



Hermon Laboratories Ltd.
Harakevet Industrial Zone, Binyamina 30500,
Israel
Tel. +972-4-6288001
Fax. +972-4-6288277
E-mail: mail@hermonlabs.com

TEST REPORT

ACCORDING TO: FCC 47CFR part 27

FOR:

Airspan Networks Inc.

Base station

Model:MacroMAXe 0707 700M Ext

This report is in conformity with ISO/ IEC 17025. The "A2LA Accredited" symbol endorsement applies only to the tests and calibrations that are listed in the scope of Hermon Laboratories accreditation. The test results relate only to the items tested.
This test report shall not be reproduced in any form except in full with the written approval of Hermon Laboratories Ltd.

Table of contents

1	Applicant information	3
2	Equipment under test attributes	3
3	Manufacturer information	3
4	Test details	3
5	Tests summary	4
6	EUT description	5
6.1	General information	5
6.2	Ports and lines	5
6.3	Support and test equipment	5
6.4	Changes made in the EUT	5
6.5	Test configuration	6
6.6	Transmitter characteristics	7
7	Transmitter tests according to 47CFR part 27	8
7.1	Peak output power test	8
7.2	Occupied bandwidth test	27
7.3	Emission mask (band edge emissions) test	37
7.4	Radiated spurious emission measurements	73
7.5	Spurious emissions at RF antenna connector test	81
7.6	Frequency stability test	99
8	APPENDIX A Test equipment and ancillaries used for tests	101
9	APPENDIX B Measurement uncertainties	102
10	APPENDIX C Test laboratory description	103
11	APPENDIX D Specification references	103
12	APPENDIX E Test equipment correction factors	104
13	APPENDIX F Abbreviations and acronyms	112

1 Applicant information

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

2 Equipment under test attributes

Product name: Base station
Model(s): MacroMAXe 0707 700M Ext
Serial number: 51F8AA111112
Hardware version: A1
Software release: 13.9.01.011
Receipt date: 8/23/2010

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: 21117
Location: Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started: 8/23/2010
Test completed: 9/06/2010
Test specification(s): FCC 47CFR part 27

5 Tests summary

Test	Status
Transmitter characteristics	
Section 27.50(c)(3), Peak output power at RF antenna connector	Pass
Section 2.1091, 27.52, RF safety	Provided in Application for Certification
Section 27.53(g), Spurious emissions at RF antenna connector	Pass
Section 27.53(g), Band edge emissions at RF antenna connector	Pass
Section 27.53(g), Radiated spurious emissions	Pass
Section 27.54, Frequency stability	Pass
Section 2.1049, Occupied bandwidth	Pass

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	September 2, 2010	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	September 6, 2010	
Approved by:	Mr. M. Nikishin, EMC and Radio group leader	September 16, 2010	

6 EUT description

6.1 General information

A base station radio, MacroMAXe 0707 700M Ext., 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 MacroMAXe's transceiver/receiver (up to 64 QAM modulation, data rate up to 46 Mbps) uses OFDM and operates in TDD duplexing mode, equipped with a 13.5 dBi external antenna.

The MacroMAXe is installed outdoors and typically is mounted on a pole. The Subscriber transmits and receives traffic to and from the base station respectively. The transceiver provides subscribers with "always-on" Internet, high speed data only, or data and voice (VoIP) services and is configured with a unique base station reference number, preventing the Subscriber from relocating to another subscriber premises without authorization.

6.2 Ports and lines

Port type	Port description	Conn. from	Conn. to	Qty.	Cable type	Cable length	Indoor / outdoor
Power	DC power	DC power supply	EUT	1	Unshielded	10	Outdoor
Signal	Ethernet	ETH2 port	ETH3 port	1	Shielded	1.5	Outdoor
Signal	Ethernet	ETH1 port	PC laptop	1	Shielded	10	Outdoor
Signal	Antenna	EUT	GPS external antenna	1	Coax	5	Outdoor
RF	Antenna	EUT	Termination 50 Ohm	4	Coax	NA	Outdoor
Signal	RS-232	EUT	Laptop	1	Unshielded	2	For maintenance only

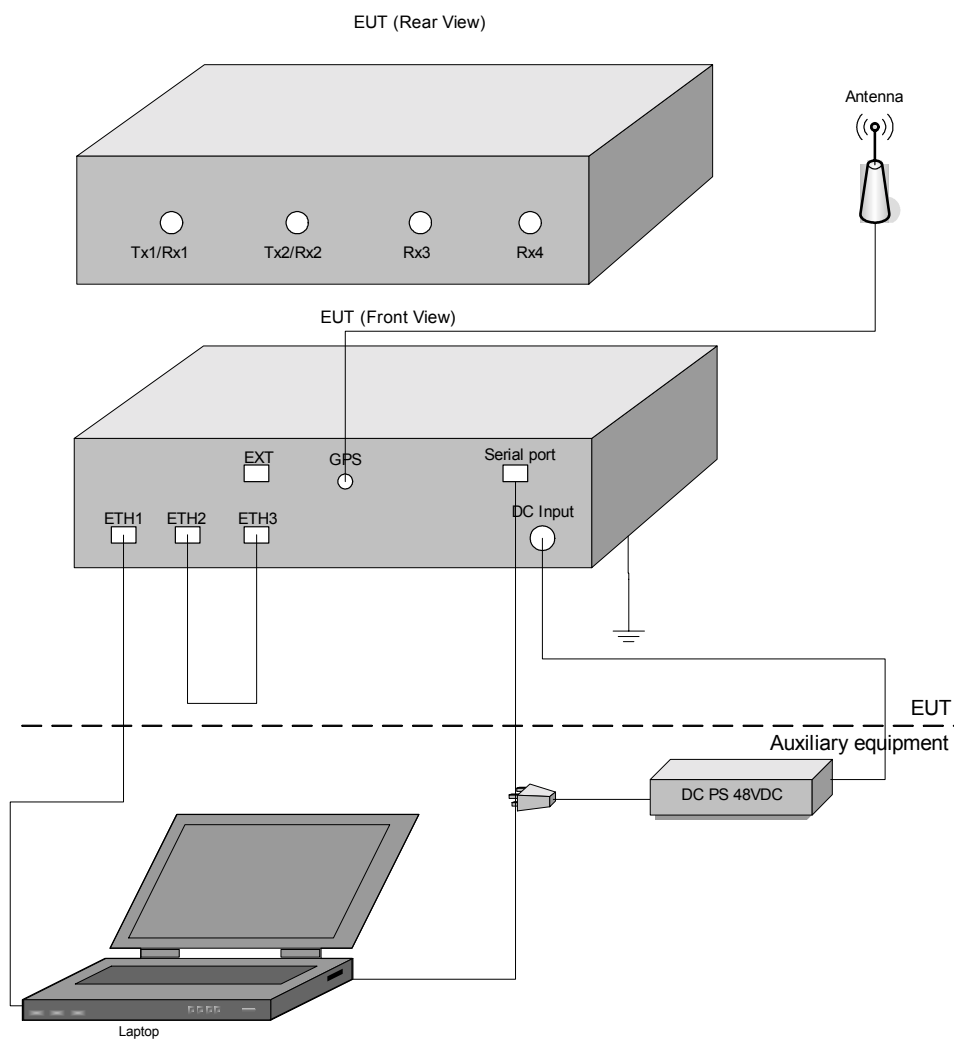
6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
DC power supply	Horizon Electronics	DHR3655D	767469
Laptop	IBM	X31	99-TXWYC
GPS antenna	Trimble	P/N 57861-00	01880177

6.4 Changes made in the EUT

No changes were implemented.

6.5 Test configuration



6.6 Transmitter characteristics

Type of equipment					
V	Stand-alone (Equipment with or without its own control provisions)				
	Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)				
	Plug-in card (Equipment intended for a variety of host systems)				
Intended use		Condition of use			
V	fixed	Always at a distance more than 2 m from all people			
	mobile	Always at a distance more than 20 cm from all people			
	portable	May operate at a distance closer than 20 cm to human body			
Assigned frequency range		698.0 – 746.0 MHz			
Operating frequency range		700.0 – 744.0 MHz for 3.5 MHz OBW 701.0 – 743.0 MHz for 5 MHz OBW 702.0 – 742.0 MHz for 7 MHz OBW 704.0 – 740.0 MHz for 10 MHz OBW			
RF channel spacing		3.5, 5, 7, 10 MHz			
Maximum rated output power		At transmitter 50 Ω RF output connector (aggregate power of both RF chains)			
		41.58 dBm – 3.5 MHz OBW 41.39 dBm – 5 MHz OBW 41.53 dBm – 7 MHz OBW 41.51 dBm – 10 MHz OBW			
		ERP density dBm / MHz (aggregate power of both RF chains) with maximum declared antenna gain			
		49.40 dBm – 3.5 MHz OBW 47.86 dBm – 5 MHz OBW 46.81 dBm – 7 MHz OBW 45.24 dBm – 10 MHz OBW			
Is transmitter output power variable?		No			
		V	Yes	continuous variable	
				stepped variable with stepsize	0.5 dB
				minimum RF power	0 dBm
				maximum RF power (single RF chain)	38.89 dBm
Antenna connection					
unique coupling	V	standard connector	Integral		
		with temporary RF connector			
		without temporary RF connector			
Antenna/s technical characteristics					
Type	Manufacturer	Model number	Gain		
Dual Polarized 60° Sector Antenna, Fixed Tilt	Alpha Wireless	AW3052	13.5 dBi		
Dual Polarized 90° Sector Antenna, Fixed Tilt	Alpha Wireless	AW3054	12.5 dBi		
OMNI Directional Antenna	MTI Wireless Edge Ltd.	MT-221023/NV	6.5 dBi		
OMNI Directional Antenna	MTI Wireless Edge Ltd.	MT-/221024NV	6.0 dBi		
Transmitter aggregate data rate/s, Mbps					
Transmitter 99% power bandwidth	Type of modulation				
		QPSK	16QAM	64QAM	
	3.5 MHz	4	9	14	
	5 MHz	7	14	23	
	7 MHz	8	17	28	
10 MHz	13	27	46		
Type of multiplexing		OFDMA/TDD			
Modulating test signal (baseband)		PRBS			
Maximum transmitter duty cycle in normal use		75%			
Transmitter power source					
V	DC	Nominal rated voltage	48 VDC		
Common power source for transmitter and receiver		V	yes no		

Test specification:		Section 27.50(c)(3), Peak output power at RF antenna connector	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:	Compliance	Verdict:	PASS
Date:	8/23/2010		
Temperature: 24.6 °C	Air Pressure: 1003 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

7 Transmitter tests according to 47CFR part 27

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 (Fixed and Base Station)	
	W/MHz	dBm/MHz
698.0 – 746.0	1000	60.00

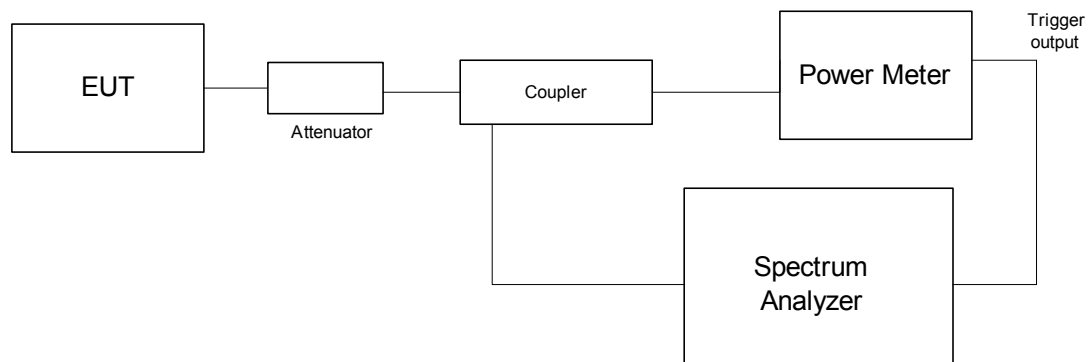
7.1.2 Test procedure

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 spectrum analyzer as provided in Table 7.1.2 and the associated plots.

Figure 7.1.1 Peak output power test setup



Test specification:	Section 27.50(c)(3), Peak output power at RF antenna connector			
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode:	Compliance	Verdict: PASS		
Date:	8/23/2010			
Temperature: 24.6 °C	Air Pressure: 1003 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC	
Remarks:				

Table 7.1.2 Peak output power test results

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
 DETECTOR USED: Average
 RESOLUTION BANDWIDTH: 1000 kHz
 VIDEO BANDWIDTH: 3000 kHz
 MODULATING SIGNAL: PRBS
 MAXIMUM ANTENNA GAIN: 13.5 dbi (11.35 dBd)

CHANNEL BANDWIDTH: 3.5 MHz

Carrier frequency, MHz	Spectrum analyzer reading RF#1 dBm/MHz	Spectrum analyzer reading RF#2 dBm/MHz	Antenna gain, dBd	Total ERP, dBm/MHz*	Limit, dBm/MHz	Margin, dB	Verdict	Power Meter reading RF#1, dBm	Power Meter reading RF#2, dBm	Total RF power***, dBm
QPSK										
700.00	34.79	35.22	11.35	49.37	60.00	-10.63	Pass	38.53	38.61	41.58
719.00	34.26	34.94	11.35	48.97	60.00	-11.03	Pass	38.00	38.32	41.17
744.00	33.39	34.36	11.35	48.26	60.00	-11.74	Pass	37.11	37.71	40.43
64QAM										
700.00	35.18	34.89	11.35	49.40	60.00	-10.60	Pass	38.51	38.52	41.53
719.00	34.65	34.68	11.35	49.03	60.00	-10.97	Pass	37.99	38.29	41.15
744.00	33.88	34.70	11.35	48.67	60.00	-11.33	Pass	37.06	37.55	40.32

CHANNEL BANDWIDTH: 5 MHz

Carrier frequency, MHz	Spectrum analyzer reading RF#1 dBm/MHz	Spectrum analyzer reading RF#2 dBm/MHz	Antenna gain, dBd	Total ERP, dBm/MHz*	Limit, dBm/MHz	Margin, dB	Verdict	Power Meter reading RF#1, dBm	Power Meter reading RF#2, dBm	Total RF power***, dBm
QPSK										
701.00	33.30	33.29	11.35	47.66	60.00	-12.34	Pass	38.41	38.35	41.39
719.00	32.79	33.13	11.35	47.32	60.00	-12.68	Pass	37.87	38.12	41.01
743.00	32.55	32.98	11.35	47.13	60.00	-12.87	Pass	37.59	37.85	40.73
64QAM										
701.00	33.63	33.37	11.35	47.86	60.00	-12.14	Pass	38.46	38.27	41.38
719.00	33.17	33.07	11.35	47.48	60.00	-12.52	Pass	37.93	38.06	41.01
743.00	32.97	32.58	11.35	47.14	60.00	-12.86	Pass	37.66	37.82	40.75

* - ERP total, dBm/MHz = Pmeas**, dBm/MHz + Antenna Gain, dBd

** - Pmeas , dBm/MHz = 10 log{10³[P(dBm/MHz, RF#1)/10] + 10³[P(dBm/MHz, RF#2)/10]}

*** - Total RF, dBm = 10 log{10³[P(dBm, RF#1)/10] + 10³[P(dBm, RF#2)/10]}

Test specification:	Section 27.50(c)(3), Peak output power at RF antenna connector			
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode:	Compliance	Verdict: PASS		
Date:	8/23/2010			
Temperature: 24.6 °C	Air Pressure: 1003 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC	
Remarks:				

Table 7.1.2 Peak output power test results (continued)

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
 DETECTOR USED: Average
 RESOLUTION BANDWIDTH: 1000 kHz
 VIDEO BANDWIDTH: 3000 kHz
 MODULATING SIGNAL: PRBS
 MAXIMUM ANTENNA GAIN: 13.5 dbi (11.35 dBd)

CHANNEL BANDWIDTH: 7 MHz

Carrier frequency, MHz	Spectrum analyzer reading RF#1 dBm/MHz	Spectrum analyzer reading RF#2 dBm/MHz	Antenna gain, dBd	Total ERP, dBm/MHz*	Limit, dBm/MHz	Margin, dB	Verdict	Power Meter reading RF#1 dBm	Power Meter reading RF#2, dBm	Total RF power***, dBm
QPSK										
702.00	32.06	31.86	11.35	46.32	60.00	-13.68	Pass	38.55	38.33	41.45
720.00	31.19	31.61	11.35	45.77	60.00	-14.23	Pass	37.94	38.10	41.03
742.00	31.10	31.60	11.35	45.72	60.00	-14.28	Pass	37.28	37.97	40.65
64QAM										
702.00	32.59	32.30	11.35	46.81	60.00	-13.19	Pass	38.63	38.41	41.53
720.00	31.61	32.07	11.35	46.21	60.00	-13.79	Pass	38.03	38.17	41.11
742.00	31.53	32.01	11.35	46.14	60.00	-13.86	Pass	37.45	38.07	40.78

CHANNEL BANDWIDTH: 10 MHz

Carrier frequency, MHz	Spectrum analyzer reading RF#1 dBm/MHz	Spectrum analyzer reading RF#2 dBm/MHz	Antenna gain, dBd	Total ERP, dBm/MHz*	Limit, dBm/MHz	Margin, dB	Verdict	Power Meter reading RF#1 dBm	Power Meter reading RF#2, dBm	Total RF power***, dBm
QPSK										
704.00	30.80	30.70	11.35	45.11	60.00	-14.89	Pass	38.49	38.27	41.39
722.00	31.19	30.54	11.35	45.24	60.00	-14.76	Pass	38.89	38.08	41.51
740.00	29.92	29.91	11.35	44.28	60.00	-15.72	Pass	37.49	37.49	40.50
64QAM										
704.00	30.55	30.50	11.35	44.89	60.00	-15.11	Pass	38.47	38.38	41.44
722.00	30.99	30.18	11.35	44.96	60.00	-15.04	Pass	38.85	38.05	41.48
740.00	29.83	29.84	11.35	44.20	60.00	-15.80	Pass	37.50	37.45	40.49

* - ERP total, dBm/MHz = Pmeas**, dBm/MHz + Antenna Gain, dBd

** - Pmeas, dBm/MHz = 10 log{10⁴[P(dBm/MHz, RF#1)/10] + 10⁴[P(dBm/MHz, RF#2)/10]}

*** - Total RF, dBm = 10 log{10⁴[P(dBm, RF#1)/10] + 10⁴[P(dBm, RF#2)/10]}

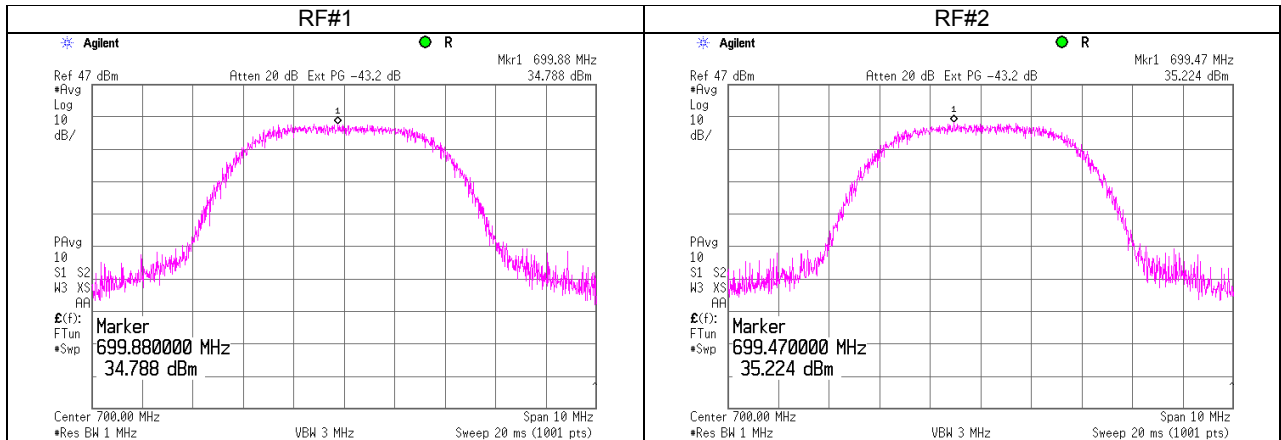
Reference numbers of test equipment used

HL 2015	HL 3301	HL 3302	HL 3472	HL 3781	HL 3818		
---------	---------	---------	---------	---------	---------	--	--

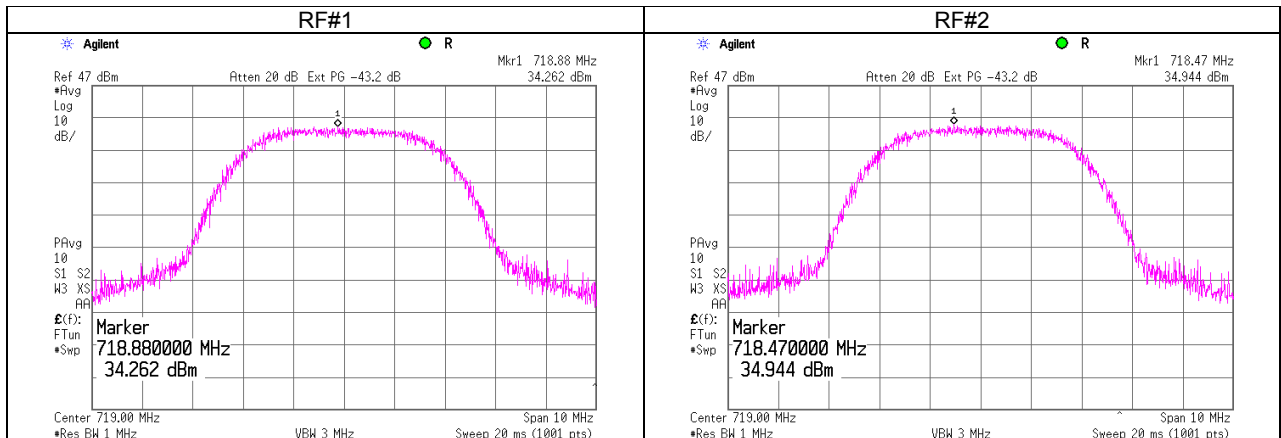
Full description is given in Appendix A.

Test specification:		Section 27.50(c)(3), Peak output power at RF antenna connector	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:		Compliance	Verdict: PASS
Date:		8/23/2010	
Temperature: 24.6 °C	Air Pressure: 1003 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.1 Peak output power test results at low frequency, QPSK modulation, 3.5 MHz CBW

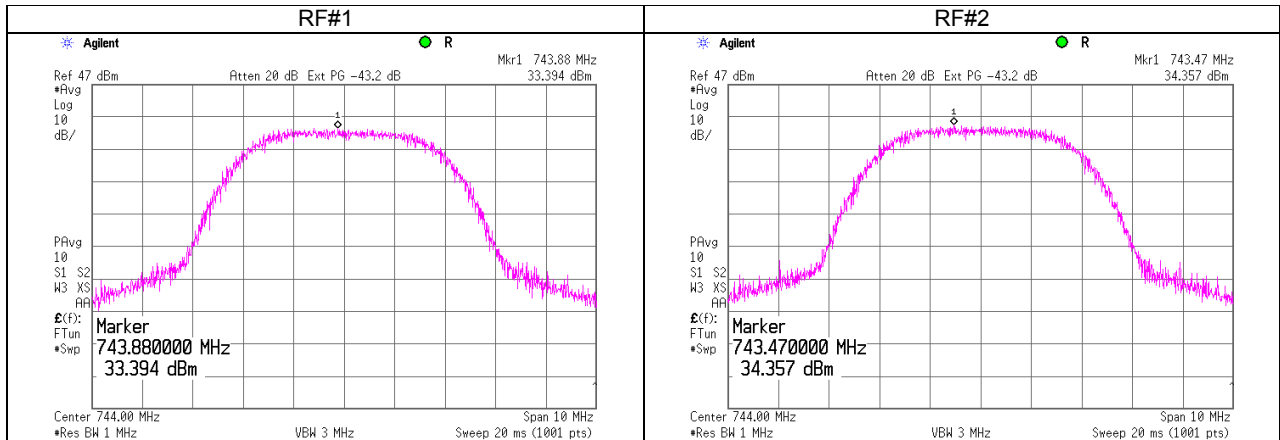


Plot 7.1.2 Peak output power test results at mid frequency, QPSK modulation, 3.5 MHz CBW



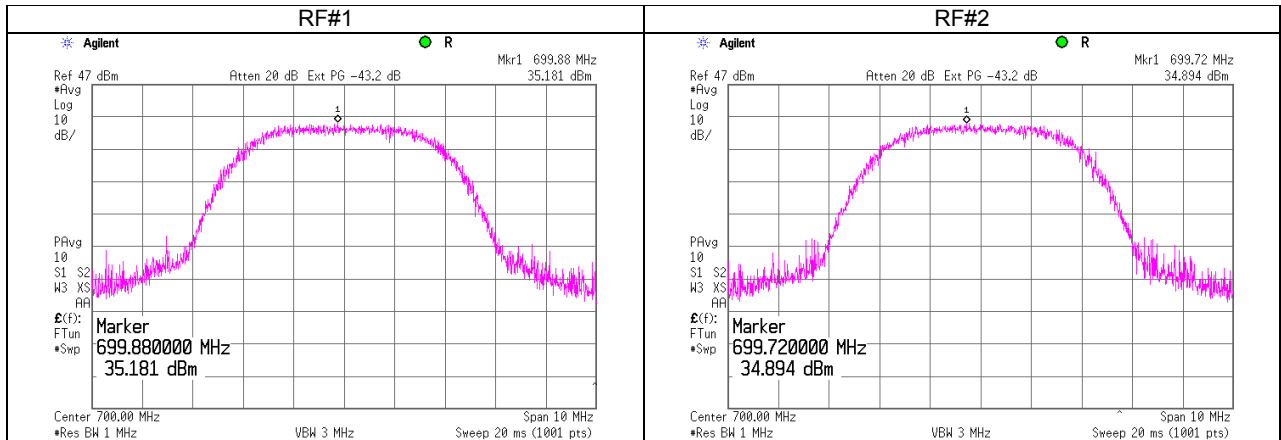
Test specification:		Section 27.50(c)(3), Peak output power at RF antenna connector	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:		Compliance	Verdict: PASS
Date:		8/23/2010	
Temperature: 24.6 °C	Air Pressure: 1003 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.3 Peak output power test results at high frequency, QPSK modulation, 3.5 MHz CBW

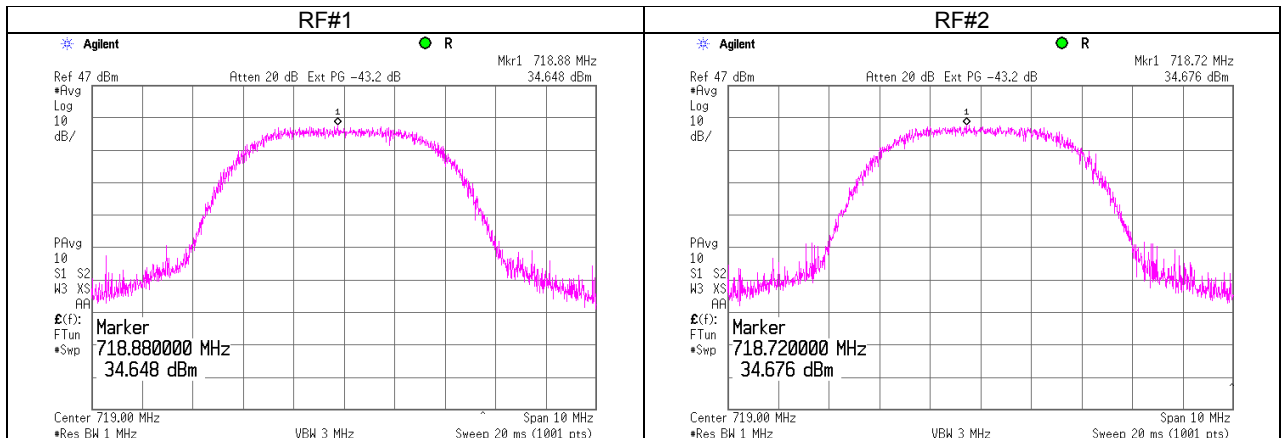


Test specification:		Section 27.50(c)(3), Peak output power at RF antenna connector	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:		Compliance	Verdict: PASS
Date:		8/23/2010	
Temperature: 24.6 °C	Air Pressure: 1003 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.4 Peak output power test results at low frequency, 64QAM modulation, 3.5 MHz CBW

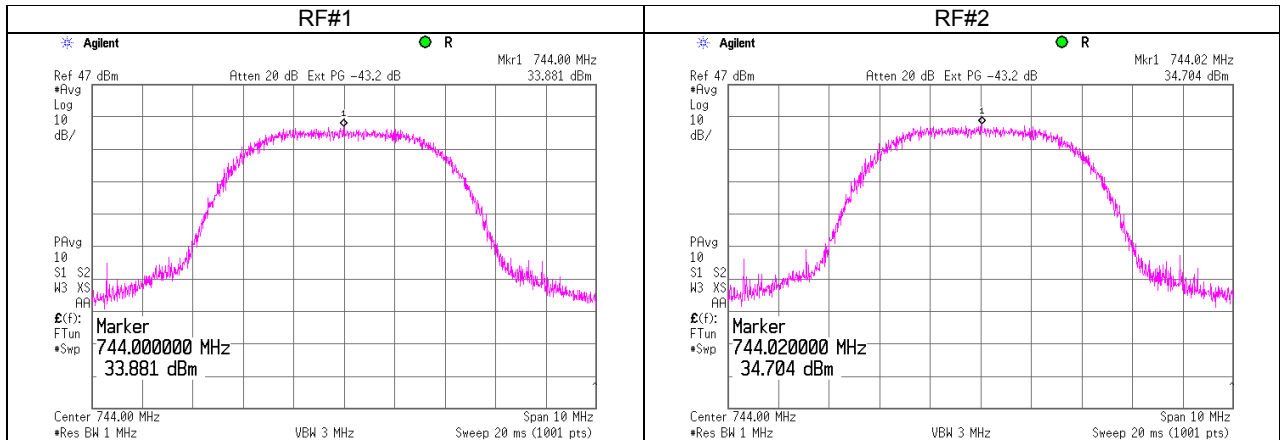


Plot 7.1.5 Peak output power test results at mid frequency, 64QAM modulation, 3.5 MHz CBW



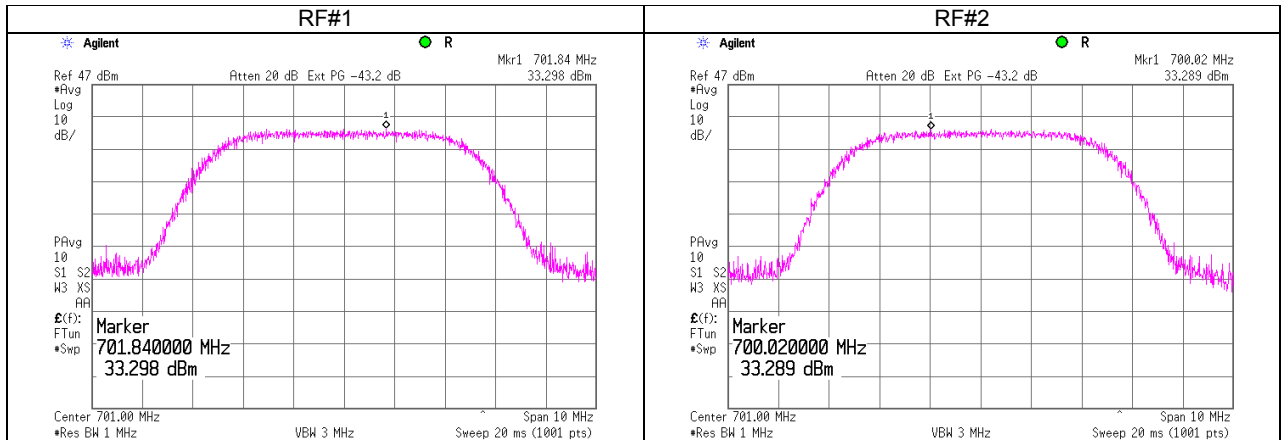
Test specification:		Section 27.50(c)(3), Peak output power at RF antenna connector	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:		Compliance	Verdict: PASS
Date:		8/23/2010	
Temperature: 24.6 °C	Air Pressure: 1003 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.6 Peak output power test results at high frequency, 64QAM modulation, 3.5 MHz CBW

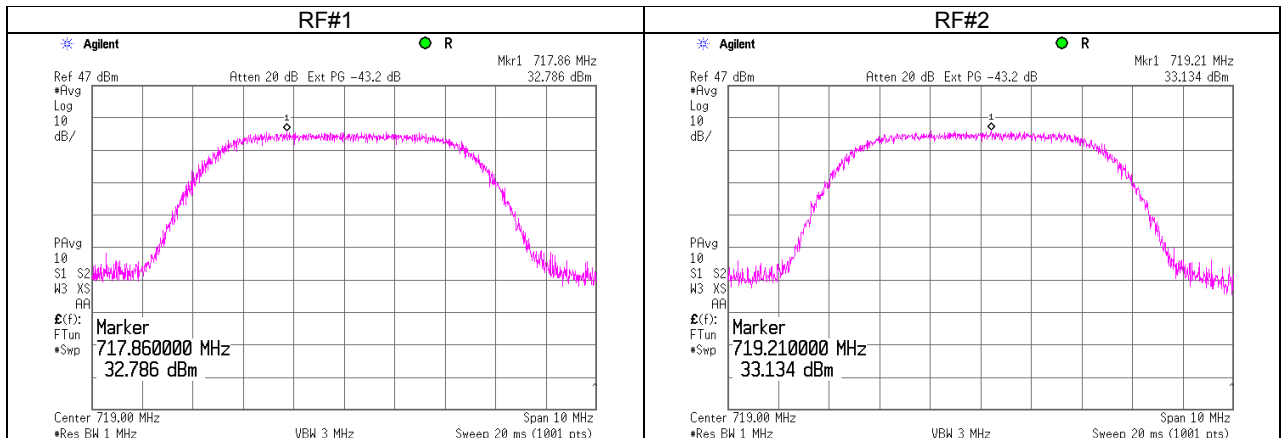


Test specification:		Section 27.50(c)(3), Peak output power at RF antenna connector	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:		Compliance	Verdict: PASS
Date:		8/23/2010	
Temperature: 24.6 °C	Air Pressure: 1003 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.7 Peak output power test results at low frequency, QPSK modulation, 5 MHz CBW

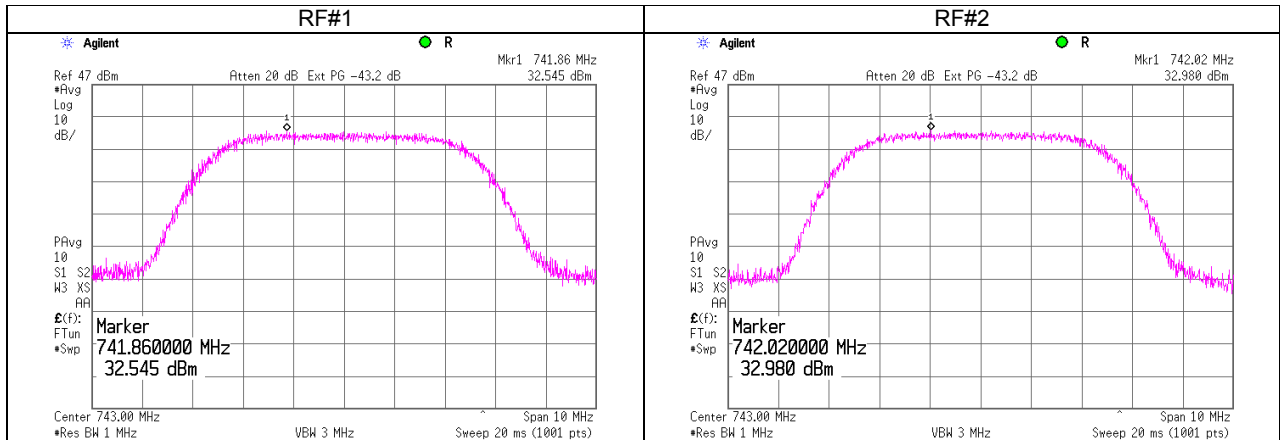


Plot 7.1.8 Peak output power test results at mid frequency, QPSK modulation, 5 MHz CBW



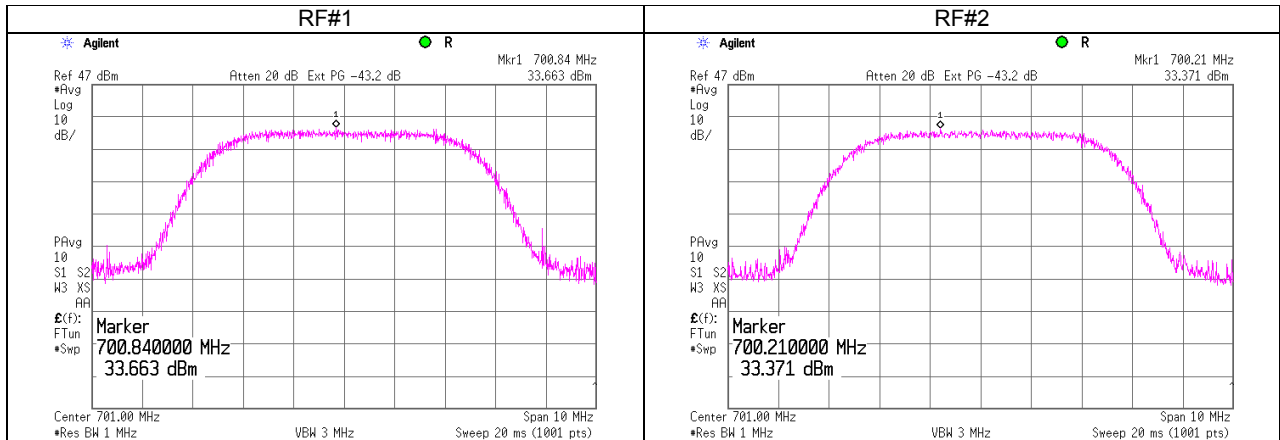
Test specification:		Section 27.50(c)(3), Peak output power at RF antenna connector	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:		Compliance	Verdict: PASS
Date:		8/23/2010	
Temperature: 24.6 °C	Air Pressure: 1003 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.9 Peak output power test results at high frequency, QPSK modulation, 5 MHz CBW

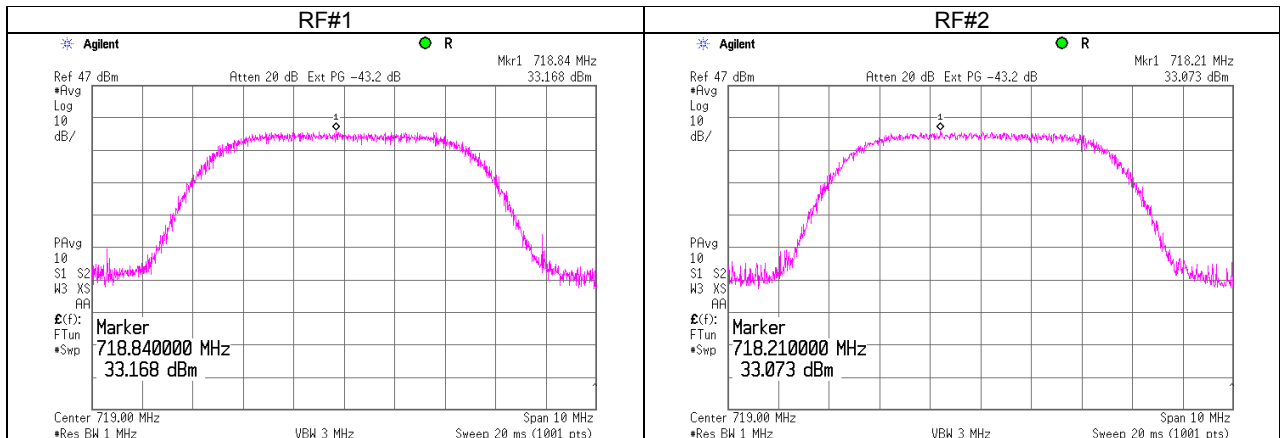


Test specification:		Section 27.50(c)(3), Peak output power at RF antenna connector	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:		Compliance	Verdict: PASS
Date:		8/23/2010	
Temperature: 24.6 °C	Air Pressure: 1003 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.10 Peak output power test results at low frequency, 64QAM modulation, 5 MHz CBW

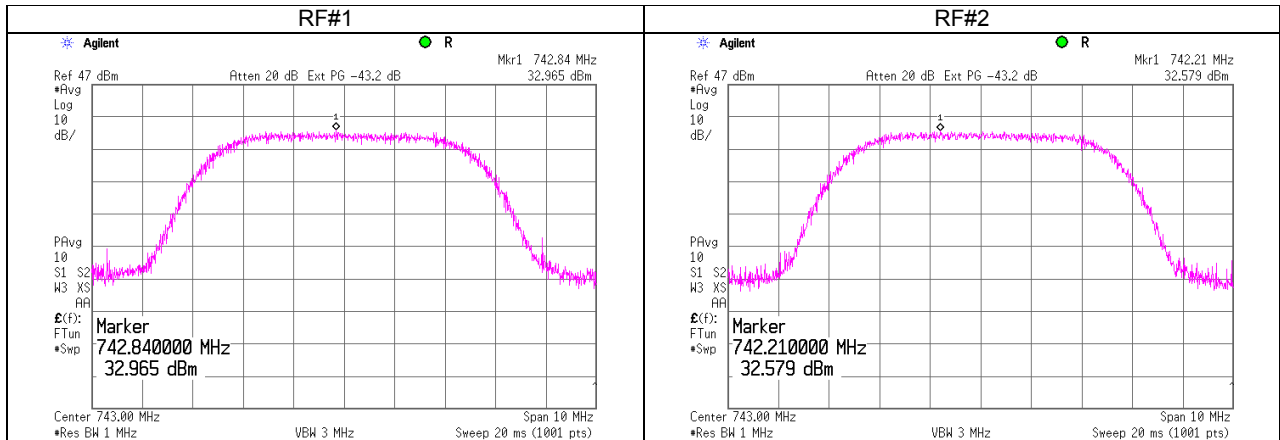


Plot 7.1.11 Peak output power test results at mid frequency, 64QAM modulation, 5 MHz CBW



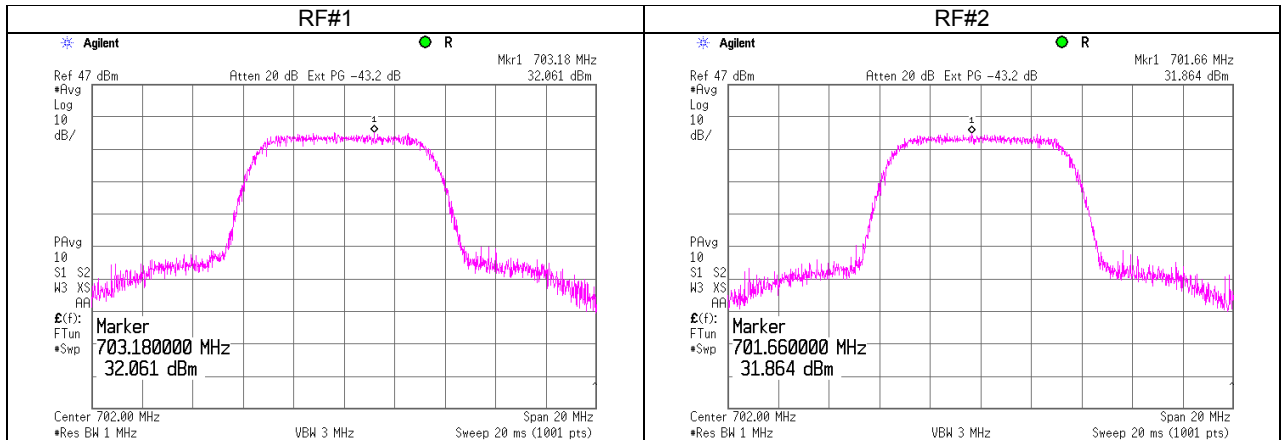
Test specification:		Section 27.50(c)(3), Peak output power at RF antenna connector	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:		Compliance	Verdict: PASS
Date:		8/23/2010	
Temperature: 24.6 °C	Air Pressure: 1003 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.12 Peak output power test results at high frequency, 64QAM modulation, 5 MHz CBW

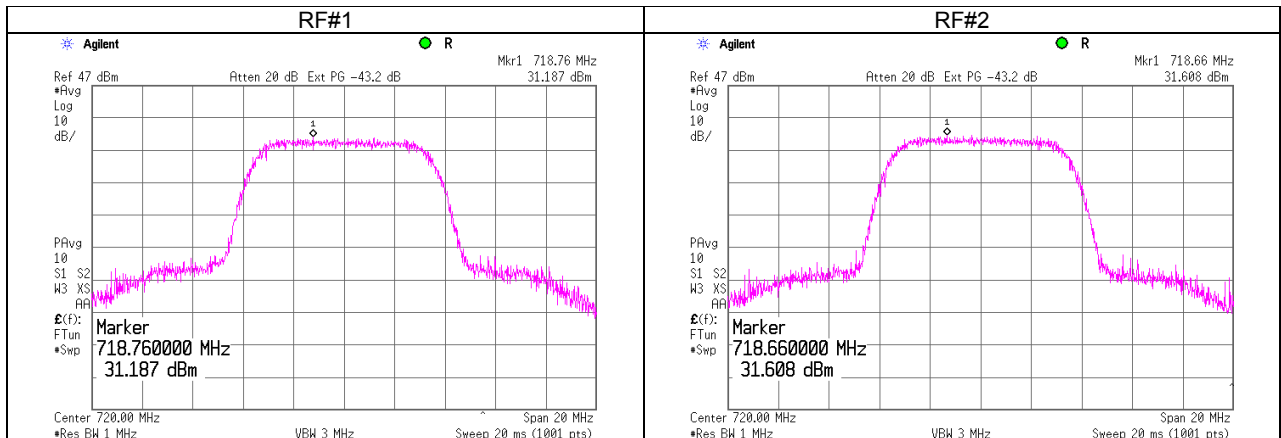


Test specification:		Section 27.50(c)(3), Peak output power at RF antenna connector	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:		Compliance	Verdict: PASS
Date:		8/23/2010	
Temperature: 24.6 °C	Air Pressure: 1003 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.13 Peak output power test results at low frequency, QPSK modulation, 7 MHz CBW

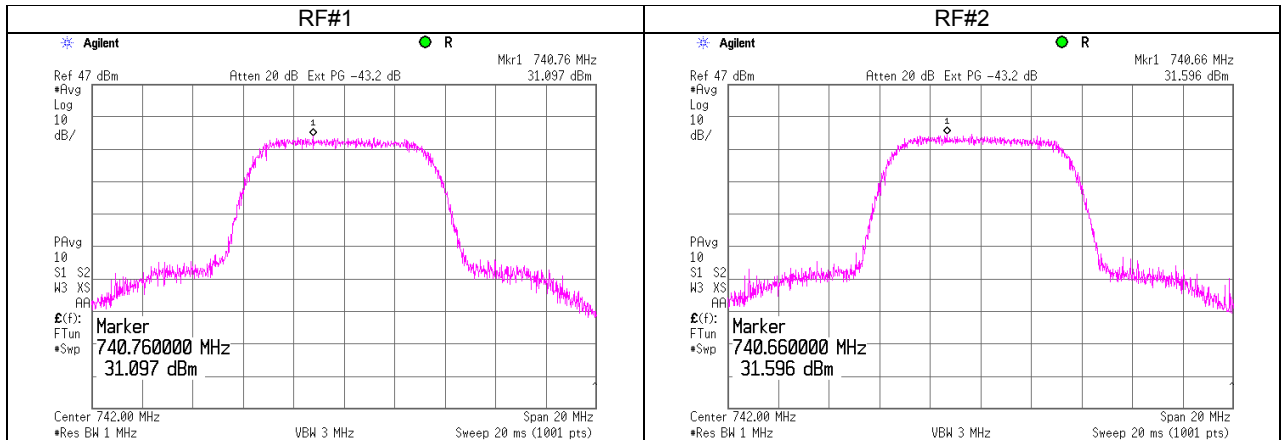


Plot 7.1.14 Peak output power test results at mid frequency, QPSK modulation, 7 MHz CBW



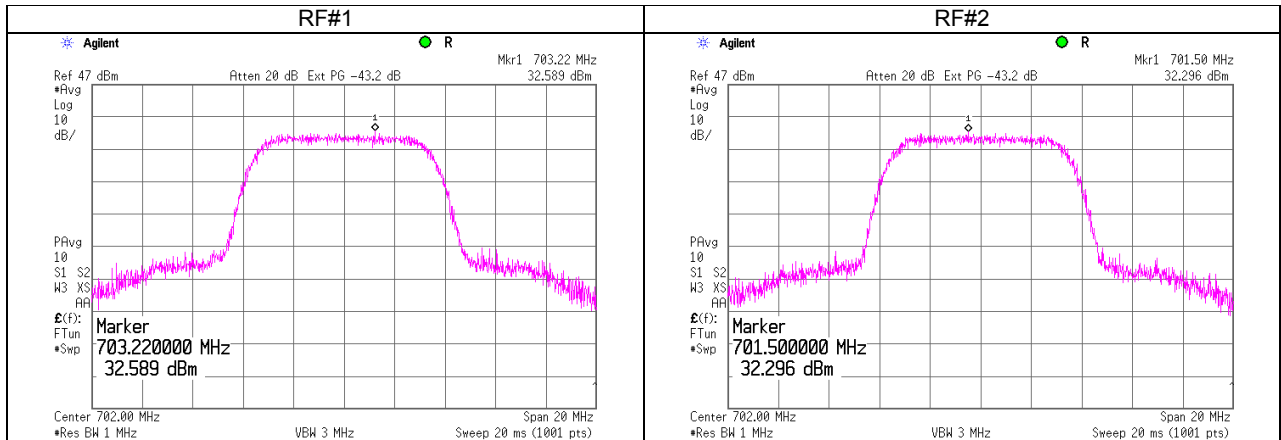
Test specification:		Section 27.50(c)(3), Peak output power at RF antenna connector	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:		Compliance	Verdict: PASS
Date:		8/23/2010	
Temperature: 24.6 °C	Air Pressure: 1003 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.15 Peak output power test results at high frequency, QPSK modulation, 7 MHz CBW

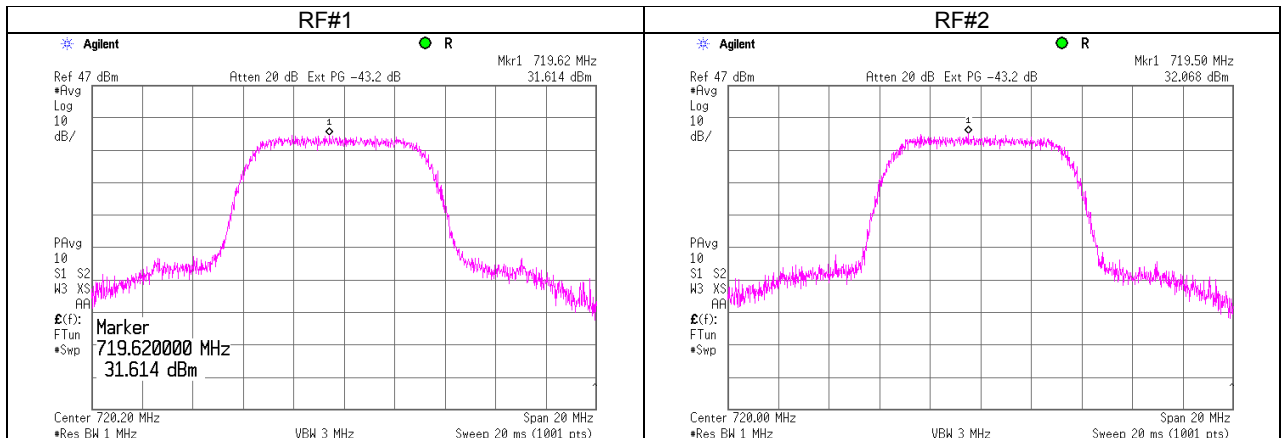


Test specification:		Section 27.50(c)(3), Peak output power at RF antenna connector	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:		Compliance	Verdict: PASS
Date:		8/23/2010	
Temperature: 24.6 °C	Air Pressure: 1003 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.16 Peak output power test results at low frequency, 64QAM modulation, 7 MHz CBW

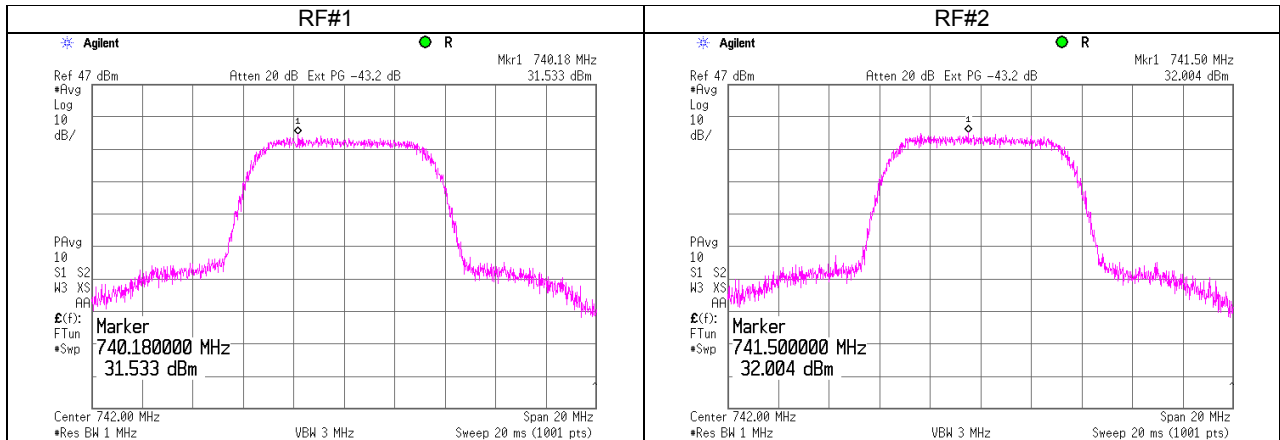


Plot 7.1.17 Peak output power test results at mid frequency, 64QAM modulation, 7 MHz CBW



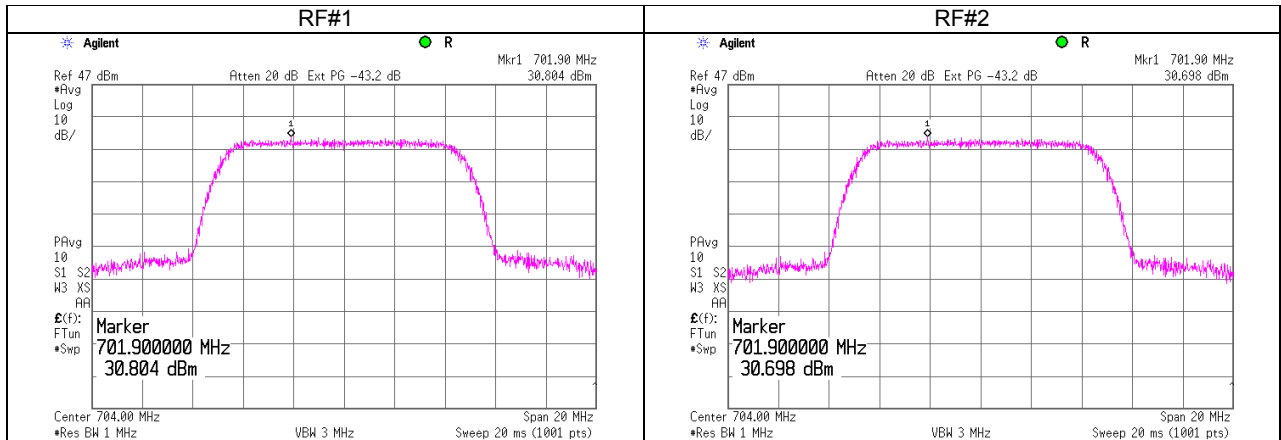
Test specification:		Section 27.50(c)(3), Peak output power at RF antenna connector	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:		Compliance	Verdict: PASS
Date:		8/23/2010	
Temperature: 24.6 °C	Air Pressure: 1003 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.18 Peak output power test results at high frequency, 64QAM modulation, 7 MHz CBW

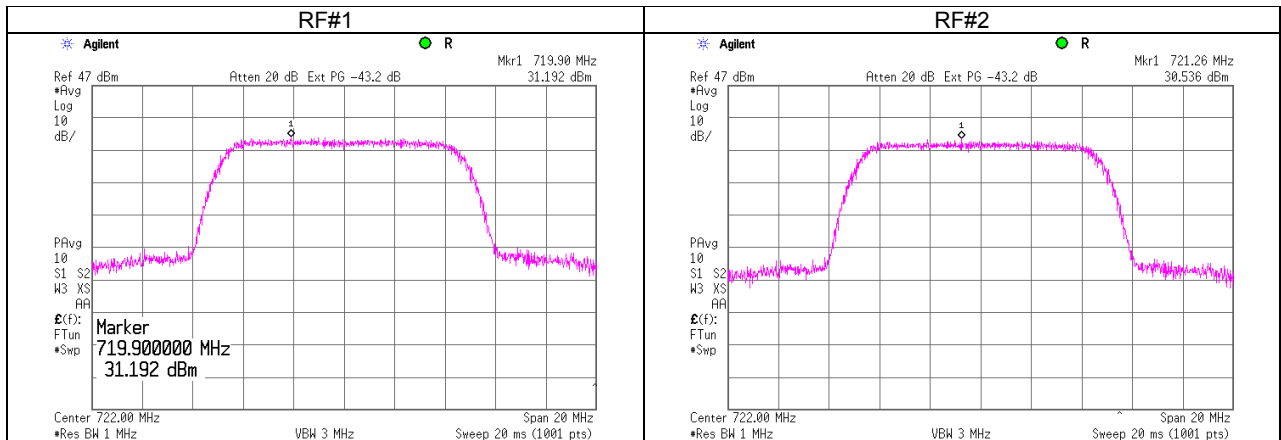


Test specification:	Section 27.50(c)(3), Peak output power at RF antenna connector		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date:	8/23/2010		
Temperature: 24.6 °C	Air Pressure: 1003 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.19 Peak output power test results at low frequency, QPSK modulation, 10 MHz CBW

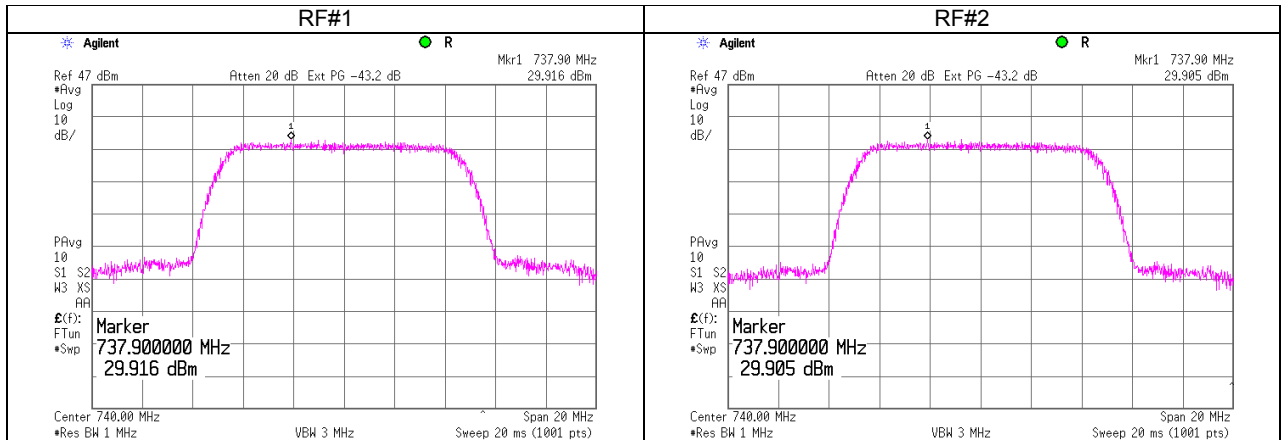


Plot 7.1.20 Peak output power test results at mid frequency, QPSK modulation, 10 MHz CBW



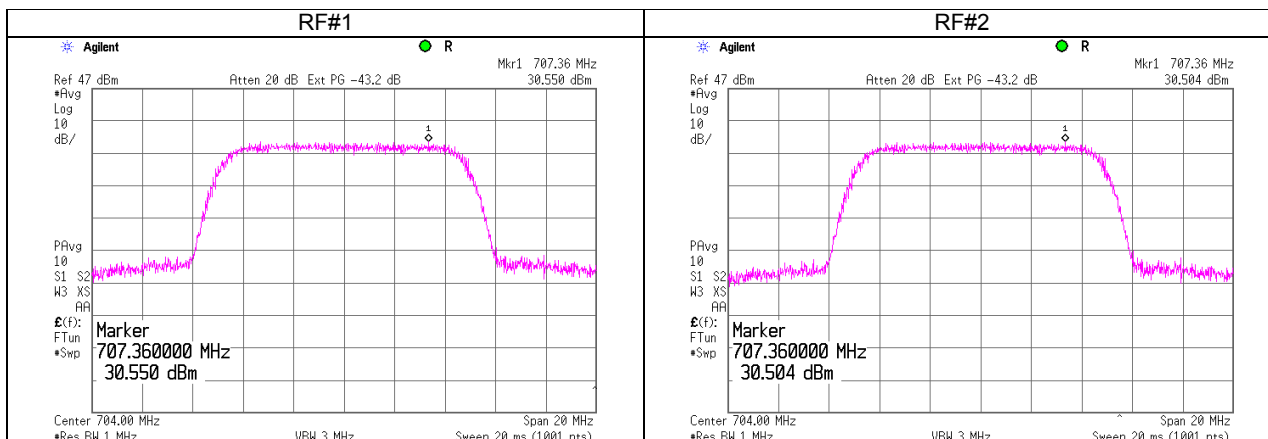
Test specification:		Section 27.50(c)(3), Peak output power at RF antenna connector	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:		Compliance	Verdict: PASS
Date:		8/23/2010	
Temperature: 24.6 °C	Air Pressure: 1003 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.21 Peak output power test results at high frequency, QPSK modulation, 10 MHz CBW

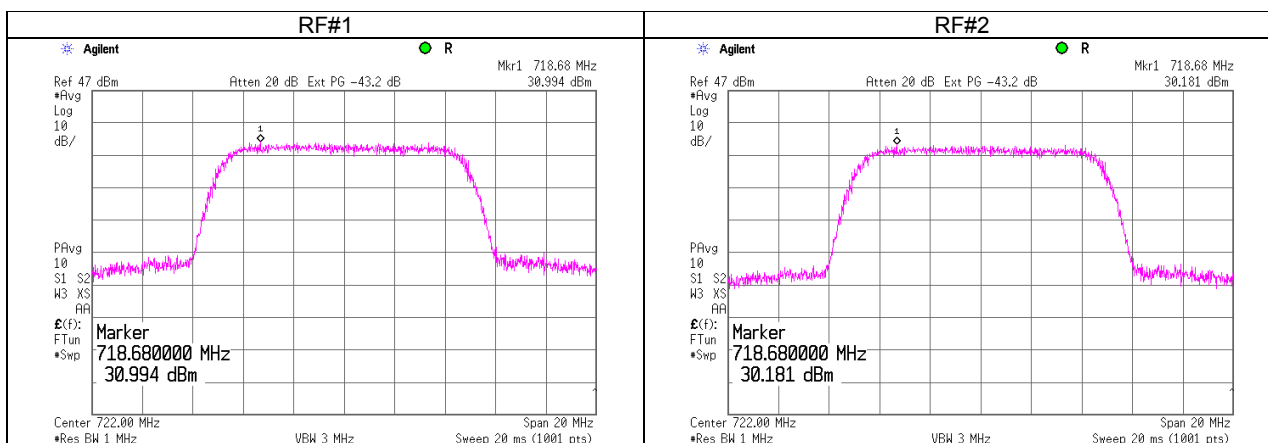


Test specification:	Section 27.50(c)(3), Peak output power at RF antenna connector		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict: PASS	
Date:	8/23/2010		
Temperature: 24.6 °C	Air Pressure: 1003 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.22 Peak output power test results at low frequency, 64QAM modulation, 10 MHz CBW

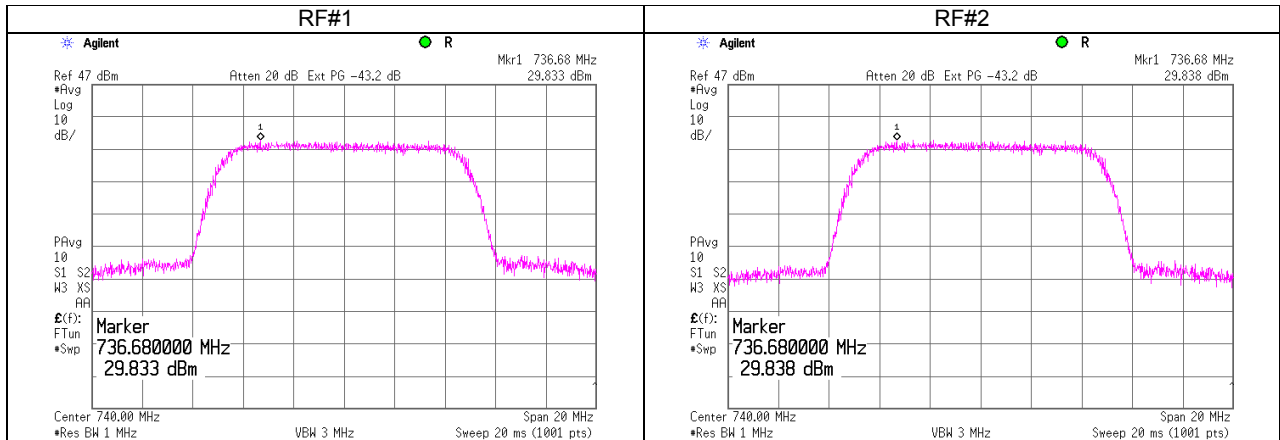


Plot 7.1.23 Peak output power test results at mid frequency, 64QAM modulation, 10 MHz CBW



Test specification:		Section 27.50(c)(3), Peak output power at RF antenna connector	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:		Compliance	Verdict: PASS
Date:		8/23/2010	
Temperature: 24.6 °C	Air Pressure: 1003 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.24 Peak output power test results at high frequency, 64QAM modulation, 10 MHz CBW



Test specification:		Section 2.1049, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:	Compliance	Verdict:	PASS
Date:	8/24/2010		
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
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	Maximum allowed bandwidth, kHz
698.0 – 746.0	NA

* - Modulation envelope reference points are provided in terms of attenuation below the total output power.

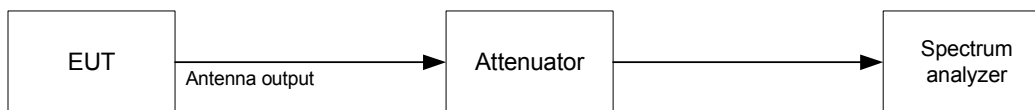
7.2.2 Test procedure

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 normally modulated carrier.

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

Figure 7.2.1 Occupied bandwidth test setup



Test specification:		Section 2.1049, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:	Compliance	Verdict:	PASS
Date:	8/24/2010		
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Table 7.2.2 Occupied bandwidth test results

DETECTOR USED: Peak hold
 RESOLUTION BANDWIDTH: 0.5 – 2 % of OBW
 VIDEO BANDWIDTH: 10 times RBW
 MODULATION ENVELOPE REFERENCE POINTS: 26 dBc and 99% power
 MODULATION: OFDM (QPSK – 64QAM)
 MODULATING SIGNAL: PRBS

Channel bandwidth, MHz	Modulation	Carrier frequency, MHz	Occupied bandwidth 99%, kHz	Occupied bandwidth 26 dBc, kHz
3.5	QPSK	700.0	3253.0	3400.0
		719.0	3246.5	3239.3
		744.0	3249.0	3246.7
3.5	64QAM	700.0	3246.0	3400.0
		719.0	3400.0	3399.0
		744.0	3405.0	3405.0
5.0	QPSK	701.0	4546.2	4744.0
		719.0	4549.3	4752.0
		743.0	4545.9	4745.0
5.0	64QAM	701.0	4543.0	4744.0
		719.0	4546.4	4744.0
		743.0	4543.9	4745.0
7.0	QPSK	702.0	6482.3	6743.0
		720.0	6480.6	6738.0
		772.0	6473.6	6739.0
7.0	64QAM	702.0	6480.7	6738.0
		720.0	6480.7	6738.0
		772.0	6484.7	6744.0
10.0	QPSK	704.0	9077.2	9429.0
		722.0	9086.0	9414.0
		740.0	9076.4	9412.0
10.0	64QAM	704.0	9085.3	9423.0
		722.0	9077.6	9403.0
		740.0	9085.5	9414.0

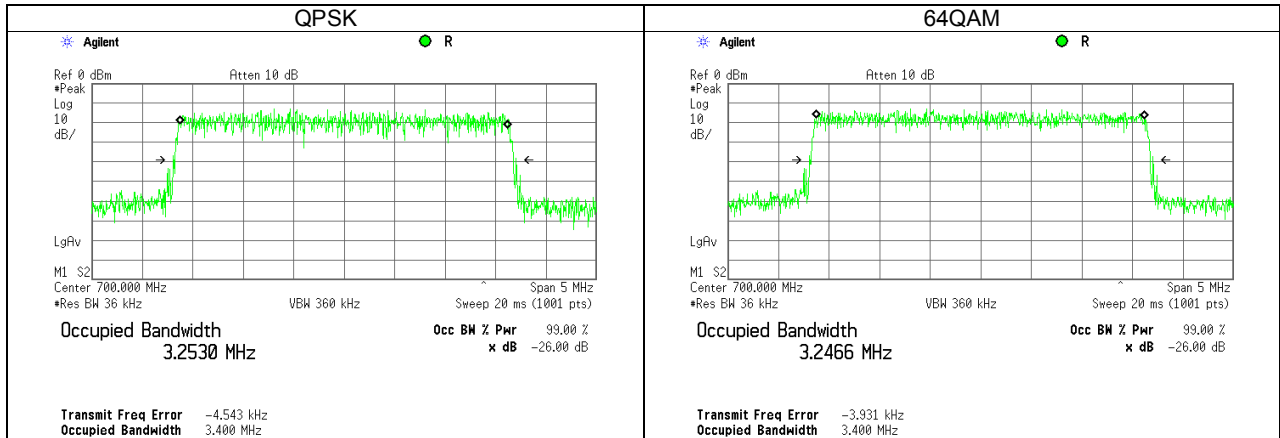
Reference numbers of test equipment used

HL 3472	HL 3761	HL 3781	HL 3818				
---------	---------	---------	---------	--	--	--	--

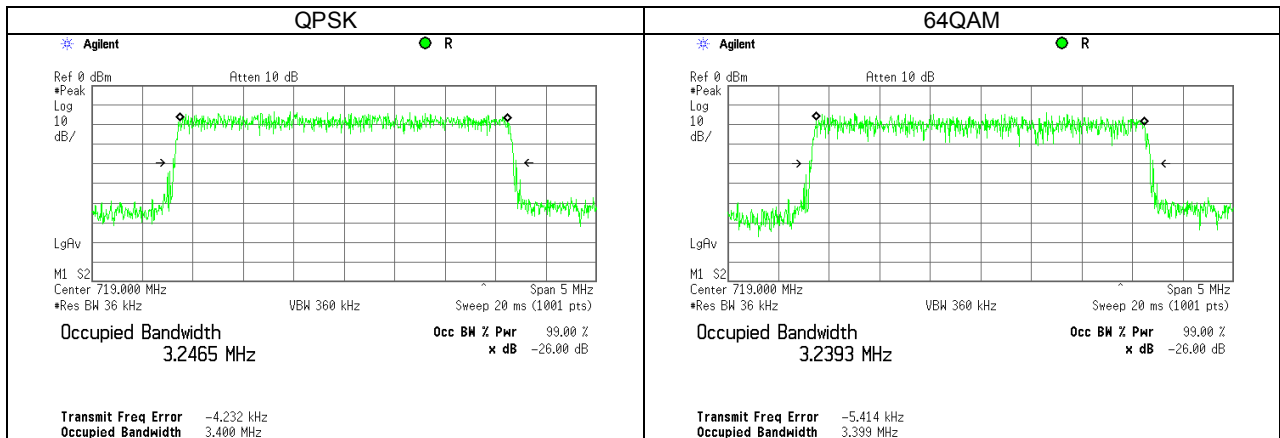
Full description is given in Appendix A.

Test specification: Section 2.1049, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance		Verdict: PASS	
Date: 8/24/2010			
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.1 Occupied bandwidth test result at low frequency, 3.5 MHz CBW

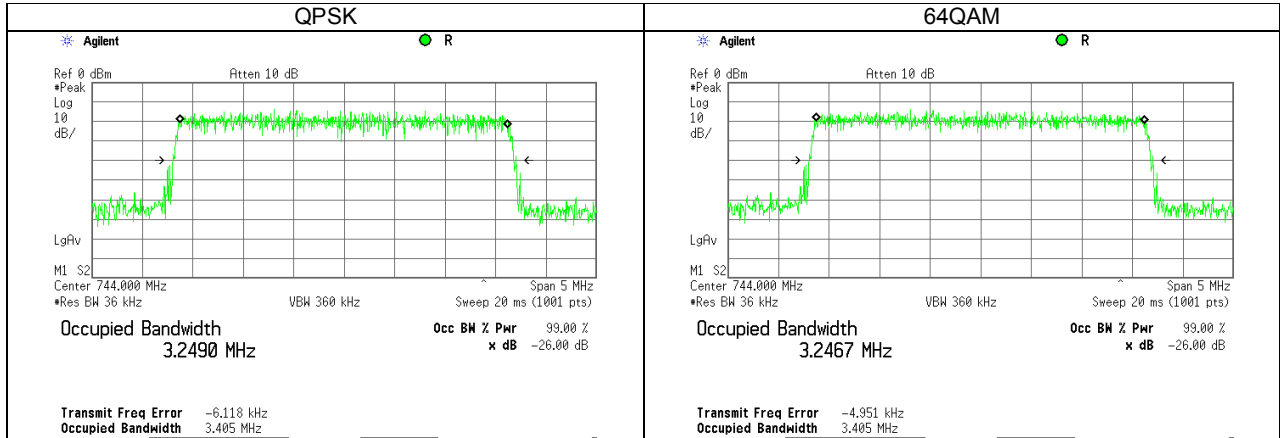


Plot 7.2.2 Occupied bandwidth test result at mid frequency, 3.5 MHz CBW



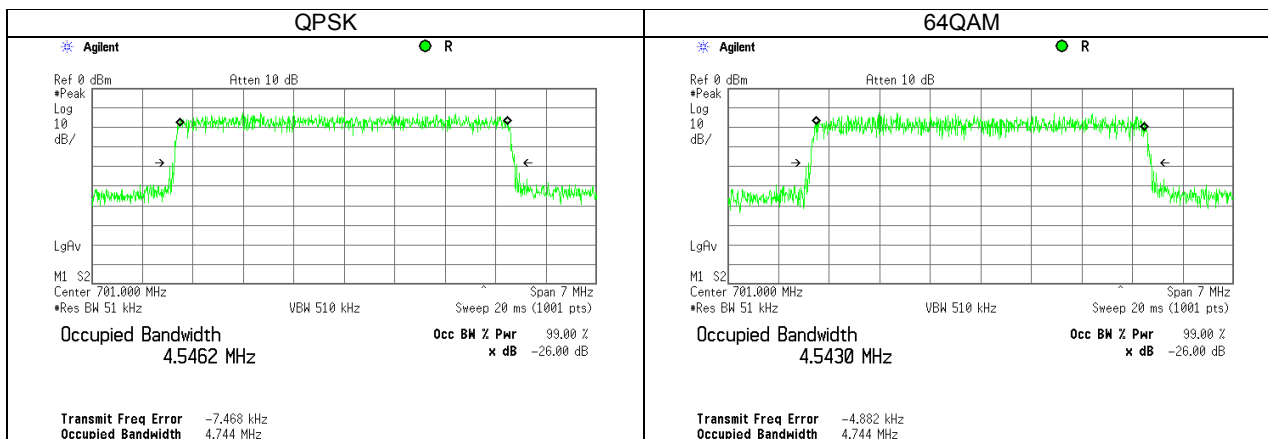
Test specification: Section 2.1049, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance		Verdict: PASS	
Date: 8/24/2010			
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.3 Occupied bandwidth test result at high frequency, 3.5 MHz CBW

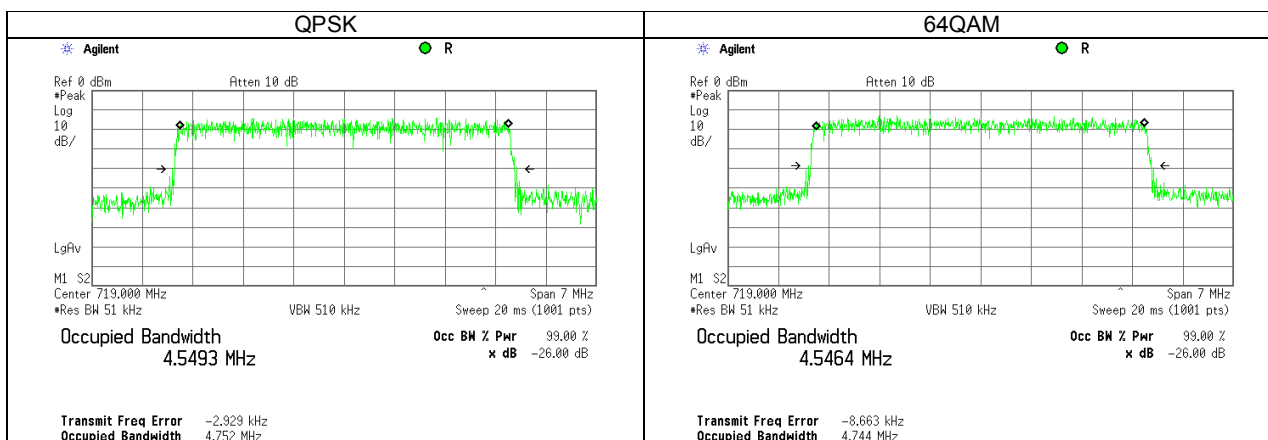


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict: PASS	
Date:	8/24/2010		
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.4 Occupied bandwidth test result at low frequency, 5 MHz CBW

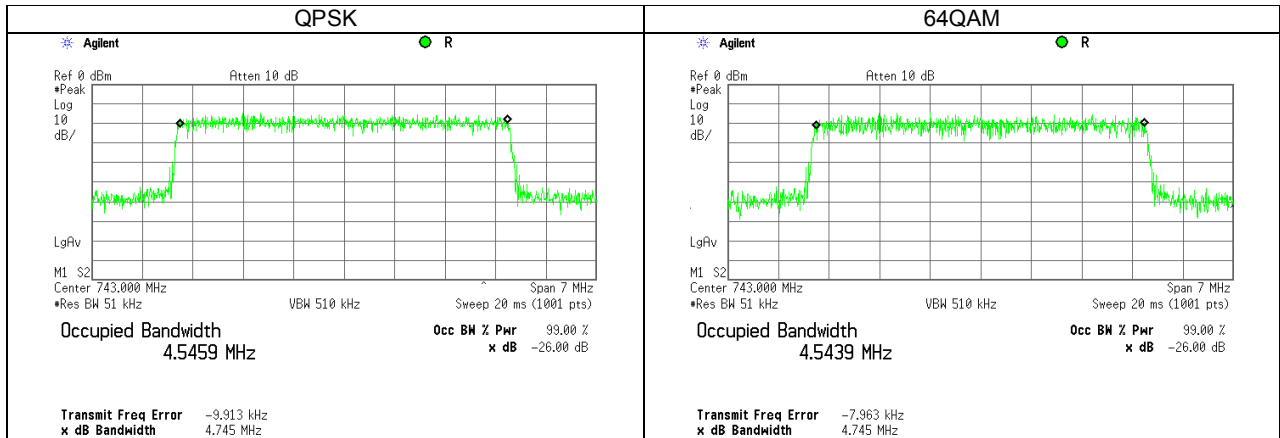


Plot 7.2.5 Occupied bandwidth test result at mid frequency, 5 MHz CBW



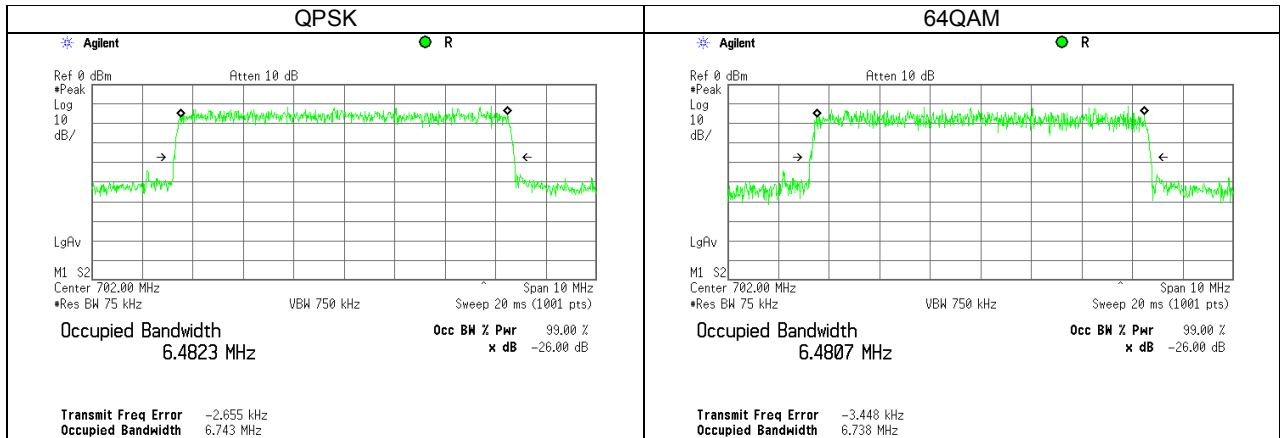
Test specification:		Section 2.1049, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date:		8/24/2010	
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.6 Occupied bandwidth test result at high frequency, 5 MHz CBW

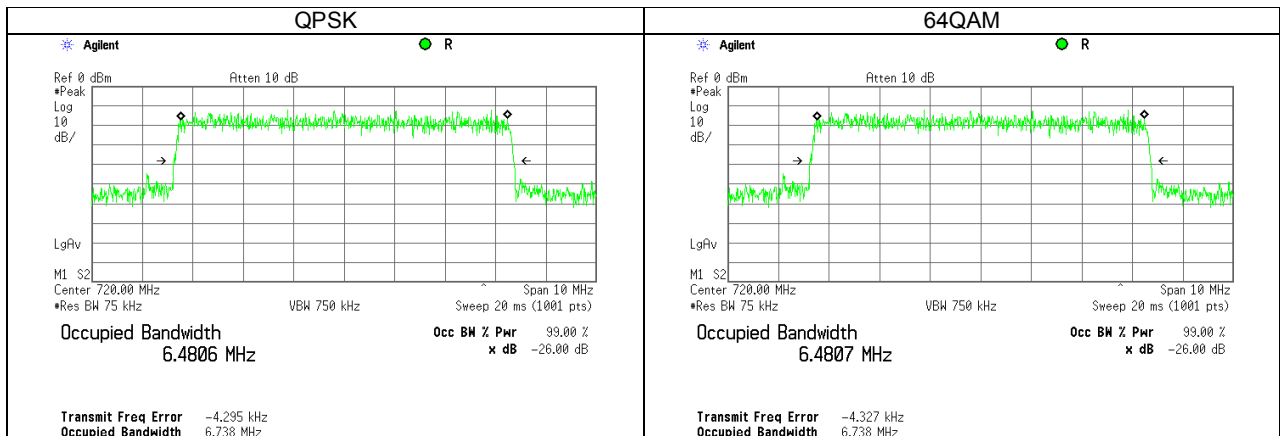


Test specification: Section 2.1049, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance		Verdict: PASS	
Date: 8/24/2010			
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.7 Occupied bandwidth test result at low frequency, 7 MHz CBW

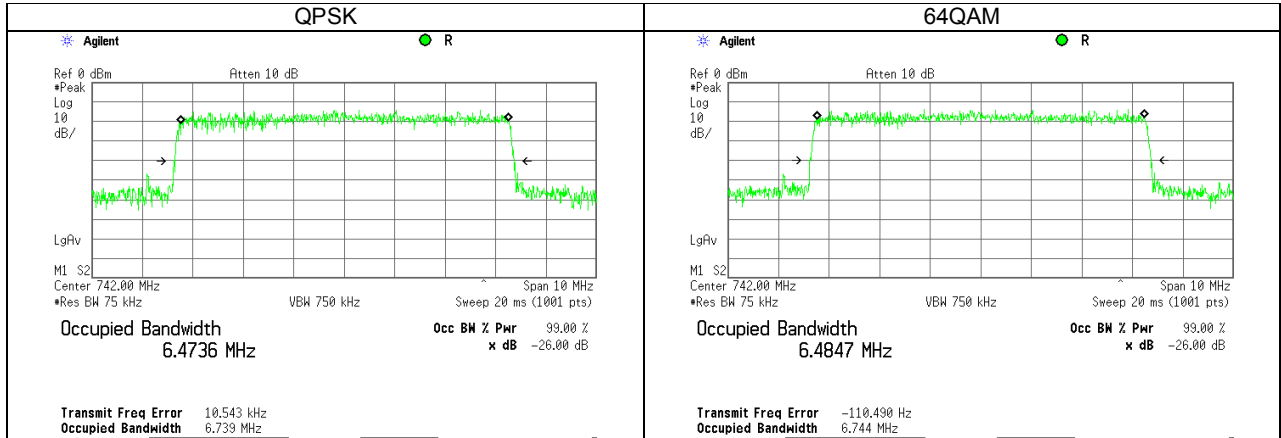


Plot 7.2.8 Occupied bandwidth test result at mid frequency, 7 MHz CBW



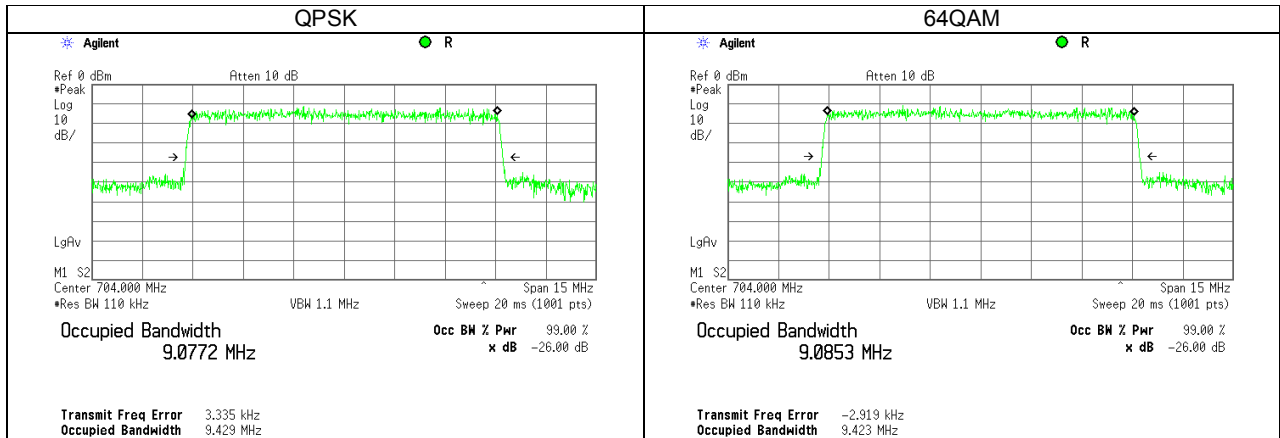
Test specification:		Section 2.1049, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date:		8/24/2010	
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.9 Occupied bandwidth test result at high frequency, 7 MHz CBW

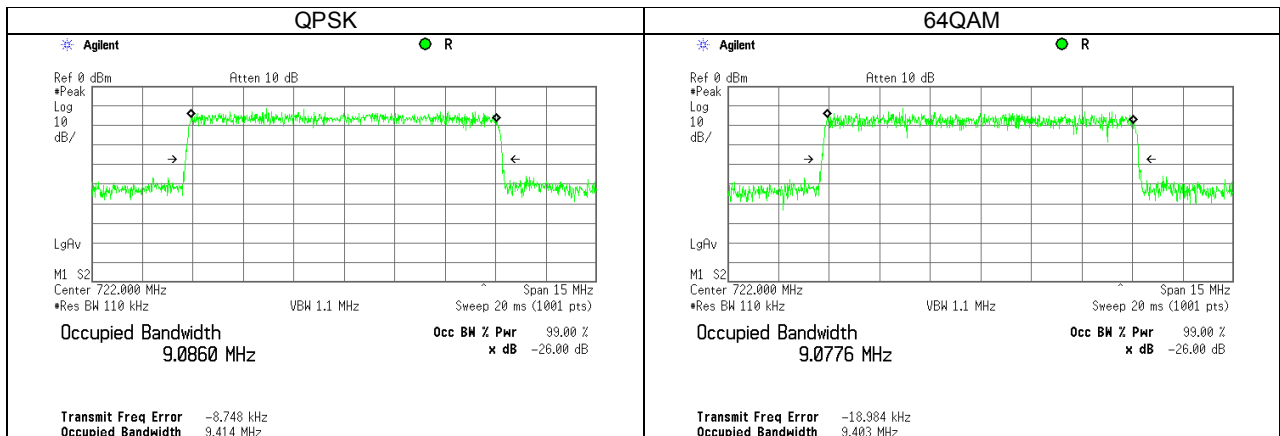


Test specification: Section 2.1049, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance		Verdict: PASS	
Date: 8/24/2010			
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.10 Occupied bandwidth test result at low frequency, 10 MHz CBW

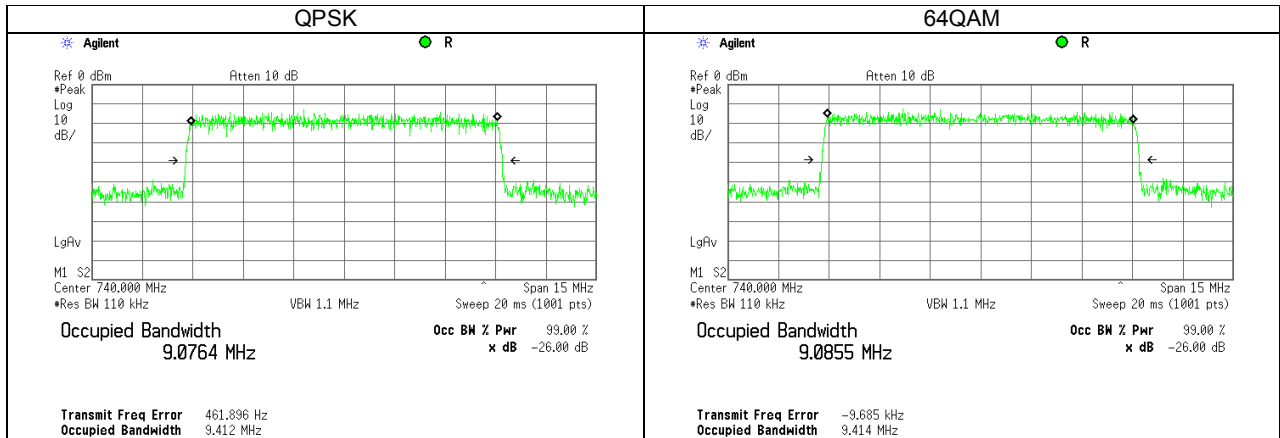


Plot 7.2.11 Occupied bandwidth test result at mid frequency, 10 MHz CBW



Test specification:		Section 2.1049, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date:		8/24/2010	
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.12 Occupied bandwidth test result at high frequency, 10 MHz CBW



Test specification:		Section 27.53(g), Band edge emissions	
Test procedure:		47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13	
Test mode:	Compliance	Verdict: PASS	
Date:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

7.3 Emission mask (band edge emissions) test

7.3.1 General

This test was performed to measure emission mask at RF antenna connector. Specification test limits are given in Table 7.3.1. The test results are provided in the associated plots.

Table 7.3.1 Emission mask limits

Investigated band, MHz	Attenuation below carrier, dBc	ERP of spurious, dBm	RBW, kHz
0.009 - 7500	43+10logP(W)	-13.0	100
100 kHz bands immediately outside and adjacent to a licensee's frequency block	43+10logP(W)	-13.0	30

OBW (MHz)	Investigated Band Edge	Attenuation below carrier, dBc
698.0 - 704.0 MHz Channel (Block A low)		
3.5	697.9 – 698.0 MHz	43+10logP(W) (RBW = 30 kHz)
	704.0 – 704.1 MHz	
5	697.9 – 698.0 MHz	
	704.0 – 704.1 MHz	
698.0 - 710.0 MHz Channel (Block A + Block B low)		
7	697.9 – 698.0 MHz	43+10logP(W) (RBW = 30 kHz)
	710.0 – 710.1 MHz	
10	697.9 – 698.0 MHz	
	710.0 – 710.1 MHz	
716.0 - 722.0 MHz Channel (Block D + Block E)		
3.5	715.9 – 716.0 MHz	43+10logP(W) (RBW = 30 kHz)
	722.0 – 722.1 MHz	
5	715.9 – 716.0 MHz	
	722.0 – 722.1 MHz	
716.0 - 728.0 MHz Channel (Block D + Block E)		
7	715.9 – 716.0 MHz	43+10logP(W) (RBW = 30 kHz)
	728.0 – 728.1 MHz	
10	715.9 – 716.0 MHz	
	728.0 – 728.1 MHz	
740.0 - 746.0 MHz Channel (Block C high)		
3.5	739.9 – 740.0 MHz	43+10logP(W) (RBW = 30 kHz)
	746.0 – 746.1 MHz	
5	739.9 – 740.0 MHz	
	746.0 – 746.1 MHz	
734.0 - 746.0 MHz Channel (Block B + Block C high)		
7	733.9 – 734.0 MHz	43+10logP(W) (RBW = 30 kHz)
	746.0 – 746.1 MHz	
10	733.9 – 734.0 MHz	
	746.0 – 746.1 MHz	

Test specification:		Section 27.53(g), Band edge emissions	
Test procedure:		47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13	
Test mode:	Compliance	Verdict:	PASS
Date:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

7.3.2 Test procedure

7.3.2.1 The EUT was set up as shown in Figure 7.3.1 or Figure 7.3.2, energized and its proper operation was checked.

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

7.3.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.3.2, Table 7.3.3 and the associated plots.

Figure 7.3.1 Spurious emission test setup for single output

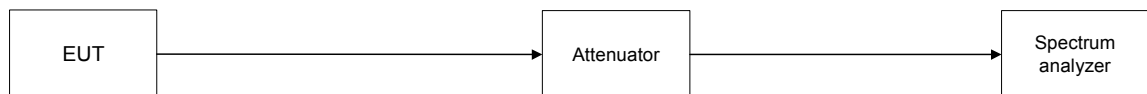
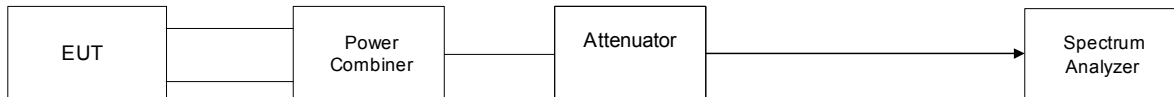


Figure 7.3.2 Spurious emission test setup for combined outputs



Test specification:	Section 27.53(g), Band edge emissions			
Test procedure:	47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13			
Test mode:	Compliance	Verdict:		PASS
Date:	8/25/2010			
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC	
Remarks: Band edges				

Table 7.3.2 Spurious emission at band edges test results (combined)

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 7500 MHz
 DETECTOR USED: Average
 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
QPSK, 3.5 MHz CBW, 700.0 MHz								
696.35	-15.01	Included	Included	100	-15.01	-13.00	-2.01	Pass
703.60	-14.81	Included	Included	100	-14.81	-13.00	-1.84	Pass
64QAM, 3.5 MHz CBW, 719.0 MHz								
714.80	-14.63	Included	Included	100	-14.63	-13.00	-1.63	Pass
722.65	-17.92	Included	Included	100	-17.92	-13.00	-4.92	Pass
64QAM, 3.5 MHz CBW, 744.0 MHz								
740.00	-14.71	Included	Included	100	-14.71	-13.00	-1.71	Pass
747.55	-18.97	Included	Included	100	-18.97	-13.00	-5.97	Pass
QPSK, 5.0 MHz CBW, 701.0 MHz								
696.25	-19.38	Included	Included	100	-19.38	-13.00	-6.38	Pass
705.85	-17.32	Included	Included	100	-17.32	-13.00	-4.32	Pass
QPSK, 5.0 MHz CBW, 719.0 MHz								
714.25	-19.02	Included	Included	100	-19.02	-13.00	-6.02	Pass
723.85	-17.04	Included	Included	100	-17.04	-13.00	-4.04	Pass
QPSK, 5.0 MHz CBW, 743.0 MHz								
747.85	-20.18	Included	Included	100	-20.18	-13.00	-7.18	Pass
64QAM, 5.0 MHz CBW, 743.0 MHz								
738.75	-20.89	Included	Included	100	-20.89	-13.00	-7.89	Pass
64QAM, 7.0 MHz CBW, 702.0 MHz								
696.05	-15.75	Included	Included	100	-15.75	-13.00	-2.75	Pass
708.45	-13.98	Included	Included	100	-13.98	-13.00	-0.98	Pass
64QAM, 7.0 MHz CBW, 720.0 MHz								
714.05	-18.30	Included	Included	100	-18.30	-13.00	-5.30	Pass
726.45	-14.78	Included	Included	100	-14.78	-13.00	-1.78	Pass
64QAM, 7.0 MHz CBW, 742.0 MHz								
736.05	-16.23	Included	Included	100	-16.23	-13.00	-3.23	Pass
748.45	-15.83	Included	Included	100	-15.83	-13.00	-2.83	Pass
64QAM, 10.0 MHz CBW, 704.0 MHz								
693.85	-18.68	Included	Included	100	-18.68	-13.00	-5.68	Pass
712.70	-21.16	Included	Included	100	-21.16	-13.00	-8.16	Pass
64QAM, 10.0 MHz CBW, 722.0 MHz								
712.70	-18.62	Included	Included	100	-18.62	-13.00	-5.62	Pass
QPSK, 10.0 MHz CBW, 722.0 MHz								
732.55	-21.23	Included	Included	100	-21.23	-13.00	-8.23	Pass
64QAM, 10.0 MHz CBW, 740.0 MHz								
730.70	-16.12	Included	Included	100	-16.12	-13.00	-3.12	Pass
QPSK, 10.0 MHz CBW, 740.0 MHz								
750.55	-23.19	Included	Included	100	-23.19	-13.00	-10.19	Pass

Test specification:	Section 27.53(g), Band edge emissions			
Test procedure:	47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13			
Test mode:	Compliance	Verdict:		PASS
Date:	8/25/2010			
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC	
Remarks: Band edges				

Table 7.3.3 Spurious emission at band edges test results (single output)

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 7500 MHz
 DETECTOR USED: Average
 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
64QAM, 3.5 MHz CBW, 700.0 MHz								
697.48	-14.55	Included	Included	100	-14.55	-13.00	-1.55	Pass
702.80	-16.68	Included	Included	100	-16.68	-13.00	-3.68	Pass
QPSK, 3.5 MHz CBW, 719.0 MHz								
716.78	-14.72	Included	Included	100	-14.72	-13.00	-1.72	Pass
721.40	-15.44	Included	Included	100	-15.44	-13.00	-2.44	Pass
QPSK, 3.5 MHz CBW, 744.0 MHz								
741.24	-14.35	Included	Included	100	-14.35	-13.00	-1.35	Pass
747.52	-18.08	Included	Included	100	-18.08	-13.00	-5.08	Pass
QPSK, 5.0 MHz CBW, 701.0 MHz								
697.80	-16.30	Included	Included	100	-16.30	-13.00	-3.30	Pass
705.44	-16.16	Included	Included	100	-16.16	-13.00	-3.16	Pass
QPSK, 5.0 MHz CBW, 719.0 MHz								
723.48	-18.50	Included	Included	100	-18.50	-13.00	-5.40	Pass
64QAM, 5.0 MHz CBW, 719.0 MHz								
715.78	-14.54	Included	Included	100	-14.54	-13.00	-1.54	Pass
QPSK, 5.0 MHz CBW, 743.0 MHz								
746.68	-19.66	Included	Included	100	-19.68	-13.00	-6.68	Pass
64QAM, 5.0 MHz CBW, 743.0 MHz								
740.00	-20.46	Included	Included	100	-20.46	-13.00	-7.46	Pass
64QAM, 7.0 MHz CBW, 702.0 MHz								
696.78	-15.27	Included	Included	100	-15.27	-13.00	-2.27	Pass
706.66	-13.68	Included	Included	100	-13.68	-13.00	-0.68	Pass
64QAM, 7.0 MHz CBW, 720.0 MHz								
714.78	-16.37	Included	Included	100	-16.37	-13.00	-3.37	Pass
724.66	-14.70	Included	Included	100	-14.70	-13.00	-1.70	Pass
64QAM, 7.0 MHz CBW, 742.0 MHz								
738.00	-20.58	Included	Included	100	-20.58	-13.00	-7.58	Pass
746.00	-22.19	Included	Included	100	-22.19	-13.00	-9.19	Pass
QPSK, 10.0 MHz CBW, 704.0 MHz								
710.00	-20.38	Included	Included	100	-20.38	-13.00	-7.38	Pass
64QAM, 10.0 MHz CBW, 704.0 MHz								
698.02	-25.16	Included	Included	100	-25.16	-13.00	-12.16	Pass
QPSK, 10.0 MHz CBW, 722.0 MHz								
716.02	-21.98	Included	Included	100	-21.98	-13.00	-8.98	Pass
728.00	-22.81	Included	Included	100	-22.81	-13.00	-9.81	Pass
QPSK, 10.0 MHz CBW, 740.0 MHz								
734.02	-21.55	Included	Included	100	-21.55	-13.00	-8.55	Pass
746.00	-24.22	Included	Included	100	-24.22	-13.00	-11.22	Pass

*- Margin = Spurious emission – specification limit.

Reference numbers of test equipment used

HL 2013	HL 2015	HL 3472	HL 3473	HL 3474	HL 3761	HL 3781	HL 3818
---------	---------	---------	---------	---------	---------	---------	---------

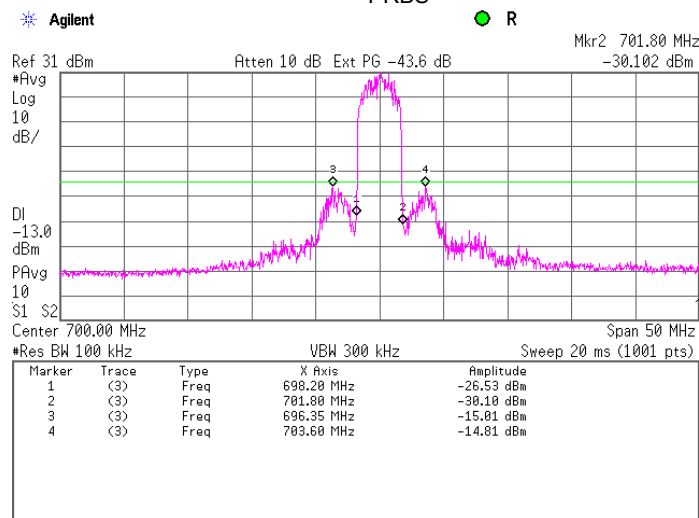
Full description is given in Appendix A.

Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.1 Emission mask test results at low carrier frequency, 3.5 MHz CBW, combined outputs

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

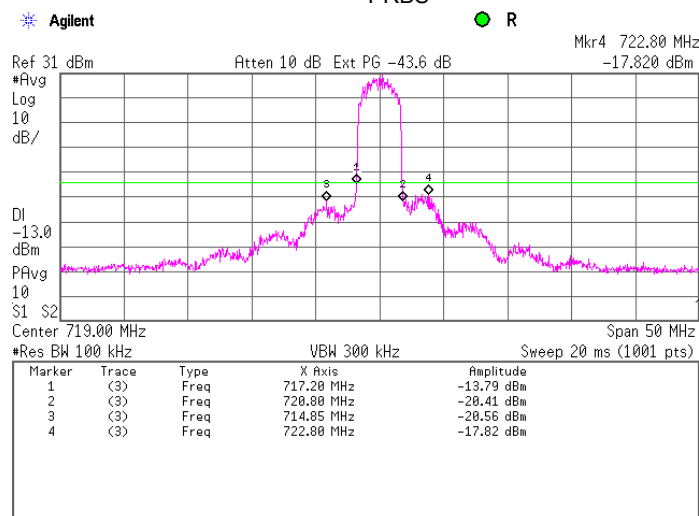
698.0 – 746.0 MHz
Average
QPSK
PRBS



Plot 7.3.2 Emission mask test results at mid carrier frequency, 3.5 MHz CBW, combined outputs

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

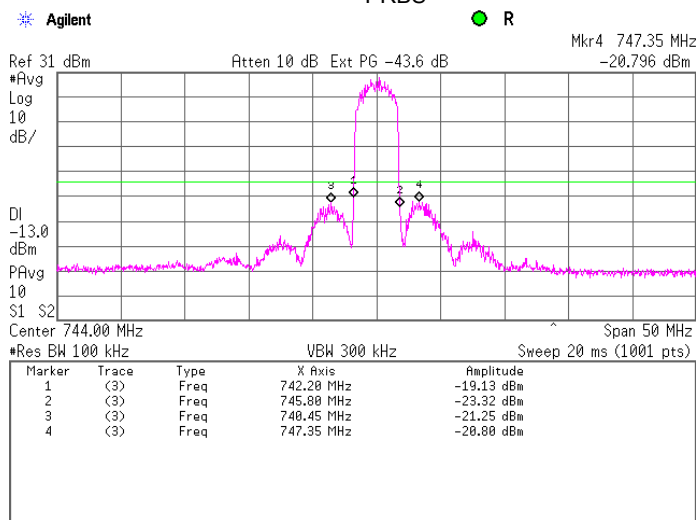
698.0 – 746.0 MHz
Average
QPSK
PRBS



Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.3 Emission mask test results at high carrier frequency, 3.5 MHz CBW, combined outputs

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS

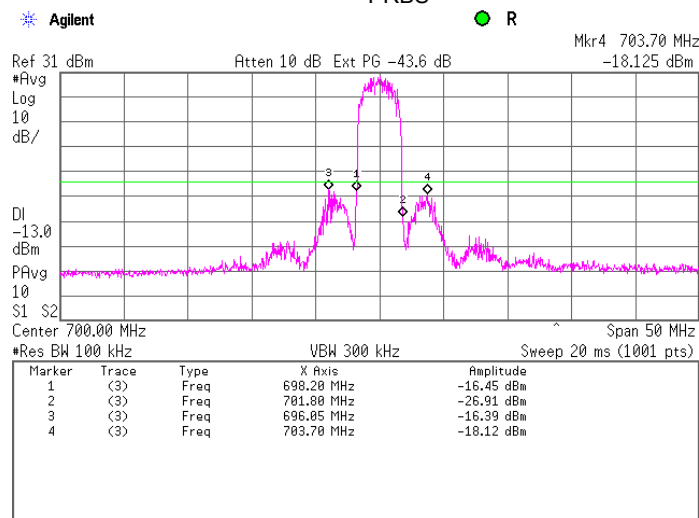


Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.4 Emission mask test results at low carrier frequency, 3.5 MHz CBW, combined outputs

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

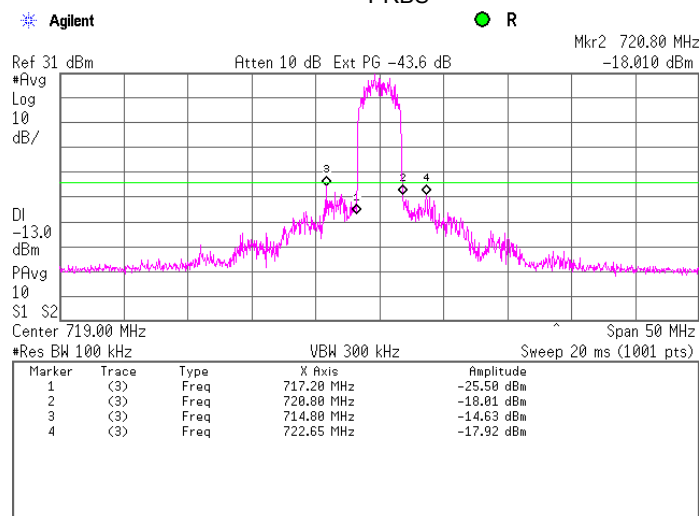
698.0 – 746.0 MHz
Average
64QAM
PRBS



Plot 7.3.5 Emission mask test results at mid carrier frequency, 3.5 MHz CBW, combined outputs

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

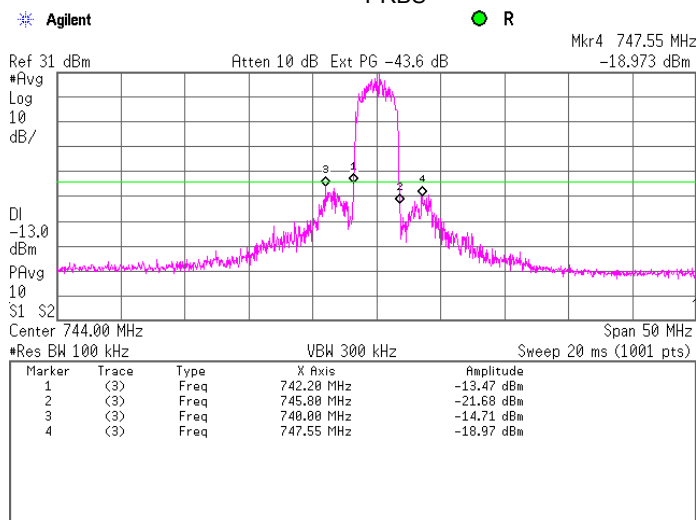
698.0 – 746.0 MHz
Average
64QAM
PRBS



Test specification:		Section 27.53(g), Band edge emissions	
Test procedure:		47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		8/25/2010	
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.6 Emission mask test results at high carrier frequency, 3.5 MHz CBW, combined outputs

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS

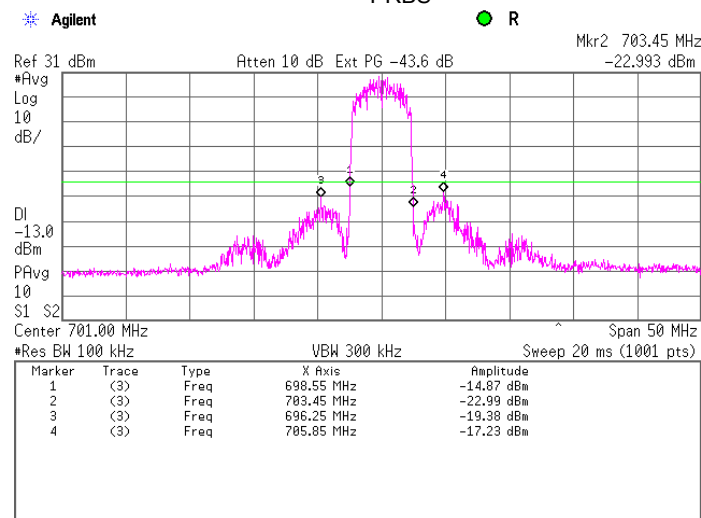


Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.7 Emission mask test results at low carrier frequency, 5 MHz CBW, combined outputs

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

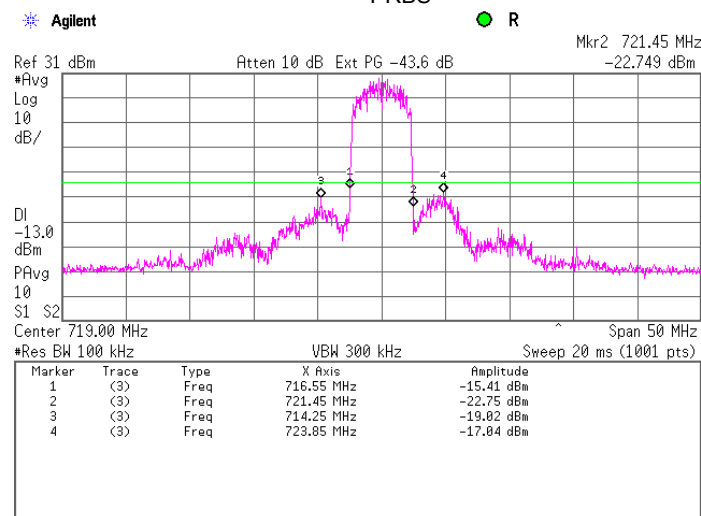
698.0 – 746.0 MHz
Average
QPSK
PRBS



Plot 7.3.8 Emission mask test results at mid carrier frequency, 5 MHz CBW, combined outputs

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

698.0 – 746.0 MHz
Average
QPSK
PRBS

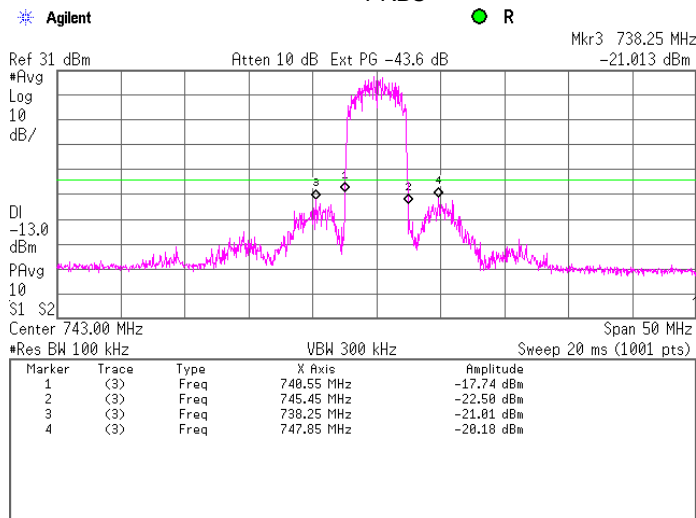


Test specification:		Section 27.53(g), Band edge emissions	
Test procedure:		47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		8/25/2010	
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.9 Emission mask test results at high carrier frequency, 5 MHz CBW, combined outputs

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

698.0 – 746.0 MHz
Average
QPSK
PRBS

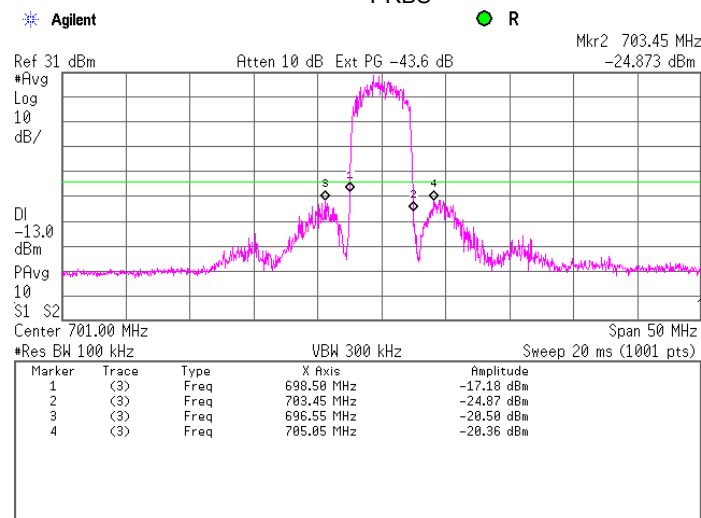


Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.10 Emission mask test results at low carrier frequency, 5 MHz CBW, combined outputs

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

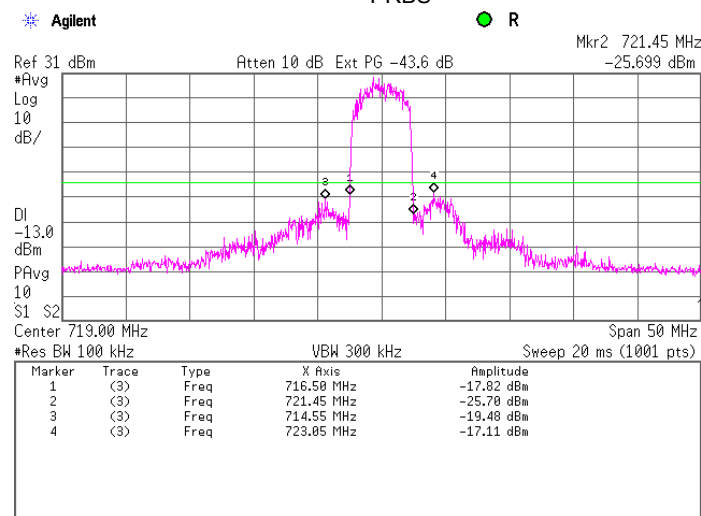
698.0 – 746.0 MHz
Average
64QAM
PRBS



Plot 7.3.11 Emission mask test results at mid carrier frequency, 5 MHz CBW, combined outputs

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

698.0 – 746.0 MHz
Average
64QAM
PRBS



Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.12 Emission mask test results at high carrier frequency, 5 MHz CBW, combined outputs

ASSIGNED FREQUENCY RANGE:

698.0 – 746.0 MHz

DETECTOR USED:

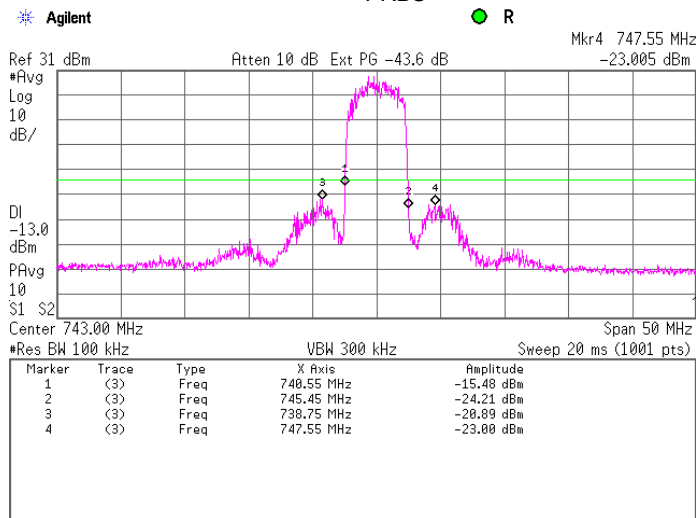
Average

MODULATION:

64QAM

MODULATING SIGNAL:

PRBS

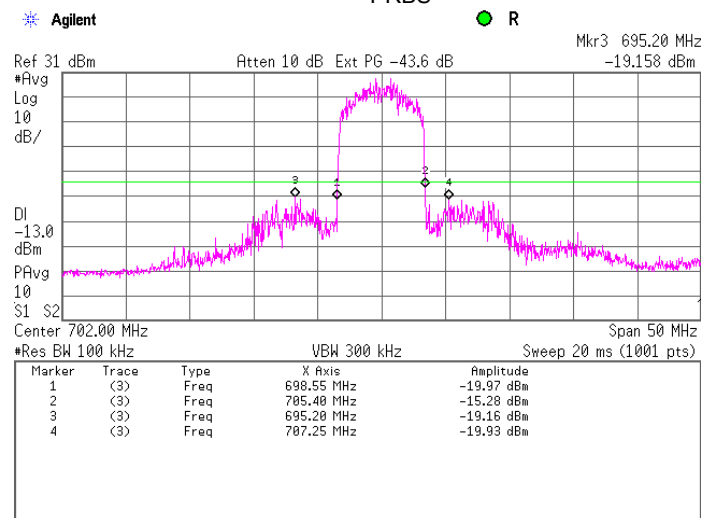


Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.13 Emission mask test results at low carrier frequency, 7 MHz CBW, combined outputs

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

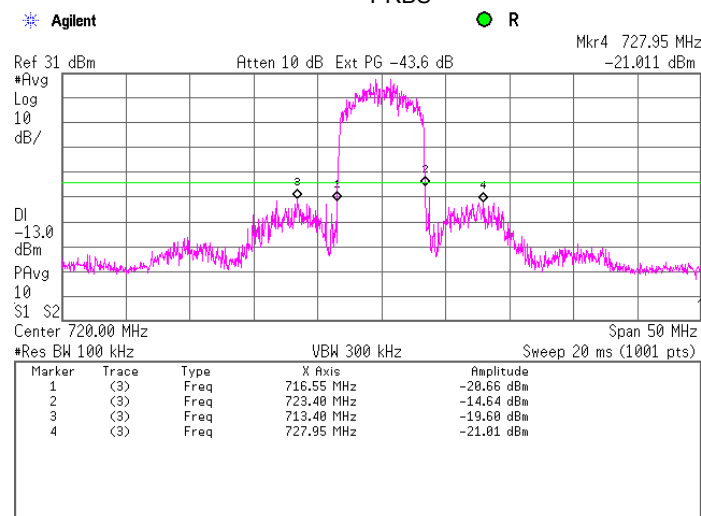
698.0 – 746.0 MHz
Average
QPSK
PRBS



Plot 7.3.14 Emission mask test results at mid carrier frequency, 7 MHz CBW, combined outputs

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

698.0 – 746.0 MHz
Average
QPSK
PRBS

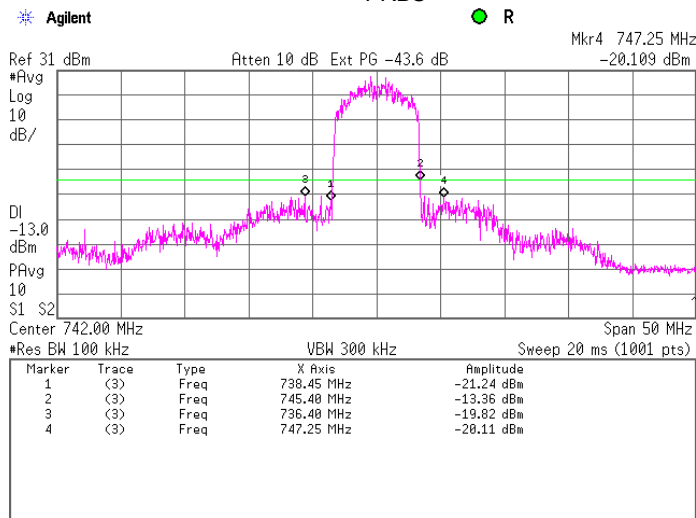


Test specification:		Section 27.53(g), Band edge emissions	
Test procedure:		47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		8/25/2010	
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.15 Emission mask test results at high carrier frequency, 7 MHz CBW, combined outputs

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

698.0 – 746.0 MHz
Average
QPSK
PRBS

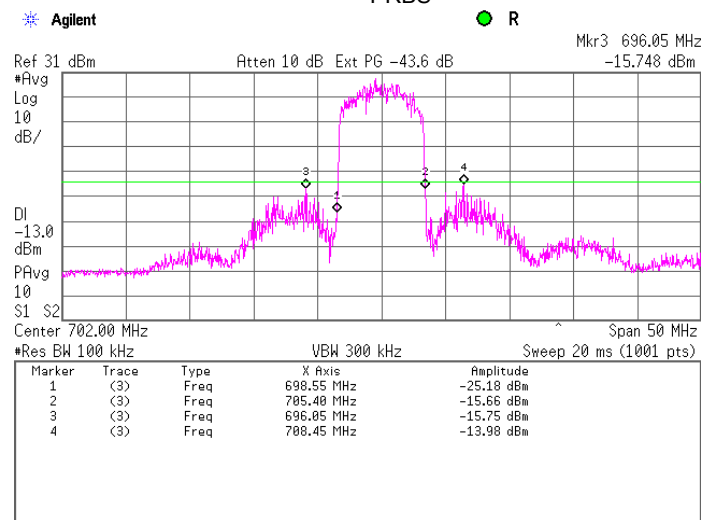


Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.16 Emission mask test results at low carrier frequency, 7 MHz CBW, combined outputs

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

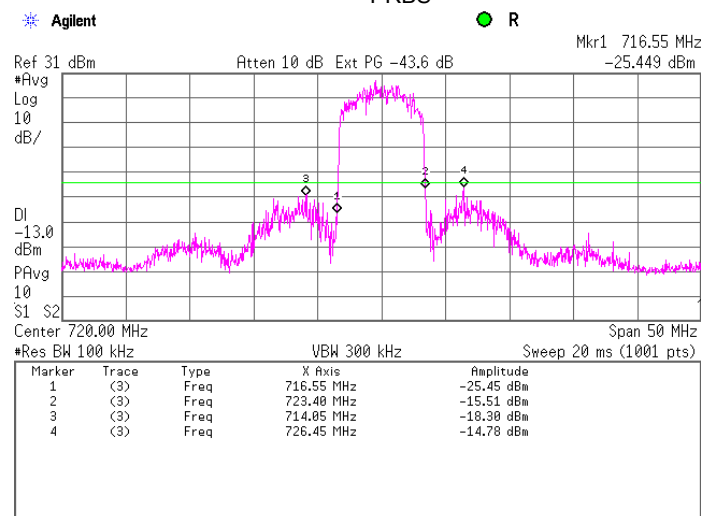
698.0 – 746.0 MHz
Average
64QAM
PRBS



Plot 7.3.17 Emission mask test results at mid carrier frequency, 7 MHz CBW, combined outputs

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

698.0 – 746.0 MHz
Average
64QAM
PRBS

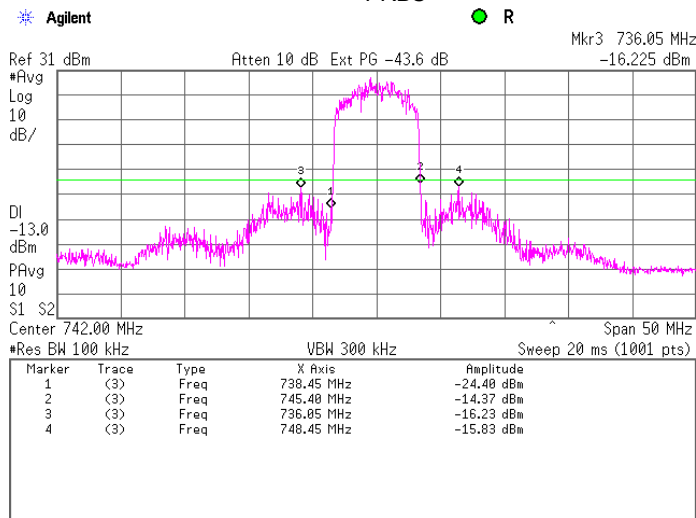


Test specification:		Section 27.53(g), Band edge emissions	
Test procedure:		47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		8/25/2010	
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.18 Emission mask test results at high carrier frequency, 7 MHz CBW, combined outputs

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

698.0 – 746.0 MHz
Average
64QAM
PRBS

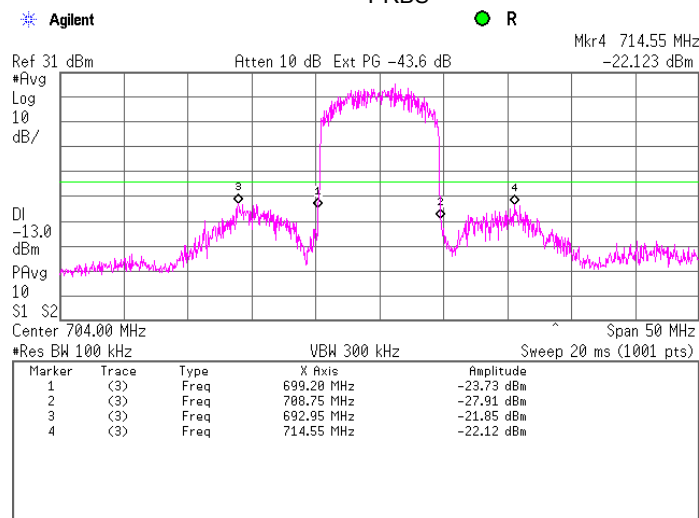


Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.19 Emission mask test results at low carrier frequency, 10 MHz CBW, combined outputs

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

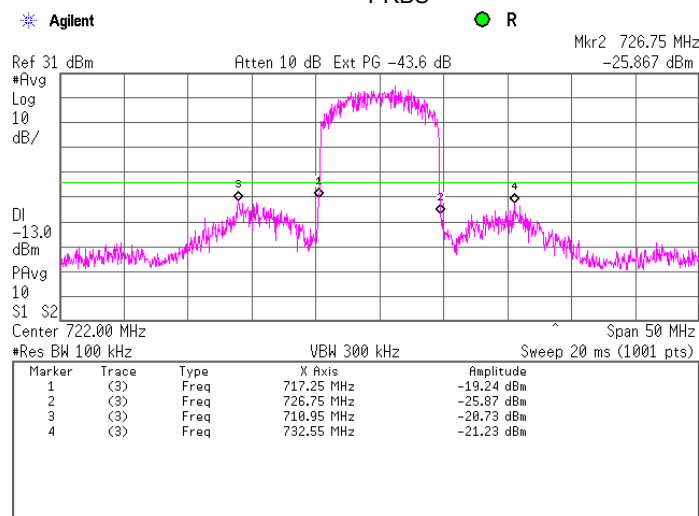
698.0 – 746.0 MHz
Average
QPSK
PRBS



Plot 7.3.20 Emission mask test results at mid carrier frequency, 10 MHz CBW, combined outputs

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

698.0 – 746.0 MHz
Average
QPSK
PRBS

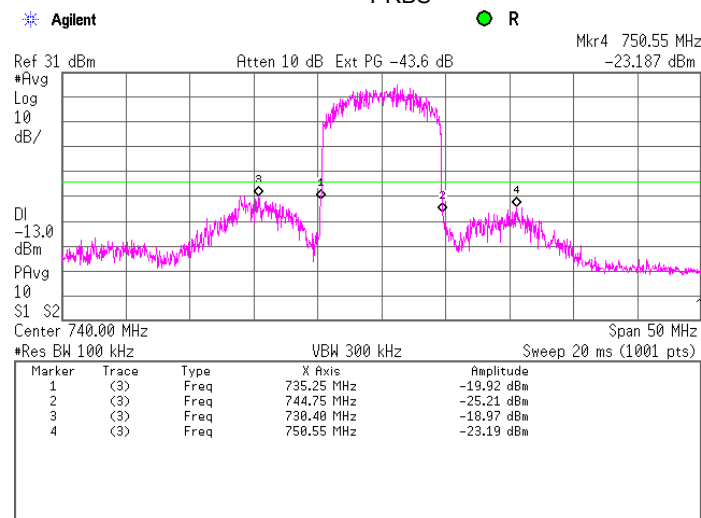


Test specification:		Section 27.53(g), Band edge emissions	
Test procedure:		47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		8/25/2010	
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.21 Emission mask test results at high carrier frequency, 10 MHz CBW, combined outputs

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

698.0 – 746.0 MHz
Average
QPSK
PRBS

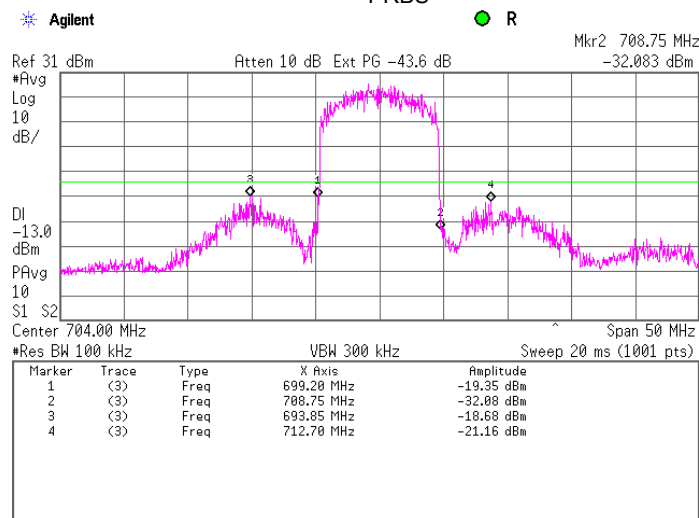


Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.22 Emission mask test results at low carrier frequency, 10 MHz CBW, combined outputs

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

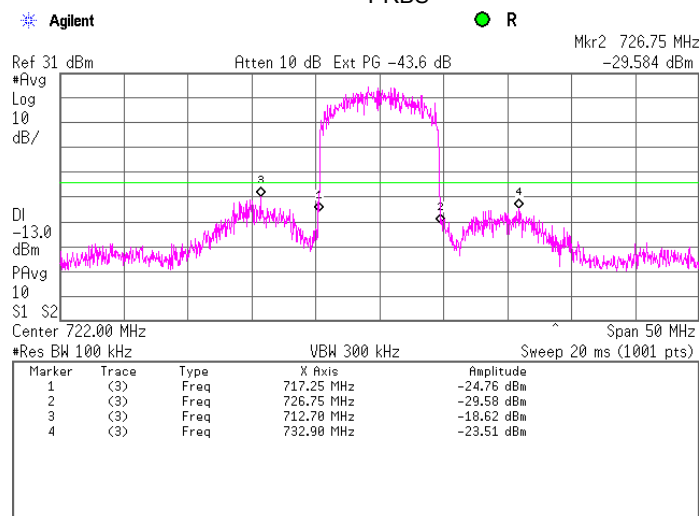
698.0 – 746.0 MHz
Average
64QAM
PRBS



Plot 7.3.23 Emission mask test results at mid carrier frequency, 10 MHz CBW, combined outputs

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

698.0 – 746.0 MHz
Average
64QAM
PRBS

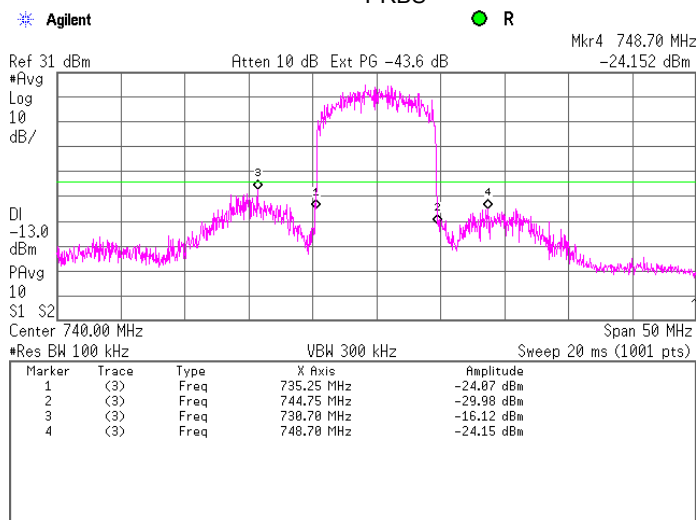


Test specification:		Section 27.53(g), Band edge emissions	
Test procedure:		47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		8/25/2010	
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.24 Emission mask test results at high carrier frequency, 10 MHz CBW, combined outputs

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

698.0 – 746.0 MHz
Average
64QAM
PRBS

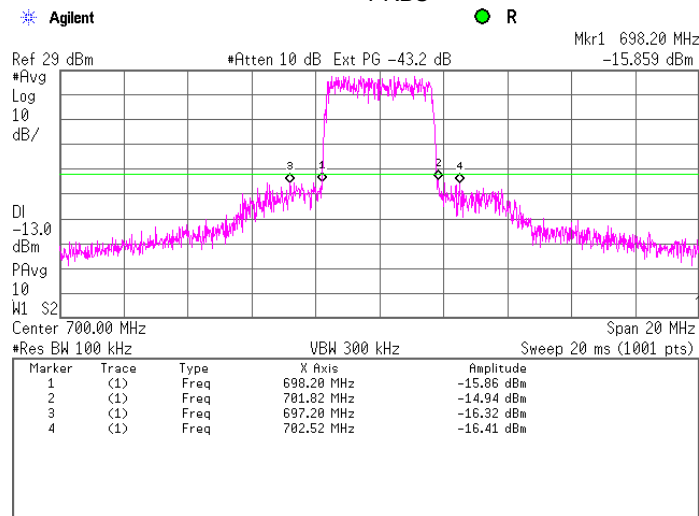


Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.25 Emission mask test results at low carrier frequency, 3.5 MHz CBW, single output

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

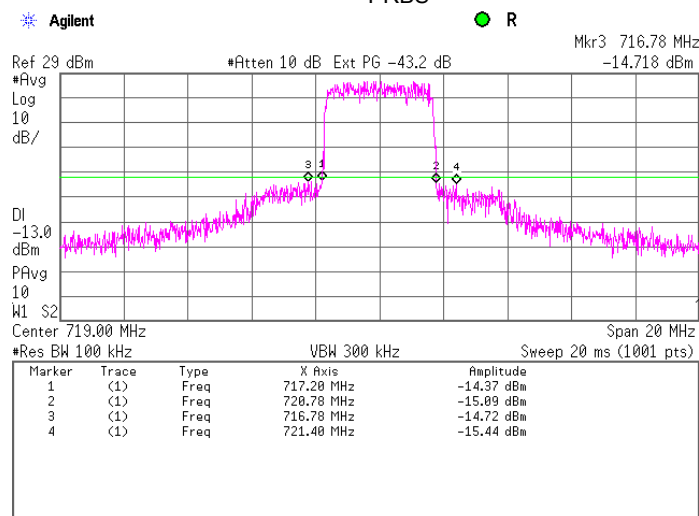
698.0 – 746.0 MHz
Average
QPSK
PRBS



Plot 7.3.26 Emission mask test results at mid carrier frequency, 3.5 MHz CBW, single output

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

698.0 – 746.0 MHz
Average
QPSK
PRBS

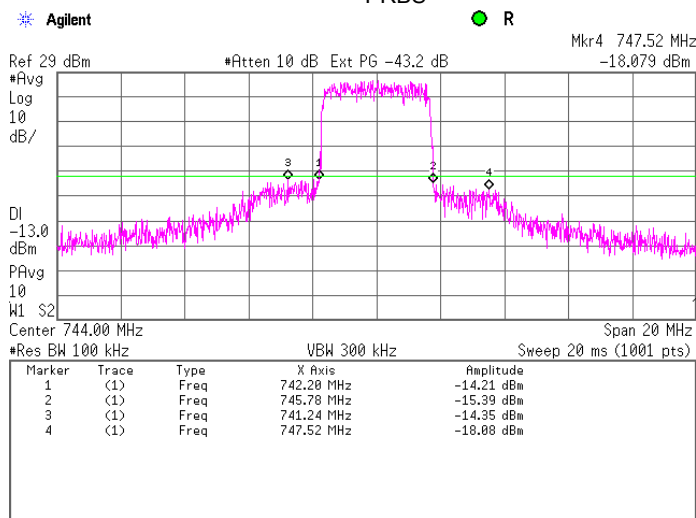


Test specification:		Section 27.53(g), Band edge emissions	
Test procedure:		47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		8/25/2010	
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.27 Emission mask test results at high carrier frequency, 3.5 MHz CBW, single output

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

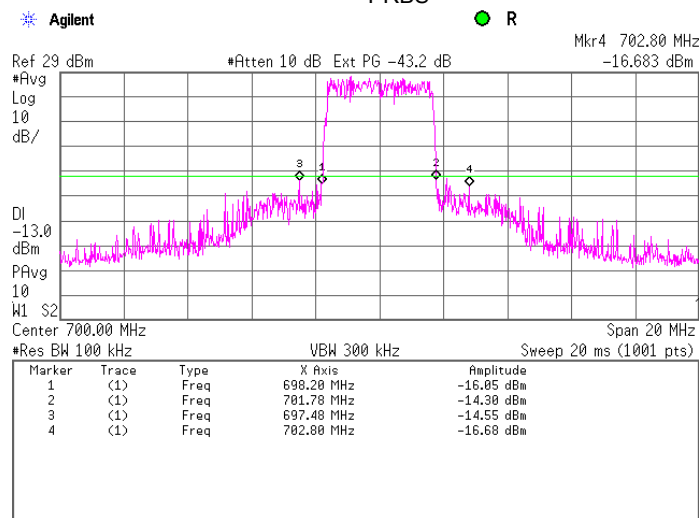
698.0 – 746.0 MHz
Average
QPSK
PRBS



Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

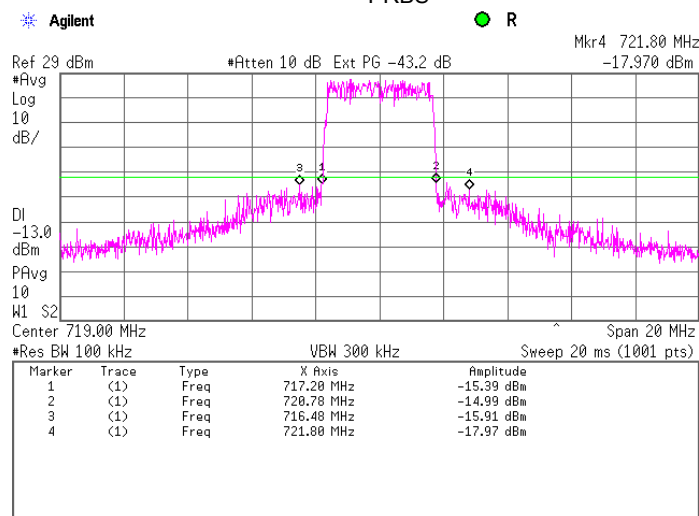
Plot 7.3.28 Emission mask test results at low carrier frequency, 3.5 MHz CBW, single output

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS



Plot 7.3.29 Emission mask test results at mid carrier frequency, 3.5 MHz CBW, single output

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS

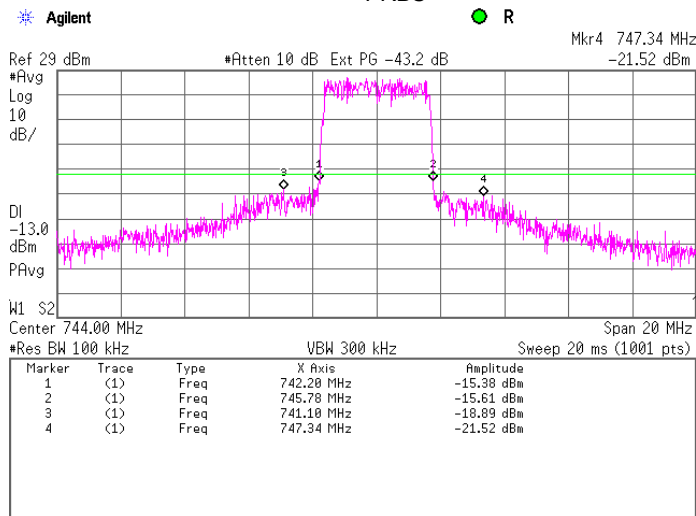


Test specification:		Section 27.53(g), Band edge emissions	
Test procedure:		47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		8/25/2010	
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.30 Emission mask test results at high carrier frequency, 3.5 MHz CBW, single output

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

698.0 – 746.0 MHz
Average
64QAM
PRBS

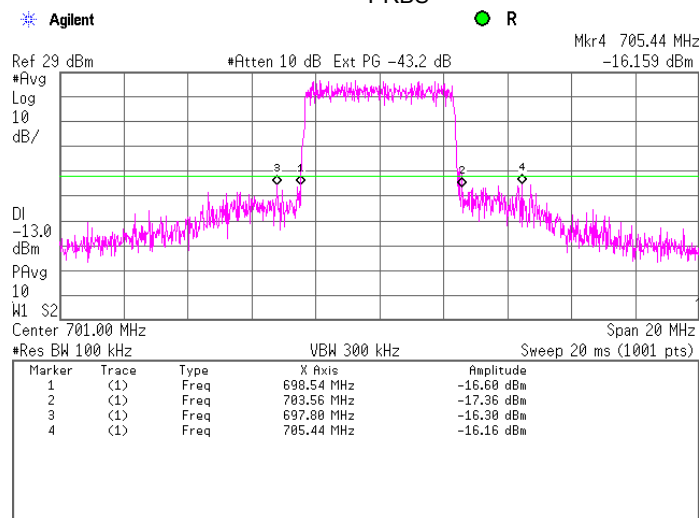


Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.31 Emission mask test results at low carrier frequency, 5 MHz CBW, single output

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

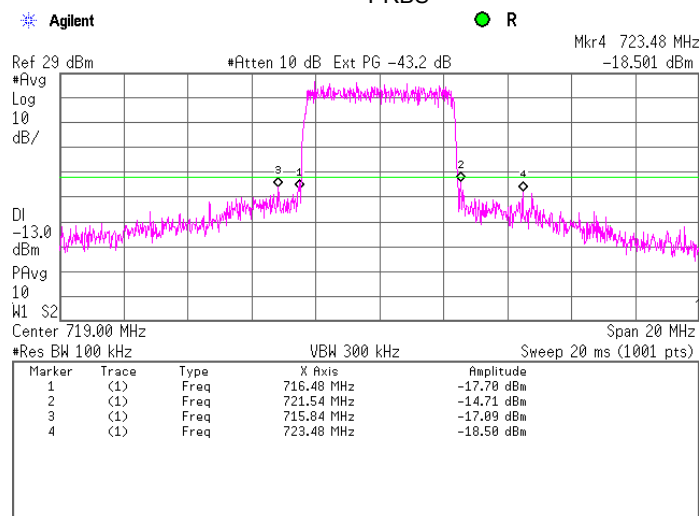
698.0 – 746.0 MHz
Average
QPSK
PRBS



Plot 7.3.32 Emission mask test results at mid carrier frequency, 5 MHz CBW, single output

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

698.0 – 746.0 MHz
Average
QPSK
PRBS

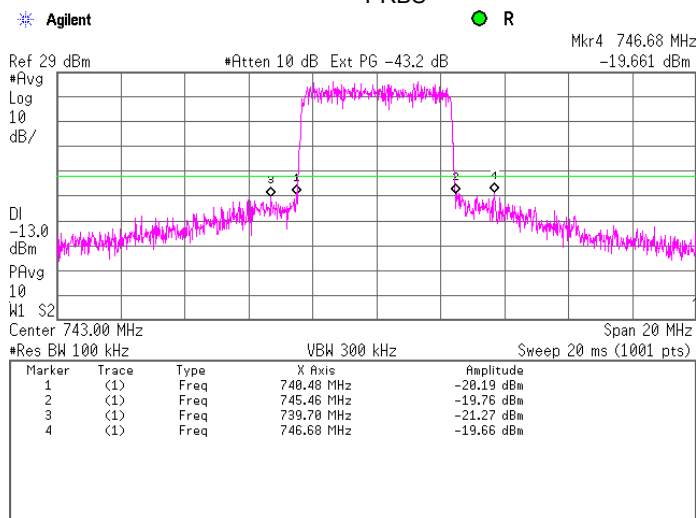


Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.33 Emission mask test results at high carrier frequency, 5 MHz CBW, single output

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

698.0 – 746.0 MHz
Average
QPSK
PRBS

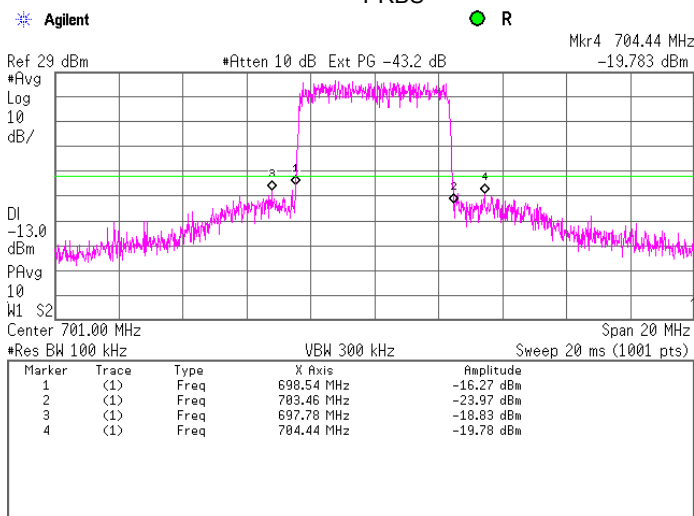


Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.34 Emission mask test results at low carrier frequency, 5 MHz CBW, single output

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

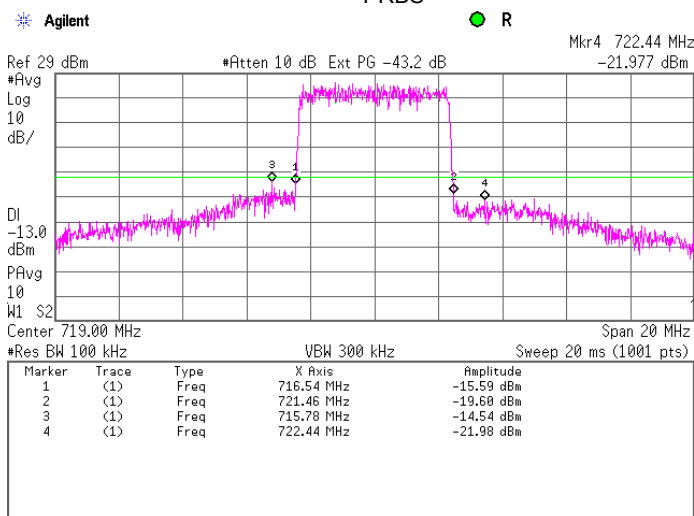
698.0 – 746.0 MHz
Average
64QAM
PRBS



Plot 7.3.35 Emission mask test results at mid carrier frequency, 5 MHz CBW, single output

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

698.0 – 746.0 MHz
Average
64QAM
PRBS

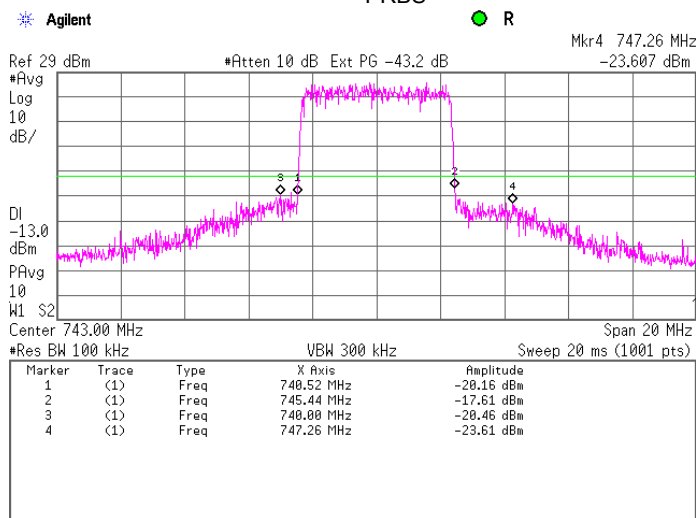


Test specification:		Section 27.53(g), Band edge emissions	
Test procedure:		47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		8/25/2010	
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.36 Emission mask test results at high carrier frequency, 5 MHz CBW, single output

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

698.0 – 746.0 MHz
Average
64QAM
PRBS

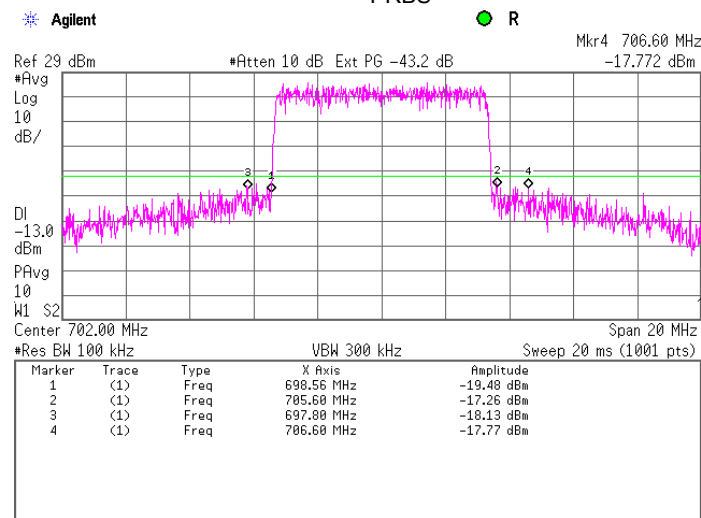


Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.37 Emission mask test results at low carrier frequency, 7 MHz CBW, single output

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

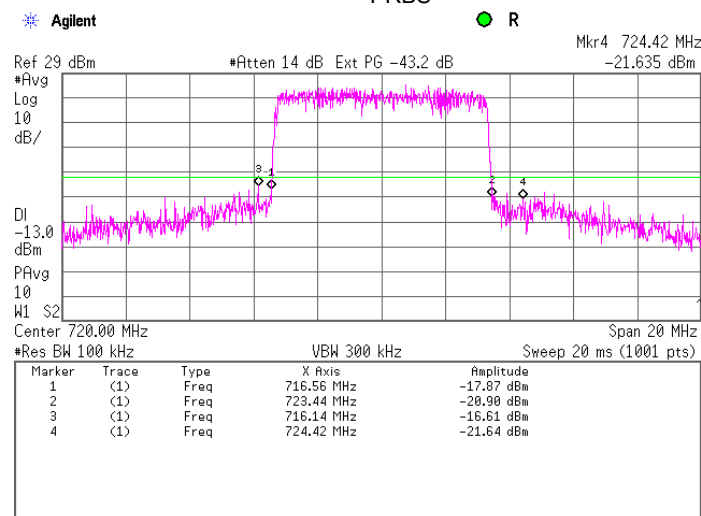
698.0 – 746.0 MHz
Average
QPSK
PRBS



Plot 7.3.38 Emission mask test results at mid carrier frequency, 7 MHz CBW, single output

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

698.0 – 746.0 MHz
Average
QPSK
PRBS



Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.39 Emission mask test results at high carrier frequency, 7 MHz CBW, single output

ASSIGNED FREQUENCY RANGE:

698.0 – 746.0 MHz

DETECTOR USED:

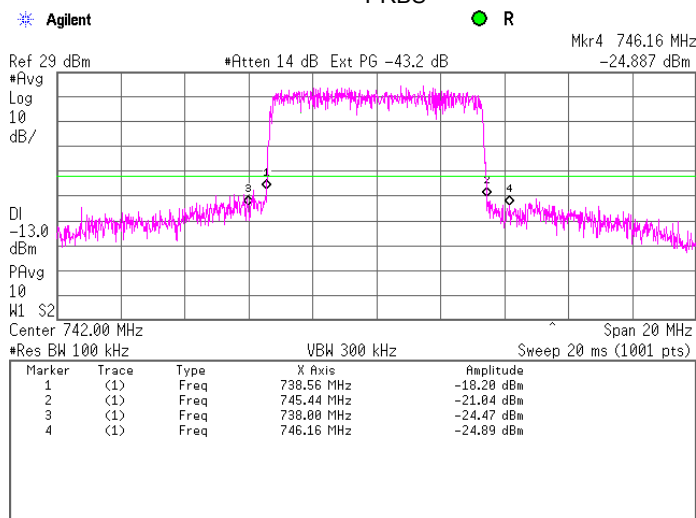
Average

MODULATION:

QPSK

MODULATING SIGNAL:

PRBS

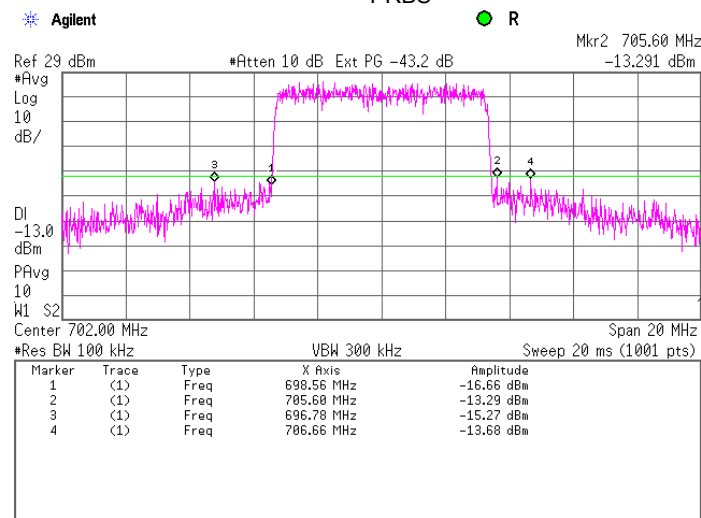


Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.40 Emission mask test results at low carrier frequency, 7 MHz CBW, single output

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

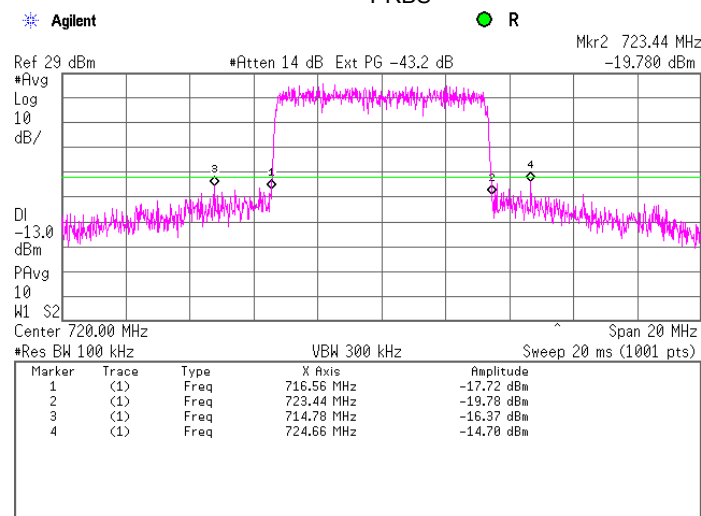
698.0 – 746.0 MHz
Average
64QAM
PRBS



Plot 7.3.41 Emission mask test results at mid carrier frequency, 7 MHz CBW, single output

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

698.0 – 746.0 MHz
Average
64QAM
PRBS



Test specification:		Section 27.53(g), Band edge emissions	
Test procedure:		47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13	
Test mode:	Compliance	Verdict:	PASS
Date:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.42 Emission mask test results at high carrier frequency, 7 MHz CBW, single output

ASSIGNED FREQUENCY RANGE:

698.0 – 746.0 MHz

DETECTOR USED:

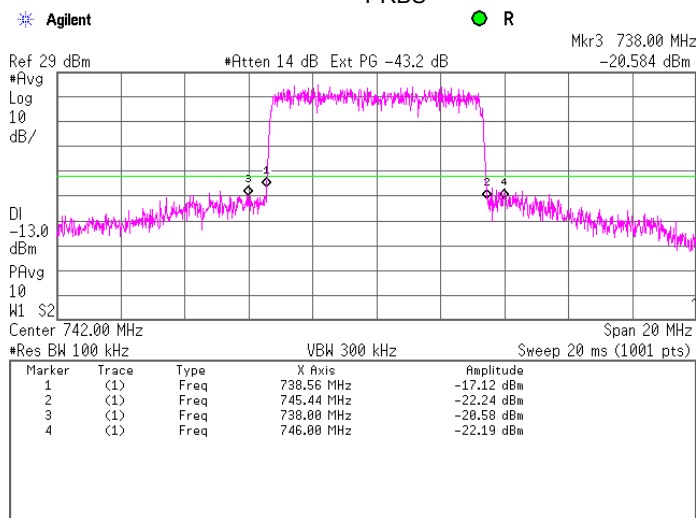
Average

MODULATION:

64QAM

MODULATING SIGNAL:

PRBS

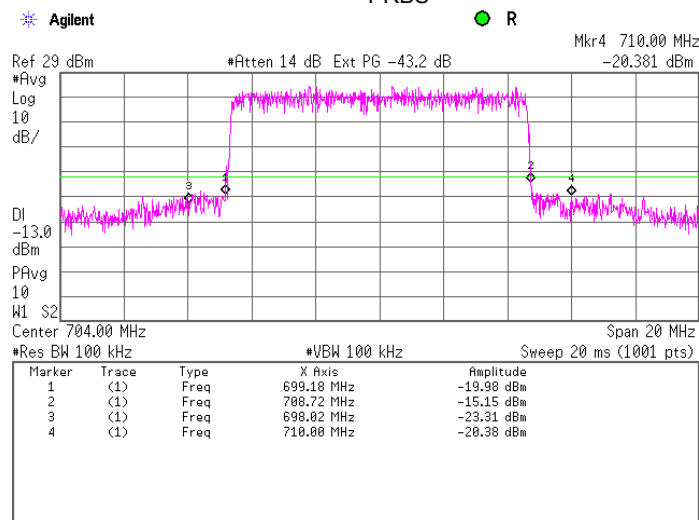


Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.43 Emission mask test results at low carrier frequency, 10 MHz CBW, single output

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

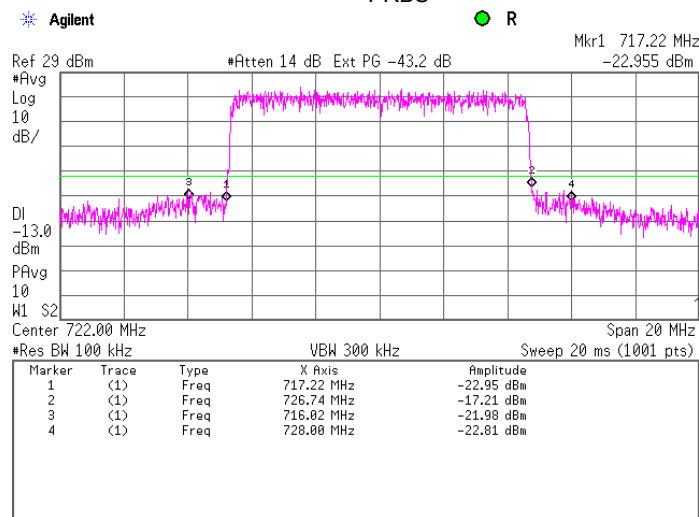
698.0 – 746.0 MHz
Average
QPSK
PRBS



Plot 7.3.44 Emission mask test results at mid carrier frequency, 10 MHz CBW, single output

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

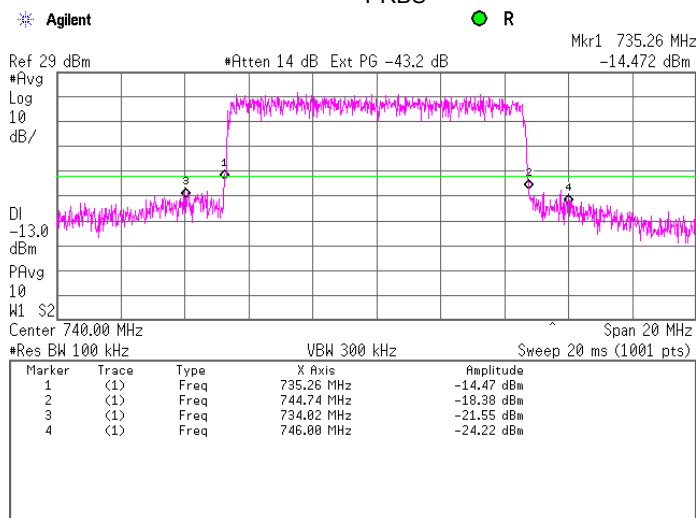
698.0 – 746.0 MHz
Average
QPSK
PRBS



Test specification:		Section 27.53(g), Band edge emissions	
Test procedure:		47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		8/25/2010	
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.45 Emission mask test results at high carrier frequency, 10 MHz CBW, single output

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS

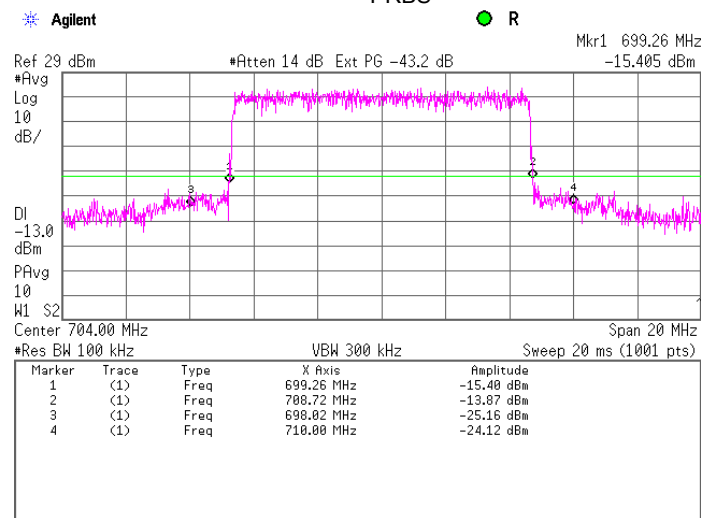


Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.46 Emission mask test results at low carrier frequency, 10 MHz CBW, single output

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

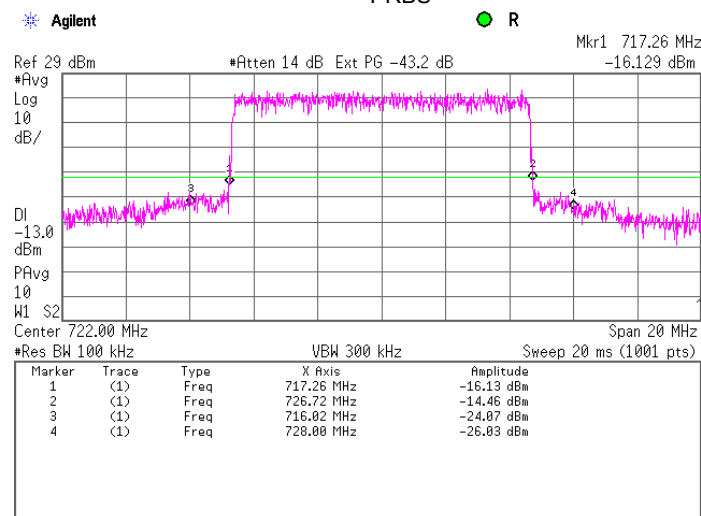
698.0 – 746.0 MHz
Average
64QAM
PRBS



Plot 7.3.47 Emission mask test results at mid carrier frequency, 10 MHz CBW, single output

ASSIGNED FREQUENCY RANGE:
DETECTOR USED:
MODULATION:
MODULATING SIGNAL:

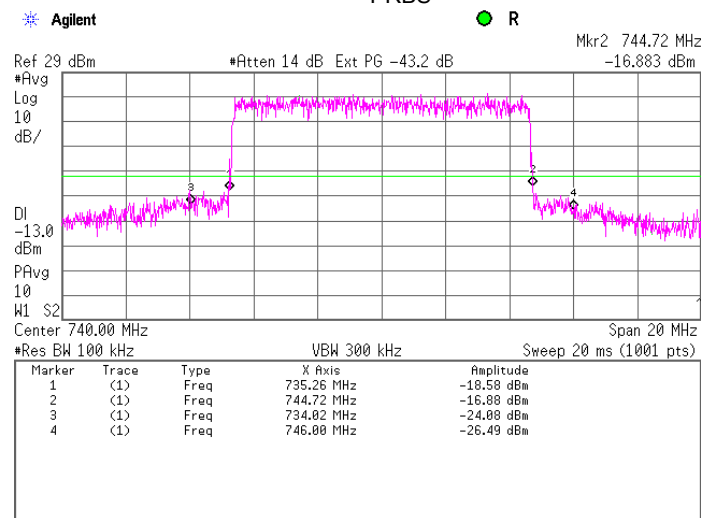
698.0 – 746.0 MHz
Average
64QAM
PRBS



Test specification:	Section 27.53(g), Band edge emissions		
Test procedure:	47 CFR, Sections 2.1047 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks: Band edges			

Plot 7.3.48 Emission mask test results at high carrier frequency, 10 MHz CBW, single output

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS



Test specification:		Section 27.53(g), Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053 and 27.53(g); TIA/EIA-603-C, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date:	8/26/2010		
Temperature: 25.4 °C	Air Pressure: 1004 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks:			

7.4 Radiated spurious emission measurements

7.4.1 General

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

Table 7.4.1 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

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

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

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

7.4.2.3 The worst test results (the lowest margins) were recorded in Table 7.4.2 and shown in the associated plots.

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

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

7.4.3.2 The specified frequency range was investigated with antenna connected to spectrum analyzer. 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.

7.4.3.3 The worst test results (the lowest margins) were recorded in Table 7.4.2 and shown in the associated plots.

Test specification:		Section 27.53(g), Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053 and 27.53(g); TIA/EIA-603-C, Section 2.2.12	
Test mode:		Compliance	Verdict: PASS
Date:		8/26/2010	
Temperature: 25.4 °C	Air Pressure: 1004 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks:			

Figure 7.4.1 Setup for spurious emission field strength measurements in 9 kHz to 30 MHz band

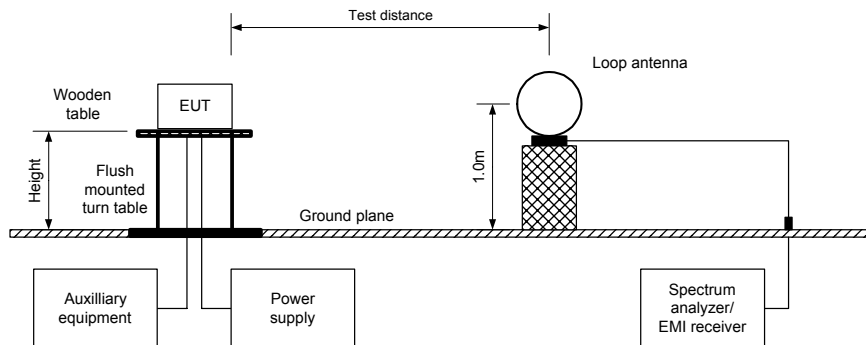
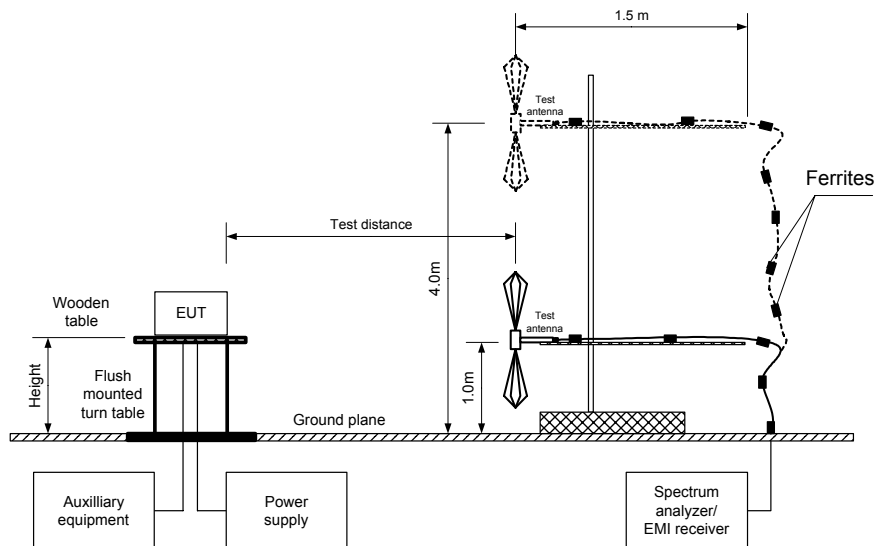


Figure 7.4.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	Section 27.53(g), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 27.53(g); TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	8/26/2010		
Temperature: 25.4 °C	Air Pressure: 1004 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks:			

Table 7.4.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
 TEST DISTANCE: 3 m
 TEST SITE: Semi anechoic chamber
 EUT HEIGHT: 0.8 m
 INVESTIGATED FREQUENCY RANGE: 0.009 – 7500 MHz
 DETECTOR USED: Peak
 VIDEO BANDWIDTH: > Resolution bandwidth
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
 Biconilog (30 MHz – 1000 MHz)
 Double ridged guide (above 1000 MHz)
 MODULATION: QPSK
 MODULATING SIGNAL: PRBS
 CHANNEL BANDWIDTH: 5 MHz (worst case power density)
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	Field strength, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	RBW, kHz	Antenna polarization	Antenna height, m	Turn-table position**, degrees
Low carrier frequency MHz							
All spurious were found at least 20 dB below the specified limit							

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

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

Reference numbers of test equipment used

HL 0446	HL 2432	HL 2697	HL 2780	HL 2883	HL 3119	HL 3334	HL 3340
HL 3884							

Full description is given in Appendix A.

Test specification:	Section 27.53(g), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 27.53(g); TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	8/26/2010		
Temperature: 25.4 °C	Air Pressure: 1004 hPa	Relative Humidity: 36 %	Power Supply: 48 Vdc
Remarks:			

Plot 7.4.1 Radiated emission measurements in 9 - 150 kHz range

TEST SITE:

ANTENNA POLARIZATION:

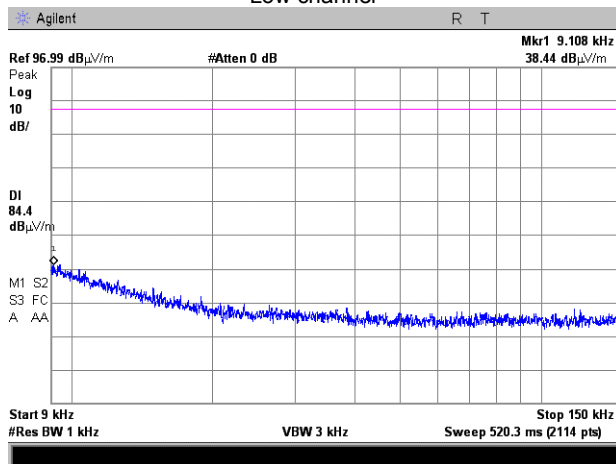
TEST DISTANCE:

Fully anechoic chamber

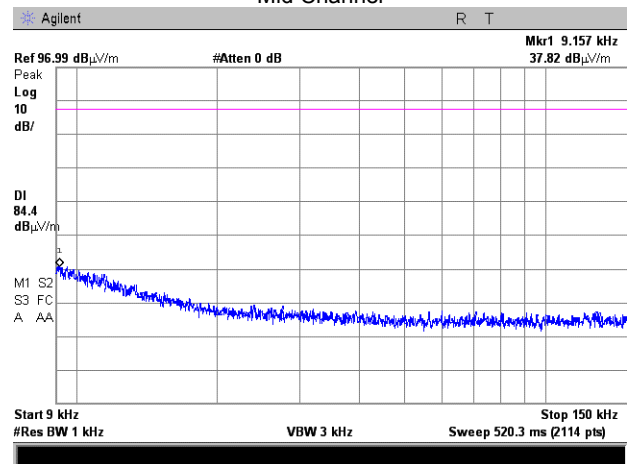
Vertical and Horizontal

3 m

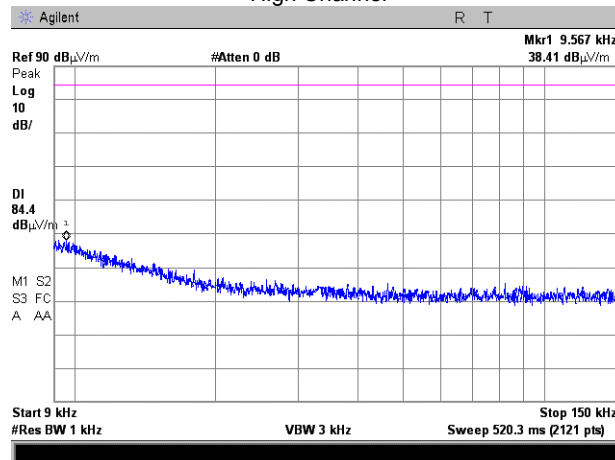
Low channel



Mid Channel



High Channel



Test specification:		Section 27.53(g), Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053 and 27.53(g); TIA/EIA-603-C, Section 2.2.12	
Test mode:		Compliance	Verdict: PASS
Date:		8/26/2010	
Temperature: 25.4 °C	Air Pressure: 1004 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.2 Radiated emission measurements in 0.15 - 30 MHz range

TEST SITE:

ANTENNA POLARIZATION:

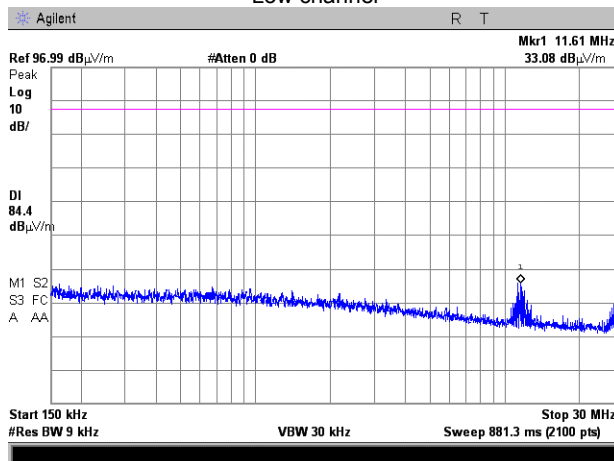
TEST DISTANCE:

Fully anechoic chamber

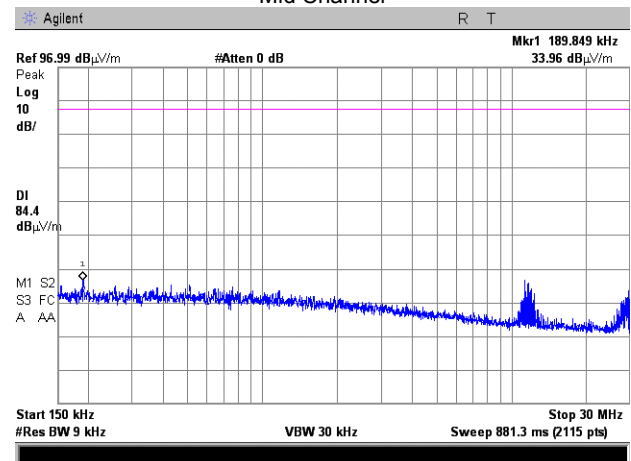
Vertical and Horizontal

3 m

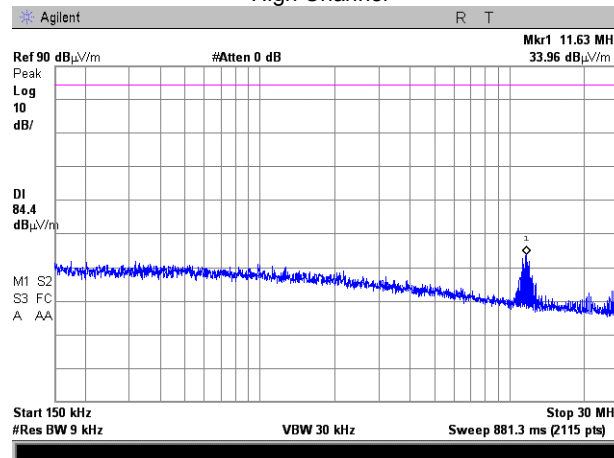
Low channel



Mid Channel



High Channel



Test specification:		Section 27.53(g), Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053 and 27.53(g); TIA/EIA-603-C, Section 2.2.12	
Test mode:		Compliance	Verdict: PASS
Date:		8/26/2010	
Temperature: 25.4 °C	Air Pressure: 1004 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.3 Radiated emission measurements in 30 - 1000 MHz range

TEST SITE:

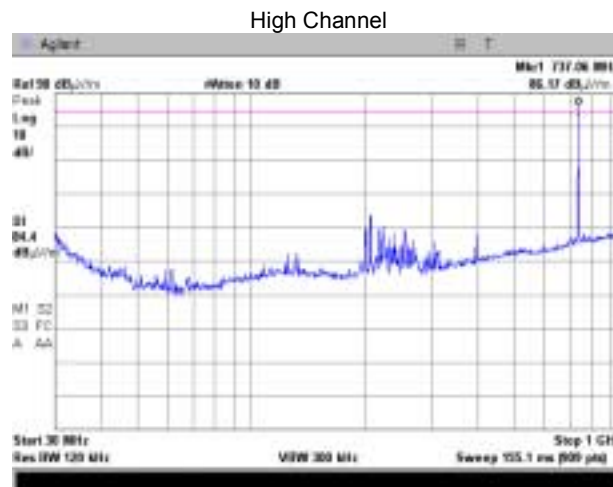
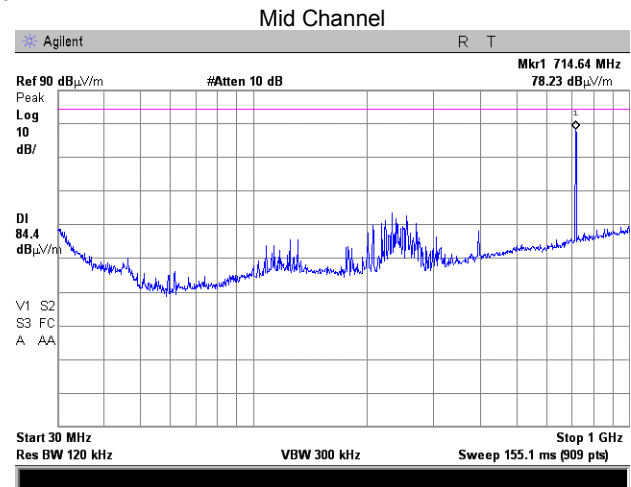
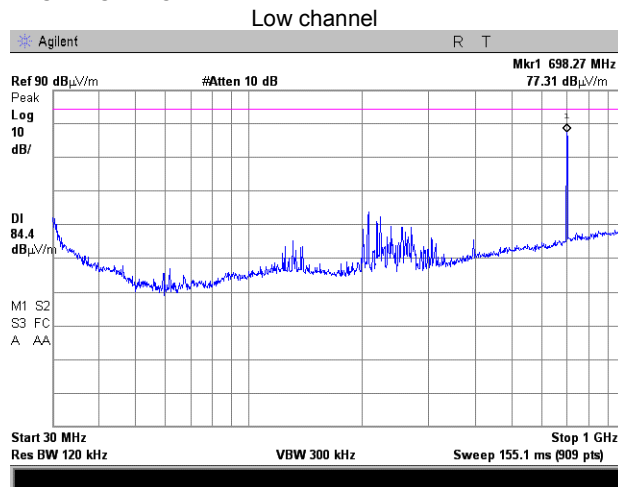
ANTENNA POLARIZATION:

TEST DISTANCE:

Fully anechoic chamber

Vertical and Horizontal

3 m



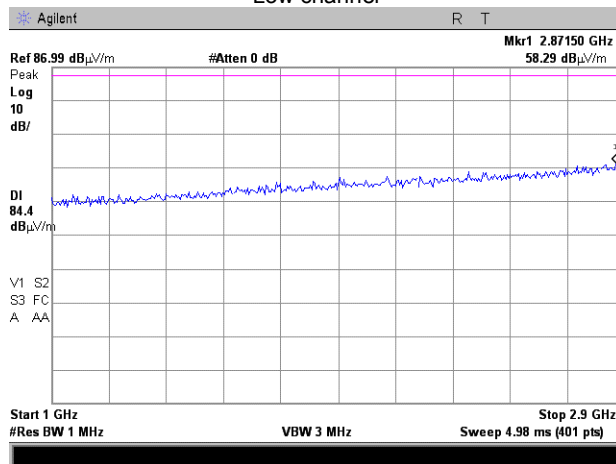
Test specification:		Section 27.53(g), Radiated spurious emissions	
Test procedure:		47 CFR, Sections 2.1053 and 27.53(g); TIA/EIA-603-C, Section 2.2.12	
Test mode:		Compliance	Verdict: PASS
Date:		8/26/2010	
Temperature: 25.4 °C	Air Pressure: 1004 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.4 Radiated emission measurements in 1000 – 2900 MHz range

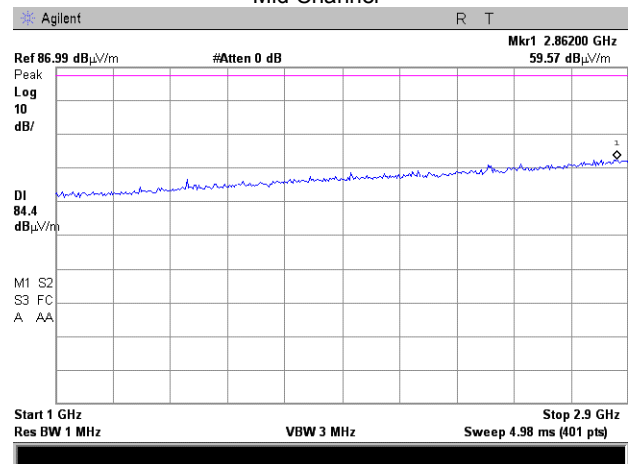
TEST SITE:
ANTENNA POLARIZATION:
TEST DISTANCE:

Fully anechoic chamber
Vertical and Horizontal
3 m

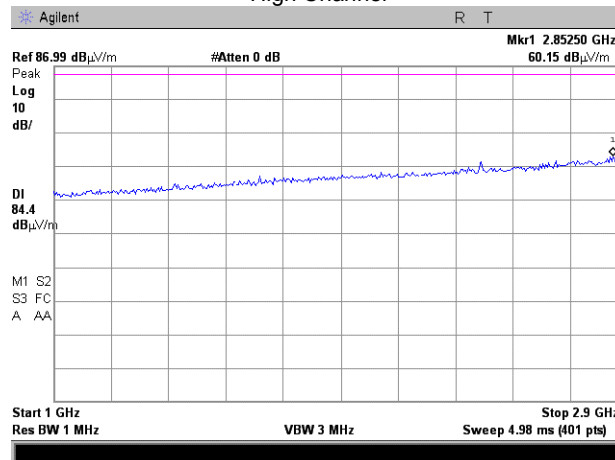
Low channel



Mid Channel



High Channel



Test specification:	Section 27.53(g), Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 27.53(g); TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date:	8/26/2010		
Temperature: 25.4 °C	Air Pressure: 1004 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks:			

Plot 7.4.5 Radiated emission measurements in 2900 – 7500 MHz range

TEST SITE:

ANTENNA POLARIZATION:

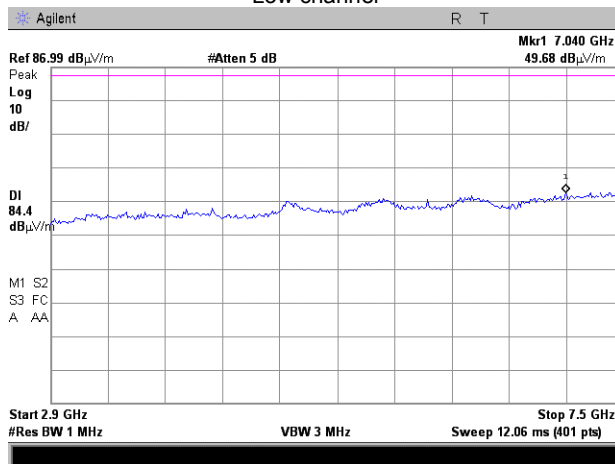
TEST DISTANCE:

Fully anechoic chamber

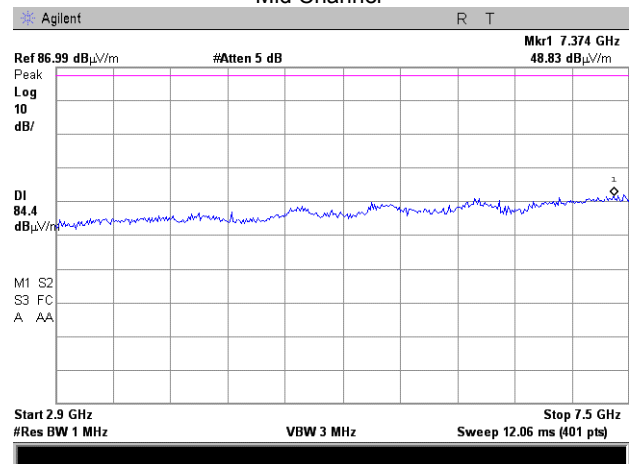
Vertical and Horizontal

3 m

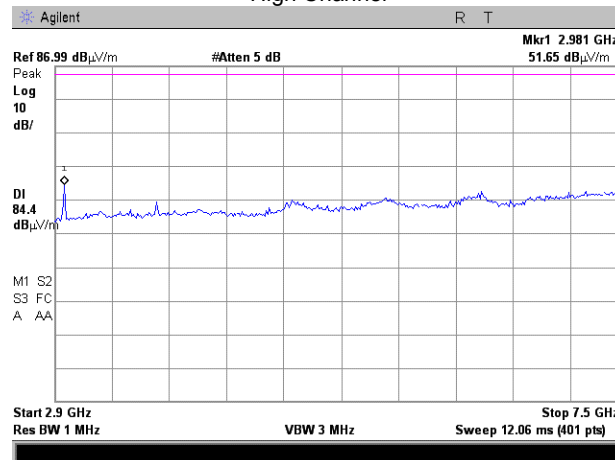
Low channel



Mid Channel



High Channel



Test specification:	Section 27.53(g), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/24/2010		
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

7.5 Spurious emissions at RF antenna connector test

7.5.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 7.5.1.

Table 7.5.1 Spurious emission limits

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

* - P is transmitter output power in Watts

7.5.2 Test procedure

7.5.2.1 The EUT was set up as shown in Figure 7.5.1 or Figure 7.5.2, energized and its proper operation was checked.

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

7.5.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.5.2 and the associated plots.

Figure 7.5.1 Spurious emission test setup, single output

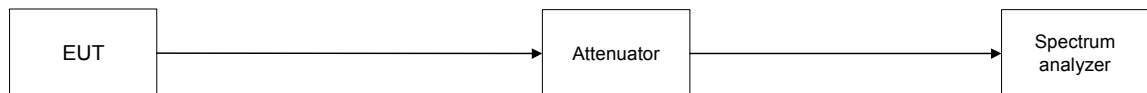
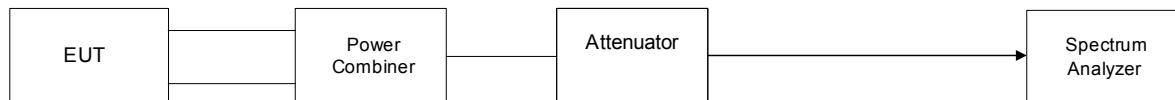


Figure 7.5.2 Spurious emission test setup, single output





Test specification:	Section 27.53(g), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/24/2010		
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Table 7.5.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 698.0 – 746.0 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 7500 MHz
 DETECTOR USED: Peak
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 MODULATION: 64QAM / QPSK
 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 700.0 MHz								
No spurious were found								Pass
Mid carrier frequency 719.0 MHz								
No spurious were found								Pass
High carrier frequency 744.0 MHz								
No spurious were found								Pass

*- Margin = Spurious emission – specification limit.

NOTE: the test was performed with EUT configured to 3.5 MHz CBW with 64QAM modulation as settings that produce the maximum power spectral density.

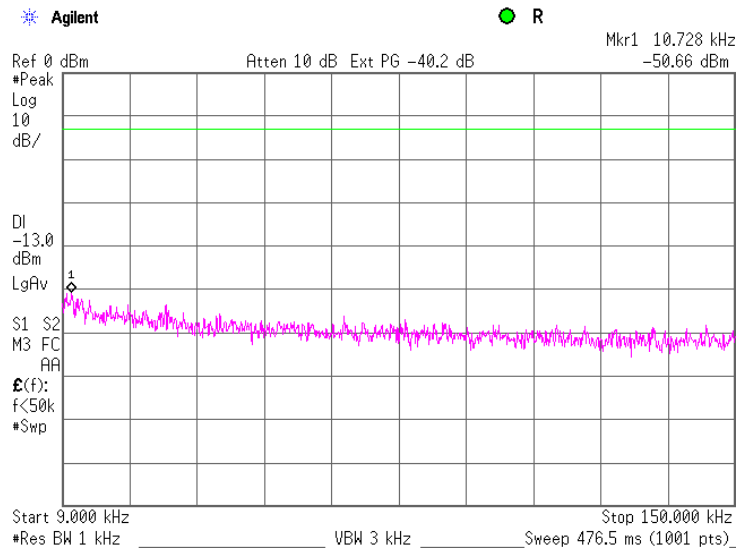
Reference numbers of test equipment used

HL 2013	HL 2015	HL 3472	HL 3473	HL 3474	HL 3781	HL 3787	HL 3818
---------	---------	---------	---------	---------	---------	---------	---------

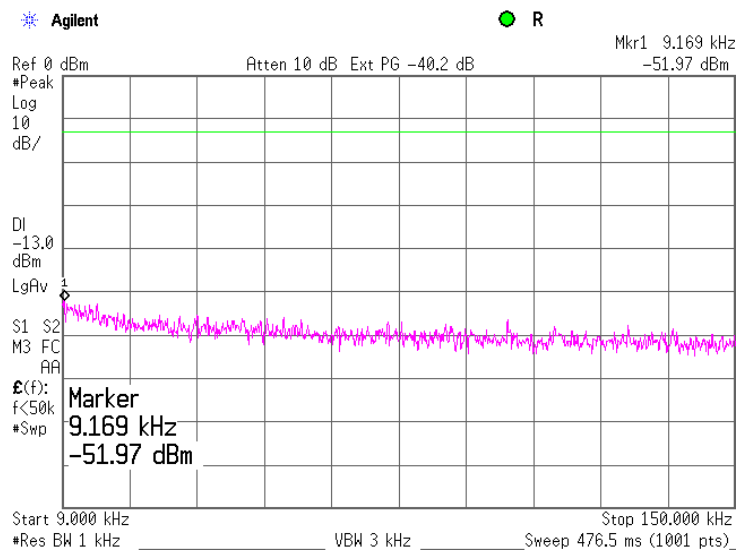
Full description is given in Appendix A.

Test specification:	Section 27.53(g), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/24/2010		
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.1 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency, single output

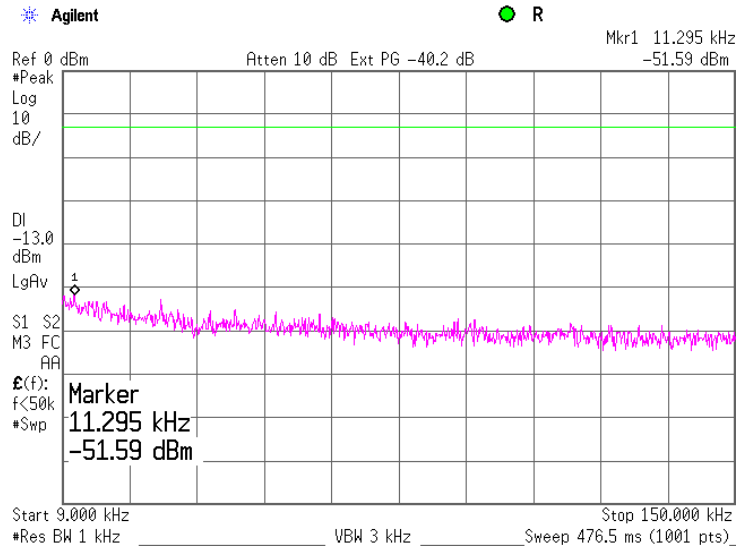


Plot 7.5.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency, single output



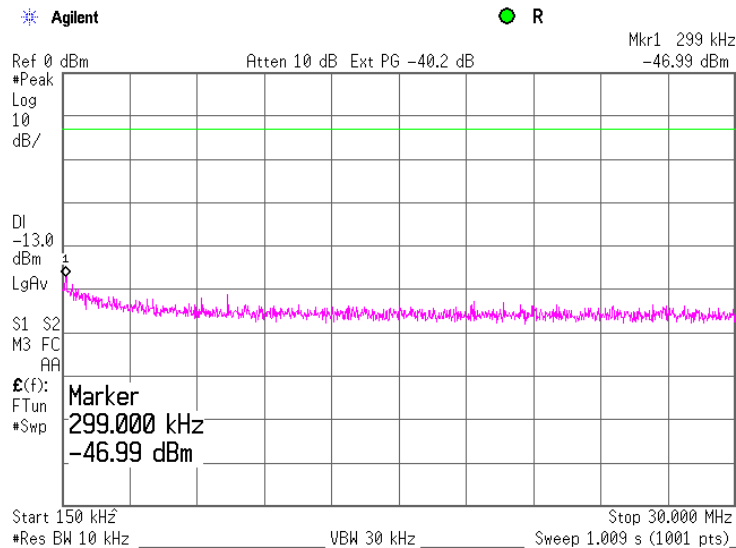
Test specification:		Section 27.53(g), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051 and 27.53(g); TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		8/24/2010	
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.3 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency, single output

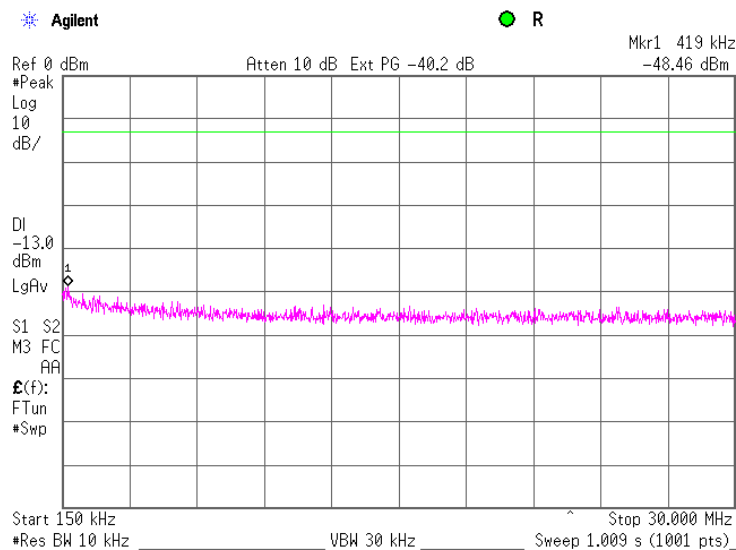


Test specification:	Section 27.53(g), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/24/2010		
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.4 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency, single output

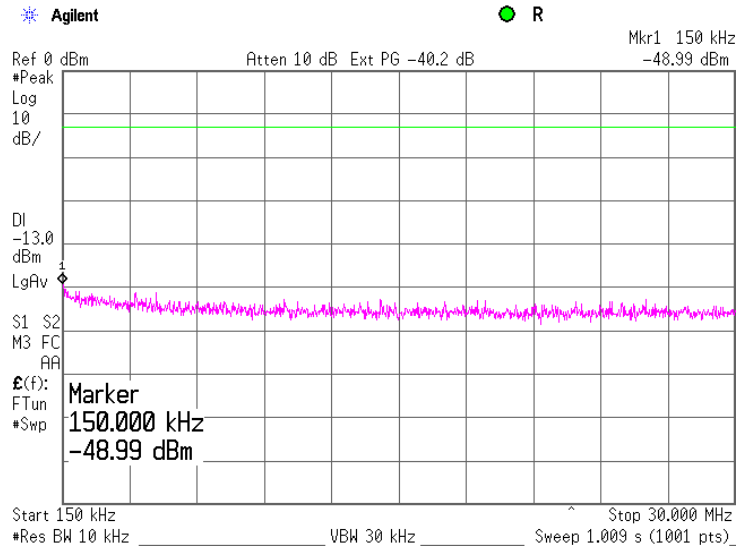


Plot 7.5.5 Spurious emission measurements in 0.15 - 30.0 MHz range at mid carrier frequency, single output



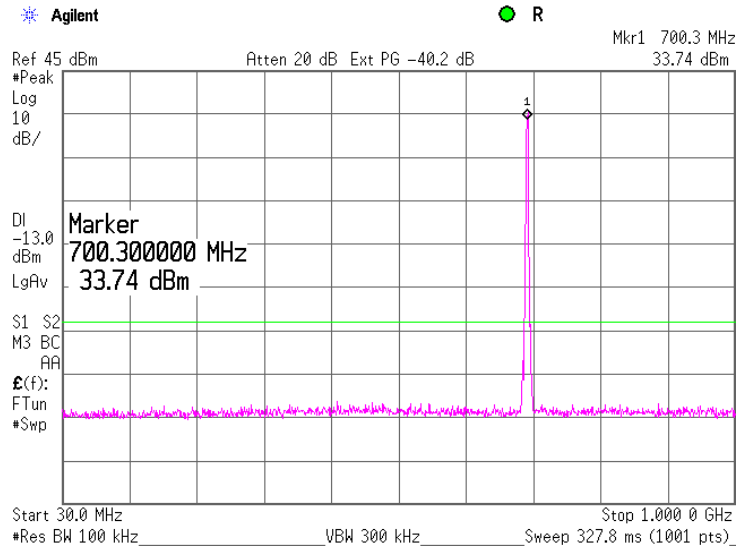
Test specification:	Section 27.53(g), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/24/2010		
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.6 Spurious emission measurements in 0.15 – 30.0 MHz range at high carrier frequency, single output

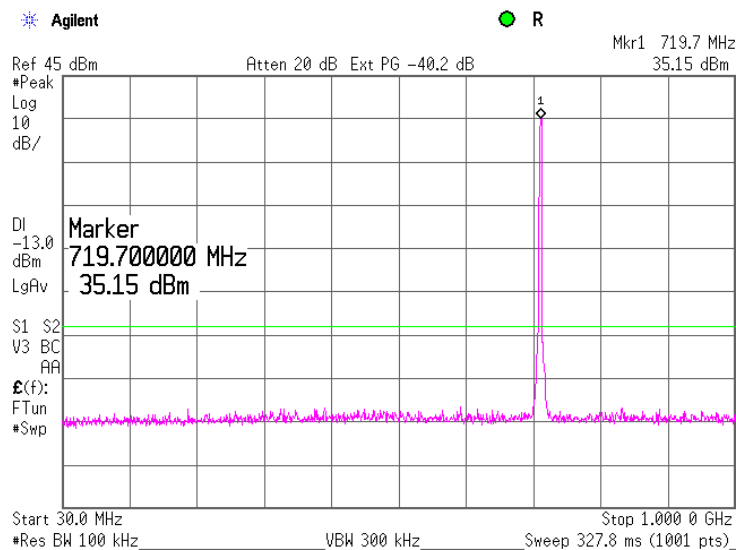


Test specification:	Section 27.53(g), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/24/2010		
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.7 Spurious emission measurements in 30.0 – 1000.0 MHz range at low carrier frequency, single output

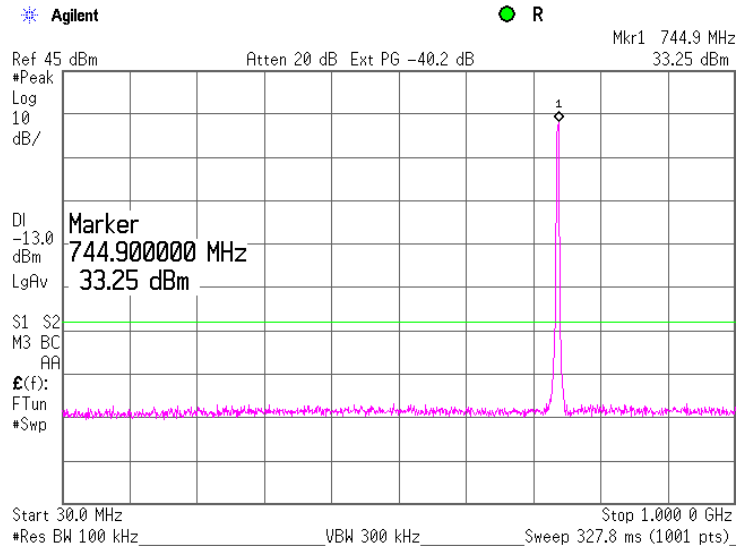


Plot 7.5.8 Spurious emission measurements in 30.0 – 1000.0 MHz range at mid carrier frequency, single output



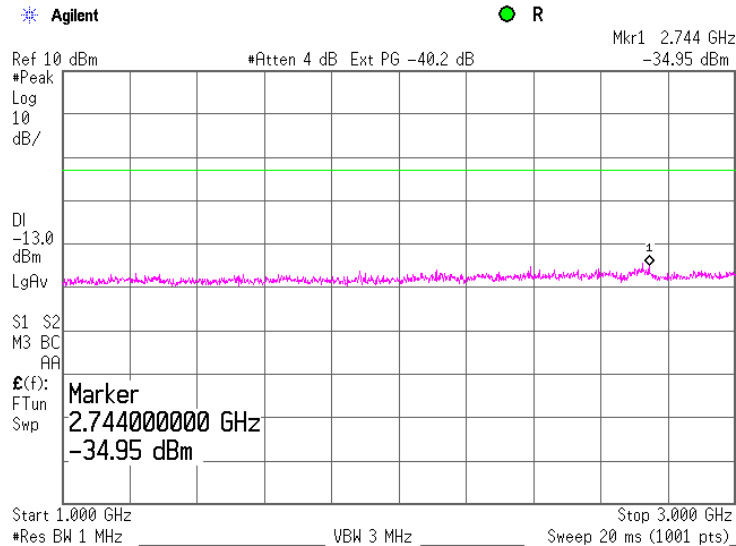
Test specification:		Section 27.53(g), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051 and 27.53(g); TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		8/24/2010	
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.9 Spurious emission measurements in 30.0 – 1000.0 MHz range at high carrier frequency, single output

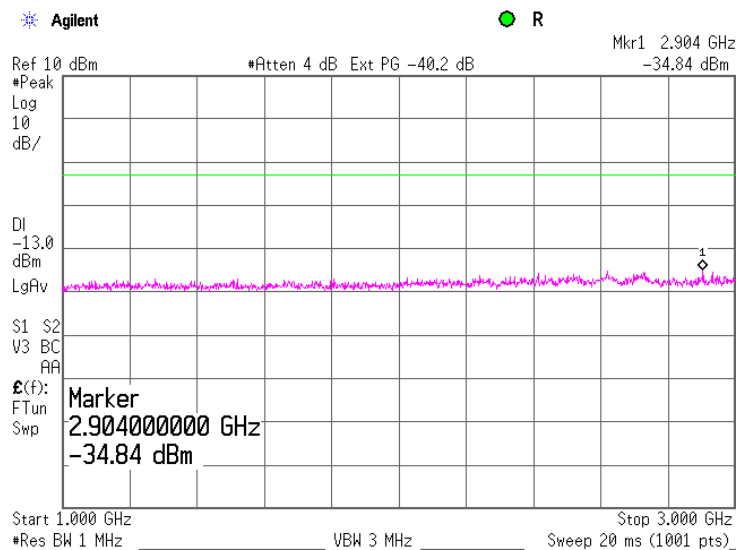


Test specification:	Section 27.53(g), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/24/2010		
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.10 Spurious emission measurements in 1000.0 – 3000.0 MHz range at low carrier frequency, single output

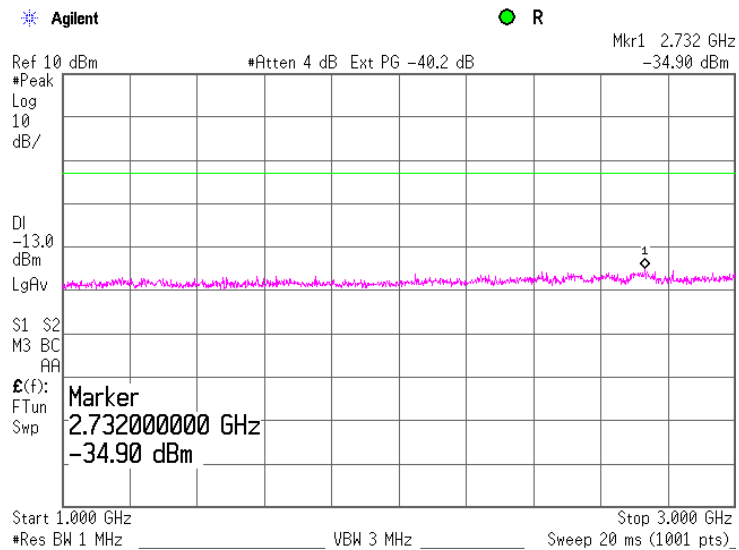


Plot 7.5.11 Spurious emission measurements in 1000.0 – 3000.0 MHz range at mid carrier frequency, single output



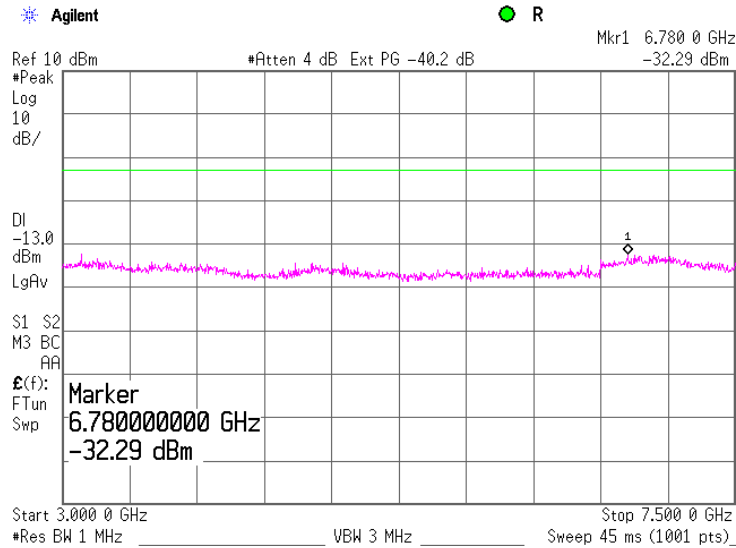
Test specification:		Section 27.53(g), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051 and 27.53(g); TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		8/24/2010	
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.12 Spurious emission measurements in 1000.0 – 3000.0 MHz at high carrier frequency, single output

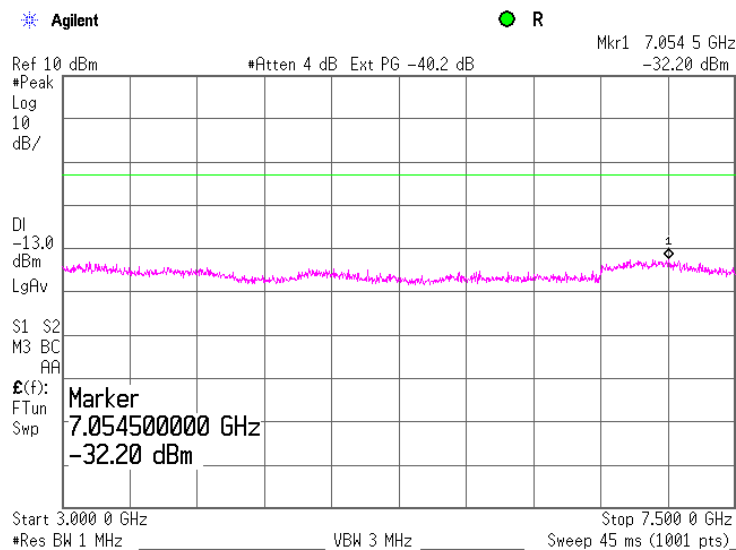


Test specification:	Section 27.53(g), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/24/2010		
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.13 Spurious emission measurements in 3000.0 – 7500.0 MHz range at low carrier frequency, single output

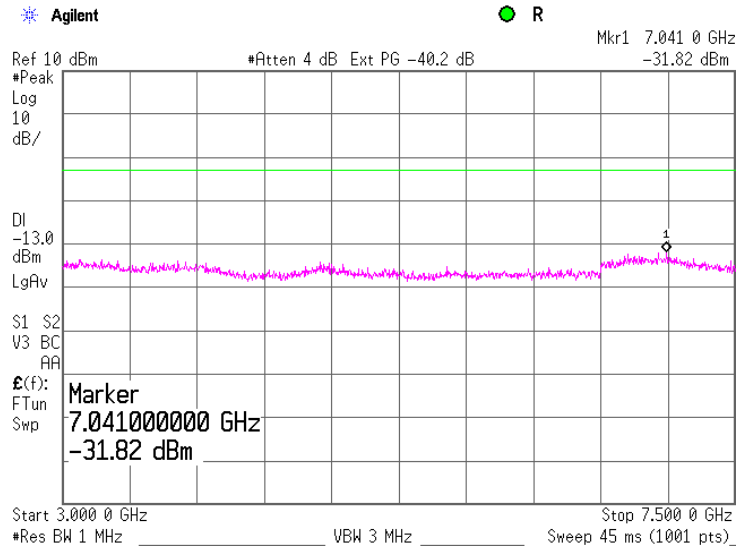


Plot 7.5.14 Spurious emission measurements in 3000.0 – 7500.0 MHz range at mid carrier frequency, single output



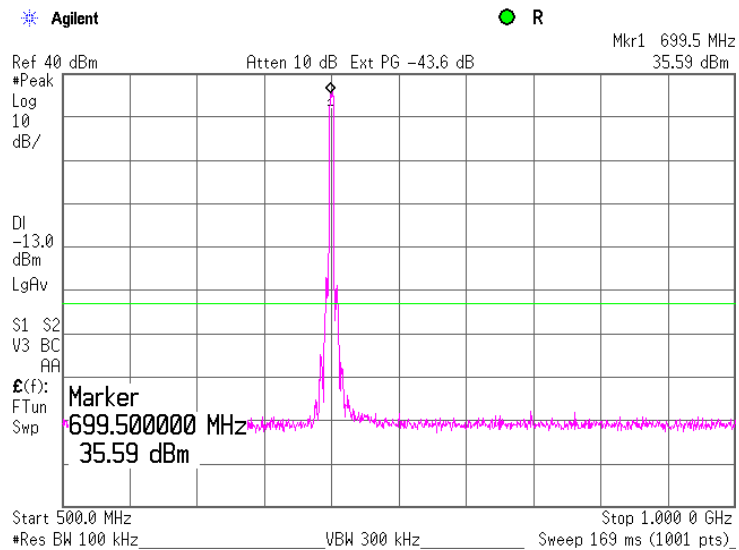
Test specification:	Section 27.53(g), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/24/2010		
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.15 Spurious emission measurements in 3000.0 – 7500.0 MHz range at high carrier frequency, single output

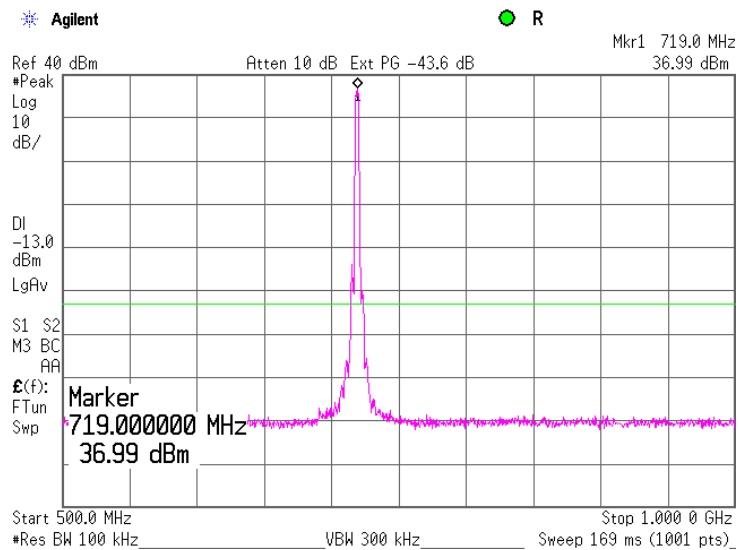


Test specification:	Section 27.53(g), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/24/2010		
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.16 Spurious emission measurements in 500.0 – 1000.0 MHz range at low carrier frequency, combined outputs

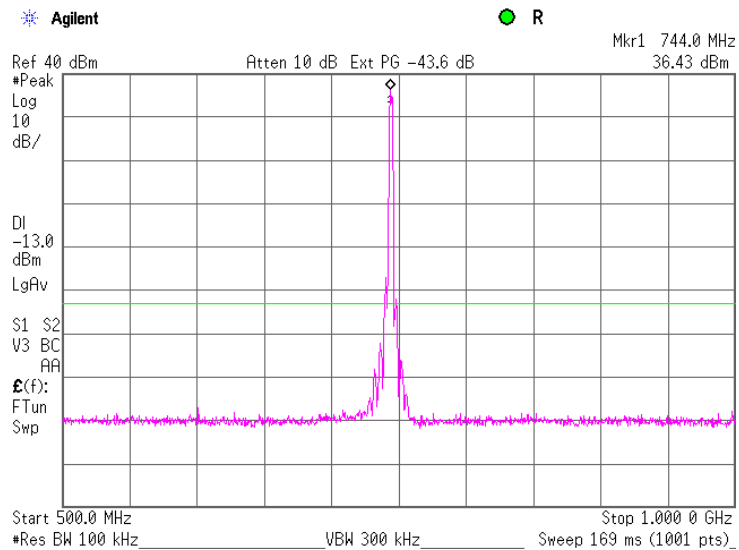


Plot 7.5.17 Spurious emission measurements in 500.0 – 1000.0 MHz range at mid carrier frequency, combined outputs



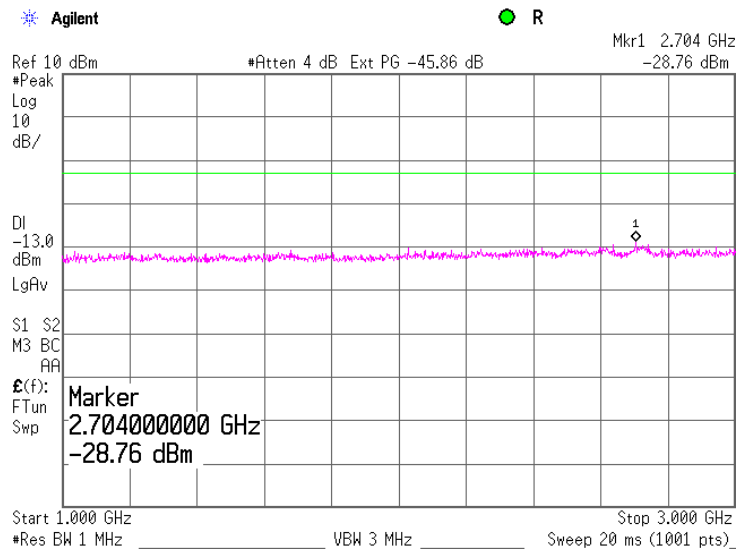
Test specification:		Section 27.53(g), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051 and 27.53(g); TIA/EIA-603-C, Section 2.2.13	
Test mode:	Compliance	Verdict:	PASS
Date:	8/24/2010		
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.18 Spurious emission measurements in 500.0 – 1000.0 MHz range at high carrier frequency, combined outputs

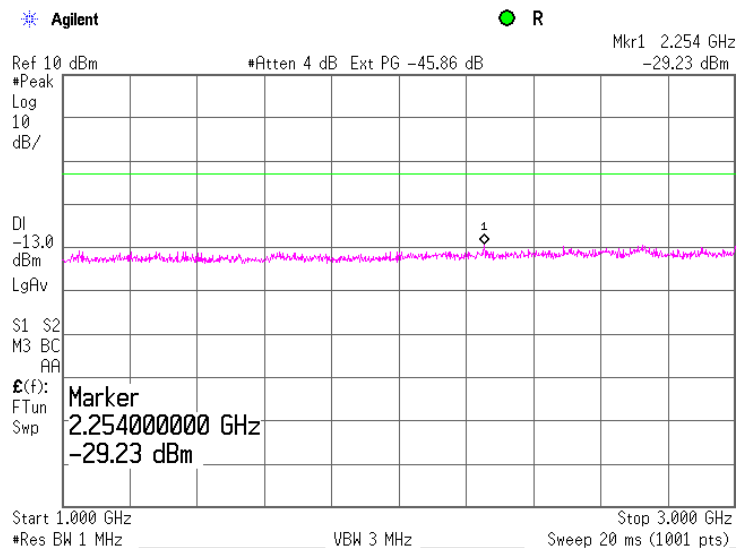


Test specification:	Section 27.53(g), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/24/2010		
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.19 Spurious emission measurements in 1000.0 – 3000.0 MHz range at low carrier frequency, combined outputs

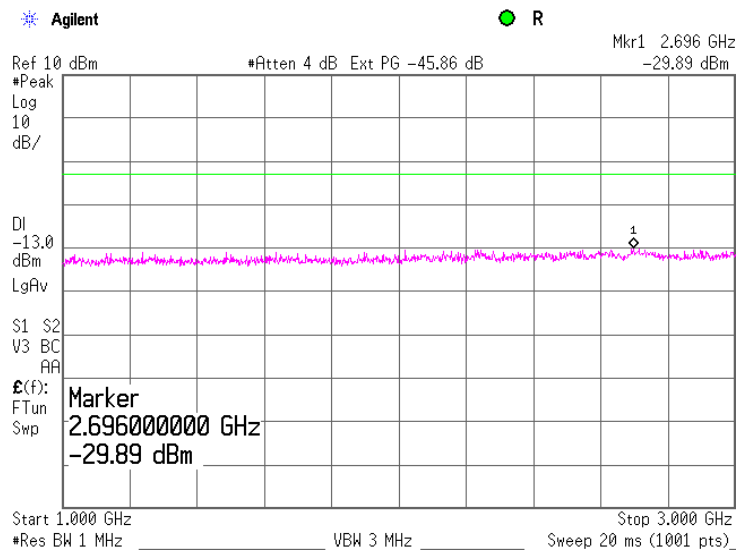


Plot 7.5.20 Spurious emission measurements in 1000.0 – 3000.0 MHz range at mid carrier frequency, combined outputs



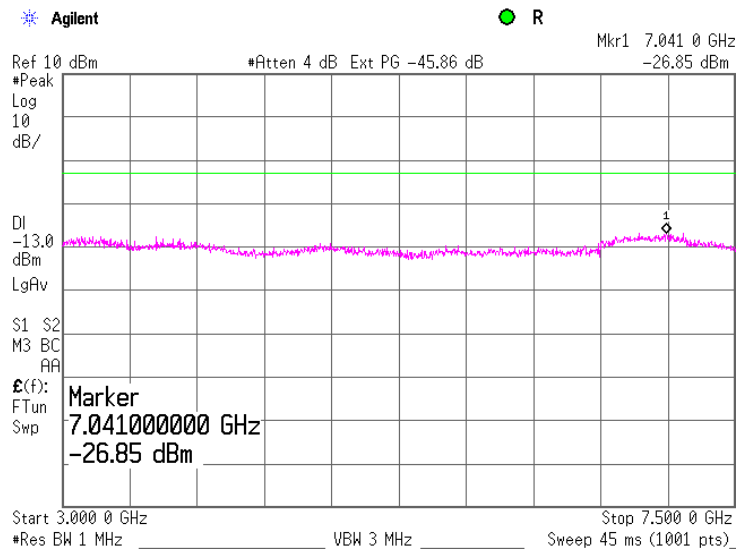
Test specification:		Section 27.53(g), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051 and 27.53(g); TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		8/24/2010	
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.21 Spurious emission measurements in 1000.0 – 3000.0 MHz range at high carrier frequency, combined outputs

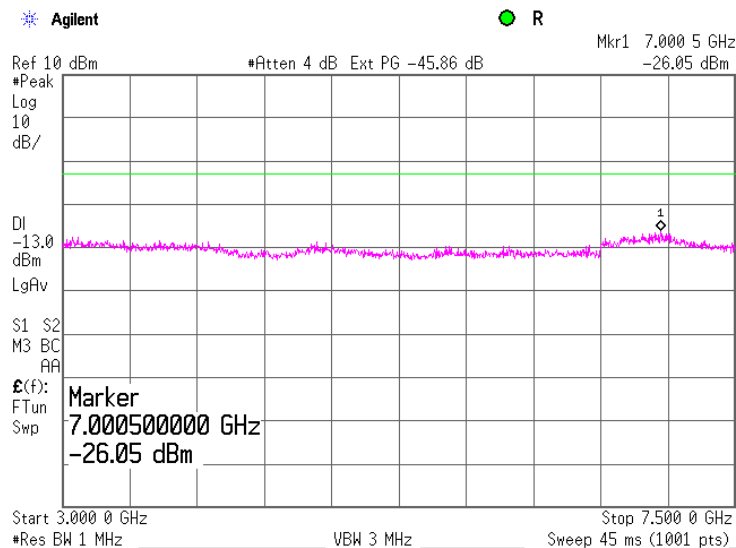


Test specification:	Section 27.53(g), Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(g); TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	8/24/2010		
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.22 Spurious emission measurements in 3000.0 – 7500.0 MHz range at low carrier frequency, combined outputs

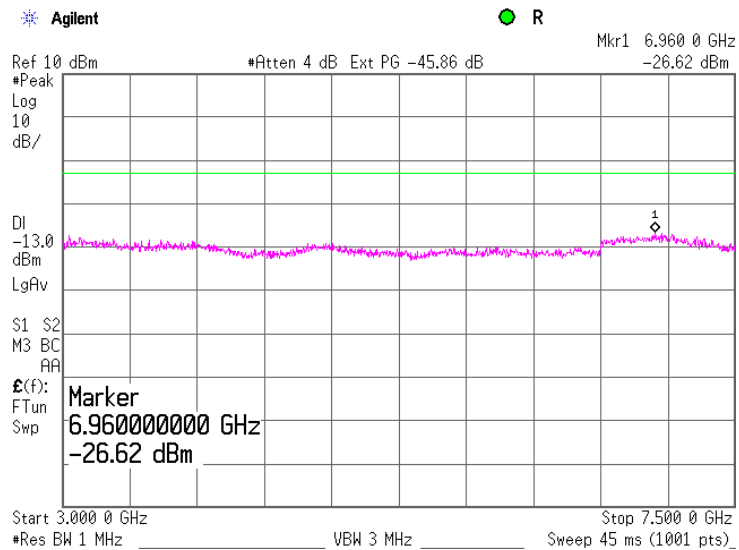


Plot 7.5.23 Spurious emission measurements in 3000.0 – 7500.0 MHz range at mid carrier frequency, combined outputs



Test specification:		Section 27.53(g), Conducted spurious emissions	
Test procedure:		47 CFR, Sections 2.1051 and 27.53(g); TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		8/24/2010	
Temperature: 24.2 °C	Air Pressure: 1005 hPa	Relative Humidity: 35 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.24 Spurious emission measurements in 3000.0 – 7500.0 MHz range at high carrier frequency, combined outputs



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:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks:			

7.6 Frequency stability test

7.6.1 General

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

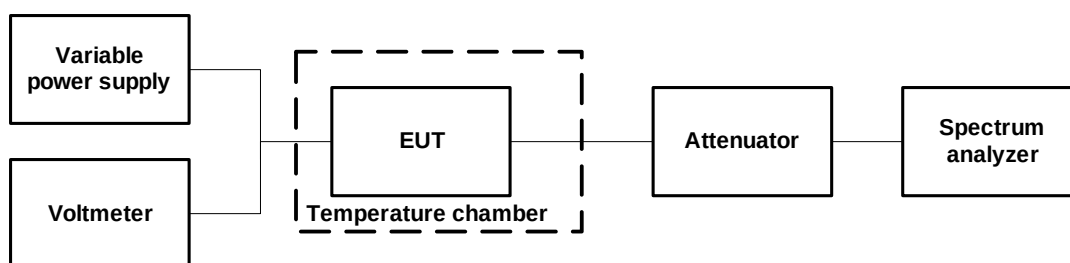
Table 7.6.1 Frequency stability limits

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

7.6.2 Test procedure

- 7.6.2.1 The EUT was set up as shown in Figure 7.6.1, energized and its proper operation was checked.
- 7.6.2.2 The EUT power was turned off. Temperature within test chamber was set to +30°C and a period of time sufficient to stabilize all of the oscillator circuit components was allowed.
- 7.6.2.3 The EUT was powered on and carrier frequency was measured at start up moment and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.
- 7.6.2.4 The above procedure was repeated at 0°C and at the lowest test temperature.
- 7.6.2.5 The EUT was powered on and carrier frequency was measured at start up moment and at the end of stabilization period at the rest of test temperatures and voltages. The EUT was powered off.
- 7.6.2.6 Frequency displacement was calculated and compared with the limit as provided in Table 7.6.2.

Figure 7.6.1 Frequency stability test setup



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:	8/25/2010		
Temperature: 23.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks:			

Table 7.6.2 Frequency stability test results

ASSIGNEDG FREQUENCY RANGE: 700.0 – 744.0 MHz
 NOMINAL POWER VOLTAGE: 48 VDC
 TEMPERATURE STABILIZATION PERIOD: 20 min
 POWER DURING TEMPERATURE TRANSITION: Off
 SPECTRUM ANALYZER MODE: Counter
 RESOLUTION BANDWIDTH: 10 Hz
 VIDEO BANDWIDTH: 30 Hz
 MODULATION: Unmodulated

T, °C	Voltage, V	Frequency, MHz							Max frequency drift, Hz		Max frequency drift, ppm	
		Start up	1st min	2nd min	3rd min	4th min	5th min	10th min	Positive	Negative	Positive	Negative
Low channel: 700.0 MHz												
-30	nominal	700.000100	700.000098	700.000010	700.000092	700.000090	700.000087	700.000066	106.00	0.00	0.15	0.00
-20	nominal	700.000086						700.000121	127.00	0.00	0.18	0.00
-10	nominal	700.000109						700.000162	168.00	0.00	0.24	0.00
0	nominal	700.000032	700.000067	700.000092	700.000100	700.000108	700.000112	700.000011	118.00	0.00	0.17	0.00
10	nominal	700.000082						700.000037	88.00	0.00	0.13	0.00
20	55.2	699.999999						699.999989	5.00	-5.00	0.01	-0.01
20	48.0	699.999997						699.999994	3.00	0.00	0.00	0.00
20	40.8	700.000004						699.999998	10.00	0.00	0.01	0.00
30	nominal	699.999997	699.999994	699.999987	699.999987	699.999987	699.999986	699.999986	3.00	-8.00	0.00	-0.01
40	nominal	700.000012						700.000023	29.00	0.00	0.04	0.00
50	nominal	699.999999	699.999995	699.999998	700.000007	700.000011	700.000048	700.000053	59.00	0.00	0.08	0.00
Mid channel: 719.0 MHz												
-30	nominal	719.000070	719.000071	719.000069	719.000070	719.000067	719.000068	719.000062	77.00	0.00	0.11	0.00
-20	nominal	719.000134						719.000147	153.00	0.00	0.21	0.00
-10	nominal	719.000100						719.000173	179.00	0.00	0.25	0.00
0	nominal	719.000090	719.000118	719.000125	719.000125	719.000120	719.000121	719.000104	131.00	0.00	0.18	0.00
10	nominal	718.999978						719.000032	38.00	-16.00	0.05	-0.02
20	55.2	718.999998						718.999988	4.00	-6.00	0.01	-0.01
20	48.0	718.999993						718.999994	0.00	-1.00	0.00	0.00
20	40.8	719.000004						718.999997	10.00	0.00	0.01	0.00
30	nominal	718.999987	718.999987	718.999987	718.999987	718.999987	718.999987	718.999987	0.00	-7.00	0.00	-0.01
40	nominal	718.999986						719.000014	20.00	-8.00	0.03	-0.01
50	nominal	718.999997	718.999999	719.000008	719.000007	719.000024	719.000048	719.000063	69.00	0.00	0.10	0.00
High channel: 744.0 MHz												
-30	nominal	744.000069	744.000068	744.000063	744.000068	744.000067	744.000067	744.000067	76.00	0.00	0.10	0.00
-20	nominal	743.999964						744.000135	142.00	-29.00	0.19	-0.04
-10	nominal	744.000092						744.000180	187.00	0.00	0.25	0.00
0	nominal	744.000160	744.000155	744.000154	744.000149	744.000141	744.000137	744.000134	167.00	0.00	0.22	0.00
10	nominal	743.999939						744.000034	41.00	-54.00	0.06	-0.07
20	55.2	744.000133						743.999988	140.00	-5.00	0.19	-0.01
20	48.0	743.999994						743.999993	1.00	0.00	0.00	0.00
20	40.8	744.000004						743.999997	11.00	0.00	0.01	0.00
30	nominal	743.999987	743.999987	743.999987	743.999987	743.999987	743.999987	743.999985	0.00	-8.00	0.00	-0.01
40	nominal	743.999980						743.999987	0.00	-13.00	0.00	-0.02
50	nominal	743.999997	743.999999	744.000010	744.000017	744.000044	744.000054	744.000072	79.00	0.00	0.11	0.00

NOTE: Frequency stability test results are sufficient enough to ensure that the fundamental emissions stay within the authorized bands of operation

* - Reference frequency

Reference numbers of test equipment used

HL 1424	HL 2386						
---------	---------	--	--	--	--	--	--

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-10	29-Jun-11
1424	Spectrum Analyzer, 30 Hz- 40 GHz	Agilent Technologies	8564EC	3946A00219	30-Aug-10	30-Aug-11
2013	Power Divider, 0.5-18.0 GHz, 80 W	Omni Spectra	2090-6204-00	2013	01-Dec-08	01-Dec-10
2015	Power Divider, 0.5-18.0 GHz, 80 W	Omni Spectra	2090-6204-00	2015	01-Dec-08	01-Dec-10
2386	Spike Generator 10us, 900 V	Hermon Laboratories	SG2/10	2368	27-May-10	27-May-11
2432	Antenna, Double-Ridged Waveguide Horn 1-18 GHz	EMC Test Systems	3115	00027177	11-Jun-10	11-Jun-11
2697	Antenna, 30 MHz - 3.0 GHz	Sunol Sciences Corp. Pleasanton, California USA	JB3	A022805	11-Jan-10	11-Jan-11
2780	EMC analyzer, 100 Hz to 26.5 GHz	Agilent Technologies	E7405A	MY45102462	07-Jul-10	07-Jul-11
2883	Cable, 18 GHz N-type, M-F, 3 m	Bird Electronic Corp.	TC-MNFN-3.0	211539003	01-Dec-09	01-Dec-10
3119	Cable, 18 GHz N-type, M-F, 3 m	Bird Electronic Corp.	TC-MNFN-3.0	211539004	29-Nov-09	29-Nov-10
3301	Power Meter, P-series, 50 MHz to 40 GHz	Agilent Technologies	N1911A	MY45101057	14-Dec-09	14-Dec-10
3302	Power sensor, P-Series, 50 MHz to 40 GHz, -35/30 to 20 dBm	Agilent Technologies	N1922A	MY45240586	14-Dec-09	14-Dec-10
3334	Filter, High Pass, 2.5 GHz	LORCH MICROWAVE	5HP7-2500-SR	Z22	05-Oct-09	05-Oct-10
3340	High Pass Filter, 50 Ohm, 1000 to 3000 MHz	Mini-Circuits	SHP-1000+	NA	05-Oct-09	05-Oct-10
3472	Cable, Coax, Microwave, DC-18 GHz, SMA-SMA, 1.0 m	Gore	GORE 65474	1003478	09-May-10	09-May-11
3473	Cable, Coax, Microwave, DC-18 GHz, SMA-SMA, 0.6 m	Gore	GORE 65474	1003478	09-May-10	09-May-11
3474	Cable, Coax, Microwave, DC-18 GHz, SMA-SMA, 0.6 m	Gore	GORE 65475	1640102	09-May-10	09-May-11
3761	Precision Fixed Attenuator, 50 Ohm, 5 W, 20 dB, DC to 18 GHz	Mini-Circuits	BW-S20W5+	NA	07-Dec-09	07-Dec-10
3781	Precision Fixed Attenuator, 50 Ohm, 5 W, 10 dB, DC to 18 GHz	Mini-Circuits	BW-S10W5+	NA	07-Dec-09	07-Dec-10
3787	Precision Fixed Attenuator, 50 Ohm, 5 W, 10 dB, DC to 18 GHz	Mini-Circuits	BW-S10W5+	NA	07-Dec-09	07-Dec-10
3818	PSA Series Spectrum Analyzer, 3 Hz- 44 GHz	Agilent Technologies	E4446A	MY48250288	25-Sep-09	25-Sep-10
3884	Preamplifier, 0.1 to 18 GHz, Gain 25 dB, N-type(f) in, N-type(m) out.	Agilent Technologies	87405C	MY47010418	13-Jan-10	13-Jan-11

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, IC 2186A-2 for anechoic chamber, IC 2186A-3 for full-anechoic chamber for RE measurements above 1 GHz), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, G-27 for full-anechoic chamber for RE measurements above 1 GHz, C-845 for conducted emissions site, T-1606 for conducted emissions at telecommunication ports), 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).

Address: P.O. Box 23, Binyamina 30500, Israel.
Telephone: +972 4628 8001
Fax: +972 4628 8277
e-mail: mail@hermonlabs.com
website: www.hermonlabs.com

Person for contact: Mr. Alex Usoskin, CEO.

11 APPENDIX D Specification references

FCC 47CFR part 27: 2009	Miscellaneous wireless communications services
FCC 47CFR part 1: 2009	Practice and procedure
FCC 47CFR part 2: 2009	Frequency allocations and radio treaty matters; general rules and regulations
ANSI C63.2: 1996	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4: 2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
ANSI/TIA/EIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

12 APPENDIX E Test equipment correction factors

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

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

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



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

Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain
30	22.2	-22.5	0.01	520	19.7	6.3	4.27	1215	24.9	7.0	5.05	1810	28.3	7.1	5.08	2405	30.9	6.9	4.93
35	18.5	-17.4	0.02	525	19.7	6.5	4.42	1220	24.9	7.0	4.99	1815	28.5	6.9	4.91	2410	30.9	6.9	4.89
40	14.7	-12.5	0.06	530	19.6	6.6	4.57	1225	25.1	6.9	4.91	1820	28.6	6.8	4.74	2415	31.0	6.9	4.85
45	11.3	-8.1	0.16	535	19.7	6.5	4.48	1230	25.2	6.8	4.92	1825	28.7	6.8	4.76	2420	31.0	6.8	4.82
45	11.3	-8.1	0.16	640	19.9	6.4	4.40	1235	25.1	7.0	4.96	1830	28.7	6.8	4.76	2425	31.1	6.8	4.81
50	8.9	-4.7	0.34	645	19.9	6.5	4.45	1240	25.0	7.1	5.09	1835	28.7	6.7	4.72	2430	31.0	6.9	4.87
55	7.9	-2.8	0.52	650	19.9	6.5	4.51	1245	25.0	7.1	5.12	1840	28.8	6.7	4.69	2435	31.0	6.9	4.88
60	7.8	-2.1	0.62	655	19.9	6.6	4.60	1250	25.0	7.1	5.15	1845	28.6	6.9	4.90	2440	31.2	6.8	4.74
65	8.5	2.0	0.63	660	19.9	6.7	4.69	1255	25.0	7.2	5.25	1850	28.4	7.1	5.12	2445	31.1	6.9	4.91
70	9.0	-1.9	0.64	665	19.9	6.7	4.70	1260	24.9	7.3	5.36	1855	28.5	7.0	5.07	2450	31.0	7.0	4.96
75	8.8	-1.1	0.78	670	20.0	6.7	4.71	1265	25.0	7.3	5.31	1860	28.6	7.0	5.01	2455	31.0	7.0	5.01
80	8.4	-0.2	0.97	675	20.1	6.7	4.71	1270	25.1	7.2	5.26	1865	28.5	7.1	5.17	2460	30.9	7.2	5.19
85	8.0	0.8	1.20	680	20.1	6.7	4.71	1275	25.3	7.0	5.05	1870	28.4	7.3	5.33	2465	31.1	6.9	4.96
90	8.2	1.1	1.29	685	20.1	6.5	4.79	1280	25.5	6.8	4.94	1875	28.4	7.2	5.28	2470	31.3	6.8	4.76
95	9.2	0.5	1.13	690	20.1	6.9	4.88	1285	25.4	7.0	4.97	1880	28.5	7.2	5.22	2475	31.4	6.7	4.69
100	10.6	-0.4	0.92	695	20.2	6.8	4.82	1290	25.3	7.1	5.10	1885	28.5	7.2	5.22	2480	31.3	6.8	4.79
110	12.6	-1.6	0.70	705	20.4	6.8	4.75	1300	25.2	7.3	5.33	1895	28.6	7.2	5.24	2490	31.1	7.0	4.99
120	13.9	-2.1	0.82	715	20.5	6.8	4.80	1310	25.5	7.1	5.09	1905	28.5	7.3	5.36	2500	30.9	7.2	5.27
125	14.2	2.0	0.83	720	20.5	6.9	4.85	1315	25.4	7.2	5.23	1910	28.5	7.4	5.45	2505	31.1	7.1	5.15
130	14.2	-1.7	0.68	725	20.6	6.8	4.81	1320	25.3	7.3	5.36	1915	28.5	7.3	5.38	2510	31.0	7.2	5.22
140	13.4	-0.3	0.94	735	20.9	6.7	4.65	1330	25.6	7.0	5.06	1925	28.6	7.3	5.35	2520	31.2	7.0	5.05
150	12.9	0.8	1.21	745	21.0	6.6	4.59	1340	25.7	7.1	5.09	1935	28.5	7.4	5.54	2530	31.0	7.3	5.37
160	12.7	1.6	1.44	755	21.0	6.8	4.74	1350	25.7	7.1	5.17	1945	28.5	7.5	5.59	2540	31.2	7.1	5.08
165	12.6	2.0	1.59	760	21.0	6.8	4.83	1355	25.8	7.0	5.06	1950	28.5	7.4	5.48	2545	31.0	7.3	5.43
170	12.2	2.6	1.83	765	21.1	6.8	4.73	1360	25.9	6.9	4.95	1955	28.6	7.5	5.57	2550	31.0	7.3	5.39
175	11.8	3.3	2.13	770	21.3	6.7	4.64	1365	26.0	6.9	4.95	1960	28.6	7.5	5.65	2555	31.1	7.2	5.30
180	11.6	3.7	2.36	775	21.3	6.7	4.68	1370	26.0	7.0	4.96	1965	28.7	7.4	5.47	2560	31.0	7.4	5.47
185	11.5	4.0	2.54	780	21.3	6.7	4.72	1375	26.0	7.0	5.01	1970	28.9	7.2	5.29	2565	30.8	7.6	5.70
190	11.6	4.2	2.61	785	21.3	6.7	4.77	1380	26.1	7.1	5.11	1975	28.9	7.3	5.32	2570	31.0	7.3	5.37
200	13.1	3.2	2.07	795	21.4	6.8	4.79	1390	26.1	6.9	4.92	1985	29.1	7.1	5.11	2580	31.6	6.9	4.87
205	12.0	4.4	2.76	800	21.5	6.8	4.77	1395	26.2	6.9	4.94	1990	29.1	7.0	5.06	2585	31.6	6.8	4.79
210	11.0	5.6	3.66	805	21.6	6.7	4.71	1400	26.2	7.0	4.96	1995	29.1	7.1	5.09	2590	31.6	6.9	4.88
215	11.3	5.6	3.59	810	21.7	6.7	4.65	1405	26.1	7.0	5.02	2000	29.1	7.1	5.11	2595	31.5	7.0	4.97
220	11.6	5.5	3.53	815	21.7	6.7	4.72	1410	26.1	7.1	5.09	2005	29.1	7.1	5.16	2600	31.6	6.9	4.86
225	11.7	5.5	3.55	820	21.7	6.8	4.80	1415	26.2	7.0	5.02	2010	29.1	7.1	5.15	2605	31.3	7.2	5.30
230	11.9	5.5	3.57	825	21.7	6.8	4.82	1420	26.3	7.0	4.96	2015	29.2	7.1	5.13	2610	31.4	7.1	5.15
235	12.1	5.5	3.56	830	21.7	6.9	4.85	1425	26.2	7.1	5.10	2020	29.2	7.1	5.18	2615	31.7	6.9	4.88
240	12.3	5.5	3.54	835	21.8	6.8	4.82	1430	26.1	7.2	5.25	2025	29.3	7.1	5.08	2620	31.6	7.0	4.97
245	12.3	5.7	3.71	840	21.9	6.8	4.80	1435	26.1	7.2	5.24	2030	29.3	7.0	5.05	2625	31.4	7.1	5.17
250	12.3	5.9	3.88	845	21.9	6.8	4.83	1440	26.2	7.2	5.24	2035	29.3	7.1	5.07	2630	31.6	7.0	5.00
255	12.5	5.9	3.85	850	21.9	6.8	4.86	1445	26.3	7.1	5.11	2040	29.3	7.1	5.13	2635	31.6	6.8	4.82
260	12.7	5.8	3.83	855	22.0	6.8	4.80	1450	26.5	7.0	4.98	2045	29.2	7.2	5.23	2640	31.7	7.0	4.98
265	13.2	5.5	3.64	860	22.1	6.8	4.74	1455	26.4	7.1	5.07	2050	29.2	7.2	5.27	2645	31.7	6.9	4.93
270	13.7	5.2	3.27	865	22.0	6.9	4.92	1460	26.4	7.1	5.17	2055	29.3	7.2	5.21	2650	31.8	6.9	4.85
275	13.7	5.3	3.39	870	21.9	7.1	5.11	1465	26.4	7.2	5.19	2060	29.5	7.0	5.02	2655	31.8	6.9	4.85
280	13.7	5.4	3.50	875	22.0	7.1	5.08	1470	26.4	7.2	5.22	2065	29.4	7.1	5.08	2660	31.7	7.0	5.02
285	13.6	5.6	3.61	880	22.0	7.0	5.05	1475	26.3	7.1	5.17	2070	29.4	7.1	5.10	2665	31.7	6.7	4.71
290	13.7	5.7	3.72	885	22.1	7.0	5.06	1480	26.5	7.1	5.12	2075	29.5	7.0	5.01	2670	32.0	6.7	4.67
295	13.8	5.8	3.77	890	22.1	7.0	5.06	1485	26.5	7.1	5.14	2080	29.8	6.8	4.76	2675	31.9	6.8	4.81
300	13.9	5.8	3.81	895	22.2	7.1	5.09	1490	26.5	7.1	5.17	2085	29.7	6.9	4.89	2680	31.7	7.0	5.04
305	14.0	5.9	3.85	900	22.2	7.1	5.12	1495	26.5	7.2	5.24	2090	29.7	6.9	4.86	2685	31.9	6.8	4.83
310	14.1	5.9	3.88	905	22.3	7.1	5.09	1500	26.5	7.2	5.31	2095	29.8	6.8	4.78	2690	32.1	6.7	4.72
315	14.3	5.9	3.89	910	22.3	7.0	5.05	1505	26.5	7.2	5.27	2100	29.9	6.8	4.75	2695	32.1	6.7	4.71
320	14.4	5.9	3.90	915	22.4	7.0	4.99	1510	26.6	7.2	5.23	2105	29.8	6.8	4.81	2700	32.0	6.8	4.81
325	14.5	5.9	3.92	920	22.6	6.9	4.92	1515	26.6	7.2	5.30	2110	29.9	6.8	4.78	2705	32.0	6.8	4.80
330	14.6	5.9	3.93	925	22.7	6.9	4.85	1520	26.5	7.3	5.38	2115	29.9	6.8	4.76	2710	32.1	6.8	4.79
335	14.7	6.0	4.02	930	22.8	6.8	4.77	1525	26.6	7.3	5.37	2120	29.9	6.8	4.84	2715	32.1	6.7	4.71
340	14.7	6.2	4.12	935	22.8	6.8	4.83	1530	26.6	7.3	5.36	2125	29.9	6.9	4.89	2720	32.4	6.5	4.47
345	14.8	6.1	4.06	940	22.9	6.8	4.89	1535	26.6	7.4	5.44	2130	29.9	6.8	4.90	2725	32.6	6.7	4.63
350	15.1	6.0	3.99	945	22.8	6.9	4.87	1540	26.5	7.4	5.53	2135	29.8	6.9	4.94	2730	31.9	7.0	5.05
355	15.3	5.9	3.88	950	22.9	6.9	4.85	1545	26.5	7.5	5.58	2140	29.8	7.1	5.08	2735	31.6	7.4	5.44
360	15.6	5.8	3.78	955	23.0	6.8	4.81	1550	26.5	7.5	5.63	2145	29.9	6.9	4.92	2740	31.6	7.1	5.46
365	15.5	5.9	3.89	960	23.1	6.8	4.77	1555	26.7	7.3	5.39	2150	29.9	7.0	4.98	2745	31.9	7.0	5.08
370	15.5	6.0	4.01	965	23.1	6.7	4.73	1560	26.9	7.1	5.16	2155	29.8	7.1	5.10	2750	32.0	6.9	4.94
375	15.6	6.1	4.03	970	23.2	6.7	4.69	1565	26.9	7.2	5.23	2160	29.8	7.1	5.08	2755	32.0	7.0	4.98
380	15.7	6.1	4.05	975	23.3	6.6	4.62	1570	26.9	7.2	5.30	2165	29.9	7.0	5.09	2760	32.0	7.0	5.06
385	15.7	6.2	4.15	980	23.5	6.6	4.54	1575	27.0	7.2	5.23	2170	29.9	7.1	5.07	2765	32.2	6.8	4.80
390	15.7	6.3	4.25	985	23.5	6.6	4.52	1580	27.0	7.1	5.17	2175	29.8	7.2	5.20	2770	32.3	6.8	4.73
395																			

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

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

Cable loss
Cable 18 GHz, N-type, M-F, 3 m, Bird Electronic Corp., model TC-MNFN-3.0, S/N 211539004
HL 3119

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	0.06	3600	1.34	7400	2.00	11200	2.48	15100	2.90
30	0.09	3700	1.36	7500	2.01	11300	2.45	15200	2.89
50	0.11	3800	1.37	7600	2.03	11400	2.51	15300	2.91
100	0.23	3900	1.39	7700	2.05	11500	2.45	15400	2.85
200	0.30	4000	1.39	7800	2.07	11600	2.49	15500	2.83
300	0.42	4100	1.42	7900	2.06	11700	2.51	15600	2.89
400	0.39	4200	1.45	8000	2.06	11800	2.50	15700	2.85
500	0.47	4300	1.47	8100	2.09	11900	2.52	15800	2.87
600	0.49	4400	1.49	8200	2.10	12000	2.48	15900	2.91
700	0.63	4500	1.51	8300	2.11	12100	2.53	16000	2.90
800	0.62	4600	1.53	8400	2.15	12200	2.54	16100	2.94
900	0.70	4700	1.55	8500	2.15	12300	2.56	16200	2.91
1000	0.70	4800	1.54	8600	2.17	12400	2.57	16300	2.96
1100	0.77	4900	1.57	8700	2.19	12500	2.57	16400	3.01
1200	0.78	5000	1.60	8800	2.20	12600	2.55	16500	3.01
1300	0.83	5100	1.60	8900	2.21	12700	2.50	16600	2.98
1400	0.86	5200	1.62	9000	2.22	12800	2.57	16700	3.00
1500	0.85	5300	1.65	9100	2.23	12900	2.57	16800	3.01
1600	0.94	5400	1.66	9200	2.25	13000	2.55	16900	3.06
1700	0.90	5500	1.69	9300	2.24	13100	2.62	17000	3.07
1800	0.90	5600	1.70	9400	2.28	13200	2.60	17100	3.09
1900	0.95	5700	1.72	9500	2.28	13300	2.67	17200	3.10
2000	0.97	5800	1.74	9600	2.27	13400	2.66	17300	3.11
2100	1.00	5900	1.75	9700	2.30	13500	2.71	17400	3.16
2200	1.02	6000	1.77	9800	2.30	13600	2.73	17500	3.15
2300	1.05	6100	1.79	9900	2.34	13700	2.73	17600	3.21
2400	1.08	6200	1.82	10000	2.32	13800	2.85	17700	3.21
2500	1.10	6300	1.83	10100	2.31	13900	2.83	17800	3.18
2600	1.13	6400	1.83	10200	2.31	14000	2.83	17900	3.25
2700	1.15	6500	1.87	10300	2.26	14100	2.83	18000	3.14
2800	1.17	6600	1.88	10400	2.32	14200	2.84		
2900	1.21	6700	1.90	10500	2.26	14300	2.90		
3000	1.22	6800	1.93	10600	2.26	14400	2.84		
3100	1.25	6900	1.92	10700	2.31	14600	2.88		
3200	1.27	7000	1.95	10800	2.24	14700	2.85		
3300	1.29	7100	1.96	10900	2.39	14800	2.92		
3400	1.28	7200	1.99	11000	2.41	14900	2.93		
3500	1.31	7300	2.00	11100	2.46	15000	2.83		

Cable loss
Cable coaxial, Microwave, SMA-SMA, 18 GHz, 1.0 m
Gore, HL 3472

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.01	5000	0.47	10200	0.72	15500	0.75
30	0.03	5100	0.47	10300	0.67	15600	0.89
50	0.04	5200	0.47	10400	0.77	15700	0.82
100	0.04	5300	0.47	10500	0.67	15800	0.89
200	0.08	5400	0.49	10600	0.74	15900	0.89
300	0.11	5500	0.48	10700	0.81	16000	0.93
400	0.11	5600	0.49	10800	0.77	16100	0.90
500	0.12	5700	0.49	10900	0.82	16200	0.92
600	0.14	5800	0.51	11000	0.86	16300	0.90
700	0.15	5900	0.50	11100	0.78	16400	0.94
800	0.16	6000	0.51	11200	0.82	16500	0.93
900	0.18	6100	0.53	11300	0.77	16600	0.95
1000	0.17	6200	0.52	11400	0.84	16700	0.98
1100	0.19	6300	0.53	11500	0.74	16800	1.00
1200	0.22	6400	0.54	11600	0.81	16900	0.94
1300	0.21	6500	0.55	11700	0.73	17000	1.00
1400	0.22	6600	0.54	11800	0.75	17100	0.93
1500	0.23	6700	0.57	11900	0.73	17200	1.00
1600	0.24	6800	0.54	12000	0.75	17300	0.93
1700	0.24	6900	0.58	12100	0.66	17400	0.93
1800	0.25	7000	0.58	12200	0.66	17500	0.96
1900	0.26	7100	0.58	12300	0.72	17600	0.94
2000	0.28	7200	0.61	12400	0.64	17700	0.99
2100	0.27	7300	0.59	12500	0.75	17800	0.97
2200	0.29	7400	0.55	12600	0.67	17900	0.90
2300	0.29	7500	0.63	12700	0.75	18000	0.78
2400	0.30	7600	0.60	12800	0.66		
2500	0.30	7700	0.61	12900	0.81		
2600	0.32	7800	0.64	13000	0.75		
2700	0.32	7900	0.60	13100	0.80		
2800	0.33	8000	0.58	13200	0.80		
2900	0.34	8100	0.61	13300	0.81		
3000	0.34	8200	0.62	13400	0.88		
3100	0.35	8300	0.62	13500	0.82		
3200	0.35	8400	0.68	13600	1.00		
3300	0.36	8500	0.63	13700	0.93		
3400	0.37	8600	0.61	13800	0.86		
3500	0.38	8700	0.63	13900	0.84		
3600	0.38	8800	0.62	14000	1.00		
3700	0.40	8900	0.64	14100	0.86		
3800	0.40	9000	0.62	14200	0.98		
3900	0.40	9100	0.64	14300	0.99		
4000	0.40	9200	0.62	14400	0.82		
4100	0.43	9300	0.62	14600	0.89		
4200	0.43	9400	0.62	14700	0.84		
4300	0.43	9500	0.63	14800	0.90		
4400	0.44	9600	0.64	14900	0.89		
4500	0.45	9700	0.60	15000	0.89		
4600	0.45	9800	0.65	15100	0.86		
4700	0.46	9900	0.60	15200	0.87		
4800	0.46	10000	0.67	15300	0.86		
4900	0.46	10100	0.69	15400	0.87		

Cable loss
Cable coaxial, Microwave, SMA-SMA, 18 GHz, 0.6 m
Gore, HL 3473

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.01	5000	0.48	10200	0.72	15500	0.85
30	0.03	5100	0.48	10300	0.70	15600	0.93
50	0.04	5200	0.48	10400	0.75	15700	0.87
100	0.04	5300	0.48	10500	0.68	15800	0.88
200	0.08	5400	0.50	10600	0.77	15900	0.94
300	0.11	5500	0.48	10700	0.80	16000	0.94
400	0.12	5600	0.50	10800	0.77	16100	0.99
500	0.13	5700	0.50	10900	0.85	16200	0.96
600	0.15	5800	0.52	11000	0.83	16300	0.96
700	0.15	5900	0.51	11100	0.79	16400	0.94
800	0.17	6000	0.52	11200	0.82	16500	0.94
900	0.19	6100	0.54	11300	0.79	16600	1.03
1000	0.18	6200	0.53	11400	0.81	16700	1.04
1100	0.20	6300	0.54	11500	0.76	16800	1.07
1200	0.22	6400	0.55	11600	0.78	16900	0.94
1300	0.22	6500	0.56	11700	0.74	17000	1.05
1400	0.23	6600	0.56	11800	0.76	17100	0.96
1500	0.24	6700	0.60	11900	0.79	17200	1.07
1600	0.25	6800	0.55	12000	0.74	17300	0.98
1700	0.25	6900	0.60	12100	0.69	17400	1.16
1800	0.26	7000	0.59	12200	0.69	17500	1.05
1900	0.27	7100	0.60	12300	0.75	17600	1.13
2000	0.29	7200	0.61	12400	0.66	17700	1.05
2100	0.28	7300	0.60	12500	0.76	17800	1.22
2200	0.30	7400	0.57	12600	0.70	17900	1.02
2300	0.30	7500	0.63	12700	0.77	18000	1.04
2400	0.31	7600	0.60	12800	0.69		
2500	0.31	7700	0.63	12900	0.79		
2600	0.33	7800	0.66	13000	0.81		
2700	0.33	7900	0.61	13100	0.83		
2800	0.35	8000	0.58	13200	0.80		
2900	0.35	8100	0.62	13300	0.82		
3000	0.35	8200	0.62	13400	0.90		
3100	0.35	8300	0.63	13500	0.85		
3200	0.36	8400	0.67	13600	1.04		
3300	0.38	8500	0.63	13700	0.93		
3400	0.38	8600	0.61	13800	0.91		
3500	0.40	8700	0.64	13900	0.89		
3600	0.40	8800	0.62	14000	0.96		
3700	0.40	8900	0.64	14100	0.88		
3800	0.41	9000	0.64	14200	1.01		
3900	0.41	9100	0.64	14300	0.99		
4000	0.41	9200	0.63	14400	0.83		
4100	0.45	9300	0.63	14600	0.88		
4200	0.43	9400	0.63	14700	0.91		
4300	0.46	9500	0.64	14800	0.91		
4400	0.44	9600	0.65	14900	0.88		
4500	0.47	9700	0.62	15000	0.89		
4600	0.46	9800	0.66	15100	0.91		
4700	0.47	9900	0.61	15200	0.88		
4800	0.47	10000	0.70	15300	0.94		
4900	0.48	10100	0.70	15400	0.91		

Cable loss
Cable coaxial, Microwave, SMA-SMA, 18 GHz, 0.6 m
Gore, HL 3474

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.00	5000	0.44	10200	0.72	15500	0.84
30	0.02	5100	0.44	10300	0.68	15600	0.95
50	0.03	5200	0.44	10400	0.75	15700	0.82
100	0.03	5300	0.44	10500	0.64	15800	0.94
200	0.07	5400	0.46	10600	0.75	15900	0.91
300	0.10	5500	0.45	10700	0.80	16000	0.91
400	0.11	5600	0.46	10800	0.77	16100	0.86
500	0.12	5700	0.47	10900	0.80	16200	0.86
600	0.14	5800	0.48	11000	0.79	16300	0.86
700	0.14	5900	0.48	11100	0.70	16400	0.84
800	0.15	6000	0.49	11200	0.76	16500	0.83
900	0.18	6100	0.51	11300	0.70	16600	0.87
1000	0.17	6200	0.50	11400	0.73	16700	0.90
1100	0.18	6300	0.50	11500	0.67	16800	0.91
1200	0.21	6400	0.51	11600	0.74	16900	0.90
1300	0.20	6500	0.51	11700	0.64	17000	0.97
1400	0.21	6600	0.52	11800	0.68	17100	0.94
1500	0.22	6700	0.54	11900	0.67	17200	1.01
1600	0.23	6800	0.51	12000	0.71	17300	0.97
1700	0.23	6900	0.55	12100	0.64	17400	1.02
1800	0.24	7000	0.54	12200	0.64	17500	1.06
1900	0.25	7100	0.55	12300	0.71	17600	1.01
2000	0.27	7200	0.55	12400	0.62	17700	1.10
2100	0.26	7300	0.54	12500	0.80	17800	1.16
2200	0.28	7400	0.52	12600	0.69	17900	1.12
2300	0.28	7500	0.58	12700	0.85	18000	1.00
2400	0.28	7600	0.56	12800	0.67		
2500	0.29	7700	0.57	12900	0.84		
2600	0.30	7800	0.62	13000	0.76		
2700	0.31	7900	0.57	13100	0.85		
2800	0.32	8000	0.55	13200	0.77		
2900	0.32	8100	0.59	13300	0.82		
3000	0.32	8200	0.59	13400	0.79		
3100	0.33	8300	0.60	13500	0.82		
3200	0.33	8400	0.66	13600	0.91		
3300	0.35	8500	0.60	13700	0.81		
3400	0.35	8600	0.59	13800	0.76		
3500	0.36	8700	0.59	13900	0.75		
3600	0.36	8800	0.58	14000	0.81		
3700	0.37	8900	0.60	14100	0.77		
3800	0.38	9000	0.60	14200	0.89		
3900	0.38	9100	0.60	14300	0.92		
4000	0.38	9200	0.57	14400	0.78		
4100	0.41	9300	0.57	14600	0.85		
4200	0.40	9400	0.58	14700	0.83		
4300	0.41	9500	0.60	14800	0.95		
4400	0.42	9600	0.62	14900	0.89		
4500	0.43	9700	0.58	15000	0.96		
4600	0.42	9800	0.63	15100	0.90		
4700	0.44	9900	0.58	15200	0.96		
4800	0.43	10000	0.67	15300	0.90		
4900	0.44	10100	0.69	15400	0.95		

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
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
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