

TEST REPORT

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

FOR:

Vishay Israel Ltd.

**Remote Wireless Load Cell
of Jack Point Wireless
Aircraft Weighing System
Model: Jetway-W node**

This report is in conformity with ISO/ IEC 17025. The "A2LA Accredited" symbol endorsement applies only to the tests and calibrations that are listed in the scope of Hermon Laboratories accreditation. The test results relate only to the items tested.
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1 Applicant information

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Telephone: +972 3634 4131
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E-mail: dania@rfwaves.com
Contact name: Mr. Dani Alon

2 Equipment under test attributes

Product name: Remote wireless load cell of Jack Point Wireless Aircraft Weighing System
Product type: Transceiver
Model(s): Jetway-W node
Serial number: 5
Hardware version: 1
Software release: 1
Receipt date: 12/19/2006

3 Manufacturer information

Manufacturer name: Vishay Israel Ltd.
Address: RF Waves division, 1c Yoni Netanyahu street, Or Yehuda 60376, Israel
Telephone: +972 3634 4131
Fax: +972 3634 4130
E-Mail: dania@rfwaves.com
Contact name: Mr. Dani Alon

4 Test details




Project ID: 17617
Location: Hermon Laboratories Ltd., Harakevet Industrial Zone, Binyamina 30500, Israel
Test started: 12/19/2006
Test completed: 5/03/2007
Test specification(s): FCC 47CFR part 15, subpart C §15.247 and subpart B

5 Tests summary

Test	Status
Transmitter characteristics	
Section 15.247(a)2, 6 dB bandwidth	Pass
Section 15.247(b)3, Peak output power	Pass
Section 15.247(b)5, RF exposure	Pass
Section 15.247(c), Conducted spurious emissions	Pass
Section 15.247(c), Radiated spurious emissions	Pass
Section 15.247(d), Peak power density	Pass
Section 15.207(a), Conducted emission	Pass
Section 15.203, Antenna requirement	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	Not required

Testing was completed against all relevant requirements of the test standard. 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:VSHRAD_FCC.17617_N_rev1.

	Name and Title	Date	Signature
Tested by:	Mr. A. Lane, test engineer	May 3, 2007	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	May 21, 2007	
Approved by:	Mr. M. Nikishin, EMC and radio group leader	May 29, 2007	

6 EUT description

6.1 General information

The EUT is a Jack Point Wireless Aircraft Weighing System including a user terminal (master) communicated with up to five remote wireless load cells (slaves). The EUT is powered from internal battery or from AC mains via AC/DC adapter. The EUT powered from AC mains via AC/DC adapters was tested as the worst case.

The master operates in transceive and standby modes. The slave operates in transceive and receive modes.

6.2 Ports and lines

Port type	Port description	Connected		Connector type	Qty.	Cable type	Cable length	Indoor / outdoor
		From	To					
Power	DC power	Master	AC/DC adapter	DC jack	1	Unshielded	1.5 m	Indoor
Power	AC mains	AC/DC adapter	AC mains	2-pole wall-outlet	1	NA	NA	Indoor
Signal	RS 232	Master	Open circuit	D type 9 pin	1	Shielded	10 m	Indoor
RF	Antenna	Master	Antenna	SMA	2	NA	NA	Indoor
Power	DC power	Slave	AC/DC adapter	DC jack	1	Unshielded	1.5 m	Indoor
Power	AC mains	AC/DC adapter	AC mains	2-pole wall-outlet	1	NA	NA	Indoor
RF	Antenna	Slave	Antenna	SMA	2	NA	NA	Indoor

6.3 Power adapters

Description	Manufacturer	Model number	Serial number
AC/DC adapter of master	Delta Electronics	EADP-10BB	592A601Z9SIOK4
AC/DC adapter of slave	EDACPOWER ELEC.	EA1015AR	1312D1015ARI

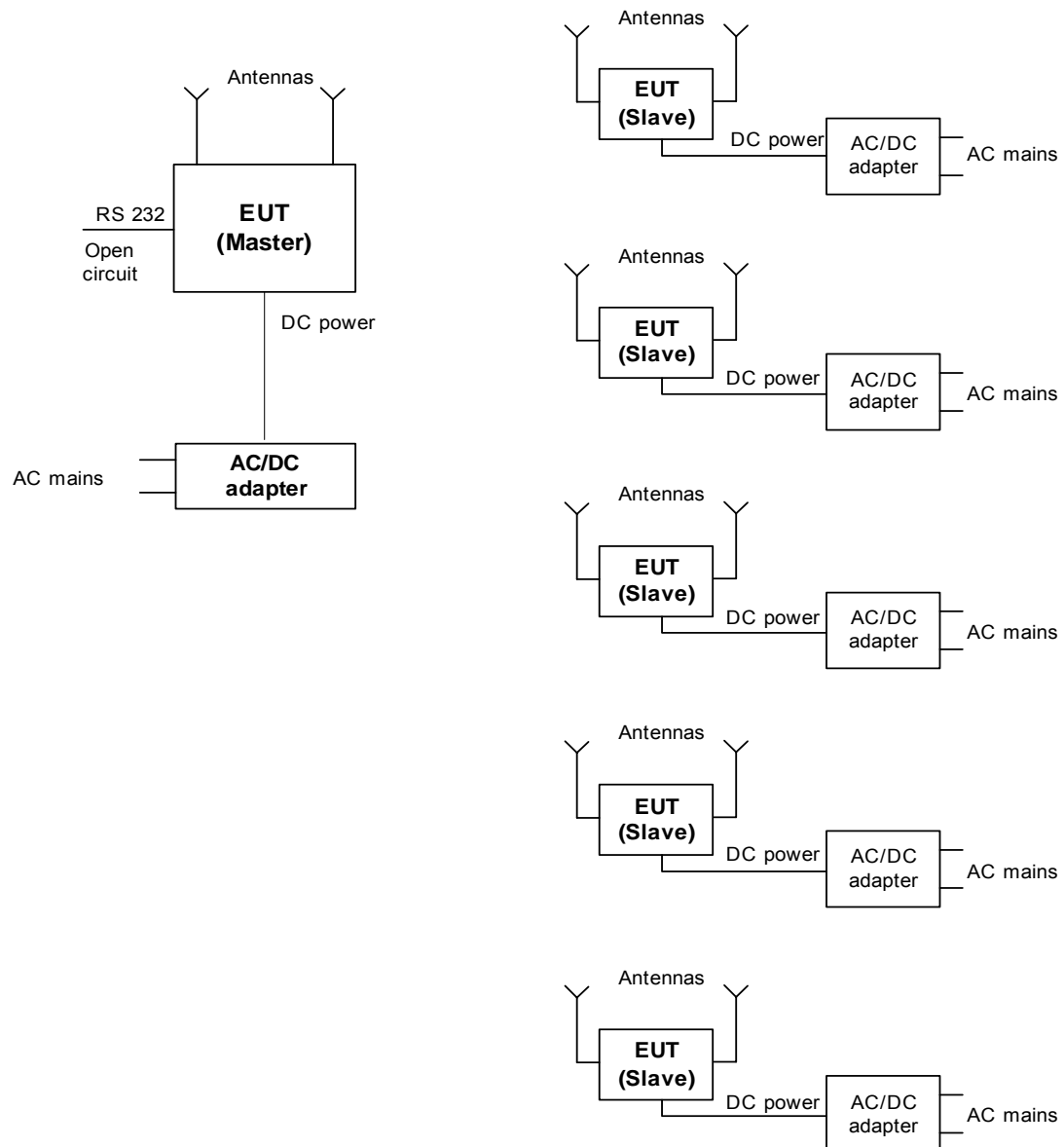
6.4 Operating frequencies

Source	Frequency, MHz
Oscillator	24
Tx/Rx	2424 - 2456

6.5 Changes made in EUT

No changes were implemented.

6.6 Test configuration



6.7 Transmitter characteristics

Type of equipment						
X	Stand-alone (Equipment with or without its own control provisions)					
	Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)					
	Plug-in card (Equipment intended for a variety of host systems)					
Intended use		Condition of use				
	fixed	Always at a distance more than 2 m from all people				
X	mobile	Always at a distance more than 20 cm from all people				
	portable	May operate at a distance closer than 20 cm to human body				
Assigned frequency range		2400 – 2483.5 MHz				
Operating frequency range		2424 -2456 MHz				
RF channel spacing		NA				
Maximum peak output power		At transmitter 50 Ω RF output connector			16.4 dBm	
		Effective radiated power (for equipment with no RF connector)				
Is transmitter output power variable?		X	No			
			Yes	continuous variable		
				stepped variable with stepsize		
Antenna connection						
X	unique coupling	standard connector	integral	with temporary RF connector		
				without temporary RF connector		
Antenna/s technical characteristics						
Type	Manufacturer		Model number		Gain	
Dipole	WANSIH Electronics		NA		2 dBi	
Transmitter 99% power bandwidth		22 MHz				
Transmitter aggregate data rate/s		3 Mbps				
Type of modulation		OOK				
Type of multiplexing		TDMA				
Maximum transmitter duty cycle in normal use		0.14 % (slave)	Tx ON time	0.054 msec	Period 40 msec	
Transmitter power source						
X	Battery	Nominal rated voltage	1) 4.2 V	Battery type	Lithium	
X	DC	Nominal rated voltage	2) DC from AC/DC adapter			
	AC mains	Nominal rated voltage		Frequency		
Common power source for transmitter and receiver			X	yes	no	
Spread spectrum technique used			Digital transmission system (DTS)			

Test specification:		Section 15.247(a)2, 6 dB bandwidth	
Test procedure:		FCC New Guidance on Measurements for DTS in section 15.247(a)(2)	
Test mode:		Compliance	Verdict: PASS
Date & Time:		12/24/2006 1:09:51 PM	
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

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

7.1 Minimum 6 dB bandwidth

7.1.1 General

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

Table 7.1.1 The 6 dB bandwidth limits

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

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

7.1.2 Test procedure

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

7.1.2.2 The EUT was set to transmit modulated carrier.

7.1.2.3 The transmitter minimum 6 dB bandwidth was measured with spectrum analyzer RBW=100 kHz as frequency delta between reference points on modulation envelope and provided in Table 7.1.2 and associated plots.

Figure 7.1.1 The 6 dB bandwidth test setup





Test specification:		Section 15.247(a)2, 6 dB bandwidth	
Test procedure:		FCC New Guidance on Measurements for DTS in section 15.247(a)(2)	
Test mode:		Compliance	Verdict: PASS
Date & Time:		12/24/2006 1:09:51 PM	
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

Table 7.1.2 The 6 dB bandwidth test results

ASSIGNED FREQUENCY BAND: 2400-2483.5 MHz
DETECTOR USED: Peak
SWEEP MODE: Single
SWEEP TIME: Auto
RESOLUTION BANDWIDTH: 100 kHz
VIDEO BANDWIDTH: 300 kHz
MODULATION ENVELOPE REFERENCE POINTS: 6.0 dBc
MODULATION: OOK
MODULATING SIGNAL: ID CODE
BIT RATE: 3 Mbps

Carrier frequency, MHz	6 dB bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
Low frequency				
2424	9062	500	-8562	Pass
High frequency				
2456	7950	500	-7450	Pass

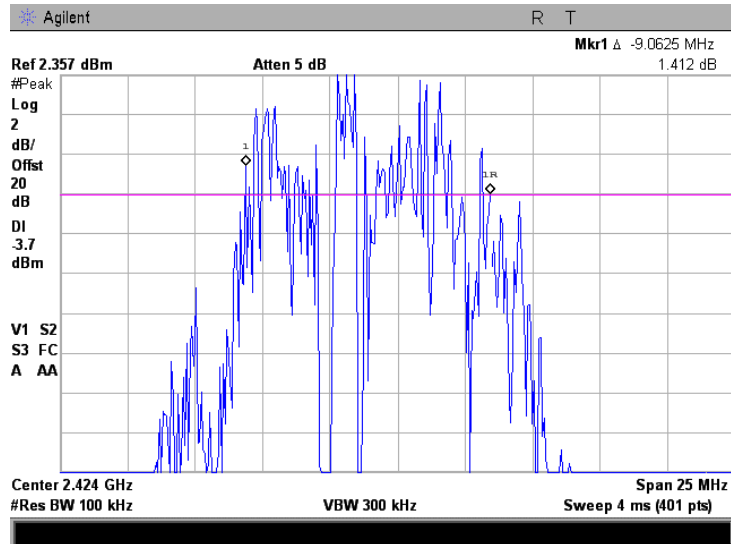
Reference numbers of test equipment used

HL 2866	HL 2909							
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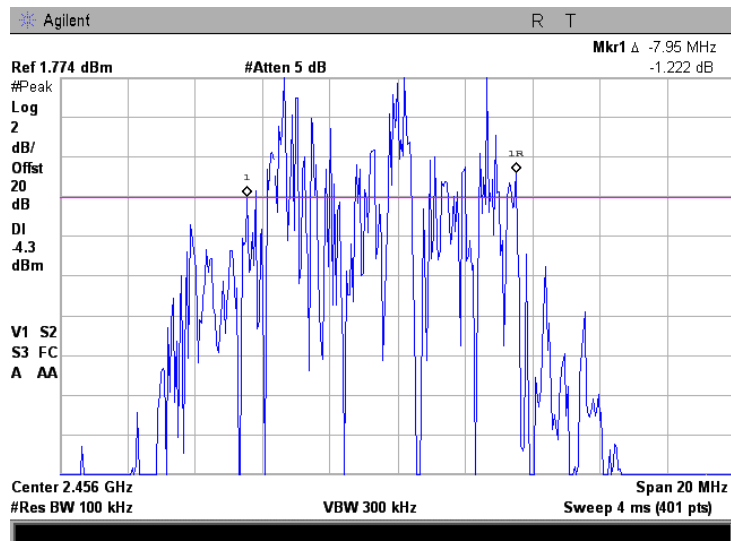
Full description is given in Appendix A.

Test specification:	Section 15.247(a)2, 6 dB bandwidth		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(a)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/24/2006 1:09:51 PM		
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

Plot 7.1.1 The 6 dB bandwidth test result at low frequency



Plot 7.1.2 The 6 dB bandwidth test result at high frequency



Test specification:		Section 15.247(b)3, Peak output power	
Test procedure:		FCC New Guidance on Measurements for DTS in section 15.247(b), Option 2, Method #3	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/20/2006 10:50:24 AM		
Temperature: 20°C	Air Pressure: 1012 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: slave unit			

7.2 Peak output power

7.2.1 General

This test was performed to measure the maximum peak output power at the transmitter RF antenna connector. Specification test limits are given in Table 7.2.1.

Table 7.2.1 Peak output power limits

Assigned frequency range, MHz	Maximum antenna gain, dBi	Peak output power*	
		W	dBm
902.0 – 928.0	6.0	1.0	30.0
2400.0 – 2483.5			
5725.0 – 5850.0			

*- If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power limit shall be reduced below the stated value as follows:

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

7.2.2 Test procedure

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

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

7.2.2.3 The 1 MHz resolution bandwidth of spectrum analyzer was set, video averaging with max hold and sum across the band were used. Since the transmitter pulse duration (T) is about 0.054 msec (refer to plot 7.4.42), a VBW of 1/T =30 kHz was used for averaging and the maximum peak output power was measured as provided in Table 7.2.2 and associated plots.

Figure 7.2.1 Peak output power test setup





Test specification:		Section 15.247(b)3, Peak output power	
Test procedure:		FCC New Guidance on Measurements for DTS in section 15.247(b), Option 2, Method #3	
Test mode:		Compliance	Verdict: PASS
Date & Time:		12/20/2006 10:50:24 AM	
Temperature: 20°C	Air Pressure: 1012 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: slave unit			

Table 7.2.2 Peak output power test results

ASSIGNED FREQUENCY: 2400 - 2483.5 MHz
 MODULATION: OOK
 MODULATING SIGNAL: ID CODE
 BIT RATE: 3 Mbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 DETECTOR USED: Peak
 EUT 26 dB BANDWIDTH: 22 MHz
 RESOLUTION BANDWIDTH: 1 MHz
 VIDEO BANDWIDTH: =>1/Ton=30 kHz

Carrier frequency MHz	Spectrum analyzer reading, dBm	External attenuation dB	Cable loss dB	Peak output power** dBm	Limit, dBm	Margin*, dB	Verdict
2424	2.946	included	included	16.37	30	-13.62	Pass
2456	2.073	included	included	15.49	30	-14.51	Pass

* - Margin = Peak output power – specification limit.

** - Peak power over EBW = S.A reading + 10 log(EBW/1MHz)

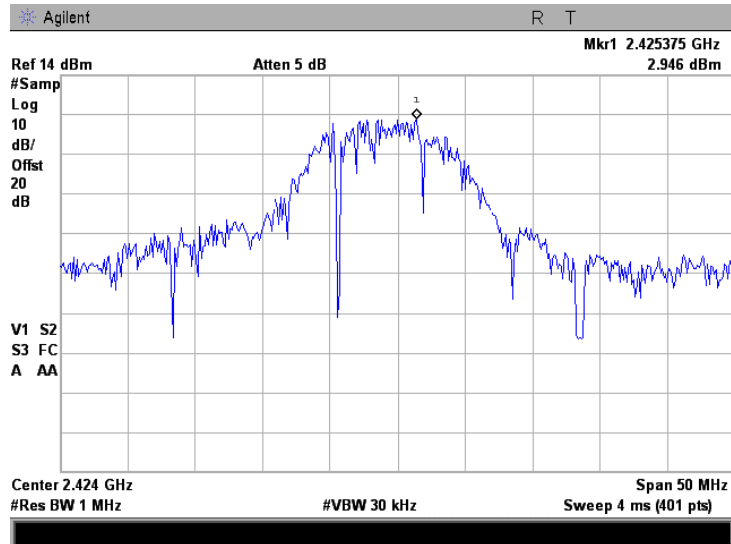
Reference numbers of test equipment used

HL 2866	HL 2909					
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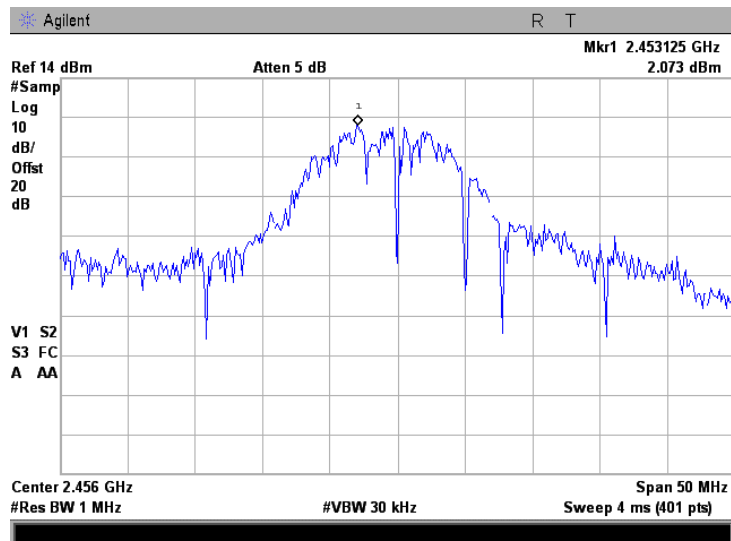
Full description is given in Appendix A.

Test specification:	Section 15.247(b)3, Peak output power		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(b), Option 2, Method #3		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/20/2006 10:50:24 AM		
Temperature: 20°C	Air Pressure: 1012 hPa	Relative Humidity: 48%	Power Supply: 120 V AC
Remarks: slave unit			

Plot 7.2.1 Peak output power at low frequency



Plot 7.2.2 Peak output power at high frequency



Test specification:		Section 15.247(c), Conducted spurious emissions	
Test procedure:		FCC New Guidance on Measurements for DTS in section 15.247(c)	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/24/2006 4:30:51 PM		
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

7.3 Spurious emissions at RF antenna connector

7.3.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 7.3.1.

Table 7.3.1 Spurious emission limits

Frequency*, MHz	Attenuation below carrier**, dBc
0.009 – 10 th harmonic	30.0

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

** - Spurious emission limit is provided in terms of attenuation below the peak of modulated carrier based on the use of RMS averaging over a time interval.

7.3.2 Test procedure

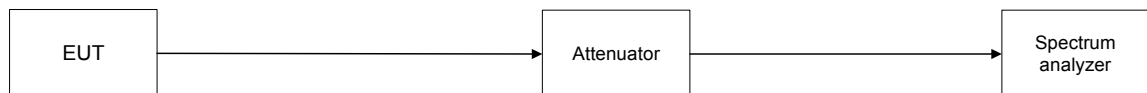
7.3.2.1 The EUT was set up as shown in Figure 7.3.1, energized and its proper operation was checked.

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

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

7.3.2.4 The spurious emission was measured with spectrum analyzer settings as provided in Table 7.3.2 and associated plots and referenced to the highest emission level measured within the authorized band.

Figure 7.3.1 Spurious emission test setup





Test specification:		Section 15.247(c), Conducted spurious emissions	
Test procedure:		FCC New Guidance on Measurements for DTS in section 15.247(c)	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/24/2006 4:30:51 PM		
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

Table 7.3.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 2400-2483.5 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 25000 MHz
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 100 kHz
 VIDEO BANDWIDTH: 300 kHz
 MODULATION: OOK
 MODULATING SIGNAL: ID CODE
 BIT RATE: 3Mbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 TRANSMITTER OUTPUT POWER: 16.37 dBm at low carrier frequency
 15.49 dBm at high carrier frequency

Frequency, MHz	Spurious emission, dBm	Emission at carrier, dBm	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict
All carrier frequencies						
All spurious are 30 dB below limit						Pass

*- Margin = Attenuation below carrier – specification limit.

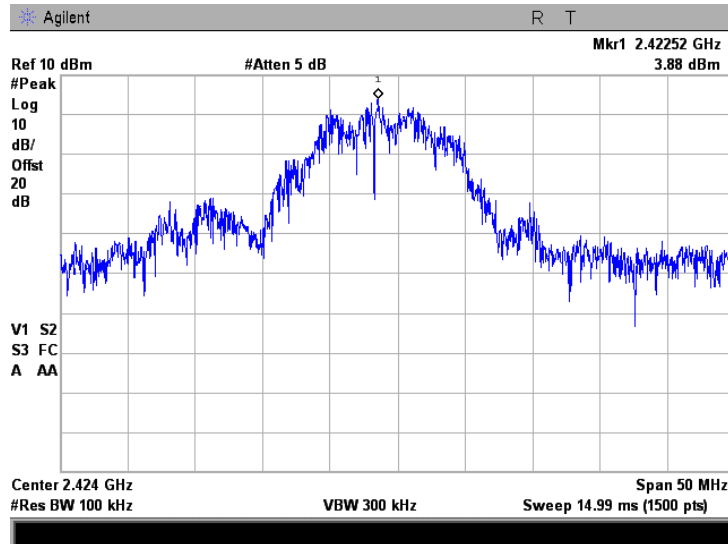
Reference numbers of test equipment used

HL 2254	HL 2909						
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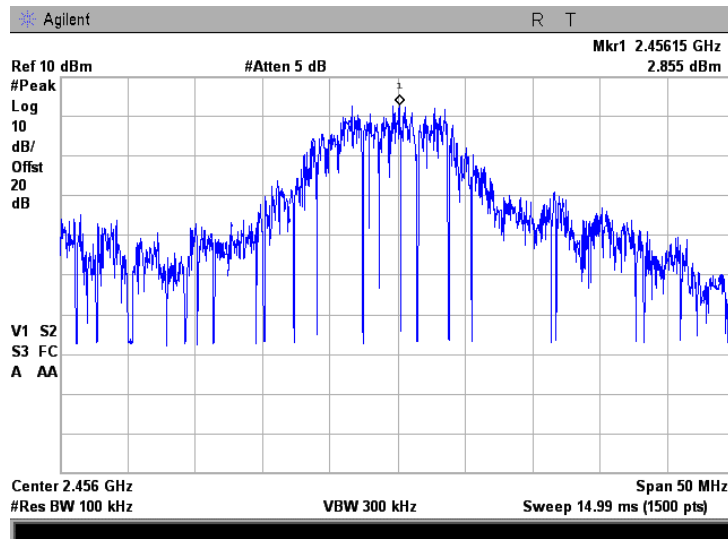
Full description is given in Appendix A.

Test specification:		Section 15.247(c), Conducted spurious emissions	
Test procedure:		FCC New Guidance on Measurements for DTS in section 15.247(c)	
Test mode:		Compliance	Verdict: PASS
Date & Time:		12/24/2006 4:30:51 PM	
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

Plot 7.3.1 The highest emission level within the assigned band at low carrier frequency

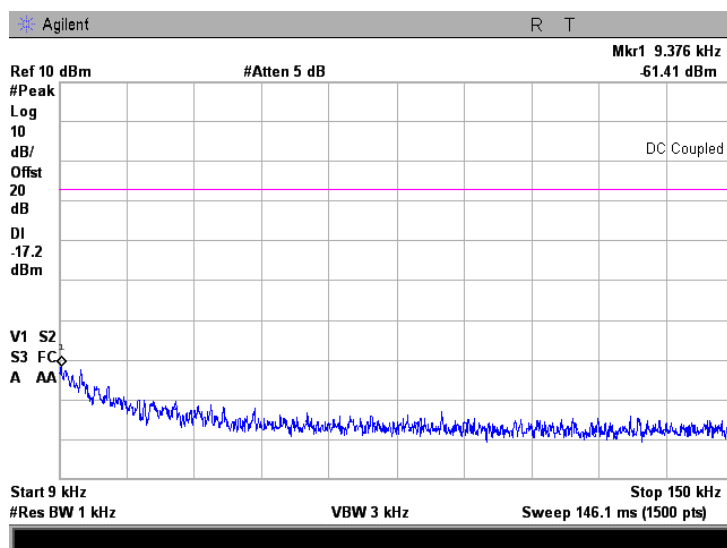


Plot 7.3.2 The highest emission level within the assigned band at high carrier frequency

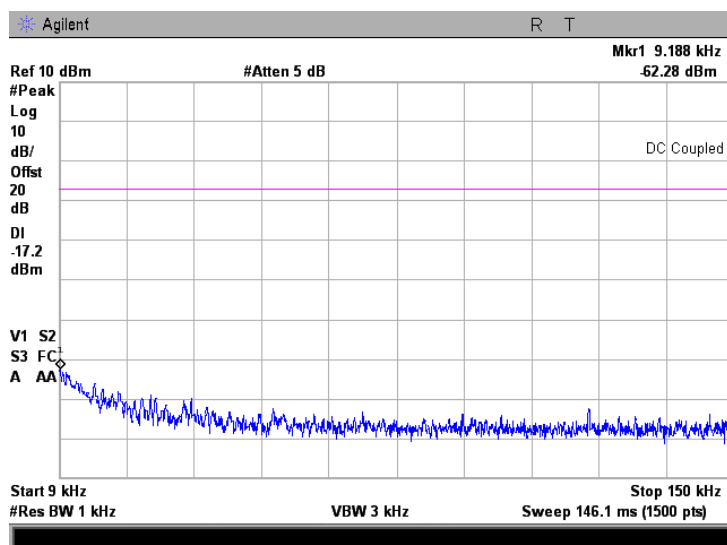


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/24/2006 4:30:51 PM		
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

Plot 7.3.3 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency

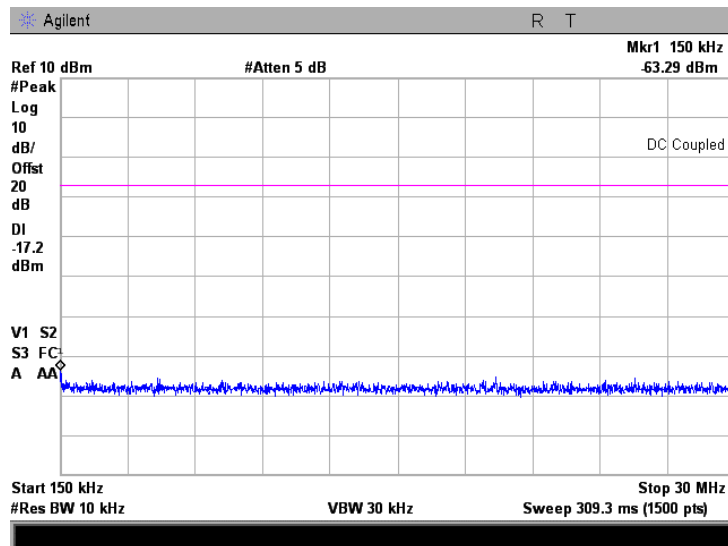


Plot 7.3.4 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency

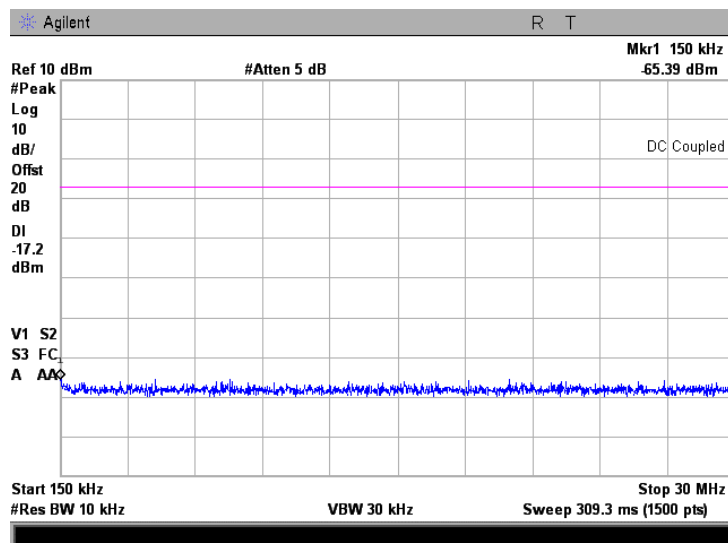


Test specification:		Section 15.247(c), Conducted spurious emissions	
Test procedure:		FCC New Guidance on Measurements for DTS in section 15.247(c)	
Test mode:		Compliance	Verdict: PASS
Date & Time:		12/24/2006 4:30:51 PM	
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

Plot 7.3.5 Spurious emission measurements in 0.15 - 30 MHz range at low carrier frequency

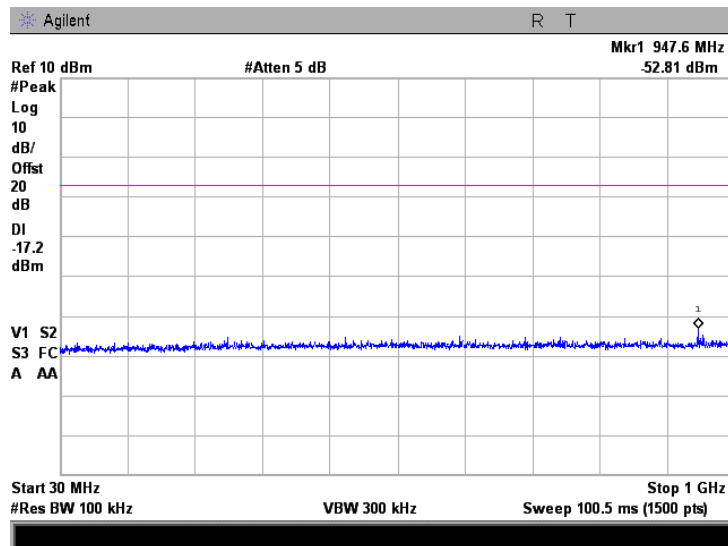


Plot 7.3.6 Spurious emission measurements in 0.15 - 30 MHz range at high carrier frequency

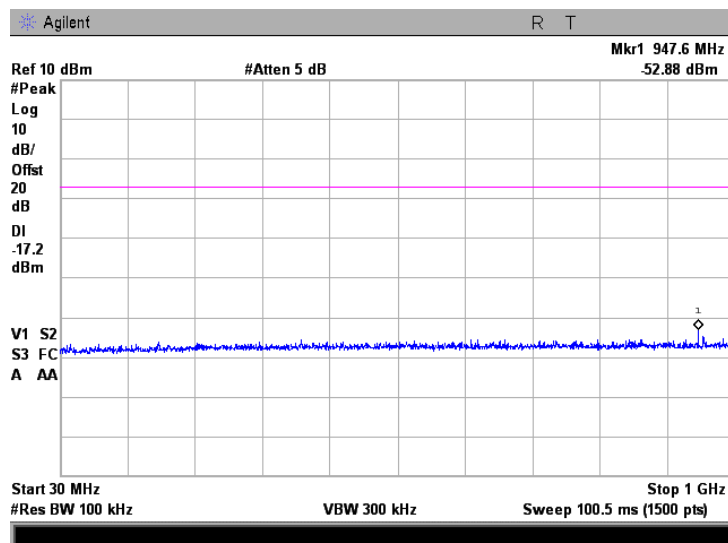


Test specification:		Section 15.247(c), Conducted spurious emissions	
Test procedure:		FCC New Guidance on Measurements for DTS in section 15.247(c)	
Test mode:		Compliance	Verdict: PASS
Date & Time:		12/24/2006 4:30:51 PM	
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

Plot 7.3.7 Spurious emission measurements in 30 - 1000 MHz range at low carrier frequency

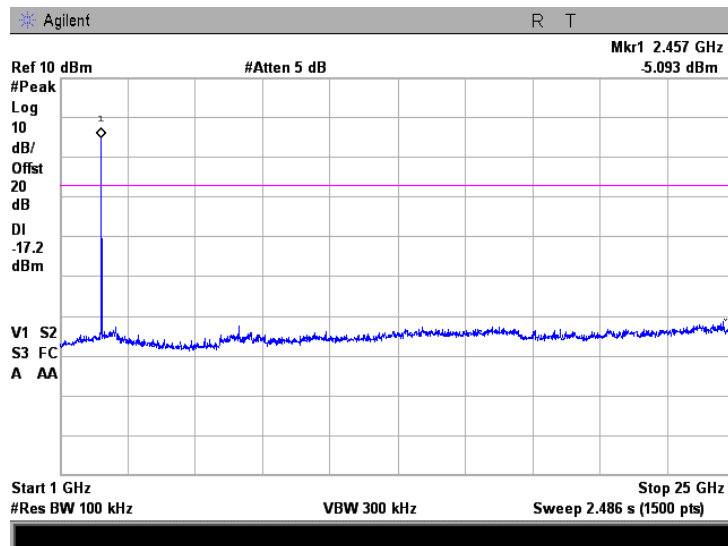


Plot 7.3.8 Spurious emission measurements in 30 - 1000 MHz range at high carrier frequency

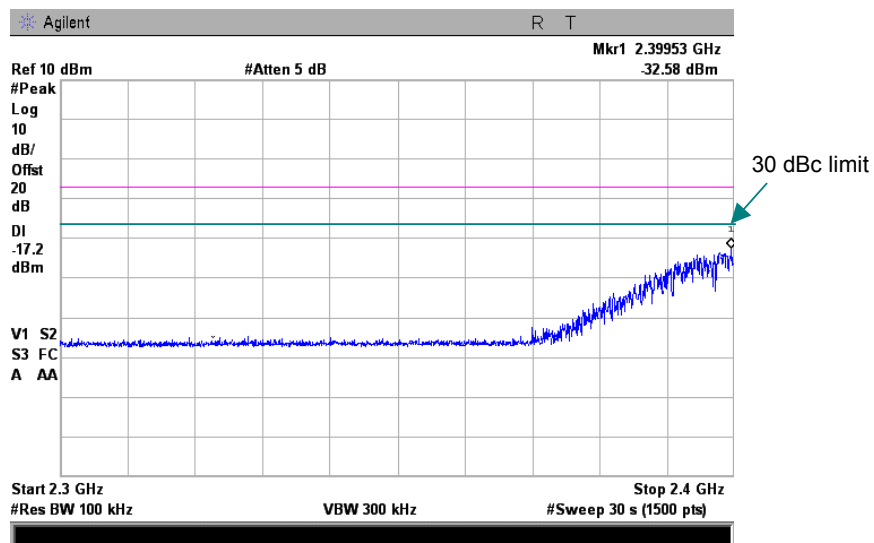


Test specification:		Section 15.247(c), Conducted spurious emissions	
Test procedure:		FCC New Guidance on Measurements for DTS in section 15.247(c)	
Test mode:		Compliance	Verdict: PASS
Date & Time:		12/24/2006 4:30:51 PM	
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

Plot 7.3.9 Spurious emission measurements in 1000 - 25000MHz range at low carrier frequency

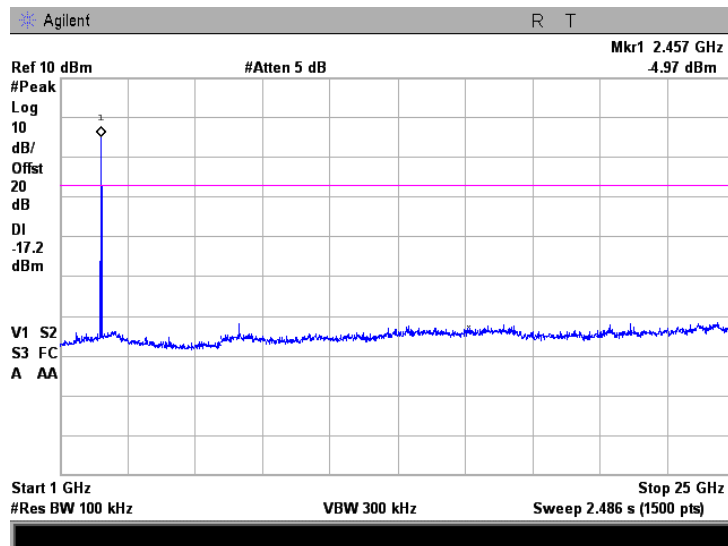


Plot 7.3.10 Spurious emission measurements in 2300 - 2400MHz range at low carrier frequency

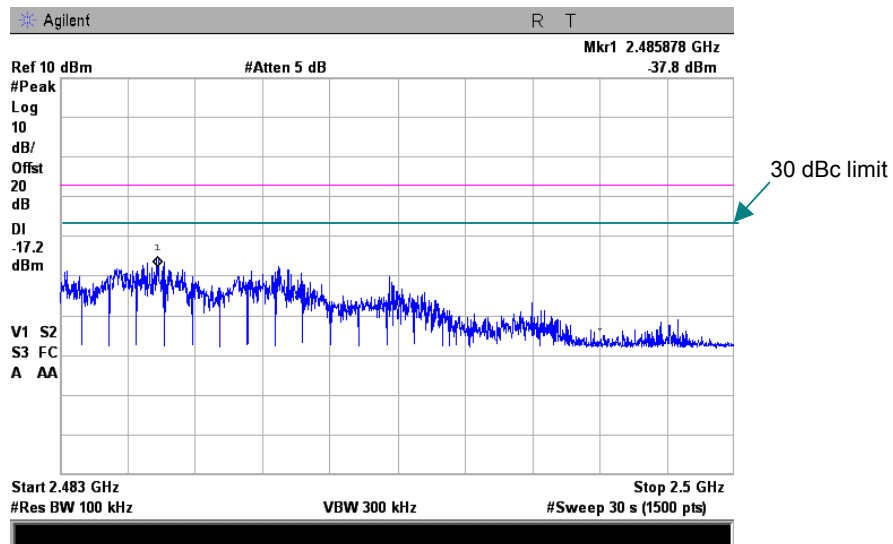


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/24/2006 4:30:51 PM		
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

Plot 7.3.11 Spurious emission measurements in 1000 - 25000MHz range at high carrier frequency

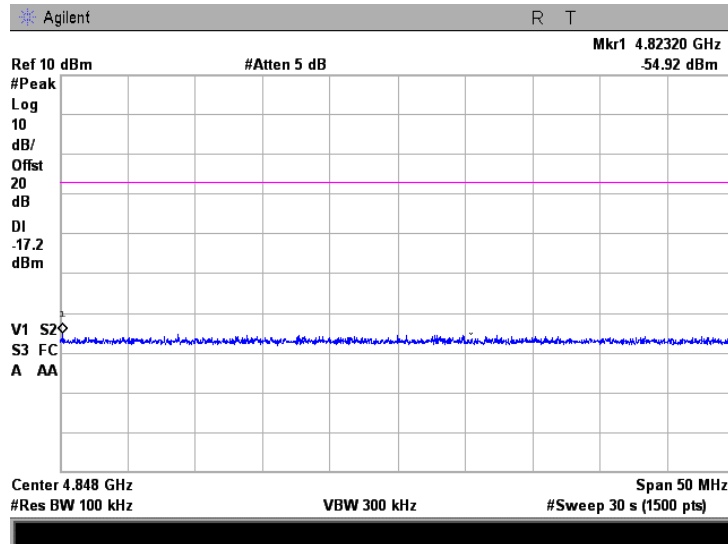


Plot 7.3.12 Spurious emission measurements in 2483.5 - 2500MHz range high carrier frequency

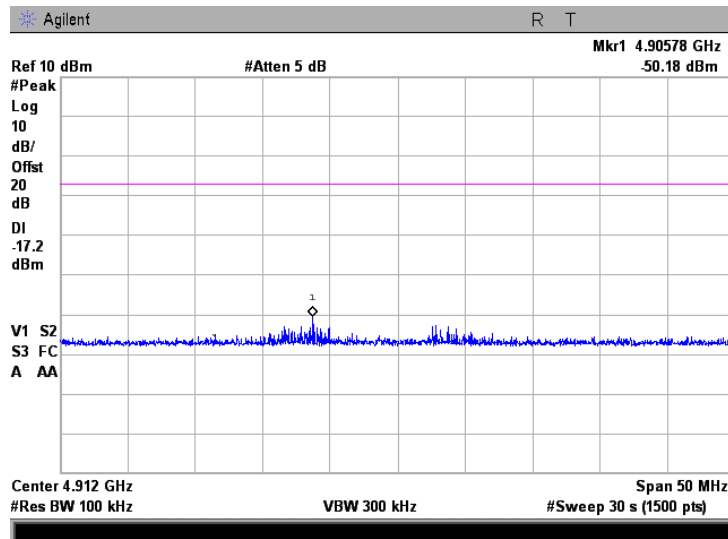


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/24/2006 4:30:51 PM		
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

Plot 7.3.13 Conducted spurious emission measurements at the 2nd harmonic of low carrier frequency

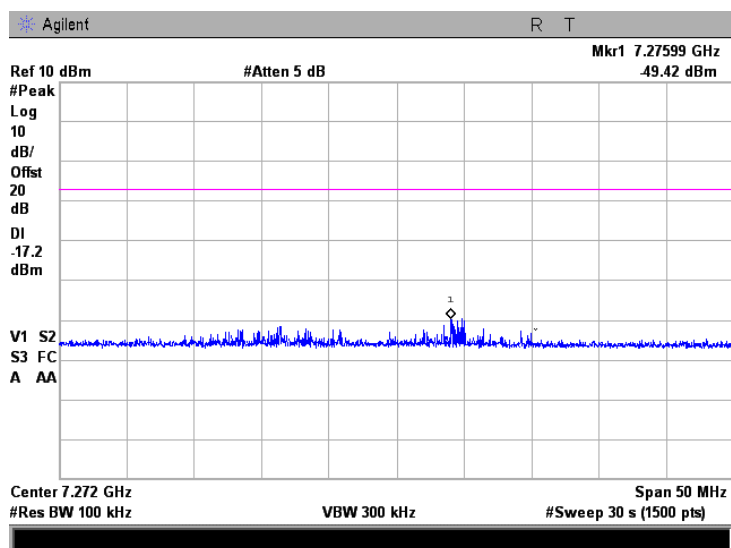


Plot 7.3.14 Conducted spurious emission measurements at the 2nd harmonic of high carrier frequency

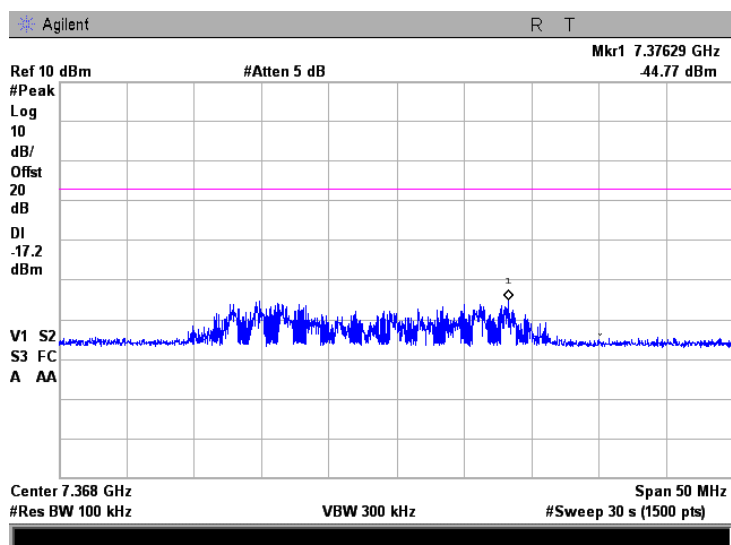


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/24/2006 4:30:51 PM		
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

Plot 7.3.15 Conducted spurious emission measurements at the 3rd harmonic of low carrier frequency

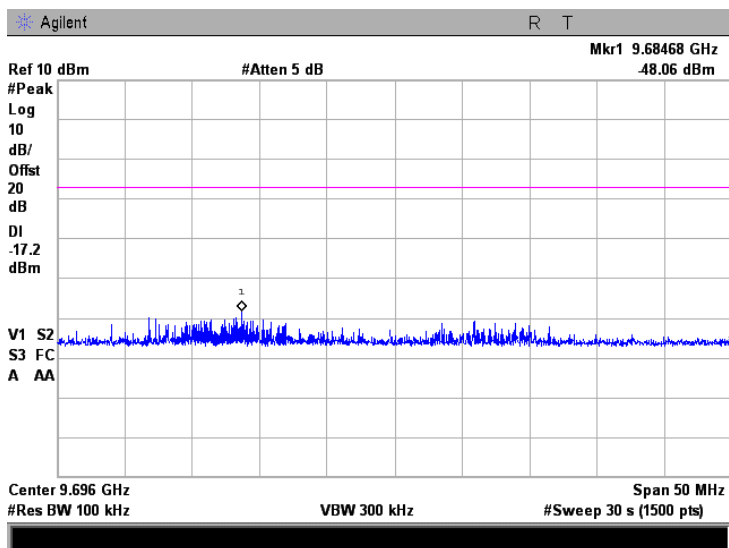


Plot 7.3.16 Conducted spurious emission measurements at the 3rd harmonic of high carrier frequency

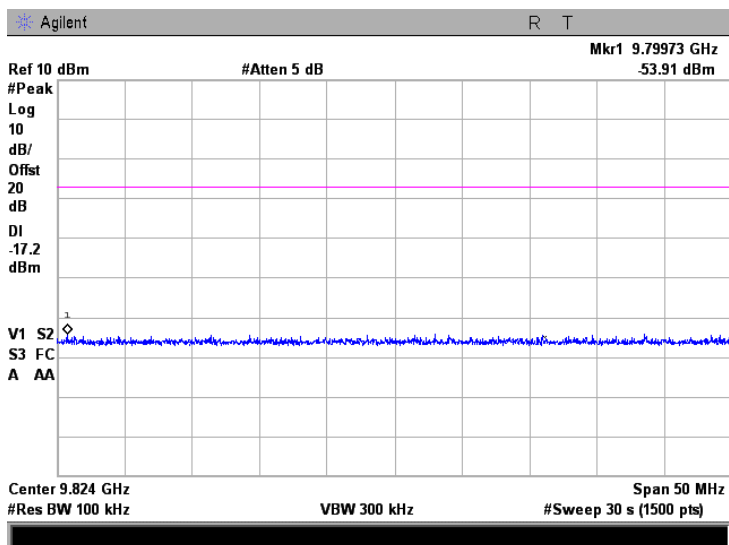


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/24/2006 4:30:51 PM		
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

Plot 7.3.17 Conducted spurious emission measurements at the 4th harmonic of low carrier frequency

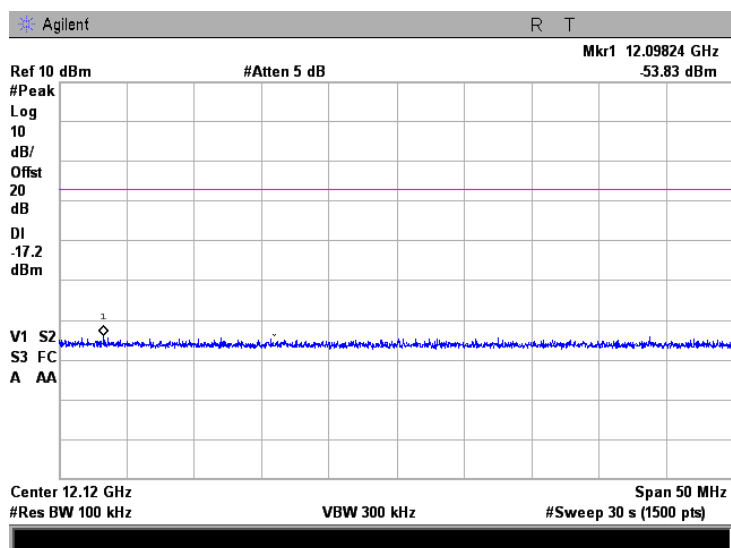


Plot 7.3.18 Conducted spurious emission measurements at the 4th harmonic of high carrier frequency

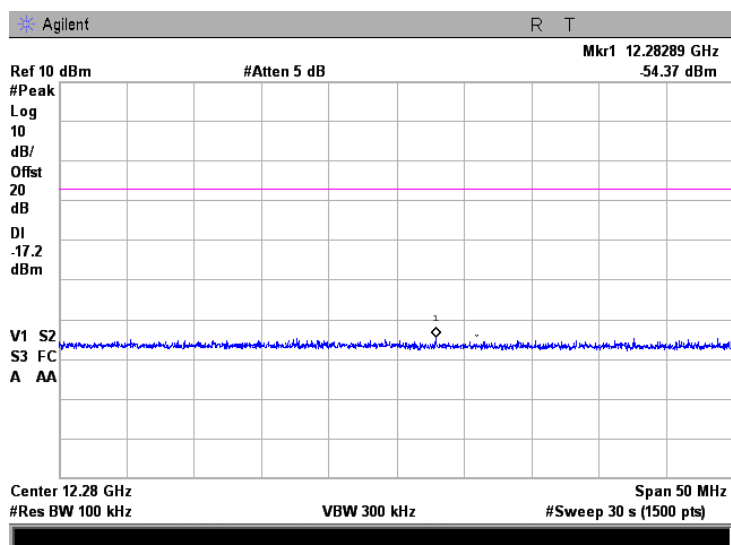


Test specification:		Section 15.247(c), Conducted spurious emissions	
Test procedure:		FCC New Guidance on Measurements for DTS in section 15.247(c)	
Test mode:		Compliance	Verdict: PASS
Date & Time:		12/24/2006 4:30:51 PM	
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

Plot 7.3.19 Conducted spurious emission measurements at the 5th harmonic of low carrier frequency

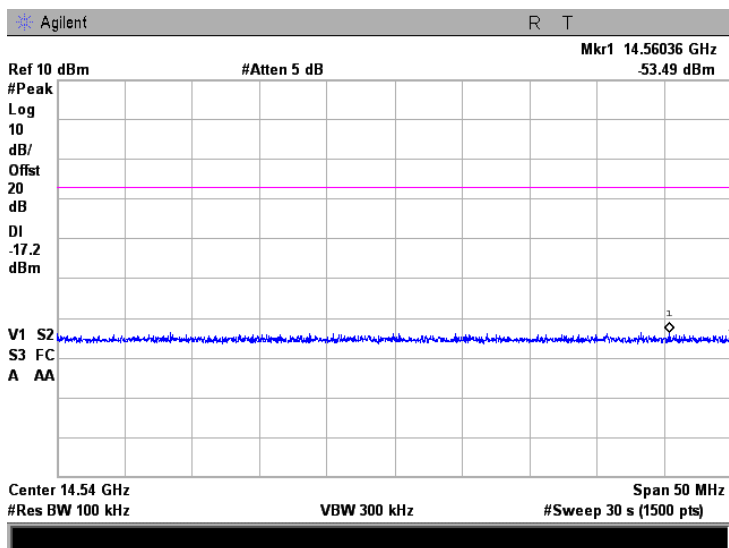


Plot 7.3.20 Conducted spurious emission measurements at the 5th harmonic of high carrier frequency

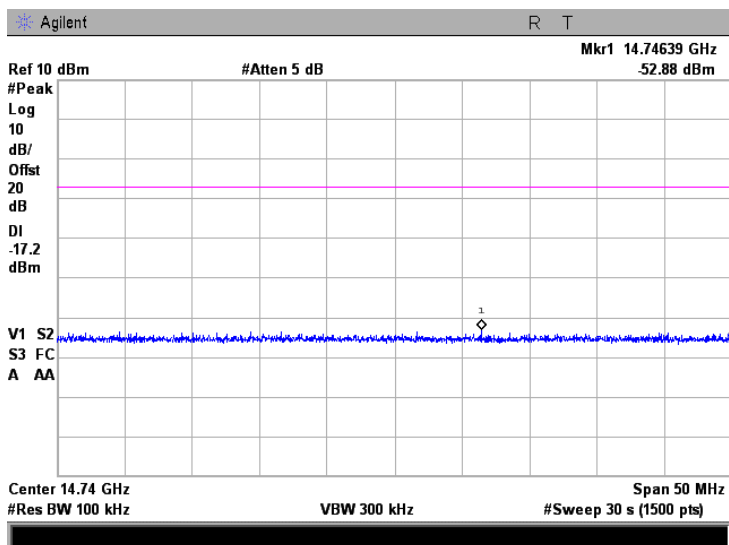


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/24/2006 4:30:51 PM		
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

Plot 7.3.21 Conducted spurious emission measurements at the 6th harmonic of low carrier frequency

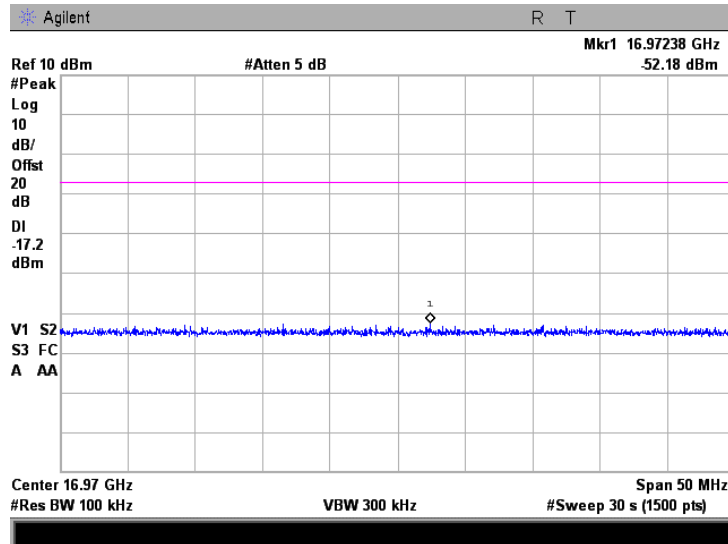


Plot 7.3.22 Conducted spurious emission measurements at the 6th harmonic of high carrier frequency

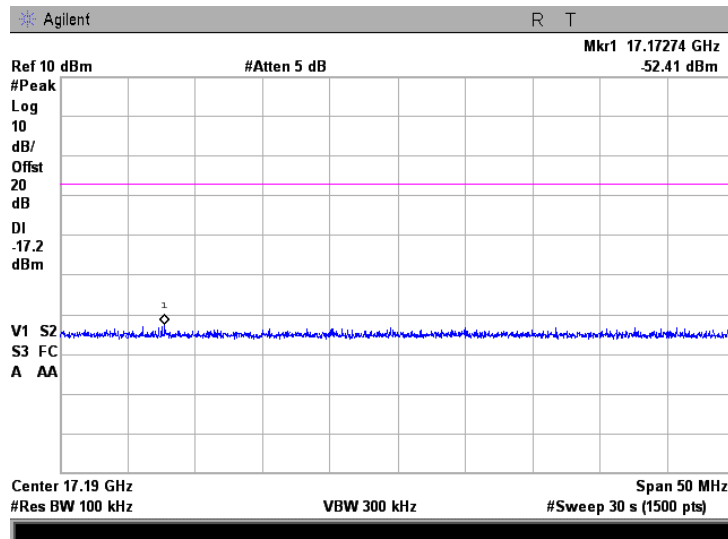


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/24/2006 4:30:51 PM		
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

Plot 7.3.23 Conducted spurious emission measurements at the 7th harmonic of low carrier frequency

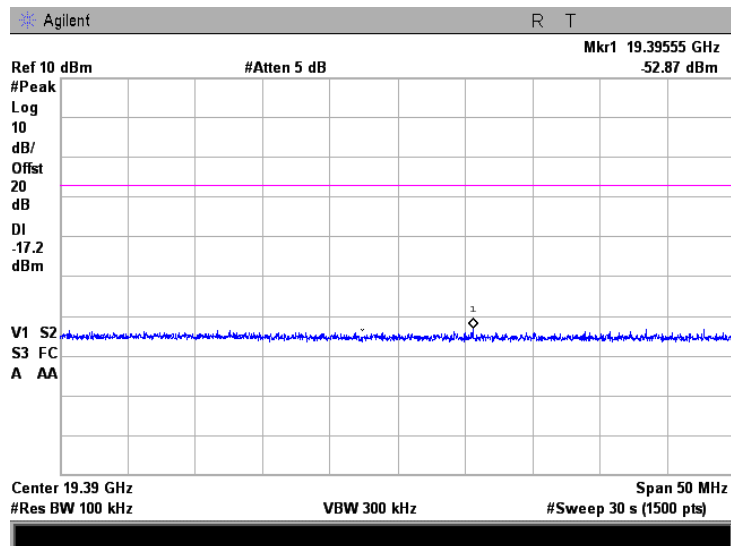


Plot 7.3.24 Conducted spurious emission measurements at the 7th harmonic of high carrier frequency

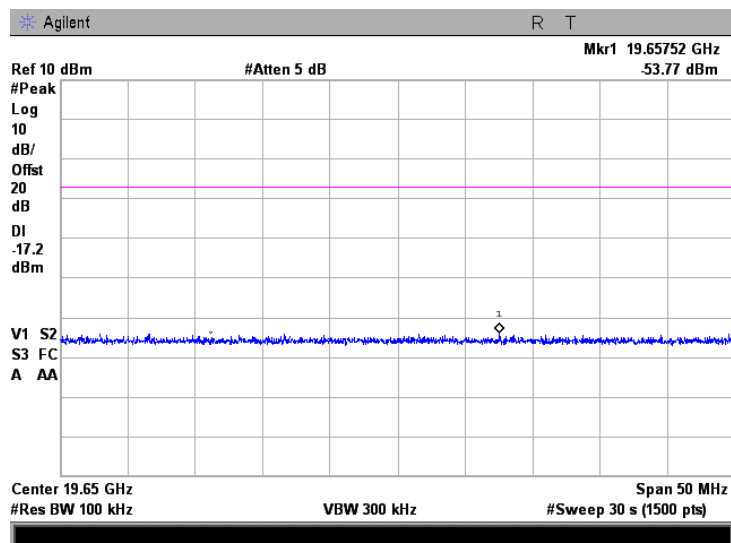


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/24/2006 4:30:51 PM		
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

Plot 7.3.25 Conducted spurious emission measurements at the 8th harmonic of low carrier frequency

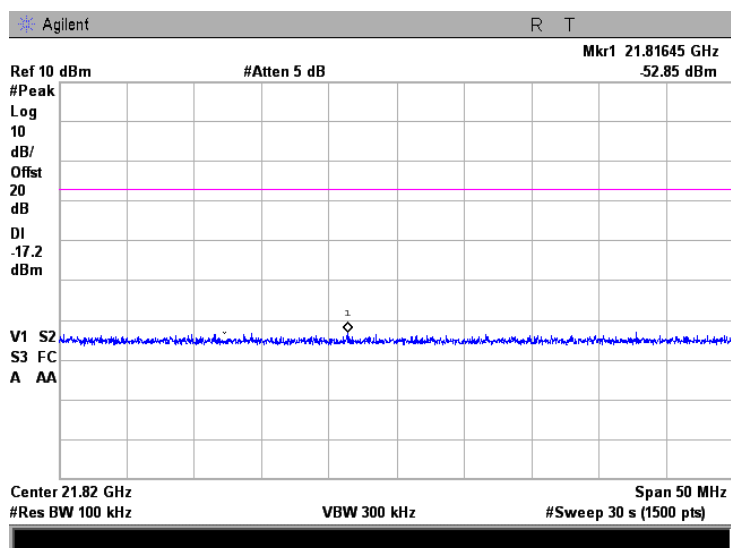


Plot 7.3.26 Conducted spurious emission measurements at the 8th harmonic of high carrier frequency

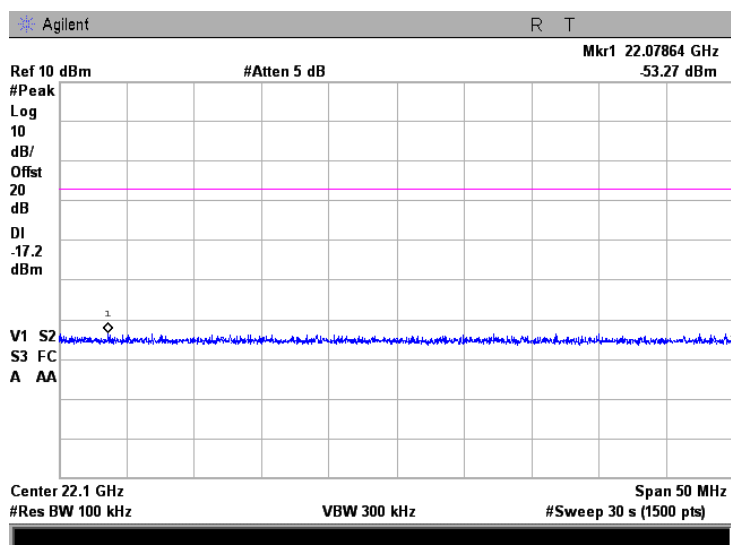


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/24/2006 4:30:51 PM		
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

Plot 7.3.27 Conducted spurious emission measurements at the 9th harmonic of low carrier frequency

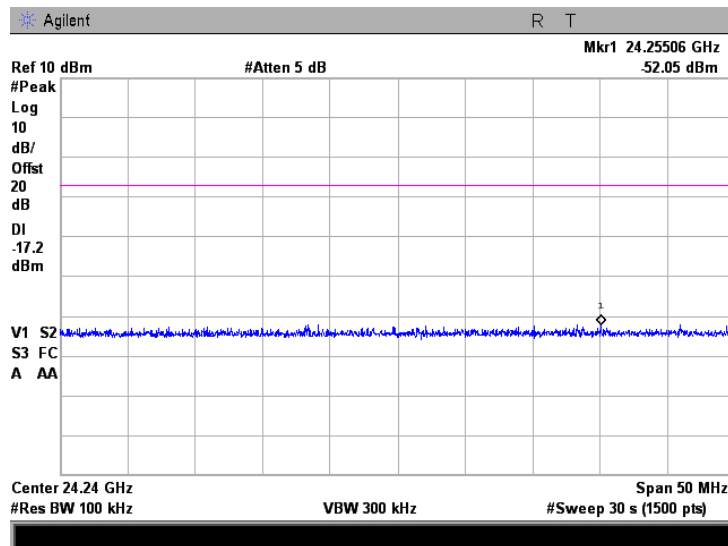


Plot 7.3.28 Conducted spurious emission measurements at the 9th harmonic of high carrier frequency

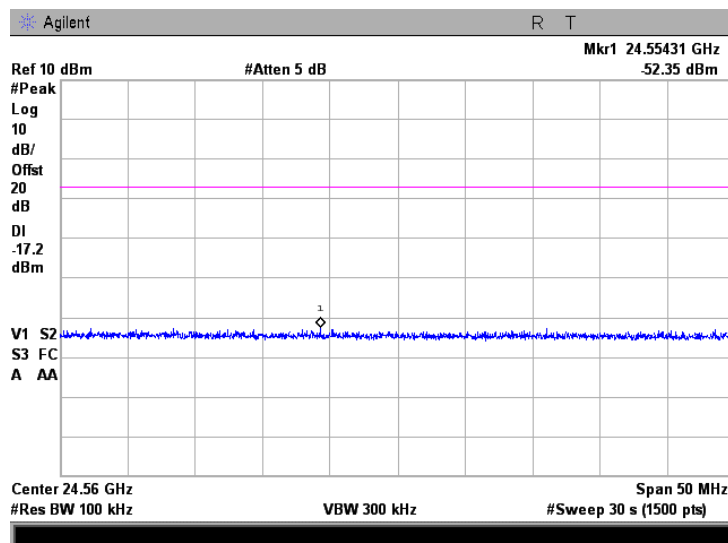


Test specification:	Section 15.247(c), Conducted spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/24/2006 4:30:51 PM		
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

Plot 7.3.29 Conducted spurious emission measurements at the 10th harmonic of low carrier frequency



Plot 7.3.30 Conducted spurious emission measurements at the 10th harmonic of high carrier frequency



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

7.4 Field strength of spurious emissions

7.4.1 General

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

Table 7.4.1 Radiated spurious emissions limits

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

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

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

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

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

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

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

7.4.2.1 The EUT was set up as shown in Figure 7.4.1, energized and the performance check was conducted.

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

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

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

7.4.3.1 The EUT was set up as shown in Figure 7.4.2, energized and the performance check was conducted.

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

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

Test specification:		Section 15.247(c), Radiated spurious emissions	
Test procedure:		FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict: PASS	
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

Figure 7.4.1 Setup for spurious emission field strength measurements below 30 MHz

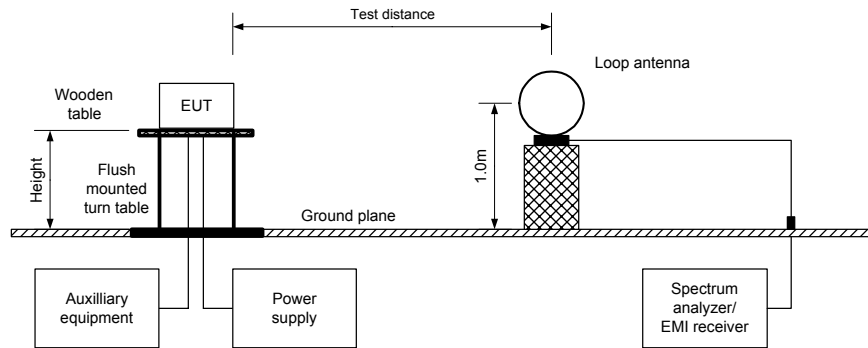
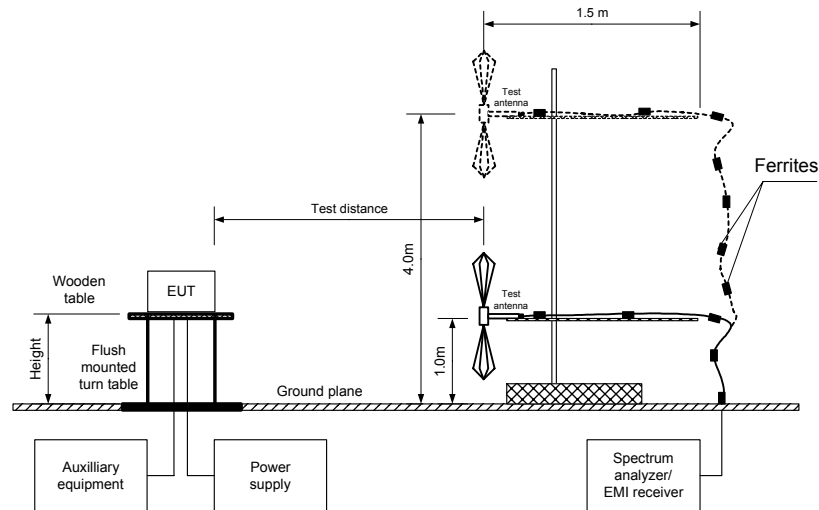


Figure 7.4.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

Table 7.4.2 Field strength of spurious emissions above 1 GHz within restricted bands

ASSIGNED FREQUENCY: 2400-2483.5 MHz
 INVESTIGATED FREQUENCY RANGE: 1000 -26500 MHz
 TEST DISTANCE: 3 m
 MODULATION: OOK
 MODULATING SIGNAL: ID CODE
 BIT RATE: 3 Mbps
 DUTY CYCLE: 0.14%
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 1000 kHz
 TEST ANTENNA TYPE: Double ridged guide

Frequency MHz	Antenna		Azimuth degrees	Peak field strength(VBW=3 MHz)			Average field strength(VBW=30KHz)				Verdict
	Polarization	Height m		Measured dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	Measured dB(μV/m)	Calculated dB(μV/m)	Limit, dB(μV/m)	Margin dB***	
Low carrier frequency											
2399	V	1.2	120	69.89	74.0	-4.11	55.74	35.74	54.0	-18.26	Pass
4848	V	1.3	90	55.88	74.0	-18.12	46.00	26.00	54.0	-28.00	
7272	V	1.3	95	62.46	74.0	-11.54	52.76	32.76	54.0	-21.24	
High carrier frequency											
2484	V	1.2	120	60.69	74.0	-13.31	48.02	28.02	54.0	-25.98	Pass
4912	V	1.4	110	53.61	74.0	-20.39	44.00	24.00	54.0	-30.00	
7368	V	1.2	80	66.65	74.0	-7.35	51.78	31.78	54.0	-22.22	

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

**- Margin = Measured field strength - specification limit.

***- Margin = Calculated field strength - specification limit,

where Calculated field strength = Measured field strength + average factor.

Table 7.4.3 Average factor calculation

Transmission pulse		Transmission train duration, ms	Average factor, dB
Duration, ms	Period, ms		
0.054	39.50	NA	-20

*- Average factor was calculated as follows

for pulse train shorter than 100 ms:

$$\text{Average factor} = 20 \times \log_{10} \left(\frac{\text{Pulse duration}}{\text{Pulse period}} \times \frac{\text{Burst duration}}{\text{Train duration}} \times \text{Number of bursts within pulse train} \right)$$

for pulse train longer than 100 ms:

$$\text{Average factor} = 20 \times \log_{10} \left(\frac{\text{Pulse duration}}{\text{Pulse period}} \times \frac{\text{Burst duration}}{100 \text{ ms}} \times \text{Number of bursts within 100 ms} \right)$$

Test specification:	Section 15.247(c), Radiated spurious emissions			
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4			
Test mode:	Compliance	Verdict: PASS		
Date & Time:	12/31/2006 12:10:43 PM			
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC	
Remarks: slave unit				

Table 7.4.4 Field strength of spurious emissions below 1 GHz within restricted bands

ASSIGNED FREQUENCY: 2400-2483.5 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 1000 MHz
 TEST DISTANCE: 3 m
 MODULATION: OOK
 MODULATING SIGNAL: ID CODE
 BIT RATE: 3 Mbps
 DUTY CYCLE: 0.14 %
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 RESOLUTION BANDWIDTH: 1 kHz (9 kHz – 150 kHz)
 9.0 kHz (150 kHz – 30 MHz)
 120 kHz (30 MHz – 1000 MHz)
 VIDEO BANDWIDTH: > Resolution bandwidth
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
 Biconilog (30 MHz – 1000 MHz)

Frequency MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
All carrier frequencies								
120.0200	50.56	41.10	43.50	-2.40	H	1.0	230	Pass
311.9770	42.19	37.02	46.00	-8.98	H	1.0	230	
335.9834	44.98	43.09	46.00	-2.91	H	1.0	230	
359.9706	42.65	41.29	46.00	-4.71	H	1.0	230	
719.9470	37.54	35.42	46.00	-10.58	H	1.0	230	
743.9414	38.93	36.61	46.00	-9.39	H	1.0	230	
767.9354	36.61	33.82	46.00	-12.18	H	1.0	230	

*- Margin = Measured emission - specification limit.

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

Table 7.4.5 Restricted bands

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

Reference numbers of test equipment used

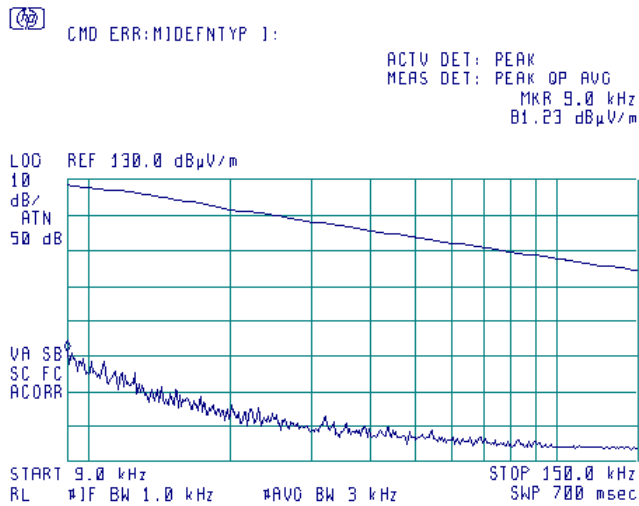
HL 0446	HL 0789	HL 1425	HL 1553	HL 1566	HL 1947	HL 1984	HL 2697
HL 2780							

Full description is given in Appendix A.

Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

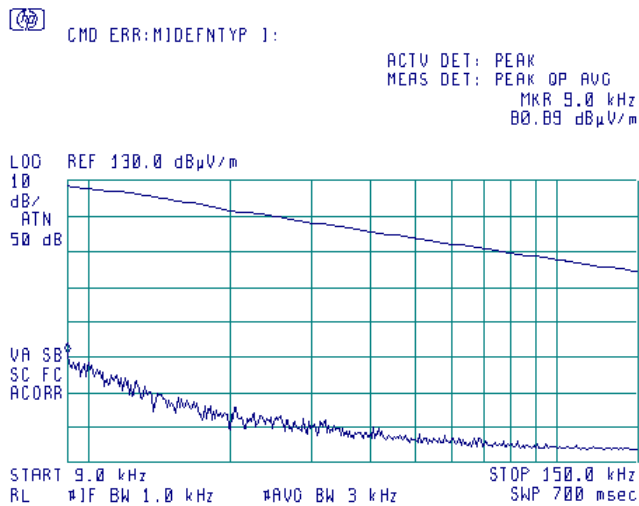
Plot 7.4.1 Radiated emission measurements from 9 to 150 kHz at the low carrier frequency

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



Plot 7.4.2 Radiated emission measurements from 9 to 150 kHz at the high carrier frequency

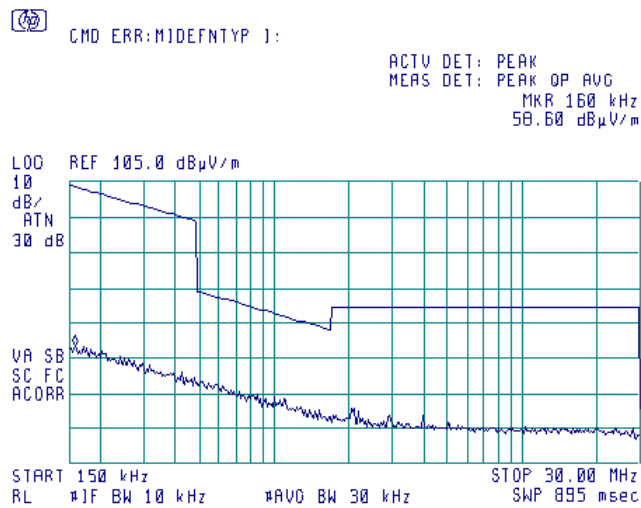
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

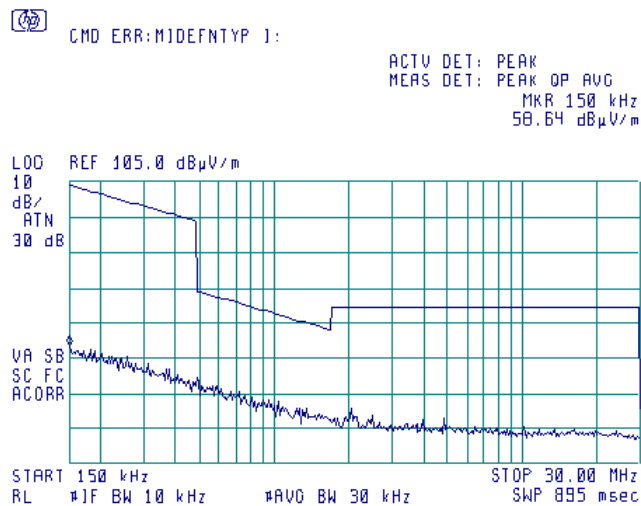
Plot 7.4.3 Radiated emission measurements from 0.15 to 30 MHz at the low carrier frequency

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



Plot 7.4.4 Radiated emission measurements from 0.15 to 30 MHz at the high carrier frequency

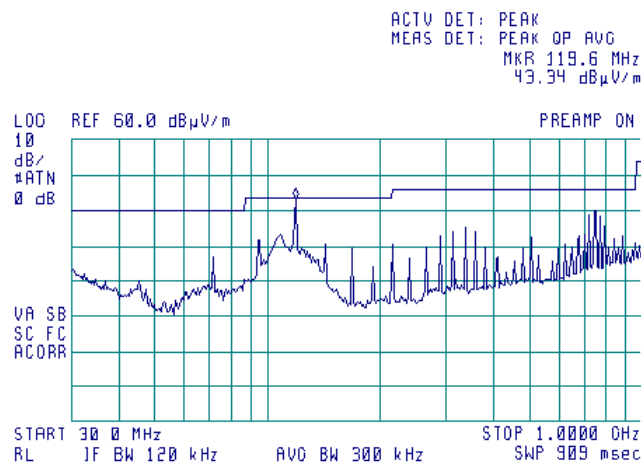
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:		Section 15.247(c), Radiated spurious emissions	
Test procedure:		FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

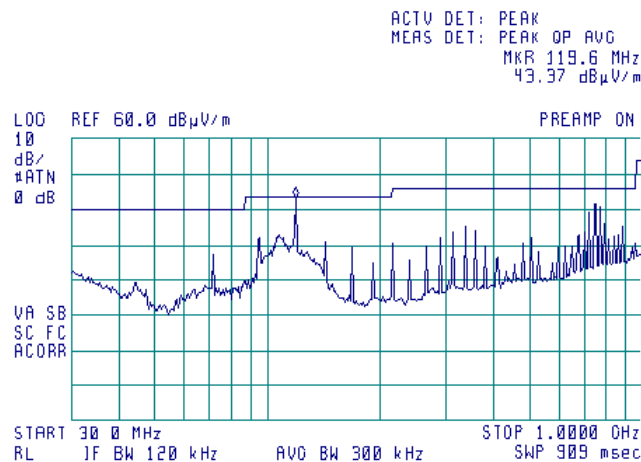
Plot 7.4.5 Radiated emission measurements from 30 to 1000 MHz at the low carrier frequency

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



Plot 7.4.6 Radiated emission measurements from 30 to 1000 MHz at the high carrier frequency

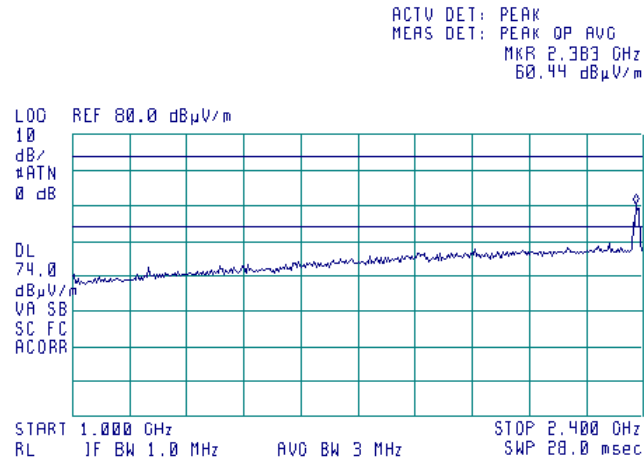
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:		Section 15.247(c), Radiated spurious emissions	
Test procedure:		FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

Plot 7.4.7 Radiated emission measurements from 1000 to 2400 MHz at the low carrier frequency

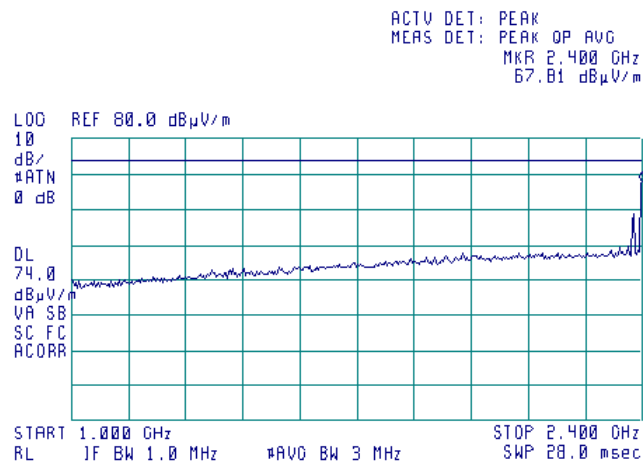
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

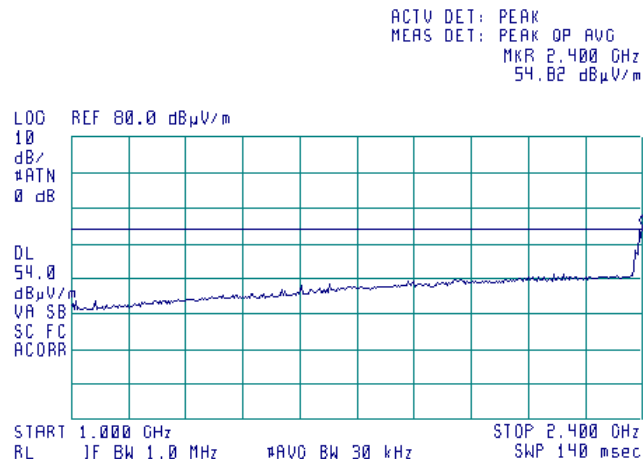
Plot 7.4.8 Radiated emission measurements from 1000 to 2400 MHz at the high carrier frequency

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



Plot 7.4.9 Radiated emission measurements from 1000 to 2400 MHz at the high carrier frequency

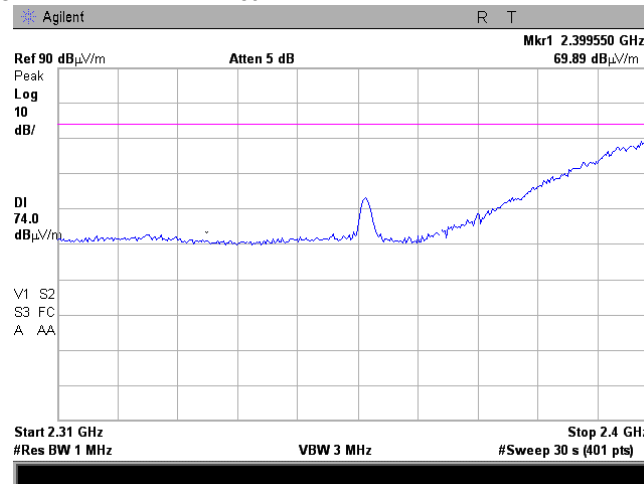
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Average



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

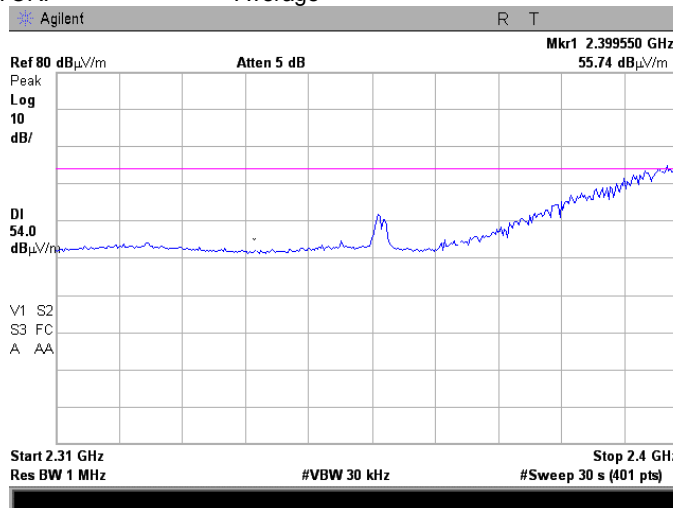
Plot 7.4.10 Radiated emission measurements from 2310 to 2400 MHz at the low carrier frequency

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



Plot 7.4.11 Radiated emission measurements from 2310 to 2400 MHz at the low carrier frequency

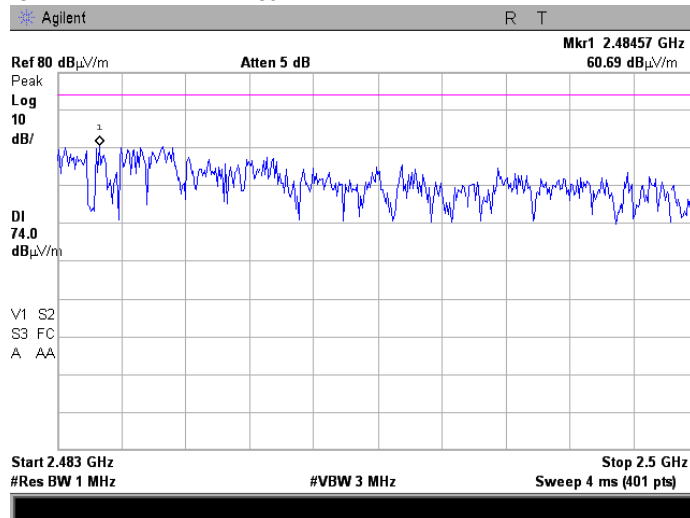
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Average



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

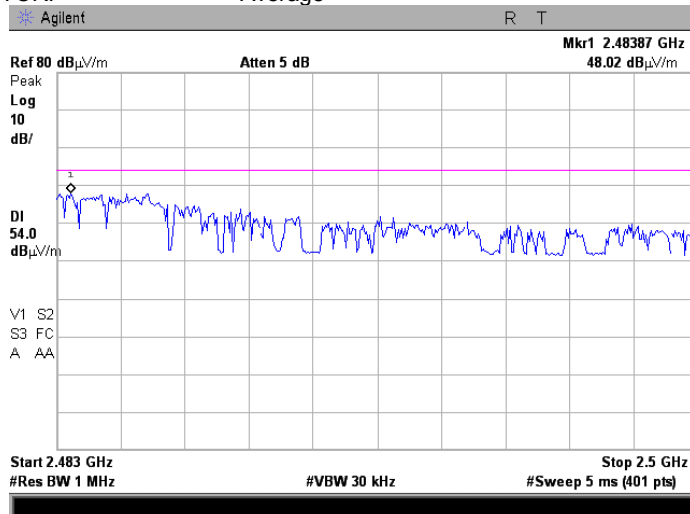
Plot 7.4.12 Radiated emission measurements from 2483.5 to 2500 MHz at the high carrier frequency

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



Plot 7.4.13 Radiated emission measurements from 2483.5 to 2500 MHz at the high carrier frequency

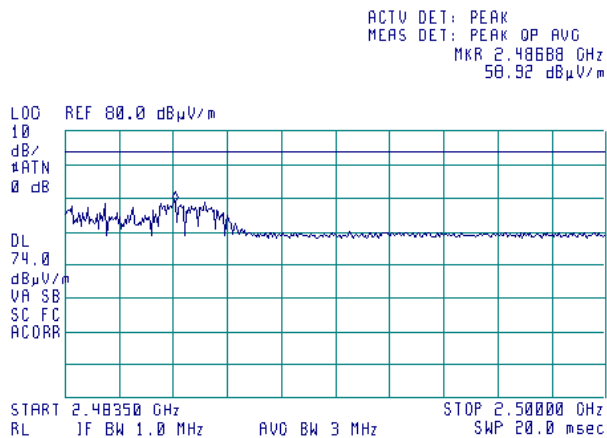
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Average



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

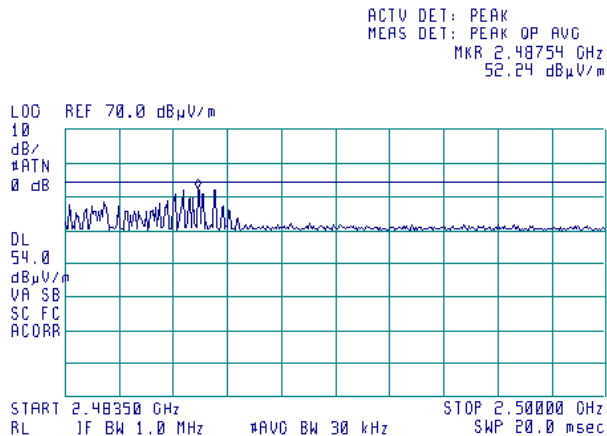
Plot 7.4.14 Radiated emission measurements from 2483.5 to 2500 MHz at the low carrier frequency

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



Plot 7.4.15 Radiated emission measurements from 2483.5 to 2500 MHz at the low carrier frequency

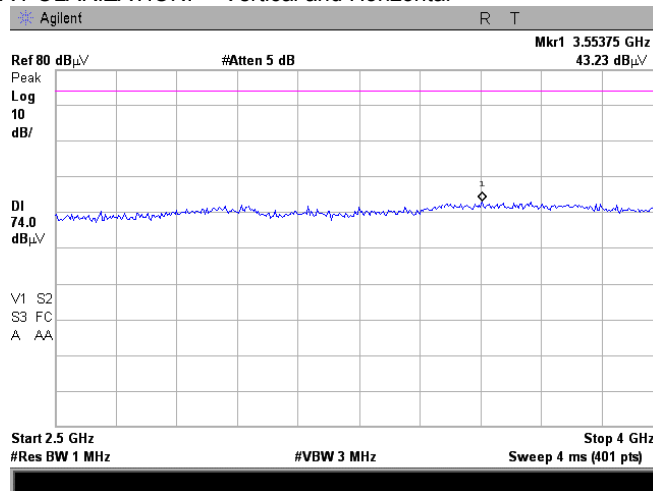
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Average



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

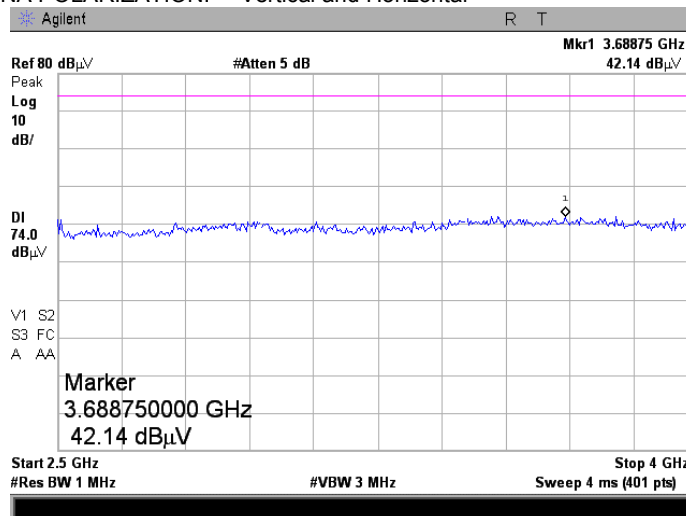
Plot 7.4.16 Radiated emission measurements from 2500 to 4000 MHz at the low carrier frequency

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



Plot 7.4.17 Radiated emission measurements from 2500 to 4000 MHz at the high carrier frequency

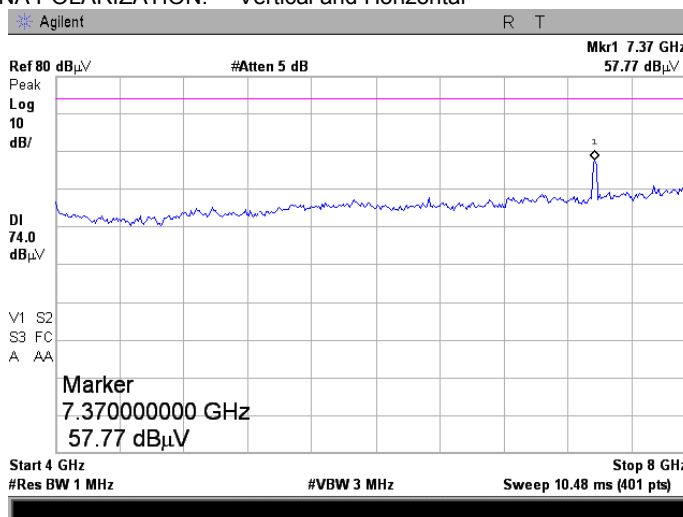
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

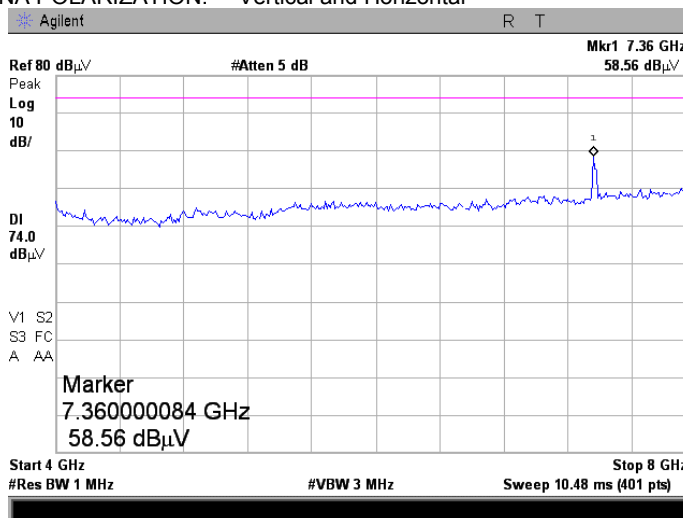
Plot 7.4.18 Radiated emission measurements from 4000 to 8000 MHz at the low carrier frequency

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



Plot 7.4.19 Radiated emission measurements from 4000 to 8000 MHz at the high carrier frequency

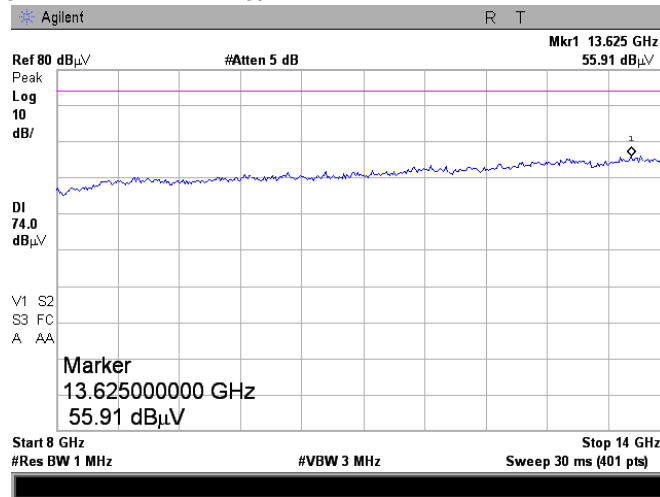
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

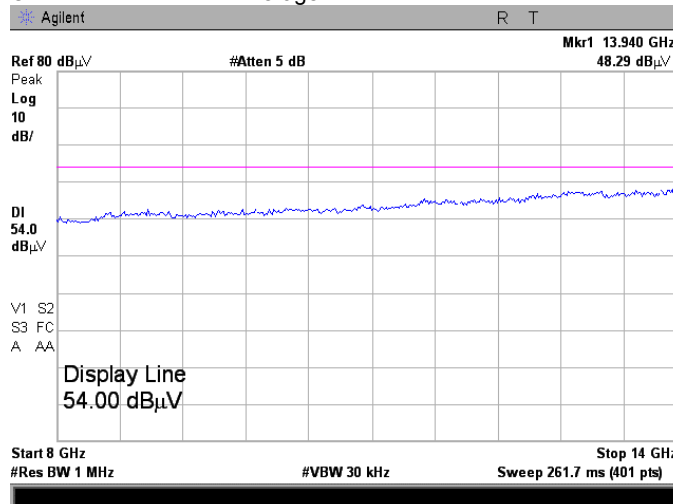
Plot 7.4.20 Radiated emission measurements from 8000 to 14000 MHz at the low carrier frequency

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



Plot 7.4.21 Radiated emission measurements from 8000 to 14000 MHz at the low carrier frequency

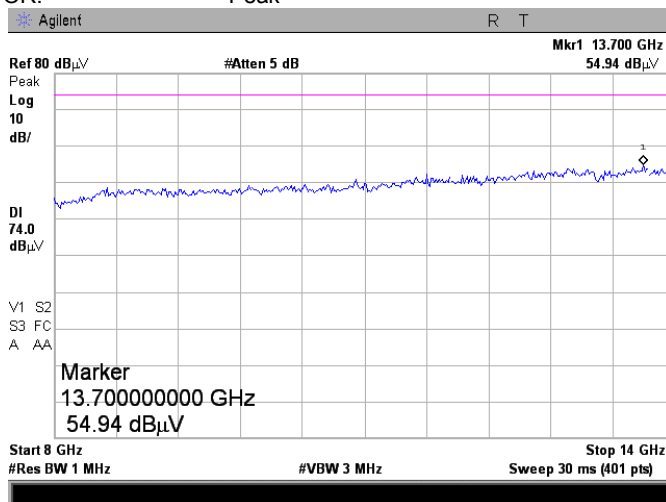
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Average



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

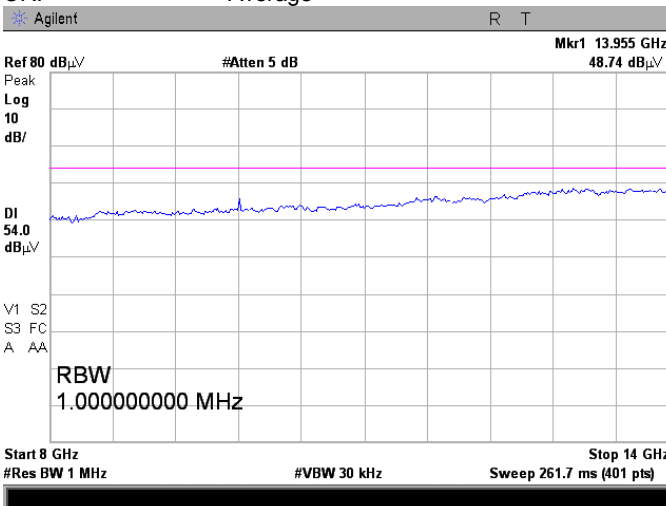
Plot 7.4.22 Radiated emission measurements from 8000 to 14000 MHz at the high carrier frequency

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



Plot 7.4.23 Radiated emission measurements from 8000 to 14000 MHz at the high carrier frequency

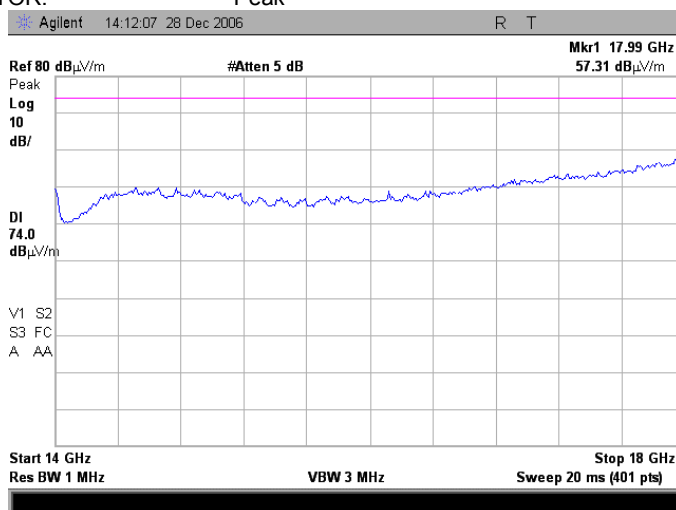
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Average



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

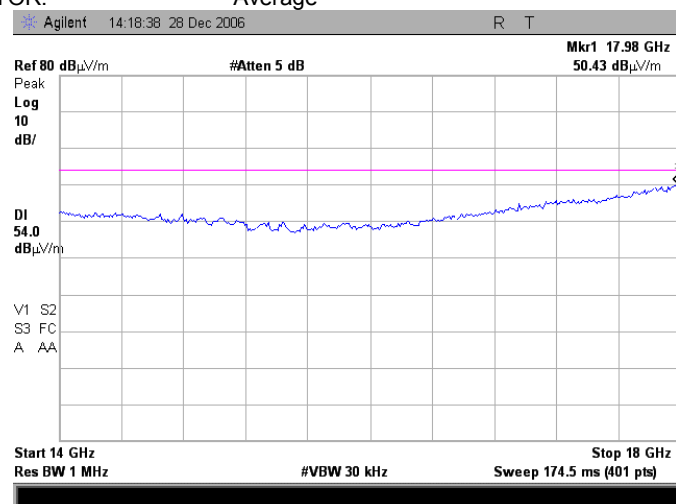
Plot 7.4.24 Radiated emission measurements from 14000 to18000 MHz at the low carrier frequency

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



Plot 7.4.25 Radiated emission measurements from 14000 to18000 MHz at the low carrier frequency

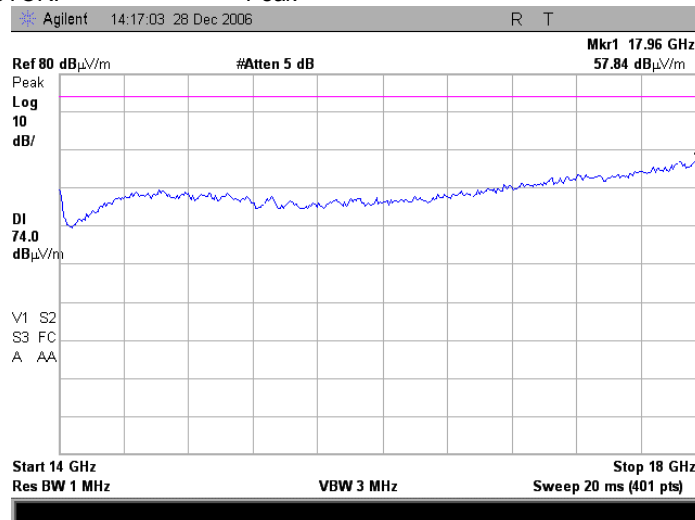
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Average



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

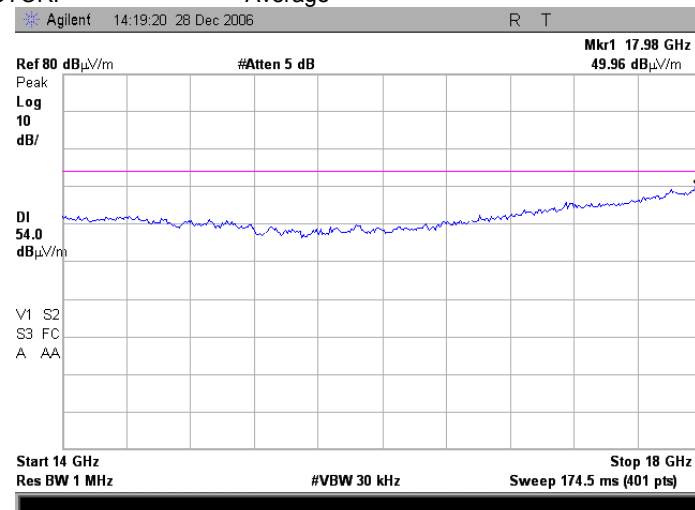
Plot 7.4.26 Radiated emission measurements from 14000 to18000 MHz at the high carrier frequency

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



Plot 7.4.27 Radiated emission measurements from 14000 to18000 MHz at the high carrier frequency

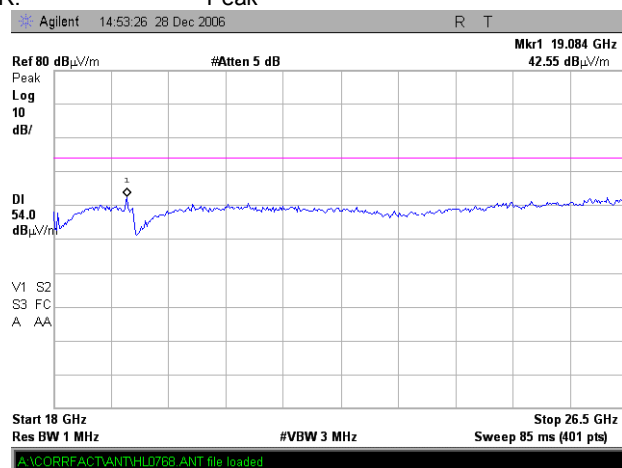
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Average



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

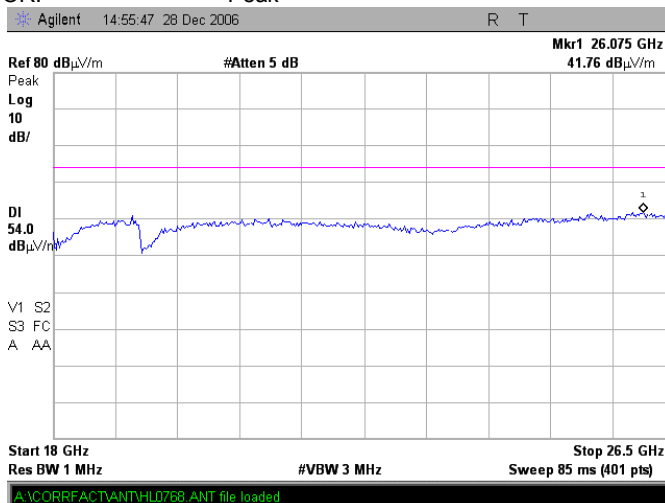
Plot 7.4.28 Radiated emission measurements from 18000 to 26500 MHz at the low carrier frequency

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



Plot 7.4.29 Radiated emission measurements from 18000 to 26500 MHz at the high carrier frequency

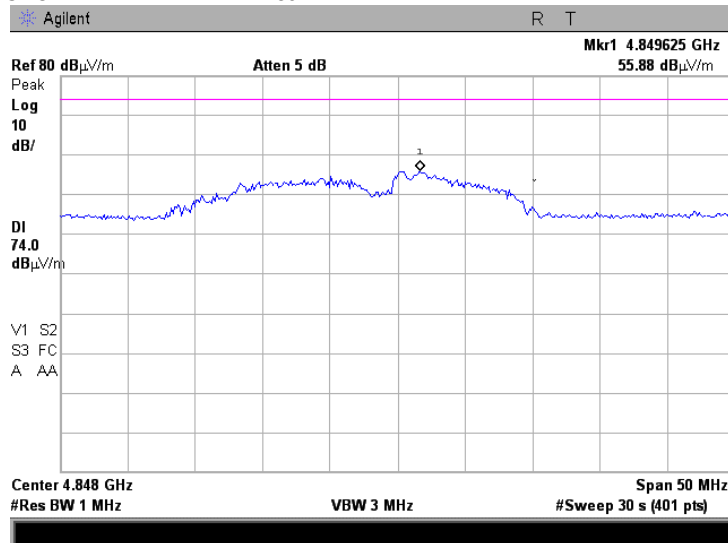
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

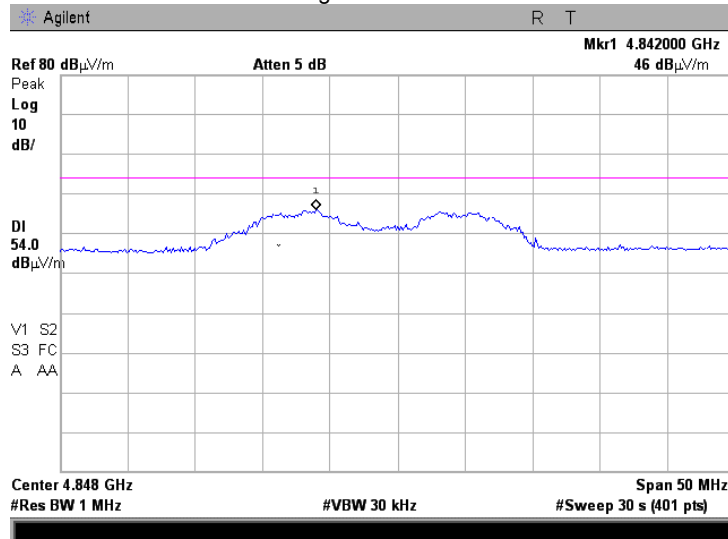
Plot 7.4.30 Radiated emission measurements at the second harmonic of low carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR: Peak



Plot 7.4.31 Radiated emission measurements at the second harmonic of low carrier frequency

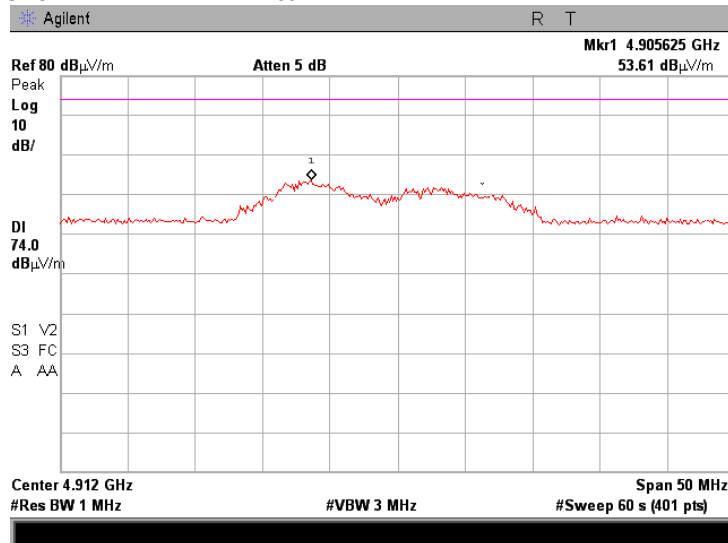
TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR: Average



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

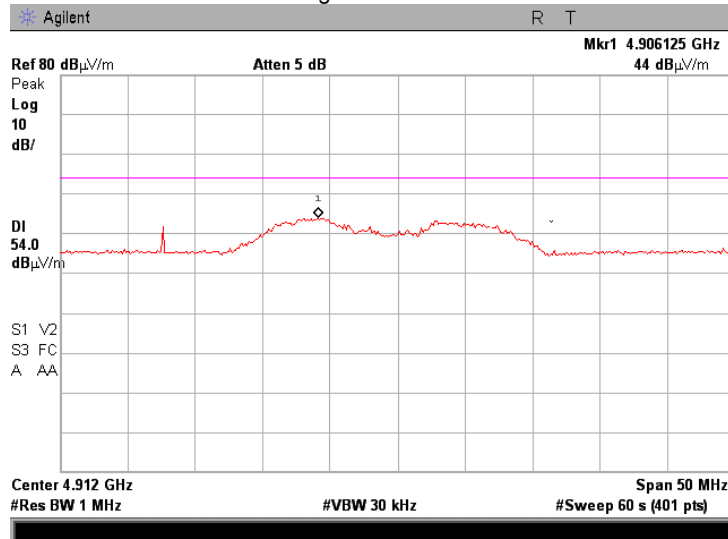
Plot 7.4.32 Radiated emission measurements at the second harmonic of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR: Peak



Plot 7.4.33 Radiated emission measurements at the second harmonic of high carrier frequency

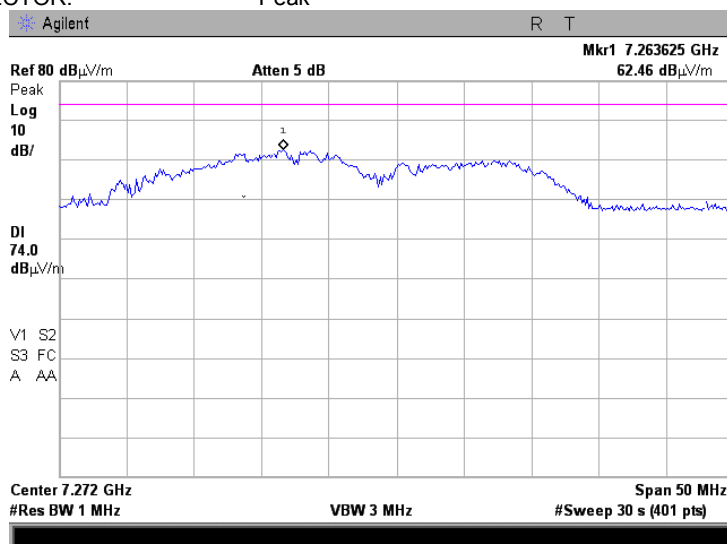
TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR: Average



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

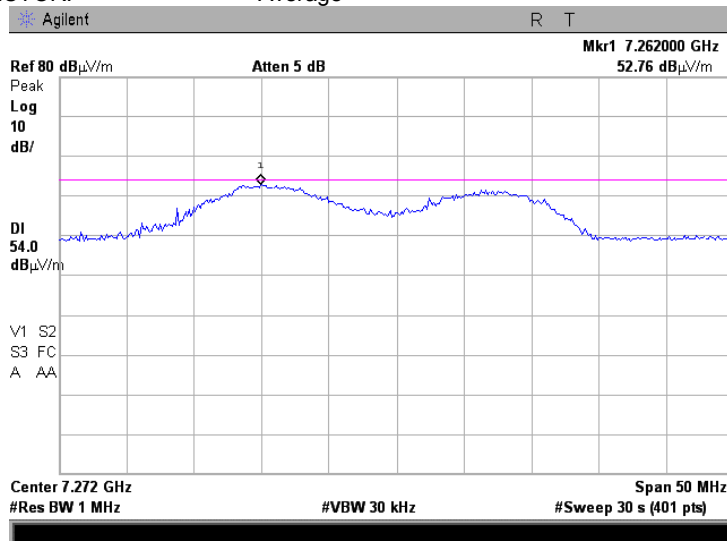
Plot 7.4.34 Radiated emission measurements at the third harmonic of low carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR: Peak



Plot 7.4.35 Radiated emission measurements at the third harmonic of low carrier frequency

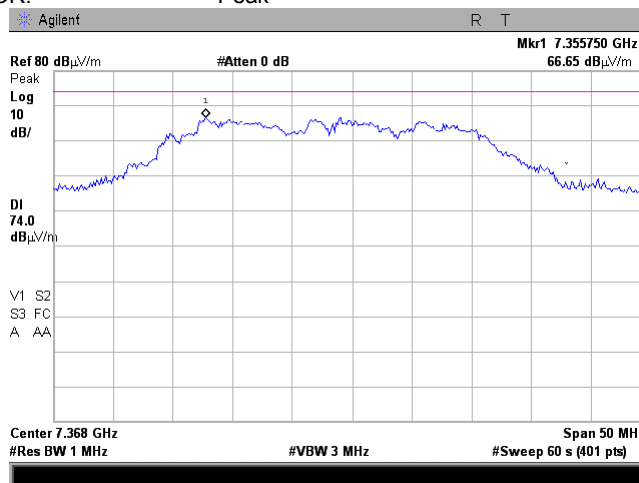
TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR: Average



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

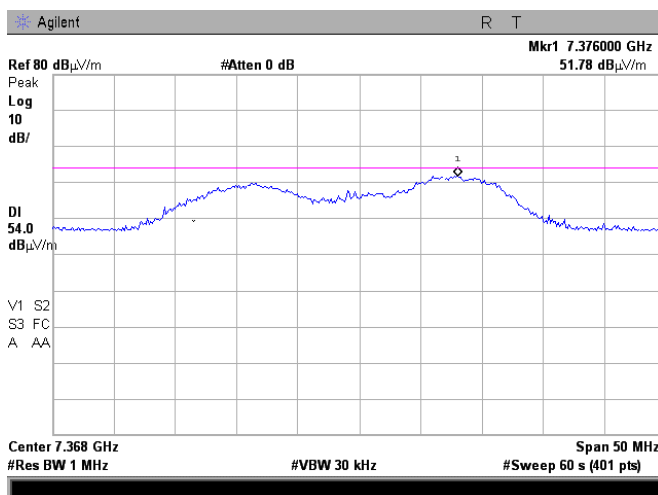
Plot 7.4.36 Radiated emission measurements at the third harmonic of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR: Peak



Plot 7.4.37 Radiated emission measurements at the third harmonic of high carrier frequency

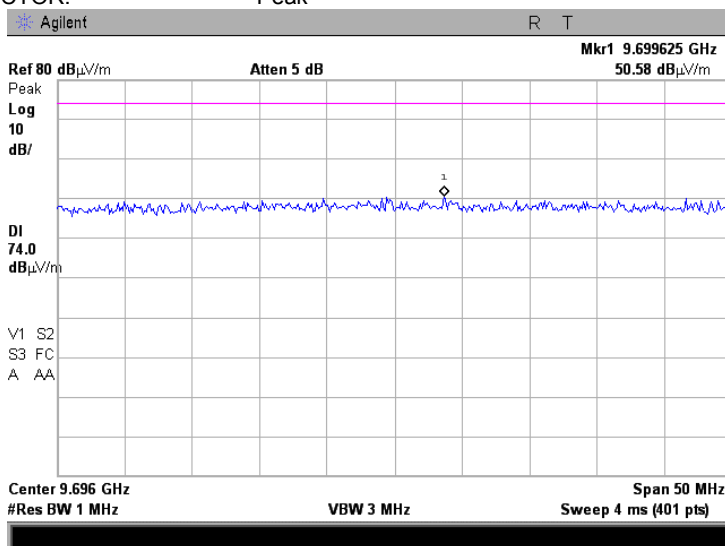
TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR: Average



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

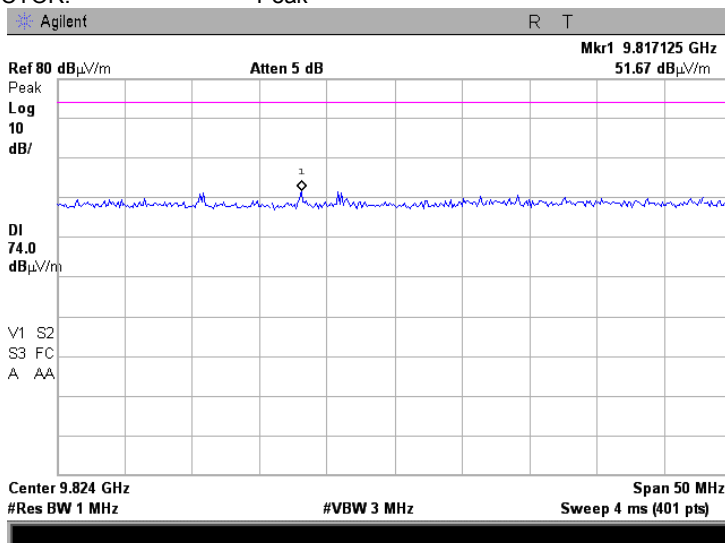
Plot 7.4.38 Radiated emission measurements at the forth harmonic of low carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR: Peak



Plot 7.4.39 Radiated emission measurements at the forth harmonic of high carrier frequency

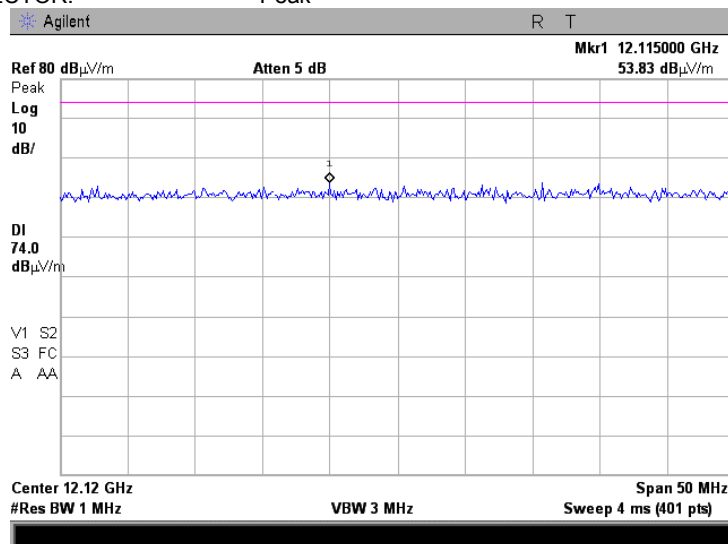
TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR: Peak



Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

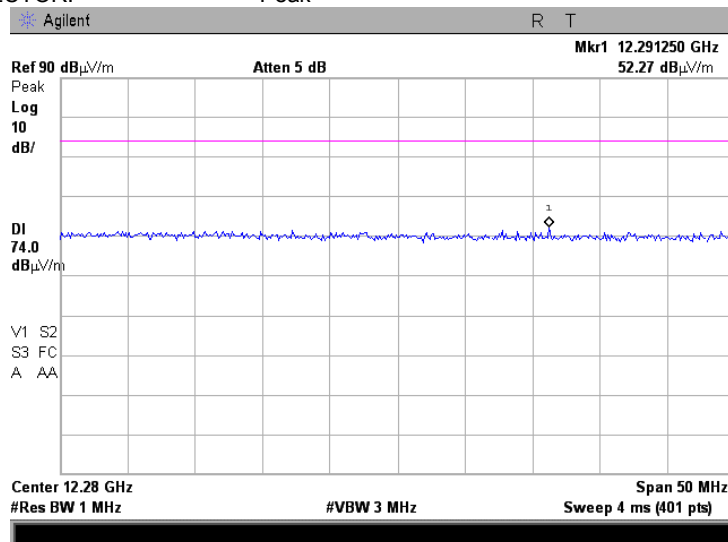
Plot 7.4.40 Radiated emission measurements at the fifth harmonic of low carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR: Peak



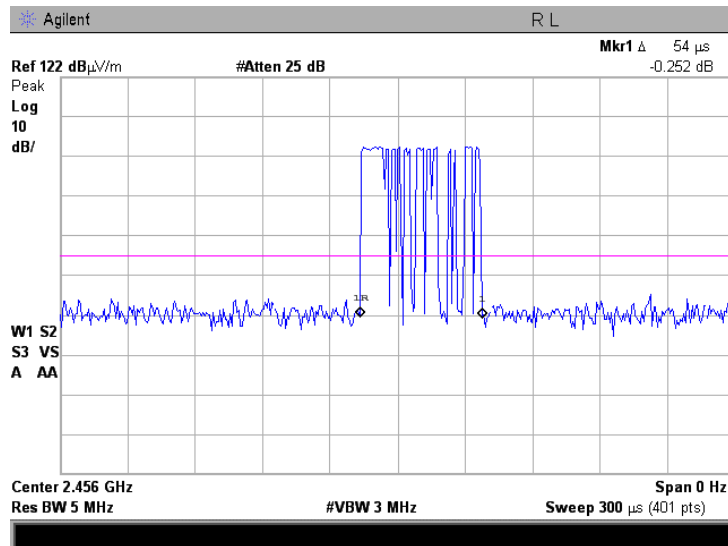
Plot 7.4.41 Radiated emission measurements at the fifth harmonic of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR: Peak

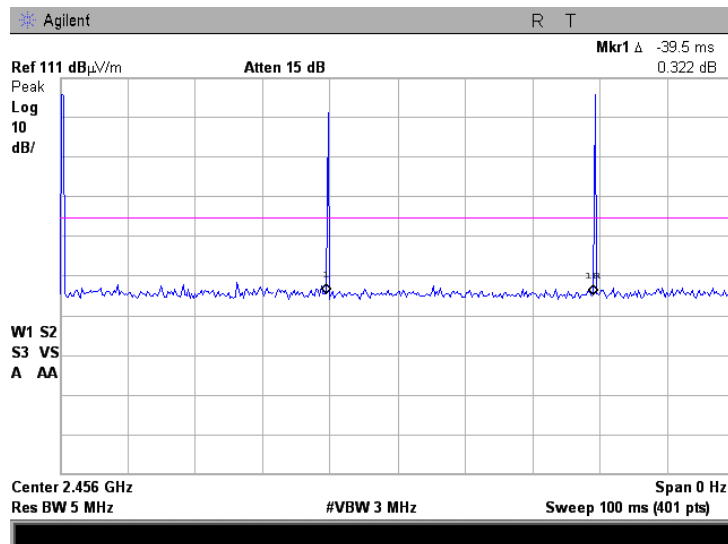


Test specification:	Section 15.247(c), Radiated spurious emissions		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(c)/ ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/31/2006 12:10:43 PM		
Temperature: 21°C	Air Pressure: 1007 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: slave unit			

Plot 7.4.42 Transmission pulse duration



Plot 7.4.43 Transmission pulse period



Test specification:		Section 15.247(d), Peak power density	
Test procedure:		FCC New Guidance on Measurements for DTS in section 15.247(d), Option 2	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/24/2006 11:53:49 AM		
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

7.5 Peak spectral power density

7.5.1 General

This test was performed to measure the peak spectral power density at the transmitter RF antenna connector. Specification test limits are given in Table 7.5.1.

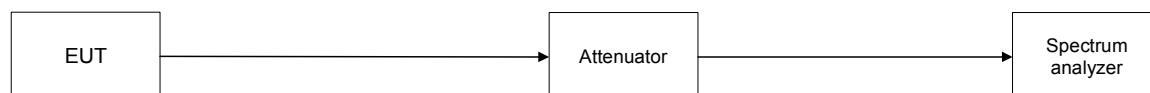
Table 7.5.1 Peak spectral power density limits

Assigned frequency range, MHz	Measurement bandwidth, kHz	Peak spectral power density, dBm
24000-2483.5	3.0	8.0

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 was adjusted to produce maximum available to end user RF output power.
- 7.5.2.3 The frequency span of spectrum analyzer was set to capture the entire 6 dB band of the transmitter, in peak hold mode with resolution bandwidth set to 3.0 kHz, video bandwidth wider than resolution bandwidth, auto sweep time and sufficient number of sweeps was allowed for trace stabilization. The spectrum lines spacing was verified to be wider than 3 kHz.
- 7.5.2.4 The peak of emission was zoomed with span set just wide enough to capture the emission peak area and sweep time was set equal to span width divided by resolution bandwidth. Spectrum analyzer was set in peak hold mode, sufficient number of sweeps was allowed for trace stabilization and peak spectral power density was measured as provided in Table 7.5.2 and associated plots.

Figure 7.5.1 Peak spectral power density test setup





Test specification:	Section 15.247(d), Peak power density		
Test procedure:	FCC New Guidance on Measurements for DTS in section 15.247(d), Option 2		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/24/2006 11:53:49 AM		
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

Table 7.5.2 Peak spectral power density test results

ASSIGNED FREQUENCY: 2400-2483.5 MHz
 MODULATION: OOK
 MODULATING SIGNAL: ID CODE
 BIT RATE: 3 Mbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 TRANSMITTER OUTPUT POWER: 16.37 dBm at low carrier frequency
 15.49 dBm at high carrier frequency
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 3 kHz
 VIDEO BANDWIDTH: 10 kHz

Carrier frequency MHz	Spectrum analyzer reading, dBm	External attenuation dB	Cable loss dB	Peak power density, dB(mW/3 kHz)	Limit, dBm	Margin*, dB	Verdict
2424	-16.24	included	included	-16.24	8.0	-24.24	Pass
2456	-20.28	included	included	-20.28	8.0	-28.28	Pass

* - Margin = Peak power density – specification limit.

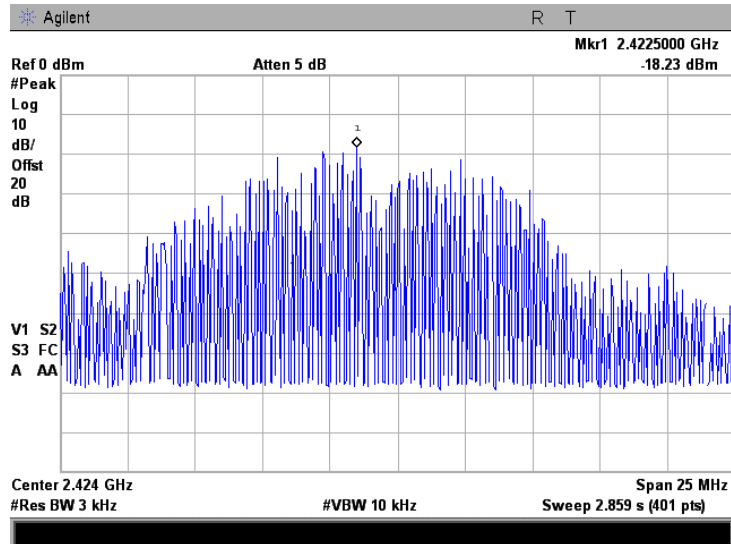
Reference numbers of test equipment used

HL 2866	HL 2909						
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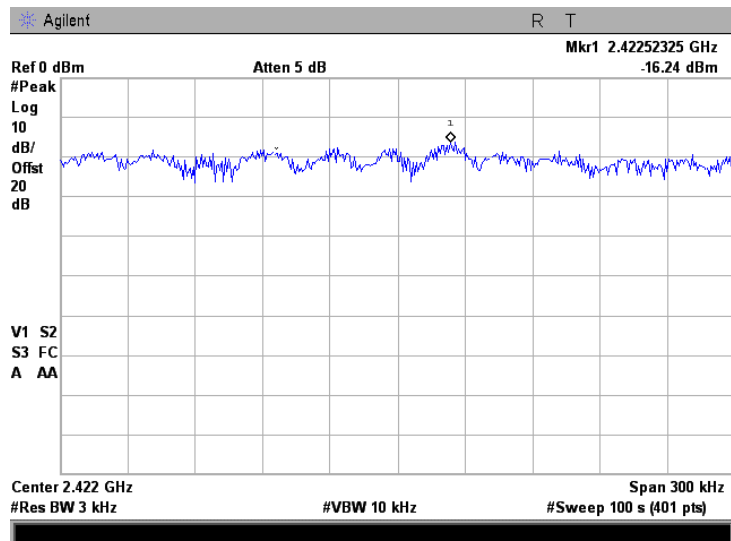
Full description is given in Appendix A.

Test specification:		Section 15.247(d), Peak power density	
Test procedure:		FCC New Guidance on Measurements for DTS in section 15.247(d), Option 2	
Test mode:		Compliance	Verdict: PASS
Date & Time:		12/24/2006 11:53:49 AM	
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

Plot 7.5.1 Peak spectral power density at low frequency within 6 dB band

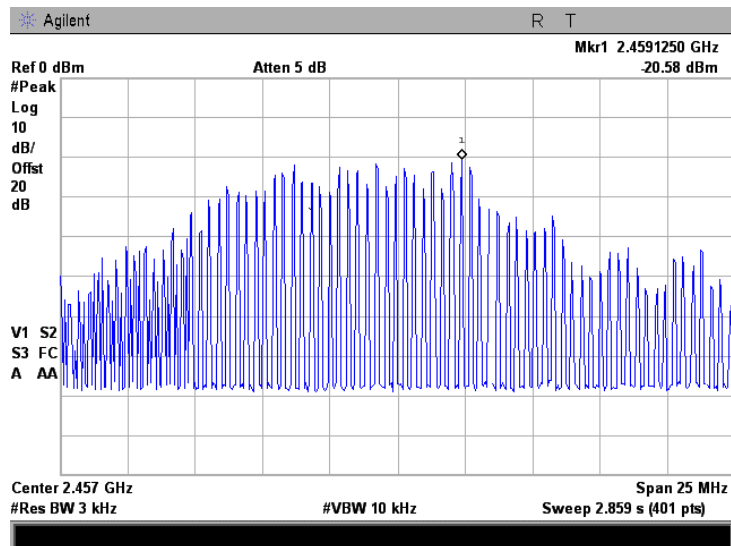


Plot 7.5.2 Peak spectral power density at low frequency zoomed at the peak

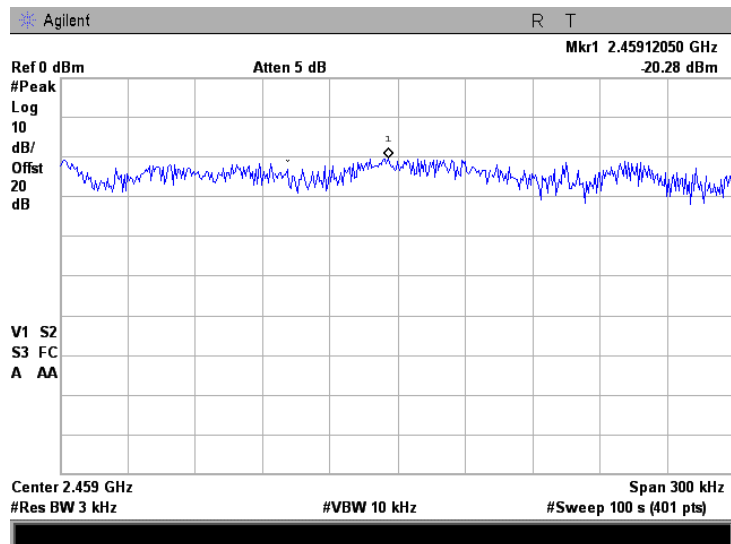


Test specification:		Section 15.247(d), Peak power density	
Test procedure:		FCC New Guidance on Measurements for DTS in section 15.247(d), Option 2	
Test mode:		Compliance	Verdict: PASS
Date & Time:		12/24/2006 11:53:49 AM	
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

Plot 7.5.3 Peak spectral power density at high frequency within 6 dB band

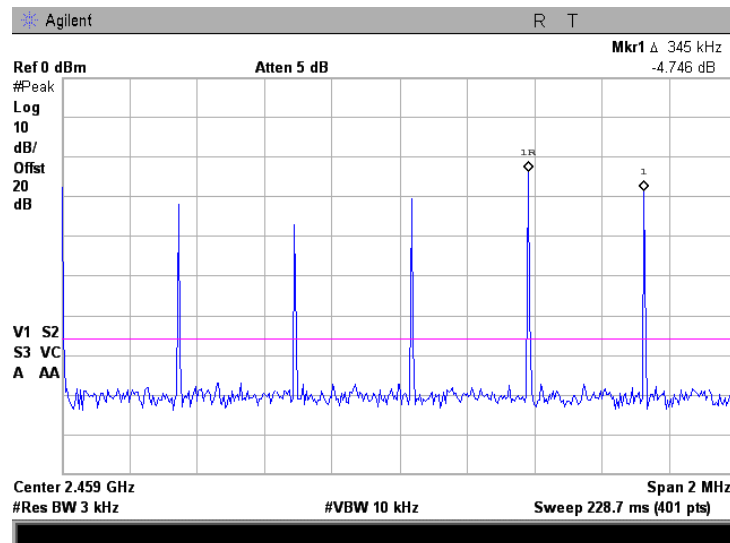


Plot 7.5.4 Peak spectral power density at high frequency zoomed at the peak



Test specification:		Section 15.247(d), Peak power density	
Test procedure:		FCC New Guidance on Measurements for DTS in section 15.247(d), Option 2	
Test mode:		Compliance	Verdict: PASS
Date & Time:		12/24/2006 11:53:49 AM	
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

Plot 7.5.5 Spectral lines spacing greater than 3 KHz



Test specification:		Section 15.207(a), Conducted emission	
Test procedure:		ANSI C63.4, Section 13.1.3	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/22/2007 11:03:47 AM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply: 120 V AC
Remarks: slave unit			

7.6 Conducted emissions

7.6.1 General

This test was performed to measure common mode conducted emissions at the power port. Specification test limits are given in Table 7.6.1.

Table 7.6.1 Limits for conducted emissions

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

* The limit decreases linearly with the logarithm of frequency.

7.6.2 Test procedure

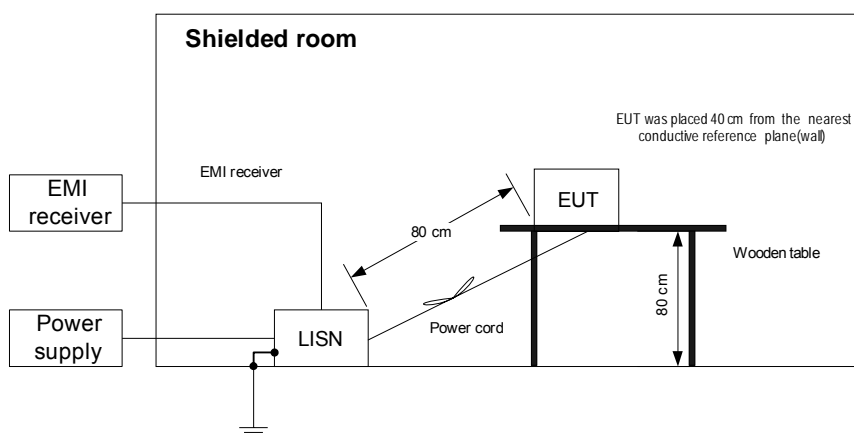
7.6.2.1 The EUT was set up as shown in Figure 7.6.1, energized and the performance check was conducted.

7.6.2.2 The measurements were performed at power terminals with the LISN, connected to a spectrum analyzer in the frequency range referred to in Table 7.6.2. Unused coaxial connector of the LISN was terminated with 50 Ohm. Quasi-peak and average detectors were used throughout the testing.

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

7.6.2.4 The worst test results (the lowest margins) were recorded in Table 7.6.2 and shown in the associated plots.

Figure 7.6.1 Setup for conducted emission measurements, table-top equipment





Test specification:	Section 15.207(a), Conducted emission		
Test procedure:	ANSI C63.4, Section 13.1.3		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	1/22/2007 11:03:47 AM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply: 120 V AC
Remarks: slave unit			

Table 7.6.2 Conducted emission test results at slave power lines

LINE: AC mains
 LIMIT: Class B
 EUT OPERATING MODE: Transmit
 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*		
0.201747	43.51	40.52	63.59	-23.07	31.24	53.59	-22.35	L1	Pass
0.406076	43.96	40.36	57.76	-17.40	34.59	47.76	-13.17		
0.474130	48.26	44.94	56.48	-11.54	39.20	46.48	-7.28		
0.540495	42.84	38.52	56.00	-17.48	31.82	46.00	-14.18		
1.087074	42.41	36.37	56.00	-19.63	30.08	46.00	-15.92		
1.897703	39.11	35.13	56.00	-20.87	28.85	46.00	-17.15		
0.204474	43.72	40.31	63.48	-23.17	35.25	53.48	-18.23	L2	Pass
0.408040	41.61	40.12	57.72	-17.60	38.50	47.72	-9.22		
0.475928	46.18	45.57	56.45	-10.88	44.12	46.45	-2.33		
0.543808	46.07	42.00	56.00	-14.00	35.93	46.00	-10.07		
1.087752	43.59	40.13	56.00	-15.87	35.52	46.00	-10.48		
1.222441	41.74	40.53	56.00	-15.47	37.05	46.00	-8.95		

Reference numbers of test equipment used

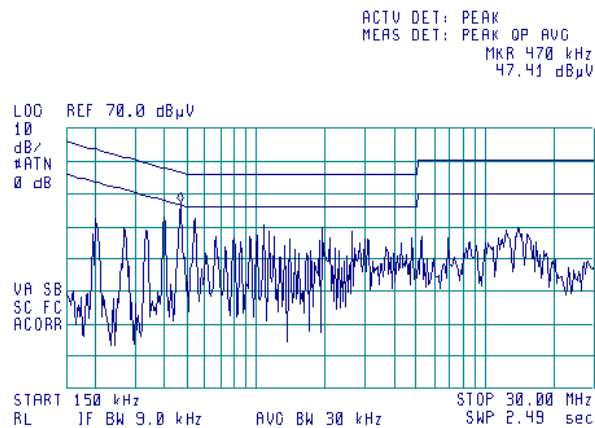
HL 0163	HL 0672	HL 0787	HL 1430	HL 1502	HL 1510		
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Full description is given in Appendix A.

Test specification:	Section 15.207(a), Conducted emission		
Test procedure:	ANSI C63.4, Section 13.1.3		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/22/2007 11:03:47 AM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply: 120 V AC
Remarks: slave unit			

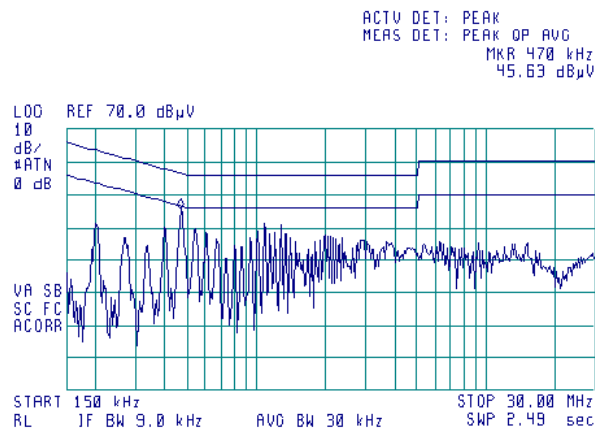
Plot 7.6.1 Conducted emission measurements at slave power lines

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



Plot 7.6.2 Conducted emission measurements at slave power lines

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



Test specification:	Section 15.203, Antenna requirement		
Test procedure:	Visual inspection		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	12/25/2006 3:49:27 PM		
Temperature: 20°C	Air Pressure: 1010 hPa	Relative Humidity: 51%	Power Supply: 120 V AC
Remarks: slave unit			

7.7 Antenna requirements

The EUT was verified for compliance with antenna requirements. A transmitter shall be designed to ensure that no antenna other than that furnished by the responsible party will be used with the device. It may be either permanently attached or employs a unique antenna connector for every antenna proposed for use with the EUT. This requirement does not apply to professionally installed transmitters.

The rationale for compliance with the above requirements was either visual inspection results or supplier declaration. The summary of results is provided in Table 7.7.1.

Table 7.7.1 Antenna requirements

Requirement	Rationale	Verdict
The transmitter antenna is permanently attached	Visual inspection	Comply
The transmitter employs a unique antenna connector	NA	
The transmitter requires professional installation	NA	

Photograph 7.7.1 Antenna assembly



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:	2/21/2007 6:06:48 PM		
Temperature: 23°C	Air Pressure: 1020 hPa	Relative Humidity: 53 %	Power Supply: 120 VAC
Remarks: slave unit			

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

8.1 Conducted emissions

8.1.1 General

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

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

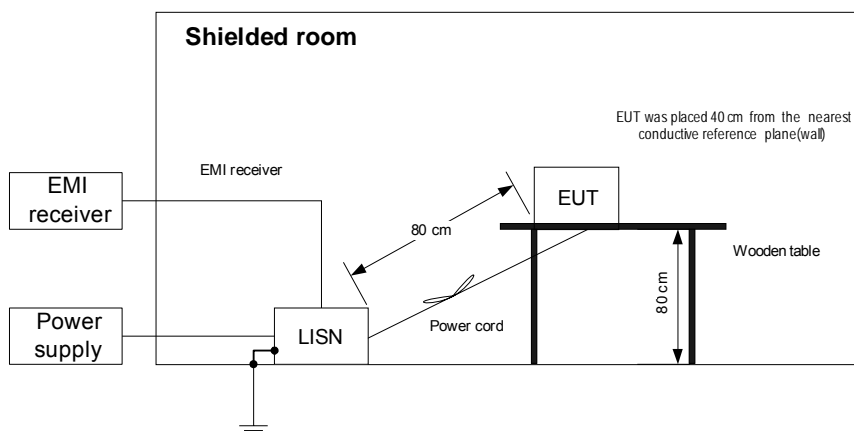
8.1.2.1 The EUT was set up as shown in Figure 8.1.1, energized and the performance check was conducted.

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:	2/21/2007 6:06:48 PM			
Temperature: 23°C	Air Pressure: 1020 hPa	Relative Humidity: 53 %	Power Supply: 120 VAC	
Remarks: slave unit				

Table 8.1.2 Conducted emission test results

LINE: AC mains
 LIMIT: Class B
 EUT OPERATING MODE: Receive
 EUT SET UP: TABLE-TOP
 TEST SITE: SHIELDED ROOM
 DETECTORS USED: 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*		
0.201228	46.21	42.95	63.61	-20.66	32.43	53.61	-21.18	L1	Pass
0.402985	43.50	40.17	57.81	-17.64	34.00	47.81	-13.81		
0.469968	48.39	45.17	56.56	-11.39	39.37	46.56	-7.19		
0.539993	41.03	39.57	56.00	-16.43	31.85	46.00	-14.15		
0.606814	43.30	39.87	56.00	-16.13	33.87	46.00	-12.13		
0.673786	41.89	38.73	56.00	-17.27	31.60	46.00	-14.40		
1.079675	41.76	36.27	56.00	-19.73	29.18	46.00	-16.82		
0.475060	45.55	44.89	56.47	-11.58	43.38	46.47	-3.09	L2	Pass
0.543948	42.57	42.18	56.00	-13.82	39.01	46.00	-6.99		
0.680022	41.20	40.15	56.00	-15.85	38.89	46.00	-7.11		
0.748118	41.46	40.26	56.00	-15.74	38.58	46.00	-7.42		
1.155922	39.49	37.86	56.00	-18.14	30.19	46.00	-15.81		
1.427672	40.13	39.24	56.00	-16.76	37.28	46.00	-8.72		

*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

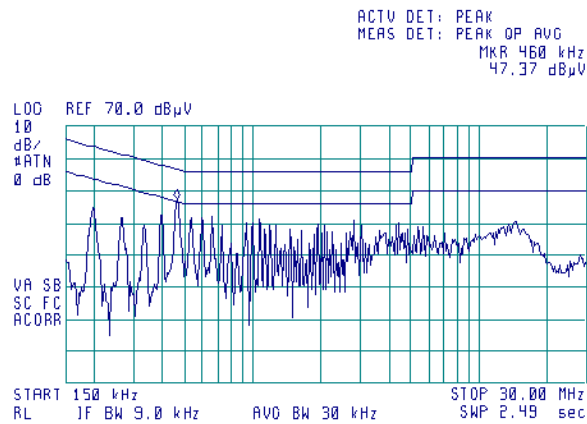
HL 0163	HL 0787	HL 1430	HL 1502	HL 1510			
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Full description is given in Appendix A.

Test specification:		Section 15.107, Conducted emission at AC power port	
Test procedure:		ANSI C63.4, Sections 11.5 and 12.1.3	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/21/2007 6:06:48 PM		
Temperature: 23°C	Air Pressure: 1020 hPa	Relative Humidity: 53 %	Power Supply: 120 VAC
Remarks: slave unit			

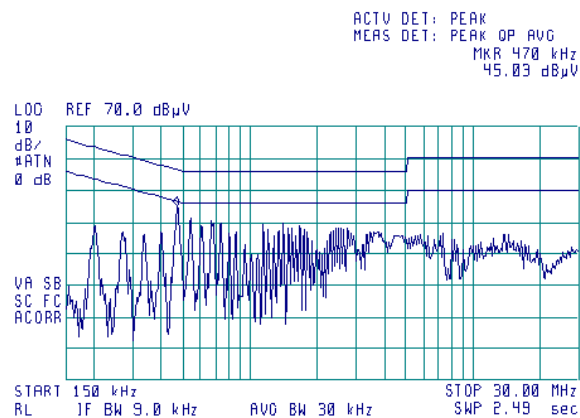
Plot 8.1.1 Conducted emission measurements

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



Plot 8.1.2 Conducted emission measurements

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



Test specification:		Section 15.109, Radiated emission	
Test procedure:		ANSI C63.4, Sections 11.6 and 12.1.4	
Test mode:	Compliance	Verdict:	
Date & Time:	5/03/2007 1:15:32 PM		
Temperature: 23°C	Air Pressure: 1013 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: $\text{Lim}_{S2} = \text{Lim}_{S1} + 20 \log (S_1/S_2)$, where S_1 and S_2 – standard defined and test distance respectively in meters.

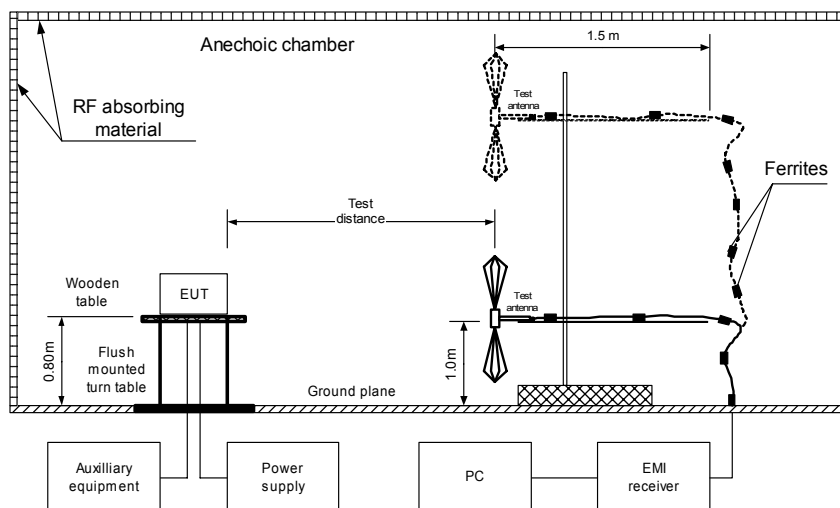
8.2.2 Test procedure for measurements in semi-anechoic chamber

8.2.2.1 The EUT was set up as shown in Figure 8.2.1, 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°, 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.

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





Test specification:		Section 15.109, Radiated emission	
Test procedure:		ANSI C63.4, Sections 11.6 and 12.1.4	
Test mode:	Compliance	Verdict:	
Date & Time:	5/03/2007 1:15:32 PM		
Temperature: 23°C	Air Pressure: 1013 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

Table 8.2.2 Radiated emission test results

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

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*				
96.050000	33.16	28.12	43.50	-15.38	Vertical	1.00	82	Pass
105.450000	34.50	31.37	43.50	-12.13	Vertical	1.00	102	
117.867500	30.43	23.89	43.50	-19.61	Horizontal	1.80	0	
120.017500	43.03	37.09	43.50	-6.41	Horizontal	1.90	5	
144.000000	39.28	35.46	43.50	-8.04	Vertical	1.00	46	
166.716100	32.68	31.04	43.50	-12.46	Vertical	1.00	38	
172.888200	35.63	32.70	43.50	-10.80	Vertical	1.10	24	
179.060000	32.99	30.36	43.50	-13.14	Vertical	1.00	60	

*- Margin = Measured emission - specification limit.

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

Reference numbers of test equipment used

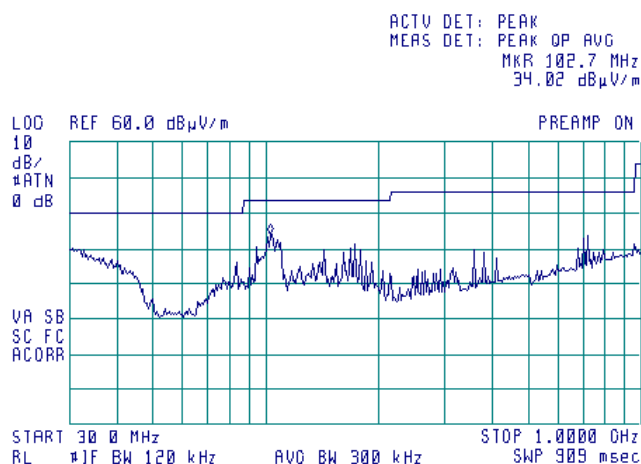
HL 0465	HL 0521	HL 0589	HL 0593	HL 0594	HL 0604	HL 2009	
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Full description is given in Appendix A.

Test specification:		Section 15.109, Radiated emission	
Test procedure:		ANSI C63.4, Sections 11.6 and 12.1.4	
Test mode:		Compliance	Verdict:
Date & Time:		5/03/2007 1:15:32 PM	
Temperature: 23°C	Air Pressure: 1013 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

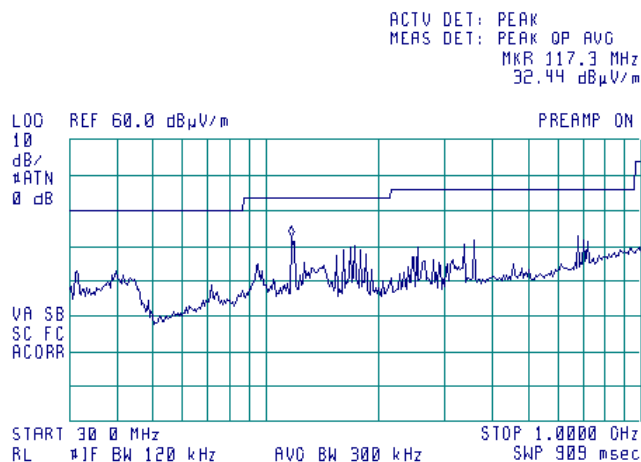
Plot 8.2.1 Radiated emission measurements in 30 - 1000 MHz range, vertical antenna polarization

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m



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

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m



9 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
0163	LISN FCC/VDE/50 Ohm/50 uH + 5 Ohm, MIL-STD-461E, CISPR 16-1	Electro-Metrics	ANS 25/2	1314	01-Oct-06	01-Oct-07
0446	Antenna, Loop, Active, 10 kHz - 30 MHz	EMCO	6502	2857	28-Jun-06	28-Jun-07
0465	Anechoic Chamber 9(L) x 6.5(W) x 5.5(H) m	HL	AC - 1	023	11-Nov-06	11-Nov-07
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A 00319, 3448A002 53	26-Sep-06	26-Sep-07
0569	Antenna, Log Periodic, 200 - 1000 MHz	Electro-Metrics	LPA 25/30	1953	10-Jan-07	10-Jan-08
0589	Cable Coaxial, GORE A2P01POL118, 2.3 m	HL	GORE-3	176	02-Dec-06	02-Dec-07
0593	Antenna Mast, 1-4 m Pneumatic	Madgesh	AM-F1	101	02-Feb-07	02-Feb-08
0594	Turn Table FOR ANECHOIC CHAMBER flush mount d=1.2 m Pneumatic	HL	TT-WDC1	102	26-Jan-07	26-Jan-08
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	10-Jan-07	10-Jan-08
0672	Shielded Room 4,6(L) x 4,2(W) x 2,4(H) m	HL	SR - 3	027	11-Nov-06	11-Nov-07
0787	Transient Limiter 9 kHz-200 MHz	Hewlett Packard	11947A	3107A018 77	21-Nov-06	21-Nov-07
0789	Power Divider / Combiner 0.5 to 2 GHz	A.E.L. Israel	MW 1225	1023	01-Jul-06	01-Jul-07
1215	Gertsch ratio transformer, 350 V	Singer, Alfred, Eaton	RT-60	1077	01-Jan-07	01-Jan-08
1425	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1426, HL1427	Agilent Technologies	8542E	3710A002 22, 3705A002 04	01-Sep-06	01-Sep-07
1430	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1431, HL1432	Agilent Technologies	8542E	3807A002 62,3705A0 0217	01-Sep-06	01-Sep-07
1502	Cable RF, 6 m, BNC/BNC	Belden	M17/167 MIL-C-17	1502	27-Nov-06	27-Nov-07
1503	Cable RF, 6 m, BNC/BNC	Belden	M17/167 MIL-C-17	1503	11-Sep-06	11-Sep-07
1510	Cable RF, 8 m, BNC/BNC	Belden	M17/167 MIL-C-17	1510	02-Dec-06	02-Dec-07
1553	Cable RF, 3.5 m	Alpha Wire	RG-214	1553	22-May-07	22-May-08
1566	Cable RF, 2 m	Huber-Suhner	Sucoflex 104PE	13094/4PE	02-Dec-06	02-Dec-07
1947	Cable 18GHz, 6.5 m, blue	Rhophase Microwave Limited	NPS-1803A-6500-NPS	T4974	17-Oct-06	17-Oct-07
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W	EMC Test Systems	3115	9911-5964	03-Mar-07	03-Mar-08
2009	Cable RF, 8 m	Alpha Wire	RG-214	C-56	20-May-07	20-May-08
2254	Cable 40GHz, 0.8 m, blue	Rhophase Microwave Limited	KPS-1503A-800-KPS	W4907	20-Jun-06	20-Jun-07
2697	Antenna, 30 MHz - 3.0 GHz	Sunol Sciences. Corp. Pleasanton, California USA	JB3	A022805	10-Jan-07	10-Jan-08



HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
2780	EMC analyzer, 100 Hz to 26.5 GHz	Agilent Technologies	E7405A	MY4510246	11-Jun-06	11-Jun-07
2866	Cable, 18 GHz, 0.6 m, SMA - SMA	Gore	NA	91P67960	01-Jan-07	01-Jan-08
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY41444762	07-May-07	07-May-08

10 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Conducted carrier power at RF antenna connector	Below 12.4 GHz: ± 1.7 dB 12.4 GHz to 40 GHz: ± 2.3 dB
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB
Occupied bandwidth	± 8.0 %
Duty cycle, timing (Tx ON / OFF) and average factor measurements	± 1.0 %
Conducted emissions with LISN	9 kHz to 150 kHz: ± 3.9 dB 150 kHz to 30 MHz: ± 3.8 dB
Radiated emissions at 3 m measuring distance Horizontal polarization Vertical polarization	Biconilog antenna: ± 5.3 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.3 dB Double ridged horn antenna: ± 5.3 dB Biconilog antenna: ± 6.0 dB Biconical antenna: ± 5.7 dB Log periodic antenna: ± 6.0 dB Double ridged horn antenna: ± 6.0 dB

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 2186-1 for OATS and IC 2186-2 for anechoic chamber), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, C-845 for conducted emissions site), assessed by TNO Certification EP&S (Netherlands) for a number of EMC, telecommunications, environmental, safety standards, and by AMTAC (UK) for safety of medical devices. The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing and environmental simulation (for exact scope please refer to Certificate No. 839.01).

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12 APPENDIX D Specification references

47CFR part 15: 2006	Radio Frequency Devices.
FR Vol.62	Federal Register, Volume 62, May 13, 1997
ANSI C63.2: 1996	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4: 2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

13 APPENDIX E Abbreviations and acronyms

A	ampere
AC	alternating current
AM	amplitude modulation
AVRG	average (detector)
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μ V)	decibel referred to one microvolt
dB(μ V/m)	decibel referred to one microvolt per meter
dB(μ A)	decibel referred to one microampere
dB Ω	decibel referred to one Ohm
DC	direct current
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
μ s	microsecond
NA	not applicable
NT	not tested
OATS	open area test site
Ω	Ohm
QP	quasi-peak
RE	radiated emission
RF	radio frequency
rms	root mean square
Rx	receive
s	second
T	temperature
Tx	transmit
V	volt

14 APPENDIX F Test equipment correction factors

Correction factor
Line impedance stabilization network
Model ANS-25/2, Electro-Metrics, HL 0163

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.

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

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

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

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

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

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

Antenna factor
Double-ridged wave guide horn antenna
Model 3115, S/N 9911-5964, 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(μ V) to convert it into field intensity in dB(μ V/m).

Antenna calibration

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

Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain
30	22.2	-22.5	0.01	520	19.7	6.3	4.27	1215	24.9	7.0	5.05	1810	28.3	7.1	5.08
35	18.5	-17.4	0.02	525	19.7	6.5	4.42	1220	24.9	7.0	4.99	1815	28.5	6.9	4.91
40	14.7	-12.5	0.06	530	19.6	6.6	4.57	1225	25.1	6.9	4.91	1820	28.6	6.8	4.74
45	11.3	-8.1	0.16	535	19.7	6.5	4.48	1230	25.2	6.8	4.92	1825	28.7	6.8	4.76
45	11.3	-8.1	0.16	540	19.9	6.4	4.40	1235	25.1	7.0	4.96	1830	28.7	6.8	4.76
50	8.9	-4.7	0.34	545	19.9	6.5	4.45	1240	25.0	7.1	5.09	1835	28.7	6.7	4.72
55	7.9	-2.8	0.52	550	19.9	6.5	4.51	1245	25.0	7.1	5.12	1840	28.8	6.7	4.69
60	7.8	-2.1	0.62	555	19.9	6.6	4.60	1250	25.0	7.1	5.15	1845	28.6	6.9	4.90
65	8.5	-2.0	0.63	560	19.9	6.7	4.69	1255	25.0	7.2	5.25	1850	28.4	7.1	5.12
70	9.0	-1.9	0.64	565	19.9	6.7	4.70	1260	24.9	7.3	5.36	1855	28.5	7.0	5.07
75	8.8	-1.1	0.78	570	20.0	6.7	4.71	1265	25.0	7.3	5.31	1860	28.6	7.0	5.01
80	8.4	-0.2	0.97	575	20.1	6.7	4.71	1270	25.1	7.2	5.26	1865	28.5	7.1	5.17
85	8.0	0.8	1.20	580	20.1	6.7	4.71	1275	25.3	7.0	5.05	1870	28.4	7.3	5.33
90	8.2	1.1	1.29	585	20.1	6.5	4.79	1280	25.5	6.8	4.94	1875	28.4	7.2	5.28
95	9.2	0.5	1.13	590	20.1	6.9	4.88	1285	25.4	7.0	4.97	1880	28.5	7.2	5.22
100	10.6	-0.4	0.92	595	20.2	6.8	4.82	1290	25.3	7.1	5.10	1885	28.5	7.2	5.22
110	12.6	-1.6	0.70	705	20.4	6.8	4.75	1300	25.2	7.3	5.33	1895	28.6	7.2	5.24
120	13.9	-2.1	0.82	715	20.5	6.8	4.80	1310	25.5	7.1	5.09	1905	28.5	7.3	5.36
125	14.2	-2.0	0.83	720	20.5	6.9	4.85	1315	25.4	7.2	5.23	1910	28.5	7.4	5.45
130	14.2	-1.7	0.88	725	20.6	6.8	4.81	1320	25.3	7.3	5.36	1915	28.5	7.3	5.38
140	13.4	-0.3	0.94	735	20.9	6.7	4.65	1330	25.6	7.0	5.06	1925	28.6	7.3	5.35
150	12.9	0.8	1.21	745	21.0	6.6	4.59	1340	25.7	7.1	5.09	1935	28.5	7.4	5.54
160	12.4	1.6	1.44	755	21.0	6.8	4.74	1350	25.7	7.1	5.17	1945	28.5	7.5	5.59
165	12.5	2.0	1.59	760	21.0	6.8	4.83	1355	25.8	7.0	5.06	1950	28.5	7.4	5.48
170	12.2	2.6	1.83	765	21.1	6.8	4.73	1360	25.9	6.9	4.95	1955	28.6	7.5	5.57
175	11.8	3.3	2.13	770	21.3	6.7	4.64	1365	26.0	6.9	4.95	1960	28.6	7.5	5.65
180	11.6	3.7	2.36	775	21.3	6.7	4.68	1370	26.0	7.0	4.96	1965	28.7	7.4	5.47
185	11.5	4.0	2.54	780	21.3	6.7	4.72	1375	26.0	7.0	5.01	1970	28.9	7.2	5.29
190	11.6	4.2	2.61	785	21.7	6.7	4.77	1380	26.1	7.1	5.09	1975	28.9	7.2	5.22
200	13.1	3.2	2.07	795	21.4	6.8	4.79	1390	26.1	6.9	4.92	1985	29.1	7.1	5.11
205	12.0	4.4	2.76	800	21.5	6.8	4.77	1395	26.2	6.9	4.94	1990	29.1	7.0	5.06
210	11.0	5.6	3.66	805	21.6	6.7	4.71	1400	26.2	7.0	4.96	1995	29.1	7.1	5.09
215	11.3	5.6	3.59	810	21.7	6.7	4.65	1405	26.1	7.0	5.02	2000	29.1	7.1	5.11
220	11.6	5.5	3.53	815	21.7	6.7	4.72	1410	26.1	7.1	5.09	2005	29.1	7.1	5.16
225	11.7	5.5	3.55	820	21.7	6.8	4.80	1415	26.2	7.0	5.02	2010	29.1	7.1	5.15
230	11.9	5.5	3.57	825	21.7	6.8	4.82	1420	26.3	7.0	4.96	2015	29.2	7.1	5.13
235	12.1	5.5	3.56	830	21.7	6.9	4.85	1425	26.2	7.1	5.10	2020	29.2	7.1	5.18
240	12.3	5.5	3.54	835	21.8	6.8	4.82	1430	26.1	7.2	5.25	2025	29.3	7.1	5.08
245	12.3	5.7	3.71	840	21.9	6.8	4.80	1435	26.1	7.2	5.24	2030	29.3	7.0	5.05
250	12.3	5.9	3.88	845	21.9	6.8	4.83	1440	26.2	7.2	5.24	2035	29.3	7.1	5.07
255	12.5	5.9	3.85	850	21.9	6.8	4.86	1445	26.3	7.1	5.13	2040	29.3	7.1	5.13
260	12.7	5.8	3.83	855	22.0	6.8	4.80	1450	26.5	7.0	4.98	2045	29.2	7.2	5.23
265	13.2	5.5	3.64	860	22.1	6.8	4.74	1455	26.4	7.1	5.07	2050	29.2	7.2	5.27
270	13.7	5.2	3.27	865	22.0	6.9	4.92	1460	26.4	7.1	5.17	2055	29.3	7.2	5.21
275	13.7	5.3	3.39	870	21.9	7.1	5.11	1465	26.4	7.2	5.19	2060	29.5	7.0	5.02
280	13.7	5.4	3.50	875	22.0	7.1	5.08	1470	26.4	7.2	5.22	2065	29.4	7.1	5.08
285	13.6	5.6	3.61	880	22.0	7.0	5.05	1475	26.3	7.1	5.17	2070	29.4	7.1	5.10
290	13.7	5.7	3.72	885	22.1	7.0	5.06	1480	26.5	7.1	5.12	2075	29.5	7.0	5.01
295	13.8	5.8	3.77	890	22.1	7.0	5.06	1485	26.5	7.1	5.14	2080	29.8	6.8	4.76
300	13.9	5.8	3.81	895	22.2	7.1	5.09	1490	26.5	7.1	5.17	2085	29.7	6.9	4.89
305	14.0	5.9	3.85	900	22.2	7.1	5.12	1495	26.5	7.2	5.24	2090	29.7	6.9	4.86
310	14.1	5.9	3.88	905	22.3	7.1	5.09	1500	26.5	7.2	5.31	2095	29.8	6.8	4.78
315	14.3	5.9	3.89	910	22.3	7.0	5.05	1505	26.5	7.2	5.27	2100	29.9	6.8	4.75
320	14.4	5.9	3.90	915	22.4	7.0	4.99	1510	26.6	7.2	5.23	2105	29.8	6.8	4.81
325	14.5	5.9	3.92	920	22.6	6.9	4.92	1515	26.6	7.2	5.30	2110	29.9	6.8	4.78
330	14.6	5.9	3.93	925	22.7	6.9	4.85	1520	26.5	7.3	5.38	2115	29.9	6.8	4.76
335	14.7	6.0	4.02	930	22.8	6.8	4.77	1525	26.6	7.3	5.37	2120	29.9	6.8	4.84
340	14.7	6.2	4.12	935	22.8	6.8	4.83	1530	26.6	7.3	5.36	2125	29.9	6.9	4.89
345	14.8	6.1	4.06	940	22.8	6.8	4.89	1535	26.6	7.4	5.44	2130	29.9	6.8	4.90
350	15.1	6.0	3.99	945	22.8	6.9	4.87	1540	26.5	7.4	5.53	2135	29.8	6.9	4.94
355	15.3	5.9	3.88	950	22.9	6.9	4.85	1545	26.5	7.5	5.58	2140	29.8	7.1	5.08
360	15.6	5.8	3.78	955	23.0	6.8	4.81	1550	26.5	7.5	5.63	2145	29.9	6.9	4.92
365	15.5	5.9	3.89	960	23.1	6.8	4.77	1555	26.7	7.3	5.39	2150	29.9	7.0	4.98
370	15.5	6.0	4.01	965	23.1	6.7	4.73	1560	26.9	7.1	5.16	2155	29.8	7.1	5.10
375	15.6	6.1	4.03	970	23.2	6.7	4.69	1565	26.9	7.2	5.23	2160	29.8	7.1	5.08
380	15.7	6.1	4.05	975	23.2	6.6	4.62	1570	26.9	7.2	5.30	2165	29.9	7.0	5.09
385	15.7	6.2	4.15	980	23.5	6.6	4.54	1575	27.0	7.2	5.23	2170	29.8	7.1	5.07
390	15.7	6.3	4.25	985	23.5	6.6	4.52	1580	27.0	7.1	5.17	2175	29.8	7.2	5.20
395	15.9	6.3	4.22	990	23.6	6.5	4.50	1585	27.0	7.2	5.20	2180	29.8	7.2	5.27
400	16.0	6.2	4.18	995	23.6	6.5	4.48	1590	27.0	7.2	5.22	2185	29.8	7.2	5.27
405	16.3	6.1	4.07	1000	23.7	6.5	4.46	1595	27.0	7.2	5.29	2190	29.8	7.2	5.28
410	16.5	6.0	3.96	1005	23.7	6.5	4.51	1600	27.0	7.3	5.38	2195	29.9	7.2	5.30
415	16.5	6.0	4.00	1010	23.7	6.6	4.57	1605	27.0	7.3	5.38	2200	29.7	7.3	5.38
420	16.6	6.1	4.03	1015	23.7	6.6	4.55	1610	27.0	7.3	5.41	2205	29.7	7.3	5.41
425	16.6	6.1	4.10	1020	23.8	6.6	4.54	1615	27.1	7.3	5.33	2210	29.7	7.4	5.47
430	16.7	6.2	4.16	1025	23.8	6.6	4.62	1620	27.2	7.2	5.27	2215	29.7	7.4	5.44
435	16.9	6.1	4.05	1030	23.7	6.7	4.70	1625	27.2	7.2	5.30	2220	29.7	7.5	5.57
440	17.1	5.9	3.93	1035	23.7	6.8	4.81	1630	27.2	7.3	5.33	2225	29.8	7.3	5.43
445	17.2	6.0	3.97	1040	23.6	6.9	4.92	1635	27.2	7.3	5.35	2230	29.8	7.4	5.45
450	17.2	6.0	4.00	1045	23.7	6.9	4.91	1640	27.2	7.3	5.36	2235	29.7	7.5	5.61
455	17.3	6.1	4.04	1050	23.7	6.9	4.91	1645	27.3	7.2	5.22	2240	29.5	7.7	5.66
460	17.4	6.1	4.07	1055	23.7	7.0	5.01	1650	27.5	7.1	5.09	2245	29.8	7.4	5.53
465	17.5	6.1	4.05	1060	23.6	7.1	5.11	1655	27.5	7.1	5.11	2250	30.0	7.3	5.35
470	17.6	6.1	4.04	1065	23.7	7.0	5.06	1660	27.5	7.1	5.13	2255	30.0	7.2	5.28
475	17.7	6.0	3.99	1070	23.8	7.0									

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

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

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

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

Cable loss
Cable coaxial, 6 m, model: M17/167 MIL-C-17, HL 1503

Frequency, MHz	Cable loss, dB
0.15	0.043
1	0.077
3	0.139
5	0.169
10	0.248
30	0.430
50	0.561
75	0.697
100	0.822
300	1.446
500	1.901
800	2.663
1000	2.829
1500	3.569
2000	4.179

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

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

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

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

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

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

Cable loss
Cable 18 GHz, 6.5 m, blue, model: NPS-1803A-6500-NPS, S/N T4974, HL 1947

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

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

Cable loss
RF cable 8 m, model RG-214, HL 2009

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

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

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

Cable loss
Cable coaxial, Gore, 18 GHz, 0.6 m, SMA - SMA, model Right Angle, S/N 91P67960
HL 2866

Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB
10	0.03	5750	0.56	12000	0.77
30	0.02	6000	0.60	12250	0.68
100	0.02	6250	0.54	12500	0.67
250	0.10	6500	0.60	12750	0.71
500	0.15	6750	0.56	13000	0.80
750	0.11	7000	0.63	13250	0.75
1000	0.13	7250	0.59	13500	0.66
1250	0.14	7500	0.62	13750	0.68
1500	0.16	7750	0.63	14000	0.69
1750	0.20	8000	0.60	14250	0.69
2000	0.26	8250	0.59	14500	0.62
2250	0.26	8500	0.57	14750	0.71
2500	0.32	8750	0.54	15000	0.73
2750	0.35	9000	0.53	15250	0.64
3000	0.45	9250	0.54	15500	0.62
3250	0.51	9500	0.55	15750	0.76
3500	0.63	9750	0.54	16000	0.92
3750	0.56	10000	0.58	16250	0.86
4000	0.52	10250	0.63	16500	0.84
4250	0.49	10500	0.73	16750	0.86
4500	0.47	10750	0.77	17000	1.02
4750	0.42	11000	0.81	17250	1.02
5000	0.42	11250	0.84	17500	0.91
5250	0.47	11500	0.87	17750	0.91
5500	0.56	11750	0.84	18000	1.07