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839.01
Electrical

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TEST REPORT

ACCORDING TO: FCC CFR 47 PART 90 subpart Z and PART 15 subpart B

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:	S123456
Receipt date	7/12/2009

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:	19837
Location:	Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started:	7/12/2009
Test completed:	9/06/2009
Test specification(s):	47CFR part 90 subpart Z; part 15 subpart B

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

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.19837.

	Name and Title	Date	Signature
Tested by:	Mr. L. Markel, test engineer	September 6, 2009	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	September 9, 2009	
Approved by:	Mr. M. Nikishin, EMC and Radio group leader	September 10, 2009	

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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	3652.5 – 3672.5
LO	3130 - 3155

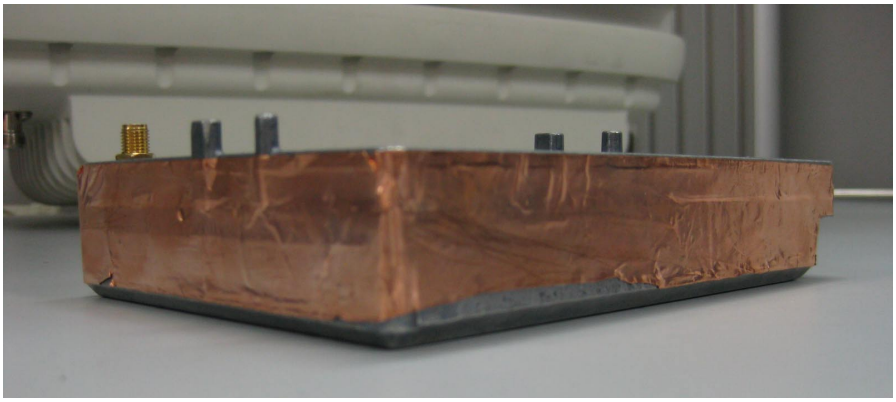
6.7 Changes made in the EUT

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.

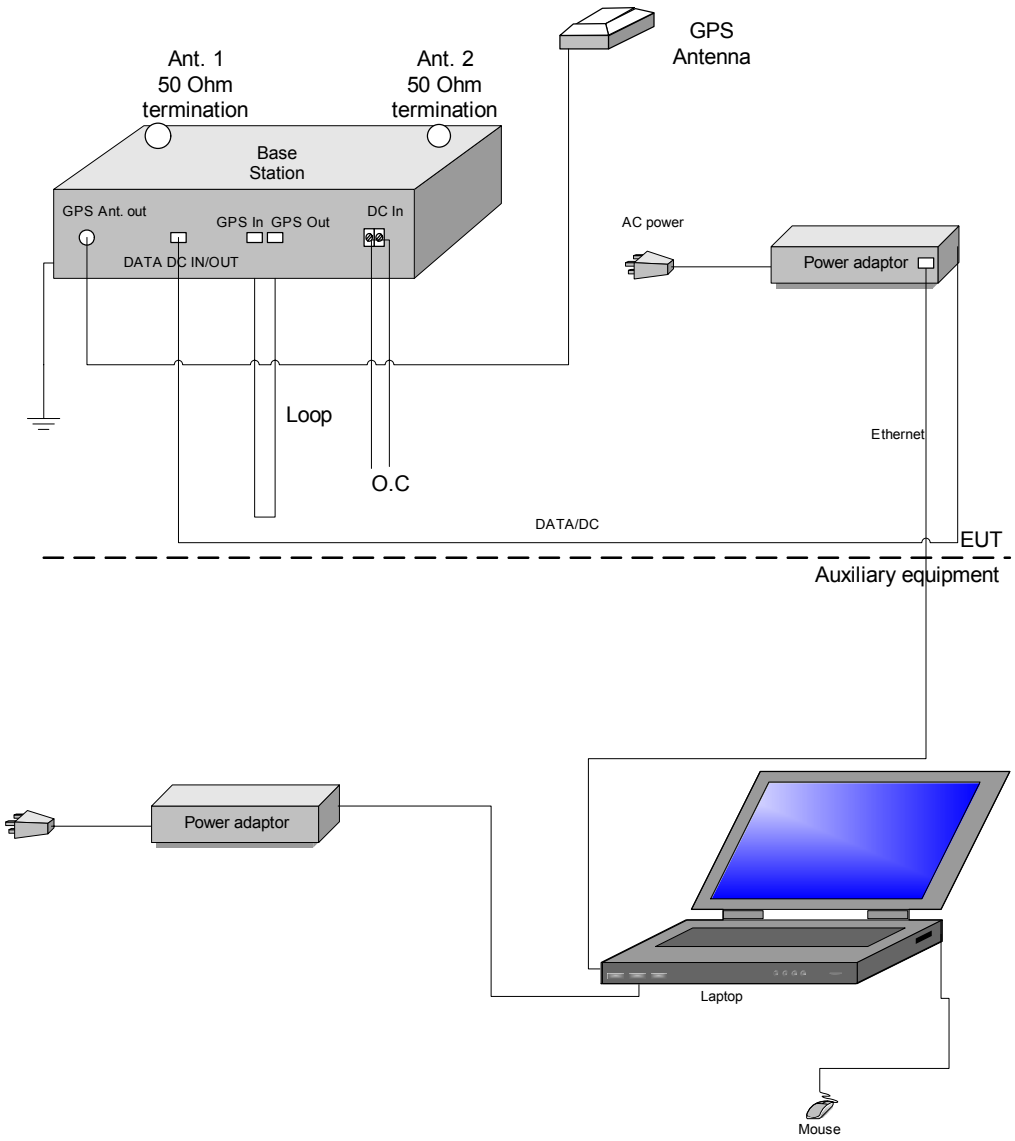
Photograph 6.7.1 RF head enclosure with shielding improved



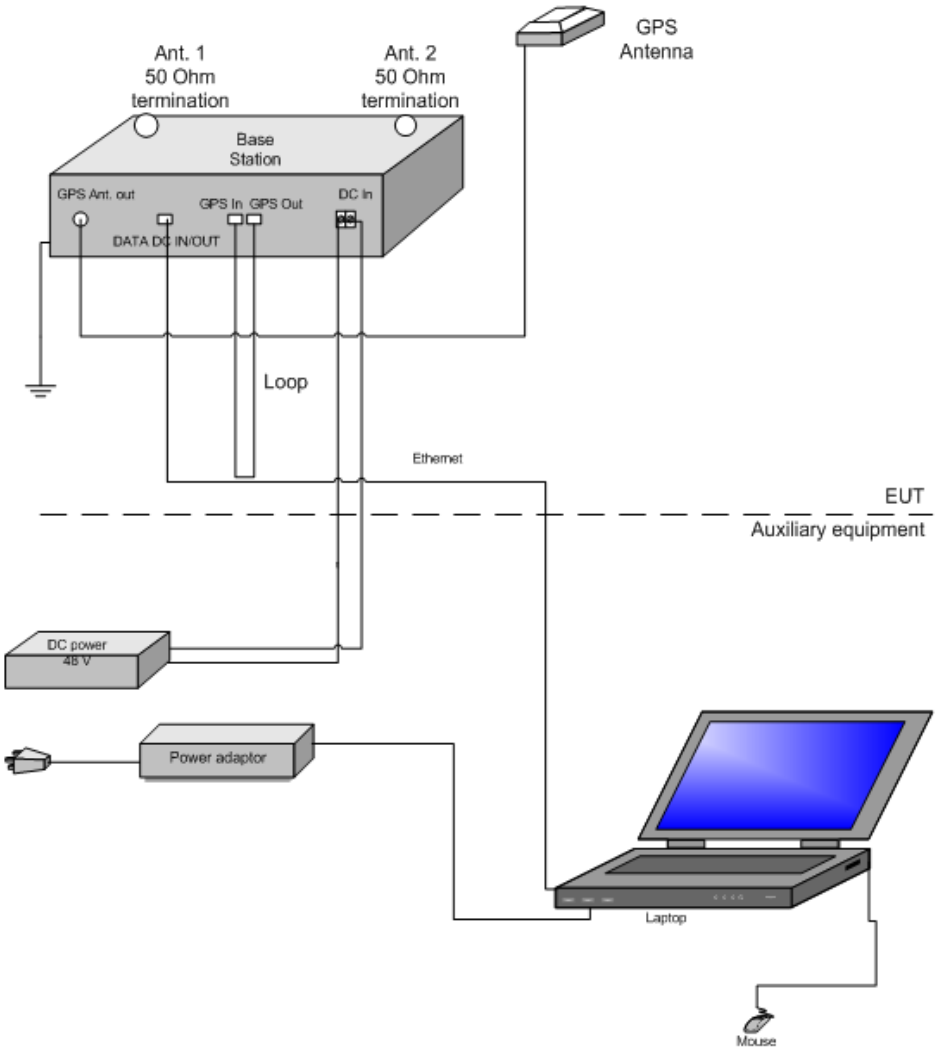
Photograph 6.7.2 RF head connector

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

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		3652.5 – 3672.5 MHz					
RF channel spacing		5 MHz, 10 MHz					
Maximum rated output power		At transmitter 50 Ω RF output connectors				Total 26.6 dBm for 5 MHz CBW Total 28.7 dBm for 10 MHz CBW	
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		28.7 dBm	
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
Integral dual slant	PCTEL	P/N AN1429-01 Rev.A	13 dBi
External omni-directional	Alvarion	P/N 300609 Rev.A	10 dBi
External dual slant	Alvarion	P/N 300644 Rev.A	16.5 dBi

Transmitter 99% power bandwidth		5 MHz, 10 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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 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.

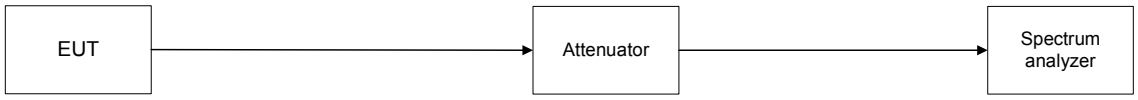
Table 7.1.1 Peak output power and spectral density limits

Assigned frequency range, MHz	Channel bandwidth, MHz	Maximum EIRP, dBm		EIRP power spectral density, dBm/MHz
		W	dBm	
3650.0 – 3675.0	5	5	37.0	30.0
	10	10	40.0	

7.1.2 Test procedure

7.1.2.1 The EUT was set up as shown in Figure 7.1.1, energized and its proper operation was checked.
7.1.2.2 The EUT was adjusted to produce maximum available to the end user RF output power.
7.1.2.3 The peak output power was measured with spectrum analyzer as provided in Table 7.1.2 and the associated plots.
7.1.2.4 All test results are provided in Table 7.1.2 to Table 7.1.13 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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 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
TRANSMITTER OUTPUT POWER SETTINGS: 23 dBm
ANTENNA ASSEMBLY GAIN*: 9.3 dBi
CHANNEL BANDWITH: 5 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						
3652.50	23.50	23.42	Included	26.47	35.77	37.00	-1.23	Pass
3662.00	23.59	23.56	Included	26.59	35.89	37.00	-1.11	Pass
3672.50	23.53	23.48	Included	26.52	35.82	37.00	-1.18	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: Peak
RESOLUTION BANDWIDTH: 1000 kHz
VIDEO BANDWIDTH: 3000 kHz
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
TRANSMITTER OUTPUT POWER SETTINGS: 23 dBm
ANTENNA ASSEMBLY GAIN*: 9.3 dBi
CHANNEL BANDWITH: 5 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						
3652.50	17.10	16.86	Included	19.99	29.29	30.00	-0.71	Pass
3662.00	17.30	17.43	Included	20.38	29.68	30.00	-0.32	Pass
3672.50	17.38	17.37	Included	20.39	29.69	30.00	-0.31	Pass

* - Antenna assembly gain = Antenna gain (10 dBi) – minimum declared feeder loss (0.7 dB)
** - RF output power 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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 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
TRANSMITTER OUTPUT POWER SETTINGS: 19 dBm
ANTENNA GAIN: 13 dBi
CHANNEL BANDWITH: 5 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						
3652.50	19.26	19.10	Included	22.19	35.19	37.00	-1.81	Pass
3662.00	19.43	19.22	Included	22.34	35.34	37.00	-1.66	Pass
3672.50	19.45	19.39	Included	22.43	35.43	37.00	-1.57	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: Peak
RESOLUTION BANDWIDTH: 1000 kHz
VIDEO BANDWIDTH: 3000 kHz
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
TRANSMITTER OUTPUT POWER SETTINGS: 19 dBm
ANTENNA GAIN: 13 dBi
CHANNEL BANDWITH: 5 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						
3652.50	13.12	13.44	Included	16.29	29.29	30.00	-0.71	Pass
3662.00	13.31	13.10	Included	16.22	29.22	30.00	-0.78	Pass
3672.50	13.63	13.69	Included	16.67	29.67	30.00	-0.33	Pass

* - RF output power 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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 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
TRANSMITTER OUTPUT POWER SETTINGS: 17 dBm
ANTENNA ASSEMBLY GAIN*: 15.8 dBi
CHANNEL BANDWITH: 5 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						
3652.50	16.80	16.92	Included	19.87	35.67	37.00	-1.33	Pass
3662.00	16.89	16.77	Included	19.84	35.64	37.00	-1.36	Pass
3672.50	16.84	16.87	Included	19.87	35.67	37.00	-1.33	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: Peak
RESOLUTION BANDWIDTH: 1000 kHz
VIDEO BANDWIDTH: 3000 kHz
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
TRANSMITTER OUTPUT POWER SETTINGS: 17 dBm
ANTENNA ASSEMBLY GAIN*: 15.8 dBi
CHANNEL BANDWITH: 5 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						
3652.50	10.61	10.69	Included	13.66	29.46	30.00	-0.54	Pass
3662.00	10.65	10.63	Included	13.65	29.45	30.00	-0.55	Pass
3672.50	10.62	10.65	Included	13.65	29.45	30.00	-0.55	Pass

* - Antenna assembly gain = Antenna gain (16.5 dBi) – minimum declared feeder loss (0.7 dB)
** - RF output power 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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 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
TRANSMITTER OUTPUT POWER SETTINGS: 25 dBm
ANTENNA ASSEMBLY GAIN*: 9.3 dBi
CHANNEL BANDWITH: 10 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						
3655.00	25.43	25.40	Included	28.43	37.73	40.00	-2.27	Pass
3662.00	25.63	25.46	Included	28.56	37.86	40.00	-2.14	Pass
3670.00	25.70	25.69	Included	28.71	38.01	40.00	-1.99	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: Peak
RESOLUTION BANDWIDTH: 1000 kHz
VIDEO BANDWIDTH: 3000 kHz
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
TRANSMITTER OUTPUT POWER SETTINGS: 25 dBm
ANTENNA ASSEMBLY GAIN*: 9.3 dBi
CHANNEL BANDWITH: 10 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						
3655.00	16.24	16.47	Included	19.37	28.67	30.00	-1.33	Pass
3662.00	16.50	16.50	Included	19.51	28.81	30.00	-1.19	Pass
3670.00	17.03	16.87	Included	19.96	29.26	30.00	-0.74	Pass

* - Antenna assembly gain = Antenna gain (10 dBi) – minimum declared feeder loss (0.7 dB)
** - RF output power 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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 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
TRANSMITTER OUTPUT POWER SETTINGS: 22 dBm
ANTENNA GAIN: 13 dBi
CHANNEL BANDWITH: 10 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						
3655.00	22.37	22.37	Included	25.38	38.38	40.00	-1.62	Pass
3662.00	22.47	22.52	Included	25.51	38.51	40.00	-1.49	Pass
3670.00	22.62	22.55	Included	25.60	38.60	40.00	-1.40	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: Peak
RESOLUTION BANDWIDTH: 1000 kHz
VIDEO BANDWIDTH: 3000 kHz
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
TRANSMITTER OUTPUT POWER SETTINGS: 22 dBm
ANTENNA GAIN: 13 dBi
CHANNEL BANDWITH: 10 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						
3655.00	13.41	13.67	Included	16.55	29.55	30.00	-0.45	Pass
3662.00	13.68	13.76	Included	16.73	29.73	30.00	-0.27	Pass
3670.00	14.00	13.89	Included	16.96	29.96	30.00	-0.04	Pass

* - RF output power 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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 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
TRANSMITTER OUTPUT POWER SETTINGS: 18 dBm
ANTENNA ASSEMBLY GAIN*: 15.8 dBi
CHANNEL BANDWITH: 5 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						
3655.00	18.42	18.33	Included	21.39	37.19	40.00	-2.81	Pass
3662.00	18.53	18.44	Included	21.50	37.30	40.00	-2.70	Pass
3670.00	18.48	18.46	Included	21.48	37.28	40.00	-2.72	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: Peak
RESOLUTION BANDWIDTH: 1000 kHz
VIDEO BANDWIDTH: 3000 kHz
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
TRANSMITTER OUTPUT POWER SETTINGS: 18 dbm
ANTENNA ASSEMBLY GAIN*: 15.8 dBi
CHANNEL BANDWITH: 5 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						
3655.00	9.32	9.46	Included	12.40	28.20	30.00	-1.80	Pass
3662.00	9.83	9.51	Included	12.68	28.48	30.00	-1.52	Pass
3670.00	10.05	9.96	Included	13.02	28.82	30.00	-1.18	Pass

* - Antenna assembly gain = Antenna gain (16.5 dBi) – minimum declared feeder loss (0.7 dB)
** - RF output power 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

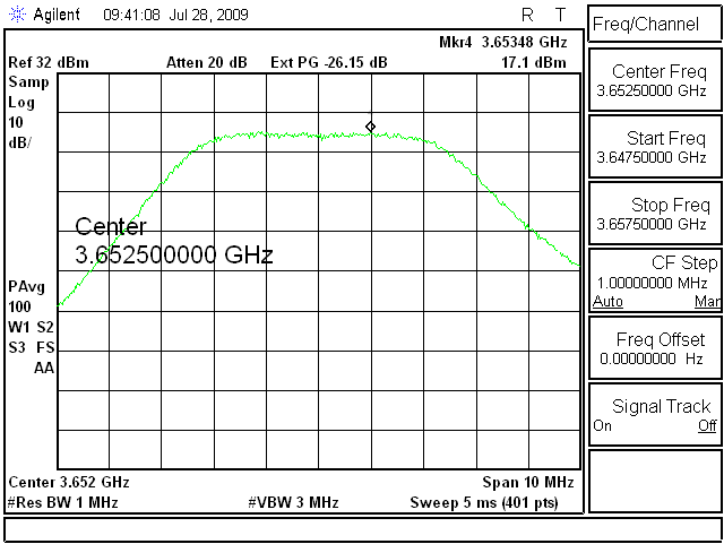
#1	#2	#3	#4	#5	#6		

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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 48 VDC
Remarks:			

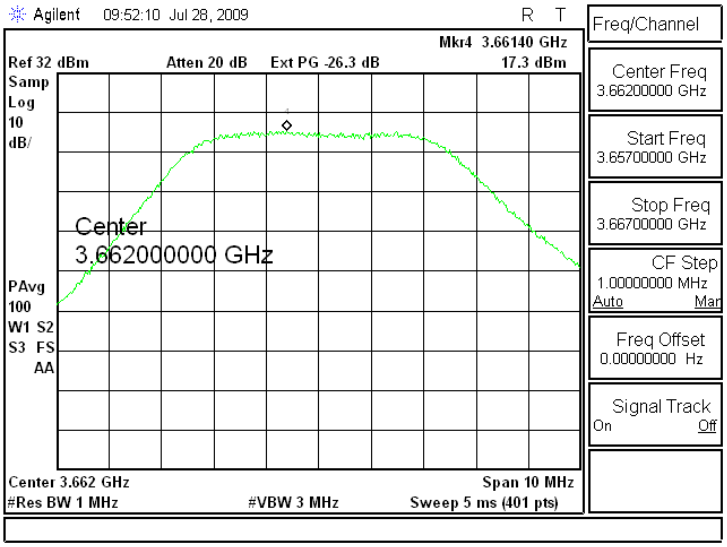
Plot 7.1.1 Peak output power test results at low frequency

EUT OUTPUT CONNECTOR: Ant 1
CHANNEL BANDWIDTH: 5 MHz
ANTENNA GAIN: 10 dBi



Plot 7.1.2 Peak output power test results at mid frequency

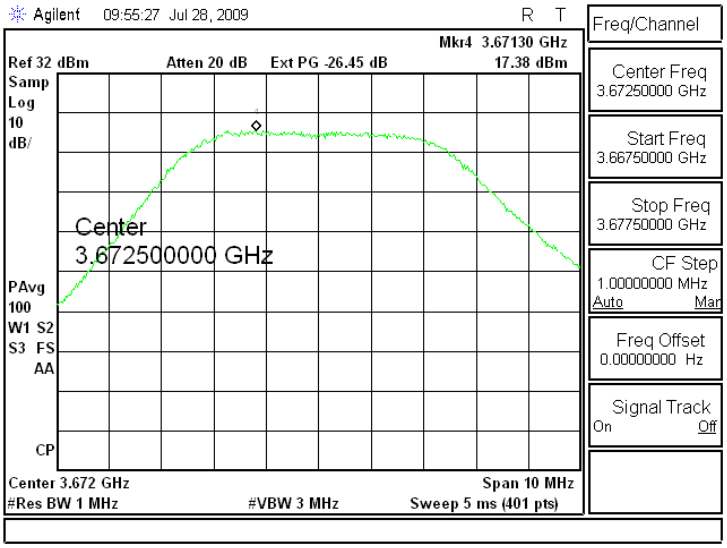
EUT OUTPUT CONNECTOR: Ant 1
CHANNEL BANDWIDTH: 5 MHz
ANTENNA GAIN: 10 dBi



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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 48 VDC
Remarks:			

Plot 7.1.3 Peak output power test results at high frequency

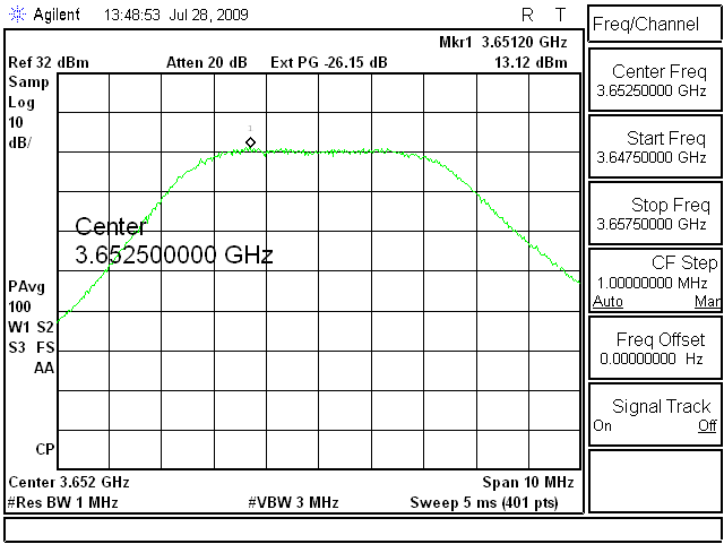
EUT OUTPUT CONNECTOR: Ant 1
CHANNEL BANDWIDTH: 5 MHz
ANTENNA GAIN: 10 dBi



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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 48 VDC
Remarks:			

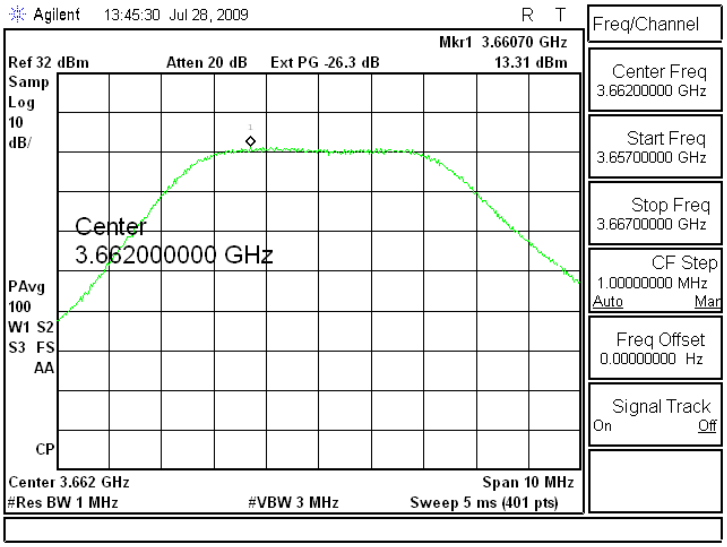
Plot 7.1.4 Peak output power test results at low frequency

EUT OUTPUT CONNECTOR: Ant 1
CHANNEL BANDWIDTH: 5 MHz
ANTENNA GAIN: 13 dBi



Plot 7.1.5 Peak output power test results at mid frequency

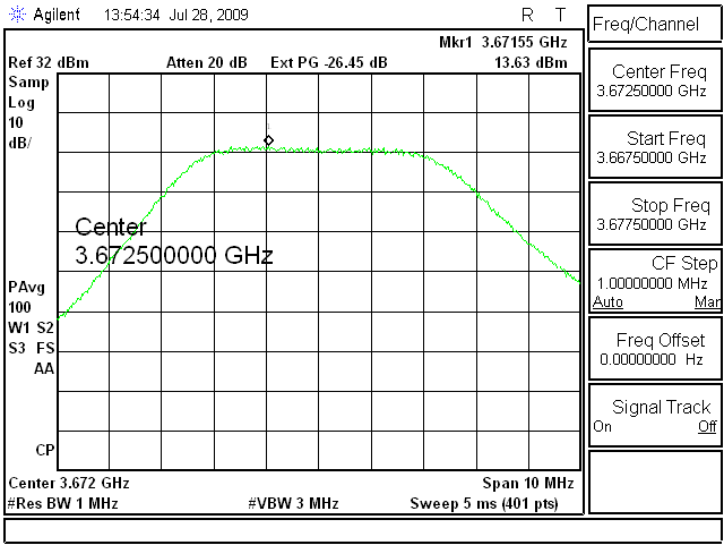
EUT OUTPUT CONNECTOR: Ant 1
CHANNEL BANDWIDTH: 5 MHz
ANTENNA GAIN: 13 dBi



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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 48 VDC
Remarks:			

Plot 7.1.6 Peak output power test results at high frequency

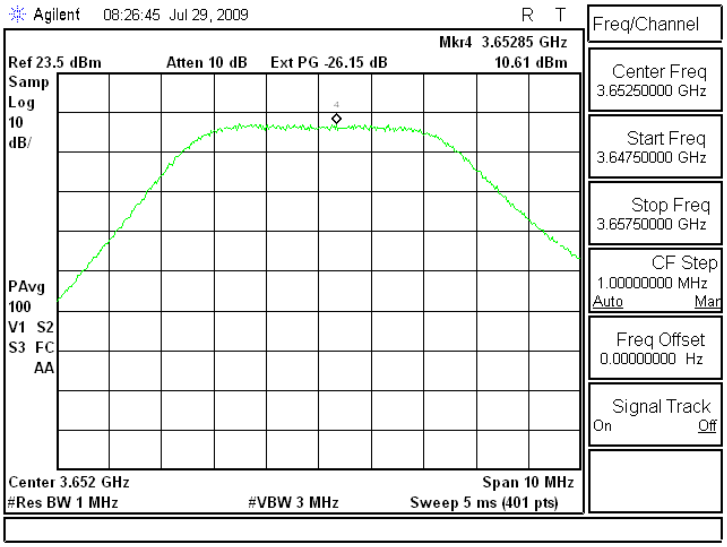
EUT OUTPUT CONNECTOR: Ant 1
CHANNEL BANDWIDTH: 5 MHz
ANTENNA GAIN: 13 dBi



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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 48 VDC
Remarks:			

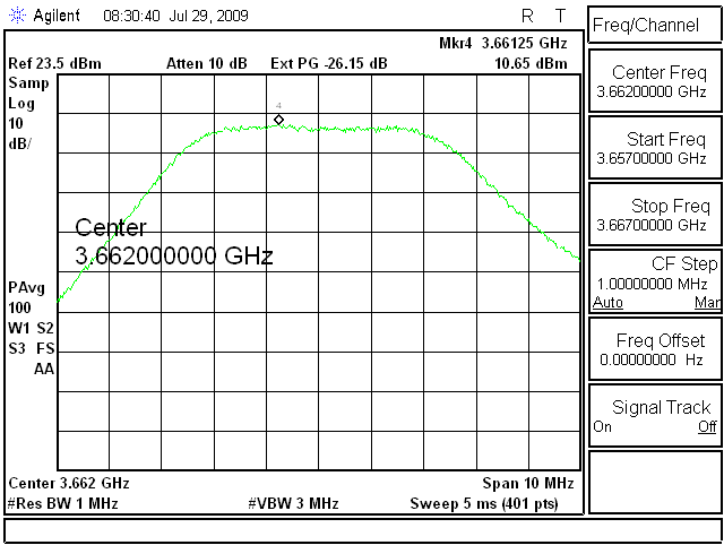
Plot 7.1.7 Peak output power test results at low frequency

EUT OUTPUT CONNECTOR: Ant 1
CHANNEL BANDWIDTH: 5 MHz
ANTENNA GAIN: 16.5 dBi



Plot 7.1.8 Peak output power test results at mid frequency

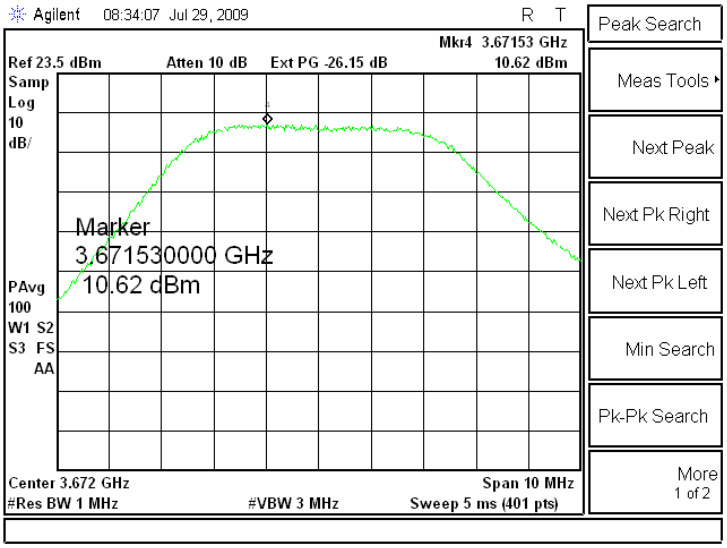
EUT OUTPUT CONNECTOR: Ant 1
CHANNEL BANDWIDTH: 5 MHz
ANTENNA GAIN: 16.5 dBi



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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 48 VDC
Remarks:			

Plot 7.1.9 Peak output power test results at high frequency

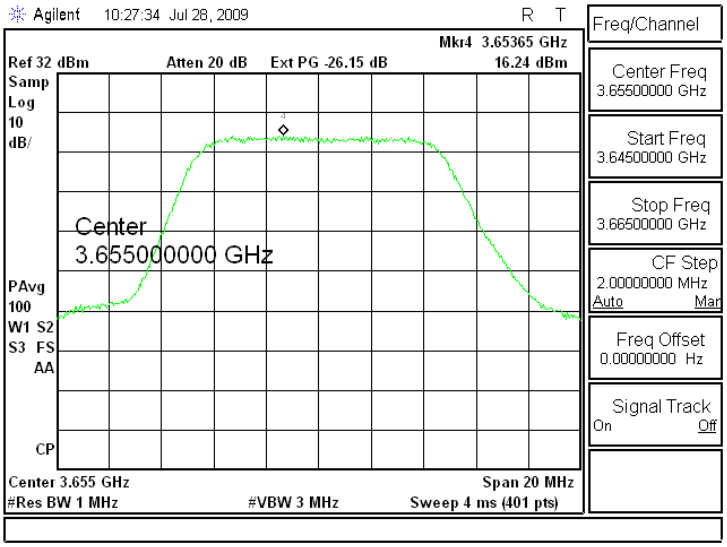
EUT OUTPUT CONNECTOR: Ant 1
CHANNEL BANDWIDTH: 5 MHz
ANTENNA GAIN: 16.5 dBi



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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 48 VDC
Remarks:			

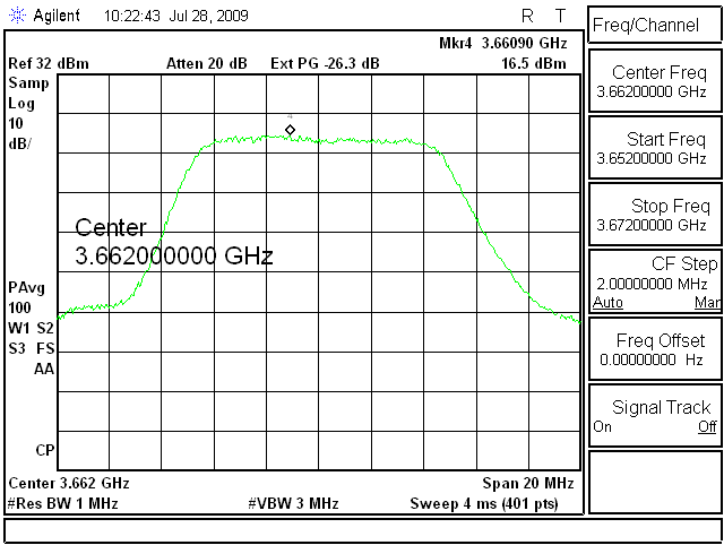
Plot 7.1.10 Peak output power test results at low frequency

EUT OUTPUT CONNECTOR: Ant 1
CHANNEL BANDWIDTH: 10 MHz
ANTENNA GAIN: 10 dBi



Plot 7.1.11 Peak output power test results at mid frequency

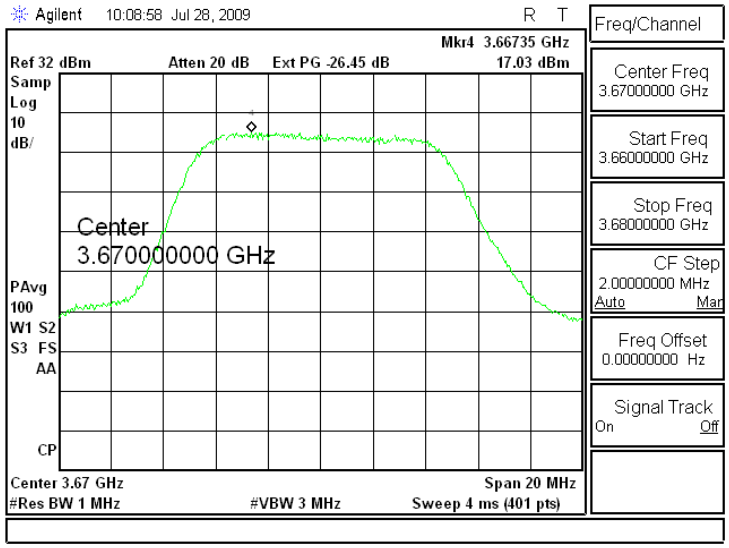
EUT OUTPUT CONNECTOR: Ant 1
CHANNEL BANDWIDTH: 10 MHz
ANTENNA GAIN: 10 dBi



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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 48 VDC
Remarks:			

Plot 7.1.12 Peak output power test results at high frequency

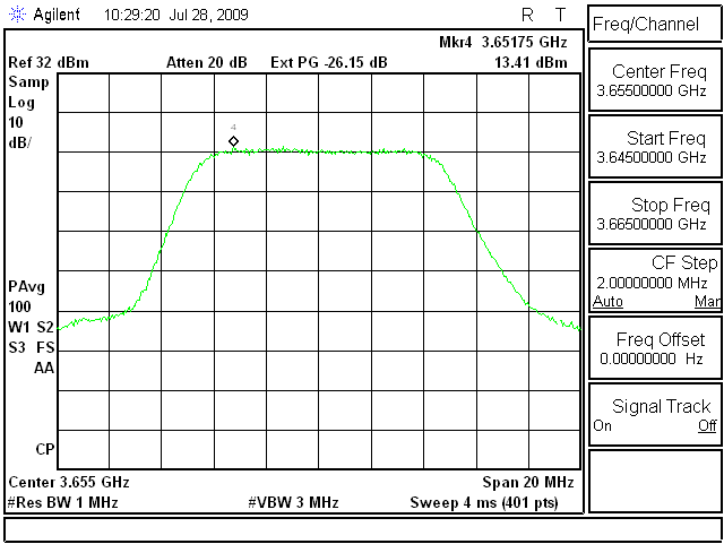
EUT OUTPUT CONNECTOR:	Ant 1
CHANNEL BANDWIDTH:	10 MHz
ANTENNA GAIN:	10 dBi



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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 48 VDC
Remarks:			

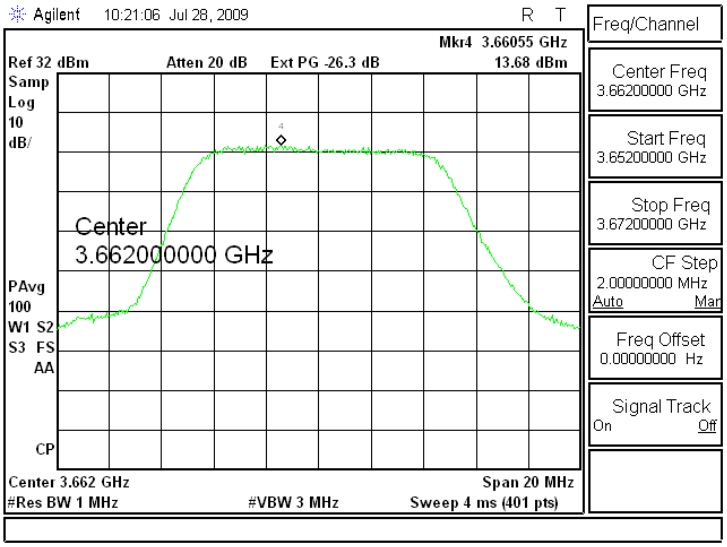
Plot 7.1.13 Peak output power test results at low frequency

EUT OUTPUT CONNECTOR: Ant 1
CHANNEL BANDWIDTH: 10 MHz
ANTENNA GAIN: 13 dBi



Plot 7.1.14 Peak output power test results at mid frequency

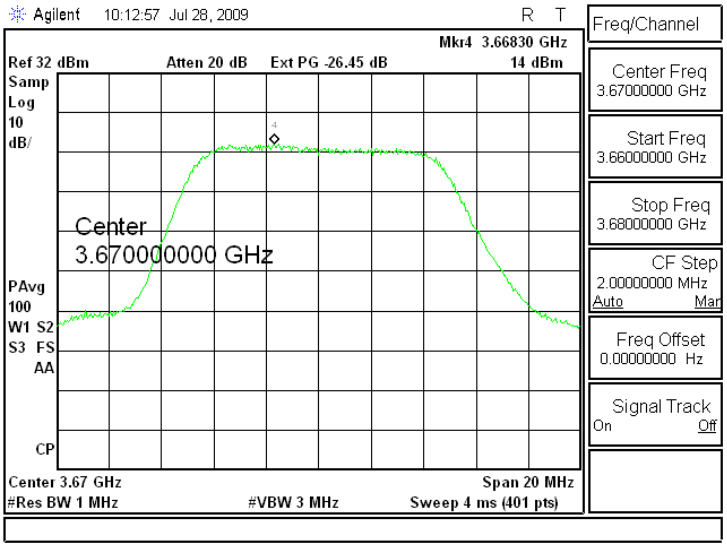
EUT OUTPUT CONNECTOR: Ant 1
CHANNEL BANDWIDTH: 10 MHz
ANTENNA GAIN: 13 dBi



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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 48 VDC
Remarks:			

Plot 7.1.15 Peak output power test results at high frequency

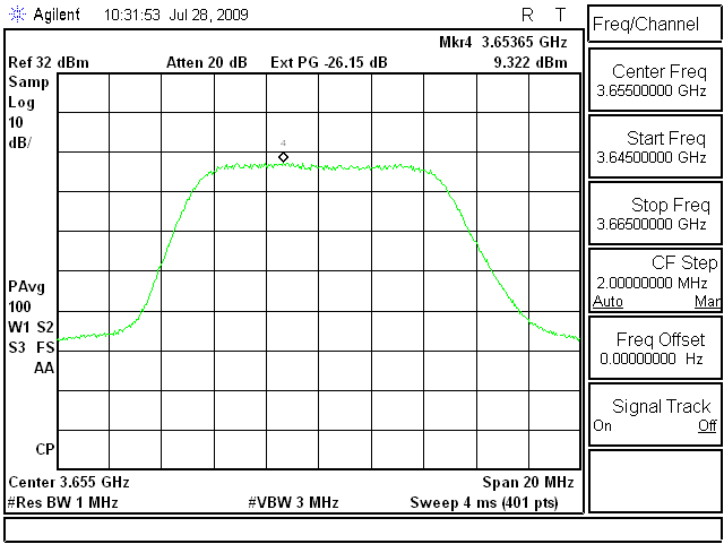
EUT OUTPUT CONNECTOR:	Ant 1
CHANNEL BANDWIDTH:	10 MHz
ANTENNA GAIN:	13 dBi



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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 48 VDC
Remarks:			

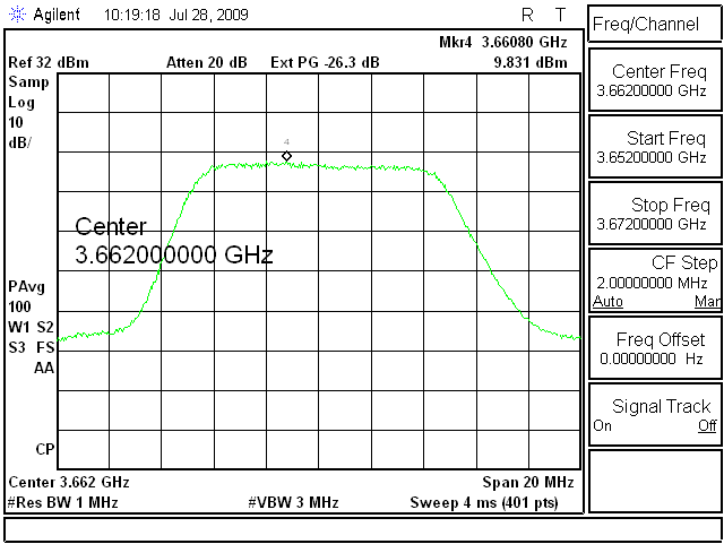
Plot 7.1.16 Peak output power test results at low frequency

EUT OUTPUT CONNECTOR: Ant 1
CHANNEL BANDWIDTH: 10 MHz
ANTENNA GAIN: 16.5 dBi



Plot 7.1.17 Peak output power test results at mid frequency

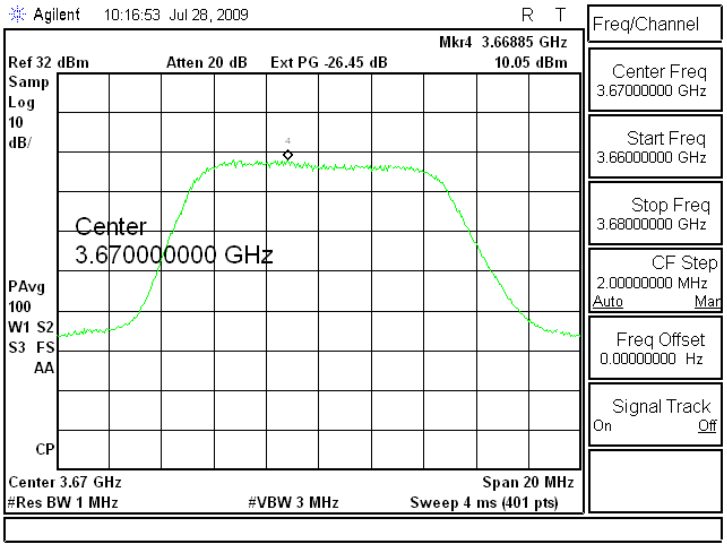
EUT OUTPUT CONNECTOR: Ant 1
CHANNEL BANDWIDTH: 10 MHz
ANTENNA GAIN: 16.5 dBi



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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 48 VDC
Remarks:			

Plot 7.1.18 Peak output power test results at high frequency

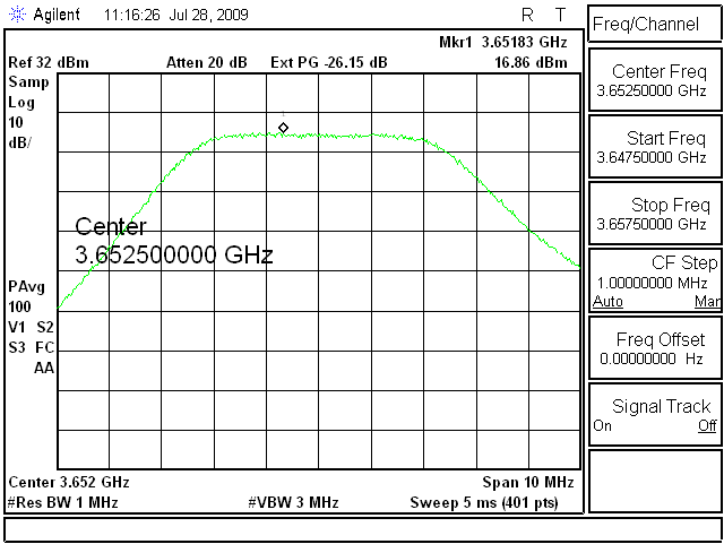
EUT OUTPUT CONNECTOR: Ant 1
CHANNEL BANDWIDTH: 10 MHz
ANTENNA GAIN: 16.5 dBi



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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 48 VDC
Remarks:			

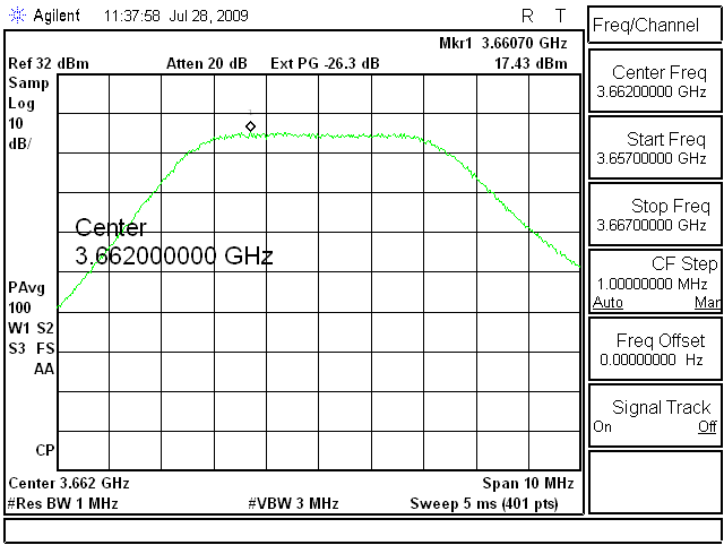
Plot 7.1.19 Peak output power test results at low frequency

EUT OUTPUT CONNECTOR: Ant 2
CHANNEL BANDWIDTH: 5 MHz
ANTENNA GAIN: 10 dBi



Plot 7.1.20 Peak output power test results at mid frequency

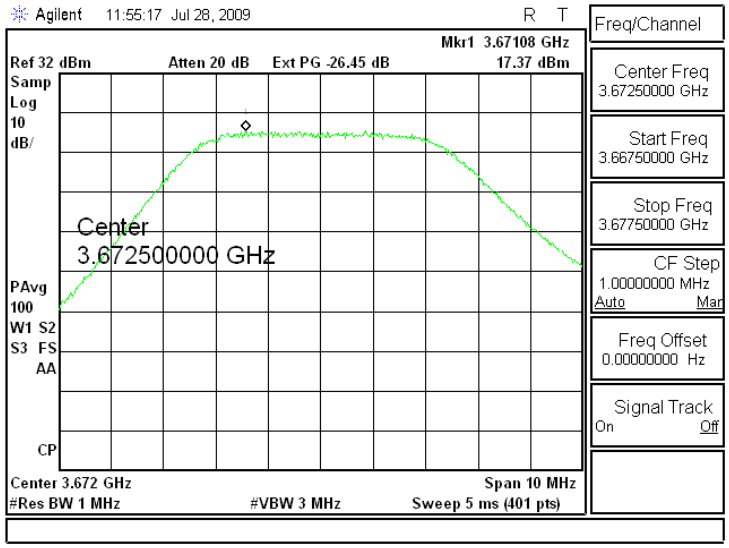
EUT OUTPUT CONNECTOR: Ant 2
CHANNEL BANDWIDTH: 5 MHz
ANTENNA GAIN: 10 dBi



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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 48 VDC
Remarks:			

Plot 7.1.21 Peak output power test results at high frequency

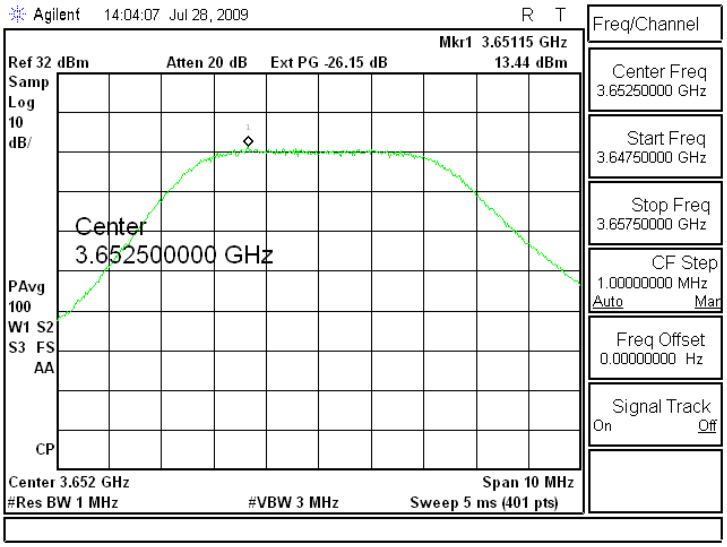
EUT OUTPUT CONNECTOR:	Ant 2
CHANNEL BANDWIDTH:	5 MHz
ANTENNA GAIN:	10 dBi



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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 48 VDC
Remarks:			

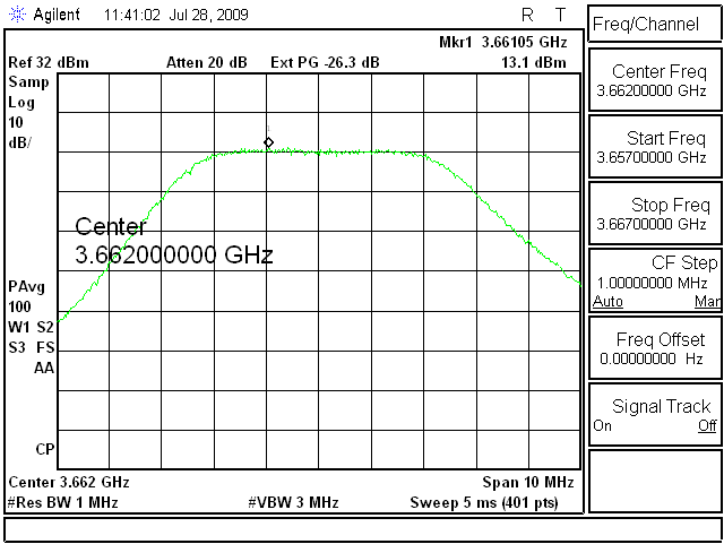
Plot 7.1.22 Peak output power test results at low frequency

EUT OUTPUT CONNECTOR: Ant 2
CHANNEL BANDWIDTH: 5 MHz
ANTENNA GAIN: 13 dBi



Plot 7.1.23 Peak output power test results at mid frequency

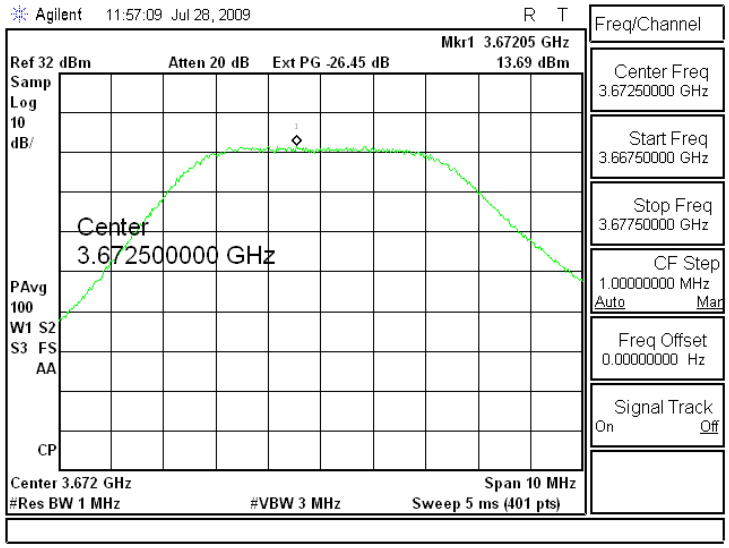
EUT OUTPUT CONNECTOR: Ant 2
CHANNEL BANDWIDTH: 5 MHz
ANTENNA GAIN: 13 dBi



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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 48 VDC
Remarks:			

Plot 7.1.24 Peak output power test results at high frequency

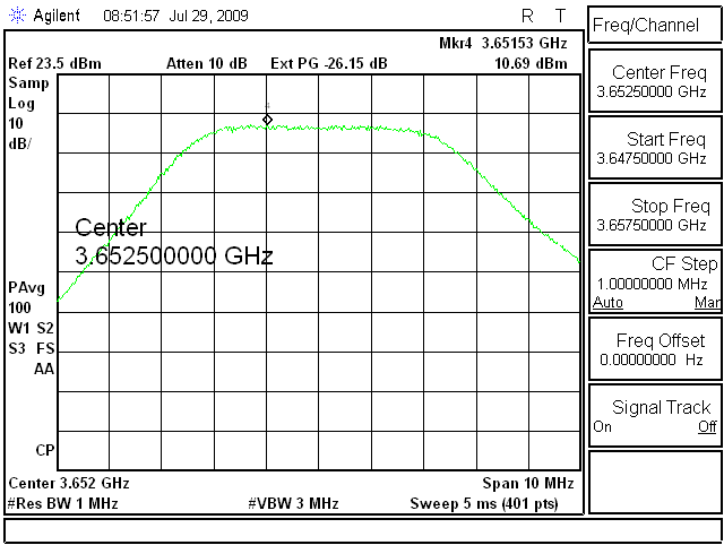
EUT OUTPUT CONNECTOR:	Ant 2
CHANNEL BANDWIDTH:	5 MHz
ANTENNA GAIN:	13 dBi



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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 48 VDC
Remarks:			

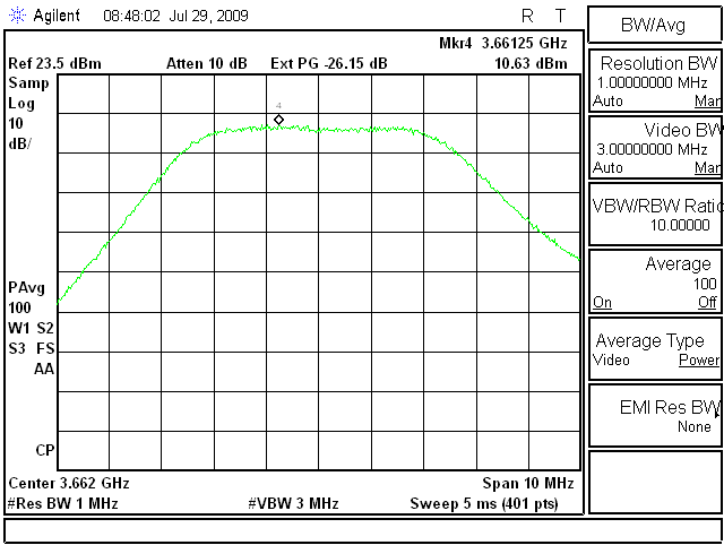
Plot 7.1.25 Peak output power test results at low frequency

EUT OUTPUT CONNECTOR: Ant 2
CHANNEL BANDWIDTH: 5 MHz
ANTENNA GAIN: 16.5 dBi



Plot 7.1.26 Peak output power test results at mid frequency

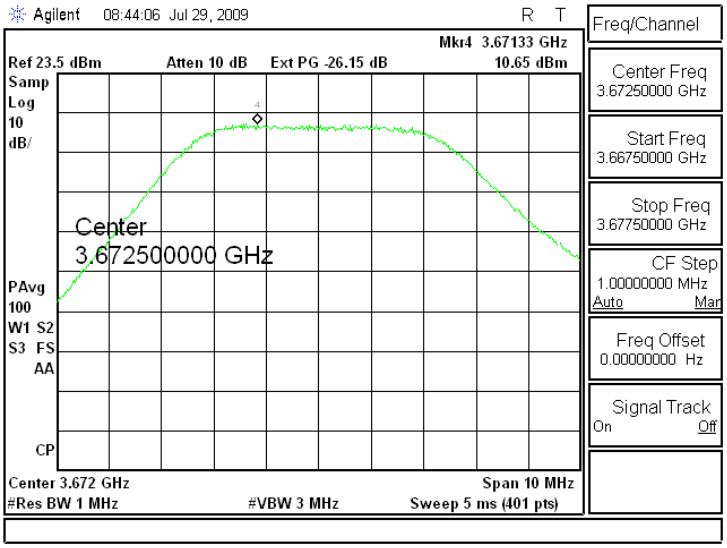
EUT OUTPUT CONNECTOR: Ant 2
CHANNEL BANDWIDTH: 5 MHz
ANTENNA GAIN: 16.5 dBi



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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 48 VDC
Remarks:			

Plot 7.1.27 Peak output power test results at high frequency

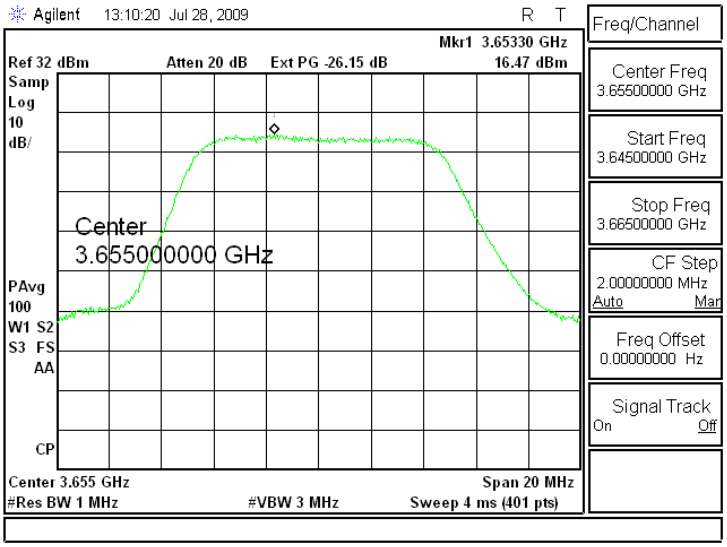
EUT OUTPUT CONNECTOR: Ant 2
CHANNEL BANDWIDTH: 5 MHz
ANTENNA GAIN: 16.5 dBi



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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 48 VDC
Remarks:			

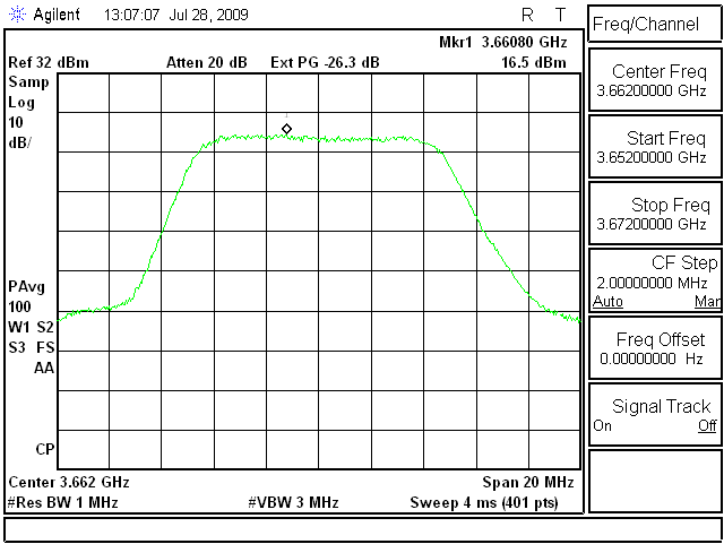
Plot 7.1.28 Peak output power test results at low frequency

EUT OUTPUT CONNECTOR: Ant 2
CHANNEL BANDWIDTH: 10 MHz
ANTENNA GAIN: 10 dBi



Plot 7.1.29 Peak output power test results at mid frequency

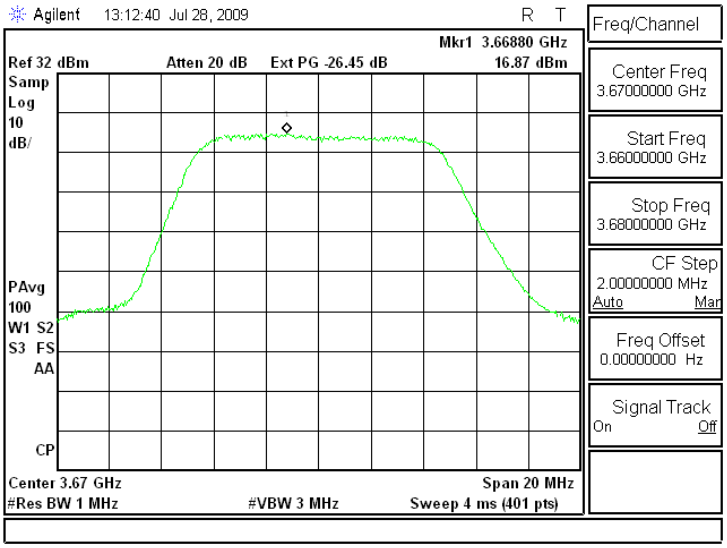
EUT OUTPUT CONNECTOR: Ant 2
CHANNEL BANDWIDTH: 10 MHz
ANTENNA GAIN: 10 dBi



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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 48 VDC
Remarks:			

Plot 7.1.30 Peak output power test results at high frequency

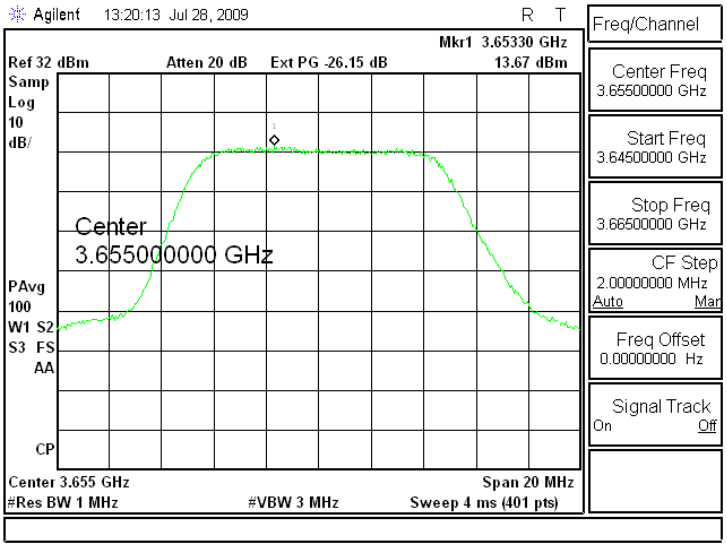
EUT OUTPUT CONNECTOR:	Ant 2
CHANNEL BANDWIDTH:	10 MHz
ANTENNA GAIN:	10 dBi



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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 48 VDC
Remarks:			

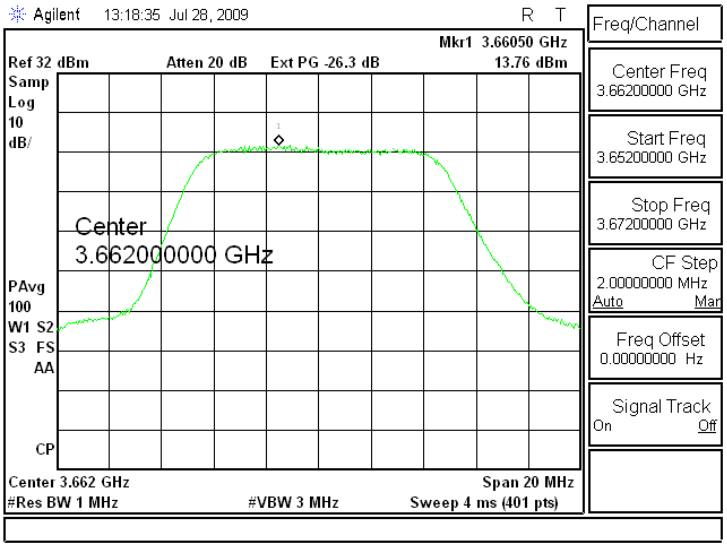
Plot 7.1.31 Peak output power test results at low frequency

EUT OUTPUT CONNECTOR: Ant 2
CHANNEL BANDWIDTH: 10 MHz
ANTENNA GAIN: 13 dBi



Plot 7.1.32 Peak output power test results at mid frequency

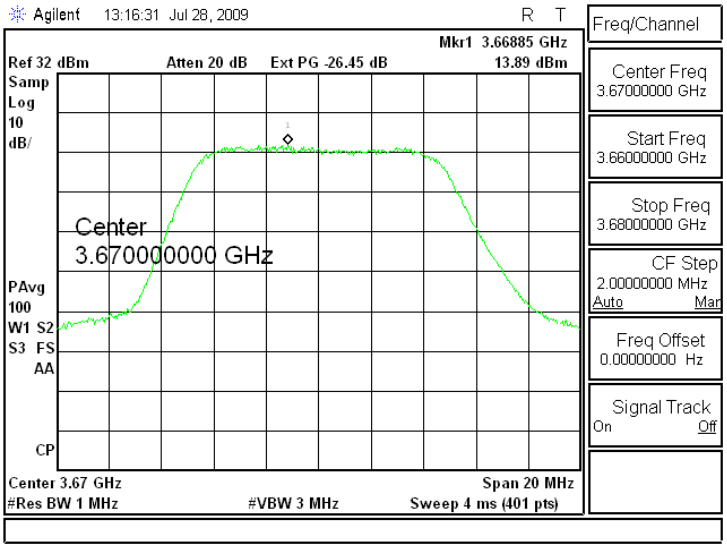
EUT OUTPUT CONNECTOR: Ant 2
CHANNEL BANDWIDTH: 10 MHz
ANTENNA GAIN: 13 dBi



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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 48 VDC
Remarks:			

Plot 7.1.33 Peak output power test results at high frequency

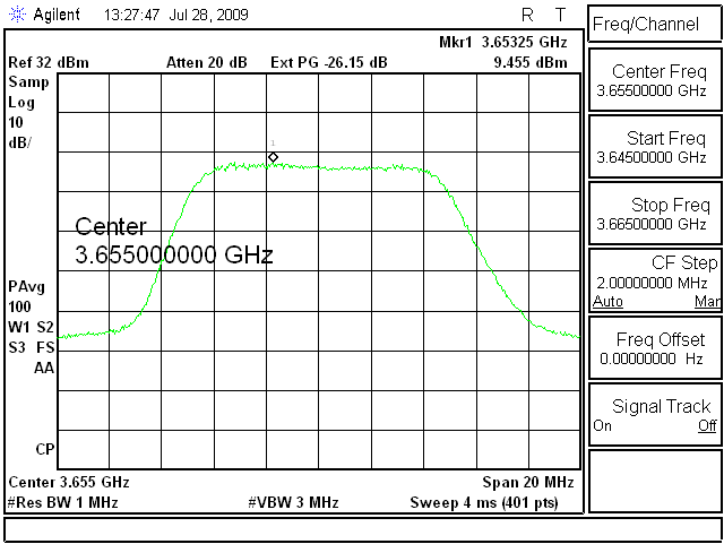
EUT OUTPUT CONNECTOR:	Ant 2
CHANNEL BANDWIDTH:	10 MHz
ANTENNA GAIN:	13 dBi



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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 48 VDC
Remarks:			

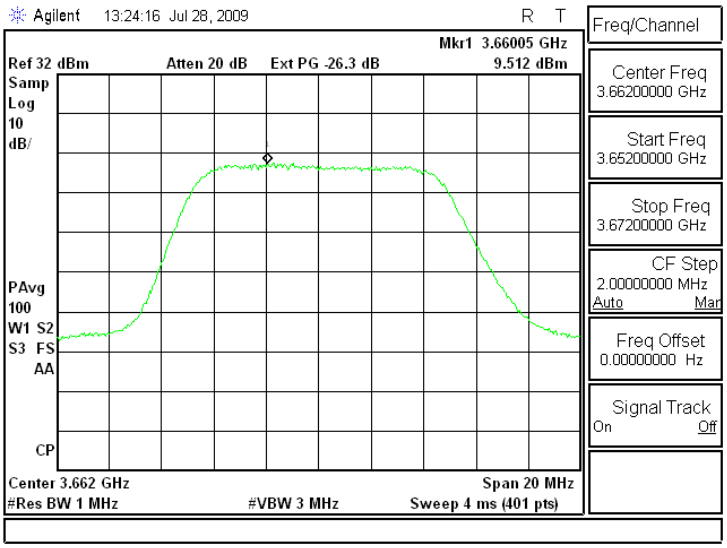
Plot 7.1.34 Peak output power test results at low frequency

EUT OUTPUT CONNECTOR: Ant 2
CHANNEL BANDWIDTH: 10 MHz
ANTENNA GAIN: 16.5 dBi



Plot 7.1.35 Peak output power test results at mid frequency

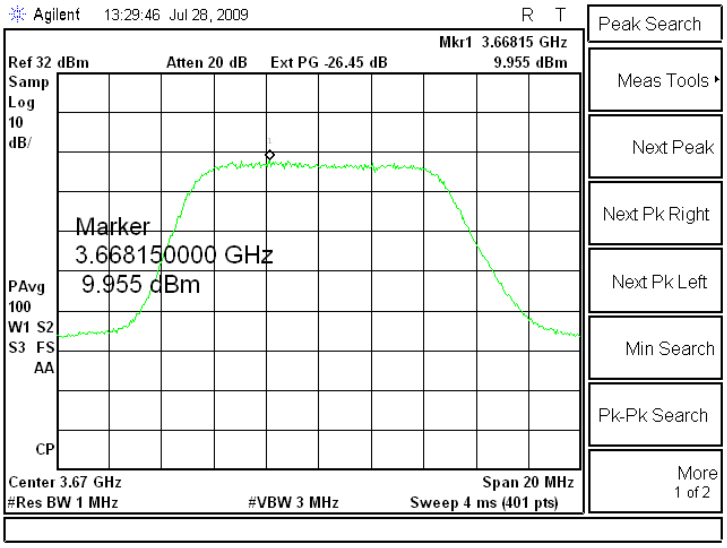
EUT OUTPUT CONNECTOR: Ant 2
CHANNEL BANDWIDTH: 10 MHz
ANTENNA GAIN: 16.5 dBi



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:	9/6/2009 11:26:04 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 48 VDC
Remarks:			

Plot 7.1.36 Peak output power test results at high frequency

EUT OUTPUT CONNECTOR:	Ant 2
CHANNEL BANDWIDTH:	10 MHz
ANTENNA GAIN:	16.5 dBi



Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:10:32 AM		
Temperature: 25ºC	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. 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, 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

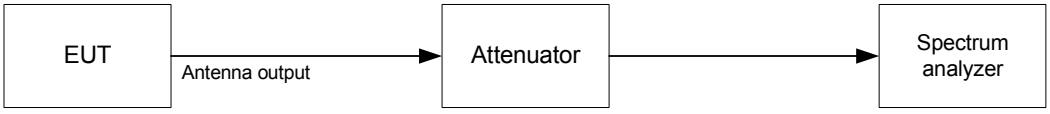
7.2.2 Test procedure

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:	9/2/2009 9:10:32 AM		
Temperature: 25ºC	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:	100 kHz
VIDEO BANDWIDTH:	300 kHz
MODULATION ENVELOPE REFERENCE POINTS:	26 dBc
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
BIT RATE:	Maximum
CHANNEL BANDWIDTH:	5 MHz
TRANSMITTER OUTPUT POWER:	23.50 dBm at the low carrier frequency 23.59 dBm at the mid carrier frequency 23.53 dBm at the high carrier frequency

Carrier frequency, MHz	Occupied bandwidth, kHz
3652.50	4740.00
2662.00	4730.00
3672.50	4740.00

DETECTOR USED:	Average
RESOLUTION BANDWIDTH:	100 kHz
VIDEO BANDWIDTH:	300 kHz
MODULATION ENVELOPE REFERENCE POINTS:	26 dBc
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
BIT RATE:	Maximum
CHANNEL BANDWIDTH:	10 MHz
TRANSMITTER OUTPUT POWER:	25.43 dBm at the low carrier frequency 25.63 dBm at the mid carrier frequency 25.70 dBm at the high carrier frequency

Carrier frequency, MHz	Occupied bandwidth, kHz
3655.00	9270.00
2662.00	9270.00
3670.00	9270.00

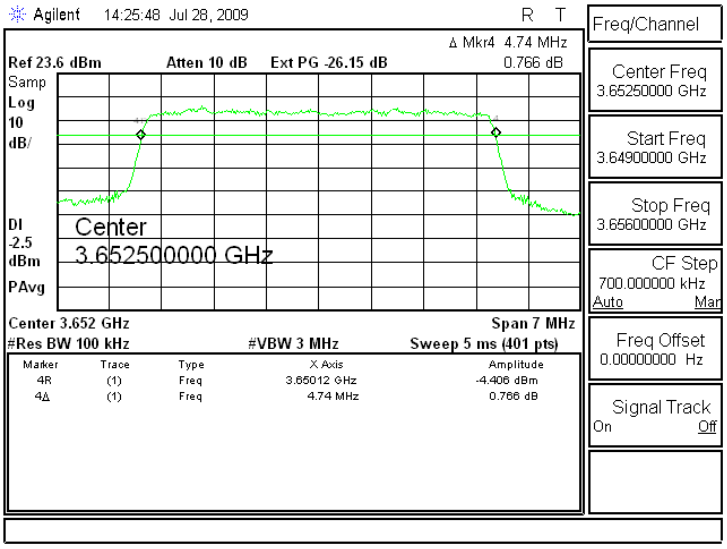
Reference numbers of manufacture's test equipment used

#1	#4	#6	#10				

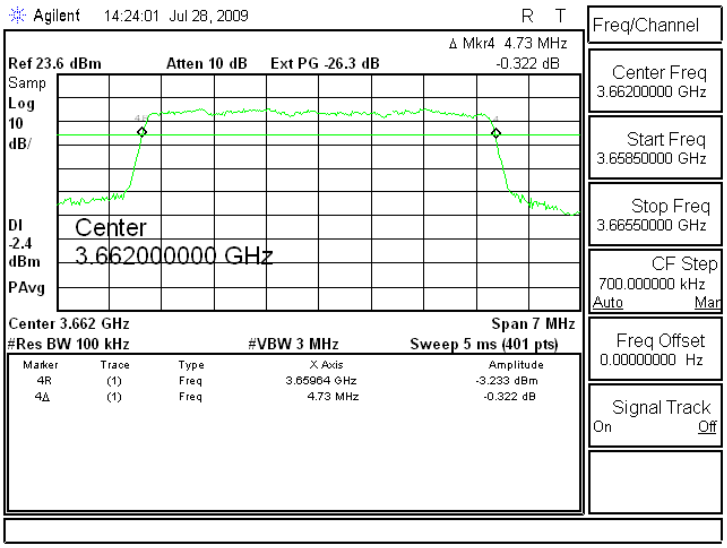
Full description is given in Appendix A.

Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:10:32 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

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

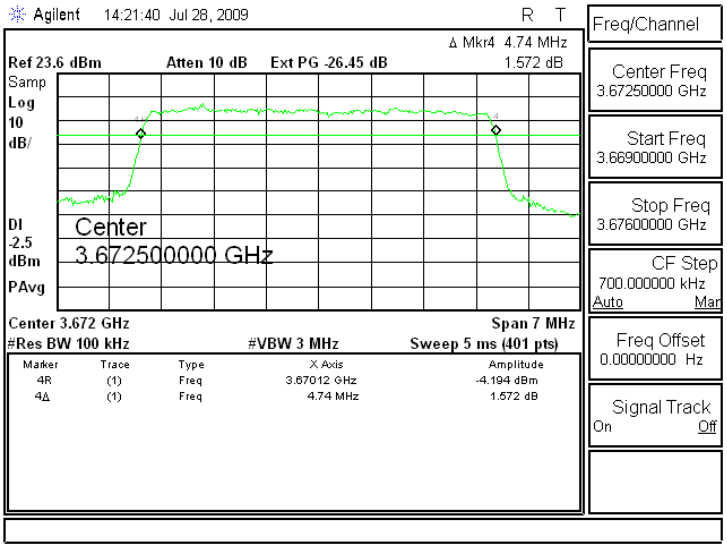


Plot 7.2.2 Occupied bandwidth test result at mid frequency, 5 MHz channel bandwidth



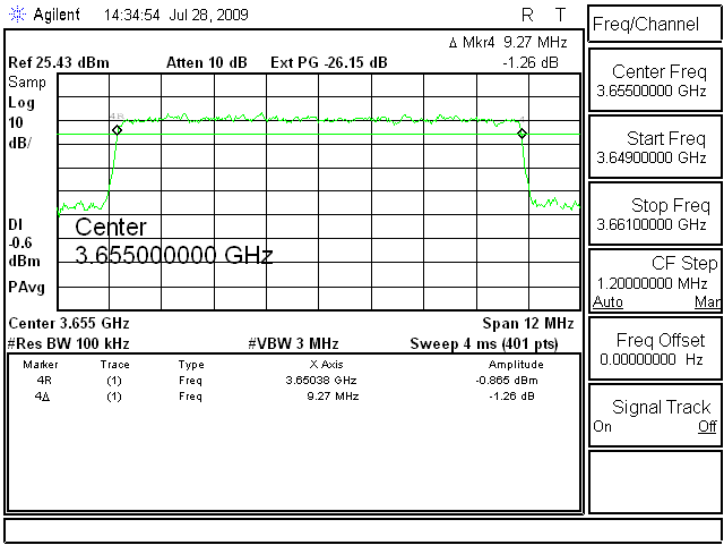
Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:10:32 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

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

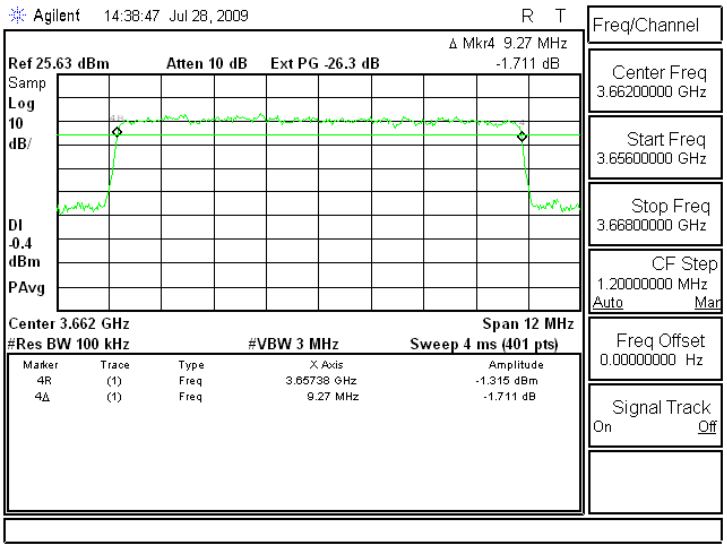


Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:10:32 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.4 Occupied bandwidth test result at low frequency, 10 MHz channel bandwidth

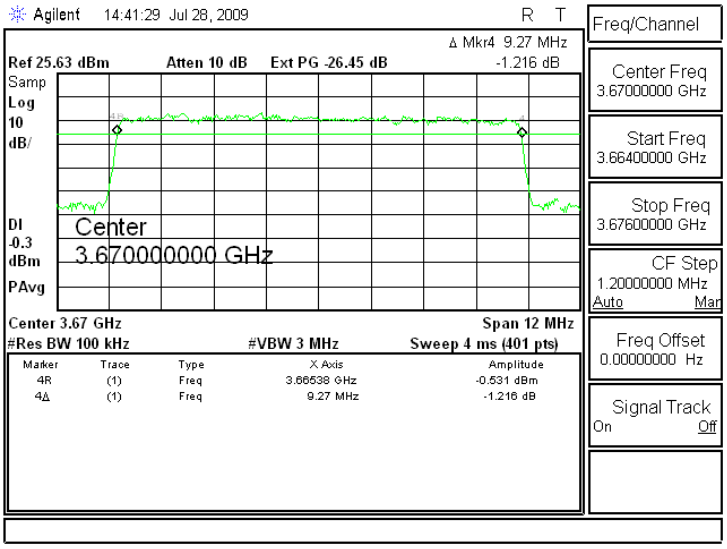


Plot 7.2.5 Occupied bandwidth test result at mid frequency, 10 MHz channel bandwidth



Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:10:32 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.6 Occupied bandwidth test result at high frequency, 10 MHz channel bandwidth



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:	8/26/2009 11:45:18 AM		
Temperature: 25ºC	Air Pressure: 1011 hPa	Relative Humidity: 48 %	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 and Table 7.3.2. The test results are provided in the associated plots.

Table 7.3.1 Emission mask limits for 5 MHz channel bandwidth

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

* - 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 10 MHz channel bandwidth

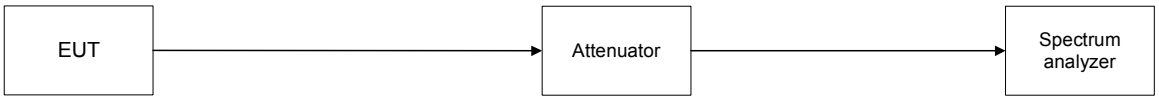
Frequency displacement from carrier	Attenuation below carrier, dBc
Emission mask B(Channel bandwidth 10 MHz)	
0 – 5 MHz	0
5 – 10 MHz	25
10.0 – 25 MHz	35
More than** 25 MHz	43 + 10 log(P)

* - F – frequency in MHz removed from center
** - emission mask includes carrier modulation envelope within ± 150 % of the authorized bandwidth; the frequency range removed beyond ± 150 % 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 7.3.3 and Table 7.3.4.

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:	8/26/2009 11:45:18 AM		
Temperature: 25ºC	Air Pressure: 1011 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

Table 7.3.3 Emission mask test results for 5 MHz channel bandwidth

Carrier frequency, MHz	Limit	Verdict
3652.5	Emission mask B	Pass
3662.0		
3672.5		

The zero dB reference is measured relative to the highest total average power of the fundamental emission measured across the designated channel bandwidth.

Table 7.3.4 Emission mask test results for 10 MHz channel bandwidth

Carrier frequency, MHz	Limit	Verdict
3655.0	Emission mask B	Pass
3662.0		
3670.0		

The zero dB reference is measured relative to the highest total average power of the fundamental emission measured across the designated channel bandwidth.

Reference numbers of manufacture's test equipment used

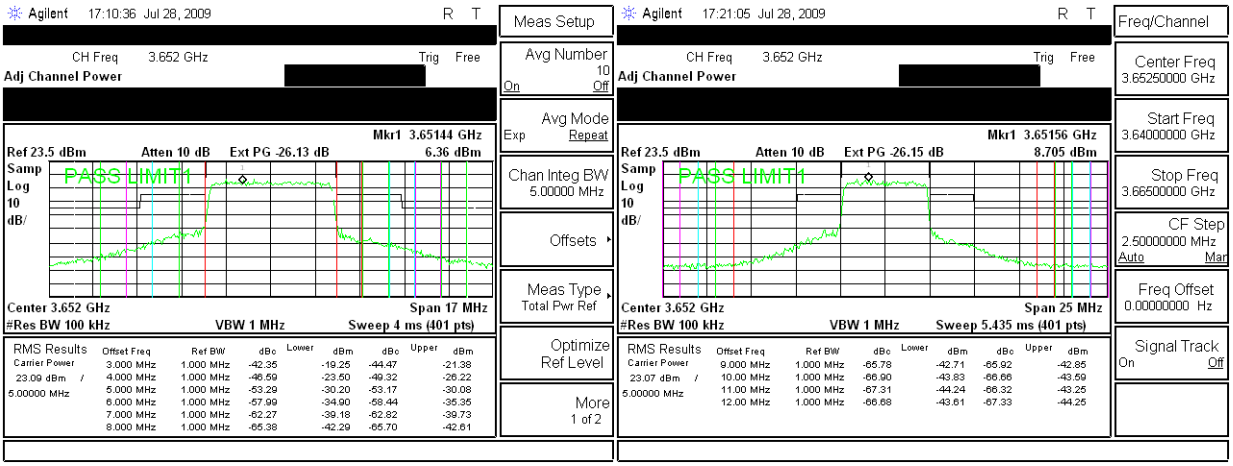
#1	#2	#3	#4	#5	#6		

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:	8/26/2009 11:45:18 AM		
Temperature: 25ºC	**Air Pressure:** 1011 hPa	**Relative Humidity:** 48 %	**Power Supply:** 48 VDC
Remarks:			

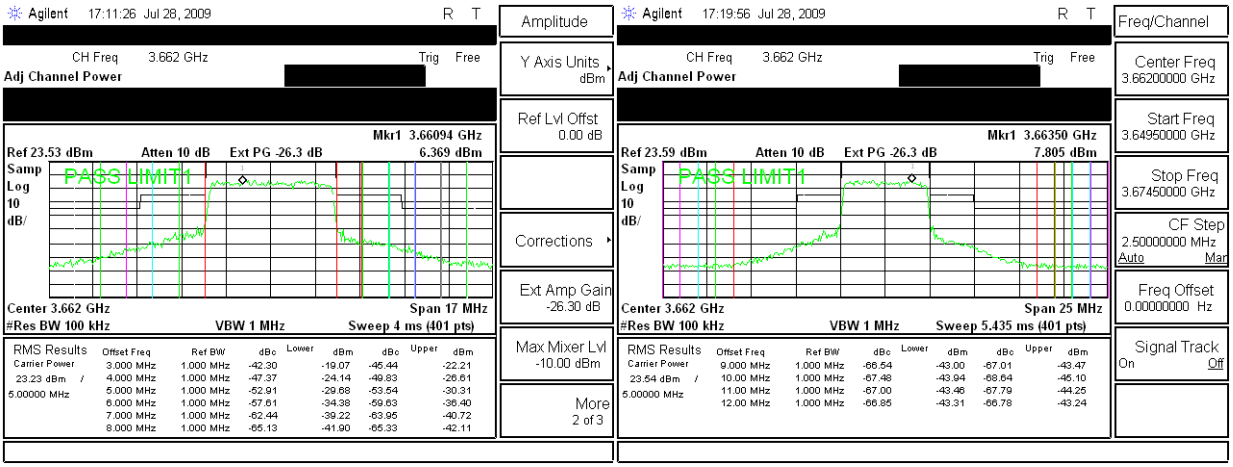
Plot 7.3.1 Emission mask test results at low carrier frequency 5 MHz CBW

ASSIGNED FREQUENCY RANGE:	3650 – 3675 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
BIT RATE:	Maximum
TRANSMITTER OUTPUT POWER SETTINGS:	23



Plot 7.3.2 Emission mask test results at mid carrier frequency

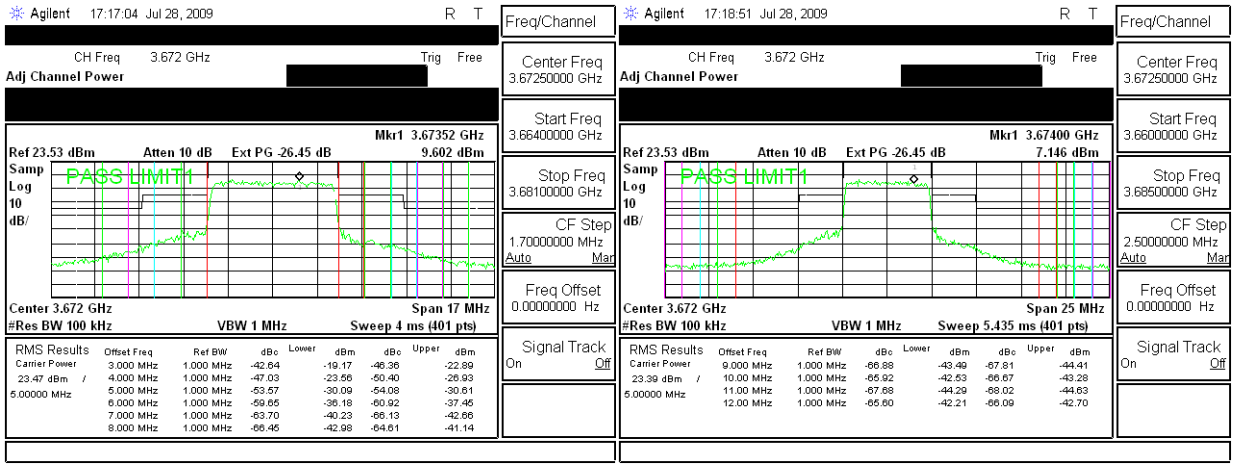
ASSIGNED FREQUENCY RANGE:	3650 – 3675 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
BIT RATE:	Maximum
TRANSMITTER OUTPUT POWER SETTINGS:	23



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:	8/26/2009 11:45:18 AM		
Temperature: 25ºC	**Air Pressure:** 1011 hPa	**Relative Humidity:** 48 %	**Power Supply:** 48 VDC
Remarks:			

Plot 7.3.3 Emission mask test results at high carrier frequency

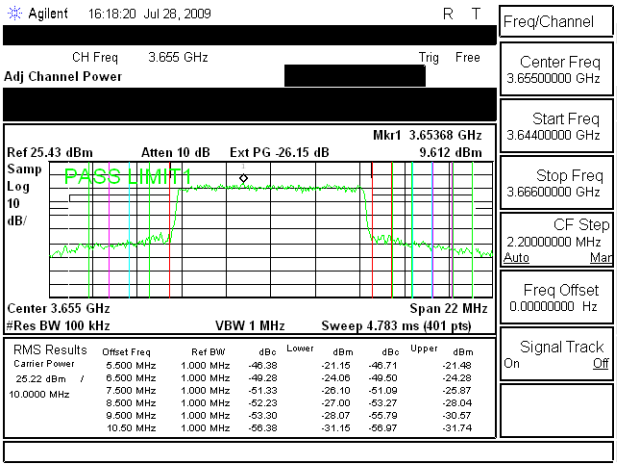
ASSIGNED FREQUENCY RANGE:	3650 – 3675 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
BIT RATE:	Maximum
TRANSMITTER OUTPUT POWER SETTINGS:	23

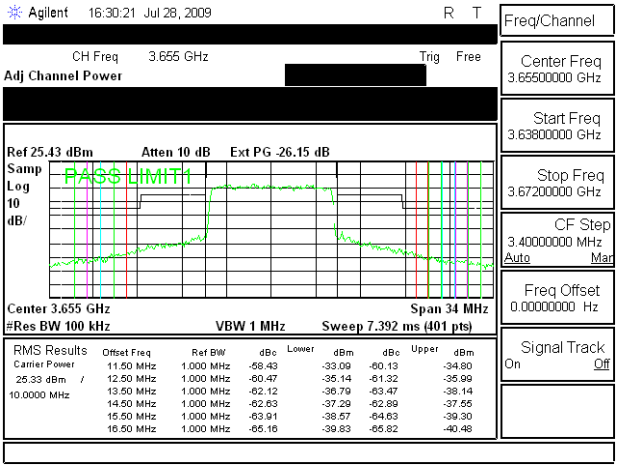


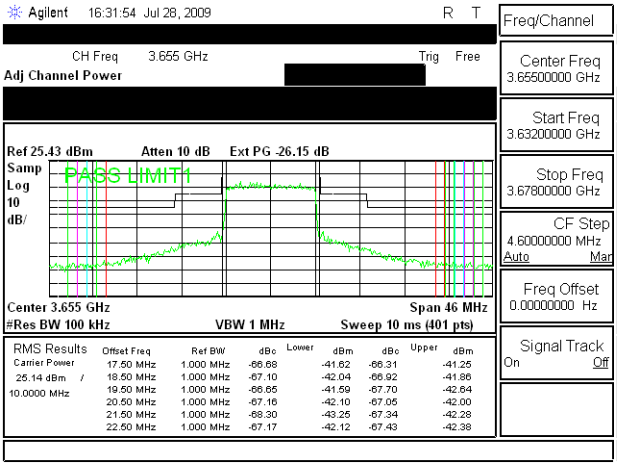
Test specification:	Section 90.210 (b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(b); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	8/26/2009 11:45:18 AM		
Temperature: 25ºC	Air Pressure: 1011 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

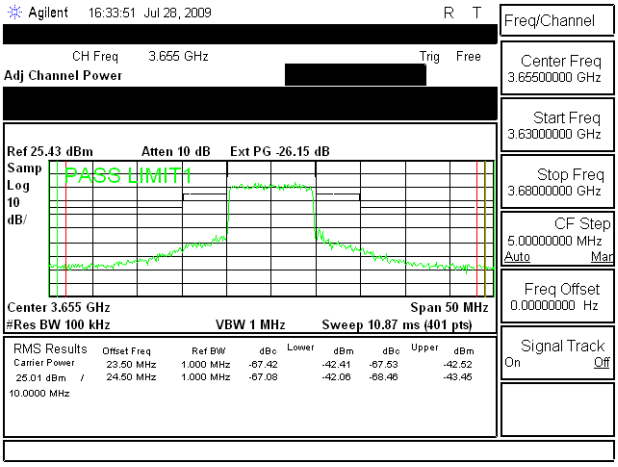
Plot 7.3.4 Emission mask test results at low carrier frequency 10 MHz CBW

ASSIGNED FREQUENCY RANGE:	3650 – 3675 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
BIT RATE:	Maximum
TRANSMITTER OUTPUT POWER SETTINGS:	25





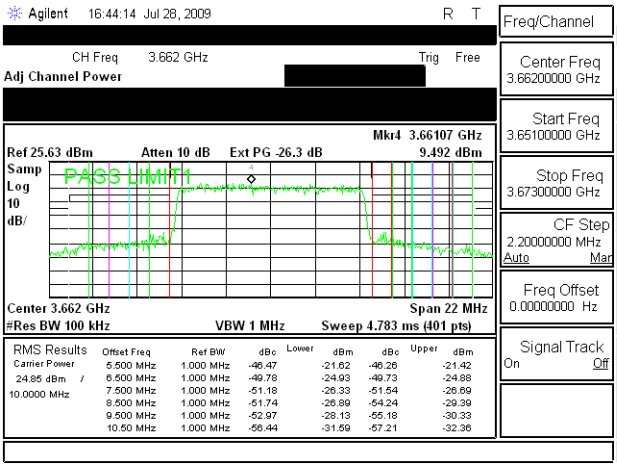


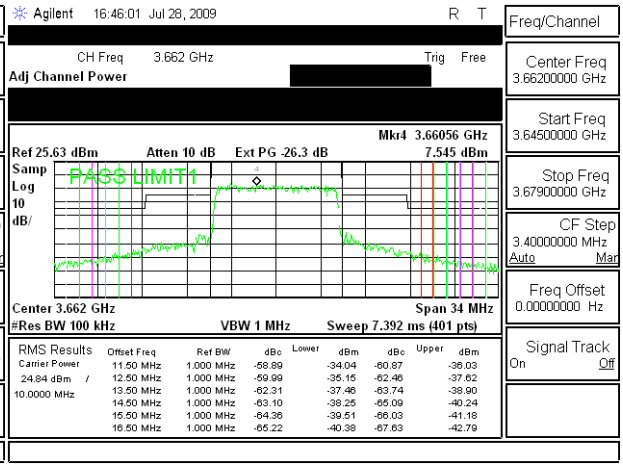


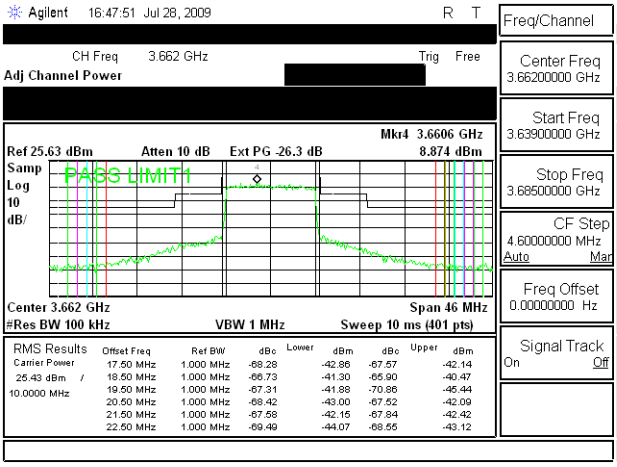
Test specification:	Section 90.210 (b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(b); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	8/26/2009 11:45:18 AM		
Temperature: 25ºC	Air Pressure: 1011 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

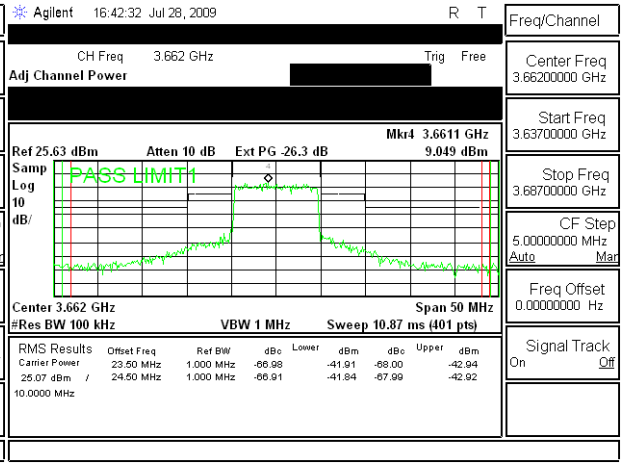
Plot 7.3.5 Emission mask test results at mid carrier frequency 10 MHz CBW

ASSIGNED FREQUENCY RANGE:	3650 – 3675 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
BIT RATE:	Maximum
TRANSMITTER OUTPUT POWER SETTINGS:	25





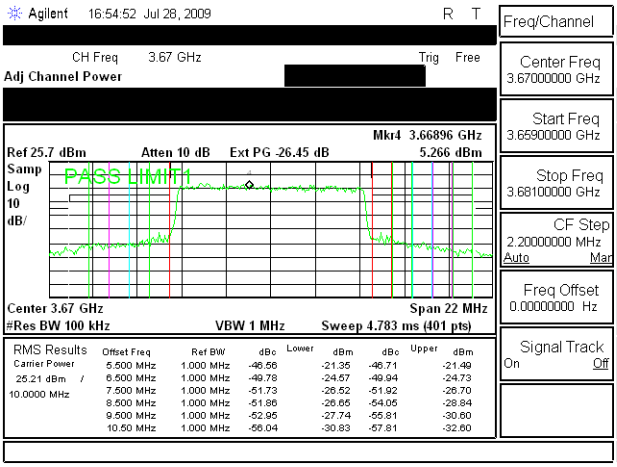


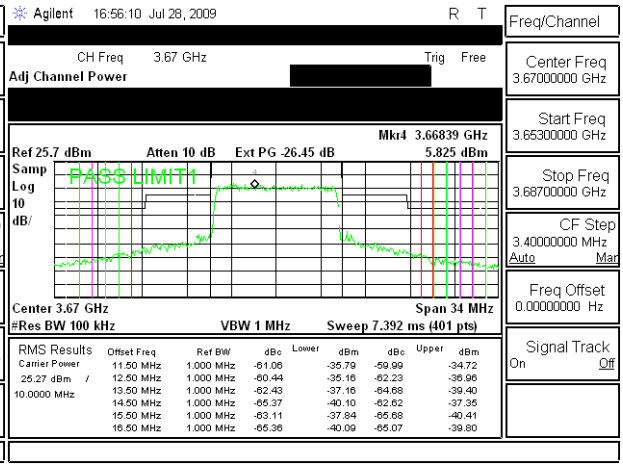


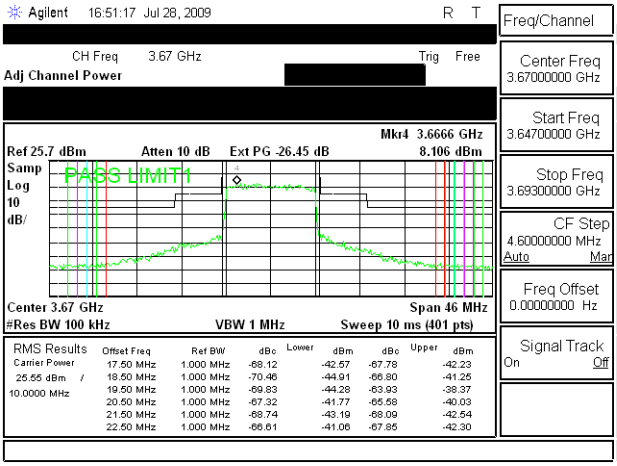
Test specification:	Section 90.210 (b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(b); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	8/26/2009 11:45:18 AM		
Temperature: 25ºC	Air Pressure: 1011 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

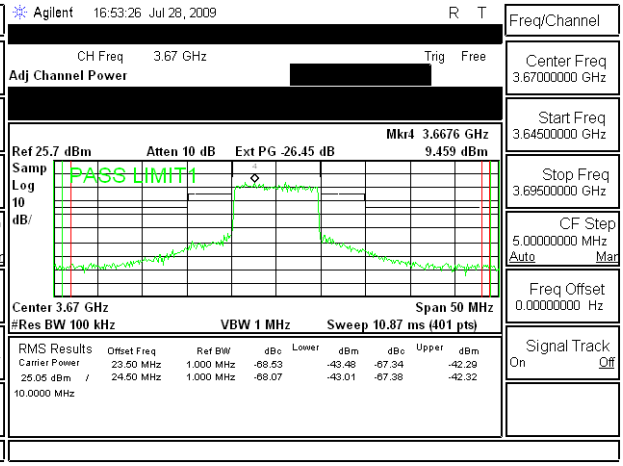
Plot 7.3.6 Emission mask test results at high carrier frequency 10 MHz CBW

ASSIGNED FREQUENCY RANGE:	3650 – 3675 MHz
DETECTOR USED:	Average
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
BIT RATE:	Maximum
TRANSMITTER OUTPUT POWER SETTINGS:	25









Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:05:47 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

7.4 Radiated spurious emission measurements

7.4.1 General

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

Table 7.4.1 Radiated spurious emission test limits

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

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

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

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

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

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

Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:05:47 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

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

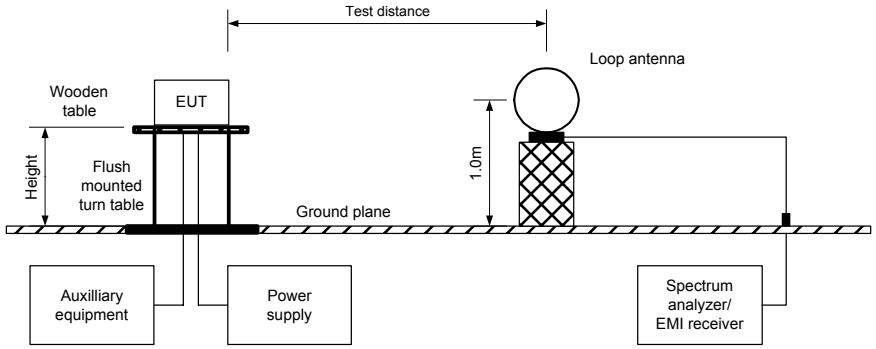
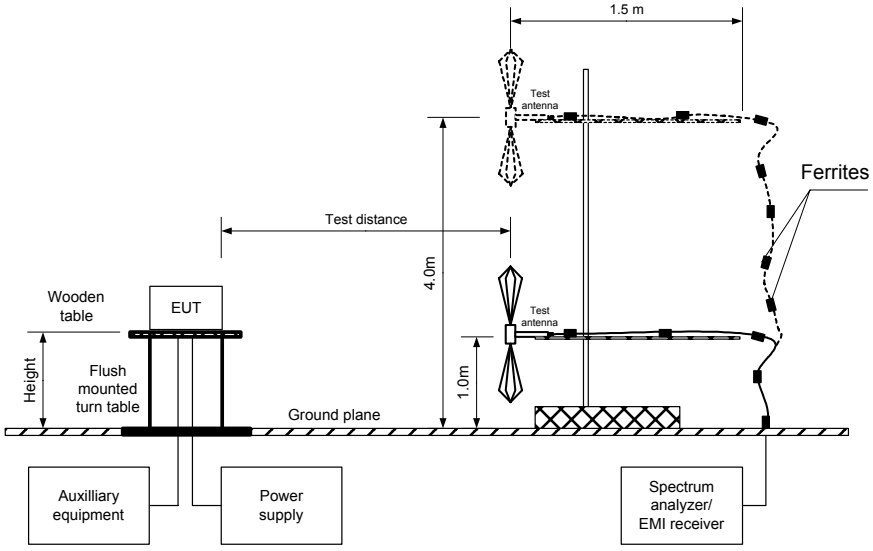


Figure 7.4.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	**Section 90.1323, Radiated spurious emissions**		
Test procedure:	47 CFR, Sections 2.1053 and 90.1323		
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	9/2/2009 9:05:47 AM		
Temperature: 25ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 41 %	**Power Supply:** 48 VDC
Remarks:			

Table 7.4.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE:	3650 – 3675 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)
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
BIT RATE:	Maximum
TRANSMITTER OUTPUT POWER SETTINGS:	25 dBm for both antenna chains
CHANNEL BANDWIDTH:	10 MHz (maximum output power settings)

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 3655.00 MHz							
All found emissions were from digital part of EUT							

Verdict: Pass

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

Reference numbers of test equipment used

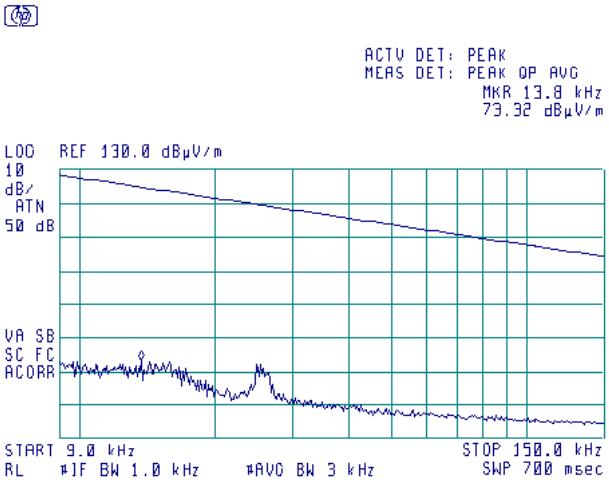
HL 0446	HL 0521	HL 0768	HL 0769	HL 1424	HL 1425	HL 1984	HL 2697
HL 2883	HL 3121	HL 3122	HL 3531	HL 3533	HL 3535	HL 3616	

Full description is given in Appendix A.

Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:05:47 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

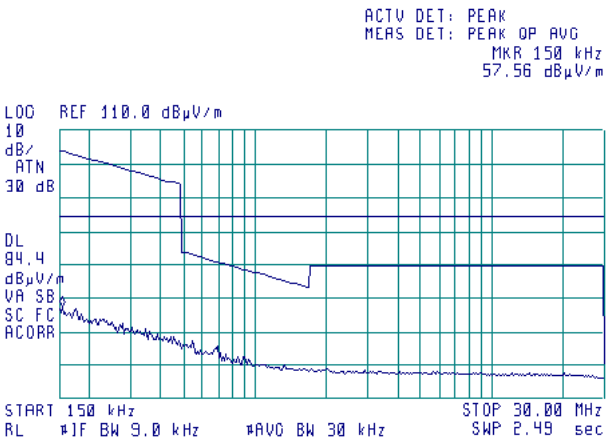
Plot 7.4.1 Radiated emission measurements in 9 - 150 kHz range

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



Plot 7.4.2 Radiated emission measurements in 0.15 - 30 MHz range

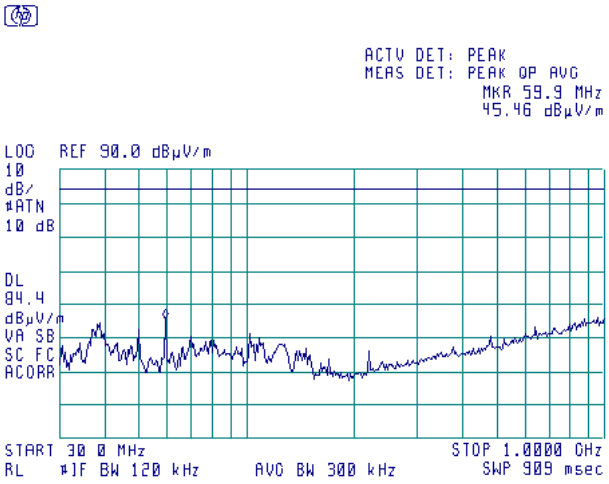
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low, Mid, High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:05:47 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

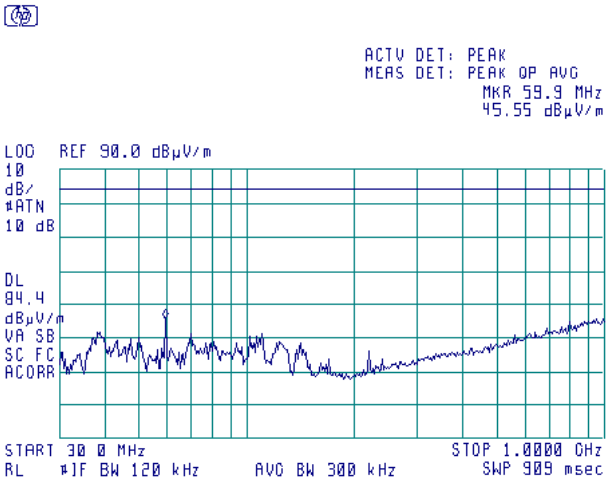
Plot 7.4.3 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.4.4 Radiated emission measurements in 30 - 1000 MHz range

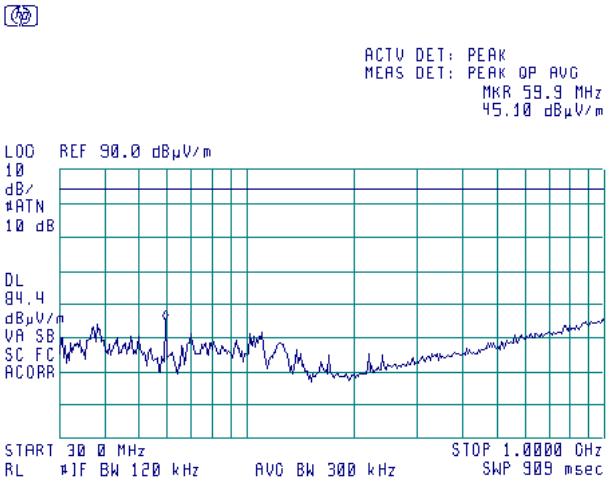
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:05:47 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

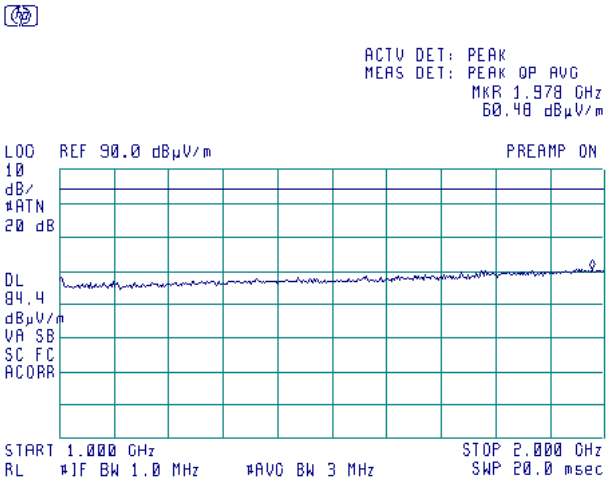
Plot 7.4.5 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.4.6 Radiated emission measurements in 1000 – 2000 MHz range

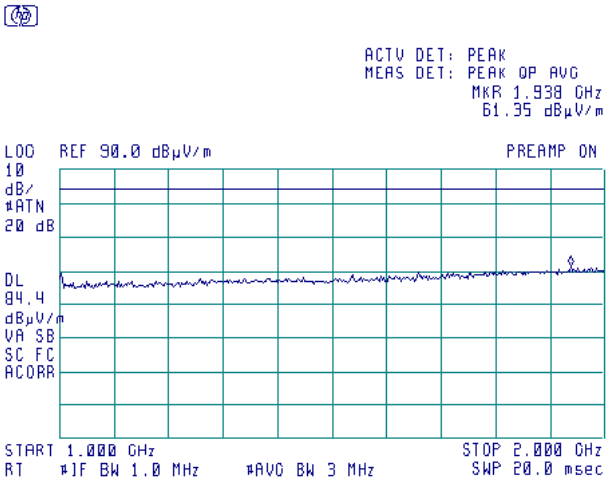
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:05:47 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

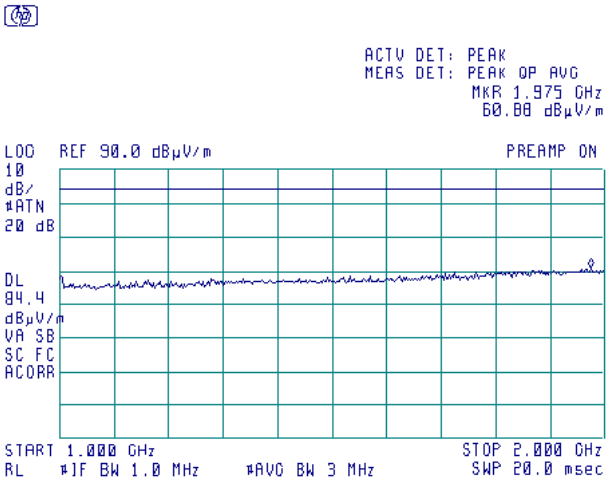
Plot 7.4.7 Radiated emission measurements in 1000 – 2000 MHz range

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



Plot 7.4.8 Radiated emission measurements in 1000 – 2000 MHz range

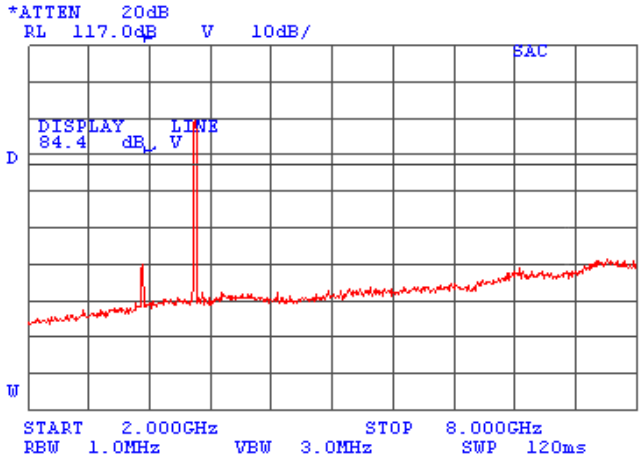
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:05:47 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

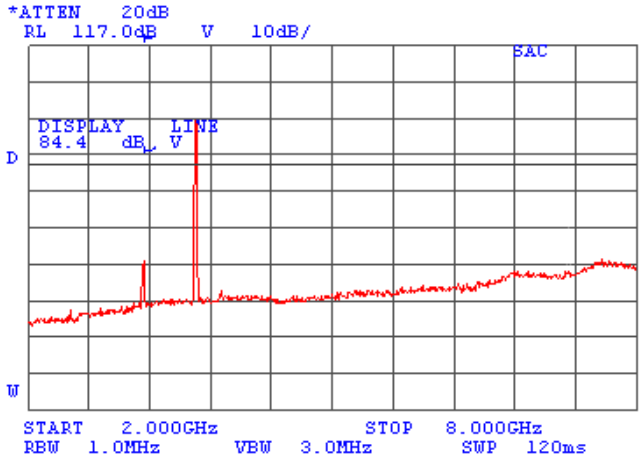
Plot 7.4.9 Radiated emission measurements in 2000 – 8000 MHz range

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



Plot 7.4.10 Radiated emission measurements in 2000 – 8000 MHz range

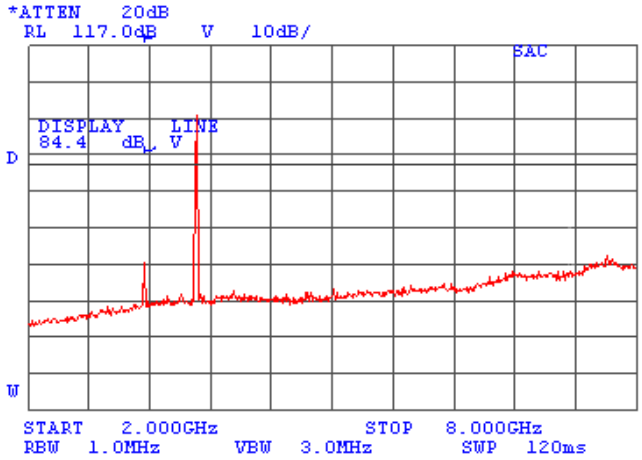
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:05:47 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.11 Radiated emission measurements in 2000 – 8000 MHz range

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

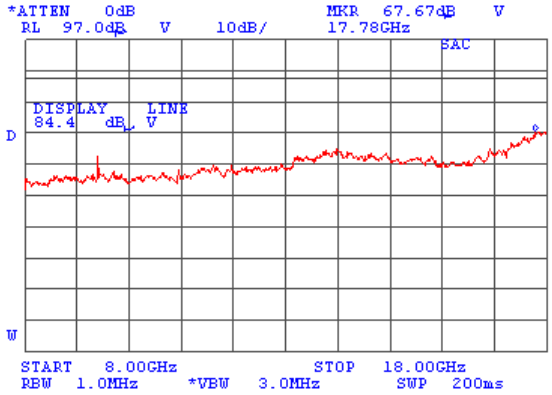


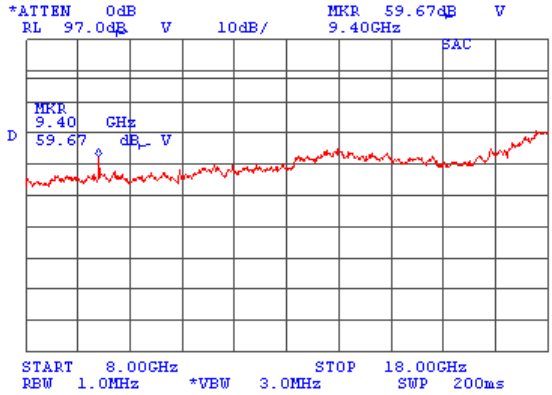
3670.00 – high channel carrier

Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:05:47 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.12 Radiated emission measurements in 8000 – 18000 MHz range

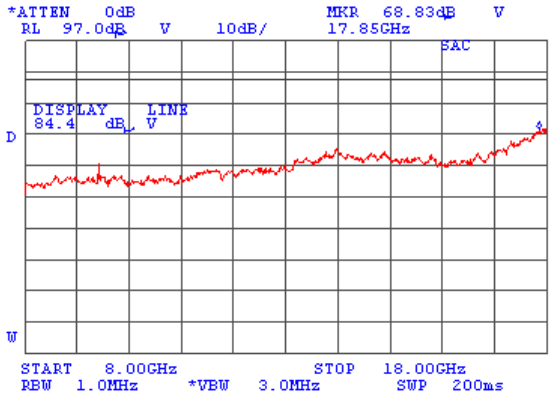
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m

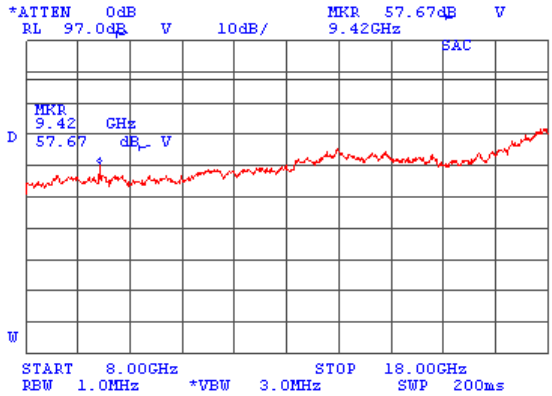




Plot 7.4.13 Radiated emission measurements in 8000 – 18000 MHz range

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

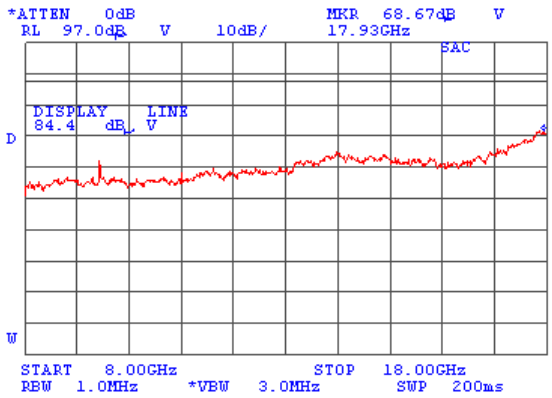


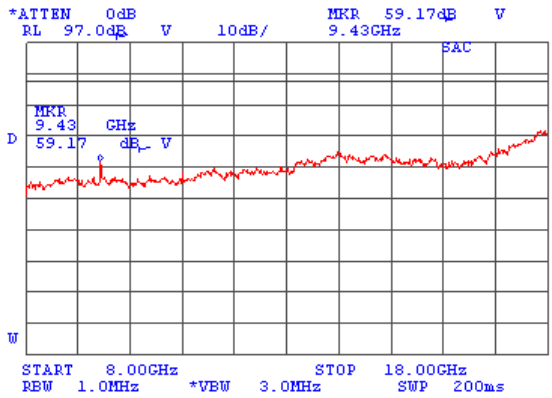


Test specification:	**Section 90.1323, Radiated spurious emissions**		
Test procedure:	47 CFR, Sections 2.1053 and 90.1323		
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	9/2/2009 9:05:47 AM		
Temperature: 25ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 41 %	**Power Supply:** 48 VDC
Remarks:			

Plot 7.4.14 Radiated emission measurements in 8000 – 18000 MHz range

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

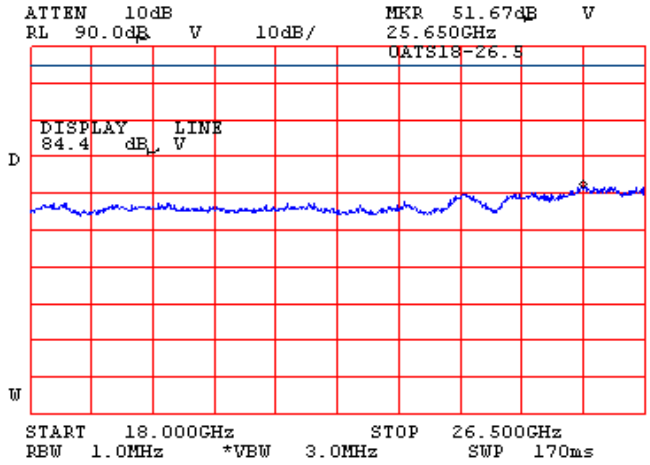




Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:05:47 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

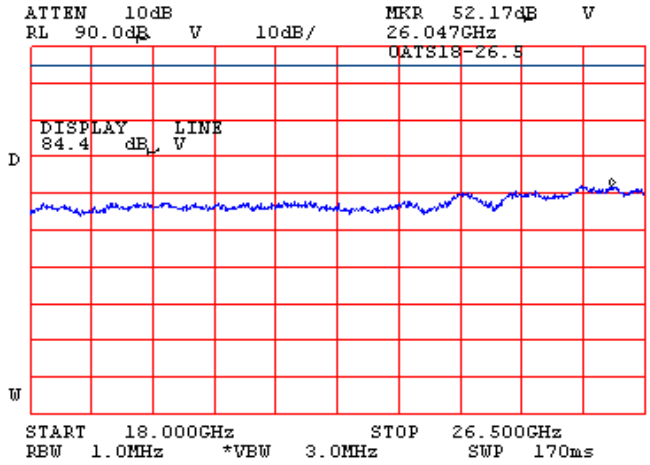
Plot 7.4.15 Radiated emission measurements in 18000 – 26500 MHz range

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



Plot 7.4.16 Radiated emission measurements in 18000 – 26500 MHz range

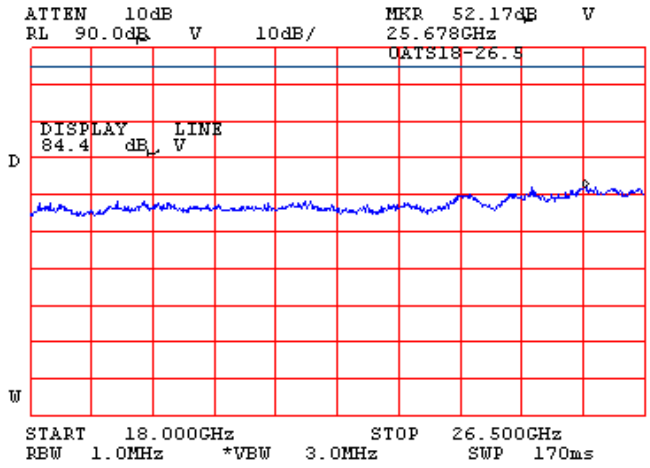
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:05:47 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.17 Radiated emission measurements in 18000 – 26500 MHz range

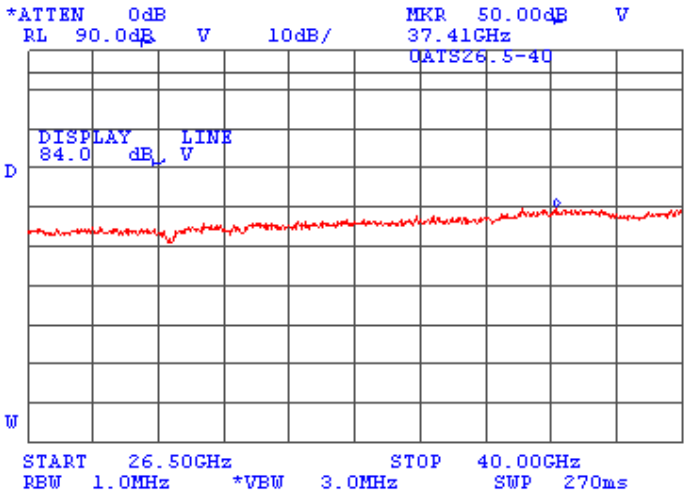
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:05:47 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

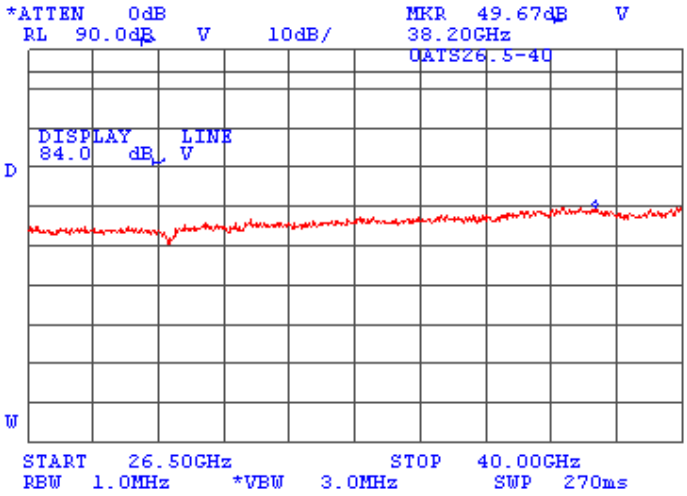
Plot 7.4.18 Radiated emission measurements in 26500 – 40000 MHz range

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



Plot 7.4.19 Radiated emission measurements in 26500 – 40000 MHz range

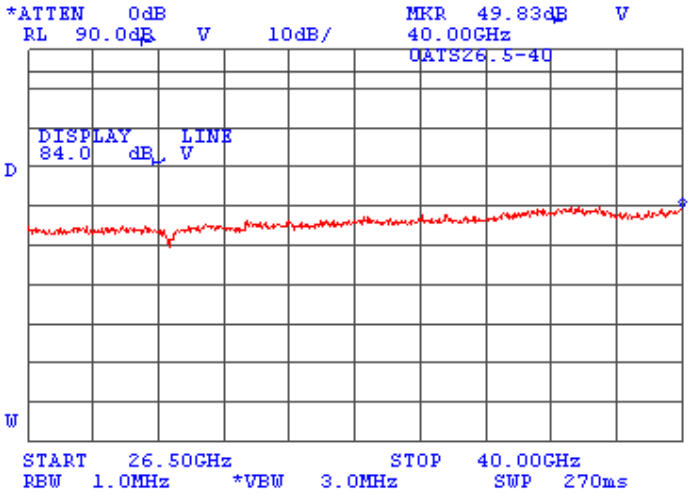
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:05:47 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.20 Radiated emission measurements in 26500 – 40000 MHz range

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



Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
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, 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 associated plots.

Figure 7.5.1 Spurious emission test setup

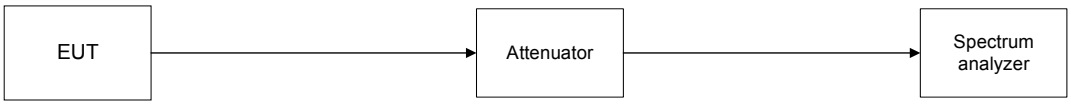


Figure 7.5.2 Spurious emission test setup

Test specification:	**Section 90.1323, Conducted spurious emissions**		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 41 %	**Power Supply:** 48 VDC
Remarks:			

Table 7.5.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 3650 – 3675 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 – 40000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
TRANSMITTER OUTPUT POWER: 25.43 (Ant 1) /25.40 (Ant 2) dBm at low frequency
25.63 (Ant 1) /25.46 (Ant 2) dBm at mid frequency
25.70 (Ant 1) /25.69 (Ant 2) dBm at high frequency

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict
All emissions were found at least 20 dB below the specified limit									Pass

*- Margin = Spurious emission – specification limit.

Reference numbers of HL test equipment used

HL 2013	HL 3455	HL 3472	HL 3473	HL 3474	HL 3559		

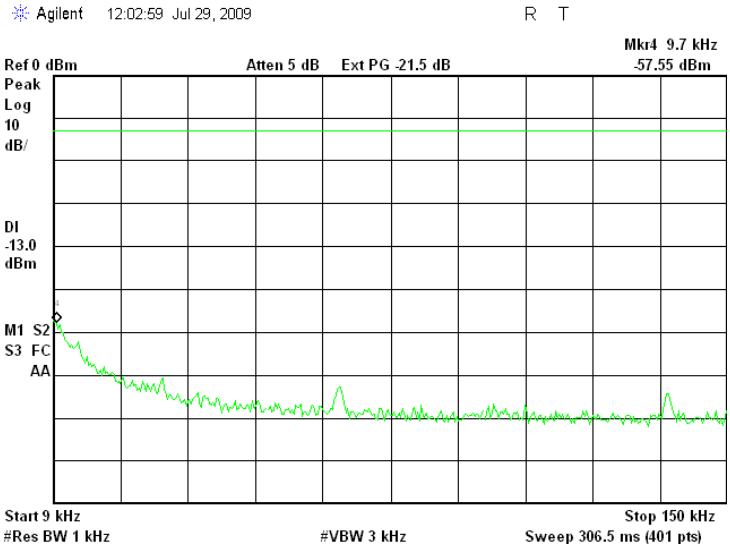
Reference numbers of manufacture's test equipment used

#1	#3	#5	#8	#9			

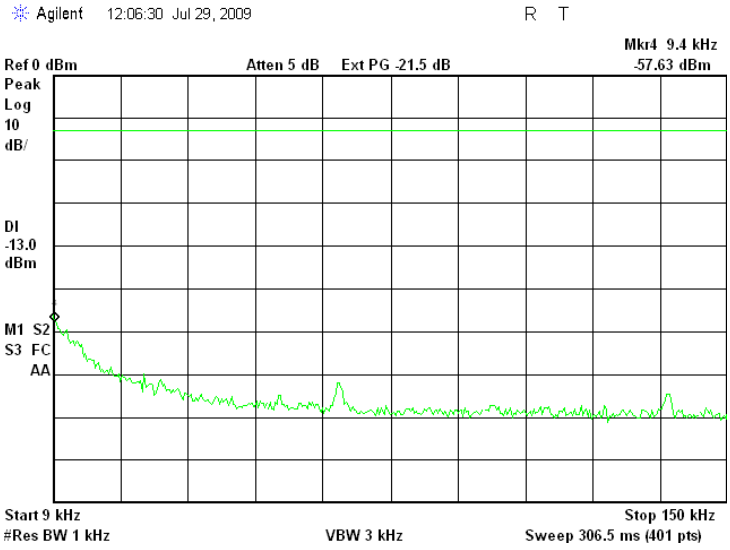
Full description is given in Appendix A.

Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.1 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency (Ant.1)

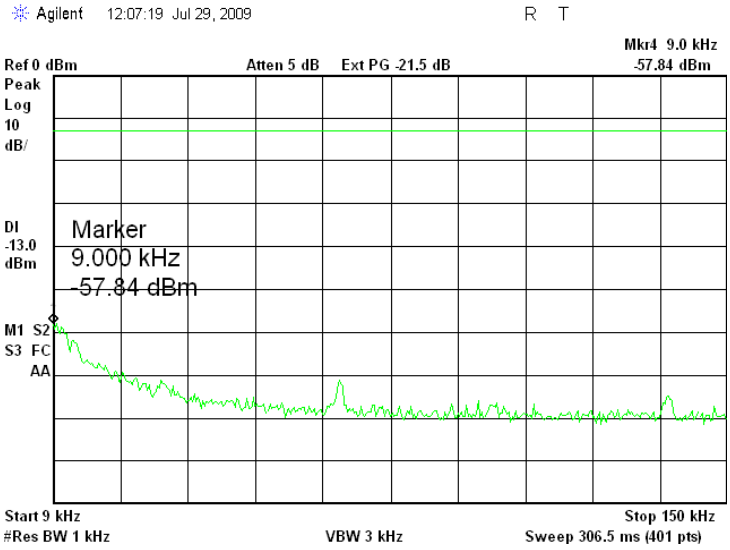


Plot 7.5.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency (Ant.1)



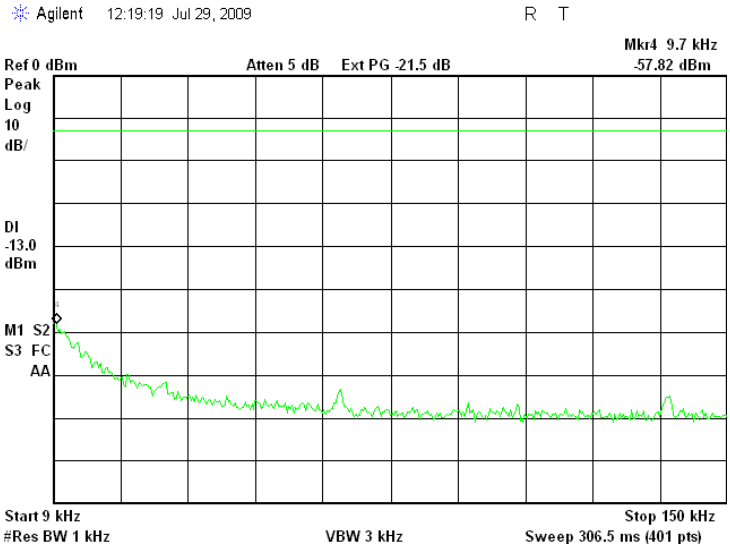
Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.3 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency (Ant.1)

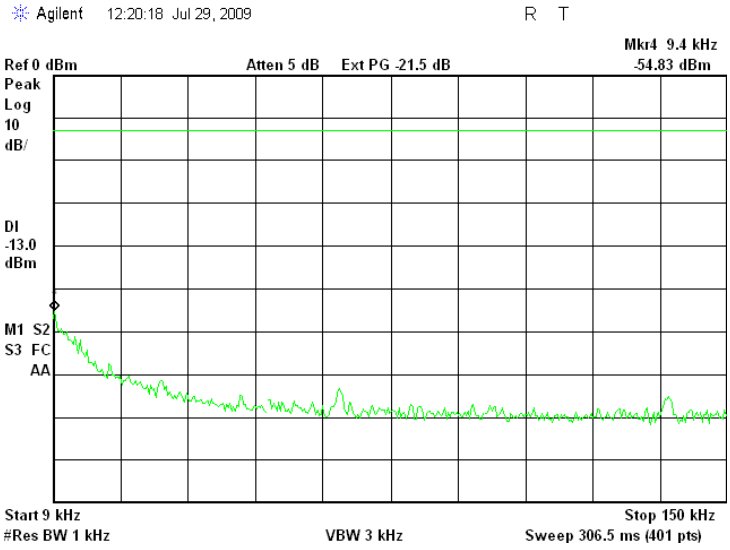


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.4 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency (Ant.2)

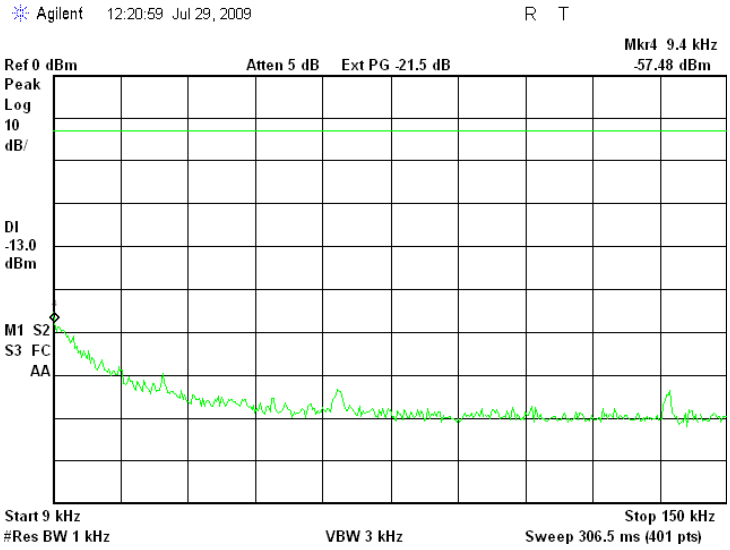


Plot 7.5.5 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency (Ant.2)



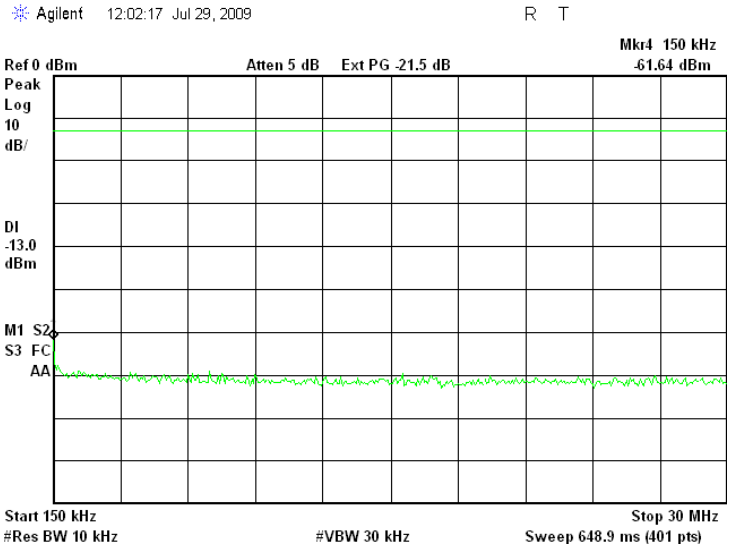
Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.6 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency (Ant.2)

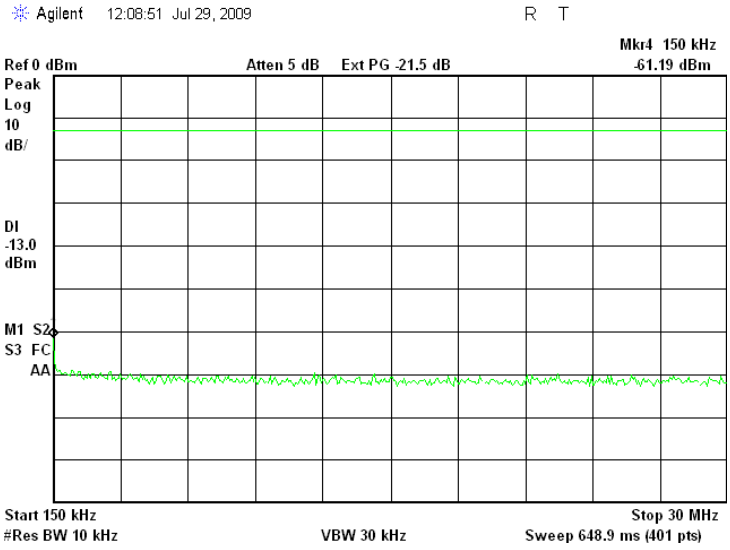


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.7 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency (Ant.1)

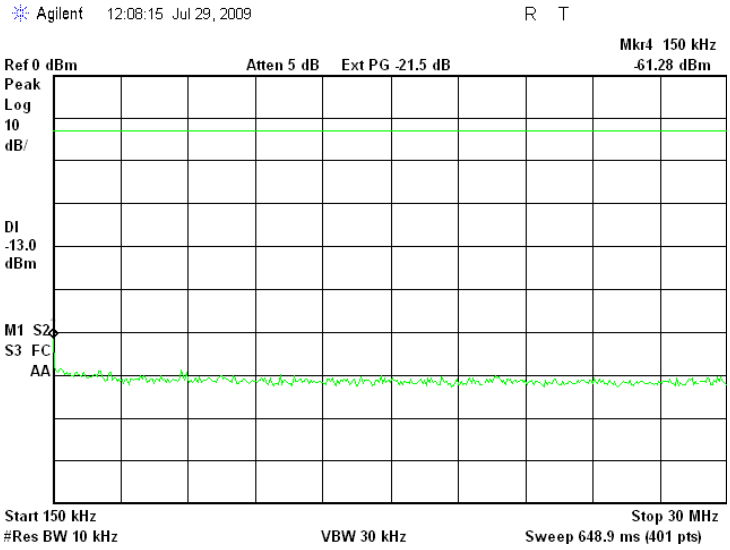


Plot 7.5.8 Spurious emission measurements in 0.15 - 30.0 MHz range at mid carrier frequency (Ant.1)



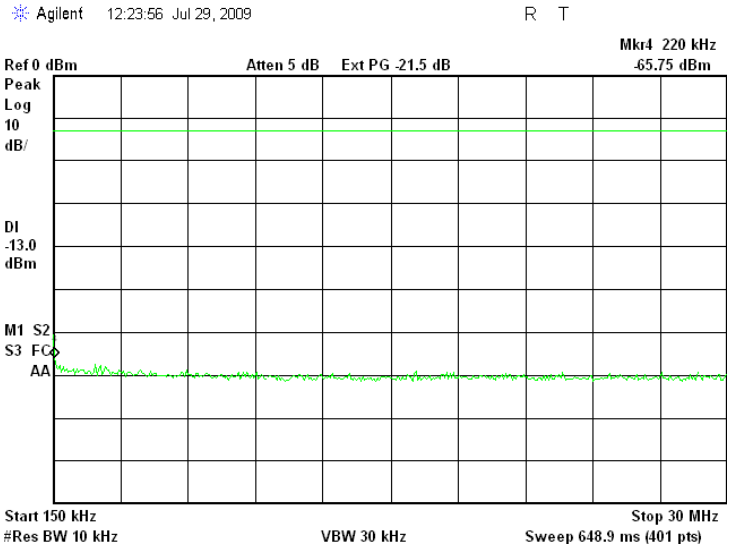
Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.9 Spurious emission measurements in 0.15 – 30.0 MHz range at high carrier frequency (Ant.1)

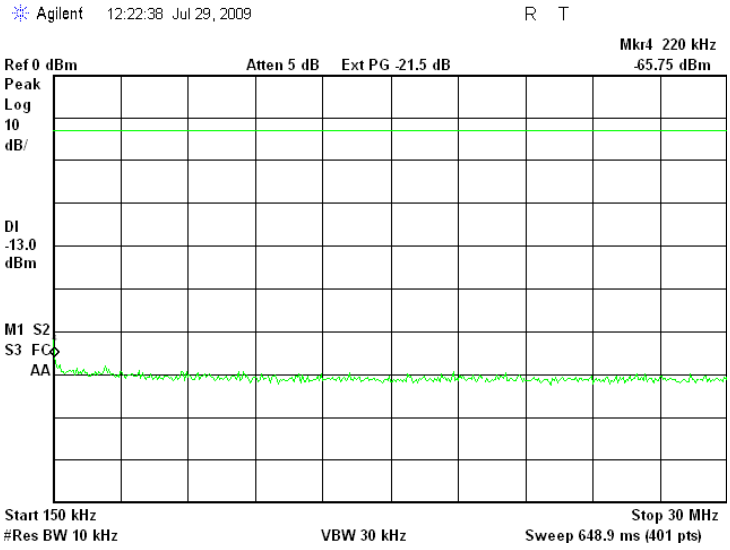


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.10 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency (Ant.2)

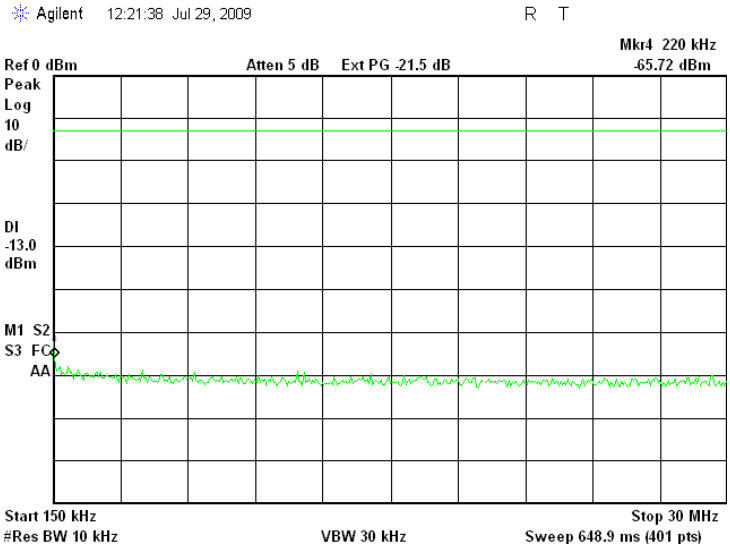


Plot 7.5.11 Spurious emission measurements in 0.15 - 30.0 MHz range at mid carrier frequency (Ant.2)



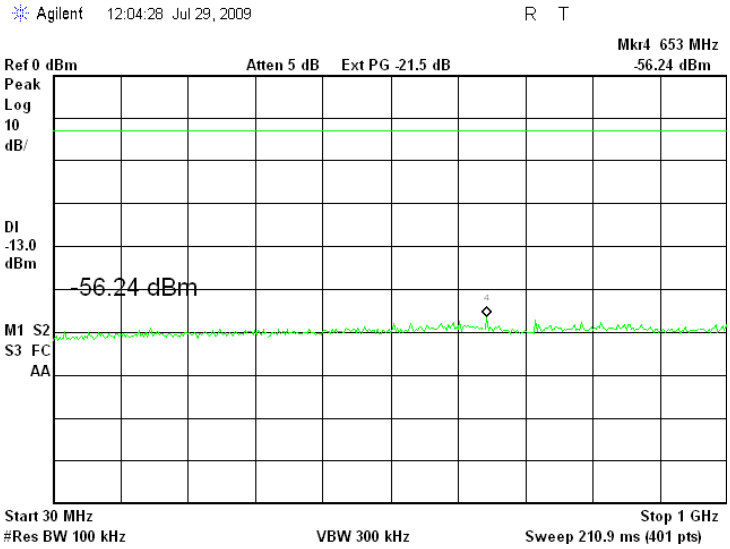
Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.12 Spurious emission measurements in 0.15 – 30.0 MHz range at high carrier frequency (Ant.2)

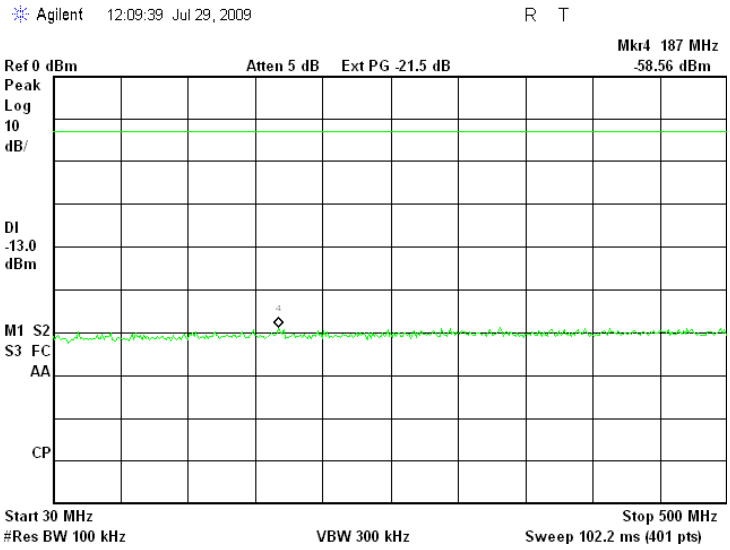


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.13 Spurious emission measurements in 30.0 - 500 MHz range at low carrier frequency (Ant.1)

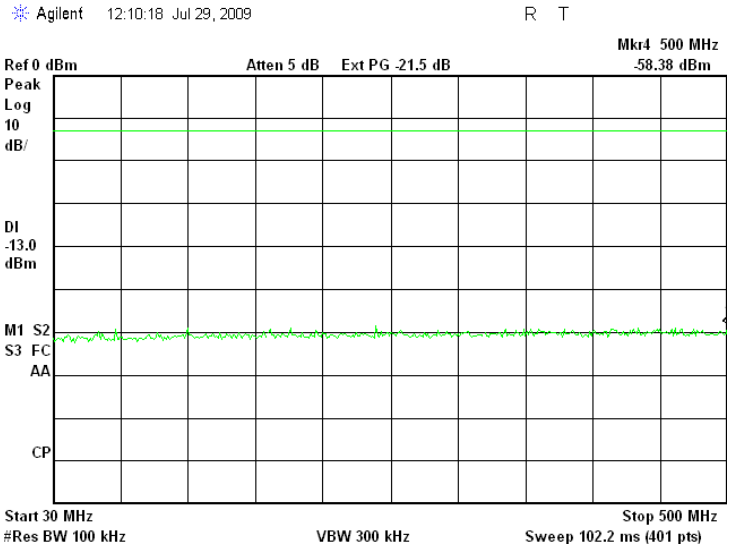


Plot 7.5.14 Spurious emission measurements in 30.0 - 500 MHz range at mid carrier frequency (Ant.1)



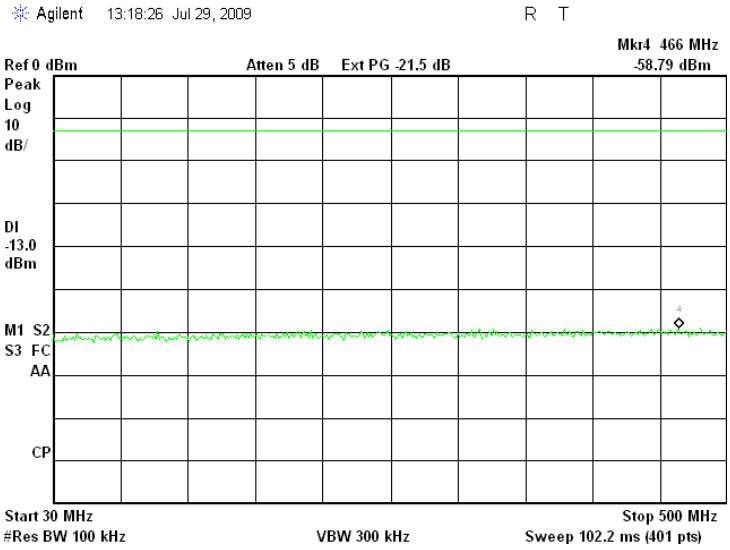
Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.15 Spurious emission measurements in 30.0 - 500 MHz range at high carrier frequency (Ant.1)

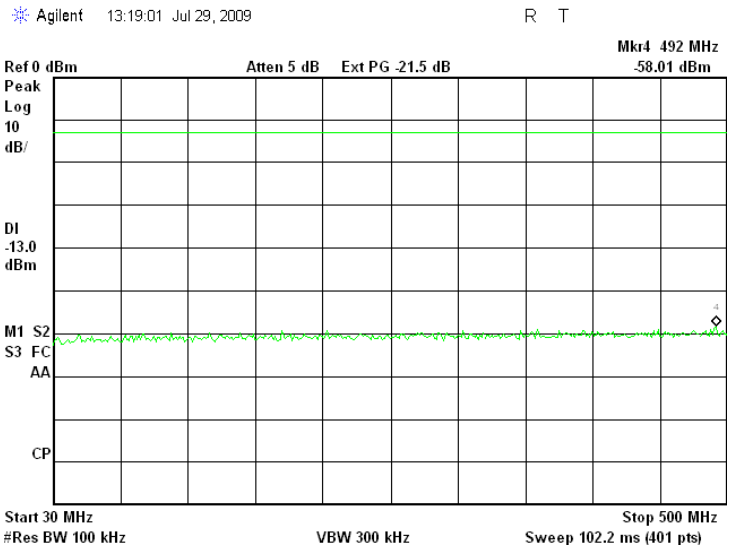


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.16 Spurious emission measurements in 30.0 - 500 MHz range at low carrier frequency (Ant.2)

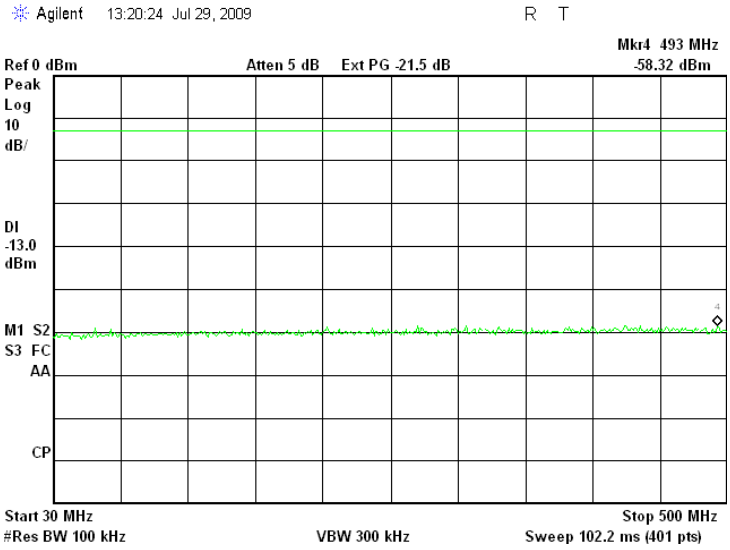


Plot 7.5.17 Spurious emission measurements in 30.0 - 500 MHz range at mid carrier frequency (Ant.2)



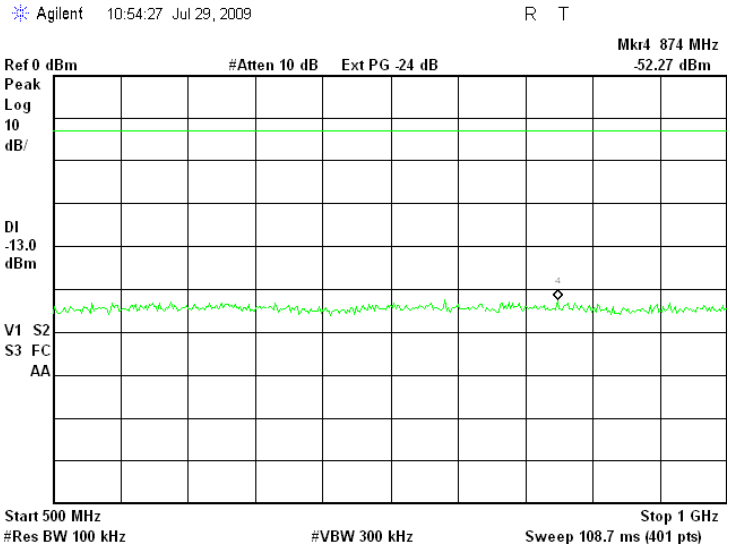
Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.18 Spurious emission measurements in 30.0 - 500 MHz range at high carrier frequency (Ant.2)

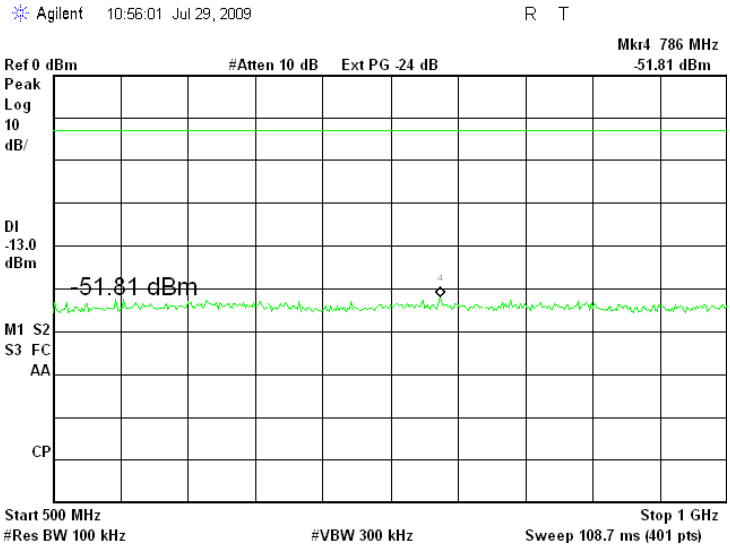


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.19 Spurious emission measurements in 500 - 1000 MHz range at low carrier frequency (Combined)

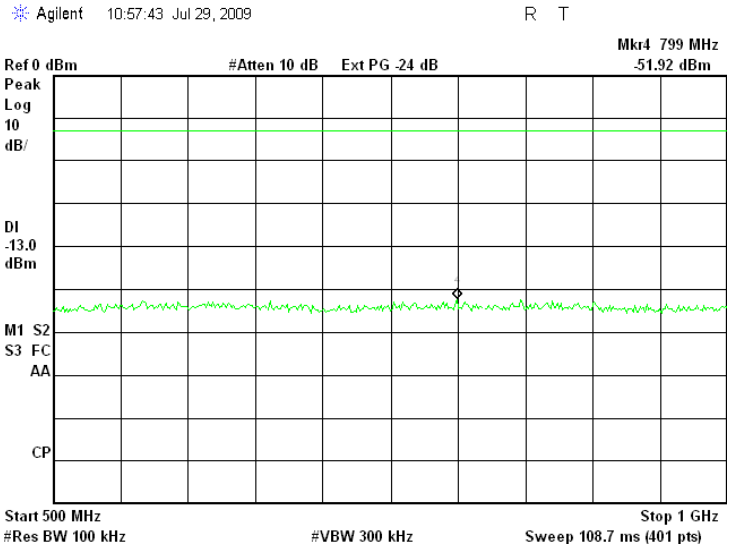


Plot 7.5.20 Spurious emission measurements in 500 - 1000 MHz at mid carrier frequency (Combined)



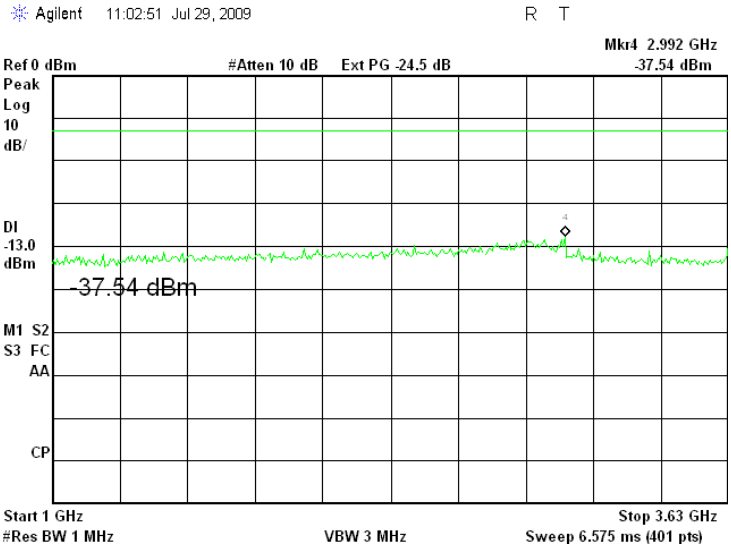
Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.21 Spurious emission measurements in 500 - 1000 MHz at high carrier frequency (Combined)

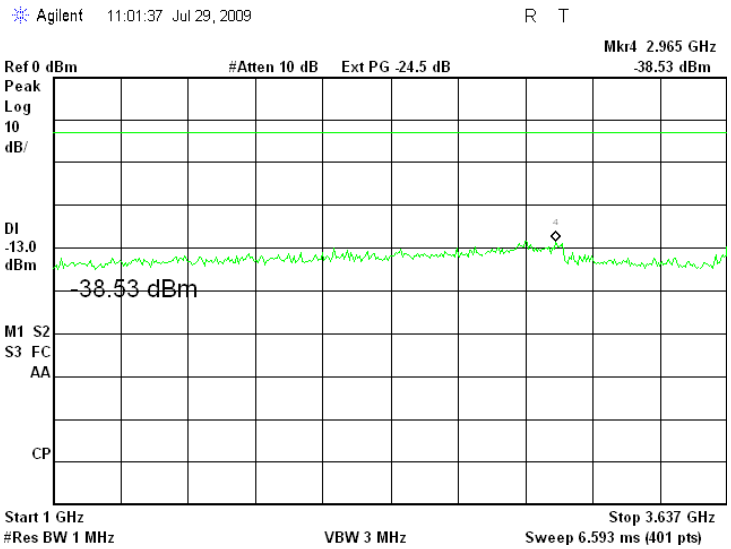


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.22 Spurious emission measurements in 1000 - 3630 MHz range at low carrier frequency (Combined)

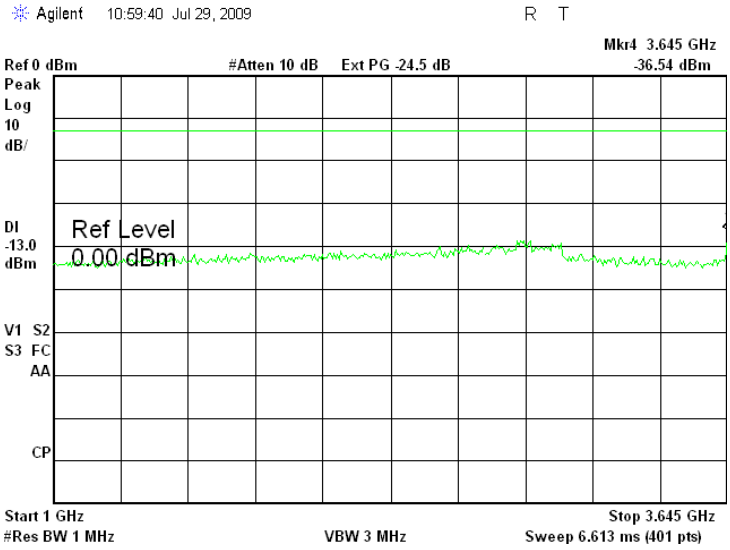


Plot 7.5.23 Spurious emission measurements in 1000 - 3637 MHz at mid carrier frequency (Combined)



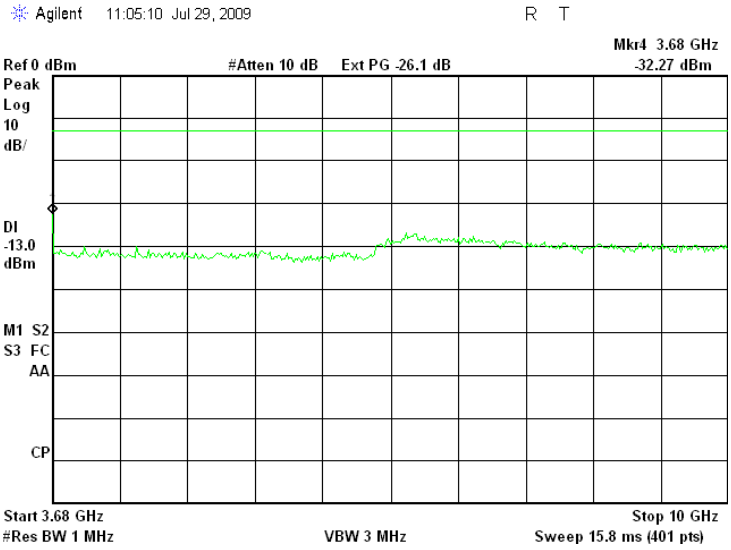
Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.24 Spurious emission measurements in 1000 - 3645 MHz at high carrier frequency (Combined)

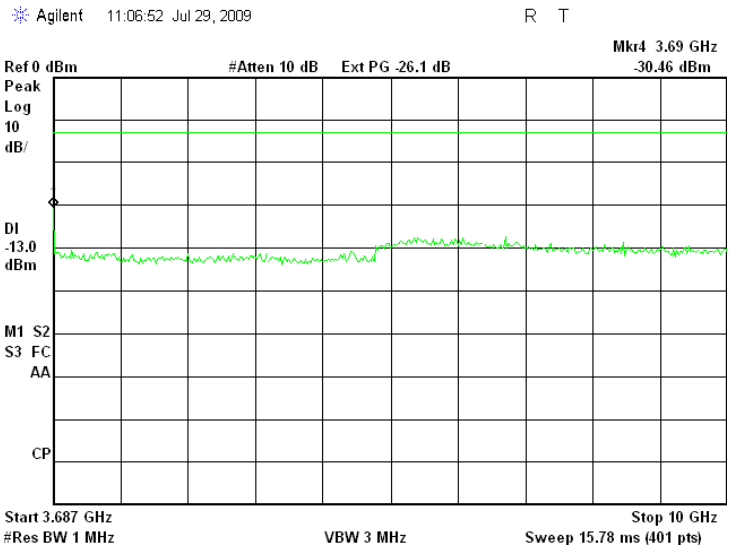


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.25 Spurious emission measurements in 3680 - 10000 MHz range at low carrier frequency (Combined)

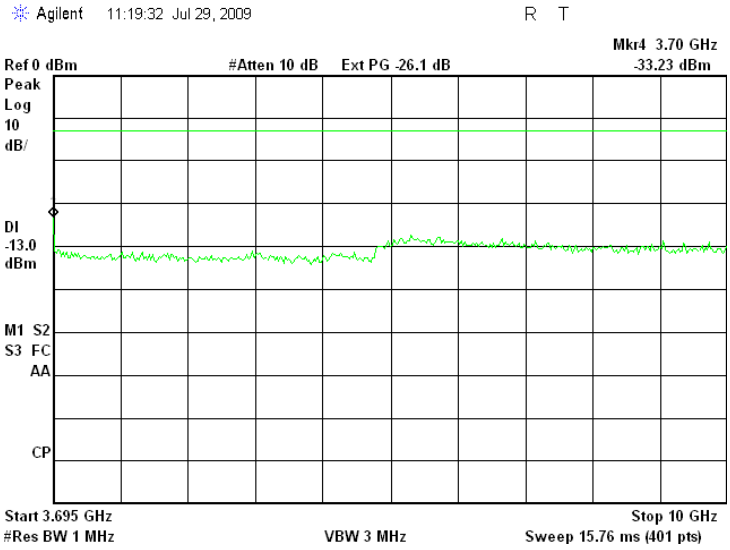


Plot 7.5.26 Spurious emission measurements in 3687 - 10000 MHz at mid carrier frequency (Combined)



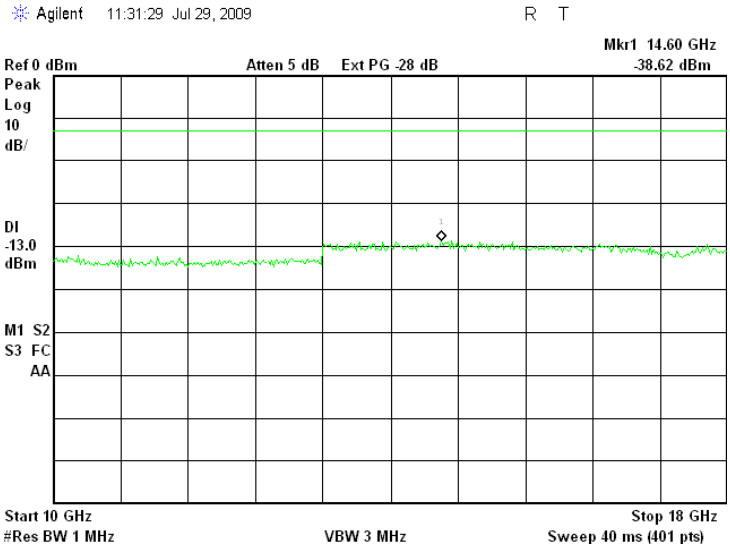
Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.27 Spurious emission measurements in 3695 - 10000 MHz at high carrier frequency (Combined)

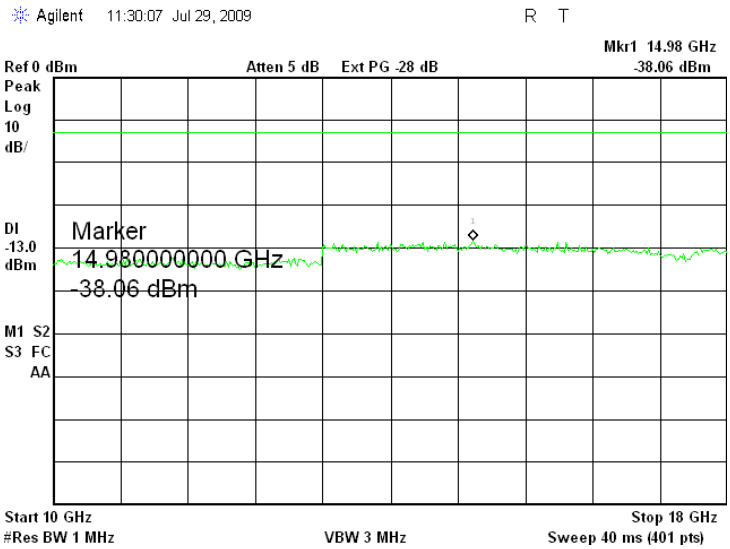


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.28 Spurious emission measurements in 10000 – 18000 MHz range at low carrier frequency (Combined)

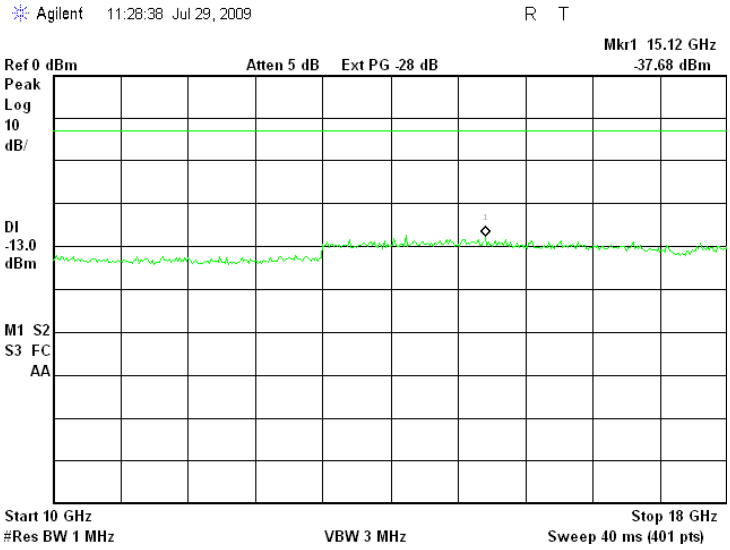


Plot 7.5.29 Spurious emission measurements in 10000 – 18000 MHz at mid carrier frequency (Combined)



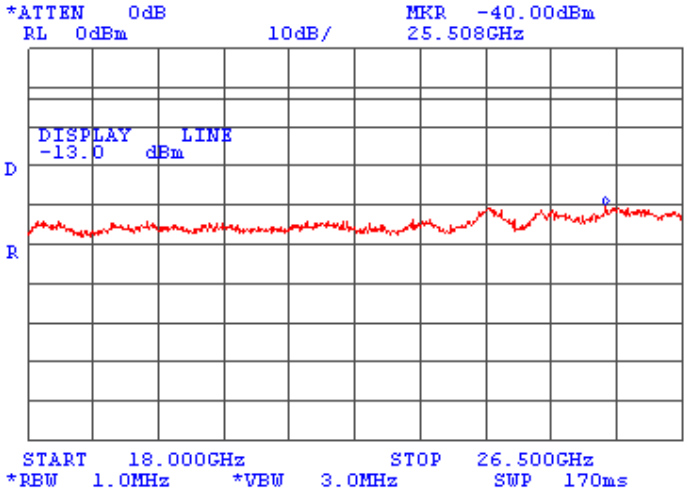
Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.30 Spurious emission measurements in 10000 – 18000 MHz at high carrier frequency (Combined)

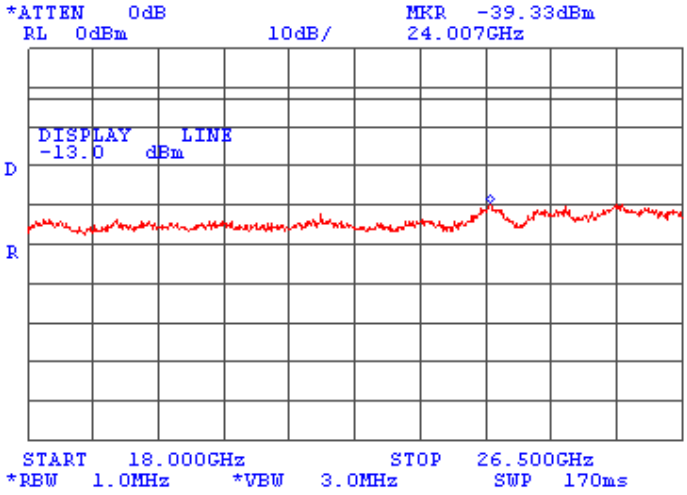


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.31 Spurious emission measurements in 18000 – 26500 MHz range at low carrier frequency (Ant. 1)

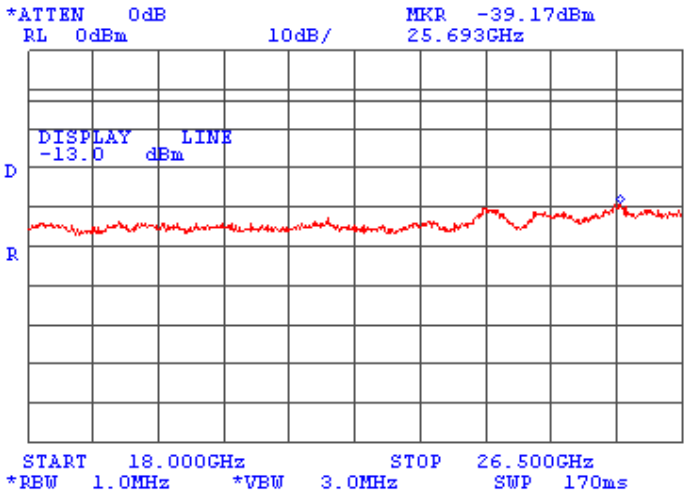


Plot 7.5.32 Spurious emission measurements in 18000 – 26500 MHz at mid carrier frequency (Ant. 1)



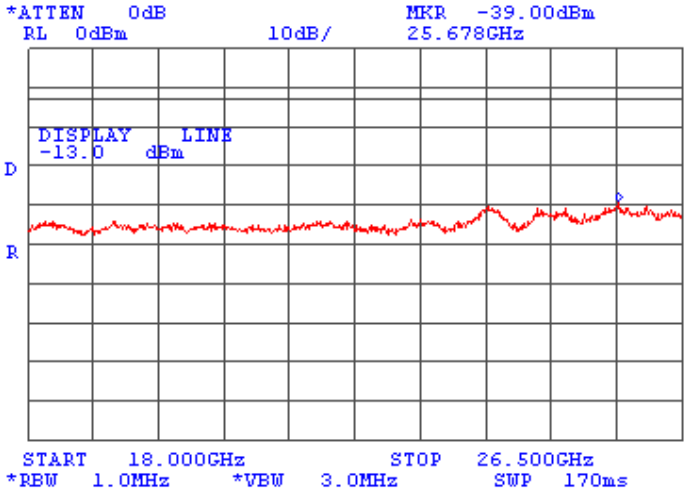
Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.33 Spurious emission measurements in 18000 – 26500 MHz at high carrier frequency (Ant. 1)

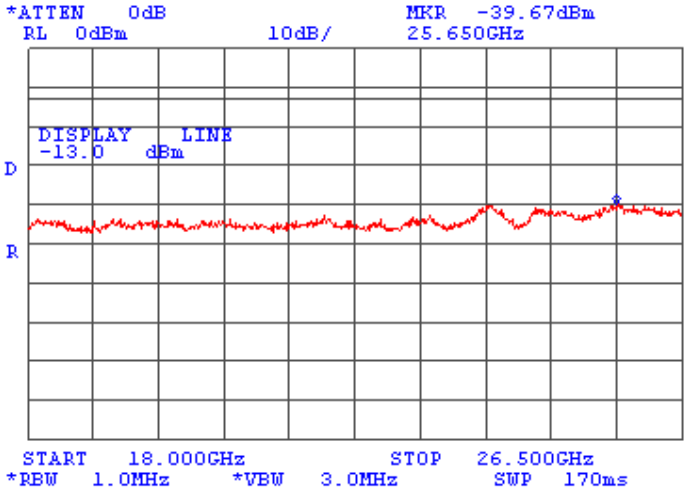


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.34 Spurious emission measurements in 18000 – 26500 MHz range at low carrier frequency (Ant. 2)



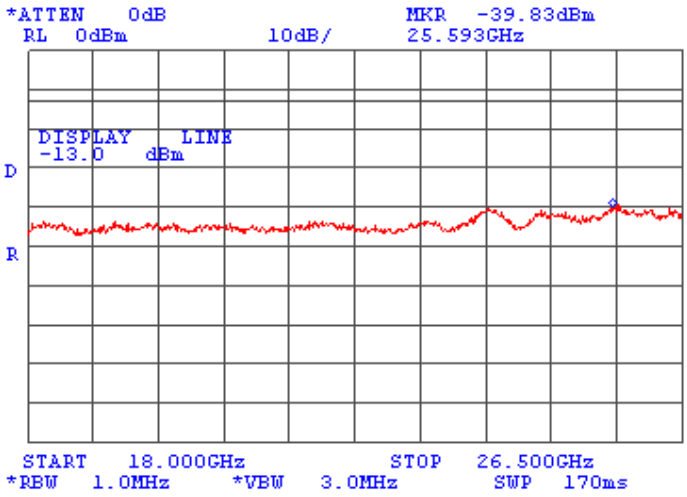
Plot 7.5.35 Spurious emission measurements in 18000 – 26500 MHz at mid carrier frequency (Ant. 2)



9

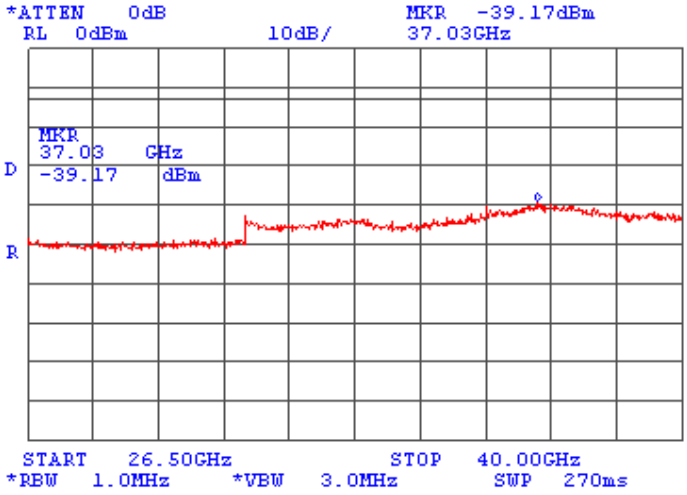
Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.36 Spurious emission measurements in 18000 – 26500 MHz at high carrier frequency (Ant. 2)

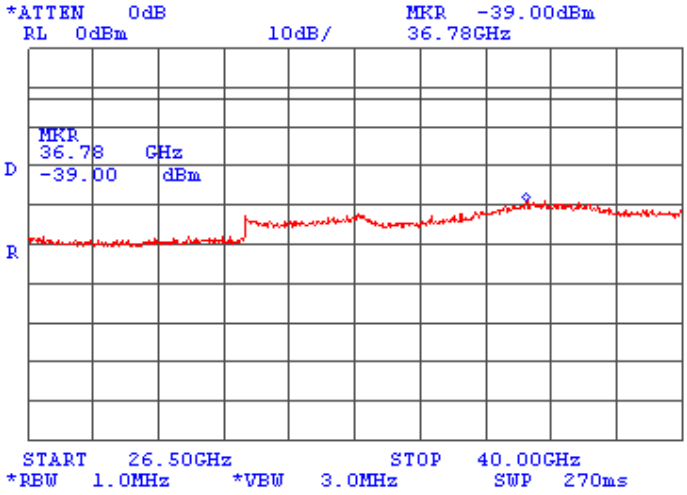


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.37 Spurious emission measurements in 26500 - 40000 MHz range at low carrier frequency (Ant. 1)

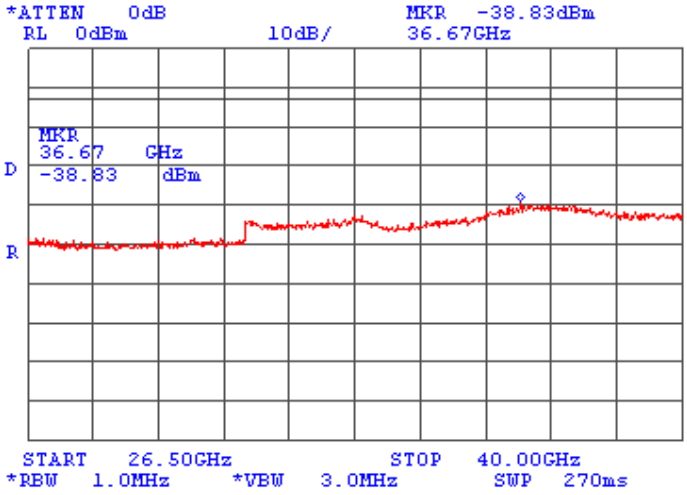


Plot 7.5.38 Spurious emission measurements in 26500 - 40000 MHz at mid carrier frequency (Ant. 1)

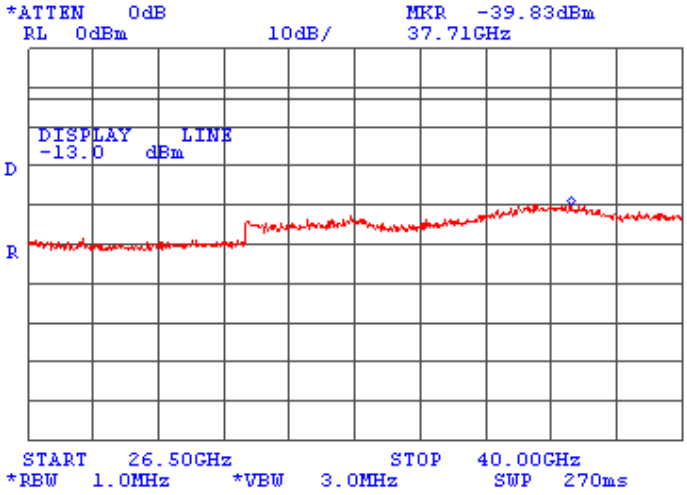


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.39 Spurious emission measurements in 26500 - 40000 MHz at high carrier frequency (Ant. 1)

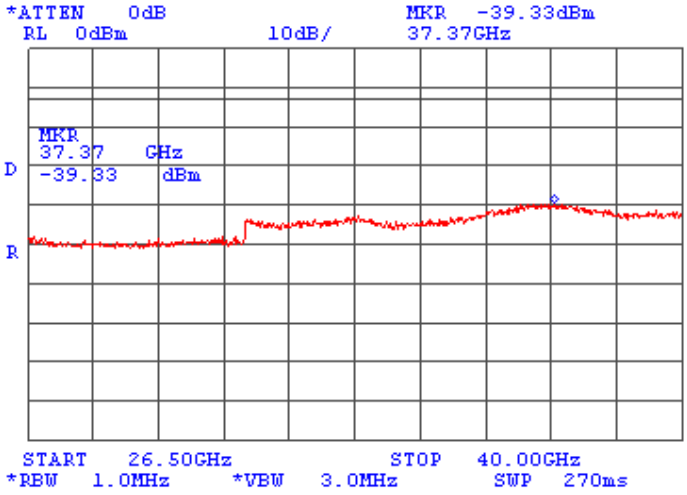


Plot 7.5.40 Spurious emission measurements in 26500 - 40000 MHz range at low carrier frequency (Ant. 2)

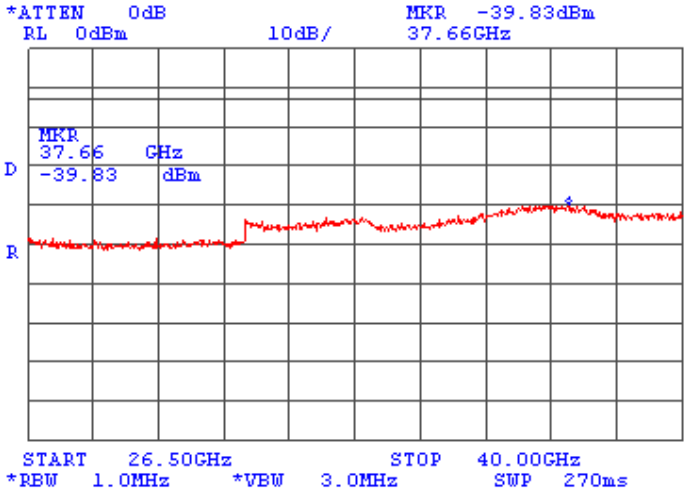


Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.1323		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:19:12 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.41 Spurious emission measurements in 26500 - 40000 MHz at mid carrier frequency (Ant. 2)



Plot 7.5.42 Spurious emission measurements in 26500 - 40000 MHz at high carrier frequency (Ant. 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:	9/2/2009 10:36:42 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
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
3650.00 – 3700.00	The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

7.6.2 Test procedure

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

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

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

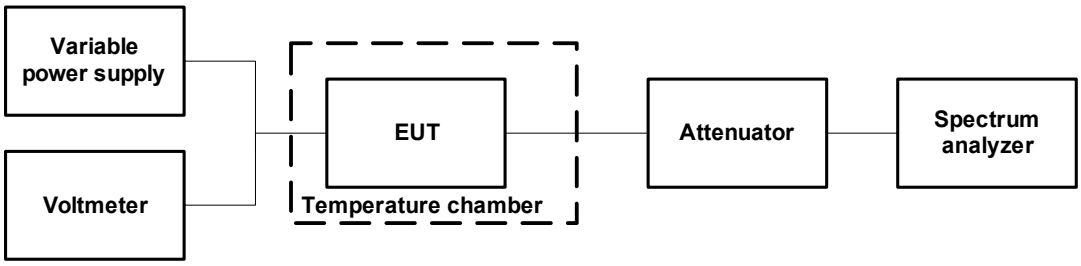
7.6.2.4 The above procedure was repeated at 0˚C and at the lowest test temperature.

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

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

7.6.2.7 The test results are provided in Table 7.6.3.

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:	9/2/2009 10:36:42 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Table 7.6.2 Frequency stability test results

ASSIGNED FREQUENCY RANGE: 3650 – 3675 MHz
NOMINAL POWER VOLTAGE: 48VDC
TEMPERATURE STABILIZATION PERIOD: 20 min
POWER DURING TEMPERATURE TRANSITION: Off
SPECTRUM ANALYZER MODE: Peak Hold
RESOLUTION BANDWIDTH: 3 kHz
VIDEO BANDWIDTH: 10 kHz

T, ºC	Voltage, V	Frequency, MHz							Max frequency drift Hz	
		Start up	1st min	2nd min	3rd min	4th min	5th min	10th min	Positive	Negative
Low carrier frequency 3652.50 MHz										
-30	nominal	3652.500539	3652.500539	3652.500547	3652.500551	3652.500551	3652.500553	3652.500554	0.00	-1831.00
-20	nominal	3652.500000	NA	NA	NA	NA	NA	3652.499974	0.00	-2396.00
-10	nominal	3652.500913	NA	NA	NA	NA	NA	3652.500960	0.00	-1457.00
0	nominal	3652.501900	3652.501792	3652.501847	3652.501894	3652.501940	3652.501980	3652.502320	0.00	-578.00
10	nominal	3652.503270	NA	NA	NA	NA	NA	3652.503290	920.00	0.00
20	15%	3652.502340	NA	NA	NA	NA	NA	3652.502290	0.00	-80.00
20	nominal	3652.502400	NA	NA	NA	NA	NA	3652.502370*	30.00	0.00
20	-15%	3652.502350	NA	NA	NA	NA	NA	3652.502340	0.00	-30.00
30	nominal	3652.502453	3652.502567	3652.502627	3652.502727	3652.502835	3652.502910	3652.503038	668.00	0.00
40	nominal	3652.501595	NA	NA	NA	NA	NA	3652.501450	0.00	-920.00
50	nominal	3652.500128	3652.500931	3652.500907	3652.500846	3652.500816	3652.500684	3652.500450	0.00	-2242.00
Mid carrier frequency 3662.00 MHz										
-30	nominal	3662.000507	3662.000515	3662.000514	3662.000524	3662.000523	3662.000528	3662.000538	0.00	-1873.00
-20	nominal	3661.999152	NA	NA	NA	NA	NA	3661.999700	0.00	-3228.00
-10	nominal	3662.000886	NA	NA	NA	NA	NA	3662.000920	0.00	-1494.00
0	nominal	3662.002345	3662.002367	3662.002375	3662.002386	3662.002399	3662.002409	3662.002443	63.00	-35.00
10	nominal	3662.003300	NA	NA	NA	NA	NA	3662.003300	920.00	0.00
20	15%	3662.002300	NA	NA	NA	NA	NA	3662.002200	0.00	-180.00
20	nominal	3662.002380	NA	NA	NA	NA	NA	3662.002380*	0.00	0.00
20	-15%	3662.002370	NA	NA	NA	NA	NA	3662.002370	0.00	-10.00
30	nominal	3662.003045	3662.003041	3662.003037	3662.003022	3662.003021	3662.003019	3662.003000	665.00	0.00
40	nominal	3662.001762	NA	NA	NA	NA	NA	3662.001610	0.00	-770.00
50	nominal	3662.000453	3662.000410	3662.000363	3662.000333	3662.000290	3662.000262	3662.000095	0.00	-2285.00
High carrier frequency 3672.50 MHz										
-30	nominal	3672.499993	3672.500456	3672.500471	3672.500480	3672.500489	3672.500495	3672.500508	0.00	-2387.00
-20	nominal	3672.499699	NA	NA	NA	NA	NA	3672.499650	0.00	-2730.00
-10	nominal	3672.501328	NA	NA	NA	NA	NA	3672.500080	0.00	-2300.00
0	nominal	3672.502571	3672.502464	3672.502470	3672.502471	3672.502479	3672.502477	3672.502483	191.00	0.00
10	nominal	3672.502760	NA	NA	NA	NA	NA	3672.503310	930.00	0.00
20	15%	3672.502340	NA	NA	NA	NA	NA	3672.502220	0.00	-160.00
20	nominal	3672.502380	NA	NA	NA	NA	NA	3672.502380*	0.00	0.00
20	-15%	3672.502380	NA	NA	NA	NA	NA	3672.502390	10.00	0.00
30	nominal	3672.503016	3672.503003	3672.503000	3672.502985	3672.502977	3672.502969	3672.502945	636.00	0.00
40	nominal	3672.502558	NA	NA	NA	NA	NA	3672.501770	178.00	-610.00
50	nominal	3672.500077	3672.500059	3672.500005	3672.499975	3672.499960	3672.499950	3672.499773	0.00	-2607.00

* - Reference frequency

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:	9/2/2009 10:36:42 AM		
Temperature: 25ºC	Air Pressure: 1007 hPa	Relative Humidity: 41 %	Power Supply: 48 VDC
Remarks:			

Table 7.6.2 Frequency stability test results (continued)

NOMINAL POWER VOLTAGE: 120 VAC

T, ºC	Voltage, V	Frequency, MHz							Max frequency drift Hz	
		Start up	1st min	2nd min	3rd min	4th min	5th min	10th min	Positive	Negative
Low carrier frequency 3652.50 MHz										
20	15%	3652.50231	NA	NA	NA	NA	NA	3652.50229	100.00	0.00
20	nominal	3652.50227	NA	NA	NA	NA	NA	3652.50221*	60.00	0.00
20	-15%	3652.50227	NA	NA	NA	NA	NA	3652.50227	60.00	0.00
Mid carrier frequency 3662.00 MHz										
20	15%	3662.00228	NA	NA	NA	NA	NA	3662.00230	140.00	0.00
20	nominal	3662.00221	NA	NA	NA	NA	NA	3662.00216*	50.00	0.00
20	-15%	3662.00231	NA	NA	NA	NA	NA	3662.00227	150.00	0.00
High carrier frequency 3672.50 MHz										
20	15%	3672.50220	NA	NA	NA	NA	NA	3672.50227	150.00	0.00
20	nominal	3672.50216	NA	NA	NA	NA	NA	3672.50212*	40.00	0.00
20	-15%	3672.50219	NA	NA	NA	NA	NA	3672.50216	70.00	0.00

* - Reference frequency

Table 7.6.3 Maximum frequency displacement

Channel	Maximum frequency displacement			
	ppm		Hz	
	Negative	Positive	Negative	Positive
3652.50	-0.656	0.252	-2396.0	920.0
3662.00	-0.881	0.251	-3228.0	920.0
3672.50	-0.743	0.253	-2730.0	930.0

Reference numbers of manufacture's test equipment used

#1	#4	#7					

Full description is given in Appendix A.

Test specification:	Section 15.107, Class B, Conducted emission at AC power port		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:59:44 AM		
Temperature: 25ºC	Air Pressure: 1006 hPa	Relative Humidity: 41%	Power Supply: 120 VAC
Remarks:			

8 Emissions tests according to 47CFR part 15 subpart B requirements

8.1 Conducted emissions

8.1.1 General

This test was performed to measure common mode conducted emissions at the mains power port. Specification test limits are given in Table 8.1.1.

Table 8.1.1 Limits for conducted emissions

Frequency, MHz	Class B limit, dB(μV)		Class A limit, dB(μV)	
	QP	AVRG	QP	AVRG
0.15 - 0.5	66 - 56*	56 - 46*	79	66
0.5 - 5.0	56	46	73	60
5.0 - 30	60	50	73	60

* The limit decreases linearly with the logarithm of frequency.

8.1.2 Test procedure

8.1.2.1 The EUT was set up as shown in Figure 8.1.1 and associated photographs, energized and the performance check was conducted.

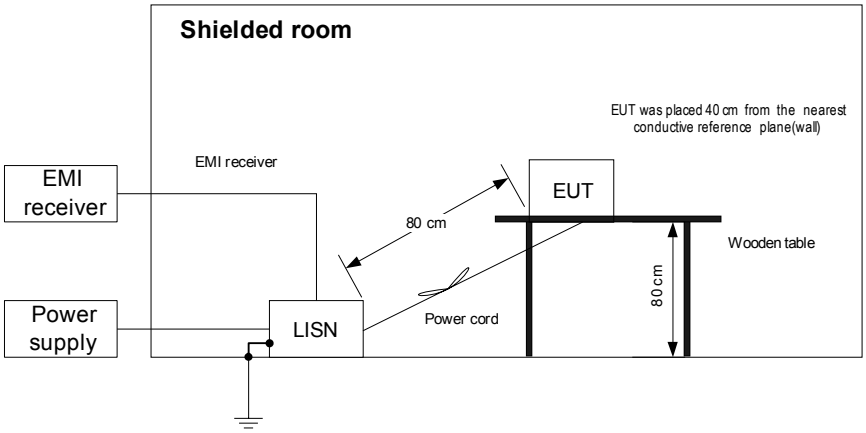
8.1.2.2 The measurements were performed at power terminals with the LISN, connected to a spectrum analyzer in the frequency range referred to in Table 8.1.2. Unused coaxial connector of the LISN was terminated with 50 Ohm. Quasi-peak and average detectors were used throughout the testing.

8.1.2.3 The position of the device cables was varied to determine maximum emission level.

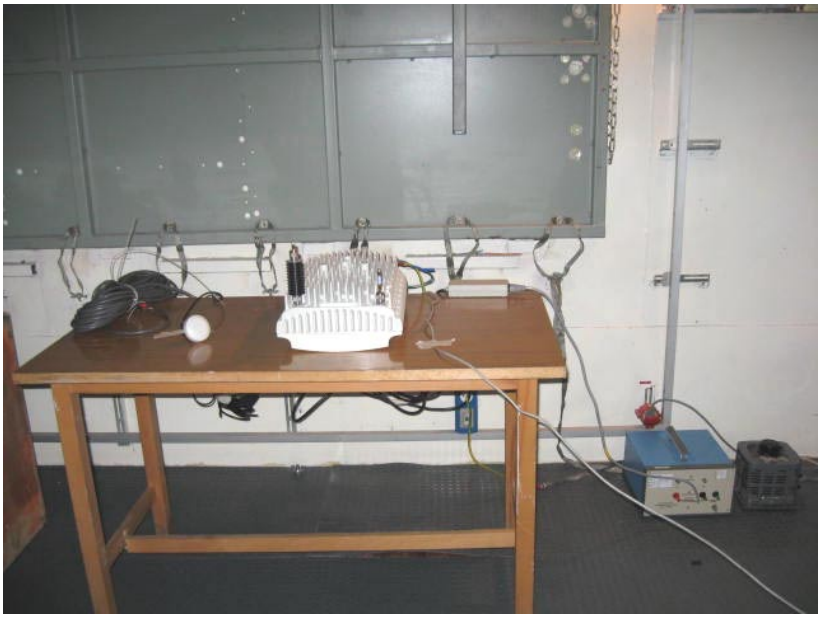
8.1.2.4 The worst test results (the lowest margins) were recorded in Table 8.1.2 and shown in the associated plots.

Test specification:	Section 15.107, Class B, Conducted emission at AC power port		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:59:44 AM		
Temperature: 25ºC	Air Pressure: 1006 hPa	Relative Humidity: 41%	Power Supply: 120 VAC
Remarks:			

Figure 8.1.1 Setup for conducted emission measurements, table-top equipment

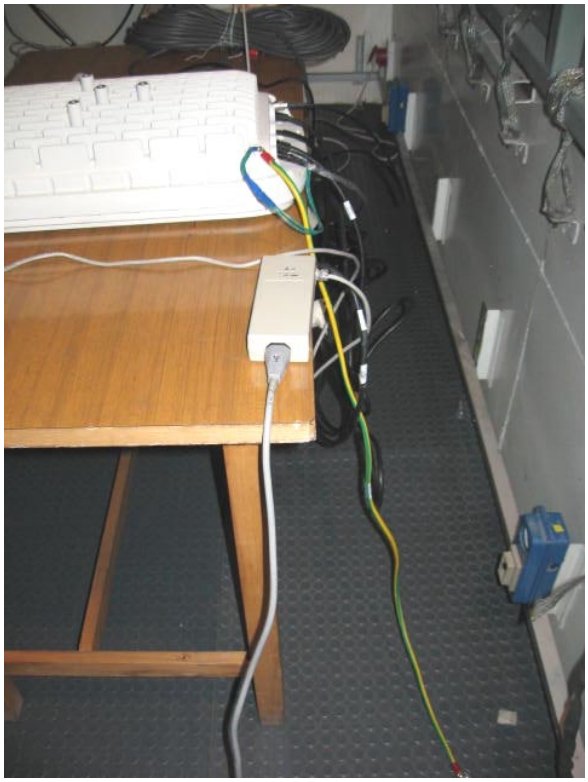


Photograph 8.1.1 Setup for conducted emission measurements



Test specification:	Section 15.107, Class B, Conducted emission at AC power port		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:59:44 AM		
Temperature: 25ºC	Air Pressure: 1006 hPa	Relative Humidity: 41%	Power Supply: 120 VAC
Remarks:			

Photograph 8.1.2 Setup for conducted emission measurements



Test specification:	**Section 15.107, Class B, Conducted emission at AC power port**		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	9/2/2009 9:59:44 AM		
Temperature: 25ºC	**Air Pressure:** 1006 hPa	**Relative Humidity:** 41%	**Power Supply:** 120 VAC
Remarks:			

Table 8.1.2 Conducted emission test results

LINE: AC mains
LIMIT: Class B
EUT OPERATING MODE: Receive / Stand-by
EUT SET UP: TABLE-TOP
TEST SITE: SHIELDED ROOM
DETECTORS USED: PEAK / QUASI-PEAK / AVERAGE
FREQUENCY RANGE: 150 kHz - 30 MHz
RESOLUTION BANDWIDTH: 9 kHz

Frequency, MHz	Peak emission, dB(µV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(µV)	Limit, dB(µV)	Margin, dB*	Measured emission, dB(µV)	Limit, dB(µV)	Margin, dB*		
0.181988	51.06	44.50	64.44	-19.94	22.44	54.44	-32.00	L1	Pass
0.192738	49.49	49.07	63.93	-14.86	40.03	53.93	-13.90		
0.257063	51.81	50.44	61.57	-11.13	45.73	51.57	-5.84		
0.321938	48.53	47.81	59.69	-11.88	42.06	49.69	-7.63		
2.052675	46.67	43.98	56.00	-12.02	33.85	46.00	-12.15		
22.822280	38.30	36.44	60.00	-23.56	35.75	50.00	-14.25		
0.182685	51.44	45.10	64.41	-19.31	25.03	54.41	-29.38	L2	Pass
0.255203	51.53	48.38	61.63	-13.25	43.20	51.63	-8.43		
0.321900	47.83	47.09	59.69	-12.60	41.21	49.69	-8.48		
2.050535	46.03	43.31	56.00	-12.69	32.79	46.00	-13.21		
7.217070	45.57	44.50	60.00	-15.50	37.87	50.00	-12.13		
22.824505	41.23	37.55	60.00	-22.45	34.89	50.00	-15.11		

*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

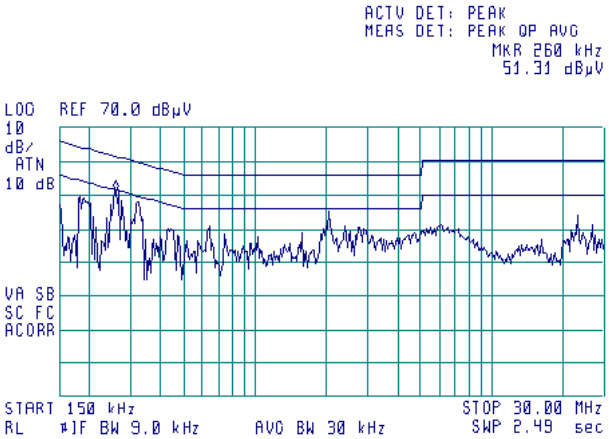
HL 1430	HL 1510	HL 2888	HL 3612				

Full description is given in Appendix A.

Test specification:	Section 15.107, Class B, Conducted emission at AC power port		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/2/2009 9:59:44 AM		
Temperature: 25ºC	Air Pressure: 1006 hPa	Relative Humidity: 41%	Power Supply: 120 VAC
Remarks:			

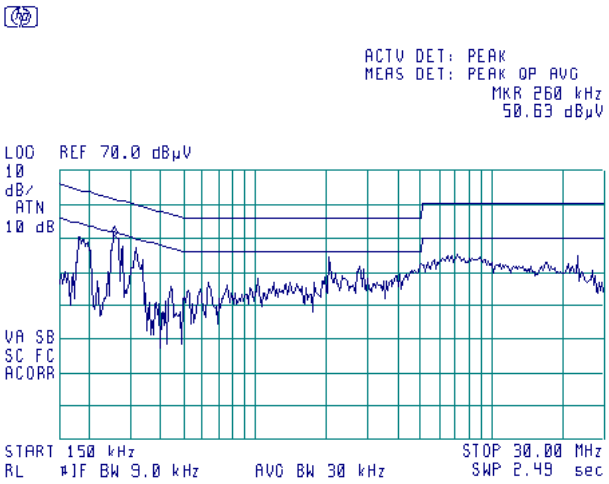
Plot 8.1.1 Conducted emission measurements

LINE:	L1
LIMIT:	Class B
EUT OPERATING MODE:	Receive / Stand-by
LIMIT:	QUASI-PEAK, AVERAGE
DETECTOR:	PEAK



Plot 8.1.2 Conducted emission measurements

LINE:	L2
LIMIT:	Class B
EUT OPERATING MODE:	Receive / Stand-by
LIMIT:	QUASI-PEAK, AVERAGE
DETECTOR:	PEAK



Test specification:	Section 15.109, Class A, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/6/2009 11:12:12 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 120 VAC
Remarks:			

8.2 Radiated emission measurements

8.2.1 General

This test was performed to measure radiated emissions from the EUT enclosure. The specification test limits are given in Table 8.2.1.

Table 8.2.1 Radiated emission test limits

Frequency, MHz	Class B limit, dB(μV/m)		Class A limit, dB(μV/m)	
	10 m distance	3 m distance	10 m distance	3 m distance
30 - 88	29.5*	40.0	39.0	49.5*
88 - 216	33.0*	43.5	43.5	54.0*
216 - 960	35.5*	46.0	46.4	56.9*
Above 960	43.5*	54.0	49.5	60.0*

* - The limit for a test distance other than specified was calculated using the inverse linear distance extrapolation factor as follows: $Lim_{S2} = Lim_{S1} + 20 \log (S_1/S_2)$,
where S_1 and S_2 – the standard defined and the test distance respectively in meters.

8.2.2 Test procedure

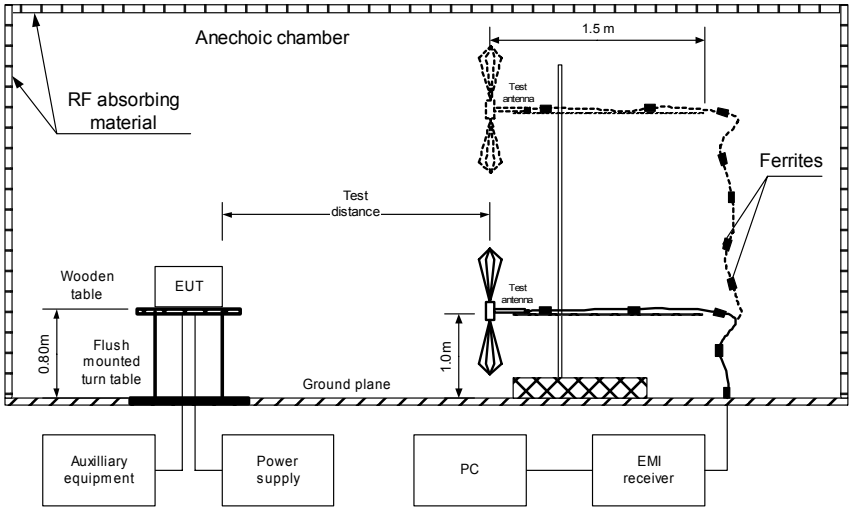
8.2.2.1 The EUT was set up as shown in Figure 8.2.1, Figure 8.2.2 and the associated photographs, energized and the EUT performance was checked.

8.2.2.2 The measurements were performed in the anechoic chamber at 3 m test distance. The specified frequency range was investigated with the antenna connected to the EMI receiver. To find the highest emission the turntable was rotated 360^0 and the measuring antenna height was swept from 1 to 4 m in both, vertical and horizontal polarizations. The EUT cables position was varied to maximize emission.

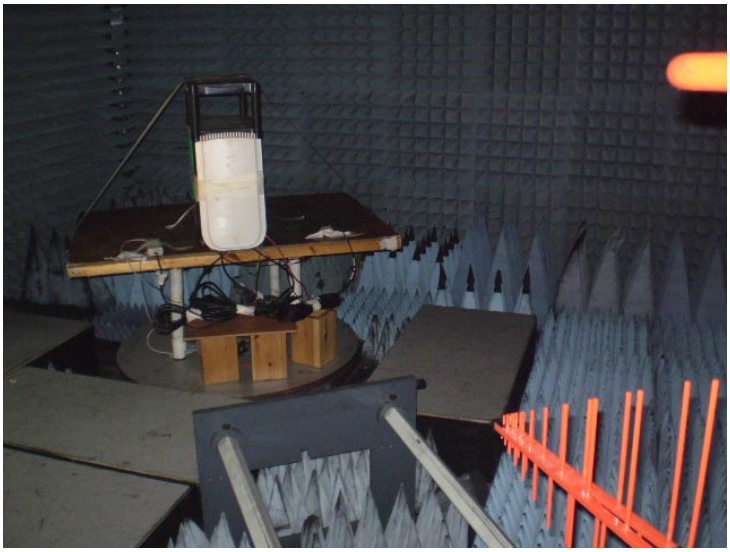
8.2.2.3 The worst test results with respect to the limits were recorded in Table 8.2.2 and shown in the associated plots.

Test specification:	Section 15.109, Class A, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/6/2009 11:12:12 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 120 VAC
Remarks:			

Figure 8.2.1 Setup for radiated emission measurements in anechoic chamber, table-top EUT

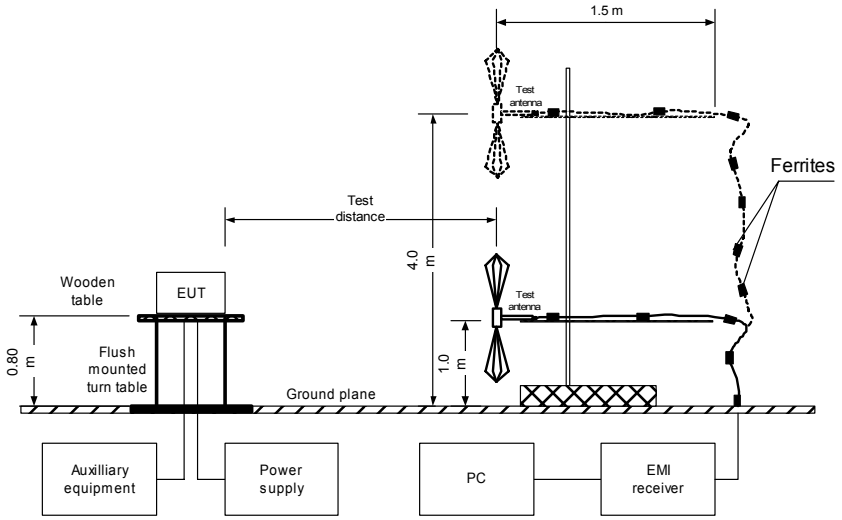


Photograph 8.2.1 Setup for radiated emission measurements in the full anechoic chamber

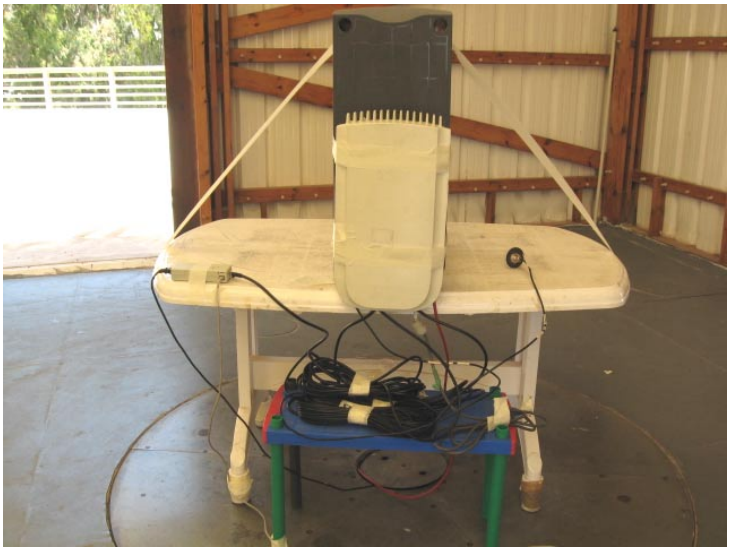


Test specification:	Section 15.109, Class A, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/6/2009 11:12:12 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 120 VAC
Remarks:			

Figure 8.2.2 Setup for radiated emission measurements at OATS, table-top EUT



Photograph 8.2.2 Setup for radiated emission measurements at OATS, EUT cabling



Test specification:	**Section 15.109, Class A, Radiated emission**		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	9/6/2009 11:12:12 AM		
Temperature: 25ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 44%	**Power Supply:** 120 VAC
Remarks:			

Table 8.2.2 Radiated emission test results

EUT SET UP: TABLE-TOP
TEST SITE: SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / QUASI-PEAK
FREQUENCY RANGE: 30 MHz – 1000 MHz
RESOLUTION BANDWIDTH: 120 kHz

OPTION: AC mode

Frequency, MHz	Peak emission, dB(µV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(µV/m)	Limit, dB(µV/m)	Margin, dB*				
36.14	45.50	42.20	49.50	-7.30	V	1.0	000	Pass
101.900	39.60	37.00	54.00	-17.00	V	1.0	290	
106.715	39.80	35.90	54.00	-18.10	V	1.0	010	
719.924	38.40	36.90	56.90	-20.00	V	1.9	020	
791.995	40.90	38.60	56.90	-18.30	V	1.0	010	
800.008	45.80	37.80	56.90	-19.10	V	1.1	020	
858.005	42.40	40.90	56.90	-16.00	V	1.0	000	
880.000	45.20	44.20	56.90	-12.70	H	1.6	000	

OPTION: DC mode

Frequency, MHz	Peak emission, dB(µV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(µV/m)	Limit, dB(µV/m)	Margin, dB*				
719.991	39.60	38.20	56.90	-18.70	V	1.9	020	Pass
792.000	39.90	37.80	56.90	-19.10	V	1.0	010	
800.000	49.20	47.90	56.90	-9.00	V	1.1	020	
858.000	43.10	39.90	56.90	-17.00	V	1.0	000	
880.000	50.00	49.36	56.90	-7.54	H	1.6	000	

TEST SITE: SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / AVERAGE
FREQUENCY RANGE: 1000 MHz – 8000 MHz
RESOLUTION BANDWIDTH: 1000 kHz
OPTION: AC mode (the worst case)

Frequency, MHz	Peak			Average			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
	Measured emission, dB(µV/m)	Limit, dB(µV/m)	Margin, dB*	Measured emission, dB(µV/m)	Limit, dB(µV/m)	Margin, dB*				
1200.000	47.20	80.00	-32.80	43.40	60.00	-16.60	H	1.2	000	Pass
1440.035	46.00	80.00	-34.00	40.70	60.00	-19.30	H	1.4	000	

*- Margin = Measured emission - specification limit.
**- EUT front panel refers to 0 degrees position of turntable.

Test specification:	**Section 15.109, Class A, Radiated emission**		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	9/6/2009 11:12:12 AM		
Temperature: 25ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 44%	**Power Supply:** 120 VAC
Remarks:			

Table 8.2.2 Radiated emission test results (continued)

TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / AVERAGE
FREQUENCY RANGE: 1000 MHz – 8000 MHz
RESOLUTION BANDWIDTH: 1000 kHz
OPTION: AC mode (the worst case)

Frequency, MHz	Peak			Average			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
	Measured emission, dB(µV/m)	Limit, dB(µV/m)	Margin, dB*	Measured emission, dB(µV/m)	Limit, dB(µV/m)	Margin, dB*				
3145.000	53.37	80.00	-26.63	50.19	60.00	-9.81	H	1.3	000	Pass

Reference numbers of test equipment used

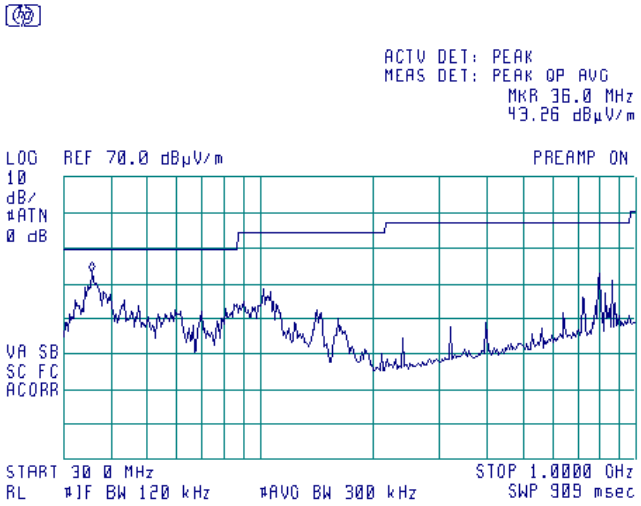
HL 0521	HL 0604	HL 1424	HL 1425	HL 1553	HL 1984	HL 2883	HL 3531
HL 3616							

Full description is given in Appendix A.

Test specification:	Section 15.109, Class A, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/6/2009 11:12:12 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 120 VAC
Remarks:			

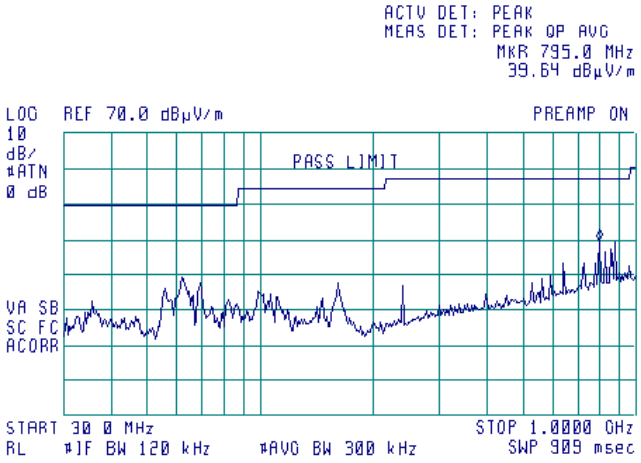
Plot 8.2.1 Radiated emission measurements in 30 - 1000 MHz range, vertical antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
OPTION: AC mode



Plot 8.2.2 Radiated emission measurements in 30 - 1000 MHz range, horizontal antenna polarization

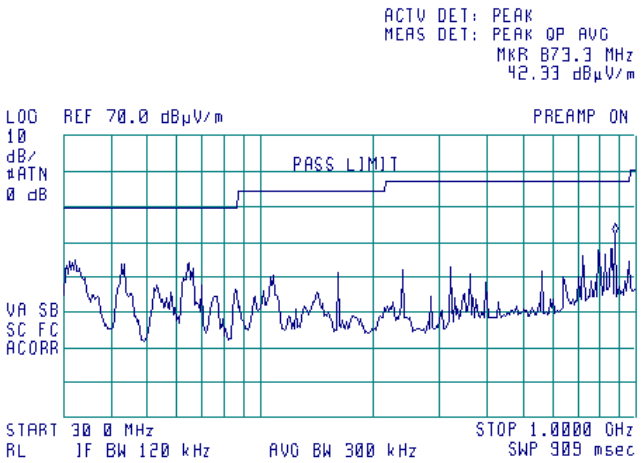
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
OPTION: AC mode



Test specification:	Section 15.109, Class A, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/6/2009 11:12:12 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 120 VAC
Remarks:			

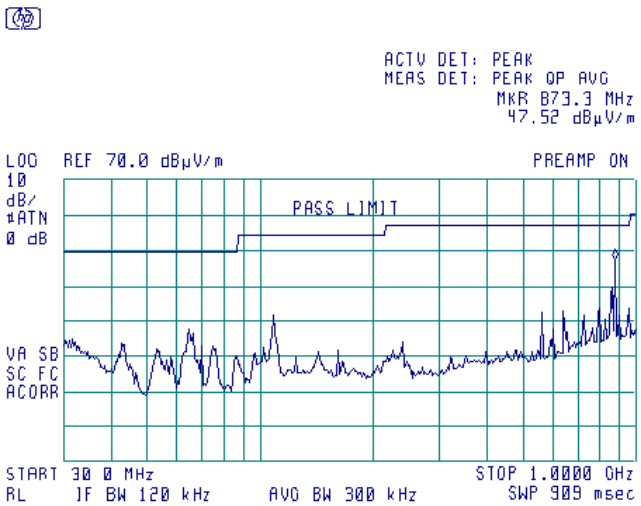
Plot 8.2.3 Radiated emission measurements in 30 - 1000 MHz range, vertical antenna polarization

TEST SITE: Full anechoic chamber
TEST DISTANCE: 3 m
OPTION: DC mode



Plot 8.2.4 Radiated emission measurements in 30 - 1000 MHz range, horizontal antenna polarization

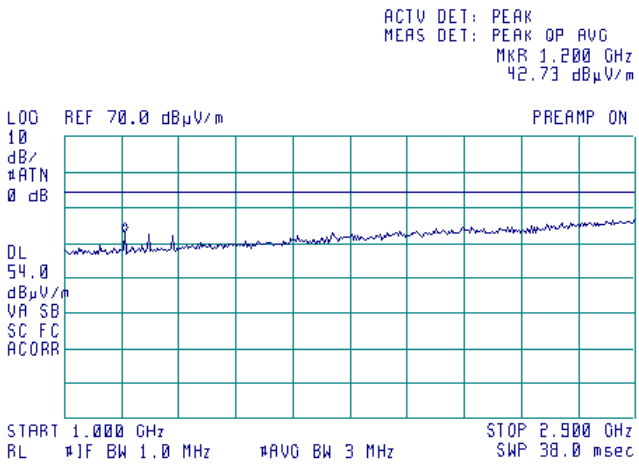
TEST SITE: Full anechoic chamber
TEST DISTANCE: 3 m
OPTION: DC mode



Test specification:	Section 15.109, Class A, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/6/2009 11:12:12 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 120 VAC
Remarks:			

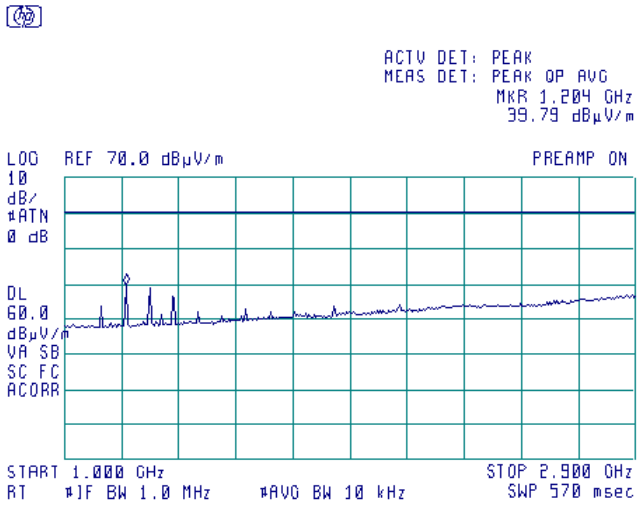
Plot 8.2.5 Radiated emission measurements in 1000 – 2900 MHz, vertical antenna polarization

TEST SITE:	Semi anechoic chamber
TEST DISTANCE:	3 m
OPTION:	AC mode
DETECTOR:	Peak



Plot 8.2.6 Radiated emission measurements in 1000 – 2900 MHz, vertical antenna polarization

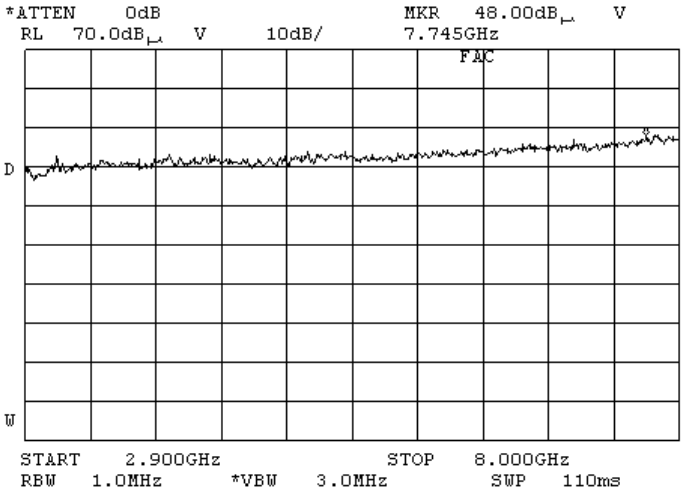
TEST SITE:	Semi anechoic chamber
TEST DISTANCE:	3 m
OPTION:	AC mode
DETECTOR:	Average



Test specification:	Section 15.109, Class A, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/6/2009 11:12:12 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 120 VAC
Remarks:			

Plot 8.2.7 Radiated emission measurements in 2900 – 8000 MHz, vertical antenna polarization

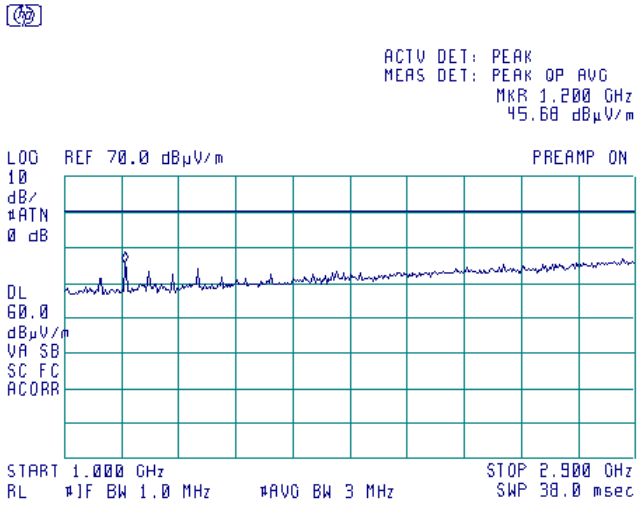
TEST SITE:	Semi anechoic chamber
TEST DISTANCE:	3 m
OPTION:	AC mode
DETECTOR:	Peak



Test specification:	Section 15.109, Class A, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/6/2009 11:12:12 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 120 VAC
Remarks:			

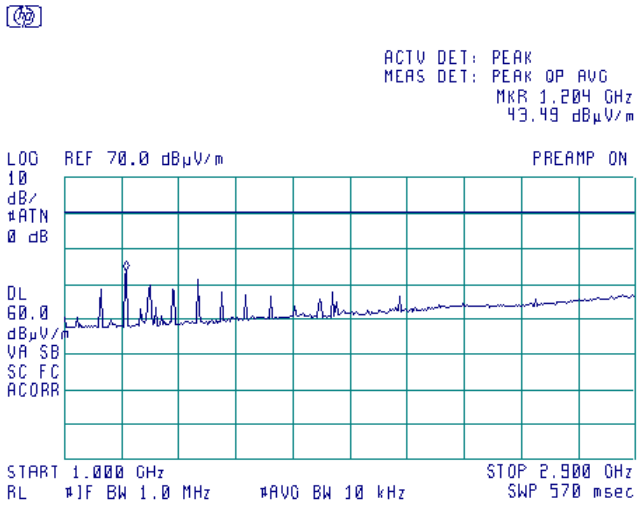
Plot 8.2.8 Radiated emission measurements in 1000 - 2900 MHz, horizontal antenna polarization

TEST SITE:	Semi anechoic chamber
TEST DISTANCE:	3 m
OPTION:	AC mode
DETECTOR:	Peak



Plot 8.2.9 Radiated emission measurements in 1000 - 2900 MHz, horizontal antenna polarization

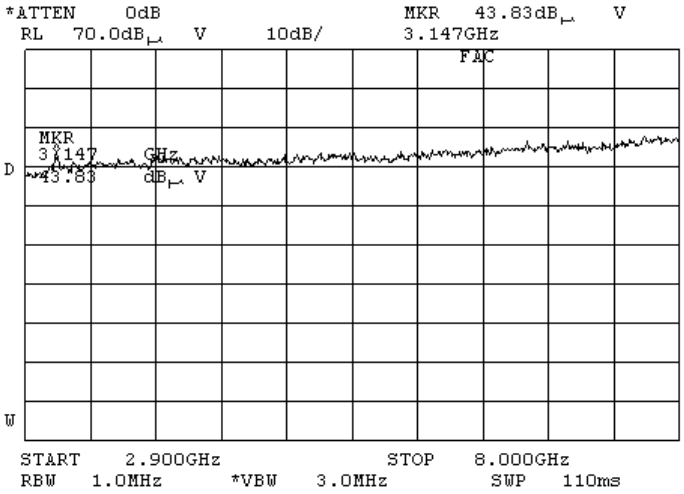
TEST SITE:	Semi anechoic chamber
TEST DISTANCE:	3 m
OPTION:	AC mode
DETECTOR:	Average



Test specification:	Section 15.109, Class A, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	9/6/2009 11:12:12 AM		
Temperature: 25ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: 120 VAC
Remarks:			

Plot 8.2.10 Radiated emission measurements in 2900 – 8000 MHz, vertical antenna polarization

TEST SITE:	Semi anechoic chamber
TEST DISTANCE:	3 m
OPTION:	AC mode
DETECTOR:	Peak



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-09	29-Jun-10
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-09	11-Jan-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
1424	Spectrum Analyzer, 30 Hz- 40 GHz	Agilent Technologies	8564EC	3946A002 19	28-Sep-08	28-Sep-09
1425	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1426, HL1427	Agilent Technologies	8542E	3710A002 22, 3705A002 04	28-Aug-09	28-Aug-10
1430	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1431, HL1432	Agilent Technologies	8542E	3807A002 62,3705A0 0217	31-Aug-09	31-Aug-10
1510	Cable RF, 8 m, BNC/BNC	Belden	M17/167 MIL-C-17	1510	01-Jan-09	01-Jan-10
1553	Cable RF, 3.5 m, N/N-type	Alpha Wire	RG-214	1553	01-Jan-09	01-Jan-10
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W	EMC Test Systems	3115	9911-5964	23-Jan-09	23-Jan-10
2013	Power Divider, 0.5-18.0 GHz, 80 W	Omni Spectra	2090-6204-00	2013	01-Dec-08	01-Dec-09
2697	Antenna, 30 MHz - 3.0 GHz	Sunol Sciences. Corp. Pleasanton, California USA	JB3	A022805	11-Jan-09	11-Jan-10
2883	Cable, 18 GHz N-type, M-F, 3 m	Bird	TC-MNFN-3.0	211539 003	07-Dec-08	07-Dec-09
2888	LISN Two-line V-Network 50 Ohm / 50 uH + 5 Ohm, 16A, MIL STD 461E, CISPR 16-1	Rolf Heine	NNB-2/16Z	02/10018	06-Jul-09	06-Jul-10
3121	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-9155-00	3121	07-Dec-08	07-Dec-09
3122	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-9155-00	3122	01-Jan-09	01-Jan-10
3455	Medium Power Fixed Coaxial Attenuator DC to 40 GHz, 20 dB, 5 W	Aeroflex / Weinschel	75A-20-12	1182	17-Mar-09	17-Mar-10
3472	Cable, Coax, Microwave, DC-18 GHz, SMA-SMA, 1.0 m	Gore	GORE 65474	1003478	10-May-09	10-May-10
3473	Cable, Coax, Microwave, DC-18 GHz, SMA-SMA, 0.6 m	Gore	GORE 65474	1003478	10-May-09	10-May-10
3474	Cable, Coax, Microwave, DC-18 GHz, SMA-SMA, 0.6 m	Gore	GORE 65475	1640102	10-May-09	10-May-10
3531	Amplifier, low noise, 2 to 8 GHz	Quinstar Technology	QLJ-02084040 -J0	111590020 02	07-Dec-08	07-Dec-09

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
3533	Amplifier, low noise, 6 to 18 GHz	Quinstar Technology	QLJ-06184040-J0	11159001001	07-Dec-08	07-Dec-09
3535	Amplifier, low noise, 18 to 40 GHz	Quinstar Technology	QLJ-18404537-J0	11159003001	07-Dec-08	07-Dec-09
3559	Cable 40 GHz, SMA-SMA, 0.95 m, Blue	Gore	PHASEFLEX	03771245	10-Aug-09	10-Aug-10
3612	Cable RF, 17.5 m, N type-N type	Teldor	RG-214/U	NA	17-Nov-08	17-Nov-09
3616	Cable RF, 6.5 m, N type-N type, DC-6.5 GHz	Suhner Switzerland	Rg 214/U	NA	07-Dec-08	07-Dec-09

Manufacture's test equipment and ancillaries used for tests

No.	Description	Manufacturer	Model No.	Serial No.	Due Calibr
1	Spectrum analyzer, 9 kHz-26.5 GHz	Agilent	E4407B	US40241729	30-Jun-10
2	EPM Series Power Meter	Agilent	E4418B	GB39512058	30-Jun-10
3	Power Sensor, 50 MHz-50 GHz	HP	8487H	3318A03115	30-Jun-10
4	Attenuator, DC-8.5GHz, 20 dB	Aeroflex/Weinschel	24-20-34 SN: BX4460	NA	NA
5	Microwave 1.5m cable	Suhner	Sucoflex 104PE	27314/4PE	NA
6	Splitter	Mini-Circuits	ZN2PD-9G 0 0142	15542	NA
7	Oven	Cincinnati Sub-Zero Products	ZH-2-033-033-H/C	ZZ9712534	30-Jun-10
8	Attenuator, DC-18 GHz, 10 dB	Mini-Circuits	BW-S10W5+	NA	NA
9	Attenuator, DC-18 GHz, 10 dB	Mini-Circuits	BW-S10W5+	NA	NA

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 %

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 and IC 2186A-2 for anechoic chamber), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, C-845 for conducted emissions site), 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.

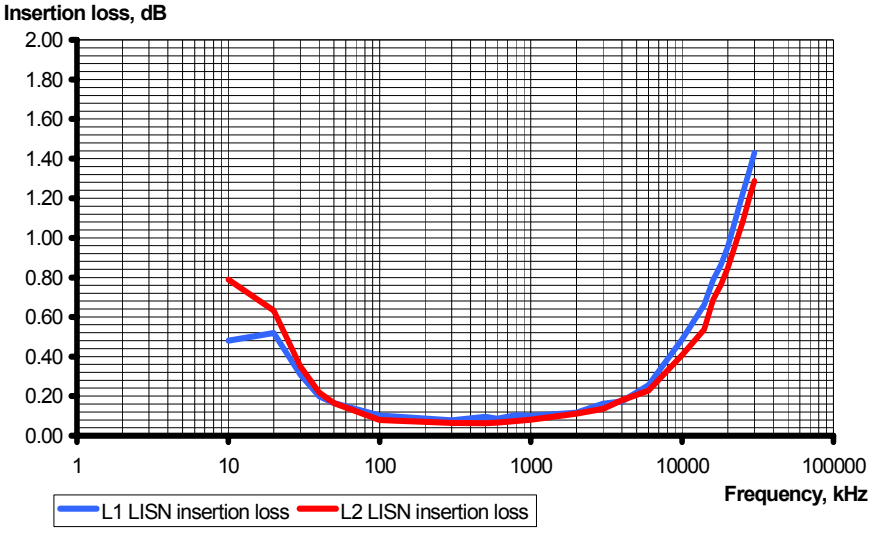
12 APPENDIX D Specification references

FCC 47CFR part 90: 2008	Private land mobile radio services
FCC 47CFR part 1: 2008	Practice and procedure
FCC 47CFR part 2: 2008	Frequency allocations and radio treaty matters; general rules and regulations
FCC 47CFR part 15: 2008	Radio Frequency Devices.
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

Correction factor
Line impedance stabilization network
Model NNB-2/16Z, Rolf Heine, HL 2888

Frequency, kHz	Insertion loss,dB		Measurement Uncertainty, dB
	L1	N	
10	0.48	0.79	±0.6
20	0.52	0.63	
30	0.31	0.35	
40	0.20	0.22	
50	0.16	0.17	
100	0.10	0.08	
300	0.08	0.06	
500	0.10	0.06	
600	0.09	0.07	
800	0.10	0.07	
1000	0.10	0.08	
2000	0.12	0.11	
3000	0.16	0.14	
4000	0.17	0.18	
6000	0.26	0.23	
10000	0.49	0.41	
14000	0.66	0.54	
16000	0.79	0.69	
18000	0.86	0.76	
20000	0.96	0.85	
25000	1.22	1.08	
28000	1.35	1.21	
30000	1.43	1.29	



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

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

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

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

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

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

Antenna factor

Biconilog antenna EMCO, model 3141, serial number 1011, HL 0604

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

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

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

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

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

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

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

Cable loss
Cable M17/167 MIL-C-17, HL 1510

No.	Frequency, MHz	Cable loss, dB
1	0.1	0.05
2	1	0.09
3	3	0.16
4	5	0.18
5	10	0.27
6	30	0.44
7	50	0.58
8	80	0.69
9	100	0.82
10	300	1.48
11	500	2.01
12	800	2.65
13	1000	3.12

Cable loss
RF cable 3.5 m, Alpha Wire, model RG-214, S/N 149, HL 1553

No.	Frequency, MHz	Cable loss, dB	Measurement uncertainty, dB
1	1	0.01	±0.05
2	10	0.07	
3	30	0.12	
4	50	0.22	
5	100	0.26	
6	200	0.40	
7	300	0.52	
8	400	0.60	
9	500	0.70	
10	600	0.77	
11	700	0.84	
12	800	1.00	
13	900	1.00	
14	1000	1.05	
15	2000	1.70	

Cable loss
Cable coaxial, Bird, 18 GHz, N-type, M-F, model TC-MNFN-3.0, S/N 211539 003
HL 2883

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.06	5750	1.70	12000	2.46
30	0.12	6000	1.75	12250	2.48
100	0.21	6250	1.80	12500	2.52
250	0.34	6500	1.81	12750	2.50
500	0.47	6750	1.86	13000	2.54
750	0.59	7000	1.86	13250	2.48
1000	0.67	7250	1.92	13500	2.63
1250	0.76	7500	1.96	13750	2.65
1500	0.84	7750	1.98	14000	2.72
1750	0.92	8000	2.02	14250	2.67
2000	0.98	8250	2.03	14500	2.70
2250	1.05	8500	2.05	14750	2.72
2500	1.12	8750	2.11	15000	2.79
2750	1.17	9000	2.17	15250	2.80
3000	1.22	9250	2.17	15500	2.83
3250	1.27	9500	2.20	15750	2.75
3500	1.33	9750	2.19	16000	2.82
3750	1.38	10000	2.22	16250	2.85
4000	1.42	10250	2.25	16500	2.90
4250	1.46	10500	2.30	16750	2.89
4500	1.51	10750	2.28	17000	2.88
4750	1.54	11000	2.32	17250	2.85
5000	1.59	11250	2.34	17500	2.96
5250	1.62	11500	2.39	17750	3.04
5500	1.65	11750	2.42	18000	3.04

Cable loss
Microwave Cable Assembly, 18 GHz, 6.4 m, SMA – SMA, Huber-Suhner, model 198-9155-00
HL 3121

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	0.08	3600	2.10	7400	3.08	11200	3.85	15100	4.58
30	0.18	3700	2.14	7500	3.11	11300	3.85	15200	4.60
50	0.26	3800	2.18	7600	3.14	11400	3.86	15300	4.63
100	0.34	3900	2.19	7700	3.16	11500	3.86	15400	4.65
200	0.47	4000	2.25	7800	3.18	11600	3.87	15500	4.71
300	0.59	4100	2.25	7900	3.20	11700	3.85	15600	4.70
400	0.66	4200	2.28	8000	3.22	11800	3.96	15700	4.69
500	0.75	4300	2.35	8100	3.26	11900	3.92	15800	4.71
600	0.83	4400	2.35	8200	3.27	12000	3.92	15900	4.74
700	0.90	4500	2.38	8300	3.29	12100	3.94	16000	4.69
800	0.96	4600	2.43	8400	3.30	12200	3.94	16100	4.72
900	1.02	4700	2.43	8500	3.31	12300	3.99	16200	4.71
1000	1.07	4800	2.45	8600	3.33	12400	4.02	16300	4.74
1100	1.12	4900	2.48	8700	3.35	12500	4.10	16400	4.74
1200	1.15	5000	2.55	8800	3.36	12600	4.09	16500	4.75
1300	1.22	5100	2.54	8900	3.38	12700	4.15	16600	4.78
1400	1.28	5200	2.56	9000	3.40	12800	4.15	16700	4.86
1500	1.29	5300	2.58	9100	3.41	12900	4.08	16800	4.84
1600	1.36	5400	2.61	9200	3.45	13000	4.21	16900	4.83
1700	1.40	5500	2.64	9300	3.48	13100	4.19	17000	4.86
1800	1.45	5600	2.69	9400	3.52	13200	4.29	17100	4.83
1900	1.51	5700	2.67	9500	3.54	13300	4.24	17200	4.90
2000	1.50	5800	2.71	9600	3.59	13400	4.26	17300	4.91
2100	1.56	5900	2.73	9700	3.59	13500	4.26	17400	4.94
2200	1.59	6000	2.75	9800	3.62	13600	4.29	17500	4.93
2300	1.63	6100	2.81	9900	3.70	13700	4.35	17600	4.93
2400	1.73	6200	2.80	10000	3.70	13800	4.31	17700	5.00
2500	1.73	6300	2.82	10100	3.72	13900	4.29	17800	5.01
2600	1.78	6400	2.85	10200	3.73	14000	4.32	17900	5.00
2700	1.84	6500	2.87	10300	3.75	14100	4.33	18000	5.00
2800	1.84	6600	2.90	10400	3.76	14200	4.34		
2900	1.91	6700	2.91	10500	3.77	14300	4.36		
3000	1.91	6800	2.94	10600	3.79	14400	4.38		
3100	1.97	6900	2.96	10700	3.80	14600	4.42		
3200	1.98	7000	2.98	10800	3.81	14700	4.42		
3300	2.04	7100	3.01	10900	3.81	14800	4.55		
3400	2.04	7200	3.02	11000	3.83	14900	4.55		
3500	2.10	7300	3.04	11100	3.84	15000	4.55		

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, Microwave, SMA-SMA, 18 GHz, 1.0 m
Gore, HL 3472

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.01	5000	0.47	10200	0.72	15500	0.75
30	0.03	5100	0.47	10300	0.67	15600	0.89
50	0.04	5200	0.47	10400	0.77	15700	0.82
100	0.04	5300	0.47	10500	0.67	15800	0.89
200	0.08	5400	0.49	10600	0.74	15900	0.89
300	0.11	5500	0.48	10700	0.81	16000	0.93
400	0.11	5600	0.49	10800	0.77	16100	0.90
500	0.12	5700	0.49	10900	0.82	16200	0.92
600	0.14	5800	0.51	11000	0.86	16300	0.90
700	0.15	5900	0.50	11100	0.78	16400	0.94
800	0.16	6000	0.51	11200	0.82	16500	0.93
900	0.18	6100	0.53	11300	0.77	16600	0.95
1000	0.17	6200	0.52	11400	0.84	16700	0.98
1100	0.19	6300	0.53	11500	0.74	16800	1.00
1200	0.22	6400	0.54	11600	0.81	16900	0.94
1300	0.21	6500	0.55	11700	0.73	17000	1.00
1400	0.22	6600	0.54	11800	0.75	17100	0.93
1500	0.23	6700	0.57	11900	0.73	17200	1.00
1600	0.24	6800	0.54	12000	0.75	17300	0.93
1700	0.24	6900	0.58	12100	0.66	17400	0.93
1800	0.25	7000	0.58	12200	0.66	17500	0.96
1900	0.26	7100	0.58	12300	0.72	17600	0.94
2000	0.28	7200	0.61	12400	0.64	17700	0.99
2100	0.27	7300	0.59	12500	0.75	17800	0.97
2200	0.29	7400	0.55	12600	0.67	17900	0.90
2300	0.29	7500	0.63	12700	0.75	18000	0.78
2400	0.30	7600	0.60	12800	0.66		
2500	0.30	7700	0.61	12900	0.81		
2600	0.32	7800	0.64	13000	0.75		
2700	0.32	7900	0.60	13100	0.80		
2800	0.33	8000	0.58	13200	0.80		
2900	0.34	8100	0.61	13300	0.81		
3000	0.34	8200	0.62	13400	0.88		
3100	0.35	8300	0.62	13500	0.82		
3200	0.35	8400	0.68	13600	1.00		
3300	0.36	8500	0.63	13700	0.93		
3400	0.37	8600	0.61	13800	0.86		
3500	0.38	8700	0.63	13900	0.84		
3600	0.38	8800	0.62	14000	1.00		
3700	0.40	8900	0.64	14100	0.86		
3800	0.40	9000	0.62	14200	0.98		
3900	0.40	9100	0.64	14300	0.99		
4000	0.40	9200	0.62	14400	0.82		
4100	0.43	9300	0.62	14600	0.89		
4200	0.43	9400	0.62	14700	0.84		
4300	0.43	9500	0.63	14800	0.90		
4400	0.44	9600	0.64	14900	0.89		
4500	0.45	9700	0.60	15000	0.89		
4600	0.45	9800	0.65	15100	0.86		
4700	0.46	9900	0.60	15200	0.87		
4800	0.46	10000	0.67	15300	0.86		
4900	0.46	10100	0.69	15400	0.87		

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, 17 m
Teldor, HL 3612

Frequency, GHz	Cable loss, dB
0.1	0.05
0.5	0.07
1	0.10
3	0.22
5	0.29
10	0.39
30	0.68
50	0.90
100	1.27
150	1.58
200	1.80
250	2.12
300	2.36
350	2.60
400	2.82
450	2.99
500	3.23
550	3.40
600	3.56
650	3.71
700	3.90
750	4.04
800	4.23
850	4.39
900	4.55
950	4.65
1000	4.79

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)
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