HERMON LABORATORIES

ELECTRICAL TESTING
0839.01

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 CFR 47 PART 90 subpart Z and RSS-197 Issue 1:2010

FOR:

Alvarion Ltd.
BreezeCompact base station
Model: CMP.XT-BS-3.X
FCC ID:LKT-COMPACT3X
IC:2514A-COMPACT3X

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1 Applicant information

Client name:	Alvarion Ltd.
Address:	21A Habarzel street, Ramat Hachayal, Tel Aviv 69710, Israel
Telephone:	972 3645 7859
Fax:	972 3645 6222
E-mail:	moti.ezra@alvarion.com
Contact name:	Mr. Ezra Moti

2 Equipment under test attributes

Product name:	BreezeCompact base station
Product type:	Transceiver
Brand:	BreezeCompact
Model(s):	CMP.XT-BS-3.X
Serial number:	90119395
Hardware version:	REV 6
Software release:	Compact_4_0_0_51
Receipt date	5/20/2012

3 Manufacturer information

Manufacturer name:	Alvarion Ltd.
Address:	21A Habarzel street, Ramat Hachayal, Tel Aviv 69710, Israel
Telephone:	972 3645 7859
Fax:	972 3645 6222
E-Mail:	moti.ezra@alvarion.com
Contact name:	Mr. Ezra Moti

4 Test details

Project ID:	22854
Location:	Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started:	5/20/2012
Test completed:	5/24/2012
Test specification(s):	47CFR part 90 subpart Z; RSS-197 issue 1:2010

5 Tests summary

Test	Status
Transmitter characteristics	
Section 90.1321 / RSS-197, Section 5.6, Maximum conducted output power	Pass
Section 90.1321 / RSS-197, Section 5.6, Peak EIRP power density	Pass
Section 90.209 / RSS-197, Section 5.2, Occupied bandwidth	Pass
Section 90.210(b), Emission mask	Pass
Section 90.1323 / RSS-197, Section 5.7, Spurious emissions at RF antenna connector	Pass
Section 90.1323 / RSS-197, Section 5.7, Radiated spurious emissions	Pass
Section 90.213 / RSS-197, Section 5.7, Frequency stability	Pass
Section 90.1335 / RSS-Gen, Section 5.5, RF exposure	Pass, Exhibit attached to Application for certification
Receiver characteristics	
RSS-197, Section 5.8, Receiver spurious emissions	Pass

The product was approved under FCC ID:LKT-COMPACT3X and IC:2514A-COMPACT3X for operation in 3653.5 – 3671.5 MHz band with 7 MHz and 10 MHz channel bandwidth. Relevant tests to support 5 MHz channel bandwidth in 3652.5 – 3672.5 MHz band were performed.
The bandwidth change is software controlled, no hardware change was made.

This test report replaces the previously issued test report identified by Doc ID:ALVRAD_FCC.22854_RSS197.

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:	Mrs. E. Pitt, test engineer	May 24, 2012	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	May 29, 2012	
Approved by:	Mr. M. Nikishin, EMC and radio group manager	May 31, 2012	

6 EUT description

6.1 General information

The EUT, base station, is a part of Breeze Compact 3.X high capacity, IP services oriented Broadband Wireless Access system. The product is digital modulated TDD system covering 3400 MHz up to 3800 MHz range. The system contains a base station unit and a subscriber unit.
The basic base station system configuration is all outdoor-box configurations that contain a power supply, a modem and the radio part. No simultaneous operation of RF outputs is allowed.
The product was approved for operation in 3653.5 – 3671.5 MHz band with 7 MHz and 10 MHz channel bandwidth. The 5 MHz channel bandwidth for operation in 3652.5 – 3672.5 MHz band was added. The bandwidth change is software controlled, no hardware change was made.

6.2 Ports and lines

Port type	Port description	Connected from	Connected to	Qty.	Cable type	Cable length, m
Power	DC power	EUT	DC power supply	1	Shielded	10
Telecom	Ethernet 10M/100M/1G	EUT	Ethernet switch	1	Shielded	10
Telecom	Ethernet 100M/1G	EUT	Ethernet switch	1	Shielded	10
Signal	GPS OUT	EUT	GPS	1	Shielded	10
Signal	Sync/IN/OUT	EUT	Termination	1	Shielded	10
RF	Antenna	EUT	Subscriber unit**	1	Coax	10*
RF	Antenna	EUT	Not connected	3	NA	NA
Signal	USB	EUT	Not in use	1	NA	NA

* 0.3 m connected to antenna in field installation; 10-m cable connected to subscriber unit was used to provide the EUT performance during the tests.

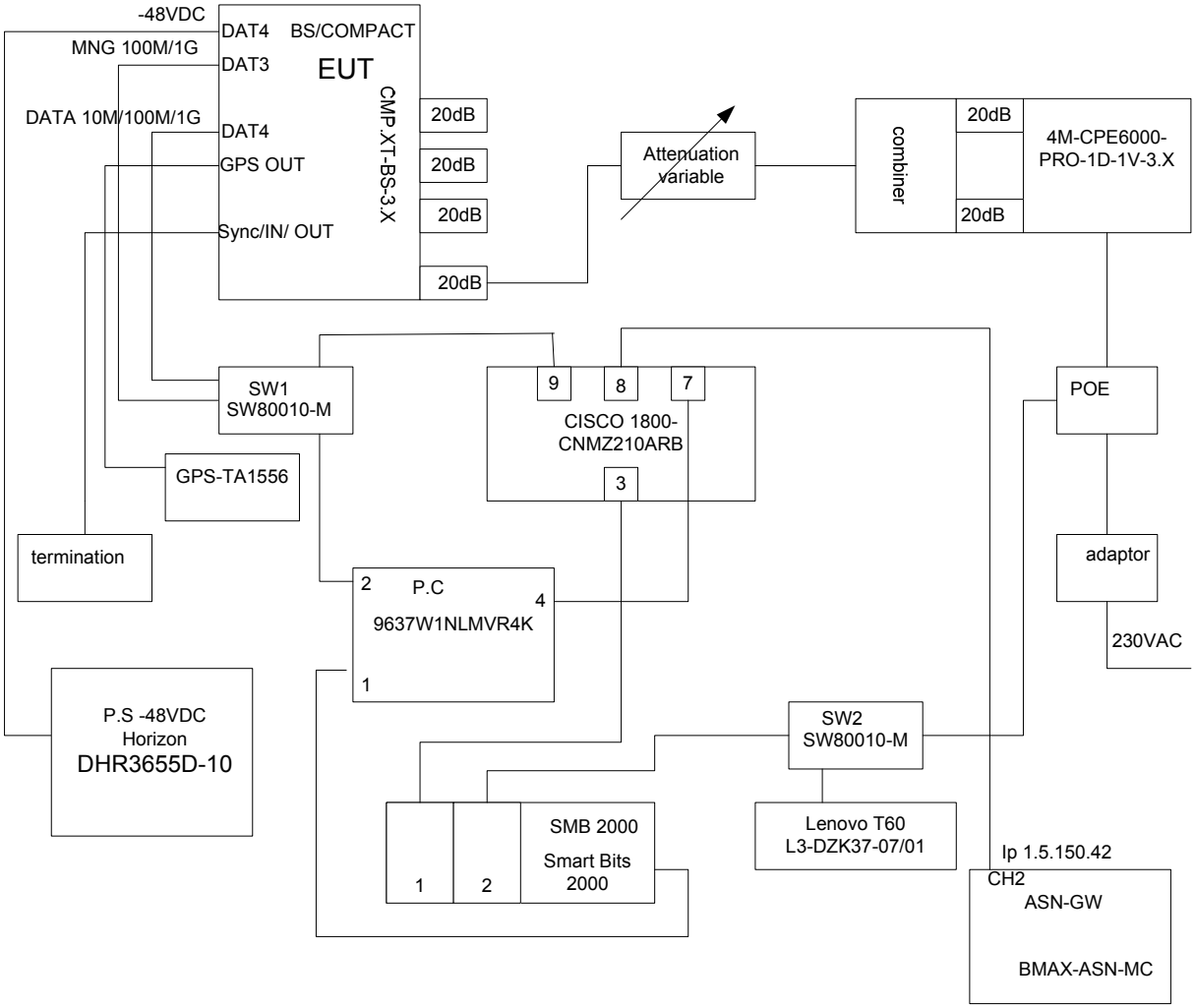
6.3 Auxiliary equipment

Description	Manufacturer	Model number	Serial number
Smart Bits	Spirent communication	Smart Bits 2000	63673610
Ethernet switch x 2	Dynamode	SW80010-M	NA
Subscriber unit	Alvarion	4M-CPE6000-PRO-1D-1V-3.X	NA
PC	Lenovo	NA	9637W1NLMVR4K
Laptop	Lenovo	T60	L3-dzk37-07/01
DC power suply	Horizon	DHR3655D-10	773352(Alvarion internal)
Hub	CISCO 1800	CNMZ210ARB	NA
GPS	Alvarion	TA1556	NA
ASN-GW	Alvarion	BMAX-ASN-MC	NA

6.4 Changes made in EUT

No changes were implemented in the EUT.

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		3650 – 3675 MHz					
Operating frequency range		3652.5 – 3672.5 MHz					
RF channel spacing		5 MHz, 7 MHz, 10 MHz					
Maximum rated output power		EIRP, total:				36.9 dBm for 5 MHz CS 38.4 dBm for 7 MHz CS 39.0 dBm for 10 MHz CBW	
Is transmitter output power variable?			No				
		V	Yes		continuous variable		
				V	stepped variable with stepsize	1 dB	
				minimum RF power		17 dBm	
				maximum RF power, total		19.4 dBm for 5 MHz CBW 20.9 dBm for 7 MHz CBW 21.5 dBm for 10 MHz CBW	
Antenna connection							
unique coupling		**V**	standard connector	**V**	Integral	**V**	with temporary RF connector
							without temporary RF connector

Antenna/s technical characteristics					
Type	Manufacturer	Model number	Gain	Feeder loss	Assembly gain
External sector antenna	Alpha Wireless	AW3023-PT	18 dBi	0.5 dB	17.5 dBi

Transmitter 99% power bandwidth, MHz		5 MHz, 7 MHz, 10 MHz			
Type of modulation		QPSK1/2, QPSK3/4, 16QAM1/2,16QAM3/4, 64QAM5/6			
Modulating test signal (baseband)		PRBS			
Maximum transmitter duty cycle in normal use		60%			
Transmitter power source					
		Nominal rated voltage		Battery type	
V	DC	**Nominal rated voltage**	48 V		
	AC mains	**Nominal rated voltage**		Frequency	
Common power source for transmitter and receiver			**V** yes	no	

Table 6.6.1 Type of modulation and bit rate

Modulation type	Bit rate, Mbps		
	EBW=5 MHz	EBW=7 MHz	EBW=10 MHz
QPSK 1/2	1.728000	2.304000	3.456000
QPSK 3/4	2.592000	3.456000	5.184000
QAM16 1/2	3.456000	4.608000	6.912000
QAM16 3/4	5.184000	6.912000	10.368000
QAM64 1/2	5.184000	6.912000	10.368000
QAM64 2/3	6.192000	9.216000	13.824000
QAM64 3/4	7.776000	10.368000	15.552000
QAM64 5/6	8.640000	11.520000	17.280000

Test specification:	Section 90.1321 / RSS-197, Section 5.6, Maximum conducted output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 20 ºC	Air Pressure: 1015 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

7 Transmitter tests according to 47CFR part 90 and RSS-197 requirements

7.1 Maximum output power

7.1.1 General

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

Table 7.1.1 Maximum output power limits

Assigned frequency range, MHz	Occupied bandwidth, MHz	Maximum peak output power, EIRP dBm	
		FCC part 90	RSS-197 (low population areas)
3650 – 3700	5	37.00	54.77
	7	38.45	56.23
	10	40.00	57.78

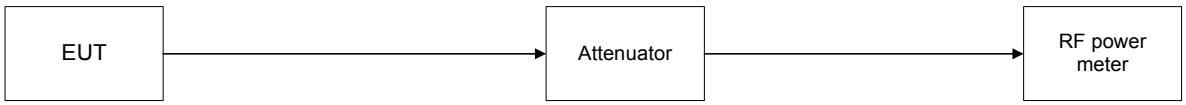
7.1.2 Test procedure

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 for end user RF output power.

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

Figure 7.1.1 Transmitter output power test setup



Test specification:	Section 90.1321 / RSS-197, Section 5.6, Maximum conducted output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 20 ºC	Air Pressure: 1015 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

Table 7.1.2 EIRP test results

OPERATING FREQUENCY RANGE: 3650 – 3675 MHz
DETECTOR USED: Average (Power Meter)
MODULATION: QPSK/64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
ANTENNA ASSEMBLY GAIN*: 17.5 dBi
CHANNEL BANDWITH: 5 MHz

FCC part 90

Carrier frequency, MHz	RF output power, dBm Ant. 1	Loss from antenna connector to power meter	Antenna gain, dBi	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
QPSK							
3652.5	19.37	included	17.5	36.87	37	-0.13	Pass
3662.5	19.04	Included	17.5	36.54	37	-0.46	Pass
3672.5	18.89	included	17.5	36.39	37	-0.61	Pass
64QAM							
3652.5	19.20	included	17.5	36.70	37	-0.30	Pass
3662.5	19.03	Included	17.5	36.53	37	-0.47	Pass
3672.5	18.89	included	17.5	36.39	37	-0.61	Pass

RSS-197 low population areas

Carrier frequency, MHz	RF output power, dBm Ant. 1	Loss from antenna connector to power meter	Antenna gain, dBi	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
QPSK							
3652.5	25.82	included	17.5	43.32	54.77	-11.45	Pass
3662.5	26.00	Included	17.5	43.50	54.77	-11.27	Pass
3672.5	25.86	included	17.5	43.36	54.77	-11.41	Pass
64QAM							
3652.5	25.90	included	17.5	43.40	54.77	-11.37	Pass
3662.5	25.86	Included	17.5	43.36	54.77	-11.41	Pass
3672.5	25.73	included	17.5	43.23	54.77	-11.54	Pass

* - Antenna assembly gain = Antenna gain (18 dBi) – minimum declared feeder loss (0.5dB)
** - EIRP total, dBm/MHz = RF output power calculated, dBm/MHz + Antenna Assembly Gain, dBi

Reference numbers of test equipment used

HL 2013	HL 3301	HL 3302	HL 3818				

Full description is given in Appendix A.

Test specification:	Section 90.1321 / RSS-197, Section 5.6, Maximum conducted output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 20 ºC	Air Pressure: 1015 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

Table 7.1.2 EIRP test results (continued)

OPERATING FREQUENCY RANGE: 3650 – 3675 MHz
DETECTOR USED: Average (Power Meter)
MODULATION: QPSK/64QAM
MODULATING SIGNAL: PRBS
BIT RATE: Maximum
ANTENNA ASSEMBLY GAIN*: 17.5 dBi
CHANNEL BANDWITH: 7 MHz

FCC part 90

Carrier frequency, MHz	RF output power, dBm	Loss from antenna connector to power meter	Antenna gain, dBi	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
	Ant. 1						
QPSK							
3653.5	20.90	included	17.5	38.40	38.45	-0.05	Pass
3662.5	20.75	Included	17.5	38.25	38.45	-0.20	Pass
3671.5	20.86	included	17.5	38.36	38.45	-0.09	Pass
64QAM							
3653.5	20.35	included	17.5	37.85	38.45	-0.60	Pass
3662.5	20.64	Included	17.5	38.14	38.45	-0.31	Pass
3671.5	20.90	included	17.5	38.40	38.45	-0.05	Pass

RSS-197 low population areas

Carrier frequency, MHz	RF output power, dBm	Loss from antenna connector to power meter	Antenna gain, dBi	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
	Ant. 1						
QPSK							
3653.5	27.24	included	17.5	44.74	56.23	-11.49	Pass
3662.5	27.99	Included	17.5	45.49	56.23	-10.74	Pass
3671.5	28.10	included	17.5	45.60	56.23	-10.63	Pass
64QAM							
3653.5	27.64	included	17.5	45.14	56.23	-11.09	Pass
3662.5	28.00	Included	17.5	45.50	56.23	-10.73	Pass
3671.5	27.94	included	17.5	45.44	56.23	-10.79	Pass

* - Antenna assembly gain, dBi = Antenna gain (18 dBi) – minimum declared feeder loss (0.5 dB)
** - EIRP total, dBm = RF output power, dBm + Antenna assembly gain, dBi

Test specification:	Section 90.1321 / RSS-197, Section 5.6, Maximum conducted output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 20 ºC	Air Pressure: 1015 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

Table 7.1.2 EIRP test results (continued)

CHANNEL BANDWITH: 10 MHz

FCC part 90

Carrier frequency, MHz	RF output power, dBm	Loss from antenna connector to power meter	Antenna gain, dBi	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
	Ant. 1						
QPSK							
3655.0	21.15	included	17.5	38.65	40.00	-1.35	Pass
3662.5	21.07	Included	17.5	38.57	40.00	-1.43	Pass
3670.0	21.48	included	17.5	38.98	40.00	-1.02	Pass
64QAM							
3655.0	19.90	included	17.5	37.40	40.00	-2.60	Pass
3662.5	19.90	Included	17.5	37.90	40.00	-2.10	Pass
3670.0	20.22	included	17.5	37.72	40.00	-2.28	Pass

RSS-197 low population areas

Carrier frequency, MHz	RF output power, dBm	Loss from antenna connector to power meter	Antenna gain, dBi	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
	Ant. 1						
QPSK							
3655.0	28.46	included	17.5	45.96	57.78	-11.82	Pass
3662.5	28.73	Included	17.5	46.23	57.78	-11.55	Pass
3670.0	28.59	included	17.5	46.09	57.78	-11.69	Pass
64QAM							
3655.0	27.10	included	17.5	44.60	57.78	-13.18	Pass
3662.5	27.06	Included	17.5	44.56	57.78	-13.22	Pass
3670.0	27.44	included	17.5	44.94	57.78	-12.84	Pass

* - Antenna assembly gain, dBi = Antenna gain (18 dBi) – minimum declared feeder loss (0.5 dB)
** - EIRP total, dBm = RF output power, dBm + Antenna assembly gain, dBi

Reference numbers of test equipment used

HL 2013	HL 3301	HL 3302	HL 3818	HL 4289			

Full description is given in Appendix A.

Test specification:	Section 90.1321 / RSS-197, Section 5.6, Peak EIRP power density		
Test procedure:	47 CFR, Sections 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

7.2 Peak EIRP power density

7.2.1 General

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

Table 7.2.1 Peak power density limits

Assigned frequency range, MHz	Occupied bandwidth, MHz	Maximum peak power spectral density, EIRP dBm	
		FCC 90	RSS-197 (low population areas)
3650.0 – 3675.0	5, 7; 10	30	47.78

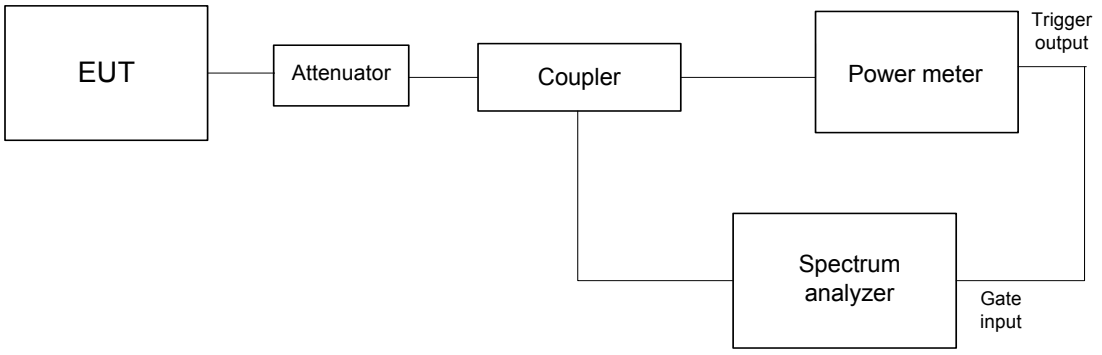
7.2.2 Test procedure

7.2.2.1 The EUT was set up as shown in Figure 7.2.1Figure 7.1.1, energized and its proper operation was checked.

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

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

Figure 7.2.1 Peak power density test setup



Test specification:	Section 90.1321 / RSS-197, Section 5.6, Peak EIRP power density		
Test procedure:	47 CFR, Sections 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

Table 7.2.2 Peak EIRP power density test results

OPERATING FREQUENCY RANGE:	3650.0 – 3675.0 MHz
DETECTOR USED:	Average (RMS)
RESOLUTION BANDWIDTH:	1000 kHz
VIDEO BANDWIDTH:	3000 kHz
MODULATING SIGNAL:	PRBS
EMISSION BANDWIDTH	5 MHz

FCC part 90

Channel, MHz	Modulation	Power density dBm/MHz	Antenna gain, dBi	EIRP power density*, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
3652.5	QPSK	11.56	17.5	29.06	30	-0.94	Pass
3662.5	QPSK	11.86	17.5	29.36	30	-0.64	Pass
3672.5	QPSK	11.54	17.5	29.04	30	-0.96	Pass
3652.5	64QAM	11.57	17.5	29.07	30	-0.93	Pass
3662.5	64QAM	11.66	17.5	29.16	30	-0.84	Pass
3672.5	64QAM	11.23	17.5	28.73	30	-0.27	Pass

RSS-197 low population areas

Channel, MHz	Modulation	Power density dBm/MHz	Antenna gain, dBi	EIRP power density *, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
3652.5	QPSK	18.12	17.5	35.62	47.78	-12.16	Pass
3662.5	QPSK	18.13	17.5	35.63	47.78	-12.15	Pass
3672.5	QPSK	18.06	17.5	35.56	47.78	-12.22	Pass
3652.5	64QAM	18.04	17.5	35.54	47.78	-12.24	Pass
3662.5	64QAM	18.20	17.5	35.70	47.78	-12.08	Pass
3672.5	64QAM	17.56	17.5	35.06	47.78	-12.72	Pass

Test specification:	Section 90.1321 / RSS-197, Section 5.6, Peak EIRP power density		
Test procedure:	47 CFR, Sections 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

Table 7.2.2 Peak EIRP power density test results (continued)

EMISSION BANDWIDTH 7 MHz

FCC part 90

Channel, MHz	Modulation	Power density dBm/MHz	Antenna gain, dBi	EIRP power density*, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
3653.5	QPSK	12.34	17.5	29.84	30	-0.16	Pass
3662.5	QPSK	11.75	17.5	29.25	30	-0.75	Pass
3671.5	QPSK	11.92	17.5	29.42	30	-0.58	Pass
3653.5	64QAM	12.15	17.5	29.65	30	-0.35	Pass
3662.5	64QAM	11.79	17.5	29.29	30	-0.71	Pass
3671.5	64QAM	12.37	17.5	29.87	30	-0.13	Pass

RSS-197 low population areas

Channel, MHz	Modulation	Power density dBm/MHz	Antenna gain, dBi	EIRP power density *, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
3653.5	QPSK	18.53	17.5	36.03	47.78	-11.75	Pass
3662.5	QPSK	18.81	17.5	36.31	47.78	-11.47	Pass
3671.5	QPSK	18.93	17.5	36.43	47.78	-11.35	Pass
3653.5	64QAM	18.87	17.5	36.37	47.78	-11.41	Pass
3662.5	64QAM	19.21	17.5	36.71	47.78	-11.07	Pass
3671.5	64QAM	19.67	17.5	37.17	47.78	-10.61	Pass

Test specification:	Section 90.1321 / RSS-197, Section 5.6, Peak EIRP power density		
Test procedure:	47 CFR, Sections 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

Table 7.2.2 Peak EIRP power density test results (continued)

EMISSION BANDWIDTH 10 MHz

FCC part 90

Channel, MHz	Modulation	Power density dBm/MHz	Antenna gain, dBi	EIRP power density*, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
3655.0	QPSK	10.44	17.5	27.94	30	-2.06	Pass
3662.5	QPSK	8.21	17.5	25.71	30	-4.29	Pass
3670.0	QPSK	10.29	17.5	27.79	30	-2.21	Pass
3655.0	64QAM	12.04	17.5	29.54	30	-0.46	Pass
3662.5	64QAM	8.81	17.5	26.31	30	-3.69	Pass
3670.0	64QAM	6.40	17.5	23.90	30	-6.10	Pass

RSS-197 low population areas

Channel, MHz	Modulation	Power density dBm/MHz	Antenna gain, dBi	EIRP power density*, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
3655.0	QPSK	23.297	17.5	40.80	47.78	-6.98	Pass
3662.5	QPSK	24.360	17.5	41.86	47.78	-5.92	Pass
3670.0	QPSK	24.668	17.5	42.17	47.78	-5.61	Pass
3655.0	64QAM	22.331	17.5	39.83	47.78	-7.95	Pass
3662.5	64QAM	23.143	17.5	40.64	47.78	-7.14	Pass
3670.0	64QAM	22.551	17.5	40.05	47.78	-7.73	Pass

* - EIRP power density, dBm/MHz = Power density*, dBm/MHz + Antenna gain, dBi

Reference numbers of test equipment used

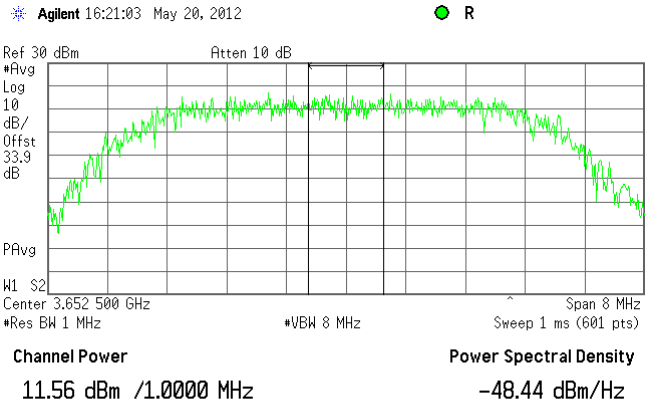
HL 2013	HL 3301	HL 3302	HL 3818	HL 4289			

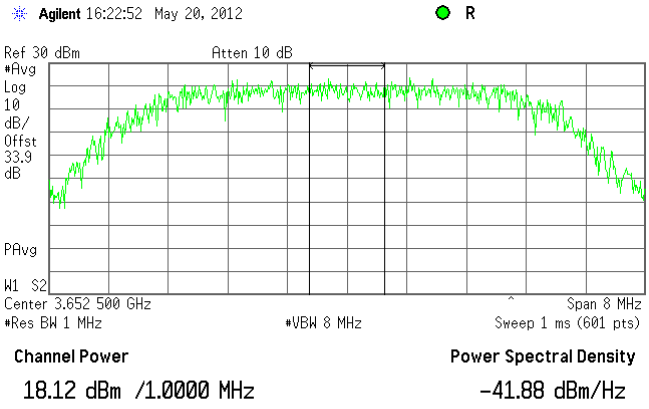
Full description is given in Appendix A.

Test specification:	Section 90.1321 / RSS-197, Section 5.6, Peak EIRP power density		
Test procedure:	47 CFR, Sections 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.1 Peak output power density test results at low frequency

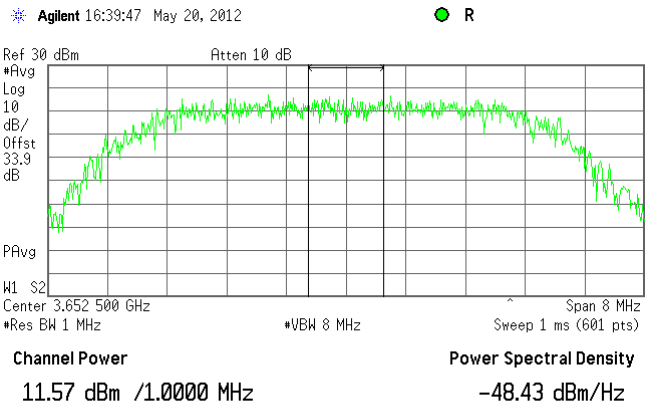
CARRIER FREQUENCY:	3652.5 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION	QPSK
FCC PART 90	**RSS-197 LOW POPULATION AREAS**

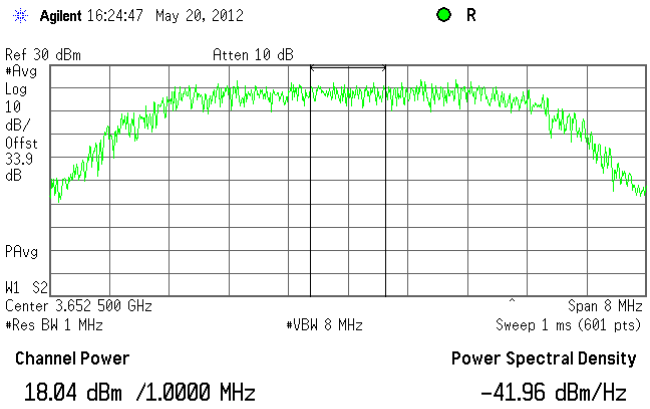




Plot 7.2.2 Peak output power density test results at low frequency

CARRIER FREQUENCY:	3652.5 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION	64QAM
FCC PART 90	**RSS-197 LOW POPULATION AREAS**

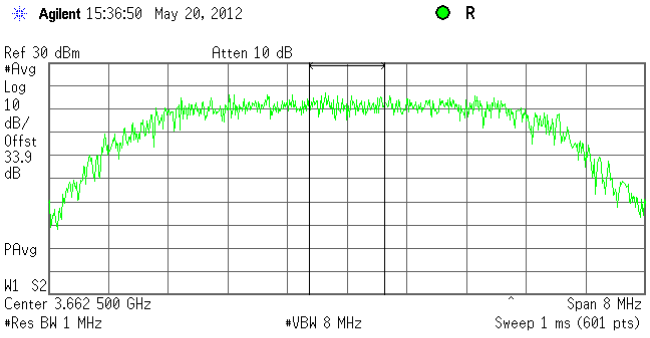


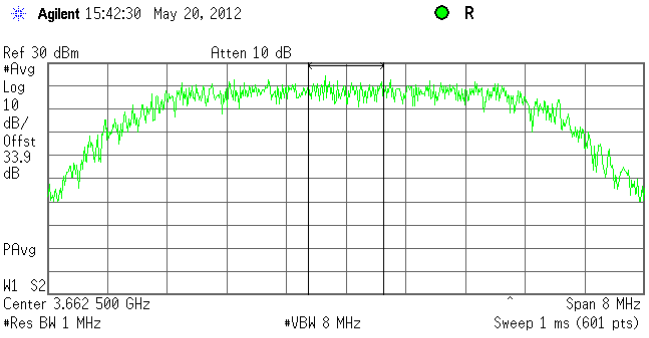


Test specification:	Section 90.1321 / RSS-197, Section 5.6, Peak EIRP power density		
Test procedure:	47 CFR, Sections 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.3 Peak output power density test results at mid frequency

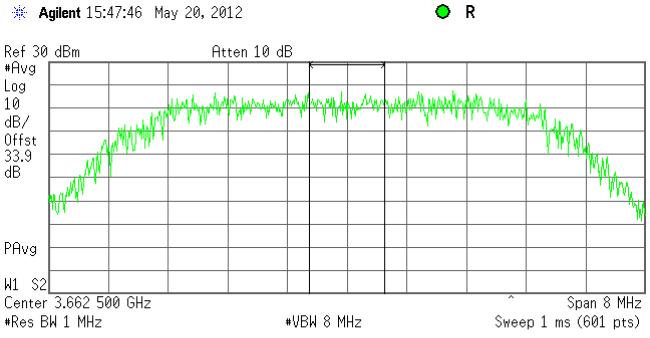
CARRIER FREQUENCY:	3662.5 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION	QPSK
FCC PART 90	**RSS-197 LOW POPULATION AREAS**

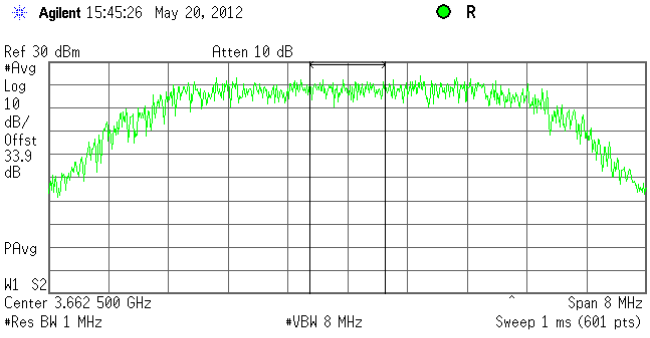




Plot 7.2.4 Peak output power density test results at mid frequency

CARRIER FREQUENCY:	3662.5 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION	64QAM
FCC PART 90	**RSS-197 LOW POPULATION AREAS**

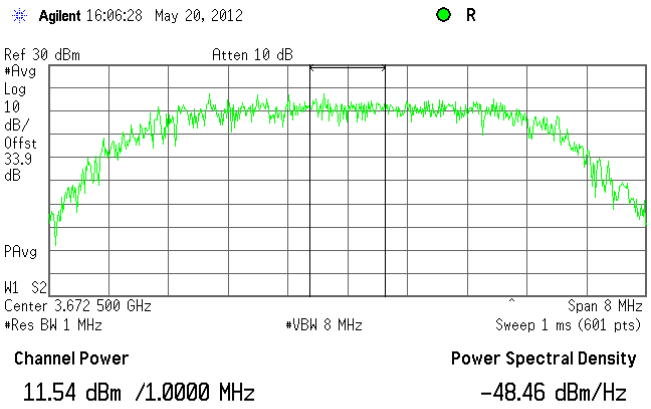


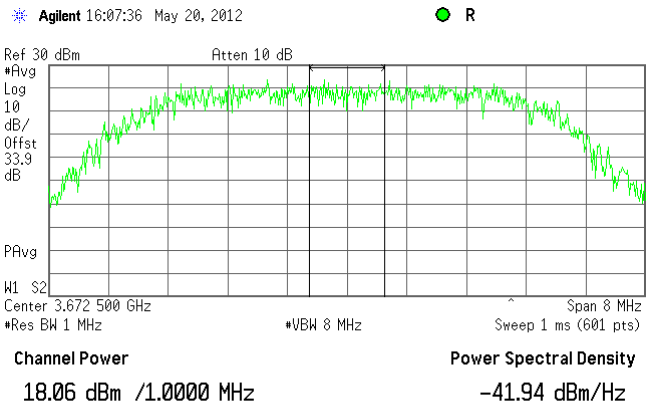


Test specification:	Section 90.1321 / RSS-197, Section 5.6, Peak EIRP power density		
Test procedure:	47 CFR, Sections 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.5 Peak output power density test results at high frequency

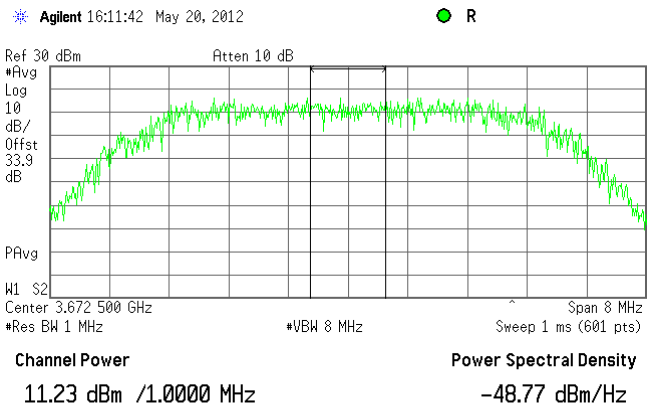
CARRIER FREQUENCY:	3672.5 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION:	QPSK
FCC PART 90	**RSS-197 LOW POPULATION AREAS**

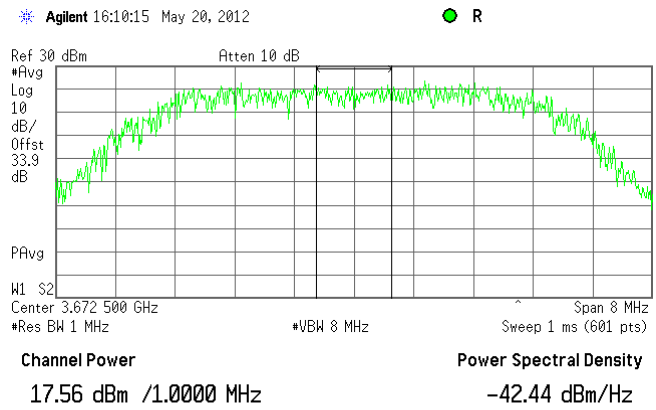




Plot 7.2.6 Peak output power density test results at high frequency

CARRIER FREQUENCY:	3672.5 MHz
EMISSION BANDWIDTH:	5 MHz
MODULATION:	64QAM
FCC PART 90	**RSS-197 LOW POPULATION AREAS**

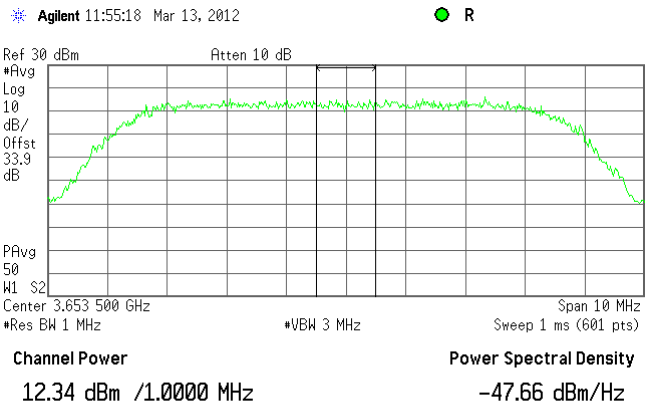


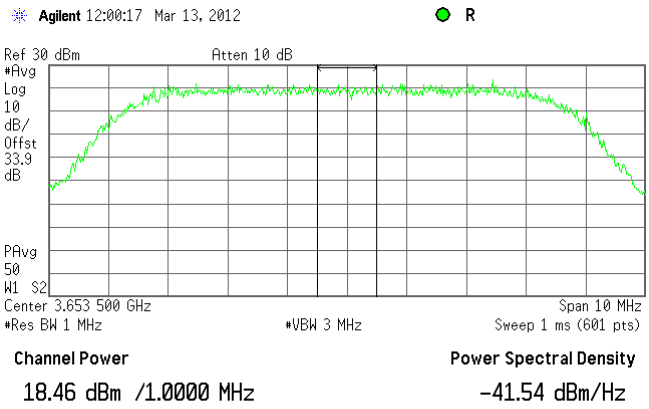


Test specification:	Section 90.1321 / RSS-197, Section 5.6, Peak EIRP power density		
Test procedure:	47 CFR, Sections 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.7 Peak output power density test results at low frequency

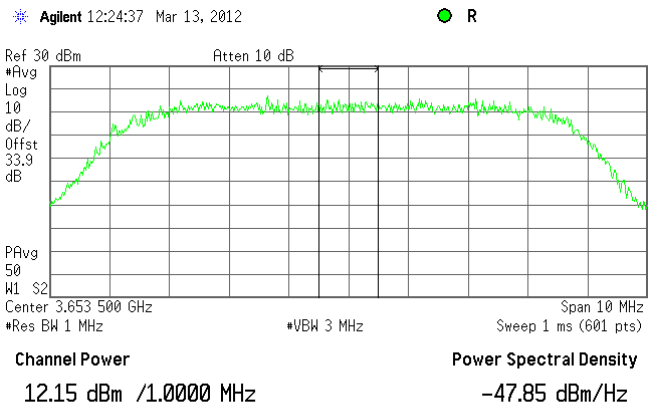
CARRIER FREQUENCY:	3653.5 MHz
EMISSION BANDWIDTH:	7 MHz
MODULATION	QPSK
FCC PART 90	**RSS-197 LOW POPULATION AREAS**

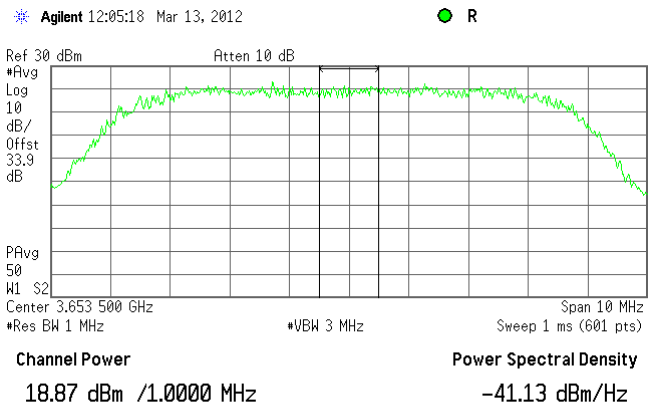




Plot 7.2.8 Peak output power density test results at low frequency

CARRIER FREQUENCY:	3653.5 MHz
EMISSION BANDWIDTH:	7 MHz
MODULATION	64QAM
FCC PART 90	**RSS-197 LOW POPULATION AREAS**

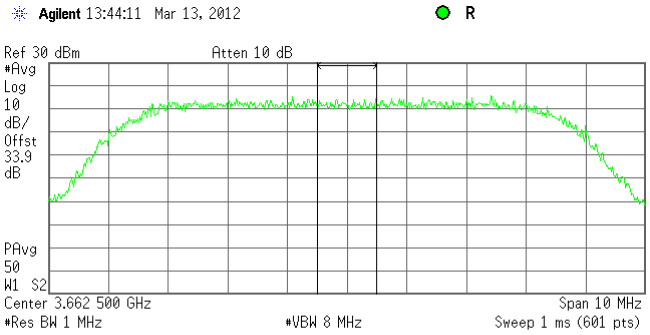


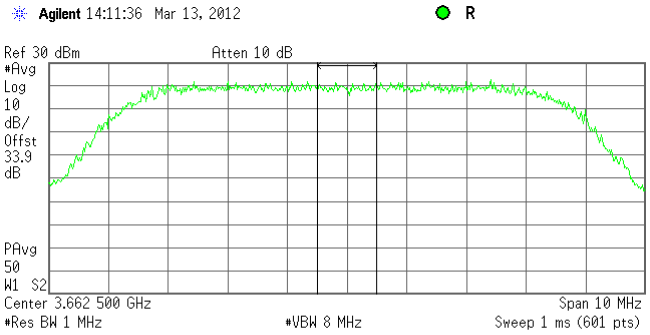


Test specification:	Section 90.1321 / RSS-197, Section 5.6, Peak EIRP power density		
Test procedure:	47 CFR, Sections 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.9 Peak output power density test results at mid frequency

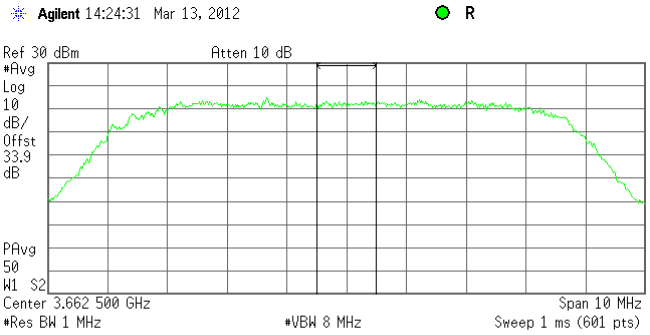
CARRIER FREQUENCY:	3662.5 MHz
EMISSION BANDWIDTH:	7 MHz
MODULATION	QPSK
FCC PART 90	**RSS-197 LOW POPULATION AREAS**

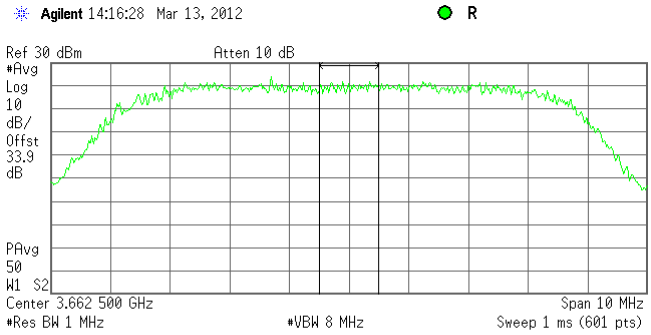




Plot 7.2.10 Peak output power density test results at mid frequency

CARRIER FREQUENCY:	3662.5 MHz
EMISSION BANDWIDTH:	7 MHz
MODULATION	64QAM
FCC PART 90	**RSS-197 LOW POPULATION AREAS**

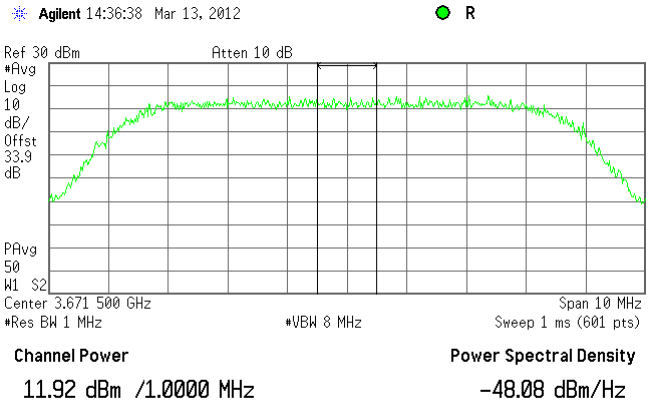


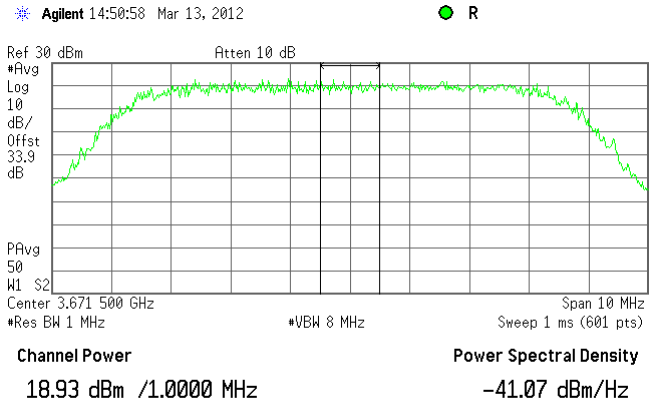


Test specification:	Section 90.1321 / RSS-197, Section 5.6, Peak EIRP power density		
Test procedure:	47 CFR, Sections 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.11 Peak output power density test results at high frequency

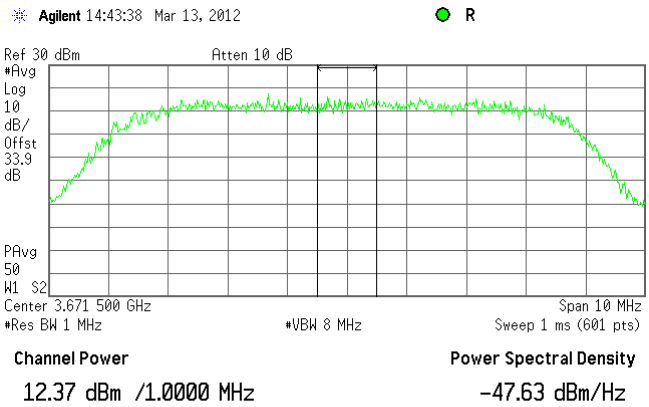
CARRIER FREQUENCY:	3671.5 MHz
EMISSION BANDWIDTH:	7 MHz
MODULATION:	QPSK
FCC PART 90	**RSS-197 LOW POPULATION AREAS**

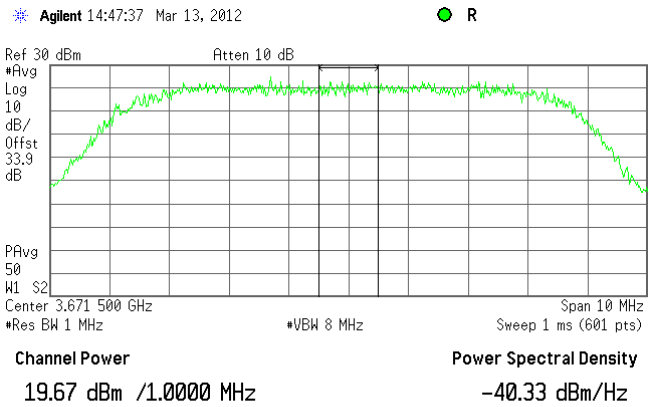




Plot 7.2.12 Peak output power density test results at high frequency

CARRIER FREQUENCY:	3671.5 MHz
EMISSION BANDWIDTH:	7 MHz
MODULATION:	64QAM
FCC PART 90	**RSS-197 LOW POPULATION AREAS**

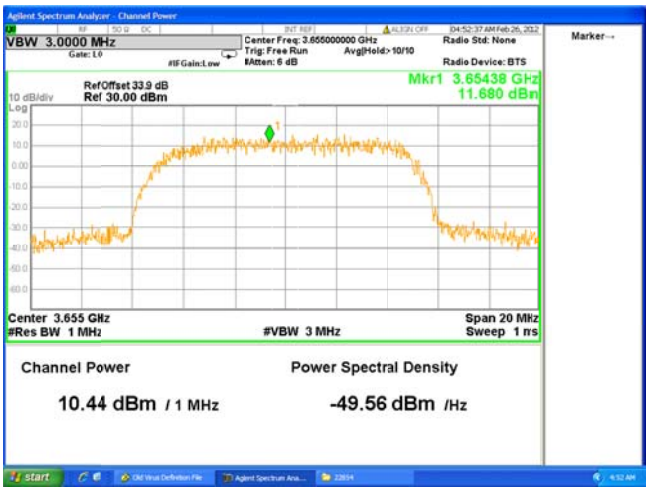


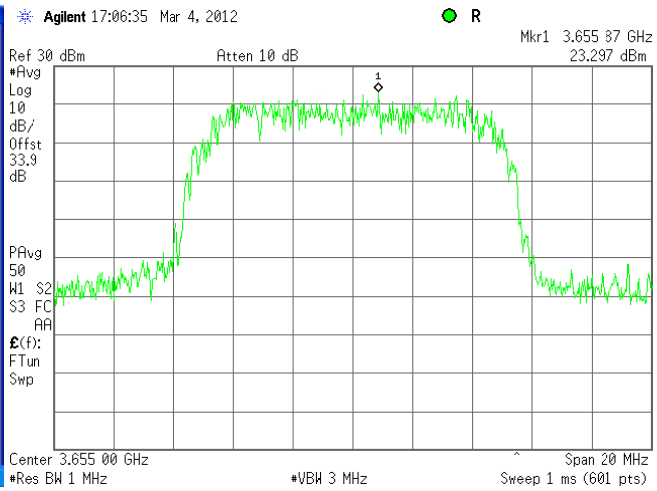


Test specification:	Section 90.1321 / RSS-197, Section 5.6, Peak EIRP power density		
Test procedure:	47 CFR, Sections 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.13 Peak output power density test results at low frequency

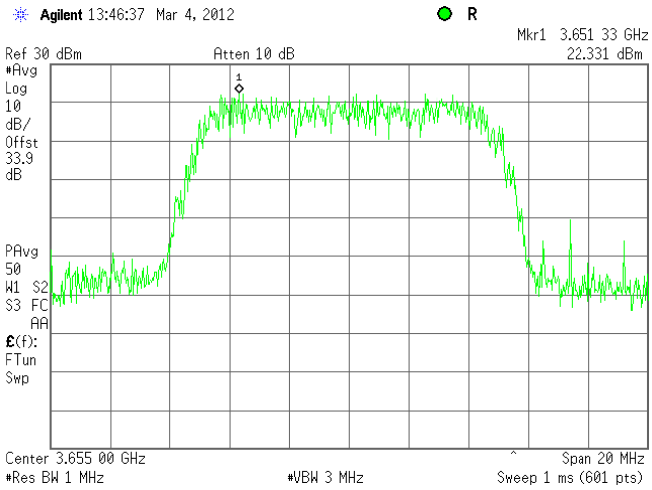
CARRIER FREQUENCY:	3655 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION	QPSK
FCC PART 90	**RSS-197 LOW POPULATION AREAS**





Plot 7.2.14 Peak output power density test results at low frequency

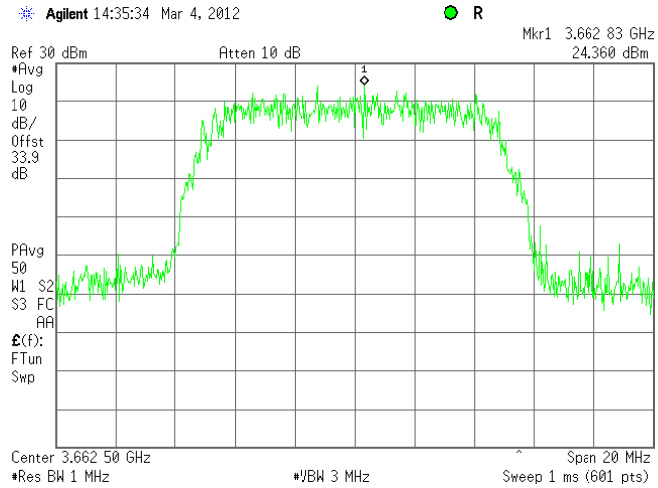
CARRIER FREQUENCY:	3655 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION	64QAM
FCC PART 90	**RSS-197 LOW POPULATION AREAS**



Test specification:	Section 90.1321 / RSS-197, Section 5.6, Peak EIRP power density		
Test procedure:	47 CFR, Sections 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

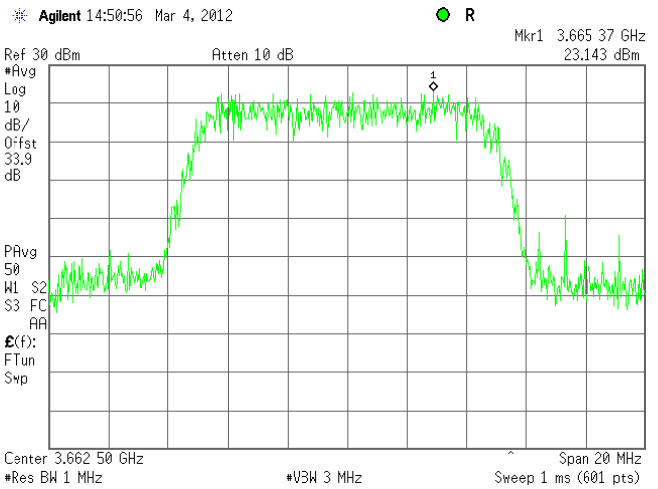
Plot 7.2.15 Peak output power density test results at mid frequency

CARRIER FREQUENCY:	3662.5 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION	QPSK
FCC PART 90	**RSS-197 LOW POPULATION AREAS**



Plot 7.2.16 Peak output power density test results at mid frequency

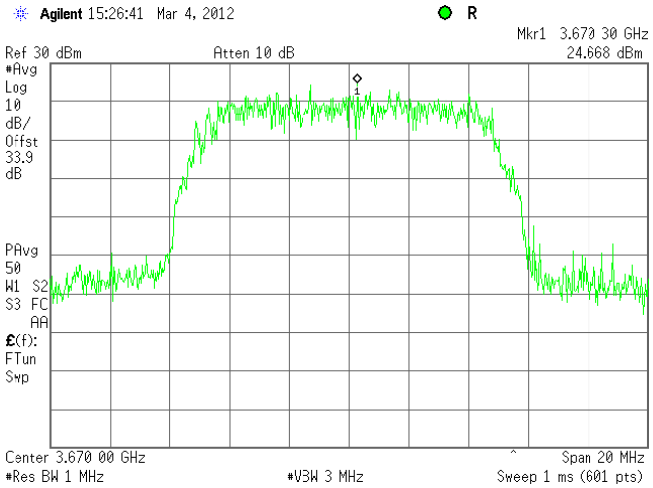
CARRIER FREQUENCY:	3662.5 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION	64QAM
FCC PART 90	**RSS-197 LOW POPULATION AREAS**



Test specification:	Section 90.1321 / RSS-197, Section 5.6, Peak EIRP power density		
Test procedure:	47 CFR, Sections 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

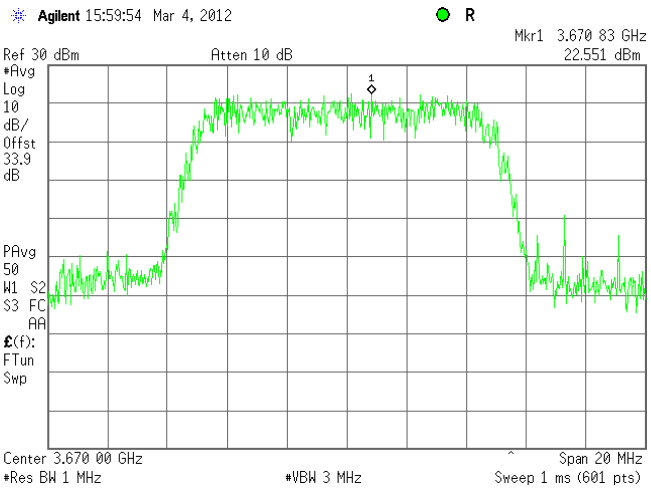
Plot 7.2.17 Peak output power density test results at high frequency

CARRIER FREQUENCY:	3670 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION:	QPSK
FCC PART 90	**RSS-197 LOW POPULATION AREAS**



Plot 7.2.18 Peak output power density test results at high frequency

CARRIER FREQUENCY:	3670 MHz
EMISSION BANDWIDTH:	10 MHz
MODULATION:	64QAM
FCC PART 90	**RSS-197 LOW POPULATION AREAS**



Test specification:	Section 90.209 / RSS-197, Section 5.2, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 21 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

7.3 Occupied bandwidth test

7.3.1 General

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

Table 7.3.1 Occupied bandwidth limits

FCC part 90

Assigned frequency, MHz	Modulation envelope reference points*, dBc	Maximum allowed bandwidth, MHz
3650.0 – 3675.0	26	NA

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

RSS-197

Assigned frequency, MHz	Modulation envelope reference points	Maximum allowed bandwidth, MHz
3650.0 – 3675.0	99% EBW	NA

7.3.2 Test procedure

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

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

7.3.2.3 The transmitter occupied bandwidth was measured with spectrum analyzer as a frequency delta between the reference points on modulation envelope and provided in Table 7.3.2 and the associated plots.

Figure 7.3.1 Occupied bandwidth test setup

Test specification:	Section 90.209 / RSS-197, Section 5.2, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 21 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

Table 7.3.2 Occupied bandwidth test results

RESOLUTION BANDWIDTH: 0.5-2% of the Emission bandwidth
VIDEO BANDWIDTH: 10 times RBW
MODULATION ENVELOPE REFERENCE POINTS: 26 dB below total average power
MODULATING SIGNAL: PRBS
EMISSION BANDWIDTH 5 MHz

Carrier frequency, MHz	Modulation	Occupied bandwidth 99%, MHz		Occupied bandwidth 26 dBc MHz	Verdict
		Other than low population area	Low population area		
3652.5	QPSK	4.5478	4.5436	4.783	NA
3662.5		4.5981	4.5503	4.810	
3672.5		4.5993	4.5997	4.814	
3652.5	64QAM	4.5189	4.4706	4.771	NA
3662.5		4.4600	4.4623	4.780	
3672.5		4.4684	4.4650	4.726	

EMISSION BANDWIDTH 7 MHz

Carrier frequency, MHz	Modulation	Occupied bandwidth 99%, MHz		Occupied bandwidth 26 dBc MHz	Verdict
		Other than low population area	Low population area		
3653.5	QPSK	6.4733	6.5412	6.817	NA
3662.5		6.4770	6.4977	6.815	
3671.5		6.5222	6.5100	6.817	
3653.5	64QAM	6.5033	6.5016	6.834	NA
3662.5		6.5187	6.5092	6.814	
3671.5		6.5062	6.5061	6.817	

EMISSION BANDWIDTH 10 MHz

Carrier frequency, MHz	Modulation	Occupied bandwidth 99%, MHz		Occupied bandwidth 26 dBc MHz	Verdict
		Other than low population area	Low population area		
3655.0	QPSK	9.1842	9.0767	9.716	NA
3662.5		9.2400	9.2328	9.746	
3670.0		9.2447	9.1055	9.719	
3655.0	64QAM	9.2461	9.2467	9.726	NA
3662.5		9.2411	9.1718	9.781	
3670.0		9.2389	9.1549	9.733	

Reference numbers of test equipment used

HL 2909	HL 2013	HL 3818	HL 3301	HL 3302			

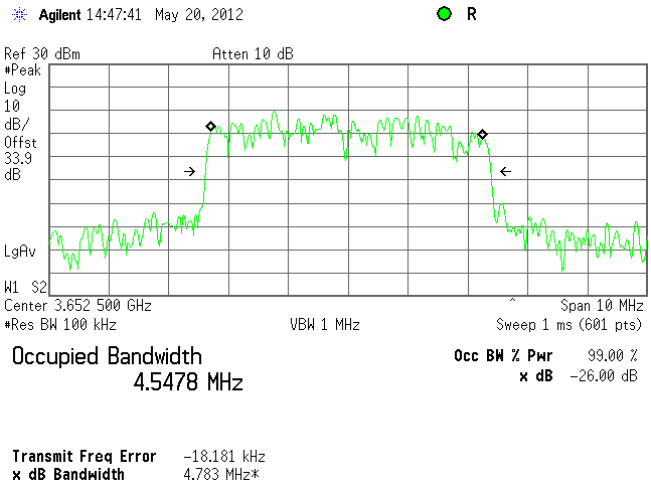
Full description is given in Appendix A.

Test specification:	Section 90.209 / RSS-197, Section 5.2, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 21 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

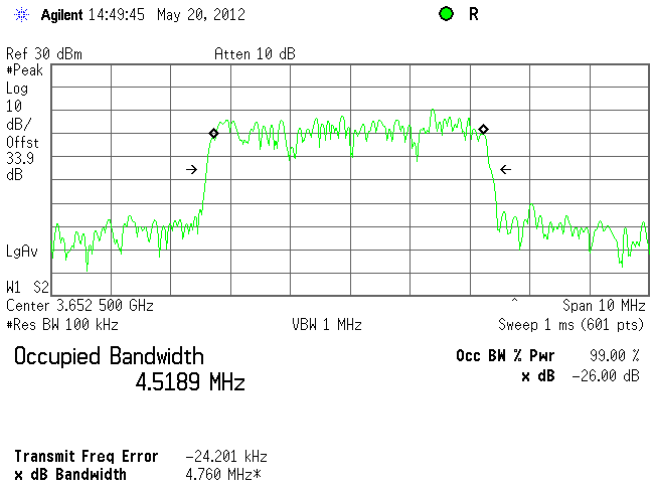
Plot 7.3.1 Occupied bandwidth test result at low frequency, 5 MHz BW

Other than low population area

QPSK



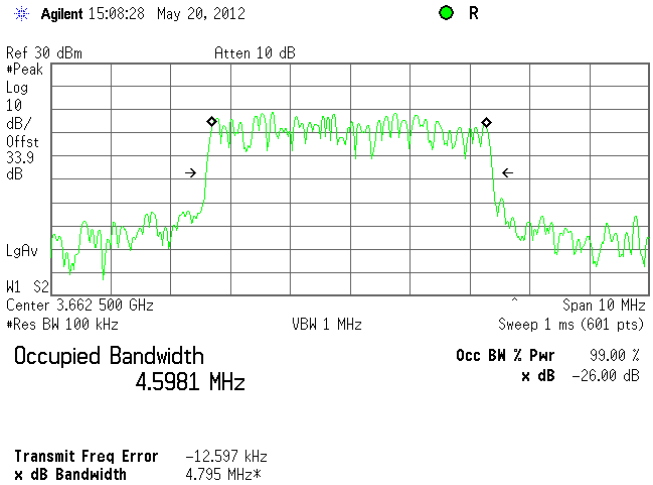
64QAM



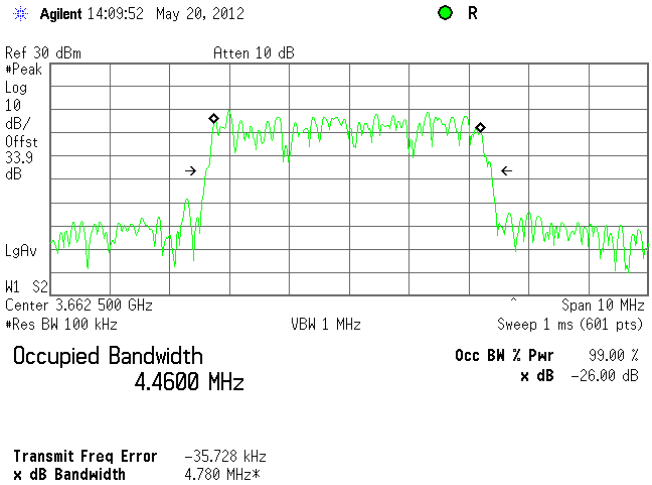
Plot 7.3.2 Occupied bandwidth test result at mid frequency, 5 MHz BW

Other than low population area

QPSK



64QAM

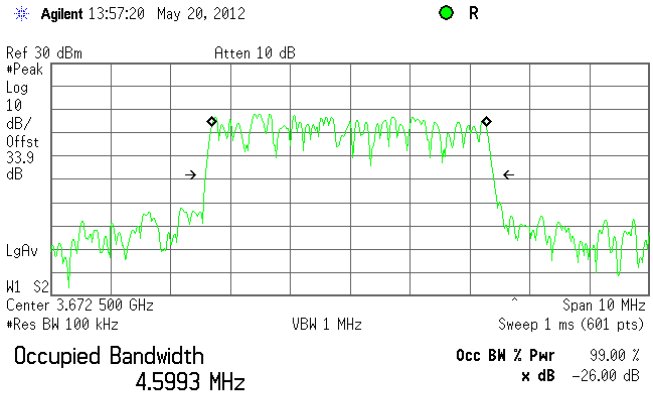


Test specification:	Section 90.209 / RSS-197, Section 5.2, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 21 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

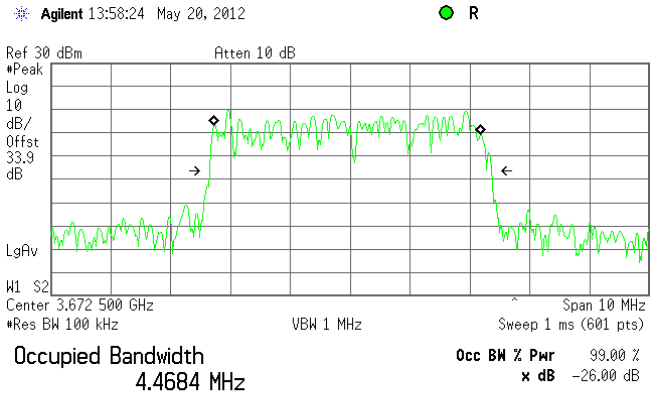
Plot 7.3.3 Occupied bandwidth test result at high frequency, 5 MHz BW

Other than low population area

QPSK



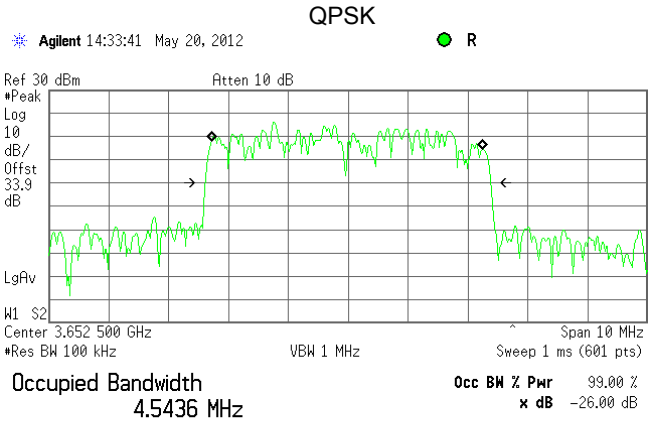
64QAM



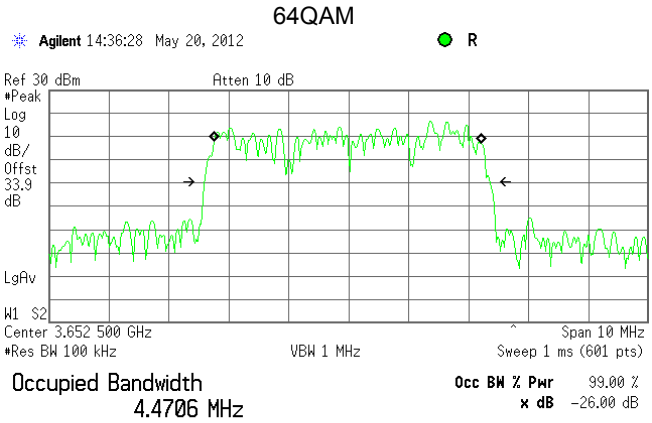
Plot 7.3.4 Occupied bandwidth test result at low frequency, 5 MHz BW

Low population area

QPSK



64QAM

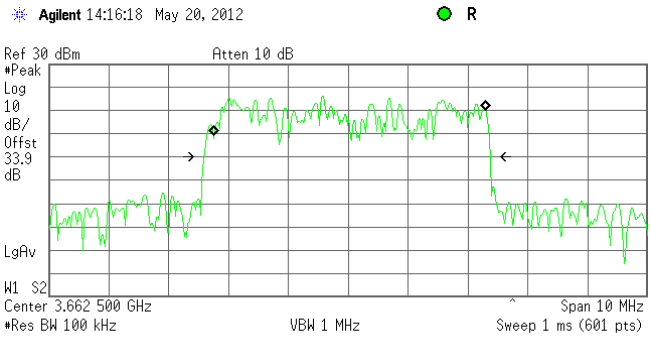


Test specification:	Section 90.209 / RSS-197, Section 5.2, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 21 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

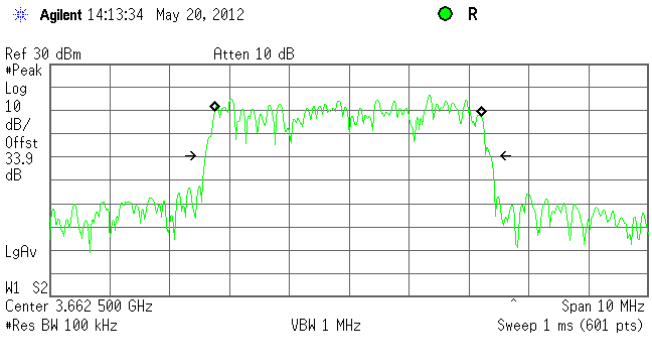
Plot 7.3.5 Occupied bandwidth test result at mid frequency, 5 MHz BW

Low population area

QPSK



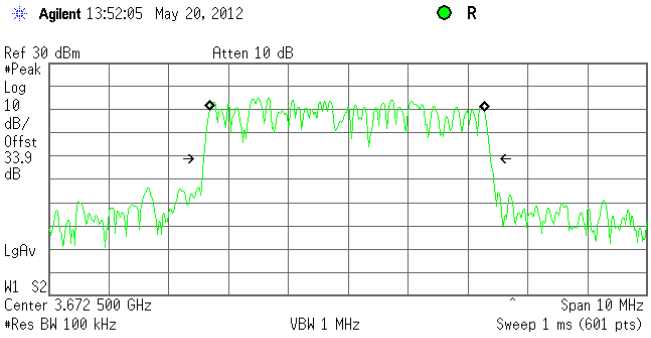
64QAM



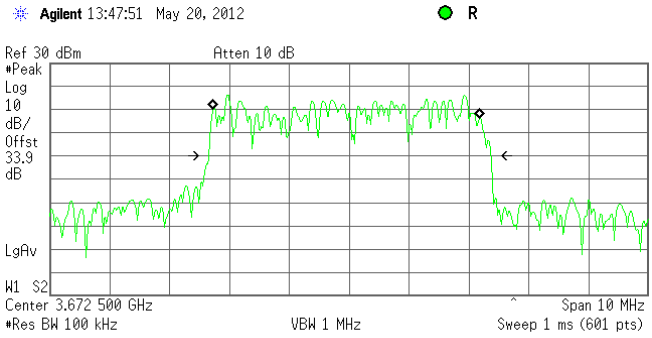
Plot 7.3.6 Occupied bandwidth test result at high frequency, 5 MHz BW

Low population area

QPSK



64QAM

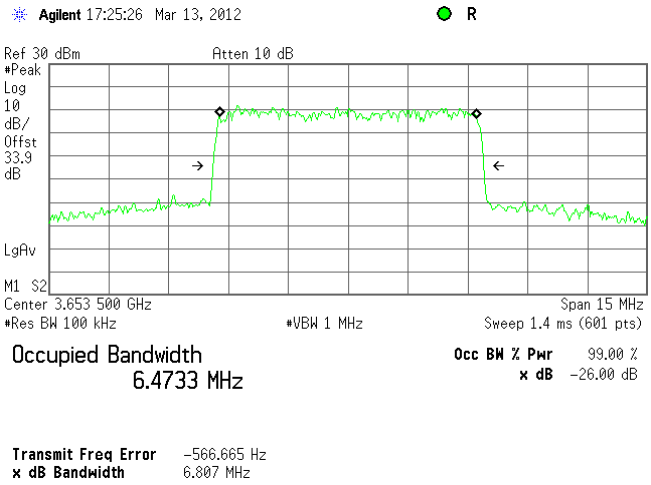


Test specification:	Section 90.209 / RSS-197, Section 5.2, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 21 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

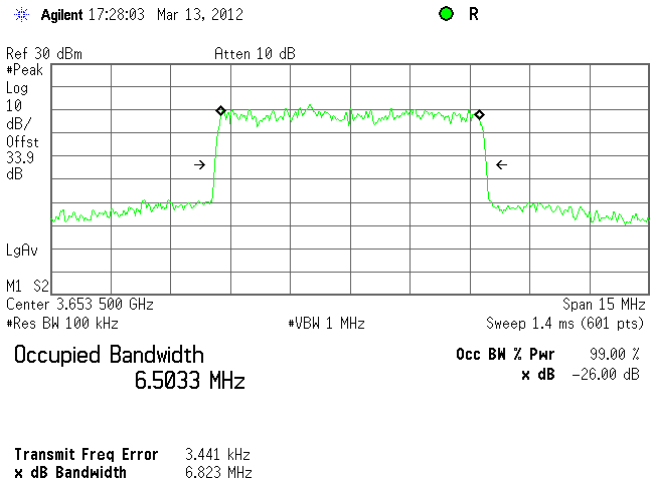
Plot 7.3.7 Occupied bandwidth test result at low frequency, 7 MHz BW

Other than low population area

QPSK



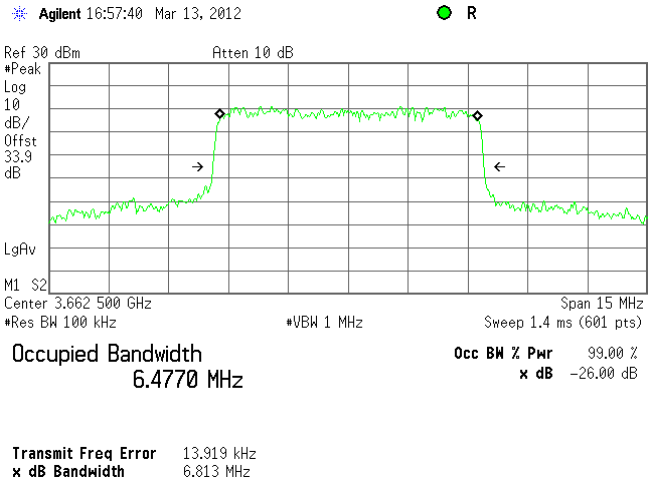
64QAM



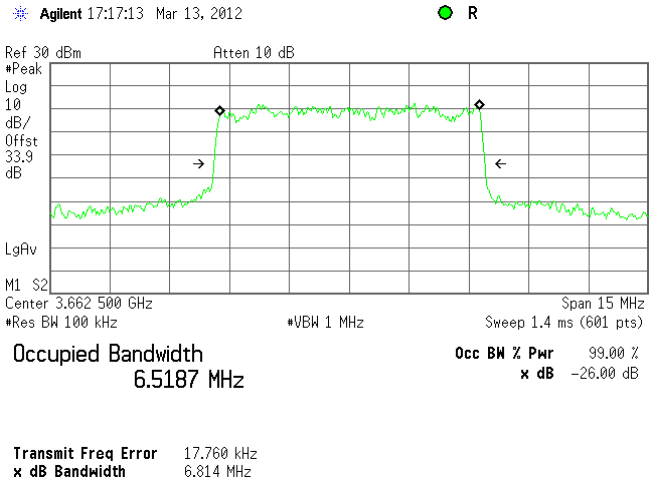
Plot 7.3.8 Occupied bandwidth test result at mid frequency, 7 MHz BW

Other than low population area

QPSK



64QAM

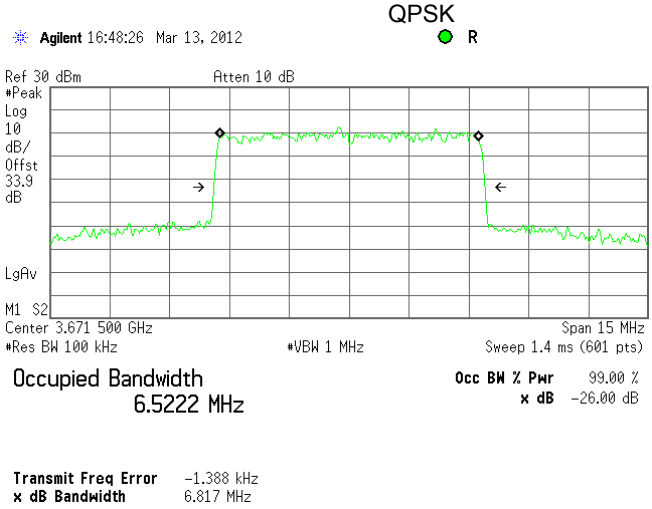


Test specification:	Section 90.209 / RSS-197, Section 5.2, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 21 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

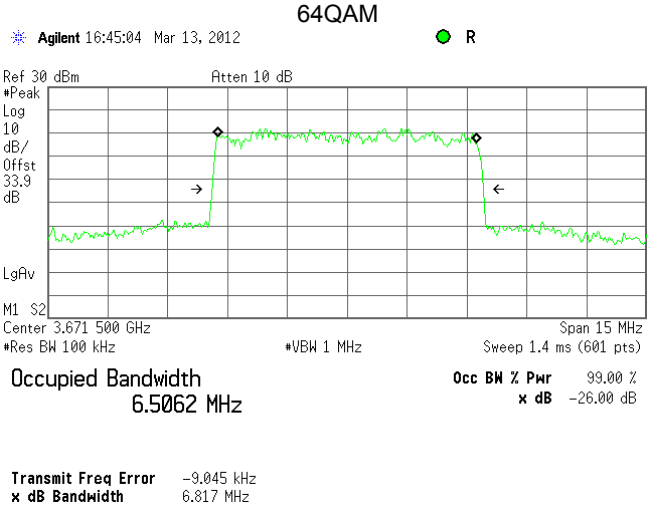
Plot 7.3.9 Occupied bandwidth test result at high frequency, 7 MHz BW

Other than low population area

QPSK



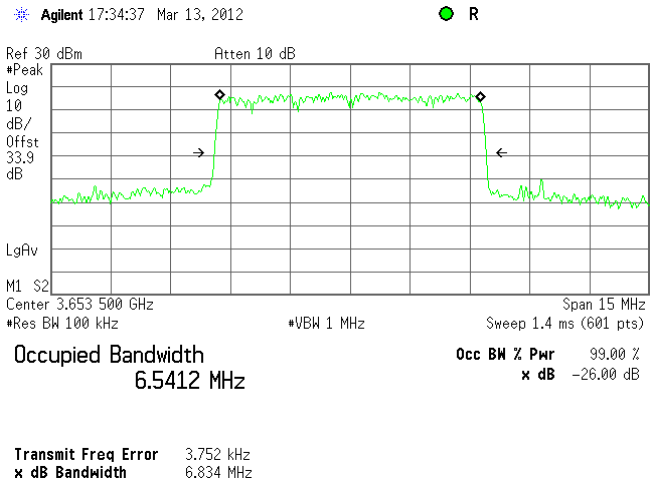
64QAM



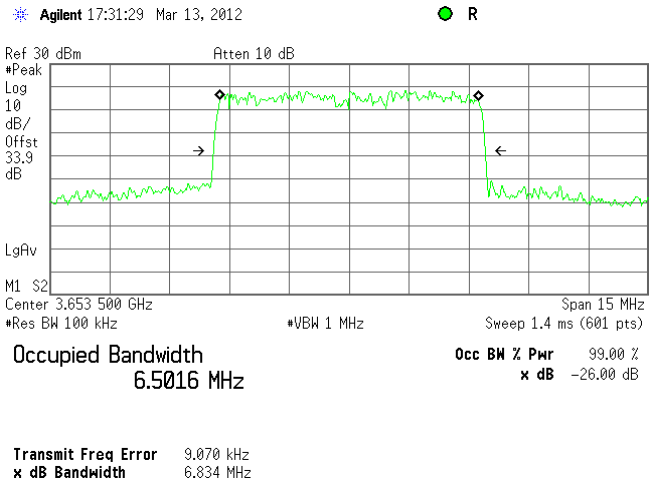
Plot 7.3.10 Occupied bandwidth test result at low frequency, 7 MHz BW

Low population area

QPSK



64QAM

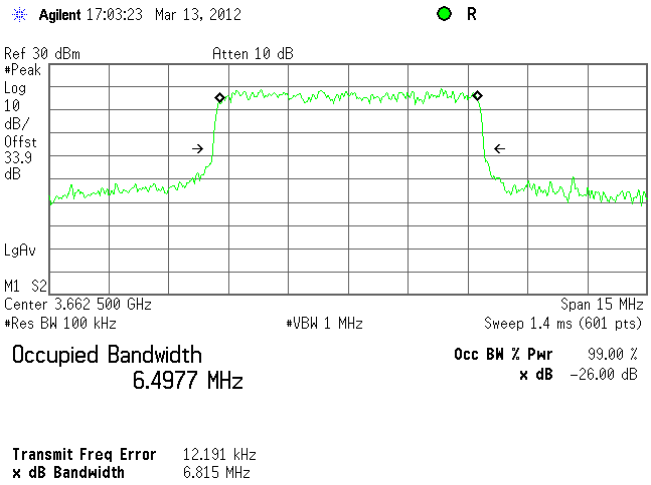


Test specification:	Section 90.209 / RSS-197, Section 5.2, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 21 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

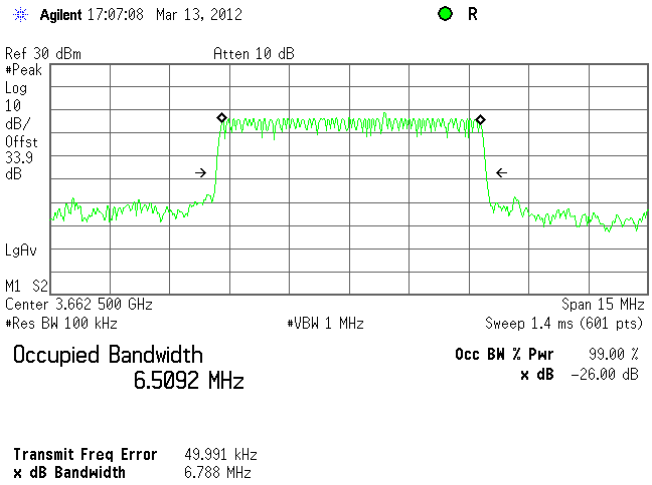
Plot 7.3.11 Occupied bandwidth test result at mid frequency, 7 MHz BW

Low population area

QPSK



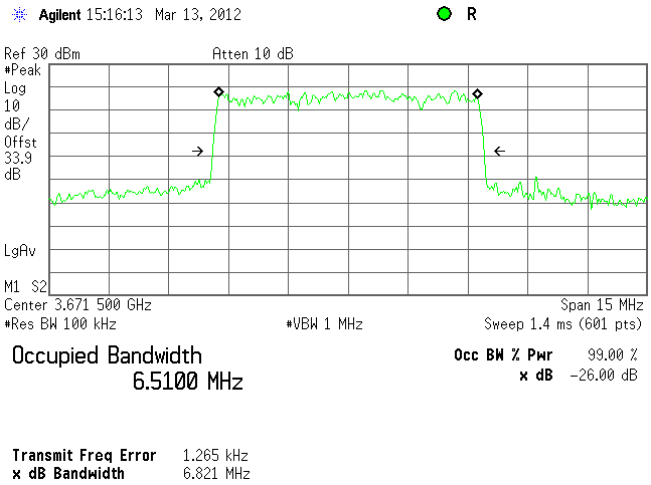
64QAM



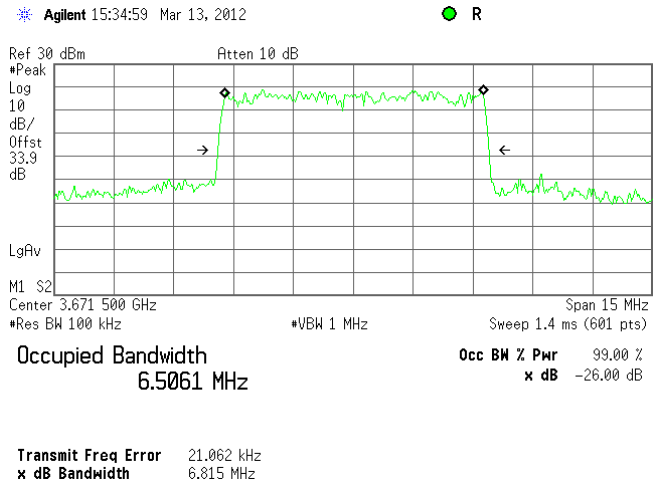
Plot 7.3.12 Occupied bandwidth test result at high frequency, 7 MHz BW

Low population area

QPSK



64QAM

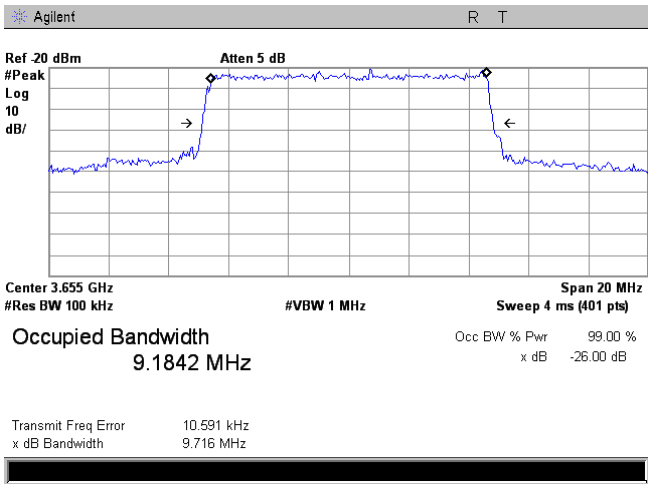


Test specification:	Section 90.209 / RSS-197, Section 5.2, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 21 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

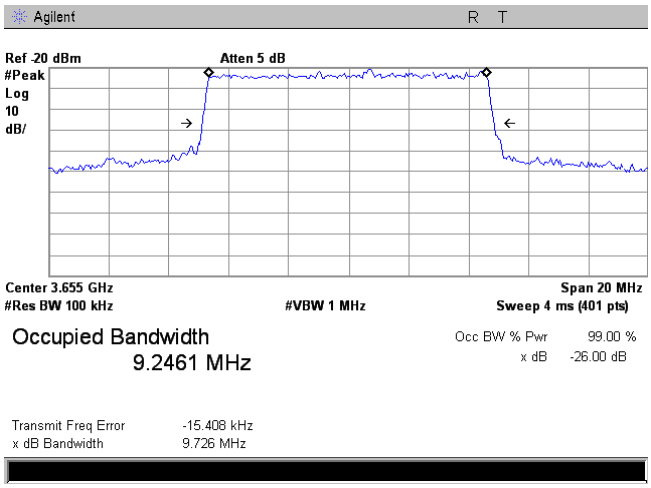
Plot 7.3.13 Occupied bandwidth test result at low frequency, 10 MHz BW

Other than low population area

QPSK



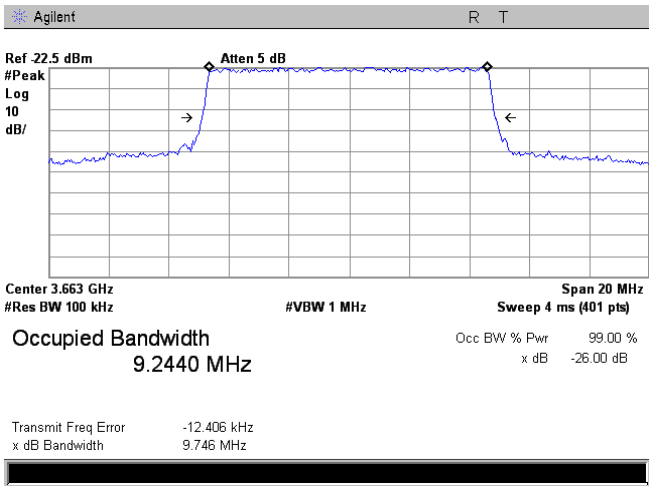
64QAM



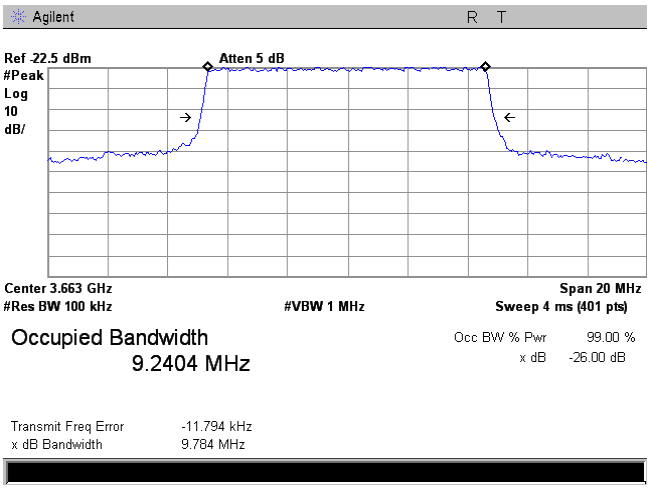
Plot 7.3.14 Occupied bandwidth test result at mid frequency, 10 MHz BW

Other than low population area

QPSK



64QAM

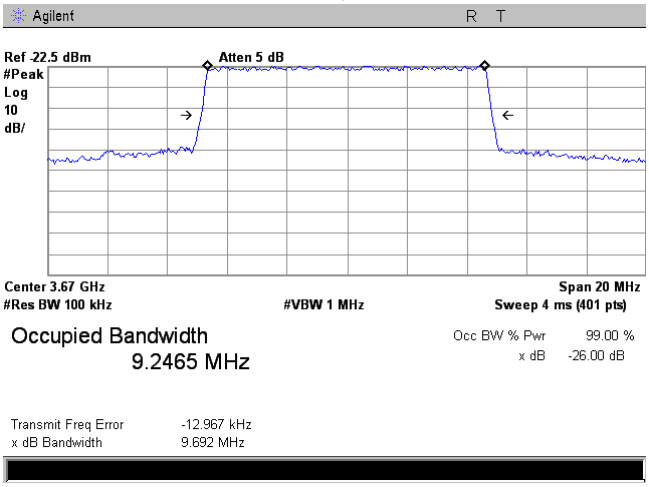


Test specification:	Section 90.209 / RSS-197, Section 5.2, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 21 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

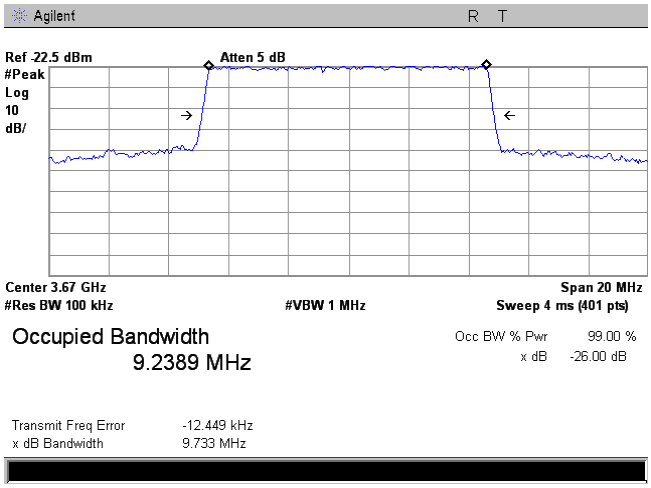
Plot 7.3.15 Occupied bandwidth test result at high frequency, 10 MHz BW

Other than low population area

QPSK



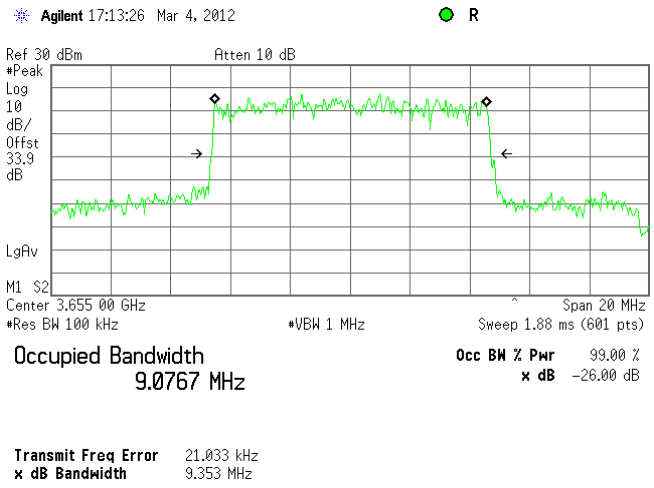
64QAM



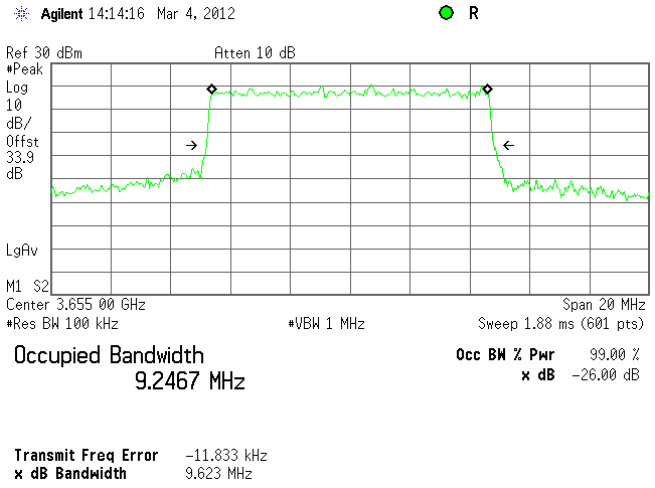
Plot 7.3.16 Occupied bandwidth test result at low frequency, 10 MHz BW

Low population area

QPSK



64QAM

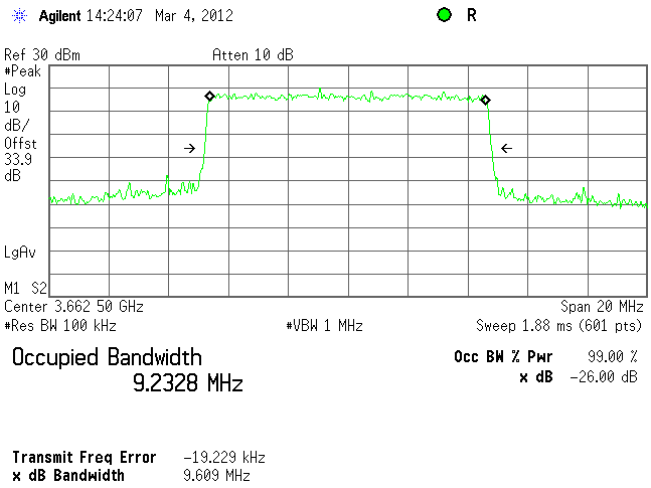


Test specification:	Section 90.209 / RSS-197, Section 5.2, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 21 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

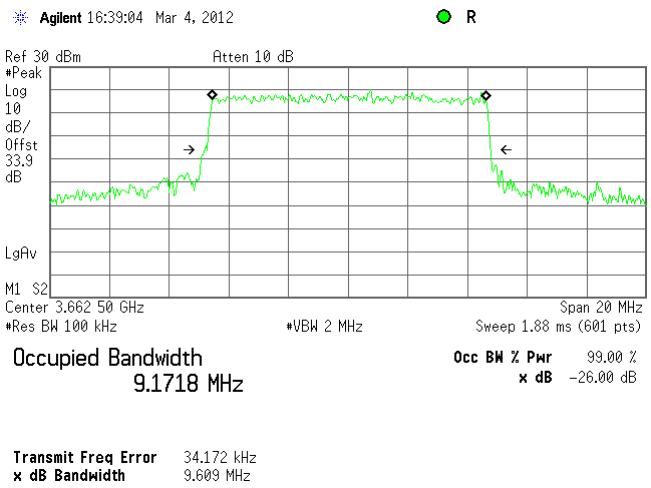
Plot 7.3.17 Occupied bandwidth test result at mid frequency, 10 MHz BW

Low population area

QPSK



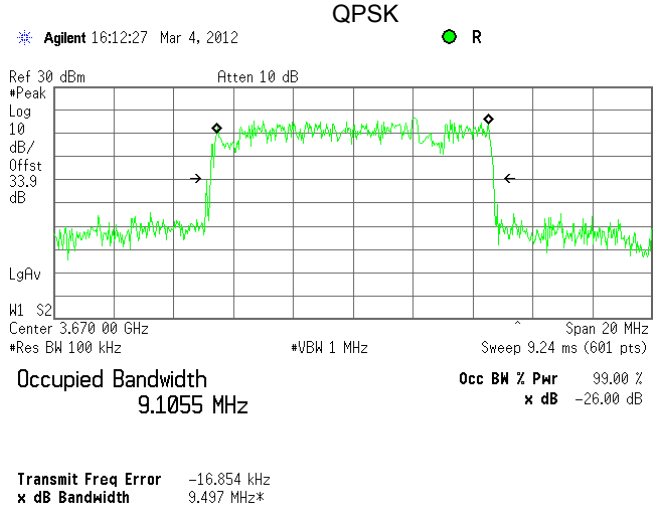
64QAM



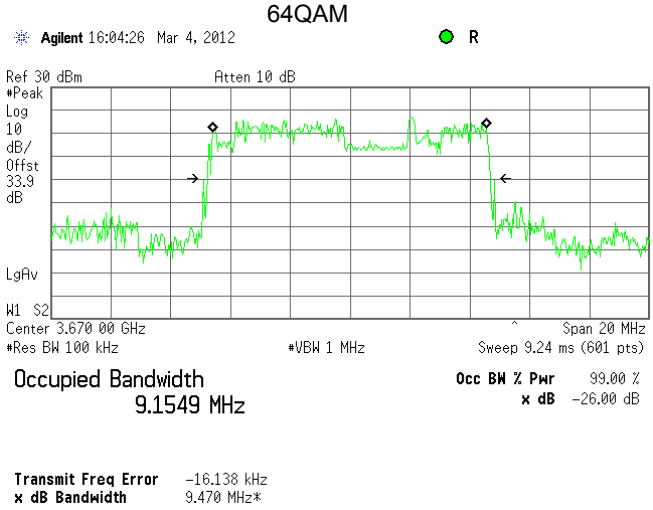
Plot 7.3.18 Occupied bandwidth test result at high frequency, 10 MHz BW

Low population area

QPSK



64QAM



Test specification:	Section 90.210(b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/8/2012, 5/21/2012		
Temperature: 22.7 ºC	Air Pressure: 1021 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

7.4 Emission mask test

7.4.1 General

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

Table 7.4.1 Emission mask limits

Frequency displacement from carrier	Attenuation below carrier, dBc
Emission mask B (Emission bandwidth 5 MHz)	
0 – 2.5 MHz	0
2.5 – 5.0 MHz	25
5.0 – 12.5 MHz	35
More than* 12.5 MHz	43 + 10 log(P)
Emission mask B (Emission bandwidth 7 MHz)	
0 – 3.5 MHz	0
3.55 – 7 MHz	25
7 – 17.5 MHz	35
More than* 17.5 MHz	43 + 10 log(P)
Emission mask B (Emission bandwidth 10 MHz)	
0 – 5 MHz	0
5 – 10.0 MHz	25
10.0 – 25.0 MHz	35
More than* 25.0 MHz	43 + 10 log(P)
Emission mask B (Emission bandwidth 10 MHz)	
0 – 5 MHz	0
5 – 10.0 MHz	25
10.0 – 25.0 MHz	35
More than* 25.0 MHz	43 + 10 log(P)

* - emission mask includes carrier modulation envelope within ± 250 % of the authorized bandwidth; the frequency range removed beyond ± 250 % of the authorized bandwidth from carrier was investigated as spurious emission

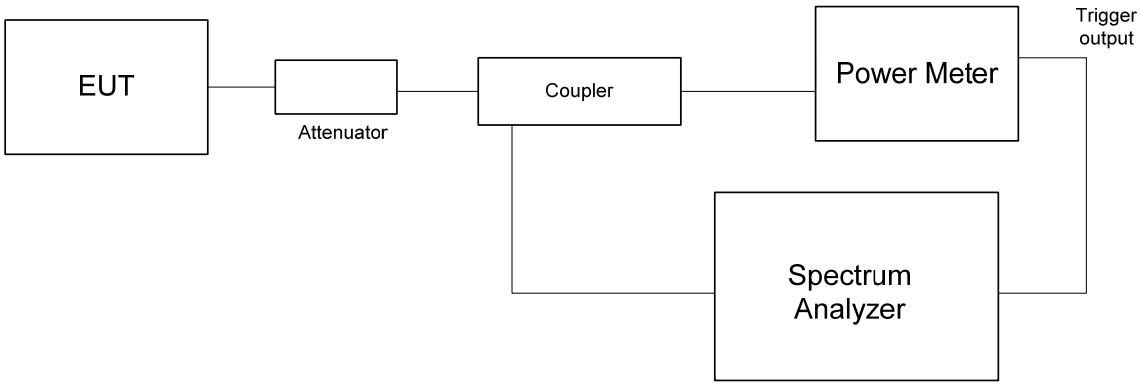
7.4.2 Test procedure

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

7.4.2.2 The emission mask was measured with spectrum analyzer as provided in the associated plots. The test results recorded in Table 7.4.2.

Test specification:	**Section 90.210(b), Emission mask**		
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	3/8/2012, 5/21/2012		
Temperature: 22.7 ºC	**Air Pressure:** 1021 hPa	**Relative Humidity:** 41 %	**Power Supply:** 48VDC
Remarks:			

Figure 7.4.1 Emission mask test setup



Test specification:	**Section 90.210(b), Emission mask**		
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	3/8/2012, 5/21/2012		
Temperature: 22.7 ºC	**Air Pressure:** 1021 hPa	**Relative Humidity:** 41 %	**Power Supply:** 48VDC
Remarks:			

Table 7.4.2 Emission mask test results

Carrier frequency, MHz	Limit	Reference to Plot	Verdict
5 MHz			
3652.5	Emission mask B	Plot 7.4.1, Plot 7.4.2	Pass
3662.5		Plot 7.4.3, Plot 7.4.4	
3672.5		Plot 7.4.5, Plot 7.4.6	
7 MHz			
3653.5	Emission mask B	Plot 7.4.7, Plot 7.4.8	Pass
3662.5		Plot 7.4.9, Plot 7.4.10	
3671.5		Plot 7.4.11, Plot 7.4.12	
10 MHz			
3655.0	Emission mask B	Plot 7.4.13, Plot 7.4.14	Pass
3662.5		Plot 7.4.15, Plot 7.4.16	
3670.0		Plot 7.4.17, Plot 7.4.18	

NOTE1: Attenuation below carrier provided in terms of attenuation below total average power within occupied bandwidth. Measurement was performed with RBW set to 100 kHz and the limit mask was reduced by 10 dB to compensate the lower RBW [10*log(1 MHz/ 100 kHz] = 10 dB;

Reference numbers of test equipment used

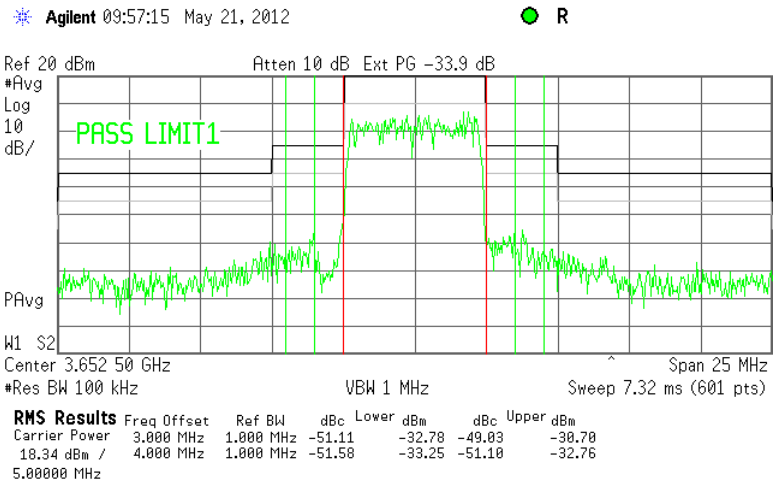
HL 2818	HL 2952	HL 3301	HL 3302	HL 3763	HL 3818	HL 3868	

Full description is given in Appendix A.

Test specification:	Section 90.210(b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/8/2012, 5/21/2012		
Temperature: 22.7 °C	Air Pressure: 1021 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

Plot 7.4.1 Emission mask test results at low carrier frequency, 5 MHz CBW

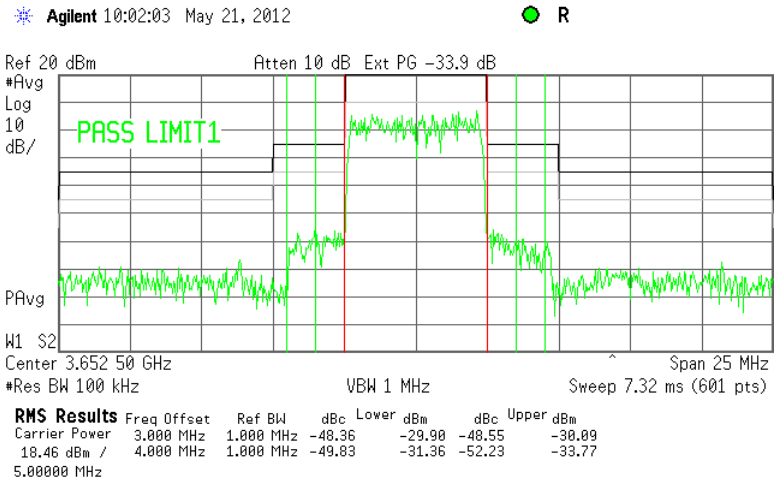
MODULATION: QPSK 1/2
BIT RATE: Minimum



Note: Upper display line is emission mask limit.
Lower display line is emission mask limit reduced by 10 dB to compensate the lower RBW [10*log(1 MHz/ 100 kHz] = 10 dB.

Plot 7.4.2 Emission mask test results at low carrier frequency, 5 MHz CBW

MODULATION: 64QAM 5/6
BIT RATE: Maximum

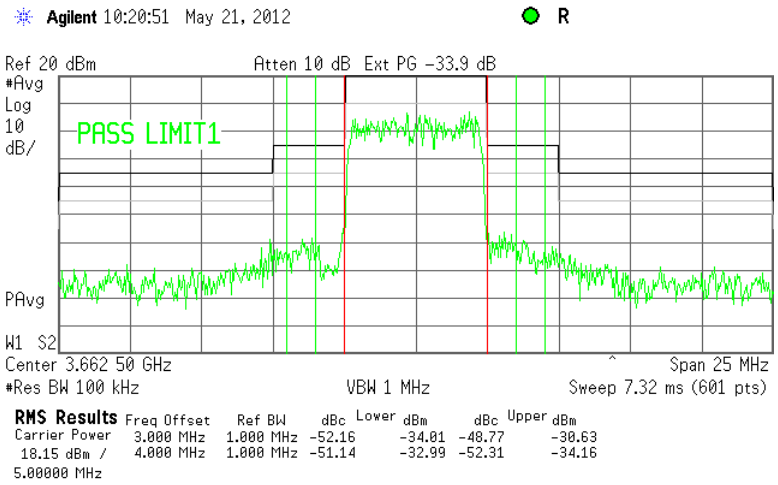


Note: Upper display line is emission mask limit.
Lower display line is emission mask limit reduced by 10 dB to compensate the lower RBW [10*log(1 MHz/ 100 kHz] = 10 dB.

Test specification:	Section 90.210(b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/8/2012, 5/21/2012		
Temperature: 22.7 °C	Air Pressure: 1021 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

Plot 7.4.3 Emission mask test results at mid carrier frequency, 5 MHz CBW

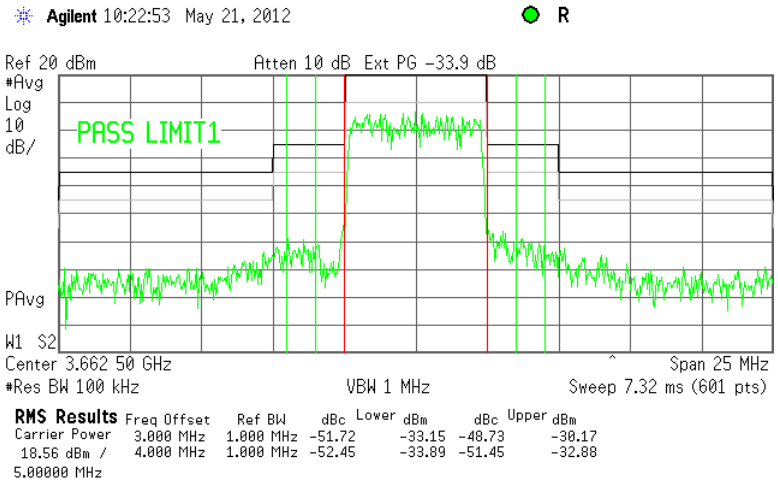
MODULATION: QPSK 1/2
BIT RATE: Minimum



Note: Upper display line is emission mask limit.
Lower display line is emission mask limit reduced by 10 dB to compensate the lower RBW [10*log(1 MHz/ 100 kHz] = 10 dB.

Plot 7.4.4 Emission mask test results at mid carrier frequency, 5 MHz CBW

MODULATION: 64QAM 5/6
BIT RATE: Maximum

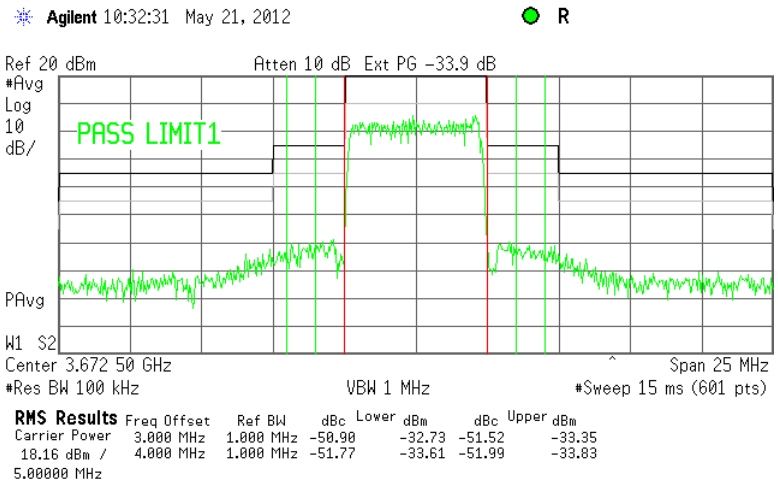


Note: Upper display line is emission mask limit.
Lower display line is emission mask limit reduced by 10 dB to compensate the lower RBW [10*log(1 MHz/ 100 kHz] = 10 dB.

Test specification:	Section 90.210(b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/8/2012, 5/21/2012		
Temperature: 22.7 °C	Air Pressure: 1021 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

Plot 7.4.5 Emission mask test results at high carrier frequency, 5 MHz CBW

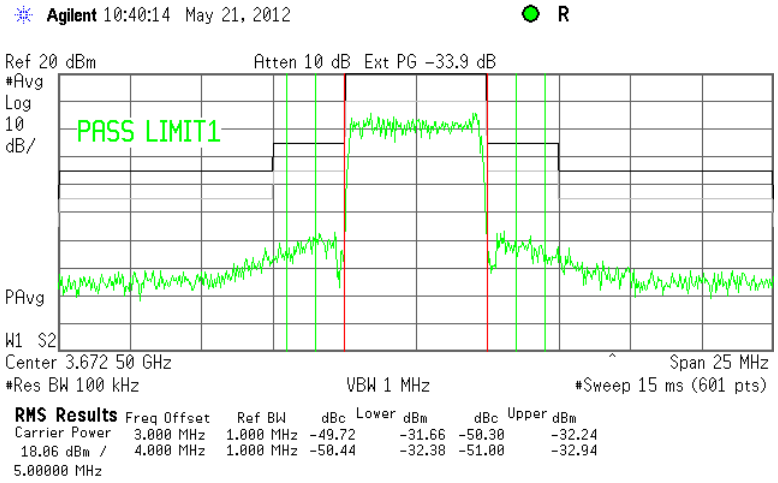
MODULATION: QPSK 1/2
BIT RATE: Minimum



Note: Upper display line is emission mask limit.
Lower display line is emission mask limit reduced by 10 dB to compensate the lower RBW [10*log(1 MHz/ 100 kHz] = 10 dB.

Plot 7.4.6 Emission mask test results at high carrier frequency, 5 MHz CBW

MODULATION: 64QAM 5/6
BIT RATE: Maximum

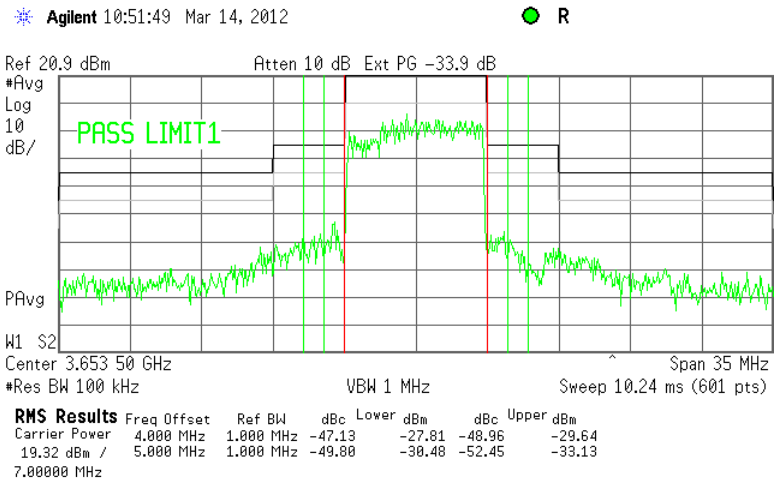


Note: Upper display line is emission mask limit.
Lower display line is emission mask limit reduced by 10 dB to compensate the lower RBW [10*log(1 MHz/ 100 kHz] = 10 dB.

Test specification:	Section 90.210(b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/8/2012, 5/21/2012		
Temperature: 22.7 °C	Air Pressure: 1021 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

Plot 7.4.7 Emission mask test results at low carrier frequency, 7 MHz CBW

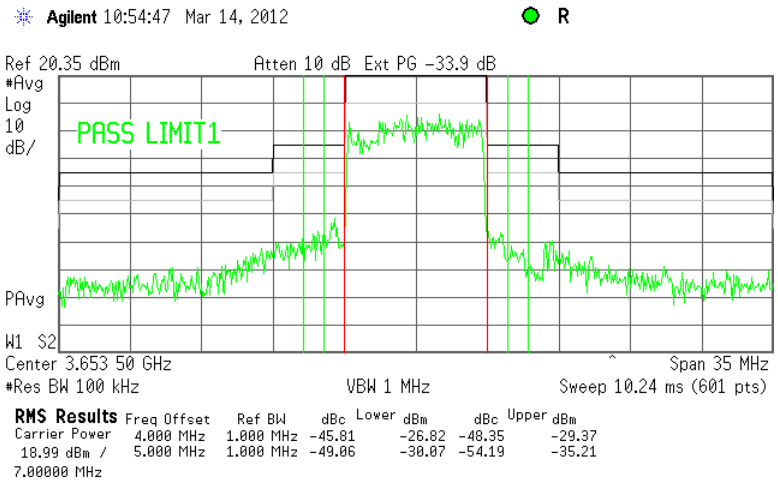
MODULATION: QPSK 1/2
BIT RATE: Minimum



Note: Upper display line is emission mask limit.
Lower display line is emission mask limit reduced by 10 dB to compensate the lower RBW [10*log(1 MHz/ 100 kHz] = 10 dB.

Plot 7.4.8 Emission mask test results at low carrier frequency, 7 MHz CBW

MODULATION: 64QAM 5/6
BIT RATE: Maximum

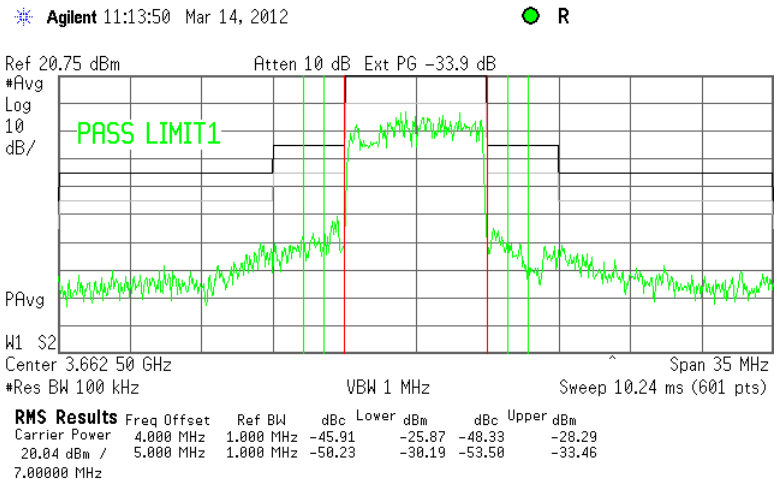


Note: Upper display line is emission mask limit.
Lower display line is emission mask limit reduced by 10 dB to compensate the lower RBW [10*log(1 MHz/ 100 kHz] = 10 dB.

Test specification:	Section 90.210(b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/8/2012, 5/21/2012		
Temperature: 22.7 °C	Air Pressure: 1021 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

Plot 7.4.9 Emission mask test results at mid carrier frequency, 7 MHz CBW

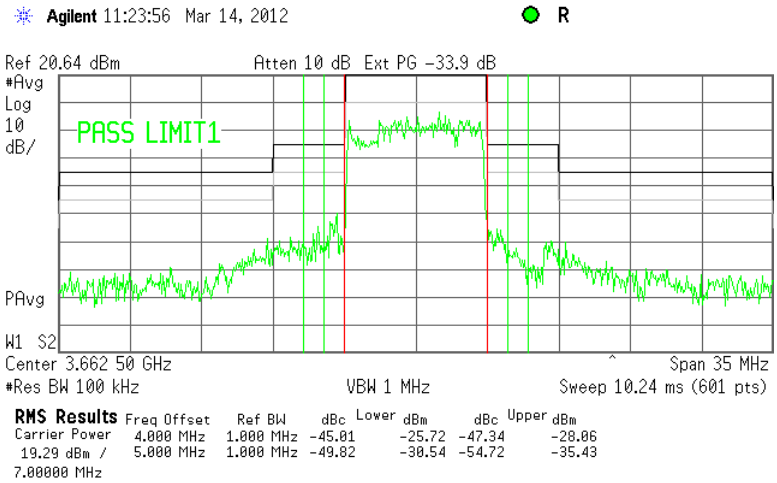
MODULATION: QPSK 1/2
BIT RATE: Minimum



Note: Upper display line is emission mask limit.
Lower display line is emission mask limit reduced by 10 dB to compensate the lower RBW [10*log(1 MHz/ 100 kHz] = 10 dB.

Plot 7.4.10 Emission mask test results at mid carrier frequency, 7 MHz CBW

MODULATION: 64QAM 5/6
BIT RATE: Maximum

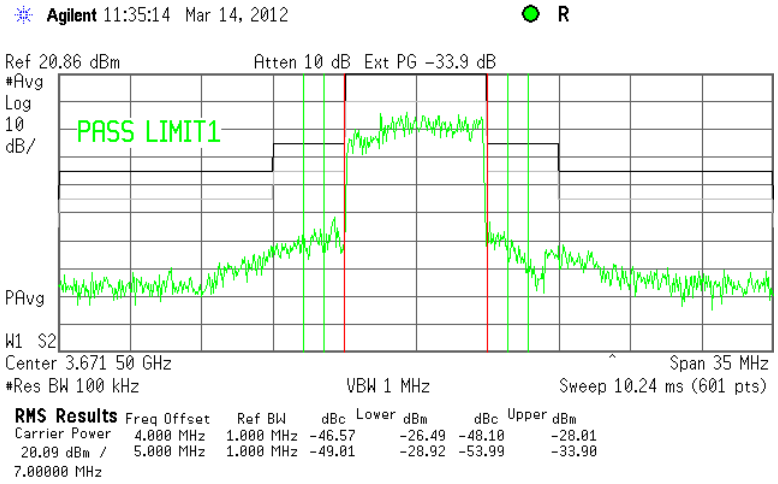


Note: Upper display line is emission mask limit.
Lower display line is emission mask limit reduced by 10 dB to compensate the lower RBW [10*log(1 MHz/ 100 kHz] = 10 dB.

Test specification:	Section 90.210(b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/8/2012, 5/21/2012		
Temperature: 22.7 °C	Air Pressure: 1021 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

Plot 7.4.11 Emission mask test results at high carrier frequency, 7 MHz CBW

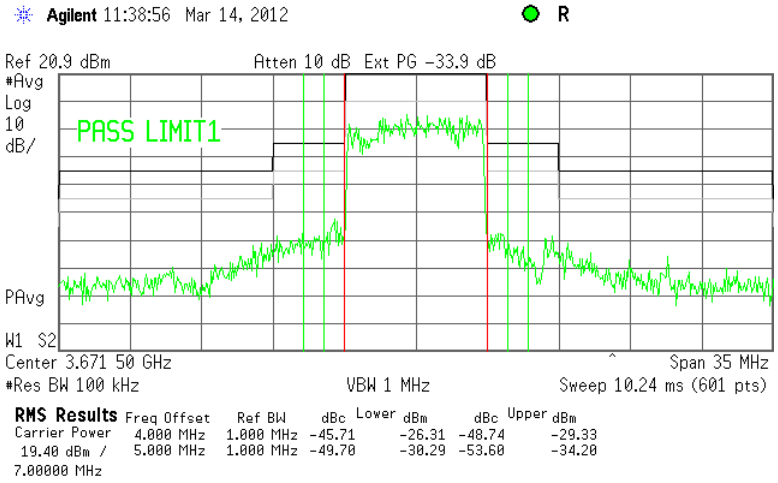
MODULATION: QPSK 1/2
BIT RATE: Minimum



Note: Upper display line is emission mask limit.
Lower display line is emission mask limit reduced by 10 dB to compensate the lower RBW [10*log(1 MHz/ 100 kHz] = 10 dB.

Plot 7.4.12 Emission mask test results at high carrier frequency, 7 MHz CBW

MODULATION: 64QAM 5/6
BIT RATE: Maximum

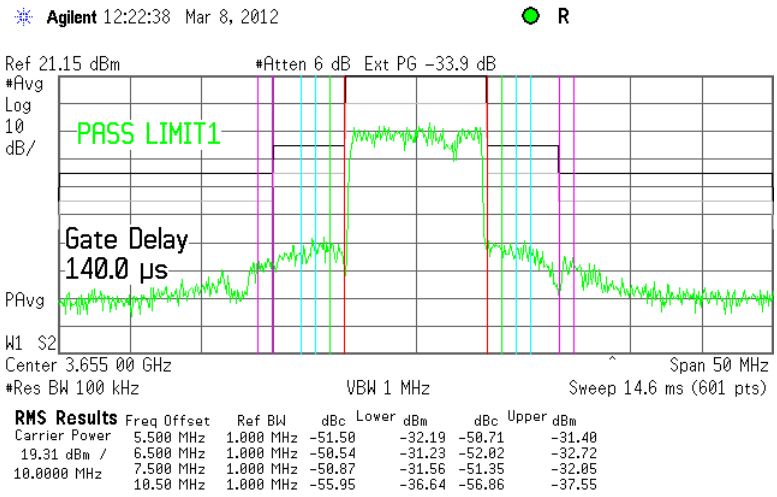


Note: Upper display line is emission mask limit.
Lower display line is emission mask limit reduced by 10 dB to compensate the lower RBW [10*log(1 MHz/ 100 kHz] = 10 dB.

Test specification:	Section 90.210(b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/8/2012, 5/21/2012		
Temperature: 22.7 °C	Air Pressure: 1021 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

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

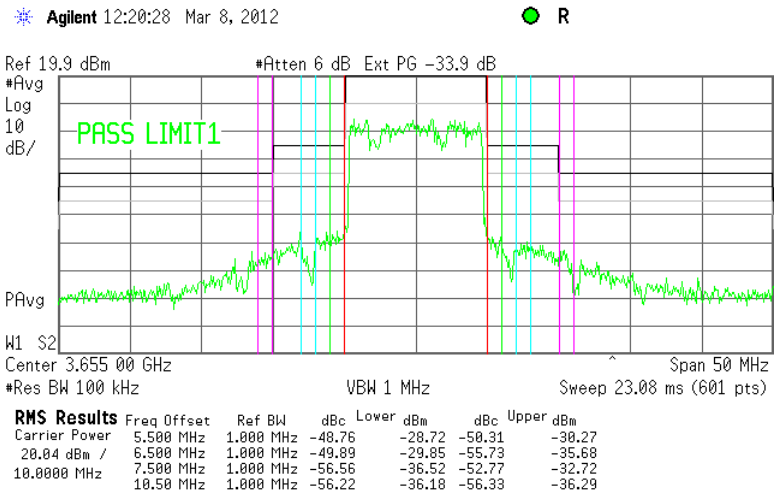
MODULATION: QPSK 1/2
BIT RATE: Minimum



Note: Upper display line is emission mask limit.
Lower display line is emission mask limit reduced by 10 dB to compensate the lower RBW [10*log(1 MHz/ 100 kHz] = 10 dB.

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

MODULATION: 64QAM 5/6
BIT RATE: Maximum

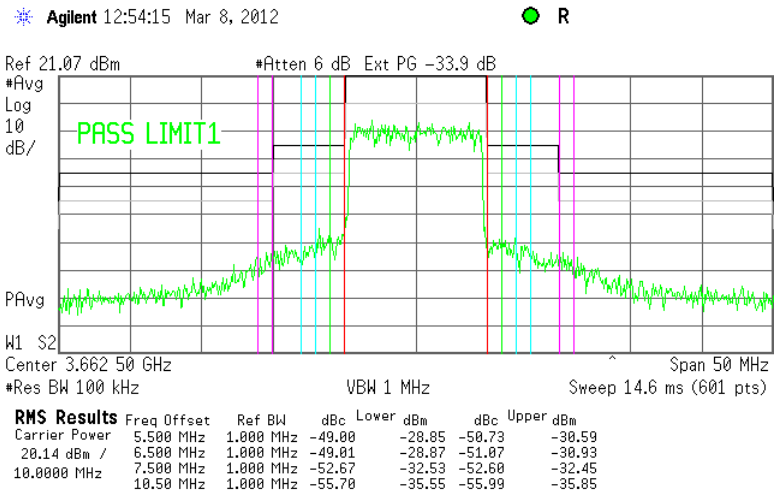


Note: Upper display line is emission mask limit.
Lower display line is emission mask limit reduced by 10 dB to compensate the lower RBW [10*log(1 MHz/ 100 kHz] = 10 dB.

Test specification:	Section 90.210(b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/8/2012, 5/21/2012		
Temperature: 22.7 °C	Air Pressure: 1021 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

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

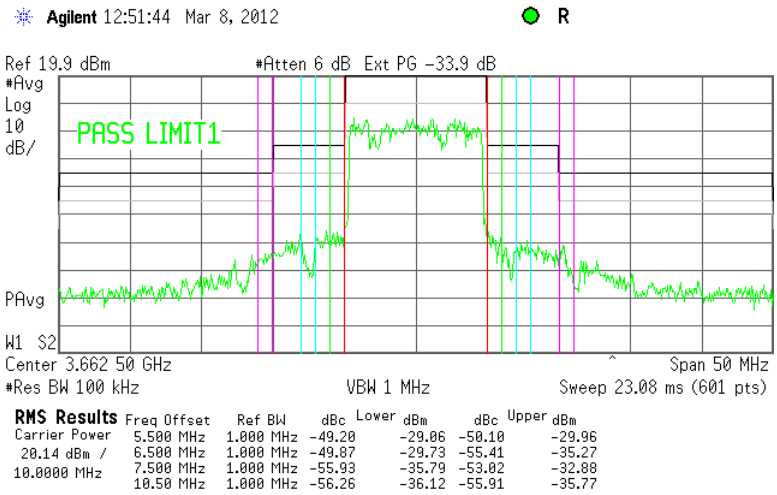
MODULATION: QPSK 1/2
BIT RATE: Minimum



Note: Upper display line is emission mask limit.
Lower display line is emission mask limit reduced by 10 dB to compensate the lower RBW [10*log(1 MHz/ 100 kHz] = 10 dB.

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

MODULATION: 64QAM 5/6
BIT RATE: Maximum

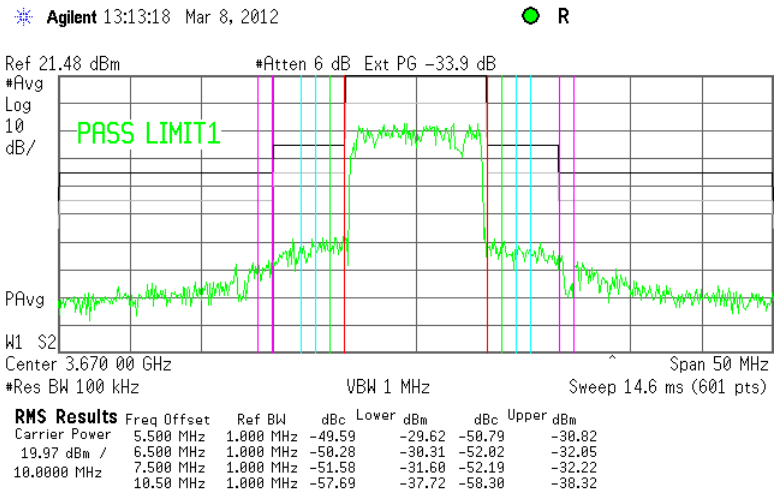


Note: Upper display line is emission mask limit.
Lower display line is emission mask limit reduced by 10 dB to compensate the lower RBW [10*log(1 MHz/ 100 kHz] = 10 dB.

Test specification:	Section 90.210(b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/8/2012, 5/21/2012		
Temperature: 22.7 °C	Air Pressure: 1021 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

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

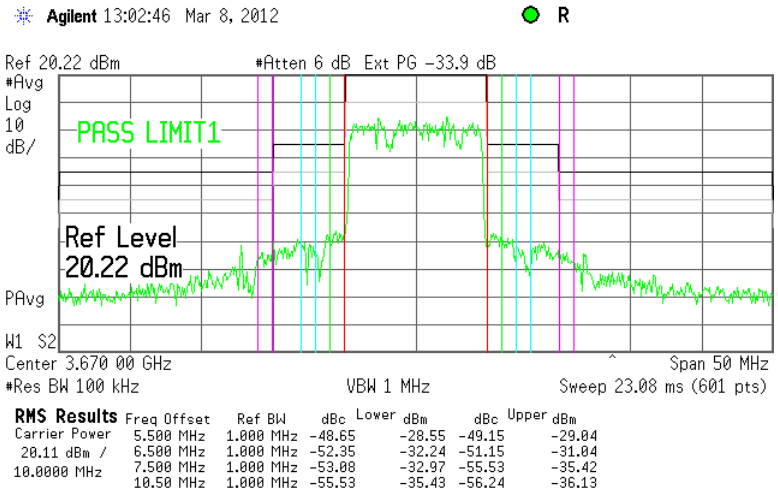
MODULATION: QPSK 1/2
BIT RATE: Minimum



Note: Upper display line is emission mask limit.
Lower display line is emission mask limit reduced by 10 dB to compensate the lower RBW [10*log(1 MHz/ 100 kHz] = 10 dB.

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

MODULATION: 64QAM 5/6
BIT RATE: Maximum



Note: Upper display line is emission mask limit.
Lower display line is emission mask limit reduced by 10 dB to compensate the lower RBW [10*log(1 MHz/ 100 kHz] = 10 dB.

Test specification:	Section 90.1323 / RSS-197, Section 5.7, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
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+10logP** (mask B)	-13.0

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

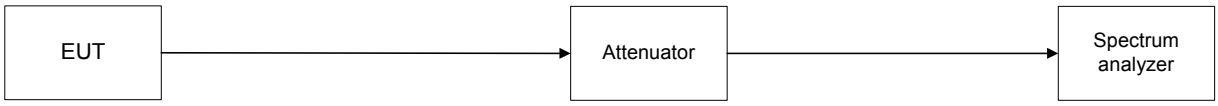
7.5.2 Test procedure

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

7.5.2.2 The EUT was adjusted to produce maximum available 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 for single antenna mode



Test specification:	**Section 90.1323 / RSS-197, Section 5.7, Spurious emissions at RF antenna connector**		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	**Air Pressure:** 1014 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48VDC
Remarks:			

Table 7.5.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 3650-3675 MHz
INVESTIGATED FREQUENCY RANGE: 0.009-37000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATION: 64 QAM
MODULATING SIGNAL: PRBS

EMISSION BANDWIDTH: 10 MHz
TRANSMITTER OUTPUT POWER: Maximum

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm	Limit, dBm	Margin, dB*	Verdict
Low carrier frequency								
No emissions were found								Pass
Mid carrier frequency								
No emissions were found								Pass
High carrier frequency								
No emissions were found								Pass

EMISSION BANDWIDTH: 5 MHz
TRANSMITTER OUTPUT POWER: Maximum

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm	Limit, dBm	Margin, dB*	Verdict
Low carrier frequency								
No emissions were found								Pass
Mid carrier frequency								
No emissions were found								Pass
High carrier frequency								
No emissions were found								Pass

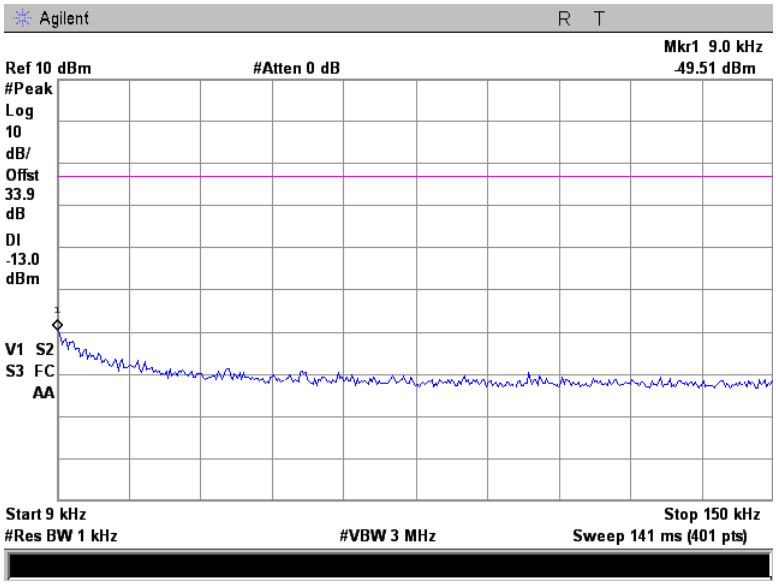
Reference numbers of test equipment used

HL 2013	HL 2909	HL 3818					

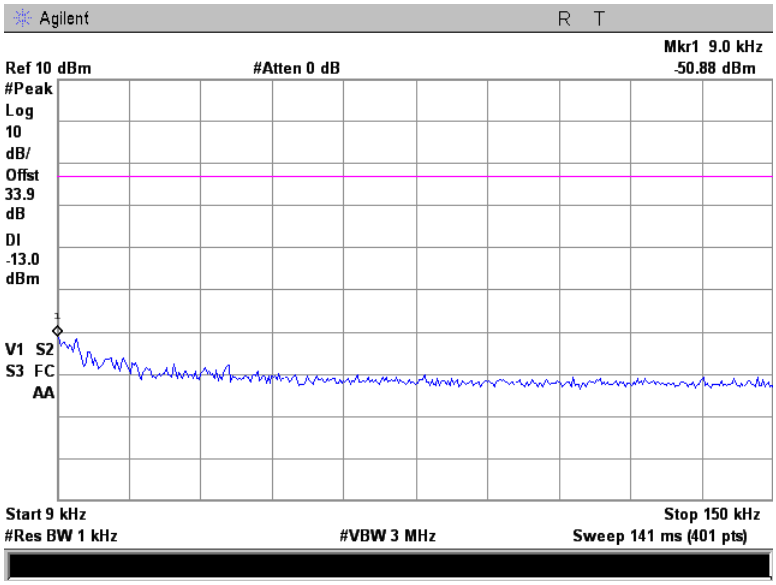
Full description is given in Appendix A.

Test specification:	Section 90.1323 / RSS-197, Section 5.7, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.1 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency, 10 MHz CBW

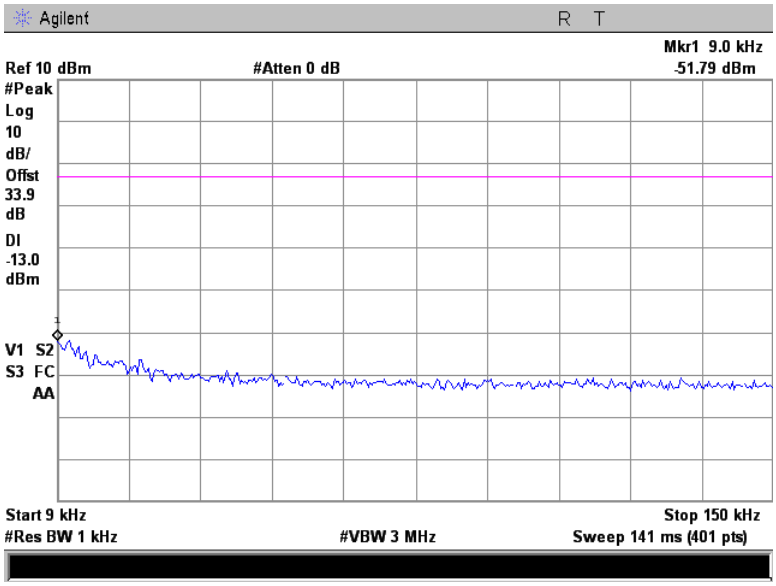


Plot 7.5.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency, 10 MHz CBW

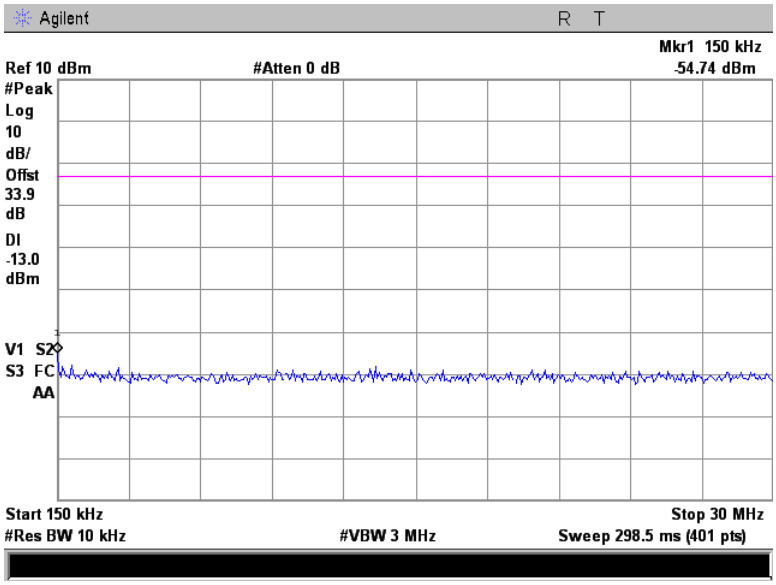


Test specification:	Section 90.1323 / RSS-197, Section 5.7, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 °C	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.3 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency, 10 MHz CBW

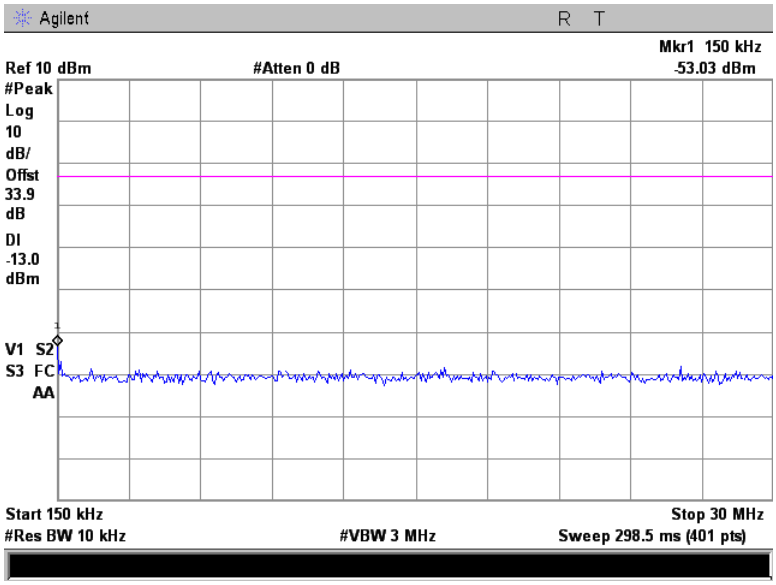


Plot 7.5.4 Spurious emission measurements in 0.150 - 30.0 MHz range at low carrier frequency, 10 MHz CBW

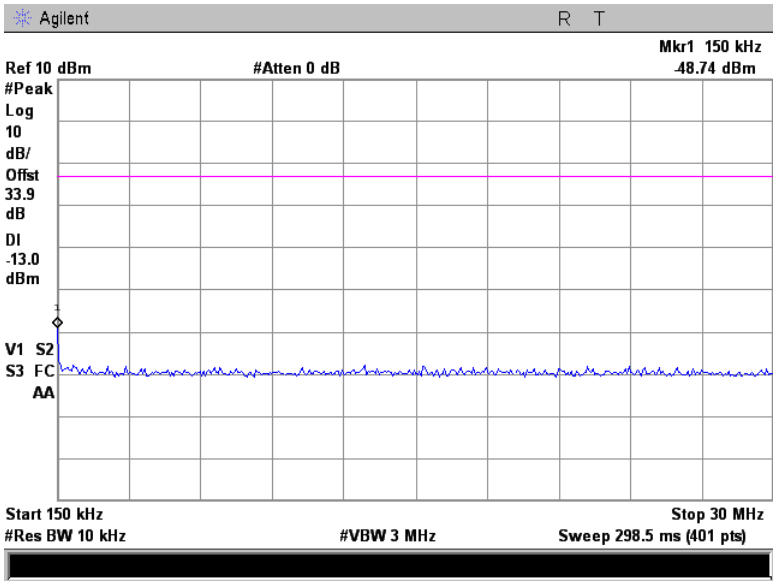


Test specification:	Section 90.1323 / RSS-197, Section 5.7, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 °C	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.5 Spurious emission measurements in 0.150 - 30.0 MHz range at mid carrier frequency, 10 MHz CBW

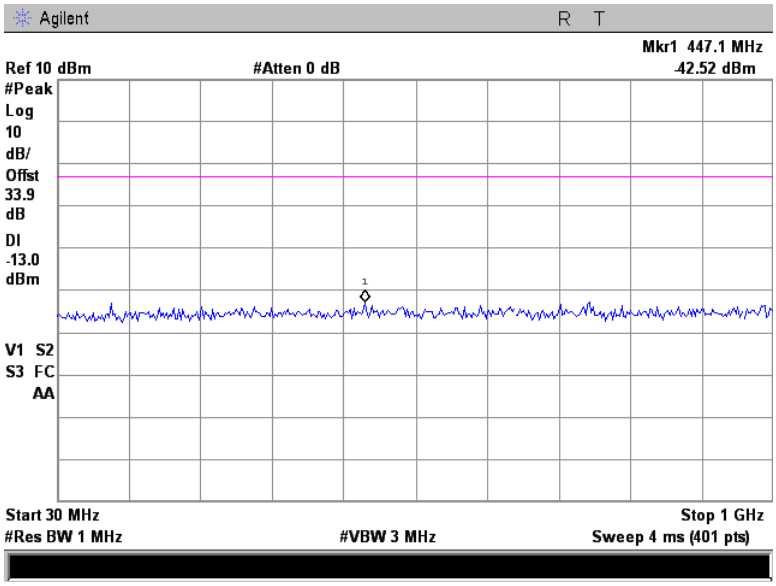


Plot 7.5.6 Spurious emission measurements in 0.150 - 30.0 MHz range at high carrier frequency, 10 MHz CBW

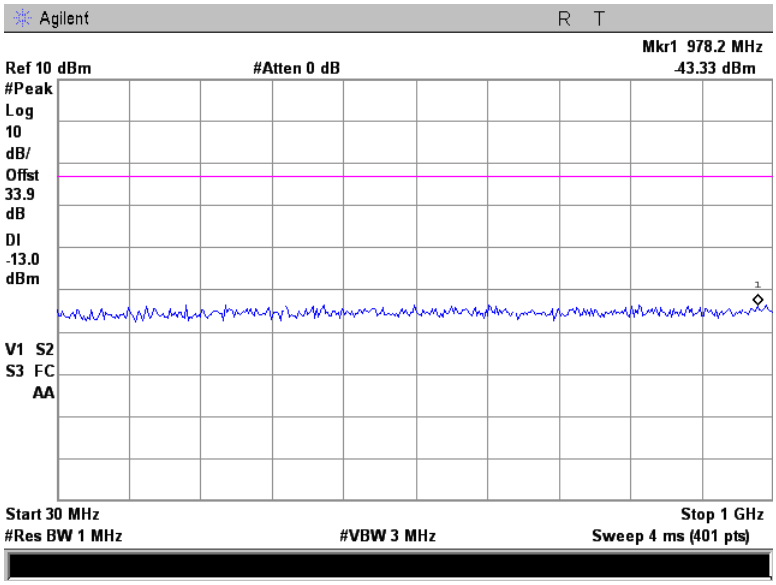


Test specification:	Section 90.1323 / RSS-197, Section 5.7, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.7 Spurious emission measurements in 30.0 - 1000 MHz range at low carrier frequency, 10 MHz CBW

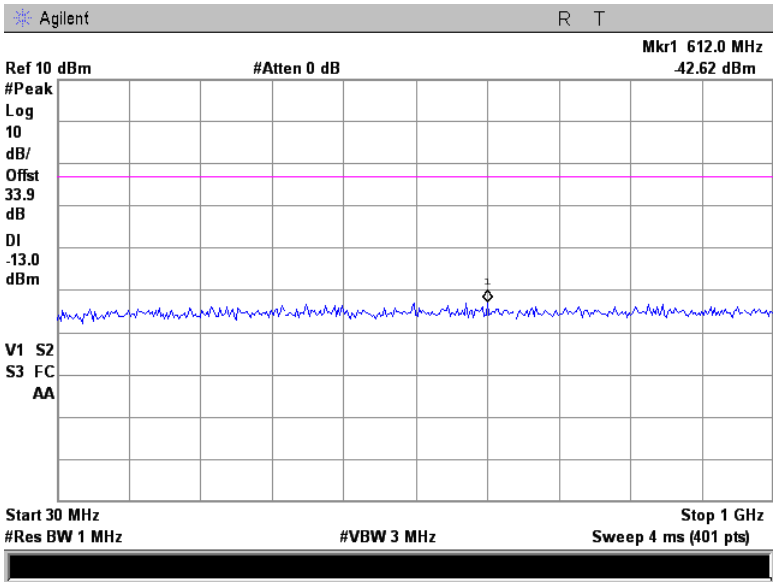


Plot 7.5.8 Spurious emission measurements in 30.0 - 1000 MHz range at mid carrier frequency, 10 MHz CBW

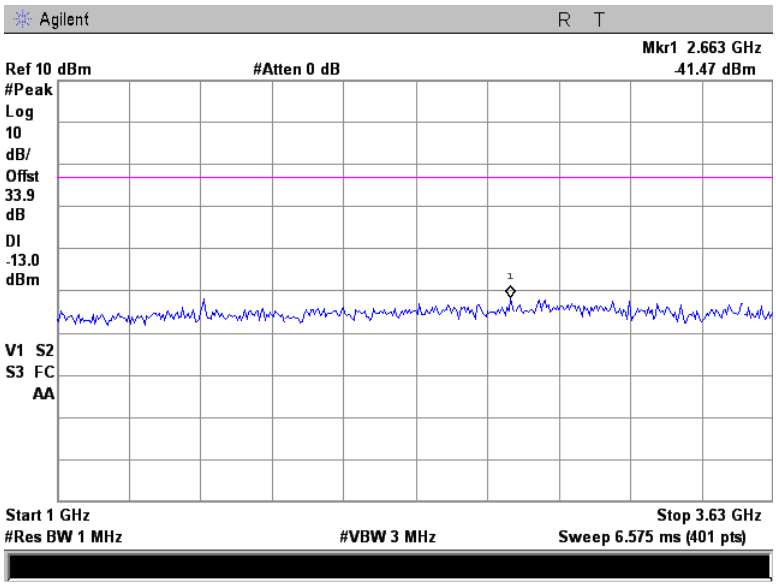


Test specification:	Section 90.1323 / RSS-197, Section 5.7, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 °C	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.9 Spurious emission measurements in 30.0 - 1000 MHz range at high carrier frequency, 10 MHz CBW

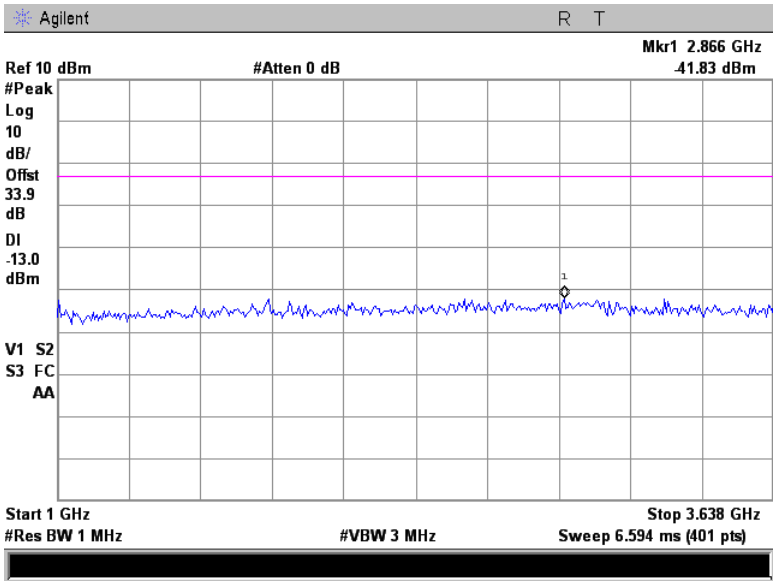


Plot 7.5.10 Spurious emission measurements in 1000 - 3630 MHz range at low carrier frequency, 10 MHz CBW

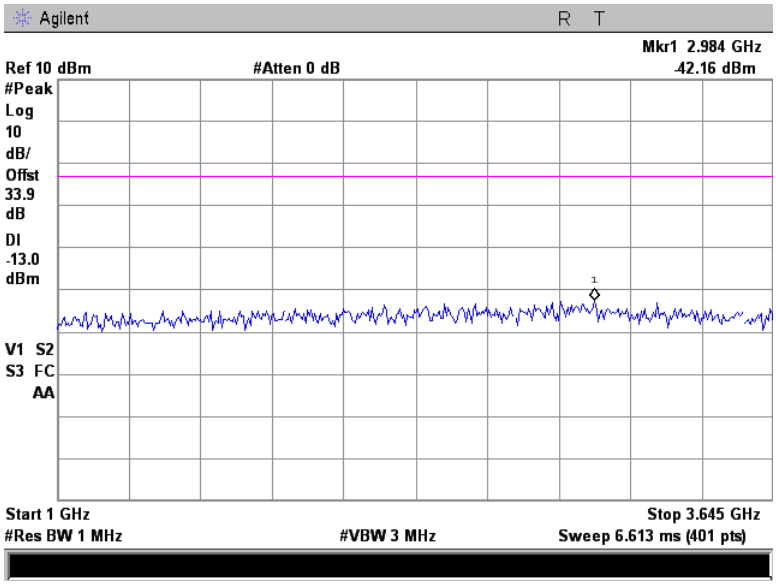


Test specification:	Section 90.1323 / RSS-197, Section 5.7, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.11 Spurious emission measurements in 1000 – 3637.5 MHz range at mid carrier frequency, 10 MHz CBW

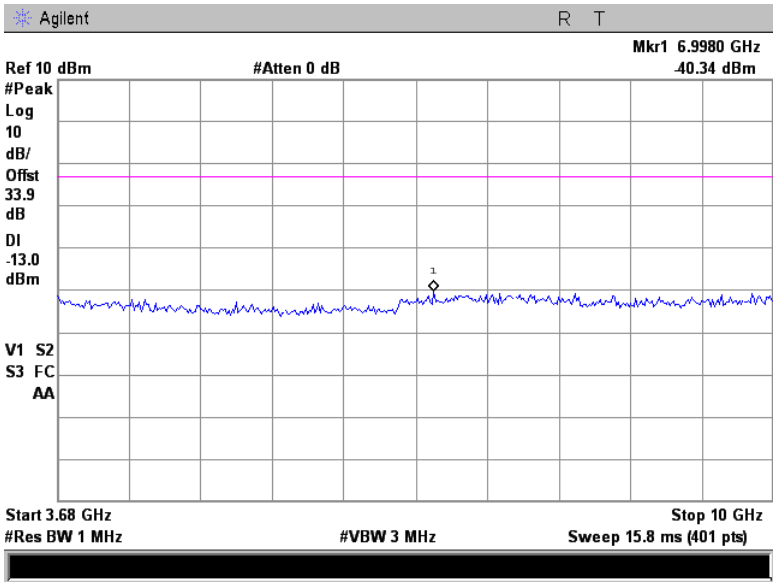


Plot 7.5.12 Spurious emission measurements in 1000 - 3645 MHz range at high carrier frequency, 10 MHz CBW

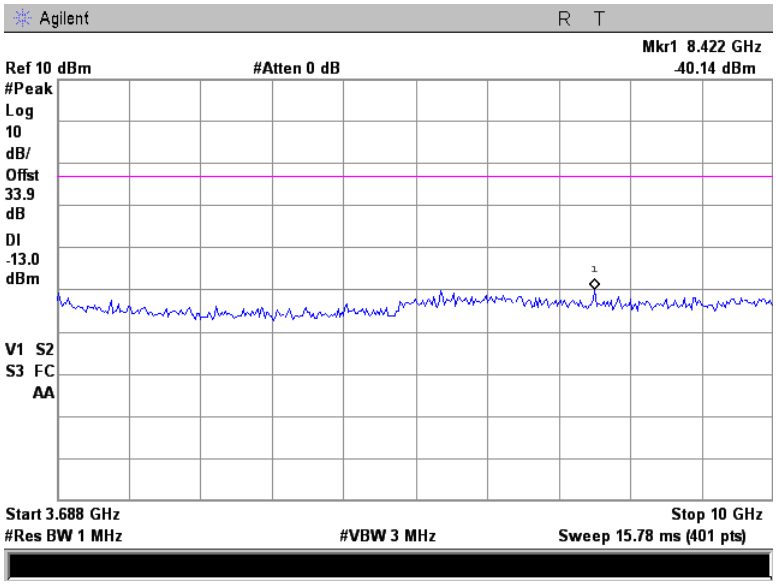


Test specification:	Section 90.1323 / RSS-197, Section 5.7, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.13 Spurious emission measurements in 3680-10000 MHz range at low carrier frequency, 10 MHz CBW

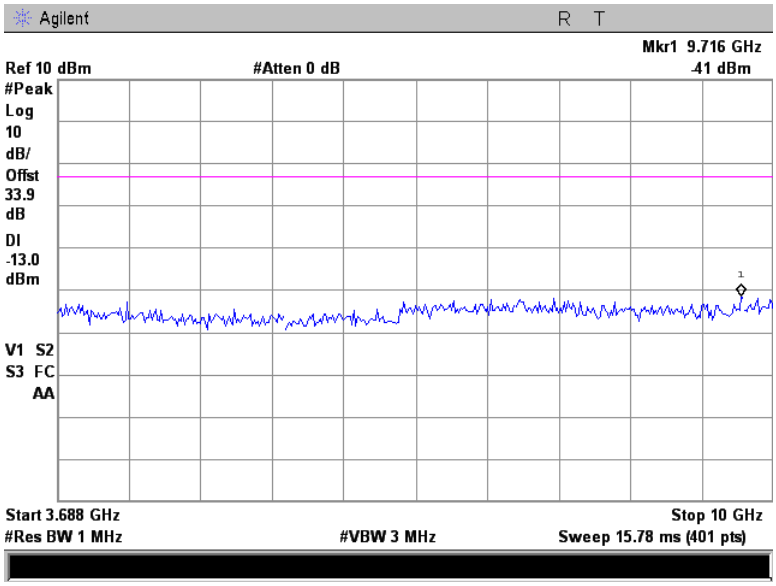


Plot 7.5.14 Spurious emission measurements in 3687.5-10000 MHz range at mid carrier frequency, 10 MHz CBW

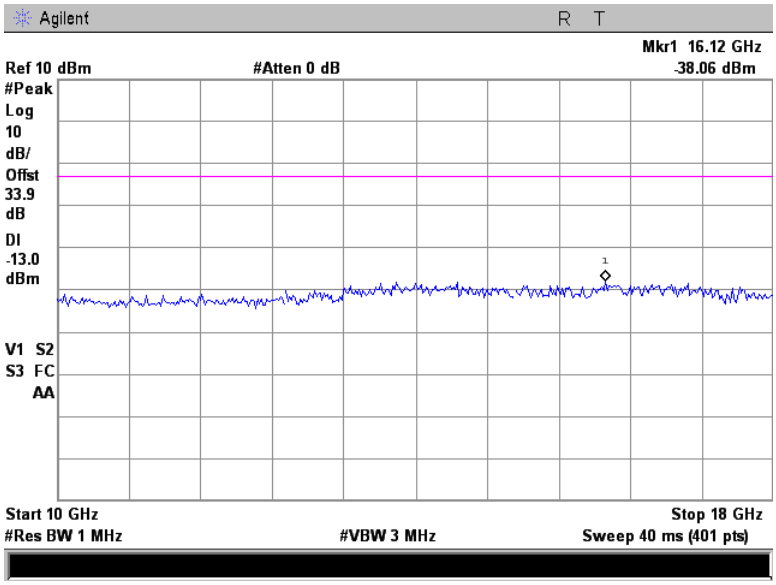


Test specification:	Section 90.1323 / RSS-197, Section 5.7, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.15 Spurious emission measurements in 3695-10000 MHz range at high carrier frequency, 10 MHz CBW

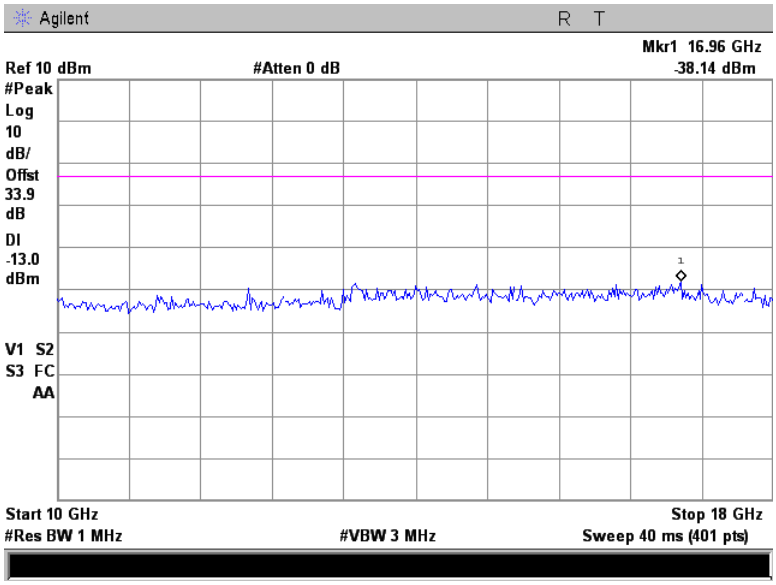


Plot 7.5.16 Spurious emission measurements in 10 - 18 GHz range at low carrier frequency, 10 MHz CBW

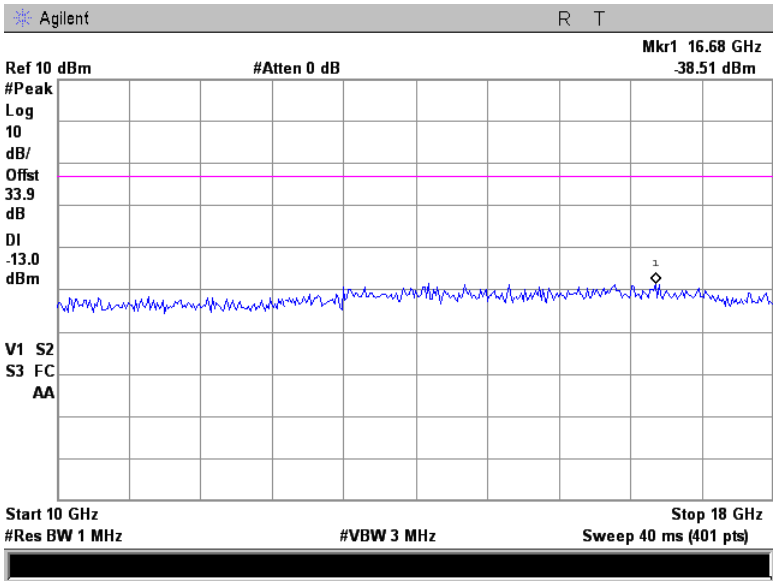


Test specification:	Section 90.1323 / RSS-197, Section 5.7, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.17 Spurious emission measurements in 10 - 18 GHz range at mid carrier frequency, 10 MHz CBW

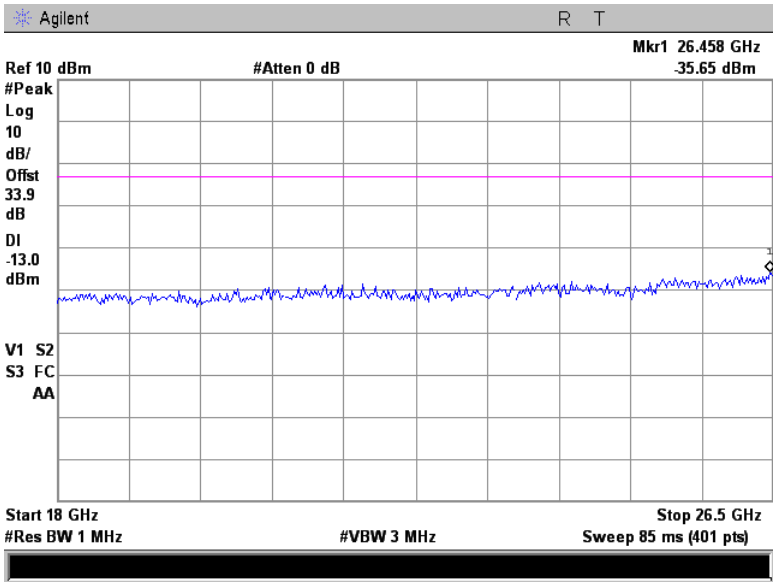


Plot 7.5.18 Spurious emission measurements in 10 - 18 GHz range at high carrier frequency, 10 MHz CBW

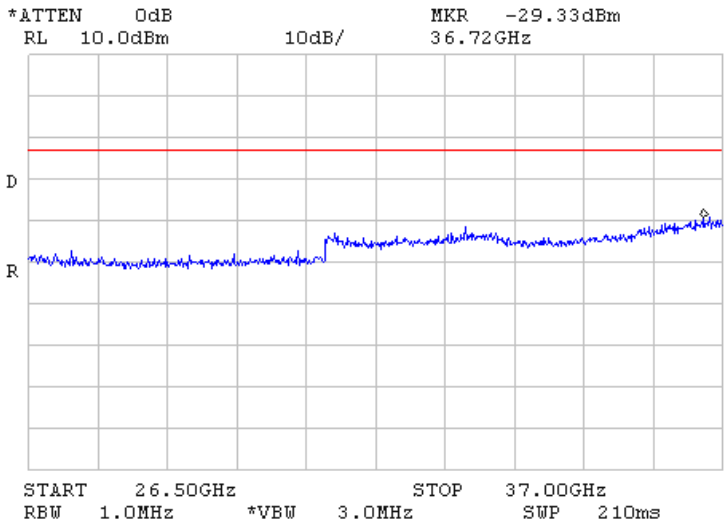


Test specification:	Section 90.1323 / RSS-197, Section 5.7, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.19 Spurious emission measurements in 18-26.5 GHz range at low, mid and high carrier frequency, 10 MHz CBW

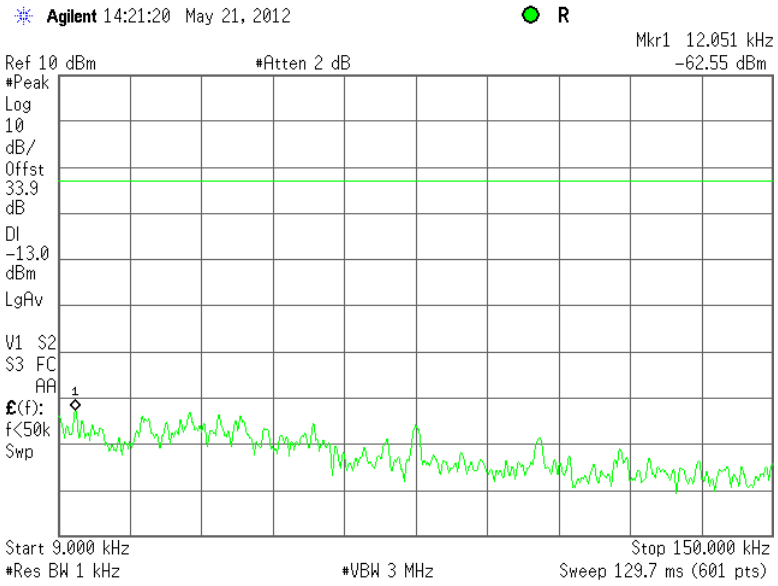


Plot 7.5.20 Spurious emission measurements in 26.5 - 37 GHz range at low, mid and high carrier frequency, 10 MHz CBW

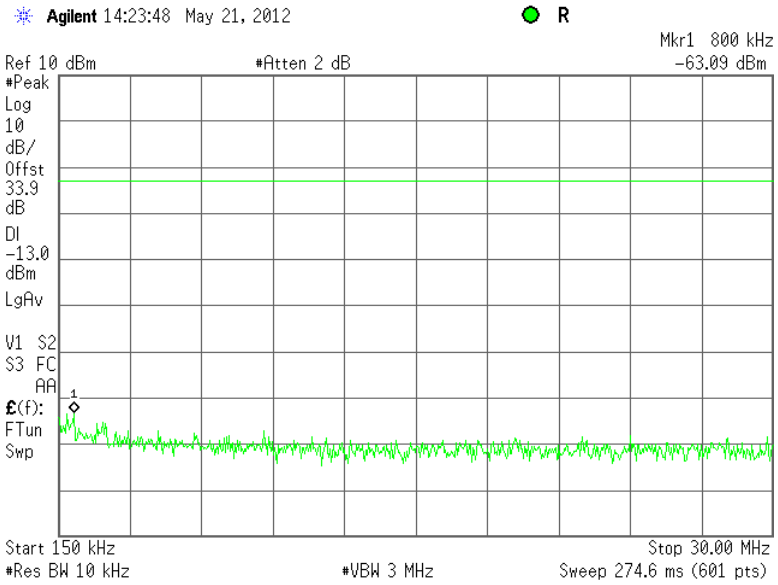


Test specification:	Section 90.1323 / RSS-197, Section 5.7, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.21 Spurious emission measurements in 9 - 150 kHz range at low, mid and high carrier frequency, 5 MHz CBW

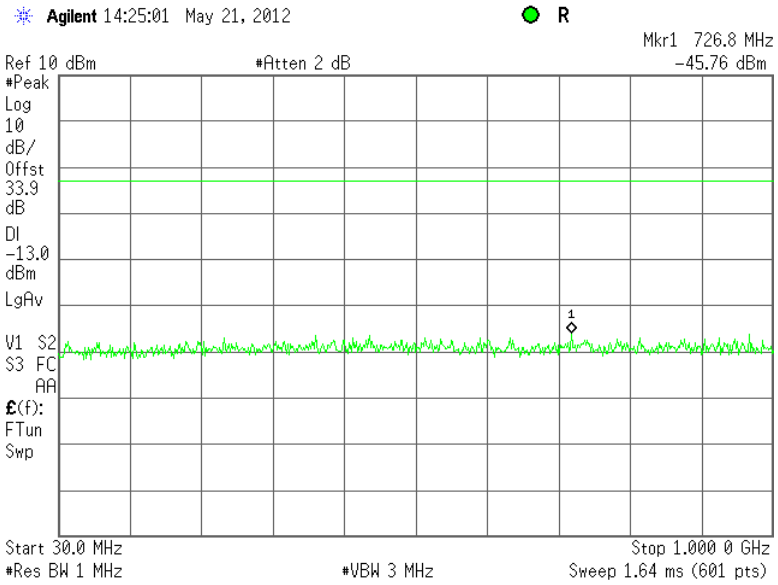


Plot 7.5.22 Spurious emission measurements in 0.150 - 30.0 MHz range at low, mid and high carrier frequency, 5 MHz CBW

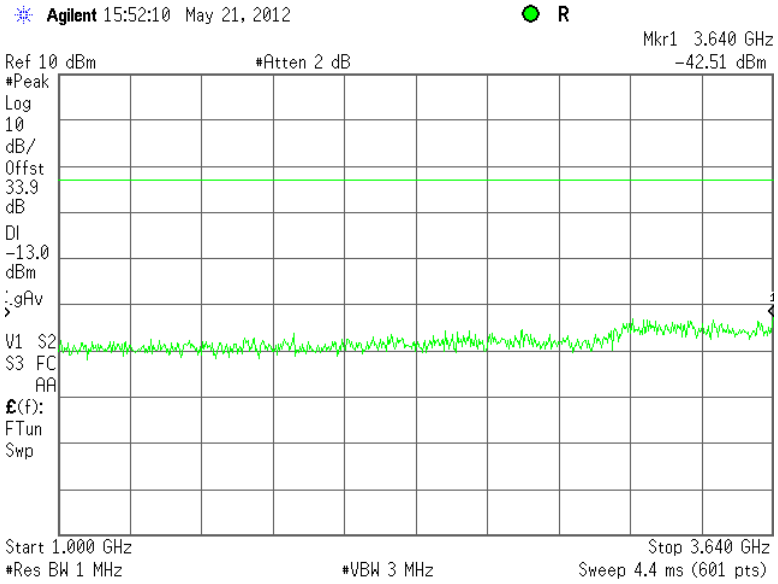


Test specification:	Section 90.1323 / RSS-197, Section 5.7, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.23 Spurious emission measurements in 30.0 - 1000 MHz range at low, mid and high carrier frequency, 5 MHz CBW

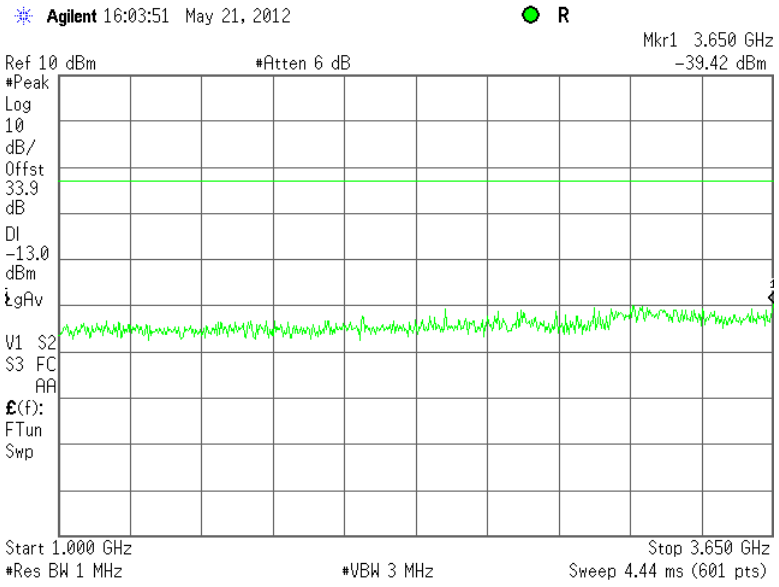


Plot 7.5.24 Spurious emission measurements in 1000 - 3640 MHz range at low carrier frequency, 5 MHz CBW

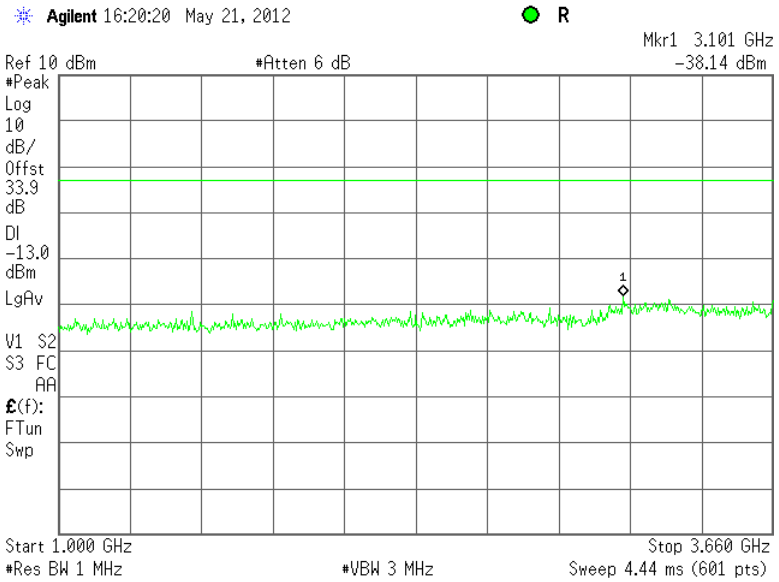


Test specification:	Section 90.1323 / RSS-197, Section 5.7, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.25 Spurious emission measurements in 1000 – 3650 MHz range at mid carrier frequency, 5 MHz CBW

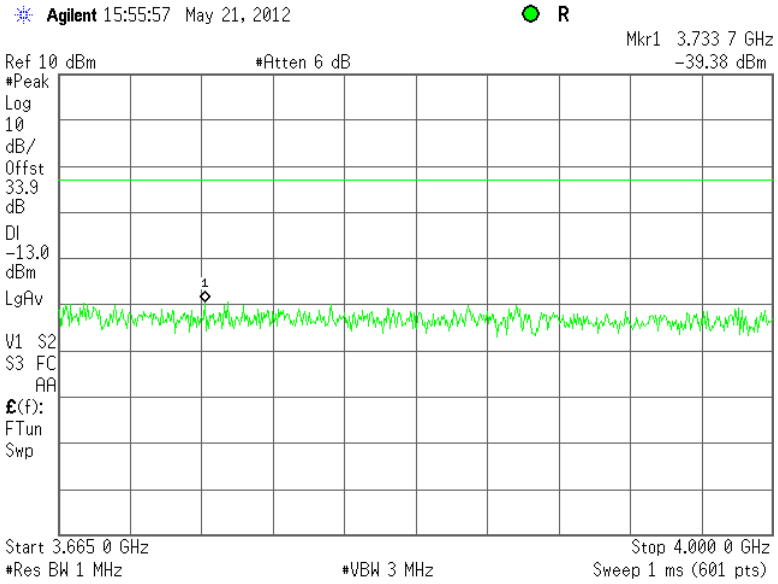


Plot 7.5.26 Spurious emission measurements in 1000 - 3660 MHz range at high carrier frequency, 5 MHz CBW

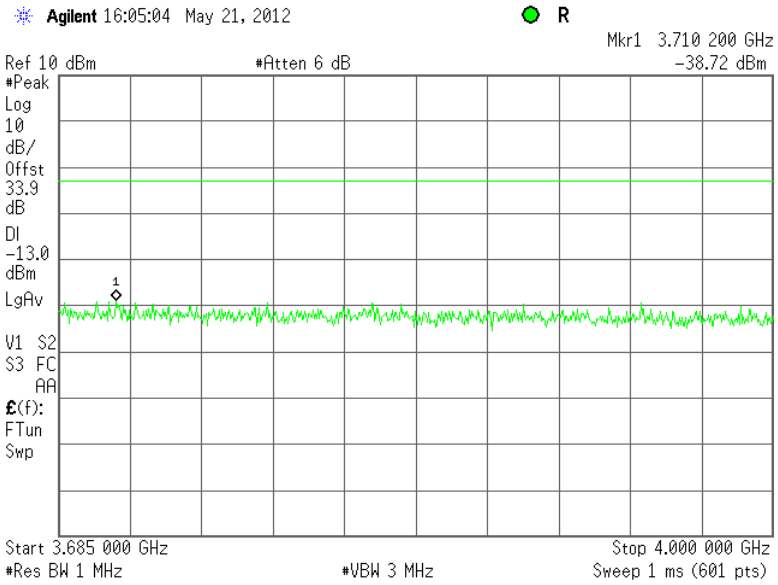


Test specification:	Section 90.1323 / RSS-197, Section 5.7, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.27 Spurious emission measurements in 3665-4000 MHz range at low carrier frequency, 5 MHz CBW

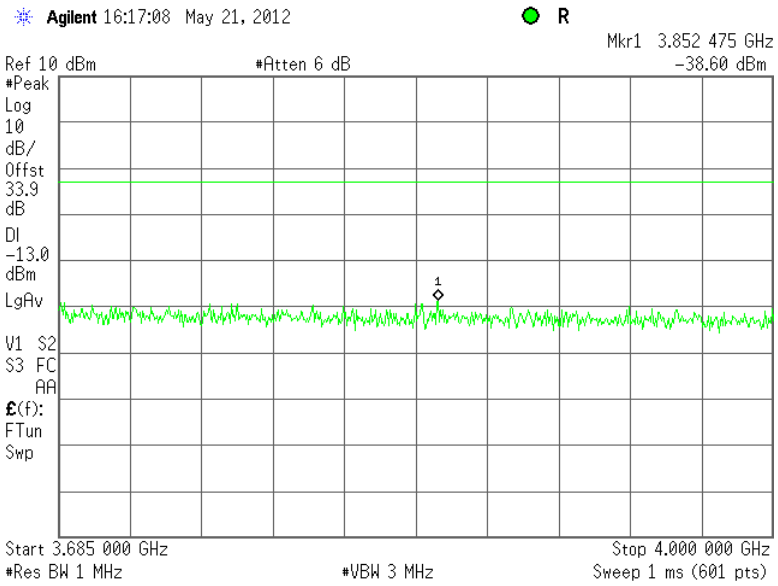


Plot 7.5.28 Spurious emission measurements in 3685-4000 MHz range at mid carrier frequency, 5 MHz CBW

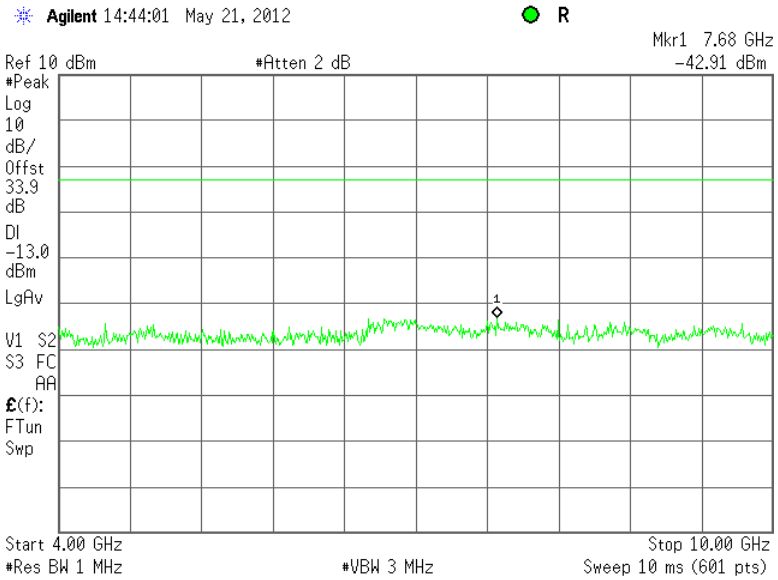


Test specification:	Section 90.1323 / RSS-197, Section 5.7, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.29 Spurious emission measurements in 3685-4000 MHz range at high carrier frequency, 5 MHz CBW

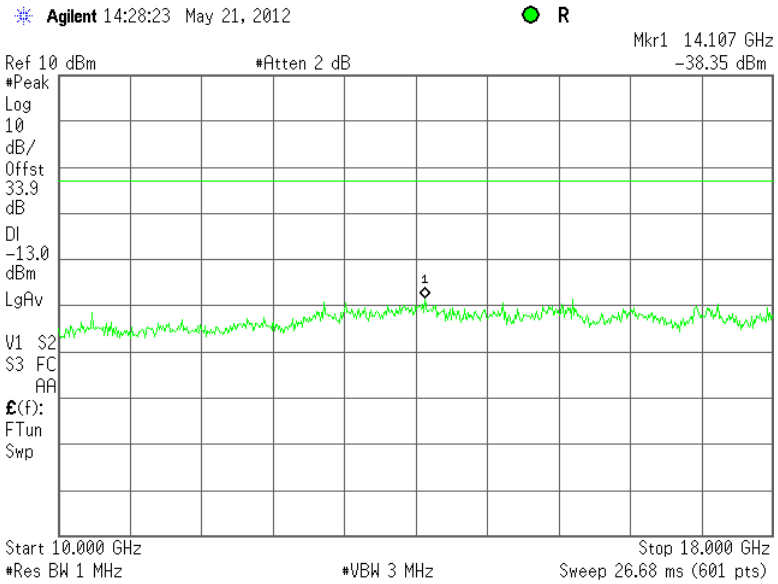


Plot 7.5.30 Spurious emission measurements in 4000-10000 MHz range at low, mid and high carrier frequency, 5 MHz CBW

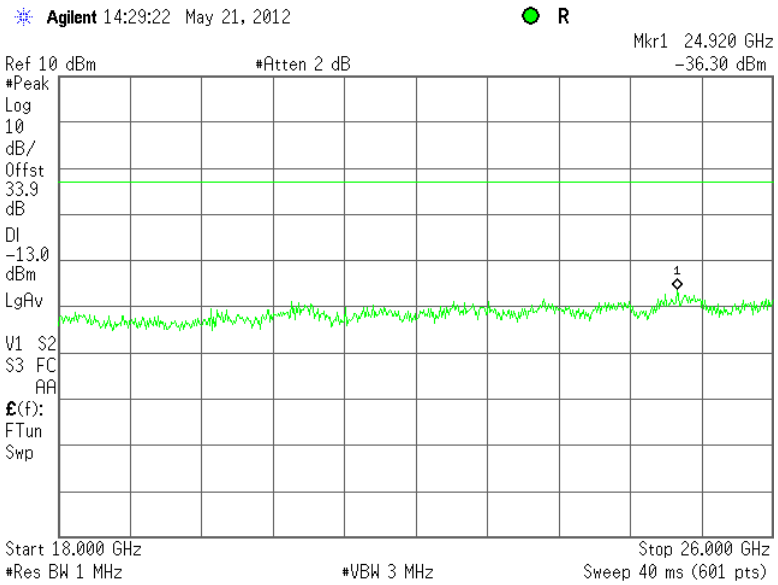


Test specification:	Section 90.1323 / RSS-197, Section 5.7, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.31 Spurious emission measurements in 10 - 18 GHz range at low, mid and high carrier frequency, 5 MHz CBW

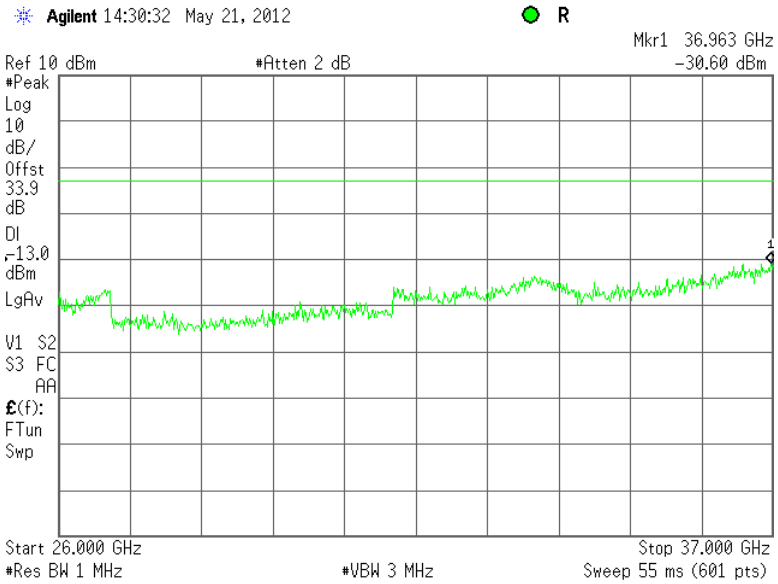


Plot 7.5.32 Spurious emission measurements in 18-26 GHz range at low, mid and high carrier frequency, 5 MHz CBW



Test specification:	Section 90.1323 / RSS-197, Section 5.7, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/27/2012, 5/21/2012		
Temperature: 22 ºC	Air Pressure: 1014 hPa	Relative Humidity: 42 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.33 Spurious emission measurements in 26- 37 GHz range at low, mid and high carrier frequency, 5 MHz CBW



Test specification:	Section 90.1323 / RSS-197, Section 5.7, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/28/2012 - 3/15/2012		
Temperature: 21 ºC	Air Pressure: 1009 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

7.6 Radiated spurious emission measurements

7.6.1 General

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

Table 7.6.1 Radiated spurious emission test limits

Frequency, MHz	Attenuation below carrier, dBc	ERP of spurious, dBm	Equivalent field strength limit @ 3m, dB(µV/m)***
0.009 – 10th 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×P×1.64)/r, where P is ERP in Watts, 1.64 is numeric gain of ideal dipole and r is antenna to EUT distance in meters

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

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

7.6.2.2 The specified frequency range was investigated with antenna connected to spectrum analyzer. To find maximum radiation the turntable was rotated 360^0 and the measuring antenna was rotated around its vertical axis.

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

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

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

7.6.3.2 The specified frequency range was investigated with antenna connected to spectrum analyzer. To find maximum radiation the turntable was rotated 360^0 and the measuring antenna height was swept from 1 to 4 m in both, vertical and horizontal, polarizations.

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

Test specification:	Section 90.1323 / RSS-197, Section 5.7, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/28/2012 - 3/15/2012		
Temperature: 21 ºC	Air Pressure: 1009 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

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

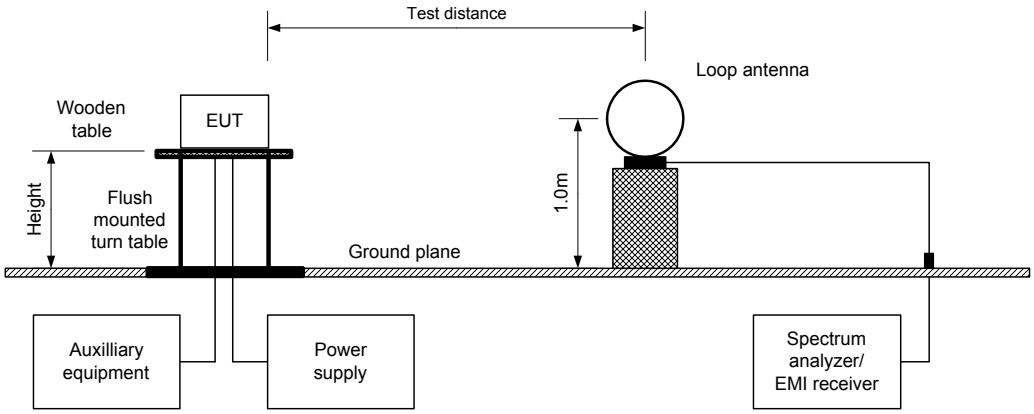
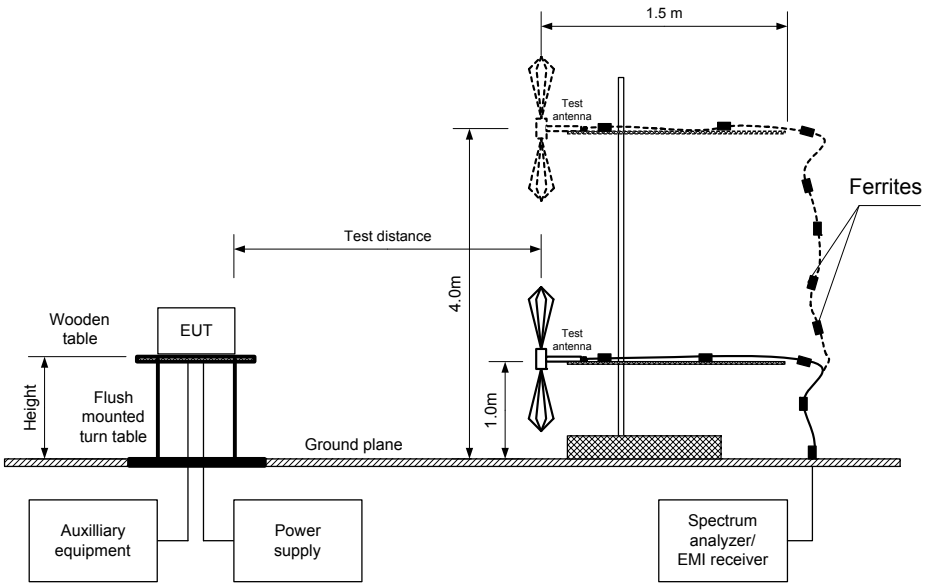


Figure 7.6.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	Section 90.1323 / RSS-197, Section 5.7, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/28/2012 - 3/15/2012		
Temperature: 21 ºC	Air Pressure: 1009 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

Table 7.6.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE: 3650-3675 MHz
TEST DISTANCE: 3 m
TEST SITE: Semi anechoic chamber / OATS
EUT HEIGHT: 0.8 m
INVESTIGATED FREQUENCY RANGE: 0.009 – 37000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: > Resolution bandwidth
TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
Biconical (30 MHz – 200 MHz)
Log periodic (200 MHz – 1000 MHz)
Biconilog (30 MHz – 1000 MHz)
Double ridged guide (above 1000 MHz)
MODULATION: 64 QAM (7 MHz CBW)
MODULATING SIGNAL: PRBS
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 3655 MHz							
No spurious emission were found							
Mid carrier frequency 3662.5 MHz							
No spurious emission were found							
High carrier frequency 3670 MHz							
No spurious emission were found							

Verdict: Pass

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

Reference numbers of test equipment used

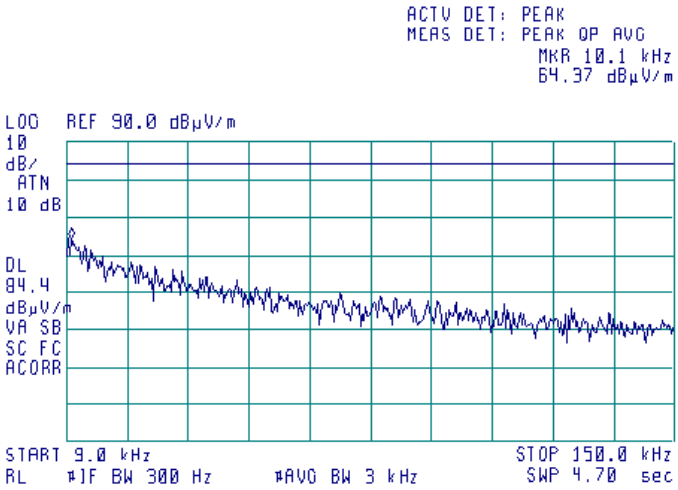
HL 0446	HL 0521	HL 0604	HL 0768	HL 0769	HL 1424	HL 2432	HL 2871
HL 3533	HL 3535	HL 3617	HL 3901	HL 4278			

Full description is given in Appendix A.

Test specification:	Section 90.1323 / RSS-197, Section 5.7, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/28/2012 - 3/15/2012		
Temperature: 21 ºC	Air Pressure: 1009 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

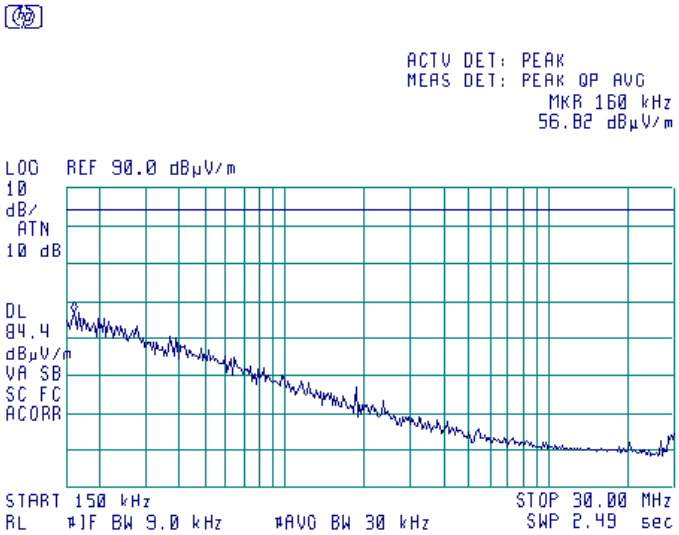
Plot 7.6.1 Radiated emission measurements in 9 - 150 kHz range

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Low, Mid, High
TEST DISTANCE: 3 m



Plot 7.6.2 Radiated emission measurements in 0.15 - 30 MHz range

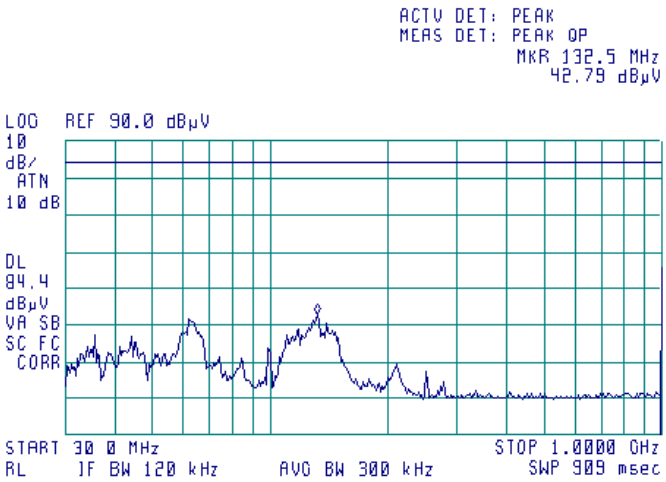
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Low, Mid, High
TEST DISTANCE: 3 m



Test specification:	Section 90.1323 / RSS-197, Section 5.7, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/28/2012 - 3/15/2012		
Temperature: 21 ºC	Air Pressure: 1009 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

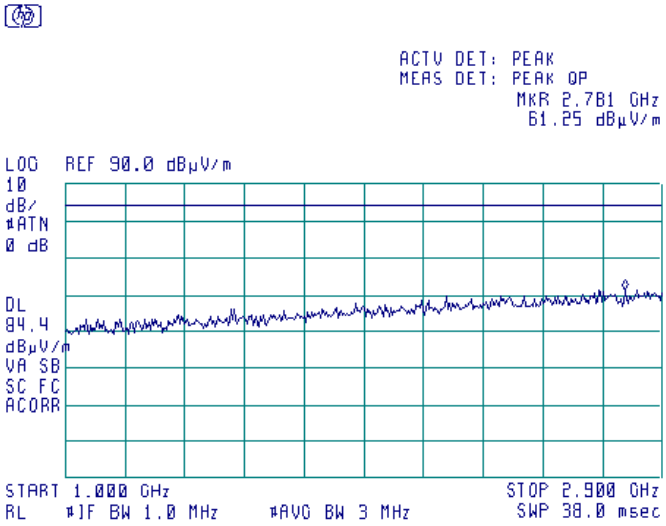
Plot 7.6.3 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.6.4 Radiated emission measurements in 1000 – 2900 MHz range

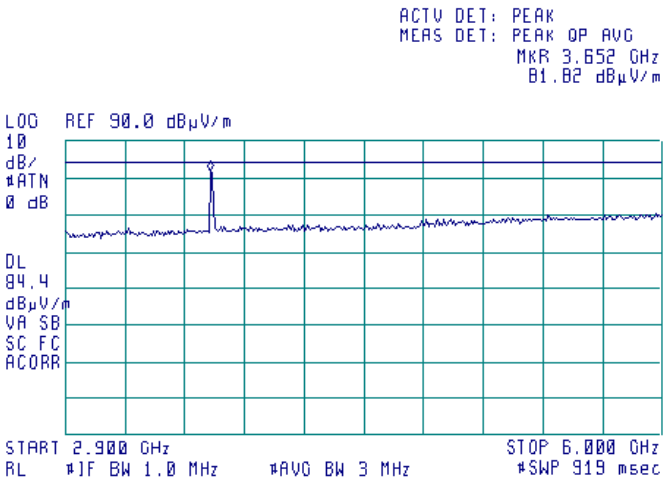
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Low, Mid, High
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:	Section 90.1323 / RSS-197, Section 5.7, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/28/2012 - 3/15/2012		
Temperature: 21 ºC	Air Pressure: 1009 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

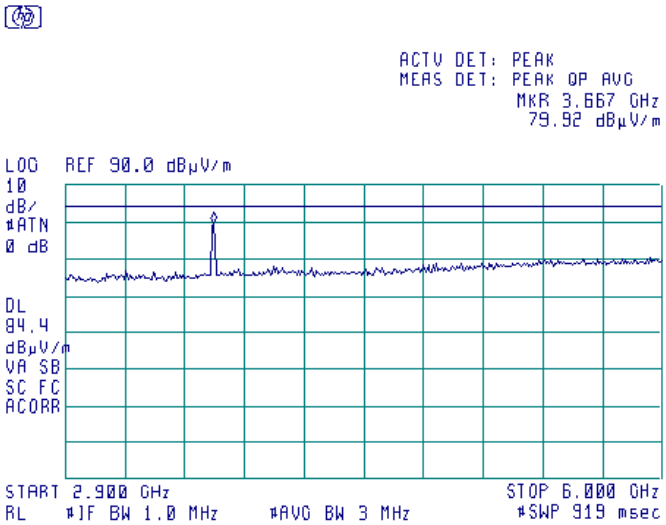
Plot 7.6.5 Radiated emission measurements in 2900 – 6500 MHz range

TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Low (3655 MHz)
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Plot 7.6.6 Radiated emission measurements in 2900 – 6000 MHz range

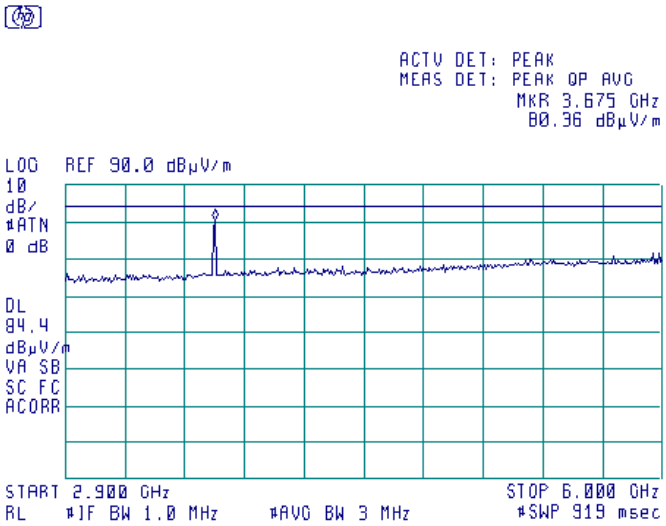
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Mid (3662.5 MHz)
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:	Section 90.1323 / RSS-197, Section 5.7, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/28/2012 - 3/15/2012		
Temperature: 21 ºC	Air Pressure: 1009 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

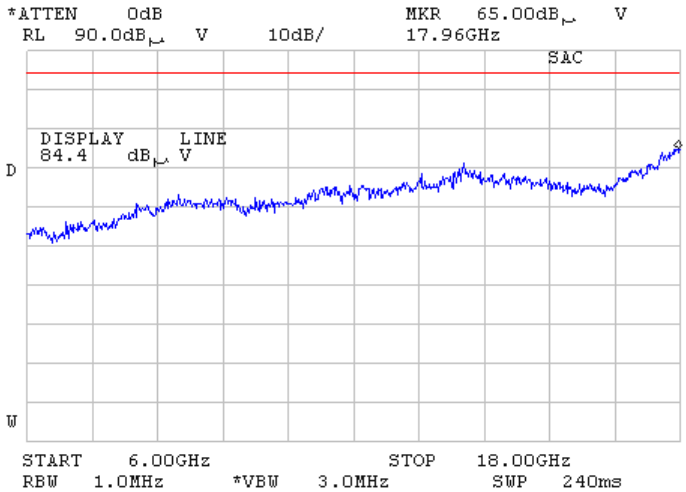
Plot 7.6.7 Radiated emission measurements in 2900 – 6000 MHz range

TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	High (3670 MHz)
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Plot 7.6.8 Radiated emission measurements in 6000 – 18000 MHz range

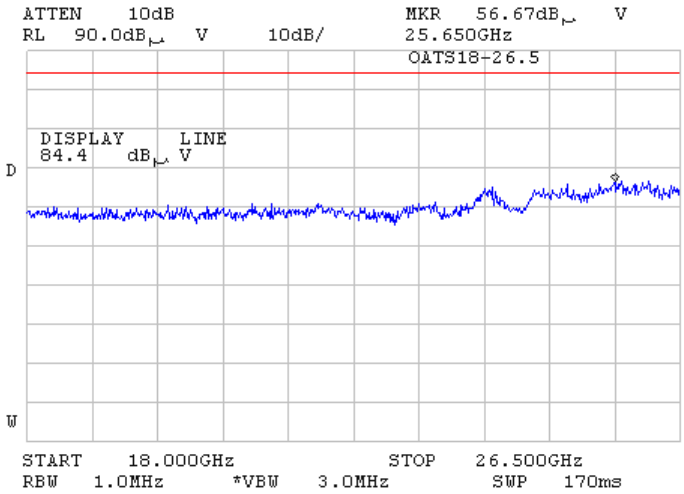
TEST SITE:	Semi anechoic chamber
CARRIER FREQUENCY:	Low, Mid, High
ANTENNA POLARIZATION:	Vertical and Horizontal
TEST DISTANCE:	3 m



Test specification:	Section 90.1323 / RSS-197, Section 5.7, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053, 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	2/28/2012 - 3/15/2012		
Temperature: 21 ºC	Air Pressure: 1009 hPa	Relative Humidity: 47 %	Power Supply: 48 VDC
Remarks:			

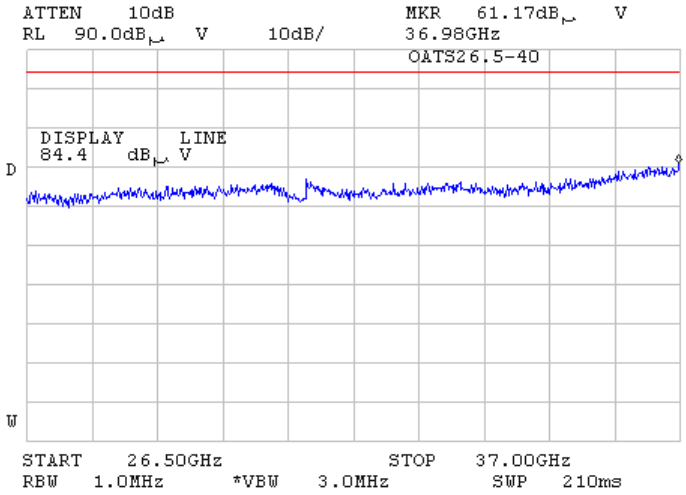
Plot 7.6.9 Radiated emission measurements in 18000 – 26500 MHz range

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



Plot 7.6.10 Radiated emission measurements in 26500 – 37000 MHz range

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



Test specification:	Section 90.213 / RSS-197, Section 5.7, Frequency stability		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/6/2012 - 3/8/2012		
Temperature: 22.7 ºC	Air Pressure: 1021 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

7.7 Frequency stability test

7.7.1 General

This test was performed to measure frequency stability of transmitter RF carrier. Specification test limits are given in Table 7.7.1, Table 7.7.2.

Table 7.7.1 Frequency stability limits

Assigned frequency, MHz	Maximum allowed frequency displacement	
	ppm	Hz
3650.0 – 3675.0	The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation	

Table 7.7.2 Frequency stability limits according to RSS-197

Assigned frequency, MHz	Maximum allowed frequency displacement
3650.0 – 3675.0	The frequency stability shall be sufficient to ensure that f_L minus the frequency offset and f_H plus the frequency offset shall be within the authorized band of operation

7.7.2 Test procedure

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

7.7.2.2 The EUT 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.

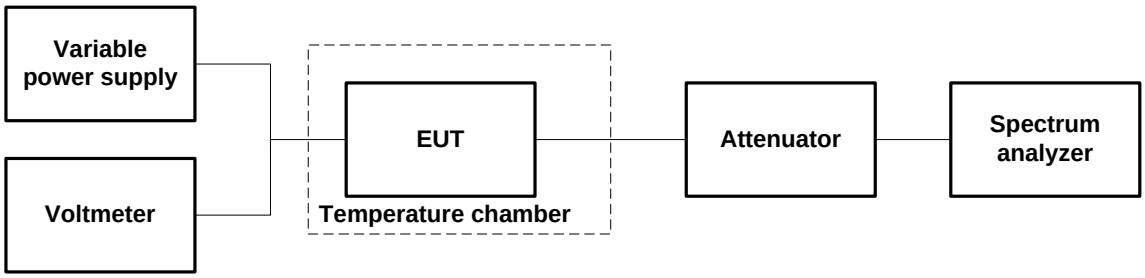
7.7.2.3 The EUT was powered on and carrier frequency was measured at start up moment and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.

7.7.2.4 The above procedure was repeated at 0˚C and at the lowest test temperature.

7.7.2.5 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.

7.7.2.6 Frequency displacement was calculated and compared with the limit as provided in Table 7.7.3.

Figure 7.7.1 Frequency stability test setup



Test specification:	**Section 90.213 / RSS-197, Section 5.7, Frequency stability**		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	3/6/2012 - 3/8/2012		
Temperature: 22.7 ºC	**Air Pressure:** 1021 hPa	**Relative Humidity:** 41 %	**Power Supply:** 48VDC
Remarks:			

Table 7.7.3 Frequency stability test results

ASSIGNED FREQUENCY RANGE: 3650.0 – 3675.0 MHz
NOMINAL POWER VOLTAGE: 48 VDC
TEMPERATURE STABILIZATION PERIOD: 20 min
POWER DURING TEMPERATURE TRANSITION: Off
SPECTRUM ANALYZER MODE: Peak
RESOLUTION BANDWIDTH: 1 kHz
VIDEO BANDWIDTH: 3 kHz
MODULATION: 64QAM

T, ºC	Voltage, VDC	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												
-30	nominal	3654.999883	3654.999913	3654.999899	3654.999895	3654.999915	3654.999916	3654.999933	151	0	0.0413	0
-20	nominal	3654.999908	NA	NA	NA	NA	NA	3654.999895	126	0	0.0345	0
-10	nominal	3655.000377	NA	NA	NA	NA	NA	3655.000271	595	0	0.1628	0
0	nominal	3654.999893	3654.999908	3654.999913	3654.999914	3654.999924	3654.999919	3654.999905	142	0	0.0389	0
10	nominal	3654.999924	NA	NA	NA	NA	NA	3654.999895	142	0	0.0389	0
20	+15%	3654.999772	NA	NA	NA	NA	NA	3654.999763	0	19	0	0.0052
20	nominal	3654.999792	NA	NA	NA	NA	NA	3654.999782	10	0	0.0027	0
20	-15%	3654.999768	NA	NA	NA	NA	NA	3654.999744	0	38	0	0.0104
30	nominal	3654.999874	3654.999782	3654.999785	3654.999767	3654.999730	3654.999758	3654.999787	92	52	0.0252	0.0142
40	nominal	3654.999805	NA	NA	NA	NA	NA	3654.999797	23	0	0.0063	0
50	nominal	3654.999964	NA	NA	NA	NA	NA	3654.999955	182	0	0.0499	0
Mid channel												
-30	nominal	3662.499916	NA	NA	NA	NA	NA	3662.499873	0	183	0	0.0500
-20	nominal	3662.499998	NA	NA	NA	NA	NA	3662.499956	0	100	0	0.0273
-10	nominal	3662.499935	3662.499936	3662.499926	3662.499921	3662.499906	3662.499912	3662.499898	0	158	0	0.0431
0	nominal	3662.499895	NA	NA	NA	NA	NA	3662.499894	0	162	0	0.0442
10	nominal	3662.500077	NA	NA	NA	NA	NA	3662.500047	21	9	0.0057	0.0025
20	+15%	3662.500086	NA	NA	NA	NA	NA	3662.500056	30	0	0.0082	0
20	nominal	3662.500061	NA	NA	NA	NA	NA	3662.500041	5	15	0.0014	0.0041
20	-15%	3662.500075	3662.500023	3662.500031	3662.500006	3662.500002	3662.500007	3662.500008	19	54	0.0052	0.0147
30	nominal	3662.500059	NA	NA	NA	NA	NA	3662.500068	12	0	0.0033	0
40	nominal	3662.500130	NA	NA	NA	NA	NA	3662.500119	74	0	0.0202	0
50	nominal	3662.499916	NA	NA	NA	NA	NA	3662.499873	0	183	0	0.0500
High channel												
-30	nominal	3669.999913	3669.999899	3669.999919	3669.999914	3669.999914	3669.999919	3669.999935	0	152	0	0.0414
-20	nominal	3669.999961	NA	NA	NA	NA	NA	3669.999929	0	122	0	0.0332
-10	nominal	3669.999977	NA	NA	NA	NA	NA	3669.999954	0	97	0	0.0264
0	nominal	3669.999942	3669.999923	3669.999919	3669.999899	3669.999920	3669.999940	3669.999917	0	152	0	0.0414
10	nominal	3669.999915	NA	NA	NA	NA	NA	3669.999923	0	136	0	0.0371
20	+15%	3670.000079	NA	NA	NA	NA	NA	3670.000051	28	0	0.0076	0
20	nominal	3670.000089	NA	NA	NA	NA	NA	3670.000051	38	0	0.0104	0
20	-15%	3669.999965	NA	NA	NA	NA	NA	3669.999941	0	110	0	0.0300
30	nominal	3670.000049	3670.000039	3670.000024	3670.000009	3670.000025	3670.000020	3670.000016	0	42	0	0.0114
40	nominal	3670.000057	NA	NA	NA	NA	NA	3670.000044	6	7	0.0016	0.0019
50	nominal	3670.000081	NA	NA	NA	NA	NA	3670.000056	30	0	0.0082	0

VERDICT: Pass

* - Reference frequency

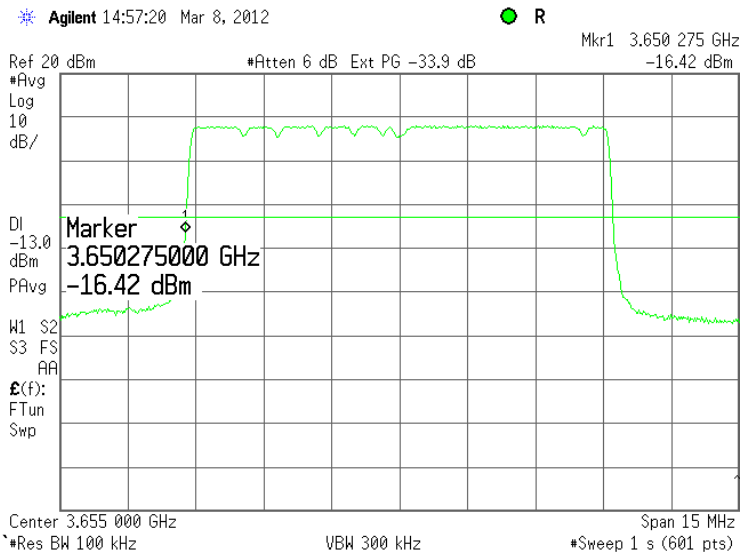
Reference numbers of test equipment used

HL 2952	HL 3286	HL 3818	HL 4164				

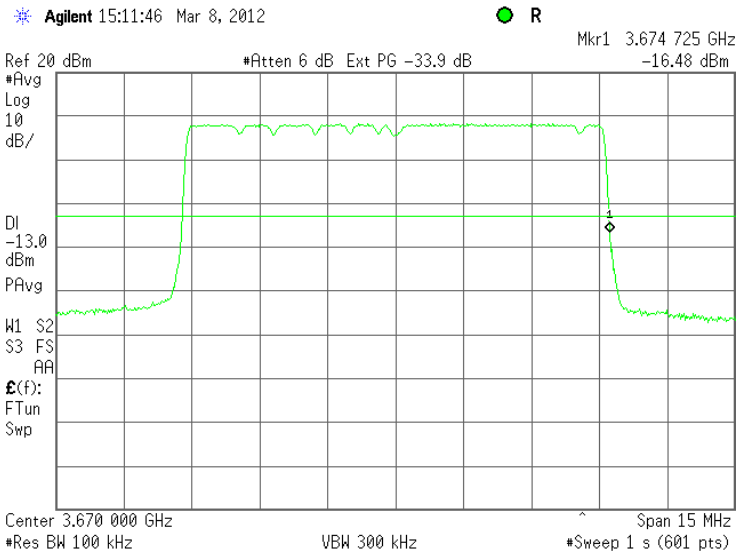
Full description is given in Appendix A.

Test specification:	Section 90.213 / RSS-197, Section 5.7, Frequency stability		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/6/2012 - 3/8/2012		
Temperature: 22.7 °C	Air Pressure: 1021 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

Plot 7.7.1 Band edge test result at low frequency, QPSK, EBW 10 MHz

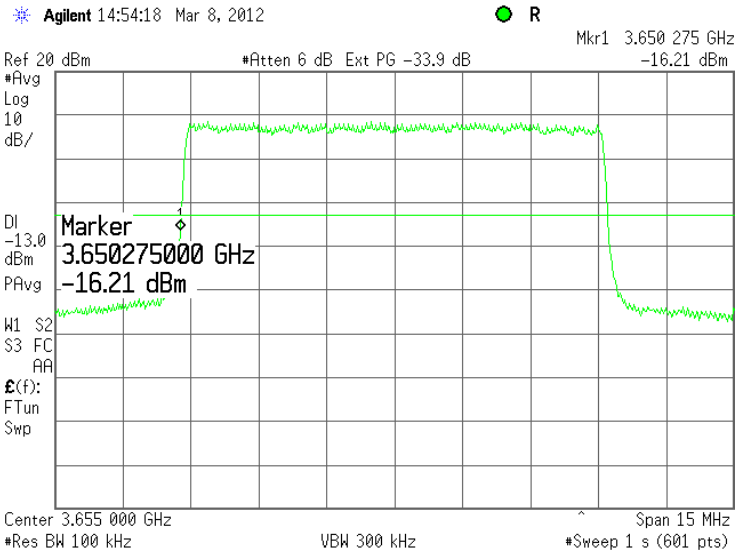


Plot 7.7.2 Band edge test result at high frequency, QPSK, EBW 10 MHz

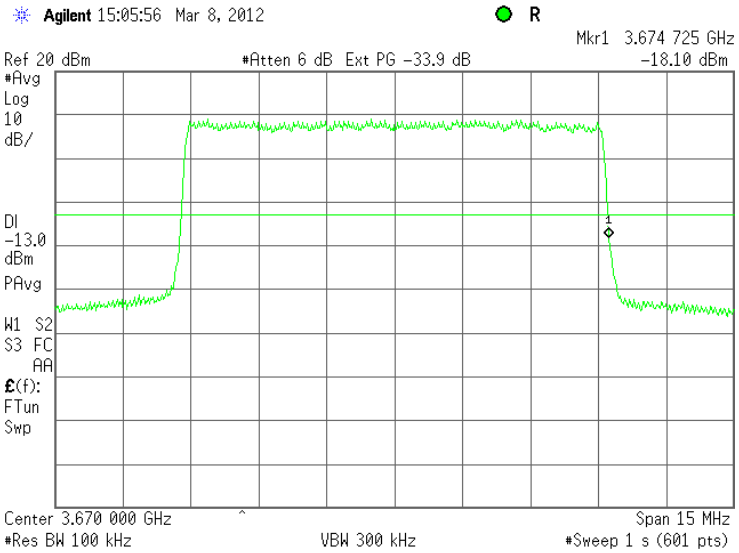


Test specification:	Section 90.213 / RSS-197, Section 5.7, Frequency stability		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/6/2012 - 3/8/2012		
Temperature: 22.7 °C	Air Pressure: 1021 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

Plot 7.7.3 Band edge test result at low frequency, 64QAM, EBW 10 MHz

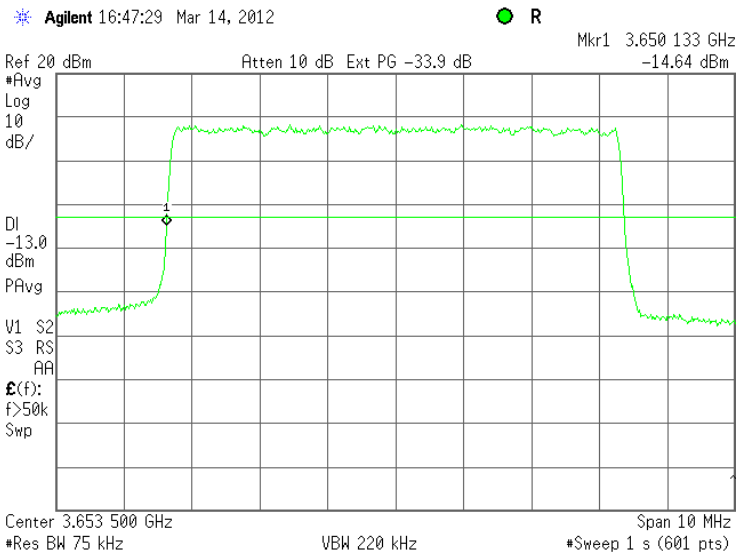


Plot 7.7.4 Band edge test result at high frequency, 64QAM, EBW 10 MHz

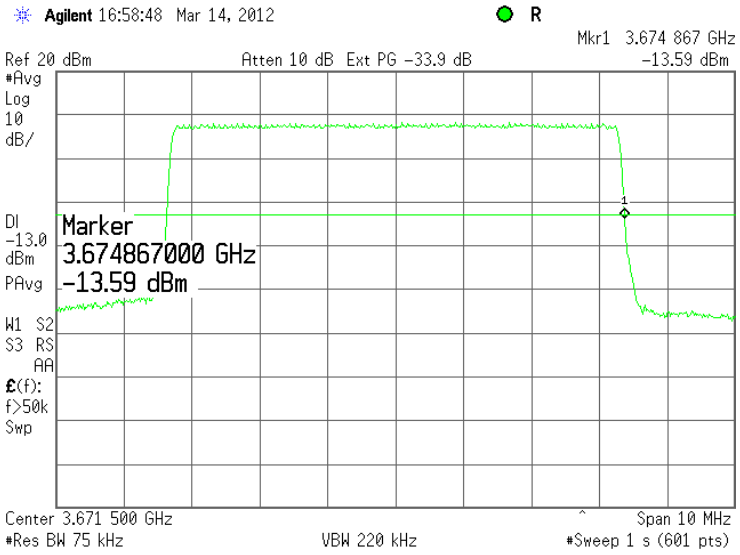


Test specification:	Section 90.213 / RSS-197, Section 5.7, Frequency stability		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/6/2012 - 3/8/2012		
Temperature: 22.7 °C	Air Pressure: 1021 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

Plot 7.7.5 Band edge test result at low frequency, QPSK, EBW 7MHz

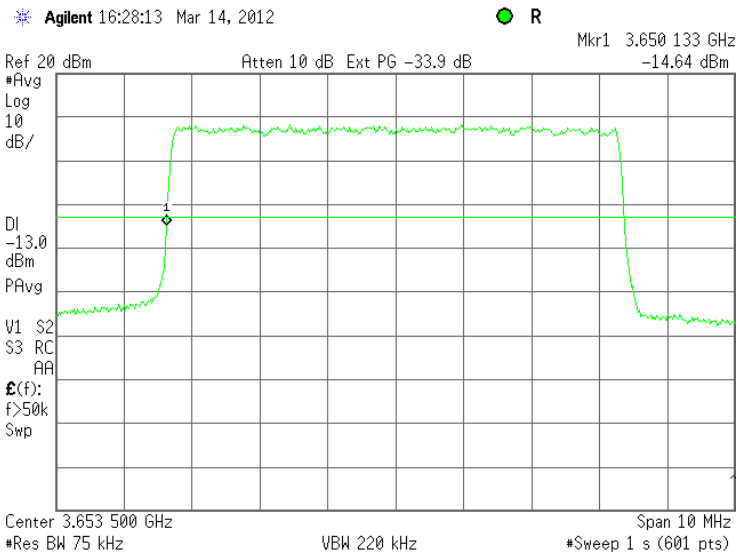


Plot 7.7.6 Band edge test result at high frequency, QPSK, EBW 7 MHz

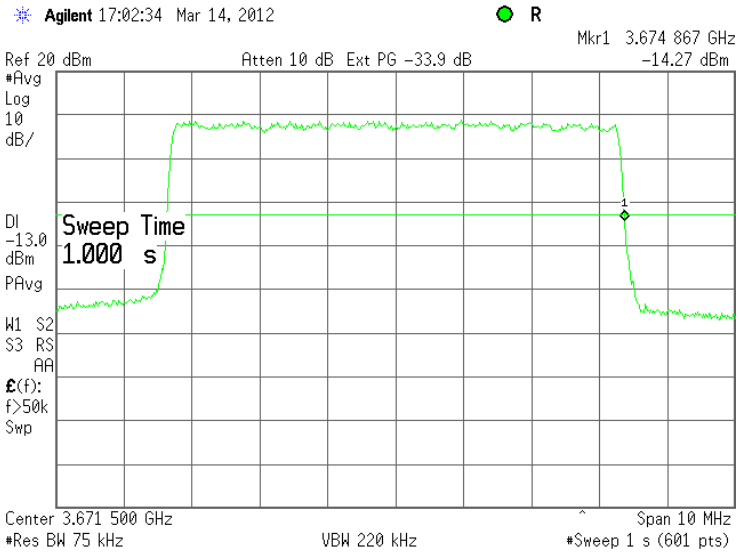


Test specification:	Section 90.213 / RSS-197, Section 5.7, Frequency stability		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/6/2012 - 3/8/2012		
Temperature: 22.7 °C	Air Pressure: 1021 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

Plot 7.7.7 Band edge test result at low frequency, 64QAM, EBW 7 MHz

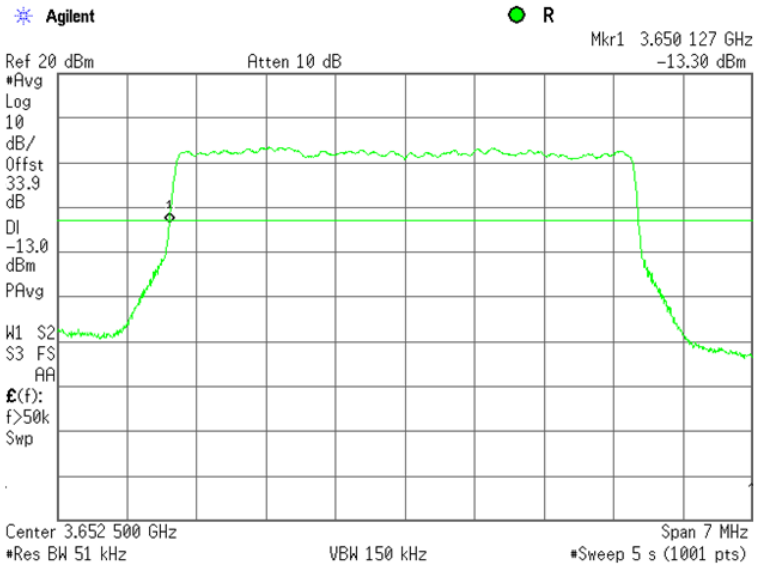


Plot 7.7.8 Band edge test result at high frequency, 64QAM, EBW 7 MHz

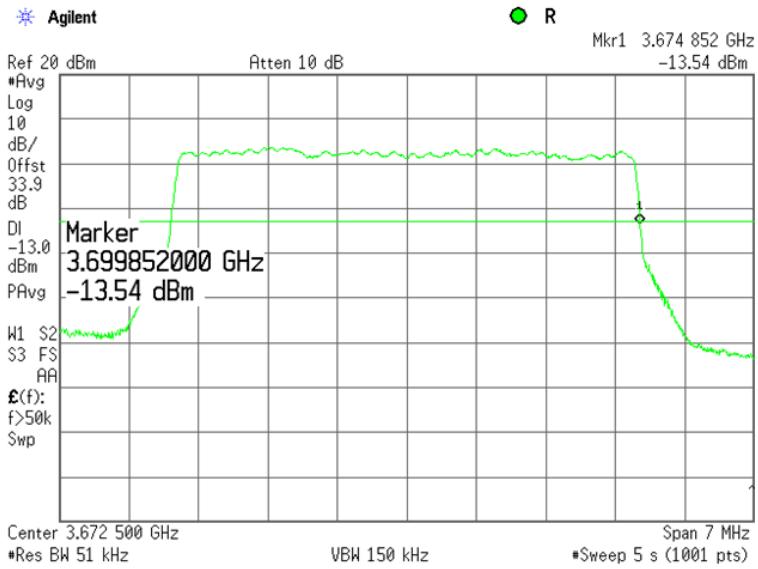


Test specification:	Section 90.213 / RSS-197, Section 5.7, Frequency stability		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/6/2012 - 3/8/2012		
Temperature: 22.7 °C	Air Pressure: 1021 hPa	Relative Humidity: 41 %	Power Supply: 48VDC
Remarks:			

Plot 7.7.9 Band edge test result at low frequency, EBW 5 MHz



Plot 7.7.10 Band edge test result at high frequency, EBW 5 MHz



Test specification:	RSS-197, Section 5.8, Receiver spurious emissions		
Test procedure:	ANSI C63.4, Sections 12.1.4, 12.1.5		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/15/2012		
Temperature: 20 ºC	Air Pressure: 1014 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

7.8 Receiver spurious emissions

7.8.1 General

This test was performed to measure spurious emissions at RF antenna connector of receiver or a receiver which was tested for compliance with radiated emission limits with the antenna port connected to resistive termination. Specification test limits at antenna connector measurement are given in Table 7.8.1 (RSS-Gen section 6.2).

Table 7.8.1 Antenna conducted measurement spurious emission limits

Frequency range, MHz	Power of spurious		Measurement bandwidth, (min) kHz
	nW	dBm	
30 – 1000	2	-57	4
1000 – 3rd harmonic	5	-53	4

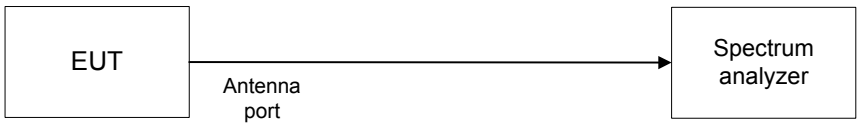
* - harmonic of the highest frequency the EUT generates, uses, operates or tunes to (without exceeding 40 GHz).

7.8.2 Test procedure for conducted measurement

7.8.2.1 The EUT was set up as shown in Figure 7.8.1, energized and its proper operation was checked.

7.8.2.2 The spurious emission was measured with spectrum analyzer as provided in Table 7.8.2 and the associated plots.

Figure 7.8.1 Spurious emission test setup



Test specification:	**RSS-197, Section 5.8, Receiver spurious emissions**		
Test procedure:	ANSI C63.4, Sections 12.1.4, 12.1.5		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	3/15/2012		
Temperature: 20 ºC	**Air Pressure:** 1014 hPa	**Relative Humidity:** 38 %	**Power Supply:** 48 VDC
Remarks:			

Table 7.8.2 Spurious emission test results according to RSS-Gen, Section 6.2

INVESTIGATED FREQUENCY RANGE: 30-12000 MHz
EUT OPERATING MODE: Receive
RESOLUTION BANDWIDTH: 100 kHz (below 1000 MHz)
1000 kHz (above 1000 MHz)
VIDEO BANDWIDTH: 300 kHz (below 1000 MHz)
3000 kHz (above 1000 MHz)

Frequency, MHz	Spurious emission, dBm	Limit, dBm	Margin, dB	Verdict
No spurious were found				Pass

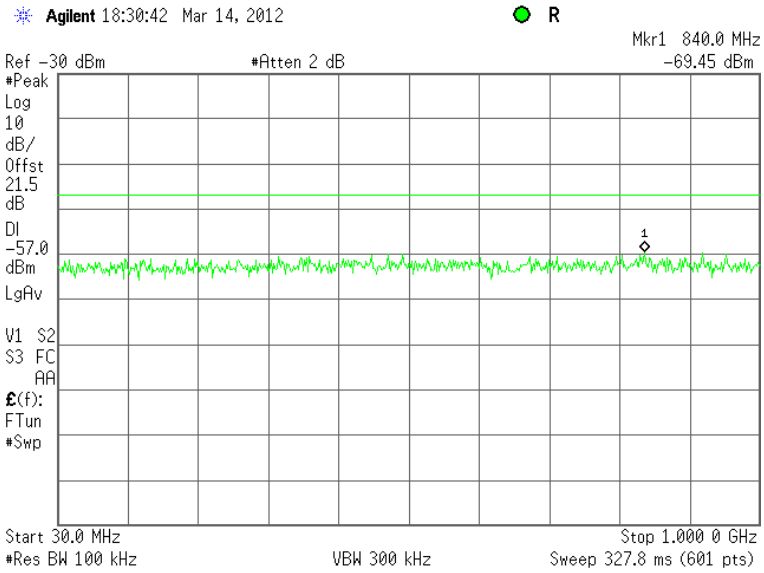
Reference numbers of test equipment used

HL 2013	HL 3769	HL 3818					

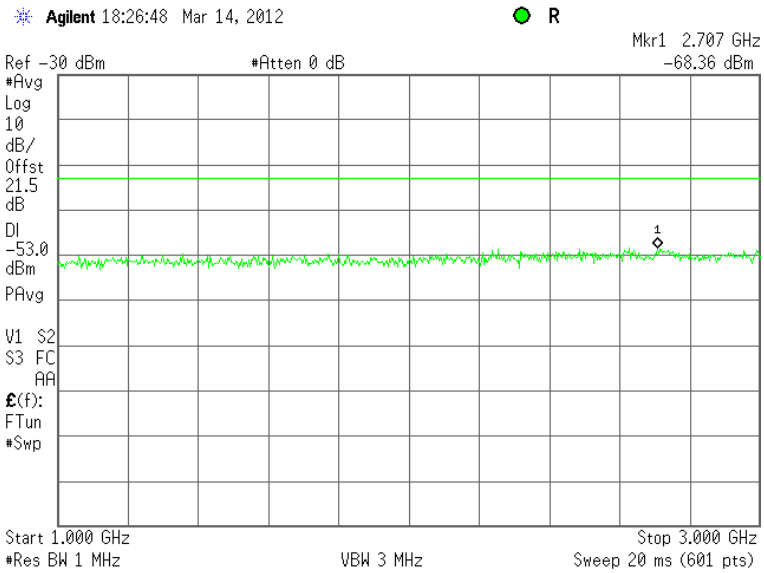
Full description is given in Appendix A.

Test specification:	RSS-197, Section 5.8, Receiver spurious emissions		
Test procedure:	ANSI C63.4, Sections 12.1.4, 12.1.5		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/15/2012		
Temperature: 20 ºC	Air Pressure: 1014 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.8.1 Spurious emission test results in 30-1000 MHz

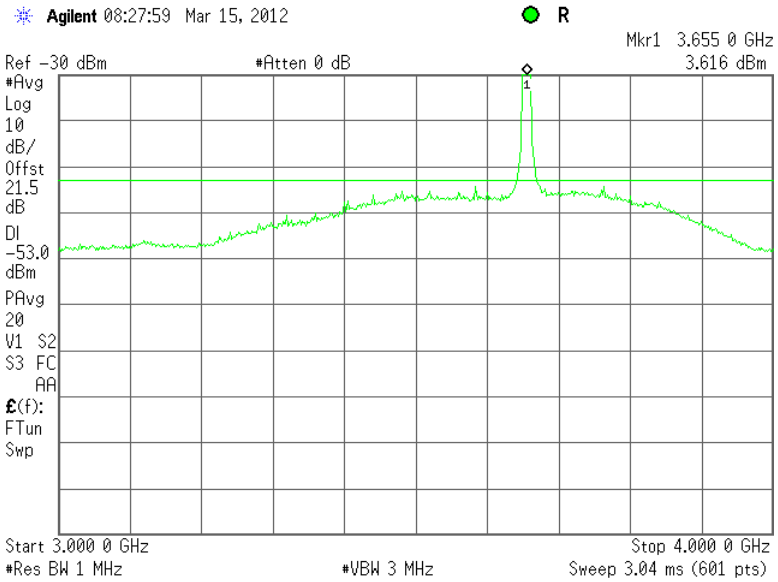


Plot 7.8.2 Spurious emission test results in 1-3 GHz



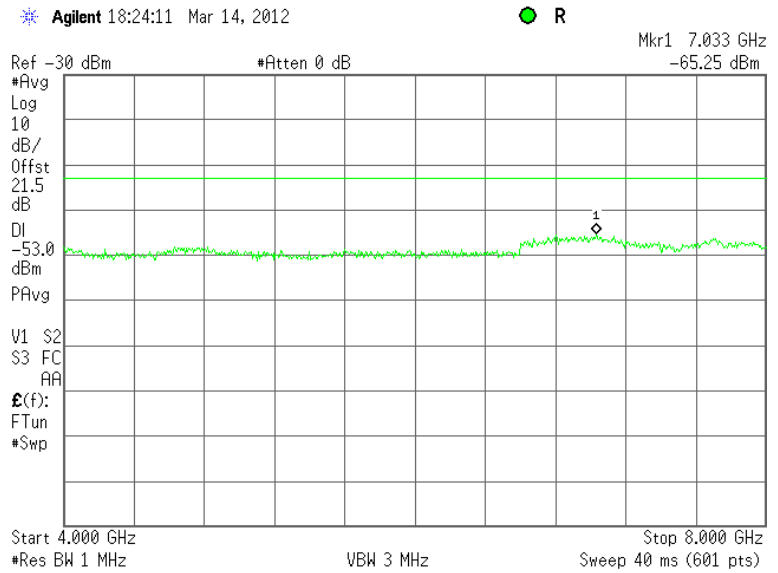
Test specification:	RSS-197, Section 5.8, Receiver spurious emissions		
Test procedure:	ANSI C63.4, Sections 12.1.4, 12.1.5		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/15/2012		
Temperature: 20 ºC	Air Pressure: 1014 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.8.3 Spurious emission test results in 3-4 GHz



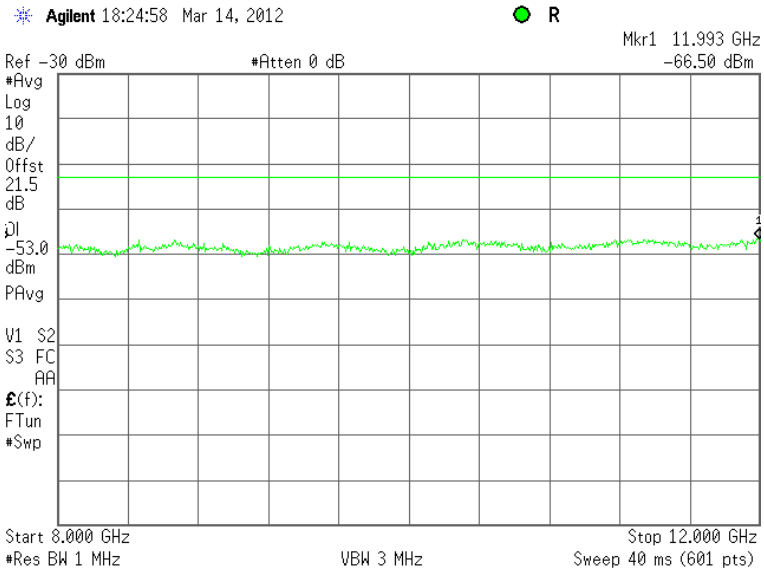
NOTE: 3655 MHz – fundamental frequency

Plot 7.8.4 Spurious emission test results in 4-8 GHz



Test specification:	RSS-197, Section 5.8, Receiver spurious emissions		
Test procedure:	ANSI C63.4, Sections 12.1.4, 12.1.5		
Test mode:	Compliance	Verdict:	PASS
Date(s):	3/15/2012		
Temperature: 20 ºC	Air Pressure: 1014 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Plot 7.8.5 Spurious emission test results in 8-12 GHz



8 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./ Check	Due Cal./ Check
0446	Antenna, Loop, Active, 10 kHz - 30 MHz	EMCO	6502	2857	03-Jul-11	03-Jul-12
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A 00319, 3448A00253	29-Aug-11	29-Sep-12
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	11-Jan-11	11-Jan-13
0768	Antenna Standard Gain Horn,18-26.5 GHz, WR-42, 25 dB gain	Quinstar Technology	QWH-4200-BA	110	03-Feb-12	03-Feb-15
0769	Antenna Standard Gain Horn, 26.5-40 GHz, WR28, 25 dB gain	Quinstar Technology	QWH-2800-BA	112	03-Feb-12	03-Feb-15
1424	Spectrum Analyzer, 30 Hz- 40 GHz	Agilent Technologies	8564EC	3946A00219	25-Sep-11	25-Sep-12
2013	Power Divider, 0.5-18.0 GHz, 80 W	Omni Spectra	2090-6204-00	2013	01-Dec-10	01-Dec-12
2432	Antenna, Double-Ridged Waveguide Horn 1-18 GHz	EMC Test Systems	3115	00027177	25-Nov-11	25-Nov-12
2818	Cable TELEQUIS RG 58 C/U SMA/SMA TELEQUIS RG 58 C/U BNC/BNC	Belden	TELEQUIS	2818	01-Jan-12	01-Jan-13
2871	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-8155-00	2871	15-Jan-12	15-Jan-13
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY41444762	08-May-12	08-May-13
2952	Cable, RF, 18 GHz, 1.2 m, SMA-SMA	Gore	10020014	NA	03-Oct-11	03-Oct-12
2953	Cable, RF, 18 GHz, 1.2 m, SMA-SMA	Gore	10020014	NA	03-Oct-11	03-Oct-12
3286	Temperature Chamber, (-50 to +170) °C	Thermotron	EL-8-CH-1-1-CO2	21-9048	11-Sep-11	11-Sep-12
3301	Power Meter, P-series, 50 MHz to 40 GHz	Agilent Technologies	N1911A	MY45101057	14-Dec-11	14-Dec-12
3302	Power sensor, P-Series, 50 MHz to 40 GHz, -35/30 to 20 dBm	Agilent Technologies	N1922A	MY45240586	14-Dec-11	14-Dec-12
3533	Amplifier, low noise, 6 to 18 GHz	Quinstar Technology	QLJ-06184040-J0	11159001001	25-Dec-11	25-Dec-12
3535	Amplifier, low noise, 18 to 40 GHz	Quinstar Technology	QLJ-18404537-J0	11159003001	11-Jul-11	11-Jul-12
3617	Cable RF, 6.5 m, N type-N type, DC-6.5 GHz	Suhner Switzerland	RG 214/U	NA	19-May-12	19-May-13
3667	Directional coupler, 2 GHz to 8 GHz, 10 dB	ELISRA	MW10162	1011	31-Aug-11	31-Aug-12
3763	Precision Fixed Attenuator, 50 Ohm, 5 W, 20 dB, DC to 18 GHz	Mini-Circuits	BW-S20W5+	NA	07-Mar-12	07-Mar-13
3769	Attenuator, N-type, 20 dB, DC to 18 GHz, 5 W	Mini-Circuits	BW-N20W5+	NA	22-Aug-11	22-Aug-12

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./ Check	Due Cal./ Check
3818	PSA Series Spectrum Analyzer, 3 Hz- 44 GHz	Agilent Technologies	E4446A	MY48250288	16-Feb-12	16-Feb-13
3868	Directional coupler, 2 GHz to 8 GHz, 10 dB, SMA Female	Narda	4203-10	06978	13-Dec-10	13-Dec-12
3901	Microwave Cable Assembly, 40.0 GHz, 3.5 m, SMA/SMA	Huber-Suhner	SUCOFLEX 102A	1225/2A	08-Feb-12	08-Feb-13
4164	DC Power Supply, 60V, 5A	Standig	605D	NA	18-Jan-12	18-Jan-13
4278	Test Cable , DC-18 GHz, 4.6 m, N/M - N/M	Mini-Circuits	APC-15FT-NMNM+	0755A	23-Nov-11	23-Nov-12
4289	PXA signal analyzer, 3 Hz to 50 GHz	Agilent Technologies	N9030	US51160171	20-Dec-11	20-Dec-12

9 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

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

Hermon Laboratories is accredited by A2LA for calibration according to present requirements of ISO/IEC 17025 and NCSL Z540-1. The accreditation is granted to perform calibration of parameters that are listed in the Scope of Hermon Laboratories Accreditation.
Hermon Laboratories calibrates its reference and transfer standards by calibration laboratories accredited to ISO/IEC 17025 by a mutually recognized Accreditation Body or by a recognized national metrology institute. All reference and transfer standards used in the calibration system are traceable to national or international standards.
In-house calibration of all test and measurement equipment is performed on a regular basis according to Hermon Laboratories calibration procedures, manufacturer calibration/verification procedures or procedures defined in the relevant standards. The Hermon Laboratories test and measurement equipment is calibrated within the tolerances specified by the manufacturers and/or by the relevant standards.

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). The FCC Designation Number is US1003.

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 90: 2011	Private land mobile radio services
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
RSS-197 Issue 1:2010	Wireless Broadband Access Equipment Operating in the Band 3650-3700 MHz
SRSP-303.65 Issue 1:2010	Technical Requirements for Wireless Broadband Services (WBS) in the Band 3650-3700 MHz
RSS-Gen Issue 3: 2010	General Requirements and Information for the certification of Radiocommunication Equipment

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

Antenna factor
Standard gain horn antenna
Quinstar Technology
Model QWH, Ser.No.112, HL 0768, 0769

Frequency min, GHz	Frequency max, GHz	Antenna factor, dB(1/m)
18.000	26.500	32.01
26.500	40.000	35.48
40.000	60.000	39.03
60.000	90.000	42.55
90.000	140.000	46.23
140.000	220.000	50.11

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

Antenna factor

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

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

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

Antenna factor
Double-ridged guide horn antenna
Model 3115, serial number: 00027177, HL 2432

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

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

Cable loss
Cable coaxial, Huber-Suhner, 18 GHz, 6.4 m, SMA - SMA, model 198-8155-00, HL 2871

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.12	5750	2.34	12000	3.55
30	0.14	6000	2.39	12250	3.61
100	0.27	6250	2.46	12500	3.67
250	0.45	6500	2.52	12750	3.74
500	0.63	6750	2.58	13000	3.79
750	0.76	7000	2.64	13250	3.82
1000	0.89	7250	2.68	13500	3.83
1250	1.01	7500	2.73	13750	3.83
1500	1.12	7750	2.78	14000	3.88
1750	1.23	8000	2.83	14250	3.93
2000	1.32	8250	2.88	14500	3.96
2250	1.41	8500	2.94	14750	4.01
2500	1.49	8750	2.97	15000	4.00
2750	1.58	9000	3.02	15250	4.01
3000	1.66	9250	3.07	15500	4.00
3250	1.73	9500	3.13	15750	4.13
3500	1.80	9750	3.18	16000	4.22
3750	1.87	10000	3.21	16250	4.29
4000	1.93	10250	3.26	16500	4.29
4250	2.01	10500	3.30	16750	4.32
4500	2.06	10750	3.36	17000	4.37
4750	2.12	11000	3.39	17250	4.45
5000	2.17	11250	3.44	17500	4.49
5250	2.24	11500	3.48	17750	4.53
5500	2.29	11750	3.52	18000	4.55

Cable loss
Cable coaxial, Gore, 18 GHz, 1.2 m, SMA-SMA, S/N 10020014
HL 2952

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.03	5750	0.97	12000	1.50
30	0.05	6000	1.01	12250	1.45
100	0.11	6250	1.03	12500	1.48
250	0.19	6500	1.06	12750	1.57
500	0.26	6750	1.08	13000	1.51
750	0.32	7000	1.10	13250	1.64
1000	0.38	7250	1.13	13500	1.60
1250	0.43	7500	1.13	13750	1.63
1500	0.47	7750	1.21	14000	1.59
1750	0.53	8000	1.20	14250	1.66
2000	0.55	8250	1.24	14500	1.60
2250	0.59	8500	1.29	14750	1.65
2500	0.63	8750	1.23	15000	1.72
2750	0.66	9000	1.27	15250	1.68
3000	0.69	9250	1.27	15500	1.73
3250	0.72	9500	1.29	15750	1.70
3500	0.75	9750	1.30	16000	1.82
3750	0.78	10000	1.38	16250	1.79
4000	0.82	10250	1.44	16500	1.81
4250	0.84	10500	1.47	16750	1.91
4500	0.86	10750	1.45	17000	1.92
4750	0.90	11000	1.50	17250	1.98
5000	0.91	11250	1.46	17500	2.05
5250	0.94	11500	1.47	17750	2.04
5500	0.96	11750	1.44	18000	2.05

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

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

Cable loss
Cable coaxial, RG-214/U, N type-N type, 6.5 m
Suhner Switzerland, HL 3617

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.13	2200	2.97	4500	5.10
50	0.33	2300	3.06	4600	5.20
100	0.48	2400	3.16	4700	5.34
200	0.71	2500	3.23	4800	5.36
300	0.89	2600	3.34	4900	5.48
400	1.04	2700	3.42	5000	5.52
500	1.19	2800	3.52	5100	5.61
600	1.32	2900	3.61	5200	5.72
700	1.44	3000	3.69	5300	5.81
800	1.56	3100	3.80	5400	5.93
900	1.68	3200	3.86	5500	6.08
1000	1.80	3300	3.98	5600	6.12
1100	1.90	3400	4.07	5700	6.25
1200	2.00	3500	4.14	5800	6.31
1300	2.11	3600	4.27	5900	6.41
1400	2.21	3700	4.36	6000	6.51
1500	2.30	3800	4.47	6100	6.62
1600	2.40	3900	4.62	6200	6.73
1700	2.49	4000	4.63	6300	6.86
1800	2.61	4100	4.76	6400	6.94
1900	2.69	4200	4.83	6500	7.06
2000	2.79	4300	4.89		
2100	2.88	4400	5.04		

Cable loss
Microwave Cable Assembly, Huber-Suhner, 40 GHz, 3.5 m, SMA-SMA, S/N 1225/2A
HL 3901

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.09	9500	4.29	21000	6.67
100	0.41	10000	4.40	22000	6.92
500	0.93	10500	4.52	23000	7.00
1000	1.33	11000	4.64	24000	7.18
1500	1.63	11500	4.76	25000	7.29
2000	1.90	12000	4.87	26000	7.55
2500	2.12	12500	4.99	27000	7.70
3000	2.33	13000	5.11	28000	7.88
3500	2.50	13500	5.20	29000	8.02
4000	2.67	14000	5.31	30000	8.15
4500	2.82	14500	5.42	31000	8.35
5000	2.99	15000	5.51	32000	8.40
5500	3.16	15500	5.58	33000	8.62
6000	3.32	16000	5.68	34000	8.73
6500	3.51	16500	5.78	35000	8.78
7000	3.65	17000	5.91	36000	8.94
7500	3.79	17500	5.99	37000	9.21
8000	3.92	18000	6.07	38000	9.37
8500	4.04	19000	6.36	39000	9.45
9000	4.18	20000	6.49	40000	9.52

Cable loss
Test cable, Mini-Circuits, S/N 0755A, 18 GHz, 4.6 m, N/M - N/M
APC-15FT-NMNM+, HL 4278

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.24	5000	4.25	10200	6.52	15400	8.40
30	0.26	5100	4.29	10300	6.57	15500	8.42
50	0.34	5200	4.32	10400	6.59	15600	8.46
100	0.50	5300	4.38	10500	6.61	15700	8.50
200	0.72	5400	4.41	10600	6.64	15800	8.52
300	0.90	5500	4.46	10700	6.64	15900	8.56
400	1.06	5600	4.51	10800	6.65	16000	8.61
500	1.20	5700	4.56	10900	6.68	16100	8.64
600	1.32	5800	4.59	11000	6.68	16200	8.66
700	1.44	5900	4.64	11100	6.69	16300	8.70
800	1.54	6000	4.69	11200	6.70	16400	8.73
900	1.64	6100	4.72	11300	6.74	16500	8.74
1000	1.74	6200	4.77	11400	6.78	16600	8.75
1100	1.83	6300	4.80	11500	6.81	16700	8.78
1200	1.92	6400	4.83	11600	6.84	16800	8.79
1300	2.01	6500	4.89	11700	6.87	16900	8.81
1400	2.09	6600	4.90	11800	6.92	17000	8.85
1500	2.18	6700	4.95	11900	6.98	17100	8.90
1600	2.25	6800	5.01	12000	7.02	17200	8.95
1700	2.33	6900	4.99	12100	7.08	17300	8.99
1800	2.39	7000	5.04	12200	7.15	17400	9.03
1900	2.47	7100	5.11	12300	7.20	17500	9.07
2000	2.53	7200	5.14	12400	7.26	17600	9.11
2100	2.60	7300	5.21	12500	7.31	17700	9.15
2200	2.67	7400	5.29	12600	7.36	17800	9.19
2300	2.73	7500	5.33	12700	7.41	17900	9.24
2400	2.80	7600	5.38	12800	7.46	18000	9.28
2500	2.87	7700	5.46	12900	7.51		
2600	2.93	7800	5.52	13000	7.55		
2700	3.00	7900	5.58	13100	7.59		
2800	3.06	8000	5.64	13200	7.65		
2900	3.12	8100	5.69	13300	7.69		
3000	3.18	8200	5.75	13400	7.72		
3100	3.24	8300	5.80	13500	7.78		
3200	3.30	8400	5.84	13600	7.82		
3300	3.35	8500	5.90	13700	7.86		
3400	3.42	8600	5.97	13800	7.91		
3500	3.46	8700	5.99	13900	7.96		
3600	3.52	8800	6.04	14000	8.01		
3700	3.57	8900	6.10	14100	8.06		
3800	3.61	9000	6.13	14200	8.10		
3900	3.67	9100	6.17	14300	8.13		
4000	3.71	9200	6.23	14400	8.16		
4100	3.77	9300	6.27	14500	8.19		
4200	3.83	9400	6.30	14600	8.21		
4300	3.89	9500	6.35	14700	8.23		
4400	3.94	9600	6.37	14800	8.26		
4500	4.00	9700	6.40	14900	8.28		
4600	4.05	9800	6.44	15000	8.30		
4700	4.10	9900	6.45	15100	8.33		
4800	4.16	10000	6.47	15200	8.35		
4900	4.19	10100	6.50	15300	8.37		

13 APPENDIX F Abbreviations and acronyms

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

END OF DOCUMENT