HERMON LABORATORIES

839.01
Electrical

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TEST REPORT

ACCORDING TO: FCC part 27 and part 15 subpart B

FOR:

Airspan Networks (Israel) Ltd.

Base station

Model: MicroMAX 1.4G TDD

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1 Applicant information

Client name:	Airspan Networks (Israel) Ltd.
Address:	1, Hamelacha street, Lod 71293, Israel
Telephone:	+972 3977 7444
Fax:	+972 3977 7400
E-mail:	zlevi@airspan.com
Contact name:	Mr. Zion Levi

2 Equipment under test attributes

Product name:	Base station
Product type:	P/N 90803041
Model(s):	MicroMAX 1.4G TDD
Serial number:	922F7610159A
Hardware version:	B1
Software release:	7.5.8.0
Receipt date	2/8/2009

3 Manufacturer information

Manufacturer name:	Airspan Networks (Israel) Ltd.
Address:	1, Hamelacha street, Lod 71293, Israel
Telephone:	+972 3977 7444
Fax:	+972 3977 7400
E-Mail:	zlevi@airspan.com
Contact name:	Mr. Zion Levi

4 Test details

Project ID:	19440
Location:	Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started:	2/8/2009
Test completed:	2/16/2009
Test specification(s):	FCC part 27; part 15 subpart B

5 Tests summary

Test	Status
Transmitter characteristics	
Section 27.50(e)(1), Peak output power at RF antenna connector	Pass
Section 2.1091, 27.52, RF safety	NA, fixed equipment
Section 27.53(j), Spurious emissions at RF antenna connector	Pass
Section 27.53(j), Band edge emissions at RF antenna connector	Pass
Section 27.53(j), Radiated spurious emissions	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, Conducted emission at receiver antenna port	Pass

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

This test report replaces the previously issued test report identified by Doc ID:AIRRAD_FCC.19440.

	Name and Title	Date	Signature
Tested by:	Mr. L. Markel, test engineer	February 16, 2009	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	March 1, 2009	
Approved by:	Mr. M. Nikishin, EMC and Radio group manager	March 10, 2009	

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6 EUT description

6.1 General information

The EUT, base station radio, MicroMAX 1400 MHz TDD, is a part of a WiMAX broadband fixed cellular wireless access system. The system provides a radio link between an end-user (a subscriber) and a network to give high-speed data access. The MicroMAX's transceiver/receiver (up to 64 QAM modulation, data rate up to 18 Mbps) uses OFDM and operates in TDD duplexing mode, equipped with a 10 dBi internal or 18 dBi external antenna.

6.2 Ports and lines

Port type	Port description	Connected from	Connected to	Qty.	Cable type	Cable length	Indoor / outdoor
Power	DC Power	EUT	SDA (+ DATA)	1	UTP	10	Outdoor
Signal	RS-232	EUT	Laptop	1	UTP	0.2	Outdoor
RF	Antenna	EUT	50 Ohm Termination	1	Shielded	NA	NA

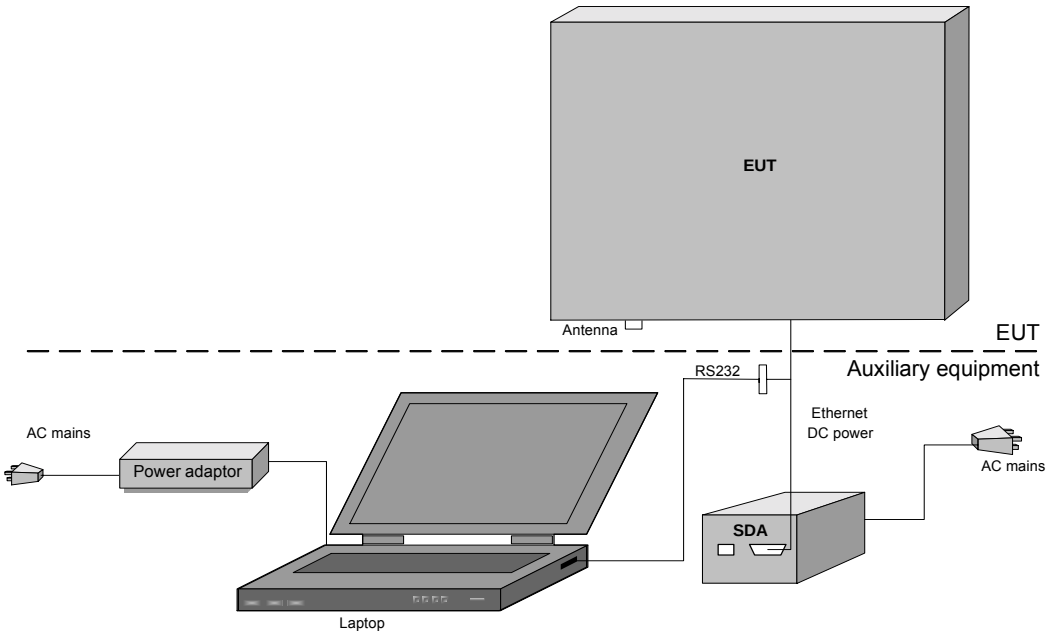
6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
Laptop	IBM	X31	99-TXWYC
Laptop adaptor	IBM	NA	11S92P1014Z1ZD2N74T2LS
SDA	Airspan	SDA-4S/VL type 2	753D6A0086

6.4 Changes made in the EUT

No changes were implemented in the EUT.

6.5 Test configuration



6.6 Transmitter characteristics

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

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

Assigned frequency range	1432 - 1435 MHz
Operating frequency	1433.5 MHz
RF channel spacing	1.75, 2.5 MHz
Maximum rated output power	At transmitter 50 Ω RF output connector: 27.28 dBm

Is transmitter output power variable?				
	No			
V	Yes		continuous variable	
		V	stepped variable with stepsize	0.5 dB
		minimum RF power		-30 dBm
		maximum RF power		27.28 dBm

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

Antenna/s technical characteristics

Type	Manufacturer	Model number	Gain (maximum)
Internal	MARS Antennas	MA-WC15-AS10	10 dBi
External	Foshan Sanshui Shing Road Antenna Co., Ltd.	TDJ-SA1500-18-65	18 dBi

Transmitter 99% power bandwidth	Transmitter aggregate data rate/s, MBps	Type of modulation
1.75 MHz	0.719	BPSK
	1.0475	QPSK
	3.14125	16QAM
	6.4715	64QAM
2.5 MHz	1.0475	BPSK
	2.095	QPSK
	6.2825	16QAM
	9.425	64QAM

Type of multiplexing	OFDM
Modulating test signal (baseband)	PRBS
Maximum transmitter duty cycle in normal use	90%

Transmitter power source					
		Nominal rated voltage		Battery type	
V	DC	**Nominal rated voltage**	48 VDC via SDA		
	AC mains	**Nominal rated voltage**	120 V	Frequency	60 Hz

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

Test specification:	Section 27.50(e)(1), Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 1:33:05 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

7 Transmitter tests according to 47CFR part 27 requirements

7.1 Peak output power test

7.1.1 General

This test was performed to measure the peak output power at RF antenna connector. Specification test limits are given in Table 7.1.1.

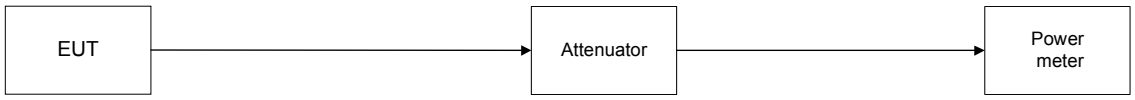
Table 7.1.1 Peak output power limits

Assigned frequency range, MHz	Maximum peak output power	
	W	dBm
1432.0 – 1435.0	2000	63.0

7.1.2 Test procedure

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

Figure 7.1.1 Output power test setup



Test specification:	**Section 27.50(e)(1), Peak output power**		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	2/16/2009 1:33:05 PM		
Temperature: 23ºC	**Air Pressure:** 1019 hPa	**Relative Humidity:** 43%	**Power Supply:** 120 V AC
Remarks:			

Table 7.1.2 Output power test results

OPERATING FREQUENCY RANGE: 1432.0 – 1435.0 MHz
DETECTOR USED: Power meter
MODULATING SIGNAL: PRBS
BIT RATE: 0.719 (BPSK), 6.4715 (64QAM) Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
EBW: 1.75 MHz
ANTENNA GAIN: 18 dBi
POWER SETTINGS: 2100
DUTY CYCLE: 100 %

Carrier frequency, MHz	Power meter reading, dBm	External attenuation, dB	Cable loss, dB	RF output power*, EIRP dBm	Limit, EIRP, dBm	Margin, dB	Verdict
BPSK							
1433.5	27.02	Included	Included	45.02	63.0	-17.98	Pass
64QAM							
1433.5	27.28	Included	Included	45.28	63.0	-17.72	Pass

OPERATING FREQUENCY RANGE: 1432.0 – 1435.0 MHz
DETECTOR USED: Power meter
MODULATING SIGNAL: PRBS
BIT RATE: 1.0475 (BPSK), 9.425 (64QAM) Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
EBW: 2.5 MHz
ANTENNA GAIN: 18 dBi
POWER SETTINGS: 2100
DUTY CYCLE: 100 %

Carrier frequency, MHz	Power meter reading, dBm	External attenuation, dB	Cable loss, dB	RF output power*, EIRP dBm	Limit, EIRP, dBm	Margin, dB	Verdict
BPSK 2300							
1433.5	26.50	Included	Included	44.50	63.0	-18.50	Pass
64QAM							
1433.5	26.43	Included	Included	44.43	63.0	-18.57	Pass

* - RF output power, EIRP (dBm) = Power meter reading, dBm + Antenna gain, dBi

Reference numbers of test equipment used

HL 3301	HL 3302	HL 3435	HL 3442				

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 & Time:	2/16/2009 1:35:07 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

7.2 Occupied bandwidth test

7.2.1 General

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

Table 7.2.1 Occupied bandwidth limits

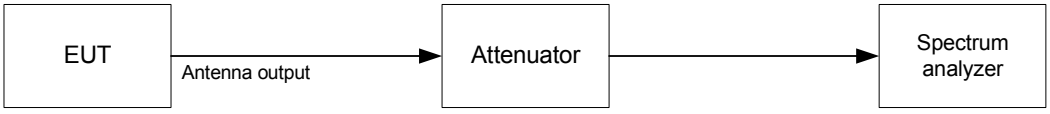
Assigned frequency, MHz	Modulation envelope reference points*, dBc	Maximum allowed bandwidth, kHz
1432.0 – 1435.0	26	NA

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

7.2.2 Test procedure

7.2.2.1 The EUT was set up as shown in Figure 7.2.1, energized and its proper operation was checked.
7.2.2.2 The EUT was set to transmit the unmodulated carrier and the reference peak power level was measured.
7.2.2.3 The EUT was set to transmit the normally modulated carrier.
7.2.2.4 The transmitter occupied bandwidth was measured with spectrum analyzer as a frequency delta between the reference points on modulation envelope and provided in Table 7.2.2 and the associated plots.

Figure 7.2.1 Occupied bandwidth test setup



Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 1:35:07 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Table 7.2.2 Occupied bandwidth test results

DETECTOR USED: Peak hold
RESOLUTION BANDWIDTH: 10 kHz
VIDEO BANDWIDTH: 30 kHz
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
MODULATING SIGNAL: PRBS
BIT RATE: 0.719 Mbps (BPSK)
6.4715 Mbps (64QAM)
EBW: 1.75 MHz

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
BPSK				
1433.5	1627.5	NA	NA	Pass
64QAM				
1433.5	1627.5	NA	NA	Pass

DETECTOR USED: Peak hold
RESOLUTION BANDWIDTH: 30 kHz
VIDEO BANDWIDTH: 100 kHz
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
MODULATING SIGNAL: PRBS
BIT RATE: 1.0475 Mbps (BPSK)
9.425 Mbps (64QAM)
EBW: 2.5 MHz

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
BPSK				
1433.5	2400.0	NA	NA	Pass
64QAM				
1433.5	2470.0	NA	NA	Pass

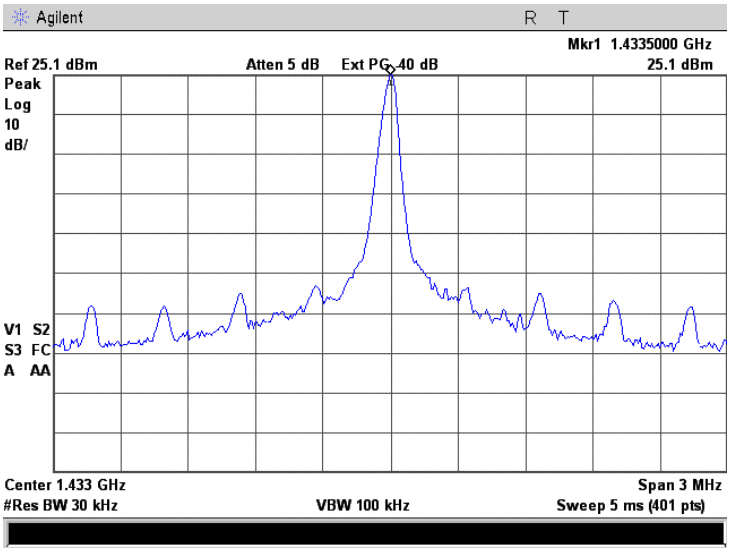
Reference numbers of test equipment used

HL 2867	HL 2909	HL 3439	HL 3442				

Full description is given in Appendix A.

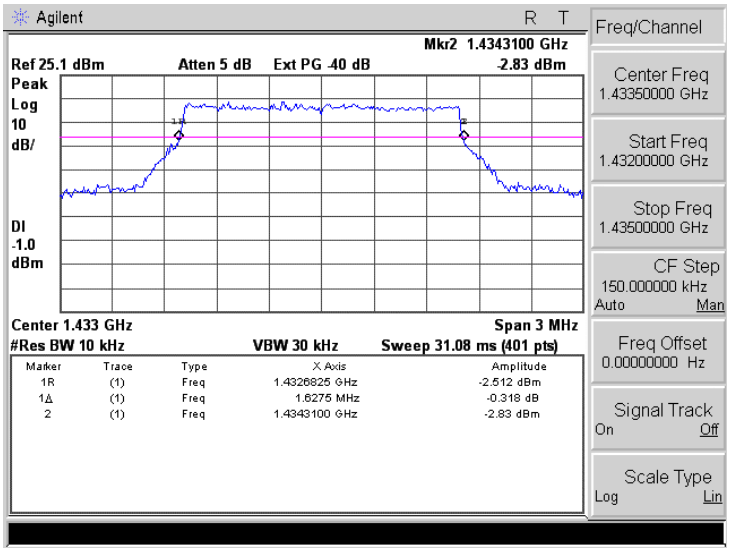
Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 1:35:07 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.2.1 Occupied bandwidth test result reference level at 1.75 MHz EBW

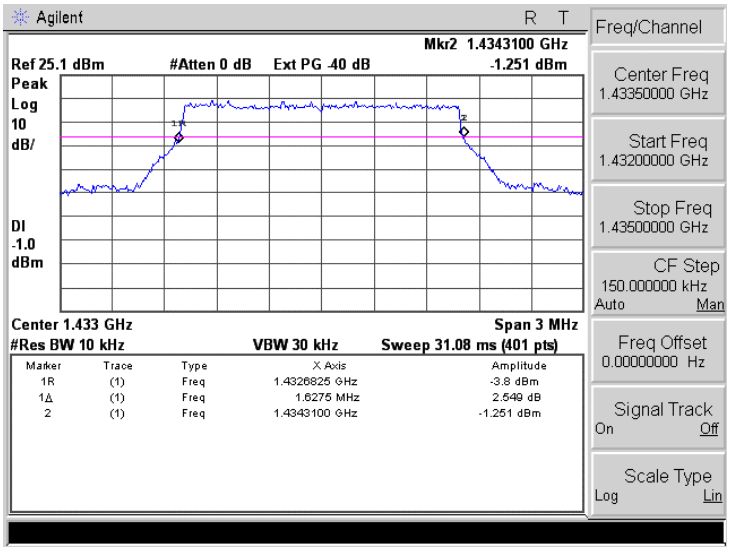


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 1:35:07 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.2.2 Occupied bandwidth test result at BPSK modulation

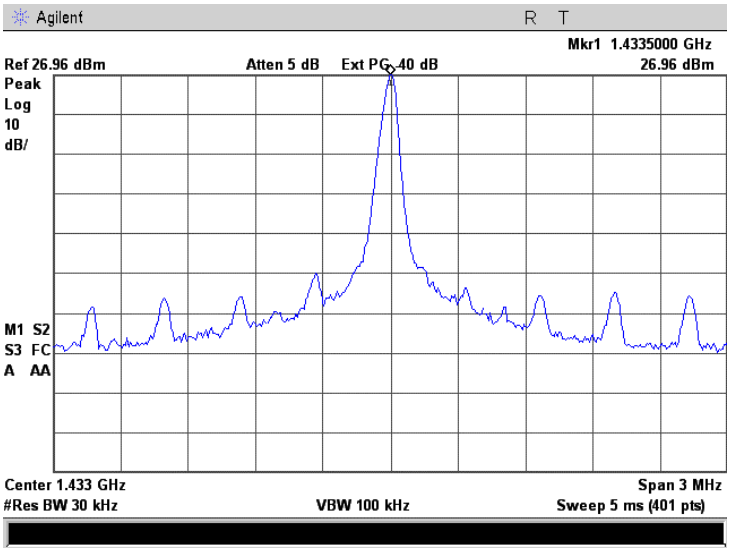


Plot 7.2.3 Occupied bandwidth test result at 64QAM modulation



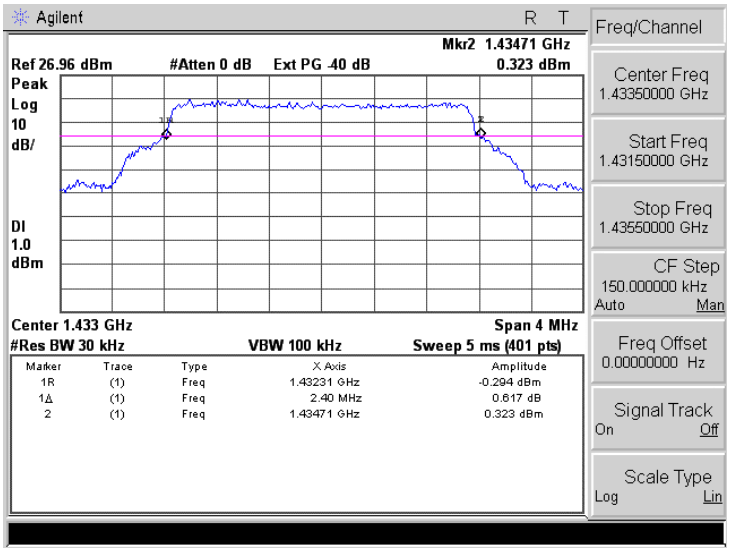
Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 1:35:07 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.2.4 Occupied bandwidth test result reference level at 2. 5 MHz EBW

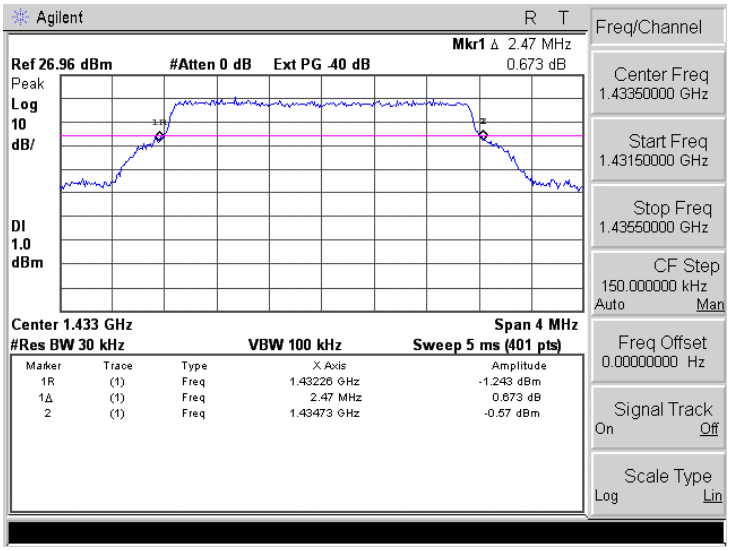


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 1:35:07 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.2.5 Occupied bandwidth test result at BPSK modulation



Plot 7.2.6 Occupied bandwidth test result at 64QAM modulation



Test specification:	Section 27.53(j), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 2:58:56 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

7.3 Radiated spurious emission measurements

7.3.1 General

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

Table 7.3.1 Radiated spurious emission test limits

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

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

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

7.3.2.1 The EUT was set up as shown in Figure 7.3.1, energized and the performance check was conducted.
7.3.2.2 The specified frequency range was investigated with antenna connected to spectrum analyzer. To find maximum radiation the turntable was rotated 360^0 and the measuring antenna was rotated around its vertical axis.
7.3.2.3 The worst test results (the lowest margins) were recorded in Table 7.3.2 and shown in the associated plots.

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

7.3.3.1 The EUT was set up as shown in Figure 7.3.2, energized and the performance check was conducted.
7.3.3.2 The specified frequency range was investigated with antenna connected to spectrum analyzer. 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.
7.3.3.3 The worst test results (the lowest margins) were recorded in Table 7.3.2 and shown in the associated plots.

7.3.4 Test procedure for substitution ERP measurements of spurious

7.3.4.1 The test equipment was set up as shown in Figure 7.3.3 and energized.
7.3.4.2 RF signal generator was set to the frequency of investigated spurious emission and the RF output level was preliminary adjusted to produce the same field strength as it was measured from the EUT.
7.3.4.3 The test antenna height was swept from 1 to 4 m to find maximum emission from substitution antenna and RF signal generator output was fine adjusted to produce the same field strength as it was measured from the EUT.
7.3.4.4 The above procedure was performed in both, horizontal and vertical, polarizations of the test and substitution antennas.
7.3.4.5 The ERP of spurious emissions was calculated as a sum of signal generator output power in dBm and antenna gain in dBd reduced by cable loss in dB.
7.3.4.6 The above procedure was repeated at the rest of investigated frequencies.
7.3.4.7 The worst test results (the lowest margins) were recorded in Table 7.3.3 and shown in the associated plots.

Test specification:	Section 27.53(j), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 2:58:56 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Figure 7.3.1 Setup for spurious emission field strength measurements in 9 kHz to 30 MHz band

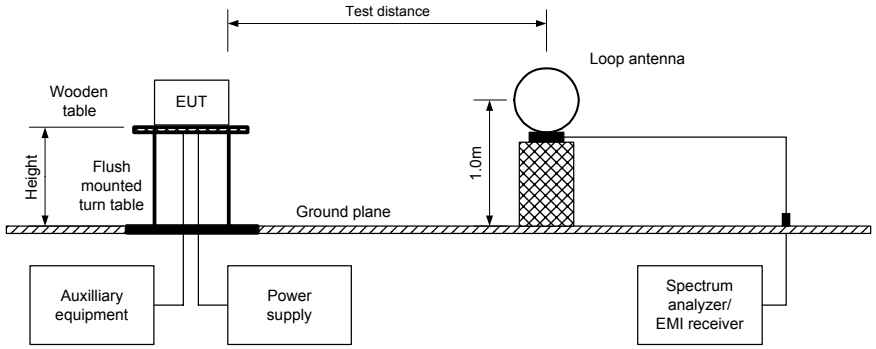
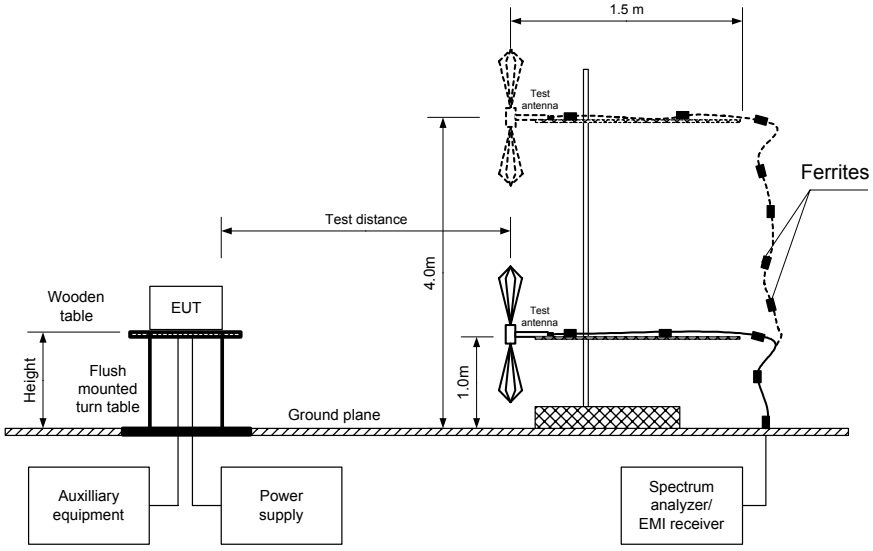
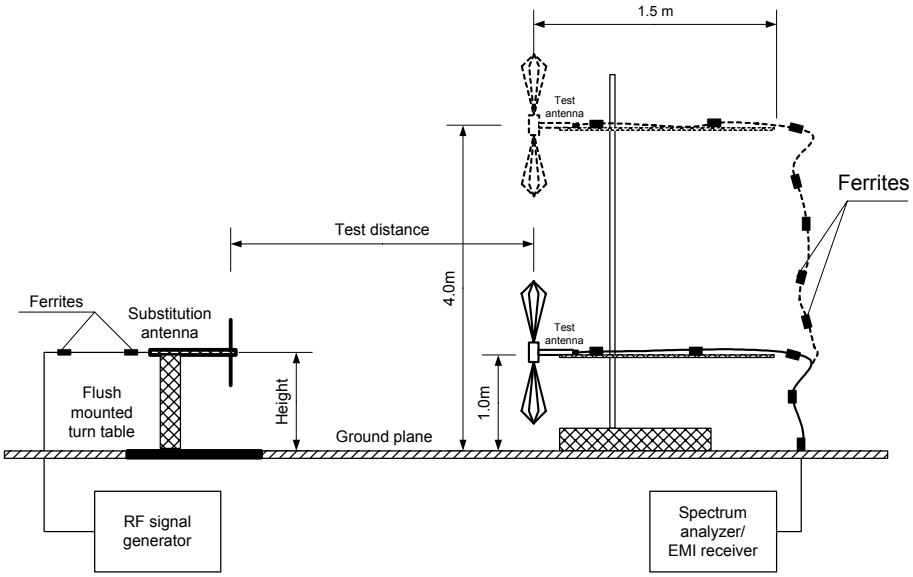


Figure 7.3.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	Section 27.53(j), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 2:58:56 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Figure 7.3.3 Setup for substitution ERP measurements of spurious



Test specification:	**Section 27.53(j), Radiated spurious emissions**		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	2/16/2009 2:58:56 PM		
Temperature: 23ºC	**Air Pressure:** 1019 hPa	**Relative Humidity:** 43%	**Power Supply:** 120 V AC
Remarks:			

Table 7.3.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE: 1432.0 – 1435.0 MHz
TEST DISTANCE: 3 m
TEST SITE: OATS
EUT HEIGHT: 0.8 m
INVESTIGATED FREQUENCY RANGE: 0.009 – 14500 MHz
DETECTOR USED: Power Average (100 sweeps)
VIDEO BANDWIDTH: > Resolution bandwidth
TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
Biconilog (30 MHz – 1000 MHz)
Double ridged guide (above 1000 MHz)
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 6.4715 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
EBW: 1.75 MHz
DUTY CYCLE: 100 %

Frequency, MHz	Field strength, dB(µV/m)	Limit, dB(µV/m)	Margin, dB*	RBW, kHz	Antenna polarization	Antenna height, m	Turn-table position**, degrees
Carrier frequency 1433.5 MHz							
2866.575	78.07	84.40	-6.33	1000	H	1.2	030
4300.125	68.13	84.40	-16.27	1000	H	1.2	045
5733.925	57.78	84.40	-26.62	1000	V	1.1	070
7168.000	72.27	84.40	-12.13	1000	V	1.1	060

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

Table 7.3.3 Substitution ERP of spurious test results

ASSIGNED FREQUENCY RANGE: 1432.0 – 1435.0 MHz
TEST SITE: OATS
TEST DISTANCE: 3 m
SUBSTITUTION ANTENNA HEIGHT: 0.8 m
DETECTOR USED: Power Average (100 sweeps)
VIDEO BANDWIDTH: > Resolution bandwidth
SUBSTITUTION ANTENNA TYPE: Tunable dipole (30 MHz – 1000 MHz)
Double ridged guide (above 1000 MHz)

Frequency MHz	Field strength, dB(µV/m)	RBW, kHz	Antenna polarization	RF generator output, dBm	Ant gain dBd	Cable loss dB	ERP, dBm	Limit, dBm	Margin, dB*	Verdict
Carrier frequency 1433.5 MHz										
2866.575	78.07	1000	H	-30.67	7.30	1.22	-24.59	-13	-9.47	Pass
4300.125	68.13	1000	H	-36.72	8.06	1.53	-30.22	-13	-17.22	Pass
5733.925	57.78	1000	V	-47.48	8.46	1.78	-41.83	-13	-27.83	Pass
7168.000	72.27	1000	V	-36.46	8.60	1.95	-29.84	-13	-16.84	Pass

*****- Margin = Spurious emission – specification limit.
NOTE: Radiated spurious emissions were tested with EUT configured to transmit at 1.75 MHz EBW and 64QAM modulation assuming that this configuration produces maximum RF power density.

Reference numbers of test equipment used

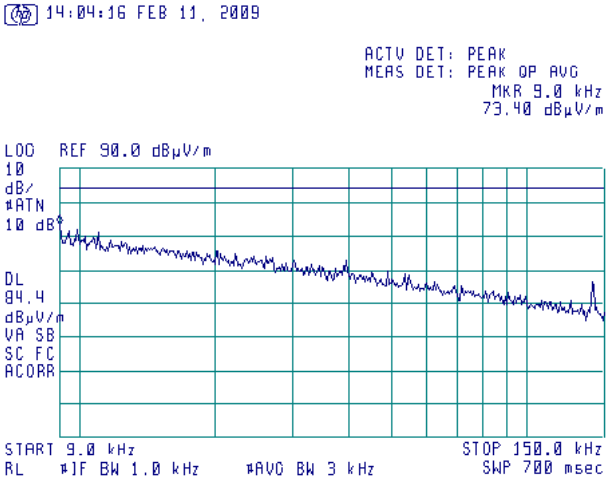
HL 0446	HL 0521	HL 0604	HL 1984	HL 2432	HL 2780	HL 2387	HL 2883
HL 2785	HL 3122	HL 3123	HL 3234	HL 3342	HL 3344	HL 3532	HL 3534

Full description is given in Appendix A.

Test specification:	Section 27.53(j), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 2:58:56 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

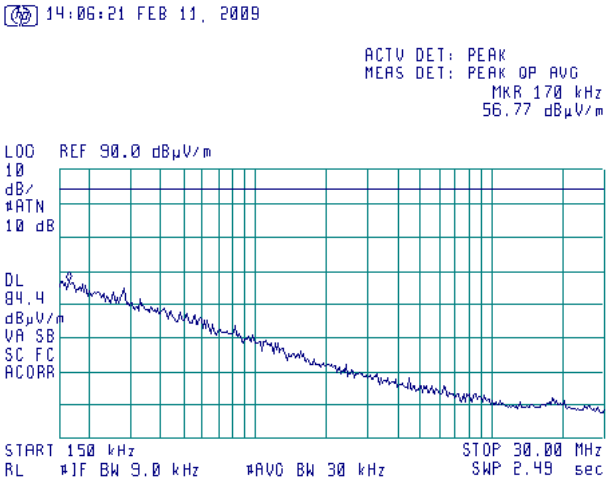
Plot 7.3.1 Radiated emission measurements in 9 - 150 kHz range

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



Plot 7.3.2 Radiated emission measurements in 0.15 - 30 MHz range

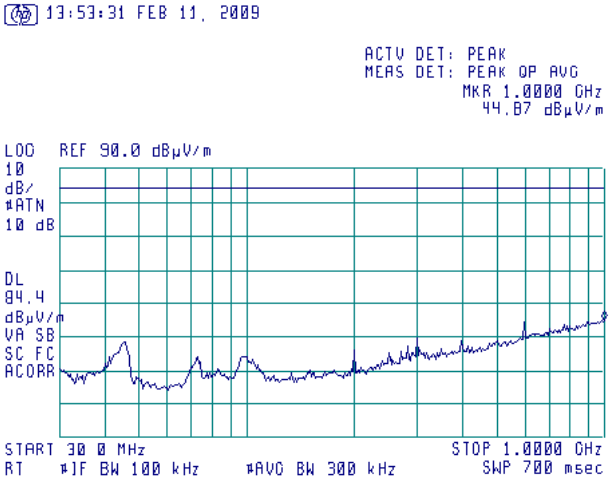
TEST SITE: Semi anechoic chamber
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:	Section 27.53(j), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 2:58:56 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

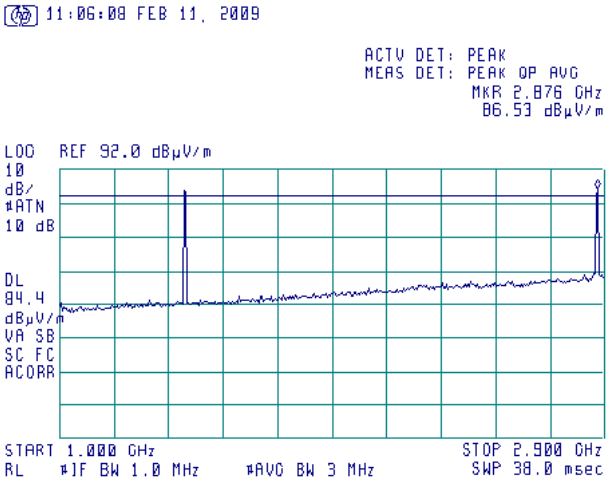
Plot 7.3.3 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.3.4 Radiated emission measurements in 1000 – 2900 MHz range

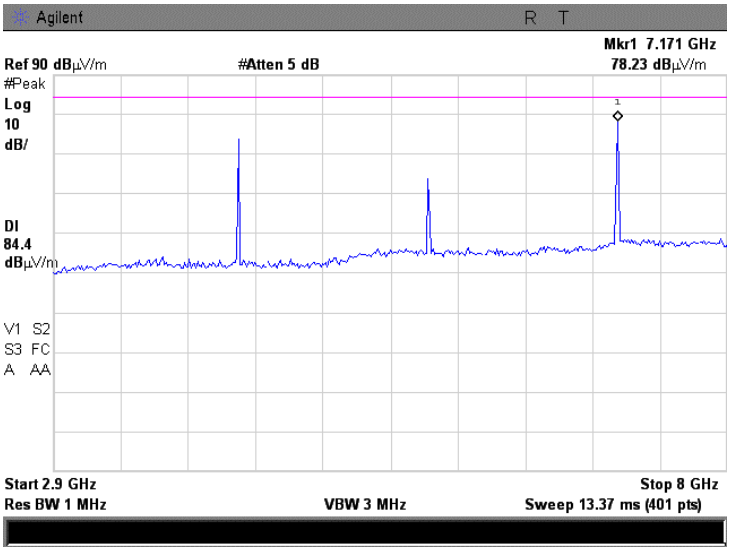
TEST SITE: Semi anechoic chamber
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:	Section 27.53(j), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 2:58:56 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

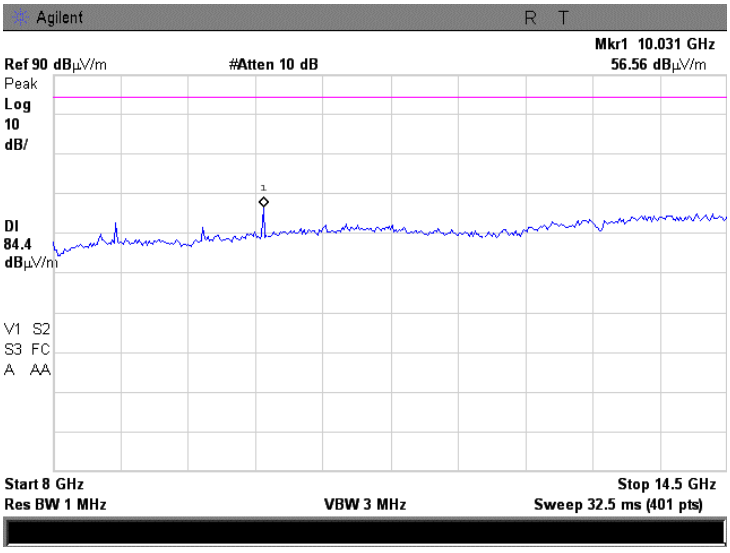
Plot 7.3.5 Radiated emission measurements in 2900 – 8000 MHz range

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



Plot 7.3.6 Radiated emission measurements in 8000 – 14500 MHz range

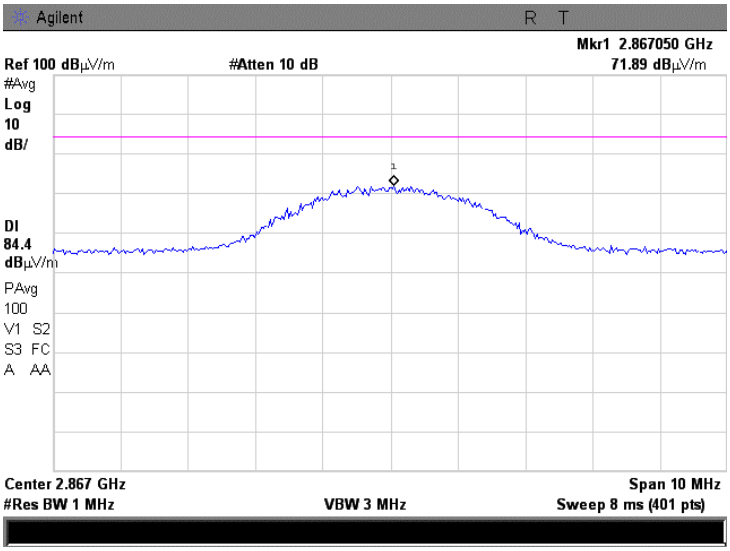
TEST SITE: Semi anechoic chamber
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:	Section 27.53(j), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 2:58:56 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

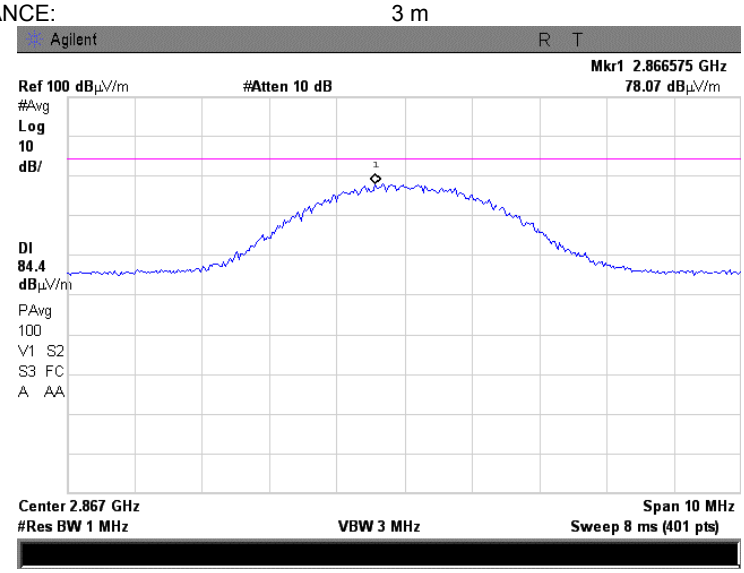
Plot 7.3.7 Radiated emission measurements at the 2nd harmonic

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



Plot 7.3.8 Radiated emission measurements at the 2nd harmonic

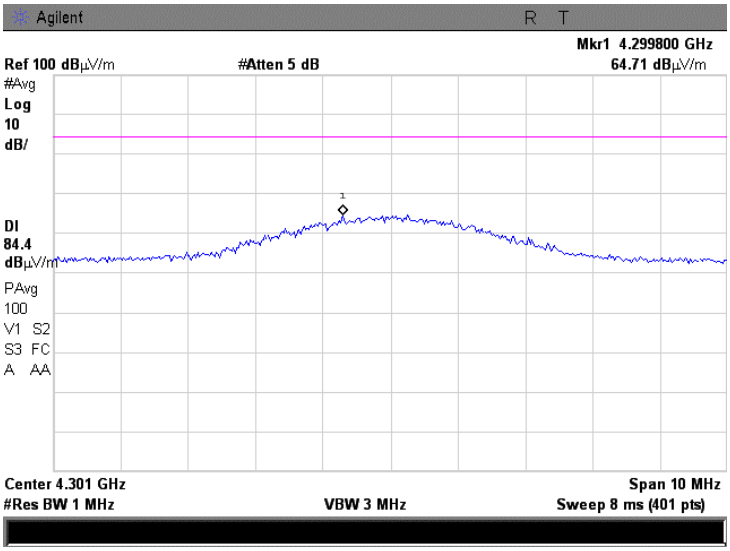
TEST SITE: OATS
ANTENNA POLARIZATION: Horizontal
TEST DISTANCE: 3 m



Test specification:	Section 27.53(j), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 2:58:56 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

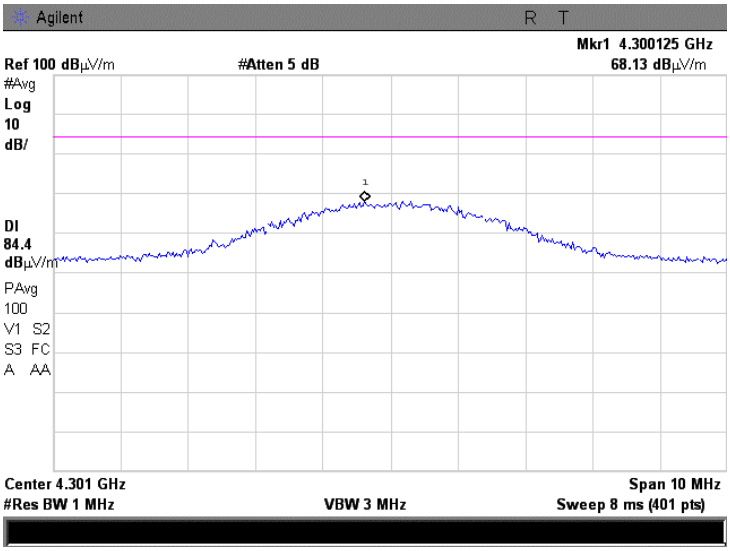
Plot 7.3.9 Radiated emission measurements at the 3rd harmonic

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



Plot 7.3.10 Radiated emission measurements at the 3rd harmonic

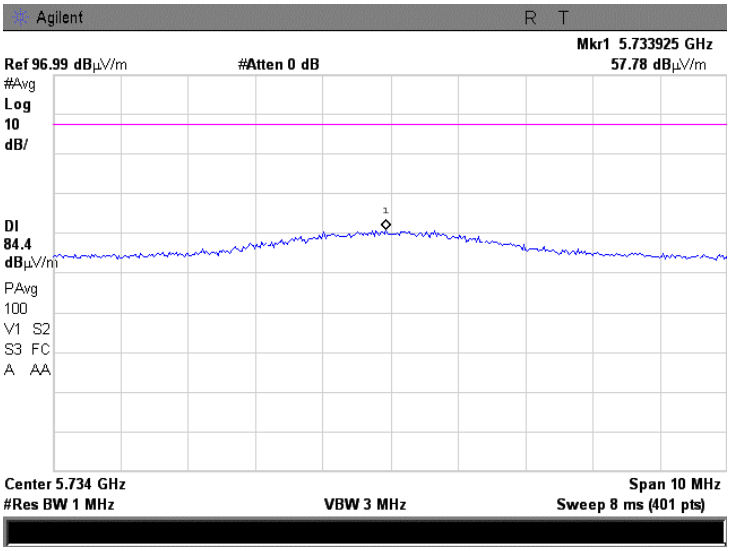
TEST SITE: OATS
ANTENNA POLARIZATION: Horizontal
TEST DISTANCE: 3 m



Test specification:	Section 27.53(j), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 2:58:56 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

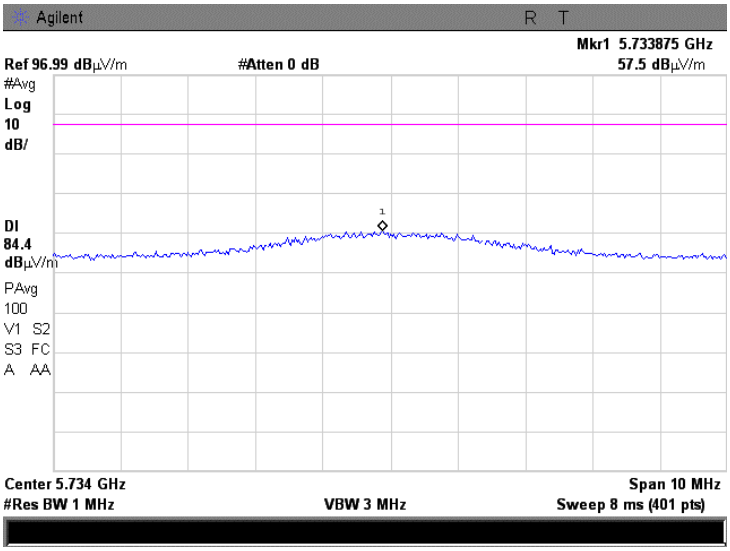
Plot 7.3.11 Radiated emission measurements at the 4th harmonic

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



Plot 7.3.12 Radiated emission measurements at the 4th harmonic

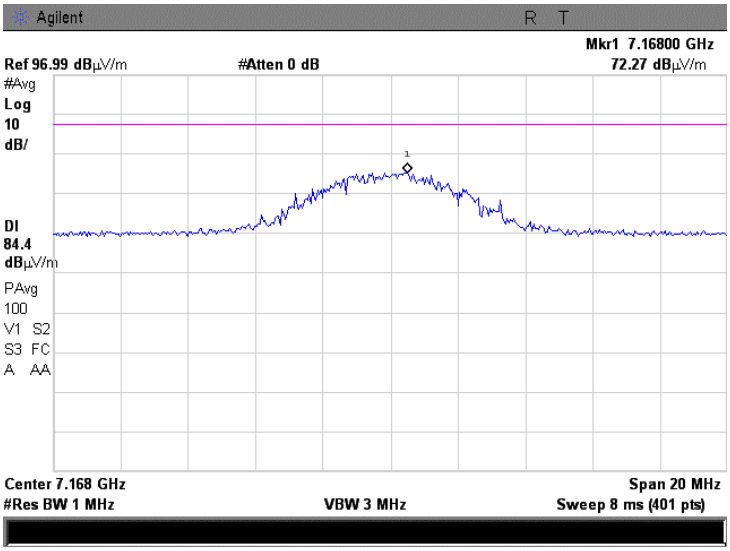
TEST SITE: OATS
ANTENNA POLARIZATION: Horizontal
TEST DISTANCE: 3 m



Test specification:	Section 27.53(j), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 2:58:56 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

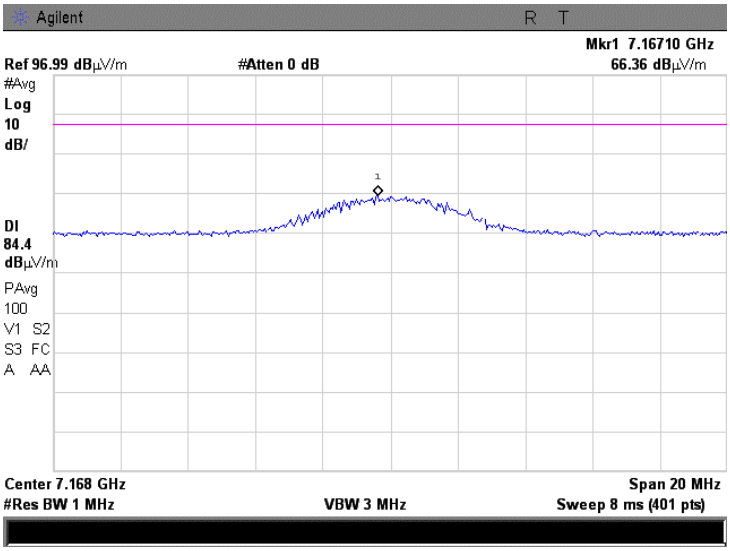
Plot 7.3.13 Radiated emission measurements at the 5th harmonic

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



Plot 7.3.14 Radiated emission measurements at the 5th harmonic

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



Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 1:43:30 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

7.4 Spurious emissions at RF antenna connector test

7.4.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 7.4.1.

Table 7.4.1 Spurious emission limits

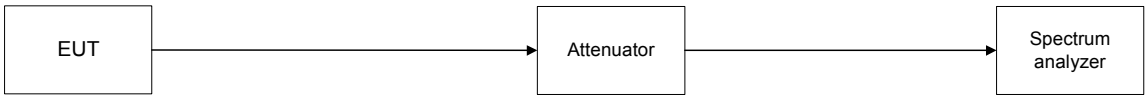
Frequency, MHz	Attenuation below carrier, dBc	ERP of spurious, dBm
0.009 – 10th harmonic*	43+10logP**	-13.0

* - spurious emission limits do not apply to the in band emission within ± 250 % of the authorized bandwidth from the carrier; investigated in course of emission mask testing
** - P is transmitter output power in Watts

7.4.2 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 spurious emission was measured with spectrum analyzer as provided in Table 7.4.2, Table 7.4.3 and the associated plots.

Figure 7.4.1 Spurious emission test setup



Test specification:	**Section 27.53(j), Conducted spurious emissions**		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	2/16/2009 1:43:30 PM		
Temperature: 23ºC	**Air Pressure:** 1019 hPa	**Relative Humidity:** 43%	**Power Supply:** 120 V AC
Remarks:			

Table 7.4.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 1432.0 – 1435.0 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 – 14500 MHz
DETECTOR USED: Power Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATING SIGNAL: PRBS
DUTY CYCLE: 100%
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
TRANSMITTER OUTPUT POWER: 27.28 dBm @ 1.75 MHz EBW
26.50 dBm @ 2.5 MHz EBW

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission**, dBm	Limit, dBm	Margin, dB*	Verdict
BPSK 1.75 MHz EBW								
1430.000	-35.76	Included	Included	300	-30.53	-13.0	-17.53	Pass
1437.000	-36.82	Included	Included	300	-31.59	-13.0	-18.59	Pass
BPSK 2.5 MHz EBW								
1429.875	-32.27	Included	Included	300	-32.27	-13.0	-14.04	Pass
1437.080	-34.13	Included	Included	300	-34.13	-13.0	-15.90	Pass
64QAM 1.75 MHz EBW								
1429.950	-35.54	Included	Included	300	-30.31	-13.0	-17.31	Pass
1437.040	-37.22	Included	Included	300	-31.99	-13.0	-18.99	Pass
64QAM 2.5 MHz EBW								
1429.975	-32.27	Included	Included	300	-27.04	-13.0	-14.04	Pass
1437.000	-34.03	Included	Included	300	-28.80	-13.0	-15.80	Pass

*****- Margin = Spurious emission – specification limit.
** - Spurious emission, dBm = SA reading, dBm + Integration factor, dB***
*** - Integration factor, dB = 10* Log (1000 kHz/300 kHz) = 5.23 dB

Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 1:43:30 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Table 7.4.3 Spurious emission test results in 1430.0 – 1437.0 MHz range

ASSIGNED FREQUENCY RANGE: 1432.0 – 1435.0 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 – 14500 MHz
RBW: 1% of the EBW
DETECTOR USED: Power Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATING SIGNAL: PRBS
DUTY CYCLE: 100%
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	SA reading, dBc	Attenuator, dB	Cable loss, dB	RBW, kHz	Attenuation below carrier, dBc	Limit, dBc***	Margin, dB***	Verdict
BPSK 1.75 MHz EBW 25.16 dBm total power*								
1430-1431	51.66	Included	Included	30	51.66	38.16	13.50	Pass
1431-1432	43.60	Included	Included	30	43.60	38.16	5.44	Pass
1435-1436	43.99	Included	Included	30	43.99	38.16	5.83	Pass
1436-1437	-53.42	Included	Included	30	53.42	38.16	15.26	Pass
BPSK 2.5 MHz EBW 25.00 dBm total power*								
1430-1431	46.78	Included	Included	30	46.78	38.0	8.78	Pass
1431-1432	39.44	Included	Included	30	39.44	38.0	1.44	Pass
1435-1436	39.72	Included	Included	30	39.72	38.0	1.72	Pass
1436-1437	47.80	Included	Included	30	47.80	38.0	9.80	Pass
64QAM 1.75 MHz EBW 25.27 dBm total power*								
1430-1431	51.90	Included	Included	30	51.90	38.27	13.63	Pass
1431-1432	44.10	Included	Included	30	44.10	38.27	5.83	Pass
1435-1436	43.79	Included	Included	30	43.79	38.27	5.52	Pass
1436-1437	52.73	Included	Included	30	52.73	38.27	14.46	Pass
64QAM 2.5 MHz EBW 24.92 dBm total power*								
1430-1431	46.78	Included	Included	30	46.78	37.92	8.86	Pass
1431-1432	39.14	Included	Included	30	39.14	37.92	1.22	Pass
1435-1436	39.76	Included	Included	30	39.76	37.92	1.84	Pass
1436-1437	47.11	Included	Included	30	47.11	37.92	9.19	Pass

* - Total power – measured with the same settings as spurious emissions
** -The limit was calculated as 43 dB+10 log(total power*)
***- Margin = Spurious emission – specification limit.

NOTE: Conducted spurious emissions were tested with EUT configured to transmit at 1.75 MHz EBW and 64QAM modulation assuming that this configuration produces the maximum RF power density. However in the 1420 – 1445 MHz range both 1.75 MHz and 2.5 MHz EBW configurations under maximum and minimum bit rates were tested.

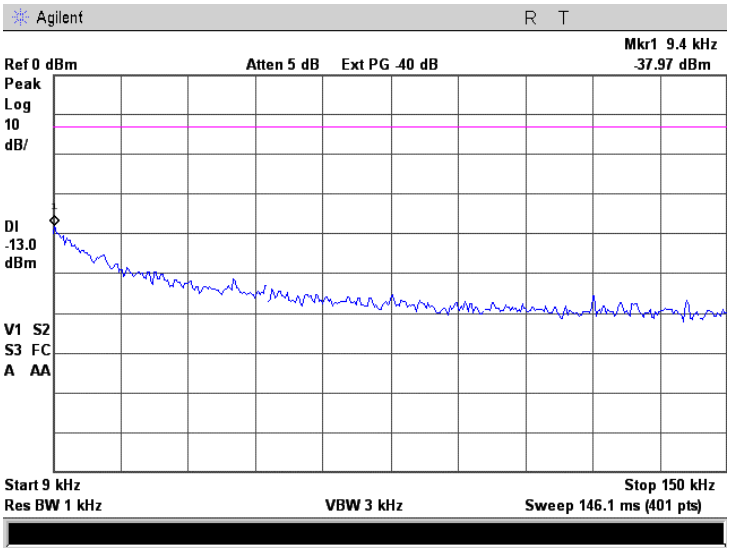
Reference numbers of test equipment used

HL 2867	HL 2909	HL 3439	HL 3442				

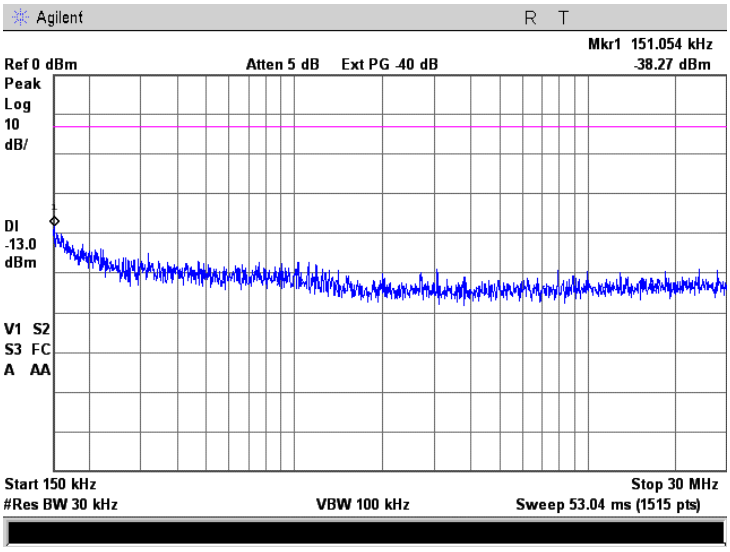
Full description is given in Appendix A.

Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 1:43:30 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.1 Spurious emission measurements in 9 - 150 kHz range

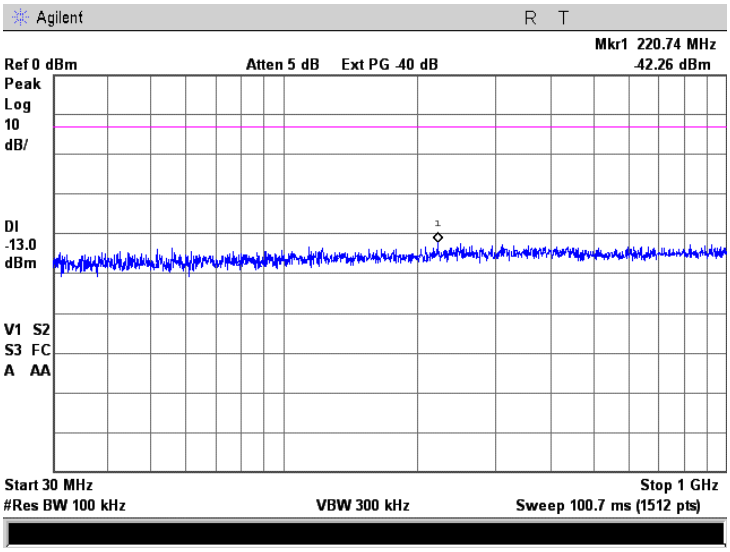


Plot 7.4.2 Spurious emission measurements in 0.15 - 30.0 MHz range

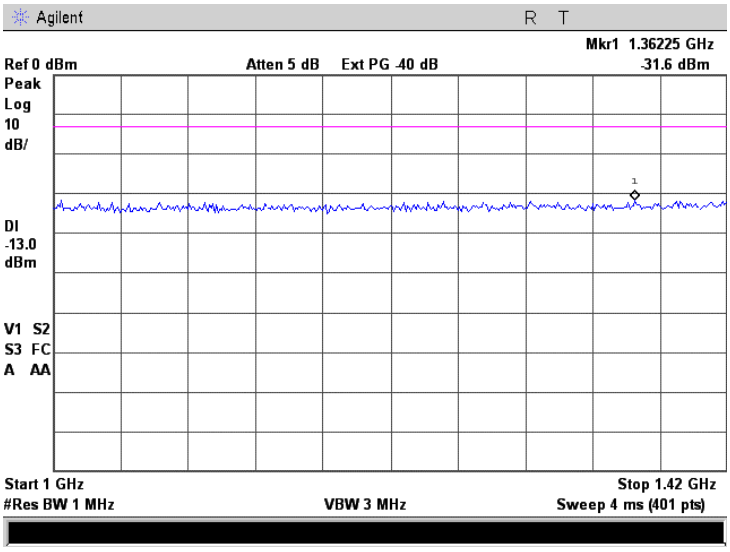


Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 1:43:30 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.3 Spurious emission measurements in 30.0 - 1000 MHz range

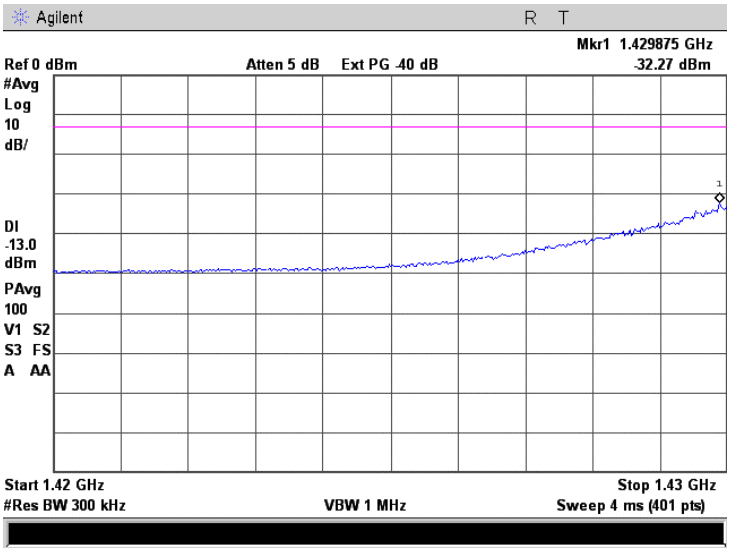


Plot 7.4.4 Spurious emission measurements in 1000 – 1420.0 MHz range

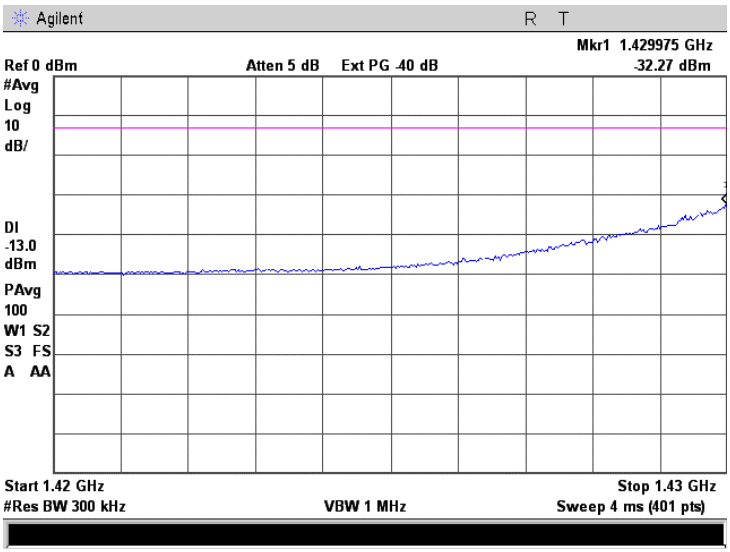


Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 1:43:30 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.5 Spurious emission measurements in 1420 - 1430 MHz range, 2.5 MHz EBW, BPSK

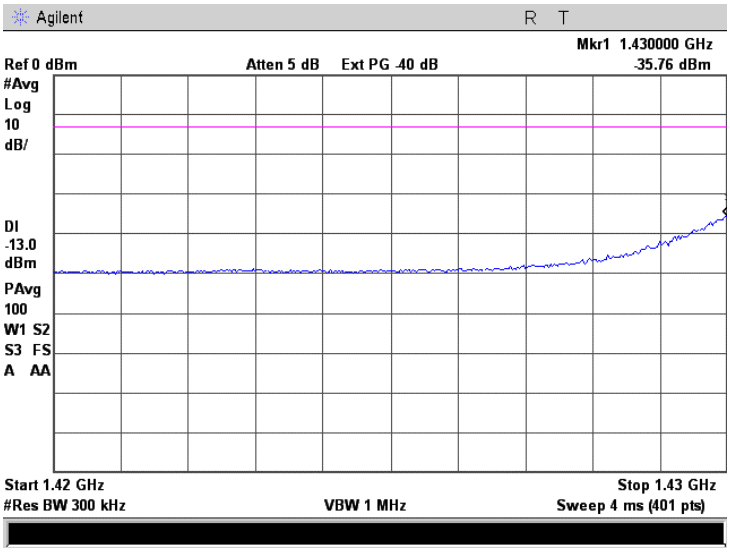


Plot 7.4.6 Spurious emission measurements in 1420 - 1430 MHz range, 2.5 MHz EBW, 64QAM



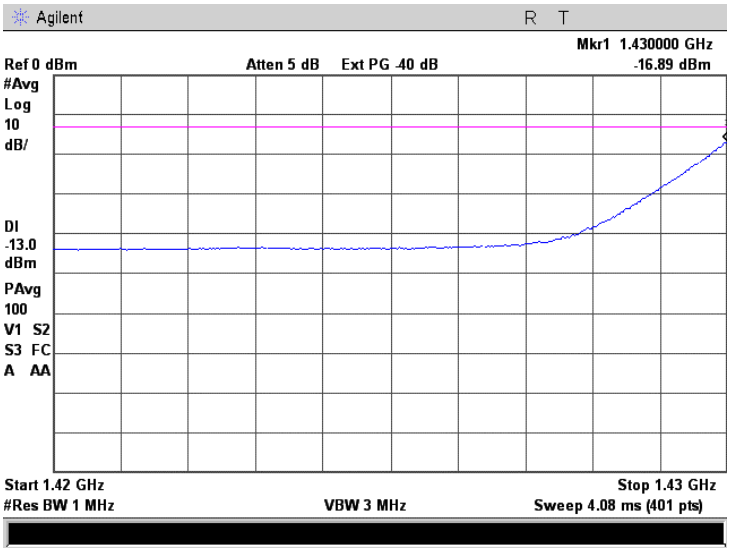
Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 1:43:30 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.7 Spurious emission measurements in 1420 - 1430 MHz range, 1.75 MHz EBW, BPSK

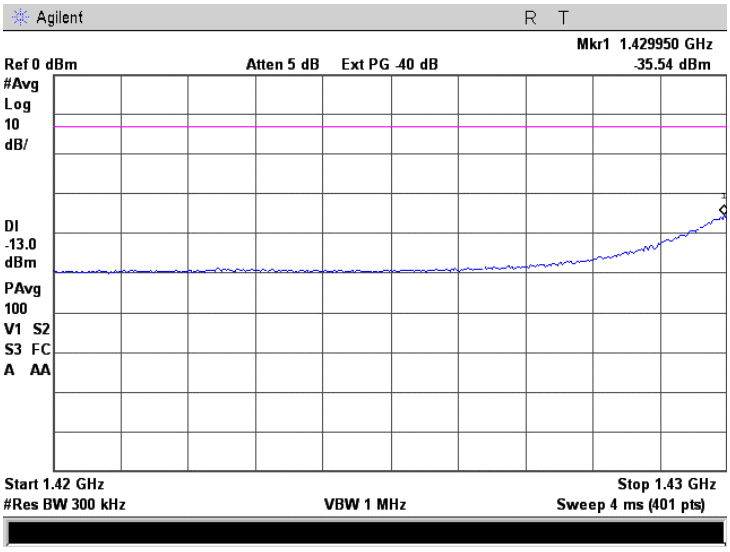


Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 1:43:30 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.8 Spurious emission measurements in 1420 - 1430 MHz range, 1.75 MHz EBW, 64QAM, RBW=1000 kHz

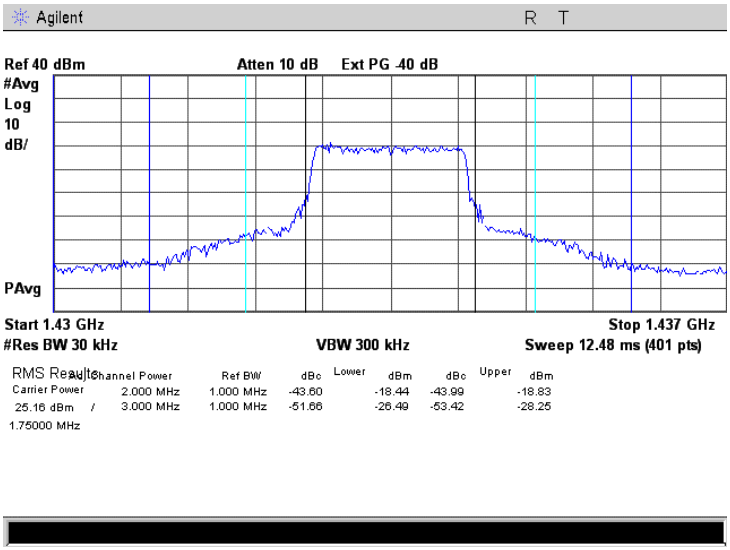


Plot 7.4.9 Spurious emission measurements in 1420 - 1430 MHz range, 1.75 MHz EBW, 64QAM, RBW=300 kHz

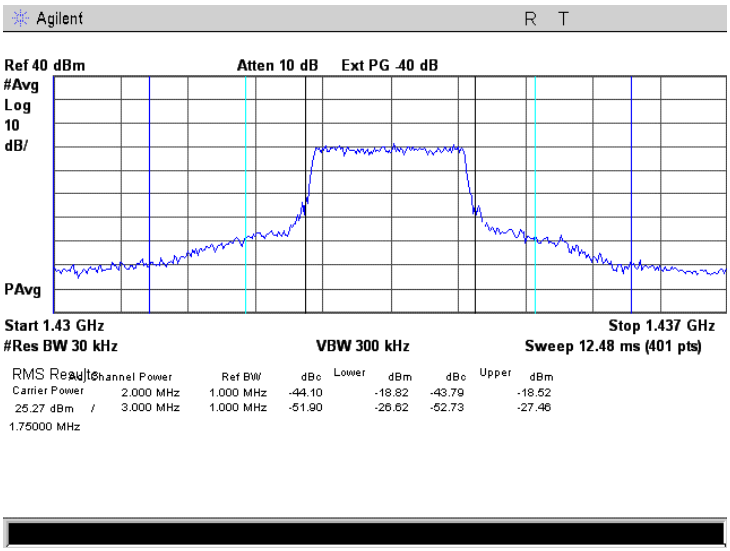


Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 1:43:30 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.10 Band Edge Spurious emission measurements in 1430 – 1431, 1431 – 1432, 1435 – 1436, 1436 – 1437 MHz range, 1.75 MHz EBW, BPSK

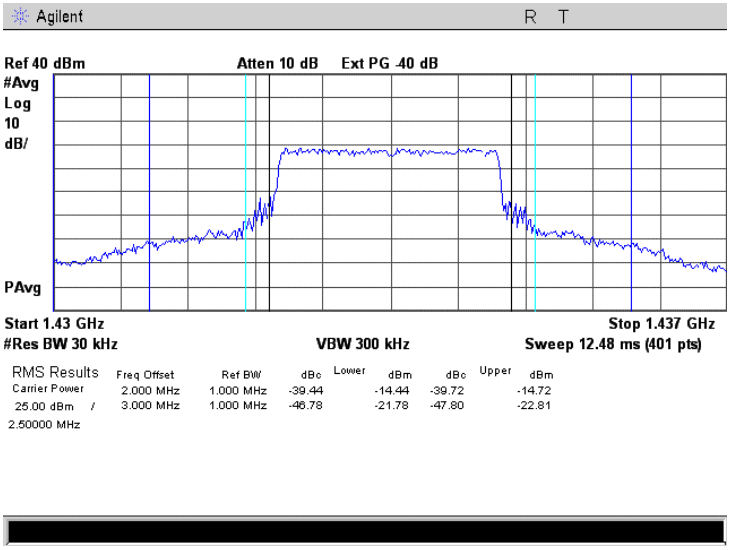


Plot 7.4.11 Band edge spurious emission measurements in 1430 – 1431, 1431 – 1432, 1435 – 1436, 1436 – 1437 MHz range, 1.75 MHz EBW, 64QAM

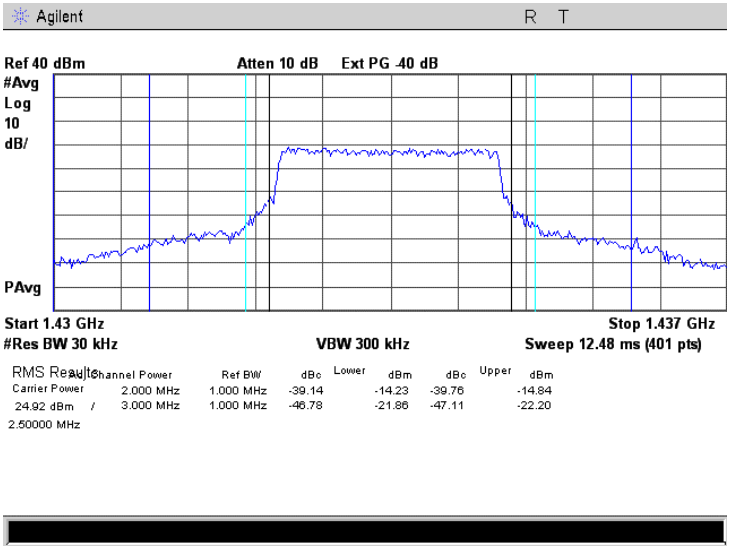


Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 1:43:30 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.12 Band Edge Spurious emission measurements in 1430 – 1431, 1431 – 1432, 1435 – 1436, 1436 – 1437 MHz range, 2.5 MHz EBW, BPSK

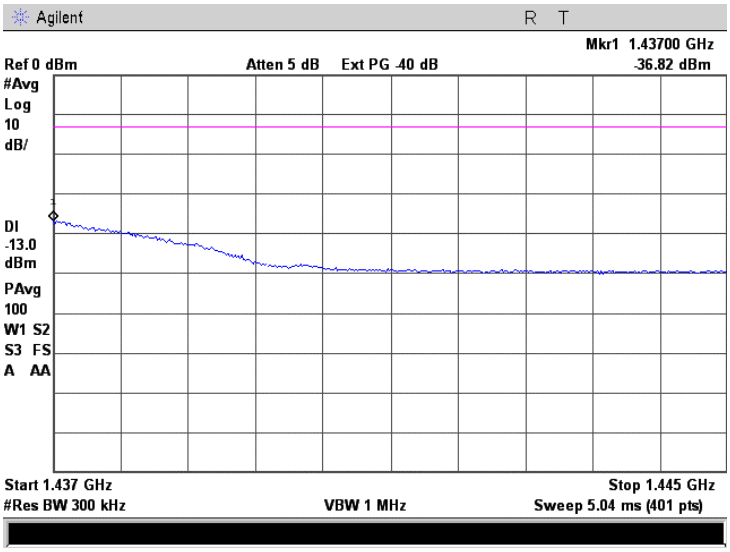


Plot 7.4.13 Band Edge Spurious emission measurements in 1430 – 1431, 1431 – 1432, 1435 – 1436, 1436 – 1437 MHz range, 2.5 MHz EBW, 64QAM



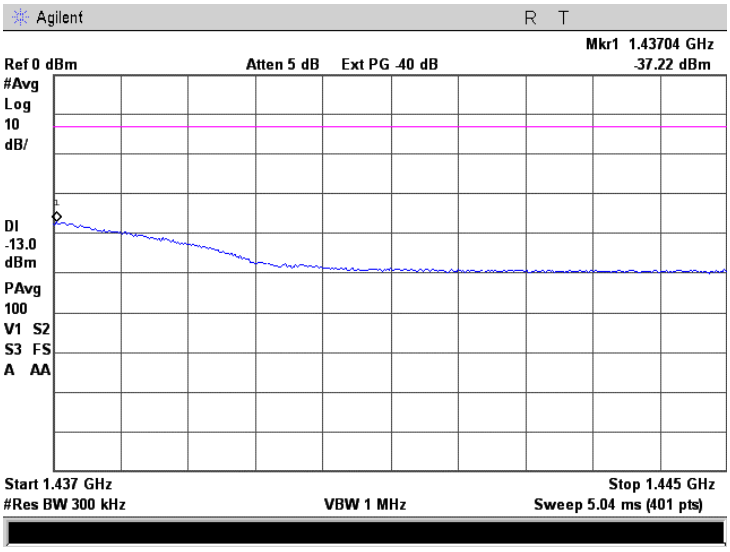
Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 1:43:30 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.14 Spurious emission measurements in 1437 - 1445 MHz range, 1.75 MHz EBW, BPSK, RBW=300 kHz

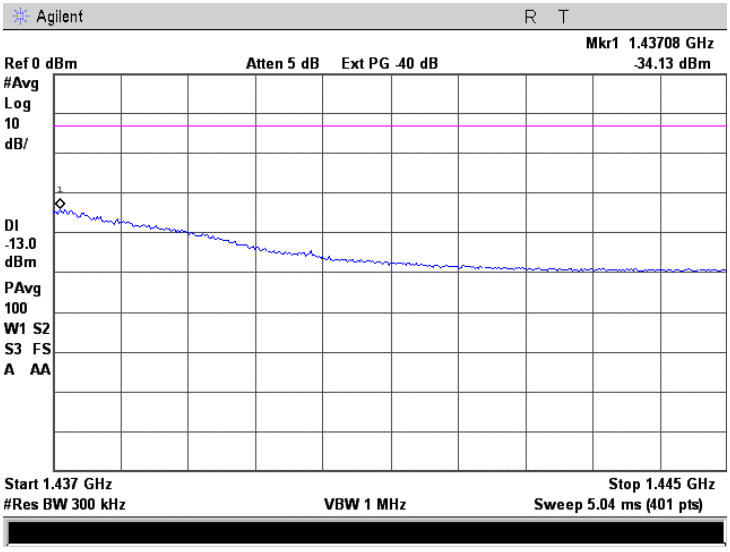


Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 1:43:30 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.15 Spurious emission measurements in 1437 - 1445 MHz range, 1.75 MHz EBW, 64QAM

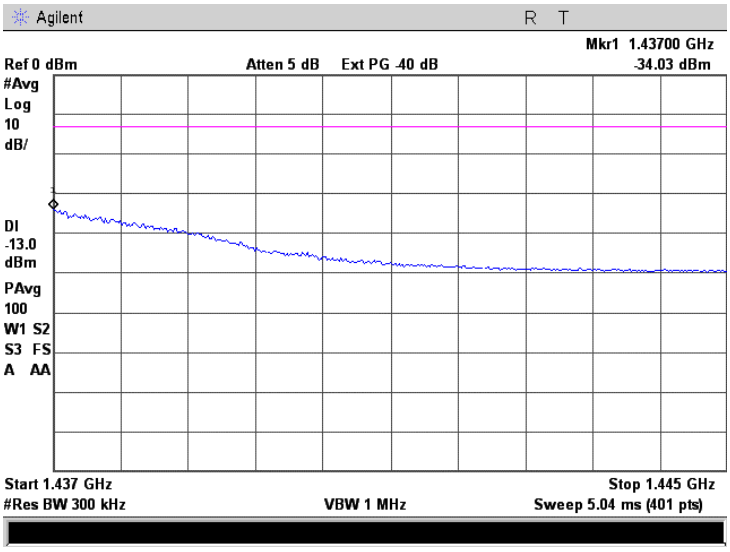


Plot 7.4.16 Spurious emission measurements in 1437 - 1445 MHz range, 2.5 MHz EBW, BPSK

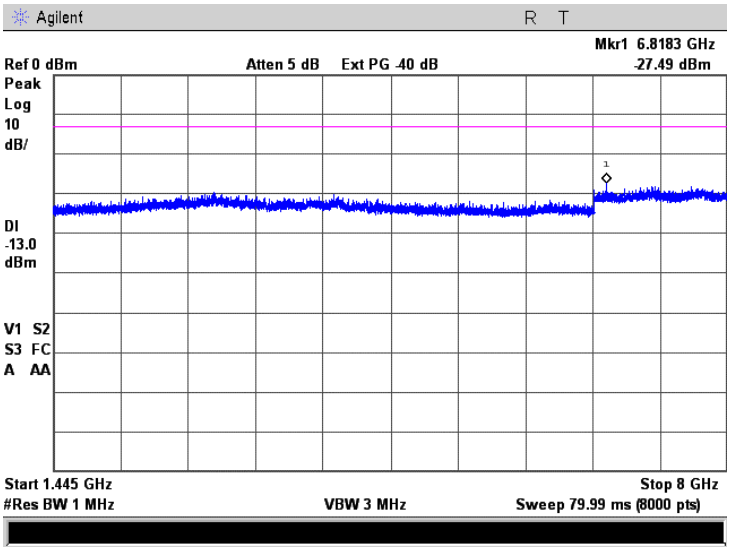


Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 1:43:30 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.17 Spurious emission measurements in 1437 - 1445 MHz range, 2.5 MHz EBW, 64QAM

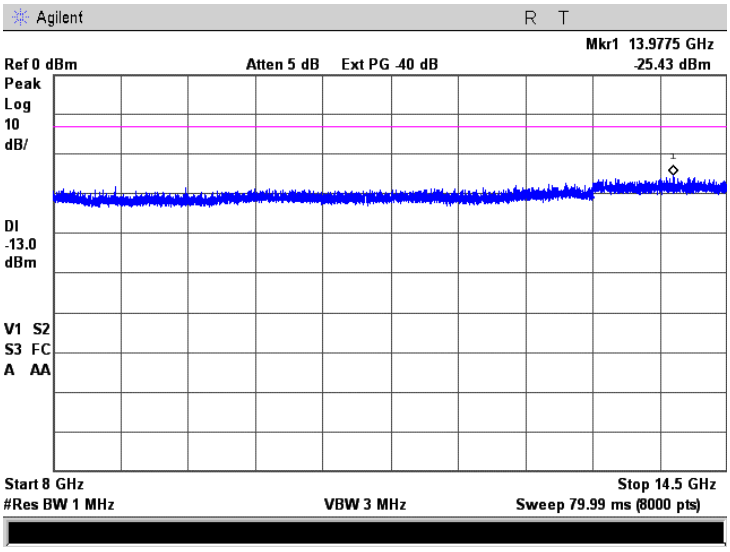


Plot 7.4.18 Spurious emission measurements in 1445 - 8000 MHz range



Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 1:43:30 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.19 Spurious emission measurements in 8000 - 14500 MHz range



Test specification:	Section 27.54, Frequency stability		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 1:44:17 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

7.5 Frequency stability test

7.5.1 General

This test was performed to measure frequency stability of transmitter RF carrier. Specification test limits are given in Table 7.5.1.

Table 7.5.1 Frequency stability limits

Assigned frequency, MHz	Maximum allowed frequency displacement Hz
1432.0 – 1435.0 MHz	The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation

7.5.2 Test procedure

7.5.2.1 The EUT was set up as shown in Figure 7.5.1, energized and its proper operation was checked.

7.5.2.2 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.

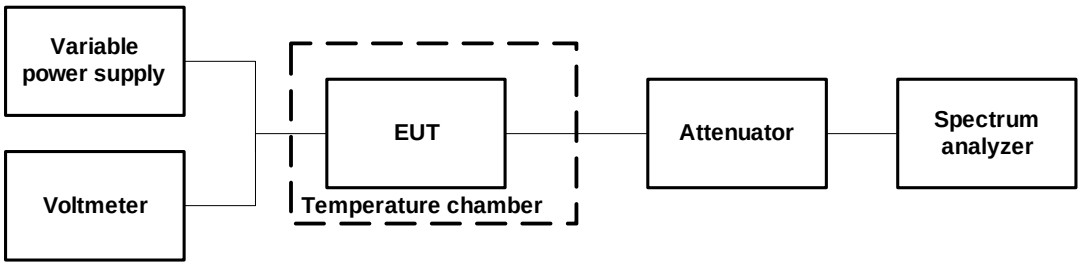
7.5.2.3 The EUT was powered on and carrier frequency was measured at start up moment and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.

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

7.5.2.5 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.

7.5.2.6 Frequency displacement was calculated and compared with the limit as provided in Table 7.5.2 and Table 7.5.3.

Figure 7.5.1 Frequency stability test setup



Test specification:	**Section 27.54, Frequency stability**		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2		
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	2/16/2009 1:44:17 PM		
Temperature: 23ºC	**Air Pressure:** 1019 hPa	**Relative Humidity:** 43%	**Power Supply:** 120 V AC
Remarks:			

Table 7.5.2 Frequency stability test results

OPERATING FREQUENCY: 1432.0 – 1435.0 MHz
NOMINAL POWER VOLTAGE: 120 VAC
TEMPERATURE STABILIZATION PERIOD: 20 min
POWER DURING TEMPERATURE TRANSITION: Off
SPECTRUM ANALYZER MODE: Peak Hold
RESOLUTION BANDWIDTH: 10 Hz
VIDEO BANDWIDTH: 30 Hz

T, ºC	Voltage, V	Frequency, MHz							lax frequency drift, H	
		Start up	1st min	2nd min	3rd min	4th min	5th min	10th min	›ositive	Negative
Carrier frequency 1433.50 MHz										
-30	nominal	1433.499171	1433.499126	1433.499098	1433.499004	1433.498987	1433.498972	1433.498963	**1114.00**	0.00
-20	nominal	1433.499030	NA	NA	NA	NA	NA	1433.499012	973.00	0.00
-10	nominal	1433.499155	NA	NA	NA	NA	NA	1433.498905	1098.00	0.00
0	nominal	1433.498087	1433.498062	1433.498052	1433.498043	1433.498051	1433.498052	1433.498063	30.00	-14.00
10	nominal	1433.498025	NA	NA	NA	NA	NA	1433.497915	0.00	**-142.00**
20	15%	1433.498053	NA	NA	NA	NA	NA	1433.498069	12.00	-4.00
20	nominal	1433.498000	NA	NA	NA	NA	NA	1433.498057*	0.00	-57.00
20	-15%	1433.498066	NA	NA	NA	NA	NA	1433.498062	9.00	0.00
30	nominal	1433.498600	1433.498067	1433.498071	1433.498070	1433.498066	1433.498063	1433.498063	543.00	0.00
40	nominal	1433.498000	NA	NA	NA	NA	NA	1433.498133	76.00	-57.00
50	nominal	1433.498012	1433.498027	1433.498058	1433.498112	1433.498127	1433.498131	1433.498215	158.00	-45.00

* - Reference frequency

Table 7.5.3 Transmission occupied bandwidth with frequency drift test results

Lower measured* band edge, MHz	Upper measured* band edge, MHz	Lower calculated** band edge, MHz	Upper calculated** band edge, MHz	Lower specified band edge, MHz	Upper specified band edge, MHz	Lower Margin***, MHz	Upper Margin***, MHz	Verdict
Carrier frequency 1433.50 MHz, 2.5 MHz EBW								
BPSK								
1432.31	1434.71	1432.31	1434.711	1432	1435	-0.309858	-0.288886	Pass
64QAM								
1432.26	1434.73	1432.26	1434.731	1432	1435	-0.259858	-0.268886	Pass

* - Measured under normal test conditions at 26 dBc points
** - Measured band edge with proper drift addition
*** - Margin = Calculated band edge – specified band edge

Reference numbers of test equipment used

HL 1194	HL 2867	HL 2909	HL 3210				

Full description is given in Appendix A.

Test specification:	Section 15.107, Conducted emission at AC power port		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 1:50:29 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

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

8.1 Conducted emissions

8.1.1 General

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

Table 8.1.1 Limits for conducted emissions

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

* The limit decreases linearly with the logarithm of frequency.

8.1.2 Test procedure

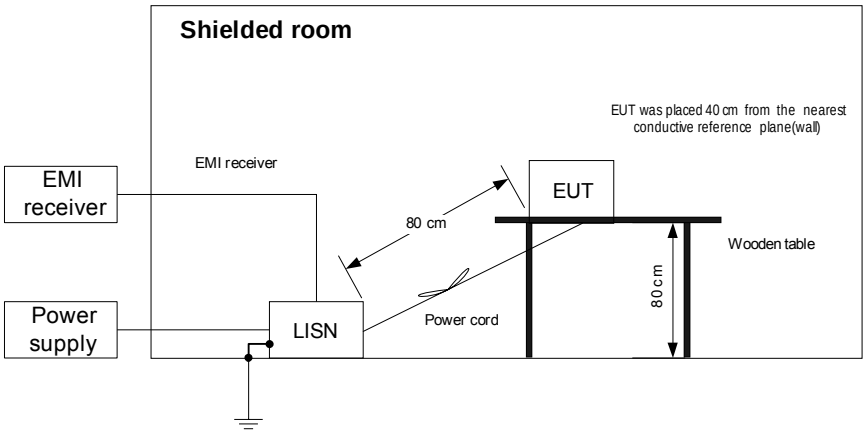
8.1.2.1 The EUT was set up as shown in Figure 8.1.1, energized and the performance check was conducted.

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

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

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

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



Test specification:	**Section 15.107, Conducted emission at AC power port**		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	2/16/2009 1:50:29 PM		
Temperature: 23ºC	**Air Pressure:** 1019 hPa	**Relative Humidity:** 43%	**Power Supply:** 120 V AC
Remarks:			

Table 8.1.2 Conducted emission test results

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

Frequency, MHz	Peak emission, dB(µV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(µV)	Limit, dB(µV)	Margin, dB*	Measured emission, dB(µV)	Limit, dB(µV)	Margin, dB*		
0.150710	47.86	46.81	79.00	-32.19	45.66	66.00	-20.34	L1	Pass
0.399985	43.69	43.27	79.00	-35.73	43.17	66.00	-22.83		
0.601235	43.75	43.3	73.00	-29.70	43.00	60.00	-17.00		
0.650930	44.02	43.61	73.00	-29.39	43.52	60.00	-16.48		
0.701270	43.87	43.23	73.00	-29.77	42.58	60.00	-17.42		
0.901700	44.55	44.22	73.00	-28.78	44.17	60.00	-15.83		
1.151740	43.81	43.38	73.00	-29.62	43.28	60.00	-16.72		
0.150000	48.27	47.44	79.00	-31.56	47.00	66.00	-19.00	L2	Pass
0.250000	47.21	46.89	79.00	-32.11	46.87	66.00	-19.13		
0.400225	46.95	46.62	79.00	-32.38	46.57	66.00	-19.43		
0.600425	47.14	46.74	73.00	-26.26	46.52	60.00	-13.48		
0.650150	47.06	46.66	73.00	-26.34	46.57	60.00	-13.43		
0.900950	47.22	46.93	73.00	-26.07	46.86	60.00	-13.14		
0.901075	47.11	46.80	73.00	-26.20	46.74	60.00	-13.26		
1.151500	46.37	46.02	73.00	-26.98	45.95	60.00	-14.05		

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

Reference numbers of test equipment used

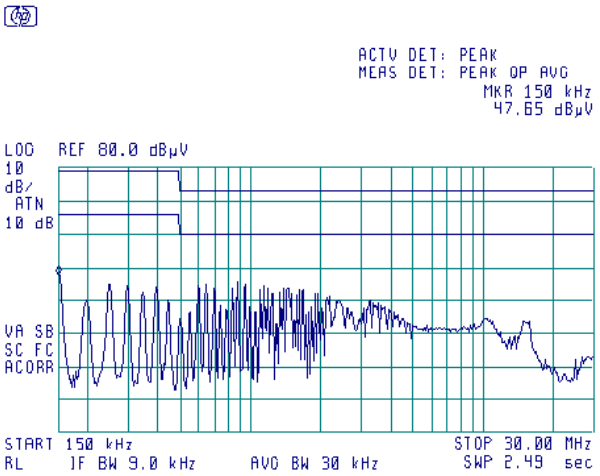
HL 0447	HL 0580	HL 1430	HL 1513	HL 2888	HL 3170	HL 3612	

Full description is given in Appendix A.

Test specification:	Section 15.107, Conducted emission at AC power port		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/16/2009 1:50:29 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

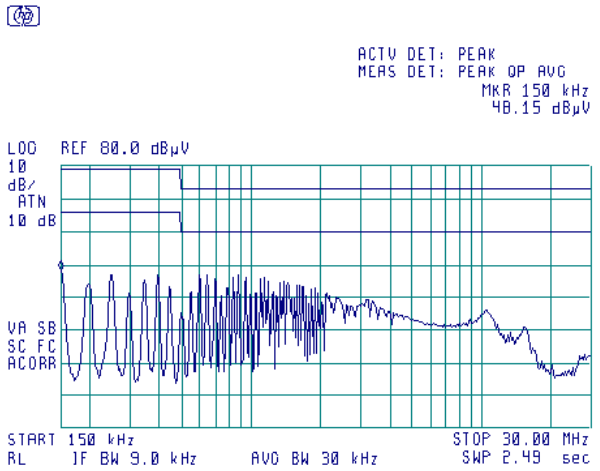
Plot 8.1.1 Conducted emission measurements

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



Plot 8.1.2 Conducted emission measurements

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



Test specification:	Section 15.109, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/15/2009 10:27:01 AM		
Temperature: 23ºC	Air Pressure: 1022 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

8.2 Radiated emission measurements

8.2.1 General

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

Table 8.2.1 Radiated emission test limits

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

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

8.2.2 Test procedure for measurements in semi-anechoic chamber

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

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

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

8.2.3 Test procedure for measurements at OATS

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

8.2.3.2 Preliminary measurements were performed in the anechoic chamber at 3 m test distance. The specified frequency range was investigated with biconical and log periodic antennas connected to EMI receiver. To find maximum radiation the turntable was rotated 360^0, the measuring antenna height was changed, its polarization was switched from vertical to horizontal and the EUT cables position was varied.

8.2.3.3 The EUT was set up as shown in Figure 8.2.2, energized and the performance check was conducted.

8.2.3.4 Final measurements were performed at the open area test site at 10 m test distance. The EUT wires and cables were arranged to produce maximum emission as it was found during preliminary measurements. The frequencies yield the worst test results (the lowest margins) during preliminary testing were investigated with biconilog antenna connected to EMI receiver. To find maximum radiation the turntable was rotated 360^0, the measuring antenna height was changed from 1 to 4 m and its polarization was changed from vertical to horizontal. At frequencies where high ambient noise was encountered, the final measurements were taken in the anechoic chamber at 3 m distance.

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

Test specification:	Section 15.109, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/15/2009 10:27:01 AM		
Temperature: 23ºC	Air Pressure: 1022 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

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

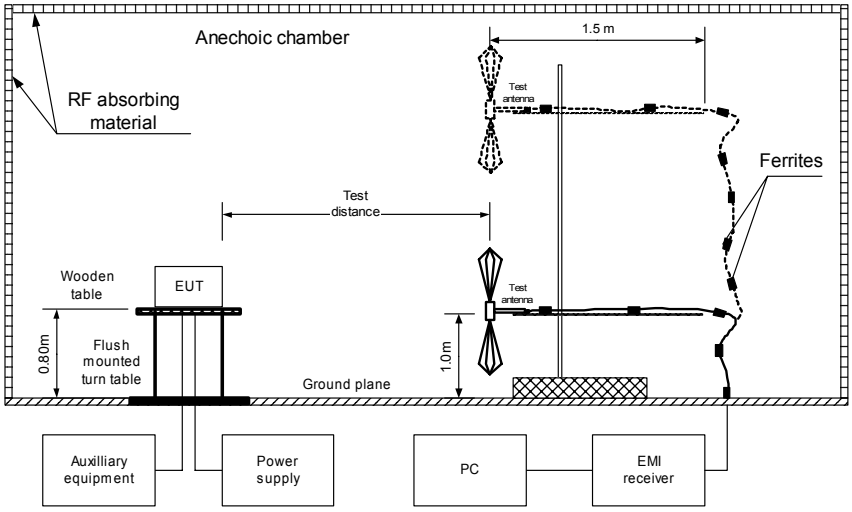
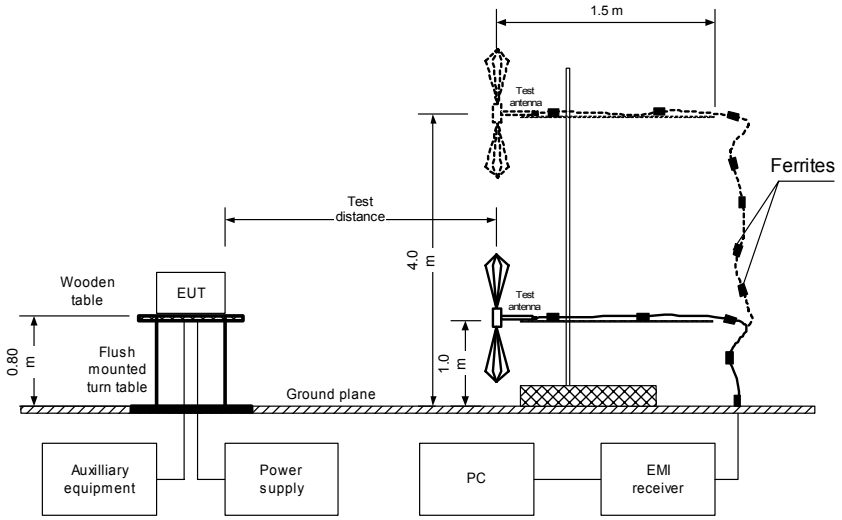


Figure 8.2.2 Setup for radiated emission measurements at OATS, table-top equipment



Test specification:	**Section 15.109, Radiated emission**		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	**Verdict:**	PASS
Date & Time:	2/15/2009 10:27:01 AM		
Temperature: 23ºC	**Air Pressure:** 1022 hPa	**Relative Humidity:** 45%	**Power Supply:** 120 V AC
Remarks:			

Table 8.2.2 Radiated emission test results

EUT SET UP: TABLE-TOP
LIMIT: Class A
EUT OPERATING MODE: Receive / Stand-by
TEST SITE: OATS
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*				
199.998800	37.28	35.17	54.00	-18.83	V	1.4	210	Pass
299.998500	48.09	46.65	57.00	-10.35	H	1.0	210	
399.994000	40.31	37.78	57.00	-19.22	V	1.3	100	
499.997600	44.53	42.42	57.00	-14.58	V	1.2	010	
599.997600	42.71	40.26	57.00	-16.74	V	1.1	000	

TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / AVERAGE
FREQUENCY RANGE: 1000 MHz – 8000 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*				
5512.354	51.27	44.38	60.0	-15.62	V	1.2	010	Pass

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

Reference numbers of test equipment used

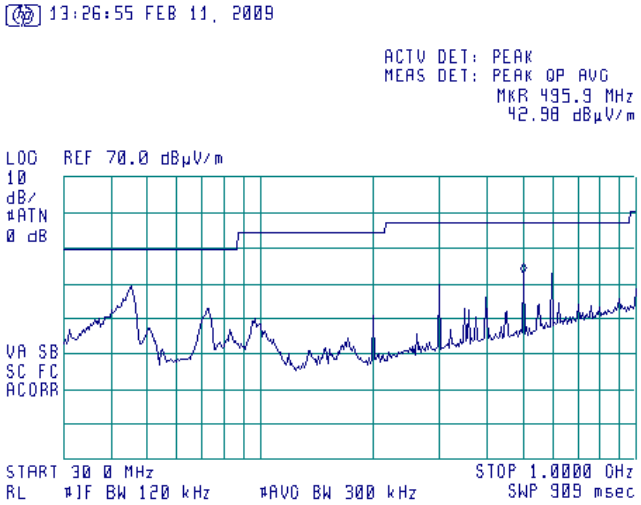
HL 0415	HL 0521	HL 0569	HL 0604	HL 0812	HL 1430	HL 1984	HL 2780
HL 3121	HL 3123	HL 3532	HL 3615				

Full description is given in Appendix A.

Test specification:	Section 15.109, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/15/2009 10:27:01 AM		
Temperature: 23ºC	Air Pressure: 1022 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

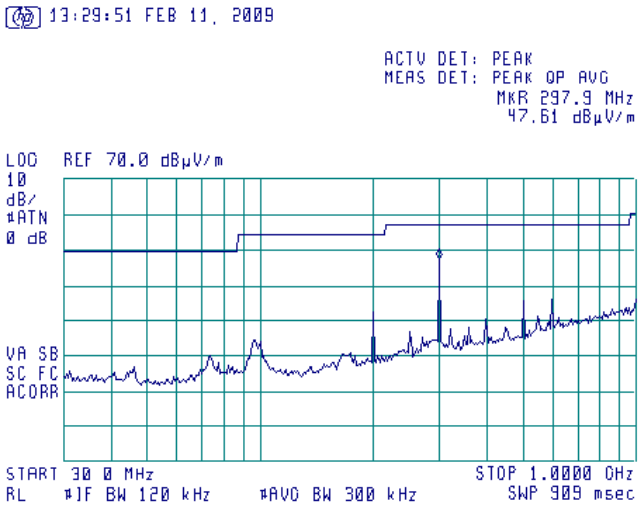
Plot 8.2.1 Radiated emission measurements in 30 - 1000 MHz range, vertical antenna polarization

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



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

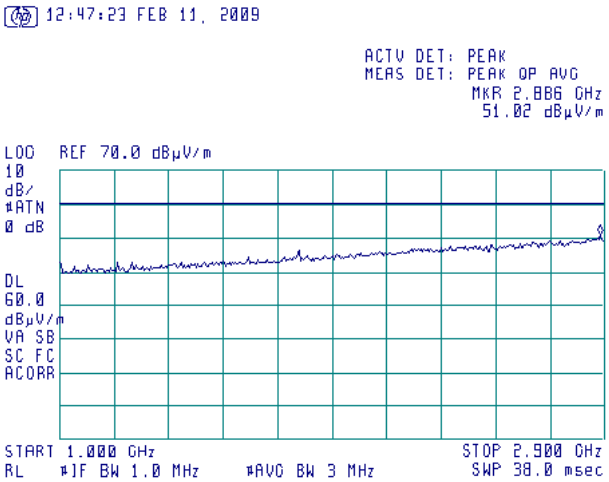
TEST SITE: Semi anechoic chamber
LIMIT: Class A
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



Test specification:	Section 15.109, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/15/2009 10:27:01 AM		
Temperature: 23ºC	Air Pressure: 1022 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

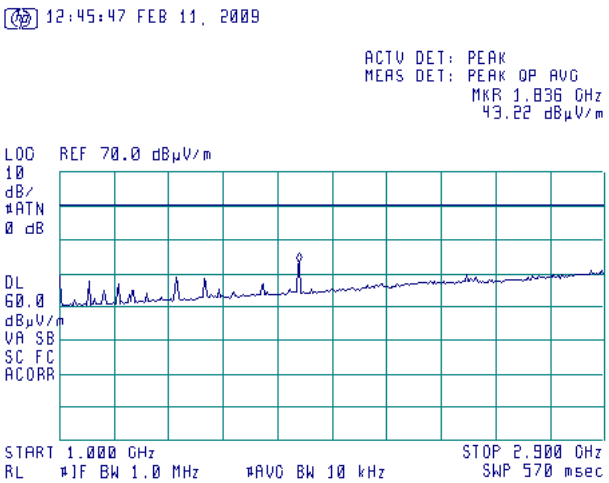
Plot 8.2.3 Radiated emission measurements in 1000 MHz – 2900 MHz, vertical antenna polarization

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



Plot 8.2.4 Radiated emission measurements in 1000 MHz – 2900 MHz, vertical antenna polarization

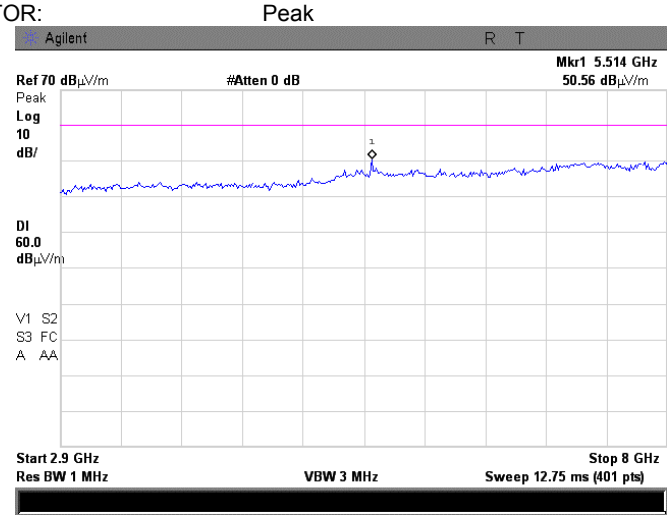
TEST SITE:	Semi anechoic chamber
LIMIT:	Class A
TEST DISTANCE:	3 m
EUT OPERATING MODE:	Receive / Stand-by
DETECTOR:	Average



Test specification:	Section 15.109, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/15/2009 10:27:01 AM		
Temperature: 23ºC	Air Pressure: 1022 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

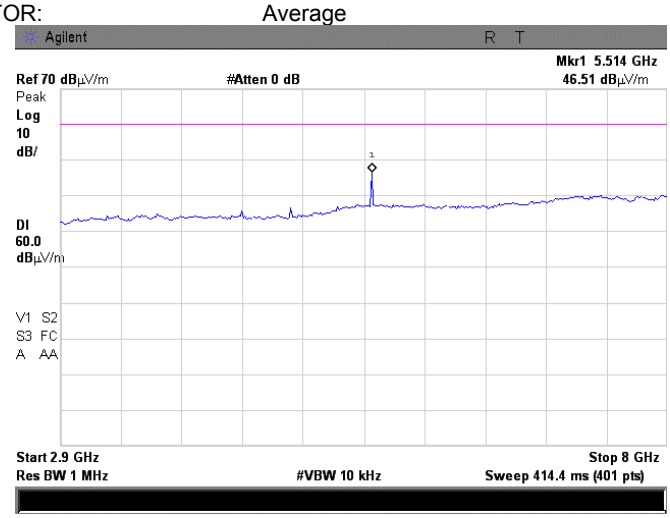
Plot 8.2.5 Radiated emission measurements in 2.9 GHz – 8.0 GHz, vertical antenna polarization

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



Plot 8.2.6 Radiated emission measurements in 2.9 GHz – 8.0 GHz GHz, vertical antenna polarization

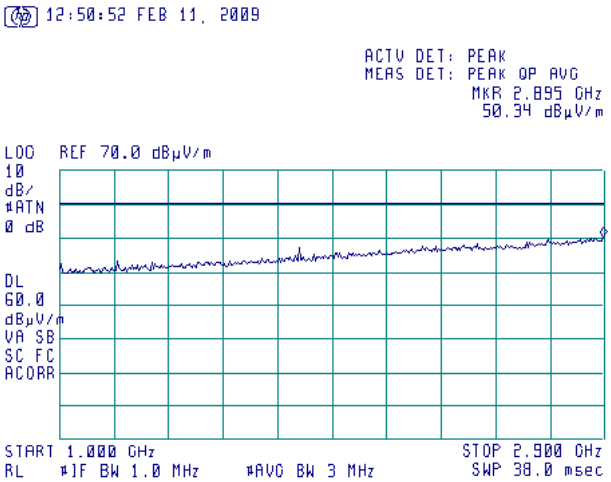
TEST SITE: Semi anechoic chamber
LIMIT: Class A
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by
DETECTOR: Average



Test specification:	Section 15.109, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/15/2009 10:27:01 AM		
Temperature: 23ºC	Air Pressure: 1022 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

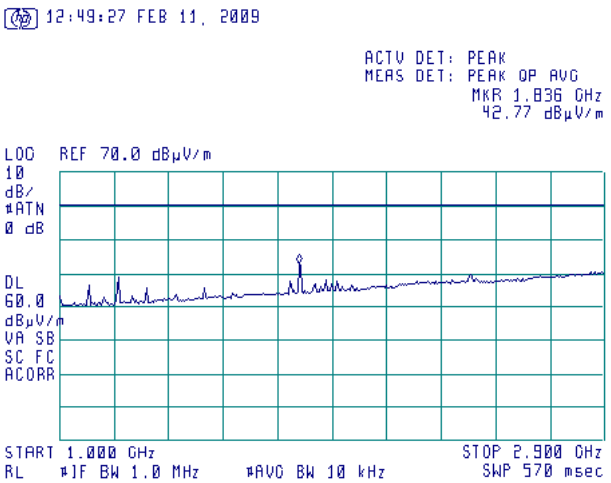
Plot 8.2.7 Radiated emission measurements in 1000 MHz – 2900 MHz, horizontal antenna polarization

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



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

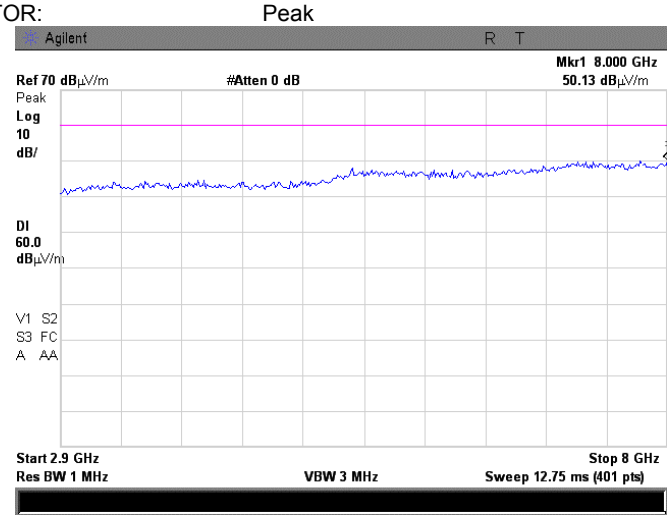
TEST SITE:	Semi anechoic chamber
LIMIT:	Class A
TEST DISTANCE:	3 m
EUT OPERATING MODE:	Receive / Stand-by
DETECTOR:	Average



Test specification:	Section 15.109, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/15/2009 10:27:01 AM		
Temperature: 23ºC	Air Pressure: 1022 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

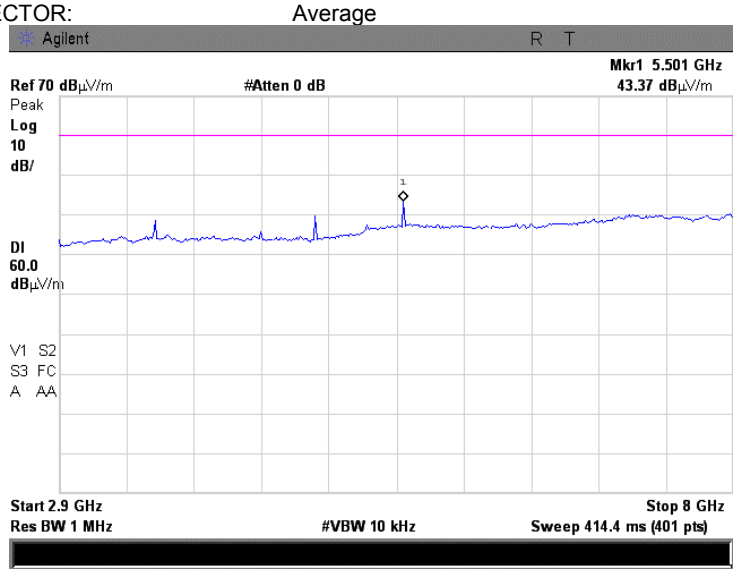
Plot 8.2.9 Radiated emission measurements in 2.9 GHz – 8.0 GHz, horizontal antenna polarization

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



Plot 8.2.10 Radiated emission measurements in 2.9 GHz – 8.0 GHz, horizontal antenna polarization

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



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 & Time:	2/16/2009 1:56:10 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

8.3 Spurious emissions at RF antenna connector

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 or a citizens band (CB) receiver which was tested for compliance with radiated emission limits with the antenna port connected to resistive termination. Specification test limits are given in Table 8.3.1.

Table 8.3.1 Spurious emission limits

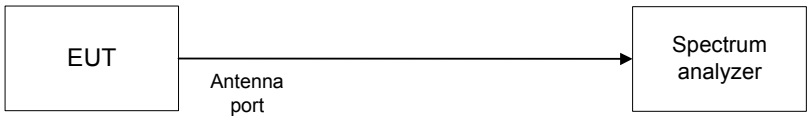
Frequency, MHz	EUT type	Power of spurious	
		nW	dBm
25 MHz – 5th harmonic*	Citizens band (CB) receiver	2.0	-57.0
30 MHz – 2nd harmonic**	Superheterodyne receiver		
30 MHz – 5th harmonic*	Other receiver operates within 30 – 960 MHz		

* - harmonic of the highest frequency the EUT generates, uses, operates or tunes to.
** - 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 & Time:	2/16/2009 1:56:10 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Table 8.3.2 Spurious emission test results

INVESTIGATED FREQUENCY RANGE:	1432.0 – 1435.0 MHz
RECEIVER TYPE:	Superheterodyne
EUT OPERATING MODE:	Receive
DETECTOR USED:	Peak
RESOLUTION BANDWIDTH:	100 kHz (30 – 1000 MHz), 1000 kHz (above 1000 MHz)
VIDEO BANDWIDTH:	300 kHz (30 – 1000 MHz), 3000 kHz (above 1000 MHz)kHz

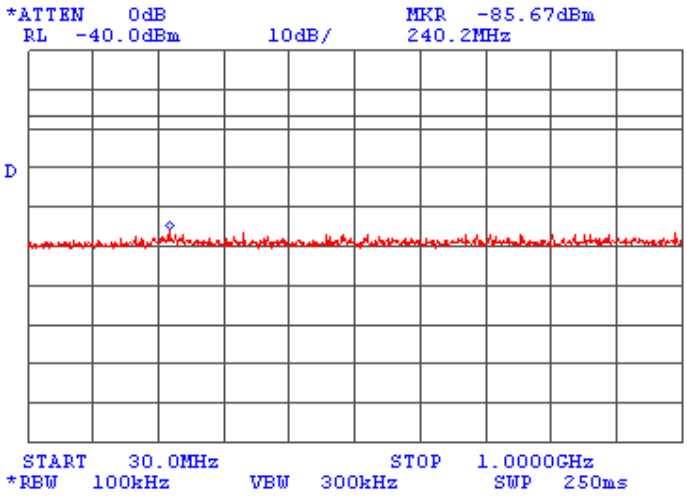
Frequency, MHz	Spurious emission, dBm	Limit, dBm	Margin, dB	Verdict
No emissions were found		-57.0	NA	Pass

Reference numbers of test equipment used

HL 1424	HL 2911						

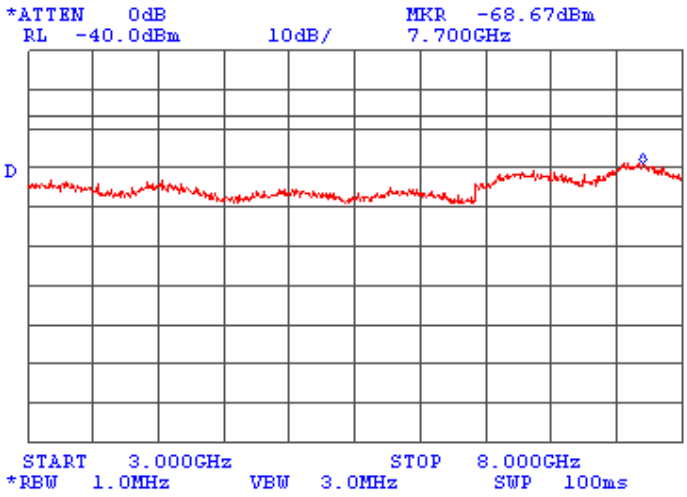
Full description is given in Appendix A.

Plot 8.3.1 Spurious emission test results 30 – 1000 MHz range



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 & Time:	2/16/2009 1:56:10 PM		
Temperature: 23ºC	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 8.3.2 Spurious emission test results 1000 – 8000 MHz range



9 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
0415	Cable, Coax, RF, RG-214	Hermon Laboratories	CC-3	056	02-Dec-08	02-Dec-09
0446	Antenna, Loop, Active, 10 kHz - 30 MHz	EMCO	6502	2857	29-Jun-08	29-Jun-09
0447	LISN, 16/2, 300V RMS, 50 Ohm/50 uH + 5 Ohm, STD CISPR 16-1	Hermon Laboratories	LISN 16 - 1	066	04-Nov-08	04-Nov-09
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard Co	8546A	3617A 00319, 3448A002 53	29-Aug-08	29-Aug-09
0569	Antenna, Log Periodic, 200 - 1000 MHz	Electro-Metrics	LPA 25/30	1953	25-Sep-08	25-Sep-10
0580	DC block adaptor 10 kHz - 2.2 GHz	Anritsu	MA8601 A	580	23-Nov-08	23-Nov-09
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	11-Jan-09	11-Jan-10
0812	Cable Coax, RG-214, 11.5 m, N-type connectors	Hermon Laboratories	C214-11	148	02-Dec-08	02-Dec-09
1194	Variac, 220 V/ 2.5 A	Matsunaga		2962	06-Jan-09	06-Jan-10
1424	Spectrum Analyzer, 30 Hz- 40 GHz	Agilent Technologies	8564EC	3946A002 19	30-Dec-08	30-Dec-09
1430	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1431, HL1432	Agilent Technologies	8542E	3807A002 62,3705A0 0217	31-Aug-08	31-Aug-09
1513	Cable RF, 8 m, BNC/BNC	Belden	M17/167 MIL-C-17	1513	03-Sep-08	03-Sep-09
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W	EMC Test Systems	3115	9911-5964	23-Jan-09	23-Jan-10
2387	Filter Bandpass, 8-14 GHz	Hermon Laboratories	FBP8-14	2387	05-Jun-07	05-Jun-09
2432	Antenna, Double-Ridged Waveguide Horn 1-18 GHz	EMC Test Systems	3115	00027177	23-Jan-09	23-Jan-10
2780	EMC analyzer, 100 Hz to 26.5 GHz	Agilent Technologies	E7405A	MY451024 6	11-Jun-07	11-Jun-09
2785	Signal generator, 50 MHz to 26 GHz, pulse modulation	Giga-tronics	1026-01	284007	15-Oct-08	15-Oct-09
2867	Cable, 18 GHz, 0.9 m, SMA - SMA, Right Angle	Gore	NA	91P72076	04-Feb-09	04-Feb-10
2883	Cable, 18 GHz N-type, M-F, 3 m	Bird	TC-MNFN-3.0	211539 003	07-Dec-08	07-Dec-09
2888	LISN Two-line V-Network 50 Ohm / 50 uH + 5 Ohm, 16A, MIL STD 461E, CISPR 16-1	Rolf Heine	NNB-2/16Z	02/10018	09-Jul-08	09-Jul-09
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY414447 62	07-May-08	07-May-09
2911	Cable 18 GHz, 1.5 m, SMA-SMA	Gore	NA	89386	05-Oct-08	05-Oct-09
3121	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-9155-00	3121	07-Dec-08	07-Dec-09

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
3122	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-9155-00	3122	07-Dec-08	07-Dec-09
3123	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-9155-00	3123	30-Dec-08	30-Dec-09
3170	Attenuator, N-type, 10 dB, DC to 6 GHz, 1 W	Mini-Circuits	UNAT-10+	15542	07-May-08	07-May-09
3210	Temperature Chamber, (-50…+100) °C	Associated	NA	NA	11-Sep-08	11-Sep-09
3234	Signal generator, 9 kHz - 3.3 GHz	Rohde & Schwarz	SML03	103387	13-Jul-08	13-Jul-09
3301	Power Meter, P-series, 50 MHz to 40 GHz	Agilent Technologies	N1911A	MY45101057	03-Dec-08	03-Dec-09
3302	Power sensor, P-Series, 50 MHz to 40 GHz, -35/30 to 20 dBm	Agilent Technologies	N1922A	MY45240586	05-Dec-08	05-Dec-09
3342	High Pass Filter, 50 Ohm, 2000 to 5200 MHz.	Mini-Circuits	VHF-1910+	NA	29-Oct-08	29-Oct-09
3344	High Pass Filter, 50 Ohm, 3400 to 9900 MHz.	Mini-Circuits	VHF-3100+	NA	29-Oct-08	29-Oct-09
3435	Precision Fixed Attenuator, 50 Ohm, 5 W, 10 dB, DC to 18 GHz	Mini-Circuits	BW-S10W5+	NA	09-Mar-08	09-Mar-09
3439	Precision Fixed Attenuator, 50 Ohm, 5 W, 20 dB, DC to 18 GHz	Mini-Circuits	BW-S20W5+	NA	09-Mar-08	09-Mar-09
3442	Precision Fixed Attenuator, 50 Ohm, 5 W, 20 dB, DC to 18 GHz	Mini-Circuits	BW-S20W5+	NA	09-Mar-08	09-Mar-09
3532	Amplifier, low noise, 2 to 8 GHz	Quinstar Technology	QLJ-02084040-J0	11159002001	23-Nov-08	23-Nov-09
3534	Amplifier, low noise, 6 to 18 GHz	Quinstar Technology	QLJ-06184040-J0	11159001002	07-Dec-08	07-Dec-09
3612	Cable RF, 17.5 m, N type-N type	Teldor	RG-214/U	NA	17-Nov-08	17-Nov-09
3615	Cable RF, 6.5 m, N type-N type, DC-6 GHz	Suhner Switzerland	RG 214/U	NA	07-Dec-08	07-Dec-09

10 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Transmitter tests	
Carrier power conducted at antenna connector	± 1.7 dB
Carrier power radiated (substitution method)	± 4.5 dB
Occupied bandwidth	±8%
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB
Spurious emissions radiated 30 MHz – 40 GHz (substitution method)	± 4.5 dB
Frequency error	30 – 300 MHz: ± 50.5 Hz (1.68 ppm) 300 – 1000 MHz: ± 168 Hz (0.56 ppm)
Transient frequency behaviour	187 Hz ± 13.9 %
Duty cycle, timing (Tx ON / OFF) and average factor measurements	± 1.0 %
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

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

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

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

11 APPENDIX C Test laboratory description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, safety, environmental and telecommunication testing facility. Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47) and by Industry Canada for electromagnetic emissions (file numbers IC 2186A-1 for OATS and IC 2186A-2 for anechoic chamber), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, C-845 for conducted emissions site), assessed by TNO Certification EP&S (Netherlands) for a number of EMC, telecommunications, environmental, safety standards, and by AMTAC (UK) for safety of medical devices. The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing and environmental simulation (for exact scope please refer to Certificate No. 839.01).

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12 APPENDIX D Specification references

FCC 47CFR part 27: 2008	Miscellaneous wireless communications services
FCC 47CFR part 1: 2008	Practice and procedure
FCC 47CFR part 2: 2008	Frequency allocations and radio treaty matters; general rules and regulations
FCC 47CFR part 15: 2008	Radio Frequency Devices
ANSI C63.2: 1996	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4: 2005	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
ANSI/TIA/EIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

13 APPENDIX E Test equipment correction factors

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

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

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

Antenna factor
Log periodic antenna
Electro-Metrics, model LPA-25/30
Ser.No.1953, HL 0569

Frequency MHz	Antenna Factor dB(1/m)	Frequency MHz	Antenna Factor dB(1/m)
200	15.2	625	25.2
225	15.1	650	25.8
250	16.3	675	27.2
275	17.2	700	27.6
300	19.6	725	27.6
325	18.4	750	27.6
350	19.0	775	28.0
375	20.0	800	28.2
400	20.9	825	29.4
425	21.3	850	29.9
450	22.1	875	30.0
475	22.7	900	30.4
500	23.2	925	30.6
525	23.9	950	30.8
550	24.2	975	31.6
575	24.6	1000	32.1
600	24.7		

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

Antenna factor

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

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

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

Antenna factor
Double-ridged wave guide horn antenna
Model 3115, S/N 9911-5964, HL 1984

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

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

Antenna factor
Double-ridged guide horn antenna
Model 3115, serial number: 00027177, HL 2432

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

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

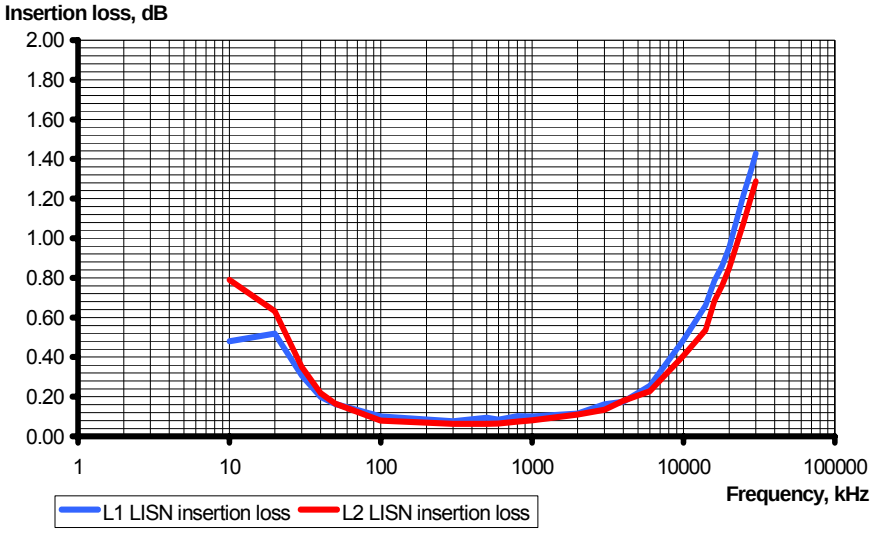
Correction factor
Line impedance stabilization network
Model LISN 16 - 1
Hermon Laboratories, HL 0447

Frequency, kHz	Correction factor, dB
10	4.9
15	2.86
20	1.83
25	1.25
30	0.91
35	0.69
40	0.53
50	0.35
60	0.25
70	0.18
80	0.14
90	0.11
100	0.09
125	0.06
150	0.04

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 NNB-2/16Z, Rolf Heine, HL 2888

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



Cable loss
Cable Coaxial, RG-58/RG-214, s/n 056, HL 0415
+ Cable Coaxial, RG-214, 11.5m, s/n 148, HL 0812

No.	Frequency, MHz	Cable loss, dB	Measured uncertainty, dB
1	20	0.73	±0.12
2	30	0.91	
3	50	1.2	
4	80	1.56	
5	100	1.76	
6	200	2.59	
7	300	3.26	
8	400	3.93	
9	500	4.42	
10	600	4.92	
11	700	5.36	
12	800	5.88	
13	900	6.41	
14	1000	6.71	
15	1500	8.63	
16	2000	10.39	

Cable loss
Cable coaxial, Gore, 18 GHz, 0.9 m, SMA - SMA, model Right Angle, S/N 91P72076
HL 2867

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.06	5750	0.68	12000	1.06
30	0.04	6000	0.69	12250	1.07
100	0.07	6250	0.70	12500	1.09
250	0.14	6500	0.73	12750	1.09
500	0.19	6750	0.74	13000	1.15
750	0.22	7000	0.78	13250	1.17
1000	0.26	7250	0.77	13500	1.16
1250	0.27	7500	0.79	13750	1.17
1500	0.31	7750	0.81	14000	1.14
1750	0.35	8000	0.86	14250	1.13
2000	0.38	8250	0.86	14500	1.06
2250	0.41	8500	0.87	14750	1.12
2500	0.43	8750	0.87	15000	1.16
2750	0.46	9000	0.88	15250	1.11
3000	0.48	9250	0.89	15500	1.06
3250	0.51	9500	0.90	15750	1.12
3500	0.53	9750	0.94	16000	1.20
3750	0.55	10000	1.00	16250	1.25
4000	0.56	10250	1.01	16500	1.24
4250	0.58	10500	1.02	16750	1.34
4500	0.60	10750	1.01	17000	1.35
4750	0.62	11000	1.01	17250	1.35
5000	0.64	11250	1.01	17500	1.36
5250	0.67	11500	1.01	17750	1.40
5500	0.68	11750	1.05	18000	1.51

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

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

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

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

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

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.08	3600	2.10	7400	3.08	11200	3.85	15100	4.58
30	0.18	3700	2.14	7500	3.11	11300	3.85	15200	4.60
50	0.26	3800	2.18	7600	3.14	11400	3.86	15300	4.63
100	0.34	3900	2.19	7700	3.16	11500	3.86	15400	4.65
200	0.47	4000	2.25	7800	3.18	11600	3.87	15500	4.71
300	0.59	4100	2.25	7900	3.20	11700	3.85	15600	4.70
400	0.66	4200	2.28	8000	3.22	11800	3.96	15700	4.69
500	0.75	4300	2.35	8100	3.26	11900	3.92	15800	4.71
600	0.83	4400	2.35	8200	3.27	12000	3.92	15900	4.74
700	0.90	4500	2.38	8300	3.29	12100	3.94	16000	4.69
800	0.96	4600	2.43	8400	3.30	12200	3.94	16100	4.72
900	1.02	4700	2.43	8500	3.31	12300	3.99	16200	4.71
1000	1.07	4800	2.45	8600	3.33	12400	4.02	16300	4.74
1100	1.12	4900	2.48	8700	3.35	12500	4.10	16400	4.74
1200	1.15	5000	2.55	8800	3.36	12600	4.09	16500	4.75
1300	1.22	5100	2.54	8900	3.38	12700	4.15	16600	4.78
1400	1.28	5200	2.56	9000	3.40	12800	4.15	16700	4.86
1500	1.29	5300	2.58	9100	3.41	12900	4.08	16800	4.84
1600	1.36	5400	2.61	9200	3.45	13000	4.21	16900	4.83
1700	1.40	5500	2.64	9300	3.48	13100	4.19	17000	4.86
1800	1.45	5600	2.69	9400	3.52	13200	4.29	17100	4.83
1900	1.51	5700	2.67	9500	3.54	13300	4.24	17200	4.90
2000	1.50	5800	2.71	9600	3.59	13400	4.26	17300	4.91
2100	1.56	5900	2.73	9700	3.59	13500	4.26	17400	4.94
2200	1.59	6000	2.75	9800	3.62	13600	4.29	17500	4.93
2300	1.63	6100	2.81	9900	3.70	13700	4.35	17600	4.93
2400	1.73	6200	2.80	10000	3.70	13800	4.31	17700	5.00
2500	1.73	6300	2.82	10100	3.72	13900	4.29	17800	5.01
2600	1.78	6400	2.85	10200	3.73	14000	4.32	17900	5.00
2700	1.84	6500	2.87	10300	3.75	14100	4.33	18000	5.00
2800	1.84	6600	2.90	10400	3.76	14200	4.34		
2900	1.91	6700	2.91	10500	3.77	14300	4.36		
3000	1.91	6800	2.94	10600	3.79	14400	4.38		
3100	1.97	6900	2.96	10700	3.80	14600	4.42		
3200	1.98	7000	2.98	10800	3.81	14700	4.42		
3300	2.04	7100	3.01	10900	3.81	14800	4.55		
3400	2.04	7200	3.02	11000	3.83	14900	4.55		
3500	2.10	7300	3.04	11100	3.84	15000	4.55		

Cable loss
Microwave Cable Assembly, 18 GHz, 6.4 m, SMA – SMA, Huber-Suhner, model 198-9155-00
HL 3122

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.11	3600	2.08	7400	3.07	11200	3.92	15100	4.61
30	0.17	3700	2.12	7500	3.09	11300	3.95	15200	4.58
50	0.23	3800	2.15	7600	3.14	11400	3.93	15300	4.62
100	0.32	3900	2.18	7700	3.15	11500	3.93	15400	4.62
200	0.47	4000	2.21	7800	3.19	11600	3.94	15500	4.65
300	0.58	4100	2.24	7900	3.22	11700	3.97	15600	4.66
400	0.66	4200	2.27	8000	3.20	11800	3.98	15700	4.66
500	0.74	4300	2.31	8100	3.21	11900	4.08	15800	4.72
600	0.81	4400	2.31	8200	3.24	12000	4.03	15900	4.78
700	0.88	4500	2.36	8300	3.27	12100	4.06	16000	4.89
800	0.95	4600	2.37	8400	3.32	12200	4.05	16100	4.95
900	1.00	4700	2.40	8500	3.35	12300	4.16	16200	4.92
1000	1.06	4800	2.43	8600	3.35	12400	4.18	16300	4.95
1100	1.11	4900	2.45	8700	3.33	12500	4.20	16400	5.02
1200	1.16	5000	2.50	8800	3.37	12600	4.22	16500	5.04
1300	1.21	5100	2.51	8900	3.39	12700	4.23	16600	5.06
1400	1.26	5200	2.55	9000	3.45	12800	4.28	16700	5.17
1500	1.31	5300	2.56	9100	3.46	12900	4.26	16800	5.16
1600	1.35	5400	2.59	9200	3.47	13000	4.28	16900	5.19
1700	1.39	5500	2.62	9300	3.46	13100	4.28	17000	5.23
1800	1.44	5600	2.65	9400	3.50	13200	4.28	17100	5.30
1900	1.47	5700	2.67	9500	3.50	13300	4.29	17200	5.26
2000	1.52	5800	2.71	9600	3.53	13400	4.34	17300	5.30
2100	1.55	5900	2.72	9700	3.52	13500	4.31	17400	5.30
2200	1.60	6000	2.73	9800	3.54	13600	4.35	17500	5.36
2300	1.63	6100	2.76	9900	3.56	13700	4.36	17600	5.40
2400	1.67	6200	2.78	10000	3.57	13800	4.37	17700	5.47
2500	1.70	6300	2.81	10100	3.60	13900	4.41	17800	5.56
2600	1.74	6400	2.85	10200	3.69	14000	4.42	17900	5.45
2700	1.78	6500	2.87	10300	3.69	14100	4.45	18000	5.47
2800	1.83	6600	2.87	10400	3.67	14200	4.49		
2900	1.85	6700	2.90	10500	3.70	14300	4.55		
3000	1.89	6800	2.91	10600	3.70	14400	4.62		
3100	1.92	6900	2.96	10700	3.76	14600	4.54		
3200	1.96	7000	2.99	10800	3.88	14700	4.58		
3300	1.99	7100	3.01	10900	3.88	14800	4.57		
3400	2.03	7200	3.04	11000	3.85	14900	4.65		
3500	2.06	7300	3.08	11100	3.85	15000	4.64		

Cable loss
Microwave Cable Assembly, 18 GHz, 6.4 m, SMA – SMA, Huber-Suhner, model 198-9155-00
HL 3123

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.11	3600	1.97	7400	3.12	11200	3.90	15100	4.74
30	0.17	3700	1.97	7500	3.13	11300	3.93	15200	4.70
50	0.25	3800	2.03	7600	3.16	11400	3.88	15300	4.73
100	0.32	3900	2.04	7700	3.18	11500	3.87	15400	4.78
200	0.46	4000	2.10	7800	3.20	11600	3.90	15500	4.75
300	0.58	4100	1.97	7900	3.23	11700	3.86	15600	4.76
400	0.65	4200	1.97	8000	3.25	11800	3.88	15700	4.75
500	0.74	4300	2.03	8100	3.26	11900	3.86	15800	4.78
600	0.82	4400	2.04	8200	3.28	12000	3.89	15900	4.79
700	0.89	4500	2.10	8300	3.31	12100	3.94	16000	4.73
800	0.95	4600	1.97	8400	3.31	12200	3.92	16100	4.78
900	1.01	4700	1.97	8500	3.32	12300	3.96	16200	4.84
1000	1.07	4800	2.03	8600	3.34	12400	4.01	16300	4.90
1100	1.11	4900	2.04	8700	3.35	12500	4.07	16400	4.87
1200	1.17	5000	2.10	8800	3.37	12600	4.08	16500	4.90
1300	1.22	5100	2.53	8900	3.39	12700	4.17	16600	4.98
1400	1.27	5200	2.55	9000	3.42	12800	4.26	16700	5.05
1500	1.29	5300	2.60	9100	3.43	12900	4.16	16800	5.04
1600	1.35	5400	2.61	9200	3.51	13000	4.21	16900	5.02
1700	1.40	5500	2.64	9300	3.52	13100	4.24	17000	5.09
1800	1.44	5600	2.70	9400	3.54	13200	4.27	17100	5.07
1900	1.51	5700	2.67	9500	3.63	13300	4.31	17200	5.10
2000	1.49	5800	2.71	9600	3.61	13400	4.33	17300	5.13
2100	1.55	5900	2.74	9700	3.71	13500	4.25	17400	5.23
2200	1.58	6000	2.80	9800	3.66	13600	4.27	17500	5.21
2300	1.62	6100	2.79	9900	3.77	13700	4.33	17600	5.22
2400	1.72	6200	2.81	10000	3.75	13800	4.33	17700	5.36
2500	1.76	6300	2.83	10100	3.77	13900	4.31	17800	5.35
2600	1.78	6400	2.86	10200	3.80	14000	4.30	17900	5.45
2700	1.80	6500	2.88	10300	3.79	14100	4.30	18000	5.43
2800	1.86	6600	2.90	10400	3.87	14200	4.31		
2900	1.90	6700	2.92	10500	3.83	14300	4.37		
3000	1.90	6800	2.98	10600	3.88	14400	4.35		
3100	1.97	6900	2.98	10700	3.86	14600	4.53		
3200	1.97	7000	3.00	10800	3.87	14700	4.50		
3300	2.03	7100	3.02	10900	3.90	14800	4.62		
3400	2.04	7200	3.04	11000	3.84	14900	4.65		
3500	2.10	7300	3.06	11100	3.88	15000	4.79		

Cable loss
Cable coaxial, RG-214/U, N type-N type, 17 m
Teldor, HL 3612

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

14 APPENDIX F Abbreviations and acronyms

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

END OF DOCUMENT