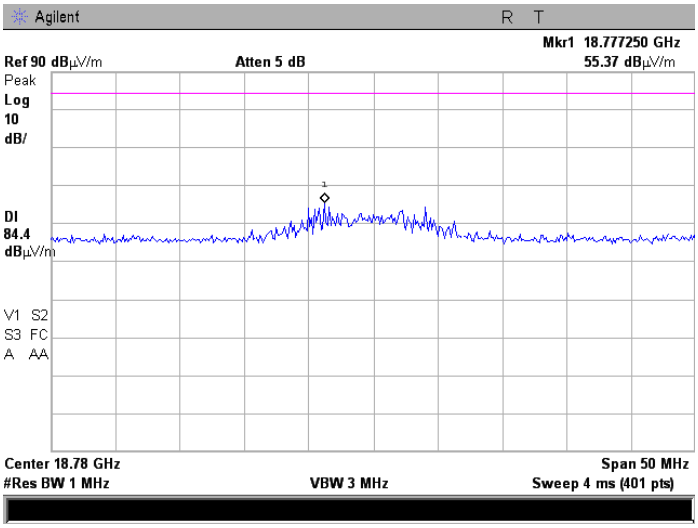
Plot 7.4.32 Radiated emission measurements at the 7th harmonic

TEST SITE:	OATS
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Plot 7.4.33 Radiated emission measurements at the 7th harmonic

TEST SITE:	OATS
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/18/2012		
Temperature: 21.4 ºC	Air Pressure: 1022 hPa	Relative Humidity: 42 %	Power Supply: 5.4VDC
Remarks:			

7.5 Spurious emissions at RF antenna connector test

7.5.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 7.5.1.

Table 7.5.1 Spurious emission limits

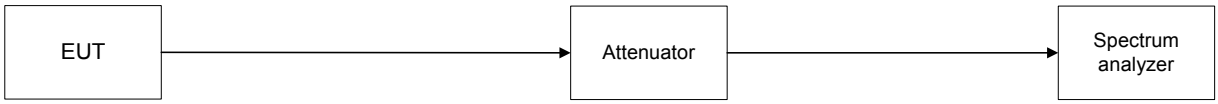
Frequency, MHz	Attenuation below carrier, dBc	ERP of spurious, dBm
0.009 – 10th harmonic*	43+10logP**	-13.0

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

7.5.2 Test procedure

7.5.2.1 The EUT was set up as shown in Figure 7.5.1, energized and its proper operation was checked.
7.5.2.2 The EUT was adjusted to produce maximum available for end user RF output power.
7.5.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.5.2 and the associated plots.

Figure 7.5.1 Spurious emission test setup



Test specification:	**Section 27.53(m)(2), Conducted spurious emissions**		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	1/18/2012		
Temperature: 21.4 ºC	**Air Pressure:** 1022 hPa	**Relative Humidity:** 42 %	**Power Supply:** 5.4VDC
Remarks:			

Table 7.5.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 2500.0 – 2686.0 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 – 27000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATION: OFDM
MODULATING SIGNAL: PRBS
BIT RATE: 4.0 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
CONFIGURATION: Single output
THE NUMBER OF OUTPUTS: 2
EBW: 3.5 MHz

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission*, dBm	Limit, dBm	Margin, dB**	Verdict
Low carrier frequency								
7508.80	-27.12	Included	Included	1000	-24.12	-13.0	-11.12	Pass
Mid carrier frequency								
7778.88	-28.53	Included	Included	1000	-25.53	-13.0	-12.53	Pass
High carrier frequency								
8047.38	-24.86	Included	Included	1000	-21.86	-13.0	-8.86	Pass

***** - Spurious emission = SA Reading + 10*log(N), where N is the number of outputs
****** - Margin = Spurious emission – specification limit.

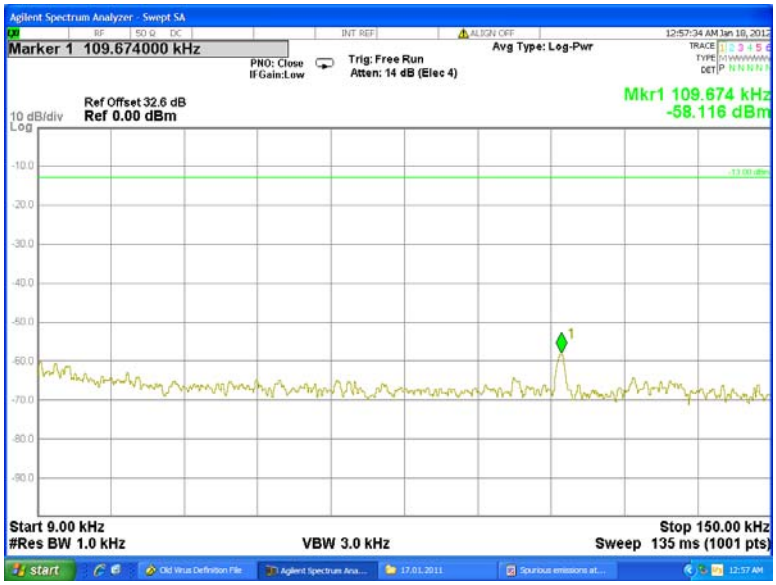
Reference numbers of test equipment used

HL 3455	HL 3901	HL 4289					

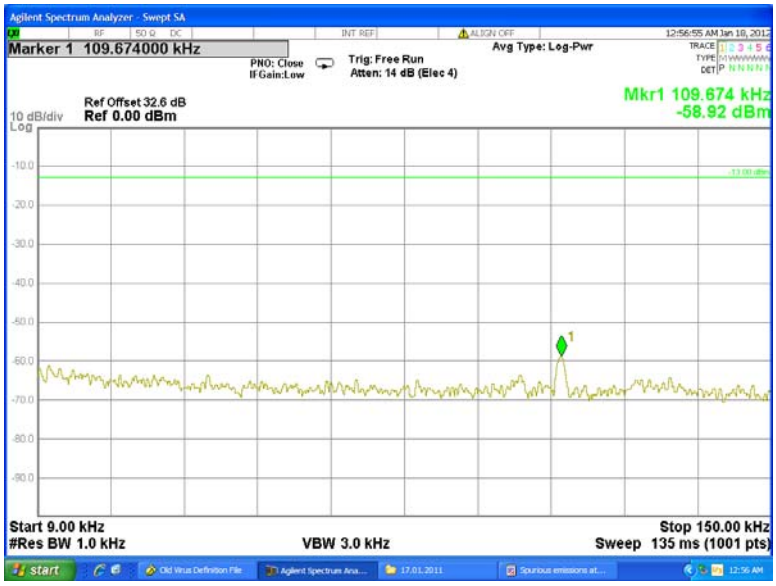
Full description is given in Appendix A.

Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/18/2012		
Temperature: 21.4 ºC	Air Pressure: 1022 hPa	Relative Humidity: 42 %	Power Supply: 5.4VDC
Remarks:			

Plot 7.5.1 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency

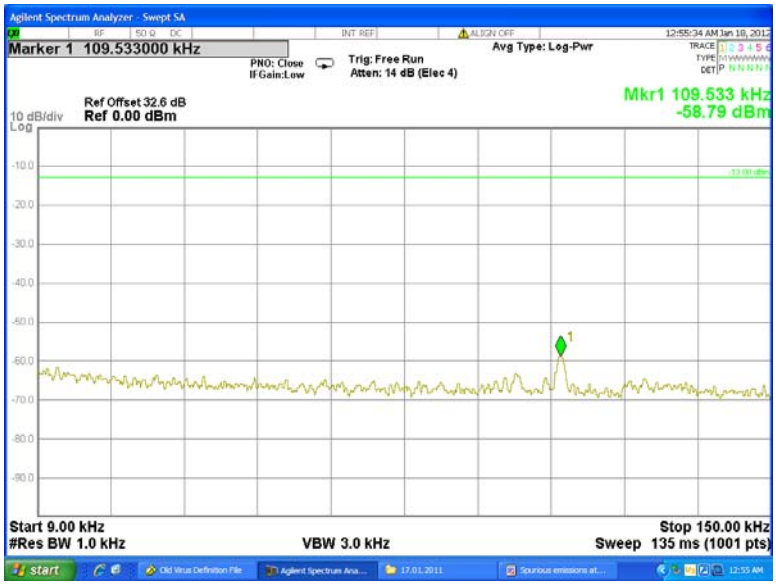


Plot 7.5.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency

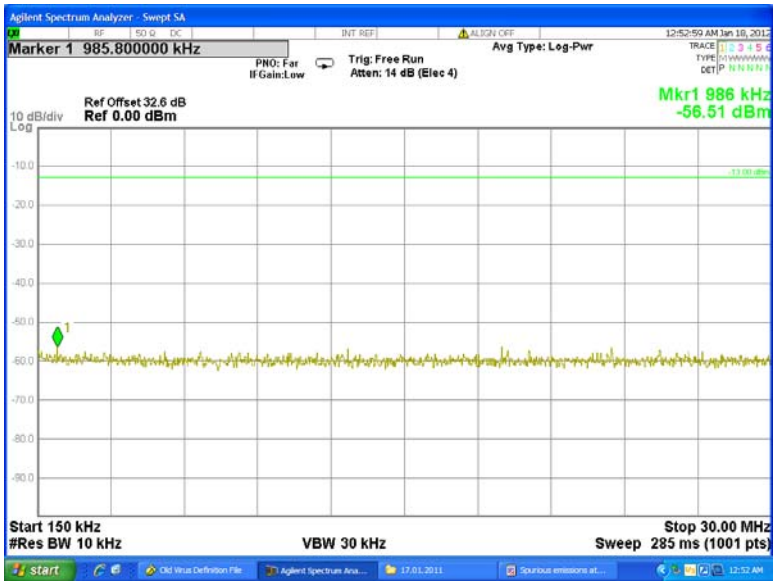


Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/18/2012		
Temperature: 21.4 ºC	Air Pressure: 1022 hPa	Relative Humidity: 42 %	Power Supply: 5.4VDC
Remarks:			

Plot 7.5.3 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency

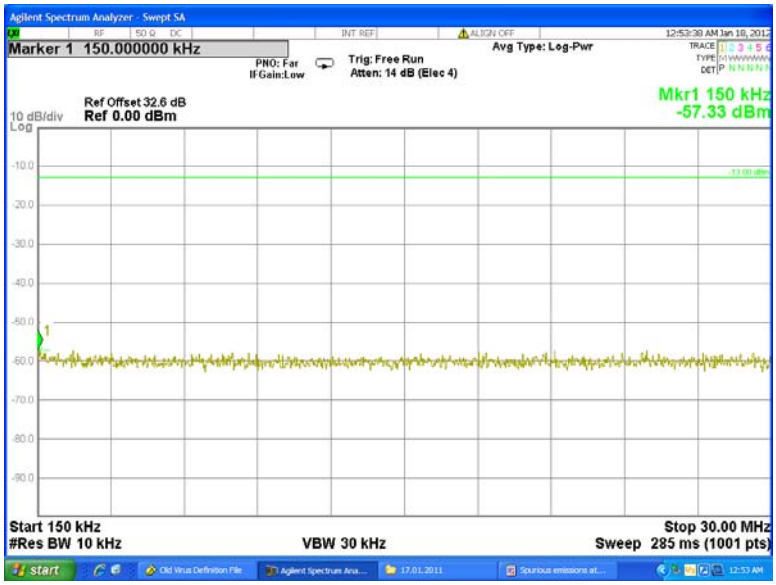


Plot 7.5.4 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency

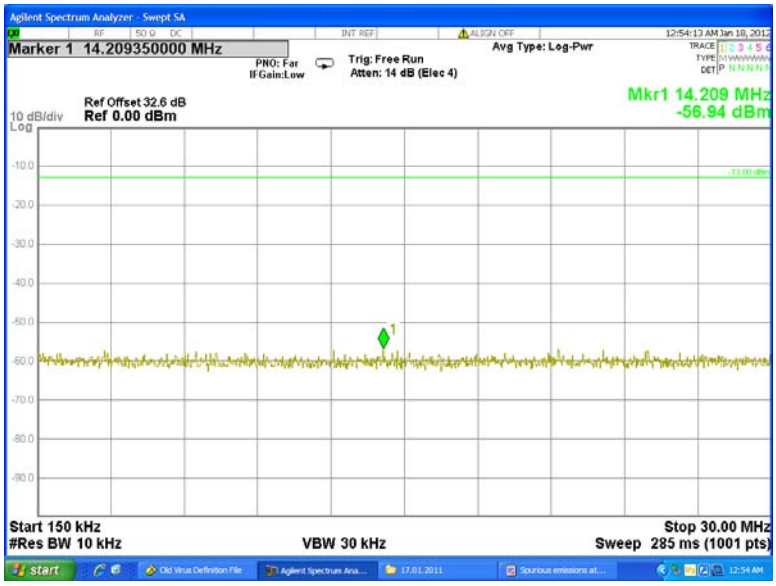


Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/18/2012		
Temperature: 21.4 ºC	Air Pressure: 1022 hPa	Relative Humidity: 42 %	Power Supply: 5.4VDC
Remarks:			

Plot 7.5.5 Spurious emission measurements in 0.15 - 30.0 MHz range at mid carrier frequency

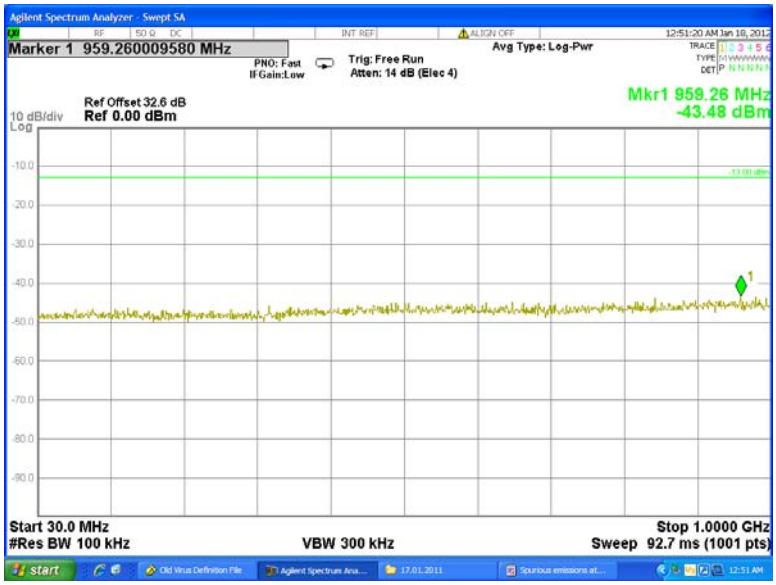


Plot 7.5.6 Spurious emission measurements in 0.15 – 30.0 MHz range at high carrier frequency

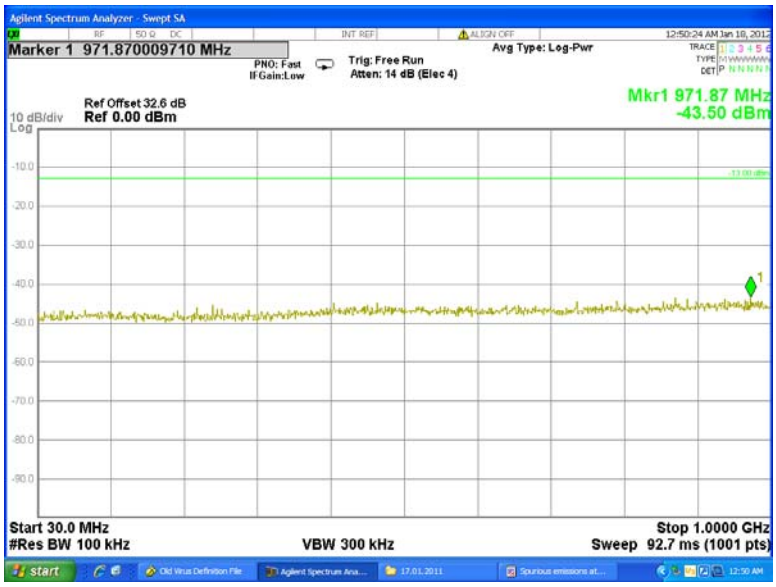


Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/18/2012		
Temperature: 21.4 ºC	Air Pressure: 1022 hPa	Relative Humidity: 42 %	Power Supply: 5.4VDC
Remarks:			

Plot 7.5.7 Spurious emission measurements in 30.0 - 1000 MHz range at low carrier frequency

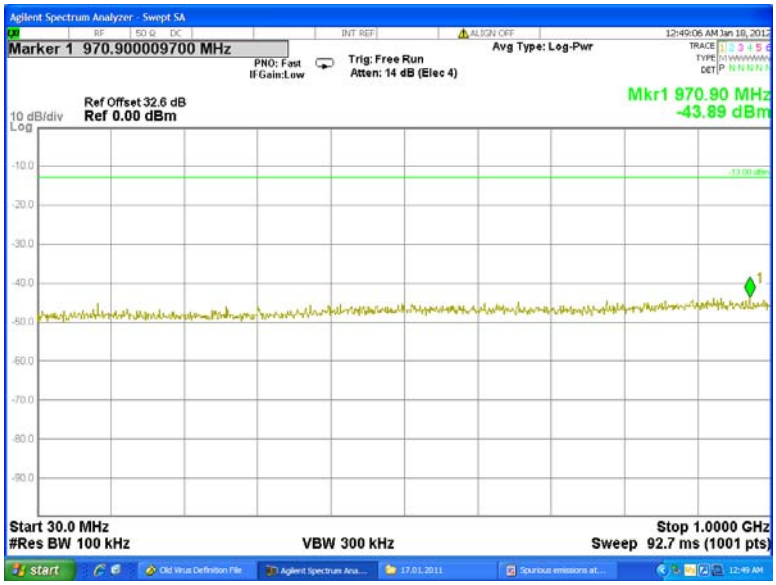


Plot 7.5.8 Spurious emission measurements in 30.0 - 1000 MHz range at mid carrier frequency

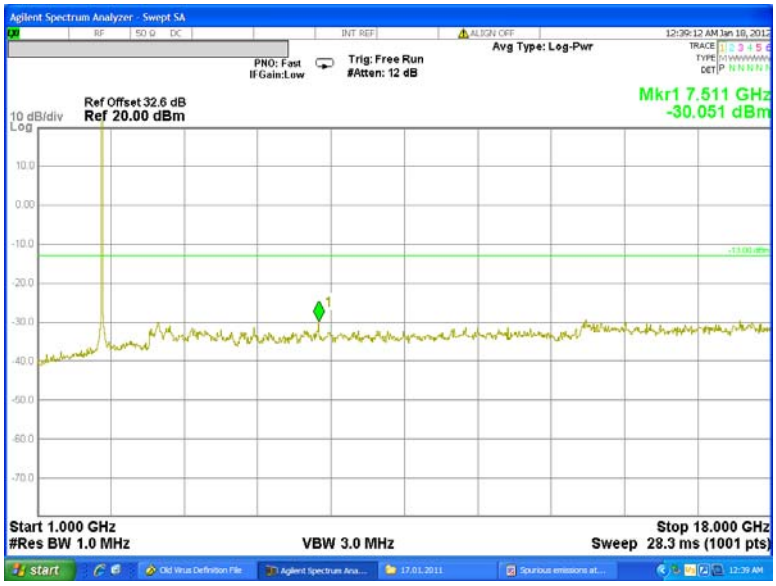


Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/18/2012		
Temperature: 21.4 ºC	Air Pressure: 1022 hPa	Relative Humidity: 42 %	Power Supply: 5.4VDC
Remarks:			

Plot 7.5.9 Spurious emission measurements in 30.0 - 1000 MHz range at high carrier frequency

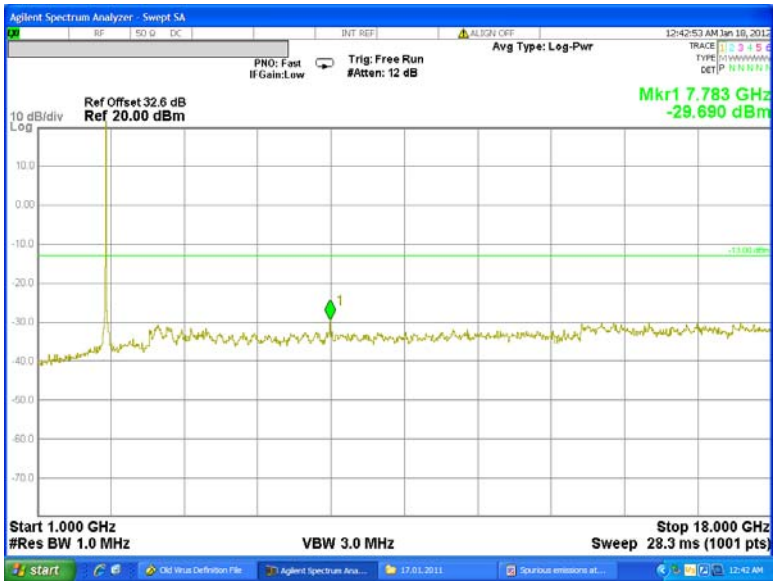


Plot 7.5.10 Spurious emission measurements in 1000 - 18000 MHz range at low carrier frequency

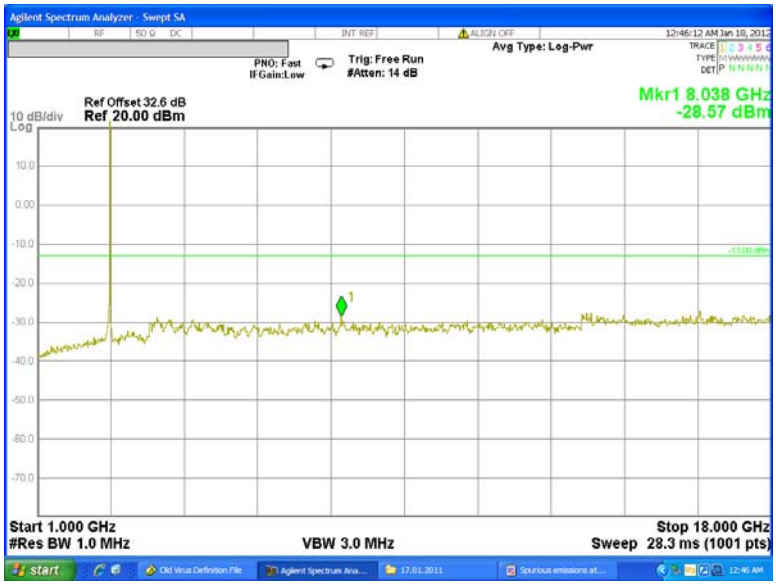


Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/18/2012		
Temperature: 21.4 ºC	Air Pressure: 1022 hPa	Relative Humidity: 42 %	Power Supply: 5.4VDC
Remarks:			

Plot 7.5.11 Spurious emission measurements in 1000 - 18000 MHz at mid carrier frequency

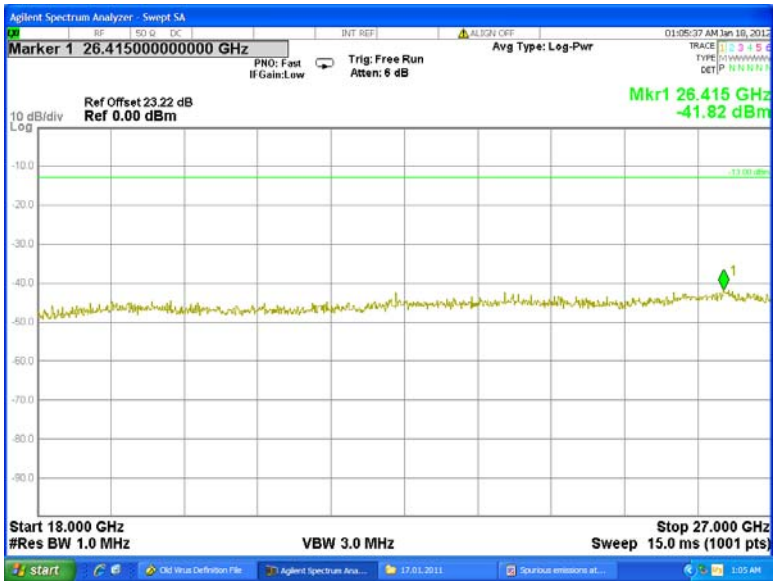


Plot 7.5.12 Spurious emission measurements in 1000 - 18000 MHz at high carrier frequency

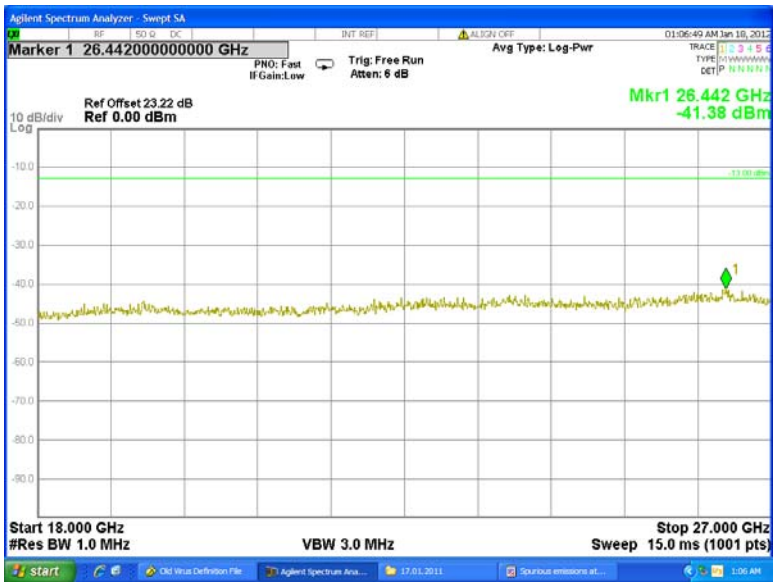


Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/18/2012		
Temperature: 21.4 ºC	Air Pressure: 1022 hPa	Relative Humidity: 42 %	Power Supply: 5.4VDC
Remarks:			

Plot 7.5.13 Spurious emission measurements in 18000 - 27000 MHz range at low carrier frequency

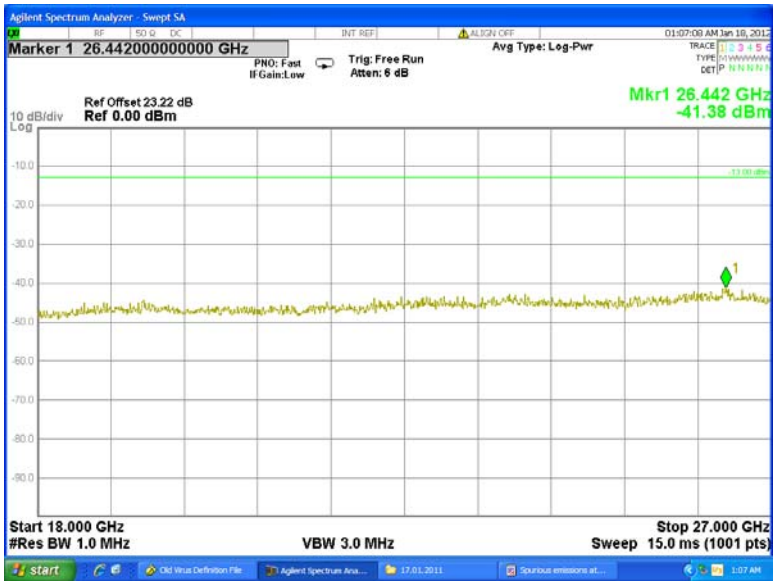


Plot 7.5.14 Spurious emission measurements in 18000 - 27000 MHz at mid carrier frequency



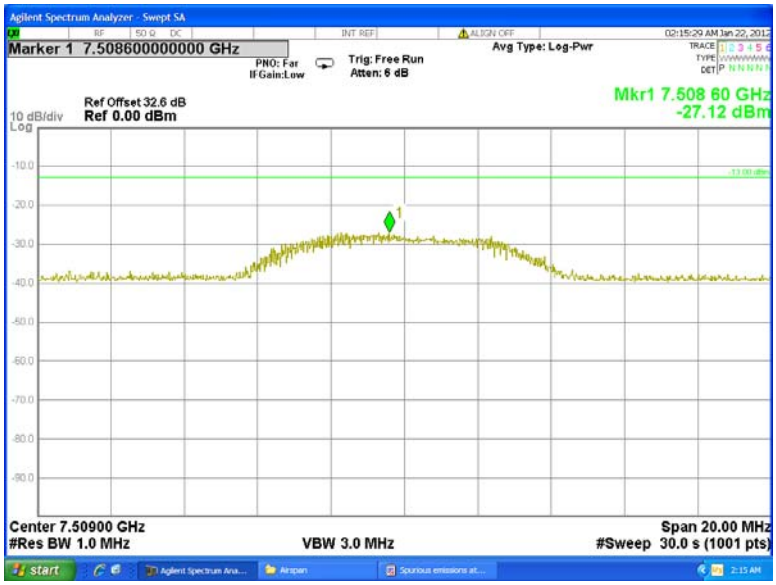
Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/18/2012		
Temperature: 21.4 ºC	Air Pressure: 1022 hPa	Relative Humidity: 42 %	Power Supply: 5.4VDC
Remarks:			

Plot 7.5.15 Spurious emission measurements in 18000 - 27000 MHz at high carrier frequency

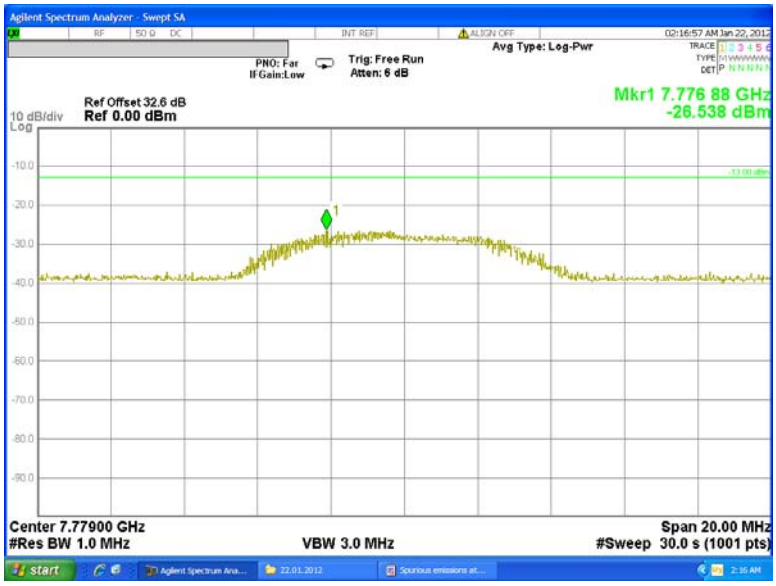


Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/18/2012		
Temperature: 21.4 ºC	Air Pressure: 1022 hPa	Relative Humidity: 42 %	Power Supply: 5.4VDC
Remarks:			

Plot 7.5.16 Conducted spurious emission measurements at the 3rd harmonic of low carrier frequency

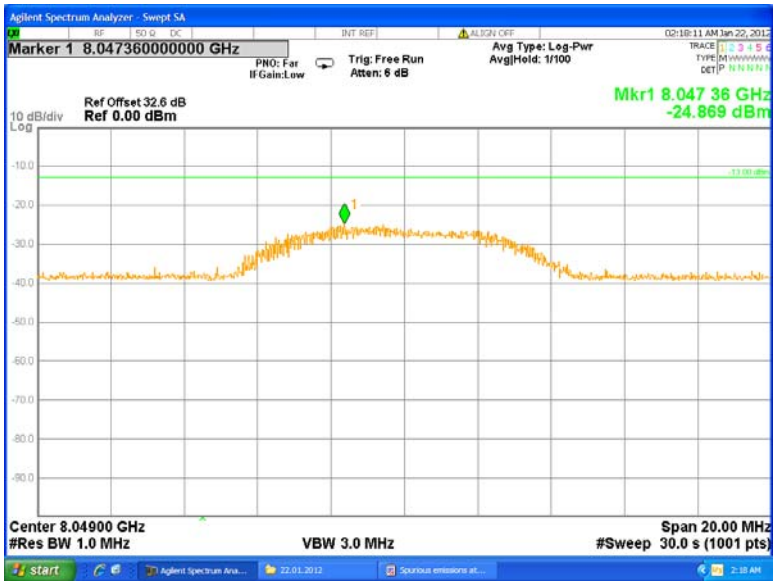


Plot 7.5.17 Conducted spurious emission measurements at the 3rd harmonic of mid carrier frequency



Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/18/2012		
Temperature: 21.4 ºC	Air Pressure: 1022 hPa	Relative Humidity: 42 %	Power Supply: 5.4VDC
Remarks:			

Plot 7.5.18 Conducted spurious emission measurements at the 3rd harmonic of high carrier frequency



Test specification:	Section 27.54, Frequency stability		
Test procedure:	47 CFR, Section 2.1055		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/18/2012 - 1/22/2012		
Temperature: 20.3 ºC	Air Pressure: 1016 hPa	Relative Humidity: 42 %	Power Supply: 5.4VDC
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.

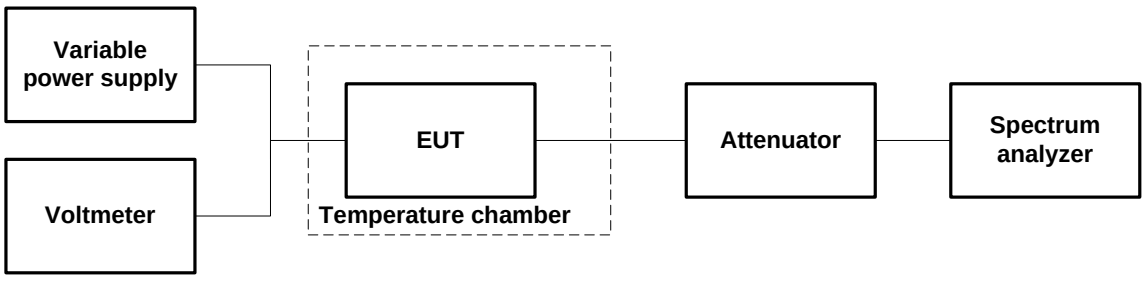
7.6.2.3 The EUT was powered on and carrier frequency was measured at start up moment and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.

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 compared with the limit as provided in Table 7.6.2.

Figure 7.6.1 Frequency stability test setup



Test specification:	Section 27.54, Frequency stability		
Test procedure:	47 CFR, Section 2.1055		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/18/2012 - 1/22/2012		
Temperature: 20.3 ºC	Air Pressure: 1016 hPa	Relative Humidity: 42 %	Power Supply: 5.4VDC
Remarks:			

Table 7.6.2 Frequency stability test results

OPERATING FREQUENCY: 2500.0 – 2686.0 MHz
NOMINAL POWER VOLTAGE: 5.4 VDC
TEMPERATURE STABILIZATION PERIOD: 20 min
POWER DURING TEMPERATURE TRANSITION: Off
SPECTRUM ANALYZER MODE: Counter
RESOLUTION BANDWIDTH: 1 kHz
VIDEO BANDWIDTH: 3 kHz
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 frequency 2503.0 MHz										
-30	nominal	2502.996197	2502.996194	2502.996195	2502.996207	2502.996197	2502.996193	2502.996223	0	-2800
-20	nominal	2502.996334	NA	NA	NA	NA	NA	2502.996342	0	-2659
-10	nominal	2502.996489	NA	NA	NA	NA	NA	2502.996758	0	-2504
0	nominal	2502.998161	2502.998148	2502.998151	2502.998142	2502.998129	2502.998139	2502.998114	0	-879
10	nominal	2502.999242	NA	NA	NA	NA	NA	2502.999206	249	0
20	15%	2502.998891	NA	NA	NA	NA	NA	2502.998842	0	-151
20	nominal	2502.999038	NA	NA	NA	NA	NA	2502.998993	45	0
20	-15%	2502.998993	NA	NA	NA	NA	NA	2502.998927	0	-66
30	nominal	2502.999109	2502.999111	2502.999105	2502.999101	2502.999097	2502.999093	2502.999085	118	0
40	nominal	2502.998311	NA	NA	NA	NA	NA	2502.999139	146	-682
50	nominal	2502.996858	NA	NA	NA	NA	NA	2502.996847	0	-2146
Mid frequency 2593 MHz										
-30	nominal	2592.996107	2592.996094	2592.996088	2592.996098	2592.996107	2592.996093	2592.996105	0	-2816
-20	nominal	2592.996214	NA	NA	NA	NA	NA	2592.996238	0	-2690
-10	nominal	2592.996681	NA	NA	NA	NA	NA	2592.996688	0	-2223
0	nominal	2592.998022	2592.998041	2592.998042	2592.998046	2592.998049	2592.998046	2592.998033	0	-882
10	nominal	2592.999193	NA	NA	NA	NA	NA	2592.999173	289	0
20	15%	2592.998806	NA	NA	NA	NA	NA	2592.998768	0	-136
20	nominal	2592.998961	NA	NA	NA	NA	NA	2592.998904	57	0
20	-15%	2592.998895	NA	NA	NA	NA	NA	2592.998862	0	-42
30	nominal	2592.999059	2592.999054	2592.999050	2592.999045	2592.999043	2592.999041	2592.999038	155	0
40	nominal	2592.998071	NA	NA	NA	NA	NA	2592.998018	0	-886
50	nominal	2592.996725	NA	NA	NA	NA	NA	2592.996702	0	-2202
High frequency 2683 MHz										
-30	nominal	2682.995986	2682.995977	2682.995968	2682.995979	2682.995973	2682.995983	2682.995995	0	-2895
-20	nominal	2682.996115	NA	NA	NA	NA	NA	2682.996094	0	-2769
-10	nominal	2682.996566	NA	NA	NA	NA	NA	2682.996544	0	-2319
0	nominal	2682.997975	2682.997933	2682.997939	2682.997928	2682.997934	2682.997915	2682.997925	0	-948
10	nominal	2682.999146	NA	NA	NA	NA	NA	2682.999108	283	0
20	15%	2682.998723	NA	NA	NA	NA	NA	2682.998739	0	-140
20	nominal	2682.998861	NA	NA	NA	NA	NA	2682.998863	0	-2
20	-15%	2682.998821	NA	NA	NA	NA	NA	2682.998832	0	-42
30	nominal	2682.999003	2682.999004	2682.999006	2682.999011	2682.999008	2682.999006	2682.998997	148	0
40	nominal	2682.997926	NA	NA	NA	NA	NA	2682.997924	0	-939
50	nominal	2682.996682	NA	NA	NA	NA	NA	2682.996579	0	-2284

* - Reference frequency (T, ºC = 20ºC, V = nominal, after 10^t minutes)

Table 7.6.3 Maximum frequency displacement

Channel	Maximum frequency displacement			
	ppm		Hz	
	Negative	Positive	Negative	Positive
Low (2503.0 MHz)	-1.119	0.099	-2800	249
Mid (2593.0 MHz)	-1.086	0.111	-2816	289
High (2683.0 MHz)	-1.079	0.105	-2895	283

Test specification:	Section 27.54, Frequency stability		
Test procedure:	47 CFR, Section 2.1055		
Test mode:	Compliance	Verdict:	PASS
Date(s):	1/18/2012 - 1/22/2012		
Temperature: 20.3 ºC	Air Pressure: 1016 hPa	Relative Humidity: 42 %	Power Supply: 5.4VDC
Remarks:			

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
3.5 MHz BW								
QPSK								
2501.120000	2504.920000	2501.117200	2504.920249	2500.000000	2506.000000	1.117200	-1.079751	Pass
2591.070000	2594.915000	2591.067184	2594.915289	2590.000000	2596.000000	1.067184	-1.084711	Pass
2681.095000	2684.880000	2681.092105	2684.880283	2680.000000	2686.000000	1.092105	-1.119717	Pass
64QAM								
2501.025000	2504.895000	2501.022200	2504.895249	2500.000000	2506.000000	1.022200	-1.104751	Pass
2591.110000	2594.935000	2591.107184	2594.935289	2590.000000	2596.000000	1.107184	-1.064711	Pass
2681.050000	2684.930000	2681.047105	2684.930283	2680.000000	2686.000000	1.047105	-1.069717	Pass
5 MHz BW								
QPSK								
2500.718000	2505.276000	2500.715200	2505.276249	2500.000000	2506.000000	0.715200	-0.723751	Pass
2590.724000	2595.276000	2590.721184	2595.276289	2590.000000	2596.000000	0.721184	-0.723711	Pass
2680.694000	2685.270000	2680.691105	2685.270283	2680.000000	2686.000000	0.691105	-0.729717	Pass
64QAM								
2500.730000	2505.270000	2500.727200	2505.270249	2500.000000	2506.000000	0.727200	-0.729751	Pass
2590.688000	2595.276000	2590.685184	2595.276289	2590.000000	2596.000000	0.685184	-0.723711	Pass
2680.291000	2685.732000	2680.288105	2685.732283	2680.000000	2686.000000	0.288105	-0.267717	Pass
10 MHz BW								
QPSK								
2501.324000	2510.692000	2501.321200	2510.692249	2500.000000	2512.000000	1.321200	-1.307751	Pass
2591.324000	2600.692000	2591.321184	2600.692289	2590.000000	2602.000000	1.321184	-1.307711	Pass
2675.308000	2684.669000	2675.305105	2684.669283	2674.000000	2686.000000	1.305105	-1.330717	Pass
64QAM								
2501.300000	2510.680000	2501.297200	2510.680249	2500.000000	2512.000000	1.297200	-1.319751	Pass
2591.312000	2600.690000	2591.309184	2600.690289	2590.000000	2602.000000	1.309184	-1.309711	Pass
2675.306000	2684.684000	2675.303105	2684.684283	2674.000000	2686.000000	1.303105	-1.315717	Pass

* - measured under normal test conditions at 26 dBc points
** - Measured band edge with proper drift addition (maximum measured drift)
*** - Margin = Calculated band edge – specified band edge

Reference numbers of test equipment used

HL 1480	HL 3286	HL 3787	HL 4289				

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	03-Jul-11	03-Jul-12
0768	Antenna Standard Gain Horn, 18 - 26.5 GHz, WR-42, 25 dB gain	Quinstar Technology	QWH-4200-BA	110	26-Jan-11	26-Jan-14
1480	Cable, 1 m	Harbour Industries	MIL 17/60-RG142	1480	01-Sep-11	01-Sep-12
2697	Antenna, 30 MHz - 3.0 GHz	Sunol Sciences. Corp. Pleasanton, California USA	JB3	A022805	11-Jan-11	11-Jan-13
2882	Cable, 18 GHz N-type, M-F, 3 m	Bird Electronic Corp.	TC-MNFN-3.0	211539001	25-Jul-11	25-Jul-12
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY41444762	08-May-11	08-May-12
3286	Temperature Chamber, (-50 to +170) °C	Thermotron	EL-8-CH-1-1-CO2	21-9048	11-Sep-11	11-Sep-12
3301	Power Meter, P-series, 50 MHz to 40 GHz	Agilent Technologies	N1911A	MY45101057	14-Dec-11	14-Dec-12
3302	Power sensor, P-Series, 50 MHz to 40 GHz, -35/30 to 20 dBm	Agilent Technologies	N1922A	MY45240586	14-Dec-11	14-Dec-12
3390	Microwave Cable Assembly, 26.5 GHz, 1.0 m, N type/N type	Suhner Sucoflex	104EA	3390	07-Feb-11	07-Feb-12
3455	Medium Power Fixed Coaxial Attenuator DC to 40 GHz, 20 dB, 5 W	Aeroflex / Weinschel	75A-20-12	1182	27-Mar-11	27-Mar-12
3531	Amplifier, low noise, 2 to 8 GHz	Quinstar Technology	QLJ-02084040-J0	11159002002	25-Dec-11	25-Dec-12
3533	Amplifier, low noise, 6 to 18 GHz	Quinstar Technology	QLJ-06184040-J0	11159001001	25-Dec-11	25-Dec-12
3535	Amplifier, low noise, 18 to 40 GHz	Quinstar Technology	QLJ-18404537-J0	11159003001	11-Jul-11	11-Jul-12
3768	Attenuator, N-type, 20 dB, DC to 18 GHz, 5 W	Mini-Circuits	BW-N20W5+	NA	22-Aug-11	22-Aug-12
3787	Precision Fixed Attenuator, 50 Ohm, 5 W, 10 dB, DC to 18 GHz	Mini-Circuits	BW-S10W5+	NA	19-Dec-11	19-Dec-12
3901	Microwave Cable Assembly, 40.0 GHz, 3.5 m, SMA/SMA	Huber-Suhner	SUCOFLEX 102A	1225/2A	07-Feb-11	07-Feb-12
3902	Microwave Cable Assembly, 40.0 GHz, 1.5 m, SMA/SMA	Huber-Suhner	SUCOFLEX 102A	1227/2A	07-Feb-11	07-Feb-12
4114	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz	ETS Lindgren	3117	00123515	23-Jan-12	23-Jan-13
4150	Preamplifier, 0.1 to 18 GHz, Gain 25 dB, N-type(f) in, N-type(m) out.	Agilent Technologies	87405C	MY47010591	14-Jun-11	14-Jun-12

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./ Check	Due Cal./ Check
4289	PXA signal analyzer, 3 Hz to 50 GHz	Agilent Technologies	N9030	US51160171	20-Dec-11	20-Dec-12

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)
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 laboratory description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, safety, environmental and telecommunication testing facility.
Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47), Registration Numbers 90624 for OATS and 90623 for the anechoic chamber; by Industry Canada for electromagnetic emissions (file numbers IC 2186A-1 for OATS, IC 2186A-2 for anechoic chamber, IC 2186A-3 for full-anechoic chamber for RE measurements above 1 GHz), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, G-27 for full-anechoic chamber for RE measurements above 1 GHz, C-845 for conducted emissions site, T-1606 for conducted emissions at telecommunication ports), has a status of a Telefication - Listed Testing Laboratory, Certificate No. L138/00. The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing and environmental simulation (for exact scope please refer to Certificate No. 839.01). The FCC Designation Number is US1003.

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11 APPENDIX D Specification references

FCC 47CFR part 27: 2010	Miscellaneous wireless communications services
FCC 47CFR part 1: 2010	Practice and procedure
FCC 47CFR part 2: 2010	Frequency allocations and radio treaty matters; general rules and regulations
ANSI C63.2: 1996	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4: 2003	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.

12 APPENDIX E Test equipment correction factors

Antenna Factor
Active Loop Antenna
EMC Test Systems, model 6502, S/N 2857, HL 0446

Frequency, MHz	Magnetic Antenna Factor, dB(S/m)	Electric Antenna Factor, dB(1/m)
0.009	-32.8	18.7
0.010	-33.8	17.7
0.020	-38.3	13.2
0.050	-41.1	10.4
0.075	-41.3	10.2
0.100	-41.6	9.9
0.150	-41.7	9.8
0.250	-41.6	9.9
0.500	-41.8	9.7
0.750	-41.9	9.6
1.000	-41.4	10.1
2.000	-41.5	10.0
3.000	-41.4	10.1
4.000	-41.4	10.1
5.000	-41.5	10.0
10.000	-41.9	9.6
15.000	-41.9	9.6
20.000	-42.2	9.3
25.000	-42.8	8.7
30.000	-44.0	7.5

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

Antenna factor
Standard gain horn antenna
Quinstar Technology
Model QWH
Ser.No.110, HL 0768

Frequency min, GHz	Frequency max, GHz	Antenna factor, dB(1/m)
18.000	26.500	32.01
26.500	40.000	35.48
40.000	60.000	39.03
60.000	90.000	42.55
90.000	140.000	46.23
140.000	220.000	50.11

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

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

Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain
30	22.2	-22.5	0.01	620	19.7	6.3	4.27	1215	24.9	7.0	5.05	1810	28.3	7.1	5.08	2405	30.9	6.9	4.93
35	18.5	-17.4	0.02	625	19.7	6.5	4.42	1220	24.9	7.0	4.99	1815	28.5	6.9	4.91	2410	30.9	6.9	4.89
40	14.7	-12.5	0.06	630	19.6	6.6	4.57	1225	25.1	6.9	4.91	1820	28.6	6.8	4.74	2415	31.0	6.9	4.85
45	11.3	-8.1	0.16	635	19.7	6.5	4.48	1230	25.2	6.8	4.82	1825	28.7	6.8	4.75	2420	31.0	6.8	4.82
45	11.3	-8.1	0.16	640	19.9	6.4	4.40	1235	25.1	7.0	4.96	1830	28.7	6.8	4.76	2425	31.1	6.8	4.81
50	8.9	-4.7	0.34	645	19.9	6.5	4.45	1240	25.0	7.1	5.09	1835	28.7	6.7	4.72	2430	31.0	6.9	4.87
55	7.9	-2.8	0.52	650	19.9	6.5	4.51	1245	25.0	7.1	5.12	1840	28.8	6.7	4.69	2435	31.0	6.9	4.88
60	7.8	-2.1	0.62	655	19.9	6.6	4.60	1250	25.0	7.1	5.15	1845	28.6	6.9	4.90	2440	31.2	6.8	4.74
65	8.5	-2.0	0.63	660	19.9	6.7	4.69	1255	25.0	7.2	5.25	1850	28.4	7.1	5.12	2445	31.1	6.9	4.91
70	9.0	-1.9	0.64	665	19.9	6.7	4.70	1260	24.9	7.3	5.36	1855	28.5	7.0	5.07	2450	31.0	7.0	4.96
75	8.8	-1.1	0.78	670	20.0	6.7	4.71	1265	25.0	7.3	5.31	1860	28.6	7.0	5.01	2455	31.0	7.0	5.01
80	8.4	-0.2	0.97	675	20.1	6.7	4.71	1270	25.1	7.2	5.26	1865	28.5	7.1	5.17	2460	30.9	7.2	5.19
85	8.0	0.8	1.20	680	20.1	6.7	4.71	1275	25.3	7.0	5.05	1870	28.4	7.3	5.33	2465	31.1	6.9	4.95
90	8.2	1.1	1.29	685	20.1	6.8	4.79	1280	25.5	6.8	4.84	1875	28.4	7.2	5.28	2470	31.3	6.8	4.76
95	9.2	0.5	1.13	690	20.1	6.9	4.88	1285	25.4	7.0	4.97	1880	28.5	7.2	5.22	2475	31.4	6.7	4.69
100	10.6	-0.4	0.92	695	20.2	6.8	4.82	1290	25.3	7.1	5.10	1885	28.5	7.2	5.22	2480	31.3	6.8	4.79
110	12.6	-1.6	0.70	705	20.4	6.8	4.75	1300	25.2	7.3	5.33	1895	28.6	7.2	5.24	2490	31.1	7.0	4.99
120	13.9	-2.1	0.62	715	20.5	6.8	4.80	1310	25.5	7.1	5.09	1905	28.5	7.3	5.36	2500	30.9	7.2	5.27
125	14.2	-2.0	0.63	720	20.5	6.9	4.85	1315	25.4	7.2	5.23	1910	28.5	7.4	5.45	2505	31.1	7.1	5.15
130	14.2	-1.7	0.68	725	20.6	6.8	4.81	1320	25.3	7.3	5.36	1915	28.5	7.3	5.38	2510	31.0	7.2	5.22
140	13.4	-0.3	0.94	735	20.9	6.7	4.65	1330	25.6	7.0	5.06	1925	28.6	7.3	5.35	2520	31.2	7.0	5.05
150	12.9	0.8	1.21	745	21.0	6.6	4.59	1340	25.7	7.1	5.09	1935	28.5	7.4	5.54	2530	31.0	7.3	5.37
160	12.7	1.6	1.44	755	21.0	6.8	4.74	1350	25.7	7.1	5.17	1945	28.5	7.5	5.59	2540	31.2	7.1	5.09
165	12.5	2.0	1.59	760	21.0	6.8	4.83	1355	25.8	7.0	5.06	1950	28.6	7.4	5.48	2545	31.0	7.3	5.43
170	12.2	2.6	1.83	765	21.1	6.8	4.73	1360	25.9	6.9	4.95	1955	28.6	7.5	5.57	2550	31.0	7.3	5.39
175	11.8	3.3	2.13	770	21.3	6.7	4.64	1365	26.0	6.9	4.95	1960	28.6	7.5	5.65	2555	31.1	7.2	5.30
180	11.6	3.7	2.36	775	21.3	6.7	4.68	1370	26.0	7.0	4.96	1965	28.7	7.4	5.47	2560	31.0	7.4	5.47
185	11.5	4.0	2.54	780	21.3	6.7	4.72	1375	26.0	7.0	5.01	1970	28.9	7.2	5.29	2565	30.8	7.6	5.70
190	11.6	4.2	2.61	785	21.3	6.8	4.77	1380	26.0	7.0	5.06	1975	28.9	7.2	5.22	2570	31.1	7.3	5.37
200	13.1	3.2	2.07	795	21.4	6.8	4.79	1390	26.1	6.9	4.92	1985	29.1	7.1	5.11	2580	31.6	6.9	4.87
205	12.0	4.4	2.76	800	21.5	6.8	4.77	1395	26.2	6.9	4.94	1990	29.1	7.0	5.06	2585	31.6	6.8	4.79
210	11.0	5.6	3.66	805	21.6	6.7	4.71	1400	26.2	7.0	4.96	1995	29.1	7.1	5.09	2590	31.6	6.9	4.88
215	11.3	5.6	3.59	810	21.7	6.7	4.65	1405	26.1	7.0	5.02	2000	29.1	7.1	5.11	2595	31.5	7.0	4.97
220	11.6	5.5	3.52	815	21.7	6.7	4.72	1410	26.1	7.1	5.09	2005	29.1	7.1	5.16	2600	31.6	6.9	4.86
225	11.7	5.5	3.55	820	21.7	6.8	4.80	1415	26.2	7.0	5.02	2010	29.1	7.1	5.15	2605	31.3	7.2	5.30
230	11.9	5.5	3.57	825	21.7	6.8	4.82	1420	26.3	7.0	4.96	2015	29.2	7.1	5.13	2610	31.4	7.1	5.15
235	12.1	5.5	3.56	830	21.7	6.9	4.85	1425	26.2	7.1	5.10	2020	29.2	7.1	5.18	2615	31.7	6.9	4.88
240	12.3	5.5	3.54	835	21.8	6.8	4.82	1430	26.1	7.2	5.25	2025	29.3	7.1	5.08	2620	31.6	7.0	4.97
245	12.3	5.7	3.71	840	21.9	6.8	4.80	1435	26.1	7.2	5.24	2030	29.3	7.0	5.05	2625	31.4	7.1	5.17
250	12.3	5.9	3.88	845	21.9	6.8	4.83	1440	26.2	7.2	5.24	2035	29.3	7.1	5.07	2630	31.6	7.0	5.00
255	12.5	5.9	3.85	850	21.9	6.9	4.86	1445	26.3	1	5.11	2040	29.3	7.1	5.13	2635	31.8	6.8	4.82
260	12.7	5.8	3.83	855	22.0	6.8	4.80	1450	26.5	7.0	4.98	2045	29.2	7.2	5.23	2640	31.7	7.0	4.98
265	13.2	5.5	3.54	860	22.1	6.8	4.74	1455	26.4	7.1	5.07	2050	29.2	7.2	5.27	2645	31.7	6.9	4.93
270	13.7	5.2	3.27	865	22.0	6.9	4.92	1460	26.4	7.1	5.17	2055	29.3	7.2	5.21	2650	31.8	6.9	4.85
275	13.7	5.3	3.39	870	21.9	7.1	5.11	1465	26.4	7.2	5.19	2060	29.5	7.0	5.02	2655	31.8	6.9	4.85
280	13.7	5.4	3.50	875	22.0	7.1	5.08	1470	26.4	7.2	5.22	2065	29.4	7.1	5.08	2660	31.7	7.0	5.02
285	13.7	5.6	3.61	880	22.1	7.0	5.05	1475	26.4	7.1	5.17	2070	29.4	7.1	5.10	2665	32.0	6.7	4.71
290	13.7	5.7	3.72	885	22.1	7.0	5.06	1480	26.5	7.1	5.12	2075	29.5	7.0	5.01	2670	32.0	6.7	4.67
295	13.8	5.8	3.77	890	22.1	7.0	5.06	1485	26.5	7.1	5.14	2080	29.8	6.8	4.76	2675	31.9	6.8	4.81
300	13.9	5.8	3.81	895	22.2	7.1	5.09	1490	26.5	7.1	5.17	2085	29.7	6.9	4.89	2680	31.7	7.0	5.04
305	14.0	5.9	3.85	900	22.2	7.1	5.12	1495	26.5	7.2	5.24	2090	29.7	6.9	4.86	2685	31.9	6.8	4.83
310	14.1	5.9	3.88	905	22.3	7.1	5.09	1500	26.5	7.2	5.31	2095	29.8	6.8	4.78	2690	32.1	6.7	4.72
315	14.3	5.9	3.89	910	22.3	7.0	5.05	1505	26.6	7.2	5.27	2100	29.9	6.8	4.75	2695	32.1	6.7	4.71
320	14.4	5.9	3.90	915	22.4	7.0	4.99	1510	26.6	7.2	5.23	2105	29.8	6.8	4.81	2700	32.0	6.8	4.81
325	14.5	5.9	3.92	920	22.6	6.9	4.92	1515	26.6	7.2	5.30	2110	29.9	6.8	4.78	2705	32.0	6.8	4.80
330	14.6	5.9	3.93	925	22.7	6.9	4.85	1520	26.5	7.3	5.38	2115	29.9	6.8	4.76	2710	32.1	6.8	4.79
335	14.7	6.0	4.02	930	22.8	6.8	4.77	1525	26.6	7.3	5.37	2120	29.9	6.8	4.84	2715	32.1	6.7	4.71
340	14.7	6.2	4.12	935	22.8	6.8	4.83	1530	26.6	7.3	5.36	2125	29.9	6.9	4.89	2720	32.4	6.5	4.47
345	14.9	6.1	4.06	940	22.8	6.9	4.89	1535	26.6	7.4	5.44	2130	29.9	6.9	4.90	2725	32.2	6.7	4.63
350	15.1	6.0	3.99	945	22.8	6.9	4.87	1540	26.5	7.4	5.53	2135	29.8	6.9	4.94	2730	31.9	7.0	5.05
355	15.3	5.9	3.88	950	22.9	6.9	4.85	1545	26.5	7.5	5.58	2140	29.8	7.1	5.08	2735	31.6	7.4	5.44
360	15.6	5.8	3.78	955	23.0	6.8	4.81	1550	26.5	7.5	5.63	2145	29.9	6.9	4.92	2740	31.6	7.1	5.46
365	15.5	5.9	3.89	960	23.1	6.8	4.77	1555	26.7	7.3	5.39	2150	29.9	7.0	4.98	2745	31.9	7.0	5.06
370	15.5	6.0	4.01	965	23.1	6.7	4.73	1560	26.9	7.1	5.16	2155	29.8	7.1	5.10	2750	32.0	6.9	4.94
375	15.6	6.1	4.03	970	23.2	6.7	4.69	1565	26.9	7.2	5.23	2160	29.8	7.1	5.09	2755	32.0	7.0	4.98
380	15.7	6.1	4.05	975	23.3	6.6	4.62	1570	26.9	7.2	5.30	2165	29.9	7.0	5.00	2760	32.0	7.0	5.06
385	15.7	6.2	4.15	980	23.5	6.6	4.54	1575	27.0	7.2	5.23	2170	29.9	7.1	5.07	2765	32.2	6.8	4.80
390	15.7	6.3	4.25	985	23.5	6.6	4.52	1580	27.0	7.1	5.17	2175	29.8	7.2	5.20	2770	32.3	6.8	4.73
395	15.9	6.3	4.22	990	23.6	6.5	4.50	1585	27.0	7.2	5.20	2180	29.8	7.2	5.27	2775	32.3	6.8	4.77
400	16.0	6.2	4.18	995	23.6	6.5	4.48	1590	27.0	7.2	5.22	2185	29.8	7.2	5.27	2780	32.3	6.8	4.82
405	16.3	6.1	4.07	1000	23.7	6.5	4.46	1595	27.0	7.2	5.29	2190	29.8	7.2	5.28	2785	32.7	6.4	4.41
410	16.5	6.0	3.96	1005	23.7	6.5	4.51	1600	27.0	7.3	5.36	2195	29.8	7.2	5.30	2790	32.8	6.3	4.25
415	16.5	6.0	4.00	1010	23.7	6.6	4.57	1605	27.0	7.3	5.38	2200	29.7	7.3	5.38	2795	32.8	6.4	4.33
420	16.6	6.1	4.03	1015	23.7	6.6	4.55	1610	27.0	7.3	5.41	2205	29.7	7.3	5.41	2800	32.5	6.7	4.66
425	16.6	6.1	4.10	1020	23.8	6.6	4.54	1615	27.1	7.3	5.33	2210	29.7	7.4	5.47	2805	32.5	6.6	4.62
430	16.7	6.2	4.16	1025	23.8	6.6	4.62	1620	27.2	7.2	5.27	2215	29.7	7.4	5.54	2810	32.5	6.7	4.70
435	16.9	6.1	4.05	1030	23.7	6.7	4.70	1625	27.2	7.2	5.30	2220	29.7	7.5	5.57	2815	32.3	6.9	4.85
440	17.1	5.9	3.93	1035	23.7	6.8	4.81	1630	27.2	7.3	5.33	2225	29.8	7.3	5.43	2820	32.2	7.0	5.01
445	17.2	6.0	3.97	1040	23.6	6.9	4.92	1635	27.2	7.3	5.35	2230	29.8	7.4	5.45	2825	32.3	7.0	4.96
450	17.2	6.0	4.00	1045	23.7	6.9	4.91	1640	27.2	7.3	5.36	2235	29.7	7.5	5.61	2830	32.4	6.8	4.80
455	17.3	6.1	4.04	1050	23.7	6.9	4.91	1645	27.3	7.2	5.22	2240	29.5	7.7	5.86	2835	32.5	6.7	4.68
460	17.4	6.1	4.07	1055	23.7	7.0	5.01	1650	27.5	7.1	5.09	2245	29.8	7.4	5.53	2840	32.5	6.8	4.78
465	17.5	6.1	4.05	1060	23.6	7.1	5.11	1655	27.5	7.1	5.11	2250	30.0	7.3	5.35	2845	32.6	6.6	4.62
470	17.6	6.1	4.04	1065	23.7	7.0	5.06	1660	27.5	7.1	5.13	2255	30.0	7.2	5.28	2850	32.6	6.7	4.70
475	17.7	6.0	3.99	1070	23.8	7.0	5.01	1665	27.6	7.0	5.06	2260	30.1	7.2	5.24	2855	32.4	6.9	4.88
480	17.9	5.9	3.93	1075	23.8	7.0	5.01	1670	27.7	7.0	4.99	2265	30.1	7.2	5.20	2860	32.4	7.0	4.98
485	18.0	5.9	3.88	1080	23.9	7.0	5.01	1675	27.7	7.0	5.02	2270	30.2	7.1	5.12	2865	32.8	6.5	4.52
490	18.2	5.8	3.82	1085	24.0	7.0	4.96	1680	27.7	7.0	5.05	2275	30.3	7.0	5.05	2870	33.0	6.3	4.30
495	18.0	6.0	4.02	1090	24.0	6.9	4.91	1685	27.7	7.0	5.01	2280	30.0	7.0	5.06	2875	33.0	6.4	4.38
500	17.9	6.3	4.23	1095	24.1	6.9	4.86	1690	27.8	7.0	4.98	2285	30.3	7.0	5.05	2880	32.5	6.9	4.87
505	17.9	6.3	4.29	1100	24.2	6.8	4.82	1695	27.8	7.0	5.01	2290	30.3	7.1	5.07	2885	33.0	6.4	4.40
510	18.0	6.4	4.36	1105	24.3	6.8	4.80	1700	27.8	7.0	5.03	2295	30.3	7.1	5.13	2890	33.1	6.3	4.28
515	18.1	6.4	4.34	1110	24.3	6.8	4.78	1705	27.8	7.1	5.09	2300	30.2	7.2	5.23	2895	33.1	6.4	4.34
520	18.2	6.4	4.32	1115	24.3	6.8	4.79	1710	27.7	7.1	5.16	2305	30.3	7.2	5.20	2900	33.0	6.4	4.41
525	18.2	6.4	4.36	1120	24.4	6.8	4.80	1715	27.8	7.1	5.08	2310	30.2	7.3	5.35	2905	32.9	6.6	4.58
530	18.3	6.4	4.39	1125	24.3	6.9	4.90	1720	27.9	7.0	5.00	2315	30.1	7.4	5.45	2910	32.9	6.5	4.51
535	18.3	6.4	4.41	1130	24.3	7.0	5.00	1725	28.0	7.0	4.99	2320	30.3	7.2	5.27	2915	33.1	6.4	4.33
540	18.4	6.4	4.41	1135	24.4	6.9	4.90	1730	28.0	7.0	4.98	2325	304	7.2	5.22	2920	33.3	6.2	4.16
545	18.4	6.5	4.47	1140	24.5	6.8	4.81	1735	28.0	7.0	5.02	2330	30.4	7.1	5.13	2925	33.0	6.5	4.45
550	18.4	6.6	4.53	1145	24.6	6.8	4.76	1740	28.0	7.1	5.07	2335	30.5	7.0	5.07	2930	33.0	6.5	4.51
555	18.6	6.5	4.45	1150	24.7	6.7	4.71	1745	28.0	7.0	5.04	2340	30.5	7.1	5.11	2935	33.0	6.5	4.48
560	18.8	6.4	4.37	1155	24.7	6.8	4.76	1750	28.1	7.0	5.01	2345	30.6	7.0	5.07	2940	33.0	6.5	4.52
565	18.9	6.4	4.33	1160	24.7	6.8	4.80	1755	27.9	7.1	5.17	2350	30.5	7.1	5.12	2945	33.1	6.5	4.42
570	19.0	6.3	4.28	1165	24.7	6.8	4.81	1760	27.8	7.3	5.34	2355	30.6	7.1	5.08	2950	33.2	6.4	4.32
575	19.1	6.3	4.31	1170	24.7	6.8	4.81	1765	27.9	7.3	5.31	2360	30.9	6.8	4.79	2955	33.3	6.3	4.27
580	19.1	6.4	4.33	1175	24.8	6.8	4.84	1770	27.9	7.2	5.28	2365	31.0	6.7	4.66	2960	33.3	6.3	4.30
590	19.1	6.6	4.52	1185	24.8	6.9	4.92	1780	27.9	7.3	5.35	2375	31.1	6.6	4.60	2970	33.3	6.4	4.36
595	19.0	6.6	4.62	1190	24.7	7.0	4.99	1785	28.1	7.2	5.21	2380	31.1	6.6	4.61	2975	33.0	6.6	4.60
600	19.0	6.7	4.72	1195	24.7	7.0	5.02	1790	28.2	7.0	5.07	2385	31.1	6.7	4.62	2980	32.9	6.8	4.74
610	19.1	6.8	4.76	1205	24.08	7.1	5.08	1800	28.3	7.0	5.06	2395	31.2	6.6	4.60	2990	32.9	6.8	4.82
615	19.4	6.5	4.51	1210	24.8	7.1	5.11	1805	28.3	7.1	5.07	2400	30.9	6.9	4.93	3000	33.4	6.4	4.33

Antenna factor
Double-ridged waveguide horn antenna
ETS Lindgren, Model 3117, serial number: 00123515, HL 4114

Frequency, MHz	Antenna factor, dB/m		
	Measured	Manufacturer	Deviation
1000	28.0	28.4	-0.4
1500	28.0	27.4	0.6
2000	31.2	30.9	0.3
2500	32.5	33.4	-0.9
3000	32.9	32.6	0.3
3500	32.7	32.8	-0.1
4000	33.1	33.4	-0.3
4500	33.8	33.9	-0.1
5000	33.8	34.1	-0.3
5500	34.4	34.5	-0.1
6000	35.0	35.2	-0.2
6500	35.4	35.5	-0.1
7000	35.7	35.7	0.0
7500	35.9	35.7	0.2
8000	35.8	35.8	0.0
8500	35.9	35.8	0.1
9000	36.3	36.2	0.1
9500	36.6	36.6	0.0
10000	37.1	37.1	0.0
10500	37.6	37.5	0.1
11000	37.9	37.7	0.2
11500	38.5	38.1	0.4
12000	39.2	38.7	0.5
12500	39.0	38.9	0.1
13000	39.1	39.1	0.0
13500	38.9	38.8	0.1
14000	39.0	38.8	0.2
14500	39.6	39.9	-0.3
15000	39.9	39.7	0.2
15500	39.9	40.1	-0.2
16000	40.7	40.8	-0.1
16500	41.3	41.8	-0.5
17000	42.5	42.1	0.4
17500	41.3	41.2	0.1
18000	41.4	40.9	0.5

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

Cable loss
Cable coaxial, Bird, 18 GHz, N-type, M-F, model TC-MNFN-3.0, S/N 211539 001
HL 2882

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.08	5750	1.78	12000	2.57
30	0.12	6000	1.84	12250	2.62
100	0.22	6250	1.87	12500	2.66
250	0.35	6500	1.92	12750	2.68
500	0.49	6750	1.96	13000	2.67
750	0.60	7000	2.01	13250	2.75
1000	0.68	7250	2.08	13500	2.77
1250	0.78	7500	2.12	13750	2.90
1500	0.85	7750	2.19	14000	3.00
1750	0.92	8000	2.22	14250	3.12
2000	0.98	8250	2.28	14500	2.98
2250	1.06	8500	2.29	14750	3.03
2500	1.11	8750	2.27	15000	2.99
2750	1.19	9000	2.28	15250	2.99
3000	1.25	9250	2.26	15500	2.98
3250	1.30	9500	2.29	15750	2.98
3500	1.34	9750	2.33	16000	2.99
3750	1.40	10000	2.34	16250	3.05
4000	1.45	10250	2.41	16500	3.11
4250	1.51	10500	2.46	16750	3.18
4500	1.54	10750	2.48	17000	3.23
4750	1.59	11000	2.48	17250	3.21
5000	1.63	11250	2.52	17500	3.22
5250	1.68	11500	2.53	17750	3.22
5500	1.72	11750	2.56	18000	3.25

Cable loss
Cable coaxial, Microwave Cable Assembly, 104EA, 18 GHz, 1.0 m
Suhner Sucoflex, HL 3390

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.03	4800	0.55	9800	0.89	14900	1.07
30	0.04	4900	0.56	9900	0.89	15000	1.07
50	0.05	5000	0.57	10000	0.86	15100	1.08
100	0.07	5100	0.58	10100	0.86	15200	1.07
200	0.10	5200	0.58	10200	0.88	15300	1.09
300	0.12	5300	0.59	10300	0.92	15400	1.10
400	0.14	5400	0.59	10400	0.94	15500	1.10
500	0.16	5500	0.60	10500	0.96	15600	1.12
600	0.17	5600	0.61	10600	0.93	15700	1.15
700	0.18	5700	0.61	10700	0.89	15800	1.15
800	0.20	5800	0.63	10800	0.89	15900	1.17
900	0.21	5900	0.63	10900	0.88	16000	1.14
1000	0.23	6000	0.64	11000	0.92	16100	1.14
1100	0.24	6100	0.64	11100	0.91	16200	1.15
1200	0.25	6200	0.64	11200	0.89	16300	1.14
1300	0.27	6300	0.65	11300	0.88	16400	1.13
1400	0.28	6400	0.65	11400	0.88	16500	1.13
1500	0.28	6500	0.66	11500	0.90	16600	1.13
1600	0.30	6600	0.67	11600	0.94	16700	1.14
1700	0.31	6700	0.67	11700	0.96	16800	1.14
1800	0.32	6800	0.67	11800	0.92	16900	1.14
1900	0.33	6900	0.68	11900	0.92	17000	1.14
2000	0.34	7000	0.67	12000	0.91	17100	1.15
2100	0.35	7100	0.68	12100	0.92	17200	1.14
2200	0.35	7200	0.69	12200	0.95	17300	1.15
2300	0.36	7300	0.69	12300	0.98	17400	1.15
2400	0.37	7400	0.68	12400	0.96	17500	1.16
2500	0.39	7500	0.69	12500	0.99	17600	1.16
2600	0.40	7600	0.70	12600	0.96	17700	1.16
2700	0.41	7700	0.71	12700	0.93	17800	1.19
2800	0.42	7800	0.72	12800	0.94	17900	1.21
2900	0.42	7900	0.72	12900	0.98	18000	1.25
3000	0.43	8000	0.72	13000	0.99		
3100	0.44	8100	0.73	13100	0.99		
3200	0.45	8200	0.74	13200	0.99		
3300	0.46	8300	0.75	13300	0.99		
3400	0.46	8400	0.74	13400	1.00		
3500	0.47	8500	0.73	13500	1.02		
3600	0.47	8600	0.73	13600	1.05		
3700	0.47	8700	0.75	13700	1.03		
3800	0.49	8800	0.77	13800	1.02		
3900	0.49	8900	0.77	13900	1.03		
4000	0.50	9000	0.77	14000	1.03		
4100	0.51	9100	0.77	14100	1.05		
4200	0.52	9200	0.78	14200	1.05		
4300	0.52	9300	0.80	14300	1.04		
4400	0.53	9400	0.82	14400	1.03		
4500	0.53	9500	0.82	14600	1.06		
4600	0.54	9600	0.83	14700	1.07		
4700	0.56	9700	0.89	14800	1.08		

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

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

Cable loss
Microwave Cable Assembly, Huber-Suhner, 40 GHz, 1.5 m, SMA-SMA, S/N 1227/2A
HL 3902

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	-0.02	9500	1.84	21000	2.93
100	0.15	10000	1.86	22000	3.04
500	0.38	10500	1.93	23000	3.08
1000	0.56	11000	1.99	24000	3.18
1500	0.69	11500	2.04	25000	3.23
2000	0.82	12000	2.10	26000	3.34
2500	0.90	12500	2.15	27000	3.39
3000	0.98	13000	2.21	28000	3.49
3500	1.06	13500	2.25	29000	3.55
4000	1.11	14000	2.29	30000	3.64
4500	1.17	14500	2.34	31000	3.68
5000	1.24	15000	2.36	32000	3.77
5500	1.32	15500	2.40	33000	3.87
6000	1.40	16000	2.45	34000	3.93
6500	1.50	16500	2.48	35000	3.89
7000	1.56	17000	2.56	36000	4.00
7500	1.62	17500	2.58	37000	4.15
8000	1.68	18000	2.60	38000	4.20
8500	1.74	19000	2.80	39000	4.25
9000	1.78	20000	2.85	40000	4.32

13 APPENDIX F Abbreviations and acronyms

A	ampere
AC	alternating current
A/m	ampere per meter
AM	amplitude modulation
AVRG	average (detector)
CBW	channel bandwidth
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
DC	direct current
EBW	emission bandwidth
EIRP	equivalent isotropically radiated power
ERP	effective radiated power
EUT	equipment under test
F	frequency
GHz	gigahertz
GND	ground
H	height
HL	Hermon laboratories
Hz	hertz
k	kilo
kHz	kilohertz
LO	local oscillator
m	meter
MHz	megahertz
min	minute
mm	millimeter
ms	millisecond
μs	microsecond
NA	not applicable
NB	narrow band
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

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