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839.01
Electrical

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TEST REPORT

ACCORDING TO: FCC 47CFR part 15 subpart C § 15.247 and subpart B

FOR:

Bioness Neuromodulation Ltd.

Remote Control unit

Model: RC

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Table of contents

1 Applicant information

Client name:	Bioness Neuromodulation Ltd.
Address:	P.O.Box 2500, 19 Ha'haroshet street, Ra'anana 43654, Israel
Telephone:	+972 9790 7100
Fax:	+972 9748 5740
E-mail:	shai.feldman@bioness.co.il
Contact name:	Mr. Shai Feldman

2 Equipment under test attributes

Product name:	Remote Control unit
Trade mark:	StimRouter
Model:	RC
Serial number:	20015261
Software release:	1.0.0.0
Receipt date	3/31/2009

3 Manufacturer information

Manufacturer name:	Bioness Neuromodulation Ltd.
Address:	P.O.Box 2500, 19 Ha'haroshet street, Ra'anana 43654, Israel
Telephone:	+972 9790 7100
Fax:	+972 9748 5740
E-Mail:	shai.feldman@bioness.co.il
Contact name:	Mr. Shai Feldman

4 Test details

Project ID:	19567
Location:	Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started:	3/31/2009
Test completed:	4/22/2009
Test specification(s):	FCC 47CFR part 15:2007, subpart C §15.247; subpart B §15.109

5 Tests summary

Test	Status
Transmitter characteristics	
Section 15.247(a)2, 6 dB bandwidth	Pass
Section 15.247(b)3, Peak output power	Pass
Section 15.247(i), RF exposure	Pass, the exhibit to the application of certification is provided
Section 15.247(d), Radiated spurious emissions	Pass
Section 15.247(e), Peak power density	Pass
Section 15.207(a), Conducted emission	Not required
Unintentional emissions	
Section 15.107, Conducted emission at AC power port	Not required
Section 15.109, Radiated emission	Pass

Testing was completed against all relevant requirements of the test standard. The results obtained indicate that the product under test complies in full with the requirements tested.
The test results relate only to the items tested. Pass/ fail decision was based on nominal values.

	Name and Title	Date	Signature
Tested by:	Mrs. E. Pitt, test engineer	April 22, 2009	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	May 19, 2009	
Approved by:	Mr. M. Nikishin, EMC and radio group manager	May 21, 2009	

6 EUT description

6.1 General information

The EUT, a Remote Control unit (RC), is used to control the operation of an Electronic Pulse Transmitter EPT that applies electrical pulses to the human body through conduction to the skin. The EUT contains a microcontroller that accepts commands from the user through push-buttons and sends indications to the user through a simple display. The EUT can also accept commands from a serial cable as an alternative.
When the RC receives a command from the user or from the serial cable, it generates an RF packet containing this command and sends it though an RF channel to the EPT. Following the transmission the RC waits to receive a reply to the command. The RC is held in the user's hand when input command is from the push-button keys, or it may be docked in a cradle when the serial cable is used as an interface.
The main functions of the RC when commanding the EPT are the following:
1) Start stimulation
2) Stop stimulation
3) Change stimulation parameters (amplitude, frequency, pulse width).

6.2 Operating frequencies

Source	Frequency, MHz		
Tx/Rx	2401 - 2417		
Clock	7.3728	0.032768	26

6.3 Changes made in EUT

No changes were implemented in the EUT.

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6.4 Transmitter characteristics

Type of equipment	
	Stand-alone (Equipment with or without its own control provisions)
X	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**
	fixed	Always at a distance more than 2 m from all people
	mobile	Always at a distance more than 20 cm from all people
X	portable	May operate at a distance closer than 20 cm to human body

Assigned frequency range	2400-2483.5 MHz
Operating frequency range	2401 – 2417.262 MHz
RF channel spacing	580.810 kHz

Maximum rated output power	At transmitter 50 Ω RF output connector	NA
	Equivalent isotropically radiated power	4.1 dBm

Is transmitter output power variable?	X	No		
		Yes		continuous variable
				stepped variable with stepsize dB
			minimum RF power	-30 dBm
			maximum RF power	0 dBm

Antenna connection			
unique coupling	standard connector	X integral	with temporary RF connector
			X without temporary RF connector

Antenna/s technical characteristics			
Type	Manufacturer	Model number	Gain
Chip antenna	Fractus	FR05-S1-N-0-102	+1 dBi (max)

Transmitter 99% power bandwidth	590 kHz		
Transmitter aggregate data rate/s	0.5 Mkbps		
Transmitter aggregate symbol (baud) rate/s	0.5 Msymbols (Mbaud) per second		
Type of modulation	MSK		
Type of multiplexing	TDMA		
Modulating test signal (baseband)	PN-9		
Maximum transmitter duty cycle in normal use	<1%		
Transmitter duty cycle supplied for test	100%	**Tx ON time**	**Period**

Transmitter power source						
X	Battery	**Nominal rated voltage**	1.2 VDC	Battery type	Rechargeable NiMH
	DC	**Nominal rated voltage**	VDC		
	AC mains	**Nominal rated voltage**	VAC	Frequency	Hz

Common power source for transmitter and receiver	X yes		no

Test specification:	Section 15.247(a)2, 6 dB bandwidth		
Test procedure:	FR Vol.62, page 26243, Section 15.247(a)2		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/1/2009 5:29:39 PM		
Temperature: 22ºC	Air Pressure: 1016 hPa	Relative Humidity: 42%	Power Supply: Battery
Remarks:			

7 Transmitter tests according to 47CFR part 15 subpart C requirements

7.1 Minimum 6 dB bandwidth

7.1.1 General

This test was performed to measure 6 dB bandwidth of the EUT carrier frequency. Specification test limits are given in Table 7.1.1.

Table 7.1.1 The 6 dB bandwidth limits

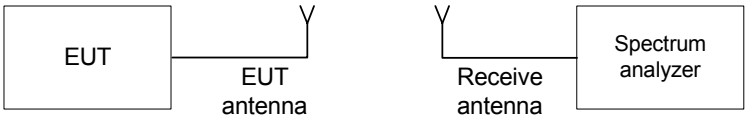
Assigned frequency, MHz	Modulation envelope reference points*, dBc	Minimum bandwidth, kHz
902.0 – 928.0	6.0	500.0
2400.0 – 2483.5		
5725.0 – 5850.0		

* - Modulation envelope reference points provided in terms of attenuation below the peak of modulated carrier.

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 set to transmit modulated carrier.
7.1.2.3 The transmitter minimum 6 dB bandwidth was measured with spectrum analyzer as frequency delta between reference points on modulation envelope and provided in Table 7.1.2 and associated plot.

Figure 7.1.1 The 6 dB bandwidth test setup



Test specification:	Section 15.247(a)2, 6 dB bandwidth		
Test procedure:	FR Vol.62, page 26243, Section 15.247(a)2		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/1/2009 5:29:39 PM		
Temperature: 22ºC	Air Pressure: 1016 hPa	Relative Humidity: 42%	Power Supply: Battery
Remarks:			

Table 7.1.2 The 6 dB bandwidth test results

ASSIGNED FREQUENCY BAND:	2400-2483.5 MHz
DETECTOR USED:	Peak
SWEEP MODE:	Single
SWEEP TIME:	Auto
RESOLUTION BANDWIDTH:	100 kHz
VIDEO BANDWIDTH:	300 kHz
MODULATION ENVELOPE REFERENCE POINTS:	6.0 dBc
MODULATION:	MSK
MODULATING SIGNAL:	PRBS
BIT RATE:	0.5Mbps

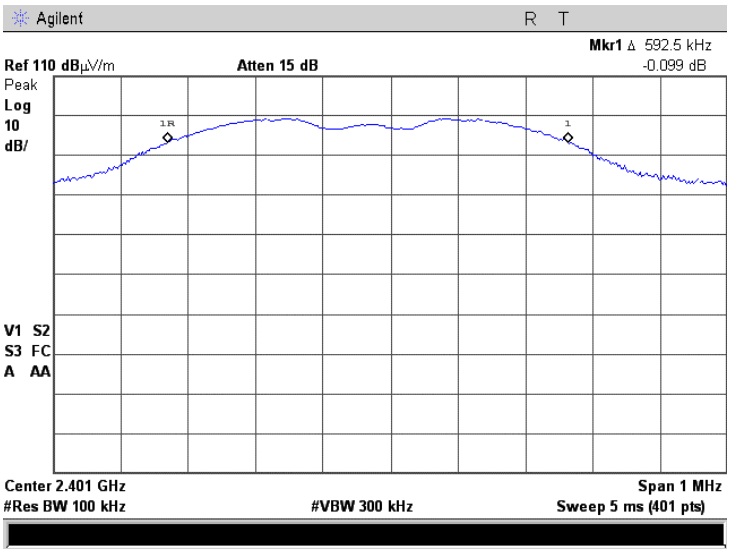
Carrier frequency, MHz	6 dB bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
Low frequency				
2401.000	592.5	500	92.5	Pass
Mid frequency				
2407.969	602.5	500	102.5	Pass
High frequency				
2417.262	596.6	500	96.6	Pass

Reference numbers of test equipment used

HL 2432	HL 2909	HL 2911						

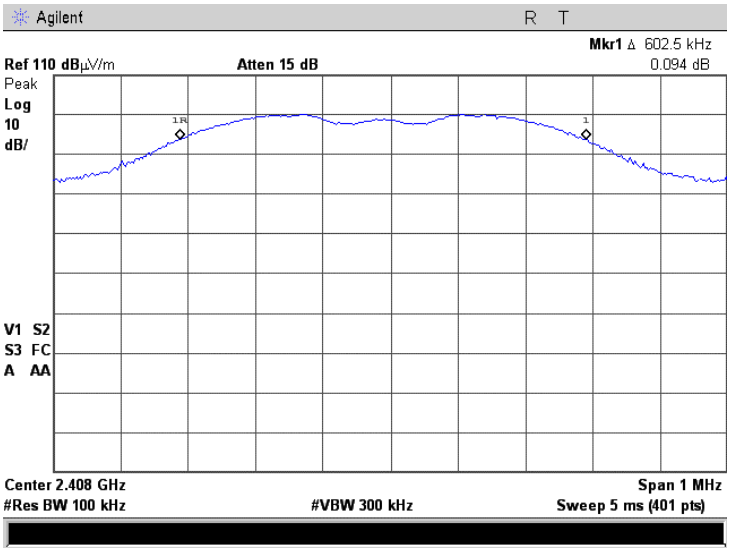
Full description is given in Appendix A.

Plot 7.1.1 The 6 dB bandwidth test result at low frequency

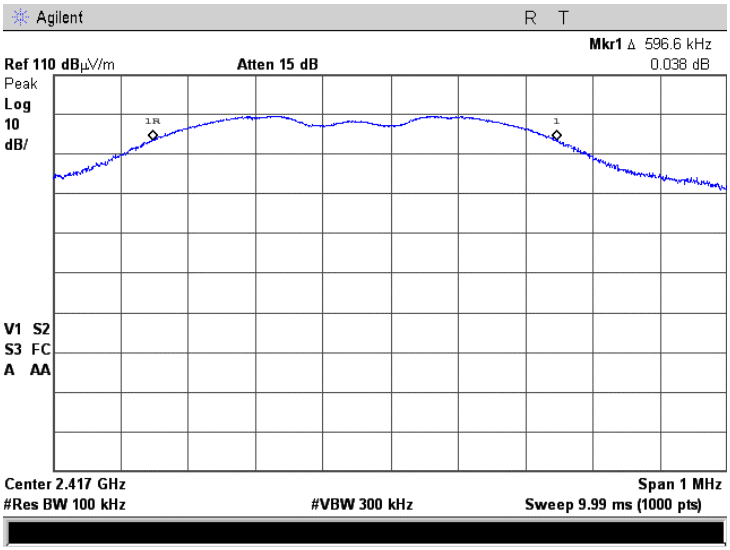


Test specification:	Section 15.247(a)2, 6 dB bandwidth		
Test procedure:	FR Vol.62, page 26243, Section 15.247(a)2		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/1/2009 5:29:39 PM		
Temperature: 22ºC	Air Pressure: 1016 hPa	Relative Humidity: 42%	Power Supply: Battery
Remarks:			

Plot 7.1.2 The 6 dB bandwidth test result at mid frequency



Plot 7.1.3 The 6 dB bandwidth test result at high frequency



Test specification:	Section 15.247(b)3, Peak output power		
Test procedure:	FR Vol.62, page 26243, Section 15.247(b)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/1/2009 5:32:17 PM		
Temperature: 22ºC	Air Pressure: 1016 hPa	Relative Humidity: 42%	Power Supply: Battery
Remarks:			

7.2 Peak output power

7.2.1 General

This test was performed to measure the maximum peak output power radiated by transmitter. Specification test limits are given in Table 7.2.1.

Table 7.2.1 Peak output power limits

Assigned frequency range, MHz	Maximum antenna gain, dBi	Peak output power*		Equivalent field strength limit @ 3m, dB(μV/m)**
		W	dBm	
902.0 – 928.0	6.0	1.0	30.0	131.2
2400.0 – 2483.5				
5725.0 – 5850.0				

*- The limit is provided in terms of conducted RF power at the antenna connector. If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power limit shall be reduced below the stated value as follows:

by 1 dB for every 3 dB that the directional gain of antenna exceeds 6 dBi for fixed point-to-point transmitters operate in 2400-2483.5 MHz band;
without any corresponding reduction for fixed point-to-point transmitters operate in 5725-5850 MHz band;
by the amount in dB that the directional gain of antenna exceeds 6 dBi for the rest of transmitters.

**- Equivalent field strength limit was calculated from the peak output power as follows: E=sqrt(30×P×G)/r, where P is peak output power in Watts, r is antenna to EUT distance in meters and G is transmitter antenna gain in dBi.

7.2.2 Test procedure

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

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

7.2.2.3 The maximum field strength of the EUT carrier frequency was measured in 3 orthogonal positions of the device.

7.2.2.4 The resolution bandwidth of spectrum analyzer was set wider than 6 dB bandwidth of the EUT and the field strength of the EUT carrier frequency was measured with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360^0 and the measuring antenna height was swept in both vertical and horizontal polarizations.

7.2.2.5 The maximum field strength of the EUT carrier frequency was measured as provided in Table 7.2.2 and the associated plots.

7.2.2.6 The maximum peak output power was calculated from the field strength of carrier as follows:

$$P = (E \times d)^2 / (30 \times G),$$

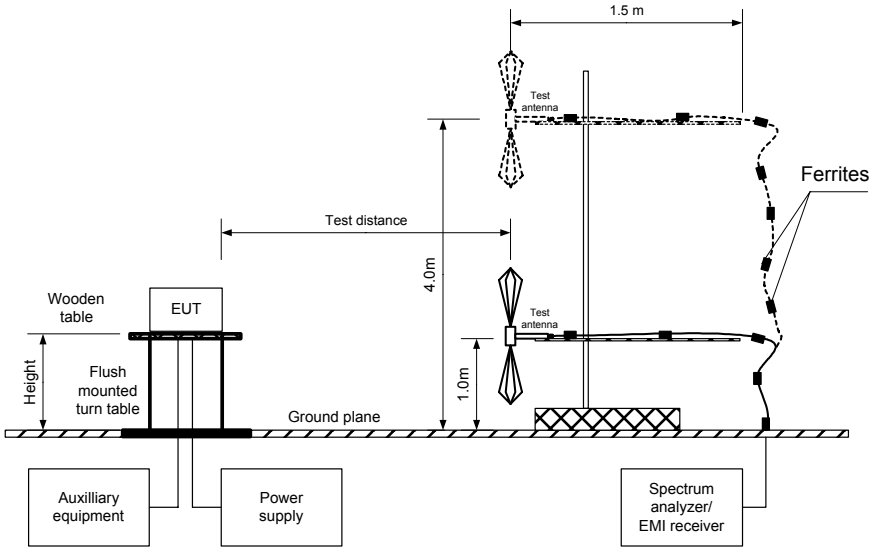
where P is the peak output power in W, E is the field strength in V/m, d is the test distance and G is the transmitter numeric antenna gain over an isotropic radiator.
The above equation was converted in logarithmic units for 3 m test distance:

Peak output power in dBm = Field strength in dB(μV/m) - Transmitter antenna gain in dBi – 95.2 dB

7.2.2.7 The worst test results (the lowest margins) were recorded in Table 7.2.2.

Test specification:	Section 15.247(b)3, Peak output power		
Test procedure:	FR Vol.62, page 26243, Section 15.247(b)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/1/2009 5:32:17 PM		
Temperature: 22ºC	Air Pressure: 1016 hPa	Relative Humidity: 42%	Power Supply: Battery
Remarks:			

Figure 7.2.1 Setup for carrier field strength measurements



Test specification:	Section 15.247(b)3, Peak output power		
Test procedure:	FR Vol.62, page 26243, Section 15.247(b)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/1/2009 5:32:17 PM		
Temperature: 22ºC	Air Pressure: 1016 hPa	Relative Humidity: 42%	Power Supply: Battery
Remarks:			

Table 7.2.2 Peak output power test results

ASSIGNED FREQUENCY:	2400-2483.5 MHz
EUT POSITION:	3 orthogonal
TEST DISTANCE:	3 m
TEST SITE:	OATS
EUT HEIGHT:	0.8 m
DETECTOR USED:	Peak
TEST ANTENNA TYPE:	Double ridged guide (above 1000 MHz)
MODULATION:	MSK
MODULATING SIGNAL:	PRBS
BIT RATE:	0.5 Mbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum
DETECTOR USED:	Peak
EUT 6 dB BANDWIDTH:	MHz
RESOLUTION BANDWIDTH:	1 MHz
VIDEO BANDWIDTH:	3 MHz

Frequency, MHz	Field strength, dB(µV/m)	Antenna polarization	Antenna height, m	Azimuth, degrees*	EUT antenna gain, dBi	Peak output power, dBm**	Limit, dBm	Margin dB***	Verdict
2401.000	99.53	H	1.2	45	1	3.33	30	-26.67	Pass
2407.969	100.30	H	1.2	45	1	4.10	30	-25.90	Pass
2417.262	99.90	H	1.2	45	1	3.70	30	-26.30	Pass

The recorded test results were obtained in the Z-axis (horizontal) position.

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

**- Peak output power was calculated from the field strength of carrier as follows: $P = (E \times d)^2 / (30 \times G)$,
where P is the peak output power in W, E is the field strength in V/m, d is the test distance in meters and G is the transmitter numeric antenna gain over an isotropic radiator. The above equation was converted in logarithmic units for 3 m test distance: *Peak output power in dBm = Field strength in dB(µV/m) - Transmitter antenna gain in dBi – 95.2 dB*

***- Margin = Peak output power – specification limit.

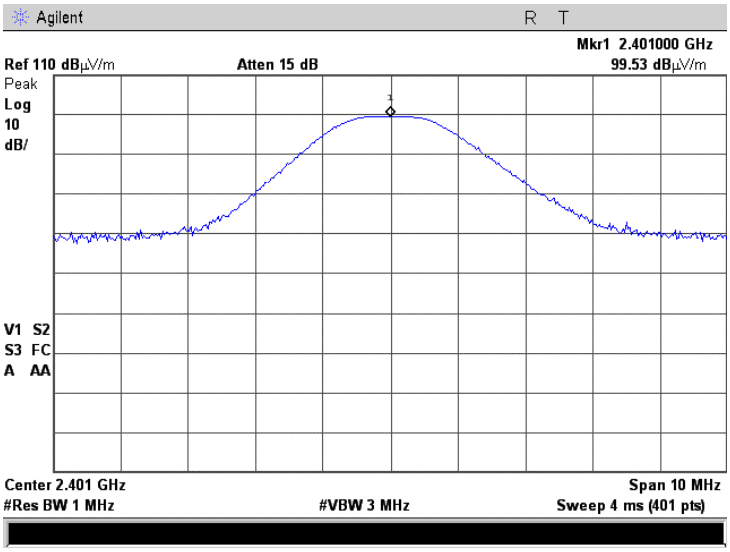
Reference numbers of test equipment used

HL 2909	HL 2911	HL 2432					

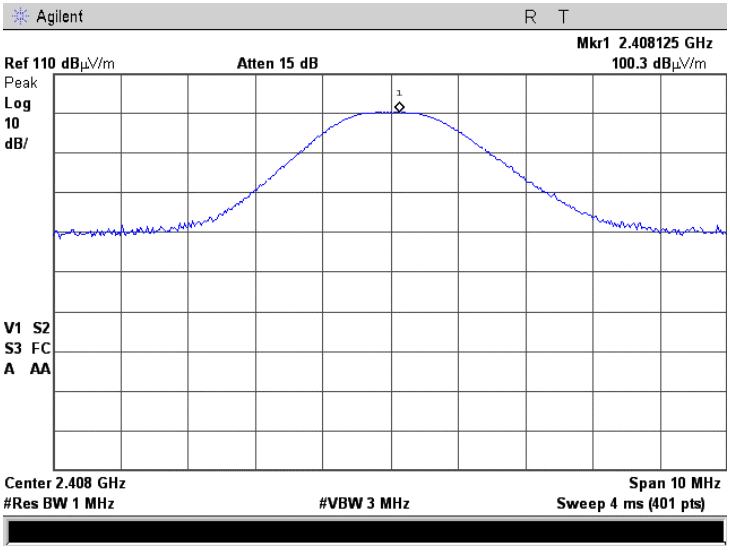
Full description is given in Appendix A.

Test specification:	Section 15.247(b)3, Peak output power		
Test procedure:	FR Vol.62, page 26243, Section 15.247(b)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/1/2009 5:32:17 PM		
Temperature: 22ºC	Air Pressure: 1016 hPa	Relative Humidity: 42%	Power Supply: Battery
Remarks:			

Plot 7.2.1 Field strength of carrier at low frequency

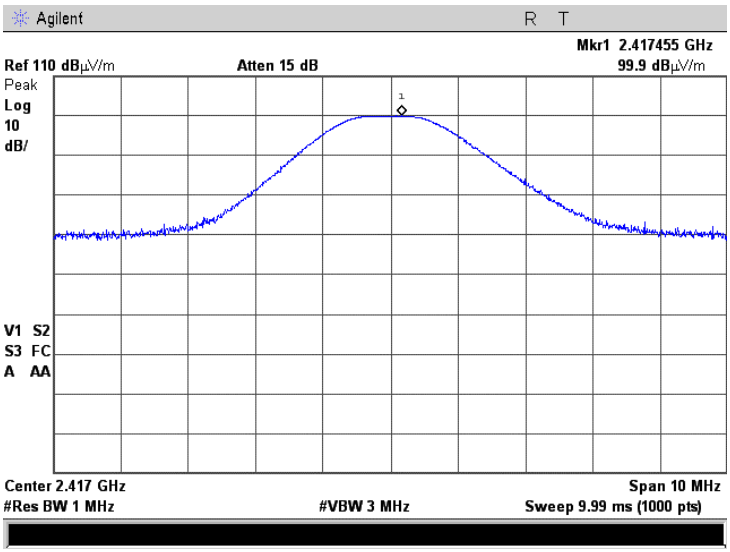


Plot 7.2.2 Field strength of carrier at mid frequency



Test specification:	Section 15.247(b)3, Peak output power		
Test procedure:	FR Vol.62, page 26243, Section 15.247(b)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/1/2009 5:32:17 PM		
Temperature: 22ºC	Air Pressure: 1016 hPa	Relative Humidity: 42%	Power Supply: Battery
Remarks:			

Plot 7.2.3 Field strength of carrier at high frequency



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

7.3 Field strength of spurious emissions

7.3.1 General

This test was performed to measure field strength of spurious emissions from the EUT. Specification test limits are given in Table 7.3.1.

Table 7.3.1 Radiated spurious emissions limits

Frequency, MHz	Field strength at 3 m within restricted bands, dB(μV/m)*			Attenuation of field strength of spurious versus carrier outside restricted bands, dBc***
	Peak	Quasi Peak	Average	
0.009 – 0.090	148.5 – 128.5	NA	128.5 – 108.5**	20.0
0.090 – 0.110	NA	108.5 – 106.8**	NA	
0.110 – 0.490	126.8 – 113.8	NA	106.8 – 93.8**	
0.490 – 1.705	NA	73.8 – 63.0**	NA	
1.705 – 30.0*		69.5		
30 – 88		40.0		
88 – 216		43.5		
216 – 960		46.0		
960 - 1000		54.0		
1000 – 10thharmonic	74.0	NA	54.0	

*- The limit for 3 m test distance was calculated using the inverse square distance extrapolation factor as follows:

$$Lim_{S2} = Lim_{S1} + 40 \log (S_1/S_2),$$

where S_1 and S_2 – standard defined and test distance respectively in meters.

**- The limit decreases linearly with the logarithm of frequency.

*** - The field strength limits applied from the lowest radio frequency generated in the device, without going below 9 kHz up to the tenth harmonic of the highest fundamental frequency.

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

7.3.2.1 The EUT was set up as shown in Figure 7.3.1, energized and the performance check was conducted.

7.3.2.2 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360^0 and the measuring antenna was rotated around its vertical axis.

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

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

7.3.3.1 The EUT was set up as shown in Figure 7.3.2, energized and the performance check was conducted.

7.3.3.2 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360^0, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal.

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

Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

Figure 7.3.1 Setup for spurious emission field strength measurements below 30 MHz

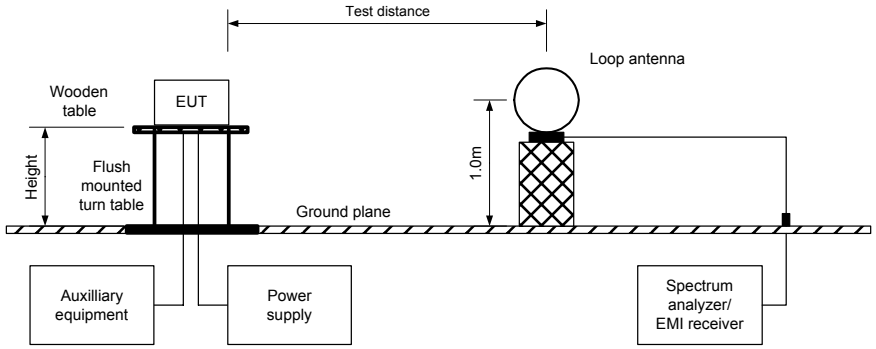
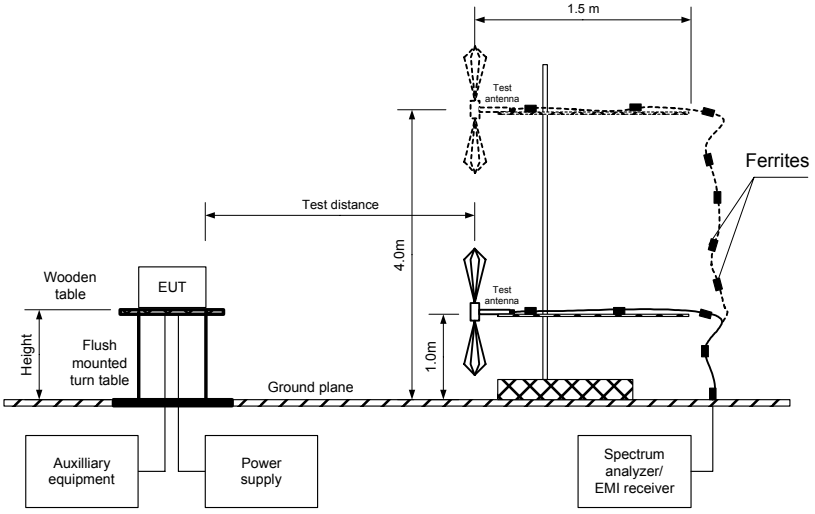


Figure 7.3.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

Table 7.3.2 Field strength of emissions outside restricted bands

ASSIGNED FREQUENCY:	2400-2483.5 MHz
EUT POSITION:	3 orthogonal
INVESTIGATED FREQUENCY RANGE:	0.009 -25000 MHz
TEST DISTANCE:	3 m
MODULATION:	MSK
MODULATING SIGNAL:	PRBS
BIT RATE:	Mbps
DUTY CYCLE:	100 %
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum
DETECTOR USED:	Peak
RESOLUTION BANDWIDTH:	100 kHz
VIDEO BANDWIDTH:	300 kHz
TEST ANTENNA TYPE:	Active loop (9 kHz – 30 MHz) Biconilog (30 MHz – 1000 MHz) Double ridged guide (above 1000 MHz)

Frequency MHz	Field strength of spurious, dB(µV/m)	Antenna polarization	Antenna height, m	Azimuth, degrees*	Field strength of carrier, dB(µV/m)	Attenuation below carrier, dBc	Limit, dBc	Margin, dB**	Verdict
Low carrier frequency									
7203	48.6	H	1.2	110	95.0	-46.4	20.0	-26.4	Pass
Mid carrier frequency									
7225	49.75	H	1.2	110	96.0	-46.25	20.0	-26.25	Pass
High carrier frequency									
No spurious were found									

The recorded test results were obtained in the Z-axis (horizontal) position.

*- EUT front panel refers to 0 degrees position of turntable.
**- Margin = Attenuation below carrier – specification limit.

Test specification:	**Section 15.247(d), Radiated spurious emissions**		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	**Air Pressure:** 1013 hPa	**Relative Humidity:** 48%	**Power Supply:** Battery
Remarks:			

Table 7.3.3 Field strength of spurious emissions within restricted bands

ASSIGNED FREQUENCY:	2400-2483.5 MHz
EUT POSITION:	3 orthogonal
INVESTIGATED FREQUENCY RANGE:	0.009 - 25000 MHz
TEST DISTANCE:	3 m
MODULATION:	MSK
MODULATING SIGNAL:	PRBS
BIT RATE:	Mbps
DUTY CYCLE:	100 %
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum
DETECTOR USED:	Peak
RESOLUTION BANDWIDTH:	1 kHz (9 kHz – 150 kHz) 9.0 kHz (150 kHz – 30 MHz) 120 kHz (30 MHz – 1000 MHz) above 1000 MHz (1000 MHz)
VIDEO BANDWIDTH:	> Resolution bandwidth
TEST ANTENNA TYPE:	Active loop (9 kHz – 30 MHz) Biconilog (30 MHz – 1000 MHz) Double ridged guide (above 1000 MHz)

Frequency MHz	Antenna		Azimuth degrees*	Peak field strength(VBW=3 MHz			Average field strength(VBW=10 Hz)				Verdict
	Polarization	Height m		Measured dB(µV/m)	Limit, dB(µV/m	Margin, dB**	Measured dB(µV/m)	Calculated dB(µV/m)	Limit, dB(µV/m	Margin dB***	
Low carrier frequency											
4802	H	1.3	70	54.52	74	-19.48	53.00	8.90	54	-45.10	Pass
Mid carrier frequency											
4816	H	1.3	70	55.89	74	-18.11	53.47	9.37	54	-44.63	Pass
High carrier frequency											
4834	H	1.3	70	55.24	74	-18.76	53.08	8.98	54	-45.02	Pass
7251	H	1.2	110	50.01	74	-23.99	43.89	-0.21	54	-54.21	

The recorded test results were obtained in Z-axis (horizontal) position.

*- EUT front panel refers to 0 degrees position of turntable.
**- Margin = Measured field strength - specification limit.
***- Margin = Calculated field strength - specification limit,
where Calculated field strength = Measured field strength + average factor.

Table 7.3.4 Average factor calculation

Transmission pulse		Transmission burst		Transmission train duration, ms	Average factor, dB
Duration, ms	Period, ms	Duration, ms	Period, ms		
0.625	100	NA	NA	NA	-44.1

*- Average factor was calculated as follows

for pulse train shorter than 100 ms: $$Average\ factor = 20 \times \log_{10}\left(\frac{Pulse\ duration}{Pulse\ period} \times \frac{Burst\ duration}{Train\ duration} \times Number\ of\ bursts\ within\ pulse\ train\right)$$

for pulse train longer than 100 ms: $$Average\ factor = 20 \times \log_{10}\left(\frac{Pulse\ duration}{Pulse\ period} \times \frac{Burst\ duration}{100\,ms} \times Number\ of\ bursts\ within\ 100\,ms\right)$$

Test specification:	**Section 15.247(d), Radiated spurious emissions**		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	**Air Pressure:** 1013 hPa	**Relative Humidity:** 48%	**Power Supply:** Battery
Remarks:			

Table 7.3.5 Restricted bands

MHz	MHz	MHz	MHz	MHz	GHz
0.09 - 0.11	8.37625 - 8.38675	73 - 74.6	399.9 - 410	2690 - 2900	10.6 - 12.7
0.495 - 0.505	8.41425 - 8.41475	74.8 - 75.2	608 - 614	3260 - 3267	13.25 - 13.4
2.1735 - 2.1905	12.29 - 12.293	108 - 121.94	960 - 1240	3332 - 3339	14.47 - 14.5
4.125 - 4.128	12.51975 - 12.52025	123 - 138	1300 - 1427	3345.8 - 3358	15.35 - 16.2
4.17725 - 4.17775	12.57675 - 12.57725	149.9 - 150.05	1435 - 1626.5	3600 - 4400	17.7 - 21.4
4.20725 - 4.20775	13.36 - 13.41	156.52475 - 156.52525	1645.5 - 1646.5	4500 - 5150	22.01 - 23.12
6.215 - 6.218	16.42 - 16.423	156.7 - 156.9	1660 - 1710	5350 – 5460	23.6 - 24
6.26775 - 6.26825	16.69475 - 16.69525	162.0125 - 167.17	1718.8 - 1722.2	7250 - 7750	31.2 - 31.8
6.31175 - 6.31225	16.80425 - 16.80475	167.72 - 173.2	2200 - 2300	8025 – 8500	36.43 - 36.5
8.291 - 8.294	25.5 - 25.67	240 - 285	2310 - 2390	9000 - 9200	Above 38.6
8.362 - 8.366	37.5 - 38.25	322 - 335.4	2483.5 - 2500	9300 - 9500	

Reference numbers of test equipment used

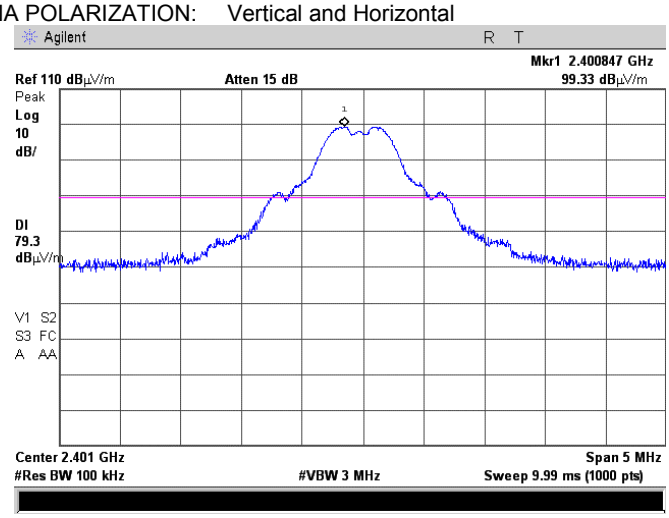
HL 0446	HL 0768	HL 1200	HL 1425	HL 1984	HL 2254	HL 2499	HL 2882
HL 2909	HL 2911	HL 3119	HL 3532	HL 3534	HL 3535		

Full description is given in Appendix A.

Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

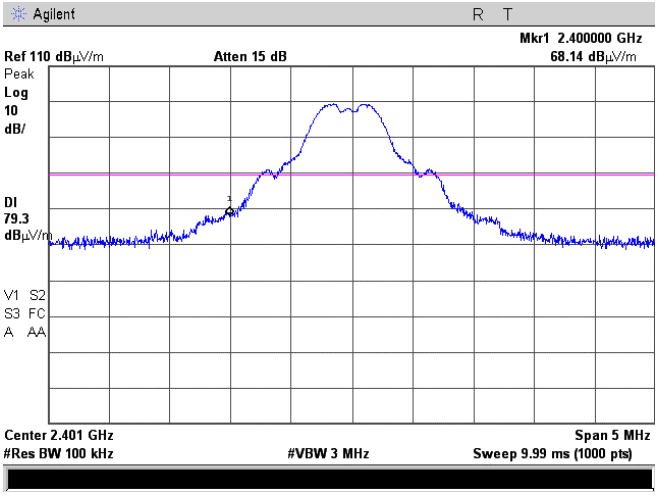
Plot 7.3.1 Radiated emission measurements at the low carrier frequency

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



Plot 7.3.2 Radiated emission measurements at the low carrier frequency (band edge)

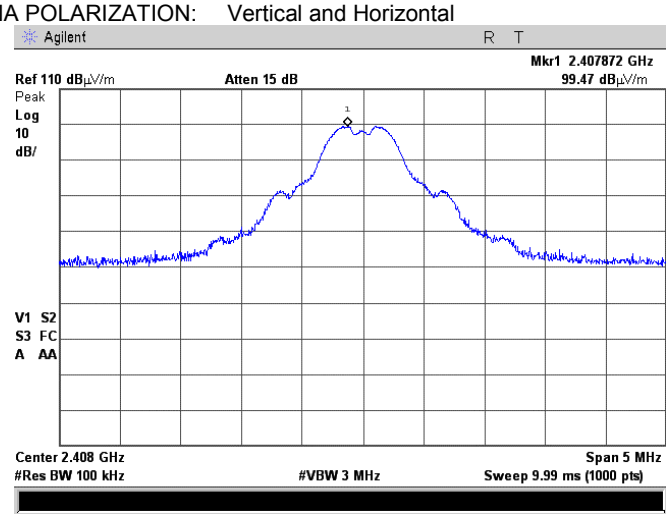
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

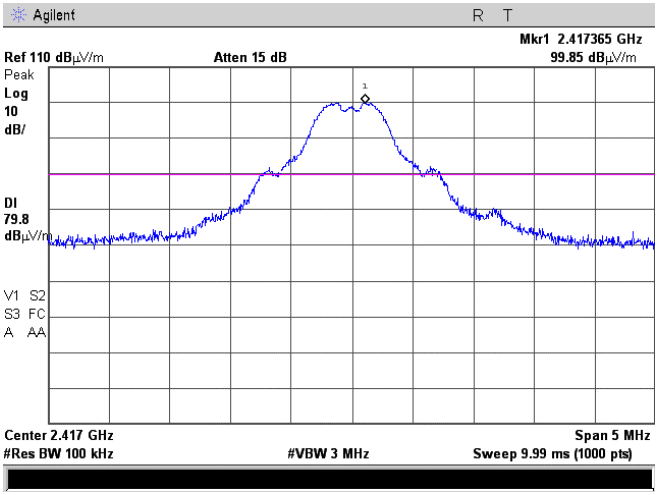
Plot 7.3.3 Radiated emission measurements at the mid carrier frequency

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



Plot 7.3.4 Radiated emission measurements at the high carrier frequency

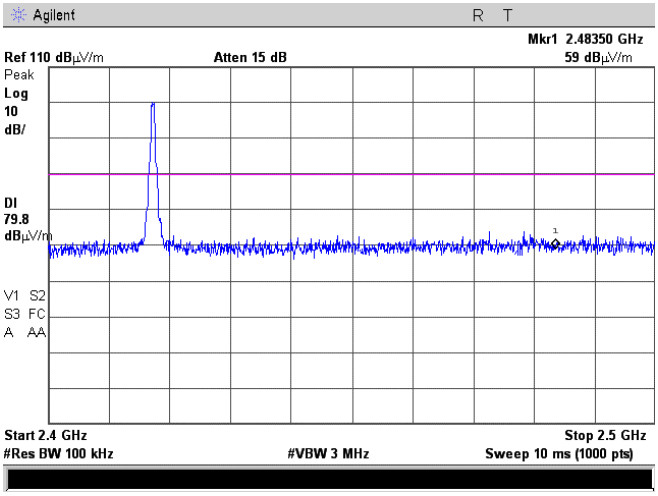
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

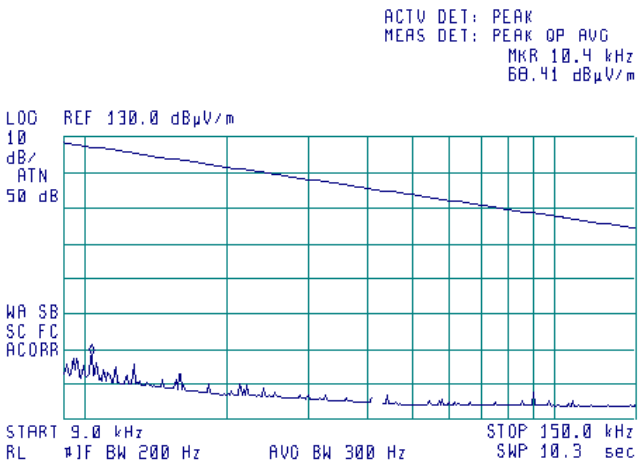
Plot 7.3.5 Radiated emission measurements at the high carrier frequency (band edge)

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



Plot 7.3.6 Plot 7.3.7 Radiated emission measurements from 9 to 150 kHz at the low carrier frequency

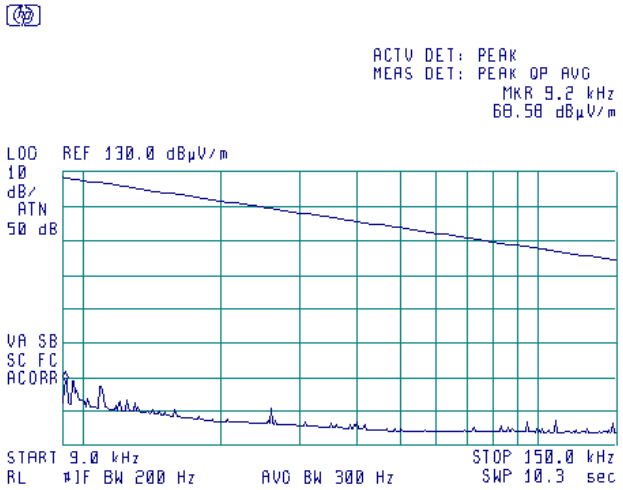
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

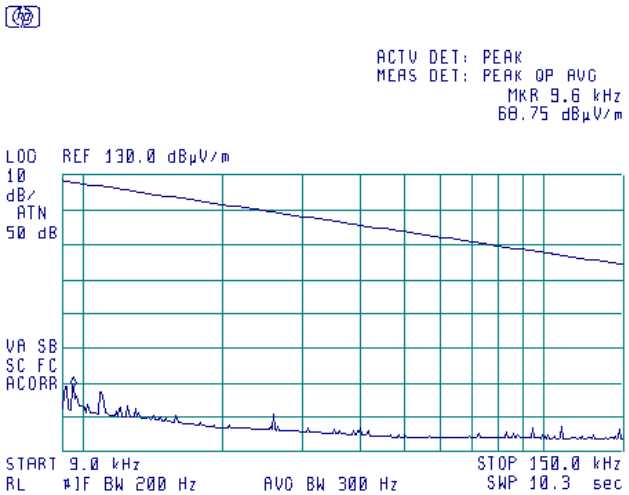
Plot 7.3.8 Radiated emission measurements from 9 to 150 kHz at the mid carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Plot 7.3.9 Radiated emission measurements from 9 to 150 kHz at the high carrier frequency

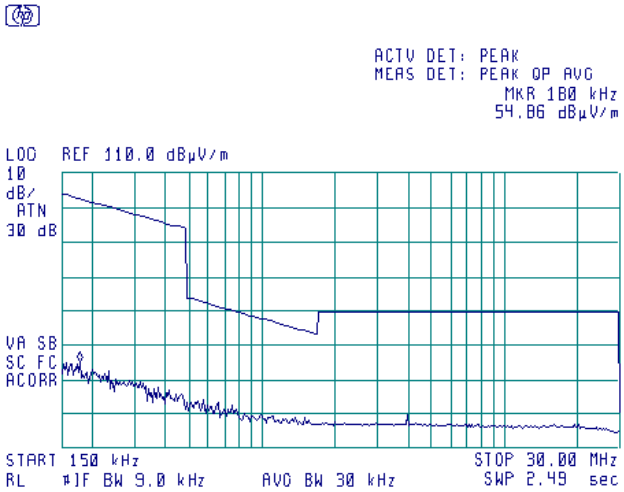
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

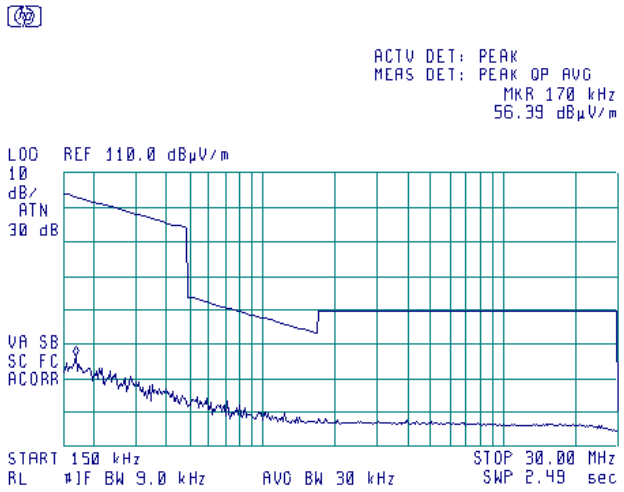
Plot 7.3.10 Radiated emission measurements from 0.15 to 30 MHz at the low carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Plot 7.3.11 Radiated emission measurements from 0.15 to 30 MHz at the mid carrier frequency

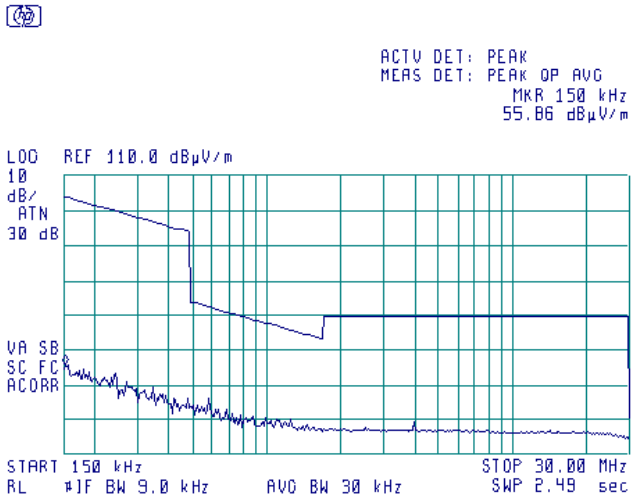
TEST SITE: Anechoic chamber / OATS / Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

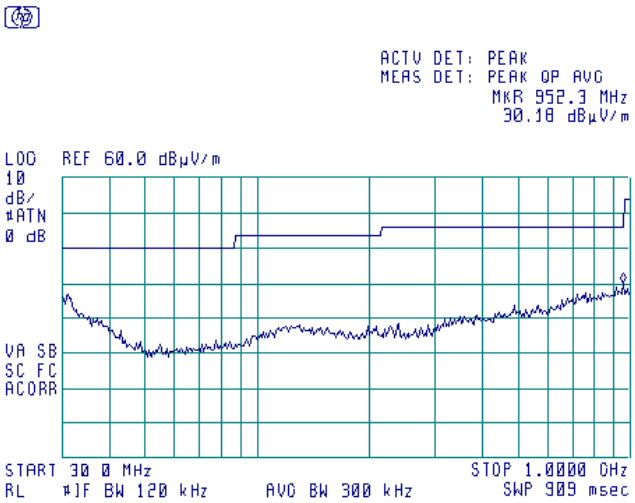
Plot 7.3.12 Radiated emission measurements from 0.15 to 30 MHz at the high carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Plot 7.3.13 Radiated emission measurements from 30 to 1000 MHz at the low carrier frequency

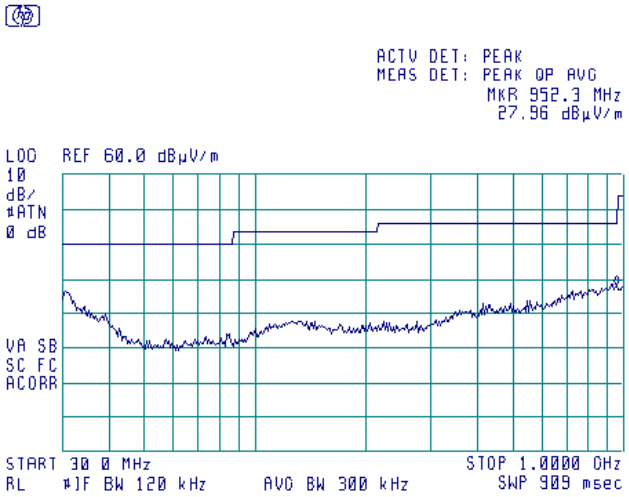
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

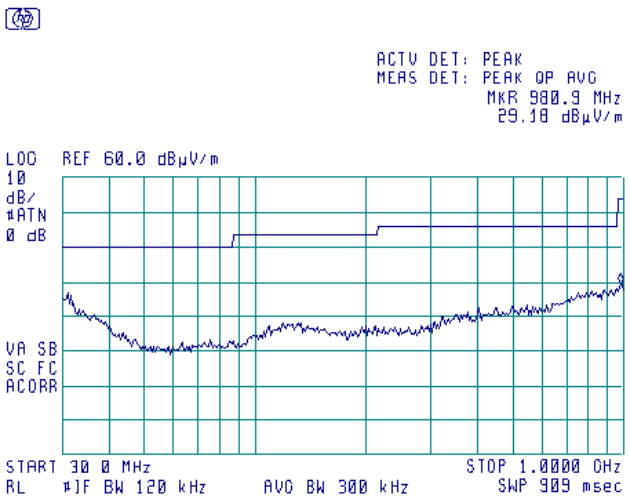
Plot 7.3.14 Radiated emission measurements from 30 to 1000 MHz at the mid carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.3.15 Radiated emission measurements from 30 to 1000 MHz at the high carrier frequency

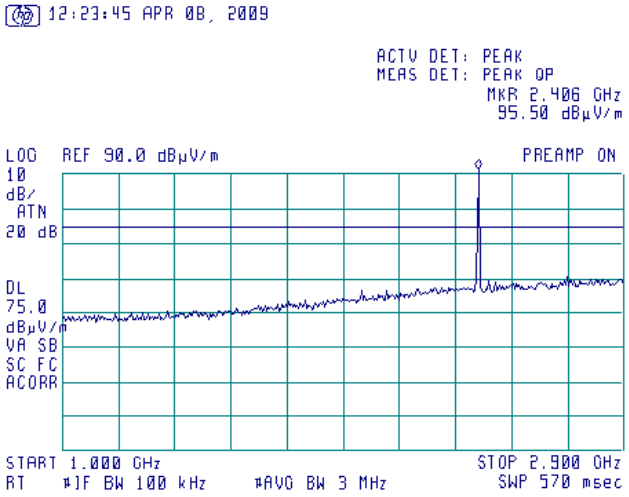
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

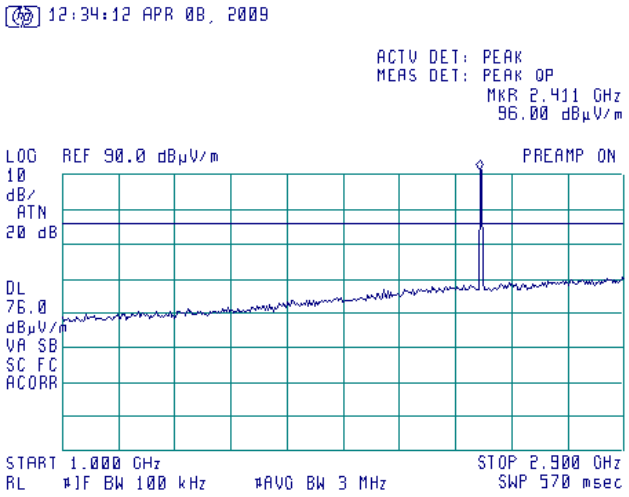
Plot 7.3.16 Radiated emission measurements from 1000 to 2900 MHz at the low carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.3.17 Radiated emission measurements from 1000 to 2900 MHz at the mid carrier frequency

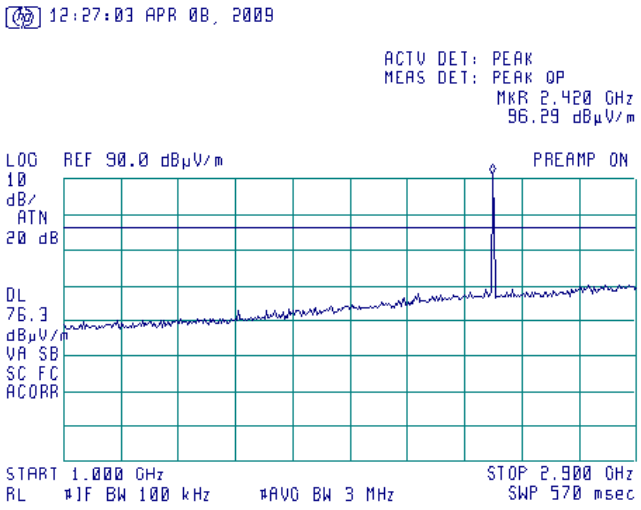
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

Plot 7.3.18 Radiated emission measurements from 1000 to 2900 MHz at the high carrier frequency

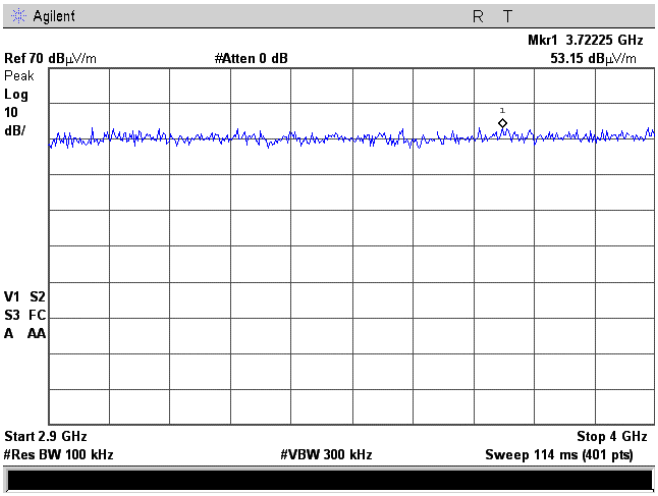
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

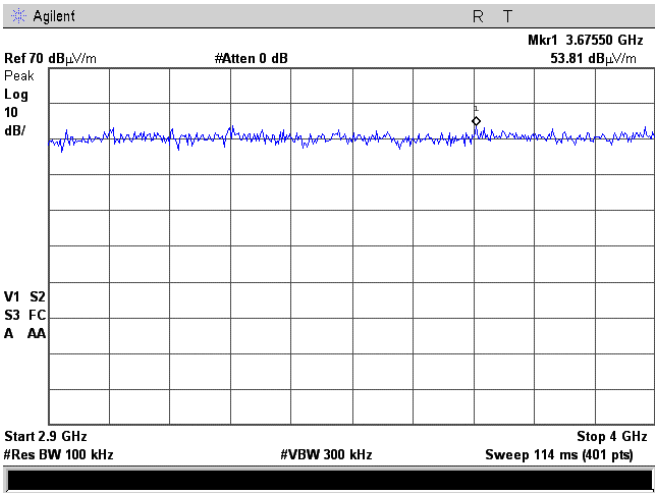
Plot 7.3.19 Radiated emission measurements from 2900 to 4000 MHz at the low carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.3.20 Radiated emission measurements from 2900 to 4000 MHz at the mid carrier frequency

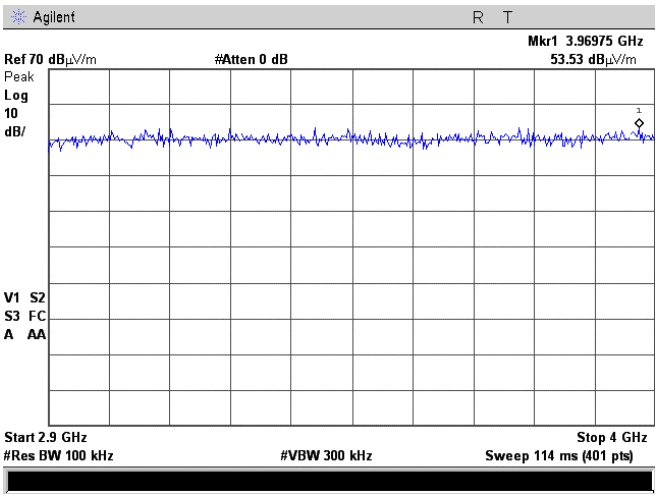
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

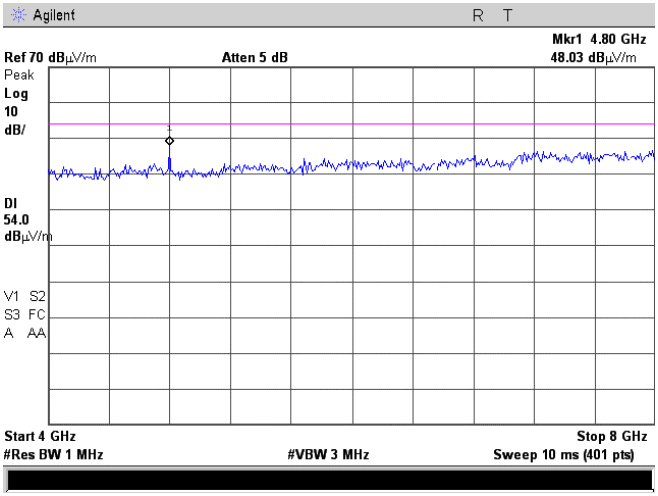
Plot 7.3.21 Radiated emission measurements from 2900 to 4000 MHz at the high carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.3.22 Radiated emission measurements from 4000 to 8000 MHz at the low carrier frequency

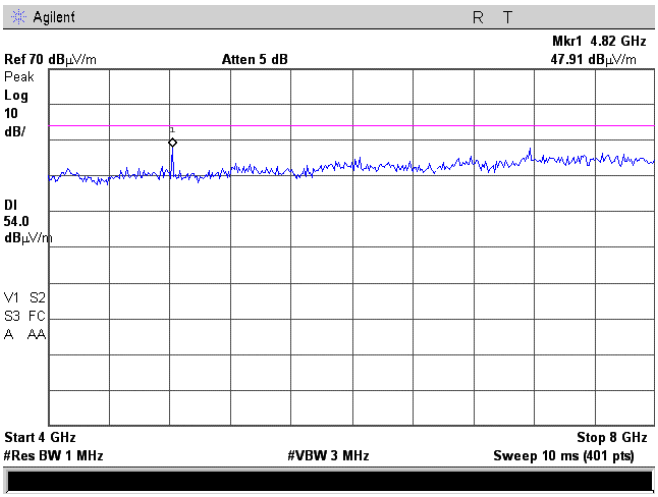
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

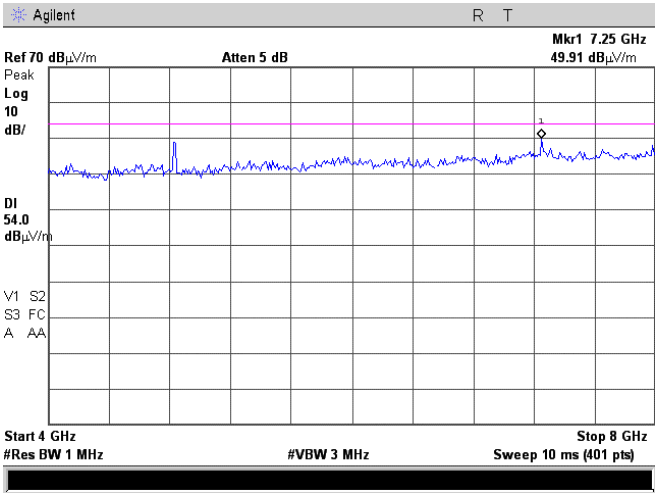
Plot 7.3.23 Radiated emission measurements from 4000 to 8000 MHz at the mid carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.3.24 Radiated emission measurements from 4000 to 8000 MHz at the high carrier frequency

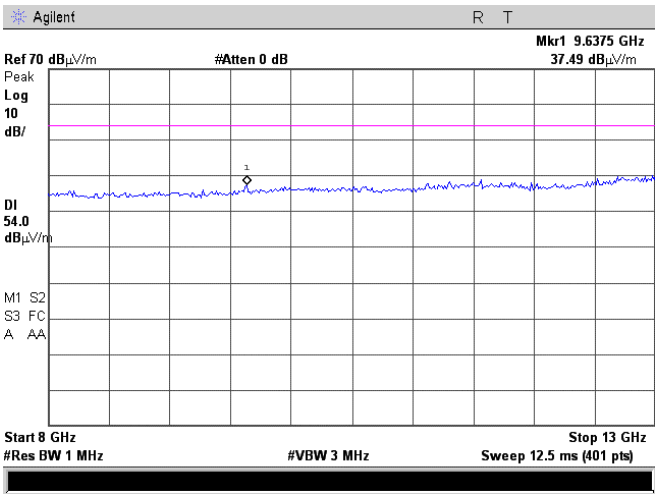
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

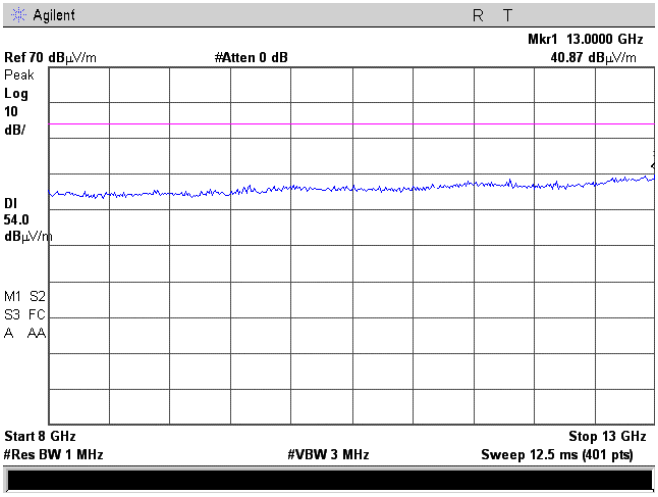
Plot 7.3.25 Radiated emission measurements from 8000 to 13000 MHz at the low carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.3.26 Radiated emission measurements from 8000 to 13000 MHz at the mid carrier frequency

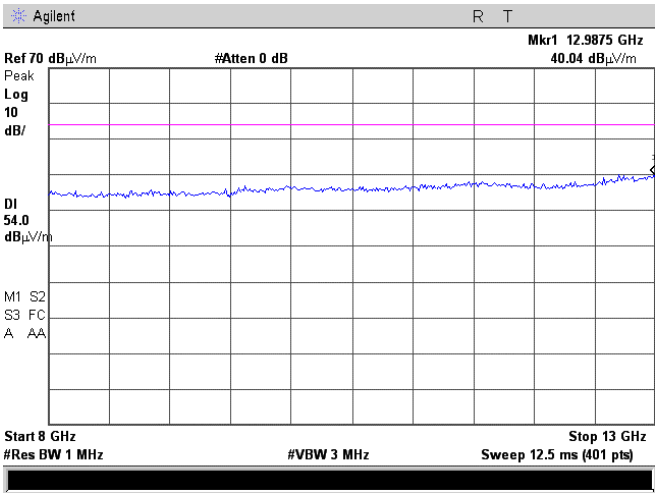
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

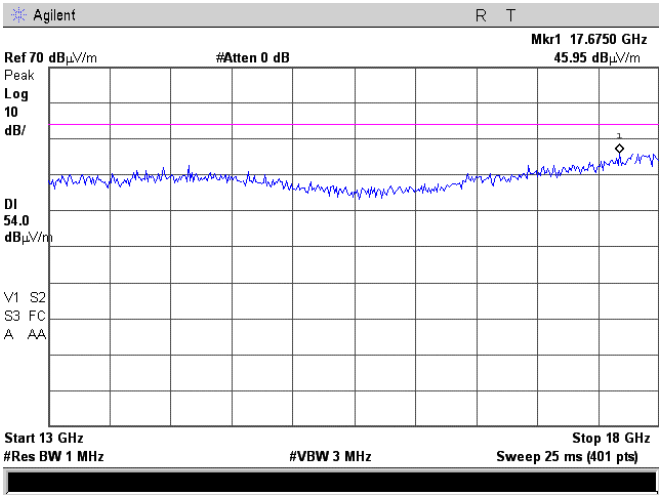
Plot 7.3.27 Radiated emission measurements from 8000 to 13000 MHz at the high carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.3.28 Radiated emission measurements from 13000 to 18000 MHz at the low carrier frequency

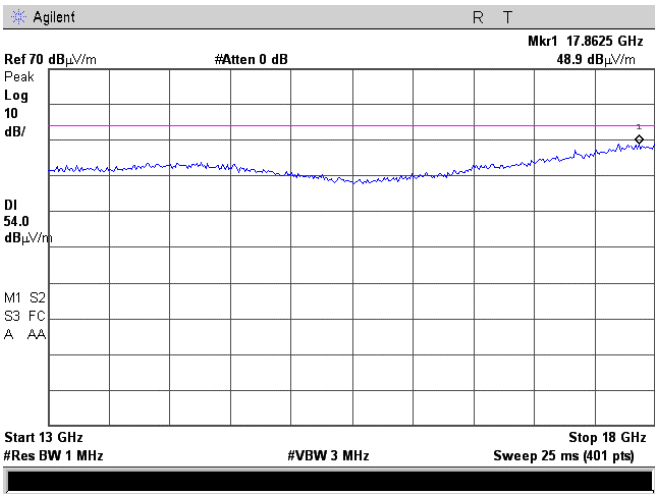
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

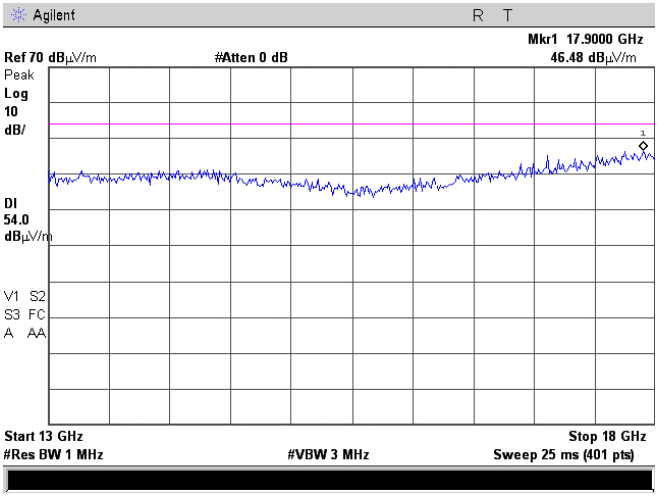
Plot 7.3.29 Radiated emission measurements from 13000 to 18000 MHz at the mid carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.3.30 Radiated emission measurements from 13000 to 18000 MHz at the high carrier frequency

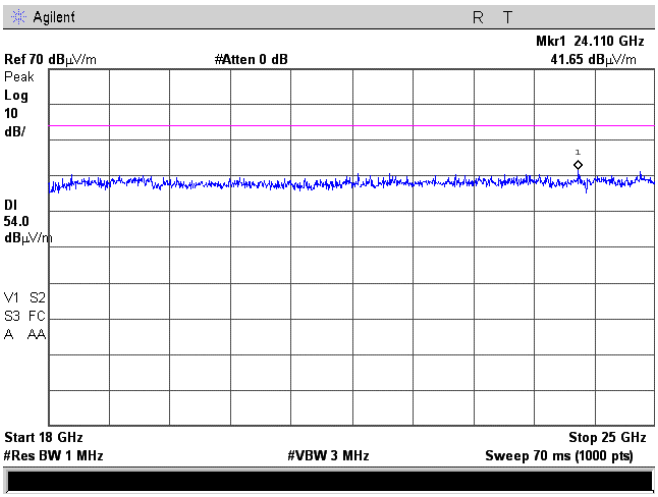
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

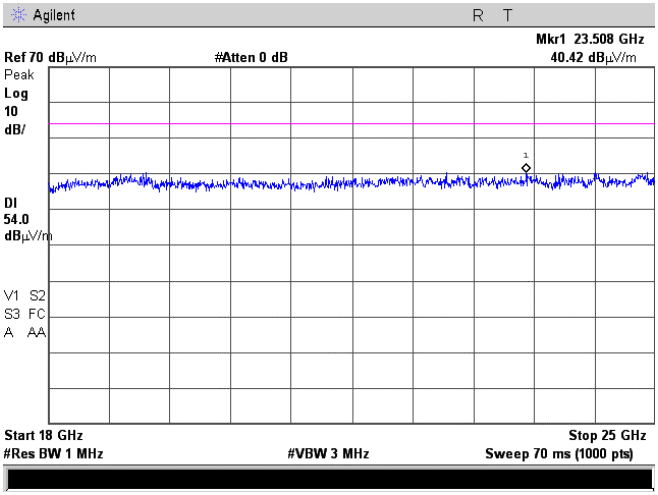
Plot 7.3.31 Radiated emission measurements from 18000 to 25000 MHz at the low carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.3.32 Radiated emission measurements from 18000 to 25000 MHz at the mid carrier frequency

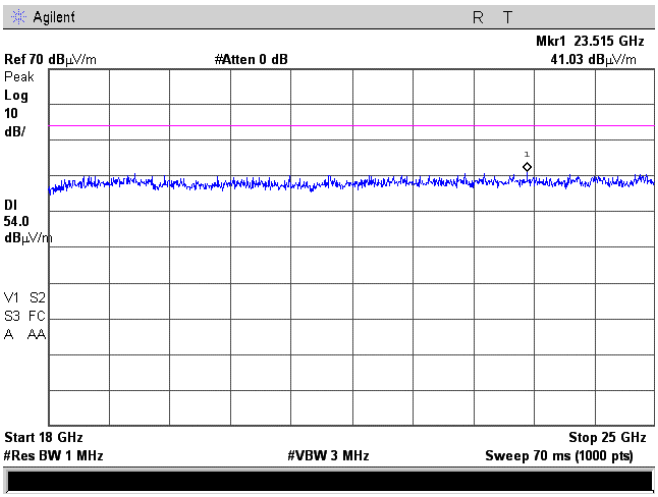
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

Plot 7.3.33 Radiated emission measurements from 18000 to 25000 MHz at the high carrier frequency

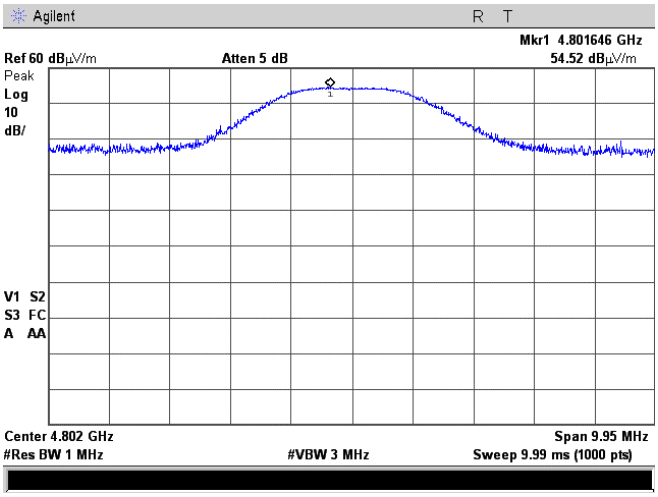
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

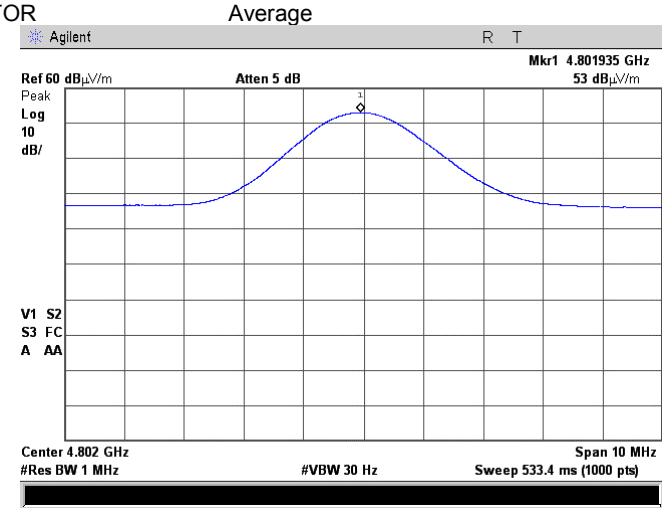
Plot 7.3.34 Radiated emission measurements at the second harmonic of low carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR Peak



Plot 7.3.35 Radiated emission measurements at the second harmonic of low carrier frequency

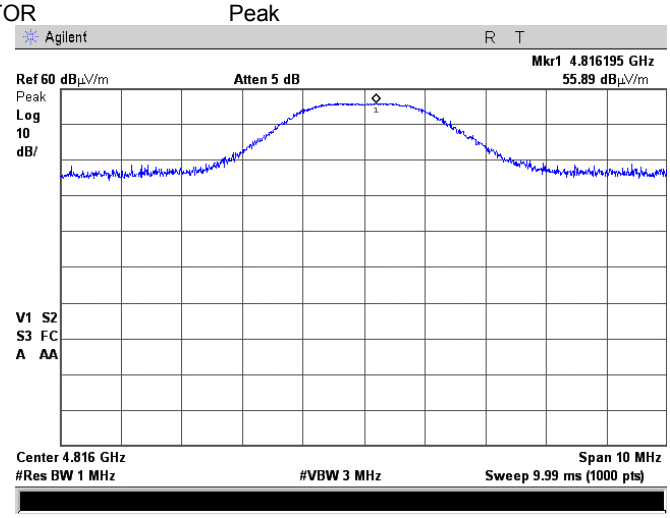
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR Average



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

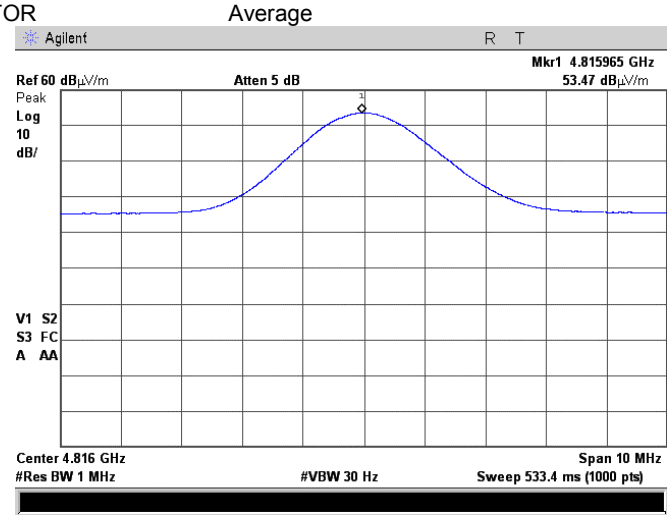
Plot 7.3.36 Radiated emission measurements at the second harmonic of mid carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR Peak



Plot 7.3.37 Radiated emission measurements at the second harmonic of mid carrier frequency

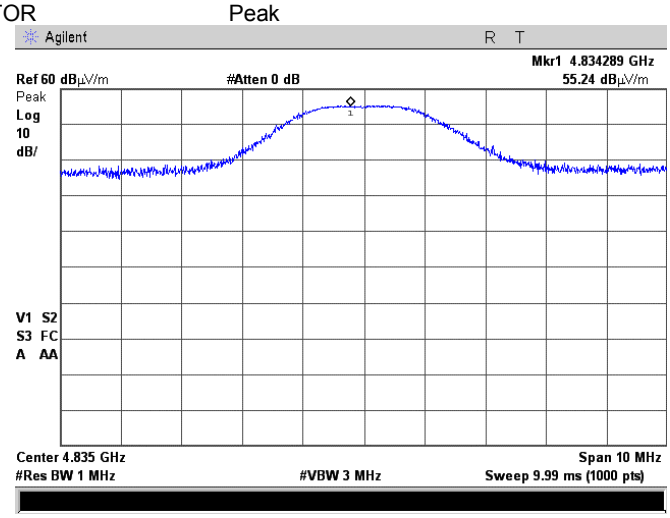
TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR Average



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

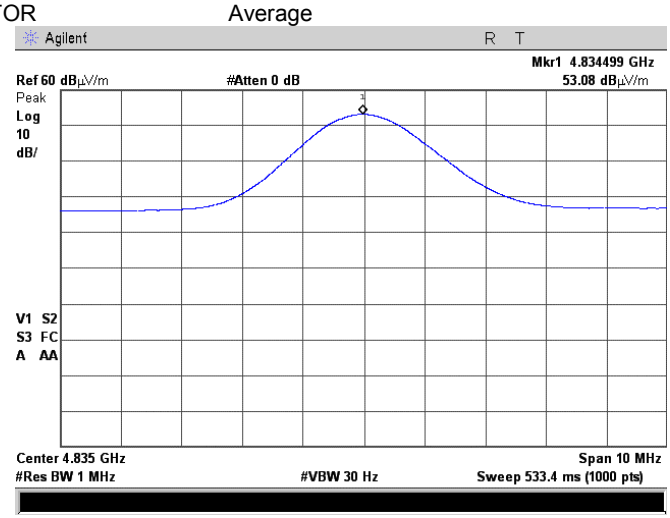
Plot 7.3.38 Radiated emission measurements at the second harmonic of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR Peak



Plot 7.3.39 Radiated emission measurements at the second harmonic of high carrier frequency

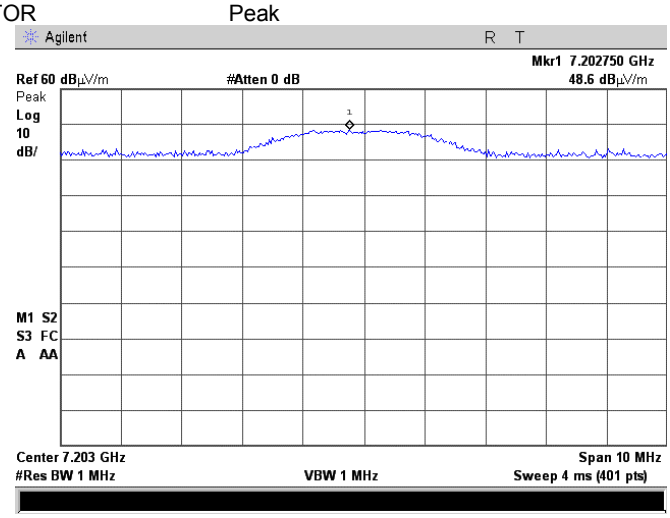
TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR Average



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

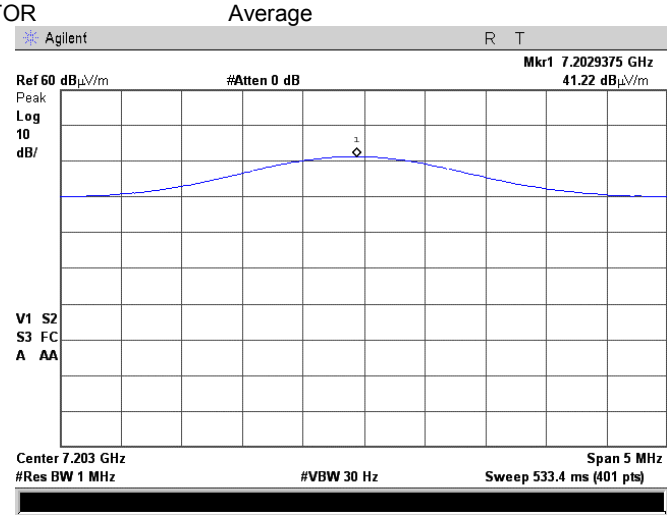
Plot 7.3.40 Radiated emission measurements at the third harmonic of low carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR Peak



Plot 7.3.41 Radiated emission measurements at the third harmonic of low carrier frequency

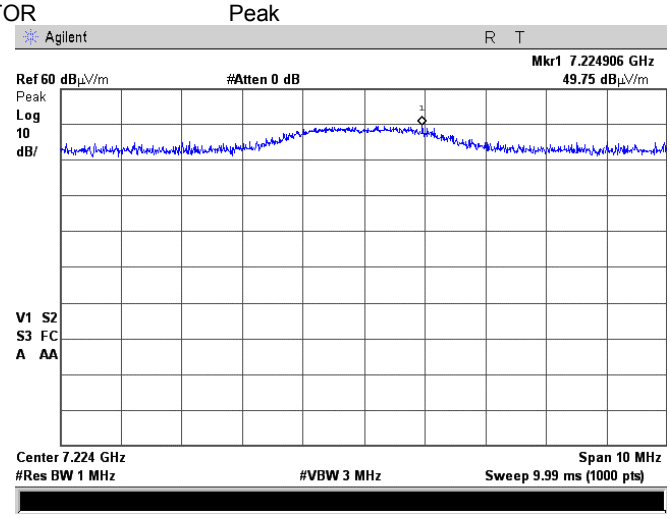
TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR Average



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

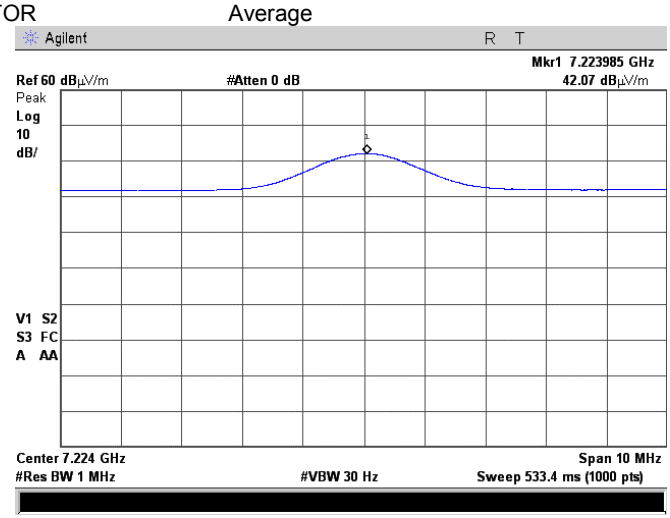
Plot 7.3.42 Radiated emission measurements at the third harmonic of mid carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR Peak



Plot 7.3.43 Radiated emission measurements at the third harmonic of mid carrier frequency

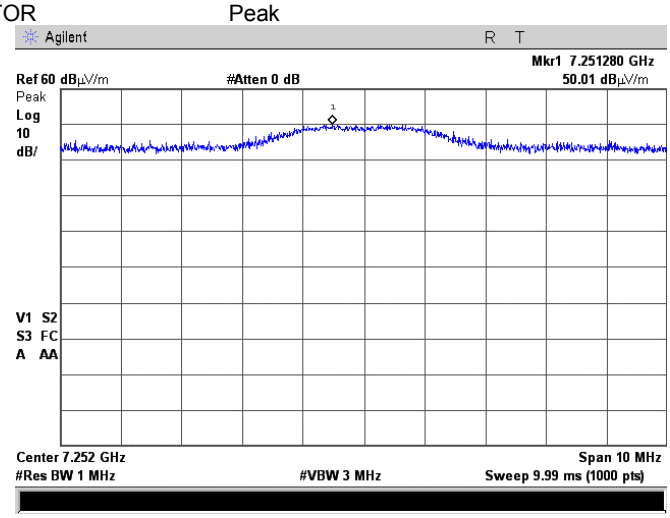
TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR Average



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

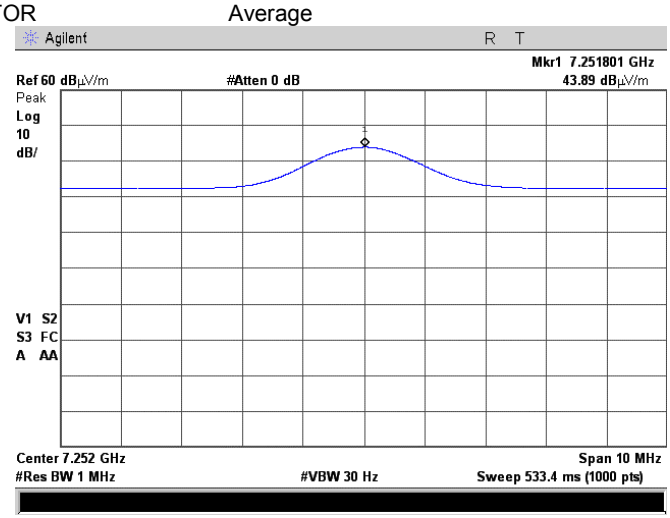
Plot 7.3.44 Radiated emission measurements at the third harmonic of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR Peak



Plot 7.3.45 Radiated emission measurements at the third harmonic of high carrier frequency

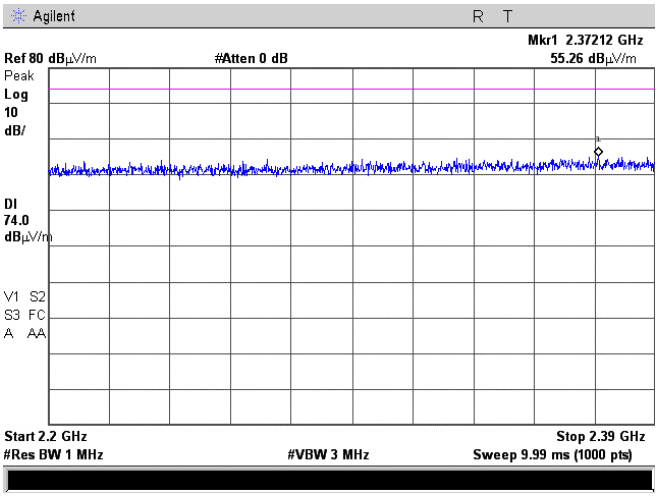
TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR Average



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

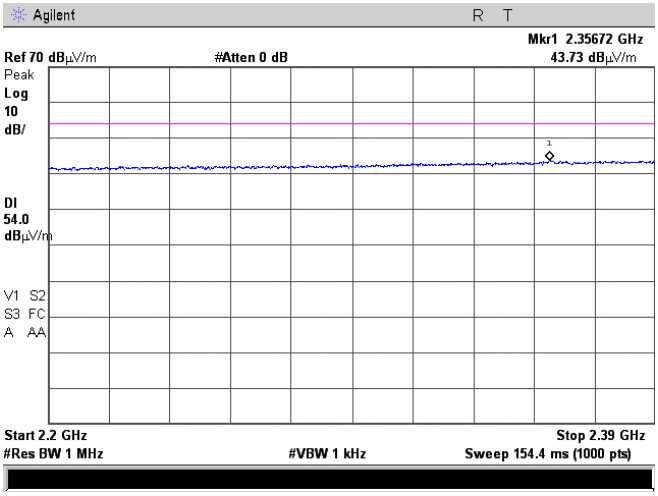
Plot 7.3.46 Radiated emission measurements within restricted bands of low carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
FREQUENCY RANGE: 2200-2390 MHz
DETECTOR: PEAK



Plot 7.3.47 Radiated emission measurements within restricted bands of low carrier frequency

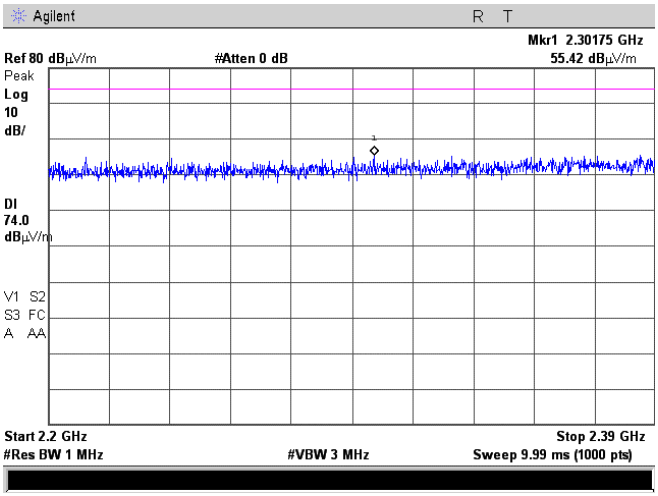
TEST SITE: OATS
TEST DISTANCE: 3 m
FREQUENCY RANGE: 2200-2390 MHz
DETECTOR: AVERAGE



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

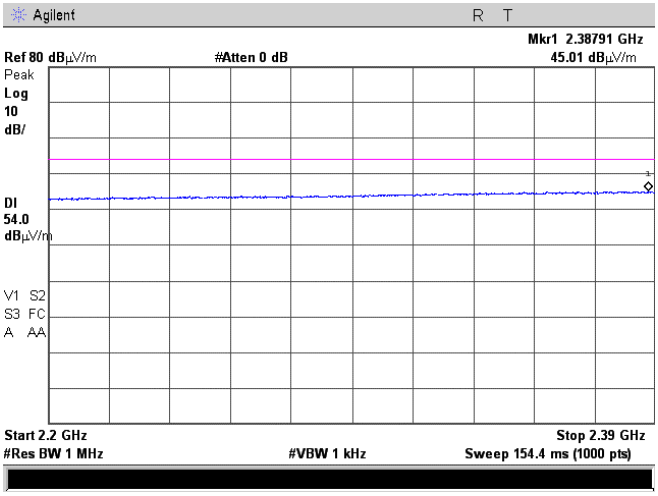
Plot 7.3.48 Radiated emission measurements within restricted bands of mid carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
FREQUENCY RANGE: 2200-2390 MHz
DETECTOR: PEAK



Plot 7.3.49 Radiated emission measurements within restricted bands of mid carrier frequency

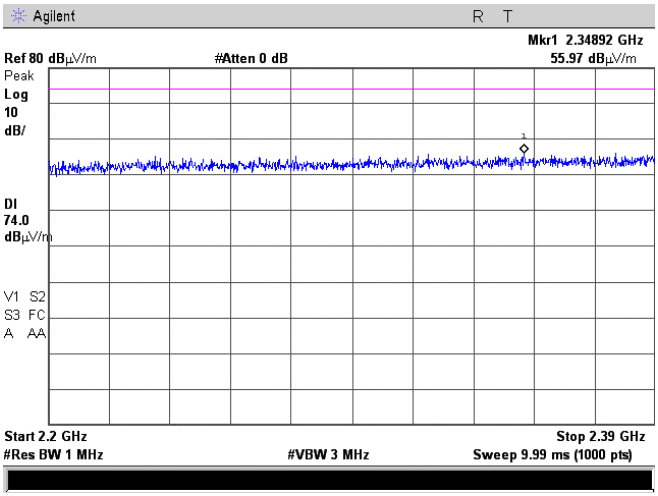
TEST SITE: OATS
TEST DISTANCE: 3 m
FREQUENCY RANGE: 2200-2390 MHz
DETECTOR: AVERAGE



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

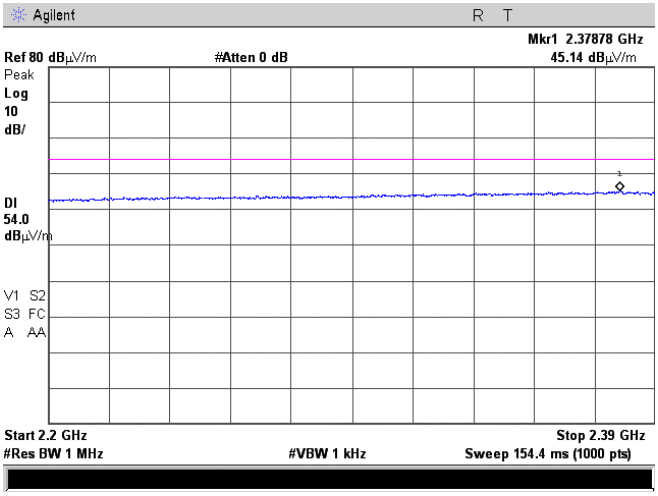
Plot 7.3.50 Radiated emission measurements within restricted bands of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
FREQUENCY RANGE: 2200-2390 MHz
DETECTOR: PEAK



Plot 7.3.51 Radiated emission measurements within restricted bands of high carrier frequency

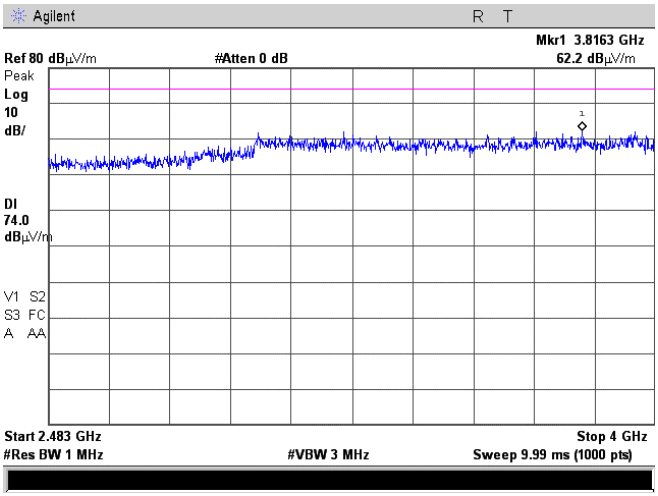
TEST SITE: OATS
TEST DISTANCE: 3 m
FREQUENCY RANGE: 2200-2390 MHz
DETECTOR: AVERAGE



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

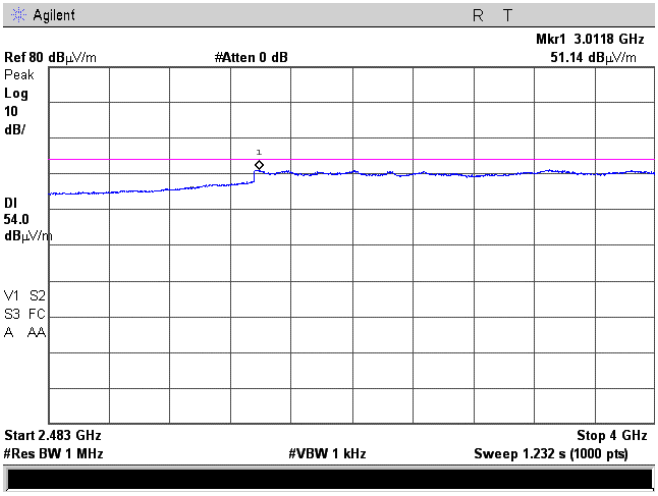
Plot 7.3.52 Radiated emission measurements within restricted bands of low carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
FREQUENCY RANGE: 2483.5-4000 MHz
DETECTOR: PEAK



Plot 7.3.53 Radiated emission measurements within restricted bands of low carrier frequency

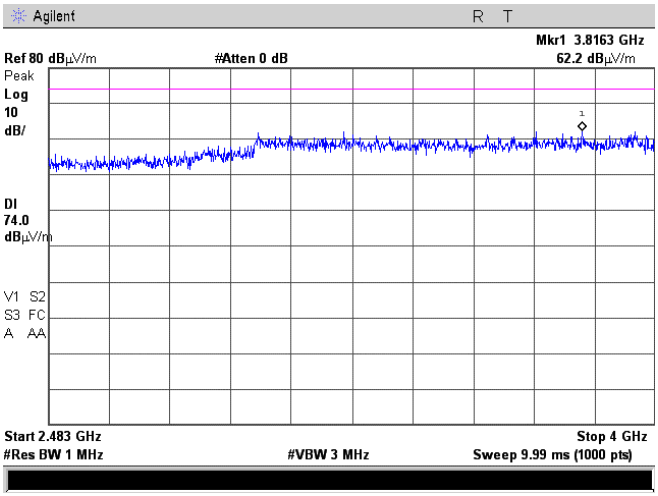
TEST SITE: OATS
TEST DISTANCE: 3 m
FREQUENCY RANGE: 2483.5-4000 MHz
DETECTOR: AVERAGE



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

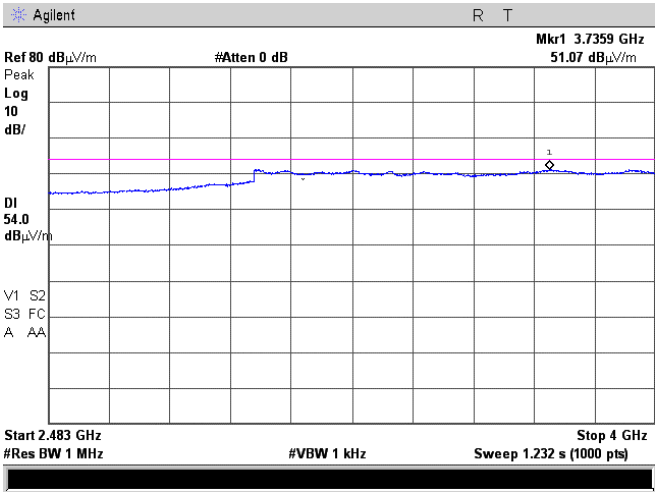
Plot 7.3.54 Radiated emission measurements within restricted bands of mid carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
FREQUENCY RANGE: 2483.5-4000 MHz
DETECTOR: PEAK



Plot 7.3.55 Radiated emission measurements within restricted bands of mid carrier frequency

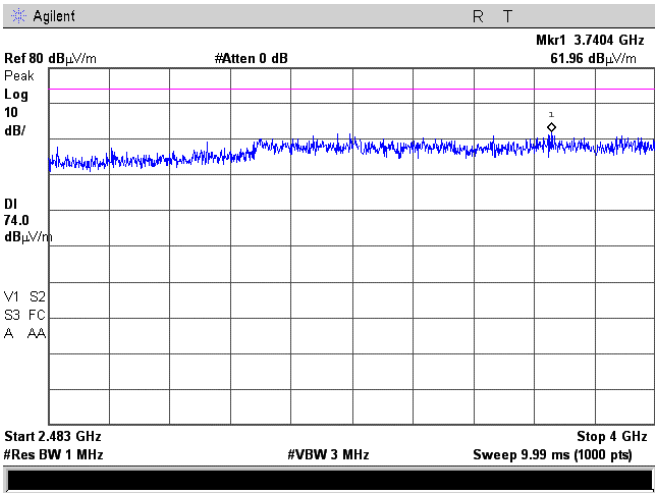
TEST SITE: OATS
TEST DISTANCE: 3 m
FREQUENCY RANGE: 2483.5-4000 MHz
DETECTOR: AVERAGE



Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

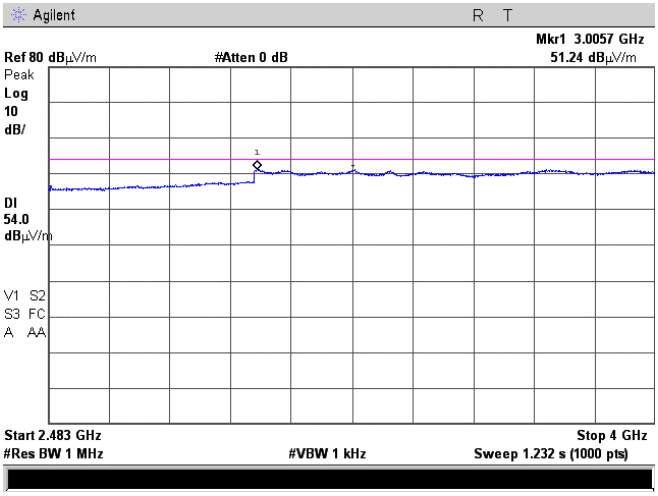
Plot 7.3.56 Radiated emission measurements within restricted bands of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
FREQUENCY RANGE: 2483.5-4000 MHz
DETECTOR: PEAK



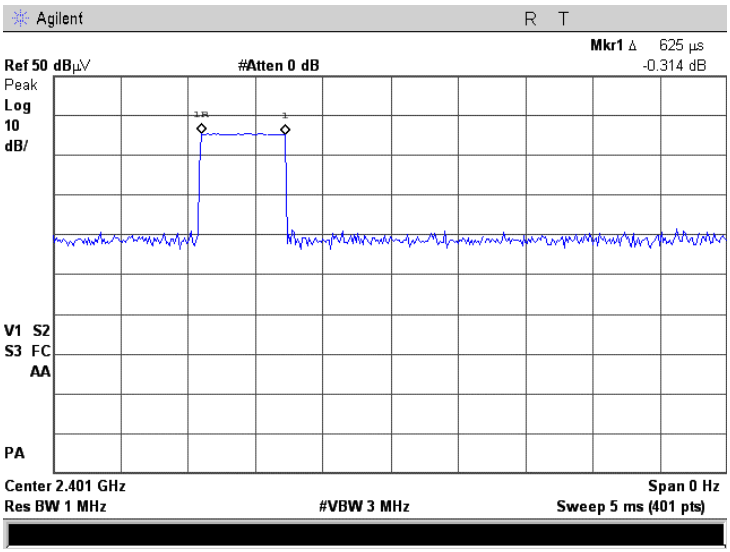
Plot 7.3.57 Radiated emission measurements within restricted bands of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
FREQUENCY RANGE: 2483.5-4000 MHz
DETECTOR: AVERAGE

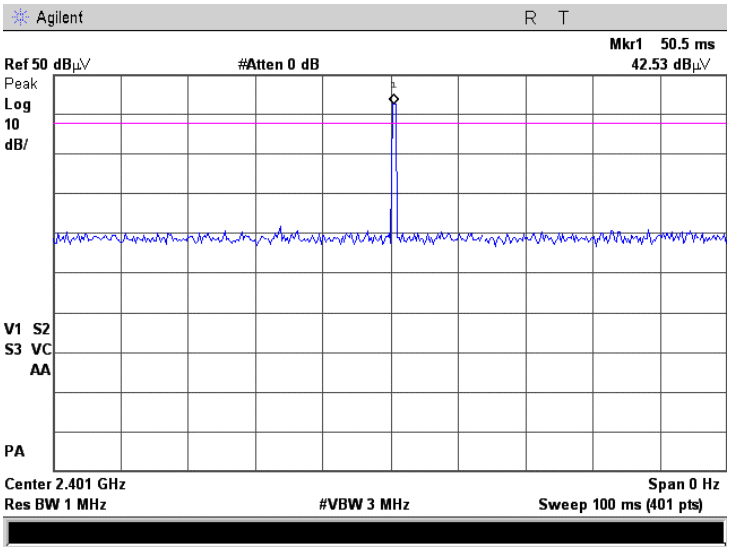


Test specification:	Section 15.247(d), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/22/2009 3:51:09 PM		
Temperature: 23ºC	Air Pressure: 1013 hPa	Relative Humidity: 48%	Power Supply: Battery
Remarks:			

Plot 7.3.58 Transmitter pulse duration



Plot 7.3.59 Transmitter pulse duration within 100 ms



Test specification:	Section 15.247(e), Peak power density		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(e)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/1/2009 5:33:32 PM		
Temperature: 22ºC	Air Pressure: 1016 hPa	Relative Humidity: 42%	Power Supply: Battery
Remarks:			

7.4 Peak spectral power density

7.4.1 General

This test was performed to measure the peak spectral power density radiated by the transmitter RF antenna. Specification test limits are given in Table 7.4.1.

Table 7.4.1 Peak spectral power density limits

Assigned frequency range, MHz	Measurement bandwidth, kHz	Peak spectral power density, dBm	Equivalent field strength limit @ 3m, dB(μV/m)*
902.0 – 928.0	3.0	8.0	103.2
2400.0 – 2483.5			
5725.0 – 5850.0			

* - Equivalent field strength limit was calculated from the peak spectral power density as follows: E=sqrt(30×P)/r, where P is peak spectral power density and r is antenna to EUT distance in meters.

7.4.2 Test procedure for field strength measurements

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

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

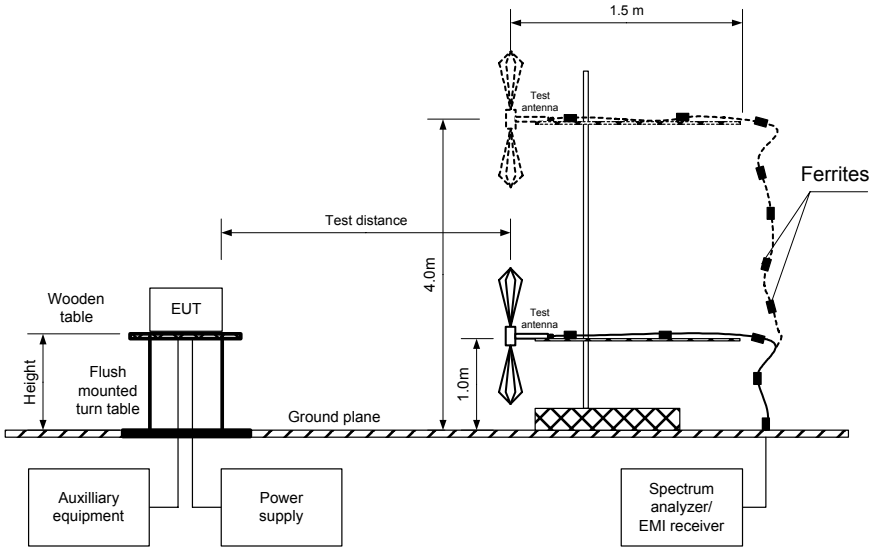
7.4.2.3 The field strength of the EUT carrier frequency was measured with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360^0 and the measuring antenna height was swept in both vertical and horizontal polarizations.

7.4.2.4 The frequency span of spectrum analyzer was set to capture the entire 6 dB band of the transmitter, in peak hold mode with resolution bandwidth set to 3.0 kHz, video bandwidth wider than resolution bandwidth, auto sweep time and sufficient number of sweeps was allowed for trace stabilization. The spectrum lines spacing was verified to be wider than 3 kHz. Otherwise the resolution bandwidth was reduced until individual spectrum lines were resolved and the power of individual spectrum lines was integrated over 3 kHz band.

7.4.2.5 The peak of emission was zoomed with span set just wide enough to capture the emission peak area and sweep time was set equal to span width divided by resolution bandwidth. Spectrum analyzer was set in peak hold mode, sufficient number of sweeps was allowed for trace stabilization and peak spectral power density was measured as provided in Table 7.4.2 and associated plots.

Test specification:	Section 15.247(e), Peak power density		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(e)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/1/2009 5:33:32 PM		
Temperature: 22ºC	Air Pressure: 1016 hPa	Relative Humidity: 42%	Power Supply: Battery
Remarks:			

Figure 7.4.1 Setup for carrier field strength measurements



Test specification:	**Section 15.247(e), Peak power density**		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(e)		
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	4/1/2009 5:33:32 PM		
Temperature: 22ºC	**Air Pressure:** 1016 hPa	**Relative Humidity:** 42%	**Power Supply:** Battery
Remarks:			

Table 7.4.2 Field strength measurement of peak spectral power density

ASSIGNED FREQUENCY:	2400-2483.5 MHz
TEST DISTANCE:	3 m
TEST SITE:	OATS
EUT HEIGHT:	0.8 m
DETECTOR USED:	Peak
RESOLUTION BANDWIDTH:	3 kHz
VIDEO BANDWIDTH:	10 kHz
TEST ANTENNA TYPE:	Double ridged guide (above 1000 MHz)
MODULATION:	MSK
MODULATING SIGNAL:	PRBS
BIT RATE:	0.5 Mbps
TRANSMITTER OUTPUT POWER:	Maximum

Frequency, MHz	Field strength, dB(µV/m)	EUT antenna gain, dBi	Limit, dB(µV/m)	Margin, dB*	Antenna polarization	Antenna height, m	Turn-table position**, degrees
2401.000	88.37	1	103.2	-15.83	H	1.2	45
2407.969	89.42	1	103.2	-14.78	H	1.2	45
2417.262	89.11	1	103.2	-14.09	H	1.2	45

*- Margin = Field strength - EUT antenna gain - calculated field strength limit.
**- EUT front panel refer to 0 degrees position of turntable.

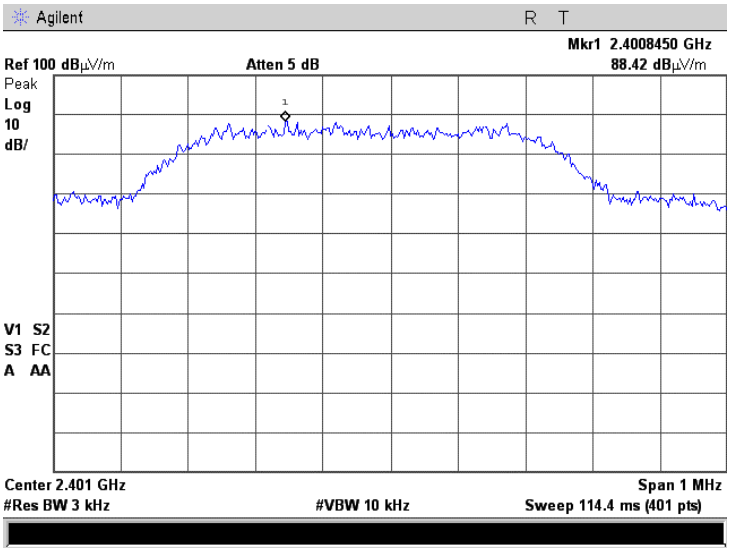
Reference numbers of test equipment used

HL 2909	HL 2911	HL 2432					

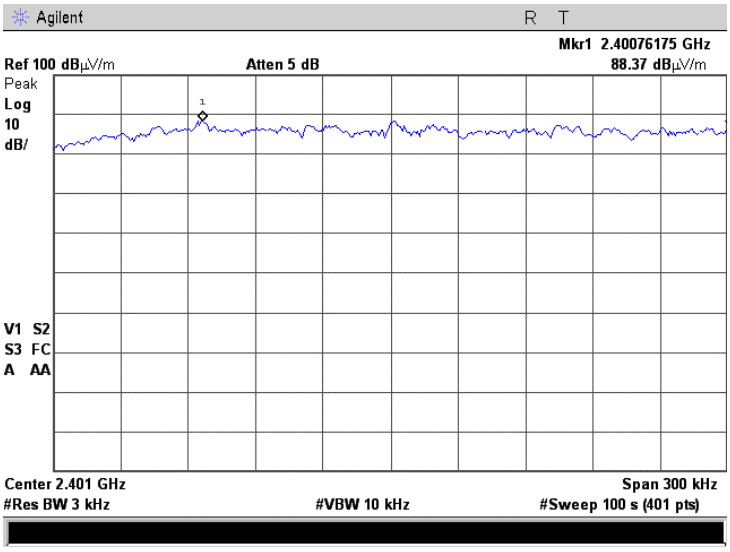
Full description is given in Appendix A.

Test specification:	Section 15.247(e), Peak power density		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(e)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/1/2009 5:33:32 PM		
Temperature: 22ºC	Air Pressure: 1016 hPa	Relative Humidity: 42%	Power Supply: Battery
Remarks:			

Plot 7.4.1 Peak spectral power density at low frequency within 6 dB band

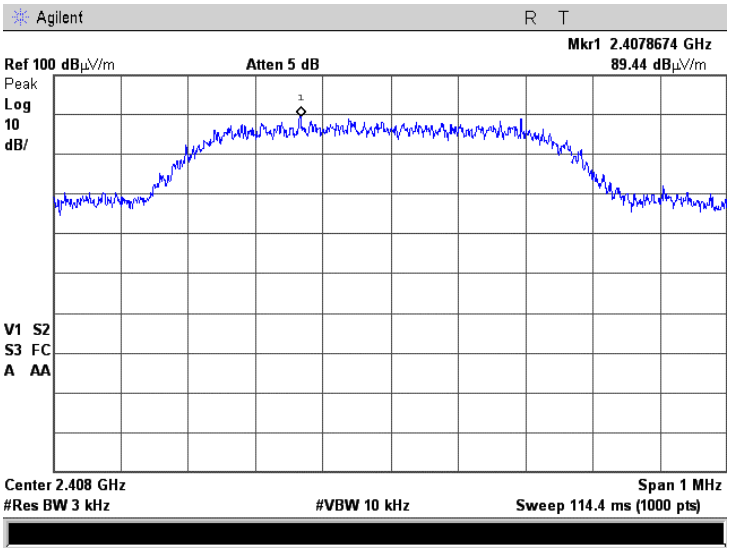


Plot 7.4.2 Peak spectral power density at low frequency zoomed at the peak

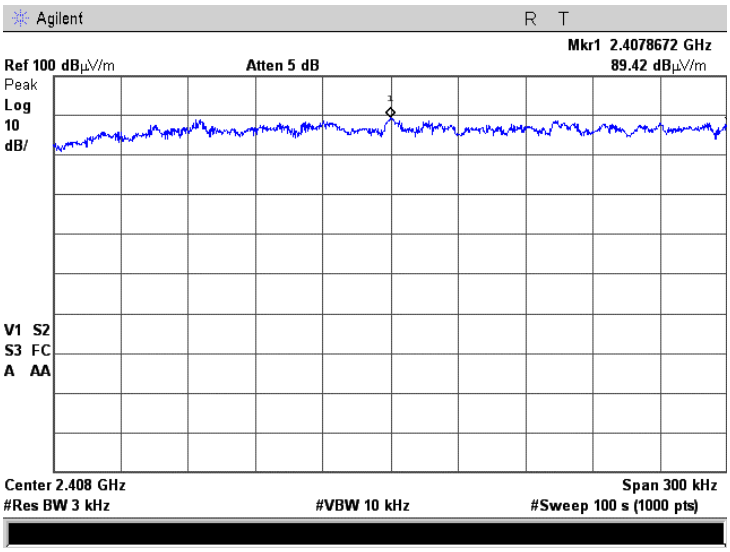


Test specification:	Section 15.247(e), Peak power density		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(e)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/1/2009 5:33:32 PM		
Temperature: 22ºC	Air Pressure: 1016 hPa	Relative Humidity: 42%	Power Supply: Battery
Remarks:			

Plot 7.4.3 Peak spectral power density at mid frequency within 6 dB band

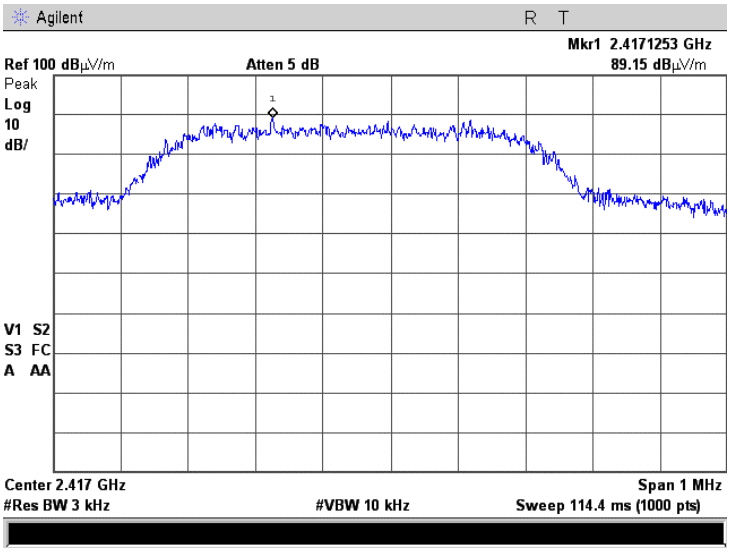


Plot 7.4.4 Peak spectral power density at mid frequency zoomed at the peak

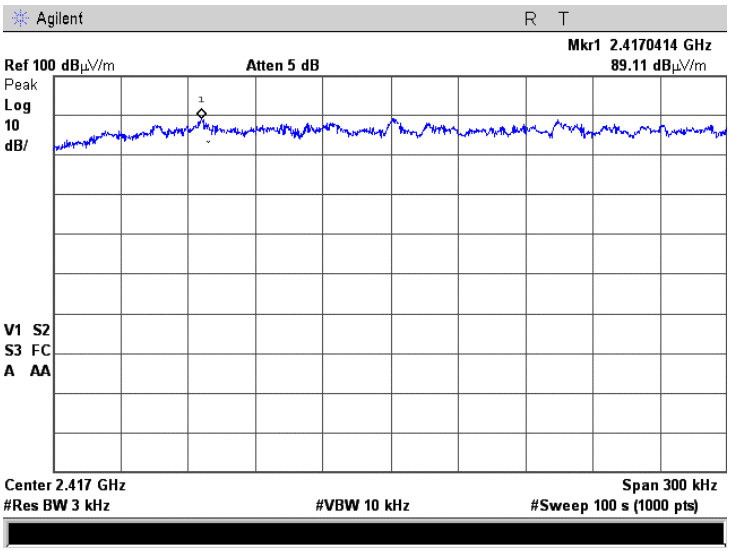


Test specification:	Section 15.247(e), Peak power density		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(e)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/1/2009 5:33:32 PM		
Temperature: 22ºC	Air Pressure: 1016 hPa	Relative Humidity: 42%	Power Supply: Battery
Remarks:			

Plot 7.4.5 Peak spectral power density at high frequency within 6 dB band



Plot 7.4.6 Peak spectral power density at high frequency zoomed at the peak



Test specification:	Section 15.109, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/12/2009 5:13:26 PM		
Temperature: 23ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: Battery
Remarks:			

8 Unintentional emission tests

8.1 Radiated emission measurements

8.1.1 General

This test was performed to measure radiated emissions from the EUT enclosure. Specification test limits are given in Table 8.1.1.

Table 8.1.1 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 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 – standard defined and test distance respectively in meters.

8.1.2 Test procedure

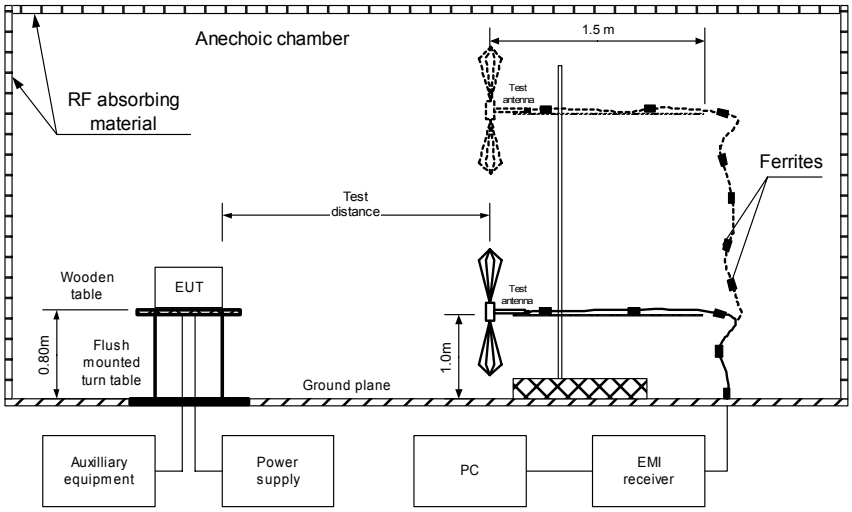
8.1.2.1 The EUT was set up as shown in Figure 8.1.1, energized and the performance check was conducted.

8.1.2.2 The specified frequency range was investigated with biconilog antenna connected to EMI receiver. To find maximum radiation the turntable was rotated 360^0, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal and the EUT cables position was varied.

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

Test specification:	Section 15.109, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/12/2009 5:13:26 PM		
Temperature: 23ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: Battery
Remarks:			

Figure 8.1.1 Setup for radiated emission measurements in anechoic chamber, table-top equipment



Test specification:	Section 15.109, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/12/2009 5:13:26 PM		
Temperature: 23ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: Battery
Remarks:			

Table 8.1.2 Radiated emission test results

EUT SET UP: TABLE-TOP
LIMIT: Class B
Power 120 VAC
EUT OPERATING MODE: Receive / Stand-by
TEST SITE: SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / QUASI-PEAK
FREQUENCY RANGE: 30 MHz – 1000 MHz
RESOLUTION BANDWIDTH: 120 kHz

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*				
51.250000	26.50	20.88	40.00	-19.12	Ver	1.0	90	Pass
53.912800	28.98	23.99	40.00	-16.01	Ver	1.0	90	
80.000000	27.12	22.30	40.00	-17.70	Ver	1.0	90	
85.648888	29.62	23.79	40.00	-16.21	Ver	1.0	90	
91.500000	25.55	20.63	43.50	-22.87	Ver	1.0	90	

TEST SITE: SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / AVERAGE
FREQUENCY RANGE: 1000 MHz –13000 MHz
RESOLUTION BANDWIDTH: 1000 kHz

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*				
No emissions were found										

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

Reference numbers of test equipment used

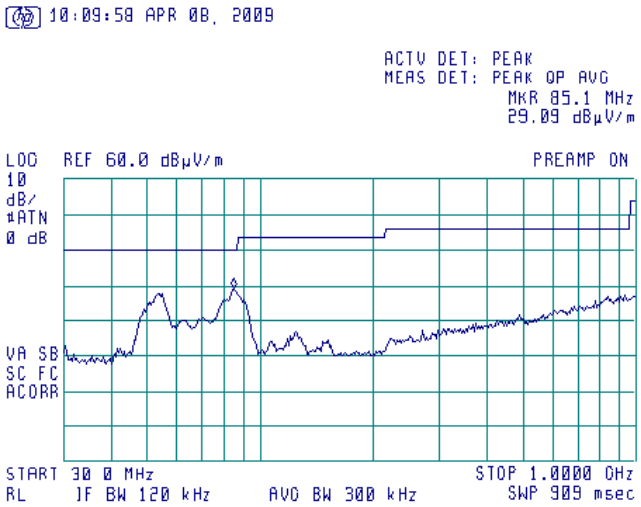
HL 0521	HL 0604	HL 2432	HL 3121				

Full description is given in Appendix A.

Test specification:	Section 15.109, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/12/2009 5:13:26 PM		
Temperature: 23ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: Battery
Remarks:			

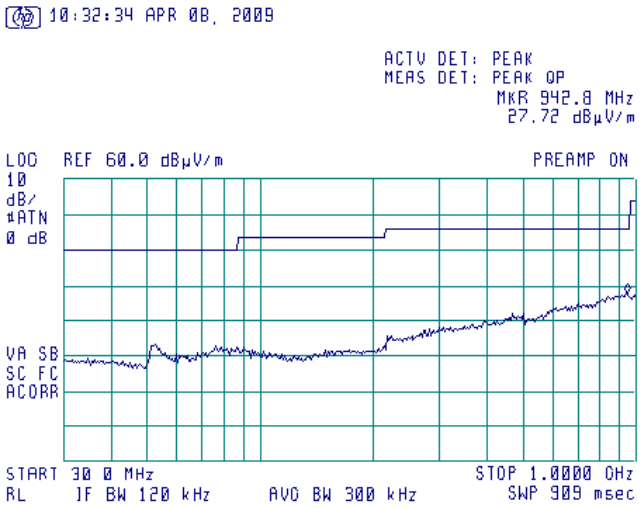
Plot 8.1.1 Radiated emission measurements in 30 - 1000 MHz range, vertical antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



Plot 8.1.2 Radiated emission measurements in 30 - 1 000 MHz range, horizontal antenna polarization

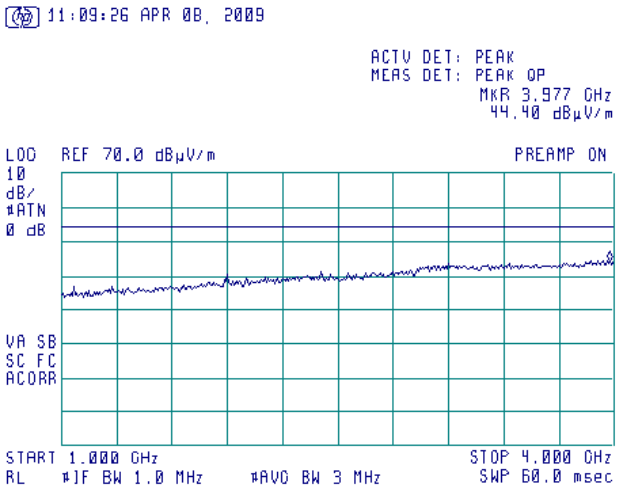
TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



Test specification:	Section 15.109, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/12/2009 5:13:26 PM		
Temperature: 23ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: Battery
Remarks:			

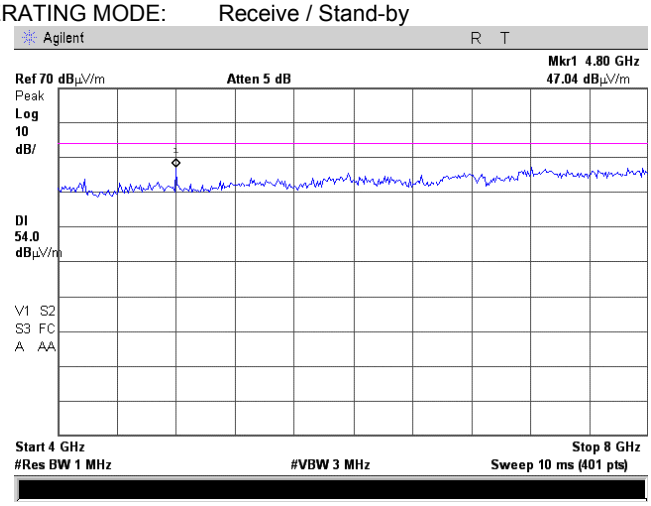
Plot 8.1.3 Radiated emission measurements in 1000 - 4000 MHz range

TEST SITE:	Semi anechoic chamber
LIMIT:	Class B
TEST DISTANCE:	3 m
ANTENNA POLARIZATION:	Vertical and Horizontal
EUT OPERATING MODE:	Receive / Stand-by



Plot 8.1.4 Radiated emission measurements in 4000 - 8000 MHz range

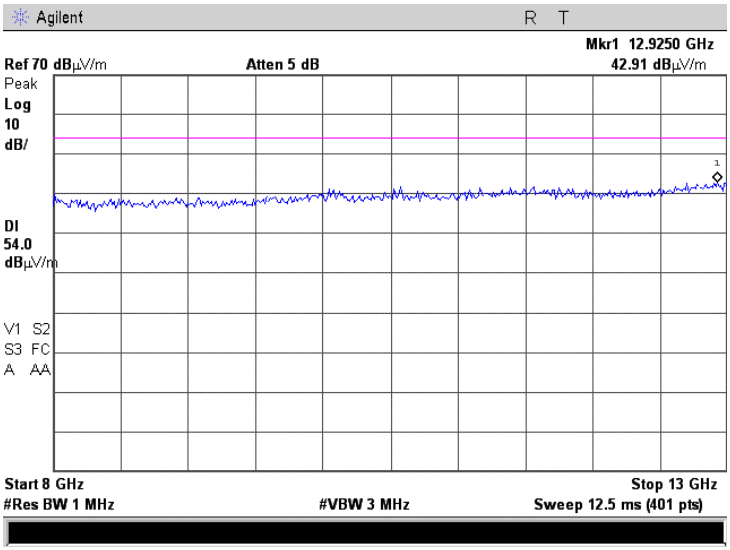
TEST SITE:	Semi anechoic chamber
LIMIT:	Class B
TEST DISTANCE:	3 m
ANTENNA POLARIZATION:	Vertical and Horizontal
EUT OPERATING MODE:	Receive / Stand-by



Test specification:	Section 15.109, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	4/12/2009 5:13:26 PM		
Temperature: 23ºC	Air Pressure: 1009 hPa	Relative Humidity: 44%	Power Supply: Battery
Remarks:			

Plot 8.1.5 Radiated emission measurements in 8000 - 13000 MHz range

TEST SITE:	Semi anechoic chamber
LIMIT:	Class B
TEST DISTANCE:	3 m
ANTENNA POLARIZATION:	Vertical and Horizontal
EUT OPERATING MODE:	Receive / Stand-by



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-08	29-Jun-09
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard Co	8546A	3617A 00319, 3448A002 53	29-Aug-08	29-Aug-09
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	08-Dec-06	08-Dec-09
1200	Quadruplexer 1-12 GHz (1-2 GHz; 2-4GHz;4-8 GHz; 8-12GHz)	Elettronica S.p.A. - Roma	UE 84	D/00240	08-Feb-07	08-Feb-10
1425	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1426, HL1427	Agilent Technologies	8542E	3710A002 22, 3705A002 04	03-Sep-08	03-Sep-09
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W	EMC Test Systems	3115	9911-5964	23-Jan-09	23-Jan-10
2254	Cable 40 GHz, 0.8 m, blue	Rhophase Microwave Limited	KPS-1503A-800-KPS	W4907	10-Jun-08	10-Jun-09
2432	Antenna, Double-Ridged Waveguide Horn 1-18 GHz	EMC Test Systems	3115	00027177	23-Jan-09	23-Jan-10
2499	Quadruplexer 1-12 GHz (1-2 GHz; 2-4GHz;4-8 GHz; 8-12GHz)	Elettronica S.p.A. - Roma	UE 84	D/00239	08-Feb-07	08-Feb-10
2882	Cable, 18 GHz N-type, M-F, 3 m	Bird	TC-MNFN-3.0	211539 001	04-Feb-09	04-Feb-10
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY414447 62	07-May-09	07-May-10
2911	Cable 18 GHz, 1.5 m, SMA-SMA	Gore	NA	89386	05-Oct-08	05-Oct-09
3119	Cable, 18 GHz N-type, M-F, 3 m	Bird	TC-MNFN-3.0	211539004	07-Dec-08	07-Dec-09
3121	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-9155-00	3121	07-Dec-08	07-Dec-09
3532	Amplifier, low noise, 2 to 8 GHz	Quinstar Technology	QLJ-02084040-J0	111590020 01	23-Nov-08	23-Nov-09
3534	Amplifier, low noise, 6 to 18 GHz	Quinstar Technology	QLJ-06184040-J0	111590010 02	07-Dec-08	07-Dec-09
3535	Amplifier, low noise, 18 to 40 GHz	Quinstar Technology	QLJ-18404537-J0	111590030 01	07-Dec-08	07-Dec-09

10 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Occupied bandwidth	± 8.0 %
Duty cycle, timing (Tx ON / OFF) and average factor measurements	± 1.0 %
Radiated emissions at 3 m measuring distance	
Horizontal polarization	Biconilog antenna: ± 5.3 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.3 dB Double ridged horn antenna: ± 5.3 dB
Vertical polarization	Biconilog antenna: ± 6.0 dB Biconical antenna: ± 5.7 dB Log periodic antenna: ± 6.0 dB Double ridged horn antenna: ± 6.0 dB

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

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

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

11 APPENDIX C Test laboratory description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, safety, environmental and telecommunication testing facility. Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47) and 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), assessed by TNO Certification EP&S (Netherlands) for a number of EMC, telecommunications, environmental, safety standards, and by AMTAC (UK) for safety of medical devices. 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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Person for contact: Mr. Alex Usoskin, CEO.

12 APPENDIX D Specification references

FCC 47CFR part 15: 2008	Radio Frequency Devices.
FR Vol.62	Federal Register, Volume 62, May 13, 1997
FCC New Guidance:2004	FCC New Guidance on Measurements for DTS
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.

13 APPENDIX E Test equipment correction factors

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

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

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

Antenna factor
Standard gain horn antenna
Quinstar Technology
Model QWH
Ser.No.110, HL 0768

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

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

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

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

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

Antenna factor
Double-ridged wave guide horn antenna
Model 3115, S/N 9911-5964, 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 factor
Double-ridged guide horn antenna
Model 3115, serial number: 00027177, HL 2432

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

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

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

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

Cable loss
Cable coaxial, Bird, 18 GHz, N-type, M-F, model TC-MNFN-3.0, S/N 211539 001
HL 2882

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.08	5750	1.78	12000	2.57
30	0.12	6000	1.84	12250	2.62
100	0.22	6250	1.87	12500	2.66
250	0.35	6500	1.92	12750	2.68
500	0.49	6750	1.96	13000	2.67
750	0.60	7000	2.01	13250	2.75
1000	0.68	7250	2.08	13500	2.77
1250	0.78	7500	2.12	13750	2.90
1500	0.85	7750	2.19	14000	3.00
1750	0.92	8000	2.22	14250	3.12
2000	0.98	8250	2.28	14500	2.98
2250	1.06	8500	2.29	14750	3.03
2500	1.11	8750	2.27	15000	2.99
2750	1.19	9000	2.28	15250	2.99
3000	1.25	9250	2.26	15500	2.98
3250	1.30	9500	2.29	15750	2.98
3500	1.34	9750	2.33	16000	2.99
3750	1.40	10000	2.34	16250	3.05
4000	1.45	10250	2.41	16500	3.11
4250	1.51	10500	2.46	16750	3.18
4500	1.54	10750	2.48	17000	3.23
4750	1.59	11000	2.48	17250	3.21
5000	1.63	11250	2.52	17500	3.22
5250	1.68	11500	2.53	17750	3.22
5500	1.72	11750	2.56	18000	3.25

Cable loss
Cable coaxial, Gore, 18 GHz, 1.5 m, SMA-SMA, S/N 89386
HL 2911

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.06	5750	1.32	12000	2.04
30	0.09	6000	1.34	12250	2.04
100	0.16	6250	1.41	12500	2.07
250	0.27	6500	1.43	12750	1.96
500	0.38	6750	1.46	13000	1.97
750	0.49	7000	1.49	13250	2.01
1000	0.55	7250	1.52	13500	2.04
1250	0.62	7500	1.56	13750	2.12
1500	0.68	7750	1.66	14000	2.16
1750	0.74	8000	1.69	14250	2.16
2000	0.78	8250	1.78	14500	2.28
2250	0.83	8500	1.73	14750	2.26
2500	0.88	8750	1.71	15000	2.22
2750	0.97	9000	1.72	15250	2.34
3000	1.00	9250	1.74	15500	2.41
3250	1.03	9500	1.76	15750	2.45
3500	1.05	9750	1.80	16000	2.57
3750	1.09	10000	1.89	16250	2.54
4000	1.14	10250	1.94	16500	2.55
4250	1.17	10500	1.99	16750	2.52
4500	1.21	10750	1.92	17000	2.42
4750	1.22	11000	1.96	17250	2.49
5000	1.24	11250	1.97	17500	2.62
5250	1.28	11500	2.02	17750	2.70
5500	1.30	11750	2.07	18000	2.76

Cable loss
Cable 18 GHz, N-type, M-F, 3 m, Bird Electronic Corp., model TC-MNFN-3.0, S/N 211539004
HL 3119

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	0.06	3600	1.34	7400	2.00	11200	2.48	15100	2.90
30	0.09	3700	1.36	7500	2.01	11300	2.45	15200	2.89
50	0.11	3800	1.37	7600	2.03	11400	2.51	15300	2.91
100	0.23	3900	1.39	7700	2.05	11500	2.45	15400	2.85
200	0.30	4000	1.39	7800	2.07	11600	2.49	15500	2.83
300	0.42	4100	1.42	7900	2.06	11700	2.51	15600	2.89
400	0.39	4200	1.45	8000	2.06	11800	2.50	15700	2.85
500	0.47	4300	1.47	8100	2.09	11900	2.52	15800	2.87
600	0.49	4400	1.49	8200	2.10	12000	2.48	15900	2.91
700	0.63	4500	1.51	8300	2.11	12100	2.53	16000	2.90
800	0.62	4600	1.53	8400	2.15	12200	2.54	16100	2.94
900	0.70	4700	1.55	8500	2.15	12300	2.56	16200	2.91
1000	0.70	4800	1.54	8600	2.17	12400	2.57	16300	2.96
1100	0.77	4900	1.57	8700	2.19	12500	2.57	16400	3.01
1200	0.78	5000	1.60	8800	2.20	12600	2.55	16500	3.01
1300	0.83	5100	1.60	8900	2.21	12700	2.50	16600	2.98
1400	0.86	5200	1.62	9000	2.22	12800	2.57	16700	3.00
1500	0.85	5300	1.65	9100	2.23	12900	2.57	16800	3.01
1600	0.94	5400	1.66	9200	2.25	13000	2.55	16900	3.06
1700	0.90	5500	1.69	9300	2.24	13100	2.62	17000	3.07
1800	0.90	5600	1.70	9400	2.28	13200	2.60	17100	3.09
1900	0.95	5700	1.72	9500	2.28	13300	2.67	17200	3.10
2000	0.97	5800	1.74	9600	2.27	13400	2.66	17300	3.11
2100	1.00	5900	1.75	9700	2.30	13500	2.71	17400	3.16
2200	1.02	6000	1.77	9800	2.30	13600	2.73	17500	3.15
2300	1.05	6100	1.79	9900	2.34	13700	2.73	17600	3.21
2400	1.08	6200	1.82	10000	2.32	13800	2.85	17700	3.21
2500	1.10	6300	1.83	10100	2.31	13900	2.83	17800	3.18
2600	1.13	6400	1.83	10200	2.31	14000	2.83	17900	3.25
2700	1.15	6500	1.87	10300	2.26	14100	2.83	18000	3.14
2800	1.17	6600	1.88	10400	2.32	14200	2.84		
2900	1.21	6700	1.90	10500	2.26	14300	2.90		
3000	1.22	6800	1.93	10600	2.26	14400	2.84		
3100	1.25	6900	1.92	10700	2.31	14600	2.88		
3200	1.27	7000	1.95	10800	2.24	14700	2.85		
3300	1.29	7100	1.96	10900	2.39	14800	2.92		
3400	1.28	7200	1.99	11000	2.41	14900	2.93		
3500	1.31	7300	2.00	11100	2.46	15000	2.83		

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		

14 APPENDIX F Abbreviations and acronyms

A	ampere
AC	alternating current
A/m	ampere per meter
AM	amplitude modulation
AVRG	average (detector)
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μV)	decibel referred to one microvolt
dB(μV/m)	decibel referred to one microvolt per meter
dB(μA)	decibel referred to one microampere
DC	direct current
EIRP	equivalent isotropically radiated power
ERP	effective radiated power
EUT	equipment under test
F	frequency
GHz	gigahertz
GND	ground
H	height
HL	Hermon laboratories
Hz	hertz
k	kilo
kHz	kilohertz
LO	local oscillator
m	meter
MHz	megahertz
min	minute
mm	millimeter
ms	millisecond
μs	microsecond
NA	not applicable
NB	narrow band
NT	not tested
OATS	open area test site
Ω	Ohm
PM	pulse modulation
PS	power supply
ppm	part per million (10^{-6})
QP	quasi-peak
RE	radiated emission
RF	radio frequency
rms	root mean square
Rx	receive
s	second
T	temperature
Tx	transmit
V	volt
WB	wideband

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