HERMON LABORATORIES

ELECTRICAL TESTING
0839.01

Hermon Laboratories Ltd.
Harakevet Industrial Zone, Binyamina 30500,
Israel
Tel. +972-4-6288001
Fax. +972-4-6288277
E-mail: mail@hermonlabs.com

TEST REPORT

ACCORDING TO: FCC 47CFR part 90, subpart Z

FOR:

Airspan Networks Inc.

Terminal station

Model: CRM 3.65GHz

FCC ID:PIDCRM3650

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1 Applicant information

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

2 Equipment under test attributes

Product name:	Terminal station
Product type:	Transceiver
Model(s):	CRM 3.65 GHz
Serial number:	A1AFC1D20130
Hardware version:	Ver.C
Software release:	10.3.1.23
Receipt date:	5/29/2012

3 Manufacturer information

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

4 Test details

Project ID:	23805
Location:	Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started:	5/29/2012
Test completed:	5/31/2012
Test specification:	FCC 47CFR part 90, subpart Z

5 Tests summary

Test	Status
Transmitter characteristics	
Section 90.1321, Maximum conducted output power	Pass
Section 90.1321, Peak EIRP power density	Pass
Section 90.209, Occupied bandwidth	Pass
Section 90.210(b), Emission mask	Pass
Section 90.1323, Spurious emissions at RF antenna connector	Pass
Section 90.1323, Radiated spurious emissions	Pass
Section 90.213, Frequency stability	Pass
Section 90.1335, RF exposure	Pass, exhibit provided in Application for certification

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	May 31, 2012	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	October 29, 2012	
Approved by:	Mr. M. Nikishin, EMC and Radio group leader	October 30, 2012	

6 EUT description

6.1 General information

The EUT, subscriber premises radio, CRM 3.65 GHz TDD is part of a WiMAX broadband fixed cellular wireless access system. The system provides a radio link between an end-user (a subscriber) and a network to give high-speed data access. The CRM's transceiver/receiver (up to 64 QAM modulation, data rate up to 46 Mbps) uses OFDMA and operating in TDD duplexing mode.

6.2 Ports and lines

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

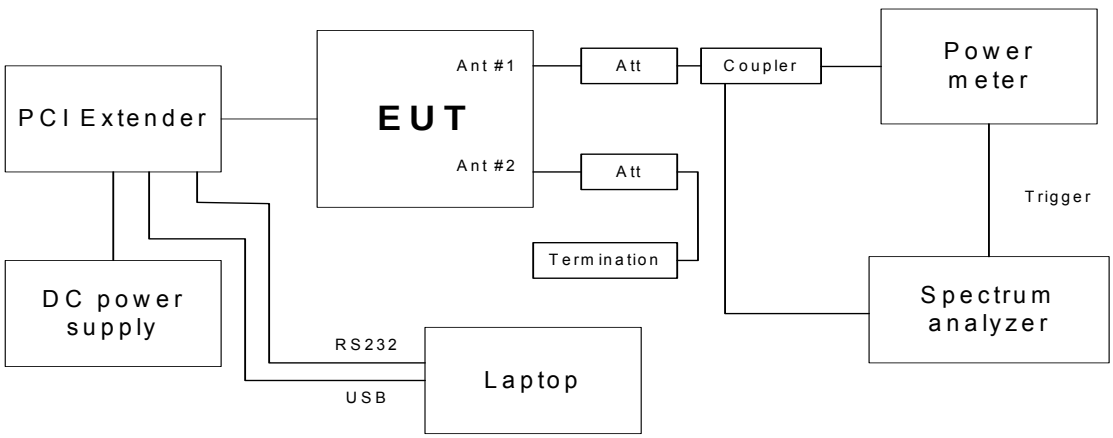
6.3 Support and test equipment

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
Laptop	IBM	ThinkPad T43	L3-AFKW5 05/09
AC/DC Adapter	IBM	08K8202	Z1ZAPW5940EL

6.4 Changes made in EUT

No changes were implemented in the EUT during testing.

6.5 Test configuration



6.6 Transmitter characteristics

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

Intended use		**Condition of use**
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	3650.0 – 3700.0 MHz
Operating frequency range	3652.5 – 3697.5 MHz for 5 MHz OBW 3655.0 – 3695.0 MHz for 10 MHz OBW
RF channel spacing	5, 10 MHz

Maximum rated output power	At transmitter 50 Ω RF output connector (aggregate power of both RF chains)	26 dBm – 5 MHz OBW 26.8 dBm – 10 MHz OBW
	EIRP, dBm (with 19.5 dBi antenna)	35.4 dBm – 5 MHz OBW 39.1 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		-10 dBm
		maximum RF power		26.8 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 Panel Antenna	PCTEL	07-1161-01	19.5 dBi
Direct Mount LPT Style Antenna	Pulse Electronics	W1982	5.6 dBi

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

Type of multiplexing	OFDM
Modulating test signal (baseband)	PRBS
Maximum transmitter duty cycle in normal use	Maximum 38 %

Transmitter power source			
V	DC	Nominal rated voltage	5.5 VDC via PC MCI slot

Common power source for transmitter and receiver	V	yes	no

Test specification:	Section 90.1321, Maximum conducted output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/29/2012		
Temperature: 23.6 ºC	Air Pressure: 1005 hPa	Relative Humidity: 43 %	Power Supply: 5.5VDC
Remarks:			

7 Transmitter tests according to FCC 47CFR part 90 requirements

7.1 Maximum output power

7.1.1 General

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

Table 7.1.1 Maximum output power limits

Assigned frequency range, MHz	Occupied bandwidth, MHz	Maximum peak output power, EIRP	
		W	dBm
Base and fixed stations			
3650.0 – 3700.0	5	5	36.99
	10	10	40.00

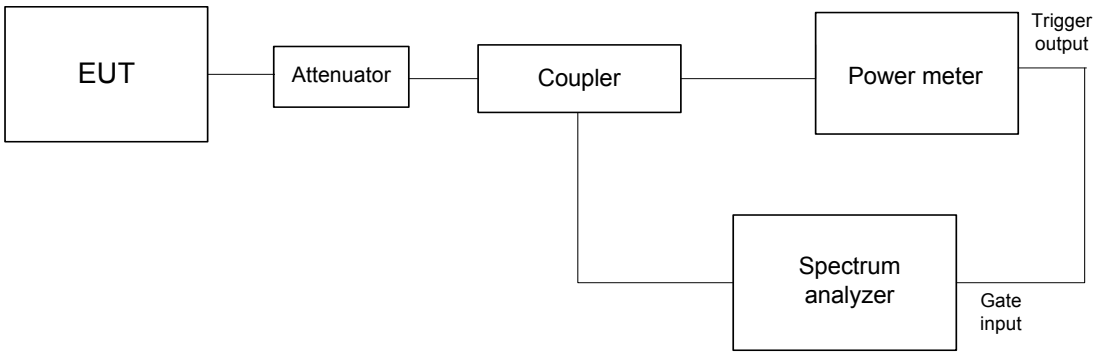
7.1.2 Test procedure

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 for end user RF output power.

7.1.2.3 The peak output power was measured with a power meter as provided in Table 7.1.2.

Figure 7.1.1 Transmitter output power test setup



Test specification:	Section 90.1321, Maximum conducted output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/29/2012		
Temperature: 23.6 ºC	Air Pressure: 1005 hPa	Relative Humidity: 43 %	Power Supply: 5.5VDC
Remarks:			

Table 7.1.2 Peak EIRP output power test results

ASSIGNED FREQUENCY RANGE: 3650.0 – 3700.0 MHz
DETECTOR USED: Average (Power Meter)
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA GAIN: 19.5 dBi
EMISSION BANDWIDTH: 5 MHz

Modulation, Bit rate, Mbps	Power meter reading, dBm	Total power*, dBm	EIRP, dBm	Limit, dBm	Margin*, dB	Verdict
5 MHz BW, Low channel 3652.5 MHz						
QPSK, 7.0	12.63	15.6	35.1	37.0	-1.87	Pass
64QAM, 23.0	12.62	15.6	35.1	37.0	-1.88	Pass
5 MHz BW, Mid channel 3675.0 MHz						
QPSK, 7.0	12.53	15.5	35.0	37.0	-1.97	Pass
64QAM, 23.0	12.55	15.6	35.1	37.0	-1.95	Pass
5 MHz BW, High channel 3697.5 MHz						
QPSK, 7.0	12.88	15.9	35.4	37.0	-1.62	Pass
64QAM, 23.0	12.65	15.7	35.2	37.0	-1.85	Pass

EMISSION BANDWIDTH: 10 MHz

Modulation, Bit rate, Mbps	Power meter reading, dBm	Total power*, dBm	EIRP, dBm	Limit, dBm	Margin*, dB	Verdict
10 MHz BW, Low channel 3655 MHz						
QPSK, 13.0	16.14	19.1	38.6	40.0	-1.36	Pass
64QAM, 46.0	16.61	19.6	39.1	40.0	-0.89	Pass
10 MHz BW, Mid channel 3675.0 MHz						
QPSK, 13.0	16.43	19.4	38.9	40.0	-1.07	Pass
64QAM, 46.0	16.64	19.6	39.1	40.0	-0.86	Pass
10 MHz BW, High channel 3695.0 MHz						
QPSK, 13.0	16.48	19.5	39.0	40.0	-1.02	Pass
64QAM, 46.0	16.44	19.4	38.9	40.0	-1.06	Pass

* - Total power, dBm = Power meter reading + 10*log(N)
** - EIRP, dBm = Total power*, dBm + Antenna gain, dBi

Test specification:	Section 90.1321, Maximum conducted output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/29/2012		
Temperature: 23.6 ºC	Air Pressure: 1005 hPa	Relative Humidity: 43 %	Power Supply: 5.5VDC
Remarks:			

Table 7.1.3 Peak EIRP output power test results

ASSIGNED FREQUENCY RANGE: 3650.0 – 3700.0 MHz
DETECTOR USED: Average (Power Meter)
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA GAIN: 5.6 dBi
EMISSION BANDWIDTH: 5 MHz

Modulation, Bit rate, Mbps	Power meter reading, dBm	Total power*, dBm	EIRP, dBm	Limit, dBm	Margin*, dB	Verdict
5 MHz BW, Low channel 3652.5 MHz						
QPSK, 7.0	22.53	25.5	31.1	37.0	-5.87	Pass
64QAM, 23.0	22.73	25.7	31.3	37.0	-5.67	Pass
5 MHz BW, Mid channel 3675.0 MHz						
QPSK, 7.0	22.86	25.9	31.5	37.0	-5.54	Pass
64QAM, 23.0	22.67	25.7	31.3	37.0	-5.73	Pass
5 MHz BW, High channel 3697.5 MHz						
QPSK, 7.0	22.75	25.8	31.4	37.0	-5.65	Pass
64QAM, 23.0	22.95	26.0	31.6	37.0	-5.45	Pass

EMISSION BANDWIDTH: 10 MHz

Modulation, Bit rate, Mbps	Power meter reading, dBm	Total power*, dBm	EIRP dBm	Limit, dBm	Margin*, dB	Verdict
10 MHz BW, Low channel 3655 MHz						
QPSK, 13.0	23.41	26.4	32.0	40.0	-7.99	Pass
64QAM, 46.0	23.18	26.2	31.8	40.0	-8.22	Pass
10 MHz BW, Mid channel 3675.0 MHz						
QPSK, 13.0	23.49	26.5	32.1	40.0	-7.91	Pass
64QAM, 46.0	23.27	26.3	31.9	40.0	-8.13	Pass
10 MHz BW, High channel 3695.0 MHz						
QPSK, 13.0	23.82	26.8	32.4	40.0	-7.58	Pass
64QAM, 46.0	23.21	26.2	31.8	40.0	-8.19	Pass

* - Total power, dBm = Power meter reading + 10*log(N)
** - EIRP, dBm = Total power*, dBm + Antenna gain, dBi

Reference numbers of test equipment used

HL 2214	HL 3301	HL 3302	HL 3818	HL 3903			

Full description is given in Appendix A.

Test specification:	Section 90.1321, Peak EIRP power density		
Test procedure:	47 CFR, Sections 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/29/2012		
Temperature: 23.6 ºC	Air Pressure: 1005 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

7.2 Peak EIRP power density

7.2.1 General

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

Table 7.2.1 Peak power density limits

Assigned frequency range, MHz	Occupied bandwidth, MHz	Maximum peak power spectral density, EIRP	
		W/MHz	dBm/MHz
Base and fixed stations			
3650.0 – 3700.0	5	1	30
	10		

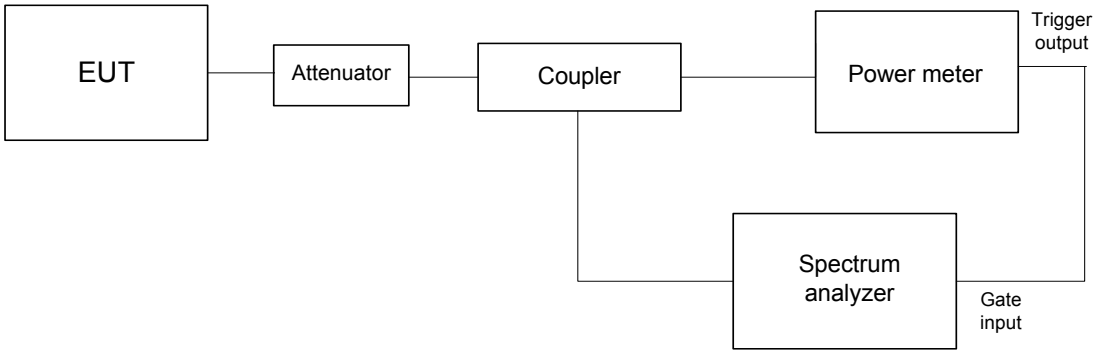
7.2.2 Test procedure

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

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

7.2.2.3 The peak output power density was measured with spectrum analyzer as provided in Table 7.2.2 and the associated plots.

Figure 7.2.1 Peak power density test setup



Test specification:	**Section 90.1321, Peak EIRP power density**		
Test procedure:	47 CFR, Sections 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	5/29/2012		
Temperature: 23.6 ºC	**Air Pressure:** 1005 hPa	**Relative Humidity:** 46 %	**Power Supply:** 5.5VDC
Remarks:			

Table 7.2.2 Peak EIRP power density test results

OPERATING FREQUENCY RANGE: 3650.0 – 3700.0 MHz
DETECTOR USED: Average (RMS)
RESOLUTION BANDWIDTH: 100 kHz with integration over a 1 MHz slice of spectrum
VIDEO BANDWIDTH: 300 kHz
MODULATING SIGNAL: PRBS
ANTENNA GAIN: 19.5 dBi
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

EMISSION BANDWIDTH: 5 MHz

Channel, MHz	Modulation	SA reading (RF#1), dBm/MHz	Total Power density *, dBm/MHz	Antenna gain, dBi	EIRP power density**, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
3652.5	QPSK	6.59	9.59	19.5	29.1	30.0	-0.91	Pass
3675.0	QPSK	6.65	9.65	19.5	29.2	30.0	-0.85	Pass
3697.5	QPSK	7.28	10.28	19.5	29.8	30.0	-0.22	Pass
3652.5	64QAM	6.66	9.66	19.5	29.2	30.0	-0.84	Pass
3675.0	64QAM	6.63	9.63	19.5	29.1	30.0	-0.87	Pass
3697.5	64QAM	6.95	9.95	19.5	29.5	30.0	-0.55	Pass

EMISSION BANDWIDTH: 10 MHz

Channel, MHz	Modulation	SA reading (RF#1), dBm/MHz	Total Power density *, dBm/MHz	Antenna gain, dBi	EIRP power density**, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
3655.0	QPSK	6.71	9.71	19.5	29.2	30.0	-0.79	Pass
3675.0	QPSK	7.16	10.16	19.5	29.7	30.0	-0.34	Pass
3695.0	QPSK	7.38	10.38	19.5	29.9	30.0	-0.12	Pass
3655.0	64QAM	7.29	10.29	19.5	29.8	30.0	-0.21	Pass
3675.0	64QAM	7.24	10.24	19.5	29.7	30.0	-0.26	Pass
3695.0	64QAM	7.20	10.20	19.5	29.7	30.0	-0.30	Pass

* - Total Power density, dBm/MHz = SA reading, dBm/MHz + 10*log(N)
** - EIRP power density, dBm/MHz = Total Power density, dBm/MHz + Antenna gain, dBi

Test specification:	Section 90.1321, Peak EIRP power density		
Test procedure:	47 CFR, Sections 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/29/2012		
Temperature: 23.6 ºC	Air Pressure: 1005 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

Table 7.2.3 Peak EIRP power density test results

OPERATING FREQUENCY RANGE: 3650.0 – 3700.0 MHz
DETECTOR USED: Average (RMS)
RESOLUTION BANDWIDTH: 100 kHz with integration over a 1 MHz slice of spectrum
VIDEO BANDWIDTH: 300 kHz
MODULATING SIGNAL: PRBS
ANTENNA GAIN: 5.6 dBi
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

EMISSION BANDWIDTH: 5 MHz

Channel, MHz	Modulation	SA reading (RF#1), dBm/MHz	Total Power density *, dBm/MHz	Antenna gain, dBi	EIRP power density**, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
3652.5	QPSK	16.24	19.24	5.6	24.8	30.0	-5.16	Pass
3675.0	QPSK	16.60	19.60	5.6	25.2	30.0	-4.80	Pass
3697.5	QPSK	16.65	19.65	5.6	25.3	30.0	-4.75	Pass
3652.5	64QAM	16.68	19.68	5.6	25.3	30.0	-4.72	Pass
3675.0	64QAM	16.33	19.33	5.6	24.9	30.0	-5.07	Pass
3697.5	64QAM	16.97	19.97	5.6	25.6	30.0	-4.43	Pass

EMISSION BANDWIDTH: 10 MHz

Channel, MHz	Modulation	SA reading (RF#1), dBm/MHz	Total Power density *, dBm/MHz	Antenna gain, dBi	EIRP power density**, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
3655.0	QPSK	13.89	16.89	5.6	22.5	30.0	-7.51	Pass
3675.0	QPSK	13.85	16.85	5.6	22.5	30.0	-7.55	Pass
3695.0	QPSK	13.24	16.24	5.6	21.8	30.0	-8.16	Pass
3655.0	64QAM	13.81	16.81	5.6	22.4	30.0	-7.59	Pass
3675.0	64QAM	13.70	16.70	5.6	22.3	30.0	-7.70	Pass
3695.0	64QAM	13.67	16.67	5.6	22.3	30.0	-7.73	Pass

* - Total Power density, dBm/MHz = SA reading, dBm/MHz + 10*log(N)
** - EIRP power density, dBm/MHz = Total Power density, dBm/MHz + Antenna gain, dBi

Reference numbers of test equipment used

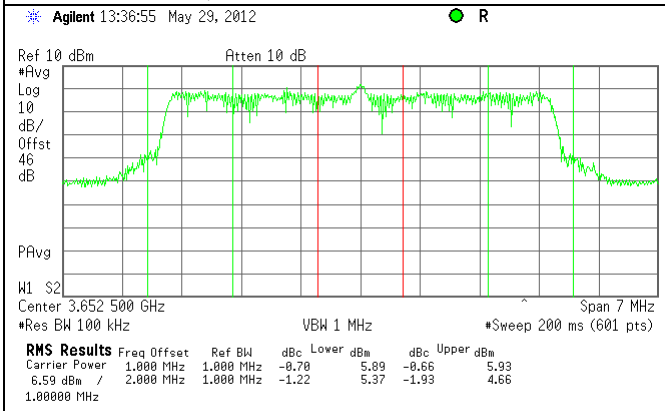
HL 2214	HL 3301	HL 3302	HL 3818	HL 3901			

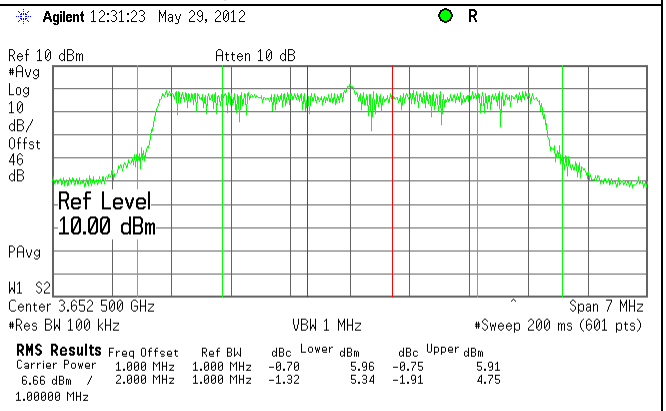
Full description is given in Appendix A.

Test specification:	Section 90.1321, Peak EIRP power density		
Test procedure:	47 CFR, Sections 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/29/2012		
Temperature: 23.6 ºC	Air Pressure: 1005 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

Plot 7.2.1 EIRP spectral density test results at low frequency, antenna gain 19.5 dBi

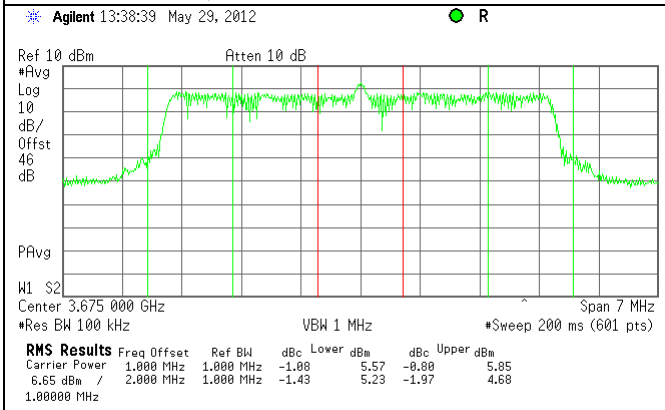
CARRIER FREQUENCY:	3652.5 MHz
EMISSION BANDWIDTH:	5 MHz
RF OUTPUT:	Antenna #2
MODULATION: QPSK	MODULATION: 64QAM

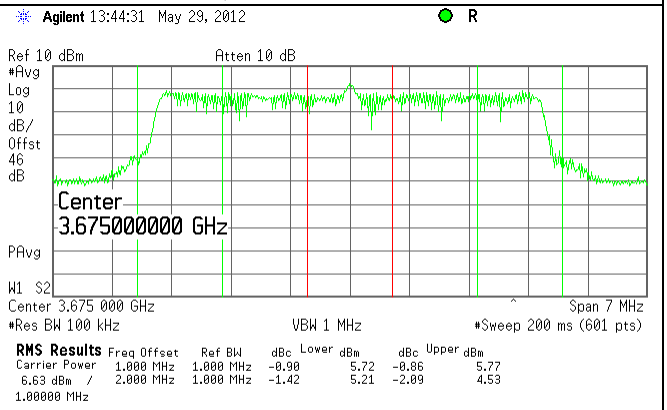




Plot 7.2.2 EIRP spectral density test results at mid frequency, antenna gain 19.5 dBi

CARRIER FREQUENCY:	3675.0 MHz
EMISSION BANDWIDTH:	5 MHz
RF OUTPUT:	Antenna #2
MODULATION: QPSK	MODULATION: 64QAM

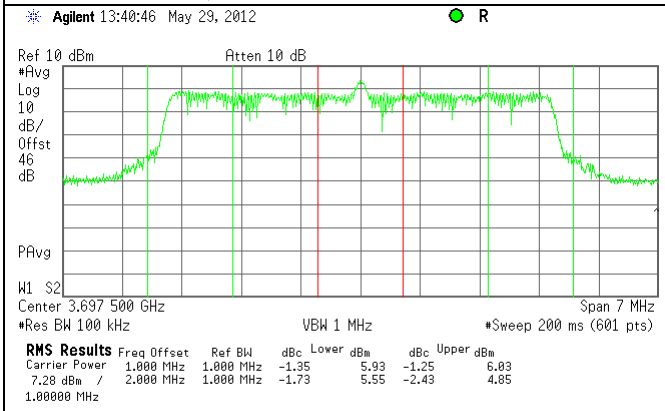


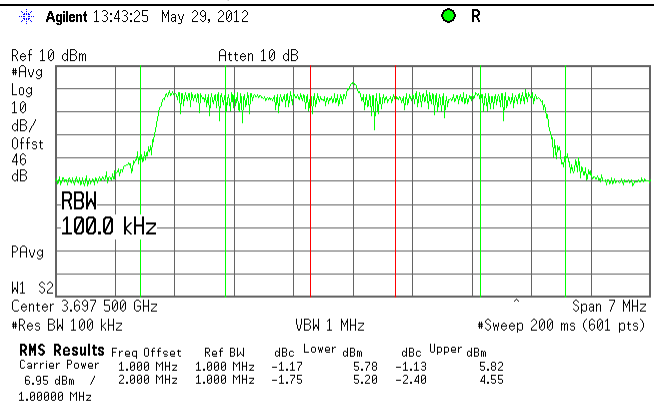


Test specification:	Section 90.1321, Peak EIRP power density		
Test procedure:	47 CFR, Sections 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/29/2012		
Temperature: 23.6 ºC	Air Pressure: 1005 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

Plot 7.2.3 EIRP spectral density test results at high frequency, antenna gain 19.5 dBi

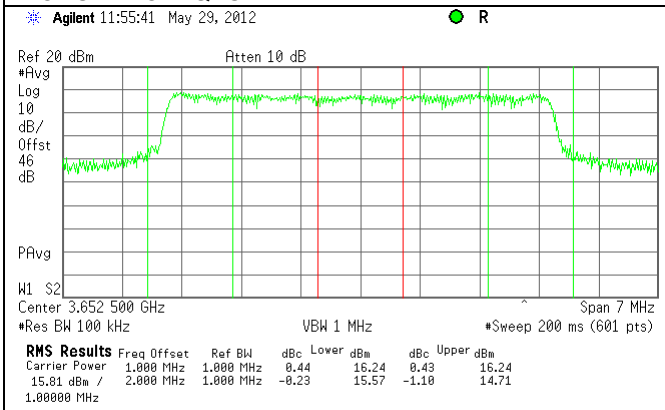
CARRIER FREQUENCY:	3697.5 MHz
EMISSION BANDWIDTH:	5 MHz
RF OUTPUT:	Antenna #2
MODULATION: QPSK	MODULATION: 64QAM

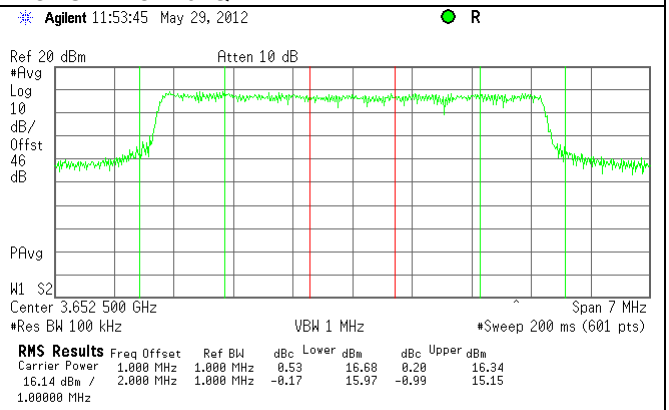




Plot 7.2.4 EIRP spectral density test results at low frequency, antenna gain 5.6 dBi

CARRIER FREQUENCY:	3652.5 MHz
EMISSION BANDWIDTH:	5 MHz
RF OUTPUT:	Antenna #2
MODULATION: QPSK	MODULATION: 64QAM

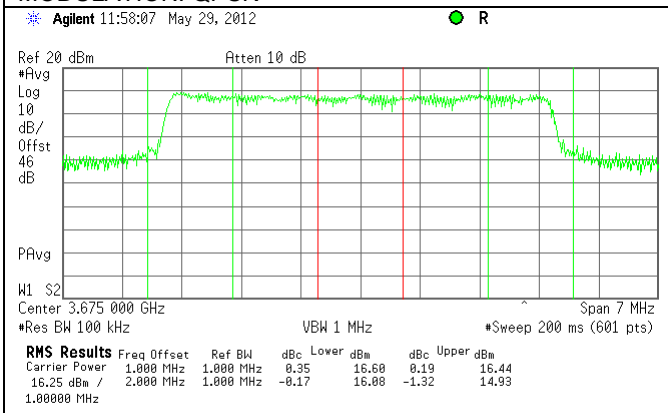


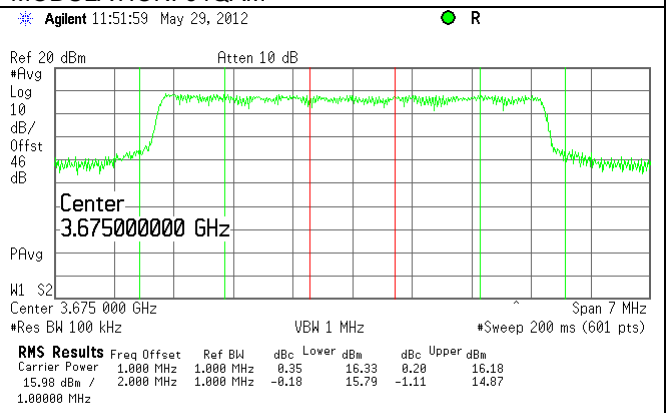


Test specification:	Section 90.1321, Peak EIRP power density		
Test procedure:	47 CFR, Sections 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/29/2012		
Temperature: 23.6 ºC	Air Pressure: 1005 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

Plot 7.2.5 EIRP spectral density test results at mid frequency, antenna gain 5.6 dBi

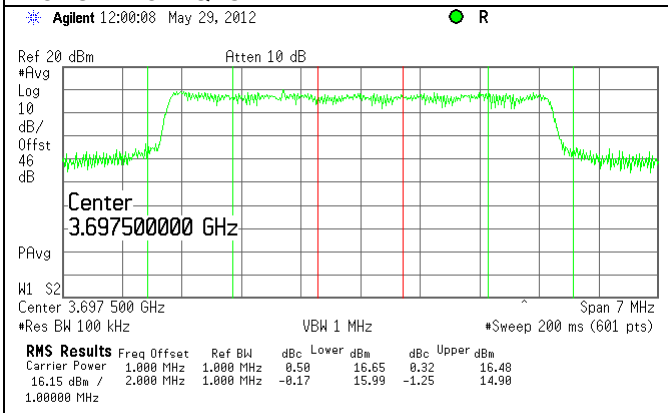
CARRIER FREQUENCY:	3675.0 MHz
EMISSION BANDWIDTH:	5 MHz
RF OUTPUT:	Antenna #2
MODULATION: QPSK	MODULATION: 64QAM

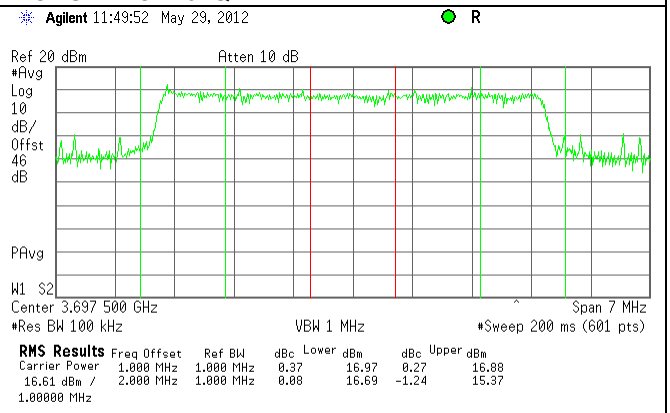




Plot 7.2.6 EIRP spectral density test results at high frequency, antenna gain 5.6 dBi

CARRIER FREQUENCY:	3697.5 MHz
EMISSION BANDWIDTH:	5 MHz
RF OUTPUT:	Antenna #2
MODULATION: QPSK	MODULATION: 64QAM

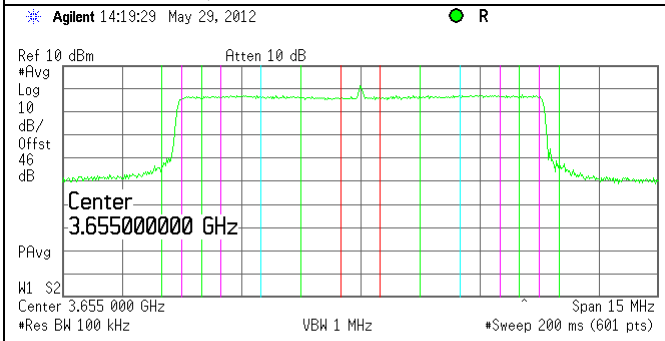


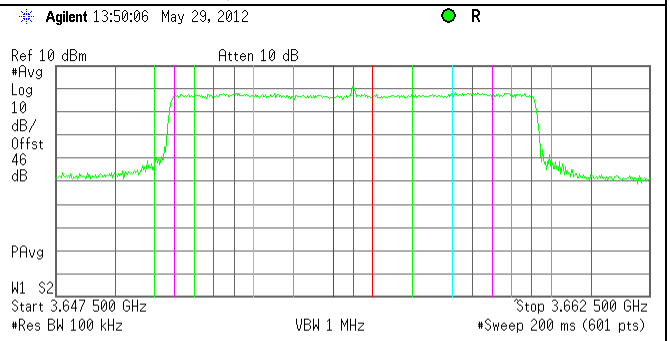


Test specification:	Section 90.1321, Peak EIRP power density		
Test procedure:	47 CFR, Sections 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/29/2012		
Temperature: 23.6 ºC	Air Pressure: 1005 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

Plot 7.2.7 EIRP spectral density test results at low frequency, antenna gain 19.5 dBi

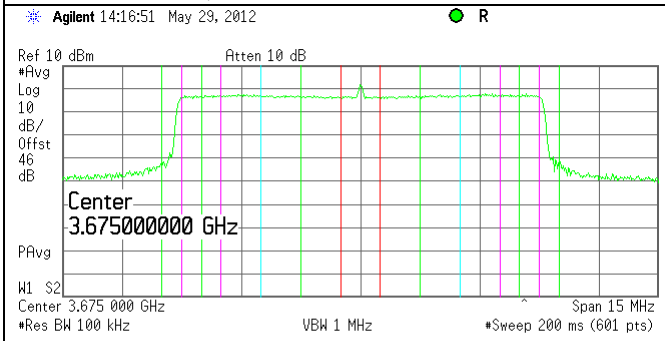
CARRIER FREQUENCY:	3655 MHz
EMISSION BANDWIDTH:	10 MHz
RF OUTPUT:	Antenna #2
MODULATION: QPSK	MODULATION: 64QAM

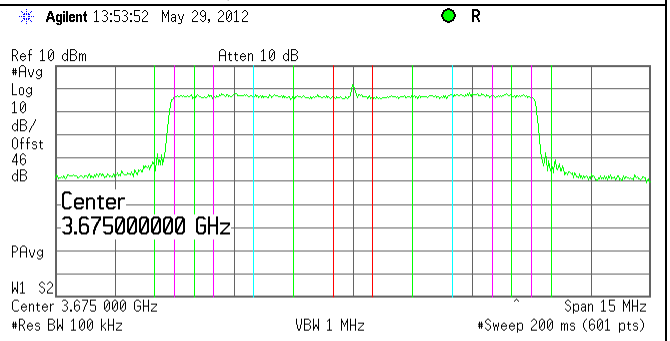




Plot 7.2.8 EIRP spectral density test results at mid frequency, antenna gain 19.5 dBi

CARRIER FREQUENCY:	3675.0 MHz
EMISSION BANDWIDTH:	10 MHz
RF OUTPUT:	Antenna #2
MODULATION: QPSK	MODULATION: 64QAM

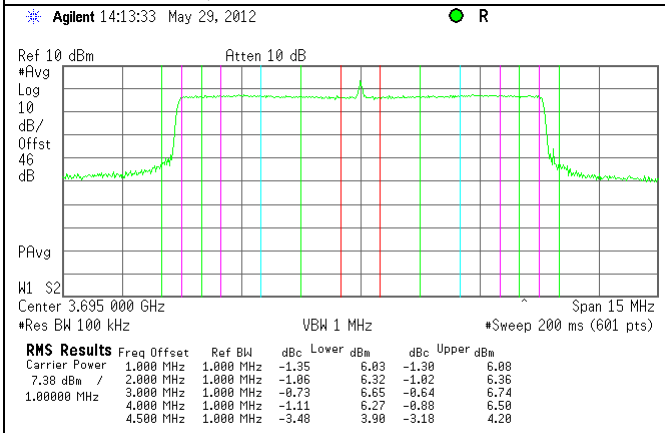


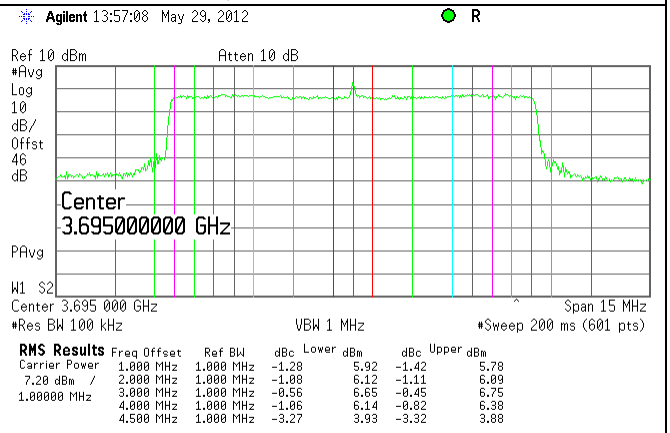


Test specification:	Section 90.1321, Peak EIRP power density		
Test procedure:	47 CFR, Sections 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/29/2012		
Temperature: 23.6 ºC	Air Pressure: 1005 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

Plot 7.2.9 EIRP spectral density test results at high frequency, antenna gain 19.5 dBi

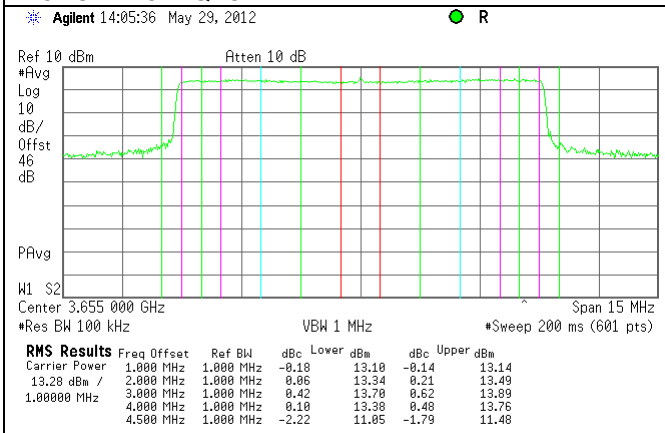
CARRIER FREQUENCY:	3695.0 MHz
EMISSION BANDWIDTH:	10 MHz
RF OUTPUT:	Antenna #2
MODULATION: QPSK	MODULATION: 64QAM

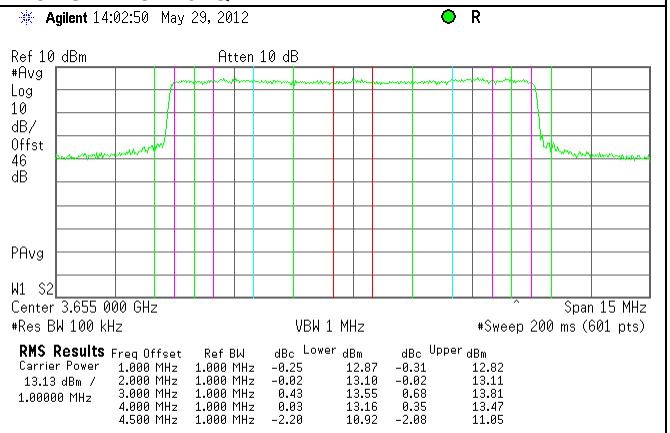




Plot 7.2.10 EIRP spectral density test results at low frequency, antenna gain 5.6 dBi

CARRIER FREQUENCY:	3655 MHz
EMISSION BANDWIDTH:	10 MHz
RF OUTPUT:	Antenna #2
MODULATION: QPSK	MODULATION: 64QAM

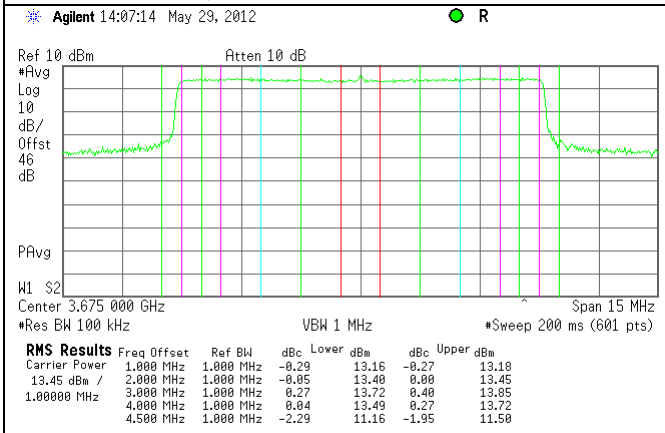


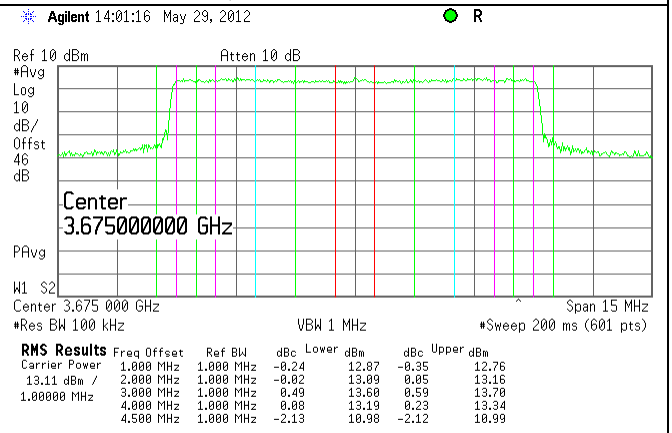


Test specification:	Section 90.1321, Peak EIRP power density		
Test procedure:	47 CFR, Sections 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/29/2012		
Temperature: 23.6 ºC	Air Pressure: 1005 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

Plot 7.2.11 EIRP spectral density test results at mid frequency, antenna gain 5.6 dBi

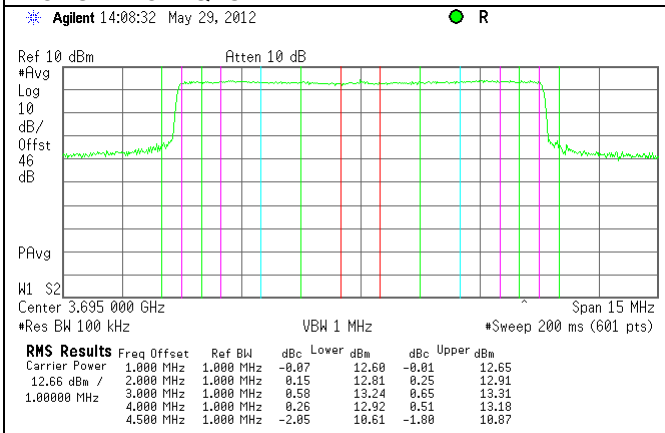
CARRIER FREQUENCY:	3675.0 MHz
EMISSION BANDWIDTH:	10 MHz
RF OUTPUT:	Antenna #2
MODULATION: QPSK	MODULATION: 64QAM

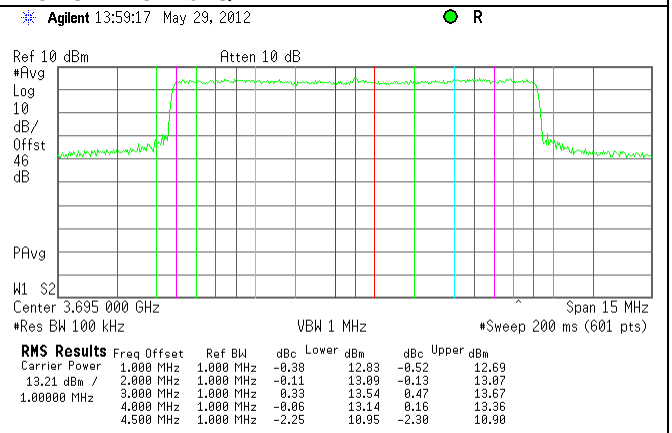




Plot 7.2.12 EIRP spectral density test results at high frequency, antenna gain 5.6 dBi

CARRIER FREQUENCY:	3695.0 MHz
EMISSION BANDWIDTH:	10 MHz
RF OUTPUT:	Antenna #2
MODULATION: QPSK	MODULATION: 64QAM





Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/29/2012		
Temperature: 23.6 ºC	Air Pressure: 1005 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

7.3 Occupied bandwidth test

7.3.1 General

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

Table 7.3.1 Occupied bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points*, dBc	Maximum allowed bandwidth, MHz
3650.0 – 3700.0	26	NA

* - Modulation envelope reference points are provided in terms of attenuation below the total average power.

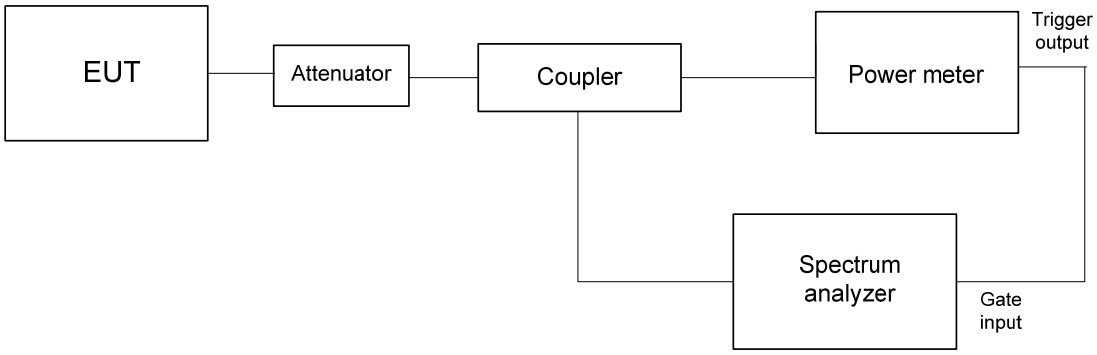
7.3.2 Test procedure

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

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

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

Figure 7.3.1 Occupied bandwidth test setup



Test specification:	**Section 90.209, Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	5/29/2012		
Temperature: 23.6 ºC	**Air Pressure:** 1005 hPa	**Relative Humidity:** 46 %	**Power Supply:** 5.5VDC
Remarks:			

Table 7.3.2 Occupied bandwidth test results

DETECTOR USED: Average
RESOLUTION BANDWIDTH: 0.5-2% of the Emission bandwidth
VIDEO BANDWIDTH: 3 times RBW
MODULATION ENVELOPE REFERENCE POINTS: 26 dB below total average power
MODULATING SIGNAL: PRBS
EMISSION BANDWIDTH: 5 MHz

Carrier frequency, MHz	Modulation	26 dBc Occupied bandwidth, MHz	Emission Bandwidth, MHz	Verdict
3652.5	QPSK	4.608	5.0	Pass
3675.0	QPSK	4.608	5.0	Pass
3697.5	QPSK	4.608	5.0	Pass
3652.5	64QAM	4.608	5.0	Pass
3675.0	64QAM	4.608	5.0	Pass
3697.5	64QAM	4.608	5.0	Pass

EMISSION BANDWIDTH: 10 MHz

Carrier frequency, MHz	Modulation	26 dBc Occupied bandwidth, MHz	Emission Bandwidth, MHz	Verdict
3655.0	QPSK	9.250	10.0	Pass
3675.0	QPSK	9.275	10.0	Pass
3695.0	QPSK	9.275	10.0	Pass
3655.0	64QAM	9.250	10.0	Pass
3675.0	64QAM	9.250	10.0	Pass
3695.0	64QAM	9.275	10.0	Pass

Reference numbers of test equipment used

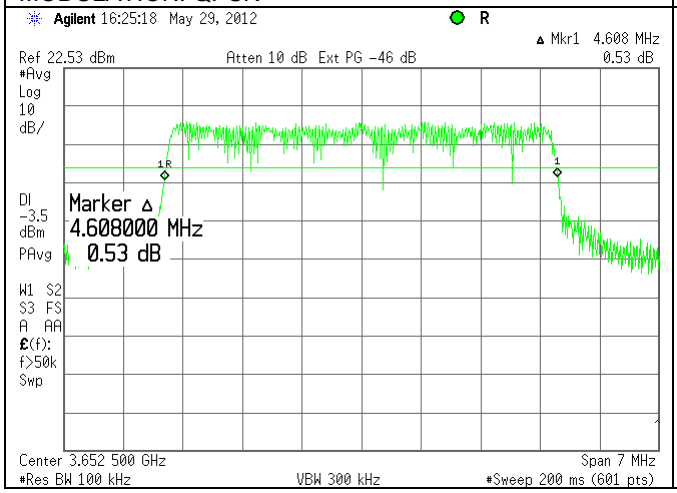
HL 2214	HL 3301	HL 3302	HL 3818	HL 3903			

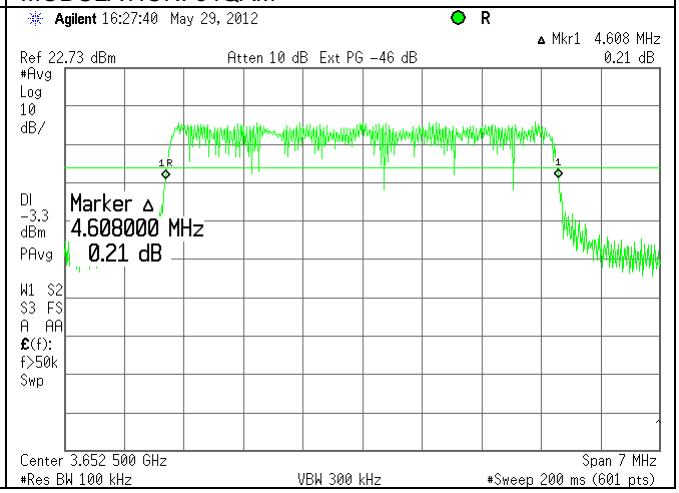
Full description is given in Appendix A.

Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/29/2012		
Temperature: 23.6 ºC	Air Pressure: 1005 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

Plot 7.3.1 Occupied bandwidth test result at low frequency

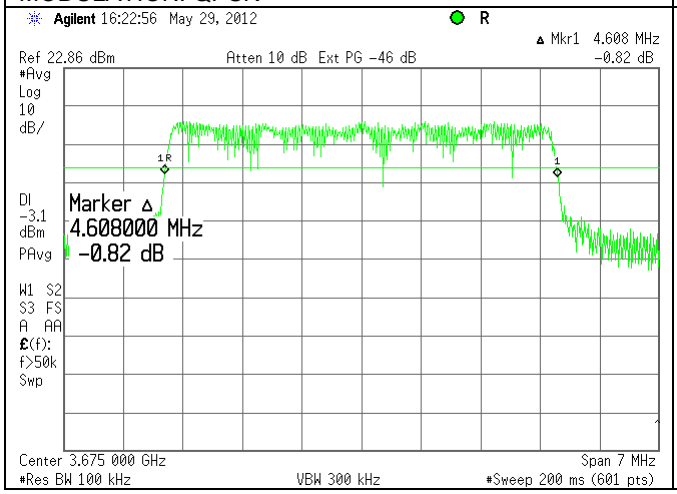
CARRIER FREQUENCY:	3652.5 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION: QPSK	MODULATION: 64QAM

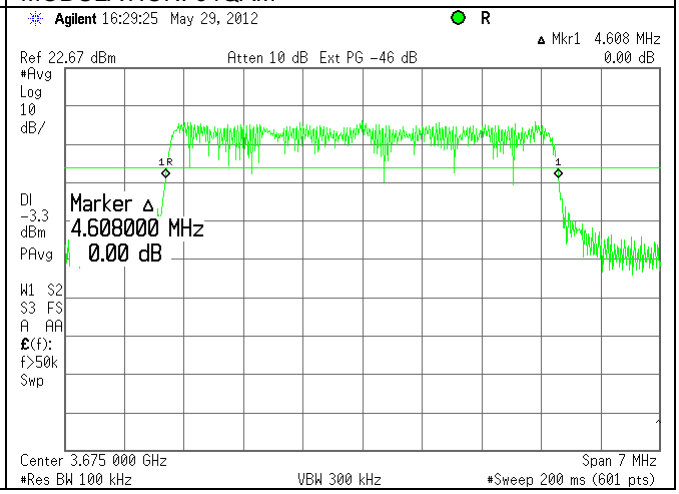




Plot 7.3.2 Occupied bandwidth test result at mid frequency

CARRIER FREQUENCY:	3675.0 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION: QPSK	MODULATION: 64QAM

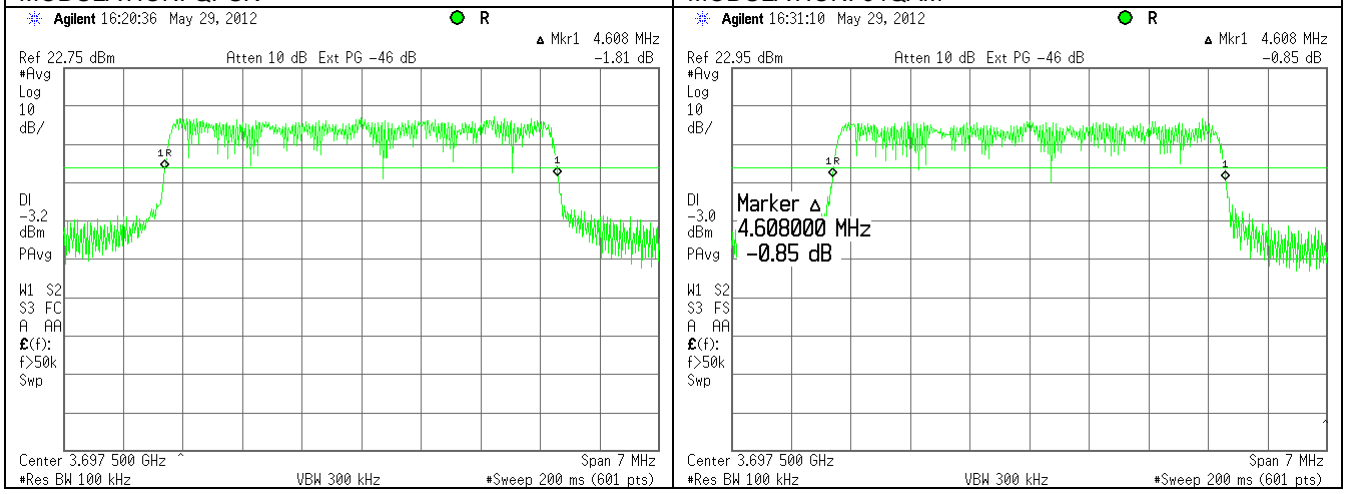




Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/29/2012		
Temperature: 23.6 ºC	Air Pressure: 1005 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

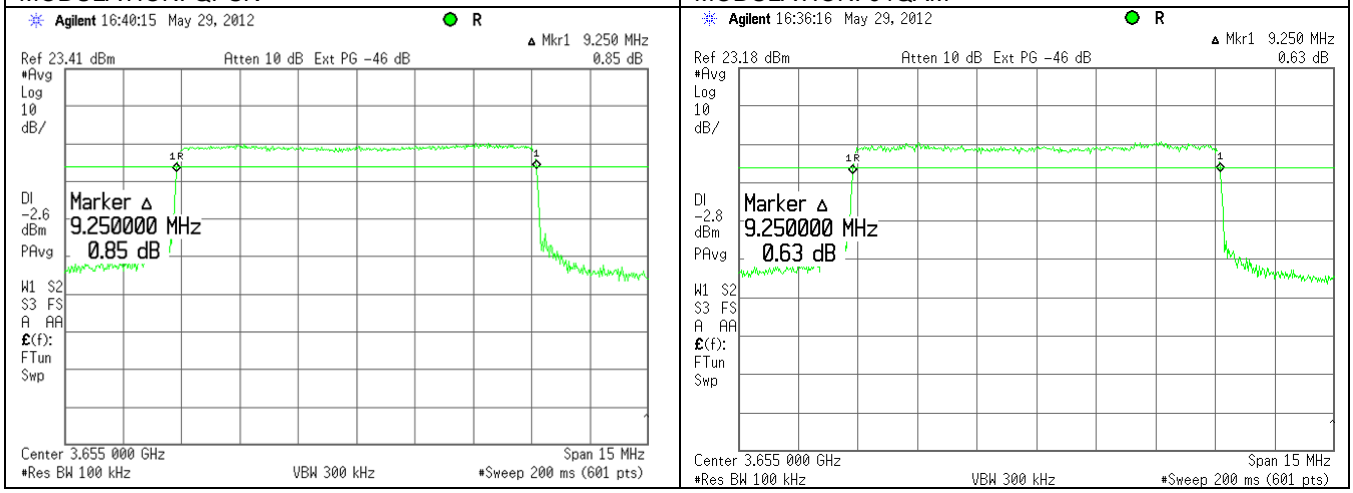
Plot 7.3.3 Occupied bandwidth test result at high frequency

CARRIER FREQUENCY:	3697.5 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION: QPSK	MODULATION: 64QAM



Plot 7.3.4 Occupied bandwidth test result at low frequency

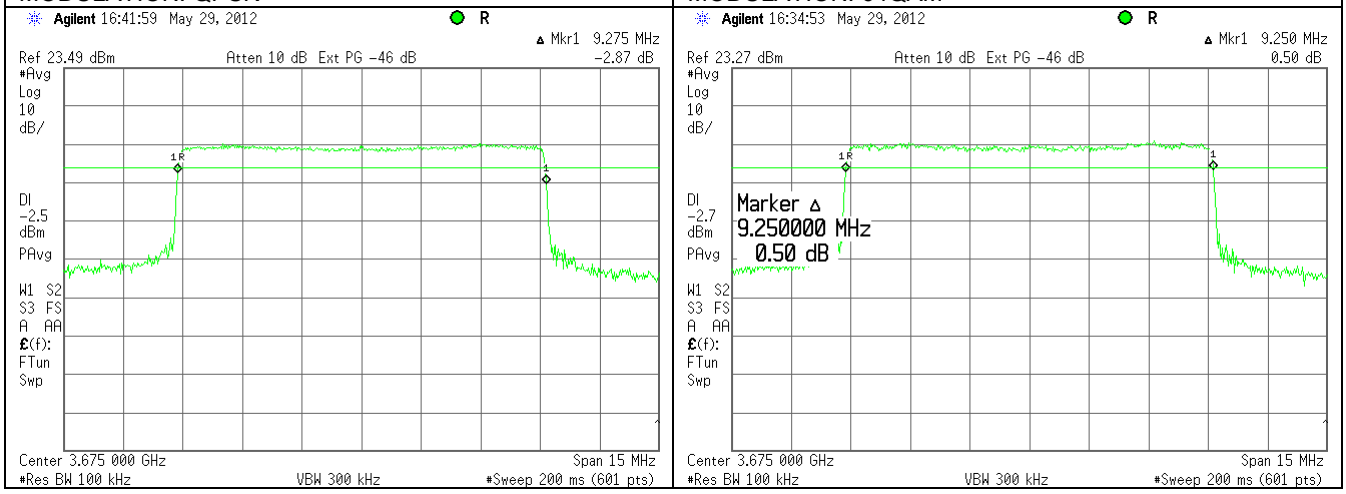
CARRIER FREQUENCY:	3655.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION: QPSK	MODULATION: 64QAM



Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/29/2012		
Temperature: 23.6 °C	Air Pressure: 1005 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

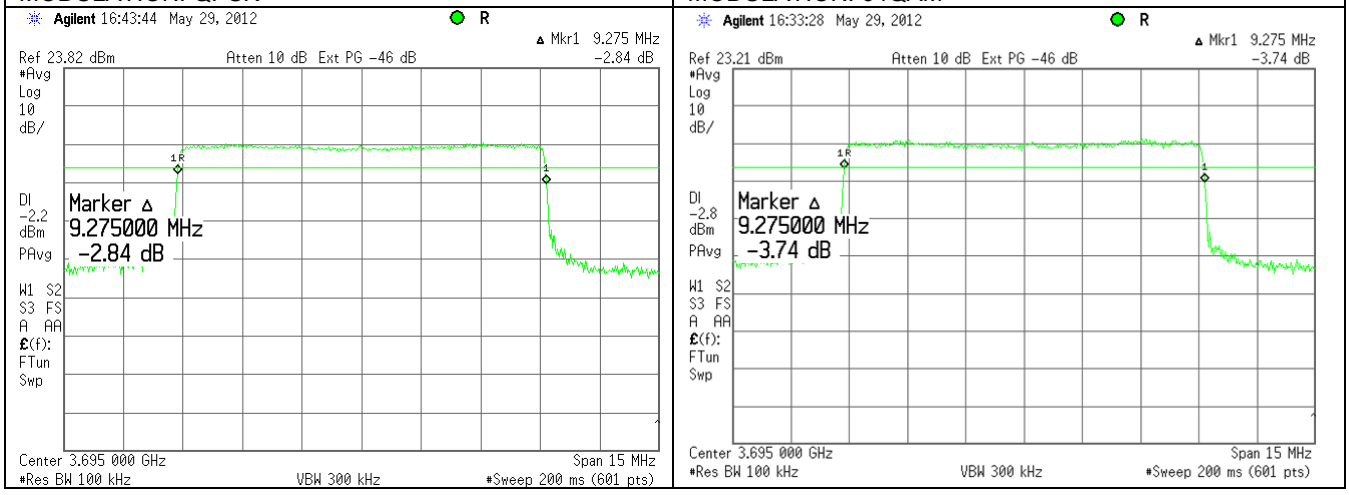
Plot 7.3.5 Occupied bandwidth test result at mid frequency

CARRIER FREQUENCY:	3675.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION: QPSK	MODULATION: 64QAM



Plot 7.3.6 Occupied bandwidth test result at high frequency

CARRIER FREQUENCY:	3695.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION: QPSK	MODULATION: 64QAM



Test specification:	Section 90.210(b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/29/2012		
Temperature: 23.63 ºC	Air Pressure: 1005 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

7.4 Emission mask test

7.4.1 General

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

Table 7.4.1 Emission mask limits

Frequency displacement from carrier	Attenuation below carrier, dBc
Emission mask B (Emission bandwidth 5 MHz)	
0 – 2.5 MHz	0
2.5 – 5.0 MHz	25
5.0 – 12.5 MHz	35
More than* 12.5 MHz	43 + 10 log(P)
Emission mask B (Emission bandwidth 10 MHz)	
0 – 5 MHz	0
5 – 10.0 MHz	25
10.0 – 25.0 MHz	35
More than* 25.0 MHz	43 + 10 log(P)

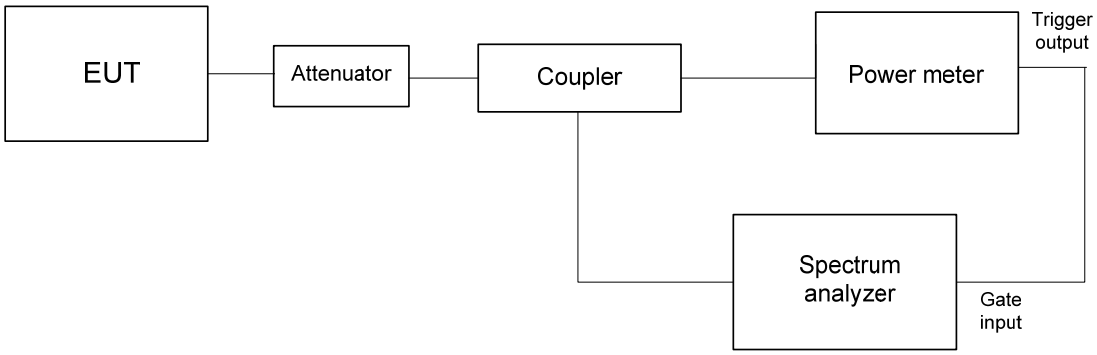
* - emission mask includes carrier modulation envelope within ± 250 % of the authorized bandwidth; the frequency range removed beyond ± 250 % of the authorized bandwidth from carrier was investigated as spurious emission

7.4.2 Test procedure

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

7.4.2.2 The emission mask was measured with spectrum analyzer as provided in the associated plots. The test results recorded in Table 7.4.2.

Figure 7.4.1 Emission mask test setup



Test specification:	**Section 90.210(b), Emission mask**		
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	5/29/2012		
Temperature: 23.63 ºC	**Air Pressure:** 1005 hPa	**Relative Humidity:** 46 %	**Power Supply:** 5.5VDC
Remarks:			

Table 7.4.2 Emission mask test results

EMISSION BANDWIDTH: 5 MHz

Carrier frequency, MHz	Limit	Reference to Plot	Verdict
3652.5	Emission mask B	Plot 7.4.1	Pass
3675.0		Plot 7.4.2	
3697.5		Plot 7.4.3	

EMISSION BANDWIDTH: 10 MHz

Carrier frequency, MHz	Limit	Reference to Plot	Verdict
3655.0	Emission mask B	Plot 7.4.4	Pass
3675.0		Plot 7.4.5	
3695.0		Plot 7.4.6	

NOTE1: Attenuation below carrier provided in terms of attenuation below total average power within occupied bandwidth. Measurement was performed with RBW set to 100 kHz and the limit mask was reduced by 10 dB to compensate the lower RBW [10*log(1 MHz/ 100 kHz] = 10 dB;

Reference numbers of test equipment used

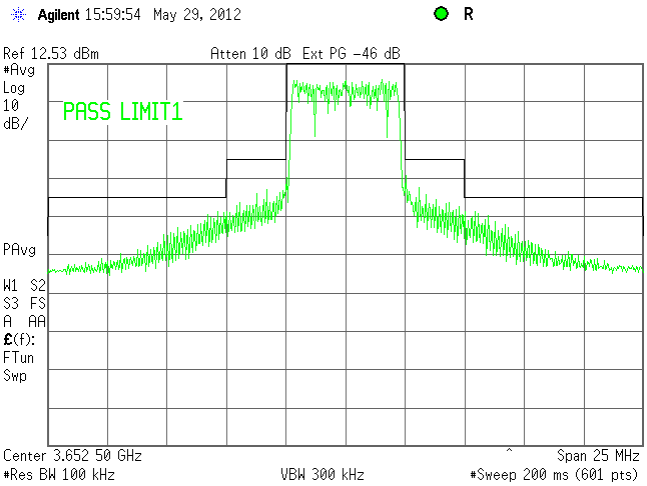
HL 2214	HL 3301	HL 3302	HL 3818	HL 3903			

Full description is given in Appendix A.

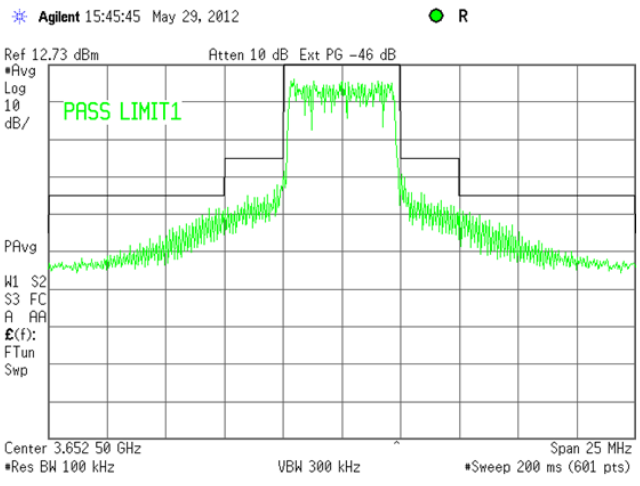
Test specification:	Section 90.210(b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/29/2012		
Temperature: 23.63 ºC	Air Pressure: 1005 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

Plot 7.4.1 Emission mask test results at low carrier frequency

ASSIGNED FREQUENCY RANGE: 3650.0 - 3700.0 MHz
DETECTOR USED: Average
MODULATING SIGNAL: PRBS
EMISSION BANDWIDTH: 5 MHz
TRANSMITTER OUTPUT POWER: 22.53 dBm
MODULATION: QPSK

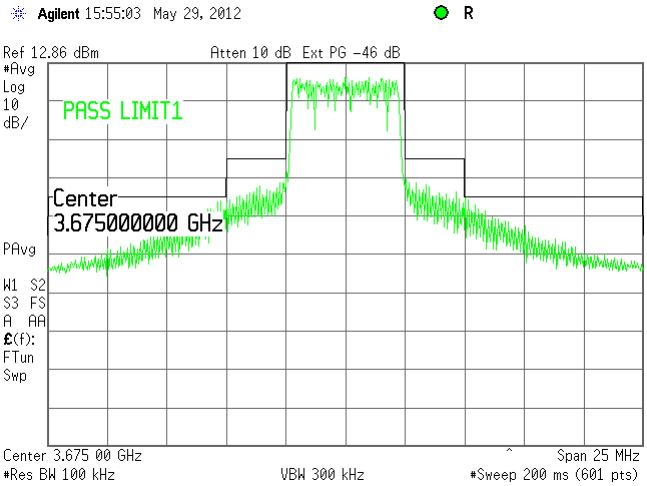


TRANSMITTER OUTPUT POWER: 22.73 dBm
MODULATION: 64QAM

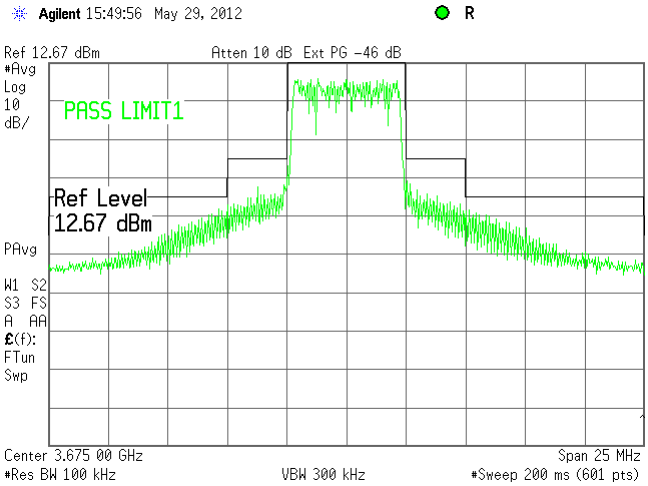


Plot 7.4.2 Emission mask test results at mid carrier frequency

ASSIGNED FREQUENCY RANGE: 3650.0 - 3700.0 MHz
DETECTOR USED: Average
MODULATING SIGNAL: PRBS
EMISSION BANDWIDTH: 5 MHz
TRANSMITTER OUTPUT POWER: 22.86 dBm
MODULATION: QPSK



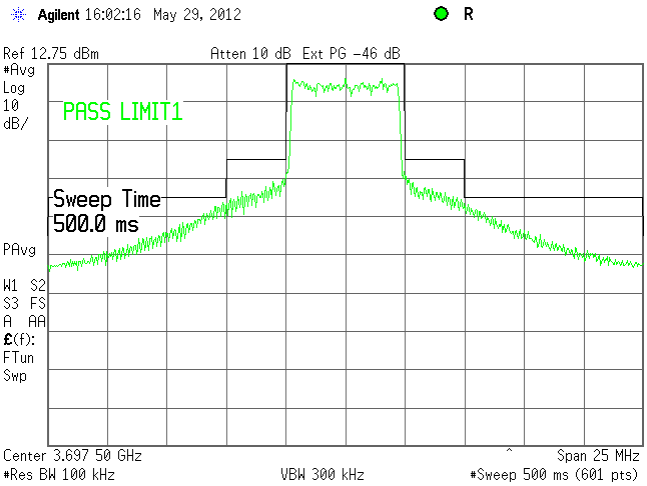
TRANSMITTER OUTPUT POWER: 22.67 dBm
MODULATION: 64QAM



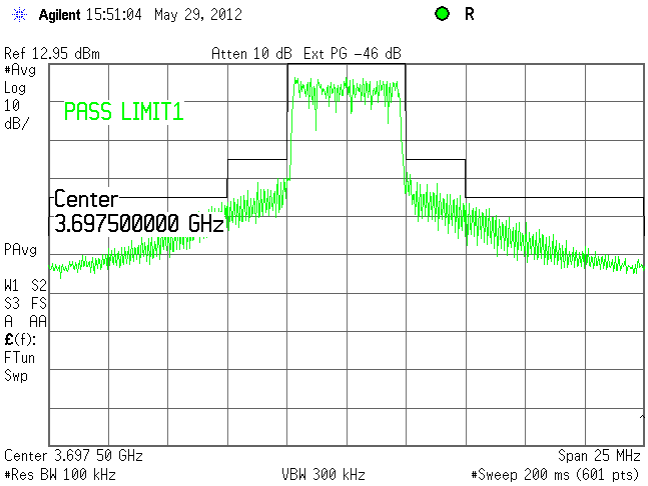
Test specification:	Section 90.210(b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/29/2012		
Temperature: 23.63 ºC	Air Pressure: 1005 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

Plot 7.4.3 Emission mask test results at high carrier frequency

ASSIGNED FREQUENCY RANGE: 3650.0 - 3700.0 MHz
DETECTOR USED: Average
MODULATING SIGNAL: PRBS
EMISSION BANDWIDTH: 5 MHz
TRANSMITTER OUTPUT POWER: 22.75 dBm
MODULATION: QPSK

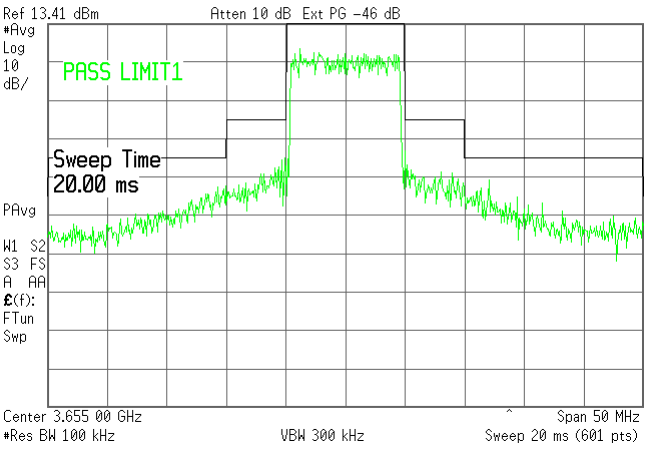


ASSIGNED FREQUENCY RANGE: 3650.0 - 3700.0 MHz
DETECTOR USED: Average
MODULATING SIGNAL: PRBS
EMISSION BANDWIDTH: 5 MHz
TRANSMITTER OUTPUT POWER: 22. 95dBm
MODULATION: 64QAM

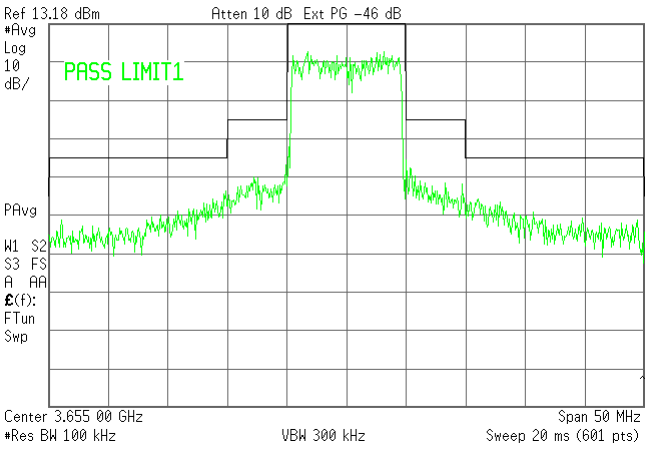


Plot 7.4.4 Emission mask test results at low carrier frequency

ASSIGNED FREQUENCY RANGE: 3650.0 - 3700.0 MHz
DETECTOR USED: Average
MODULATING SIGNAL: PRBS
EMISSION BANDWIDTH: 10 MHz
TRANSMITTER OUTPUT POWER: 23.41 dBm
MODULATION: QPSK



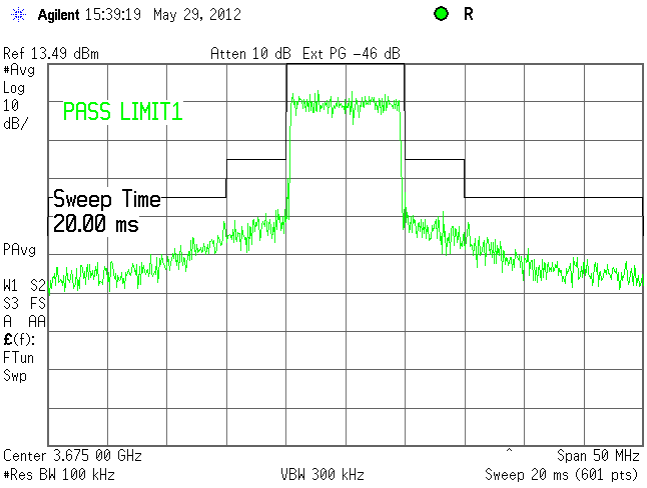
ASSIGNED FREQUENCY RANGE: 3650.0 - 3700.0 MHz
DETECTOR USED: Average
MODULATING SIGNAL: PRBS
EMISSION BANDWIDTH: 10 MHz
TRANSMITTER OUTPUT POWER: 23.18 dBm
MODULATION: 64QAM



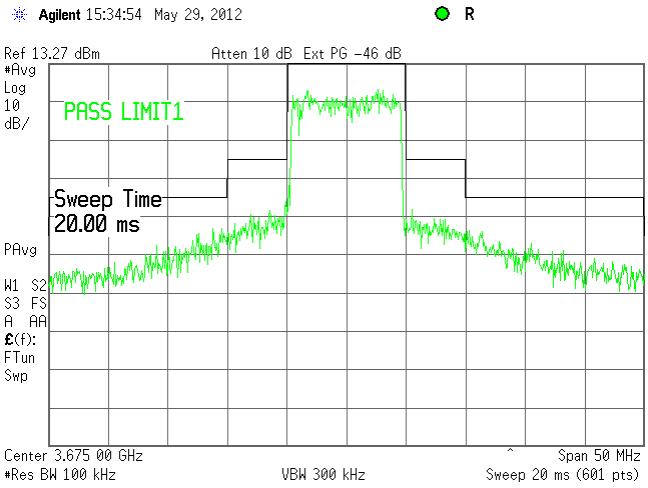
Test specification:	Section 90.210(b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/29/2012		
Temperature: 23.63 ºC	Air Pressure: 1005 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

Plot 7.4.5 Emission mask test results at mid carrier frequency

ASSIGNED FREQUENCY RANGE: 3650.0 - 3700.0 MHz
DETECTOR USED: Average
MODULATING SIGNAL: PRBS
EMISSION BANDWIDTH: 10 MHz
TRANSMITTER OUTPUT POWER: 23.49 dBm
MODULATION: QPSK

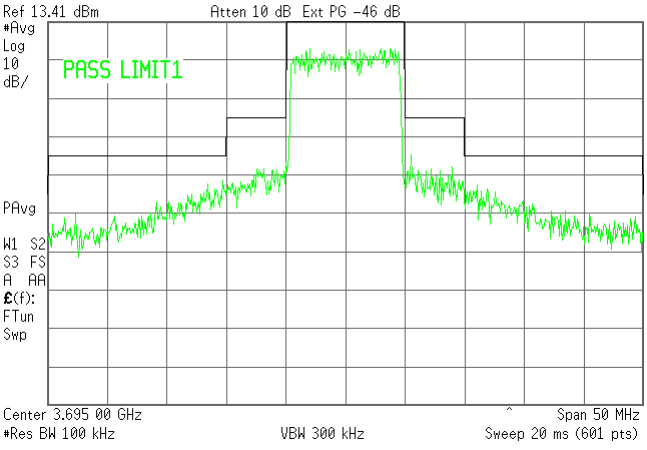


TRANSMITTER OUTPUT POWER: 23.27 dBm
MODULATION: 64QAM

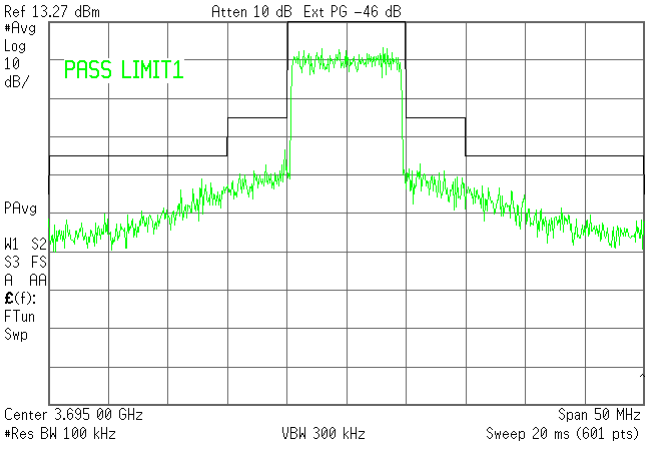


Plot 7.4.6 Emission mask test results at high carrier frequency

ASSIGNED FREQUENCY RANGE: 3650.0 - 3700.0 MHz
DETECTOR USED: Average
MODULATING SIGNAL: PRBS
EMISSION BANDWIDTH: 10 MHz
TRANSMITTER OUTPUT POWER: 23.41 dBm
MODULATION: QPSK



TRANSMITTER OUTPUT POWER: 23.27 dBm
MODULATION: 64QAM



Test specification:	Section 90.1323, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/30/2012		
Temperature: 24.2 ºC	Air Pressure: 1013 hPa	Relative Humidity: 47 %	Power Supply: 5.5VDC
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** (mask B)	-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

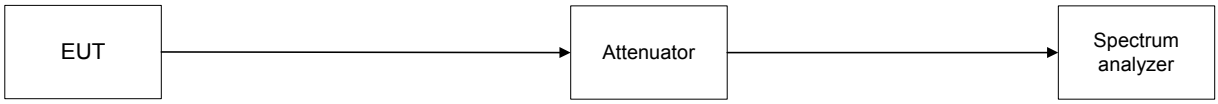
7.5.2 Test procedure

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 associated plots.

Figure 7.5.1 Spurious emission test setup for single antenna mode



Test specification:	**Section 90.1323, Spurious emissions at RF antenna connector**		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	5/30/2012		
Temperature: 24.2 ºC	**Air Pressure:** 1013 hPa	**Relative Humidity:** 47 %	**Power Supply:** 5.5VDC
Remarks:			

Table 7.5.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 3650.0 – 3700.0 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 – 37000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
NUMBER OF OUTPUTS: N = 2
EMISSION BANDWIDTH: 5 MHz (worst case output power and density)

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm*	Limit, dBm	Margin, dB**	Verdict
Low carrier frequency 3652.5 MHz								
10954.92	-25.52	Included	Included	1000	-22.52	-13.0	-9.52	Pass
Mid carrier frequency 3675.0 MHz								
11022.50	-25.96	Included	Included	1000	-22.96	-13.0	-9.96	Pass
High carrier frequency 3697.5 MHz								
11090.13	-27.19	Included	Included	1000	-24.19	-13.0	-11.19	Pass

*****- Spurious emission = SA Reading + 10*log(N) = . SA Reading + 3dB
******- Margin = Spurious emission – specification limit.

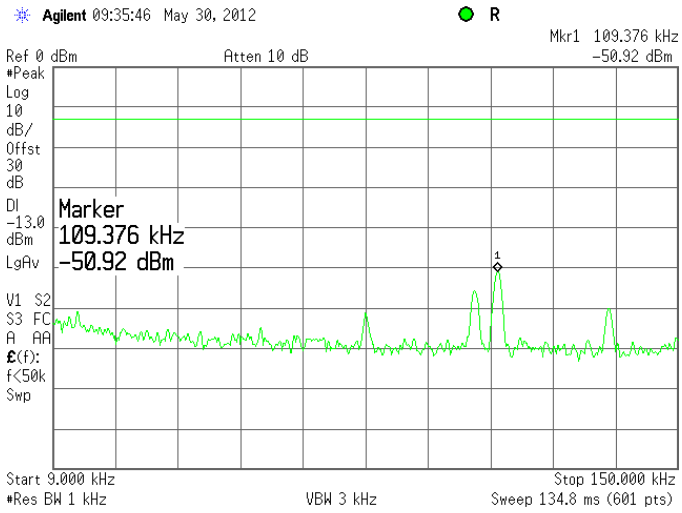
Reference numbers of test equipment used

HL 3455	HL 3787	HL 3818	HL 3903				

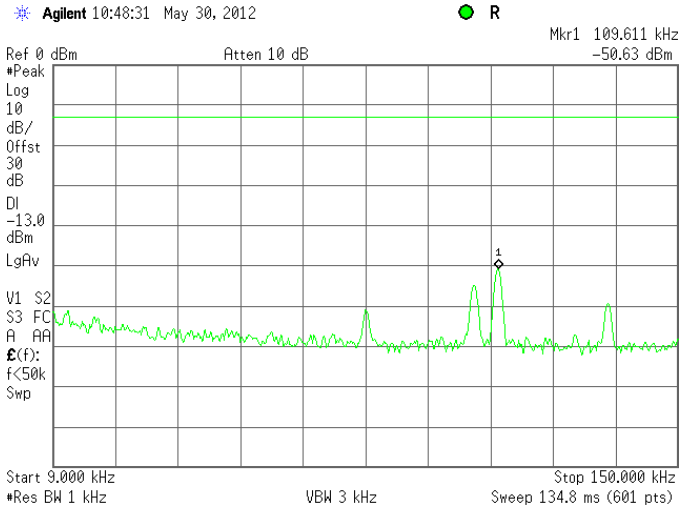
Full description is given in Appendix A.

Test specification:	Section 90.1323, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/30/2012		
Temperature: 24.2 °C	Air Pressure: 1013 hPa	Relative Humidity: 47 %	Power Supply: 5.5VDC
Remarks:			

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

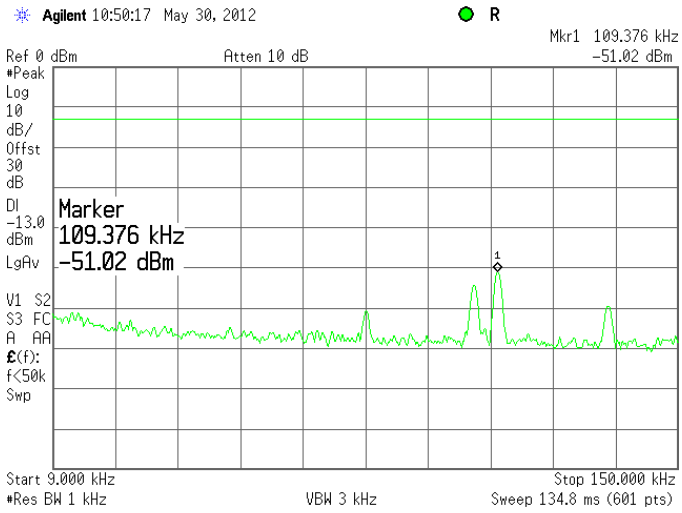


Plot 7.5.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency

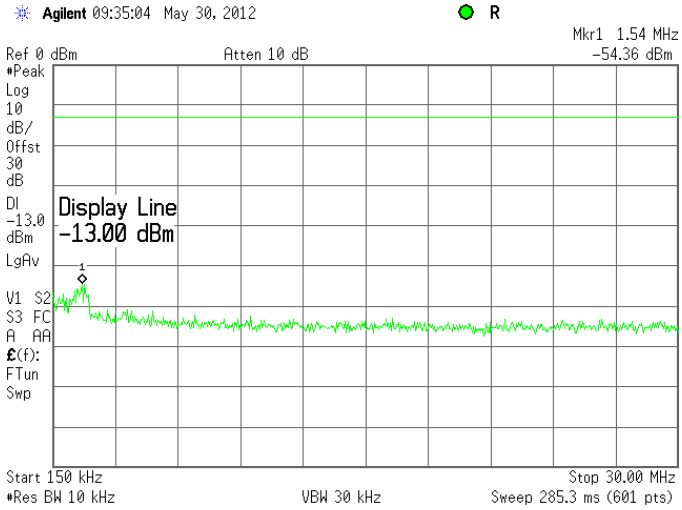


Test specification:	Section 90.1323, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/30/2012		
Temperature: 24.2 °C	Air Pressure: 1013 hPa	Relative Humidity: 47 %	Power Supply: 5.5VDC
Remarks:			

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

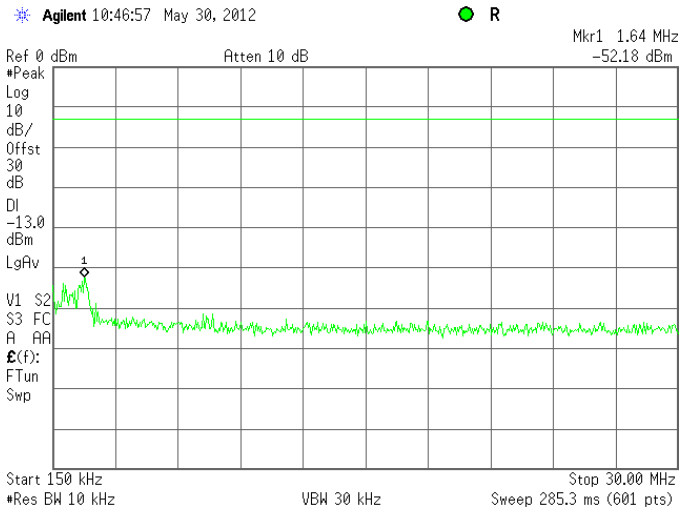


Plot 7.5.4 Spurious emission measurements in 0.150 - 30.0 MHz range at low carrier frequency

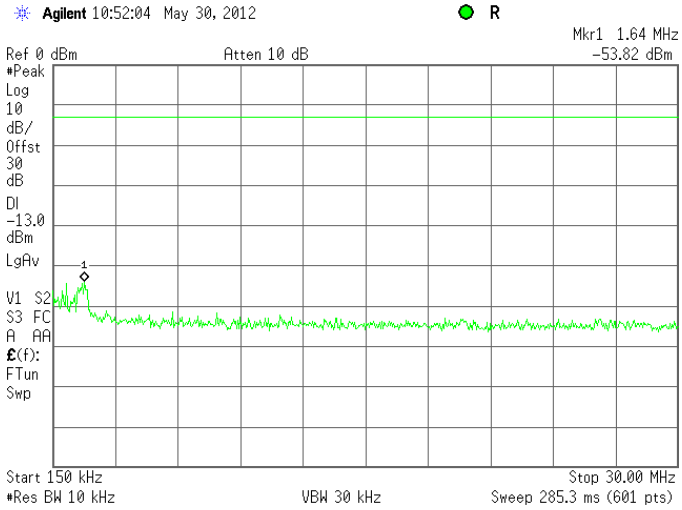


Test specification:	Section 90.1323, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/30/2012		
Temperature: 24.2 °C	Air Pressure: 1013 hPa	Relative Humidity: 47 %	Power Supply: 5.5VDC
Remarks:			

Plot 7.5.5 Spurious emission measurements in 0.150 - 30.0 MHz range at mid carrier frequency

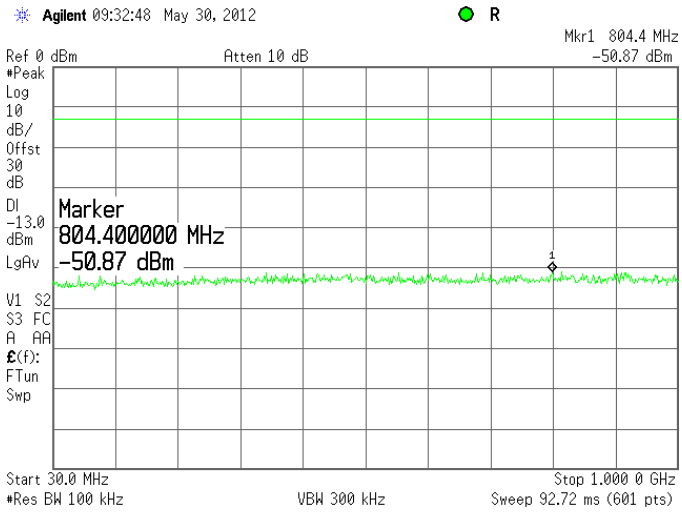


Plot 7.5.6 Spurious emission measurements in 0.150 - 30.0 MHz range at high carrier frequency

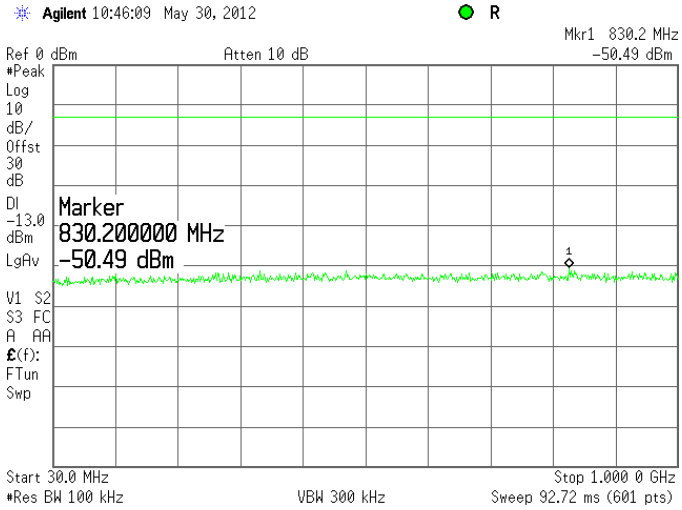


Test specification:	Section 90.1323, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/30/2012		
Temperature: 24.2 °C	Air Pressure: 1013 hPa	Relative Humidity: 47 %	Power Supply: 5.5VDC
Remarks:			

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

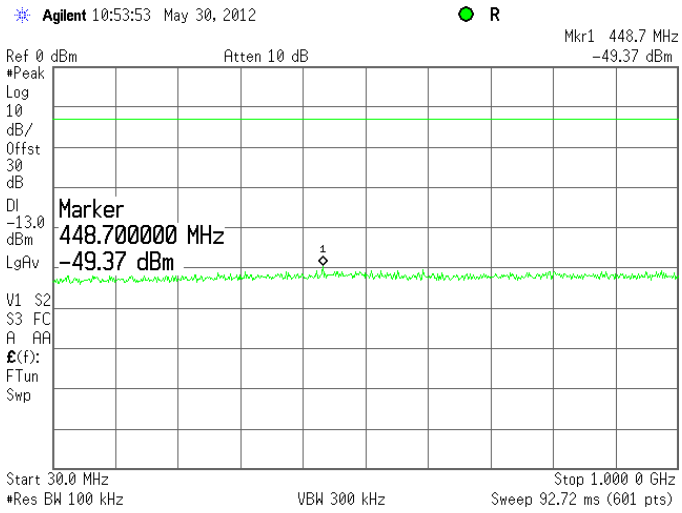


Plot 7.5.8 Spurious emission measurements in 30.0 - 1000 MHz range at mid carrier frequency

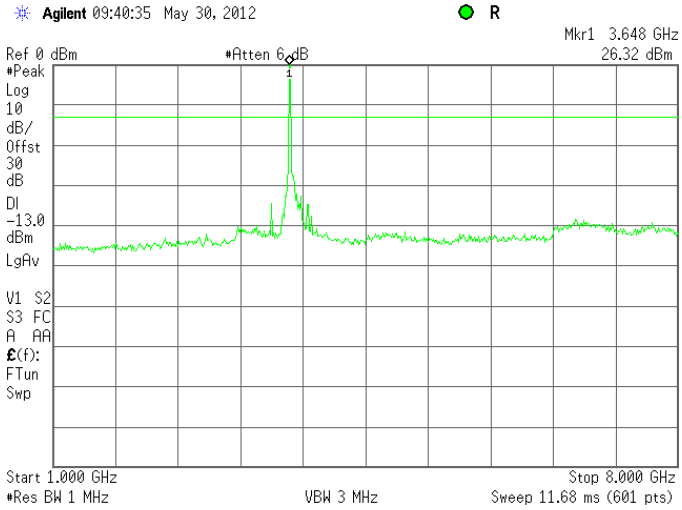


Test specification:	Section 90.1323, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/30/2012		
Temperature: 24.2 °C	Air Pressure: 1013 hPa	Relative Humidity: 47 %	Power Supply: 5.5VDC
Remarks:			

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

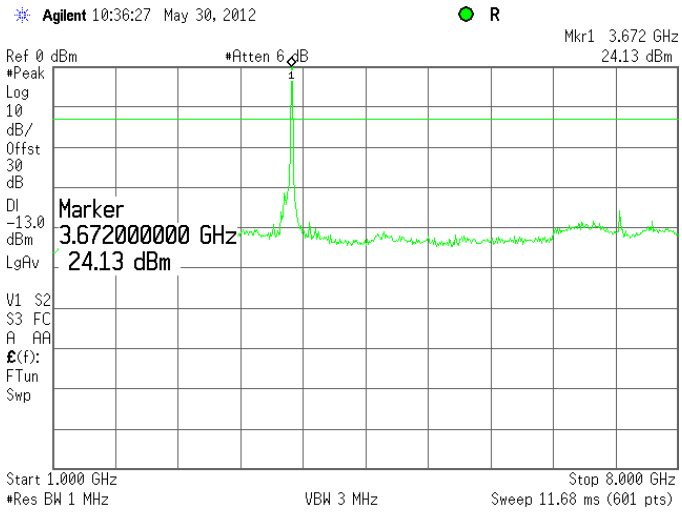


Plot 7.5.10 Spurious emission measurements in 1000 - 8000 MHz range at low carrier frequency

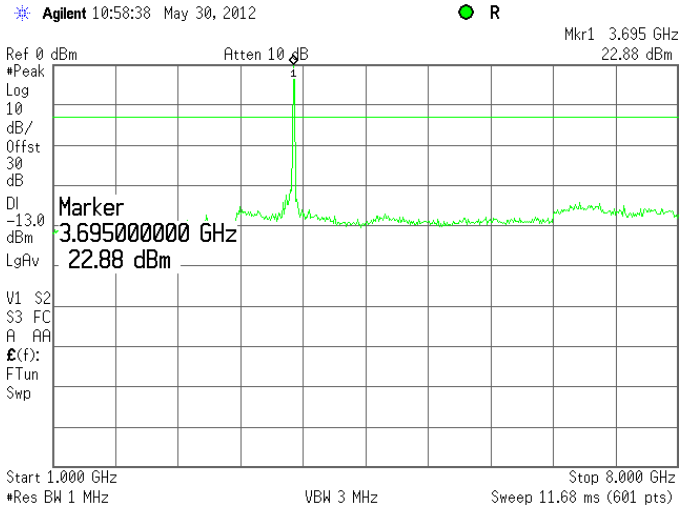


Test specification:	Section 90.1323, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/30/2012		
Temperature: 24.2 °C	Air Pressure: 1013 hPa	Relative Humidity: 47 %	Power Supply: 5.5VDC
Remarks:			

Plot 7.5.11 Spurious emission measurements in 1000 - 8000 MHz at mid carrier frequency

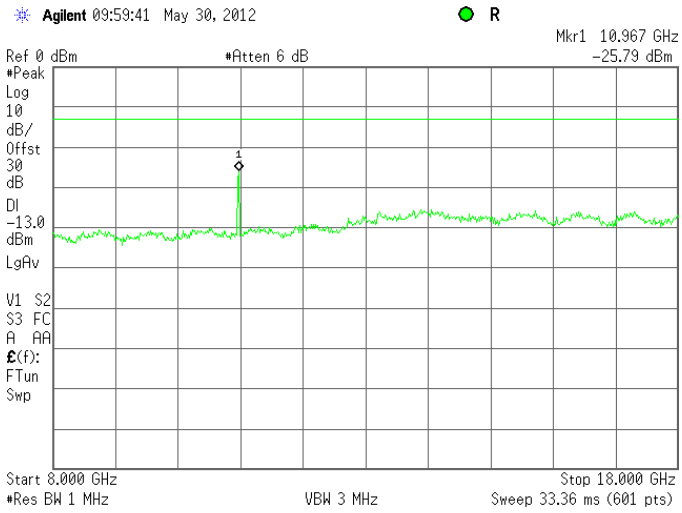


Plot 7.5.12 Spurious emission measurements in 1000 - 8000 MHz at high carrier frequency

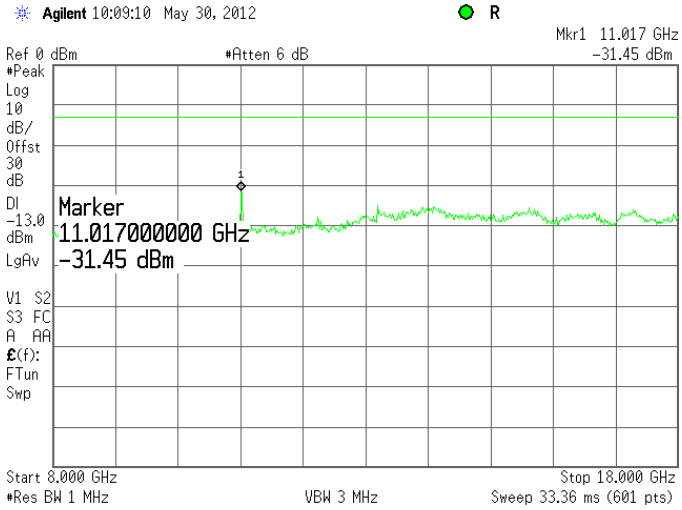


Test specification:	Section 90.1323, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/30/2012		
Temperature: 24.2 °C	Air Pressure: 1013 hPa	Relative Humidity: 47 %	Power Supply: 5.5VDC
Remarks:			

Plot 7.5.13 Spurious emission measurements in 8000 - 18000 MHz range at low carrier frequency

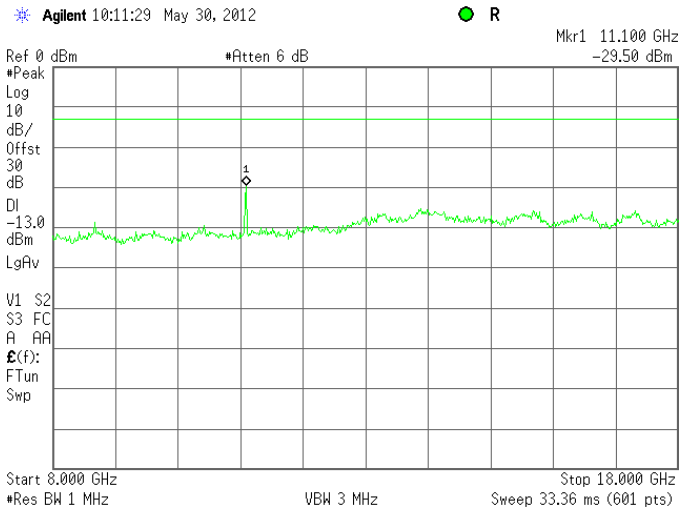


Plot 7.5.14 Spurious emission measurements in 8000 - 18000 MHz at mid carrier frequency

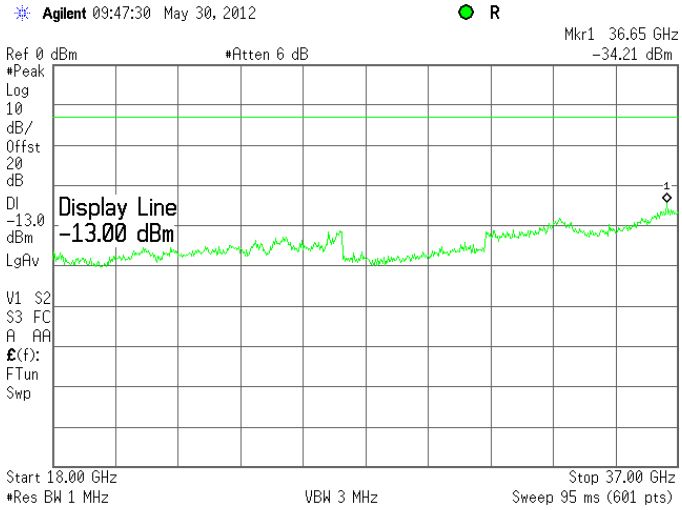


Test specification:	Section 90.1323, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/30/2012		
Temperature: 24.2 °C	Air Pressure: 1013 hPa	Relative Humidity: 47 %	Power Supply: 5.5VDC
Remarks:			

Plot 7.5.15 Spurious emission measurements in 8000 - 18000 MHz at high carrier frequency

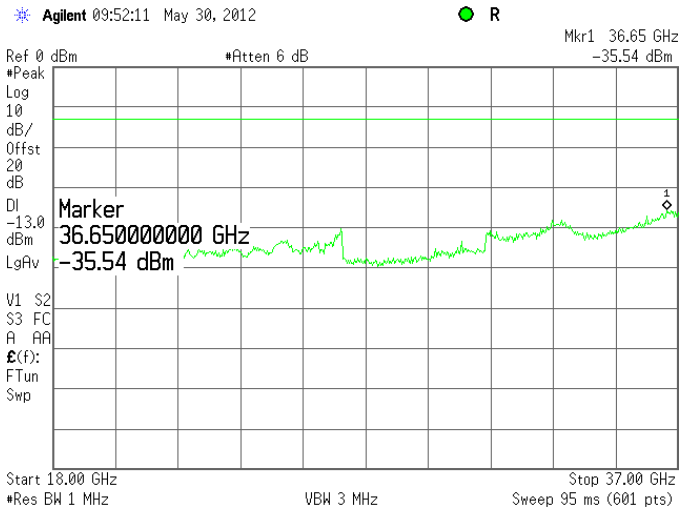


Plot 7.5.16 Spurious emission measurements in 18000 – 37000 MHz range at low carrier frequency

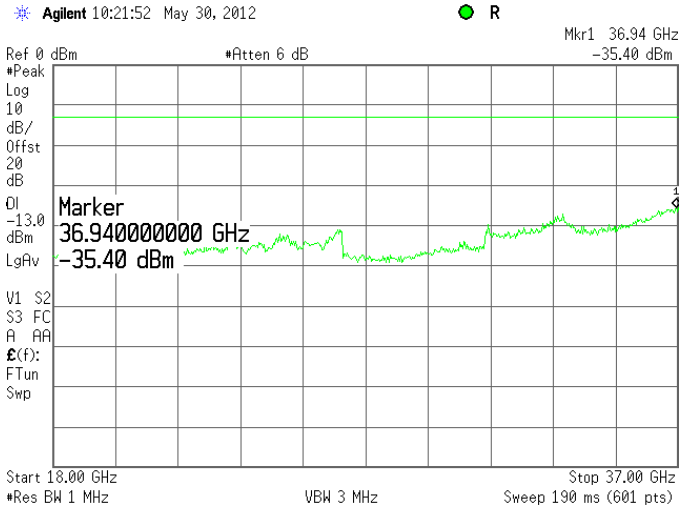


Test specification:	Section 90.1323, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/30/2012		
Temperature: 24.2 °C	Air Pressure: 1013 hPa	Relative Humidity: 47 %	Power Supply: 5.5VDC
Remarks:			

Plot 7.5.17 Spurious emission measurements in 18000 – 37000 MHz at mid carrier frequency

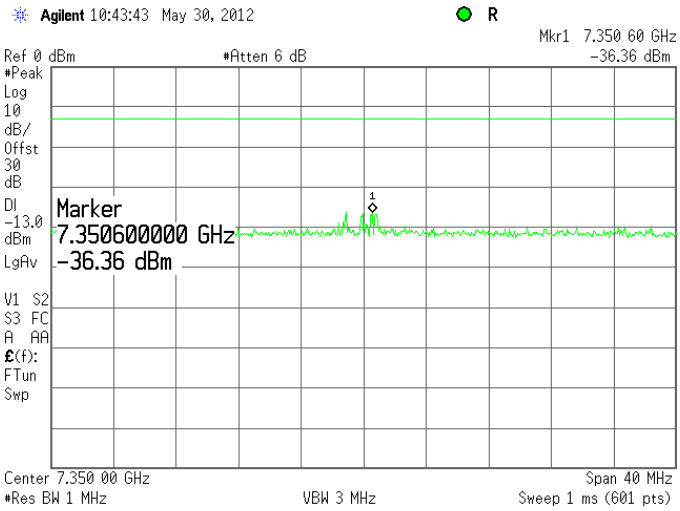


Plot 7.5.18 Spurious emission measurements in 18000 – 37000 MHz at high carrier frequency

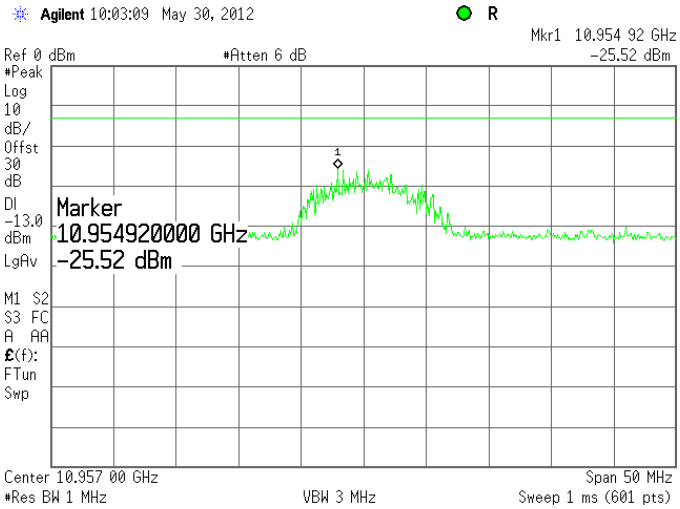


Test specification:	Section 90.1323, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/30/2012		
Temperature: 24.2 °C	Air Pressure: 1013 hPa	Relative Humidity: 47 %	Power Supply: 5.5VDC
Remarks:			

Plot 7.5.19 Conducted spurious emission measurements at the 2nd harmonic of mid carrier frequency

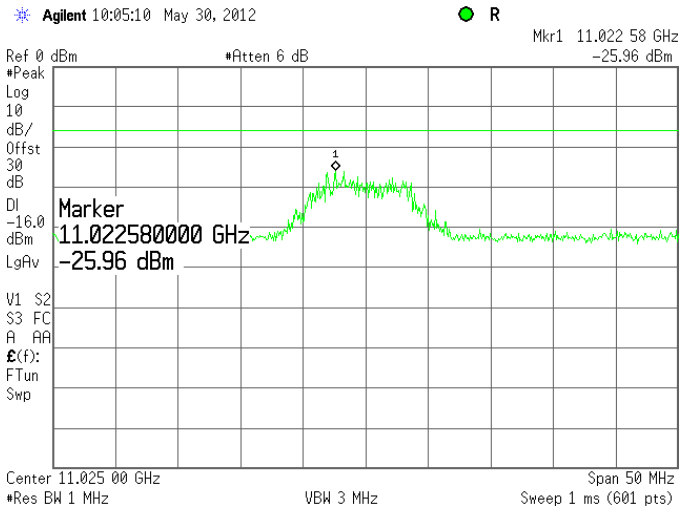


Plot 7.5.20 Conducted spurious emission measurements at the 3rd harmonic of low carrier frequency

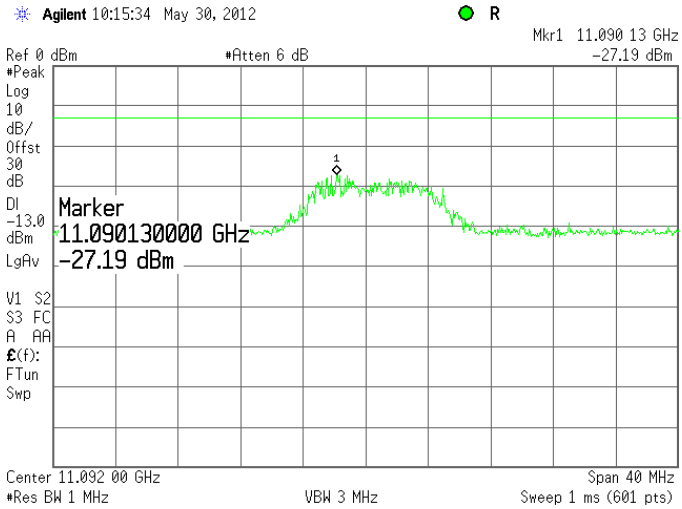


Test specification:	Section 90.1323, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/30/2012		
Temperature: 24.2 °C	Air Pressure: 1013 hPa	Relative Humidity: 47 %	Power Supply: 5.5VDC
Remarks:			

Plot 7.5.21 Conducted spurious emission measurements at the 3rd harmonic of mid carrier frequency



Plot 7.5.22 Conducted spurious emission measurements at the 3rd harmonic of high carrier frequency



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/31/2012		
Temperature: 24.2 ºC	Air Pressure: 1013 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

7.6 Radiated spurious emission measurements

7.6.1 General

This test was performed to measure radiated spurious emissions from the EUT. Specification test limits are given in Table 7.6.1.

Table 7.6.1 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

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

7.6.2.1 The EUT was set up as shown in Figure 7.6.1, energized and the performance check was conducted.

7.6.2.2 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.

7.6.2.3 The worst test results (the lowest margins) were recorded in Table 7.6.2 and shown in the associated plots.

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

7.6.3.1 The EUT was set up as shown in Figure 7.6.2, energized and the performance check was conducted.

7.6.3.2 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.

7.6.3.3 The worst test results (the lowest margins) were recorded in Table 7.6.2 and shown in the associated plots.

7.6.4 Test procedure for substitution ERP measurements of spurious

7.6.4.1 The test equipment was set up as shown in Figure 7.6.3 and energized.

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

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

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

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

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

7.6.4.7 The worst test results (the lowest margins) were recorded in Table 7.6.3.

Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/31/2012		
Temperature: 24.2 ºC	Air Pressure: 1013 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

Figure 7.6.1 Setup for spurious emission field strength measurements in 9 kHz to 30 MHz band

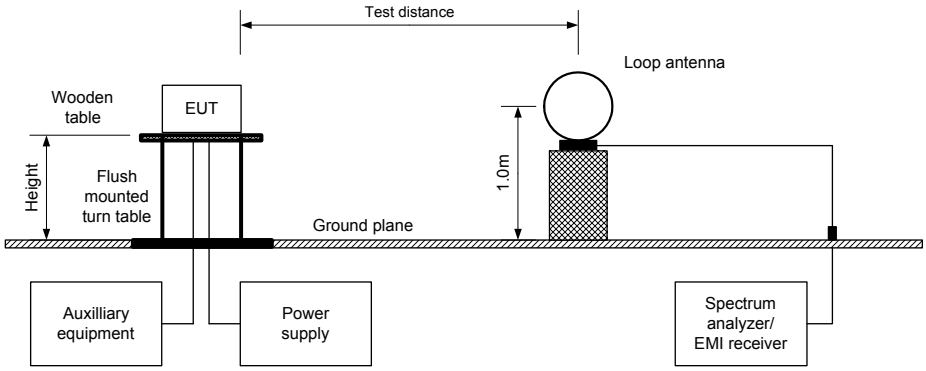
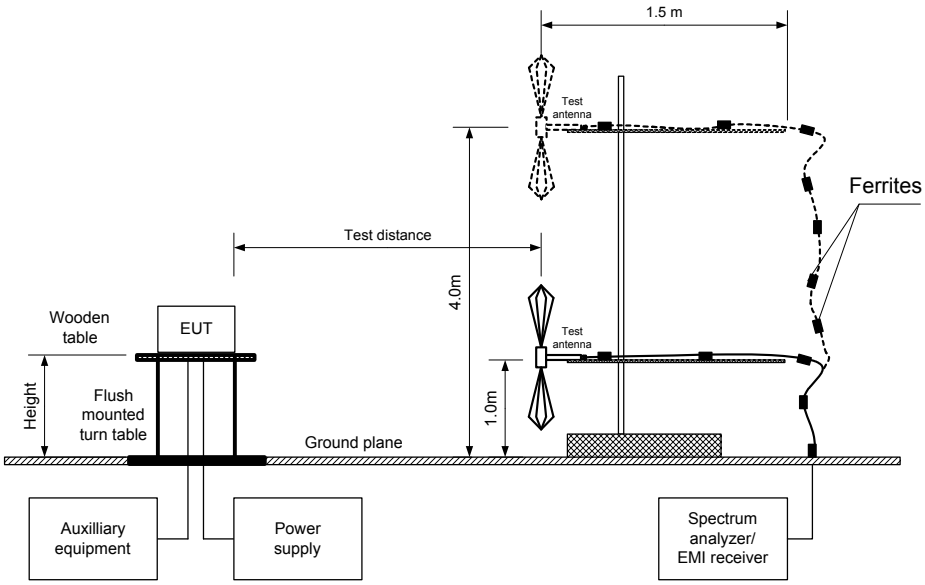
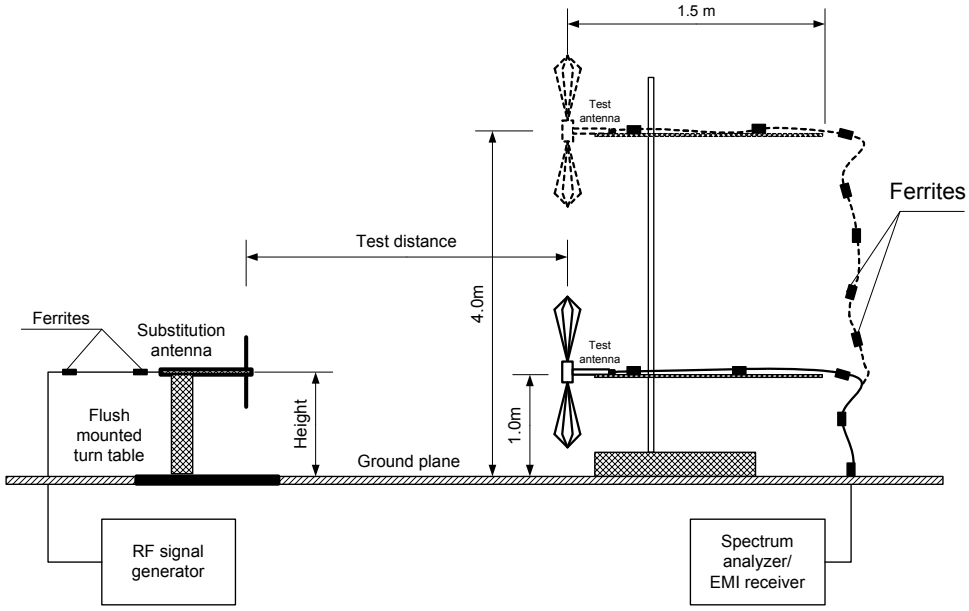


Figure 7.6.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/31/2012		
Temperature: 24.2 ºC	Air Pressure: 1013 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

Figure 7.6.3 Setup for substitution ERP measurements of spurious



Test specification:	**Section 90.1323, Radiated spurious emissions**		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	5/31/2012		
Temperature: 24.2 ºC	**Air Pressure:** 1013 hPa	**Relative Humidity:** 46 %	**Power Supply:** 5.5VDC
Remarks:			

Table 7.6.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE:	3650.0 – 3700.0 MHz
TEST DISTANCE:	3 m
TEST SITE:	Semi anechoic chamber
EUT HEIGHT:	0.8 m
INVESTIGATED FREQUENCY RANGE:	0.009 – 37000 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:	64QAM
MODULATING SIGNAL:	PRBS
BIT RATE:	23 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum
EMISSION BANDWIDTH:	5 MHz (worst case output power and density)

Frequency, MHz	Field strength, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	RBW, kHz	Antenna polarization	Antenna height, m	Turn-table position**, degrees
Low carrier frequency 3652.5 MHz							
10959.25	74.20	84.4	-10.2	1000	Vertical	1.3	89
Mid carrier frequency 3675.0 MHz							
11022.25	72.95	84.4	-11.45	1000	Vertical	1.3	91
High carrier frequency 3697.5 MHz							
11094.50	68.71	84.4	-15.69	1000	Vertical	1.3	93

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

Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/31/2012		
Temperature: 24.2 ºC	Air Pressure: 1013 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

Table 7.6.3 Substitution ERP of spurious test results

ASSIGNED FREQUENCY RANGE: 3650.0 – 3700.0 MHz
TRANSMITTER CARRIER ERP: 22.73 dBm at low frequency
22.86 dBm at mid frequency
22.95 dBm at high frequency
TEST SITE: OATS
TEST DISTANCE: 3 m
SUBSTITUTION ANTENNA HEIGHT: 0.8 m
DETECTOR USED: Peak
VIDEO BANDWIDTH: > Resolution bandwidth
SUBSTITUTION ANTENNA TYPE: Double ridged guide (above 1000 MHz)

Frequency, MHz	Field strength, dB(µV/m)	RBW, kHz	Antenna polarization	RF generator output, dBm	Ant gain, dBd	Cable loss, dB	ERP, dBm	Limit, dBm	Margin, dB*	Verdict
Low carrier frequency 3652.5 MHz										
10959.25	74.20	1000	Vertical	-32.56	10.38	3.51	-25.69	-13.00	-12.69	Pass
Mid carrier frequency 3675.0 MHz										
11022.25	72.95	1000	Vertical	-34.01	10.45	3.51	-27.07	-13.00	-14.07	Pass
High carrier frequency 3697.5 MHz										
11094.50	68.71	1000	Vertical	-38.17	10.32	3.53	-31.38	-13.00	-18.38	Pass

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

Reference numbers of test equipment used

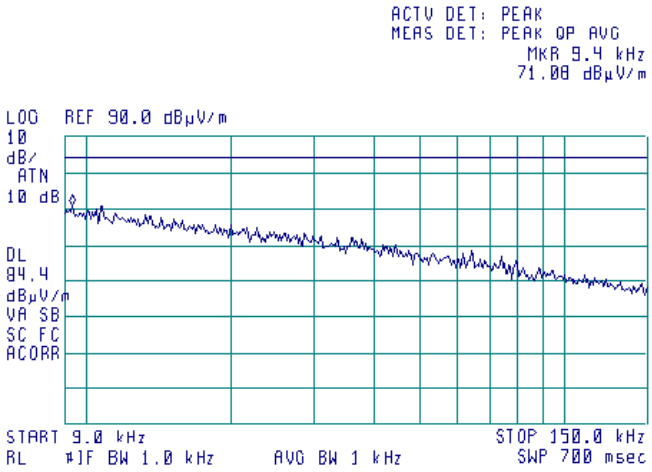
HL 0446	HL 0465	HL 0521	HL 0604	HL 0768	HL 0769	HL 1984	HL 2871
HL 3533	HL 3535	HL 3623	HL 3818	HL 3901	HL 4114	HL 4150	

Full description is given in Appendix A.

Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/31/2012		
Temperature: 24.2 ºC	Air Pressure: 1013 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

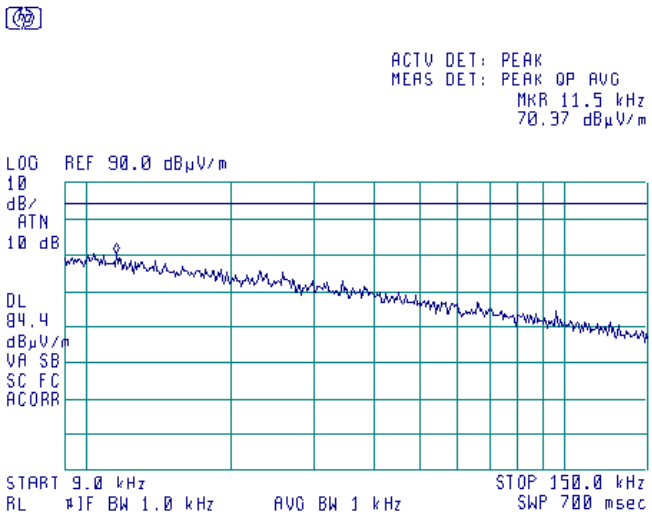
Plot 7.6.1 Radiated emission measurements in 9 - 150 kHz range

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



Plot 7.6.2 Radiated emission measurements in 9 - 150 kHz range

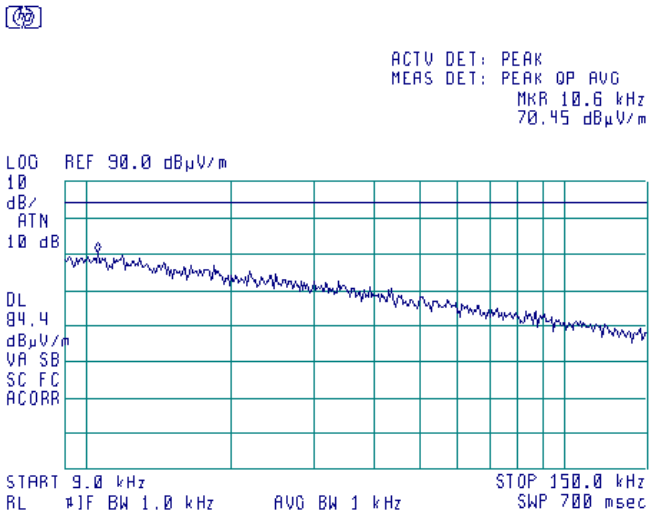
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/31/2012		
Temperature: 24.2 ºC	Air Pressure: 1013 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

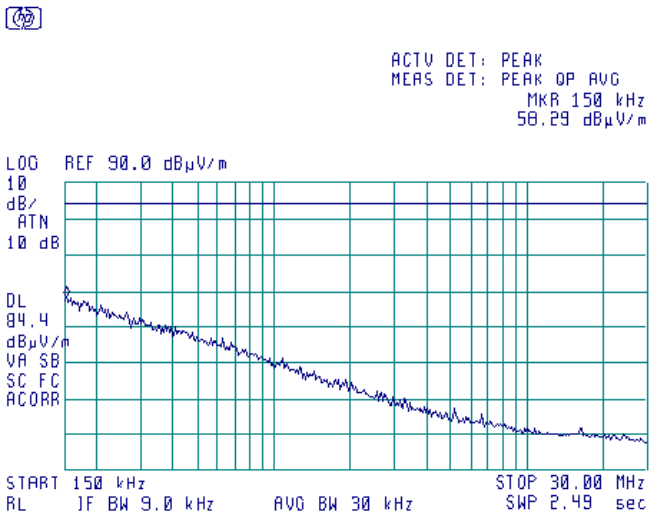
Plot 7.6.3 Radiated emission measurements in 9 - 150 kHz range

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



Plot 7.6.4 Radiated emission measurements in 0.15 - 30 MHz range

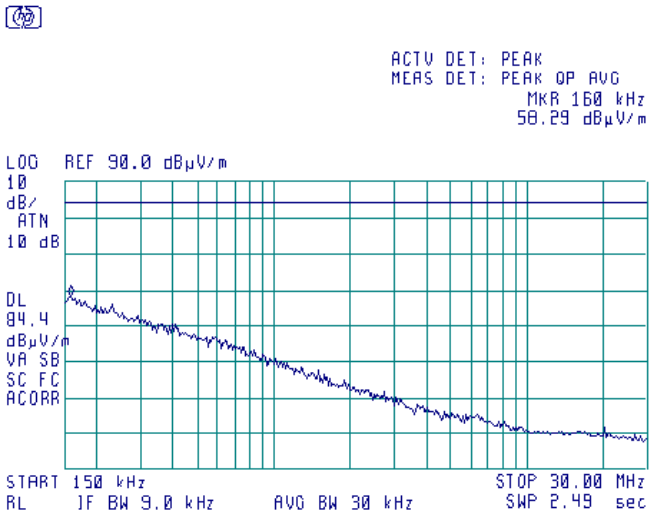
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/31/2012		
Temperature: 24.2 ºC	Air Pressure: 1013 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

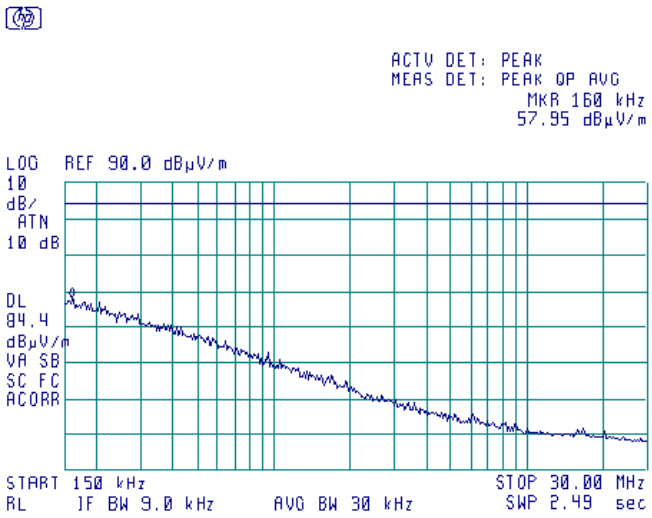
Plot 7.6.5 Radiated emission measurements in 0.15 - 30 MHz range

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



Plot 7.6.6 Radiated emission measurements in 0.15 - 30 MHz range

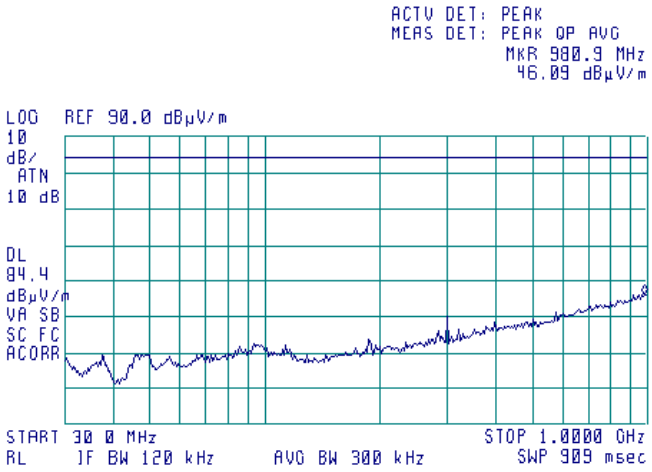
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/31/2012		
Temperature: 24.2 ºC	Air Pressure: 1013 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

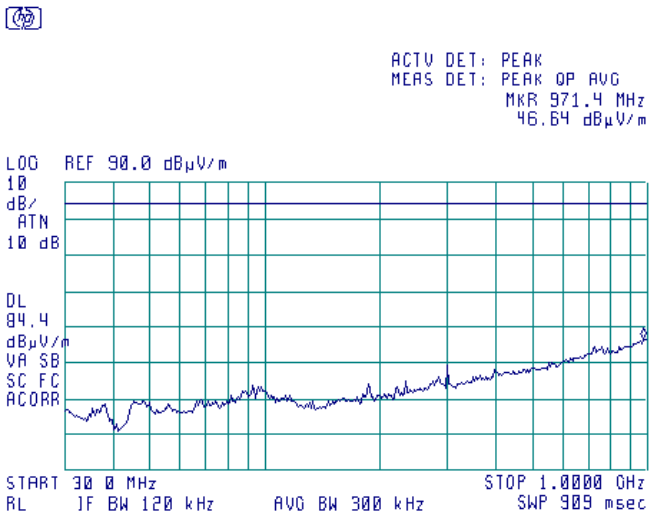
Plot 7.6.7 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.6.8 Radiated emission measurements in 30 - 1000 MHz range

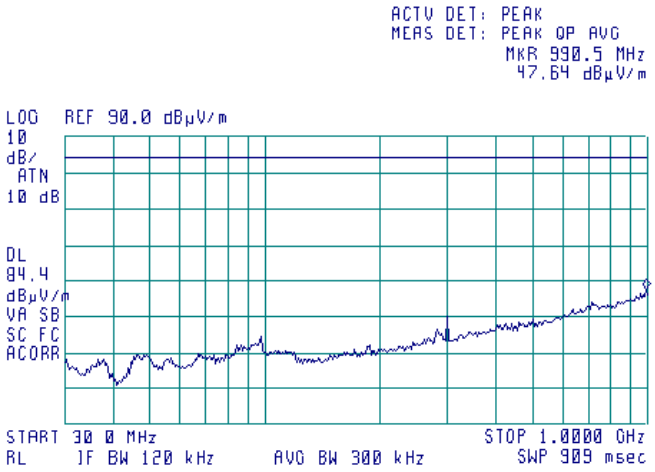
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/31/2012		
Temperature: 24.2 ºC	Air Pressure: 1013 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

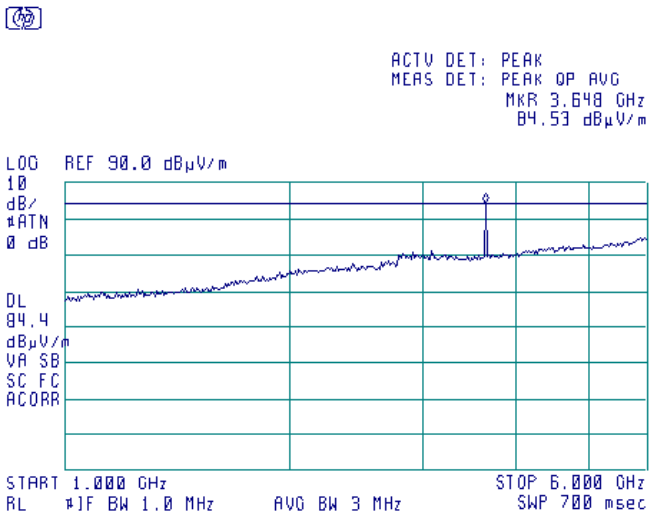
Plot 7.6.9 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.6.10 Radiated emission measurements in 1000 – 6000 MHz range

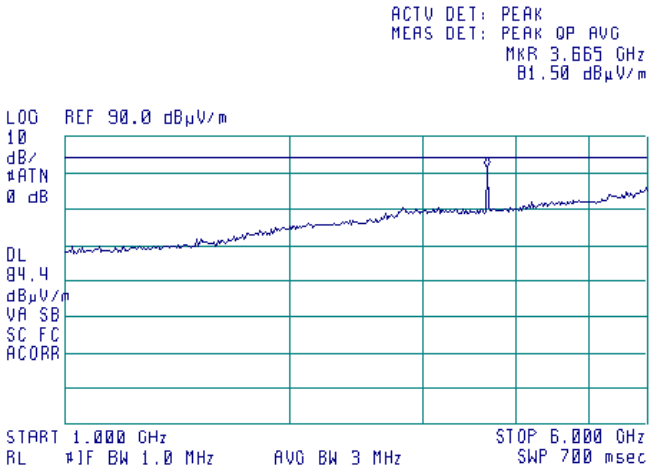
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/31/2012		
Temperature: 24.2 ºC	Air Pressure: 1013 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

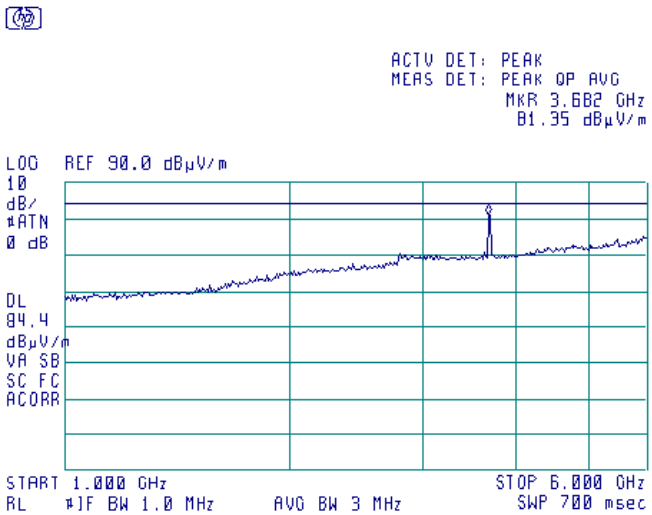
Plot 7.6.11 Radiated emission measurements in 1000 – 6000 MHz range

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



Plot 7.6.12 Radiated emission measurements in 1000 – 6000 MHz range

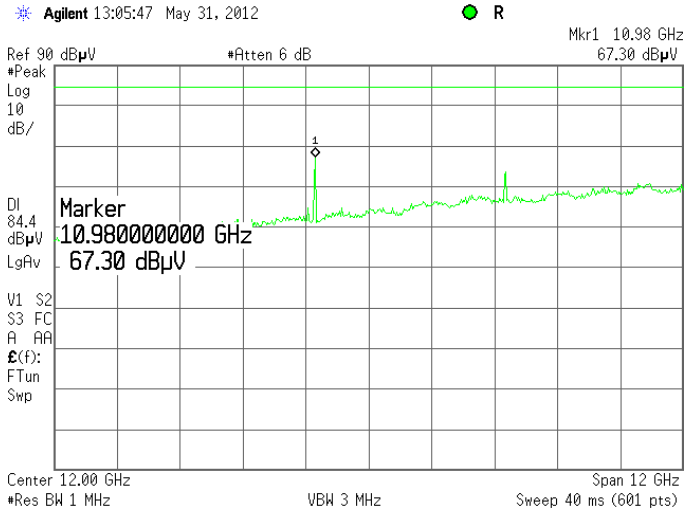
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/31/2012		
Temperature: 24.2 °C	Air Pressure: 1013 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

Plot 7.6.13 Radiated emission measurements in 6000 – 18000 MHz range

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



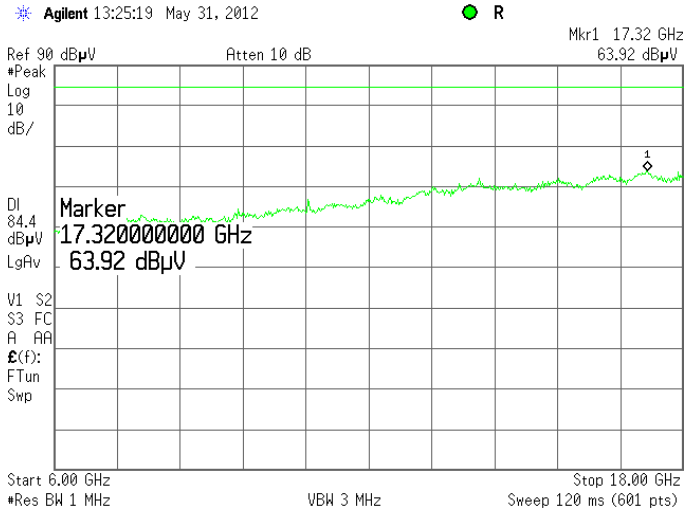
Plot 7.6.14 Radiated emission measurements in 6000 – 18000 MHz range

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

Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/31/2012		
Temperature: 24.2 °C	Air Pressure: 1013 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

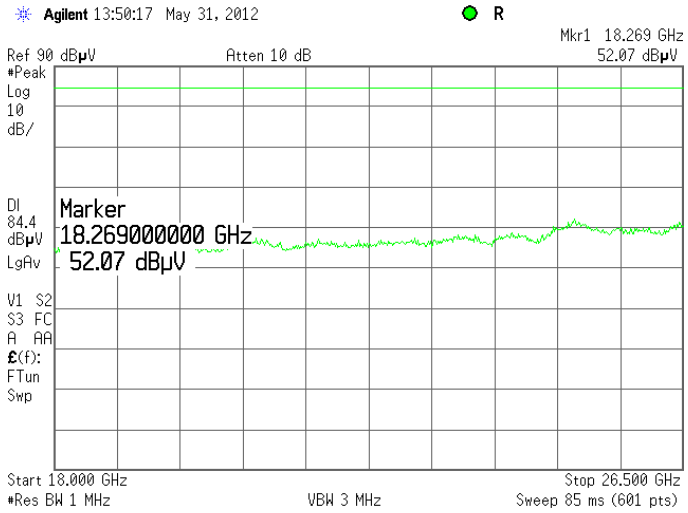
Plot 7.6.15 Radiated emission measurements in 6000 – 18000 MHz range

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



Plot 7.6.16 Radiated emission measurements in 18000 – 26500 MHz range

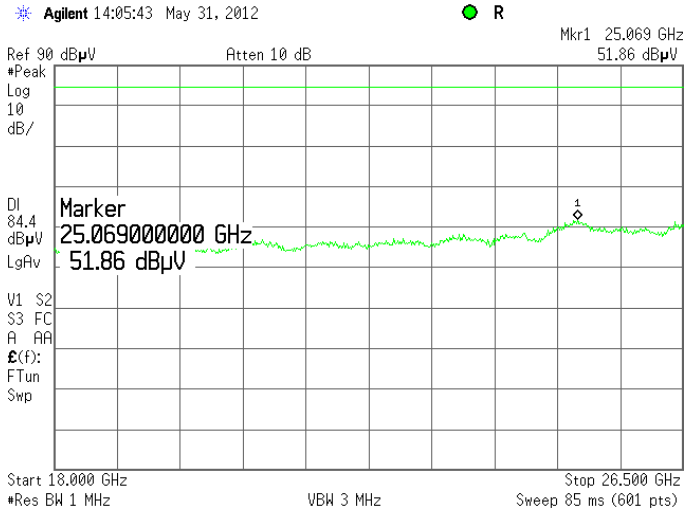
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/31/2012		
Temperature: 24.2 ºC	Air Pressure: 1013 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

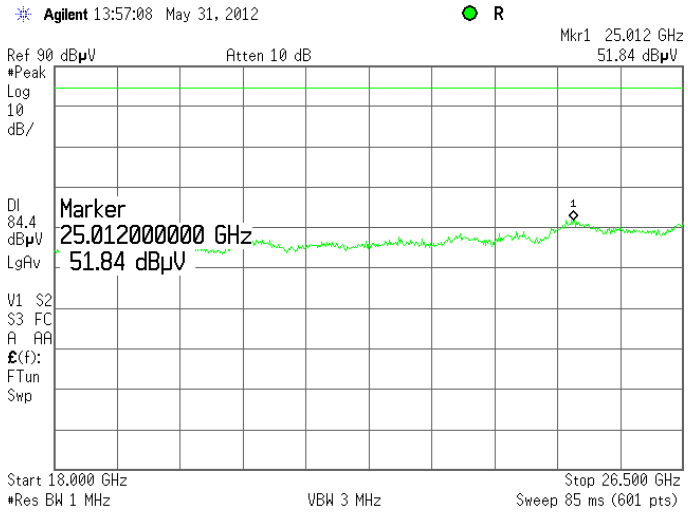
Plot 7.6.17 Radiated emission measurements in 18000 – 26500 MHz range

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



Plot 7.6.18 Radiated emission measurements in 18000 – 26500 MHz range

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



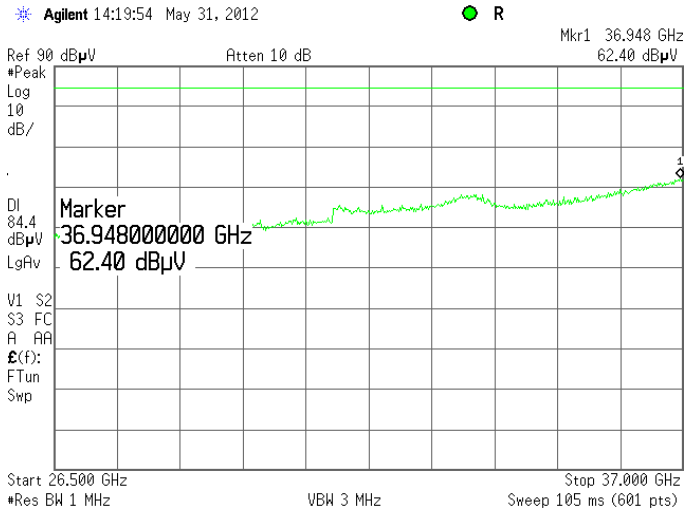
Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/31/2012		
Temperature: 24.2 °C	Air Pressure: 1013 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

Plot 7.6.19 Radiated emission measurements in 26500 – 37000 MHz range

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

Plot 7.6.20 Radiated emission measurements in 26500 – 37000 MHz range

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



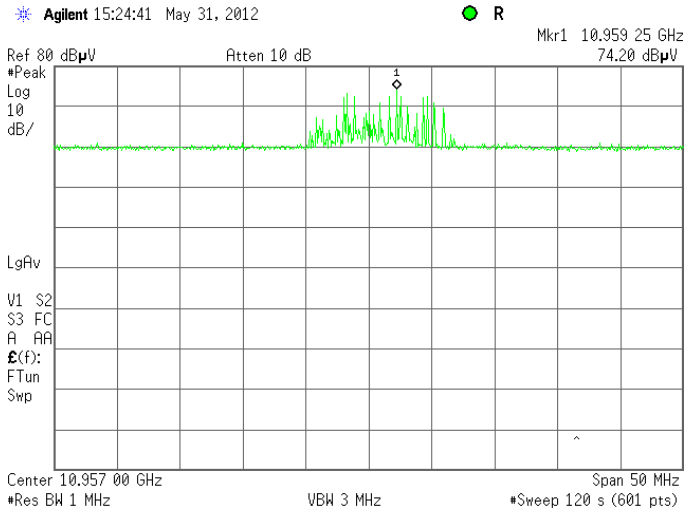
Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/31/2012		
Temperature: 24.2 °C	Air Pressure: 1013 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

Plot 7.6.21 Radiated emission measurements in 26500 – 37000 MHz range

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

Plot 7.6.22 Radiated emission measurements at the 3rd harmonic

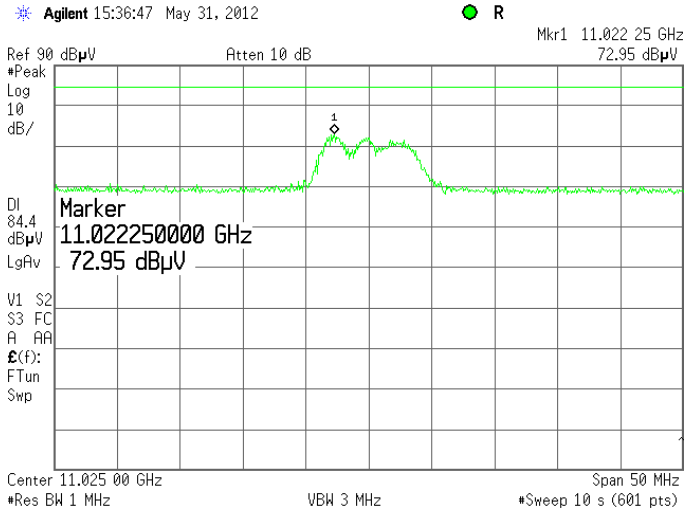
TEST SITE: OATS
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical
TEST DISTANCE: 3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	5/31/2012		
Temperature: 24.2 °C	Air Pressure: 1013 hPa	Relative Humidity: 46 %	Power Supply: 5.5VDC
Remarks:			

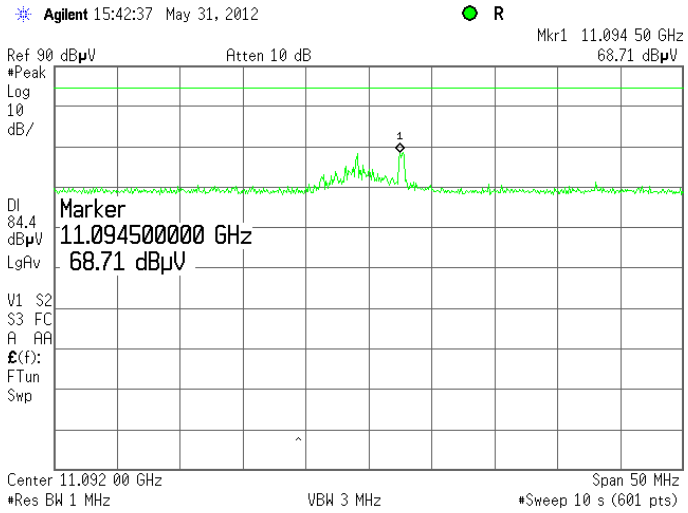
Plot 7.6.23 Radiated emission measurements at the 3rd harmonic

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



Plot 7.6.24 Radiated emission measurements at the 3rd harmonic

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



Test specification:	Section 90.213, Frequency stability		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	5/30/2012 - 5/31/2012		
Temperature: 23.9 ºC	**Air Pressure:** 1013 hPa	**Relative Humidity:** 46 %	**Power Supply:** 5.5VDC
Remarks:			

7.7 Frequency stability test

7.7.1 General

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

Table 7.7.1 Frequency stability limits

Assigned frequency, MHz	Maximum allowed frequency displacement	
	ppm	Hz
3650.0 – 3700.0	NA	

7.7.2 Test procedure

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

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

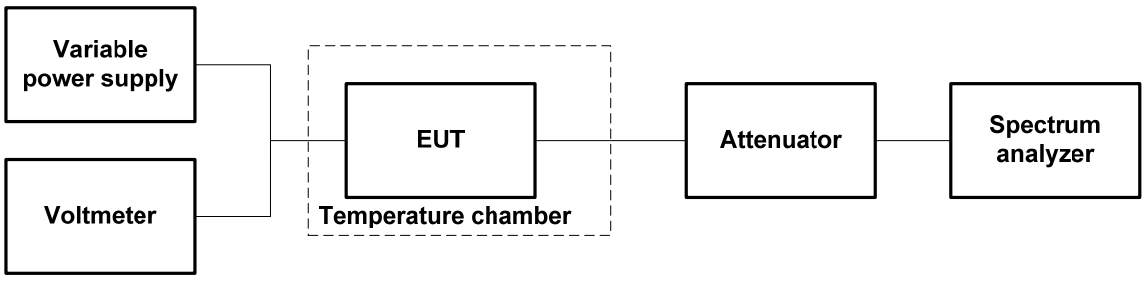
7.7.2.3 The EUT was powered on and carrier frequency was measured at start up moment and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.

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

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

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

Figure 7.7.1 Frequency stability test setup



Test specification:	Section 90.213, Frequency stability		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	5/30/2012 - 5/31/2012		
Temperature: 23.9 ºC	**Air Pressure:** 1013 hPa	**Relative Humidity:** 46 %	**Power Supply:** 5.5VDC
Remarks:			

Table 7.7.2 Frequency stability test results

ASSIGNED FREQUENCY RANGE: 3650.0 – 3700.0 MHz
NOMINAL POWER VOLTAGE: 5.5 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, VDC	Frequency, MHz							Max frequency drift, Hz		Max frequency drift, ppm	
		Start up	1st min	2nd min	3rd min	4th min	5th min	10th min	Positive	Negative	Positive	Negative
Low channel												
-30	nominal	3652.490251	3652.490833	3652.491241	3652.491662	3652.491707	3652.491687	3652.491728	0	-3678	0.00	-1.01
-20	nominal	3652.491989	NA	NA	NA	NA	NA	3652.492863	0	-1940	0.00	-0.53
-10	nominal	3652.491674	NA	NA	NA	NA	NA	3652.494797	868	-2255	0.24	-0.62
0	nominal	3652.494195	3652.494566	3652.494981	3652.495522	3652.495641	3652.495673	3652.495626	1744	0	0.48	0.00
10	nominal	3652.495315	NA	NA	NA	NA	NA	3652.495323	1394	0	0.38	0.00
20	+15%	3652.494841	NA	NA	NA	NA	NA	3652.493891	912	-38	0.25	-0.01
20	nominal	3652.493948	NA	NA	NA	NA	NA	3652.493929	19	0	0.01	0.00
20	-15%	3652.495323	NA	NA	NA	NA	NA	3652.495023	1394	0	0.38	0.00
30	nominal	3652.494381	3652.493765	3652.493117	3652.493008	3652.492877	3652.492659	3652.492492	452	-1437	0.12	-0.39
40	nominal	3652.493647	NA	NA	NA	NA	NA	3652.491298	0	-2631	0.00	-0.72
50	nominal	3652.492217	NA	NA	NA	NA	NA	3652.491388	0	-2541	0.00	-0.70
Mid channel												
-30	nominal	3674.991428	3674.991477	3674.991513	3674.991587	3674.991633	3674.991699	3674.991668	0	-2514	0.00	-0.68
-20	nominal	3674.992159	NA	NA	NA	NA	NA	3674.992852	0	-1783	0.00	-0.49
-10	nominal	3674.993459	NA	NA	NA	NA	NA	3674.994786	844	-483	0.23	-0.13
0	nominal	3674.994555	3674.994878	3674.995161	3674.995487	3674.995609	3674.995617	3674.995614	1675	0	0.46	0.00
10	nominal	3674.995498	NA	NA	NA	NA	NA	3674.995299	1556	0	0.42	0.00
20	+15%	3674.994721	NA	NA	NA	NA	NA	3674.993849	779	-93	0.21	-0.03
20	nominal	3674.992052	NA	NA	NA	NA	NA	3674.993942	0	-1890	0.00	-0.51
20	-15%	3674.995285	NA	NA	NA	NA	NA	3674.995022	1343	0	0.37	0.00
30	nominal	3674.994192	3674.993412	3674.992801	3674.992713	3674.992636	3674.992562	3674.992544	250	-1398	0.07	-0.38
40	nominal	3674.992832	NA	NA	NA	NA	NA	3674.991251	0	-2691	0.00	-0.73
50	nominal	3674.991349	NA	NA	NA	NA	NA	3674.991337	0	-2605	0.00	-0.71
High channel												
-30	nominal	3697.491483	3697.491533	3697.491576	3697.491599	3697.491621	3697.491644	3697.491625	0	-2491	0.00	-0.67
-20	nominal	3697.492561	NA	NA	NA	NA	NA	3697.492792	0	-1413	0.00	-0.38
-10	nominal	3697.493930	NA	NA	NA	NA	NA	3697.494752	778	-44	0.21	-0.01
0	nominal	3697.495398	3697.495486	3697.495534	3697.495577	3697.495609	3697.495610	3697.495578	1636	0	0.44	0.00
10	nominal	3697.495528	NA	NA	NA	NA	NA	3697.495263	1554	0	0.42	0.00
20	+15%	3697.494019	NA	NA	NA	NA	NA	3697.493786	45	-188	0.01	-0.05
20	nominal	3697.491447	NA	NA	NA	NA	NA	3697.493974	0	-2527	0.00	-0.68
20	-15%	3697.495131	NA	NA	NA	NA	NA	3697.494965	1157	0	0.31	0.00
30	nominal	3697.493296	3697.492921	3697.492681	3697.492577	3697.492532	3697.492486	3697.491505	0	-2469	0.00	-0.67
40	nominal	3697.491758	NA	NA	NA	NA	NA	3697.491202	0	-2772	0.00	-0.75
50	nominal	3697.491153	NA	NA	NA	NA	NA	3697.491269	0	-2821	0.00	-0.76

* - Reference frequency

Note1: As no limit is specified by the standard for 3650.0 – 3700.0 MHz band the worst case test results are given for information purpose only.

Reference numbers of test equipment used

HL 2634	HL 2988	HL 3787	HL 3818				

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
0465	Anechoic Chamber 9(L) x 6.5(W) x 5.5(H) m	Hermon Laboratories	AC - 1	023	03-Feb-11	03-Feb-14
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A00319, 3448A00253	29-Aug-11	29-Sep-12
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	11-Jan-11	11-Jan-13
0768	Antenna Standard Gain Horn, 18-26.5 GHz, WR-42, 25 dB gain	Quinstar Technology	QWH-4200-BA	110	03-Feb-12	03-Feb-15
0769	Antenna Standard Gain Horn, 26.5-40 GHz, WR28, 25 dB gain	Quinstar Technology	QWH-2800-BA	112	03-Feb-12	03-Feb-15
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W	EMC Test Systems	3115	9911-5964	25-Nov-11	25-Nov-12
2214	Directional Coupler 1.7-26.5 GHz	Krytar	2616	31354	31-Aug-11	31-Aug-12
2634	Power Supply, 0-36.0 VDC, 0-12.0 A	NEMIC-LAMBDA	UP36-12	2634	03-Aug-11	03-Aug-12
2871	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-8155-00	2871	15-Jan-12	15-Jan-13
2988	Cable RF, 6 m, SMA-SMA	Harbour Industries	CRF-1	2988	01-Sep-11	01-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
3455	Medium Power Fixed Coaxial Attenuator DC to 40 GHz, 20 dB, 5 W	Aeroflex / Weinschel	75A-20-12	1182	19-Mar-12	19-Mar-13
3533	Amplifier, low noise, 6 to 18 GHz	Quinstar Technology	QLJ-0618 4040-J0	11159001001	25-Dec-11	25-Dec-12
3535	Amplifier, low noise, 18 to 40 GHz	Quinstar Technology	QLJ-1840 4537-J0	11159003001	11-Jun-12	11-Jun-13
3623	Cable RF, 6.0 m, N type-N type, DC-6.5 GHz	Belden	MIL C-17	NA	09-May-12	09-May-13
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
3818	PSA Series Spectrum Analyzer, 3 Hz- 44 GHz	Agilent Technologies	E4446A	MY48250288	16-Feb-12	16-Feb-13
3901	Microwave Cable Assembly, 40.0 GHz, 3.5 m, SMA/SMA	Huber-Suhner	SUCOFLEX 102A	1225/2A	08-Feb-12	08-Feb-13
3903	Microwave Cable Assembly, 40.0 GHz, 1.5 m, SMA/SMA	Huber-Suhner	SUCOFLEX 102A	1226/2A	08-Feb-12	08-Feb-13
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

*Note: The calibration was valid at the testing time.

9 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Transmitter tests	
Carrier power conducted at antenna connector	± 1.7 dB
Carrier power radiated (substitution method)	± 4.5 dB
Occupied bandwidth	±8%
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB
Spurious emissions radiated 30 MHz – 40 GHz (substitution method)	± 4.5 dB
Frequency error	30 – 300 MHz: ± 50.5 Hz (1.68 ppm) 300 – 1000 MHz: ± 168 Hz (0.56 ppm)
Transient frequency behaviour	187 Hz ± 13.9 %
Duty cycle, timing (Tx ON / OFF) and average factor measurements	± 1.0 %

Hermon Laboratories is accredited by A2LA for calibration according to present requirements of ISO/IEC 17025 and NCSL Z540-1. The accreditation is granted to perform calibration of parameters that are listed in the Scope of Hermon Laboratories Accreditation.
Hermon Laboratories calibrates its reference and transfer standards by calibration laboratories accredited to ISO/IEC 17025 by a mutually recognized Accreditation Body or by a recognized national metrology institute. All reference and transfer standards used in the calibration system are traceable to national or international standards.
In-house calibration of all test and measurement equipment is performed on a regular basis according to Hermon Laboratories calibration procedures, manufacturer calibration/verification procedures or procedures defined in the relevant standards. The Hermon Laboratories test and measurement equipment is calibrated within the tolerances specified by the manufacturers and/or by the relevant standards.

10 APPENDIX C Test 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.

Address: P.O. Box 23, Binyamina 30500, Israel.
Telephone: +972 4628 8001
Fax: +972 4628 8277
e-mail: mail@hermonlabs.com
website: www.hermonlabs.com

Person for contact: Mr. Alex Usoskin, CEO.

11 APPENDIX D Specification references

FCC 47CFR part 90: 2011	Private land mobile radio services
ANSI C63.2: 1996	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4: 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.
ANSI/TIA/EIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

12 APPENDIX E Test equipment correction factors

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

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

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

Antenna factor
Standard gain horn antenna
Quinstar Technology
Model QWH
Ser.No.112, HL 0768, 0769

Frequency min, GHz	Frequency max, GHz	Antenna factor, dB(1/m)
18.000	26.500	32.01
26.500	40.000	35.48

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

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

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

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

Antenna factor
Double-ridged wave guide horn antenna
Model 3115, S/N 9911-5964, HL1984

Frequency, MHz	Antenna factor, dB(1/m)
1000.0	24.7
1500.0	25.7
2000.0	27.6
2500.0	28.9
3000.0	31.2
3500.0	32.0
4000.0	32.5
4500.0	32.7
5000.0	33.6
5500.0	35.1
6000.0	35.4
6500.0	34.9
7000.0	36.1
7500.0	37.8
8000.0	38.0
8500.0	38.1
9000.0	39.1
9500.0	38.3
10000.0	38.6
10500.0	38.2
11000.0	38.7
11500.0	39.5
12000.0	40.0
12500.0	40.4
13000.0	40.5
13500.0	41.1
14000.0	41.6
14500.0	41.7
15000.0	38.7
15500.0	38.2
16000.0	38.8
16500.0	40.5
17000.0	42.5
17500.0	45.9
18000.0	49.4

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

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, Huber-Suhner, 18 GHz, 6.4 m, SMA - SMA, model 198-8155-00, HL 2871

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.12	5750	2.34	12000	3.55
30	0.14	6000	2.39	12250	3.61
100	0.27	6250	2.46	12500	3.67
250	0.45	6500	2.52	12750	3.74
500	0.63	6750	2.58	13000	3.79
750	0.76	7000	2.64	13250	3.82
1000	0.89	7250	2.68	13500	3.83
1250	1.01	7500	2.73	13750	3.83
1500	1.12	7750	2.78	14000	3.88
1750	1.23	8000	2.83	14250	3.93
2000	1.32	8250	2.88	14500	3.96
2250	1.41	8500	2.94	14750	4.01
2500	1.49	8750	2.97	15000	4.00
2750	1.58	9000	3.02	15250	4.01
3000	1.66	9250	3.07	15500	4.00
3250	1.73	9500	3.13	15750	4.13
3500	1.80	9750	3.18	16000	4.22
3750	1.87	10000	3.21	16250	4.29
4000	1.93	10250	3.26	16500	4.29
4250	2.01	10500	3.30	16750	4.32
4500	2.06	10750	3.36	17000	4.37
4750	2.12	11000	3.39	17250	4.45
5000	2.17	11250	3.44	17500	4.49
5250	2.24	11500	3.48	17750	4.53
5500	2.29	11750	3.52	18000	4.55

Cable loss
Cable coaxial, MIL C-17, N type-N type, 6 m
Belden, HL 3623

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.10	2600	4.35	5300	7.67
50	0.30	2700	4.54	5400	7.79
100	0.45	2800	4.70	5500	7.89
200	0.69	2900	4.87	5600	7.94
300	0.89	3000	5.04	5700	8.01
400	1.06	3100	5.19	5800	8.12
500	1.24	3200	5.35	5900	8.19
600	1.38	3300	5.50	6000	8.30
700	1.54	3400	5.65	6100	8.35
800	1.69	3500	5.79	6200	8.45
900	1.83	3600	5.92	6300	8.55
1000	1.96	3700	6.07	6400	8.65
1100	2.14	3800	6.17	6500	8.75
1200	2.31	3900	6.30		
1300	2.38	4000	6.43		
1400	2.51	4100	6.53		
1500	2.63	4200	6.65		
1600	2.76	4300	6.75		
1700	2.90	4400	6.85		
1800	3.04	4500	7.01		
1900	3.19	4600	7.09		
2000	3.35	4700	7.20		
2100	3.51	4800	7.24		
2200	3.67	4900	7.31		
2300	3.84	5000	7.41		
2400	4.01	5100	7.48		
2500	4.18	5200	7.56		

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 1226/2A
HL 3903

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

13 APPENDIX F Abbreviations and acronyms

A	ampere
AC	alternating current
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

END OF DOCUMENT