HERMON LABORATORIES

839.01
Electrical

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TEST REPORT

ACCORDING TO: FCC FCC CFR 47 PART 90 subpart Z

FOR:

Airspan Networks Inc.

Base station

Model: MacroMAXe 3605 3.7G Ext

Report ID: AIRRAD_FCC.20452_rev2.doc
Date of Issue: July 2010

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1 Applicant information

Client name:	Airspan Networks Inc.
Address:	777 Yamato Rd, Suite 310, Boca Raton 33431, Florida, USA
Telephone:	+1 561 893 8686
Fax:	+1 561 893 8671
E-mail:	zlevi@airspan.com
Contact name:	Mr. Zion Levi

2 Equipment under test attributes

Product name:	Base station
Model(s):	MacroMAXe 3605 3.7G Ext
Serial number:	4FEA9C130142, P/N 998-03-535 0A1
Hardware version:	HW MAC 00A00A130142, 00A00A130143
Software release:	Test SW: 13_9_00_15
Receipt date	1/24/2010

3 Manufacturer information

Manufacturer name:	Airspan Networks Inc.
Address:	777 Yamato Rd, Suite 310, Boca Raton 33431, Florida, USA
Telephone:	+1 561 893 8686
Fax:	+1 561 893 8671
E-Mail:	zlevi@airspan.com
Contact name:	Mr. Zion Levi

4 Test details

Project ID:	20452
Location:	Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started:	1/24/2010
Test completed:	3/28/2010
Test specification(s):	47CFR part 90 subpart Z

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5 Tests summary

Test	Status
Transmitter characteristics	
Section 90.205, 90.1321 Maximum output power and peak power spectral 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 90.203 (o), Contention based protocol	Pass
Section 2.1091, 90.1335, RF radiation exposure evaluation	Pass, exhibit attached to the 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.

This test report replaces the previously issued test report identified by Doc ID:AIRRAD_FCC.20452.

	Name and Title	Date	Signature
Tested by:	Mr. L. Markel, test engineer	June 30, 2010	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	July 13, 2010	
Approved by:	Mr. M. Nikishin, EMC and Radio group manager	July 14, 2010	

6 EUT description

6.1 General information

A base station radio, MacroMAXe 3605 3.7G Ext., is a part of a WiMAX broadband fixed cellular wireless access system. The system provides a radio link between an end-user (a subscriber) and a network to give high-speed data access. The MacroMAXe's transceiver/receiver (Up to 64 QAM modulation, data rate up to 43 Mbps) uses OFDMA and operating in TDD duplexing mode, equipped with a 2 dBi external antenna.

The MacroMAXe 3605 base radio has two Tx channels for MIMO operation mode and four receivers' channels for Rx.

The MacroMAXe is installed outdoors and typically is mounted on a pole. The Subscriber transmits and receives traffic to and from the base station respectively. The transceiver provides subscribers with "always-on" Internet, high speed data only, or data and voice (VoIP) services and is configured with a unique base station reference number, preventing the Subscriber from relocating to another subscriber premises without authorization.

6.2 Ports and lines

Port type	Port description	Conn. from	Conn. to	Qty.	Cable type	Cable length	Indoor / outdoor
Power	DC power	DC power supply	EUT	1	Unshielded	10	Outdoor
Signal	Ethernet	ETH2 port	ETH3 port	1	Shielded	1.5	Outdoor
Signal	Ethernet	ETH1 port	PC laptop	1	Shielded	10	Outdoor
Signal	Antenna	EUT	GPS external antenna	1	Coax	5	Outdoor
RF	Antenna	EUT	Termination 50 Ohm	4	Coax	NA	Outdoor
Signal	RS-232	EUT	Laptop	1	Unshielded	2	For maintance only

6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
DC power supply	LAMBDA	SWS300-48	467-910C34-0128W3108
PC laptop	IBM	X31	99-TXWYC
GPS Antenna	TA	TA-200	2000858

6.4 Changes made in the EUT

No changes were implemented.

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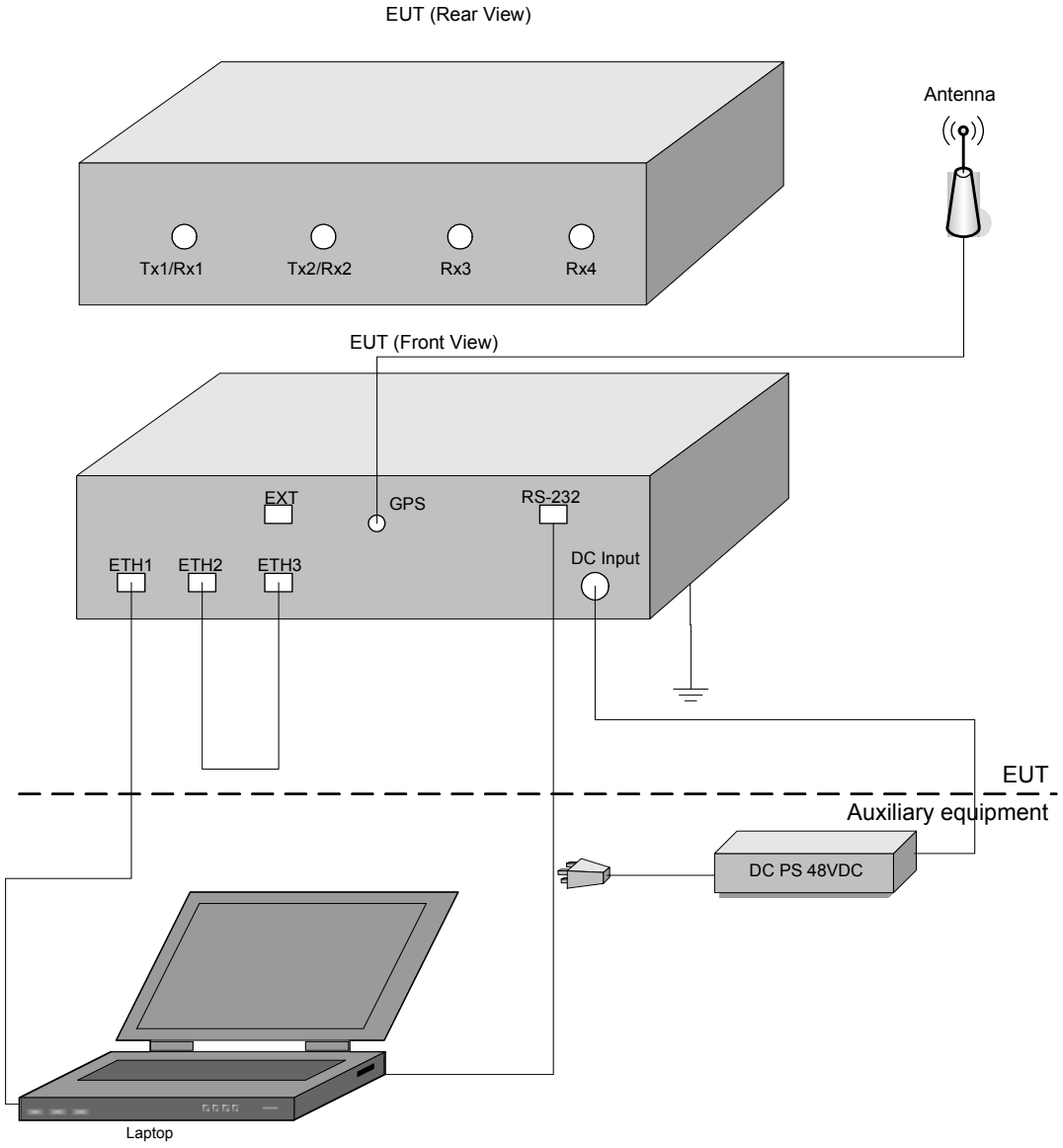
6.5 Test configuration



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 EBW 3653.5 – 3696.5 MHz for 7 MHz EBW 3655.0 – 3695.0 MHz for 10 MHz EBW
RF channel spacing	5, 7, 10 MHz
Maximum rated output power	At transmitter 50 Ω RF output connector (aggregate power of both RF chains): 34.05 dBm – 5 MHz OBW; 35.53 dBm – 7 MHz OBW; 36.88 dBm – 10 MHz OBW

Is transmitter output power variable?				
	No			
V	Yes		continuous variable	
		V	stepped variable with stepsize	0.1 dB
		minimum RF power		0 dBm
		maximum RF power		dBm

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

Antenna/s technical characteristics

Type	Manufacturer	Model number	Gain
+/-45° Polarized 90° Sector Antenna, Quad Port Fixed Tilt	Alpha Wireless	AW3035	17.0 dBi
Manual Tilt Panel Antenna, Dual Slant ± 45°	Argus Technologies Pty Ltd.	SSPX310M	18.0 dBi
Omni Directional Antenna	MTI Wireless Edge Ltd.	MT-402005/N	9 dBi
Omni Directional Base Station Antenna	MARS Antennas & RF Systems Ltd.	MA-WO36-10N	9.5 dBi
Omni directional Antenna	MTI Wireless Edge Ltd.	MT-402009/N/A	8.5 dBi
Omni Directional Antenna	MTI Wireless Edge Ltd.	MT-403017/N	10.5 dBi
Double Dual Slant Base Station Antenna, 65º	MTI Wireless Edge Ltd.	MT -404081/ND	17.5 dBi
Blade antenna	European Antennas Ltd.	SBA-3800-D1/1040	2.0 dBi

Transmitter aggregate data rate/s, Mbps

Transmitter 99% power bandwidth	Type of modulation		
	64QAM	16QAM	QPSK
10 MHz	43	26	13
7 MHz	26	16	8
5 MHz	22	13	6

Type of multiplexing	OFDMA/TDD
Modulating test signal (baseband)	PRBS
Maximum transmitter duty cycle in normal use	75 %

Transmitter power source

V	DC	Nominal rated voltage	48 VDC

Common power source for transmitter and receiver	V	yes	no

Test specification:	Section 90.1321, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 9:05:39 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48 VDC
Remarks:			

7 Transmitter tests according to 47CFR part 90 requirements

7.1 Peak output power test

7.1.1 General

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

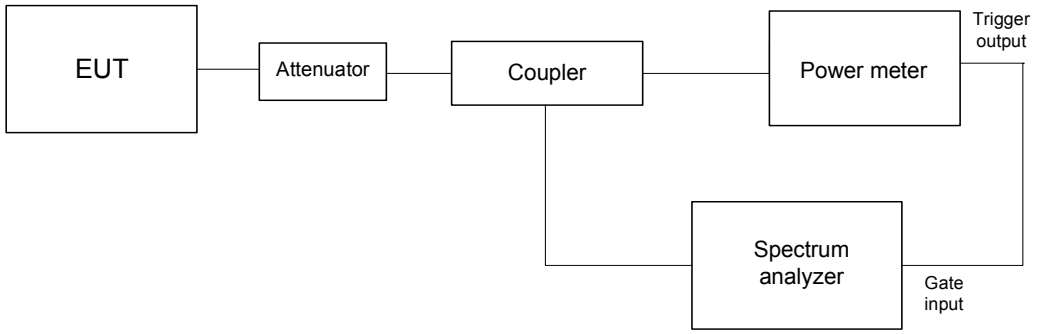
Table 7.1.1 Peak output power limits

Assigned frequency range, MHz	Occupied Bandwidth, MHz	Maximum peak output power, EIRP	
		W	dBm
3650.0 – 3700.0	5	5	36.99
	7	7	38.45
	10	10	40.00
Assigned frequency range, MHz	**Occupied Bandwidth, MHz**	**Maximum peak power spectral density, EIRP**	
		W	**dBm/MHz**
3650.0 – 3700.0	5	1	30
	7		
	10		

7.1.2 Test procedure

7.1.2.1 The EUT was set up as shown in Figure 7.1.1, energized and its proper operation was checked.
7.1.2.2 The EUT was adjusted to produce maximum available to the end user RF output power.
7.1.2.3 The peak output power was measured with a power meter as provided in Table 7.1.2.
7.1.2.4 The peak output power density was measured with spectrum analyzer as provided in Table 7.1.3 and the associated plots.

Figure 7.1.1 Peak output power and power spectral density test setup



Test specification:	Section 90.1321, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 9:05:39 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48 VDC
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 (see NOTE1)

EBW: 5 MHz

Channel, MHz	Modulation	Pmeas (RF#1), dBm	Pmeas (RF#2), dBm	P_{meas} *, dBm	Antenna gain, dBi	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
3652.50	QPSK	30.42	31.55	34.03	2.00	36.03	36.99	-0.96	Pass
3675.00	QPSK	30.76	30.94	33.86	2.00	35.86	36.99	-1.13	Pass
3697.50	QPSK	30.90	30.84	33.88	2.00	35.88	36.99	-1.11	Pass
3652.50	64QAM	30.39	31.60	34.05	2.00	36.05	36.99	-0.94	Pass
3675.00	64QAM	30.99	31.04	34.03	2.00	36.03	36.99	-0.96	Pass
3697.50	64QAM	31.06	30.87	33.98	2.00	35.98	36.99	-1.01	Pass

EBW: 7 MHz

Channel, MHz	Modulation	Pmeas (RF#1), dBm	Pmeas (RF#2), dBm	P_{meas} *, dBm	Antenna gain, dBi	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
3653.50	QPSK	32.05	32.68	35.39	2.00	37.39	38.45	-1.06	Pass
3675.00	QPSK	32.44	32.38	35.42	2.00	37.42	38.45	-1.03	Pass
3696.50	QPSK	32.10	32.60	35.37	2.00	37.37	38.45	-1.08	Pass
3653.50	64QAM	32.07	32.80	35.46	2.00	37.46	38.45	-0.99	Pass
3675.00	64QAM	32.51	32.53	35.53	2.00	37.53	38.45	-0.92	Pass
3696.50	64QAM	32.21	32.58	35.41	2.00	37.41	38.45	-1.04	Pass

EBW: 10 MHz

Channel, MHz	Modulation	Pmeas (RF#1), dBm	Pmeas (RF#2), dBm	P_{meas} *, dBm	Antenna gain, dBi	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
3655.00	QPSK	34.06	33.68	36.88	2.00	38.88	40.00	-1.12	Pass
3675.00	QPSK	34.01	33.47	36.76	2.00	38.76	40.00	-1.24	Pass
3695.00	QPSK	34.06	33.30	36.71	2.00	38.71	40.00	-1.29	Pass
3655.00	64QAM	33.96	33.62	36.80	2.00	38.80	40.00	-1.20	Pass
3675.00	64QAM	34.36	33.21	36.83	2.00	38.83	40.00	-1.17	Pass
3695.00	64QAM	34.12	33.37	36.77	2.00	38.77	40.00	-1.23	Pass

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

NOTE1: the EUT was configured to produce maximum conducted RF power for minimum declared Antenna gain of 2 dBi. RF output power will vary depending on the antenna assembly gain to ensure that the total EIRP power and power limits comply with EIRP limits. For actual settings of power levels with respect to actual antenna assembly used, please refer to the User's Manual.

Test specification:	Section 90.1321, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 9:05:39 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48 VDC
Remarks:			

Table 7.1.3 Peak EIRP power density test results

OPERATING FREQUENCY RANGE:	3650.0 – 3700.0 MHz
DETECTOR USED:	Average (RMS)
RESOLUTION BANDWIDTH:	1000 kHz
VIDEO BANDWIDTH:	3000 kHz
MODULATING SIGNAL:	PRBS
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum (see NOTE1)

EBW: 5 MHz

Channel, MHz	Modulation	Pmeas (RF#1), dBm/MHz	Pmeas (RF#2), dBm/MHz	Power density *, dBm/MHz	Antenna gain, dBi	EIRP power density**, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
3652.50	QPSK	24.14	25.44	27.85	2.00	29.85	30.00	-0.15	Pass
3675.00	QPSK	24.55	24.69	27.63	2.00	29.63	30.00	-0.37	Pass
3697.50	QPSK	24.79	24.58	27.70	2.00	29.70	30.00	-0.30	Pass
3652.50	64QAM	24.24	25.26	27.79	2.00	29.79	30.00	-0.21	Pass
3675.00	64QAM	24.77	24.94	27.87	2.00	29.87	30.00	-0.13	Pass
3697.50	64QAM	25.05	24.76	27.92	2.00	29.92	30.00	-0.08	Pass

EBW: 7 MHz

Channel, MHz	Modulation	Pmeas (RF#1), dBm/MHz	Pmeas (RF#2), dBm/MHz	Power density *, dBm/MHz	Antenna gain, dBi	EIRP power density **, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
3653.50	QPSK	24.53	24.97	27.77	2.00	29.77	30.00	-0.23	Pass
3675.00	QPSK	24.89	24.82	27.87	2.00	29.87	30.00	-0.13	Pass
3696.50	QPSK	24.61	24.99	27.81	2.00	29.81	30.00	-0.19	Pass
3653.50	64QAM	24.55	25.00	27.79	2.00	29.79	30.00	-0.21	Pass
3675.00	64QAM	24.93	24.95	27.95	2.00	29.95	30.00	-0.05	Pass
3696.50	64QAM	24.61	25.00	27.82	2.00	29.82	30.00	-0.18	Pass

EBW: 10 MHz

Channel, MHz	Modulation	Pmeas (RF#1), dBm/MHz	Pmeas (RF#2), dBm/MHz	Power density *, dBm/MHz	Antenna gain, dBi	EIRP power density **, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
3655.00	QPSK	25.18	24.73	27.97	2.00	29.97	30.00	-0.03	Pass
3675.00	QPSK	25.13	24.61	27.89	2.00	29.89	30.00	-0.11	Pass
3695.00	QPSK	25.34	24.51	27.96	2.00	29.96	30.00	-0.04	Pass
3655.00	64QAM	25.12	24.79	27.97	2.00	29.97	30.00	-0.03	Pass
3675.00	64QAM	25.51	24.30	27.96	2.00	29.96	30.00	-0.04	Pass
3695.00	64QAM	25.23	24.59	27.93	2.00	29.93	30.00	-0.07	Pass

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

** - EIRP power density, dBm/MHz = Power density*, dBm/MHz + Antenna Gain, dBi

NOTE1: EUT was configured to produce maximum conducted RF power for minimum declared Antenna gain of 2 dBi. RF output power will vary depending on the antenna assembly gain to ensure that the total EIRP power and power limits withstand with EIRP limits. For actual settings of power levels with respect to actual antenna assembly used, please refer to the User's Manual.

Reference numbers of test equipment used

HL 3301	HL 3302	HL 3322	HL 3474	HL 3559	HL 3782	HL 3818	HL 3868

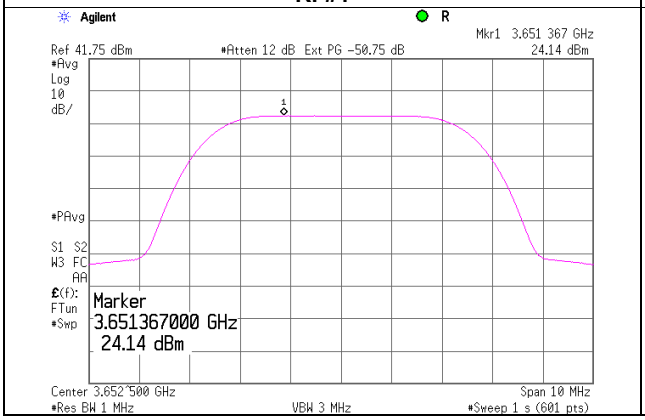
Full description is given in Appendix A.

Test specification:	Section 90.1321, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 9:05:39 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48 VDC
Remarks:			

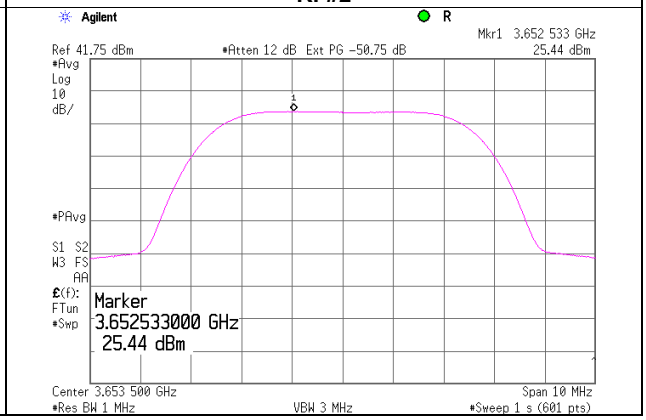
Plot 7.1.1 Peak output power density test results at low frequency

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

RF#1



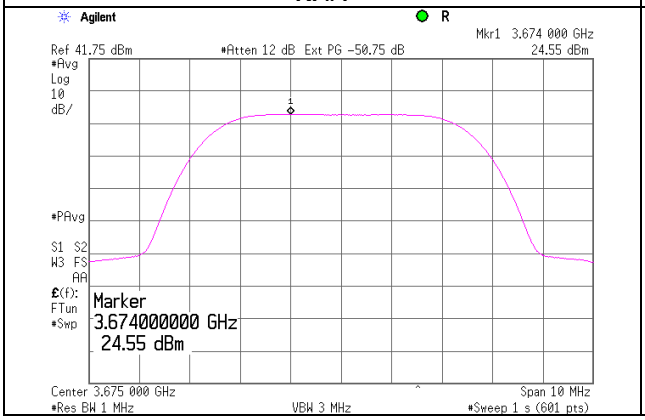
RF#2



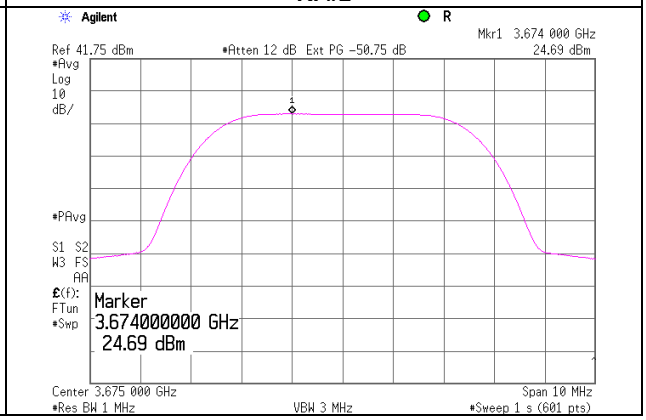
Plot 7.1.2 Peak output power density test results at mid frequency

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

RF#1

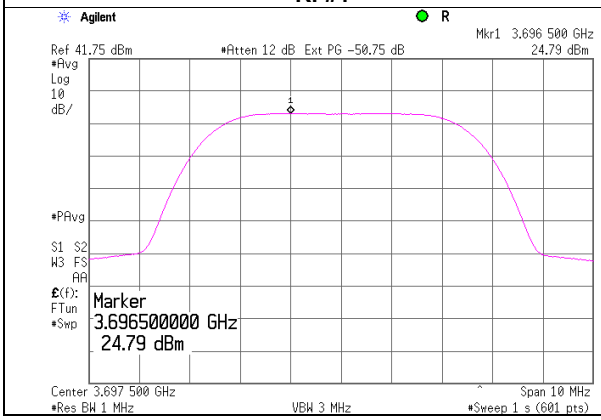
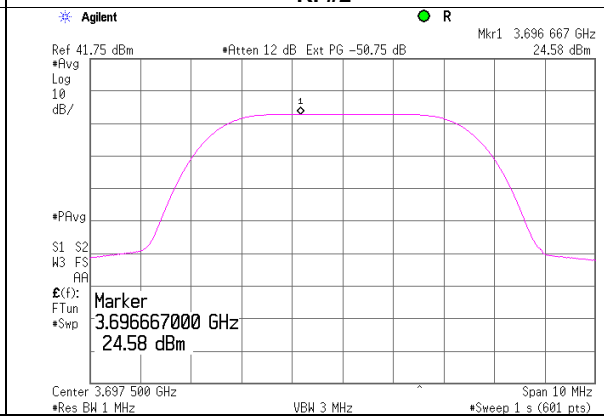


RF#2



Test specification:	**Section 90.1321, Maximum output power**		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	3/28/2010 9:05:39 AM		
Temperature: 23ºC	**Air Pressure:** 1011 hPa	**Relative Humidity:** 47 %	**Power Supply:** 120VAC/48 VDC
Remarks:			

Plot 7.1.3 Peak output power test results at high frequency

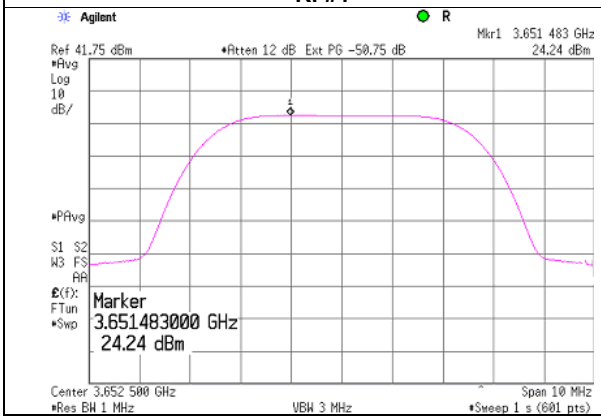
CARRIER FREQUENCY:	3697.5 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION:	QPSK
RF#1	**RF#2**
	

Test specification:	Section 90.1321, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 9:05:39 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48 VDC
Remarks:			

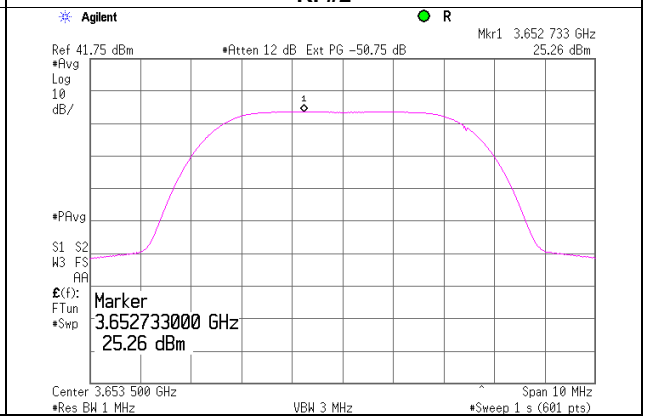
Plot 7.1.4 Peak output power test results at low frequency

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

RF#1



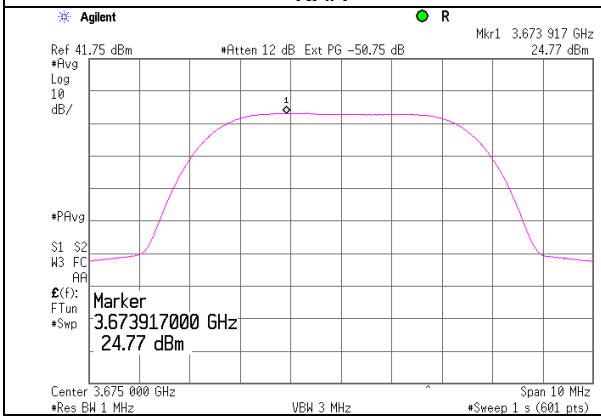
RF#2



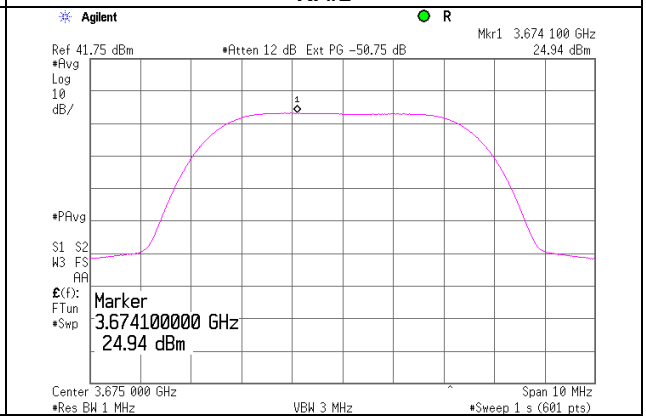
Plot 7.1.5 Peak output power test results at mid frequency

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

RF#1



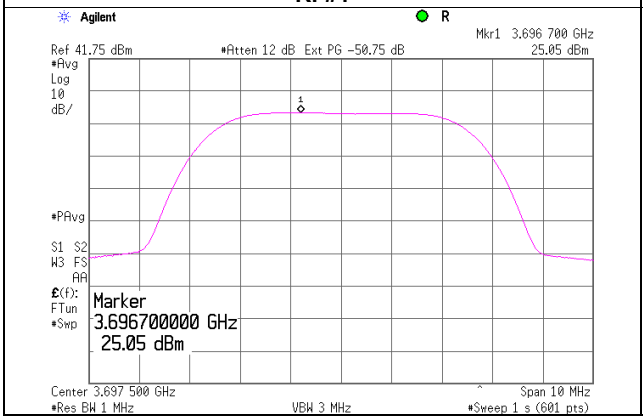
RF#2

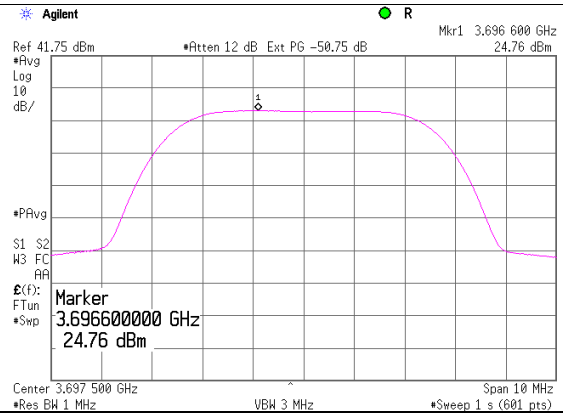


Test specification:	**Section 90.1321, Maximum output power**		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	3/28/2010 9:05:39 AM		
Temperature: 23ºC	**Air Pressure:** 1011 hPa	**Relative Humidity:** 47 %	**Power Supply:** 120VAC/48 VDC
Remarks:			

Plot 7.1.6 Peak output power test results at high frequency

CARRIER FREQUENCY:	3697.50 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION:	64QAM
RF#1	**RF#2**



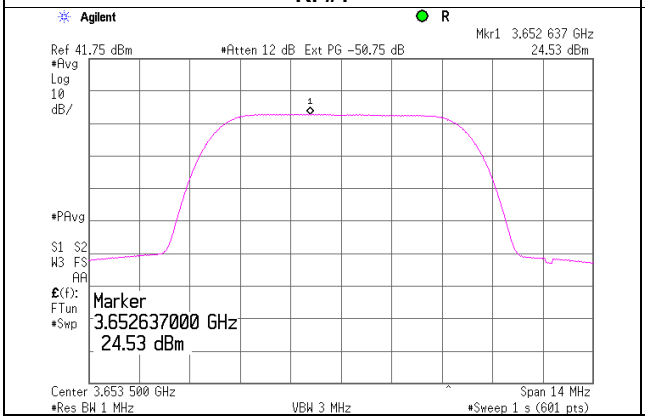


Test specification:	Section 90.1321, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 9:05:39 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48 VDC
Remarks:			

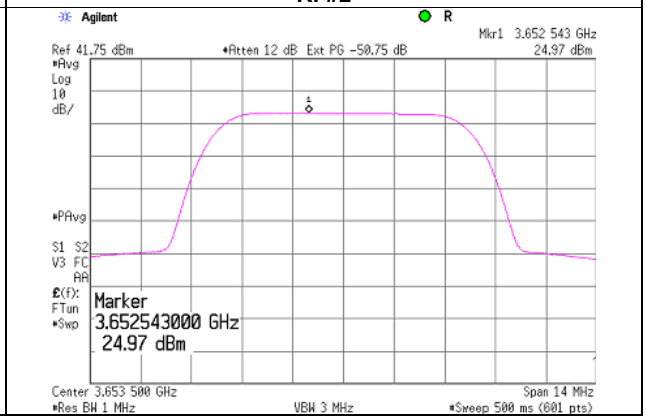
Plot 7.1.7 Peak output power test results at low frequency

CARRIER FREQUENCY:	3653.5 MHz
EMISSION BANDWIDTH:	7 MHz
MODULATION:	QPSK

RF#1



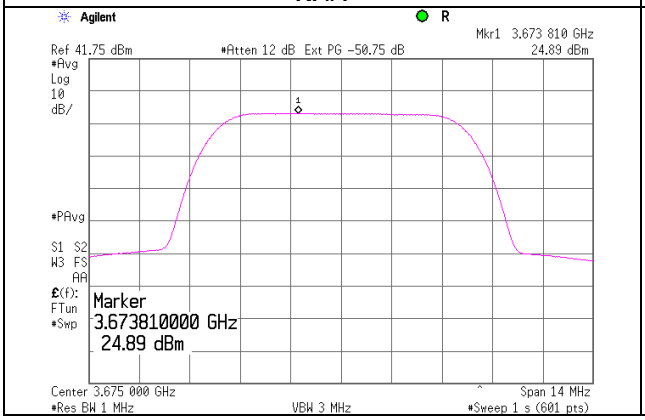
RF#2



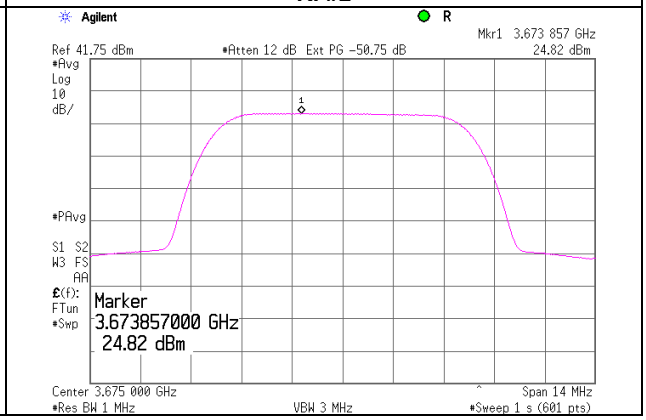
Plot 7.1.8 Peak output power test results at mid frequency

CARRIER FREQUENCY:	3675.0 MHz
EMISSION BANDWIDTH:	7 MHz
MODULATION:	QPSK

RF#1

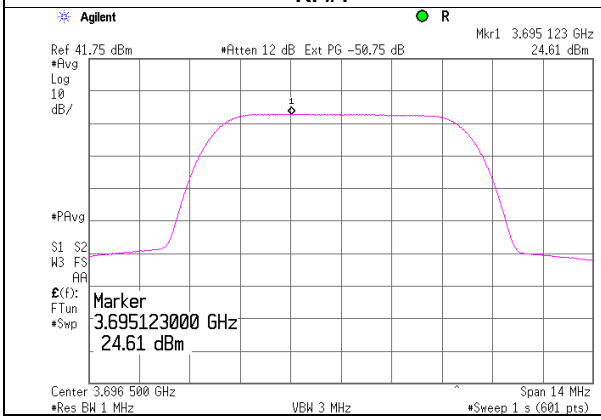
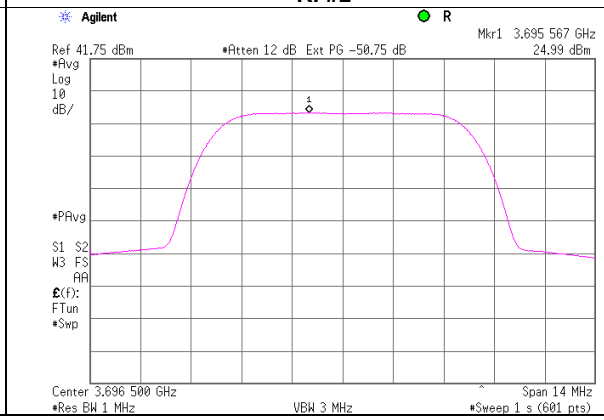


RF#2



Test specification:	**Section 90.1321, Maximum output power**		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	3/28/2010 9:05:39 AM		
Temperature: 23ºC	**Air Pressure:** 1011 hPa	**Relative Humidity:** 47 %	**Power Supply:** 120VAC/48 VDC
Remarks:			

Plot 7.1.9 Peak output power test results at high frequency

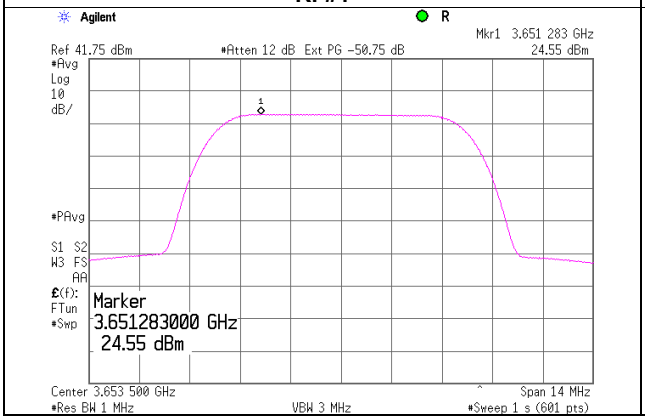
CARRIER FREQUENCY:	3696.5 MHz
EMISSION BANDWIDTH:	7 MHz
MODULATION:	QPSK
RF#1	**RF#2**
	

Test specification:	Section 90.1321, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 9:05:39 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48 VDC
Remarks:			

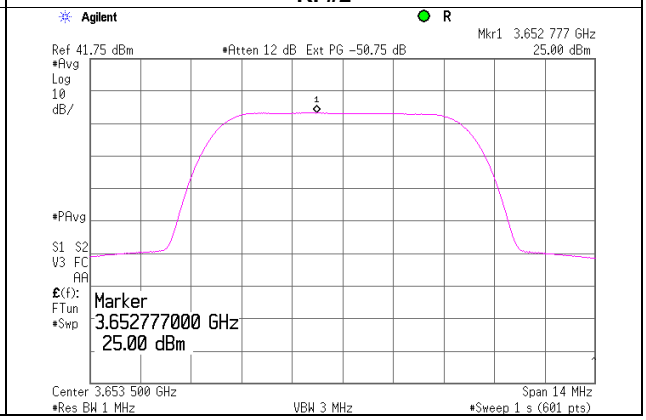
Plot 7.1.10 Peak output power test results at low frequency

CARRIER FREQUENCY:	3653.5 MHz
EMISSION BANDWIDTH:	7 MHz
MODULATION:	64QAM

RF#1



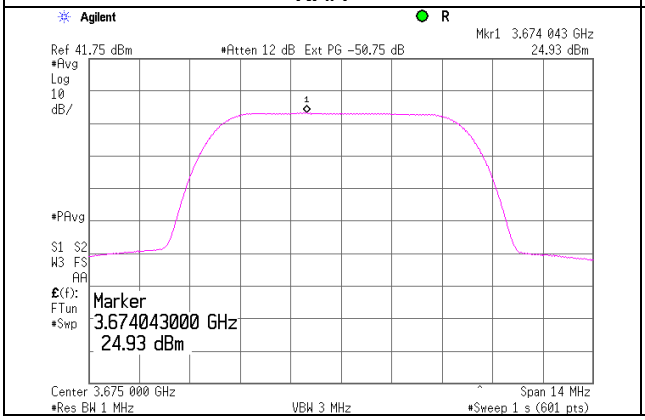
RF#2



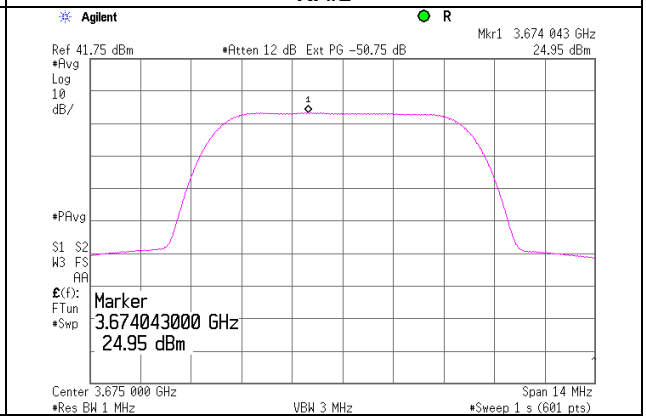
Plot 7.1.11 Peak output power test results at mid frequency

CARRIER FREQUENCY:	3675.0 MHz
EMISSION BANDWIDTH:	7 MHz
MODULATION:	64QAM

RF#1



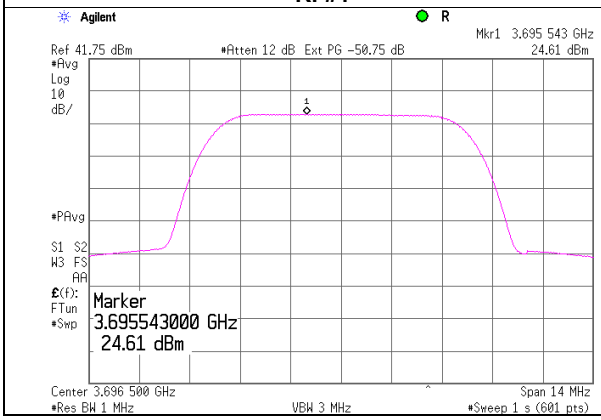
RF#2

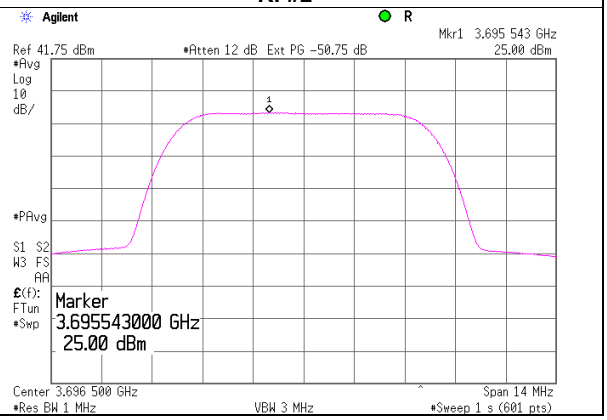


Test specification:	Section 90.1321, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 9:05:39 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48 VDC
Remarks:			

Plot 7.1.12 Peak output power test results at high frequency

CARRIER FREQUENCY:	3696.50 MHz
EMISSION BANDWIDTH:	7 MHz
MODULATION:	64QAM
RF#1	**RF#2**



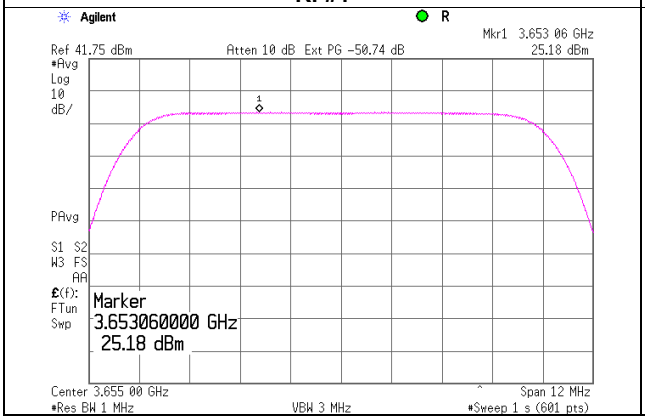


Test specification:	Section 90.1321, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 9:05:39 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48 VDC
Remarks:			

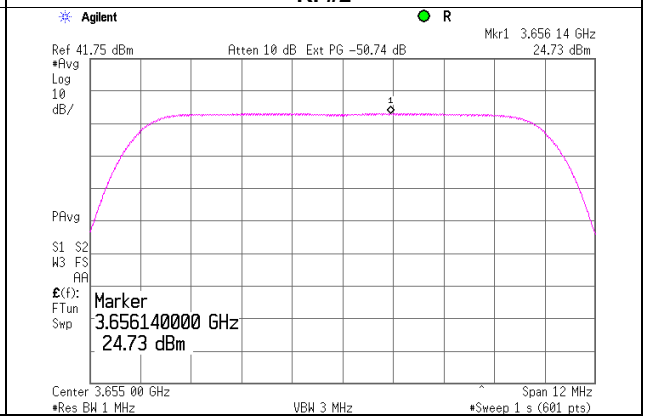
Plot 7.1.13 Peak output power test results at low frequency

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

RF#1



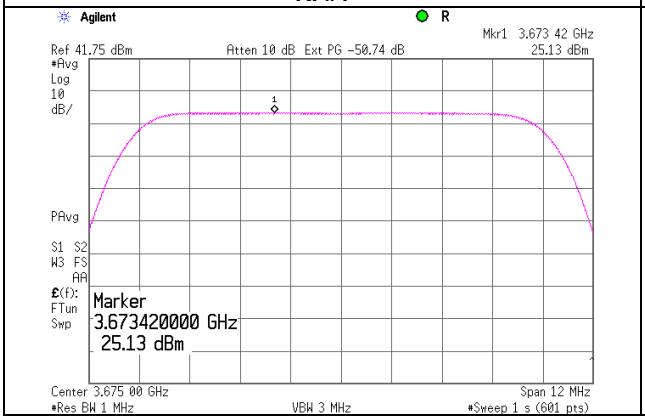
RF#2



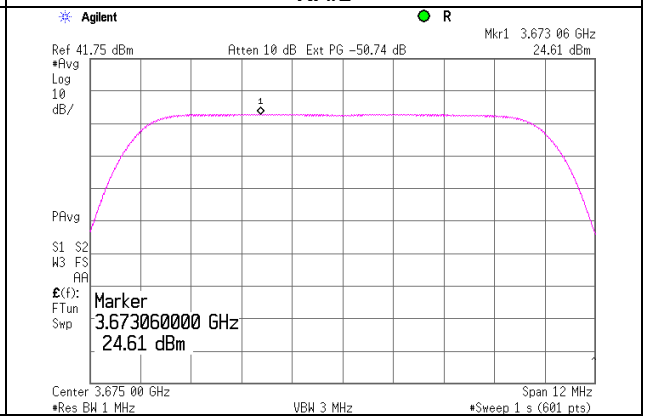
Plot 7.1.14 Peak output power test results at mid frequency

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

RF#1



RF#2

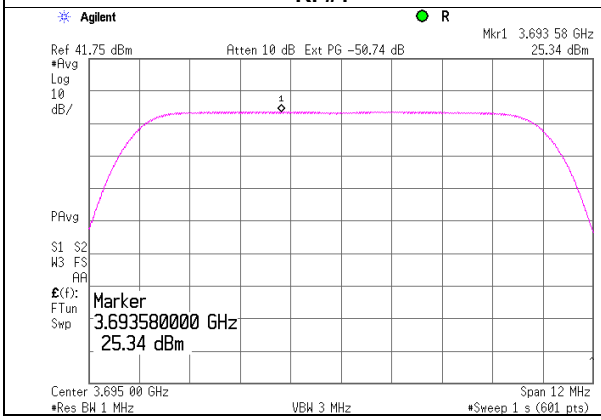


Test specification:	Section 90.1321, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 9:05:39 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48 VDC
Remarks:			

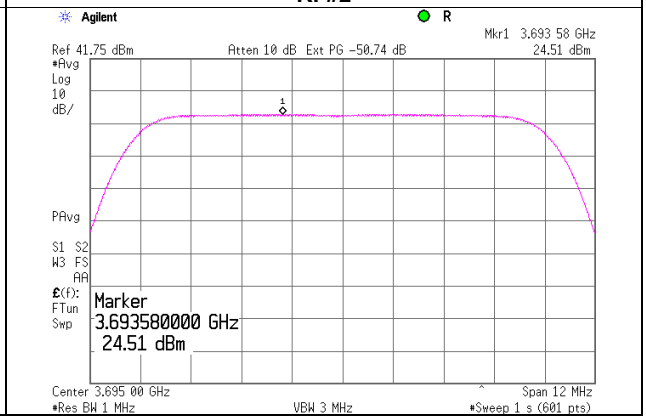
Plot 7.1.15 Peak output power test results at high frequency

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

RF#1



RF#2

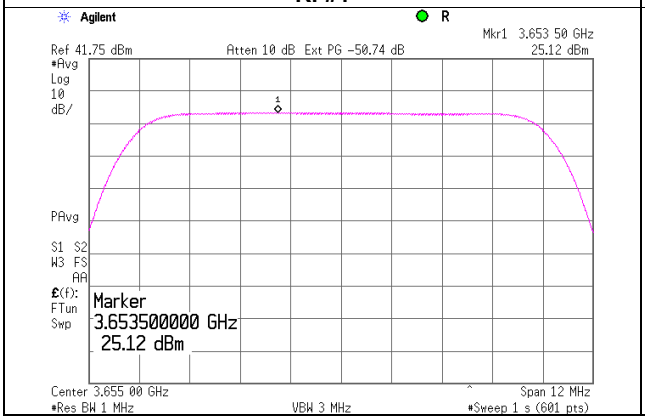


Test specification:	Section 90.1321, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 9:05:39 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48 VDC
Remarks:			

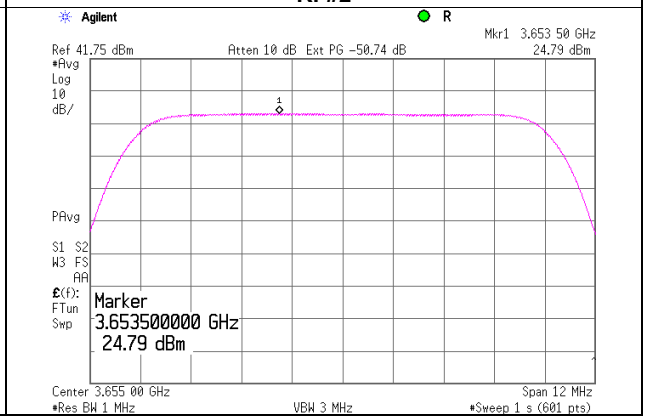
Plot 7.1.16 Peak output power test results at low frequency

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

RF#1



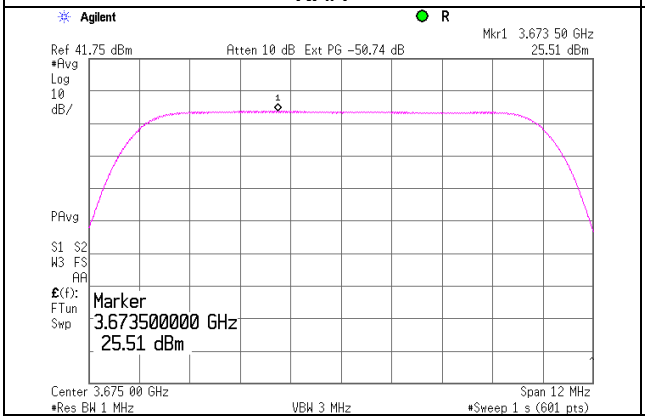
RF#2



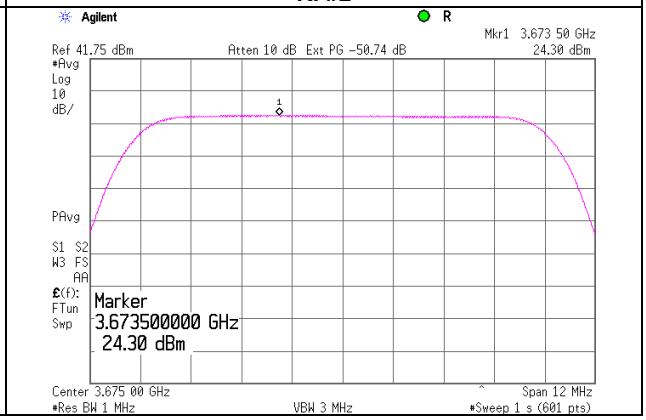
Plot 7.1.17 Peak output power test results at mid frequency

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

RF#1



RF#2

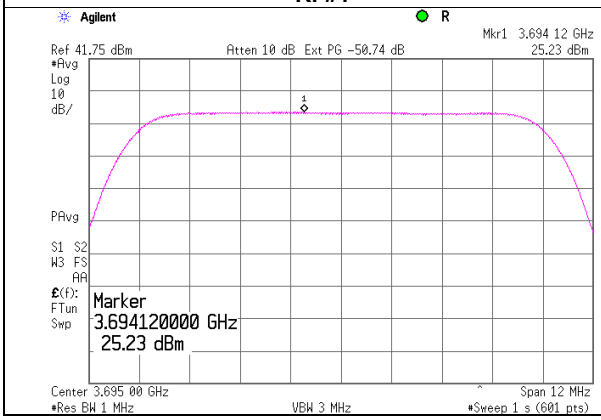


Test specification:	Section 90.1321, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 9:05:39 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48 VDC
Remarks:			

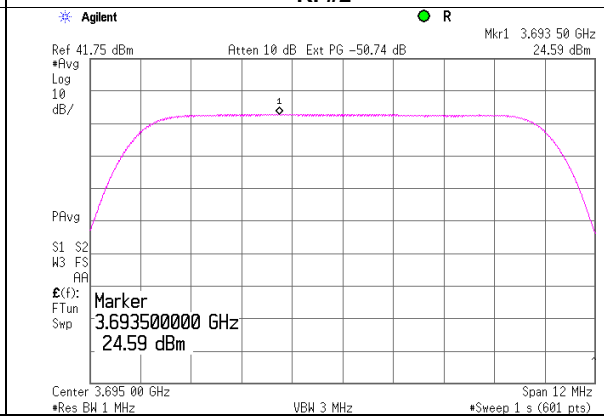
Plot 7.1.18 Peak output power test results at high frequency

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

RF#1



RF#2



Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 11:23:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

7.2 Occupied bandwidth test

7.2.1 General

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in Table 7.2.1 . The test results are provided in Table 7.2.2 .and the associated plots.

Table 7.2.1 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.

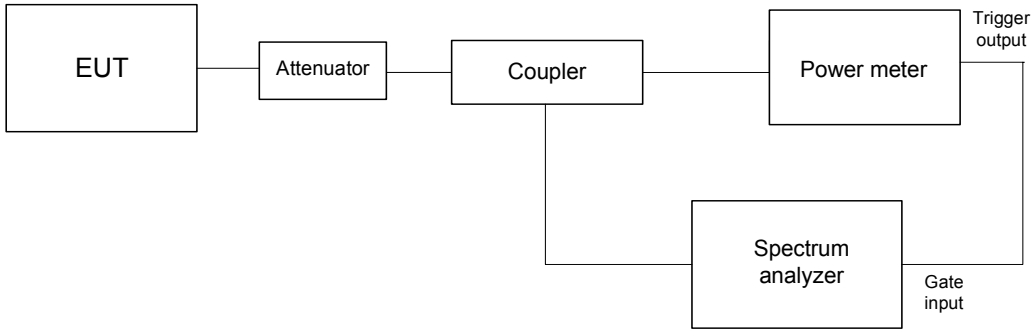
7.2.2 Test procedure

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

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

7.2.2.3 The transmitter occupied bandwidth was measured with spectrum analyzer as a frequency delta between the reference points on modulation envelope and provided in Table 7.2.2 and the associated plots.

Figure 7.2.1 Occupied bandwidth test setup



Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 11:23:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Table 7.2.2 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: 26 dB below total average power
MODULATING SIGNAL: PRBS

Carrier frequency, MHz	Modulation	99% Occupied bandwidth, MHz	Emission Bandwidth, MHz	Verdict
3652.5	QPSK	4.653	5.0	Pass
3675.0	QPSK	4.657	5.0	Pass
3697.5	QPSK	4.657	5.0	Pass
3652.5	64QAM	4.644	5.0	Pass
3675.0	64QAM	4.666	5.0	Pass
3697.5	64QAM	4.657	5.0	Pass
3653.5	QPSK	6.613	7.0	Pass
3675.0	QPSK	6.613	7.0	Pass
3696.5	QPSK	6.638	7.0	Pass
3653.5	64QAM	6.638	7.0	Pass
3675.0	64QAM	6.613	7.0	Pass
3696.5	64QAM	6.613	7.0	Pass
3655.0	QPSK	9.310	10.0	Pass
3675.0	QPSK	9.293	10.0	Pass
3695.0	QPSK	9.293	10.0	Pass
3655.0	64QAM	9.310	10.0	Pass
3675.0	64QAM	9.293	10.0	Pass
3695.0	64QAM	9.293	10.0	Pass

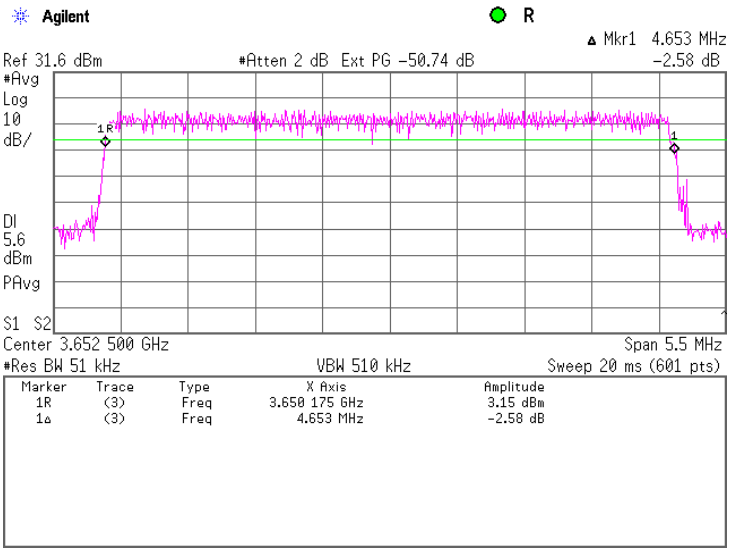
Reference numbers of test equipment used

HL 3301	HL 3302	HL 3322	HL 3474	HL 3559	HL 3782	HL 3818	HL 3868

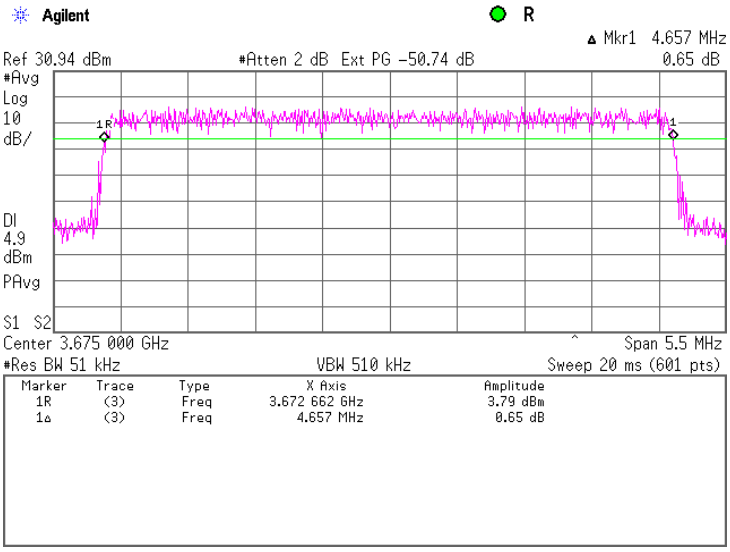
Full description is given in Appendix A.

Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 11:23:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.2.1 Occupied bandwidth test result at low frequency, 5 MHz EBW, QPSK

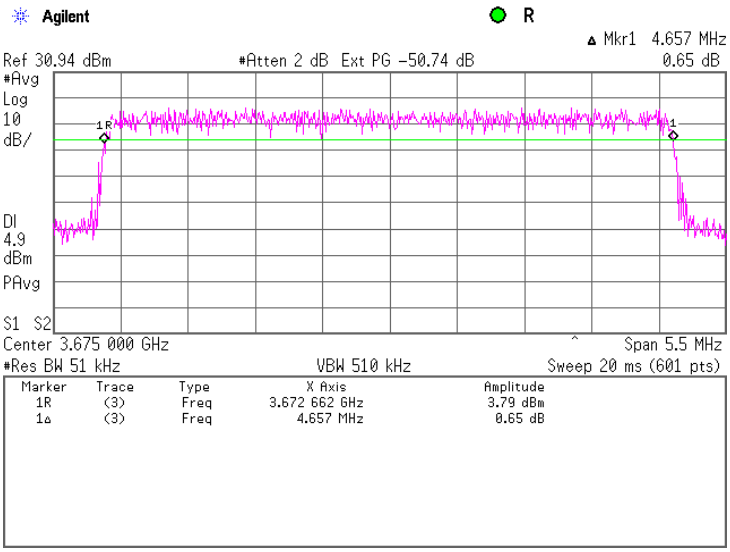


Plot 7.2.2 Occupied bandwidth test result at mid frequency, 5 MHz EBW, QPSK



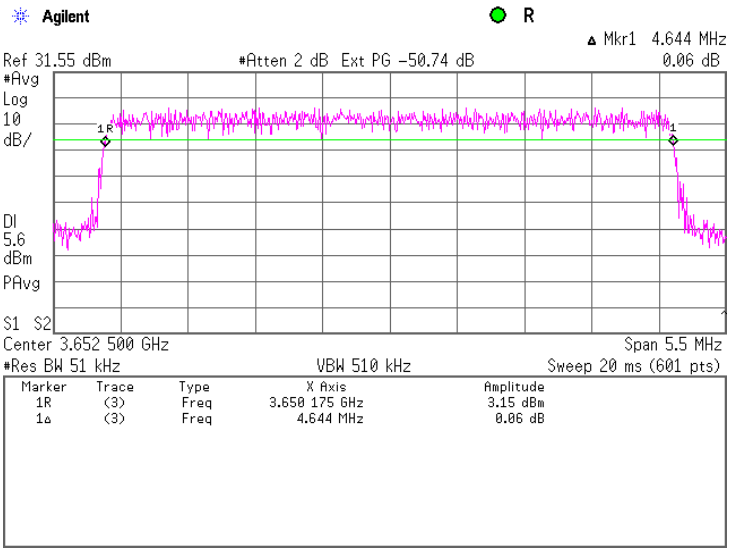
Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 11:23:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.2.3 Occupied bandwidth test result at high frequency, 5 MHz EBW, QPSK

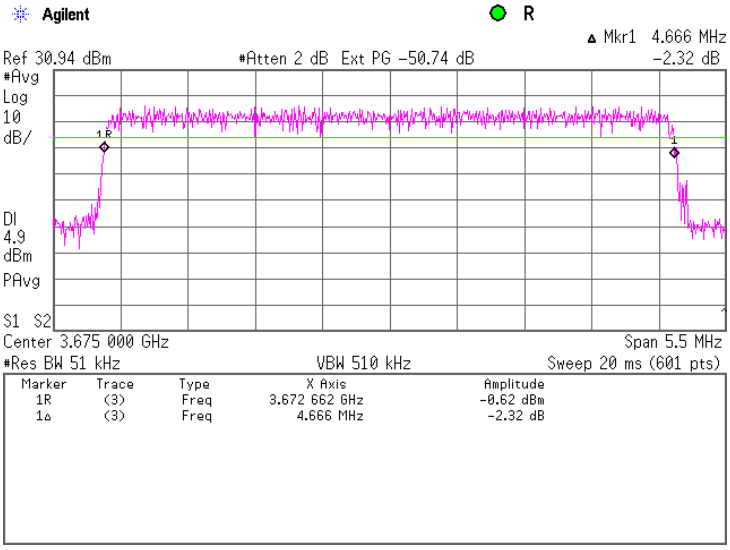


Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 11:23:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.2.4 Occupied bandwidth test result at low frequency, 5 MHz EBW, 64QAM

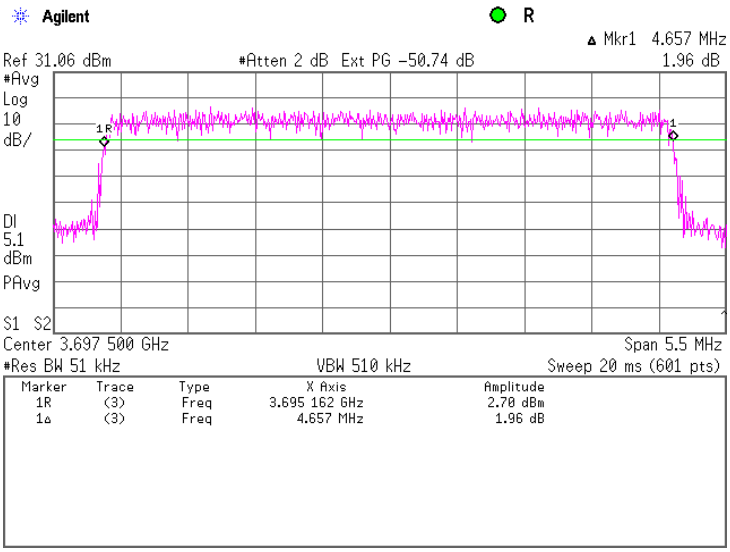


Plot 7.2.5 Occupied bandwidth test result at mid frequency, 5 MHz EBW, 64QAM



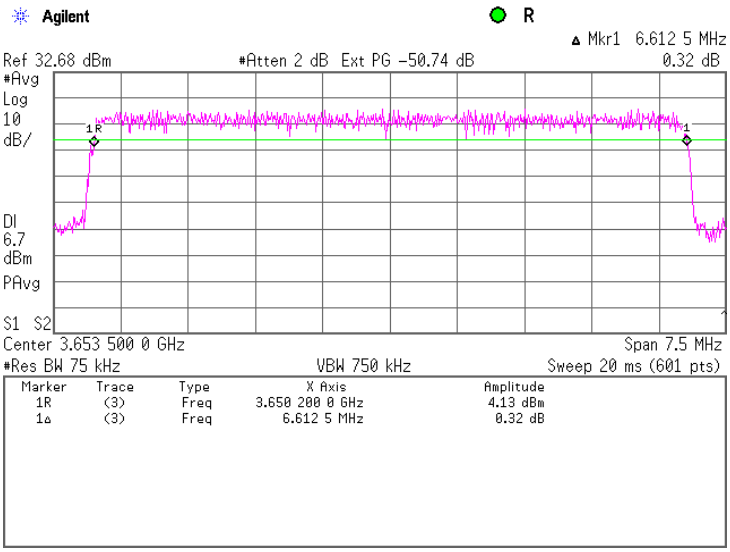
Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 11:23:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.2.6 Occupied bandwidth test result at high frequency, 5 MHz EBW, 64QAM

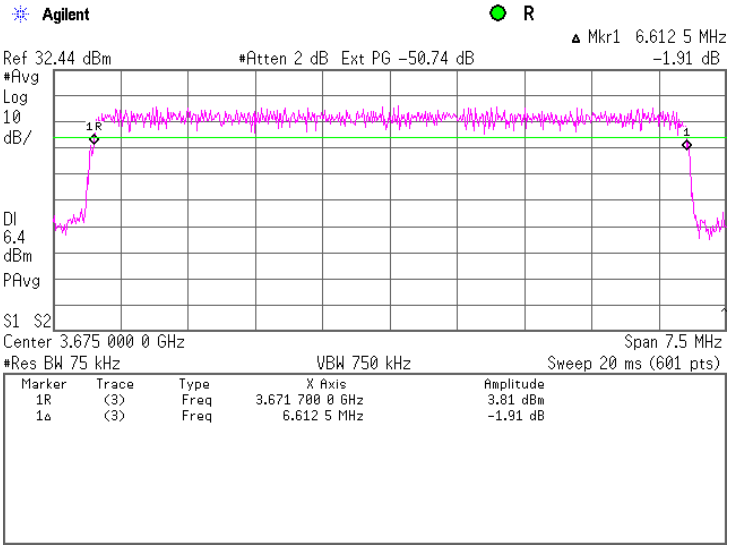


Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 11:23:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.2.7 Occupied bandwidth test result at low frequency, 7 MHz EBW, QPSK

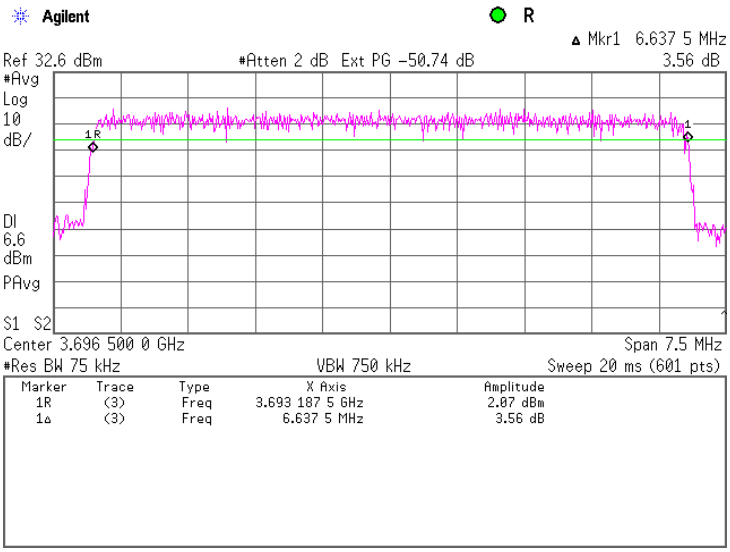


Plot 7.2.8 Occupied bandwidth test result at mid frequency, 7 MHz EBW, QPSK



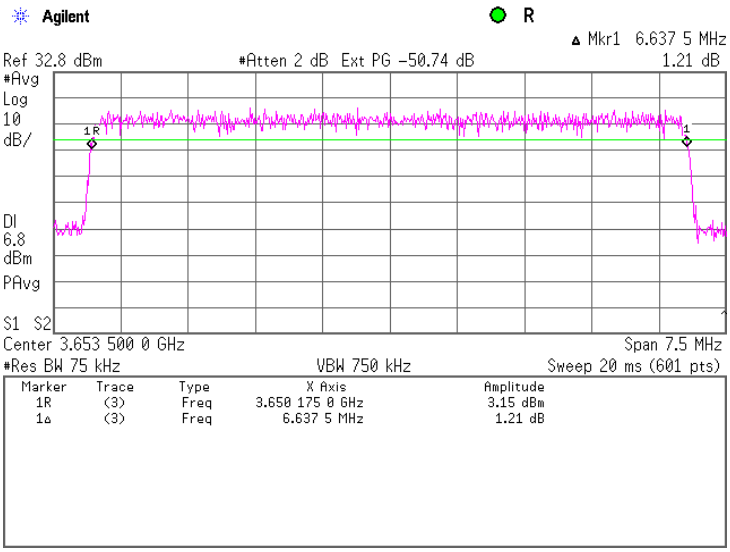
Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 11:23:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.2.9 Occupied bandwidth test result at high frequency, 7 MHz EBW, QPSK

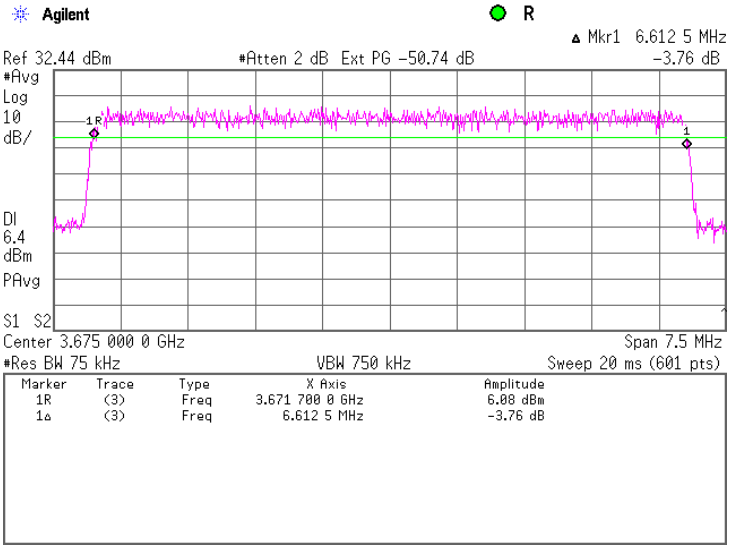


Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 11:23:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.2.10 Occupied bandwidth test result at low frequency, 7 MHz EBW, 64QAM

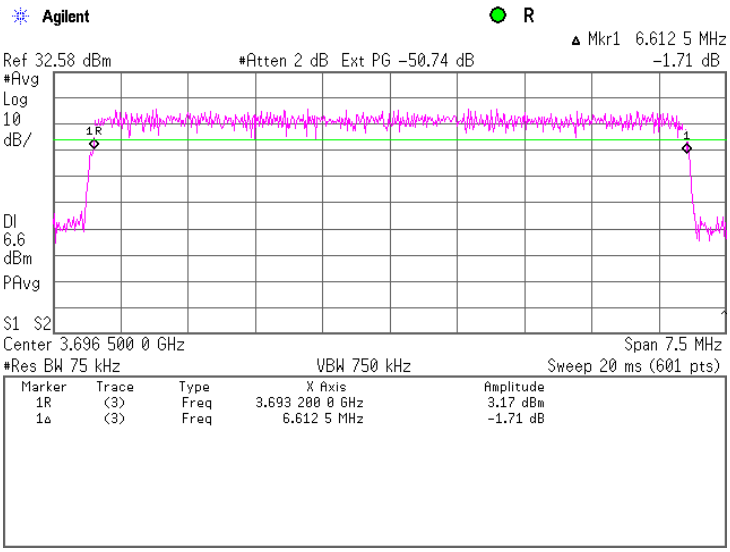


Plot 7.2.11 Occupied bandwidth test result at mid frequency, 7 MHz EBW, 64QAM



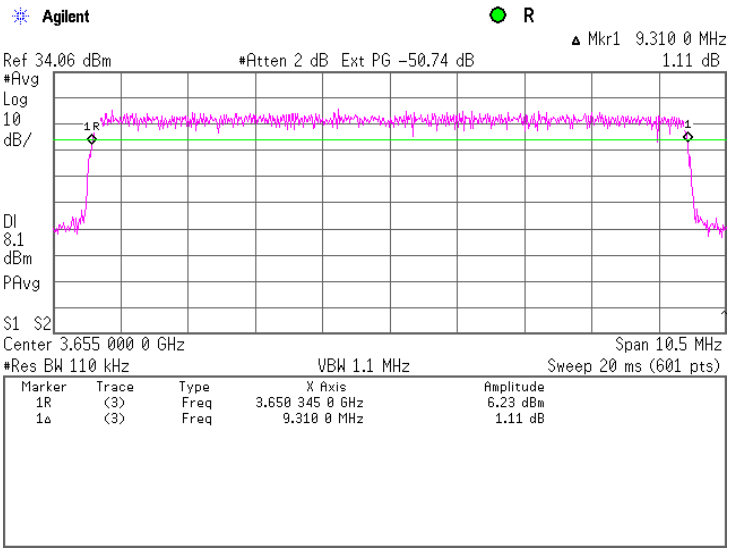
Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 11:23:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.2.12 Occupied bandwidth test result at high frequency, 7 MHz EBW, 64QAM

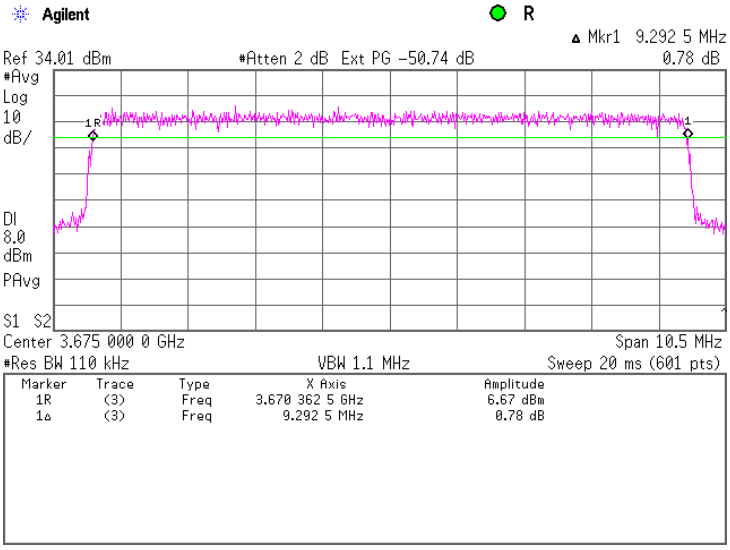


Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 11:23:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.2.13 Occupied bandwidth test result at low frequency, 10 MHz EBW, QPSK

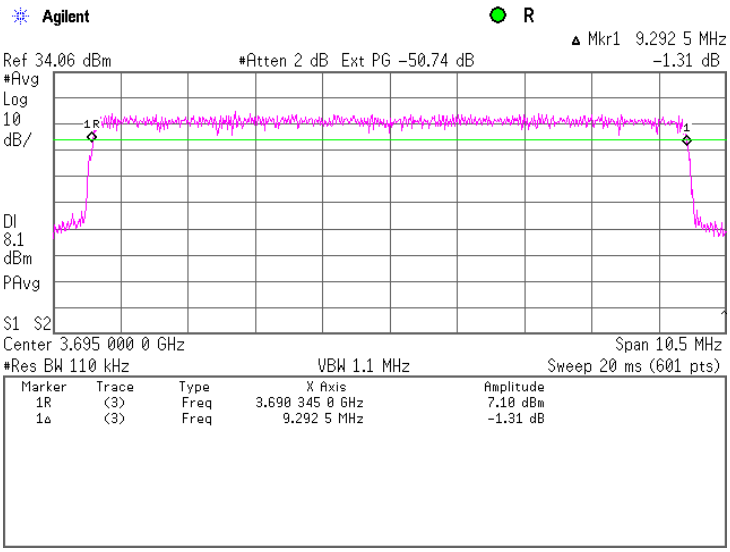


Plot 7.2.14 Occupied bandwidth test result at mid frequency, 10 MHz EBW, QPSK



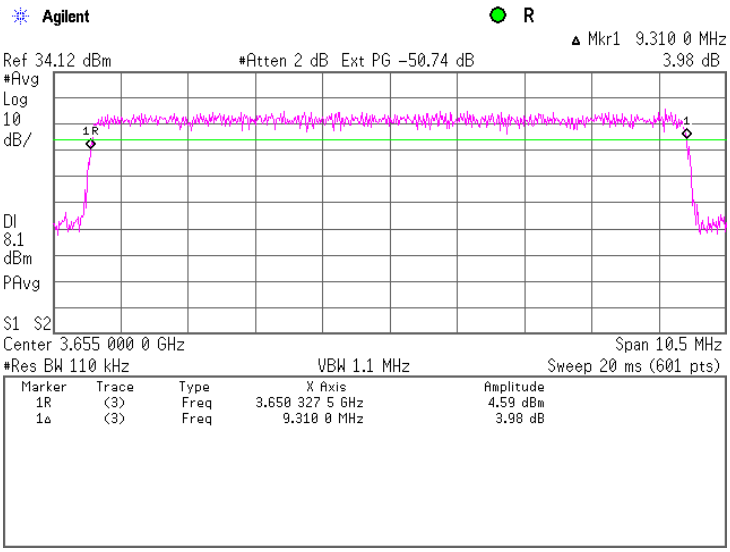
Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 11:23:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.2.15 Occupied bandwidth test result at high frequency, 10 MHz EBW, QPSK

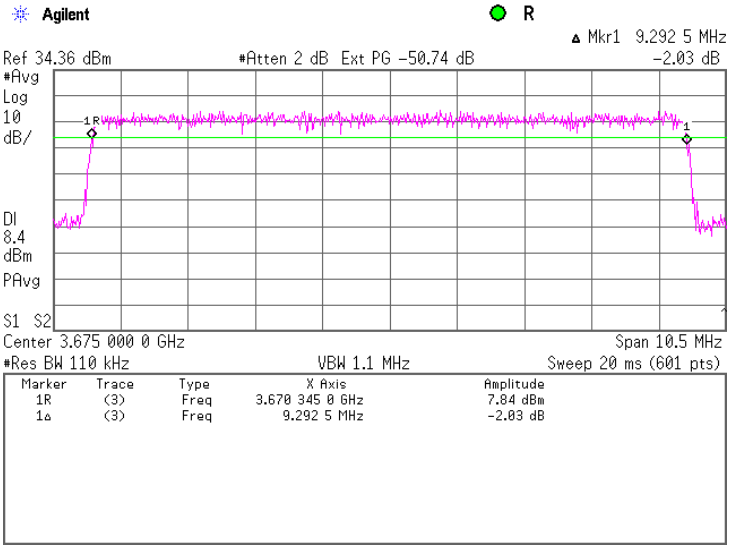


Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 11:23:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.2.16 Occupied bandwidth test result at low frequency, 10 MHz EBW, 64QAM

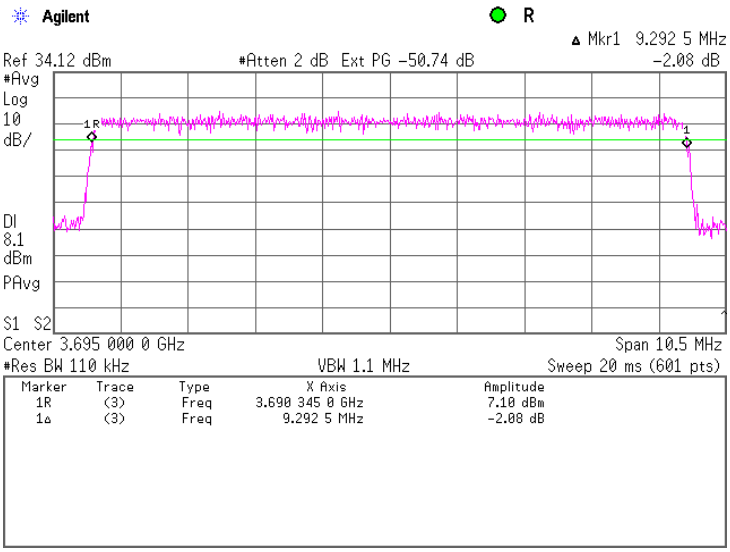


Plot 7.2.17 Occupied bandwidth test result at mid frequency, 10 MHz EBW, 64QAM



Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 11:23:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.2.18 Occupied bandwidth test result at high frequency, 10 MHz EBW, 64QAM



Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 10:16:04 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

7.3 Emission mask test

7.3.1 General

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

Table 7.3.1 Emission mask limits

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)

* - linearly increase with frequency
** - 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

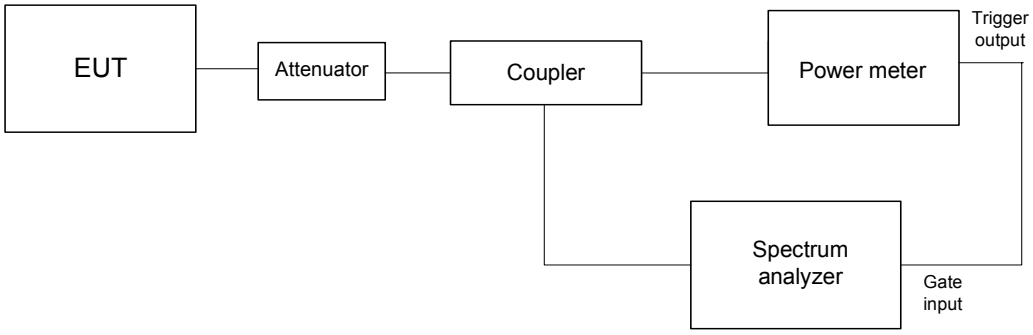
7.3.2 Test procedure

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

7.3.2.2 The emission mask was measured with spectrum analyzer as provided in the associated plots. The test results recorded in Table 7.3.2.

Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 10:16:04 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Figure 7.3.1 Emission mask test setup



Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 10:16:04 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Table 7.3.2 Emission mask test results

Carrier frequency, MHz	Limit	Reference to Plot	Verdict
5 MHz EBW 64QAM			
3652.5	Emission mask B	Plot 7.3.1	Pass
3675.0		Plot 7.3.2	
3697.5		Plot 7.3.3	
7 MHz EBW 64QAM			
3653.5	Emission mask B	Plot 7.3.4	Pass
3675.0		Plot 7.3.5	
3696.5		Plot 7.3.6	
10 MHz EBW 64QAM			
3655.0	Emission mask B	Plot 7.3.7	Pass
3675.0		Plot 7.3.8	
3695.0		Plot 7.3.9	

NOTE1: Attenuation below carrier provided in terms of attenuation below total average power within occupied bandwidth. Measurement was performed with RBW set to 100 kHz and the limit mask was reduced by 10 dB to compensate the lower RBW [10*log(1 MHz/ 100 kHz] = 10 dB;
NOTE2: Measurement was performed at 64QAM modulation as represent the worst case of power and power density.

Reference numbers of test equipment used

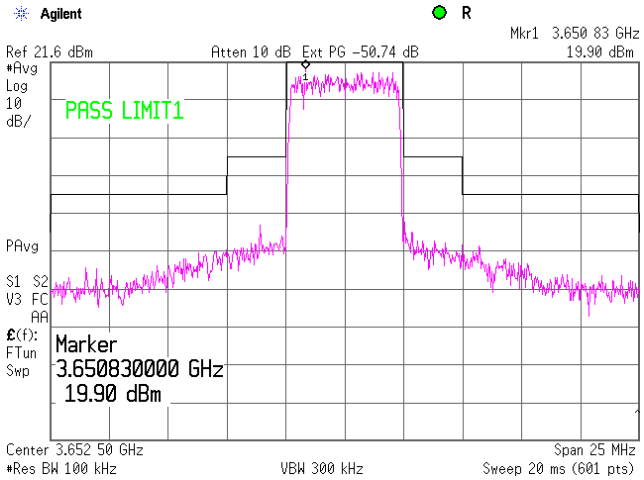
HL 3301	HL 3302	HL 3322	HL 3474	HL 3559	HL 3782	HL 3818	HL 3868

Full description is given in Appendix A.

Test specification:	**Section 90.210, Emission mask**		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	3/28/2010 10:16:04 AM		
Temperature: 23ºC	**Air Pressure:** 1011 hPa	**Relative Humidity:** 47 %	**Power Supply:** 120VAC/48VDC
Remarks:			

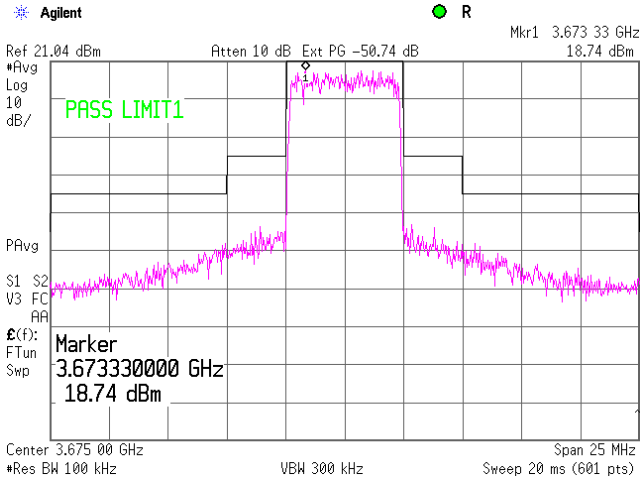
Plot 7.3.1 Emission mask test results at low carrier frequency

OPERATING FREQUENCY RANGE:	3650.0 - 3700.0 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
CHANNEL BANDWIDTH:	5 MHz
TRANSMITTER OUTPUT POWER:	31.60 dBm



Plot 7.3.2 Emission mask test results at mid carrier frequency

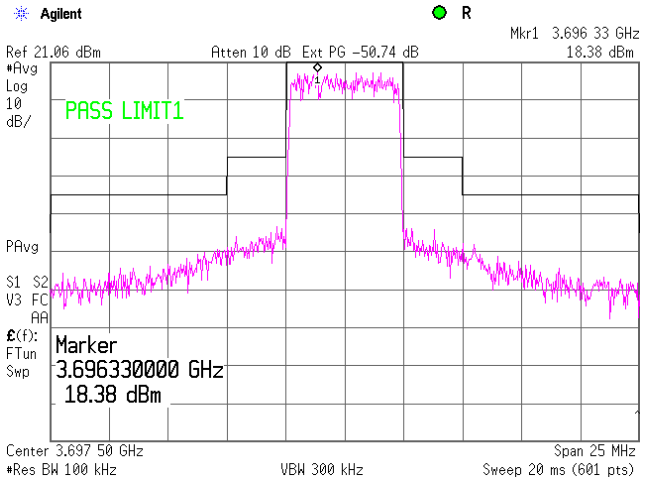
OPERATING FREQUENCY RANGE:	3650.0 - 3700.0 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
CHANNEL BANDWIDTH:	5 MHz
TRANSMITTER OUTPUT POWER SETTINGS:	31.04 dBm



Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 10:16:04 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.3.3 Emission mask test results at high carrier frequency

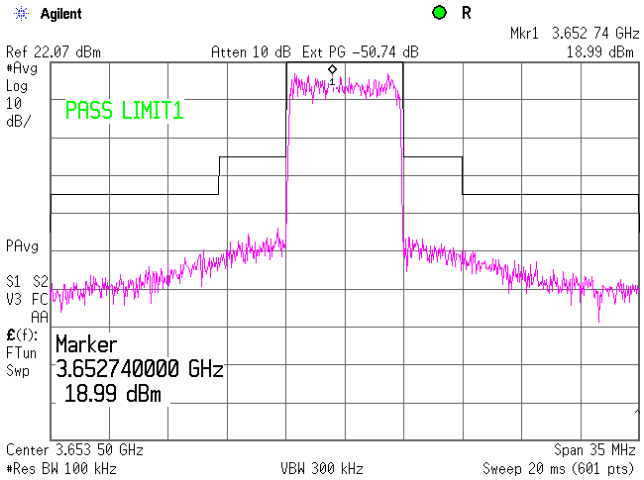
OPERATING FREQUENCY RANGE:	3650.0 - 3700.0 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
CHANNEL BANDWIDTH:	5 MHz
TRANSMITTER OUTPUT POWER SETTINGS:	31.06 dBm



Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 10:16:04 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

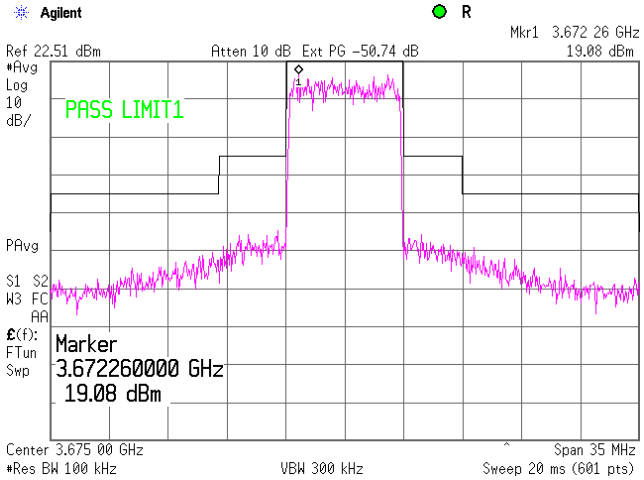
Plot 7.3.4 Emission mask test results at low carrier frequency

OPERATING FREQUENCY RANGE:	3650.0 - 3700.0 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
CHANNEL BANDWIDTH:	7 MHz
TRANSMITTER OUTPUT POWER:	32.80 dBm



Plot 7.3.5 Emission mask test results at mid carrier frequency

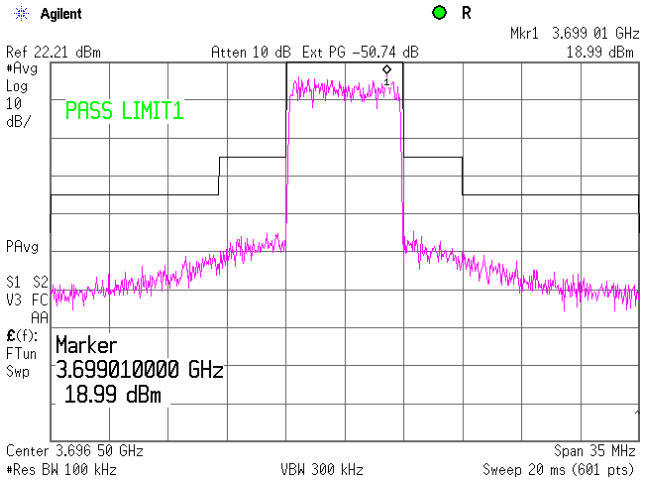
OPERATING FREQUENCY RANGE:	3650.0 - 3700.0 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
CHANNEL BANDWIDTH:	7 MHz
TRANSMITTER OUTPUT POWER SETTINGS:	32.53 dBm



Test specification:	**Section 90.210, Emission mask**		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	3/28/2010 10:16:04 AM		
Temperature: 23ºC	**Air Pressure:** 1011 hPa	**Relative Humidity:** 47 %	**Power Supply:** 120VAC/48VDC
Remarks:			

Plot 7.3.6 Emission mask test results at high carrier frequency

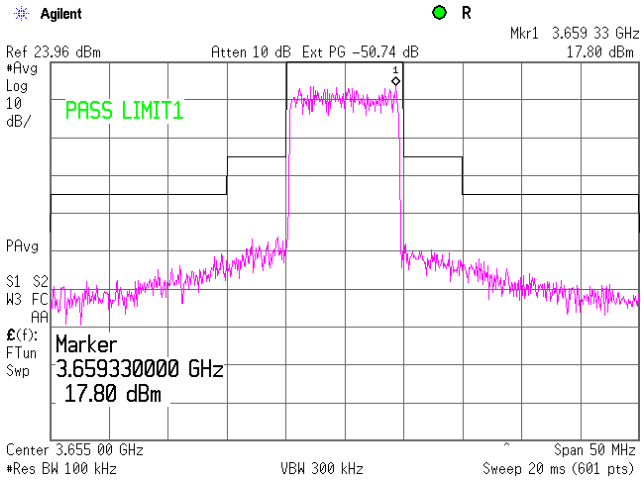
OPERATING FREQUENCY RANGE:	3650.0 - 3700.0 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
CHANNEL BANDWIDTH:	7 MHz
TRANSMITTER OUTPUT POWER SETTINGS:	32.60 dBm



Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 10:16:04 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

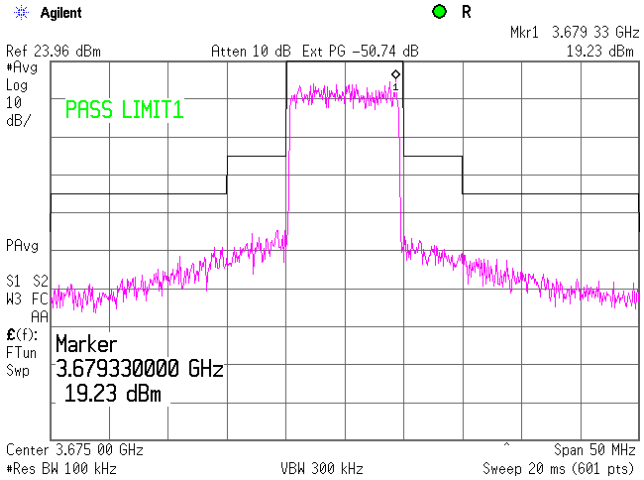
Plot 7.3.7 Emission mask test results at low carrier frequency

OPERATING FREQUENCY RANGE:	3650.0 - 3700.0 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
CHANNEL BANDWIDTH:	10 MHz
TRANSMITTER OUTPUT POWER:	34.06 dBm



Plot 7.3.8 Emission mask test results at mid carrier frequency

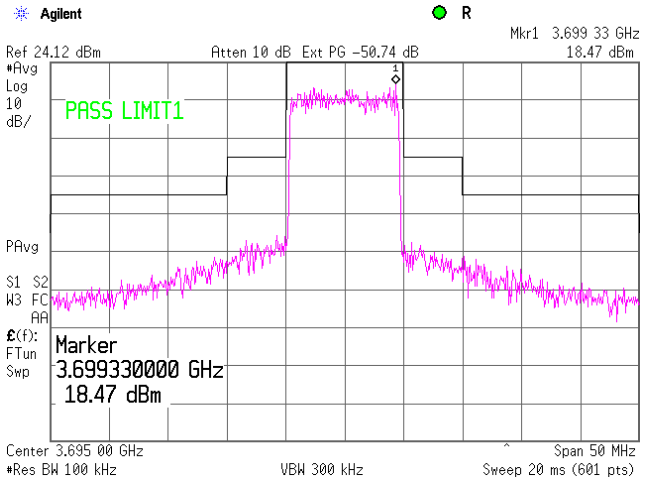
OPERATING FREQUENCY RANGE:	3650.0 - 3700.0 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
CHANNEL BANDWIDTH:	10 MHz
TRANSMITTER OUTPUT POWER SETTINGS:	34.47 dBm



Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 10:16:04 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.3.9 Emission mask test results at high carrier frequency

OPERATING FREQUENCY RANGE:	3650.0 - 3700.0 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
CHANNEL BANDWIDTH:	10 MHz
TRANSMITTER OUTPUT POWER SETTINGS:	34.12 dBm



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2010 11:09:06 AM		
Temperature: 16 ºC	Air Pressure: 1023 hPa	Relative Humidity: 57 %	Power Supply: 120VAC/48VDC
Remarks:			

7.4 Radiated spurious emission measurements

7.4.1 General

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

Table 7.4.1 Radiated spurious emission test limits

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

* - Excluding the in band emission within ± 250 % of the authorized bandwidth from the carrier
** - P is transmitter output power in Watts
*** - Equivalent field strength limit was calculated from maximum allowed ERP of spurious as follows: E=sqrt(30×P×1.64)/r, where P is ERP in Watts, 1.64 is numeric gain of ideal dipole and r is antenna to EUT distance in meters

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

7.4.2.1 The EUT was set up as shown in Figure 7.4.1, energized and the performance check was conducted.
7.4.2.2 The specified frequency range was investigated with antenna connected to spectrum analyzer. To find maximum radiation the turntable was rotated 360^0 and the measuring antenna was rotated around its vertical axis.
7.4.2.3 The worst test results (the lowest margins) were recorded in Table 7.4.2 and shown in the associated plots.

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

7.4.3.1 The EUT was set up as shown in Figure 7.4.2, energized and the performance check was conducted.
7.4.3.2 The specified frequency range was investigated with antenna connected to spectrum analyzer. To find maximum radiation the turntable was rotated 360^0 and the measuring antenna height was swept from 1 to 4 m in both, vertical and horizontal, polarizations.
7.4.3.3 The worst test results (the lowest margins) were recorded in Table 7.4.2 and shown in the associated plots.

7.4.4 Test procedure for substitution ERP measurements of spurious

7.4.4.1 The test equipment was set up as shown in Figure 7.4.3 and energized.
7.4.4.2 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.
7.4.4.3 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.
7.4.4.4 The above procedure was performed in both, horizontal and vertical, polarizations of the test and substitution antennas.
7.4.4.5 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.
7.4.4.6 The above procedure was repeated at the rest of investigated frequencies.
7.4.4.7 The worst test results (the lowest margins) were recorded in Table 7.4.3 and shown in the associated plots.

Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2010 11:09:06 AM		
Temperature: 16 ºC	Air Pressure: 1023 hPa	Relative Humidity: 57 %	Power Supply: 120VAC/48VDC
Remarks:			

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

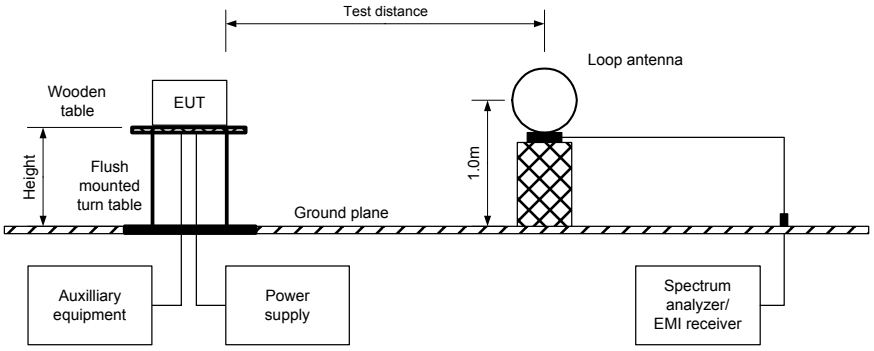
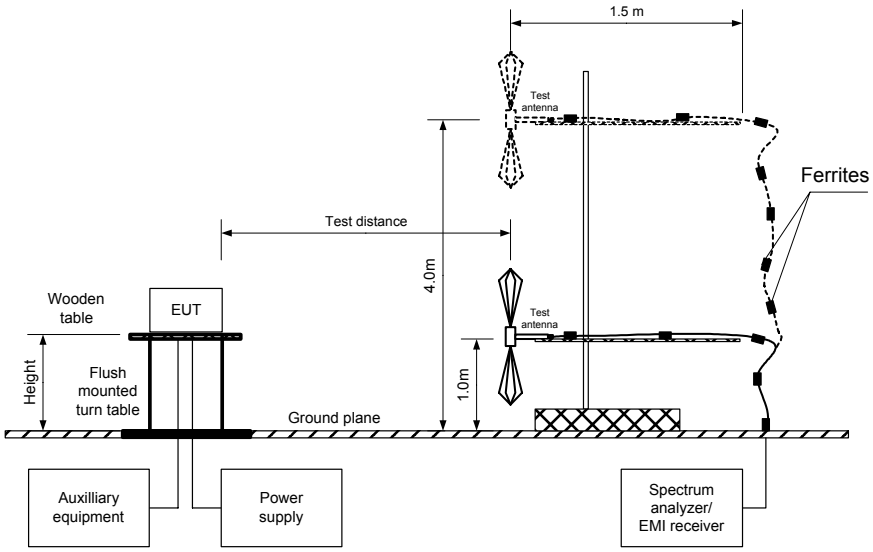
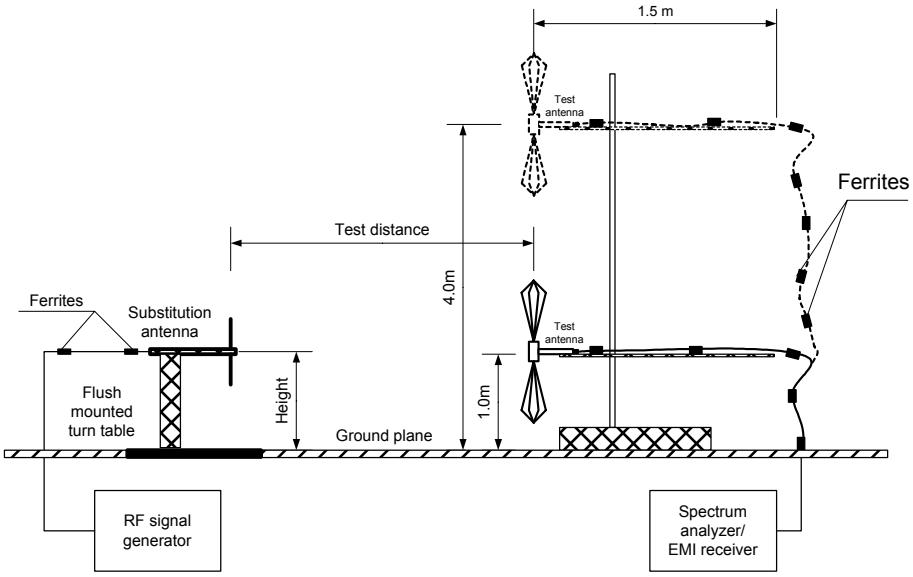


Figure 7.4.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2010 11:09:06 AM		
Temperature: 16 ºC	Air Pressure: 1023 hPa	Relative Humidity: 57 %	Power Supply: 120VAC/48VDC
Remarks:			

Figure 7.4.3 Setup for substitution ERP measurements of spurious



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2010 11:09:06 AM		
Temperature: 16 ºC	Air Pressure: 1023 hPa	Relative Humidity: 57 %	Power Supply: 120VAC/48VDC
Remarks:			

Table 7.4.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE: 3650.0 – 3700.0 MHz
TEST DISTANCE: 3 m
TEST SITE: Semi anechoic chamber / OATS
EUT HEIGHT: 0.8 m
INVESTIGATED FREQUENCY RANGE: 0.009 – 40000 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)
EMISSION BANDWIDTH: 10 MHz (Highest power settings)
MODULATION: 64QAM (worst case power and power density)
MODE: MIMO
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	Field strength, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	RBW, kHz	Antenna polarization	Antenna height, m	Turn-table position**, degrees
Low carrier frequency							
7308.73	65.41	84.40	-18.99	1000	V	1.0	010
Mid carrier frequency							
7352.74	63.05	84.40	21.35	1000	V	1.0	010
High carrier frequency							
7388.95	62.11	84.40	-22.29	1000	V	1.0	010

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

Test specification:	**Section 90.1323, Radiated spurious emissions**		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	1/28/2010 11:09:06 AM		
Temperature: 16 ºC	**Air Pressure:** 1023 hPa	**Relative Humidity:** 57 %	**Power Supply:** 120VAC/48VDC
Remarks:			

Table 7.4.3 Substitution ERP of spurious test results

ASSIGNED FREQUENCY RANGE: 3650.0 – 3700.0 MHz
TRANSMITTER CARRIER ERP: 36.80 dBm at low frequency
36.83 dBm at mid frequency
36.77 dBm at high frequency
TEST SITE: Semi anechoic chamber / 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										
7308.73	65.41	1000	H	-36.39	8.74	2.05	-29.70	-13.00	-16.70	Pass
Mid carrier frequency										
7352.74	63.05	1000	H	-38.62	8.79	2.05	-31.88	-13.00	-18.88	Pass
High carrier frequency										
7388.95	62.11	1000	H	-38.71	8.83	2.05	-31.93	-13.00	-18.93	Pass

*- Margin = Spurious emission – specification limit.

Reference numbers of test equipment used

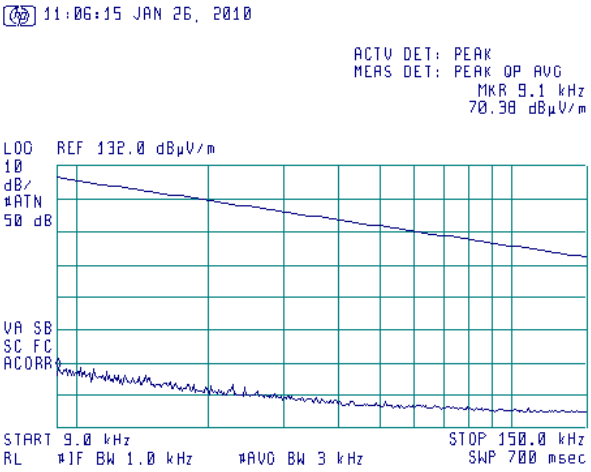
HL 0446	HL 0521	HL 0604	HL 0661	HL 0768	HL 0769	HL 1424	HL 1984
HL 2254	HL 2432	HL 2870	HL 3122	HL 3206	HL 3207	HL 3533	HL 3535
HL 3616	HL 3818						

Full description is given in Appendix A.

Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2010 11:09:06 AM		
Temperature: 16 ºC	Air Pressure: 1023 hPa	Relative Humidity: 57 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.4.1 Radiated emission measurements in 9 - 150 kHz range

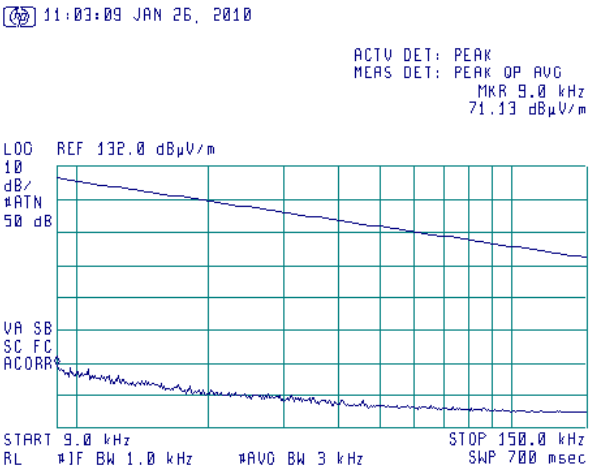
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



§15.209 limit

Plot 7.4.2 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

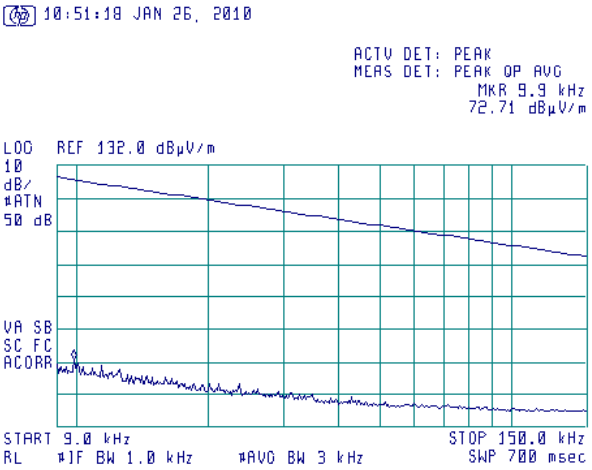


§15.209 limit

Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2010 11:09:06 AM		
Temperature: 16 ºC	Air Pressure: 1023 hPa	Relative Humidity: 57 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.4.3 Radiated emission measurements in 9 - 150 kHz range

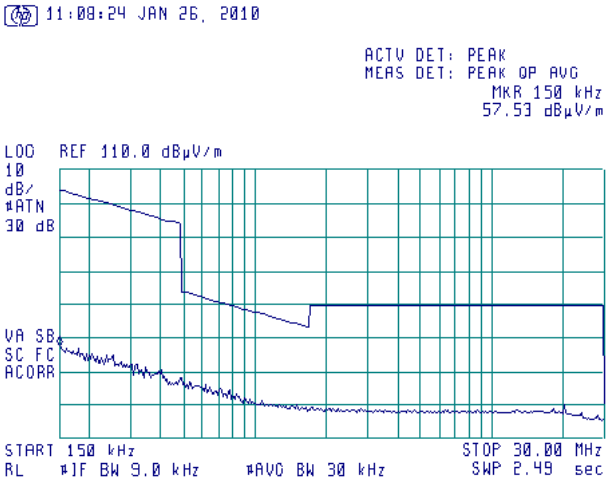
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



§15.209 limit

Plot 7.4.4 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

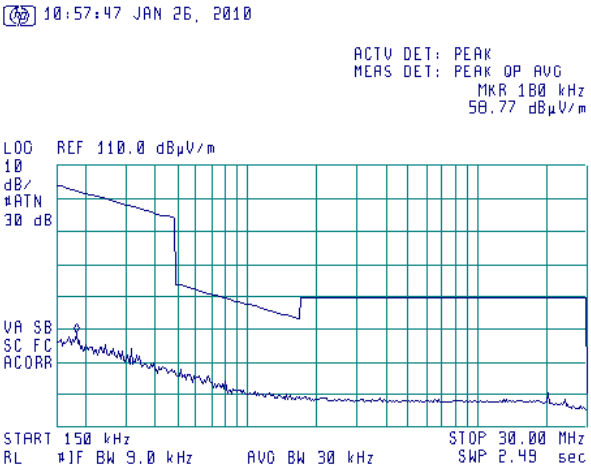


§15.209 limit

Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2010 11:09:06 AM		
Temperature: 16 ºC	Air Pressure: 1023 hPa	Relative Humidity: 57 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.4.5 Radiated emission measurements in 0.15 - 30 MHz range

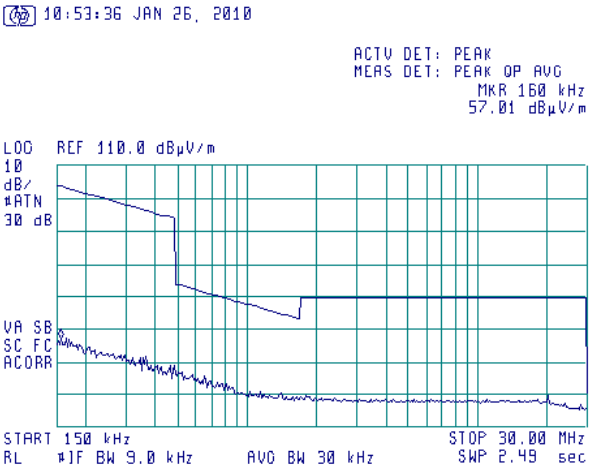
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



§15.209 limit

Plot 7.4.6 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

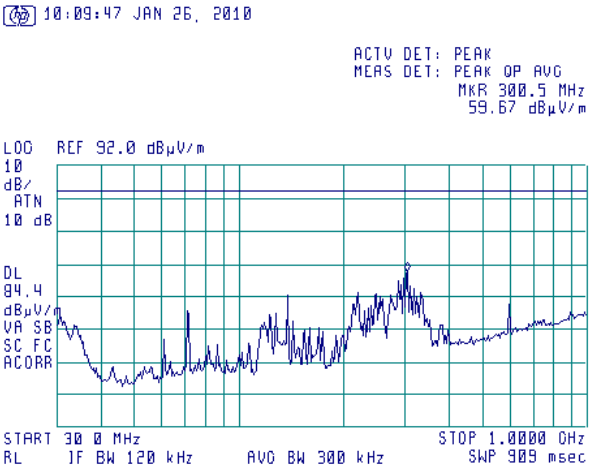


§15.209 limit

Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2010 11:09:06 AM		
Temperature: 16 ºC	Air Pressure: 1023 hPa	Relative Humidity: 57 %	Power Supply: 120VAC/48VDC
Remarks:			

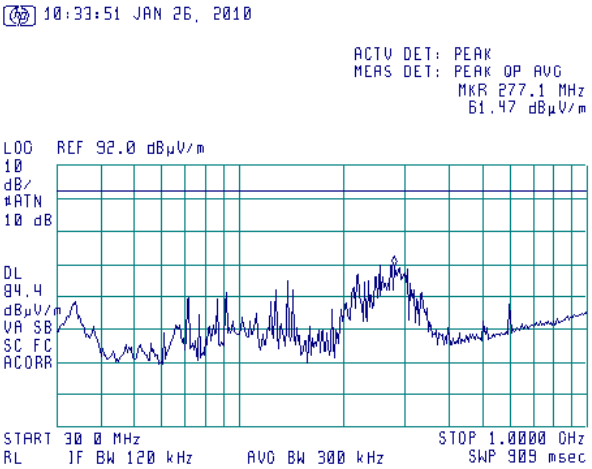
Plot 7.4.7 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.4.8 Radiated emission measurements in 30 - 1000 MHz range

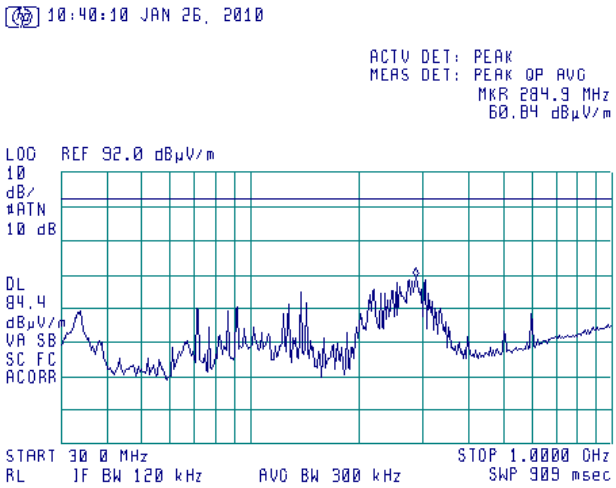
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2010 11:09:06 AM		
Temperature: 16 ºC	Air Pressure: 1023 hPa	Relative Humidity: 57 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.4.9 Radiated emission measurements in 30 - 1000 MHz range

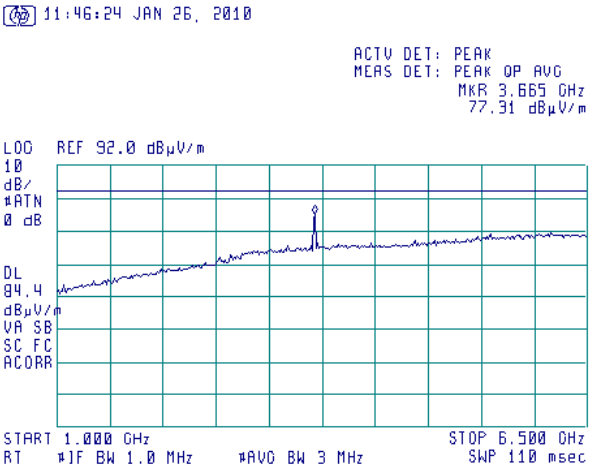
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2010 11:09:06 AM		
Temperature: 16 ºC	Air Pressure: 1023 hPa	Relative Humidity: 57 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.4.10 Radiated emission measurements in 1000 – 6500 MHz range

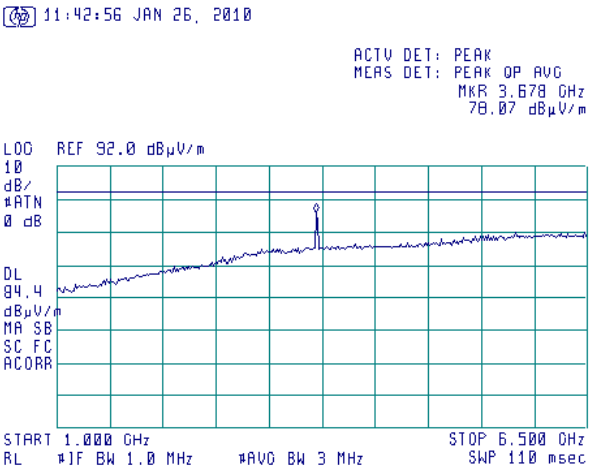
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



3655.0 MHz low carrier channel

Plot 7.4.11 Radiated emission measurements in 1000 – 6500 MHz range

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

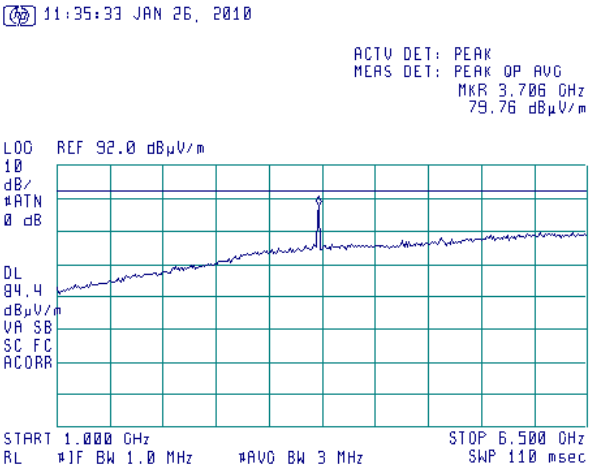


3675.0 MHz mid carrier channel

Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2010 11:09:06 AM		
Temperature: 16 ºC	Air Pressure: 1023 hPa	Relative Humidity: 57 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.4.12 Radiated emission measurements in 1000 – 6500 MHz range

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

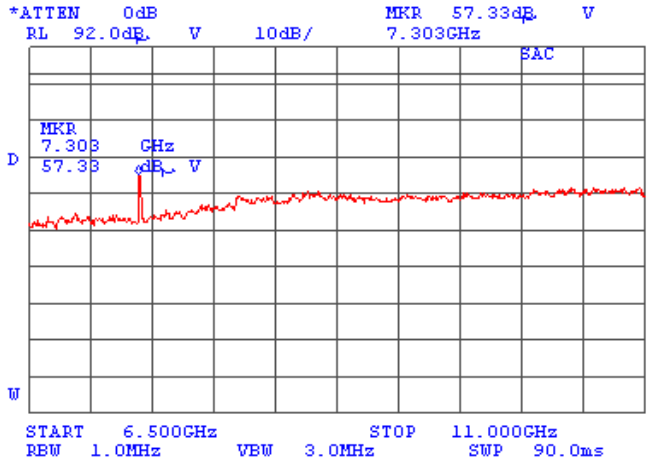


3695.0 MHz high carrier channel

Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2010 11:09:06 AM		
Temperature: 16 ºC	Air Pressure: 1023 hPa	Relative Humidity: 57 %	Power Supply: 120VAC/48VDC
Remarks:			

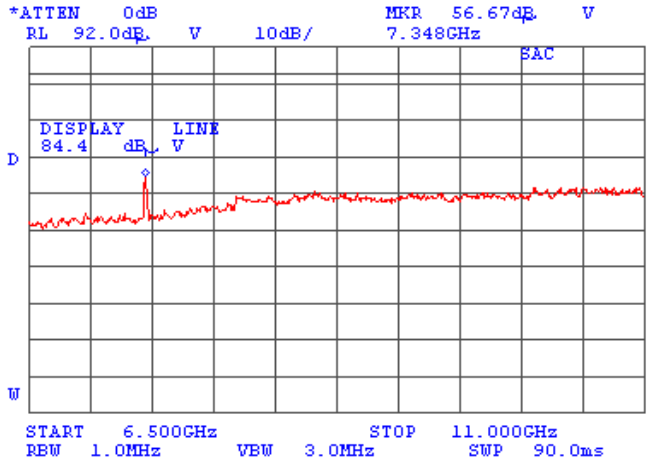
Plot 7.4.13 Radiated emission measurements in 6500 – 11000 MHz range

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



Plot 7.4.14 Radiated emission measurements in 6500 – 11000 MHz range

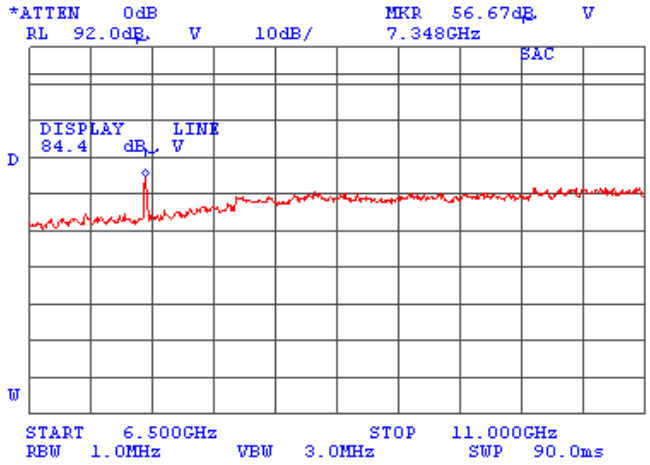
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2010 11:09:06 AM		
Temperature: 16 ºC	Air Pressure: 1023 hPa	Relative Humidity: 57 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.4.15 Radiated emission measurements in 6500 – 11000 MHz range

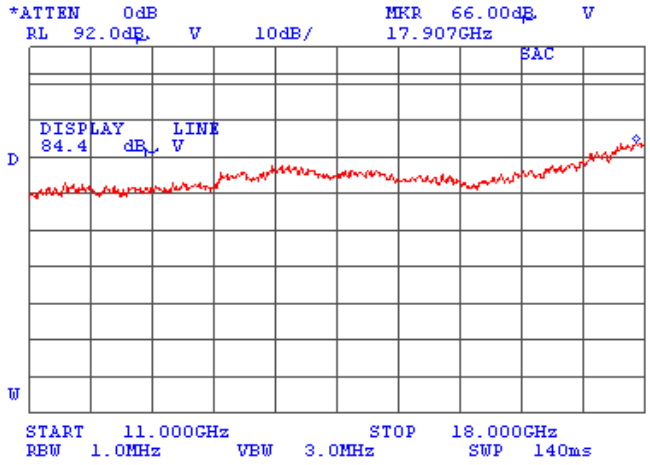
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2010 11:09:06 AM		
Temperature: 16 ºC	Air Pressure: 1023 hPa	Relative Humidity: 57 %	Power Supply: 120VAC/48VDC
Remarks:			

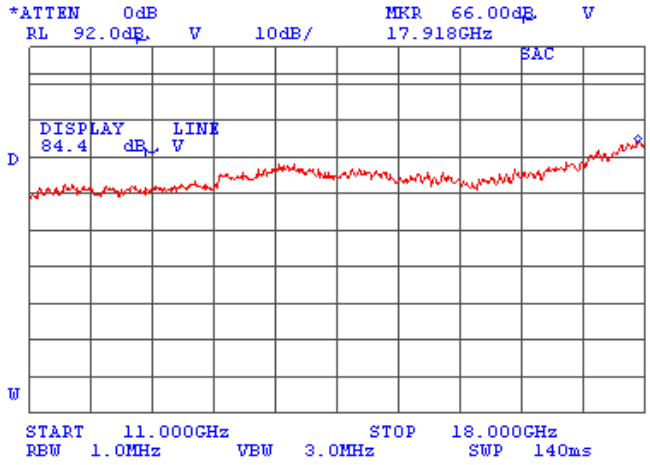
Plot 7.4.16 Radiated emission measurements in 11000 – 18000 MHz range

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



Plot 7.4.17 Radiated emission measurements in 11000 – 18000 MHz range

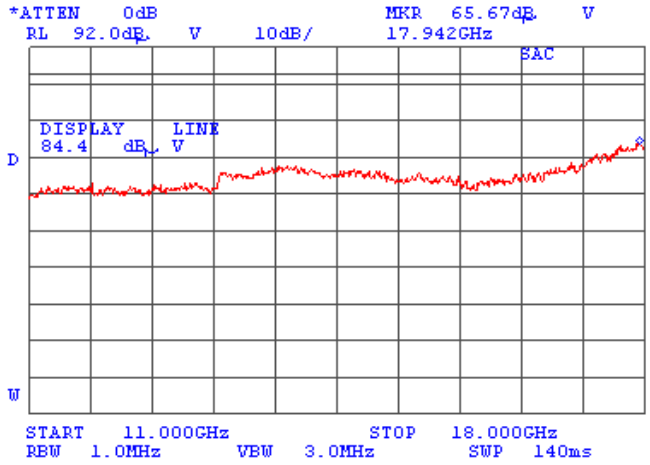
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Mid
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2010 11:09:06 AM		
Temperature: 16 ºC	Air Pressure: 1023 hPa	Relative Humidity: 57 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.4.18 Radiated emission measurements in 11000 – 18000 MHz range

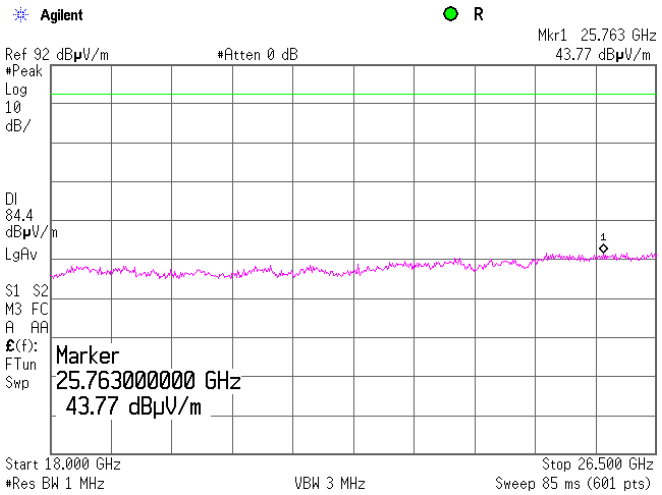
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2010 11:09:06 AM		
Temperature: 16 ºC	Air Pressure: 1023 hPa	Relative Humidity: 57 %	Power Supply: 120VAC/48VDC
Remarks:			

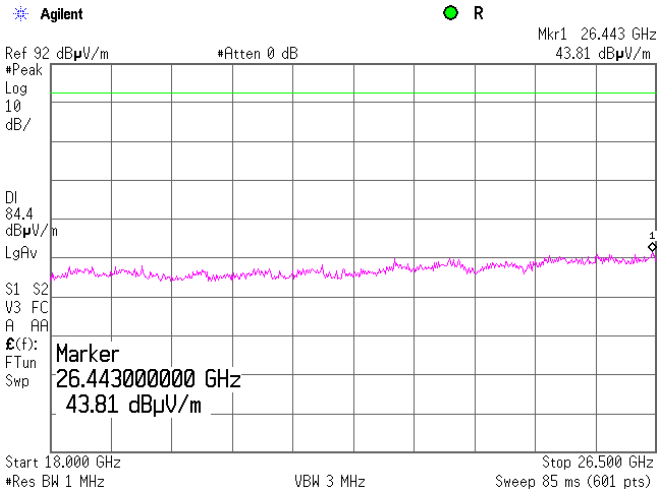
Plot 7.4.19 Radiated emission measurements in 18000 – 26500 MHz range

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



Plot 7.4.20 Radiated emission measurements in 18000 – 26500 MHz range

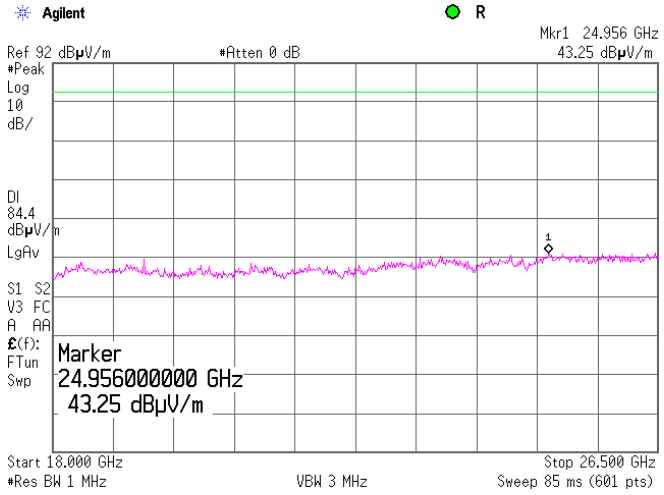
TEST SITE:	OATS
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2010 11:09:06 AM		
Temperature: 16 ºC	Air Pressure: 1023 hPa	Relative Humidity: 57 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.4.21 Radiated emission measurements in 18000 – 26500 MHz range

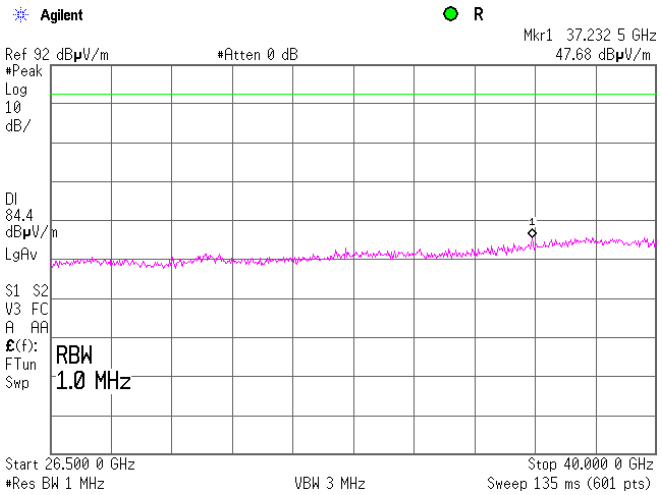
TEST SITE:	OATS
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2010 11:09:06 AM		
Temperature: 16 °C	Air Pressure: 1023 hPa	Relative Humidity: 57 %	Power Supply: 120VAC/48VDC
Remarks:			

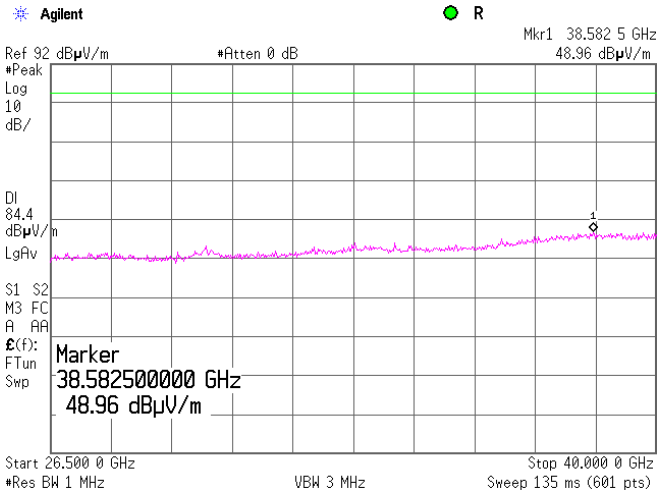
Plot 7.4.22 Radiated emission measurements in 26500 – 40000 MHz range

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



Plot 7.4.23 Radiated emission measurements in 26500 – 40000 MHz range

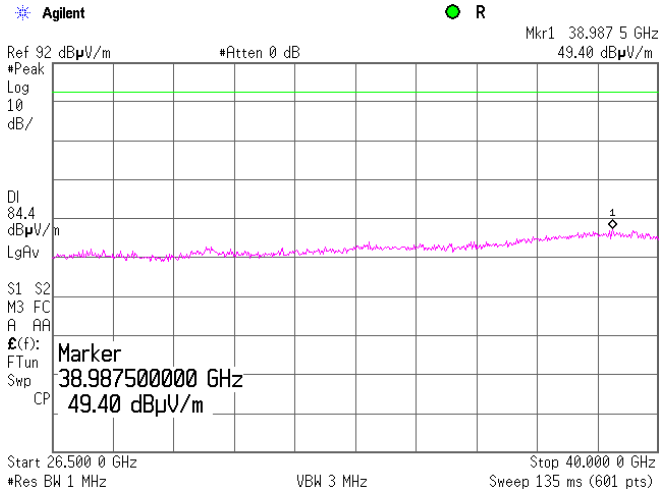
TEST SITE: OATS
CARRIER FREQUENCY: Mid
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2010 11:09:06 AM		
Temperature: 16 ºC	Air Pressure: 1023 hPa	Relative Humidity: 57 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.4.24 Radiated emission measurements in 26500 – 40000 MHz range

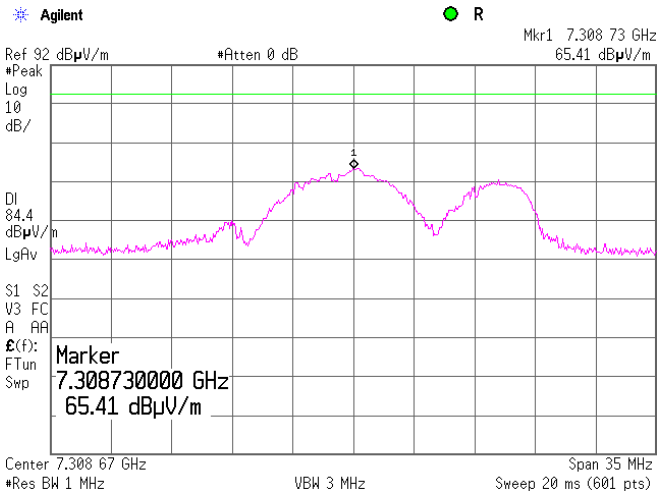
TEST SITE:	OATS
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2010 11:09:06 AM		
Temperature: 16 °C	Air Pressure: 1023 hPa	Relative Humidity: 57 %	Power Supply: 120VAC/48VDC
Remarks:			

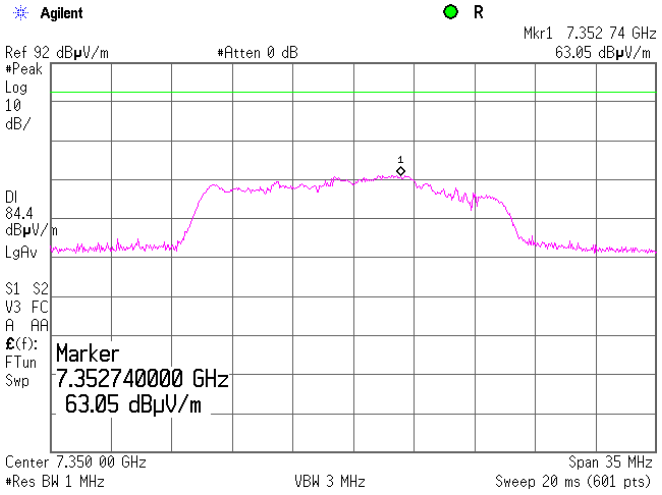
Plot 7.4.25 Radiated emission measurements at the 2nd harmonic

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



Plot 7.4.26 Radiated emission measurements at the 2nd harmonic

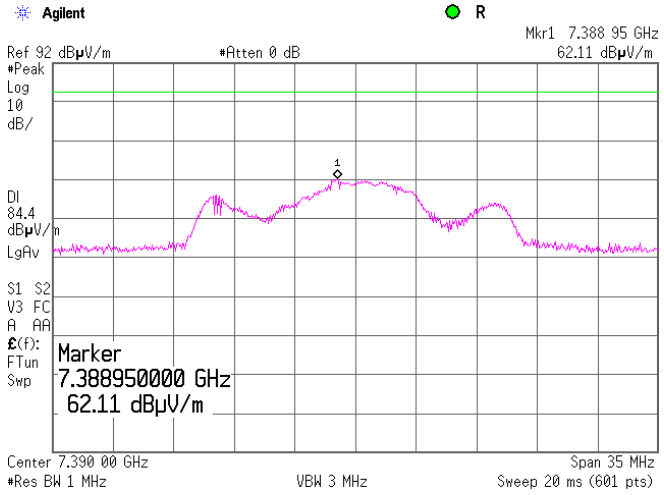
TEST SITE: OATS
CARRIER FREQUENCY: Mid
ANTENNA POLARIZATION: Vertical
TEST DISTANCE: 3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2010 11:09:06 AM		
Temperature: 16 ºC	Air Pressure: 1023 hPa	Relative Humidity: 57 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.4.27 Radiated emission measurements at the 2nd harmonic

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



Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 12:11:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

7.5 Spurious emissions at RF antenna connector test

7.5.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 7.5.1. The test results are provided in Table 7.5.2 and associated plots.

Table 7.5.1 Spurious emission limits

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

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

7.5.2 Test procedure

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

Figure 7.5.1 Spurious emission test setup for single antenna mode

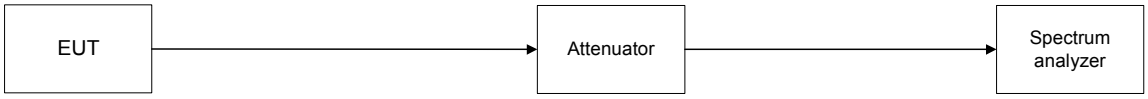
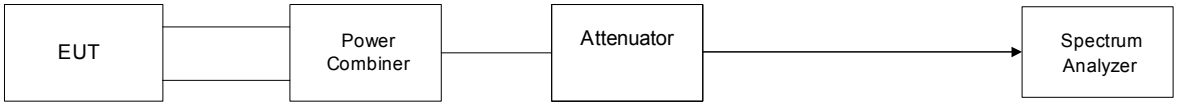


Figure 7.5.2 Spurious emission test setup for MIMO mode



Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 12:11:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Table 7.5.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 3650.0 – 3700.0 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 – 40000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
EMISSION BANDWIDTH: 10 MHz (worst case output power and density)
TRANSMITTER OUTPUT POWER: Maximum

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm	Limit, dBm	Margin, dB*	Verdict
Low carrier frequency								
0.130051	-38.04	Included	Included	1.0	-38.04	-13.00	-15.04	Pass
3629.780	-16.89	Included	Included	1000	-16.89	-13.00	-3.89	Pass
3680.000	-16.33	Included	Included	1000	-16.33	-13.00	-3.33	Pass
Mid carrier frequency								
0.130051	-38.23	Included	Included	1.0	-38.23	-13.0	-15.23	Pass
3586.250	-22.12	Included	Included	1000	-22.12	-13.00	-9.12	Pass
3650.000	-16.60	Included	Included	1000	-16.60	-13.00	-3.60	Pass
3700.000	-15.65	Included	Included	1000	-15.65	-13.00	-2.65	Pass
High carrier frequency								
0.130051	-37.79	Included	Included	1.0	-37.79	-13.0	-15.04	Pass
3669.720	-16.11	Included	Included	1000	-16.11	-13.00	-3.11	Pass
3720.000	-16.22	Included	Included	1000	-16.22	-13.00	-3.22	Pass

*- Margin = Spurious emission – specification limit.

NOTE1: The spurious emissions worst case was found during single antenna mode configuration.

NOTE2: Conducted spurious emissions in 0.009 – 500 MHz and 18000 – 40000 MHz were tested at each antenna connector separately to show that no spurious emission come closer than 6 dB to the specified limit.

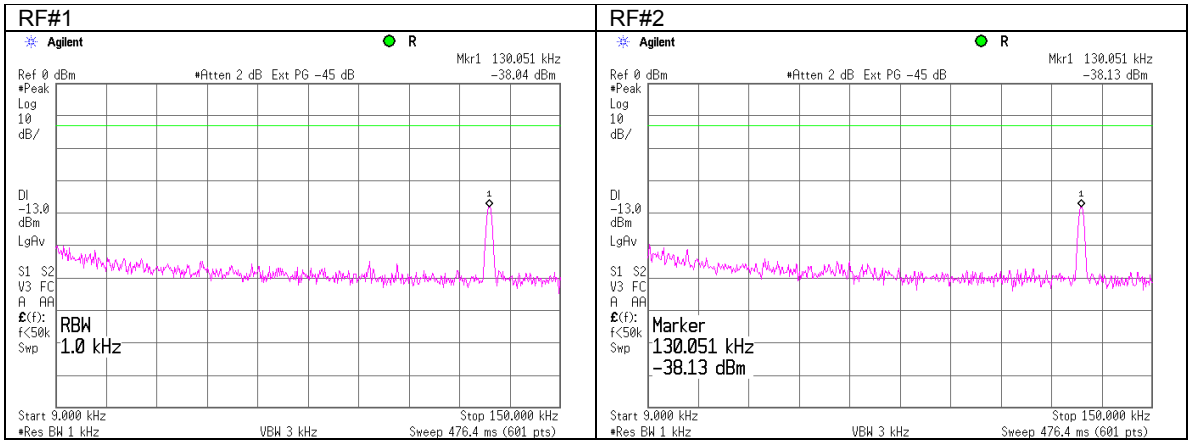
Reference numbers of test equipment used

HL 1291	HL 1378	HL 2015	HL 2254	HL 3206	HL 3301	HL 3302	HL 3322
HL 3455	HL 3473	HL 3474	HL 3559	HL 3782	HL 3818	HL 3868	

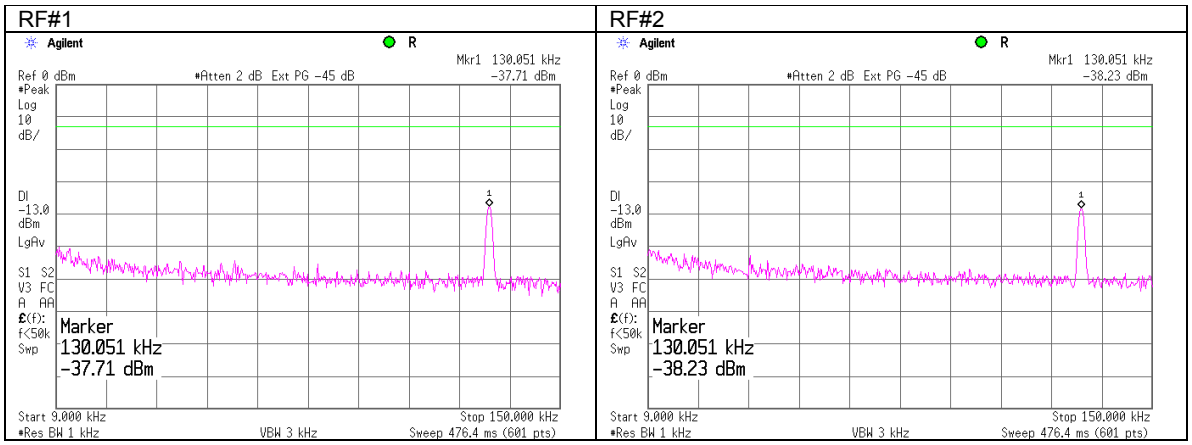
Full description is given in Appendix A.

Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 12:11:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

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

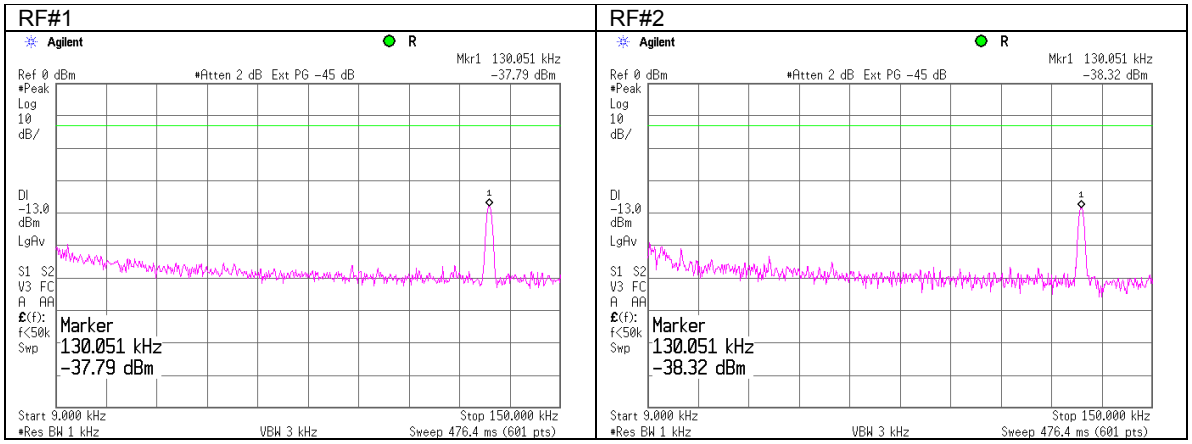


Plot 7.5.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency

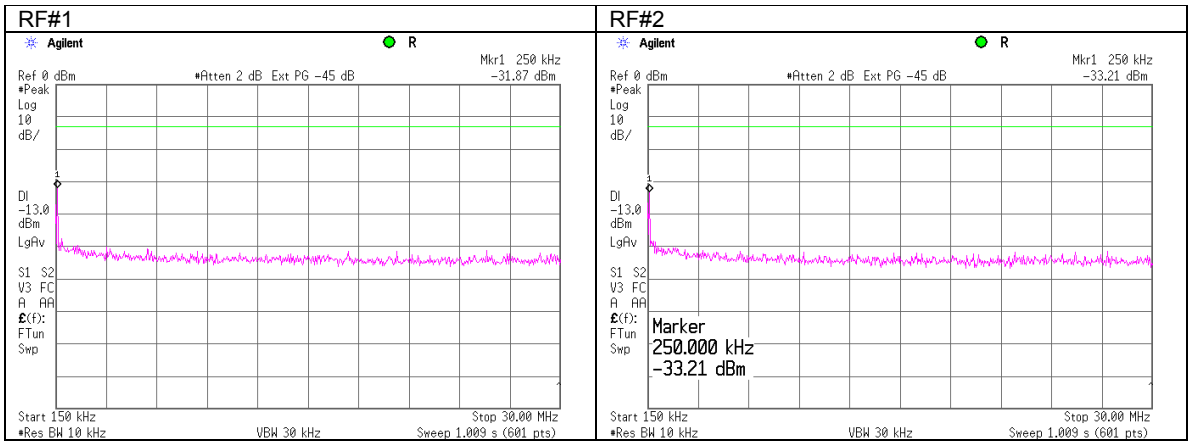


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 12:11:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

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

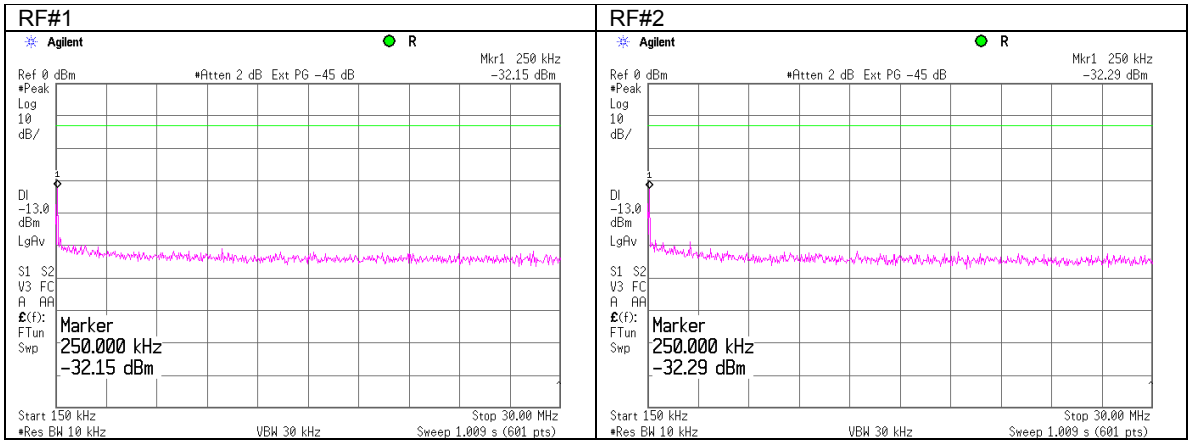


Plot 7.5.4 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency

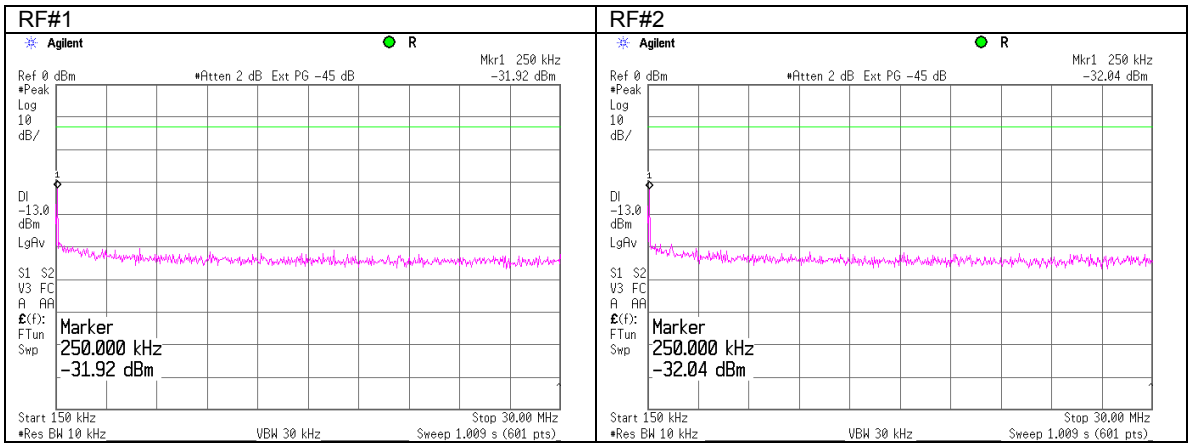


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 12:11:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

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

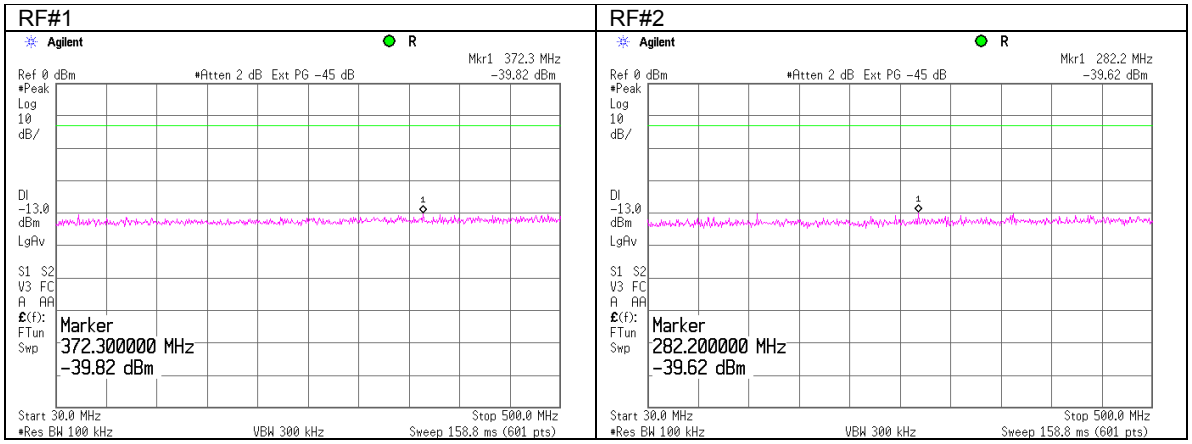


Plot 7.5.6 Spurious emission measurements in 0.15 – 30.0 MHz range at high carrier frequency

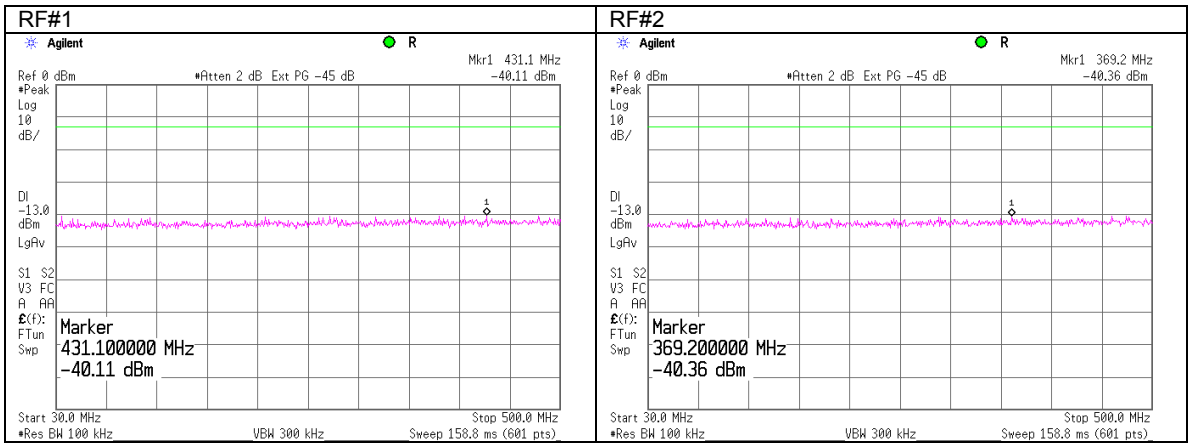


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 12:11:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.5.7 Spurious emission measurements in 30.0 - 500 MHz range at low carrier frequency

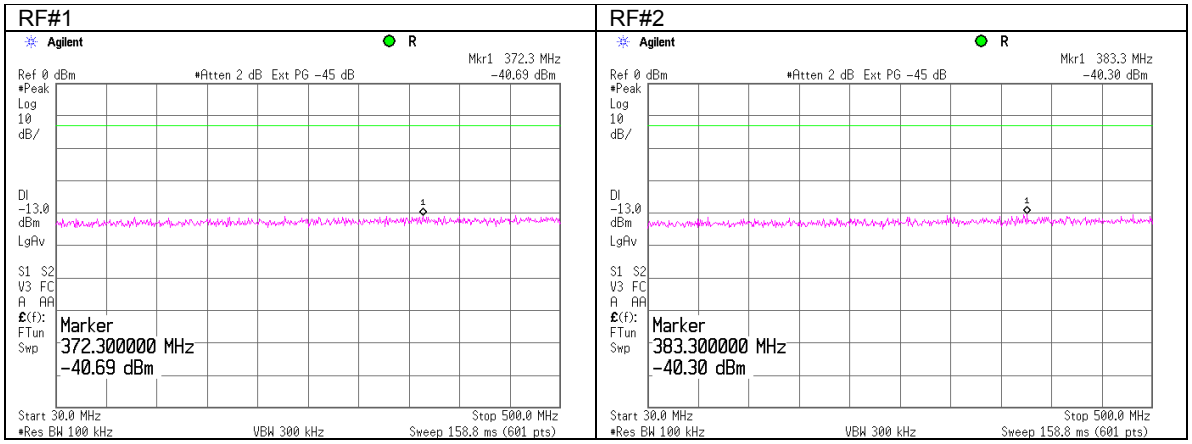


Plot 7.5.8 Spurious emission measurements in 30.0 - 500 MHz range at mid carrier frequency

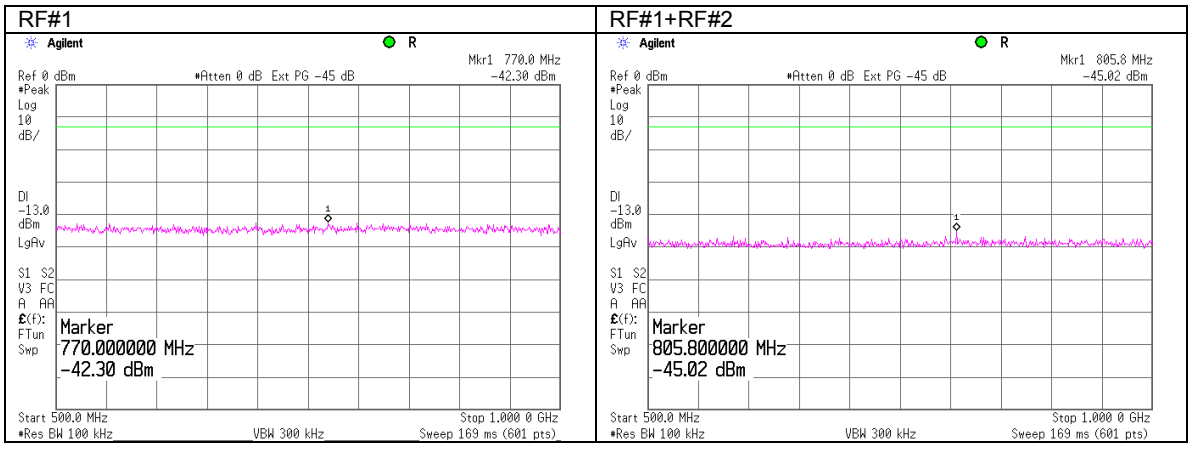


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 12:11:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.5.9 Spurious emission measurements in 30.0 - 500 MHz range at high carrier frequency

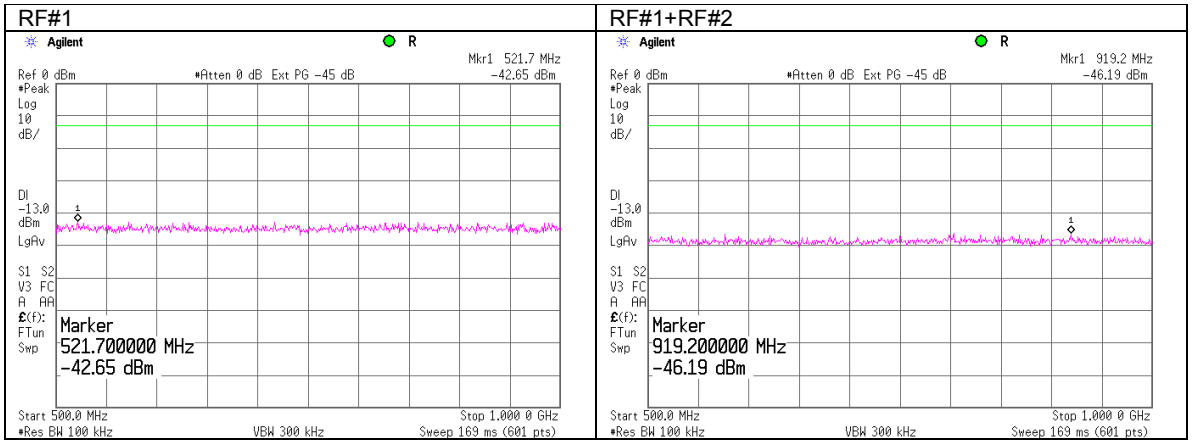


Plot 7.5.10 Spurious emission measurements in 500.0 - 1000 MHz range at low carrier frequency

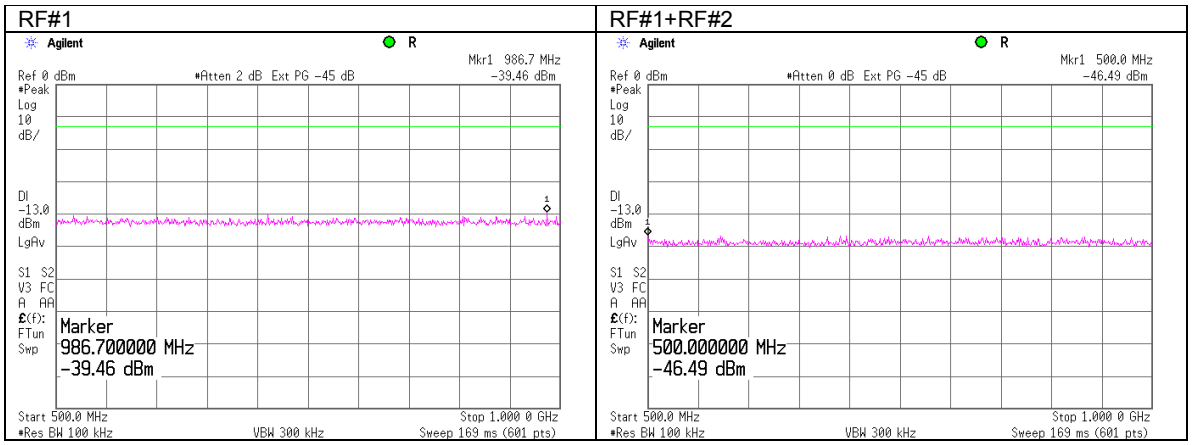


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 12:11:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.5.11 Spurious emission measurements in 500.0 – 1000 MHz range at mid carrier frequency

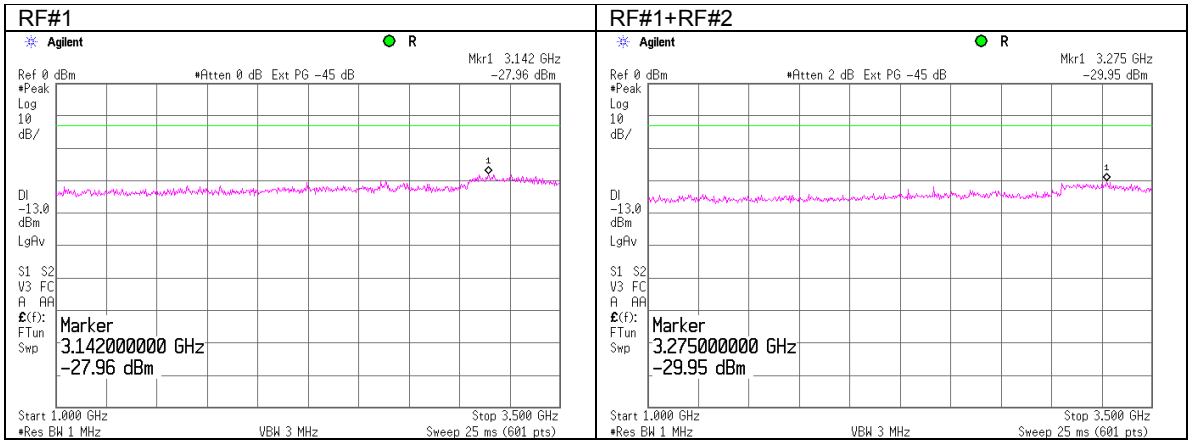


Plot 7.5.12 Spurious emission measurements in 500.0 – 1000 MHz range at high carrier frequency

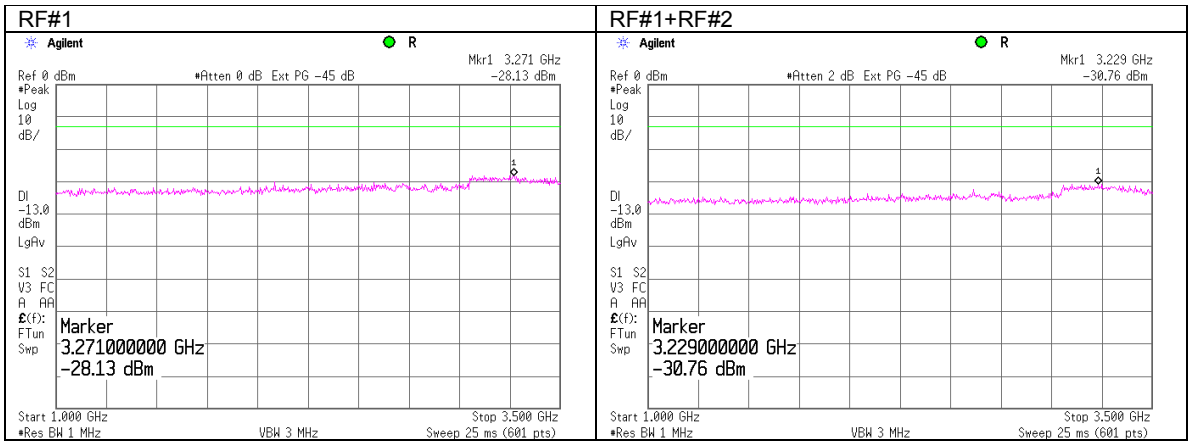


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 12:11:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.5.13 Spurious emission measurements in 1000 - 3500 MHz range at low carrier frequency



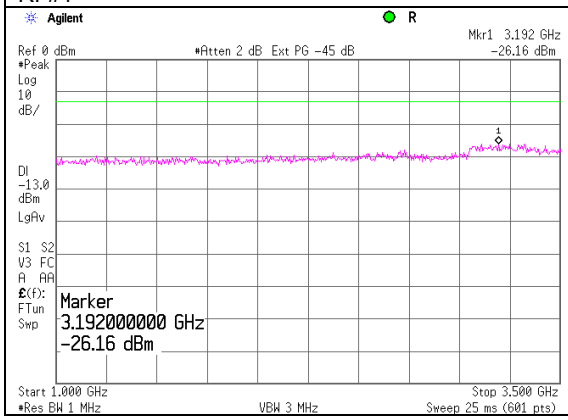
Plot 7.5.14 Spurious emission measurements in 1000 - 3500 MHz at mid carrier frequency



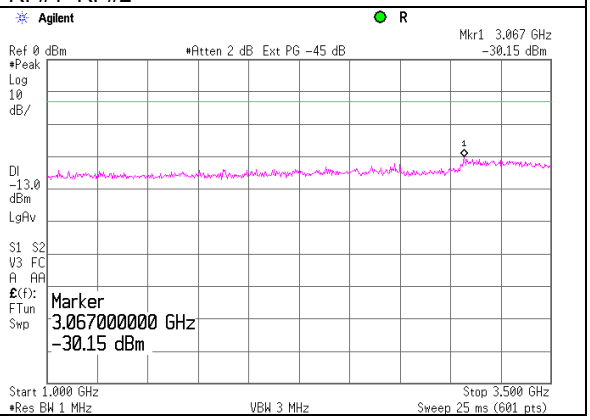
Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 12:11:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.5.15 Spurious emission measurements in 1000 - 3500 MHz at high carrier frequency

RF#1

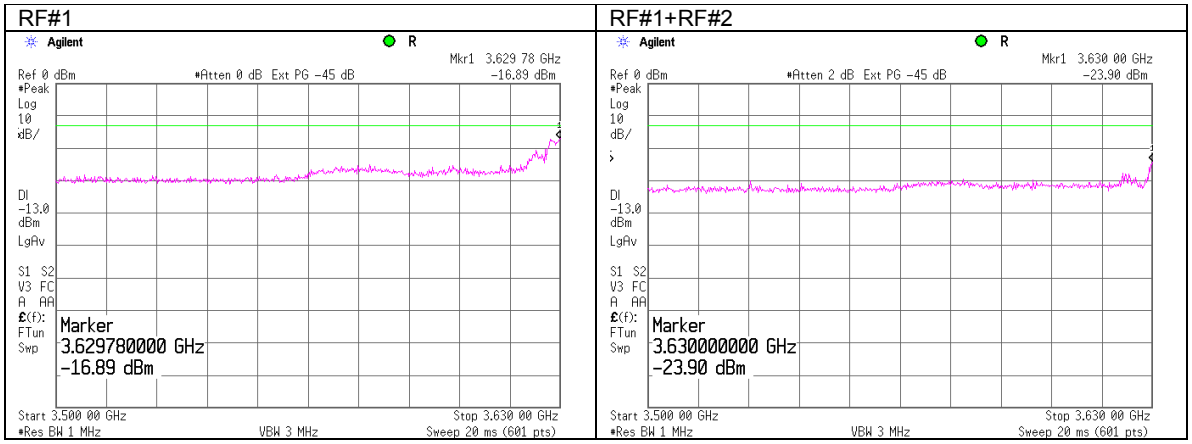


RF#1+RF#2

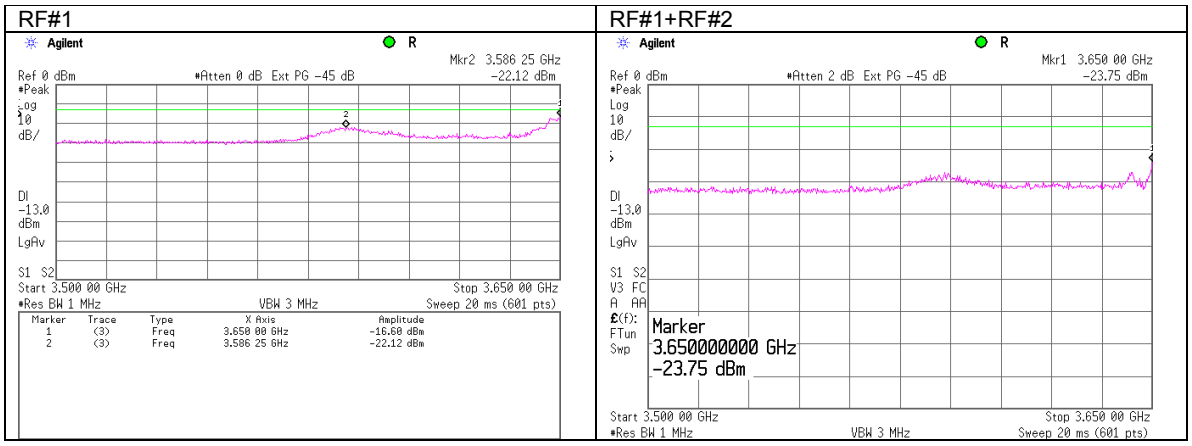


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 12:11:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.5.16 Spurious emission measurements in 3500 - 3630 MHz range at low carrier frequency

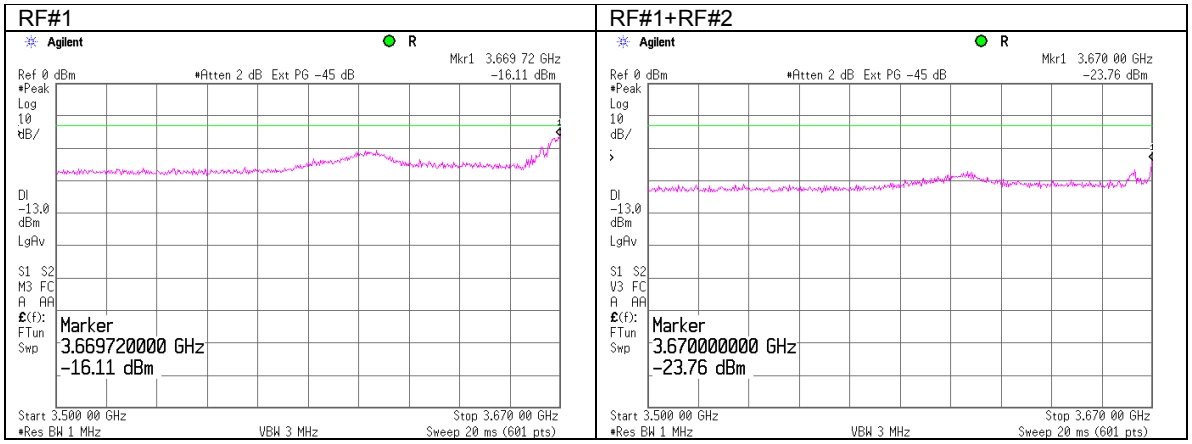


Plot 7.5.17 Spurious emission measurements in 3500 – 3650 MHz at mid carrier frequency

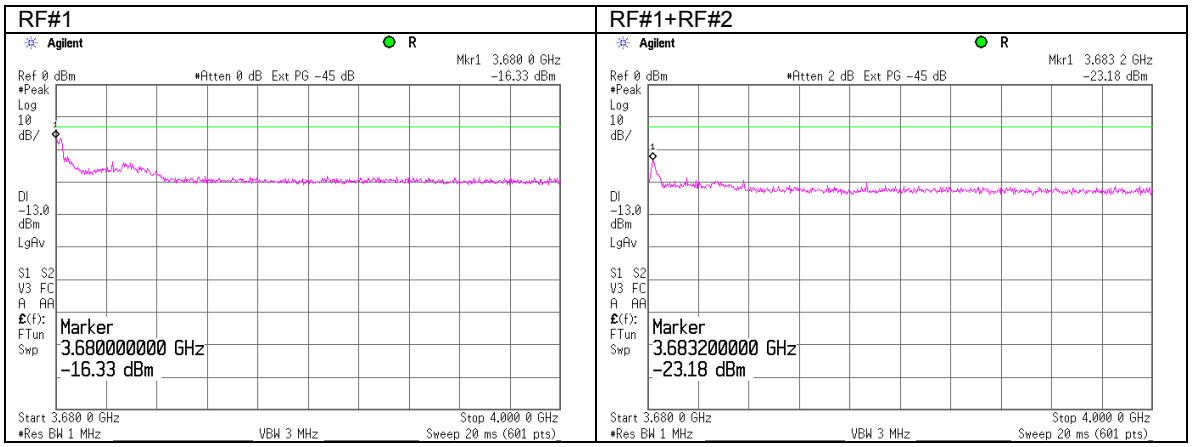


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 12:11:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.5.18 Spurious emission measurements in 3500 - 3670 MHz at high carrier frequency

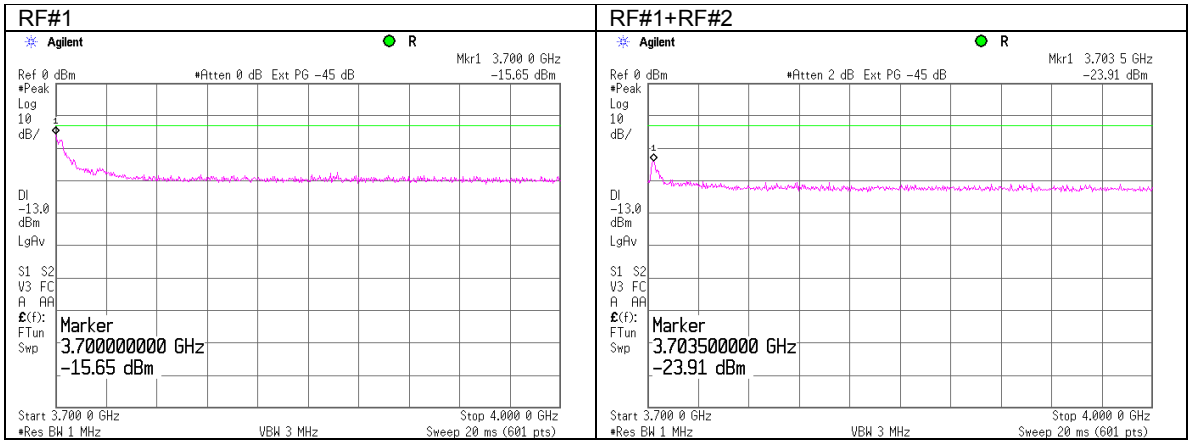


Plot 7.5.19 Spurious emission measurements in 3680 - 4000 MHz range at low carrier frequency

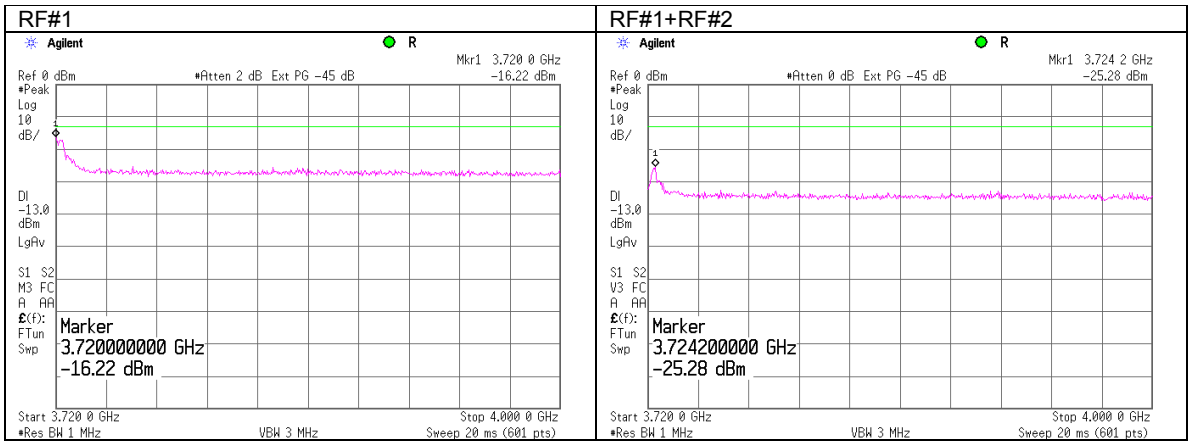


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 12:11:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.5.20 Spurious emission measurements in 3700 - 4000 MHz at mid carrier frequency

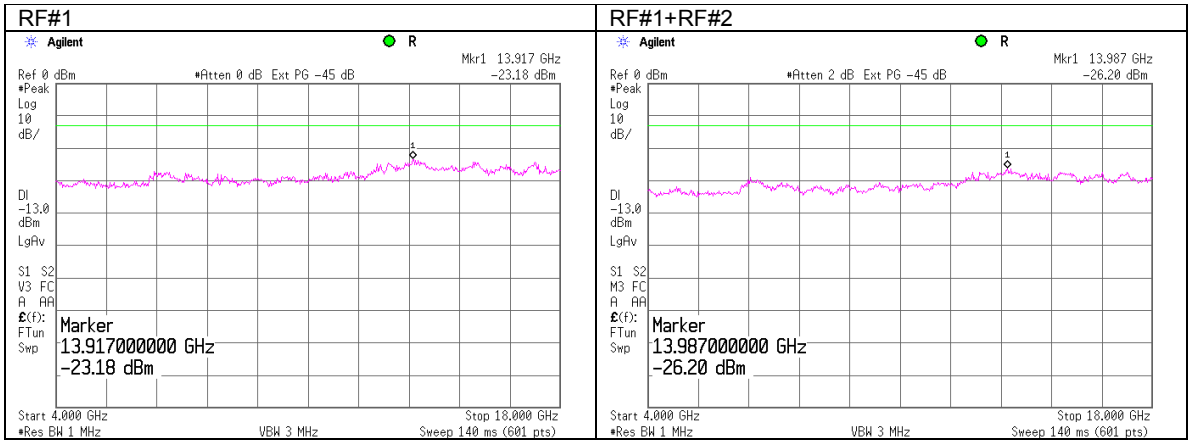


Plot 7.5.21 Spurious emission measurements in 3720 - 4000 MHz at high carrier frequency

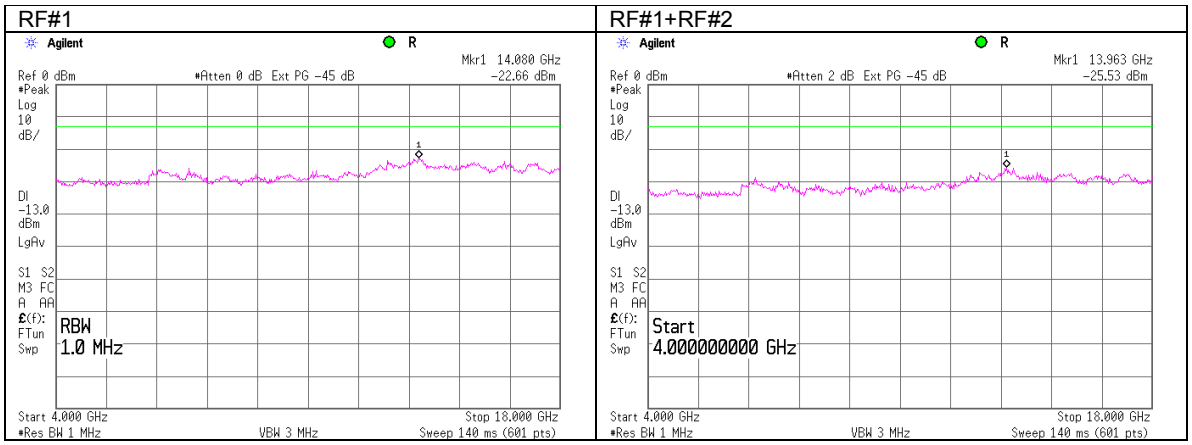


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 12:11:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.5.22 Spurious emission measurements in 4000 - 18000 MHz range at low carrier frequency

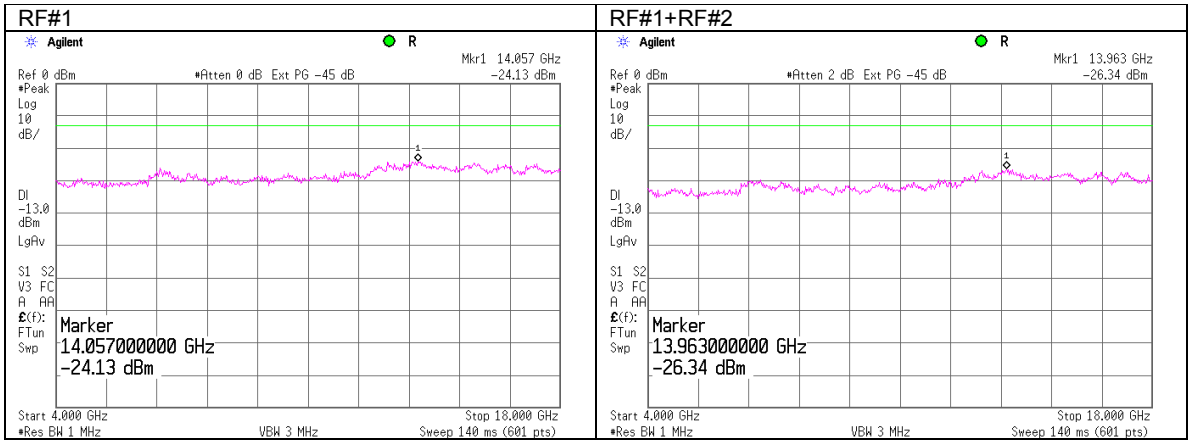


Plot 7.5.23 Spurious emission measurements in 4000 - 18000 MHz at mid carrier frequency

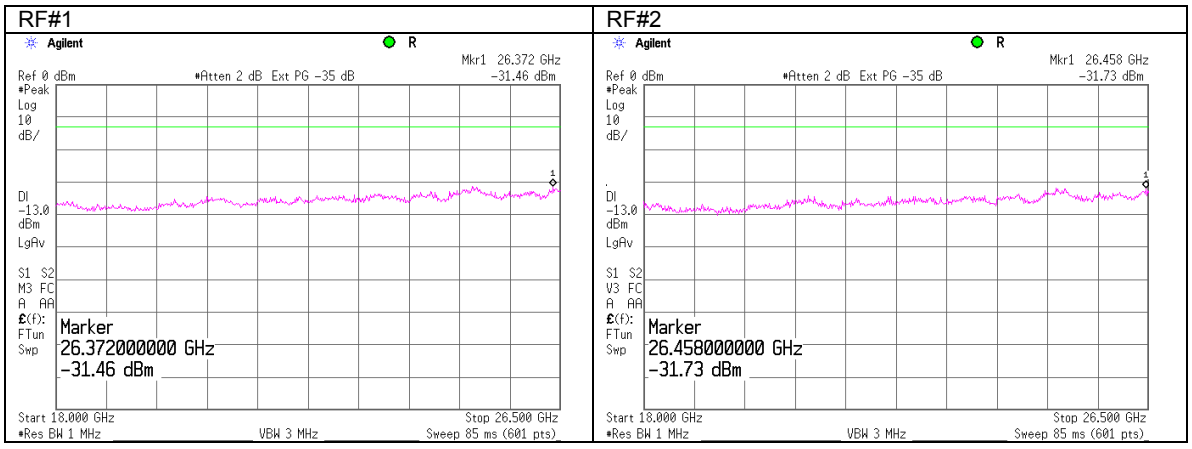


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 12:11:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.5.24 Spurious emission measurements in 4000 - 18000 MHz at high carrier frequency

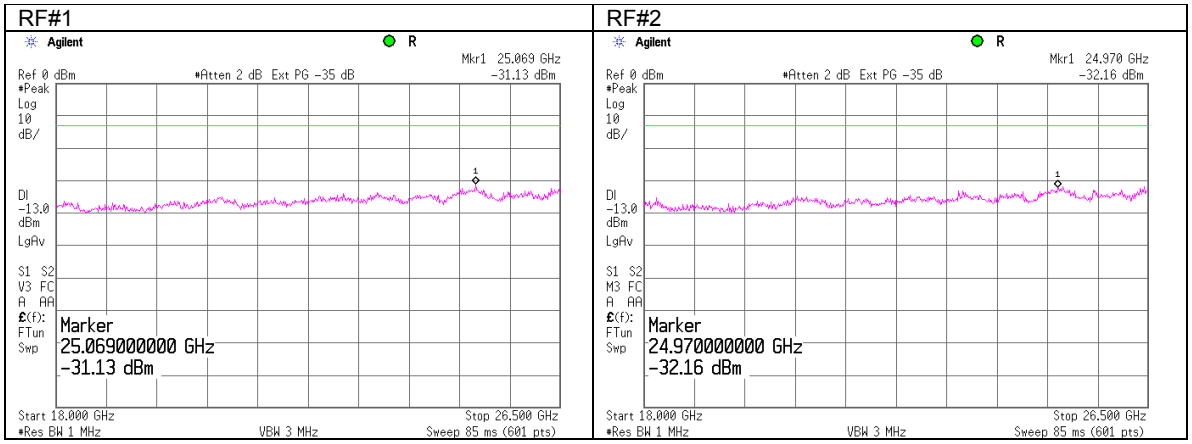


Plot 7.5.25 Spurious emission measurements in 18000 – 26500 MHz range at low carrier frequency

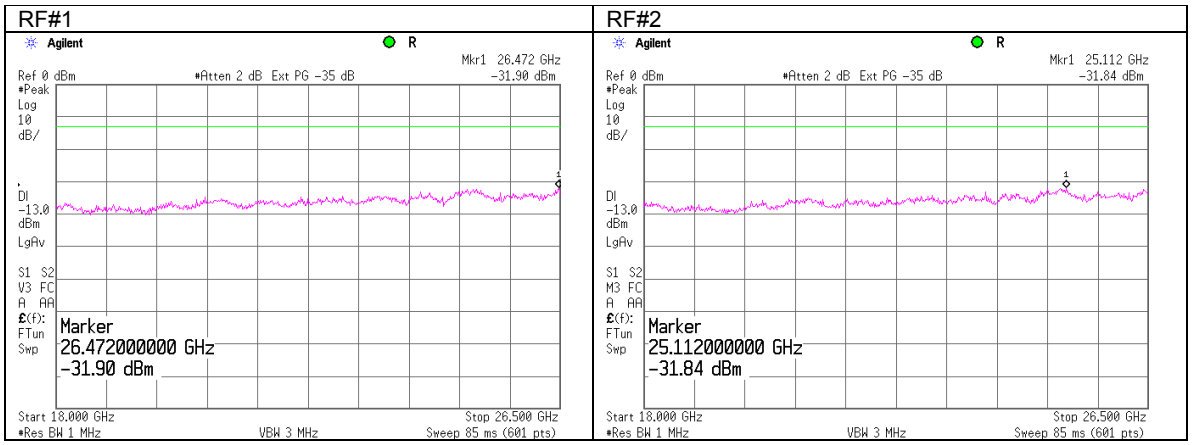


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 12:11:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.5.26 Spurious emission measurements in 18000 – 26500 MHz at mid carrier frequency

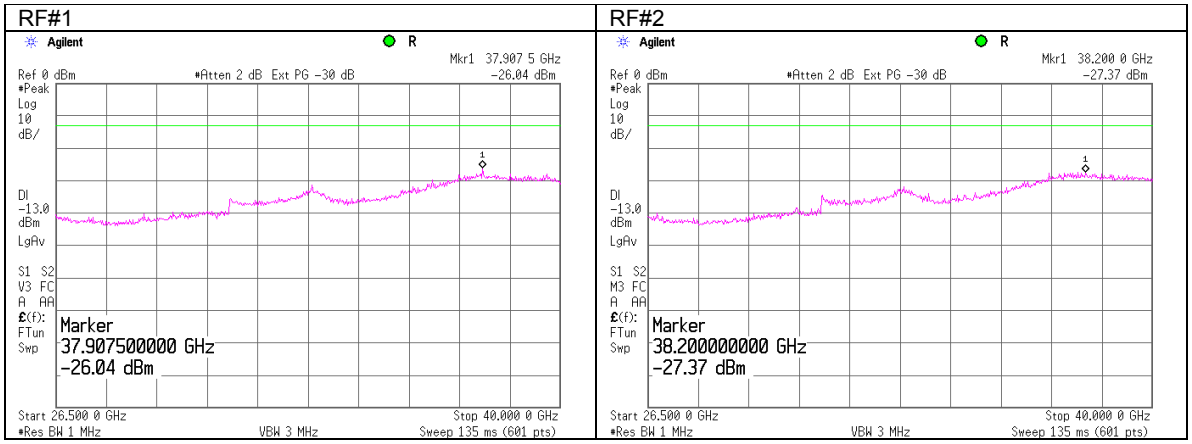


Plot 7.5.27 Spurious emission measurements in 18000 – 26500 MHz at high carrier frequency

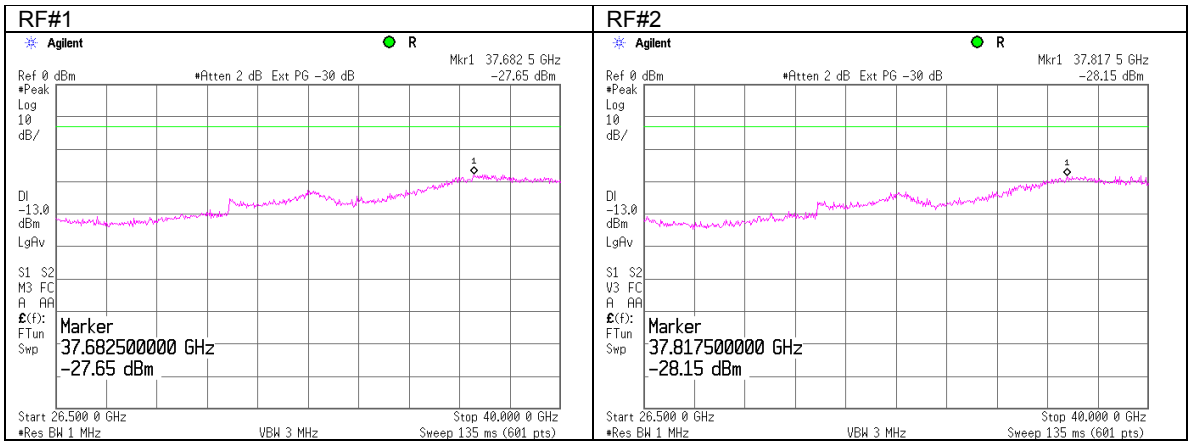


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 12:11:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.5.28 Spurious emission measurements in 26500 - 40000 MHz range at low carrier frequency



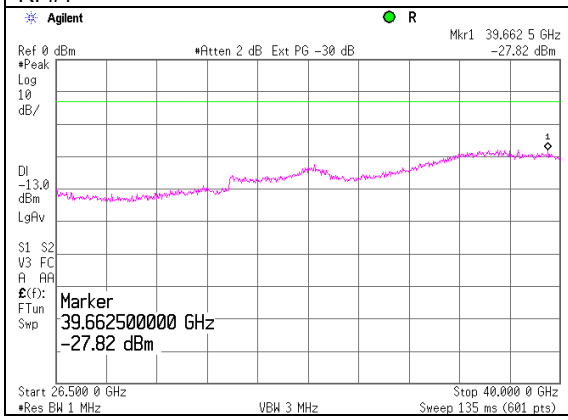
Plot 7.5.29 Spurious emission measurements in 26500 - 40000 MHz at mid carrier frequency



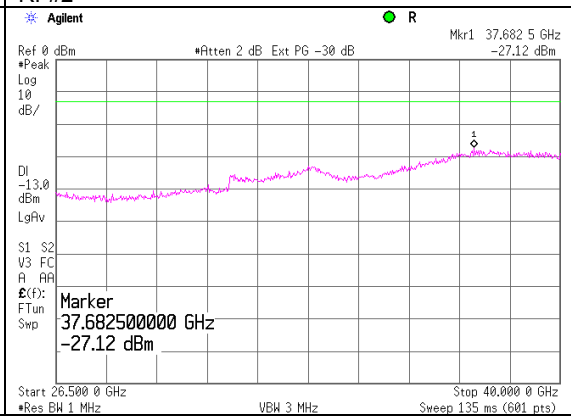
Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	3/28/2010 12:11:25 AM		
Temperature: 23ºC	Air Pressure: 1011 hPa	Relative Humidity: 47 %	Power Supply: 120VAC/48VDC
Remarks:			

Plot 7.5.30 Spurious emission measurements in 26500 - 40000 MHz at high carrier frequency

RF#1



RF#2



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 & Time:	1/28/2010 11:51:01 AM		
Temperature: 22.0 ºC	Air Pressure: 1014 hPa	Relative Humidity: 43 %	Power Supply: 48VDC
Remarks:			

7.6 Frequency stability test

7.6.1 General

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

Table 7.6.1 Frequency stability limits

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

7.6.2 Test procedure

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

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

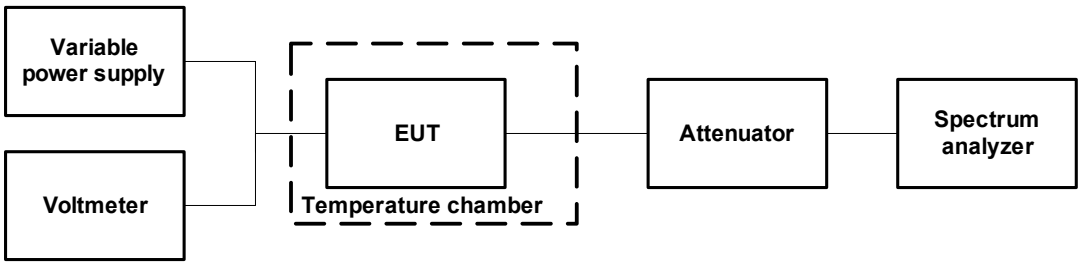
7.6.2.3 The EUT was powered on and carrier frequency was measured at start up moment and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.

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

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

7.6.2.6 Frequency displacement was calculated and compared with the limit as provided in Table 7.6.2.

Figure 7.6.1 Frequency stability test setup



Test specification:	**Section 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 & Time:	1/28/2010 11:51:01 AM		
Temperature: 22.0 ºC	**Air Pressure:** 1014 hPa	**Relative Humidity:** 43 %	**Power Supply:** 48VDC
Remarks:			

Table 7.6.2 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: 30 Hz
VIDEO BANDWIDTH: 100 Hz
MODULATION: Unmodulated

T, ºC	Voltage, VDC	Frequency, MHz							Max frequency drift, Hz		Max frequency drift, ppm	
		Start up	1st min	2nd min	3rd min	4th min	5th min	10th min	Positive	Negative	Positive	Negative
Low channel 3652.5 MHz												
-30	nominal	3652.503065	3652.499737	3652.499737	3652.499711	3652.499525	3652.499434	3652.499657	3655.00	0.00	1.00	0.00
-20	nominal	3652.499356	NA	NA	NA	NA	NA	3652.500450	1040.00	-54.00	0.28	-0.01
-10	nominal	3652.502496	NA	NA	NA	NA	NA	3652.500289	3086.00	0.00	0.84	0.00
0	nominal	3652.499910	3652.499979	3652.499740	3652.499730	3652.499692	3652.499696	3652.499681	569.00	0.00	0.16	0.00
10	nominal	3652.499380	NA	NA	NA	NA	NA	3652.499300	0.00	-110.00	0.00	-0.03
20	55.2	3652.499310	NA	NA	NA	NA	NA	3652.499500	90.00	-100.00	0.02	-0.03
20	48.0	3652.499300	NA	NA	NA	NA	NA	3652.499410	0.00	-110.00	0.00	-0.03
20	40.8	3652.499320	NA	NA	NA	NA	NA	3652.499470	60.00	-90.00	0.02	-0.02
30	nominal	3652.502580	3652.499350	3652.499390	3652.499490	3652.499490	3652.499540	3652.499770	3170.00	-60.00	0.87	-0.02
40	nominal	3652.499760	NA	NA	NA	NA	NA	3652.500050	640.00	0.00	0.18	0.00
50	nominal	3652.499740	3652.499890	3652.499990	3652.500100	3652.500110	3652.500090	3652.499930	700.00	0.00	0.19	0.00
Mid Channel 3675.0 MHz												
-30	nominal	3675.003359	3674.999876	3674.999876	3674.999776	3674.999621	3674.999444	3674.999661	3959.00	0.00	1.08	0.00
-20	nominal	3674.999278	NA	NA	NA	NA		3675.000415	1015.00	-122.00	0.28	-0.03
-10	nominal	3675.003379	NA	NA	NA	NA	NA	3675.000292	3979.00	0.00	1.08	0.00
0	nominal	3674.999990	3674.999980	3674.999730	3674.999730	3674.999699	3674.999677	3674.999670	590.00	0.00	0.16	0.00
10	nominal	3674.999410	NA	NA	NA	NA	NA	3674.999290	10.00	-110.00	0.00	-0.03
20	55.2	3674.999282	NA	NA	NA	NA	NA	3674.999500	100.00	-118.00	0.03	-0.03
20	48.0	3674.999310	NA	NA	NA	NA	NA	3674.999400	0.00	-90.00	0.00	-0.02
20	40.8	3674.999300	NA	NA	NA	NA	NA	3674.999510	110.00	-100.00	0.03	-0.03
30	nominal	3675.001760	3674.999320	3674.999400	3674.999450	3674.999500	3674.999540	3674.999760	2360.00	-80.00	0.64	-0.02
40	nominal	3674.999770	NA	NA	NA	NA	NA	3675.000050	650.00	0.00	0.18	0.00
50	nominal	3674.999760	3674.999840	3675.000020	3675.000080	3675.000100	3675.000100	3674.999920	700.00	0.00	0.19	0.00
High channel 3697.5 MHz												
-30	nominal	3697.503337	3697.499975	3697.499975	3697.499813	3697.499689	3697.499456	3697.499648	3917.00	0.00	1.06	0.00
-20	nominal	3697.499313	NA	NA	NA	NA	NA	3697.500395	975.00	-107.00	0.26	-0.03
-10	nominal	3697.503362	NA	NA	NA	NA	NA	3697.500295	3942.00	0.00	1.07	0.00
0	nominal	3697.500010	3697.499770	3697.499750	3697.499710	3697.499702	3697.499669	3697.499686	590.00	0.00	0.16	0.00
10	nominal	3697.499570	NA	NA	NA	NA	NA	3697.499260	150.00	-160.00	0.04	-0.04
20	55.2	3697.499270	NA	NA	NA	NA	NA	3697.499450	30.00	-150.00	0.01	-0.04
20	48.0	3697.499290	NA	NA	NA	NA	NA	3697.499420	0.00	-130.00	0.00	-0.04
20	40.8	3697.499320	NA	NA	NA	NA	NA	3697.499510	90.00	-100.00	0.02	-0.03
30	nominal	3697.497970	3697.499300	3697.499410	3697.499445	3697.499510	3697.499530	3697.499770	350.00	-1450.00	0.09	-0.39
40	nominal	3697.499780	NA	NA	NA	NA	NA	3697.500010	590.00	0.00	0.16	0.00
50	nominal	3697.499790	3697.499850	3697.500040	3697.500080	3697.500100	3697.500110	3697.499890	690.00	0.00	0.19	0.00

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 1210	HL 1424	HL 3286	HL 3559				

Full description is given in Appendix A.

Test specification:	Section 90.203 (o), Contention based protocol		
Test procedure:			
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/30/2010 5:07:15 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 52 %	Power Supply: 48VDC
Remarks:			

8 Contention Based Protocol

8.1 General

This test was performed to verify the EUT contention-based protocol function. Contention-based protocol is defined as:

> A protocol that allows multiple users to share the same spectrum by defining the events that must occur when two or more transmitters attempt to simultaneously access the same channel and establishing rules by which a transmitter provides reasonable opportunities for other transmitters to operate. Such a protocol may consist of procedures for initiating new transmissions, procedures for determining the state of the channel (available or unavailable), and procedures for managing retransmissions in the event of a busy channel. Contention-based protocols shall fall into one of two categories:
> (1) An unrestricted contention-based protocol is one which can avoid co-frequency interference with devices using all other types of contention-based protocols.
> (2) A restricted contention-based protocol is one that does not qualify as unrestricted.

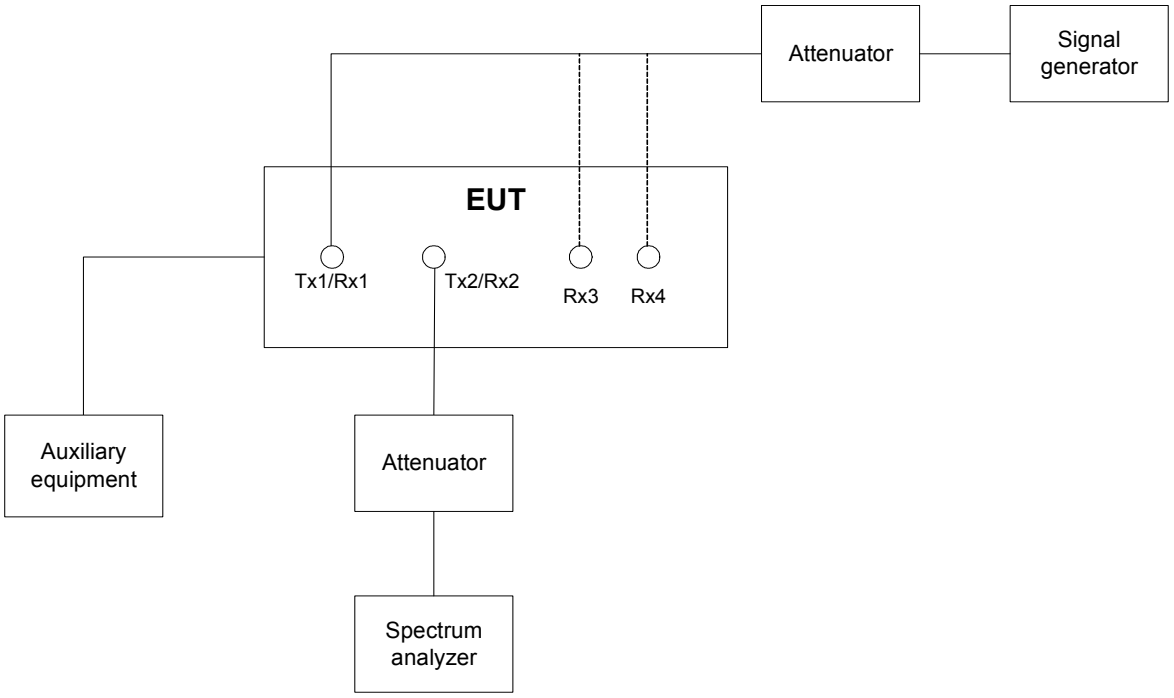
The EUT is WiMax Base station capable to operate in TDD mode at the full 3650.0 – 3700.0 MHz band and using unrestricted Contention Based Protocol. The EUT equipped with "listen before transmit" function that performs channel measurements across transmission bandwidth at the beginning of each downlink frame prior to transmission.

In case a signal level measured is above the RSL Turn-off level the EUT will not transmit for the next timeslot (defined by Backoff frame parameter).

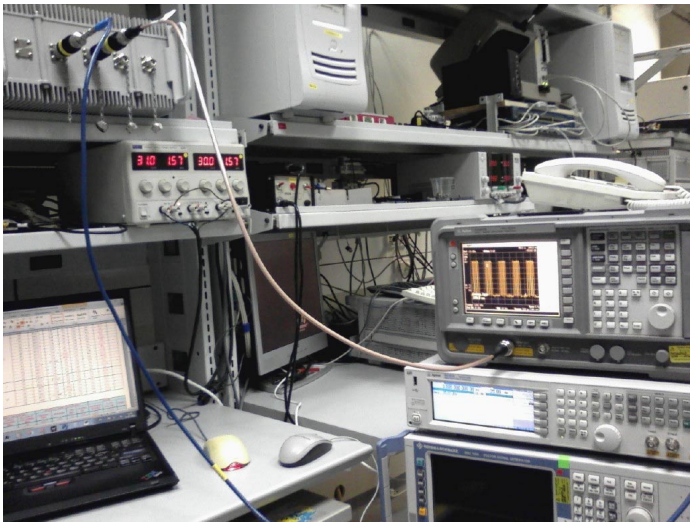
The EUT RSL turn-off level and Backoff frame are operator/user defined.

Test specification:	Section 90.203 (o), Contention based protocol		
Test procedure:			
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/30/2010 5:07:15 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 52 %	Power Supply: 48VDC
Remarks:			

Figure 8.1.1 Set-up for contention-based protocol verification test



Photograph 8.1.1 Test setup



Test specification:	Section 90.203 (o), Contention based protocol		
Test procedure:			
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/30/2010 5:07:15 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 52 %	Power Supply: 48VDC
Remarks:			

8.2 Test procedure

The EUT is equipped with two Tx/Rx chains and additional two Rx chains. As both transmit chains operate simultaneously and each Tx/Rx and Rx chain is equipped with contention-based protocol function the test was performed while interferer signal is injected in Tx_1/Rx_1 port, the EUT operation monitored by a spectrum analyzer connected to the Tx_2/Rx_2 port.

Additional verification was performed by switching between Tx_1/Rx_1 and Tx_2/Rx_2 ports and then by injecting the interferer signal to each Rx port independently.

The EUT was set to transmit as shown in Figure 8.1.1 and the transmission was verified by the spectrum analyzer.

The signal generator was connected as shown in Figure 8.1.1, an interferer signal was generated. The EUT response was monitored and reported inTable 8.2.1 to Table 8.2.4.

Plot 8.2.1 shows an example of the EUT transmission operation while detecting an interferer signal at its RSL turn-off level.

The combination of EUT transmission bandwidth, channel, interferer signal type and level was chosen according to Table 8.2.1 to Table 8.2.4.

The CW interferer signal parameters are shown in Plot 8.2.2 and Plot 8.2.3.

The OFDMA interferer signal parameters are shown in Plot 8.2.4 and Plot 8.2.5.

Test specification:	**Section 90.203 (o), Contention based protocol**		
Test procedure:			
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	6/30/2010 5:07:15 PM		
Temperature: 23ºC	**Air Pressure:** 1013 hPa	**Relative Humidity:** 52 %	**Power Supply:** 48VDC
Remarks:			

Table 8.2.1 Contention based protocol test results

INTERFERER SIGNAL INJECTION: To port Tx_1/Rx_1
EUT TRANSMISSION MONITORING: At port Tx_2/Rx_2

Test number	Wanted signal characteristics			Interferer signal characteristics			Results		
	Channel frequency, MHz	Channel Bandwidth, MHz	RSL turn-off level settings, dBm	Frequency, MHz	Modulation	Level, dBm	Interference detection	Tx OFF time, ms**	Verdict
1	3652.5	5	-65	3652.5	CW	-65	Yes	22.50	Pass
2	3652.5		-65	3652.5	CW	-70	No	NA	Pass
3	3652.5		-85	3652.5	CW	-85	Yes	21.80	Pass
4	3652.5		-85	3652.5	CW	-90	No	NA	Pass
5	3675.0		-65	3675.0	CW	-65	Yes	21.88	Pass
6	3675.0		-65	3675.0	CW	-70	No	NA	Pass
7	3675.0		-85	3675.0	CW	-85	Yes	21.75	Pass
8	3675.0		-85	3675.0	CW	-90	No	NA	Pass
9	3675.0		-85	3672.5	CW	-85	Yes	21.25	Pass
10	3675.0		-85	3677.5	CW	-85	Yes	21.75	Pass
11	3675.0		-85	3675.0	OFDMA	-85	Yes	22.00	Pass
12	3697.5		-65	3697.5	CW	-65	Yes	21.88	Pass
13	3697.5		-65	3697.5	CW	-70	No	NA	Pass
14	3697.5		-85	3697.5	CW	-85	Yes	21.39	Pass
15	3697.5		-85	3697.5	CW	-90	No	NA	Pass
16	3653.5	7	-85	3653.5	CW	-85	Yes	21.80	Pass
17	3675.0		-85	3675.0	OFDMA	-85	Yes	21.50	Pass
18	3696.5		-85	3696.5	CW	-85	Yes	21.50	Pass
19	3655.0	10	-85	3655.0	CW	-85	Yes	21.70	Pass
20	3675.0		-85	3670.0	CW	-85	Yes	21.80	Pass
21	3675.0		-85	3680.0	CW	-85	Yes	21.72	Pass
22	3675.0		-85	3675.0	OFDMA	-85	Yes	21.81	Pass
23	3695.0		-85	3695.0	CW	-85	Yes	21.90	Pass

* - Interference and wanted signal durations are measured in ms and each frame duration is 5 ms
** - Tx OFF time is measured as a time period from the start of interference signal (interference signal exceeds the threshold level) and till the EUT ceases to transmit.

Test specification:	**Section 90.203 (o), Contention based protocol**		
Test procedure:			
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	6/30/2010 5:07:15 PM		
Temperature: 23ºC	**Air Pressure:** 1013 hPa	**Relative Humidity:** 52 %	**Power Supply:** 48VDC
Remarks:			

Table 8.2.2 Contention based protocol test results

INTERFERER SIGNAL INJECTION: To port Tx_2/Rx_2
EUT TRANSMISSION MONITORING: At port Tx_1/Rx_1

Test number	Wanted signal characteristics			Interferer signal characteristics			Results		
	Channel frequency, MHz	Channel Bandwidth, MHz	RSL turn-off level settings, dBm	Frequency, MHz	Modulation	Level, dBm	Interference detection	Tx OFF time, ms**	Verdict
24	3655.0	10	-85	3655.0	CW	-85	Yes	22.10	Pass
25	3675.0		-85	3670.0	CW	-85	Yes	21.34	Pass
26	3675.0		-85	3680.0	CW	-85	Yes	20.75	Pass
27	3675.0		-85	3675.0	OFDMA	-85	Yes	21.25	Pass
28	3695.0		-85	3695.0	CW	-85	Yes	21.30	Pass

* - Interference and wanted signal durations are measured in ms and each frame duration is 5 ms
** - Tx OFF time is measured as a time period from the start of interference signal (interference signal exceeds the threshold level) and till the EUT ceases to transmit

Table 8.2.3 Contention based protocol test results

INTERFERER SIGNAL INJECTION: To port Rx_3
EUT TRANSMISSION MONITORING: At port Tx_1/Rx_1 and Tx_2/Rx_2

Test number	Wanted signal characteristics			Interferer signal characteristics			Results		
	Channel frequency, MHz	Channel Bandwidth, MHz	RSL turn-off level settings, dBm	Frequency, MHz	Modulation	Level, dBm	Interference detection	Tx OFF time, ms**	Verdict
29	3655.0	10	-85	3655.0	CW	-85	Yes	21.56	Pass
30	3675.0		-85	3670.0	CW	-85	Yes	21.24	Pass
31	3675.0		-85	3680.0	CW	-85	Yes	20.42	Pass
32	3675.0		-85	3675.0	OFDMA	-85	Yes	21.27	Pass
33	3695.0		-85	3695.0	CW	-85	Yes	21.45	Pass

* - Interference and wanted signal durations are measured in ms and each frame duration is 5 ms
** - Tx OFF time is measured as a time period from the start of interference signal (interference signal exceeds the threshold level) and till the EUT ceases to transmit

Test specification:	**Section 90.203 (o), Contention based protocol**		
Test procedure:			
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	6/30/2010 5:07:15 PM		
Temperature: 23ºC	**Air Pressure:** 1013 hPa	**Relative Humidity:** 52 %	**Power Supply:** 48VDC
Remarks:			

Table 8.2.4 Contention based protocol test results

INTERFERER SIGNAL INJECTION: To port Rx_4
EUT TRANSMISSION MONITORING: At port Tx_1/Rx_1 and Tx_2/Rx_2

Test number	Wanted signal characteristics			Interferer signal characteristics			Results		
	Channel frequency, MHz	Channel Bandwidth, MHz	RSL turn-off level settings, dBm	Frequency, MHz	Modulation	Level, dBm	Interference detection	Tx OFF time, ms**	Verdict
34	3655.0	10	-85	3655.0	CW	-85	Yes	21.34	Pass
35	3675.0		-85	3670.0	CW	-85	Yes	21.45	Pass
36	3675.0		-85	3680.0	CW	-85	Yes	20.23	Pass
37	3675.0		-85	3675.0	OFDMA	-85	Yes	21.45	Pass
38	3695.0		-85	3695.0	CW	-85	Yes	21.56	Pass

* - Interference and wanted signal durations are measured in ms and each frame duration is 5 ms
** - Tx OFF time is measured as a time period from the start of interference signal (interference signal exceeds the threshold level) and till the EUT ceases to transmit.

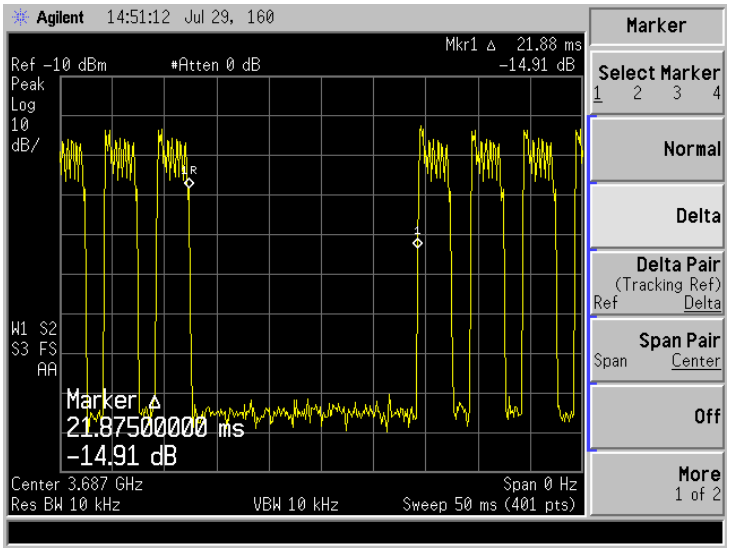
Reference numbers of test equipment used

HL 2909	HL 3234						

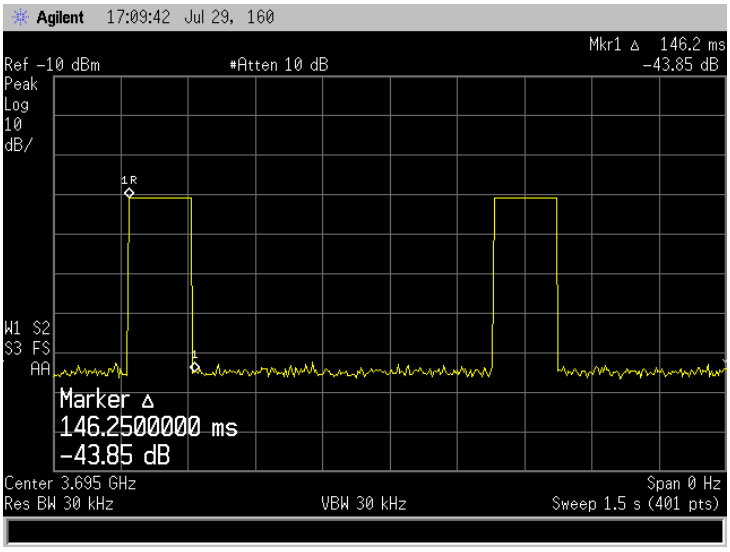
Full description is given in Appendix A.

Test specification:	Section 90.203 (o), Contention based protocol		
Test procedure:			
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/30/2010 5:07:15 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 52 %	Power Supply: 48VDC
Remarks:			

Plot 8.2.1 Tx off example

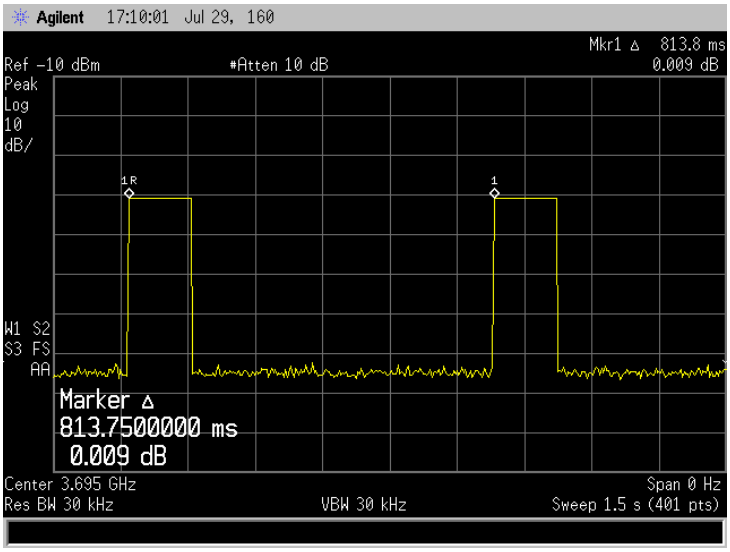


Plot 8.2.2 CW signal interferer pulse width

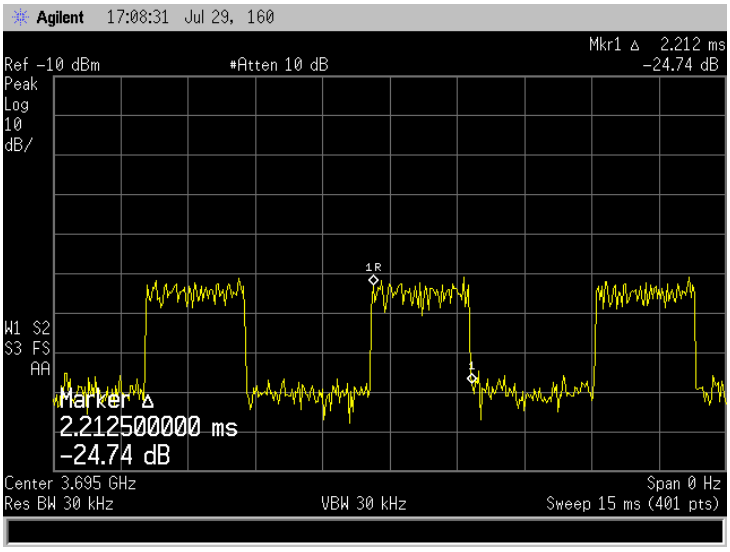


Test specification:	Section 90.203 (o), Contention based protocol		
Test procedure:			
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/30/2010 5:07:15 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 52 %	Power Supply: 48VDC
Remarks:			

Plot 8.2.3 CW signal interferer period

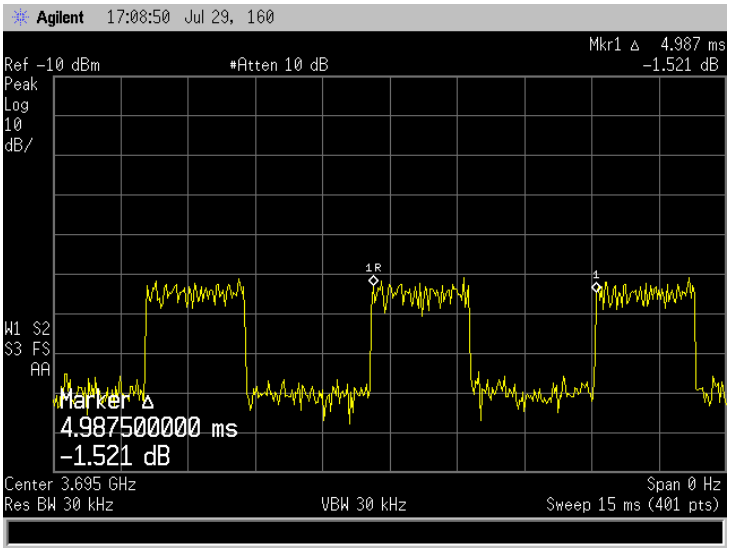


Plot 8.2.4 OFDMA signal interferer pulse width



Test specification:	Section 90.203 (o), Contention based protocol		
Test procedure:			
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/30/2010 5:07:15 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 52 %	Power Supply: 48VDC
Remarks:			

Plot 8.2.5 OFDMA signal interferer pulse period



9 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
0446	Antenna, Loop, Active, 10 kHz - 30 MHz	EMCO	6502	2857	29-Jun-10	29-Jun-11
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A 00319, 3448A002 53	27-Aug-09	27-Aug-10
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	11-Jan-10	11-Jan-11
0661	Generator Swept Signal, 10 MHz to 40 GHz, + 10 dBm	HP	83640B	3614A002 66	17-Sep-09	17-Dec-10
0768	Antenna Standard Gain Horn,18-26.5 GHz, WR-42, 25 dB gain	Quinstar Technology	QWH-4200-BA	110	23-Dec-08	23-Dec-11
0769	Antenna Standard Gain Horn, 26.5-40 GHz, WR28, 25 dB gain	Quinstar Technology	QWH-2800-BA	112	23-Dec-08	23-Dec-11
1210	Power Supply DC 60V, 25A	Horizon Electronics	SR 60-25	66025362	24-Sep-09	24-Sep-10
1291	Attenuator, 26.5 - 40 GHz, 0 - 50 dB, 0.5 W	Hughes	45721H-1000	060	03-Sep-09	03-Sep-10
1378	Variable Attenuator 18.0-26.5 GHz	Hewlett Packard Co	K382A	1223	15-Jul-08	15-Jul-10
1424	Spectrum Analyzer, 30 Hz- 40 GHz	Agilent Technologies	8564EC	3946A002 19	28-Aug-09	28-Aug-10
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W	EMC Test Systems	3115	9911-5964	29-Jan-10	29-Jan-11
2015	Power Divider, 0.5-18.0 GHz, 80 W	Omni Spectra	2090-6204-00	2015	01-Dec-08	01-Dec-10
2254	Cable 40 GHz, 0.8 m, blue	Rhophase Microwave Limited	KPS-1503A-800-KPS	W4907	11-Jun-10	11-Jun-11
2432	Antenna, Double-Ridged Waveguide Horn 1-18 GHz	EMC Test Systems	3115	00027177	29-Jan-10	29-Jan-11
2870	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-9155-00	2870	17-Sep-09	17-Sep-10
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY414447 62	07-May-10	07-May-11
3122	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-9155-00	3122	01-Jan-10	01-Jan-11
3206	Cable 40 GHz, 0.6 m	Gore	GOR245	05118336	11-Jun-10	11-Jun-11
3207	Cable 40 GHz, 1.2 m	Gore	GOR245	05118337	11-Jun-10	11-Jun-11
3234	Signal generator, 9 kHz - 3.3 GHz	Rohde & Schwarz	SML03	103387	19-Jul-09	19-Jul-10
3286	Temperature Chamber, (-40 to +170)°C	Thermotron	EL-8-CH-1-1-CO2	21-9048	09-Sep-09	09-Sep-10
3301	Power Meter, P-series, 50 MHz to 40 GHz	Agilent Technologies	N1911A	MY451010 57	14-Dec-09	14-Dec-10
3302	Power sensor, P-Series, 50 MHz to 40 GHz, -35/30 to 20 dBm	Agilent Technologies	N1922A	MY452405 86	14-Dec-09	14-Dec-10
3322	Attenuator DC to 22 GHz, 30 dB, 50 W	Aeroflex / Weinschel	86-30-12	448	24-Dec-09	24-Dec-10
3455	Medium Power Fixed Coaxial Attenuator DC to 40 GHz, 20 dB, 5 W	Aeroflex / Weinschel	75A-20-12	1182	25-Mar-10	25-Mar-11
3473	Cable, Coax, Microwave, DC-18 GHz, SMA-SMA, 0.6 m	Gore	GORE 65474	1003478	10-May-10	10-May-11

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
3474	Cable, Coax, Microwave, DC-18 GHz, SMA-SMA, 0.6 m	Gore	GORE 65475	1640102	10-May-10	10-May-11
3533	Amplifier, low noise, 6 to 18 GHz	Quinstar Technology	QLJ-06184040-J0	11159001001	06-Dec-09	06-Dec-10
3535	Amplifier, low noise, 18 to 40 GHz	Quinstar Technology	QLJ-18404537-J0	11159003001	06-Dec-09	06-Dec-10
3559	Cable 40 GHz, SMA-SMA, 0.95 m, Blue	Gore	PHASEFLEX	03771245	10-Aug-09	10-Aug-10
3616	Cable RF, 6.5 m, N type-N type, DC-6.5 GHz	Suhner Switzerland	Rg 214/U	NA	02-Dec-09	02-Dec-10
3782	Precision Fixed Attenuator, 50 Ohm, 5 W, 10 dB, DC to 18 GHz	Mini-Circuits	BW-S10W5+	NA	07-Dec-09	07-Dec-10
3818	PSA Series Spectrum Analyzer, 3 Hz- 44 GHz	Agilent Technologies	E4446A	MY48250288	25-Sep-09	25-Sep-10
3868	Directional coupler, 2 GHz to 8 GHz, 10 dB, SMA Female	Narda	4203-10	06978	14-Dec-09	14-Dec-10

10 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

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

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

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

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

11 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).

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12 APPENDIX D Specification references

FCC 47CFR part 90: 2009	Private land mobile radio services
FCC 47CFR part 1: 2009	Practice and procedure
FCC 47CFR part 2: 2009	Frequency allocations and radio treaty matters; general rules and regulations
ANSI C63.2: 1996	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4: 2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
ANSI/TIA/EIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

13 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
Ser.No.1011, HL 0604

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

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, HL 1984

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 intensity in dB(μV/m).

Antenna factor
Double-ridged guide horn antenna
Model 3115, serial number: 00027177, HL 2432

Frequency, MHz	Antenna factor. dB(1/m)
1000.0	24.7
1500.0	25.7
2000.0	27.8
2500.0	28.9
3000.0	30.7
3500.0	31.8
4000.0	33.0
4500.0	32.8
5000.0	34.2
5500.0	34.9
6000.0	35.2
6500.0	35.4
7000.0	36.3
7500.0	37.3
8000.0	37.5
8500.0	38.0
9000.0	38.3
9500.0	38.3
10000.0	38.7
10500.0	38.7
11000.0	38.9
11500.0	39.5
12000.0	39.5
12500.0	39.4
13000.0	40.5
13500.0	40.8
14000.0	41.5
14500.0	41.3
15000.0	40.2
15500.0	38.7
16000.0	38.5
16500.0	39.8
17000.0	41.9
17500.0	45.8
18000.0	49.1

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).

Cable loss
Cable 40 GHz, 0.8 m, blue, model: KPS-1503A-800-KPS, S/N W4907, HL 2254

Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB
0.03	0.04	5.10	0.80	15.00	1.49
0.05	0.07	5.30	0.83	15.50	1.49
0.10	0.09	5.50	0.83	16.00	1.46
0.20	0.15	5.70	0.84	16.50	1.47
0.30	0.19	5.90	0.87	17.00	1.50
0.40	0.25	6.10	0.86	17.50	1.57
0.50	0.29	6.30	0.89	18.00	1.63
0.60	0.33	6.50	0.90	18.50	1.57
0.70	0.37	6.70	0.89	19.00	1.63
0.80	0.41	6.90	0.93	19.50	1.65
0.90	0.44	7.10	0.92	20.00	1.64
1.00	0.45	7.30	0.95	20.50	1.75
1.10	0.48	7.50	0.96	21.00	1.72
1.20	0.51	7.70	0.97	21.50	1.78
1.30	0.53	7.90	1.01	22.00	1.76
1.40	0.54	8.10	1.00	22.50	1.72
1.50	0.57	8.30	1.05	23.00	1.83
1.60	0.59	8.50	1.04	23.50	1.80
1.70	0.04	8.70	1.07	24.00	1.90
1.80	0.07	8.90	1.11	24.50	1.81
1.90	0.09	9.10	1.09	25.00	1.98
2.00	0.15	9.30	1.14	25.50	1.91
2.10	0.19	9.50	1.12	26.00	2.02
2.20	0.25	9.70	1.15	26.50	1.92
2.30	0.29	9.90	1.16	27.00	1.97
2.40	0.33	10.10	1.16	28.00	2.02
2.50	0.37	10.30	1.19	29.00	1.95
2.60	0.41	10.50	1.14	30.00	1.94
2.70	0.44	10.70	1.19	31.00	2.11
2.80	0.45	10.90	1.17	32.00	2.17
2.90	0.48	11.10	1.13	33.00	2.27
3.10	0.61	11.30	1.20	34.00	2.27
3.30	0.64	11.50	1.13	35.00	2.29
3.50	0.65	11.70	1.20	36.00	2.35
3.70	0.68	11.90	1.18	37.00	2.37
3.90	0.69	12.10	1.14	38.00	2.40
4.10	0.71	12.40	1.19	39.00	2.57
4.30	0.73	13.00	1.34	40.00	2.36
4.50	0.75	13.50	1.33		
4.70	0.77	14.00	1.48		
4.90	0.79	14.50	1.45		

Cable loss
Cable coaxial, Huber-Suhner, 18 GHz, 6.4 m, SMA - SMA, model 198-9155-00, HL 2870

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.09	5750	2.49	12000	3.71
30	0.17	6000	2.53	12250	3.81
100	0.32	6250	2.58	12500	3.84
250	0.49	6500	2.64	12750	3.88
500	0.70	6750	2.69	13000	3.92
750	0.86	7000	2.75	13250	3.96
1000	1.00	7250	2.80	13500	3.98
1250	1.11	7500	2.87	13750	4.01
1500	1.23	7750	2.93	14000	4.03
1750	1.34	8000	2.94	14250	4.09
2000	1.41	8250	3.00	14500	4.08
2250	1.51	8500	3.04	14750	4.10
2500	1.59	8750	3.08	15000	4.15
2750	1.68	9000	3.14	15250	4.22
3000	1.76	9250	3.16	15500	4.31
3250	1.83	9500	3.22	15750	4.42
3500	1.91	9750	3.26	16000	4.48
3750	1.97	10000	3.36	16250	4.54
4000	2.05	10250	3.41	16500	4.56
4250	2.11	10500	3.46	16750	4.57
4500	2.18	10750	3.50	17000	4.59
4750	2.24	11000	3.54	17250	4.66
5000	2.30	11250	3.58	17500	4.70
5250	2.36	11500	3.63	17750	4.76
5500	2.43	11750	3.66	18000	4.72

Cable loss
Microwave Cable Assembly, 18 GHz, 6.4 m, SMA – SMA, Huber-Suhner, model 198-9155-00
HL 3122

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.11	3600	2.08	7400	3.07	11200	3.92	15100	4.61
30	0.17	3700	2.12	7500	3.09	11300	3.95	15200	4.58
50	0.23	3800	2.15	7600	3.14	11400	3.93	15300	4.62
100	0.32	3900	2.18	7700	3.15	11500	3.93	15400	4.62
200	0.47	4000	2.21	7800	3.19	11600	3.94	15500	4.65
300	0.58	4100	2.24	7900	3.22	11700	3.97	15600	4.66
400	0.66	4200	2.27	8000	3.20	11800	3.98	15700	4.66
500	0.74	4300	2.31	8100	3.21	11900	4.08	15800	4.72
600	0.81	4400	2.31	8200	3.24	12000	4.03	15900	4.78
700	0.88	4500	2.36	8300	3.27	12100	4.06	16000	4.89
800	0.95	4600	2.37	8400	3.32	12200	4.05	16100	4.95
900	1.00	4700	2.40	8500	3.35	12300	4.16	16200	4.92
1000	1.06	4800	2.43	8600	3.35	12400	4.18	16300	4.95
1100	1.11	4900	2.45	8700	3.33	12500	4.20	16400	5.02
1200	1.16	5000	2.50	8800	3.37	12600	4.22	16500	5.04
1300	1.21	5100	2.51	8900	3.39	12700	4.23	16600	5.06
1400	1.26	5200	2.55	9000	3.45	12800	4.28	16700	5.17
1500	1.31	5300	2.56	9100	3.46	12900	4.26	16800	5.16
1600	1.35	5400	2.59	9200	3.47	13000	4.28	16900	5.19
1700	1.39	5500	2.62	9300	3.46	13100	4.28	17000	5.23
1800	1.44	5600	2.65	9400	3.50	13200	4.28	17100	5.30
1900	1.47	5700	2.67	9500	3.50	13300	4.29	17200	5.26
2000	1.52	5800	2.71	9600	3.53	13400	4.34	17300	5.30
2100	1.55	5900	2.72	9700	3.52	13500	4.31	17400	5.30
2200	1.60	6000	2.73	9800	3.54	13600	4.35	17500	5.36
2300	1.63	6100	2.76	9900	3.56	13700	4.36	17600	5.40
2400	1.67	6200	2.78	10000	3.57	13800	4.37	17700	5.47
2500	1.70	6300	2.81	10100	3.60	13900	4.41	17800	5.56
2600	1.74	6400	2.85	10200	3.69	14000	4.42	17900	5.45
2700	1.78	6500	2.87	10300	3.69	14100	4.45	18000	5.47
2800	1.83	6600	2.87	10400	3.67	14200	4.49		
2900	1.85	6700	2.90	10500	3.70	14300	4.55		
3000	1.89	6800	2.91	10600	3.70	14400	4.62		
3100	1.92	6900	2.96	10700	3.76	14600	4.54		
3200	1.96	7000	2.99	10800	3.88	14700	4.58		
3300	1.99	7100	3.01	10900	3.88	14800	4.57		
3400	2.03	7200	3.04	11000	3.85	14900	4.65		
3500	2.06	7300	3.08	11100	3.85	15000	4.64		

Cable loss
Cable coaxial, GORE-TEX, GOR245, 40 GHz, 0.6 m, SMA-SMA, S/N 05118336
HL 3206

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss,dB	Frequency, MHz	Cable loss,dB
10	0.09	5000	0.85	10200	1.24	15500	1.55	31500	2.24
30	0.09	5100	0.86	10300	1.25	15600	1.50	32000	2.21
50	0.10	5200	0.87	10400	1.24	15700	1.56	32500	2.19
100	0.14	5300	0.88	10500	1.20	15800	1.50	33000	2.24
200	0.18	5400	0.89	10600	1.23	15900	1.58	33500	2.26
300	0.22	5500	0.90	10700	1.25	16000	1.56	34000	2.25
400	0.26	5600	0.92	10800	1.28	16100	1.59	34500	2.28
500	0.29	5700	0.93	10900	1.35	16200	1.57	35000	2.27
600	0.31	5800	0.93	11000	1.30	16300	1.59	35500	2.31
700	0.33	5900	0.95	11100	1.31	16400	1.57	36000	2.36
800	0.35	6000	0.93	11200	1.31	16500	1.60	36500	2.39
900	0.38	6100	0.97	11300	1.35	16600	1.60	37000	2.39
1000	0.39	6200	0.95	11400	1.32	16700	1.63	37500	2.41
1100	0.41	6300	0.99	11500	1.38	16800	1.66	38000	2.40
1200	0.42	6400	0.98	11600	1.33	16900	1.64	38500	2.40
1300	0.45	6500	0.99	11700	1.37	17000	1.66	39000	2.54
1400	0.46	6600	0.99	11800	1.36	17100	1.65	39500	2.39
1500	0.48	6700	0.99	11900	1.42	17200	1.67	40000	2.48
1600	0.49	6800	0.99	12000	1.34	17300	1.66		
1700	0.50	6900	1.02	12100	1.41	17400	1.69		
1800	0.52	7000	1.02	12200	1.36	17500	1.66		
1900	0.53	7100	1.06	12300	1.40	17600	1.69		
2000	0.53	7200	1.05	12400	1.34	17700	1.70		
2100	0.54	7300	1.02	12500	1.39	17800	1.74		
2200	0.55	7400	1.03	12600	1.40	17900	1.67		
2300	0.56	7500	1.04	12700	1.42	18000	1.72		
2400	0.57	7600	1.05	12800	1.37	18500	1.72		
2500	0.59	7700	1.10	12900	1.39	19000	1.78		
2600	0.60	7800	1.11	13000	1.40	19500	1.77		
2700	0.62	7900	1.10	13100	1.42	20000	1.82		
2800	0.62	8000	1.10	13200	1.41	20500	1.82		
2900	0.65	8100	1.10	13300	1.43	21000	1.94		
3000	0.65	8200	1.10	13400	1.45	21500	1.92		
3100	0.66	8300	1.16	13500	1.45	22000	2.07		
3200	0.67	8400	1.15	13600	1.54	22500	1.90		
3300	0.69	8500	1.20	13700	1.54	23000	1.96		
3400	0.70	8600	1.19	13800	1.49	23500	1.88		
3500	0.71	8700	1.15	13900	1.50	24000	1.96		
3600	0.71	8800	1.16	14000	1.50	24500	1.96		
3700	0.73	8900	1.19	14100	1.52	25000	2.10		
3800	0.74	9000	1.18	14200	1.60	25500	2.05		
3900	0.75	9100	1.23	14300	1.57	26000	2.05		
4000	0.76	9200	1.20	14400	1.57	26500	2.05		
4100	0.76	9300	1.20	14600	1.50	27000	1.97		
4200	0.78	9400	1.19	14700	1.54	27500	2.09		
4300	0.79	9500	1.23	14800	1.51	28000	2.10		
4400	0.80	9600	1.21	14900	1.54	28500	2.05		
4500	0.80	9700	1.22	15000	1.57	29000	2.08		
4600	0.82	9800	1.20	15100	1.56	29500	1.94		
4700	0.82	9900	1.18	15200	1.51	30000	2.11		
4800	0.83	10000	1.20	15300	1.56	30500	2.25		
4900	0.85	10100	1.23	15400	1.54	31000	2.23		

Cable loss
Cable coaxial, GORE-TEX, GOR245, 40 GHz, 1.2 m, SMA-SMA, S/N 05118337
HL 3207

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss,dB	Frequency, MHz	Cable loss,dB
10	0.17	5000	1.54	10200	2.26	15500	2.77	31500	4.07
30	0.14	5100	1.54	10300	2.26	15600	2.78	32000	4.03
50	0.16	5200	1.56	10400	2.24	15700	2.81	32500	3.93
100	0.22	5300	1.59	10500	2.23	15800	2.81	33000	4.00
200	0.30	5400	1.60	10600	2.25	15900	2.84	33500	4.09
300	0.38	5500	1.61	10700	2.31	16000	2.91	34000	4.08
400	0.44	5600	1.63	10800	2.34	16100	2.92	34500	4.13
500	0.48	5700	1.66	10900	2.38	16200	2.88	35000	4.15
600	0.54	5800	1.68	11000	2.38	16300	2.90	35500	4.18
700	0.58	5900	1.68	11100	2.38	16400	2.93	36000	4.22
800	0.62	6000	1.71	11200	2.37	16500	2.92	36500	4.25
900	0.65	6100	1.71	11300	2.38	16600	2.97	37000	4.26
1000	0.69	6200	1.73	11400	2.40	16700	3.02	37500	4.40
1100	0.73	6300	1.75	11500	2.41	16800	3.02	38000	4.40
1200	0.76	6400	1.76	11600	2.44	16900	3.01	38500	4.52
1300	0.78	6500	1.78	11700	2.44	17000	3.04	39000	4.54
1400	0.81	6600	1.77	11800	2.44	17100	3.08	39500	4.36
1500	0.85	6700	1.79	11900	2.45	17200	3.05	40000	4.48
1600	0.87	6800	1.80	12000	2.46	17300	3.06		
1700	0.90	6900	1.83	12100	2.45	17400	3.06		
1800	0.93	7000	1.84	12200	2.45	17500	3.07		
1900	0.96	7100	1.86	12300	2.48	17600	3.08		
2000	0.95	7200	1.88	12400	2.49	17700	3.09		
2100	0.98	7300	1.86	12500	2.51	17800	3.12		
2200	1.00	7400	1.87	12600	2.53	17900	3.09		
2300	1.02	7500	1.90	12700	2.51	18000	3.08		
2400	1.04	7600	1.91	12800	2.52	18500	3.11		
2500	1.06	7700	1.95	12900	2.54	19000	3.14		
2600	1.08	7800	1.98	13000	2.56	19500	3.20		
2700	1.11	7900	1.99	13100	2.56	20000	3.24		
2800	1.14	8000	1.98	13200	2.59	20500	3.31		
2900	1.15	8100	1.98	13300	2.59	21000	3.38		
3000	1.17	8200	2.00	13400	2.60	21500	3.44		
3100	1.19	8300	2.01	13500	2.65	22000	3.45		
3200	1.20	8400	2.05	13600	2.71	22500	3.45		
3300	1.24	8500	2.07	13700	2.71	23000	3.47		
3400	1.26	8600	2.08	13800	2.69	23500	3.47		
3500	1.27	8700	2.09	13900	2.67	24000	3.54		
3600	1.28	8800	2.09	14000	2.68	24500	3.62		
3700	1.32	8900	2.10	14100	2.68	25000	3.73		
3800	1.32	9000	2.12	14200	2.74	25500	3.77		
3900	1.35	9100	2.12	14300	2.77	26000	3.71		
4000	1.36	9200	2.15	14400	2.80	26500	3.73		
4100	1.39	9300	2.13	14600	2.74	27000	3.73		
4200	1.40	9400	2.16	14700	2.73	27500	3.78		
4300	1.41	9500	2.17	14800	2.75	28000	3.81		
4400	1.43	9600	2.17	14900	2.75	28500	3.81		
4500	1.47	9700	2.18	15000	2.77	29000	3.80		
4600	1.46	9800	2.16	15100	2.76	29500	3.81		
4700	1.49	9900	2.17	15200	2.76	30000	3.89		
4800	1.50	10000	2.20	15300	2.77	30500	4.03		
4900	1.52	10100	2.22	15400	2.79	31000	4.01		

Cable loss
Cable coaxial, Microwave, SMA-SMA, 18 GHz, 0.6 m
Gore, HL 3473

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.01	5000	0.48	10200	0.72	15500	0.85
30	0.03	5100	0.48	10300	0.70	15600	0.93
50	0.04	5200	0.48	10400	0.75	15700	0.87
100	0.04	5300	0.48	10500	0.68	15800	0.88
200	0.08	5400	0.50	10600	0.77	15900	0.94
300	0.11	5500	0.48	10700	0.80	16000	0.94
400	0.12	5600	0.50	10800	0.77	16100	0.99
500	0.13	5700	0.50	10900	0.85	16200	0.96
600	0.15	5800	0.52	11000	0.83	16300	0.96
700	0.15	5900	0.51	11100	0.79	16400	0.94
800	0.17	6000	0.52	11200	0.82	16500	0.94
900	0.19	6100	0.54	11300	0.79	16600	1.03
1000	0.18	6200	0.53	11400	0.81	16700	1.04
1100	0.20	6300	0.54	11500	0.76	16800	1.07
1200	0.22	6400	0.55	11600	0.78	16900	0.94
1300	0.22	6500	0.56	11700	0.74	17000	1.05
1400	0.23	6600	0.56	11800	0.76	17100	0.96
1500	0.24	6700	0.60	11900	0.79	17200	1.07
1600	0.25	6800	0.55	12000	0.74	17300	0.98
1700	0.25	6900	0.60	12100	0.69	17400	1.16
1800	0.26	7000	0.59	12200	0.69	17500	1.05
1900	0.27	7100	0.60	12300	0.75	17600	1.13
2000	0.29	7200	0.61	12400	0.66	17700	1.05
2100	0.28	7300	0.60	12500	0.76	17800	1.22
2200	0.30	7400	0.57	12600	0.70	17900	1.02
2300	0.30	7500	0.63	12700	0.77	18000	1.04
2400	0.31	7600	0.60	12800	0.69		
2500	0.31	7700	0.63	12900	0.79		
2600	0.33	7800	0.66	13000	0.81		
2700	0.33	7900	0.61	13100	0.83		
2800	0.35	8000	0.58	13200	0.80		
2900	0.35	8100	0.62	13300	0.82		
3000	0.35	8200	0.62	13400	0.90		
3100	0.35	8300	0.63	13500	0.85		
3200	0.36	8400	0.67	13600	1.04		
3300	0.38	8500	0.63	13700	0.93		
3400	0.38	8600	0.61	13800	0.91		
3500	0.40	8700	0.64	13900	0.89		
3600	0.40	8800	0.62	14000	0.96		
3700	0.40	8900	0.64	14100	0.88		
3800	0.41	9000	0.64	14200	1.01		
3900	0.41	9100	0.64	14300	0.99		
4000	0.41	9200	0.63	14400	0.83		
4100	0.45	9300	0.63	14600	0.88		
4200	0.43	9400	0.63	14700	0.91		
4300	0.46	9500	0.64	14800	0.91		
4400	0.44	9600	0.65	14900	0.88		
4500	0.47	9700	0.62	15000	0.89		
4600	0.46	9800	0.66	15100	0.91		
4700	0.47	9900	0.61	15200	0.88		
4800	0.47	10000	0.70	15300	0.94		
4900	0.48	10100	0.70	15400	0.91		

Cable loss
Cable coaxial, Microwave, SMA-SMA, 18 GHz, 0.6 m
Gore, HL 3474

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.00	5000	0.44	10200	0.72	15500	0.84
30	0.02	5100	0.44	10300	0.68	15600	0.95
50	0.03	5200	0.44	10400	0.75	15700	0.82
100	0.03	5300	0.44	10500	0.64	15800	0.94
200	0.07	5400	0.46	10600	0.75	15900	0.91
300	0.10	5500	0.45	10700	0.80	16000	0.91
400	0.11	5600	0.46	10800	0.77	16100	0.86
500	0.12	5700	0.47	10900	0.80	16200	0.86
600	0.14	5800	0.48	11000	0.79	16300	0.86
700	0.14	5900	0.48	11100	0.70	16400	0.84
800	0.15	6000	0.49	11200	0.76	16500	0.83
900	0.18	6100	0.51	11300	0.70	16600	0.87
1000	0.17	6200	0.50	11400	0.73	16700	0.90
1100	0.18	6300	0.50	11500	0.67	16800	0.91
1200	0.21	6400	0.51	11600	0.74	16900	0.90
1300	0.20	6500	0.51	11700	0.64	17000	0.97
1400	0.21	6600	0.52	11800	0.68	17100	0.94
1500	0.22	6700	0.54	11900	0.67	17200	1.01
1600	0.23	6800	0.51	12000	0.71	17300	0.97
1700	0.23	6900	0.55	12100	0.64	17400	1.02
1800	0.24	7000	0.54	12200	0.64	17500	1.06
1900	0.25	7100	0.55	12300	0.71	17600	1.01
2000	0.27	7200	0.55	12400	0.62	17700	1.10
2100	0.26	7300	0.54	12500	0.80	17800	1.16
2200	0.28	7400	0.52	12600	0.69	17900	1.12
2300	0.28	7500	0.58	12700	0.85	18000	1.00
2400	0.28	7600	0.56	12800	0.67		
2500	0.29	7700	0.57	12900	0.84		
2600	0.30	7800	0.62	13000	0.76		
2700	0.31	7900	0.57	13100	0.85		
2800	0.32	8000	0.55	13200	0.77		
2900	0.32	8100	0.59	13300	0.82		
3000	0.32	8200	0.59	13400	0.79		
3100	0.33	8300	0.60	13500	0.82		
3200	0.33	8400	0.66	13600	0.91		
3300	0.35	8500	0.60	13700	0.81		
3400	0.35	8600	0.59	13800	0.76		
3500	0.36	8700	0.59	13900	0.75		
3600	0.36	8800	0.58	14000	0.81		
3700	0.37	8900	0.60	14100	0.77		
3800	0.38	9000	0.60	14200	0.89		
3900	0.38	9100	0.60	14300	0.92		
4000	0.38	9200	0.57	14400	0.78		
4100	0.41	9300	0.57	14600	0.85		
4200	0.40	9400	0.58	14700	0.83		
4300	0.41	9500	0.60	14800	0.95		
4400	0.42	9600	0.62	14900	0.89		
4500	0.43	9700	0.58	15000	0.96		
4600	0.42	9800	0.63	15100	0.90		
4700	0.44	9900	0.58	15200	0.96		
4800	0.43	10000	0.67	15300	0.90		
4900	0.44	10100	0.69	15400	0.95		

Cable loss
Cable coaxial, GORE, PHASEFLEX, 40 GHz, 0.95 m, SMA-SMA, S/N 03771245
HL 3559

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss,dB
30	0.08	10000	0.96	20500	1.59	31000	2.24
100	0.10	10500	0.99	21000	1.63	31500	2.71
500	0.22	11000	1.02	21500	1.70	32000	2.47
1000	0.32	11500	1.07	22000	1.71	32500	2.37
1500	0.40	12000	1.13	22500	1.60	33000	2.35
2000	0.41	12500	1.16	23000	1.58	33500	2.34
2500	0.44	13000	1.26	23500	1.64	34000	2.31
3000	0.53	13500	1.26	24000	1.68	34500	2.43
3500	0.54	14000	1.22	24500	1.79	35000	2.45
4000	0.62	14500	1.26	25000	1.86	35500	2.48
4500	0.62	15000	1.27	25500	1.77	36000	3.60
5000	0.67	15500	1.29	26000	1.78	36500	2.62
5500	0.70	16000	1.39	26500	1.83	37000	2.45
6000	0.72	16500	1.50	27000	1.87	37500	2.47
6500	0.76	17000	1.49	27500	1.97	38000	2.38
7000	0.83	17500	1.37	28000	2.69	38500	2.41
7500	0.85	18000	1.40	28500	1.94	39000	2.56
8000	0.89	18500	1.41	29000	2.02	39500	2.71
8500	0.91	19000	1.48	29500	2.05	40000	2.69
9000	0.95	19500	1.61	30000	2.11		
9500	0.96	20000	1.59	30500	2.11		

Cable loss
Cable coaxial, RG-214/U, N type-N type, 6.5 m
Suhner Switzerland, HL 3616

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.13	1750	2.66	3550	4.44	5350	6.08
30	0.25	1800	2.72	3600	4.46	5400	6.12
50	0.32	1850	2.78	3650	4.59	5450	6.17
100	0.48	1900	2.81	3700	4.60	5500	6.25
150	0.60	1950	2.86	3750	4.72	5550	6.31
200	0.71	2000	2.94	3800	4.72	5600	6.35
250	0.81	2050	2.97	3850	4.86	5650	6.41
300	0.91	2100	3.01	3900	4.85	5700	6.50
350	1.00	2150	3.06	3950	4.99	5750	6.52
400	1.07	2200	3.11	4000	4.90	5800	6.57
450	1.14	2250	3.16	4050	5.04	5850	6.61
500	1.23	2300	3.21	4100	5.01	5900	6.71
550	1.30	2350	3.26	4150	5.10	5950	6.70
600	1.37	2400	3.31	4200	5.08	6000	6.75
650	1.44	2450	3.35	4250	5.18	6050	6.74
700	1.50	2500	3.39	4300	5.14	6100	6.84
750	1.58	2550	3.46	4350	5.22	6150	6.87
800	1.64	2600	3.48	4400	5.21	6200	6.93
850	1.69	2650	3.55	4450	5.29	6250	6.96
900	1.77	2700	3.59	4500	5.31	6300	7.02
950	1.79	2750	3.66	4550	5.39	6350	7.04
1000	1.87	2800	3.68	4600	5.41	6400	7.10
1050	1.92	2850	3.75	4650	5.49	6450	7.11
1100	1.98	2900	3.79	4700	5.52	6500	7.19
1150	2.05	2950	3.86	4750	5.60		
1200	2.09	3000	3.89	4800	5.64		
1250	2.15	3050	3.94	4850	5.73		
1300	2.21	3100	3.98	4900	5.70		
1350	2.27	3150	4.03	4950	5.73		
1400	2.33	3200	4.06	5000	5.75		
1450	2.38	3250	4.12	5050	5.83		
1500	2.44	3300	4.14	5100	5.82		
1550	2.48	3350	4.22	5150	5.91		
1600	2.52	3400	4.24	5200	5.92		
1650	2.56	3450	4.31	5250	5.98		
1700	2.62	3500	4.35	5300	6.01		

14 APPENDIX F Abbreviations and acronyms

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

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