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TEST REPORT

ACCORDING TO: FCC CFR47 part 27

FOR:

Airspan Networks Inc.

Base station

Model: MicroMax 2.5G TDD

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 Inc.
Address: 777 Yamato Rd, Suite 310, Boca Raton 33431, Florida, USA
Telephone: +1 561 893 8686
Fax: +1 561 893 8671
E-mail: zlevi@airspan.com
Contact name: Mr. Zion Levi

2 Equipment under test attributes

Product name: Base station
Product type: Transceiver
Model(s): MicroMax 2.5G TDD
Receipt date: 6/4/2009

3 Manufacturer information

Manufacturer name: Airspan Networks Inc.
Address: 777 Yamato Rd, Suite 310, Boca Raton 33431, Florida, USA
Telephone: +1 561 893 8686
Fax: +1 561 893 8671
E-Mail: zlevi@airspan.com
Contact name: Mr. Zion Levi

4 Test details

Project ID: 19693
Location: Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started: 6/4/2009
Test completed: 6/24/2009
Test specification(s): FCC part 27



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5 Tests summary

Test	Status
Transmitter characteristics	
Section 27.50(h), Peak output power at RF antenna connector	Pass
Section 27.50(h)(4), Spectral power density	Pass
Section 2.1091, 27.52, RF safety	Pass, exhibit provided in Application for certification
Section 27.53(m)(2), Spurious emissions at RF antenna connector	Pass
Section 27.53(m)(2), Band edge emissions at RF antenna connector	Pass
Section 27.53(m)(2), Radiated spurious emissions	Pass
Section 27.54, Frequency stability	Pass
Section 2.1049, Occupied bandwidth	Pass

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

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

This test report replaces the previously issued test report identified by Doc ID:AIRRAD_FCC.19693.

	Name and Title	Date	Signature
Tested by:	Mr. L. Markel, test engineer	June 24, 2009	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	June 30, 2009	
Approved by:	Mr. M. Nikishin, EMC and Radio group manager	July 5, 2009	



6 EUT description

6.1 General information

The EUT, base station radio MicroMAX 2.5 GHz TDD, is a part of a WiMAX broadband fixed cellular wireless access system. The system provides a radio link between an end-user (a subscriber) and a network to give high-speed data access. The MicroMAX's transceiver/receiver (Up to 64 QAM modulation, data rate up to 18Mbps) uses OFDM and operating in TDD duplexing mode, equipped with an internal or external antenna.

The MicroMAX is installed outdoors and typically is mounted on a pole. The transceiver provides subscribers with "always-on" Internet, high speed data only, or data and voice (VoIP) services.

6.2 Ports and lines

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

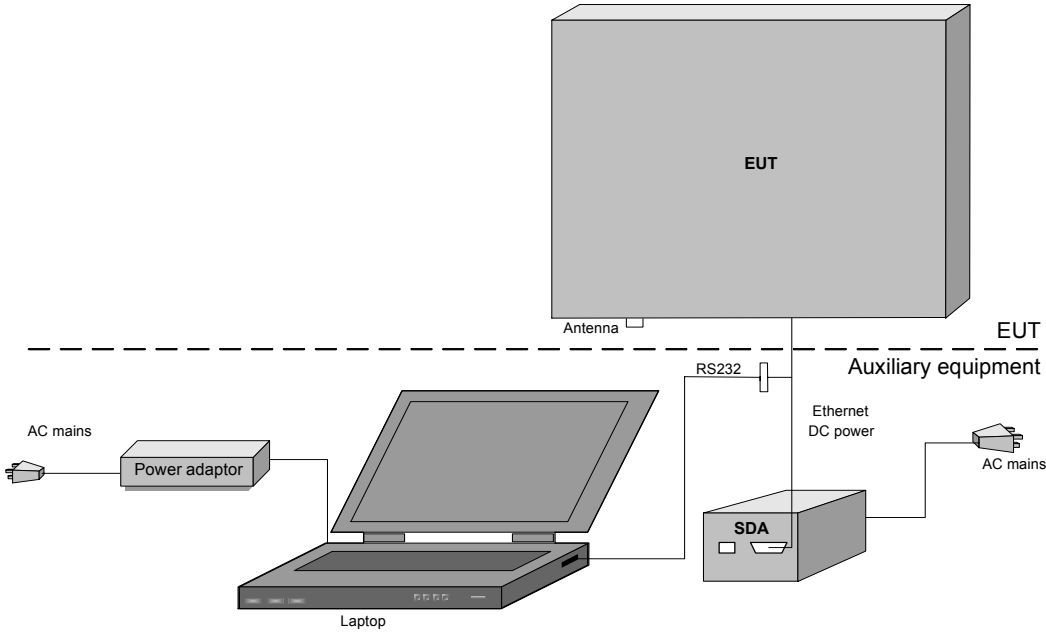
6.3 Support and test equipment

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

6.4 Changes made in the EUT

No changes were implemented in the EUT.

6.5 Test configuration





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6.6 Transmitter characteristics

Type of equipment					
V	Stand-alone (Equipment with or without its own control provisions)				
	Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)				
	Plug-in card (Equipment intended for a variety of host systems)				
Intended use		Condition of use			
V	fixed	Always at a distance more than 2 m from all people			
	mobile	Always at a distance more than 20 cm from all people			
	portable	May operate at a distance closer than 20 cm to human body			
Assigned frequency range		2496.0 – 2690.0 MHz			
Operating frequency		2497.5 - 2688.5 MHz			
RF channel spacing		2.5 MHz, 5 MHz, 10 MHz			
Maximum rated output power		At transmitter 50 Ω RF output connector			28.46 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	28 dBm				
Antenna connection					
unique coupling	V	standard connector	Integral	V with temporary RF connector without temporary RF connector	
Antenna/s technical characteristics					
Type	Manufacturer	Model number	Gain		
Internal	MARS Antennas	MA-WC25-AS12	12 dBi		
External	MARS Antennas	MA-WC24-14	14 dBi		
External	MARS Antennas	MA-WD24-15	15.5 dBi		
External	MARS Antennas	MA-WC24-17	17 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	
10 MHz		18.85		64QAM	
		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	
V	DC	Nominal rated voltage	48 VDC via SDA		
	AC mains	Nominal rated voltage	120 V	Frequency	60 Hz
Common power source for transmitter and receiver			V	yes	no



Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/18/2009 1:07:43 PM		
Temperature: 23.8 °C	Air Pressure: 1012 hPa	Relative Humidity: 42 %	Power Supply: 120VAC
Remarks:			

7 Transmitter tests according to 47CFR part 27 requirements

7.1 Occupied bandwidth test

7.1.1 General

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in Table 7.1.1.

Table 7.1.1 Occupied bandwidth limits

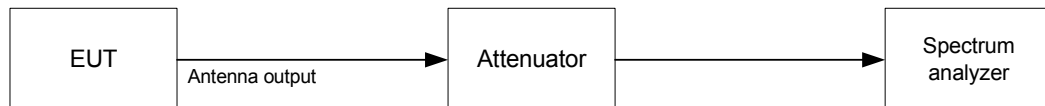
Assigned frequency, MHz	Modulation envelope reference points*, dBc	Maximum allowed bandwidth, kHz
2496.00 – 2690.0	26	NA

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

7.1.2 Test procedure

- 7.1.2.1 The EUT was set up as shown in Figure 7.1.1, energized and its proper operation was checked.
- 7.1.2.2 The EUT was set to transmit the unmodulated carrier and the reference peak power level was measured.
- 7.1.2.3 The EUT was set to transmit the normally modulated carrier.
- 7.1.2.4 The transmitter occupied bandwidth was measured with spectrum analyzer as a frequency delta between the reference points on modulation envelope and provided in Table 7.1.2 and the associated plots.

Figure 7.1.1 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:	6/18/2009 1:07:43 PM			
Temperature: 23.8 °C	Air Pressure: 1012 hPa	Relative Humidity: 42 %	Power Supply: 120VAC	
Remarks:				

Table 7.1.2 Occupied bandwidth test results

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

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
BPSK 1.0475 Mbps				
2497.50	2422.5	NA	NA	Pass
2593.00	2430.0	NA	NA	Pass
2688.50	2392.5	NA	NA	Pass
QPSK 2.095 Mbps				
2497.50	2445.0	NA	NA	Pass
2593.00	2407.5	NA	NA	Pass
2688.50	2422.5	NA	NA	Pass
16QAM 6.2825 Mbps				
2497.50	2452.5	NA	NA	Pass
2593.00	2407.5	NA	NA	Pass
2688.50	2430.0	NA	NA	Pass
64QAM 9.425 Mbps				
2497.50	2497.5	NA	NA	Pass
2593.00	2437.5	NA	NA	Pass
2688.50	2415.0	NA	NA	Pass

DETECTOR USED: Average
 RESOLUTION BANDWIDTH: 100 kHz
 VIDEO BANDWIDTH: 1000 kHz
 MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
 MODULATING SIGNAL: PRBS
 EBW: 5 MHz

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
BPSK 2.095 Mbps				
2498.75	4917.5	NA	NA	Pass
2593.00	4865.0	NA	NA	Pass
2687.25	4917.5	NA	NA	Pass
QPSK 4.19 Mbps				
2498.50	4917.5	NA	NA	Pass
2593.00	4865.0	NA	NA	Pass
2687.50	4917.5	NA	NA	Pass
16QAM 12.565 Mbps				
2498.50	4917.5	NA	NA	Pass
2593.00	4900.0	NA	NA	Pass
2687.50	4917.5	NA	NA	Pass
64QAM 18.85 Mbps				
2498.50	4952.5	NA	NA	Pass
2593.00	4865.0	NA	NA	Pass
2687.50	4917.5	NA	NA	Pass



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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:	6/18/2009 1:07:43 PM		
Temperature: 23.8 °C	Air Pressure: 1012 hPa	Relative Humidity: 42 %	Power Supply: 120VAC
Remarks:			

Table 7.1.2 Occupied bandwidth test results (continued)

DETECTOR USED: Average
 RESOLUTION BANDWIDTH: 300 kHz
 VIDEO BANDWIDTH: 3000 kHz
 MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
 MODULATING SIGNAL: PRBS
 EBW: 10 MHz

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
BPSK 4.19 Mbps				
2501.00	9930.0	NA	NA	Pass
2596.00	9960.0	NA	NA	Pass
2685.00	9960.0	NA	NA	Pass
QPSK 8.38 Mbps				
2501.00	9930.0	NA	NA	Pass
2596.00	9960.0	NA	NA	Pass
2685.00	9960.0	NA	NA	Pass
16QAM 25.13 Mbps				
2501.00	9750.0	NA	NA	Pass
2596.00	9930.0	NA	NA	Pass
2685.00	9930.0	NA	NA	Pass
64QAM 37.7 Mbps				
2501.00	9870.0	NA	NA	Pass
2596.00	9900.0	NA	NA	Pass
2685.00	9930.0	NA	NA	Pass

Reference numbers of test equipment used

HL 2780	HL 2953	HL 3439	HL 3442				
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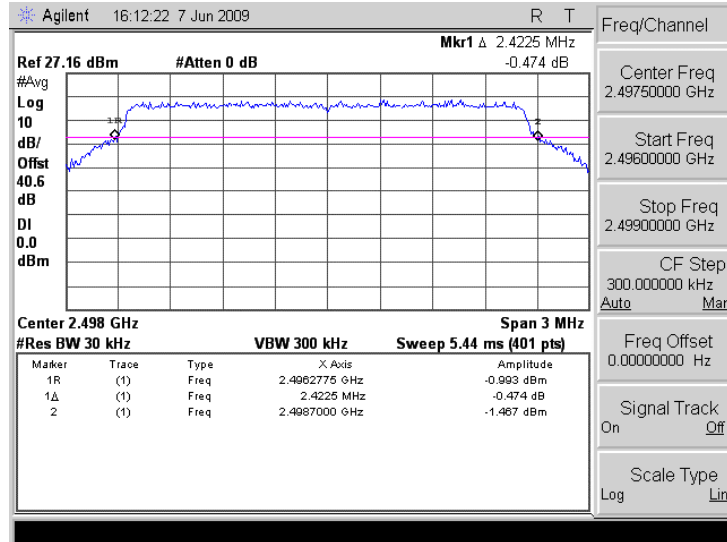
Full description is given in Appendix A.



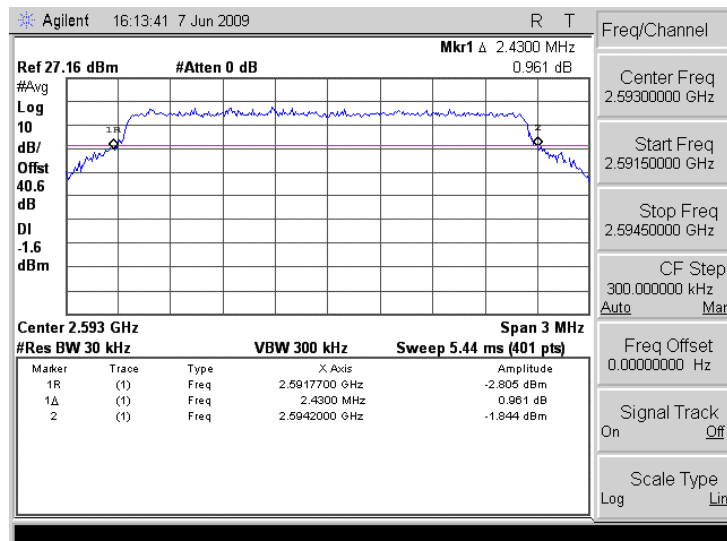
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Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/18/2009 1:07:43 PM		
Temperature: 23.8 °C	Air Pressure: 1012 hPa	Relative Humidity: 42 %	Power Supply: 120VAC
Remarks:			

Plot 7.1.1 Occupied bandwidth test results at low frequency, 2.5 MHz EBW, BPSK



Plot 7.1.2 Occupied bandwidth test results at mid frequency, 2.5 MHz EBW, BPSK

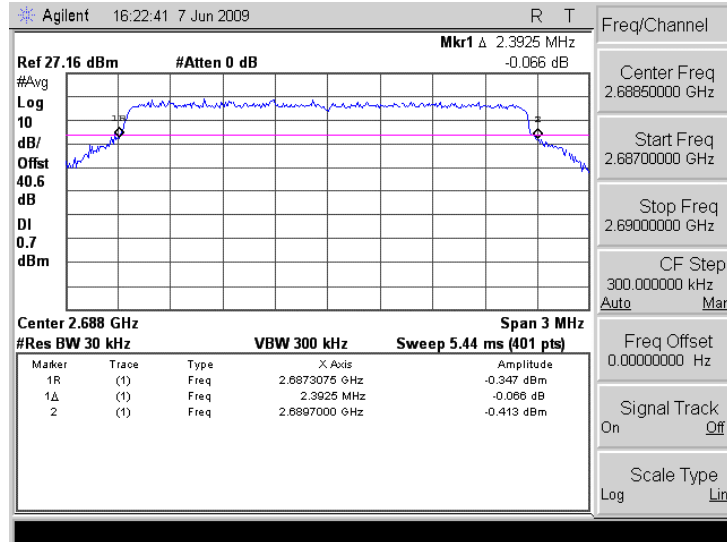




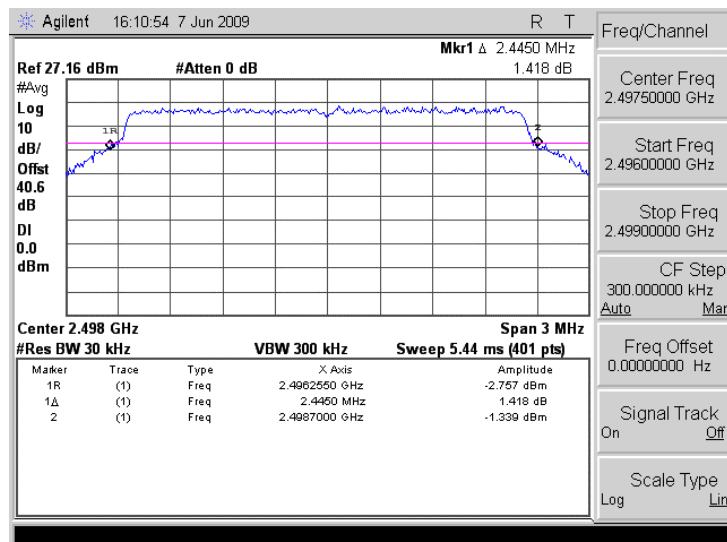
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Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/18/2009 1:07:43 PM		
Temperature: 23.8 °C	Air Pressure: 1012 hPa	Relative Humidity: 42 %	Power Supply: 120VAC
Remarks:			

Plot 7.1.3 Occupied bandwidth test results at high frequency, 2.5 MHz EBW, BPSK



Plot 7.1.4 Occupied bandwidth test results at low frequency, 2.5 MHz EBW, QPSK

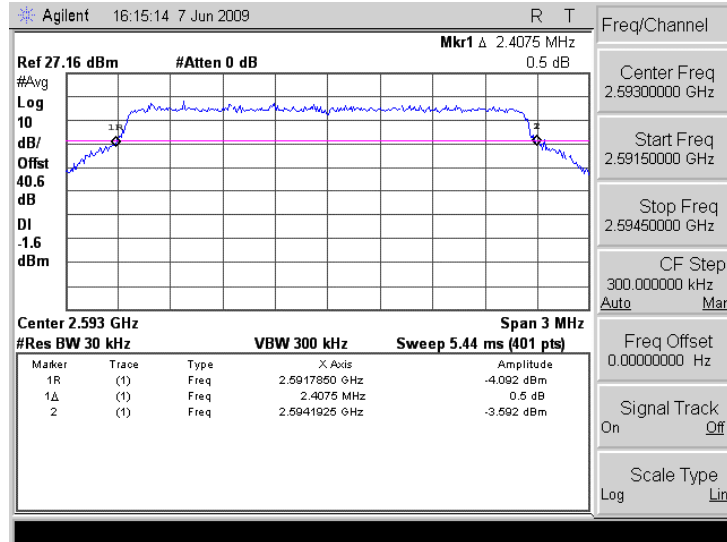




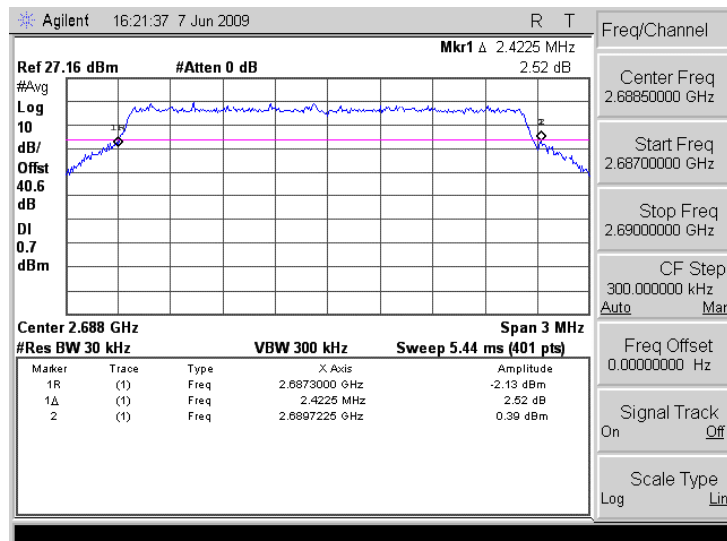
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Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/18/2009 1:07:43 PM		
Temperature: 23.8 °C	Air Pressure: 1012 hPa	Relative Humidity: 42 %	Power Supply: 120VAC
Remarks:			

Plot 7.1.5 Occupied bandwidth test results at mid frequency, 2.5 MHz EBW, QPSK



Plot 7.1.6 Occupied bandwidth test results at high frequency, 2.5 MHz EBW, QPSK

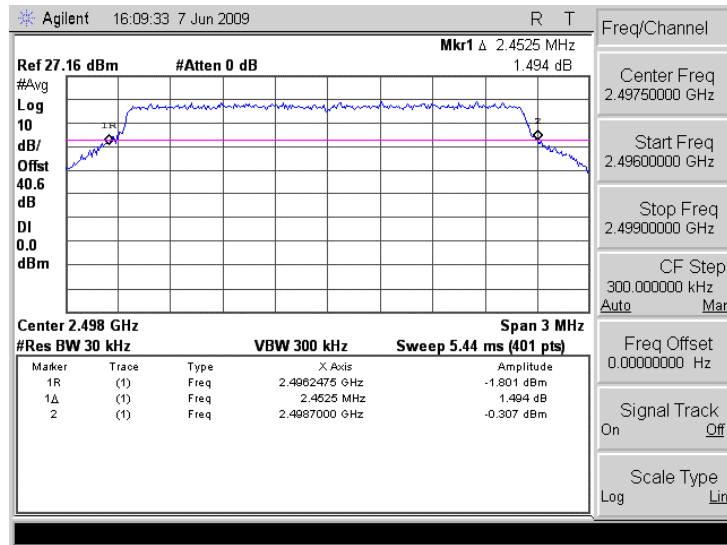




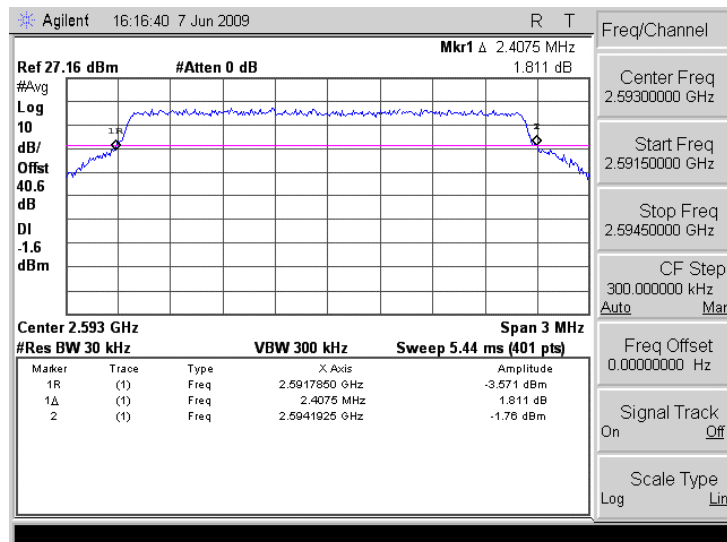
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Test specification: Section 2.1049, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 6/18/2009 1:07:43 PM			
Temperature: 23.8 °C	Air Pressure: 1012 hPa	Relative Humidity: 42 %	Power Supply: 120VAC
Remarks:			

Plot 7.1.7 Occupied bandwidth test results at low frequency, 2.5 MHz EBW, 16QAM



Plot 7.1.8 Occupied bandwidth test results at mid frequency, 2.5 MHz EBW, 16QAM

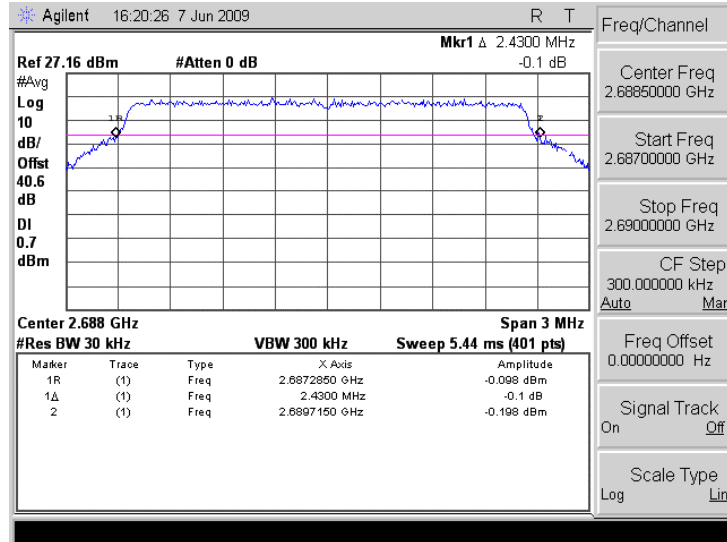




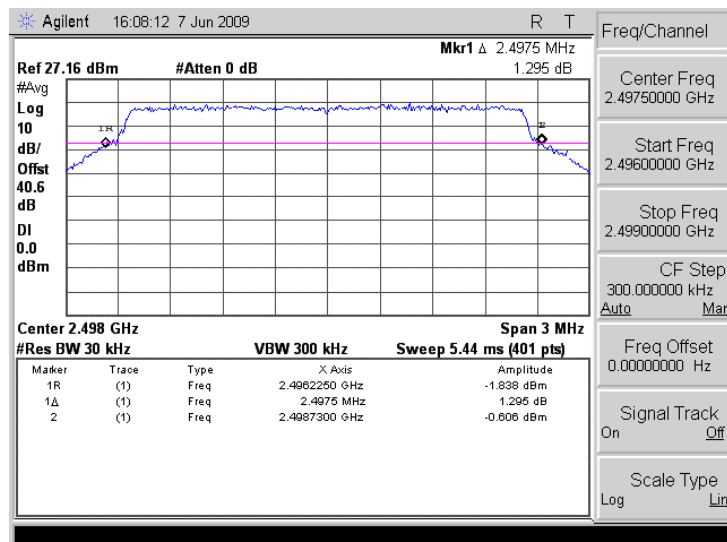
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Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/18/2009 1:07:43 PM		
Temperature: 23.8 °C	Air Pressure: 1012 hPa	Relative Humidity: 42 %	Power Supply: 120VAC
Remarks:			

Plot 7.1.9 Occupied bandwidth test results at high frequency, 2.5 MHz EBW, 16QAM



Plot 7.1.10 Occupied bandwidth test results at low frequency, 2.5 MHz EBW, 64QAM

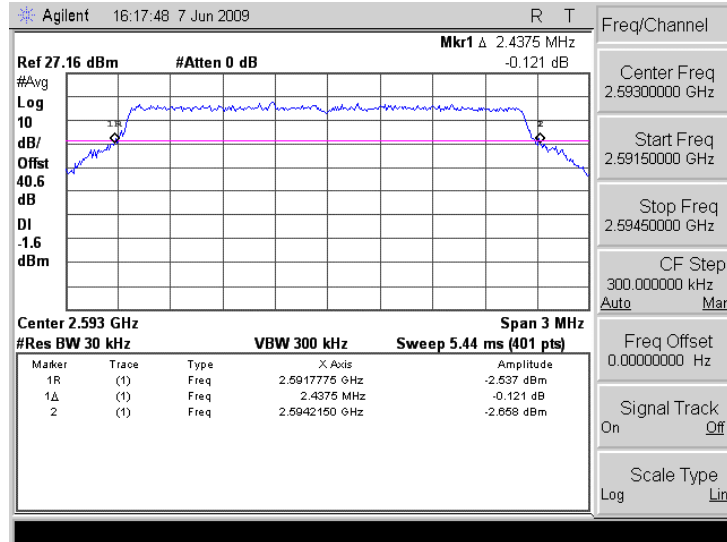




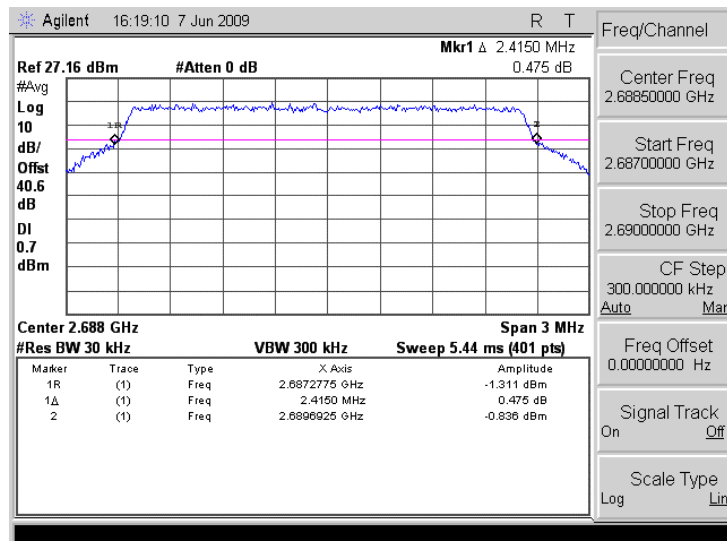
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Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/18/2009 1:07:43 PM		
Temperature: 23.8 °C	Air Pressure: 1012 hPa	Relative Humidity: 42 %	Power Supply: 120VAC
Remarks:			

Plot 7.1.11 Occupied bandwidth test results at mid frequency, 2.5 MHz EBW, 64QAM



Plot 7.1.12 Occupied bandwidth test results at high frequency, 2.5 MHz EBW, 64QAM

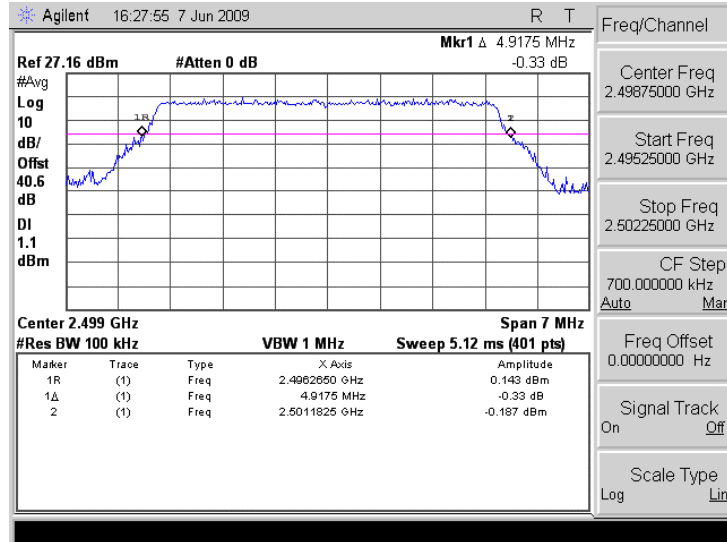




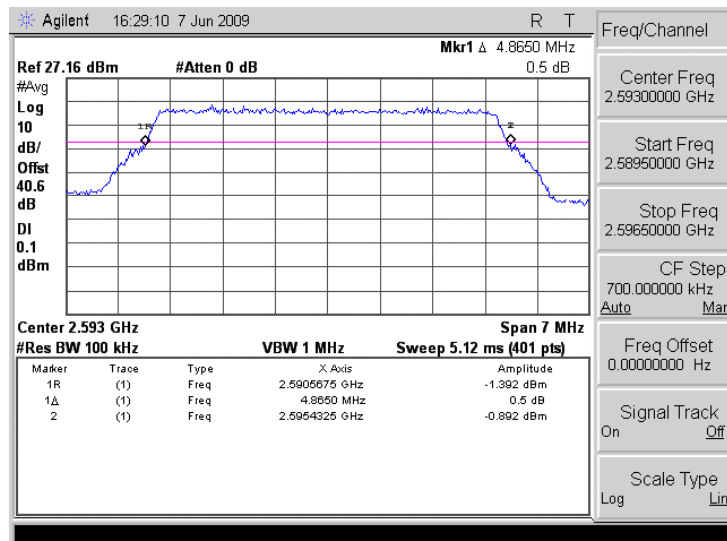
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Test specification: Section 2.1049, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 6/18/2009 1:07:43 PM			
Temperature: 23.8 °C	Air Pressure: 1012 hPa	Relative Humidity: 42 %	Power Supply: 120VAC
Remarks:			

Plot 7.1.13 Occupied bandwidth test results at low frequency, 5 MHz EBW, BPSK



Plot 7.1.14 Occupied bandwidth test results at mid frequency, 5 MHz EBW, BPSK

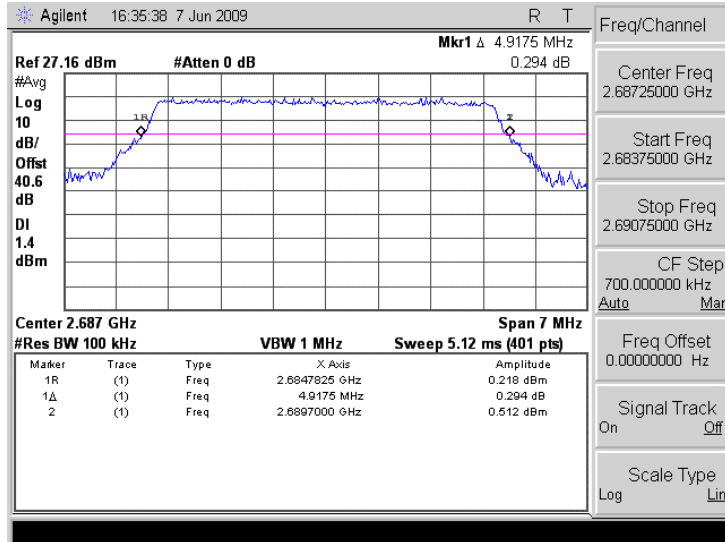




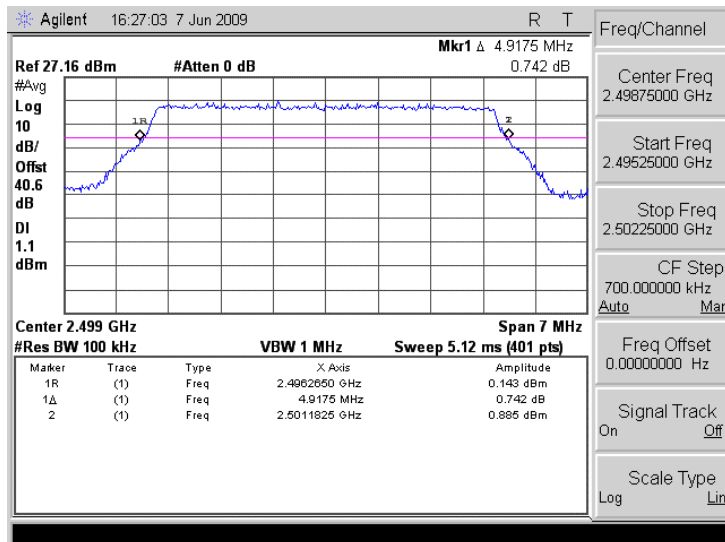
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Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/18/2009 1:07:43 PM		
Temperature: 23.8 °C	Air Pressure: 1012 hPa	Relative Humidity: 42 %	Power Supply: 120VAC
Remarks:			

Plot 7.1.15 Occupied bandwidth test results at high frequency, 5 MHz EBW, BPSK



Plot 7.1.16 Occupied bandwidth test results at low frequency, 5 MHz EBW, QPSK

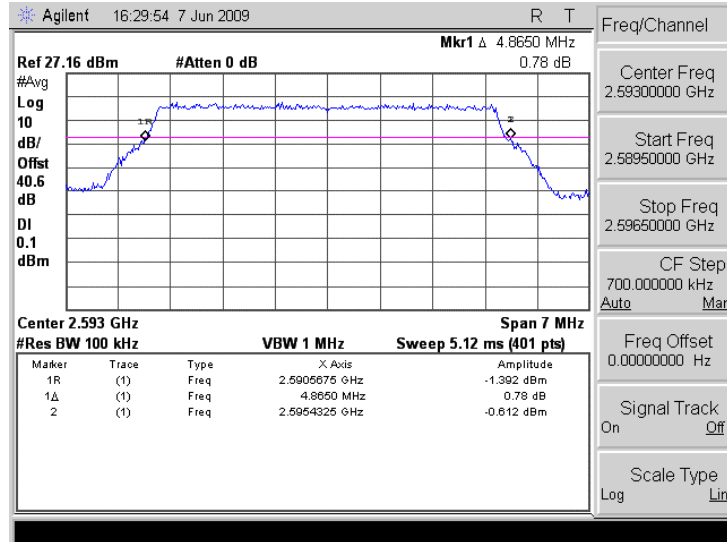




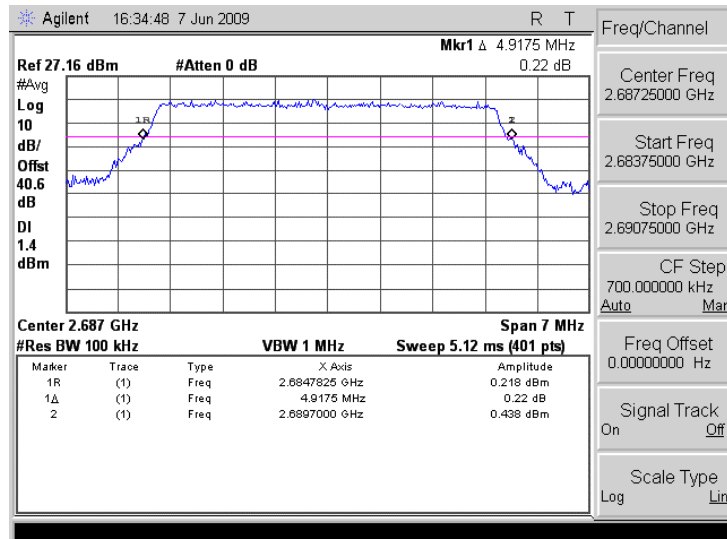
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Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/18/2009 1:07:43 PM		
Temperature: 23.8 °C	Air Pressure: 1012 hPa	Relative Humidity: 42 %	Power Supply: 120VAC
Remarks:			

Plot 7.1.17 Occupied bandwidth test results at mid frequency, 5 MHz EBW, QPSK



Plot 7.1.18 Occupied bandwidth test results at high frequency, 5 MHz EBW, QPSK

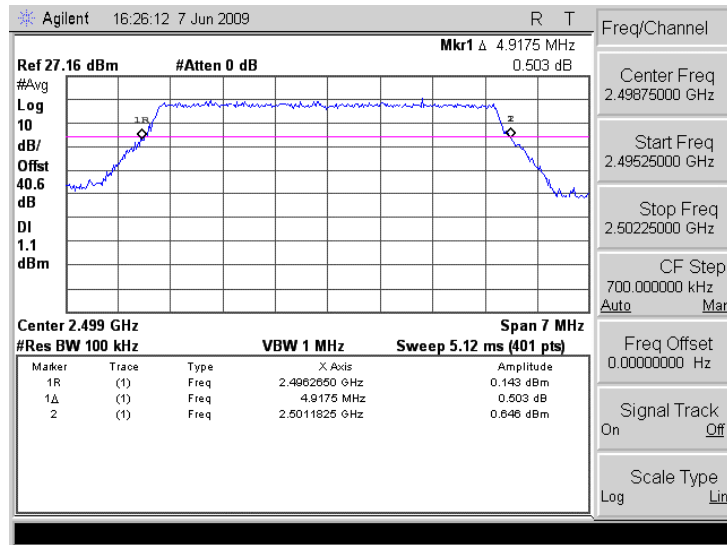




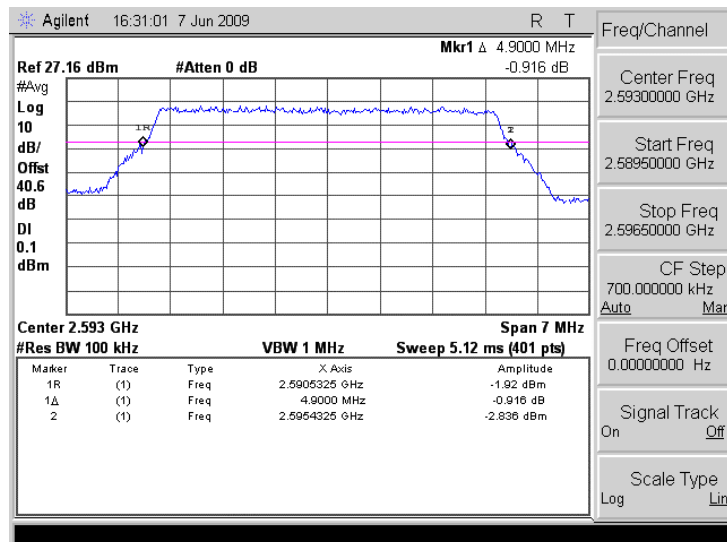
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Test specification: Section 2.1049, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 6/18/2009 1:07:43 PM			
Temperature: 23.8 °C	Air Pressure: 1012 hPa	Relative Humidity: 42 %	Power Supply: 120VAC
Remarks:			

Plot 7.1.19 Occupied bandwidth test results at low frequency, 5 MHz EBW, 16QAM



Plot 7.1.20 Occupied bandwidth test results at mid frequency, 5 MHz EBW, 16QAM

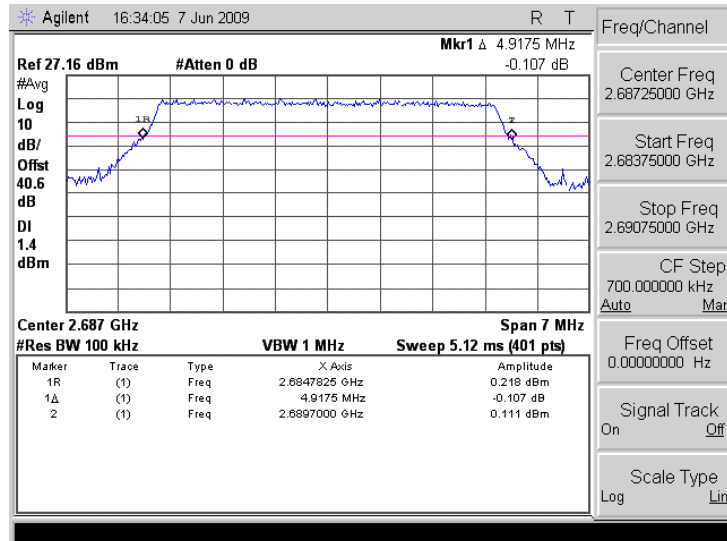




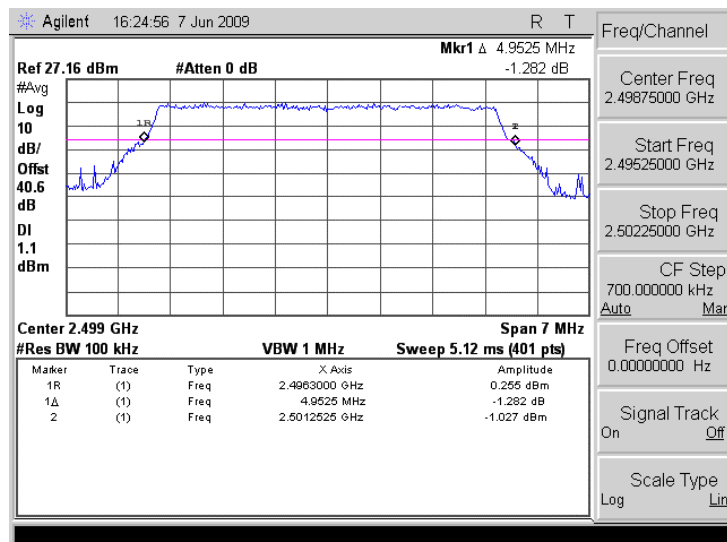
HERMON LABORATORIES

Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/18/2009 1:07:43 PM		
Temperature: 23.8 °C	Air Pressure: 1012 hPa	Relative Humidity: 42 %	Power Supply: 120VAC
Remarks:			

Plot 7.1.21 Occupied bandwidth test results at high frequency, 5 MHz EBW, 16QAM



Plot 7.1.22 Occupied bandwidth test results at low frequency, 5 MHz EBW, 64QAM

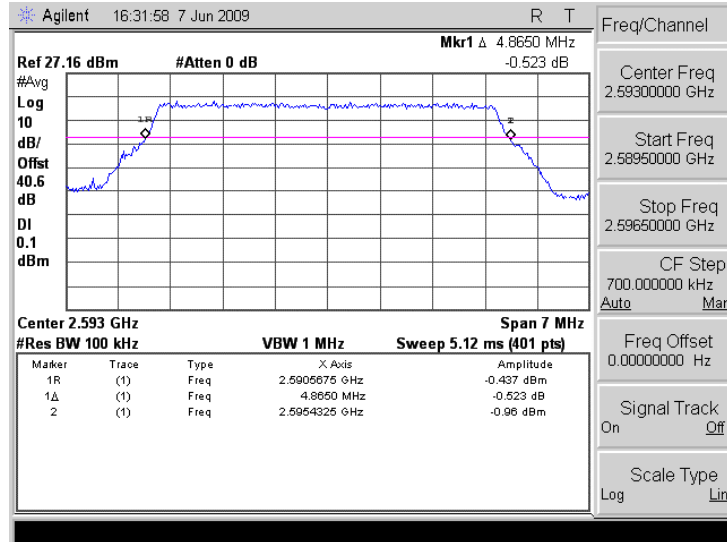




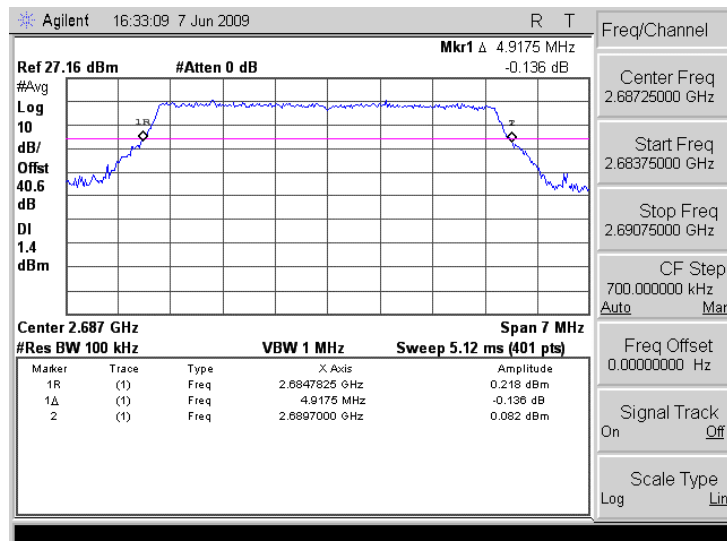
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Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/18/2009 1:07:43 PM		
Temperature: 23.8 °C	Air Pressure: 1012 hPa	Relative Humidity: 42 %	Power Supply: 120VAC
Remarks:			

Plot 7.1.23 Occupied bandwidth test results at mid frequency, 5 MHz EBW, 64QAM



Plot 7.1.24 Occupied bandwidth test results at high frequency, 5 MHz EBW, 64QAM

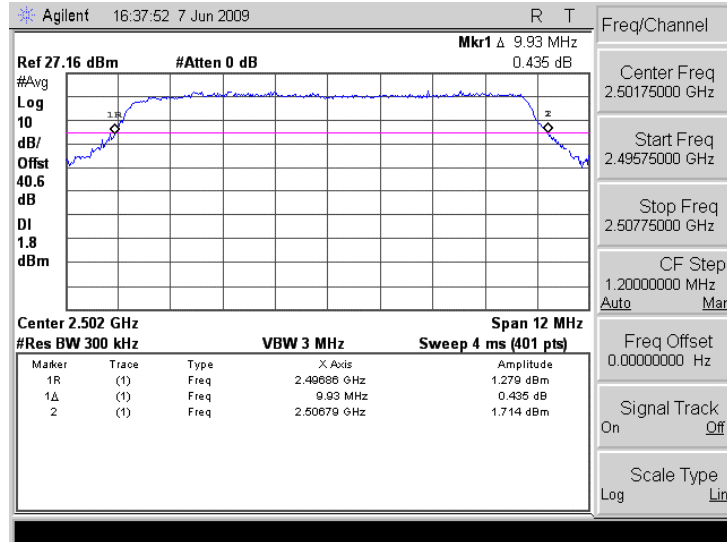




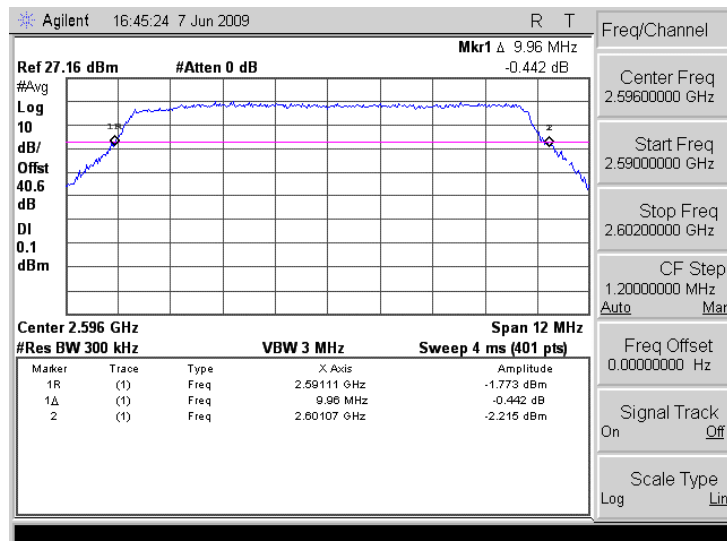
HERMON LABORATORIES

Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/18/2009 1:07:43 PM		
Temperature: 23.8 °C	Air Pressure: 1012 hPa	Relative Humidity: 42 %	Power Supply: 120VAC
Remarks:			

Plot 7.1.25 Occupied bandwidth test results at low frequency, 10 MHz EBW, BPSK



Plot 7.1.26 Occupied bandwidth test results at mid frequency frequency, 10 MHz EBW, BPSK

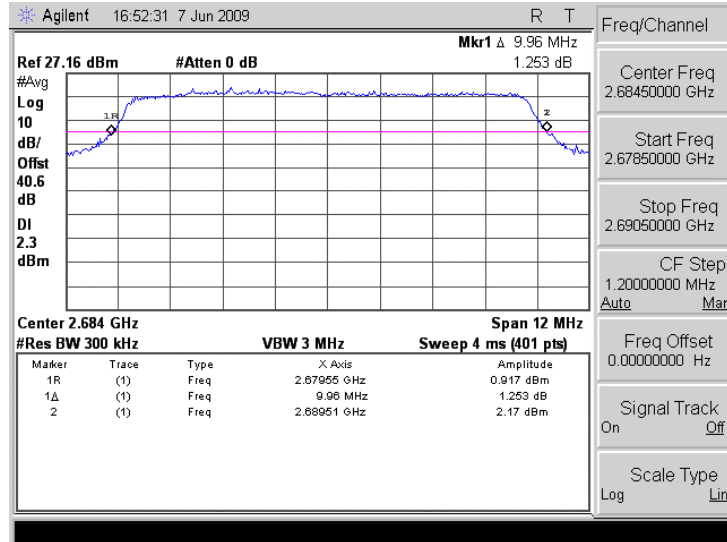




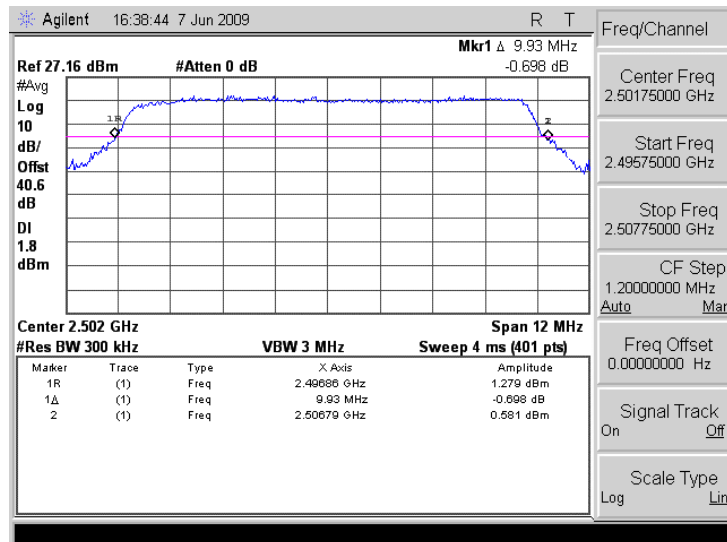
HERMON LABORATORIES

Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/18/2009 1:07:43 PM		
Temperature: 23.8 °C	Air Pressure: 1012 hPa	Relative Humidity: 42 %	Power Supply: 120VAC
Remarks:			

Plot 7.1.27 Occupied bandwidth test results at high frequency, 10 MHz EBW, BPSK



Plot 7.1.28 Occupied bandwidth test results at low frequency, 10 MHz EBW, QPSK

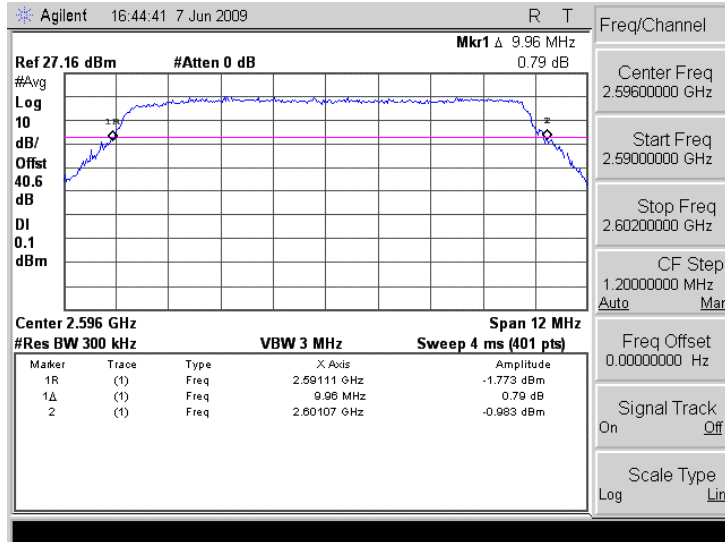




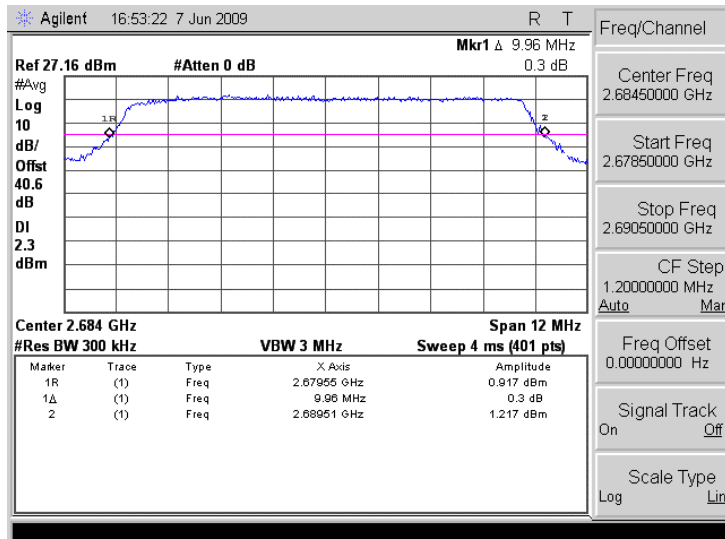
HERMON LABORATORIES

Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/18/2009 1:07:43 PM		
Temperature: 23.8 °C	Air Pressure: 1012 hPa	Relative Humidity: 42 %	Power Supply: 120VAC
Remarks:			

Plot 7.1.29 Occupied bandwidth test results at mid frequency, 10 MHz EBW, QPSK



Plot 7.1.30 Occupied bandwidth test results at high frequency, 10 MHz EBW, QPSK

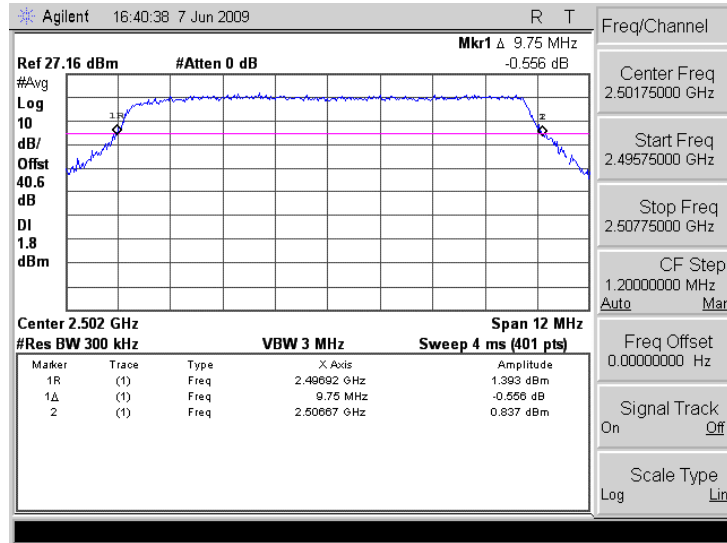




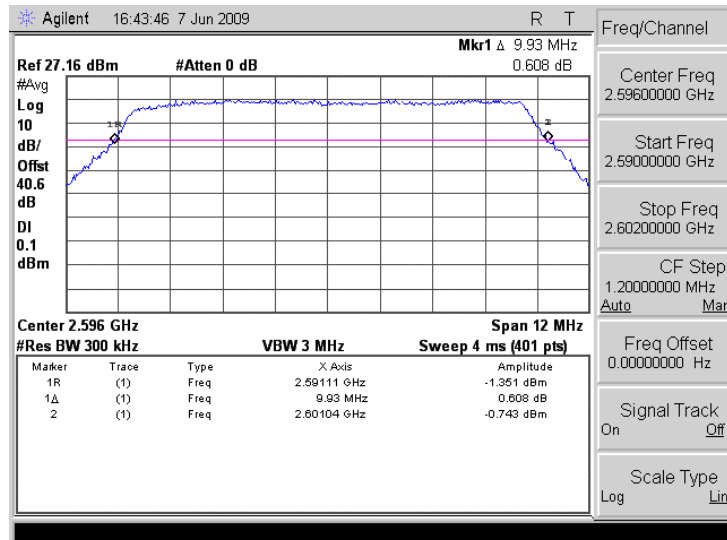
HERMON LABORATORIES

Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/18/2009 1:07:43 PM		
Temperature: 23.8 °C	Air Pressure: 1012 hPa	Relative Humidity: 42 %	Power Supply: 120VAC
Remarks:			

Plot 7.1.31 Occupied bandwidth test results at low frequency, 10 MHz EBW, 16QAM



Plot 7.1.32 Occupied bandwidth test results at mid frequency, 10 MHz EBW, 16QAM

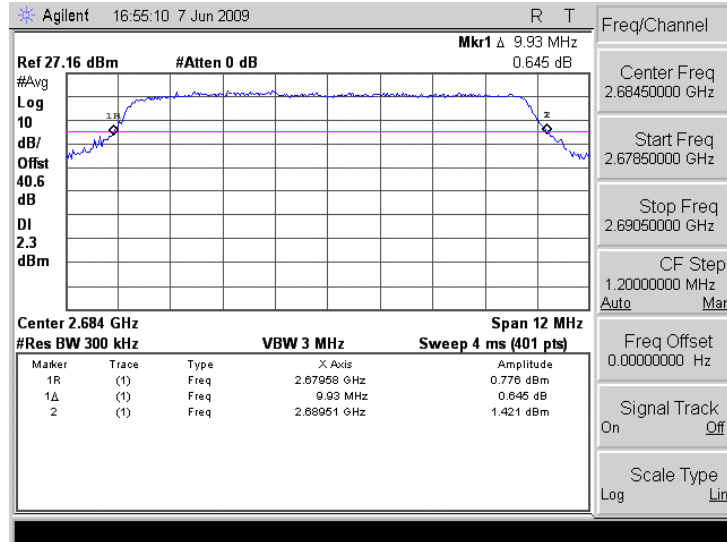




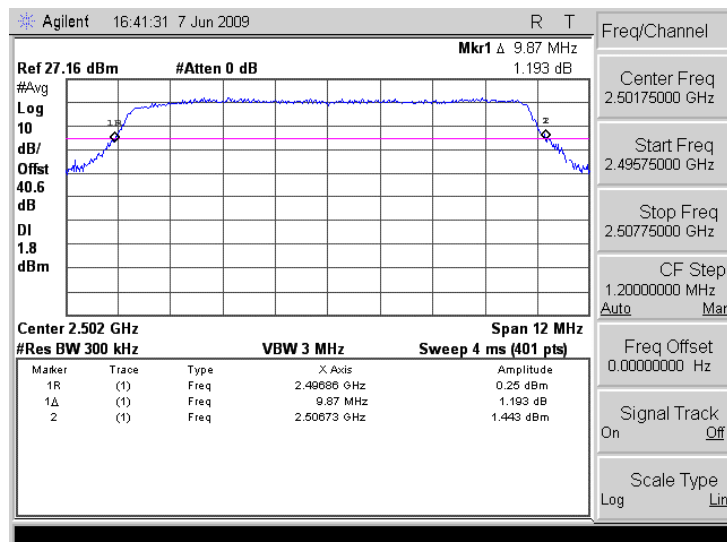
HERMON LABORATORIES

Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/18/2009 1:07:43 PM		
Temperature: 23.8 °C	Air Pressure: 1012 hPa	Relative Humidity: 42 %	Power Supply: 120VAC
Remarks:			

Plot 7.1.33 Occupied bandwidth test results at high frequency, 10 MHz EBW, 16QAM



Plot 7.1.34 Occupied bandwidth test results at low frequency, 10 MHz EBW, 64QAM

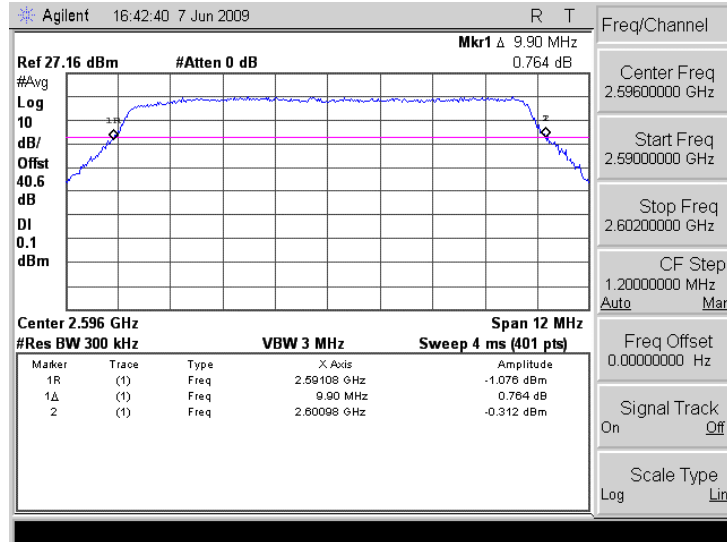




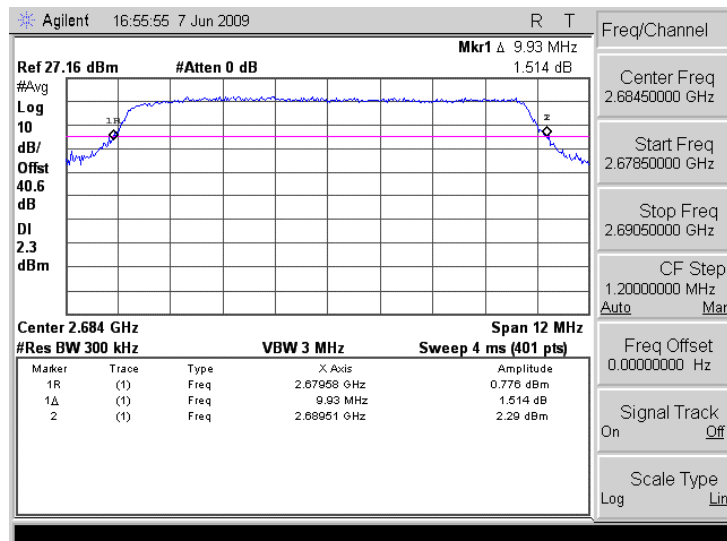
HERMON LABORATORIES

Test specification: Section 2.1049, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date & Time: 6/18/2009 1:07:43 PM			
Temperature: 23.8 °C	Air Pressure: 1012 hPa	Relative Humidity: 42 %	Power Supply: 120VAC
Remarks:			

Plot 7.1.35 Occupied bandwidth test results at mid frequency, 10 MHz EBW, 64QAM



Plot 7.1.36 Occupied bandwidth test results at high frequency, 10 MHz EBW, 64QAM





Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

7.2 Peak output power test

7.2.1 General

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

Table 7.2.1 Peak output power limits

Assigned frequency range, MHz	Maximum peak output power dBm
2496.0 – 2690.0	$63+10\log(X/Y)+10\log(360/\text{beamwidth})$
	Maximum peak power density dBm/100 kHz
	$\text{EIRP}+10\log(0.1/Y)$

*- X is the actual channel width in MHz, Y is either

- 1) 6 MHz if prior to transition or the station is in the MBS following transition or
- 2) 5.5 MHz if the station is in the LBS and UBS following transition, and
- 3) beamwidth is the total horizontal plane beam width of the individual transmitting antenna for the station or any sector measured at the half-power points.

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 the associated plots.

Figure 7.2.1 Peak output power test setup





HERMON LABORATORIES

Test specification: Section 27.50(h), Peak output power	
Test procedure: Section 27.50(h)	
Test mode: Compliance	Verdict: PASS
Date & Time: 6/18/2009 1:05:49 PM	
Temperature: 25°C	Air Pressure: 1008 hPa
Relative Humidity: 38 %	
Power Supply: 120VAC	
Remarks:	

Table 7.2.2 Peak output power test results

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
 DETECTOR USED: Average
 RESOLUTION BANDWIDTH: 30 kHz
 VIDEO BANDWIDTH: 300 kHz
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 DUTY CYCLE: 100%
 EBW: 2.5 MHz
 MAXIMUM ANTENNA GAIN: 17 dBi

Carrier frequency, MHz	Spectrum analyzer reading, dBm	External attenuation, dB	Cable loss, dB	RF output power, dBm	Limit, dBm	Verdict
BPSK 1.0475 Mbps						
2497.50	26.11	Included	Included	43.11	See Table 7.2.5	Pass
2593.00	24.41	Included	Included	41.41		
2688.50	26.72	Included	Included	43.72		
QPSK 2.095 Mbps						
2498.00	25.95	Included	Included	42.95	See Table 7.2.5	Pass
2593.00	24.36	Included	Included	41.36		
2688.50	26.70	Included	Included	43.70		
16QAM 6.2825 Mbps						
2498.00	26.06	Included	Included	43.06	See Table 7.2.5	Pass
2593.00	24.50	Included	Included	41.00		
2688.50	26.81	Included	Included	43.81		
64QAM 9.425 Mbps						
2498.00	26.02	Included	Included	43.0.2	See Table 7.2.5	Pass
2593.00	24.54	Included	Included	41.54		
2688.50	26.86	Included	Included	43.86		

- RF output power, dBm = spectrum analyzer reading, dBm + antenna gain, dBi



HERMON LABORATORIES

Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Table 7.2.2 Peak output power test results (continued)

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
 DETECTOR USED: Average
 RESOLUTION BANDWIDTH: 100 kHz
 VIDEO BANDWIDTH: 1000 kHz
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 DUTY CYCLE: 100%
 EBW: 5 MHz
 MAXIMUM ANTENNA GAIN: 17 dBi

Carrier frequency, MHz	Spectrum analyzer reading, dBm	External attenuation, dB	Cable loss, dB	RF output power, dBm	Limit, dBm	Verdict
BPSK 2.095 Mbps						
2498.75	27.15	Included	Included	44.15	See Table 7.2.5	Pass
2593.00	26.10	Included	Included	43.10		
2687.25	27.36	Included	Included	44.36		
QPSK 4.19 Mbps						
2498.75	27.11	Included	Included	44.11	See Table 7.2.5	Pass
2593.00	26.13	Included	Included	43.13		
2687.25	27.37	Included	Included	44.37		
16QAM 12.565 Mbps						
2498.75	27.28	Included	Included	44.28	See Table 7.2.5	Pass
2593.00	26.12	Included	Included	43.12		
2687.25	27.44	Included	Included	44.44		
64QAM 18.85 Mbps						
2498.75	27.55	Included	Included	44.55	See Table 7.2.5	Pass
2593.00	26.16	Included	Included	43.16		
2687.25	27.52	Included	Included	44.52		

* - RF output power, dBm = spectrum analyzer reading, dBm + antenna gain, dBi



Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Table 7.2.2 Peak output power test results (continued)

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
 DETECTOR USED: Average
 RESOLUTION BANDWIDTH: 300 kHz
 VIDEO BANDWIDTH: 3000 kHz
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 DUTY CYCLE: 100%
 EBW: 10 MHz
 MAXIMUM ANTENNA GAIN: 17 dBi

Carrier frequency, MHz	Spectrum analyzer reading, dBm	External attenuation, dB	Cable loss, dB	RF output power, dBm	Limit, dBm	Verdict
BPSK 4.19 Mbps						
2501.75	27.79	Included	Included	43.79	See Table 7.2.5	Pass
2596.00	26.07	Included	Included	43.07		
2684.50	28.35	Included	Included	45.35		
QPSK 8.38 Mbps						
2501.75	27.82	Included	Included	44.82	See Table 7.2.5	Pass
2596.00	26.07	Included	Included	43.07		
2684.50	28.40	Included	Included	45.40		
16QAM 25.13 Mbps						
2501.75	27.84	Included	Included	44.84	See Table 7.2.5	Pass
2596.00	26.15	Included	Included	43.15		
2684.50	28.42	Included	Included	45.42		
64QAM 37.7 Mbps						
2501.75	27.96	Included	Included	44.96	See Table 7.2.5	Pass
2596.00	26.20	Included	Included	43.20		
2684.50	28.46	Included	Included	45.46		

* - RF output power, dBm = Spectrum analyzer reading, dBm + antenna gain, dBi



Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Table 7.2.3 Power spectral density test results

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
 DETECTOR USED: Average
 RESOLUTION BANDWIDTH: 30 kHz
 VIDEO BANDWIDTH: 300 kHz
 MODULATING SIGNAL: PRBS
 CHANNEL BANDWIDTH: 2.5 MHz
 TRANSMITTER OUTPUT POWER SETTINGS: 24 dBm
 DUTY CYCLE: 100%

Carrier frequency, MHz	Spectrum analyzer reading, dBm/Hz	External attenuation, dB	Cable loss, dB	Spectral power density, dBm/100kHz*	Limit, dBm/100kHz	Verdict
BPSK 1.0475Mbps						
2497.50	-37.87	Included	Included	28.63	See Table 7.2.6	Pass
2593.00	-39.57	Included	Included	26.93		
2688.50	-37.25	Included	Included	29.75		
QPSK 2.095 Mbps						
2497.50	-38.03	Included	Included	28.97	See Table 7.2.6	Pass
2593.00	-39.62	Included	Included	27.38		
2688.50	-37.27	Included	Included	29.73		
16QAM 6.2825 Mbps						
2497.50	-37.92	Included	Included	29.08	See Table 7.2.6	Pass
2593.00	-39.48	Included	Included	27.52		
2688.50	-37.17	Included	Included	29.83		
64QAM 9.425 Mbps						
2497.50	-37.96	Included	Included	29.04	See Table 7.2.6	Pass
2593.00	-39.44	Included	Included	27.56		
2688.50	-37.11	Included	Included	29.89		

* - Spectral power density, dBm/100kHz = Spectrum analyzer reading, dBm/Hz + 50 dB + antenna gain, dBi



Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Table 7.2.3 Power spectral density test results (continued)

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
 DETECTOR USED: Average
 RESOLUTION BANDWIDTH: 100 kHz
 VIDEO BANDWIDTH: 1000 kHz
 MODULATING SIGNAL: PRBS
 CHANNEL BANDWIDTH: 5 MHz
 TRANSMITTER OUTPUT POWER SETTINGS: 24 dBm
 DUTY CYCLE: 100%

Carrier frequency, MHz	Spectrum analyzer reading, dBm/100 kHz	External attenuation, dB	Cable loss, dB	Spectral power density, dBm/100kHz*	Limit, dBm/100kHz	Verdict
BPSK 2.095 Mbps						
2498.75	-39.84	Included	Included	27.16	See Table 7.2.6	Pass
2593.00	-40.89	Included	Included	26.11		
2687.25	-39.63	Included	Included	27.37		
QPSK 4.19 Mbps						
2498.75	-39.88	Included	Included	27.12	See Table 7.2.6	Pass
2593.00	-40.86	Included	Included	26.14		
2687.25	-39.62	Included	Included	27.38		
16QAM 12.565 Mbps						
2498.75	-39.71	Included	Included	27.29	See Table 7.2.6	Pass
2593.00	-40.87	Included	Included	26.13		
2687.25	-39.54	Included	Included	27.46		
64QAM 18.85 Mbps						
2498.75	-39.44	Included	Included	27.56	See Table 7.2.6	Pass
2593.00	-40.83	Included	Included	26.17		
2687.25	-39.47	Included	Included	27.53		

* - Spectral power density, dBm/100kHz = Spectrum analyzer reading, dBm/Hz + 50 dB + antenna gain, dBi



Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Table 7.2.3 Power spectral density test results (continued)

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
 DETECTOR USED: Average
 RESOLUTION BANDWIDTH: 300 kHz
 VIDEO BANDWIDTH: 3000 kHz
 MODULATING SIGNAL: PRBS
 CHANNEL BANDWIDTH: 10 MHz
 TRANSMITTER OUTPUT POWER SETTINGS: 24 dBm
 DUTY CYCLE: 100%

Carrier frequency, MHz	Spectrum analyzer reading, dBm/100 kHz	External attenuation, dB	Cable loss, dB	Spectral Power Density, dBm/100kHz*	Limit, dBm/100kHz	Verdict
BPSK 4.19 Mbps						
2499.00	-42.21	Included	Included	24.79	See Table 7.2.6	Pass
2593.00	-43.93	Included	Included	23.07		
2687.25	-41.65	Included	Included	25.35		
QPSK 8.38 Mbps						
2499.00	-42.18	Included	Included	24.72	See Table 7.2.6	Pass
2593.00	-43.93	Included	Included	23.07		
2687.25	-41.60	Included	Included	25.40		
16QAM 25.13 Mbps						
2499.00	-42.16	Included	Included	24.74	See Table 7.2.6	Pass
2593.00	-43.85	Included	Included	23.15		
2687.25	-41.58	Included	Included	25.42		
64QAM 37.7 Mbps						
2499.00	-42.04	Included	Included	24.96	See Table 7.2.6	Pass
2593.00	-43.80	Included	Included	23.20		
2687.25	-41.54	Included	Included	25.46		

* - Spectral power density, dBm/100kHz = Spectrum analyzer reading, dBm/Hz + 50 dB + antenna gain, dBi

Reference numbers of test equipment used

HL 2909	HL 3437	HL 3442	HL 3559			
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Full description is given in Appendix A.



HERMON LABORATORIES

Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Table 7.2.4 Post transition frequency channels assignment

Channel	Channel BW, MHz	Peak power limit, dBm	Power density limit, dBm/100kHz
2.5 MHz Single Channel			
2497.5 MHz: BRS Ch. 1	6.0	$63+10\log(\text{OBW}/6.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/6.0)$
2593.0 MHz: EBS Ch. D4	6.0	$63+10\log(\text{OBW}/6.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/6.0)$
2688.5 MHz: BRS Ch. G3	5.5	$63+10\log(\text{OBW}/5.5)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/5.5)$
5 MHz Single Channel			
2498.5 MHz: BRS Ch. 1	6.0	$63+10\log(\text{OBW}/6.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/6.0)$
2593.0 MHz: EBS Ch. D4	6.0	$63+10\log(\text{OBW}/6.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/6.0)$
2687.5 MHz: BRS Ch. G3	5.5	$63+10\log(\text{OBW}/5.5)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/5.5)$
10 MHz Dual Channel			
2501.00 MHz: BRS Ch. 1+ EBS Ch. A1	11.5	$63+10\log(\text{OBW}/11.5)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/11.5)$
2596.0 MHz: EBS Ch. D4+ EBS Ch. G4	12.0	$63+10\log(\text{OBW}/12.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/12.0)$
2685.0 MHz: BRS Ch. G4+ BRS Ch. G3	11.0	$63+10\log(\text{OBW}/11.0)+10\log(360/\text{beamwidth})$	$\text{EIRP}+10\log(0.1/11.0)$

NOTE: Channels at post transition band were taken as the worst case



Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Table 7.2.5 EIRP limits

Channel	Channel BW, MHz	Peak power limit, dBm			
		15.5 dBi, 90° beamwidth	14 dBi, 60° beamwidth	12 dBi, 60° beamwidth	17 dBi, 60° beamwidth
2.5 MHz Single Channel					
2497.5 MHz: BRS Ch. 1	6.0	65.05*	66.82	66.82	66.82
2593.0 MHz: EBS Ch. D4	6.0	65.05	66.82	66.82	66.82
2688.5 MHz: BRS Ch. G3	5.5	65.43	67.19	67.19	67.19
5 MHz Single Channel					
2498.5 MHz: BRS Ch. 1	6.0	68.11	69.87	69.87	69.87
2593.0 MHz: EBS Ch. D4	6.0	68.11	69.87	69.87	69.87
2687.5 MHz: BRS Ch. G3	5.5	68.49	70.25	70.25	70.25
10 MHz Dual Channel					
2501.00 MHz: BRS Ch. 1+ EBS Ch. A1	11.5	68.30	70.06	70.06	70.06
2596.0 MHz: EBS Ch. D4+ EBS Ch. G4	12.0	68.12	69.88	69.88	69.88
2685.0 MHz: BRS Ch. G4+ BRS Ch. G3	11.0	68.50	70.26	70.26	70.26

NOTE: Calculations made for EBW = 2.4075 MHz, 4865.0 MHz, 9.930 MHz as minimum measured occupied bandwidths.
* EIRP= 63+10log (2.4075/6.0) + 10log (360/90) = 65.05 dBm.



HERMON LABORATORIES

Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Table 7.2.6 Peak power density limits

Channel	Channel BW, MHz	Peak power density, dBm/100kHz			
		15.5 dBi, 90° beamwidth	14 dBi, 60° beamwidth	12 dBi, 60° beamwidth	17 dBi, 60° beamwidth
2.5 MHz Single Channel					
2497.5 MHz: BRS Ch. 1	6.0	47.27*	49.03	49.03	49.03
2593.0 MHz: EBS Ch. D4	6.0	47.27	49.03	49.03	49.03
2688.5 MHz: BRS Ch. G3	5.5	48.03	49.79	49.79	49.79
5 MHz Single Channel					
2498.5 MHz: BRS Ch. 1	6.0	50.33	52.09	52.09	52.09
2593.0 MHz: EBS Ch. D4	6.0	50.33	52.09	52.09	52.09
2687.5 MHz: BRS Ch. G3	5.5	51.08	52.85	52.85	52.85
10 MHz Dual Channel					
2501.00 MHz: BRS Ch. 1+ EBS Ch. A1	11.5	47.70	49.46	49.46	49.46
2596.0 MHz: EBS Ch. D4+ EBS Ch. G4	12.0	47.33	49.09	49.09	49.09
2685.0 MHz: BRS Ch. G4+ BRS Ch. G3	11.0	48.08	49.84	49.84	49.84

NOTE: Calculations made for EBW = 2.4075 MHz, 4865.0 MHz, 9.930 MHz as minimum measured occupied bandwidths

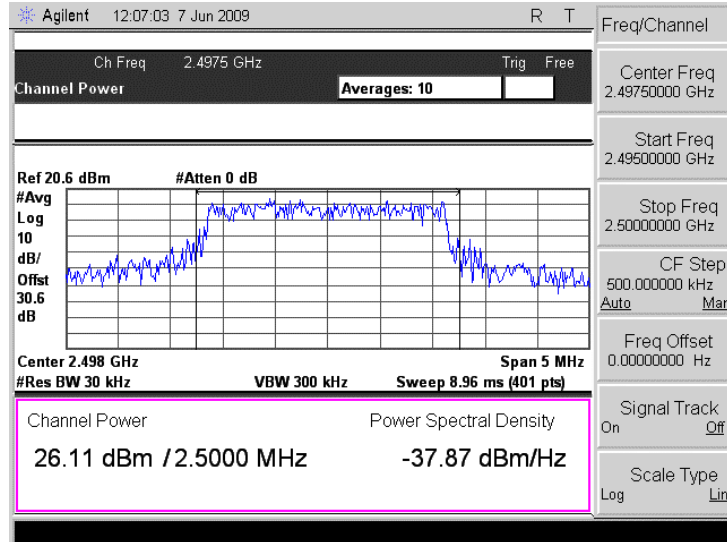
* Power density= 65.05 – 10 log (0.1/6) = 47.27 dBm/100kHz



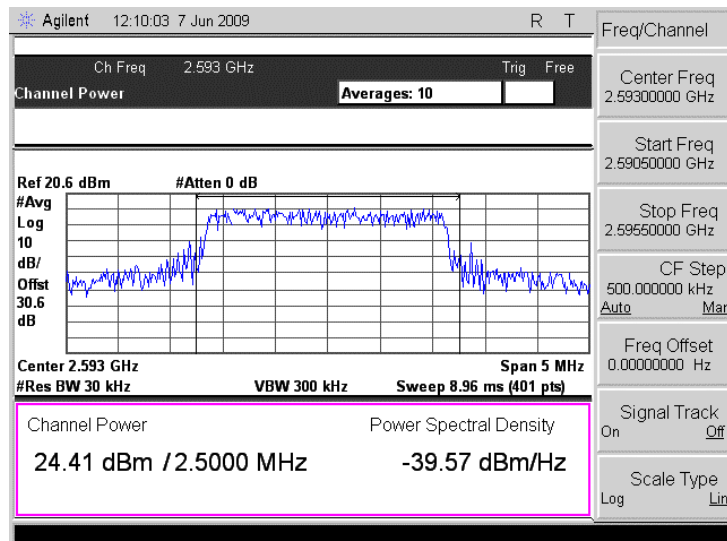
HERMON LABORATORIES

Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Plot 7.2.1 Power spectral density test results at low frequency, BPSK, 2.5 MHz EBW



Plot 7.2.2 Power spectral density test results at mid frequency, BPSK, 2.5 MHz EBW

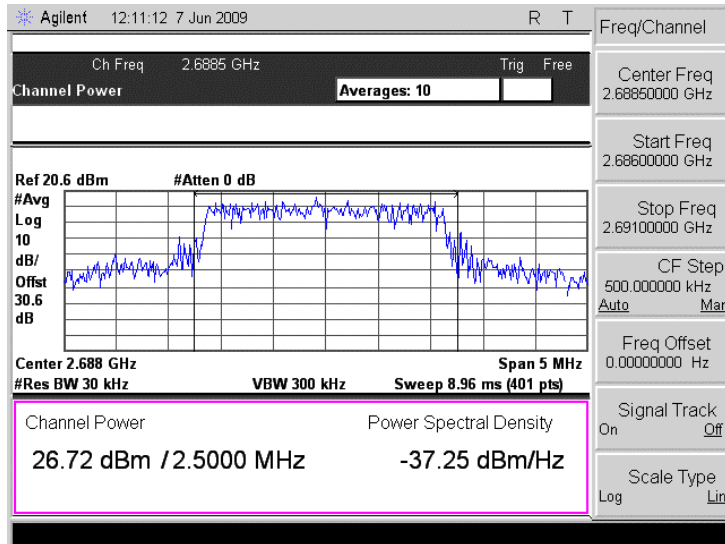




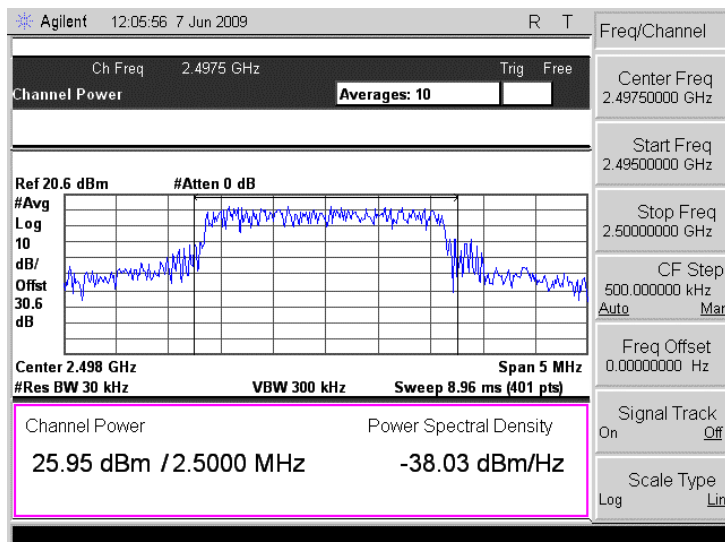
HERMON LABORATORIES

Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Plot 7.2.3 Power spectral density test results at high frequency, BPSK, 2.5 MHz EBW



Plot 7.2.4 Power spectral density test results at low frequency, QPSK, 2.5 MHz EBW

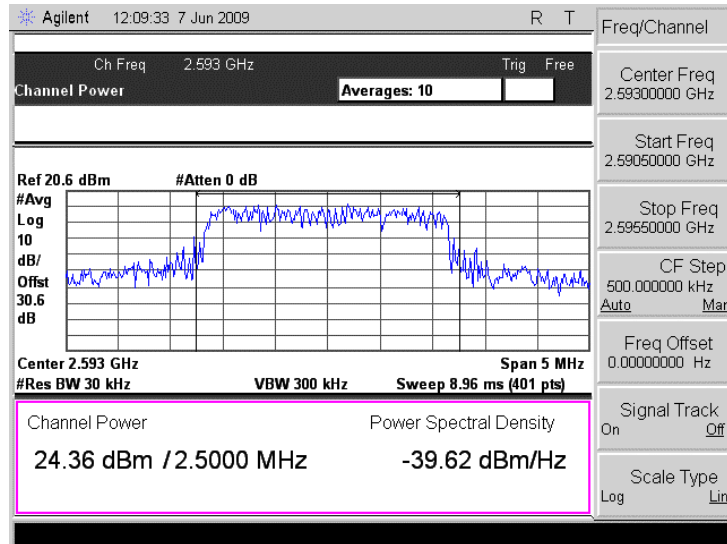




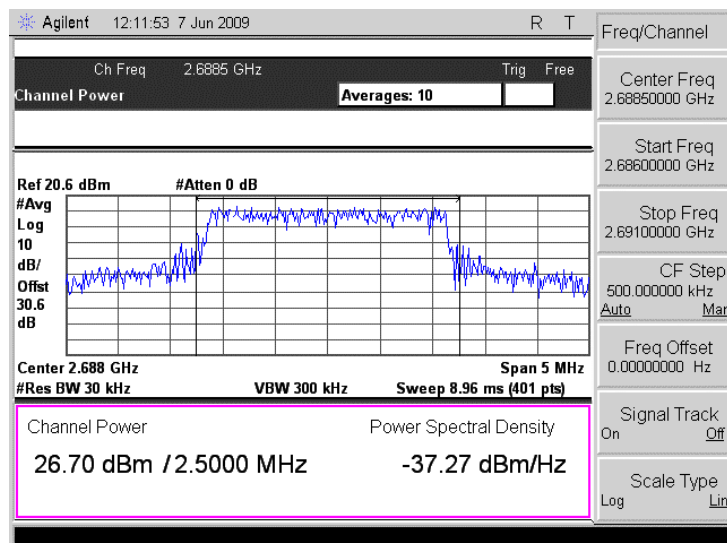
HERMON LABORATORIES

Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Plot 7.2.5 Power spectral density test results at mid frequency, QPSK, 2.5 MHz EBW



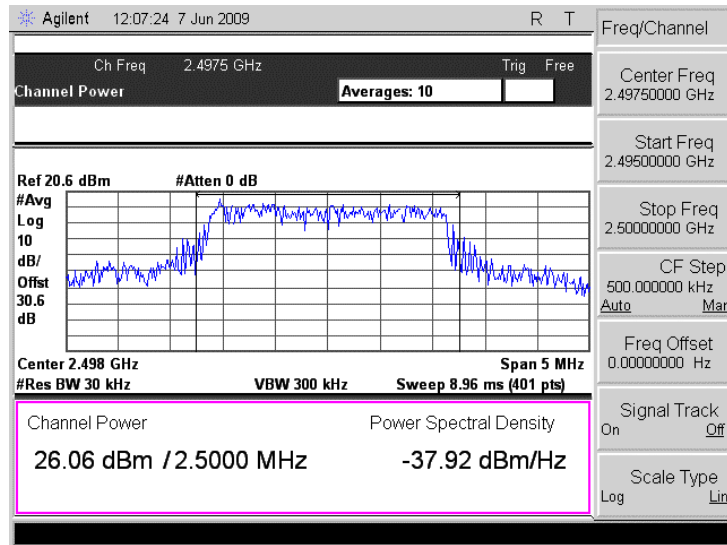
Plot 7.2.6 Power spectral density test results at high frequency, QPSK, 2.5 MHz EBW



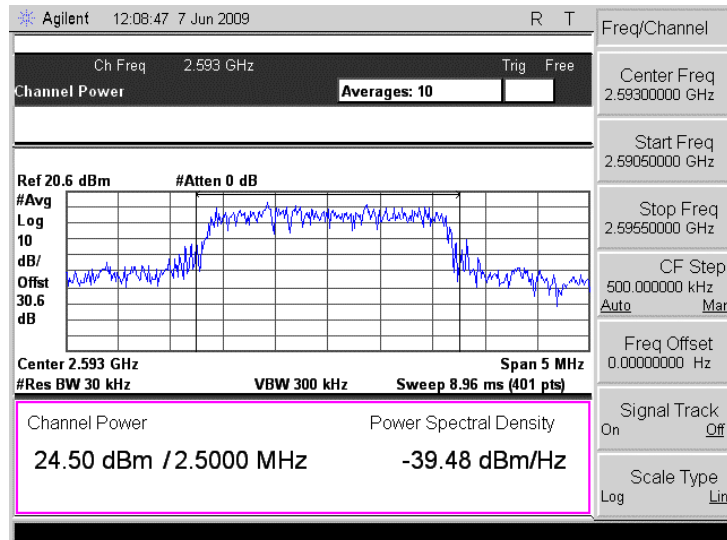


Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Plot 7.2.7 Power spectral density test results at low frequency, 16QAM, 2.5 MHz EBW



Plot 7.2.8 Power spectral density test results at mid frequency, 16QAM, 2.5 MHz EBW

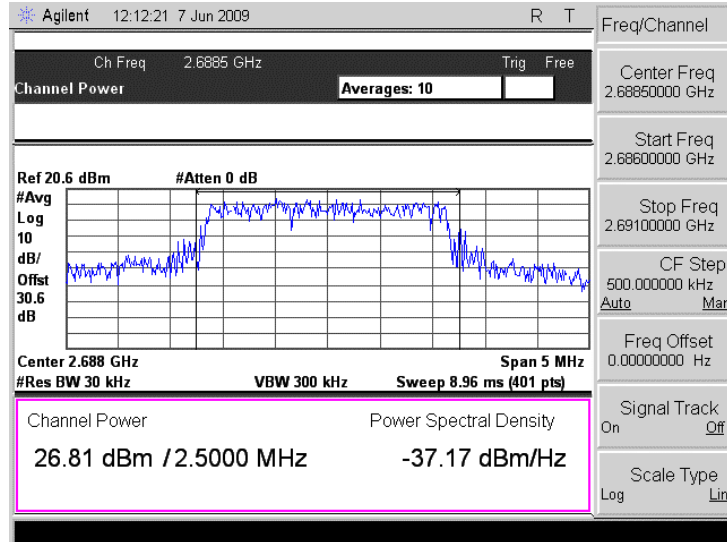




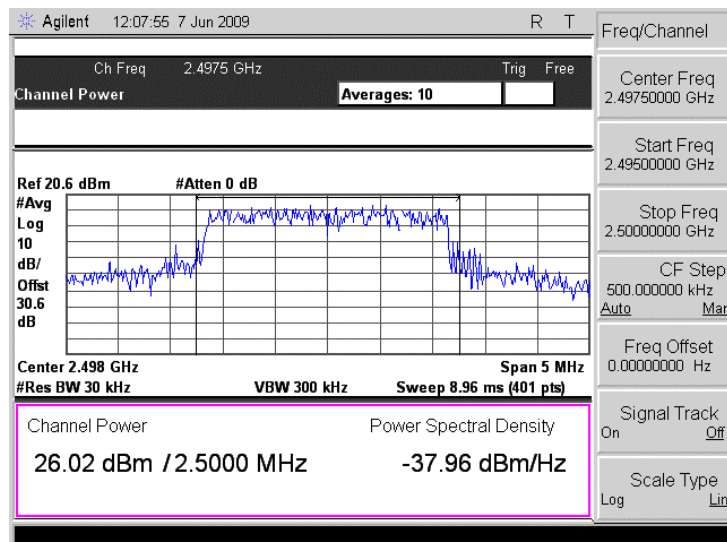
HERMON LABORATORIES

Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Plot 7.2.9 Power spectral density test results at high frequency, 16QAM, 2.5 MHz EBW



Plot 7.2.10 Power spectral density test results at low frequency, 64QAM, 2.5 MHz EBW

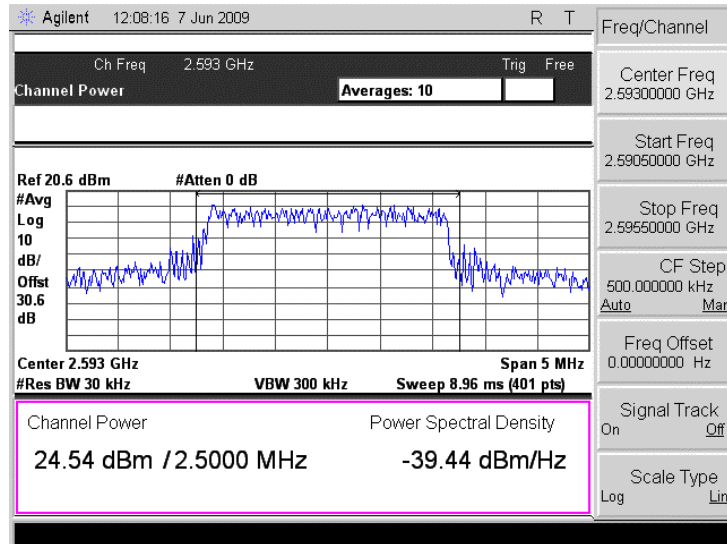




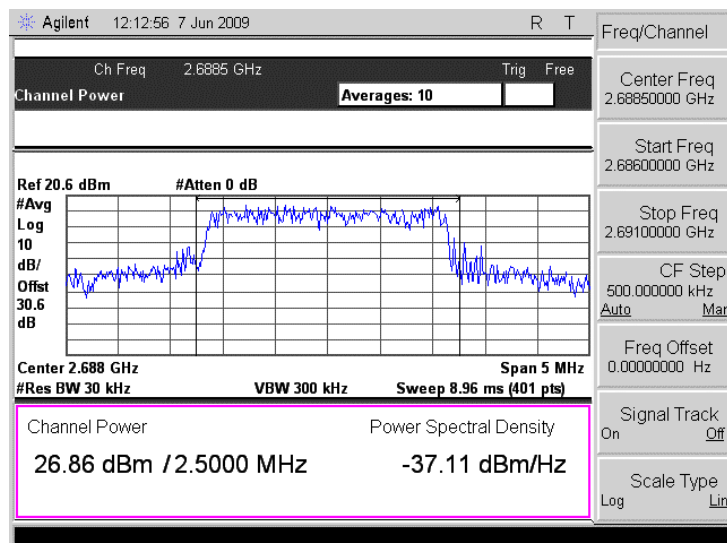
HERMON LABORATORIES

Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Plot 7.2.11 Power spectral density test results at mid frequency, 64QAM, 2.5 MHz EBW



Plot 7.2.12 Power spectral density test results at high frequency, 64QAM, 2.5 MHz EBW

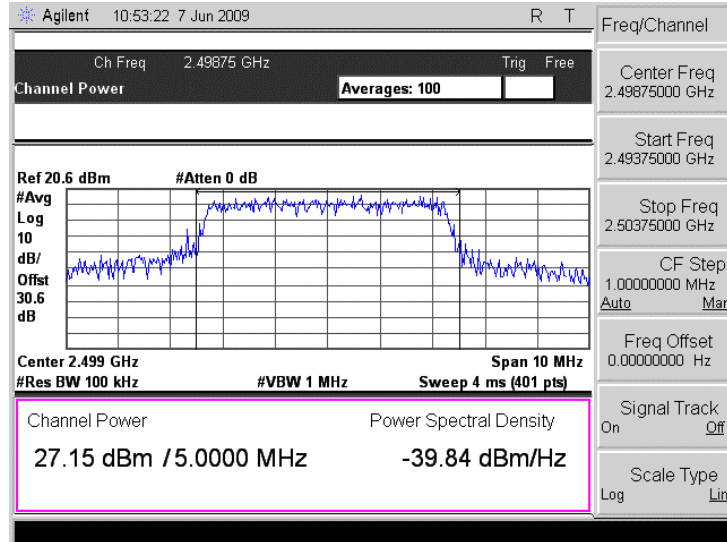




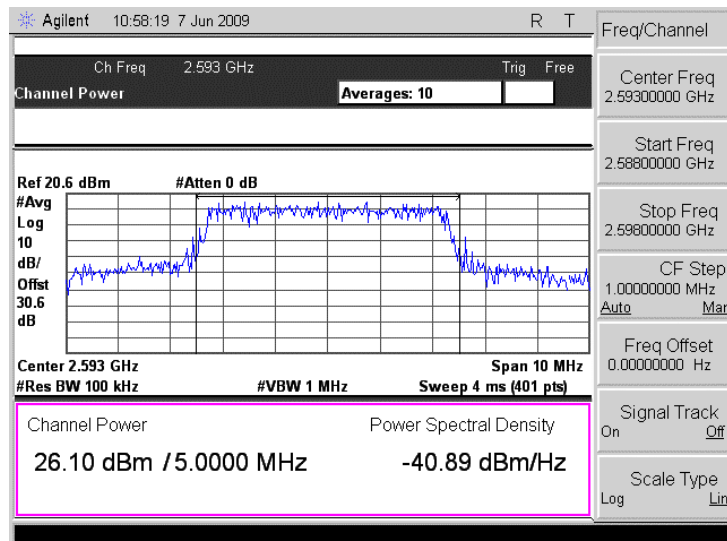
HERMON LABORATORIES

Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Plot 7.2.13 Power spectral density test results at low frequency, BPSK, 5 MHz EBW



Plot 7.2.14 Power spectral density test results at mid frequency, BPSK, 5 MHz EBW

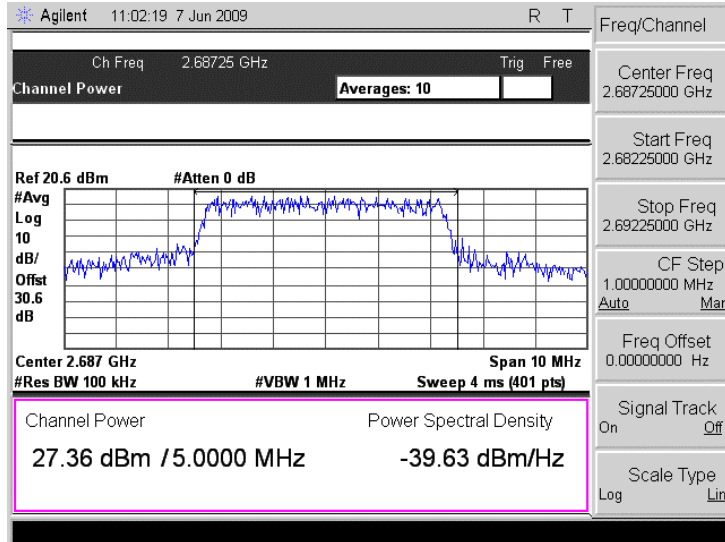




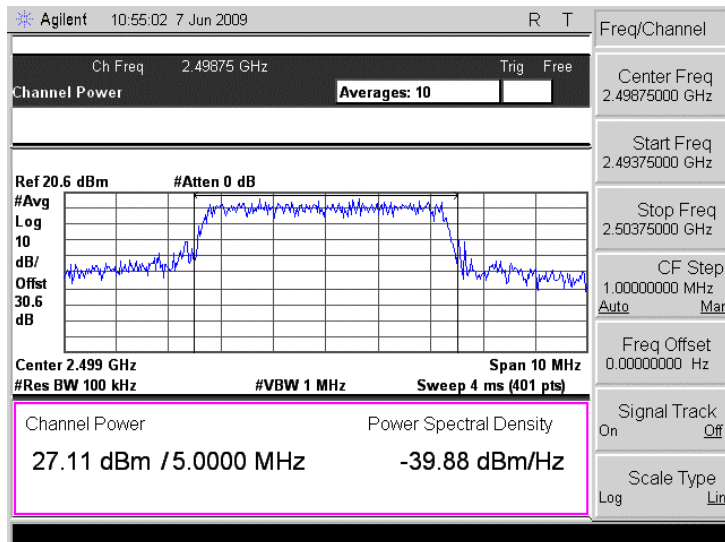
HERMON LABORATORIES

Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Plot 7.2.15 Power spectral density test results at high frequency, BPSK, 5 MHz EBW



Plot 7.2.16 Power spectral density test results at low frequency, QPSK, 5 MHz EBW

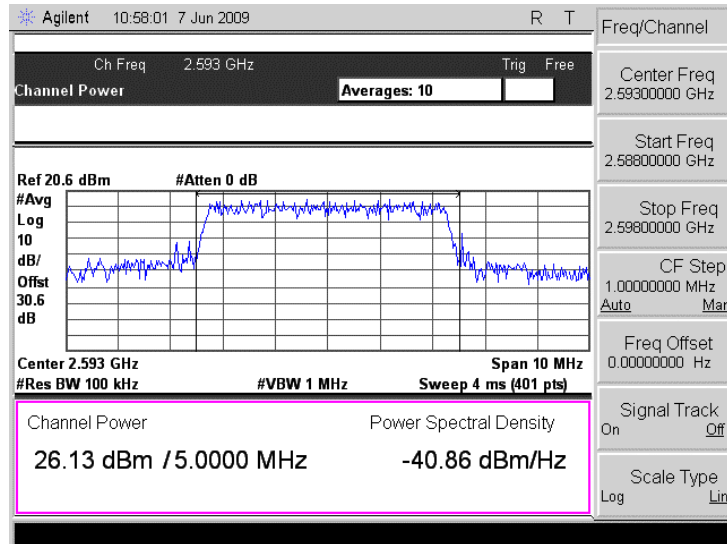




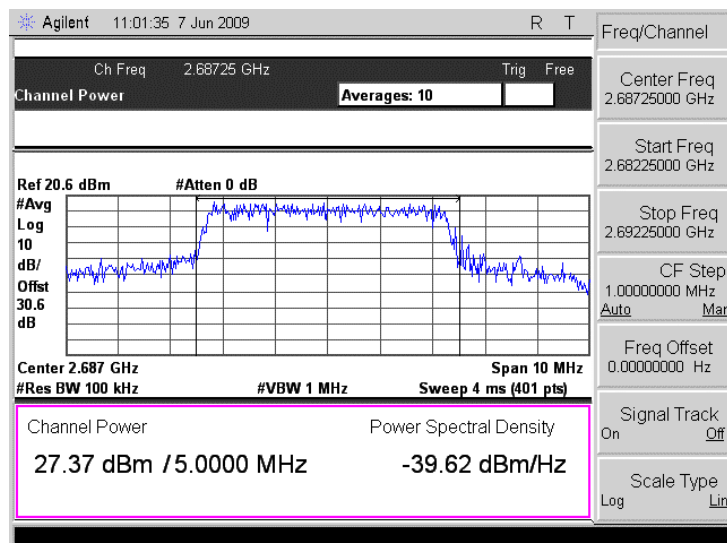
HERMON LABORATORIES

Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Plot 7.2.17 Power spectral density test results at mid frequency, QPSK, 5 MHz EBW



Plot 7.2.18 Power spectral density test results at high frequency, QPSK, 5 MHz EBW

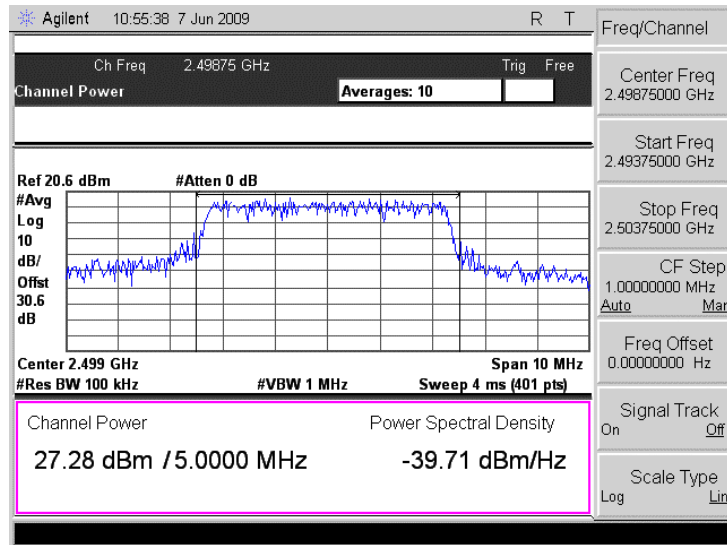




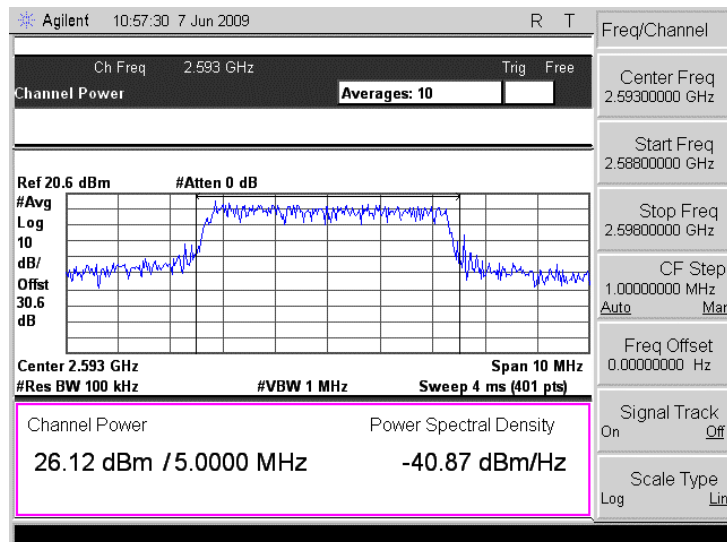
HERMON LABORATORIES

Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Plot 7.2.19 Power spectral density test results at low frequency, 16QAM, 5 MHz EBW



Plot 7.2.20 Power spectral density test results at mid frequency, 16QAM, 5 MHz EBW

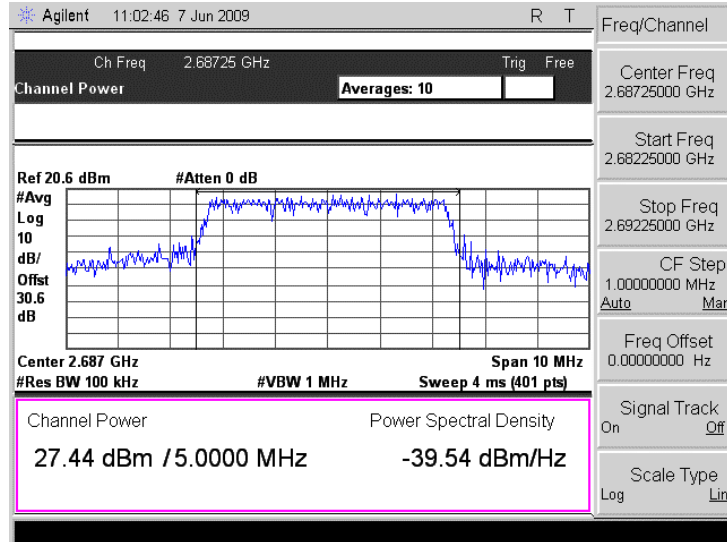




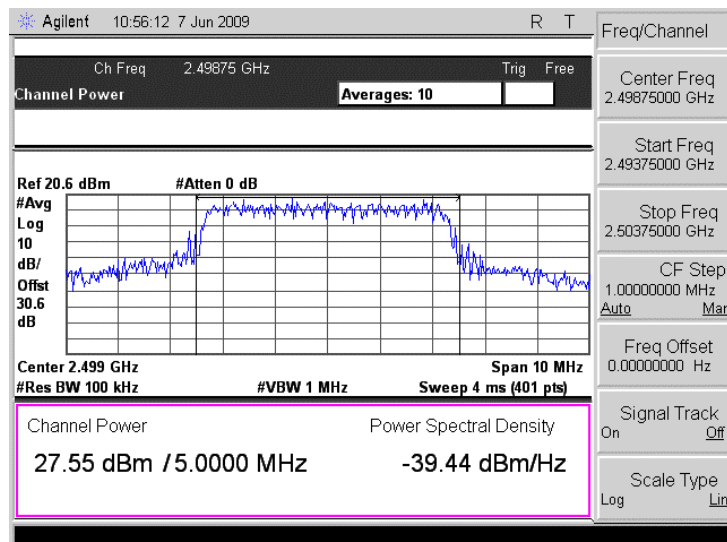
HERMON LABORATORIES

Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Plot 7.2.21 Power spectral density test results at high frequency, 16QAM, 5 MHz EBW



Plot 7.2.22 Power spectral density test results at low frequency, 64QAM, 5 MHz EBW

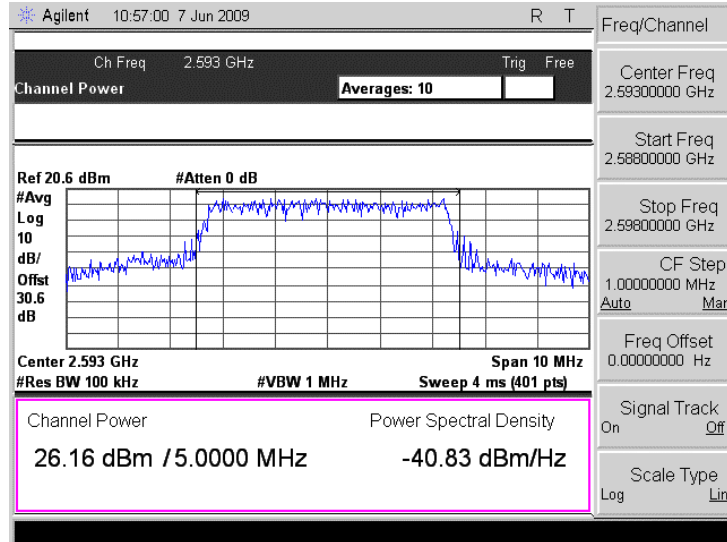




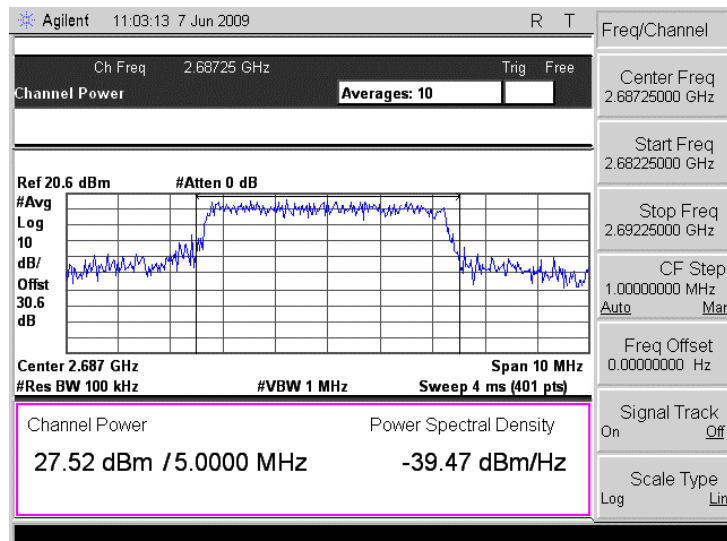
HERMON LABORATORIES

Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Plot 7.2.23 Power spectral density test results at mid frequency, 64QAM, 5 MHz EBW



Plot 7.2.24 Power spectral density test results at high frequency, 64QAM, 5 MHz EBW

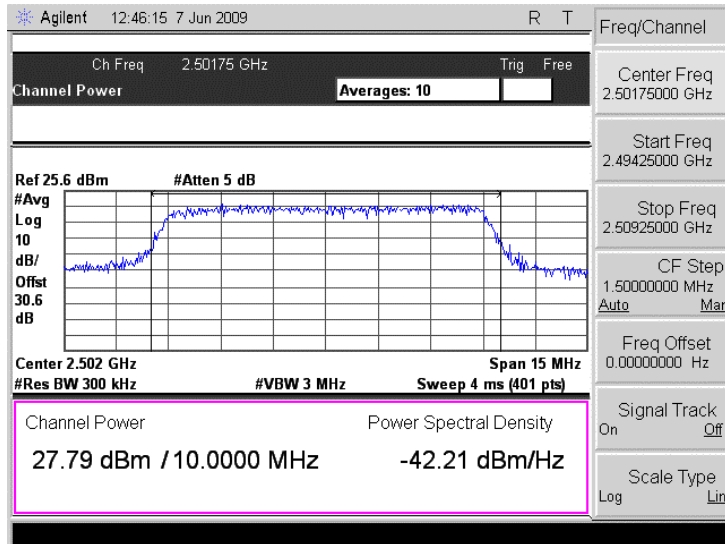




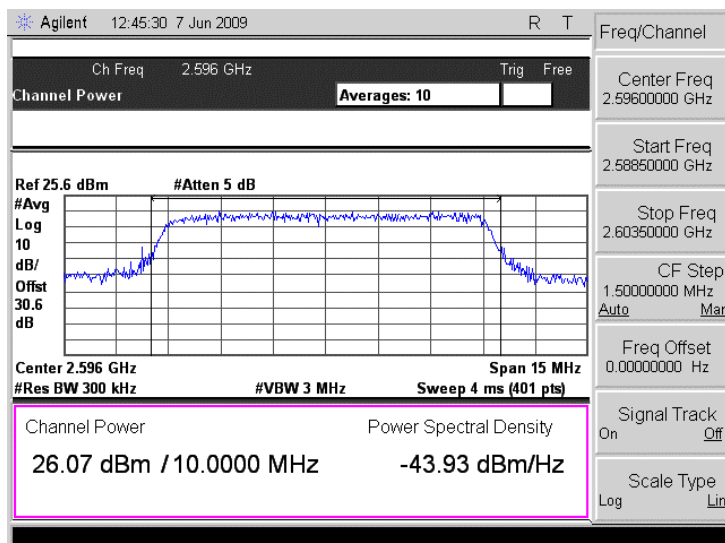
HERMON LABORATORIES

Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Plot 7.2.25 Power spectral density test results at low frequency, BPSK, 10 MHz EBW



Plot 7.2.26 Power spectral density test results at mid frequency, BPSK, 10 MHz EBW

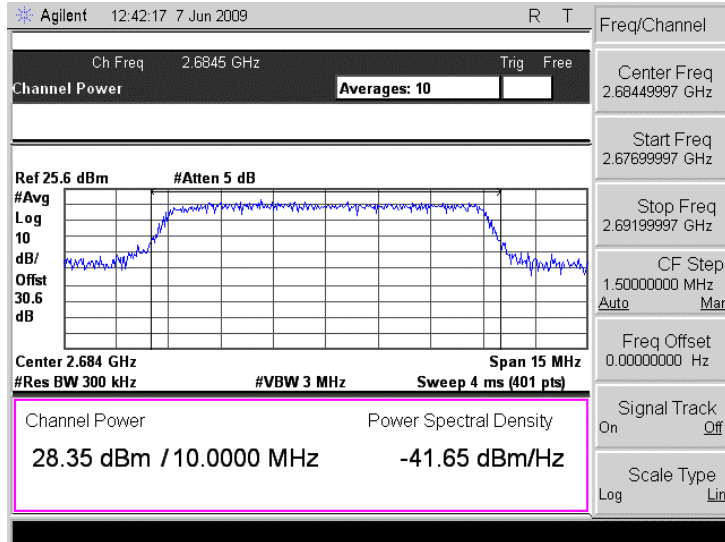




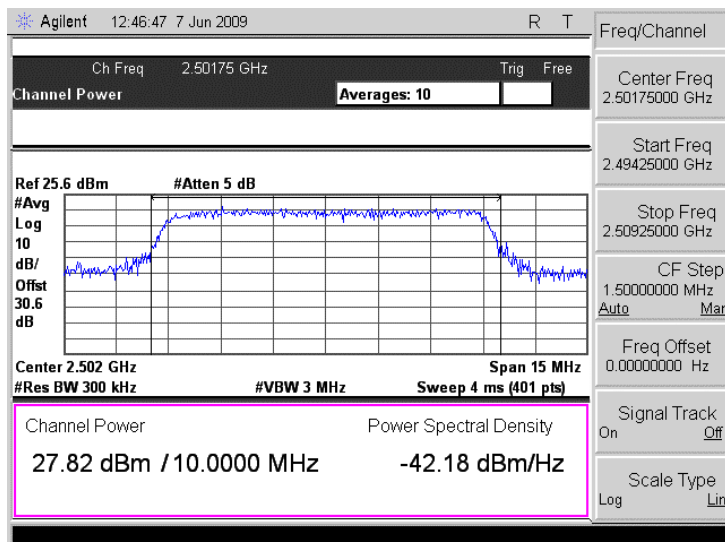
HERMON LABORATORIES

Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Plot 7.2.27 Power spectral density test results at high frequency, BPSK, 10 MHz EBW



Plot 7.2.28 Power spectral density test results at low frequency, QPSK, 10 MHz EBW

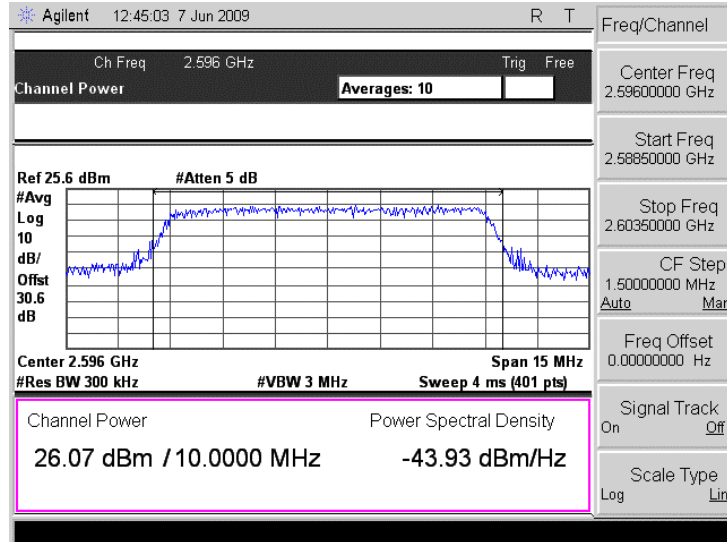




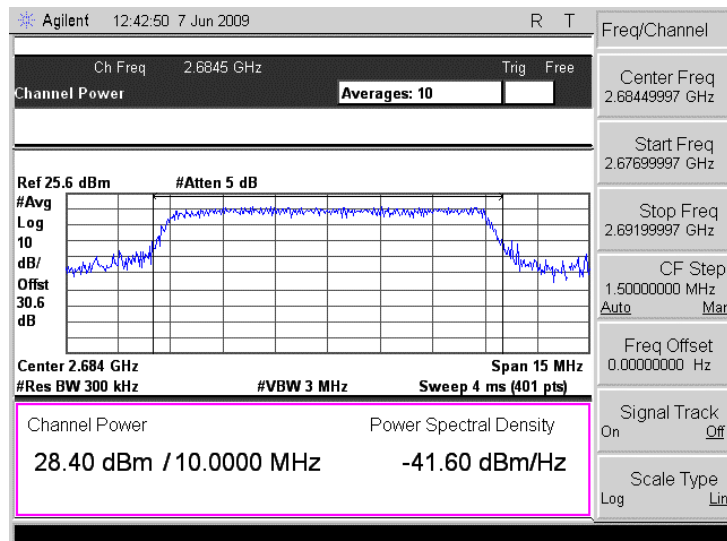
HERMON LABORATORIES

Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Plot 7.2.29 Power spectral density test results at mid frequency, QPSK, 10 MHz EBW



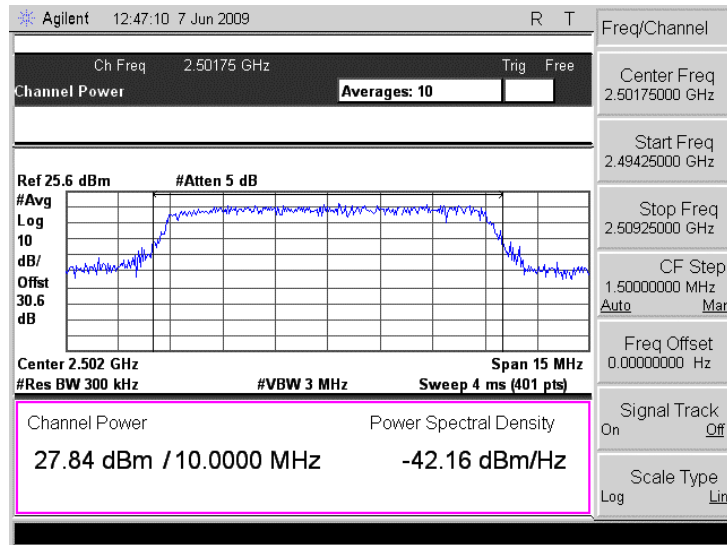
Plot 7.2.30 Power spectral density test results at high frequency, QPSK, 10 MHz EBW



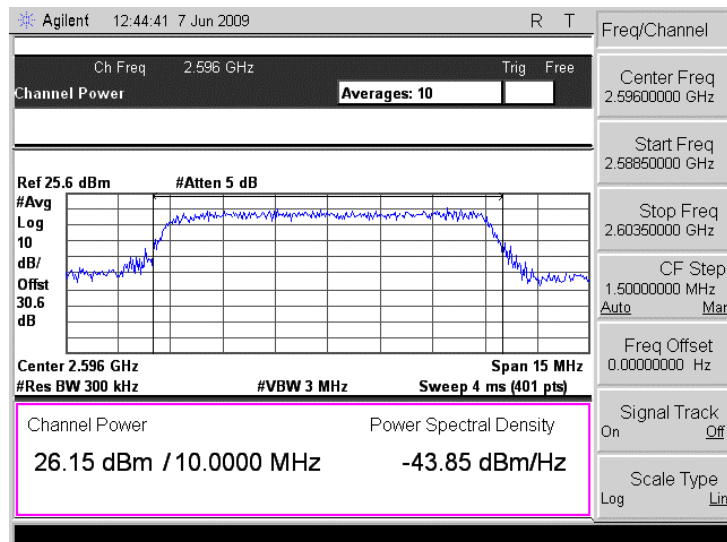


Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Plot 7.2.31 Power spectral density test results at low frequency, 16QAM, 10 MHz EBW



Plot 7.2.32 Power spectral density test results at mid frequency, 16QAM, 10 MHz EBW

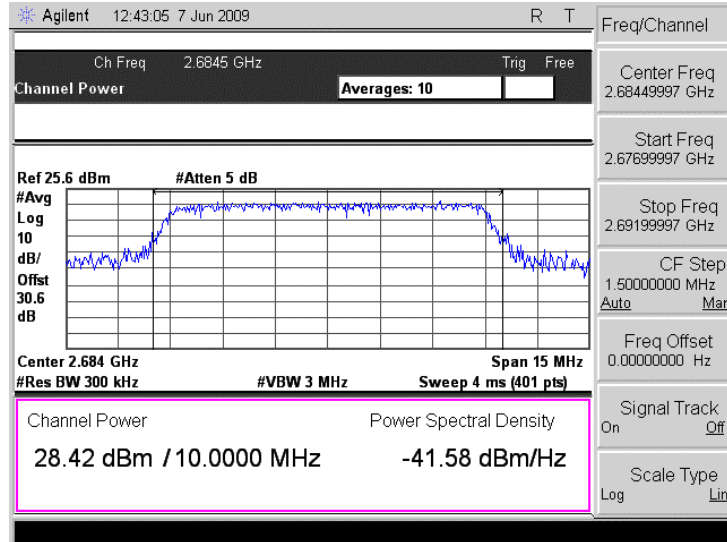




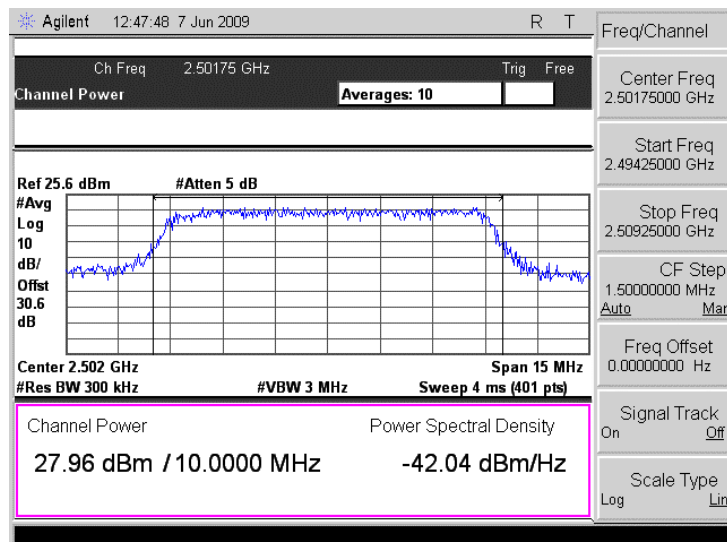
HERMON LABORATORIES

Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Plot 7.2.33 Power spectral density test results at high frequency, 16QAM, 10 MHz EBW



Plot 7.2.34 Power spectral density test results at low frequency, 64QAM, 10 MHz EBW

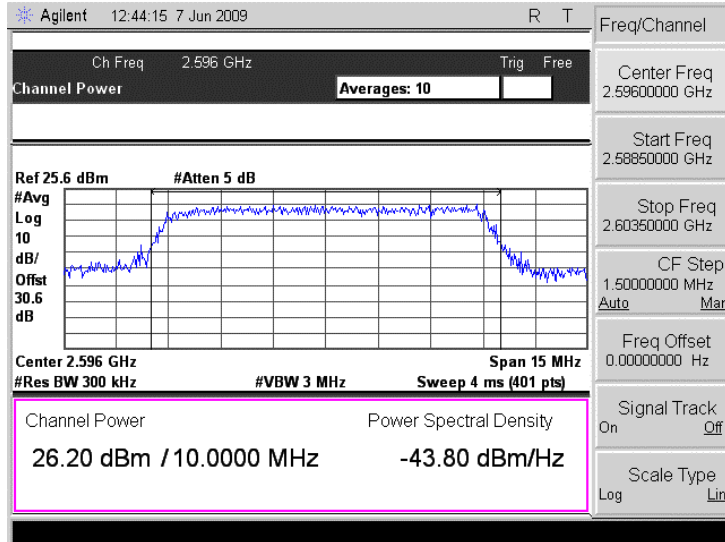




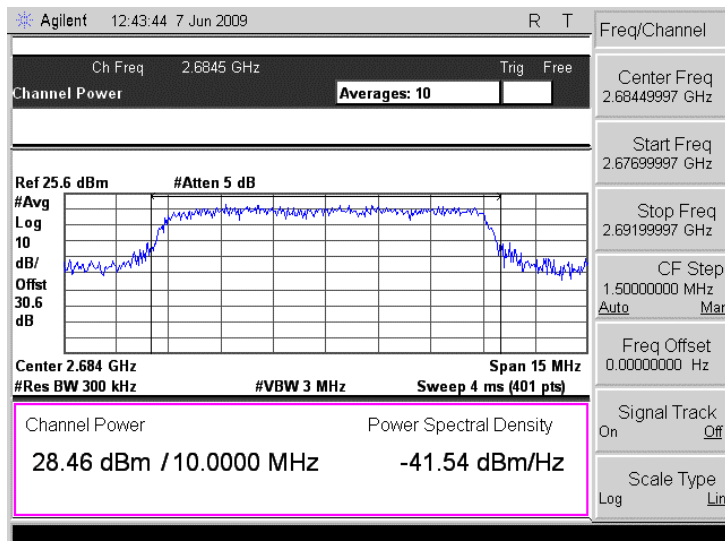
HERMON LABORATORIES

Test specification:	Section 27.50(h), Peak output power		
Test procedure:	Section 27.50(h)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/18/2009 1:05:49 PM		
Temperature: 25°C	Air Pressure: 1008 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Plot 7.2.35 Power spectral density test results at mid frequency, 64QAM, 10 MHz EBW



Plot 7.2.36 Power spectral density test results at high frequency, 64QAM, 10 MHz EBW





Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/24/2009 4:36:57 PM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

7.3 Conducted spurious emissions at the band edges (emission mask)

7.3.1 General

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

Table 7.3.1 Spurious emission limits

Channel	Frequency range	Attenuation below carrier, dBc	Limit, dBm
Channel bandwidth 2.5 MHz			
2497.5	2491.0 – 2496.0 2499.0 – 2504.0	43+ 10*Log (P*)	-13.0
2593.0	2586.5 – 2591.5 2594.5 – 2599.5	43+ 10*Log (P*)	-13.0
2688.5	2682.0 – 2687.0 2690.0 – 2695.0	43+ 10*Log (P*)	-13.0
Channel bandwidth 5 MHz			
2498.5	2491.0 – 2496.0 2501.5 – 2506.5	43+ 10*Log (P*)	-13.0
2593.0	2585.0 – 2690.0 2596.0 – 2601.0	43+ 10*Log (P*)	-13.0
2687.5	2679.5 – 2684.5 2690.0 – 2695.0	43+ 10*Log (P*)	-13.0
Channel bandwidth 10 MHz			
2498.5	2491.0 – 2496.0 2507.5 – 2512.5	43+ 10*Log (P*)	-13.0
2593.0	2585.0 – 2590.0 2602.0 – 2607.0	43+ 10*Log (P*)	-13.0
2687.5	2674.0 – 2679.0 2690.0 – 2695.0	43+ 10*Log (P*)	-13.0

* - P is transmitter output power in Watts

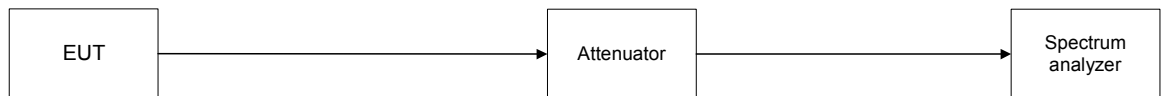
7.3.2 Test procedure

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

7.3.2.2 The spurious emissions were measured with spectrum analyzer as provided in the associated plots.

7.3.2.3 The worst case results are provided in Table 7.3.2 and Table 7.3.3.

Figure 7.3.1 Conducted spurious emission test setup





HERMON LABORATORIES

Test specification:		Section 27.53(m)(2), Conducted spurious emissions at the band edges	
Test procedure:		Section 27.53(m)(2)	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/24/2009 4:36:57 PM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

Table 7.3.2 Spurious emission at the band edges test results

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
 INVESTIGATED FREQUENCY RANGE: See Table 7.3.1
 RBW: 1 % of EBW
 DETECTOR USED: Average
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 MODULATION: BPSK, QPSK, 16QAM, 64QAM
 The worst case results provided in the following table.

Frequency offset, ± MHz	SA reading, dBm low range	SA reading, dBm high range	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
2.5 EBW						
Low carrier frequency 2497.5 MHz 64QAM 2.5 MHz EBW (Output power = 26.16 dBm)						
2.0	-13.77	-16.36	30	1000	-13.0	Pass
3.0	-22.25	-24.70	30	1000	-13.0	
4.0	-29.47	-29.85	30	1000	-13.0	
5.0	-34.18	-33.91	30	1000	-13.0	
6.0	-37.63	-36.10	30	1000	-13.0	
Mid carrier frequency 2593.0 MHz 64QAM 2.5 MHz EBW (Output power = 24.46 dBm)						
2.0	-15.06	-17.46	30	1000	-13.0	Pass
3.0	-22.20	-23.50	30	1000	-13.0	
4.0	-28.41	-28.47	30	1000	-13.0	
5.0	-33.82	-33.13	30	1000	-13.0	
6.0	-37.77	-36.63	30	1000	-13.0	
Mid carrier frequency 2688.5 MHz 64QAM 2.5 MHz EBW (Output power = 26.63 dBm)						
2.0	-13.20	-15.29	30	1000	-13.0	Pass
3.0	-21.17	-23.21	30	1000	-13.0	
4.0	-28.07	-28.72	30	1000	-13.0	
5.0	-32.69	-32.69	30	1000	-13.0	
6.0	-35.81	-35.63	30	1000	-13.0	



HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/24/2009 4:36:57 PM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

Table 7.3.3 Spurious emission at the band edges test results

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
 INVESTIGATED FREQUENCY RANGE: See Table 7.3.1
 RBW: 1 % of EBW
 DETECTOR USED: Average
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 MODULATION: BPSK, QPSK, 16QAM, 64QAM
 The worst case results provided in the following table.

Frequency offset, ± MHz	SA reading, dBm low range	SA reading, dBm high range	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
5 MHz EBW						
Low carrier frequency 2498.75 MHz 64QAM 5 MHz EBW (Output power = 26.42 dBm)						
3.25	-13.67	-16.35	100	1000	-13.0	Pass
4.25	-17.86	-21.22	100	1000	-13.0	
5.25	-21.55	-24.18	100	1000	-13.0	
6.25	-25.75	-26.39	100	1000	-13.0	
7.25	-28.72	-29.52	100	1000	-13.0	
Mid carrier frequency 2593.0 MHz QPSK 5 MHz EBW (Output power = 24.88 dBm)						
3.5	-16.77	-19.84	100	1000	-13.0	Pass
4.5	-20.01	-22.67	100	1000	-13.0	
5.5	-23.66	-25.01	100	1000	-13.0	
6.5	-27.52	-28.35	100	1000	-13.0	
7.5	-30.35	-30.49	100	1000	-13.0	
Mid carrier frequency 2687.25 MHz 64QAM 5 MHz EBW (Output power = 26.71 dBm)						
3.25	-13.60	-16.95	100	1000	-13.0	Pass
4.25	-16.75	-21.30	100	1000	-13.0	
5.25	-20.94	-23.43	100	1000	-13.0	
6.25	-25.21	-27.02	100	1000	-13.0	
7.25	-27.55	-30.68	100	1000	-13.0	
10 MHz EBW						
Low carrier frequency 2501.75 MHz BPSK 10 MHz EBW (Output power = 27.79 dBm)						
6.25	-16.17	-18.60	300	1000	-13.0	Pass
7.25	-17.99	-19.91	300	1000	-13.0	
8.25	-20.31	-20.88	300	1000	-13.0	
9.25	-21.38	-23.43	300	1000	-13.0	
10.25	-22.96	-24.99	300	1000	-13.0	
Mid carrier frequency 2596.0 MHz 64QAM 10 MHz EBW (Output power = 26.50 dBm)						
6.5	-18.49	-21.66	300	1000	-13.0	Pass
7.5	-20.23	-22.26	300	1000	-13.0	
8.5	-21.84	-23.57	300	1000	-13.0	
9.5	-23.00	-24.96	300	1000	-13.0	
10.5	-24.33	-26.26	300	1000	-13.0	
Mid carrier frequency 2684.5 MHz 64QAM 10 MHz EBW (Output power = 28.46 dBm)						
6.0	-13.30	-13.94	300	1000	-13.0	Pass
7.0	-14.50	-15.33	300	1000	-13.0	
8.0	-16.90	-17.69	300	1000	-13.0	
9.0	-19.26	-19.50	300	1000	-13.0	
10.0	-20.49	-22.14	300	1000	-13.0	

NOTE: For the rest test results please see Plot 7.3.1- Plot 7.3.36

Reference numbers of test equipment used

HL 2909	HL 3437	HL 3442	HL 3559			
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Full description is given in Appendix A.

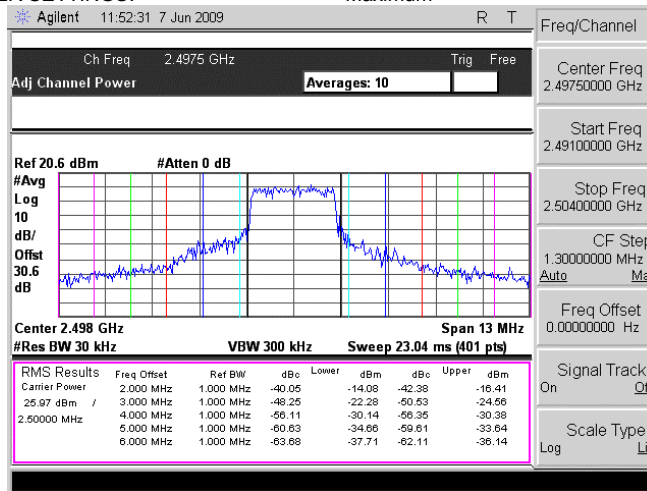


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/24/2009 4:36:57 PM	Relative Humidity:	%
Temperature: °C	Air Pressure: hPa	Power Supply:	
Remarks:			

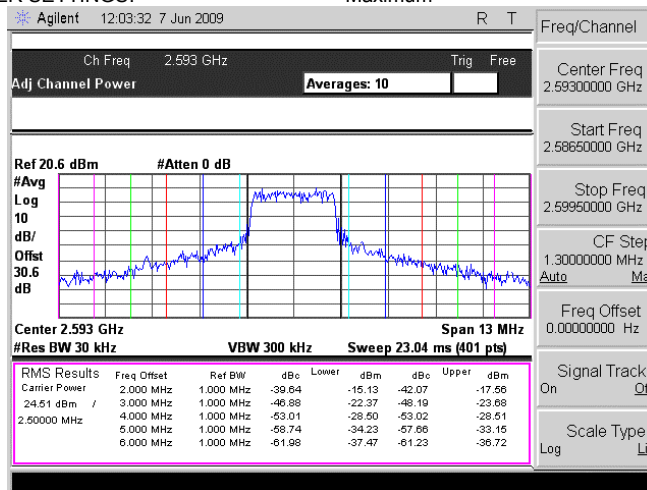
Plot 7.3.1 Emission mask test results at low carrier frequency, 2.5 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: BPSK
MODULATING SIGNAL: PRBS
BIT RATE: 1.0475 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.2 Emission mask test results at mid carrier frequency, 2.5 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: BPSK
MODULATING SIGNAL: PRBS
BIT RATE: 1.0475 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



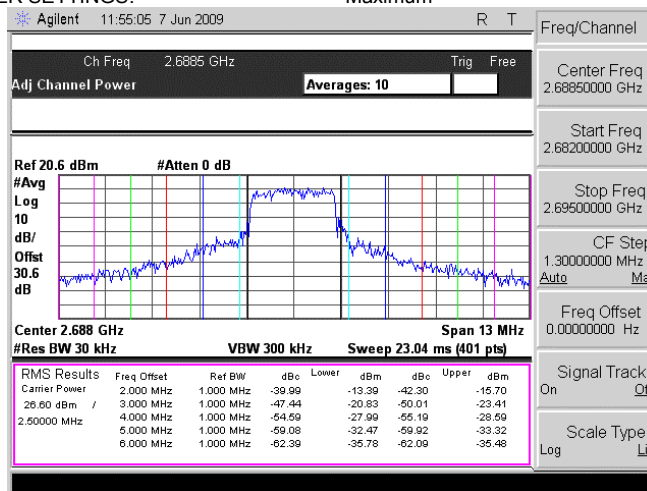


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/24/2009 4:36:57 PM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

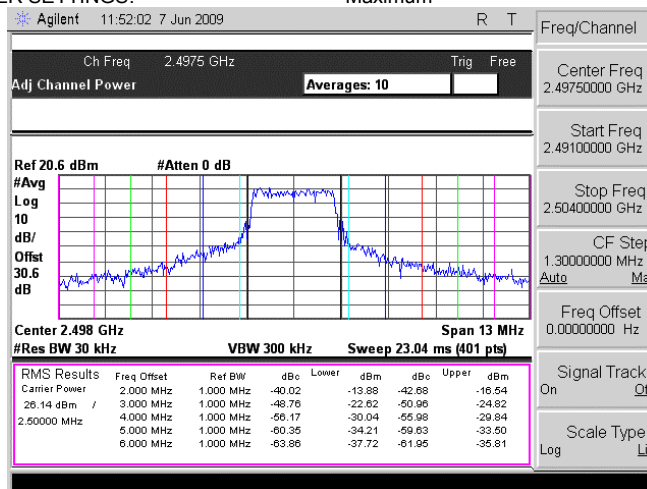
Plot 7.3.3 Emission mask test results at high carrier frequency, 2.5 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
 DETECTOR USED: Average
 MODULATION: BPSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 1.0475 Mbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.4 Emission mask test results at low carrier frequency, 2.5 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
 DETECTOR USED: Average
 MODULATION: QPSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 2.095 Mbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum



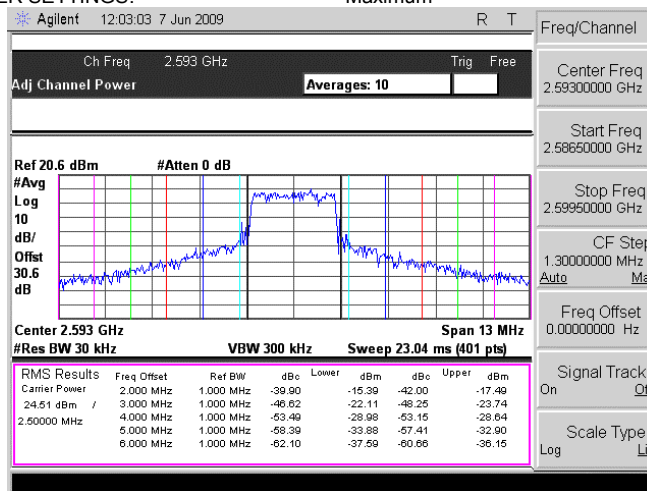


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/24/2009 4:36:57 PM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

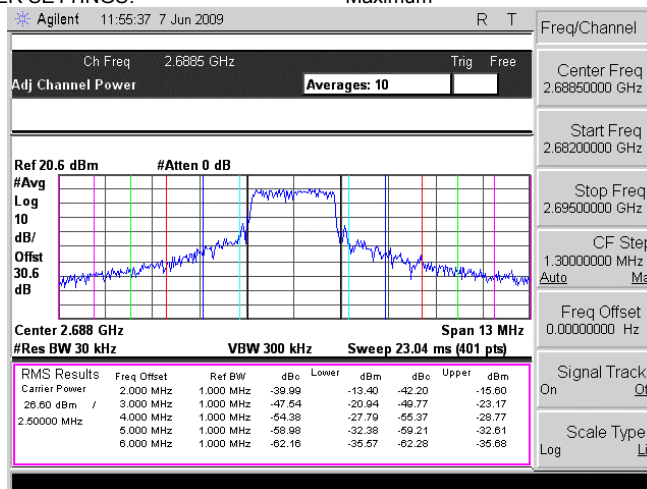
Plot 7.3.5 Emission mask test results at mid carrier frequency, 2.5 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 2.095 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.6 Emission mask test results at high carrier frequency, 2.5 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 2.095 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



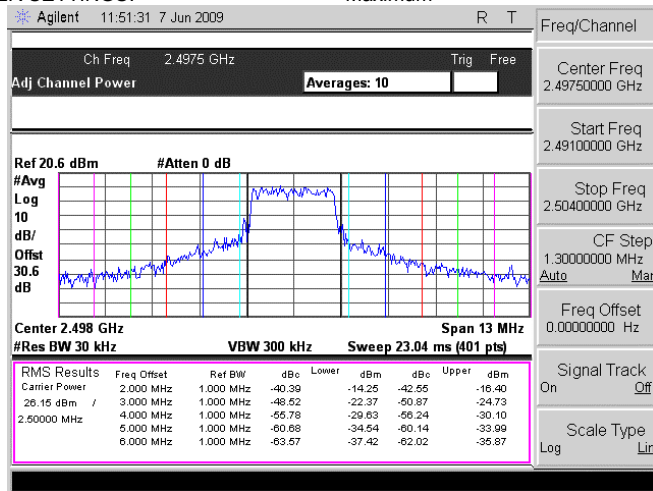


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/24/2009 4:36:57 PM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

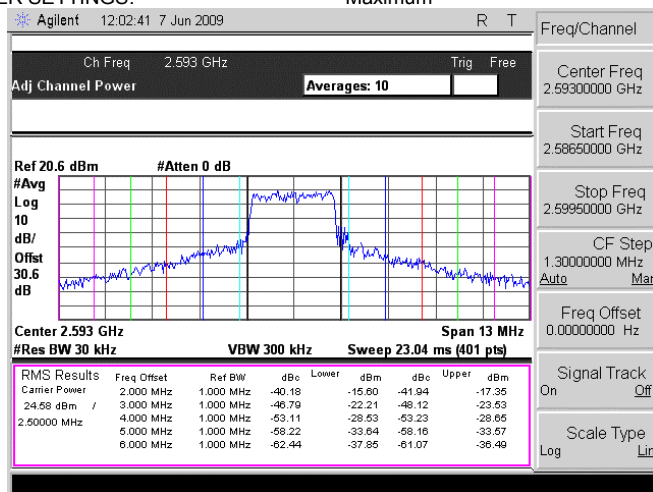
Plot 7.3.7 Emission mask test results at low carrier frequency, 2.5 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 16QAM
MODULATING SIGNAL: PRBS
BIT RATE: 6.2825 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.8 Emission mask test results at mid carrier frequency, 2.5 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 16QAM
MODULATING SIGNAL: PRBS
BIT RATE: 6.2825 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



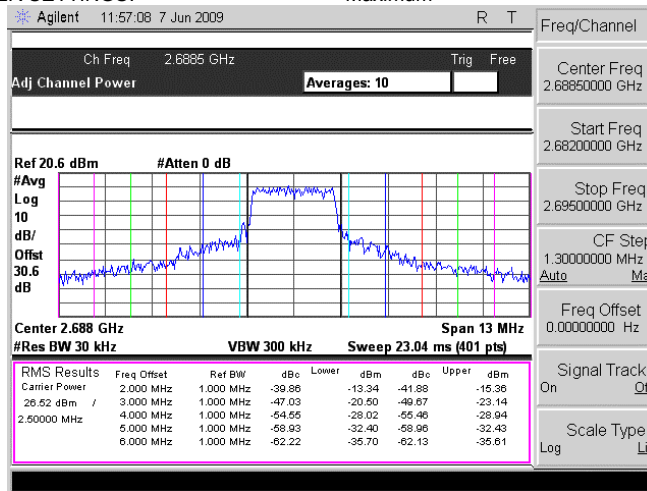


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/24/2009 4:36:57 PM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

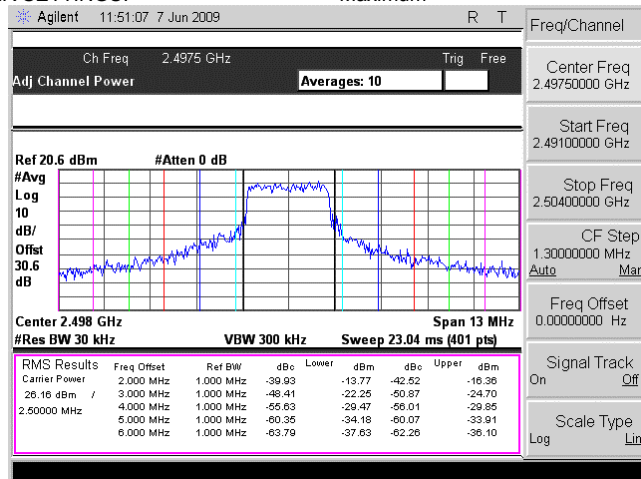
Plot 7.3.9 Emission mask test results at high carrier frequency, 2.5 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 16QAM
MODULATING SIGNAL: PRBS
BIT RATE: 6.2825 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.10 Emission mask test results at low carrier frequency, 2.5 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 9.425 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



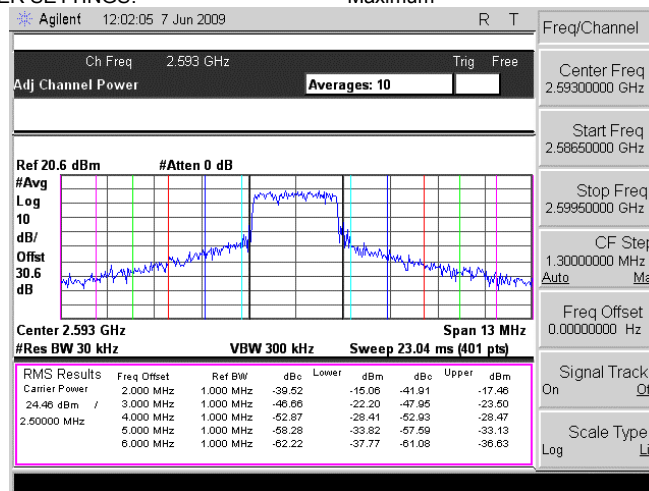


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/24/2009 4:36:57 PM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

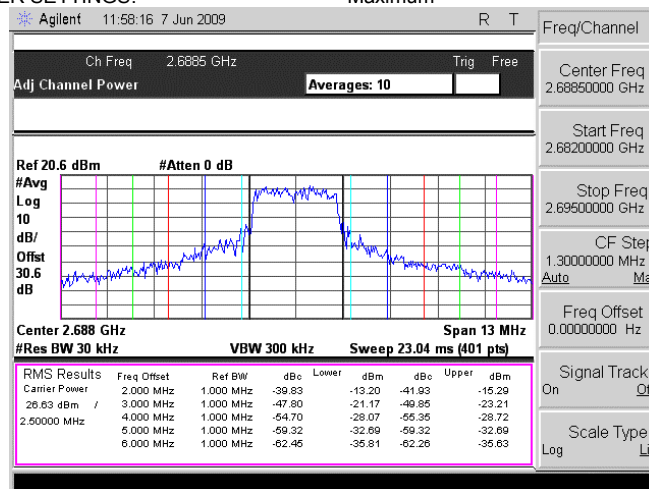
Plot 7.3.11 Emission mask test results at mid carrier frequency, 2.5 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 9.425 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.12 Emission mask test results at high carrier frequency, 2.5 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 9.425 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



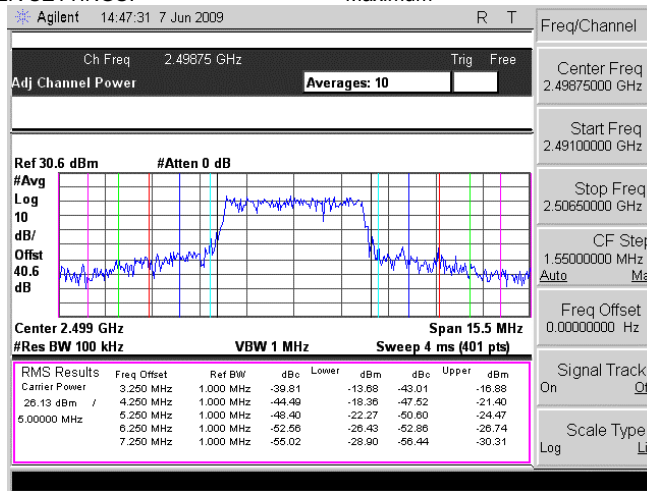


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/24/2009 4:36:57 PM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

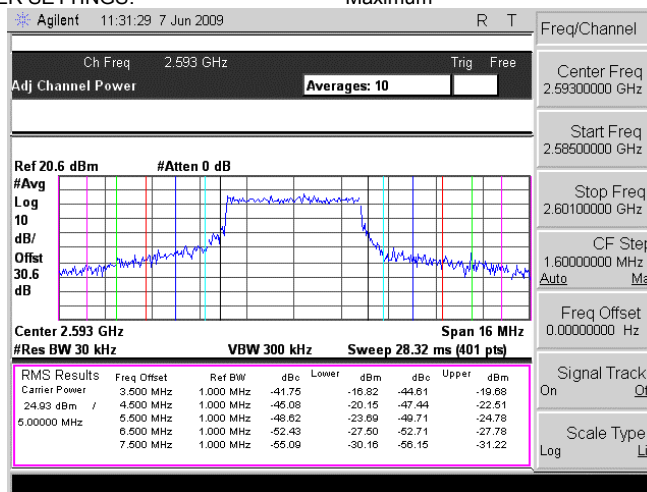
Plot 7.3.13 Emission mask test results at low carrier frequency, 5 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: BPSK
MODULATING SIGNAL: PRBS
BIT RATE: 2.095 MBps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.14 Emission mask test results at mid carrier frequency, 5 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: BPSK
MODULATING SIGNAL: PRBS
BIT RATE: 2.095 MBps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



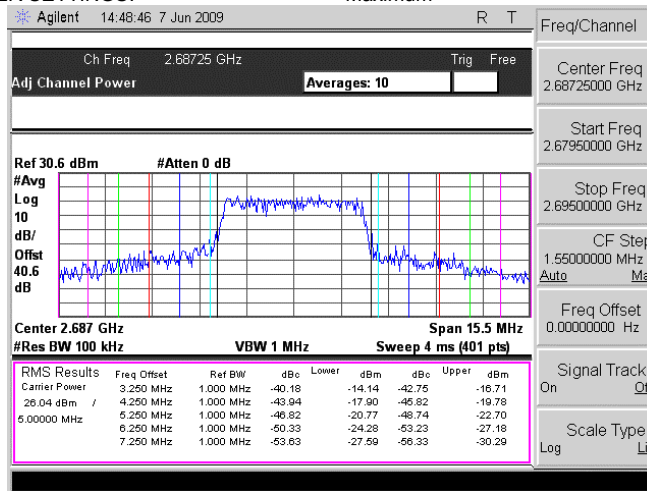


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/24/2009 4:36:57 PM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

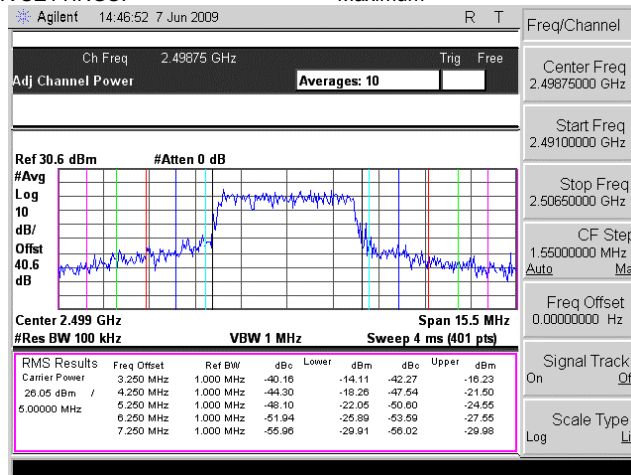
Plot 7.3.15 Emission mask test results at high carrier frequency, 5 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: BPSK
MODULATING SIGNAL: PRBS
BIT RATE: 2.095 MBps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.16 Emission mask test results at low carrier frequency, 5 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 4.19 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



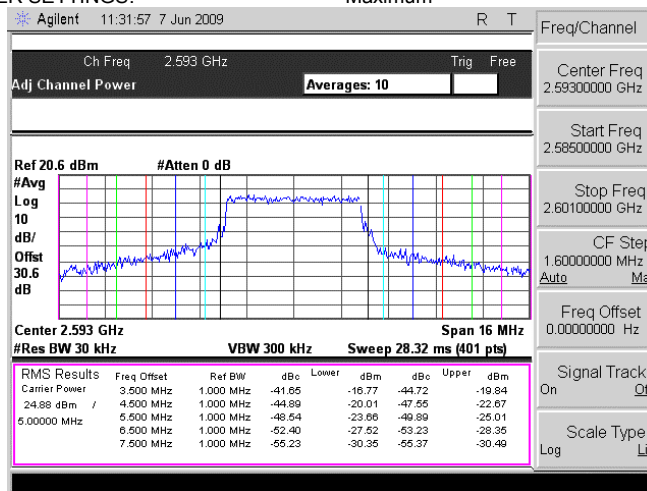


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/24/2009 4:36:57 PM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

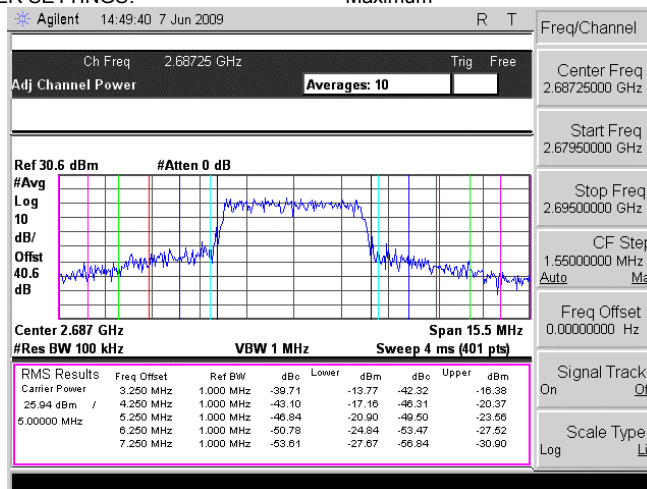
Plot 7.3.17 Emission mask test results at mid carrier frequency, 5 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 4.19 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.18 Emission mask test results at high carrier frequency, 5 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 4.19 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



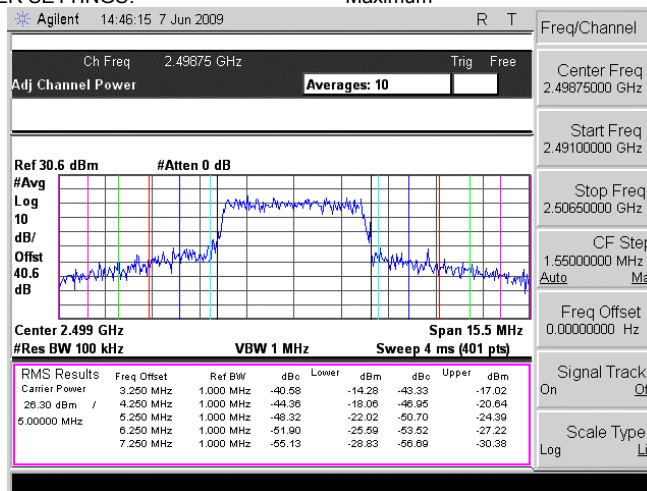


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/24/2009 4:36:57 PM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

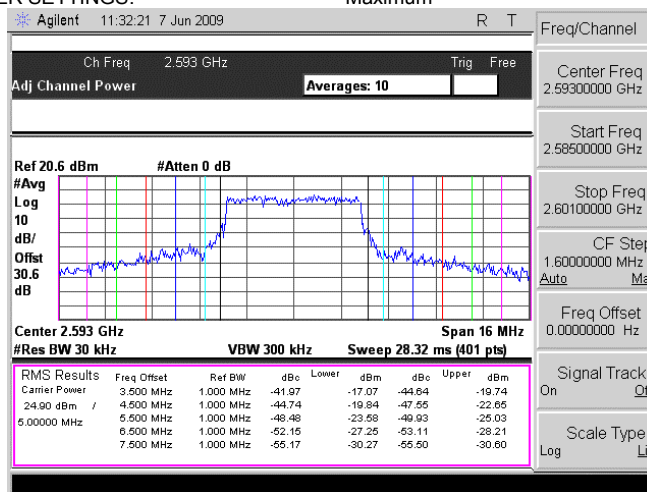
Plot 7.3.19 Emission mask test results at low carrier frequency, 5 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 16QAM
MODULATING SIGNAL: PRBS
BIT RATE: 12.565 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.20 Emission mask test results at mid carrier frequency, 5 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 16QAM
MODULATING SIGNAL: PRBS
BIT RATE: 12.565 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



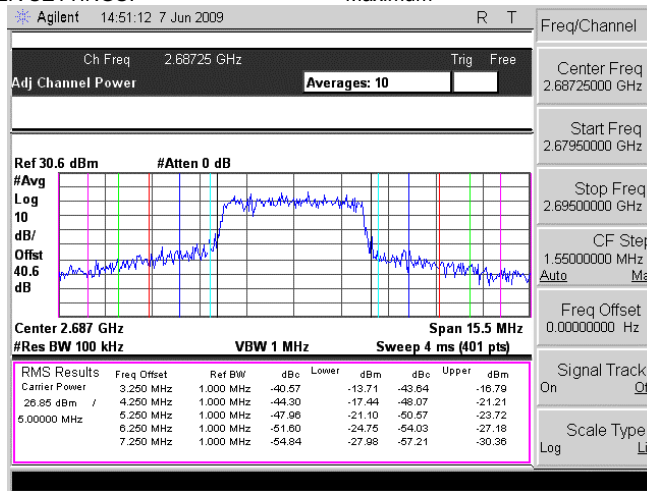


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/24/2009 4:36:57 PM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

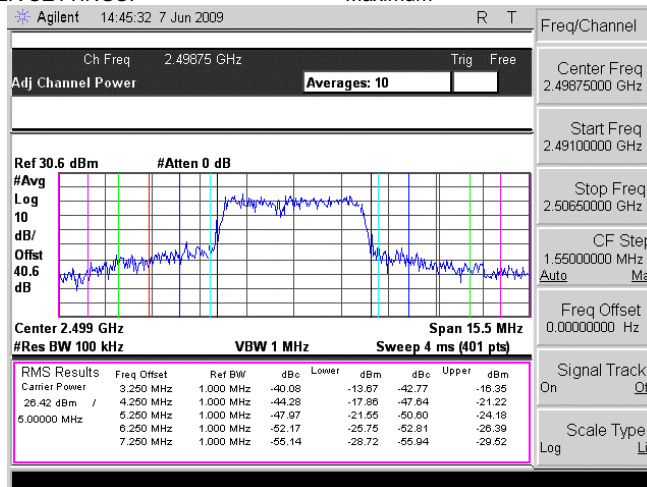
Plot 7.3.21 Emission mask test results at high carrier frequency, 5 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 16QAM
MODULATING SIGNAL: PRBS
BIT RATE: 12.565 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.22 Emission mask test results at low carrier frequency, 5 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 18.85 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



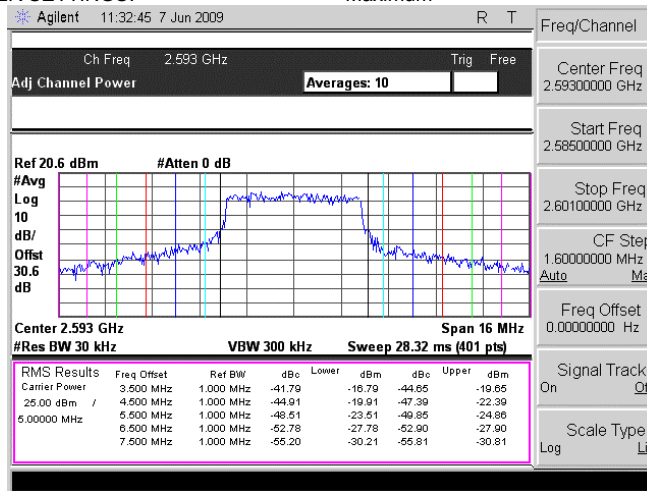


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/24/2009 4:36:57 PM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

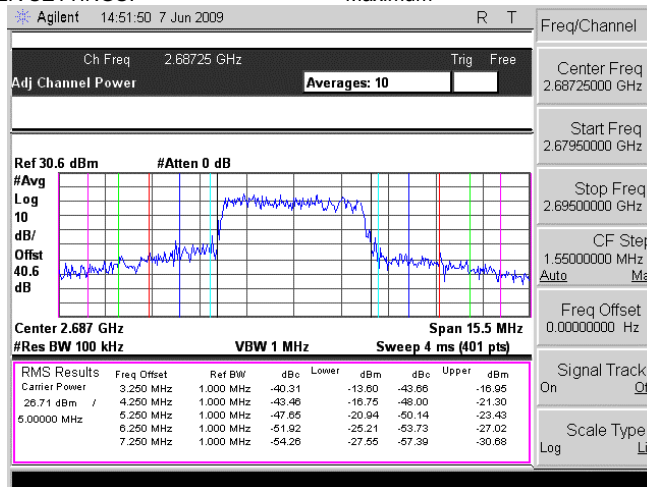
Plot 7.3.23 Emission mask test results at mid carrier frequency, 5 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 18.85 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.24 Emission mask test results at high carrier frequency, 5 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 18.85 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



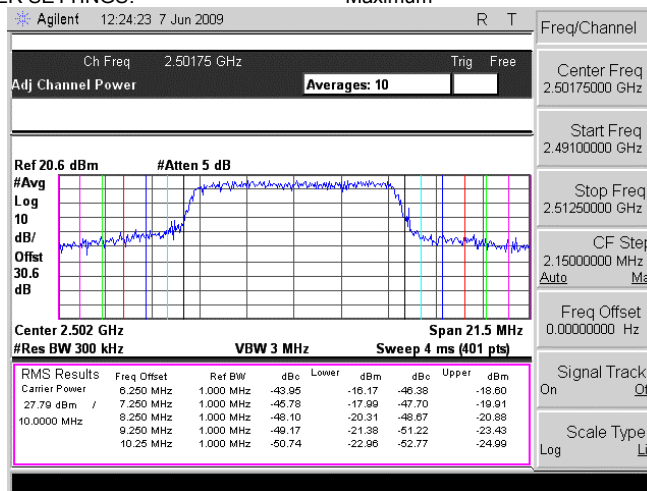


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/24/2009 4:36:57 PM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

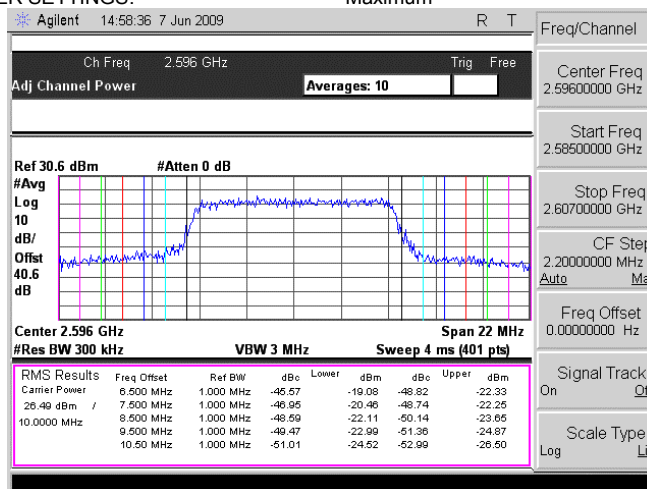
Plot 7.3.25 Emission mask test results at low carrier frequency, 10 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: BPSK
MODULATING SIGNAL: PRBS
BIT RATE: 4.19 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.26 Emission mask test results at mid carrier frequency, 10 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: BPSK
MODULATING SIGNAL: PRBS
BIT RATE: 4.19 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



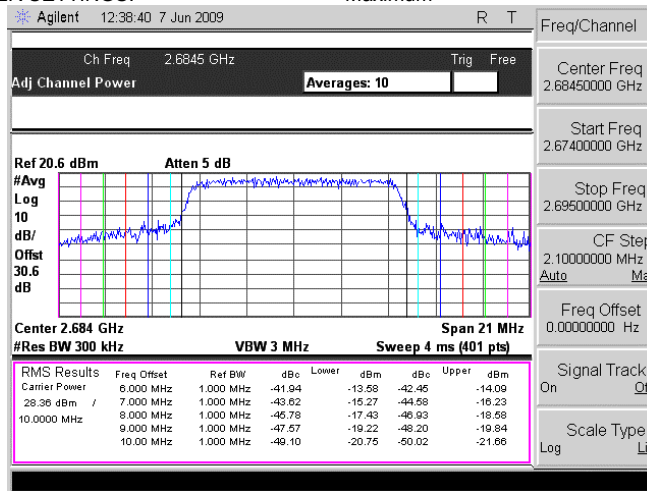


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/24/2009 4:36:57 PM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

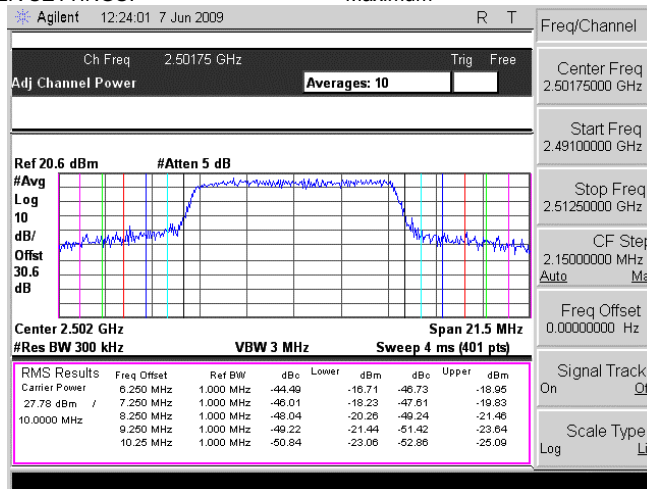
Plot 7.3.27 Emission mask test results at high carrier frequency, 10 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: BPSK
MODULATING SIGNAL: PRBS
BIT RATE: 4.19 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.28 Emission mask test results at low carrier frequency, 10 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 8.38 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



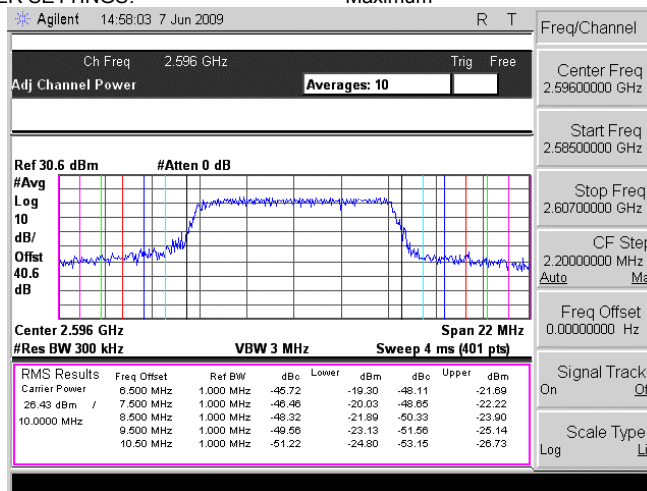


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/24/2009 4:36:57 PM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

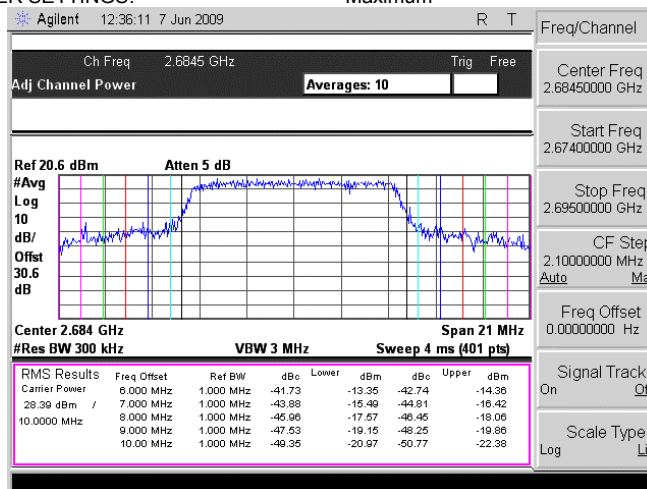
Plot 7.3.29 Emission mask test results at mid carrier frequency, 10 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 8.38 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.30 Emission mask test results at high carrier frequency, 10 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS
BIT RATE: 8.38 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



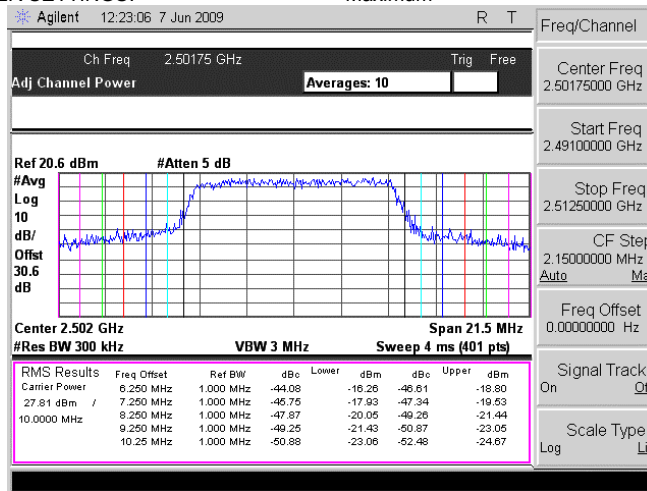


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/24/2009 4:36:57 PM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

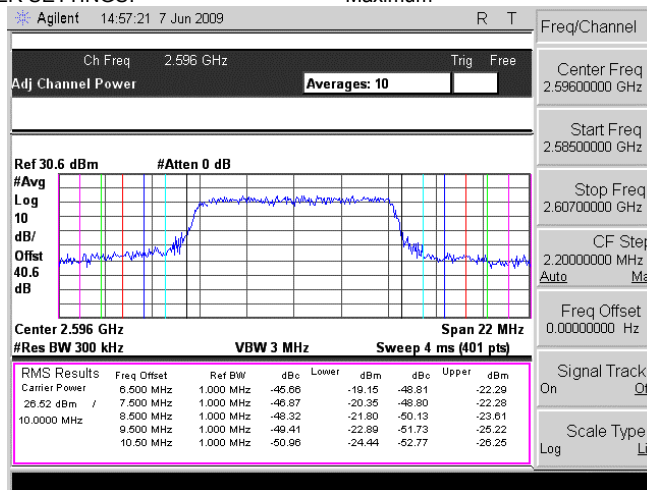
Plot 7.3.31 Emission mask test results at low carrier frequency, 10 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
 DETECTOR USED: Average
 MODULATION: 16QAM
 MODULATING SIGNAL: PRBS
 BIT RATE: 25.13 Mbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.32 Emission mask test results at mid carrier frequency, 10 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
 DETECTOR USED: Average
 MODULATION: 16QAM
 MODULATING SIGNAL: PRBS
 BIT RATE: 25.13 Mbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum



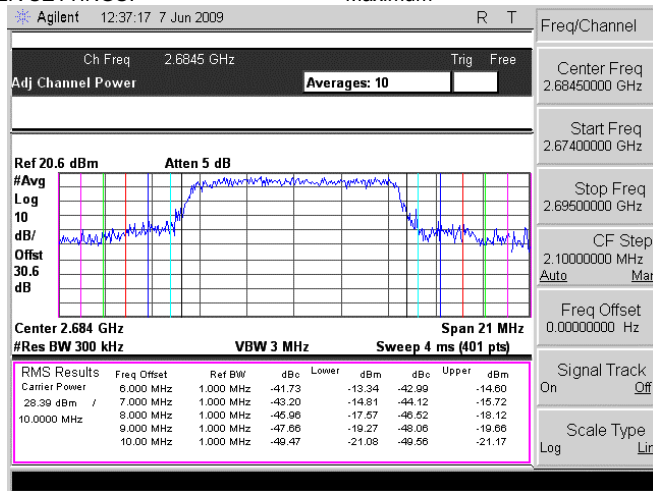


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/24/2009 4:36:57 PM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

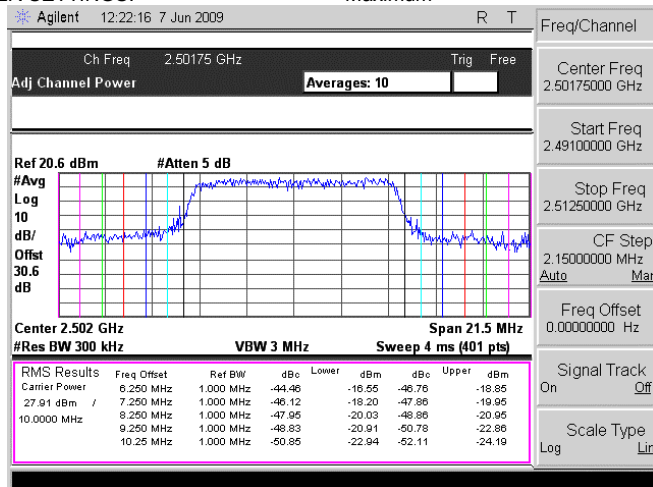
Plot 7.3.33 Emission mask test results at high carrier frequency, 10 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 16QAM
MODULATING SIGNAL: PRBS
BIT RATE: 25.13 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.34 Emission mask test results at low carrier frequency, 10 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 37.7 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



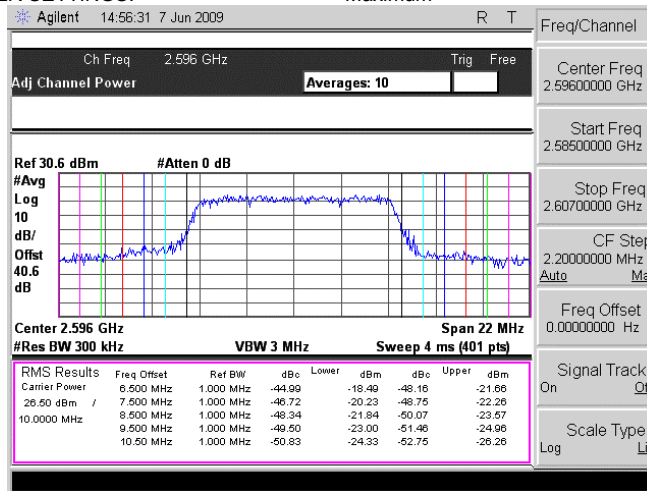


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions at the band edges		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/24/2009 4:36:57 PM		
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply:
Remarks:			

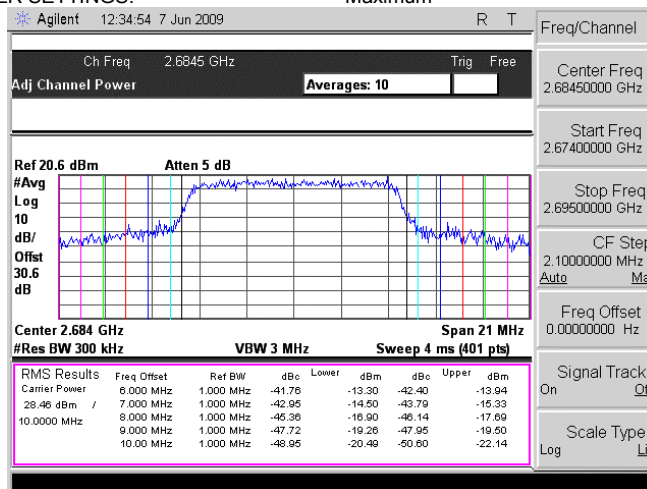
Plot 7.3.35 Emission mask test results at mid carrier frequency, 10 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 37.7 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.36 Emission mask test results at high carrier frequency, 10 MHz EBW

OPERATING FREQUENCY RANGE: 2496.0 – 2690.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 37.7 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum





Test specification:		Section 27.53(m)(2), Conducted spurious emissions	
Test procedure:		Section 27.53(m)(2)	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/24/2009 3:18:05 PM		
Temperature: 24.5 °C	Air Pressure: 1007 hPa	Relative Humidity: 40 %	Power Supply: 120VAC
Remarks:			

7.4 Spurious emissions at RF antenna connector test

7.4.1 General

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

Table 7.4.1 Spurious emission limits

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

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

** - P is transmitter output power in Watts

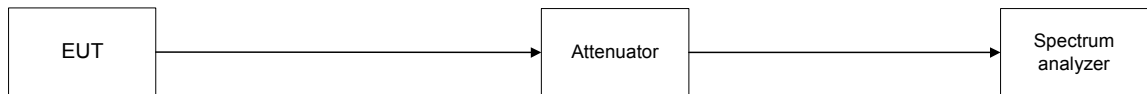
7.4.2 Test procedure

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

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

7.4.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.4.2 and associated plots.

Figure 7.4.1 Spurious emission test setup





HERMON LABORATORIES

Test specification: Section 27.53(m)(2), Conducted spurious emissions			
Test procedure: Section 27.53(m)(2)			
Test mode: Compliance	Verdict: PASS		
Date & Time: 6/24/2009 3:18:05 PM			
Temperature: 24.5 °C	Air Pressure: 1007 hPa	Relative Humidity: 40 %	Power Supply: 120VAC
Remarks:			

Table 7.4.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 27000 MHz
 (except:
 2491.0 – 2512.5 MHz for low channel
 2585.0 – 2607.0 for mid channel
 2674.0 – 2695.0 MHz for high channel)
 See NOTE 2

DETECTOR USED: Average
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 MODULATION: 64QAM
 MODULATING SIGNAL: PRBS
 BIT RATE: 37.7 Mbps
 EBW: 10 MHz (See NOTE 1)
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 TRANSMITTER OUTPUT POWER: 27.96 dBm at low frequency
 26.07 dBm at mid frequency
 28.46 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								
2491.000	-19.33	Included	Included	1000	-19.33	-13.00	-6.33	Pass
2512.500	-21.90	Included	Included	1000	-21.90	-13.00	-8.90	Pass
2540.000	-22.56	Included	Included	1000	-22.56	-13.00	-9.56	Pass
Mid carrier frequency								
2585.500	-23.23	Included	Included	1000	-23.23	-13.00	-10.23	Pass
2607.500	-27.19	Included	Included	1000	-27.19	-13.00	-14.19	Pass
High carrier frequency								
2674.000	-16.39	Included	Included	1000	-16.39	-13.00	-3.39	Pass
2695.000	-18.39	Included	Included	1000	-18.39	-13.00	-5.39	Pass

*- Margin = Spurious emission – specification limit.

NOTE 1: Spurious emissions test was performed at 10 MHz EBW with 64QAM modulation as configuration that produces maximum output power.

NOTE 2: For band edge emissions please see emission mask test report.

Reference numbers of test equipment used

HL 1424	HL 2909	HL 3437	HL 3442	HL 3455	HL 3559		
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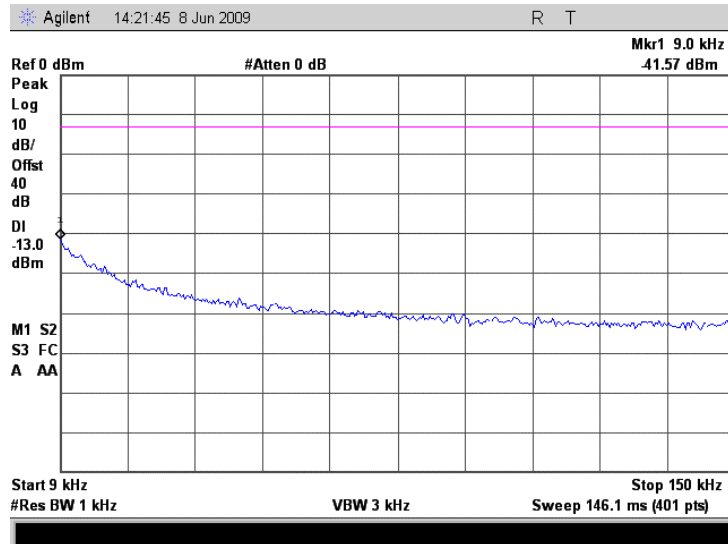
Full description is given in Appendix A.



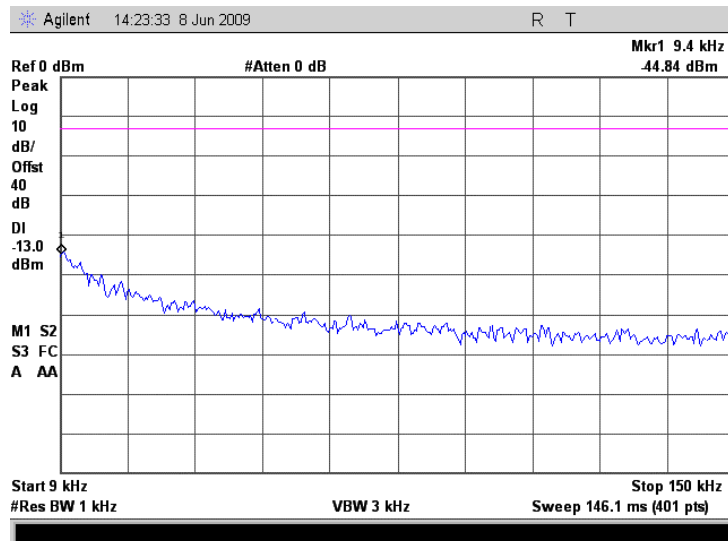
HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/24/2009 3:18:05 PM		
Temperature: 24.5 °C	Air Pressure: 1007 hPa	Relative Humidity: 40 %	Power Supply: 120VAC
Remarks:			

Plot 7.4.1 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency



Plot 7.4.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency

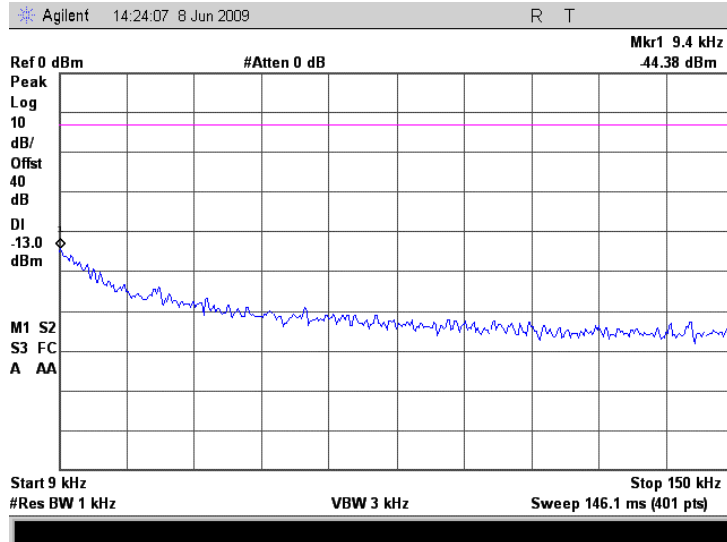




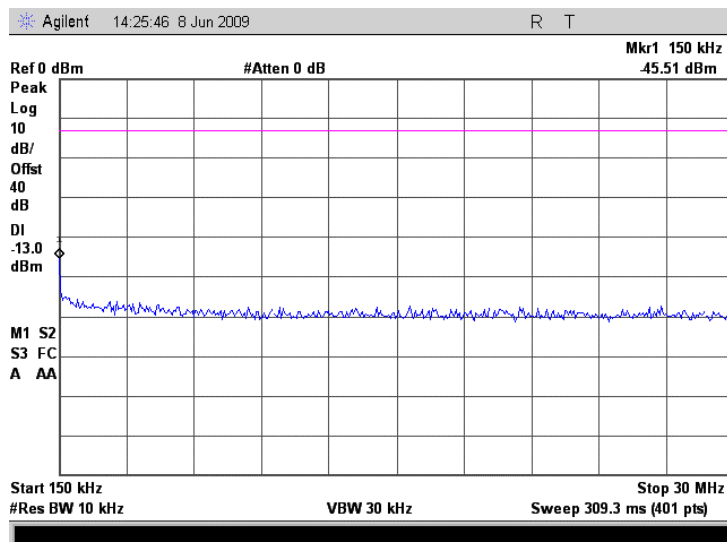
HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/24/2009 3:18:05 PM		
Temperature: 24.5 °C	Air Pressure: 1007 hPa	Relative Humidity: 40 %	Power Supply: 120VAC
Remarks:			

Plot 7.4.3 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency



Plot 7.4.4 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency

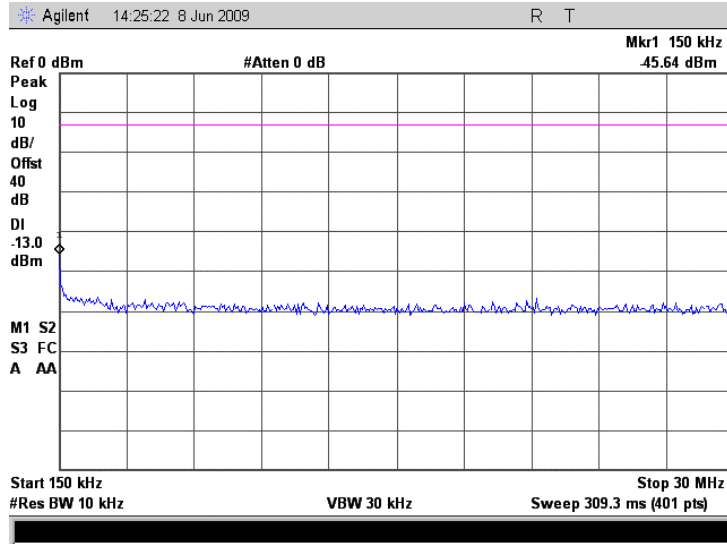




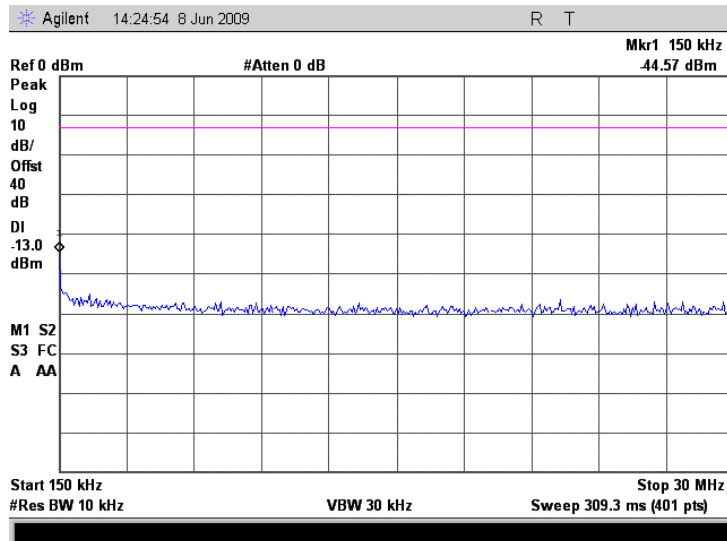
HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/24/2009 3:18:05 PM		
Temperature: 24.5 °C	Air Pressure: 1007 hPa	Relative Humidity: 40 %	Power Supply: 120VAC
Remarks:			

Plot 7.4.5 Spurious emission measurements in 0.15 - 30.0 MHz range at mid carrier frequency



Plot 7.4.6 Spurious emission measurements in 0.15 - 30.0 MHz range at high carrier frequency

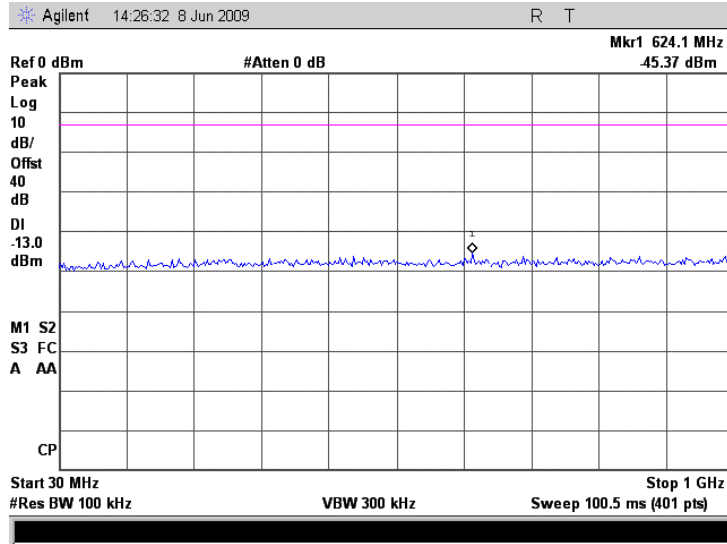




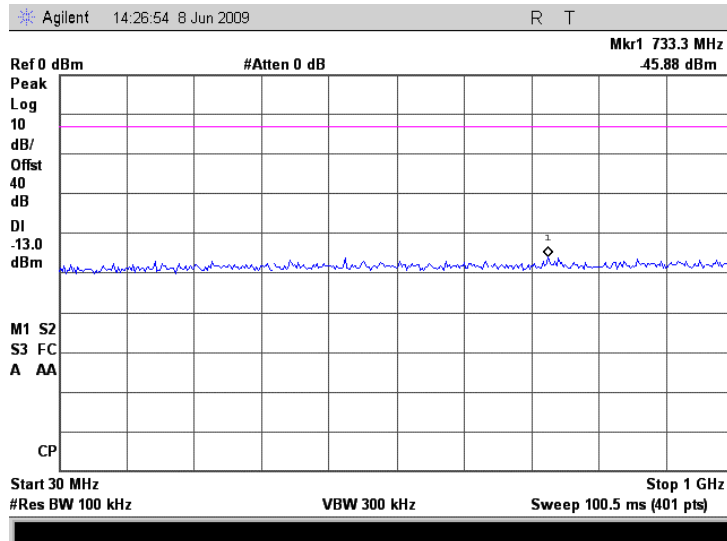
HERMON LABORATORIES

Test specification: Section 27.53(m)(2), Conducted spurious emissions			
Test procedure: Section 27.53(m)(2)			
Test mode: Compliance	Verdict: PASS		
Date & Time: 6/24/2009 3:18:05 PM			
Temperature: 24.5 °C	Air Pressure: 1007 hPa	Relative Humidity: 40 %	Power Supply: 120VAC
Remarks:			

Plot 7.4.7 Spurious emission measurements in 30.0 - 1000 MHz range at low carrier frequency



Plot 7.4.8 Spurious emission measurements in 30.0 - 1000 MHz range at mid carrier frequency

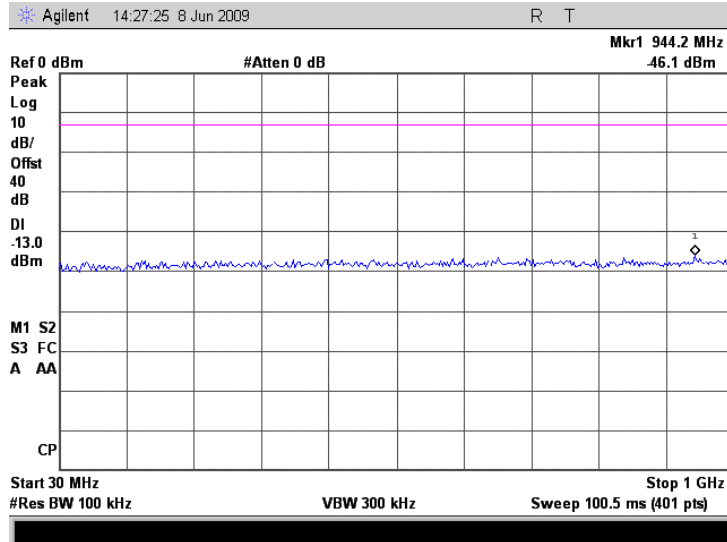




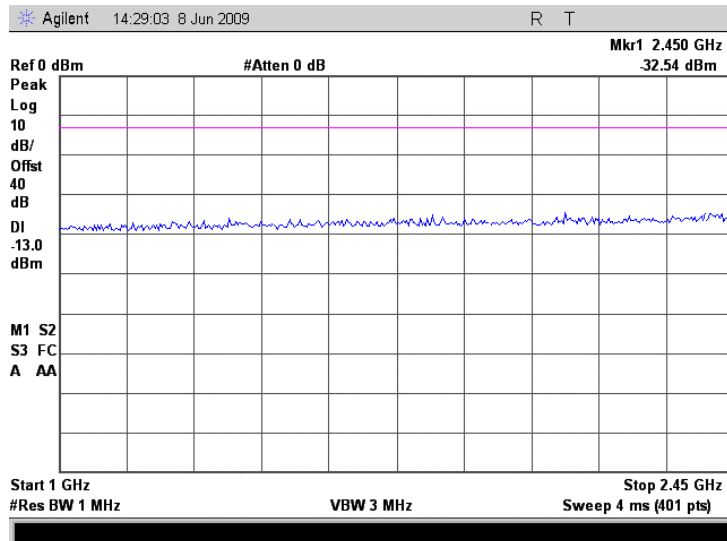
HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/24/2009 3:18:05 PM		
Temperature: 24.5 °C	Air Pressure: 1007 hPa	Relative Humidity: 40 %	Power Supply: 120VAC
Remarks:			

Plot 7.4.9 Spurious emission measurements in 30.0 - 1000 MHz range at high carrier frequency



Plot 7.4.10 Spurious emission measurements in 1000 - 2450 MHz range at low carrier frequency

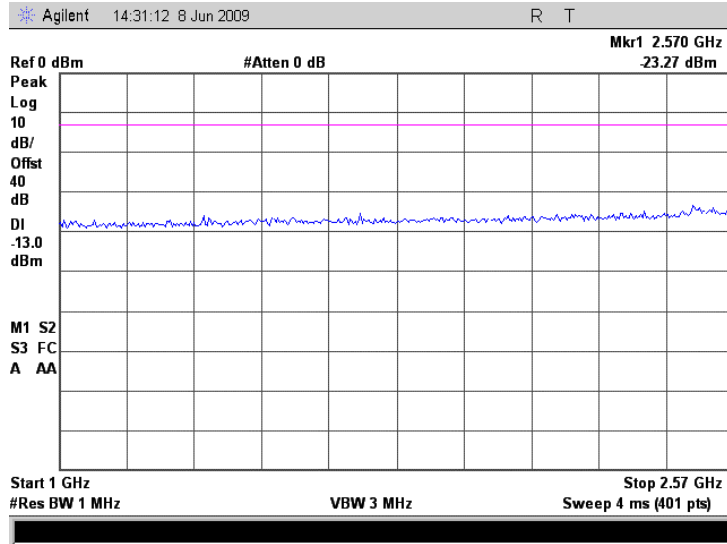




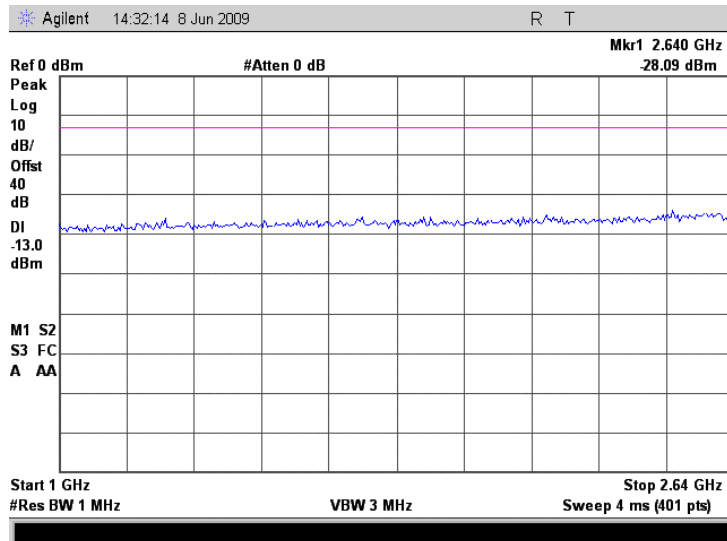
HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/24/2009 3:18:05 PM		
Temperature: 24.5 °C	Air Pressure: 1007 hPa	Relative Humidity: 40 %	Power Supply: 120VAC
Remarks:			

Plot 7.4.11 Spurious emission measurements in 1000 - 2570 MHz at mid carrier frequency



Plot 7.4.12 Spurious emission measurements in 1000 - 2640 MHz at high carrier frequency

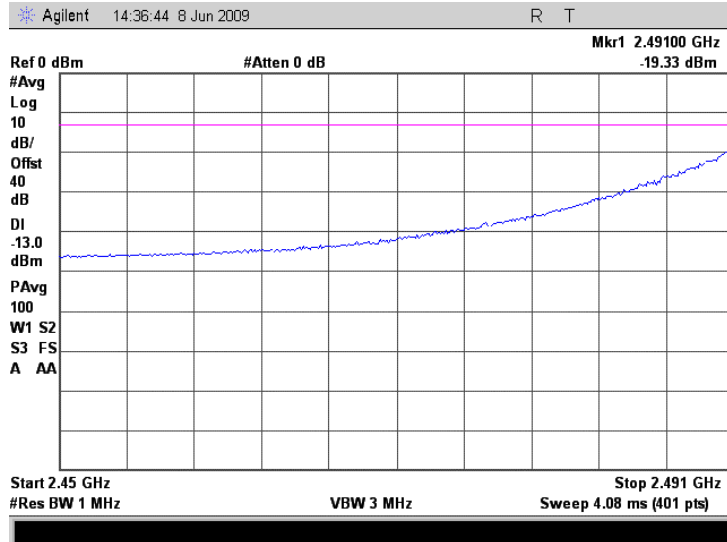




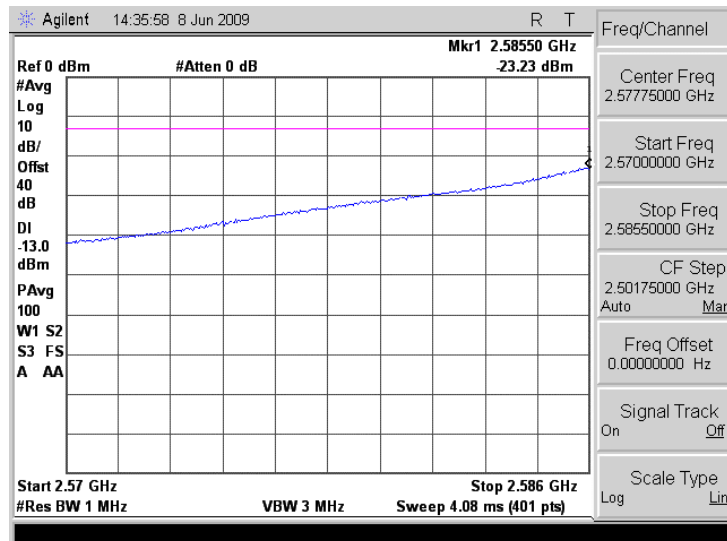
HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/24/2009 3:18:05 PM		
Temperature: 24.5 °C	Air Pressure: 1007 hPa	Relative Humidity: 40 %	Power Supply: 120VAC
Remarks:			

Plot 7.4.13 Spurious emission measurements in 2450 - 2491 MHz range at low carrier frequency



Plot 7.4.14 Spurious emission measurements in 2570 – 2585.5 MHz at mid carrier frequency

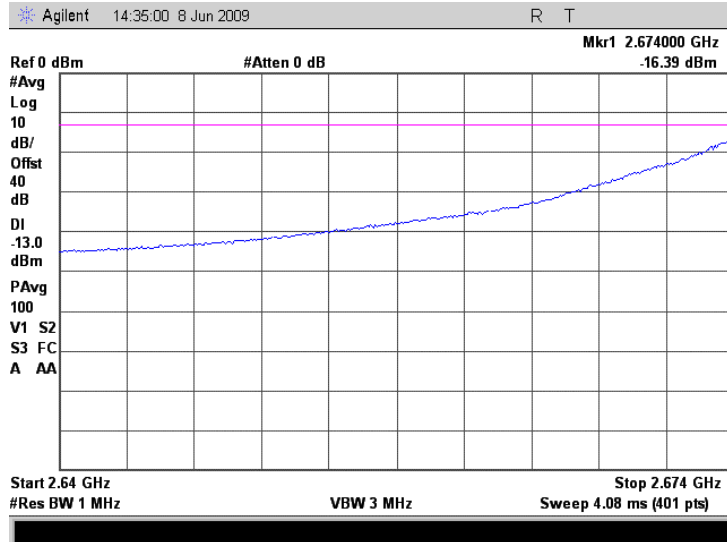




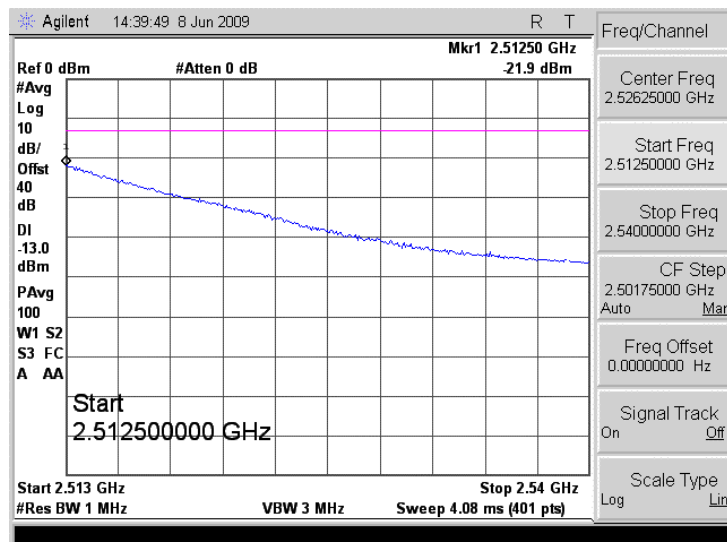
HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/24/2009 3:18:05 PM		
Temperature: 24.5 °C	Air Pressure: 1007 hPa	Relative Humidity: 40 %	Power Supply: 120VAC
Remarks:			

Plot 7.4.15 Spurious emission measurements in 2640 - 2674 MHz at high carrier frequency



Plot 7.4.16 Spurious emission measurements in 2512.5 - 2540 MHz range at low carrier frequency

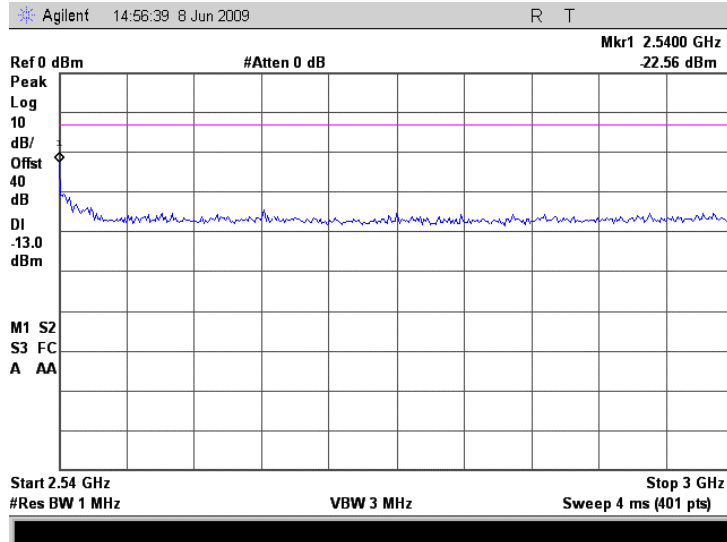




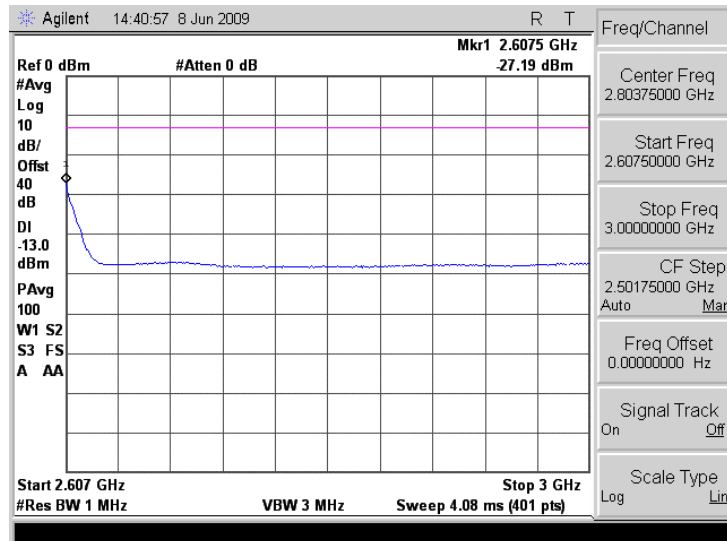
HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/24/2009 3:18:05 PM		
Temperature: 24.5 °C	Air Pressure: 1007 hPa	Relative Humidity: 40 %	Power Supply: 120VAC
Remarks:			

Plot 7.4.17 Spurious emission measurements in 2540 - 3000 MHz range at low carrier frequency



Plot 7.4.18 Spurious emission measurements in 2607.5 – 3000 MHz at mid carrier frequency

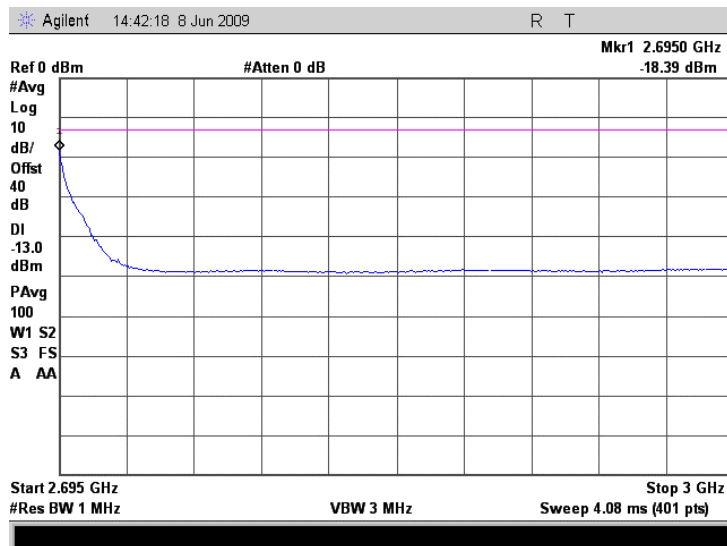




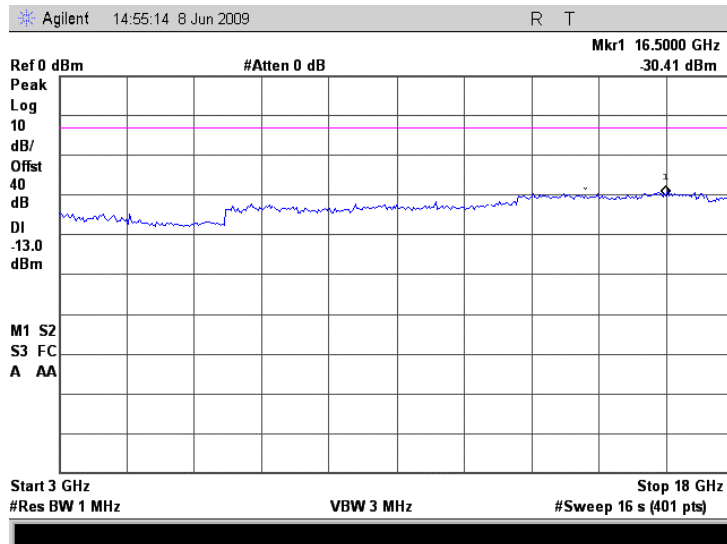
HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/24/2009 3:18:05 PM		
Temperature: 24.5 °C	Air Pressure: 1007 hPa	Relative Humidity: 40 %	Power Supply: 120VAC
Remarks:			

Plot 7.4.19 Spurious emission measurements in 2695 - 3000 MHz at high carrier frequency



Plot 7.4.20 Spurious emission measurements in 3000 - 18000 MHz range at low carrier frequency

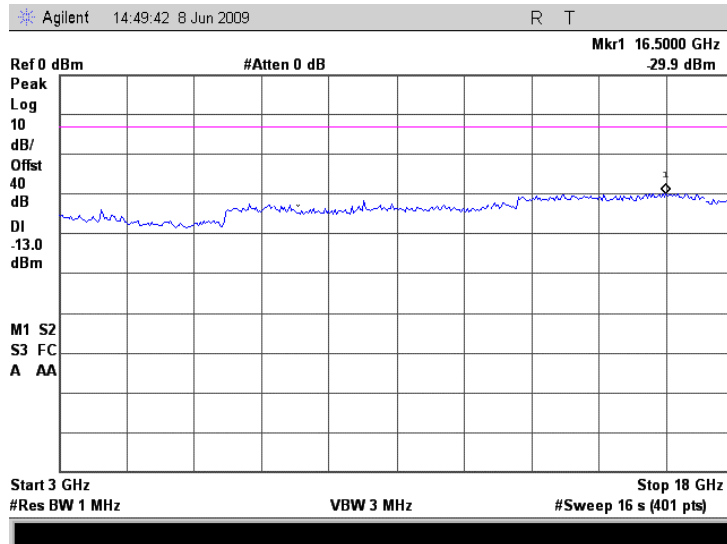




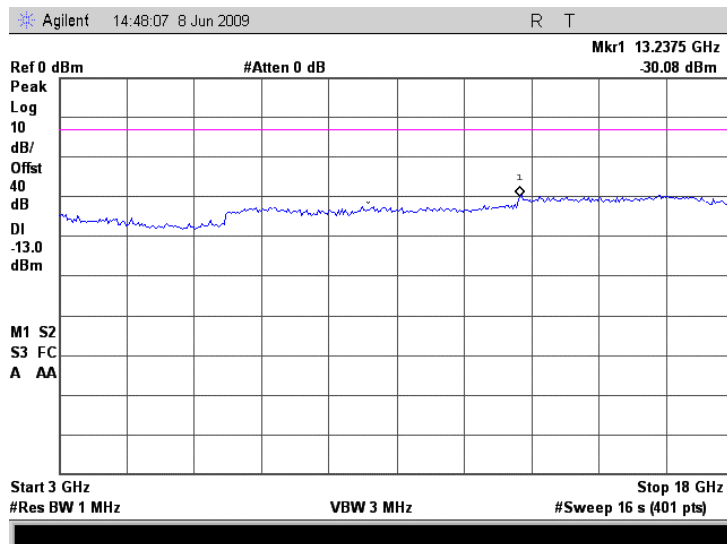
HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/24/2009 3:18:05 PM		
Temperature: 24.5 °C	Air Pressure: 1007 hPa	Relative Humidity: 40 %	Power Supply: 120VAC
Remarks:			

Plot 7.4.21 Spurious emission measurements in 3000 - 18000 MHz at mid carrier frequency



Plot 7.4.22 Spurious emission measurements in 3000 - 18000 MHz at high carrier frequency

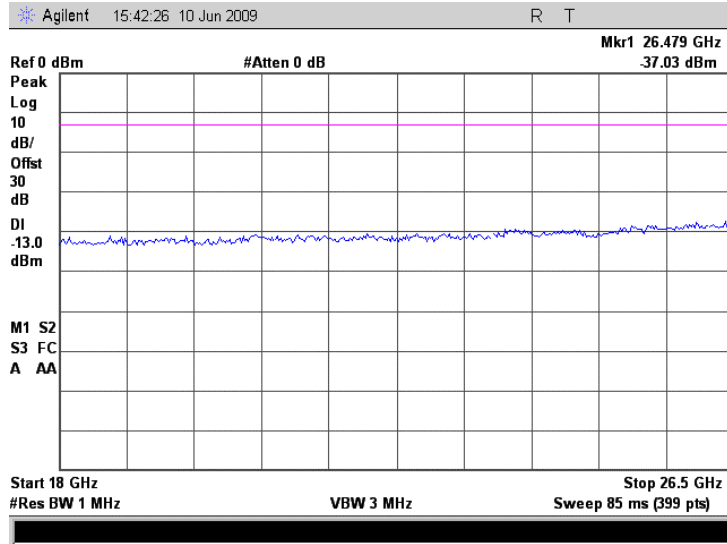




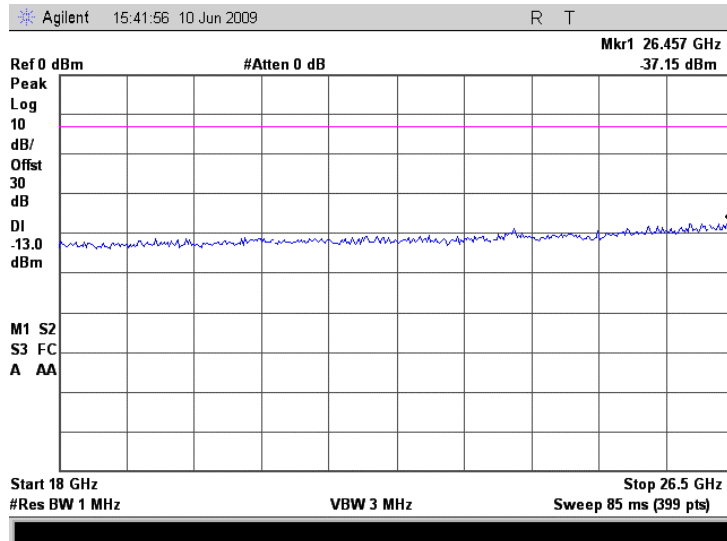
HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/24/2009 3:18:05 PM		
Temperature: 24.5 °C	Air Pressure: 1007 hPa	Relative Humidity: 40 %	Power Supply: 120VAC
Remarks:			

Plot 7.4.23 Spurious emission measurements in 18000 - 26500 MHz range at low carrier frequency



Plot 7.4.24 Spurious emission measurements in 18000 - 26500 MHz at mid carrier frequency

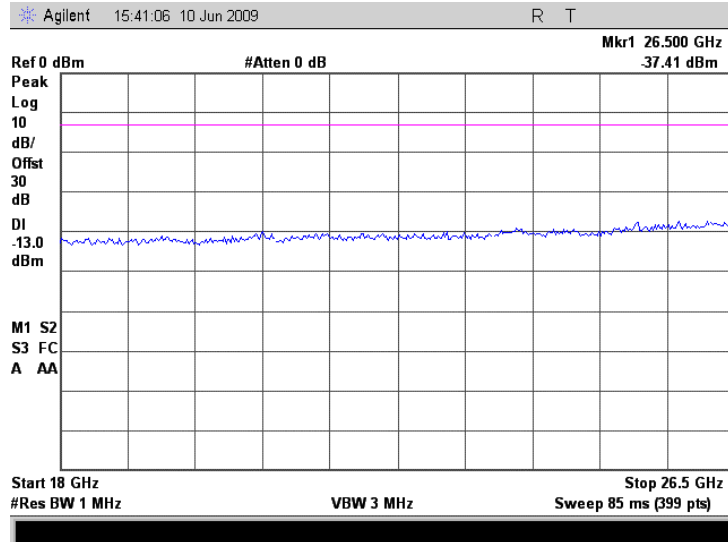




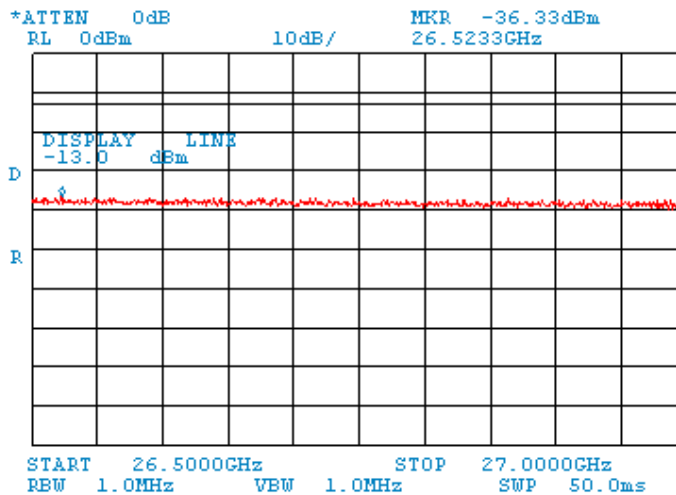
HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/24/2009 3:18:05 PM		
Temperature: 24.5 °C	Air Pressure: 1007 hPa	Relative Humidity: 40 %	Power Supply: 120VAC
Remarks:			

Plot 7.4.25 Spurious emission measurements in 18000 - 26500 MHz at high carrier frequency



Plot 7.4.26 Spurious emission measurements in 26500 - 27000 MHz at high carrier frequency





Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/22/2009 5:36:19 PM		
Temperature: 29 °C	Air Pressure: 1007 hPa	Relative Humidity: 60 %	Power Supply: 120VAC
Remarks:			

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(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/22/2009 5:36:19 PM		
Temperature: 29 °C	Air Pressure: 1007 hPa	Relative Humidity: 60 %	Power Supply: 120VAC
Remarks:			

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

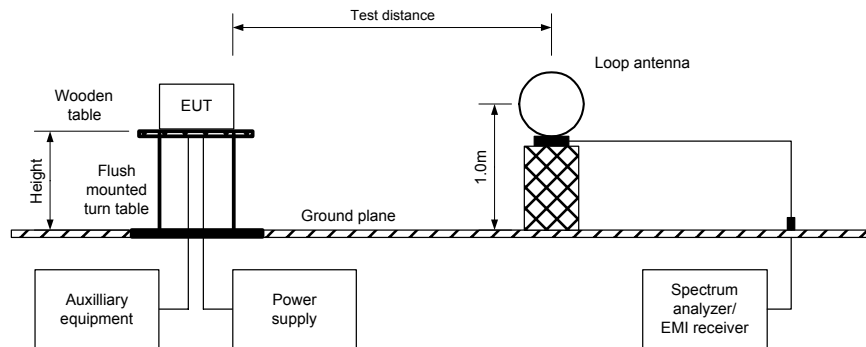
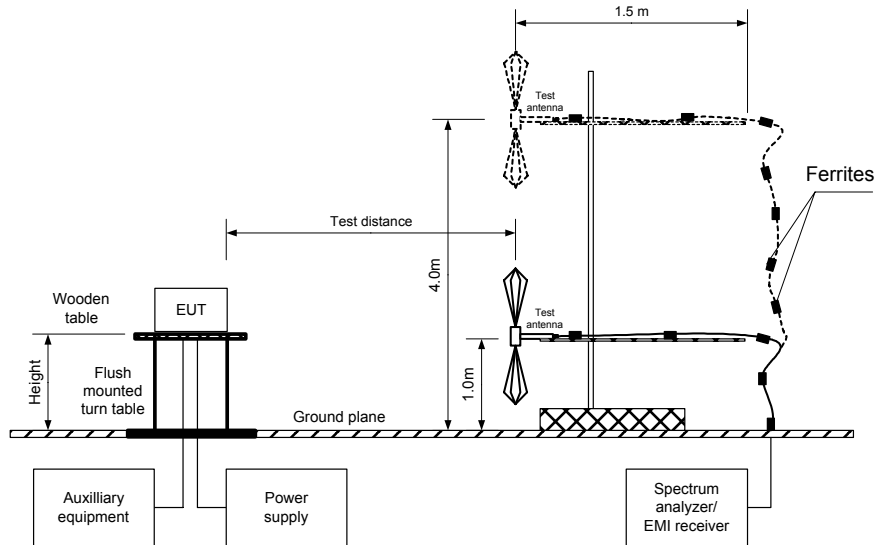


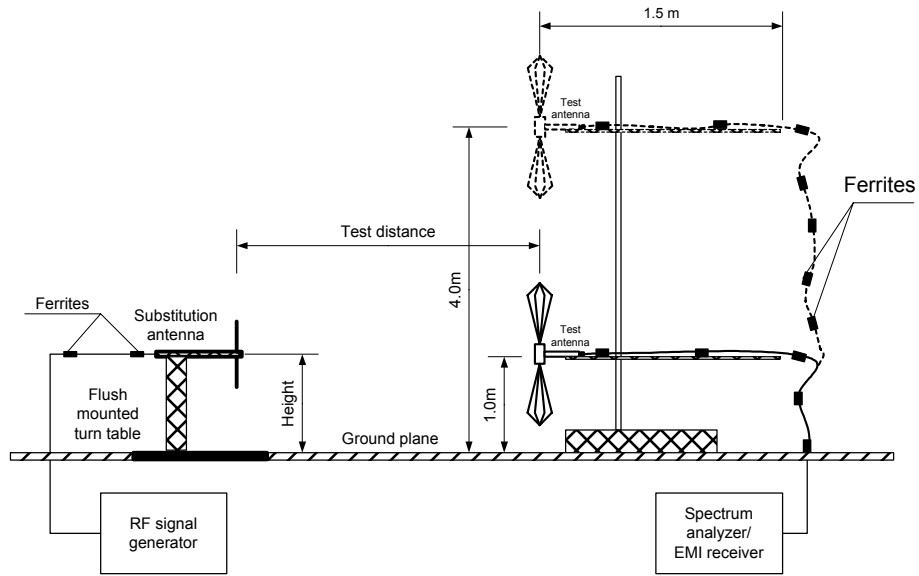
Figure 7.5.2 Setup for spurious emission field strength measurements above 30 MHz





Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/22/2009 5:36:19 PM		
Temperature: 29 °C	Air Pressure: 1007 hPa	Relative Humidity: 60 %	Power Supply: 120VAC
Remarks:			

Figure 7.5.3 Setup for substitution ERP measurements of spurious





Test specification: Section 27.53(m)(2), Radiated spurious emissions	
Test procedure: Section 27.53(m)(2)	
Test mode: Compliance	Verdict: PASS
Date & Time: 6/22/2009 5:36:19 PM	
Temperature: 29 °C	Air Pressure: 1007 hPa
Relative Humidity: 60 %	
Power Supply: 120VAC	
Remarks:	

Table 7.5.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
TEST DISTANCE: 3 m
TEST SITE: OATS
EUT HEIGHT: 0.8 m
INVESTIGATED FREQUENCY RANGE: 0.009 – 27000 MHz
DETECTOR USED: Power average
VIDEO BANDWIDTH: > Resolution bandwidth
TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
Biconilog (30 MHz – 1000 MHz)
Double ridged guide (above 1000 MHz)
EBW: See NOTE 1
MODULATION: 64 QAM
MODULATING SIGNAL: PRBS
BIT RATE: 9.425 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 2497.5 MHz							
4995.00	79.93	84.35	-4.42	1000	H	1.2	020
7492.00	70.54	84.35	-13.81	1000	H	1.2	010
Mid carrier frequency 2593.0 MHz							
5186.00	83.52	84.35	-0.83	1000	H	1.2	020
7779.00	69.49	84.35	-14.86	1000	H	1.2	020
High carrier frequency 2688.5 MHz							
5377.00	78.38	84.35	-5.97	1000	H	1.1	030
8066.00	73.40	84.35	-10.95	1000	H	1.1	020

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

NOTE1: The 2.5 MHz EBW was chosen as configuration with maximum power density and causes worst case spurious emissions despite of maximum output power at 10 MHz channel bandwidth configuration.



Test specification:		Section 27.53(m)(2), Radiated spurious emissions	
Test procedure:		Section 27.53(m)(2)	
Test mode:	Compliance	Verdict: PASS	
Date & Time:	6/22/2009 5:36:19 PM		
Temperature: 29 °C	Air Pressure: 1007 hPa	Relative Humidity: 60 %	Power Supply: 120VAC
Remarks:			

Table 7.5.3 Substitution ERP of spurious test results

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
 TRANSMITTER CARRIER EIRP: 43.02 dBm at low frequency
 41.54 dBm at mid frequency
 43.86 dBm at high frequency

TEST SITE: OATS
 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, dBc	Margin, dB*	Verdict
Low carrier frequency										
4995.00	79.93	1000	H	-23.30	3.56	0.91	-20.65	-13.00	-7.65	Pass
7492.00	70.54	1000	H	-34.63	8.38	2.07	-31.74	-13.00	-15.32	Pass
Mid carrier frequency										
5186.00	83.52	1000	H	-23.88	8.19	1.71	-17.40	-13.00	-4.40	Pass
7779.00	69.49	1000	V	-30.35	4.41	1.18	-27.12	-13.00	-14.12	Pass
High carrier frequency										
5377.00	78.38	1000	H	-29.19	8.10	1.75	-22.84	-13.00	-9.84	Pass
8066.00	73.40	1000	H	-35.00	8.42	2.13	-28.71	-13.00	-15.71	Pass

*- Margin = Spurious emission – specification limit.

Reference numbers of test equipment used

HL 0446	HL 0521	HL 0604	HL 0661	HL 1116	HL 1425	HL 1984	HL 2254
HL 2432	HL 2909	HL 3120	HL 3207	HL 3533	HL 3534	HL 3535	

Full description is given in Appendix A.

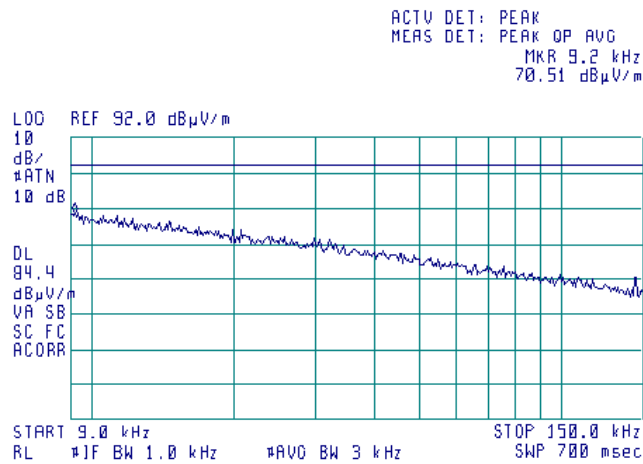


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/22/2009 5:36:19 PM		
Temperature: 29 °C	Air Pressure: 1007 hPa	Relative Humidity: 60 %	Power Supply: 120VAC
Remarks:			

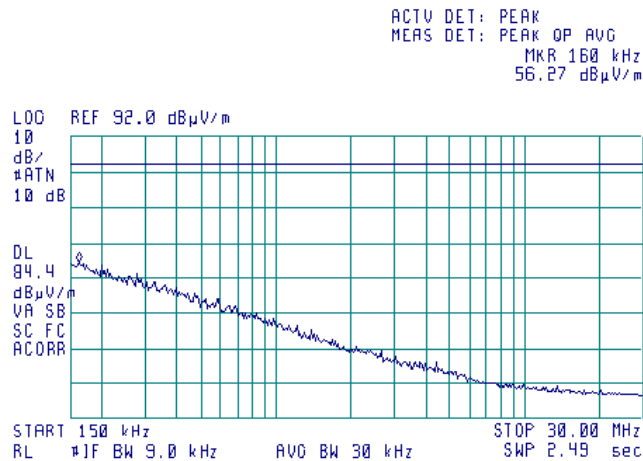
Plot 7.5.1 Radiated emission measurements in 9 - 150 kHz range

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



Plot 7.5.2 Radiated emission measurements in 0.15 - 30 MHz range

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





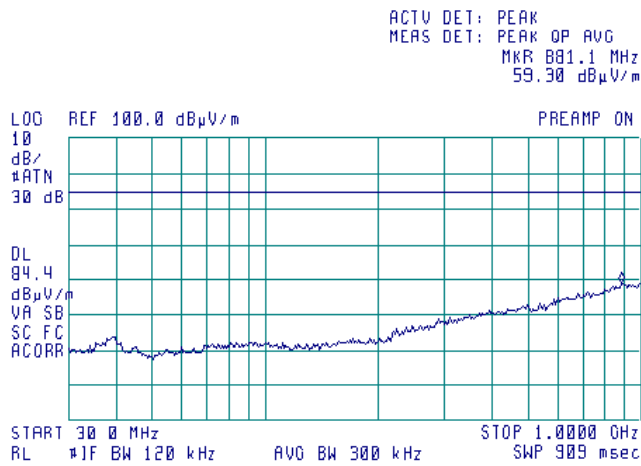
HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/22/2009 5:36:19 PM		
Temperature: 29 °C	Air Pressure: 1007 hPa	Relative Humidity: 60 %	Power Supply: 120VAC
Remarks:			

Plot 7.5.3 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

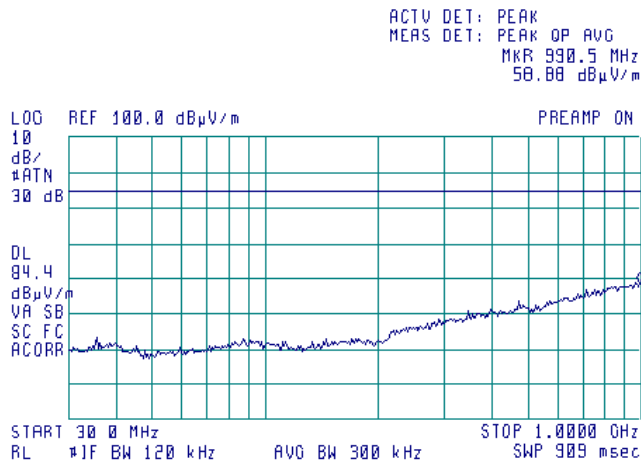
22:27:50 JUN 14, 2009



Plot 7.5.4 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

22:30:54 JUN 14, 2009





HERMON LABORATORIES

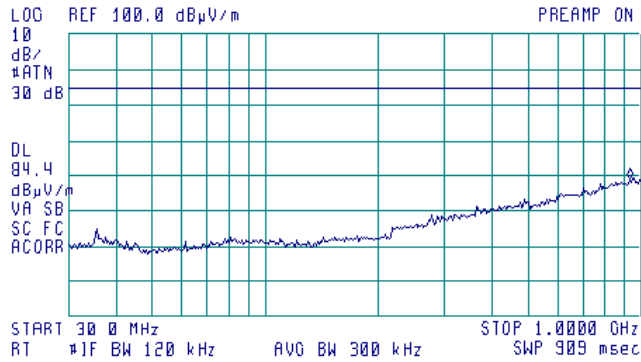
Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/22/2009 5:36:19 PM		
Temperature: 29 °C	Air Pressure: 1007 hPa	Relative Humidity: 60 %	Power Supply: 120VAC
Remarks:			

Plot 7.5.5 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

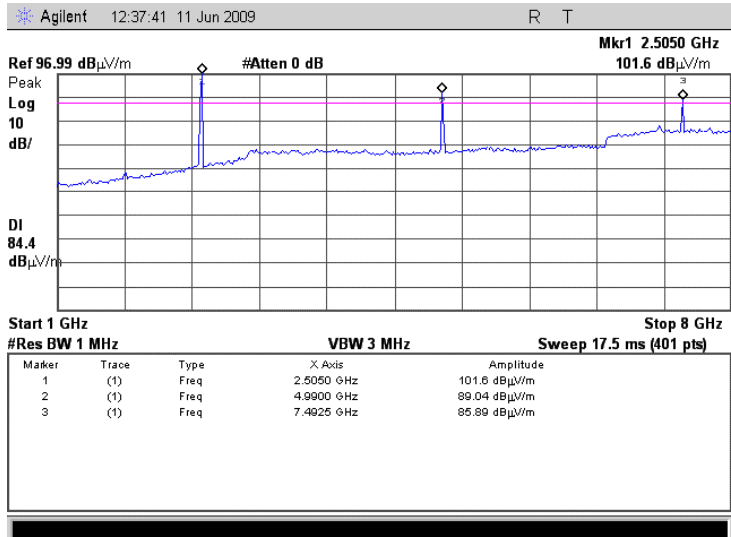
22:34:30 JUN 14, 2009

ACTV DET: PEAK
 MEAS DET: PEAK OP AVG
 MKR 923.7 MHz
 59.00 dBµV/m



Plot 7.5.6 Radiated emission measurements in 1000 – 8000 MHz range

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



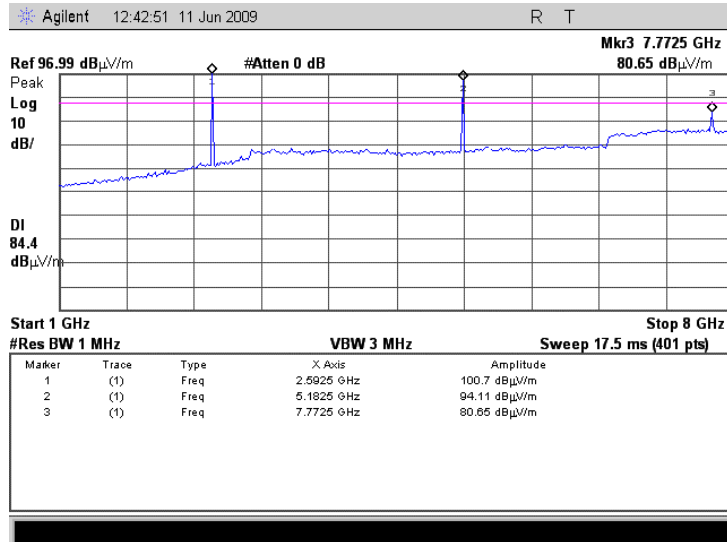


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/22/2009 5:36:19 PM		
Temperature: 29 °C	Air Pressure: 1007 hPa	Relative Humidity: 60 %	Power Supply: 120VAC
Remarks:			

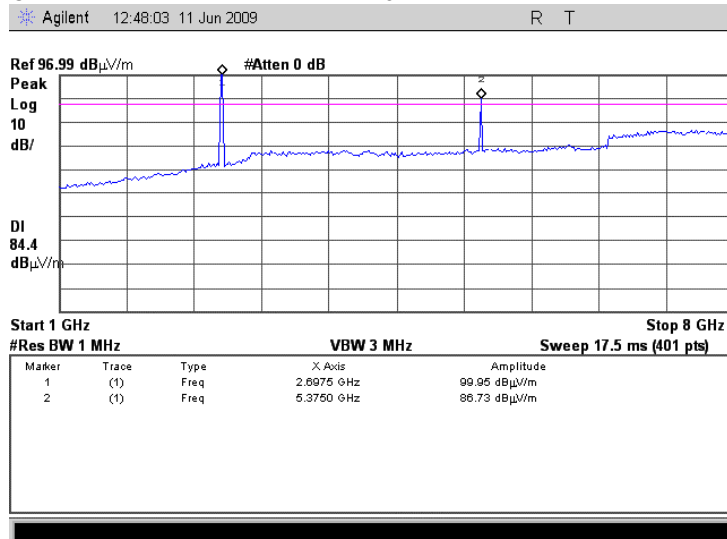
Plot 7.5.7 Radiated emission measurements in 1000 – 8000 MHz range

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



Plot 7.5.8 Radiated emission measurements in 1000 – 8000 MHz range

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



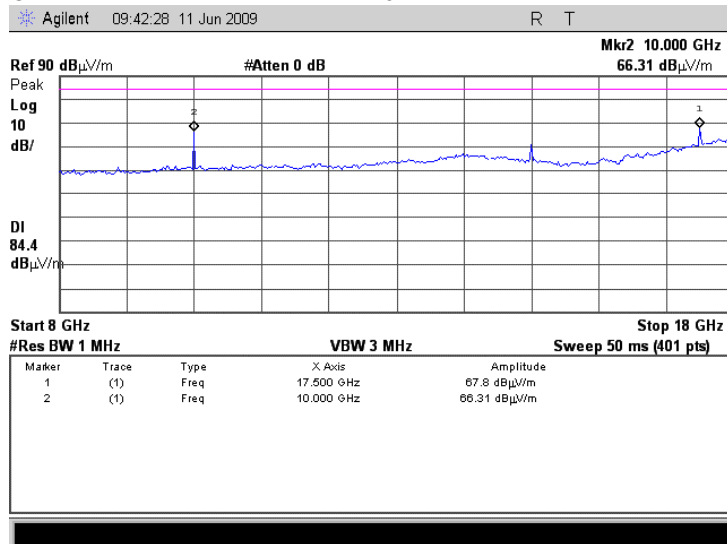


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/22/2009 5:36:19 PM		
Temperature: 29 °C	Air Pressure: 1007 hPa	Relative Humidity: 60 %	Power Supply: 120VAC
Remarks:			

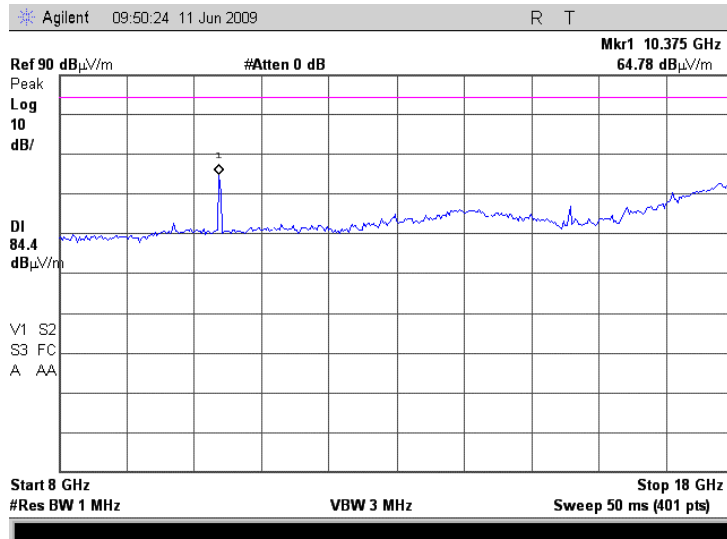
Plot 7.5.9 Radiated emission measurements in 8000 – 18000 MHz range

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



Plot 7.5.10 Radiated emission measurements in 8000 – 18000 MHz range

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



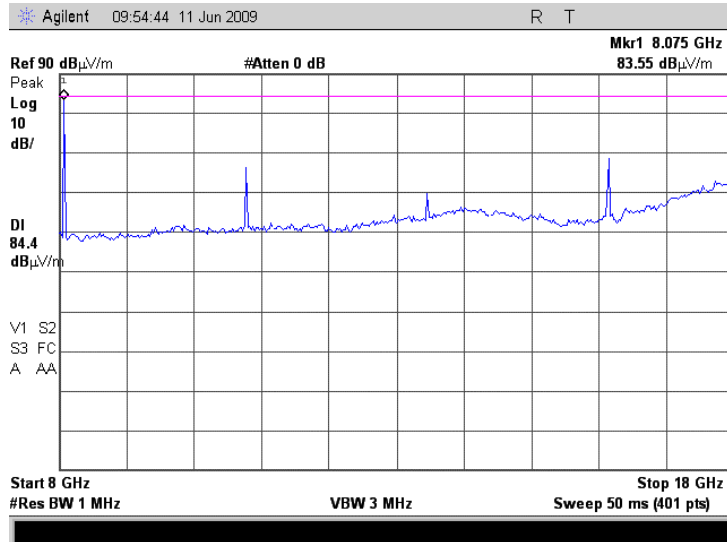


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/22/2009 5:36:19 PM		
Temperature: 29 °C	Air Pressure: 1007 hPa	Relative Humidity: 60 %	Power Supply: 120VAC
Remarks:			

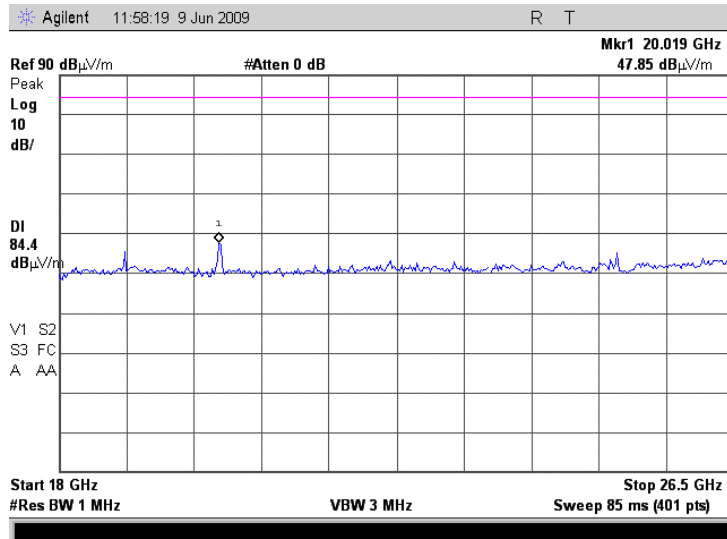
Plot 7.5.11 Radiated emission measurements in 8000 – 18000 MHz range

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



Plot 7.5.12 Radiated emission measurements in 18000 – 26500 MHz range

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



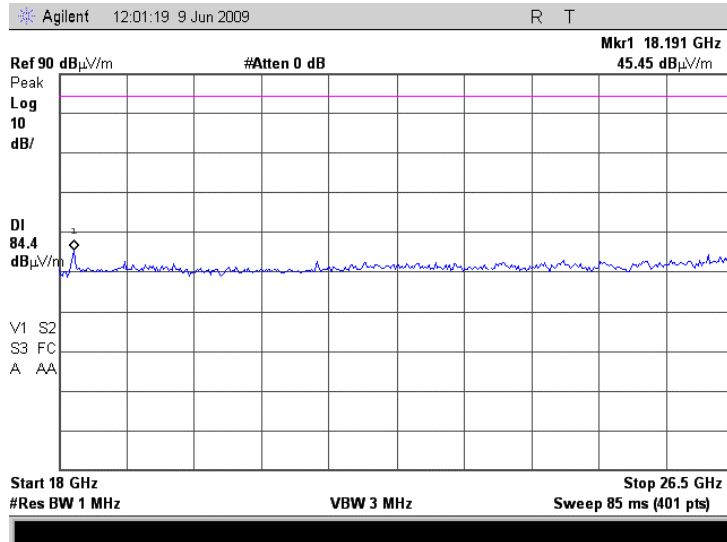


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/22/2009 5:36:19 PM		
Temperature: 29 °C	Air Pressure: 1007 hPa	Relative Humidity: 60 %	Power Supply: 120VAC
Remarks:			

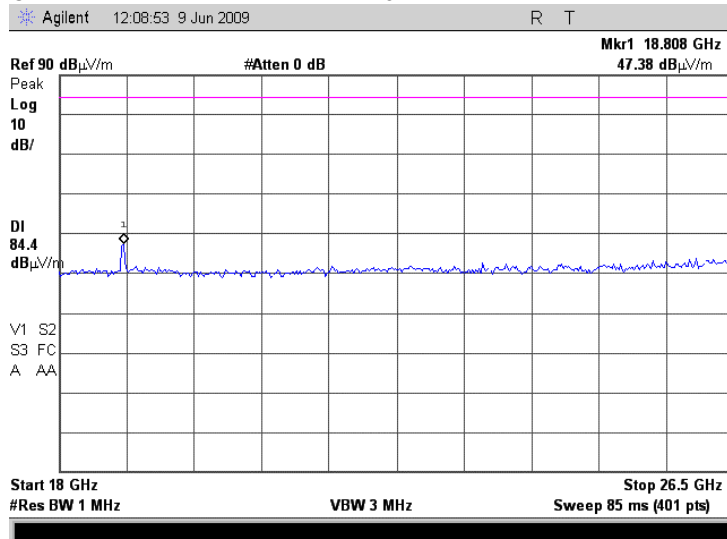
Plot 7.5.13 Radiated emission measurements in 18000 – 26500 MHz range

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



Plot 7.5.14 Radiated emission measurements in 18000 – 26500 MHz range

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



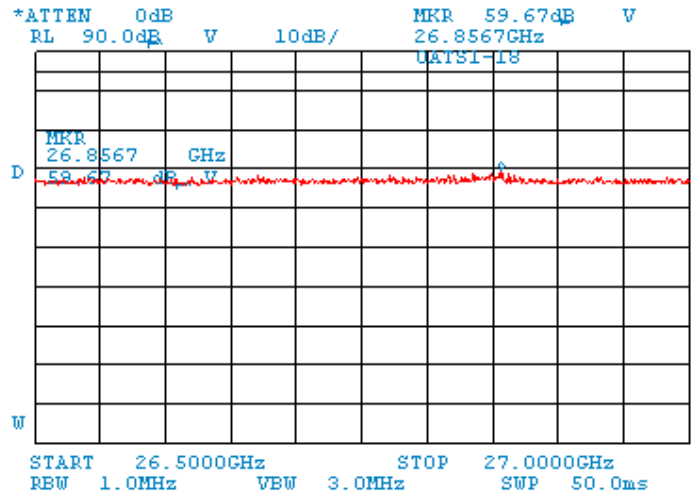


HERMON LABORATORIES

Test specification: Section 27.53(m)(2), Radiated spurious emissions			
Test procedure: Section 27.53(m)(2)			
Test mode: Compliance	Verdict: PASS		
Date & Time: 6/22/2009 5:36:19 PM			
Temperature: 29 °C	Air Pressure: 1007 hPa	Relative Humidity: 60 %	Power Supply: 120VAC
Remarks:			

Plot 7.5.15 Radiated emission measurements in 26500 – 27000 MHz range

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



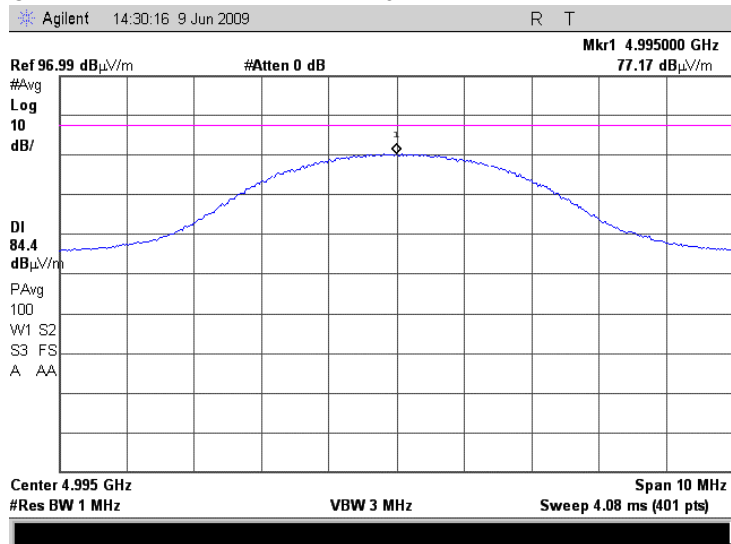


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/22/2009 5:36:19 PM		
Temperature: 29 °C	Air Pressure: 1007 hPa	Relative Humidity: 60 %	Power Supply: 120VAC
Remarks:			

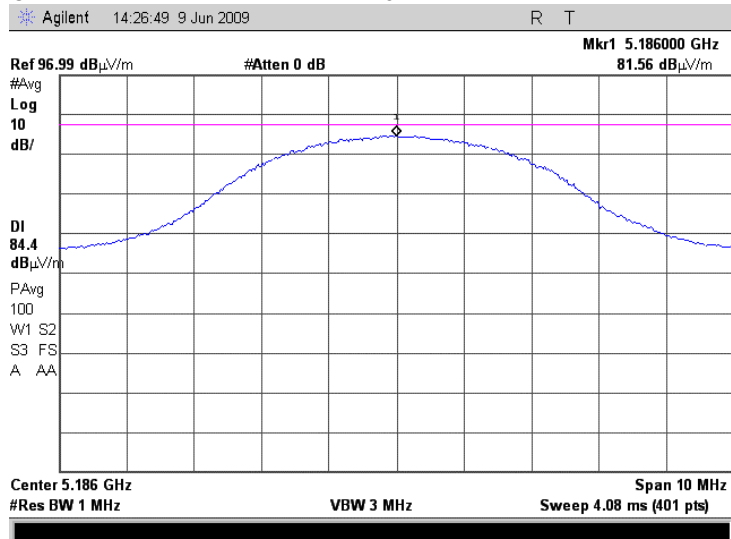
Plot 7.5.16 Radiated emission measurements at the 2nd harmonic

TEST SITE: OATS
 CARRIER FREQUENCY: Low
 ANTENNA POLARIZATION: Vertical
 TEST DISTANCE: 3 m



Plot 7.5.17 Radiated emission measurements at the 2nd harmonic

TEST SITE: OATS
 CARRIER FREQUENCY: Mid
 ANTENNA POLARIZATION: Vertical
 TEST DISTANCE: 3 m



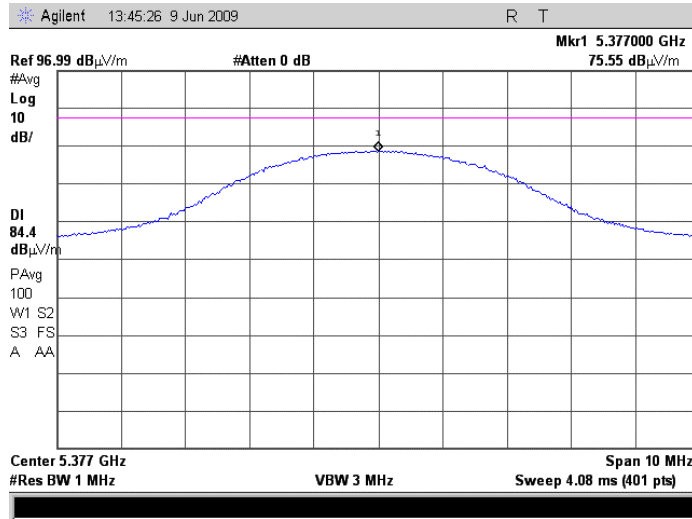


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/22/2009 5:36:19 PM		
Temperature: 29 °C	Air Pressure: 1007 hPa	Relative Humidity: 60 %	Power Supply: 120VAC
Remarks:			

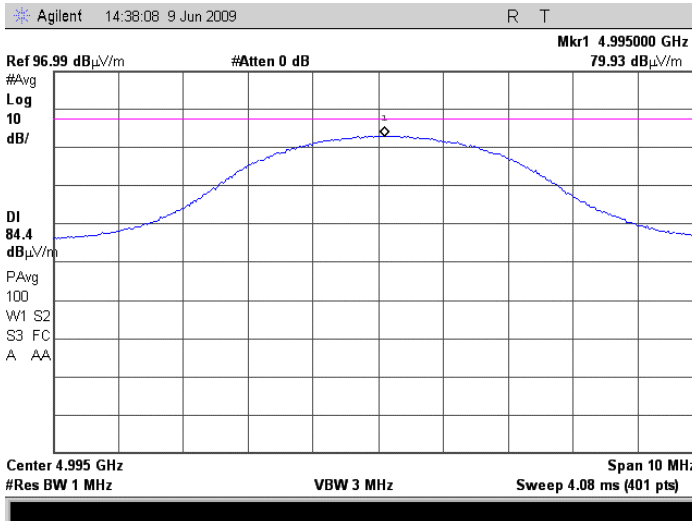
Plot 7.5.18 Radiated emission measurements at the 2nd harmonic

TEST SITE: OATS
 CARRIER FREQUENCY: High
 ANTENNA POLARIZATION: Vertical
 TEST DISTANCE: 3 m



Plot 7.5.19 Radiated emission measurements at the 2nd harmonic

TEST SITE: OATS
 CARRIER FREQUENCY: Low
 ANTENNA POLARIZATION: Horizontal
 TEST DISTANCE: 3 m



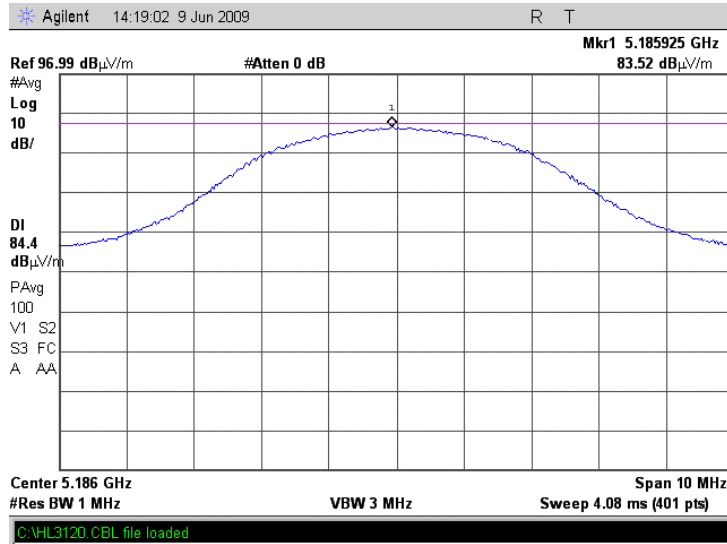


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/22/2009 5:36:19 PM		
Temperature: 29 °C	Air Pressure: 1007 hPa	Relative Humidity: 60 %	Power Supply: 120VAC
Remarks:			

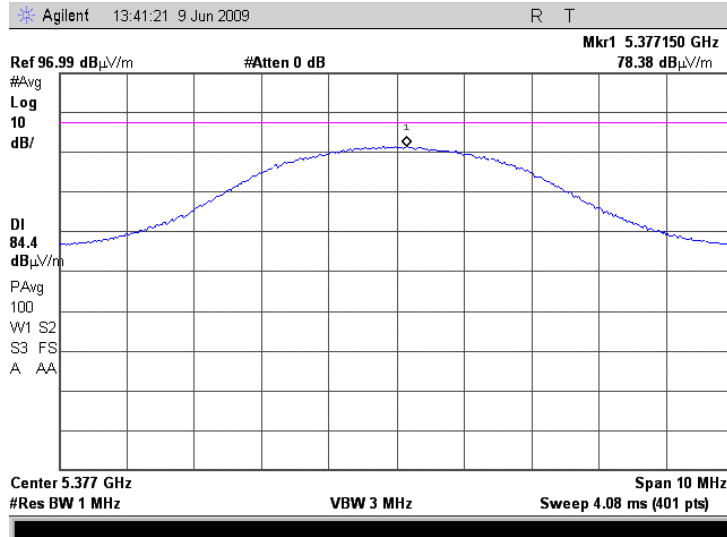
Plot 7.5.20 Radiated emission measurements at the 2nd harmonic

TEST SITE: OATS
 CARRIER FREQUENCY: Mid
 ANTENNA POLARIZATION: Horizontal
 TEST DISTANCE: 3 m



Plot 7.5.21 Radiated emission measurements at the 2nd harmonic

TEST SITE: Semi anechoic chamber / OATS
 CARRIER FREQUENCY: High
 ANTENNA POLARIZATION: Horizontal
 TEST DISTANCE: 3 m



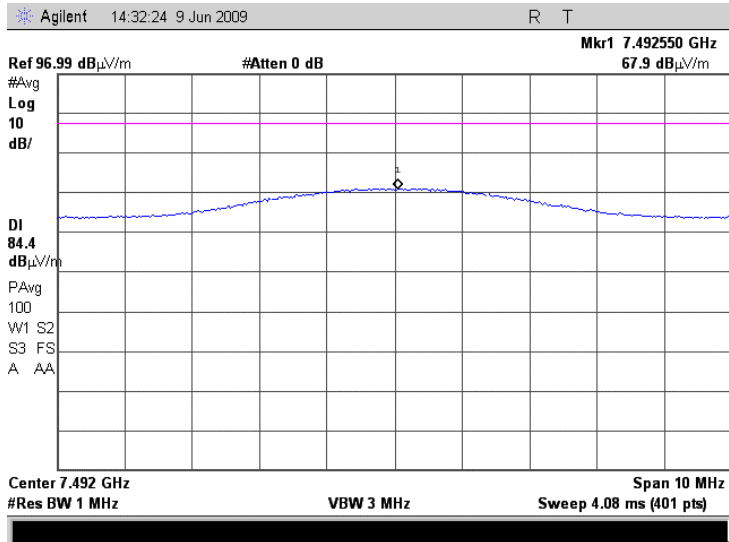


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/22/2009 5:36:19 PM		
Temperature: 29 °C	Air Pressure: 1007 hPa	Relative Humidity: 60 %	Power Supply: 120VAC
Remarks:			

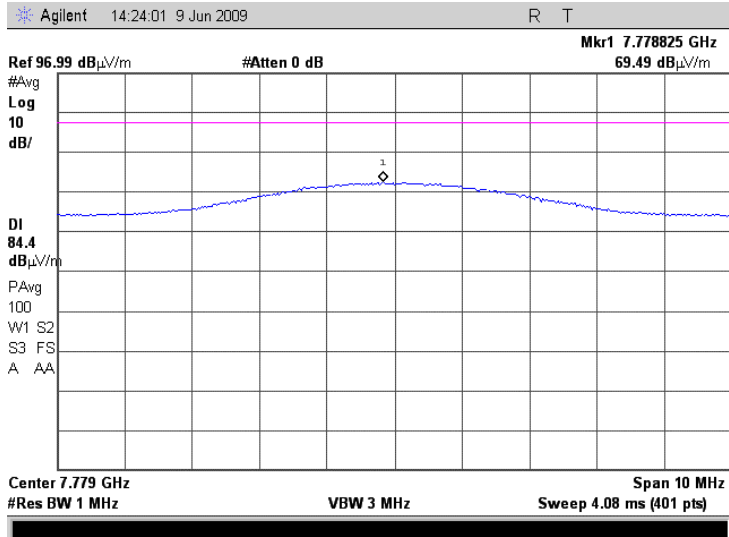
Plot 7.5.22 Radiated emission measurements at the 3rd harmonic

TEST SITE: OATS
 CARRIER FREQUENCY: Low
 ANTENNA POLARIZATION: Vertical
 TEST DISTANCE: 3 m



Plot 7.5.23 Radiated emission measurements at the 3rd harmonic

TEST SITE: OATS
 CARRIER FREQUENCY: Mid
 ANTENNA POLARIZATION: Vertical
 TEST DISTANCE: 3 m



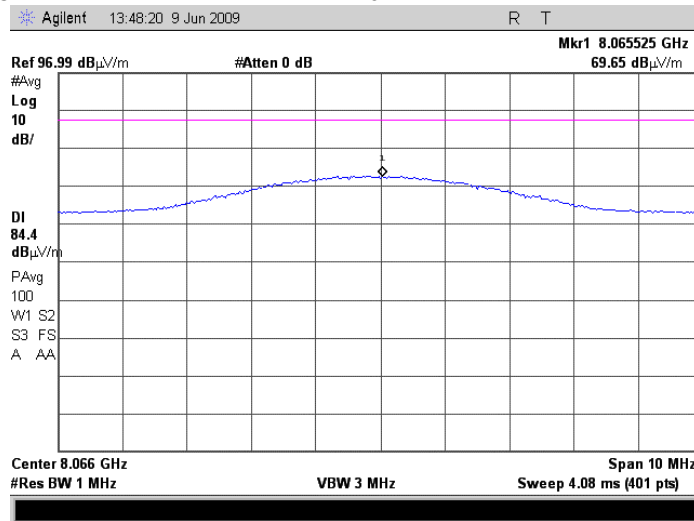


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/22/2009 5:36:19 PM		
Temperature: 29 °C	Air Pressure: 1007 hPa	Relative Humidity: 60 %	Power Supply: 120VAC
Remarks:			

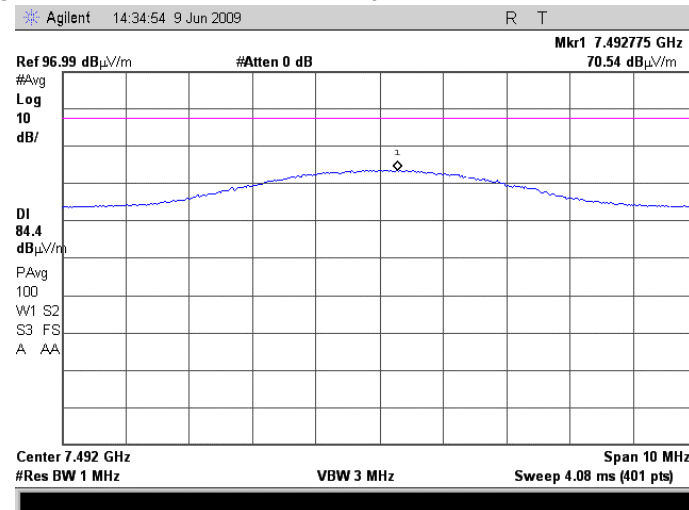
Plot 7.5.24 Radiated emission measurements at the 3rd harmonic

TEST SITE: OATS
 CARRIER FREQUENCY: High
 ANTENNA POLARIZATION: Vertical
 TEST DISTANCE: 3 m



Plot 7.5.25 Radiated emission measurements at the 3rd harmonic

TEST SITE: OATS
 CARRIER FREQUENCY: Low
 ANTENNA POLARIZATION: Horizontal
 TEST DISTANCE: 3 m



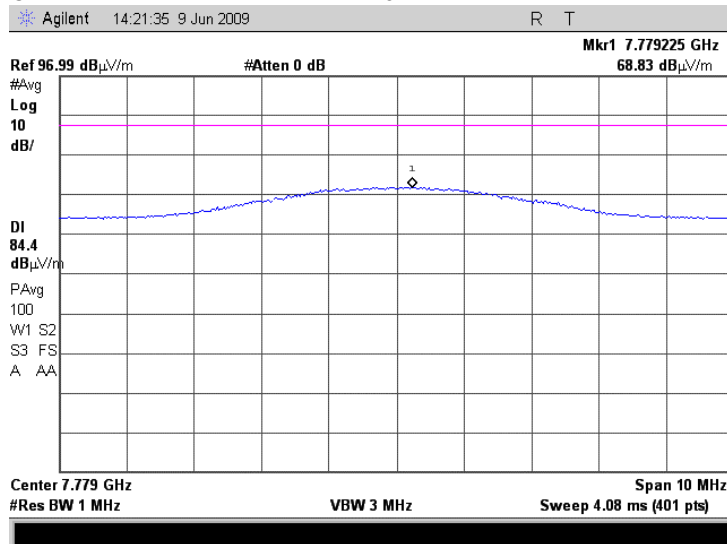


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/22/2009 5:36:19 PM		
Temperature: 29 °C	Air Pressure: 1007 hPa	Relative Humidity: 60 %	Power Supply: 120VAC
Remarks:			

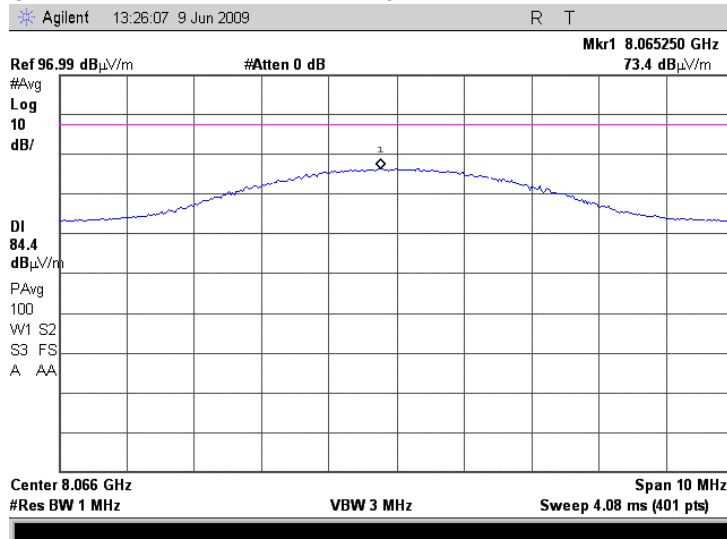
Plot 7.5.26 Radiated emission measurements at the 3rd harmonic

TEST SITE: OATS
 CARRIER FREQUENCY: Mid
 ANTENNA POLARIZATION: Horizontal
 TEST DISTANCE: 3 m



Plot 7.5.27 Radiated emission measurements at the 3rd harmonic

TEST SITE: OATS
 CARRIER FREQUENCY: High
 ANTENNA POLARIZATION: Horizontal
 TEST DISTANCE: 3 m



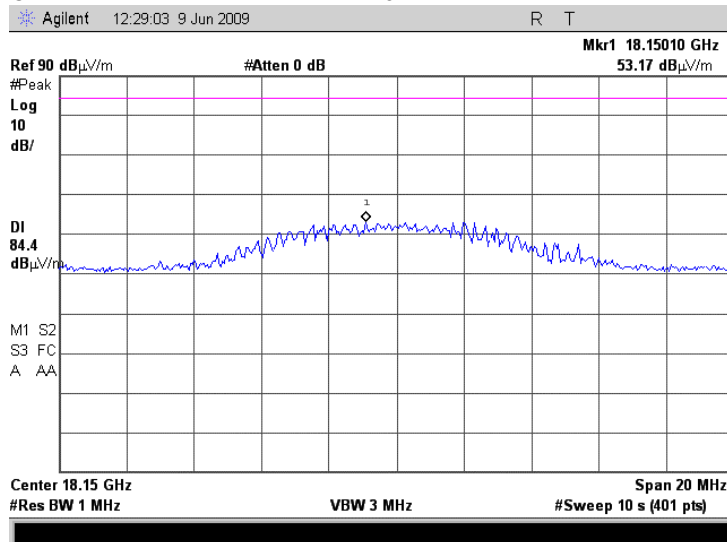


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/22/2009 5:36:19 PM		
Temperature: 29 °C	Air Pressure: 1007 hPa	Relative Humidity: 60 %	Power Supply: 120VAC
Remarks:			

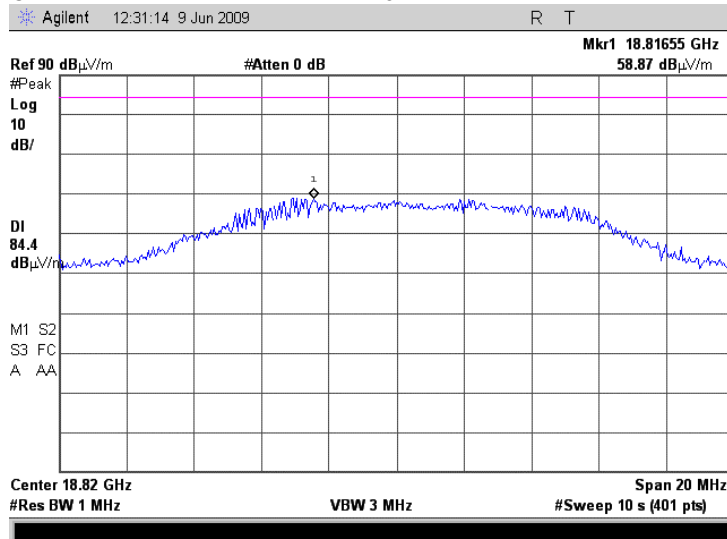
Plot 7.5.28 Radiated emission measurements at the 7th harmonic

TEST SITE: OATS
 CARRIER FREQUENCY: Mid
 ANTENNA POLARIZATION: Vertical
 TEST DISTANCE: 3 m



Plot 7.5.29 Radiated emission measurements at the 7th harmonic

TEST SITE: OATS
 CARRIER FREQUENCY: High
 ANTENNA POLARIZATION: Vertical
 TEST DISTANCE: 3 m



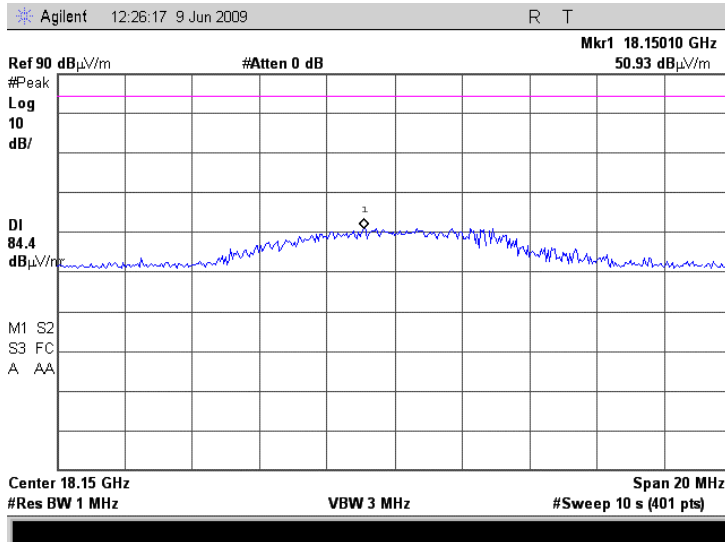


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/22/2009 5:36:19 PM		
Temperature: 29 °C	Air Pressure: 1007 hPa	Relative Humidity: 60 %	Power Supply: 120VAC
Remarks:			

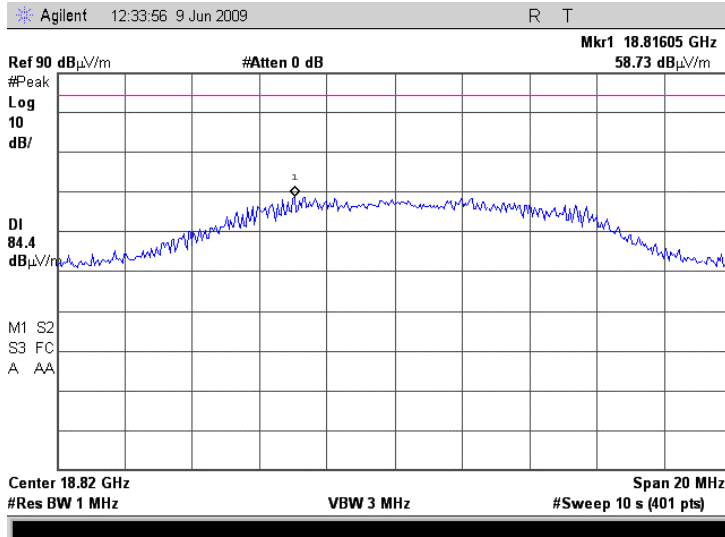
Plot 7.5.30 Radiated emission measurements at the 7th harmonic

TEST SITE: OATS
 CARRIER FREQUENCY: Mid
 ANTENNA POLARIZATION: Horizontal
 TEST DISTANCE: 3 m



Plot 7.5.31 Radiated emission measurements at the 7th harmonic

TEST SITE: OATS
 CARRIER FREQUENCY: High
 ANTENNA POLARIZATION: Horizontal
 TEST DISTANCE: 3 m



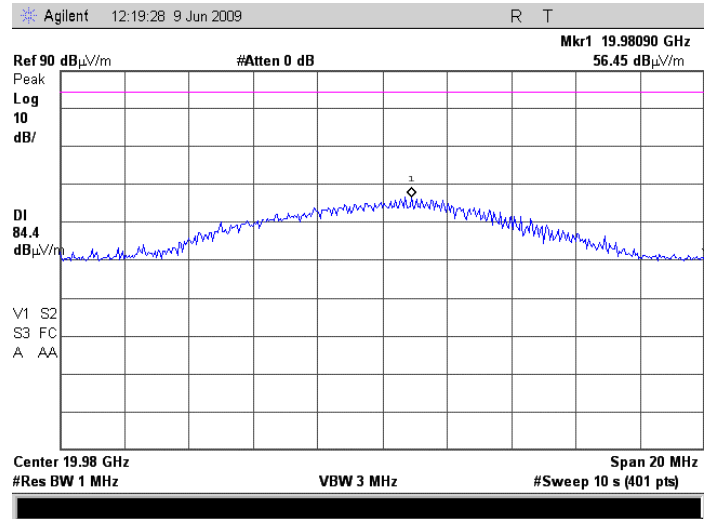


HERMON LABORATORIES

Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	6/22/2009 5:36:19 PM		
Temperature: 29 °C	Air Pressure: 1007 hPa	Relative Humidity: 60 %	Power Supply: 120VAC
Remarks:			

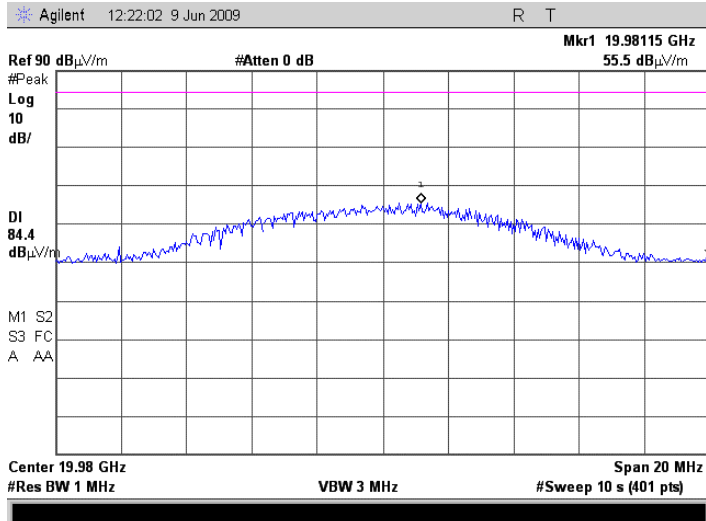
Plot 7.5.32 Radiated emission measurements at the 8th harmonic

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



Plot 7.5.33 Radiated emission measurements at the 8th harmonic

TEST SITE: OATS
 CARRIER FREQUENCY: Low
 ANTENNA POLARIZATION: Horizontal
 TEST DISTANCE: 3 m





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: 6/22/2009 4:33:45 PM			
Temperature: 25.8 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

7.6 Frequency stability test

7.6.1 General

This test was performed to measure frequency stability of transmitter RF carrier. Specification test limits are given in Table 7.6.1.

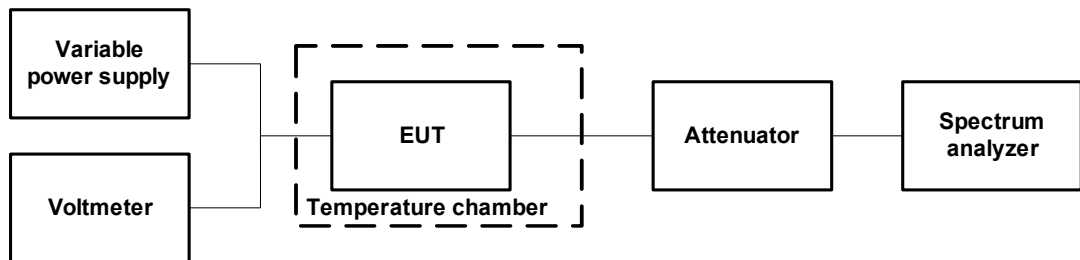
Table 7.6.1 Frequency stability limits

Assigned frequency, MHz	Maximum allowed frequency displacement
2496.0 – 2690.0	The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

7.6.2 Test procedure

- 7.6.2.1 The EUT was set up as shown in Figure 7.6.1, energized and its proper operation was checked.
- 7.6.2.2 The EUT 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.
- 7.6.2.3 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.
- 7.6.2.4 The above procedure was repeated at 0°C and at the lowest test temperature.
- 7.6.2.5 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.
- 7.6.2.6 Frequency displacement was calculated and compared with the limit as provided in Table 7.6.2.

Figure 7.6.1 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:	6/22/2009 4:33:45 PM		
Temperature: 25.8 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 120VAC
Remarks:			

Table 7.6.2 Frequency stability test results

OPERATING FREQUENCY: 2496 – 2690 MHz
 NOMINAL POWER VOLTAGE: 120 VAC
 TEMPERATURE STABILIZATION PERIOD: 20 min
 POWER DURING TEMPERATURE TRANSITION: Off
 SPECTRUM ANALYZER MODE: Peak Hold
 RESOLUTION BANDWIDTH: 1 kHz
 VIDEO BANDWIDTH: 3 kHz

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 2497.50 MHz										
-30	nominal	2497.501506	2497.501517	2497.501526	2497.501529	2497.501535	2497.501536	2497.501550	3209.0000	0.00
-20	nominal	2497.500805	NA	NA	NA	NA	NA	2497.500782	2464.0000	0.00
-10	nominal	2497.500746	NA	NA	NA	NA	NA	2497.500866	2525.0000	0.00
0	nominal	2497.500099	2497.500095	2497.500091	2497.500088	2497.500087	2497.500087	2497.500088	1758.0000	0.00
10	nominal	2497.499783	NA	NA	NA	NA	NA	2497.499820	1479.0000	0.00
20	15%	2497.495989	NA	NA	NA	NA	NA	2497.497348	0.000000	-2352.00
20	nominal	2497.497497	NA	NA	NA	NA	NA	2497.498341*	0.000000	-844.00
20	-15%	2497.498550	NA	NA	NA	NA	NA	2497.498150	209.000000	-191.00
30	nominal	2497.499620	2497.499626	2497.499676	2497.499682	2497.499688	2497.499690	2497.499710	1369.0000	0.00
40	nominal	2497.499588	NA	NA	NA	NA	NA	2497.499626	1285.0000	0.00
50	nominal	2497.499276	2497.499665	2497.499634	2497.499621	2497.499608	2497.499604	2497.499523	1324.0000	0.00
Mid carrier frequency 2593.00 MHz										
-30	nominal	2592.999962	2593.001556	2593.001562	2593.001568	2593.001567	2593.001568	2593.001590	2847.00	0.00
-20	nominal	2593.000833	NA	NA	NA	NA	NA	2593.000813	2090.00	0.00
-10	nominal	2593.000882	NA	NA	NA	NA	NA	2593.000874	2139.00	0.00
0	nominal	2593.000125	2593.000109	2593.000112	2593.000114	2593.000111	2593.000108	2593.000103	1382.00	0.00
10	nominal	2592.999816	NA	NA	NA	NA	NA	2592.999817	1074.00	0.00
20	15%	2592.997185	NA	NA	NA	NA	NA	2592.998861	118.00	-1558.00
20	nominal	2592.998303	NA	NA	NA	NA	NA	2592.998743	0.00	-440.00
20	-15%	2592.998409	NA	NA	NA	NA	NA	2592.998393	0.00	-350.00
30	nominal	2592.999700	2592.999703	2592.999700	2592.999700	2592.999700	2592.999701	2592.999700	960.00	0.00
40	nominal	2592.999616	NA	NA	NA	NA	NA	2592.999674	931.00	0.00
50	nominal	2592.999683	2592.999675	2592.999672	2592.999664	2592.999656	2592.999654	2592.999650	940.00	0.00
High carrier frequency 2688.50 MHz										
-30	nominal	2688.501510	2688.501380	2688.501553	2688.501573	2688.501584	2688.501597	2688.501610	2690.00	0.00
-20	nominal	2688.500914	NA	NA	NA	NA	NA	2688.500825	1994.00	0.00
-10	nominal	2688.500904	NA	NA	NA	NA	NA	2688.500899	1984.00	0.00
0	nominal	2688.499993	2688.500144	2688.500140	2688.500138	2688.500137	2688.500133	2688.500130	1224.00	0.00
10	nominal	2688.499687	NA	NA	NA	NA	NA	2688.499860	880.00	0.00
20	15%	2688.498866	NA	NA	NA	NA	NA	2688.498991	71.00	-54.00
20	nominal	2688.498715	NA	NA	NA	NA	NA	2688.498920	0.00	-205.00
20	-15%	2688.498341	NA	NA	NA	NA	NA	2688.498554	0.00	-579.00
30	nominal	2688.499694	2688.499704	2688.499702	2688.499701	2688.499698	2688.499694	2688.499692	784.00	0.00
40	nominal	2688.499671	NA	NA	NA	NA	NA	2688.499794	874.00	0.00
50	nominal	2688.499510	2688.499509	2688.499572	2688.499650	2688.499668	2688.499666	2688.499683	763.00	0.00

* - Reference frequency

Table 7.6.3 Maximum frequency displacement

Channel	Maximum frequency displacement			
	ppm		Hz	
	Negative	Positive	Negative	Positive
Low (2497.5 MHz)	-0.942	1.285	2352.00	3209.00
Mid (2593.0 MHz)	-0.601	1.108	1558.00	2874.00
High (2688.5 MHz)	-0.215	1.001	579.00	2690.00



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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: 6/22/2009 4:33:45 PM	
Temperature: 25.8 °C	Air Pressure: 1010 hPa
Remarks:	

Table 7.6.4 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								
2496.2775	2498.7	2496.275148	2498.703209	2496	2502	-0.27515	-3.29679	Pass
2591.77	2594.2	2591.768442	2594.202847	2590	2596	-1.76844	-1.79715	Pass
2687.3075	2689.7	2687.306921	2689.70269	2684.5	2690	-2.80692	-0.29731	Pass
QPSK								
2496.255	2498.7	2496.252648	2498.703209	2496	2502	-0.25265	-3.29679	Pass
2591.785	2594.1925	2591.783442	2594.195347	2590	2596	-1.78344	-1.80465	Pass
2687.3	2689.7225	2687.299421	2689.72519	2684.5	2690	-2.79942	-0.27481	Pass
16QAM								
2496.2475	2498.7	2496.245148	2498.703209	2496	2502	-0.24515	-3.29679	Pass
2591.785	2594.1925	2591.783442	2594.195347	2590	2596	-1.78344	-1.80465	Pass
2687.285	2689.715	2687.284421	2689.71769	2684.5	2690	-2.78442	-0.28231	Pass
64QAM								
2496.225	2498.73	2496.222648	2498.733209	2496	2507.5	-0.22265	-8.76679	Pass
2591.7775	2594.215	2591.775942	2594.217847	2590	2602	-1.77594	-7.78215	Pass
2687.2775	2689.6925	2687.276921	2689.69519	2679	2690	-8.27692	-0.30481	Pass
5 MHz BW								
BPSK								
2496.265	2501.1825	2496.262648	2501.185709	2496	2502	-0.26265	-0.81429	Pass
2590.5675	2595.4325	2590.565942	2595.435347	2590	2596	-0.56594	-0.56465	Pass
2684.7825	2689.7	2684.781921	2689.70269	2684.5	2690	-0.28192	-0.29731	Pass
QPSK								
2496.265	2501.1825	2496.262648	2501.185709	2496	2502	-0.26265	-0.81429	Pass
2590.5675	2595.4325	2590.565942	2595.435347	2590	2596	-0.56594	-0.56465	Pass
2684.7825	2689.7	2684.781921	2689.70269	2684.5	2690	-0.28192	-0.29731	Pass
16QAM								
2496.265	2501.1825	2496.262648	2501.185709	2496	2502	-0.26265	-0.81429	Pass
2590.5325	2595.4325	2590.530942	2595.435347	2590	2596	-0.53094	-0.56465	Pass
2684.7825	2689.7	2684.781921	2689.70269	2684.5	2690	-0.28192	-0.29731	Pass
64QAM								
2496.3	2501.2525	2496.297648	2501.255709	2496	2507.5	-0.29765	-6.24429	Pass
2590.5675	2595.4325	2590.565942	2595.435347	2590	2602	-0.56594	-6.56465	Pass
2684.7825	2689.7	2684.781921	2689.70269	2679	2690	-5.78192	-0.29731	Pass



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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: 6/22/2009 4:33:45 PM	
Temperature: 25.8 °C	Air Pressure: 1010 hPa
Relative Humidity: 38 %	
Power Supply: 120VAC	
Remarks:	

Table 7.6.4 Transmission occupied bandwidth with frequency drift test results (continued)

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
10 MHz BW								
BPSK								
2496.86	2506.79	2496.857648	2506.793209	2496	2507.5	-0.85765	-0.70679	Pass
2591.11	2601.07	2591.108442	2601.072847	2590	2602	-1.10844	-0.92715	Pass
2679.55	2689.51	2679.549421	2689.51269	2679	2690	-0.54942	-0.48731	Pass
QPSK								
2496.86	2506.79	2496.857648	2506.793209	2496	2507.5	-0.85765	-0.70679	Pass
2591.11	2601.07	2591.108442	2601.072847	2590	2602	-1.10844	-0.92715	Pass
2679.55	2689.51	2679.549421	2689.51269	2679	2690	-0.54942	-0.48731	Pass
16QAM								
2496.92	2506.67	2496.917648	2506.673209	2496	2507.5	-0.91765	-0.82679	Pass
2591.11	2601.04	2591.108442	2601.042847	2590	2602	-1.10844	-0.95715	Pass
2679.58	2689.51	2679.579421	2689.51269	2679	2690	-0.57942	-0.48731	Pass
64QAM								
2496.86	2506.73	2496.857648	2506.733209	2496	2507.5	-0.85765	-0.76679	Pass
2591.08	2600.98	2591.078442	2600.982847	2590	2602	-1.07844	-1.01715	Pass
2679.58	2689.51	2679.579421	2689.51269	2679	2690	-0.57942	-0.48731	Pass

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

Reference numbers of test equipment used

HL 3001	HL 3286	HL 3386				
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Full description is given in Appendix A.

**8 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-09	29-Jun-10
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
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
1116	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz	Hermon Laboratories	A1-18	186	23-Jan-09	23-Jan-10
1424	Spectrum Analyzer, 30 Hz- 40 GHz	Agilent Technologies	8564EC	3946A002 19	28-Aug-08	28-Aug-09
1425	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1426, HL1427	Agilent Technologies	8542E	3710A002 22, 3705A002 04	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
2254	Cable 40 GHz, 0.8 m, blue	Rhophase Microwave Limited	KPS-1503A-800-KPS	W4907	11-Jun-09	11-Jun-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	12-Jun-08	12-Jun-10
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY414447 62	07-May-08	07-May-10
2953	Cable, RF, 18 GHz, 1.2 m, SMA-SMA	Gore	10020014	NA	05-Oct-08	05-Oct-09
3001	EMC Analyzer, 9 kHz to 3 GHz	Agilent Technologies	E7402A	US394401 80	23-Nov-08	23-Nov-09
3120	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-9155-00	3120	01-Jan-09	01-Jan-10
3207	Cable 40 GHz, 1.2 m	Gore	GOR245	05118337	11-Jun-09	11-Jun-10
3286	Temperature Chamber, (-40 to +170) °C	Thermotron	EL-8-CH-1-1-CO2	21-9048	09-Sep-08	09-Sep-09
3386	Microwave Cable Assembly, 18 GHz, 1.0 m, N type/N type	Suhner Sucoflex	104EA	3386	04-Feb-09	04-Feb-10
3437	Precision Fixed Attenuator, 50 Ohm, 5 W, 10 dB, DC to 18 GHz	Mini-Circuits	BW-S10W5+	NA	08-Mar-09	08-Mar-10
3439	Precision Fixed Attenuator, 50 Ohm, 5 W, 20 dB, DC to 18 GHz	Mini-Circuits	BW-S20W5+	NA	08-Mar-09	08-Mar-10
3442	Precision Fixed Attenuator, 50 Ohm, 5 W, 20 dB, DC to 18 GHz	Mini-Circuits	BW-S20W5+	NA	08-Mar-09	08-Mar-10
3455	Medium Power Fixed Coaxial Attenuator DC to 40 GHz, 20 dB, 5 W	Aeroflex / Weinschel	75A-20-12	1182	17-Mar-09	17-Mar-10
3533	Amplifier, low noise, 6 to 18 GHz	Quinstar Technology	QLJ-06184040-J0	111590010 01	07-Dec-08	07-Dec-09
3534	Amplifier, low noise, 6 to 18 GHz	Quinstar Technology	QLJ-06184040-J0	111590010 02	07-Dec-08	07-Dec-09



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HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
3535	Amplifier, low noise, 18 to 40 GHz	Quinstar Technology	QLJ-18404537-J0	11159003001	07-Dec-08	07-Dec-09
3559	Cable 40 GHz, SMA-SMA, 0.95 m, Blue	Gore	PHASEFL EX	03771245	10-Aug-08	10-Aug-09

9 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 %

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.

10 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), Registration Numbers 90624 for OATS and 90623 for the anechoic chamber; 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), has a status of a Telefication - Listed Testing Laboratory, Certificate No. L138/00. 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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11 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
ANSI C63.2: 1996	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4: 2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
ANSI/TIA/EIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

12 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).

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

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

Cable loss
Cable coaxial, Gore, 25.5 GHz, 1.2 m, SMA-SMA, S/N 10020014
HL 2953

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.06	8750	1.28	18000	1.84
30	0.06	9000	1.30	18250	1.91
100	0.12	9250	1.35	18500	1.94
250	0.19	9500	1.34	18750	1.92
500	0.27	9750	1.36	19000	1.95
750	0.34	10000	1.33	19250	2.00
1000	0.40	10250	1.38	19500	1.96
1250	0.45	10500	1.39	19750	2.02
1500	0.50	10750	1.39	20000	1.92
1750	0.54	11000	1.43	20250	2.04
2000	0.57	11250	1.42	20500	2.00
2250	0.60	11500	1.48	20750	2.09
2500	0.64	11750	1.49	21000	2.01
2750	0.67	12000	1.59	21250	2.07
3000	0.70	12250	1.50	21500	2.20
3250	0.74	12500	1.55	21750	2.10
3500	0.76	12750	1.55	22000	2.24
3750	0.80	13000	1.61	22250	2.25
4000	0.83	13250	1.62	22500	2.12
4250	0.85	13500	1.56	22750	2.05
4500	0.87	13750	1.61	23000	2.10
4750	0.91	14000	1.57	23250	2.03
5000	0.92	14250	1.66	23500	2.08
5250	0.96	14500	1.58	23750	2.14
5500	0.99	14750	1.69	24000	2.16
5750	0.99	15000	1.71	24250	2.25
6000	1.03	15250	1.74	24500	2.17
6250	1.05	15500	1.75	24750	2.32
6500	1.07	15750	1.72	25000	2.32
6750	1.08	16000	1.89	25250	2.32
7000	1.12	16250	1.79	25500	2.41
7250	1.13	16500	1.84	25750	2.31
7500	1.15	16750	1.82	26000	2.28
7750	1.20	17000	1.79	26250	2.32
8000	1.20	17250	1.78	26500	2.29
8250	1.23	17500	1.85		
8500	1.27	17750	1.83		



Cable loss
Microwave Cable Assembly, 18 GHz, 6.4 m, SMA – SMA, Huber-Suhner, model 198-9155-00
HL 3120

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	0.09	3600	2.13	7400	3.14	11200	3.93	15100	4.64
30	0.19	3700	2.19	7500	3.17	11300	3.93	15200	4.63
50	0.27	3800	2.21	7600	3.20	11400	3.94	15300	4.65
100	0.35	3900	2.22	7700	3.26	11500	3.92	15400	4.66
200	0.49	4000	2.28	7800	3.25	11600	3.92	15500	4.71
300	0.61	4100	2.28	7900	3.27	11700	3.89	15600	4.70
400	0.68	4200	2.31	8000	3.28	11800	3.94	15700	4.71
500	0.77	4300	2.37	8100	3.29	11900	3.95	15800	4.72
600	0.85	4400	2.38	8200	3.37	12000	3.96	15900	4.71
700	0.91	4500	2.40	8300	3.34	12100	4.06	16000	4.77
800	0.98	4600	2.45	8400	3.35	12200	4.01	16100	4.75
900	1.04	4700	2.45	8500	3.36	12300	4.11	16200	4.76
1000	1.09	4800	2.48	8600	3.38	12400	4.11	16300	4.81
1100	1.14	4900	2.53	8700	3.40	12500	4.17	16400	4.80
1200	1.16	5000	2.57	8800	3.42	12600	4.19	16500	4.84
1300	1.24	5100	2.56	8900	3.46	12700	4.27	16600	4.85
1400	1.29	5200	2.59	9000	3.47	12800	4.35	16700	4.88
1500	1.30	5300	2.61	9100	3.48	12900	4.22	16800	4.88
1600	1.38	5400	2.64	9200	3.52	13000	4.33	16900	4.86
1700	1.43	5500	2.68	9300	3.54	13100	4.30	17000	4.88
1800	1.47	5600	2.74	9400	3.58	13200	4.38	17100	4.85
1900	1.54	5700	2.71	9500	3.59	13300	4.34	17200	4.89
2000	1.52	5800	2.74	9600	3.67	13400	4.36	17300	4.91
2100	1.58	5900	2.78	9700	3.65	13500	4.32	17400	4.92
2200	1.61	6000	2.79	9800	3.72	13600	4.32	17500	4.91
2300	1.71	6100	2.82	9900	3.71	13700	4.39	17600	4.91
2400	1.75	6200	2.84	10000	3.80	13800	4.37	17700	4.97
2500	1.76	6300	2.86	10100	3.76	13900	4.41	17800	5.00
2600	1.80	6400	2.89	10200	3.84	14000	4.39	17900	5.00
2700	1.86	6500	2.90	10300	3.81	14100	4.38	18000	5.04
2800	1.86	6600	2.92	10400	3.84	14200	4.39		
2900	1.93	6700	2.95	10500	3.85	14300	4.43		
3000	1.93	6800	2.98	10600	3.86	14400	4.46		
3100	2.00	6900	3.01	10700	3.88	14600	4.53		
3200	2.03	7000	3.02	10800	3.89	14700	4.51		
3300	2.03	7100	3.06	10900	3.95	14800	4.64		
3400	2.09	7200	3.08	11000	3.89	14900	4.61		
3500	2.13	7300	3.10	11100	3.93	15000	4.65		



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		

Cable loss
Cable coaxial, Microwave Cable Assembly, 104EA, 18 GHz, 1.0 m
Suhner Sucoflex, HL 3386

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.05	5750	1.01	12000	1.29
30	0.07	6000	1.02	12250	1.33
100	0.12	6250	1.02	12500	1.36
250	0.18	6500	0.95	12750	1.35
500	0.26	6750	0.96	13000	1.36
750	0.32	7000	1.01	13250	1.39
1000	0.35	7250	1.04	13500	1.37
1250	0.41	7500	1.09	13750	1.43
1500	0.45	7750	1.12	14000	1.46
1750	0.50	8000	1.13	14250	1.39
2000	0.54	8250	1.15	14500	1.36
2250	0.57	8500	1.15	14750	1.47
2500	0.61	8750	1.15	15000	1.47
2750	0.64	9000	1.16	15250	1.41
3000	0.67	9250	1.14	15500	1.52
3250	0.70	9500	1.14	15750	1.54
3500	0.71	9750	1.19	16000	1.49
3750	0.74	10000	1.20	16250	1.48
4000	0.77	10250	1.22	16500	1.52
4250	0.80	10500	1.23	16750	1.56
4500	0.84	10750	1.22	17000	1.57
4750	0.85	11000	1.21	17250	1.53
5000	0.84	11250	1.24	17500	1.55
5250	0.85	11500	1.26	17750	1.55
5500	0.92	11750	1.28	18000	1.54

Cable loss
Cable coaxial, GORE, PHASEFLEX, 40 GHz, 0.95 m, SMA-SMA, S/N 03771245
HL 3559

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
30	0.08	10000	0.96	20500	1.59	31000	2.24
100	0.10	10500	0.99	21000	1.63	31500	2.71
500	0.22	11000	1.02	21500	1.70	32000	2.47
1000	0.32	11500	1.07	22000	1.71	32500	2.37
1500	0.40	12000	1.13	22500	1.60	33000	2.35
2000	0.41	12500	1.16	23000	1.58	33500	2.34
2500	0.44	13000	1.26	23500	1.64	34000	2.31
3000	0.53	13500	1.26	24000	1.68	34500	2.43
3500	0.54	14000	1.22	24500	1.79	35000	2.45
4000	0.62	14500	1.26	25000	1.86	35500	2.48
4500	0.62	15000	1.27	25500	1.77	36000	3.60
5000	0.67	15500	1.29	26000	1.78	36500	2.62
5500	0.70	16000	1.39	26500	1.83	37000	2.45
6000	0.72	16500	1.50	27000	1.87	37500	2.47
6500	0.76	17000	1.49	27500	1.97	38000	2.38
7000	0.83	17500	1.37	28000	2.69	38500	2.41
7500	0.85	18000	1.40	28500	1.94	39000	2.56
8000	0.89	18500	1.41	29000	2.02	39500	2.71
8500	0.91	19000	1.48	29500	2.05	40000	2.69
9000	0.95	19500	1.61	30000	2.11		
9500	0.96	20000	1.59	30500	2.11		

13 APPENDIX F Abbreviations and acronyms

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

END OF DOCUMENT