

TEST REPORT

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

FOR:

RadWin Ltd.

**Broadband wireless
transmission system**

Models: WinLink 1000/F58

AirMux-200/F58

Point to point

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1 Applicant information

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Telephone: +972 3645 9440
Fax: +972 3765 7535
E-mail: Leonid_a@radwin.com
Contact name: Mr. Leonid Avramhaimov

2 Equipment under test attributes

Product name: Broadband wireless transmission system
Product type: Point to point
Model(s): WinLink 1000/F58, AirMux-200/F58
Serial number: NA
Receipt date: 4/13/2004 7:26:00 AM

3 Manufacturer information

Manufacturer name: RadWin Ltd.
Address: 34 Habarzel str., Tel Aviv 69710, Israel
Telephone: +972 3645 9440
Fax: +972 3765 7535
E-Mail: Leonid_a@radwin.com
Contact name: Mr. Leonid Avramhaimov




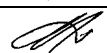
4 Test details

Project ID: 15885
Location: Hermon Laboratories Ltd. P.O.Box 23, Binyamina 30500, Israel
Test started: 4/13/2004 7:26:00 AM
Test completed: 5/13/2004
Test specification(s): FCC part 15, subpart C, §15.247 (DTS) and subpart B
Test suite: FCC_15.247_DTS_with_RF_connector (4/11/2004 12:33:34 PM, modified)

5 Test report 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(b)5, RF exposure	Pass
Section 15.247(c), Conducted spurious emissions	Pass
Section 15.247(c), Radiated spurious emissions	Pass
Section 15.247(d), Peak power density	Pass
Section 15.207(a), Conducted emission	Pass
Unintentional radiation	
Section 15.107, Conducted emission at AC power port	Pass
Section 15.109, Radiated emission	Pass
Section 15.111, Conducted emission at antenna port	Not required

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

	Name and Title	Date	Signature
Tested by:	Mr. M. Lerman, test engineer	May 13, 2004	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	May 23, 2004	
	Mr. M. Nikishin, EMC group leader	June 1, 2004	
Approved by:	Mr. A. Usoskin, CEO	June 1, 2004	

6 EUT description

6.1 General information

WinLink 1000/AirMux-200 is a carrier class, high capacity and low cost point-to-point broadband wireless transmission system. It provides high capacity connectivity of up to 54 Mbps. The EUT is powered from mains via 120 V AC/48 V DC power adapter.

6.2 Ports and lines

Port type	Port description	Connected		Connector type	Q-ty	Cable type	Cable length, m	Indoor / outdoor
		From	To					
Signal	Ethernet	IDU	LAPTOP	RJ45	1	FTP	100	Indoor
Power	DC power	IDU	AC/DC adapter	T.B.	1	2 wire	2	Indoor
RF	Antenna	ODU	Load 50 Ω	N-type	1	NA	NA	NA
Signal	WAN PoE	IDU	ODU	RJ45	1	See note*	100	Outdoor
Functional earth	Functional earth	ODU	GND	Screw	1	NA	NA	NA
Functional earth	Functional earth	IDU	GND	Screw	1	NA	NA	NA
Signal	RS232	ODU	PC	RJ45	1	Not connected, for configuration and service use only		
Signal	RS232	IDU	PC	RJ45	1	Not connected, for configuration and service use only		

*Four-pair category 5e, double jacket 4x2x24 AWG FTP type

6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
AC/DC adaptor	HITRON	HE551-58007	0022
Lap top	Compaq	Armada PP2060	AESP3600T4X12 DC6458

6.4 Operating frequencies

Source	Frequency, MHz					
Digital portion	(clock)	2.048	10	16.38		
Receiver	(LO)	40	(IF)	5740 – 5835		
Transmitter	(LO)	40	(IF)	5740 – 5835		

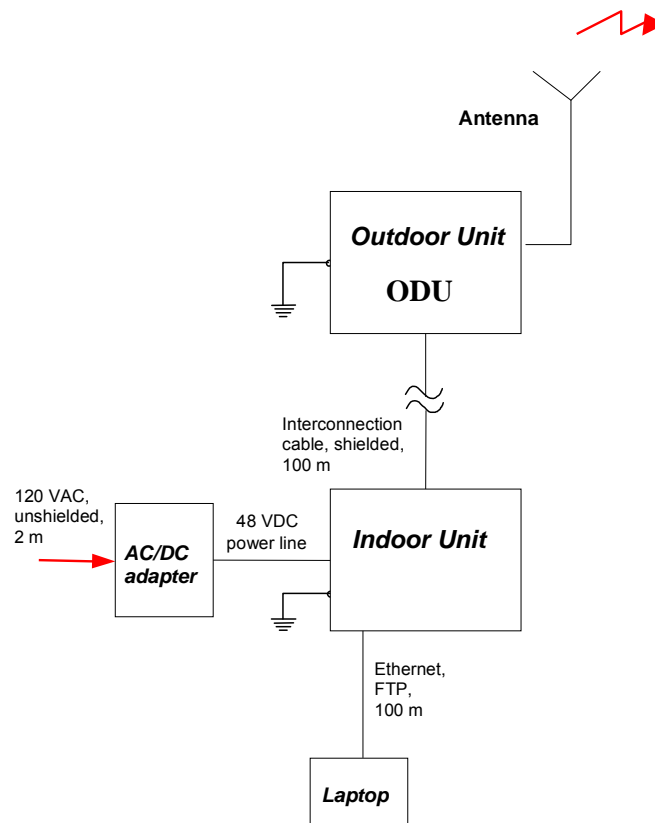
6.5 Changes made in the EUT

To withstand the standard requirements the MURATA band pass filter, bandwidth 4900 - 5850 MHz, was changed for filter with the 5725 - 5850 MHz bandwidth, P/N:DFCB25G80LBHAB.

6.6 Transmitter characteristics

Type of equipment			
X	Stand-alone (Equipment with or without its own control provisions)		
Intended use		Condition of use	
X	fixed	Always at a distance more than 2 m from all people	
Assigned frequency range		5725 - 5850 MHz	
Operating frequency range		5740 - 5835 MHz	
Maximum rated output power		At transmitter 50 Ω RF output connector	21.36 dBm
Antenna connection			
unique coupling	X	standard connector, N-type	integral X with temporary RF connector without temporary RF connector
Antenna/s technical characteristics			
Type	Manufacturer	Model number	Gain
Planar Array (integral)	MTI	MT-485028\CVA	22 dBi
Planar Array (external)	MTI	MT-486001	28 dBi
Transmitter 99% power bandwidth		16.5 MHz	
Transmitter aggregate data rate/s		16.25; 31.25; 61.25; 91.25 Mbps depend on rate	
Transmitter aggregate symbol (baud) rate/s		16.25 MBaud	
Type of modulation		BPSK, 4QAM, 16QAM, 64QAM	
Type of multiplexing		OFDM	
Modulating test signal (baseband)		PRBS	
Maximum transmitter duty cycle in normal use		100%	
Transmitter duty cycle supplied for test		100%	
Spread spectrum technique used		Digital transmission system (DTS)	

6.7 Test configuration



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:	5/11/2004 11:34:22 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
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
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.

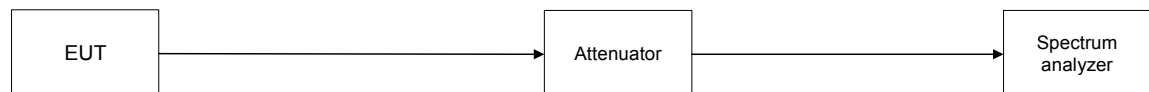
7.1.2 Test procedure

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
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:	5/11/2004 11:34:22 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Table 7.1.2

6 dB bandwidth test results

FREQUENCY RANGE: 5740 – 5835 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: QAM
 MODULATING SIGNAL: PRBS
 BIT RATE: 6 Mbps (worst case)

Carrier frequency, MHz	6 dB bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
Low frequency				
5740	16500	500	16000	Pass
Mid frequency				
5785	16470	500	15970	Pass
High frequency				
5835	16530	500	16030	Pass

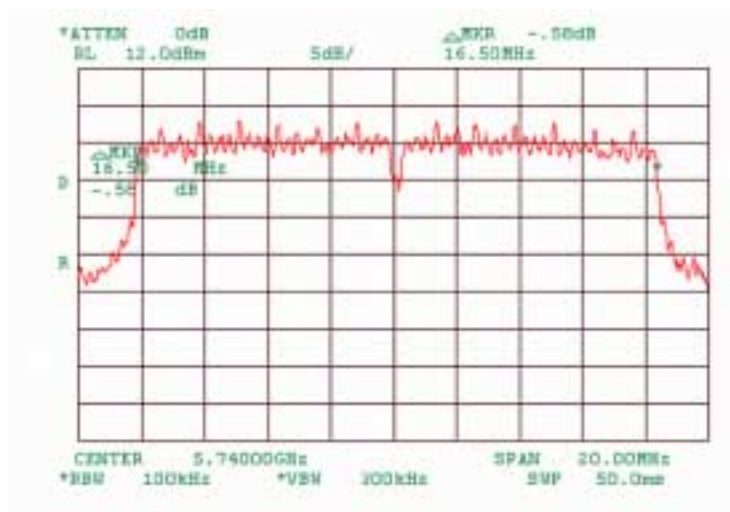
Reference numbers of test equipment used

HL 1424	HL 2254	HL 2287						
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Full description is given in Appendix A.

Plot 7.1.1

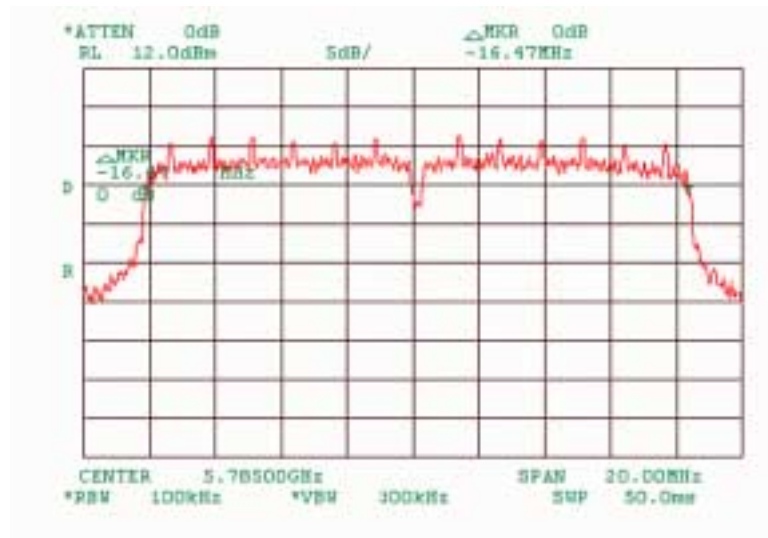
6 dB bandwidth test result at low frequency at data rate 6 MBps



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:	5/11/2004 11:34:22 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

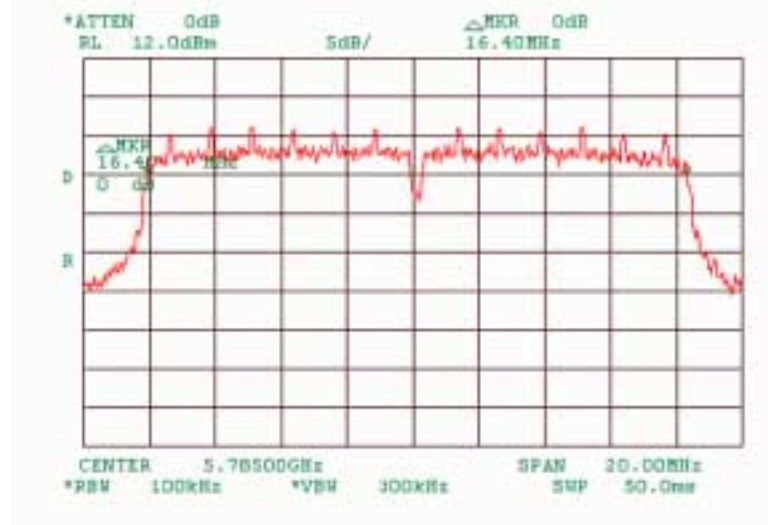
Plot 7.1.2

6 dB bandwidth test result at mid frequency at data rate 6 MBps



Plot 7.1.3

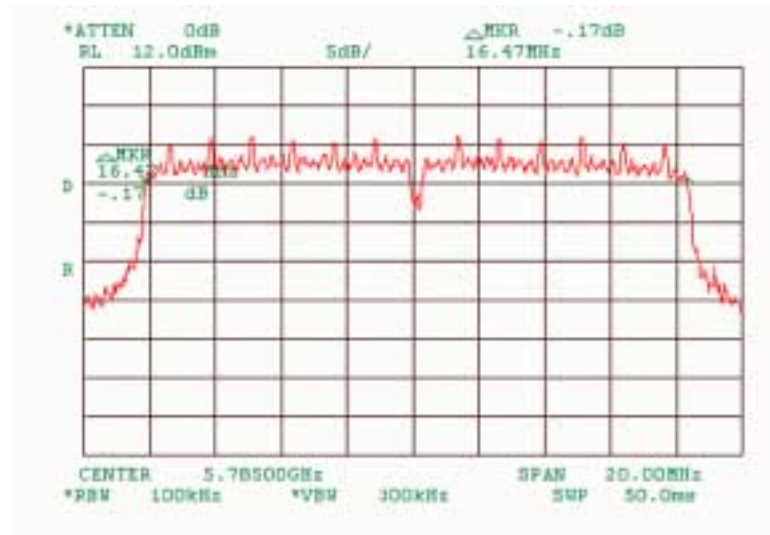
6 dB bandwidth test result at mid frequency at data rate 9 MBps



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:	5/11/2004 11:34:22 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

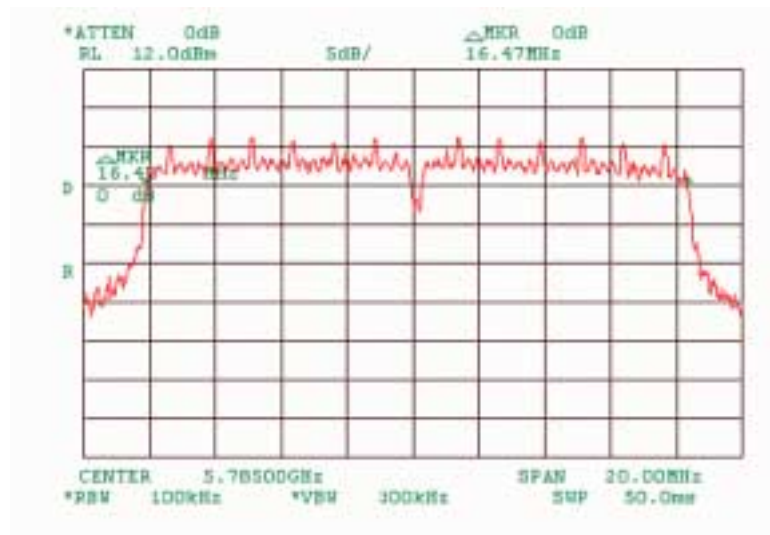
Plot 7.1.4

6 dB bandwidth test result at mid frequency at data rate 12 MBps



Plot 7.1.5

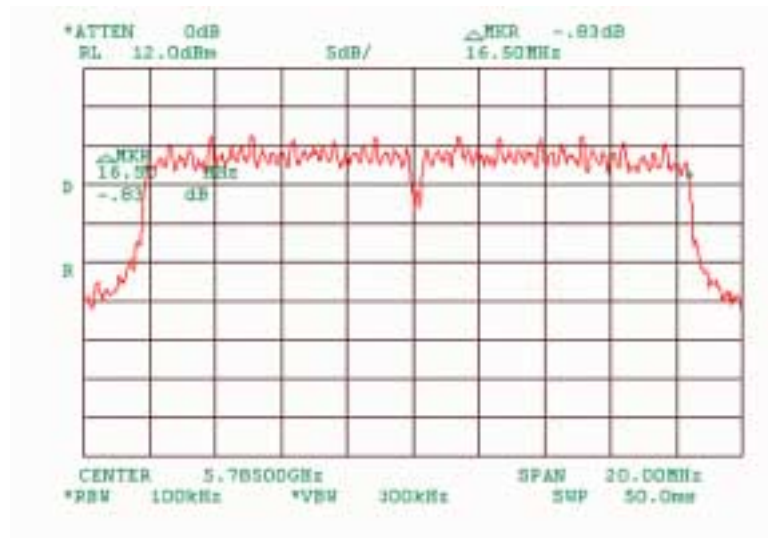
6 dB bandwidth test result at mid frequency at data rate 18 MBps



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:	5/11/2004 11:34:22 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

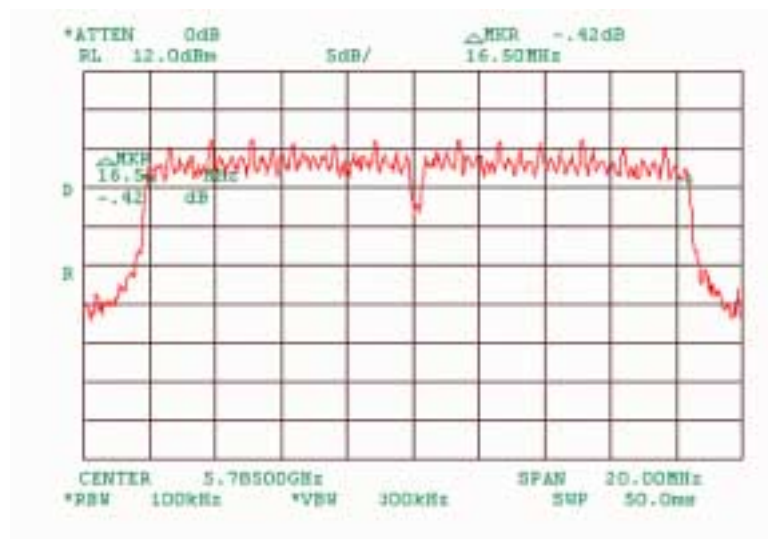
Plot 7.1.6

6 dB bandwidth test result at mid frequency at data rate 24 MBps



Plot 7.1.7

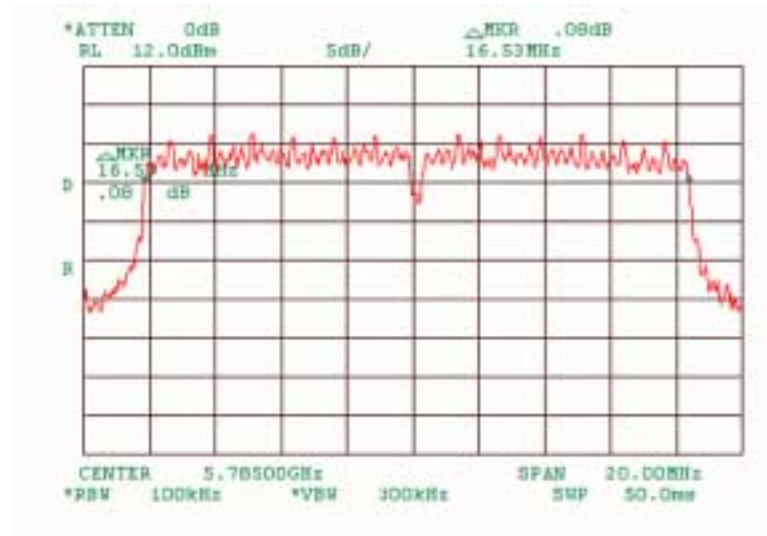
6 dB bandwidth test result at high frequency at data rate 36 MBps



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:	5/11/2004 11:34:22 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

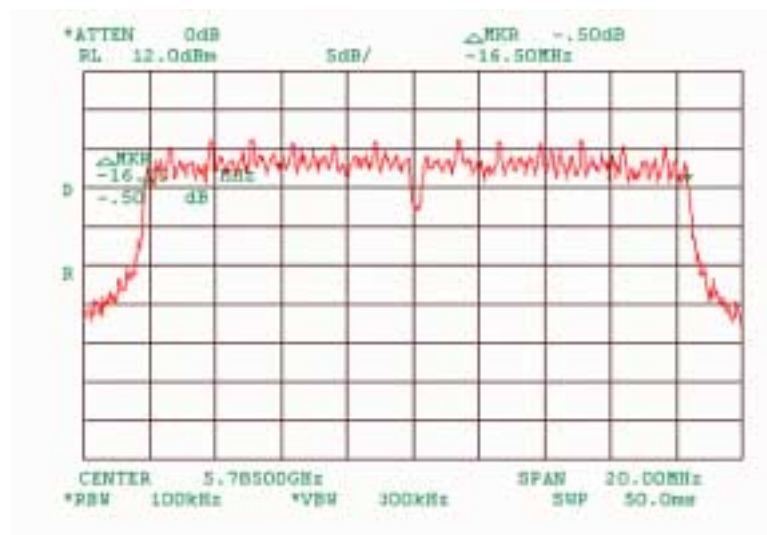
Plot 7.1.8

6 dB bandwidth test result at mid frequency at data rate 48 MBps



Plot 7.1.9

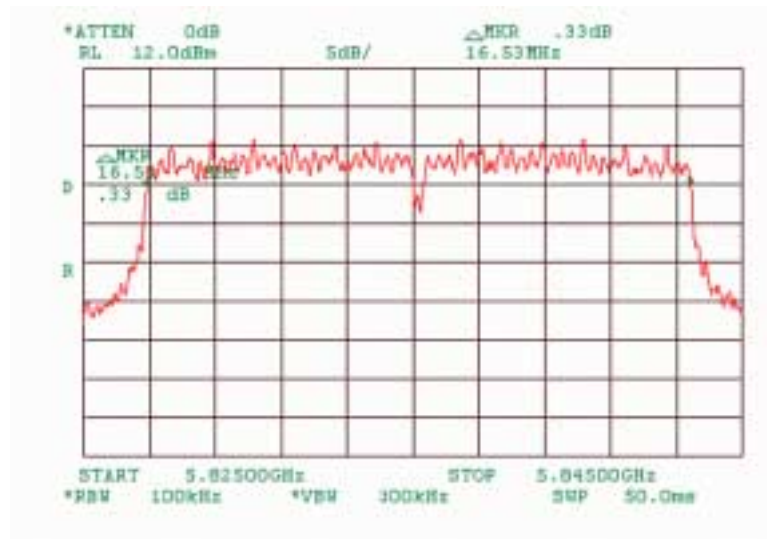
6 dB bandwidth test result at mid frequency at data rate 54 MBps



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:	5/11/2004 11:34:22 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.10

6 dB bandwidth test result at high frequency at data rate 6 MBps



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:	5/11/2004 11:37:53 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

7.2 Peak output power test

7.2.1 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. The test results are provided in Table 7.2.2 and associated plots.

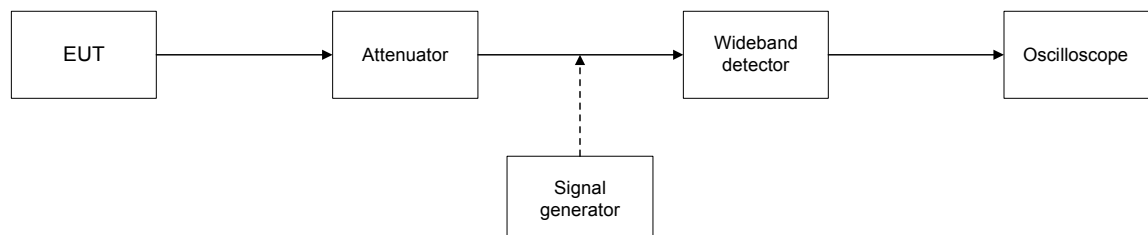
Table 7.2.1 Peak output power limits

Assigned frequency range, MHz	Maximum peak output power	
	W	dBm
5725-5850	1	30

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 for end user RF output power.
- 7.2.2.3 The peak of modulation envelope was captured with oscilloscope at the output of wideband detector as provided in the associated plots.
- 7.2.2.4 The EUT was replaced with RF signal generator set to the same frequency and the output power was adjusted to produce the same voltage as was captured.
- 7.2.2.5 The transmitter peak output power was calculated as follows: $P_T = R_{fgen} - \text{Cable loss} + \text{Attenuation}$.

Figure 7.2.1 Peak output power test setup



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:	5/11/2004 11:37:53 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Table 7.2.2 Peak output power test results

FREQUENCY RANGE: 5740 – 5835 MHz
DETECTOR USED: Peak
MODULATION: QAM (OFDM)
MODULATING SIGNAL: PRBS
BIT RATE: 6 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

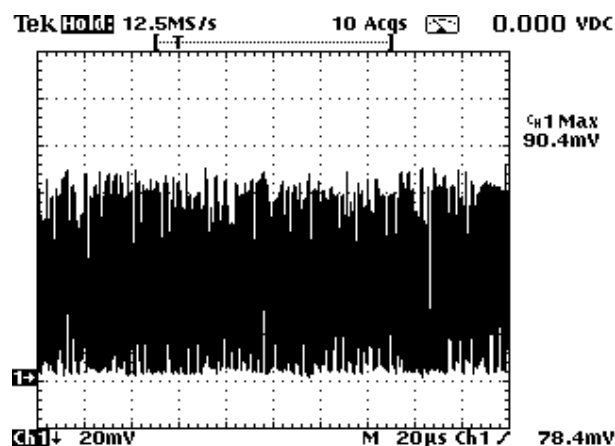
Carrier frequency, MHz	Oscilloscope reading, mV	Signal generator output, dBm	External attenuation, dB	Cable loss, dB	RF output power, dBm	Limit, dBm	Margin, dB	Verdict
5740	90.4	12.72	10	1.36	21.36	30	8.64	Pass
5785	87.2	12.53	10	1.36	21.17	30	8.83	Pass
5835	83.2	12.23	10	1.36	20.87	30	9.13	Pass

Reference numbers of test equipment used

HL 0661	HL 1562	HL 2014	HL 2227	HL 2400			
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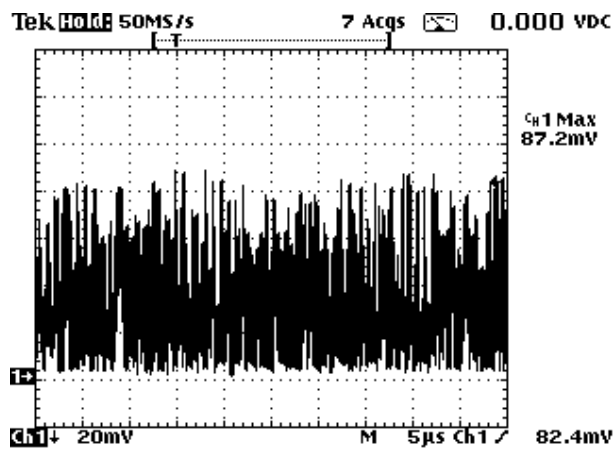
Full description is given in Appendix A.

Plot 7.2.1 Peak output power at low frequency at data rate 6 Mbps

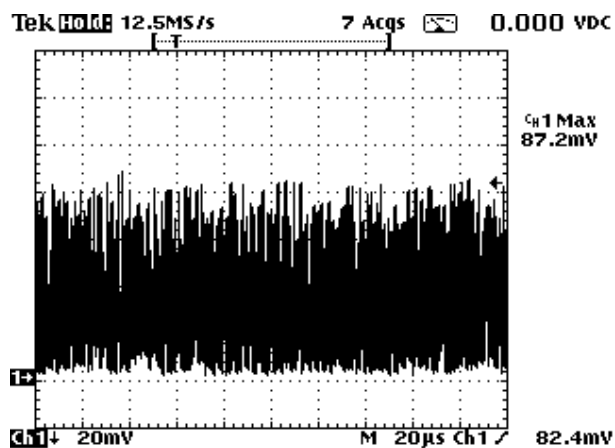


Test specification:	Section 15.247(b)3, Peak output power		
Test procedure:	FR Vol.62, page 26243, Section 15.247(b)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:37:53 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.2 Peak output power at mid frequency at data rate 6 Mbps

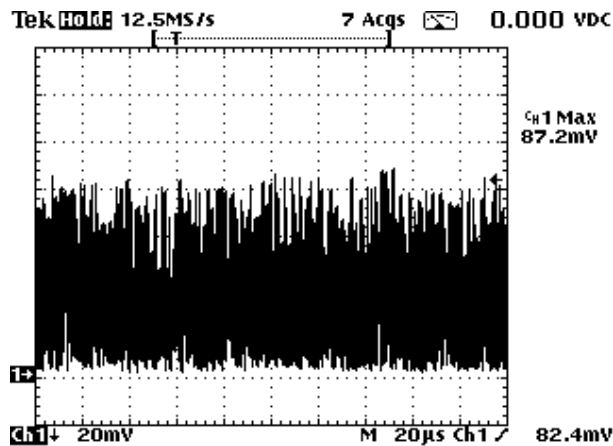


Plot 7.2.3 Peak output power at mid frequency at data rate 9 Mbps

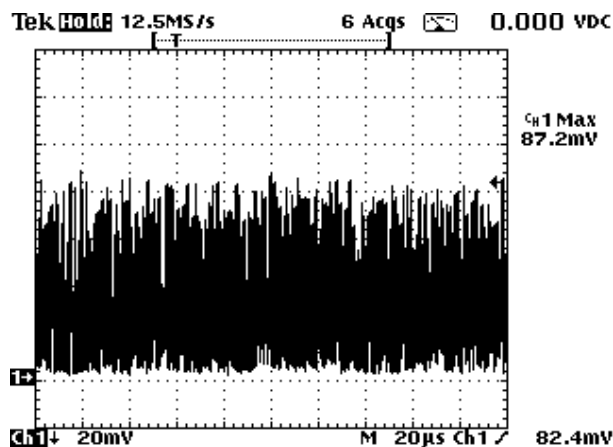


Test specification:	Section 15.247(b)3, Peak output power		
Test procedure:	FR Vol.62, page 26243, Section 15.247(b)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:37:53 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.4 Peak output power at mid frequency at data rate 12 Mbps

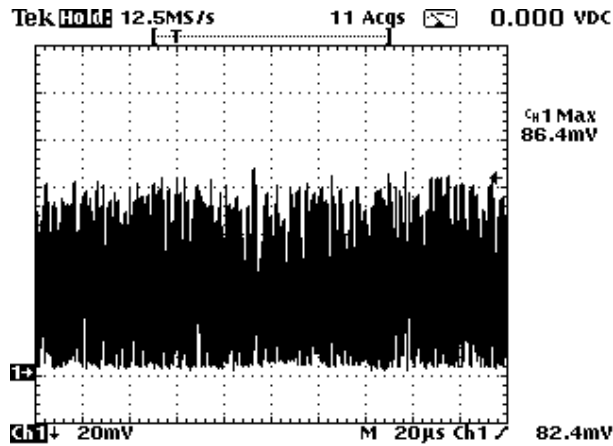


Plot 7.2.5 Peak output power at mid frequency at data rate 18 Mbps

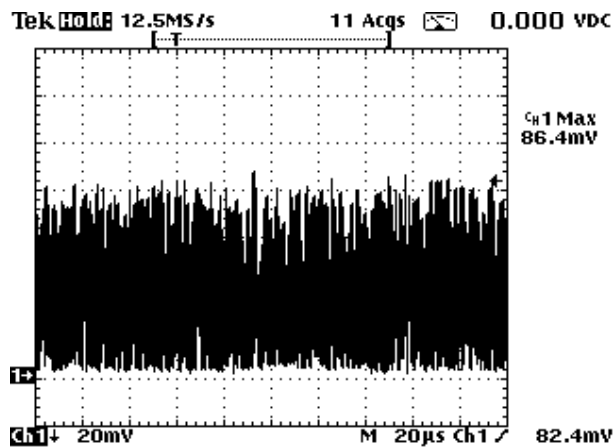


Test specification:	Section 15.247(b)3, Peak output power		
Test procedure:	FR Vol.62, page 26243, Section 15.247(b)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:37:53 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.6 Peak output power at mid frequency at data rate 24 Mbps

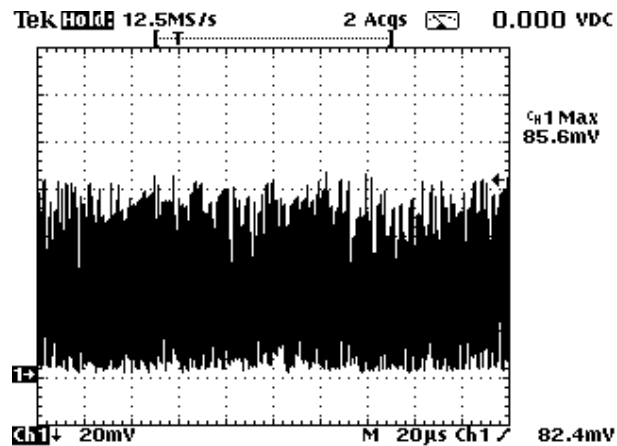


Plot 7.2.7 Peak output power at mid frequency at data rate 36 Mbps

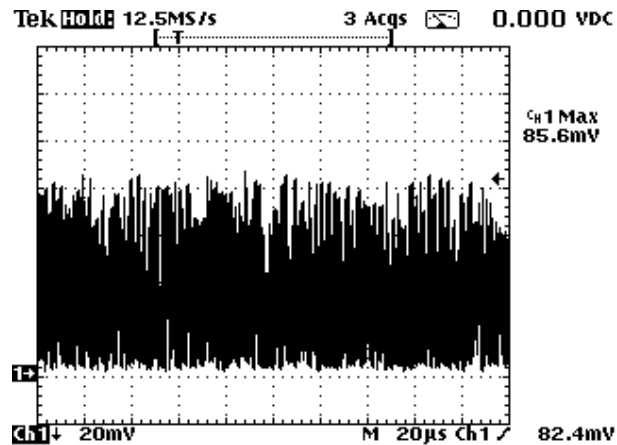


Test specification:	Section 15.247(b)3, Peak output power		
Test procedure:	FR Vol.62, page 26243, Section 15.247(b)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:37:53 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.8 Peak output power at mid frequency at data rate 48 Mbps

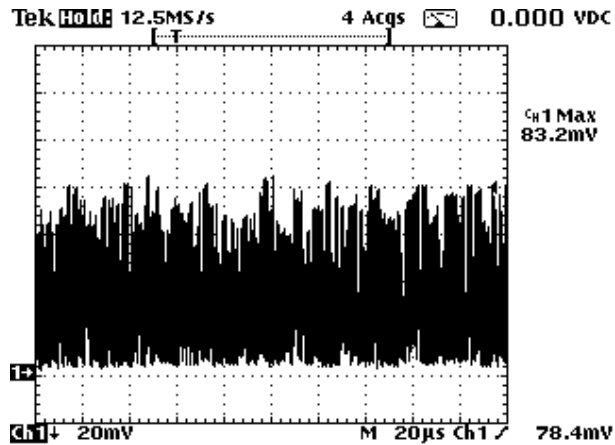


Plot 7.2.9 Peak output power at mid frequency at data rate 54 Mbps



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:	5/11/2004 11:37:53 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.10 Peak output power at high frequency at data rate 6 Mbps



Test specification:		Section 15.247(b)5, RF exposure	
Test procedure:		47 CFR, Section 1.1307(b)1	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 12:32:02 PM		
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 55 %	Power Supply: 48 VDC
Remarks:			

7.3 RF exposure

7.3.1 General

This test was performed to determine the minimum safe distance between the transmitter antenna and human to avoid public exposure in excess of limits for general population (uncontrolled exposure). Specification test limits are given in Table 7.3.1.

Table 7.3.1 RF exposure limits

Frequency range, MHz	Power density	
	mW/cm ²	W/m ²
902.0 – 928.0	0.60 – 0.62*	6.0 – 6.2
2400.0 – 2483.5	1.00	10.0
5725.0 – 5850.0	1.00	10.0

*- Power density limit within 300 – 1500 MHz was calculated according to the following equation: $S = F / 1500$, where S is power density in mW/cm² and F is frequency in MHz.

7.3.2 Safe distance calculation for fixed transmitter

The minimum safe distance was calculated from the following equation as provided in Table 7.3.2:

$$r = \sqrt{P \times G / (4 \times \pi \times S)}$$

where S is power density in W/m², P is the transmitter output power in W, G is the transmitter antenna numeric gain and r is distance to transmit antenna in m.

With power density equal to the RF exposure limit the minimum safe distance was calculated according to the following equation: $r = \sqrt{P \times G / (4 \times \pi \times S)}$

Table 7.3.2 Safe distance calculation

FREQUENCY RANGE: 5740 – 5835 MHz
EQUIPMENT INTENDED USE: Fixed*

Carrier frequency, MHz	Peak output power, dBm	Antenna gain, dBi	EIRP		Power density limit, W/m ²	Safe distance, m**	Intended separation, m	Verdict
			dBm	W				
5740	21.36	28	49.36	86.30	10	0.83	2	Pass
5785	21.17	28	49.17	82.60	10	0.81	2	Pass
5835	20.87	28	48.87	77.09	10	0.78	2	Pass

*- The equipment deemed fixed as intended for use at a distance of more than 2.0 m from humans.

Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:48:11 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

7.4 Spurious emissions at RF antenna connector

7.4.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 7.4.1. The test results are provided in Table 7.4.2 and associated plots.

Table 7.4.1 Spurious emission limits

Frequency*, MHz	Attenuation below carrier*, dBc
0.009 – 10 th harmonic	20.0

*- The above 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.

** - Spurious emission limit is provided in terms of attenuation below the peak of modulated carrier measured with the same resolution bandwidth.

7.4.2 Test procedure

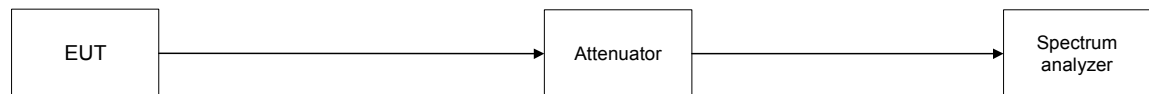
7.4.2.1 The EUT was set up as shown in Figure 7.4.1, energized and its proper operation was checked.

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

7.4.2.3 The highest emission level within the authorized band was measured.

7.4.2.4 The spurious emission was measured with spectrum analyzer as provided in Table 7.4.2 and associated plots and referenced to the highest emission level measured within the authorized band.

Figure 7.4.1 Spurious emission test setup



Test specification:		Section 15.247(c), Conducted spurious emissions	
Test procedure:		FR Vol. 62, page 26243, Section 15.247(c)	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:48:11 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Table 7.4.2 Spurious emission test results

FREQUENCY RANGE: 5740 – 5835 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 40000MHz
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 100 kHz
 VIDEO BANDWIDTH: 300 kHz
 MODULATION: QAM
 MODULATING SIGNAL: PRBS
 BIT RATE: 6 Mbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 TRANSMITTER OUTPUT POWER: 21.36 dBm at low carrier frequency
 21.17 dBm at mid carrier frequency
 20.87 dBm at high carrier frequency

Frequency, MHz	Spurious emission, dBm	Emission at carrier, dBm	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict
Low carrier frequency						
11.4792	-47.83	4.33	53.56	20	33.56	Pass
Mid carrier frequency						
11.5688	-48.17	2.33	50.5	20	30.5	Pass
High carrier frequency						
11.6715	-47.33	2.67	50	20	30	Pass

*- Margin = Attenuation below carrier – specification limit.

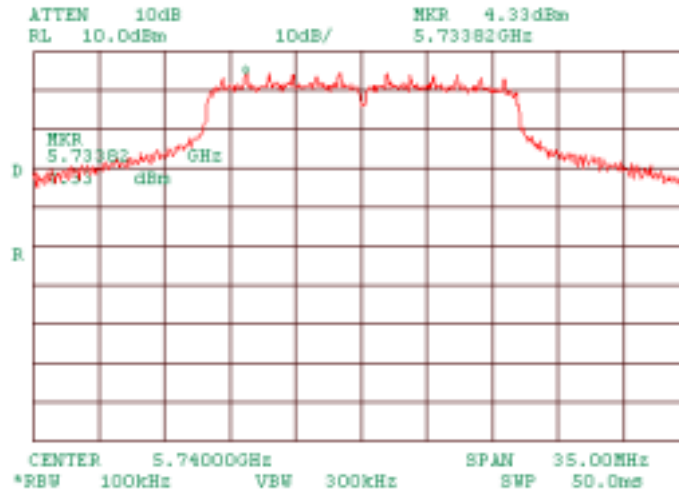
Reference numbers of test equipment used

HL 1293	HL 1294	HL 1295	HL 1296	HL 1424	HL 2254	HL 2287	
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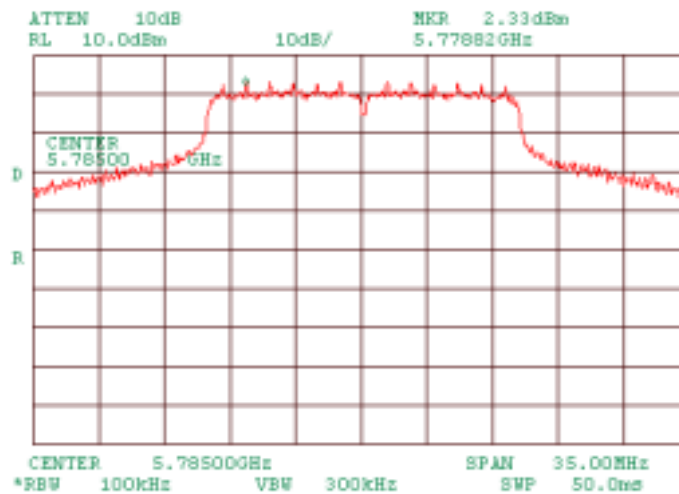
Full description is given in Appendix A.

Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:48:11 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.1 The highest emission level within the assigned band at low carrier frequency

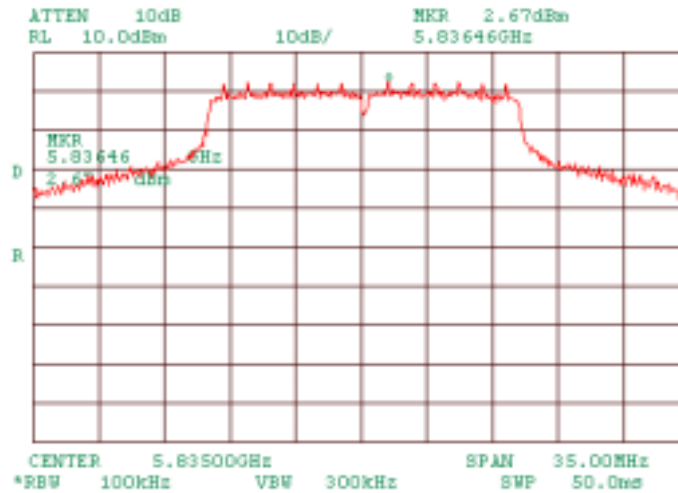


Plot 7.4.2 The highest emission level within the assigned band at mid carrier frequency

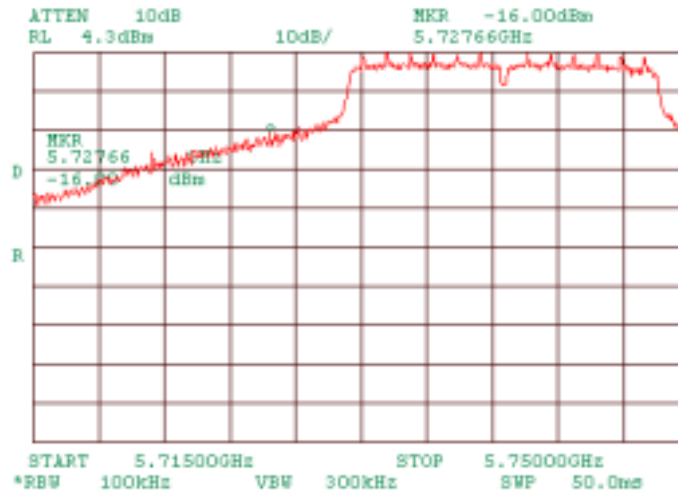


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:48:11 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.3 The highest emission level within the assigned band at high carrier frequency

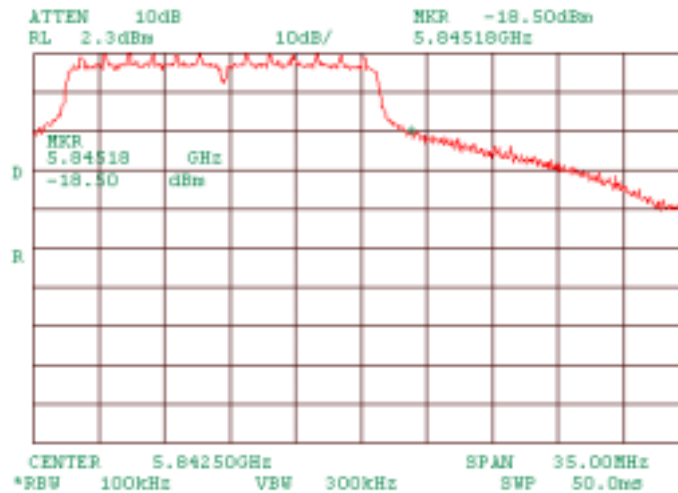


Plot 7.4.4 Spurious emission measurements at band edge at low carrier frequency

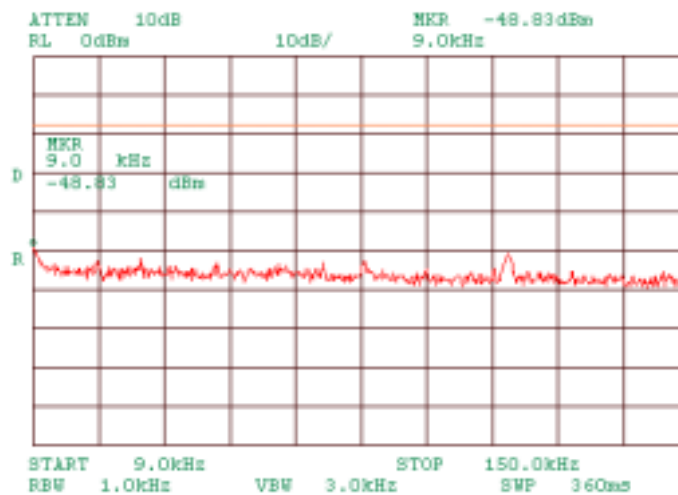


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:48:11 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.5 Spurious emission measurements at band edge at high carrier frequency

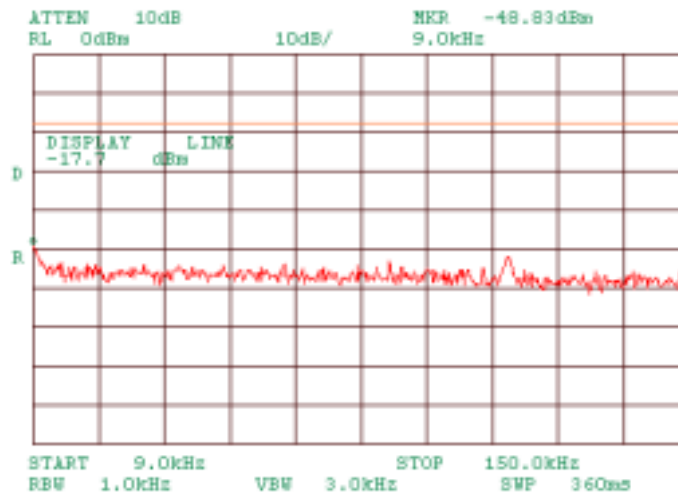


Plot 7.4.6 Spurious emission measurements in 9 – 150 kHz range at low carrier frequency

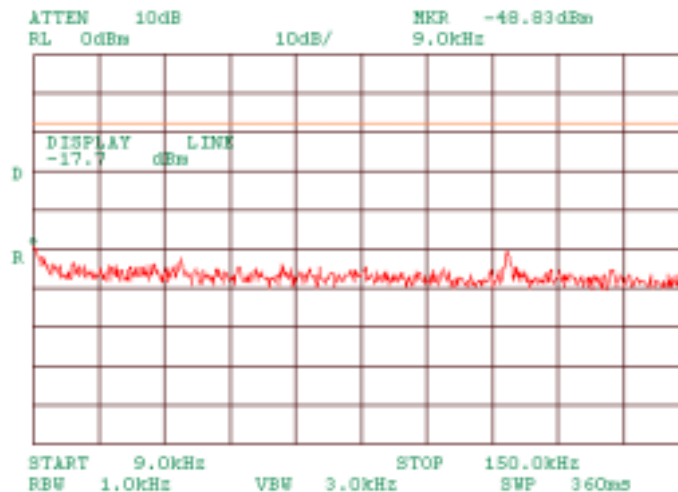


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:48:11 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.7 Spurious emission measurements in 9 – 150 kHz range at mid carrier frequency

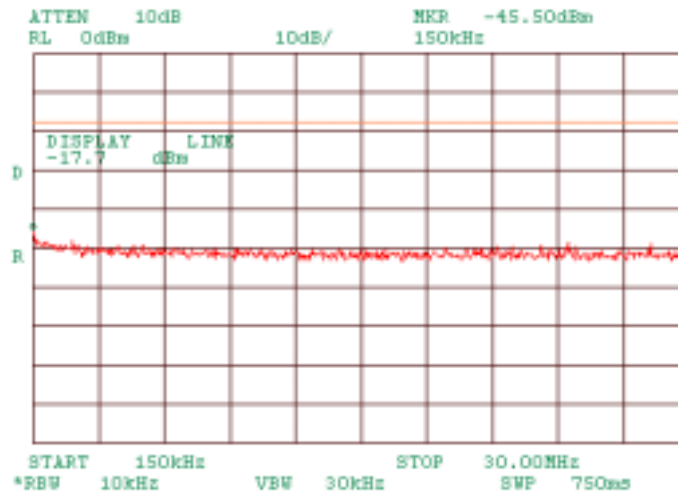


Plot 7.4.8 Spurious emission measurements in 9 – 150 kHz range at high carrier frequency

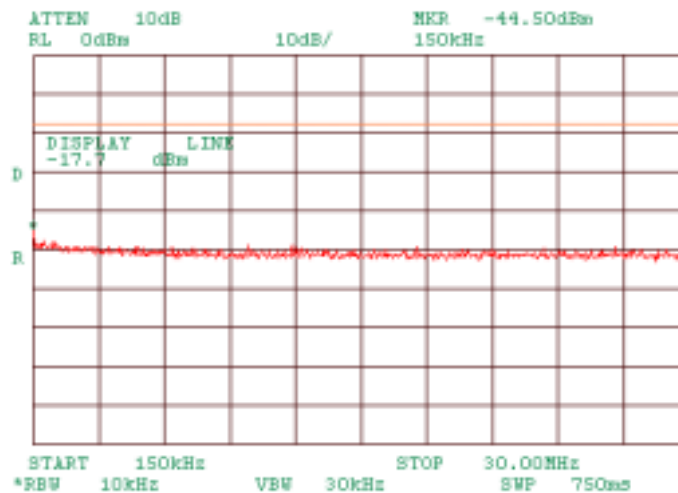


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:48:11 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.9 Spurious emission measurements in 0.15 – 30 MHz range at low carrier frequency

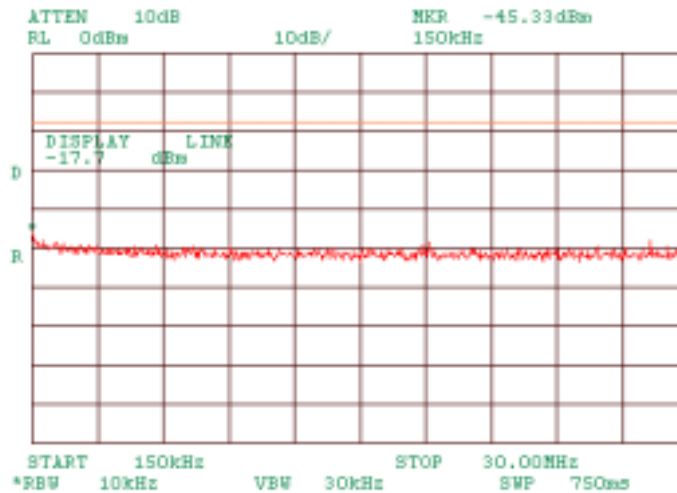


Plot 7.4.10 Spurious emission measurements in 0.15 – 30 MHz range at mid carrier frequency

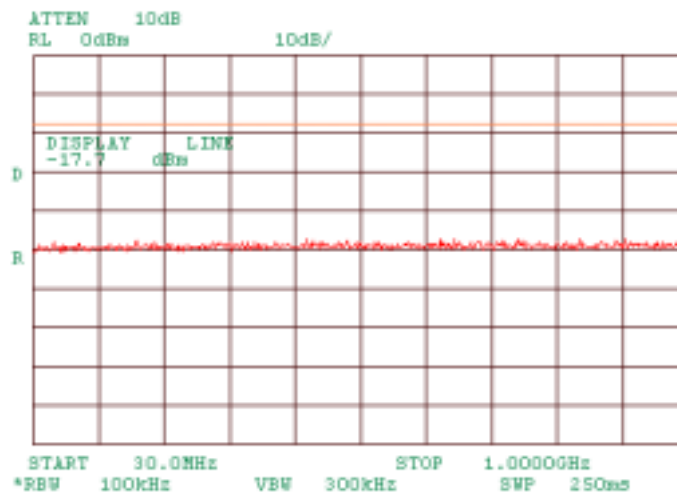


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:48:11 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.11 Spurious emission measurements in 0.15 – 30 MHz range at high carrier frequency

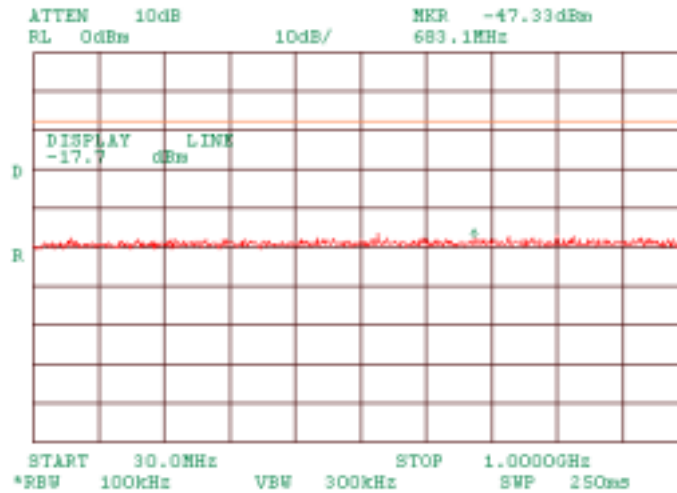


Plot 7.4.12 Spurious emission measurements in 30 – 1000 MHz range at low carrier frequency

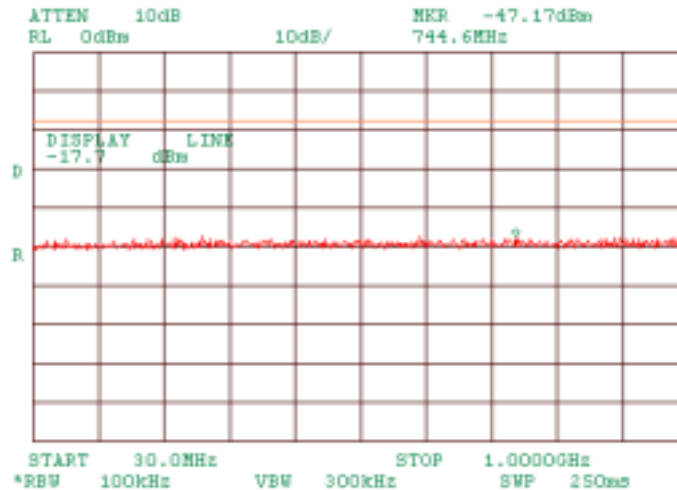


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:48:11 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.13 Spurious emission measurements in 30 – 1000 MHz range at mid carrier frequency

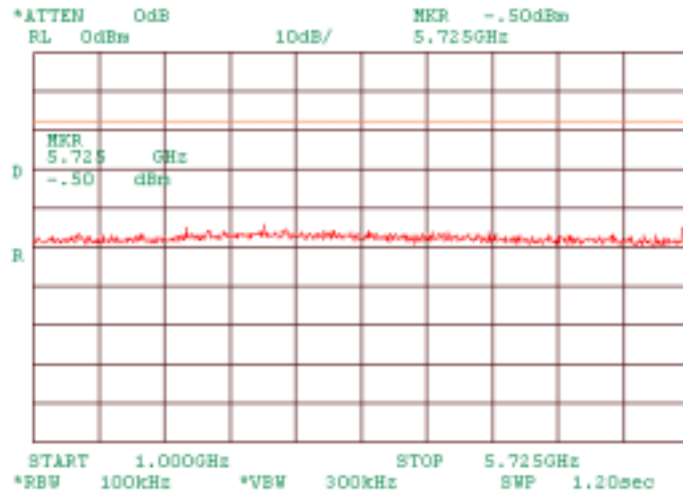


Plot 7.4.14 Spurious emission measurements in 30 – 1000 MHz range at high carrier frequency

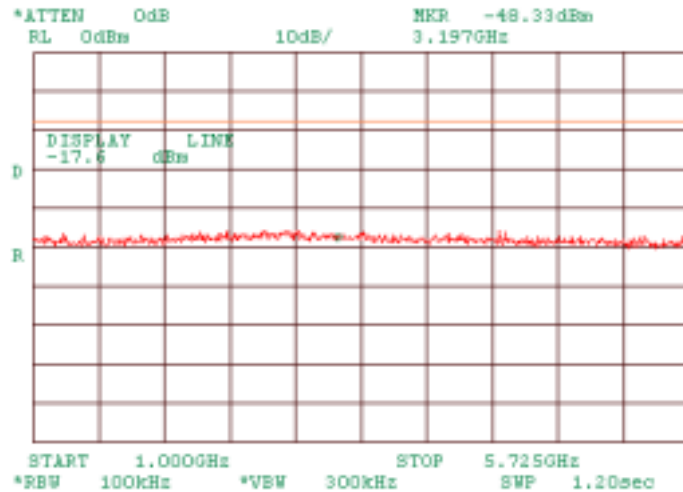


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:48:11 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.15 Spurious emission measurements in 1000 – 5725 MHz range at low carrier frequency

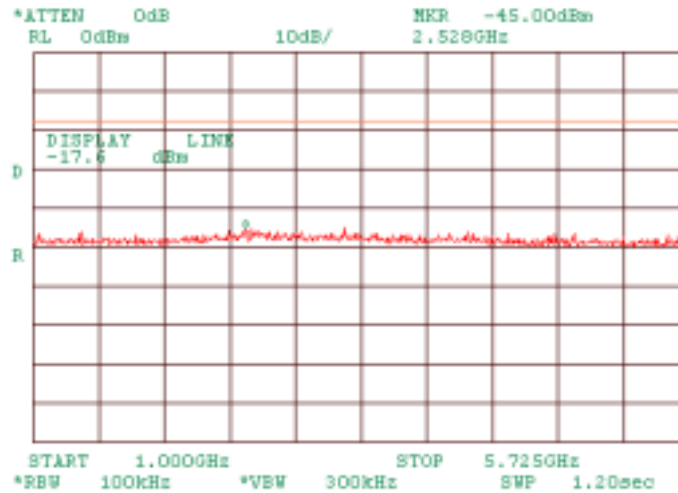


Plot 7.4.16 Spurious emission measurements in 1000 – 5725 MHz range at mid carrier frequency

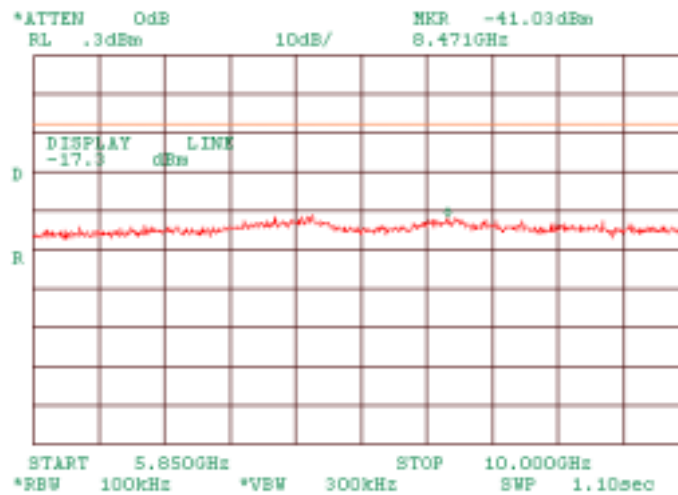


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:48:11 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.17 Spurious emission measurements in 1000 – 5725 MHz range at high carrier frequency

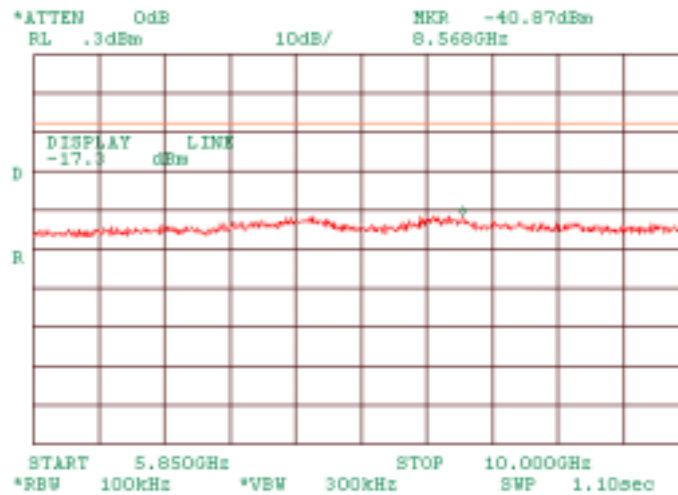


Plot 7.4.18 Spurious emission measurements in 5850 – 10000 MHz range at low carrier frequency

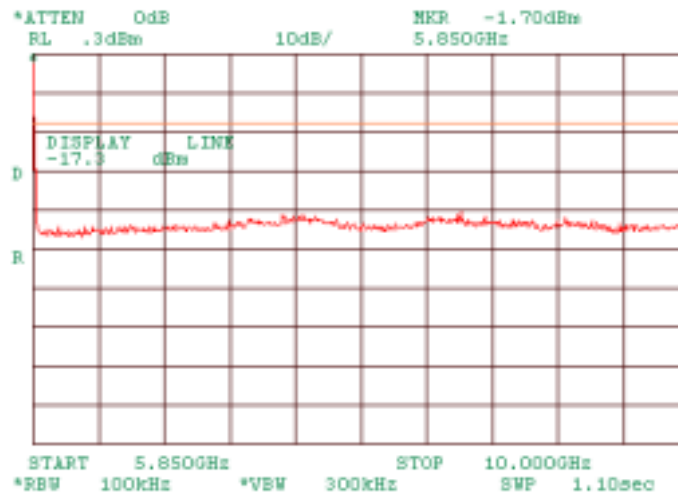


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:48:11 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.19 Spurious emission measurements in 5850 – 10000 MHz range at mid carrier frequency

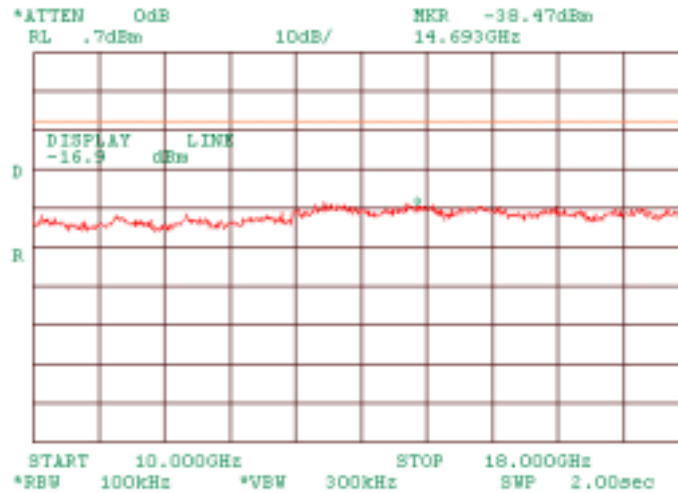


Plot 7.4.20 Spurious emission measurements in 5850 – 10000 MHz range at high carrier frequency

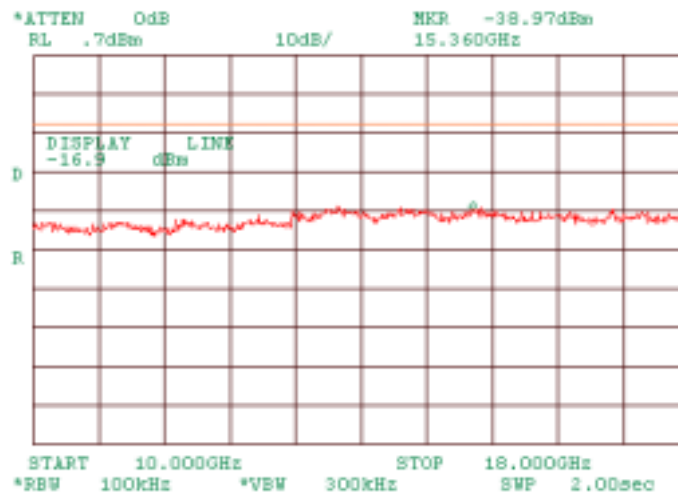


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:48:11 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.21 Spurious emission measurements in 10000 – 18000 MHz range at low carrier frequency

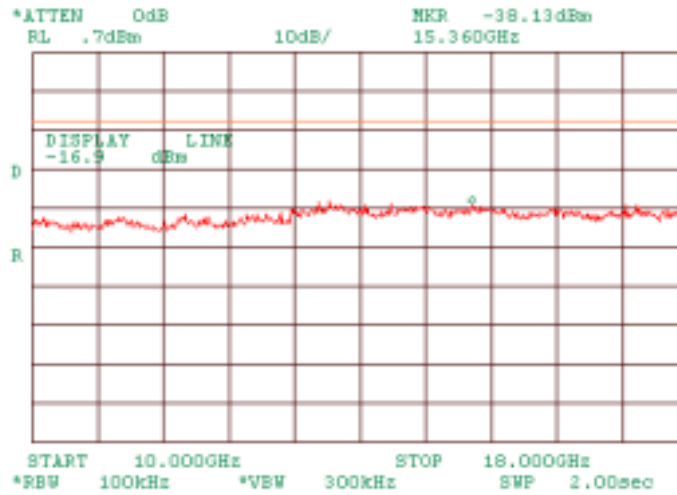


Plot 7.4.22 Spurious emission measurements in 10000 – 18000 MHz range at mid carrier frequency

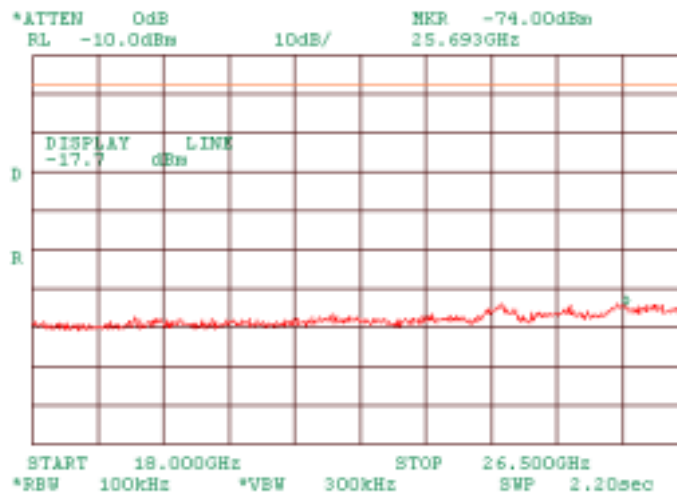


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:48:11 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.23 Spurious emission measurements in 10000 – 18000 MHz range at high carrier frequency

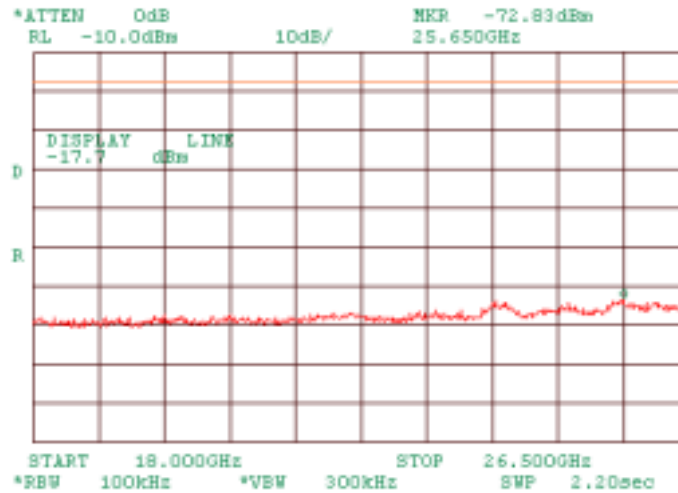


Plot 7.4.24 Spurious emission measurements in 18000 – 26500 MHz range at low carrier frequency

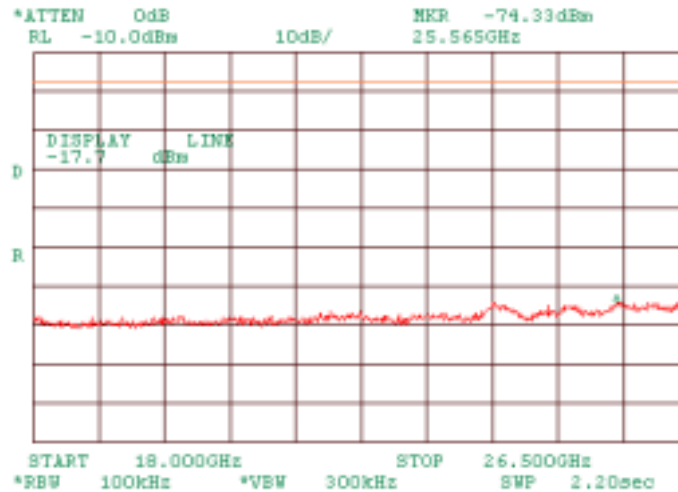


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:48:11 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.25 Spurious emission measurements in 18000 – 26500 MHz range at mid carrier frequency

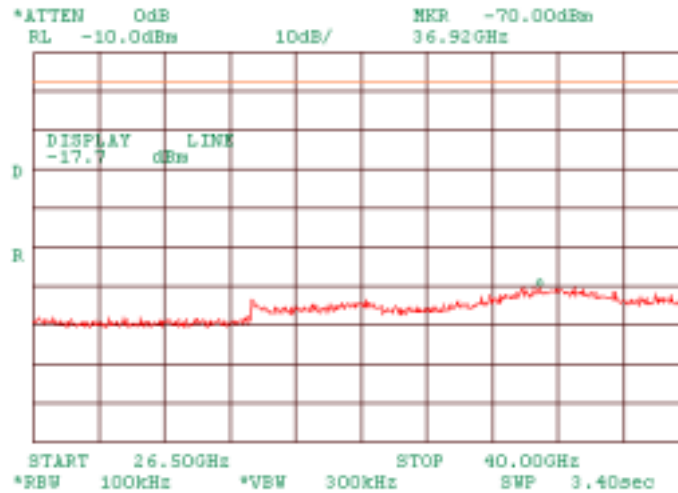


Plot 7.4.26 Spurious emission measurements in 18000 – 26500 MHz range at high carrier frequency

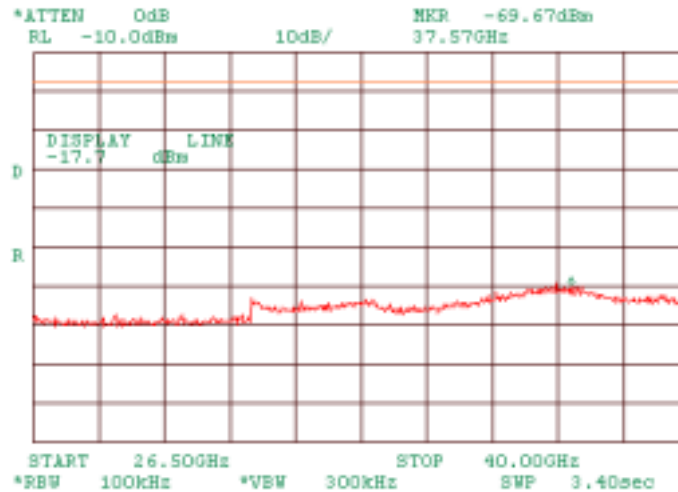


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:48:11 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.27 Spurious emission measurements in 26500 – 40000 MHz range at low carrier frequency

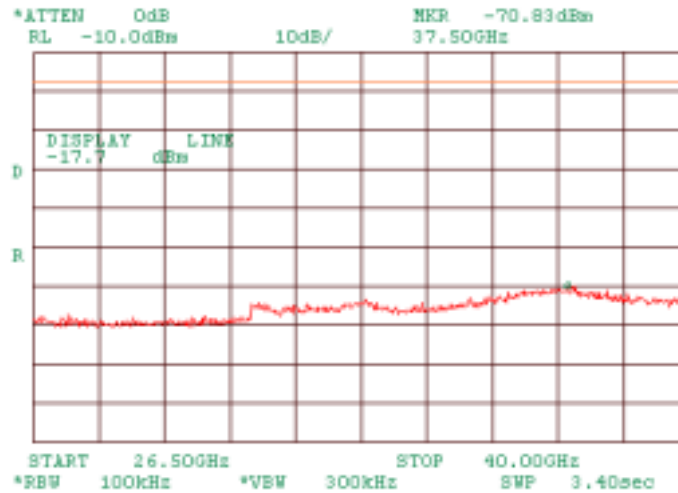


Plot 7.4.28 Spurious emission measurements in 26500 – 40000 MHz range at mid carrier frequency

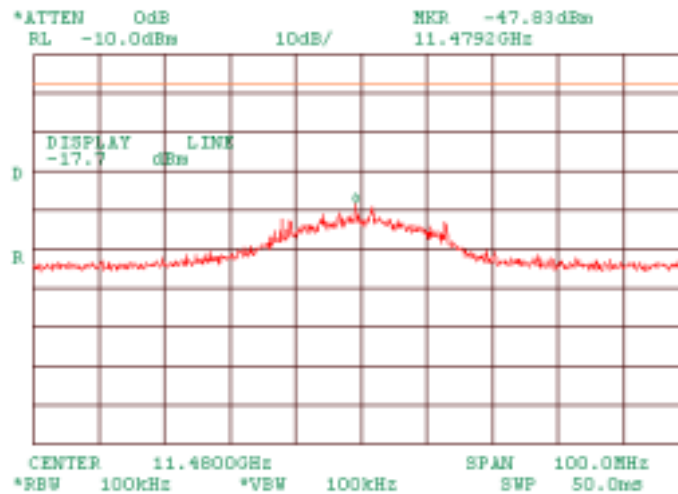


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:48:11 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.29 Spurious emission measurements in 26500 – 40000 MHz range at high carrier frequency

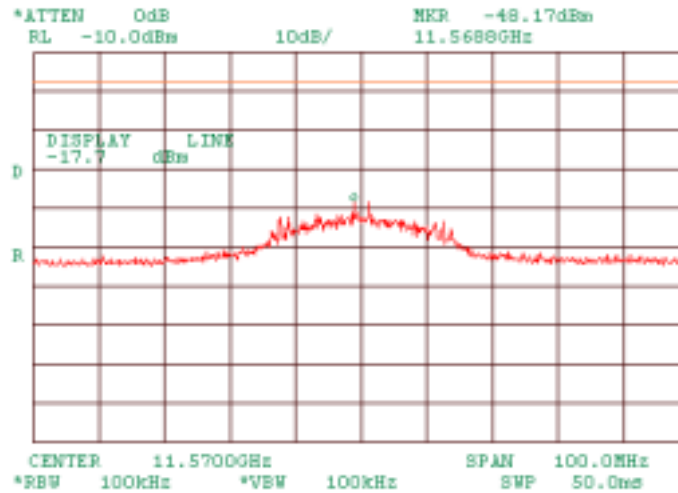


Plot 7.4.30 Conducted spurious emission measurements at the 2nd harmonic of low carrier frequency

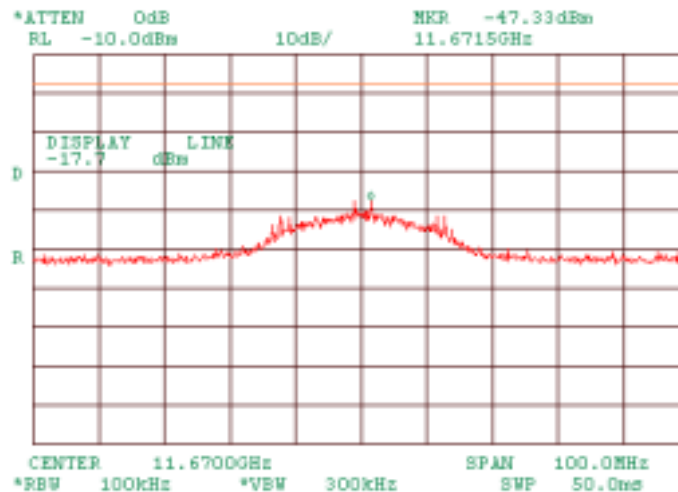


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:48:11 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.31 Conducted spurious emission measurements at the 2nd harmonic of mid carrier frequency

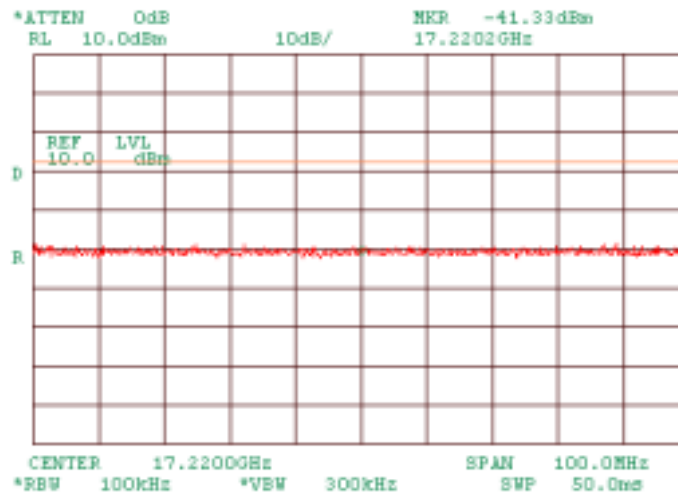


Plot 7.4.32 Conducted spurious emission measurements at the 2nd harmonic of high carrier frequency

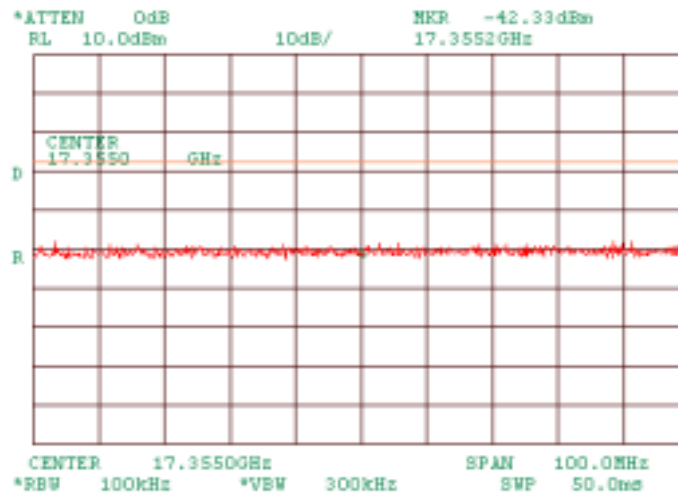


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:48:11 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.33 Conducted spurious emission measurements at the 3rd harmonic of low carrier frequency

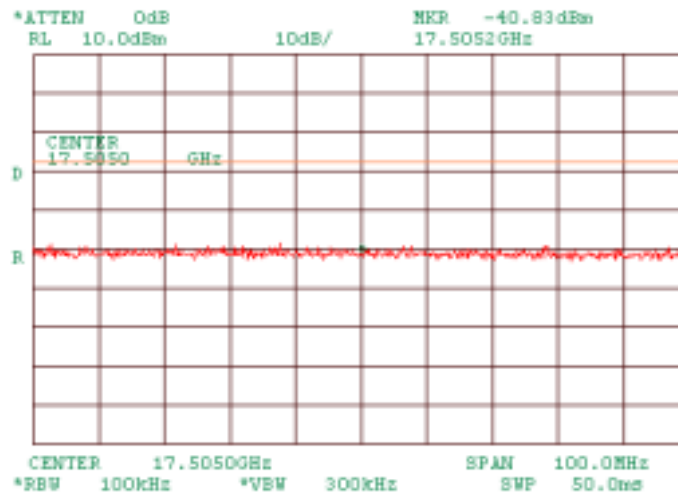


Plot 7.4.34 Conducted spurious emission measurements at the 3rd harmonic of mid carrier frequency

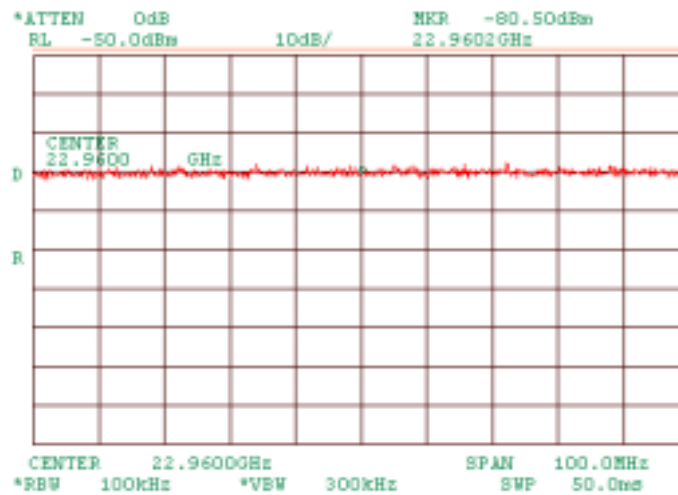


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:48:11 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.35 Conducted spurious emission measurements at the 3^d harmonic of high carrier frequency

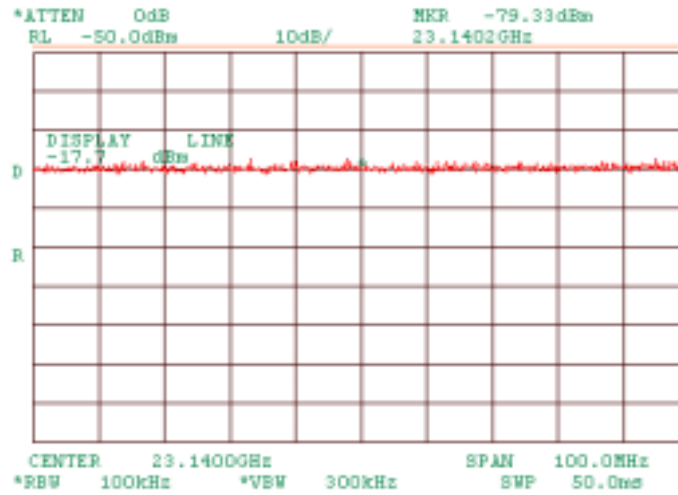


Plot 7.4.36 Conducted spurious emission measurements at the 4th harmonic of low carrier frequency

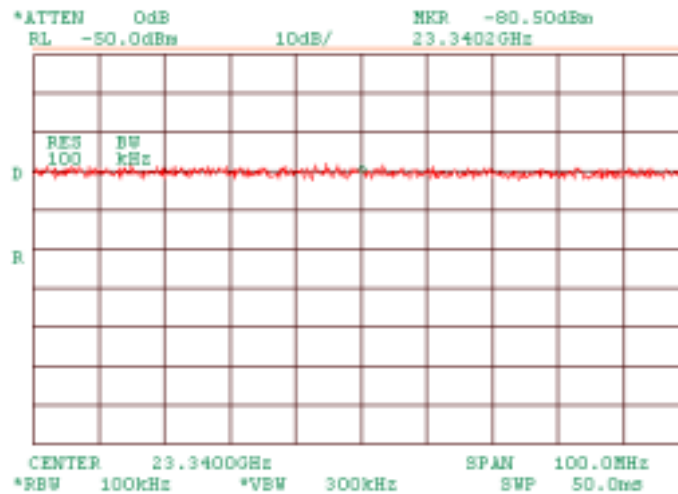


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:48:11 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.37 Conducted spurious emission measurements at the 4th harmonic of mid carrier frequency

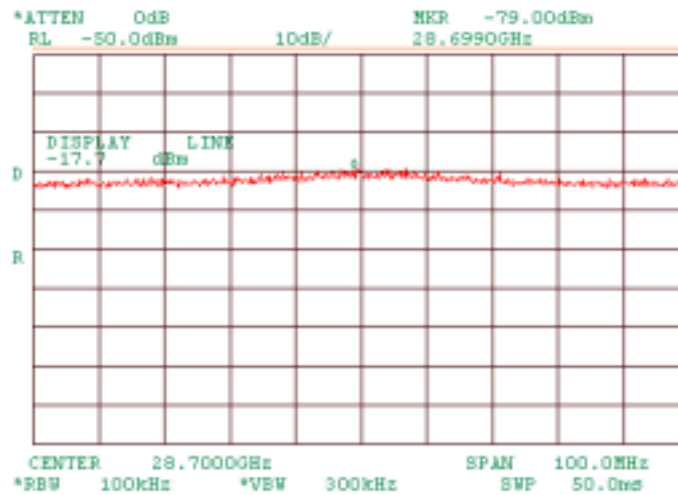


Plot 7.4.38 Conducted spurious emission measurements at the 4th harmonic of high carrier frequency

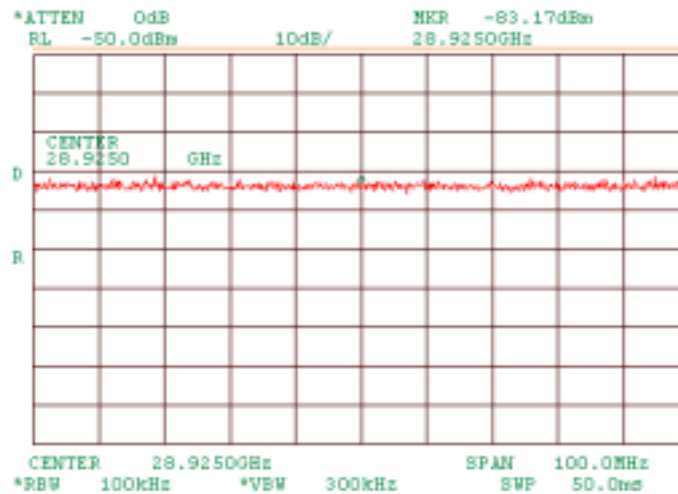


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:48:11 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.39 Conducted spurious emission measurements at the 5th harmonic of low carrier frequency

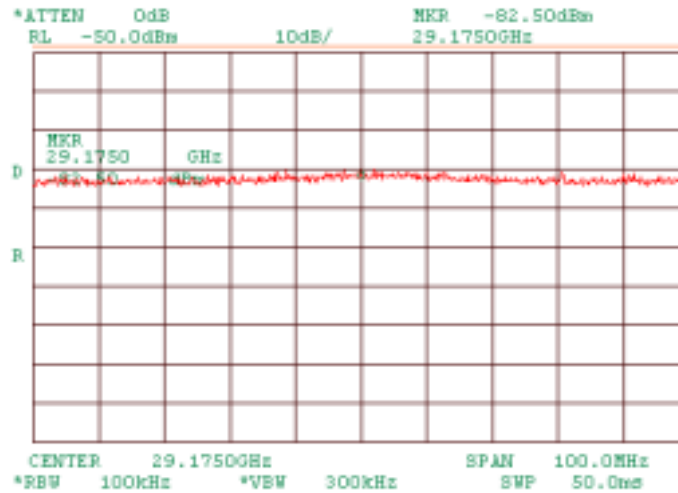


Plot 7.4.40 Conducted spurious emission measurements at the 5th harmonic of mid carrier frequency

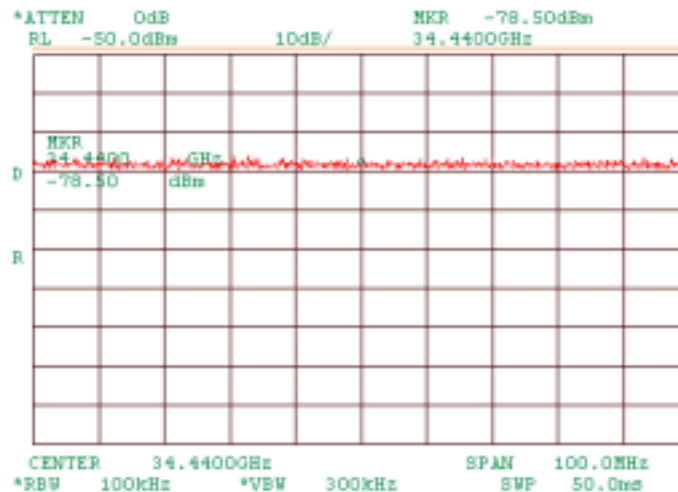


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:48:11 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.41 Conducted spurious emission measurements at the 5th harmonic of high carrier frequency

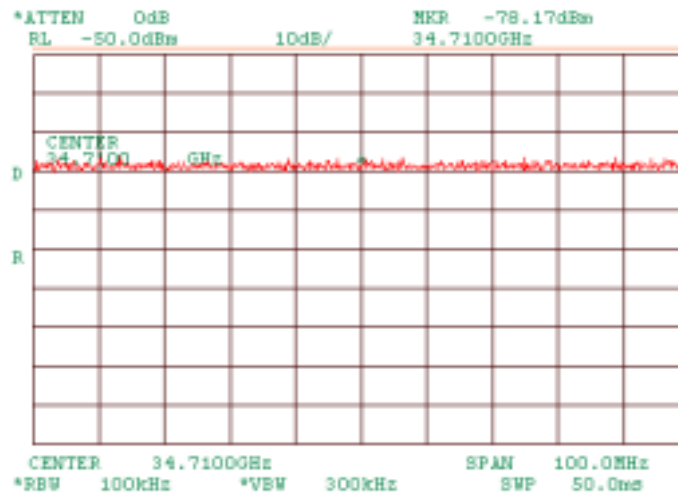


Plot 7.4.42 Conducted spurious emission measurements at the 6th harmonic of low carrier frequency

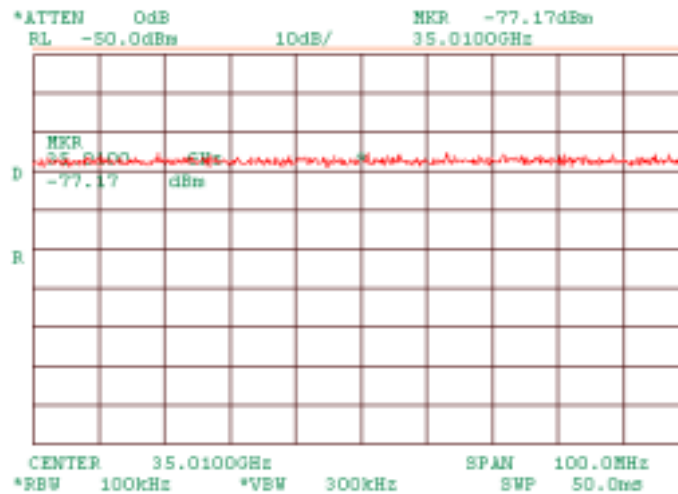


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:48:11 AM		
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.43 Conducted spurious emission measurements at the 6th harmonic of mid carrier frequency



Plot 7.4.44 Conducted spurious emission measurements at the 6th harmonic of high carrier frequency



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

7.5 Field strength of spurious emissions

7.5.1 General

This test was performed to measure field strength of spurious emissions from the EUT. Specification test limits are given in Table 7.5.1.

Table 7.5.1 Radiated spurious emissions limits

Frequency, MHz	Field strength at 3 m within restricted bands, dB(μ V/m)***			Attenuation of field strength of spurious versus carrier outside restricted bands, dBc***
	Peak	Quasi Peak	Average	
0.009 – 0.490*	NA	128.5 – 93.8**	NA	20.0
0.490 – 1.705*		73.8 – 63.0**		
1.705 – 30.0*		69.5**		
30 – 88		40.0		
88 – 216		43.5		
216 – 960		46.0		
960 – 1000		54.0		
Above 1000		74.0		

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

$$\text{Lims}_{S_2} = \text{Lims}_{S_1} + 40 \log(S_1/S_2),$$

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.

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

7.5.2.1 The EUT was set up as shown in Figure 7.5.1, energized and the performance check was conducted.

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

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

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

7.5.3.1 The EUT was set up as shown in Figure 7.5.2, energized and the performance check was conducted.

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

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

Test specification: Section 15.247(c), Radiated spurious emissions			
Test procedure: FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode: Compliance	Verdict: PASS		
Date & Time: 5/11/2004 11:50:54 AM			
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

Figure 7.5.1 Setup for spurious emission field strength measurements below 30 MHz

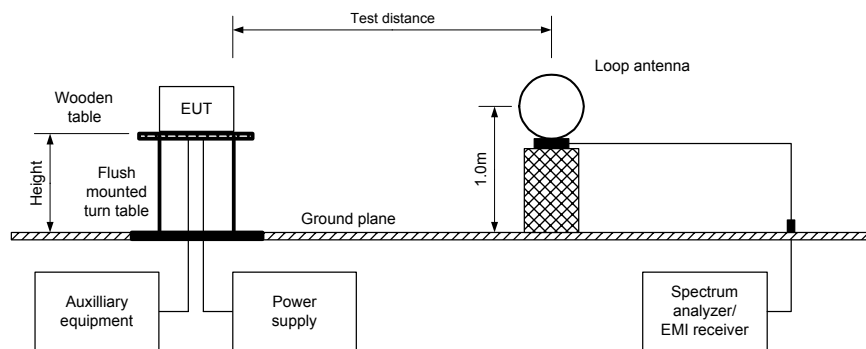
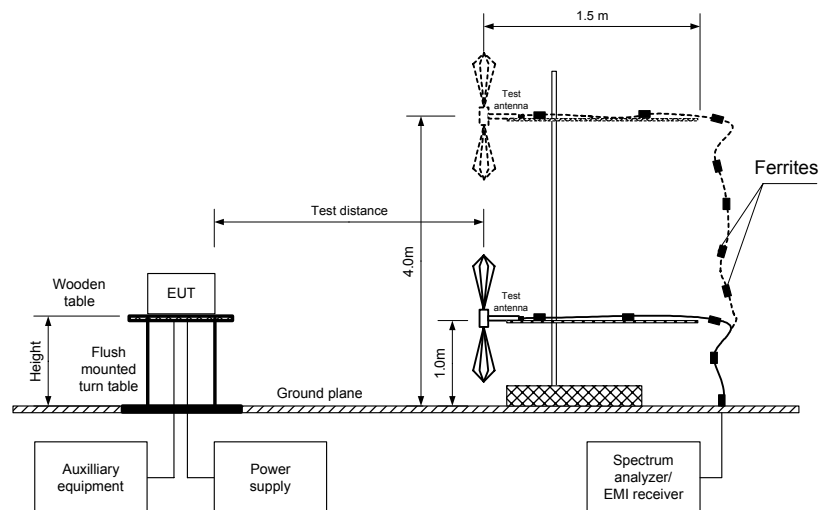


Figure 7.5.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:		Section 15.247(c), Radiated spurious emissions	
Test procedure:		FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

Table 7.5.2 Field strength of spurious emissions above 1 GHz within restricted bands

FREQUENCY RANGE: 5740 – 5835 MHz
 INVESTIGATED FREQUENCY RANGE: 1000 – 40000 MHz
 TEST SITE: Semi-anechoic chamber, OATS
 TEST DISTANCE: 3 m
 MODULATION: QAM
 MODULATING SIGNAL: PRBS
 BIT RATE: 6 Mbps
 DUTY CYCLE: 100 %
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 TRANSMITTER OUTPUT POWER: 21.36 dBm at low carrier frequency
 21.17 dBm at mid carrier frequency
 20.87 dBm at high carrier frequency
 EUT ANTENNA: External, 28 dBi gain
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 1000 kHz
 TEST ANTENNA TYPE: Double ridged guide

Frequency, MHz	Antenna		Azimuth, degrees*	Peak field strength (VBW=3 MHz)			Average field strength (VBW=10 Hz)			Verdict
	Polariz.	Height, m		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB***	
Low carrier frequency										
1063.870	Vertical	1.0	263	44.25	74	-29.75	37.12	54	-16.88	Pass
1130.745	Vertical	1.0	261	48.87	74	-25.13	40.29	54	-13.71	
1197.273	Vertical	1.5	261	45.02	74	-28.98	37.05	54	-16.95	
1329.765	Vertical	1.5	260	44.66	74	-29.34	32.57	54	-21.43	
3823.283	Vertical	1.0	0	51.33	74	-22.67	45.00	54	-9.00	
Mid carrier frequency										
1063.870	Vertical	1.0	263	44.25	74	-29.75	37.12	54	-16.88	Pass
1130.745	Vertical	1.0	261	48.87	74	-25.13	40.29	54	-13.71	
1197.273	Vertical	1.5	261	45.02	74	-28.98	37.05	54	-16.95	
1329.765	Vertical	1.5	260	44.66	74	-29.34	32.57	54	-21.43	
3856.649	Vertical	1.0	0	49.33	74	-24.67	45.50	54	-8.50	
High carrier frequency										
1063.870	Vertical	1.0	263	44.25	74	-29.75	37.12	54	-16.88	Pass
1130.745	Vertical	1.0	261	48.87	74	-25.13	40.29	54	-13.71	
1197.273	Vertical	1.5	261	45.02	74	-28.98	37.05	54	-16.95	
1329.765	Vertical	1.5	260	44.66	74	-29.34	32.57	54	-21.43	
3893.258	Vertical	1.0	0	49.33	74	-24.67	45.17	54	-8.83	
11681.7	Vertical	1.4	230	54.50	74	-19.50	41.33	54	-12.67	

*- 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.

Test specification:		Section 15.247(c), Radiated spurious emissions	
Test procedure:		FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

Table 7.5.3 Field strength of spurious emissions below 1 GHz within restricted bands

FREQUENCY RANGE:	5740 - 5835 MHz
INVESTIGATED FREQUENCY RANGE:	0.009 – 1000 MHz
TEST SITE:	Semi-anechoic chamber
TEST DISTANCE:	3 m
MODULATION:	QAM
MODULATING SIGNAL:	PRBS
BIT RATE:	6 Mbps
DUTY CYCLE:	100 %
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum
TRANSMITTER OUTPUT POWER:	21.36 dBm at low carrier frequency 21.17dBm at mid carrier frequency 20.87 dBm at high carrier frequency
EUT ANTENNA:	External, 28 dBi gain
RESOLUTION BANDWIDTH:	0.2 kHz (9 kHz – 150 kHz) 9.0 kHz (150 kHz – 30 MHz) 120 kHz (30 MHz – 1000 MHz)
VIDEO BANDWIDTH:	> Resolution bandwidth
TEST ANTENNA TYPE:	Active loop (9 kHz – 30 MHz) Biconical (30 MHz – 200 MHz) Log periodic (200 MHz – 1000 MHz) Biconilog (30 MHz – 1000 MHz)

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*				
Low carrier frequency								
130.27155	36.37	32.6	43.5	-10.9	Vertical	1.0	168	Pass
248.89625	39.15	38.88	46	-7.12	Horizontal	1.0	243	
332.4975	43.83	42.34	46	-3.66	Horizontal	1.0	17	
Mid carrier frequency								
130.27155	36.37	32.6	43.5	-10.9	Vertical	1.0	168	Pass
248.89625	39.15	38.88	46	-7.12	Horizontal	1.0	243	
332.4975	43.83	42.34	46	-3.66	Horizontal	1.0	17	
High carrier frequency								
130.27155	36.37	32.6	43.5	-10.9	Vertical	1.0	168	Pass
248.89625	39.15	38.88	46	-7.12	Horizontal	1.0	243	
332.4975	43.83	42.34	46	-3.66	Horizontal	1.0	17	

*- Margin = Measured emission - specification limit.

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

Reference numbers of test equipment used

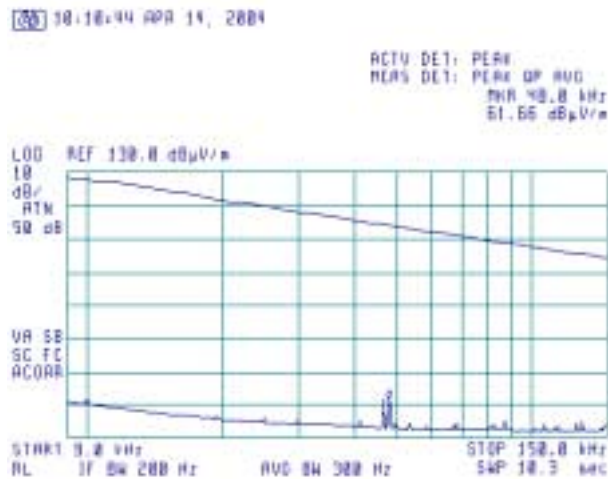
HL 0446	HL 0465	HL 0521	HL 0589	HL 0592	HL 0593	HL 0594	HL 0604
HL 0768	HL 0769	HL 1004	HL 1200	HL 1293	HL 1294	HL 1296	HL 1424
HL 1942	HL 1984						

Full description is given in Appendix A.

Test specification:		Section 15.247(c), Radiated spurious emissions	
Test procedure:		FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

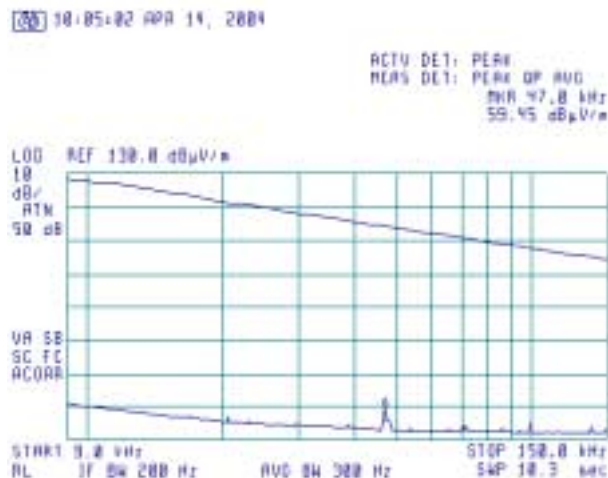
Plot 7.5.1 Radiated emission measurements from 9 to 150 kHz at the low carrier frequency

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



Plot 7.5.2 Radiated emission measurements from 9 to 150 kHz at the mid carrier frequency

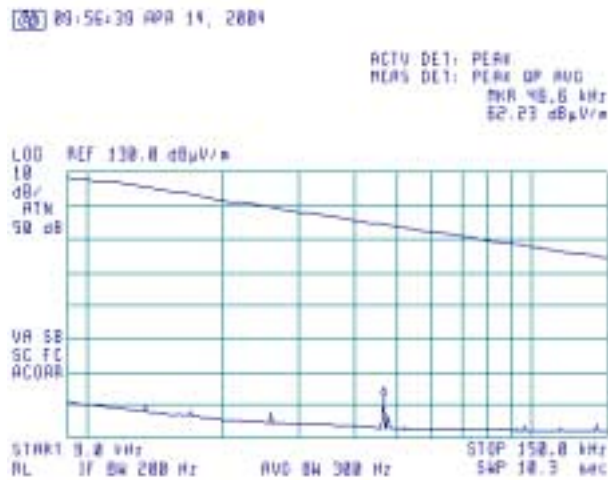
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

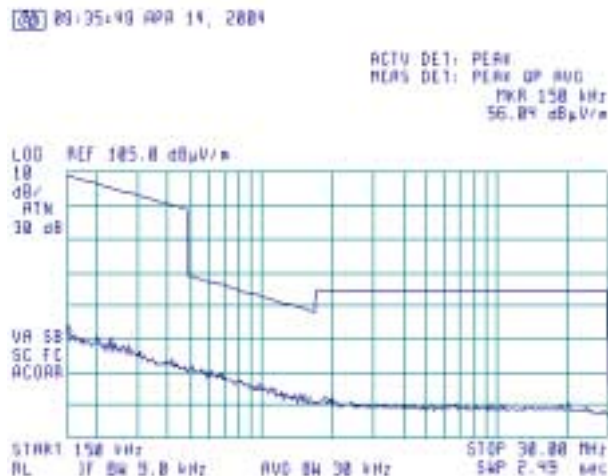
Plot 7.5.3 Radiated emission measurements from 9 to 150 kHz at the high carrier frequency

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



Plot 7.5.4 Radiated emission measurements from 0.15 to 30 MHz at the low carrier frequency

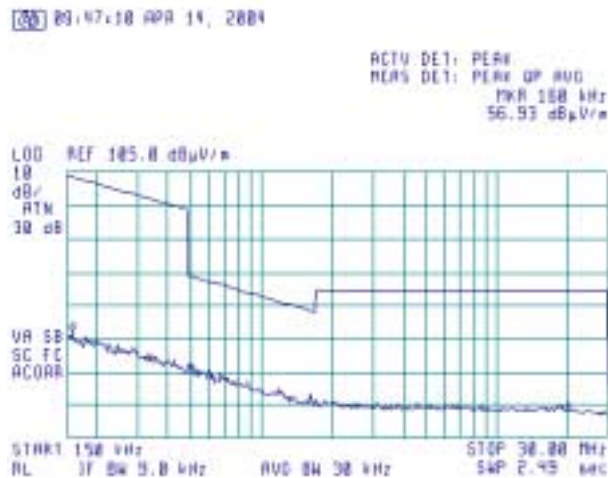
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

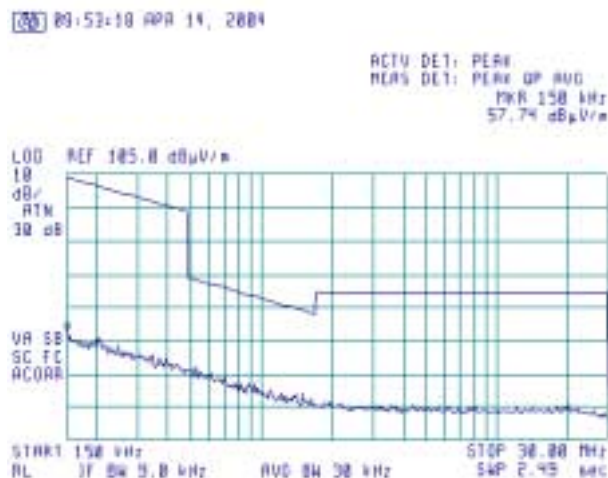
Plot 7.5.5 Radiated emission measurements from 0.15 to 30 MHz at the mid carrier frequency

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



Plot 7.5.6 Radiated emission measurements from 0.15 to 30 MHz at the high carrier frequency

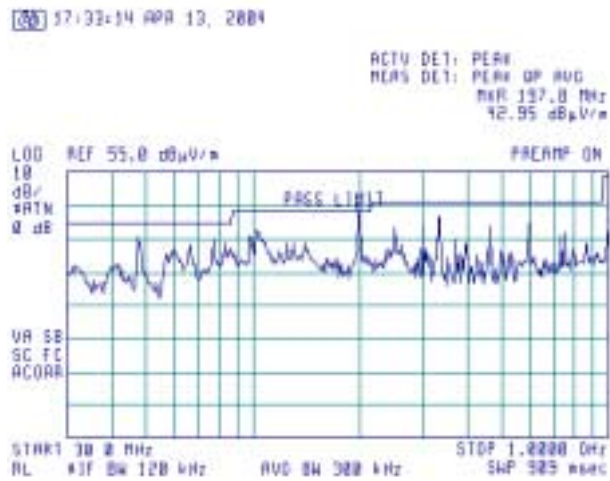
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:		Section 15.247(c), Radiated spurious emissions	
Test procedure:		FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

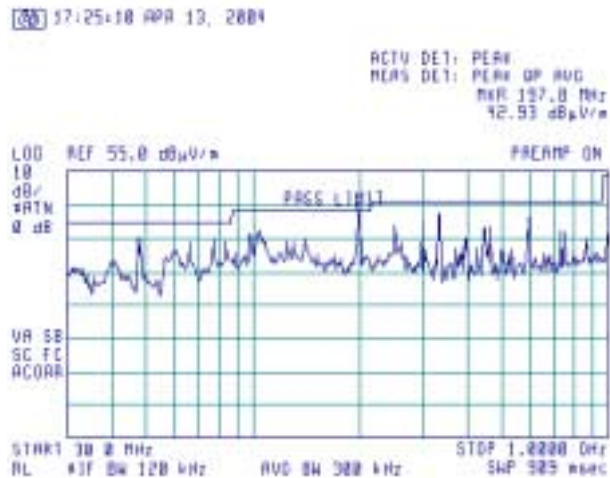
Plot 7.5.7 Radiated emission measurements from 30 to 1000 MHz at the low carrier frequency

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



Plot 7.5.8 Radiated emission measurements from 30 to 1000 MHz at the mid carrier frequency

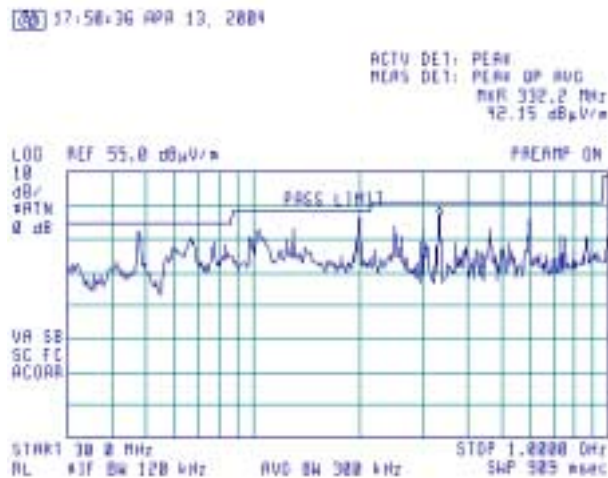
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

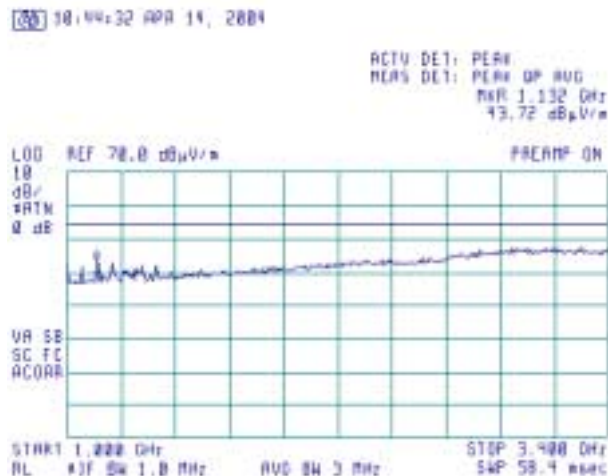
Plot 7.5.9 Radiated emission measurements from 30 to 1000 MHz at the high carrier frequency

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



Plot 7.5.10 Radiated emission measurements from 1000 to 3400 MHz at the low carrier frequency

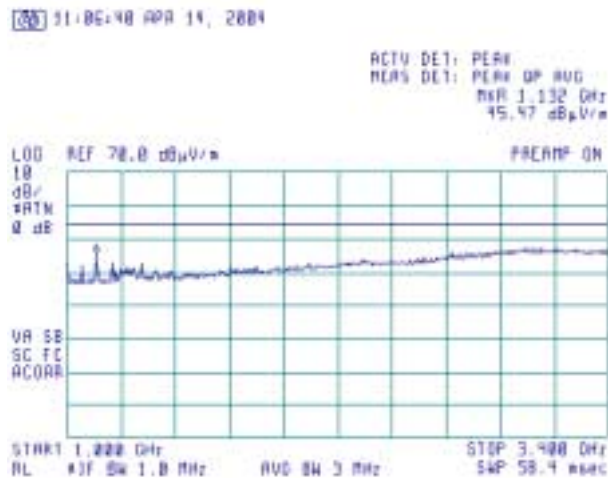
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification: Section 15.247(c), Radiated spurious emissions			
Test procedure: FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode: Compliance	Verdict: PASS		
Date & Time: 5/11/2004 11:50:54 AM			
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

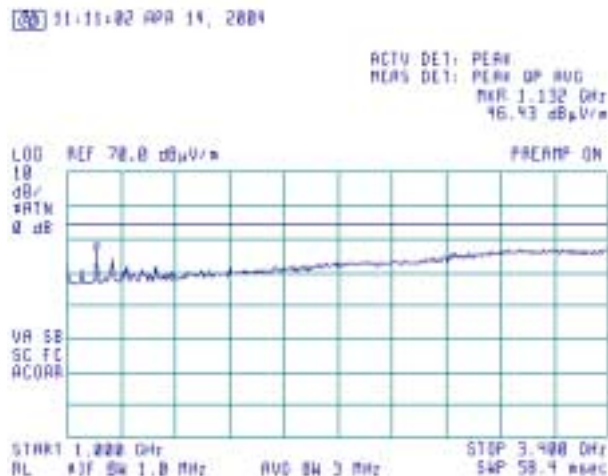
Plot 7.5.11 Radiated emission measurements from 1000 to 3400 MHz at the mid carrier frequency

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



Plot 7.5.12 Radiated emission measurements from 1000 to 3400 MHz at the high carrier frequency

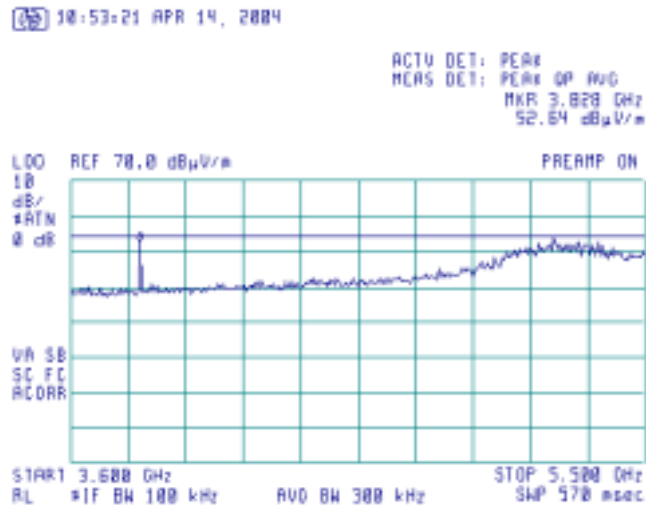
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification: Section 15.247(c), Radiated spurious emissions			
Test procedure: FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode: Compliance	Verdict: PASS		
Date & Time: 5/11/2004 11:50:54 AM			
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

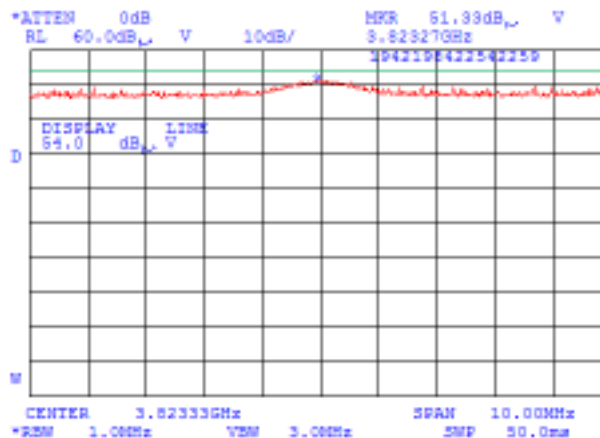
Plot 7.5.13 Radiated emission measurements from 3600 to 5500 MHz at the low carrier frequency

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



Plot 7.5.14 Radiated emission measurements at the low carrier frequency

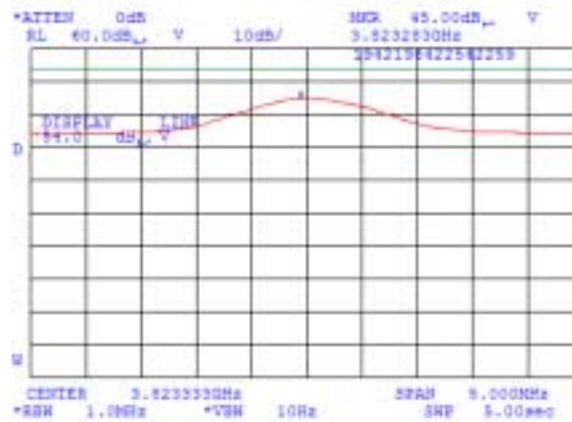
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
DETECTOR: Peak



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

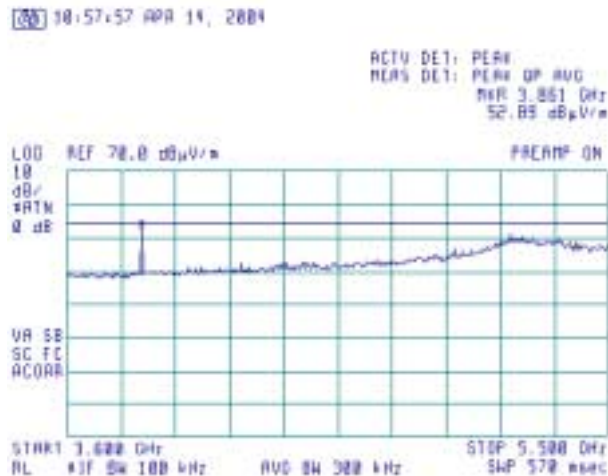
Plot 7.5.15 Radiated emission measurements at the low carrier frequency

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



Plot 7.5.16 Radiated emission measurements from 3600 to 5500 MHz at the mid carrier frequency

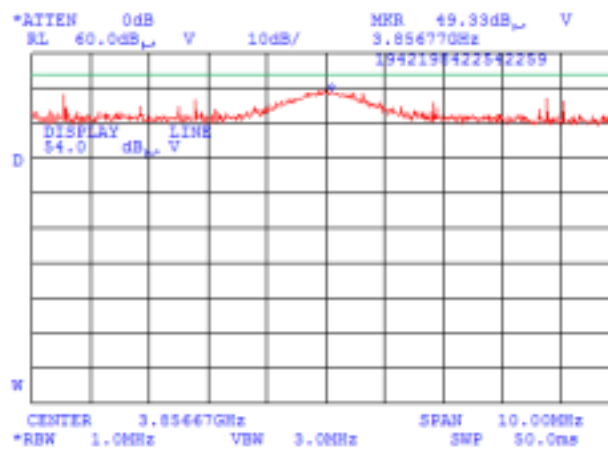
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

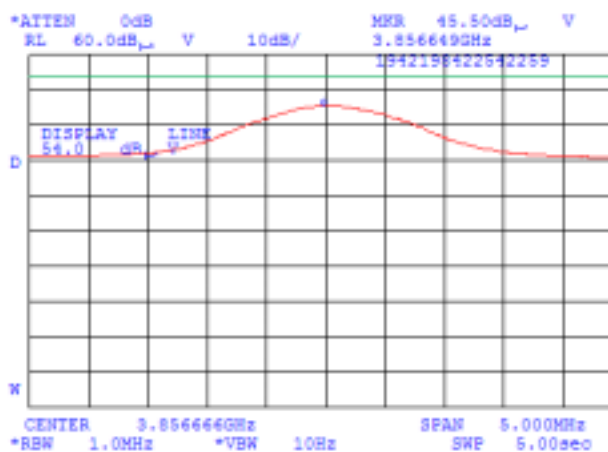
Plot 7.5.17 Radiated emission measurements at the mid carrier frequency

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



Plot 7.5.18 Radiated emission measurements at the mid carrier frequency

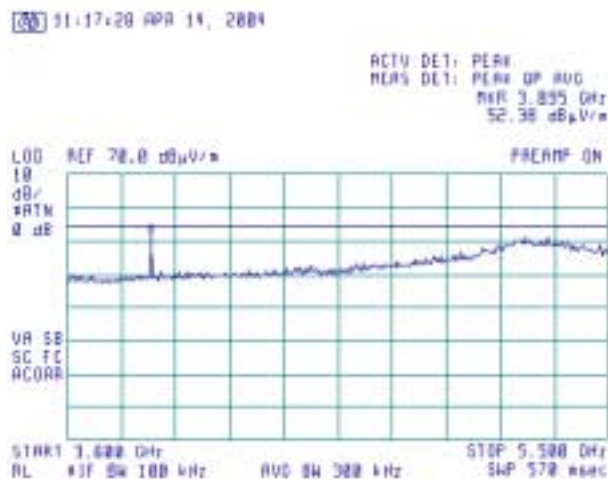
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
DETECTOR: Average



Test specification:		Section 15.247(c), Radiated spurious emissions	
Test procedure:		FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

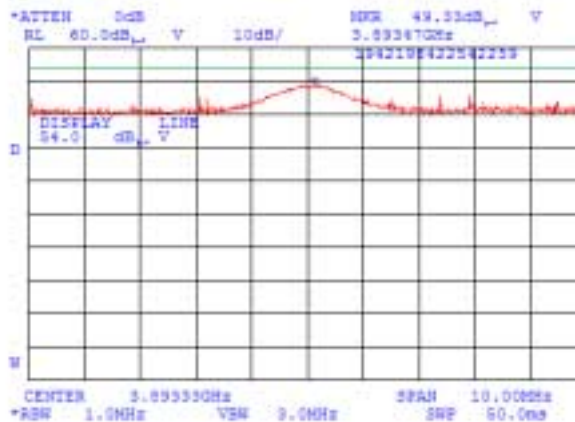
Plot 7.5.19 Radiated emission measurements from 3600 to 5500 MHz at the high carrier frequency

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



Plot 7.5.20 Radiated emission measurements at the high carrier frequency

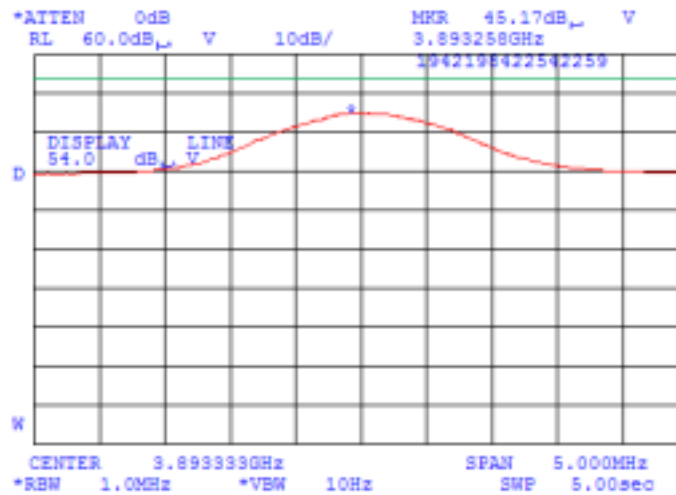
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
DETECTOR: Peak



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.21 Radiated emission measurements at the high carrier frequency

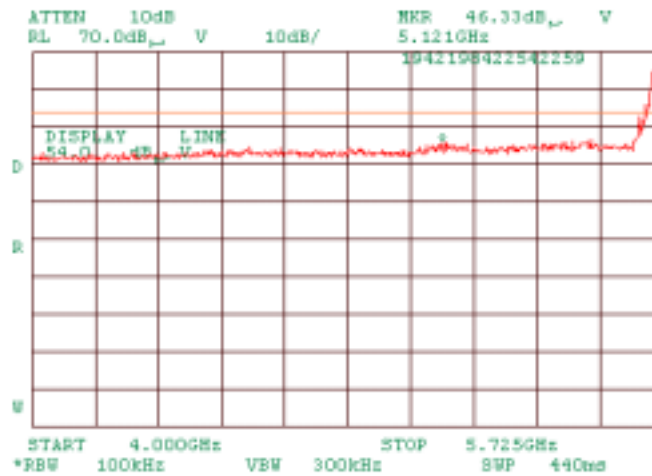
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
DETECTOR: Average



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

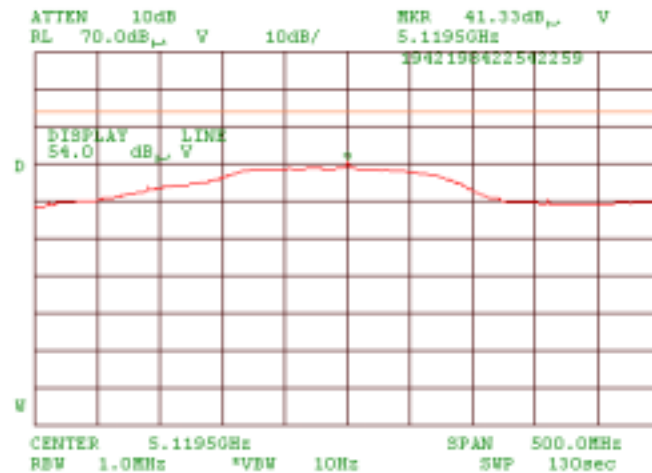
Plot 7.5.22 Radiated emission measurements from 4000 to 5725 MHz at the low carrier frequency

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



Plot 7.5.23 Radiated emission measurements at the low carrier frequency

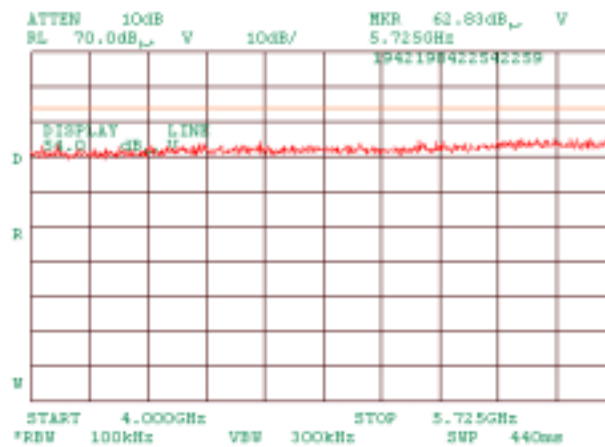
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
DETECTOR: Average



Test specification: Section 15.247(c), Radiated spurious emissions			
Test procedure: FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode: Compliance	Verdict: PASS		
Date & Time: 5/11/2004 11:50:54 AM			
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

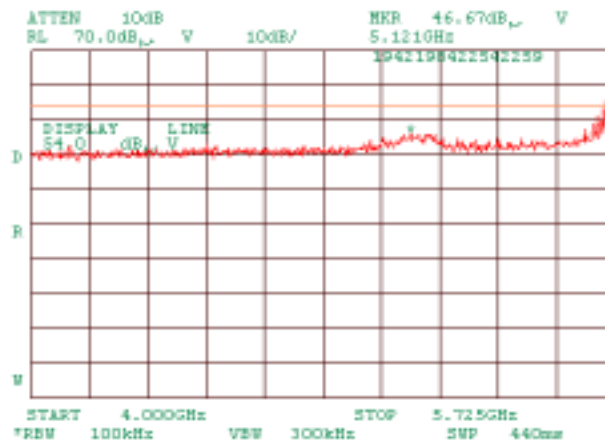
Plot 7.5.24 Radiated emission measurements at the low carrier frequency

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



Plot 7.5.25 Radiated emission measurements at the center carrier frequency

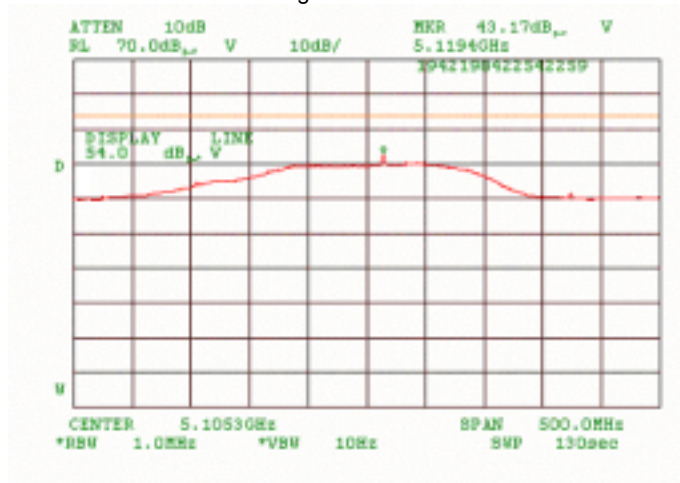
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
DETECTOR: Peak



Test specification:		Section 15.247(c), Radiated spurious emissions	
Test procedure:		FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

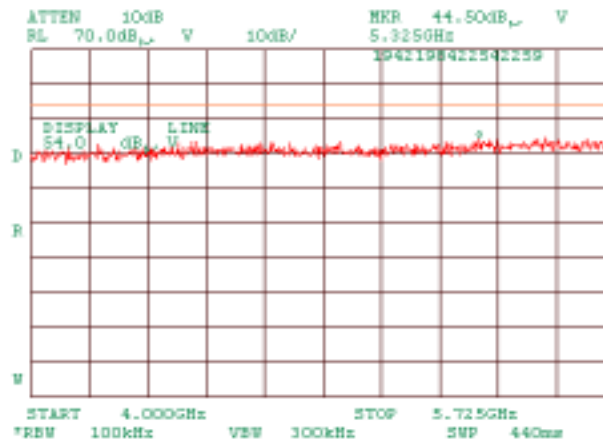
Plot 7.5.26 Radiated emission measurements at the center carrier frequency

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



Plot 7.5.27 Radiated emission measurements at the center carrier frequency

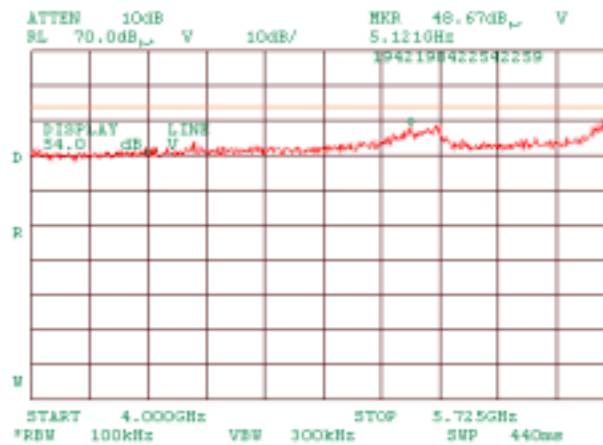
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Peak



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

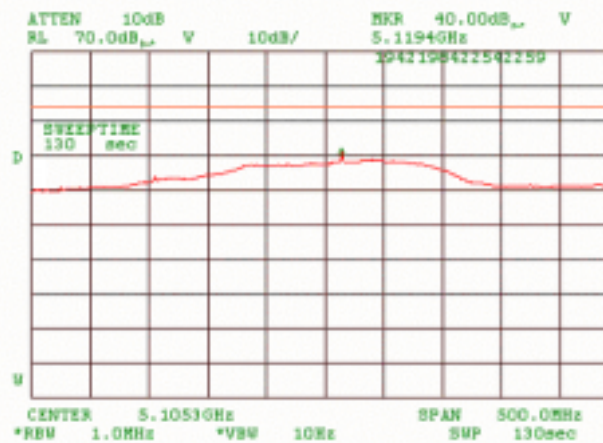
Plot 7.5.28 Radiated emission measurements at the high carrier frequency

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



Plot 7.5.29 Radiated emission measurements at the high carrier frequency

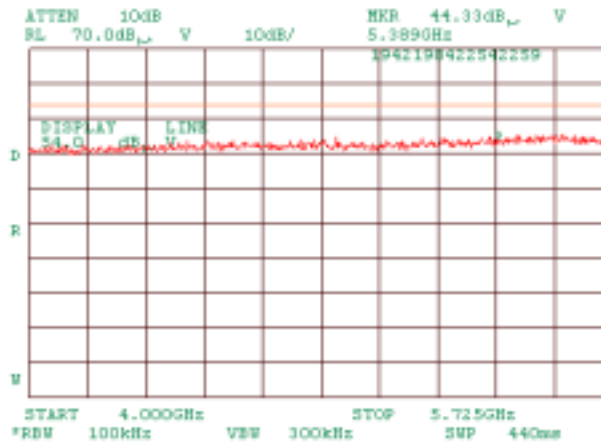
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
DETECTOR: Average



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.30 Radiated emission measurements at the high carrier frequency

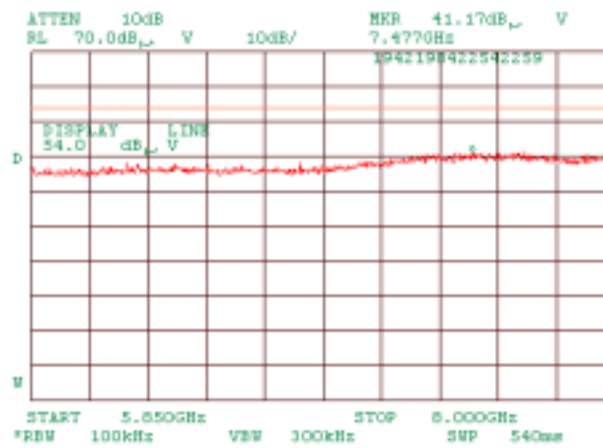
TEST SITE: OATS
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Horizontal
 DETECTOR: Peak



Test specification: Section 15.247(c), Radiated spurious emissions			
Test procedure: FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode: Compliance	Verdict: PASS		
Date & Time: 5/11/2004 11:50:54 AM			
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

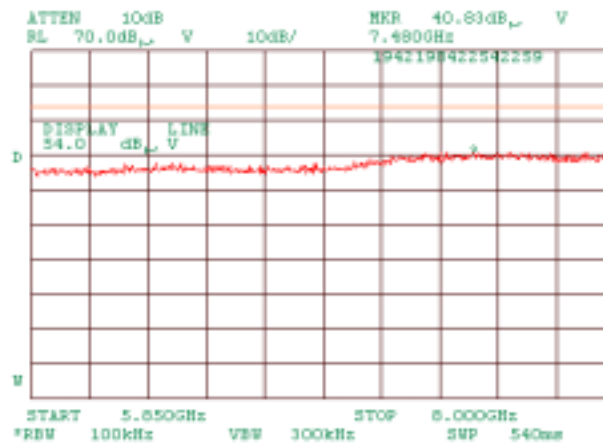
Plot 7.5.31 Radiated emission measurements at the low carrier frequency

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



Plot 7.5.32 Radiated emission measurements at the low carrier frequency

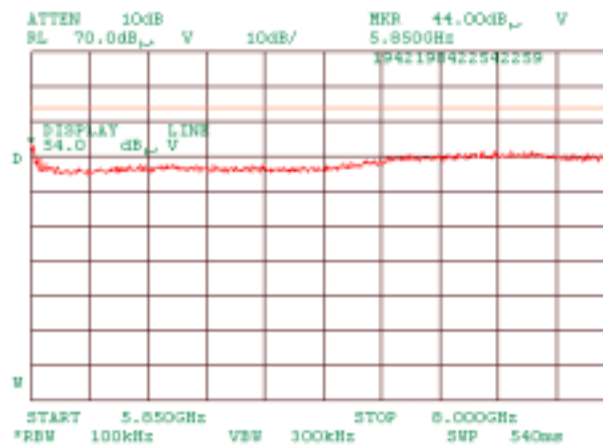
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Peak



Test specification:		Section 15.247(c), Radiated spurious emissions	
Test procedure:		FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

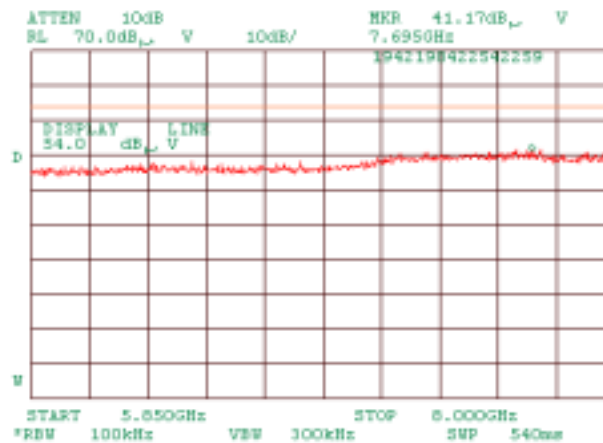
Plot 7.5.33 Radiated emission measurements at the mid carrier frequency

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



Plot 7.5.34 Radiated emission measurements at the mid carrier frequency

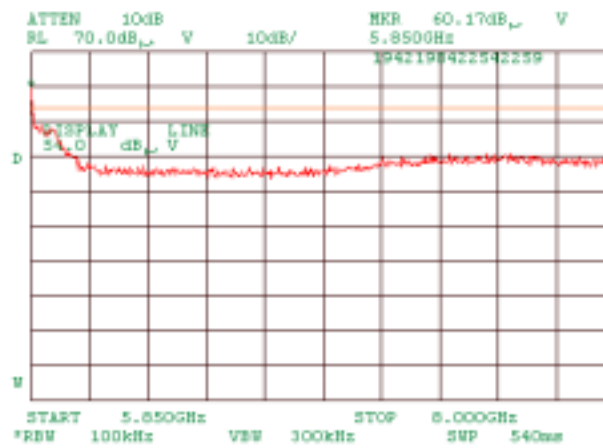
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Peak



Test specification: Section 15.247(c), Radiated spurious emissions			
Test procedure: FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode: Compliance	Verdict: PASS		
Date & Time: 5/11/2004 11:50:54 AM			
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

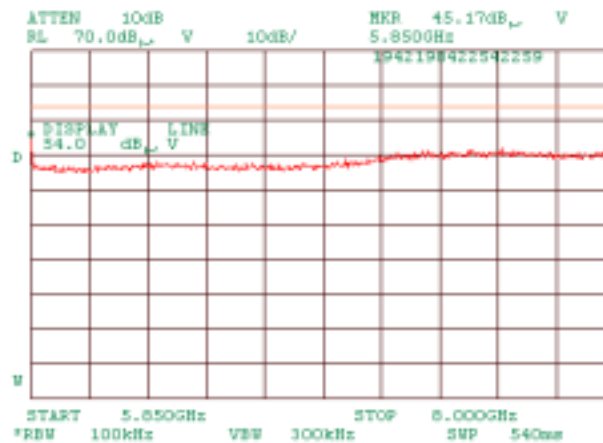
Plot 7.5.35 Radiated emission measurements at the high carrier frequency

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



Plot 7.5.36 Radiated emission measurements at the high carrier frequency

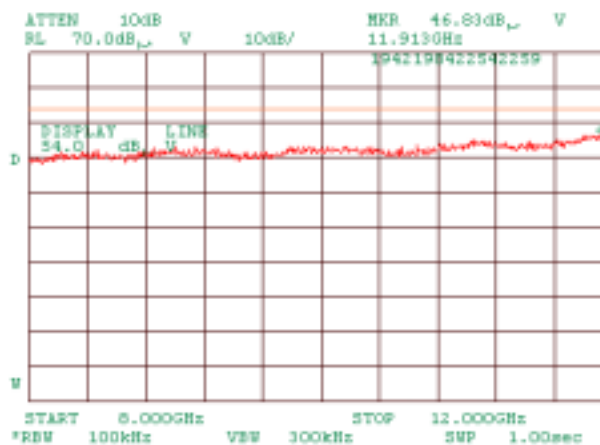
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Peak



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

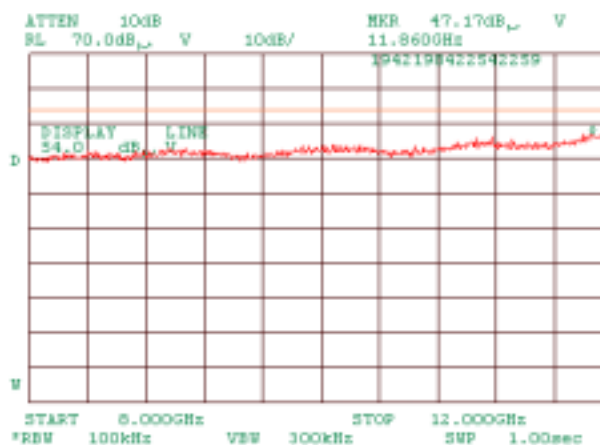
Plot 7.5.37 Radiated emission measurements at the low carrier frequency

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



Plot 7.5.38 Radiated emission measurements at the low carrier frequency

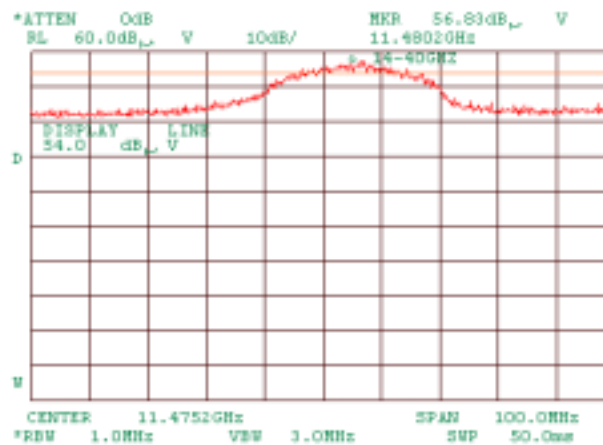
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Peak



Test specification: Section 15.247(c), Radiated spurious emissions			
Test procedure: FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode: Compliance	Verdict: PASS		
Date & Time: 5/11/2004 11:50:54 AM			
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

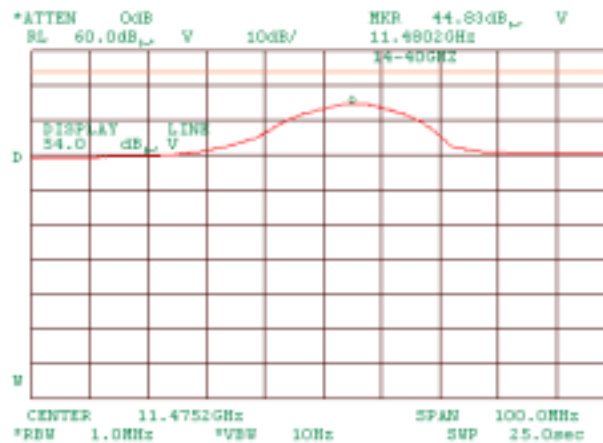
Plot 7.5.39 Radiated emission measurements at the low carrier frequency. Second harmonic

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



Plot 7.5.40 Radiated emission measurements at the low carrier frequency. Second harmonic

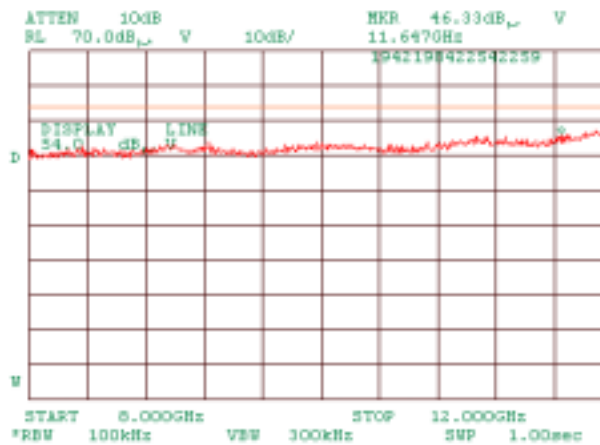
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
DETECTOR: Average



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

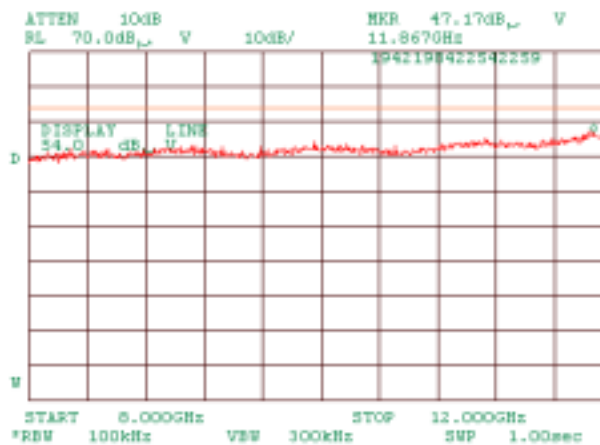
Plot 7.5.41 Radiated emission measurements at the mid carrier frequency

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



Plot 7.5.42 Radiated emission measurements at the mid carrier frequency

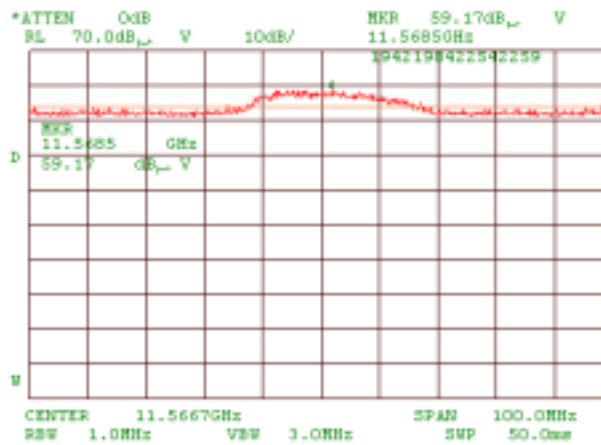
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Peak



Test specification: Section 15.247(c), Radiated spurious emissions			
Test procedure: FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode: Compliance	Verdict: PASS		
Date & Time: 5/11/2004 11:50:54 AM			
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

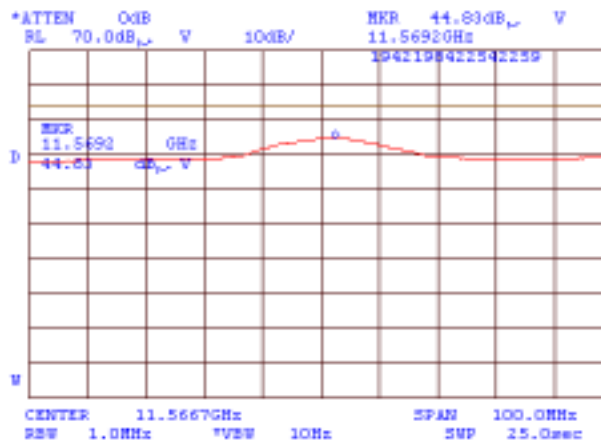
Plot 7.5.43 Radiated emission measurements at the mid carrier frequency. Second harmonic

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



Plot 7.5.44 Radiated emission measurements at the mid carrier frequency. Second harmonic

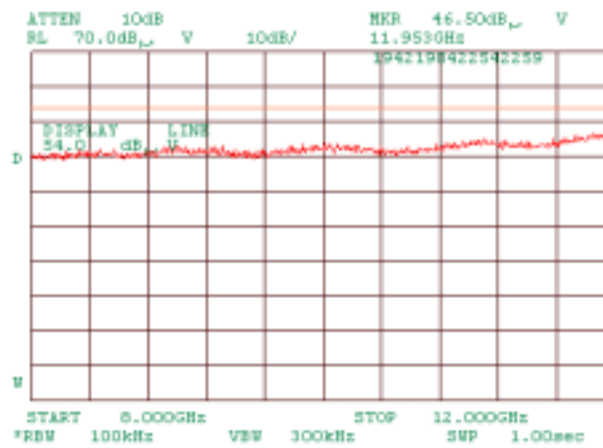
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Average



Test specification:		Section 15.247(c), Radiated spurious emissions	
Test procedure:		FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

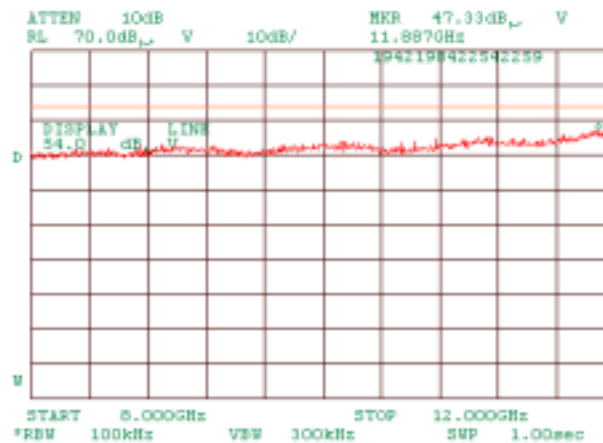
Plot 7.5.45 Radiated emission measurements at the high carrier frequency

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



Plot 7.5.46 Radiated emission measurements at the high carrier frequency

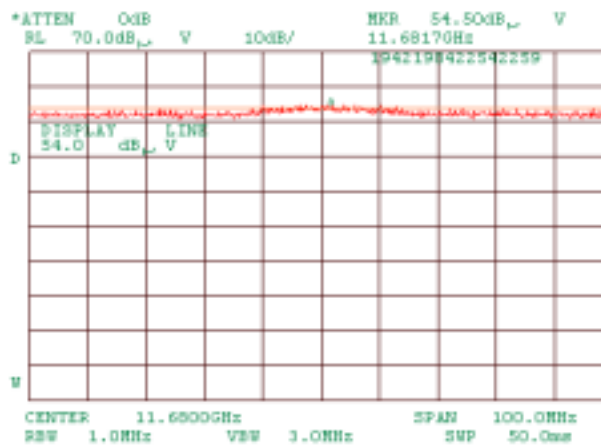
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Peak



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

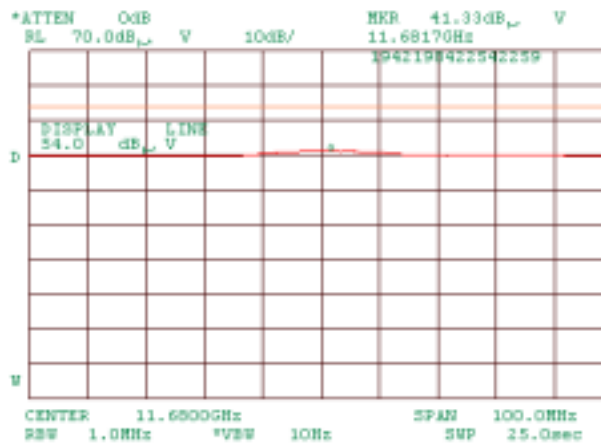
Plot 7.5.47 Radiated emission measurements at the high carrier frequency. Second harmonic

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



Plot 7.5.48 Radiated emission measurements at the high carrier frequency. Second harmonic

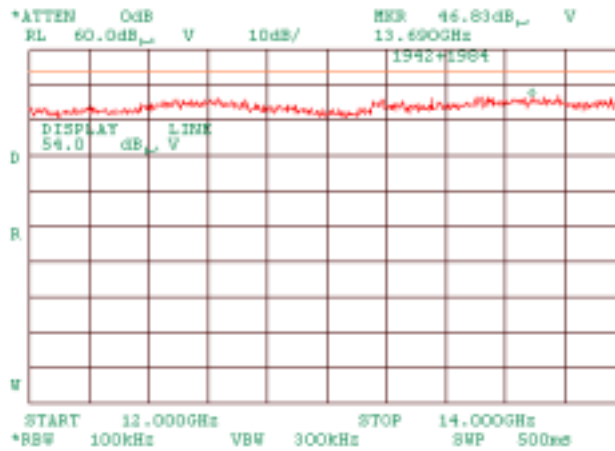
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Peak



Test specification:		Section 15.247(c), Radiated spurious emissions	
Test procedure:		FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

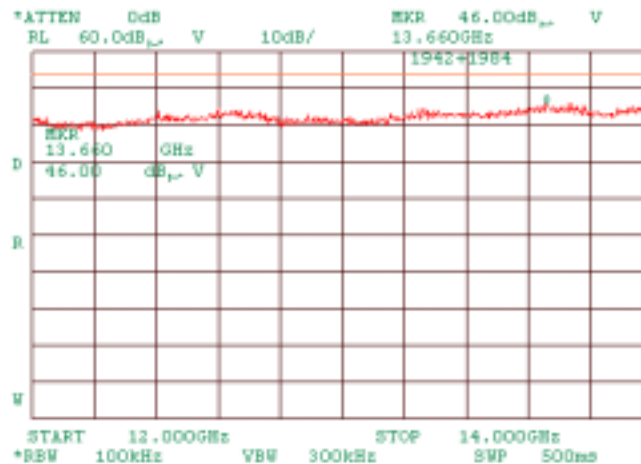
Plot 7.5.49 Radiated emission measurements at the low carrier frequency

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



Plot 7.5.50 Radiated emission measurements at the low carrier frequency

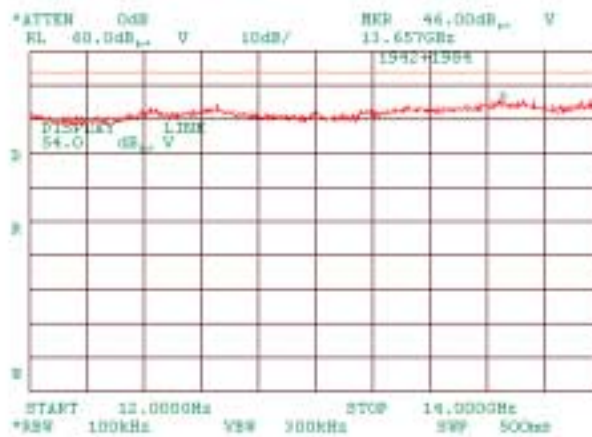
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Peak



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

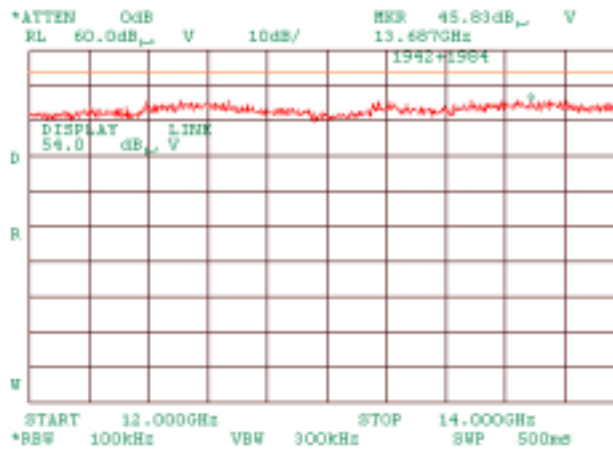
Plot 7.5.51 Radiated emission measurements at the mid carrier frequency

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



Plot 7.5.52 Radiated emission measurements at the mid carrier frequency

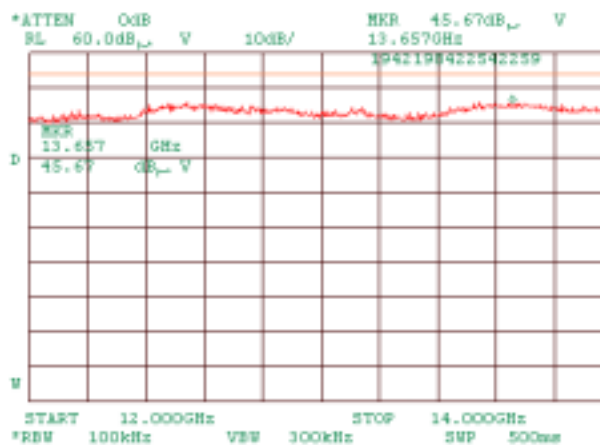
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Peak



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

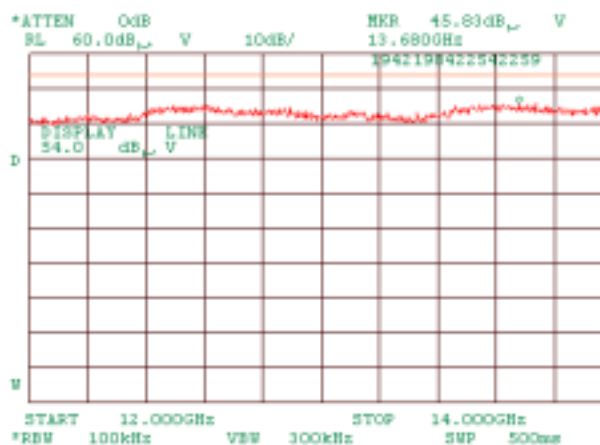
Plot 7.5.53 Radiated emission measurements at the high carrier frequency

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



Plot 7.5.54 Radiated emission measurements at the high carrier frequency

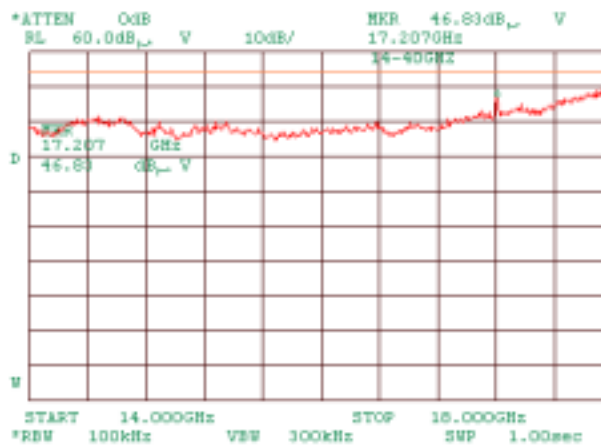
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Peak



Test specification: Section 15.247(c), Radiated spurious emissions			
Test procedure: FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode: Compliance	Verdict: PASS		
Date & Time: 5/11/2004 11:50:54 AM			
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

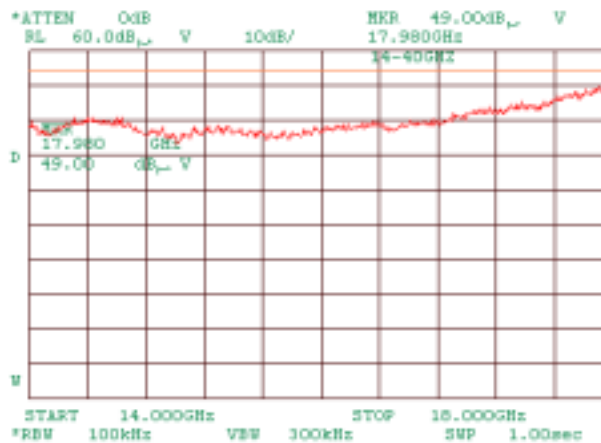
Plot 7.5.55 Radiated emission measurements at the low carrier frequency

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



Plot 7.5.56 Radiated emission measurements at the low carrier frequency

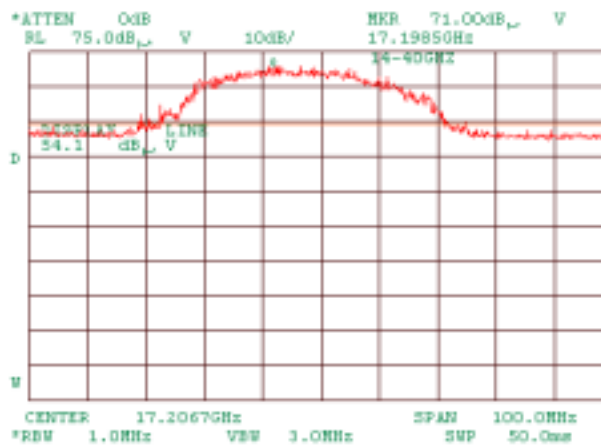
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Peak



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

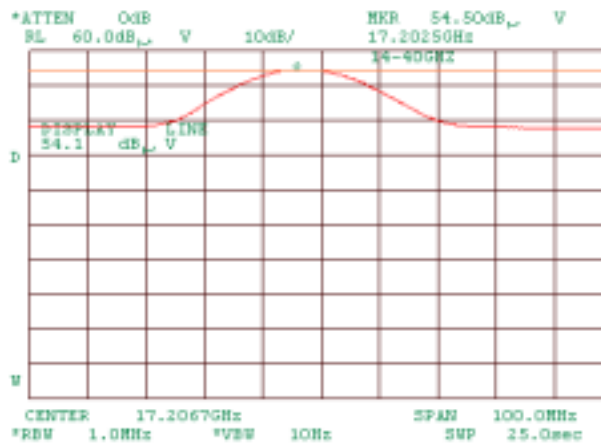
Plot 7.5.57 Radiated emission measurements at the low carrier frequency. Third harmonic

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



Plot 7.5.58 Radiated emission measurements at the low carrier frequency Third harmonic

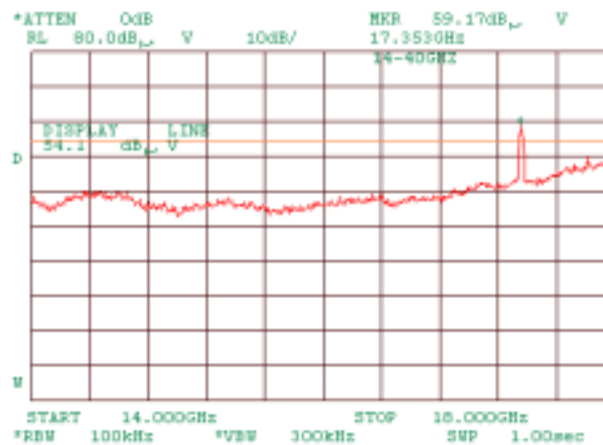
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
DETECTOR: Average



Test specification:		Section 15.247(c), Radiated spurious emissions	
Test procedure:		FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

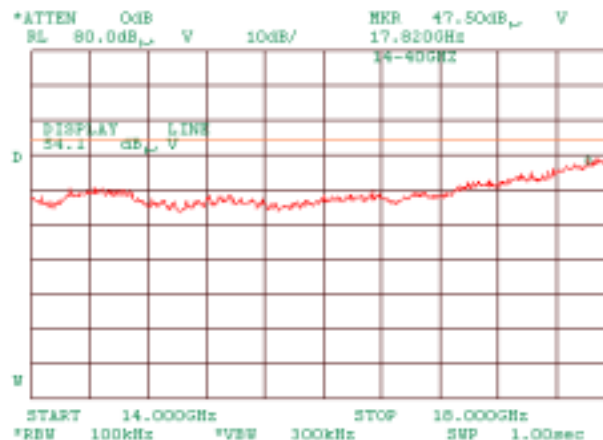
Plot 7.5.59 Radiated emission measurements at the mid carrier frequency

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



Plot 7.5.60 Radiated emission measurements at the mid carrier frequency

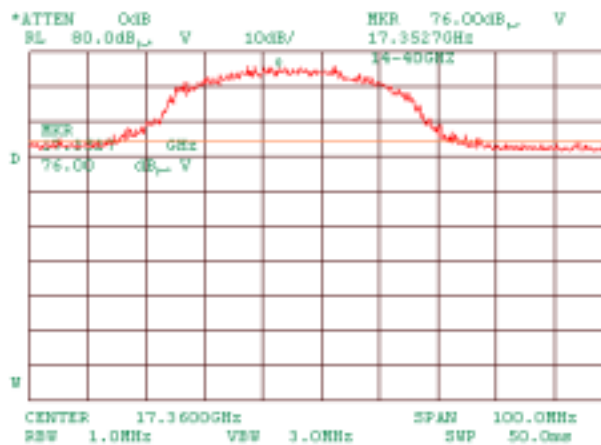
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Peak



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

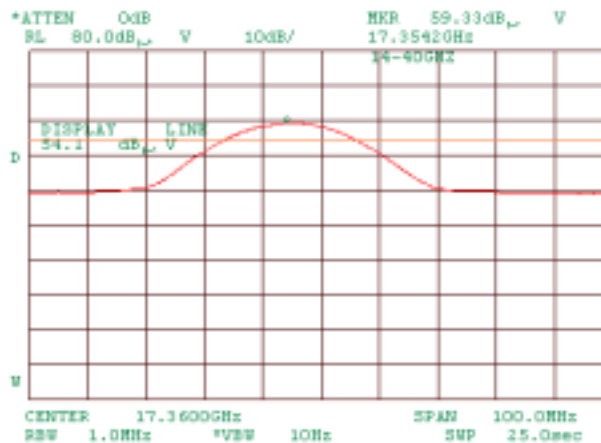
Plot 7.5.61 Radiated emission measurements at the mid carrier frequency Third harmonic

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



Plot 7.5.62 Radiated emission measurements at the mid carrier frequency Third harmonic

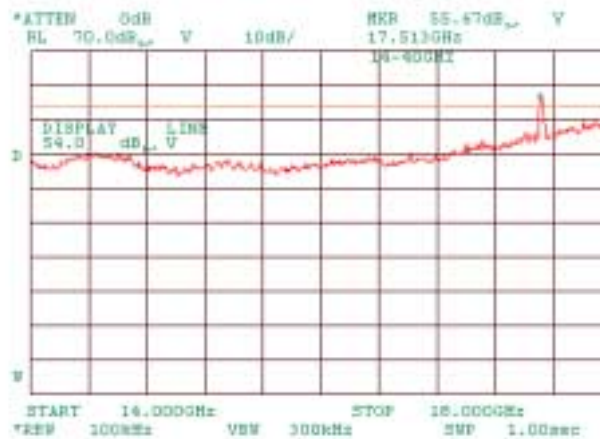
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
DETECTOR: Average



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

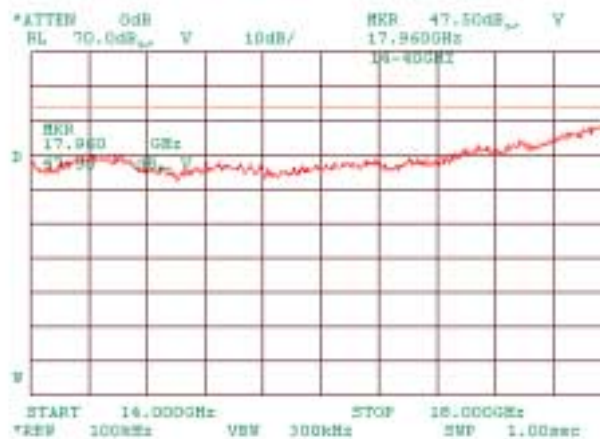
Plot 7.5.63 Radiated emission measurements at the high carrier frequency

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



Plot 7.5.64 Radiated emission measurements at the high carrier frequency

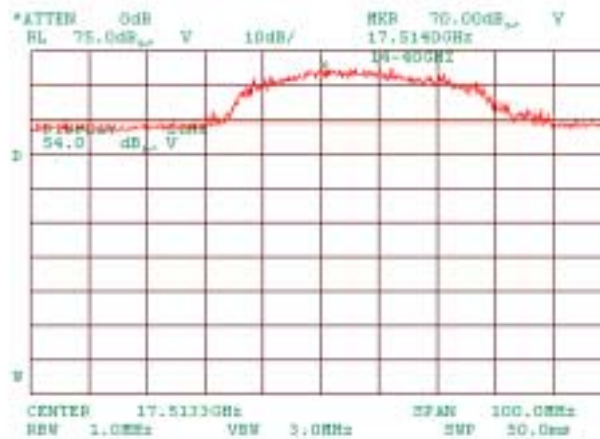
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Peak



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

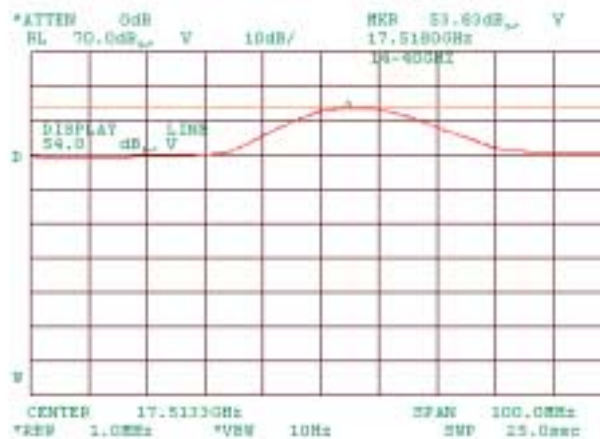
Plot 7.5.65 Radiated emission measurements at the high carrier frequency Third harmonic

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



Plot 7.5.66 Radiated emission measurements at the high carrier frequency Third harmonic

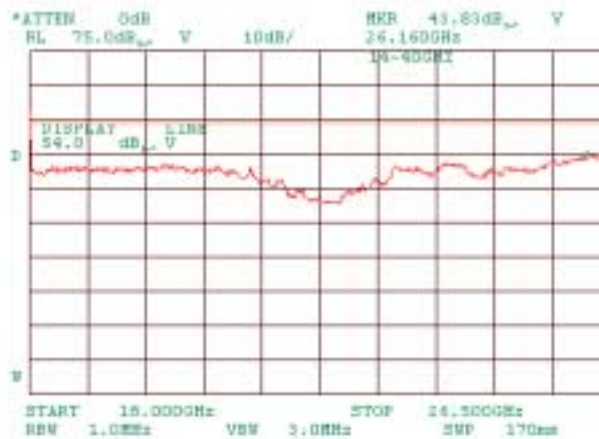
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
DETECTOR: Average



Test specification:		Section 15.247(c), Radiated spurious emissions	
Test procedure:		FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

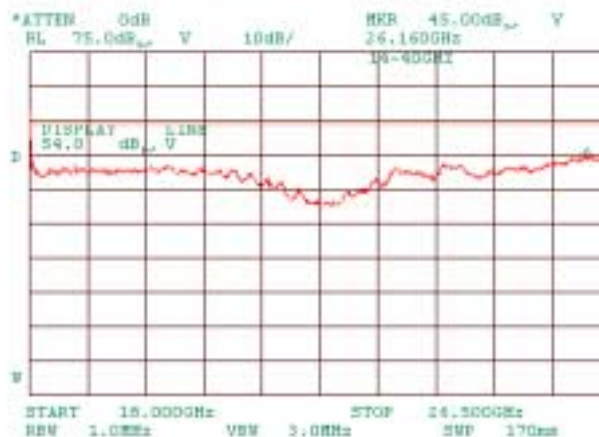
Plot 7.5.67 Radiated emission measurements at the low carrier frequency

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



Plot 7.5.68 Radiated emission measurements at the low carrier frequency

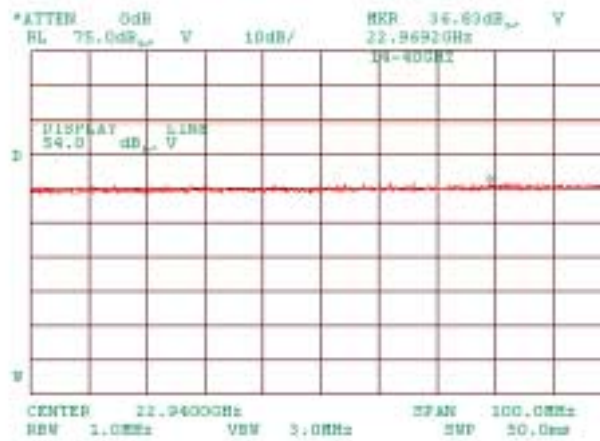
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Peak



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.69 Radiated emission measurements at the low carrier frequency, fourth harmonic

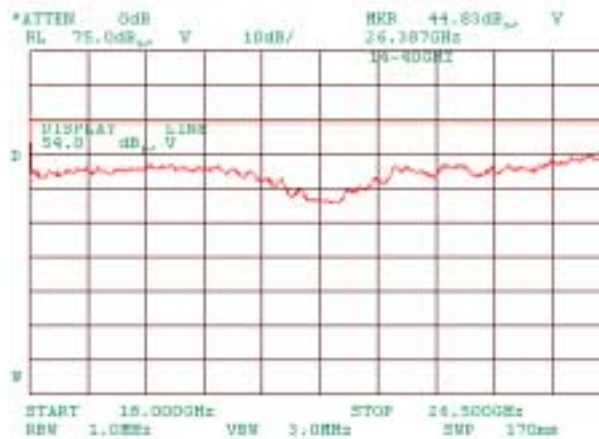
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
DETECTOR: Peak



Test specification:		Section 15.247(c), Radiated spurious emissions	
Test procedure:		FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

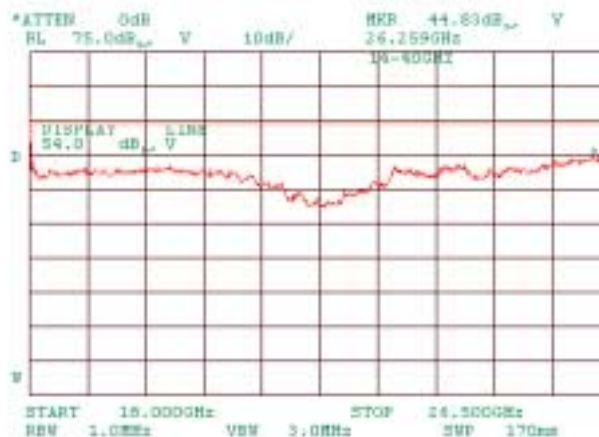
Plot 7.5.70 Radiated emission measurements at the mid carrier frequency

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



Plot 7.5.71 Radiated emission measurements at the mid carrier frequency

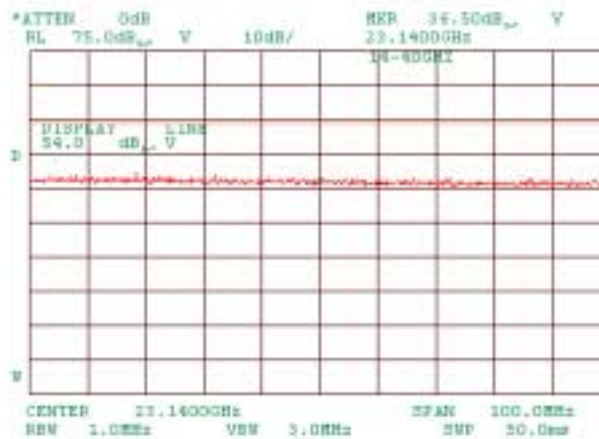
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Peak



Test specification:		Section 15.247(c), Radiated spurious emissions	
Test procedure:		FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.72 Radiated emission measurements at the mid carrier frequency, fourth harmonic

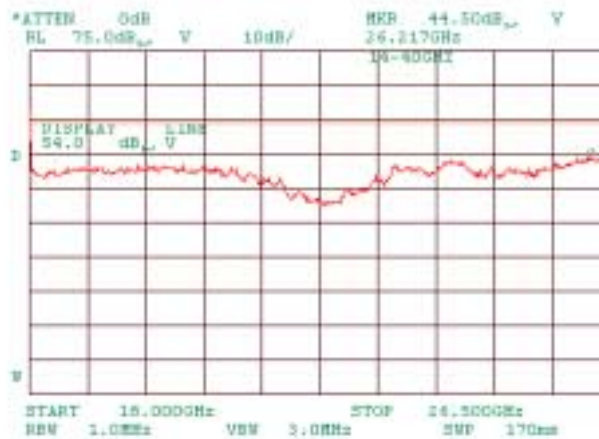
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
DETECTOR: Peak



Test specification:		Section 15.247(c), Radiated spurious emissions	
Test procedure:		FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

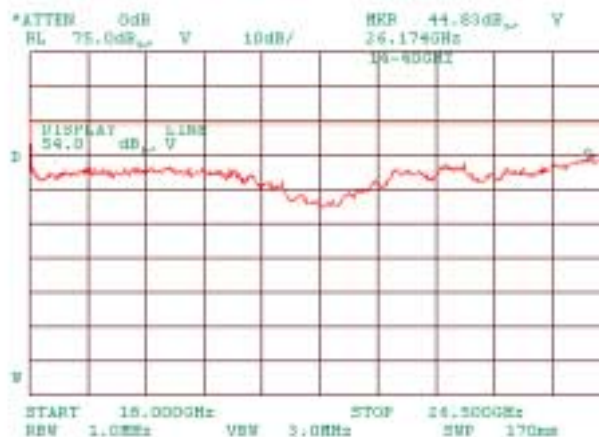
Plot 7.5.73 Radiated emission measurements at the high carrier frequency

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



Plot 7.5.74 Radiated emission measurements at the high carrier frequency

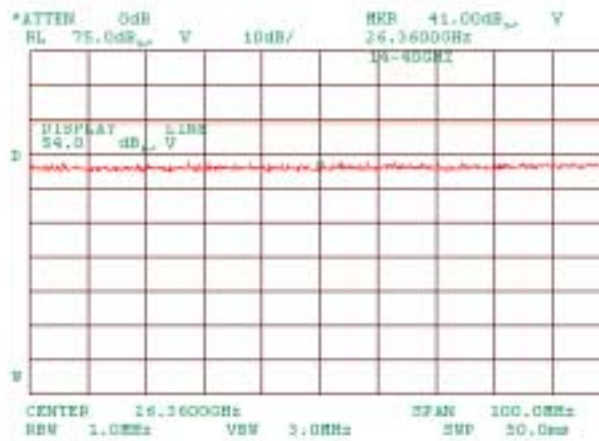
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Peak



Test specification:		Section 15.247(c), Radiated spurious emissions	
Test procedure:		FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.75 Radiated emission measurements at the high carrier frequency, fourth harmonic

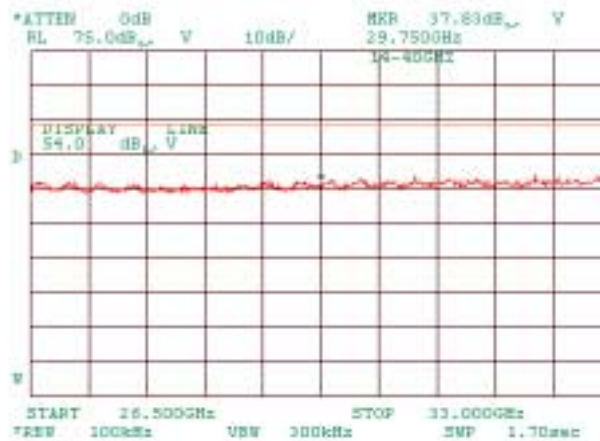
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
DETECTOR: Peak



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

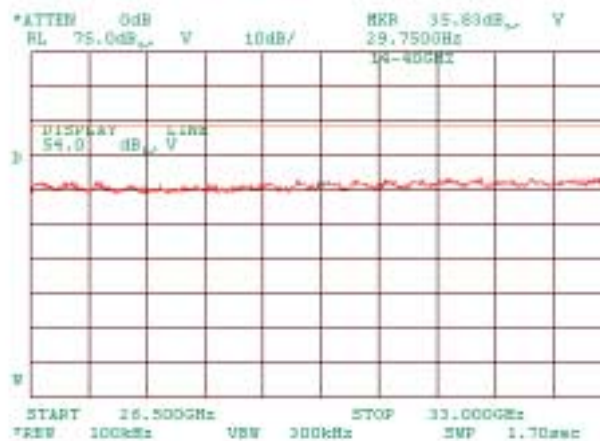
Plot 7.5.76 Radiated emission measurements at the low carrier frequency

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



Plot 7.5.77 Radiated emission measurements at the low carrier frequency

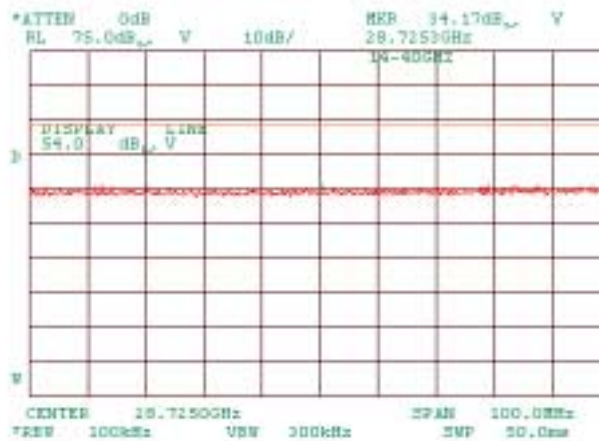
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Peak



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.78 Radiated emission measurements at the low carrier frequency. Fifth harmonic

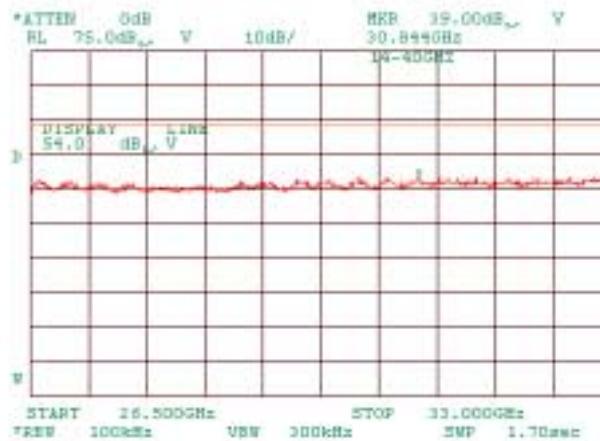
TEST SITE: OATS
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical
 DETECTOR: Peak



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

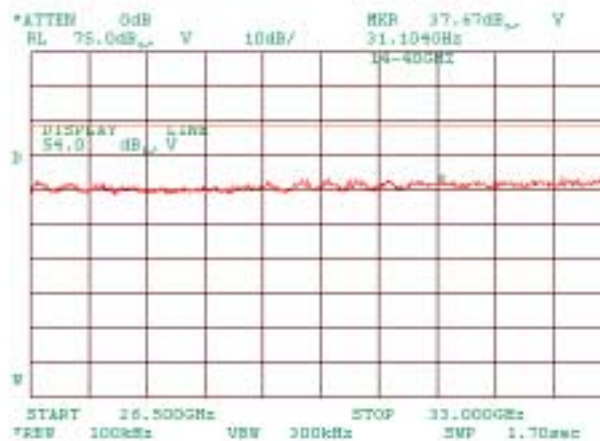
Plot 7.5.79 Radiated emission measurements at the mid carrier frequency

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



Plot 7.5.80 Radiated emission measurements at the mid carrier frequency

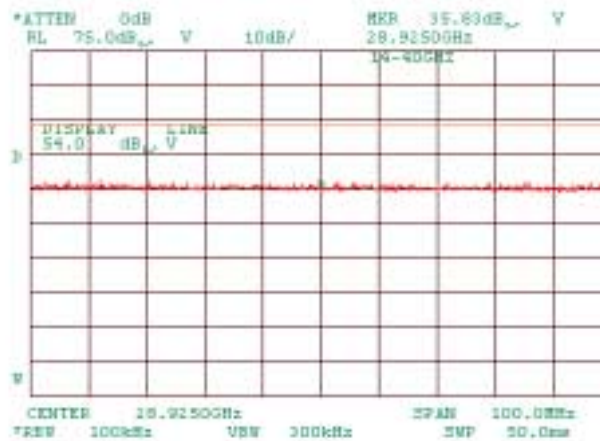
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Peak



Test specification:		Section 15.247(c), Radiated spurious emissions	
Test procedure:		FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.81 Radiated emission measurements at the mid carrier frequency. Fifth harmonic

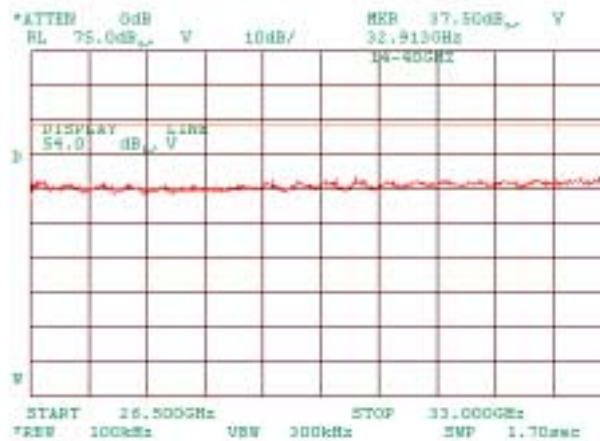
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
DETECTOR: Peak



Test specification:		Section 15.247(c), Radiated spurious emissions	
Test procedure:		FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

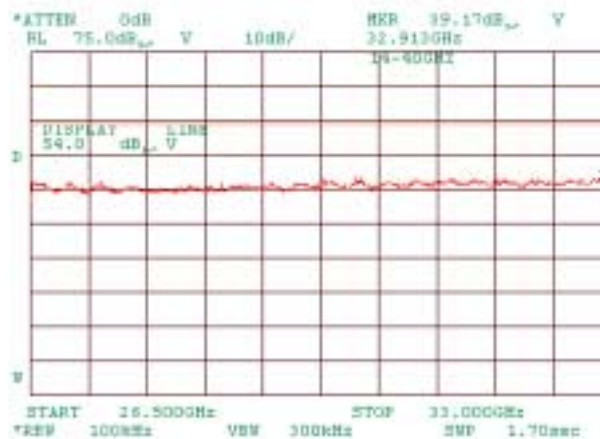
Plot 7.5.82 Radiated emission measurements at the high carrier frequency

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



Plot 7.5.83 Radiated emission measurements at the high carrier frequency

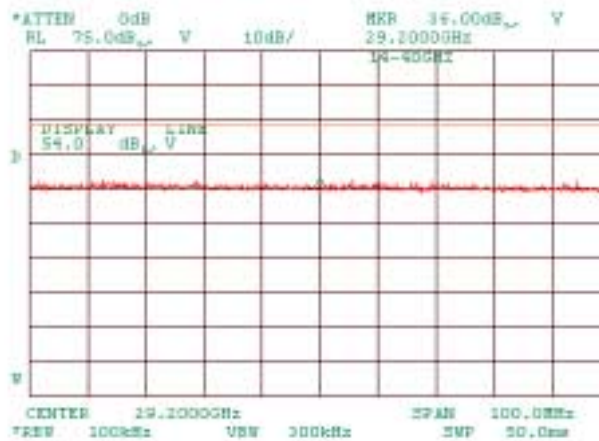
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Peak



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.84 Radiated emission measurements at the high carrier frequency. Fifth harmonic

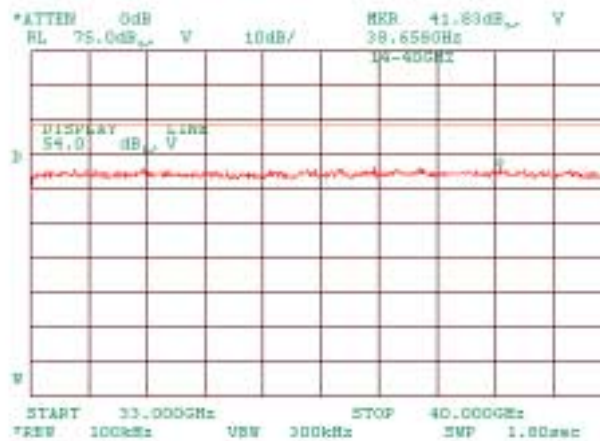
TEST SITE: OATS
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and horizontal
 DETECTOR: Peak



Test specification:		Section 15.247(c), Radiated spurious emissions	
Test procedure:		FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

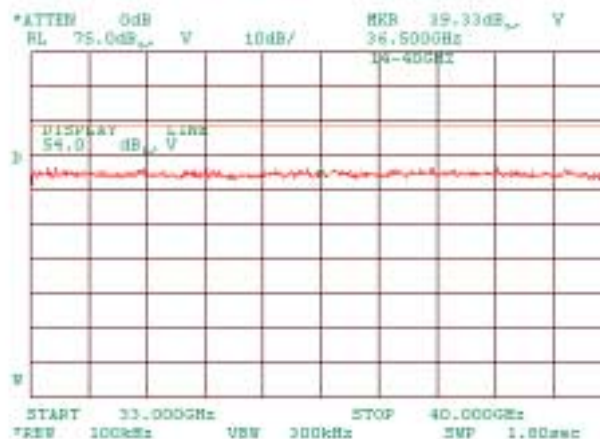
Plot 7.5.85 Radiated emission measurements at the low carrier frequency

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



Plot 7.5.86 Radiated emission measurements at the low carrier frequency

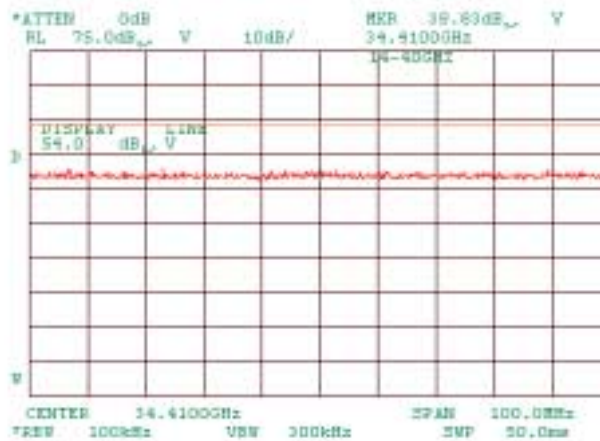
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Peak



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.87 Radiated emission measurements at the low carrier frequency. Sixth harmonic

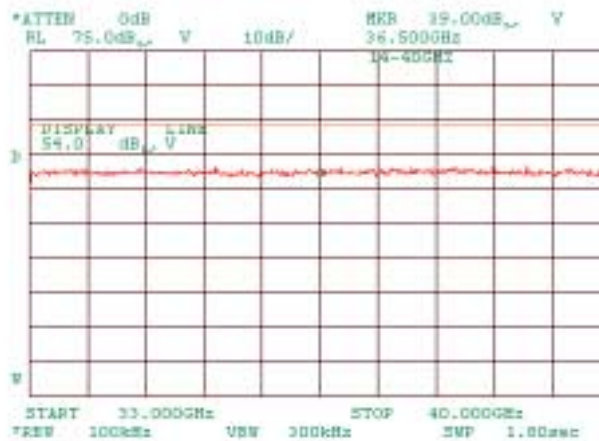
TEST SITE: OATS
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical
 DETECTOR: Peak



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

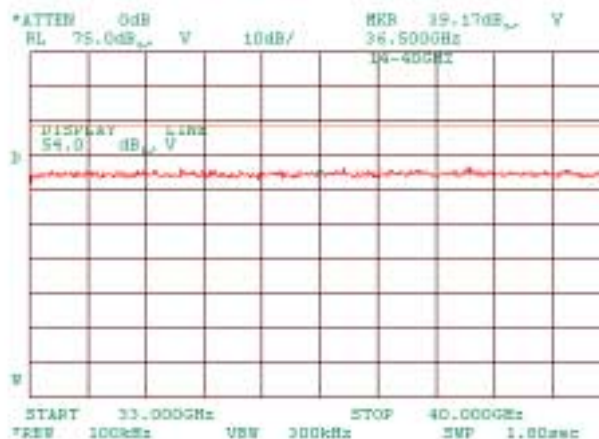
Plot 7.5.88 Radiated emission measurements at the mid carrier frequency

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



Plot 7.5.89 Radiated emission measurements at the mid carrier frequency

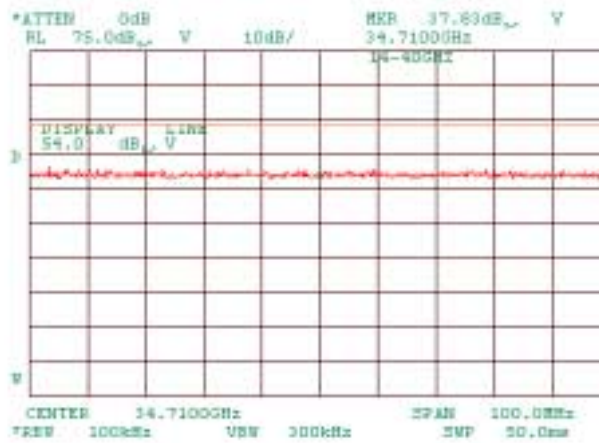
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Peak



Test specification:		Section 15.247(c), Radiated spurious emissions	
Test procedure:		FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.90 Radiated emission measurements at the mid carrier frequency. Sixth harmonic.

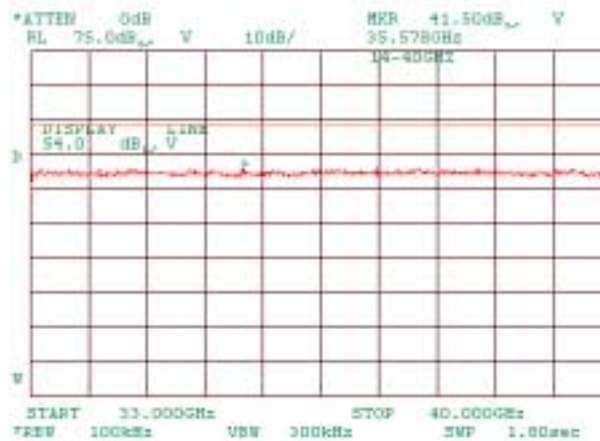
TEST SITE: OATS
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical
 DETECTOR: Peak



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

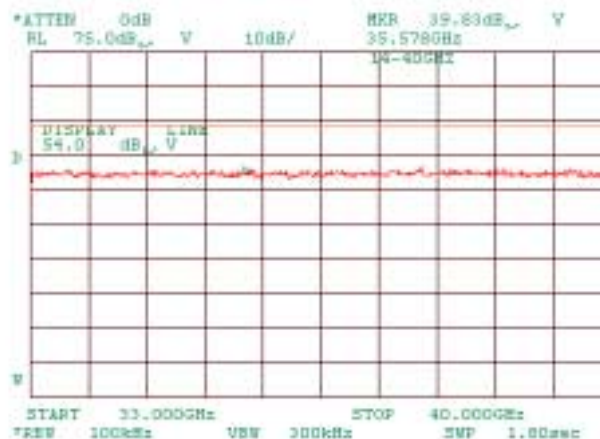
Plot 7.5.91 Radiated emission measurements at the high carrier frequency

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



Plot 7.5.92 Radiated emission measurements at the high carrier frequency

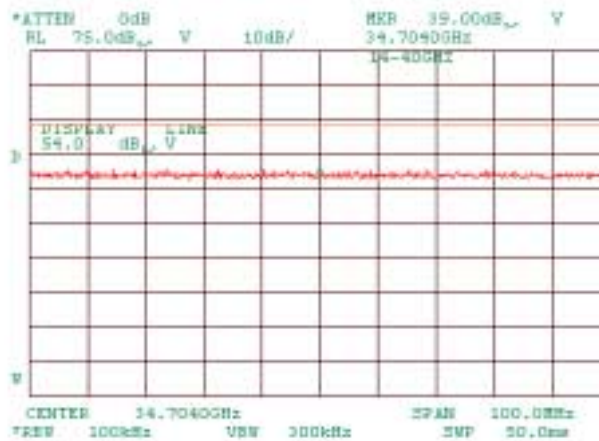
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Peak



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 11:50:54 AM		
Temperature: 24 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.93 Radiated emission measurements at the high carrier frequency. Sixth harmonic

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



Test specification:		Section 15.247(d), Peak power density	
Test procedure:		FR Vol. 62, page 26243, Section 15.247(d)	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 12:06:15 PM		
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 55 %	Power Supply: 48 VDC
Remarks:			

7.6 Peak spectral power density

7.6.1 General

This test was performed to measure the peak spectral power density at the transmitter RF antenna connector. Specification test limits are given in Table 7.6.1.

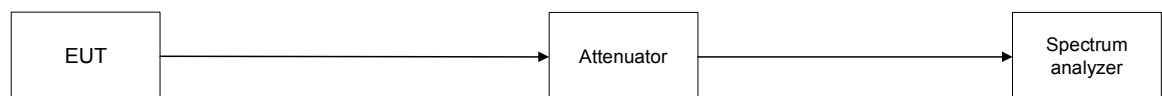
Table 7.6.1 Peak spectral power density limits

Assigned frequency range, MHz	Measurement bandwidth, kHz	Peak spectral power density, dBm
5725 - 5850	3.0	8.0

7.6.2 Test procedure

- 7.6.2.1** The EUT was set up as shown in Figure 7.6.1, energized and its proper operation was checked.
- 7.6.2.2** The EUT was adjusted to produce maximum available to end user RF output power.
- 7.6.2.3** 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.
- 7.6.2.4** 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 7.6.2 and associated plots.

Figure 7.6.1 Peak spectral power density test setup



Test specification:	Section 15.247(d), Peak power density		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 12:06:15 PM		
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 55 %	Power Supply: 48 VDC
Remarks:			

Table 7.6.2 Peak spectral power density test results

FREQUENCY RANGE: 5740 - 5835 MHz
 MODULATION: QAM
 MODULATING SIGNAL: PRBS
 BIT RATE: 6 Mbps (worst case)
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 TRANSMITTER OUTPUT POWER: 21.36 dBm at low carrier frequency
 21.17 dBm at mid carrier frequency
 20.87 dBm at high carrier frequency
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 3 kHz
 VIDEO BANDWIDTH: 10 kHz

Carrier frequency, MHz	Spectrum analyzer reading, dBm	External attenuation, dB	Cable loss, dB	Peak power density, dB(mW/3 kHz)	Limit, dBm	Margin*, dB	Verdict
5740	-9.17	0	0	-9.17	8	17.17	Pass
5785	-9.00	0	0	-9.00	8	17.00	Pass
5835	-11.00	0	0	-11.00	8	19.00	Pass

* - Margin = Peak power density – specification limit.

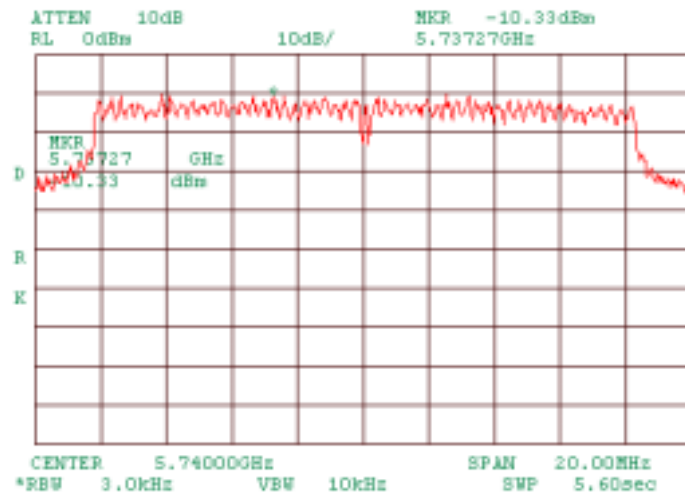
Reference numbers of test equipment used

HL 1424	HL 1650	HL 2254				
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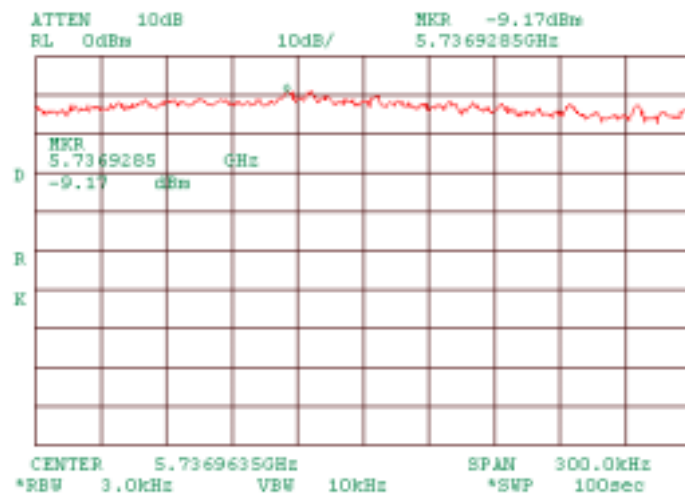
Full description is given in Appendix A.

Test specification:	Section 15.247(d), Peak power density		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 12:06:15 PM		
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 55 %	Power Supply: 48 VDC
Remarks:			

Plot 7.6.1 Peak spectral power density at low frequency within 6 dB band and data rate 6 Mbps

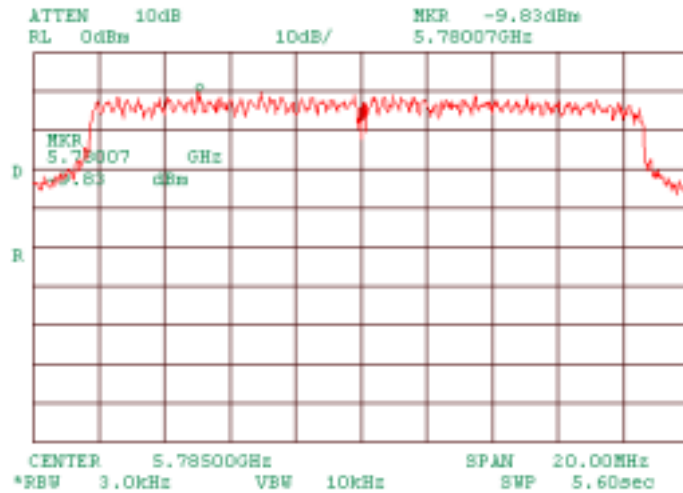


Plot 7.6.2 Peak spectral power density at low frequency zoomed at the peak and data rate 6 Mbps

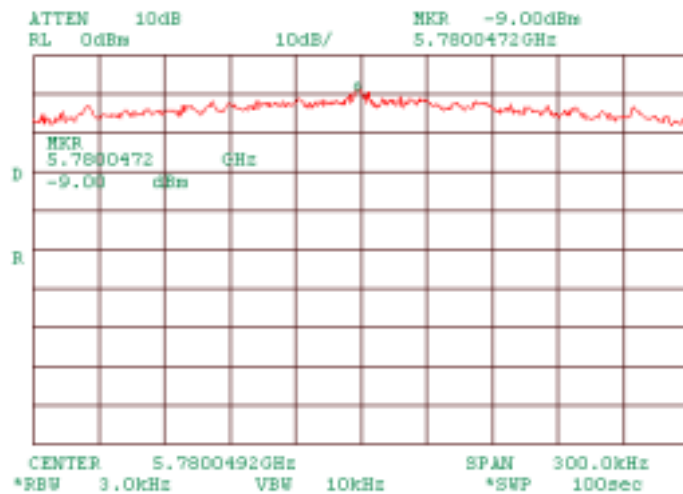


Test specification:	Section 15.247(d), Peak power density		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 12:06:15 PM		
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 55 %	Power Supply: 48 VDC
Remarks:			

Plot 7.6.3 Peak spectral power density at mid frequency within 6 dB band and data rate 6 Mbps

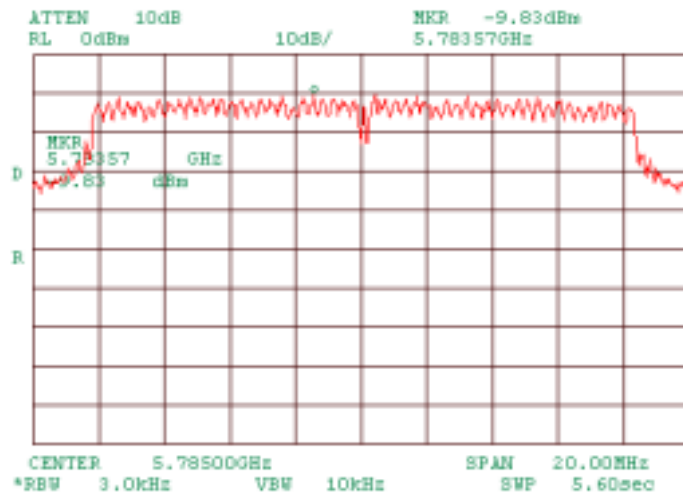


Plot 7.6.4 Peak spectral power density at mid frequency zoomed at the peak and data rate 6 Mbps

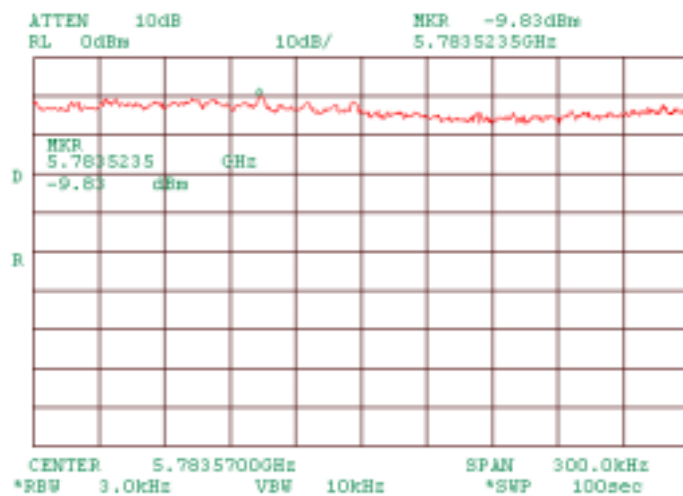


Test specification:	Section 15.247(d), Peak power density		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 12:06:15 PM		
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 55 %	Power Supply: 48 VDC
Remarks:			

Plot 7.6.5 Peak spectral power density at mid frequency within 6 dB band and data rate 9 Mbps

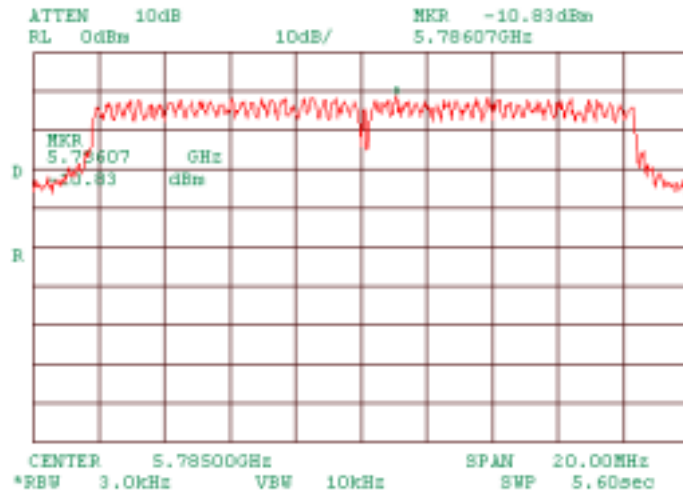


Plot 7.6.6 Peak spectral power density at mid frequency zoomed at the peak and data rate 9 Mbps

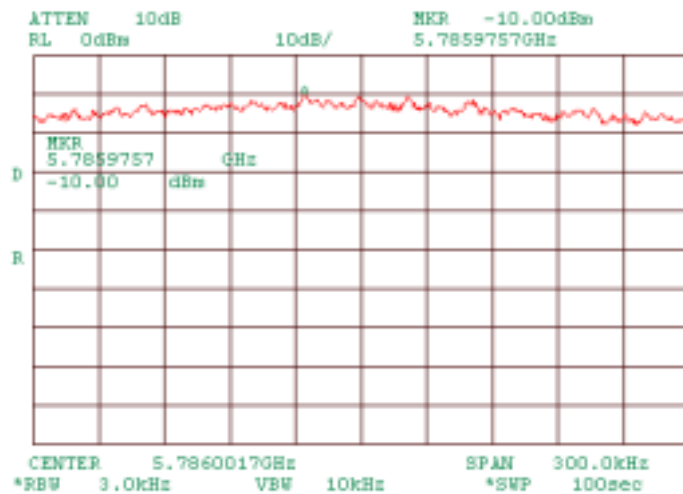


Test specification:	Section 15.247(d), Peak power density		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 12:06:15 PM		
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 55 %	Power Supply: 48 VDC
Remarks:			

Plot 7.6.7 Peak spectral power density at mid frequency within 6 dB band and data rate 12 Mbps

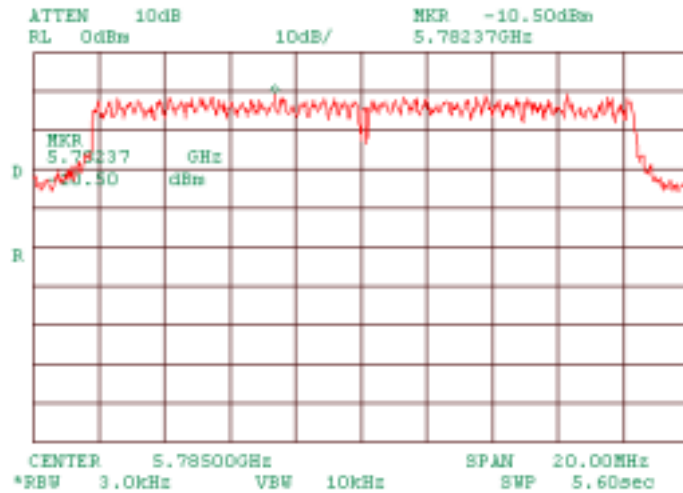


Plot 7.6.8 Peak spectral power density at mid frequency zoomed at the peak and data rate 12 Mbps

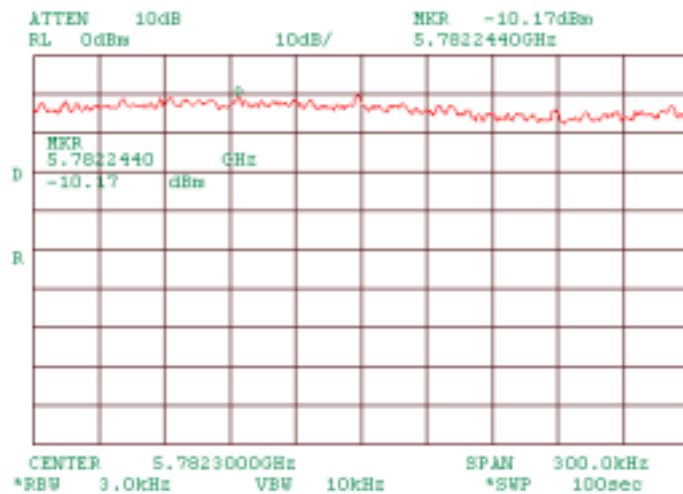


Test specification:	Section 15.247(d), Peak power density		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 12:06:15 PM		
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 55 %	Power Supply: 48 VDC
Remarks:			

Plot 7.6.9 Peak spectral power density at mid frequency within 6 dB band and data rate 18 Mbps

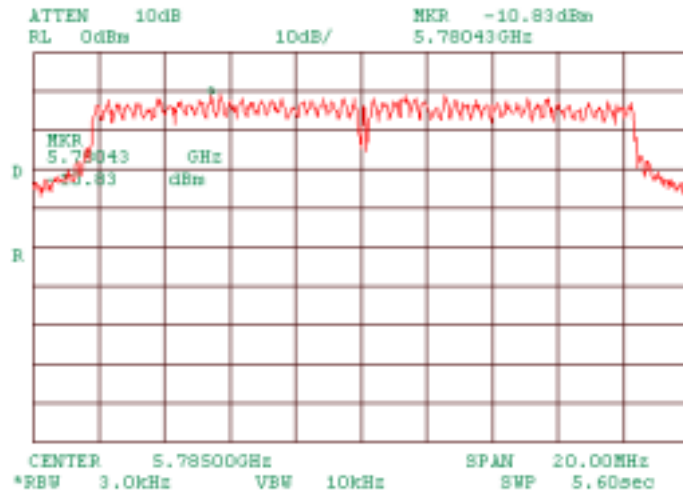


Plot 7.6.10 Peak spectral power density at mid frequency zoomed at the peak and data rate 18 Mbps

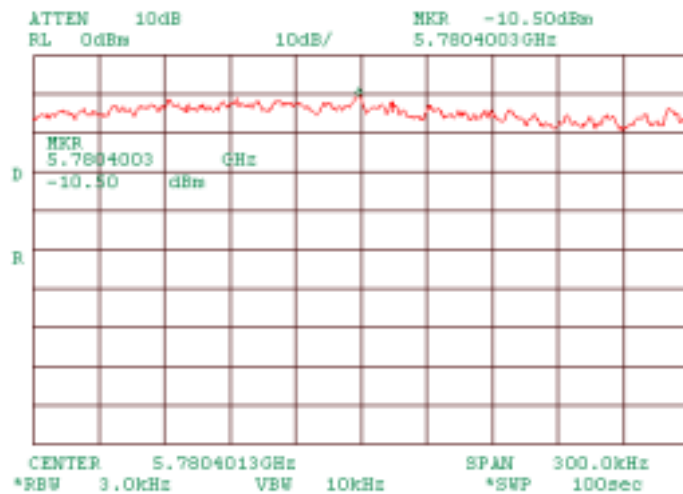


Test specification:	Section 15.247(d), Peak power density		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 12:06:15 PM		
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 55 %	Power Supply: 48 VDC
Remarks:			

Plot 7.6.11 Peak spectral power density at mid frequency within 6 dB band and data rate 24 Mbps

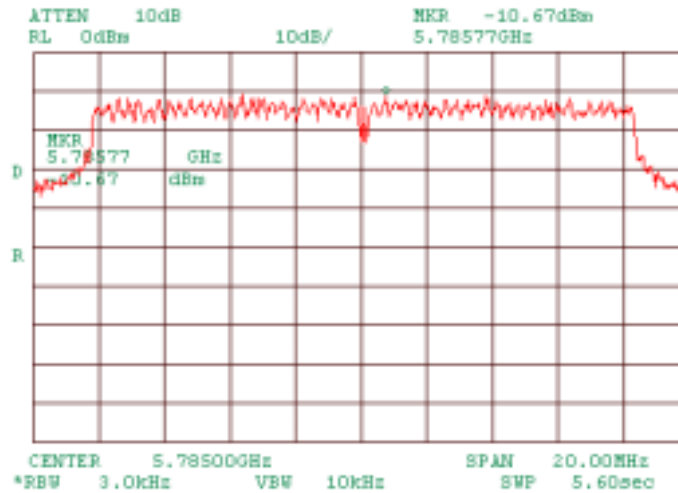


Plot 7.6.12 Peak spectral power density at mid frequency zoomed at the peak and data rate 24 Mbps

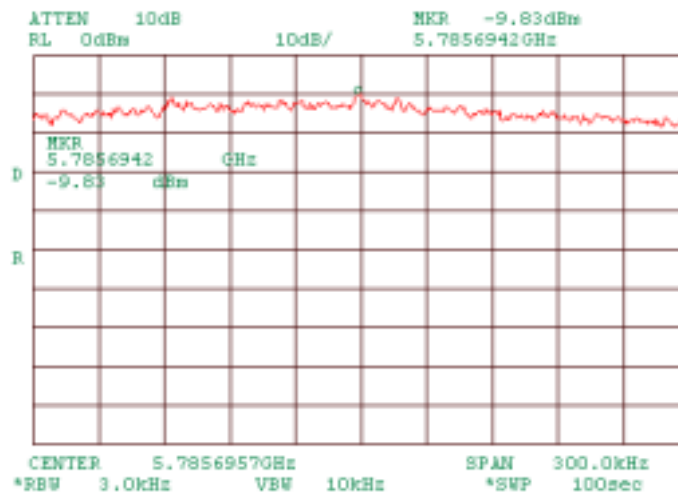


Test specification:	Section 15.247(d), Peak power density		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 12:06:15 PM		
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 55 %	Power Supply: 48 VDC
Remarks:			

Plot 7.6.13 Peak spectral power density at mid frequency within 6 dB band and data rate 36 Mbps

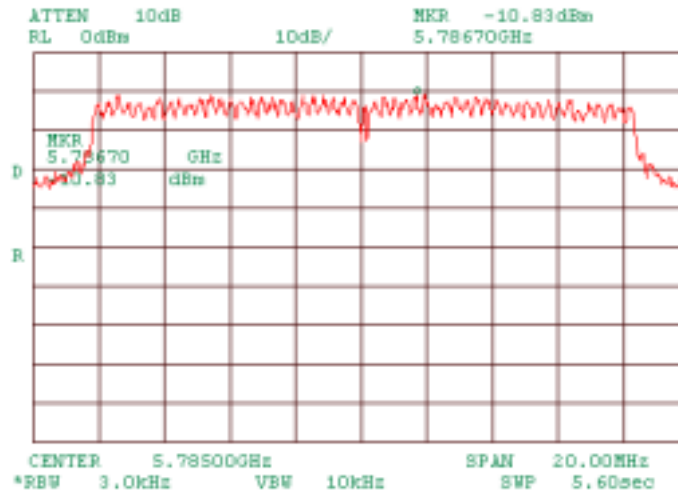


Plot 7.6.14 Peak spectral power density at mid frequency zoomed at the peak and data rate 36 Mbps

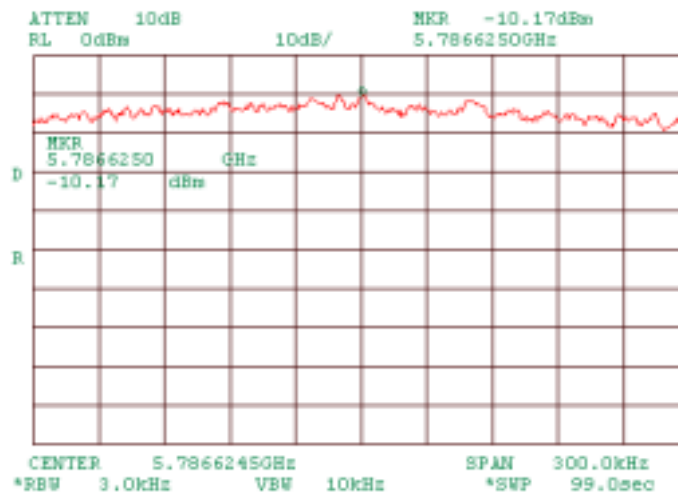


Test specification:	Section 15.247(d), Peak power density		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 12:06:15 PM		
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 55 %	Power Supply: 48 VDC
Remarks:			

Plot 7.6.15 Peak spectral power density at mid frequency within 6 dB band and data rate 48 Mbps

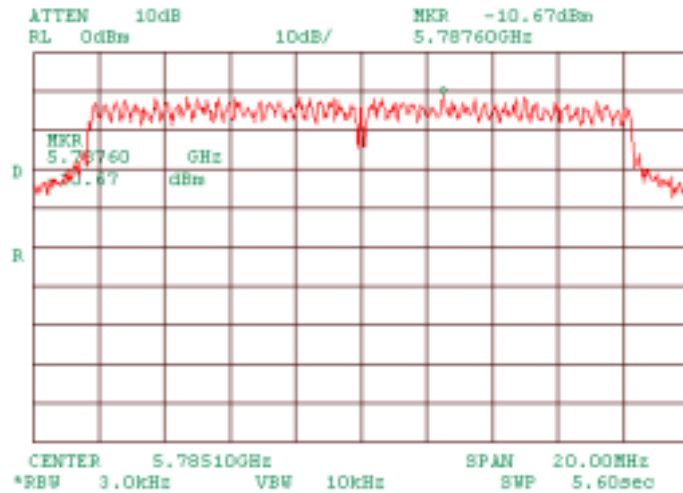


Plot 7.6.16 Peak spectral power density at mid frequency zoomed at the peak and data rate 48 Mbps

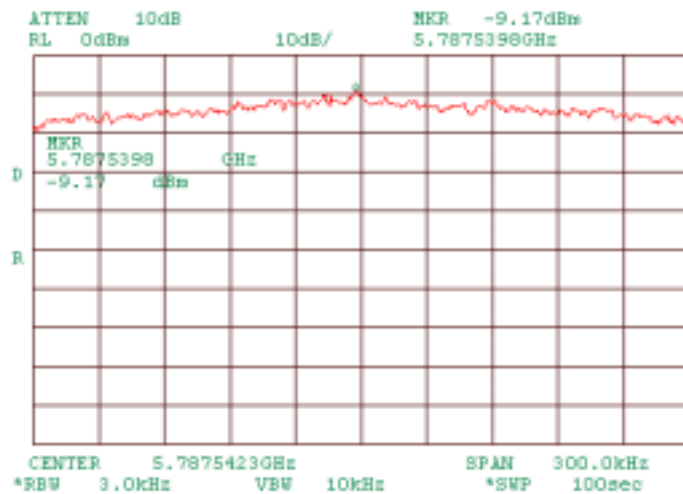


Test specification:	Section 15.247(d), Peak power density		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 12:06:15 PM		
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 55 %	Power Supply: 48 VDC
Remarks:			

Plot 7.6.17 Peak spectral power density at mid frequency within 6 dB band and data rate 54 Mbps

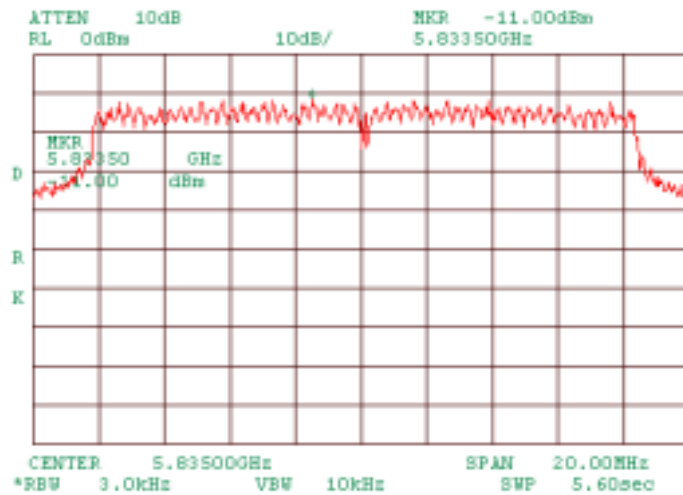


Plot 7.6.18 Peak spectral power density at mid frequency zoomed at the peak and data rate 54 Mbps

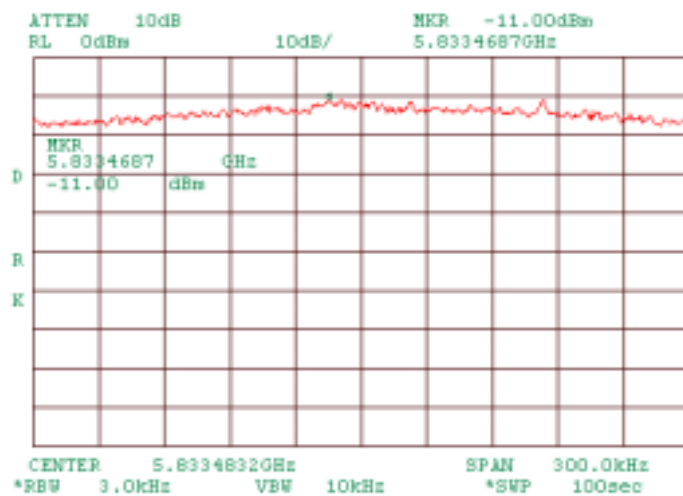


Test specification:	Section 15.247(d), Peak power density		
Test procedure:	FR Vol. 62, page 26243, Section 15.247(d)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/11/2004 12:06:15 PM		
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 55 %	Power Supply: 48 VDC
Remarks:			

Plot 7.6.19 Peak spectral power density at high frequency within 6 dB band and data rate 6 Mbps



Plot 7.6.20 Peak spectral power density at high frequency zoomed at the peak and data rate 6 Mbps



Test specification: Section 15.207(a), Conducted emission	
Test procedure: ANSI C63.4, Section 13.1.3	
Test mode: Compliance	Verdict: PASS
Date & Time: 5/9/2004 9:25:49 AM	
Temperature: °C	Air Pressure: hPa
Remarks:	Relative Humidity: % Power Supply:

7.7 Conducted emissions

7.7.1 General

This test was performed to measure common mode conducted emissions at the power port. Specification test limits are given in Table 7.7.1. The worst test results (the lowest margins) were recorded in Table 7.7.2 and shown in the associated plots.

Table 7.7.1 Limits for conducted emissions

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

- The limit decreases linearly with the logarithm of frequency.

7.7.2 Test procedure

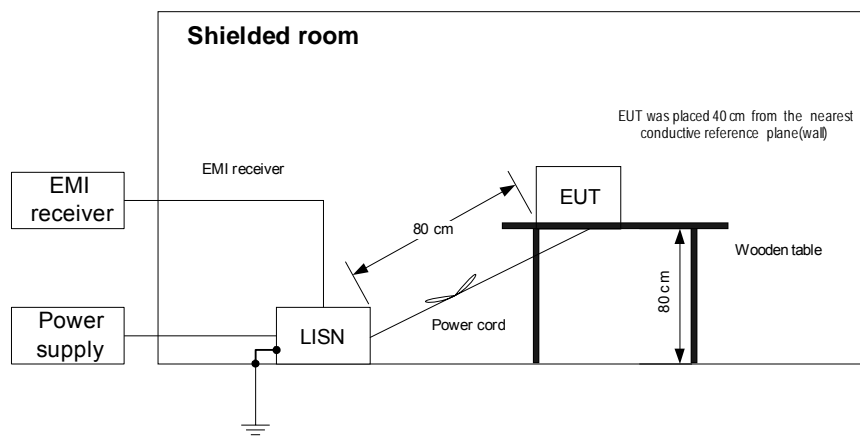
7.7.2.1 The EUT was set up as shown in Figure 7.7.1 and associated photographs, energized and the performance check was conducted.

7.7.2.2 The measurements were performed at power terminals with the LISN, connected to a spectrum analyzer in the frequency range referred to in Table 7.7.2. Unused coaxial connector of the LISN was terminated with 50 Ohm. Quasi-peak and average detectors were used throughout the testing.

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

Test specification:	Section 15.207(a), Conducted emission		
Test procedure:	ANSI C63.4, Section 13.1.3		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/9/2004 9:25:49 AM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

Figure 7.7.1 Setup for conducted emission measurements, table-top equipment



Test specification:		Section 15.207(a), Conducted emission	
Test procedure:		ANSI C63.4, Section 13.1.3	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	5/9/2004 9:25:49 AM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

Table 7.7.2 Conducted emission test results

LINE: AC mains
 EUT OPERATING MODE: Transmit
 EUT SET UP: TABLE-TOP
 TEST SITE: SHIELDED ROOM
 DETECTORS USED: 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*		
0.1502	57.11	50.83	65.99	-15.16	45.45	55.99	-10.54	L1	
0.223034	50.01	45.74	62.77	-17.03	42.01	52.77	-10.76		
0.372471	41.6	39.8	58.49	-18.69	38.06	48.49	-10.43		
0.447169	39.32	37.43	56.99	-19.56	36.65	46.99	-10.34		
0.522821	36.87	35.7	56	-20.3	34.72	46	-11.28		
25.0012	44.89	43.83	60	-16.17	43.34	50	-6.66	L2	
0.1501	58.27	50.93	66	-15.07	45.98	56	-10.02		
0.223284	50.15	45.89	62.76	-16.87	42.54	52.76	-10.22		
0.3716	41.37	38.02	58.51	-20.49	36.22	48.51	-12.29		
0.4475	40.57	37.92	56.98	-19.06	37.27	46.98	-9.71		
4.847255	38.11	37.3	56	-18.7	35.88	46	-10.12		
25.00015	44.21	43.53	60	-16.47	43.41	50	-6.59		

*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

HL 0163	HL 0447	HL 0466	HL 1430	HL 1502	HL 1510		
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Full description is given in Appendix A.

Test specification:		Section 15.107, 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:	5/9/2004 9:27:47 AM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

8 Emission 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. The worst test results (the lowest margins) were recorded in Table 8.1.2, Table 8.1.3 and shown in the associated plots.

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

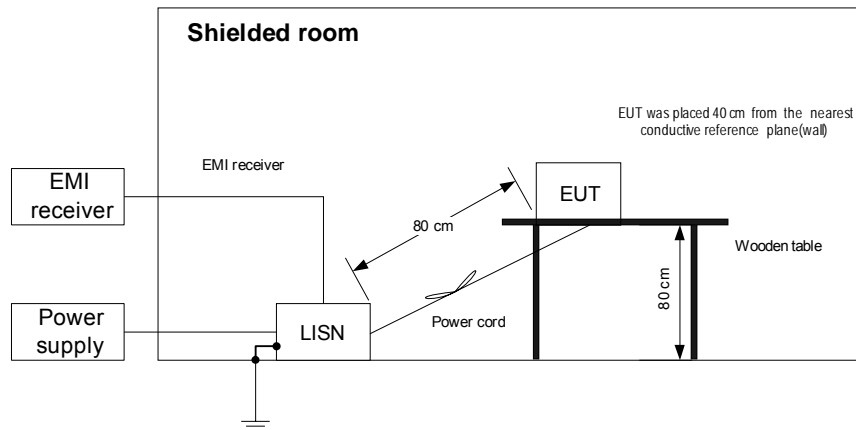
* The limit decreases linearly with the logarithm of frequency.

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 8.1.1. 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.

Test specification:	Section 15.107, 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:	5/9/2004 9:27:47 AM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

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



Test specification:		Section 15.107, 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:	5/9/2004 9:27:47 AM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

Table 8.1.2 Conducted emission test results

LINE: AC mains
LIMIT: Class B
EUT OPERATING MODE: Receive
EUT SET UP: TABLE-TOP
TEST SITE: SHIELDED ROOM
DETECTORS USED: 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*		
0.150267	57.52	50.51	65.99	-15.48	45.21	55.99	-10.78	L1	Pass
0.223134	49.33	47.02	62.76	-15.74	43.39	52.76	-9.37		
0.373138	41.28	40.05	58.47	-18.42	38.56	48.47	-9.91		
0.44695	39.55	37.87	56.99	-19.12	37.22	46.99	-9.77		
2.08752	34.41	33.66	56	-22.34	33.01	46	-12.99		
24.99896	43.43	42.9	60	-17.1	42.84	50	-7.16		
0.150088	58.68	50.88	66	-15.12	45.32	56	-10.68	L2	Pass
0.22397	50.35	47.06	62.73	-15.67	43.44	52.73	-9.29		
0.37285	41.67	38.12	58.48	-20.36	36.43	48.48	-12.05		
0.447625	40.25	37.56	56.98	-19.42	37.07	46.98	-9.91		
4.547295	35.98	35.04	56	-20.96	34.38	46	-11.62		
25.00107	43.91	43.33	60	-16.67	43.22	50	-6.78		

*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

HL 0163	HL 0447	HL 0466	HL 0521	HL 0580	HL 0590	HL 1003	HL 1503
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Full description is given in Appendix A.

Test specification:		Section 15.107, 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:	5/9/2004 9:27:47 AM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

Table 8.1.3 PC conducted emission test results

LINE: AC mains
LIMIT: Class B
EUT OPERATING MODE: Receive
EUT SET UP: TABLE-TOP
TEST SITE: SHIELDED ROOM
DETECTORS USED: 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*		
0.150206	51.96	43.87	65.99	-22.12	13.26	55.99	-42.73	L1	Pass
0.16375	52.15	44.13	65.33	-21.2	36.27	55.33	-19.06		
0.273753	41.12	36.87	61.07	-24.2	33.67	51.07	-17.4		
0.328453	39.76	36.48	59.54	-23.06	34.64	49.54	-14.9		
0.437355	34.28	32.84	57.17	-24.33	31.54	47.17	-15.63		
0.49335	34.02	32.96	56.12	-23.16	30.47	46.12	-15.65	L2	Pass
0.15045	50.44	42.14	65.98	-23.84	11.86	55.98	-44.12		
0.164331	49.47	42.62	65.3	-22.68	36.44	55.3	-18.86		
0.27375	39.66	35.22	61.07	-25.85	33.3	51.07	-17.77		
0.38305	37.91	35.7	58.24	-22.54	34.04	48.24	-14.2		
0.438725	34.11	31.49	57.15	-25.66	30.32	47.15	-16.83	L2	Pass
0.601865	32.28	30.79	56	-25.21	29.32	46	-16.68		

*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

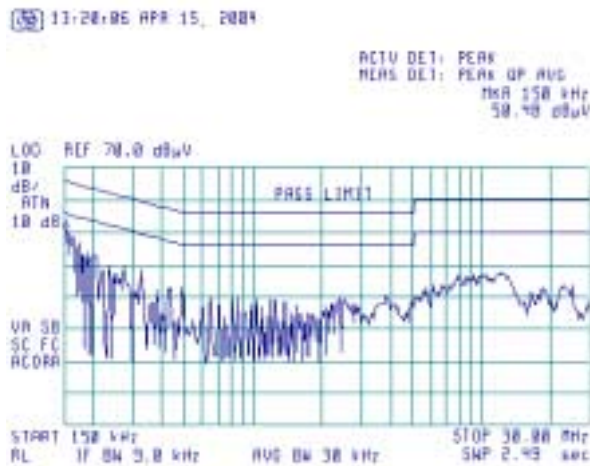
HL 0163	HL 0447	HL 0466	HL 0521	HL 0580	HL 0590	HL 1003	HL 1503
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Full description is given in Appendix A.

Test specification:	Section 15.107, 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:	5/9/2004 9:27:47 AM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

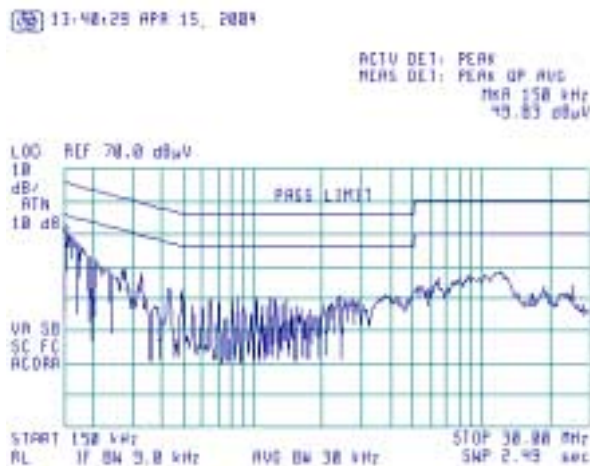
Plot 8.1.3 PC conducted emission measurements

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



Plot 8.1.4 PC conducted emission measurements

LINE: L2
LIMIT: Class B
EUT OPERATING MODE: Receive
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: 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:	5/11/2004 8:56:54 AM		
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

8.2 Radiated emission measurements

8.2.1 General

This test was performed to measure radiated emissions from the EUT enclosure. 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 test distance other than specified was calculated using the inverse linear distance extrapolation factor as follows: $\text{Lim}_{S_2} = \text{Lim}_{S_1} + 20 \log(S_1/S_2)$, where S_1 and S_2 – standard defined and test distance respectively in meters.

8.2.2 Test procedure for measurements in semi-anechoic chamber

8.2.2.1 The EUT was set up as shown in Figure 8.2.1 and associated photograph/s, energized and the performance check was conducted.

8.2.2.2 The frequency range 30 – 4000 MHz was investigated with biconilog and double ridged guide horn antennas connected to EMI receiver. To find maximum radiation the turntable was rotated 360°, 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.

8.2.2.3 The worst test results (the lowest margins) were recorded in Table 8.2.2 and shown in the associated plots.

8.2.3 Test procedure for measurements at OATS

8.2.3.1 The EUT was set up as shown in Figure 8.2.1 and associated photograph/s, energized and the performance check was conducted.

8.2.3.2 The frequency range 4000 – 40000 MHz was investigated with double ridged guide horn and standard gain horn antennas connected to spectrum analyzer. To find maximum radiation the turntable was rotated 360°, 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.

8.2.3.3 The worst test results (the lowest margins) were recorded in Table 8.2.2 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: 5/11/2004 8:56:54 AM			
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

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

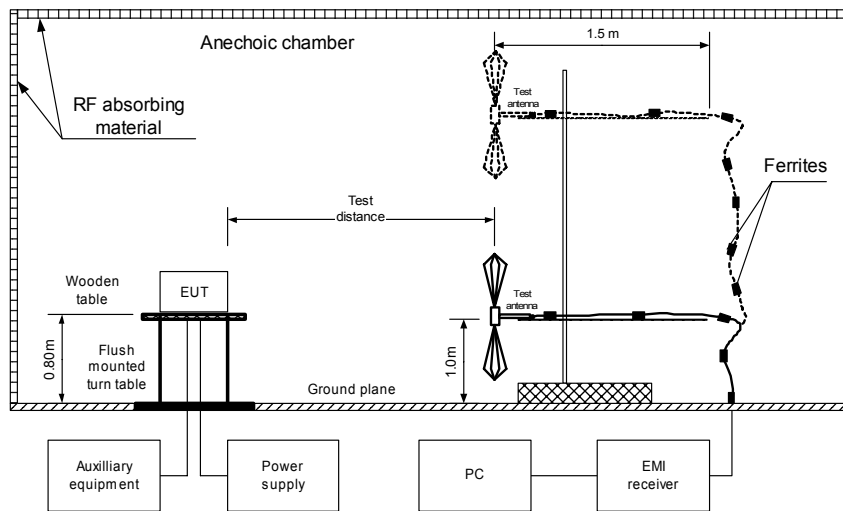
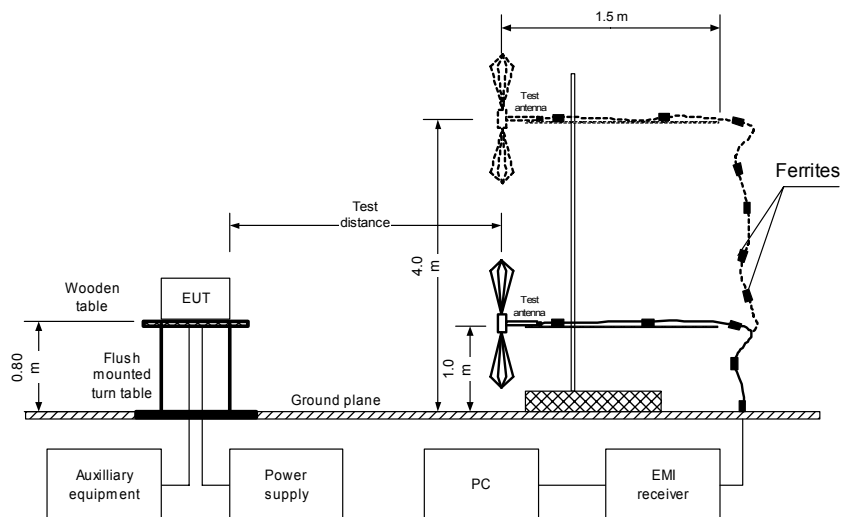


Figure 8.2.2 Setup for radiated emission measurements at OATS, table-top equipment



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: 5/11/2004 8:56:54 AM			
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

Table 8.2.2 Radiated emission test results

EUT SET UP: TABLE-TOP
LIMIT: Class B
EUT OPERATING MODE: Receive
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*				
48	37.83	36.11	40	-3.89	Vertical	1.1	101	Pass
60.55	35.1	32.00	40	-8.00	Vertical	1.0	195	
66.515	38.61	35.51	40	-4.49	Vertical	1.0	250	
77.997	38.97	35.76	40	-4.24	Vertical	1.5	160	
83.9975	37.31	33.98	40	-6.02	Vertical	1.4	195	
198.564	44.86	42.76	43.5	-0.74	Horizontal	1.3	212	
248.89625	39.15	38.88	46	-7.12	Horizontal	1.0	243	
297.81875	43.14	41.31	46	-4.69	Horizontal	1.0	181	
332.4975	43.83	42.34	46	-3.66	Horizontal	1.0	17	
465.5	41.11	39.24	46	-6.76	Vertical	1.0	260	
598.405	44.84	40.66	46	-5.34	Vertical	1.3	226	

TEST SITE: SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / AVERAGE
FREQUENCY RANGE: 1000 MHz – 40000 MHz
RESOLUTION BANDWIDTH: 1000 kHz

Frequency, MHz	Peak emission, dB(μV/m)	Average			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
1063.8700	44.25	37.54	54.00	-16.46	Vertical	1.0	263	Pass
1130.7450	48.87	39.85	54.00	-14.15	Vertical	1.0	261	
1197.2725	45.02	36.64	54.00	-17.36	Vertical	1.5	261	
1329.7650	44.66	35.60	54.00	-18.40	Vertical	1.5	260	

*- Margin = Measured emission - specification limit.

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

Reference numbers of test equipment used

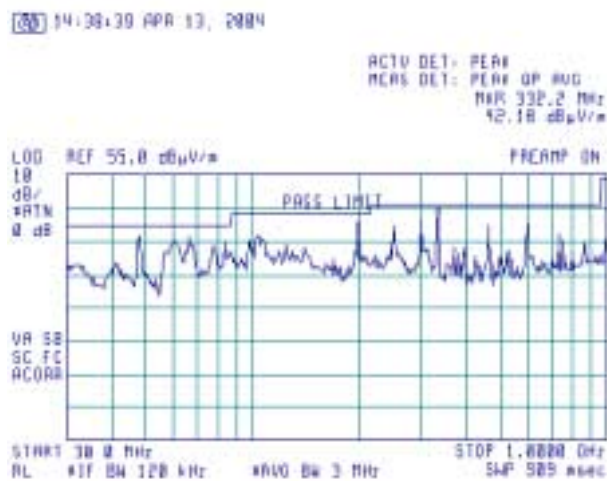
HL 0465	HL 0521	HL 0589	HL 0592	HL 0593	HL 0594	HL 0604	HL 0768
HL 0769	HL 1004	HL 1200	HL 1293	HL 1294	HL 1296	HL 1424	HL 1942
HL 1984							

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:	5/11/2004 8:56:54 AM		
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

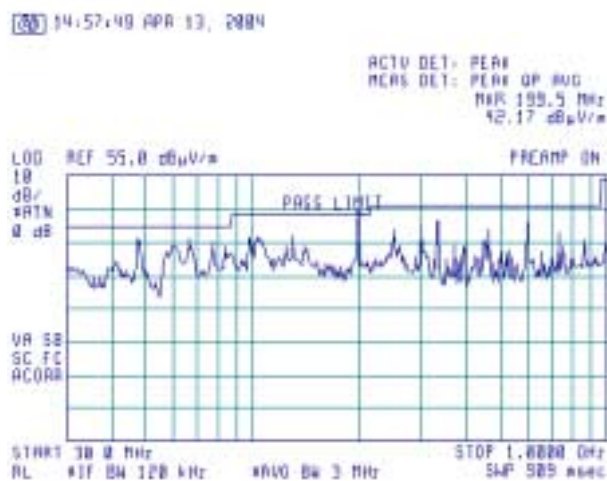
Plot 8.2.1 Radiated emission measurements in 30- 1000 MHz range

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive, low frequency



Plot 8.2.2 Radiated emission measurements in 30- 1000 MHz range

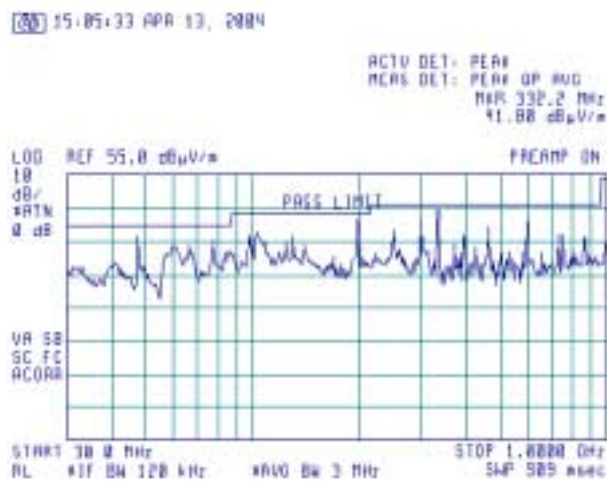
TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive, mid frequency



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:	5/11/2004 8:56:54 AM		
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

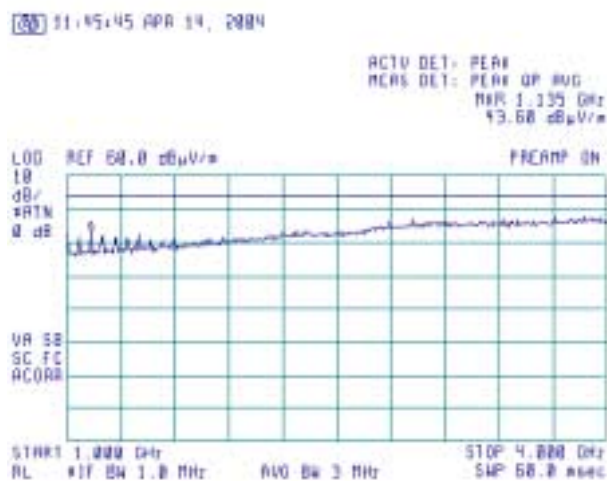
Plot 8.2.3 Radiated emission measurements in 30- 1000 MHz range

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive, high frequency



Plot 8.2.4 Radiated emission measurements in 1000- 4000 MHz range

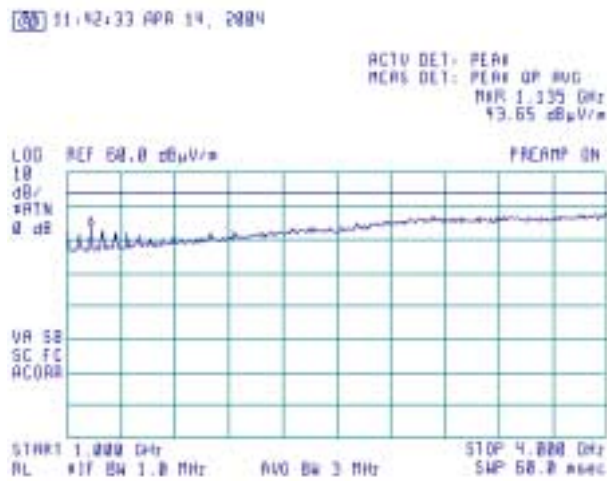
TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive, low frequency



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:	5/11/2004 8:56:54 AM		
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

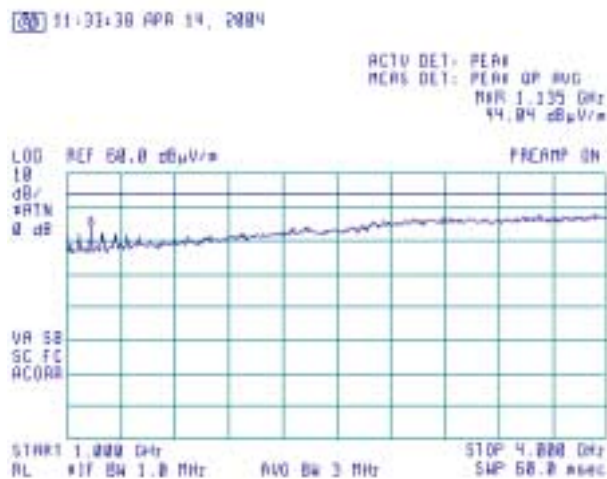
Plot 8.2.5 Radiated emission measurements in 1000- 4000 MHz range

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive, mid frequency



Plot 8.2.6 Radiated emission measurements in 1000- 4000 MHz range

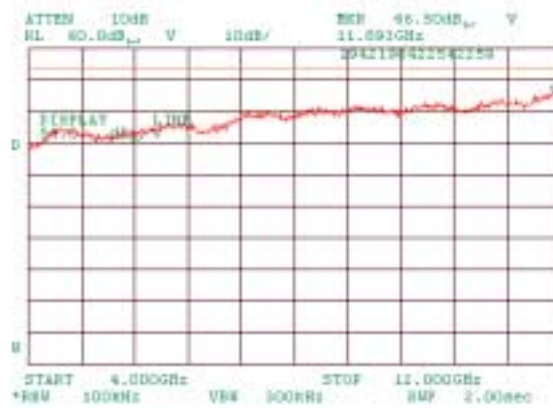
TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive, high frequency



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:	5/11/2004 8:56:54 AM		
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

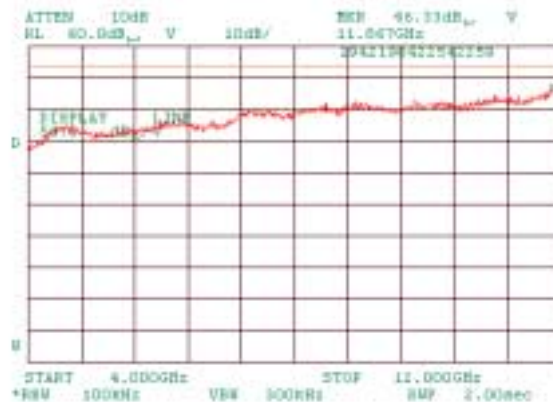
Plot 8.2.7 Radiated emission measurements in 4000- 12000 MHz range

TEST SITE: OATS
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive, low frequency
POLARIZATION: Horizontal and vertical



Plot 8.2.8 Radiated emission measurements in 4000- 12000 MHz range

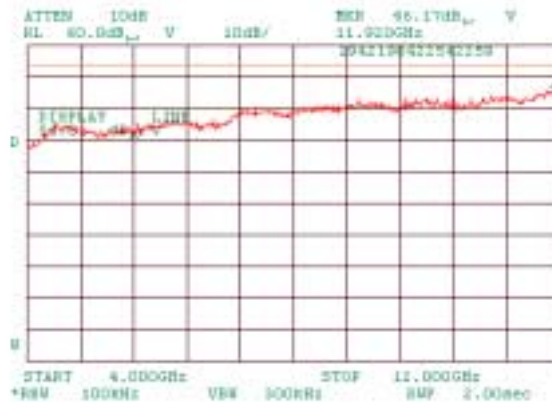
TEST SITE: OATS
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive, mid frequency
POLARIZATION: Horizontal and vertical



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:	5/11/2004 8:56:54 AM		
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

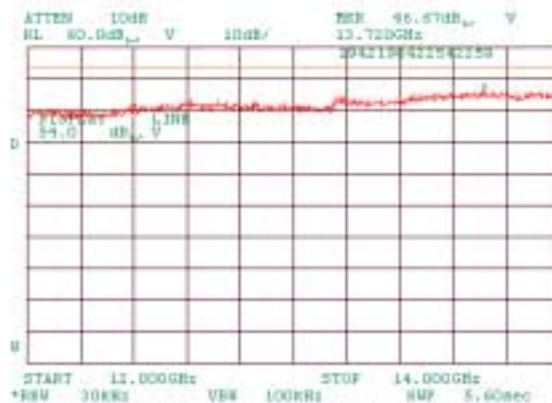
Plot 8.2.9 Radiated emission measurements in 4000- 12000 MHz range

TEST SITE: OATS
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive, high frequency
POLARIZATION: Horizontal and vertical



Plot 8.2.10 Radiated emission measurements in 12000- 14000 MHz range

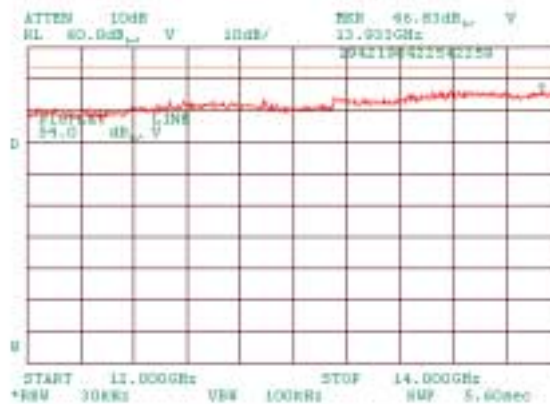
TEST SITE: OATS
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive, low frequency
POLARIZATION: Horizontal and vertical



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: 5/11/2004 8:56:54 AM			
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

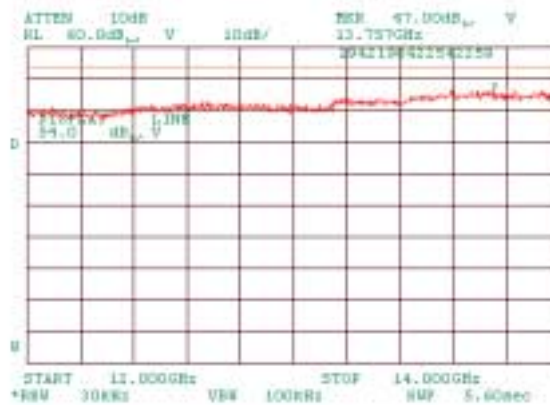
Plot 8.2.11 Radiated emission measurements in 12000- 14000 MHz range

TEST SITE: OATS
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive, mid frequency
POLARIZATION: Horizontal and vertical



Plot 8.2.12 Radiated emission measurements in 12000- 14000 MHz range

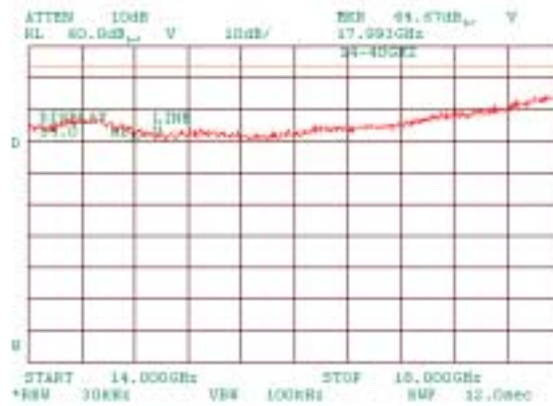
TEST SITE: OATS
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive, high frequency
POLARIZATION: Horizontal and vertical



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: 5/11/2004 8:56:54 AM			
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

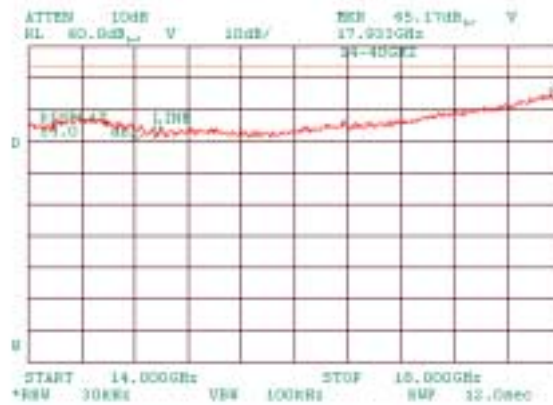
Plot 8.2.13 Radiated emission measurements in 14000- 18000 MHz range

TEST SITE: OATS
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive, low frequency
POLARIZATION: Horizontal and vertical



Plot 8.2.14 Radiated emission measurements 14000- 18000 MHz range

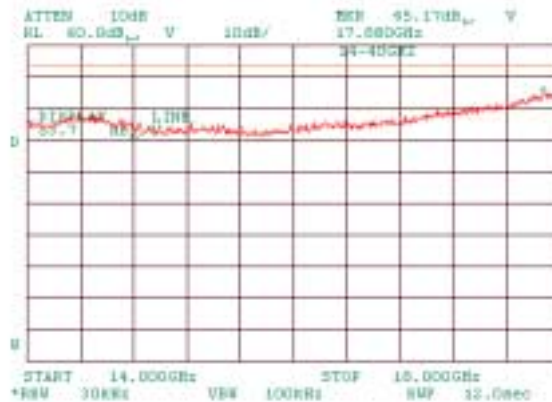
TEST SITE: OATS
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive, mid frequency
POLARIZATION: Horizontal and vertical



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:	5/11/2004 8:56:54 AM		
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

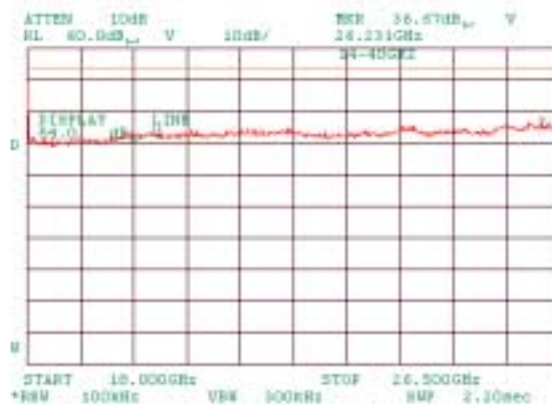
Plot 8.2.15 Radiated emission measurements in 14000- 18000 MHz range

TEST SITE: OATS
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive, high frequency
POLARIZATION: Horizontal and vertical



Plot 8.2.16 Radiated emission measurements in 18000- 26500 MHz range

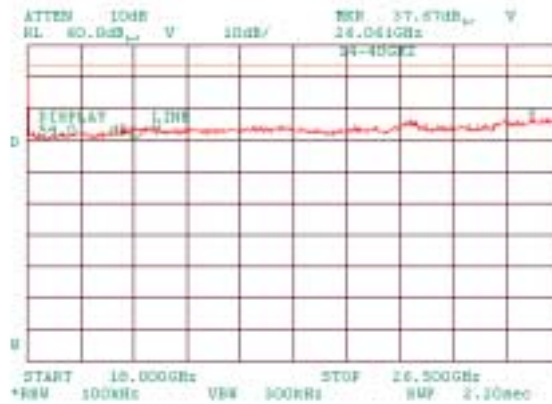
TEST SITE: OATS
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive, low frequency
POLARIZATION: Horizontal and vertical



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:	5/11/2004 8:56:54 AM		
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

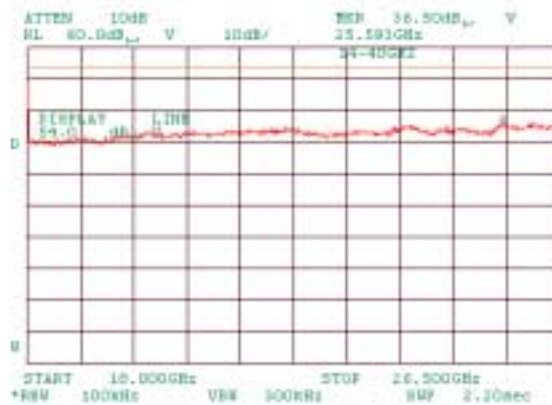
Plot 8.2.17 Radiated emission measurements in 18000- 26500 MHz range

TEST SITE: OATS
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive, mid frequency
POLARIZATION: Horizontal and vertical



Plot 8.2.18 Radiated emission measurements in 18000- 26500 MHz range

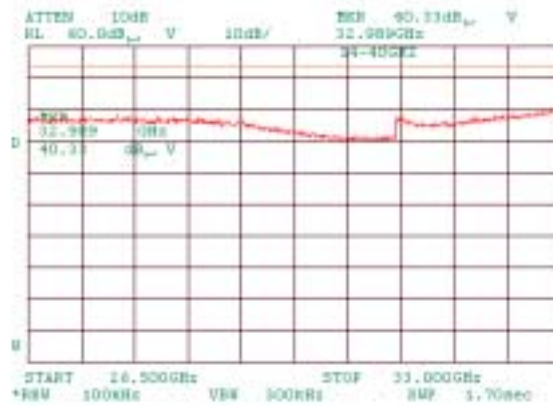
TEST SITE: OATS
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive, high frequency
POLARIZATION: Horizontal and vertical



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:	5/11/2004 8:56:54 AM		
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

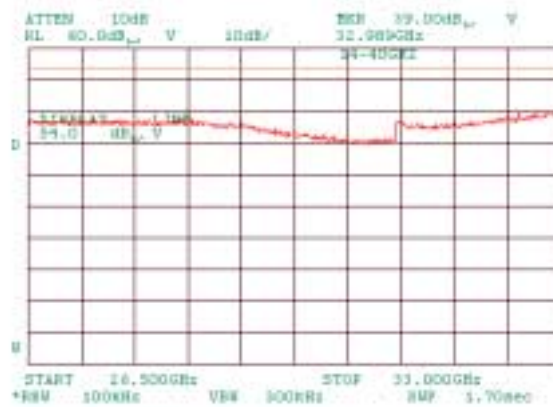
Plot 8.2.19 Radiated emission measurements in 26500- 33000 MHz range

TEST SITE: OATS
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive, low frequency
POLARIZATION: Horizontal and vertical



Plot 8.2.20 Radiated emission measurements in 26500- 33000 MHz range

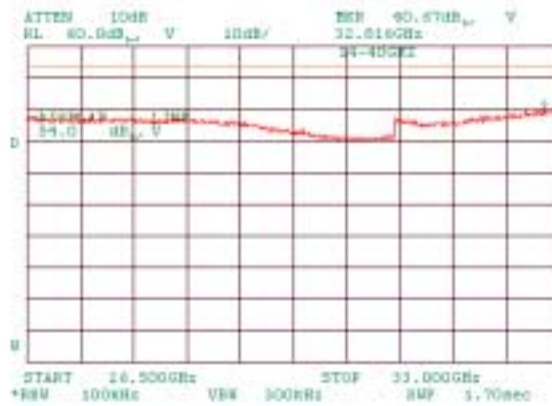
TEST SITE: OATS
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive, mid frequency
POLARIZATION: Horizontal and vertical



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:	5/11/2004 8:56:54 AM		
Temperature: 23 °C	Air Pressure: 1007 hPa	Relative Humidity: 48 %	Power Supply: 48 VDC
Remarks:			

Plot 8.2.21 Radiated emission measurements in 26500- 33000 MHz range

TEST SITE: OATS
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive, high frequency



9 APPENDIX A Test equipment and ancillaries used for tests

HL Serial No.	Description	Manufacturer information			Due calibration Month/ year
		Name	Model No.	Serial No.	
0163	LISN FCC/VDE/MIL -STD	Electro-Metrics	ANS-25/2	1314	10/04
0446	Active loop antenna 10 kHz-30 MHz	Electro-Mechanics	6502	2857	10/04
0447	LISN, 16/2, 300 V RMS	Hermon Labs	LISN 16-1	0447	11/04
0465	Anechoic chamber 9 (L) x 6.5 (W) x 5.5 (H) m	Hermon Labs	AC-1	023	10/05
0466	Shielded room 3 (L) x 3 (W) x 2.4 (H) m	Hermon Labs	SR-1	024	11/05 check
0521	Spectrum analyzer with RF filter section (EMI receiver 9 kHz - 6.5 GHz)	Hewlett Packard	8546A	0319	7/04
0580	DC block adaptor 10 kHz-2.2 GHz	Anritsu	MA8601 A	580	12/04
0589	Cable coaxial, GORE A2POL118.2, 3m	Hermon Labs	GORE-3	589	11/04
0590	Attenuator 10 dB, 50 Ohm, N-type, 2 W	Elisra Electronic Systems	MW2100-N-Type	10	1/05
0592	Position controller	Hermon Labs	L2-SR3000	100	5/05 check
0593	Antenna mast, 1-4 m/ 1-6 m Pneumatic	Hermon Labs	AM-F1	101	2/05 check
0594	Turntable for anechoic chamber, flush mounted, d=1.2 m, pneumatic	Hermon Labs	WDC1	102	1/05 check
0604	Antenna biconilog log-periodic/T bow- tie, 26 - 2000 MHz	EMCO	3141	9611-1011	1/05
0661	Generator Swept Signal, 10 MHz to 40 GHz+ 10 dBm	Hewlett Packard	83640B	0266	9/04
0768	Antenna standard gain horn 18 - 26.5 GHz, WR-42, K-band, gain – 25 dB	Quinstar Technology	QWH-4200- BA	110	7/04 check
0769	Antenna standard gain horn 26.5 - 40GHz, WR-42, K-band, gain – 25 dB	Quinstar Technology	QWH-2800- BA	112	7/04 check
1003	Cable coaxial, M17/164, 10 m	Hermon Labs	C17164-10	161	11/04
1004	Cable coaxial, ANDREW PSWJ4, 6 m	Hermon Labs	ANDREW-6	163	12/04
1200	Quadruplexer, 1-12 GHz	Elettronica S.p.A.- Roma	UE 84	0240	4/05 check
1293	Adapter, 18 – 26.5 GHz	Getronics	35WR42Kf	1293	8/04
1294	Adapter, 18 – 26.5 GHz	Getronics	35WR42Kf	1294	8/04
1295	Adapter, 26.5-40 GHz	Wiltron	35WR28KF	NA	8/04
1296	Adapter, 26.5-40 GHz	Wiltron	35WR28KF	NA	8/04

HL Serial No.	Description	Manufacturer information			Due calibration Month/ year
		Name	Model No.	Serial No.	
1424	Spectrum analyzer, 30 Hz - 40 GHz	Agilent Technologies	8564EC	3946A00219	8/04
1430	EMI receiver system, 9 kHz - 2.9 GHz	Agilent Technologies	8542E	3807A00262	9/04
1502	Cable RF, 6 m	Belden	M17/167 MIL-C-17	1502	12/04 check
1503	Cable RF, 6 m	Belden	M17/167 MIL-C-17	1503	9/04 check
1510	Cable RF, 8 m	Belden	M17/167 MIL-C-17	1510	12/04 check
1562	Oscilloscope 100 MHz, DMM	Tektronix	THS720A	B039444	9/04
1650	Attenuators set (2, 3, 5, 20 dB), DC – 18 GHz	M/A –COM	2082	1650	3/05
1942	Cable 18 GHz, 4 m, blue	Rhophase Microwave Ltd	SPS-1803A-4000-NPS	T4658	10/04
1984	Antenna, double ridged waveguide horn, 1-18 GHz, 300W, N-type	EMC Test Systems	3115	9911-5964	3/05
2014	Attenuator, Manual Step, 0-99/1 dB, 0-4 GHz, 2 W	Weinschel	AC9004-99-11	16924	12/04
2227	Crystal detector 0.01-18 GHz	Hewlett Packard	8472A	NA	10/04
2254	Cable 40 GHz, 0.8 m, blue	Rhophase Microwave Limited	KPS-1503A-800-KPS	W4907	11/04
2287	Filter bandpass, 8 – 14 GHz	Hermon Labs	FBP8-14	2387	6/04
2400	Cable 40 GHz, 1.5 m, green	Rhophase Microwave Ltd.	KPS-1503A-1500-KPS	X2946	6/04

10 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Conducted carrier power at RF antenna connector	Below 12.4 GHz: ± 1.7 dB 12.4 GHz to 40 GHz: ± 2.3 dB
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
Occupied bandwidth	± 8.0 %
Duty cycle, timing (Tx ON / OFF) and average factor measurements	± 1.0 %
Conducted emissions with LISN	9 kHz to 150 kHz: ± 3.9 dB 150 kHz to 30 MHz: ± 3.8 dB
Radiated emissions at 3 m measuring distance Horizontal polarization Vertical polarization	Biconilog antenna: ± 5.3 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.3 dB Double ridged horn antenna: ± 5.3 dB Biconilog antenna: ± 6.0 dB Biconical antenna: ± 5.7 dB Log periodic antenna: ± 6.0 dB Double ridged horn antenna: ± 6.0 dB

The test equipment has been calibrated according to its recommended procedures and is within the manufacturer's published limit of error. The standards and instruments used in the calibration system conform to the present requirements of ISO/IEC 17025 (or alternately ANSI/NCSL Z540-1).

The laboratory calibrates its measurement standards by a third party (traceable to NIST, USA) on a regular basis according to equipment manufacturer requirements. The Hermon Labs EMC measurements uncertainty is given in the table above.

Person for contact: Mr. Alex Usoskin, QA manager.

11 APPENDIX C Test facility 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 2186-1 for OATS and IC 2186-2 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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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

47CFR part 15: 2003	Radio Frequency Devices.
FR Vol.62	Federal Register, Volume 62, May 13, 1997
ANSI C63.2: 1996	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4: 2001	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 Abbreviations and acronyms

A	ampere
AC	alternating current
AM	amplitude modulation
AVRG	average (detector)
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μ V)	decibel referred to one microvolt
dB(μ V/m)	decibel referred to one microvolt per meter
dB(μ A)	decibel referred to one microampere
DC	direct current
DTS	digital transmission system
EIRP	equivalent isotropically radiated power
ERP	effective radiated power
EUT	equipment under test
F	frequency
FHSS	frequency hopping spread spectrum
GHz	gigahertz
GND	ground
H	height
Hz	hertz
k	kilo
kHz	kilohertz
LISN	line impedance stabilization network
LO	local oscillator
m	meter
MHz	megahertz
min	minute
mm	millimeter
ms	millisecond
μ s	microsecond
NA	not applicable
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
VA	volt-ampere

14 APPENDIX F Test equipment correction factors

Correction factor
Line impedance stabilization network
Model ANS-25/2
Electro-Metrics

Frequency, MHz	Correction factor, dB	Frequency, MHz	Correction factor, dB
0.01	4.7	3.0	0.1
0.02	2.1	4.0	0.1
0.03	1.1	5.0	0.1
0.04	0.7	6.0	0.1
0.05	0.5	10.0	0.1
0.1	0.2	12.0	0.1
0.2	0.1	16.0	0.1
0.4	0.1	18.0	0.1
0.6	0.1	20.0	0.1
0.8	0.1	25.0	0.1
1.0	0.1	28.0	0.1
2.0	0.1	30.0	0.1

The correction factor in dB is to be added to meter readings of an interference analyzer or a spectrum analyzer.

Correction factor
Line impedance stabilization network
Model LISN 16 - 1
Hermon Laboratories

Frequency, MHz	Correction factor, dB	Frequency, MHz	Correction factor, dB
0.01	5.0	3.0	0.1
0.02	2.2	4.0	0.1
0.03	1.1	5.0	0.1
0.04	0.7	6.0	0.2
0.05	0.5	10.0	0.3
0.1	0.2	12.0	0.4
0.2	0.1	16.0	0.5
0.4	0.1	18.0	0.6
0.6	0.1	20.0	0.7
0.8	0.1	25.0	0.9
1.0	0.1	28.0	1.2
2.0	0.1	30.0	1.3

The correction factor in dB is to be added to meter readings of an interference analyzer or a spectrum analyzer.

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

Cable loss
Cable Coaxial, GORE A2P01POL118, 2.3 m, model:GORE-3, HL 0589
+ Cable Coaxial, ANDREW PSWJ4, 6m, model: ANDREW-6, HL 1004

No.	Frequency, MHz	Cable loss, dB	Tolerance (Specification), dB	Measurement uncertainty, dB
1	30	0.33	≤ 6.5	±0.12
2	50	0.40		
3	100	0.57		
4	300	0.97		
5	500	1.25		
6	800	1.59		
7	1000	1.81		
8	1200	1.97		
9	1400	2.15		
10	1600	2.28		
11	1800	2.43		
12	2000	2.61		
13	2200	2.75		
14	2400	2.89		
15	2600	2.97		
16	2800	3.21	≤ 6.5	±0.12
17	3000	3.32		
18	3300	3.47		
19	3600	3.62		
20	3900	3.84		
21	4200	3.92		
22	4500	4.07		±0.17
23	4800	4.36		
24	5100	4.62		
25	5400	4.78		
26	5700	5.16		
27	6000	5.67		
28	6500	5.99		

Cable loss
Cable coaxial, M17/164, model: C17164-10, s/n 161, HL 1003

No.	Frequency, MHz	Cable loss, dB	Tolerance, dB	Measurement uncertainty, dB
1	30	0.41	≤ 12.5	±0.12
2	50	0.52		
3	100	0.75		
4	300	1.45		
5	500	2.01		
6	800	2.71		
7	1000	3.14		
8	1200	3.56		
9	1400	3.93		
10	1600	4.31		
11	1800	4.63		
12	2000	4.97		
13	2200	5.32		
14	2400	5.65		
15	2600	6.01		
16	2800	6.42	≤ 12.5	±0.12
17	3000	6.76		
18	3300	7.12		
19	3600	7.53		
20	3900	7.95		
21	4200	8.32		
22	4500	8.72		±0.17
23	4800	9.14		
24	5100	9.59		
25	5400	10.00		
26	5700	10.49		
27	6000	11.07		
28	6500	11.80		

Cable loss
Cable coaxial, 6 m, model: M17/167 MIL-C-17, HL 1502

Frequency, MHz	Cable loss, dB
0.1	0.02
1	0.07
3	0.15
5	0.17
10	0.26
30	0.43
50	0.57
80	0.72
100	0.81
300	1.48
500	2.00
800	2.70
1000	3.09

able 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
Cable 18 GHz, 4 m, blue, model: SPS-1803A-4000-NPS, S/N T4658, HL 1942

Frequency, GHz	Cable loss, dB
0.03	0.21
0.05	0.26
0.10	0.36
0.20	0.50
0.30	0.61
0.40	0.70
0.50	0.78
0.60	0.85
0.70	0.93
0.80	0.99
0.90	1.04
1.00	1.10
1.10	1.16
1.20	1.22
1.30	1.26
1.40	1.31
1.50	1.35
1.60	1.41
1.70	1.45
1.80	1.49
1.90	1.53
2.00	1.57
2.10	1.61
2.20	1.65
2.30	1.69
2.40	1.72
2.50	1.76
2.60	1.79
2.70	1.83
2.80	1.87
2.90	1.90
3.10	1.97
3.30	2.04
3.50	2.11
3.70	2.18
3.90	2.24
4.10	2.31
4.30	2.38
4.50	2.43
4.70	2.53
4.90	2.53
5.10	2.63
5.30	2.65
5.50	2.72
5.70	2.76
5.90	2.79

Frequency, GHz	Cable loss, dB
6.10	2.88
6.30	2.90
6.50	2.97
6.70	3.02
6.90	3.04
7.10	3.07
7.30	3.12
7.50	3.13
7.70	3.19
7.90	3.24
8.10	3.30
8.30	3.36
8.50	3.45
8.70	3.41
8.90	3.45
9.10	3.42
9.30	3.55
9.50	3.48
9.70	3.58
9.90	3.61
10.10	3.66
10.30	3.68
10.50	3.70
10.70	3.70
10.90	3.75
11.10	3.78
11.30	3.86
11.50	3.98
11.70	4.10
11.90	4.12
12.10	4.09
12.40	4.13
13.00	4.23
13.50	4.35
14.00	4.40
14.50	4.44
15.00	4.57
15.50	4.66
16.00	4.64
16.50	4.66
17.00	4.75
17.50	4.85
18.00	4.93

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, 40GHz, 1.5 m, green, Rhophase Microwave Limited, model: KPS-1503A-1500-KPS,
HL 2400

Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB
0.03	0.06	6.5	1.46	15.50	2.34
0.05	0.08	6.7	1.49	16.00	2.34
0.1	0.15	6.9	1.50	16.50	2.40
0.2	0.23	7.1	1.51	17.00	2.46
0.3	0.29	7.3	1.55	17.50	2.54
0.5	0.37	7.5	1.56	18.00	2.61
0.7	0.46	7.7	1.58	18.50	2.59
0.9	0.53	7.9	1.60	19.00	2.59
1.1	0.58	8.1	1.61	19.50	2.67
1.3	0.65	8.3	1.68	20.00	2.62
1.5	0.66	8.5	1.68	20.50	2.73
1.7	0.72	8.7	1.75	21.00	2.71
1.9	0.76	8.9	1.74	21.50	2.78
2.1	0.79	9.1	1.81	22.00	2.83
2.3	0.85	9.3	1.79	22.50	2.81
2.5	0.90	9.5	1.86	23.50	2.91
2.7	0.91	9.7	1.85	24.00	2.97
2.9	0.97	9.9	1.87	24.50	2.98
3.1	0.97	10.1	1.88	25.00	2.97
3.3	1.03	10.30	1.82	25.50	3.03
3.5	1.06	10.50	1.92	26.00	3.04
3.7	1.10	10.70	1.86	26.50	3.11
3.9	1.13	10.90	1.96	27.00	2.97
4.1	1.16	11.10	1.90	28.00	3.15
4.3	1.18	11.30	1.99	29.00	3.07
4.5	1.21	11.50	1.95	30.00	3.13
4.7	1.23	11.70	2.00	31.00	3.13
4.9	1.26	11.90	2.01	32.00	3.18
5.1	1.28	12.10	1.99	33.00	3.31
5.3	1.31	12.40	2.06	34.00	3.32
5.5	1.32	13.00	2.11	35.00	3.37
5.7	1.36	13.50	2.17	36.00	3.36
5.9	1.37	14.00	2.36	37.00	3.46
6.1	1.38	14.50	2.32	39.00	3.49
6.3	1.44	15.00	2.30	40.00	3.52