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839.01
Electrical

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TEST REPORT

ACCORDING TO: FCC CFR 47 PART 90 subpart Z

FOR:

Alvarion Ltd.

WiMAX base station

Model:BreezeMAX Extreme 3.65

FCC ID:LKT-EXTR-36

Table of contents

1 Applicant information

Client name:	Alvarion Ltd.
Address:	21A Habarzel street, Ramat Hachayal, Tel Aviv 69710, Israel
Telephone:	972 3645 7859
Fax:	972 3645 6222
E-mail:	avner.ruta@alvarion.com
Contact name:	Mr. Avner Ruta

2 Equipment under test attributes

Product name:	WiMAX base station
Product type:	Transciever
Model(s):	BreezeMAX Extreme 3.65
Serial number:	RF#1 90049746 RF#2 90049750
Receipt date	6/07/2010

3 Manufacturer information

Manufacturer name:	Alvarion Ltd.
Address:	21A Habarzel street, Ramat Hachayal, Tel Aviv 69710, Israel
Telephone:	972 3645 7859
Fax:	972 3645 6222
E-Mail:	avner.ruta@alvarion.com
Contact name:	Mr. Avner Ruta

4 Test details

Project ID:	20856
Location:	Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started:	6/07/2010
Test completed:	6/08/2010
Test specification(s):	47CFR part 90 subpart Z

5 Tests summary

Test	Status
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 2.1091, 90.1335, RF radiation exposure evaluation	Pass, exhibit provided in Application for certification
Unintentional emissions	
Section 15.107, Class B, Conducted emission at AC power port	Pass*
Section 15.109, Class A, Radiated emission	Pass*

*Note: refer to test report ALVRAD_FCC.19837_rev1.

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:ALVRAD_FCC.20856.

	Name and Title	Date	Signature
Tested by:	Mr. L. Markel, test engineer	June 8, 2010	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	June 15, 2010	
Approved by:	Mr. M. Nikishin, EMC and Radio group manager	June 16, 2010	

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6 EUT description

6.1 General information

The EUT, base station, is a part of BreezeMAX Extreme 3.65 high capacity, IP services oriented Broadband Wireless Access system. The BreezeMAX Extreme 3.65 is digital modulated TDD system covering 3650 MHz up to 3675 MHz range. The system contains a base station unit and a subscriber unit.
The basic base station system configuration is all outdoor-box configurations that contain a power supply, a MODEM and the radio part.

6.2 EUT modules and sub-assemblies

Description	Manufacturer	Model or P/N	Hardware rev.	Serial number
AC power adaptor	PS1082	0525B5555	A	A30737095990

6.3 EUT options/configurations

Mode or Number	Operating mode description
Transmit	MIMO transmit mode via both Tx chains/SISO transmit mode via each chain
Option 1	EUT powered via AC power adaptor 120 VAC to 52 VDC
Option 2	EUT powered via external 48 VDC PS

6.4 Ports and lines

Port type	Port description	Conn. from	Conn. to	Qty.	Cable type	Cable length	Indoor / outdoor
RF	Antenna	Base station	Termination	2	Coax	NA	Outdoor
RF GPS	Antenna GPS	Base station	Antenna external	1	Coax	15	Outdoor
Signal	GPS In/Out	Base station (GPS Out)	Base station (GPS In)	1	Shielded	2	Outdoor
Option 1							
Power	AC power	AC mains	Power adaptor	1	Unshielded	1.5	Indoor
Signal	DATA/DC	Power adaptor	Base station	1	Shielded	3	Outdoor
Power	DC power	Base station (DC in)	Open circuit	1	Shielded	20	Outdoor
Signal	Ethernet	Power adaptor	Laptop	1	Unshielded	10	Indoor
Option 2							
Power	DC power	48 VDC supply	Base station (DC in)	1	Shielded	20	Outdoor
Signal	Ethernet	Base station	Laptop PC	1	Shielded	10	Outdoor

6.5 Support and test equipment

Description	Manufacturer	Model number	Serial number
PC laptop	IBM (lenovo)	T61	L3-CP819 08/05

6.6 Operating frequencies

Source	Frequency, MHz
Tx/Rx	3653.5 – 3671.5
LO	3130 - 3155

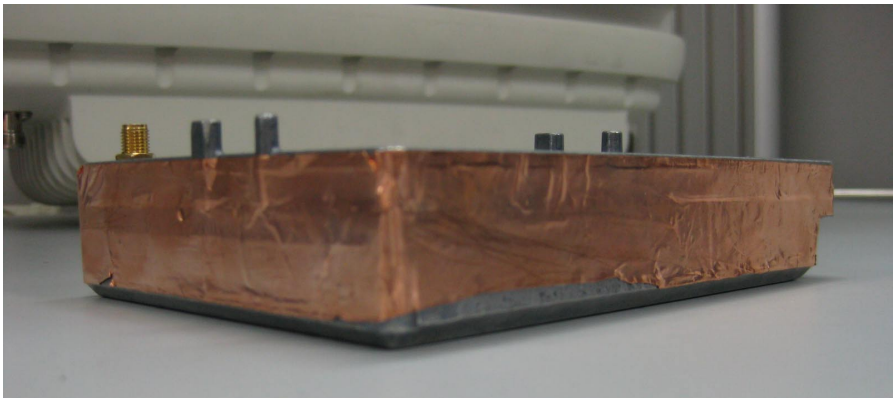
6.7 Changes made in the EUT

To withstand the standard requirements the following changes were implemented in the EUT:

1) The shielding between two parts of RF head enclosure was improved as shown in Photograph 6.7.1;
2) An absorber material was installed around the RF head connector as shown in Photograph 6.7.2;
3) The 10 MHz clock of GPS synchronization was disabled.

It is manufacturer responsibility to implement the change in the production version of the EUT. In any case the test report applies to the tested item only.

Photograph 6.7.1 RF head enclosure with shielding improved



Photograph 6.7.2 RF head connector

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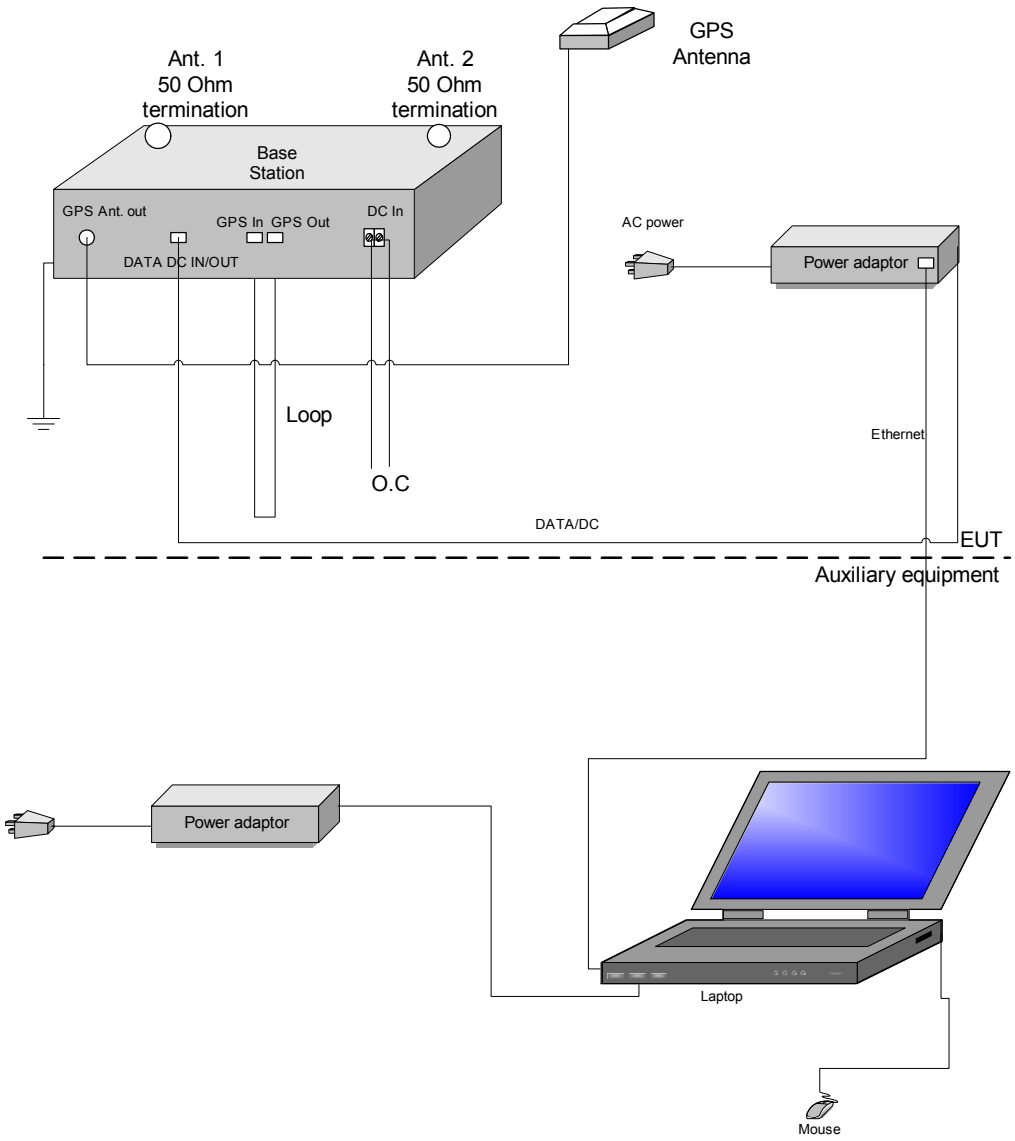
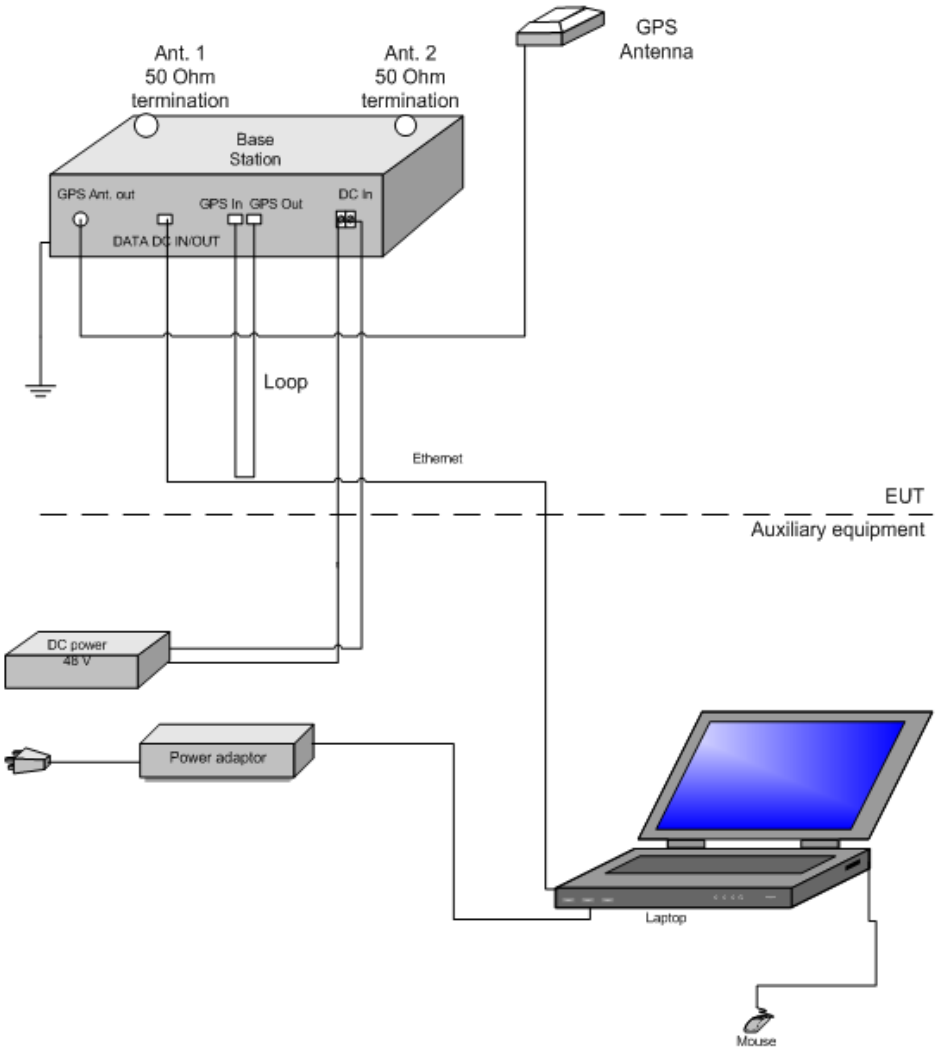
6.8 Test configuration

Option 1



Option 2


GPS
Antenna
Ant. 1
50 Ohm
termination
Ant. 2
50 Ohm
termination
Base
Station
GPS Ant. out
GPS In
GPS Out
DC In
DATA DC IN/OUT
Loop
Ethernet
EUT
Auxiliary equipment
DC power
48 V
Power adaptor
Laptop
Mouse

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6.9 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 – 3675 MHz
Operating frequency range	3653.5 – 3671.5 MHz
RF channel spacing	7 MHz, 14 MHz, 20 MHz
Maximum rated output power	EIRP, total: 37.59 dBm for 7 MHz CS 38.57 dBm for 14 MHz CS 38.62 dBm for 20 MHz CS

Is transmitter output power variable?				
	No			
V	Yes		continuous variable	
		V	stepped variable with stepsize	1 dB
		minimum RF power		17 dBm
		maximum RF power, total		28.29 dBm for 7 MHz CS 28.68 dBm for 14 MHz CS 28.67 dBm for 20 MHz CS

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

Antenna/s technical characteristics

Type	Manufacturer	Model number	Gain	Feeder loss	Assembly gain
Integral dual slant	PCTEL	P/N AN1429-01 Rev.A	13 dBi	NA	13.0 dBi
External omni-directional	Alvarion	P/N 300609 Rev.A	10 dBi	0.7 dB	9.3 dBi
External dual slant	Alvarion	P/N 300644 Rev.A	16.5 dBi	0.7 dB	15.8 dBi

Transmitter 99% power bandwidth, MHz	6.38 MHz, 13.3 MHz, 18.965 MHz
Type of modulation	QPSK1/2, QPSK3/4, 16QAM1/2,16QAM3/4, 64QAM5/6
Modulating test signal (baseband)	PRBS
Maximum transmitter duty cycle in normal use	60%

Transmitter power source					
		Nominal rated voltage		Battery type	
V	DC	**Nominal rated voltage**	48 V (option 2)		
V	AC mains	**Nominal rated voltage**	120 V (option 1)	Frequency	60 Hz

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:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	Air Pressure: 1010 hPa	Relative Humidity: 44 %	Power Supply: 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.

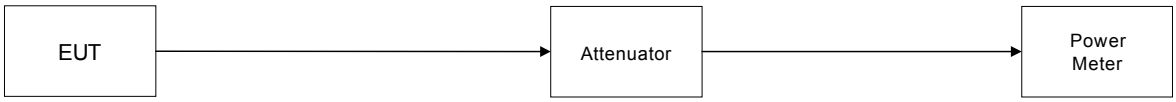
Table 7.1.1 Peak output power and spectral density limits

Assigned frequency range, MHz	Channel bandwidth, MHz	Maximum EIRP, dBm		EIRP power spectral density, dBm/MHz
		W	dBm	
3650.0 – 3675.0	7	7	38.45	30.0
	14	14	41.46	
	20	20	43.00	

7.1.2 Test procedure

7.1.2.1 The EUT was set up as shown in Figure 7.1.1, energized and its proper operation was checked.
7.1.2.2 The EUT was adjusted to produce maximum available to the end user RF output power.
7.1.2.3 The peak output power was measured with power meter as provided in Table 7.1.2 and the associated plots.
7.1.2.4 All test results are provided in Table 7.1.2 to Table 7.1.19 and the associated plots.

Figure 7.1.1 Peak output power 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:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	Air Pressure: 1010 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Table 7.1.2 EIRP test results

ASSIGNED FREQUENCY RANGE: 3650 – 3675 MHz
DETECTOR USED: Average (Power Meter)
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
ANTENNA ASSEMBLY GAIN*: 9.3 dBi
CHANNEL BANDWITH: 7 MHz

Carrier frequency, MHz	RF output power, dBm		External loss, dB	Total RF output power calculated**, dBm	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
	Ant. 1	Ant. 2						
3653.5	24.95	25.39	Included	28.19	37.49	38.45	-0.96	Pass
3662.5	25.10	25.45	Included	28.29	37.59	38.45	-0.86	Pass
3671.5	25.03	25.35	Included	28.20	37.50	38.45	-0.95	Pass

* - Antenna assembly gain = Antenna gain (10 dBi) – minimum declared feeder loss (0.7 dB)
** - RF output power calculated, dBm = 10 log{10^[P(dBm,Ant1)/10]+ 10^[P(dBm,Ant2)/10]}
*** - EIRP total, dBm = RF output power calculated, dBm + Antenna Assembly Gain, dBi

Table 7.1.3 EIRP spectral density test results

ASSIGNED FREQUENCY RANGE: 3650 – 3675 MHz
DETECTOR USED: Average
RESOLUTION BANDWIDTH: 1000 kHz
VIDEO BANDWIDTH: 3000 kHz
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
ANTENNA ASSEMBLY GAIN*: 9.3 dBi
CHANNEL BANDWITH: 7 MHz

Carrier frequency, MHz	RF output power, dBm/MHz		External loss, dB	Total RF output power spectral density calculated**, dBm/MHz	EIRP total**, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
	Ant. 1	Ant. 2						
3653.5	17.42	17.69	Included	20.57	29.87	30.00	-0.13	Pass
3662.5	17.57	17.70	Included	20.65	29.95	30.00	-0.05	Pass
3671.5	17.55	17.81	Included	20.69	29.99	30.00	-0.01	Pass

* - Antenna assembly gain = Antenna gain (10 dBi) – minimum declared feeder loss (0.7 dB)
** - RF output power spectral density calculated, dBm/MHz = 10 log{10^[P(dBm/MHz,Ant1)/10] + 10^[P(dBm/MHz,Ant2)/10]}
*** - EIRP total, dBm/MHz = RF output power calculated, dBm/MHz + Antenna Assembly Gain, dBi

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:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	Air Pressure: 1010 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Table 7.1.4 EIRP test results

ASSIGNED FREQUENCY RANGE: 3650 – 3675 MHz
DETECTOR USED: Average (Power Meter)
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
ANTENNA GAIN: 13 dBi
CHANNEL BANDWITH: 7 MHz

Carrier frequency, MHz	RF output power, dBm		External loss, dB	Total RF output power calculated*, dBm	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
	Ant. 1	Ant. 2						
3653.5	21.04	21.43	Included	24.25	37.25	38.45	-1.20	Pass
3662.5	21.07	21.41	Included	24.25	37.25	38.45	-1.20	Pass
3671.5	21.05	21.47	Included	24.28	37.28	38.45	-1.17	Pass

* - RF output power calculated, dBm = 10 log{10^[P(dBm,Ant1)/10]+ 10^[P(dBm,Ant2)/10]}
** - EIRP total, dBm = RF output power calculated, dBm + Antenna Assembly Gain, dBi

Table 7.1.5 EIRP spectral density test results

ASSIGNED FREQUENCY RANGE: 3650 – 3675 MHz
DETECTOR USED: Average
RESOLUTION BANDWIDTH: 1000 kHz
VIDEO BANDWIDTH: 3000 kHz
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
ANTENNA GAIN: 13 dBi
CHANNEL BANDWITH: 7 MHz

Carrier frequency, MHz	RF output power, dBm/MHz		External loss, dB	Total RF output power spectral density calculated*, dBm/MHz	EIRP total**, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
	Ant. 1	Ant. 2						
3653.5	13.42	13.70	Included	16.57	29.57	30.00	-0.43	Pass
3662.5	13.36	13.83	Included	16.61	29.61	30.00	-0.39	Pass
3671.5	13.40	13.95	Included	16.69	29.69	30.00	-0.31	Pass

* - RF output power spectral density calculated, dBm/MHz = 10 log{10^[P(dBm/MHz,Ant1)/10] + 10^[P(dBm/MHz,Ant2)/10]}
** - EIRP total, dBm/MHz = RF output power calculated, dBm/MHz + Antenna Assembly Gain, dBi

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:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	Air Pressure: 1010 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Table 7.1.6 EIRP test results

ASSIGNED FREQUENCY RANGE: 3650 – 3675 MHz
DETECTOR USED: Average (Power Meter)
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
ANTENNA ASSEMBLY GAIN*: 15.8 dBi
CHANNEL BANDWITH: 7 MHz

Carrier frequency, MHz	RF output power, dBm		External loss, dB	Total RF output power calculated**, dBm	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
	Ant. 1	Ant. 2						
3653.5	18.09	18.44	Included	21.28	37.08	38.45	-1.37	Pass
3662.5	18.34	18.51	Included	21.44	37.24	38.45	-1.21	Pass
3671.5	18.37	18.51	Included	21.45	37.25	38.45	-1.20	Pass

* - Antenna assembly gain = Antenna gain (16.5 dBi) – minimum declared feeder loss (0.7 dB)
** - RF output power calculated, dBm = 10 log{10^[P(dBm,Ant1)/10]+ 10^[P(dBm,Ant2)/10]}
*** - EIRP total, dBm = RF output power calculated, dBm + Antenna Assembly Gain, dBi

Table 7.1.7 EIRP spectral density test results

ASSIGNED FREQUENCY RANGE: 3650 – 3675 MHz
DETECTOR USED: Average
RESOLUTION BANDWIDTH: 1000 kHz
VIDEO BANDWIDTH: 3000 kHz
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
ANTENNA ASSEMBLY GAIN*: 15.8 dBi
CHANNEL BANDWITH: 7 MHz

Carrier frequency, MHz	RF output power, dBm/MHz		External loss, dB	Total RF output power spectral density calculated**, dBm/MHz	EIRP total***, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
	Ant. 1	Ant. 2						
3653.5	10.25	10.41	Included	13.34	29.14	30.00	-0.86	Pass
3662.5	10.37	10.77	Included	13.58	29.38	30.00	-0.62	Pass
3671.5	10.39	10.56	Included	13.49	29.29	30.00	-0.71	Pass

* - Antenna assembly gain = Antenna gain (16.5 dBi) – minimum declared feeder loss (0.7 dB)
** - RF output power spectral density calculated, dBm/MHz = 10 log{10^[P(dBm/MHz,Ant1)/10] + 10^[P(dBm/MHz,Ant2)/10]}
*** - EIRP total, dBm/MHz = RF output power calculated, dBm/MHz + Antenna Assembly Gain, dBi

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:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	Air Pressure: 1010 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Table 7.1.8 EIRP test results

ASSIGNED FREQUENCY RANGE: 3650 – 3675 MHz
DETECTOR USED: Average (Power Meter)
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
ANTENNA ASSEMBLY GAIN*: 9.3 dBi
CHANNEL BANDWITH: 14 MHz

Carrier frequency, MHz	RF output power, dBm		External loss, dB	Total RF output power calculated**, dBm	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
	Ant. 1	Ant. 2						
3657.0	25.48	25.80	Included	28.65	37.95	41.46	-3.51	Pass
3662.5	25.60	25.74	Included	28.68	37.98	41.46	-3.48	Pass
3668.0	25.34	25.90	Included	28.64	37.94	41.46	-3.52	Pass

* - Antenna assembly gain = Antenna gain (10 dBi) – minimum declared feeder loss (0.7 dB)
** - RF output power calculated, dBm = 10 log{10^[P(dBm,Ant1)/10]+ 10^[P(dBm,Ant2)/10]}
*** - EIRP total, dBm = RF output power calculated, dBm + Antenna Assembly Gain, dBi

Table 7.1.9 EIRP spectral density test results

ASSIGNED FREQUENCY RANGE: 3650 – 3675 MHz
DETECTOR USED: Average
RESOLUTION BANDWIDTH: 1000 kHz
VIDEO BANDWIDTH: 3000 kHz
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
ANTENNA ASSEMBLY GAIN*: 9.3 dBi
CHANNEL BANDWITH: 14 MHz

Carrier frequency, MHz	RF output power, dBm/MHz		External loss, dB	Total RF output power spectral density calculated**, dBm/MHz	EIRP total***, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
	Ant. 1	Ant. 2						
3657.0	15.17	15.68	Included	18.44	27.74	30.00	-2.26	Pass
3662.5	15.27	15.58	Included	18.43	27.73	30.00	-2.27	Pass
3668.0	15.65	15.59	Included	18.63	27.93	30.00	-2.07	Pass

* - Antenna assembly gain = Antenna gain (10 dBi) – minimum declared feeder loss (0.7 dB)
** - RF output power spectral density calculated, dBm/MHz = 10 log{10^[P(dBm/MHz,Ant1)/10] + 10^[P(dBm/MHz,Ant2)/10]}
*** - EIRP total, dBm/MHz = RF output power calculated, dBm/MHz + Antenna Assembly Gain, dBi

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:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	Air Pressure: 1010 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Table 7.1.10 EIRP test results

ASSIGNED FREQUENCY RANGE: 3650 – 3675 MHz
DETECTOR USED: Average (Power Meter)
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
ANTENNA GAIN: 13 dBi
CHANNEL BANDWITH: 14 MHz

Carrier frequency, MHz	RF output power, dBm		External loss, dB	Total RF output power calculated*, dBm	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
	Ant. 1	Ant. 2						
3657.0	22.52	22.53	Included	25.54	38.54	41.46	-2.92	Pass
3662.5	22.37	22.68	Included	25.54	38.54	41.46	-2.92	Pass
3668.0	22.30	22.80	Included	25.57	38.57	41.46	-2.89	Pass

* - RF output power calculated, dBm = 10 log{10^[P(dBm,Ant1)/10]+ 10^[P(dBm,Ant2)/10]}
** - EIRP total, dBm = RF output power calculated, dBm + Antenna Assembly Gain, dBi

Table 7.1.11 EIRP spectral density test results

ASSIGNED FREQUENCY RANGE: 3650 – 3675 MHz
DETECTOR USED: Average
RESOLUTION BANDWIDTH: 1000 kHz
VIDEO BANDWIDTH: 3000 kHz
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
ANTENNA GAIN: 13 dBi
CHANNEL BANDWITH: 14 MHz

Carrier frequency, MHz	RF output power, dBm/MHz		External loss, dB	Total RF output power spectral density calculated*, dBm/MHz	EIRP total**, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
	Ant. 1	Ant. 2						
3657.0	12.08	12.43	Included	15.27	28.27	30.00	-1.73	Pass
3662.5	12.19	12.52	Included	15.37	28.37	30.00	-1.63	Pass
3668.0	12.01	12.75	Included	15.41	28.41	30.00	-1.59	Pass

* - RF output power spectral density calculated, dBm/MHz = 10 log{10^[P(dBm/MHz,Ant1)/10] + 10^[P(dBm/MHz,Ant2)/10]}
** - EIRP total, dBm/MHz = RF output power calculated, dBm/MHz + Antenna Assembly Gain, dBi

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:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	Air Pressure: 1010 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Table 7.1.12 EIRP test results

ASSIGNED FREQUENCY RANGE: 3650 – 3675 MHz
DETECTOR USED: Average (Power Meter)
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
ANTENNA ASSEMBLY GAIN*: 15.8 dBi
CHANNEL BANDWITH: 14 MHz

Carrier frequency, MHz	RF output power, dBm		External loss, dB	Total RF output power calculated**, dBm	EIRP total***, dBm	Limit, dBm	Margin, dB	Verdict
	Ant. 1	Ant. 2						
3657.0	18.19	18.87	Included	21.55	37.35	41.46	-4.11	Pass
3662.5	18.36	18.74	Included	21.56	37.36	41.46	-4.10	Pass
3668.0	18.58	18.76	Included	21.68	37.48	41.46	-3.98	Pass

* - Antenna assembly gain = Antenna gain (16.5 dBi) – minimum declared feeder loss (0.7 dB)
** - RF output power calculated, dBm = 10 log{10^[P(dBm,Ant1)/10]+ 10^[P(dBm,Ant2)/10]}
*** - EIRP total, dBm = RF output power calculated, dBm + Antenna Assembly Gain, dBi

Table 7.1.13 EIRP spectral density test results

ASSIGNED FREQUENCY RANGE: 3650 – 3675 MHz
DETECTOR USED: Average
RESOLUTION BANDWIDTH: 1000 kHz
VIDEO BANDWIDTH: 3000 kHz
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
ANTENNA ASSEMBLY GAIN*: 15.8 dBi
CHANNEL BANDWITH: 14 MHz

Carrier frequency, MHz	RF output power, dBm/MHz		External loss, dB	Total RF output power spectral density calculated**, dBm/MHz	EIRP total***, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
	Ant. 1	Ant. 2						
3657.0	8.03	8.31	Included	11.18	26.98	30.00	-3.02	Pass
3662.5	8.03	8.28	Included	11.17	26.97	30.00	-3.03	Pass
3668.0	8.08	8.44	Included	11.27	27.07	30.00	-2.93	Pass

* - Antenna assembly gain = Antenna gain (16.5 dBi) – minimum declared feeder loss (0.7 dB)
** - RF output power spectral density calculated, dBm/MHz = 10 log{10^[P(dBm/MHz,Ant1)/10] + 10^[P(dBm/MHz,Ant2)/10]}
*** - EIRP total, dBm/MHz = RF output power calculated, dBm/MHz + Antenna Assembly Gain, dBi

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:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 44 %	**Power Supply:** 48 VDC
Remarks:			

Table 7.1.14 EIRP test results

ASSIGNED FREQUENCY RANGE: 3650 – 3675 MHz
DETECTOR USED: Average (Power Meter)
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
ANTENNA ASSEMBLY GAIN*: 9.3 dBi
CHANNEL BANDWITH: 20 MHz

Carrier frequency, MHz	RF output power, dBm		External loss, dB	Total RF output power calculated**, dBm	EIRP total***, dBm	Limit, dBm	Margin, dB	Verdict
	Ant. 1	Ant. 2						
3660.0	25.47	25.61	Included	28.55	37.85	43.00	-5.15	Pass
3665.0	25.54	25.78	Included	28.67	37.97	43.00	-5.03	Pass

* - Antenna assembly gain = Antenna gain (10 dBi) – minimum declared feeder loss (0.7 dB)
** - RF output power calculated, dBm = 10 log{10^[P(dBm,Ant1)/10]+ 10^[P(dBm,Ant2)/10]}
*** - EIRP total, dBm = RF output power calculated, dBm + Antenna Assembly Gain, dBi

Table 7.1.15 EIRP spectral density test results

ASSIGNED FREQUENCY RANGE: 3650 – 3675 MHz
DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 1000 kHz
VIDEO BANDWIDTH: 3000 kHz
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
ANTENNA ASSEMBLY GAIN*: 9.3 dBi
CHANNEL BANDWITH: 20 MHz

Carrier frequency, MHz	RF output power, dBm/MHz		External loss, dB	Total RF output power spectral density calculated**, dBm/MHz	EIRP total***, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
	Ant. 1	Ant. 2						
3660.0	13.96	14.39	Included	17.19	26.49	30.00	-3.51	Pass
3665.0	13.84	14.40	Included	17.14	26.44	30.00	-3.56	Pass

* - Antenna assembly gain = Antenna gain (10 dBi) – minimum declared feeder loss (0.7 dB)
** - RF output power spectral density calculated, dBm/MHz = 10 log{10^[P(dBm/MHz,Ant1)/10] + 10^[P(dBm/MHz,Ant2)/10]}
*** - EIRP total, dBm/MHz = RF output power calculated, dBm/MHz + Antenna Assembly Gain, dBi

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:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	Air Pressure: 1010 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Table 7.1.16 EIRP test results

ASSIGNED FREQUENCY RANGE: 3650 – 3675 MHz
DETECTOR USED: Average (Power Meter)
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
ANTENNA GAIN: 13 dBi
CHANNEL BANDWITH: 20 MHz

Carrier frequency, MHz	RF output power, dBm		External loss, dB	Total RF output power calculated*, dBm	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
	Ant. 1	Ant. 2						
3660.0	22.49	22.73	Included	25.62	38.62	43.00	-4.38	Pass
3665.0	22.40	22.64	Included	25.53	38.53	43.00	-4.47	Pass

* - RF output power calculated, dBm = 10 log{10^[P(dBm,Ant1)/10]+ 10^[P(dBm,Ant2)/10]}
** - EIRP total, dBm = RF output power calculated, dBm + Antenna Assembly Gain, dBi

Table 7.1.17 EIRP spectral density test results

ASSIGNED FREQUENCY RANGE: 3650 – 3675 MHz
DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 1000 kHz
VIDEO BANDWIDTH: 3000 kHz
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
ANTENNA GAIN: 13 dBi
CHANNEL BANDWITH: 20 MHz

Carrier frequency, MHz	RF output power, dBm/MHz		External loss, dB	Total RF output power spectral density calculated*, dBm/MHz	EIRP total**, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
	Ant. 1	Ant. 2						
3660.0	10.85	11.06	Included	13.97	26.97	30.00	-3.03	Pass
3665.0	10.85	11.37	Included	14.13	27.13	30.00	-2.87	Pass

* - RF output power spectral density calculated, dBm/MHz = 10 log{10^[P(dBm/MHz,Ant1)/10] + 10^[P(dBm/MHz,Ant2)/10]}
** - EIRP total, dBm/MHz = RF output power calculated, dBm/MHz + Antenna Assembly Gain, dBi

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:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 44 %	**Power Supply:** 48 VDC
Remarks:			

Table 7.1.18 EIRP test results

ASSIGNED FREQUENCY RANGE: 3650 – 3675 MHz
DETECTOR USED: Average (Power Meter)
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
ANTENNA ASSEMBLY GAIN*: 15.8 dBi
CHANNEL BANDWITH: 20 MHz

Carrier frequency, MHz	RF output power, dBm		External loss, dB	Total RF output power calculated**, dBm	EIRP total***, dBm	Limit, dBm	Margin, dB	Verdict
	Ant. 1	Ant. 2						
3660.0	18.39	18.68	Included	21.55	37.35	43.00	-5.65	Pass
3665.0	18.38	18.74	Included	21.57	37.37	43.00	-5.63	Pass

* - Antenna assembly gain = Antenna gain (16.5 dBi) – minimum declared feeder loss (0.7 dB)
** - RF output power calculated, dBm = 10 log{10^[P(dBm,Ant1)/10]+ 10^[P(dBm,Ant2)/10]}
*** - EIRP total, dBm = RF output power calculated, dBm + Antenna Assembly Gain, dBi

Table 7.1.19 EIRP spectral density test results

ASSIGNED FREQUENCY RANGE: 3650 – 3675 MHz
DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 1000 kHz
VIDEO BANDWIDTH: 3000 kHz
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
ANTENNA ASSEMBLY GAIN*: 15.8 dBi
CHANNEL BANDWITH: 20 MHz

Carrier frequency, MHz	RF output power, dBm/MHz		External loss, dB	Total RF output power spectral density calculated**, dBm/MHz	EIRP total***, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
	Ant. 1	Ant. 2						
3660.0	6.67	6.90	Included	9.80	25.60	30.00	-4.40	Pass
3665.0	6.65	6.99	Included	9.83	25.63	30.00	-4.37	Pass

* - Antenna assembly gain = Antenna gain (16.5 dBi) – minimum declared feeder loss (0.7 dB)
** - RF output power spectral density calculated, dBm/MHz = 10 log{10^[P(dBm/MHz,Ant1)/10] + 10^[P(dBm/MHz,Ant2)/10]}
*** - EIRP total, dBm/MHz = RF output power calculated, dBm/MHz + Antenna Assembly Gain, dBi

Reference numbers of manufacture's test equipment used

#2	#3	#4	#5				

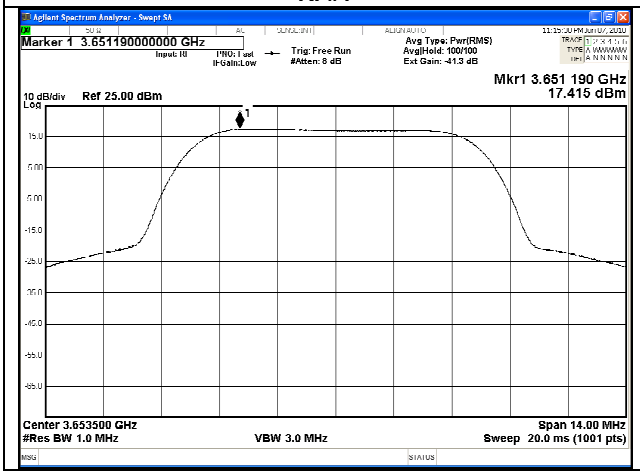
Full description is given in Appendix A.

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:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	Air Pressure: 1010 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

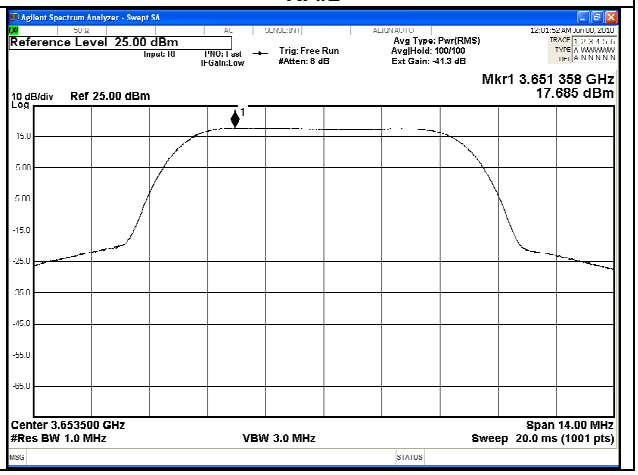
Plot 7.1.1 Peak output power spectral density test results at low frequency

ANTENNA GAIN:	10 dBi
CHANNEL BANDWIDTH:	7 MHz

RF#1



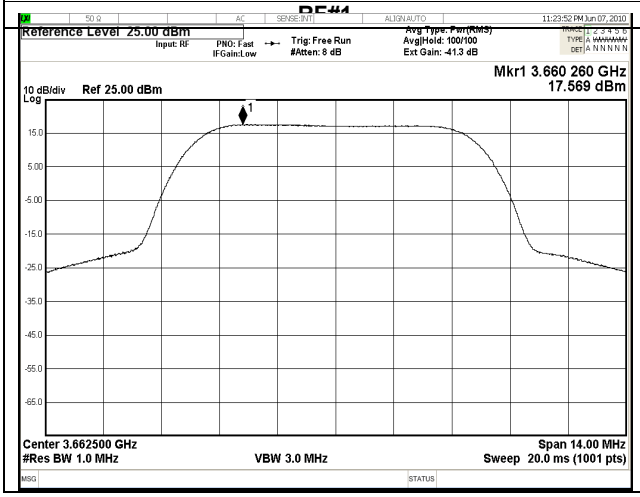
RF#2



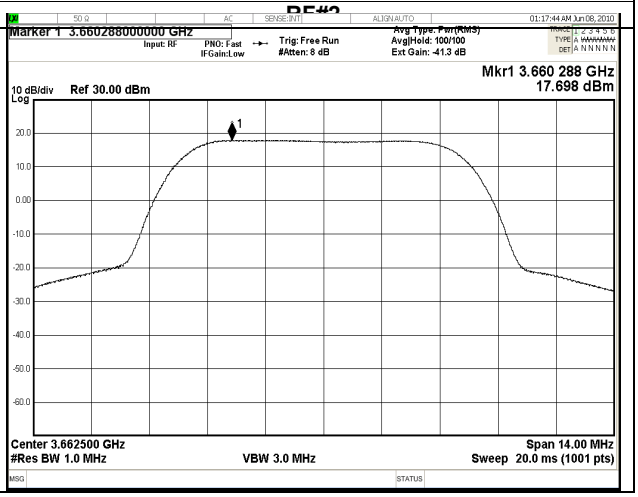
Plot 7.1.2 Peak output power spectral density test results at mid frequency

ANTENNA GAIN:	10 dBi
CHANNEL BANDWIDTH:	7 MHz

RF#1

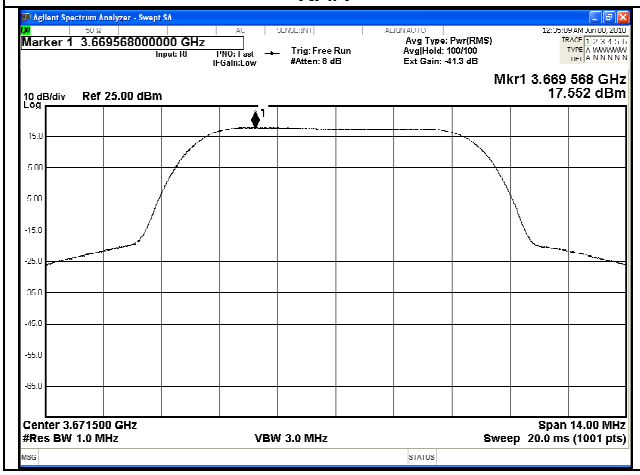
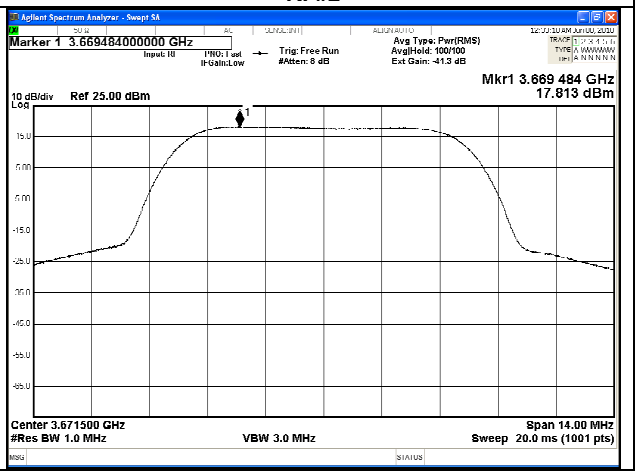


RF#2



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:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 44 %	**Power Supply:** 48 VDC
Remarks:			

Plot 7.1.3 Peak output power spectral density test results at high frequency

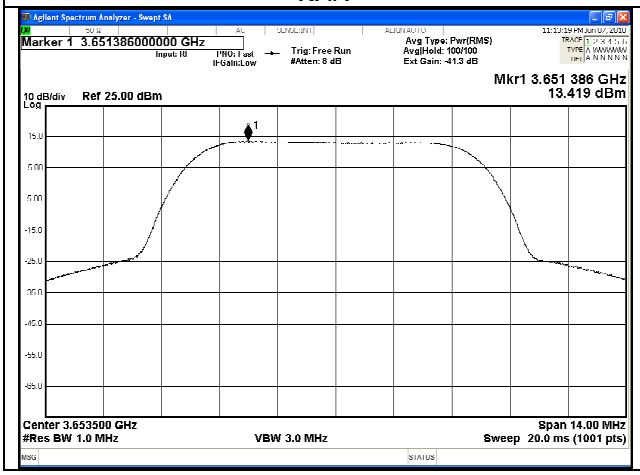
ANTENNA GAIN:	10 dBi
CHANNEL BANDWIDTH:	7 MHz
RF#1	**RF#2**
	

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:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	Air Pressure: 1010 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

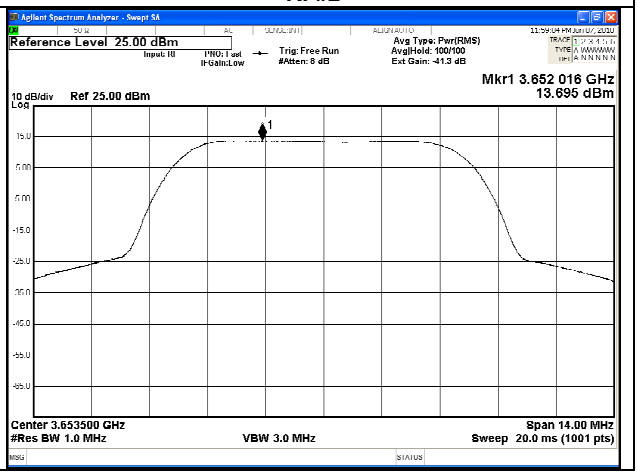
Plot 7.1.4 Peak output power spectral density test results at low frequency

ANTENNA GAIN:	13 dBi
CHANNEL BANDWIDTH:	7 MHz

RF#1



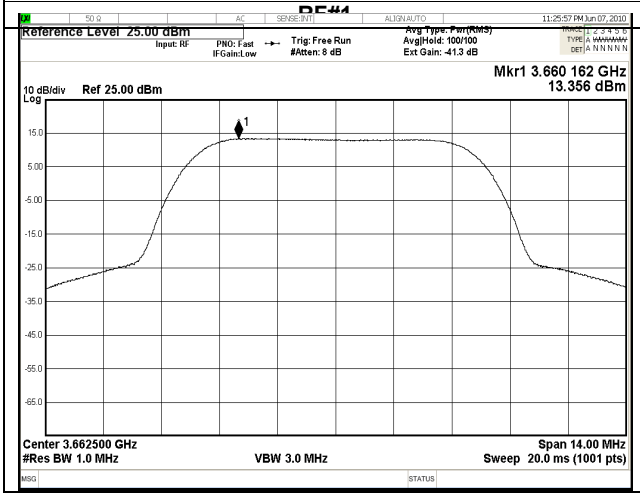
RF#2



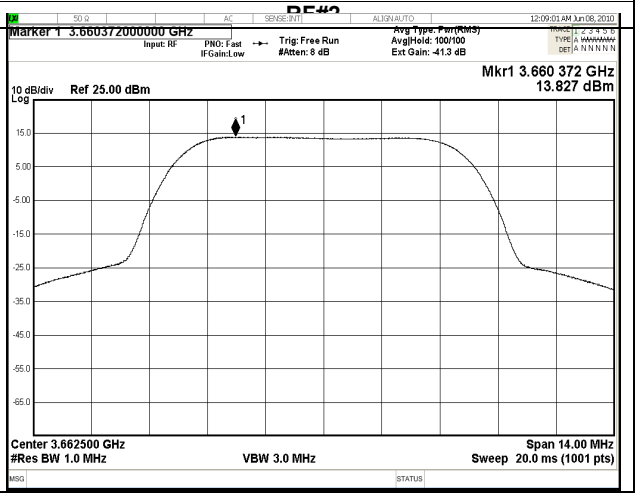
Plot 7.1.5 Peak output power spectral density test results at mid frequency

ANTENNA GAIN:	13 dBi
CHANNEL BANDWIDTH:	7 MHz

RF#1

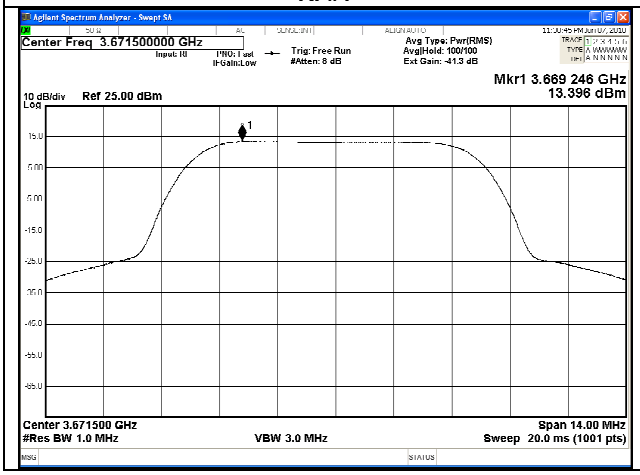
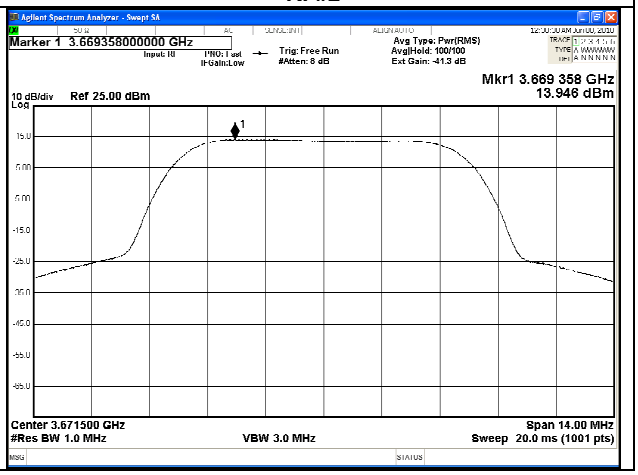


RF#2



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:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 44 %	**Power Supply:** 48 VDC
Remarks:			

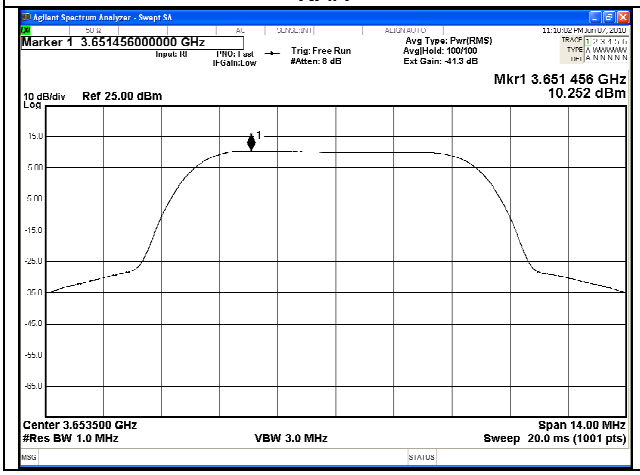
Plot 7.1.6 Peak output power spectral density test results at high frequency

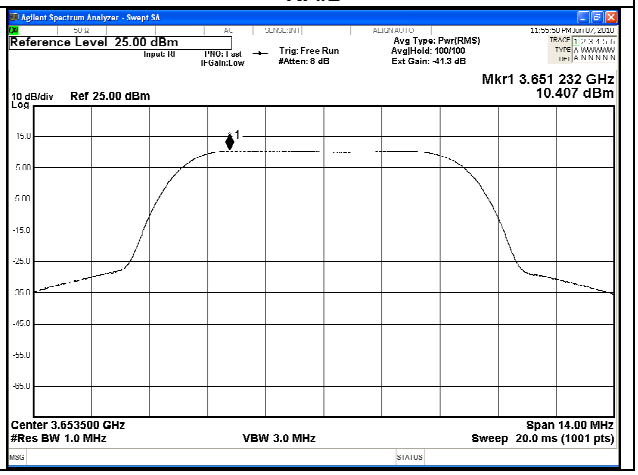
ANTENNA GAIN:	13 dBi
CHANNEL BANDWIDTH:	7 MHz
RF#1	**RF#2**
	

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:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	Air Pressure: 1010 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.7 Peak output power spectral density test results at low frequency

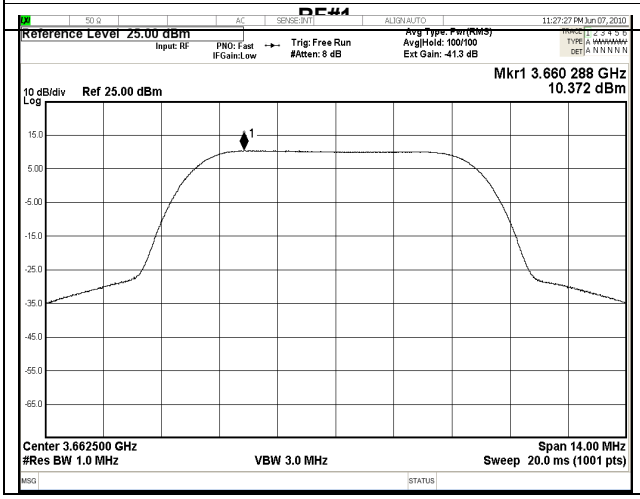
ANTENNA GAIN:	16.5 dBi
CHANNEL BANDWIDTH:	7 MHz
RF#1	**RF#2**

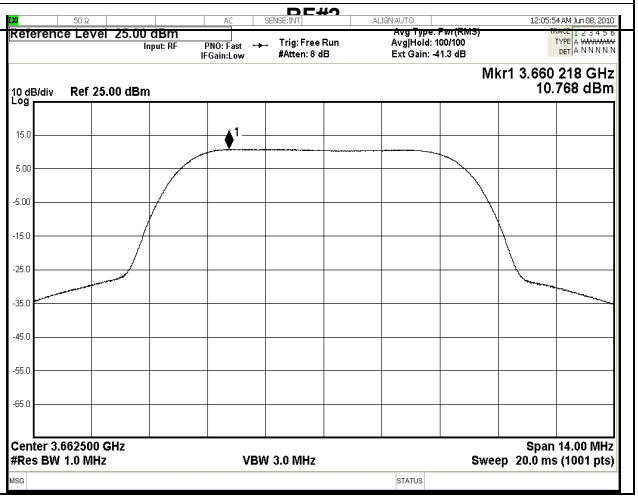




Plot 7.1.8 Peak output power spectral density test results at mid frequency

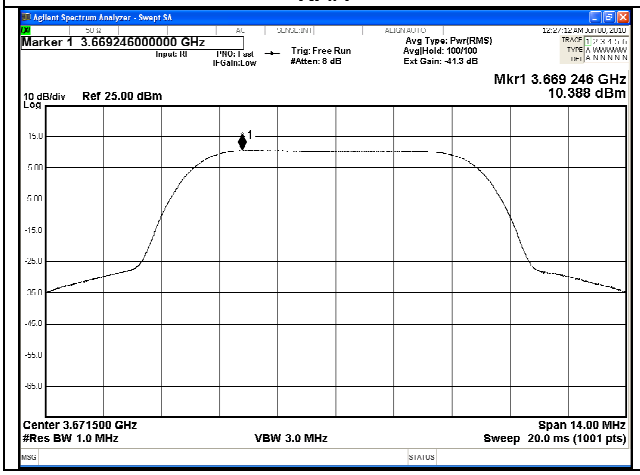
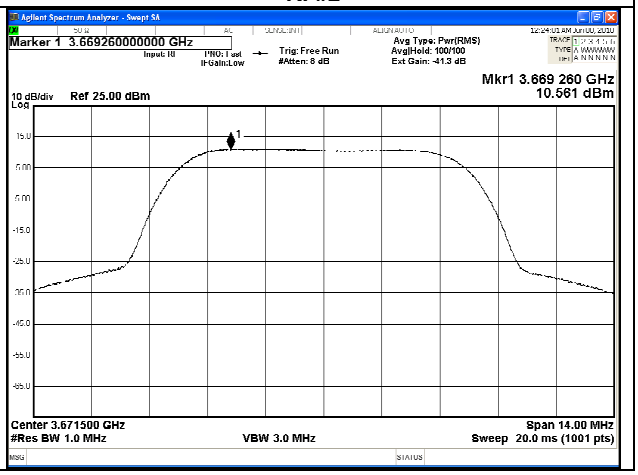
ANTENNA GAIN:	16.5 dBi
CHANNEL BANDWIDTH:	7 MHz
RF#1	**RF#2**





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:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 44 %	**Power Supply:** 48 VDC
Remarks:			

Plot 7.1.9 Peak output power spectral density test results at high frequency

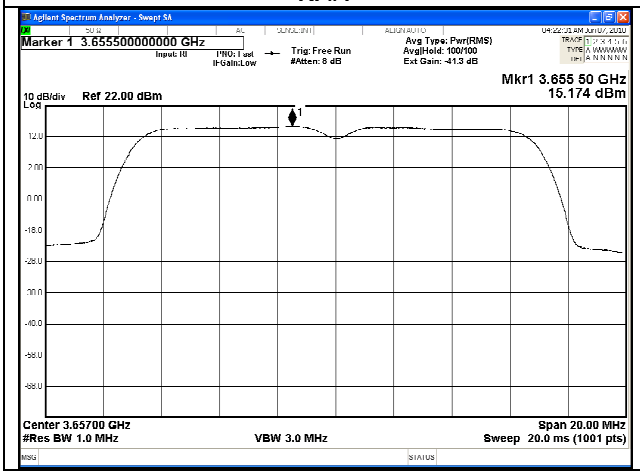
ANTENNA GAIN:	16.5 dBi
CHANNEL BANDWIDTH:	7 MHz
RF#1	**RF#2**
	

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:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	Air Pressure: 1010 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

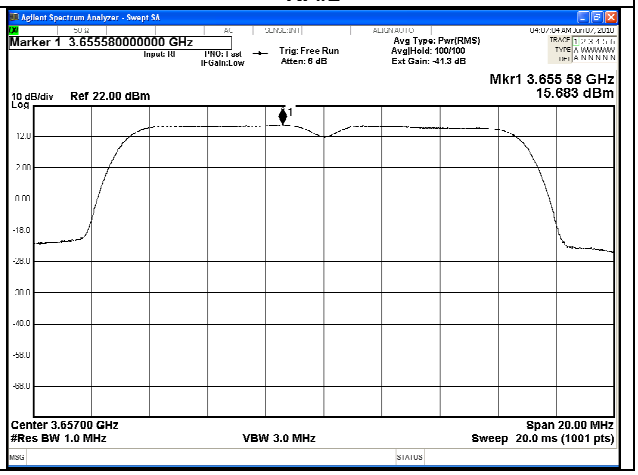
Plot 7.1.10 Peak output power spectral density test results at low frequency

ANTENNA GAIN:	10 dBi
CHANNEL BANDWIDTH:	14 MHz

RF#1



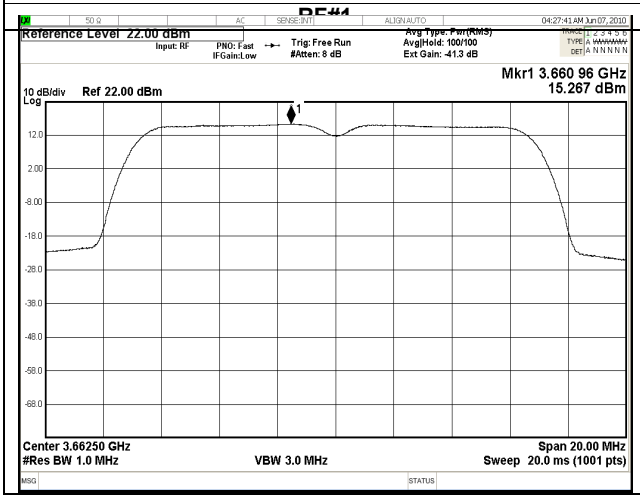
RF#2



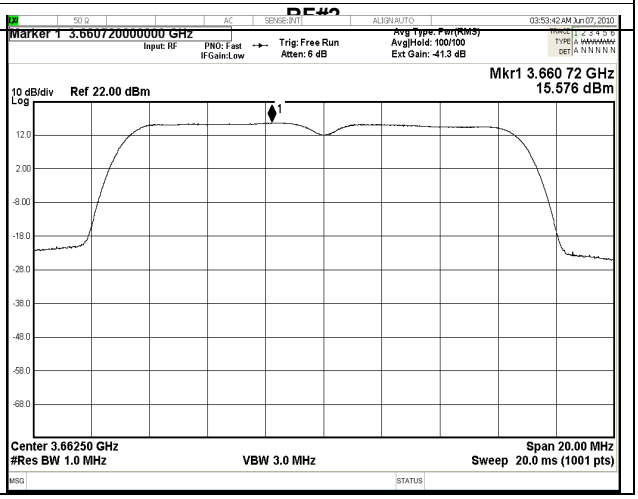
Plot 7.1.11 Peak output power spectral density test results at mid frequency

ANTENNA GAIN:	10 dBi
CHANNEL BANDWIDTH:	14 MHz

RF#1

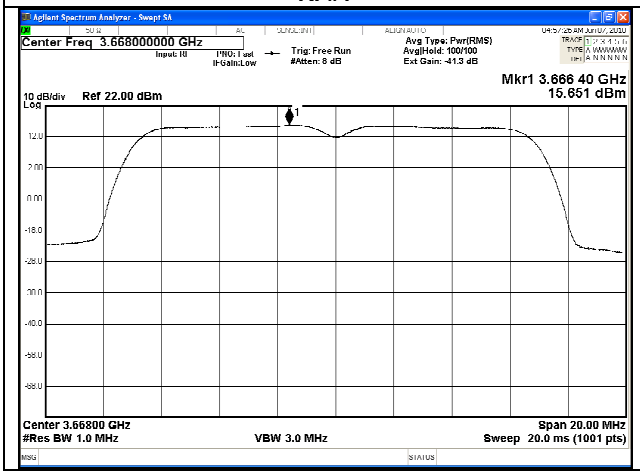
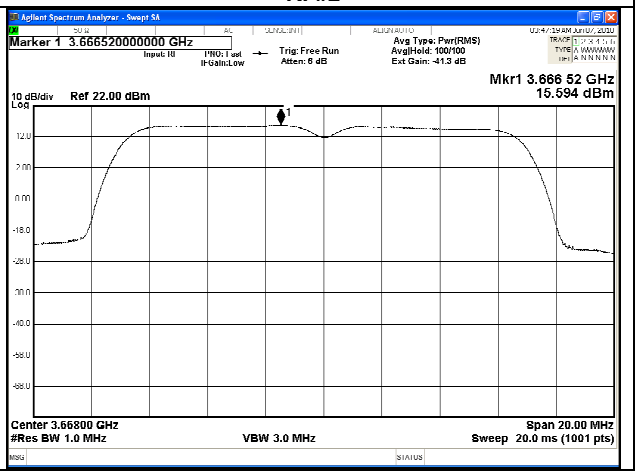


RF#2



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:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 44 %	**Power Supply:** 48 VDC
Remarks:			

Plot 7.1.12 Peak output power spectral density test results at high frequency

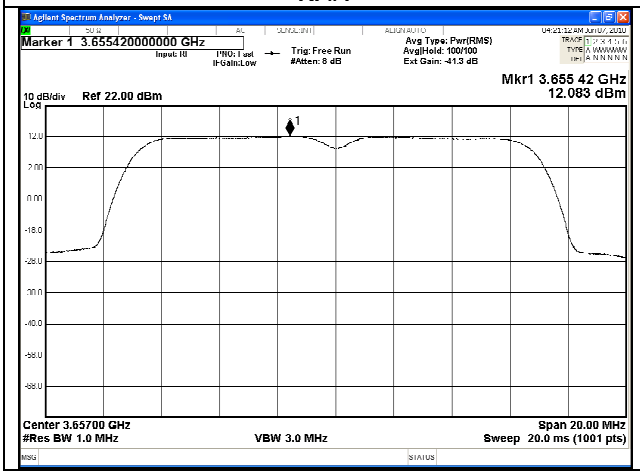
ANTENNA GAIN:	10 dBi
CHANNEL BANDWIDTH:	14 MHz
RF#1	**RF#2**
	

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:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	Air Pressure: 1010 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

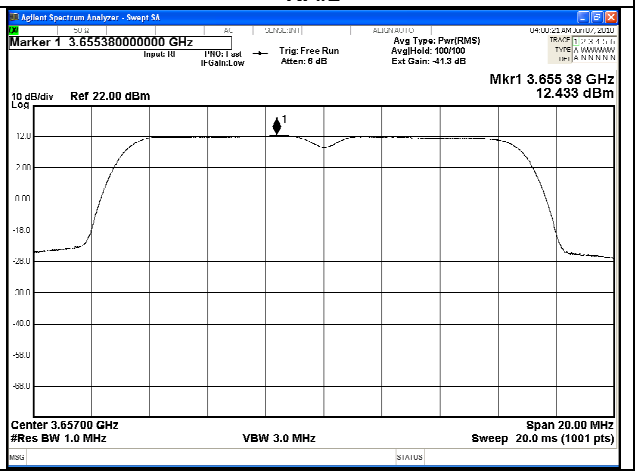
Plot 7.1.13 Peak output power spectral density test results at low frequency

ANTENNA GAIN:	13 dBi
CHANNEL BANDWIDTH:	14 MHz

RF#1



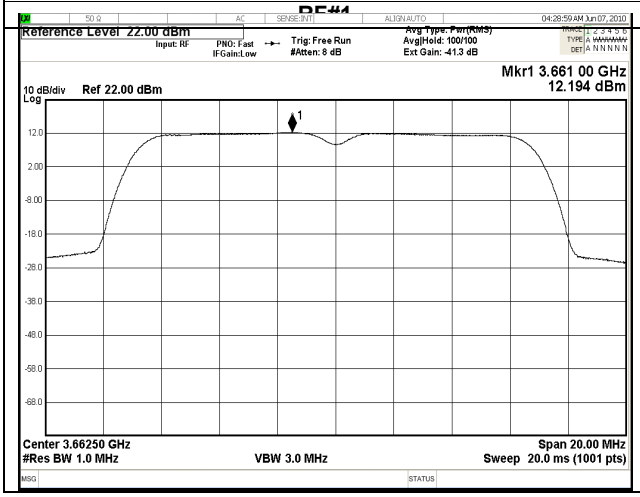
RF#2



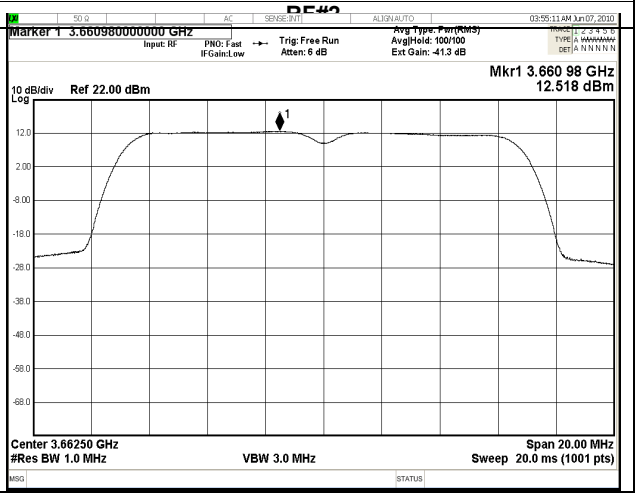
Plot 7.1.14 Peak output power spectral density test results at mid frequency

ANTENNA GAIN:	13 dBi
CHANNEL BANDWIDTH:	14 MHz

RF#1

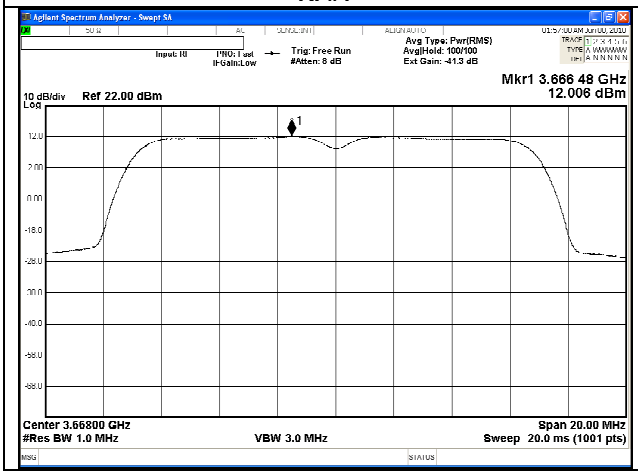
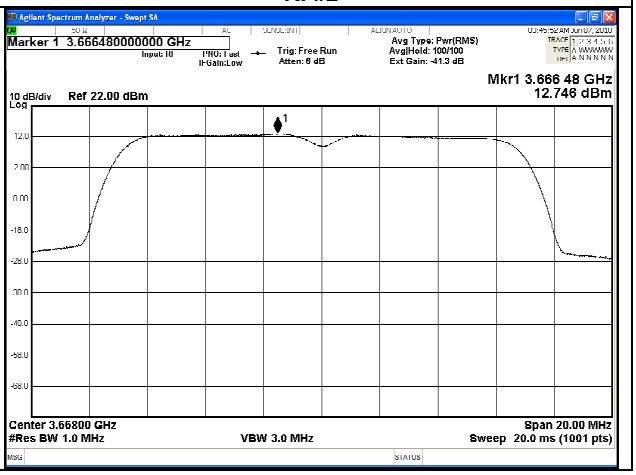


RF#2



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:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 44 %	**Power Supply:** 48 VDC
Remarks:			

Plot 7.1.15 Peak output power spectral density test results at high frequency

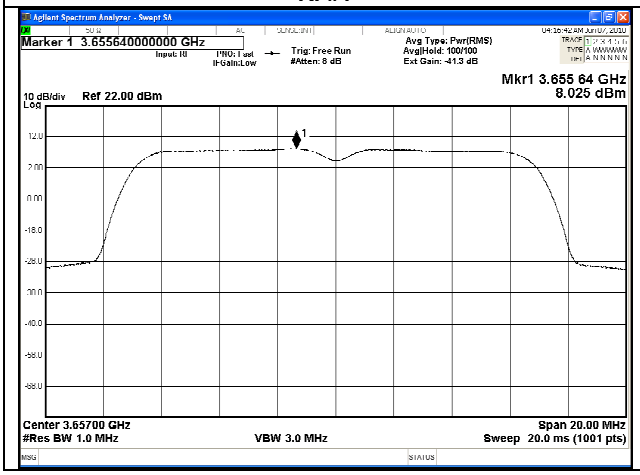
ANTENNA GAIN:	13 dBi
CHANNEL BANDWIDTH:	14 MHz
RF#1	**RF#2**
	

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:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	Air Pressure: 1010 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

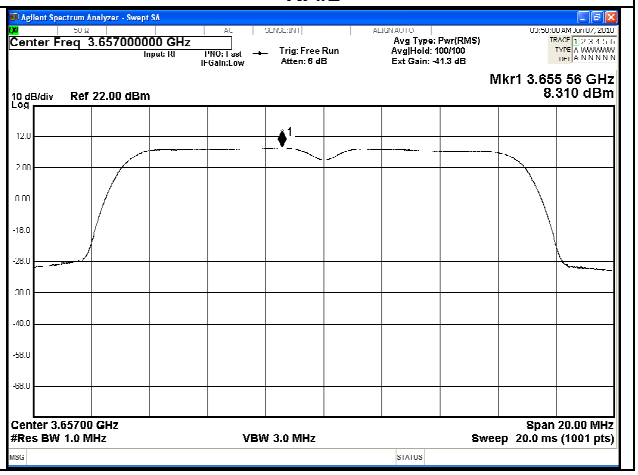
Plot 7.1.16 Peak output power spectral density test results at low frequency

ANTENNA GAIN:	16.5 dBi
CHANNEL BANDWIDTH:	14 MHz

RF#1



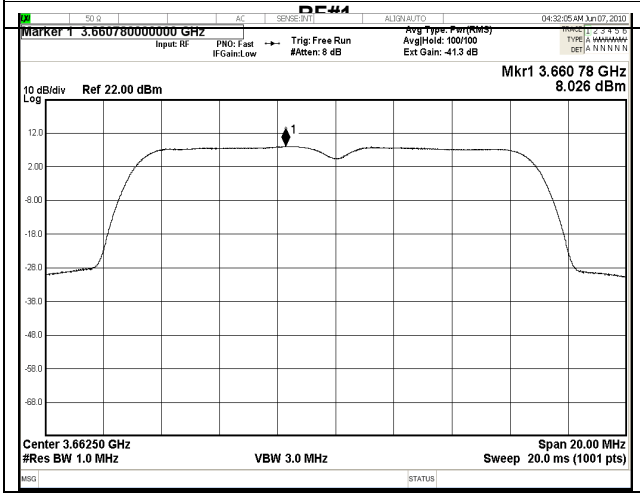
RF#2



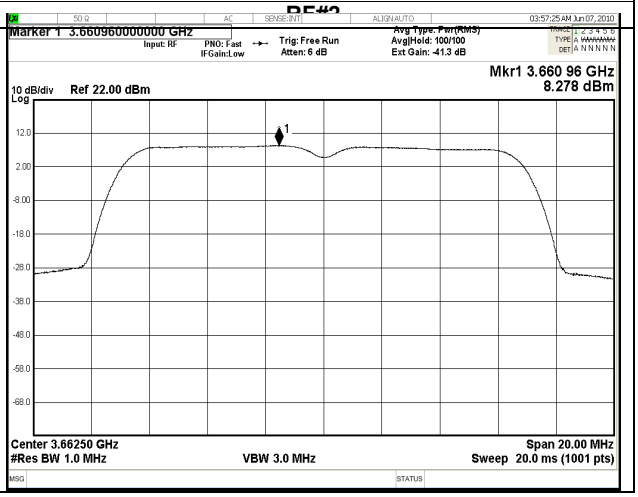
Plot 7.1.17 Peak output power spectral density test results at mid frequency

ANTENNA GAIN:	16.5 dBi
CHANNEL BANDWIDTH:	14 MHz

RF#1

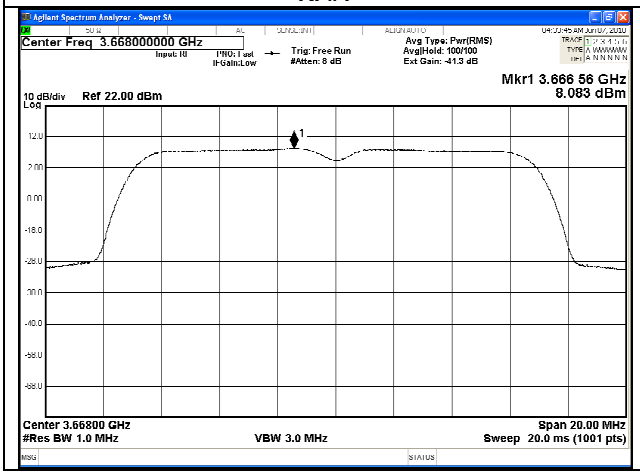
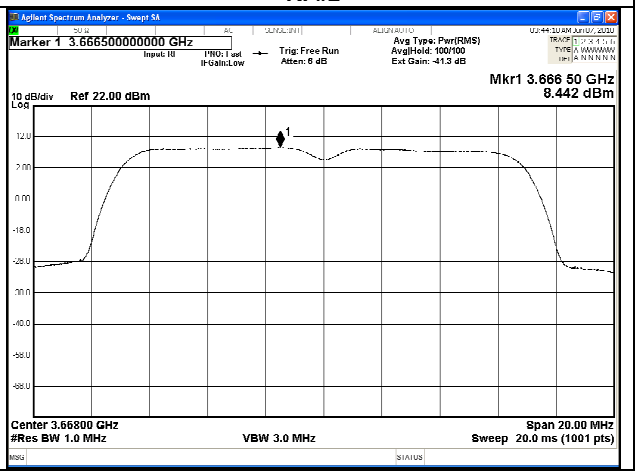


RF#2



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:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 44 %	**Power Supply:** 48 VDC
Remarks:			

Plot 7.1.18 Peak output power spectral density test results at high frequency

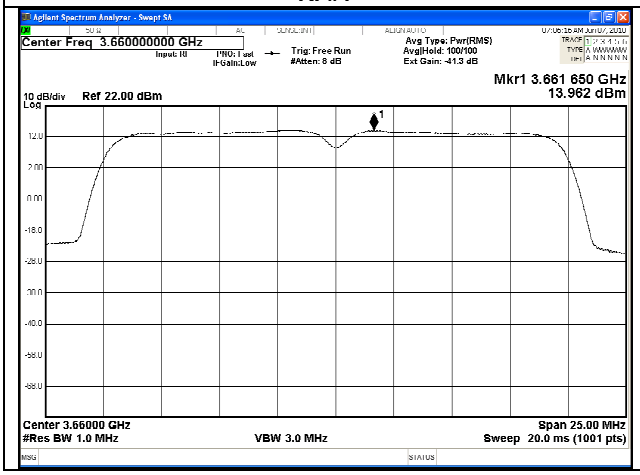
ANTENNA GAIN:	16.5 dBi
CHANNEL BANDWIDTH:	14 MHz
RF#1	**RF#2**
	

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:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	Air Pressure: 1010 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

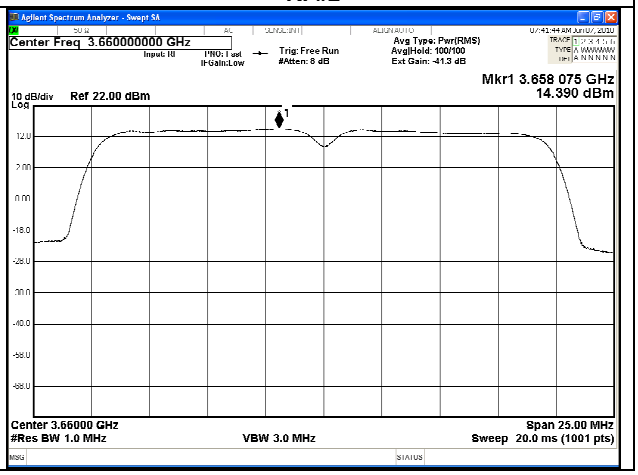
Plot 7.1.19 Peak output power spectral density test results at low frequency

ANTENNA GAIN:	10 dBi
CHANNEL BANDWIDTH:	20 MHz

RF#1



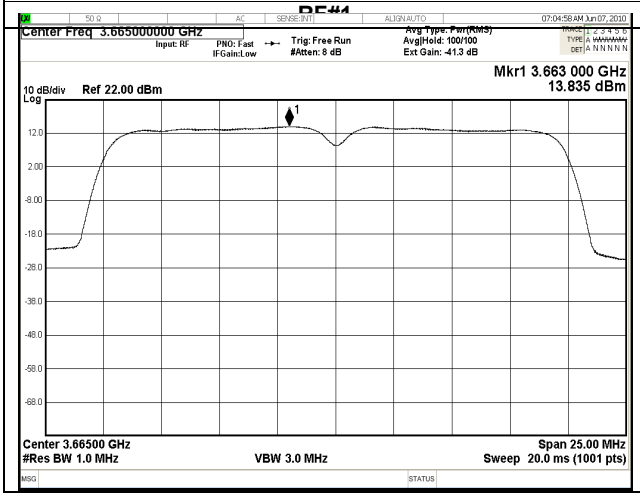
RF#2



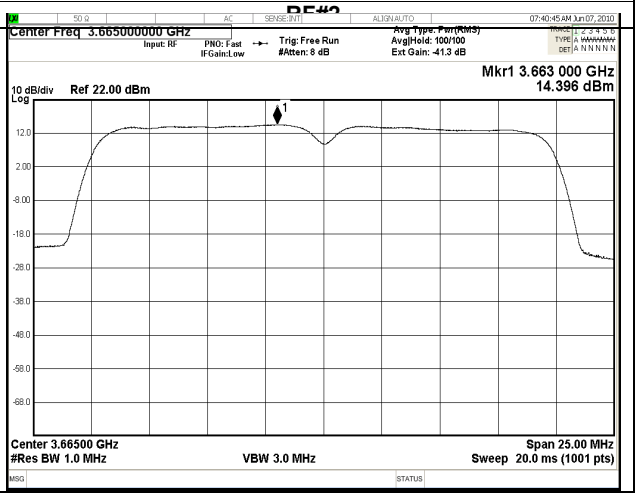
Plot 7.1.20 Peak output power spectral density test results at high frequency

ANTENNA GAIN:	10 dBi
CHANNEL BANDWIDTH:	20 MHz

RF#1



RF#2

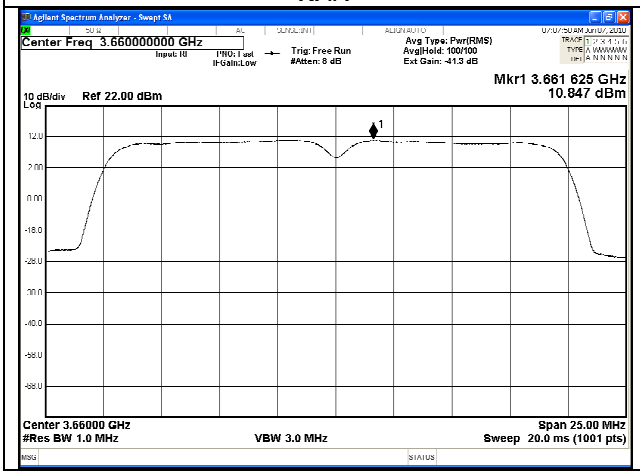


Test specification:	Section 90.1321, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	Air Pressure: 1010 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

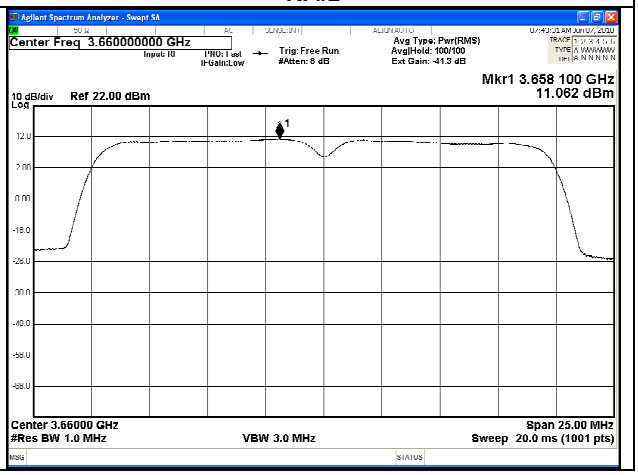
Plot 7.1.21 Peak output power spectral density test results at low frequency

ANTENNA GAIN:	13 dBi
CHANNEL BANDWIDTH:	20 MHz

RF#1



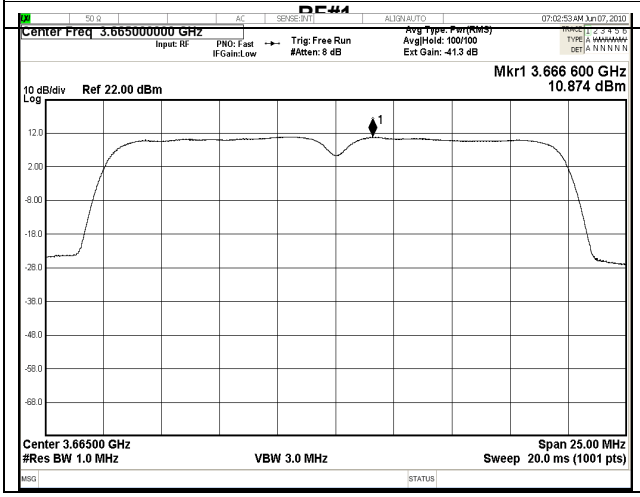
RF#2



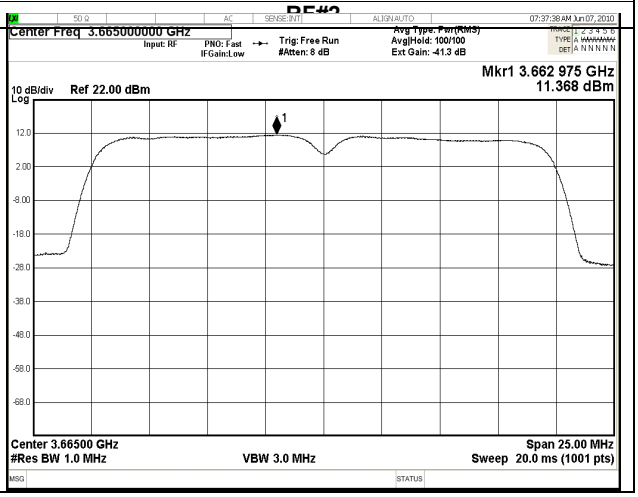
Plot 7.1.22 Peak output power spectral density test results at high frequency

ANTENNA GAIN:	13 dBi
CHANNEL BANDWIDTH:	20 MHz

RF#1



RF#2

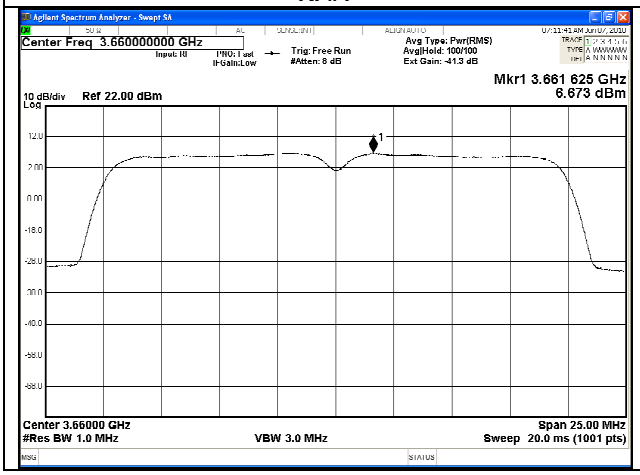


Test specification:	Section 90.1321, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/07/2010 11:15:32 AM		
Temperature: 22ºC	Air Pressure: 1010 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

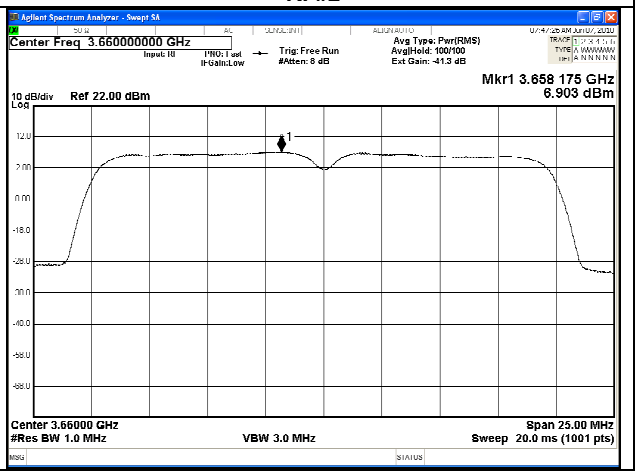
Plot 7.1.23 Peak output power spectral density test results at low frequency

ANTENNA GAIN:	16.5 dBi
CHANNEL BANDWIDTH:	20 MHz

RF#1



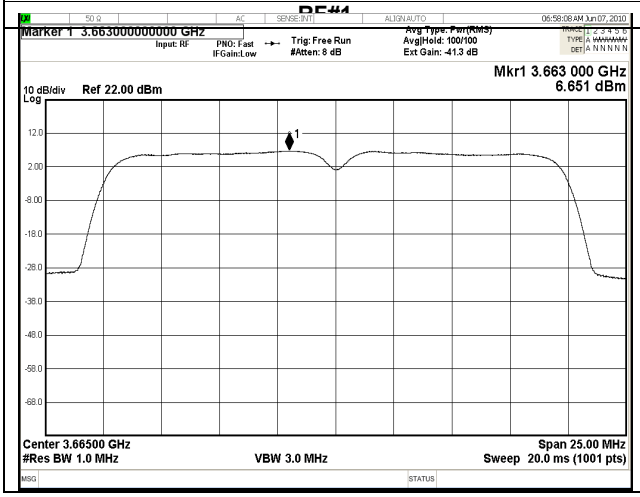
RF#2



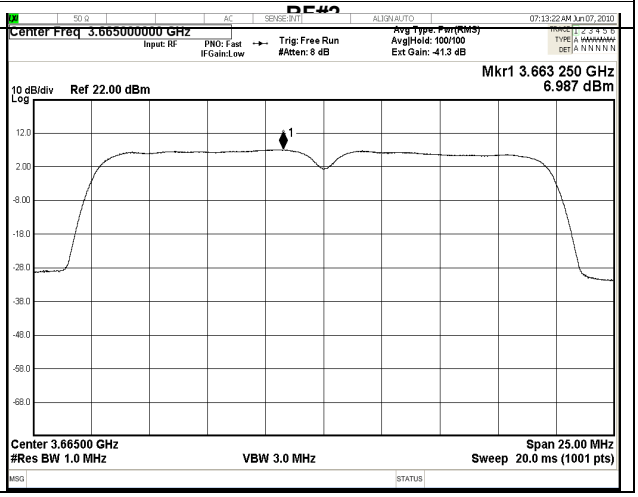
Plot 7.1.24 Peak output power spectral density test results at high frequency

ANTENNA GAIN:	16.5 dBi
CHANNEL BANDWIDTH:	20 MHz

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:	6/08/2010 9:34:12 AM		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

7.2 Occupied bandwidth test

7.2.1 General

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

Table 7.2.1 Occupied bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points*, dBc	Maximum allowed bandwidth, kHz
3650.0 – 3675.0	26	NA

* - Modulation envelope reference points are provided relative to the highest average power of the fundamental emission integrated over the designated channel bandwidth

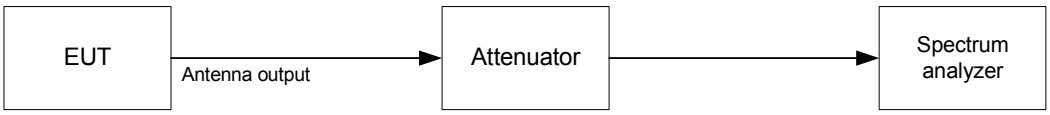
7.2.2 Test procedure

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 the test results 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:	6/08/2010 9:34:12 AM		
Temperature: 22ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 41 %	**Power Supply:** 48 VDC
Remarks:			

Table 7.2.2 Occupied bandwidth test results

DETECTOR USED: Average
RESOLUTION BANDWIDTH: 75 kHz
VIDEO BANDWIDTH: 750 kHz
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
CHANNEL BANDWIDTH: 7 MHz
TRANSMITTER OUTPUT POWER: 25.28 dBm at the low carrier frequency
25.52dBm at the mid carrier frequency
25.51 dBm at the high carrier frequency

Carrier frequency, MHz	Occupied bandwidth 99%, kHz	Occupied bandwidth 26 dBc, kHz
3653.5	6348.7	6554.0
3662.5	6376.7	6590.0
3671.5	6349.3	6554.0

DETECTOR USED: Average
RESOLUTION BANDWIDTH: 150 kHz
VIDEO BANDWIDTH: 1500 kHz
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
CHANNEL BANDWIDTH: 14 MHz
TRANSMITTER OUTPUT POWER: 25.93 dBm at the low carrier frequency
25.78 dBm at the mid carrier frequency
26.19 dBm at the high carrier frequency

Carrier frequency, MHz	Occupied bandwidth 99%, kHz	Occupied bandwidth 26 dBc, kHz
3657.0	13299.5	13760.0
3662.5	13267.0	13746.0
3668.0	13300.6	13763.0

DETECTOR USED: Average
RESOLUTION BANDWIDTH: 220 kHz
VIDEO BANDWIDTH: 2200 kHz
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
CHANNEL BANDWIDTH: 20 MHz
TRANSMITTER OUTPUT POWER: 25.73 dBm at the low carrier frequency
25.68 dBm at the high carrier frequency

Carrier frequency, MHz	Occupied bandwidth 99%, kHz	Occupied bandwidth 26 dBc, kHz
3660.0	18965.6	19669.0
3665.0	18965.1	19643.0

Reference numbers of manufacture's test equipment used

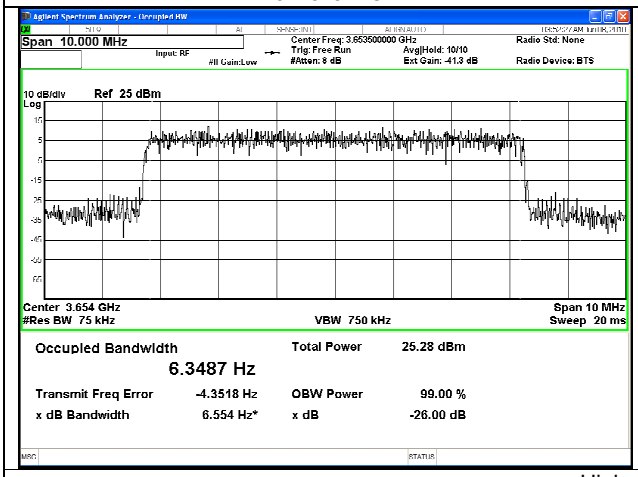
#1	#2	#4	#5				

Full description is given in Appendix A.

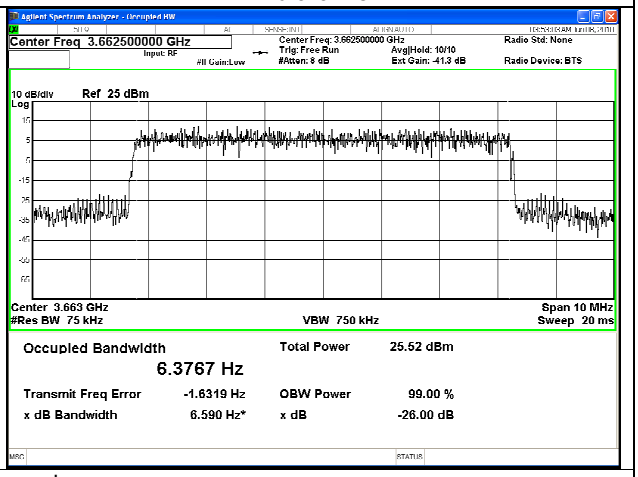
Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/08/2010 9:34:12 AM		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.1 Occupied bandwidth test result, 7 MHz channel bandwidth

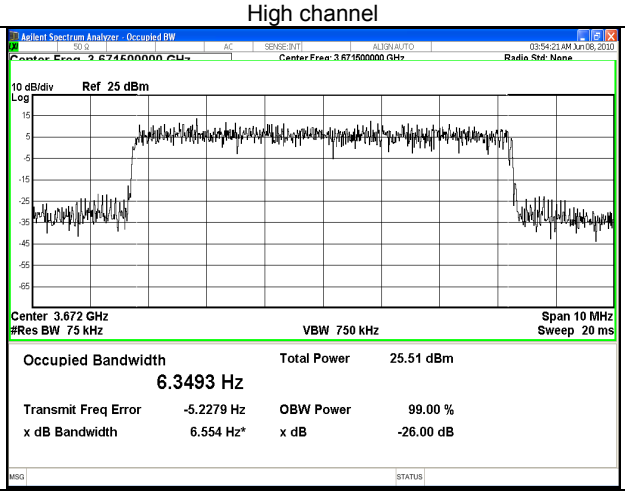
Low channel



Mid channel



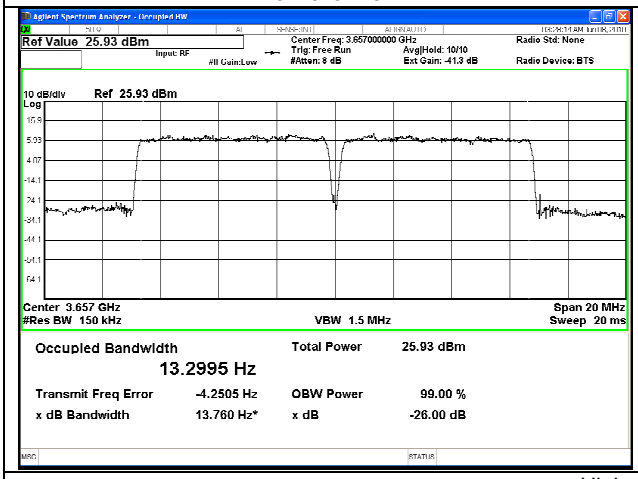
High channel



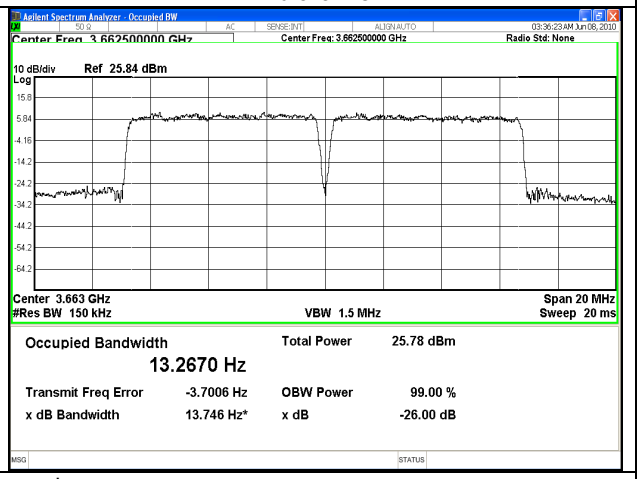
Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/08/2010 9:34:12 AM		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.2 Occupied bandwidth test result, 14 MHz channel bandwidth

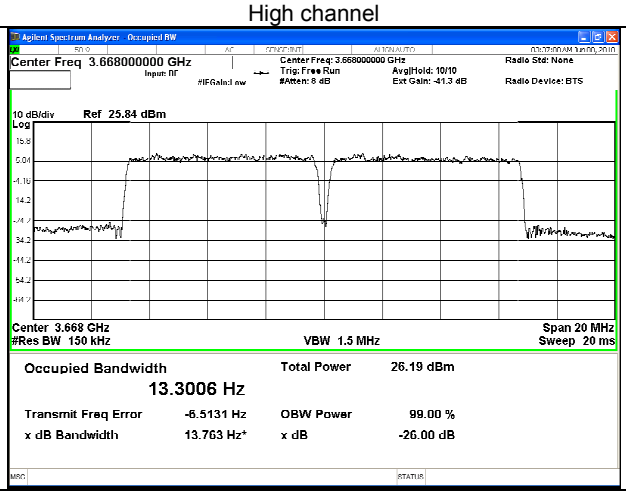
Low channel



Mid channel

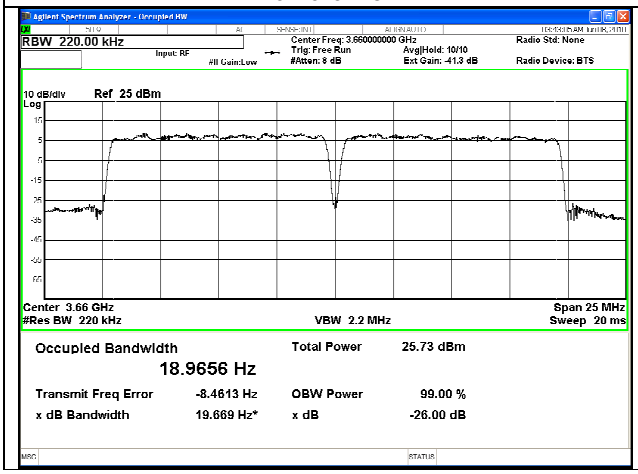
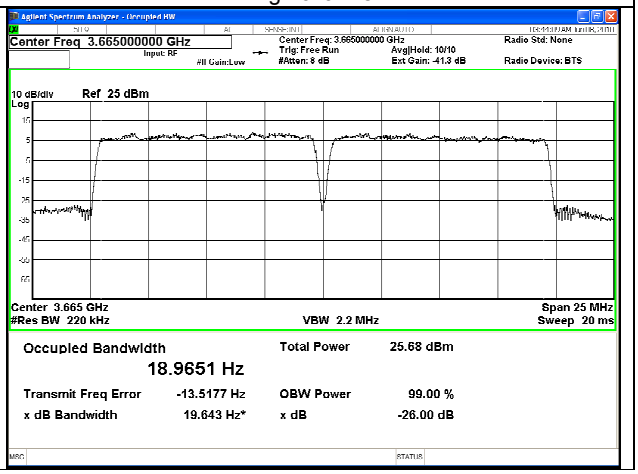


High channel



Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/08/2010 9:34:12 AM		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.3 Occupied bandwidth test result, 20 MHz channel bandwidth

Low channel	High channel
	

Test specification:	Section 90.210 (b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(b); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/08/2010 2:43:17 PM		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
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 7.3.2 and Table 7.3.3. The test results are provided in the associated plots.

Table 7.3.1 Emission mask limits for 7 MHz channel bandwidth

Frequency displacement from carrier	Attenuation below carrier, dBc
Emission mask B	
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)

* - F – frequency in MHz removed from center
** - 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

Table 7.3.2 Emission mask limits for 14 MHz channel bandwidth

Frequency displacement from carrier	Attenuation below carrier, dBc
Emission mask B	
0 – 7 MHz	0
7 – 14 MHz	25
14 – 35 MHz	35
More than** 35 MHz	43 + 10 log(P)

* - F – frequency in MHz removed from center
** - emission mask includes carrier modulation envelope within ± 150 % of the authorized bandwidth; the frequency range removed beyond ± 250 % of the authorized bandwidth from carrier was investigated as spurious emission

Table 7.3.3 Emission mask limits for 20 MHz channel bandwidth

Frequency displacement from carrier	Attenuation below carrier, dBc
Emission mask B	
0 – 10 MHz	0
10 – 20 MHz	25
20 – 40 MHz	35
More than** 40 MHz	43 + 10 log(P)

* - F – frequency in MHz removed from center
** - emission mask includes carrier modulation envelope within ± 150 % of the authorized bandwidth; the frequency range removed beyond ± 250 % of the authorized bandwidth from carrier was investigated as spurious emission

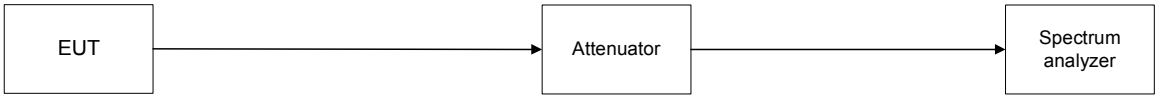
7.3.2 Test procedure

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 are provided in Table 7.3.4 and the associated plots.

Test specification:	**Section 90.210 (b), Emission mask**		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(b); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	6/08/2010 2:43:17 PM		
Temperature: 22ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 41 %	**Power Supply:** 48 VDC
Remarks:			

Figure 7.3.1 Emission mask test setup



Test specification:	**Section 90.210 (b), Emission mask**		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(b); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	6/08/2010 2:43:17 PM		
Temperature: 22ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 41 %	**Power Supply:** 48 VDC
Remarks:			

Table 7.3.4 Emission mask test results

ASSIGNED FREQUENCY RANGE: 3650 – 3675 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS

Carrier frequency, MHz	Limit	Verdict
7 MHz channel bandwidth		
3653.5	Emission mask B	Pass
3662.3		
3671.5		
14 MHz channel bandwidth		
3657.0	Emission mask B	Pass
3662.3		
3668.0		
20 MHz channel bandwidth		
3660.0	Emission mask B	Pass
3665.0		

NOTE1: Attenuation below carrier provided in terms of attenuation below total average power within occupied bandwidth. Measurement was performed with RBW set to 100 kHz for channel bandwidth 7 MHz, 14 MHz and 20 MHz and the limit mask was reduced by 10 dB to compensate the lower RBW [10*log(1 MHz/100 kHz)] = 10 dB.

Reference numbers of manufacture's test equipment used

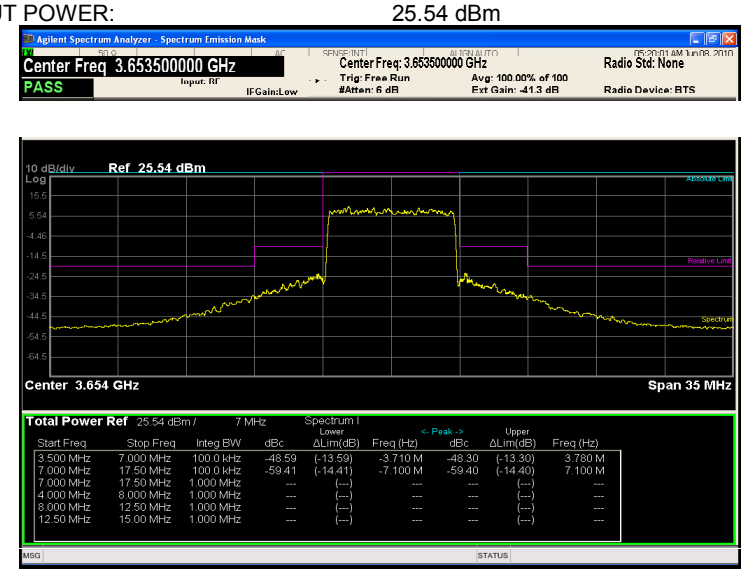
#1	#2	#4	#5				

Full description is given in Appendix A.

Test specification:	Section 90.210 (b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(b); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/08/2010 2:43:17 PM		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

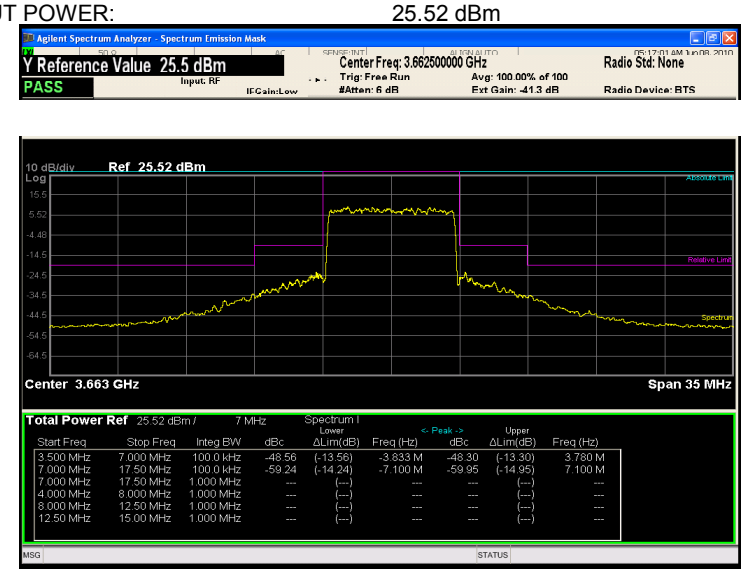
Plot 7.3.1 Emission mask test results at low carrier frequency, 7 MHz CBW

TRANSMITTER OUTPUT POWER: 25.54 dBm



Plot 7.3.2 Emission mask test results at mid carrier frequency, 7 MHz CBW

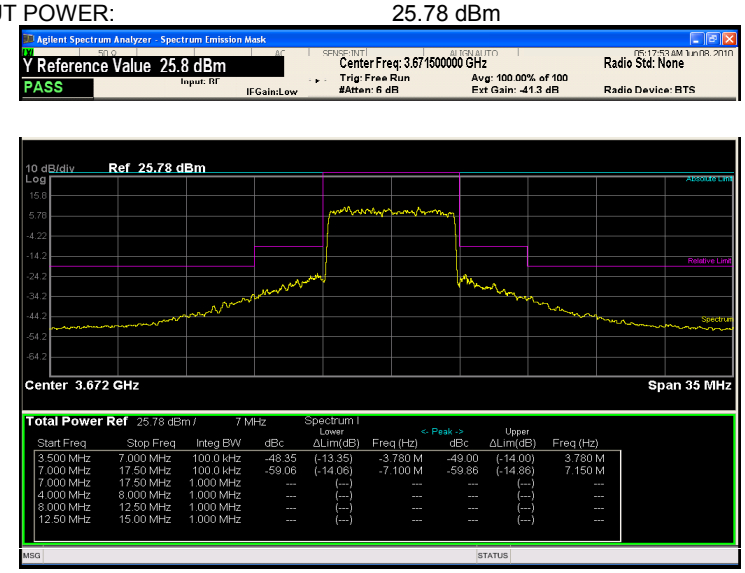
TRANSMITTER OUTPUT POWER: 25.52 dBm



Test specification:	Section 90.210 (b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(b); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/08/2010 2:43:17 PM		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.3.3 Emission mask test results at high carrier frequency, 7 MHz CBW

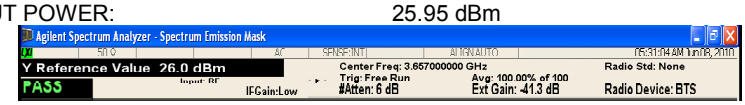
TRANSMITTER OUTPUT POWER: 25.78 dBm

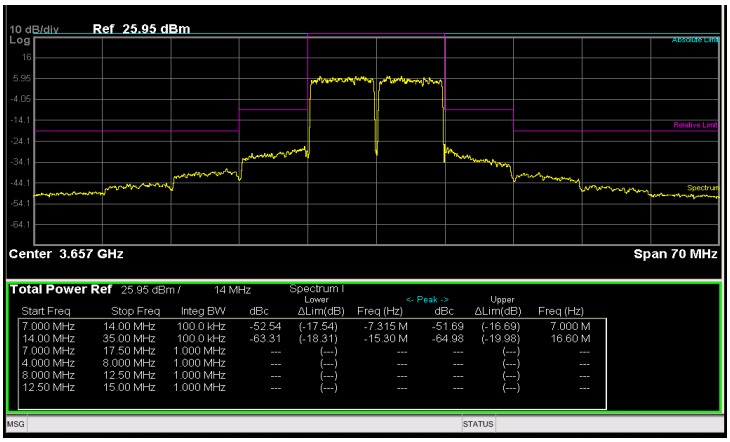


Test specification:	Section 90.210 (b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(b); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/08/2010 2:43:17 PM		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.3.4 Emission mask test results at low carrier frequency, 14 MHz CBW

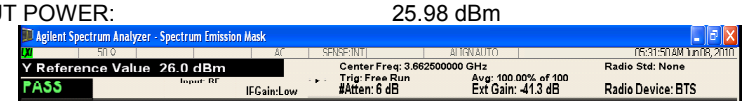
TRANSMITTER OUTPUT POWER: 25.95 dBm

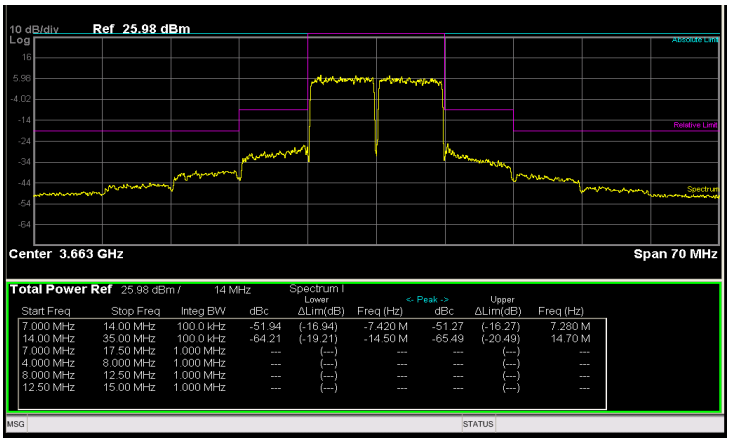




Plot 7.3.5 Emission mask test results at mid carrier frequency, 14 MHz CBW

TRANSMITTER OUTPUT POWER: 25.98 dBm

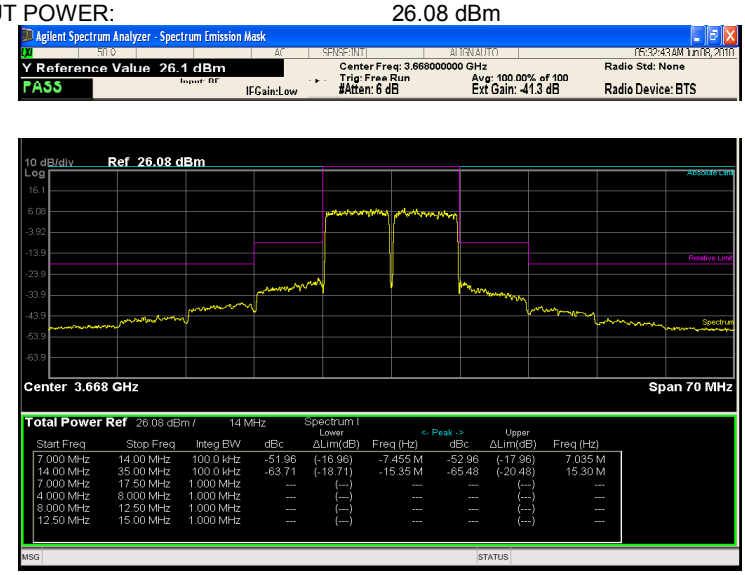




Test specification:	Section 90.210 (b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(b); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/08/2010 2:43:17 PM		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.3.6 Emission mask test results at high carrier frequency, 14 MHz CBW

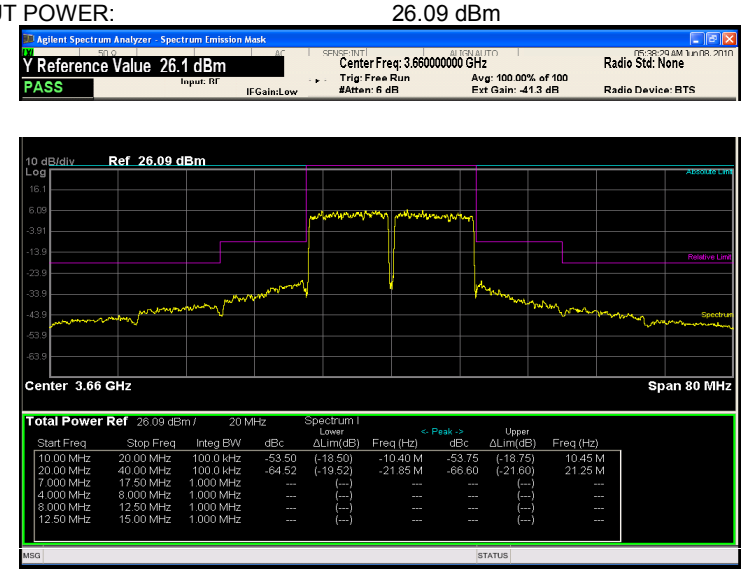
TRANSMITTER OUTPUT POWER: 26.08 dBm



Test specification:	Section 90.210 (b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(b); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/08/2010 2:43:17 PM		
Temperature: 22ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

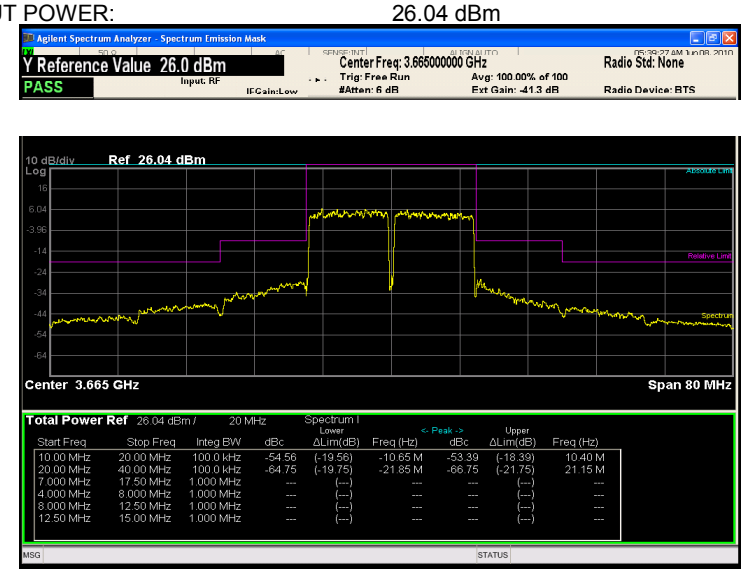
Plot 7.3.7 Emission mask test results at low carrier frequency, 20 MHz CBW

TRANSMITTER OUTPUT POWER: 26.09 dBm



Plot 7.3.8 Emission mask test results at high carrier frequency, 20 MHz CBW

TRANSMITTER OUTPUT POWER: 26.04 dBm



8 APPENDIX A Test equipment and ancillaries used for tests

Manufacture's test equipment and ancillaries used for tests

No.	Description	Manufacturer	Model No.	Serial No.	Due Calibr
1	Signal analyzer, 20 Hz-8.4 GHz	Agilent	MXA N9020A	US46470609	31-July-10
2	Power Meter	Anritsu	ML2487A	6K00005393	31-July-10
3	Power Sensor, 50 MHz-8 GHz	Anritsu	MA2490A	033929	31-July-10
4	Attenuator, DC-8.5GHz, 20 dB	Aeroflex/Weinschel	24-20-34 SN: BV4048	NA	NA
5	Microwave 1.5m cable	Suhner	Sucoflex 104PE	27314/4PE	NA

9 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Transmitter tests	
Carrier power conducted at antenna connector	± 1.7 dB
Carrier power radiated (substitution method)	± 4.5 dB
Occupied bandwidth	±8%
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB
Duty cycle, timing (Tx ON / OFF) and average factor measurements	± 1.0 %

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

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

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

10 APPENDIX C Test laboratory description

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

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Fax: +972 4628 8277
e-mail: mail@hermonlabs.com
website: www.hermonlabs.com

Person for contact: Mr. Alex Usoskin, CEO.

11 APPENDIX D Specification references

FCC 47CFR part 90: 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

12 APPENDIX E Abbreviations and acronyms

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

END OF DOCUMENT