HERMON LABORATORIES

ELECTRICAL TESTING
0839.01

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TEST REPORT

ACCORDING TO: FCC CFR 47 PART 90 subpart Z

FOR:

Runcom Technologies Ltd.
Base station operating in 3.65-3.7 GHz
Model: Pico Base Station RNU4000BS
FCC ID:XYMPICO4A351WDC

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1 Applicant information

Client name:	Runcom Technologies Ltd.
Address:	11 Moshe Levi street,UMI Building, 12th floor, Rishon Lezion 75658, Israel
Telephone:	+972 3942 8866
Fax:	+972 3952 8805
E-mail:	yonatan.zvi@runcom.co.il
Contact name:	Mr. Yonatan Zvi

2 Equipment under test attributes

Product name:	Base station operating in 3.65-3.7 GHz
Product type:	Transciever
Model(s):	Pico Base Station RNU4000BS
Name:	1) PICO-0-3.5-G-4X1W-IA11 (with internal antenna), S/N 1807C2206F008B6 2) PICO-0-3.5-G-4X1W (with external antenna), S/N 0838B2206F00733
Hardware version:	Rev 2.2
Software release:	03.29.63.01
Receipt date	3/11/2012

3 Manufacturer information

Manufacturer name:	Runcom Technologies Ltd.
Address:	11 Moshe Levi street,UMI Building, 12th floor, Rishon Lezion 75658, Israel
Telephone:	+972 3942 8866
Fax:	+972 3952 8805
E-Mail:	yonatan.zvi@runcom.co.il
Contact name:	Mr. Yonatan Zvi

4 Test details

Project ID:	23084
Location:	Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started:	3/11/2012
Test completed:	3/21/2012
Test specification(s):	FCC 47CFR part 90 subpart Z

5 Tests summary

Test	Status
Transmitter characteristics	
Section 90.205, 90.1321, Maximum output power (EIRP)	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, Conducted spurious emissions	Pass
Section 90.1323, Radiated spurious emissions	Pass
Section 90.213, Frequency stability	Pass
Section 2.1091, 90.1335, RF radiation exposure evaluation	Pass, the 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	March 21, 2012	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	April 22, 2012	
Approved by:	Mr. M. Nikishin, EMC and Radio group manager	April 23, 2012	

6 EUT description

6.1 General information

The EUT is a base station of WiMAX system operating in 3.65 – 3.70 GHz.

6.2 Ports and lines

Port type	Port description	Connected from	Connected to	Qty.	Cable type	Cable length, m
Power	48 VDC	DC power supply	EUT	1	Unshielded	10
RF	N-Type	EUT	Antenna	4	Coaxial	1
Signal	10Base-T	Ethernet switch	Ethernet switch	1	Cat 5	10
Control*	UART	EUT	PC USB-Com	1	Shielded	10

* - for service only

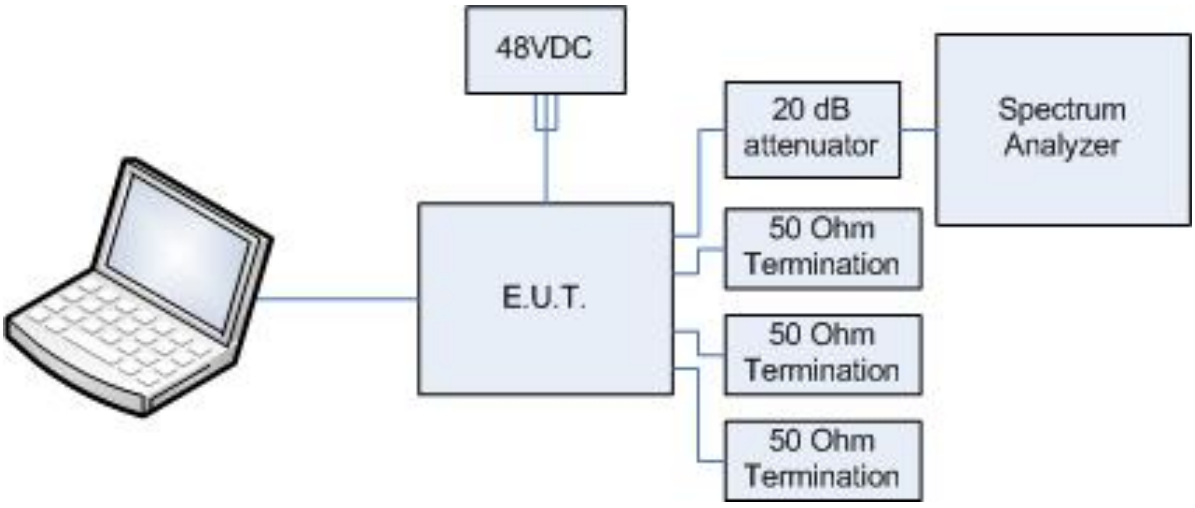
6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
DC power supply	MW (Mean Well)	ESP-240-48	NA
Laptop	IBM	ThinkPad R60	L3-A7675
50 Ohm termination	RELM	LT-50	3835
50 Ohm termination	RELM	LT-50	3836
AC/DC adapter	Lenovo	42T4432	Z1ZF3J9BA2RD
DC power supply	Horizon Electronics	DHR3655D	767469

6.4 Changes made in EUT

No changes were implemented in the EUT.

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 four RF chains): 24.67 dBm – 5 MHz OBW; 28.16 dBm – 10 MHz OBW

Is transmitter output power variable?				
	No			
V	Yes		continuous variable	
		V	stepped variable with stepsize	1.0 dB
			minimum RF power	0 dBm
			maximum RF power	28.16 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
Dual –Slant BTS Antenna	MTI Wireless Edge Ltd.	MT-404067/ND	18 dBi
Dual-Slant Antenna	PCTEL	SP3338-17XP65	17 dBi
Dual-Slant Antenna	PCTEL	SP3338-16XP90	16 dBi
Internal Antenna	Runcom Technologies Ltd.	ANT3.5G-120-11dBi-2X2	11.5 dBi

Transmitter aggregate data rate/s, Mbps			
Transmitter 99% power bandwidth	Type of modulation		
	QPSK	16QAM	64QAM
5 MHz	2.5-3.8 Mbps	5.0-7.6 Mbps	5.6-9.3 Mbps
10 MHz	5.1-7.6 Mbps	10.2-15.2 Mbps	11.2-18.7 Mbps

Type of modulation	QPSK1/2, QPSK3/4, 16QAM1/2, 16QAM3/4, 64QAM1/2, 64QAM2/3, 64QAM3/4, 64QAM5/6
Type of multiplexing	OFDMA/TDD
Modulating test signal (baseband)	PRBS
Maximum transmitter duty cycle in normal use	67 %

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

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):	3/11/2012 - 3/12/2012		
Temperature: 22.1 ºC	Air Pressure: 1010 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

7 Transmitter tests according to 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

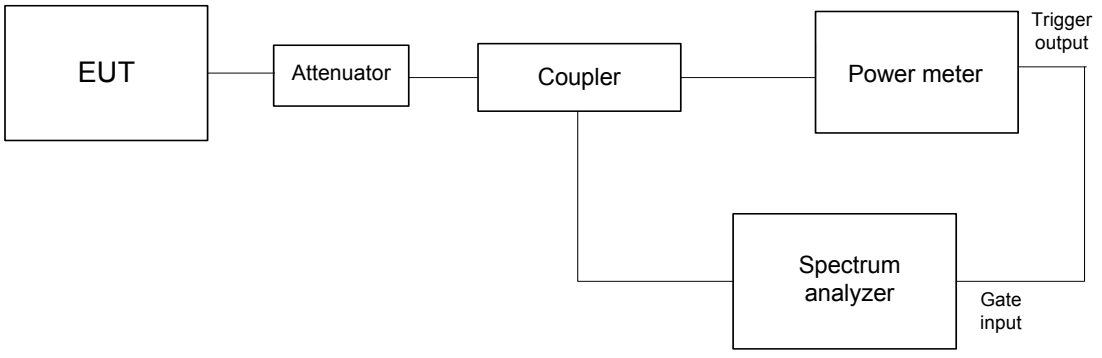
7.1.2 Test procedure

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 to Table 7.1.5.

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):	3/11/2012 - 3/12/2012		
Temperature: 22.1 ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 41 %	**Power Supply:** 48VDC
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: 18 dBi
EBW: 5 MHz
BEAMFORMING: 0 dB

Channel, MHz	Pmeas (RF#1), dBm	Pmeas (RF#2), dBm	Pmeas (RF#3), dBm	Pmeas (RF#4), dBm	P_{meas} *, dBm	Antenna gain, dBi	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
Modulation QPSK										
3652.5	12.39	12.78	12.33	11.97	18.40	18.0	36.40	36.7	-0.28	Pass
3675.0	11.53	11.46	11.58	11.23	17.49	18.0	35.49	36.7	-1.17	Pass
3697.5	11.02	11.73	11.04	11.16	17.27	18.0	35.27	36.7	-1.40	Pass
Modulation 64QAM										
3652.5	12.36	12.62	12.08	11.88	18.28	18.0	36.28	36.7	-0.39	Pass
3675.0	11.48	11.13	11.34	11.02	17.27	18.0	35.27	36.7	-1.39	Pass
3697.5	11.02	11.73	11.44	10.64	17.26	18.0	35.26	36.7	-1.40	Pass

ANTENNA GAIN: 18 dBi
EBW: 5 MHz
BEAMFORMING: 3 dB

Channel, MHz	Pmeas (RF#1), dBm	Pmeas (RF#2), dBm	Pmeas (RF#3), dBm	Pmeas (RF#4), dBm	P_{meas} *, dBm	Antenna gain, dBi	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
Modulation QPSK										
3652.5	9.42	9.66	9.33	9.08	15.40	18.0	36.40	36.7	-0.30	Pass
3675.0	8.66	8.54	8.61	8.23	14.53	18.0	35.53	36.7	-1.17	Pass
3697.5	8.17	8.56	8.11	8.22	14.29	18.0	35.29	36.7	-1.41	Pass
Modulation 64QAM										
3652.5	9.49	9.61	9.41	9.12	15.45	18.0	36.45	36.7	-0.25	Pass
3675.0	8.00	7.77	7.93	7.52	13.83	18.0	34.83	36.7	-1.87	Pass
3697.5	8.15	8.66	8.31	8.01	14.33	18.0	35.33	36.7	-1.37	Pass

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):	3/11/2012 - 3/12/2012		
Temperature: 22.1 ºC	Air Pressure: 1010 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

Table 7.1.2 Peak EIRP output power test results (continued)

ANTENNA GAIN: 18 dBi
EBW: 5 MHz
BEAMFORMING: 6 dB

Channel, MHz	Pmeas (RF#1), dBm	Pmeas (RF#2), dBm	Pmeas (RF#3), dBm	Pmeas (RF#4), dBm	P_{meas} *, dBm	Antenna gain, dBi	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
Modulation QPSK										
3652.5	6.48	6.77	6.52	6.44	12.58	18.0	36.58	36.7	-0.12	Pass
3675.0	5.72	5.54	5.74	5.33	11.61	18.0	35.61	36.7	-1.09	Pass
3697.5	5.21	5.77	5.19	4.78	11.27	18.0	35.27	36.7	-1.43	Pass
Modulation 64QAM										
3652.5	6.45	6.71	6.43	6.22	12.48	18.0	36.48	36.7	-0.22	Pass
3675.0	5.74	5.52	5.61	5.02	11.50	18.0	35.50	36.7	-1.20	Pass
3697.5	5.25	5.87	5.46	5.12	11.46	18.0	35.46	36.7	-1.24	Pass

* - Pmeas ,dBm = 10 log{10^[P(dBm,RF#1)/10] + 10^([P(dBm, RF#2)/10 + 10^[P(dBm,RF#3)/10]+ 10^([P(dBm, RF#4)/10]}
** - EIRP total, dBm = Pmeas*, dBm + Antenna Gain, dBi + Beamforming factor, dB

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):	3/11/2012 - 3/12/2012		
Temperature: 22.1 ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 41 %	**Power Supply:** 48VDC
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: 18 dBi
EBW: 10 MHz
BEAMFORMING: 0 dB

Channel, MHz	Pmeas (RF#1), dBm	Pmeas (RF#2), dBm	Pmeas (RF#3), dBm	Pmeas (RF#4), dBm	P_{meas} *, dBm	Antenna gain, dBi	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
Modulation QPSK										
3655.0	15.11	15.89	14.51	14.07	20.97	18.0	38.97	40.0	-1.03	Pass
3675.0	14.18	14.71	14.15	13.03	20.10	18.0	38.10	40.0	-1.90	Pass
3695.0	13.75	15.11	13.58	12.50	19.86	18.0	37.86	40.0	-2.14	Pass
Modulation 64QAM										
3655.0	14.68	15.17	14.64	13.99	20.66	18.0	38.66	40.0	-1.34	Pass
3675.0	14.41	14.02	14.53	12.89	20.03	18.0	38.03	40.0	-1.97	Pass
3695.0	13.92	14.39	14.14	12.35	19.80	18.0	37.80	40.0	-2.20	Pass

ANTENNA GAIN: 18 dBi
EBW: 10 MHz
BEAMFORMING: 3 dB

Channel, MHz	Pmeas (RF#1), dBm	Pmeas (RF#2), dBm	Pmeas (RF#3), dBm	Pmeas (RF#4), dBm	P_{meas} *, dBm	Antenna gain, dBi	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
Modulation QPSK										
3655.0	12.46	12.78	12.33	12.01	18.42	18.0	39.42	40.0	-0.58	Pass
3675.0	11.41	12.12	11.38	10.89	17.51	18.0	38.51	40.0	-1.49	Pass
3695.0	10.96	11.89	11.12	10.45	17.16	18.0	38.16	40.0	-1.84	Pass
Modulation 64QAM										
3655.0	12.49	12.83	12.36	11.98	18.46	18.0	39.46	40.0	-0.54	Pass
3675.0	11.42	11.58	11.73	11.03	17.47	18.0	38.47	40.0	-1.53	Pass
3695.0	10.84	11.34	11.23	10.65	17.06	18.0	38.06	40.0	-1.94	Pass

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):	3/11/2012 - 3/12/2012		
Temperature: 22.1 ºC	Air Pressure: 1010 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

Table 7.1.3 Peak EIRP output power test results (continued)

ANTENNA GAIN: 18 dBi
EBW: 10 MHz
BEAMFORMING: 6 dB

Channel, MHz	Pmeas (RF#1), dBm	Pmeas (RF#2), dBm	Pmeas (RF#3), dBm	Pmeas (RF#4), dBm	P_{meas} *, dBm	Antenna gain, dBi	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
Modulation QPSK										
3655.0	8.82	9.77	8.73	8.46	14.99	18.0	38.99	40.0	-1.01	Pass
3675.0	7.97	8.34	7.91	7.43	13.96	18.0	37.96	40.0	-2.04	Pass
3695.0	7.47	8.35	8.35	8.35	14.17	18.0	38.17	40.0	-1.83	Pass
Modulation 64QAM										
3655.0	8.83	8.83	8.83	8.83	14.85	18.0	38.85	40.0	-1.15	Pass
3675.0	7.92	7.92	7.92	7.92	13.94	18.0	37.94	40.0	-2.06	Pass
3695.0	7.42	7.42	7.42	7.42	13.44	18.0	37.44	40.0	-2.56	Pass

* - Pmeas ,dBm = 10 log{10^[P(dBm,RF#1)/10] + 10^([P(dBm, RF#2)/10 + 10^[P(dBm,RF#3)/10]+ 10^([P(dBm, RF#4)/10]}
** - EIRP total, dBm = Pmeas*, dBm + Antenna Gain, dBi + Beamforming factor, dB

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):	3/11/2012 - 3/12/2012		
Temperature: 22.1 ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 41 %	**Power Supply:** 48VDC
Remarks:			

Table 7.1.4 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: 11.5 dBi
EBW: 5 MHz
BEAMFORMING: 0 dB

Channel, MHz	Pmeas (RF#1), dBm	Pmeas (RF#2), dBm	Pmeas (RF#3), dBm	Pmeas (RF#4), dBm	P_{meas} *, dBm	Antenna gain, dBi	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
Modulation QPSK										
3652.5	18.66	18.87	18.34	18.03	24.51	11.5	36.01	36.7	-0.69	Pass
3675.0	17.86	17.99	17.65	17.34	23.74	11.5	35.24	36.7	-1.46	Pass
3697.5	17.26	17.51	17.24	17.01	23.28	11.5	34.78	36.7	-1.92	Pass
Modulation 64QAM										
3652.5	18.73	18.99	18.54	18.33	24.67	11.5	36.19	36.7	-0.51	Pass
3675.0	17.81	17.98	17.63	17.21	23.69	11.5	35.19	36.7	-1.51	Pass
3697.5	17.34	17.66	17.21	17.01	23.33	11.5	34.85	36.7	-1.85	Pass

ANTENNA GAIN: 11.5 dBi
EBW: 5 MHz
BEAMFORMING: 3 dB

Channel, MHz	Pmeas (RF#1), dBm	Pmeas (RF#2), dBm	Pmeas (RF#3), dBm	Pmeas (RF#4), dBm	P_{meas} *, dBm	Antenna gain, dBi	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
Modulation QPSK										
3655.0	15.91	16.23	15.77	15.32	21.84	11.5	36.34	36.7	-0.33	Pass
3675.0	15.08	15.28	14.96	14.77	21.05	11.5	35.56	36.7	-1.10	Pass
3695.0	14.44	14.75	14.34	14.11	20.44	11.5	34.94	36.7	-1.73	Pass
Modulation 64QAM										
3655.0	15.96	16.02	15.68	15.34	21.78	11.5	36.29	36.7	-0.38	Pass
3675.0	14.98	15.21	14.77	14.52	20.90	11.5	35.40	36.7	-1.26	Pass
3695.0	14.57	14.79	14.53	14.22	20.55	11.5	35.07	36.7	-1.60	Pass

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):	3/11/2012 - 3/12/2012		
Temperature: 22.1 ºC	Air Pressure: 1010 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

Table 7.1.4 Peak EIRP output power test results (continued)

ANTENNA GAIN: 11.5 dBi
EBW: 5 MHz
BEAMFORMING: 6 dB

Channel, MHz	Pmeas (RF#1), dBm	Pmeas (RF#2), dBm	Pmeas (RF#3), dBm	Pmeas (RF#4), dBm	P_{meas} *, dBm	Antenna gain, dBi	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
Modulation QPSK										
3655.0	12.19	12.33	12.11	12.01	18.18	11.5	35.68	36.7	-0.99	Pass
3675.0	11.47	11.64	11.43	11.21	17.46	11.5	34.98	36.7	-1.68	Pass
3695.0	10.89	11.11	11.01	10.65	16.94	11.5	34.44	36.7	-2.23	Pass
Modulation 64QAM										
3655.0	12.24	12.43	12.18	12.05	18.25	11.5	35.76	36.7	-0.91	Pass
3675.0	11.48	11.72	11.41	11.22	17.48	11.5	34.98	36.7	-1.68	Pass
3695.0	10.95	11.13	10.87	10.66	16.93	11.5	34.44	36.7	-2.22	Pass

* - Pmeas ,dBm = 10 log{10^[P(dBm,RF#1)/10] + 10^([P(dBm, RF#2)/10 + 10^[P(dBm,RF#3)/10]+ 10^([P(dBm, RF#4)/10]}
** - EIRP total, dBm = Pmeas*, dBm + Antenna Gain, dBi + Beamforming factor, dB

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):	3/11/2012 - 3/12/2012		
Temperature: 22.1 ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 41 %	**Power Supply:** 48VDC
Remarks:			

Table 7.1.5 Peak EIRP output power test results

ASSIGNED FREQUENCY RANGE: 3700.0 MHz
DETECTOR USED: Average (Power Meter)
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA GAIN: 11.5 dBi
EBW: 10 MHz
BEAMFORMING: 0 dB

Channel, MHz	Pmeas (RF#1), dBm	Pmeas (RF#2), dBm	Pmeas (RF#3), dBm	Pmeas (RF#4), dBm	P_{meas} *, dBm	Antenna gain, dBi	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
Modulation QPSK										
3652.5	22.19	22.32	22.08	21.98	28.16	11.5	39.66	40.0	-0.34	Pass
3675.0	21.32	21.55	21.16	21.01	27.29	11.5	38.80	40.0	-1.20	Pass
3697.5	20.67	20.98	20.56	20.33	26.66	11.5	38.16	40.0	-1.84	Pass
Modulation 64QAM										
3652.5	22.10	22.31	22.01	21.92	28.11	11.5	39.62	40.0	-0.38	Pass
3675.0	21.11	21.34	21.01	20.93	27.12	11.5	38.62	40.0	-1.38	Pass
3697.5	20.73	20.94	20.56	20.22	26.64	11.5	38.16	40.0	-1.84	Pass

ANTENNA GAIN: 11.5 dBi
EBW: 10 MHz
BEAMFORMING: 3 dB

Channel, MHz	Pmeas (RF#1), dBm	Pmeas (RF#2), dBm	Pmeas (RF#3), dBm	Pmeas (RF#4), dBm	P_{meas} *, dBm	Antenna gain, dBi	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
Modulation QPSK										
3655.0	18.69	18.99	18.56	18.22	24.64	11.5	39.14	40.0	-0.86	Pass
3675.0	18.11	18.34	18.05	17.96	24.14	11.5	38.65	40.0	-1.35	Pass
3695.0	17.14	17.33	17.03	16.95	23.14	11.5	37.64	40.0	-2.36	Pass
Modulation 64QAM										
3655.0	18.64	18.88	18.43	18.11	24.54	11.5	39.06	40.0	-0.94	Pass
3675.0	17.60	17.77	17.41	17.12	23.50	11.5	38.00	40.0	-2.00	Pass
3695.0	17.20	17.34	17.06	16.94	23.16	11.5	37.67	40.0	-2.33	Pass

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):	3/11/2012 - 3/12/2012		
Temperature: 22.1 ºC	Air Pressure: 1010 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

Table 7.1.5 Peak EIRP output power test results (continued)

ANTENNA GAIN: 11.5 dBi
EBW: 10 MHz
BEAMFORMING: 6 dB

Channel, MHz	Pmeas (RF#1), dBm	Pmeas (RF#2), dBm	Pmeas (RF#3), dBm	Pmeas (RF#4), dBm	P_{meas} *, dBm	Antenna gain, dBi	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
Modulation QPSK										
3655.0	16.23	16.47	16.22	16.14	22.29	11.5	39.79	40.0	-0.21	Pass
3675.0	15.06	15.32	15.01	14.87	21.09	11.5	38.60	40.0	-1.40	Pass
3695.0	14.79	14.99	14.71	14.55	20.78	11.5	38.28	40.0	-1.72	Pass
Modulation 64QAM										
3655.0	16.28	16.52	16.14	16.02	22.26	11.5	39.78	40.0	-0.22	Pass
3675.0	15.29	15.34	15.11	14.99	21.21	11.5	38.71	40.0	-1.29	Pass
3695.0	14.81	14.98	14.65	14.33	20.72	11.5	38.24	40.0	-1.76	Pass

* - Pmeas ,dBm = 10 log{10^[P(dBm,RF#1)/10] + 10^([P(dBm, RF#2)/10 + 10^[P(dBm,RF#3)/10]+ 10^([P(dBm, RF#4)/10]}
** - EIRP total, dBm = Pmeas*, dBm + Antenna Gain, dBi + Beamforming factor, dB

Reference numbers of test equipment used

HL 3301	HL 3302	HL 3667	HL 3768	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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 11.5 dBi			

7.2 Peak EIRP power density with 11.5 dBi antenna

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
	7		
	10		

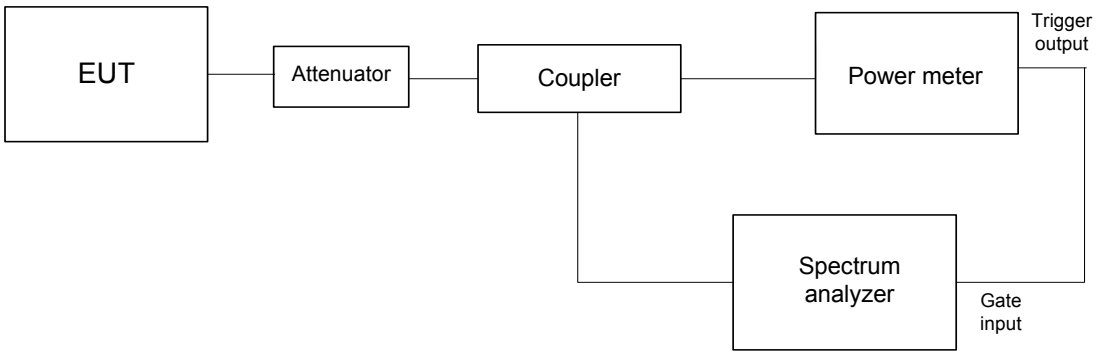
7.2.2 Test procedure

7.2.2.1 The EUT was set up as shown in Figure 7.1.2Figure 7.1.1, 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, Table 7.2.3 and the associated plots.

Figure 7.2.1 Peak power density test setup



Reference numbers of test equipment used

HL 3301	HL 3302	HL 3667	HL 3768	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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 11.5 dBi			

Table 7.2.2 Peak EIRP power density test results

ASSIGNED FREQUENCY RANGE:	3650.0 – 3700.0 MHz
DETECTOR USED:	Average (RMS)
RESOLUTION BANDWIDTH:	1000 kHz
VIDEO BANDWIDTH:	3000 kHz
MODULATING SIGNAL:	PRBS
ANTENNA GAIN:	11.5 dBi
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum
EBW:	5 MHz

BEAMFORMING: 0 dB

Carrier frequency, MHz	SA reading, dBm	Total power density, dBm	Antenna gain, dBi	Beamforming, dB	Peak EIRP power density, dBm/ MHz	Limit, dBm	Margin, dB	Verdict
Modulation QPSK								
3652.5	11.70	17.72	11.5	0	29.22	30.0	-0.78	Pass
3675.0	10.87	16.89	11.5	0	28.39	30.0	-1.61	Pass
3697.5	10.33	16.35	11.5	0	27.85	30.0	-2.15	Pass
Modulation 64QAM								
3652.5	11.90	17.92	11.5	0	29.44	30.0	-0.56	Pass
3675.0	10.91	16.93	11.5	0	28.43	30.0	-1.57	Pass
3697.5	10.64	16.66	11.5	0	28.18	30.0	-1.82	Pass

BEAMFORMING: 3 dB

Carrier frequency, MHz	SA reading, dBm	Total power density, dBm	Antenna gain, dBi	Beamforming, dB	Peak EIRP power density, dBm/ MHz	Limit, dBm	Margin, dB	Verdict
Modulation QPSK								
3652.5	8.97	14.99	11.5	3.0	29.49	30.0	-0.51	Pass
3675.0	8.10	14.12	11.5	3.0	28.64	30.0	-1.36	Pass
3697.5	7.52	13.54	11.5	3.0	28.04	30.0	-1.96	Pass
Modulation 64QAM								
3652.5	8.97	14.99	11.5	3.0	29.51	30.0	-0.49	Pass
3675.0	8.11	14.13	11.5	3.0	28.63	30.0	-1.37	Pass
3697.5	7.87	13.89	11.5	3.0	28.41	30.0	-1.59	Pass

BEAMFORMING: 6 dB

Carrier frequency, MHz	SA reading, dBm	Total power density, dBm	Antenna gain, dBi	Beamforming, dB	Peak EIRP power density, dBm/ MHz	Limit, dBm	Margin, dB	Verdict
Modulation QPSK								
3652.5	5.32	11.34	11.5	6.0	28.84	30.0	-1.16	Pass
3675.0	4.45	10.47	11.5	6.0	27.99	30.0	-2.01	Pass
3697.5	3.95	9.97	11.5	6.0	27.47	30.0	-2.53	Pass
Modulation 64QAM								
3652.5	5.26	11.28	11.5	6.0	28.80	30.0	-1.20	Pass
3675.0	4.55	10.57	11.5	6.0	28.07	30.0	-1.93	Pass
3697.5	4.10	10.12	11.5	6.0	27.64	30.0	-2.36	Pass

* - Total power density, dBm/MHz = SA Reading + 10*log(N)
** - Peak EIRP power density, dBm/MHz = Total power density*, dBm/MHz + Antenna Gain, dBi + Beamforming, dB

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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 11.5 dBi			

Table 7.2.3 Peak EIRP power density test results

ASSIGNED FREQUENCY RANGE: 3650.0 – 3700.0 MHz
DETECTOR USED: Average (RMS)
RESOLUTION BANDWIDTH: 1000 kHz
VIDEO BANDWIDTH: 3000 kHz
MODULATING SIGNAL: PRBS
ANTENNA GAIN: 11.5 dBi
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
EBW: 10 MHz

BEAMFORMING: 0 dB

Carrier frequency, MHz	SA reading, dBm	Total power density, dBm	Antenna gain, dBi	Beamforming, dB	Peak EIRP power density, dBm/ MHz	Limit, dBm	Margin, dB	Verdict
Modulation QPSK								
3655.0	12.42	18.44	11.5	0	29.94	30.0	-0.06	Pass
3675.0	11.41	17.43	11.5	0	28.95	30.0	-1.05	Pass
3695.0	10.98	17.00	11.5	0	28.50	30.0	-1.50	Pass
Modulation 64QAM								
3655.0	12.34	18.36	11.5	0	29.88	30.0	-0.12	Pass
3675.0	11.25	17.27	11.5	0	28.77	30.0	-1.23	Pass
3695.0	11.02	17.04	11.5	0	28.56	30.0	-1.44	Pass

BEAMFORMING: 3 dB

Carrier frequency, MHz	SA reading, dBm	Total power density, dBm	Antenna gain, dBi	Beamforming, dB	Peak EIRP power density, dBm/ MHz	Limit, dBm	Margin, dB	Verdict
Modulation QPSK								
3655.0	8.92	14.94	11.5	3.0	29.44	30.0	-0.56	Pass
3675.0	8.78	14.80	11.5	3.0	29.32	30.0	-0.68	Pass
3695.0	8.44	14.46	11.5	3.0	28.96	30.0	-1.04	Pass
Modulation 64QAM								
3655.0	8.83	14.85	11.5	3.0	29.37	30.0	-0.63	Pass
3675.0	7.76	13.78	11.5	3.0	28.28	30.0	-1.72	Pass
3695.0	7.56	13.58	11.5	3.0	28.10	30.0	-1.90	Pass

BEAMFORMING: 6 dB

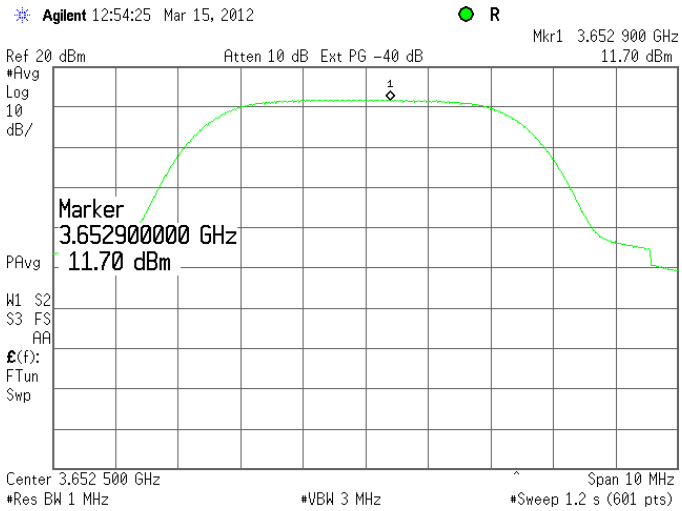
Carrier frequency, MHz	SA reading, dBm	Total power density, dBm	Antenna gain, dBi	Beamforming, dB	Peak EIRP power density, dBm/ MHz	Limit, dBm	Margin, dB	Verdict
Modulation QPSK								
3655.0	6.38	12.40	11.5	6.0	29.90	30.0	-0.10	Pass
3675.0	5.32	11.34	11.5	6.0	28.86	30.0	-1.14	Pass
3695.0	5.13	11.15	11.5	6.0	28.65	30.0	-1.35	Pass
Modulation 64QAM								
3655.0	6.38	12.40	11.5	6.0	29.90	30.0	-0.10	Pass
3675.0	5.42	11.44	11.5	6.0	28.94	30.0	-1.06	Pass
3695.0	5.19	11.21	11.5	6.0	28.71	30.0	-1.29	Pass

* - Total power density, dBm/MHz = SA Reading + 10*log(N)
** - Peak EIRP power density, dBm/MHz = Total power density*, dBm/MHz + Antenna Gain, dBi + Beamforming, dB

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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48VDC
Remarks: Antenna gain 11.5 dBi			

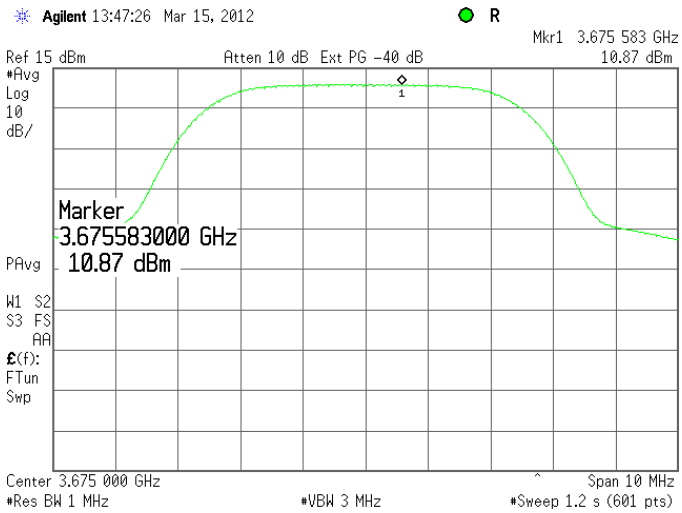
Plot 7.2.1 Peak output power density test results at low frequency

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



Plot 7.2.2 Peak output power density test results at mid frequency

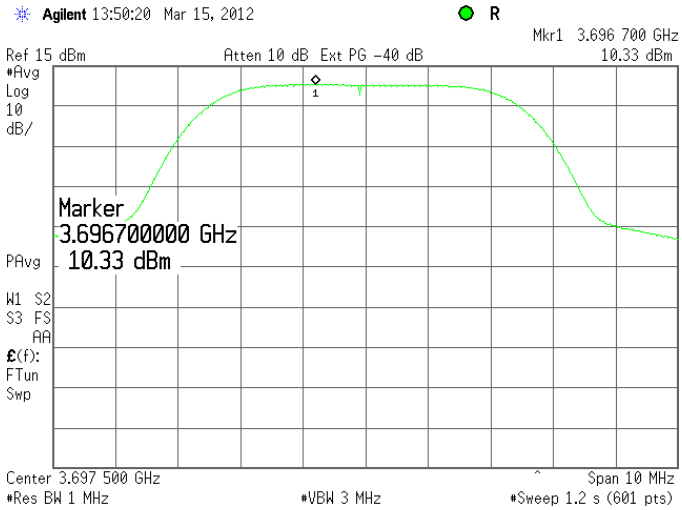
CARRIER FREQUENCY:	3675.0 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION:	QPSK
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48VDC
Remarks: Antenna gain 11.5 dBi			

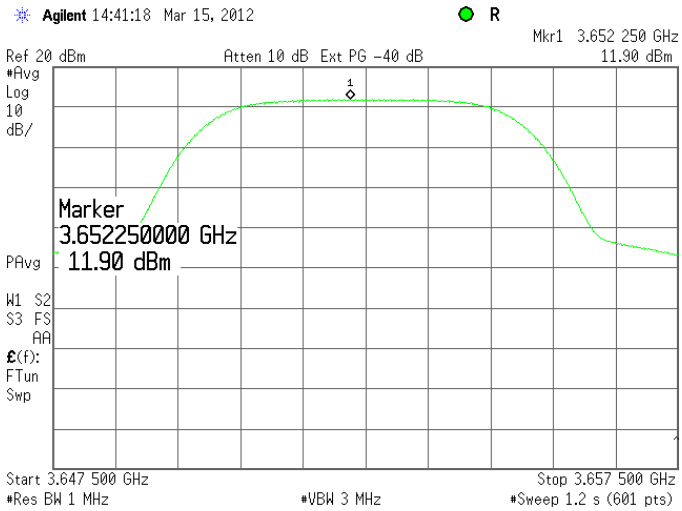
Plot 7.2.3 Peak output power density test results at high frequency

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



Plot 7.2.4 Peak output power density test results at low frequency

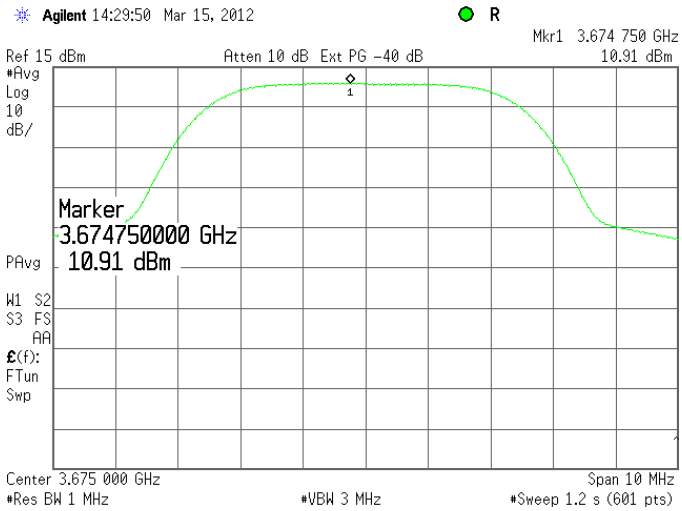
CARRIER FREQUENCY:	3652.5 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION:	64QAM
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 11.5 dBi			

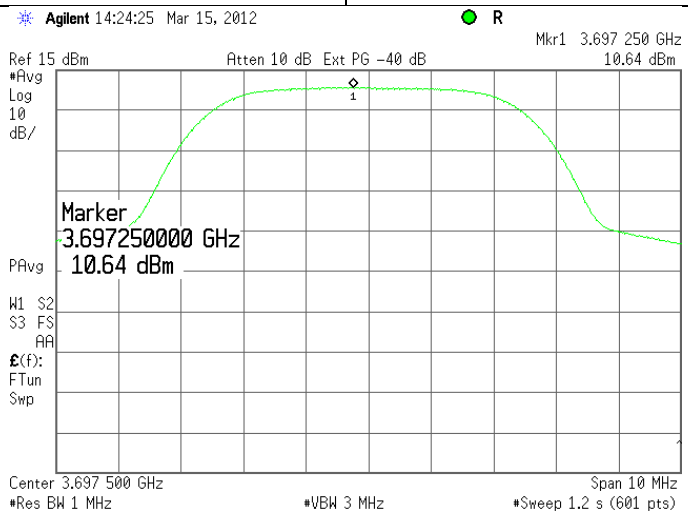
Plot 7.2.5 Peak output power density test results at mid frequency

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



Plot 7.2.6 Peak output power density test results at high frequency

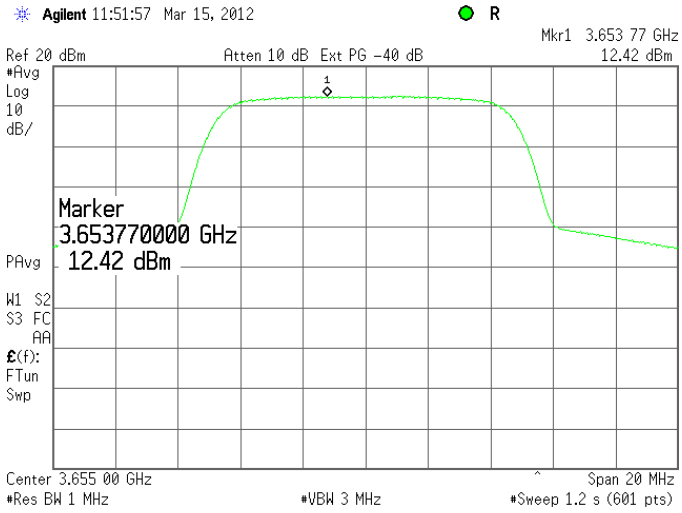
CARRIER FREQUENCY:	3697.50 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION:	64QAM
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48VDC
Remarks: Antenna gain 11.5 dBi			

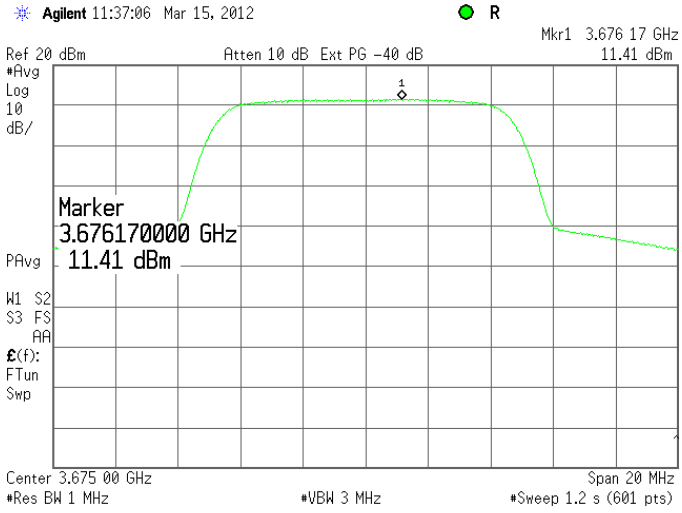
Plot 7.2.7 Peak output power density test results at low frequency

CARRIER FREQUENCY:	3655.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION:	QPSK
RF OUTPUT:	RF#2



Plot 7.2.8 Peak output power density test results at mid frequency

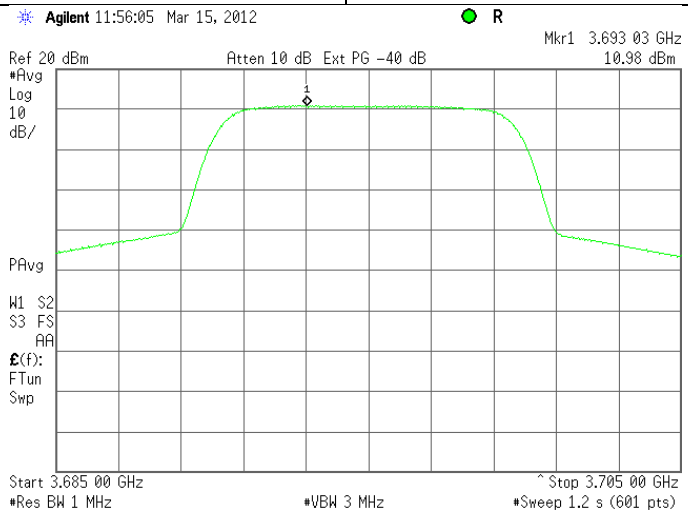
CARRIER FREQUENCY:	3675.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION:	QPSK
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 11.5 dBi			

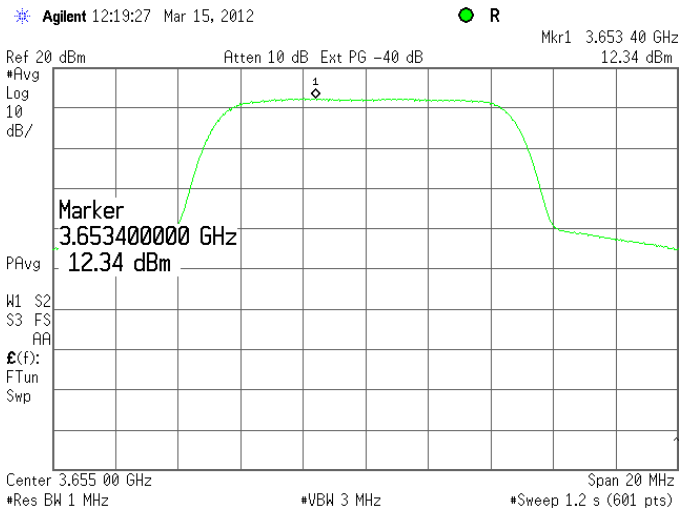
Plot 7.2.9 Peak output power density test results at high frequency

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



Plot 7.2.10 Peak output power density test results at low frequency

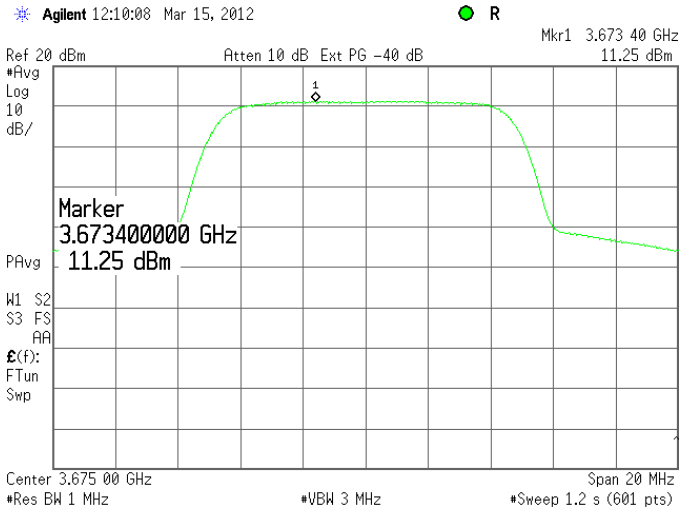
CARRIER FREQUENCY:	3655.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION:	64QAM
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48VDC
Remarks: Antenna gain 11.5 dBi			

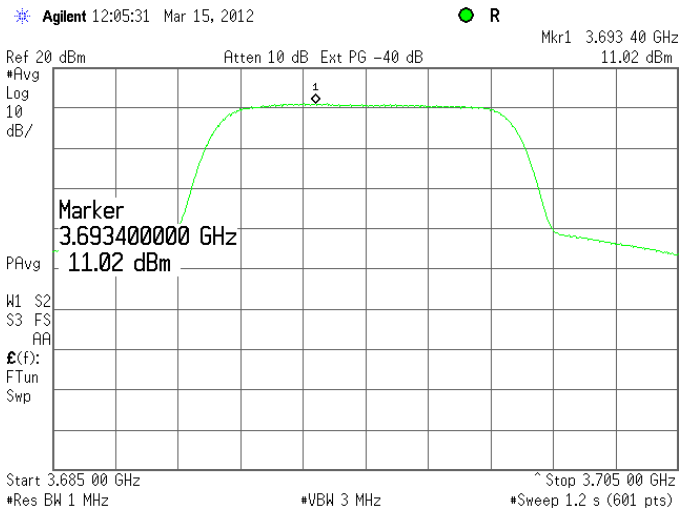
Plot 7.2.11 Peak output power density test results at mid frequency

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



Plot 7.2.12 Peak output power test density results at high frequency

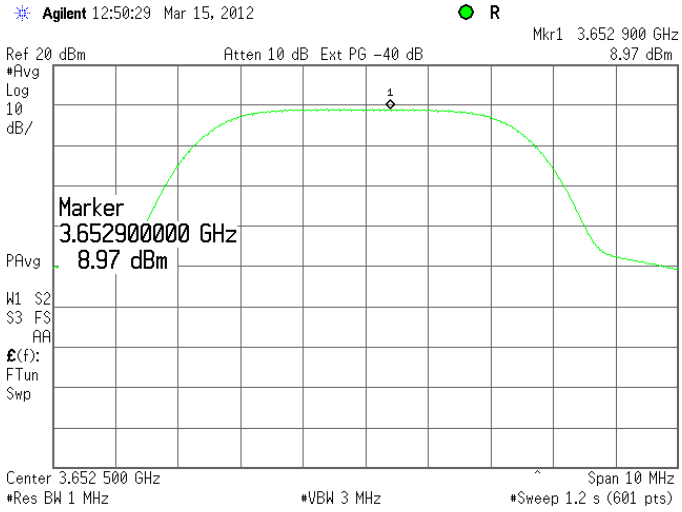
CARRIER FREQUENCY:	3695.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION:	64QAM
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48VDC
Remarks: Antenna gain 11.5 dBi			

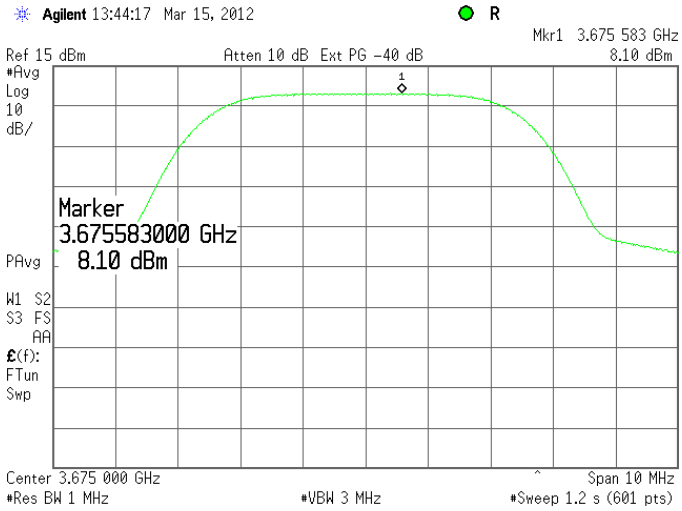
Plot 7.2.13 Peak output power density test results at low frequency

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



Plot 7.2.14 Peak output power density test results at mid frequency

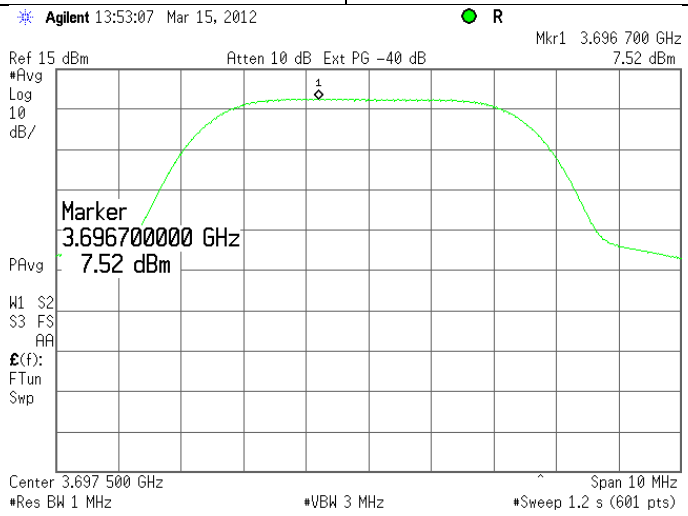
CARRIER FREQUENCY:	3675.0 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION:	QPSK
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 11.5 dBi			

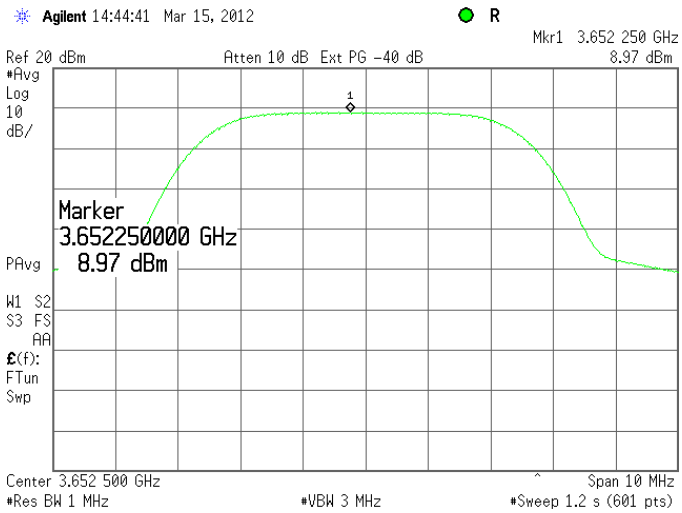
Plot 7.2.15 Peak output power density test results at high frequency

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



Plot 7.2.16 Peak output power density test results at low frequency

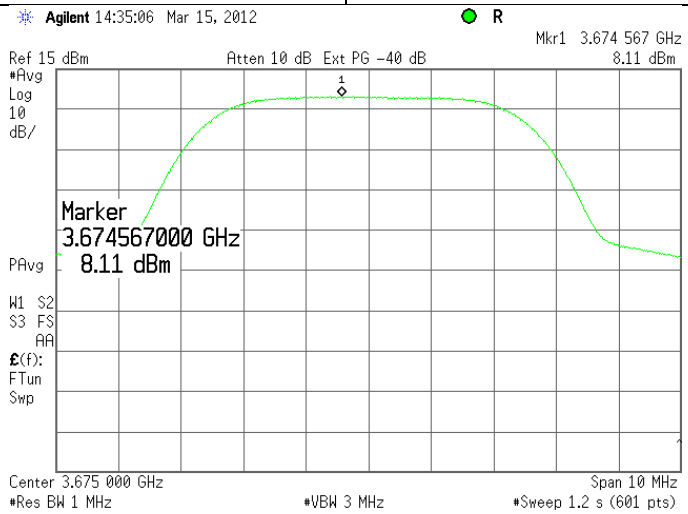
CARRIER FREQUENCY:	3652.5 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION:	64QAM
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 11.5 dBi			

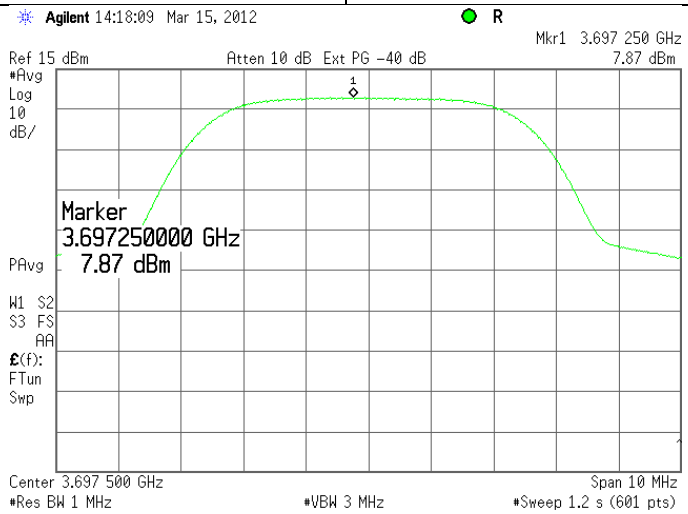
Plot 7.2.17 Peak output power density test results at mid frequency

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



Plot 7.2.18 Peak output power density test results at high frequency

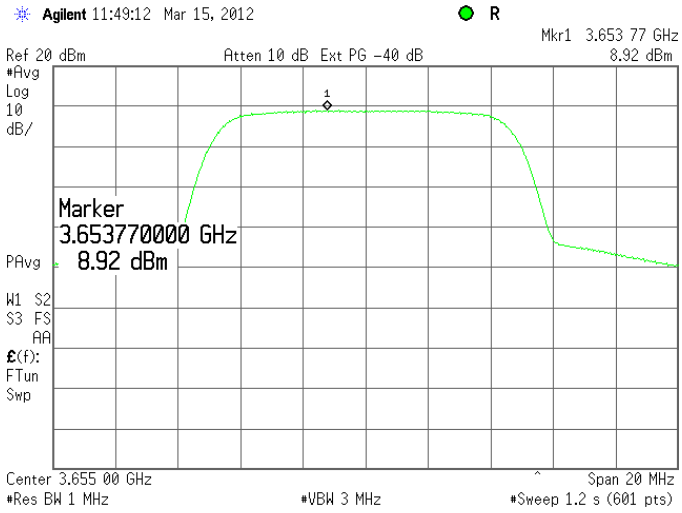
CARRIER FREQUENCY:	3697.50 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION:	64QAM
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48VDC
Remarks: Antenna gain 11.5 dBi			

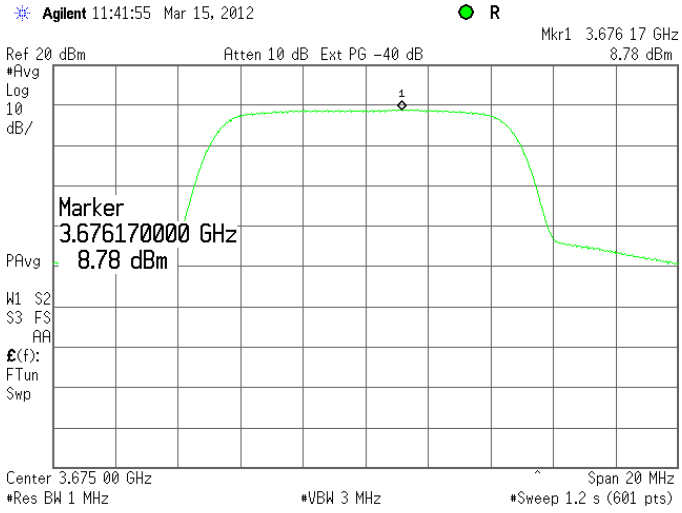
Plot 7.2.19 Peak output power density test results at low frequency

CARRIER FREQUENCY:	3655.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION:	QPSK
RF OUTPUT:	RF#2



Plot 7.2.20 Peak output power density test results at mid frequency

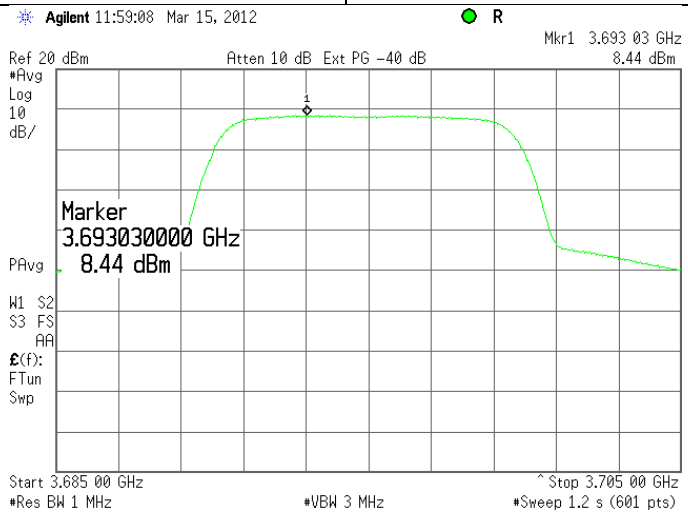
CARRIER FREQUENCY:	3675.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION:	QPSK
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 11.5 dBi			

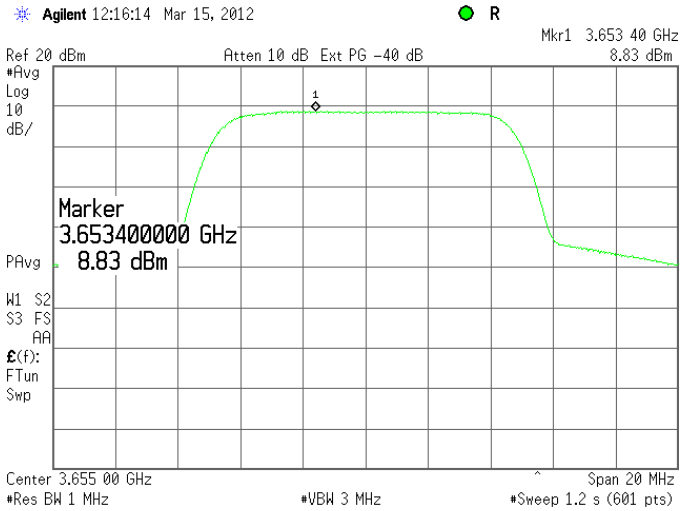
Plot 7.2.21 Peak output power test density results at high frequency

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



Plot 7.2.22 Peak output power density test results at low frequency

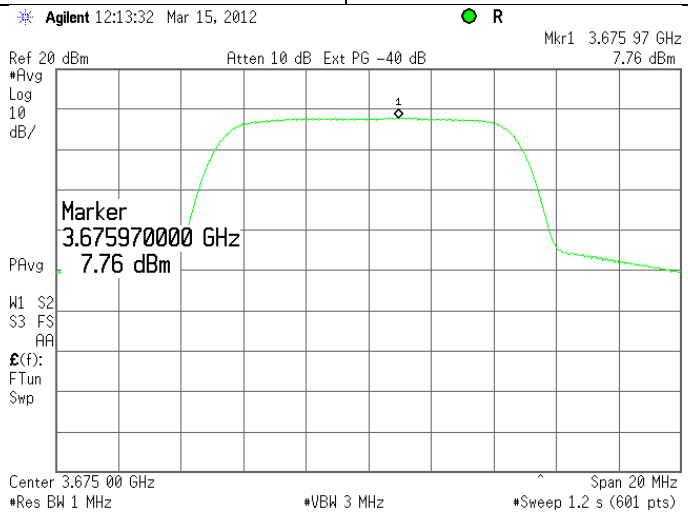
CARRIER FREQUENCY:	3655.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION:	64QAM
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 11.5 dBi			

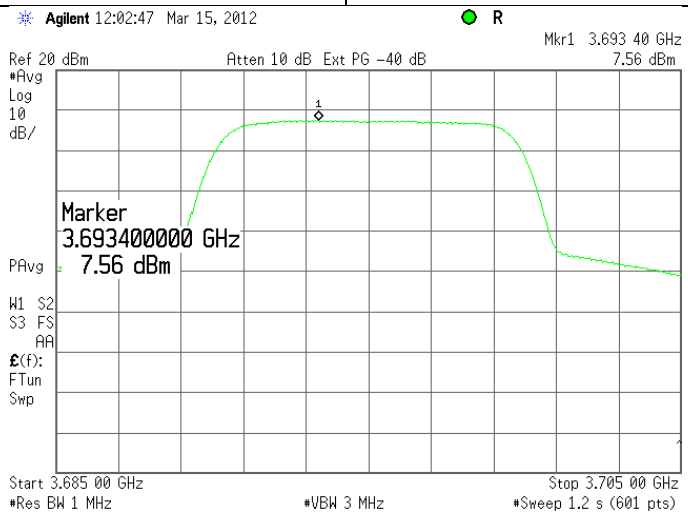
Plot 7.2.23 Peak output power density test results at mid frequency

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



Plot 7.2.24 Peak output power density test results at high frequency

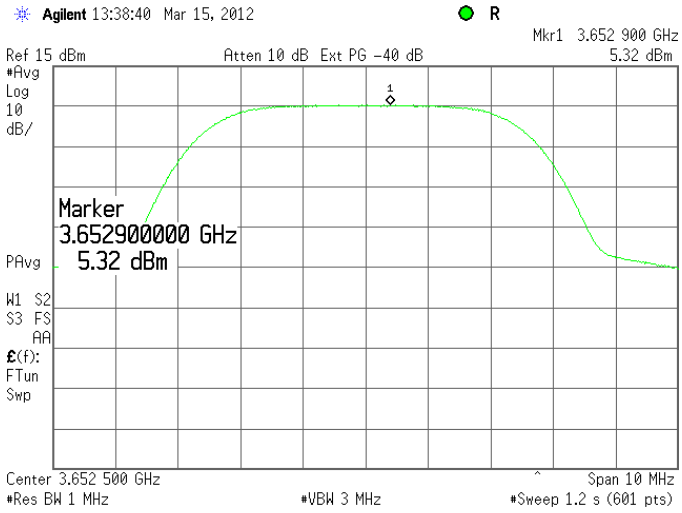
CARRIER FREQUENCY:	3695.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION:	64QAM
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48VDC
Remarks: Antenna gain 11.5 dBi			

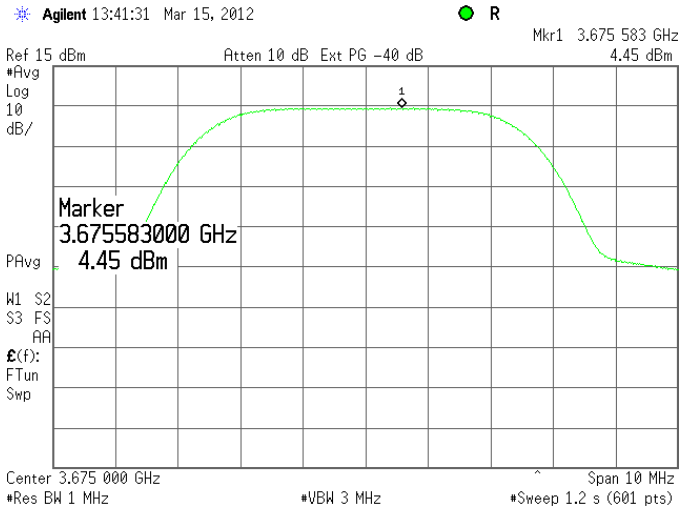
Plot 7.2.25 Peak output power density test results at low frequency

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



Plot 7.2.26 Peak output power density test results at mid frequency

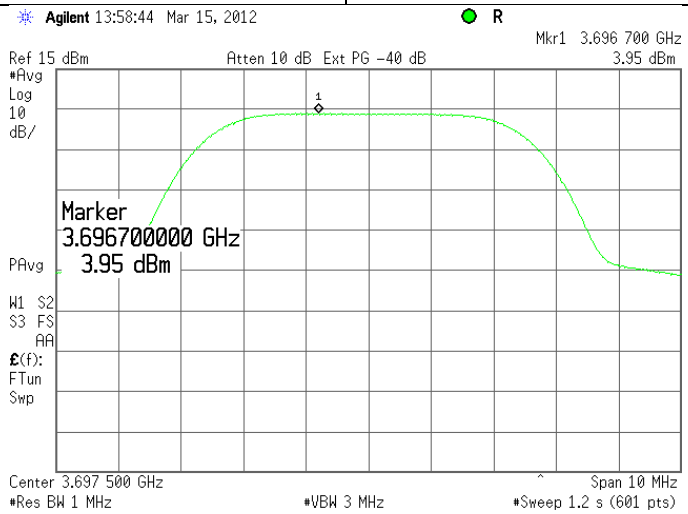
CARRIER FREQUENCY:	3675.0 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION:	QPSK
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48VDC
Remarks: Antenna gain 11.5 dBi			

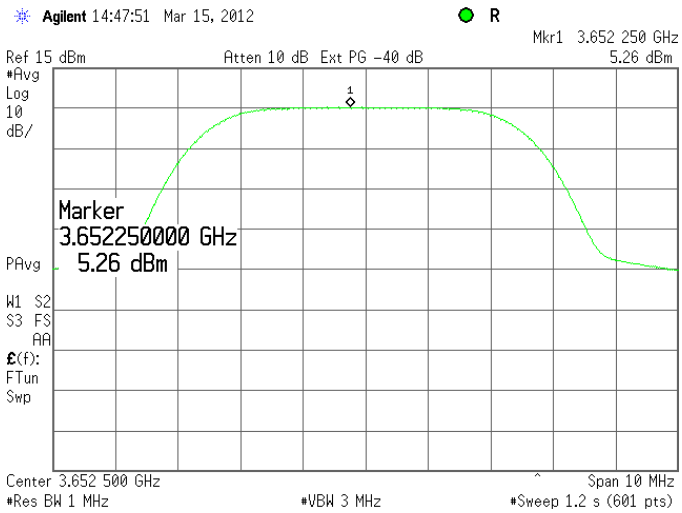
Plot 7.2.27 Peak output power density test results at high frequency

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



Plot 7.2.28 Peak output power density test results at low frequency

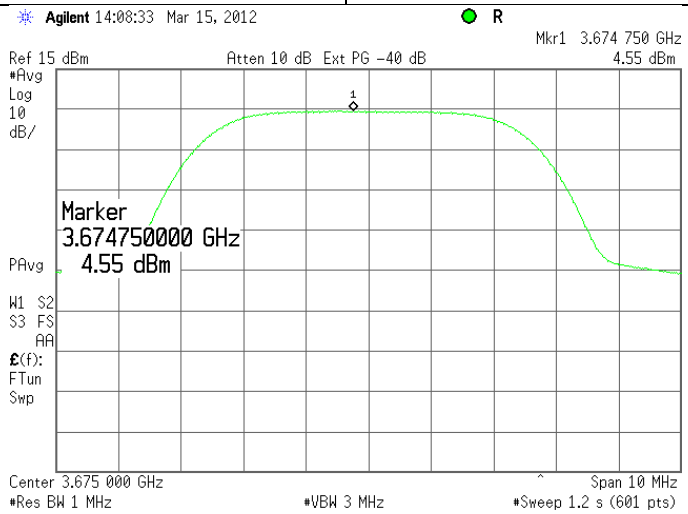
CARRIER FREQUENCY:	3652.5 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION:	64QAM
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48VDC
Remarks: Antenna gain 11.5 dBi			

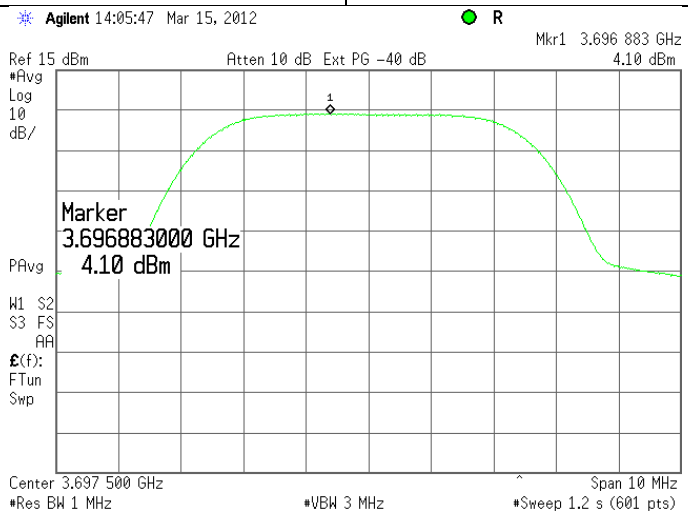
Plot 7.2.29 Peak output power density test results at mid frequency

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



Plot 7.2.30 Peak output power test density results at high frequency

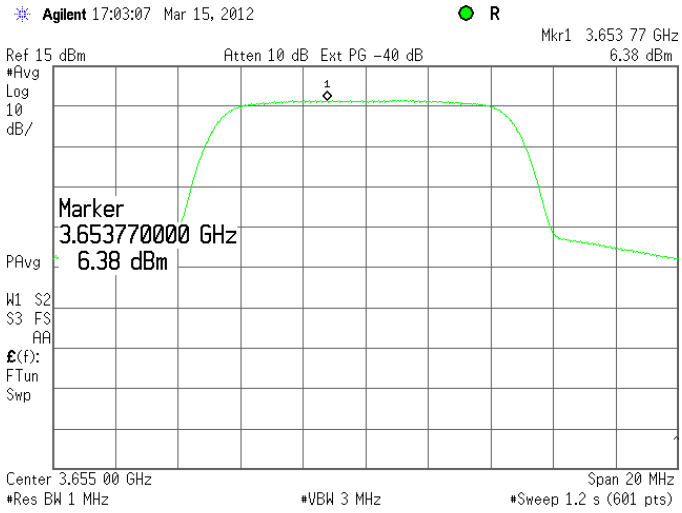
CARRIER FREQUENCY:	3697.50 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION:	64QAM
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 11.5 dBi			

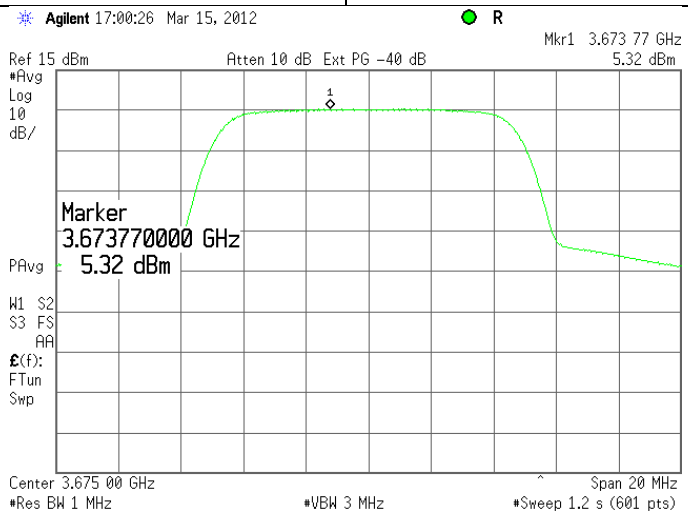
Plot 7.2.31 Peak output power density test results at low frequency

CARRIER FREQUENCY:	3655.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION:	QPSK
RF OUTPUT:	RF#2



Plot 7.2.32 Peak output power density test results at mid frequency

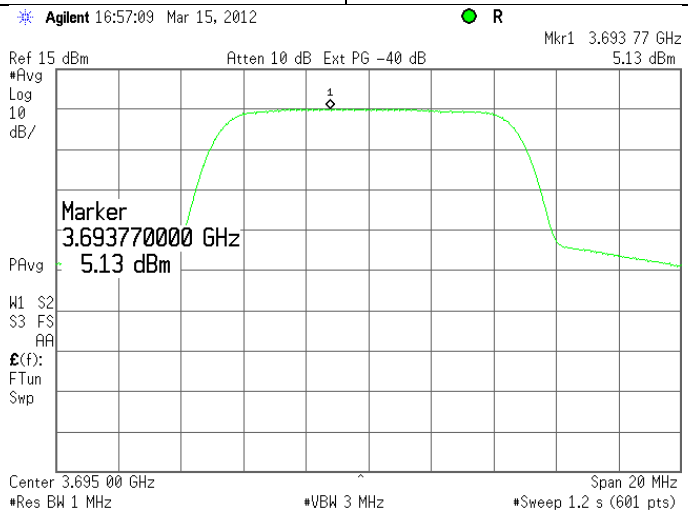
CARRIER FREQUENCY:	3675.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION:	QPSK
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 11.5 dBi			

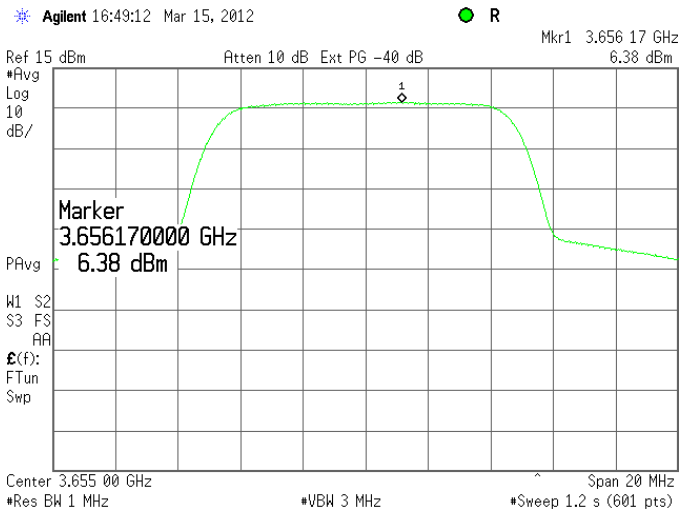
Plot 7.2.33 Peak output power density test results at high frequency

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



Plot 7.2.34 Peak output power density test results at low frequency

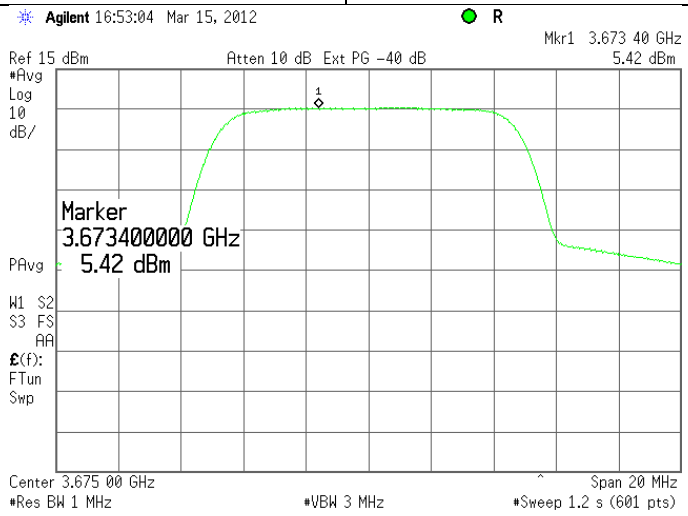
CARRIER FREQUENCY:	3655.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION:	64QAM
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 11.5 dBi			

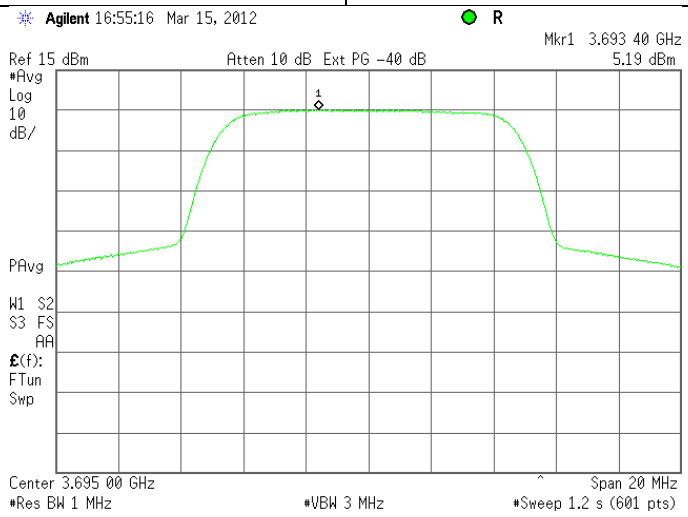
Plot 7.2.35 Peak output power density test results at mid frequency

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



Plot 7.2.36 Peak output power density test results at high frequency

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



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 18 dBi			

7.3 Peak EIRP power density with 18 dBi antenna

7.3.1 General

This test was performed to measure the peak EIRP density at the transmitter RF antenna connector. Specification test limits are given in Table 7.3.1.

Table 7.3.1 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		

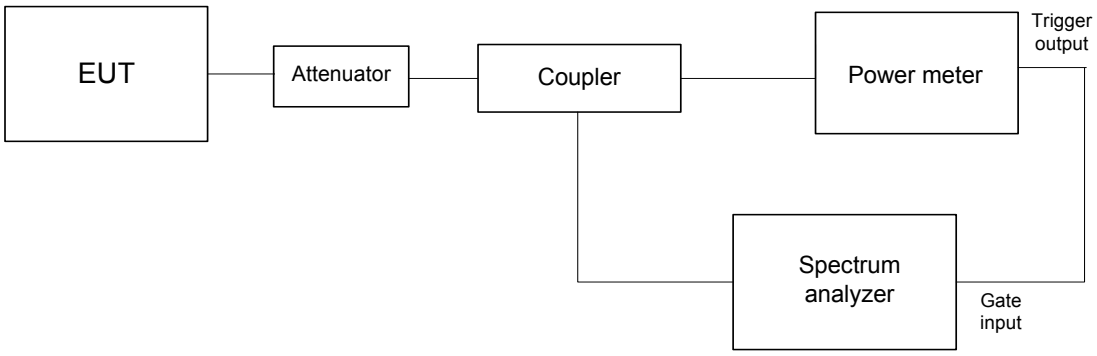
7.3.2 Test procedure

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 adjusted to produce maximum available for end user RF output power.

7.3.2.3 The peak output power density was measured with spectrum analyzer as provided in Table 7.3.2, Table 7.3.3 and the associated plots.

Figure 7.3.1 Peak power density test setup



Reference numbers of test equipment used

HL 3301	HL 3302	HL 3667	HL 3768	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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 18 dBi			

Table 7.3.2 Peak EIRP power density test results

ASSIGNED FREQUENCY RANGE:	3650.0 – 3700.0 MHz
DETECTOR USED:	Average (RMS)
RESOLUTION BANDWIDTH:	1000 kHz
VIDEO BANDWIDTH:	3000 kHz
MODULATING SIGNAL:	PRBS
ANTENNA GAIN:	18 dBi
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum
EBW:	5 MHz

BEAMFORMING: 0 dB

Carrier frequency, MHz	SA reading, dBm	Total power density, dBm	Antenna gain, dBi	Beamforming, dB	Peak EIRP power density, dBm/ MHz	Limit, dBm	Margin, dB	Verdict
Modulation QPSK								
3652.5	5.35	11.37	18.0	0	29.37	30.0	-0.63	Pass
3675.0	4.50	10.52	18.0	0	28.54	30.0	-1.46	Pass
3697.5	4.24	10.26	18.0	0	28.26	30.0	-1.74	Pass
Modulation 64QAM								
3652.5	5.44	11.46	18.0	0	29.48	30.0	-0.52	Pass
3675.0	4.57	10.59	18.0	0	28.59	30.0	-1.41	Pass
3697.5	4.18	10.20	18.0	0	28.22	30.0	-1.78	Pass

BEAMFORMING: 3 dB

Carrier frequency, MHz	SA reading, dBm	Total power density, dBm	Antenna gain, dBi	Beamforming, dB	Peak EIRP power density, dBm/ MHz	Limit, dBm	Margin, dB	Verdict
Modulation QPSK								
3652.5	2.58	8.60	18.0	3.0	29.60	30.0	-0.40	Pass
3675.0	1.62	7.64	18.0	3.0	28.64	30.0	-1.36	Pass
3697.5	1.25	7.27	18.0	3.0	28.27	30.0	-1.73	Pass
Modulation 64QAM								
3652.5	2.60	8.62	18.0	3.0	29.64	30.0	-0.36	Pass
3675.0	1.71	7.73	18.0	3.0	28.73	30.0	-1.27	Pass
3697.5	1.35	7.37	18.0	3.0	28.39	30.0	-1.61	Pass

BEAMFORMING: 6 dB

Carrier frequency, MHz	SA reading, dBm	Total power density, dBm	Antenna gain, dBi	Beamforming, dB	Peak EIRP power density, dBm/ MHz	Limit, dBm	Margin, dB	Verdict
Modulation QPSK								
3652.5	-0.21	5.81	18.0	6.0	29.81	30.0	-0.19	Pass
3675.0	-1.30	4.72	18.0	6.0	28.72	30.0	-1.28	Pass
3697.5	-1.58	4.44	18.0	6.0	28.44	30.0	-1.56	Pass
Modulation 64QAM								
3652.5	-0.31	5.71	18.0	6.0	29.73	30.0	-0.27	Pass
3675.0	-1.14	4.88	18.0	6.0	28.88	30.0	-1.12	Pass
3697.5	-1.53	4.49	18.0	6.0	28.51	30.0	-1.49	Pass

* - Total power density, dBm/MHz = SA Reading + 10*log(N)

** - Peak EIRP power density, dBm/MHz = Total power density*, dBm/MHz + Antenna Gain, dBi + Beamforming, dB

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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 18 dBi			

Table 7.3.3 Peak EIRP power density test results

ASSIGNED FREQUENCY RANGE: 3650.0 – 3700.0 MHz
DETECTOR USED: Average (RMS)
RESOLUTION BANDWIDTH: 1000 kHz
VIDEO BANDWIDTH: 3000 kHz
MODULATING SIGNAL: PRBS
ANTENNA GAIN: 18 dBi
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

EBW: 10 MHz

BEAMFORMING: 0 dB

Carrier frequency, MHz	SA reading, dBm	Total power density, dBm	Antenna gain, dBi	Beamforming, dB	Peak EIRP power density, dBm/ MHz	Limit, dBm	Margin, dB	Verdict
Modulation QPSK								
3655.0	5.19	11.21	18.0	0	29.21	30.0	-0.79	Pass
3675.0	4.26	10.28	18.0	0	28.30	30.0	-1.70	Pass
3695.0	4.01	10.03	18.0	0	28.03	30.0	-1.97	Pass
Modulation 64QAM								
3655.0	5.15	11.17	18.0	0	29.19	30.0	-0.81	Pass
3675.0	4.36	10.38	18.0	0	28.38	30.0	-1.62	Pass
3695.0	4.09	10.11	18.0	0	28.13	30.0	-1.87	Pass

BEAMFORMING: 3 dB

Carrier frequency, MHz	SA reading, dBm	Total power density, dBm	Antenna gain, dBi	Beamforming, dB	Peak EIRP power density, dBm/ MHz	Limit, dBm	Margin, dB	Verdict
Modulation QPSK								
3655.0	2.55	8.57	18.0	3.0	29.57	30.0	-0.43	Pass
3675.0	1.57	7.59	18.0	3.0	28.61	30.0	-1.39	Pass
3695.0	1.22	7.24	18.0	3.0	28.24	30.0	-1.76	Pass
Modulation 64QAM								
3655.0	2.66	8.68	18.0	3.0	29.70	30.0	-0.30	Pass
3675.0	1.60	7.62	18.0	3.0	28.62	30.0	-1.38	Pass
3695.0	1.27	7.29	18.0	3.0	28.31	30.0	-1.69	Pass

BEAMFORMING: 6 dB

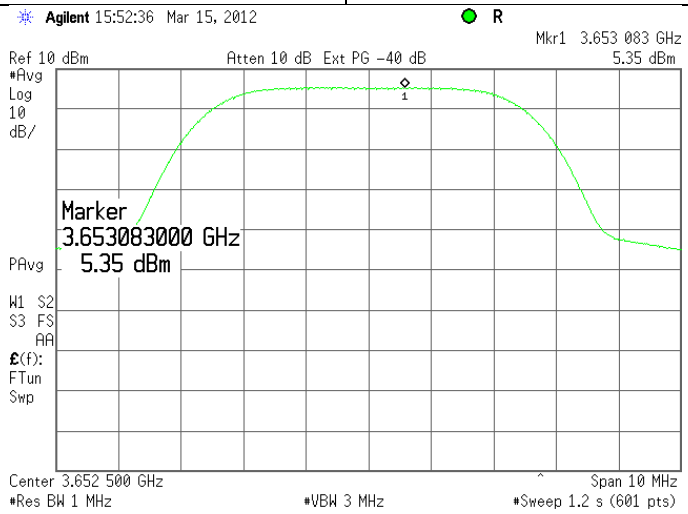
Carrier frequency, MHz	SA reading, dBm	Total power density, dBm	Antenna gain, dBi	Beamforming, dB	Peak EIRP power density, dBm/ MHz	Limit, dBm	Margin, dB	Verdict
Modulation QPSK								
3655.0	-1.02	5.00	18.0	6.0	29.00	30.0	-1.00	Pass
3675.0	-2.01	4.01	18.0	6.0	28.03	30.0	-1.97	Pass
3695.0	-1.02	5.00	18.0	6.0	27.84	30.0	-2.16	Pass
Modulation 64QAM								
3655.0	-0.97	5.05	18.0	6.0	29.07	30.0	-0.93	Pass
3675.0	-1.98	4.04	18.0	6.0	28.04	30.0	-1.96	Pass
3695.0	-2.11	3.91	18.0	6.0	27.93	30.0	-2.07	Pass

* - Total power density, dBm/MHz = SA Reading + 10*log(N)
** - Peak EIRP power density, dBm/MHz = Total power density*, dBm/MHz + Antenna Gain, dBi + Beamforming, dB

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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48VDC
Remarks: Antenna gain 18 dBi			

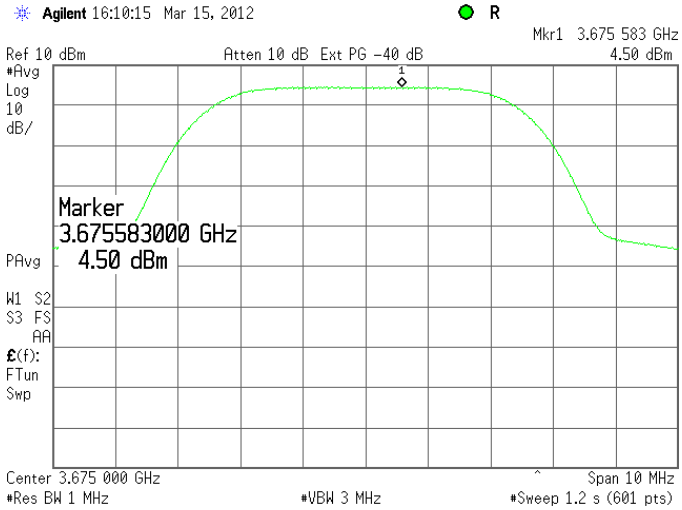
Plot 7.3.1 Peak output power density test results at low frequency

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



Plot 7.3.2 Peak output power density test results at mid frequency

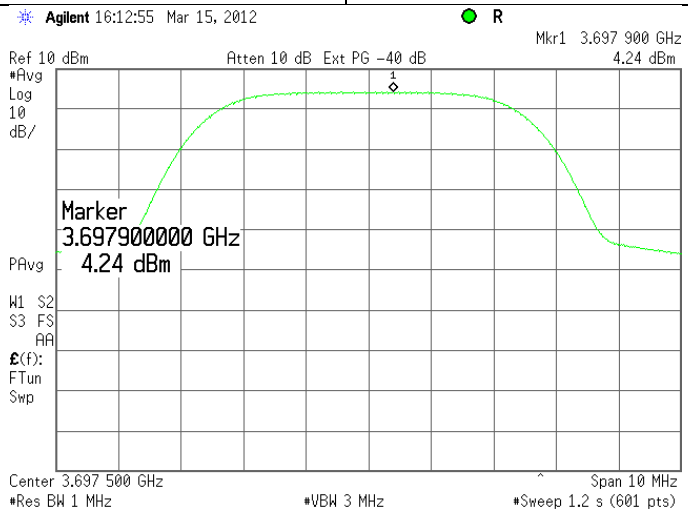
CARRIER FREQUENCY:	3675.0 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION:	QPSK
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48VDC
Remarks: Antenna gain 18 dBi			

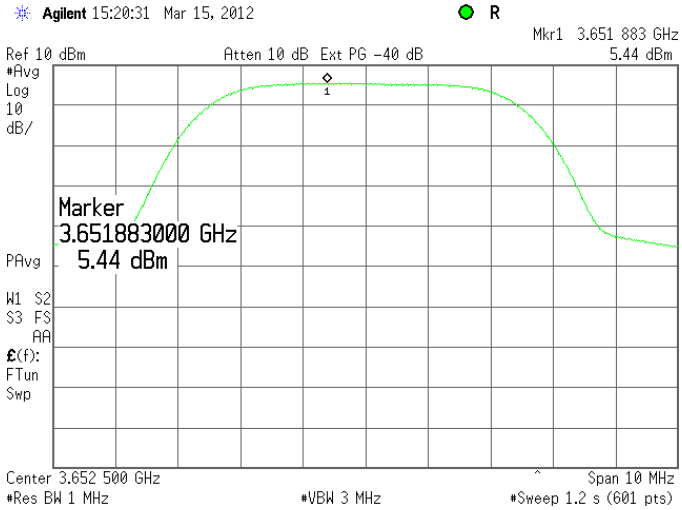
Plot 7.3.3 Peak output power test results at high frequency

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



Plot 7.3.4 Peak output power test results at low frequency

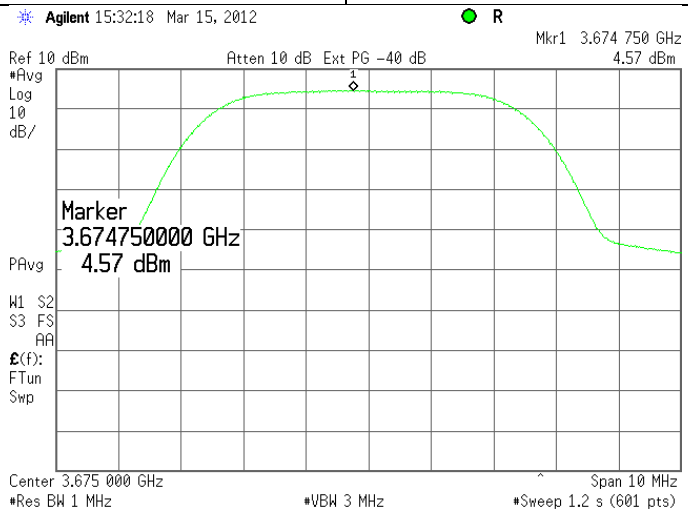
CARRIER FREQUENCY:	3652.5 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION:	64QAM
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 18 dBi			

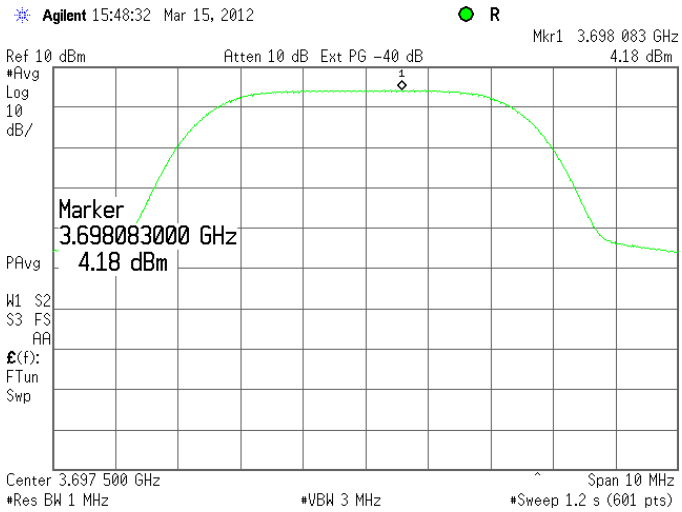
Plot 7.3.5 Peak output power test results at mid frequency

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



Plot 7.3.6 Peak output power test results at high frequency

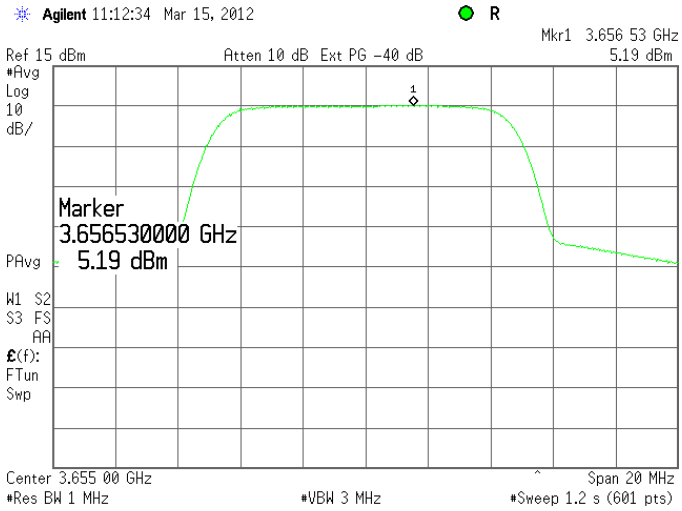
CARRIER FREQUENCY:	3697.50 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION:	64QAM
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48VDC
Remarks: Antenna gain 18 dBi			

Plot 7.3.7 Peak output power test results at low frequency

CARRIER FREQUENCY:	3655.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION:	QPSK
RF OUTPUT:	RF#2



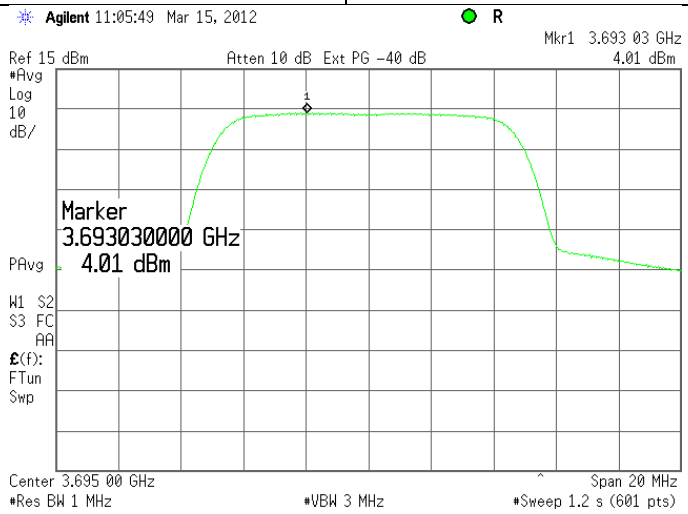
Plot 7.3.8 Peak output power test results at mid frequency

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

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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 18 dBi			

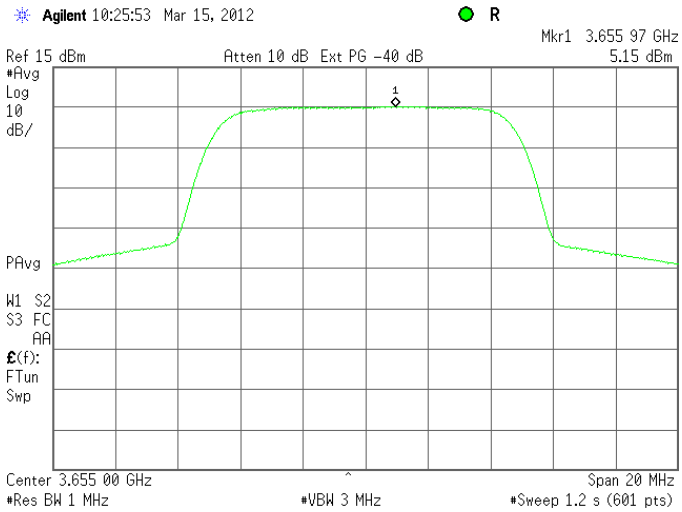
Plot 7.3.9 Peak output power test results at high frequency

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



Plot 7.3.10 Peak output power test results at low frequency

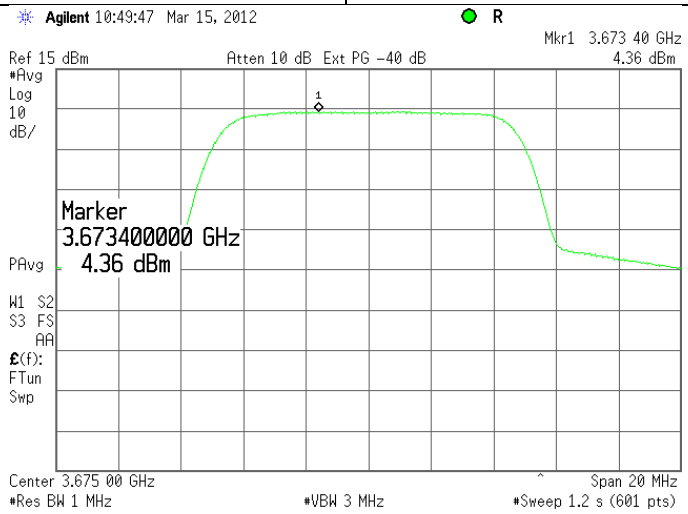
CARRIER FREQUENCY:	3655.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION:	64QAM
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 18 dBi			

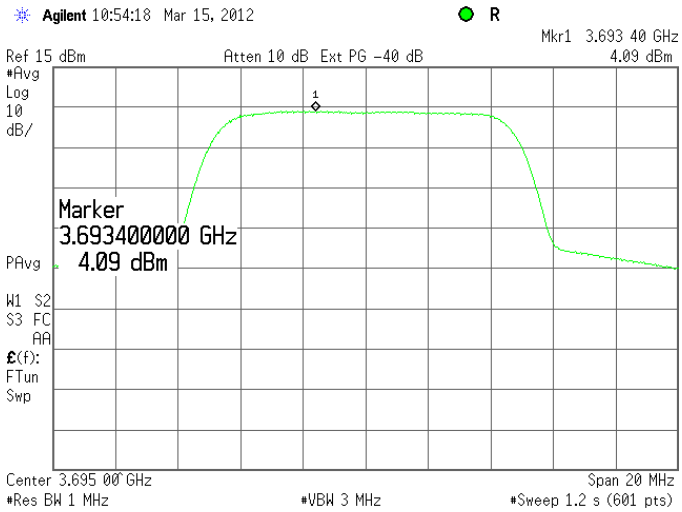
Plot 7.3.11 Peak output power test results at mid frequency

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



Plot 7.3.12 Peak output power test results at high frequency

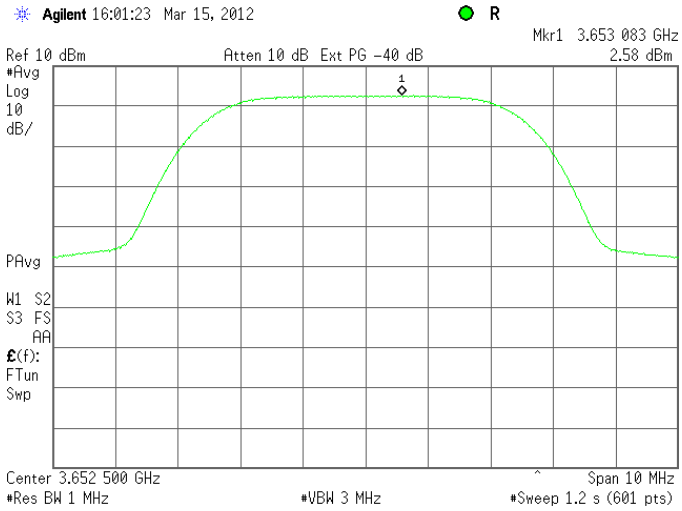
CARRIER FREQUENCY:	3695.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION:	64QAM
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 18 dBi			

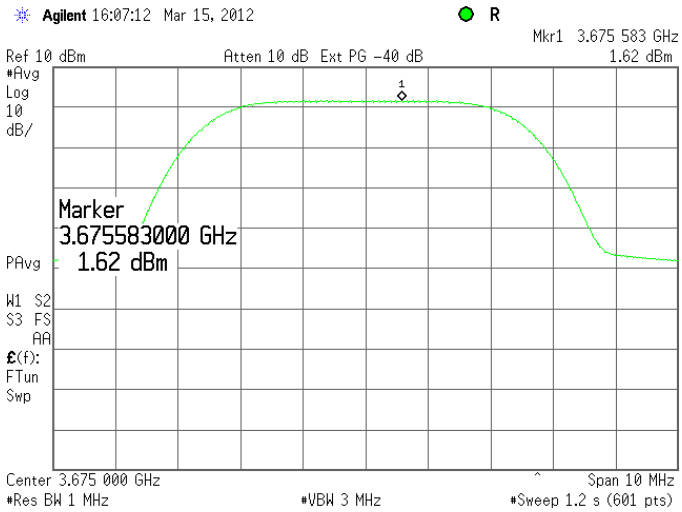
Plot 7.3.13 Peak output power density test results at low frequency

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



Plot 7.3.14 Peak output power density test results at mid frequency

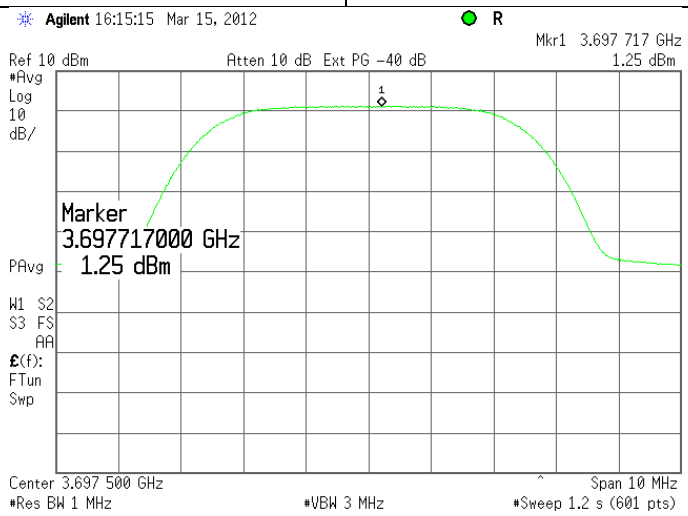
CARRIER FREQUENCY:	3675.0 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION:	QPSK
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 18 dBi			

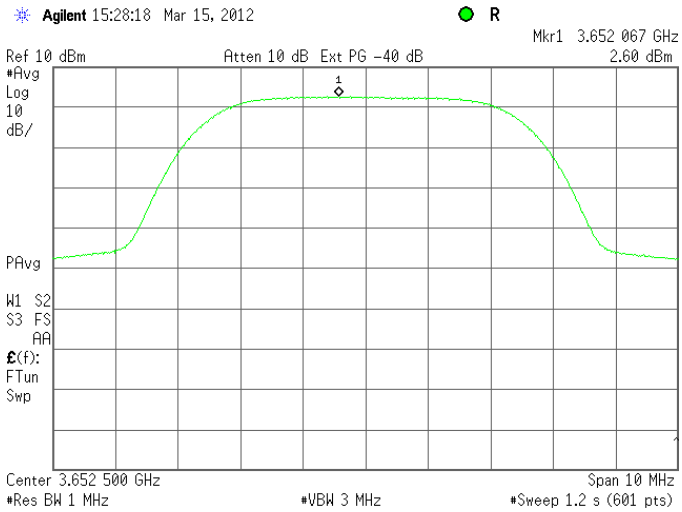
Plot 7.3.15 Peak output power test results at high frequency

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



Plot 7.3.16 Peak output power test results at low frequency

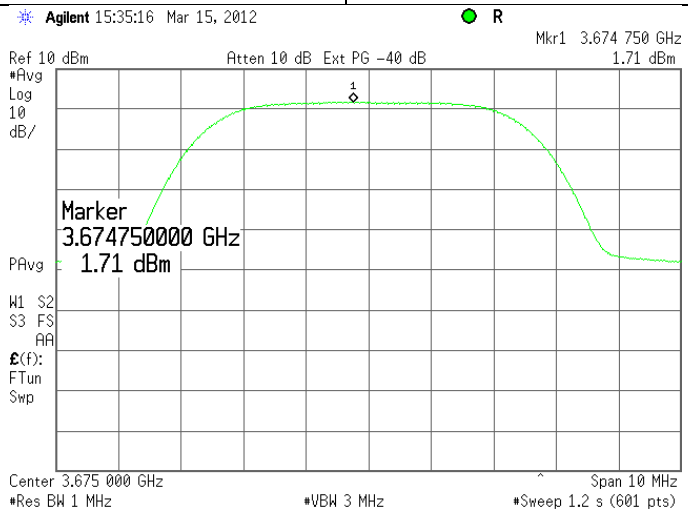
CARRIER FREQUENCY:	3652.5 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION:	64QAM
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 18 dBi			

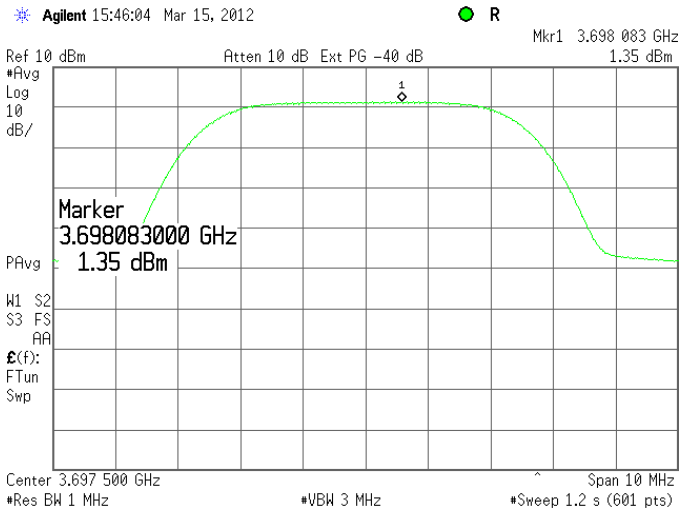
Plot 7.3.17 Peak output power test results at mid frequency

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



Plot 7.3.18 Peak output power test results at high frequency

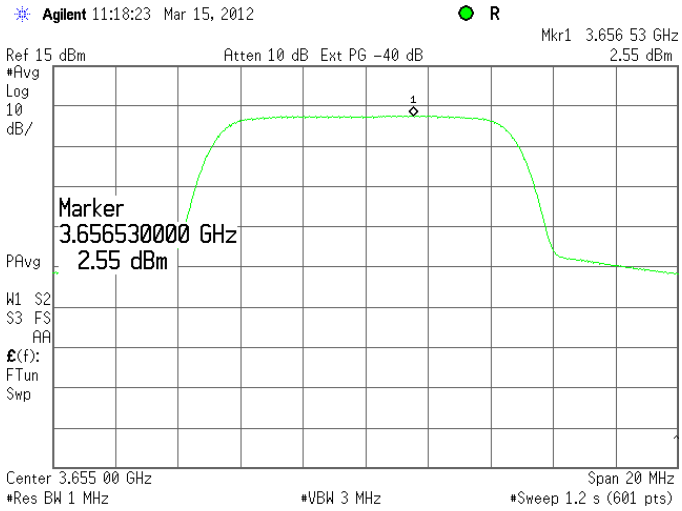
CARRIER FREQUENCY:	3697.50 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION:	64QAM
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 18 dBi			

Plot 7.3.19 Peak output power test results at low frequency

CARRIER FREQUENCY:	3655.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION:	QPSK
RF OUTPUT:	RF#2



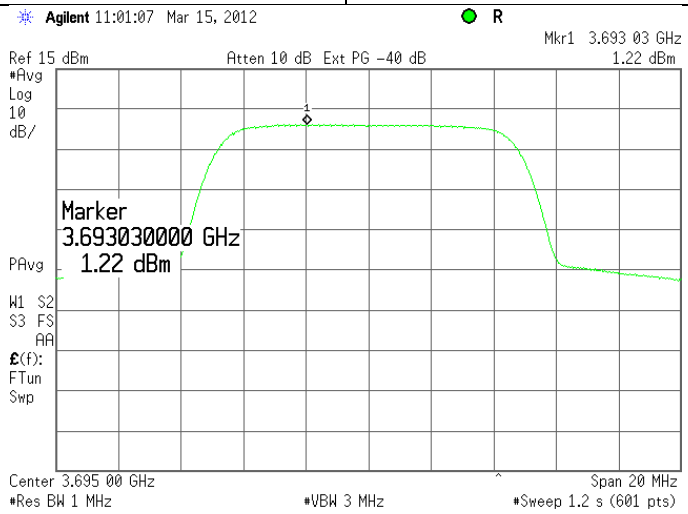
Plot 7.3.20 Peak output power test results at mid frequency

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

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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 18 dBi			

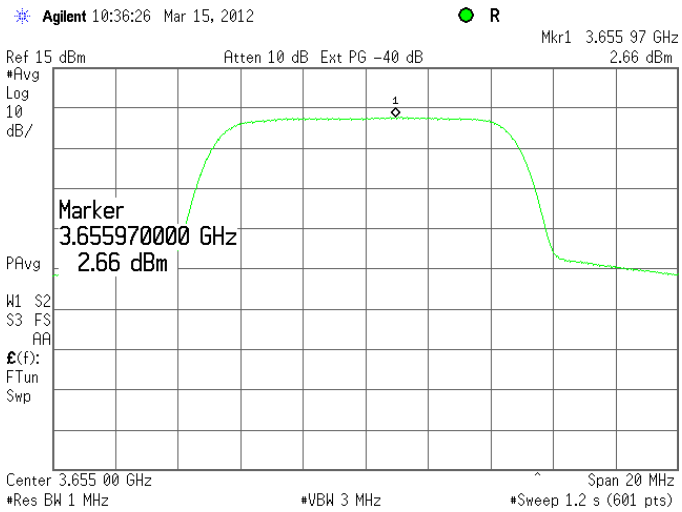
Plot 7.3.21 Peak output power test results at high frequency

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



Plot 7.3.22 Peak output power test results at low frequency

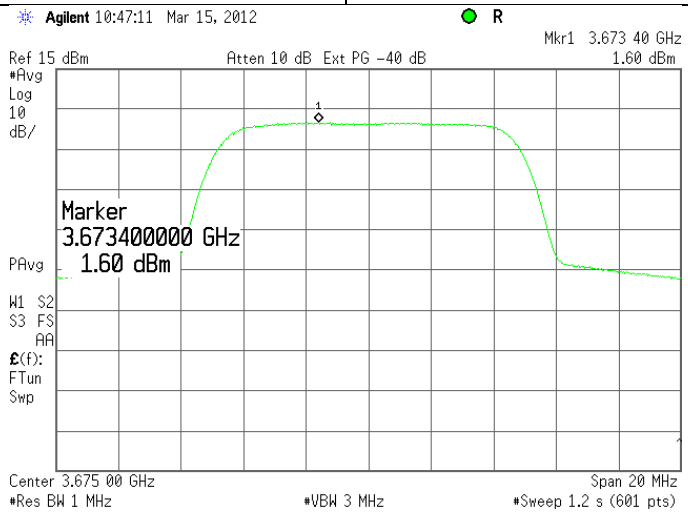
CARRIER FREQUENCY:	3655.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION:	64QAM
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48VDC
Remarks: Antenna gain 18 dBi			

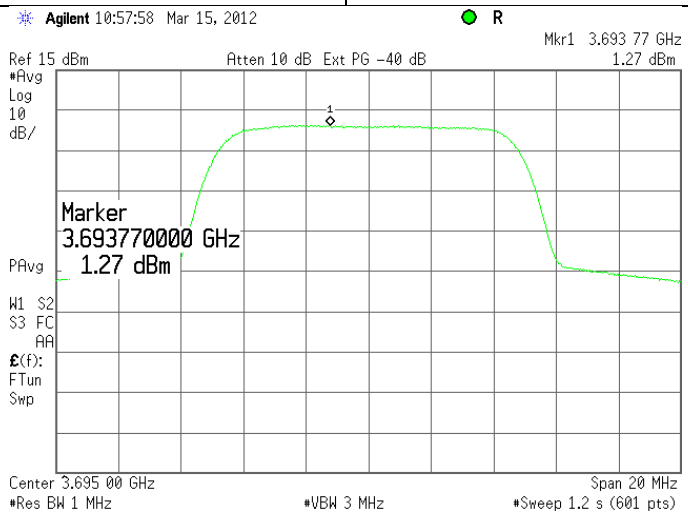
Plot 7.3.23 Peak output power test results at mid frequency

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



Plot 7.3.24 Peak output power test results at high frequency

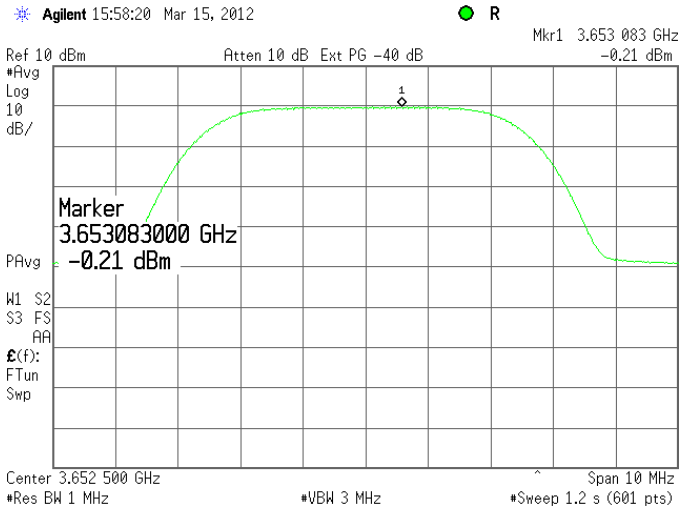
CARRIER FREQUENCY:	3695.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION:	64QAM
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 18 dBi			

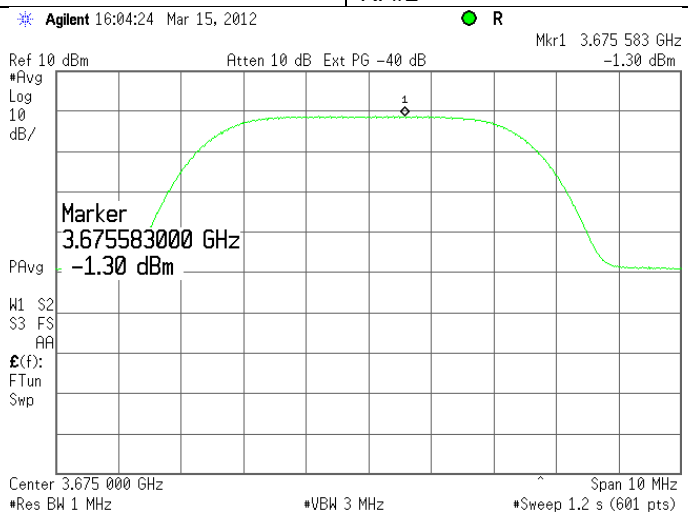
Plot 7.3.25 Peak output power density test results at low frequency

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



Plot 7.3.26 Peak output power density test results at mid frequency

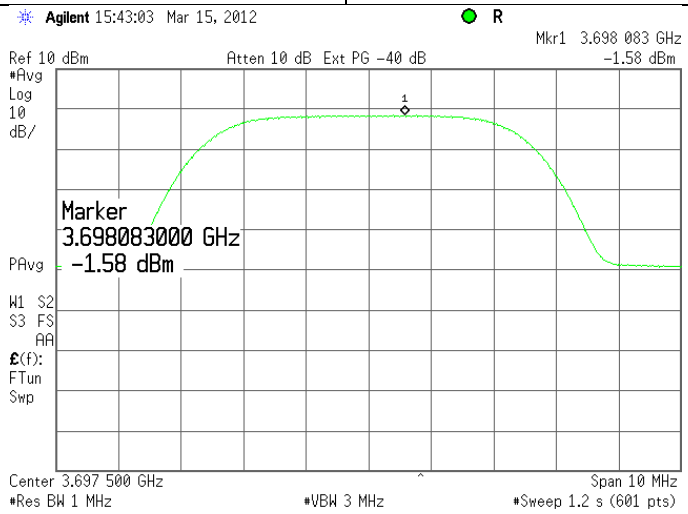
CARRIER FREQUENCY:	3675.0 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION:	QPSK
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 18 dBi			

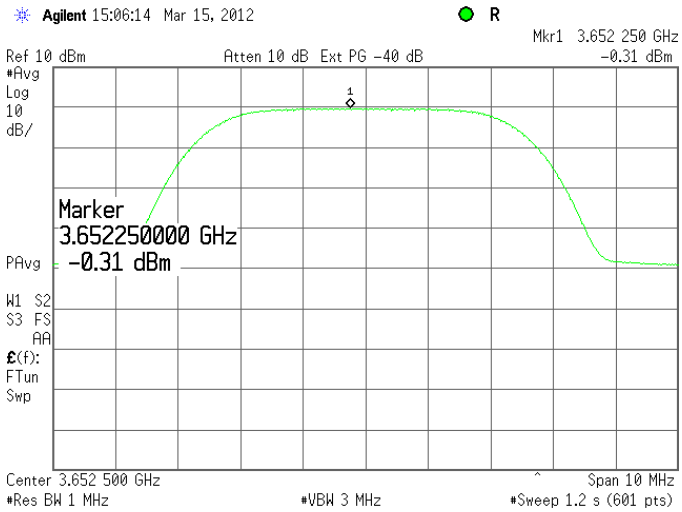
Plot 7.3.27 Peak output power test results at high frequency

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



Plot 7.3.28 Peak output power test results at low frequency

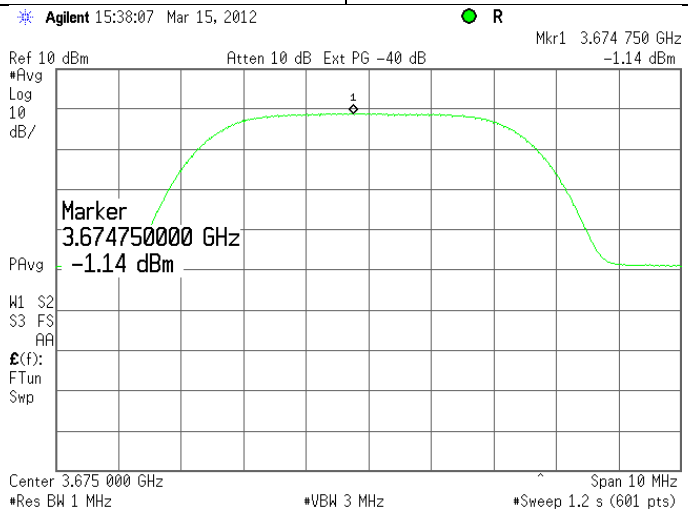
CARRIER FREQUENCY:	3652.5 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION:	64QAM
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 18 dBi			

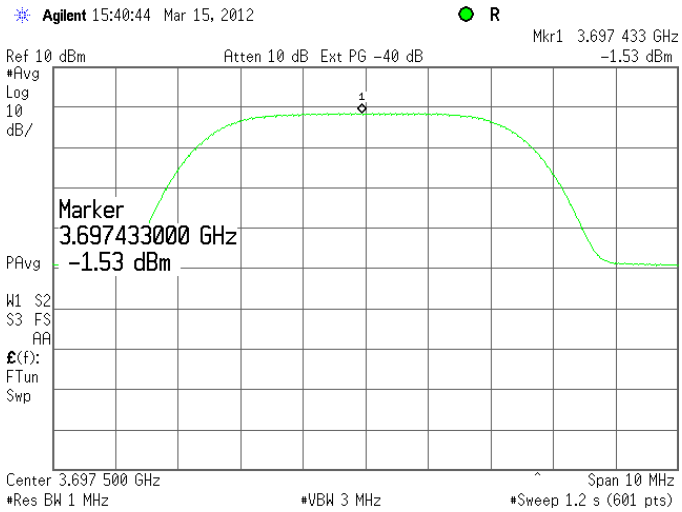
Plot 7.3.29 Peak output power test results at mid frequency

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



Plot 7.3.30 Peak output power test results at high frequency

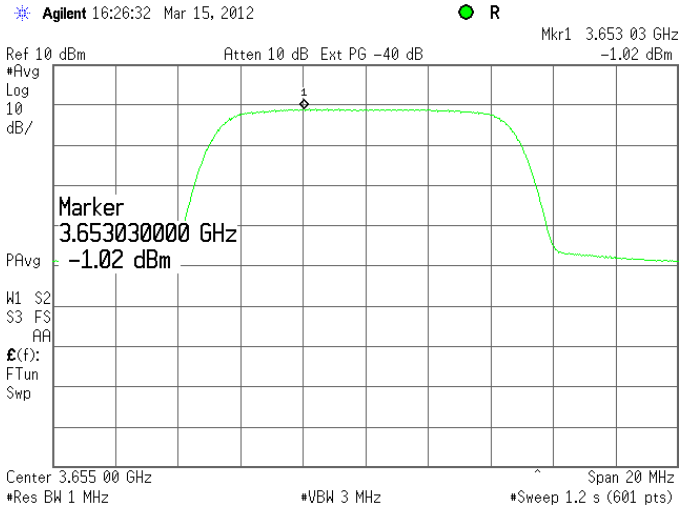
CARRIER FREQUENCY:	3697.50 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION:	64QAM
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 18 dBi			

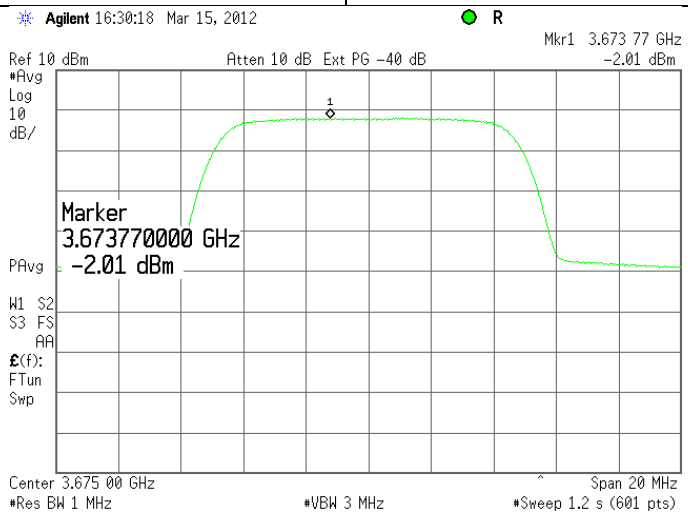
Plot 7.3.31 Peak output power test results at low frequency

CARRIER FREQUENCY:	3655.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION:	QPSK
RF OUTPUT:	RF#2



Plot 7.3.32 Peak output power test results at mid frequency

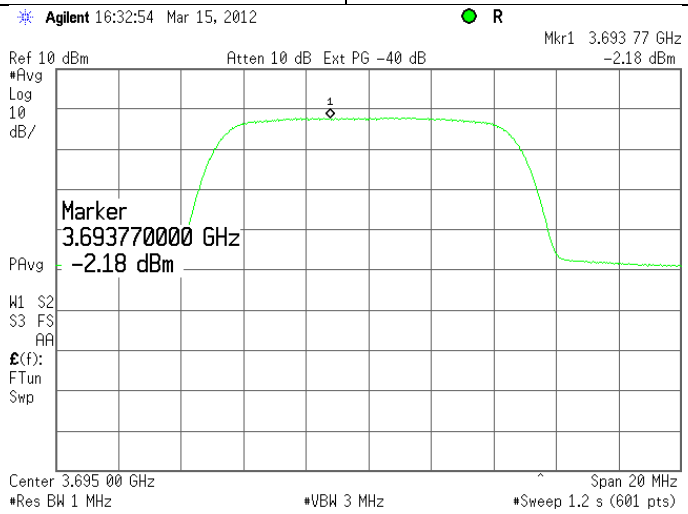
CARRIER FREQUENCY:	3675.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION:	QPSK
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48VDC
Remarks: Antenna gain 18 dBi			

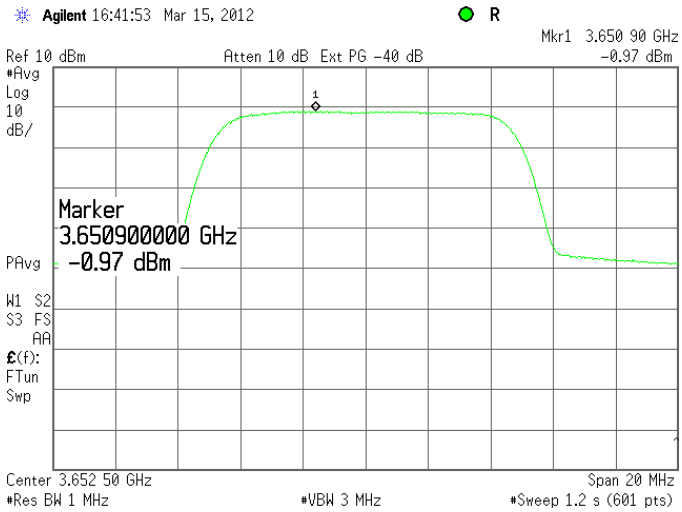
Plot 7.3.33 Peak output power test results at high frequency

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



Plot 7.3.34 Peak output power test results at low frequency

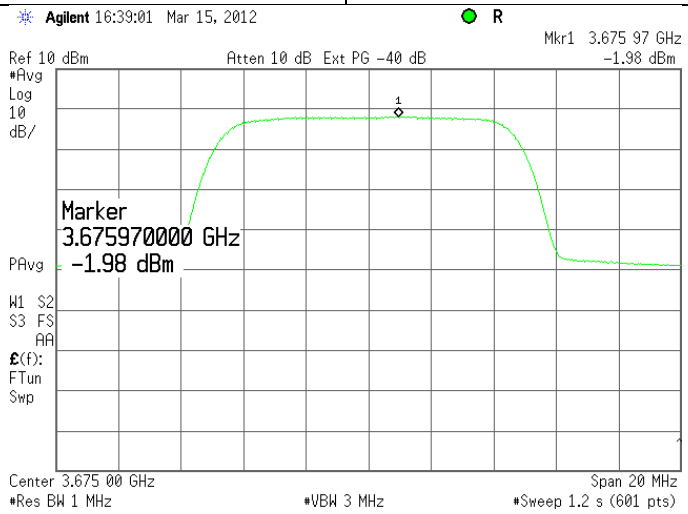
CARRIER FREQUENCY:	3655.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION:	64QAM
RF OUTPUT:	RF#2



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):	3/11/2012 - 3/12/2012		
Temperature: 22.3 ºC	Air Pressure: 1010 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks: Antenna gain 18 dBi			

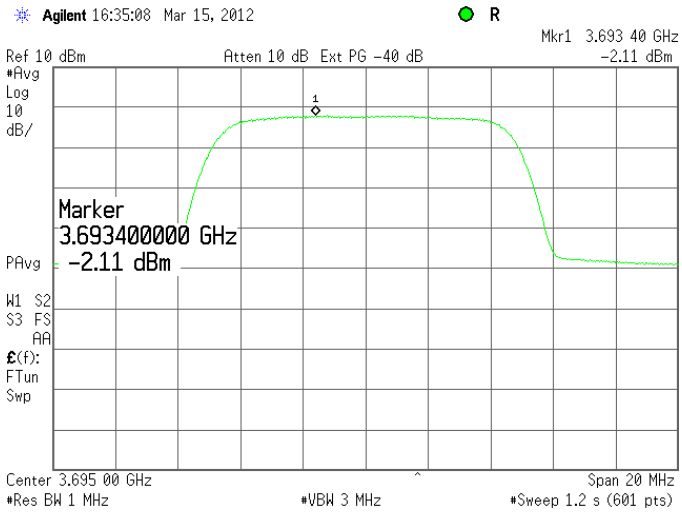
Plot 7.3.35 Peak output power test results at mid frequency

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



Plot 7.3.36 Peak output power test results at high frequency

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



Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/12/2012		
Temperature: 23.1 ºC	Air Pressure: 1010 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

7.4 Occupied bandwidth test

7.4.1 General

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in Table 7.4.1.

Table 7.4.1 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.

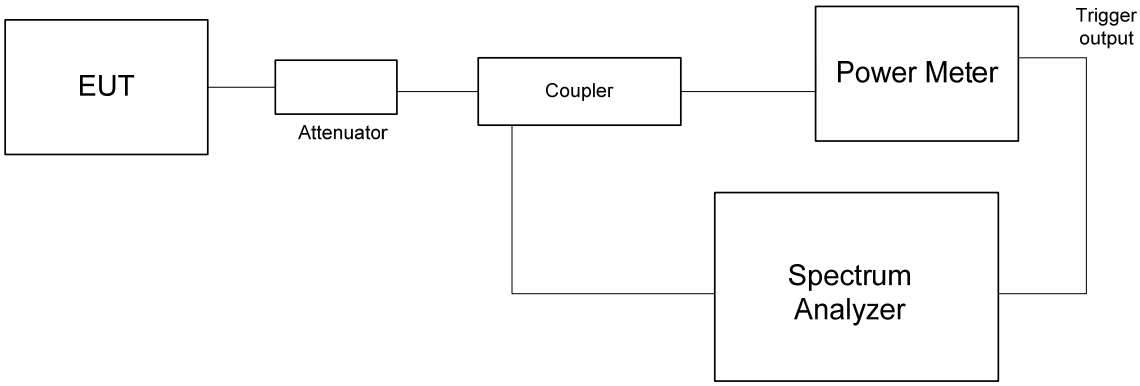
7.4.2 Test procedure

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

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

7.4.2.3 The transmitter occupied bandwidth was measured with spectrum analyzer as a frequency delta between the reference points on modulation envelope and provided in Table 7.4.2 and the associated plots.

Figure 7.4.1 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):	3/12/2012		
Temperature: 23.1 ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 44 %	**Power Supply:** 48VDC
Remarks:			

Table 7.4.2 Occupied bandwidth test results

DETECTOR USED: Average
RESOLUTION BANDWIDTH: 0.5-2% of the Emission bandwidth
VIDEO BANDWIDTH: 10 times RBW
MODULATION ENVELOPE REFERENCE POINTS: 99% Occupied bandwidth
MODULATING SIGNAL: PRBS

Carrier frequency, MHz	Modulation	Occupied bandwidth, MHz	Emission Bandwidth, MHz
Emission Bandwidth 5 MHz			
3652.5	QPSK	4.5660	5.0
3675.0	QPSK	4.5793	5.0
3697.5	QPSK	4.5694	5.0
3652.5	64QAM	4.5491	5.0
3675.0	64QAM	4.5502	5.0
3697.5	64QAM	4.5428	5.0
Emission Bandwidth 10 MHz			
3655.0	QPSK	9.0366	10.0
3675.0	QPSK	9.0431	10.0
3695.0	QPSK	9.0439	10.0
3655.0	64QAM	9.0536	10.0
3675.0	64QAM	9.0683	10.0
3695.0	64QAM	9.0676	10.0

NOTE: Measured with no limit.

Reference numbers of test equipment used

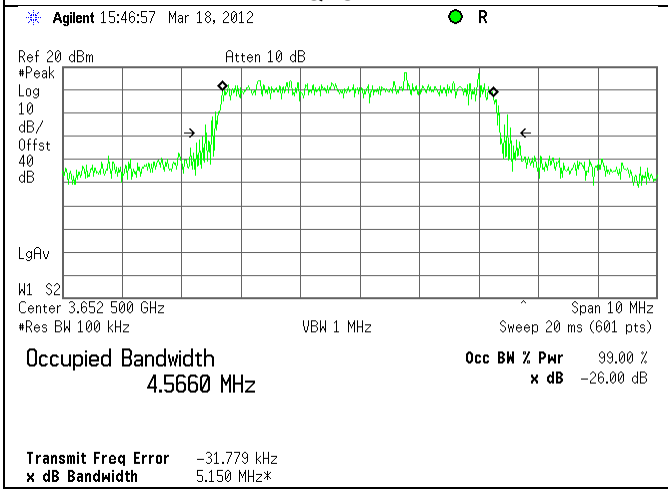
HL 3301	HL 3302	HL 3667	HL 3768	HL 3818	HL 3901		

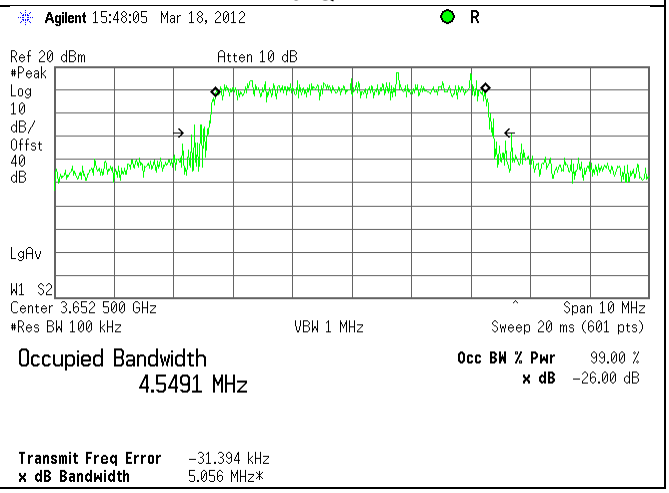
Full description is given in Appendix A.

Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/12/2012		
Temperature: 23.1 °C	Air Pressure: 1010 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.4.1 The 99% (26 dBc???) occupied bandwidth test results at low frequency

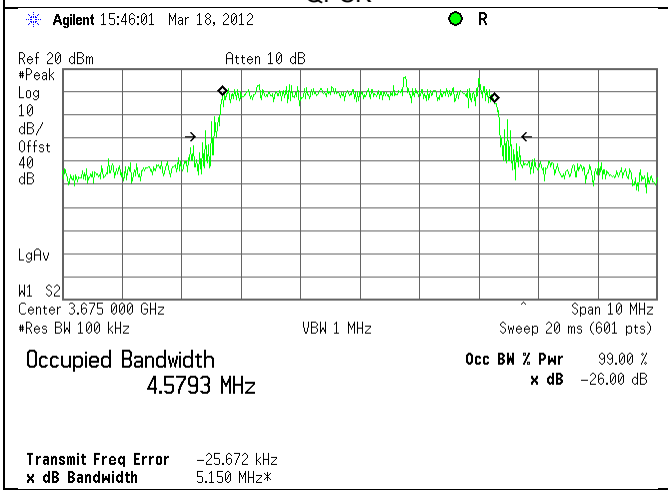
CARRIER FREQUENCY:	3652.5 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION	
QPSK	64QAM

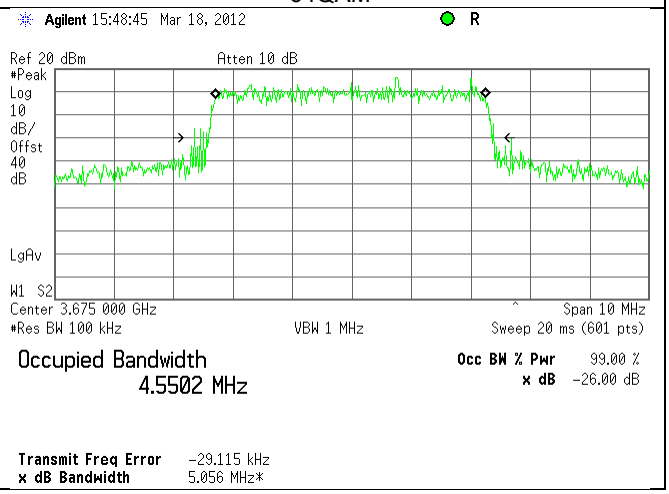




Plot 7.4.2 The 99% occupied bandwidth test results at mid frequency

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

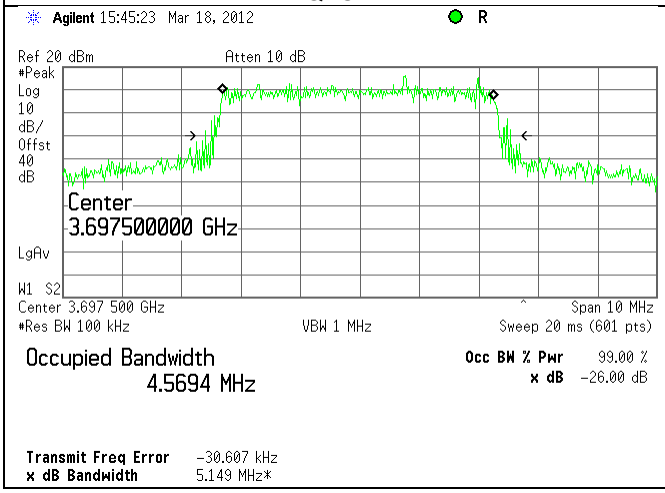


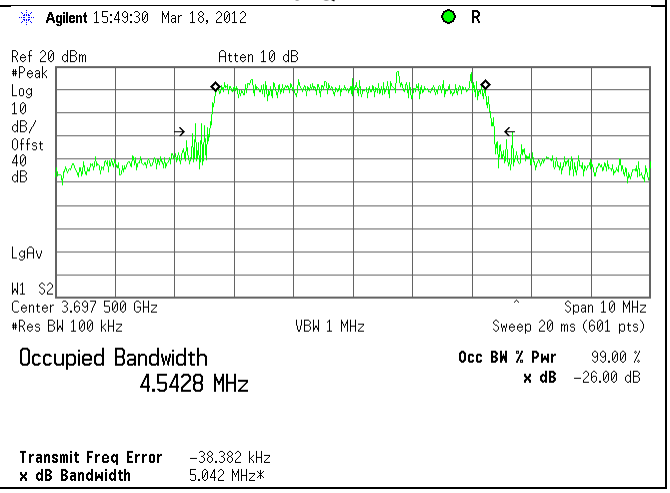


Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/12/2012		
Temperature: 23.1 °C	Air Pressure: 1010 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.4.3 The 99% occupied bandwidth test results at high frequency

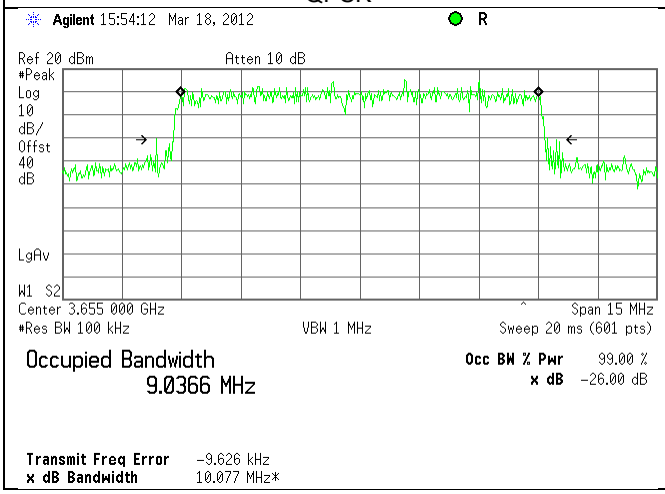
CARRIER FREQUENCY:	3697.5 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION	
QPSK	64QAM

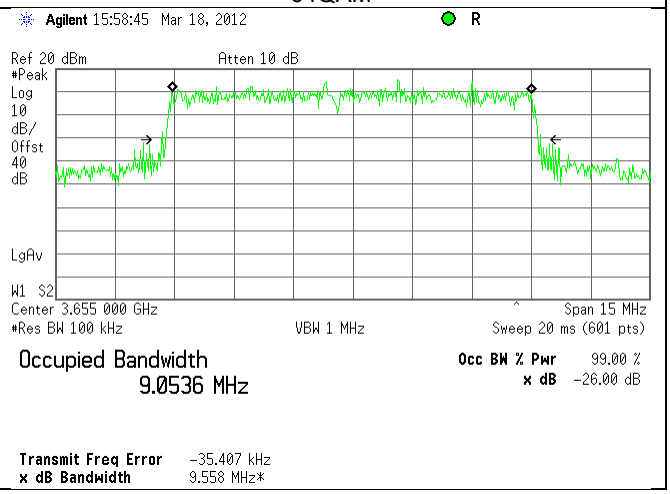




Plot 7.4.4 The 99% occupied bandwidth test results at low frequency

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

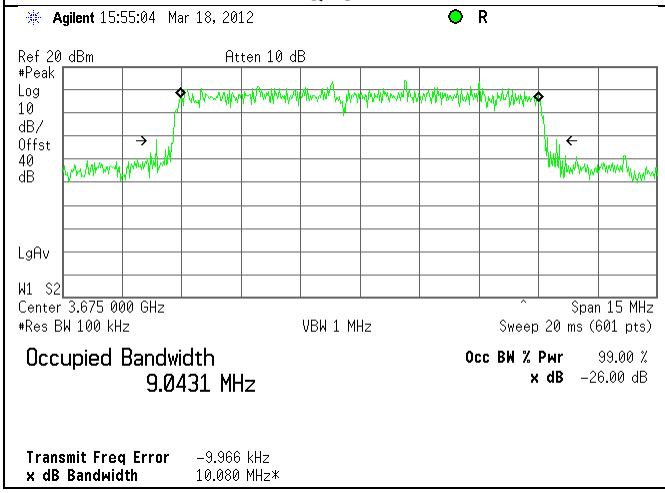


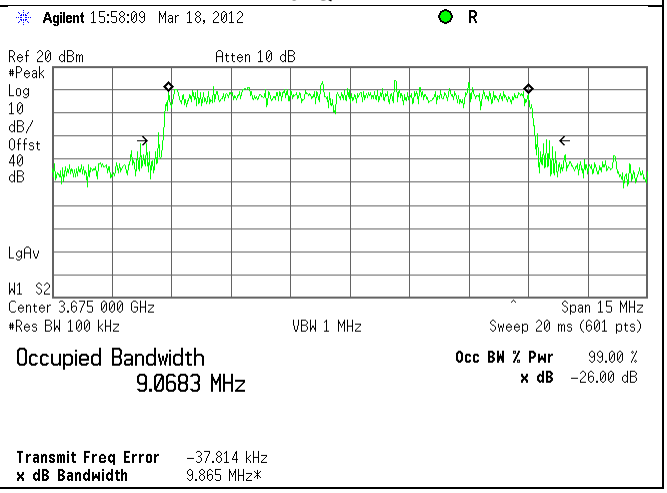


Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/12/2012		
Temperature: 23.1 °C	Air Pressure: 1010 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.4.5 The 99% occupied bandwidth test results at mid frequency

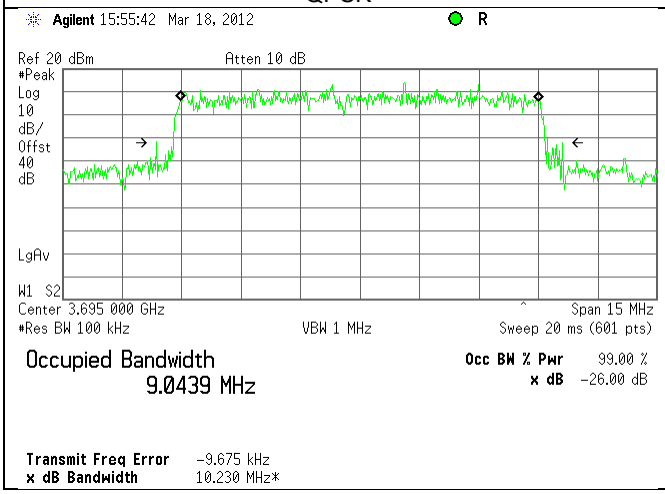
CARRIER FREQUENCY:	3675.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION	
QPSK	64QAM

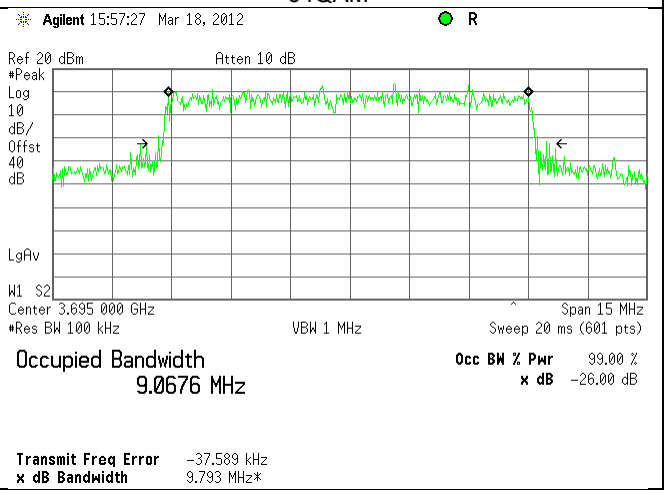




Plot 7.4.6 The 99% occupied bandwidth test results at high frequency

CARRIER FREQUENCY:	3695.0 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION	
QPSK	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):	3/14/2012		
Temperature: 23.1 ºC	Air Pressure: 1017 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

7.5 Emission mask test

7.5.1 General

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

Table 7.5.1 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 7 MHz)	
0 – 3.5 MHz	0
3.5 – 7.0 MHz	25
7.0 – 17.5 MHz	35
More than* 17.5 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)

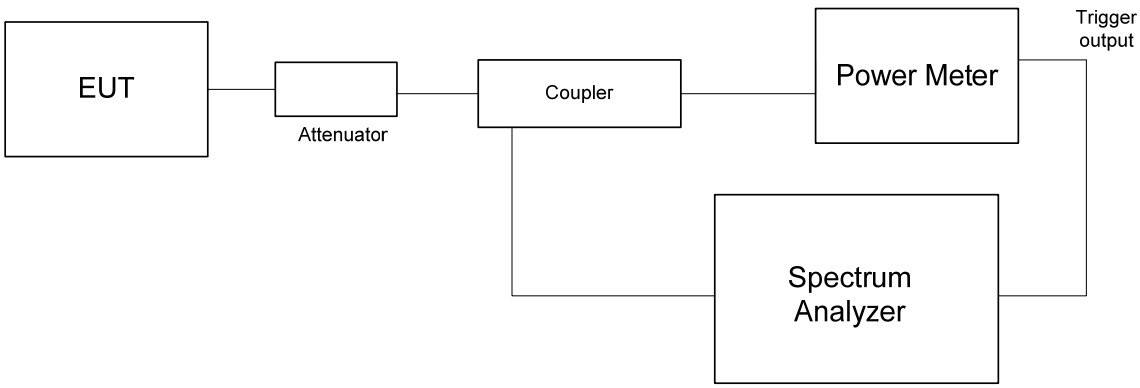
* - emission mask includes carrier modulation envelope within ± 250 % of the authorized bandwidth; the frequency range removed beyond ± 250 % of the authorized bandwidth from carrier was investigated as spurious emission

7.5.2 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 emission mask was measured with spectrum analyzer as provided in the associated plots. The test results recorded in Table 7.5.2.

Figure 7.5.1 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):	3/14/2012		
Temperature: 23.1 ºC	Air Pressure: 1017 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

Table 7.5.2 Emission mask test results

Carrier frequency, MHz	Limit	Reference to Plot	Verdict
Antenna Gain 11.5 dBi			
EBW 5 MHz			
3652.5	Emission mask B	Plot 7.5.1, Plot 7.5.2	Pass
3675.0		Plot 7.5.3, Plot 7.5.4	
3697.5		Plot 7.5.5, Plot 7.5.6	
EBW 10 MHz			
3655.0	Emission mask B	Plot 7.5.7, Plot 7.5.8	Pass
3675.0		Plot 7.5.9, Plot 7.5.10	
3695.0		Plot 7.5.11, Plot 7.5.12	
Antenna Gain 18 dBi			
EBW 5 MHz			
3652.5	Emission mask B	Plot 7.5.13, Plot 7.5.14	Pass
3675.0		Plot 7.5.15, Plot 7.5.16	
3697.5		Plot 7.5.17, Plot 7.5.18	
EBW 10 MHz			
3655.0	Emission mask B	Plot 7.5.19, Plot 7.5.20	Pass
3675.0		Plot 7.5.21, Plot 7.5.22	
3695.0		Plot 7.5.23, Plot 7.5.24	

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 for channel bandwidth 5MHz and 10MHz 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

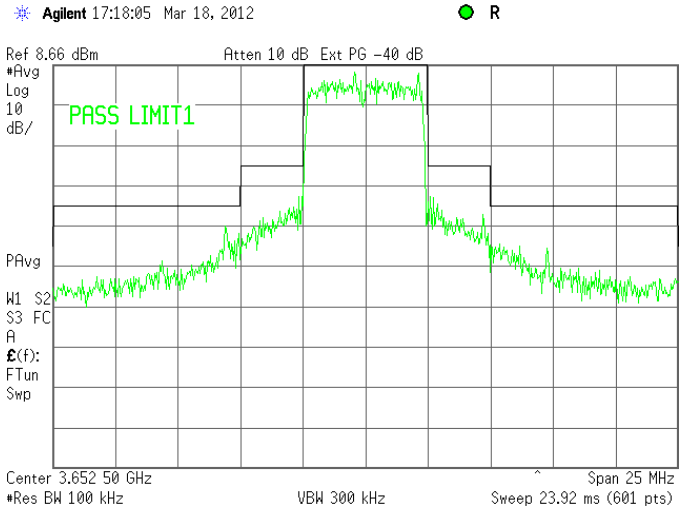
HL 3301	HL 3302	HL 3667	HL 3768	HL 3818	HL 3901		

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):	3/14/2012		
Temperature: 23.1 ºC	Air Pressure: 1017 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

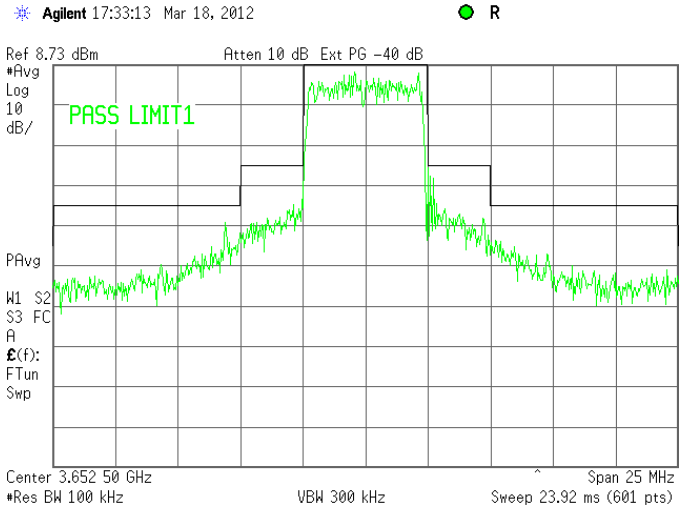
Plot 7.5.1 Emission mask test results at low carrier frequency 5 MHz CBW

MODULATION: QPSK 1/2
BIT RATE: Minimum
TRANSMITTER OUTPUT POWER: 18.66 dBm



Plot 7.5.2 Emission mask test results at low carrier frequency 5 MHz CBW

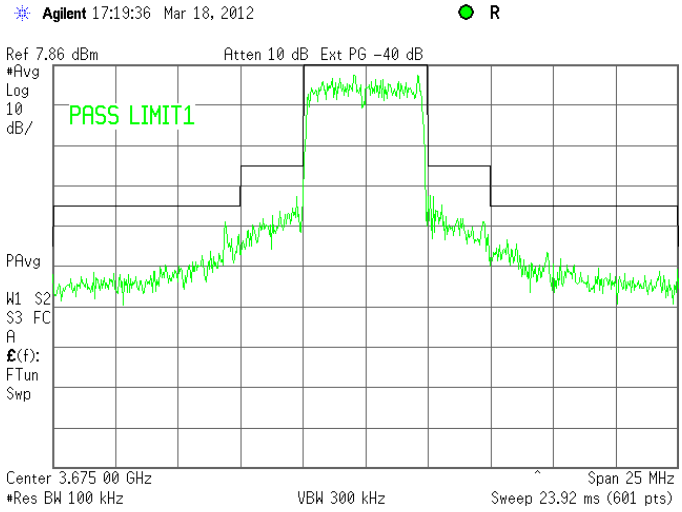
MODULATION: 64QAM 5/6
BIT RATE: Maximum
TRANSMITTER OUTPUT POWER: 18.73 dBm



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):	3/14/2012		
Temperature: 23.1 ºC	Air Pressure: 1017 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

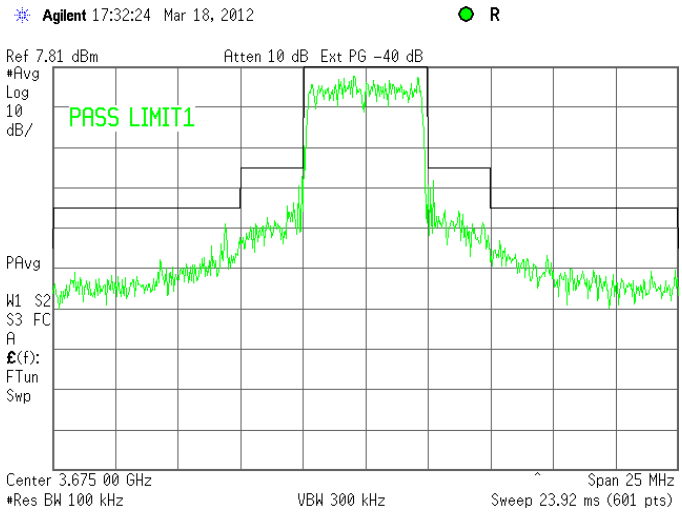
Plot 7.5.3 Emission mask test results at mid carrier frequency 5 MHz CBW

MODULATION: QPSK 1/2
BIT RATE: Minimum
TRANSMITTER OUTPUT POWER: 17.86 dBm



Plot 7.5.4 Emission mask test results at mid carrier frequency 5 MHz CBW

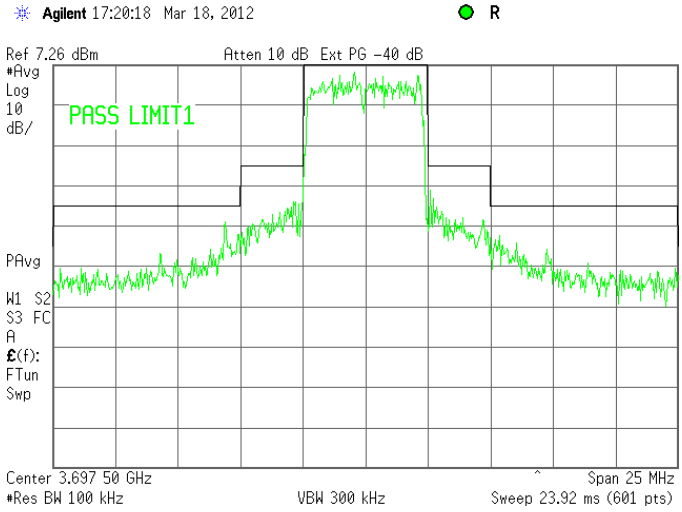
MODULATION: 64QAM 5/6
BIT RATE: Maximum
TRANSMITTER OUTPUT POWER: 17.81 dBm



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):	3/14/2012		
Temperature: 23.1 ºC	Air Pressure: 1017 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

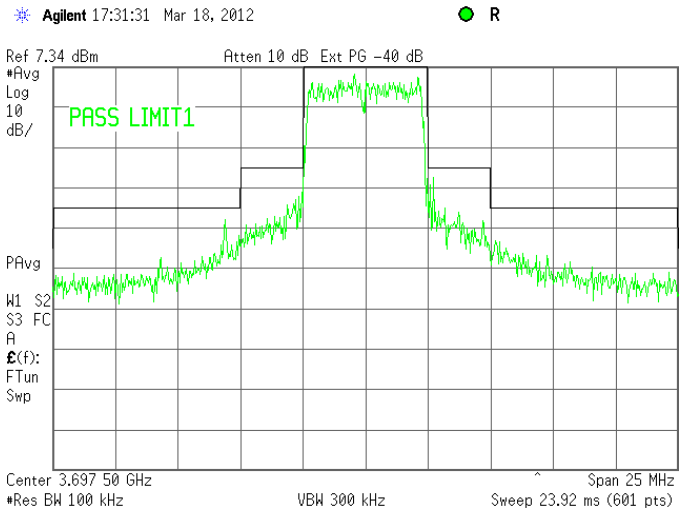
Plot 7.5.5 Emission mask test results at high carrier frequency 5 MHz CBW

MODULATION: QPSK 1/2
BIT RATE: Minimum
TRANSMITTER OUTPUT POWER: 17.26 dBm



Plot 7.5.6 Emission mask test results at high carrier frequency 5 MHz CBW

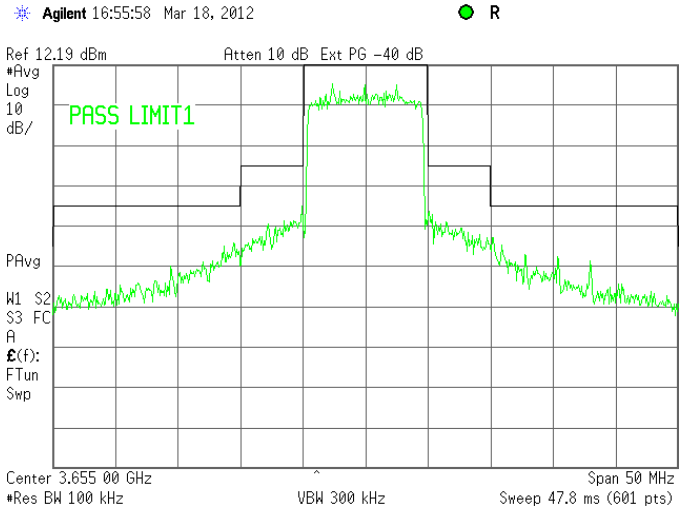
MODULATION: 64QAM 5/6
BIT RATE: Maximum
TRANSMITTER OUTPUT POWER: 17.34 dBm



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):	3/14/2012		
Temperature: 23.1 ºC	Air Pressure: 1017 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

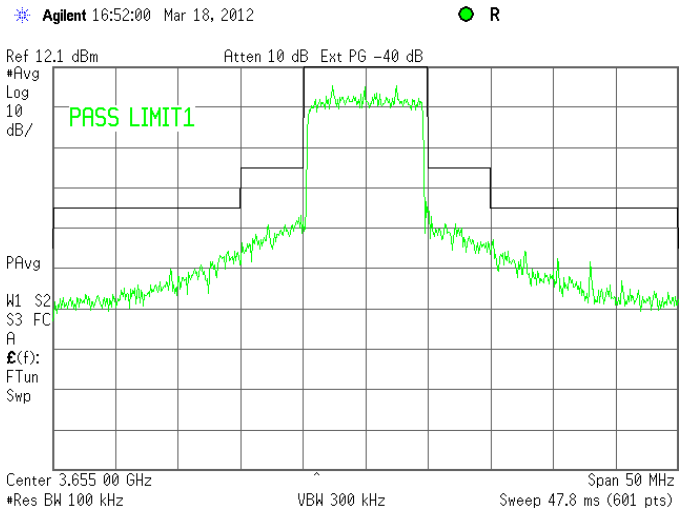
Plot 7.5.7 Emission mask test results at low carrier frequency 10 MHz CBW

MODULATION: QPSK 1/2
BIT RATE: Minimum
TRANSMITTER OUTPUT POWER: 22.19 dBm



Plot 7.5.8 Emission mask test results at low carrier frequency 10 MHz CBW

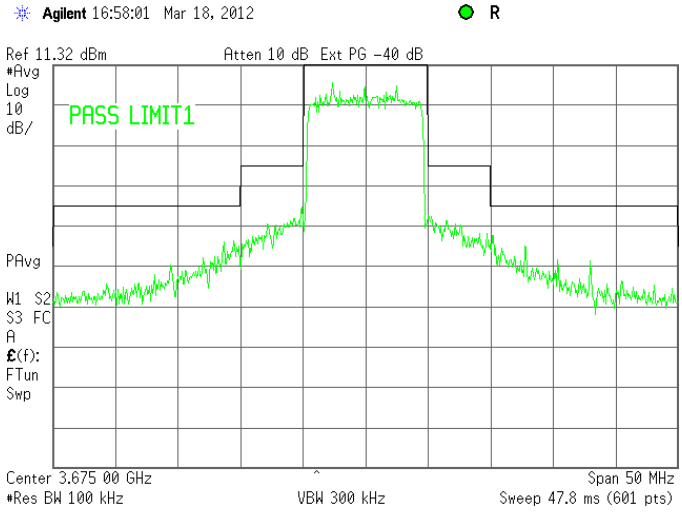
MODULATION: 64QAM 5/6
BIT RATE: Maximum
TRANSMITTER OUTPUT POWER: 22.10 dBm



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):	3/14/2012		
Temperature: 23.1 ºC	Air Pressure: 1017 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

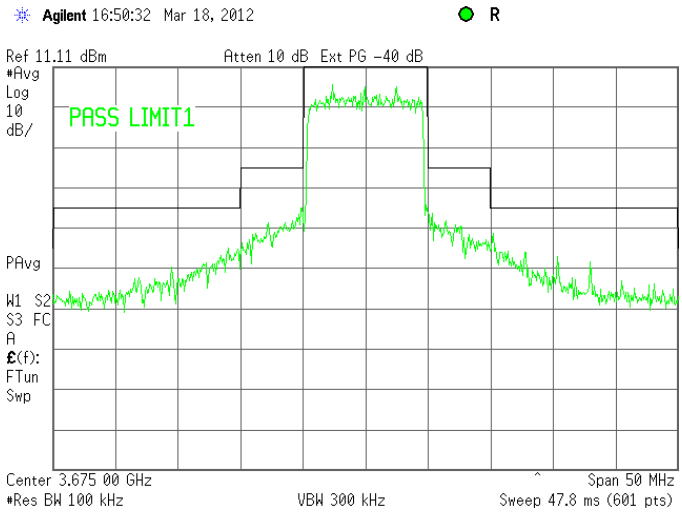
Plot 7.5.9 Emission mask test results at mid carrier frequency 10 MHz CBW

MODULATION: QPSK 1/2
BIT RATE: Minimum
TRANSMITTER OUTPUT POWER: 21.32 dBm



Plot 7.5.10 Emission mask test results at mid carrier frequency 10 MHz CBW

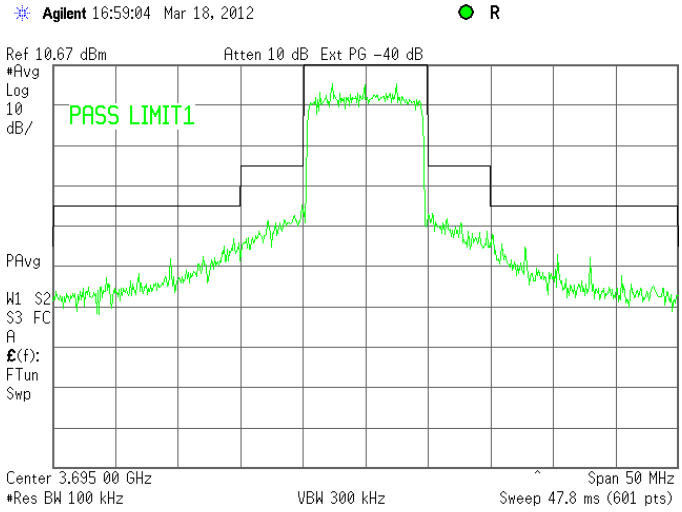
MODULATION: 64QAM 5/6
BIT RATE: Maximum
TRANSMITTER OUTPUT POWER: 21.11 dBm



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):	3/14/2012		
Temperature: 23.1 ºC	Air Pressure: 1017 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

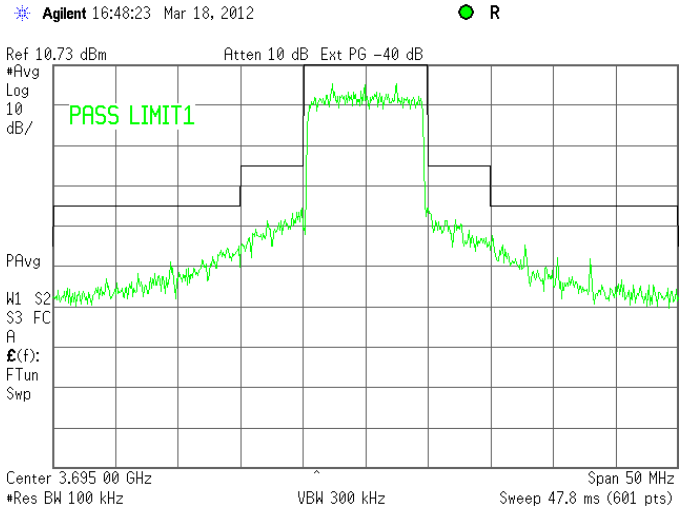
Plot 7.5.11 Emission mask test results at high carrier frequency 10 MHz CBW

MODULATION: QPSK 1/2
BIT RATE: Minimum
TRANSMITTER OUTPUT POWER: 20.67 dBm



Plot 7.5.12 Emission mask test results at high carrier frequency 10 MHz CBW

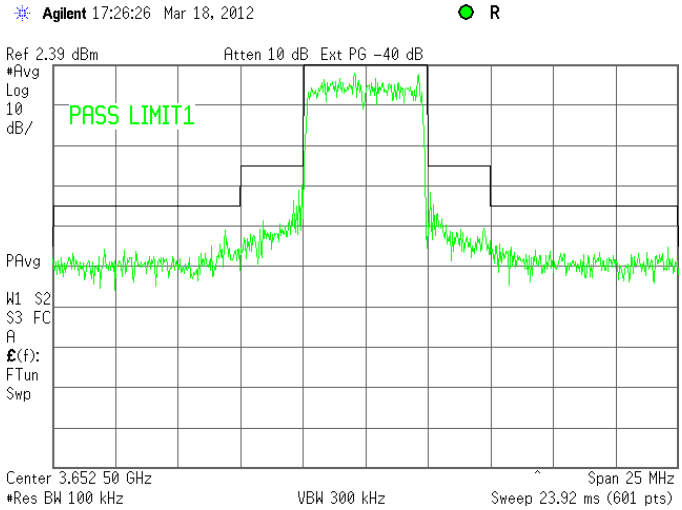
MODULATION: 64QAM 5/6
BIT RATE: Maximum
TRANSMITTER OUTPUT POWER: 20.73 dBm



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):	3/14/2012		
Temperature: 23.1 ºC	Air Pressure: 1017 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

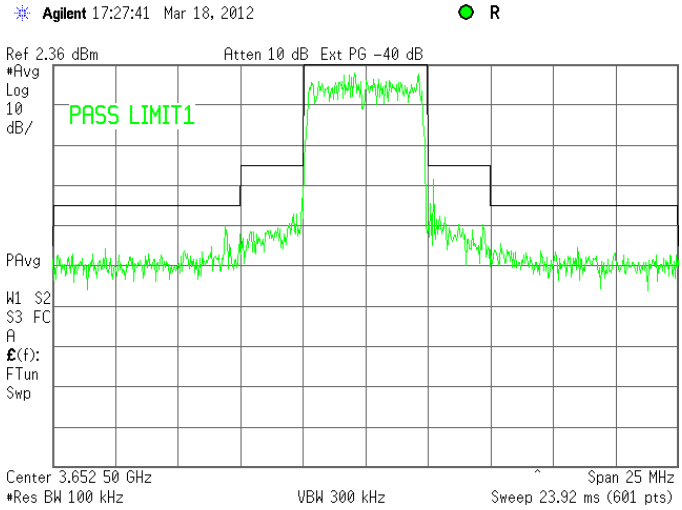
Plot 7.5.13 Emission mask test results at low carrier frequency 5 MHz CBW

MODULATION: QPSK 1/2
BIT RATE: Minimum
TRANSMITTER OUTPUT POWER: 12.39 dBm



Plot 7.5.14 Emission mask test results at low carrier frequency 5 MHz CBW

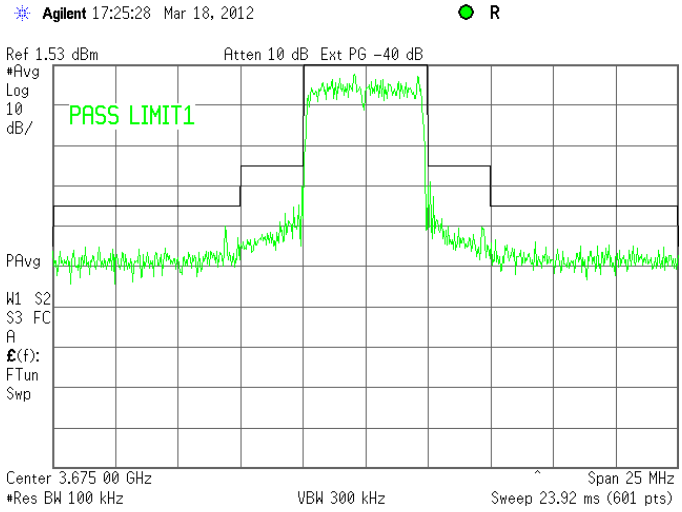
MODULATION: 64QAM 5/6
BIT RATE: Maximum
TRANSMITTER OUTPUT POWER: 12.36 dBm



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):	3/14/2012		
Temperature: 23.1 ºC	Air Pressure: 1017 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

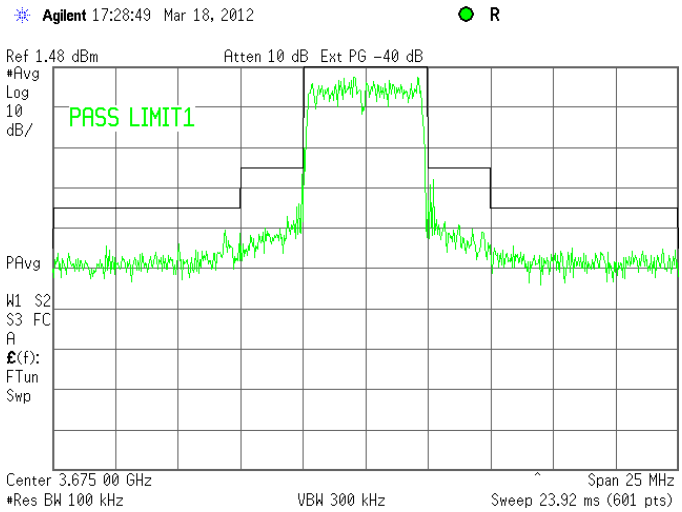
Plot 7.5.15 Emission mask test results at mid carrier frequency 5 MHz CBW

MODULATION: QPSK 1/2
BIT RATE: Minimum
TRANSMITTER OUTPUT POWER: 11.53 dBm



Plot 7.5.16 Emission mask test results at mid carrier frequency 5 MHz CBW

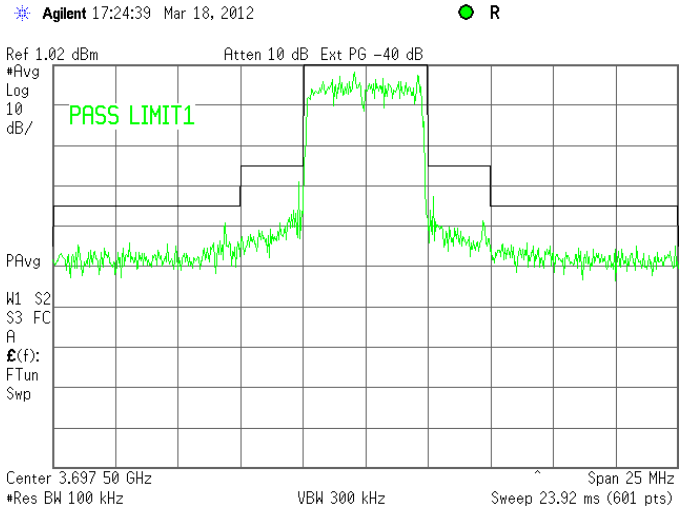
MODULATION: 64QAM 5/6
BIT RATE: Maximum
TRANSMITTER OUTPUT POWER: 11.48 dBm



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):	3/14/2012		
Temperature: 23.1 ºC	Air Pressure: 1017 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

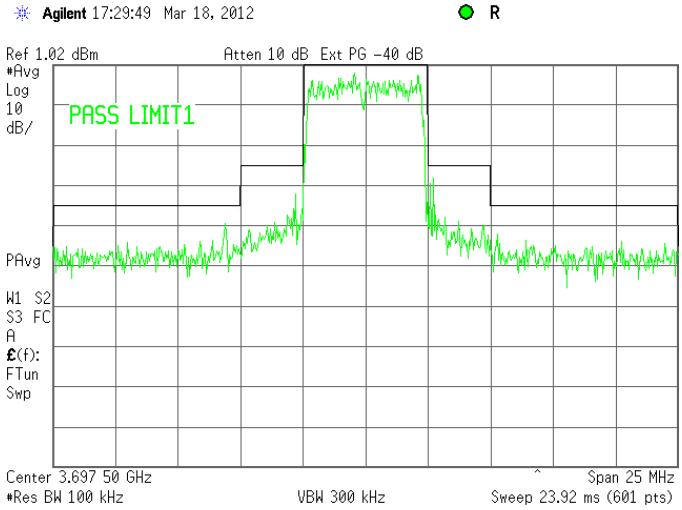
Plot 7.5.17 Emission mask test results at high carrier frequency 5 MHz CBW

MODULATION: QPSK 1/2
BIT RATE: Minimum
TRANSMITTER OUTPUT POWER: 11.02 dBm



Plot 7.5.18 Emission mask test results at high carrier frequency 5 MHz CBW

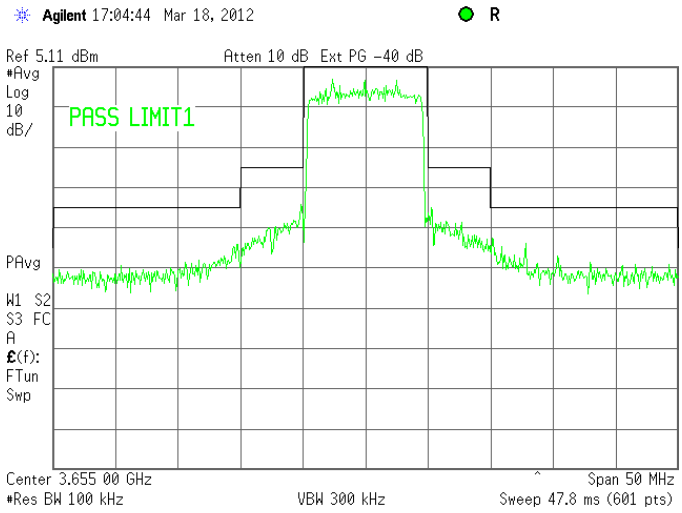
MODULATION: 64QAM 5/6
BIT RATE: Maximum
TRANSMITTER OUTPUT POWER: 11.02 dBm



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):	3/14/2012		
Temperature: 23.1 ºC	Air Pressure: 1017 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

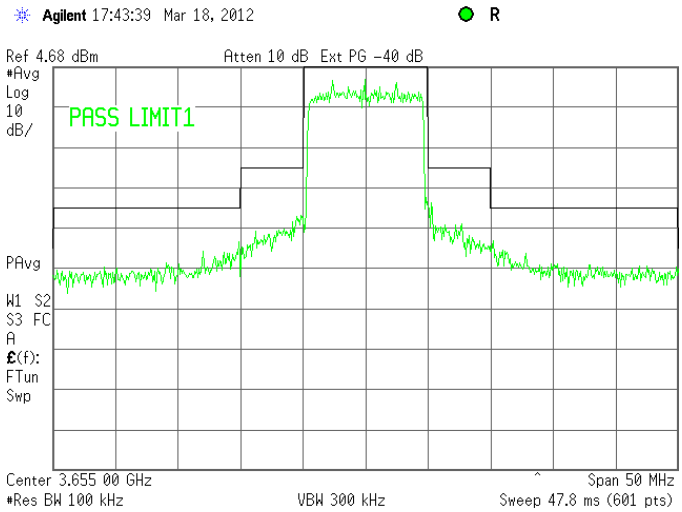
Plot 7.5.19 Emission mask test results at low carrier frequency 10 MHz CBW

MODULATION: QPSK 1/2
BIT RATE: Minimum
TRANSMITTER OUTPUT POWER: 15.11 dBm



Plot 7.5.20 Emission mask test results at low carrier frequency 10 MHz CBW

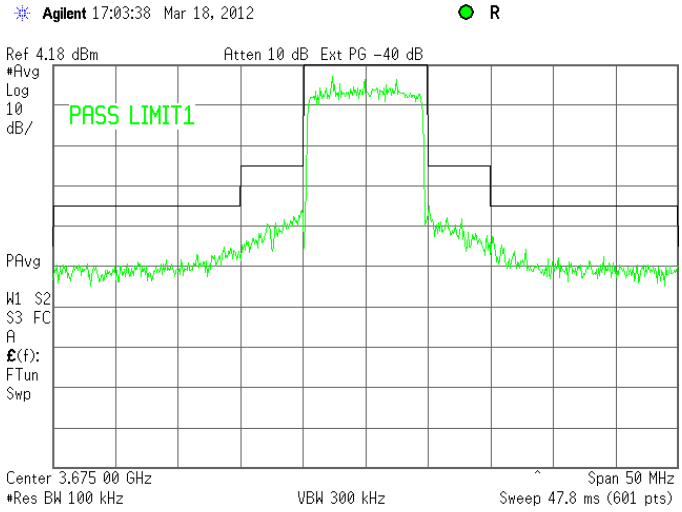
MODULATION: 64QAM 5/6
BIT RATE: Maximum
TRANSMITTER OUTPUT POWER: 14.68 dBm



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):	3/14/2012		
Temperature: 23.1 ºC	Air Pressure: 1017 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

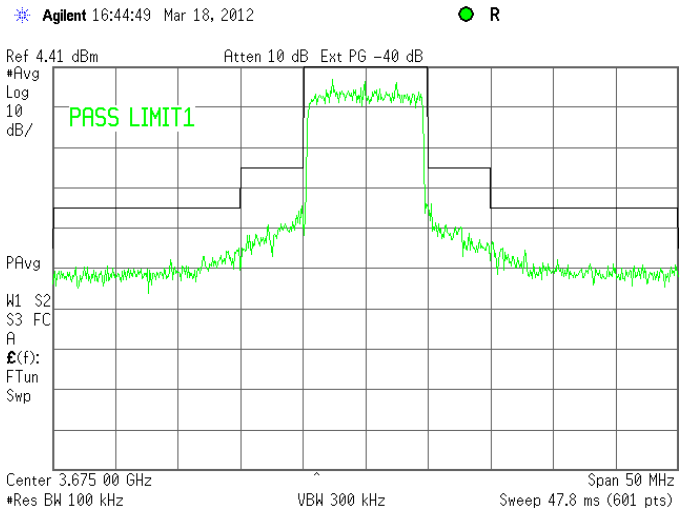
Plot 7.5.21 Emission mask test results at mid carrier frequency 10 MHz CBW

MODULATION: QPSK 1/2
BIT RATE: Minimum
TRANSMITTER OUTPUT POWER: 14.18 dBm



Plot 7.5.22 Emission mask test results at mid carrier frequency 10 MHz CBW

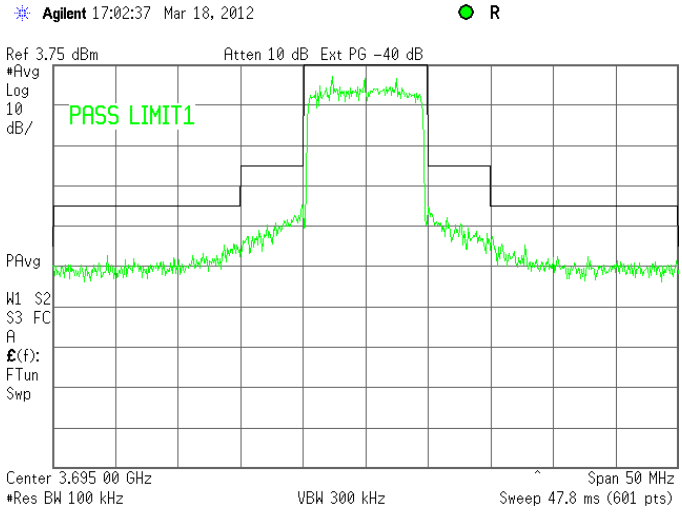
MODULATION: 64QAM 5/6
BIT RATE: Maximum
TRANSMITTER OUTPUT POWER: 14.41 dBm



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):	3/14/2012		
Temperature: 23.1 ºC	Air Pressure: 1017 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

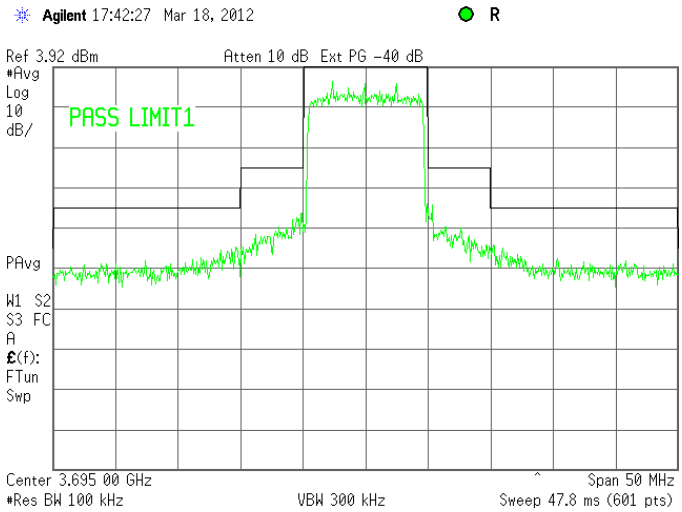
Plot 7.5.23 Emission mask test results at high carrier frequency 10 MHz CBW

MODULATION: QPSK 1/2
BIT RATE: Minimum
TRANSMITTER OUTPUT POWER: 13.75 dBm



Plot 7.5.24 Emission mask test results at high carrier frequency 10 MHz CBW

MODULATION: 64QAM 5/6
BIT RATE: Maximum
TRANSMITTER OUTPUT POWER: 13.92 dBm



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):	3/12/2012		
Temperature: 22.4 ºC	Air Pressure: 1010 hPa	Relative Humidity: 43 %	Power Supply: 48VDC
Remarks:			

7.6 Spurious emissions at RF antenna connector test

7.6.1 General

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

Table 7.6.1 Spurious emission limits

Frequency, MHz	Attenuation below carrier, dBc	ERP of spurious, dBm
0.009 – 10th harmonic*	43+10logP** (mask B, C)	-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

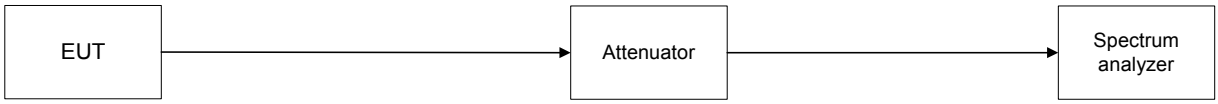
7.6.2 Test procedure

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

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

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

Figure 7.6.1 Spurious emission test setup 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):	3/12/2012		
Temperature: 22.4 ºC	Air Pressure: 1010 hPa	Relative Humidity: 43 %	Power Supply: 48VDC
Remarks:			

Table 7.6.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 3650 – 3700 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 – 37000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
EMISSION BANDWIDTH: 10 MHz

Frequency, MHz	SA reading, dBm	Factor 10 log(N), dB*	RBW, kHz	Spurious emission, dBm	Limit, dBm	Margin, dB*	Verdict
Single RF output							
Low carrier frequency							
10950.00	-35.74	0	1000	-35.74	-13.0	-22.74	Pass
Mid carrier frequency							
11028.50	-41.13	0	1000	-41.13	-13.0	-28.13	Pass
High carrier frequency							
11090.75	-43.04	0	1000	-43.04	-13.0	-30.04	Pass
Multiple RF outputs							
Low carrier frequency							
3135.50	-33.57	6	1000	-27.57	-13.0	-14.57	Pass
10950.00	-35.74	6	1000	-29.74	-13.0	-16.74	Pass
Mid carrier frequency							
3362.50	-34.06	6	1000	-28.06	-13.0	-15.06	Pass
11028.50	-41.13	6	1000	-35.13	-13.0	-22.13	Pass
High carrier frequency							
2925.00	-33.00	6	1000	-27.00	-13.0	-14.00	Pass
11090.75	-43.04	6	1000	-37.04	-13.0	-24.04	Pass

***** - Factor 10 log(N) = 10*log(4) = 6dB for 4 RF outputs.
****** - Spurious emission = SA reading + Factor 10 log(N)
******* - Margin = Spurious emission – specification limit.

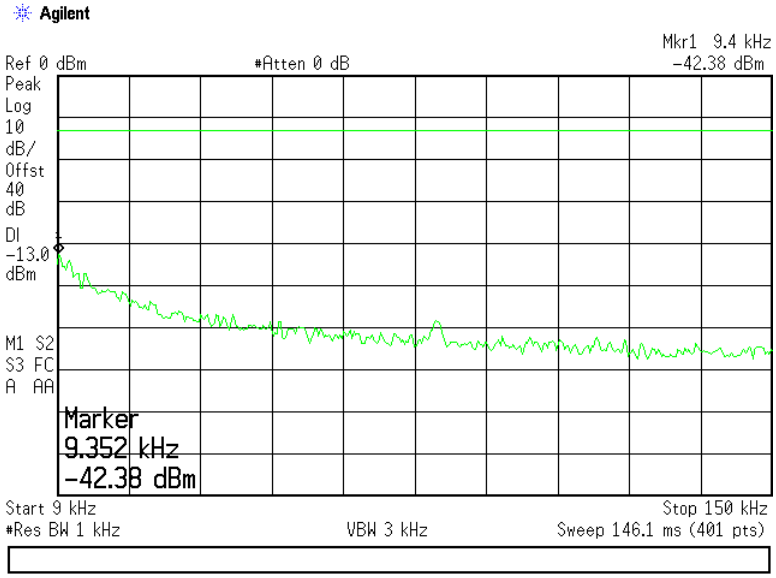
Reference numbers of test equipment used

HL 3455	HL 3667	HL 3768	HL 3818	HL 3901			

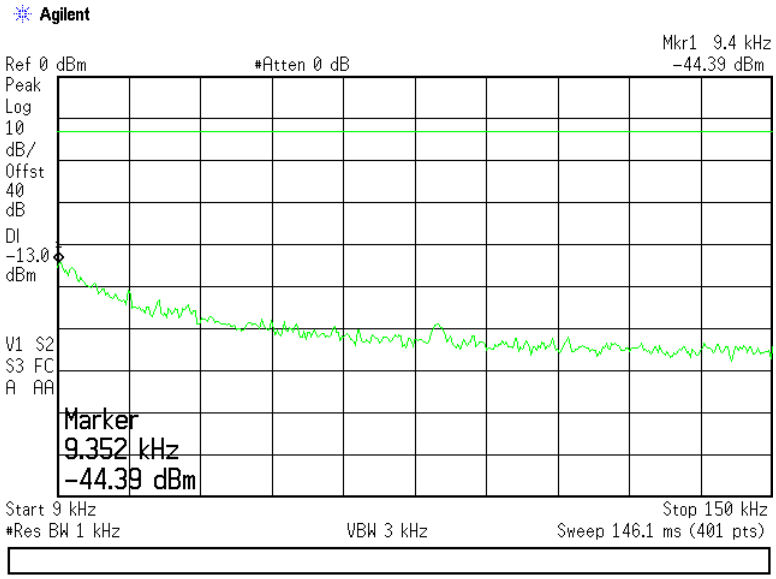
Full description is given in Appendix A.

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):	3/12/2012		
Temperature: 22.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 43 %	Power Supply: 48VDC
Remarks:			

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

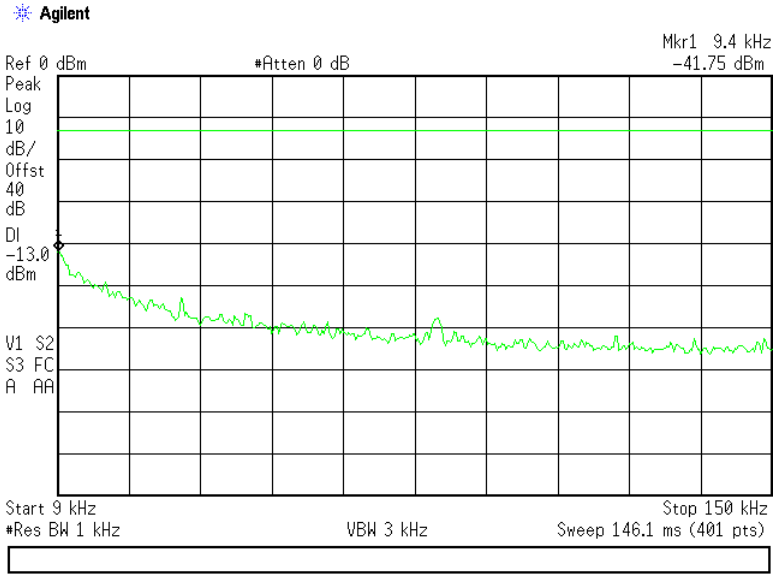


Plot 7.6.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency

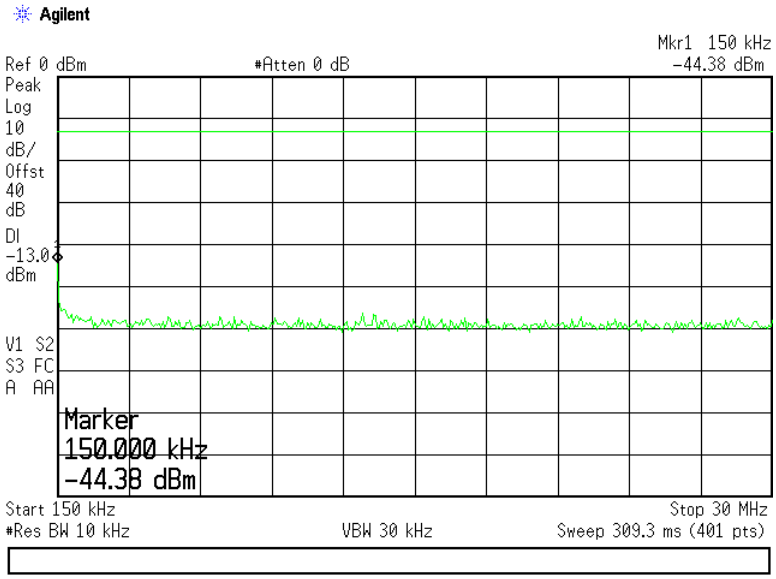


Test specification:	Section 90.1323, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/12/2012		
Temperature: 22.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 43 %	Power Supply: 48VDC
Remarks:			

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

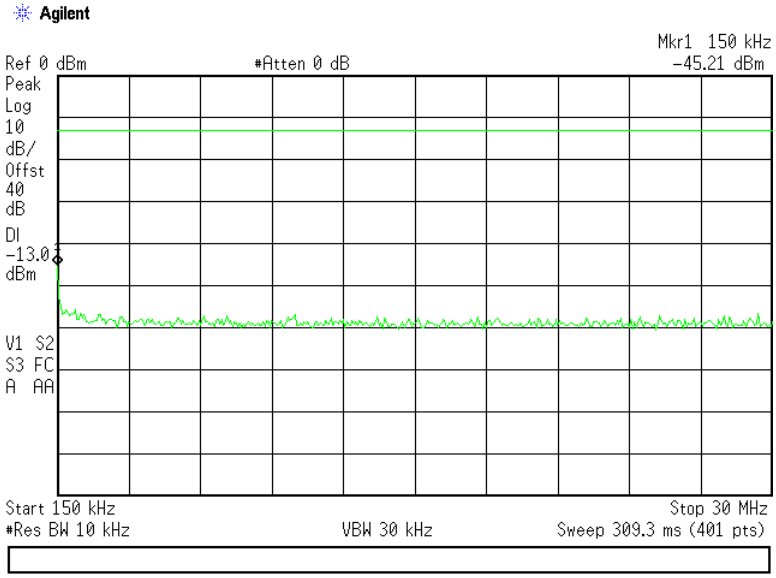


Plot 7.6.4 Spurious emission measurements in 0.150 - 30.0 MHz range at low carrier frequency

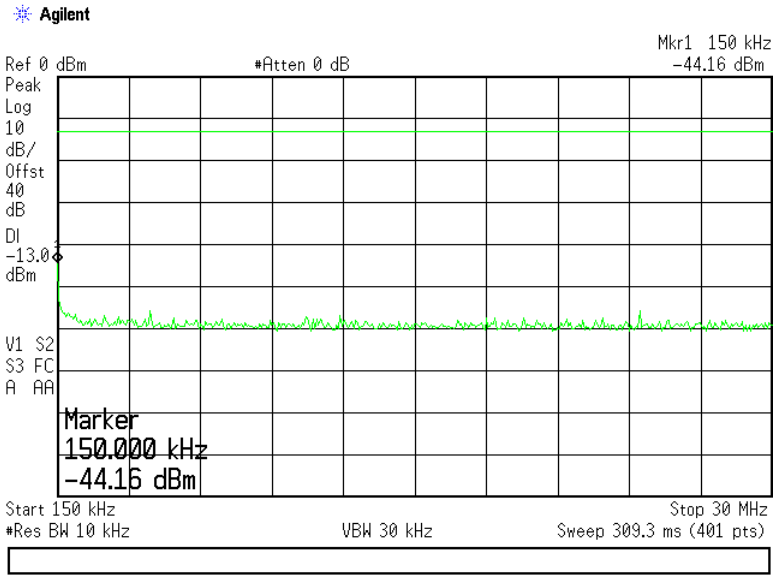


Test specification:	Section 90.1323, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/12/2012		
Temperature: 22.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 43 %	Power Supply: 48VDC
Remarks:			

Plot 7.6.5 Spurious emission measurements in 0.150 - 30.0 MHz range at mid carrier frequency

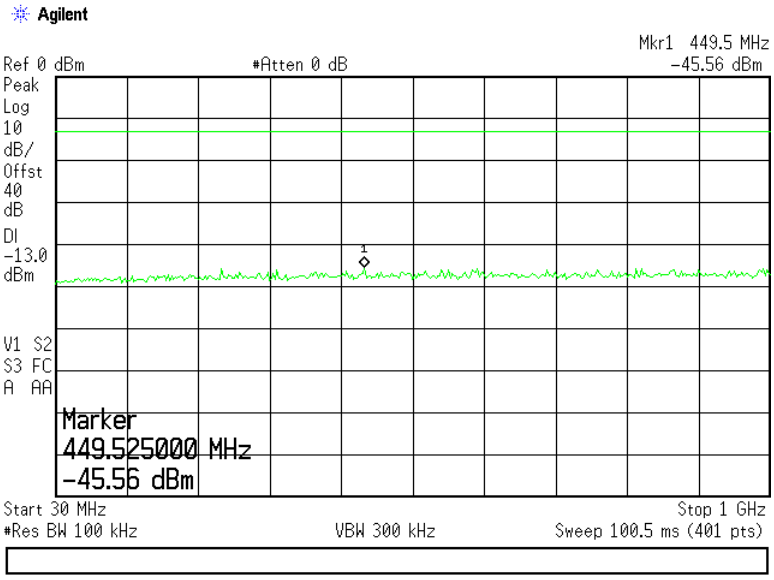


Plot 7.6.6 Spurious emission measurements in 0.150 - 30.0 MHz range at high carrier frequency

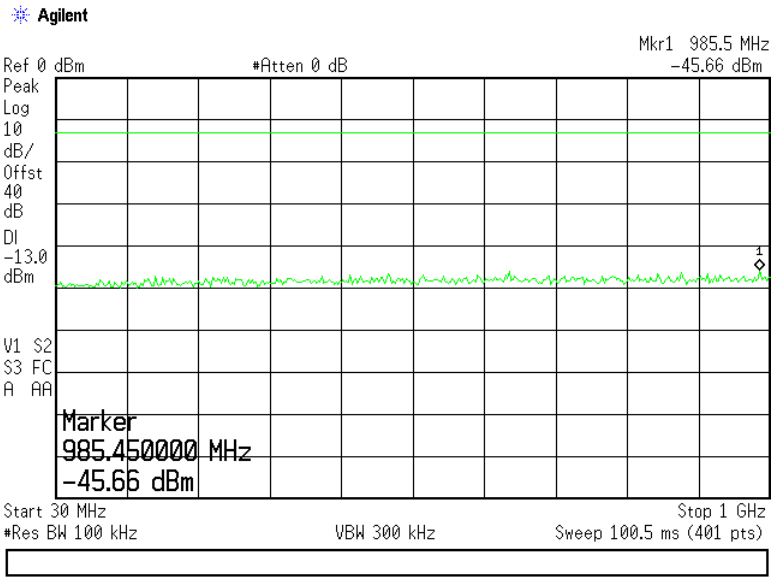


Test specification:	Section 90.1323, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/12/2012		
Temperature: 22.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 43 %	Power Supply: 48VDC
Remarks:			

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

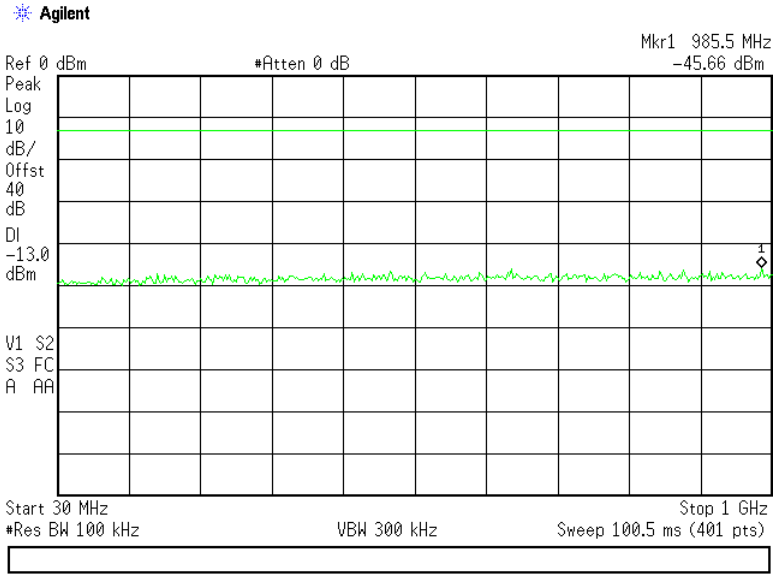


Plot 7.6.8 Spurious emission measurements in 30.0 - 1000 MHz range at mid carrier frequency

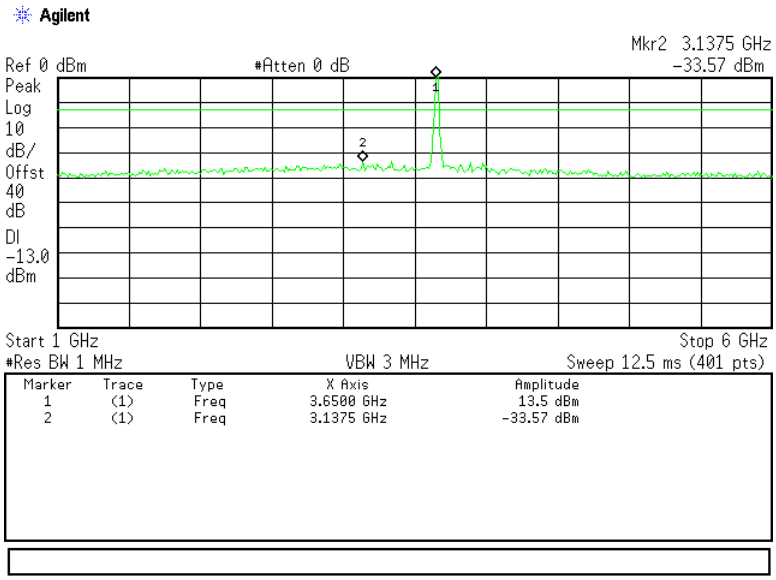


Test specification:	Section 90.1323, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/12/2012		
Temperature: 22.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 43 %	Power Supply: 48VDC
Remarks:			

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

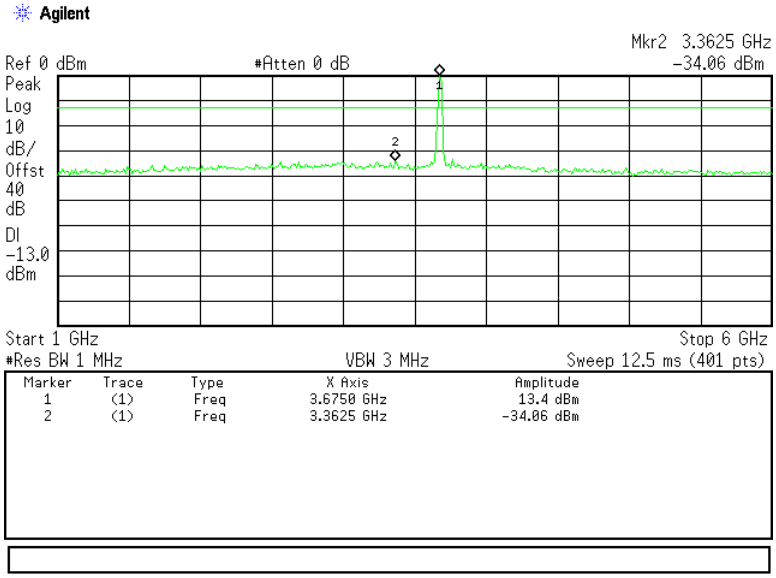


Plot 7.6.10 Spurious emission measurements in 1000 - 6000 MHz range at low carrier frequency

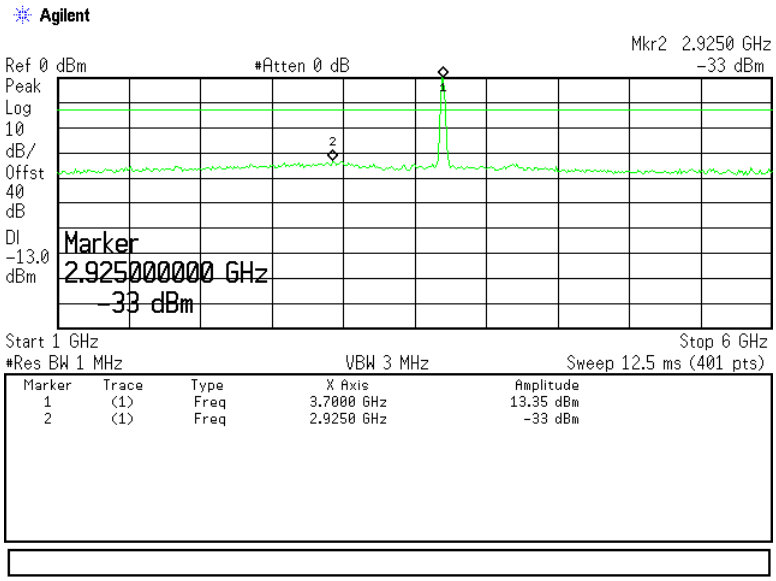


Test specification:	Section 90.1323, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/12/2012		
Temperature: 22.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 43 %	Power Supply: 48VDC
Remarks:			

Plot 7.6.11 Spurious emission measurements in 1000 - 6000 MHz range at mid carrier frequency

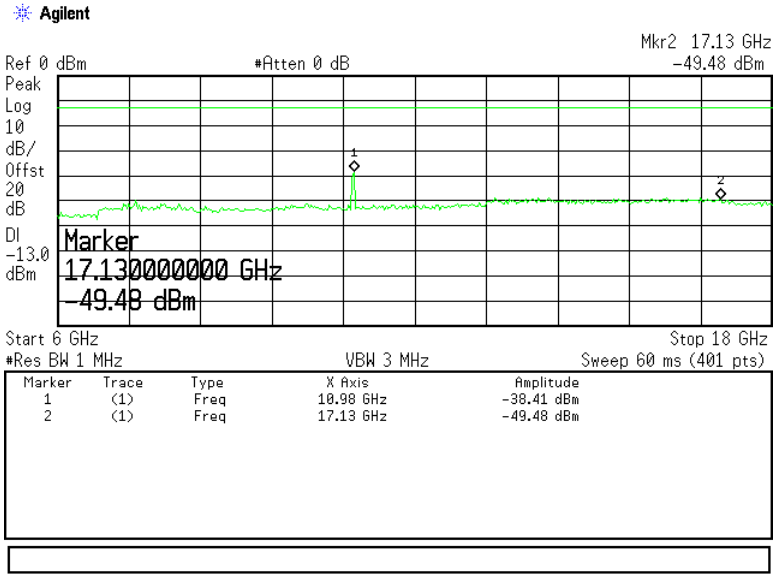


Plot 7.6.12 Spurious emission measurements in 1000 - 6000 MHz range at high carrier frequency

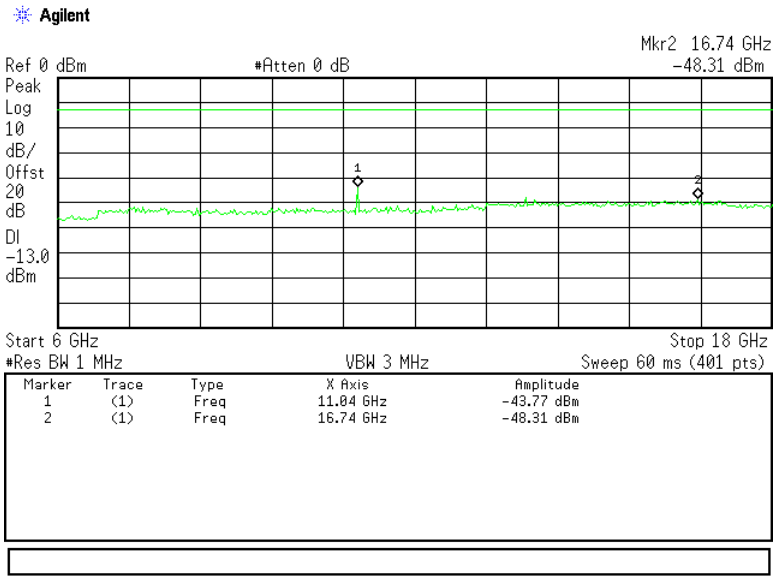


Test specification:	Section 90.1323, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/12/2012		
Temperature: 22.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 43 %	Power Supply: 48VDC
Remarks:			

Plot 7.6.13 Spurious emission measurements in 6000 - 18000 MHz range at low carrier frequency

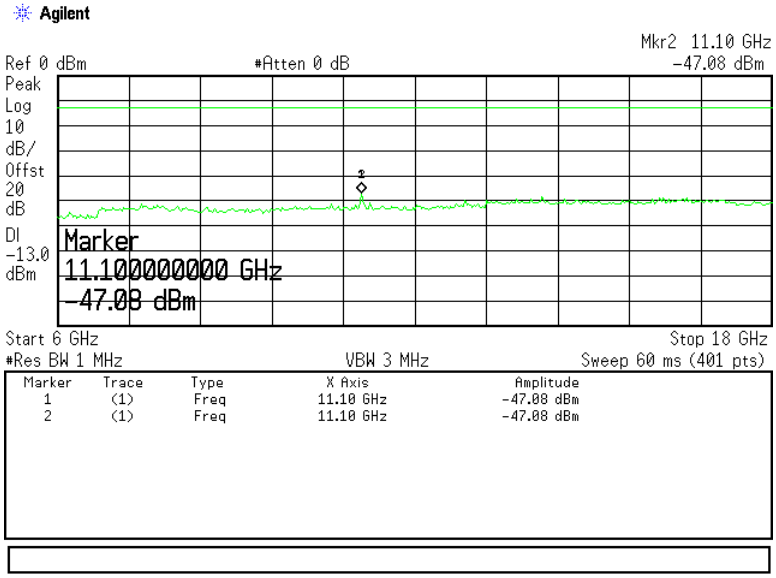


Plot 7.6.14 Spurious emission measurements in 6000 - 18000 MHz range at mid carrier frequency

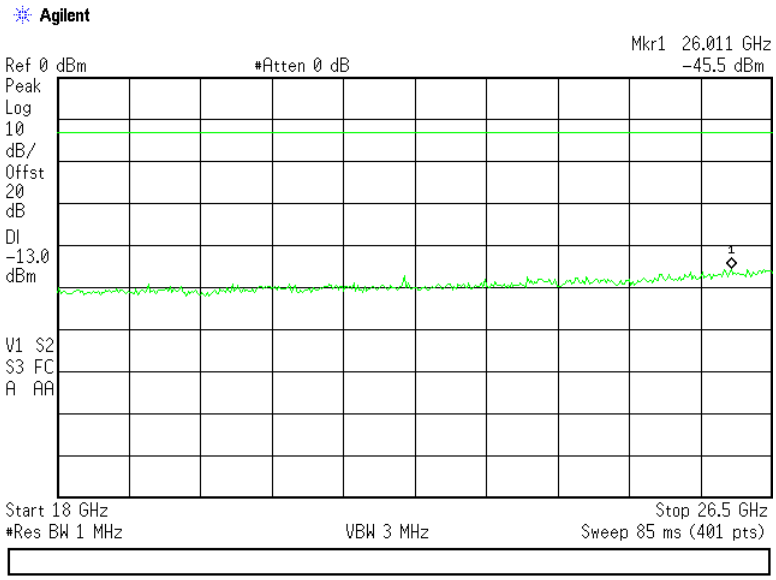


Test specification:	Section 90.1323, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/12/2012		
Temperature: 22.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 43 %	Power Supply: 48VDC
Remarks:			

Plot 7.6.15 Spurious emission measurements in 6000 - 18000 MHz range at high carrier frequency

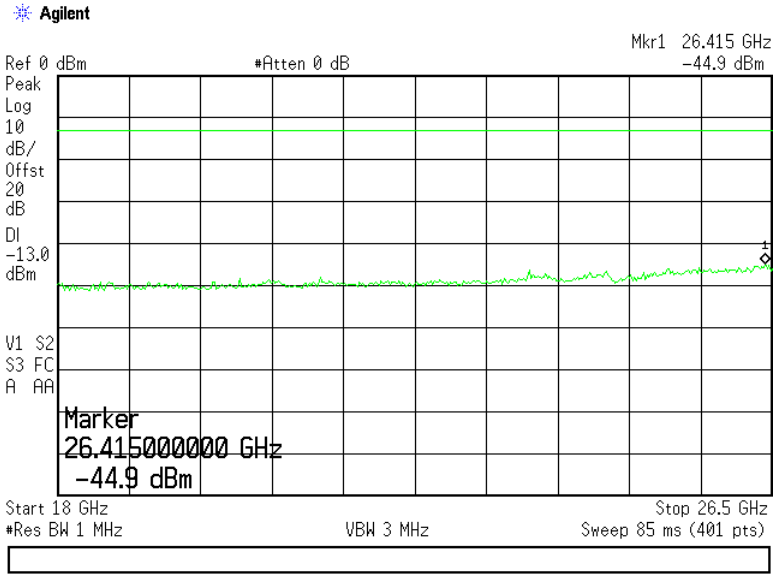


Plot 7.6.16 Spurious emission measurements in 18000 – 26500 MHz range at low carrier frequency

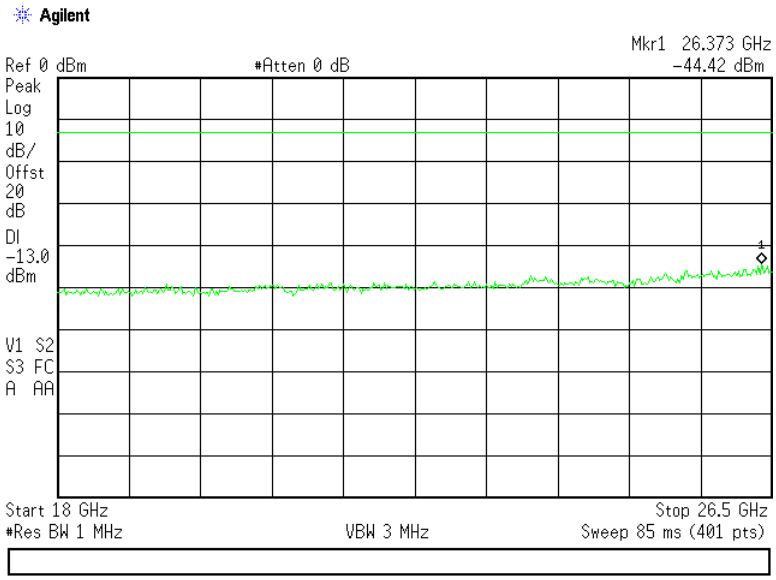


Test specification:	Section 90.1323, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/12/2012		
Temperature: 22.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 43 %	Power Supply: 48VDC
Remarks:			

Plot 7.6.17 Spurious emission measurements in 18000 – 26500 MHz range at mid carrier frequency

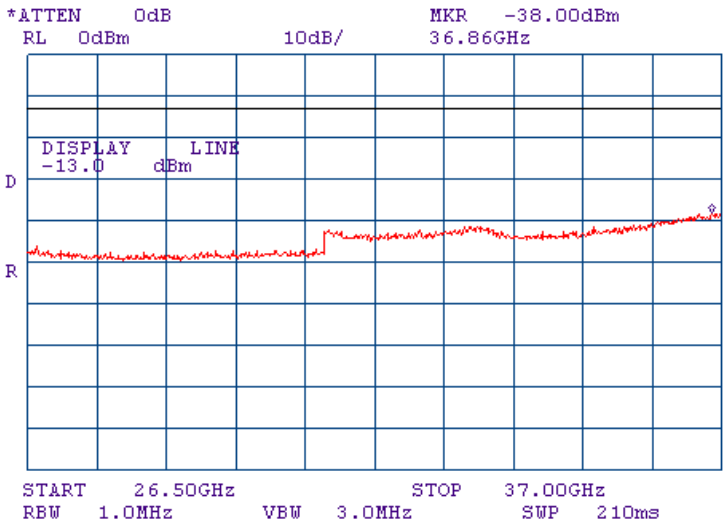


Plot 7.6.18 Spurious emission measurements in 18000 – 26500 MHz range at high carrier frequency

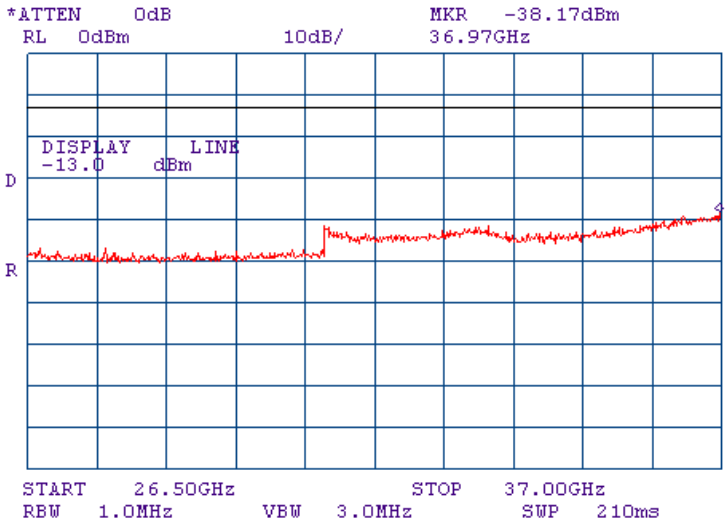


Test specification:	Section 90.1323, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/12/2012		
Temperature: 22.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 43 %	Power Supply: 48VDC
Remarks:			

Plot 7.6.19 Spurious emission measurements in 26500 – 37000 MHz range at low carrier frequency

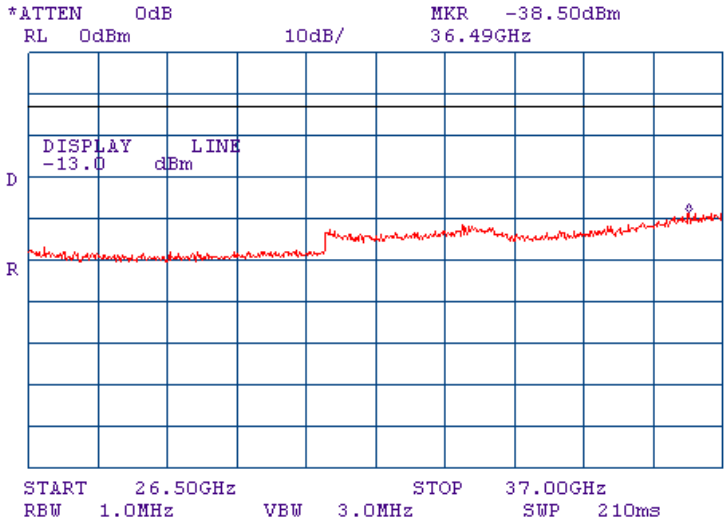


Plot 7.6.20 Spurious emission measurements in 26500 – 37000 MHz at mid carrier frequency



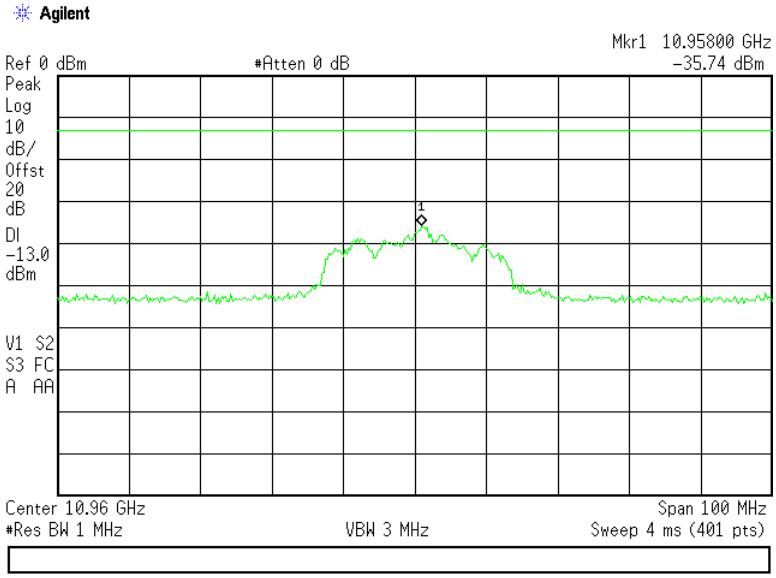
Test specification:	Section 90.1323, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/12/2012		
Temperature: 22.4 ºC	Air Pressure: 1010 hPa	Relative Humidity: 43 %	Power Supply: 48VDC
Remarks:			

Plot 7.6.21 Spurious emission measurements in 26500 – 37000 MHz at high carrier frequency

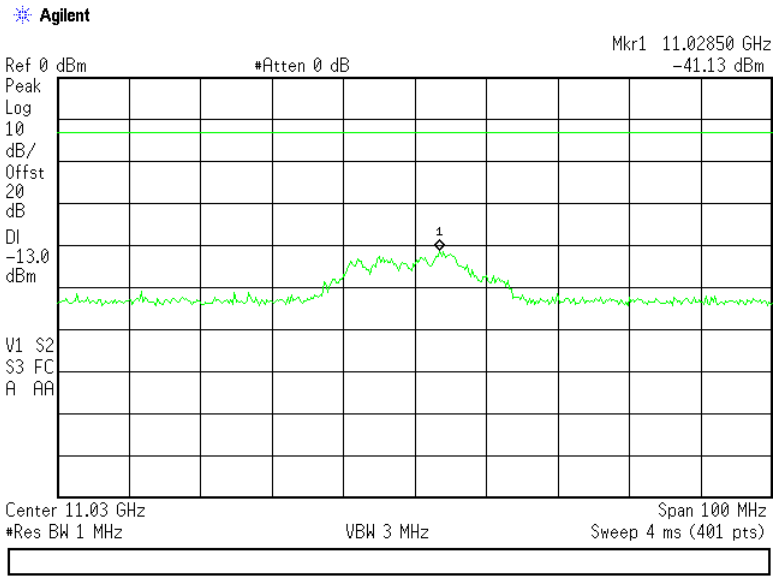


Test specification:	Section 90.1323, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/12/2012		
Temperature: 22.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 43 %	Power Supply: 48VDC
Remarks:			

Plot 7.6.22 Spurious emission measurements at the 3rd harmonic of low carrier frequency

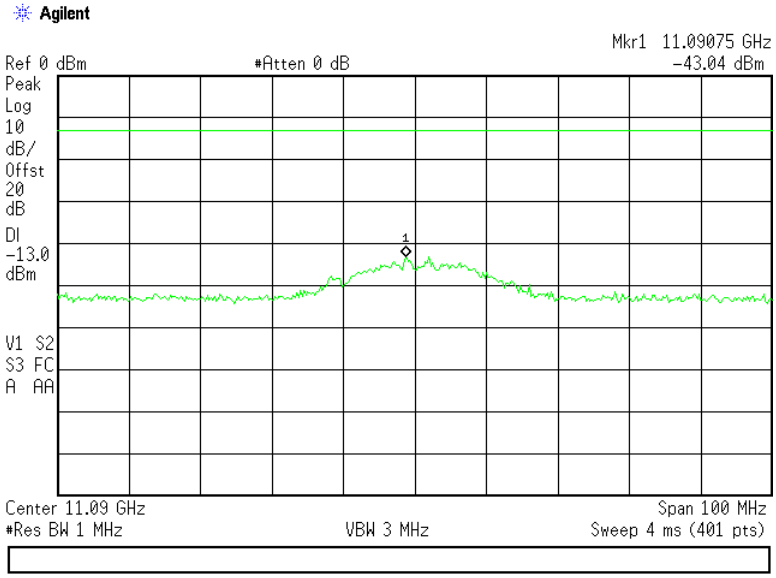


Plot 7.6.23 Spurious emission measurements at the 3rd harmonic of mid carrier frequency



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):	3/12/2012		
Temperature: 22.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 43 %	Power Supply: 48VDC
Remarks:			

Plot 7.6.24 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):	3/19/2012 - 3/20/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 11.5 dBi antenna gain			

7.7 Radiated spurious emission measurements with 11.5 dBi antenna

7.7.1 General

This test was performed to measure radiated spurious emissions from the EUT. Specification test limits are given in Table 7.7.1.

Table 7.7.1 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

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

7.7.2.1 The EUT was set up as shown in Figure 7.7.1, energized and the performance check was conducted.

7.7.2.2 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.

7.7.2.3 The worst test results (the lowest margins) were recorded in Table 7.7.2 and shown in the associated plots.

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

7.7.3.1 The EUT was set up as shown in Figure 7.7.2, energized and the performance check was conducted.

7.7.3.2 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.

7.7.3.3 The worst test results (the lowest margins) were recorded in Table 7.7.2 and shown in the associated plots.

7.7.4 Test procedure for substitution ERP measurements of spurious

7.7.4.1 The test equipment was set up as shown in Figure 7.7.3 and energized.

7.7.4.2 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.

7.7.4.3 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.

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

7.7.4.5 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.

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

7.7.4.7 The worst test results (the lowest margins) were recorded in Table 7.7.3 and shown in the associated plots.

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):	3/19/2012 - 3/20/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 11.5 dBi antenna gain			

Figure 7.7.1 Setup for spurious emission field strength measurements in 9 kHz to 30 MHz band

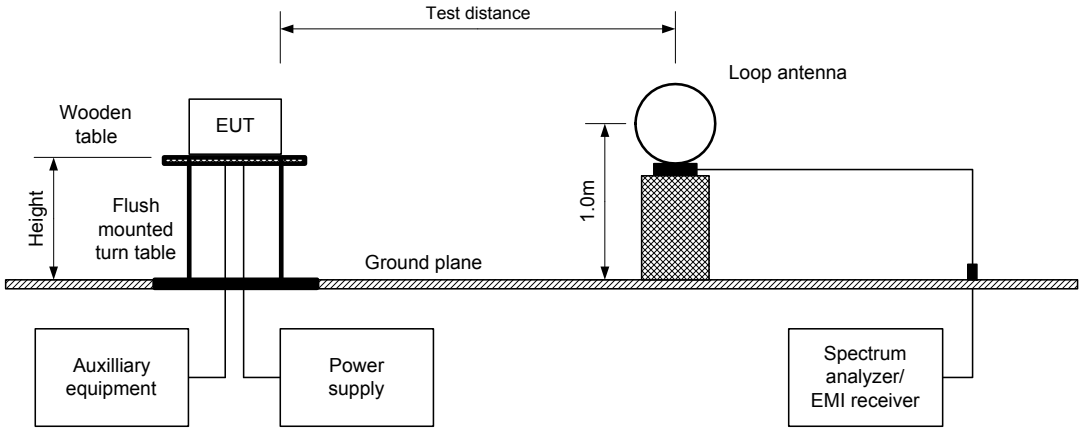
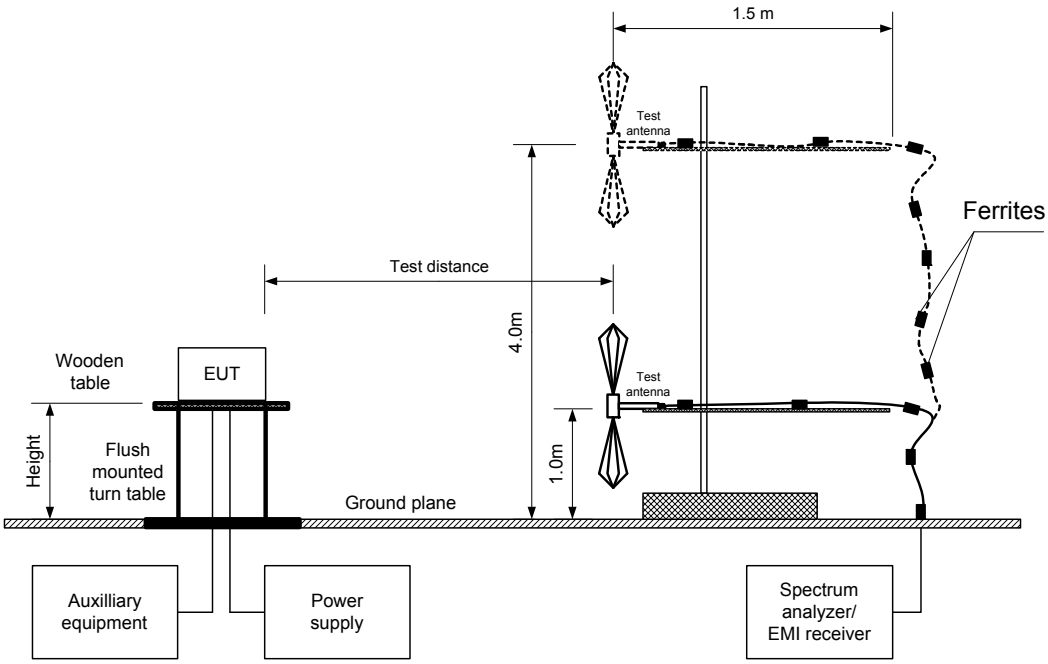
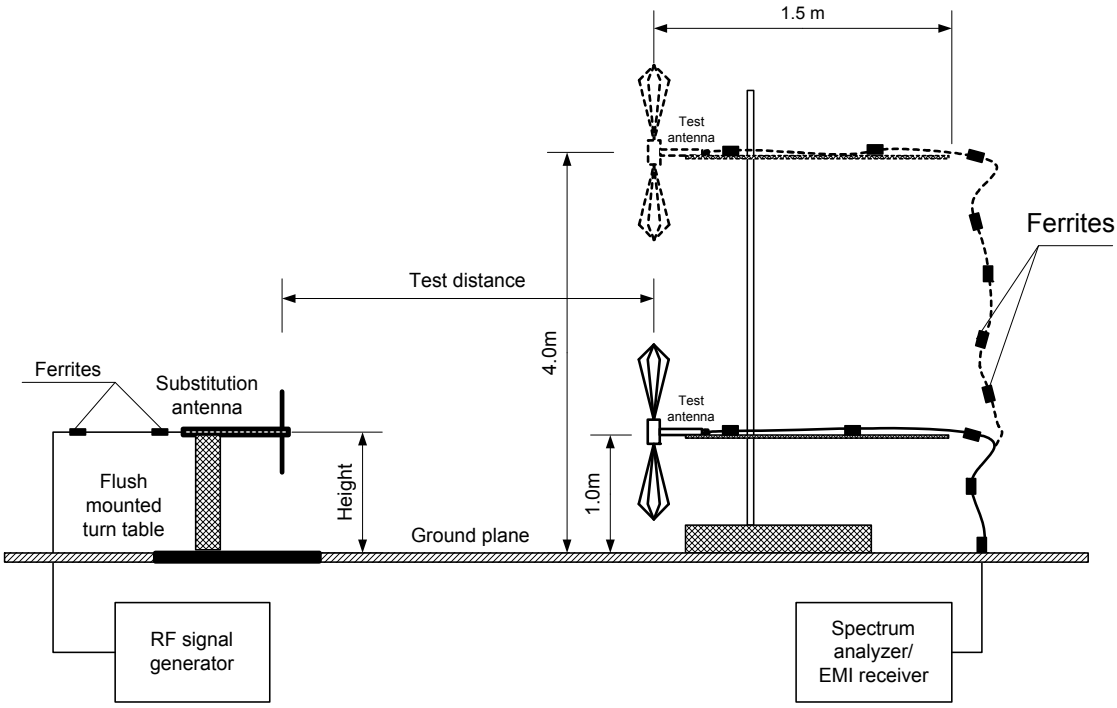


Figure 7.7.2 Setup for spurious emission field strength measurements above 30 MHz



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):	3/19/2012 - 3/20/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 11.5 dBi antenna gain			

Figure 7.7.3 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):	3/19/2012 - 3/20/2012		
Temperature: 22.4 ºC	**Air Pressure:** 1018 hPa	**Relative Humidity:** 45 %	**Power Supply:** 48VDC
Remarks: Power settings according to 11.5 dBi antenna gain			

Table 7.7.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE: 3650 – 3700 MHz
TEST DISTANCE: 3 m
TEST SITE: OATS
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: 11.2 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	Antenna		Azimuth, degrees*	Peak field strength(VBW=3 MHz)			Average field strength(VBW=1 kHz)			Verdict
	Polarization	Height, m		Measured, dB(µV/m)	Limit, dB(µV/m)	Margin, dB**	Measured, dB(µV/m)	Limit, dB(µV/m)	Margin, dB**	
Low carrier frequency										
7312.125	Vert	1.2	0	79.72	104.4	-24.68	66.87	84.4	-17.53	Pass
10965.250	Hor	1.0	10	76.92	104.4	-27.48	61.83	84.4	-22.57	
14619.500	Vert	1.0	0	68.64	104.4	-35.76	53.11	84.4	-31.29	
Mid carrier frequency										
7352.000	Vert	1.2	0	76.17	104.4	-28.23	62.46	84.4	-21.94	Pass
11024.625	Hor	1.0	10	73.60	104.4	-30.80	59.32	84.4	-25.08	
14699.500	Vert	1.0	0	69.50	104.4	-34.90	54.82	84.4	-29.58	
High carrier frequency										
7388.125	Hor	1.1	0	74.06	104.4	-30.34	60.59	84.4	-23.81	Pass
11084.625	Hor	1.0	10	74.20	104.4	-30.20	59.53	84.4	-24.87	
14782.736	Vert	1.0	0	69.38	104.4	-35.02	53.35	84.4	-31.05	

*****- EUT front panel refers to 0 degrees position of turntable.

******- Margin = Field strength of spurious –field strength limit.

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):	3/19/2012 - 3/20/2012		
Temperature: 22.4 ºC	**Air Pressure:** 1018 hPa	**Relative Humidity:** 45 %	**Power Supply:** 48VDC
Remarks: Power settings according to 11.5 dBi antenna gain			

Table 7.7.3 Substitution ERP of spurious test results

ASSIGNED FREQUENCY RANGE: 3650 – 3700 MHz
TEST SITE: OATS
TEST DISTANCE: 3 m
SUBSTITUTION ANTENNA HEIGHT: 0.8 m
DETECTOR USED: Peak
VIDEO BANDWIDTH: > Resolution bandwidth
SUBSTITUTION ANTENNA TYPE: Tunable dipole (30 MHz – 1000 MHz)
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 MHz										
7312.125	66.87	1000	Hor	-37.17	8.47	2.70	-31.40	-13.0	-18.40	Pass
10965.250	61.83	1000	Hor	-43.29	10.45	3.51	-36.35	-13.0	-23.35	Pass
14619.500	53.11	1000	Vert	-52.22	10.66	3.95	-45.51	-13.0	-32.51	Pass
Mid carrier frequency MHz										
7352.000	62.46	1000	Hor	-41.55	8.45	2.70	-35.80	-13.0	-22.80	Pass
11024.625	59.32	1000	Hor	-45.80	10.44	3.51	-38.87	-13.0	-25.87	Pass
14699.500	54.82	1000	Vert	-50.51	10.92	3.96	-43.55	-13.0	-30.55	Pass
High carrier frequency MHz										
7388.125	60.59	1000	Hor	-43.38	8.42	2.71	-37.67	-13.0	-24.67	Pass
11084.625	59.53	1000	Hor	-45.70	10.34	3.52	-38.88	-13.0	-25.88	Pass
14782.736	53.35	1000	Vert	-51.98	11.18	3.98	-44.78	-13.0	-31.78	Pass

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

Reference numbers of test equipment used

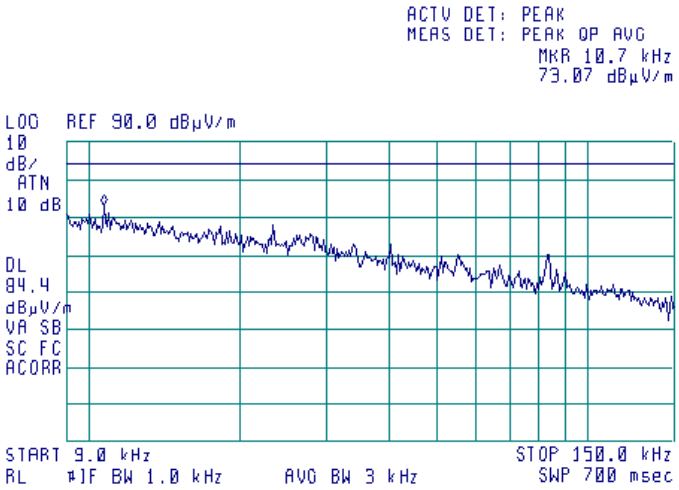
HL 0446	HL 0521	HL 0604	HL 0661	HL 0768	HL 0769	HL 1424	HL 1984
HL 2871	HL 2909	HL 3533	HL 3535	HL 3623	HL 3901	HL 4114	

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):	3/19/2012 - 3/20/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 11.5 dBi antenna gain			

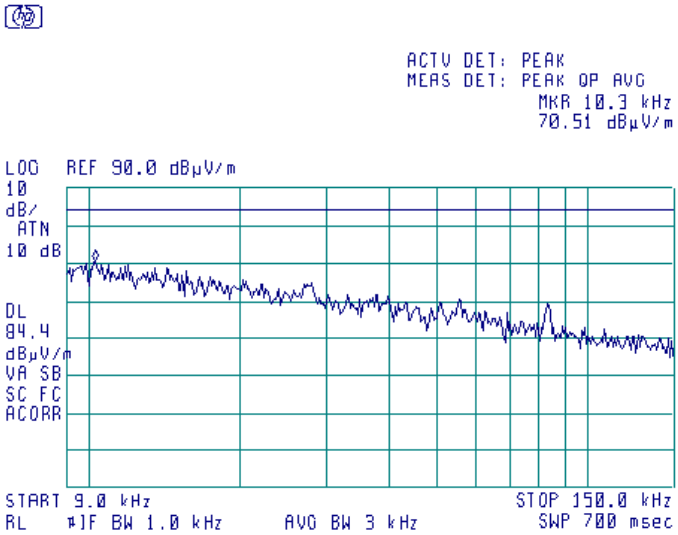
Plot 7.7.1 Radiated emission measurements in 9 - 150 kHz range

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



Plot 7.7.2 Radiated emission measurements in 9 - 150 kHz range

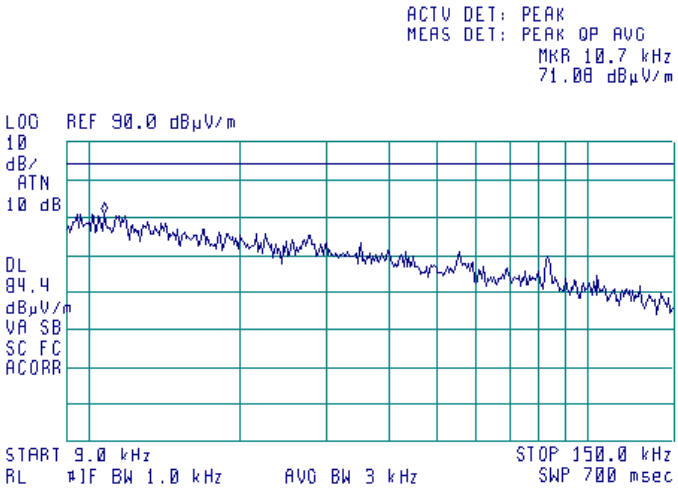
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



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):	3/19/2012 - 3/20/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 11.5 dBi antenna gain			

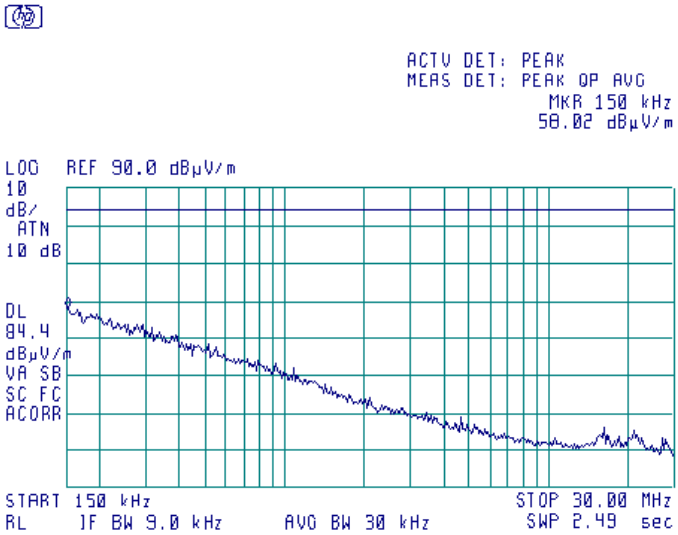
Plot 7.7.3 Radiated emission measurements in 9 - 150 kHz range

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



Plot 7.7.4 Radiated emission measurements in 0.15 - 30 MHz range

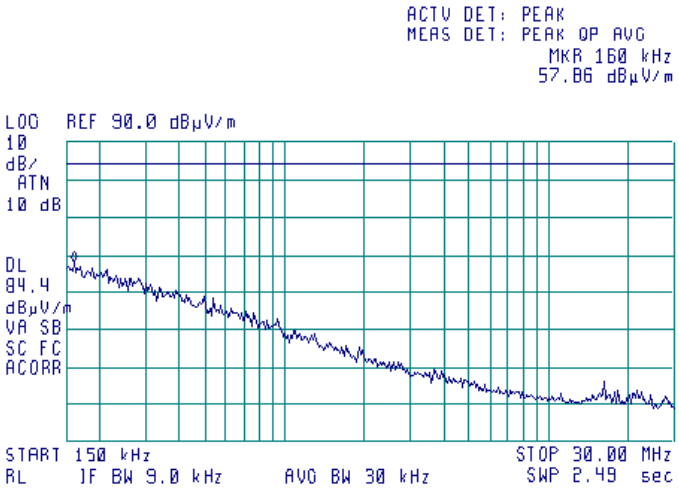
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



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):	3/19/2012 - 3/20/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 11.5 dBi antenna gain			

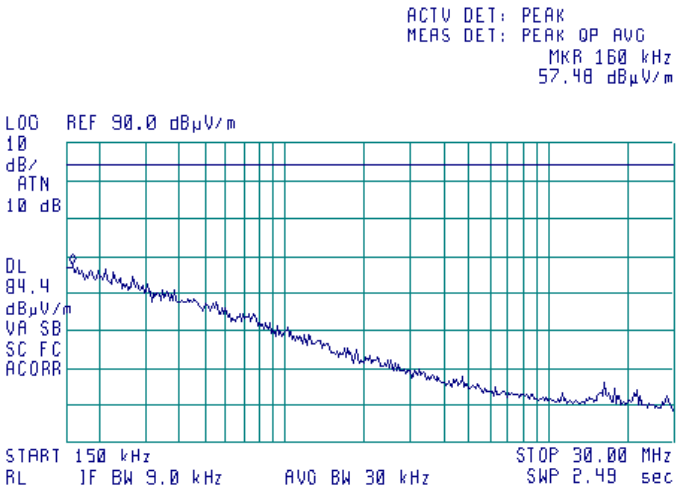
Plot 7.7.5 Radiated emission measurements in 0.15 - 30 MHz range

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



Plot 7.7.6 Radiated emission measurements in 0.15 - 30 MHz range

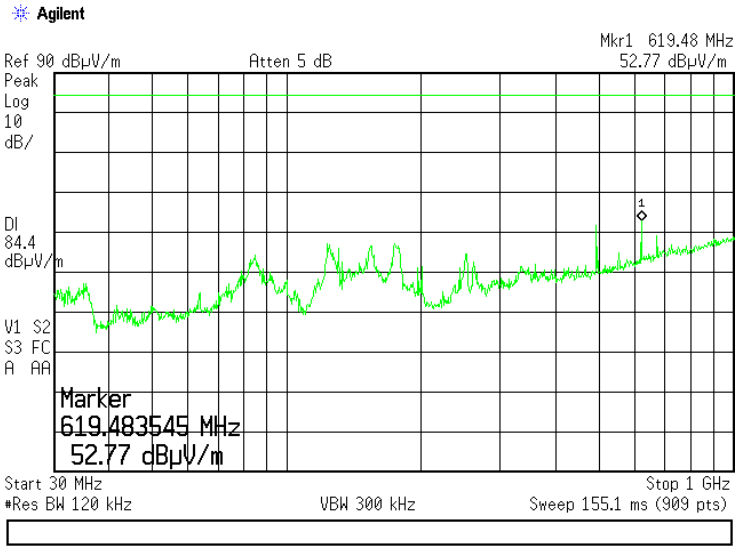
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



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):	3/19/2012 - 3/20/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 11.5 dBi antenna gain			

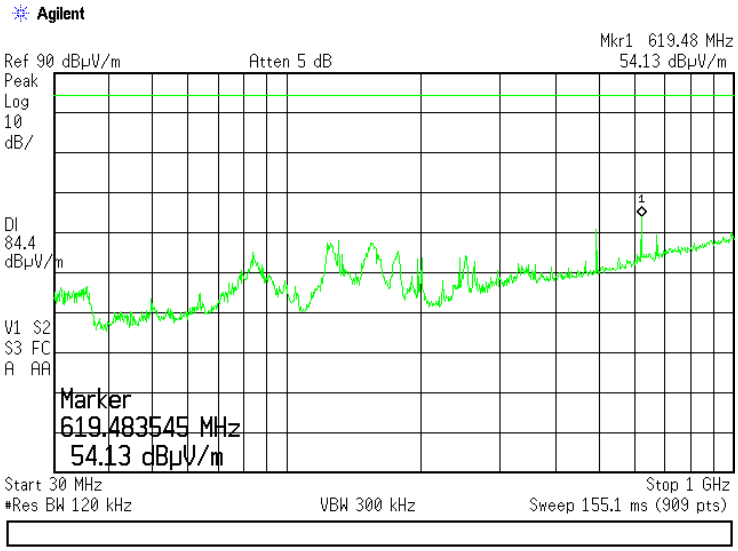
Plot 7.7.7 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.7.8 Radiated emission measurements in 30 - 1000 MHz range

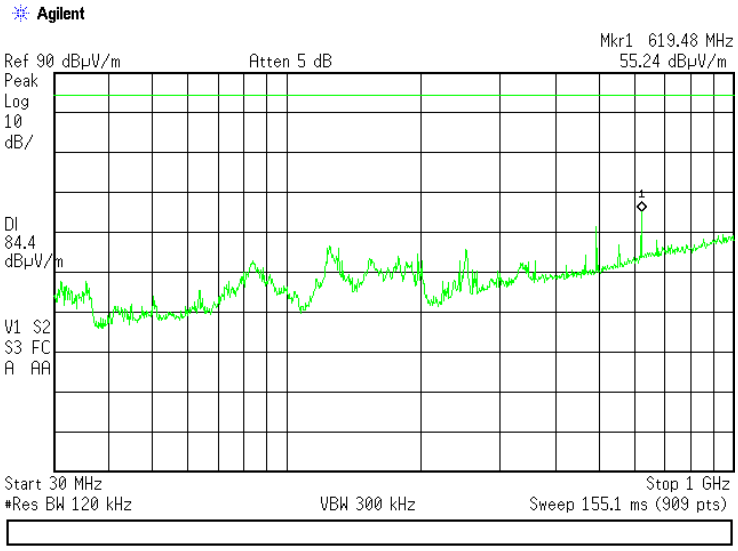
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



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):	3/19/2012 - 3/20/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 11.5 dBi antenna gain			

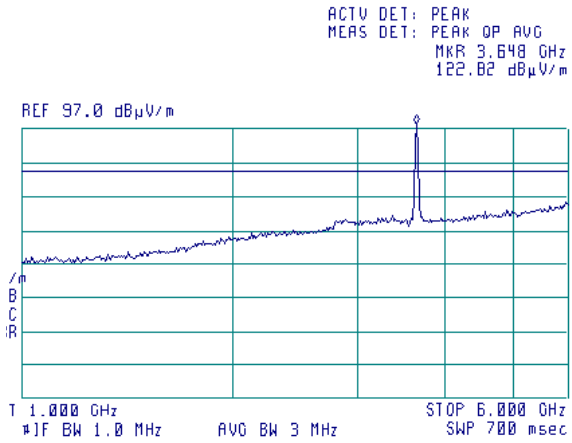
Plot 7.7.9 Radiated emission measurements in 30 - 1000 MHz range

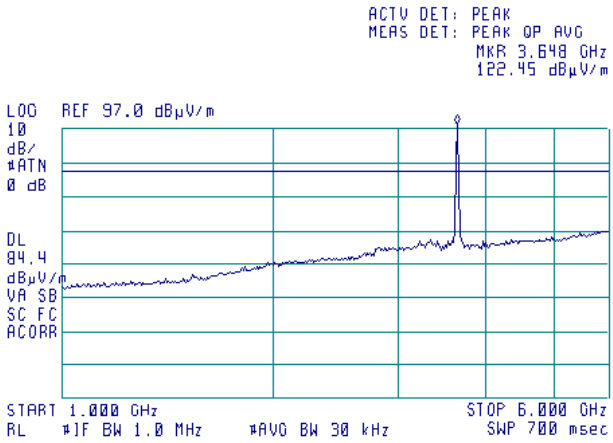
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Plot 7.7.10 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
DETECTOR: Peak	DETECTOR: Average

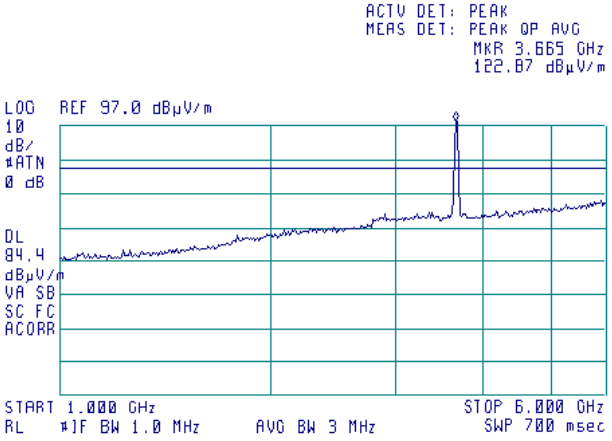




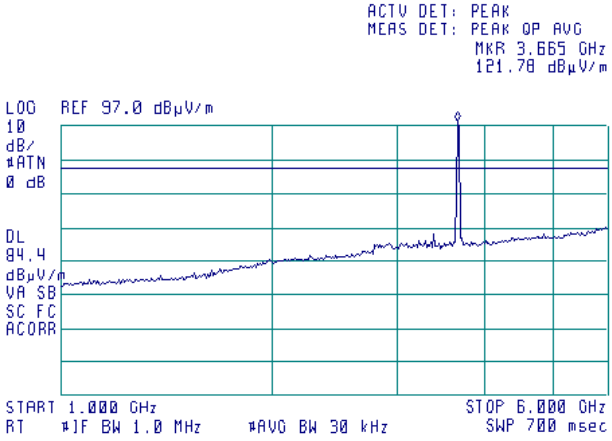
Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/19/2012 - 3/20/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 11.5 dBi antenna gain			

Plot 7.7.11 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
DETECTOR: Peak

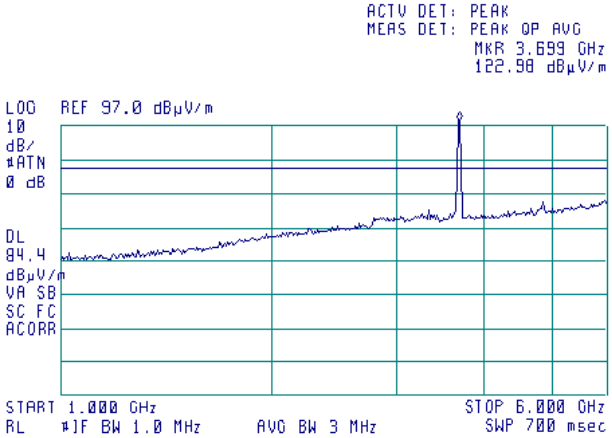


DETECTOR: Average

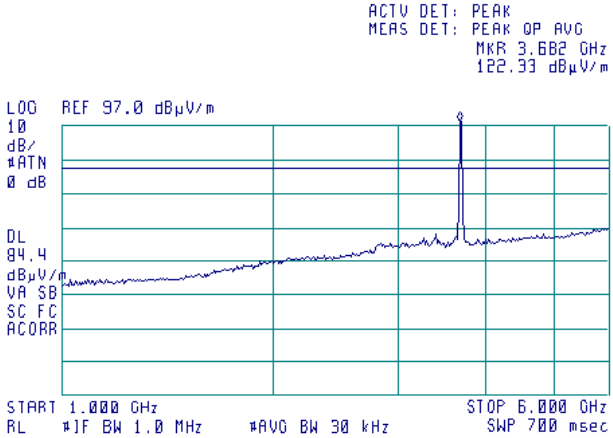


Plot 7.7.12 Radiated emission measurements in 1000 – 6000 MHz range

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



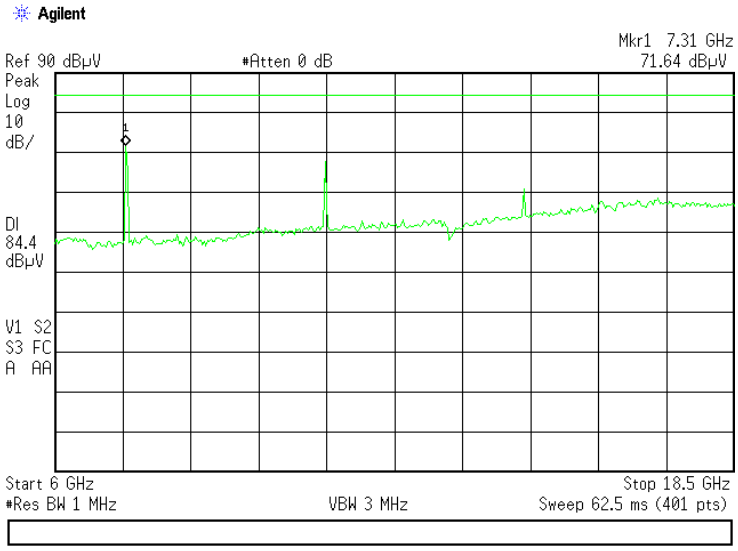
DETECTOR: Average



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):	3/19/2012 - 3/20/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 11.5 dBi antenna gain			

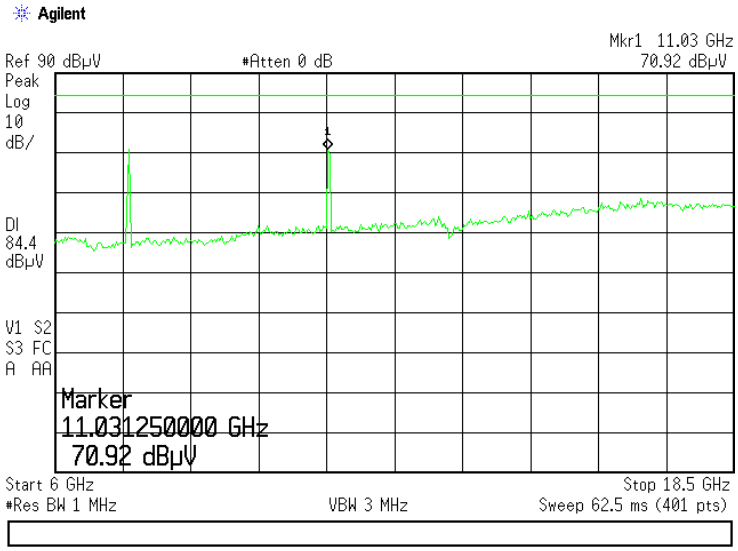
Plot 7.7.13 Radiated emission measurements in 6000 – 18000 MHz range

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



Plot 7.7.14 Radiated emission measurements in 6000 – 18000 MHz range

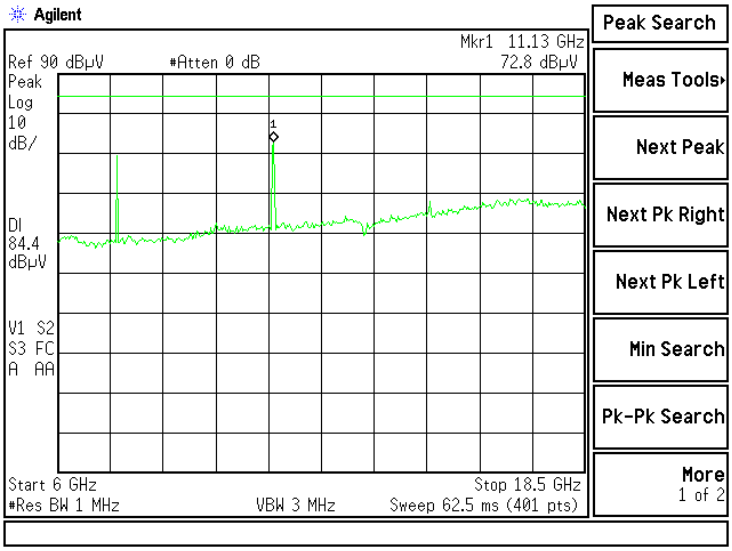
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



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):	3/19/2012 - 3/20/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 11.5 dBi antenna gain			

Plot 7.7.15 Radiated emission measurements in 6000 – 18000 MHz range

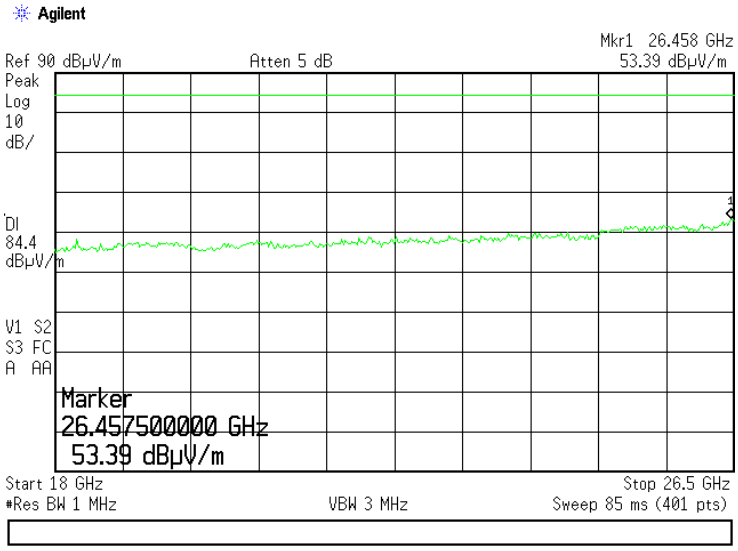
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



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):	3/19/2012 - 3/20/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 11.5 dBi antenna gain			

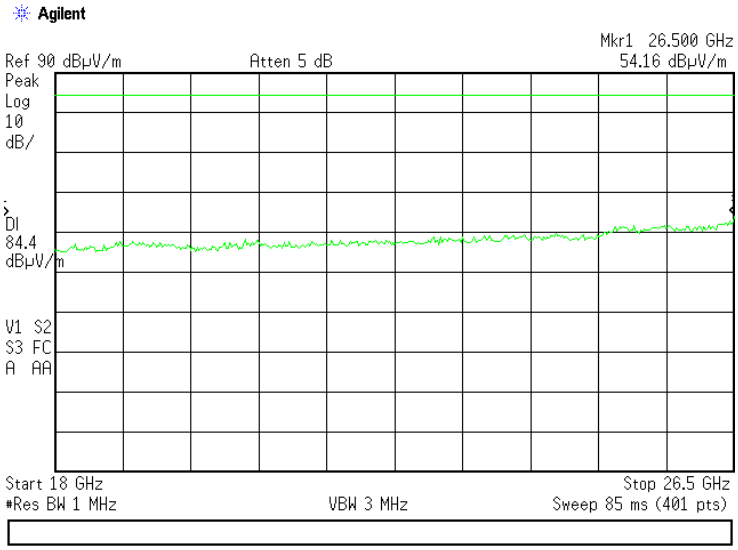
Plot 7.7.16 Radiated emission measurements in 18000 – 26500 MHz range

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



Plot 7.7.17 Radiated emission measurements in 18000 – 26500 MHz range

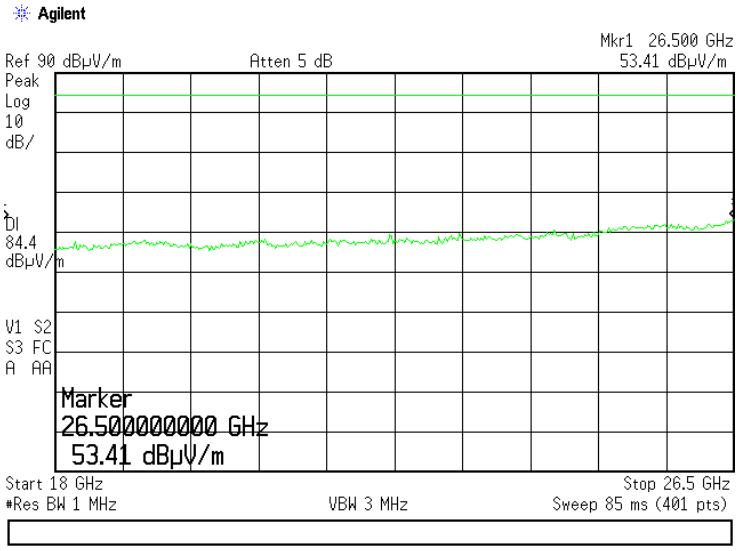
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



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):	3/19/2012 - 3/20/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 11.5 dBi antenna gain			

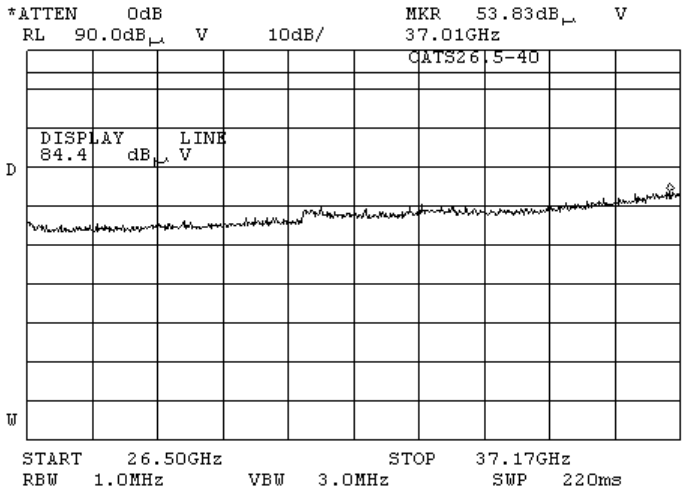
Plot 7.7.18 Radiated emission measurements in 18000 – 26500 MHz range

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



Plot 7.7.19 Radiated emission measurements in 26500 – 40000 MHz range

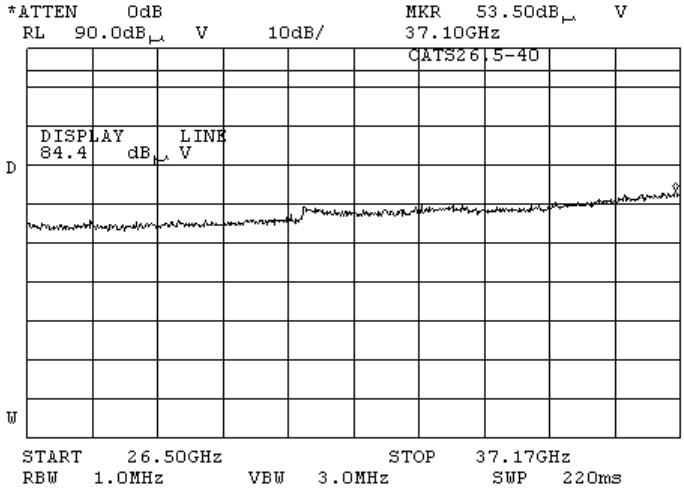
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



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):	3/19/2012 - 3/20/2012		
Temperature: 22.4 ºC	**Air Pressure:** 1018 hPa	**Relative Humidity:** 45 %	**Power Supply:** 48VDC
Remarks: Power settings according to 11.5 dBi antenna gain			

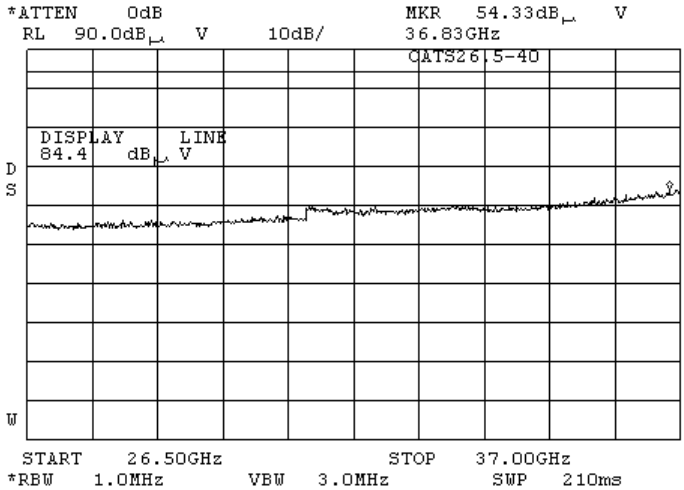
Plot 7.7.20 Radiated emission measurements in 26500 – 37000 MHz range

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



Plot 7.7.21 Radiated emission measurements in 26500 – 37000 MHz range

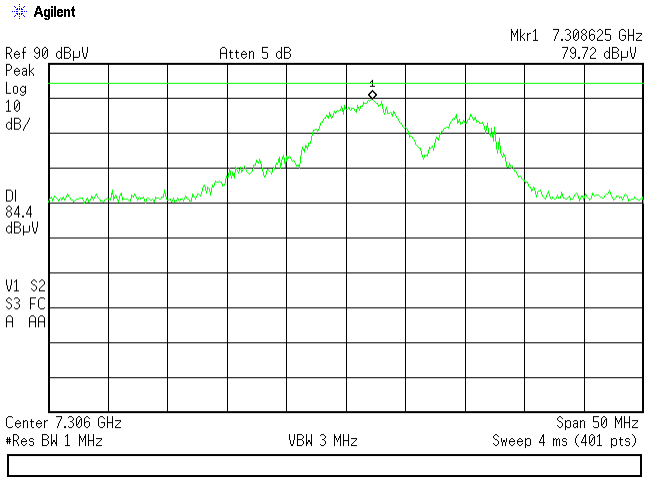
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m

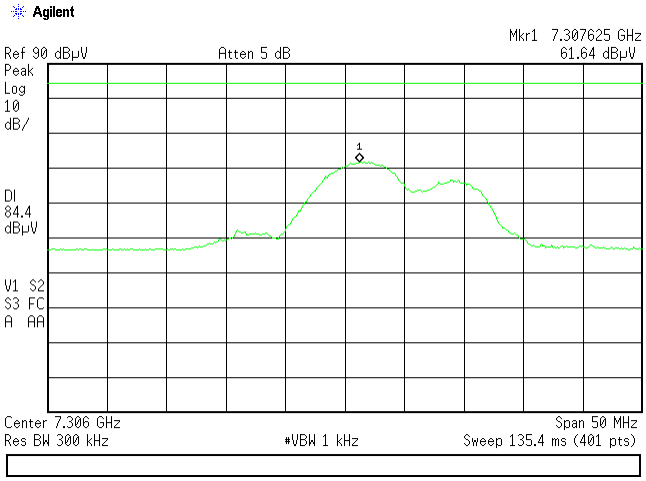


Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/19/2012 - 3/20/2012		
Temperature: 22.4 °C	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 11.5 dBi antenna gain			

Plot 7.7.22 Radiated emission measurements at the 2nd harmonic

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

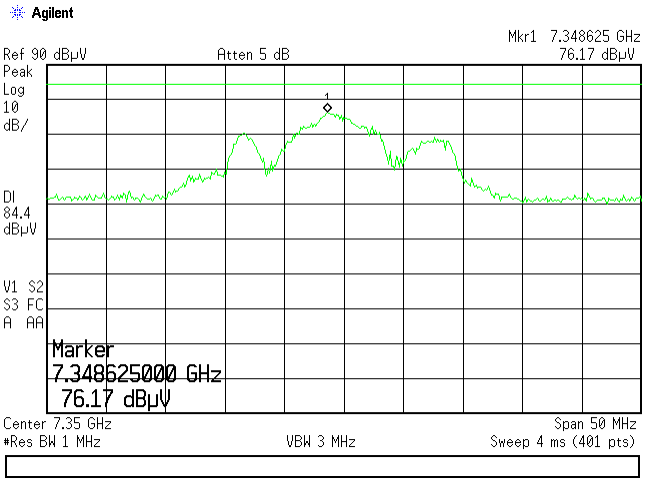


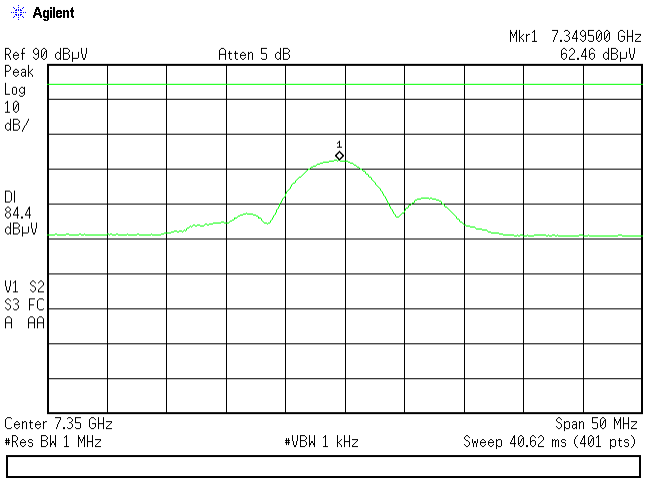


Correction factor 10 log 1 M /0.3 M= 5.23 dB was added to the obtained result: 61.64 dBµV/m +5.23 dB= 66.87 dBµV/m

Plot 7.7.23 Radiated emission measurements at the 2nd harmonic

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

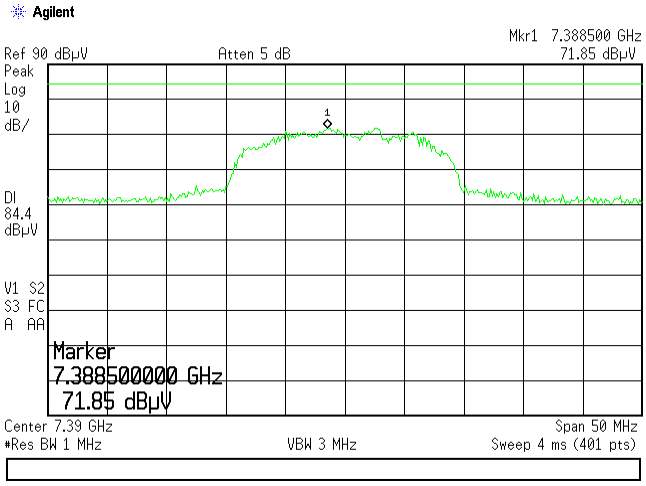


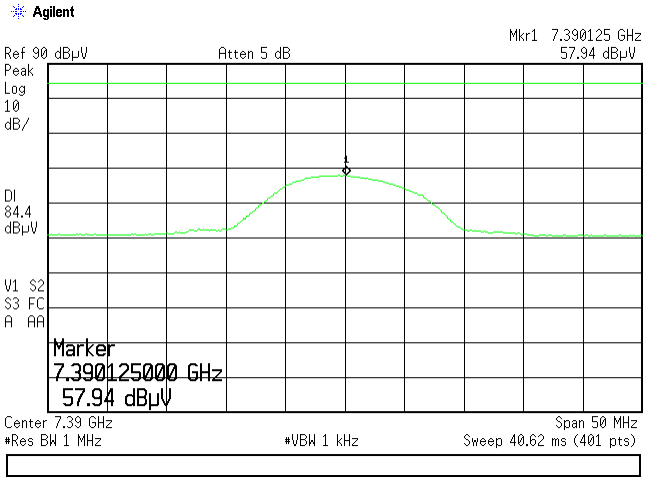


Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/19/2012 - 3/20/2012		
Temperature: 22.4 °C	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 11.5 dBi antenna gain			

Plot 7.7.24 Radiated emission measurements at the 2nd harmonic

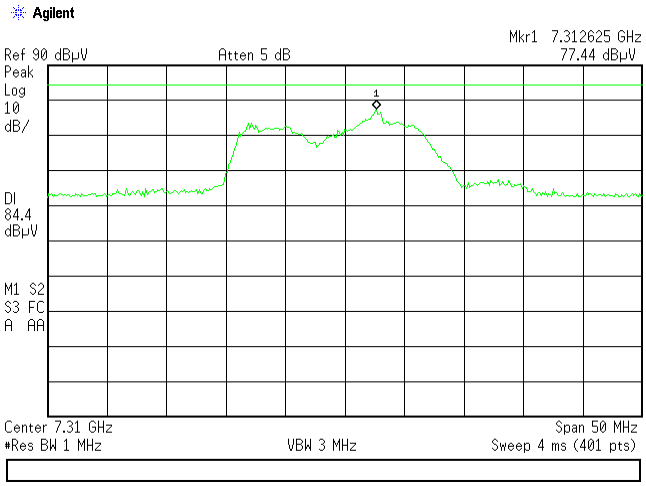
TEST SITE: OATS
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical
TEST DISTANCE: 3 m

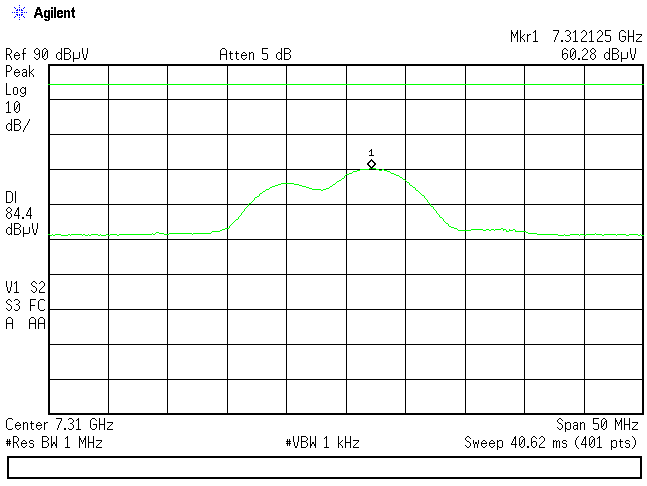




Plot 7.7.25 Radiated emission measurements at the 2nd harmonic

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

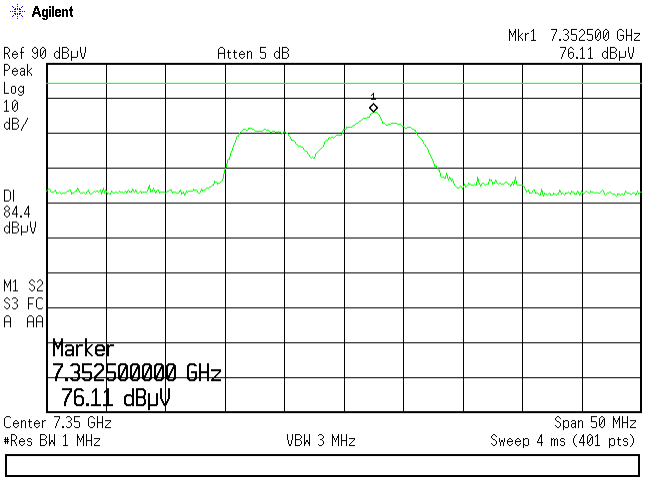


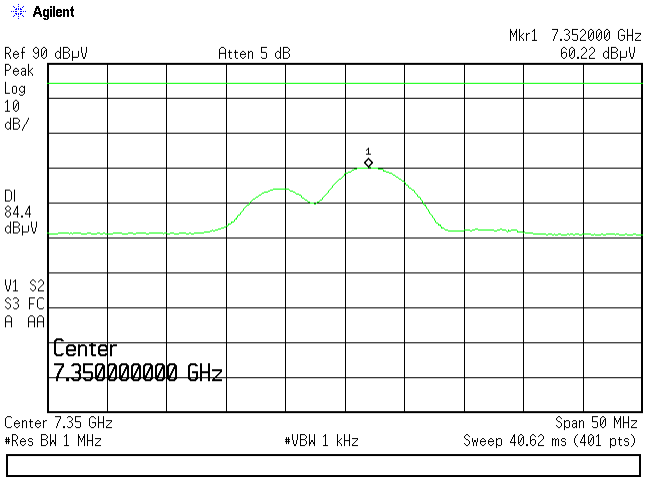


Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/19/2012 - 3/20/2012		
Temperature: 22.4 °C	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 11.5 dBi antenna gain			

Plot 7.7.26 Radiated emission measurements at the 2nd harmonic

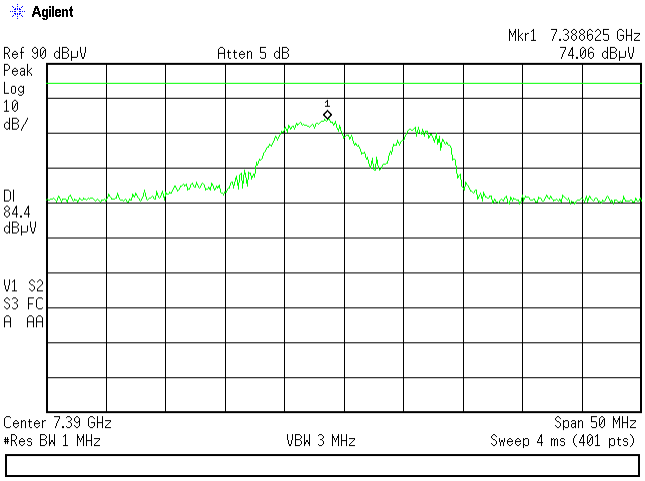
TEST SITE: OATS
CARRIER FREQUENCY: Mid
ANTENNA POLARIZATION: Horizontal
TEST DISTANCE: 3 m

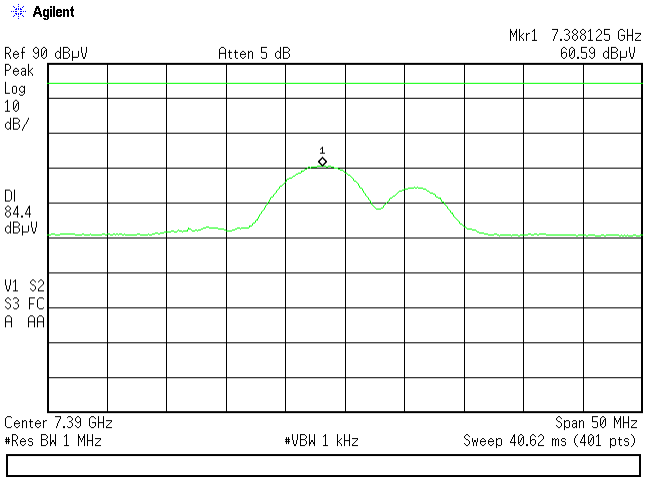




Plot 7.7.27 Radiated emission measurements at the 2nd harmonic

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

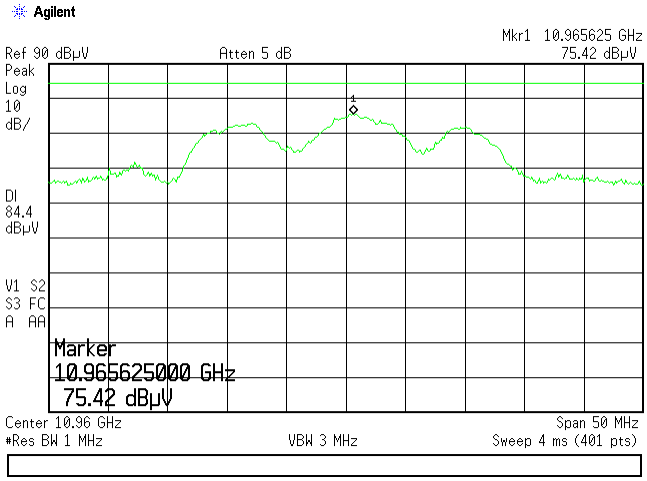


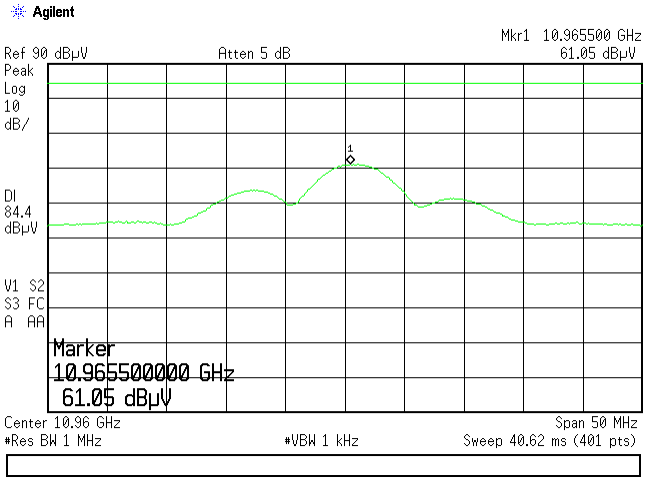


Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/19/2012 - 3/20/2012		
Temperature: 22.4 °C	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 11.5 dBi antenna gain			

Plot 7.7.28 Radiated emission measurements at the 3rd harmonic

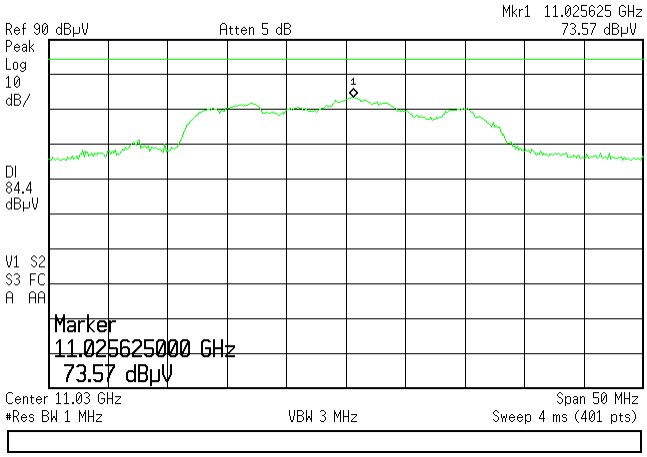
TEST SITE: OATS
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical
TEST DISTANCE: 3 m

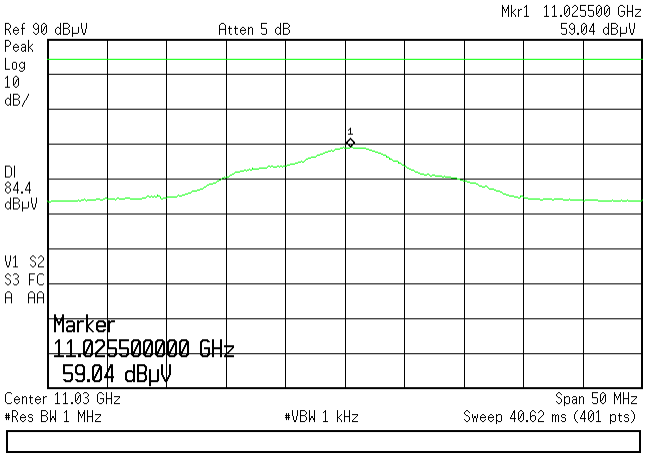




Plot 7.7.29 Radiated emission measurements at the 3rd harmonic

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

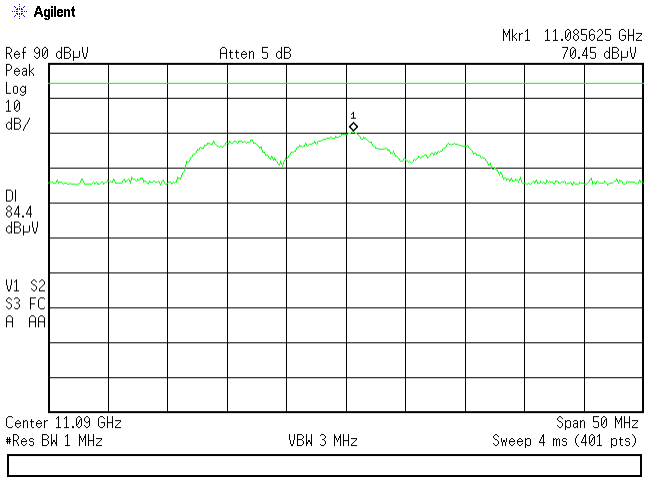


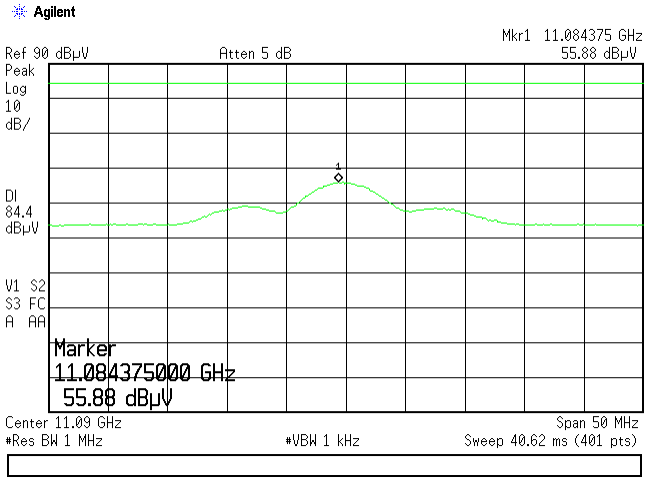


Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/19/2012 - 3/20/2012		
Temperature: 22.4 °C	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 11.5 dBi antenna gain			

Plot 7.7.30 Radiated emission measurements at the 3rd harmonic

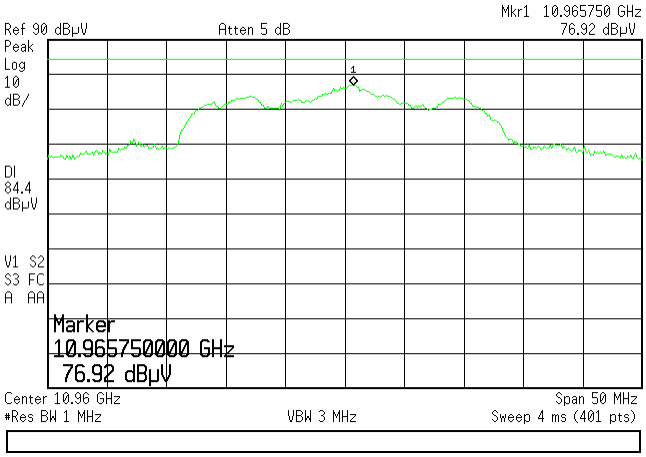
TEST SITE: OATS
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical
TEST DISTANCE: 3 m

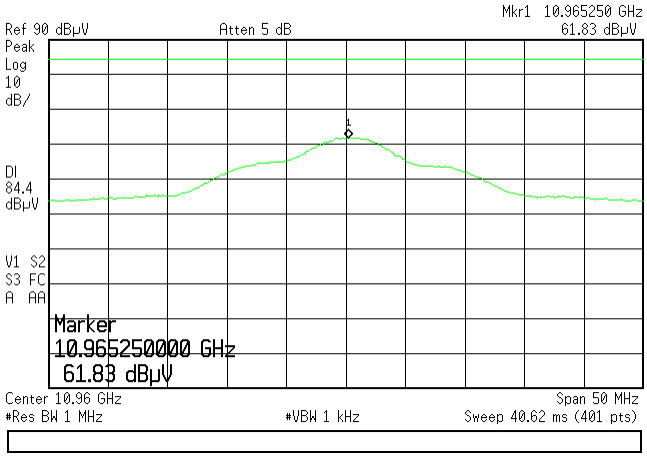




Plot 7.7.31 Radiated emission measurements at the 3rd harmonic

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

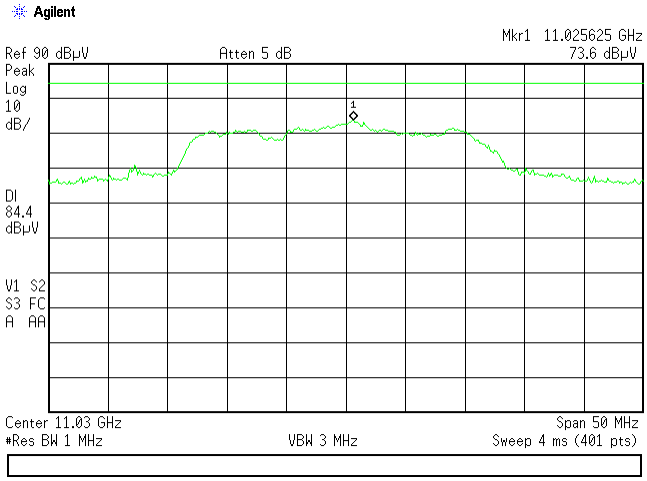


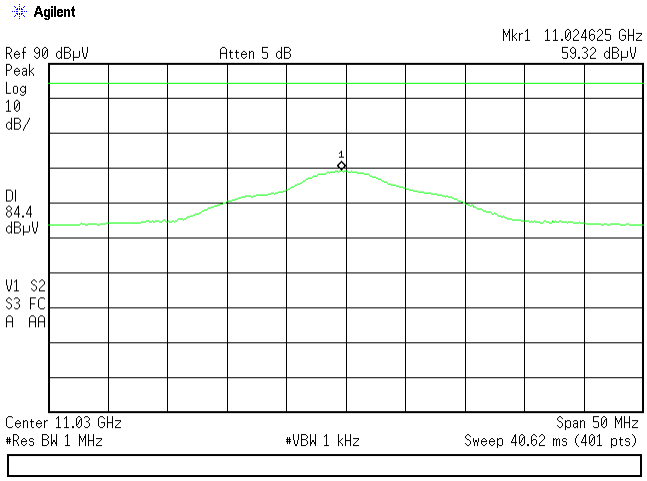


Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/19/2012 - 3/20/2012		
Temperature: 22.4 °C	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 11.5 dBi antenna gain			

Plot 7.7.32 Radiated emission measurements at the 3rd harmonic

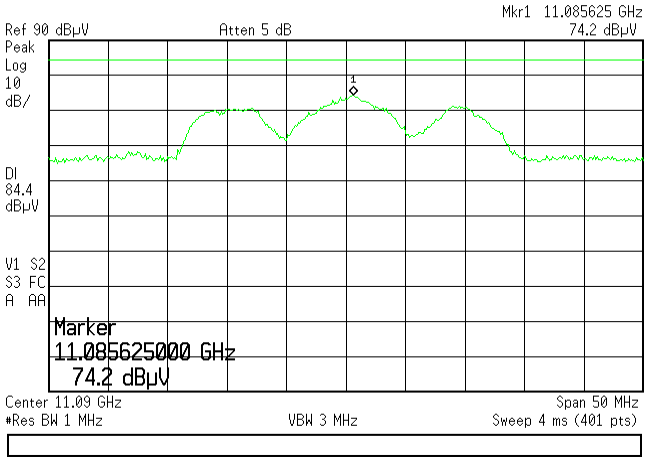
TEST SITE: OATS
CARRIER FREQUENCY: Mid
ANTENNA POLARIZATION: Horizontal
TEST DISTANCE: 3 m

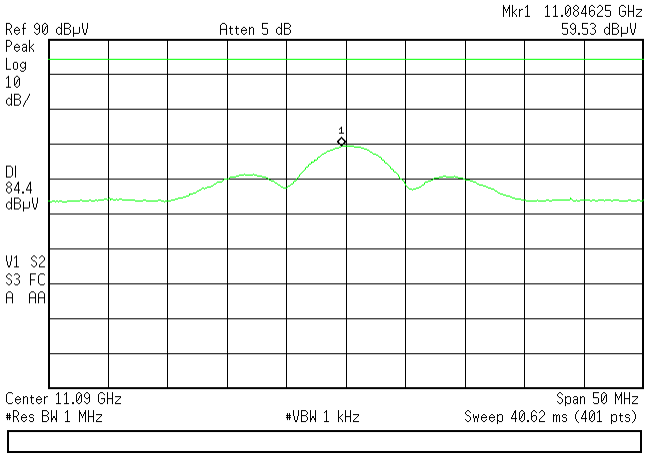




Plot 7.7.33 Radiated emission measurements at the 3rd harmonic

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

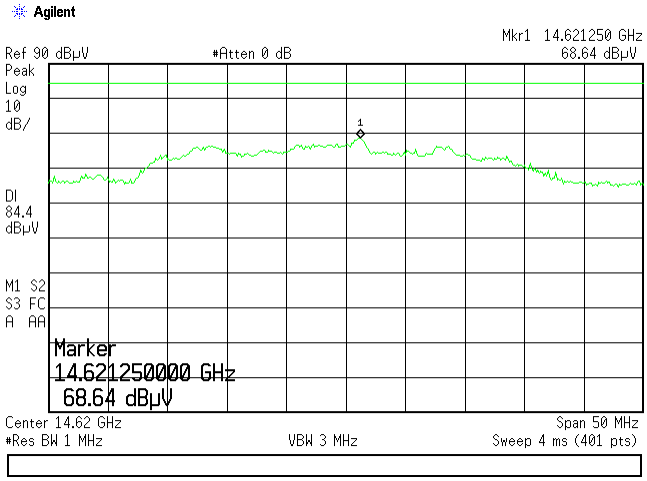


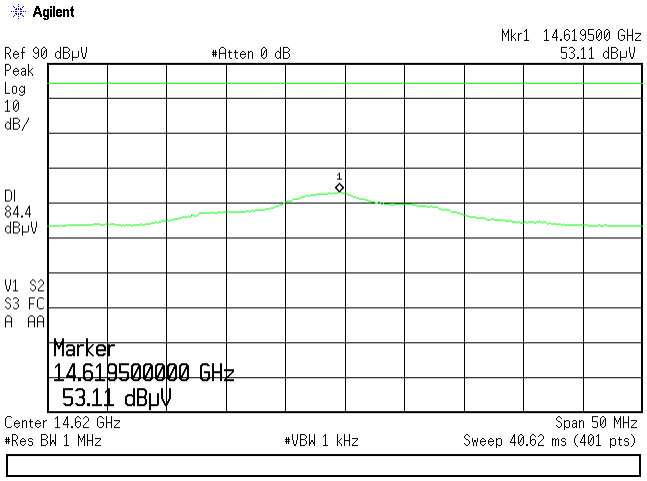


Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/19/2012 - 3/20/2012		
Temperature: 22.4 °C	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 11.5 dBi antenna gain			

Plot 7.7.34 Radiated emission measurements at the 4th harmonic

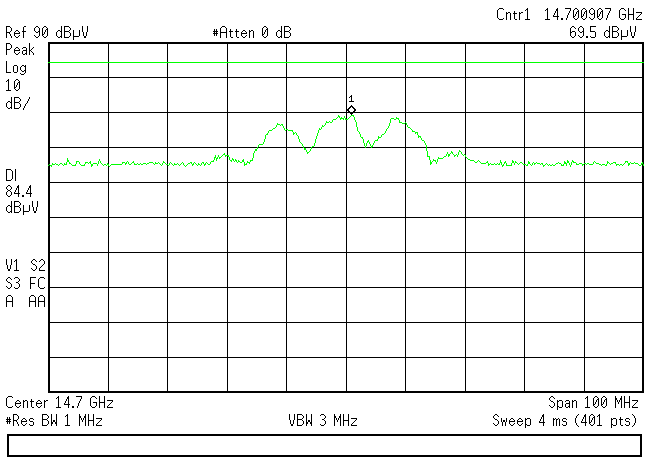
TEST SITE: OATS
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m

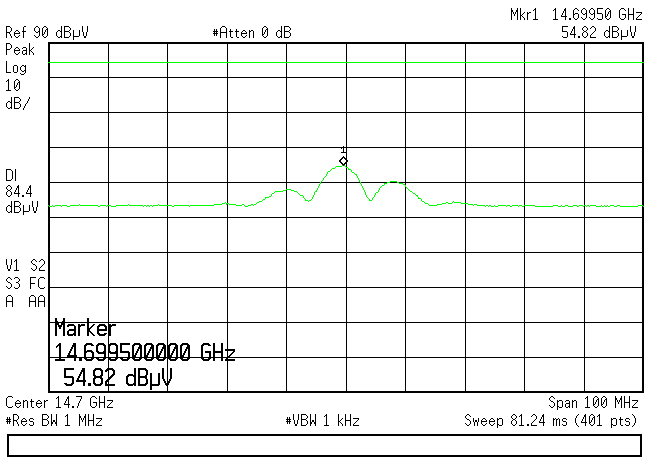




Plot 7.7.35 Radiated emission measurements at the 4th harmonic

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

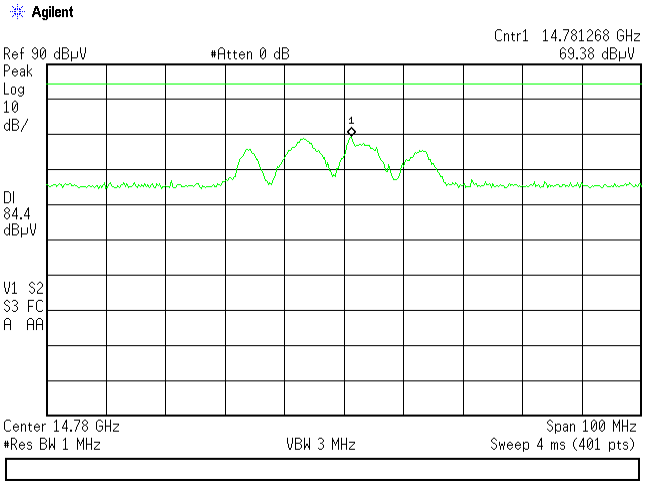


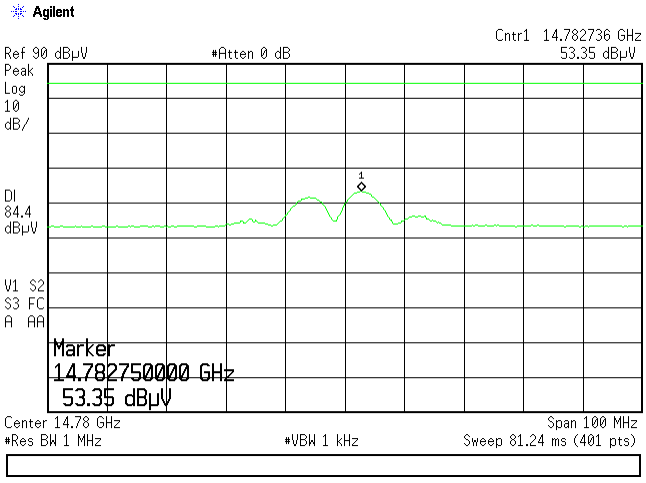


Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/19/2012 - 3/20/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 11.5 dBi antenna gain			

Plot 7.7.36 Radiated emission measurements at the 4th harmonic

TEST SITE: OATS
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):	3/15/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 18 dBi antenna gain			

7.8 Radiated spurious emission measurements with 18 dBi antenna

7.8.1 General

This test was performed to measure radiated spurious emissions from the EUT. Specification test limits are given in Table 7.8.1.

Table 7.8.1 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

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

7.8.2.1 The EUT was set up as shown in Figure 7.8.1 energized and the performance check was conducted.

7.8.2.2 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.

7.8.2.3 The worst test results (the lowest margins) were recorded in Table 7.8.2 and shown in the associated plots.

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

7.8.3.1 The EUT was set up as shown in Figure 7.8.2, energized and the performance check was conducted.

7.8.3.2 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.

7.8.3.3 The worst test results (the lowest margins) were recorded in Table 7.8.2 and shown in the associated plots.

7.8.4 Test procedure for substitution ERP measurements of spurious

7.8.4.1 The test equipment was set up as shown in Figure 7.8.3 and energized.

7.8.4.2 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.

7.8.4.3 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.

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

7.8.4.5 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.

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

7.8.4.7 The worst test results (the lowest margins) were recorded in Table 7.8.3 and shown in the associated plots.

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):	3/15/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 18 dBi antenna gain			

Figure 7.8.1 Setup for spurious emission field strength measurements in 9 kHz to 30 MHz band

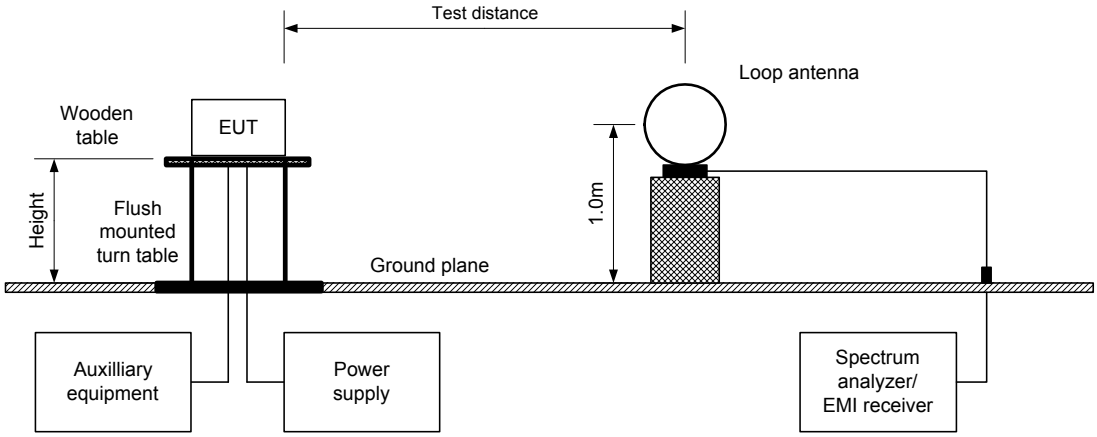
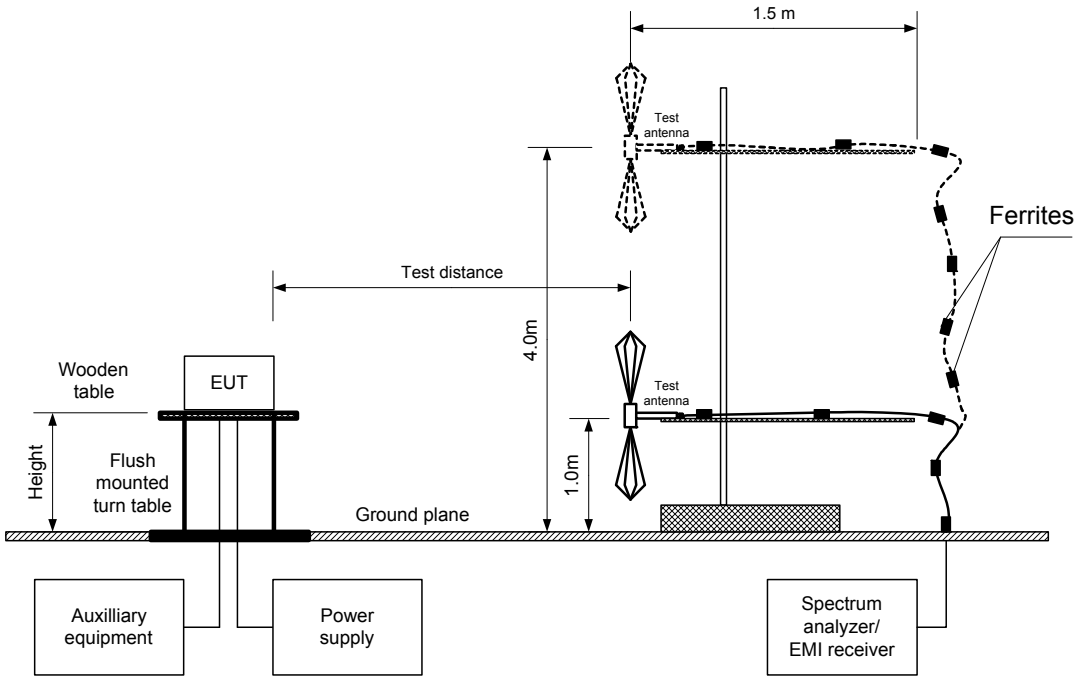
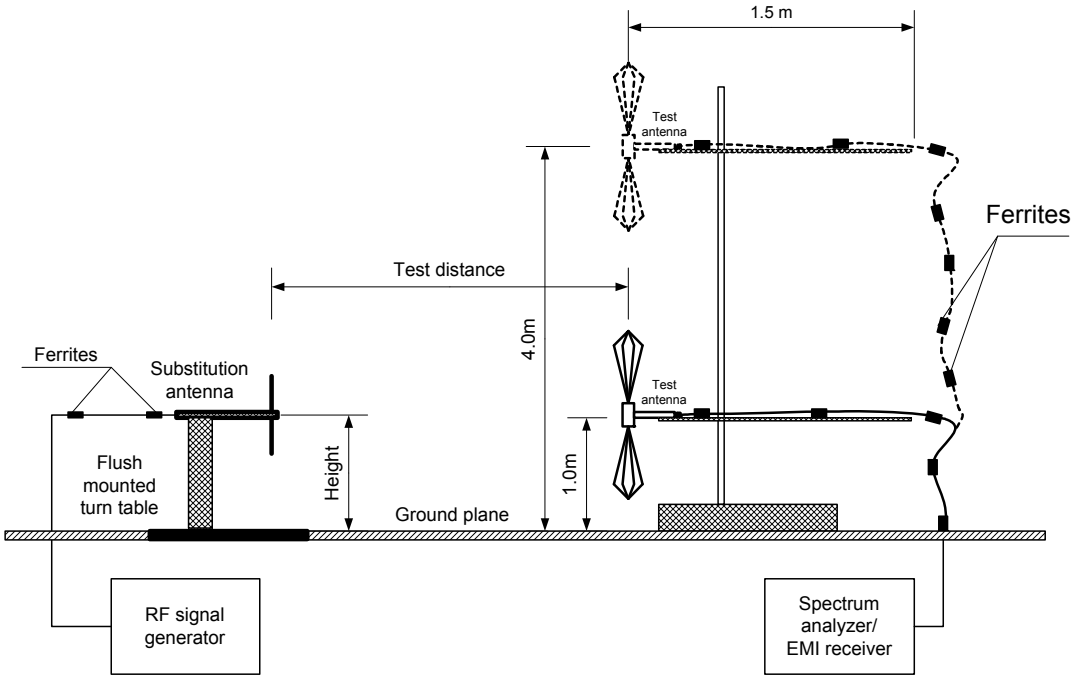


Figure 7.8.2 Setup for spurious emission field strength measurements above 30 MHz



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):	3/15/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 18 dBi antenna gain			

Figure 7.8.3 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):	3/15/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 18 dBi antenna gain			

Table 7.8.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE:	3650 – 3700 MHz
TEST DISTANCE:	3 m
TEST SITE:	OATS
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:	11.2 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum

Frequency, MHz	Antenna		Azimuth, degrees*	Peak field strength(VBW=3 MHz)			Average field strength(VBW=1 kHz)			Verdict
	Polarization	Height, m		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	
Low carrier frequency										
7312.125	Hor	1.1	0	79.72	104.4	-24.68	61.64	84.4	-22.76	Pass
10965.250	Hor	1.0	10	76.92	104.4	-27.48	61.83	84.4	-22.57	
14619.500	Vert	1.0	0	68.64	104.4	-35.76	53.11	84.4	-31.29	
Mid carrier frequency										
7352.000	Hor	1.1	0	76.17	104.4	-28.23	62.46	84.4	-21.94	Pass
11024.625	Hor	1.0	10	73.60	104.4	-30.80	59.32	84.4	-25.08	
14699.500	Vert	1.0	0	69.50	104.4	-34.90	54.82	84.4	-29.58	
High carrier frequency										
7388.125	Hor	1.1	0	74.06	104.4	-30.34	60.59	84.4	-23.81	Pass
11084.625	Hor	1.0	10	74.20	104.4	-30.20	59.53	84.4	-24.87	
14782.736	Vert	1.0	0	69.38	104.4	-35.02	53.35	84.4	-31.05	

*****- EUT front panel refers to 0 degrees position of turntable.

******- Margin = Field strength of spurious –field strength limit.

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):	3/15/2012		
Temperature: 22.4 ºC	**Air Pressure:** 1018 hPa	**Relative Humidity:** 45 %	**Power Supply:** 48VDC
Remarks: Power settings according to 18 dBi antenna gain			

Table 7.8.3 Substitution ERP of spurious test results

ASSIGNED FREQUENCY RANGE: 3650 – 3700 MHz
TEST SITE: OATS
TEST DISTANCE: 3 m
SUBSTITUTION ANTENNA HEIGHT: 0.8 m
DETECTOR USED: Peak
VIDEO BANDWIDTH: > Resolution bandwidth
SUBSTITUTION ANTENNA TYPE: Tunable dipole (30 MHz – 1000 MHz)
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 MHz										
7312.125	60.28	1000	Hor	-42.40	8.47	2.70	-36.63	-13.0	-23.63	Pass
10965.250	61.83	1000	Hor	-43.29	10.45	3.51	-36.35	-13.0	-23.35	Pass
14619.500	53.11	1000	Vert	-52.22	10.66	3.95	-45.51	-13.0	-32.51	Pass
Mid carrier frequency MHz										
7352.000	60.22	1000	Hor	-41.55	8.45	2.70	-35.80	-13.0	-22.80	Pass
11024.625	59.32	1000	Hor	-45.80	10.44	3.51	-38.87	-13.0	-25.87	Pass
14699.500	54.82	1000	Vert	-50.51	10.92	3.96	-43.55	-13.0	-30.55	Pass
High carrier frequency MHz										
7388.125	60.59	1000	Hor	-43.38	8.42	2.71	-37.67	-13.0	-24.67	Pass
11084.625	59.53	1000	Hor	-45.70	10.34	3.52	-38.88	-13.0	-25.88	Pass
14782.736	53.35	1000	Vert	-51.98	11.18	3.98	-44.78	-13.0	-31.78	Pass

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

Reference numbers of test equipment used

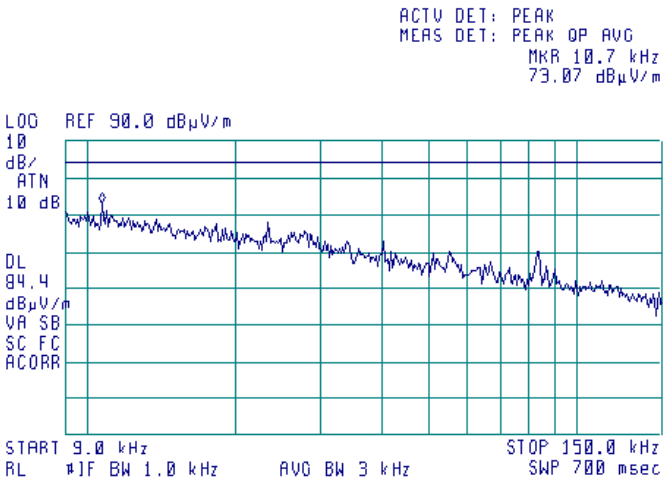
HL 0446	HL 0521	HL 0604	HL 0661	HL 0768	HL 0769	HL 1424	HL 1984
HL 2871	HL 2909	HL 3533	HL 3535	HL 3623	HL 3901	HL 4114	

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):	3/15/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 18 dBi antenna gain			

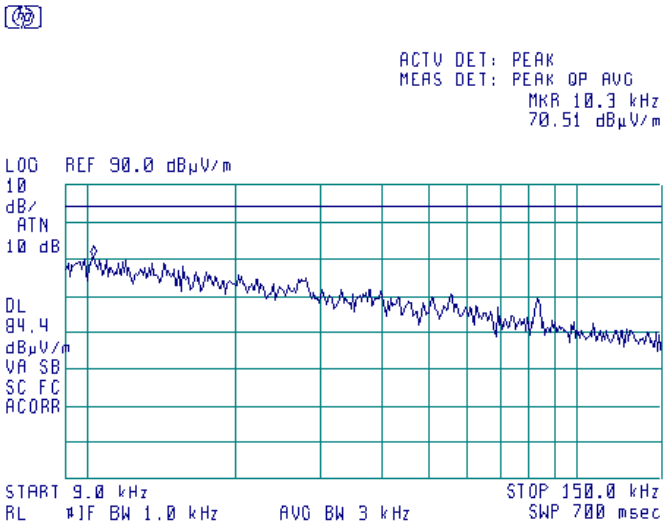
Plot 7.8.1 Radiated emission measurements in 9 - 150 kHz range

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



Plot 7.8.2 Radiated emission measurements in 9 - 150 kHz range

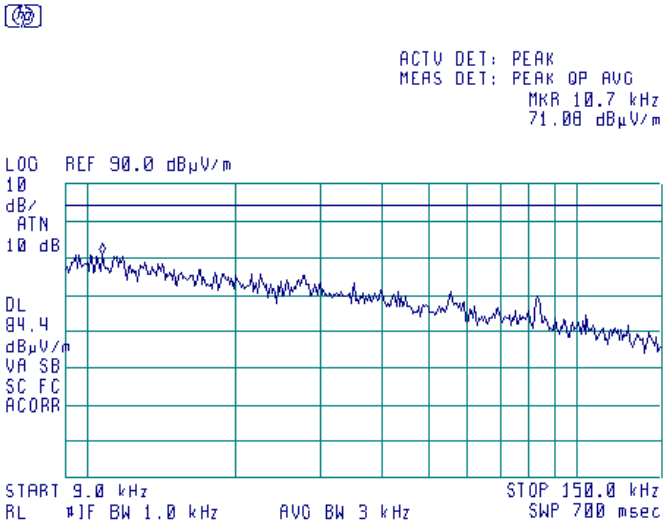
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



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):	3/15/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 18 dBi antenna gain			

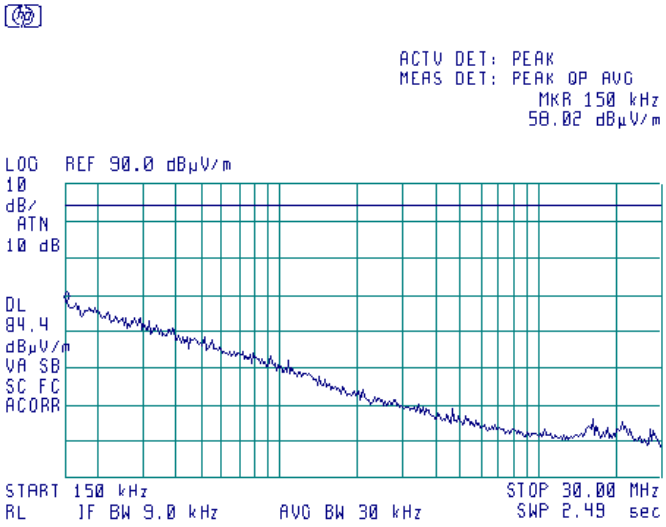
Plot 7.8.3 Radiated emission measurements in 9 - 150 kHz range

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



Plot 7.8.4 Radiated emission measurements in 0.15 - 30 MHz range

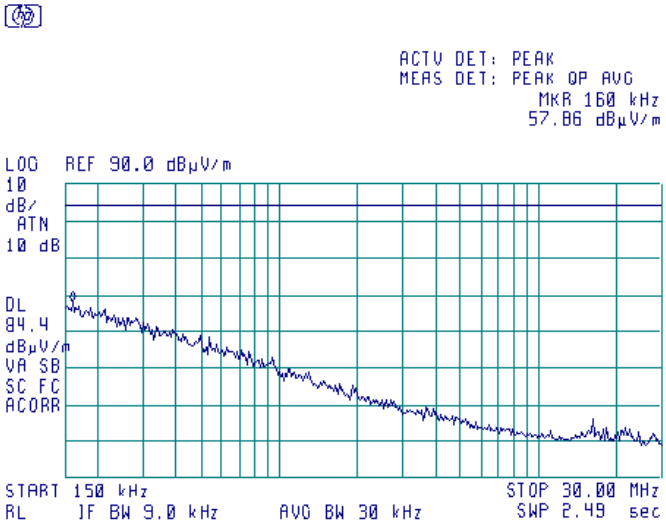
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



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):	3/15/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 18 dBi antenna gain			

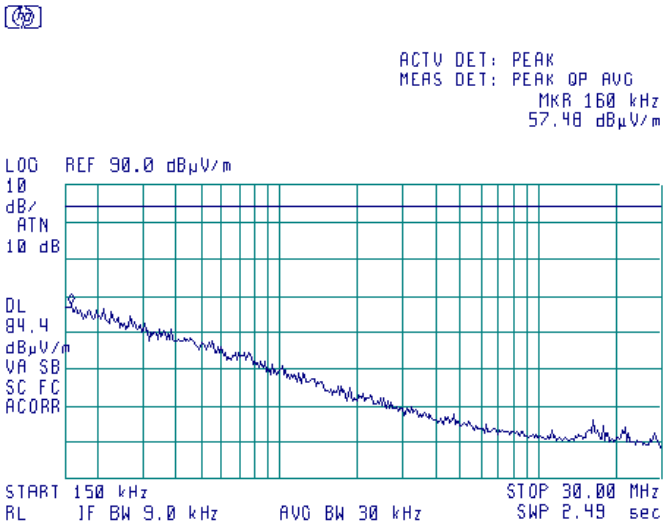
Plot 7.8.5 Radiated emission measurements in 0.15 - 30 MHz range

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



Plot 7.8.6 Radiated emission measurements in 0.15 - 30 MHz range

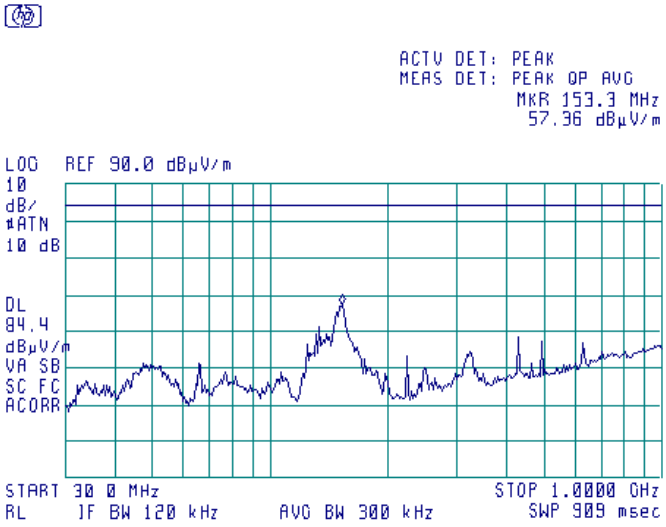
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



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):	3/15/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 18 dBi antenna gain			

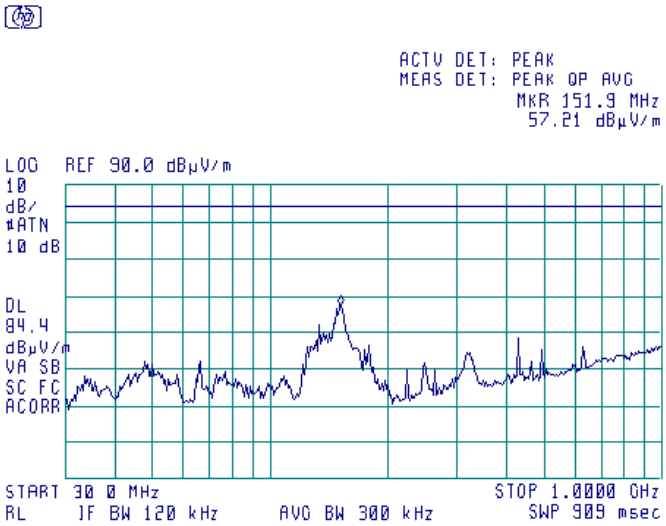
Plot 7.8.7 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.8.8 Radiated emission measurements in 30 - 1000 MHz range

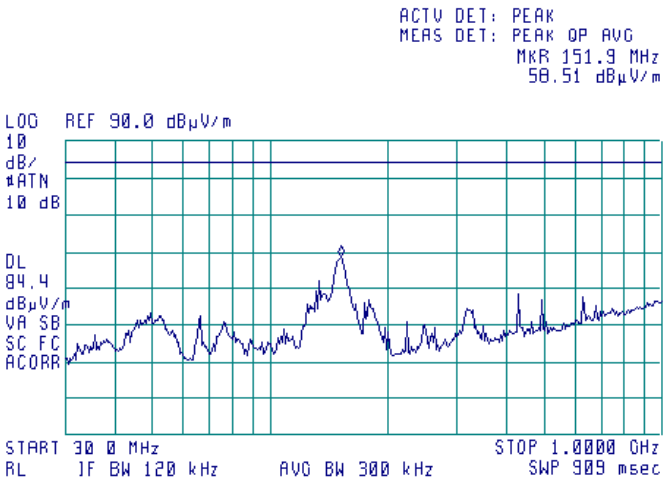
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



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):	3/15/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 18 dBi antenna gain			

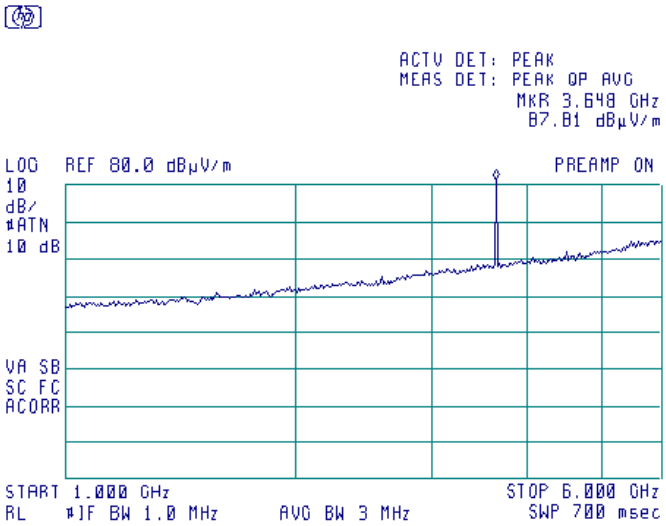
Plot 7.8.9 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.8.10 Radiated emission measurements in 1000 – 6000 MHz range

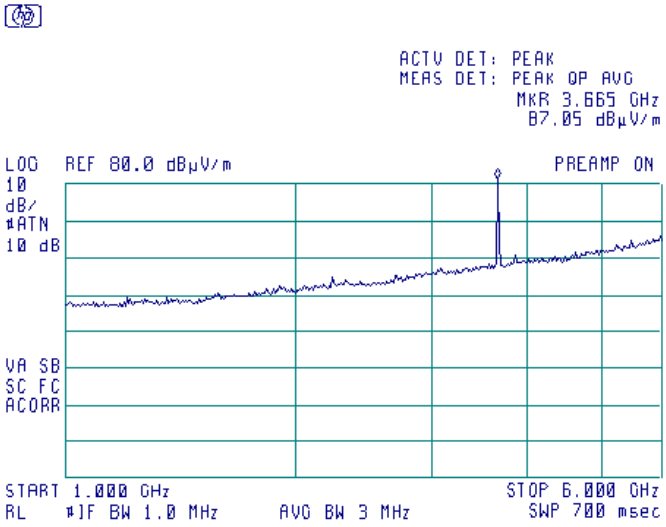
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



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):	3/15/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 18 dBi antenna gain			

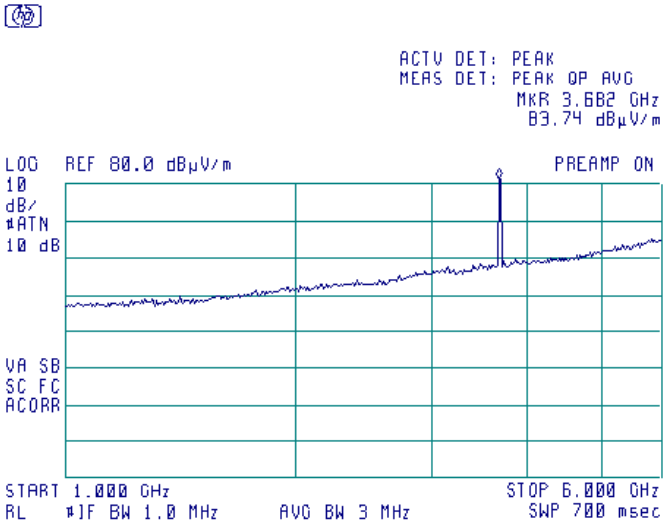
Plot 7.8.11 Radiated emission measurements in 1000 – 6000 MHz range

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



Plot 7.8.12 Radiated emission measurements in 1000 – 6000 MHz range

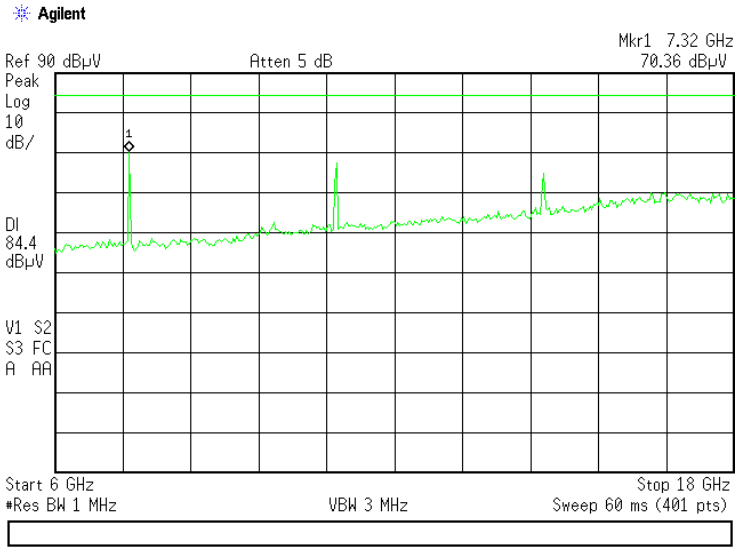
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



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):	3/15/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 18 dBi antenna gain			

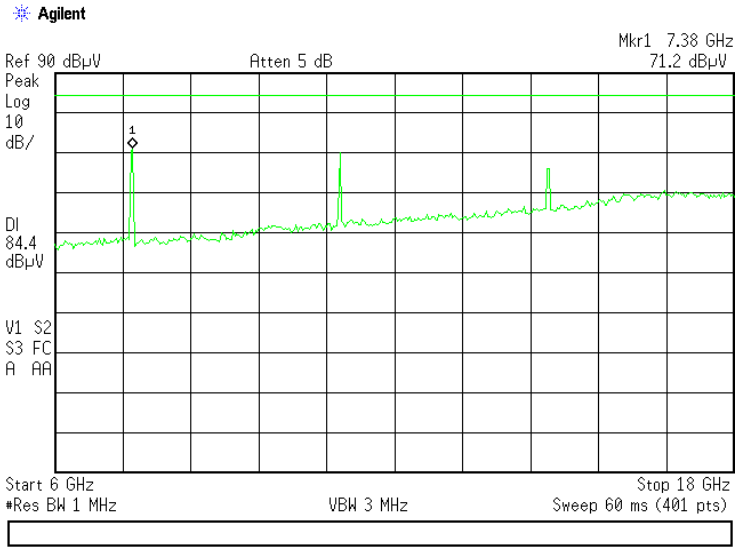
Plot 7.8.13 Radiated emission measurements in 6000 – 18000 MHz range

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



Plot 7.8.14 Radiated emission measurements in 6000 – 18000 MHz range

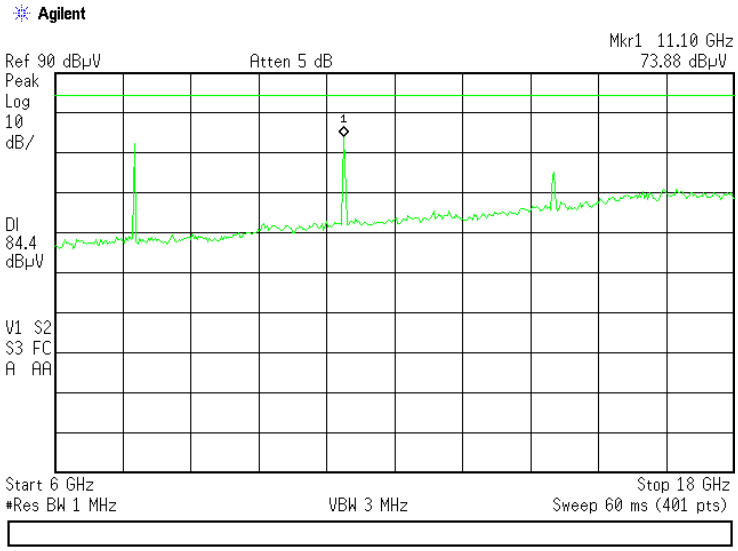
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



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):	3/15/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 18 dBi antenna gain			

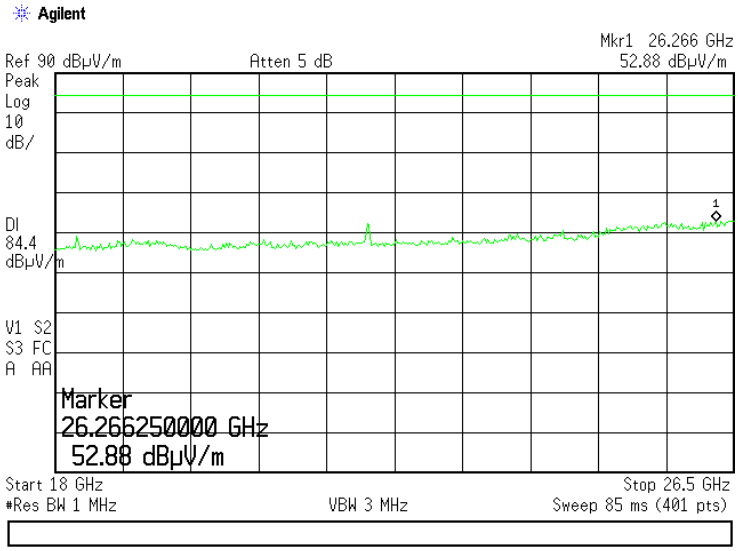
Plot 7.8.15 Radiated emission measurements in 6000 – 18000 MHz range

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



Plot 7.8.16 Radiated emission measurements in 18000 – 26500 MHz range

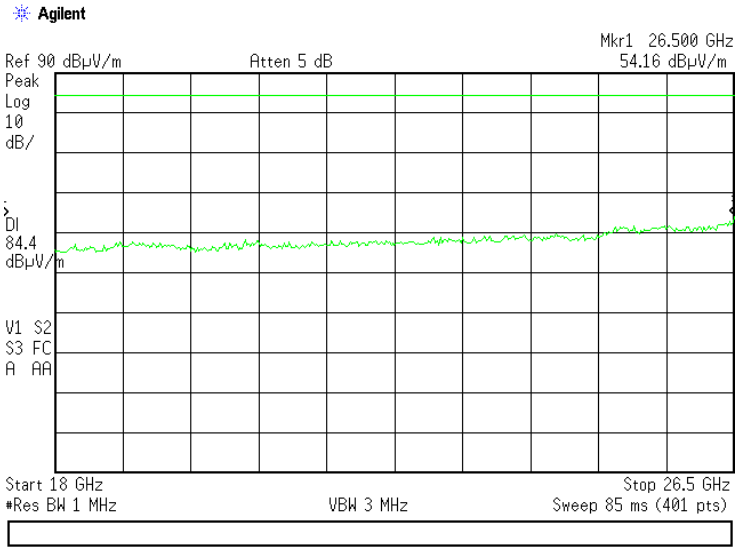
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



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):	3/15/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 18 dBi antenna gain			

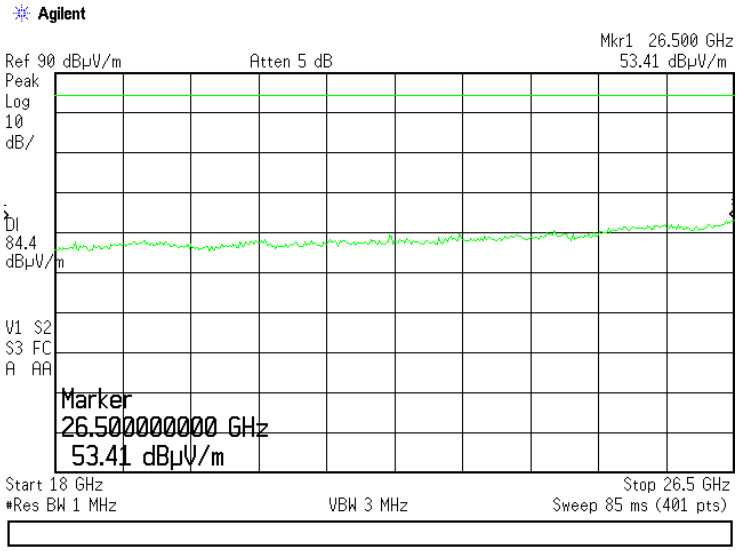
Plot 7.8.17 Radiated emission measurements in 18000 – 26500 MHz range

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



Plot 7.8.18 Radiated emission measurements in 18000 – 26500 MHz range

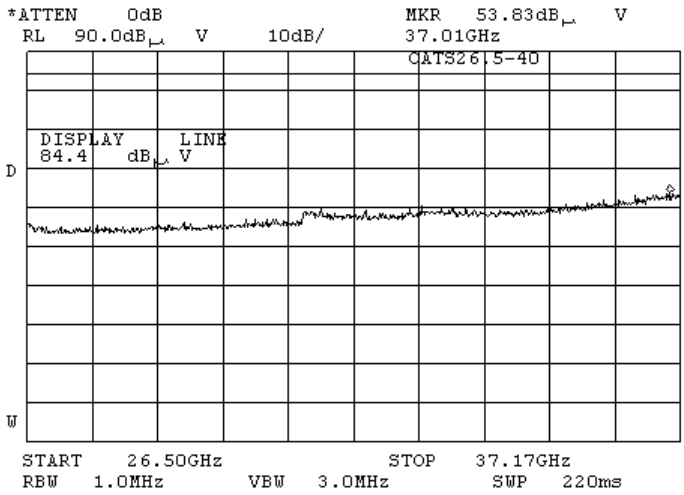
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



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):	3/15/2012		
Temperature: 22.4 ºC	**Air Pressure:** 1018 hPa	**Relative Humidity:** 45 %	**Power Supply:** 48VDC
Remarks: Power settings according to 18 dBi antenna gain			

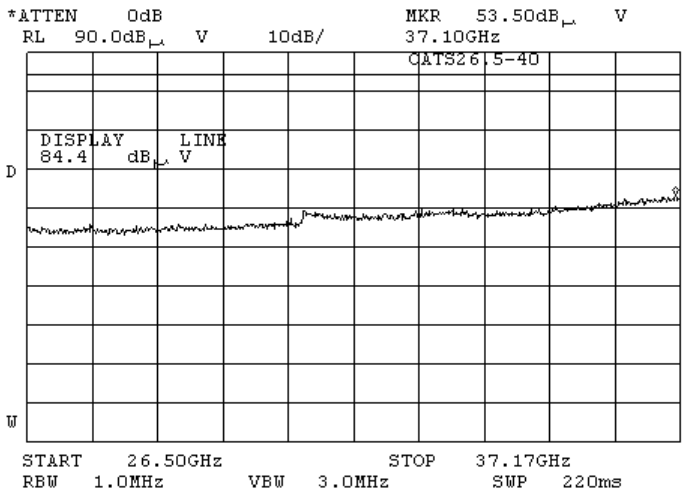
Plot 7.8.19 Radiated emission measurements in 26500 – 37170 MHz range

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



Plot 7.8.20 Radiated emission measurements in 26500 – 37170 MHz range

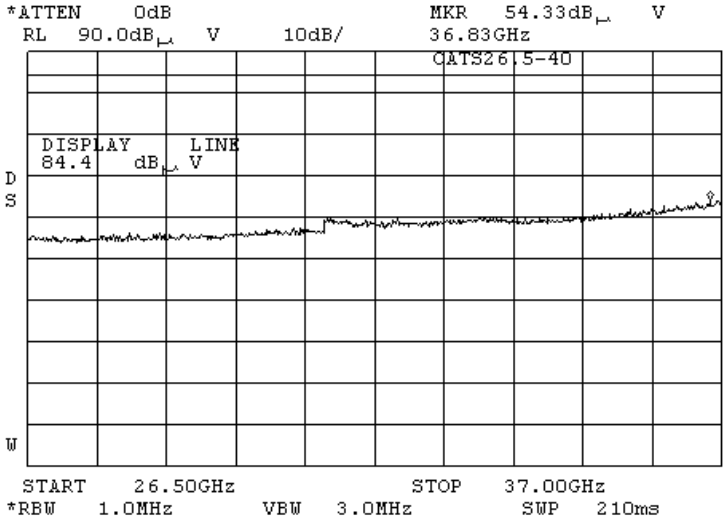
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Mid
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



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):	3/15/2012		
Temperature: 22.4 ºC	**Air Pressure:** 1018 hPa	**Relative Humidity:** 45 %	**Power Supply:** 48VDC
Remarks: Power settings according to 18 dBi antenna gain			

Plot 7.8.21 Radiated emission measurements in 26500 – 37000 MHz range

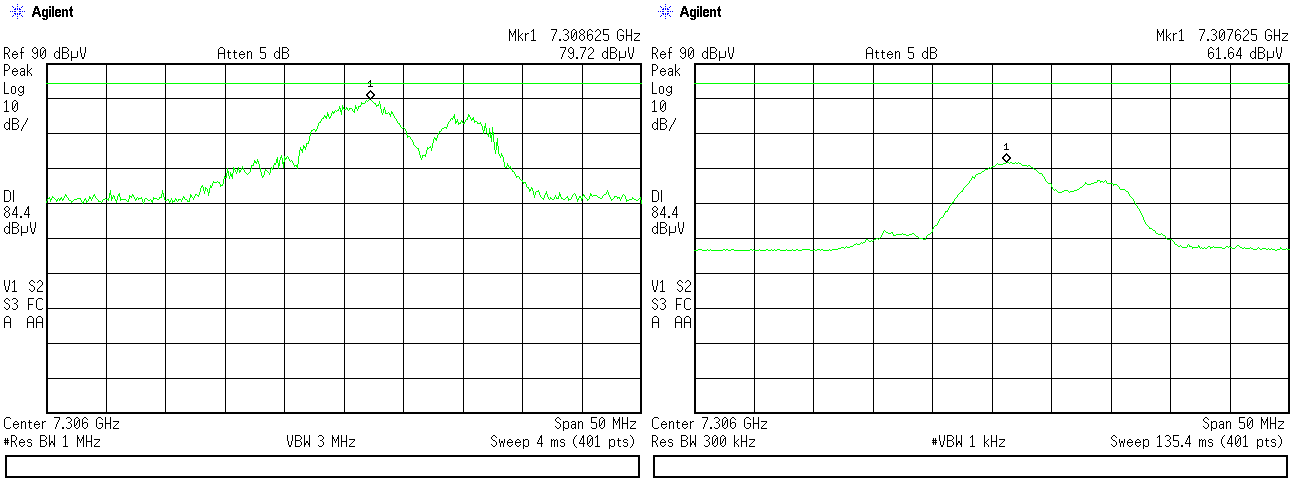
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



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):	3/15/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 18 dBi antenna gain			

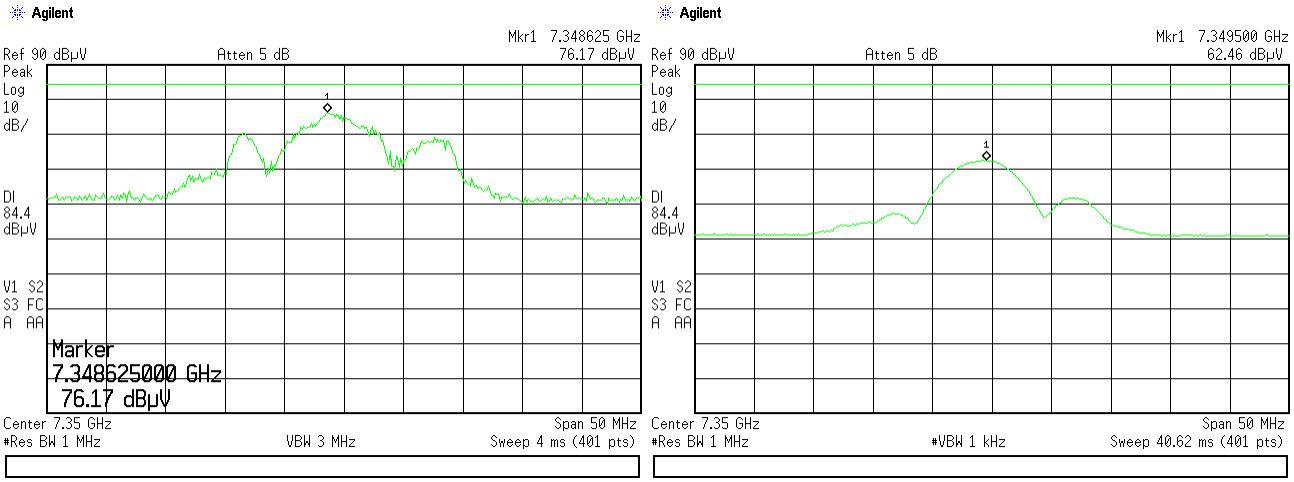
Plot 7.8.22 Radiated emission measurements at the 2nd harmonic

TEST SITE: OATS
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical 1.2m 0dgr
TEST DISTANCE: 3 m



Plot 7.8.23 Radiated emission measurements at the 2nd harmonic

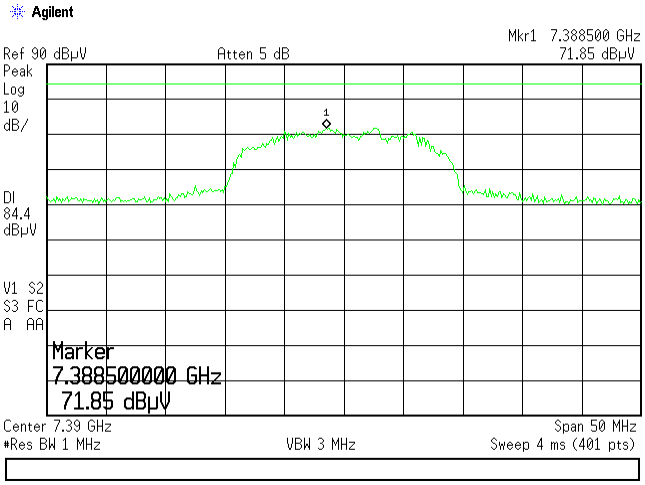
TEST SITE: OATS
CARRIER FREQUENCY: Mid
ANTENNA POLARIZATION: Vertical
TEST DISTANCE: 3 m

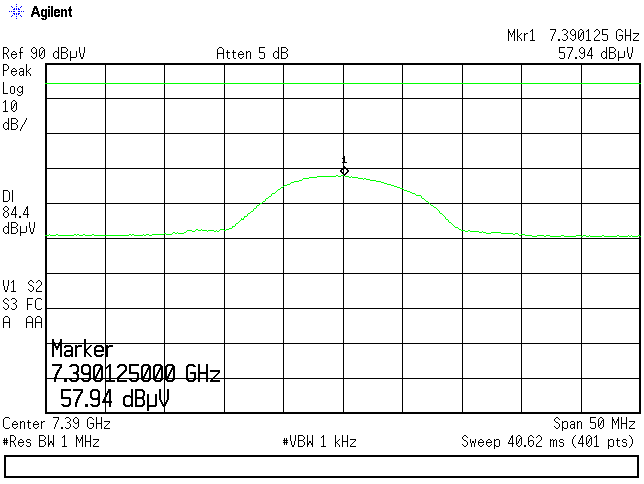


Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/15/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 18 dBi antenna gain			

Plot 7.8.24 Radiated emission measurements at the 2nd harmonic

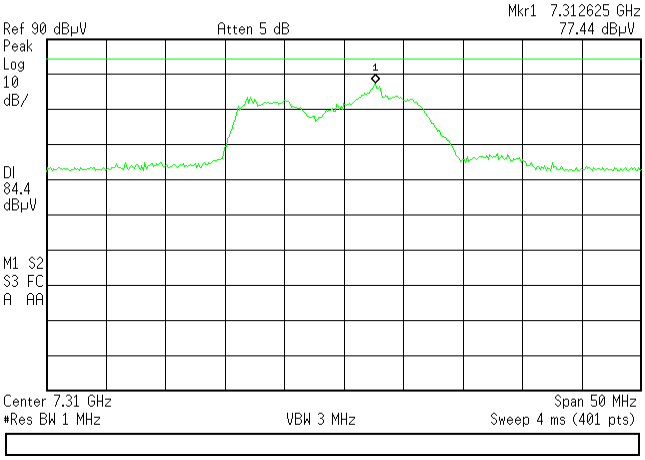
TEST SITE: OATS
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical
TEST DISTANCE: 3 m

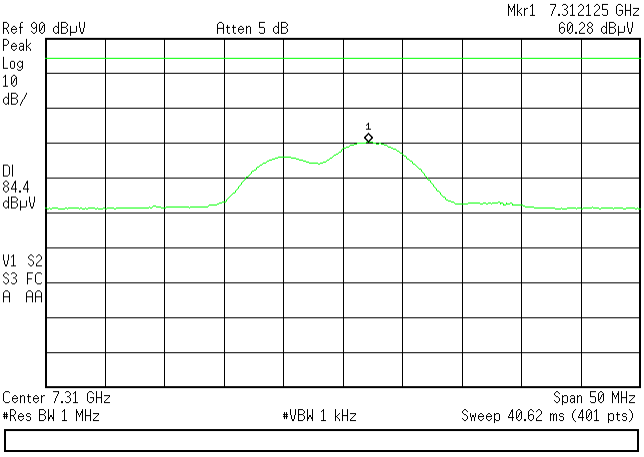




Plot 7.8.25 Radiated emission measurements at the 2nd harmonic

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

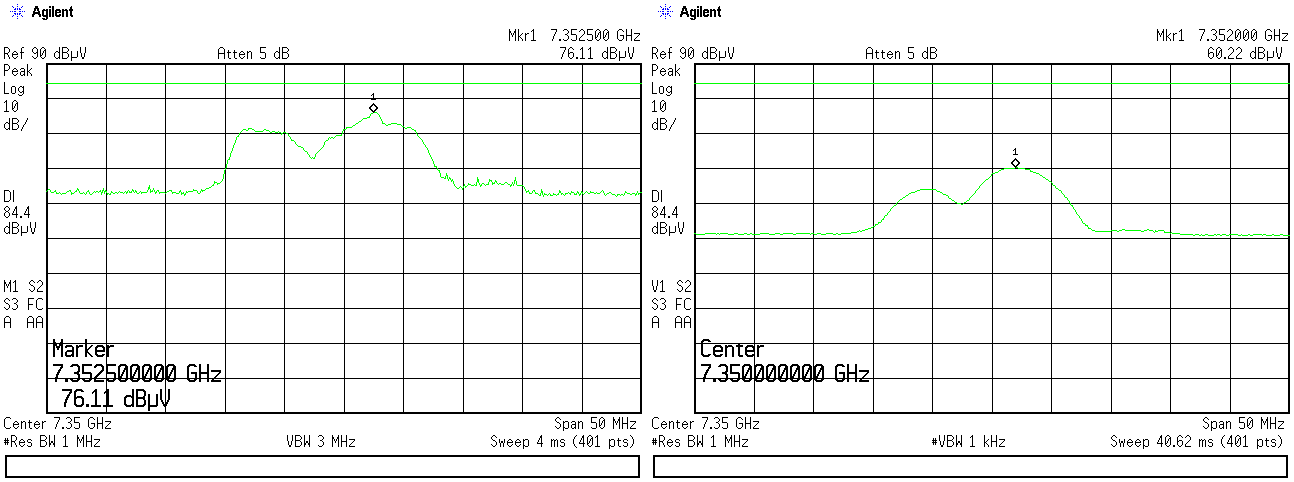




Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/15/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 18 dBi antenna gain			

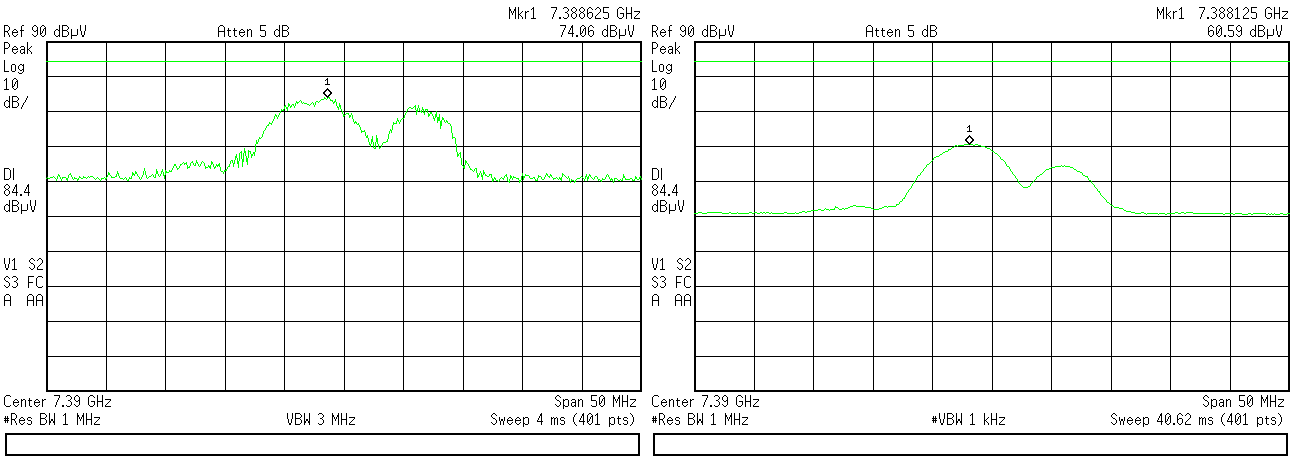
Plot 7.8.26 Radiated emission measurements at the 2nd harmonic

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



Plot 7.8.27 Radiated emission measurements at the 2nd harmonic

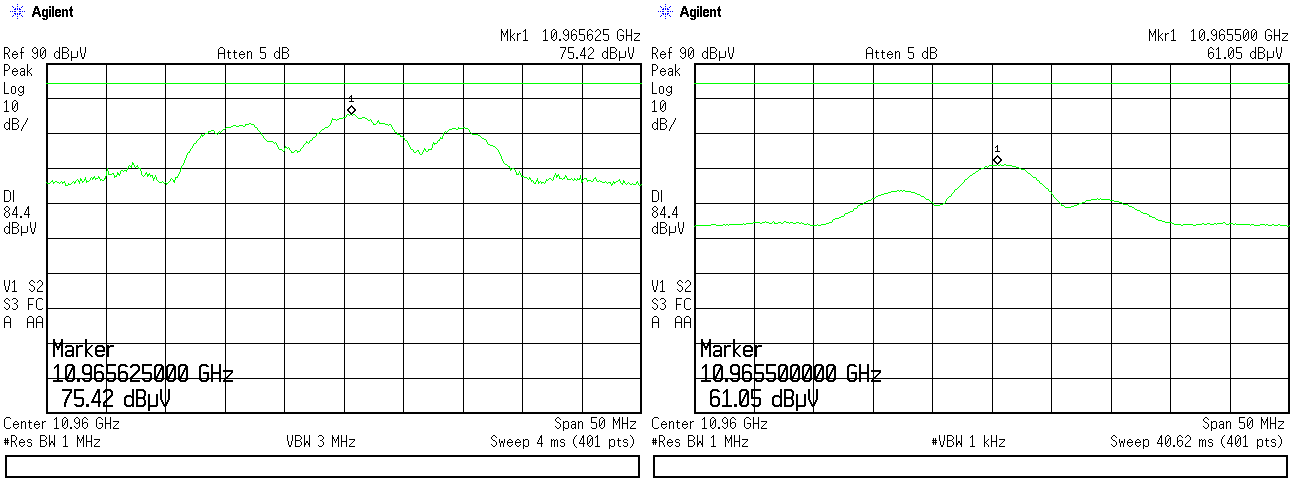
TEST SITE: OATS
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Horizontal
TEST DISTANCE: 3 m



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):	3/15/2012		
Temperature: 22.4 °C	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 18 dBi antenna gain			

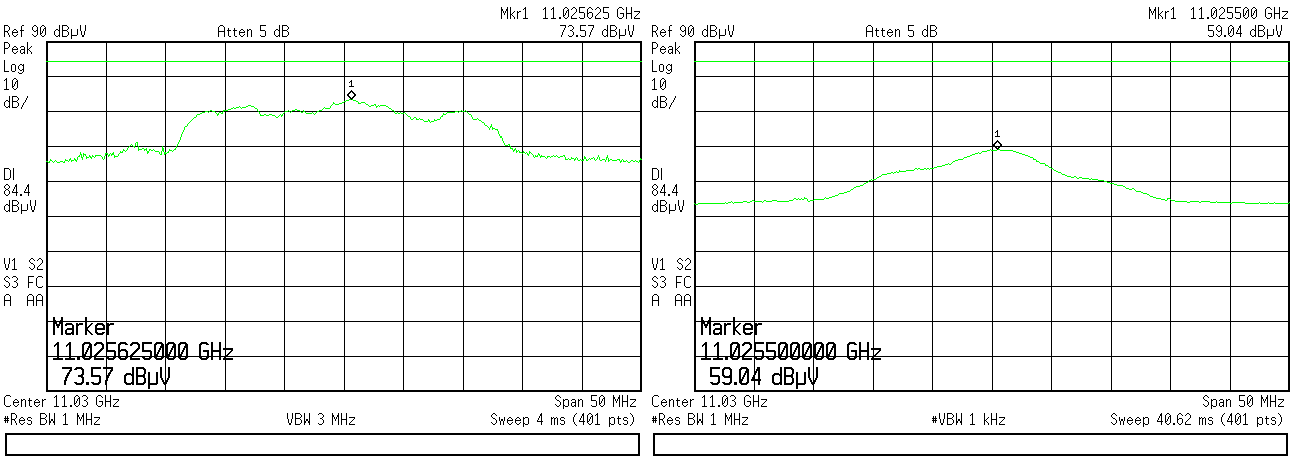
Plot 7.8.28 Radiated emission measurements at the 3rd harmonic

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



Plot 7.8.29 Radiated emission measurements at the 3rd harmonic

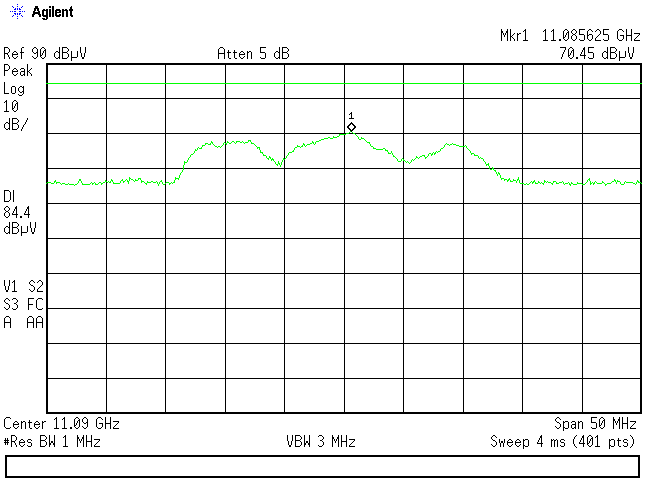
TEST SITE: OATS
CARRIER FREQUENCY: Mid
ANTENNA POLARIZATION: Vertical
TEST DISTANCE: 3 m

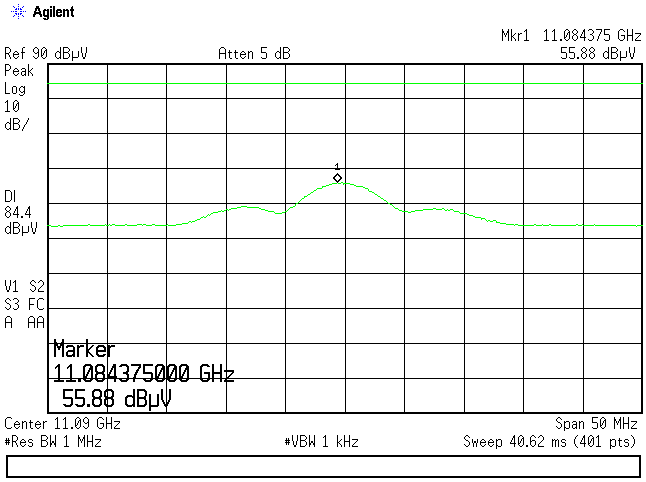


Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/15/2012		
Temperature: 22.4 °C	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 18 dBi antenna gain			

Plot 7.8.30 Radiated emission measurements at the 3rd harmonic

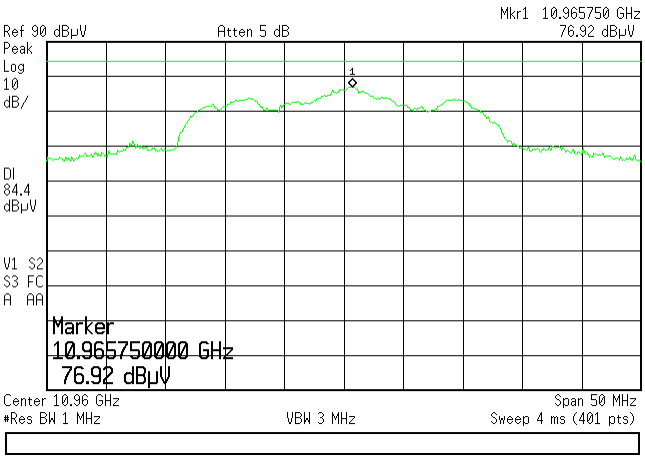
TEST SITE: OATS
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical
TEST DISTANCE: 3 m

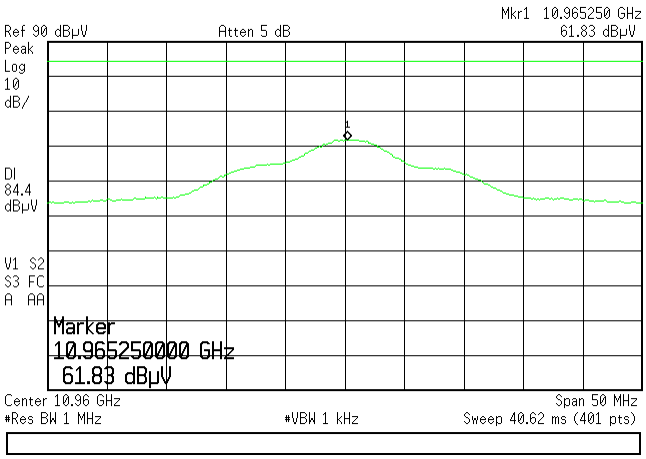




Plot 7.8.31 Radiated emission measurements at the 3rd harmonic

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

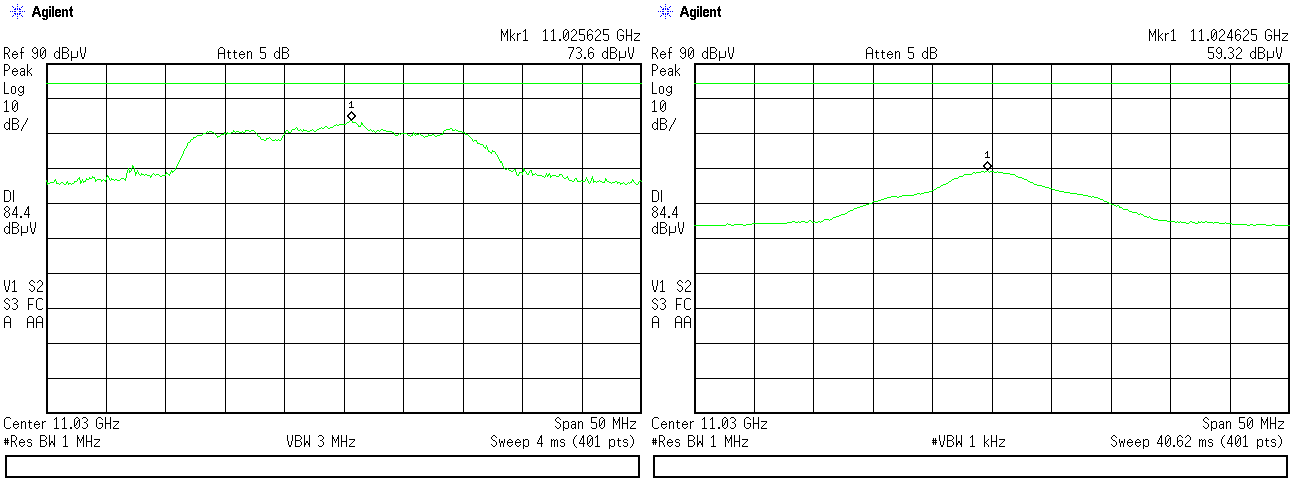




Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/15/2012		
Temperature: 22.4 °C	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 18 dBi antenna gain			

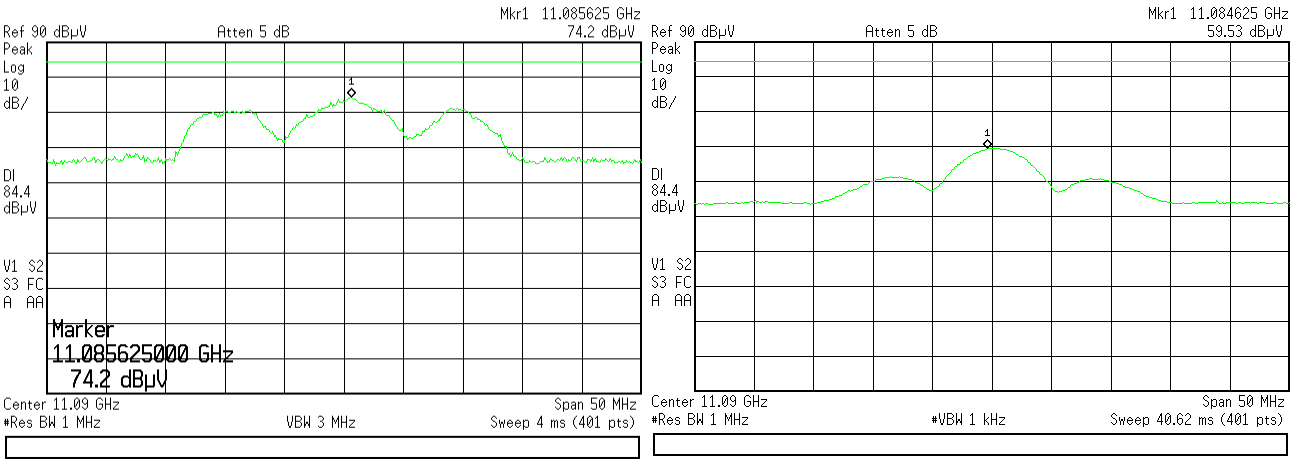
Plot 7.8.32 Radiated emission measurements at the 3rd harmonic

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



Plot 7.8.33 Radiated emission measurements at the 3rd harmonic

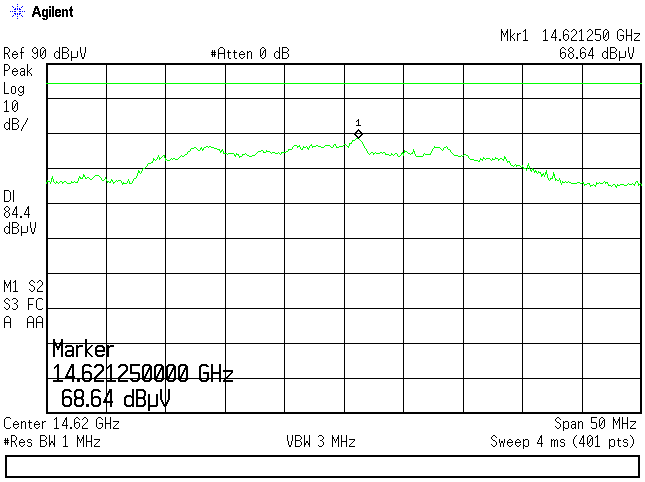
TEST SITE: OATS
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Horizontal
TEST DISTANCE: 3 m

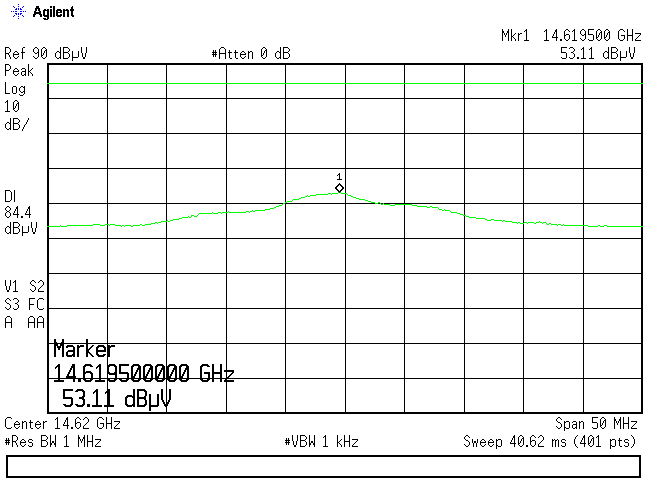


Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/15/2012		
Temperature: 22.4 °C	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 18 dBi antenna gain			

Plot 7.8.34 Radiated emission measurements at the 4th harmonic

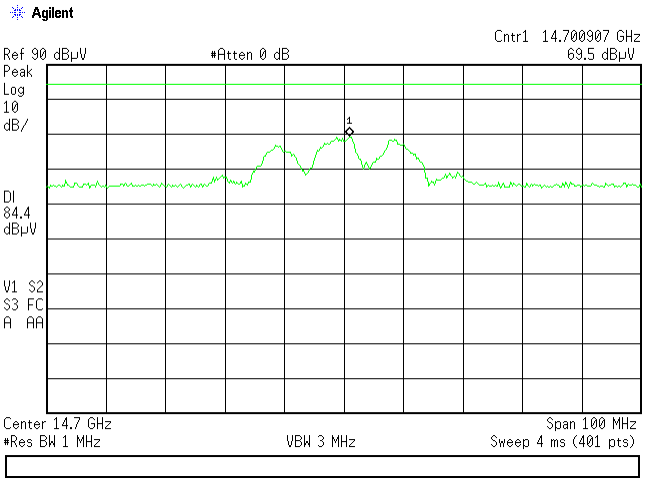
TEST SITE: OATS
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m

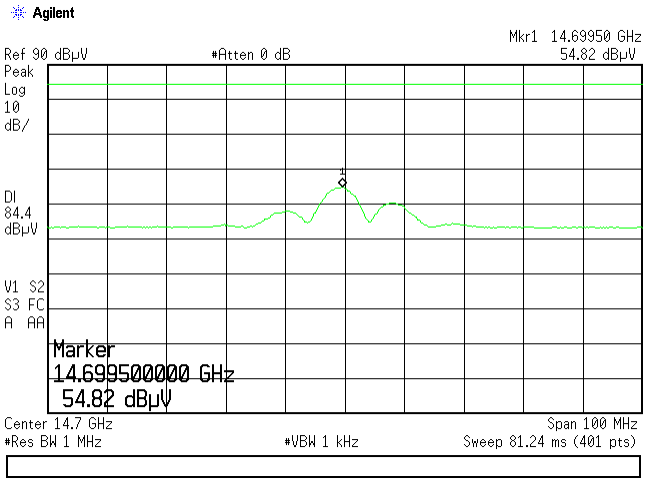




Plot 7.8.35 Radiated emission measurements at the 4th harmonic

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

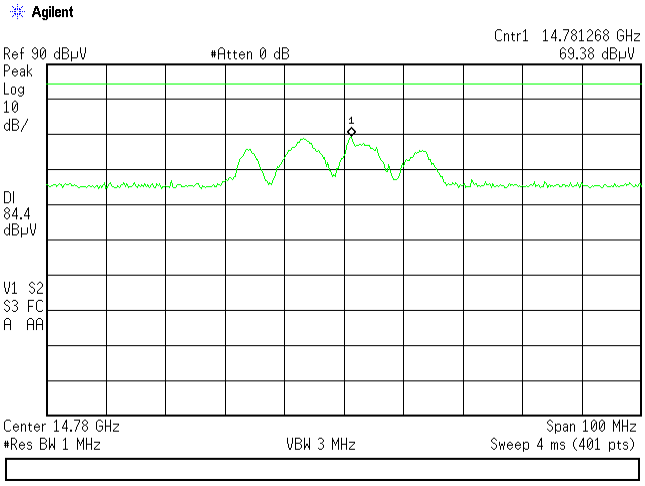


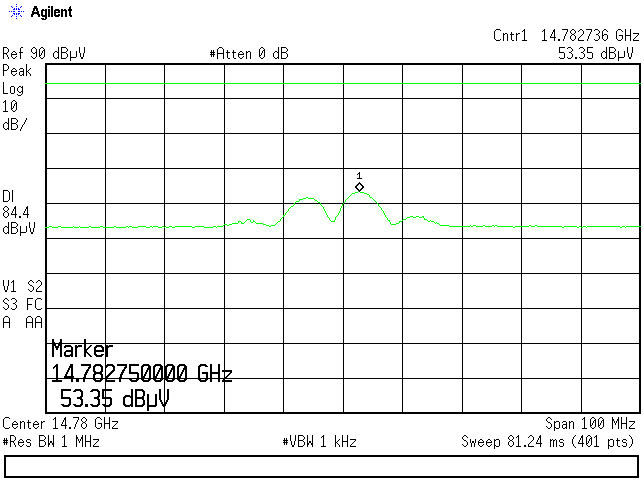


Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/15/2012		
Temperature: 22.4 ºC	Air Pressure: 1018 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks: Power settings according to 18 dBi antenna gain			

Plot 7.8.36 Radiated emission measurements at the 4th harmonic

TEST SITE: OATS
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical and Horizontal
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):	3/18/2012 - 3/21/2012		
Temperature: 22.3 ºC	Air Pressure: hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks:			

7.9 Frequency stability test

7.9.1 General

This test was performed to measure frequency stability of transmitter RF carrier. Specification test limits are given in Table 7.9.1.

Table 7.9.1 Frequency stability limits

Assigned frequency, MHz	Maximum allowed frequency displacement	
	ppm	Hz
3650.0 – 3700.0	The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation	

7.9.2 Test procedure

7.9.2.1 The EUT was set up as shown in Figure 7.9.1, energized and its proper operation was checked.

7.9.2.2 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.

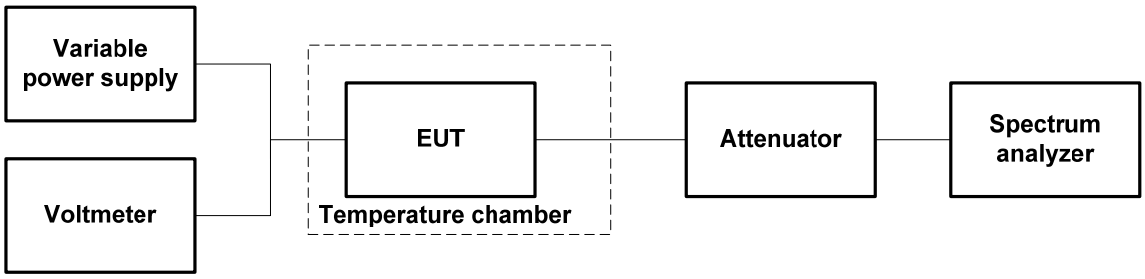
7.9.2.3 The EUT was powered on and carrier frequency was measured at start up moment and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.

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

7.9.2.5 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.

7.9.2.6 Frequency displacement was calculated and compared with the limit as provided in Table 7.9.2.

Figure 7.9.1 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):	3/18/2012 - 3/21/2012		
Temperature: 22.3 ºC	**Air Pressure:** hPa	**Relative Humidity:** 42 %	**Power Supply:** 48VDC
Remarks:			

Table 7.9.2 Frequency stability test results

ASSIGNED FREQUENCY RANGE:	3650.0 – 3700.0 MHz
NOMINAL POWER VOLTAGE:	48 VDC
TEMPERATURE STABILIZATION PERIOD:	20 min
POWER DURING TEMPERATURE TRANSITION:	Off
SPECTRUM ANALYZER MODE:	Counter
RESOLUTION BANDWIDTH:	10 kHz
VIDEO BANDWIDTH:	30 kHz
MODULATION:	QPSK
VERDICT:	**Pass**

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	3652.476750	3652.477950	3652.476750	3652.477750	3652.479150	3652.477950	3652.476750	1650	-750	0.45	-0.21
-20	nominal	3652.474350	NA	NA	NA	NA	NA	3652.475750	0	-3150	0.00	-0.86
-10	nominal	3652.473150	NA	NA	NA	NA	NA	3652.475550	0	-4350	0.00	-1.19
0	nominal	3652.475550	3652.474350	3652.475550	3652.477950	3652.475550	3652.477950	3652.474350	450	-3150	0.12	-0.86
10	nominal	3652.475550	NA	NA	NA	NA	NA	3652.476750	0	-1950	0.00	-0.53
20	+15%	3652.477500	NA	NA	NA	NA	NA	3652.476250	0	-1250	0.00	-0.34
20	nominal	3652.474000	NA	NA	NA	NA	NA	3652.477500	0	-3500	0.00	-0.96
20	-15%	3652.477500	NA	NA	NA	NA	NA	3652.482500	5000	0	1.37	0.00
30	nominal	3652.475600	3652.474400	3652.474400	3652.474400	3652.474400	3652.474400	3652.475600	0	-1900	0.00	-0.85
40	nominal	3652.472000	NA	NA	NA	NA	NA	3652.474400	0	-3100	0.00	-1.51
50	nominal	3652.475550	NA	NA	NA	NA	NA	3652.475550	0	-1950	0.00	-0.53
Mid channel												
-30	nominal	3674.975550	3674.975750	3674.976750	3674.976750	3674.977950	3674.975550	3674.976750	2300	-100	0.63	-0.03
-20	nominal	3674.973150	NA	NA	NA	NA	NA	3674.975550	0	-2500	0.00	-0.68
-10	nominal	3674.977950	NA	NA	NA	NA	NA	3674.975550	2300	-100	0.63	-0.03
0	nominal	3674.977950	3674.977950	3674.977950	3674.977950	3674.977950	3674.977950	3674.979150	3500	0	0.96	0.00
10	nominal	3674.977950	NA	NA	NA	NA	NA	3674.977950	2300	0	0.63	0.00
20	+15%	3674.974400	NA	NA	NA	NA	NA	3674.975650	0	-1250	0.00	-0.34
20	nominal	3674.976800	NA	NA	NA	NA	NA	3674.975650	1150	0	0.31	0.00
20	-15%	3674.976800	NA	NA	NA	NA	NA	3674.974400	1150	-1250	0.31	-0.34
30	nominal	3674.978000	3674.975650	3674.975650	3674.974400	3674.976800	3674.975600	3674.974400	2350	-1250	0.64	-0.34
40	nominal	3674.975600	NA	NA	NA	NA	NA	3674.975600	0	-50	0.00	-0.01
50	nominal	3674.975550	NA	NA	NA	NA	NA	3674.975550	0	-100	0.00	-0.03
High channel												
-30	nominal	3697.477950	3697.477950	3697.475550	3697.476750	3697.475550	3697.477950	3697.476750	1150	-1250	0.31	-0.34
-20	nominal	3697.475550	NA	NA	NA	NA	NA	3697.473150	0	-3650	0.00	-0.99
-10	nominal	3697.475550	NA	NA	NA	NA	NA	3697.477950	1150	-1250	0.31	-0.34
0	nominal	3697.475550	3697.475550	3697.477950	3697.477950	3697.477950	3697.477950	3697.479150	2350	-1250	0.64	-0.34
10	nominal	3697.477950	NA	NA	NA	NA	NA	3697.475550	1150	-1250	0.31	-0.34
20	+15%	3697.474400	NA	NA	NA	NA	NA	3697.474400	0	-2400	0.00	-0.65
20	nominal	3697.474400	NA	NA	NA	NA	NA	3697.476800	0	-2400	0.00	-0.65
20	-15%	3697.475600	NA	NA	NA	NA	NA	3697.476800	0	-1200	0.00	-0.32
30	nominal	3697.480400	3697.480400	3697.480400	3697.480400	3697.474400	3697.476800	3697.476800	3600	-2400	0.99	-0.65
40	nominal	3697.474350	NA	NA	NA	NA	NA	3697.473150	0	-3650	0.00	-0.99
50	nominal	3697.475550	NA	NA	NA	NA	NA	3697.471950	0	-4850	0.00	-1.31

* - 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 1474	HL 2013	HL 2953	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
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A 00319, 3448A002 53	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
0661	Generator Swept Signal, 10 MHz to 40 GHz, + 10 dBm	HP	83640B	3614A002 66	15-Dec-11	15-Dec-12
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
1424	Spectrum Analyzer, 30 Hz- 40 GHz	Agilent Technologies	8564EC	3946A002 19	25-Sep-11	25-Sep-12
1474	Cable, 1 m	Harbour Industries	MIL 17/60-RG142	1474	01-Jan-11	01-Jan-12
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W	EMC Test Systems	3115	9911-5964	25-Nov-11	25-Nov-12
2013	Power Divider, 0.5-18.0 GHz, 80 W	Omni Spectra	2090-6204-00	2013	01-Dec-10	01-Dec-12
2871	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-8155-00	2871	15-Jan-12	15-Jan-13
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY414447 62	08-May-11	08-May-12
2953	Cable, RF, 18 GHz, 1.2 m, SMA-SMA	Gore	10020014	NA	03-Oct-11	03-Oct-12
3301	Power Meter, P-series, 50 MHz to 40 GHz	Agilent Technologies	N1911A	MY451010 57	14-Dec-11	14-Dec-12
3302	Power sensor, P-Series, 50 MHz to 40 GHz, -35/30 to 20 dBm	Agilent Technologies	N1922A	MY452405 86	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-06184040 -J0	111590010 01	25-Dec-11	25-Dec-12
3535	Amplifier, low noise, 18 to 40 GHz	Quinstar Technology	QLJ-18404537 -J0	111590030 01	11-Jul-11	11-Jul-12
3617	Cable RF, 6.5 m, N type-N type, DC-6.5 GHz	Suhner Switzerland	RG 214/U	NA	19-May-11	19-May-12
3667	Directional coupler, 2 GHz to 8 GHz, 10 dB	ELISRA	MW10162	1011	31-Aug-11	31-Aug-12
3768	Attenuator, N-type, 20 dB, DC to 18 GHz, 5 W	Mini-Circuits	BW-N20W5+	NA	22-Aug-11	22-Aug-12

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./ Check	Due Cal./ Check
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
4114	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz	ETS Lindgren	3117	00123515	23-Jan-12	23-Jan-13

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.

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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
EMC Test Systems, model 6502, S/N 2857, HL 0446

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

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

Antenna factor
Standard gain horn antenna
Quinstar Technology
Model QWH, Ser.No.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
40.000	60.000	39.03
60.000	90.000	42.55
90.000	140.000	46.23
140.000	220.000	50.11

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

Antenna factor

Biconilog antenna EMCO, model 3141, serial number 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	560	19.8	1300	27.0
28	7.8	580	20.6	1320	27.8
30	7.8	600	21.3	1340	28.3
40	7.2	620	21.5	1360	28.2
60	7.1	640	21.2	1380	27.9
70	8.5	660	21.4	1400	27.9
80	9.4	680	21.9	1420	27.9
90	9.8	700	22.2	1440	27.8
100	9.7	720	22.2	1460	27.8
110	9.3	740	22.1	1480	28.0
120	8.8	760	22.3	1500	28.5
130	8.7	780	22.6	1520	28.9
140	9.2	800	22.7	1540	29.6
150	9.8	820	22.9	1560	29.8
160	10.2	840	23.1	1580	29.6
170	10.4	860	23.4	1600	29.5
180	10.4	880	23.8	1620	29.3
190	10.3	900	24.1	1640	29.2
200	10.6	920	24.1	1660	29.4
220	11.6	940	24.0	1680	29.6
240	12.4	960	24.1	1700	29.8
260	12.8	980	24.5	1720	30.3
280	13.7	1000	24.9	1740	30.8
300	14.7	1020	25.0	1760	31.1
320	15.2	1040	25.2	1780	31.0
340	15.4	1060	25.4	1800	30.9
360	16.1	1080	25.6	1820	30.7
380	16.4	1100	25.7	1840	30.6
400	16.6	1120	26.0	1860	30.6
420	16.7	1140	26.4	1880	30.6
440	17.0	1160	27.0	1900	30.6
460	17.7	1180	27.0	1920	30.7
480	18.1	1200	26.7	1940	30.9
500	18.5	1220	26.5	1960	31.2
520	19.1	1240	26.5	1980	31.6
540	19.5	1260	26.5	2000	32.0
		1280	26.6		

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

Antenna factor
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, Gore, 25.5 GHz, 1.2 m, SMA-SMA, S/N 10020014
HL 2953

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.06	8750	1.28	18000	1.84
30	0.06	9000	1.30	18250	1.91
100	0.12	9250	1.35	18500	1.94
250	0.19	9500	1.34	18750	1.92
500	0.27	9750	1.36	19000	1.95
750	0.34	10000	1.33	19250	2.00
1000	0.40	10250	1.38	19500	1.96
1250	0.45	10500	1.39	19750	2.02
1500	0.50	10750	1.39	20000	1.92
1750	0.54	11000	1.43	20250	2.04
2000	0.57	11250	1.42	20500	2.00
2250	0.60	11500	1.48	20750	2.09
2500	0.64	11750	1.49	21000	2.01
2750	0.67	12000	1.59	21250	2.07
3000	0.70	12250	1.50	21500	2.20
3250	0.74	12500	1.55	21750	2.10
3500	0.76	12750	1.55	22000	2.24
3750	0.80	13000	1.61	22250	2.25
4000	0.83	13250	1.62	22500	2.12
4250	0.85	13500	1.56	22750	2.05
4500	0.87	13750	1.61	23000	2.10
4750	0.91	14000	1.57	23250	2.03
5000	0.92	14250	1.66	23500	2.08
5250	0.96	14500	1.58	23750	2.14
5500	0.99	14750	1.69	24000	2.16
5750	0.99	15000	1.71	24250	2.25
6000	1.03	15250	1.74	24500	2.17
6250	1.05	15500	1.75	24750	2.32
6500	1.07	15750	1.72	25000	2.32
6750	1.08	16000	1.89	25250	2.32
7000	1.12	16250	1.79	25500	2.41
7250	1.13	16500	1.84	25750	2.31
7500	1.15	16750	1.82	26000	2.28
7750	1.20	17000	1.79	26250	2.32
8000	1.20	17250	1.78	26500	2.29
8250	1.23	17500	1.85		
8500	1.27	17750	1.83		

Cable loss
Cable coaxial, RG-214/U, N type-N type, 6.5 m
Suhner Switzerland, HL 3617

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.13	2200	2.97	4500	5.10
50	0.33	2300	3.06	4600	5.20
100	0.48	2400	3.16	4700	5.34
200	0.71	2500	3.23	4800	5.36
300	0.89	2600	3.34	4900	5.48
400	1.04	2700	3.42	5000	5.52
500	1.19	2800	3.52	5100	5.61
600	1.32	2900	3.61	5200	5.72
700	1.44	3000	3.69	5300	5.81
800	1.56	3100	3.80	5400	5.93
900	1.68	3200	3.86	5500	6.08
1000	1.80	3300	3.98	5600	6.12
1100	1.90	3400	4.07	5700	6.25
1200	2.00	3500	4.14	5800	6.31
1300	2.11	3600	4.27	5900	6.41
1400	2.21	3700	4.36	6000	6.51
1500	2.30	3800	4.47	6100	6.62
1600	2.40	3900	4.62	6200	6.73
1700	2.49	4000	4.63	6300	6.86
1800	2.61	4100	4.76	6400	6.94
1900	2.69	4200	4.83	6500	7.06
2000	2.79	4300	4.89		
2100	2.88	4400	5.04		

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

13 APPENDIX F Abbreviations and acronyms

A	ampere
AC	alternating current
A/m	ampere per meter
AM	amplitude modulation
AVRG	average (detector)
BB	broad band
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μV)	decibel referred to one microvolt
dB(μV/m)	decibel referred to one microvolt per meter
dB(μA)	decibel referred to one microampere
dBΩ	decibel referred to one Ohm
DC	direct current
EIRP	equivalent isotropically radiated power
ERP	effective radiated power
EUT	equipment under test
F	frequency
GHz	gigahertz
GND	ground
H	height
HL	Hermon laboratories
Hz	hertz
ITE	information technology equipment
k	kilo
kHz	kilohertz
LO	local oscillator
m	meter
MHz	megahertz
min	minute
mm	millimeter
ms	millisecond
μs	microsecond
NA	not applicable
NB	narrow band
NT	not tested
OATS	open area test site
Ω	Ohm
QP	quasi-peak
PCB	printed circuit board
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