

TEST REPORT

ACCORDING TO: FCC part 27

FOR:

Airspan Networks (Israel) Ltd.

Subscriber unit

Model: ProST 1.4G TDD V-p

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1 Applicant information

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Telephone: +1 561 893 8686
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E-mail: zlevi@airspan.com
Contact name: Mr. Zion Levi

2 Equipment under test attributes

Product name: Subscriber unit
Product type: Transceiver
Model(s): ProST 1.4G TDD V-p
Serial number: 48FF88C5C948
Hardware version: A0
Software release: 23.0.18.0
Receipt date: 2/8/2009

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: 19957
Location: Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started: 2/8/2009
Test completed: 8/24/2009
Test specification(s): FCC part 27

5 Tests summary

Test	Status
Transmitter characteristics	
Section 27.50(e)(1), (2) Peak output power at RF antenna connector	Pass
Section 2.1091, 27.52, RF safety	Pass, Exhibit provided in Application
Section 27.53(j), Spurious emissions at RF antenna connector	Pass
Section 27.53(j), Band edge emissions at RF antenna connector	Pass
Section 27.53(j), Radiated spurious emissions	Pass
Section 27.54, Frequency stability	Pass
Section 2.1049, Occupied bandwidth	Pass

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

	Name and Title	Date	Signature
Tested by:	Mr. L. Markel, test engineer	August 24, 2009	
	Mr. S. Samokha, test engineer		
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	September 8, 2009	
Approved by:	Mr. M. Nikishin, EMC and Radio group manager	September 9, 2009	

6 EUT description

6.1 General information

The EUT, subscriber premises radio, model name ProST 1.4G 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 ProST transceiver/receiver (up to 64 QAM modulation, data rate up to 37Mbps) uses OFDM and operates in TDD duplexing mode. The ProST 1.4G TDD is equipped with a 10.5 dBi internal or 18 dBi external antennas.

6.2 Ports and lines

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

6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
Laptop	IBM	X31	99-TXWYC
Laptop adaptor	IBM	NA	11S92P1014Z1 ZD2N74T2LS
SDA	Airspan	SDA-4S/VL type 2	753D6A0086
SDA (for conducted and radiated emission tests)	Airspan	SDA-4S Type 2	752D6C0444
Mouse	Microsoft	NA	X802382-004

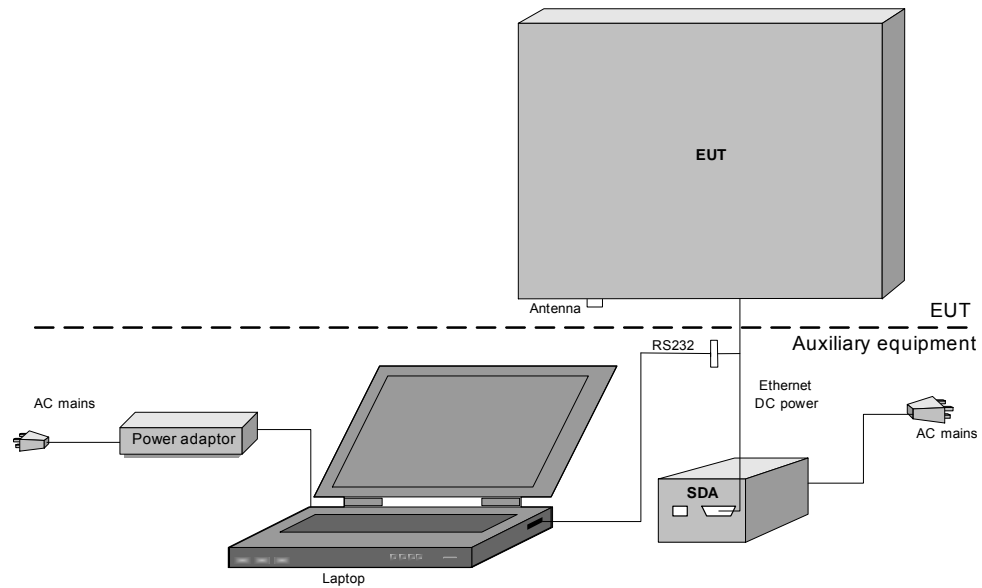
6.4 Changes made in the EUT

No changes were implemented.

6.5 Transmitter characteristics

Type of equipment			
<input checked="" type="checkbox"/>	Stand-alone (Equipment with or without its own control provisions)		
<input type="checkbox"/>	Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)		
<input type="checkbox"/>	Plug-in card (Equipment intended for a variety of host systems)		
Intended use		Condition of use	
<input checked="" type="checkbox"/>	fixed	Always at a distance more than 2 m from all people	
<input type="checkbox"/>	mobile	Always at a distance more than 20 cm from all people	
<input type="checkbox"/>	portable	May operate at a distance closer than 20 cm to human body	
Assigned frequency range		1390 – 1392 MHz; 1392 – 1395 MHz; 1432 - 1435 MHz	
Operating frequency range		1391 MHz; 1393.5 MHz; 1433.5 MHz	
RF channel spacing		1.5 MHz, 1.75 MHz, 2.5 MHz	
Maximum rated output power		At transmitter 50 Ω RF output connector 25.1 dBm @1433.5 MHz	
Is transmitter output power variable?		<input type="checkbox"/> No	
		<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> continuous variable
			<input checked="" type="checkbox"/> stepped variable with stepsize 0.5 dB
			minimum RF power -30 dBm
		maximum RF power 25.1 dBm	
Antenna connection			
<input type="checkbox"/> unique coupling	<input checked="" type="checkbox"/> standard connector	<input type="checkbox"/> Integral	<input checked="" type="checkbox"/> with temporary RF connector without temporary RF connector
Antenna/s technical characteristics			
Type	Manufacturer	Model number	Gain
Internal	MARS antennas	MA-WA15 -AS10	10.5 dBi
External	Foshan Sanshui Shing Road Antenna Co., Ltd.	TDJ-SA1500-18-65	18 dBi
Transmitter 99% power bandwidth		Transmitter aggregate data rate/s, MBps	Type of modulation
1.5 MHz	0.6285	BPSK	
	1.2570		
	3.7695		
	5.6550		
1.75 MHz	0.73325	BPSK	
	1.46650		
	4.39775		
	6.5975		
2.5 MHz	1.0475	BPSK	
	2.095		
	6.2825		
	9.425		
Type of multiplexing		OFDM	
Modulating test signal (baseband)		PRBS	
Maximum transmitter duty cycle in normal use		90%	
Transmitter power source			
<input checked="" type="checkbox"/>	DC	Nominal rated voltage	Battery type
<input type="checkbox"/>	AC mains	Nominal rated voltage	48 VDC via SDA
		Nominal rated voltage	120 V Frequency 60 Hz
Common power source for transmitter and receiver		<input checked="" type="checkbox"/> yes	<input type="checkbox"/> no

6.6 Test configuration



Test specification:		Section 27.50(e)(1), (2), Peak output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:	Compliance	Verdict:	PASS
Date:	2/15/2009, 8/24/2009		
Temperature: 23°C	Air Pressure: 1022 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

7 Transmitter tests according to 47CFR part 27 requirements

7.1 Peak output power test

7.1.1 General

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

Table 7.1.1 Peak output power limits

Assigned frequency range, MHz	Maximum peak output power, EIRP	
	W	dBm
1390.0 – 1395.0	100	50.0
1432.0 – 1435.0	2000	63.0

7.1.2 Test procedure

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

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

7.1.2.3 The peak output power was measured with a power meter as provided in Table 7.1.2 to Table 7.1.4

Figure 7.1.1 Output power test setup



Test specification:	Section 27.50(e)(1), (2), Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date:	2/15/2009, 8/24/2009		
Temperature: 23°C	Air Pressure: 1022 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

Table 7.1.2 Output power test results for Fixed Station, 1.5 MHz EBW

ASSIGNED FREQUENCY RANGE: 1390.0 – 1392.0 MHz
DETECTOR USED: Power meter
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA GAIN: 18 dBi
POWER SETTINGS: Attenuation 10 dB
DUTY CYCLE: 90 %

Carrier frequency, MHz	Power Meter reading, dBm	External attenuation, dB	Cable loss, dB	RF output power*, EIRP dBm	Limit, EIRP, dBm	Margin, dB	Verdict
BPSK, bit rate 0.628 Mbps							
1391.0	23.98	Included	Included	41.98	50.0	-8.02	Pass
64QAM, bit rate 5.655 Mbps							
1391.0	23.99	Included	Included	41.99	50.0	-8.01	Pass

ASSIGNED FREQUENCY RANGE: 1392.0 – 1395.0 MHz
DETECTOR USED: Power meter
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA GAIN: 18 dBi
POWER SETTINGS: Attenuation 10 dB
DUTY CYCLE: 90 %

Carrier frequency, MHz	Power Meter reading, dBm	External attenuation, dB	Cable loss, dB	RF output power*, EIRP dBm	Limit, EIRP, dBm	Margin, dB	Verdict
BPSK, bit rate 0.628 Mbps							
1393.5	23.62	Included	Included	41.62	50.0	-8.38	Pass
64QAM, bit rate 5.655 Mbps							
1393.5	23.61	Included	Included	41.61	50.0	-8.39	Pass

ASSIGNED FREQUENCY RANGE: 1432.0 – 1435.0 MHz
DETECTOR USED: Power meter
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
ANTENNA GAIN: 18 dBi
POWER SETTINGS: Attenuation 10 dB
DUTY CYCLE: 90 %

Carrier frequency, MHz	Power Meter reading, dBm	External attenuation, dB	Cable loss, dB	RF output power*, EIRP dBm	Limit, EIRP, dBm	Margin, dB	Verdict
BPSK, bit rate 0.628 Mbps							
1433.5	24.59	Included	Included	42.59	63.0	-20.41	Pass
64QAM, bit rate 5.655 Mbps							
1433.5	24.60	Included	Included	42.60	63.0	-20.40	Pass

* - RF output power, EIRP (dBm) = Spectrum analyzer reading, dBm + Antenna Gain, dBi

Reference numbers of test equipment used

HL 3301	HL 3437	HL 3439				
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Full description is given in Appendix A.

Test specification:	Section 27.50(e)(1), (2), Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date:	2/15/2009, 8/24/2009		
Temperature: 23°C	Air Pressure: 1022 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

Table 7.1.3 Output power test results for Fixed Station, 1.75 MHz EBW

ASSIGNED FREQUENCY RANGE: 1392.0 – 1395.0 MHz
1432.0 – 1435.0 MHz
DETECTOR USED: Power Meter (Average during transmission burst)
MODULATING SIGNAL: PRBS

MODULATION: BPSK
BIT RATE: 0.733 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum (power word 6.5)
ANTENNA GAIN: 18 dBi

Carrier frequency, MHz	Spectrum analyzer reading, dBm	External attenuation, dB	Cable loss, dB	RF output power*, EIRP dBm	Limit, EIRP dBm	Margin, dB	Verdict
1393.5	23.17	Included	Included	41.17	50.0	-8.83	Pass
1433.5	24.50	Included	Included	42.50	63.0	-20.50	Pass

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

MODULATION: 64QAM
BIT RATE: 6.5975 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum (power word 5.5)
ANTENNA GAIN: 18 dBi

Carrier frequency, MHz	Spectrum analyzer reading, dBm	External attenuation, dB	Cable loss, dB	RF output power*, EIRP dBm	Limit, EIRP dBm	Margin, dB	Verdict
1393.5	23.60	Included	Included	41.60	50.0	-8.40	Pass
1433.5	24.48	Included	Included	42.48	63.0	-20.52	Pass

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

Reference numbers of test equipment used

HL 3301	HL 3302	HL 3435	HL 3442				
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Full description is given in Appendix A.

Test specification:	Section 27.50(e)(1), (2), Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date:	2/15/2009, 8/24/2009		
Temperature: 23°C	Air Pressure: 1022 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

Table 7.1.4 Output power test results for Fixed Station, 2.5 MHz EBW

ASSIGNED FREQUENCY RANGE: 1392.0 – 1395.0 MHz
1432.0 – 1435.0 MHz
DETECTOR USED: Power Meter (Average during transmission burst)
MODULATING SIGNAL: PRBS

MODULATION: BPSK
BIT RATE: 1.0475 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum (power word: 5 low channel, 4 high channel)
ANTENNA GAIN: 18 dBi

Carrier frequency, MHz	Spectrum analyzer reading, dBm	External attenuation, dB	Cable loss, dB	RF output power*, EIRP dBm	Limit, EIRP dBm	Margin, dB	Verdict
1393.5	23.80	Included	Included	41.80	50.0	-8.20	Pass
1433.5	25.15	Included	Included	43.15	63.0	-19.85	Pass

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

MODULATION: 64QAM
BIT RATE: 9.425 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum (power word: 5 low channel, 4 high channel)
ANTENNA GAIN: 18 dBi

Carrier frequency, MHz	Spectrum analyzer reading, dBm	External attenuation, dB	Cable loss, dB	RF output power*, EIRP dBm	Limit, EIRP dBm	Margin, dB	Verdict
1393.5	23.82	Included	Included	41.82	50.0	-8.18	Pass
1433.5	25.12	Included	Included	43.12	63.0	-19.88	Pass

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

Reference numbers of test equipment used

HL 3301	HL 3302	HL 3435	HL 3442				
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Full description is given in Appendix A.

Test specification:		Section 90.209, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/20/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

7.2 Occupied bandwidth test

7.2.1 General

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

Table 7.2.1 Occupied bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points*, dBc	Maximum allowed bandwidth, kHz
1390.0 – 1392.0	26	NA
1392.0 – 1395.0	26	NA
1432.0 – 1435.0	26	NA

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

7.2.2 Test procedure

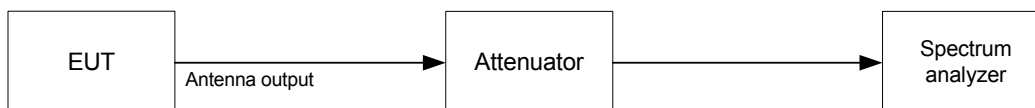
7.2.2.1 The EUT was set up as shown in Figure 7.2.1, energized and its proper operation was checked.

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

7.2.2.3 The EUT was set to transmit the normally modulated carrier.

7.2.2.4 The transmitter occupied bandwidth was measured with spectrum analyzer as a frequency delta between the reference points on modulation envelope and provided in Table 7.2.2 and the associated plots.

Figure 7.2.1 Occupied bandwidth test setup



Test specification:	Section 90.209, Occupied bandwidth			
Test procedure:	47 CFR, Section 2.1049			
Test mode:	Compliance	Verdict:		PASS
Date:	2/16/2009, 8/20/2009			
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC	
Remarks:				

Table 7.2.2 Occupied bandwidth test results

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

EBW: 1.5 MHz
MODULATION: BPSK

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
1391.0	1445.0	NA	NA	NA
1393.5	1445.0	NA	NA	NA
1433.5	1445.0	NA	NA	NA

EBW: 1.5 MHz
MODULATION: 64QAM

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
1391.0	1445.0	NA	NA	NA
1393.5	1445.0	NA	NA	NA
1433.5	1445.0	NA	NA	NA

EBW: 1.75 MHz
MODULATION: BPSK

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
1393.5	1747.5	NA	NA	Pass
1433.5	1740.0	NA	NA	Pass

EBW: 1.75 MHz
MODULATION: 64QAM

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
1393.5	1740.0	NA	NA	Pass
1433.5	1740.0	NA	NA	Pass

EBW: 2.5 MHz
MODULATION: BPSK

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
1393.5	2422.5	NA	NA	Pass
1433.5	2415.0	NA	NA	Pass

EBW: 2.5 MHz
MODULATION: 64QAM

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
1393.5	2422.5	NA	NA	Pass
1433.5	2415.0	NA	NA	Pass

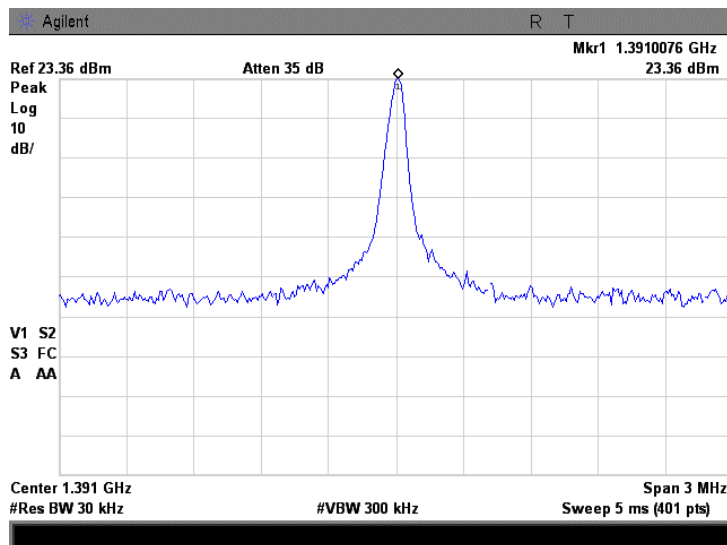
Reference numbers of test equipment used

HL 2780	HL 2869	HL 3435	HL 3437	HL 3439	HL 3442		
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Full description is given in Appendix A.

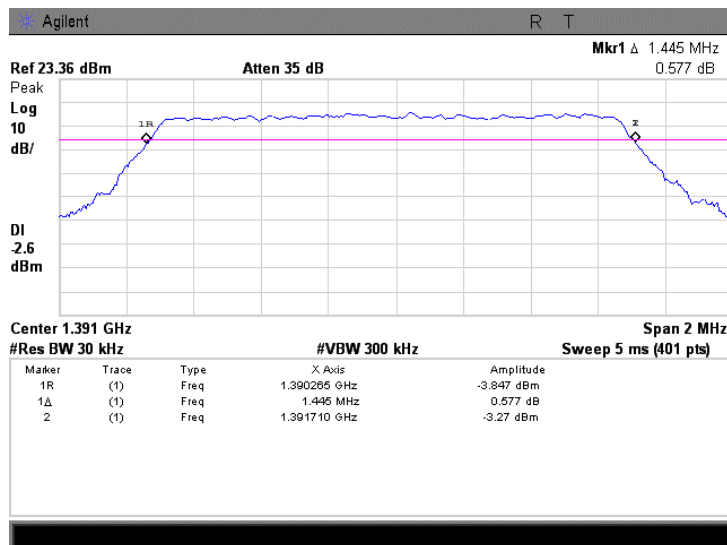
Test specification:		Section 90.209, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/20/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.2.1 Occupied bandwidth test result at 1391.0 MHz, reference level unmodulated, 1.5 MHz EBW

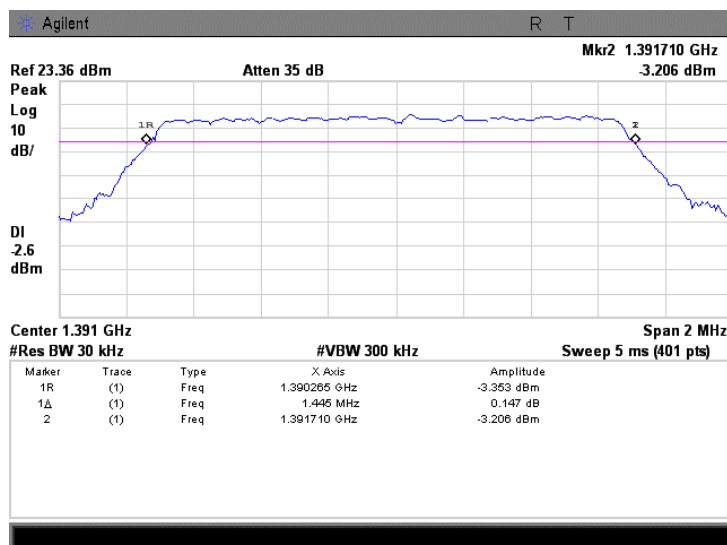


Test specification:		Section 90.209, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/20/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.2.2 Occupied bandwidth test result at 1391.0 MHz, 1.5 MHz EBW, BPSK modulation

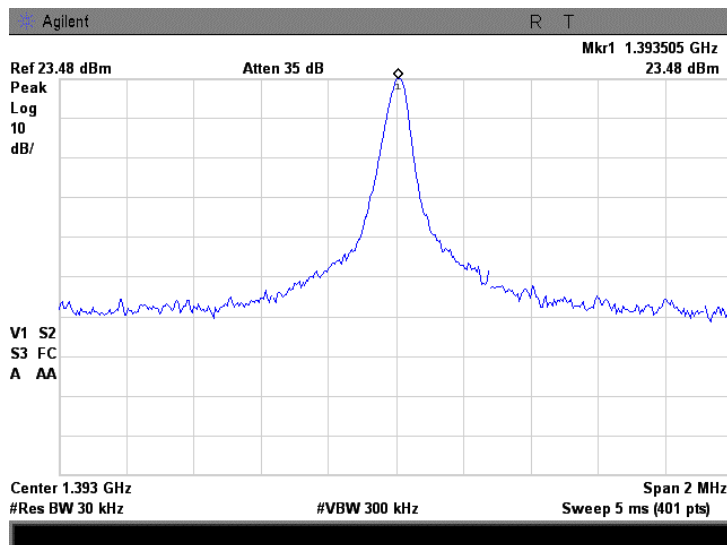


Plot 7.2.3 Occupied bandwidth test result at 1391.0 MHz, 1.5 MHz EBW, 64QAM modulation



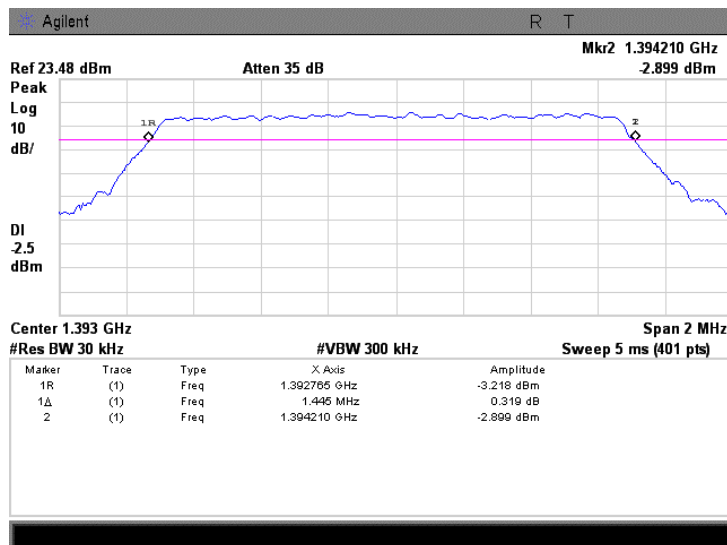
Test specification:		Section 90.209, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/20/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.2.4 Occupied bandwidth test result at 1393.5 MHz, reference level unmodulated, 1.5 MHz EBW

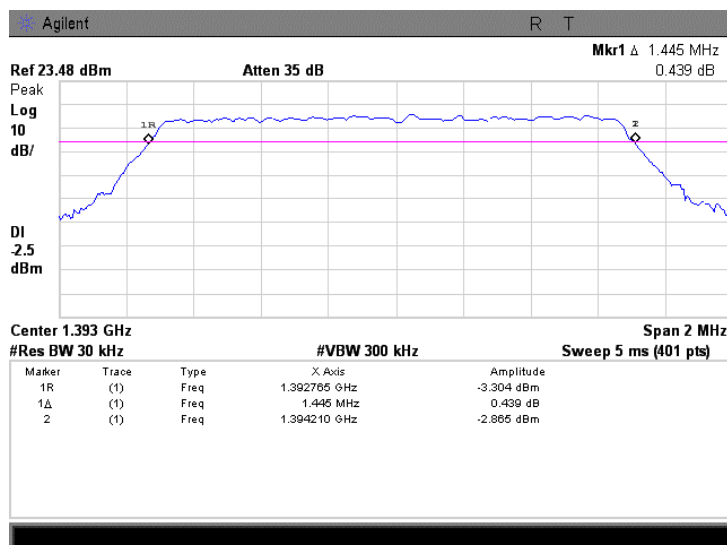


Test specification:		Section 90.209, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/20/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.2.5 Occupied bandwidth test result at 1393.5 MHz, 1.5 MHz EBW, BPSK modulation

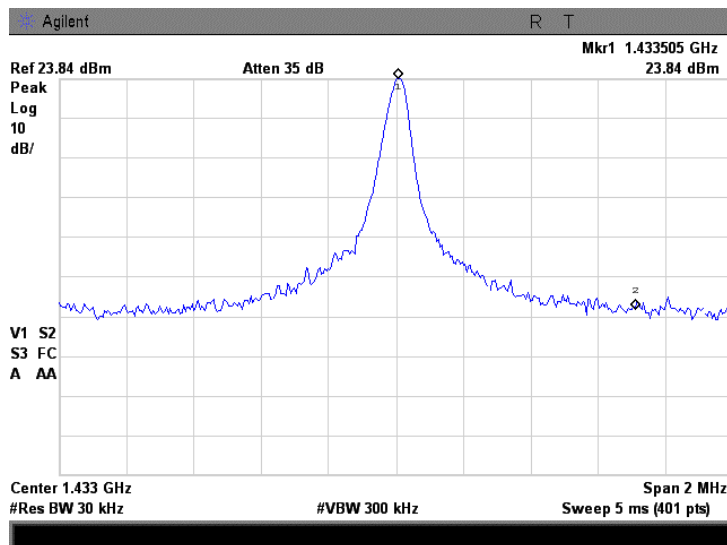


Plot 7.2.6 Occupied bandwidth test result at 1393.5 MHz, 1.5 MHz EBW, 64QAM modulation



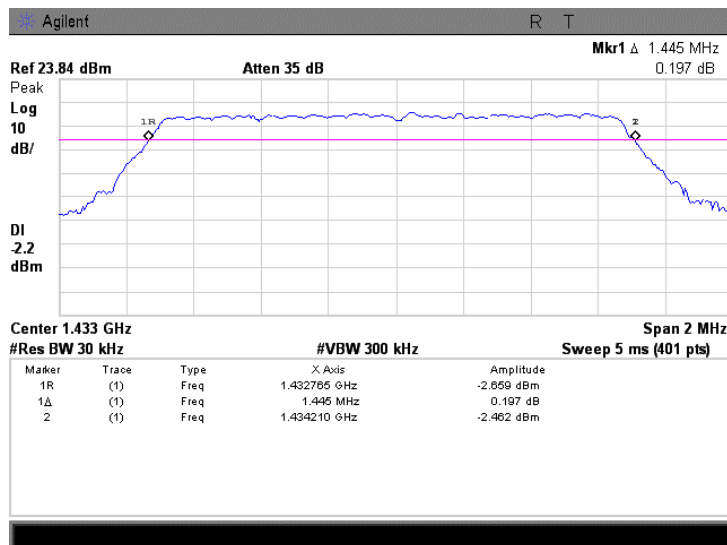
Test specification:		Section 90.209, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/20/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.2.7 Occupied bandwidth test result at 1433.5 MHz, reference level unmodulated, 1.5 MHz EBW

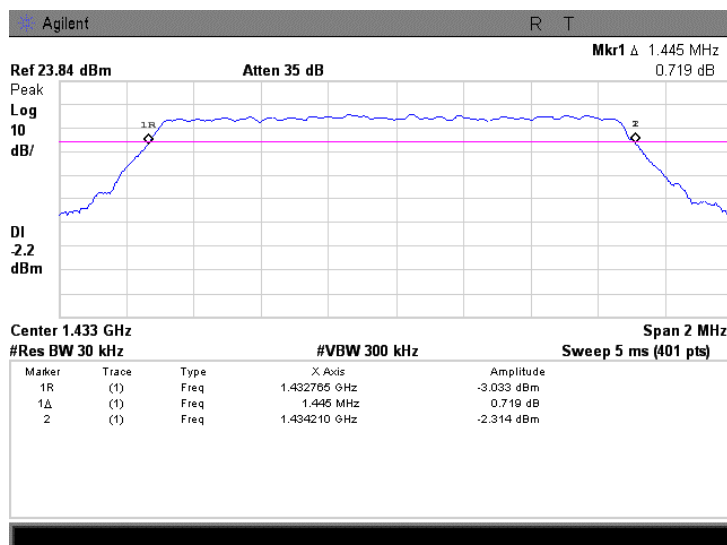


Test specification:		Section 90.209, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/20/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.2.8 Occupied bandwidth test result at 1433.5 MHz, 1.5 MHz EBW, BPSK modulation

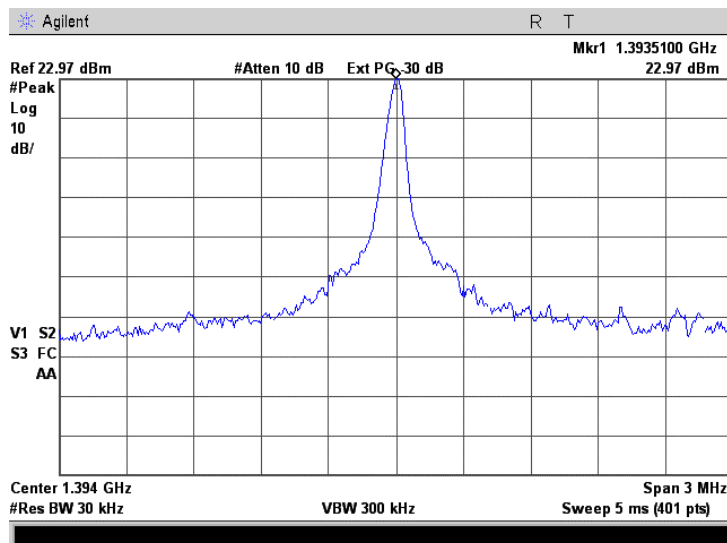


Plot 7.2.9 Occupied bandwidth test result at 1433.5 MHz, 1.5 MHz EBW, 64QAM modulation



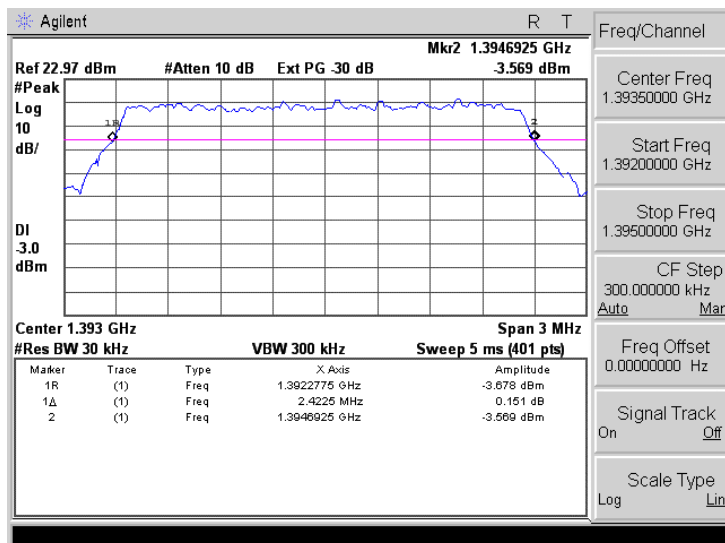
Test specification:		Section 90.209, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/20/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.2.10 Occupied bandwidth test result at 1393.5 MHz, reference level unmodulated, 2.5 MHz EBW

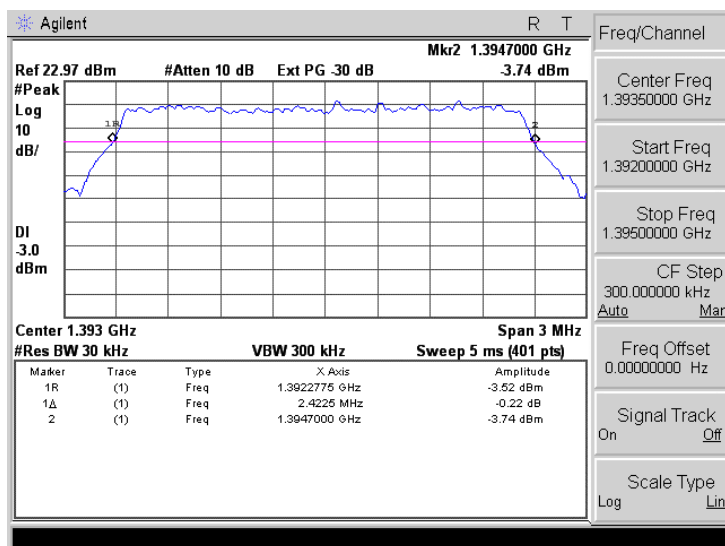


Test specification:		Section 90.209, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/20/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.2.11 Occupied bandwidth test result at 1393.5 MHz, 2.5 MHz EBW, BPSK modulation

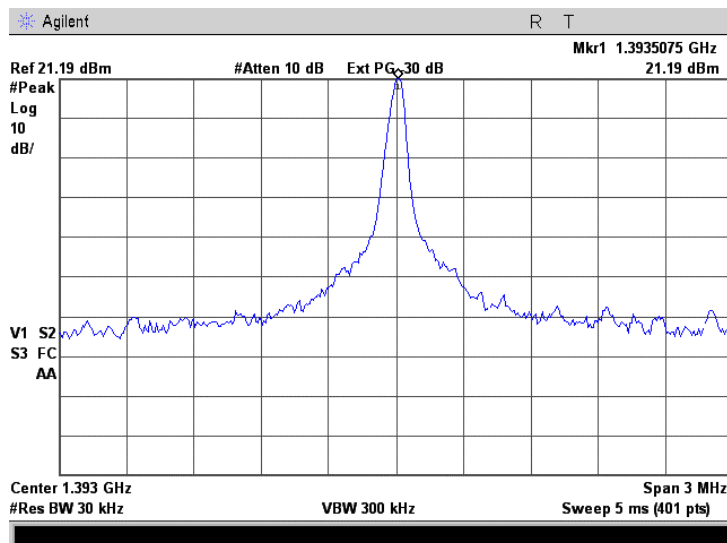


Plot 7.2.12 Occupied bandwidth test result at 1393.5 MHz, 2.5 MHz EBW, 64QAM modulation



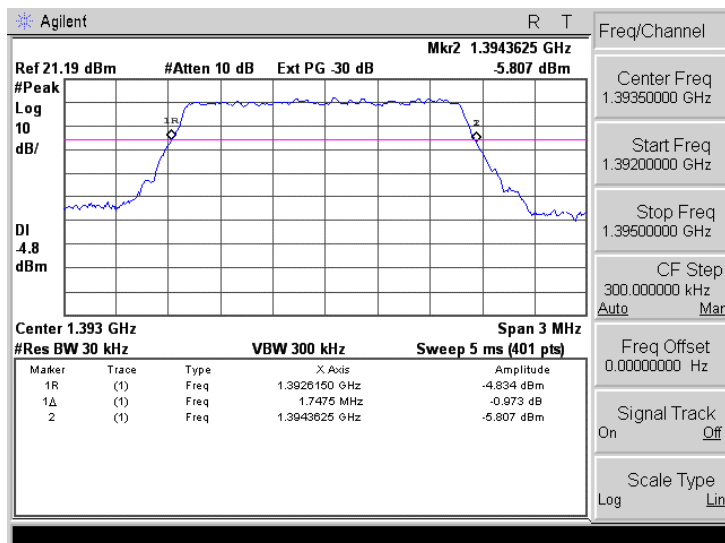
Test specification:		Section 90.209, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/20/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.2.13 Occupied bandwidth test result at 1393.5 MHz, reference level unmodulated, 1.75 MHz EBW

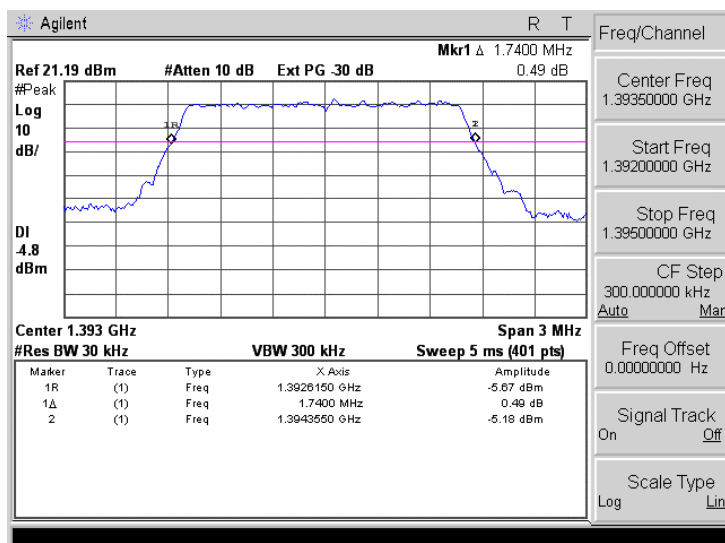


Test specification:		Section 90.209, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/20/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.2.14 Occupied bandwidth test result at 1393.5 MHz, 1.75 MHz EBW, BPSK modulation

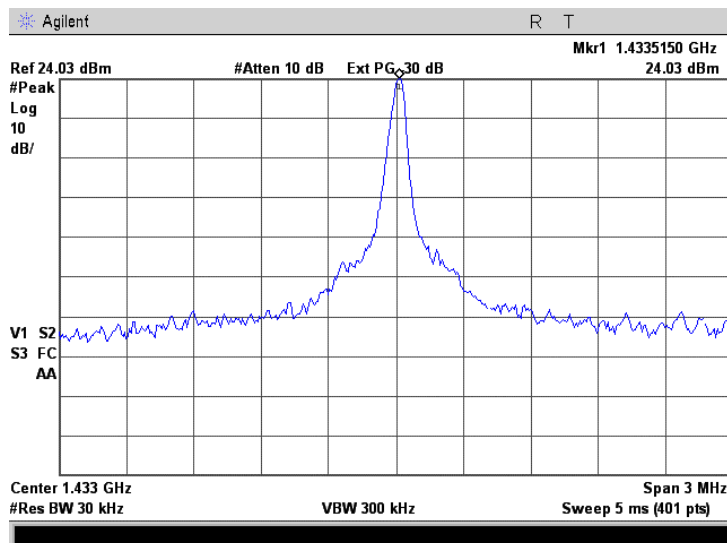


Plot 7.2.15 Occupied bandwidth test result at 1393.5 MHz, 1.75 MHz EBW, 64QAM modulation



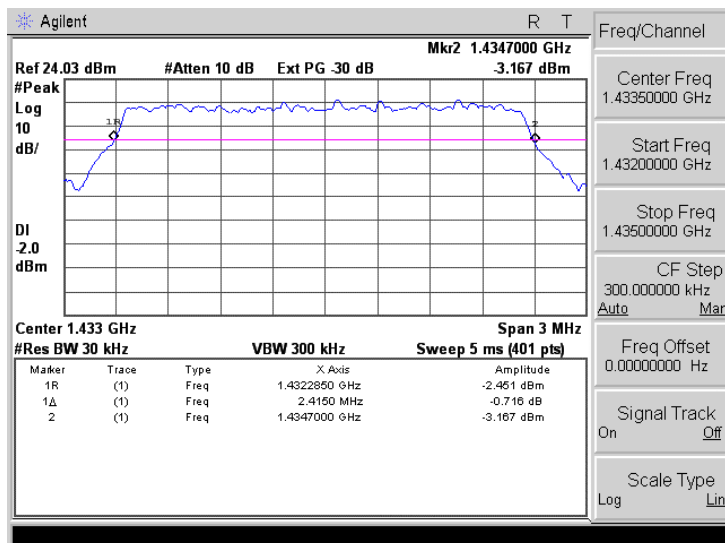
Test specification:		Section 90.209, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/20/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.2.16 Occupied bandwidth test result at 1433.5 MHz, reference level unmodulated, 2.5 MHz EBW

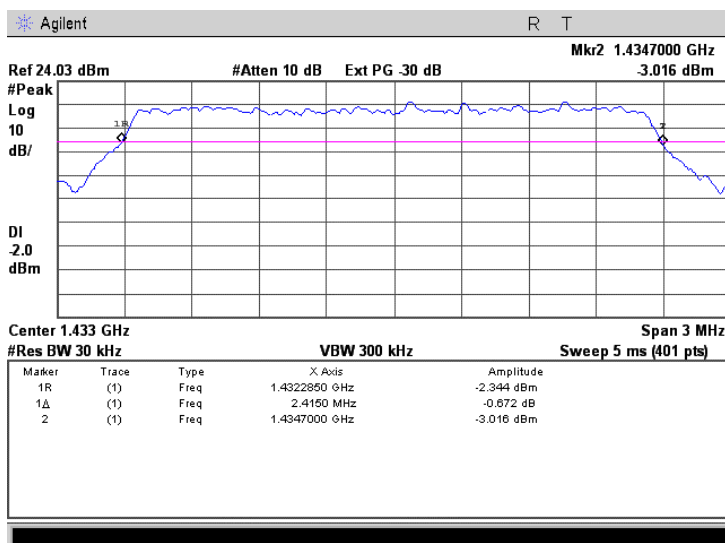


Test specification:		Section 90.209, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/20/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.2.17 Occupied bandwidth test result at 1433.5 MHz, 2.5 MHz EBW, BPSK modulation



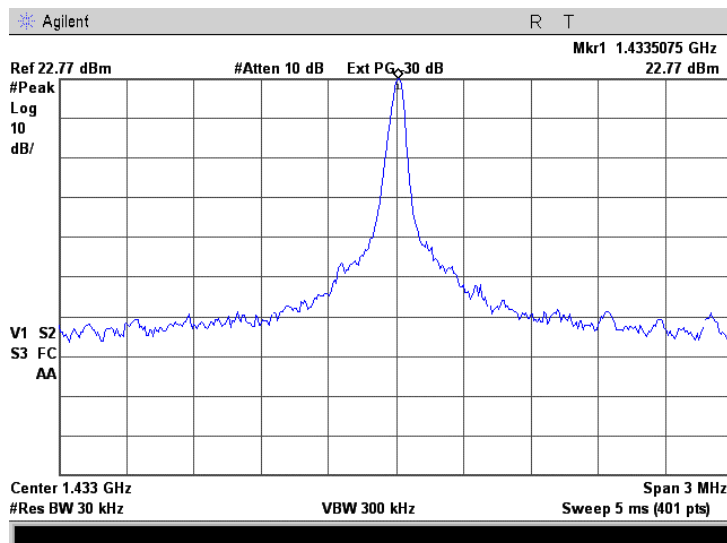
Plot 7.2.18 Occupied bandwidth test result at 1433.5 MHz, 2.5 MHz EBW, 64QAM modulation



Center frequency – 1433.5 MHz

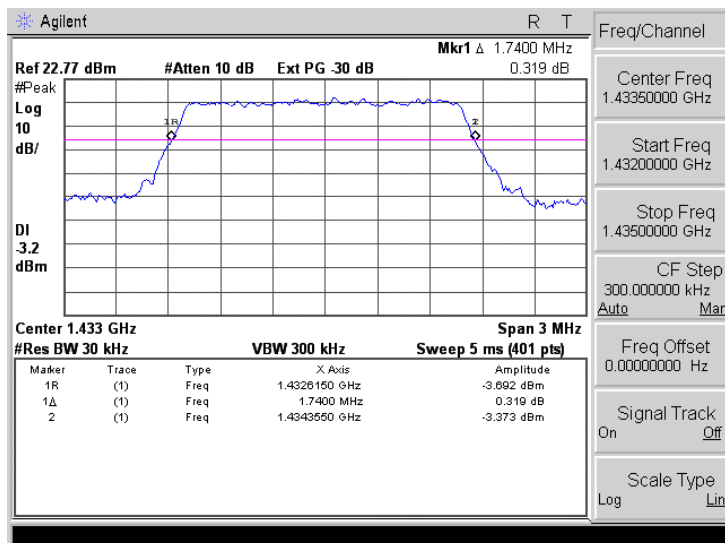
Test specification:		Section 90.209, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/20/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.2.19 Occupied bandwidth test result at 1433.5 MHz, reference level unmodulated, 1.75 MHz EBW

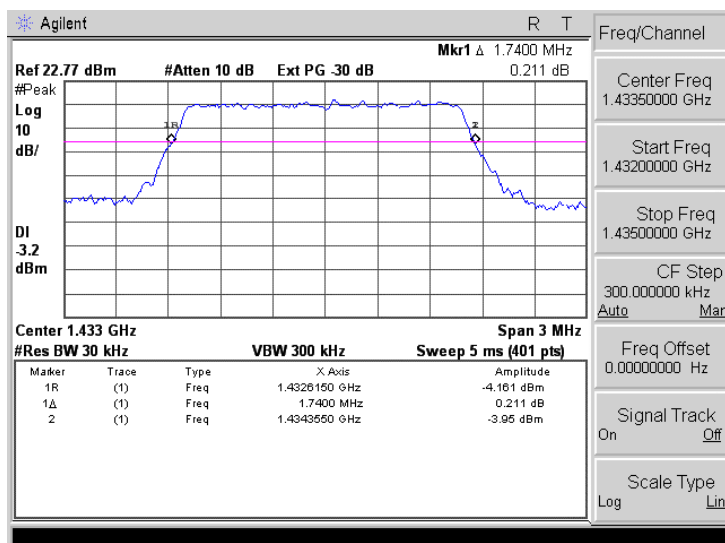


Test specification:		Section 90.209, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/20/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.2.20 Occupied bandwidth test result at 1433.5 MHz, 1.75 MHz EBW, BPSK modulation



Plot 7.2.21 Occupied bandwidth test result at 1433.5 MHz, 1.75 MHz EBW, 64QAM modulation



Test specification:		Section 27.53(j), Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2009, 8/20/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks: ProST			

7.3 Radiated spurious emission measurements

7.3.1 General

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

Table 7.3.1 Radiated spurious emission test limits

Frequency, MHz	Attenuation below carrier dBc	ERP of spurious, dBm	Equivalent field strength limit @ 3m, dB(μV/m)***
0.009 – 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

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

7.3.2.1 The EUT was set up as shown in Figure 7.3.1, energized and the performance check was conducted.

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

7.3.2.3 The worst test results (the lowest margins) were recorded in Table 7.3.2, Table 7.3.3 and shown in the associated plots.

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

7.3.3.1 The EUT was set up as shown in Figure 7.3.2, energized and the performance check was conducted.

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

7.3.3.3 The worst test results (the lowest margins) were recorded in Table 7.3.2, Table 7.3.3 and shown in the associated plots.

7.3.4 Test procedure for substitution ERP measurements of spurious

7.3.4.1 The test equipment was set up as shown in Figure 7.3.3 and energized.

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

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

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

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

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

7.3.4.7 The worst test results (the lowest margins) were recorded in Table 7.3.4 and shown in the associated plots.

Test specification:	Section 27.53(j), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date:	2/16/2009, 8/20/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks: ProST			

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

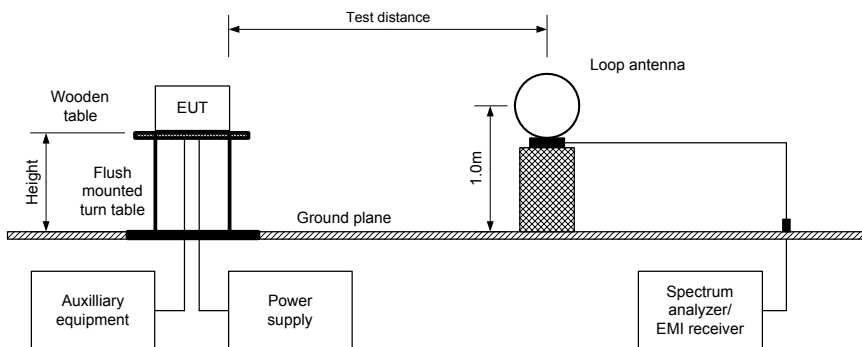
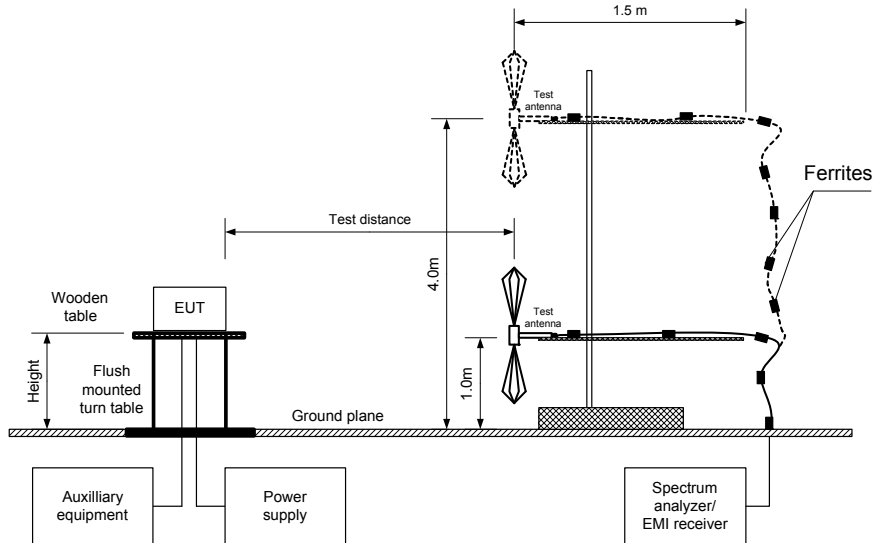
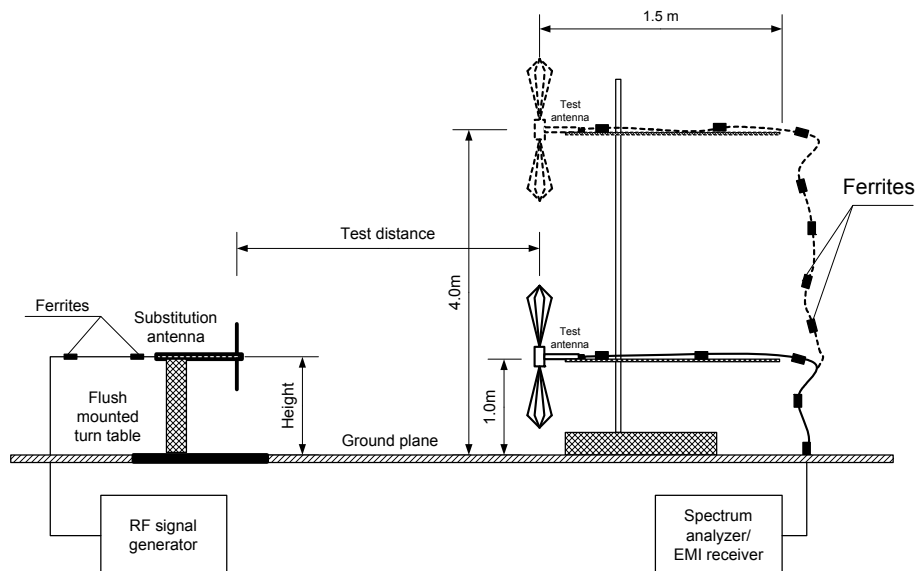


Figure 7.3.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	Section 27.53(j), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date:	2/16/2009, 8/20/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks: ProST			

Figure 7.3.3 Setup for substitution ERP measurements of spurious



Test specification:	Section 27.53(j), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2009, 8/20/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks: ProST			

Table 7.3.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE: 1390.0 – 1392.0 MHz
 TEST DISTANCE: 3 m
 TEST SITE: Semi anechoic chamber
 EUT HEIGHT: 0.8 m
 INVESTIGATED FREQUENCY RANGE: 0.009 – 14500 MHz
 DETECTOR USED: Peak
 VIDEO BANDWIDTH: > Resolution bandwidth
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
 Double ridged guide (above 1000 MHz)
 MODULATION: 64QAM
 MODULATING SIGNAL: PRBS
 BIT RATE: 5.655 Mbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 EBW: 1.5 MHz

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 1391.0 MHz							
No emissions were found							

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

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

NOTE: Radiated spurious emissions were tested with EUT configured to transmit at 1.5 MHz EBW and 64QAM modulation assuming that this configuration produces maximum RF power density.

Reference numbers of test equipment used

HL 0446	HL 0521	HL 0604	HL 2432	HL 2780	HL 2883	HL 3123	HL 3531
HL 3533	HL 3616						

Full description is given in Appendix A.

Test specification: Section 27.53(j), Radiated spurious emissions			
Test procedure: 47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12			
Test mode: Compliance	Verdict: PASS		
Date: 2/16/2009, 8/20/2009			
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks: ProST			

Table 7.3.3 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE: 1392.0 – 1395.0 MHz
1432.0 – 1435.0 MHz

TEST DISTANCE: 3 m

TEST SITE: Semi anechoic chamber / OATS

EUT HEIGHT: 0.8 m

INVESTIGATED FREQUENCY RANGE: 0.009 – 14500 MHz

DETECTOR USED: Peak

VIDEO BANDWIDTH: > Resolution bandwidth

TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
Double ridged guide (above 1000 MHz)

MODULATION: 64QAM

MODULATING SIGNAL: PRBS

BIT RATE: 9.425 Mbps

TRANSMITTER OUTPUT POWER SETTINGS: Maximum

EBW: 1.75 MHz

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 1393.5 MHz							
2787.375	67.56	84.40	-16.84	1000	H	1.2	040
High carrier frequency 1433.5 MHz							
2867.475	74.06	84.40	-10.34	1000	H	1.3	030

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

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

Table 7.3.4 Substitution ERP of spurious test results

ASSIGNED FREQUENCY RANGE: 1392.0 – 1395.0 MHz
1432.0 – 1435.0 MHz

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, dBm	Margin, dB*	Verdict
Low carrier frequency 1393.5 MHz										
2787.375	67.56	1000	H	-41.18	7.15	1.2	-35.27	-13.0	-22.27	Pass
High carrier frequency 1433.5 MHz										
2867.475	74.06	1000	H	-34.68	7.30	1.22	-28.63	-13.0	-15.63	Pass

*- Margin = Spurious emission – specification limit.

NOTE: Radiated spurious emissions were tested with EUT configured to transmit at 1.75 MHz EBW and 64QAM modulation assuming that this configuration produces the maximum RF power density.

Reference numbers of test equipment used

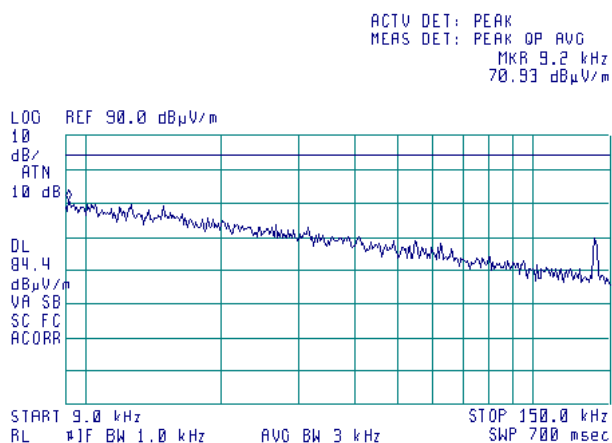
HL 0446	HL 0521	HL 0604	HL 1984	HL 2432	HL 2387	HL 2780	HL 2785
HL 2883	HL 3122	HL 3123	HL 3234	HL 3342	HL 3344	HL 3532	HL 3534

Full description is given in Appendix A.

Test specification:		Section 27.53(j), Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/20/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks: ProST			

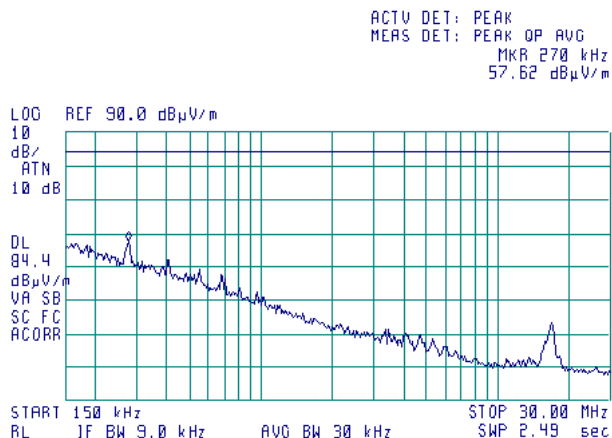
Plot 7.3.1 Radiated emission measurements in 9 - 150 kHz range

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: 1391.0 MHz
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Plot 7.3.2 Radiated emission measurements in 0.15 - 30 MHz range

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: 1391.0 MHz
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



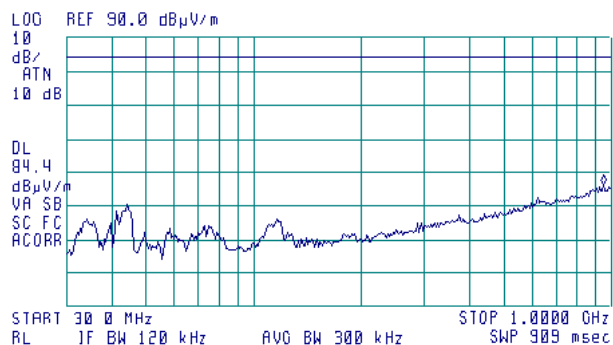
Test specification:		Section 27.53(j), Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/20/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks: ProST			

Plot 7.3.3 Radiated emission measurements in 30 - 1000 MHz range

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: 1391.0 MHz
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



ACTV DET: PEAK
MEAS DET: PEAK OP AVG
MKR 942.8 MHz
46.40 dBμV/m

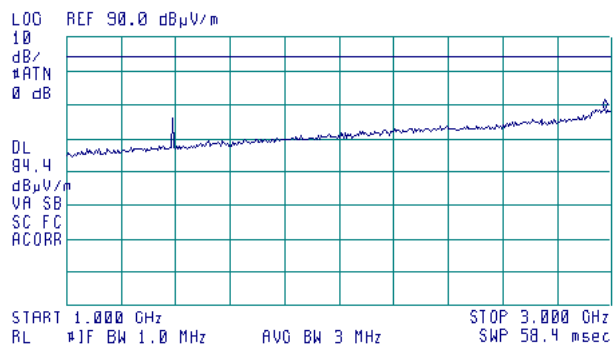


Plot 7.3.4 Radiated emission measurements in 1000 – 3000 MHz range

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: 1391.0 MHz
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



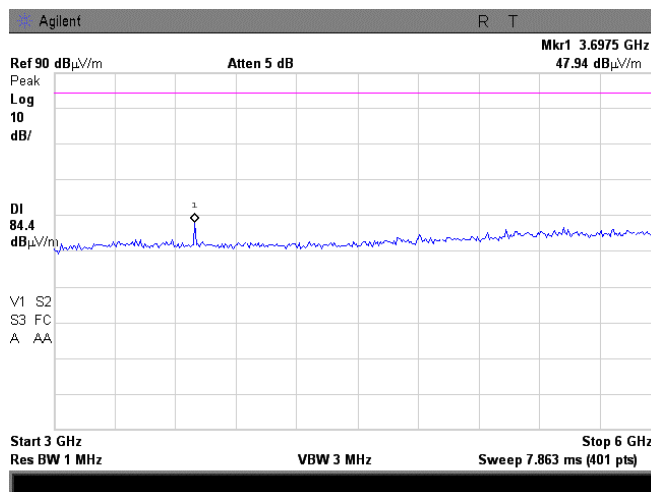
ACTV DET: PEAK
MEAS DET: PEAK OP AVG
MKR 2.974 GHz
68.41 dBμV/m



Test specification:	Section 27.53(j), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date:	2/16/2009, 8/20/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks: ProST			

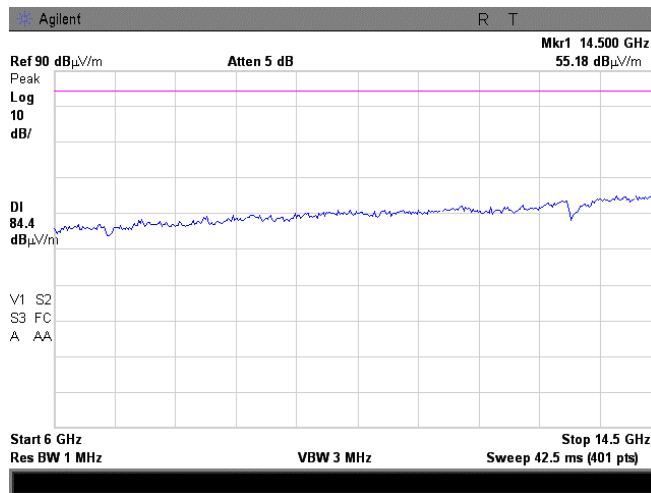
Plot 7.3.5 Radiated emission measurements in 3000 – 6000 MHz range

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: 1391.0 MHz
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Plot 7.3.6 Radiated emission measurements in 6000 – 14500 MHz range

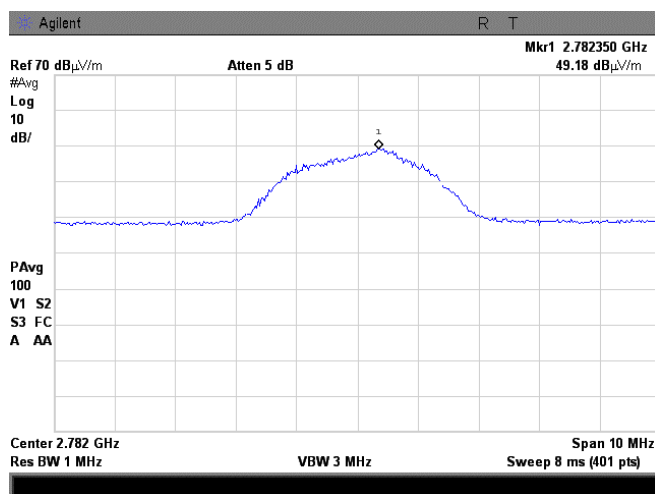
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: 1391.0 MHz
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:	Section 27.53(j), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date:	2/16/2009, 8/20/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks: ProST			

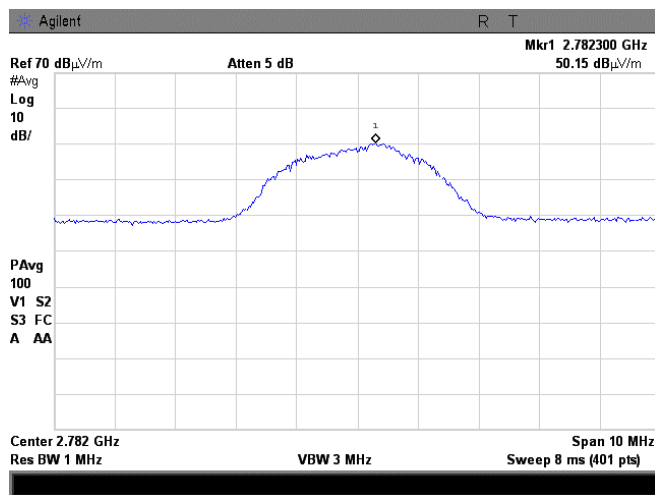
Plot 7.3.7 Radiated emission measurements at the 2nd harmonic

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: 1391.0 MHz
ANTENNA POLARIZATION: Vertical
TEST DISTANCE: 3 m



Plot 7.3.8 Radiated emission measurements at the 2nd harmonic

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: 1391.0 MHz
ANTENNA POLARIZATION: Horizontal
TEST DISTANCE: 3 m

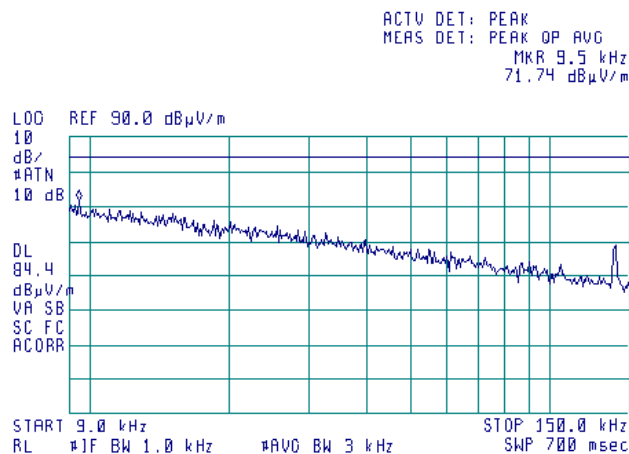


Test specification:		Section 27.53(j), Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/20/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks: ProST			

Plot 7.3.9 Radiated emission measurements in 9 - 150 kHz range

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: 1393.5 MHz
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m

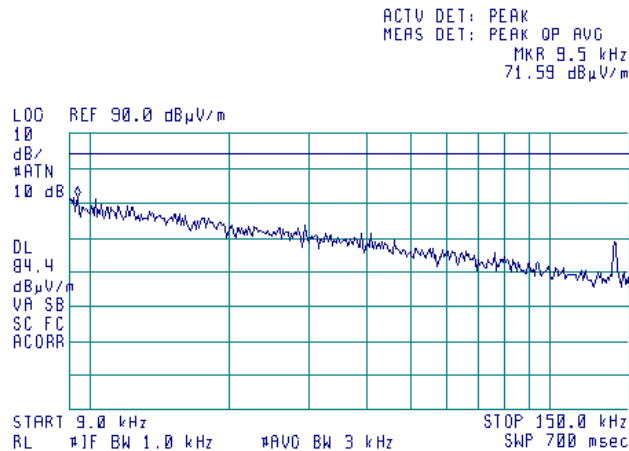
14:26:33 FEB 11, 2009



Plot 7.3.10 Radiated emission measurements in 9 - 150 kHz range

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: 1433.5 MHz
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m

14:29:20 FEB 11, 2009

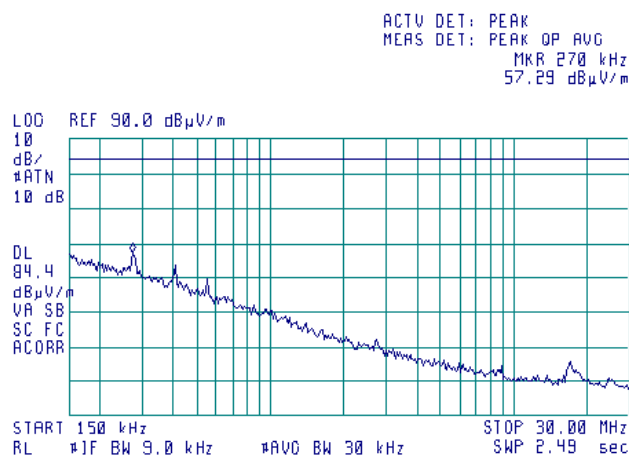


Test specification:		Section 27.53(j), Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2009, 8/20/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks: ProST			

Plot 7.3.11 Radiated emission measurements in 0.15 - 30 MHz range

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: 1393.5 MHz
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m

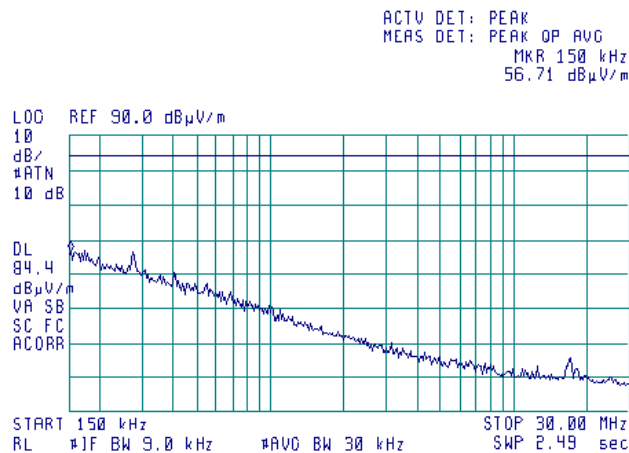
14:24:39 FEB 11, 2009



Plot 7.3.12 Radiated emission measurements in 0.15 - 30 MHz range

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: 1433.5 MHz
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m

14:31:03 FEB 11, 2009

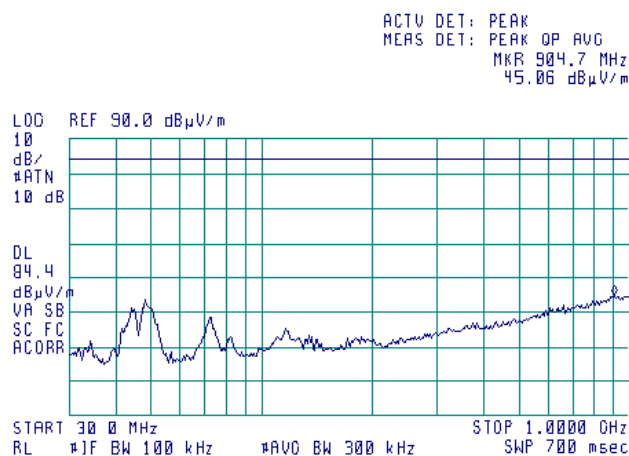


Test specification:		Section 27.53(j), Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2009, 8/20/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks: ProST			

Plot 7.3.13 Radiated emission measurements in 30 - 1000 MHz range

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: 1393.5 MHz
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m

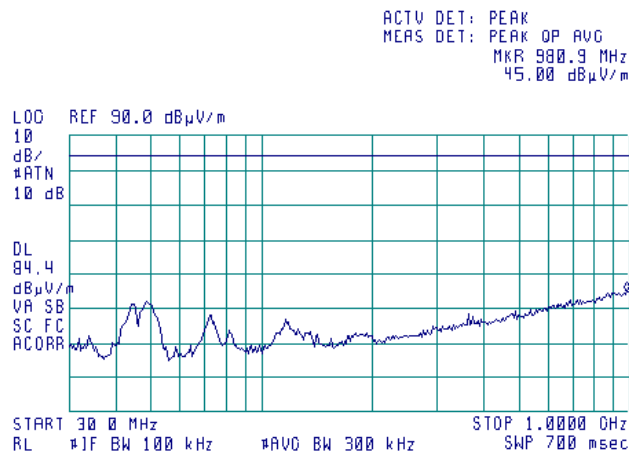
13:47:01 FEB 11, 2009



Plot 7.3.14 Radiated emission measurements in 30 - 1000 MHz range

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: 1433.5 MHz
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m

13:43:02 FEB 11, 2009

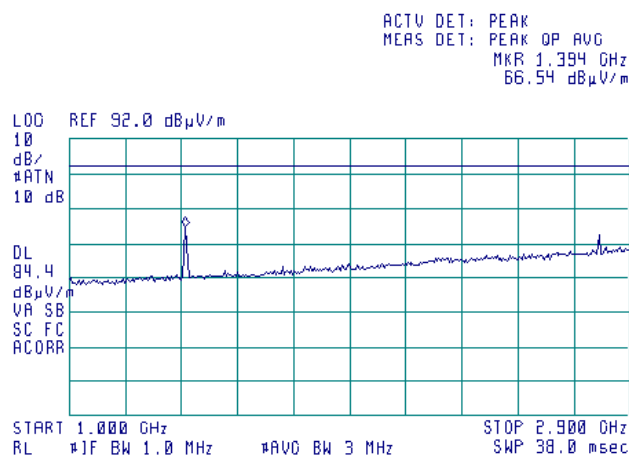


Test specification:		Section 27.53(j), Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2009, 8/20/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks: ProST			

Plot 7.3.15 Radiated emission measurements in 1000 – 2900 MHz range

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: 1393.5 MHz
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m

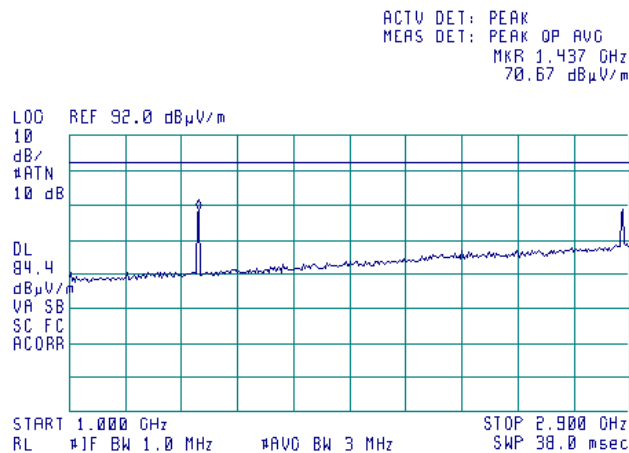
11:23:11 FEB 11, 2009



Plot 7.3.16 Radiated emission measurements in 1000 – 2900 MHz range

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: 1433.5 MHz
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m

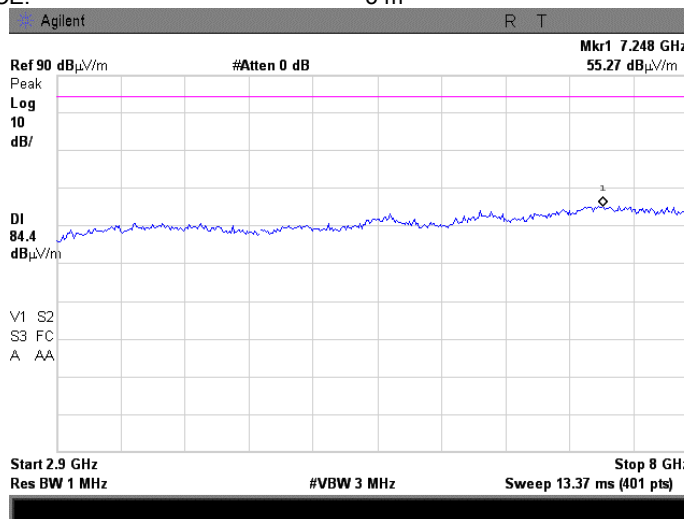
11:43:39 FEB 11, 2009



Test specification:		Section 27.53(j), Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/20/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks: ProST			

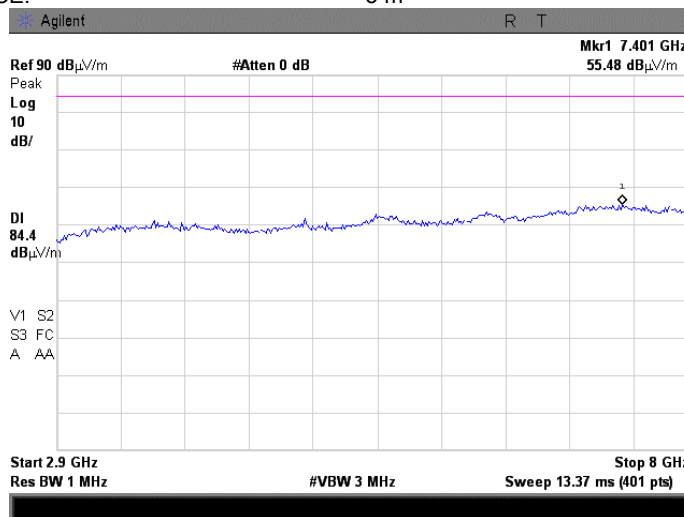
Plot 7.3.17 Radiated emission measurements in 2900 – 8000 MHz range

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: 1393.5 MHz
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Plot 7.3.18 Radiated emission measurements in 2900 – 8000 MHz range

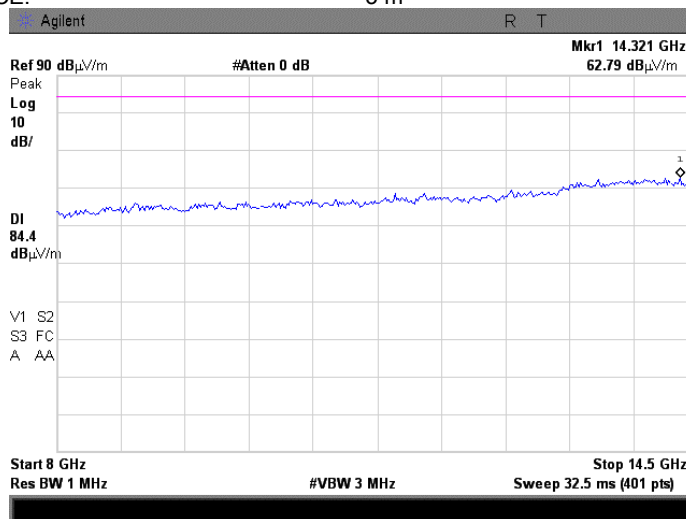
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: 1433.5 MHz
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:	Section 27.53(j), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date:	2/16/2009, 8/20/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks: ProST			

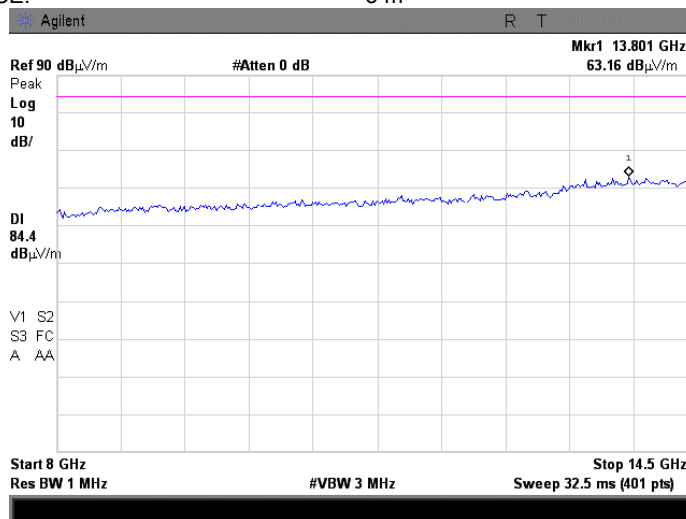
Plot 7.3.19 Radiated emission measurements in 8000 – 14500 MHz range

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: 1393.5 MHz
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Plot 7.3.20 Radiated emission measurements in 8000 – 14500 MHz range

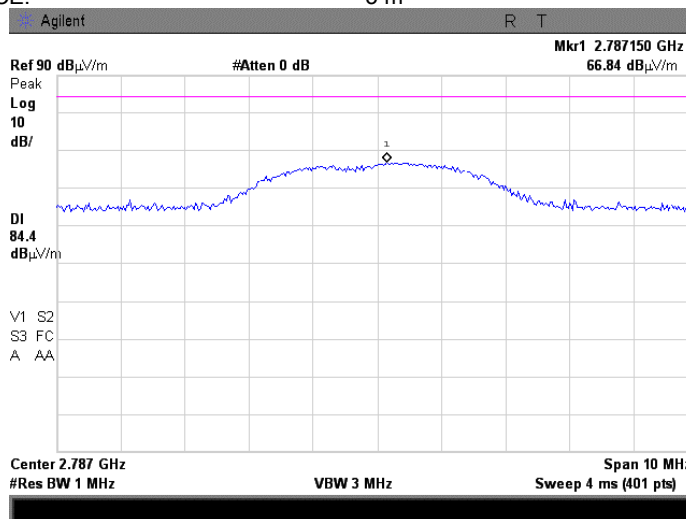
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: 1433.5 MHz
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:	Section 27.53(j), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date:	2/16/2009, 8/20/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks: ProST			

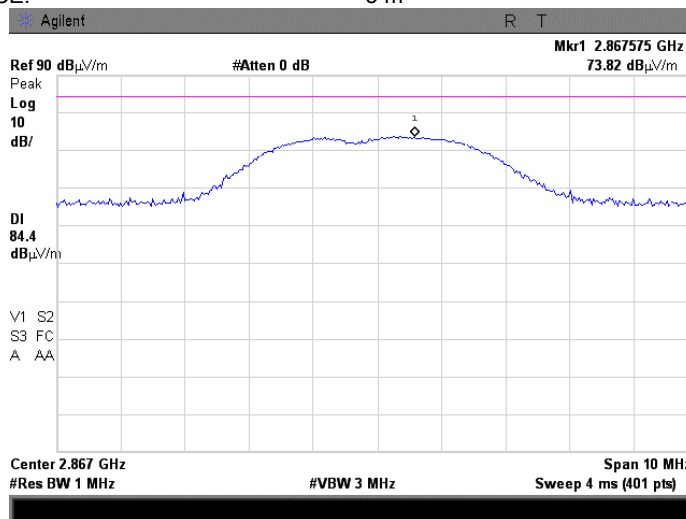
Plot 7.3.21 Radiated emission measurements at the 2nd harmonic

TEST SITE: OATS
CARRIER FREQUENCY: 1393.5 MHz
ANTENNA POLARIZATION: Vertical
TEST DISTANCE: 3 m



Plot 7.3.22 Radiated emission measurements at the 2nd harmonic

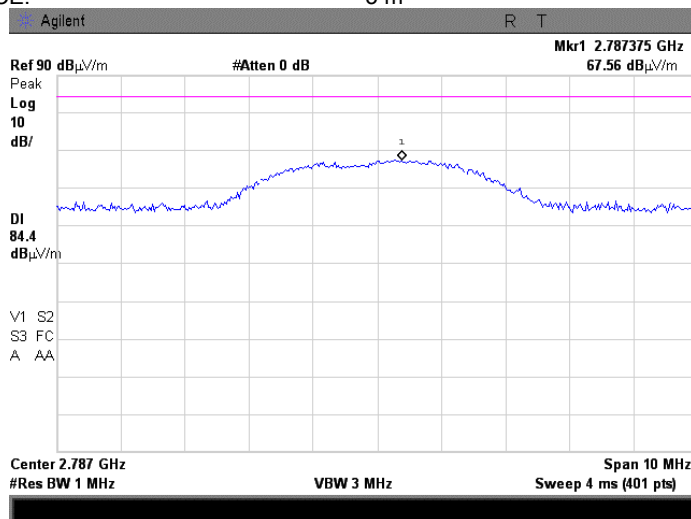
TEST SITE: OATS
CARRIER FREQUENCY: 1433.5 MHz
ANTENNA POLARIZATION: Vertical
TEST DISTANCE: 3 m



Test specification:		Section 27.53(j), Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2009, 8/20/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks: ProST			

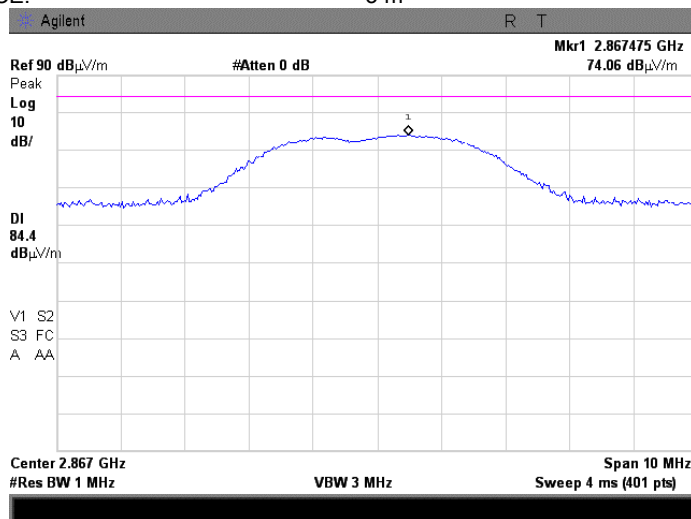
Plot 7.3.23 Radiated emission measurements at the 2nd harmonic

TEST SITE: OATS
CARRIER FREQUENCY: 1393.5 MHz
ANTENNA POLARIZATION: Horizontal
TEST DISTANCE: 3 m



Plot 7.3.24 Radiated emission measurements at the 2nd harmonic

TEST SITE: OATS
CARRIER FREQUENCY: 1433.5 MHz
ANTENNA POLARIZATION: Horizontal
TEST DISTANCE: 3 m



Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2009, 8/23/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

7.4 Spurious emissions at RF antenna connector test

7.4.1 General

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

Table 7.4.1 Spurious emission limits

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

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

** - P is transmitter output power in Watts

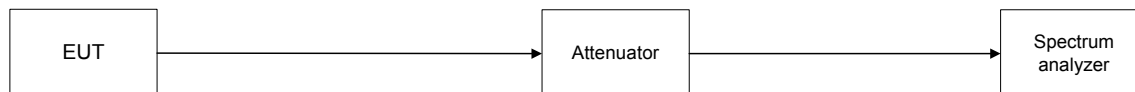
7.4.2 Test procedure

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

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

7.4.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.4.2, Table 7.4.3, Table 7.4.4, Table 7.4.5 and the associated plots.

Figure 7.4.1 Spurious emission test setup





HERMON LABORATORIES

Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date:	2/16/2009, 8/23/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Table 7.4.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 1390.0 – 1392.0 MHz
 1392.0 – 1395.0 MHz
 1432.0 – 1435.0 MHz

INVESTIGATED FREQUENCY RANGE: 0.009 – 14500 MHz

DETECTOR USED: Peak

VIDEO BANDWIDTH: ≥ Resolution bandwidth

MODULATING SIGNAL: PRBS

TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm**	Limit, dBm	Margin, dB*	Verdict
Low carrier frequency 1.5 MHz EBW BPSK								
1388.0	-44.10	Included	Included	300	-38.87	-13.00	-25.87	Pass
1394.0	-44.11	Included	Included	300	-38.88	-13.00	-25.88	Pass
Low carrier frequency 1.5 MHz EBW 64QAM								
-1388.0	-42.74	Included	Included	300	-37.51	-13.00	-24.5	Pass
-1394.0	-43.63	Included	Included	300	-38.40	-13.00	-25.4	Pass
Mid carrier frequency 1.5 MHz EBW BPSK								
1390.0	-19.38	Included	Included	1000	-19.38	-13.00	-6.38	Pass
1397.7	-45.52	Included	Included	300	-40.29	-13.00	-27.3	Pass
Mid carrier frequency 1.5 MHz EBW 64QAM								
1390.0	-18.99	Included	Included	1000	-18.99	-13.00	-5.99	Pass
1398.3	-45.91	Included	Included	300	-40.68	-13.00	-27.7	Pass
High carrier frequency 1.5 MHz EBW BPSK								
1430.0	-18.56	Included	Included	1000	-18.56	-13.00	-5.36	Pass
1437.0	-44.24	Included	Included	1000	-39.01	-13.00	-26.0	Pass
High carrier frequency 1.5 MHz EBW 64QAM								
1430.0	-18.43	Included	Included	1000	-18.43	-13.00	-5.20	Pass
1437.05	-45.08	Included	Included	1000	-39.85	-13.00	-26.9	Pass

*- Margin = Spurious emission – specification limit.

- Spurious emission, dBm = SA reading, dBm + Integration factor, dB*

*** - Integration factor, dB = 10* LOG (1000 /300) = 5.23 dB

Test specification:	Section 27.53(j), Conducted spurious emissions			
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13			
Test mode:	Compliance	Verdict:		PASS
Date:	2/16/2009, 8/23/2009			
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC	
Remarks:				

Table 7.4.3 Spurious emission test results at 1390.0 – 1397.0 and 1430.0 – 1437.0 MHz range

ASSIGNED FREQUENCY RANGE: 1390.0 – 1392.0 MHz
1392.0 – 1395.0 MHz
1432.0 – 1435.0 MHz

INVESTIGATED FREQUENCY RANGE: 0.009 – 14500 MHz

DETECTOR USED: Peak

VIDEO BANDWIDTH: ≥ Resolution bandwidth

MODULATING SIGNAL: PRBS

TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	SA reading, dBc	Attenuator, dB	Cable loss, dB	RBW, kHz	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict
Low frequency 1391.0 MHz								
BPSK, 1.5 MHz EBW, 23.49 dBm total power**								
1388-1389	57.43	Included	Included	30	57.43	36.49	20.94	Pass
1389-1390	45.90	Included	Included	30	45.90	36.49	9.41	Pass
1392-1393	48.72	Included	Included	30	48.72	36.49	12.23	Pass
1393-1394	57.54	Included	Included	30	57.54	36.49	21.05	Pass
64QAM, 1.5 MHz EBW, 22.77 dBm total power**								
1388-1389	57.33	Included	Included	30	57.33	35.77	21.56	Pass
1389-1390	45.72	Included	Included	30	45.72	35.77	9.95	Pass
1392-1393	48.32	Included	Included	30	48.32	35.77	12.55	Pass
1393-1394	56.34	Included	Included	30	56.34	35.77	20.57	Pass
Mid frequency 1393.5 MHz								
BPSK, 1.5 MHz EBW, 22.26 dBm total power**								
1390-1391	54.91	Included	Included	30	54.91	35.26	19.65	Pass
1391-1392	49.99	Included	Included	30	49.99	35.26	14.73	Pass
1395-1396	52.02	Included	Included	30	52.02	35.26	16.76	Pass
1396-1397	55.37	Included	Included	30	55.37	35.26	20.11	Pass
64QAM, 1.5 MHz EBW, 21.92 dBm total power**								
1390-1391	55.07	Included	Included	30	55.07	34.92	20.15	Pass
1391-1392	51.19	Included	Included	30	51.19	34.92	16.27	Pass
1395-1396	50.47	Included	Included	30	50.47	34.92	15.55	Pass
1396-1397	54.94	Included	Included	30	54.94	34.92	20.02	Pass
High frequency 1433.5 MHz								
BPSK, 1.5 MHz EBW, 22.45 dBm total power**								
1430-1431	55.40	Included	Included	30	55.40	35.45	19.95	Pass
1431-1432	45.17	Included	Included	30	45.17	35.45	9.72	Pass
1435-1436	49.94	Included	Included	30	49.94	35.45	14.49	Pass
1436-1437	55.80	Included	Included	30	55.80	35.45	20.35	Pass
64QAM, 1.5 MHz EBW, 21.73 dBm total power**								
1430-1431	54.67	Included	Included	30	54.67	34.73	19.94	Pass
1431-1432	45.49	Included	Included	30	45.49	34.73	10.76	Pass
1435-1436	47.94	Included	Included	30	47.94	34.73	13.21	Pass
1436-1437	54.92	Included	Included	30	54.92	34.73	20.19	Pass

* - Margin = Spurious emission – specification limit.

** - Total power – measured with the same settings as spurious emissions.

NOTE: Conducted spurious emissions were tested with EUT configured to transmit at 1.5 MHz EBW and 64QAM modulation assuming that this configuration produces maximum RF power density. However in the range 1380.0 – 1407.0 MHz and 1420 – 1447 MHz, the 1.5 MHz EBW configuration under maximum and minimum bit rates was tested.

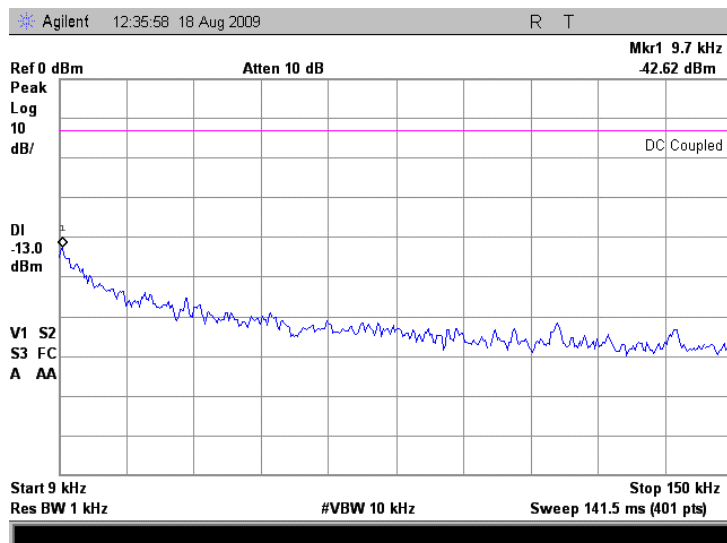
Reference numbers of test equipment used

HL 2869	HL 2909	HL 3437	HL 3439				
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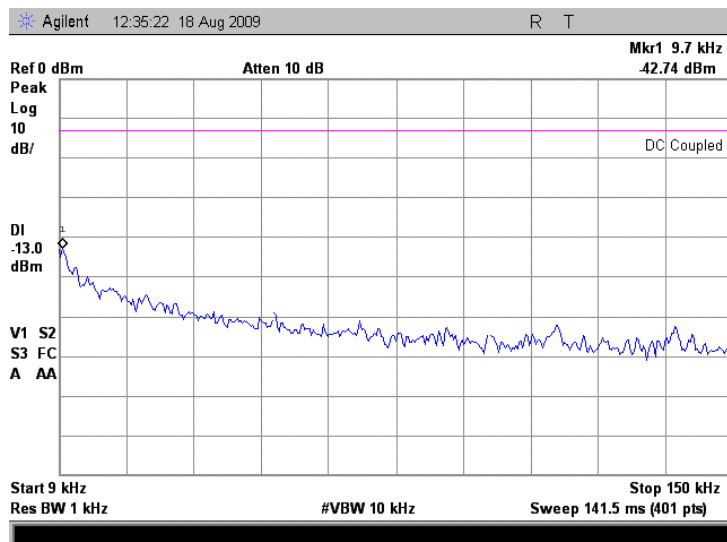
Full description is given in Appendix A.

Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/23/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

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

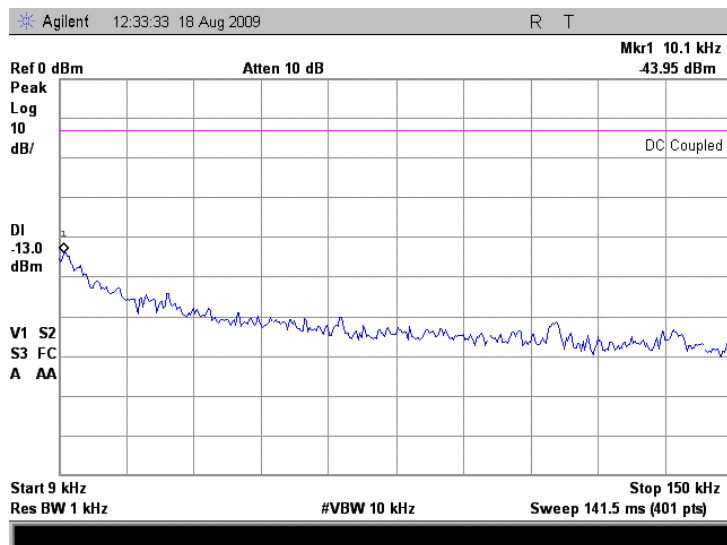


Plot 7.4.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency

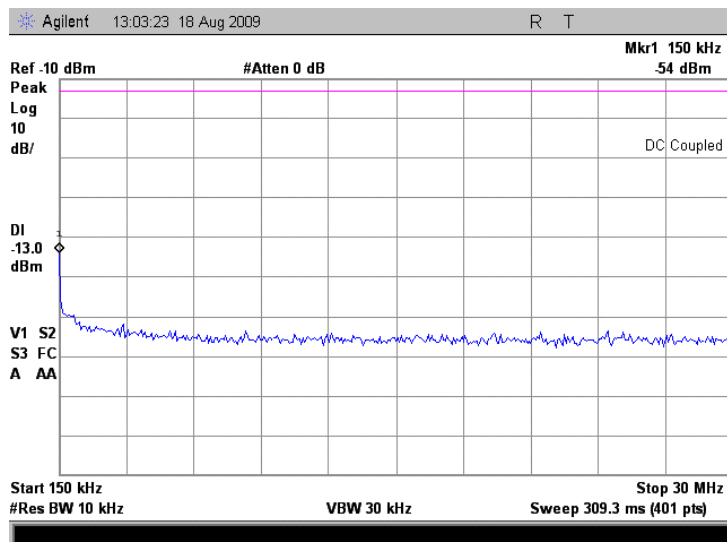


Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date:	2/16/2009, 8/23/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

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

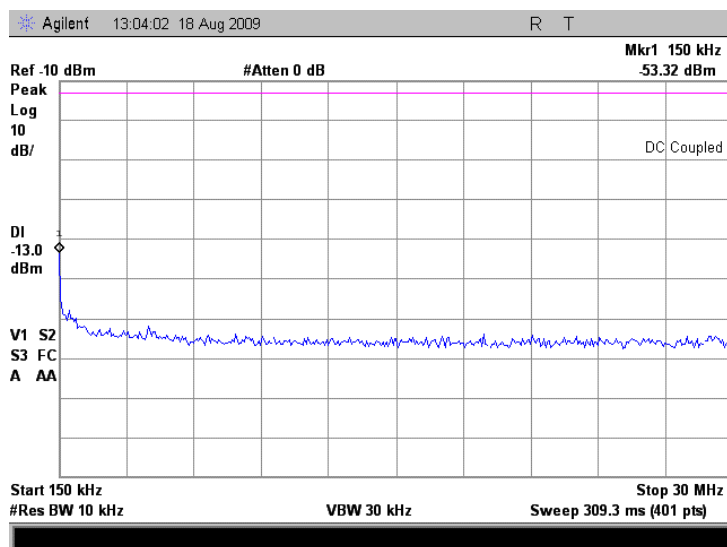


Plot 7.4.4 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency

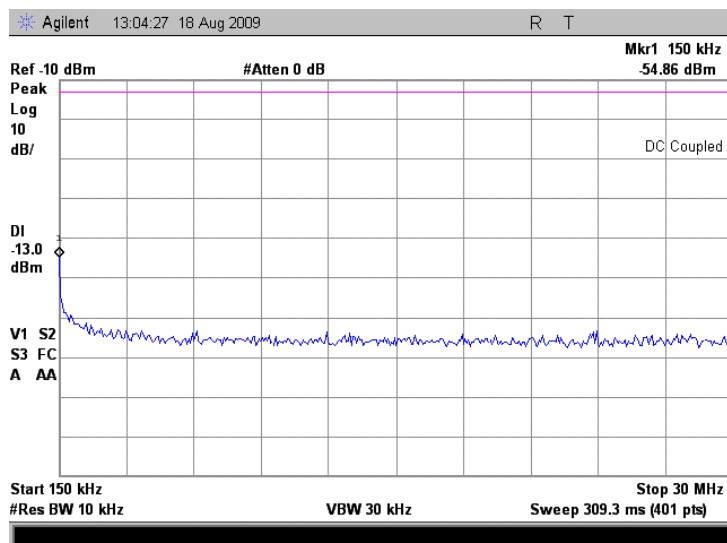


Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2009, 8/23/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

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

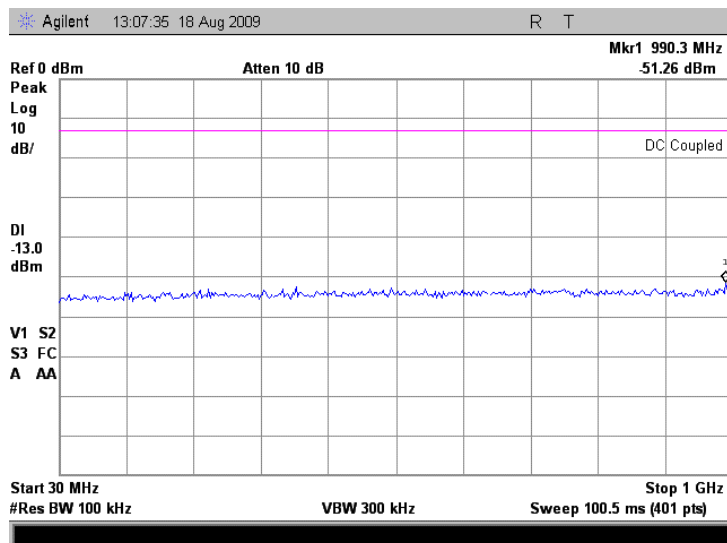


Plot 7.4.6 Spurious emission measurements in 0.15 – 30.0 MHz range at high carrier frequency

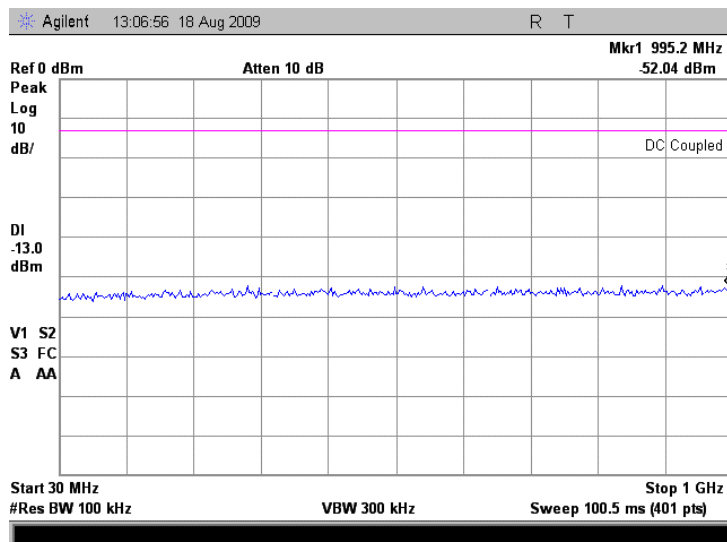


Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/23/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

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

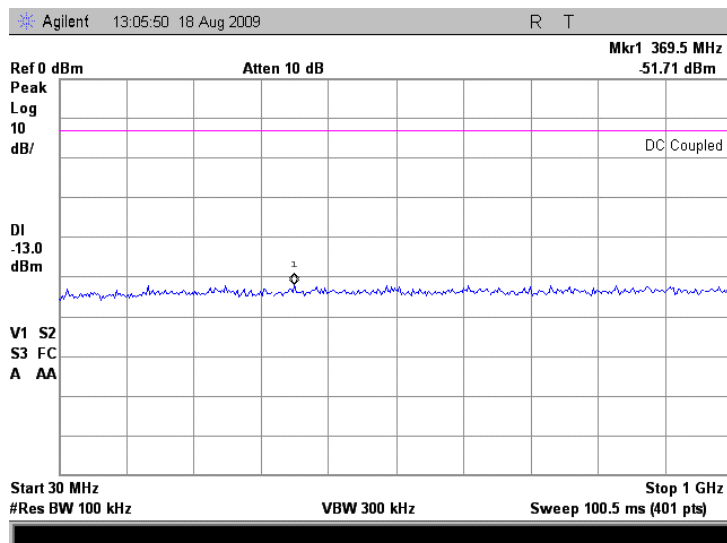


Plot 7.4.8 Spurious emission measurements in 30.0 - 1000 MHz range at mid carrier frequency



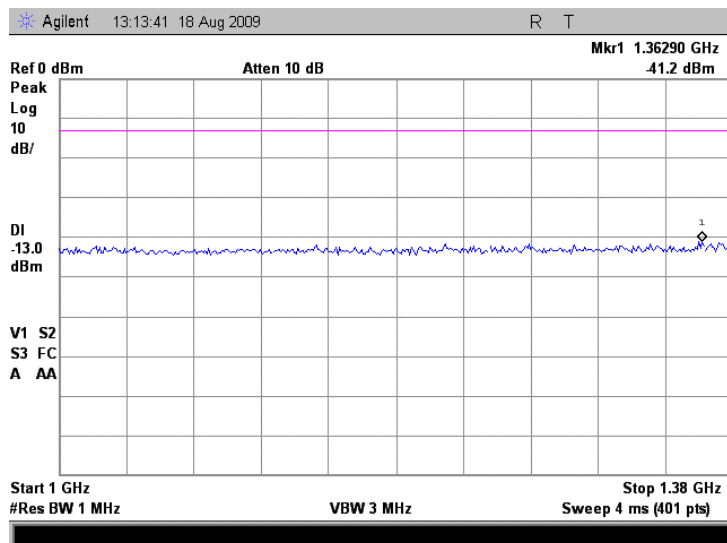
Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/23/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

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

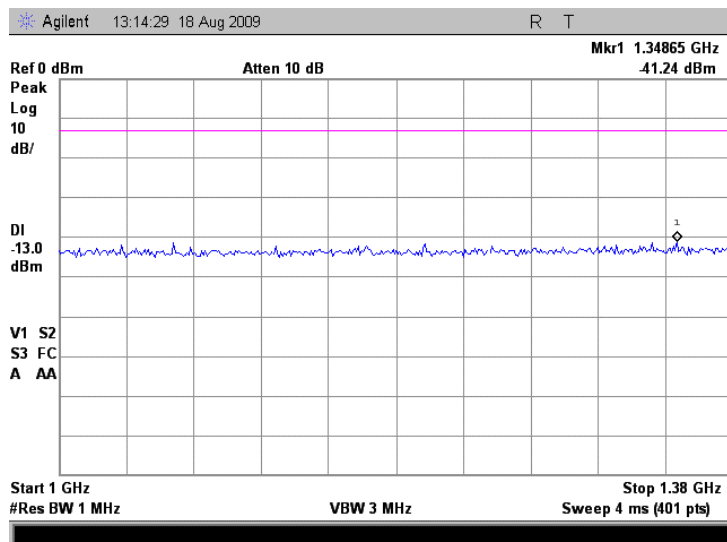


Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date:	2/16/2009, 8/23/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.10 Spurious emission measurements in 1000 - 1380 MHz range at low carrier frequency

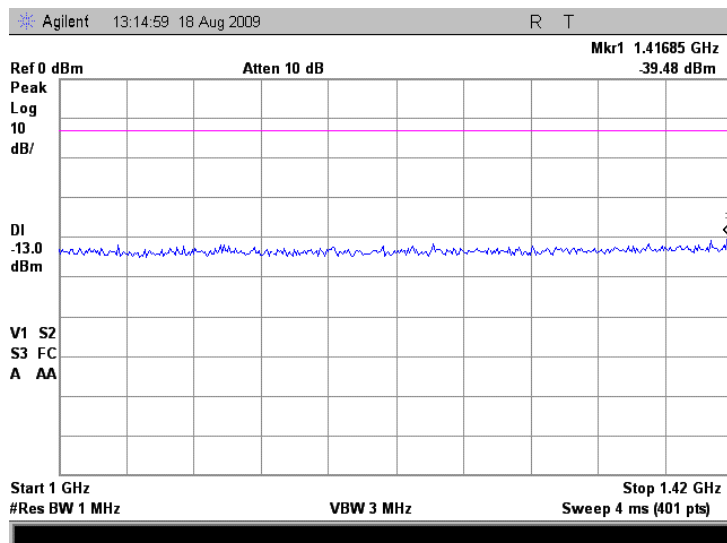


Plot 7.4.11 Spurious emission measurements in 1000 - 1380 MHz range at mid carrier frequency



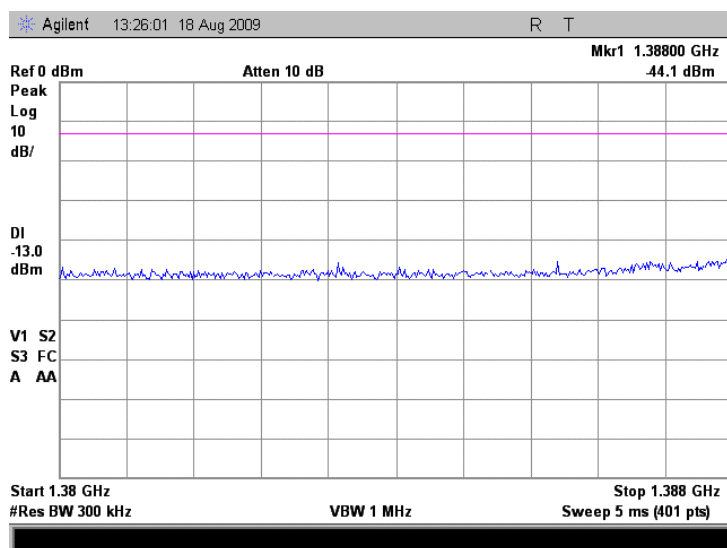
Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/23/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.12 Spurious emission measurements in 1000 - 1420 MHz at high carrier frequency

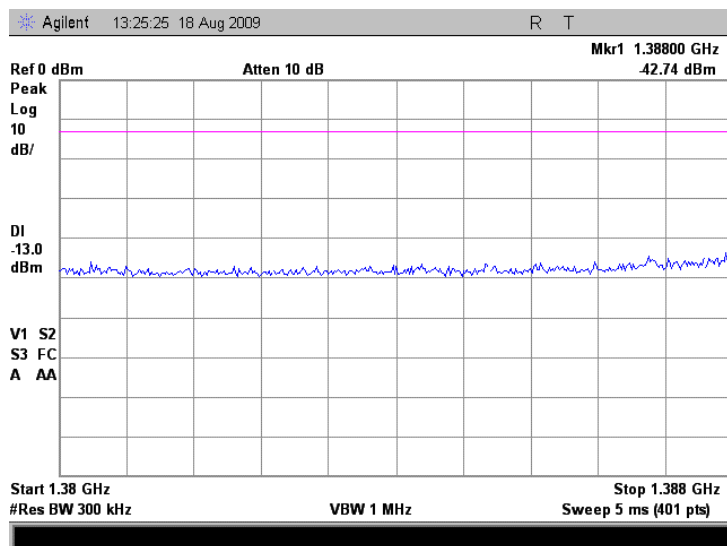


Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/23/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.13 Spurious emission measurements in 1380 - 1388 MHz range at low carrier frequency, 1.5 MHz EBW, BPSK modulation

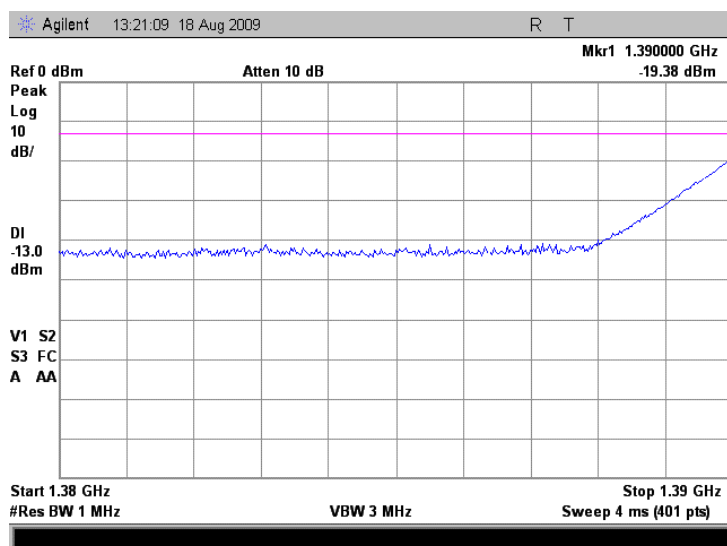


Plot 7.4.14 Spurious emission measurements in 1380 - 1388 MHz range at low carrier frequency, 1.5 MHz EBW, 64QAM modulation

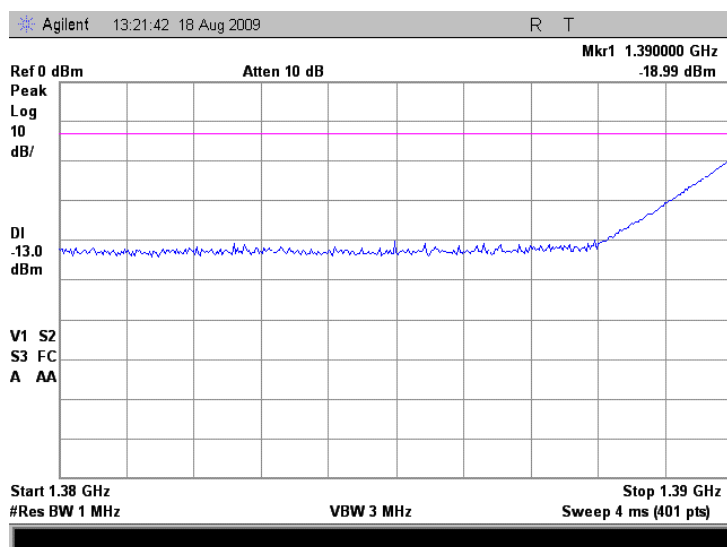


Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/23/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.15 Spurious emission measurements in 1380 - 1390 MHz range at mid carrier frequency, 1.5 MHz EBW, BPSK modulation

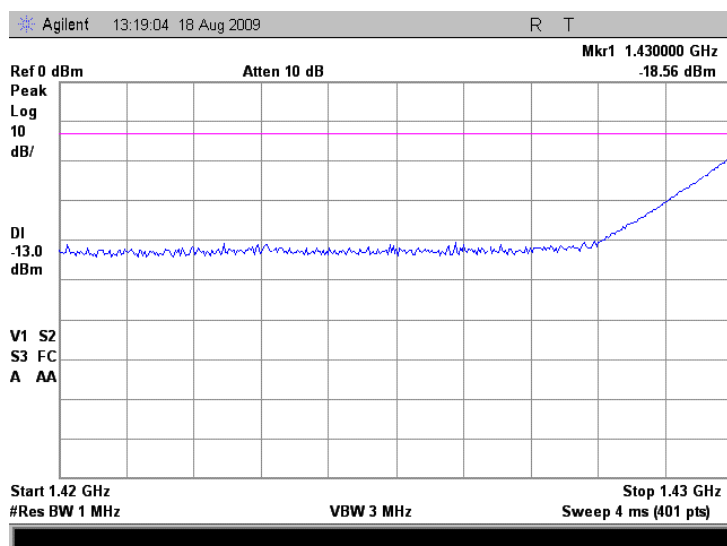


Plot 7.4.16 Spurious emission measurements in 1380 - 1390 MHz range at mid carrier frequency, 1.5 MHz EBW, 64QAM modulation

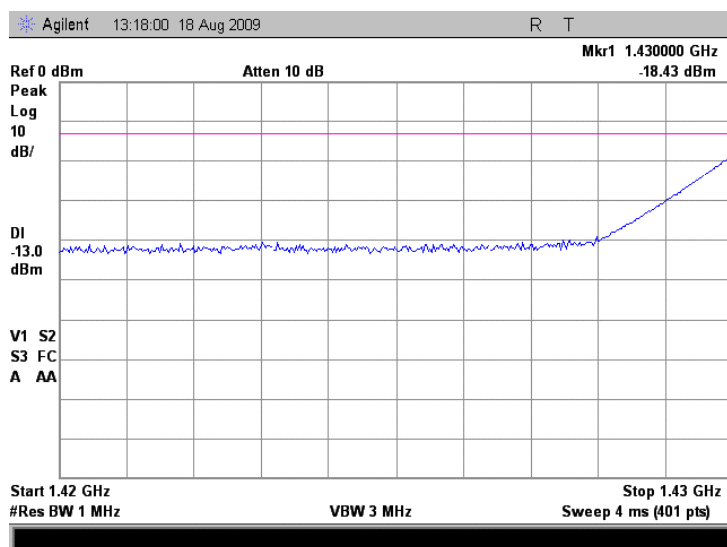


Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/23/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.17 Spurious emission measurements in 1420 - 1430 MHz at high carrier frequency, 1.5 MHz EBW, BPSK modulation

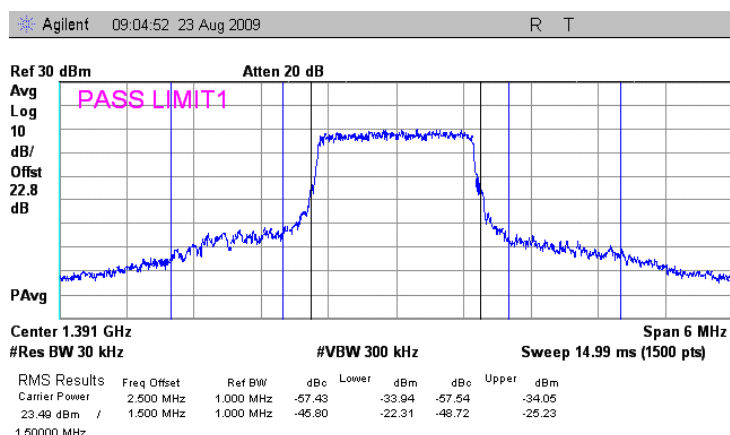


Plot 7.4.18 Spurious emission measurements in 1420 - 1430 MHz at high carrier frequency, 1.5 MHz EBW, 64QAM modulation

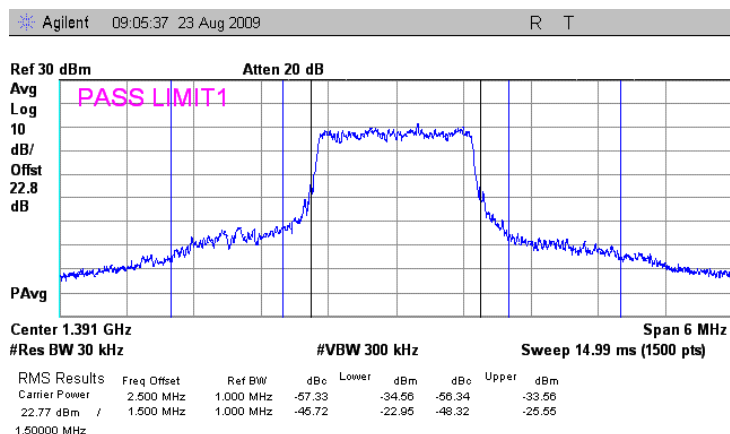


Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2009, 8/23/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.19 Spurious emission measurements in 1388 – 1389, 1389 – 1390, 1392 – 1393, 1393 - 1394 MHz at low carrier frequency, 1.5 MHz EBW, BPSK modulation

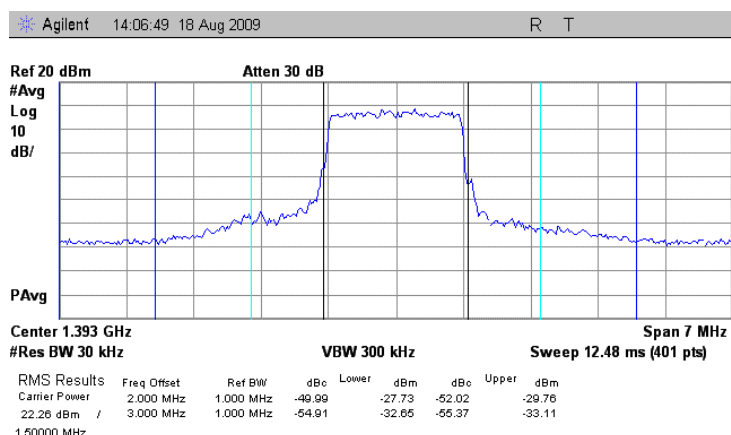


Plot 7.4.20 Spurious emission measurements in 1388 – 1389, 1389 – 1390, 1392 – 1393, 1393 - 1394 MHz at low carrier frequency, 1.5 MHz EBW, 64QAM modulation

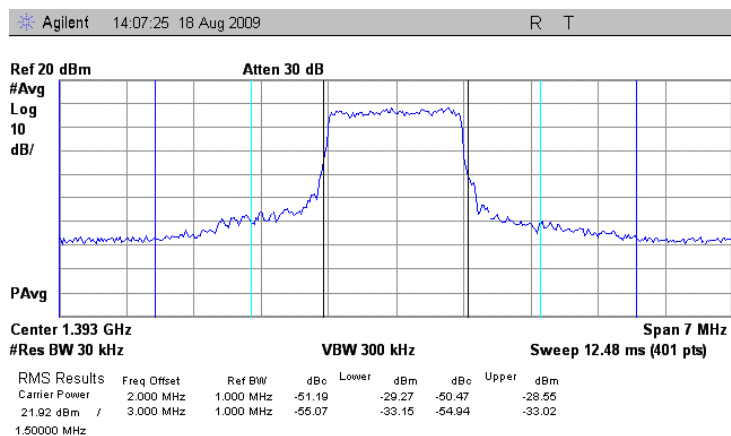


Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2009, 8/23/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.21 Spurious emission measurements in 1390 – 1391, 1391 – 1392, 1395 – 1396, 1396 – 1397 MHz at mid carrier frequency, 1.5 MHz EBW, BPSK modulation

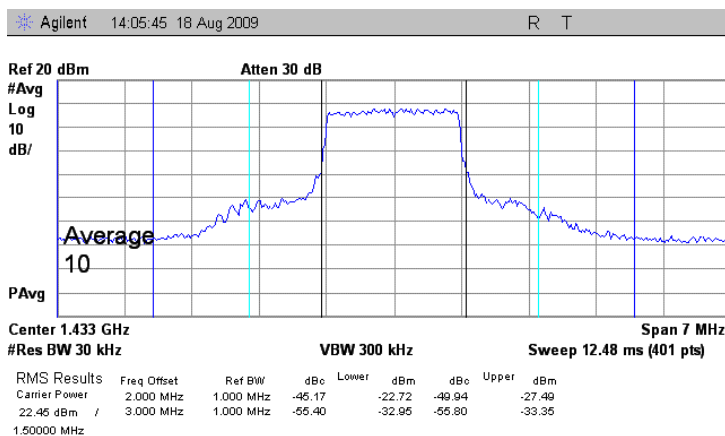


Plot 7.4.22 Spurious emission measurements in 1390 – 1391, 1391 – 1392, 1395 – 1396, 1396 – 1397 MHz at mid carrier frequency, 1.5 MHz EBW, 64QAM modulation

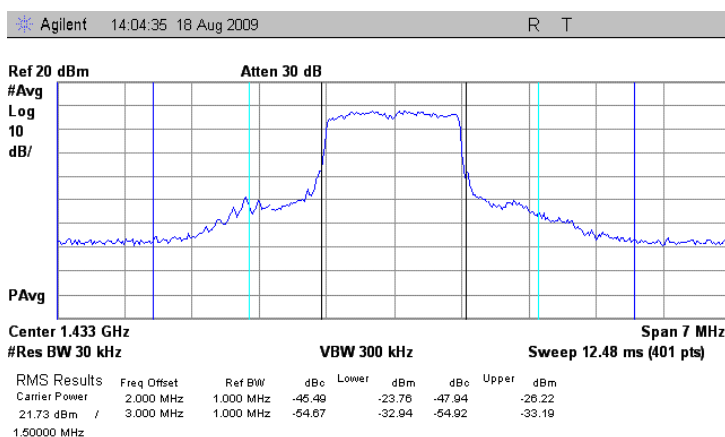


Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2009, 8/23/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.23 Spurious emission measurements in 1430 – 1431, 1431 – 1432, 1435 – 1436, 1436 - 1437 MHz at high carrier frequency, 1.5 MHz EBW, BPSK modulation

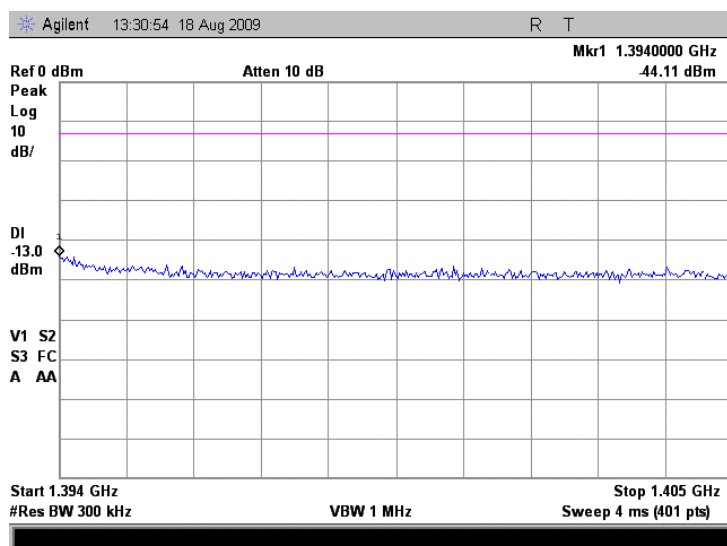


Plot 7.4.24 Spurious emission measurements in 1430 – 1431, 1431 – 1432, 1435 – 1436, 1436 - 1437 MHz at high carrier frequency, 1.5 MHz EBW, 64QAM modulation

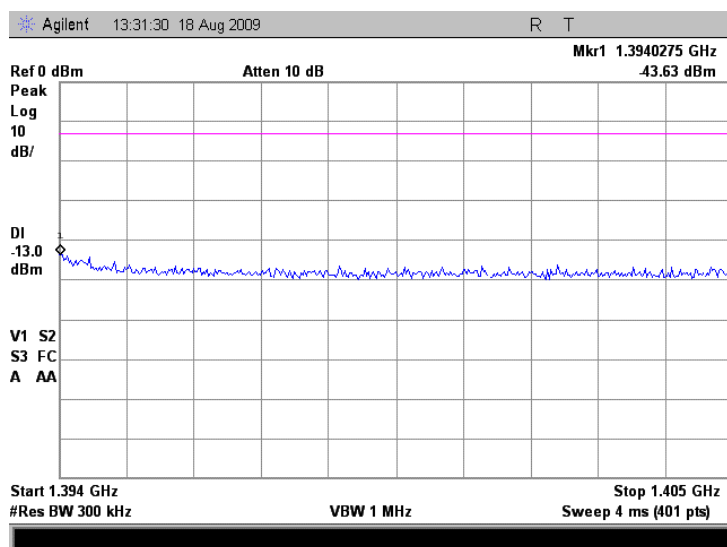


Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/23/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.25 Spurious emission measurements in 1394 - 1404 MHz at low carrier frequency, 1.5 MHz EBW, BPSK modulation

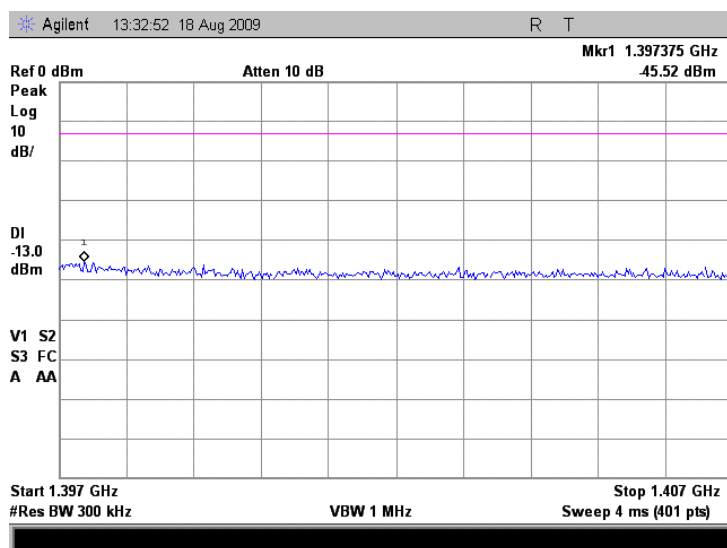


Plot 7.4.26 Spurious emission measurements in 1394 - 1404 MHz at low carrier frequency, 1.5 MHz EBW, 64QAM modulation

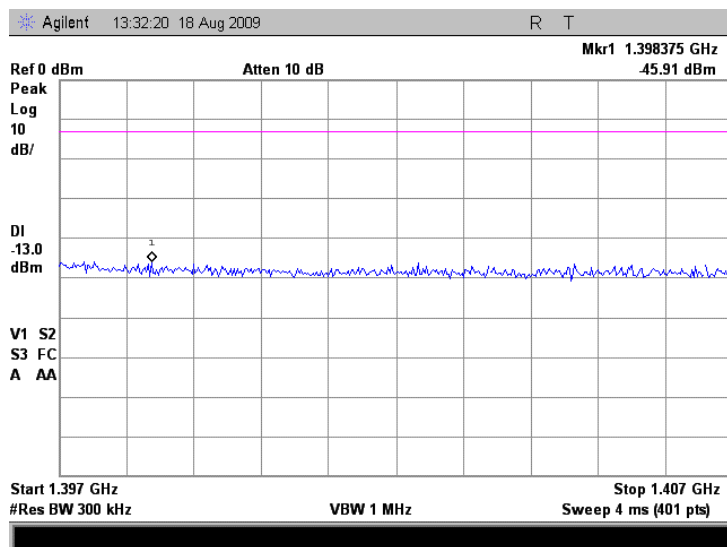


Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/23/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.27 Spurious emission measurements in 1397 - 1407 MHz at mid carrier frequency, 1.5 MHz EBW, BPSK modulation

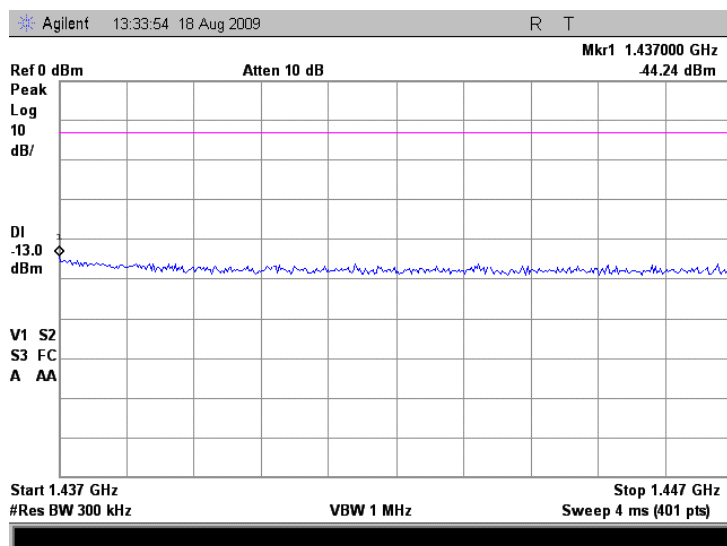


Plot 7.4.28 Spurious emission measurements in 1397 - 1407 MHz at mid carrier frequency, 1.5 MHz EBW, 64QAM modulation

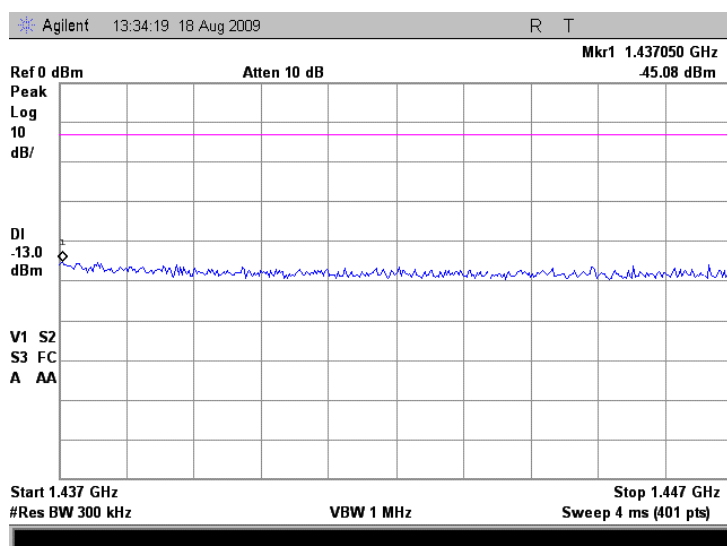


Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/23/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.29 Spurious emission measurements in 1437 - 1447 MHz at high carrier frequency, 1.5 MHz EBW, BPSK modulation

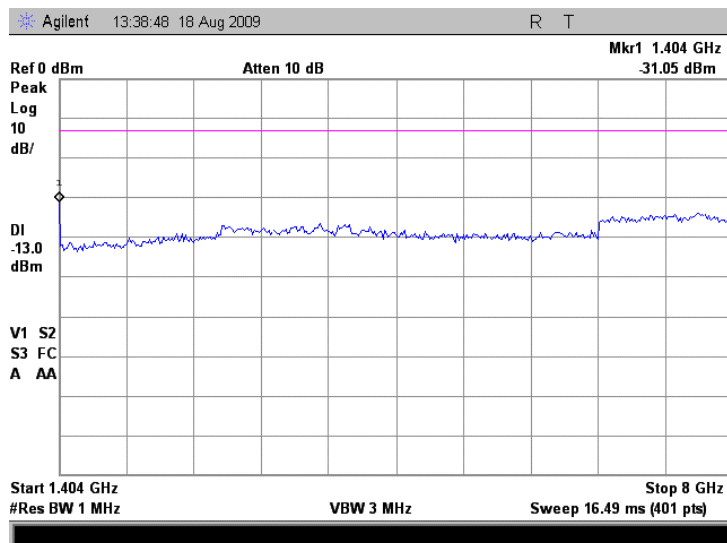


Plot 7.4.30 Spurious emission measurements in 1437 - 1447 MHz at high carrier frequency, 1.5 MHz EBW, 64QAM modulation

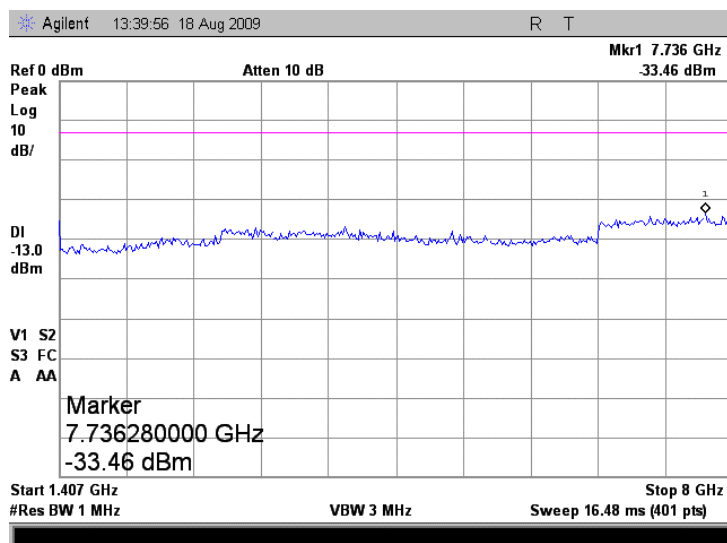


Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/23/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.31 Spurious emission measurements in 1404 - 8000 MHz range at low carrier frequency

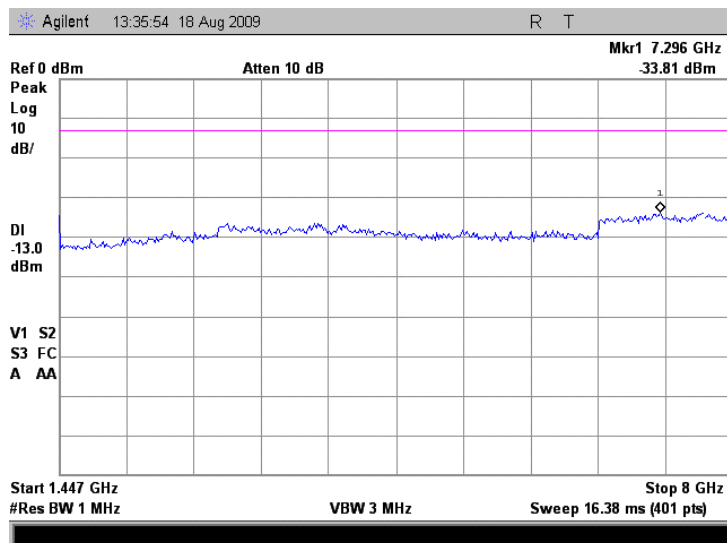


Plot 7.4.32 Spurious emission measurements in 1407 - 8000 MHz range at mid carrier frequency



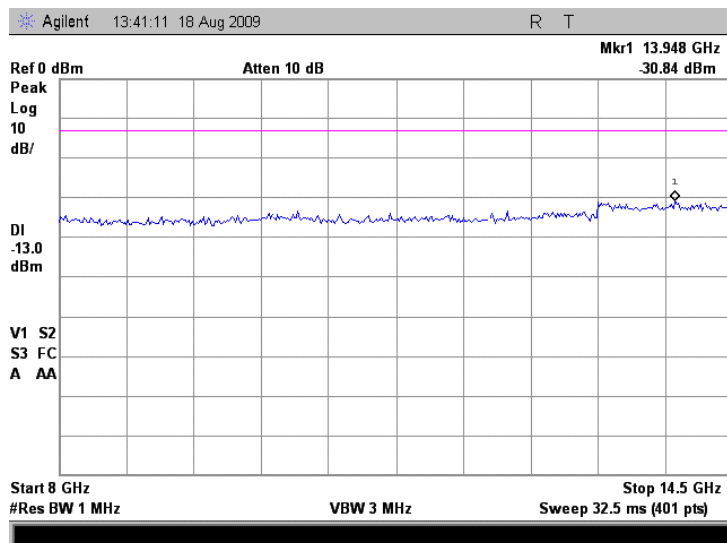
Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/23/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.33 Spurious emission measurements in 1447 - 8000 MHz at high carrier frequency

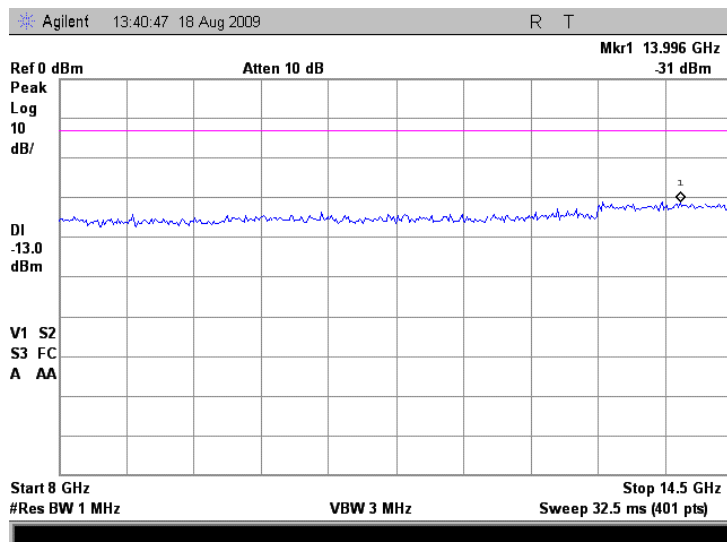


Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/23/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.34 Spurious emission measurements in 8000 - 14500 MHz at low carrier frequency

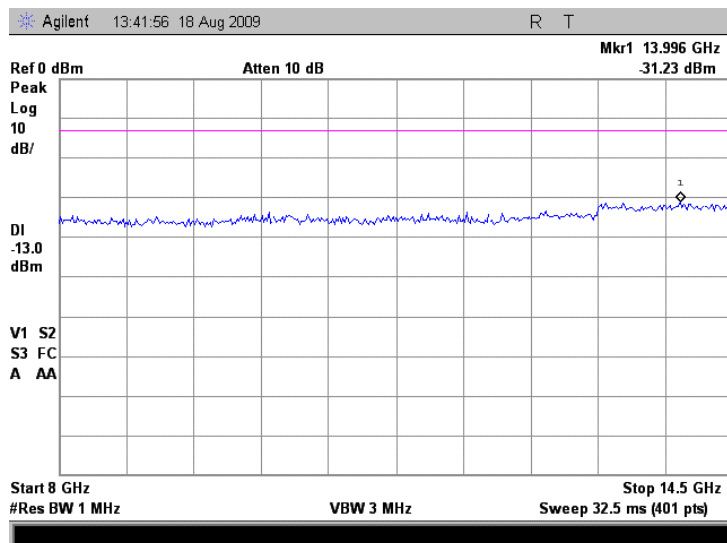


Plot 7.4.35 Spurious emission measurements in 8000 - 14500 MHz at mid carrier frequency



Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/23/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.36 Spurious emission measurements in 8000 - 14500 MHz at high carrier frequency





HERMON LABORATORIES

Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2009, 8/23/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Table 7.4.4 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 1392.0 – 1395.0 MHz
 1432.0 – 1435.0 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 14500 MHz
 DETECTOR USED: Peak
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm	Limit, dBm	Margin, dB*	Verdict
Mid carrier frequency 1.75 MHz EBW BPSK								
1389.525	-35.55	Included	Included	300	-30.32	-13.00	-17.32	Pass
1397.100	-35.95	Included	Included	300	-30.72	-13.00	-17.72	Pass
Mid carrier frequency 1.75 MHz EBW 64QAM								
1389.650	-36.03	Included	Included	300	-30.80	-13.00	-17.80	Pass
1397.025	-33.66	Included	Included	300	-28.43	-13.00	-15.43	Pass
Mid w carrier frequency 2.5 MHz EBW BPSK								
1390.000	-26.43	Included	Included	300	-21.20	-13.00	-8.20	Pass
1397.050	-26.95	Included	Included	300	-21.72	-13.00	-8.72	Pass
Mid carrier frequency 2.5 MHz EBW 64QAM								
1390.000	-26.66	Included	Included	300	-21.43	-13.00	-8.43	Pass
1397.050	-26.83	Included	Included	300	-21.60	-13.00	-8.60	Pass
High carrier frequency 1.75 MHz EBW BPSK								
1429.975	-33.62	Included	Included	300	-28.39	-13.00	-15.39	Pass
1437.025	-35.37	Included	Included	300	-30.14	-13.00	-17.14	Pass
High carrier frequency 1.75 MHz EBW 64QAM								
1429.825	-34.17	Included	Included	300	-28.94	-13.00	-15.94	Pass
1437.025	-35.02	Included	Included	300	-29.79	-13.00	-16.79	Pass
High carrier frequency 2.5 MHz EBW BPSK								
1430.000	-24.58	Included	Included	300	-19.35	-13.00	-6.35	Pass
1437.000	-25.15	Included	Included	300	-19.92	-13.00	-6.92	Pass
High carrier frequency 2.5 MHz EBW 64QAM								
1430.000	-24.71	Included	Included	300	-19.48	-13.00	-6.48	Pass
1437.025	-25.77	Included	Included	300	-20.54	-13.00	-7.54	Pass

*- Margin = Spurious emission – specification limit.

- Spurious emission, dBm = SA reading, dBm + Integration factor, dB*

*** - Integration factor, dB = 10* Log (1000 kHz/300 kHz) = 5.23 dB

Reference numbers of test equipment used

HL 2867	HL 2909	HL 3439	HL 3442				
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Full description is given in Appendix A.



HERMON LABORATORIES

Test specification:	Section 27.53(j), Conducted spurious emissions			
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13			
Test mode:	Compliance	Verdict:		PASS
Date:	2/16/2009, 8/23/2009			
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC	
Remarks:				

Table 7.4.5 Spurious emission test results at 1390.0 – 1397.0 and 1430.0 – 1437.0 MHz range

ASSIGNED FREQUENCY RANGE: 1392.0 – 1395.0 MHz; 1432.0 – 1435.0 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 14500 MHz
 DETECTOR USED: Peak
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	SA reading, dBc	Attenuator, dB	Cable loss, dB	RBW, kHz	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict
Mid frequency 1393.5 MHz								
BPSK 1.75 MHz EBW 20.90 dBm total power**								
1390-1391	62.75	Included	Included	30	62.75	33.9	28.85	Pass
1391-1392	49.82	Included	Included	30	49.82	33.9	15.92	Pass
1395-1396	54.04	Included	Included	30	54.04	33.9	20.14	Pass
1396-1397	62.17	Included	Included	30	62.17	33.9	28.27	Pass
BPSK 2.5 MHz EBW 21.57 dBm total power**								
1390-1391	62.07	Included	Included	30	62.07	34.57	27.50	Pass
1391-1392	48.93	Included	Included	30	48.93	34.57	14.36	Pass
1395-1396	52.60	Included	Included	30	52.60	34.57	18.03	Pass
1396-1397	62.13	Included	Included	30	62.13	34.57	27.56	Pass
64QAM 1.75 MHz EBW 21.97 dBm total power**								
1390-1391	50.55	Included	Included	30	50.55	34.97	15.58	Pass
1391-1392	46.09	Included	Included	30	46.09	34.97	11.12	Pass
1395-1396	49.22	Included	Included	30	49.22	34.97	14.25	Pass
1396-1397	58.23	Included	Included	30	58.23	34.97	23.26	Pass
64QAM 2.5 MHz EBW 22.01 dBm total power**								
1390-1391	50.55	Included	Included	30	50.55	35.01	15.54	Pass
1391-1392	45.59	Included	Included	30	45.59	35.01	10.58	Pass
1395-1396	48.82	Included	Included	30	48.82	35.01	13.81	Pass
1396-1397	58.09	Included	Included	30	58.09	35.01	23.08	Pass
High frequency 1433.5 MHz								
BPSK 1.75 MHz EBW 20.64 dBm total power**								
1430-1431	62.53	Included	Included	30	62.53	33.64	28.89	Pass
1431-1432	49.34	Included	Included	30	49.34	33.64	15.70	Pass
1435-1436	52.79	Included	Included	30	52.79	33.64	19.15	Pass
1436-1437	61.79	Included	Included	30	61.79	33.64	28.15	Pass
BPSK 2.5 MHz EBW 21.84 dBm total power**								
1430-1431	60.86	Included	Included	30	60.86	34.84	26.02	Pass
1431-1432	46.71	Included	Included	30	46.71	34.84	11.87	Pass
1435-1436	50.23	Included	Included	30	50.23	34.84	15.39	Pass
1436-1437	61.70	Included	Included	30	61.7	34.84	26.86	Pass
64QAM 1.75 MHz EBW 23.20 dBm total power**								
1430-1431	45.53	Included	Included	30	45.53	36.20	9.33	Pass
1431-1432	41.84	Included	Included	30	41.84	36.20	5.64	Pass
1435-1436	42.37	Included	Included	30	42.37	36.20	6.17	Pass
1436-1437	50.74	Included	Included	30	50.74	36.20	14.54	Pass
64QAM 2.5 MHz EBW 23.11 dBm total power**								
1430-1431	45.37	Included	Included	30	45.37	36.11	9.26	Pass
1431-1432	41.61	Included	Included	30	41.61	36.11	5.50	Pass
1435-1436	42.25	Included	Included	30	42.25	36.11	6.14	Pass
1436-1437	50.98	Included	Included	30	50.98	36.11	14.87	Pass

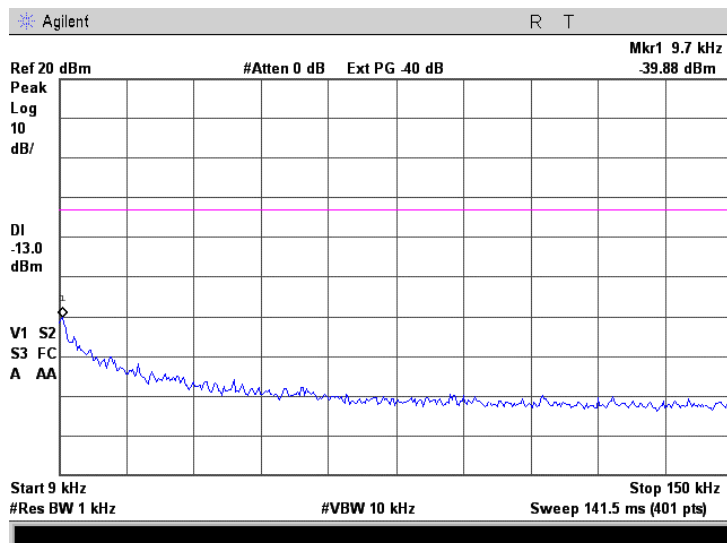
*- Margin = Spurious emission – specification limit.

**- Total power – measured with the same settings as spurious emissions.

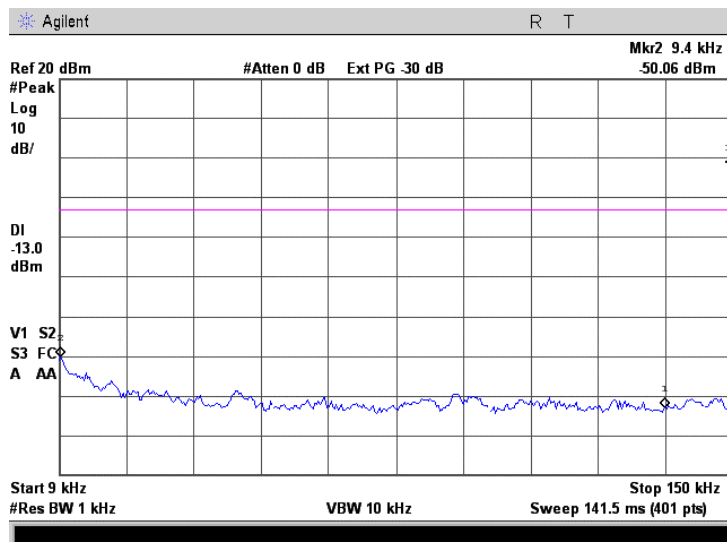
NOTE: Conducted spurious emissions were tested with EUT configured to transmit at 1.75 MHz EBW and 64QAM modulation assuming that this configuration produces maximum RF power density. However in the 1380.0 – 1407.0 MHz and 1420 – 1447 MHz range both 1.75 MHz and 2.5 MHz EBW configurations under maximum and minimum bit rates were tested.

Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date:	2/16/2009, 8/23/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.37 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency

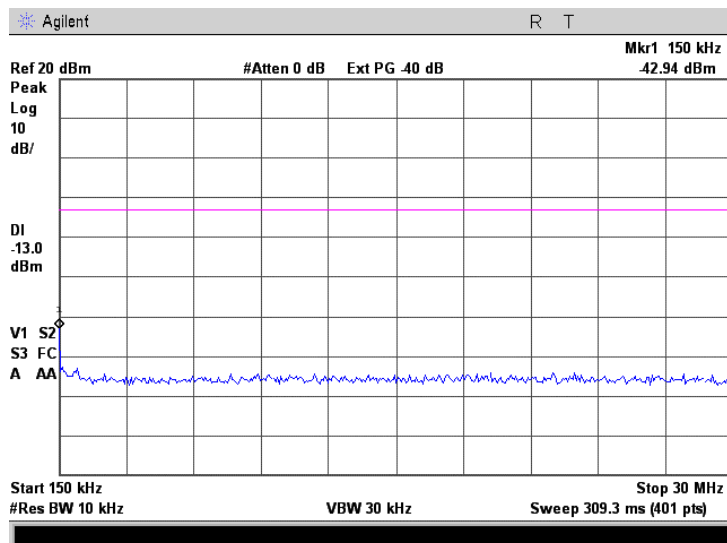


Plot 7.4.38 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency

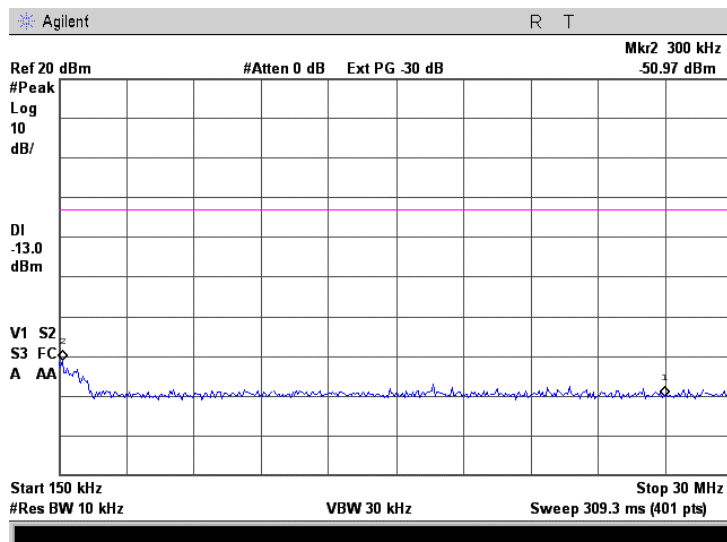


Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date:	2/16/2009, 8/23/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.39 Spurious emission measurements in 0.15 - 30.0 MHz range at mid carrier frequency

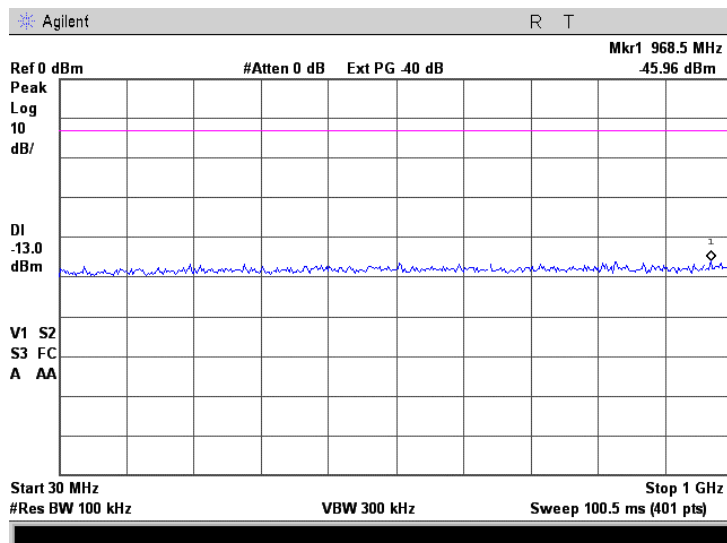


Plot 7.4.40 Spurious emission measurements in 0.15 – 30.0 MHz range at high carrier frequency

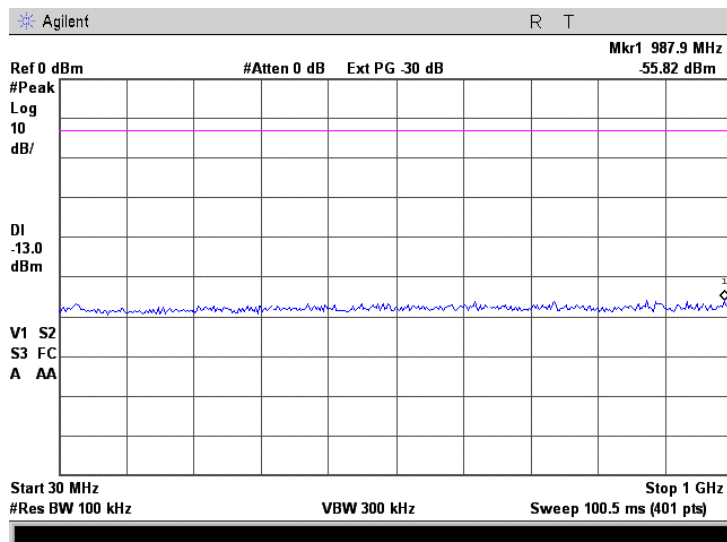


Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date:	2/16/2009, 8/23/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.41 Spurious emission measurements in 30.0 - 1000 MHz range at mid carrier frequency

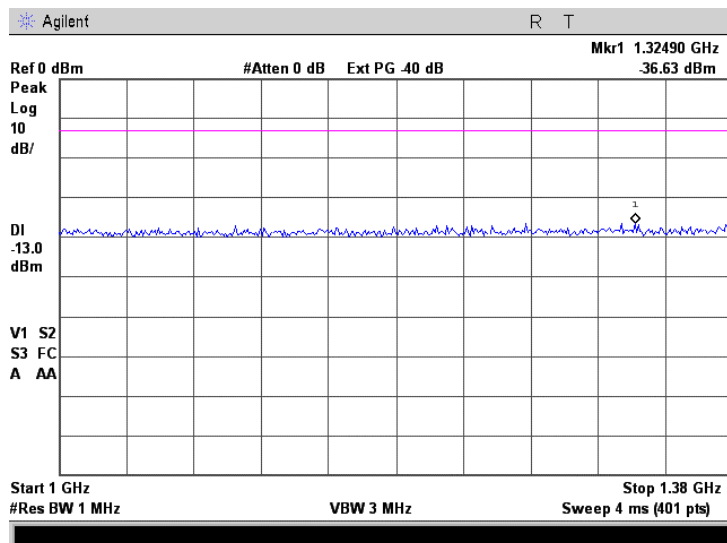


Plot 7.4.42 Spurious emission measurements in 30.0 - 1000 MHz range at high carrier frequency

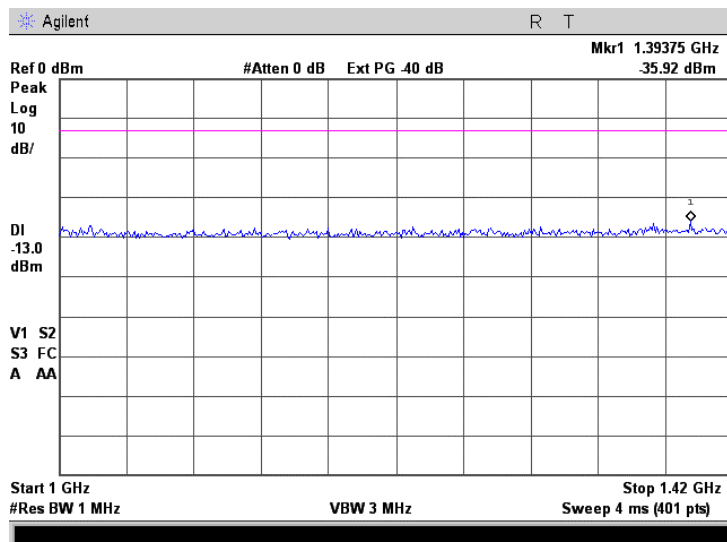


Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date:	2/16/2009, 8/23/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.43 Spurious emission measurements in 1000 - 1380 MHz range at mid carrier frequency

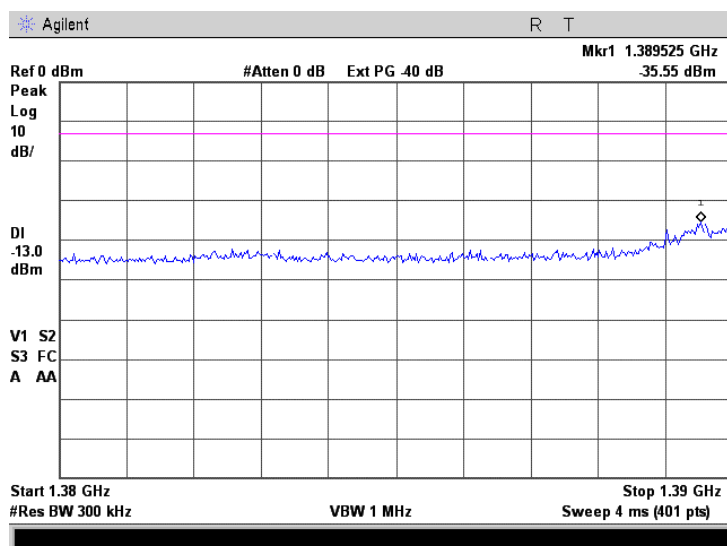


Plot 7.4.44 Spurious emission measurements in 1000 - 1420 MHz at high carrier frequency

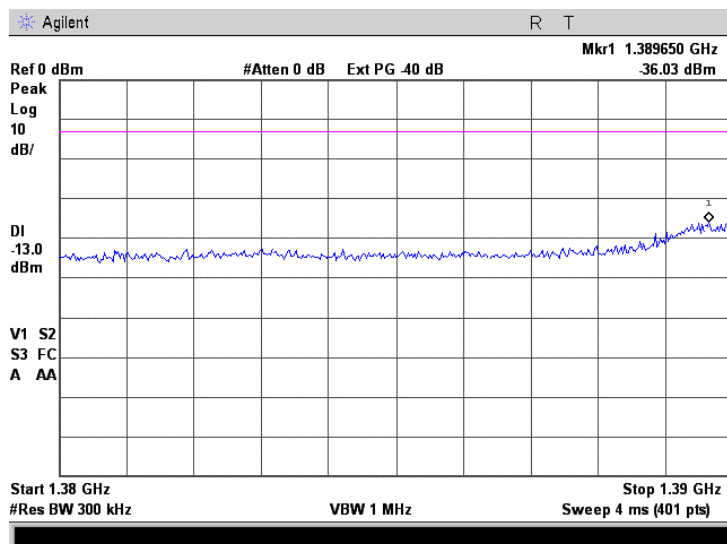


Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/23/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.45 Spurious emission measurements in 1380 - 1390 MHz range at mid carrier frequency, 1.75 MHz EBW, BPSK modulation

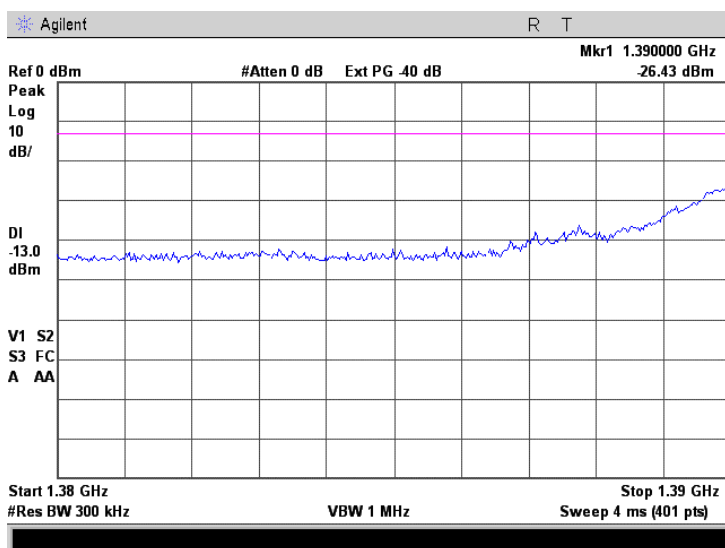


Plot 7.4.46 Spurious emission measurements in 1380 - 1390 MHz range at mid carrier frequency, 1.75 MHz EBW, 64QAM modulation

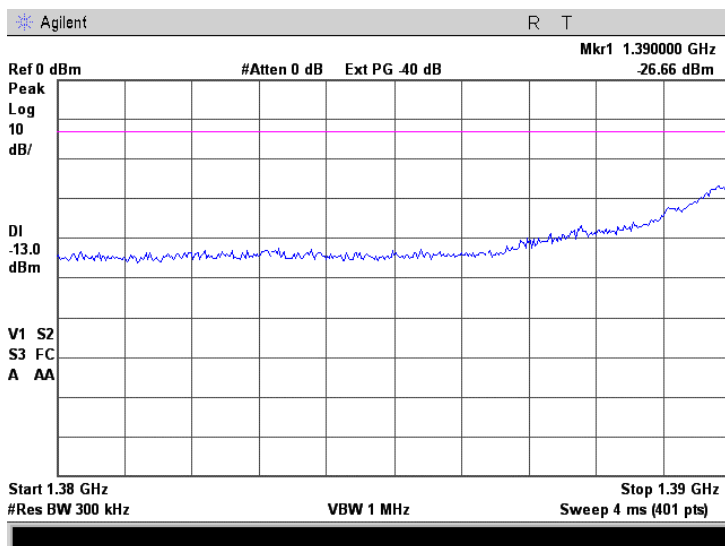


Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/23/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.47 Spurious emission measurements in 1380 - 1390 MHz range at mid carrier frequency, 2.5 MHz EBW, BPSK modulation, RBW=300 kHz

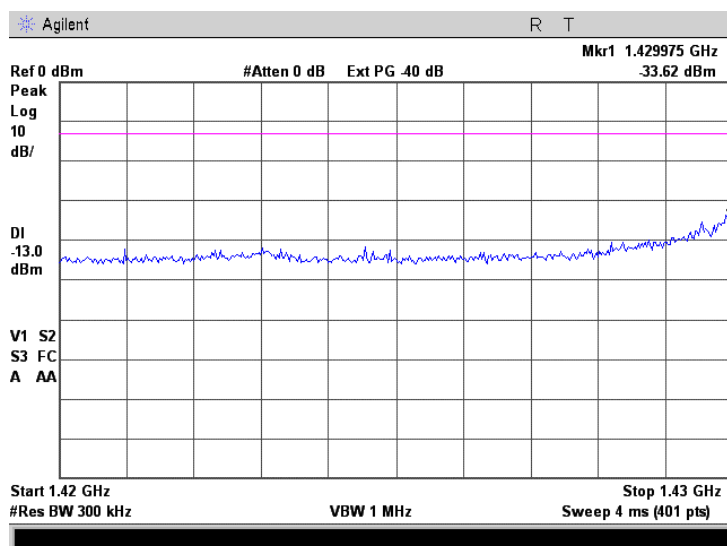


Plot 7.4.48 Spurious emission measurements in 1380 - 1390 MHz range at mid carrier frequency, 2.5 MHz EBW, 64QAM modulation

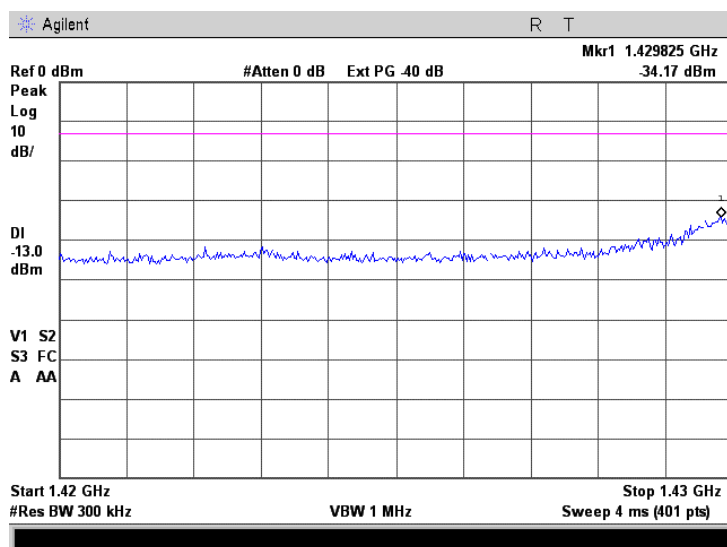


Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/23/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.49 Spurious emission measurements in 1420 - 1430 MHz at high carrier frequency, 1.75 MHz EBW, BPSK modulation

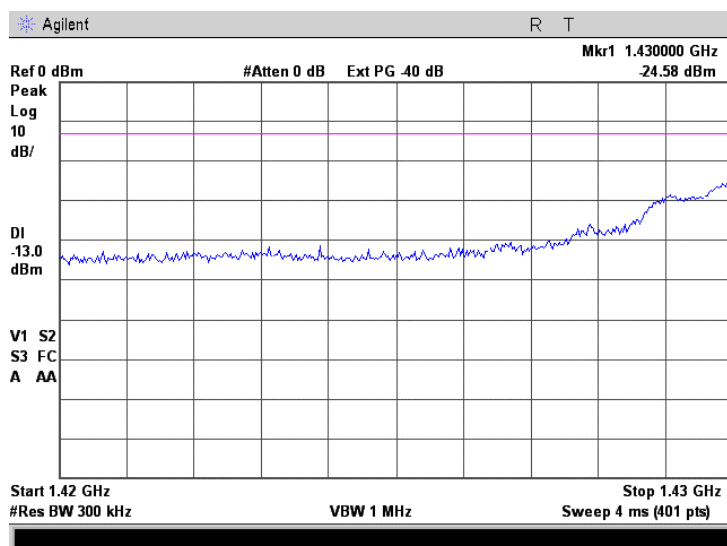


Plot 7.4.50 Spurious emission measurements in 1420 - 1430 MHz at high carrier frequency, 1.75 MHz EBW, 64QAM modulation

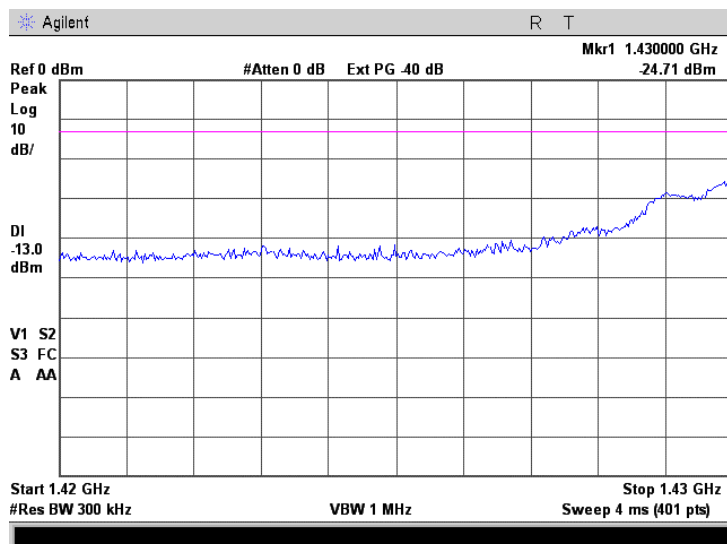


Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2009, 8/23/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.51 Spurious emission measurements in 1420 – 1430 MHz at high carrier frequency, 2.5 MHz EBW, BPSK modulation

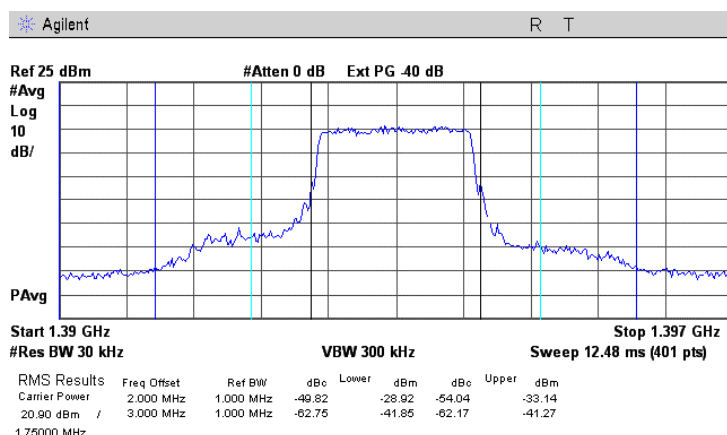


Plot 7.4.52 Spurious emission measurements in 1420 – 1430 MHz at high carrier frequency, 2.5 MHz EBW, 64QAM modulation

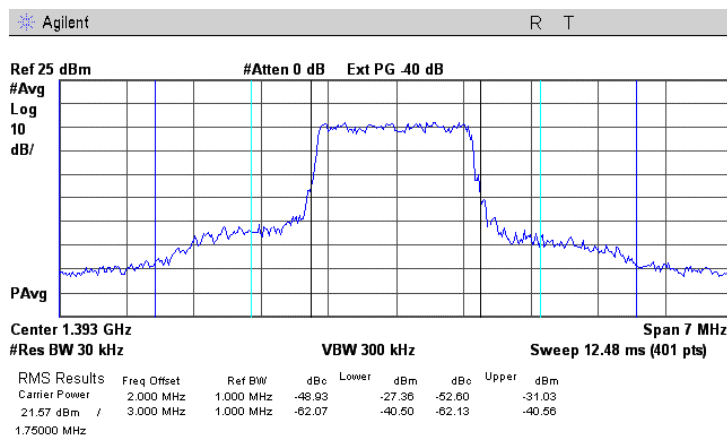


Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2009, 8/23/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.53 Spurious emission measurements in 1390 – 1391 MHz, 1391 – 1392 MHz, 1395 – 1396 MHz, 1396 – 1397 MHz at mid carrier frequency, 1.75 MHz EBW, BPSK modulation



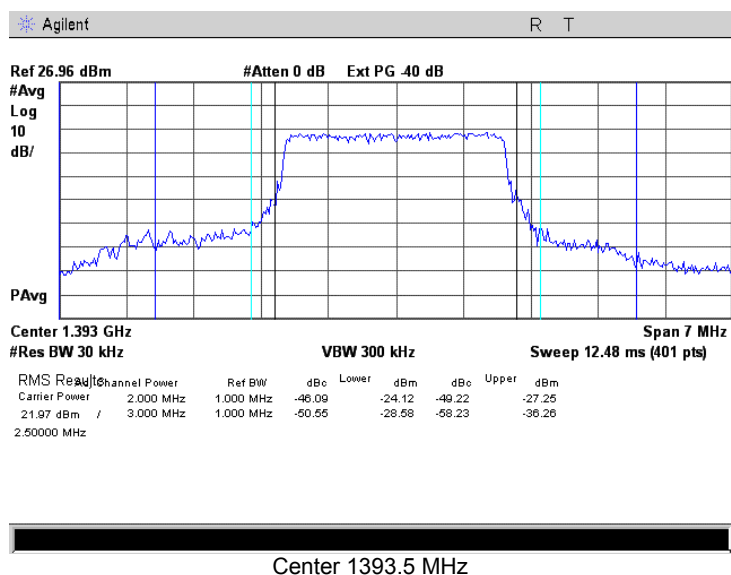
Plot 7.4.54 Spurious emission measurements in 1390 – 1391 MHz, 1391 – 1392 MHz, 1395 – 1396 MHz, 1396 – 1397 MHz at mid carrier frequency, 1.75 MHz EBW, 64QAM modulation



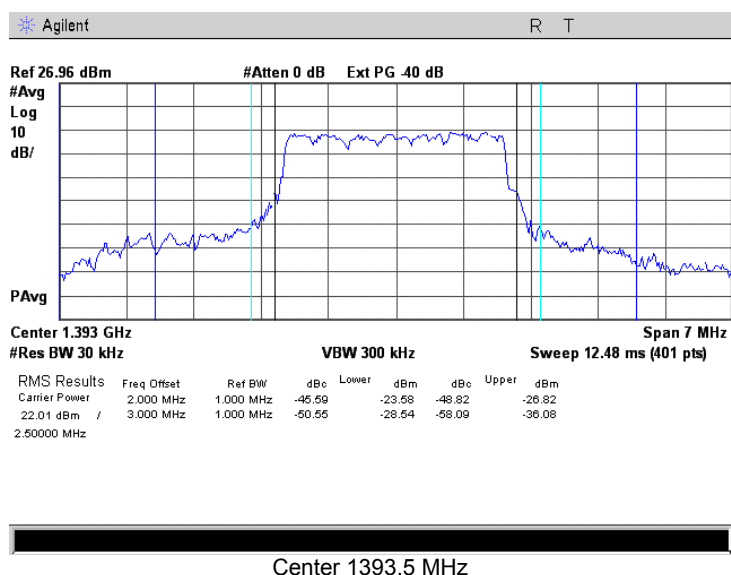
Center 1393.5 MHz

Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2009, 8/23/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.55 Spurious emission measurements in 1390 – 1391 MHz, 1391 – 1392 MHz, 1395 – 1396 MHz, 1396 – 1397 MHz at mid carrier frequency, 2.5 MHz EBW, BPSK modulation

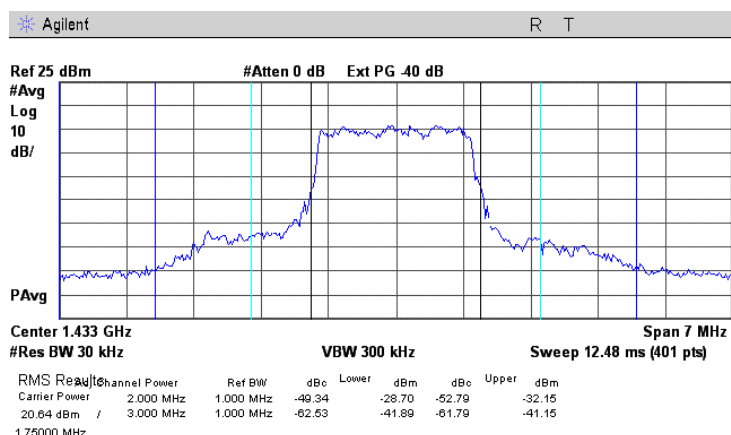


Plot 7.4.56 Spurious emission measurements in 1390 – 1391 MHz, 1391 – 1392 MHz, 1395 – 1396 MHz, 1396 - 1397 MHz at mid carrier frequency, 2.5 MHz EBW, 64QAM modulation

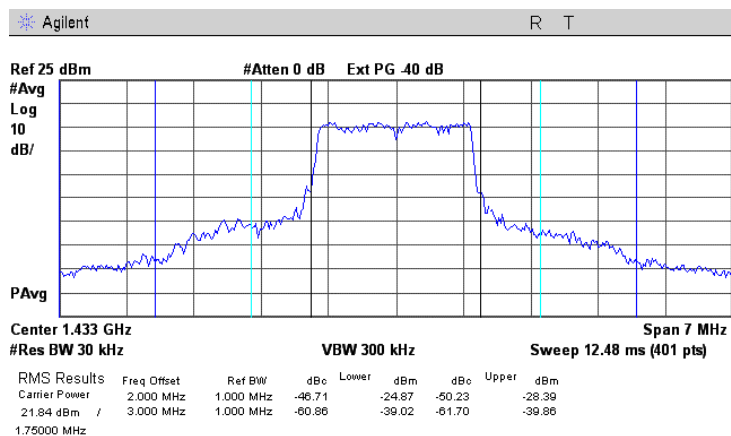


Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2009, 8/23/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.57 Spurious emission measurements in 1430 – 1431 MHz, 1431 – 1432 MHz, 1435 – 1436 MHz, 1436 - 1437 MHz at high carrier frequency, 1.75 MHz EBW, BPSK modulation

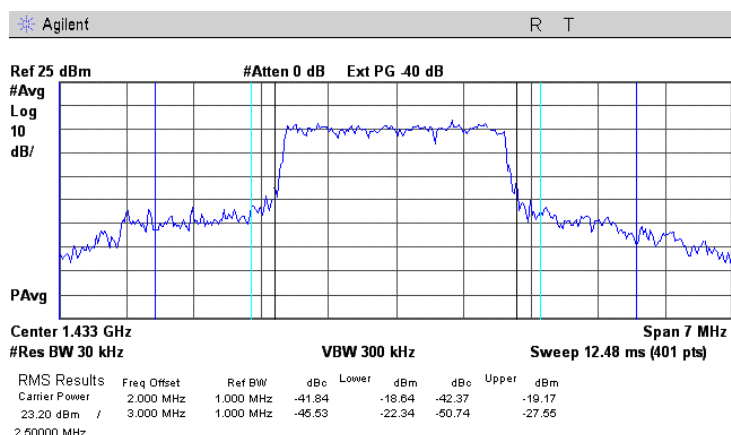


Plot 7.4.58 Spurious emission measurements in 1430 – 1431 MHz, 1431 – 1432 MHz, 1435 – 1436 MHz, 1436 - 1437 MHz at high carrier frequency, 1.75 MHz EBW, 64QAM modulation

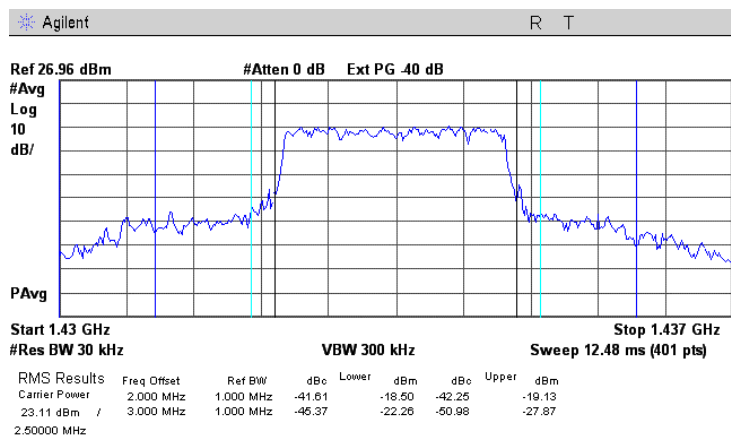


Test specification:	Section 27.53(j), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2009, 8/23/2009		
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.59 Spurious emission measurements in 1430 – 1431 MHz, 1431 – 1432 MHz, 1435 – 1436 MHz, 1436 - 1437 MHz at high carrier frequency, 2.5 MHz EBW, BPSK modulation

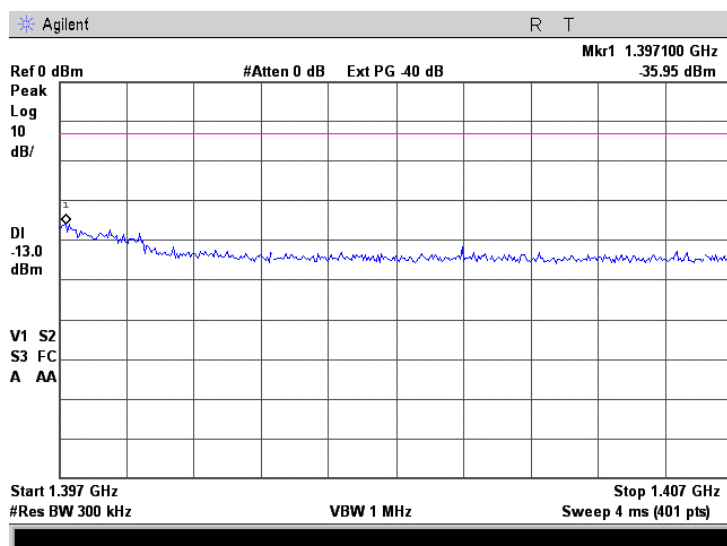


Plot 7.4.60 Spurious emission measurements in 1430 – 1431 MHz, 1431 – 1432 MHz, 1435 – 1436 MHz, 1436 - 1437 MHz at high carrier frequency, 2.5 MHz EBW, 64QAM modulation

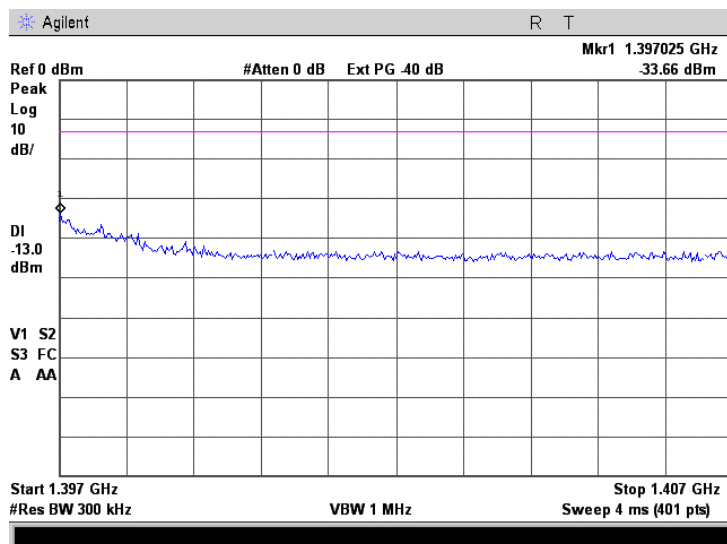


Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/23/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.61 Spurious emission measurements in 1397 - 1407 MHz at mid carrier frequency, 1.75 MHz EBW, BPSK modulation

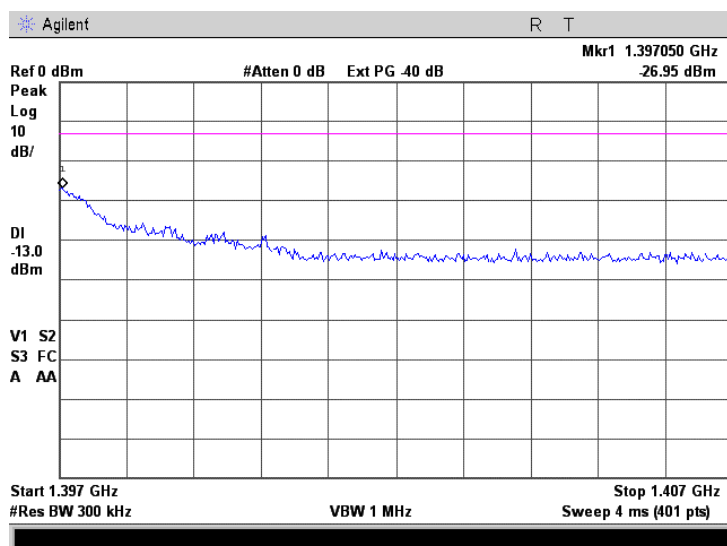


Plot 7.4.62 Spurious emission measurements in 1397 - 1407 MHz at mid carrier frequency, 1.75 MHz EBW, 64QAM modulation

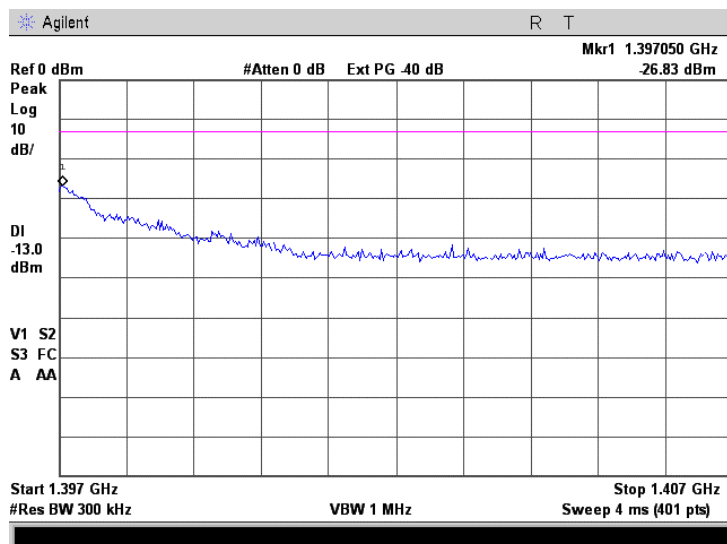


Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/23/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.63 Spurious emission measurements in 1397 - 1407 MHz at mid carrier frequency, 2.5 MHz EBW, BPSK modulation

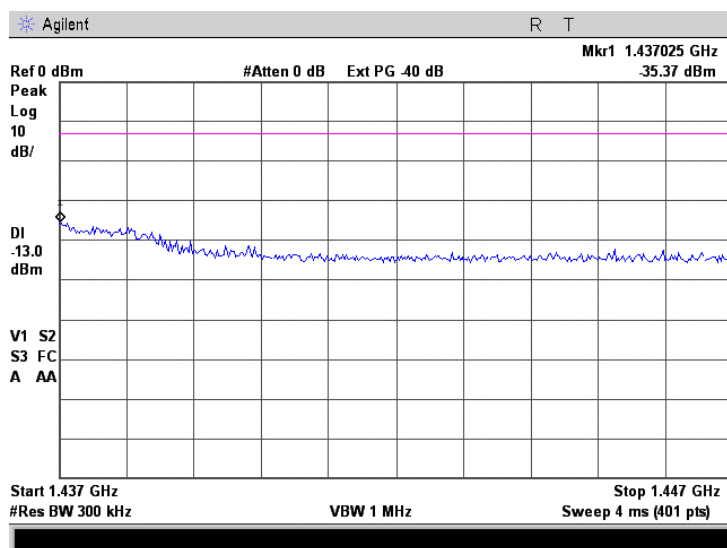


Plot 7.4.64 Spurious emission measurements in 1397 - 1407 MHz at mid carrier frequency, 2.5 MHz EBW, 64QAM modulation

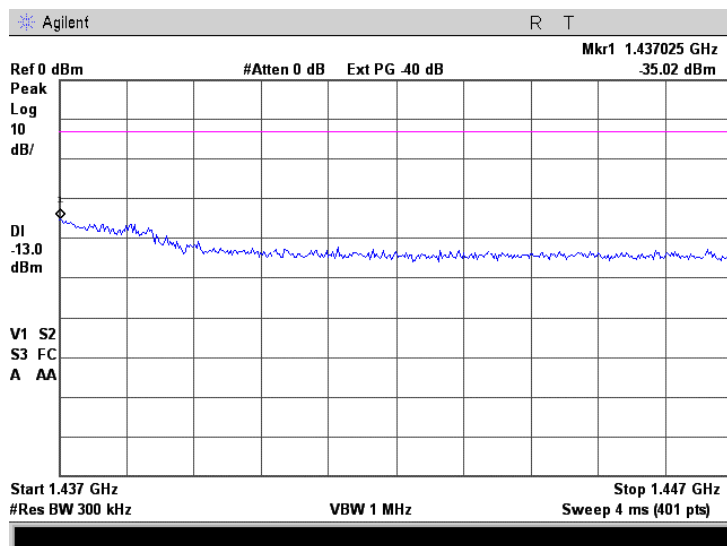


Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/23/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.65 Spurious emission measurements in 1437 - 1447 MHz at high carrier frequency, 1.75 MHz EBW, BPSK modulation

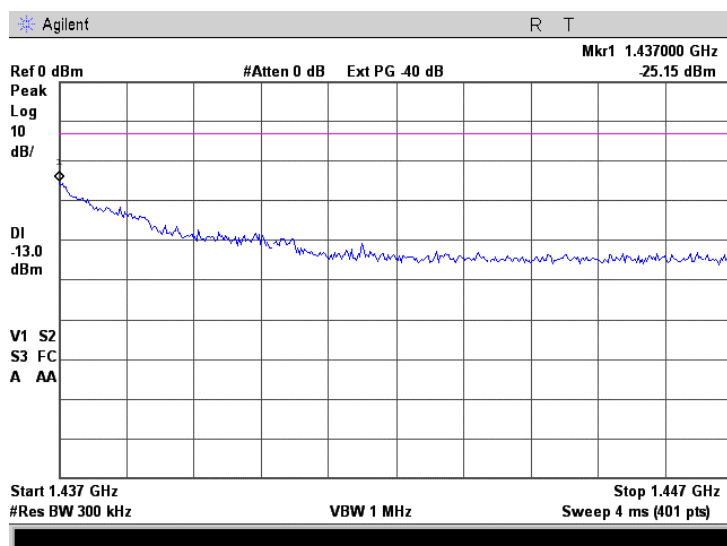


Plot 7.4.66 Spurious emission measurements in 1437 - 1447 MHz at high carrier frequency, 1.75 MHz EBW, 64QAM modulation

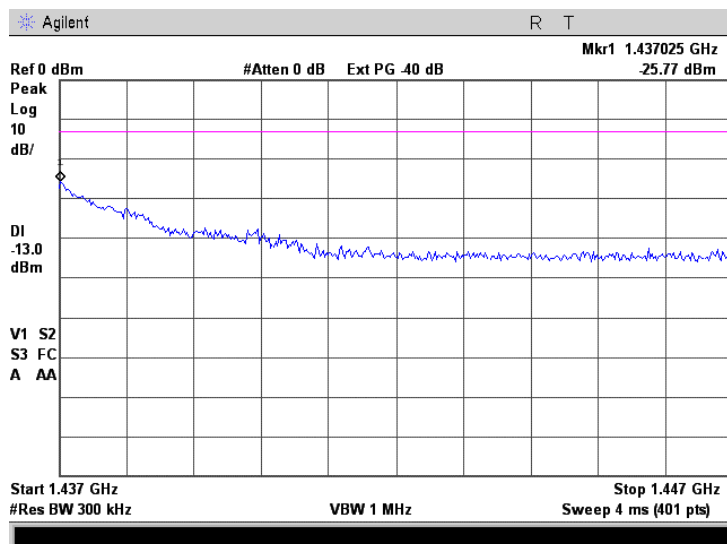


Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/23/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.67 Spurious emission measurements in 1437 - 1447 MHz at high carrier frequency, 2.5 MHz EBW, BPSK modulation

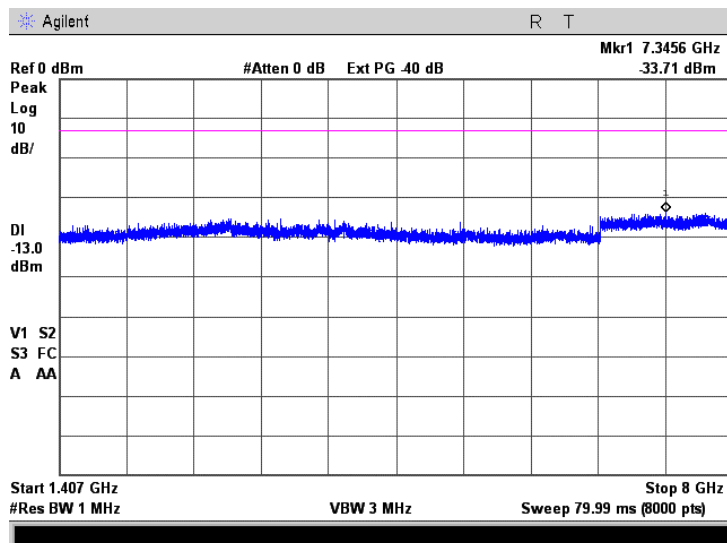


Plot 7.4.68 Spurious emission measurements in 1437 - 1447 MHz at high carrier frequency, 2.5 MHz EBW, 64QAM modulation

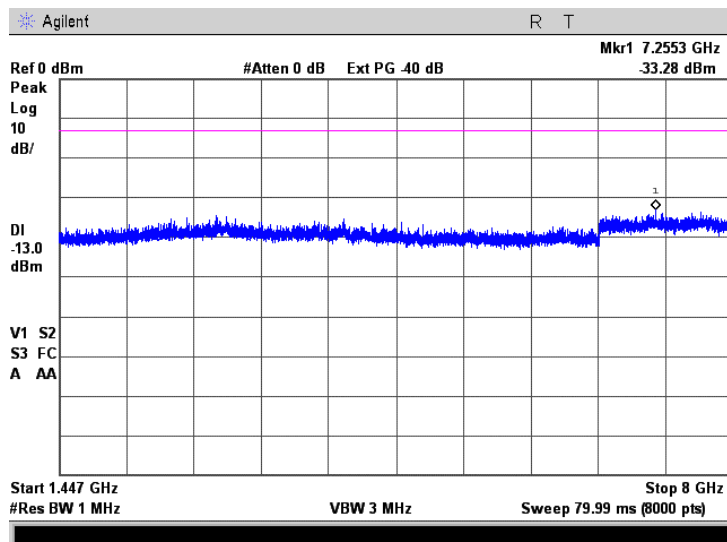


Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/23/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.69 Spurious emission measurements in 1407 - 8000 MHz range at mid carrier frequency

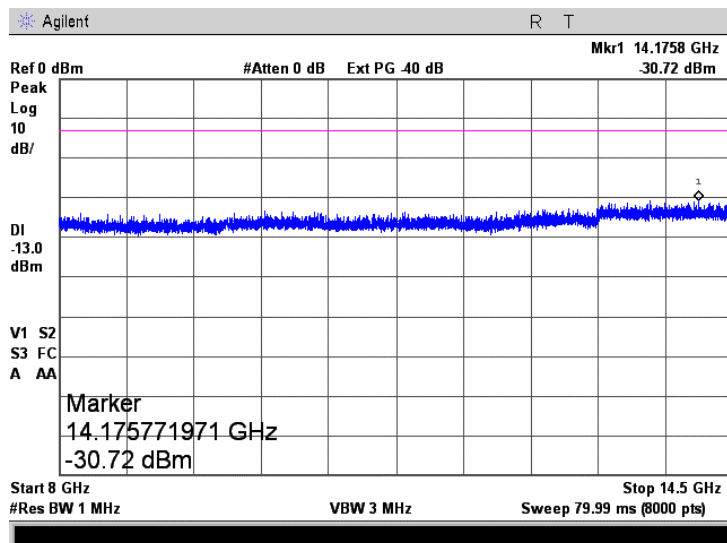


Plot 7.4.70 Spurious emission measurements in 1447 - 8000 MHz at high carrier frequency

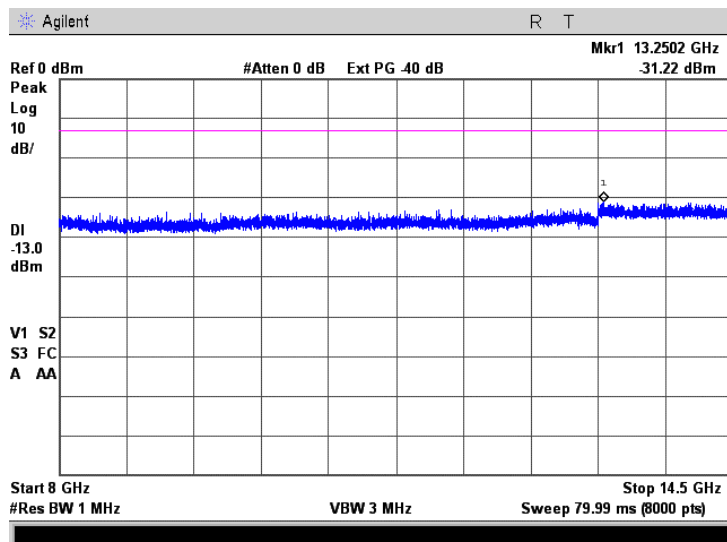


Test specification:		Section 27.53(j), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2009, 8/23/2009	
Temperature: 23°C	Air Pressure: 1019 hPa	Relative Humidity: 43%	Power Supply: 120 V AC
Remarks:			

Plot 7.4.71 Spurious emission measurements in 8000 - 14500 MHz at mid carrier frequency



Plot 7.4.72 Spurious emission measurements in 8000 - 14500 MHz at high carrier frequency



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:	2/15/2009, 8/24/2009		
Temperature: 23°C	Air Pressure: 1022 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

7.5 Frequency stability test

7.5.1 General

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

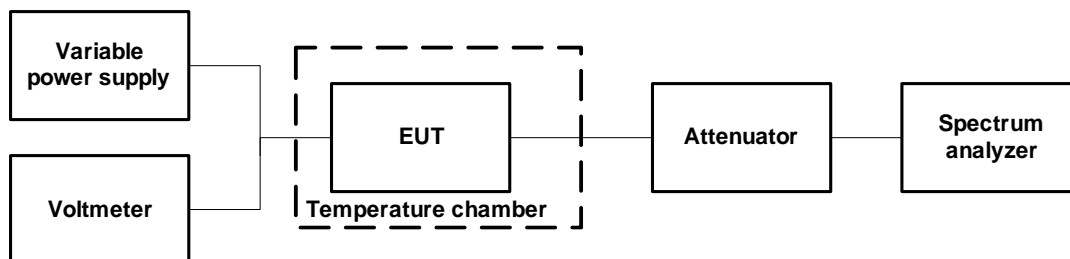
Table 7.5.1 Frequency stability limits

Assigned frequency, MHz	Maximum allowed frequency displacement, Hz
1390.0 – 1392.0	The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation
1392.0 – 1395.0	The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation
1432.0 – 1435.0	The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation

7.5.2 Test procedure

- 7.5.2.1** The EUT was set up as shown in Figure 7.5.1, energized and its proper operation was checked.
- 7.5.2.2** The EUT power was turned off. Temperature within test chamber was set to +30°C and a period of time sufficient to stabilize all of the oscillator circuit components was allowed.
- 7.5.2.3** The EUT was powered on and carrier frequency was measured at start up moment and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.
- 7.5.2.4** The above procedure was repeated at 0°C and at the lowest test temperature.
- 7.5.2.5** The EUT was powered on and carrier frequency was measured at start up moment and at the end of stabilization period at the rest of test temperatures and voltages. The EUT was powered off.
- 7.5.2.6** Frequency displacement was calculated and compared with the limit as provided in Table 7.5.2, Table 7.5.3, Table 7.5.4, Table 7.5.5.

Figure 7.5.1 Frequency stability test setup



Test specification:		Section 27.54, Frequency stability	
Test procedure:		47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2	
Test mode:	Compliance	Verdict:	PASS
Date:	2/15/2009, 8/24/2009		
Temperature: 23°C	Air Pressure: 1022 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

Table 7.5.2 Frequency stability test results

OPERATING FREQUENCY: 1390.0 – 1392.0 MHz
 NOMINAL POWER VOLTAGE: 120 V
 TEMPERATURE STABILIZATION PERIOD: 20 min
 POWER DURING TEMPERATURE TRANSITION: Off
 SPECTRUM ANALYZER MODE: Counter
 RESOLUTION BANDWIDTH: 100 Hz
 VIDEO BANDWIDTH: 100 Hz
 MODULATION: Unmodulated

Unmodulated										
, °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
Carrier frequency 1391.0 MHz										
-30	nominal	1390.999164	1390.999776	1391.000236	1391.000560	1391.000864	1391.000928	1391.001424	0	-5836
-20	nominal	1391.004560	NA	NA	NA	NA	NA	1391.007160	2160	-440
-10	nominal	1391.008828	NA	NA	NA	NA	NA	1391.009704	4704	0
0	nominal	1391.010020	1391.010120	1391.010124	1391.010112	1391.010112	1391.010100	1391.010056	5056	0
10	nominal	1391.009432	NA	NA	NA	NA	NA	1391.008868	4432	0
20	+15%	1391.005000	NA	NA	NA	NA	NA	1391.005320	320	0
20	nominal	1391.006680	NA	NA	NA	NA	NA	1391.005000*	1680	0
20	-15%	1391.005320	NA	NA	NA	NA	NA	1391.005120	320	0
30	nominal	1391.006040	1391.005780	1391.005680	1391.005600	1391.005560	1391.005520	1391.005400	1040	0
40	nominal	1391.004860	NA	NA	NA	NA	NA	1391.004000	0	-1000
50	nominal	1391.004260	NA	NA	NA	NA	NA	1391.004840	0	-740

* - Reference frequency

Table 7.5.3 Transmission occupied bandwidth with frequency drift test results

Lower measured* band edge, MHz	Upper measured* band edge, MHz	Lower calculated** band edge, MHz	Upper calculated** band edge, MHz	Lower specified band edge, MHz	Upper specified band edge, MHz	Lower Margin***, MHz	Upper Margin***, MHz	Verdict
Carrier frequency 1391.0 MHz, 1.5 MHz EBW								
BPSK								
1390.265	1391.710	1390.259164	1391.715056	1390.0	1392.0	0.259164	-0.284944	Pass
64QAM								
1390.265	1391.710	1390.259164	1391.715056	1392.0	1395.0	0.259164	-0.284944	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 1459	HL 3004	HL 3179					
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Full description is given in Appendix A.

Test specification:	Section 27.54, Frequency stability		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date:	2/15/2009, 8/24/2009		
Temperature: 23°C	Air Pressure: 1022 hPa	Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:			

Table 7.5.4 Frequency stability test results

OPERATING FREQUENCY: 1392.0 – 1395.0 MHz
1432.0 – 1435.0 MHz
NOMINAL POWER VOLTAGE: 120 VAC
TEMPERATURE STABILIZATION PERIOD: 20 min
POWER DURING TEMPERATURE TRANSITION: Off
SPECTRUM ANALYZER MODE: Peak Hold
RESOLUTION BANDWIDTH: 10 Hz
VIDEO BANDWIDTH: 30 Hz

T, °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
Carrier frequency 1393.50 MHz										
-30	nominal	1393.504250	1393.503900	1393.503600	1393.503475	1393.503475	1393.503475	1393.503525	0.00	-4005.00
-20	nominal	1393.509500	NA	NA	NA	NA	NA	1393.509575	2095.00	0.00
-10	nominal	1393.510832	NA	NA	NA	NA	NA	1393.511571	4091.00	0.00
0	nominal	1393.511875	1393.511732	1393.511728	1393.511723	1393.511713	1393.511710	1393.511710	4395.00	0.00
10	nominal	1393.509125	NA	NA	NA	NA	NA	1393.509075	1645.00	0.00
20	15%	1393.507250	NA	NA	NA	NA	NA	1393.507125	0.00	-355.00
20	nominal	1393.508330	NA	NA	NA	NA	NA	1393.507480*	850.00	0.00
20	-15%	1393.506500	NA	NA	NA	NA	NA	1393.506750	0.00	-980.00
30	nominal	1393.506820	1393.506883	1393.506835	1393.506815	1393.506798	1393.506783	1393.506730	0.00	-750.00
40	nominal	1393.506200	NA	NA	NA	NA	NA	1393.506122	0.00	-1358.00
50	nominal	1393.506099	1393.506216	1393.506281	1393.506339	1393.506395	1393.506449	1393.506657	0.00	-1381.00
Carrier frequency 1433.50 MHz										
-30	nominal	1433.503350	1433.503385	1433.503390	1433.503367	1433.503345	1433.503337	1433.503270	0.00	-3805.00
-20	nominal	1433.508500	NA	NA	NA	NA	NA	1433.509539	2464.00	0.00
-10	nominal	1433.511750	NA	NA	NA	NA	NA	1433.511517	4675.00	0.00
0	nominal	1433.511830	1433.511890	1433.511895	1433.511894	1433.511889	1433.511883	1433.511854	4820.00	0.00
10	nominal	1433.509452	NA	NA	NA	NA	NA	1433.508993	2377.00	0.00
20	15%	1433.507100	NA	NA	NA	NA	NA	1433.507100	25.00	0.00
20	nominal	1433.507750	NA	NA	NA	NA	NA	1433.507075*	675.00	0.00
20	-15%	1433.506480	NA	NA	NA	NA	NA	1433.506775	0.00	-595.00
30	nominal	1433.507836	1433.507605	1433.507459	1433.507362	1433.507276	1433.507221	1433.506981	761.00	-94.00
40	nominal	1433.506660	NA	NA	NA	NA	NA	1433.506153	0.00	-922.00
50	nominal	1433.506650	1433.506698	1433.506712	1433.506740	1433.506758	1433.506768	1433.506929	0.00	-425.00

* - Reference frequency



HERMON LABORATORIES

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:		2/15/2009, 8/24/2009			
Temperature: 23°C		Air Pressure: 1022 hPa		Relative Humidity: 45%	Power Supply: 120 V AC
Remarks:					

Table 7.5.5 Transmission occupied bandwidth with frequency drift test results

Lower measured* band edge, MHz	Upper measured* band edge, MHz	Lower calculated** band edge, MHz	Upper calculated** band edge, MHz	Lower specified band edge, MHz	Upper specified band edge, MHz	Lower Margin***, MHz	Upper Margin***, MHz	Verdict
Carrier frequency 1393.5 MHz, 2.5 MHz BW								
BPSK								
1392.2775	1394.6925	1392.273495	1394.696895	1392	1395	-0.273495	-0.303105	Pass
64QAM								
1432.285	1434.700	1432.281195	1434.70482	1432	1435	-0.281195	-0.29518	Pass
Carrier frequency 1433.5 MHz, 2.5 MHz BW								
BPSK								
1392.2775	1394.7	1392.273495	1394.704395	1392	1395	-0.273495	-0.295605	Pass
64QAM								
1432.285	1434.7	1432.281195	1434.70482	1432	1435	-0.281195	-0.29518	Pass

* - Measured under normal test conditions at 26 dBc points

** - Measured band edge with proper drift addition

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

Reference numbers of test equipment used

HL 1194	HL 2867	HL 2909	HL 3210				
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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	8546A	3617A 00319, 3448A002 53	27-Aug-09	27-Aug-10
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	11-Jan-09	11-Jan-10
1194	Variac, 220 V/ 2.5 A	Matsunaga		2962	01-Jan-09	01-Jan-10
1459	Cable, 1 m, N/N-type	Harbour Industries	MIL 17/60-RG142	1459	01-Sep-09	01-Sep-10
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W	EMC Test Systems	3115	9911-5964	23-Jan-09	23-Jan-10
2387	Filter Bandpass, 8-14 GHz	Hermon Laboratories	FBP8-14	2387	05-Jun-07	05-Oct-09
2432	Antenna, Double-Ridged Waveguide Horn 1-18 GHz	EMC Test Systems	3115	00027177	23-Jan-09	23-Jan-10
2780	EMC analyzer, 100 Hz to 26.5 GHz	Agilent Technologies	E7405A	MY451024 6	05-Jul-09	05-Jul-10
2785	Signal generator, 50 MHz to 26 GHz, pulse modulation	Giga-tronics	1026-01	284007	23-Feb-09	23-Feb-10
2867	Cable, 18 GHz, 0.9 m, SMA - SMA, Right Angle	Gore	NA	91P72076	04-Feb-09	04-Feb-10
2869	Cable, 18 GHz, 1.2 m, SMA - SMA, Right Angle	Gore	NA	91P72073	04-Feb-09	04-Feb-10
2883	Cable, 18 GHz N-type, M-F, 3 m	Bird	TC-MNFN-3.0	211539 003	07-Dec-08	07-Dec-09
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY414447 62	07-May-09	07-May-10
3004	Analyzer, Spectrum, 9.0 kHz - 2.2 GHz	Anritsu	MS2601A	MT09861	27-Mar-09	27-Mar-10
3122	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-9155-00	3122	01-Jan-09	01-Jan-10
3123	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-9155-00	3123	01-Jan-09	01-Jan-10
3179	Attenuator, N-type, 20 dB, DC to 18 GHz, 5 W	Mini-Circuits	BW-N20W5+	NA	07-May-09	07-May-10
3210	Temperature Chamber, (-50...+100) °C	Associated	NA	NA	11-Sep-08	11-Sep-09
3234	Signal generator, 9 kHz - 3.3 GHz	Rohde & Schwarz	SML03	103387	19-Jul-09	19-Jul-10
3301	Power Meter, P-series, 50 MHz to 40 GHz	Agilent Technologies	N1911A	MY451010 57	03-Dec-08	03-Dec-09
3302	Power sensor, P-Series, 50 MHz to 40 GHz, -35/30 to 20 dBm	Agilent Technologies	N1922A	MY452405 86	05-Dec-08	05-Dec-09
3342	High Pass Filter, 50 Ohm, 2000 to 5200 MHz.	Mini-Circuits	VHF-1910+	NA	29-Oct-08	29-Oct-09
3344	High Pass Filter, 50 Ohm, 3400 to 9900 MHz	Mini-Circuits	VHF-3100+	NA	29-Oct-08	29-Oct-09
3435	Precision Fixed Attenuator, 50 Ohm, 5 W, 10 dB, DC to 18 GHz	Mini-Circuits	BW-S10W5+	NA	08-Mar-09	08-Mar-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

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.*	Due Cal.*
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
3531	Amplifier, low noise, 2 to 8 GHz	Quinstar Technology	QLJ-02084040-J0	11159002002	07-Dec-08	07-Dec-09
3532	Amplifier, low noise, 2 to 8 GHz	Quinstar Technology	QLJ-02084040-J0	11159002001	23-Nov-08	23-Nov-09
3533	Amplifier, low noise, 6 to 18 GHz	Quinstar Technology	QLJ-06184040-J0	11159001001	07-Dec-08	07-Dec-09
3534	Amplifier, low noise, 6 to 18 GHz	Quinstar Technology	QLJ-06184040-J0	11159001002	07-Dec-08	07-Dec-09
3616	Cable RF, 6.5 m, N type-N type, DC-6.5 GHz	Suhner Switzerland	Rg 214/U	NA	07-Dec-08	07-Dec-09

The calibration was valid during testing.

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	$\pm 8\%$
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 $\pm 13.9\%$
Duty cycle, timing (Tx ON / OFF) and average factor measurements	$\pm 1.0\%$

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
FCC 47CFR part 15: 2008	Radio Frequency Devices
ANSI C63.2: 1996	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4: 2005	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
ANSI/TIA/EIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

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

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

Cable loss
Cable coaxial, Gore, 18 GHz, 1.1 m, SMA - SMA, model Right Angle, S/N 91P72071
HL 2869

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.06	5750	0.87	12000	1.30
30	0.06	6000	0.87	12250	1.33
100	0.10	6250	0.89	12500	1.35
250	0.18	6500	0.92	12750	1.36
500	0.25	6750	0.94	13000	1.38
750	0.27	7000	0.98	13250	1.41
1000	0.34	7250	0.99	13500	1.39
1250	0.35	7500	1.02	13750	1.41
1500	0.42	7750	1.03	14000	1.42
1750	0.44	8000	1.04	14250	1.46
2000	0.49	8250	1.04	14500	1.39
2250	0.52	8500	1.08	14750	1.46
2500	0.55	8750	1.08	15000	1.40
2750	0.59	9000	1.12	15250	1.47
3000	0.61	9250	1.12	15500	1.36
3250	0.64	9500	1.15	15750	1.49
3500	0.67	9750	1.14	16000	1.51
3750	0.69	10000	1.19	16250	1.60
4000	0.70	10250	1.20	16500	1.56
4250	0.74	10500	1.23	16750	1.66
4500	0.76	10750	1.24	17000	1.71
4750	0.77	11000	1.24	17250	1.78
5000	0.79	11250	1.25	17500	1.75
5250	0.82	11500	1.28	17750	1.77
5500	0.84	11750	1.29	18000	1.86

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

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

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

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

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

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

Cable loss
Cable coaxial, RG-214/U, N type-N type, 6.5 m
Suhner Switzerland, HL 3616

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.13	1750	2.66	3550	4.44	5350	6.08
30	0.25	1800	2.72	3600	4.46	5400	6.12
50	0.32	1850	2.78	3650	4.59	5450	6.17
100	0.48	1900	2.81	3700	4.60	5500	6.25
150	0.60	1950	2.86	3750	4.72	5550	6.31
200	0.71	2000	2.94	3800	4.72	5600	6.35
250	0.81	2050	2.97	3850	4.86	5650	6.41
300	0.91	2100	3.01	3900	4.85	5700	6.50
350	1.00	2150	3.06	3950	4.99	5750	6.52
400	1.07	2200	3.11	4000	4.90	5800	6.57
450	1.14	2250	3.16	4050	5.04	5850	6.61
500	1.23	2300	3.21	4100	5.01	5900	6.71
550	1.30	2350	3.26	4150	5.10	5950	6.70
600	1.37	2400	3.31	4200	5.08	6000	6.75
650	1.44	2450	3.35	4250	5.18	6050	6.74
700	1.50	2500	3.39	4300	5.14	6100	6.84
750	1.58	2550	3.46	4350	5.22	6150	6.87
800	1.64	2600	3.48	4400	5.21	6200	6.93
850	1.69	2650	3.55	4450	5.29	6250	6.96
900	1.77	2700	3.59	4500	5.31	6300	7.02
950	1.79	2750	3.66	4550	5.39	6350	7.04
1000	1.87	2800	3.68	4600	5.41	6400	7.10
1050	1.92	2850	3.75	4650	5.49	6450	7.11
1100	1.98	2900	3.79	4700	5.52	6500	7.19
1150	2.05	2950	3.86	4750	5.60		
1200	2.09	3000	3.89	4800	5.64		
1250	2.15	3050	3.94	4850	5.73		
1300	2.21	3100	3.98	4900	5.70		
1350	2.27	3150	4.03	4950	5.73		
1400	2.33	3200	4.06	5000	5.75		
1450	2.38	3250	4.12	5050	5.83		
1500	2.44	3300	4.14	5100	5.82		
1550	2.48	3350	4.22	5150	5.91		
1600	2.52	3400	4.24	5200	5.92		
1650	2.56	3450	4.31	5250	5.98		
1700	2.62	3500	4.35	5300	6.01		

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