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TEST REPORT

ACCORDING TO: FCC part 27 and part 15 subpart B

FOR:

Airspan Networks (Israel) Ltd.

Subscriber unit

Models: ProST 698-746M Ext.,

EasyST 698-746M

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. This test report shall not be reproduced in any form except in full with the written approval of Hermon Laboratories Ltd.



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1 Applicant information

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

2 Equipment under test attributes

Product name: Subscriber unit
Product type: Transceiver
Model(s): 1) EasyST 698-746M, s/n 48E8B5735B2;
2) ProST 698-746M Ext., s/n 48F8B3965C1
Hardware version: A1
Software release: 7.5.8.0
Receipt date 1/11/2009

3 Manufacturer information

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

4 Test details

Project ID: 19383
Location: Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started: 1/11/2009
Test completed: 1/28/2009
Test specification(s): FCC part 27; part 15 subpart B



5 Tests summary

Test	Status
Transmitter characteristics	
Section 27.50(c)(3), (c)(9), Peak output power at RF antenna connector	Pass
Section 2.1091, 27.52, RF safety	Pass, Exhibit provided in Application
Section 27.53(g), Spurious emissions at RF antenna connector	Pass
Section 27.53(g), Band edge emissions at RF antenna connector	Pass
Section 27.53(g), Radiated spurious emissions	Pass
Section 27.54, Frequency stability	Pass
Section 2.1049, Occupied bandwidth	Pass
Unintentional emissions	
Section 15.107, Conducted emission at AC power port	Pass
Section 15.109, Radiated emission	Pass
Section 15.111, Conducted emission at receiver antenna port	Pass

Testing was completed against all relevant requirements of the test standard. The results obtained indicate that the product under test complies in full with the requirements tested.

The test results relate only to the items tested. Pass/ fail decision was based on nominal values.

	Name and Title	Date	Signature
Tested by:	Mr. L. Markel, test engineer	January 28, 2009	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	February 8, 2009	
Approved by:	Mr. M. Nikishin, EMC and Radio group leader	February 9, 2009	



6 EUT description

6.1 General information

The EUT, subscriber premises radio, model names ProST 698-746M Ext and EasyST 698-746M, is a part of a WiMAX broadband fixed cellular wireless access system. The system provides a radio link between an end-user (a subscriber) and a network to give high-speed data access. The EasyST and ProST transceiver/receiver (up to 64 QAM modulation, data rate up to 37Mbps) uses OFDM, operates in TDD duplexing mode and is equipped with a 15.3 dBi external antenna.

6.2 Ports and lines

Port type	Port description	Connected from	Connected to	Qty.	Cable type	Cable length	Indoor / outdoor
ProST							
Power	DC Power	EUT	SDA (+ DATA)	1	UTP	10	Outdoor
Signal	RS-232	EUT (Maintenance only)	Laptop	1	UTP	0.2	Outdoor
RF	Antenna	EUT	50 Ohm termination	1	Shielded	NA	NA
Easy ST							
Power	DC Power	EUT	AC/DC adaptor	1	Unshielded	1.5	Indoor
Signal	Ethernet	EUT	Laptop	1	Unshielded	1	Indoor
RF	Antenna	EUT	50 Ohm termination	1	Shielded	NA	NA

6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
Laptop	IBM	X31	99-TXWYC
Laptop adaptor	IBM		11S92P1014Z1 ZD2N74T2LS
SDA	Airspan	SDA-4S/VL type 2	753D6A0086
Mouse	Microsoft	NA	X802382-004
Laptop (RE EasyST)	IBM	T43	L3-AFKW5 05/09
Laptop adaptor (RE EasyST)	IBM	NA	11S08K8202Z1 ZAPW5940EL
Laptop (CE EasyST)	DELL Inspirion 6400	PP20L	FR413 A03
Laptop adaptor (CE EasyST)	DELL	LA65NS0-00	CN-ODF263- 71615-79F- E85D

6.4 Changes made in the EUT

No changes were implemented.



6.5 Transmitter characteristics of ProST

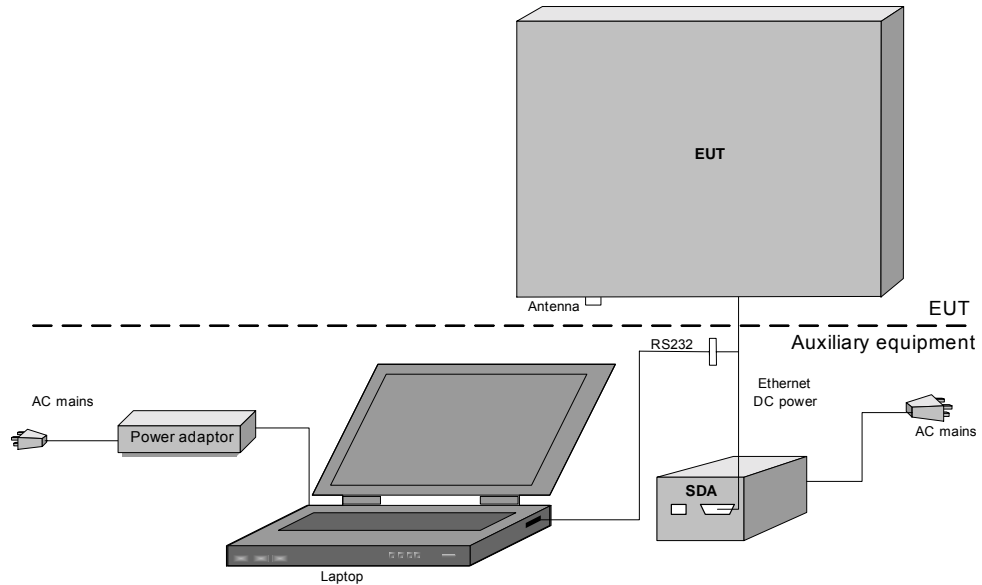
Type of equipment						
<input checked="" type="checkbox"/>	Stand-alone (Equipment with or without its own control provisions)					
	Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)					
	Plug-in card (Equipment intended for a variety of host systems)					
Intended use		Condition of use				
<input checked="" type="checkbox"/>	fixed	Always at a distance more than 2 m from all people				
	mobile	Always at a distance more than 20 cm from all people				
	portable	May operate at a distance closer than 20 cm to human body				
Assigned frequency range		698.0 - 746.0 MHz				
Operating frequency range		699.5 - 744.5 MHz				
RF channel spacing		2.5, 5, 10 MHz				
Maximum rated output power		At transmitter 50 Ω RF output connector			25.94 dBm	
Is transmitter output power variable?		No				
		continuous variable				
		<input checked="" type="checkbox"/>	Yes	stepped variable with stepsize		0.5 dB
		minimum RF power				-30 dBm
		maximum RF power		25.94 dBm		
Antenna connection						
unique coupling	<input checked="" type="checkbox"/>	standard connector	Integral	<input checked="" type="checkbox"/> with temporary RF connector without temporary RF connector		
Antenna/s technical characteristics						
Type	Manufacturer		Model number		Gain	
External	Trival Antene		UF-14C		15.3 dBi	
Transmitter 99% power bandwidth		Transmitter aggregate data rate/s, MBps		Type of modulation		
2.5 MHz		1.0475		BPSK		
		2.095		QPSK		
		6.2825		16QAM		
		9.425		64QAM		
5 MHz		2.095		BPSK		
		4.19		QPSK		
		12.565		16QAM		
		18.85		64QAM		
10 MHz		4.19		BPSK		
		8.38		QPSK		
		25.13		16QAM		
		37.7		64QAM		
Type of multiplexing			OFDM			
Modulating test signal (baseband)			PRBS			
Maximum transmitter duty cycle in normal use			90%			
Transmitter power source						
	Nominal rated voltage		Battery type			
<input checked="" type="checkbox"/>	DC	Nominal rated voltage		48 VDC via SDA		
	AC mains	Nominal rated voltage		Frequency	60 Hz	
Common power source for transmitter and receiver			<input checked="" type="checkbox"/>	yes	no	

6.6 Transmitter characteristics of EasyST

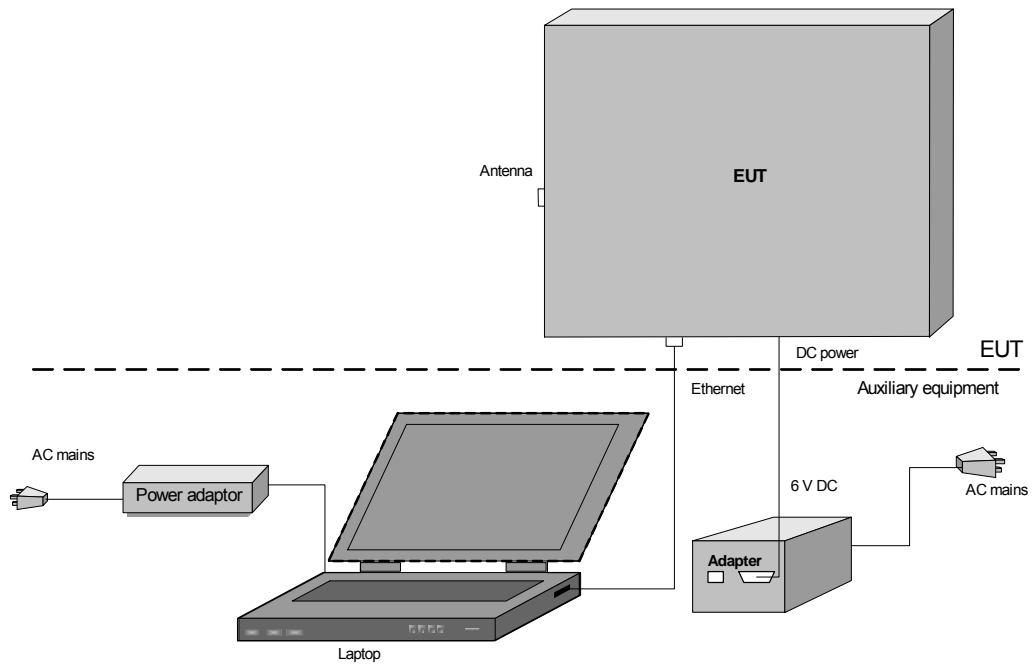
Type of equipment					
V	Stand-alone (Equipment with or without its own control provisions)				
	Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)				
	Plug-in card (Equipment intended for a variety of host systems)				
Intended use		Condition of use			
	fixed	Always at a distance more than 2 m from all people			
V	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		698.0 - 746.0 MHz			
Operating frequency range		699.5 - 744.5 MHz			
RF channel spacing		2.5, 5, 10 MHz			
Maximum rated output power		At transmitter 50 Ω RF output connector		25.94 dBm	
Is transmitter output power variable?		No			
		V	Yes	continuous variable	
				stepped variable with stepsize	
				0.5 dB	
minimum RF power		-30 dBm			
maximum RF power		25.94 dBm			
Antenna connection					
unique coupling	V	standard connector	Integral	V	with temporary RF connector without temporary RF connector
Antenna/s technical characteristics					
Type	Manufacturer		Model number		Gain (Maximum)
External	Trival Antene		UF-14C		15.3 dBi
Transmitter 99% power bandwidth		Transmitter aggregate data rate/s, MBps		Type of modulation	
2.5 MHz		1.0475		BPSK	
		2.095		QPSK	
		6.2825		16QAM	
		9.425		64QAM	
5 MHz		2.095		BPSK	
		4.19		QPSK	
		12.565		16QAM	
		18.85		64QAM	
10 MHz		4.19		BPSK	
		8.38		QPSK	
		25.13		16QAM	
		37.7		64QAM	
Type of multiplexing		OFDM			
Modulating test signal (baseband)		PRBS			
Maximum transmitter duty cycle in normal use		90%			
Transmitter power source					
V	DC	Nominal rated voltage		Battery type	
	AC mains	Nominal rated voltage		6 VDC via AC/DC adapter	
		Nominal rated voltage		Frequency	60 Hz
Common power source for transmitter and receiver		V		yes	no

6.7 Test configuration

6.7.1 ProST unit



6.7.2 EasyST unit



Test specification:	Section 27.50(c)(9), Peak output power at RF antenna connector		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/26/2009 2:34:33 PM		
Temperature: 23°C	Air Pressure: 1013 hPa	Relative Humidity: 44%	Power Supply: 120 V AC
Remarks: EasyST			

7 Transmitter tests according to 47CFR part 27 requirements

7.1 Peak output power test

7.1.1 General

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

Table 7.1.1 Peak output power limits

Assigned frequency range, MHz	Maximum peak output power (mobile station)	
	W	dBm
698.0 – 746.0	30	44.77

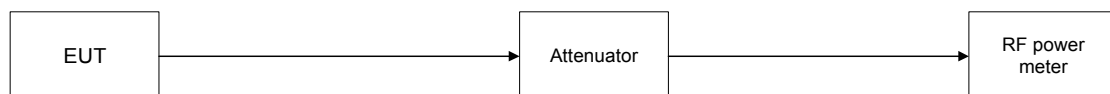
7.1.2 Test procedure

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

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

7.1.2.3 The peak output power was measured with power meter as provided in Table 7.1.2.

Figure 7.1.1 Peak output power test setup





Test specification:	Section 27.50(c)(9), Peak output power at RF antenna connector		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/26/2009 2:34:33 PM		
Temperature: 23°C	Air Pressure: 1013 hPa	Relative Humidity: 44%	Power Supply: 120 V AC
Remarks: EasyST			

Table 7.1.2 RF output power test results

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Power meter (average during transmission burst)
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: 6
CHANNEL BANDWIDTH: 2.5 MHz
MAXIMUM ANTENNA GAIN: 15.3 dBi (13.15 dBd)

Carrier frequency, MHz	Power meter reading, dBm	External attenuation, dB	Cable loss, dB	ERP*, dBm	Limit, dBm	Margin, dB	Verdict
BPSK 1.0745 Mbps							
699.5	25.09	Included	Included	38.24	44.77	-6.53	Pass
719.0	25.03	Included	Included	38.18	44.77	-6.59	Pass
744.5	25.21	Included	Included	38.36	44.77	-6.41	Pass
64 QAM 9.425 Mbps							
699.5	25.07	Included	Included	38.22	44.77	-6.55	Pass
719.0	24.46	Included	Included	37.61	44.77	-7.16	Pass
744.5	25.39	Included	Included	38.54	44.77	-6.23	Pass

* - ERP = Power meter reading, dBm + Antenna gain (dBd)

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Power meter (average during transmission burst)
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: 6
CHANNEL BANDWIDTH: 5 MHz
MAXIMUM ANTENNA GAIN: 15.3 dBi (13.15 dBd)

Carrier frequency, MHz	Power meter reading, dBm	External attenuation, dB	Cable loss, dB	ERP*, dBm	Limit, dBm	Margin, dB	Verdict
BPSK 4.19 Mbps							
701.0	25.70	Included	Included	38.85	44.77	-5.92	Pass
719.0	25.08	Included	Included	38.23	44.77	-6.54	Pass
743.0	25.78	Included	Included	38.93	44.77	-5.84	Pass
64 QAM 18.85 Mbps							
701.0	25.32	Included	Included	38.47	44.77	-6.30	Pass
719.0	25.92	Included	Included	39.07	44.77	-5.70	Pass
743.0	25.50	Included	Included	38.65	44.77	-6.12	Pass

* - ERP = Power meter reading, dBm + Antenna gain (dBd)



Test specification:		Section 27.50(c)(9), Peak output power at RF antenna connector	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/26/2009 2:34:33 PM		
Temperature: 23°C	Air Pressure: 1013 hPa	Relative Humidity: 44%	Power Supply: 120 V AC
Remarks: EasyST			

Table 7.1.2 RF output power test results (continued)

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
 DETECTOR USED: Power meter (average during transmission burst)
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: 6
 CHANNEL BANDWIDTH: 10 MHz
 MAXIMUM ANTENNA GAIN: 15.3 dBi (13.15 dBd)

Carrier frequency, MHz	Power meter reading, dBm	External attenuation, dB	Cable loss, dB	ERP*, dBm	Limit, dBm	Margin, dB	Verdict
BPSK 8.38 Mbps							
704.0	25.50	Included	Included	38.65	44.77	-6.12	Pass
722.0	25.02	Included	Included	38.17	44.77	-6.60	Pass
740.0	25.03	Included	Included	38.18	44.77	-6.59	Pass
64 QAM 37.7 Mbps							
704.0	25.53	Included	Included	38.68	44.77	-6.09	Pass
722.0	25.94	Included	Included	39.09	44.77	-5.68	Pass
740.0	25.76	Included	Included	38.91	44.77	-5.86	Pass

* - ERP = Power meter reading, dBm + Antenna gain (dBd)

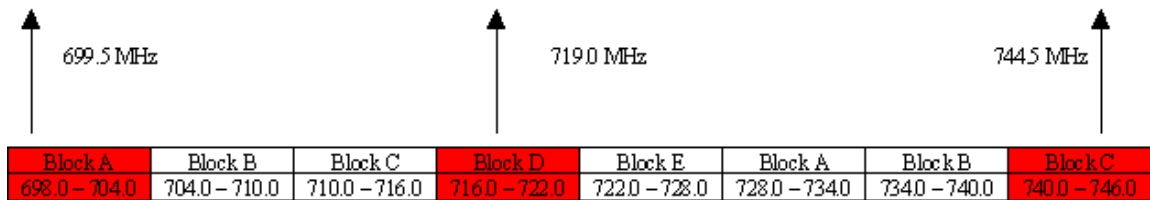
Reference numbers of test equipment used

HL 2911	HL 3301	HL 3302	HL 3439	HL 3441			
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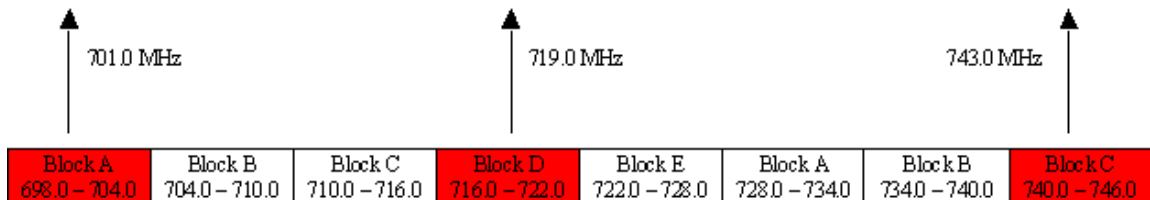
Full description is given in Appendix A.

Test specification:		Section 27.50(c)(9), Peak output power at RF antenna connector	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/26/2009 2:34:33 PM		
Temperature: 23°C	Air Pressure: 1013 hPa	Relative Humidity: 44%	Power Supply: 120 V AC
Remarks: EasyST			

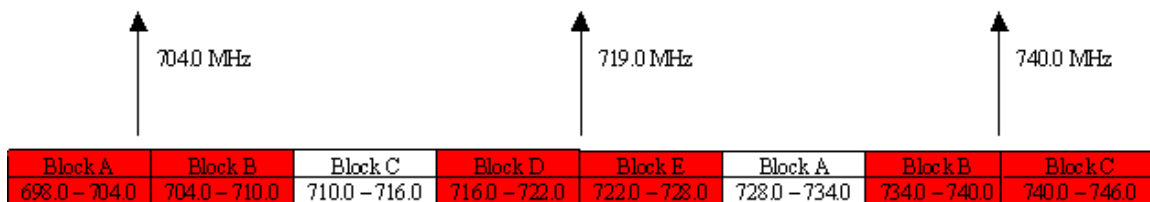
Figure 7.1.2 Frequency channels arrangement



2.5 MHz arrangement



5 MHz arrangement



10 MHz arrangement

Test specification:	Section 27.50(c)(3), Peak output power at RF antenna connector		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2009 5:36:28 PM		
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks:	ProST		

7.2 Peak output power test

7.2.1 General

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

Table 7.2.1 Peak output power limits

Assigned frequency range, MHz	Maximum peak output power (Fixed and Base Station)	
	W/MHz	dBm/MHz
698.0 – 746.0	1000	60.00

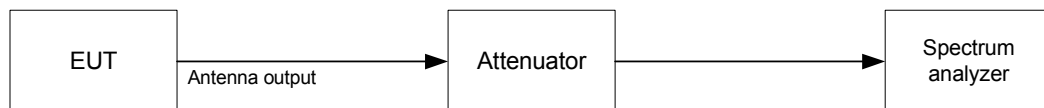
7.2.2 Test procedure

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

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

7.2.2.3 The peak output power was measured with spectrum analyzer as provided in Table 7.2.2 and associated plots.

Figure 7.2.1 Peak output power test setup





Test specification:	Section 27.50(c)(3), Peak output power at RF antenna connector		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2009 5:36:28 PM		
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST			

Table 7.2.2 RF output power test results

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 30 kHz (0.5 – 2% of OBW)
VIDEO BANDWIDTH: 1000 kHz
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: 6
CHANNEL BANDWIDTH: 2.5 MHz
MAXIMUM ANTENNA GAIN: 15.3 dBi (13.15 dBd)

Carrier frequency, MHz	Spectrum analyzer reading, dBm/Hz	External attenuation, dB	Cable loss, dB	ERP, dBm/MHz*	Limit, dBm/MHz	Margin, dB	Verdict
BPSK 1.0745 Mbps							
699.5	-33.2	Included	Included	39.95	60.00	-20.05	Pass
719.0	-32.7	Included	Included	40.45	60.00	-19.55	Pass
744.5	-33.0	Included	Included	40.15	60.00	-19.85	Pass
64 QAM 9.425 Mbps							
699.5	-33.2	Included	Included	39.95	60.00	-20.05	Pass
719.0	-32.5	Included	Included	40.65	60.00	-19.35	Pass
744.5	-33.2	Included	Included	39.95	60.00	-20.05	Pass

* - RF output power, dBm/MHz (ERP) = Spectrum analyzer reading, dBm/Hz + Integration factor** + Antenna gain (dBd)

** - Integration factor = $10 \log(1\text{MHz}/1\text{ Hz}) = 10 \log(1000000) = 60 \text{ dB}$

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 100 kHz (0.5 – 2% of OBW)
VIDEO BANDWIDTH: 1000 kHz
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: 6
CHANNEL BANDWIDTH: 5 MHz
MAXIMUM ANTENNA GAIN: 15.3 dBi (13.15 dBd)

Carrier frequency, MHz	Spectrum analyzer reading, dBm/Hz	External attenuation, dB	Cable loss, dB	ERP, dBm/MHz*	Limit, dBm/MHz	Margin, dB	Verdict
BPSK 4.19 Mbps							
701.0	-35.2	Included	Included	37.95	60.00	-22.05	Pass
719.0	-34.7	Included	Included	38.45	60.00	-21.55	Pass
743.0	-35.0	Included	Included	38.15	60.00	-21.85	Pass
64 QAM 18.85 Mbps							
701.0	-35.1	Included	Included	38.05	60.00	-21.95	Pass
719.0	-34.6	Included	Included	38.55	60.00	-21.45	Pass
743.0	-35.0	Included	Included	38.15	60.00	-21.85	Pass

* - RF output power, dBm/MHz (ERP) = Spectrum analyzer reading, dBm/Hz + Integration factor** + Antenna gain (dBd)

** - Integration factor = $10 \log(1\text{MHz}/1\text{ Hz}) = 10 \log(1000000) = 60 \text{ dB}$



Test specification:		Section 27.50(c)(3), Peak output power at RF antenna connector	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2009 5:36:28 PM		
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST			

Table 7.2.2 RF output power test results (continued)

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 100 kHz (0.5 – 2% of OBW)
 VIDEO BANDWIDTH: 1000 kHz
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: 6
 CHANNEL BANDWIDTH: 10 MHz
 MAXIMUM ANTENNA GAIN: 15.3 dBi (13.15 dBd)

Carrier frequency, MHz	Spectrum analyzer reading, dBm/Hz	External attenuation, dB	Cable loss, dB	ERP, dBm/MHz*	Limit, dBm/MHz	Margin, dB	Verdict
BPSK 8.38 Mbps							
704.0	-38.8	Included	Included	34.35	60.00	-25.65	Pass
722.0	-38.5	Included	Included	34.65	60.00	-25.35	Pass
740.0	-38.8	Included	Included	34.35	60.00	-25.65	Pass
64 QAM 37.7 Mbps							
704.0	-39.1	Included	Included	34.05	60.00	-25.95	Pass
722.0	-38.4	Included	Included	34.75	60.00	-25.25	Pass
740.0	-38.9	Included	Included	34.25	60.00	-25.75	Pass

* - RF output power, dBm/MHz (ERP) = Spectrum analyzer reading, dBm/Hz + Integration factor** + Antenna gain (dBd)

** - Integration factor = 10 log (1MHz/1 Hz) = 10 log (1000000) = 60 dB

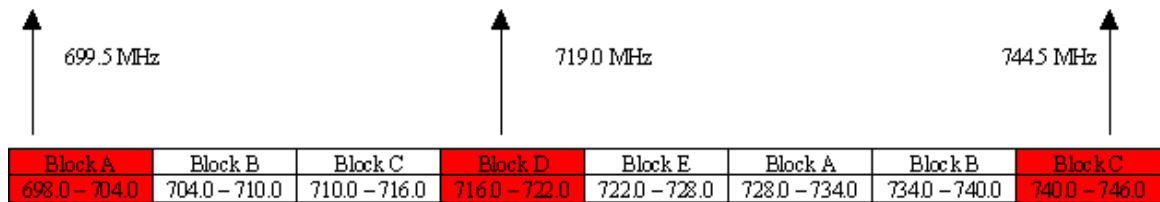
Reference numbers of test equipment used

HL 1430	HL 2911	HL 3439	HL 3441				
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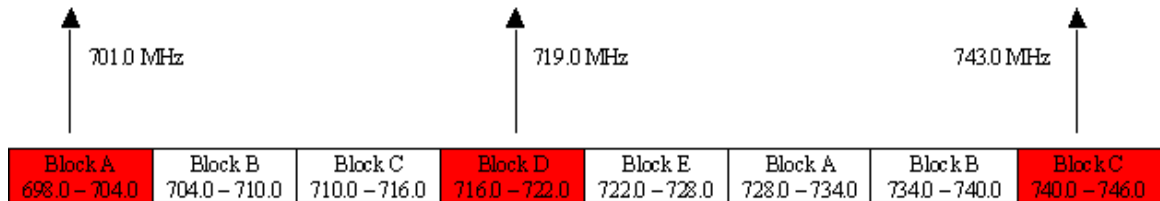
Full description is given in Appendix A.

Test specification:		Section 27.50(c)(3), Peak output power at RF antenna connector	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2009 5:36:28 PM		
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST			

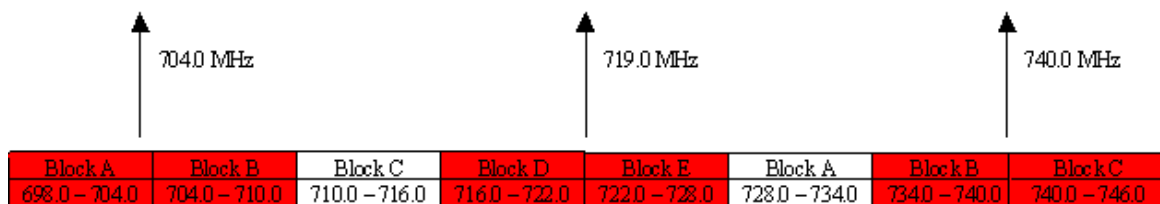
Figure 7.2.2 Frequency channels arrangement



2.5 MHz arrangement



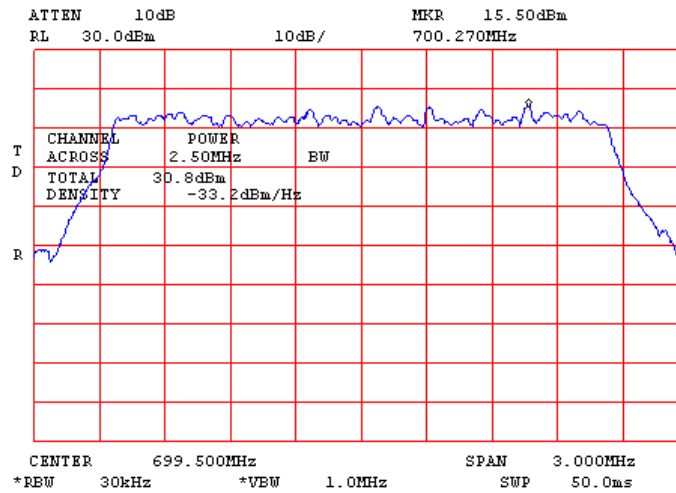
5 MHz arrangement



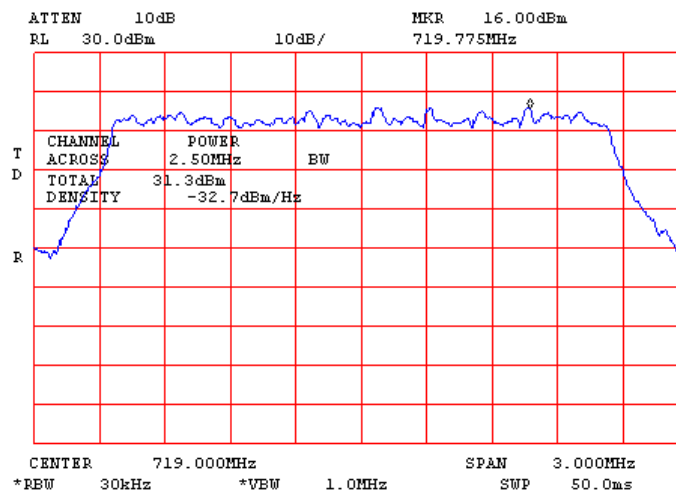
10 MHz arrangement

Test specification:	Section 27.50(c)(3), Peak output power at RF antenna connector		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	1/28/2009 5:36:28 PM		
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks:	ProST		

Plot 7.2.1 Peak output power test results at low frequency, BPSK modulation, 2.5 MHz CBW

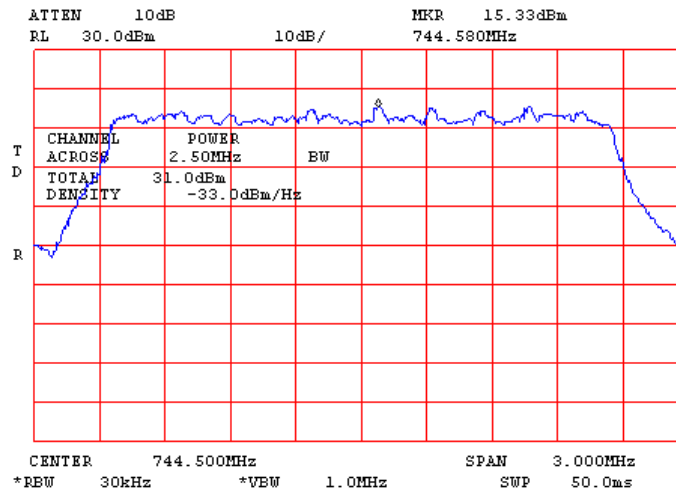


Plot 7.2.2 Peak output power test results at mid frequency, BPSK modulation, 2.5 MHz CBW

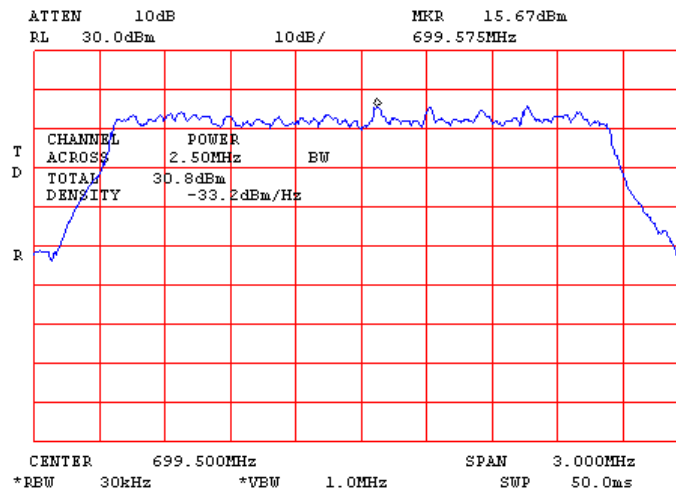


Test specification:	Section 27.50(c)(3), Peak output power at RF antenna connector		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	1/28/2009 5:36:28 PM		
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST			

Plot 7.2.3 Peak output power test results at high frequency, BPSK modulation, 2.5 MHz CBW

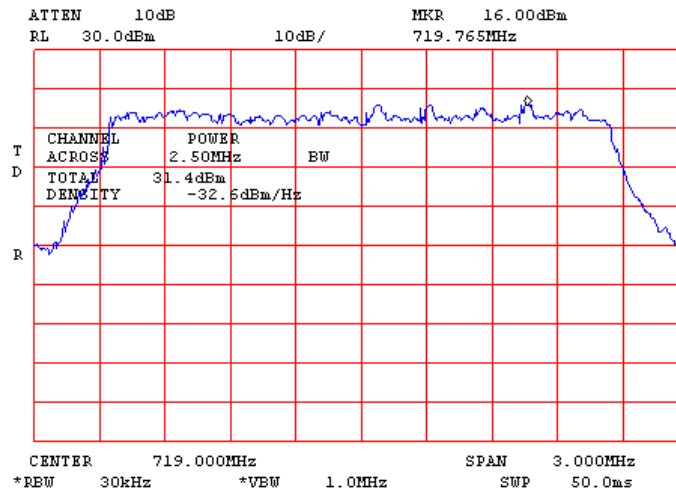


Plot 7.2.4 Peak output power test results at low frequency, 64QAM modulation, 2.5 MHz CBW

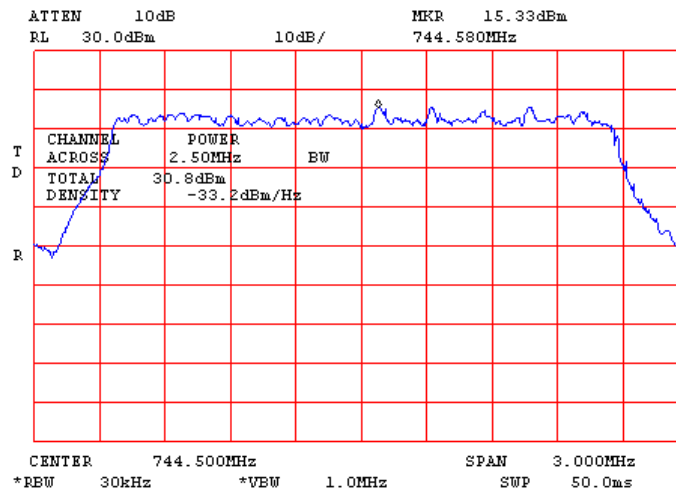


Test specification:	Section 27.50(c)(3), Peak output power at RF antenna connector		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	1/28/2009 5:36:28 PM		
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks:	ProST		

Plot 7.2.5 Peak output power test results at mid frequency, 64QAM modulation, 2.5 MHz CBW

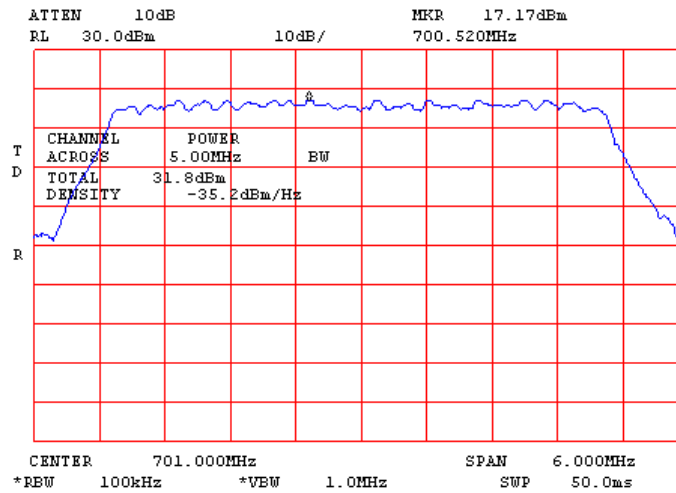


Plot 7.2.6 Peak output power test results at high frequency, 64QAM modulation, 2.5 MHz CBW

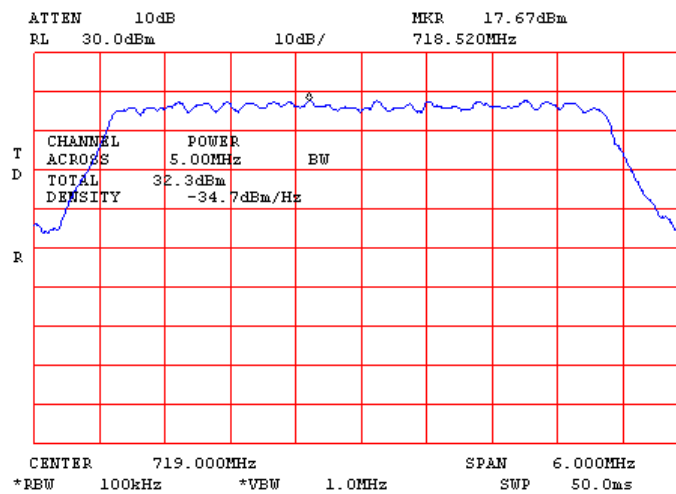


Test specification:	Section 27.50(c)(3), Peak output power at RF antenna connector		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	1/28/2009 5:36:28 PM		
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST			

Plot 7.2.7 Peak output power test results at low frequency, BPSK modulation, 5 MHz CBW

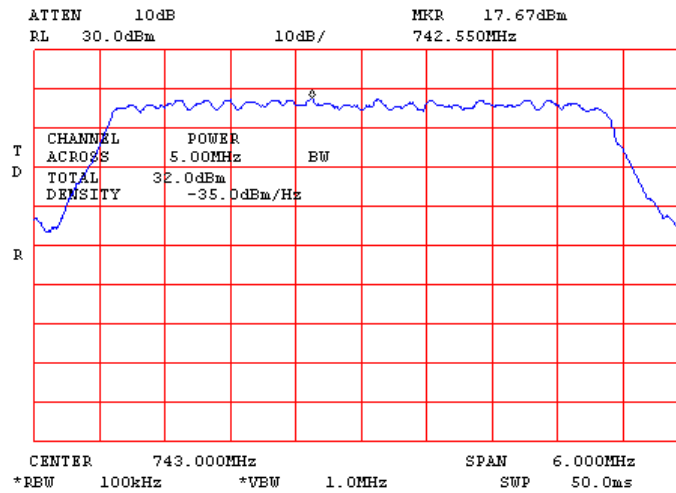


Plot 7.2.8 Peak output power test results at mid frequency, BPSK modulation, 5 MHz CBW

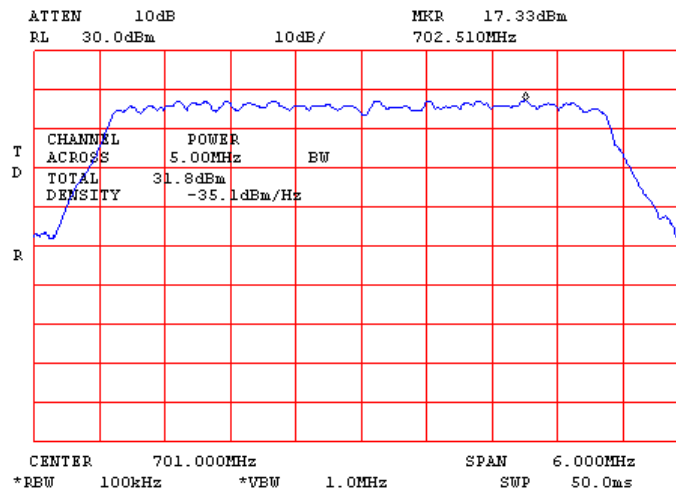


Test specification:	Section 27.50(c)(3), Peak output power at RF antenna connector		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	1/28/2009 5:36:28 PM		
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks:	ProST		

Plot 7.2.9 Peak output power test results at high frequency, BPSK modulation, 5 MHz CBW



Plot 7.2.10 Peak output power test results at low frequency, 64QAM modulation, 5 MHz CBW

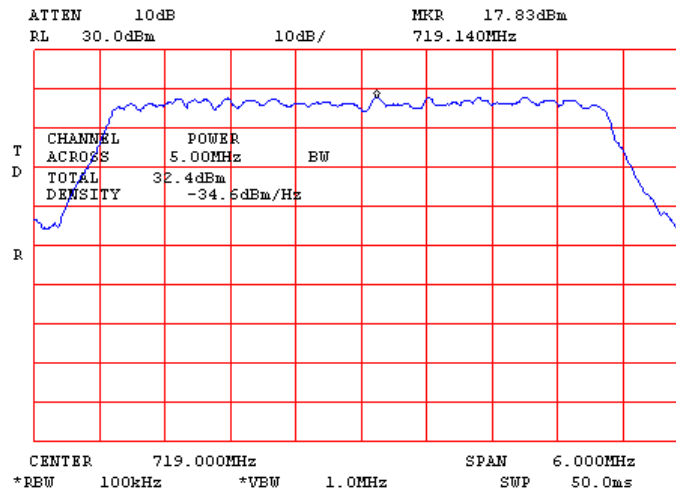




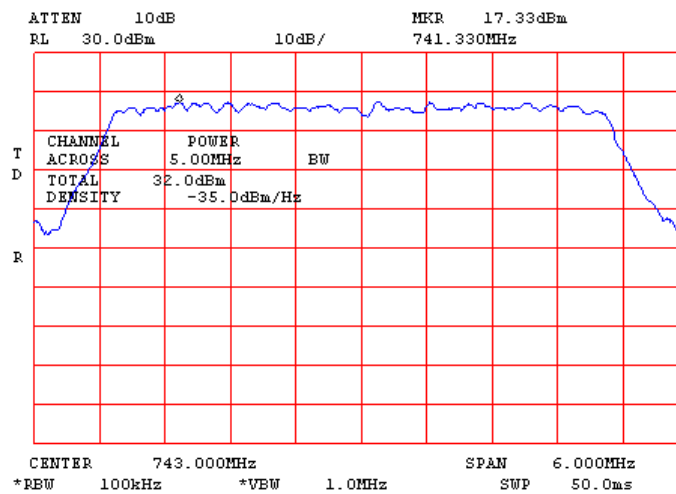
HERMON LABORATORIES

Test specification:	Section 27.50(c)(3), Peak output power at RF antenna connector		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	1/28/2009 5:36:28 PM		
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks:	ProST		

Plot 7.2.11 Peak output power test results at mid frequency, 64QAM modulation, 5 MHz CBW

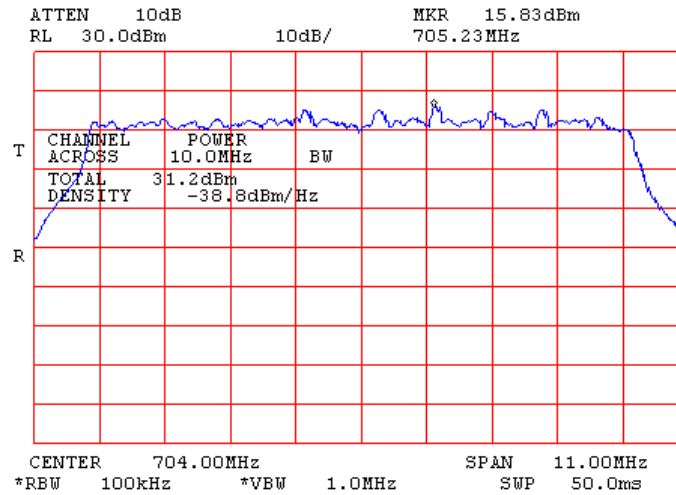


Plot 7.2.12 Peak output power test results at high frequency, 64QAM modulation, 5 MHz CBW

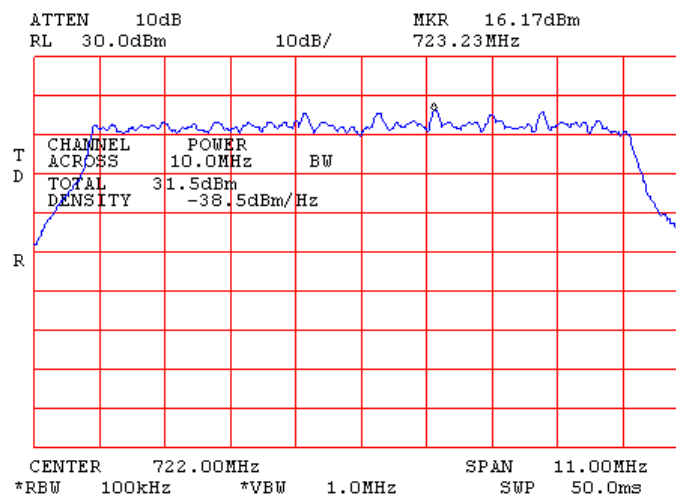


Test specification:	Section 27.50(c)(3), Peak output power at RF antenna connector		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	1/28/2009 5:36:28 PM		
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks:	ProST		

Plot 7.2.13 Peak output power test results at low frequency, BPSK modulation, 10 MHz CBW



Plot 7.2.14 Peak output power test results at mid frequency, BPSK modulation, 10 MHz CBW

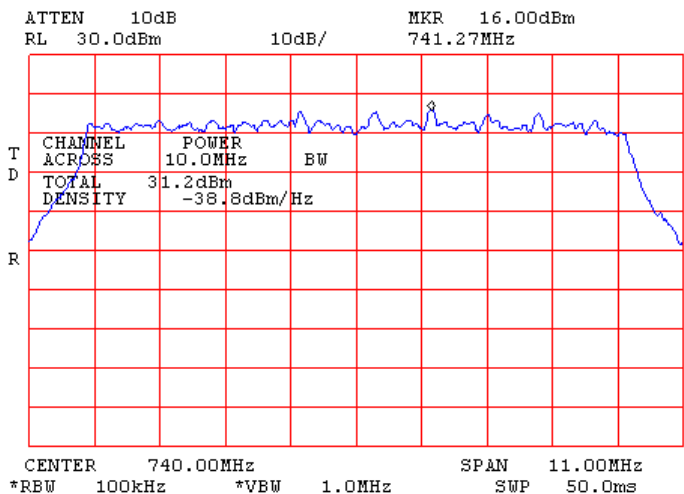




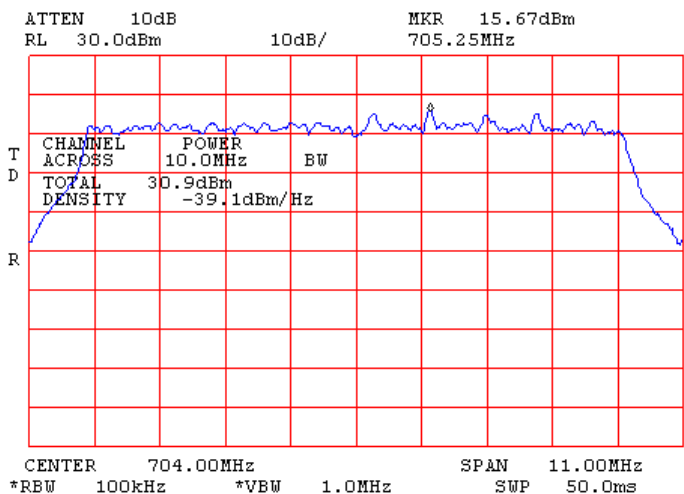
HERMON LABORATORIES

Test specification: Section 27.50(c)(3), Peak output power at RF antenna connector			
Test procedure: 47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode: Compliance	Verdict: PASS		
Date & Time: 1/28/2009 5:36:28 PM			
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks: ProST			

Plot 7.2.15 Peak output power test results at high frequency, BPSK modulation, 10 MHz CBW



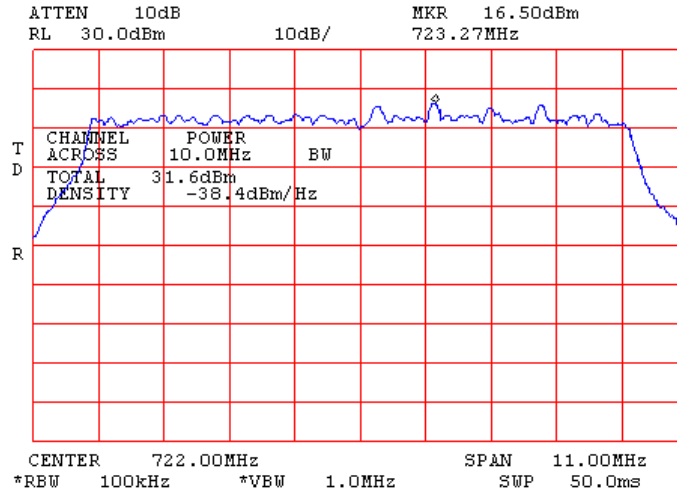
Plot 7.2.16 Peak output power test results at low frequency, 64QAM modulation, 10 MHz CBW



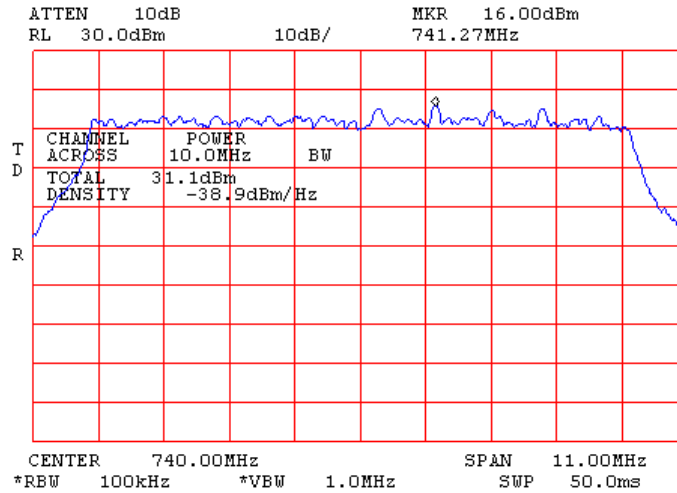


Test specification:	Section 27.50(c)(3), Peak output power at RF antenna connector		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/28/2009 5:36:28 PM		
Temperature: 23°C	Air Pressure: 1012 hPa	Relative Humidity: 42%	Power Supply: 120 V AC
Remarks:	ProST		

Plot 7.2.17 Peak output power test results at mid frequency, 64QAM modulation, 10 MHz CBW



Plot 7.2.18 Peak output power test results at high frequency, 64QAM modulation, 10 MHz CBW



Test specification:		Section 2.1049, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 3:02:47 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

7.3 Occupied bandwidth test

7.3.1 General

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in Table 7.3.1.

Table 7.3.1 Occupied bandwidth limits

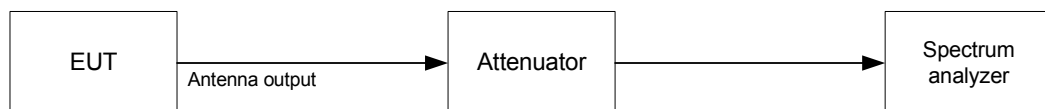
Assigned frequency, MHz	Modulation envelope reference points*, dBc	Maximum allowed bandwidth, kHz
698.0 – 746.0	26	NA

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

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 set to transmit the unmodulated carrier and the reference peak power level was measured.
- 7.3.2.3 The EUT was set to transmit the normally modulated carrier.
- 7.3.2.4 The transmitter occupied bandwidth was measured with spectrum analyzer as a frequency delta between the reference points on modulation envelope and provided in Table 7.3.2 and the associated plots.

Figure 7.3.1 Occupied bandwidth test setup



Test specification: Section 2.1049, Occupied bandwidth	
Test procedure: 47 CFR, Section 2.1049	
Test mode: Compliance	Verdict: PASS
Date & Time: 1/20/2009 3:02:47 PM	
Temperature: 23°C	Air Pressure: 1009 hPa
Relative Humidity: 46%	
Power Supply: 120 V AC	
Remarks:	

Table 7.3.2 Occupied bandwidth test results

DETECTOR USED: Peak hold
 RESOLUTION BANDWIDTH: 30 kHz
 VIDEO BANDWIDTH: 300 kHz
 MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
 MODULATING SIGNAL: PRBS
 CBW: 2.5 MHz

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
BPSK 1.0475 Mbps				
699.5	2437.5	NA	NA	NA
719.0	2437.5	NA	NA	NA
744.5	2437.5	NA	NA	NA
64QAM 9.425 Mbps				
499.5	2460.0	NA	NA	NA
719.0	2437.5	NA	NA	NA
744.5	2437.5	NA	NA	NA

DETECTOR USED: Peak hold
 RESOLUTION BANDWIDTH: 30 kHz
 VIDEO BANDWIDTH: 300 kHz
 MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
 MODULATING SIGNAL: PRBS
 CBW: 5 MHz

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
BPSK 2.095 Mbps				
701.0	4665.0	NA	NA	NA
719.0	4665.0	NA	NA	NA
743.0	4665.0	NA	NA	NA
64QAM 18.85 Mbps				
701.0	4665.0	NA	NA	NA
719.0	4680.0	NA	NA	NA
743.0	4665.0	NA	NA	NA

DETECTOR USED: Peak hold
 RESOLUTION BANDWIDTH: 100 kHz
 VIDEO BANDWIDTH: 1000 kHz
 MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
 MODULATING SIGNAL: PRBS
 CBW: 10 MHz

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
BPSK 4.19 Mbps				
704.0	9542.5	NA	NA	NA
722.0	9515.0	NA	NA	NA
740.0	9570.0	NA	NA	NA
64QAM 37.7 Mbps				
704.0	9542.5	NA	NA	NA
722.0	9487.5	NA	NA	NA
740.0	9570.0	NA	NA	NA

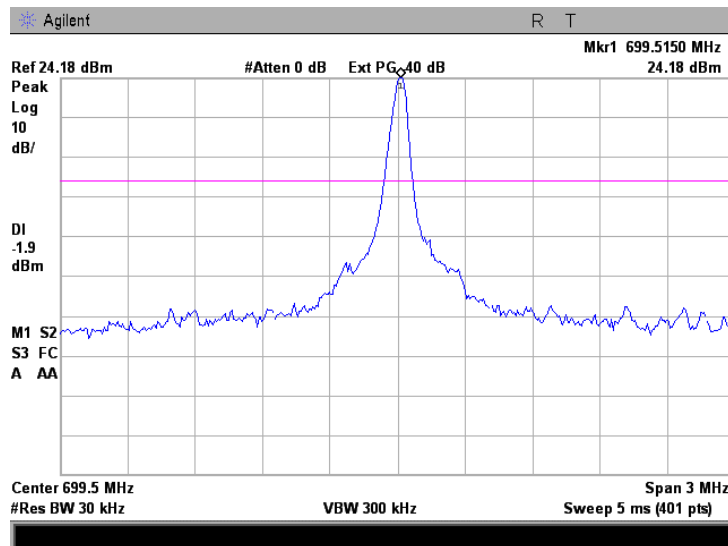
Reference numbers of test equipment used

HL 2780	HL 2911	HL 3179	HL 3181				
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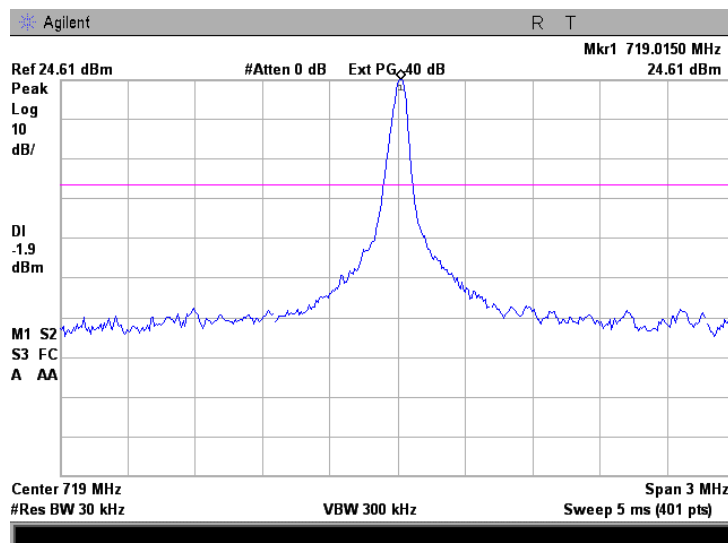
Full description is given in Appendix A.

Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 3:02:47 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.3.1 Unmodulated carrier reference level at low carrier frequency, 2.5 MHz CBW



Plot 7.3.2 Unmodulated carrier reference level at mid carrier frequency, 2.5 MHz CBW

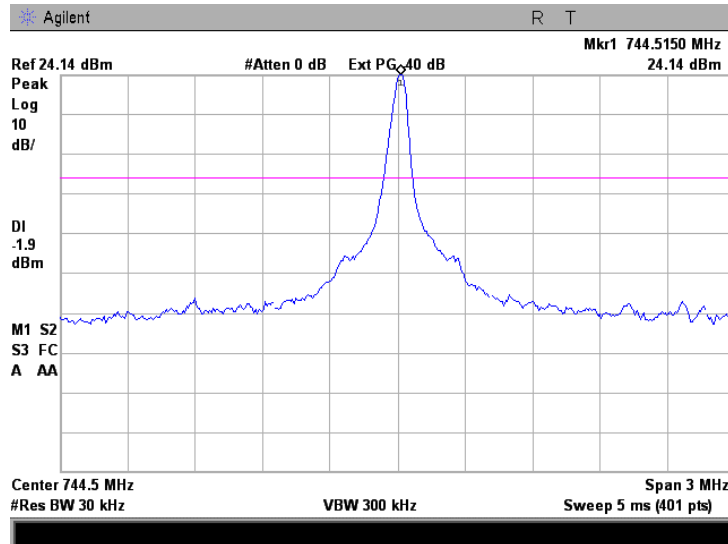




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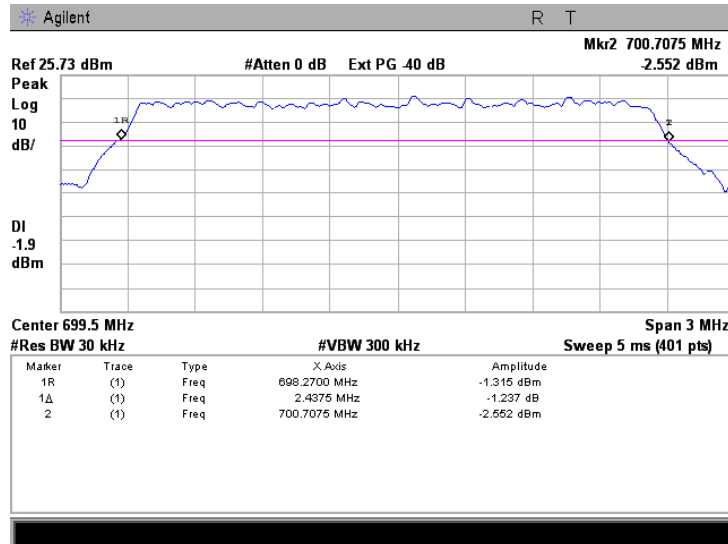
Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	1/20/2009 3:02:47 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.3.3 Unmodulated carrier reference level at high carrier frequency, 2.5 MHz CBW

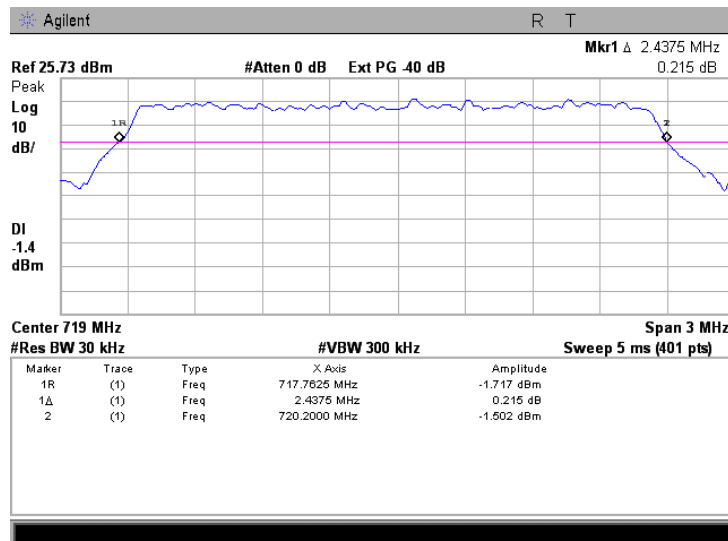


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 3:02:47 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.3.4 Occupied bandwidth test result at low frequency, BPSK modulation, 2.5 MHz CBW

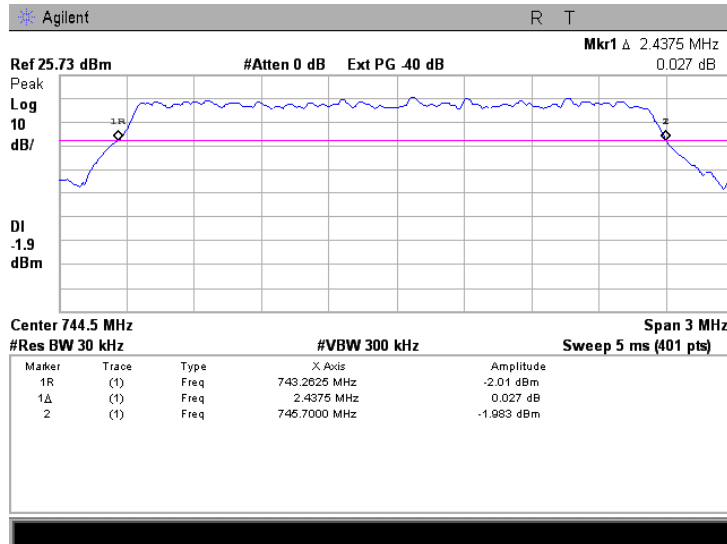


Plot 7.3.5 Occupied bandwidth test result at mid frequency, BPSK modulation, 2.5 MHz CBW

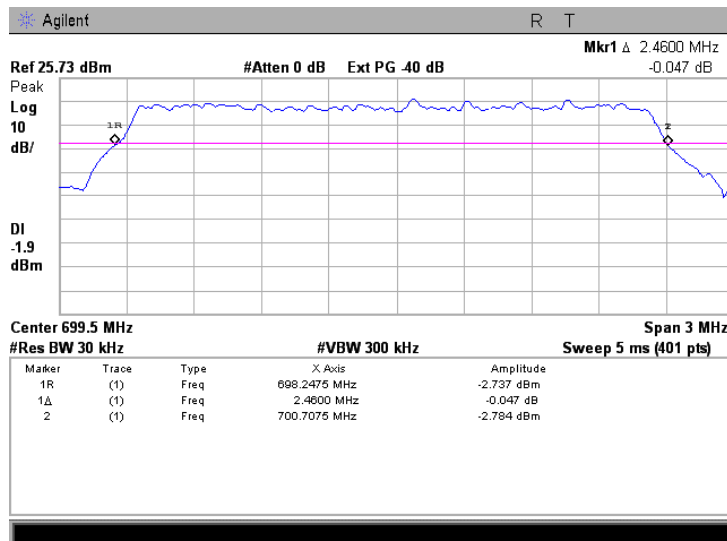


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 3:02:47 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.3.6 Occupied bandwidth test result at high frequency, BPSK modulation, 2.5 MHz CBW

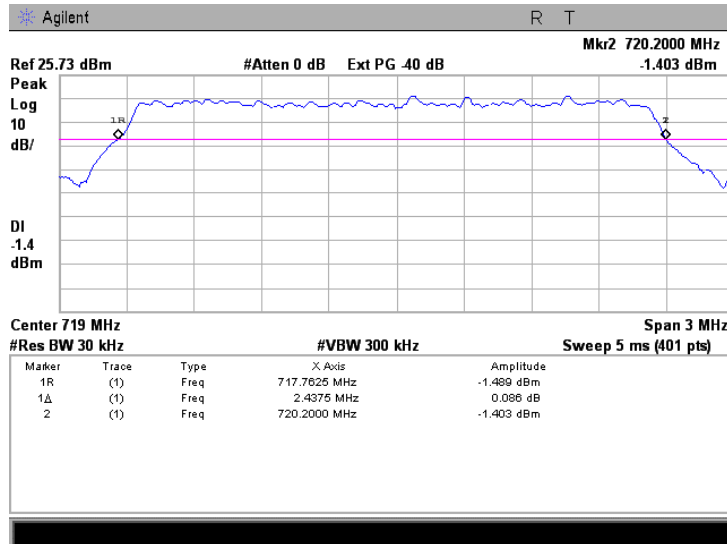


Plot 7.3.7 Occupied bandwidth test result at low frequency, 64QAM modulation, 2.5 MHz CBW

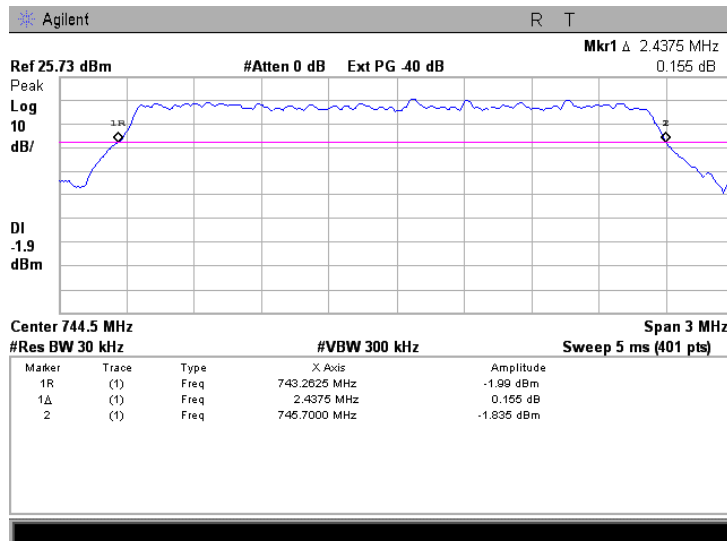


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 3:02:47 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.3.8 Occupied bandwidth test result at mid frequency, 64QAM modulation, 2.5 MHz CBW

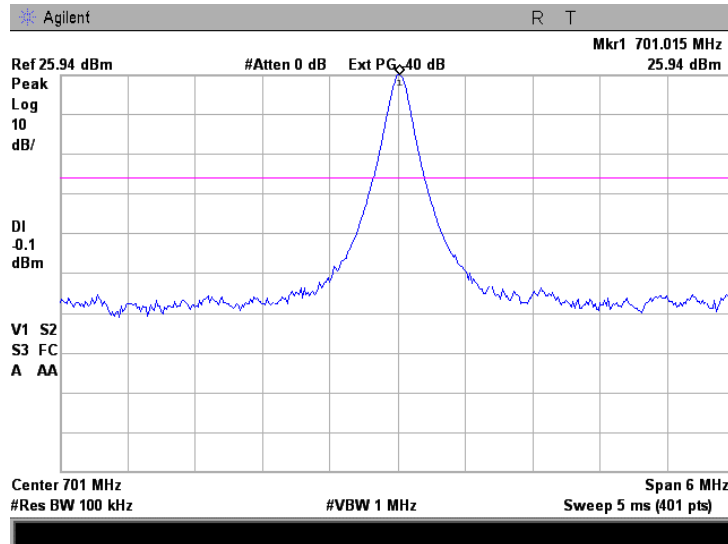


Plot 7.3.9 Occupied bandwidth test result at high frequency, 64QAM modulation, 2.5 MHz CBW

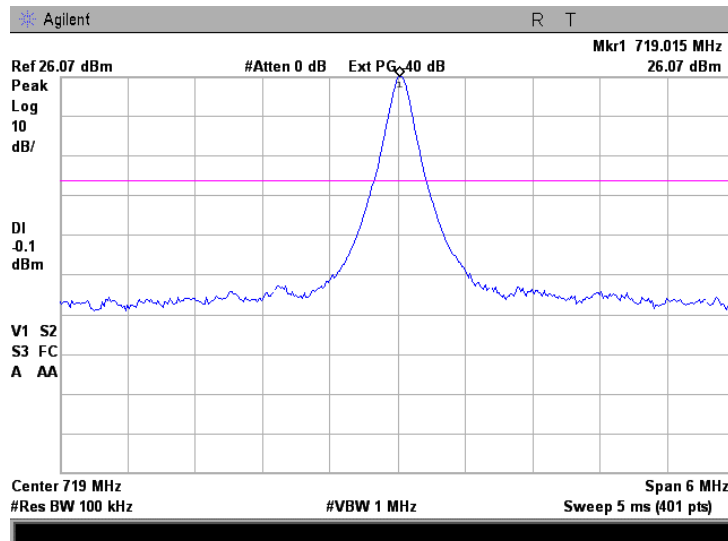


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 3:02:47 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.3.10 Unmodulated carrier reference level at low carrier frequency, 5 MHz CBW



Plot 7.3.11 Unmodulated carrier reference level at mid carrier frequency, 5 MHz CBW

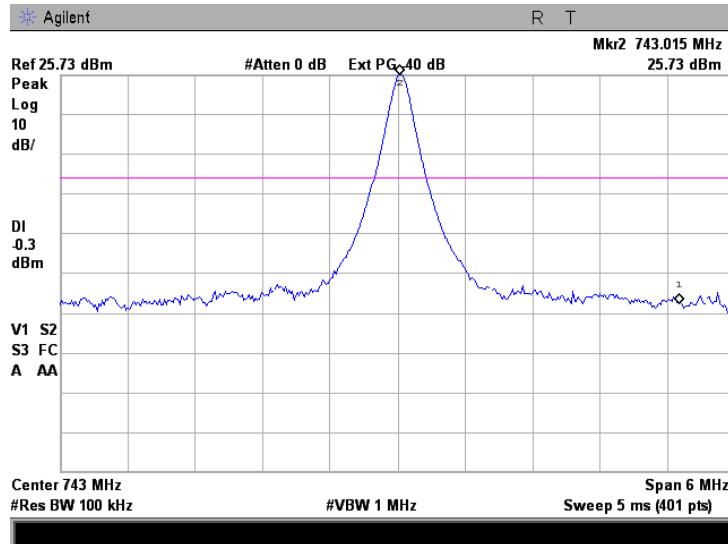




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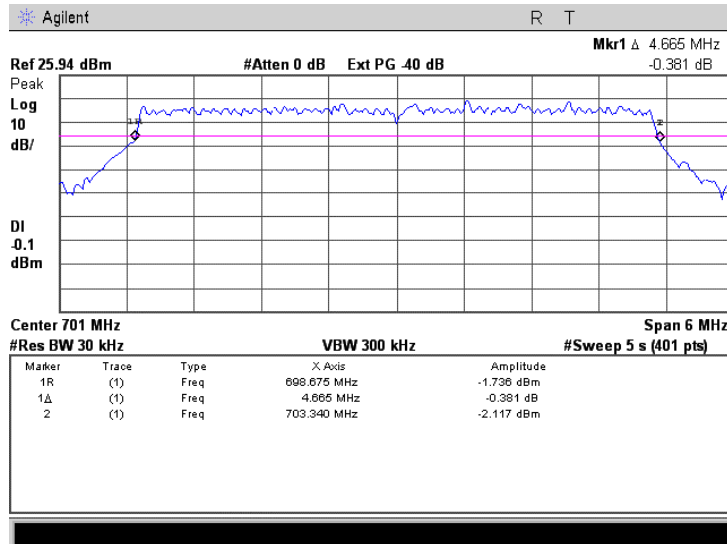
Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 3:02:47 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.3.12 Unmodulated carrier reference level at high carrier frequency, 5 MHz CBW

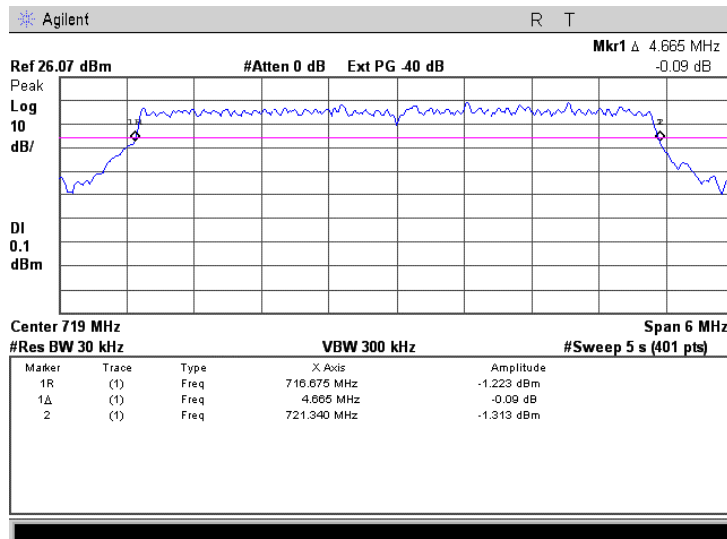


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 3:02:47 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.3.13 Occupied bandwidth test result at low frequency, BPSK modulation, 5 MHz CBW

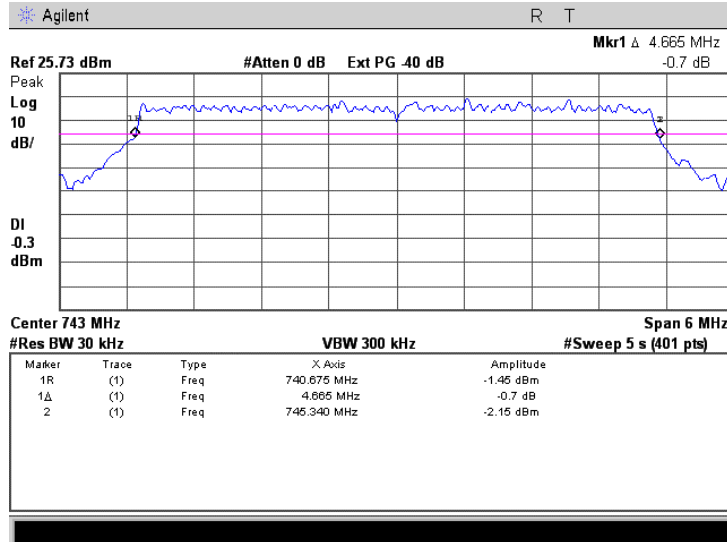


Plot 7.3.14 Occupied bandwidth test result at mid frequency, BPSK modulation, 5 MHz CBW

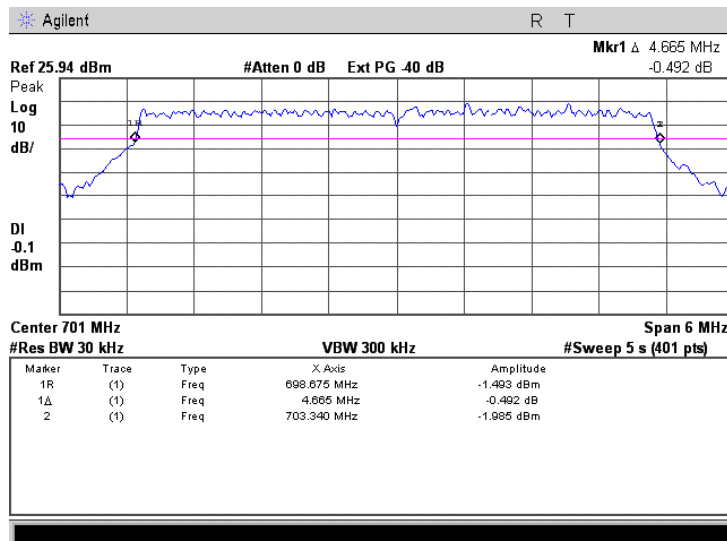


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 3:02:47 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.3.15 Occupied bandwidth test result at high frequency, BPSK modulation, 5 MHz CBW

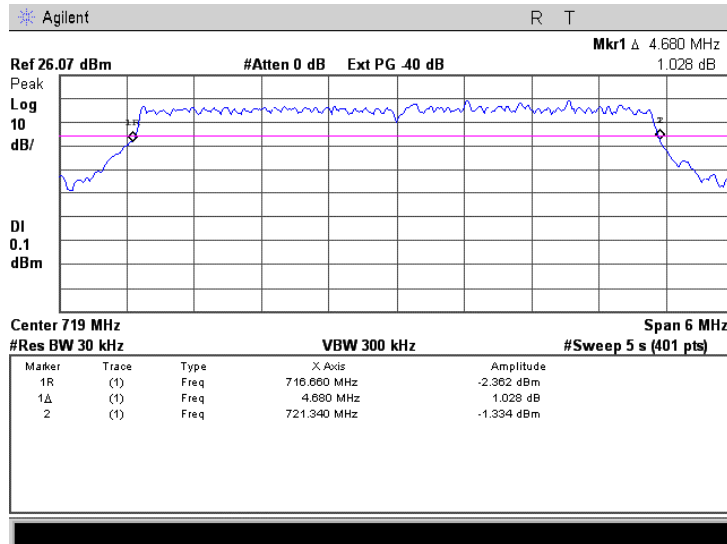


Plot 7.3.16 Occupied bandwidth test result at low frequency, 64QAM modulation, 5 MHz CBW

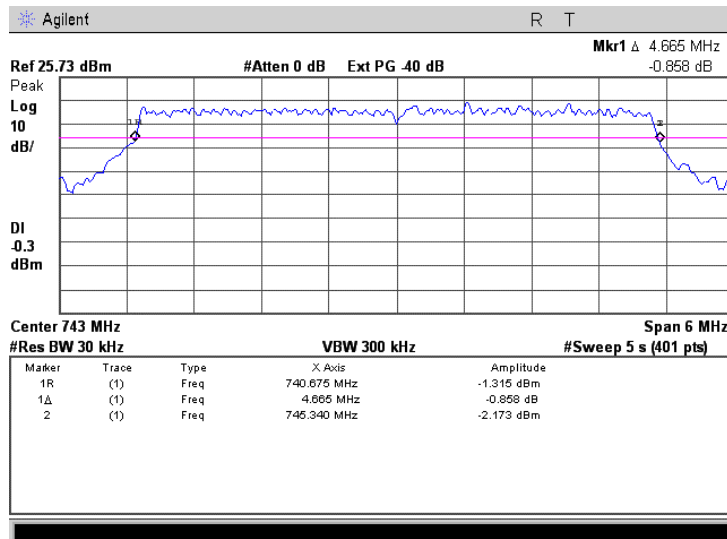


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 3:02:47 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.3.17 Occupied bandwidth test result at mid frequency, 64QAM modulation, 5 MHz CBW

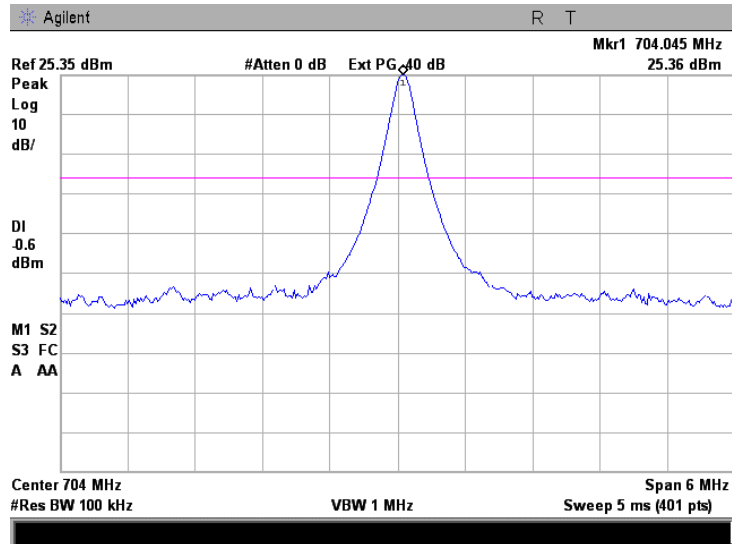


Plot 7.3.18 Occupied bandwidth test result at high frequency, 64QAM modulation, 5 MHz CBW

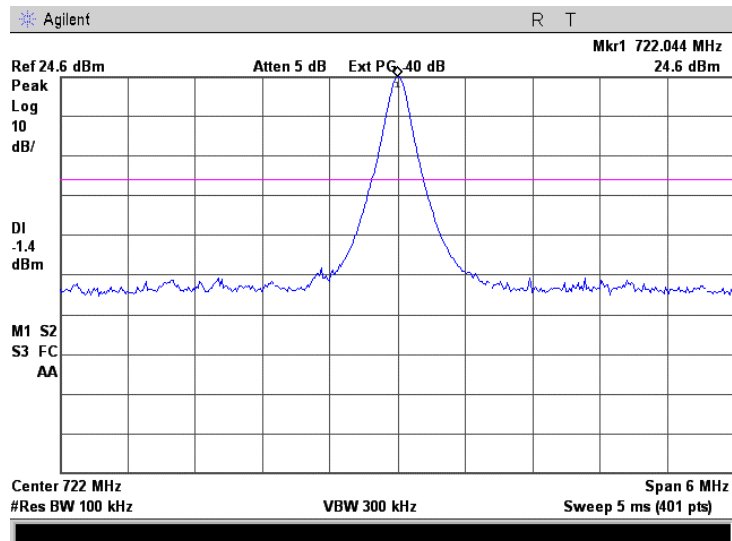


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 3:02:47 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.3.19 Unmodulated carrier reference level at low carrier frequency, 10 MHz CBW

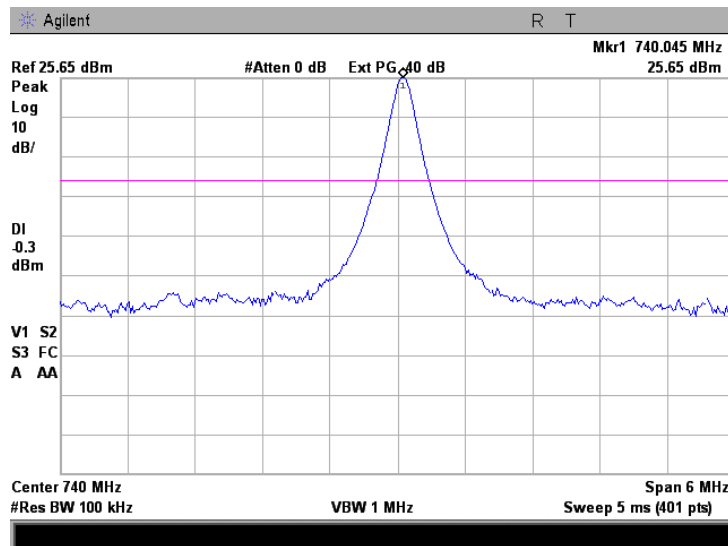


Plot 7.3.20 Unmodulated carrier reference level at mid carrier frequency, 10 MHz CBW



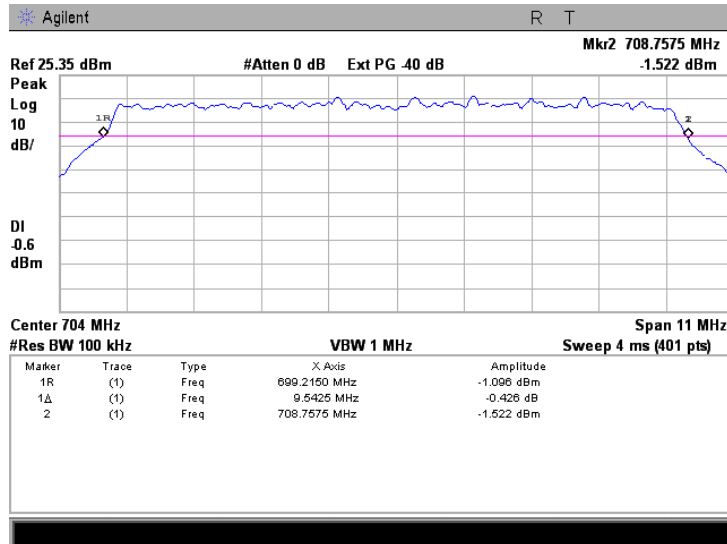
Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 3:02:47 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.3.21 Unmodulated carrier reference level at high carrier frequency, 10 MHz CBW

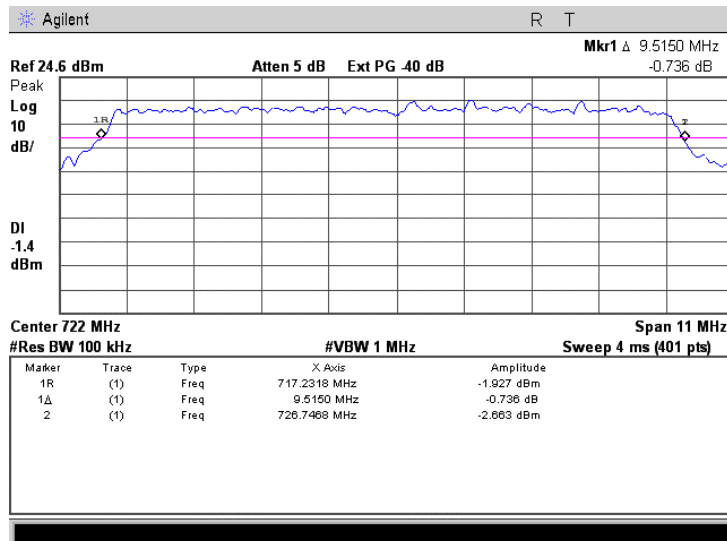


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	1/20/2009 3:02:47 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.3.22 Occupied bandwidth test result at low frequency, BPSK modulation, 10 MHz CBW

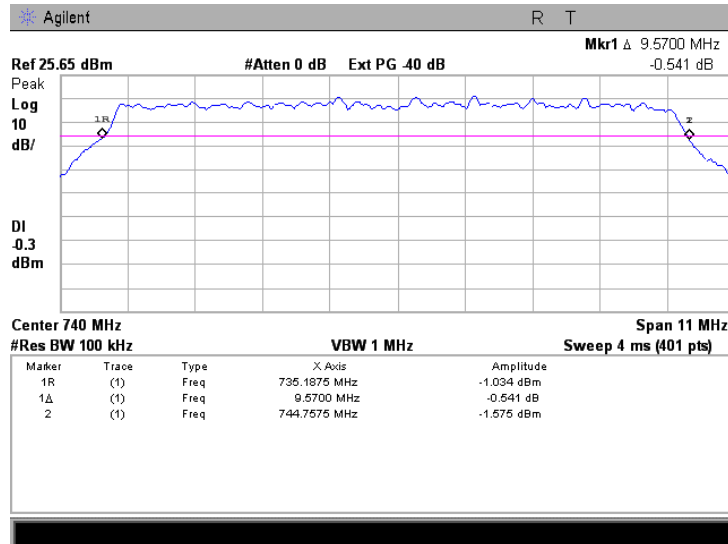


Plot 7.3.23 Occupied bandwidth test result at mid frequency, BPSK modulation, 10 MHz CBW

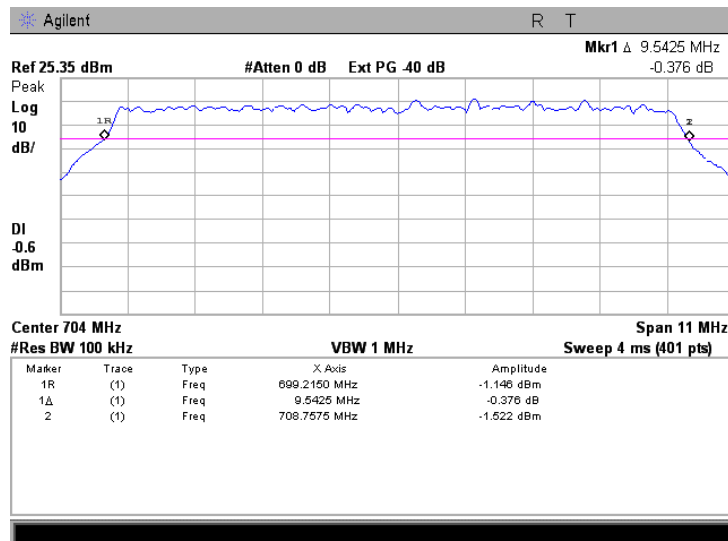


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 3:02:47 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.3.24 Occupied bandwidth test result at high frequency, BPSK modulation, 10 MHz CBW

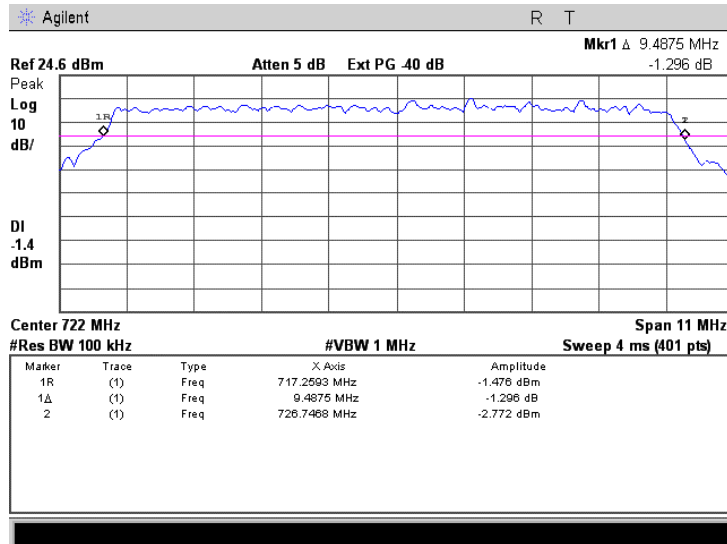


Plot 7.3.25 Occupied bandwidth test result at low frequency, 64QAM modulation, 10 MHz CBW

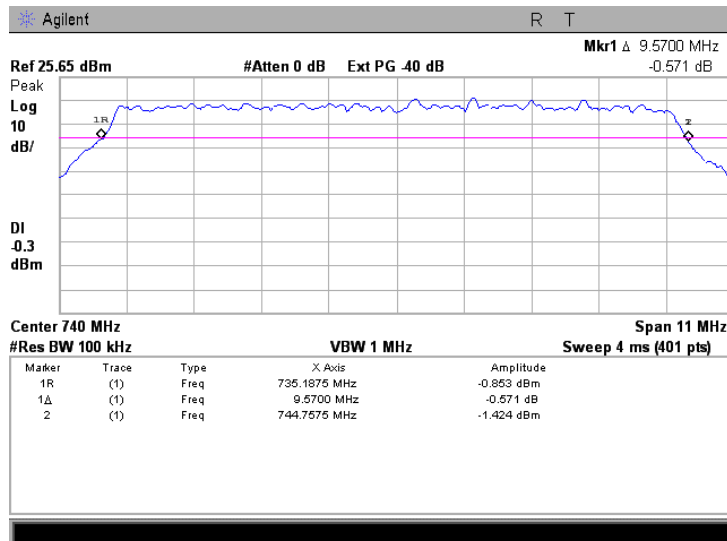


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 3:02:47 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.3.26 Occupied bandwidth test result at mid frequency, 64QAM modulation, 10 MHz CBW



Plot 7.3.27 Occupied bandwidth test result at high frequency, 64QAM modulation, 10 MHz CBW





Test specification: Section 27.53(g), Band edge emissions			
Test procedure: 47 CFR, Sections 2.1047 and 27.53(f); TIA/EIA-603-C, Section 2.2.13			
Test mode: Compliance			Verdict: PASS
Date & Time: 1/20/2009 2:22:59 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

7.4 Emission mask test

7.4.1 General

This test was performed to measure emission mask at RF antenna connector. Specification test limits are given in Table 7.4.1. The test results are provided in the associated plots.

Table 7.4.1 Emission mask limits

OBW (MHz)	Investigated Band Edge	Attenuation below carrier, dBc
698.0 - 704.0 MHz Channel (Block A low)		
2.5	697.9 – 698.0 MHz	43+10logP(W) (RBW = 30 kHz)
	704.0 – 704.1 MHz	
5	697.9 – 698.0 MHz	
	704.0 – 704.1 MHz	
698.0 - 710.0 MHz Channel (Block A + Block B low)		
10	697.9 – 698.0 MHz	43+10logP(W) (RBW = 30 kHz)
	710.0 – 710.1 MHz	
716.0 - 722.0 MHz Channel (Block D + Block E)		
2.5	715.9 – 716.0 MHz	43+10logP(W) (RBW = 30 kHz)
	722.0 – 722.1 MHz	
5	715.9 – 716.0 MHz	
	722.0 – 722.1 MHz	
716.0 - 728.0 MHz Channel (Block D + Block E)		
10	715.9 – 716.0 MHz	43+10logP(W) (RBW = 30 kHz)
	728.0 – 728.1 MHz	
740.0 - 746.0 MHz Channel (Block C high)		
2.5	739.9 – 740.0 MHz	43+10logP(W) (RBW = 30 kHz)
	746.0 – 746.1 MHz	
5	739.9 – 740.0 MHz	
	746.0 – 746.1 MHz	
734.0 - 746.0 MHz Channel (Block B + Block C high)		
10	733.9 – 734.0 MHz	43+10logP(W) (RBW = 30 kHz)
	746.0 – 746.1 MHz	

* - linearly increase with frequency

7.4.2 Test procedure

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

7.4.2.2 The emission mask was measured with spectrum analyzer as provided in the associated plots.

Figure 7.4.1 Emission mask test setup





HERMON LABORATORIES

Test specification:		Section 27.53(g), Band edge emissions	
Test procedure:		47 CFR, Sections 2.1047 and 27.53(f); TIA/EIA-603-C, Section 2.2.13	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:22:59 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Table 7.4.2 Spurious emission at band edges test results

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 7500 MHz
 DETECTOR USED: Peak
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm	Limit, dBm	Margin, dB*	Verdict
2.5 Mz BW BPSK 1.0475 Mbps								
Low carrier frequency 699.5 MHz								
698.000	-21.43	Included	Included	30	-21.43	-13.0	-8.43	Pass
High carrier frequency 744.5 MHz								
746.066	-21.29	Included	Included	30	-21.29	-13.0	-8.29	Pass
2.5 Mz BW 64QAM 9.425 Mbps								
Low carrier frequency 699.5 MHz								
697.999	-21.18	Included	Included	30	-21.18	-13.0	-8.18	Pass
High carrier frequency 744.5 MHz								
746.069	-21.61	Included	Included	30	-21.61	-13.0	-8.61	Pass
5 Mz BW BPSK 4.19 Mbps								
Low carrier frequency 699.5 MHz								
697.995	-22.06	Included	Included	30	-22.06	-13.0	-9.06	Pass
704.000	-22.05	Included	Included	30	-22.05	-13.0	-9.05	Pass
Mid carrier frequency 719.0 MHz								
715.998	-19.87	Included	Included	30	-19.87	-13.0	-6.87	Pass
722.002	-20.54	Included	Included	30	-20.54	-13.0	-7.54	Pass
High carrier frequency 744.5 MHz								
739.999	-19.96	Included	Included	30	-19.96	-13.0	-6.96	Pass
746.003	-21.19	Included	Included	30	-21.19	-13.0	-8.19	Pass
5 Mz BW 64QAM 18.85 Mbps								
Low carrier frequency 699.5 MHz								
697.993	-21.40	Included	Included	30	-21.40	-13.0	-8.40	Pass
704.002	-21.97	Included	Included	30	-21.97	-13.0	-8.97	Pass
Mid carrier frequency 719.0 MHz								
715.995	-19.80	Included	Included	30	-19.80	-13.0	-6.80	Pass
722.002	-20.39	Included	Included	30	-20.39	-13.0	-7.39	Pass
High carrier frequency 744.5 MHz								
739.999	-19.46	Included	Included	30	-19.46	-13.0	-6.46	Pass
746.003	-21.21	Included	Included	30	-21.21	-13.0	-8.21	Pass



HERMON LABORATORIES

Test specification:		Section 27.53(g), Band edge emissions	
Test procedure:		47 CFR, Sections 2.1047 and 27.53(f); TIA/EIA-603-C, Section 2.2.13	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:22:59 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Table 7.4.2 Spurious emission at band edges test results (continued)

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm	Limit, dBm	Margin, dB*	Verdict
10 Mz BW BPSK 8.38 Mbps								
Low carrier frequency 699.5 MHz								
697.974	-26.29	Included	Included	30	-26.29	-13.0	-13.29	Pass
710.002	-25.91	Included	Included	30	-25.91	-13.0	-12.91	Pass
Mid carrier frequency 719.0 MHz								
715.967	-24.36	Included	Included	30	-24.36	-13.0	-11.36	Pass
728.001	-23.62	Included	Included	30	-23.62	-13.0	-10.62	Pass
High carrier frequency 744.5 MHz								
733.966	-23.77	Included	Included	30	-23.77	-13.0	-10.77	Pass
746.003	-24.58	Included	Included	30	-24.58	-13.0	-11.58	Pass
10 Mz BW 64QAM 37.7 Mbps								
Low carrier frequency 699.5 MHz								
697.968	-26.24	Included	Included	30	-26.24	-13.0	-13.24	Pass
710.008	-26.82	Included	Included	30	-26.82	-13.0	-13.82	Pass
Mid carrier frequency 719.0 MHz								
715.968	-24.21	Included	Included	30	-24.21	-13.0	-11.21	Pass
728.001	-24.19	Included	Included	30	-24.19	-13.0	-11.19	Pass
High carrier frequency 744.5 MHz								
733.963	-23.44	Included	Included	30	-23.44	-13.0	-10.44	Pass
746.001	-24.81	Included	Included	30	-24.81	-13.0	-11.81	Pass

Reference numbers of test equipment used

HL 2780	HL 2911	HL 3179	HL 3180				
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Full description is given in Appendix A.

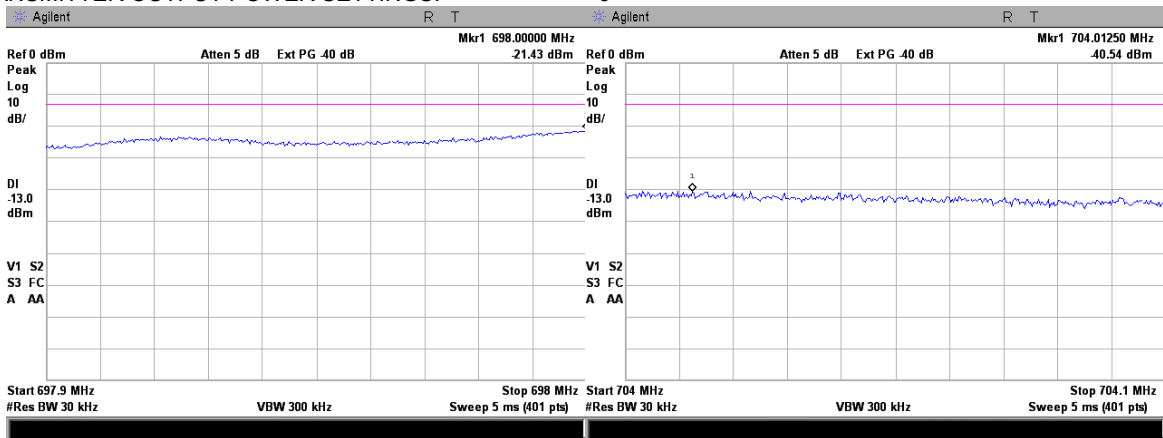


HERMON LABORATORIES

Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(f); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	1/20/2009 2:22:59 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

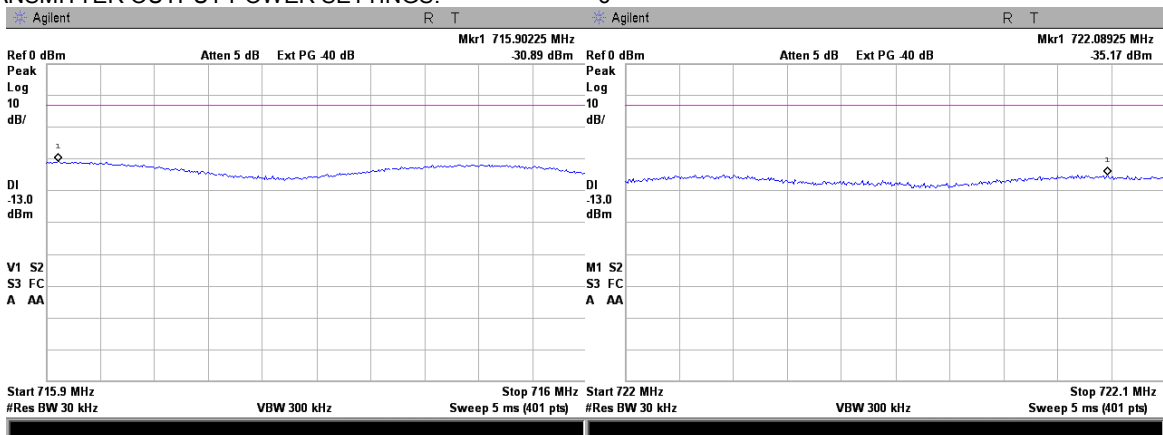
Plot 7.4.1 Emission mask test results at low carrier frequency, 2.5 MHz CBW

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Peak
MODULATION: BPSK
MODULATING SIGNAL: PRBS
BIT RATE: 1.0475 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: 6



Plot 7.4.2 Emission mask test results at mid carrier frequency, 2.5 MHz CBW

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Peak
MODULATION: BPSK
MODULATING SIGNAL: PRBS
BIT RATE: 1.0475 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: 6



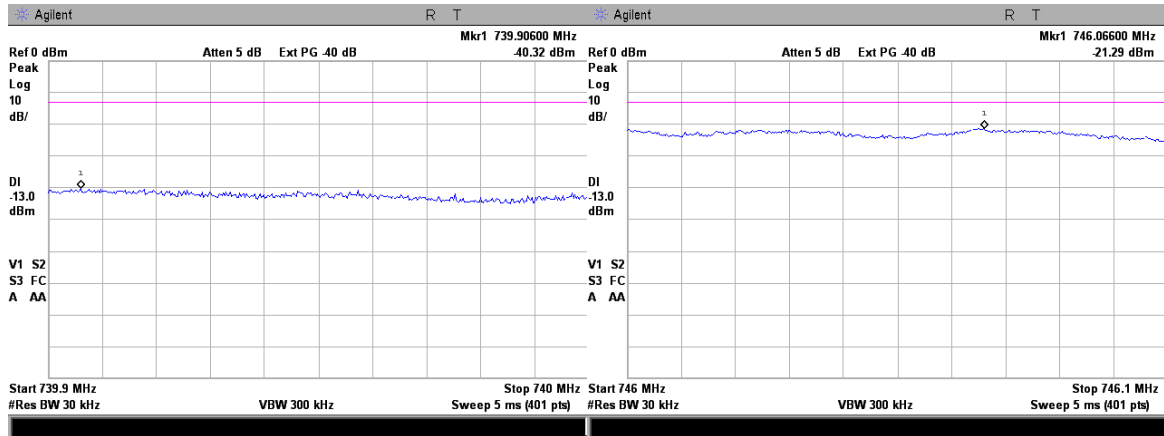


HERMON LABORATORIES

Test specification: Section 27.53(g), Band edge emissions			
Test procedure: 47 CFR, Sections 2.1047 and 27.53(f); TIA/EIA-603-C, Section 2.2.13			
Test mode: Compliance	Verdict: PASS		
Date & Time: 1/20/2009 2:22:59 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.3 Emission mask test results at high carrier frequency, 2.5 MHz CBW

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Peak
MODULATION: BPSK
MODULATING SIGNAL: PRBS
BIT RATE: 1.0475 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: 6



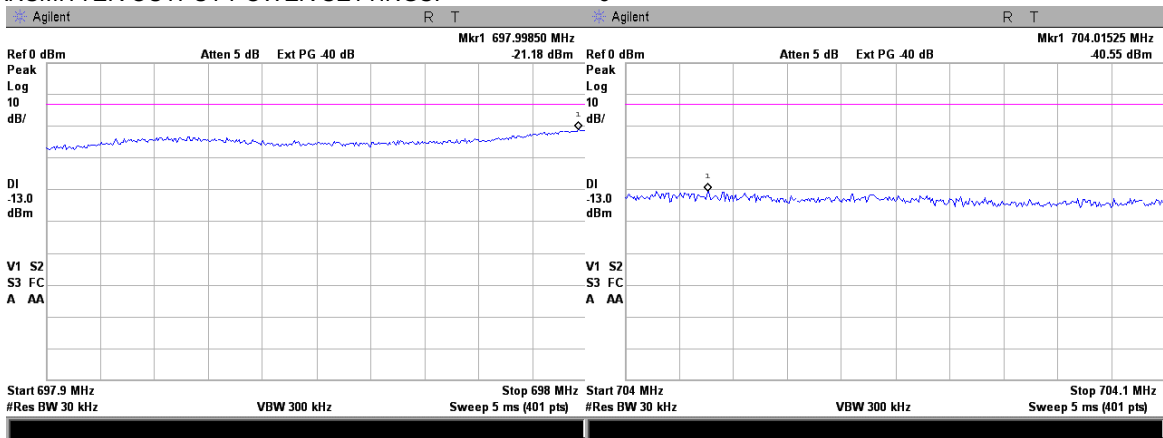


HERMON LABORATORIES

Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(f); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	1/20/2009 2:22:59 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

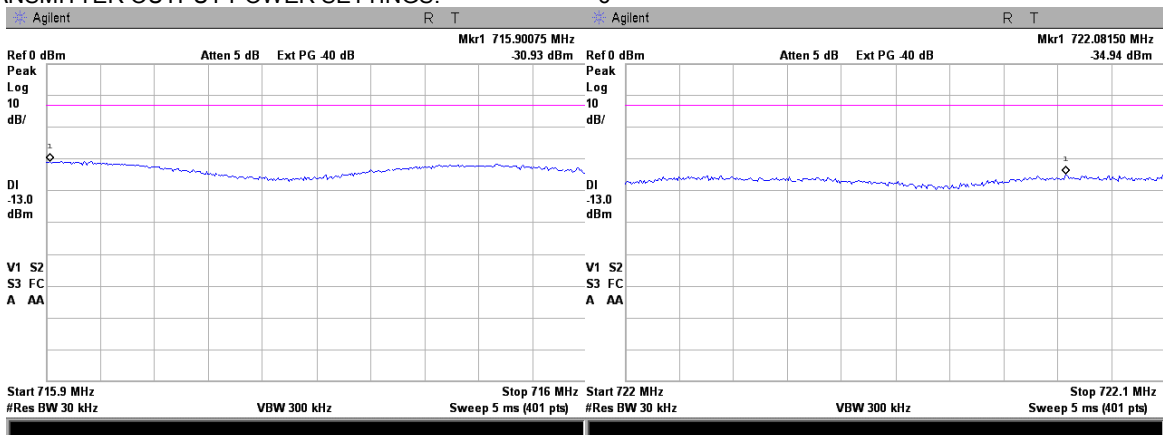
Plot 7.4.4 Emission mask test results at low carrier frequency, 2.5 MHz CBW

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Peak
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 9.425 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: 6



Plot 7.4.5 Emission mask test results at mid carrier frequency, 2.5 MHz CBW

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Peak
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 9.425 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: 6



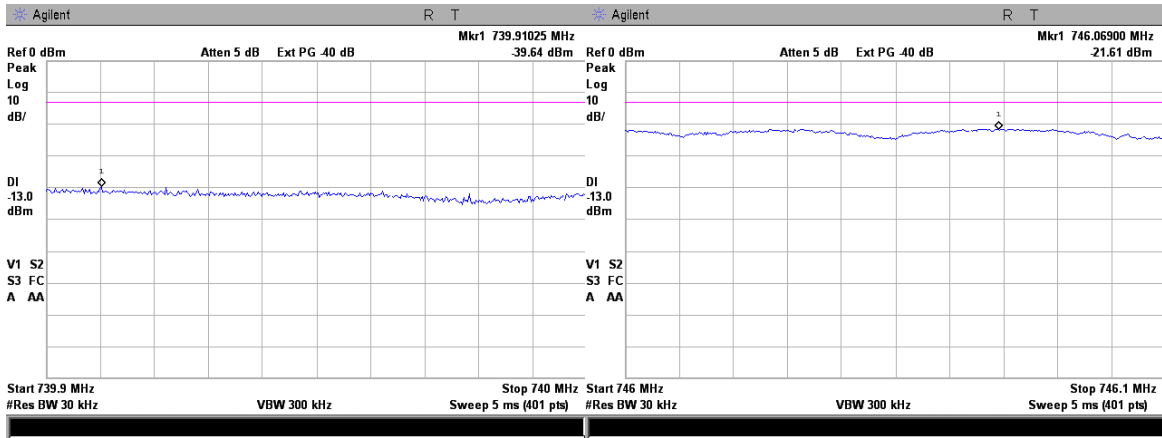


HERMON LABORATORIES

Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(f); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:22:59 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.6 Emission mask test results at high carrier frequency, 2.5 MHz CBW

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Peak
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 9.425 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: 6



Plot 7.4.7 Emission mask test results at low carrier frequency, 5 MHz CBW

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Peak
MODULATION: BPSK
MODULATING SIGNAL: PRBS
BIT RATE: 2.094 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: 6



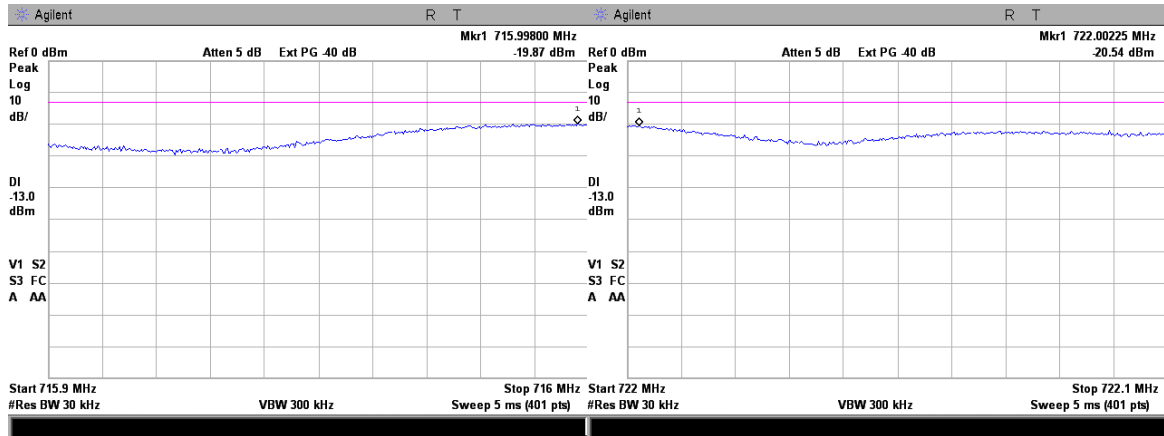


HERMON LABORATORIES

Test specification: Section 27.53(g), Band edge emissions			
Test procedure: 47 CFR, Sections 2.1047 and 27.53(f); TIA/EIA-603-C, Section 2.2.13			
Test mode: Compliance	Verdict: PASS		
Date & Time: 1/20/2009 2:22:59 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.8 Emission mask test results at mid carrier frequency, 5 MHz CBW

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Peak
MODULATION: BPSK
MODULATING SIGNAL: PRBS
BIT RATE: 2.094 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: 6



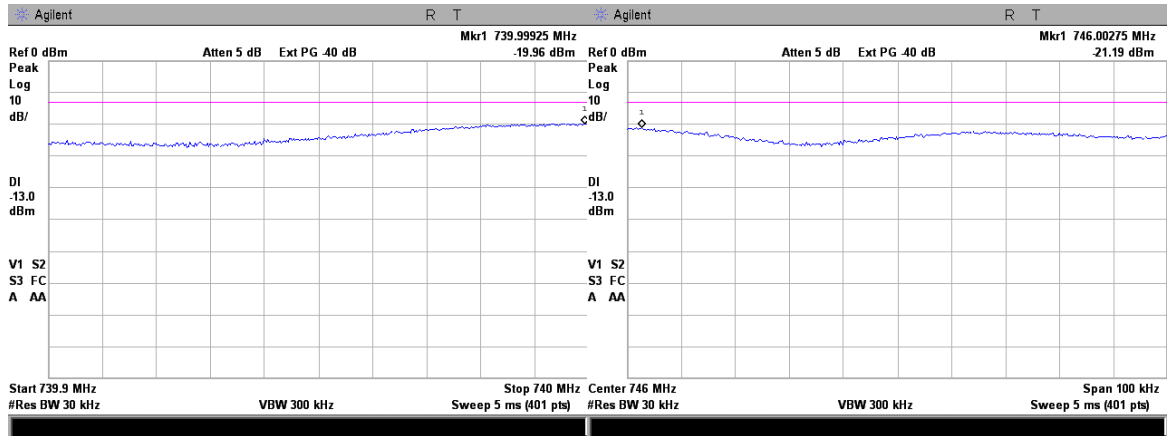


HERMON LABORATORIES

Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(f); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:22:59 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.9 Emission mask test results at high carrier frequency, 5 MHz CBW

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Peak
MODULATION: BPSK
MODULATING SIGNAL: PRBS
BIT RATE: 2.094 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: 6



The center frequency is 746.05 MHz.

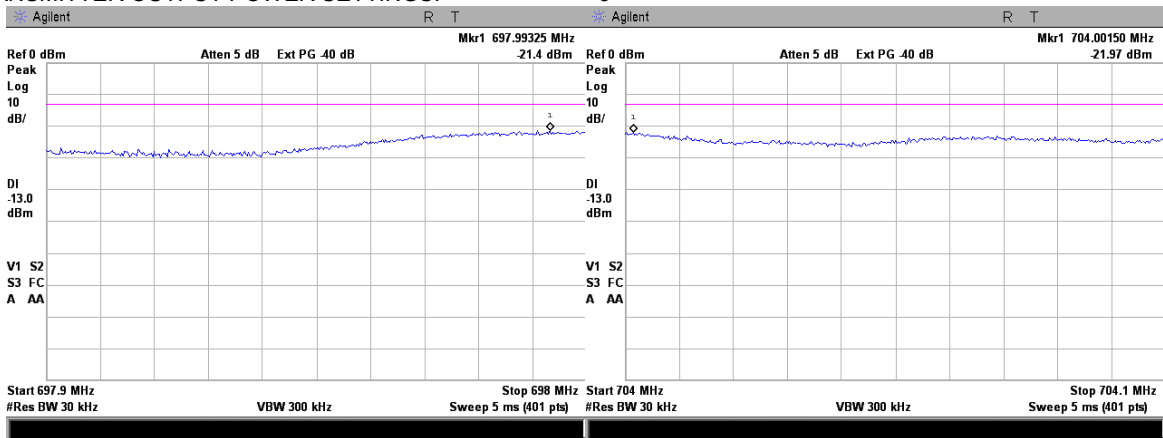


HERMON LABORATORIES

Test specification: Section 27.53(g), Band edge emissions			
Test procedure: 47 CFR, Sections 2.1047 and 27.53(f); TIA/EIA-603-C, Section 2.2.13			
Test mode: Compliance	Verdict: PASS		
Date & Time: 1/20/2009 2:22:59 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

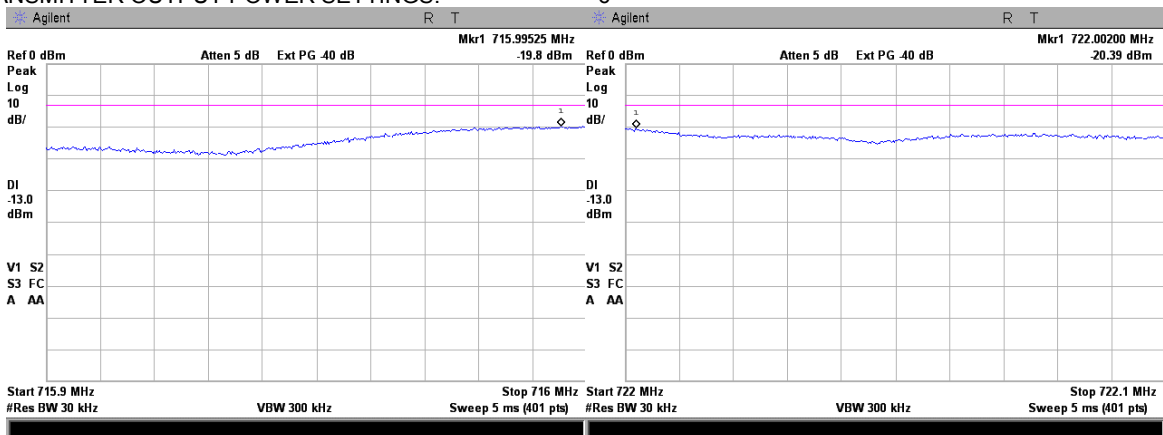
Plot 7.4.10 Emission mask test results at low carrier frequency, 5 MHz CBW

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Peak
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 18.85 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: 6



Plot 7.4.11 Emission mask test results at mid carrier frequency, 5 MHz CBW

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Peak
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 18.85 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: 6



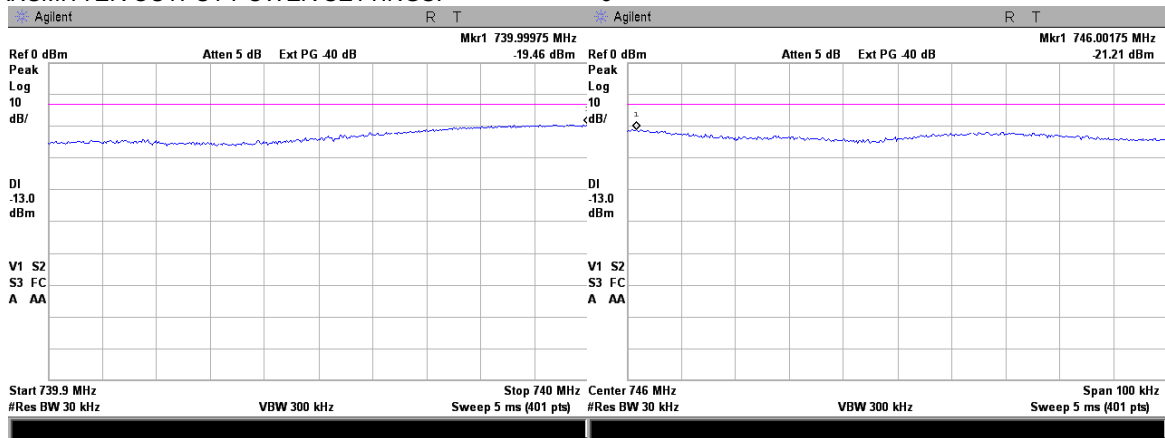


HERMON LABORATORIES

Test specification: Section 27.53(g), Band edge emissions			
Test procedure: 47 CFR, Sections 2.1047 and 27.53(f); TIA/EIA-603-C, Section 2.2.13			
Test mode: Compliance	Verdict: PASS		
Date & Time: 1/20/2009 2:22:59 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.12 Emission mask test results at high carrier frequency, 5 MHz CBW

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Peak
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 18.85 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: 6



The center frequency is 746.05 MHz.

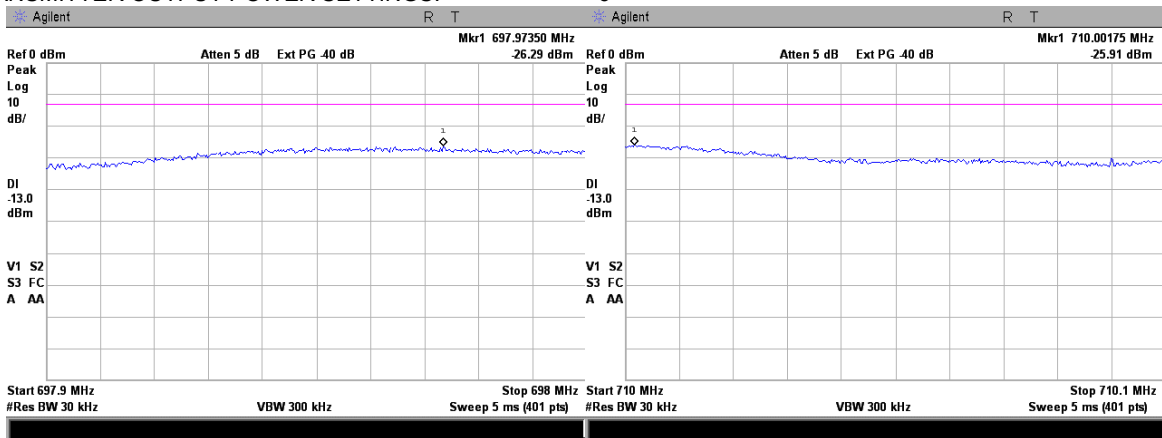


HERMON LABORATORIES

Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(f); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	1/20/2009 2:22:59 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

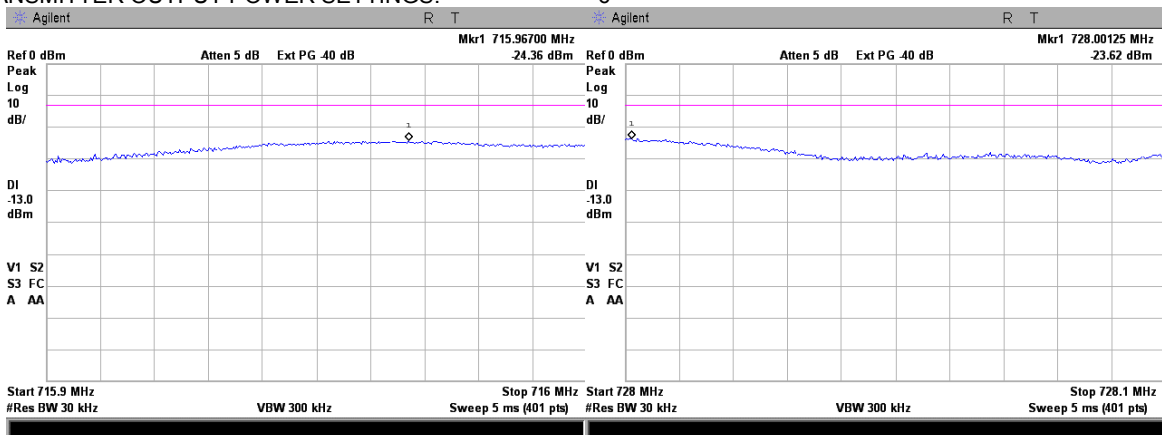
Plot 7.4.13 Emission mask test results at low carrier frequency, 10 MHz CBW

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Peak
MODULATION: BPSK
MODULATING SIGNAL: PRBS
BIT RATE: 4.188 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: 6



Plot 7.4.14 Emission mask test results at mid carrier frequency, 10 MHz CBW

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Peak
MODULATION: BPSK
MODULATING SIGNAL: PRBS
BIT RATE: 4.188 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: 6



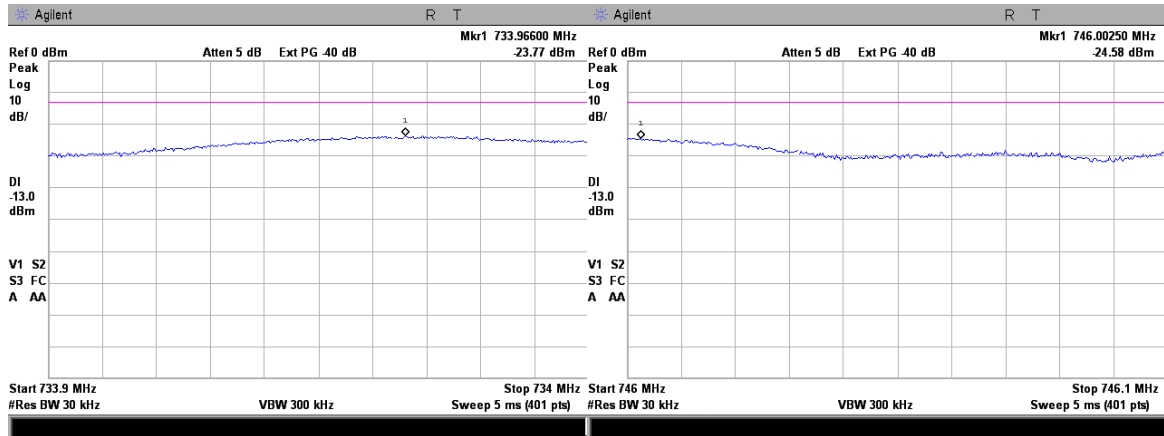


HERMON LABORATORIES

Test specification: Section 27.53(g), Band edge emissions			
Test procedure: 47 CFR, Sections 2.1047 and 27.53(f); TIA/EIA-603-C, Section 2.2.13			
Test mode: Compliance	Verdict: PASS		
Date & Time: 1/20/2009 2:22:59 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.15 Emission mask test results at high carrier frequency, 10 MHz CBW

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Peak
MODULATION: BPSK
MODULATING SIGNAL: PRBS
BIT RATE: 4.188 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: 6



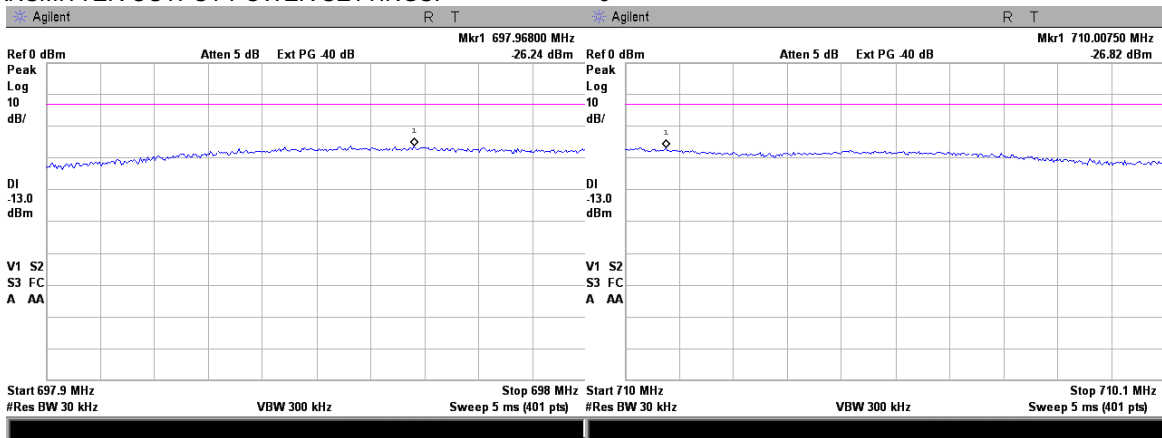


HERMON LABORATORIES

Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(f); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	1/20/2009 2:22:59 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

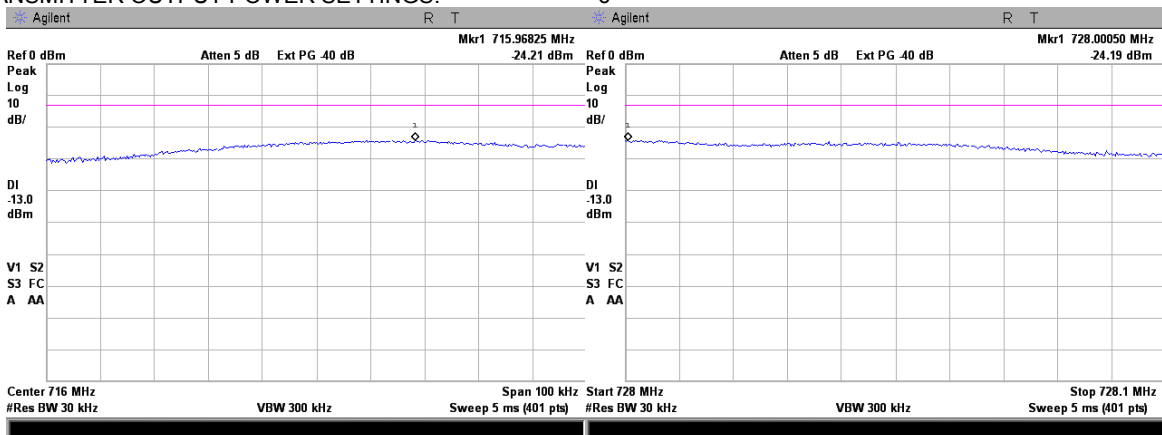
Plot 7.4.16 Emission mask test results at low carrier frequency, 10 MHz CBW

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Peak
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 37.7 MBps
TRANSMITTER OUTPUT POWER SETTINGS: 6



Plot 7.4.17 Emission mask test results at mid carrier frequency, 10 MHz CBW

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Peak
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 37.7 MBps
TRANSMITTER OUTPUT POWER SETTINGS: 6



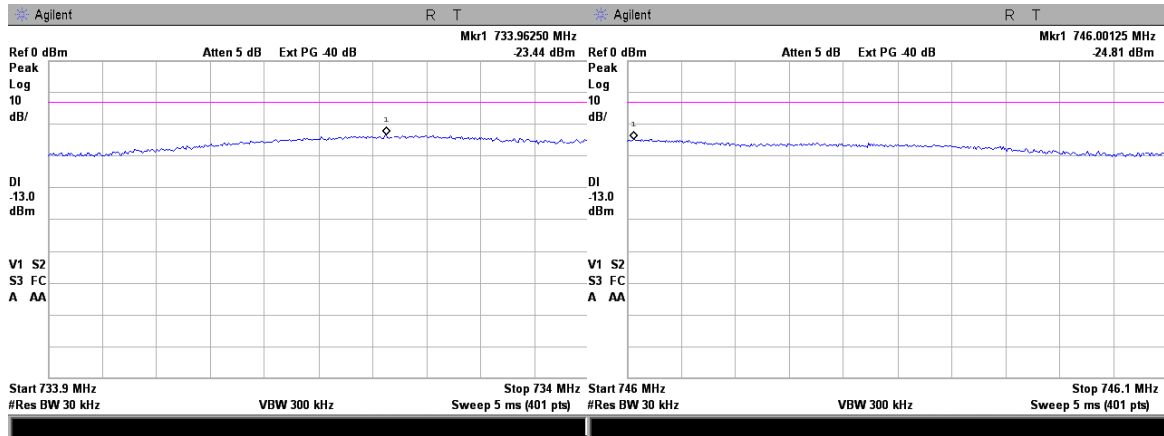


HERMON LABORATORIES

Test specification: Section 27.53(g), Band edge emissions			
Test procedure: 47 CFR, Sections 2.1047 and 27.53(f); TIA/EIA-603-C, Section 2.2.13			
Test mode: Compliance	Verdict: PASS		
Date & Time: 1/20/2009 2:22:59 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.18 Emission mask test results at high carrier frequency, 10 MHz CBW

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Peak
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 37.7 MBps
TRANSMITTER OUTPUT POWER SETTINGS: 6



Test specification:		Section 27.53(g), Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:48:19 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: ProST			

7.5 Radiated spurious emission measurements

7.5.1 General

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

Table 7.5.1 Radiated spurious emission test limits

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

* - Excluding the in band emission within ± 250 % of the authorized bandwidth from the carrier

** - P is transmitter output power in Watts

*** - Equivalent field strength limit was calculated from maximum allowed ERP of spurious as follows:
 $E = \sqrt{30 \times P \times 1.64} / r$, where P is ERP in Watts, 1.64 is numeric gain of ideal dipole and r is antenna to EUT distance in meters

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

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

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

7.5.2.3 The worst test results (the lowest margins) were recorded in Table 7.5.2 and shown in the associated plots.

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

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

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

7.5.3.3 The worst test results (the lowest margins) were recorded in Table 7.5.2 and shown in the associated plots.

7.5.4 Test procedure for substitution ERP measurements of spurious

7.5.4.1 The test equipment was set up as shown in Figure 7.5.3 and energized.

7.5.4.2 RF signal generator was set to the frequency of investigated spurious emission and the RF output level was preliminary adjusted to produce the same field strength as it was measured from the EUT.

7.5.4.3 The test antenna height was swept from 1 to 4 m to find maximum emission from substitution antenna and RF signal generator output was fine adjusted to produce the same field strength as it was measured from the EUT.

7.5.4.4 The above procedure was performed in both, horizontal and vertical, polarizations of the test and substitution antennas.

7.5.4.5 The ERP of spurious emissions was calculated as a sum of signal generator output power in dBm and antenna gain in dBd reduced by cable loss in dB.

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

7.5.4.7 The worst test results (the lowest margins) were recorded in Table 7.5.3 and shown in the associated plots.

Test specification:		Section 27.53(g), Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:48:19 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: ProST			

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

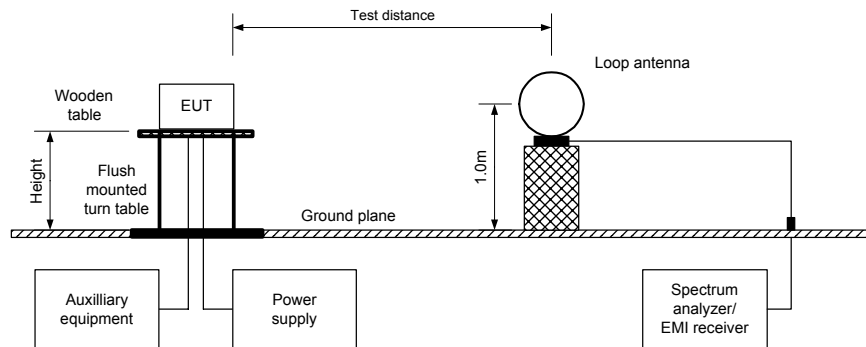
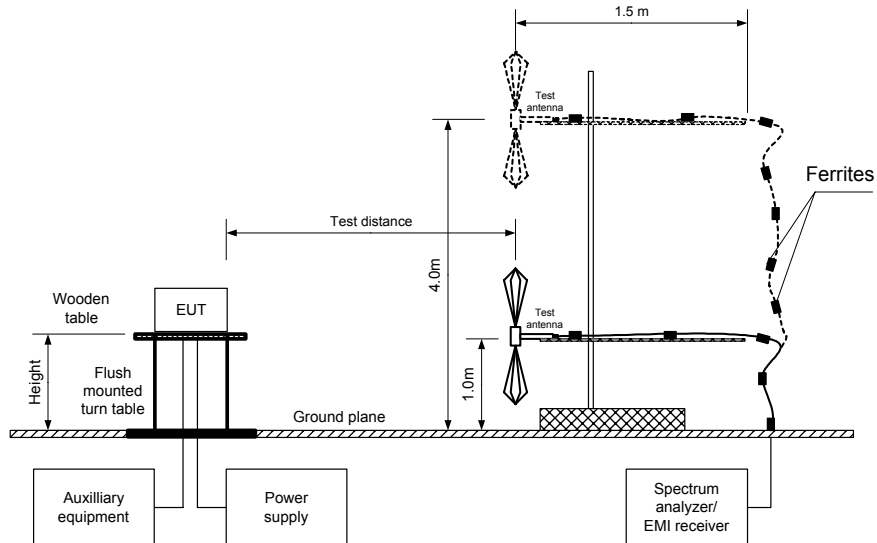
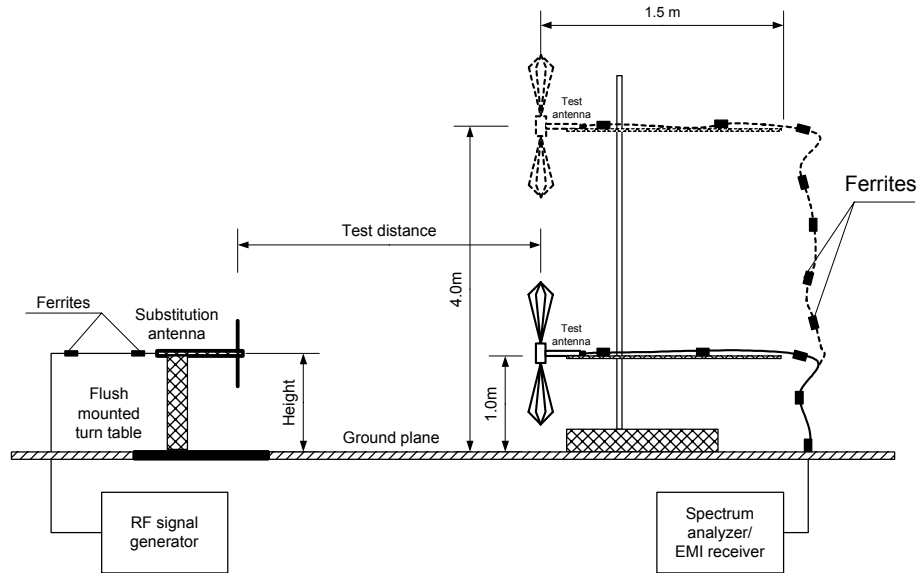


Figure 7.5.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:		Section 27.53(g), Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:48:19 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: ProST			

Figure 7.5.3 Setup for substitution ERP measurements of spurious





Test specification: Section 27.53(g), Radiated spurious emissions	
Test procedure: 47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12	
Test mode: Compliance	Verdict: PASS
Date & Time: 1/20/2009 2:48:19 PM	
Temperature: 23°C	Air Pressure: 1009 hPa
Relative Humidity: 46%	
Power Supply: 120 V AC	
Remarks: ProST	

Table 7.5.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
 TEST DISTANCE: 3 m
 TEST SITE: Semi anechoic chamber
 EUT HEIGHT: 0.8 m
 INVESTIGATED FREQUENCY RANGE: 0.009 – 8000 MHz
 DETECTOR USED: Peak
 VIDEO BANDWIDTH: > Resolution bandwidth
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
 Biconilog (30 MHz – 1000 MHz)
 Double ridged guide (above 1000 MHz)
 MODULATION: 64QAQM
 MODULATING SIGNAL: PRBS
 BIT RATE: 9.452 Mbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	Field strength, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	RBW, kHz	Antenna polarization	Antenna height, m	Turn-table position**, degrees
Low carrier frequency 699.5 MHz							
2098.275	58.50	84.40	-25.90	1000	V	1.2	330
Mid carrier frequency 719.0 MHz							
2158.050	63.16	84.40	-21.24	1000	V	1.3	330
High carrier frequency 744.5 MHz							
2230.825	60.58	84.40	-23.82	1000	V	1.2	310

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

Table 7.5.3 Substitution ERP of spurious test results

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
 TRANSMITTER CARRIER ERP: 25.07 dBm at low frequency
 24.46 dBm at mid frequency
 25.39 dBm at high frequency
 TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 SUBSTITUTION ANTENNA HEIGHT: 0.8 m
 DETECTOR USED: Peak
 VIDEO BANDWIDTH: > Resolution bandwidth
 SUBSTITUTION ANTENNA TYPE: Tunable dipole (30 MHz – 1000 MHz)
 Double ridged guide (above 1000 MHz)

Frequency MHz	Field strength, dB(μV/m)	RBW, kHz	Antenna polarization	RF generator output, dBm	Ant gain dBd	Cable loss, dB	ERP, dBm	Limit, dBm	Margin, dB	Verdict
Low carrier frequency										
2098.275	58.50	1000	V	-46.39	6.67	4.07	-43.79	-13.0	-30.79	Pass
Mid carrier frequency										
2158.050	63.16	1000	V	-41.57	6.91	4.07	-38.73	-13.0	-25.73	Pass
High carrier frequency										
2230.825	60.58	1000	V	-44.15	6.95	4.20	-41.40	-13.0	-28.40	Pass

*- Margin = Spurious emission – specification limit.

Reference numbers of test equipment used

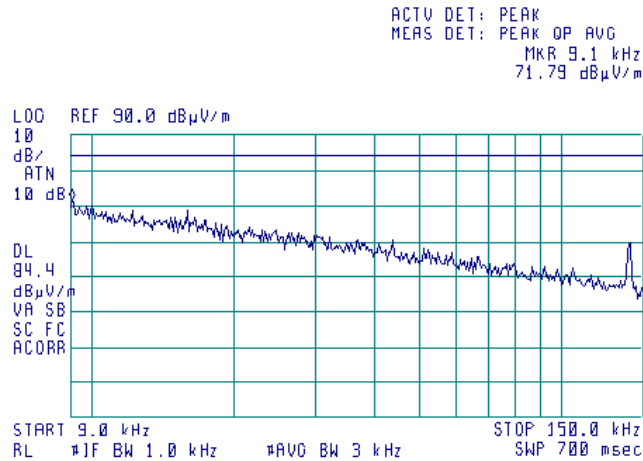
HL 0446	HL 0521	HL 0554	HL 0661	HL 1984	HL 2432	HL 2909	HL 3121
HL 3123	HL 3207						

Full description is given in Appendix A.

Test specification:		Section 27.53(g), Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:48:19 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: ProST			

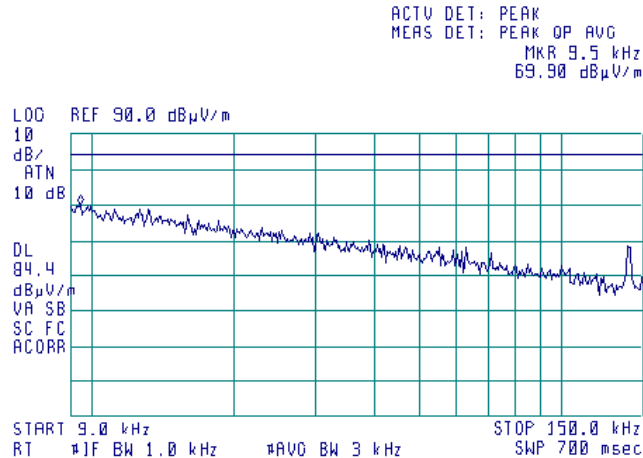
Plot 7.5.1 Radiated emission measurements in 9 - 150 kHz range

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



Plot 7.5.2 Radiated emission measurements in 9 - 150 kHz range

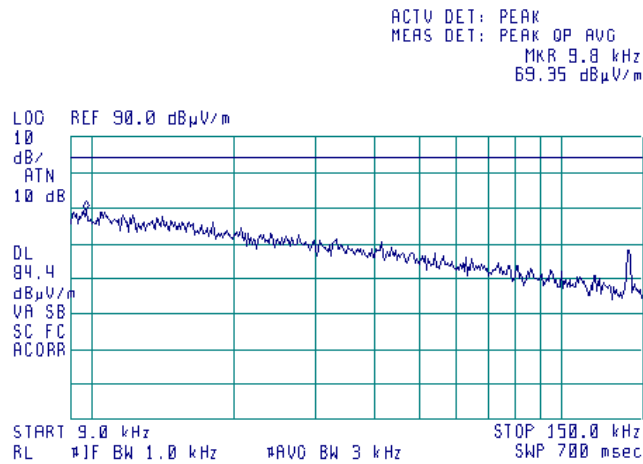
TEST SITE: Semi anechoic chamber
 CARRIER FREQUENCY: Mid
 ANTENNA POLARIZATION: Vertical and Horizontal
 TEST DISTANCE: 3 m



Test specification:	Section 27.53(g), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:48:19 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: ProST			

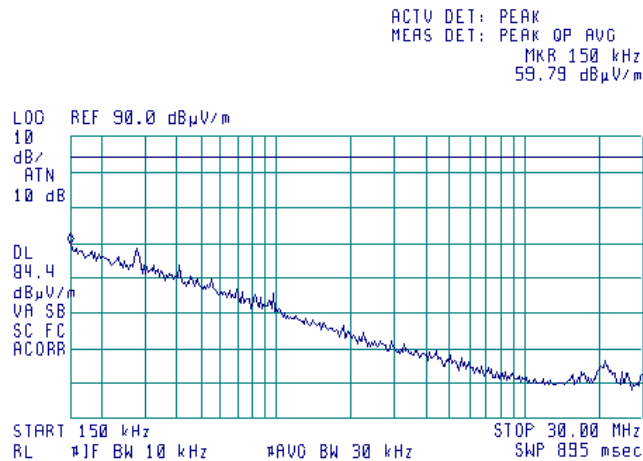
Plot 7.5.3 Radiated emission measurements in 9 - 150 kHz range

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



Plot 7.5.4 Radiated emission measurements in 0.15 - 30 MHz range

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



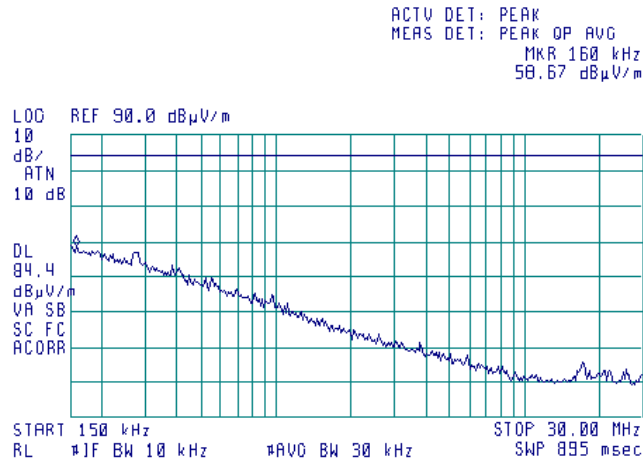


HERMON LABORATORIES

Test specification: Section 27.53(g), Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12			
Test mode: Compliance	Verdict: PASS		
Date & Time: 1/20/2009 2:48:19 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: ProST			

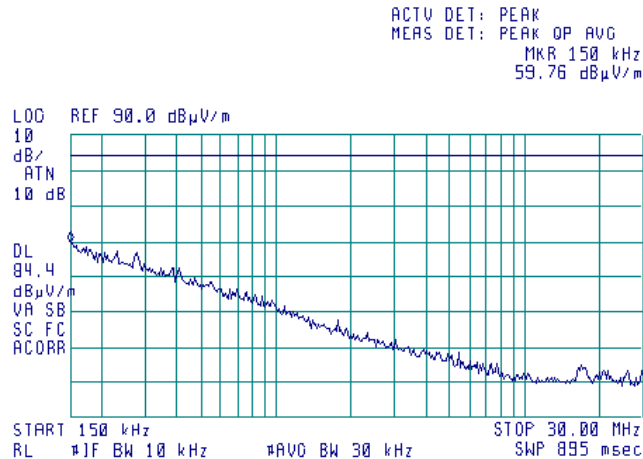
Plot 7.5.5 Radiated emission measurements in 0.15 - 30 MHz range

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



Plot 7.5.6 Radiated emission measurements in 0.15 - 30 MHz range

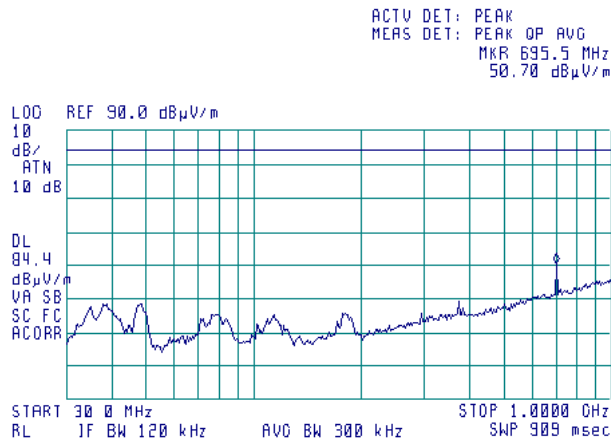
TEST SITE: Semi anechoic chamber
 CARRIER FREQUENCY: High
 ANTENNA POLARIZATION: Vertical and Horizontal
 TEST DISTANCE: 3 m



Test specification: Section 27.53(g), Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12			
Test mode: Compliance	Verdict: PASS		
Date & Time: 1/20/2009 2:48:19 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: ProST			

Plot 7.5.7 Radiated emission measurements in 30 - 1000 MHz range

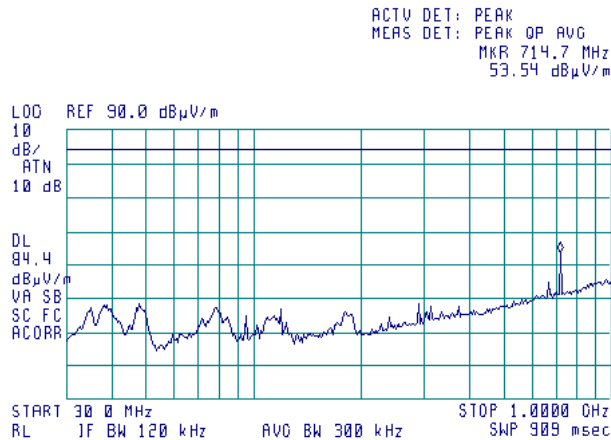
TEST SITE: Semi anechoic chamber
 CARRIER FREQUENCY: Low
 ANTENNA POLARIZATION: Vertical and Horizontal
 TEST DISTANCE: 3 m



699.5 – high channel of the carrier

Plot 7.5.8 Radiated emission measurements in 30 - 1000 MHz range

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



719.0 – high channel of the carrier

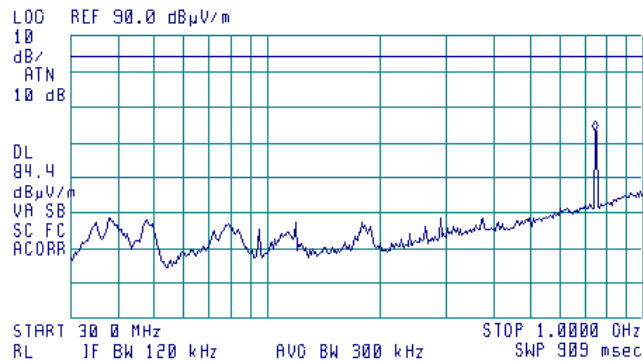
Test specification:		Section 27.53(g), Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:48:19 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: ProST			

Plot 7.5.9 Radiated emission measurements in 30 - 1000 MHz range

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



ACTV DET: PEAK
MERS DET: PEAK QP AVG
MKR 740.4 MHz
63.12 dBµV/m

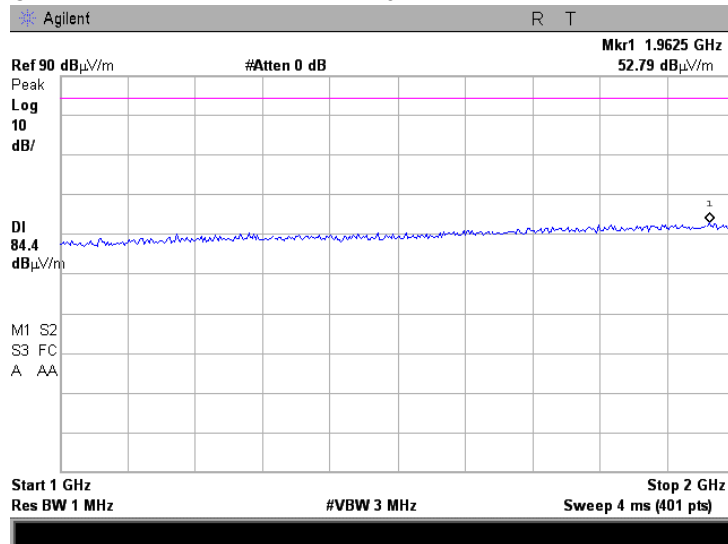


744.5 – high channel of the carrier

Test specification:	Section 27.53(g), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:48:19 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:	ProST		

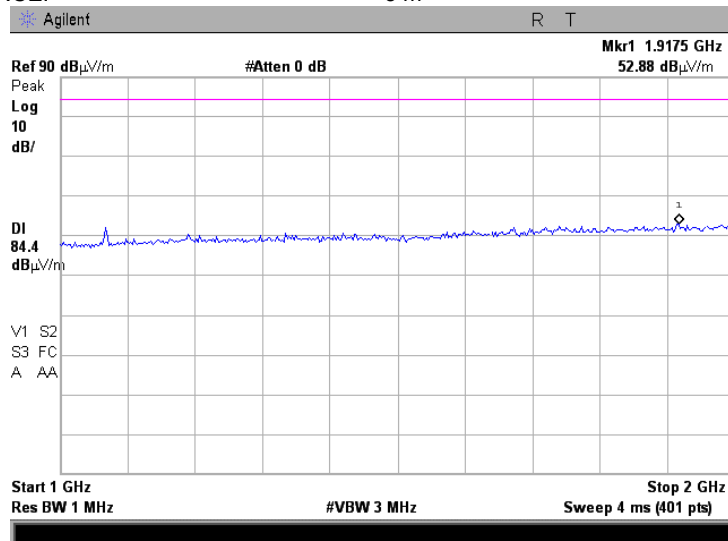
Plot 7.5.10 Radiated emission measurements in 1000 – 2000 MHz range

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



Plot 7.5.11 Radiated emission measurements in 1000 – 2000 MHz range

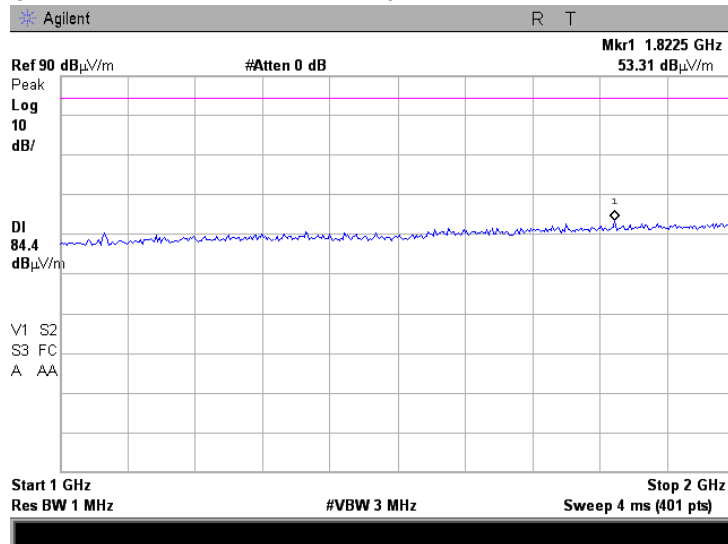
TEST SITE: Semi anechoic chamber
 CARRIER FREQUENCY: Mid
 ANTENNA POLARIZATION: Vertical and Horizontal
 TEST DISTANCE: 3 m



Test specification:	Section 27.53(g), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	1/20/2009 2:48:19 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: ProST			

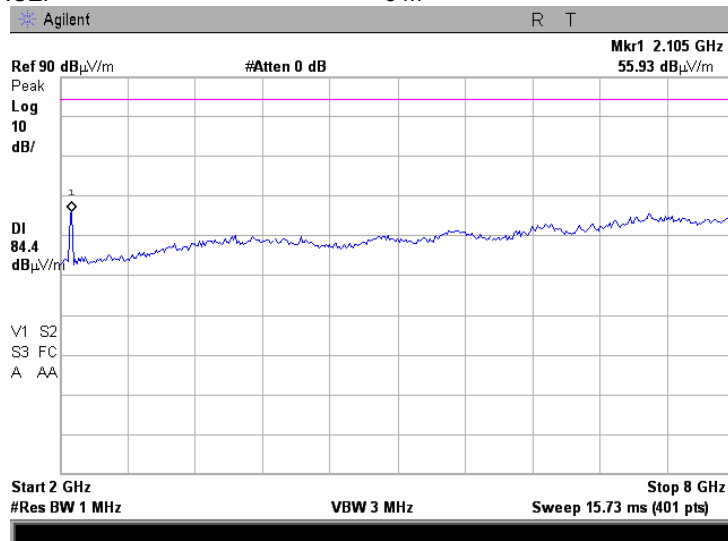
Plot 7.5.12 Radiated emission measurements in 1000 – 2000 MHz range

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



Plot 7.5.13 Radiated emission measurements in 2000 – 8000 MHz range

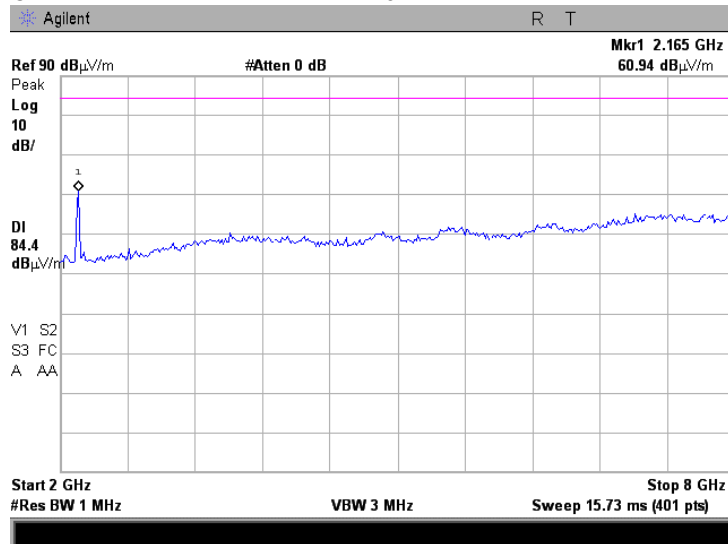
TEST SITE: Semi anechoic chamber
 CARRIER FREQUENCY: Low
 ANTENNA POLARIZATION: Vertical and Horizontal
 TEST DISTANCE: 3 m



Test specification:	Section 27.53(g), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:48:19 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:	ProST		

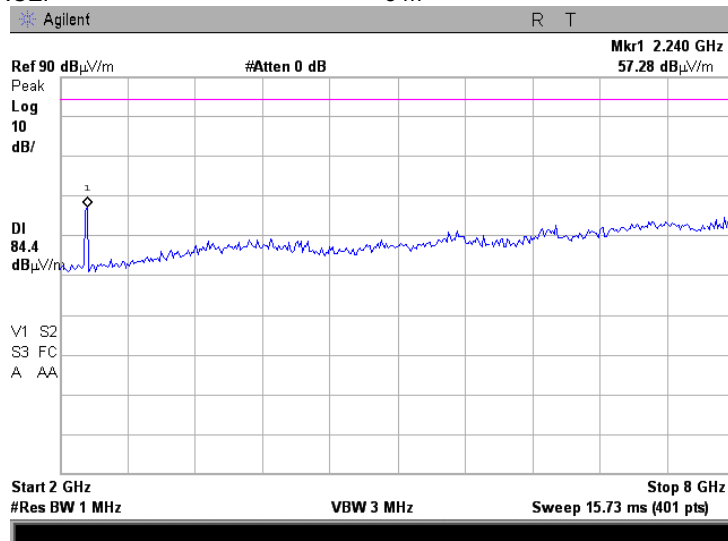
Plot 7.5.14 Radiated emission measurements in 2000 – 8000 MHz range

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



Plot 7.5.15 Radiated emission measurements in 2000 – 8000 MHz range

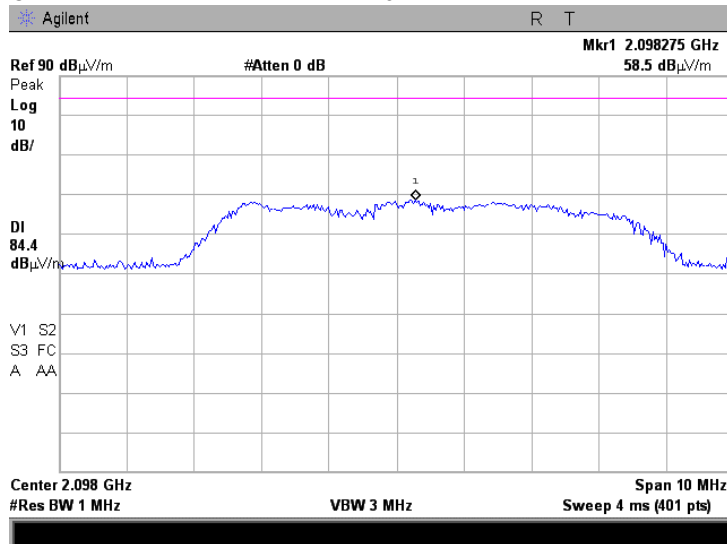
TEST SITE: Semi anechoic chamber
 CARRIER FREQUENCY: High
 ANTENNA POLARIZATION: Vertical and Horizontal
 TEST DISTANCE: 3 m



Test specification:	Section 27.53(g), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:48:19 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: ProST			

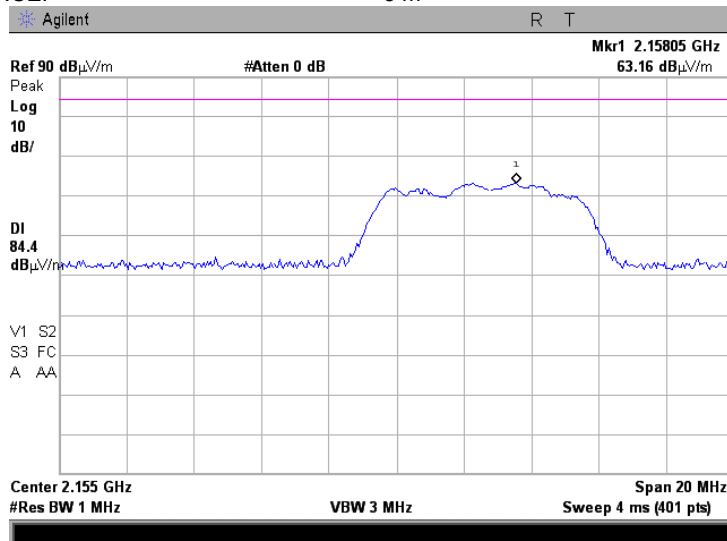
Plot 7.5.16 Radiated emission measurements at the 3rd harmonic

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



Plot 7.5.17 Radiated emission measurements at the 3rd harmonic

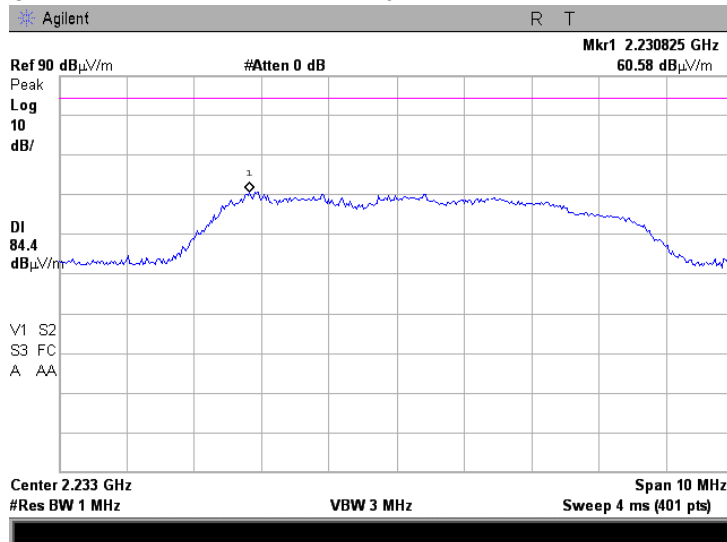
TEST SITE: Semi anechoic chamber
 CARRIER FREQUENCY: Mid
 ANTENNA POLARIZATION: Vertical
 TEST DISTANCE: 3 m



Test specification:	Section 27.53(g), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	1/20/2009 2:48:19 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: ProST			

Plot 7.5.18 Radiated emission measurements at the 3rd harmonic

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



Test specification:		Section 27.53(g), Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:53:48 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: EasyST			

7.6 Radiated spurious emission measurements

7.6.1 General

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

Table 7.6.1 Radiated spurious emission test limits

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

* - P is transmitter output power in Watts

** - Equivalent field strength limit was calculated from maximum allowed ERP of spurious as follows: $E = \sqrt{30 \times P \times 1.64} / r$, where P is ERP in Watts, 1.64 is numeric gain of ideal dipole and r is antenna to EUT distance in meters

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

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

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

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

7.6.3.1 The EUT was set up as shown in Figure 7.6.2, energized and the performance check was conducted.

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

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

Test specification: Section 27.53(g), Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12			
Test mode: Compliance	Verdict: PASS		
Date & Time: 1/20/2009 2:53:48 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: EasyST			

Figure 7.6.1 Setup for spurious emission field strength measurements in 9 kHz to 30 MHz band

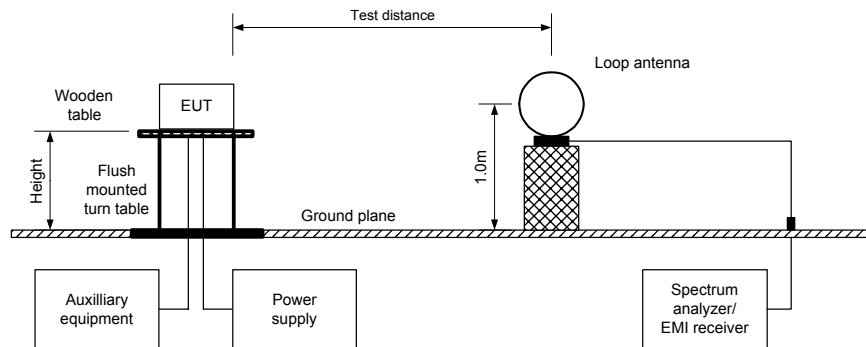
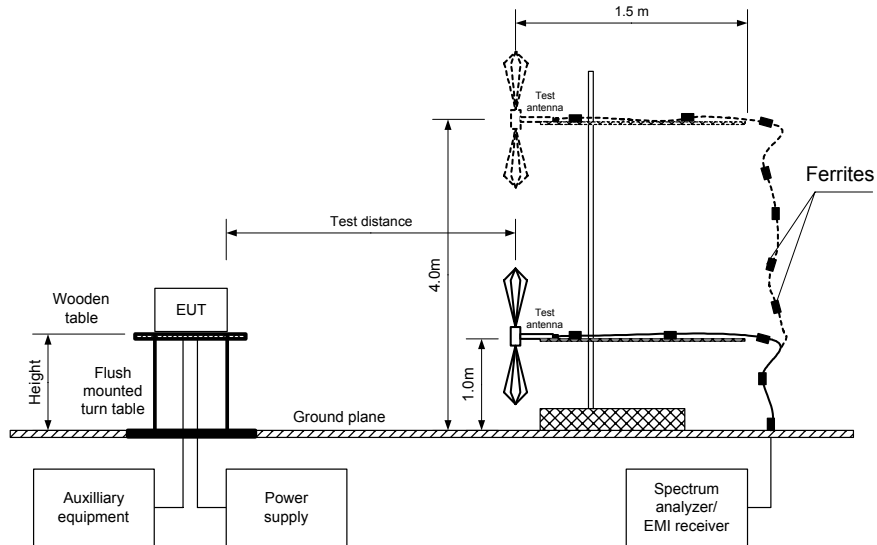


Figure 7.6.2 Setup for spurious emission field strength measurements above 30 MHz





Test specification:		Section 27.53(g), Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:53:48 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: EasyST			

Table 7.6.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
TEST DISTANCE: 3 m
TEST SITE: Semi anechoic chamber
EUT HEIGHT: 0.8 m
INVESTIGATED FREQUENCY RANGE: 0.009 – 8000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: > Resolution bandwidth
TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
Biconilog (30 MHz – 1000 MHz)
Double ridged guide (above 1000 MHz)
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 9.425 Mbps
EBW: 2.5 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	Field strength, dB(µV/m)	Limit, dB(µV/m)	Margin, dB*	RBW, kHz	Antenna polarization	Antenna height, m	Turn-table position**, degrees
No spurious emissions were found							

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

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

Reference numbers of test equipment used

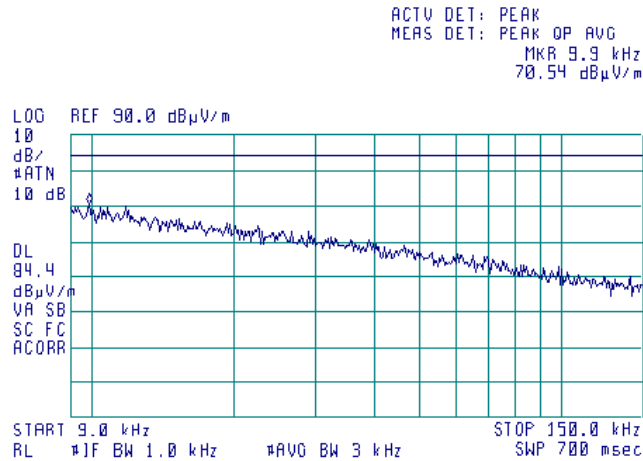
HL 0446	HL 0521	HL 0554	HL 1984	HL 2909	HL 3121	HL 3123	HL 3207
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Full description is given in Appendix A.

Test specification: Section 27.53(g), Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12			
Test mode: Compliance	Verdict: PASS		
Date & Time: 1/20/2009 2:53:48 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: EasyST			

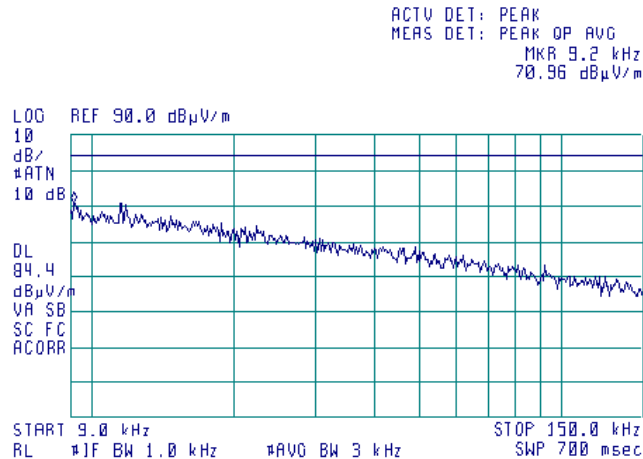
Plot 7.6.1 Radiated emission measurements in 9 - 150 kHz range

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



Plot 7.6.2 Radiated emission measurements in 9 - 150 kHz range

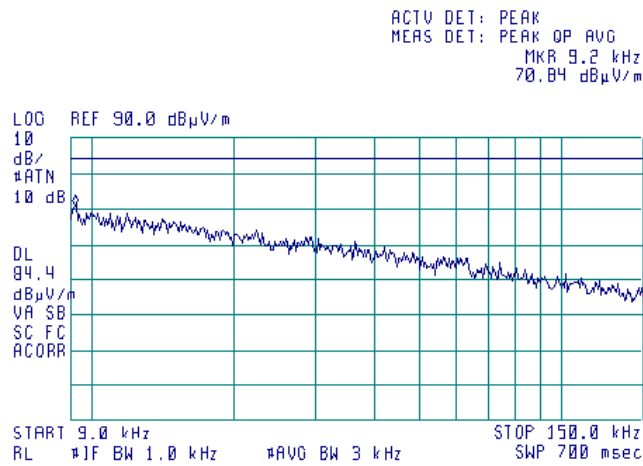
TEST SITE: Semi anechoic chamber
 CARRIER FREQUENCY: Mid
 ANTENNA POLARIZATION: Vertical and Horizontal
 TEST DISTANCE: 3 m



Test specification: Section 27.53(g), Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12			
Test mode: Compliance	Verdict: PASS		
Date & Time: 1/20/2009 2:53:48 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: EasyST			

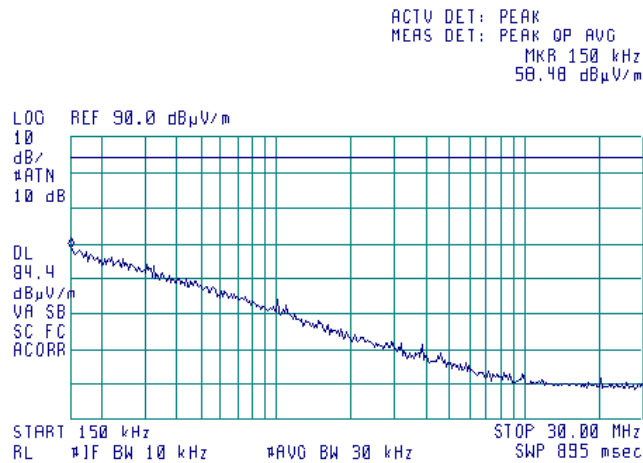
Plot 7.6.3 Radiated emission measurements in 9 - 150 kHz range

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



Plot 7.6.4 Radiated emission measurements in 0.15 - 30 MHz range

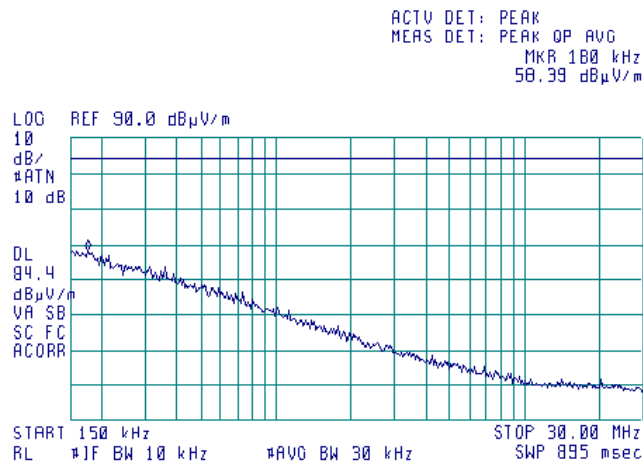
TEST SITE: Semi anechoic chamber
 CARRIER FREQUENCY: Low
 ANTENNA POLARIZATION: Vertical and Horizontal
 TEST DISTANCE: 3 m



Test specification:	Section 27.53(g), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:53:48 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: EasyST			

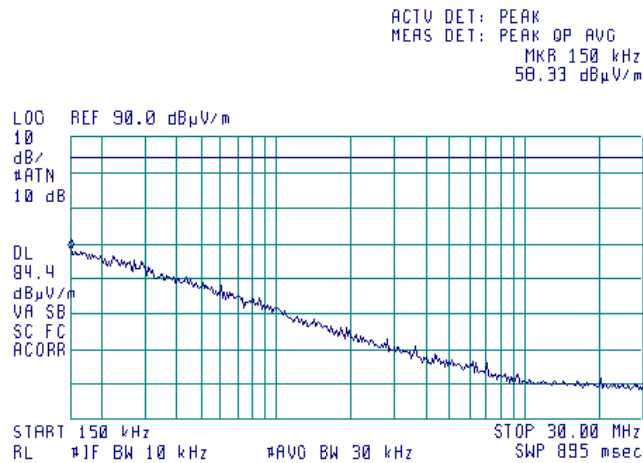
Plot 7.6.5 Radiated emission measurements in 0.15 - 30 MHz range

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



Plot 7.6.6 Radiated emission measurements in 0.15 - 30 MHz range

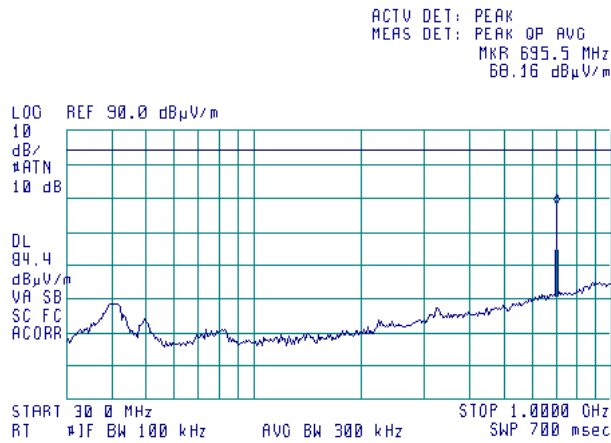
TEST SITE: Semi anechoic chamber
 CARRIER FREQUENCY: High
 ANTENNA POLARIZATION: Vertical and Horizontal
 TEST DISTANCE: 3 m



Test specification: Section 27.53(g), Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12			
Test mode: Compliance	Verdict: PASS		
Date & Time: 1/20/2009 2:53:48 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: EasyST			

Plot 7.6.7 Radiated emission measurements in 30 - 1000 MHz range

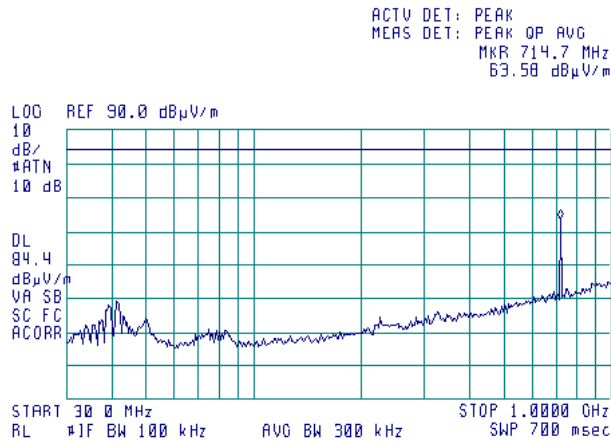
TEST SITE: Semi anechoic chamber
 CARRIER FREQUENCY: Low
 ANTENNA POLARIZATION: Vertical and Horizontal
 TEST DISTANCE: 3 m



699.5 MHz – low channel of the carrier

Plot 7.6.8 Radiated emission measurements in 30 - 1000 MHz range

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

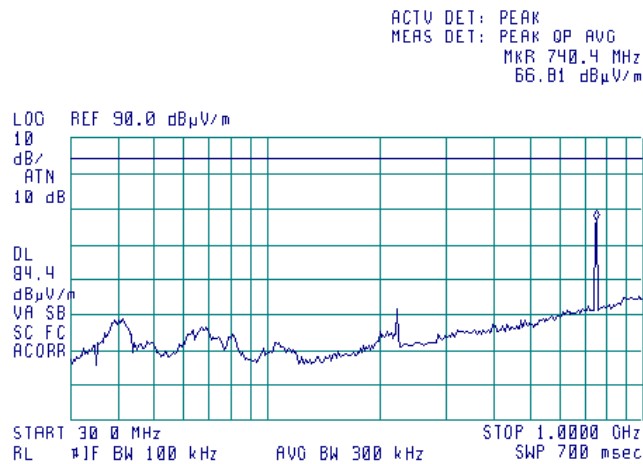


719.0 MHz – mid channel of the carrier

Test specification:	Section 27.53(g), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:53:48 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: EasyST			

Plot 7.6.9 Radiated emission measurements in 30 - 1000 MHz range

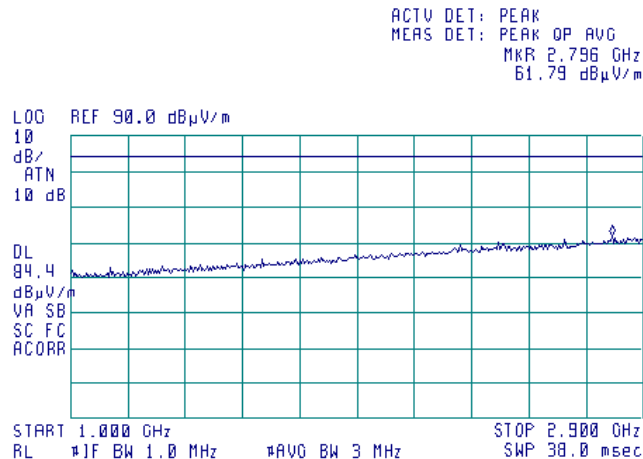
TEST SITE: Semi anechoic chamber
 CARRIER FREQUENCY: High
 ANTENNA POLARIZATION: Vertical and Horizontal
 TEST DISTANCE: 3 m



744.5 MHz – high channel of the carrier

Plot 7.6.10 Radiated emission measurements in 1000 – 2900 MHz range

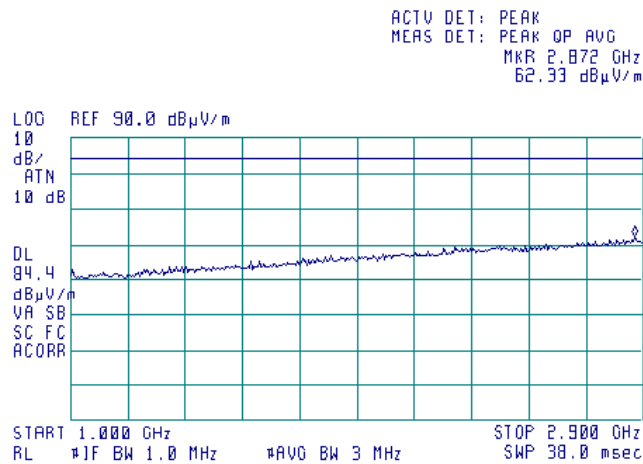
TEST SITE: Semi anechoic chamber
 CARRIER FREQUENCY: Low
 ANTENNA POLARIZATION: Vertical and Horizontal
 TEST DISTANCE: 3 m



Test specification: Section 27.53(g), Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12			
Test mode: Compliance	Verdict: PASS		
Date & Time: 1/20/2009 2:53:48 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: EasyST			

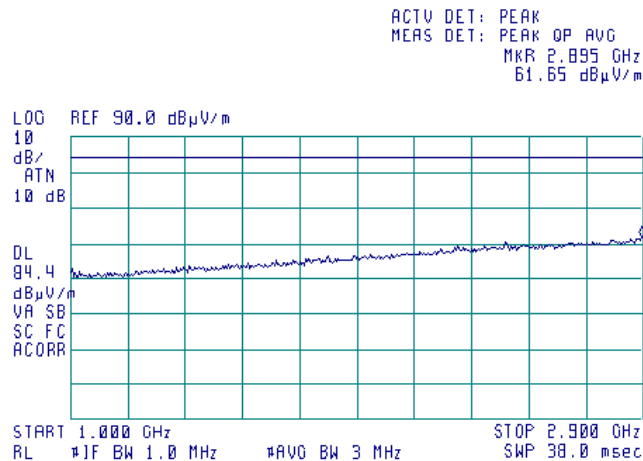
Plot 7.6.11 Radiated emission measurements in 1000 – 2900 MHz range

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



Plot 7.6.12 Radiated emission measurements in 1000 – 2900 MHz range

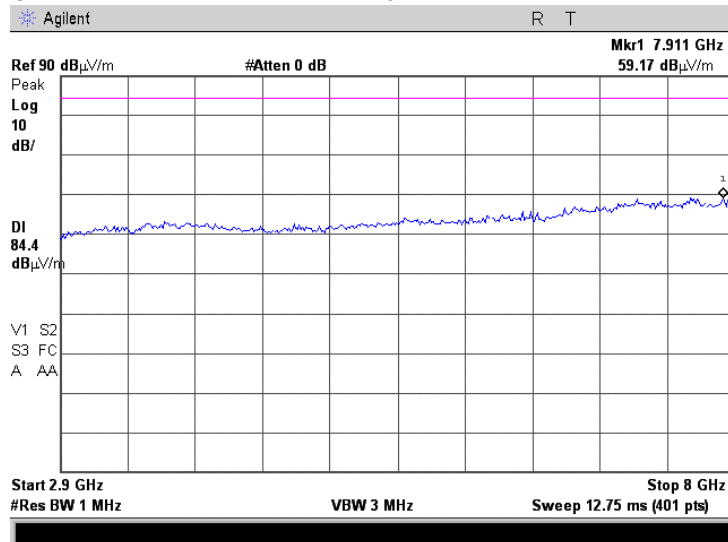
TEST SITE: Semi anechoic chamber
 CARRIER FREQUENCY: High
 ANTENNA POLARIZATION: Vertical and Horizontal
 TEST DISTANCE: 3 m



Test specification:	Section 27.53(g), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	1/20/2009 2:53:48 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: EasyST			

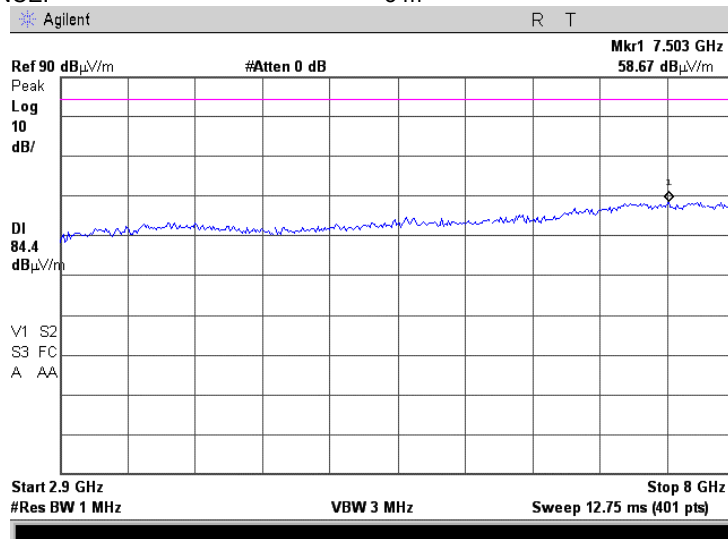
Plot 7.6.13 Radiated emission measurements in 2900 – 8000 MHz range

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



Plot 7.6.14 Radiated emission measurements in 2900 – 8000 MHz range

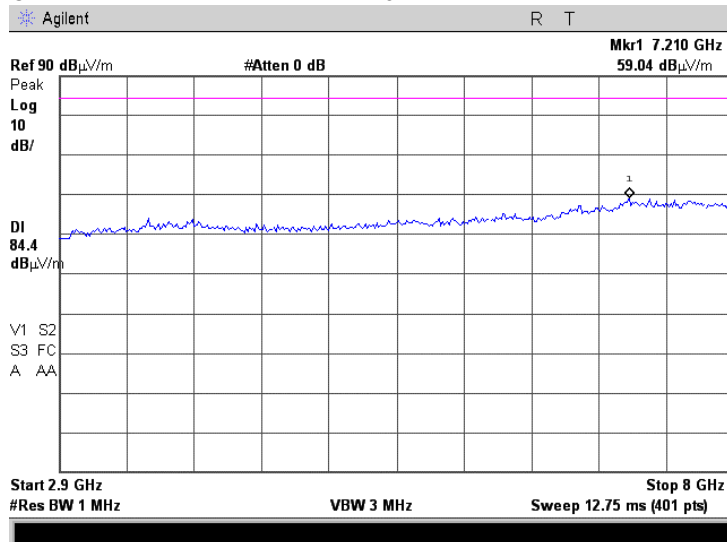
TEST SITE: Semi anechoic chamber
 CARRIER FREQUENCY: Mid
 ANTENNA POLARIZATION: Vertical and Horizontal
 TEST DISTANCE: 3 m



Test specification:	Section 27.53(g), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 27.53(f); TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:53:48 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: EasyST			

Plot 7.6.15 Radiated emission measurements in 2900 – 8000 MHz range

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



Test specification:	Section 27.53(g), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(f); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:28:13 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

7.7 Spurious emissions at RF antenna connector test

7.7.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 7.7.1. The test results are provided in Table 7.7.2 and associated plots.

Table 7.7.1 Spurious emission limits

Frequency, MHz	Attenuation below carrier, dBc	ERP of spurious, dBm
0.009 – 10th harmonic*	$43+10\log P^*$	-13.0

* - P is transmitter output power in Watts

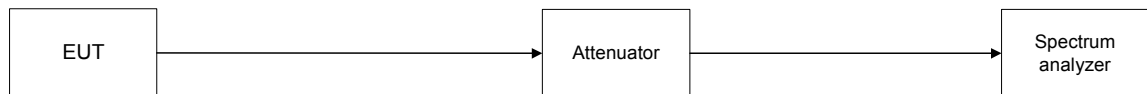
7.7.2 Test procedure

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

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

7.7.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.7.2 and associated plots.

Figure 7.7.1 Spurious emission test setup





Test specification:	Section 27.53(g), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(f); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:28:13 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Table 7.7.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 7500 MHz
 DETECTOR USED: Peak
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 MODULATION: 64QAM
 MODULATING SIGNAL: PRBS
 BIT RATE: 9.425 MBps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 TRANSMITTER OUTPUT POWER: 25.07 dBm at low frequency
 24.46 dBm at mid frequency
 25.39 dBm at high frequency

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm	Limit, dBm	Margin, dB*	Verdict
Low carrier frequency 499.5 MHz								
697.880	-18.28	Included	Included	100	-18.28	-13.0	-5.28	Pass
Mid carrier frequency 719.0 MHz								
715.841	-23.99	Included	Included	100	-23.99	-13.0	-10.99	Pass
722.159	-27.12	Included	Included	100	-27.12	-13.0	-14.12	Pass
High carrier frequency 744.5 MHz								
746.100	-15.59	Included	Included	100	-15.59	-13.0	-2.59	Pass
1488.000	-34.84	Included	Included	1000	-34.84	-13.0	-21.84	Pass

*- Margin = Spurious emission – specification limit.

NOTE: the test was performed with EUT configured to 2.5 MHz EBW with 64QAM modulation as settings that produce maximum power spectral density.

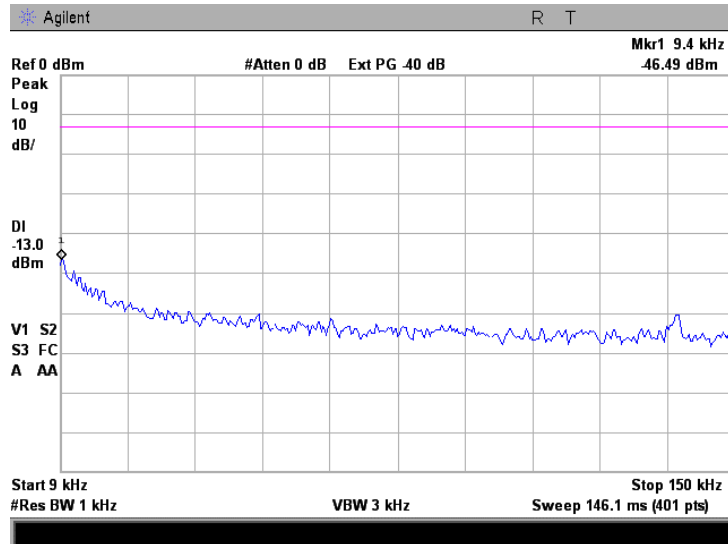
Reference numbers of test equipment used

HL 2780	HL 2911	HL 3179	HL 3180				
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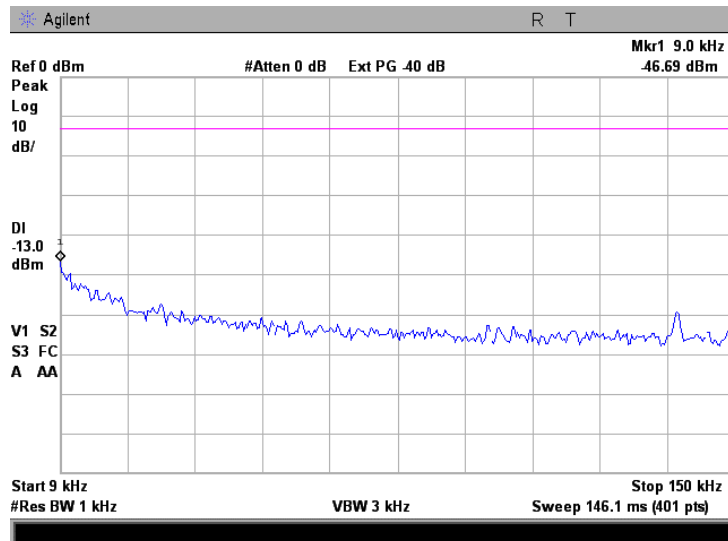
Full description is given in Appendix A.

Test specification:	Section 27.53(g), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(f); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:28:13 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.7.1 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency

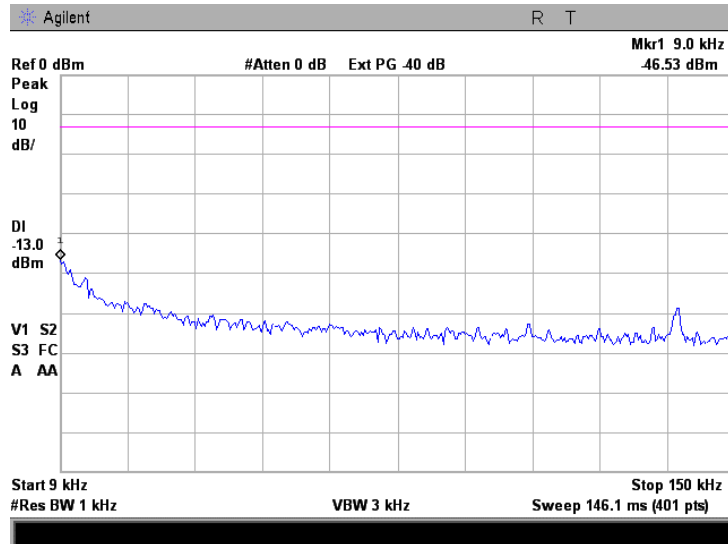


Plot 7.7.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency

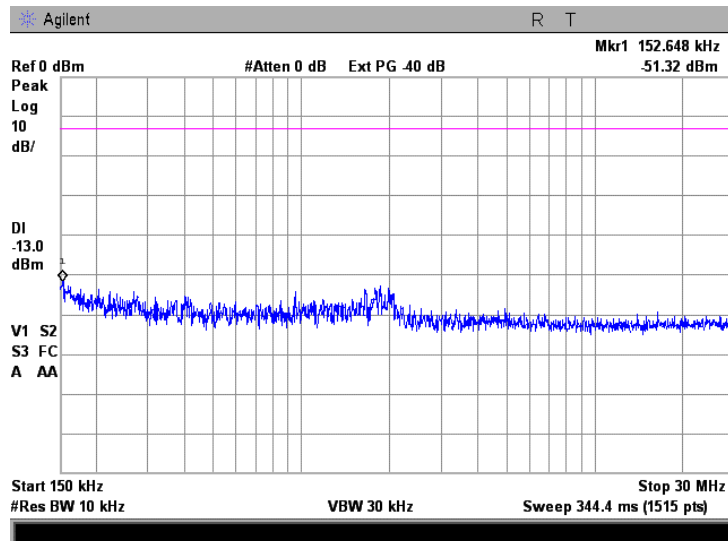


Test specification:	Section 27.53(g), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(f); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:28:13 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.7.3 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency

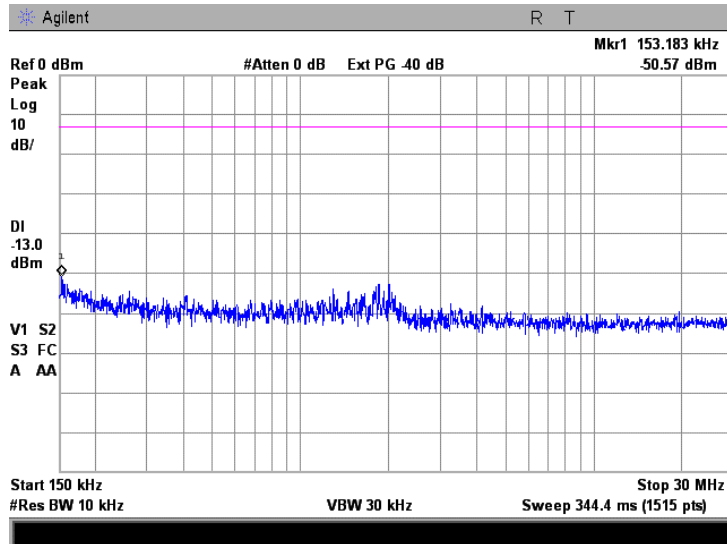


Plot 7.7.4 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency

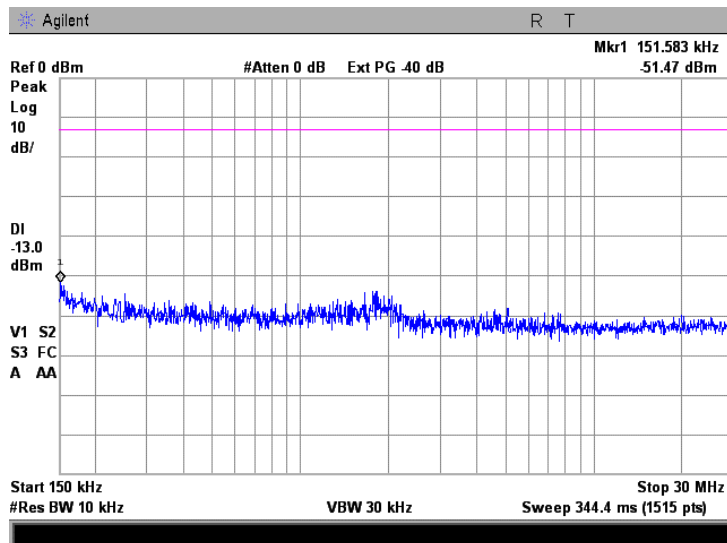


Test specification:	Section 27.53(g), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(f); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:28:13 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.7.5 Spurious emission measurements in 0.15 - 30.0 MHz range at mid carrier frequency

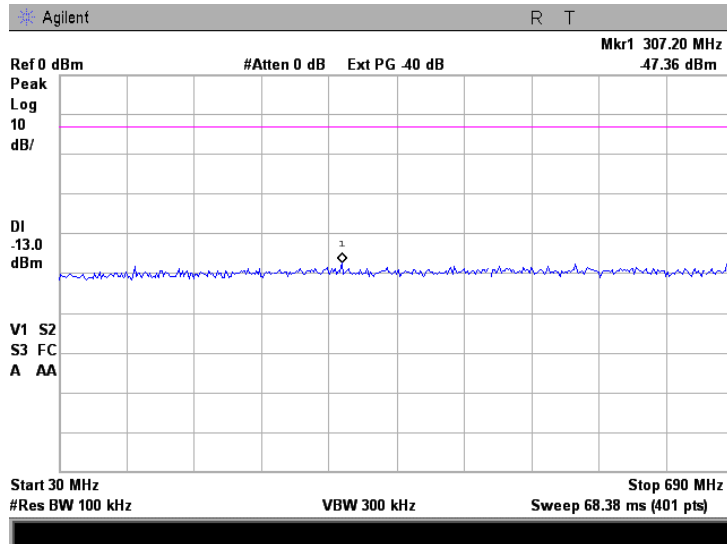


Plot 7.7.6 Spurious emission measurements in 0.15 - 30.0 MHz range at high carrier frequency

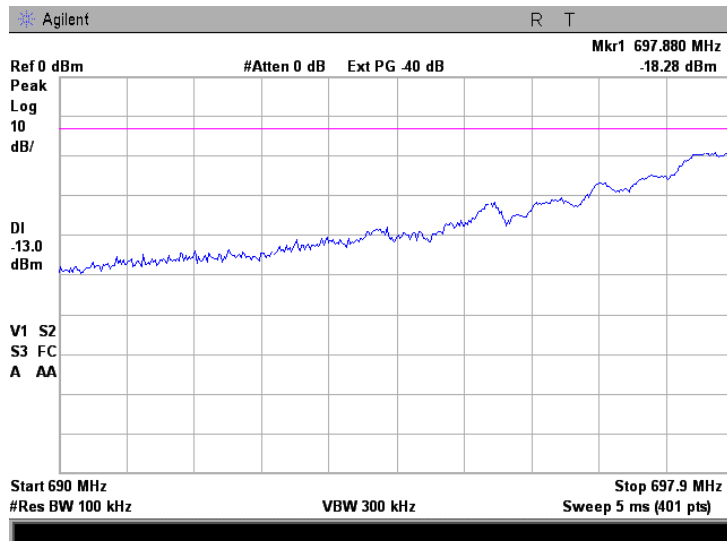


Test specification:	Section 27.53(g), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(f); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	1/20/2009 2:28:13 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.7.7 Spurious emission measurements in 30.0 – 690.0 MHz range at low carrier frequency

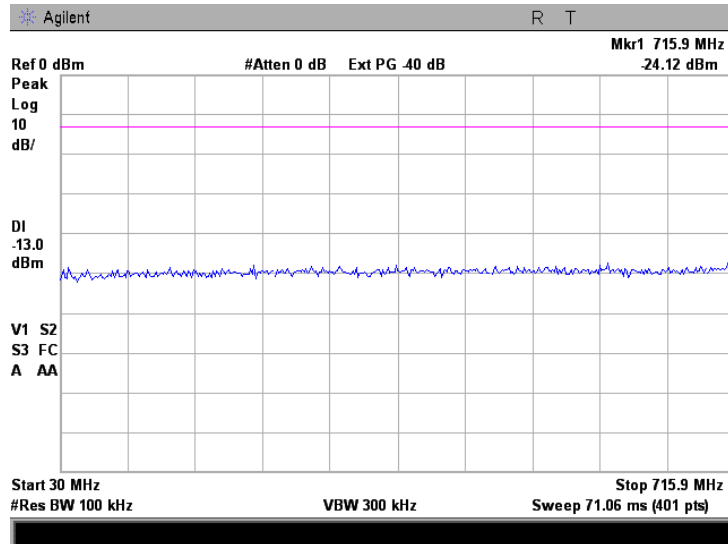


Plot 7.7.8 Spurious emission measurements in 690.0 – 697.9 MHz range at low carrier frequency

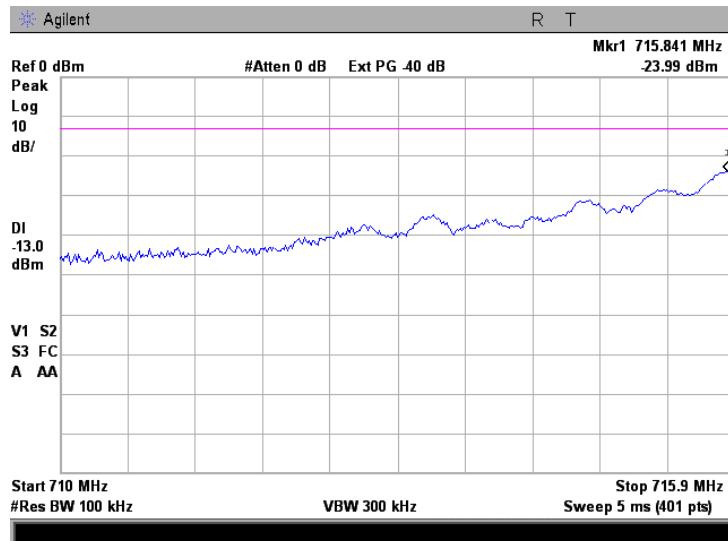


Test specification:	Section 27.53(g), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(f); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:28:13 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.7.9 Spurious emission measurements in 30 – 715.9 MHz range at mid carrier frequency

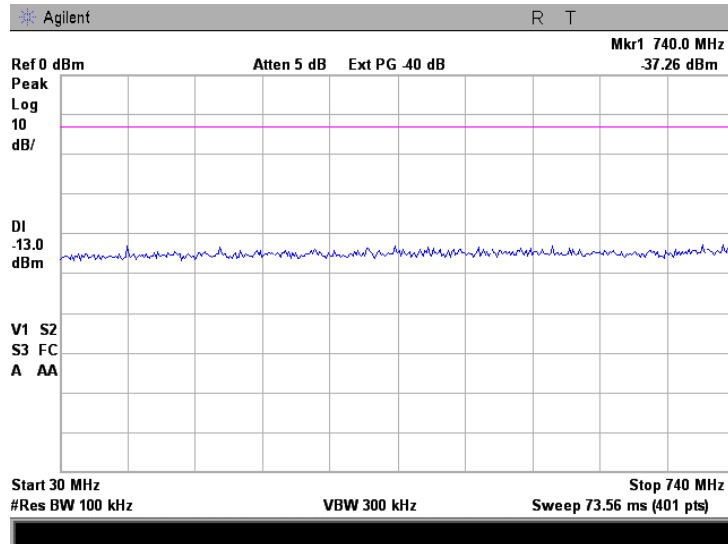


Plot 7.7.10 Spurious emission measurements in 710.0 – 715.9 MHz range at mid carrier frequency

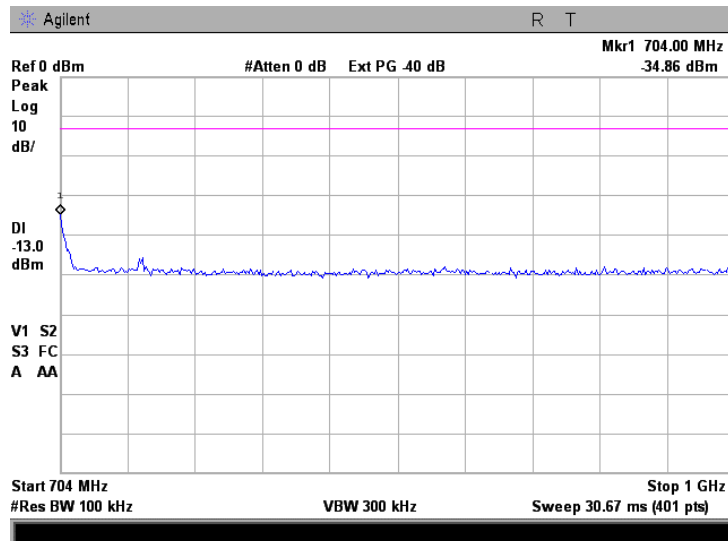


Test specification:	Section 27.53(g), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(f); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:28:13 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.7.11 Spurious emission measurements in 30.0 - 740 MHz range at high carrier frequency

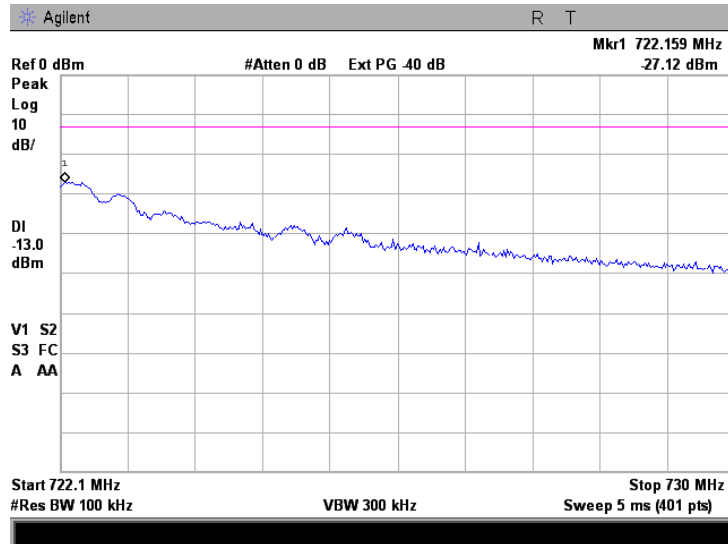


Plot 7.7.12 Spurious emission measurements in 704 - 1000 MHz range at low carrier frequency

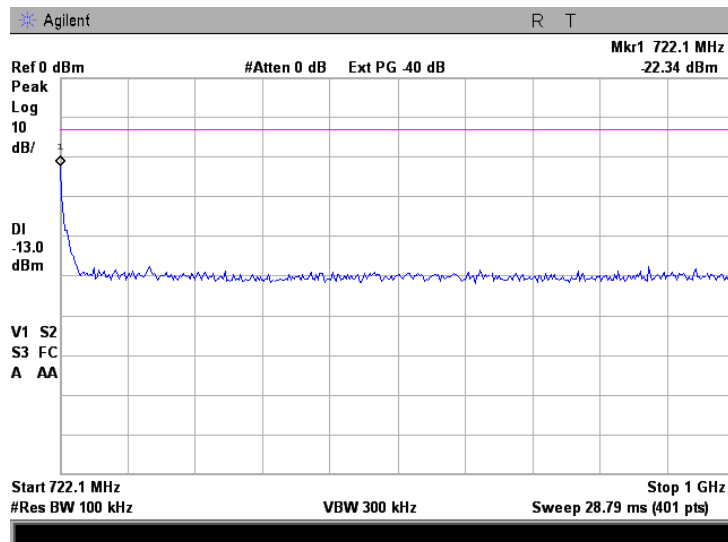


Test specification:	Section 27.53(g), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(f); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:28:13 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.7.13 Spurious emission measurements in 722.1 – 730.0 MHz at mid carrier frequency

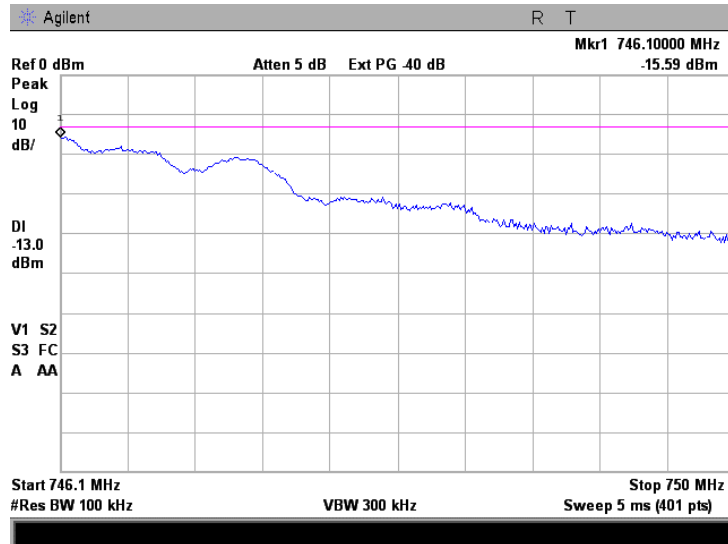


Plot 7.7.14 Spurious emission measurements in 722.1 - 1000 MHz at mid carrier frequency

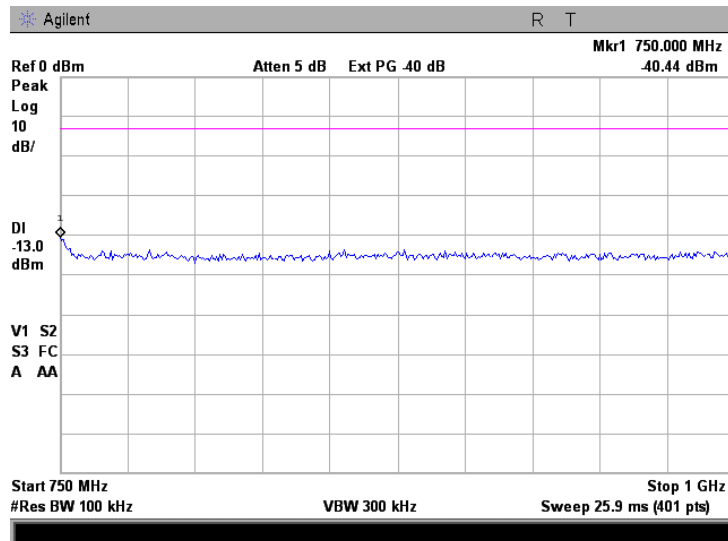


Test specification:	Section 27.53(g), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(f); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:28:13 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.7.15 Spurious emission measurements in 746.1 - 750 MHz at high carrier frequency

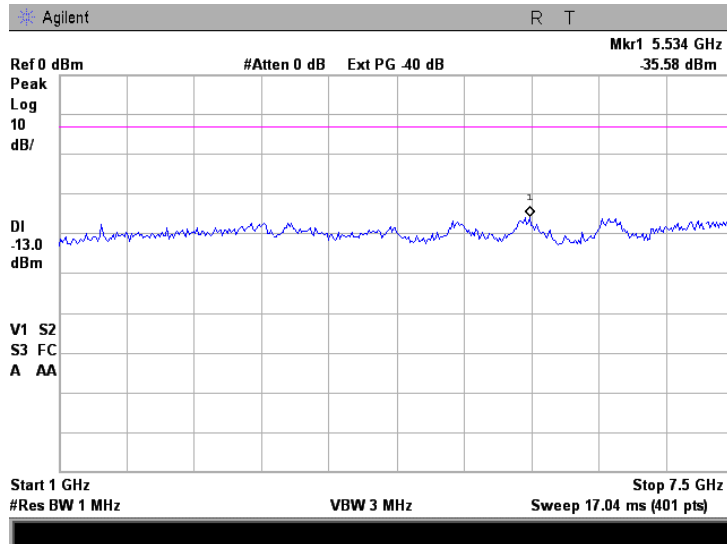


Plot 7.7.16 Spurious emission measurements in 750.0 - 1000 MHz at high carrier frequency

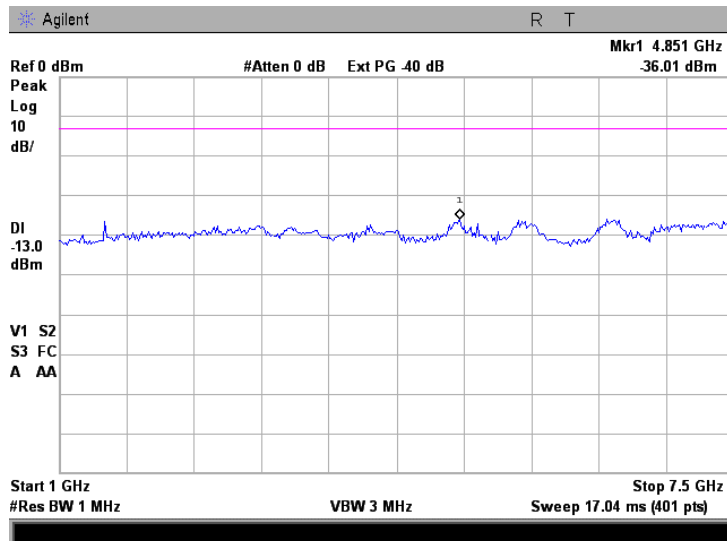


Test specification:	Section 27.53(g), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(f); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:28:13 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.7.17 Spurious emission measurements in 1000 - 7500 MHz range at low carrier frequency

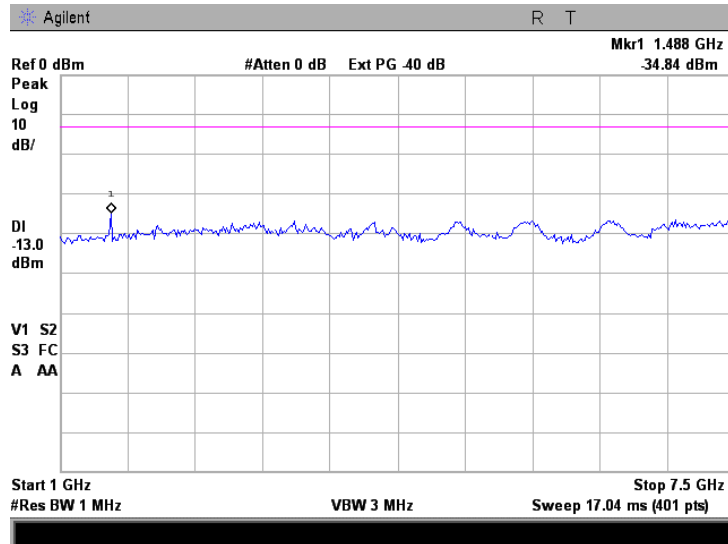


Plot 7.7.18 Spurious emission measurements in 1000 - 7500 MHz at mid carrier frequency



Test specification:	Section 27.53(g), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(f); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 2:28:13 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Plot 7.7.19 Spurious emission measurements in 1000.0 – 7500.0 MHz at high carrier frequency



1489.515 MHz -32.83 dBm

Test specification:		Section 27.54, Frequency stability	
Test procedure:		47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 3:11:38 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: EasyST			

7.8 Frequency stability test

7.8.1 General

This test was performed to measure frequency stability of transmitter RF carrier. Specification test limits are given in Table 7.8.1.

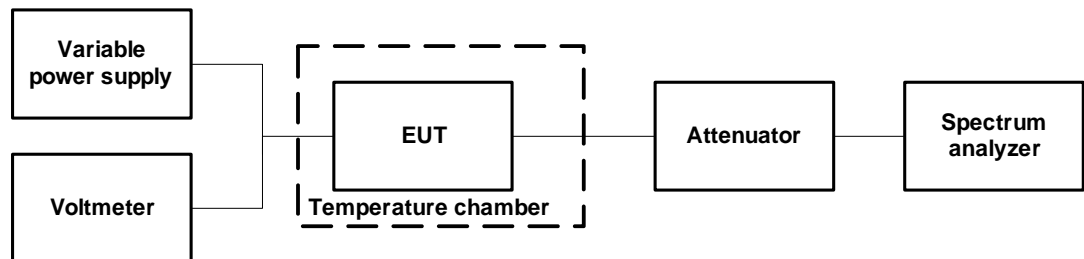
Table 7.8.1 Frequency stability limits

Assigned frequency, MHz	Maximum allowed frequency displacement Hz
698.0 – 746.0	The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation

7.8.2 Test procedure

- 7.8.2.1 The EUT was set up as shown in Figure 7.8.1, energized and its proper operation was checked.
- 7.8.2.2 The EUT power was turned off. Temperature within test chamber was set to +30°C and a period of time sufficient to stabilize all of the oscillator circuit components was allowed.
- 7.8.2.3 The EUT was powered on and carrier frequency was measured at start up moment and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.
- 7.8.2.4 The above procedure was repeated at 0°C and at the lowest test temperature.
- 7.8.2.5 The EUT was powered on and carrier frequency was measured at start up moment and at the end of stabilization period at the rest of test temperatures and voltages. The EUT was powered off.
- 7.8.2.6 Frequency displacement was calculated and compared with the limit as provided in Table 7.8.2.

Figure 7.8.1 Frequency stability test setup





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Test specification:	Section 27.54, Frequency stability		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 3:11:38 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: EasyST			

Table 7.8.2 Frequency stability test results

OPERATING FREQUENCY: 698.0 – 746.0 MHz
 NOMINAL POWER VOLTAGE: 120 VAC
 TEMPERATURE STABILIZATION PERIOD: 20 min
 POWER DURING TEMPERATURE TRANSITION: Off
 SPECTRUM ANALYZER MODE: Peak Hold
 RESOLUTION BANDWIDTH: 10 Hz
 VIDEO BANDWIDTH: 30 Hz

T, °C	Voltage, V	Frequency, MHz							Max frequency drift Hz	
		Start up	1 st min	2 nd min	3 rd min	4 th min	5 th min	10 th min	Positive	Negative
Low carrier frequency 699.50 MHz										
-30	nominal	699.504596	699.505025	699.505211	699.505398	699.505615	699.505794	699.506354	0.000000	-5949.00
-20	nominal	699.508200	NA	NA	NA	NA	NA	699.508854	0.000000	-2345.00
-10	nominal	699.510070	NA	NA	NA	NA	NA	699.510744	199.000000	-475.00
0	nominal	699.511550	699.511498	699.511493	699.511485	699.511468	699.511443	699.511205	1005.000000	0.00
10	nominal	699.511430	NA	NA	NA	NA	NA	699.511369	885.000000	0.00
20	15%	699.510117	NA	NA	NA	NA	NA	699.510450	0.000000	-428.00
20	nominal	699.510794	NA	NA	NA	NA	NA	699.510545	249.000000	0.00
20	-15%	699.510363	NA	NA	NA	NA	NA	699.510452	0.000000	-182.00
30	nominal	699.510910	699.510655	699.510602	699.510578	699.510568	699.510562	699.510515	365.000000	-30.00
40	nominal	699.510430	NA	NA	NA	NA	NA	699.510513	0.000000	-115.00
50	nominal	699.511906	699.511304	699.511366	699.511444	699.511453	699.511412	699.511316	1361.000000	0.00
Mid carrier frequency 719.00 MHz										
-30	nominal	719.006170	719.006309	719.006341	719.006390	719.006427	719.006444	719.006481	0.00	-4301.00
-20	nominal	719.008786	NA	NA	NA	NA	NA	719.008829	0.00	-1685.00
-10	nominal	719.010810	NA	NA	NA	NA	NA	719.010745	339.00	0.00
0	nominal	719.011443	719.011436	719.011412	719.011395	719.011384	719.011380	719.011506	1035.00	0.00
10	nominal	719.011369	NA	NA	NA	NA	NA	719.011362	898.00	0.00
20	15%	719.010444	NA	NA	NA	NA	NA	719.010435	0.00	-36.00
20	nominal	719.010493	NA	NA	NA	NA	NA	719.010471	22.00	0.00
20	-15%	719.010428	NA	NA	NA	NA	NA	719.010425	0.00	-46.00
30	nominal	719.010500	719.010470	719.010436	719.010433	719.010433	719.010453	719.010466	29.00	-38.00
40	nominal	719.010490	NA	NA	NA	NA	NA	719.010415	19.00	-56.00
50	nominal	719.011358	719.011336	719.011321	719.011322	719.011348	719.011398	719.011310	927.00	0.00
High carrier frequency 744.5 MHz										
-30	nominal	744.506230	744.506262	744.506288	744.506309	744.506316	744.506312	744.506307	0.00	-4182.00
-20	nominal	744.507280	NA	NA	NA	NA	NA	744.508723	0.00	-3132.00
-10	nominal	744.510724	NA	NA	NA	NA	NA	744.510749	337.00	0.00
0	nominal	744.511280	744.511455	744.511474	744.511452	744.511427	744.511429	744.511456	1062.00	0.00
10	nominal	744.511366	NA	NA	NA	NA	NA	744.511180	954.00	0.00
20	15%	744.510292	NA	NA	NA	NA	NA	744.510420	8.00	-120.00
20	nominal	744.510434	NA	NA	NA	NA	NA	744.510412	22.00	0.00
20	-15%	744.510393	NA	NA	NA	NA	NA	744.510390	0.00	-22.00
30	nominal	744.510545	744.510541	744.510537	744.510533	744.510532	744.510532	744.510532	132.70	0.00
40	nominal	744.510366	NA	NA	NA	NA	NA	744.510354	0.00	-58.00
50	nominal	744.510590	744.510838	744.510950	744.511047	744.511108	744.511150	744.511355	943.00	0.00

* - Reference frequency

NOTE: The lowest and the highest frequencies were tested

Test specification: Section 27.54, Frequency stability	
Test procedure: 47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2	
Test mode: Compliance	Verdict: PASS
Date & Time: 1/20/2009 3:11:38 PM	
Temperature: 23°C	Air Pressure: 1009 hPa
Relative Humidity: 46%	
Power Supply: 120 V AC	
Remarks: EasyST	

Table 7.8.3 Transmission occupied bandwidth with frequency drift test results

Lower measured* band edge, MHz	Upper measured* band edge, MHz	Lower calculated** band edge, MHz	Upper calculated** band edge, MHz	Lower specified band edge, MHz	Upper specified band edge, MHz	Lower Margin***, MHz	Upper Margin***, MHz	Verdict
2.5 MHz BW								
BPSK								
698.27	700.7075	698.264051	700.708861	698	704	-0.26405	-3.29114	Pass
717.7625	720.2	717.758199	720.201035	716	722	-1.7582	-1.79896	Pass
743.2625	745.7	743.258318	745.701062	740	746	-3.25832	-0.29894	Pass
64QAM								
698.2475	700.7075	698.241551	700.708861	698	704	-0.24155	-3.29114	Pass
717.7625	720.2	717.758199	720.201035	716	722	-1.7582	-1.79896	Pass
743.2625	745.7	743.258318	745.701062	740	746	-3.25832	-0.29894	Pass
5 MHz BW								
BPSK								
698.675	703.34	698.669051	703.341361	698	704	-0.66905	-0.65864	Pass
716.675	721.34	716.670699	721.341035	716	722	-0.6707	-0.65896	Pass
740.675	745.34	740.670818	745.341062	740	746	-0.67082	-0.65894	Pass
64QAM								
698.675	703.34	698.669051	703.341361	698	704	-0.66905	-0.65864	Pass
716.66	721.34	716.655699	721.341035	716	722	-0.6557	-0.65896	Pass
740.675	745.34	740.670818	745.341062	740	746	-0.67082	-0.65894	Pass
10 MHz BW								
QPSK								
699.215	708.7575	699.209051	708.758861	698	710	-1.20905	-1.24114	Pass
717.2593	726.7488	717.254999	726.749835	716	728	-1.255	-1.25017	Pass
735.1875	744.7575	735.183318	744.758562	734	746	-1.18332	-1.24144	Pass
64QAM								
699.215	708.7575	699.209051	708.758861	698	710	-1.20905	-1.24114	Pass
717.2593	726.7488	717.254999	726.749835	716	728	-1.255	-1.25017	Pass
735.1875	744.7575	735.183318	744.758562	734	746	-1.18332	-1.24144	Pass

* - measured under normal test conditions at 26 dBc points during the Occupied Bandwidth test

** - Measured band edge with proper drift addition

*** - Margin = Calculated band edge – specified band edge

Reference numbers of test equipment used

HL 1194	HL 1424	HL 2867	HL 3210				
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Full description is given in Appendix A.

Test specification:		Section 27.54, Frequency stability	
Test procedure:		47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 3:14:53 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: ProST			

7.9 Frequency stability test

7.9.1 General

This test was performed to measure frequency stability of transmitter RF carrier. Specification test limits are given in Table 7.8.1. The test results are provided in Table 7.8.2.

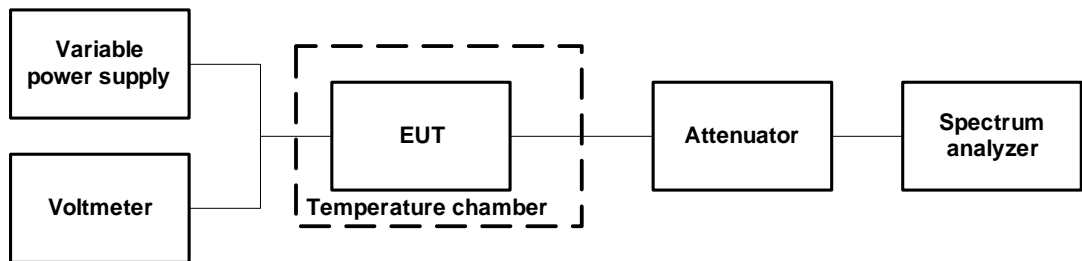
Table 7.9.1 Frequency stability limits

Assigned frequency, MHz	Maximum allowed frequency displacement Hz
698.0 – 746.0	The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation

7.9.2 Test procedure

- 7.9.2.1 The EUT was set up as shown in Figure 7.8.1, energized and its proper operation was checked.
- 7.9.2.2 The EUT power was turned off. Temperature within test chamber was set to +30°C and a period of time sufficient to stabilize all of the oscillator circuit components was allowed.
- 7.9.2.3 The EUT was powered on and carrier frequency was measured at start up moment and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.
- 7.9.2.4 The above procedure was repeated at 0°C and at the lowest test temperature.
- 7.9.2.5 The EUT was powered on and carrier frequency was measured at start up moment and at the end of stabilization period at the rest of test temperatures and voltages. The EUT was powered off.
- 7.9.2.6 Frequency displacement was calculated and compared with the limit as provided in Table 7.8.2.

Figure 7.9.1 Frequency stability test setup





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Test specification:	Section 27.54, Frequency stability		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 3:14:53 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: ProST			

Table 7.9.2 Frequency stability test results

OPERATING FREQUENCY: 698.0 – 746.0 MHz
 NOMINAL POWER VOLTAGE: 120 VAC
 TEMPERATURE STABILIZATION PERIOD: 20 min
 POWER DURING TEMPERATURE TRANSITION: Off
 SPECTRUM ANALYZER MODE: Peak Hold
 RESOLUTION BANDWIDTH: 10 Hz
 VIDEO BANDWIDTH: 30 Hz

T, °C	Voltage, V	Frequency, MHz							Max frequency drift Hz	
		Start up	1 st min	2 nd min	3 rd min	4 th min	5 th min	10 th min	Positive	Negative
Low carrier frequency 699.50 MHz										
-30	nominal	699.504596	699.505025	699.505211	699.505398	699.505615	699.505794	699.506354	0.000000	-6134.00
-20	nominal	699.508200	NA	NA	NA	NA	NA	699.508854	0.000000	-2530.00
-10	nominal	699.510070	NA	NA	NA	NA	NA	699.510744	14.000000	-660.00
0	nominal	699.511550	699.511498	699.511493	699.511485	699.511468	699.511443	699.511205	820.000000	0.00
10	nominal	699.511430	NA	NA	NA	NA	NA	699.511369	700.000000	0.00
20	15%	699.510751	NA	NA	NA	NA	NA	699.510734	21.000000	0.00
20	nominal	699.510745	NA	NA	NA	NA	NA	699.510730*	15.000000	0.00
20	-15%	699.510722	NA	NA	NA	NA	NA	699.510717	0.000000	-13.00
30	nominal	699.510910	699.510655	699.510602	699.510578	699.510568	699.510562	699.510515	180.000000	-215.00
40	nominal	699.510430	NA	NA	NA	NA	NA	699.510513	0.000000	-300.00
50	nominal	699.511906	699.511304	699.511366	699.511444	699.511453	699.511412	699.511316	1176.0000	0.00
Mid carrier frequency 719.00 MHz										
-30	nominal	719.006170	719.006309	719.006341	719.006390	719.006427	719.006444	719.006481	0.00	-4562.00
-20	nominal	719.008786	NA	NA	NA	NA	NA	719.008829	0.00	-1946.00
-10	nominal	719.010810	NA	NA	NA	NA	NA	719.010745	78.00	0.00
0	nominal	719.011443	719.011436	719.011412	719.011395	719.011384	719.011380	719.011506	774.00	0.00
10	nominal	719.011369	NA	NA	NA	NA	NA	719.011362	637.00	0.00
20	15%	719.010717	NA	NA	NA	NA	NA	719.010715	0.00	-17.00
20	nominal	719.010753	NA	NA	NA	NA	NA	719.010732*	21.000000	0.00
20	-15%	719.010727	NA	NA	NA	NA	NA	719.010710	0.00	-22.00
30	nominal	719.010500	719.010470	719.010436	719.010433	719.010433	719.010453	719.010466	0.00	-299.00
40	nominal	719.010490	NA	NA	NA	NA	NA	719.010415	0.00	-317.00
50	nominal	719.011358	719.011336	719.011321	719.011322	719.011348	719.011398	719.011310	666.00	0.00
High carrier frequency 744.5 MHz										
-30	nominal	744.506230	744.506262	744.506288	744.506309	744.506316	744.506312	744.506307	0.00	-4512.00
-20	nominal	744.507280	NA	NA	NA	NA	NA	744.508723	0.00	-3462.00
-10	nominal	744.510724	NA	NA	NA	NA	NA	744.510749	7.00	-18.00
0	nominal	744.511280	744.511455	744.511474	744.511452	744.511427	744.511429	744.511456	732.00	0.00
10	nominal	744.511366	NA	NA	NA	NA	NA	744.511180	624.00	0.00
20	15%	744.510693	NA	NA	NA	NA	NA	744.510692	0.00	-50.00
20	nominal	744.510939	NA	NA	NA	NA	NA	744.510742*	197.000000	0.00
20	-15%	744.510605	NA	NA	NA	NA	NA	744.510708	0.00	-137.00
30	nominal	744.510545	744.510541	744.510537	744.510533	744.510532	744.510532	744.510532	0.00	-209.90
40	nominal	744.510366	NA	NA	NA	NA	NA	744.510354	0.00	-388.00
50	nominal	744.510590	744.510838	744.510950	744.511047	744.511108	744.511150	744.511355	613.00	-152.00

* - Reference frequency



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Test specification: Section 27.54, Frequency stability	
Test procedure: 47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2	
Test mode: Compliance	Verdict: PASS
Date & Time: 1/20/2009 3:14:53 PM	
Temperature: 23°C	Air Pressure: 1009 hPa
Remarks: ProST	

Table 7.9.3 Transmission occupied bandwidth with frequency drift test results

Lower measured* band edge, MHz	Upper measured* band edge, MHz	Lower calculated** band edge, MHz	Upper calculated** band edge, MHz	Lower specified band edge, MHz	Upper specified band edge, MHz	Lower Margin***, MHz	Upper Margin***, MHz	Verdict
2.5 MHz BW								
BPSK								
698.27	700.7075	698.263866	700.708676	698	704	-0.26387	-3.29132	Pass
717.7625	720.2	717.757938	720.200774	716	722	-1.75794	-1.79923	Pass
743.2625	745.7	743.257988	745.700732	740	746	-3.25799	-0.29927	Pass
64QAM								
698.2475	700.7075	698.241366	700.708676	698	704	-0.24137	-3.29132	Pass
717.7625	720.2	717.757938	720.200774	716	722	-1.75794	-1.79923	Pass
743.2625	745.7	743.257988	745.700732	740	746	-3.25799	-0.29927	Pass
5 MHz BW								
BPSK								
698.675	703.34	698.668866	703.341176	698	704	-0.66887	-0.65882	Pass
716.675	721.34	716.670438	721.340774	716	722	-0.67044	-0.65923	Pass
740.675	745.34	740.670488	745.340732	740	746	-0.67049	-0.65927	Pass
64QAM								
698.675	703.34	698.668866	703.341176	698	704	-0.66887	-0.65882	Pass
716.66	721.34	716.655438	721.340774	716	722	-0.65544	-0.65923	Pass
740.675	745.34	740.670488	745.340732	740	746	-0.67049	-0.65927	Pass
10 MHz BW								
QPSK								
699.215	708.7575	699.208866	708.758676	698	710	-1.20887	-1.24132	Pass
717.2593	726.7488	717.254738	726.749574	716	728	-1.25474	-1.25043	Pass
735.1875	744.7575	735.182988	744.758232	734	746	-1.18299	-1.24177	Pass
64QAM								
699.215	708.7575	699.208866	708.758676	698	710	-1.20887	-1.24132	Pass
717.2593	726.7488	717.254738	726.749574	716	728	-1.25474	-1.25043	Pass
735.1875	744.7575	735.182988	744.758232	734	746	-1.18299	-1.24177	Pass

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

Reference numbers of test equipment used

HL 1194	HL 1424	HL 2867	HL 3210				
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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: 1/20/2009 3:15:35 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: ProST			

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

8.1 Conducted emissions, ProST unit

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

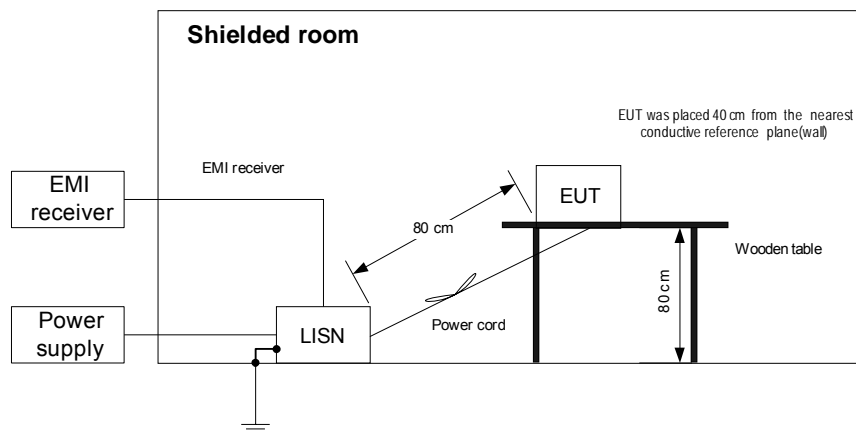
8.1.2.1 The EUT was set up as shown in Figure 8.1.1, energized and the performance check was conducted.

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: 1/20/2009 3:15:35 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: ProST			

Table 8.1.2 Conducted emission test results

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

Frequency, MHz	Peak emission, dB(μV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*	Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*		
0.156590	51.24	50.58	65.68	-15.10	50.16	55.68	-5.52	L1	Pass
0.261495	46.88	46.59	61.44	-14.85	46.58	51.44	-4.86		
0.471465	42.18	41.54	56.53	-14.99	41.47	46.53	-5.06		
0.523775	42.29	41.82	56.00	-14.18	41.73	46.00	-4.27		
0.837595	43.80	43.00	56.00	-13.00	41.42	46.00	-4.58		
1.152175	41.18	40.76	56.00	-15.24	40.68	46.00	-5.32		
0.156800	50.31	49.74	65.67	-15.93	49.51	55.67	-6.16	L2	Pass
0.261659	47.98	47.72	61.43	-13.71	47.73	51.43	-3.70		
0.470900	44.83	44.34	56.54	-12.20	44.33	46.54	-2.21		
0.523100	44.67	44.17	56.00	-11.83	44.07	46.00	-1.93		
0.785400	44.22	43.76	56.00	-12.24	43.66	46.00	-2.34		
0.837125	45.62	44.85	56.00	-11.15	43.60	46.00	-2.40		
1.151800	43.03	42.67	56.00	-13.33	42.60	46.00	-3.40		

*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

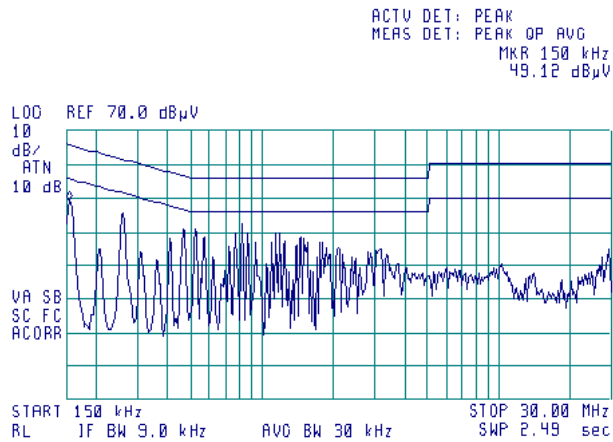
HL 0787	HL 1430	HL 1513	HL 2888	HL 3612			
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Full description is given in Appendix A.

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: 1/20/2009 3:15:35 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: ProST			

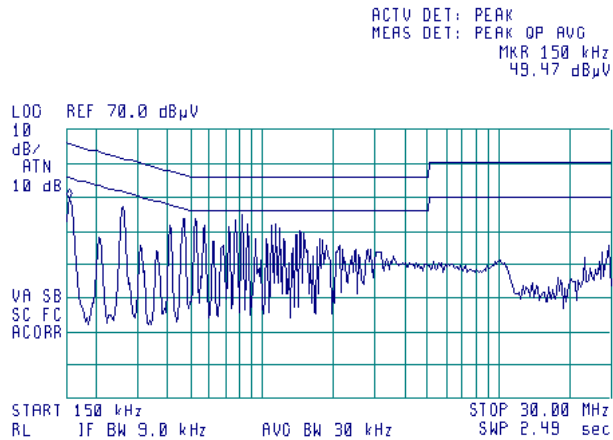
Plot 8.1.1 Conducted emission measurements

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



Plot 8.1.2 Conducted emission measurements

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



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: 1/20/2009 3:16:08 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: EasyST			

8.2 Conducted emissions, EasyST unit

8.2.1 General

This test was performed to measure common mode conducted emissions at the mains power port. Specification test limits are given in Table 8.2.1.

Table 8.2.1 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.

8.2.2 Test procedure

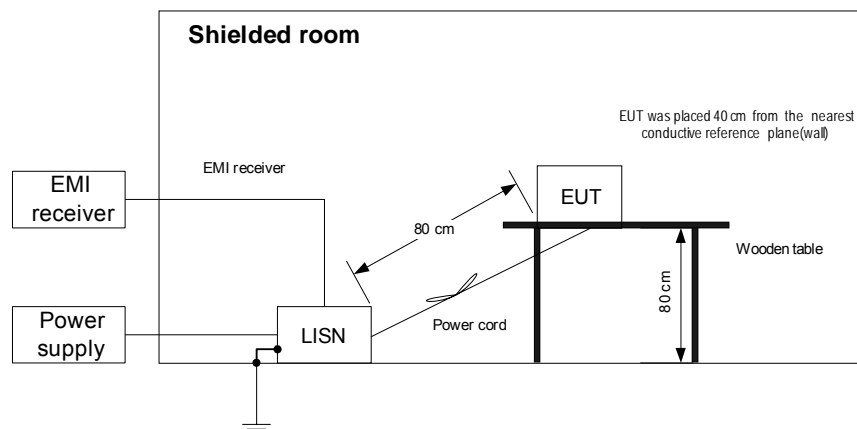
8.2.2.1 The EUT was set up as shown in Figure 8.2.1, energized and the performance check was conducted.

8.2.2.2 The measurements were performed at power terminals with the LISN, connected to a spectrum analyzer in the frequency range referred to in Table 8.2.2, Table 8.2.3. Unused coaxial connector of the LISN was terminated with 50 Ohm. Quasi-peak and average detectors were used throughout the testing.

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

8.2.2.4 The worst test results (the lowest margins) were recorded in Table 8.2.2, Table 8.2.3 and shown in the associated plots.

Figure 8.2.1 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:	1/20/2009 3:16:08 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: EasyST			

Table 8.2.2 Conducted emission test results on the EUT power lines

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

Frequency, MHz	Peak emission, dB(μV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*	Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*		
0.174100	47.22	43.10	64.82	-21.72	32.32	54.82	-22.50	L1	Pass
0.556200	44.18	42.49	56.00	-13.51	34.19	46.00	-11.81		
2.969250	41.55	35.01	56.00	-20.99	25.39	46.00	-20.61		
3.406073	42.60	30.89	56.00	-25.11	21.32	46.00	-24.68		
3.560000	46.42	34.54	56.00	-21.46	9.85	46.00	-36.15		
12.807275	49.77	47.17	60.00	-12.83	36.91	50.00	-13.09	L2	Pass
0.494875	39.75	38.86	56.10	-17.24	27.34	46.10	-18.76		
0.556300	44.86	41.04	56.00	-14.96	30.27	46.00	-15.73		
0.680225	41.86	40.27	56.00	-15.73	28.41	46.00	-17.59		
0.741825	41.68	40.65	56.00	-15.35	28.40	46.00	-17.60		
6.492550	42.52	40.01	60.00	-19.99	26.31	50.00	-23.69		
11.564375	45.93	44.57	60.00	-15.43	34.69	50.00	-15.31		

*- Margin = Measured emission - specification limit.



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: 1/20/2009 3:16:08 PM	
Temperature: 23°C	Air Pressure: 1009 hPa
Relative Humidity: 46%	
Power Supply: 120 V AC	
Remarks: EasyST	

Table 8.2.3 Conducted emission test results on the laptop power lines

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

Frequency, MHz	Peak emission, dB(μV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*	Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*		
0.161238	53.99	52.27	65.45	-13.18	40.15	55.45	-15.30	L1	Pass
0.215735	47.15	45.23	63.05	-17.82	33.04	53.05	-20.01		
3.763500	38.72	33.58	56.00	-22.42	20.89	46.00	-25.11		
0.163400	53.62	52.04	65.35	-13.31	40.86	55.35	-14.49	L2	Pass
0.217000	46.67	45.15	63.00	-17.85	33.59	53.00	-19.41		
3.785470	38.17	30.98	56.00	-25.02	19.05	46.00	-26.95		

Reference numbers of test equipment used

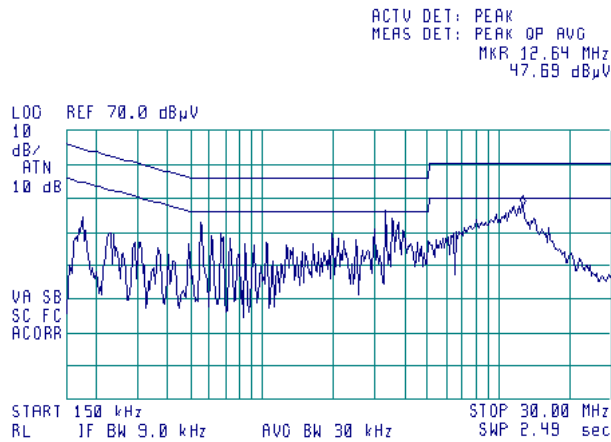
HL 0447	HL 0587	HL 0787	HL 1115	HL 1430	HL 1513	HL 2888	HL 3612
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Full description is given in Appendix A.

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: 1/20/2009 3:16:08 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: EasyST			

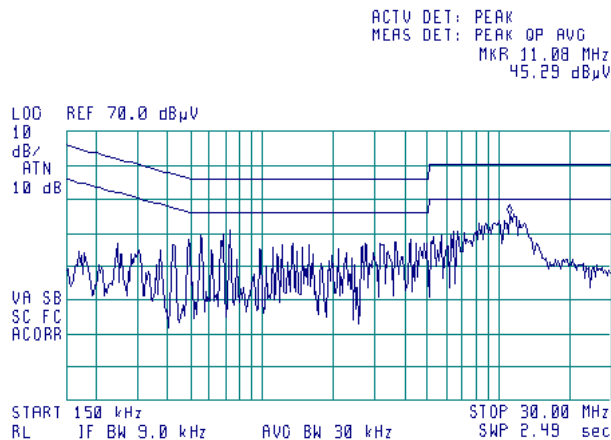
Plot 8.2.1 Conducted emission measurements the EUT power lines

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



Plot 8.2.2 Conducted emission measurements the EUT power lines

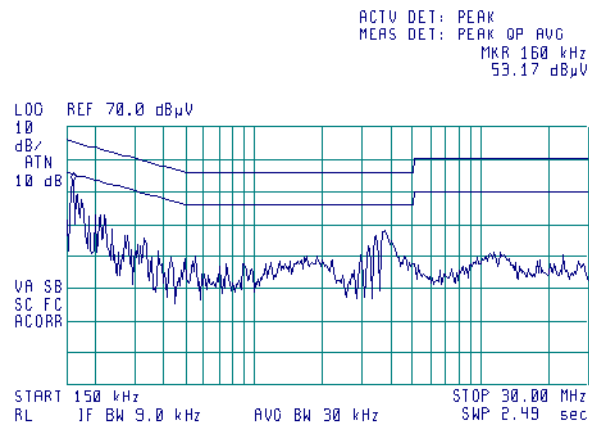
LINE: L2
LIMIT: Class A / B
EUT OPERATING MODE: Receive / Stand-by
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



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: 1/20/2009 3:16:08 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: EasyST			

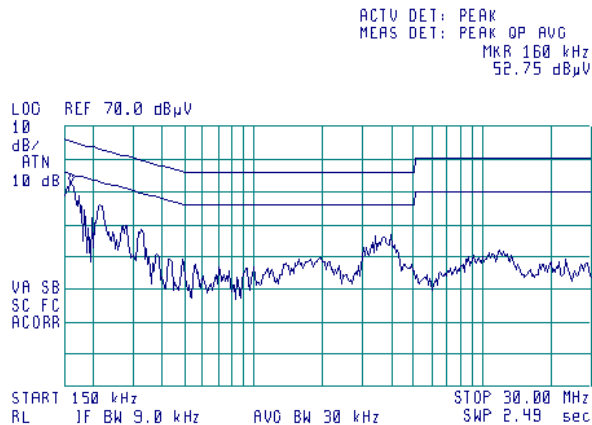
Plot 8.2.3 Conducted emission measurements on the laptop power lines

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



Plot 8.2.4 Conducted emission measurements on the laptop power lines

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



Test specification: Section 15.109, Radiated emission			
Test procedure: ANSI C63.4, Sections 11.6 and 12.1.4			
Test mode: Compliance	Verdict:		
Date & Time: 1/20/2009 3:19:28 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: EasyST			

8.3 Radiated emission measurements, EasyST unit

8.3.1 General

This test was performed to measure radiated emissions from the EUT enclosure. Specification test limits are given in Table 8.3.1.

Table 8.3.1 Radiated emission test limits

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

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

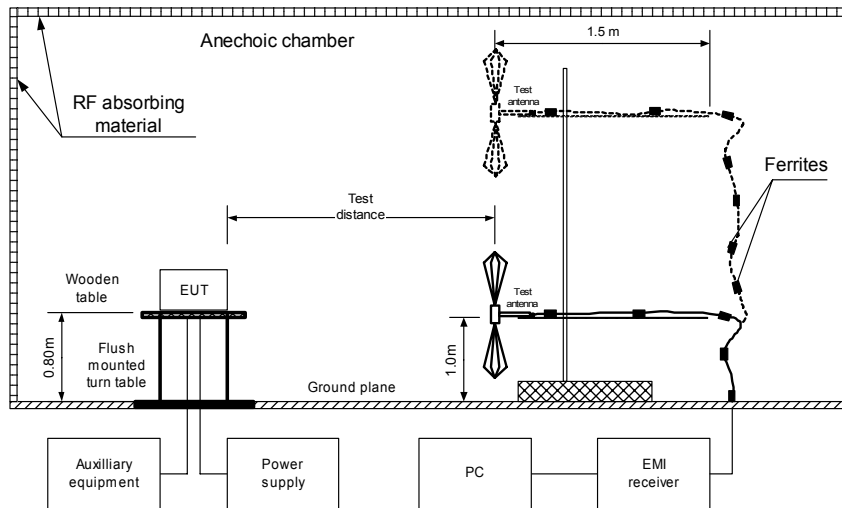
8.3.2 Test procedure for measurements in semi-anechoic chamber

8.3.2.1 The EUT was set up as shown in Figure 8.3.1 and associated photograph/s, energized and the performance check was conducted.

8.3.2.2 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.

8.3.2.3 The worst test results (the lowest margins) were recorded in Table 8.3.2 and shown in the associated plots.

Figure 8.3.1 Setup for radiated emission measurements in anechoic chamber, table-top equipment





HERMON LABORATORIES

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: 1/20/2009 3:19:28 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: EasyST			

Table 8.3.2 Radiated emission test results

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

Frequency, MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
74.475000	35.61	31.27	40.00	-8.73	H	1.9	030	Pass
136.045000	41.72	38.68	43.50	-4.82	V	1.2	330	
196.603500	38.91	36.91	43.50	-6.59	V	1.1	290	
168.204700	39.22	34.18	43.50	-9.32	H	1.7	290	
250.018500	37.99	35.94	46.00	-10.06	H	1.3	330	
324.812950	40.34	36.06	46.00	-9.94	H	1.1	070	
881.993700	42.21	38.60	46.00	-7.40	H	1.1	010	
980.006750	44.07	41.86	54.00	-12.14	H	1.0	020	

TEST SITE: SEMI ANECHOIC CHAMBER
 TEST DISTANCE: 3 m
 DETECTORS USED: PEAK / AVERAGE
 FREQUENCY RANGE: 1000 MHz – 4000 MHz
 RESOLUTION BANDWIDTH: 1000 kHz

Frequency, MHz	Peak emission, dB(μV/m)	Average			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
1063.383	49.13	28.68	54.0	-25.32	V	1.2	000	Pass
1598.985	43.32	26.97	54.0	-27.03	V	1.2	010	

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

Reference numbers of test equipment used

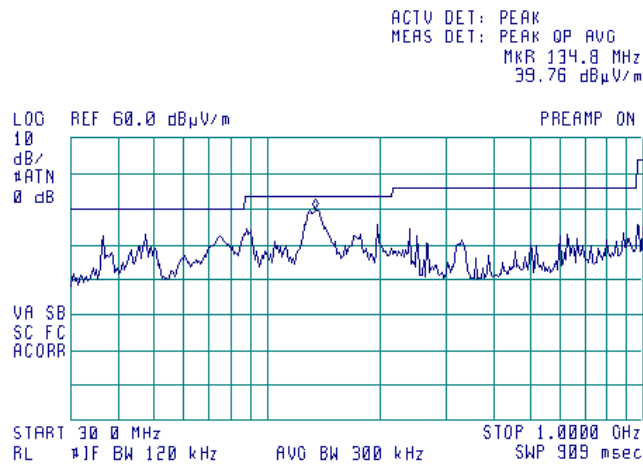
HL 0521	HL 0604	HL 2432	HL 3121	HL 3616			
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Full description is given in Appendix A.

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: 1/20/2009 3:19:28 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: EasyST			

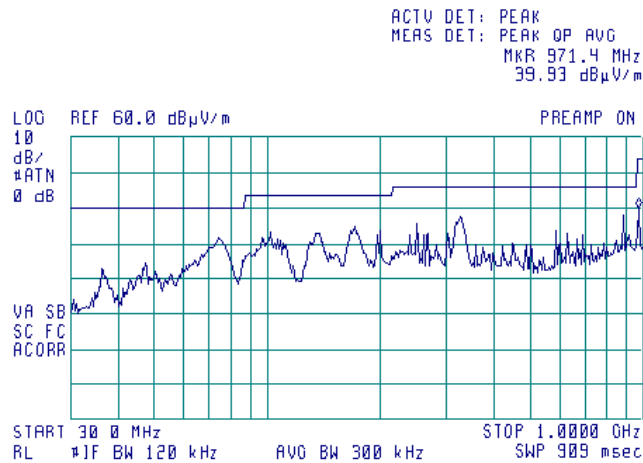
Plot 8.3.1 Radiated emission measurements in 30 - 1000 MHz range, vertical antenna polarization

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



Plot 8.3.2 Radiated emission measurements in 30 - 1000 MHz range, horizontal antenna polarization

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



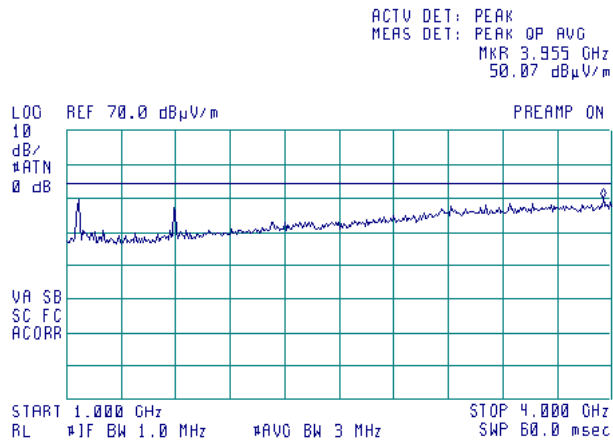


HERMON LABORATORIES

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: 1/20/2009 3:19:28 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: EasyST			

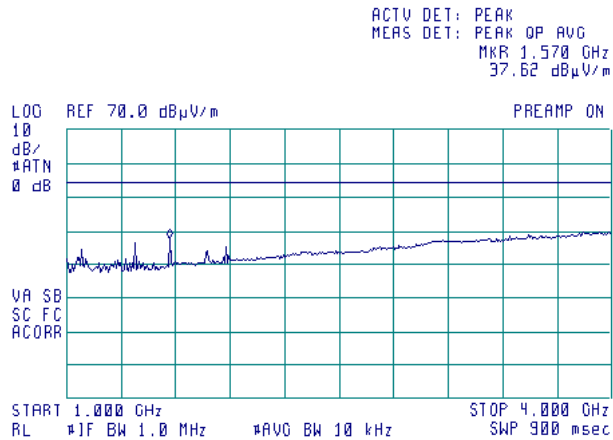
Plot 8.3.3 Radiated emission measurements above 1000 MHz, vertical antenna polarization

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



Plot 8.3.4 Radiated emission measurements above 1000 MHz, vertical antenna polarization

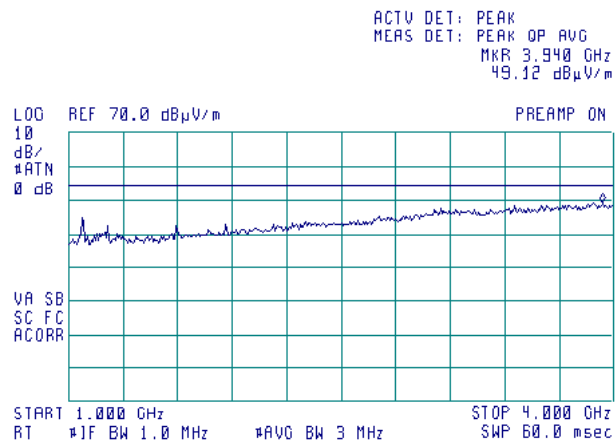
TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by
VBW: 10 kHz



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:	1/20/2009 3:19:28 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: EasyST			

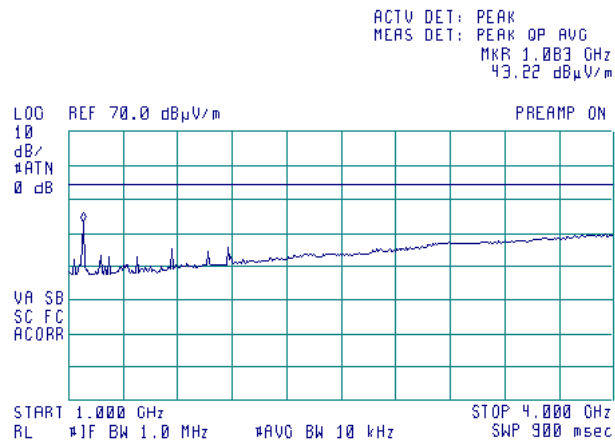
Plot 8.3.5 Radiated emission measurements above 1000 MHz, horizontal antenna polarization

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



Plot 8.3.6 Radiated emission measurements above 1000 MHz, horizontal antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by
VBW: 10 kHz



Test specification: Section 15.109, Radiated emission			
Test procedure: ANSI C63.4, Sections 11.6 and 12.1.4			
Test mode: Compliance		Verdict: PASS	
Date & Time: 1/20/2009 3:20:25 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: ProST			

8.4 Radiated emission measurements, ProST unit

8.4.1 General

This test was performed to measure radiated emissions from the EUT enclosure. Specification test limits are given in Table 8.4.1.

Table 8.4.1 Radiated emission test limits

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

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

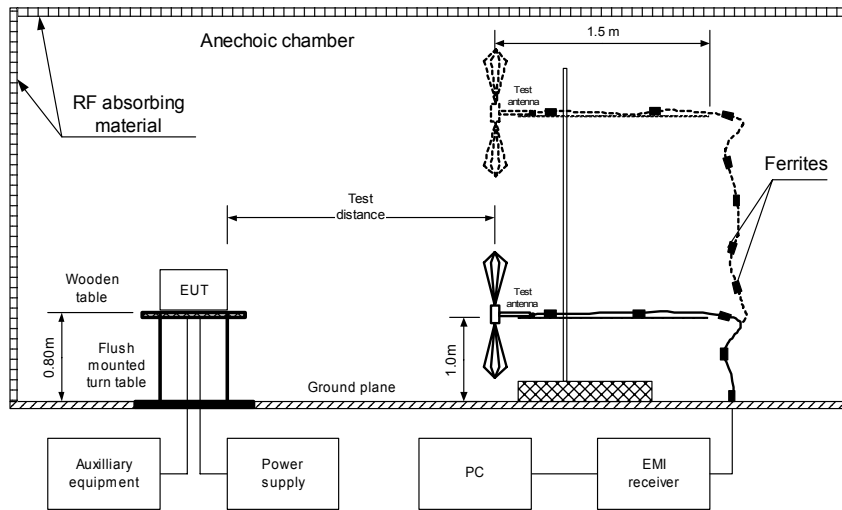
8.4.2 Test procedure for measurements in semi-anechoic chamber

8.4.2.1 The EUT was set up as shown in Figure 8.4.1, energized and the performance check was conducted.

8.4.2.2 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.

8.4.2.3 The worst test results (the lowest margins) were recorded in Table 8.4.2 and shown in the associated plots.

Figure 8.4.1 Setup for radiated emission measurements in anechoic chamber, table-top equipment





HERMON LABORATORIES

Test specification:		Section 15.109, Radiated emission	
Test procedure:		ANSI C63.4, Sections 11.6 and 12.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 3:20:25 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: ProST			

Table 8.4.2 Radiated emission test results

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

Frequency, MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
180.016	39.9	37.2	54.0	-16.8	V	1.0	090	Pass
375.033	37.5	35.3	56.9	-21.6	V	1.0	160	

TEST SITE: SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / AVERAGE
FREQUENCY RANGE: 1000 MHz – 4000 MHz
RESOLUTION BANDWIDTH: 1000 kHz

Frequency, MHz	Peak emission, dB(μV/m)	Average			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
2275.665	44.6	36.3	60.0	-23.7	V	1.4	000	Pass

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

Reference numbers of test equipment used

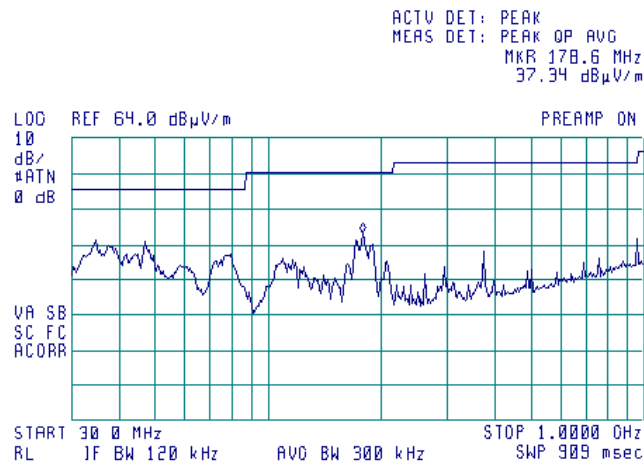
HL 0521	HL 0604	HL 2432	HL 3123	HL 3121	HL 3316		
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Full description is given in Appendix A.

Test specification: Section 15.109, Radiated emission			
Test procedure: ANSI C63.4, Sections 11.6 and 12.1.4			
Test mode: Compliance	Verdict: PASS		
Date & Time: 1/20/2009 3:20:25 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: ProST			

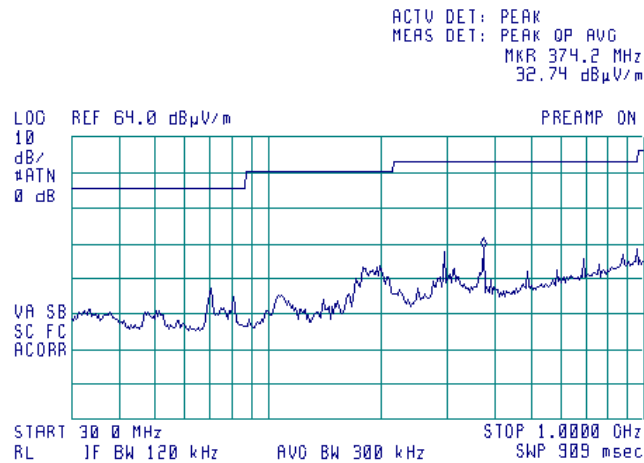
Plot 8.4.1 Radiated emission measurements in 30 - 1000 MHz range, vertical antenna polarization

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



Plot 8.4.2 Radiated emission measurements in 30 - 1000 MHz range, horizontal antenna polarization

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



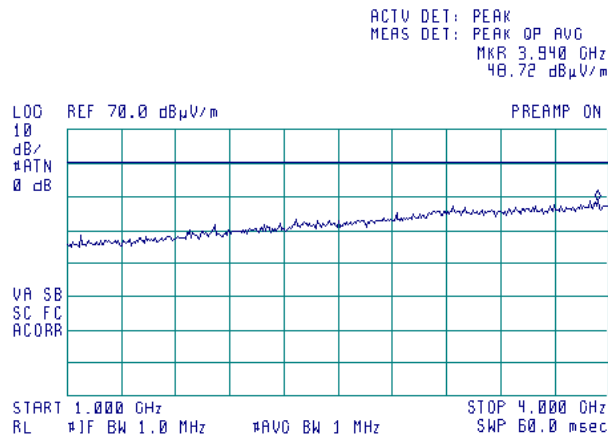


HERMON LABORATORIES

Test specification:	Section 15.109, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 3:20:25 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: ProST			

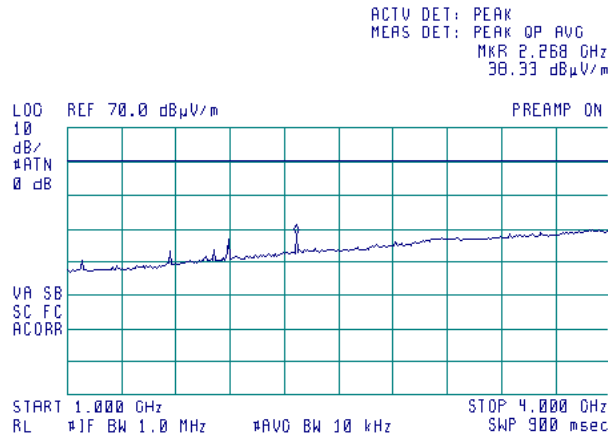
Plot 8.4.3 Radiated emission measurements above 1000 MHz, vertical antenna polarization

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



Plot 8.4.4 Radiated emission measurements above 1000 MHz, vertical antenna polarization

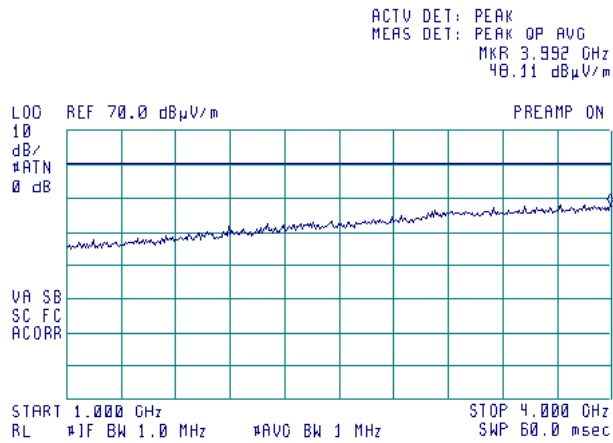
TEST SITE: Semi anechoic chamber
LIMIT: Class A
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by
VBW: 10 kHz



Test specification: Section 15.109, Radiated emission			
Test procedure: ANSI C63.4, Sections 11.6 and 12.1.4			
Test mode: Compliance	Verdict: PASS		
Date & Time: 1/20/2009 3:20:25 PM			
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks: ProST			

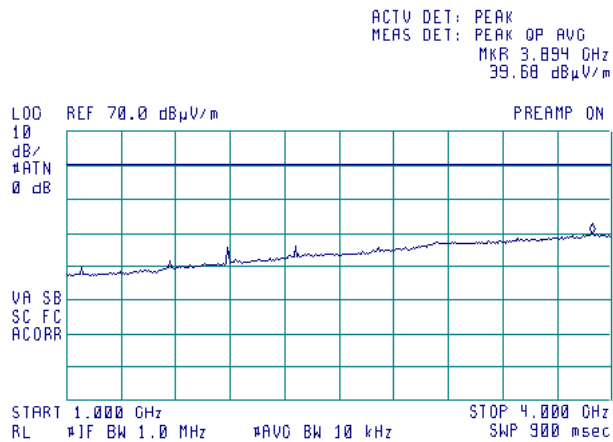
Plot 8.4.5 Radiated emission measurements above 1000 MHz, horizontal antenna polarization

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



Plot 8.4.6 Radiated emission measurements above 1000 MHz, horizontal antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class A
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by
VBW: 10 kHz



Test specification:		Section 15.111, Conducted emission at receiver antenna port	
Test procedure:		ANSI C63.4, Section 12.1.5	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 3:16:31 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

8.5 Spurious emissions at RF antenna connector

8.5.1 General

This test was performed to measure spurious emissions at RF antenna connector of receiver operated within 30 to 960 MHz band or a citizens band (CB) receiver which was tested for compliance with radiated emission limits with the antenna port connected to resistive termination. Specification test limits are given in Table 8.5.1. The test results are provided in Table 8.5.2 and associated plots.

Table 8.5.1 Spurious emission limits

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

* - harmonic of the highest frequency the EUT generates, uses, operates or tunes to.

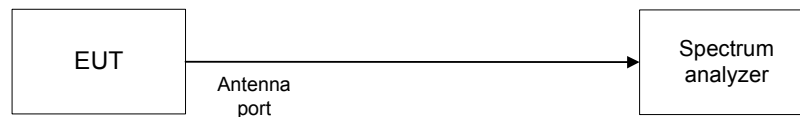
** - harmonic of the local oscillator frequency.

8.5.2 Test procedure

8.5.2.1 The EUT was set up as shown in Figure 8.5.1, energized and its proper operation was checked.

8.5.2.2 The spurious emission was measured with spectrum analyzer as provided in Table 8.5.2 and associated plots.

Figure 8.5.1 Spurious emission test setup





Test specification:		Section 15.111, Conducted emission at receiver antenna port	
Test procedure:		ANSI C63.4, Section 12.1.5	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	1/20/2009 3:16:31 PM		
Temperature: 23°C	Air Pressure: 1009 hPa	Relative Humidity: 46%	Power Supply: 120 V AC
Remarks:			

Table 8.5.2 Spurious emission test results

INVESTIGATED FREQUENCY RANGE: 30.0 – 4000.0 MHz
EUT OPERATING MODE: Receive
DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 100 kHz (30 MHz – 1000 MHz); 1000 kHz (1000 MHz – 4000 MHz)
VIDEO BANDWIDTH: 300 kHz (30 MHz – 1000 MHz); 3000 kHz (1000 MHz – 4000 MHz)

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

INVESTIGATED FREQUENCY RANGE: 698.0 – 746.0 MHz
EUT OPERATING MODE: Receive
DETECTOR USED: Peak

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

Reference numbers of test equipment used

HL 1424	HL 2867						
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Full description is given in Appendix A.

9 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
0446	Antenna, Loop, Active, 10 kHz - 30 MHz	EMCO	6502	2857	29-Jun-08	29-Jun-09
0447	LISN, 16/2, 300V RMS, 50 Ohm/50 uH + 5 Ohm, STD CISPR 16-1	Hermon Laboratories	LISN 16 - 1	066	04-Nov-08	04-Nov-09
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard Co	8546A	3617A 00319, 3448A002 53	29-Aug-08	29-Aug-09
0554	Amplifier, 2-18 GHz RF	Miteq	AFD4	104300	28-Feb-08	28-Feb-09
0587	Load Termination 50 Ohm, 0.5 W, DC-1GHz	RELM	LT-50	096	30-Dec-08	30-Dec-09
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	11-Jan-09	11-Jan-10
0661	Generator Swept Signal, 10 MHz to 40 GHz, + 10 dBm	HP	83640B	3614A002 66	17-Sep-08	17-Sep-09
0787	Transient Limiter 9 kHz-200 MHz	Hewlett Packard Co	11947A	3107A018 77	16-Oct-08	16-Oct-09
1115	Load Termination , 50 Ohm , 250 W , 0 - 1 GHz	Hermon Laboratories	L-250	185	17-Nov-08	17-Nov-09
1194	Variac, 220 V/ 2.5 A	Matsunaga		2962	06-Jan-08	06-Jan-09
1424	Spectrum Analyzer, 30 Hz- 40 GHz	Agilent Technologies	8564EC	3946A002 19	30-Dec-08	30-Dec-09
1430	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1431, HL1432	Agilent Technologies	8542E	3807A002 62,3705A0 0217	31-Aug-08	31-Aug-09
1513	Cable RF, 8 m, BNC/BNC	Belden	M17/167 MIL-C-17	1513	03-Sep-08	03-Sep-09
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W	EMC Test Systems	3115	9911-5964	23-Jan-09	23-Jan-10
2432	Antenna, Double-Ridged Waveguide Horn 1-18 GHz	EMC Test Systems	3115	00027177	23-Jan-09	23-Jan-10
2780	EMC analyzer, 100 Hz to 26.5 GHz	Agilent Technologies	E7405A	MY451024 6	11-Jun-07	11-Jun-09
2867	Cable, 18 GHz, 0.9 m, SMA - SMA, Right Angle	Gore	NA	91P72076	11-Feb-08	11-Feb-09
2888	LISN Two-line V-Network 50 Ohm / 50 uH + 5 Ohm, 16A, MIL STD 461E, CISPR 16-1	Rolf Heine	NNB- 2/16Z	02/10018	09-Jul-08	09-Jul-09
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY414447 62	07-May-07	07-May-09
2911	Cable 18 GHz, 1.5 m, SMA-SMA	Gore	NA	89386	05-Oct-08	05-Oct-09
3121	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-9155- 00	3121	07-Dec-08	07-Dec-09
3123	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-9155- 00	3123	30-Dec-08	30-Dec-09
3179	Attenuator, N-type, 20 dB, DC to 18 GHz, 5 W	Mini-Circuits	BW- N20W5+	0651	07-May-08	07-May-09



HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
3180	Attenuator, N-type, 20 dB, DC to 18 GHz, 5 W	Mini-Circuits	BW-N20W5+	0651	07-May-08	07-May-09
3181	Attenuator, N-type, 20 dB, DC to 18 GHz, 5 W	Mini-Circuits	BW-N20W5+	0651	30-Dec-08	30-Dec-09
3207	Cable 40 GHz, 1.2 m	Gore	GOR245	05118337	10-Jun-08	10-Jun-09
3210	Temperature Chamber, (-50...+100) °C	Associated	NA	NA	11-Sep-08	11-Sep-09
3301	Power Meter, P-series, 50 MHz to 40 GHz	Agilent Technologies	N1911A	MY45101057	03-Dec-08	03-Dec-09
3302	Power sensor, P-Series, 50 MHz to 40 GHz, -35/30 to 20 dBm	Agilent Technologies	N1922A	MY45240586	05-Dec-08	05-Dec-09
3439	Precision Fixed Attenuator, 50 Ohm, 5 W, 20 dB, DC to 18 GHz	Mini-Circuits	BW-S20W5+	NA	09-Mar-08	09-Mar-09
3441	Precision Fixed Attenuator, 50 Ohm, 5 W, 20 dB, DC to 18 GHz	Mini-Circuits	BW-S20W5+	NA	09-Mar-08	09-Mar-09
3612	Cable RF, 17.5 m, N type-N type	Teldor	RG-214/U	NA	17-Nov-08	17-Nov-09
3616	Cable RF, 6.5 m, N type-N type, DC-6.5 GHz	Suhner Switzerland	Rg 214/U	NA	07-Dec-08	07-Dec-09

10 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Transmitter tests	
Carrier power conducted at antenna connector	± 1.7 dB
Carrier power radiated (substitution method)	± 4.5 dB
Occupied bandwidth	±8%
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB
Spurious emissions radiated 30 MHz – 40 GHz (substitution method)	± 4.5 dB
Frequency error	30 – 300 MHz: ± 50.5 Hz (1.68 ppm) 300 – 1000 MHz: ± 168 Hz (0.56 ppm)
Transient frequency behaviour	187 Hz ± 13.9 %
Duty cycle, timing (Tx ON / OFF) and average factor measurements	± 1.0 %
Unintentional radiator tests	
Conducted emissions with LISN	9 kHz to 150 kHz: ± 3.9 dB 150 kHz to 30 MHz: ± 3.8 dB
Radiated emissions at 3 m measuring distance Horizontal polarization	Biconilog antenna: ± 5.3 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.3 dB Double ridged horn antenna: ± 5.3 dB
Vertical polarization	Biconilog antenna: ± 6.0 dB Biconical antenna: ± 5.7 dB Log periodic antenna: ± 6.0 dB Double ridged horn antenna: ± 6.0 dB

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

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

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

11 APPENDIX C Test laboratory description

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

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12 APPENDIX D Specification references

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

13 APPENDIX E Test equipment correction factors

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

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

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

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

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

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

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

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

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

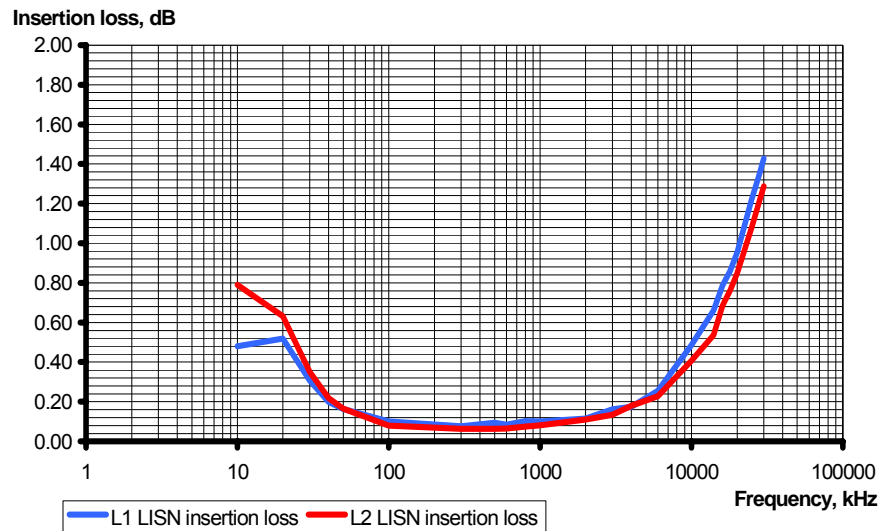
Correction factor
Line impedance stabilization network
Model LISN 16 - 1
Hermon Laboratories, HL 0447

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

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

**Correction factor
Line impedance stabilization network
Model NNB-2/16Z, Rolf Heine, HL 2888**

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



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

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

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

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

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

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

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

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

Cable loss
Cable coaxial, GORE-TEX, GOR245, 40 GHz, 1.2 m, SMA-SMA, S/N 05118337, HL 3207

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.17	5000	1.54	10200	2.26	15500	2.77	31500	4.07
30	0.14	5100	1.54	10300	2.26	15600	2.78	32000	4.03
50	0.16	5200	1.56	10400	2.24	15700	2.81	32500	3.93
100	0.22	5300	1.59	10500	2.23	15800	2.81	33000	4.00
200	0.30	5400	1.60	10600	2.25	15900	2.84	33500	4.09
300	0.38	5500	1.61	10700	2.31	16000	2.91	34000	4.08
400	0.44	5600	1.63	10800	2.34	16100	2.92	34500	4.13
500	0.48	5700	1.66	10900	2.38	16200	2.88	35000	4.15
600	0.54	5800	1.68	11000	2.38	16300	2.90	35500	4.18
700	0.58	5900	1.68	11100	2.38	16400	2.93	36000	4.22
800	0.62	6000	1.71	11200	2.37	16500	2.92	36500	4.25
900	0.65	6100	1.71	11300	2.38	16600	2.97	37000	4.26
1000	0.69	6200	1.73	11400	2.40	16700	3.02	37500	4.40
1100	0.73	6300	1.75	11500	2.41	16800	3.02	38000	4.40
1200	0.76	6400	1.76	11600	2.44	16900	3.01	38500	4.52
1300	0.78	6500	1.78	11700	2.44	17000	3.04	39000	4.54
1400	0.81	6600	1.77	11800	2.44	17100	3.08	39500	4.36
1500	0.85	6700	1.79	11900	2.45	17200	3.05	40000	4.48
1600	0.87	6800	1.80	12000	2.46	17300	3.06		
1700	0.90	6900	1.83	12100	2.45	17400	3.06		
1800	0.93	7000	1.84	12200	2.45	17500	3.07		
1900	0.96	7100	1.86	12300	2.48	17600	3.08		
2000	0.95	7200	1.88	12400	2.49	17700	3.09		
2100	0.98	7300	1.86	12500	2.51	17800	3.12		
2200	1.00	7400	1.87	12600	2.53	17900	3.09		
2300	1.02	7500	1.90	12700	2.51	18000	3.08		
2400	1.04	7600	1.91	12800	2.52	18500	3.11		
2500	1.06	7700	1.95	12900	2.54	19000	3.14		
2600	1.08	7800	1.98	13000	2.56	19500	3.20		
2700	1.11	7900	1.99	13100	2.56	20000	3.24		
2800	1.14	8000	1.98	13200	2.59	20500	3.31		
2900	1.15	8100	1.98	13300	2.59	21000	3.38		
3000	1.17	8200	2.00	13400	2.60	21500	3.44		
3100	1.19	8300	2.01	13500	2.65	22000	3.45		
3200	1.20	8400	2.05	13600	2.71	22500	3.45		
3300	1.24	8500	2.07	13700	2.71	23000	3.47		
3400	1.26	8600	2.08	13800	2.69	23500	3.47		
3500	1.27	8700	2.09	13900	2.67	24000	3.54		
3600	1.28	8800	2.09	14000	2.68	24500	3.62		
3700	1.32	8900	2.10	14100	2.68	25000	3.73		
3800	1.32	9000	2.12	14200	2.74	25500	3.77		
3900	1.35	9100	2.12	14300	2.77	26000	3.71		
4000	1.36	9200	2.15	14400	2.80	26500	3.73		
4100	1.39	9300	2.13	14600	2.74	27000	3.73		
4200	1.40	9400	2.16	14700	2.73	27500	3.78		
4300	1.41	9500	2.17	14800	2.75	28000	3.81		
4400	1.43	9600	2.17	14900	2.75	28500	3.81		
4500	1.47	9700	2.18	15000	2.77	29000	3.80		
4600	1.46	9800	2.16	15100	2.76	29500	3.81		
4700	1.49	9900	2.17	15200	2.76	30000	3.89		
4800	1.50	10000	2.20	15300	2.77	30500	4.03		
4900	1.52	10100	2.22	15400	2.79	31000	4.01		

14 APPENDIX F Abbreviations and acronyms

A	ampere
AC	alternating current
A/m	ampere per meter
AM	amplitude modulation
AVRG	average (detector)
BB	broad band
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
EIRP	equivalent isotropically radiated power
ERP	effective radiated power
EUT	equipment under test
F	frequency
GHz	gigahertz
GND	ground
H	height
HL	Hermon laboratories
Hz	hertz
k	kilo
kHz	kilohertz
LO	local oscillator
m	meter
MHz	megahertz
min	minute
mm	millimeter
ms	millisecond
μ s	microsecond
NA	not applicable
NB	narrow band
NT	not tested
OATS	open area test site
Ω	Ohm
QP	quasi-peak
PCB	printed circuit board
PM	pulse modulation
PS	power supply
RE	radiated emission
RF	radio frequency
rms	root mean square
Rx	receive
s	second
T	temperature
Tx	transmit
V	volt
VA	volt-ampere

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