HERMON LABORATORIES

ACCREDITED
839.01
Electrical

Hermon Laboratories Ltd.
P.O.Box 23, Binyamina 30500, Israel
Tel. +972 4628 8001
Fax. +972 4628 8277
E-mail: mail@hermonlabs.com

TEST REPORT

ACCORDING TO: FCC part 27: 2005
FCC part 15: 2005 subpart B

FOR:

Vyyo Ltd.
Wireless modem
Model:V284+A

Table of contents

1 Applicant information

Client name:	VYYO Ltd.
Address:	Airport City, POB 197, Ben Gurion Airport, 70100, Israel
Telephone:	+972 3976 9999
Fax:	+972 3976 9998
E-mail:	adahan@vyyo.com
Contact name:	Mr. Avihai Dahan

2 Equipment under test attributes

Product name:	Wireless modem
Operating frequency range:	776.075 – 776.925 MHz
Model:	V284+A
Serial number:	1348527
Hardware version:	602
Software release:	1.2.10
Receipt date:	2/27/2006

3 Manufacturer information

Manufacturer name:	VYYO Ltd.
Address:	Airport City, POB 197, Ben Gurion Airport, 70100, Israel
Telephone:	+972 3976 9999
Fax:	+972 3976 9998
E-Mail:	adahan@vyyo.com
Contact name:	Mr. Avihai Dahan

4 Test details

Project ID:	16694
Location:	Hermon Laboratories Ltd. P.O.Box 23, Binyamina 30500, Israel
Test started:	2/27/2006
Test completed:	3/8/2006
Test specifications:	FCC part 27:2005
	FCC part 15: 2005 subpart B

5 Tests summary

Test	Status
Transmitter characteristics	
Section 27.50(b)(2), Peak output power at RF antenna connector	Pass
Section 2.1091, RF radiation exposure evaluation	Pass
Section 27.53(d)(3), Spurious emissions RF antenna connector	Pass
Section 27.53(d)(1), Adjacent channel power	Pass
Section 27.53(d)(3), Radiated spurious emissions	Pass
Section 27.53(e), Radiated spurious emissions in 1559-1610 MHz band	Pass
Section 27.54, Frequency stability	Pass
Section 2.1049, Occupied bandwidth	Pass
Unintentional emissions	
Section 15.107, Conducted emission at AC power port	Pass
Section 15.109, Radiated emission	Pass
Section 15.111, Antenna power conducted measurements for receiver	Pass

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. A. Adelberg, test engineer	March 8, 2006	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	March 12, 2006	
Approved by:	Mr. M. Nikishin, EMC and Radio group leader	March 14, 2006	

6 EUT description

6.1 General information

The EUT is a broadband wireless data modem used by cable and wireless operators to deliver telephony services (T1/E1) and high-speed data connections to business and residential subscribers. The EUT operates within 776.1 to 776.9 MHz band and is powered from AC mains through a power adaptor.

6.2 Ports and lines

Port type	Port description	Connected		Connector type	Qty.	Cable type	Cable length	Indoor / outdoor
		From	To					
Power	AC mains	Power adaptor	AC mains	IEC 60320	1	Unshielded	1.5 m	Indoor
Power	VDC	EUT	Power adaptor	DC jack	1	Unshielded	1.5 m	Indoor
Signal	Ethernet	EUT	Laptop	RJ 45	1	FTP Cat.5	1.5 m	Indoor
Signal	Antenna	EUT	Attenuator	F-type	1	Coax 75 Ohm	12.0 m	Outdoor
Power	AC mains	Power adaptor	AC mains	IEC 60320	1	Unshielded	1.5 m	Indoor
Power	VDC	Laptop	Power adaptor	DC jack	1	Unshielded	1.5 m	Indoor
Signal	Mouse	Laptop	Mouse	PS2	1	Unshielded	2 m	Indoor
Signal	Parallel	Laptop	Printer	D type 25	1	Shielded	2 m	Indoor
Signal	RS232	Laptop	Open circuit	D type 9	1	Unshielded	1.5 m	Indoor

6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
Wireless modem termination system	Vyyo	V3000	5036408
Up converter (256 QAM)	Wavecom	UC4040D	216450
Down converter	Vyyo	XTB VHF	1348529
External laptop	IBM	ThinkPad 600x	5573MWV02/99
Power adaptor for external laptop	IBM	02K6654	4062298
Laptop	IBM	600E	5528WAP
Mouse	Microsoft	Mouse 2.1A	03306271
Printer	Epson	LX-810	44B1127035
Power adaptor for EUT	DVE	DSA-0151A	3604
Power adaptor for laptop	IBM	02K6654	150HN9

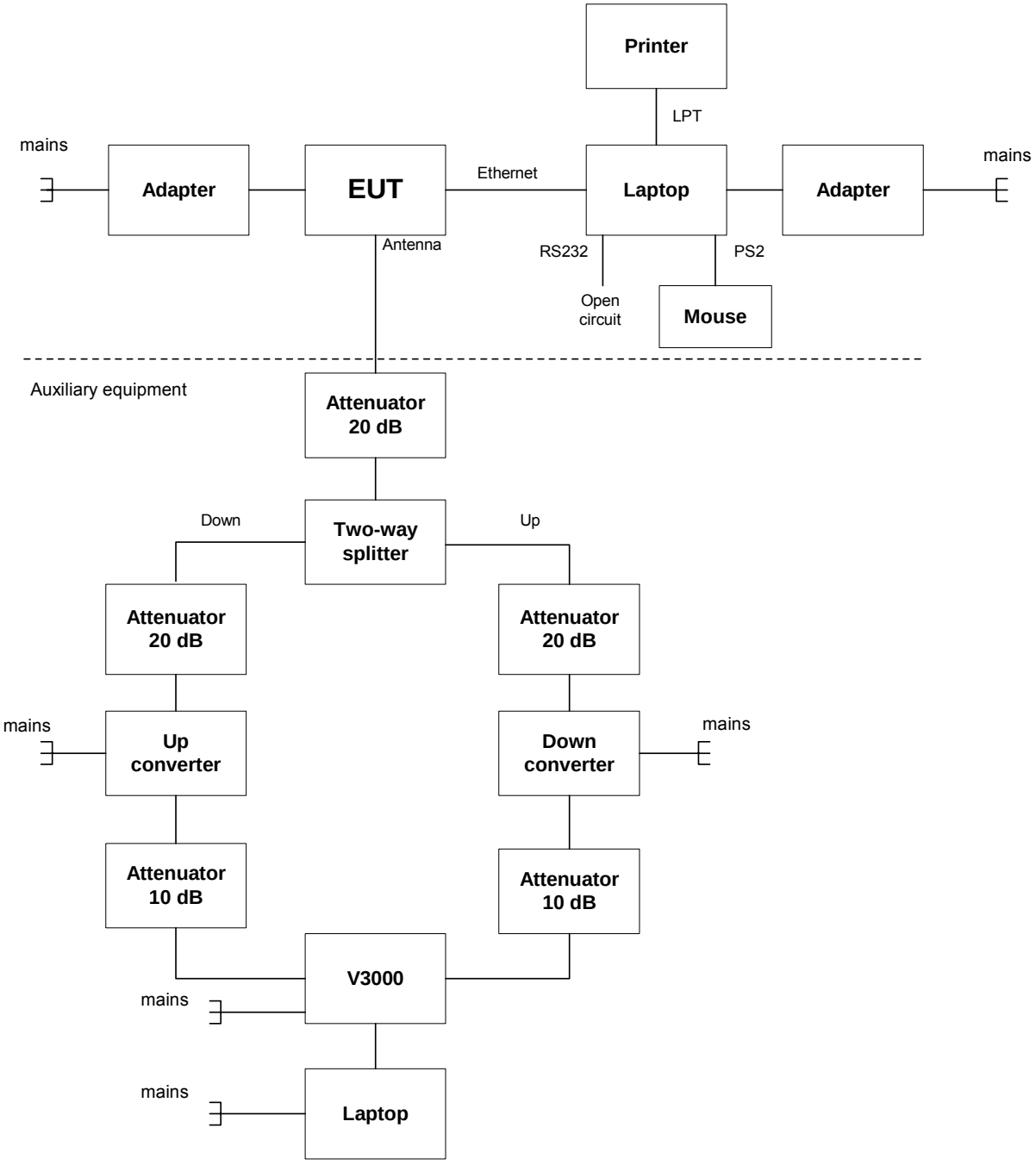
6.4 Operating frequencies

Source	Frequency, MHz		
Receiver	702.0 (LO)	44.0 (IF)	746.075 – 746.925 (Rx)
Transmitter	10.0 (VCTXO)	44.0 (IF)	776.075 - 776.925 (Tx)

6.5 Changes made in the EUT

No changes were implemented.

6.6 Test configuration



6.7 Transmitter characteristics

Type of equipment	
X	Stand-alone (Equipment with or without its own control provisions)
	Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)
	Plug-in card (Equipment intended for a variety of host systems)

Intended use		Condition of use
	fixed	Always at a distance more than 2 m from all people
X	mobile	Always at a distance more than 20 cm from all people
	portable	May operate at a distance closer than 20 cm to human body

Assigned frequency range	776.0 – 777.0 MHz
Operating frequency range	776.075 – 776.925 MHz

Maximum rated output power	At transmitter 50 Ω RF output connector	27.6 dBm
	Effective radiated power (for equipment with no RF connector)	NA

Is transmitter output power variable?		No		
	X	Yes		continuous variable
			X	stepped variable with stepsize: 0.25 dB
				minimum RF power: -17.0 dBm
				maximum RF power: +27.6 dBm

Antenna connection				
unique coupling	**X**	standard F-type connector	integral	with temporary RF connector
				without temporary RF connector

Antenna/s technical characteristics			
Type	Manufacturer	Model number	Gain
Yagi	Shenglu	TDJ-700B12G13.5	13.5 dBi

Transmitter 99% power bandwidth	150 kHz
Type of multiplexing	TDMA
Modulating test signal (baseband)	PRBS
Maximum transmitter duty cycle in normal use	50 %
Transmitter duty cycle supplied for test	50 %

Transmitter power source					
	Battery	**Nominal rated voltage**	VDC	Battery type	
	DC	**Nominal rated voltage**	VDC		
X	AC mains	**Nominal rated voltage**	120 VAC	Frequency	60 Hz

Common power source for transmitter and receiver	**X** yes	no

Type of modulation	Modulation states (constellation)	RF channel spacing	Frequency channel		
			Low	Mid	High
QAM	16	150 kHz	776.075	776.5	776.925
QPSK	4	150 kHz	776.075	776.5	776.925

Test specification:	Section 27.50(b)(2), Peak output power at RF antenna connector		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date:	2/28/2006		
Temperature: 21 ºC	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 120 VAC
Remarks:			

7 Transmitter characteristics

7.1 Peak output power test

7.1.1 General

This test was performed to measure the peak output power at RF antenna connector. Specification test limits are given in Table 7.1.1. The test results are provided in Table 7.1.2 and the associated plots.

Table 7.1.1 Peak output power limits

Assigned frequency range, MHz	Maximum peak output power*	
	dBm	W
776.0 – 777.0	33.45	2.213

* The peak output power limit was calculated by subtracting of antenna gain in dBd from maximum allowed ERP 44.8 dBm (30 W):
44.8 dBm – (13.5 dBi – 2.15 dB) = 33.45 dBm

7.1.2 Test procedure

7.1.2.1 The EUT was set up as shown in Figure 7.1.1, energized and its proper operation was checked.

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

7.1.2.3 The peak output power was measured with thermocouple power meter to obtain RMS values as provided in Table 7.1.2.

Figure 7.1.1 Peak output power test setup

Test specification:	**Section 27.50(b)(2), Peak output power at RF antenna connector**		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	**Verdict:**	PASS
Date:	2/28/2006		
Temperature: 21 ºC	**Air Pressure:** 1006 hPa	**Relative Humidity:** 44 %	**Power Supply:** 120 VAC
Remarks:			

Table 7.1.2 Peak output power test results

ASSIGNED FREQUENCY RANGE: 776.0 – 777.0 MHz
DETECTOR USED: RMS
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Carrier frequency, MHz	Power meter reading, dBm	Cable loss, dB	RF output power, dBm	Limit, dBm	Margin, dB	Verdict
Modulation: 16QAM						
776.0750	-2.04	29.60	27.56	33.45	-5.89	Pass
776.5000	-2.44	29.60	27.16	33.45	-6.29	Pass
776.9250	-2.00	29.60	27.60	33.45	-5.85	Pass
Modulation: QPSK						
776.0750	-2.02	29.60	27.58	33.45	-5.87	Pass
776.5000	-2.01	29.60	27.59	33.45	-5.86	Pass
776.9250	-2.03	29.60	27.57	33.45	-5.88	Pass

Reference numbers of test equipment used

HL 0190	HL 1097	HL 1523					

Full description is given in Appendix A.

Test specification:	Section 2.1091, RF radiation exposure evaluation		
Test procedure:	47 CFR, Section 1.1307(b)		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

7.2 RF exposure

7.2.1 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 7.2.1.

Table 7.2.1 RF exposure limits

Frequency range, MHz	Power density*		Electric field strength**, V/m
	mW/cm^2	W/m^2	
776.1	0.52	5.2	44.2
776.9	0.52	5.2	44.2

* - Power density limit within 300 - 1500 MHz was calculated according to the following equation: S = F / 1500, where S is power density in mW/cm^2 and F is frequency in MHz

** - Electric field strength limit was calculated from power density as follows: $E = \sqrt{(S \times 120 \times \pi)}$, where E is electric field strength in V/m and S is power density in W/m^2

7.2.2 Test procedure

7.2.2.1 The EUT, connected to the antenna providing the maximum directional gain, was set up as shown in .

7.2.2.2 The E-field probe was pointed to the EUT antenna zero azimuth at a 3 m distance, the maximum field strength reading was recorded in Table 7.2.2.

7.2.2.3 The E-field probe was slowly moved toward the EUT until E-field equivalent to the maximum permitted power density was measured.

7.2.2.4 The obtained antenna to probe distance was recorded in Table 7.2.2 as a minimum separation distance.

7.2.2.5 The test was repeated at the rest of test distances according to Table 7.2.2.

Table 7.2.2 Maximum permissible exposure (MPE) measurement

Test distance, m	Field strength, V/m	Equivalent power density, mW/cm^2	Limit, mW/cm^2	Margin, mW/cm^2	Verdict
3.0	2.62	0.001821	0.52	-0.518179	Pass
2.5	2.91	0.002246	0.52	-0.517754	Pass
2.0	3.20	0.002716	0.52	-0.517284	Pass
1.5	2.35	0.001465	0.52	-0.518535	Pass
1.0	3.17	0.002666	0.52	-0.517334	Pass
0.5	3.50	0.003249	0.52	-0.516751	Pass
0.3	4.50	0.005371	0.52	-0.514629	Pass
0.2	4.34	0.004996	0.52	-0.515004	Pass
0.1	6.20	0.010197	0.52	-0.509803	Pass
0.05	7.81	0.016180	0.52	-0.503820	Pass

* - Equivalent power density was calculated from electric field strength as follows: $S = 0.1 \times E^2/(120 \times \pi)$, where E is electric field strength in V/m and S is power density in mW/cm^2

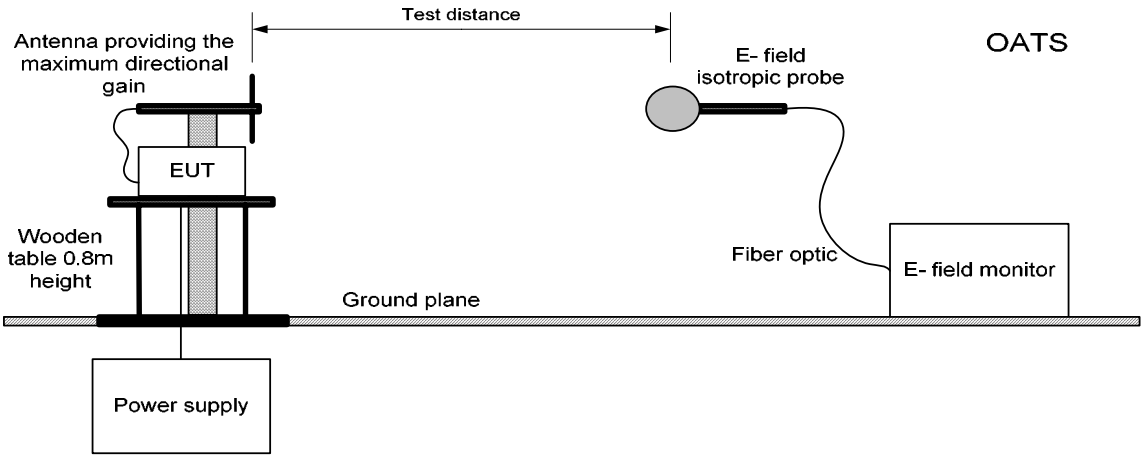
Reference numbers of test equipment used

HL 0613	HL 1629						

Full description is given in Appendix A.

Test specification:	Section 2.1091, RF radiation exposure evaluation		
Test procedure:	47 CFR, Section 1.1307(b)		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Figure 7.2.1 Maximum permissible exposure (MPE) measurement setup



Test specification:	Section 27.53(d)(3), Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

7.3 Spurious emissions at RF antenna connector test

7.3.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 7.3.1. The test results are provided in Table 7.3.2 and associated plots.

Table 7.3.1 Spurious emission limits

Frequency, MHz*	Attenuation below carrier, dBc	Spurious emissions, dBm
0.009 – 10th harmonic	43+10logP*	-13

* - P is transmitter output power in Watts.

7.3.2 Test procedure

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

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

7.3.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.3.2 and associated plots.

Figure 7.3.1 Spurious emission test setup

Test specification:	Section 27.53(d)(3), Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Table 7.3.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 776.0 – 777.0 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 – 8000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATION: 16QAM and QPSK
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	Bit rate, Mbps	RBW, kHz	Spurious emission, dBm	Limit, dBm	Margin, dB*	Verdict
Low channel						
All emissions found more than 20 dB below limit						Pass
Mid channel						
All emissions found more than 20 dB below limit						Pass
High channel						
All emissions found more than 20 dB below limit						Pass

***- Margin = Spurious emission – specification limit.

Reference numbers of test equipment used

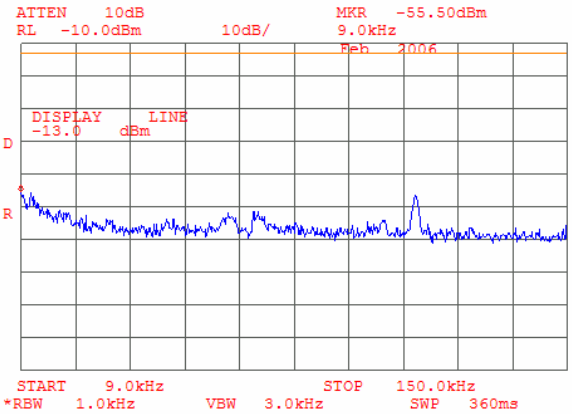
HL 1097	HL 1424	HL 1455	HL 1488	HL 1653	HL 1942		

Full description is given in Appendix A.

Test specification:	Section 27.53(d)(3), Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

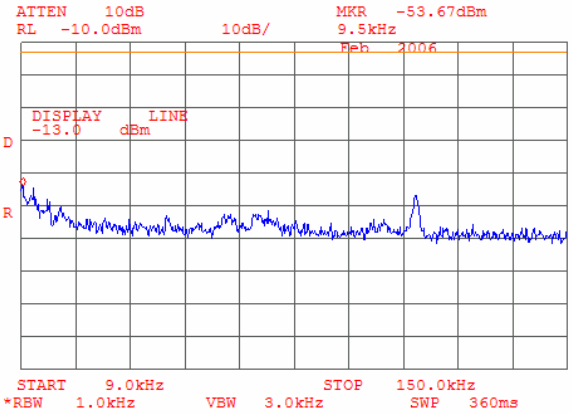
Plot 7.3.1 Spurious emission measurements at RF antenna connector, low channel

Frequency range: 9 – 150 kHz
Carrier frequency: 776.1625 MHz
Modulation: 16QAM



Plot 7.3.2 Spurious emission measurements at RF antenna connector, mid channel

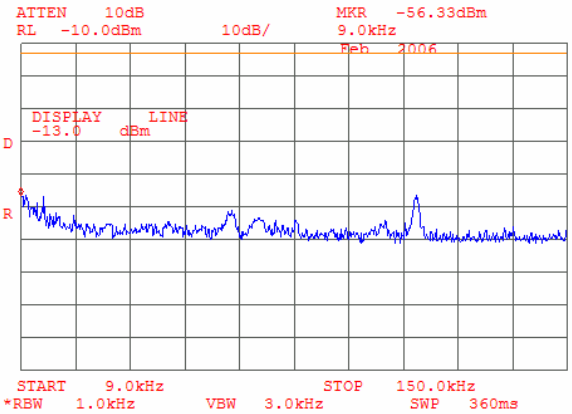
Frequency range: 9 – 150 kHz
Carrier frequency: 776.5 MHz
Modulation: 16QAM



Test specification:	Section 27.53(d)(3), Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

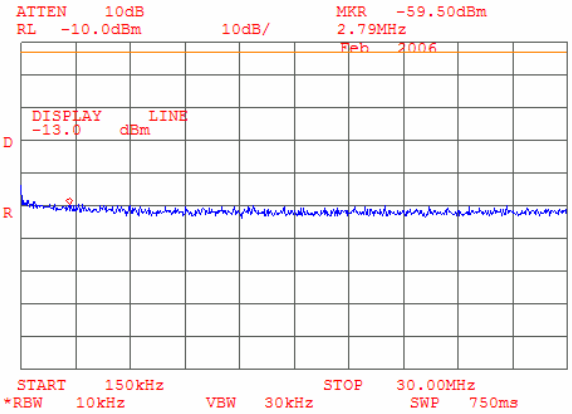
Plot 7.3.3 Spurious emission measurements at RF antenna connector, high channel

Frequency range: 9 – 150 kHz
Carrier frequency: 776.8375 MHz
Modulation: 16QAM



Plot 7.3.4 Spurious emission measurements at RF antenna connector, low channel

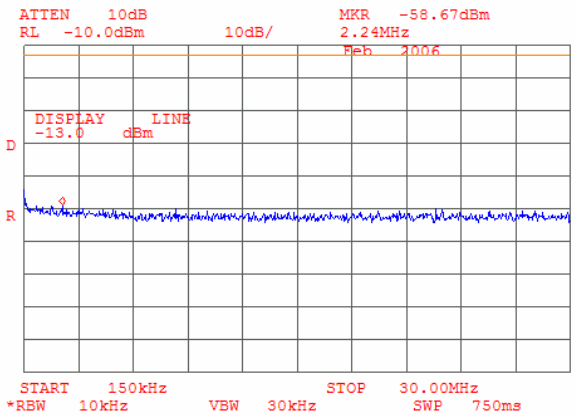
Frequency range: 0.15 – 30 MHz
Carrier frequency: 776.1625 MHz
Modulation: 16QAM



Test specification:	Section 27.53(d)(3), Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

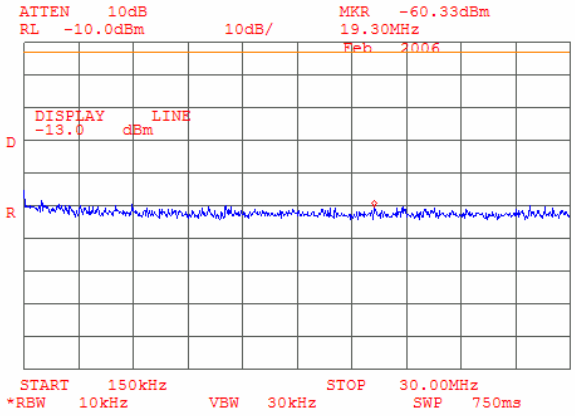
Plot 7.3.5 Spurious emission measurements at RF antenna connector, mid channel

Frequency range: 0.15 – 30 MHz
Carrier frequency: 776.5 MHz
Modulation: 16QAM



Plot 7.3.6 Spurious emission measurements at RF antenna connector, high channel

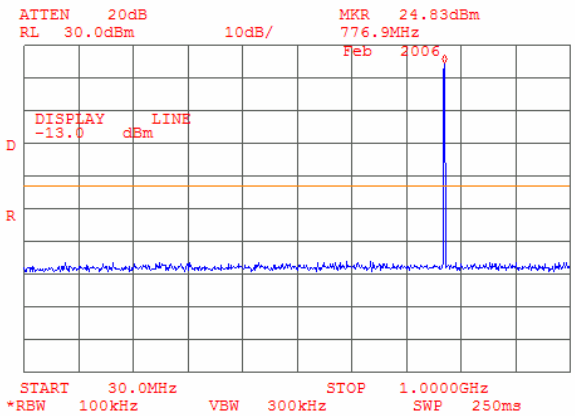
Frequency range: 0.15 – 30 MHz
Carrier frequency: 776.8375 MHz
Modulation: 16QAM



Test specification:	Section 27.53(d)(3), Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

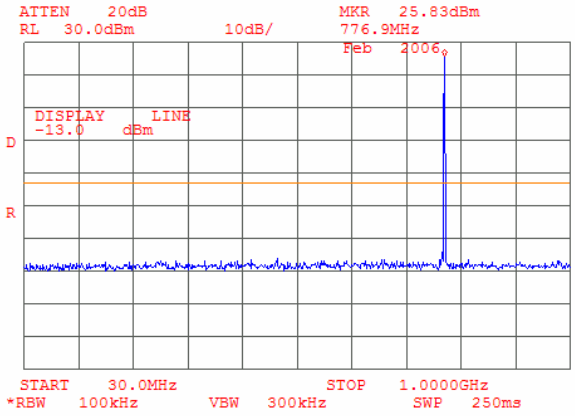
Plot 7.3.7 Spurious emission measurements at RF antenna connector, low channel

Frequency range: 30 – 1000 MHz
Carrier frequency: 776.1625 MHz
Modulation: 16QAM



Plot 7.3.8 Spurious emission measurements at RF antenna connector, mid channel

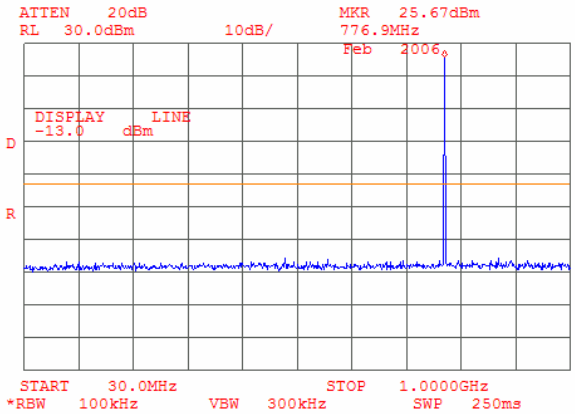
Frequency range: 30 – 1000 MHz
Carrier frequency: 776.5 MHz
Modulation: 16QAM



Test specification:	Section 27.53(d)(3), Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

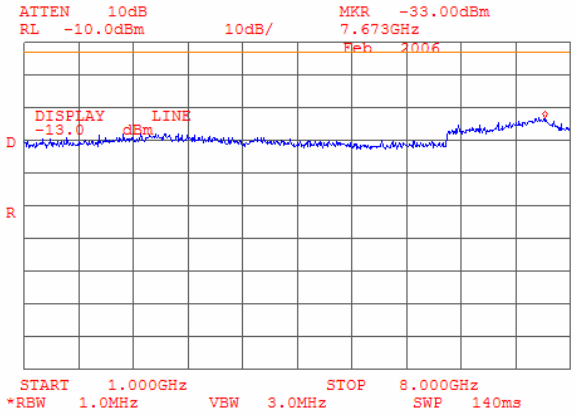
Plot 7.3.9 Spurious emission measurements at RF antenna connector, high channel

Frequency range: 30 – 1000 MHz
Carrier frequency: 776.8375 MHz
Modulation: 16QAM



Plot 7.3.10 Spurious emission measurements at RF antenna connector, low channel

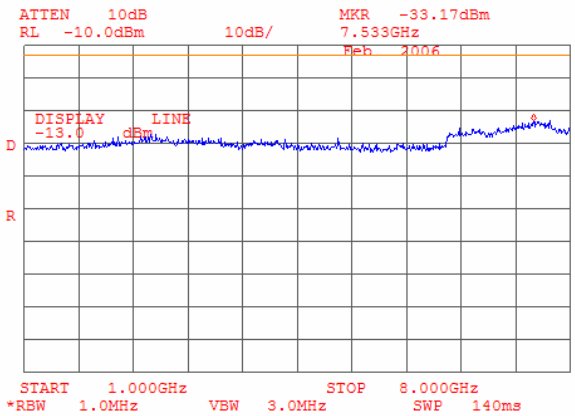
Frequency range: 1.0 – 8.0 GHz
Carrier frequency: 776.1625 MHz
Modulation: 16QAM



Test specification:	Section 27.53(d)(3), Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

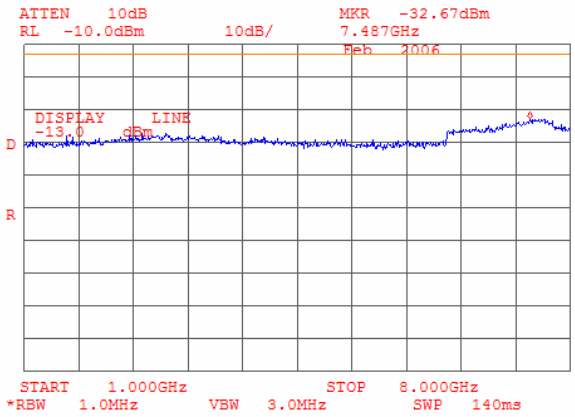
Plot 7.3.11 Spurious emission measurements at RF antenna connector, mid channel

Frequency range: 1.0 – 8.0 GHz
Carrier frequency: 776.5 MHz
Modulation: 16QAM



Plot 7.3.12 Spurious emission measurements at RF antenna connector, high channel

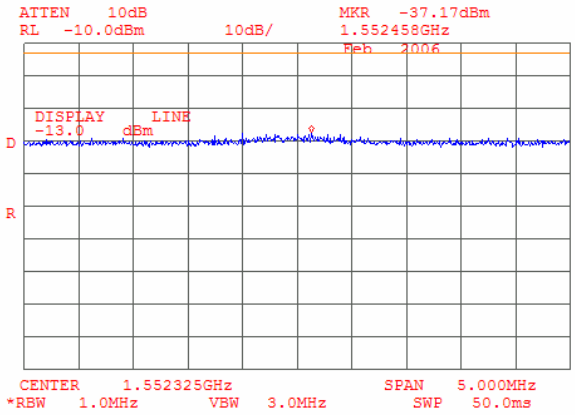
Frequency range: 1.0 – 8.0 GHz
Carrier frequency: 776.8375 MHz
Modulation: 16QAM



Test specification:	Section 27.53(d)(3), Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

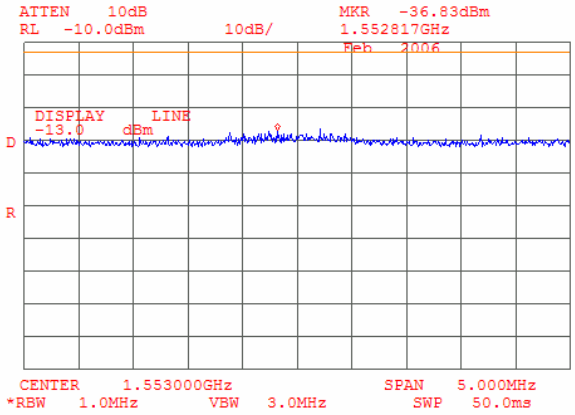
Plot 7.3.13 Spurious emission measurements at RF antenna connector, the 2nd harmonic of the low channel

Carrier frequency: 776.1625 MHz
Modulation: 16QAM



Plot 7.3.14 Spurious emission measurements at RF antenna connector, the 2nd harmonic of the mid channel

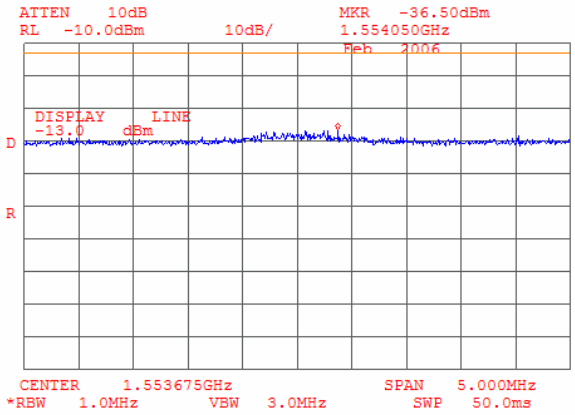
Carrier frequency: 776.5 MHz
Modulation: 16QAM



Test specification:	Section 27.53(d)(3), Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.3.15 Spurious emission measurements at RF antenna connector, the 2nd harmonic of the high channel

Carrier frequency: 776.8375 MHz
Modulation: 16QAM



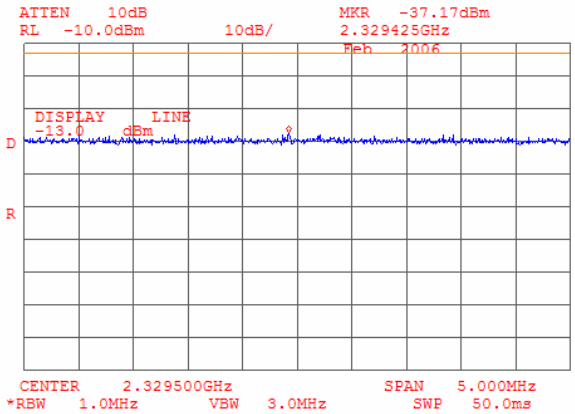
Plot 7.3.16 Spurious emission measurements at RF antenna connector, the 3rd harmonic of the low channel

Carrier frequency: 776.1625 MHz
Modulation: 16QAM

Test specification:	Section 27.53(d)(3), Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

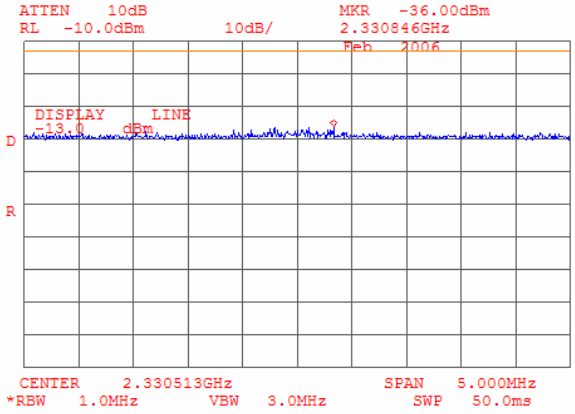
Plot 7.3.17 Spurious emission measurements at RF antenna connector, the 3rd harmonic of the mid channel

Carrier frequency: 776.5 MHz
Modulation: 16QAM



Plot 7.3.18 Spurious emission measurements at RF antenna connector, the 3rd harmonic of the high channel

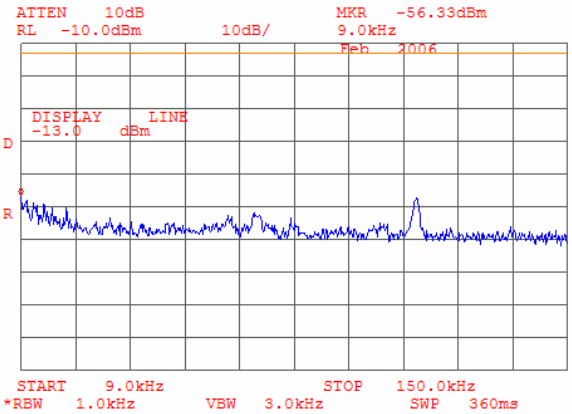
Carrier frequency: 776.8375 MHz
Modulation: 16QAM



Test specification:	Section 27.53(d)(3), Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

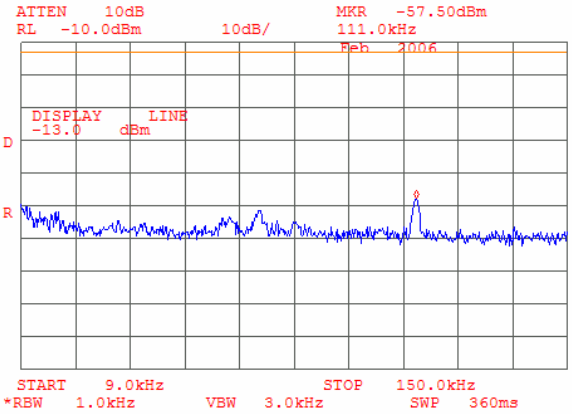
Plot 7.3.19 Spurious emission measurements at RF antenna connector, low channel

Frequency range: 9 – 150 kHz
Carrier frequency: 776.1625 MHz
Modulation: QPSK



Plot 7.3.20 Spurious emission measurements at RF antenna connector, mid channel

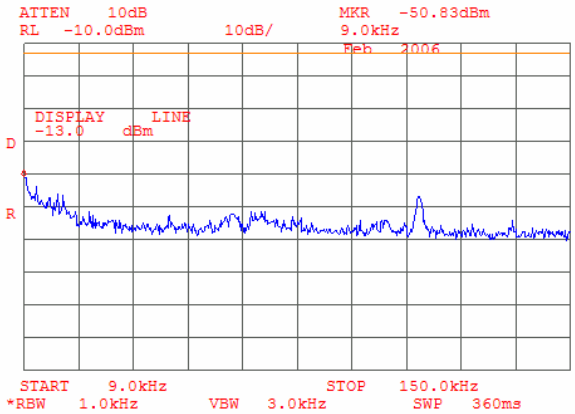
Frequency range: 9 – 150 kHz
Carrier frequency: 776.5 MHz
Modulation: QPSK



Test specification:	Section 27.53(d)(3), Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

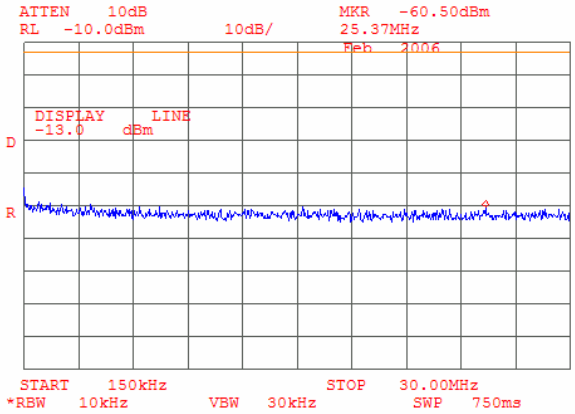
Plot 7.3.21 Spurious emission measurements at RF antenna connector, high channel

Frequency range: 9 – 150 kHz
Carrier frequency: 776.8375 MHz
Modulation: QPSK



Plot 7.3.22 Spurious emission measurements at RF antenna connector, low channel

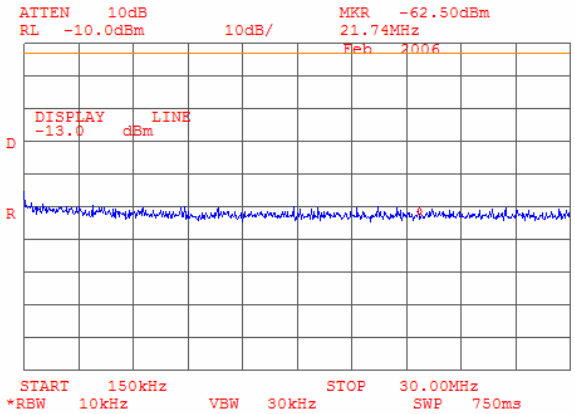
Frequency range: 0.15 – 30 MHz
Carrier frequency: 776.1625 MHz
Modulation: QPSK



Test specification:	Section 27.53(d)(3), Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

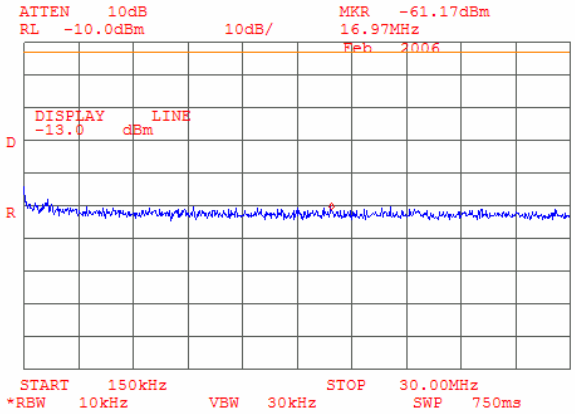
Plot 7.3.23 Spurious emission measurements at RF antenna connector, mid channel

Frequency range: 0.15 – 30 MHz
Carrier frequency: 776.5 MHz
Modulation: QPSK



Plot 7.3.24 Spurious emission measurements at RF antenna connector, high channel

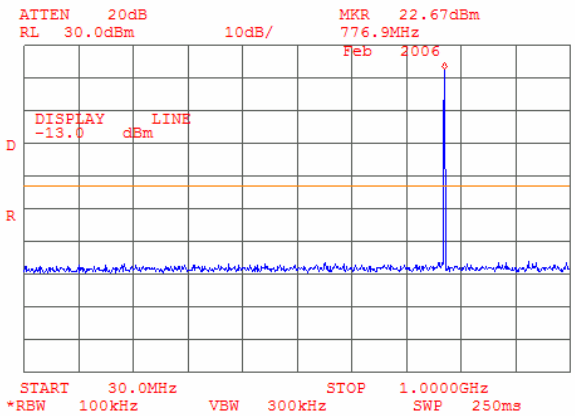
Frequency range: 0.15 – 30 MHz
Carrier frequency: 776.8375 MHz
Modulation: QPSK



Test specification:	Section 27.53(d)(3), Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

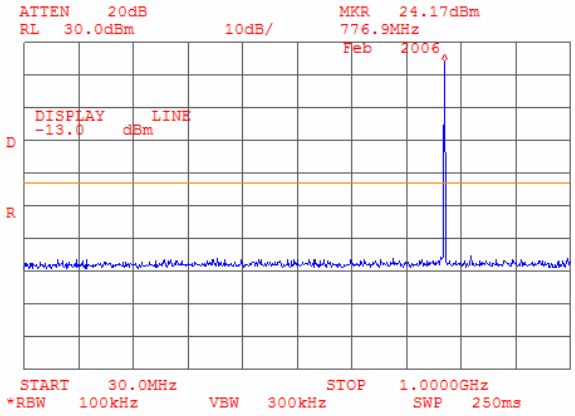
Plot 7.3.25 Spurious emission measurements at RF antenna connector, low channel

Frequency range: 30 – 1000 MHz
Carrier frequency: 776.1625 MHz
Modulation: QPSK



Plot 7.3.26 Spurious emission measurements at RF antenna connector, mid channel

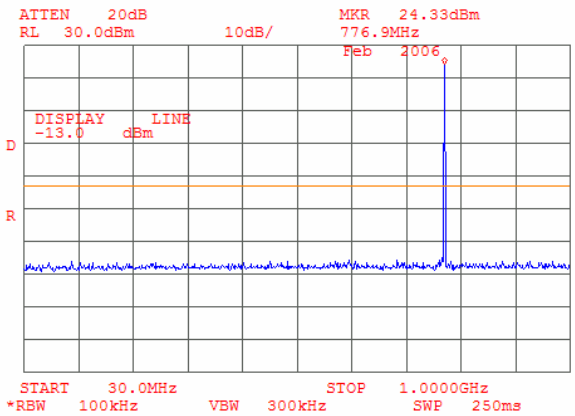
Frequency range: 30 – 1000 MHz
Carrier frequency: 776.5 MHz
Modulation: QPSK



Test specification:	Section 27.53(d)(3), Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

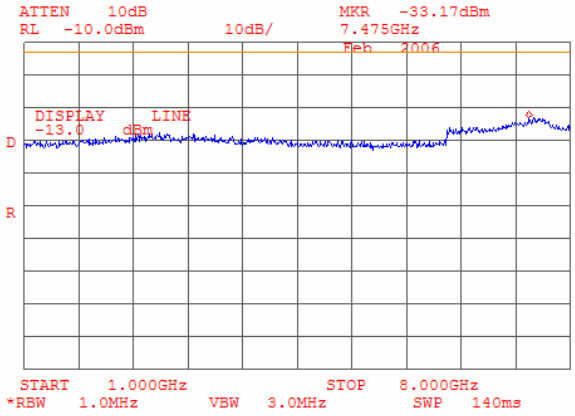
Plot 7.3.27 Spurious emission measurements at RF antenna connector, high channel

Frequency range: 30 – 1000 MHz
Carrier frequency: 776.8375 MHz
Modulation: QPSK



Plot 7.3.28 Spurious emission measurements at RF antenna connector, low channel

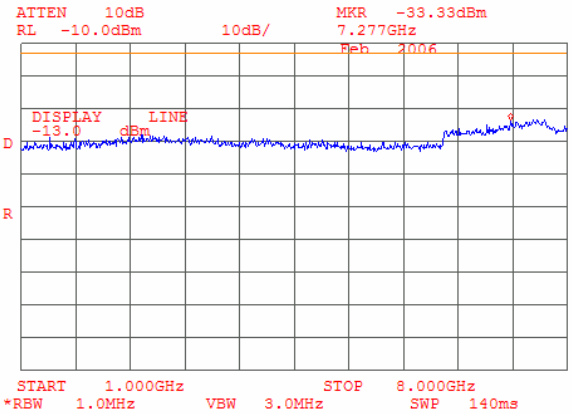
Frequency range: 1.0 – 8.0 GHz
Carrier frequency: 776.1625 MHz
Modulation: QPSK



Test specification:	Section 27.53(d)(3), Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

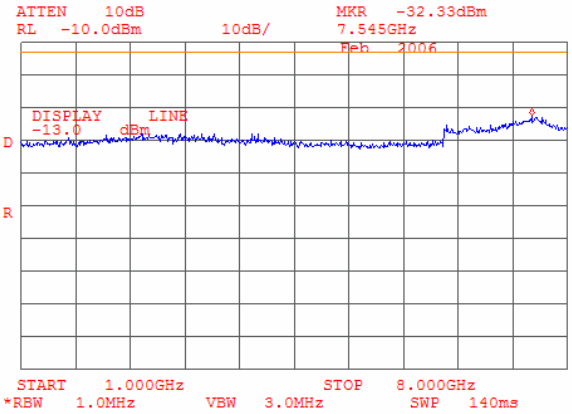
Plot 7.3.29 Spurious emission measurements at RF antenna connector, mid channel

Frequency range: 1.0 – 8.0 GHz
Carrier frequency: 776.5 MHz
Modulation: QPSK



Plot 7.3.30 Spurious emission measurements at RF antenna connector, high channel

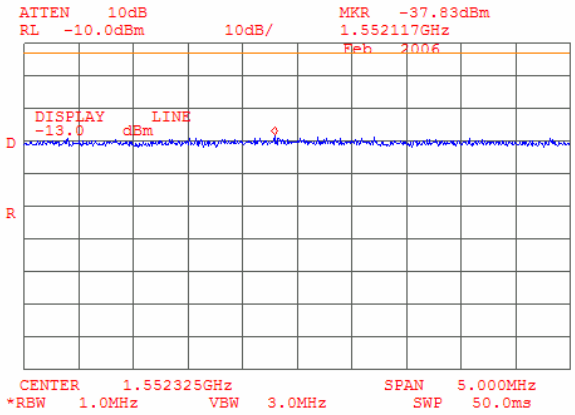
Frequency range: 1.0 – 8.0 GHz
Carrier frequency: 776.8375 MHz
Modulation: QPSK



Test specification:	Section 27.53(d)(3), Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

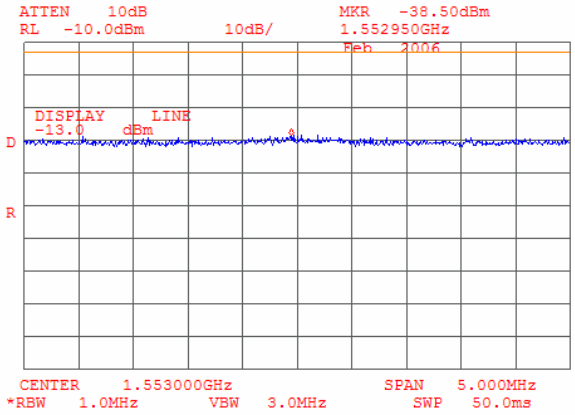
Plot 7.3.31 Spurious emission measurements at RF antenna connector, the 2nd harmonic of the low channel

Carrier frequency: 776.1625 MHz
Modulation: QPSK



Plot 7.3.32 Spurious emission measurements at RF antenna connector, the 2nd harmonic of the mid channel

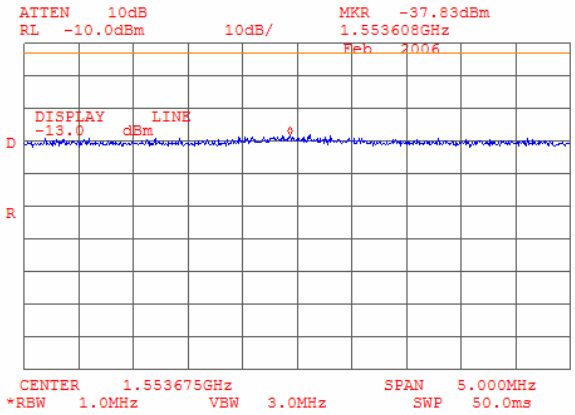
Carrier frequency: 776.5 MHz
Modulation: QPSK



Test specification:	Section 27.53(d)(3), Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

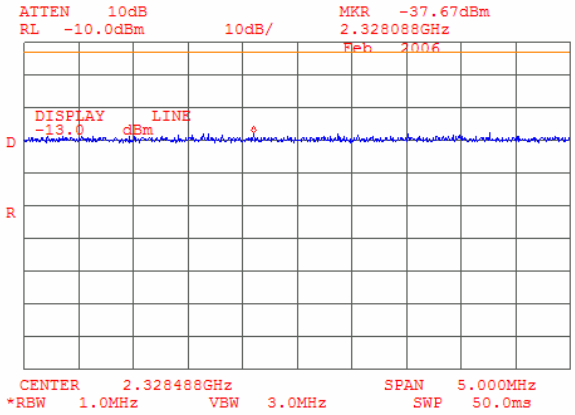
Plot 7.3.33 Spurious emission measurements at RF antenna connector, the 2nd harmonic of the high channel

Carrier frequency: 776.8375 MHz
Modulation: QPSK



Plot 7.3.34 Spurious emission measurements at RF antenna connector, the 3rd harmonic of the low channel

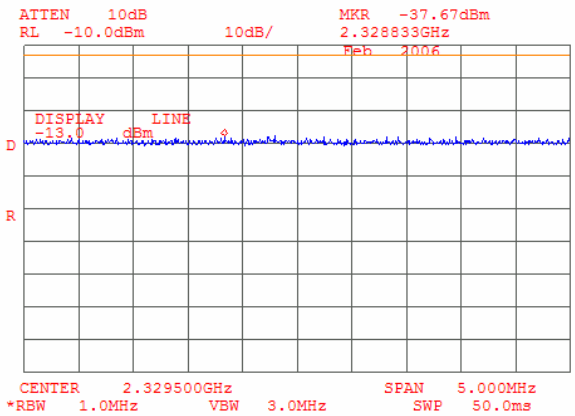
Carrier frequency: 776.1625 MHz
Modulation: QPSK



Test specification:	Section 27.53(d)(3), Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

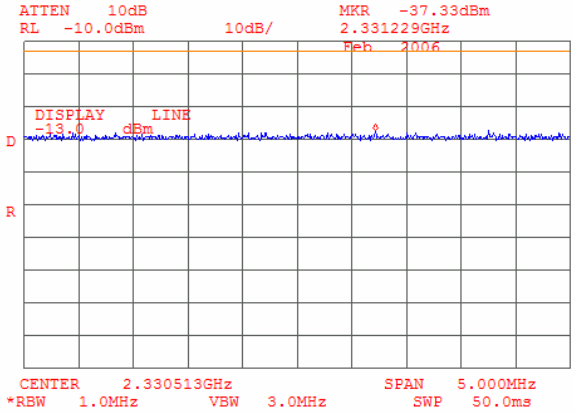
Plot 7.3.35 Spurious emission measurements at RF antenna connector, the 3rd harmonic of the mid channel

Carrier frequency: 776.5 MHz
Modulation: QPSK



Plot 7.3.36 Spurious emission measurements at RF antenna connector, the 3rd harmonic of the high channel

Carrier frequency: 776.8375 MHz
Modulation: QPSK



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

7.4 Adjacent channel power test

7.4.1 General

This test was performed to measure adjacent channel power at RF antenna connector. Test limits are given in Table 7.4.1. The test results are provided in associated plots.

Table 7.4.1 150 kHz mobile transmitter adjacent channel coupled power requirements

Offset from center frequency, kHz	Measurement bandwidth, kHz	Maximum ACCP relative, dBc
100	50	-40
200	50	-50
300	50	-50
400	50	-50
600 to 1000	30(s)*	-60
1000 to receive band	30(s)*	-70
In the receive band	30(s)*	-100

*Note - “s” means that a swept measurement is to be used.

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 for end user RF output power.

7.4.2.3 The adjacent channel coupled power was measured with spectrum analyzer as provided in Table 7.4.2, Table 7.4.3 and associated plots.

Figure 7.4.1 Adjacent channel power test setup

Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

Table 7.4.2 Adjacent channel coupled power test results

ASSIGNED FREQUENCY RANGE: 776.0 – 777.0 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATION: **QPSK**
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Offset from center frequency, kHz	Measurement bandwidth, kHz	Measured ACCP, dBm	Output power, dBm	Maximum ACCP, dBc	Maximum ACCP Limit, dBc	Margin, dB	Verdict
Low frequency							
100	50	-14.7	27.58	42.28	-40	2.28	Pass
-100	50	-14.5	27.58	42.08	-40	2.08	Pass
200	50	-24.1	27.58	51.68	-50	1.68	Pass
-200	50	-25.3	27.58	52.88	-50	2.88	Pass
300	50	-31.6	27.58	59.18	-50	9.18	Pass
-300	50	-32.7	27.58	60.28	-50	10.28	Pass
400	50	-33.2	27.58	60.78	-50	10.78	Pass
-400	50	-34.0	27.58	61.58	-50	11.58	Pass
600 – 1000	30(s)	-34.0	27.58	61.58	-60	1.58	Pass
-(600 – 1000)	30(s)	-35.5	27.58	63.08	-60	3.08	Pass
1000 to receive band	30(s)	-45.7	27.58	73.25	-70	3.25	Pass
In the receive band	30(s)	-72.8	27.58	100.41	-100	0.41	Pass
Mid frequency							
100	50	-14.2	27.59	41.79	-40	1.79	Pass
-100	50	-15.0	27.59	42.59	-40	2.59	Pass
200	50	-24.6	27.59	52.19	-50	2.19	Pass
-200	50	-25.3	27.59	52.89	-50	2.89	Pass
300	50	-30.7	27.59	58.29	-50	8.29	Pass
-300	50	-31.8	27.59	59.39	-50	9.39	Pass
400	50	-33.2	27.59	60.79	-50	10.79	Pass
-400	50	-34.9	27.59	62.49	-50	12.49	Pass
600 – 1000	30(s)	-42.2	27.59	69.76	-60	9.76	Pass
-(600 – 1000)	30(s)	-40.2	27.59	67.76	-60	7.76	Pass
1000 to receive band	30(s)	-44.8	27.59	72.42	-70	2.42	Pass
In the receive band	30(s)	-74.5	27.59	102.09	-100	2.09	Pass
High frequency							
100	50	-14.0	27.57	41.57	-40	1.57	Pass
-100	50	-14.1	27.57	41.67	-40	1.67	Pass
200	50	-24.5	27.57	52.07	-50	2.07	Pass
-200	50	-24.5	27.57	52.07	-50	2.07	Pass
300	50	-30.8	27.57	58.37	-50	8.37	Pass
-300	50	-30.3	27.57	57.87	-50	7.87	Pass
400	50	-32.8	27.57	60.37	-50	10.37	Pass
-400	50	-33.5	27.57	61.07	-50	11.07	Pass
600 – 1000	30(s)	-35.9	27.57	63.5	-60	3.5	Pass
-(600 – 1000)	30(s)	-37.8	27.57	65.33	-60	5.33	Pass
1000 to receive band	30(s)	-44.9	27.57	72.47	-70	2.47	Pass
In the receive band	30(s)	-79.9	27.57	107.47	-100	7.47	Pass

*- Margin = Adjacent channel coupled power – specification limit.

Reference numbers of test equipment used

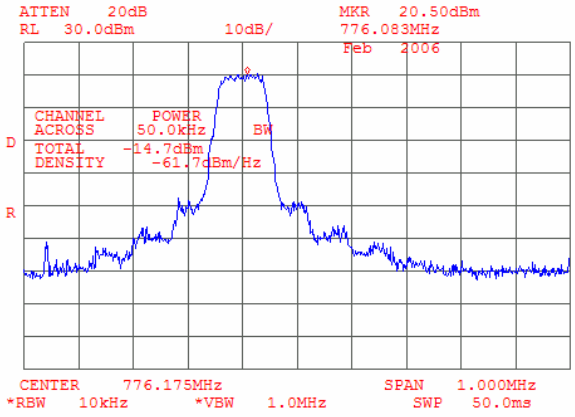
HL 1097	HL 1424	HL 1455	HL 1488	HL 1653	HL 1942		

Full description is given in Appendix A.

Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

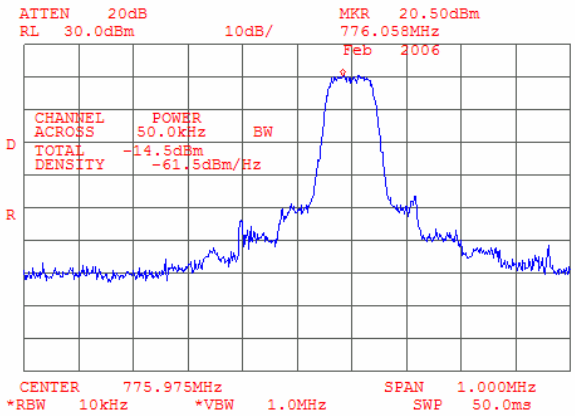
Plot 7.4.1 Adjacent channel coupled power measurements, low carrier frequency, QPSK

Frequency offset: 100 kHz



Plot 7.4.2 Adjacent channel coupled power measurements, low carrier frequency, QPSK

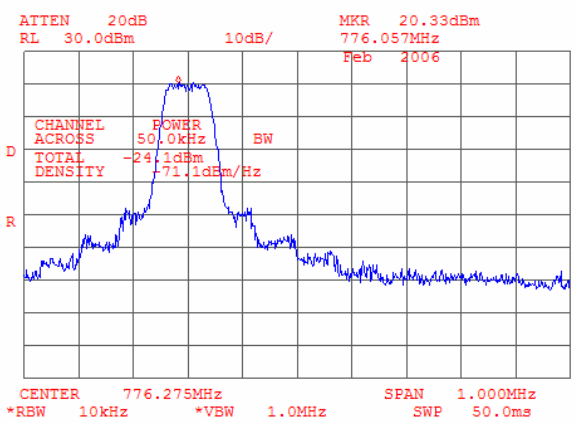
Frequency offset: -100 kHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

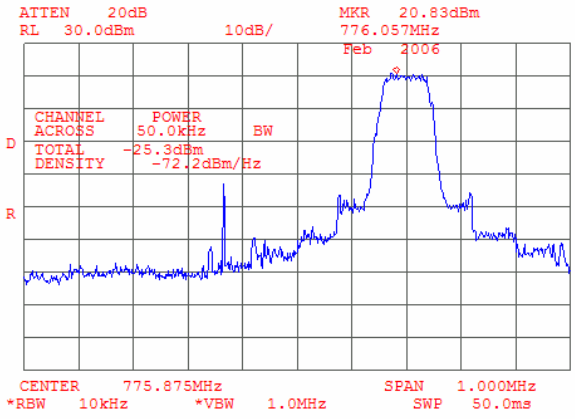
Plot 7.4.3 Adjacent channel coupled power measurements, low carrier frequency, QPSK

Frequency offset: 200 kHz



Plot 7.4.4 Adjacent channel coupled power measurements, low carrier frequency, QPSK

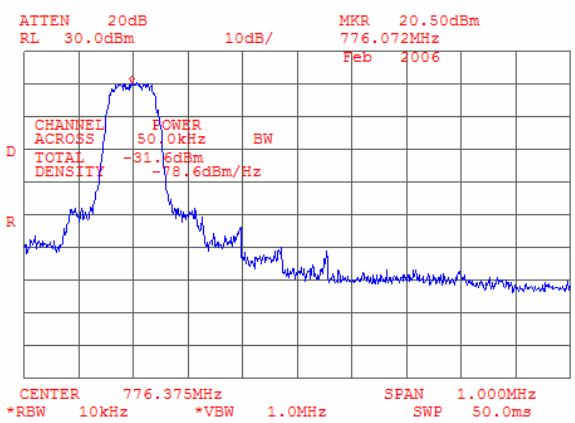
Frequency offset: - -200 kHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

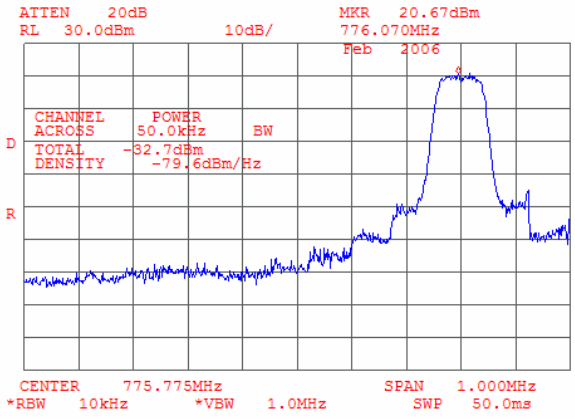
Plot 7.4.5 Adjacent channel coupled power measurements, low carrier frequency, QPSK

Frequency offset: 300 kHz



Plot 7.4.6 Adjacent channel coupled power measurements, low carrier frequency, QPSK

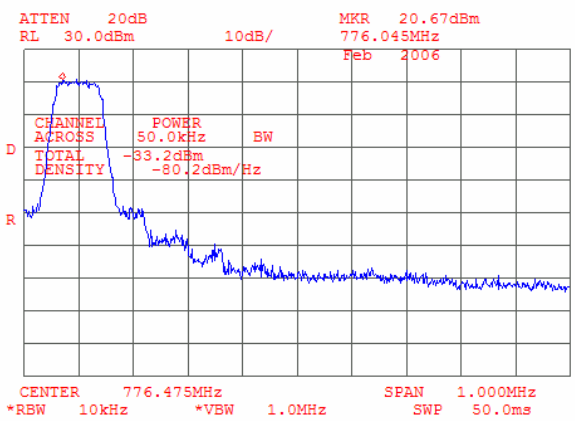
Frequency offset: -300 kHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

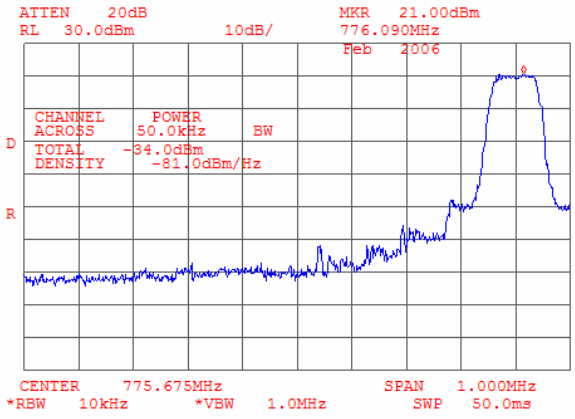
Plot 7.4.7 Adjacent channel coupled power measurements, low carrier frequency, QPSK

Frequency offset: 400 kHz



Plot 7.4.8 Adjacent channel coupled power measurements, low carrier frequency, QPSK

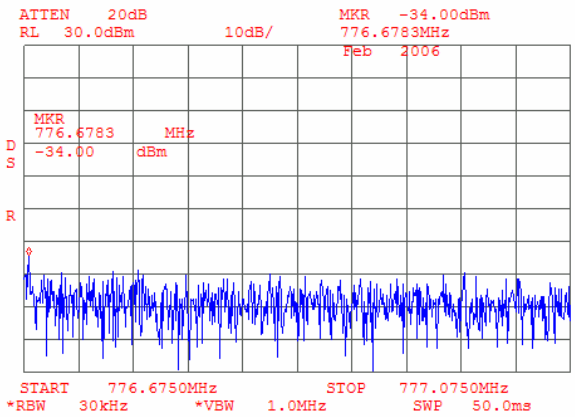
Frequency offset: -400 kHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

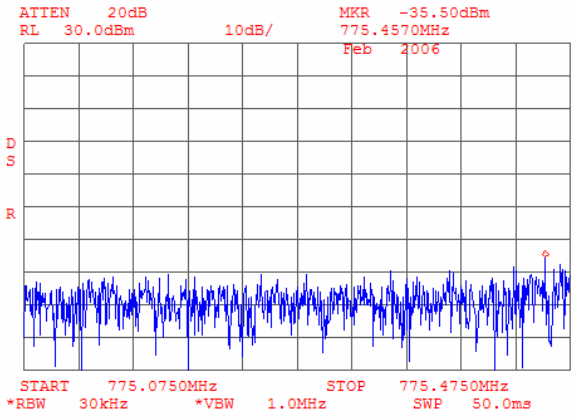
Plot 7.4.9 Adjacent channel coupled power measurements, low carrier frequency, QPSK

Frequency range: [776.075+0.60] – [776.075+1.00] MHz



Plot 7.4.10 Adjacent channel coupled power measurements, low carrier frequency, QPSK

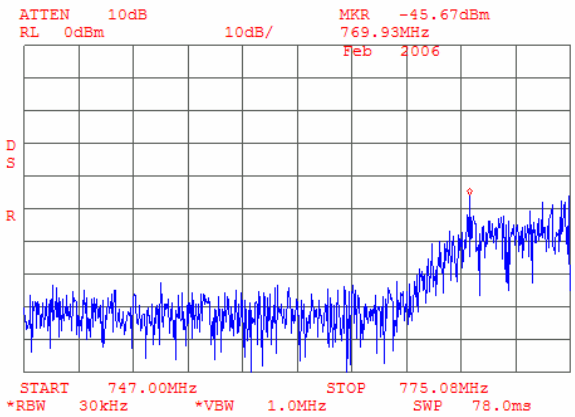
Frequency range: [776.075-0.60] – [776.075-1.00] MHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

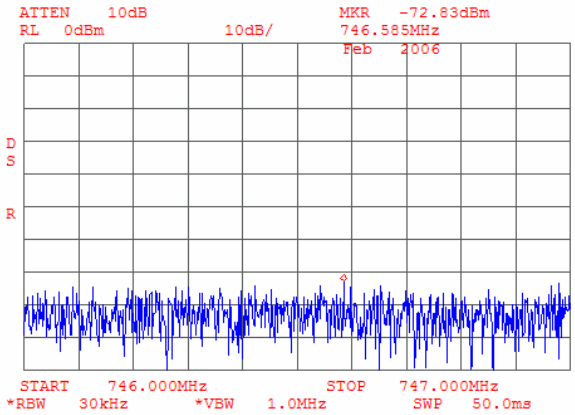
Plot 7.4.11 Adjacent channel coupled power measurements, low carrier frequency, QPSK

Frequency range: 747.0 – [776.075-1.00] MHz



Plot 7.4.12 Adjacent channel coupled power measurements, low carrier frequency, QPSK

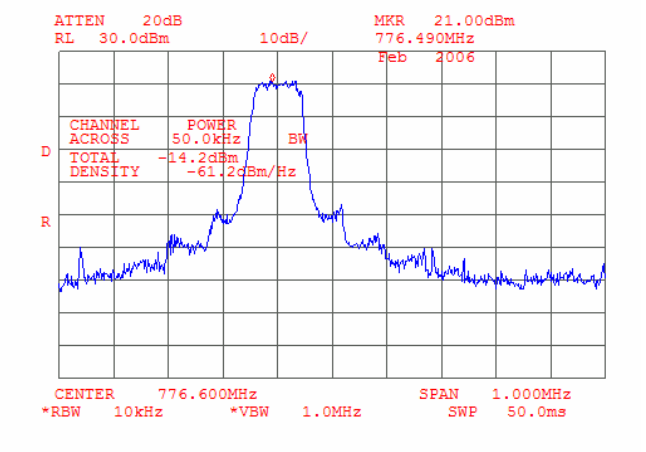
Frequency range: 746.0 – 747.0 MHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

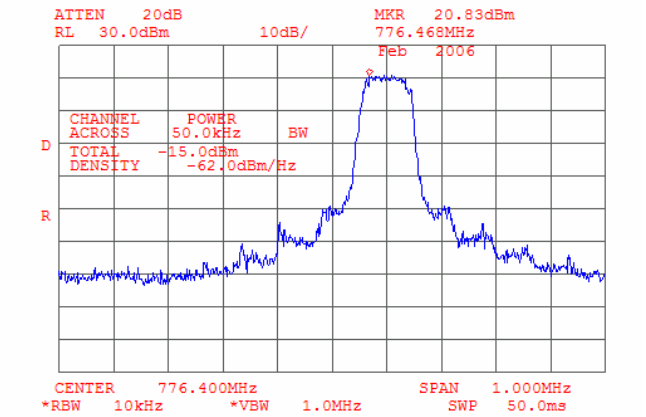
Plot 7.4.13 Adjacent channel coupled power measurements, mid carrier frequency, QPSK

Frequency offset: 100 kHz



Plot 7.4.14 Adjacent channel coupled power measurements, mid carrier frequency, QPSK

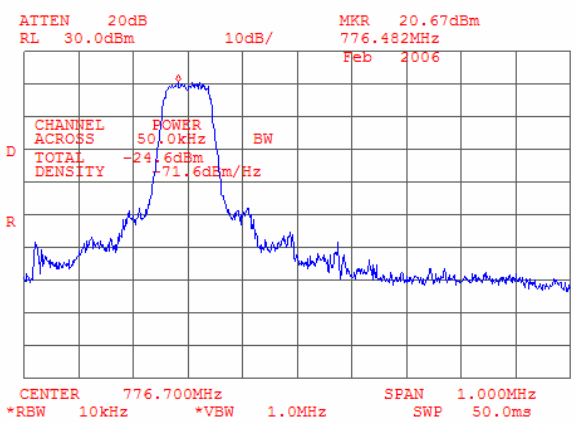
Frequency offset: -100 kHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

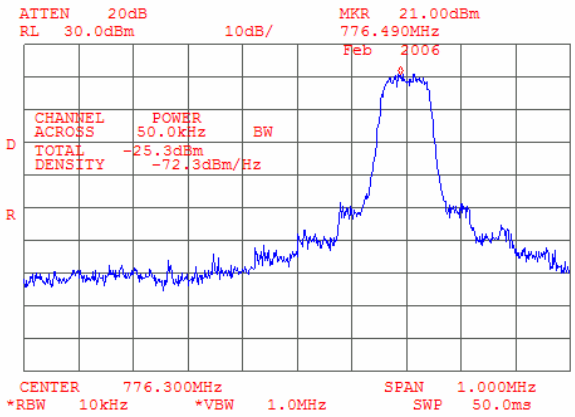
Plot 7.4.15 Adjacent channel coupled power measurements, mid carrier frequency, QPSK

Frequency offset: 200 kHz



Plot 7.4.16 Adjacent channel coupled power measurements, mid carrier frequency, QPSK

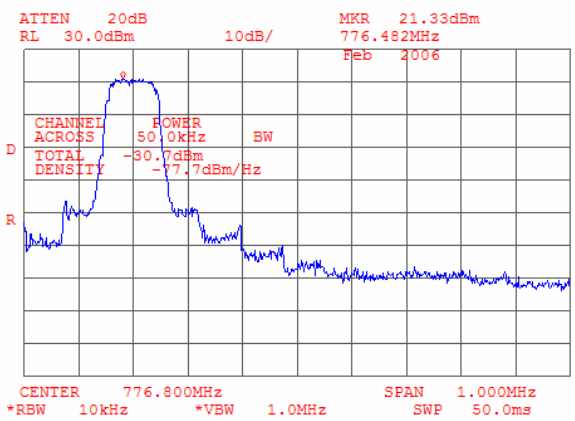
Frequency offset: -200 kHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

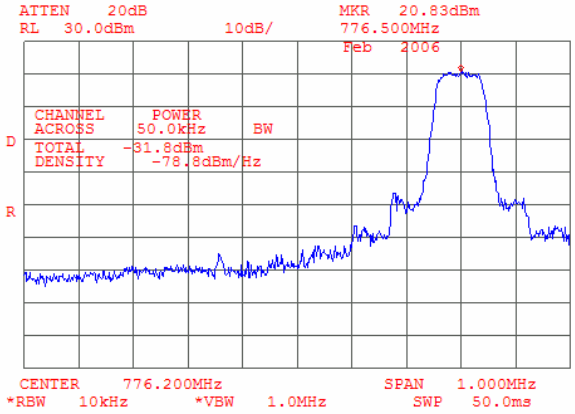
Plot 7.4.17 Adjacent channel coupled power measurements, mid carrier frequency, QPSK

Frequency offset: 300 kHz



Plot 7.4.18 Adjacent channel coupled power measurements, mid carrier frequency, QPSK

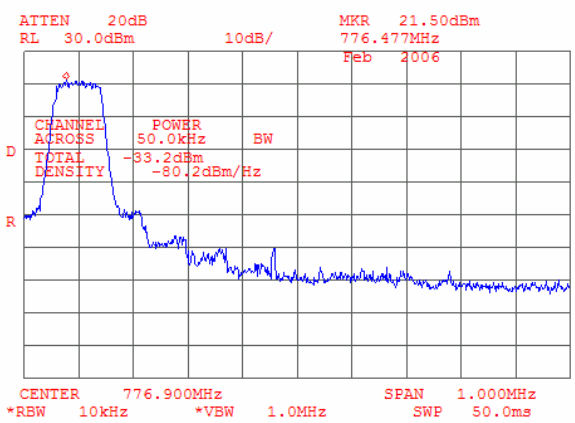
Frequency offset: -300 kHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

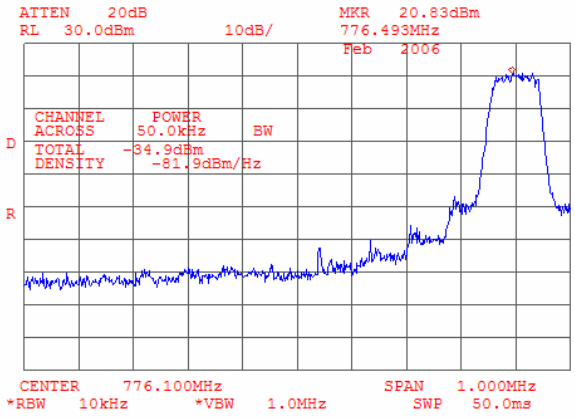
Plot 7.4.19 Adjacent channel coupled power measurements, mid carrier frequency, QPSK

Frequency offset: 400 kHz



Plot 7.4.20 Adjacent channel coupled power measurements, mid carrier frequency, QPSK

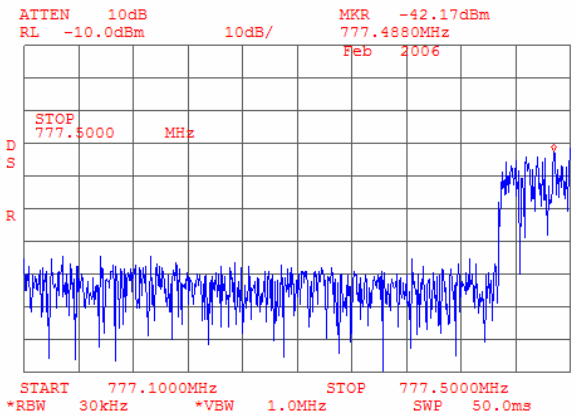
Frequency offset: -400 kHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

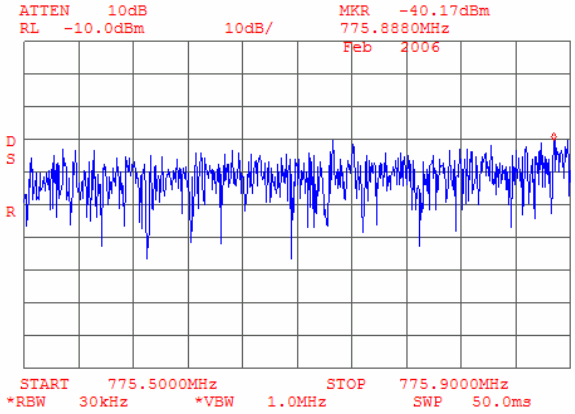
Plot 7.4.21 Adjacent channel coupled power measurements, mid carrier frequency, QPSK

Frequency range: [776.5+0.60] – [776.5+1.00] MHz



Plot 7.4.22 Adjacent channel coupled power measurements, mid carrier frequency, QPSK

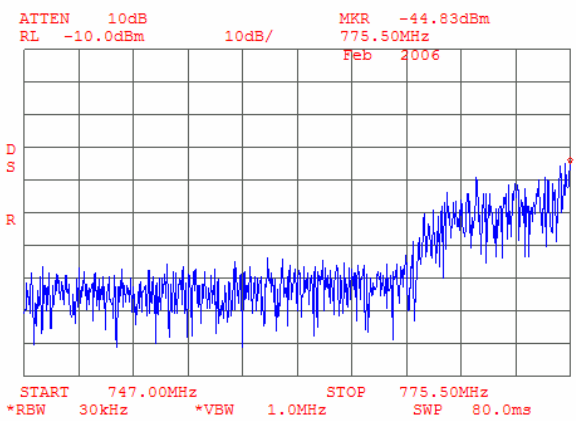
Frequency range: [776.5-0.60] – [776.5-1.00] MHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

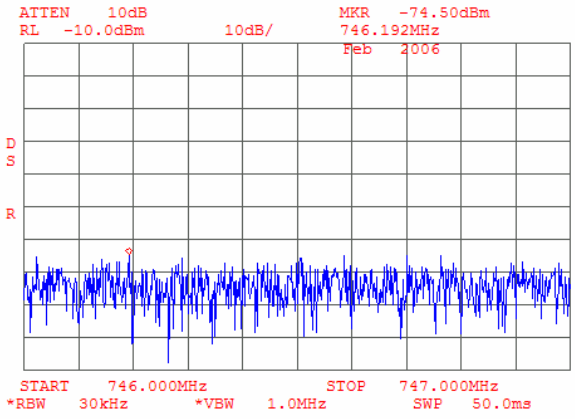
Plot 7.4.23 Adjacent channel coupled power measurements, mid carrier frequency, QPSK

Frequency range: 747.0 – [776.5-1.00] MHz



Plot 7.4.24 Adjacent channel coupled power measurements, mid carrier frequency, QPSK

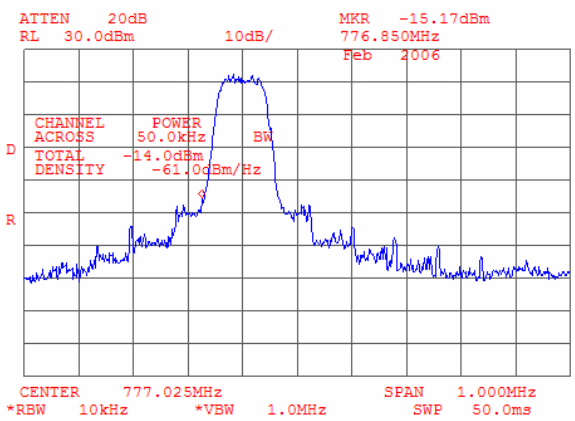
Frequency range: 746.0 – 747.0 MHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

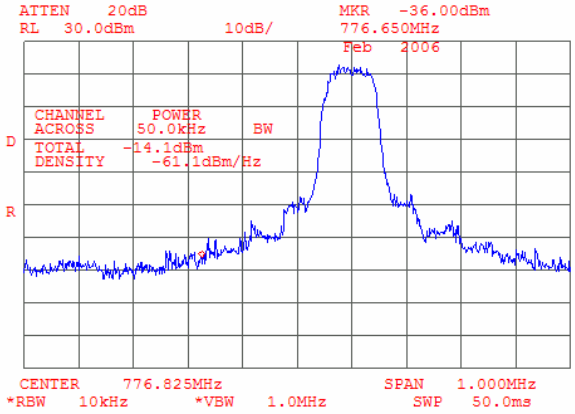
Plot 7.4.25 Adjacent channel coupled power measurements, high carrier frequency, QPSK

Frequency offset: 100 kHz



Plot 7.4.26 Adjacent channel coupled power measurements, high carrier frequency, QPSK

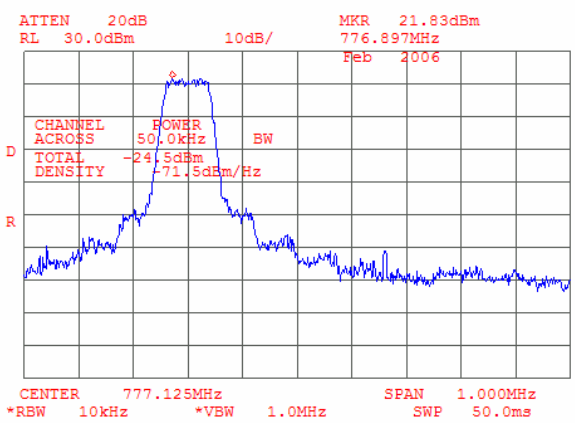
Frequency offset: -100 kHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

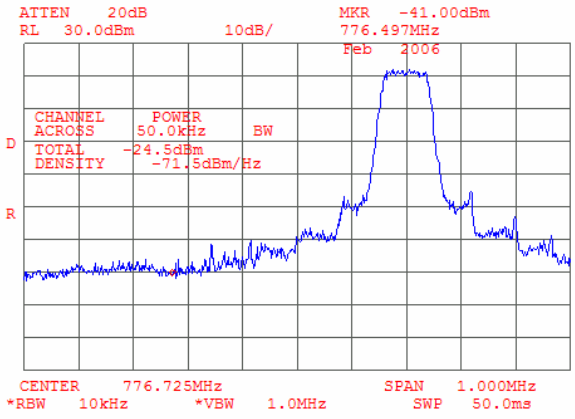
Plot 7.4.27 Adjacent channel coupled power measurements, high carrier frequency, QPSK

Frequency offset: 200 kHz



Plot 7.4.28 Adjacent channel coupled power measurements, high carrier frequency, QPSK

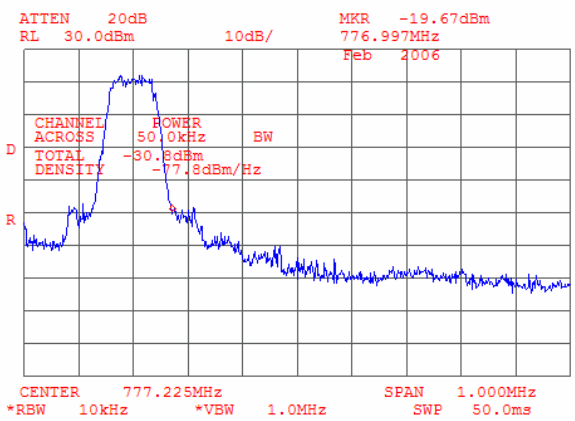
Frequency offset: -200 kHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

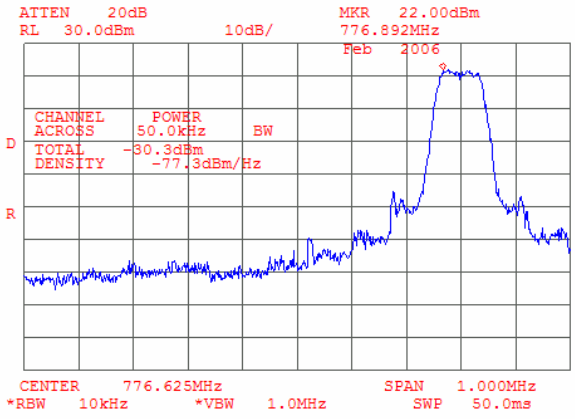
Plot 7.4.29 Adjacent channel coupled power measurements, high carrier frequency, QPSK

Frequency offset: 300 kHz



Plot 7.4.30 Adjacent channel coupled power measurements, high carrier frequency, QPSK

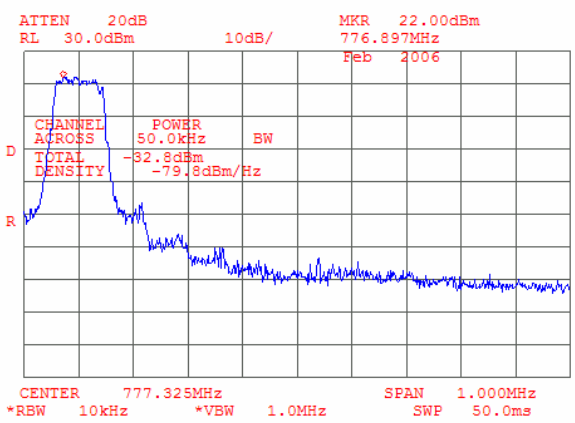
Frequency offset: -300 kHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

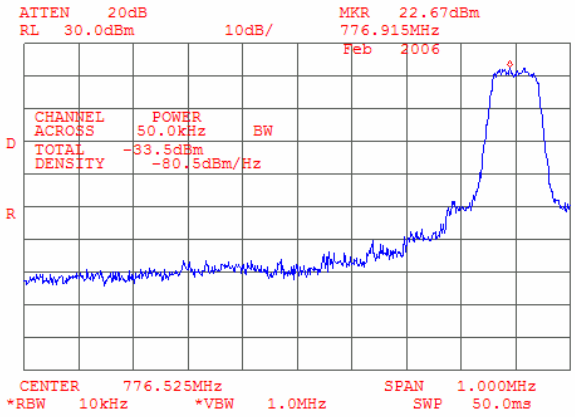
Plot 7.4.31 Adjacent channel coupled power measurements, high carrier frequency, QPSK

Frequency offset: 400 kHz



Plot 7.4.32 Adjacent channel coupled power measurements, high carrier frequency, QPSK

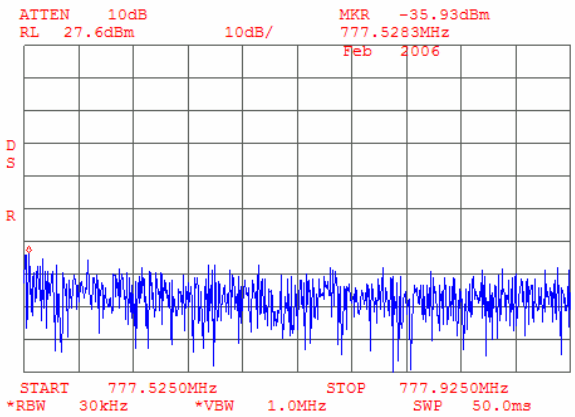
Frequency offset: -400 kHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

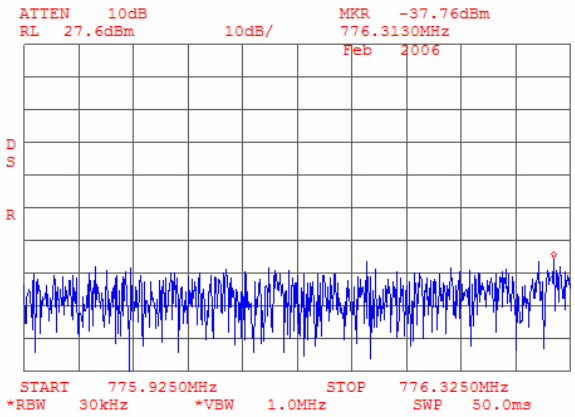
Plot 7.4.33 Adjacent channel coupled power measurements, high carrier frequency, QPSK

Frequency range: [776.925+0.60] – [776.925+1.00] MHz



Plot 7.4.34 Adjacent channel coupled power measurements, high carrier frequency, QPSK

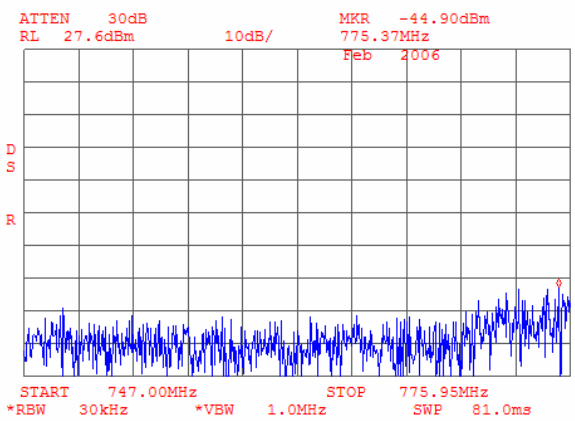
Frequency range: [776.925-0.60] – [776.925-1.00] MHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

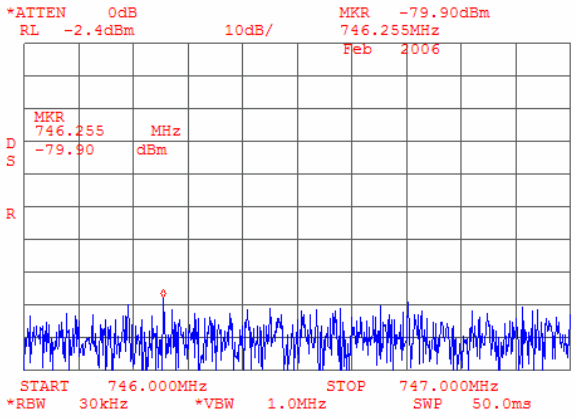
Plot 7.4.35 Adjacent channel coupled power measurements, high carrier frequency, QPSK

Frequency range: 747.0 – [776.925-1.00] MHz



Plot 7.4.36 Adjacent channel coupled power measurements, high carrier frequency, QPSK

Frequency range: 746.0 – 747.0 MHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

Table 7.4.3 Adjacent channel coupled power test results

ASSIGNED FREQUENCY RANGE: 776.0 – 777.0 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATION: **16QAM**
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Offset from center frequency, kHz	Measurement bandwidth, kHz	Measured ACCP, dBm	Output power, dBm	Maximum ACCP, dBc	Maximum ACCP Limit, dBc	Margin, dB	Verdict
Low frequency							
100	50	-15.2	27.58	42.8	-40	2.78	Pass
-100	50	-14.1	27.58	41.7	-40	1.68	Pass
200	50	-30.7	27.58	58.3	-50	8.28	Pass
-200	50	-32.3	27.58	59.9	-50	9.88	Pass
300	50	-36.9	27.58	64.5	-50	14.48	Pass
-300	50	-36.7	27.58	64.3	-50	14.28	Pass
400	50	-38.4	27.58	66.0	-50	15.98	Pass
-400	50	-38.8	27.58	66.4	-50	16.38	Pass
600 – 1000	30(s)	-38.0	27.58	65.6	-60	5.58	Pass
-(600 – 1000)	30(s)	-39.0	27.58	66.6	-60	6.58	Pass
1000 to receive band	30(s)	-46.3	27.58	73.9	-70	3.91	Pass
In the receive band	30(s)	-73.5	27.58	101.1	-100	1.08	Pass
Mid frequency							
100	50	-14.3	27.59	41.9	-40	1.89	Pass
-100	50	-14.1	27.59	41.7	-40	1.69	Pass
200	50	-25.3	27.59	52.9	-50	2.89	Pass
-200	50	-26.3	27.59	53.9	-50	3.89	Pass
300	50	-30.5	27.59	58.1	-50	8.09	Pass
-300	50	-31.2	27.59	58.8	-50	8.79	Pass
400	50	-32.0	27.59	59.6	-50	9.59	Pass
-400	50	-33.3	27.59	60.9	-50	10.89	Pass
600 – 1000	30(s)	-36.2	27.59	63.8	-60	3.76	Pass
-(600 – 1000)	30(s)	-37.8	27.59	65.4	-60	5.42	Pass
1000 to receive band	30(s)	-49.8	27.59	77.4	-70	7.42	Pass
In the receive band	30(s)	-73.8	27.59	101.4	-100	1.42	Pass
High frequency							
100	50	-14.1	27.57	41.7	-40	1.67	Pass
-100	50	-13.3	27.57	40.9	-40	0.87	Pass
200	50	-26.4	27.57	54.0	-50	3.97	Pass
-200	50	-26.6	27.57	54.2	-50	4.17	Pass
300	50	-33.7	27.57	61.3	-50	11.27	Pass
-300	50	-31.7	27.57	59.3	-50	9.27	Pass
400	50	-33.7	27.57	61.3	-50	11.27	Pass
-400	50	-34.5	27.57	62.1	-50	12.07	Pass
600 – 1000	30(s)	-40.4	27.57	68.0	-60	7.97	Pass
-(600 – 1000)	30(s)	-39.7	27.57	67.3	-60	7.3	Pass
1000 to receive band	30(s)	-45.1	27.57	72.6	-70	2.64	Pass
In the receive band	30(s)	-79.6	27.57	107.1	-100	7.14	Pass

*****- Margin = Adjacent channel coupled power – specification limit.

Reference numbers of test equipment used

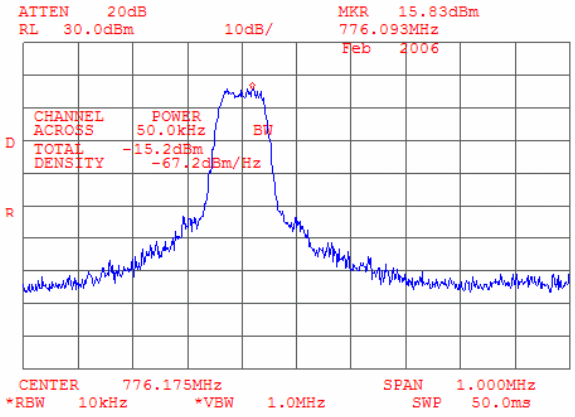
HL 1097	HL 1424	HL 1455	HL 1488	HL 1653	HL 1942		

Full description is given in Appendix A.

Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

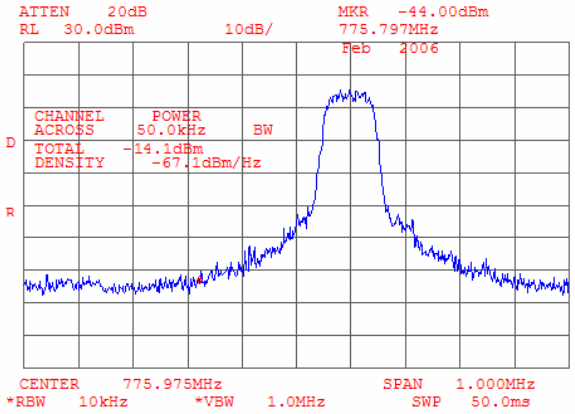
Plot 7.4.37 Adjacent channel coupled power measurements, low carrier frequency, 16QAM

Frequency offset: 100 kHz



Plot 7.4.38 Adjacent channel coupled power measurements, low carrier frequency, 16QAM

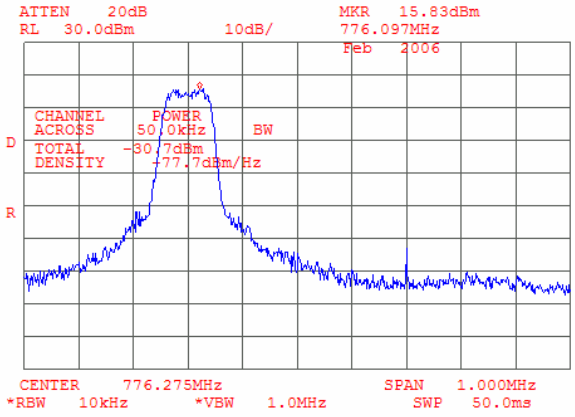
Frequency offset: -100 kHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

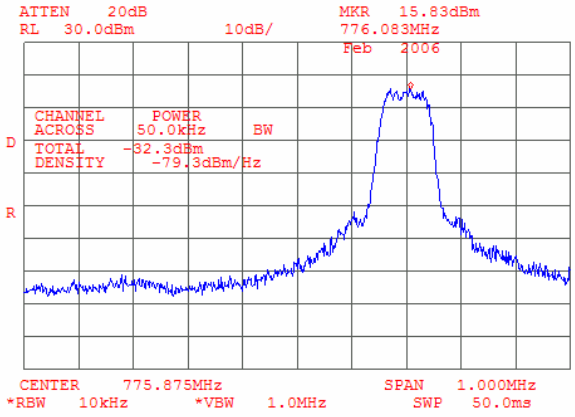
Plot 7.4.39 Adjacent channel coupled power measurements, low carrier frequency, 16QAM

Frequency offset: 200 kHz



Plot 7.4.40 Adjacent channel coupled power measurements, low carrier frequency, 16QAM

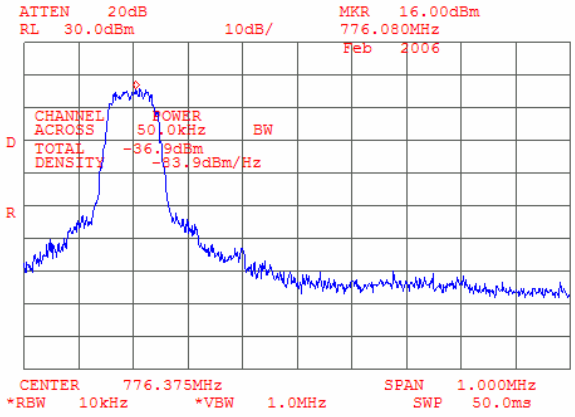
Frequency offset: -200 kHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

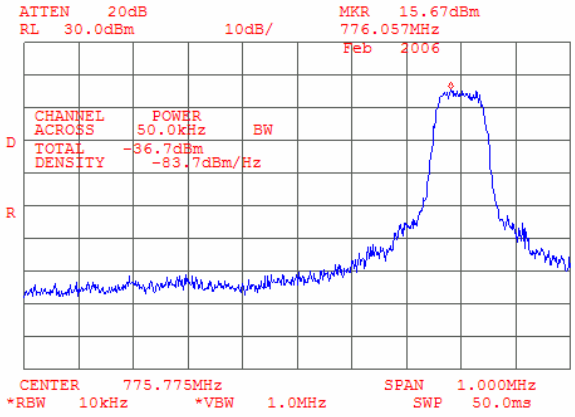
Plot 7.4.41 Adjacent channel coupled power measurements, low carrier frequency, 16QAM

Frequency offset: 300 kHz



Plot 7.4.42 Adjacent channel coupled power measurements, low carrier frequency, 16QAM

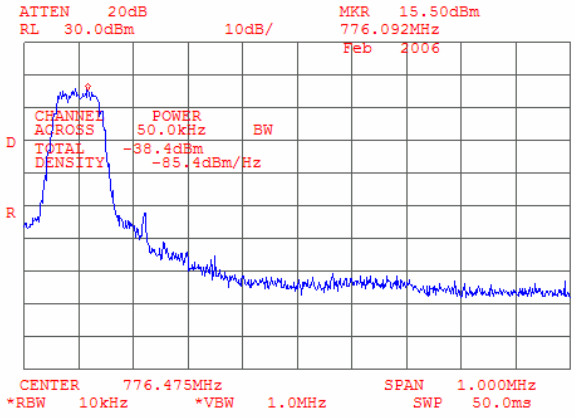
Frequency offset: -300 kHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

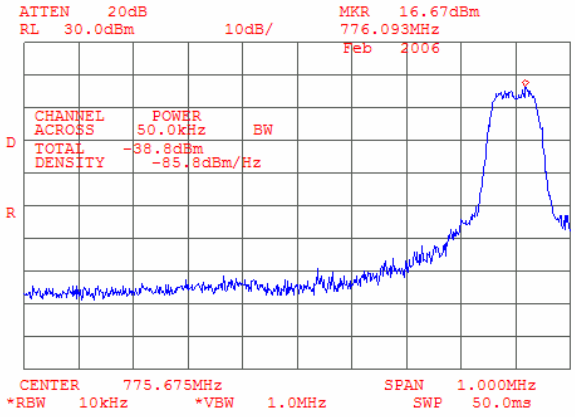
Plot 7.4.43 Adjacent channel coupled power measurements, low carrier frequency, 16QAM

Frequency offset: 400 kHz



Plot 7.4.44 Adjacent channel coupled power measurements, low carrier frequency, 16QAM

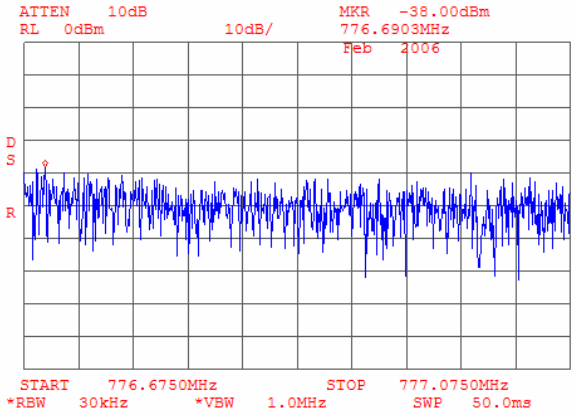
Frequency offset: -400 kHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

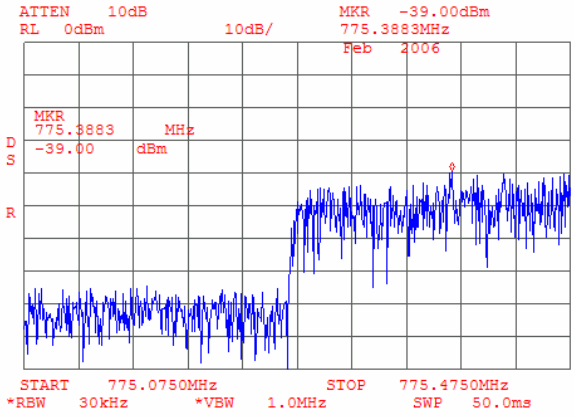
Plot 7.4.45 Adjacent channel coupled power measurements, low carrier frequency, 16QAM

Frequency range: [776.075+0.60] – [776.075+1.00] MHz



Plot 7.4.46 Adjacent channel coupled power measurements, low carrier frequency, 16QAM

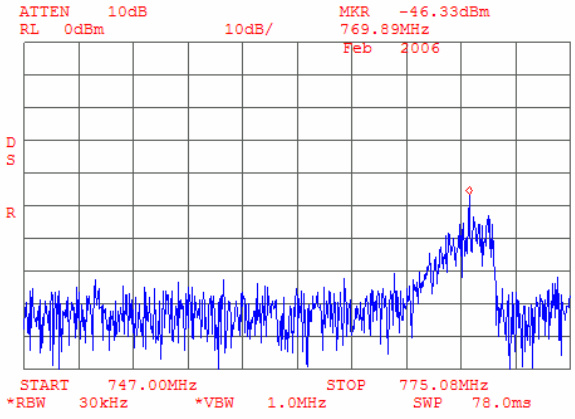
Frequency range: [776.075-0.60] – [776.075-1.00] MHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

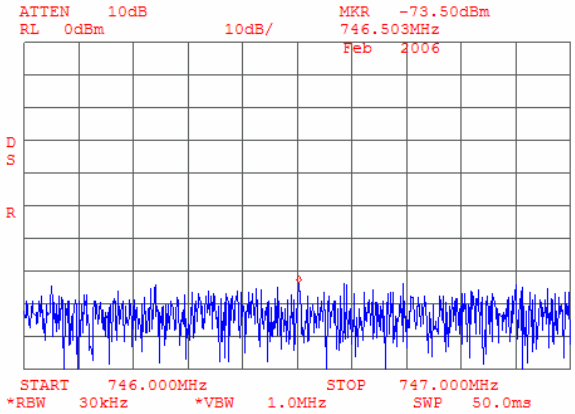
Plot 7.4.47 Adjacent channel coupled power measurements, low carrier frequency, 16QAM

Frequency range: 747.0 – [776.075-1.00] MHz



Plot 7.4.48 Adjacent channel coupled power measurements, low carrier frequency, 16QAM

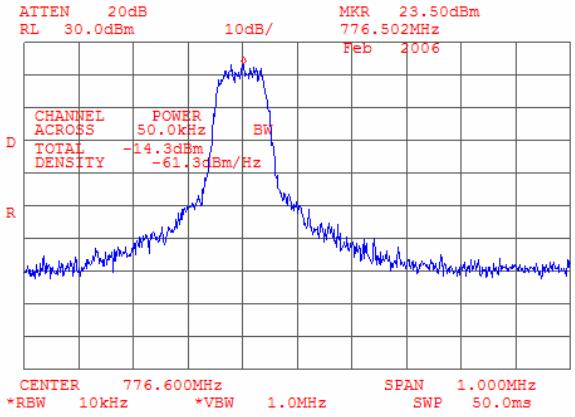
Frequency range: 746.0 – 747.0 MHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

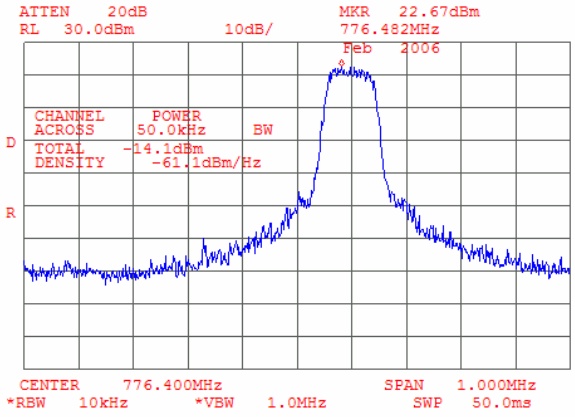
Plot 7.4.49 Adjacent channel coupled power measurements, mid carrier frequency, 16QAM

Frequency offset: 100 kHz



Plot 7.4.50 Adjacent channel coupled power measurements, mid carrier frequency, 16QAM

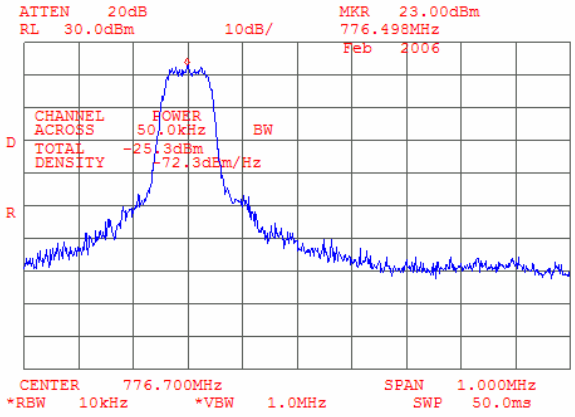
Frequency offset: -100 kHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

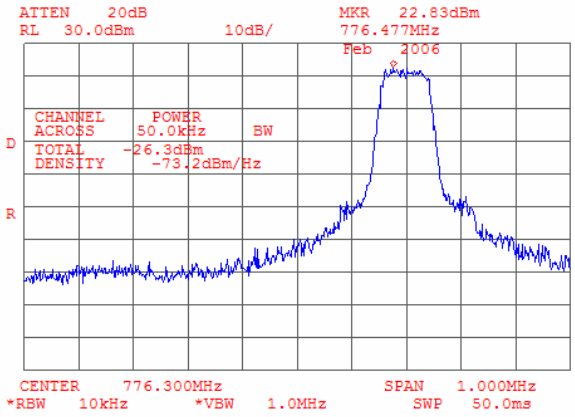
Plot 7.4.51 Adjacent channel coupled power measurements, mid carrier frequency, 16QAM

Frequency offset: 200 kHz



Plot 7.4.52 Adjacent channel coupled power measurements, mid carrier frequency, 16QAM

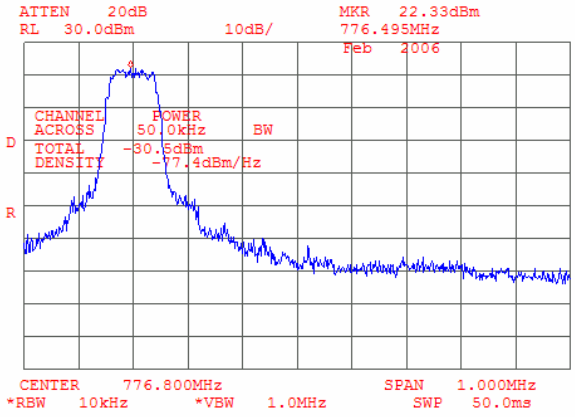
Frequency offset: -200 kHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

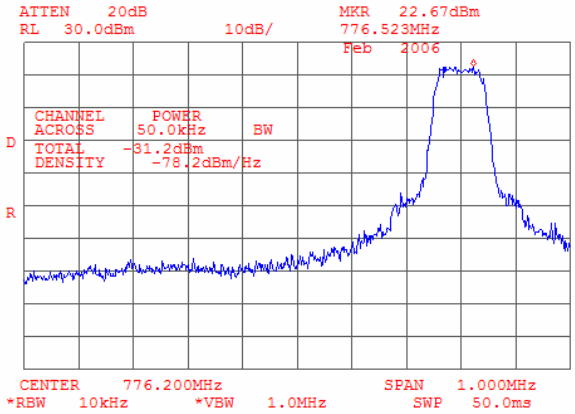
Plot 7.4.53 Adjacent channel coupled power measurements, mid carrier frequency, 16QAM

Frequency offset: 300 kHz



Plot 7.4.54 Adjacent channel coupled power measurements, mid carrier frequency, 16QAM

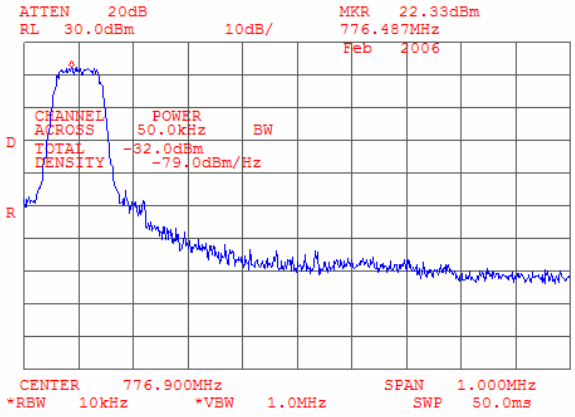
Frequency offset: -300 kHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

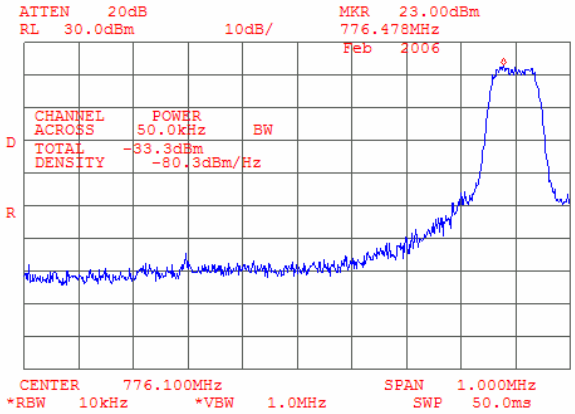
Plot 7.4.55 Adjacent channel coupled power measurements, mid carrier frequency, 16QAM

Frequency offset: 400 kHz



Plot 7.4.56 Adjacent channel coupled power measurements, mid carrier frequency, 16QAM

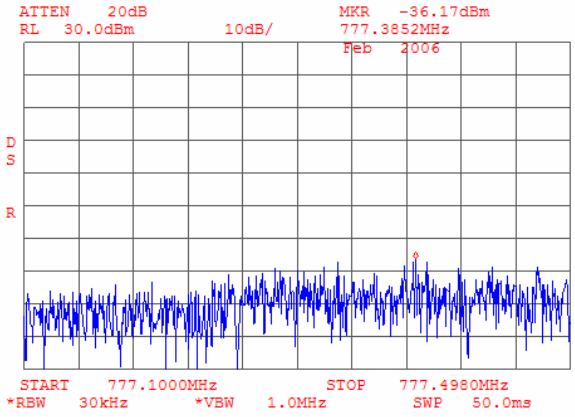
Frequency offset: -400 kHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

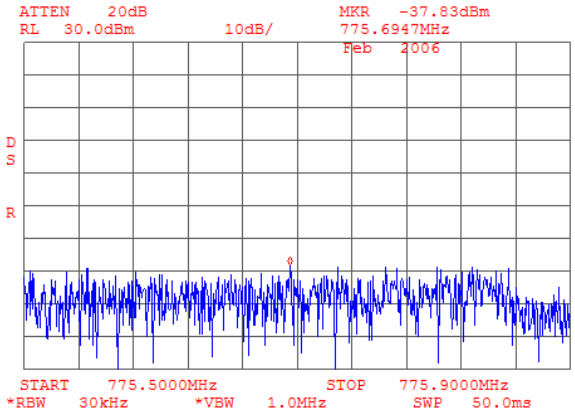
Plot 7.4.57 Adjacent channel coupled power measurements, mid carrier frequency, 16QAM

Frequency range: [776.5+0.60] – [776.5+1.00] MHz



Plot 7.4.58 Adjacent channel coupled power measurements, mid carrier frequency, 16QAM

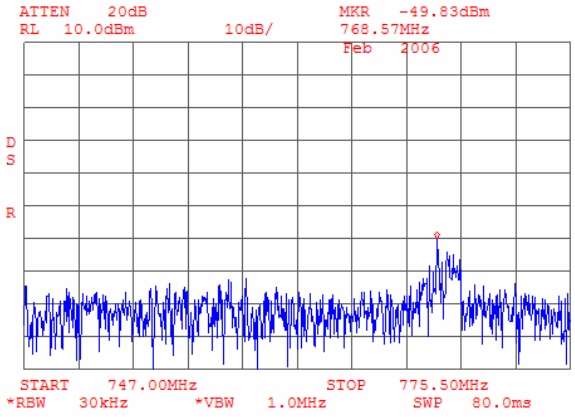
Frequency range: [776.5-0.60] – [776.5-1.00] MHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

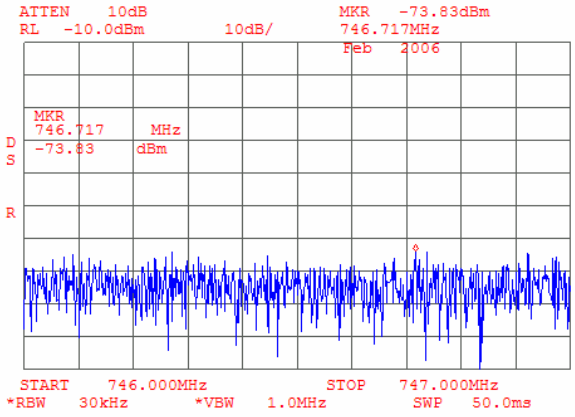
Plot 7.4.59 Adjacent channel coupled power measurements, mid carrier frequency, 16QAM

Frequency range: 747.0 – [776.5-1.00] MHz



Plot 7.4.60 Adjacent channel coupled power measurements, mid carrier frequency, 16QAM

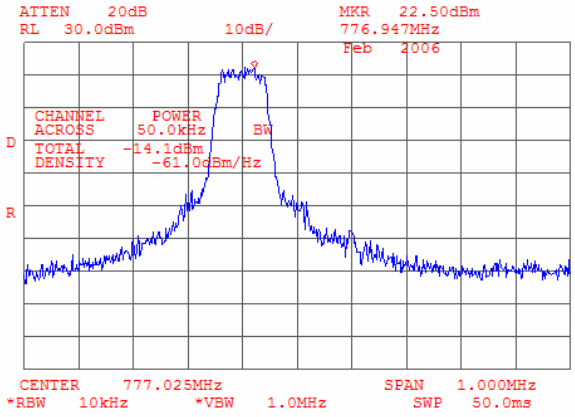
Frequency range: 746.0 – 747.0 MHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

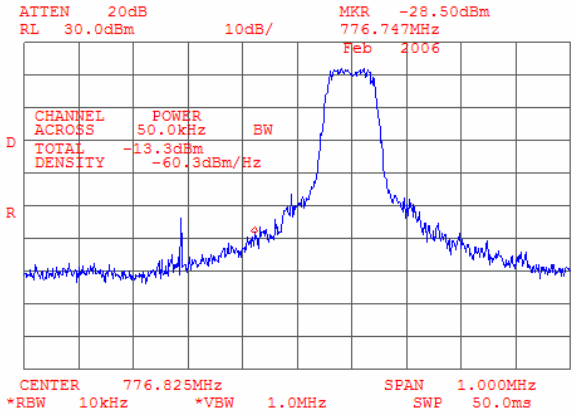
Plot 7.4.61 Adjacent channel coupled power measurements, high carrier frequency, 16QAM

Frequency offset: 100 kHz



Plot 7.4.62 Adjacent channel coupled power measurements, high carrier frequency, 16QAM

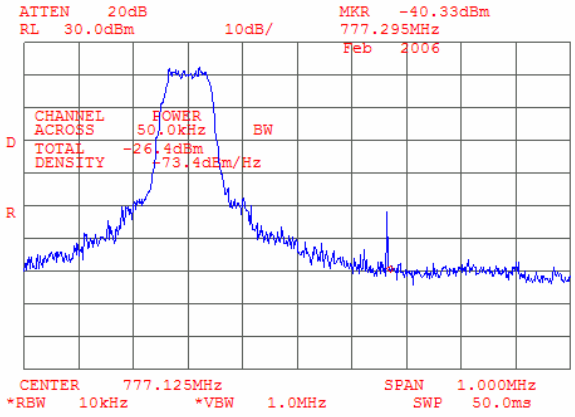
Frequency offset: -100 kHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

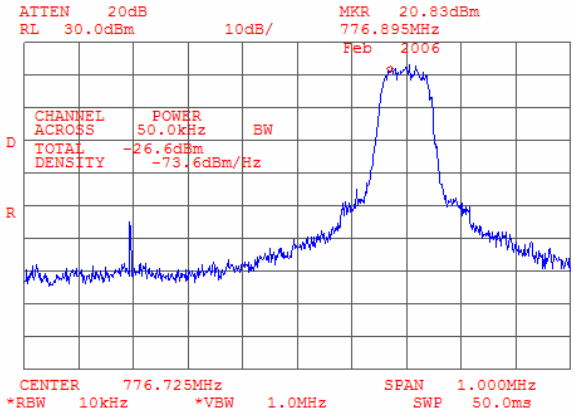
Plot 7.4.63 Adjacent channel coupled power measurements, high carrier frequency, 16QAM

Frequency offset: 200 kHz



Plot 7.4.64 Adjacent channel coupled power measurements, high carrier frequency

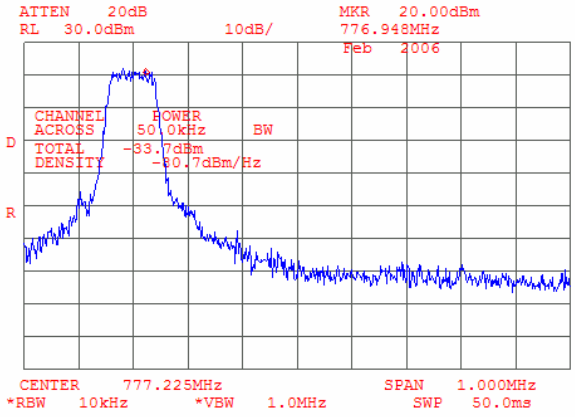
Frequency offset: -200 kHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

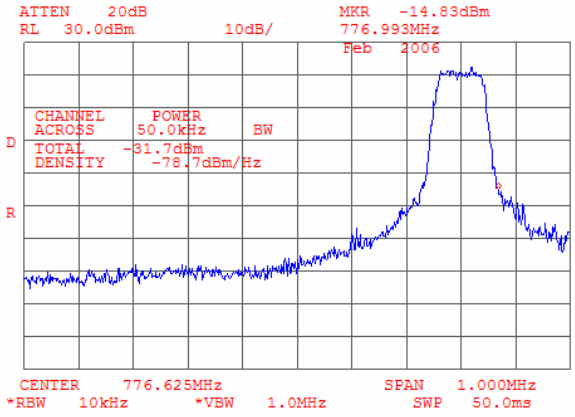
Plot 7.4.65 Adjacent channel coupled power measurements, high carrier frequency, 16QAM

Frequency offset: 300 kHz



Plot 7.4.66 Adjacent channel coupled power measurements, high carrier frequency, 16QAM

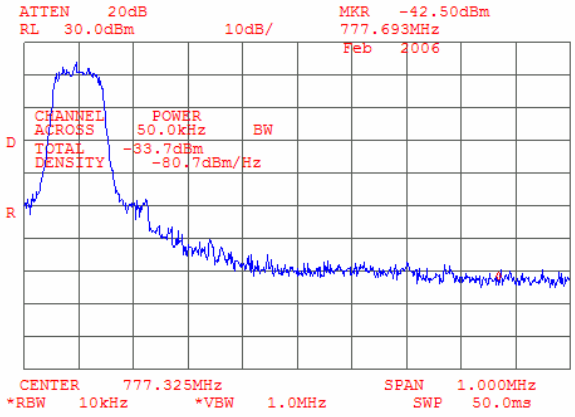
Frequency offset: -300 kHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

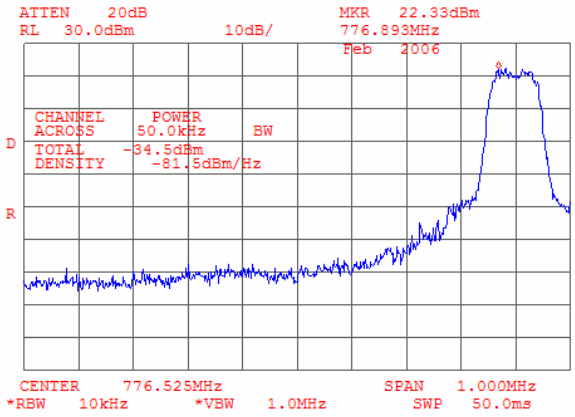
Plot 7.4.67 Adjacent channel coupled power measurements, high carrier frequency, 16QAM

Frequency offset: 400 kHz



Plot 7.4.68 Adjacent channel coupled power measurements, high carrier frequency, 16QAM

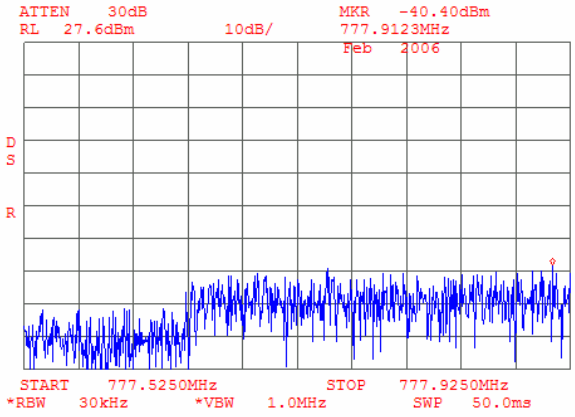
Frequency offset: -400 kHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

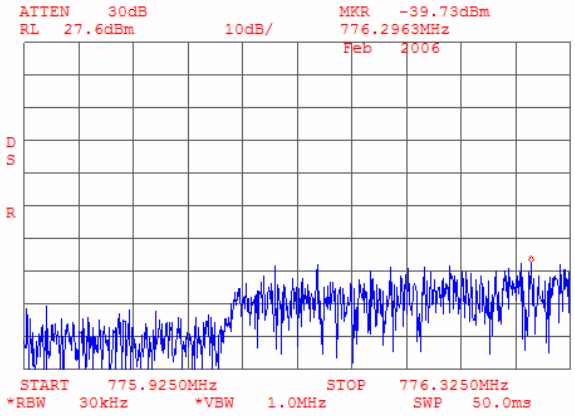
Plot 7.4.69 Adjacent channel coupled power measurements, high carrier frequency, 16QAM

Frequency range: [776.925+0.60] – [776.925+1.00] MHz



Plot 7.4.70 Adjacent channel coupled power measurements, high carrier frequency, 16QAM

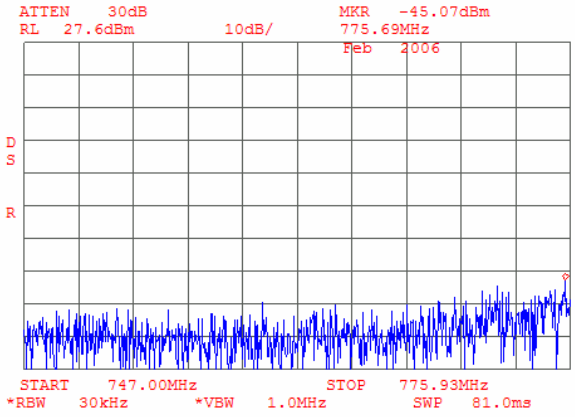
Frequency range: [776.925-0.60] – [776.925-1.00] MHz



Test specification:	Section 27.53(d)(1), Adjacent channel power at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	3/01/2006		
Temperature: 20 ºC	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

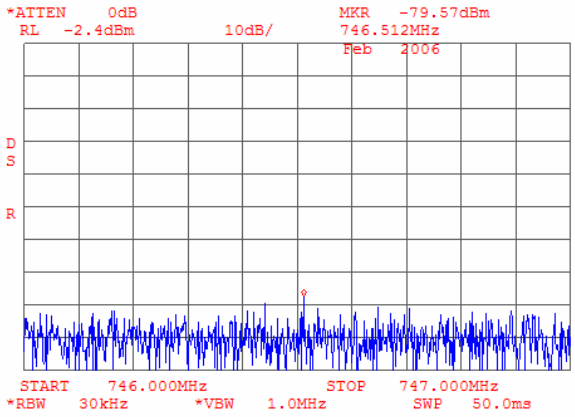
Plot 7.4.71 Adjacent channel coupled power measurements, high carrier frequency, 16QAM

Frequency range: 747.0 – [776.925-1.00] MHz



Plot 7.4.72 Adjacent channel coupled power measurements, high carrier frequency, 16QAM

Frequency range: 746.0 – 747.0 MHz



Test specification:	Section 27.53(d)(3), Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	3/02/2006		
Temperature: 21 ºC	Air Pressure: 1008 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

7.5 Radiated spurious emission measurements

7.5.1 General

This test was performed to measure radiated spurious emissions from the EUT enclosure with antenna connector terminated with 50 Ohm dummy load. Specification test limits are given in Table 7.5.1.

Table 7.5.1 Radiated spurious emission test limits

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

* - P is transmitter output power in Watts.
** - Equivalent field strength limit was calculated from maximum allowed ERP of spurious as follows: E=sqrt(30×P×1.64)/r, where P is ERP in Watts, 1.64 is numeric gain of ideal dipole and r is antenna to EUT distance in meters.

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

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

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

7.5.2.3 The test results were recorded in Table 7.5.2 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 Figures 7.5.2, energized and the EUT performance was checked.

7.5.3.2 The specified frequency range was investigated with antennas connected to spectrum analyzer. To find maximum radiation the turntable was rotated 360^0 and the measuring antenna height was swept from 1 to 4 m in both, vertical and horizontal, polarizations.

7.5.3.3 The worst test results with respect to the limits were recorded in Table 7.5.2 and shown in the associated plots.

7.5.3.4 The above procedure was repeated at the rest of investigated frequencies.

7.5.3.5 The worst test results with respect to the limits were recorded in **Error! Reference source not found.** and shown in the associated plots.

Test specification:	Section 27.53(d)(3), Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	3/02/2006		
Temperature: 21 ºC	Air Pressure: 1008 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

Figure 7.5.1 Setup for spurious emission field strength measurements in 9 kHz to 30 MHz range

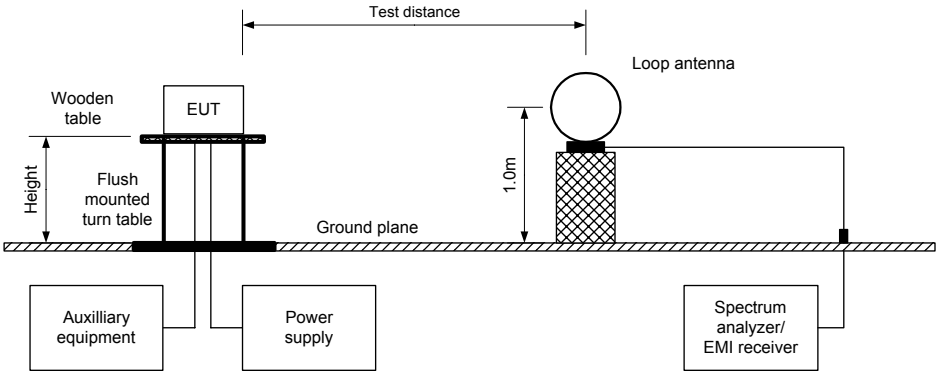
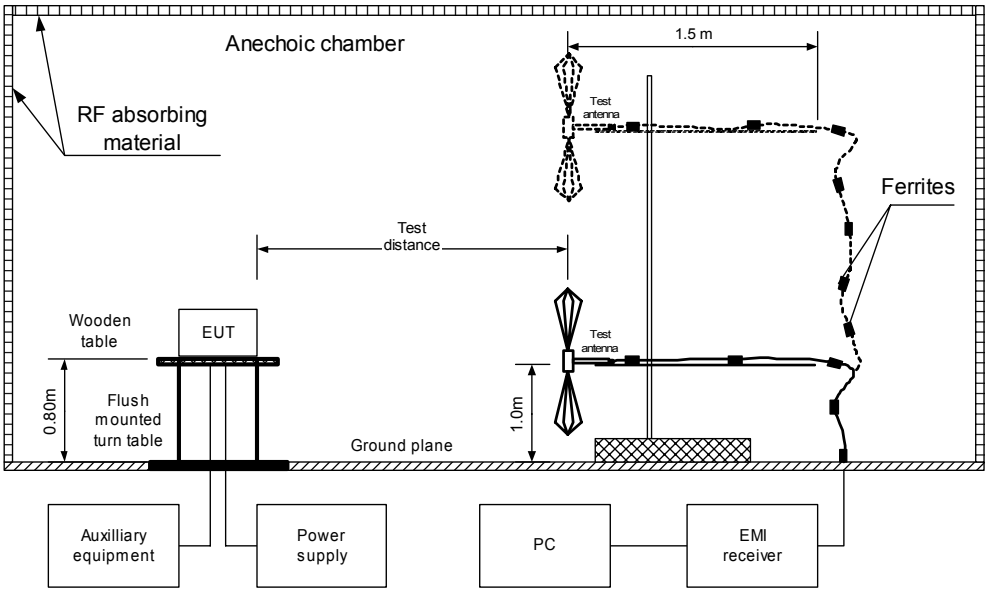


Figure 7.5.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	Section 27.53(d)(3), Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	3/02/2006		
Temperature: 21 ºC	Air Pressure: 1008 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

Table 7.5.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE: 776.0 – 777.0 MHz
TEST DISTANCE: 3 m
EUT HEIGHT: 0.8 m
INVESTIGATED FREQUENCY RANGE: 0.009 – 8000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: ≥ Resolution bandwidth
TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
Biconilog (30 MHz – 1000 MHz)
Double ridged guide (above 1000 MHz)
MODULATION: 16QAM
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	Antenna polarization	RBW, kHz	Field strength, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	Verdict
All found emissions were more than 20 dB below the limit						Pass

*- Margin = Field strength of spurious – calculated field strength limit.

Reference numbers of test equipment used

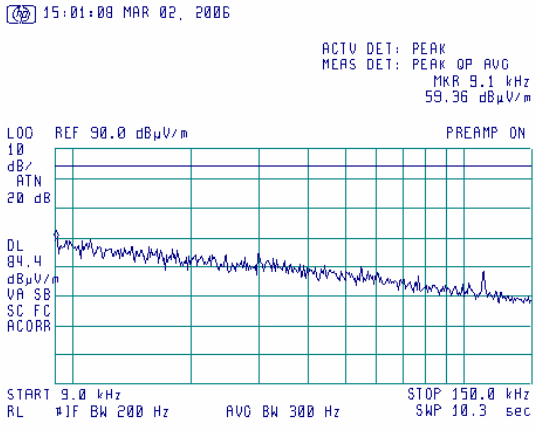
HL 0446	HL 0465	HL 0521	HL 0589	HL 0604	HL 1004	HL 1200	HL 1424
HL 1942	HL 1947	HL 1984	HL 2009	HL 2109			

Full description is given in Appendix A.

Test specification:	Section 27.53(d)(3), Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	3/02/2006		
Temperature: 21 ºC	Air Pressure: 1008 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

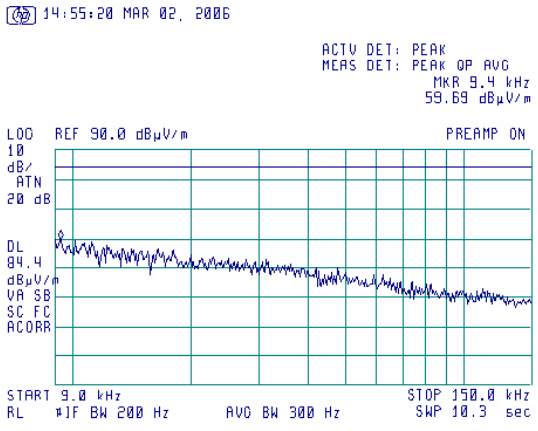
Plot 7.5.1 Radiated emission measurements in 9 - 150 kHz range

TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical
TEST DISTANCE:	3 m
MODULATION:	QPSK



Plot 7.5.2 Radiated emission measurements in 9 - 150 kHz range

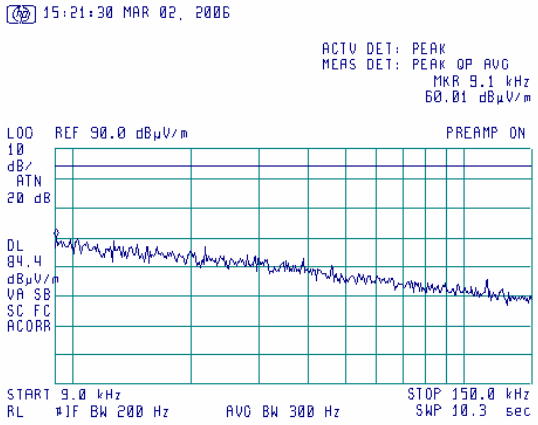
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical
TEST DISTANCE:	3 m
MODULATION:	16QAM



Test specification:	Section 27.53(d)(3), Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	3/02/2006		
Temperature: 21 ºC	Air Pressure: 1008 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

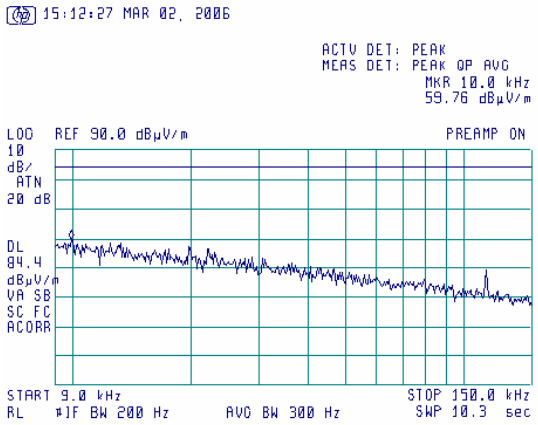
Plot 7.5.3 Radiated emission measurements in 9 - 150 kHz range

TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical
TEST DISTANCE:	3 m
MODULATION:	QPSK



Plot 7.5.4 Radiated emission measurements in 9 - 150 kHz range

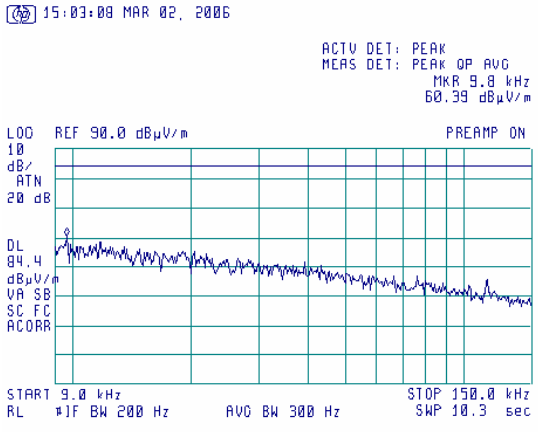
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical
TEST DISTANCE:	3 m
MODULATION:	16QAM



Test specification:	Section 27.53(d)(3), Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	3/02/2006		
Temperature: 21 ºC	Air Pressure: 1008 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

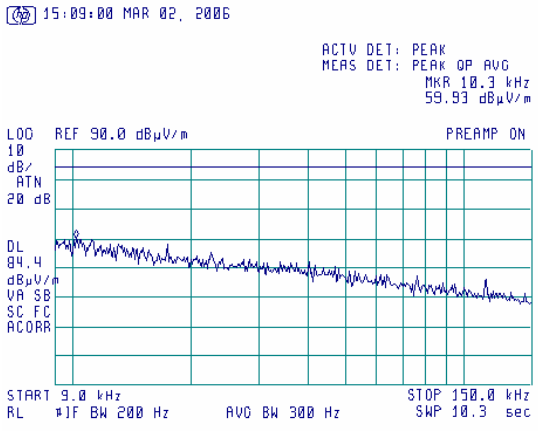
Plot 7.5.5 Radiated emission measurements in 9 - 150 kHz range

TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical
TEST DISTANCE:	3 m
MODULATION:	QPSK



Plot 7.5.6 Radiated emission measurements in 9 - 150 kHz range

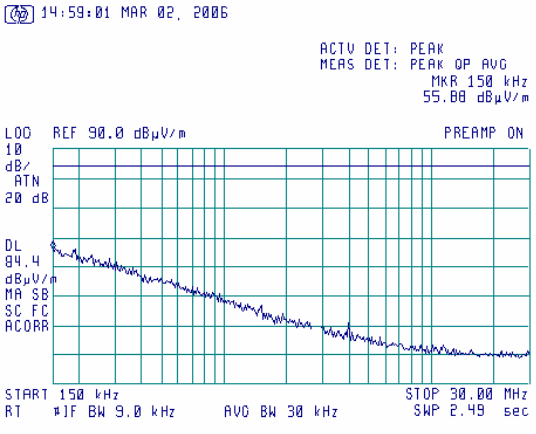
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical
TEST DISTANCE:	3 m
MODULATION:	16QAM



Test specification:	Section 27.53(d)(3), Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	3/02/2006		
Temperature: 21 ºC	Air Pressure: 1008 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

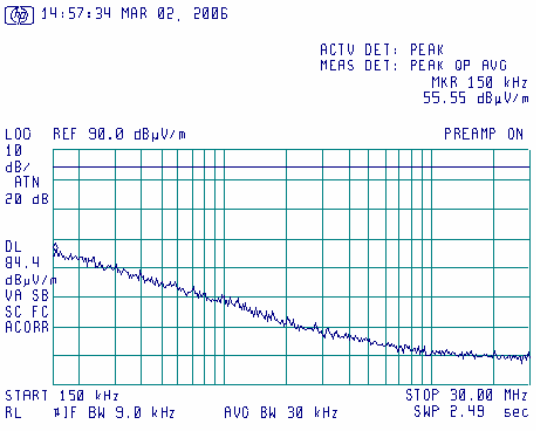
Plot 7.5.7 Radiated emission measurements in 0.15 - 30 MHz range

TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical
TEST DISTANCE:	3 m
MODULATION:	QPSK



Plot 7.5.8 Radiated emission measurements in 0.15 - 30 MHz range

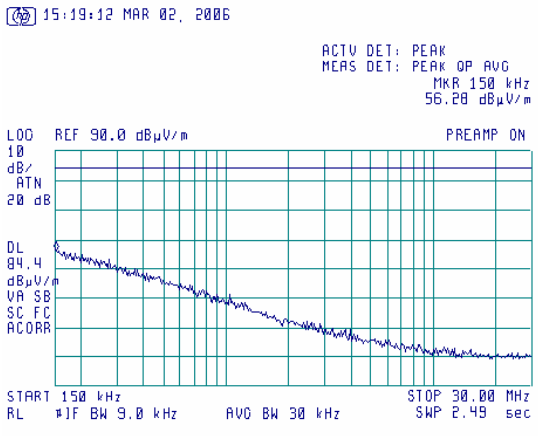
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical
TEST DISTANCE:	3 m
MODULATION:	16QAM



Test specification:	Section 27.53(d)(3), Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	3/02/2006		
Temperature: 21 ºC	Air Pressure: 1008 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

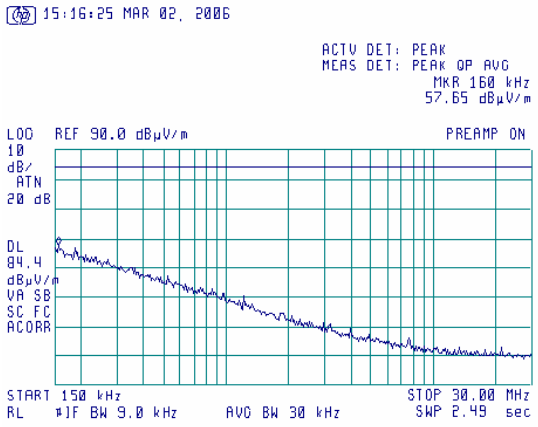
Plot 7.5.9 Radiated emission measurements in 0.15 - 30 MHz range

TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical
TEST DISTANCE:	3 m
MODULATION:	QPSK



Plot 7.5.10 Radiated emission measurements in 0.15 - 30 MHz range

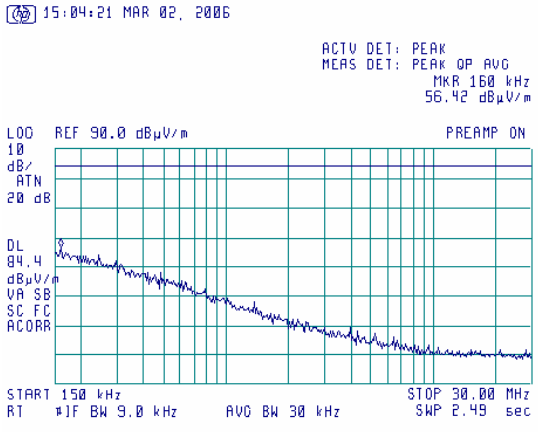
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical
TEST DISTANCE:	3 m
MODULATION:	16QAM



Test specification:	Section 27.53(d)(3), Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	3/02/2006		
Temperature: 21 ºC	Air Pressure: 1008 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

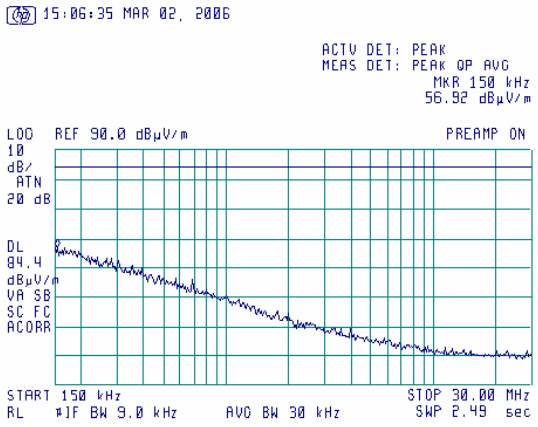
Plot 7.5.11 Radiated emission measurements in 0.15 - 30 MHz range

TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical
TEST DISTANCE:	3 m
MODULATION:	QPSK



Plot 7.5.12 Radiated emission measurements in 0.15 - 30 MHz range

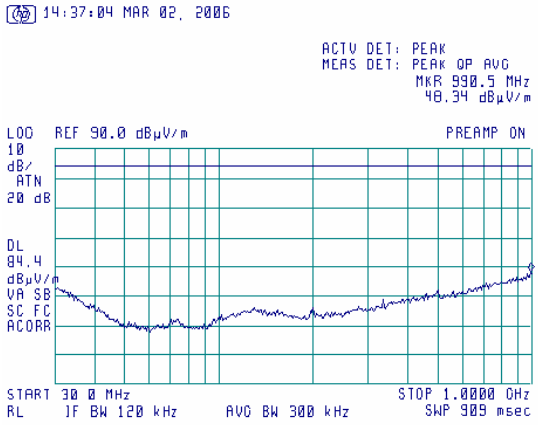
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical
TEST DISTANCE:	3 m
MODULATION:	16QAM



Test specification:	Section 27.53(d)(3), Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	3/02/2006		
Temperature: 21 ºC	Air Pressure: 1008 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

Plot 7.5.13 Radiated emission measurements in 30 - 1000 MHz range

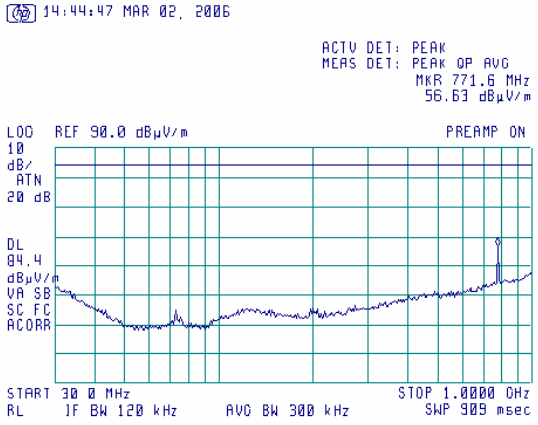
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
MODULATION:	QPSK



Note: 776.075 MHz – intentional radiation of RF module

Plot 7.5.14 Radiated emission measurements in 30 - 1000 MHz range

TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
MODULATION:	16QAM

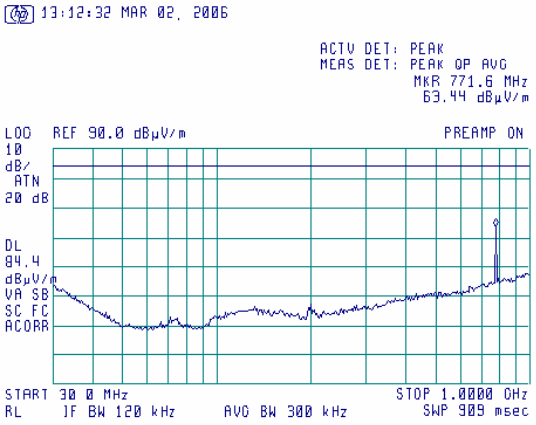


Note: 776.075 MHz – intentional radiation of RF module

Test specification:	Section 27.53(d)(3), Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	3/02/2006		
Temperature: 21 ºC	Air Pressure: 1008 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

Plot 7.5.15 Radiated emission measurements in 30 - 1000 MHz range

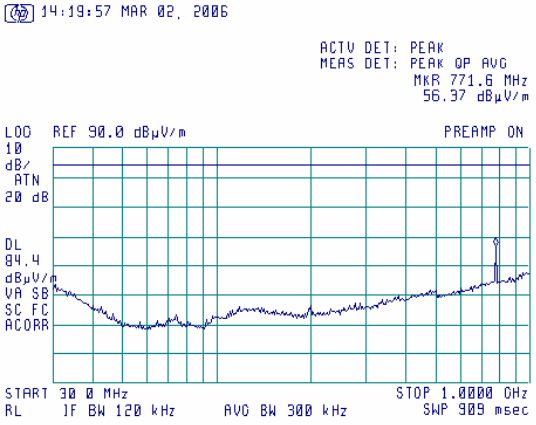
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
MODULATION:	QPSK



Note: 776.5 MHz – intentional radiation of RF module

Plot 7.5.16 Radiated emission measurements in 30 - 1000 MHz range

TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
MODULATION:	16QAM

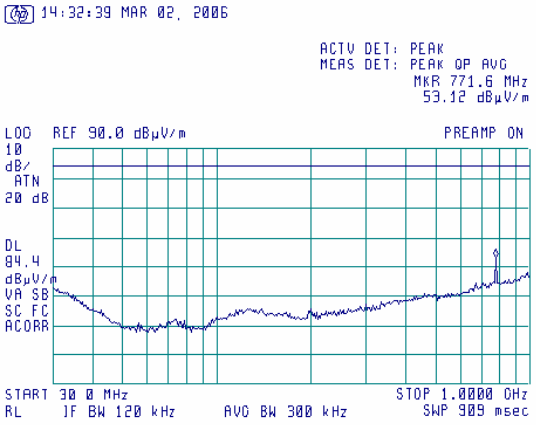


Note: 776.5 MHz – intentional radiation of RF module

Test specification:	Section 27.53(d)(3), Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	3/02/2006		
Temperature: 21 ºC	Air Pressure: 1008 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

Plot 7.5.17 Radiated emission measurements in 30 - 1000 MHz range

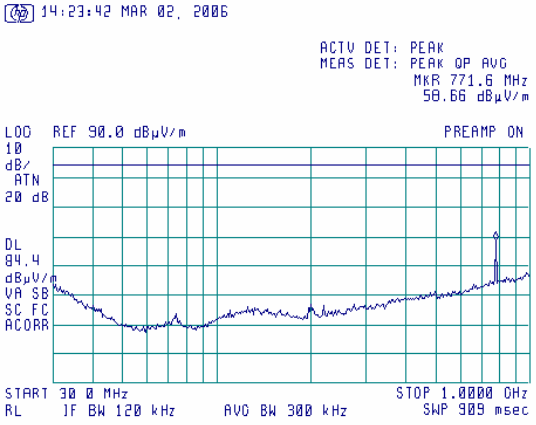
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
MODULATION:	QPSK



Note: 776.925 MHz – intentional radiation of RF module

Plot 7.5.18 Radiated emission measurements in 30 - 1000 MHz range

TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
MODULATION:	16QAM

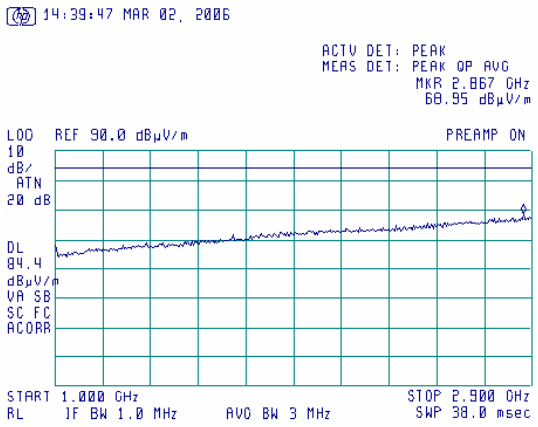


Note: 776.925 MHz – intentional radiation of RF module

Test specification:	Section 27.53(d)(3), Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	3/02/2006		
Temperature: 21 ºC	Air Pressure: 1008 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

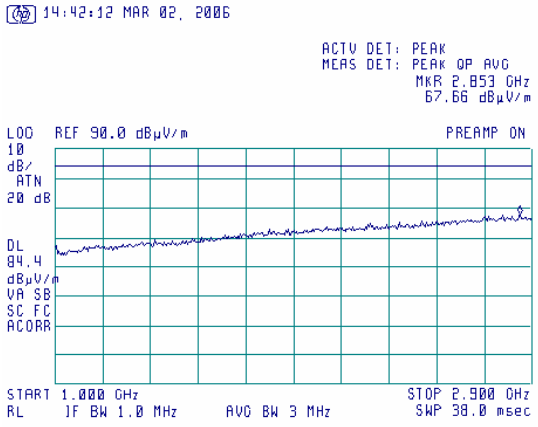
Plot 7.5.19 Radiated emission measurements in 1 – 2.9 GHz range

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



Plot 7.5.20 Radiated emission measurements in 1 – 2.9 GHz range

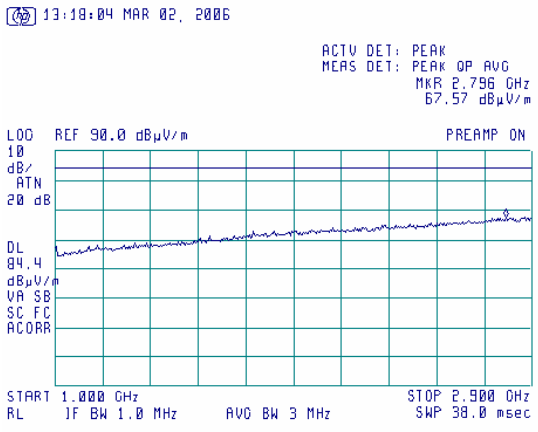
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
MODULATION:	16QAM



Test specification:	Section 27.53(d)(3), Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	3/02/2006		
Temperature: 21 ºC	Air Pressure: 1008 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

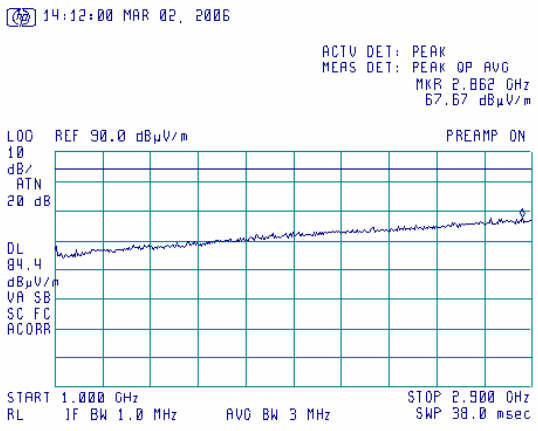
Plot 7.5.21 Radiated emission measurements in 1 – 2.9 GHz range

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



Plot 7.5.22 Radiated emission measurements in 1 – 2.9 GHz range

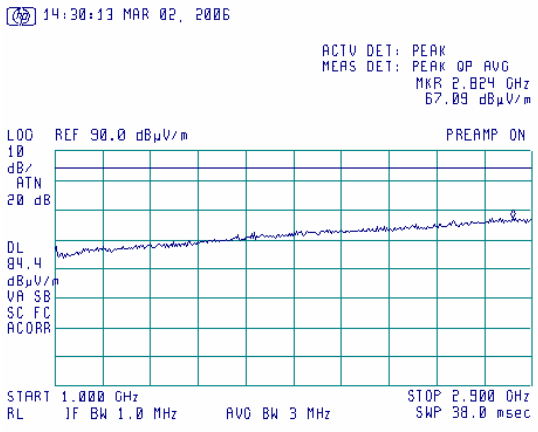
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
MODULATION:	16QAM



Test specification:	Section 27.53(d)(3), Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	3/02/2006		
Temperature: 21 ºC	Air Pressure: 1008 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

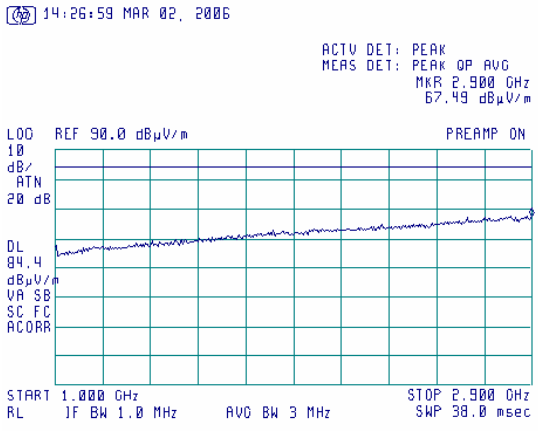
Plot 7.5.23 Radiated emission measurements in 1 – 2.9 GHz range

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



Plot 7.5.24 Radiated emission measurements in 1 – 2.9 GHz range

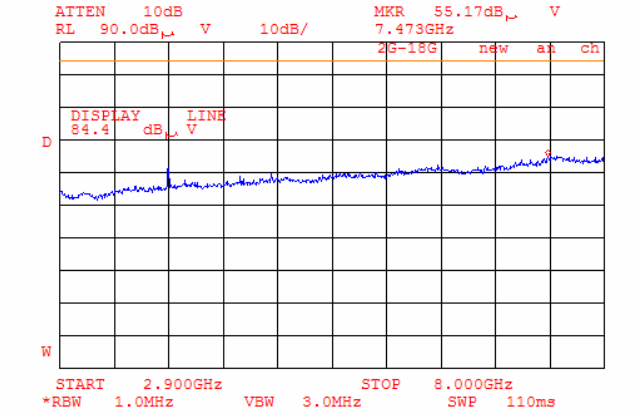
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
MODULATION:	16QAM



Test specification:	Section 27.53(d)(3), Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	3/02/2006		
Temperature: 21 ºC	Air Pressure: 1008 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

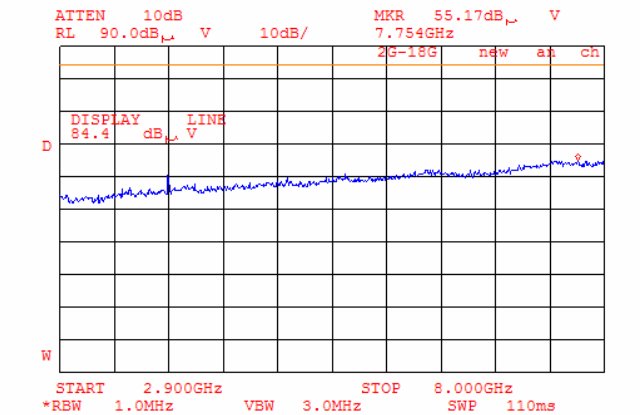
Plot 7.5.25 Radiated emission measurements in 2.9 – 8.0 GHz range

TEST SITE:	Anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
MODULATION:	QPSK



Plot 7.5.26 Radiated emission measurements in 2.9 – 8.0 GHz range

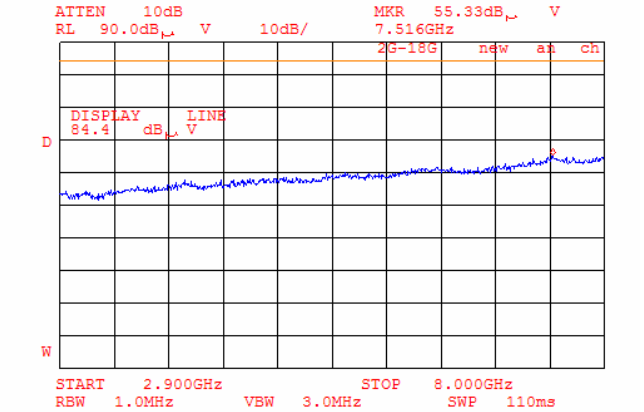
TEST SITE:	Anechoic chamber
CARRIER FREQUENCY:	Low
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
MODULATION:	16QAM



Test specification:	Section 27.53(d)(3), Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	3/02/2006		
Temperature: 21 ºC	Air Pressure: 1008 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

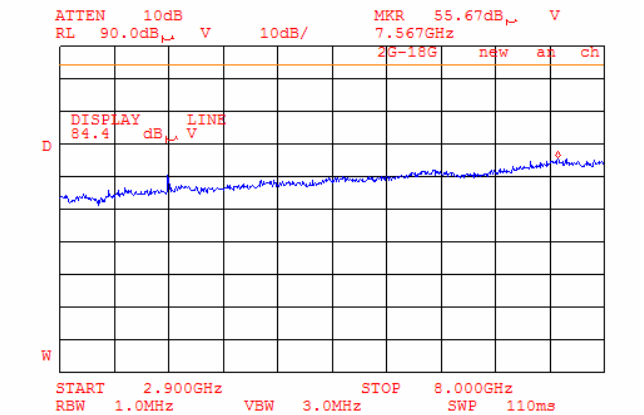
Plot 7.5.27 Radiated emission measurements in 2.9 – 8.0 GHz range

TEST SITE:	Anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
MODULATION:	QPSK



Plot 7.5.28 Radiated emission measurements in 2.9 – 8.0 GHz range

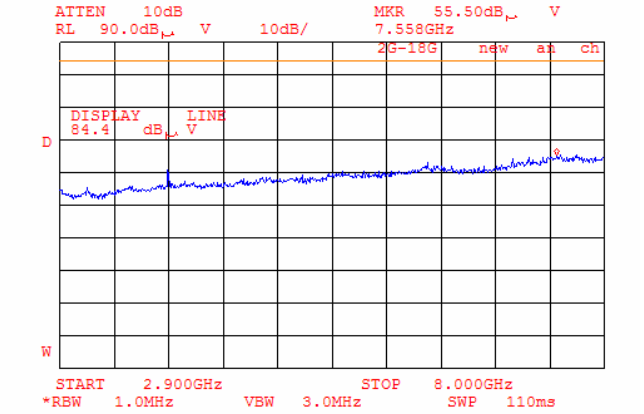
TEST SITE:	Anechoic chamber
CARRIER FREQUENCY:	Mid
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
MODULATION:	16QAM



Test specification:	Section 27.53(d)(3), Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	3/02/2006		
Temperature: 21 ºC	Air Pressure: 1008 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

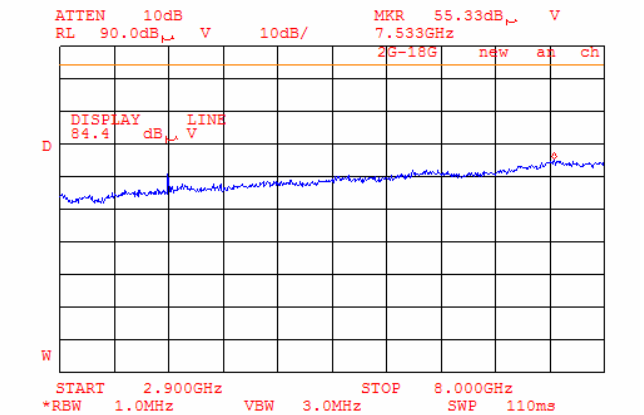
Plot 7.5.29 Radiated emission measurements in 2.9 – 8.0 GHz range

TEST SITE:	Anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
MODULATION:	QPSK



Plot 7.5.30 Radiated emission measurements in 2.9 – 8.0 GHz range

TEST SITE:	Anechoic chamber
CARRIER FREQUENCY:	High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m
MODULATION:	16QAM



Test specification:	Section 27.53(e), Radiated emissions in the 1559-1610 MHz band		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date:	3/06/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

7.6 Radiated spurious emission measurements in 1559-1610 MHz band

7.6.1 General

This test was performed to measure radiated spurious emissions from the EUT enclosure with antenna. Specification test limits are given in Table 7.6.1.

Table 7.6.1 Radiated spurious emission test limits

Frequency, MHz	EIRP of spurious emissions, dBW/MHz	Spurious emissions, dBm	Equivalent field strength limit @ 3m, dB(μV/m)
1559 - 1610	-80	-50	45.23

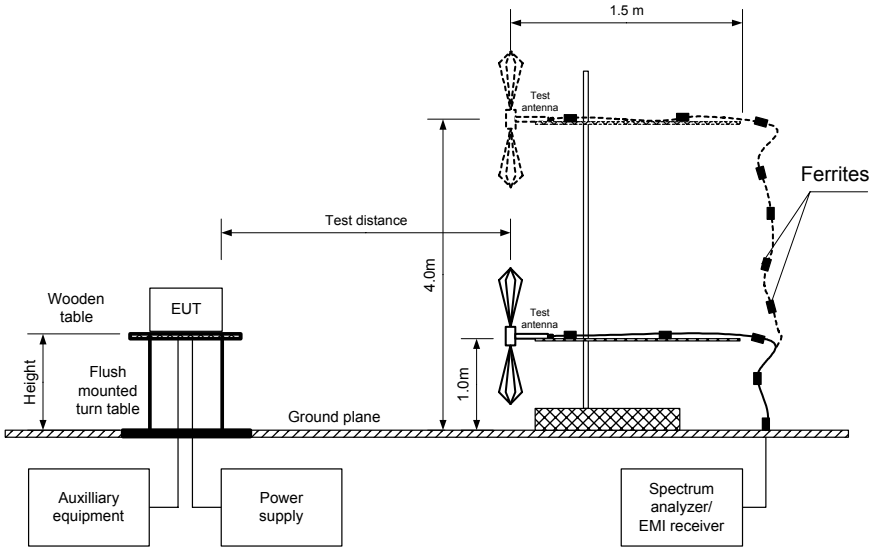
7.6.2 Test procedure for spurious emission field strength measurements above 30 MHz

7.6.2.1 The EUT was set up as shown in Figure 7.6.1, energized and the EUT performance was checked.

7.6.2.2 The specified frequency range was investigated with antennas connected to spectrum analyzer. To find maximum radiation the turntable was rotated 360^0 and the measuring antenna height was swept from 1 to 4 m in both, vertical and horizontal, polarizations.

7.6.2.3 The worst test results with respect to the limits were recorded in Table 7.6.2 and shown in the associated plots.

Figure 7.6.1 Setup for spurious emission field strength measurements



Test specification:	Section 27.53(e), Radiated emissions in the 1559-1610 MHz band		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date:	3/06/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Table 7.6.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE: 776.0 – 777.0 MHz
TEST SITE: OATS
TEST DISTANCE: 3 m
EUT HEIGHT: 0.8 m
INVESTIGATED FREQUENCY RANGE: 1559 – 1610 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: ≥ Resolution bandwidth
TEST ANTENNA TYPE: Double ridged guide
MODULATION: QPSK and 16QAM
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	Antenna polarization	RBW, kHz	Field strength, dB(µV/m)	Limit, dB(µV/m)	Margin, dB*	Verdict
No emissions were found						Pass

*- Margin = Field strength of spurious – calculated field strength limit.

Reference numbers of test equipment used

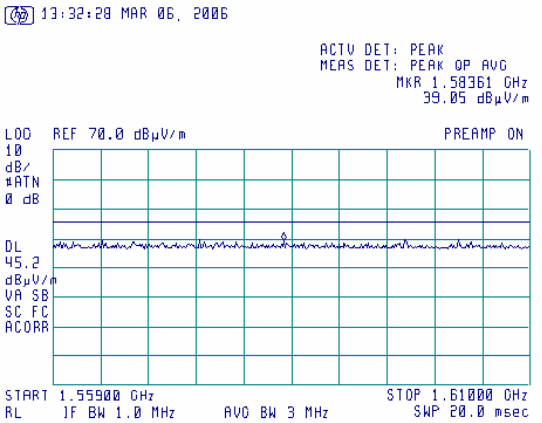
HL 1365	HL 1430	HL 1947	HL 1984				

Full description is given in Appendix A.

Test specification:	Section 27.53(e), Radiated emissions in the 1559-1610 MHz band		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date:	3/06/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 7.6.1 Radiated emission measurements in 1559 - 1610 MHz range

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



Test specification:	Section 27.54, Frequency stability		
Test procedure:	47 CFR, Section 2.1055, TIA/EIA-603-A, Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date:	3/02/2006		
Temperature: 21 ºC	Air Pressure: 1008 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

7.7 Frequency stability test

7.7.1 General

This test was performed to measure frequency stability of transmitter RF carrier. Specification test limits are given in Table 7.7.1. The test results are provided in Tables 7.6.2, 7.6.3 and shown in the associated plots.

Table 7.7.1 Frequency stability limits

Assigned frequency, MHz	Maximum allowed frequency displacement
776.0 – 777.0	26 dBc points including frequency tolerance shall remain within the assigned band

7.7.2 Test procedure

7.7.2.1 The EUT was set up as shown in Figure 7.7.1, energized and its proper operation was checked.

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

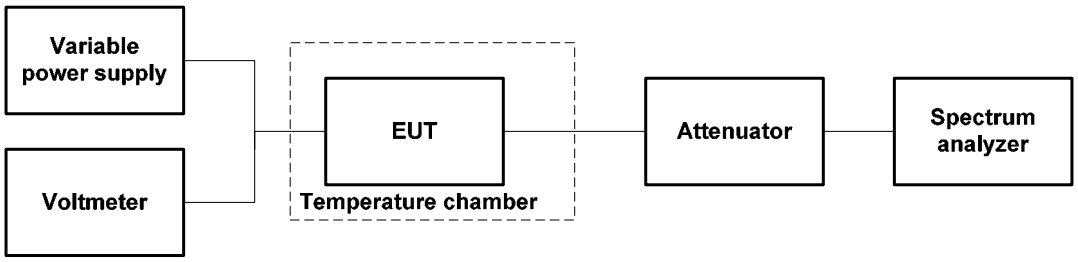
7.7.2.3 The EUT was powered on and carrier frequency was measured at start up moment and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.

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

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

7.7.2.6 Frequency displacement was calculated as provided in Table 7.7.2 and Table 7.7.3.

Figure 7.7.1 Frequency stability test setup



Test specification:	Section 27.54, Frequency stability		
Test procedure:	47 CFR, Section 2.1055, TIA/EIA-603-A, Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date:	3/02/2006		
Temperature: 21 ºC	Air Pressure: 1008 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

Table 7.7.2 Frequency stability test results

ASSIGNED FREQUENCY RANGE: 776.0 – 777.0 MHz
NOMINAL POWER VOLTAGE: 120 VAC (102 VAC - 138 VAC)
TEMPERATURE STABILIZATION PERIOD: 20 min
POWER DURING TEMPERATURE TRANSITION: Off
RESOLUTION BANDWIDTH: 300 Hz
VIDEO BANDWIDTH: 300 Hz
FREQUENCY SPAN: 10.0 kHz
SPECTRUM ANALYZER MODE: Counter
MODULATION: Unmodulated

T, ºC	Voltage, V	Frequency, MHz							Max frequency drift, Hz	
		Start up	1st min	2nd min	3rd min	4th min	5th min	10th min	Positive	Negative
Low frequency, 776.1 MHz										
-30	nominal	776.099761	776.099761	776.099759	776.099760	776.099755	776.099749	776.099728	0	-573
-20	nominal	776.099753	NA	NA	NA	NA	NA	776.099776	0	-548
-10	nominal	776.100201	NA	NA	NA	NA	NA	776.099988	0	-313
0	nominal	776.100406	776.100403	776.100400	776.100390	776.100384	776.100377	776.100329	105	0
10	nominal	776.100419	NA	NA	NA	NA	NA	776.100440	139	0
20	15%	776.100364	NA	NA	NA	NA	NA	776.100331	63	0
20	nominal	776.100328	NA	NA	NA	NA	NA	776.100301*	27	0
20	-15%	776.100352	NA	NA	NA	NA	NA	776.100340	51	0
30	nominal	776.100094	776.100096	776.100097	776.100101	776.100111	776.100139	776.100152	0	-207
40	nominal	776.100135	NA	NA	NA	NA	NA	776.100126	0	-175
50	nominal	776.099871	NA	NA	NA	NA	NA	776.099791	0	-510
High frequency, 776.9 MHz										
-30	nominal	776.899729	776.899726	776.899717	776.899711	776.899703	776.899692	776.899652	0	-504
-20	nominal	776.899837	NA	NA	NA	NA	NA	776.899761	0	-395
-10	nominal	776.899990	NA	NA	NA	NA	NA	776.899932	0	-224
0	nominal	776.900332	776.900327	776.900319	776.900313	776.900310	776.900307	776.900292	176	0
10	nominal	776.900450	NA	NA	NA	NA	NA	776.900453	297	0
20	15%	776.900159	NA	NA	NA	NA	NA	776.900171	15	0
20	nominal	776.900150	NA	NA	NA	NA	NA	776.900156*	0	-6
20	-15%	776.900174	NA	NA	NA	NA	NA	776.900192	36	0
30	nominal	776.900157	776.900155	776.900153	776.900152	776.900151	776.900152	776.900159	3	-5
40	nominal	776.900160	NA	NA	NA	NA	NA	776.900139	4	-17
50	nominal	776.900161	NA	NA	NA	NA	NA	776.899899	5	-257

* - Reference frequency

Test specification:	Section 27.54, Frequency stability		
Test procedure:	47 CFR, Section 2.1055, TIA/EIA-603-A, Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date:	3/02/2006		
Temperature: 21 ºC	Air Pressure: 1008 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

Table 7.7.3 Transmitter operating range including frequency drift

Assigned frequency band, MHz	Measured 26 dBc point, MHz	Frequency drift, Hz		26 dBc point including frequency tolerance, MHz	Verdict
		Negative	Positive		
QPSK, channel bandwidth 150 kHz					
776.0 – 777.0	776.0265 – 776.9675	-573	297	776.025927 - 776.967797	Pass
16QAM, channel bandwidth 150 kHz					
776.0 – 777.0	776.0265 – 776.9675	-573	297	776.025927 - 776.967797	Pass

Reference numbers of test equipment used

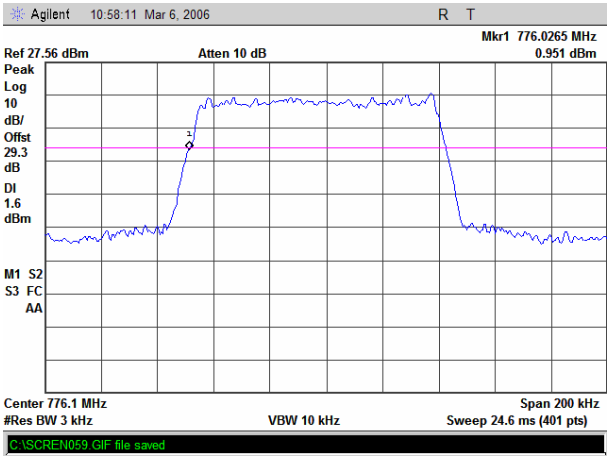
HL 0493	HL 1206	HL 1653	HL 2868				

Full description is given in Appendix A.

Test specification:	Section 27.54, Frequency stability		
Test procedure:	47 CFR, Section 2.1055, TIA/EIA-603-A, Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date:	3/02/2006		
Temperature: 21 °C	Air Pressure: 1008 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

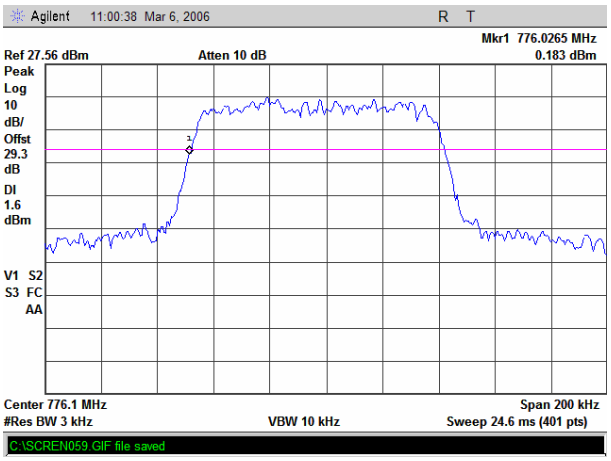
Plot 7.7.1 Band edge emission at low frequency, QPSK

Band edge: Left
Channel Bandwidth: 150 kHz



Plot 7.7.2 Band edge emission at low frequency, 16QAM

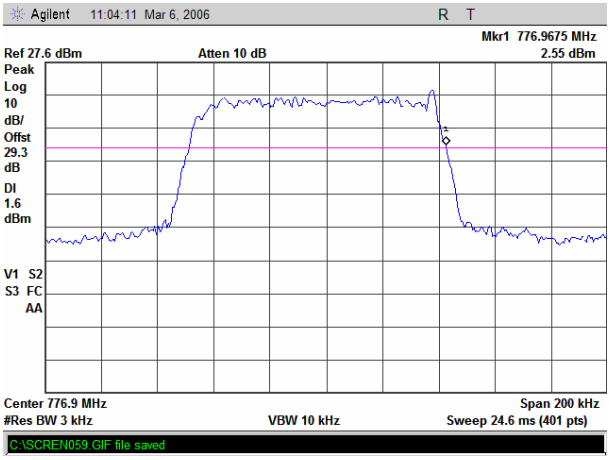
Band edge: Left
Channel Bandwidth: 150 kHz



Test specification:	Section 27.54, Frequency stability		
Test procedure:	47 CFR, Section 2.1055, TIA/EIA-603-A, Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date:	3/02/2006		
Temperature: 21 °C	Air Pressure: 1008 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

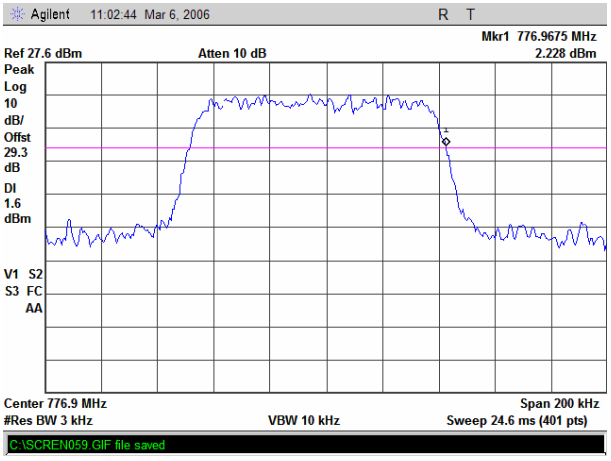
Plot 7.7.3 Band edge emission at low frequency, QPSK

Band edge: Right
Channel Bandwidth: 150 kHz



Plot 7.7.4 Band edge emission at low frequency, 16QAM

Band edge: Right
Channel Bandwidth: 150 kHz



Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	2/28/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

7.8 Occupied bandwidth test

7.8.1 General

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in Table 7.8.1.

Table 7.8.1 Occupied bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points*, dBc
776.0 – 777.0	26

* - Modulation envelope reference points provided in terms of attenuation below unmodulated carrier.

7.8.2 Test procedure

7.8.2.1 The EUT was set up as shown in Figure 7.8.1, energized and its proper operation was checked.

7.8.2.2 The EUT was set to transmit unmodulated carrier and reference peak power level was measured.

7.8.2.3 The EUT was set to transmit modulated carrier.

7.8.2.4 The transmitter occupied bandwidth was measured with spectrum analyzer as frequency delta between reference points on modulation envelope and provided in Table 7.8.2 and associated plots.

Figure 7.8.1 Occupied bandwidth test setup

Test specification:	**Section 2.1049, Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date:	2/28/2006		
Temperature: 21 ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 46 %	**Power Supply:** 120 VAC
Remarks:			

Table 7.8.2 Occupied bandwidth test results

DETECTOR USED: Peak hold
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
MODULATING SIGNAL: PRBS
RESOLUTION BANDWIDTH: 10 kHz
VIDEO BANDWIDTH: 30 kHz

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit, kHz	Margin. kHz
Modulation: QPSK, 150 kHz			
776.0750	93.50	150	-56.50
776.5000	94.00	150	-56.00
776.9250	94.00	150	-56.00
Modulation: 16QAM, 150 kHz			
776.0750	94.50	150	-55.50
776.5000	97.00	150	-53.00
776.9250	95.00	150	-55.00

Reference numbers of test equipment used

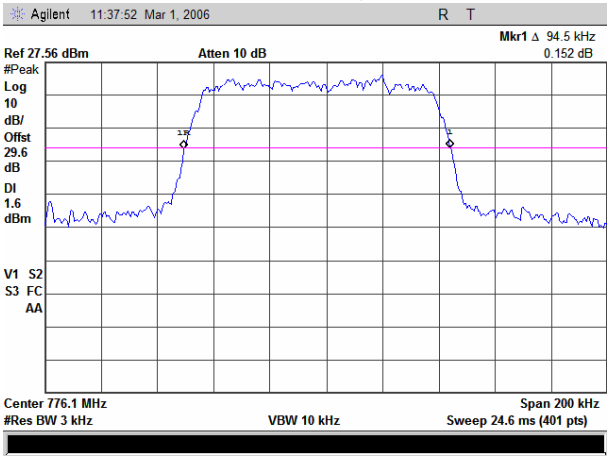
HL 1424	HL 1650	HL 2524					

Full description is given in Appendix A.

Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	2/28/2006		
Temperature: 21 °C	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

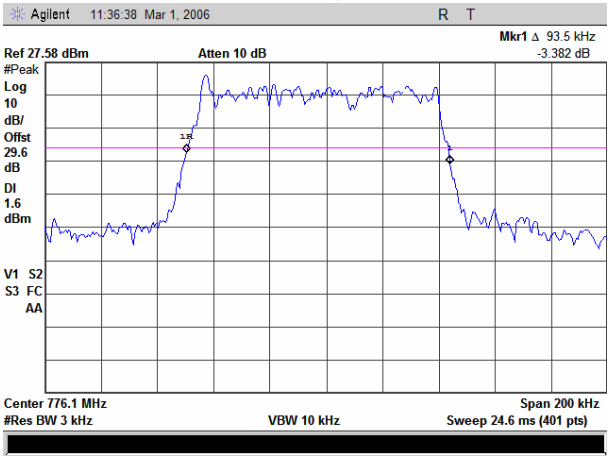
Plot 7.8.1 Occupied bandwidth test results at low frequency

Channel bandwidth: 150 kHz
Modulation: 16QAM



Plot 7.8.2 Occupied bandwidth test results at low frequency

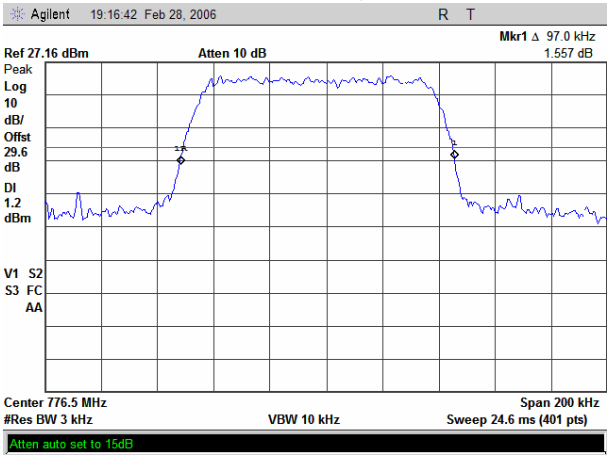
Channel bandwidth: 150 kHz
Modulation: QPSK



Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	2/28/2006		
Temperature: 21 °C	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

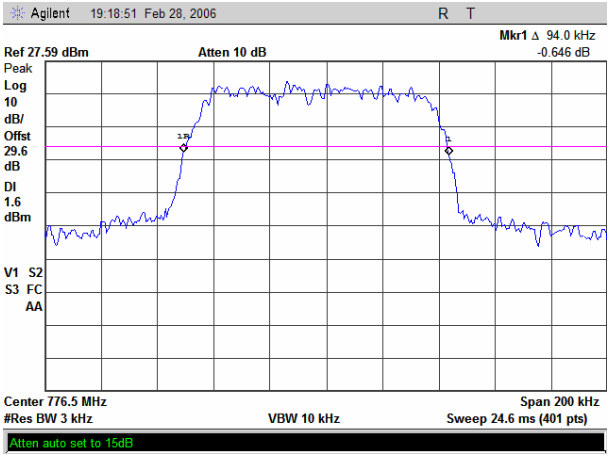
Plot 7.8.3 Occupied bandwidth test results at mid frequency

Channel bandwidth: 150 kHz
Modulation: 16QAM



Plot 7.8.4 Occupied bandwidth test results at mid frequency

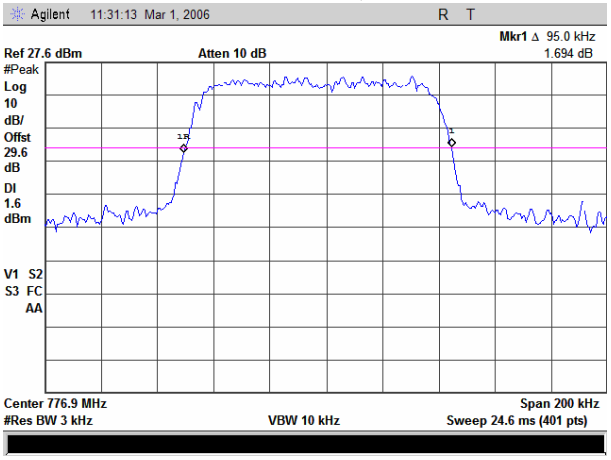
Channel bandwidth: 150 kHz
Modulation: QPSK



Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	2/28/2006		
Temperature: 21 °C	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

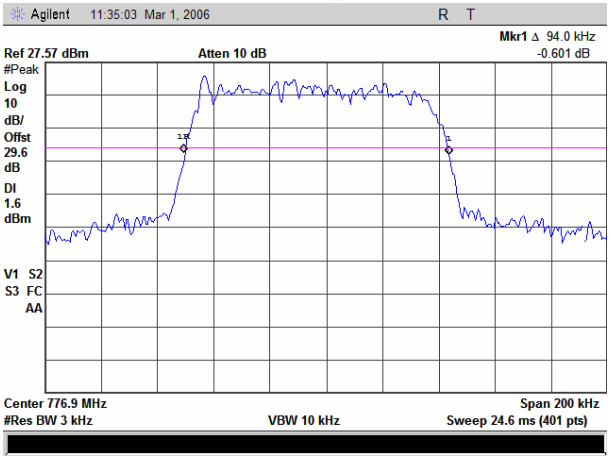
Plot 7.8.5 Occupied bandwidth test results at high frequency

Channel bandwidth: 150 kHz
Modulation: 16QAM



Plot 7.8.6 Occupied bandwidth test results at high frequency

Channel bandwidth: 150 kHz
Modulation: QPSK



Test specification:	Section 15.107, Conducted emission at AC power port, Class B		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

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

8.1 Conducted emissions

8.1.1 General

This test was performed to measure common mode conducted emissions at the mains power port. The specification test limits are given in Table 8.1.1. The worst test results with respect to the limits were recorded in Table 8.1.2 and shown in the associated plots.

Table 8.1.1 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.

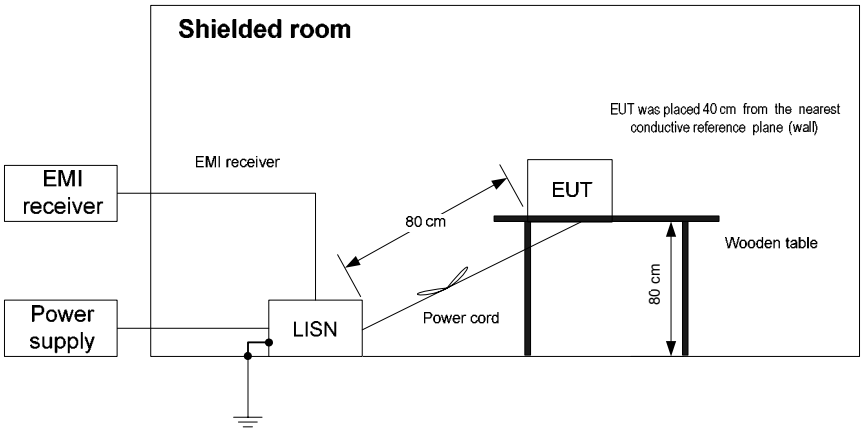
8.1.2 Test procedure

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

8.1.2.2 The measurements were performed at the EUT power terminals with the LISN, connected to the EMI receiver in the frequency range referred to in Table 8.1.2. The unused coaxial connector of the LISN was terminated with 50 Ohm.

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

Figure 8.1.1 Setup for conducted emission measurements at the mains power port, table-top EUT



Test specification:	**Section 15.107, Conducted emission at AC power port, Class B**		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	**Verdict:**	PASS
Date:	3/05/2006		
Temperature: 21 ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 46 %	**Power Supply:** 120 VAC
Remarks:			

Table 8.1.2 Conducted emission test results

LINE: AC mains
EUT SET UP: TABLE-TOP
TEST SITE: SHIELDED ROOM
DETECTORS USED: PEAK / QUASI-PEAK / AVERAGE
FREQUENCY RANGE: 150 kHz - 30 MHz
RESOLUTION BANDWIDTH: 9 kHz

Frequency, MHz	Peak emission, dB(µV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(µV)	Limit, dB(µV)	Margin, dB*	Measured emission, dB(µV)	Limit, dB(µV)	Margin, dB*		
Standby / Receive, modem									
0.152727	57.41	56.65	65.87	-9.22	45.83	55.87	-10.04	L1	Pass
0.293164	43.68	42.00	60.48	-18.48	29.56	50.48	-20.92		
1.175221	43.89	42.12	56.00	-13.88	27.58	46.00	-18.42		
1.372325	41.69	40.15	56.00	-15.85	22.52	46.00	-23.48		
1.838811	42.39	40.05	56.00	-15.95	16.20	46.00	-29.80		
3.602978	41.67	38.81	56.00	-17.19	21.38	46.00	-24.62		
0.153086	56.85	55.76	65.85	-10.09	42.98	55.85	-12.87	L2	Pass
0.293217	42.89	41.71	60.48	-18.77	25.76	50.48	-24.72		
0.592780	36.56	35.10	56.00	-20.90	22.67	46.00	-23.33		
1.200452	41.35	39.43	56.00	-16.57	24.35	46.00	-21.65		
1.365525	36.47	33.21	56.00	-22.79	19.04	46.00	-26.96		
3.424183	32.84	32.17	56.00	-23.83	12.73	46.00	-33.27		
Transmit, modem									
0.153047	57.32	56.49	65.85	-9.36	45.40	55.85	-10.45	L1	Pass
0.293032	44.08	41.87	60.48	-18.61	27.17	50.48	-23.31		
1.195320	43.69	42.07	56.00	-13.93	27.24	46.00	-18.76		
1.615914	42.56	39.06	56.00	-16.94	20.81	46.00	-25.19		
1.833174	43.25	40.68	56.00	-15.32	24.42	46.00	-21.58		
3.525614	41.96	38.79	56.00	-17.21	22.24	46.00	-23.76		
0.152908	56.82	56.00	65.86	-9.86	42.94	55.86	-12.92	L2	Pass
0.293698	42.74	41.46	60.46	-19.00	27.15	50.46	-23.31		
0.594479	36.88	35.45	56.00	-20.55	26.14	46.00	-19.86		
0.762269	36.84	34.48	56.00	-21.52	22.01	46.00	-23.99		
1.032667	37.64	35.90	56.00	-20.10	21.84	46.00	-24.16		
1.215128	41.66	39.11	56.00	-16.89	23.44	46.00	-22.56		
Transmit, laptop									
0.158472	56.95	50.00	65.59	-15.59	19.45	55.59	-36.14	L1	Pass
0.186628	54.91	46.93	64.21	-17.28	35.92	54.21	-18.29		
0.194932	54.14	46.40	63.85	-17.45	34.47	53.85	-19.38		
0.227115	51.12	43.59	62.61	-19.02	13.12	52.61	-39.49		
0.700357	43.06	36.15	56.00	-19.85	34.02	46.00	-11.98		
1.214099	38.44	34.80	56.00	-21.20	27.23	46.00	-18.77		
0.156380	55.87	47.84	65.69	-17.85	17.48	55.69	-38.21	L2	Pass
0.187385	53.58	44.08	64.18	-20.10	35.10	54.18	-19.08		
0.195662	52.56	42.94	63.82	-20.88	29.83	53.82	-23.99		
0.235495	47.48	38.79	62.29	-23.50	8.82	52.29	-43.47		
0.320576	45.24	37.78	59.72	-21.94	33.14	49.72	-16.58		
0.573655	41.49	37.00	56.00	-19.00	34.72	46.00	-11.28		

*****- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

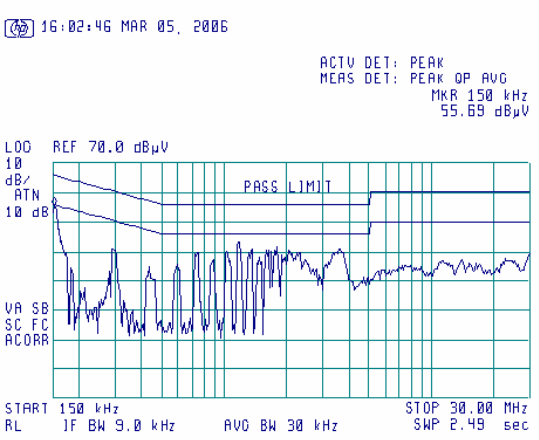
HL 0163	HL 0447	HL 0787	HL 1430	HL 1502	HL 1510		

Full description is given in Appendix A.

Test specification:	**Section 15.107, Conducted emission at AC power port, Class B**		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	**Verdict:**	PASS
Date:	3/05/2006		
Temperature: 21 ºC	**Air Pressure:** 1010 hPa	**Relative Humidity:** 46 %	**Power Supply:** 120 VAC
Remarks:			

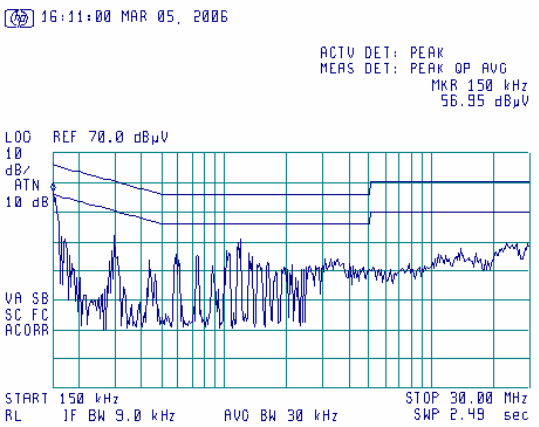
Plot 8.1.1 Conducted emission measurements on the modem AC lines

LINE: L1
EUT OPERATING MODE: Receive / Standby
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



Plot 8.1.2 Conducted emission measurements on the modem AC lines

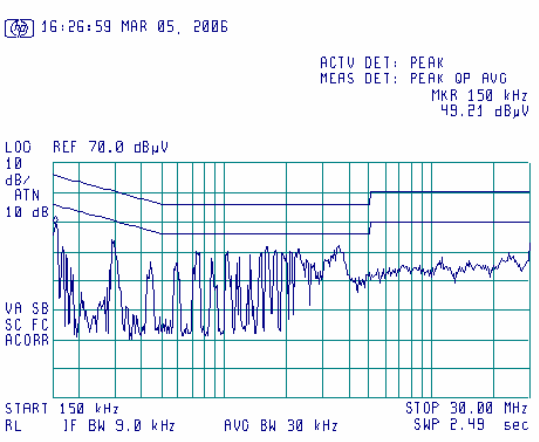
LINE: L2
EUT OPERATING MODE: Receive / Standby
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



Test specification:	Section 15.107, Conducted emission at AC power port, Class B		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

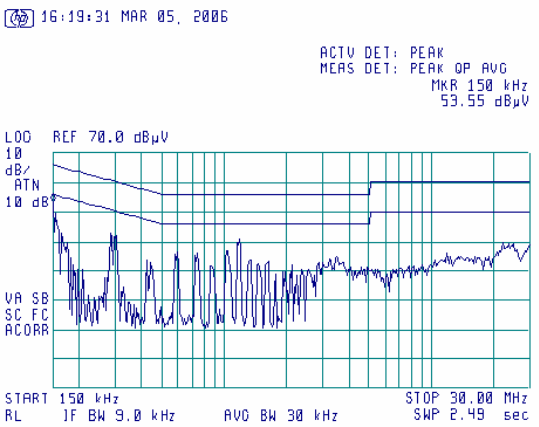
Plot 8.1.3 Conducted emission measurements on the modem AC lines

LINE: L1
EUT OPERATING MODE: Transmit
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



Plot 8.1.4 Conducted emission measurements on the modem AC lines

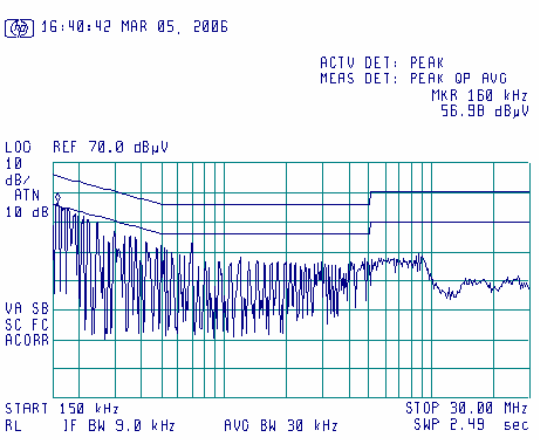
LINE: L2
EUT OPERATING MODE: Transmit
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



Test specification:	Section 15.107, Conducted emission at AC power port, Class B		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

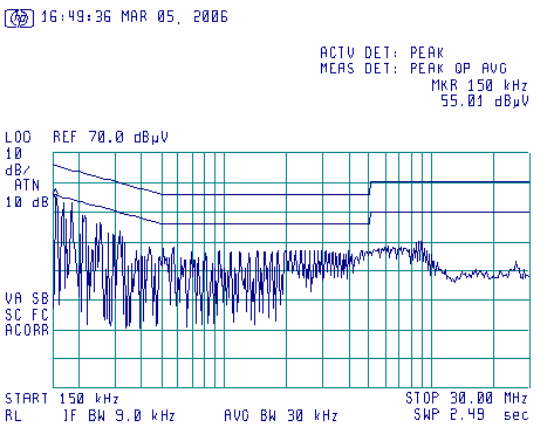
Plot 8.1.5 Conducted emission measurements on the laptop AC lines

LINE: L1
EUT OPERATING MODE: Transmit
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



Plot 8.1.6 Conducted emission measurements on the laptop AC lines

LINE: L2
EUT OPERATING MODE: Transmit
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



Test specification:	Section 15.109, Radiated emission, Class B		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

8.2 Radiated emission measurements

8.2.1 General

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

Table 8.2.1 Radiated emission test limits

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

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

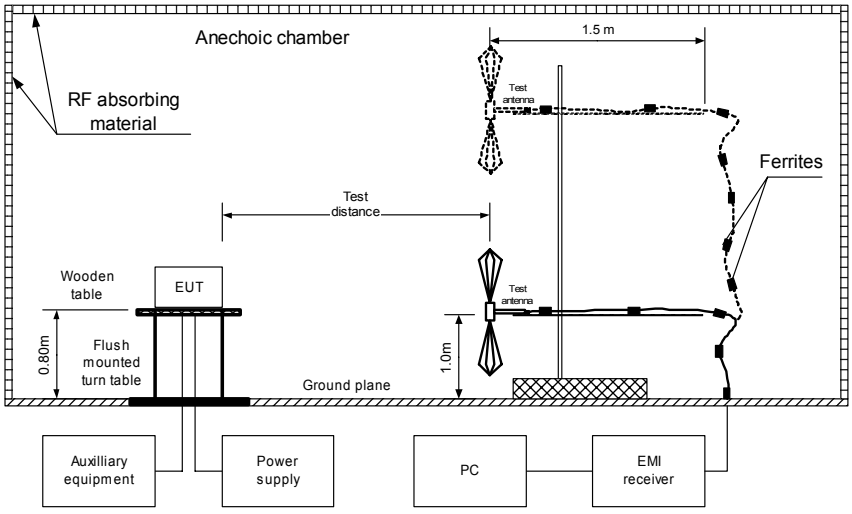
8.2.2 Test procedure

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

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

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

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



Test specification:	Section 15.109, Radiated emission, Class B		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Table 8.2.2 Radiated emission test results

EUT SET UP: TABLE-TOP
EUT OPERATING MODE: Receive / Standby
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*				
199.975000	26.63	21.84	43.5	-21.66	Horizontal	2.8	54	Pass
266.562500	33.13	23.58	46.0	-22.42	Horizontal	1.9	139	
326.114632	33.28	29.97	46.0	-16.03	Vertical	1.0	26	
333.250000	25.82	20.89	46.0	-25.11	Horizontal	3.4	97	
391.350000	31.40	26.92	46.0	-19.08	Vertical	1.0	202	
733.242500	35.96	31.98	46.0	-14.02	Horizontal	1.3	5	

DETECTORS USED: PEAK / AVERAGE
FREQUENCY RANGE: 1000 MHz – 4000 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*				
1133.00000	49.77	30.09	54.00	-23.91	Vertical	1.0	130	Pass
1200.00000	44.58	28.21	54.00	-25.79	Horizontal	1.0	221	Pass

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

Reference numbers of test equipment used

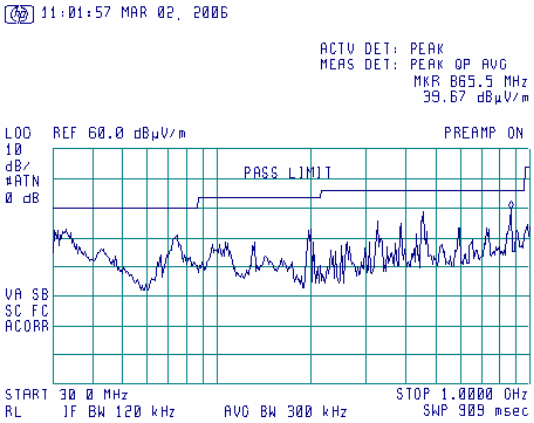
HL 0784	HL 0816	HL 1365	HL 1425	HL 1430	HL 1552	HL 1553	HL 1566
HL 1567	HL 1941	HL 1947	HL 1984	HL 1984	HL 2697		

Full description is given in Appendix A.

Test specification:	Section 15.109, Radiated emission, Class B		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

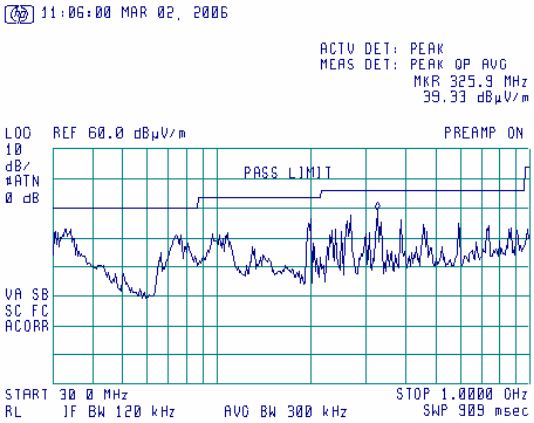
Plot 8.2.1 Radiated emission measurements in 30- 1000 MHz range, vertical antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Standby



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

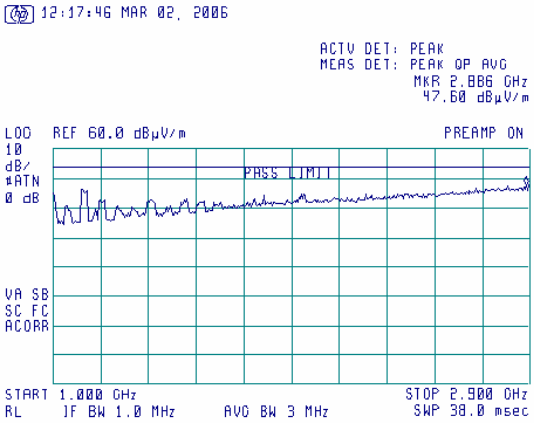
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Standby



Test specification:	Section 15.109, Radiated emission, Class B		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

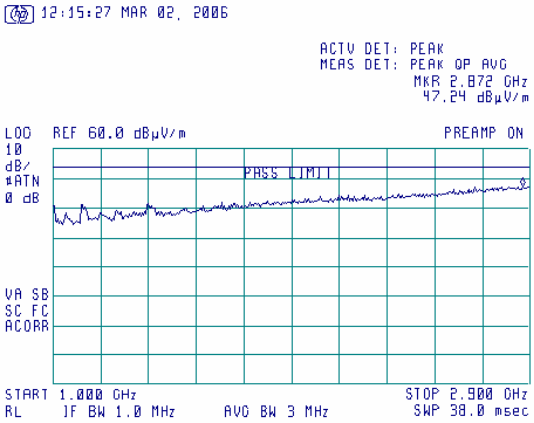
Plot 8.2.3 Radiated emission measurements in 1.0 – 2.9 GHz range, vertical antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Standby



Plot 8.2.4 Radiated emission measurements in 1.0 – 2.9 GHz range, horizontal antenna polarization

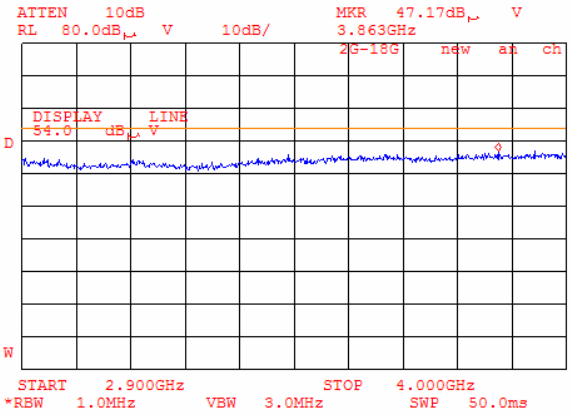
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Standby



Test specification:	Section 15.109, Radiated emission, Class B		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	3/05/2006		
Temperature: 21 ºC	Air Pressure: 1010 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

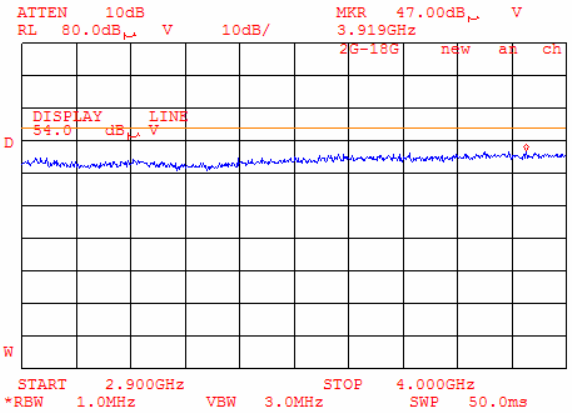
Plot 8.2.5 Radiated emission measurements in 2.9 – 4.0 GHz range, vertical antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Standby



Plot 8.2.6 Radiated emission measurements in 2.9 – 4.0GHz range, horizontal antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Standby



Test specification:	Section 15.111, Conducted emission at receiver antenna port		
Test procedure:	ANSI C63.4, Section 12.1.5		
Test mode:	Compliance	Verdict:	PASS
Date:	11/25/2004		
Temperature: 29 ºC	Air Pressure: 1012 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

8.3 Antenna power conducted measurements for receiver

8.3.1 General

This test was performed to measure spurious emissions at RF antenna connector of receiver operated within 30 to 960 MHz band which was tested for compliance with radiated emission limits with the antenna port connected to resistive termination. The specification test limits are given in Table 8.3.1.

Table 8.3.1 Spurious emission limits

Frequency, MHz	EUT type	Power of spurious	
		nW	dBm
30 MHz – 2nd harmonic*	Superheterodyne receiver	2.0	-57.0

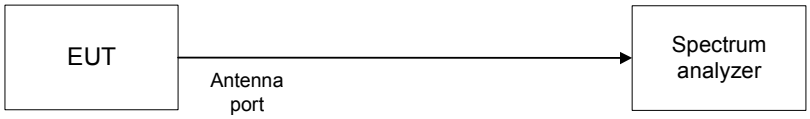
* - harmonic of the local oscillator frequency.

8.3.2 Test procedure

8.3.2.1 The EUT was set up as shown in Figure 8.3.1, energized and its proper operation was checked.

8.3.2.2 The spurious emission was measured with spectrum analyzer as provided in Table 8.3.2 and associated plots.

Figure 8.3.1 Spurious emission test setup



Test specification:	Section 15.111, Conducted emission at receiver antenna port		
Test procedure:	ANSI C63.4, Section 12.1.5		
Test mode:	Compliance	Verdict:	PASS
Date:	11/25/2004		
Temperature: 29 ºC	Air Pressure: 1012 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

Table 8.3.2 Spurious emission test results

INVESTIGATED FREQUENCY RANGE: 30 – 1500 MHz
RECEIVER TYPE: Superheterodyne
EUT OPERATING MODE: Receive
DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 1000 kHz
VIDEO BANDWIDTH: 3000 kHz

Frequency, MHz	Spurious emission, dBm	Limit, dBm	Margin, dB	Verdict
793.1	-72.5	-57.0	-15.5	Pass

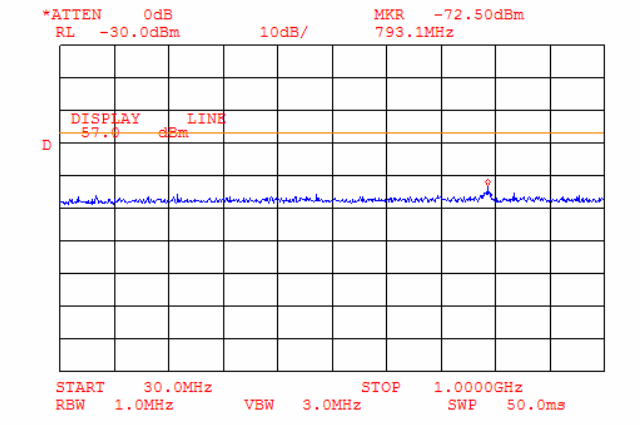
Reference numbers of test equipment used

HL 1424	HL 2399						

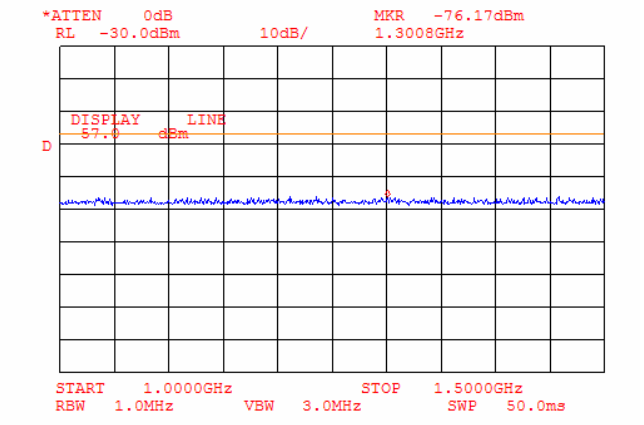
Full description is given in Appendix A.

Test specification:	Section 15.111, Conducted emission at receiver antenna port		
Test procedure:	ANSI C63.4, Section 12.1.5		
Test mode:	Compliance	Verdict:	PASS
Date:	11/25/2004		
Temperature: 29 ºC	Air Pressure: 1012 hPa	Relative Humidity: 36 %	Power Supply: 120 VAC
Remarks:			

Plot 8.3.1 Spurious emission measurements in 30 to 1000 MHz range



Plot 8.3.2 Spurious emission measurements in 1000 to 1500 MHz range



9 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
0163	LISN FCC/VDE/MIL-STD	Electro-Metrics	ANS 25/2	1314	01-Oct-05	01-Oct-06
0190	Power Meter, RF, -20 +10 dBm, 10 MHz - 10 GHz	Hewlett Packard	432A	1507A14742	17-Feb-06	17-Feb-07
0446	Antenna, Loop active, 10kHz-30MHz	EMCO	6502	2857	28-Jun-05	28-Jun-06
0447	LISN, 16/2, 300V RMS	HL	LISN 16 - 1	066	03-Nov-05	03-Nov-06
0465	Anechoic Chamber 9(L) x 6.5(W) x 5.5(H) m	HL	AC - 1	023	10-Oct-05	10-Oct-06
0493	Oven temperature -45…175 deg C	Thermotron	S-1.2 Mini-Max	14016	10-Oct-05	10-Oct-06
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A 00319, 3448A00253	10-Oct-05	10-Oct-06
0589	Cable Coaxial, GORE A2P01POL118, 2.3 m	HL	GORE-3	176	10-Oct-05	10-Oct-06
0592	Position Controller	HL	L2-SR3000 (HL CRL-3)	100	18-May-05	18-May-06
0593	Antenna Mast, 1-4 m Pneumatic	Madgesh	AM-F1	101	03-Feb-06	03-Feb-07
0594	Turn Table FOR ANECHOIC CHAMBER flush mount d=1.2 m Pneumatic	HL	TT-WDC1	102	27-Jan-06	27-Jan-07
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE 26 - 2000 MHz	EMCO	3141	9611-1011	10-Oct-05	10-Oct-06
0613	Sensor Electric Field 10 kHz-1.0 GHz, 1-300 V/m (probe), w/charger	Amplifier Research	FP2000	18677	10-Oct-05	10-Oct-06
0784	Antenna X-WING BILOG 20 MHz - 2 GHz	Schaffner-Chase EMC	CBL6140A	1120	10-Oct-05	10-Oct-06
0787	Transient Limiter	Hewlett Packard	11947A	3107A01877	10-Oct-05	10-Oct-06
0816	Cable Coax RG-214 ,8 m, N-type connectors	HL	C214-8	152	10-Oct-05	10-Oct-06
1004	Cable Coaxial , ANDREW PSWJ4 , 6m	HL	ANDREW -6	163	10-Oct-05	10-Oct-06
1097	Attenuator, 50 Ohm, 5 W, DC to 8 GHz, 20 dB	Midwest Microwave	0793-20-NN-07	1097	10-Oct-05	10-Oct-06
1200	Quadruplexer 1-12 GHz (1-2 GHz; 2-4GHz;4-8 GHz; 8-12GHz)	Elettronica S.p.A. - Roma	UE 84	D/00240	10-Oct-05	10-Oct-06
1206	One phase voltage regulator, 2kVA, 0-250V	HL	TDGC-2	142	04-Jun-05	04-Jun-06
1365	Cable Coaxial, S-FLC 12-50, 5 m	HL	C214-5	1365	04-Jun-05	04-Jun-06
1424	Spectrum Analyzer, 30 Hz- 40 GHz	Agilent Technologies (HP)	8564EC	3946A00219	04-Jun-05	04-Jun-06
1425	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1426, HL1427	Agilent Technologies (HP)	8542E	3710A00222, 3705A00204	04-Jun-05	04-Jun-06
1430	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1431, HL1432	Agilent Technologies (HP)	8542E	3807A00262,3705A00217	04-Jun-05	04-Jun-06

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
1455	Cable, 1 m	Harbour Industries	MIL 17/60-RG142	1455	11-Sep-05	11-Sep-06
1488	Power Divider 0.5 - 18 GHz	Omni Spectra	2090-6204-00		11-Sep-05	11-Sep-06
1502	Cable RF, 6 m	Belden	M17/167 MIL-C-17	1502	11-Sep-05	11-Sep-06
1510	Cable RF, 8 m	Belden	M17/167 MIL-C-17	1510	11-Sep-05	11-Sep-06
1523	Cable RF, 2.3 m	Telequis	MIL-C-17F-RG 058 CU	1523	11-Sep-05	11-Sep-06
1552	Cable RF, 8 m	Alpha Wire	RG-214	1552	11-Sep-05	11-Sep-06
1553	Cable RF, 3.5 m	Alpha Wire	RG-214	1553	11-Sep-05	11-Sep-06
1566	Cable RF, 2 m	Huber-Suhner	Sucoflex 104PE	13094/4PE	11-Sep-05	11-Sep-06
1567	Cable RF, 2 m	Huber-Suhner	Sucoflex 104PE	13095/4PE	11-Sep-05	11-Sep-06
1629	Isotropic Field Monitor	Amplifier Research	FM2000	23308	13-Feb-06	13-Feb-07
1650	Attenuators Set (2, 3, 5, 20 dB), DC-18 GHz	M/A-COM	2082	1650	13-Feb-06	13-Feb-07
1653	Analyzer EMC 9 kHz - 1.5 GHz	Agilent Technologies (HP)	E7401A	US39440281	13-Feb-06	13-Feb-07
1941	Cable 18GHz, 4 m, green	Rhophase Microwave Limited	SPS-1803A-4000-NPS	T4657	13-Feb-06	13-Feb-07
1942	Cable 18GHz, 4 m, blue	Rhophase Microwave Limited	SPS-1803A-4000-NPS	T4658	13-Feb-06	13-Feb-07
1947	Cable 18GHz, 6.5 m, blue	Rhophase Microwave Limited	NPS-1803A-6500-NPS	T4974	13-Feb-06	13-Feb-07
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W, N-type	EMC Test Systems	3115	9911-5964	22-Mar-06	22-Mar-07
2009	Cable RF, 8 m	Alpha Wire	RG-214	C-56	13-Feb-06	13-Feb-07
2109	Anechoic Chamber 6(L) x 5.5(W) x 2.95(H) m	HL	AC-2	2109	12-Dec-05	12-Dec-06
2399	Cable 40GHz, 1.5 m, blue	Rhophase Microwave Limited	KPS-1503A-1500-KPS	X2946	24-Jun-05	24-Jun-06
2524	Attenuator, 10 dB, DC-18 GHz	Midwest Microwave	263-10	2524	03-Jan-06	03-Jan-07
2697	Antenna, 30 MHz - 3.0 GHz,	Sunol Sciences. Corp. Pleasanton, California USA	JB3	A022805	10-Mar-06	10-Mar-07
2868	Cable, 18 GHz, 1.1 m, SMA - SMA, Right Angle	Gore	NA	91P72071	16-Febr-06	16-Febr-07

10 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Transmitter tests	
Carrier power conducted at antenna connector	± 1.7 dB
Carrier power radiated (substitution method)	± 4.5 dB
Occupied bandwidth	±8%
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB
Spurious emissions radiated 30 MHz – 40 GHz (substitution method)	± 4.5 dB
Frequency stability	± 168 Hz (0.56 ppm)
Unintentional radiator tests	
Conducted emissions with LISN	9 kHz to 150 kHz: ± 3.9 dB 150 kHz to 30 MHz: ± 3.8 dB
Radiated emissions at 3 m measuring distance Horizontal polarization Vertical polarization	 Biconilog antenna: ± 5.3 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.3 dB Double ridged horn antenna: ± 5.3 dB Biconilog antenna: ± 6.0 dB Biconical antenna: ± 5.7 dB Log periodic antenna: ± 6.0 dB Double ridged horn antenna: ± 6.0 dB

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.

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).

Address: P.O. Box 23, Binyamina 30500, Israel.
Telephone: +972 4628 8001
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 27: 2005	Miscellaneous wireless communications services
47CFR part 1: 2005	Practice and procedure
47CFR part 2: 2005	Frequency allocations and radio treaty matters; general rules and regulations
47CFR part 15 subpart B: 2005	Radio Frequency Devices
ANSI C63.2: 1996	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4: 2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
ANSI/TIA/EIA-603-A:2001	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

13 APPENDIX E Abbreviations and acronyms

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

14 APPENDIX F Test equipment correction factors

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

Frequency, MHz	Correction factor, dB
0.01	5.0
0.02	2.2
0.03	1.1
0.04	0.7
0.05	0.5
0.1	0.2
0.2	0.1
0.4	0.1
0.6	0.1
0.8	0.1
1	0.1
2	0.1
3	0.1
4	0.1
6	0.2
10	0.3
12	0.4
16	0.5
18	0.6
20	0.7
25	0.9
28	1.2
30	1.3

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 ANS-25/2
Electro-Metrics

Frequency, MHz	Correction factor, dB
0.01	4.7
0.02	2.1
0.03	1.1
0.04	0.7
0.05	0.5
0.1	0.2
0.2	0.1
0.4	0.1
0.6	0.1
0.8	0.1
1	0.1
2	0.1
3	0.1
4	0.1
6	0.1
10	0.1
12	0.1
16	0.1
18	0.1
20	0.1
25	0.1
28	0.1
30	0.1

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, serial number 2857, HL 0446

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

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

Antenna factor

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

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

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

Antenna factor
Biconilog antenna
CHASE Model CBL6140A
Serial no: 1120, HL 0784

Frequency, MHz	Antenna factor, dB
30.0	4.3
35.0	7.3
40.0	8.8
45.0	9.3
50.0	9.6
60.0	9.9
70.0	9.2
80.0	7.6
90.0	7.6
100.0	8.8
120.0	7.2
125.0	7.5
140.0	7.7
150.0	7.9
160.0	11.4
175.0	8.6
180.0	8.8
200.0	9.8
250.0	12.5
300.0	12.2
350.0	14.8
400.0	16.1
450.0	16.5
500.0	17.6
550.0	18.3
600.0	18.5
650.0	19.8
700.0	20.1
750.0	20.8
800.0	21.2
850.0	22.0
900.0	22.2
950.0	23.2
1000.0	23.8

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

Antenna factor
Double-ridged wave guide horn antenna
EMC Test Systems, model 3115, serial no: 9911-5964, HL 1984

Frequency, MHz	Antenna gain, dBi	Antenna factor. dB(1/m)
1000.0	5.8	24.5
1500.0	9.0	24.8
2000.0	8.6	27.7
2500.0	9.5	28.7
3000.0	8.9	30.8
3500.0	8.2	32.9
4000.0	9.6	32.7
4500.0	11.2	32.1
5000.0	10.6	33.6
5500.0	9.8	35.3
6000.0	10.1	35.7
6500.0	10.7	35.8
7000.0	10.9	36.2
7500.0	10.5	37.2
8000.0	11.1	37.2
8500.0	10.8	38.1
9000.0	10.7	38.6
9500.0	11.5	38.3
10000.0	11.8	38.4
10500.0	12.3	38.3
11000.0	12.3	38.8
11500.0	11.5	39.9
12000.0	12.2	39.6
12500.0	12.6	39.5
13000.0	12.0	40.5
13500.0	11.7	41.1
14000.0	11.7	41.5
14500.0	12.7	40.8
15000.0	14.2	39.5
15500.0	16.0	38.1
16000.0	16.2	38.1
16500.0	14.5	40.1
17000.0	12.2	42.6
17500.0	9.7	45.4
18000.0	6.6	48.7

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

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

Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain
30	22.2	-22.5	0.01	620	19.7	6.3	4.27	1215	24.9	7.0	5.05	1810	28.3	7.1	5.08	2405	30.9	6.9	4.93
35	18.5	-17.4	0.02	625	19.7	6.5	4.42	1220	24.9	7.0	4.99	1815	28.5	6.9	4.91	2410	30.9	6.9	4.89
40	14.7	-12.5	0.06	630	19.6	6.6	4.57	1225	25.1	6.9	4.91	1820	28.6	6.8	4.74	2415	31.0	6.9	4.85
45	11.3	-8.1	0.16	635	19.7	6.5	4.48	1230	25.2	6.8	4.82	1825	28.7	6.8	4.75	2420	31.0	6.8	4.82
45	11.3	-8.1	0.16	640	19.9	6.4	4.40	1235	25.1	7.0	4.96	1830	28.7	6.8	4.76	2425	31.1	6.8	4.81
50	8.9	-4.7	0.34	645	19.9	6.5	4.45	1240	25.0	7.1	5.09	1835	28.7	6.7	4.72	2430	31.0	6.9	4.87
55	7.9	-2.8	0.52	650	19.9	6.5	4.51	1245	25.0	7.1	5.12	1840	28.8	6.7	4.69	2435	31.0	6.9	4.88
60	7.8	-2.1	0.62	655	19.9	6.6	4.60	1250	25.0	7.1	5.15	1845	28.6	6.9	4.90	2440	31.2	6.8	4.74
65	8.5	-2.0	0.63	660	19.9	6.7	4.69	1255	25.0	7.2	5.25	1850	28.4	7.1	5.12	2445	31.1	6.9	4.91
70	9.0	-1.9	0.64	665	19.9	6.7	4.70	1260	24.9	7.3	5.36	1855	28.5	7.0	5.07	2450	31.0	7.0	4.96
75	8.8	-1.1	0.78	670	20.0	6.7	4.71	1265	25.0	7.3	5.31	1860	28.6	7.0	5.01	2455	31.0	7.0	5.01
80	8.4	-0.2	0.97	675	20.1	6.7	4.71	1270	25.1	7.2	5.26	1865	28.5	7.1	5.17	2460	30.9	7.2	5.19
85	8.0	0.8	1.20	680	20.1	6.7	4.71	1275	25.3	7.0	5.05	1870	28.4	7.3	5.33	2465	31.1	6.9	4.95
90	8.2	1.1	1.29	685	20.1	6.8	4.79	1280	25.5	6.8	4.84	1875	28.4	7.2	5.28	2470	31.3	6.8	4.76
95	9.2	0.5	1.13	690	20.1	6.9	4.88	1285	25.4	7.0	4.97	1880	28.5	7.2	5.22	2475	31.4	6.7	4.69
100	10.6	-0.4	0.92	695	20.2	6.8	4.82	1290	25.3	7.1	5.10	1885	28.5	7.2	5.22	2480	31.3	6.8	4.79
105	11.7	-1.1	0.78	700	20.3	6.8	4.76	1295	25.3	7.2	5.22	1890	28.6	7.2	5.21	2485	31.1	7.0	5.00
110	12.6	-1.6	0.70	705	20.4	6.8	4.75	1300	25.2	7.3	5.33	1895	28.6	7.2	5.24	2490	31.1	7.0	4.99
115	13.3	-1.9	0.65	710	20.5	6.8	4.75	1305	25.3	7.2	5.21	1900	28.6	7.2	5.27	2495	31.2	7.0	4.99
120	13.9	-2.1	0.62	715	20.5	6.8	4.80	1310	25.5	7.1	5.09	1905	28.5	7.3	5.36	2500	30.9	7.2	5.27
125	14.2	-2.0	0.63	720	20.5	6.9	4.85	1315	25.4	7.2	5.23	1910	28.5	7.4	5.45	2505	31.1	7.1	5.15
130	14.2	-1.7	0.68	725	20.6	6.8	4.81	1320	25.3	7.3	5.36	1915	28.5	7.3	5.38	2510	31.0	7.2	5.22
135	13.8	-1.0	0.79	730	20.7	6.8	4.77	1325	25.5	7.2	5.21	1920	28.6	7.3	5.31	2515	31.0	7.2	5.26
140	13.4	-0.3	0.94	735	20.9	6.7	4.65	1330	25.6	7.0	5.06	1925	28.6	7.3	5.35	2520	31.2	7.0	5.05
145	13.1	0.3	1.08	740	21.0	6.6	4.53	1335	25.7	7.1	5.07	1930	28.6	7.3	5.39	2525	30.8	7.4	5.54
150	12.9	0.8	1.21	745	21.0	6.6	4.59	1340	25.7	7.1	5.09	1935	28.5	7.4	5.54	2530	31.0	7.3	5.37
155	12.7	1.3	1.34	750	21.0	6.7	4.64	1345	25.7	7.1	5.13	1940	28.4	7.6	5.70	2535	31.2	7.0	5.06
160	12.7	1.6	1.44	755	21.0	6.8	4.74	1350	25.7	7.1	5.17	1945	28.5	7.5	5.59	2540	31.2	7.1	5.09
165	12.5	2.0	1.59	760	21.0	6.8	4.83	1355	25.8	7.0	5.06	1950	28.6	7.4	5.48	2545	31.0	7.3	5.43
170	12.2	2.6	1.83	765	21.1	6.8	4.73	1360	25.9	6.9	4.95	1955	28.6	7.5	5.57	2550	31.0	7.3	5.39
175	11.8	3.3	2.13	770	21.3	6.7	4.64	1365	26.0	6.9	4.95	1960	28.6	7.5	5.65	2555	31.1	7.2	5.30
180	11.6	3.7	2.36	775	21.3	6.7	4.68	1370	26.0	7.0	4.96	1965	28.7	7.4	5.47	2560	31.0	7.4	5.47
185	11.5	4.0	2.54	780	21.3	6.7	4.72	1375	26.0	7.0	5.01	1970	28.9	7.2	5.29	2565	30.8	7.6	5.70
190	11.6	4.2	2.61	785	21.3	6.8	4.77	1380	26.0	7.0	5.06	1975	28.9	7.2	5.22	2570	31.1	7.3	5.37
195	12.1	3.9	2.47	790	21.3	6.8	4.82	1385	26.0	7.0	4.99	1980	29.0	7.1	5.16	2575	31.5	7.0	4.96
200	13.1	3.2	2.07	795	21.4	6.8	4.79	1390	26.1	6.9	4.92	1985	29.1	7.1	5.11	2580	31.6	6.9	4.87
205	12.0	4.4	2.76	800	21.5	6.8	4.77	1395	26.2	6.9	4.94	1990	29.1	7.0	5.06	2585	31.6	6.8	4.79
210	11.0	5.6	3.66	805	21.6	6.7	4.71	1400	26.2	7.0	4.96	1995	29.1	7.1	5.09	2590	31.6	6.9	4.88
215	11.3	5.6	3.59	810	21.7	6.7	4.65	1405	26.1	7.0	5.02	2000	29.1	7.1	5.11	2595	31.5	7.0	4.97
220	11.6	5.5	3.52	815	21.7	6.7	4.72	1410	26.1	7.1	5.09	2005	29.1	7.1	5.16	2600	31.6	6.9	4.86
225	11.7	5.5	3.55	820	21.7	6.8	4.80	1415	26.2	7.0	5.02	2010	29.1	7.1	5.15	2605	31.3	7.2	5.30
230	11.9	5.5	3.57	825	21.7	6.8	4.82	1420	26.3	7.0	4.96	2015	29.2	7.1	5.13	2610	31.4	7.1	5.15
235	12.1	5.5	3.56	830	21.7	6.9	4.85	1425	26.2	7.1	5.10	2020	29.2	7.1	5.18	2615	31.7	6.9	4.88
240	12.3	5.5	3.54	835	21.8	6.8	4.82	1430	26.1	7.2	5.25	2025	29.3	7.1	5.08	2620	31.6	7.0	4.97
245	12.3	5.7	3.71	840	21.9	6.8	4.80	1435	26.1	7.2	5.24	2030	29.3	7.0	5.05	2625	31.4	7.1	5.17
250	12.3	5.9	3.88	845	21.9	6.8	4.83	1440	26.2	7.2	5.24	2035	29.3	7.1	5.07	2630	31.6	7.0	5.00
260	12.7	5.8	3.83	855	22.0	6.8	4.80	1450	26.5	7.0	4.98	2045	29.2	7.2	5.23	2640	31.7	7.0	4.98
270	13.7	5.2	3.27	865	22.0	6.9	4.92	1460	26.4	7.1	5.17	2055	29.3	7.2	5.21	2650	31.8	6.9	4.85
275	13.7	5.3	3.39	870	21.9	7.1	5.11	1465	26.4	7.2	5.19	2060	29.5	7.0	5.02	2655	31.8	6.9	4.85
280	13.7	5.4	3.50	875	22.0	7.1	5.08	1470	26.4	7.2	5.22	2065	29.4	7.1	5.08	2660	31.7	7.0	5.02
285	13.7	5.6	3.61	880	22.1	7.0	5.05	1475	26.4	7.1	5.17	2070	29.4	7.1	5.10	2665	32.0	6.7	4.71
290	13.7	5.7	3.72	885	22.1	7.0	5.06	1480	26.5	7.1	5.12	2075	29.5	7.0	5.01	2670	32.0	6.7	4.67
295	13.8	5.8	3.77	890	22.1	7.0	5.06	1485	26.5	7.1	5.14	2080	29.8	6.8	4.76	2675	31.9	6.8	4.81
300	13.9	5.8	3.81	895	22.2	7.1	5.09	1490	26.5	7.1	5.17	2085	29.7	6.9	4.89	2680	31.7	7.0	5.04
305	14.0	5.9	3.85	900	22.2	7.1	5.12	1495	26.5	7.2	5.24	2090	29.7	6.9	4.86	2685	31.9	6.8	4.83
310	14.1	5.9	3.88	905	22.3	7.1	5.09	1500	26.5	7.2	5.31	2095	29.8	6.8	4.78	2690	32.1	6.7	4.72
315	14.3	5.9	3.89	910	22.3	7.0	5.05	1505	26.5	7.2	5.27	2100	29.9	6.8	4.75	2695	32.1	6.7	4.71
320	14.4	5.9	3.90	915	22.4	7.0	4.99	1510	26.6	7.2	5.23	2105	29.8	6.8	4.81	2700	32.0	6.8	4.81
325	14.5	5.9	3.92	920	22.6	6.9	4.92	1515	26.6	7.2	5.30	2110	29.9	6.8	4.78	2705	32.0	6.8	4.80
330	14.6	5.9	3.93	925	22.7	6.9	4.85	1520	26.5	7.3	5.38	2115	29.9	6.8	4.76	2710	32.1	6.8	4.79
335	14.7	6.0	4.02	930	22.8	6.8	4.77	1525	26.6	7.3	5.37	2120	29.9	6.8	4.84	2715	32.1	6.7	4.71
340	14.7	6.2	4.12	935	22.8	6.8	4.83	1530	26.6	7.3	5.36	2125	29.9	6.9	4.89	2720	32.4	6.5	4.47
345	14.9	6.1	4.06	940	22.8	6.9	4.89	1535	26.6	7.4	5.44	2130	29.9	6.9	4.90	2725	32.2	6.7	4.63
350	15.1	6.0	3.99	945	22.8	6.9	4.87	1540	26.5	7.4	5.53	2135	29.8	6.9	4.94	2730	31.9	7.0	5.05
360	15.6	5.8	3.78	955	23.0	6.8	4.81	1550	26.5	7.5	5.63	2145	29.9	6.9	4.92	2740	31.6	7.1	5.46
365	15.5	5.9	3.89	960	23.1	6.8	4.77	1555	26.7	7.3	5.39	2150	29.9	7.0	4.98	2745	31.9	7.0	5.06
370	15.5	6.0	4.01	965	23.1	6.7	4.73	1560	26.9	7.1	5.16	2155	29.8	7.1	5.10	2750	32.0	6.9	4.94
375	15.6	6.1	4.03	970	23.2	6.7	4.69	1565	26.9	7.2	5.23	2160	29.8	7.1	5.09	2755	32.0	7.0	4.98
380	15.7	6.1	4.05	975	23.3	6.6	4.62	1570	26.9	7.2	5.30	2165	29.9	7.0	5.00	2760	32.0	7.0	5.06
385	15.7	6.2	4.15	980	23.5	6.6	4.54	1575	27.0	7.2	5.23	2170	29.9	7.1	5.07	2765	32.2	6.8	4.80
390	15.7	6.3	4.25	985	23.5	6.6	4.52	1580	27.0	7.1	5.17	2175	29.8	7.2	5.20	2770	32.3	6.8	4.73
395	15.9	6.3	4.22	990	23.6	6.5	4.50	1585	27.0	7.2	5.20	2180	29.8	7.2	5.27	2775	32.3	6.8	4.77
400	16.0	6.2	4.18	995	23.6	6.5	4.48	1590	27.0	7.2	5.22	2185	29.8	7.2	5.27	2780	32.3	6.8	4.82
405	16.3	6.1	4.07	1000	23.7	6.5	4.46	1595	27.0	7.2	5.29	2190	29.8	7.2	5.28	2785	32.7	6.4	4.41
410	16.5	6.0	3.96	1005	23.7	6.5	4.51	1600	27.0	7.3	5.36	2195	29.8	7.2	5.30	2790	32.8	6.3	4.25
420	16.6	6.1	4.03	1015	23.7	6.6	4.55	1610	27.0	7.3	5.41	2205	29.7	7.3	5.41	2800	32.5	6.7	4.66
425	16.6	6.1	4.10	1020	23.8	6.6	4.54	1615	27.1	7.3	5.33	2210	29.7	7.4	5.47	2805	32.5	6.6	4.62
430	16.7	6.2	4.16	1025	23.8	6.6	4.62	1620	27.2	7.2	5.27	2215	29.7	7.4	5.54	2810	32.5	6.7	4.70
435	16.9	6.1	4.05	1030	23.7	6.7	4.70	1625	27.2	7.2	5.30	2220	29.7	7.5	5.57	2815	32.3	6.9	4.85
440	17.1	5.9	3.93	1035	23.7	6.8	4.81	1630	27.2	7.3	5.33	2225	29.8	7.3	5.43	2820	32.2	7.0	5.01
445	17.2	6.0	3.97	1040	23.6	6.9	4.92	1635	27.2	7.3	5.35	2230	29.8	7.4	5.45	2825	32.3	7.0	4.96
450	17.2	6.0	4.00	1045	23.7	6.9	4.91	1640	27.2	7.3	5.36	2235	29.7	7.5	5.61	2830	32.4	6.8	4.80
455	17.3	6.1	4.04	1050	23.7	6.9	4.91	1645	27.3	7.2	5.22	2240	29.5	7.7	5.86	2835	32.5	6.7	4.68
460	17.4	6.1	4.07	1055	23.7	7.0	5.01	1650	27.5	7.1	5.09	2245	29.8	7.4	5.53	2840	32.5	6.8	4.78
470	17.6	6.1	4.04	1065	23.7	7.0	5.06	1660	27.5	7.1	5.13	2255	30.0	7.2	5.28	2850	32.6	6.7	4.70
475	17.7	6.0	3.99	1070	23.8	7.0	5.01	1665	27.6	7.0	5.06	2260	30.1	7.2	5.24	2855	32.4	6.9	4.88
480	17.9	5.9	3.93	1075	23.8	7.0	5.01	1670	27.7	7.0	4.99	2265	30.1	7.2	5.20	2860	32.4	7.0	4.98
485	18.0	5.9	3.88	1080	23.9	7.0	5.01	1675	27.7	7.0	5.02	2270	30.2	7.1	5.12	2865	32.8	6.5	4.52
490	18.2	5.8	3.82	1085	24.0	7.0	4.96	1680	27.7	7.0	5.05	2275	30.3	7.0	5.05	2870	33.0	6.3	4.30
495	18.0	6.0	4.02	1090	24.0	6.9	4.91	1685	27.7	7.0	5.01	2280	30.0	7.0	5.06	2875	33.0	6.4	4.38
500	17.9	6.3	4.23	1095	24.1	6.9	4.86	1690	27.8	7.0	4.98	2285	30.3	7.0	5.05	2880	32.5	6.9	4.87
510	18.0	6.4	4.36	1105	24.3	6.8	4.80	1700	27.8	7.0	5.03	2295	30.3	7.1	5.13	2890	33.1	6.3	4.28
515	18.1	6.4	4.34	1110	24.3	6.8	4.78	1705	27.8	7.1	5.09	2300	30.2	7.2	5.23	2895	33.1	6.4	4.34
520	18.2	6.4	4.32	1115	24.3	6.8	4.79	1710	27.7	7.1	5.16	2305	30.3	7.2	5.20	2900	33.0	6.4	4.41
525	18.2	6.4	4.36	1120	24.4	6.8	4.80	1715	27.8	7.1	5.08	2310	30.2	7.3	5.35	2905	32.9	6.6	4.58
530	18.3	6.4	4.39	1125	24.3	6.9	4.90	1720	27.9	7.0	5.00	2315	30.1	7.4	5.45	2910	32.9	6.5	4.51
535	18.3	6.4	4.41	1130	24.3	7.0	5.00	1725	28.0	7.0	4.99	2320	30.3	7.2	5.27	2915	33.1	6.4	4.33
540	18.4	6.4	4.41	1135	24.4	6.9	4.90	1730	28.0	7.0	4.98	2325	304	7.2	5.22	2920	33.3	6.2	4.16
545	18.4	6.5	4.47	1140	24.5	6.8	4.81	1735	28.0	7.0	5.02	2330	30.4	7.1	5.13	2925	33.0	6.5	4.45
550	18.4	6.6	4.53	1145	24.6	6.8	4.76	1740	28.0	7.1	5.07	2335	30.5	7.0	5.07	2930	33.0	6.5	4.51
555	18.6	6.5	4.45	1150	24.7	6.7	4.71	1745	28.0	7.0	5.04	2340	30.5	7.1	5.11	2935	33.0	6.5	4.48
560	18.8	6.4	4.37	1155	24.7	6.8	4.76	1750	28.1	7.0	5.01	2345	30.6	7.0	5.07	2940	33.0	6.5	4.52
565	18.9	6.4	4.33	1160	24.7	6.8	4.80	1755	27.9	7.1	5.17	2350	30.5	7.1	5.12	2945	33.1	6.5	4.42
570	19.0	6.3	4.28	1165	24.7	6.8	4.81	1760	27.8	7.3	5.34	2355	30.6	7.1	5.08	2950	33.2	6.4	4.32
575	19.1	6.3	4.31	1170	24.7	6.8	4.81	1765	27.9	7.3	5.31	2360	30.9	6.8	4.79	2955	33.3	6.3	4.27
580	19.1	6.4	4.33	1175	24.8	6.8	4.84	1770	27.9	7.2	5.28	2365	31.0	6.7	4.66	2960	33.3	6.3	4.30
590	19.1	6.6	4.52	1185	24.8	6.9	4.92	1780	27.9	7.3	5.35	2375	31.1	6.6	4.60	2970	33.3	6.4	4.36
595	19.0	6.6	4.62	1190	24.7	7.0	4.99	1785	28.1	7.2	5.21	2380	31.1	6.6	4.61	2975	33.0	6.6	4.60
600	19.0	6.7	4.72	1195	24.7	7.0	5.02	1790	28.2	7.0	5.07	2385	31.1	6.7	4.62	2980	32.9	6.8	4.74
605	19.1	6.8	4.74	1200	24.7	7.0	5.05	1795	28.2	7.0	5.07	2390	31.2	6.6	4.56	2985	32.8	6.9	4.93
610	19.1	6.8	4.76	1205	24.08	7.1	5.08	1800	28.3	7.0	5.06	2395	31.2	6.6	4.60	2990	32.9	6.8	4.82

Cable loss
Cable coaxial, GORE A2P01POL118, 2.3 m, model GORE-3, serial number 176, HL 0589
+ Cable coaxial, ANDREW PSWJ4, 6 m, model: ANDREW-6, serial number 163, 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		±0.17
22	4500	4.07		
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
RF cable 8 m, model RG-214-8m, HL 1552

No.	Frequency, MHz	Cable loss, dB	Measurement uncertainty, dB	Notes
1	0.010	0.01		
2	0.1	0.01		
3	1	0.03		
4	10	0.12		
5	20	0.23		
6	30	0.30		
7	40	0.32		
8	50	0.34		
9	60	0.39		
10	70	0.43		
11	80	0.48		
12	90	0.50		
13	100	0.55		
14	200	0.78	±0.05	
15	300	1.04		
16	400	1.16		
17	500	1.33		
18	600	1.51		
19	700	1.65		
20	800	1.77		
21	900	1.92		
22	1000	2.04		
23	1200	2.26		
24	1400	2.49		
25	1600	2.74		
26	1800	2.94		
27	2000	3.18		
28	2500	3.65		
29	2900	4.08		

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

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

Cable loss
Cable RF, 2m, model: Sucoflex 104PE, S/N 13094/4PE, HL 1566

No.	Frequency, MHz	Cable loss, dB	Tolerance, dB	Measurement uncertainty, dB
1	30	0.10	≤ 5.0	±0.12
2	50	0.13		
3	100	0.20		
4	300	0.33		
5	500	0.45		
6	800	0.60		
7	1000	0.65		
8	1500	0.91		
9	2000	1.08		
10	2500	1.19		
11	3000	1.28		
12	3500	1.49		
13	4000	1.63		
14	4500	1.63	≤ 5.0	±0.17
15	5000	1.66		
16	5500	1.88		
17	6000	1.96		
18	6500	1.93		
19	7000	2.07		
20	7500	2.37		
21	8000	2.34		
22	8500	2.64		
23	9000	2.68		
24	9500	2.64		
25	10000	2.70		
26	10500	2.84		
27	11000	2.88		
28	11500	3.19		
29	12000	3.15		
30	12500	3.20	≤ 5.0	±0.26
31	13000	3.22		
32	13500	3.47		
33	14000	3.41		
34	14500	3.59		
35	15000	3.79		
36	15500	4.24		
37	16000	4.12		
38	16500	4.46		
39	17000	4.50		
40	17500	4.49		
41	18000	4.45		

Cable loss
Cable RF, 2 m, model: Sucoflex 104PE, s/n 13095/4PE, HL 1567

No.	Frequency, MHz	Cable loss, dB
1	30	0.09
2	50	0.15
3	100	0.23
4	300	0.31
5	500	0.46
6	800	0.63
7	1000	0.67
8	1500	0.89
9	2000	1.05
10	2500	1.18
11	300	1.26
12	5300	1.51
13	4000	1.66
14	4500	1.61
15	5000	1.67
16	5500	1.91
17	6000	1.98
18	6500	1.91
19	7000	2.04
20	7500	2.36
21	8000	2.36
22	8500	2.61
23	9000	2.69
24	9500	2.62
25	10000	2.73
26	10500	2.83
27	11000	2.84
28	11500	3.22
29	12000	3.17
30	12500	3.17
31	13000	3.18
32	13500	3.49
33	14000	3.43
34	14500	3.57
35	15000	3.76
36	15500	4.20
37	16000	4.10
38	16500	4.49
39	17000	4.53
40	17500	4.46
41	18000	4.47

Cable loss
Cable 18 GHz, 4 m, green, model: SPS-1803A-4000-NPS, S/N T4657, HL 1941

Frequency, GHz	Cable loss, dB
0.03	0.39
0.05	0.49
0.1	0.68
0.2	0.95
0.3	1.30
0.5	1.58
0.7	1.84
0.9	2.08
1.1	2.28
1.3	2.56
1.5	2.91
1.7	2.95
1.9	3.17
2.1	3.22
2.3	3.25
2.5	3.39
2.7	3.51
2.9	3.67
3.1	3.81
3.3	3.92
3.5	4.05
3.7	4.14
3.9	4.30
4.1	4.44
4.3	4.55
4.5	4.68
4.7	4.75
4.9	4.84
5.1	4.86
5.3	4.89
5.5	5.00
5.7	5.05
5.9	5.19
6.1	5.28
7.7	5.58

Frequency, GHz	Cable loss, dB
7.9	5.63
8.1	5.67
8.3	5.70
8.5	5.74
8.7	5.78
8.9	5.84
9.1	5.89
9.3	5.94
9.5	6.02
9.7	6.10
9.9	6.12
10.1	6.09
10.3	6.03
10.5	6.01
10.7	6.05
10.9	6.08
11.1	6.10
11.3	6.18
11.5	6.23
11.7	6.20
11.9	6.16
12.1	6.18
12.4	6.33
13.0	6.51
13.5	6.51
14.0	6.75
14.5	6.82
15.0	6.93
15.5	7.16
16.0	7.10
16.5	7.18
17.0	7.67
17.5	7.71
18.0	7.61

Cable loss
Cable 18 GHz, 4 m, blue, model SPS-1803A-4000-NPS, serial number 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 18 GHz, 6.5 m, blue, model NPS-1803A-6500-NPS, serial number T4974, HL 1947

Frequency, GHz	Insertion loss, dB
0.03	0.30
0.05	0.38
0.10	0.53
0.20	0.74
0.30	0.91
0.40	1.05
0.50	1.18
0.60	1.29
0.70	1.40
0.80	1.50
0.90	1.59
1.00	1.68
1.10	1.77
1.20	1.86
1.30	1.94
1.40	2.01
1.50	2.08
1.60	2.16
1.70	2.22
1.80	2.29
1.90	2.36
2.00	2.42
2.10	2.48
2.20	2.54
2.30	2.60
2.40	2.66
2.50	2.71
2.60	2.77
2.70	2.83
2.80	2.89
2.90	2.95
3.10	3.06
3.30	3.17
3.50	3.28
3.70	3.39
3.90	3.51
4.10	3.62
4.30	3.76
4.50	3.87
4.70	4.01
4.90	4.10
5.10	4.21
5.30	4.31
5.50	4.43
5.70	4.56
5.90	4.71

Frequency, GHz	Insertion loss, dB
6.10	4.87
6.30	4.95
6.50	4.94
6.70	4.88
6.90	4.87
7.10	4.83
7.30	4.85
7.50	4.86
7.70	4.91
7.90	4.96
8.10	5.03
8.30	5.08
8.50	5.13
8.70	5.21
8.90	5.22
9.10	5.34
9.30	5.35
9.50	5.52
9.70	5.51
9.90	5.66
10.10	5.70
10.30	5.78
10.50	5.79
10.70	5.82
10.90	5.86
11.10	5.94
11.30	6.06
11.50	6.21
11.70	6.44
11.90	6.61
12.10	6.76
12.40	6.68
13.00	6.66
13.50	6.81
14.00	6.90
14.50	6.90
15.00	6.97
15.50	7.17
16.00	7.28
16.50	7.27
17.00	7.38
17.50	7.68
18.00	7.92

Cable loss
RF cable 8 m, model RG-214, serial number C-56, HL 2009

No.	Frequency, MHz	Cable loss, dB	Tolerance (Specification), dB	Measurement uncertainty, dB
1	1	0.10	NA	±0.12
2	10	0.14		
3	30	0.25		
4	50	0.34		
5	100	0.53		
6	300	0.99		
7	500	1.31		
8	800	1.73		
9	1000	1.98		
10	1100	2.11		
11	1200	2.21		
12	1300	2.35		
13	1400	2.46		
14	1500	2.55		
15	1600	2.68		
16	1700	2.78		
17	1800	2.88		
18	1900	2.98		
19	2000	3.09		

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

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

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

Cable loss
Cable coaxial, 40GHz, 1.5 m, Blue, Rhophase Microwave Limited, model: KPS-1503A-1500-KPS, HL 2399

Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB
0.03	0.07	6.5	1.57	15.50	2.50
0.05	0.10	6.7	1.60	16.00	2.51
0.1	0.16	6.9	1.55	16.50	2.58
0.2	0.26	7.1	1.65	17.00	2.65
0.3	0.33	7.3	1.65	17.50	2.73
0.5	0.38	7.5	1.70	18.00	2.74
0.7	0.41	7.7	1.71	18.50	2.67
0.9	0.58	7.9	1.73	19.00	2.67
1.1	0.64	8.1	1.79	19.50	2.74
1.3	0.70	8.3	1.81	20.00	2.69
1.5	0.75	8.5	1.84	20.50	2.80
1.7	0.79	8.7	1.85	21.00	2.82
1.9	0.83	8.9	1.90	21.50	2.87
2.1	0.88	9.1	1.95	22.00	2.87
2.3	0.93	9.3	1.93	22.50	2.92
2.5	0.97	9.5	1.98	23.50	3.04
2.7	1.01	9.7	1.96	24.00	3.05
2.9	1.04	9.9	2.03	24.50	3.03
3.1	1.08	10.1	1.99	25.00	3.11
3.3	1.14	10.30	2.02	25.50	3.10
3.5	1.17	10.50	2.02	26.00	3.17
3.7	1.21	10.70	2.02	26.50	3.11
3.9	1.24	10.90	2.08	27.00	3.16
4.1	1.26	11.10	2.02	28.00	3.19
4.3	1.26	11.30	2.09	29.00	3.19
4.5	1.29	11.50	2.05	30.00	3.30
4.7	1.34	11.70	2.11	31.00	3.31
4.9	1.34	11.90	2.11	32.00	3.35
5.1	1.40	12.10	2.12	33.00	3.46
5.3	1.43	12.40	2.17	34.00	3.45
5.5	1.45	13.00	2.29	35.00	3.49
5.7	1.47	13.50	2.31	36.00	3.54
5.9	1.40	14.00	2.43	37.00	3.62
6.1	1.53	14.50	2.43	39.00	3.69
6.3	1.55	15.00	2.46	40.00	3.75

Cable loss
Cable coaxial, Gore, 18 GHz, 1.1 m, SMA - SMA, model Right Angle, HL 2868

Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB
10	0.06	5750	0.82	12000	1.27
30	0.06	6000	0.84	12250	1.28
100	0.09	6250	0.85	12500	1.30
250	0.17	6500	0.89	12750	1.32
500	0.22	6750	0.90	13000	1.36
750	0.27	7000	0.96	13250	1.35
1000	0.30	7250	0.95	13500	1.36
1250	0.35	7500	0.97	13750	1.35
1500	0.37	7750	0.98	14000	1.39
1750	0.43	8000	0.98	14250	1.40
2000	0.46	8250	1.01	14500	1.36
2250	0.49	8500	1.03	14750	1.43
2500	0.52	8750	1.03	15000	1.35
2750	0.56	9000	1.06	15250	1.42
3000	0.59	9250	1.09	15500	1.34
3250	0.61	9500	1.09	15750	1.48
3500	0.64	9750	1.12	16000	1.52
3750	0.66	10000	1.14	16250	1.55
4000	0.67	10250	1.15	16500	1.61
4250	0.71	10500	1.17	16750	1.58
4500	0.73	10750	1.18	17000	1.71
4750	0.74	11000	1.20	17250	1.68
5000	0.75	11250	1.21	17500	1.76
5250	0.78	11500	1.23	17750	1.74
5500	0.80	11750	1.24	18000	1.76