HERMON LABORATORIES

ELECTRICAL TESTING
0839.01

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TEST REPORT

ACCORDING TO: FCC 47CFR part 15 subpart C § 15.247(DTS) and subpart B, RSS-210 issue 8 Annex 8, RSS-Gen issue 3 section 6

FOR:

Motorola Solutions Inc.

LTE Vehicular Subscriber Modem

Product name: VML700

Model:F4080A

FCC ID:AZ492FT7045

IC:109U-92FT7045

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1 Applicant information

Client name:	Motorola Solutions Inc.
Address:	One Motorola Plaza, Holtsville, N.Y 11742, USA
Telephone:	+972 3565 9229
Fax:	+972 3565 9968
E-mail:	cab011@motorolasolutions.com
Contact name:	Mr. Alex Babaladze

2 Equipment under test attributes

Product name:	VML700
Product type:	LTE vehicular subscriber modem
Model(s):	F4080A
Serial number:	CAI110WK16
Hardware version:	P2-HW ID 1
Software release:	03.00.00.00.18
Receipt date	8/21/2012

3 Manufacturer information

Manufacturer name:	Motorola Solutions Inc.
Address:	One Motorola Plaza, Holtsville, N.Y 11742, USA
Telephone:	+972 3565 9229
Fax:	+972 3565 9968
E-Mail:	cab011@motorolasolutions.com
Contact name:	Mr. Alex Babaladze

4 Test details

Project ID:	23632
Location:	Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started:	8/21/2012
Test completed:	9/02/2012
Test specification(s):	FCC 47CFR part 15:2010, subpart C §15.247 (DTS); RSS-210 issue 8 Annex 8 FCC 47CFR part 15:2010 subpart B §15.109; RSS-Gen issue 3 section 6.1

5 Tests summary

Test	Status
Transmitter characteristics	
FCC section 15.247(a)(2), RSS-210 section A8.2(a), 6 dB bandwidth	Pass
FCC section 15.247(b)(3), RSS-210 section A8.4(4), Peak output power	Pass
FCC section 15.247(b)5, RSS-Gen section 5.5, RF exposure	Pass the exhibit to the application of certification is provided
FCC section 15.247(d), RSS-210 section A8.5, Conducted spurious emissions	Pass
FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions	Pass
FCC section 15.247(d), RSS-210 section A8.5, Band edge emissions	Pass
Section 15.247(e), RSS-210 section A8.2(b), Peak power density	Pass
FCC section 15.207(a), RSS-Gen section 7.2.4, Conducted emission	Not required
FCC section 15.203, RSS-Gen section 7.1.2, Antenna requirement	Pass
Unintentional emissions	
FCC Part 15, Section 107, ICES-003, Conducted emission at AC power port	Not required
FCC Part 15, Section 109, RSS-Gen section 6.1/ ICES-003, Radiated emission	Pass

The approved under FCC ID:AZ492FT7045 and IC:109U-92FT7045 product was changed to support WiFi 802.11n.
The tests were performed to submit Application for Class II permissive change.

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

	Name and Title	Date	Signature
Tested by:	Mr. S.Samokha, test engineer	September 2, 2012	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	September 4, 2012	
Approved by:	Mr. M. Nikishin, EMC and radio group leader	September 5, 2012	

6 EUT description

6.1 General information

The EUT is the LTE vehicular subscriber modem, approved by FCC and IC under FCC ID:AZ492FT7045 and IC:109U-92FT7045. The WiFi 802.11n protocol was added for operation in 2412-2462 MHz band.

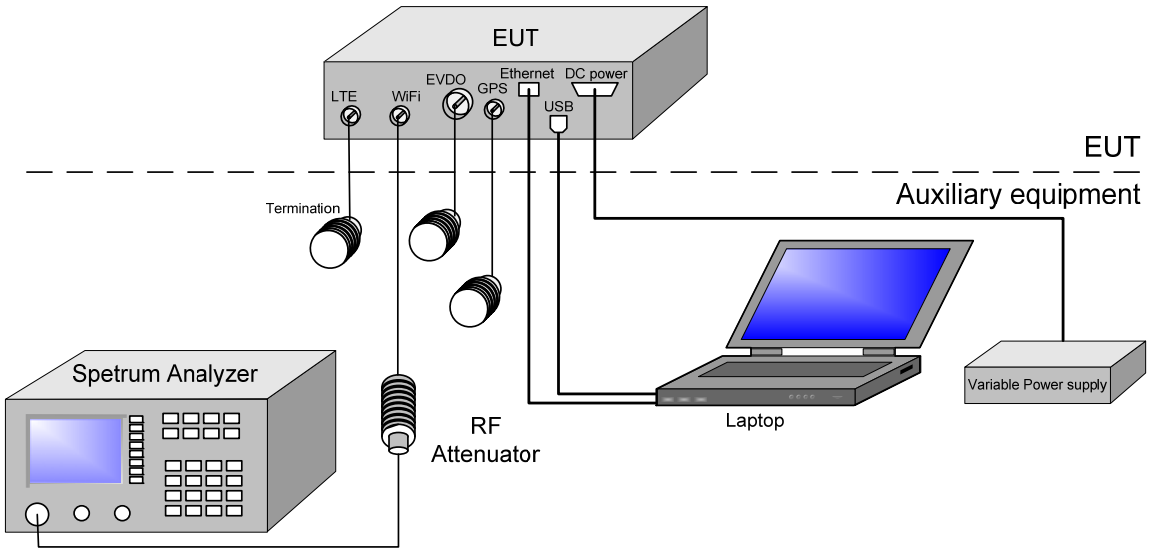
6.2 Ports and lines

Port type	Port description	Connected from	Connected to	Qty.	Cable type	Cable length, m
Power	DC power	EUT	Power supply	1	Unshielded	1
Control	USB	EUT	Laptop	1	Shielded	12
RF WiFi	Antenna	EUT	Test equipment	1	Coax 50 Ohm	1
RF LTE	Antenna	EUT	Termination	1	NA	NA
RF EVDO	Antenna	EUT	Termination	1	NA	NA
RF GPS	Antenna	EUT	Termination	1	NA	NA
Signal	Ethernet	EUT	Laptop	1	Cat5E	4.5

6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
Laptop	LENOVO	Thinkpad e530	MP-0B4Z9 12/05

6.4 Test configuration



6.5 WiFi transmitter characteristics in frequency range 2401.0 – 2472.0 MHz

Type of equipment	
V	Stand-alone (Equipment with or without its own control provisions)
	Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)
	Plug-in card (Equipment intended for a variety of host systems)

Intended use		**Condition of use**
	fixed	Always at a distance more than 2 m from all people
V	mobile	Always at a distance more than 20 cm from all people
	portable	May operate at a distance closer than 20 cm to human body

Assigned frequency range	2401.0 - 2472.0 MHz
Operating frequencies	2412.0 – 2462.0 MHz
RF channel bandwidth	Protocol 802.11b/g - 20 MHz Protocol 802.11n - 20 MHz, 40 MHz
Maximum rated output power	At transmitter 50 Ω RF output connector: Maximum -13.5 dBm Nominal – 12.5 dBm

Is transmitter output power variable?	**V**	No		
		Yes	continuous variable	
			stepped variable with step size	
			minimum RF power	
			maximum RF power	

Antenna connection				
unique coupling	**V**	standard connector	Integral	with temporary RF connector
				without temporary RF connector

Antenna/s technical characteristics			
Type	Manufacturer	Model number	Gain
Folded Monopole	PCTEL	FTN7651A	1.46 dBi (Including 12ft coaxial cable)

Transmitter 99% power bandwidth	WLAN	**Type of modulation**	**Bit rate (Mbps)**
20 MHz	802.11b	DSSS, CCK	1, 2, 5, 11
20 MHz	802.11g	BPSK, QPSK, 16QAM, 64QAM	6, 9, 12, 18 24, 36, 48, 54
20 MHz	802.11n	BPSK, QPSK, 16QAM, 64QAM	6.5, 13, 19.5, 26, 39, 52, 58.5, 65
40 MHz	802.11n	BPSK, QPSK, 16QAM, 64QAM	13.5, 27, 40.5, 54, 81, 108, 121.5, 135

Type of multiplexing	OFDM

Transmitter power source					
X	Battery	**Nominal rated voltage**	13.8 V	Battery type	Car battery
	DC	**Nominal rated voltage**			
	AC mains	**Nominal rated voltage**		Frequency	

Common power source for transmitter and receiver	X	yes	no

Test specification:	FCC section 15.247(a)(2), RSS-210 section A8.2(a), 6 dB bandwidth		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/21/2012		
Temperature: 24.3 ºC	Air Pressure: 1006 hPa	Relative Humidity: 41 %	Power Supply: 13.8 VDC
Remarks:			

7 Transmitter tests according to 47CFR part 15 subpart C and RSS-210 requirements

7.1 Minimum 6 dB bandwidth

7.1.1 General

This test was performed to measure 6 dB bandwidth of the EUT carrier frequency. Specification test limits are given in Table 7.1.1.

Table 7.1.1 The 6 dB bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points*, dBc	Minimum bandwidth, kHz
902.0 – 928.0	6.0	500.0
2400.0 – 2483.5		
5725.0 – 5850.0		

* - Modulation envelope reference points provided in terms of attenuation below the peak of modulated carrier.

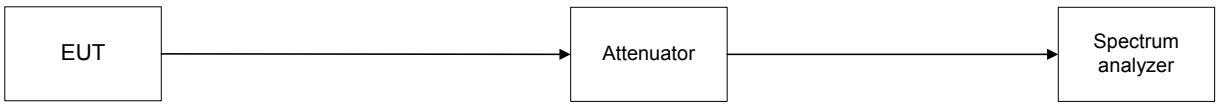
7.1.2 Test procedure

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

7.1.2.2 The EUT was set to transmit modulated carrier.

7.1.2.3 The transmitter minimum 6 dB bandwidth was measured with spectrum analyzer as frequency delta between reference points on modulation envelope and provided in Table 7.1.2 and the associated plots.

Figure 7.1.1 The 6 dB bandwidth test setup



Test specification:	**FCC section 15.247(a)(2), RSS-210 section A8.2(a), 6 dB bandwidth**		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	8/21/2012		
Temperature: 24.3 ºC	**Air Pressure:** 1006 hPa	**Relative Humidity:** 41 %	**Power Supply:** 13.8 VDC
Remarks:			

Table 7.1.2 The 6 dB bandwidth test results

ASSIGNED FREQUENCY BAND:	2400 – 2483.5 MHz
DETECTOR USED:	Peak
SWEEP MODE:	Max hold
SWEEP TIME:	Auto
RESOLUTION BANDWIDTH:	1 – 5% of EBW
VIDEO BANDWIDTH:	> 3 x RBW
MODULATION ENVELOPE REFERENCE POINTS:	6.0 dBc
MODULATION:	BPSK
MODULATING SIGNAL:	PRBS
BIT RATE:	6.5 Mbps

Carrier frequency, MHz	6 dB bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
EBW 20 MHz				
Low frequency				
2412.0	17895.7	500	-17395.7	Pass
Mid frequency				
2442.0	17907.7	500	-17407.7	Pass
High frequency				
2462.0	17908.5	500	-17408.5	Pass
EBW 40 MHz				
Low frequency				
2422.0	37092.3	500	-36952.3	Pass
Mid frequency				
2442.0	37061.0	500	-36561.0	Pass
High frequency				
2452.0	36991.9	500	-36491.9	Pass

Reference numbers of test equipment used

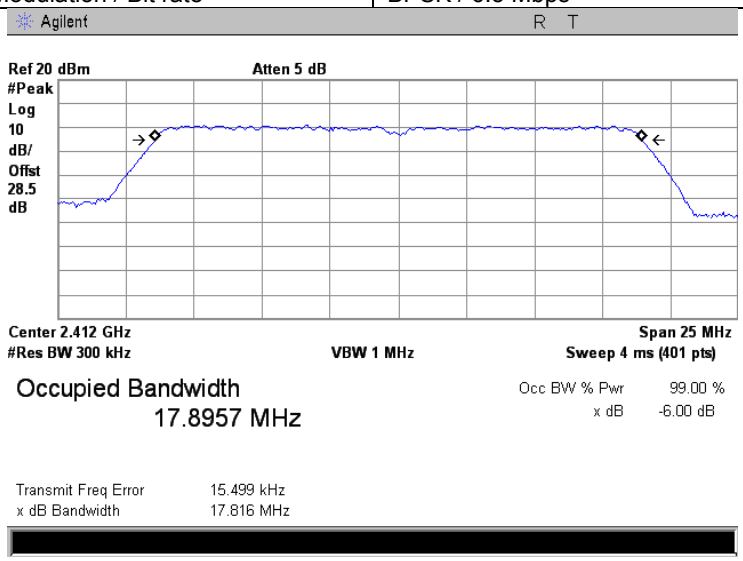
HL 3787	HL 3818	HL 3901						

Full description is given in Appendix A.

Test specification:	FCC section 15.247(a)(2), RSS-210 section A8.2(a), 6 dB bandwidth		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/21/2012		
Temperature: 24.3 ºC	Air Pressure: 1006 hPa	Relative Humidity: 41 %	Power Supply: 13.8 VDC
Remarks:			

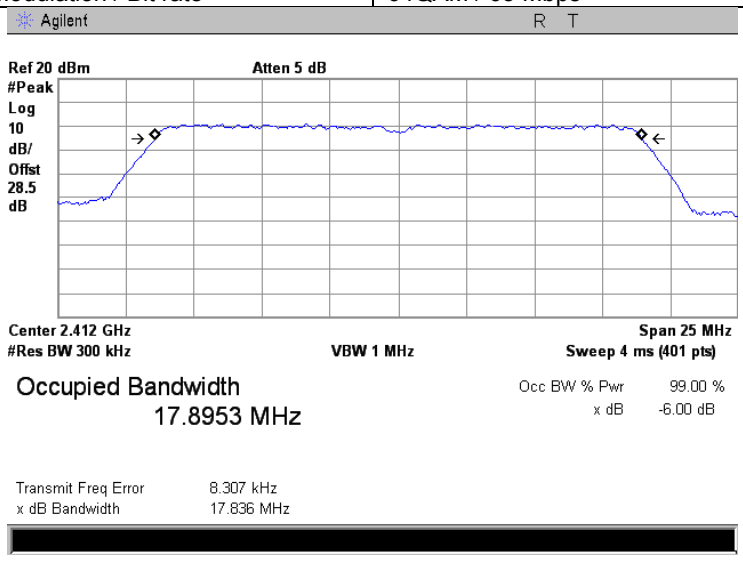
Plot 7.1.1 The 6 dB bandwidth test result at low frequency

Emission Bandwidth	20 MHz
Modulation / Bit rate	BPSK / 6.5 Mbps



Plot 7.1.2 The 6 dB bandwidth test result at low frequency

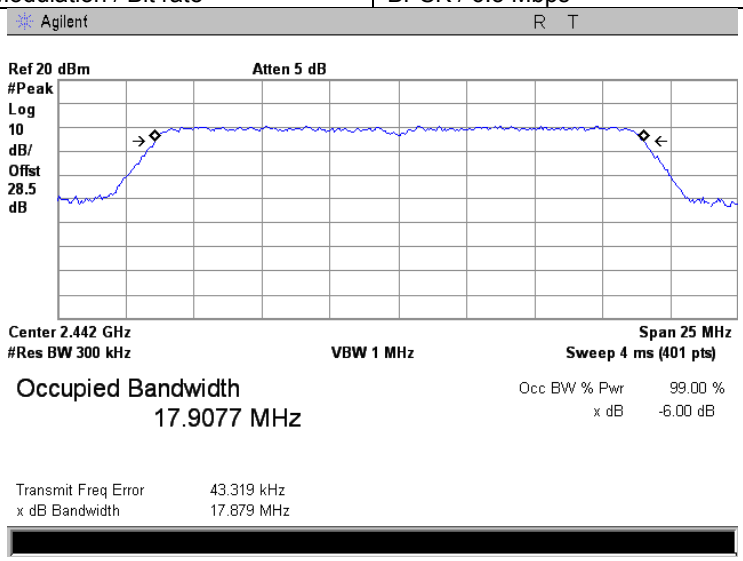
Emission Bandwidth	20 MHz
Modulation / Bit rate	64QAM / 65 Mbps



Test specification:	FCC section 15.247(a)(2), RSS-210 section A8.2(a), 6 dB bandwidth		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/21/2012		
Temperature: 24.3 ºC	Air Pressure: 1006 hPa	Relative Humidity: 41 %	Power Supply: 13.8 VDC
Remarks:			

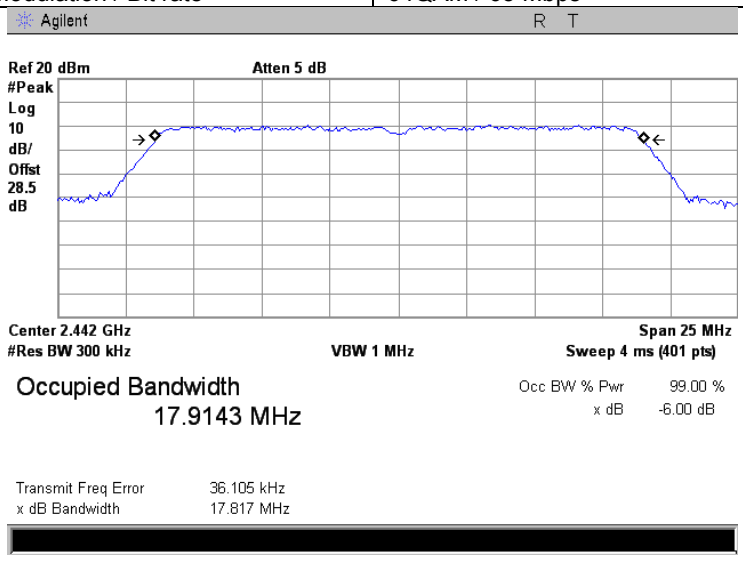
Plot 7.1.3 The 6 dB bandwidth test result at mid frequency

Emission Bandwidth	20 MHz
Modulation / Bit rate	BPSK / 6.5 Mbps



Plot 7.1.4 The 6 dB bandwidth test result at mid frequency

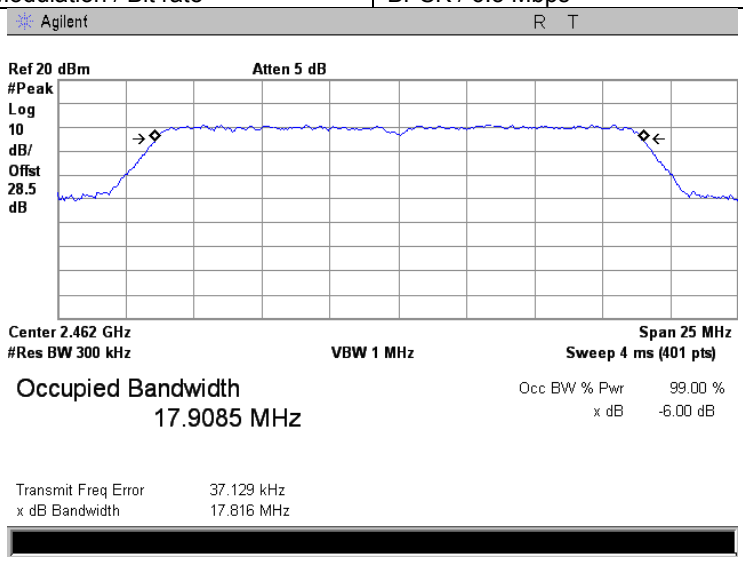
Emission Bandwidth	20 MHz
Modulation / Bit rate	64QAM / 65 Mbps



Test specification:	FCC section 15.247(a)(2), RSS-210 section A8.2(a), 6 dB bandwidth		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/21/2012		
Temperature: 24.3 ºC	Air Pressure: 1006 hPa	Relative Humidity: 41 %	Power Supply: 13.8 VDC
Remarks:			

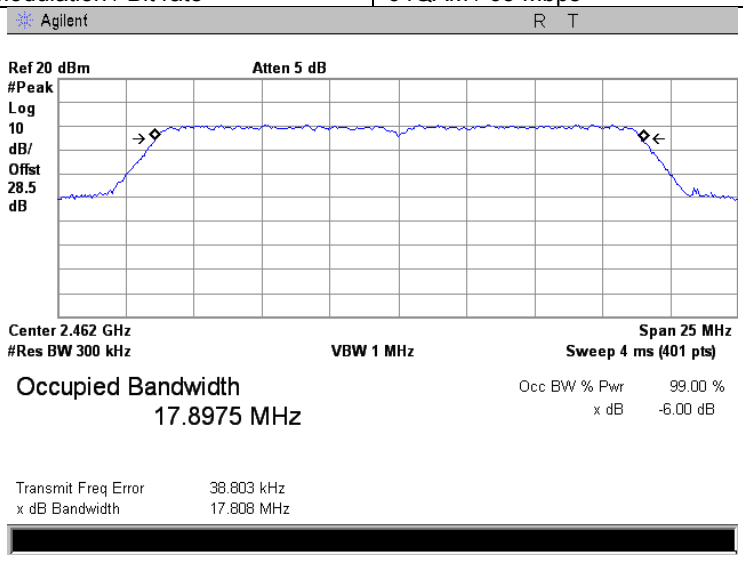
Plot 7.1.5 The 6 dB bandwidth test result at high frequency

Emission Bandwidth	20 MHz
Modulation / Bit rate	BPSK / 6.5 Mbps



Plot 7.1.6 The 6 dB bandwidth test result at high frequency

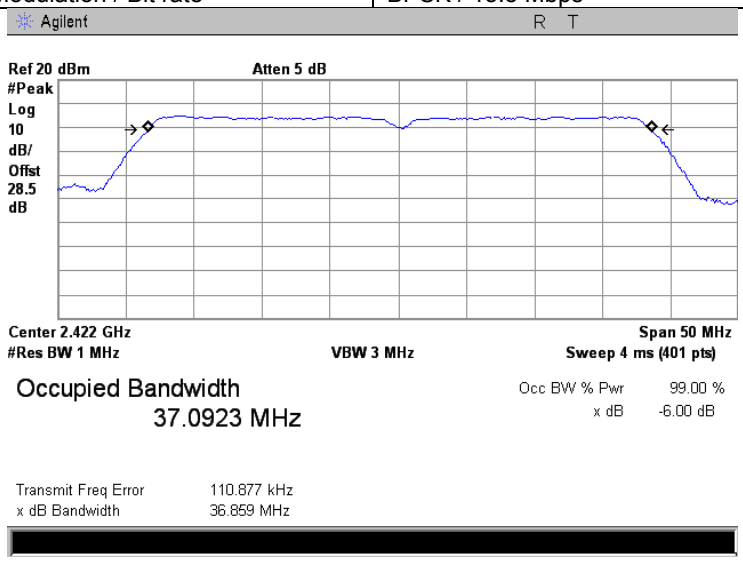
Emission Bandwidth	20 MHz
Modulation / Bit rate	64QAM / 65 Mbps



Test specification:	FCC section 15.247(a)(2), RSS-210 section A8.2(a), 6 dB bandwidth		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/21/2012		
Temperature: 24.3 ºC	Air Pressure: 1006 hPa	Relative Humidity: 41 %	Power Supply: 13.8 VDC
Remarks:			

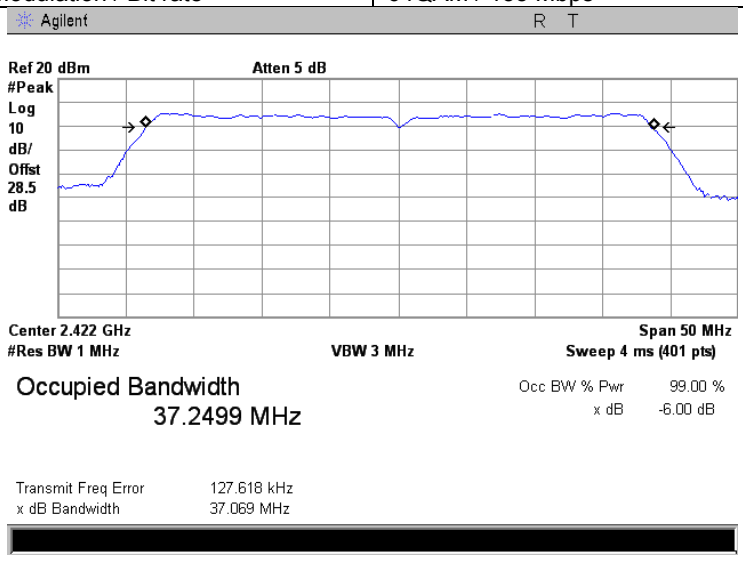
Plot 7.1.7 The 6 dB bandwidth test result at low frequency

Emission Bandwidth	40 MHz
Modulation / Bit rate	BPSK / 13.5 Mbps



Plot 7.1.8 The 6 dB bandwidth test result at low frequency

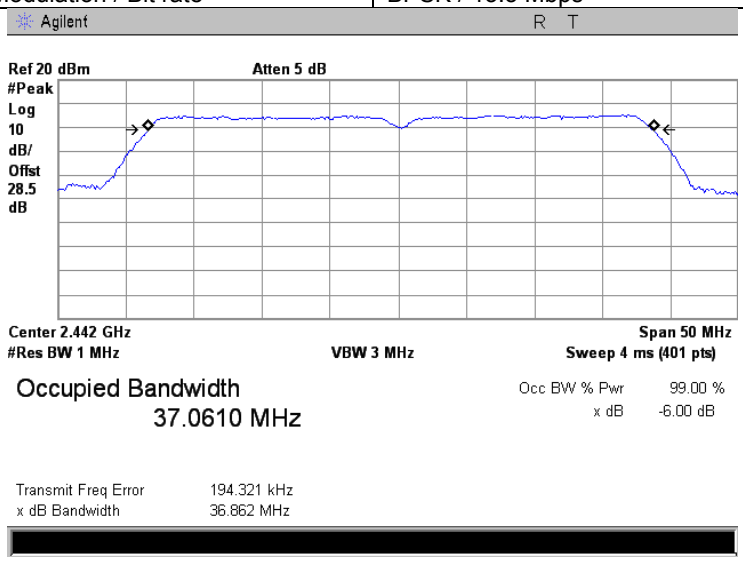
Emission Bandwidth	40 MHz
Modulation / Bit rate	64QAM / 135 Mbps



Test specification:	FCC section 15.247(a)(2), RSS-210 section A8.2(a), 6 dB bandwidth		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/21/2012		
Temperature: 24.3 ºC	Air Pressure: 1006 hPa	Relative Humidity: 41 %	Power Supply: 13.8 VDC
Remarks:			

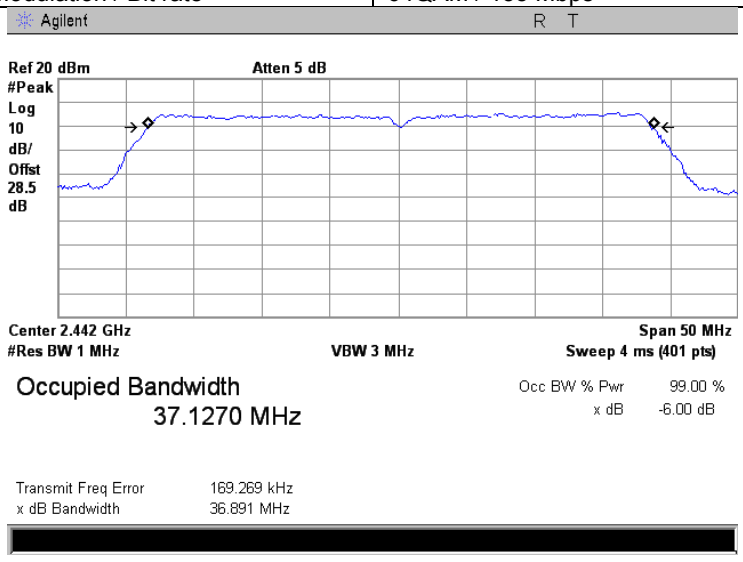
Plot 7.1.9 The 6 dB bandwidth test result at mid frequency

Emission Bandwidth	40 MHz
Modulation / Bit rate	BPSK / 13.5 Mbps



Plot 7.1.10 The 6 dB bandwidth test result at mid frequency

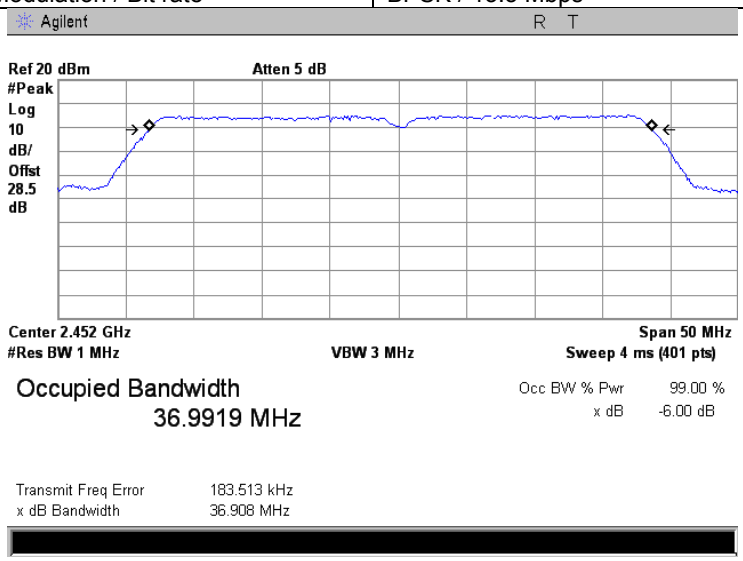
Emission Bandwidth	40 MHz
Modulation / Bit rate	64QAM / 135 Mbps



Test specification:	FCC section 15.247(a)(2), RSS-210 section A8.2(a), 6 dB bandwidth		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/21/2012		
Temperature: 24.3 ºC	Air Pressure: 1006 hPa	Relative Humidity: 41 %	Power Supply: 13.8 VDC
Remarks:			

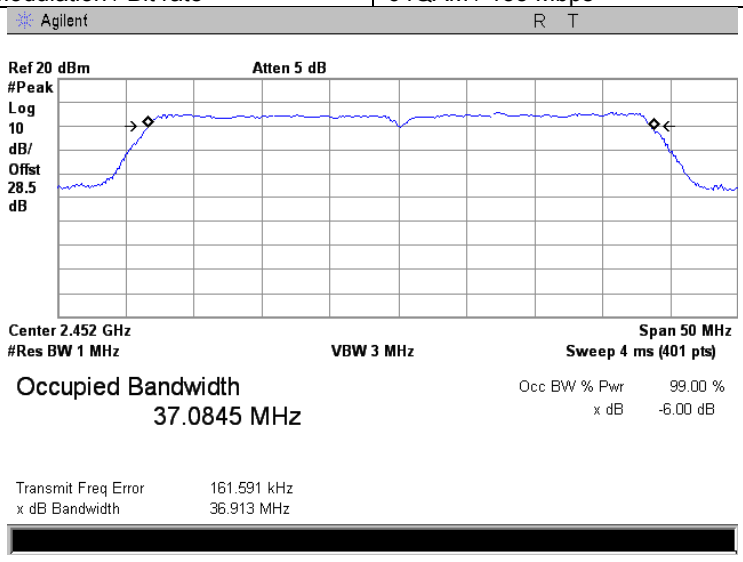
Plot 7.1.11 The 6 dB bandwidth test result at high frequency

Emission Bandwidth	40 MHz
Modulation / Bit rate	BPSK / 13.5 Mbps



Plot 7.1.12 The 6 dB bandwidth test result at high frequency

Emission Bandwidth	40 MHz
Modulation / Bit rate	64QAM / 135 Mbps



Test specification:	FCC section 15.247(b)(3), RSS-210 section A8.4(4), Output power		
Test procedure:	558074 D01 DTS Meas Guidance v01 section 5.2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/21/2012 - 9/2/2012		
Temperature: 24.1 ºC	Air Pressure: 1007 hPa	Relative Humidity: 35 %	Power Supply: 13.8 VDC
Remarks:			

7.2 Output power

7.2.1 General

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

Table 7.2.1 Output power limits

Assigned frequency range, MHz	Maximum antenna gain, dBi	Peak output power*	
		W	dBm
902.0 – 928.0	6.0	1.0	30.0
2400.0 – 2483.5			
5725.0 – 5850.0			

*- If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power limit shall be reduced below the stated value as follows:

by 1 dB for every 3 dB that the directional gain of antenna exceeds 6 dBi for fixed point-to-point transmitters operate in 2400-2483.5 MHz band;

without any corresponding reduction for fixed point-to-point transmitters operate in 5725-5850 MHz band;

by the amount in dB that the directional gain of antenna exceeds 6 dBi for the rest of transmitters.

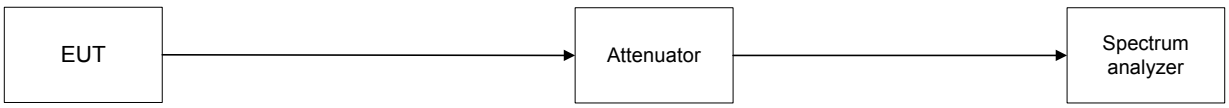
7.2.2 Test procedure

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

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

7.2.2.3 The resolution bandwidth of spectrum analyzer was set to 1 MHz, video bandwidth was set > 3xRBW and the maximum average output power was measured as provided in Table 7.2.2 and the associated plots.

Figure 7.2.1 Peak output power test setup



Test specification:	**FCC section 15.247(b)(3), RSS-210 section A8.4(4), Output power**		
Test procedure:	558074 D01 DTS Meas Guidance v01 section 5.2.2.1		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	8/21/2012 - 9/2/2012		
Temperature: 24.1 ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 35 %	**Power Supply:** 13.8 VDC
Remarks:			

Table 7.2.2 Output power test results

OPERATING FREQUENCY RANGE: 2400 – 2483.5 MHz
DETECTOR USED: Average
RESOLUTION BANDWIDTH: 1 MHz
VIDEO BANDWIDTH: ≥3 x RBW
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Modulation, Bit rate, Mbps	Spectrum analyzer reading, dBm	External attenuation, dB	Cable loss, dB	Peak output power*, dBm	Limit, dBm	Margin**, dB	Verdict
20 MHz BW, low channel 2412 MHz							
BPSK, 6.5	12.92	Included	Included	12.92	30.0	-17.08	Pass
64QAM, 65	12.91	Included	Included	12.91	30.0	-17.09	Pass
20 MHz BW, mid channel 2442 MHz							
BPSK, 6.5	13.04	Included	Included	13.04	30.0	-16.96	Pass
64QAM, 65	13.17	Included	Included	13.17	30.0	-16.83	Pass
20 MHz BW, high channel 2462 MHz							
BPSK, 6.5	12.52	Included	Included	12.52	30.0	-17.48	Pass
64QAM, 65	12.52	Included	Included	12.52	30.0	-17.48	Pass
40 MHz BW, low channel 2422 MHz							
BPSK, 13.5	11.24	Included	Included	11.24	30.0	-18.76	Pass
64QAM, 135	11.18	Included	Included	11.18	30.0	-18.82	Pass
40 MHz BW, mid channel 2442 MHz							
BPSK, 13.5	11.69	Included	Included	11.69	30.0	-18.31	Pass
64QAM, 135	11.57	Included	Included	11.57	30.0	-18.43	Pass
40 MHz BW, high channel 2452 MHz							
BPSK, 13.5	11.36	Included	Included	11.36	30.0	-18.64	Pass
64QAM, 135	11.41	Included	Included	11.41	30.0	-18.59	Pass

* - Peak power over EBW = S.A reading
** - Margin = Peak output power – specification limit.
Note: Maximum peak output power was obtained at U_{nom} input power voltage.

Reference numbers of test equipment used

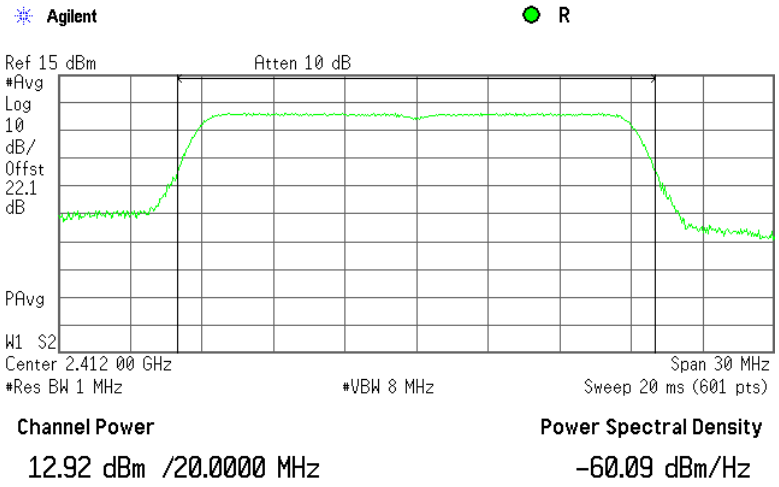
HL 3787	HL 3818	HL 3901					

Full description is given in Appendix A.

Test specification:	FCC section 15.247(b)(3), RSS-210 section A8.4(4), Output power		
Test procedure:	558074 D01 DTS Meas Guidance v01 section 5.2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/21/2012 - 9/2/2012		
Temperature: 24.1 °C	Air Pressure: 1007 hPa	Relative Humidity: 35 %	Power Supply: 13.8 VDC
Remarks:			

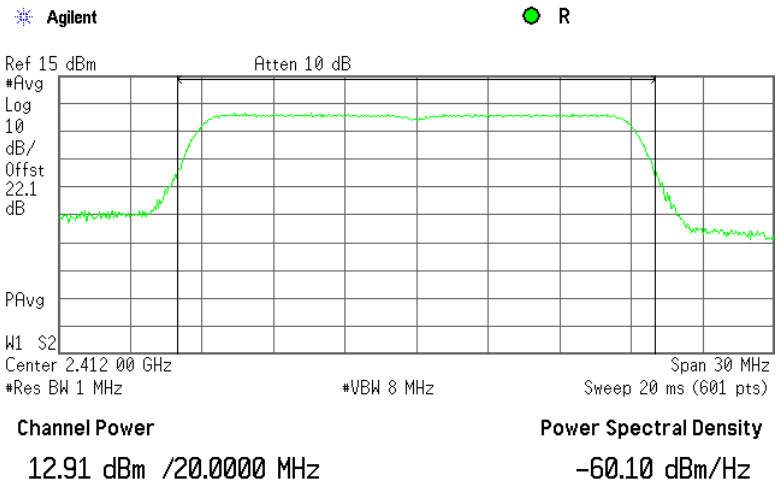
Plot 7.2.1 Output power at low frequency

Emission Bandwidth	20 MHz
Modulation / Bit rate	BPSK / 6.5 Mbps



Plot 7.2.2 Output power at low frequency

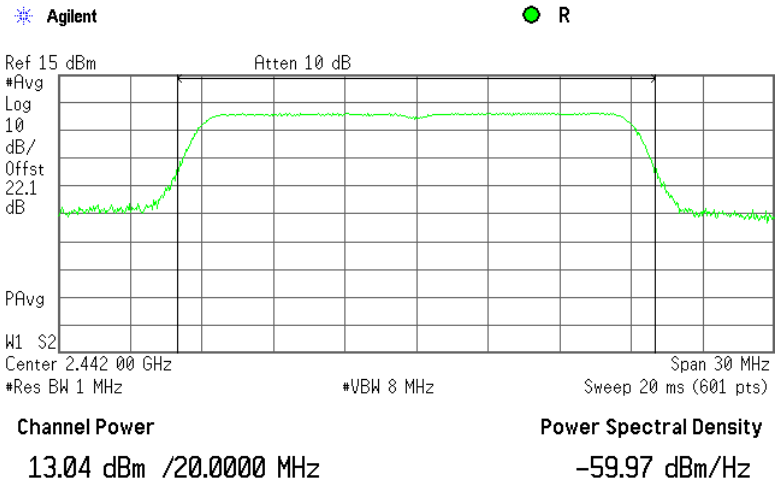
Emission Bandwidth	20 MHz
Modulation / Bit rate	64QAM / 65 Mbps



Test specification:	FCC section 15.247(b)(3), RSS-210 section A8.4(4), Output power		
Test procedure:	558074 D01 DTS Meas Guidance v01 section 5.2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/21/2012 - 9/2/2012		
Temperature: 24.1 °C	Air Pressure: 1007 hPa	Relative Humidity: 35 %	Power Supply: 13.8 VDC
Remarks:			

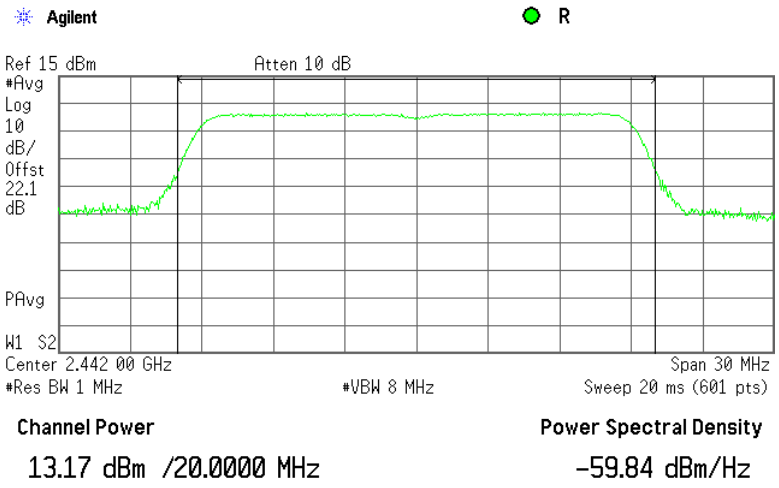
Plot 7.2.3 Output power at mid frequency

Emission Bandwidth	20 MHz
Modulation / Bit rate	BPSK / 6.5 Mbps



Plot 7.2.4 Output power at mid frequency

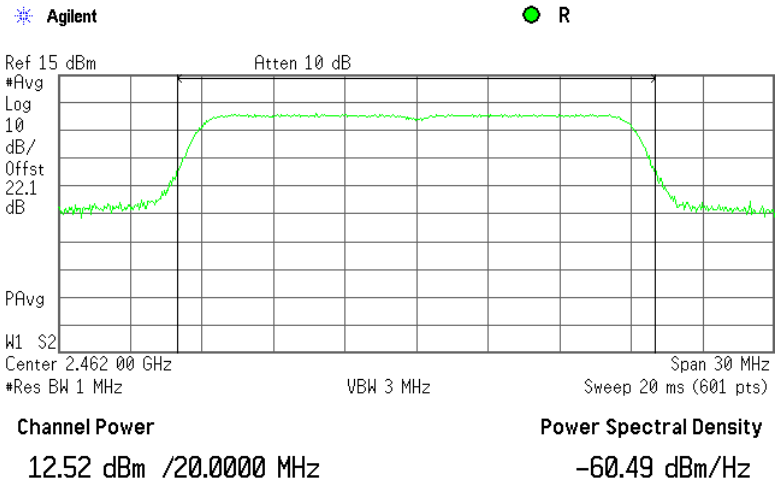
Emission Bandwidth	20 MHz
Modulation / Bit rate	64QAM / 65 Mbps



Test specification:	FCC section 15.247(b)(3), RSS-210 section A8.4(4), Output power		
Test procedure:	558074 D01 DTS Meas Guidance v01 section 5.2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/21/2012 - 9/2/2012		
Temperature: 24.1 °C	Air Pressure: 1007 hPa	Relative Humidity: 35 %	Power Supply: 13.8 VDC
Remarks:			

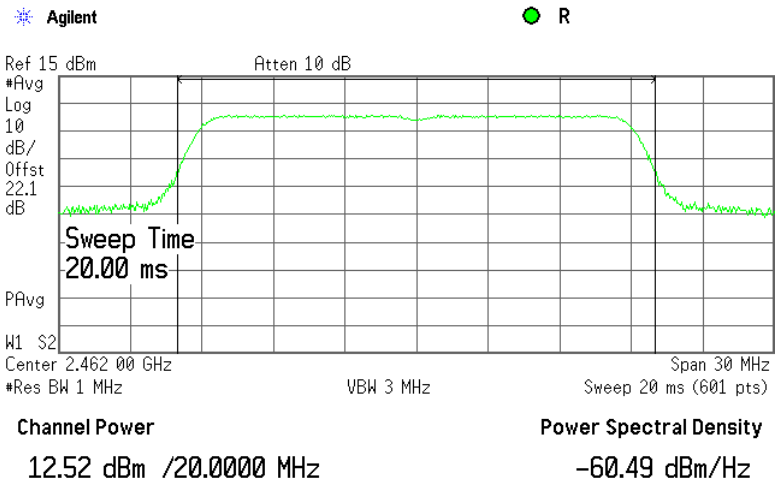
Plot 7.2.5 Output power at high frequency

Emission Bandwidth	20 MHz
Modulation / Bit rate	BPSK / 6.5 Mbps



Plot 7.2.6 Output power at high frequency

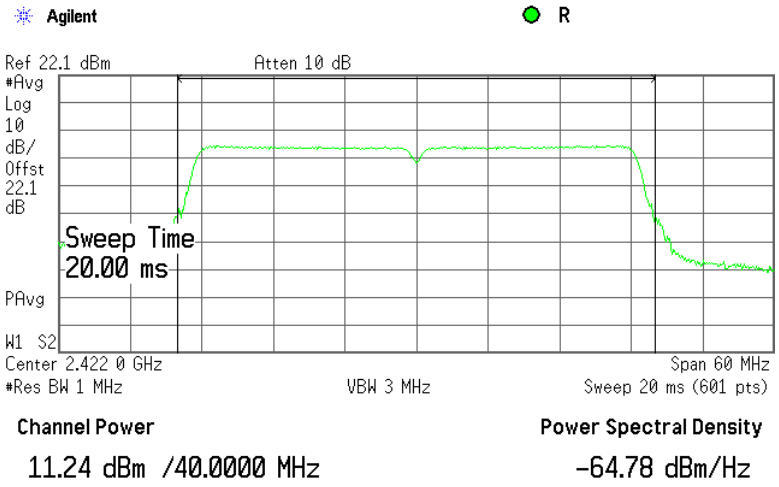
Emission Bandwidth	20 MHz
Modulation / Bit rate	64QAM / 65 Mbps



Test specification:	FCC section 15.247(b)(3), RSS-210 section A8.4(4), Output power		
Test procedure:	558074 D01 DTS Meas Guidance v01 section 5.2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/21/2012 - 9/2/2012		
Temperature: 24.1 °C	Air Pressure: 1007 hPa	Relative Humidity: 35 %	Power Supply: 13.8 VDC
Remarks:			

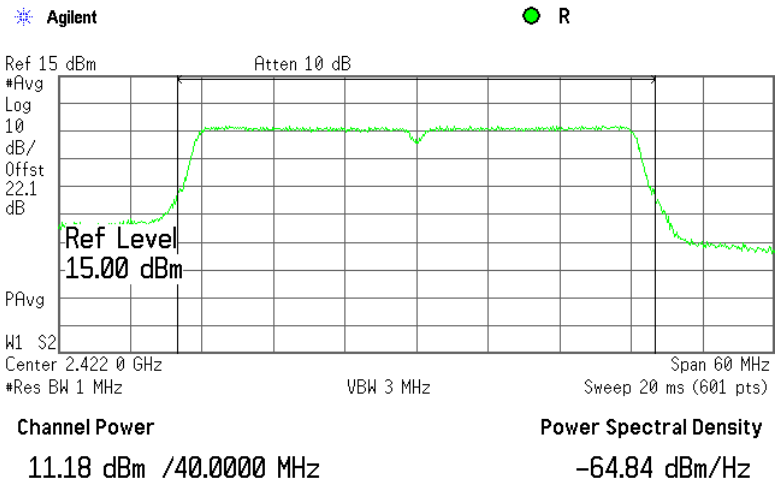
Plot 7.2.7 Output power at low frequency

Emission Bandwidth	40 MHz
Modulation / Bit rate	BPSK / 13.5 Mbps



Plot 7.2.8 Output power at low frequency

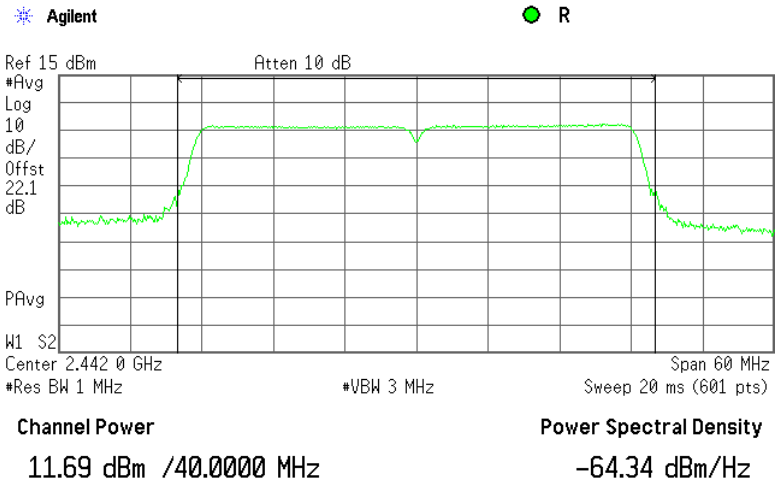
Emission Bandwidth	40 MHz
Modulation / Bit rate	64QAM / 135 Mbps



Test specification:	FCC section 15.247(b)(3), RSS-210 section A8.4(4), Output power		
Test procedure:	558074 D01 DTS Meas Guidance v01 section 5.2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/21/2012 - 9/2/2012		
Temperature: 24.1 °C	Air Pressure: 1007 hPa	Relative Humidity: 35 %	Power Supply: 13.8 VDC
Remarks:			

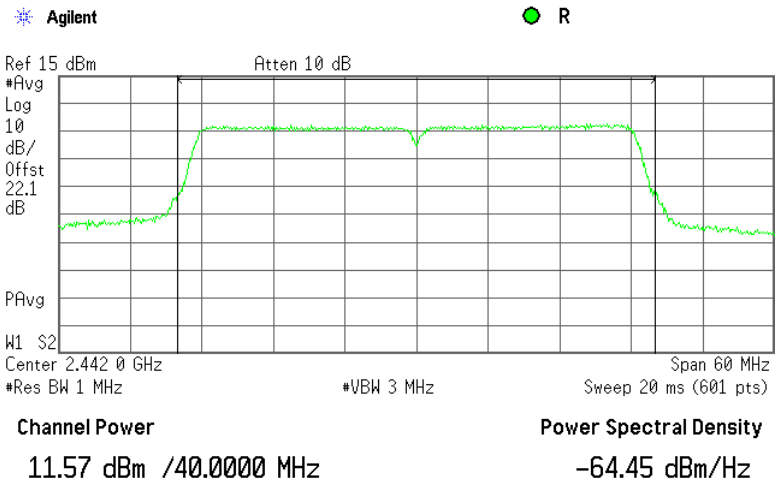
Plot 7.2.9 Output power at mid frequency

Emission Bandwidth	40 MHz
Modulation / Bit rate	BPSK / 13.5 Mbps



Plot 7.2.10 Output power at mid frequency

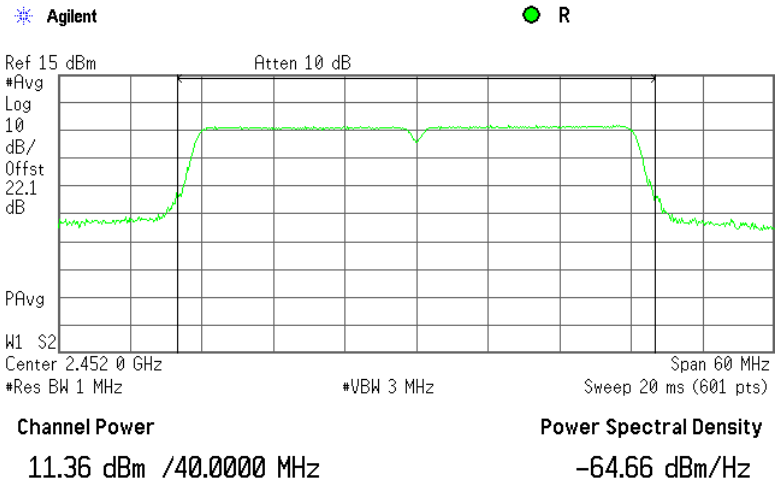
Emission Bandwidth	40 MHz
Modulation / Bit rate	64QAM / 135 Mbps



Test specification:	FCC section 15.247(b)(3), RSS-210 section A8.4(4), Output power		
Test procedure:	558074 D01 DTS Meas Guidance v01 section 5.2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/21/2012 - 9/2/2012		
Temperature: 24.1 °C	Air Pressure: 1007 hPa	Relative Humidity: 35 %	Power Supply: 13.8 VDC
Remarks:			

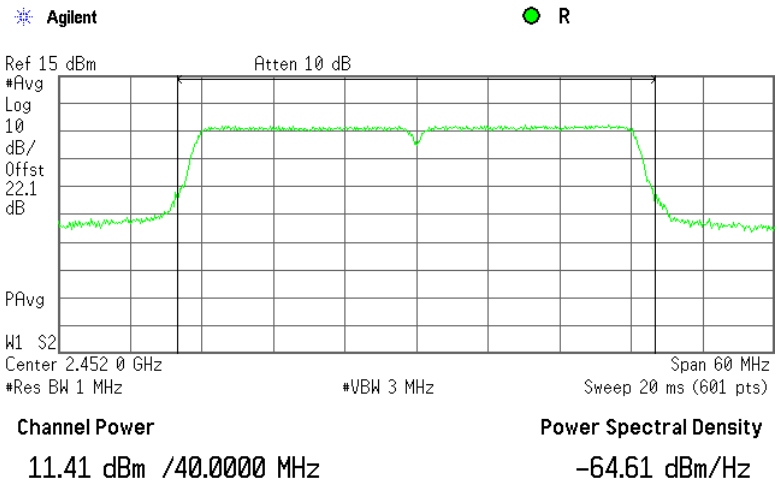
Plot 7.2.11 Output power at high frequency

Emission Bandwidth	40 MHz
Modulation / Bit rate	BPSK / 13.5 Mbps



Plot 7.2.12 Output power at high frequency

Emission Bandwidth	40 MHz
Modulation / Bit rate	64QAM / 135 Mbps



Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Conducted spurious emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/22/2012		
Temperature: 24.2 ºC	Air Pressure: 1008 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

7.3 Spurious emissions at RF antenna connector

7.3.1 General

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

Table 7.3.1 Spurious emission limits

Frequency*, MHz	Attenuation below carrier**, dBc
0.009 – 10th harmonic	20.0 (30.0)

* - The above limits applied from the lowest radio frequency generated in the device, without going below 9 kHz up to the tenth harmonic of the highest fundamental frequency.
** - Spurious emission limit is provided in terms of attenuation below the peak of modulated carrier measured with the same resolution bandwidth.

7.3.2 Test procedure

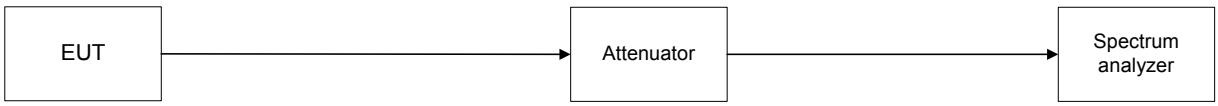
7.3.2.1 The EUT was set up as shown in Figure 7.3.1, energized and its proper operation was checked.

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

7.3.2.3 The highest emission level within the authorized band was measured.

7.3.2.4 The spurious emission was measured with spectrum analyzer as provided in Table 7.3.2 and associated plots and referenced to the highest emission level measured within the authorized band.

Figure 7.3.1 Spurious emission test setup



Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Conducted spurious emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/22/2012		
Temperature: 24.2 ºC	Air Pressure: 1008 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

Table 7.3.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 2400 – 2483.5 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 – 25000 MHz
DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 100 kHz
VIDEO BANDWIDTH: 300 kHz
MODULATION: BPSK (worst case)
MODULATING SIGNAL: PRBS
BIT RATE: 6.5 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	Spurious emission, dBm	Emission at carrier, dBm	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict
Low carrier frequency						
No spurious emissions were found						Pass
Mid carrier frequency						
No spurious emissions were found						Pass
High carrier frequency						
No spurious emissions were found						Pass

*****- Margin = Attenuation below carrier – specification limit.

Reference numbers of test equipment used

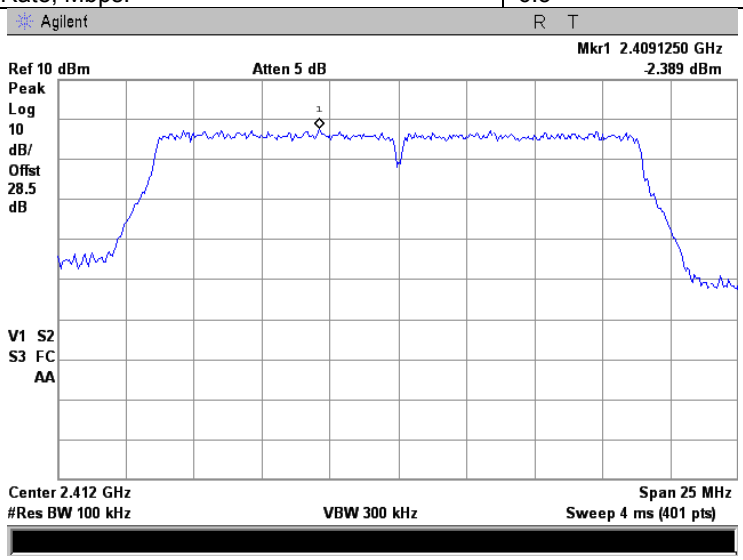
HL 3455	HL 3787	HL 3818	HL 3901				

Full description is given in Appendix A.

Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Conducted spurious emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/22/2012		
Temperature: 24.2 ºC	Air Pressure: 1008 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

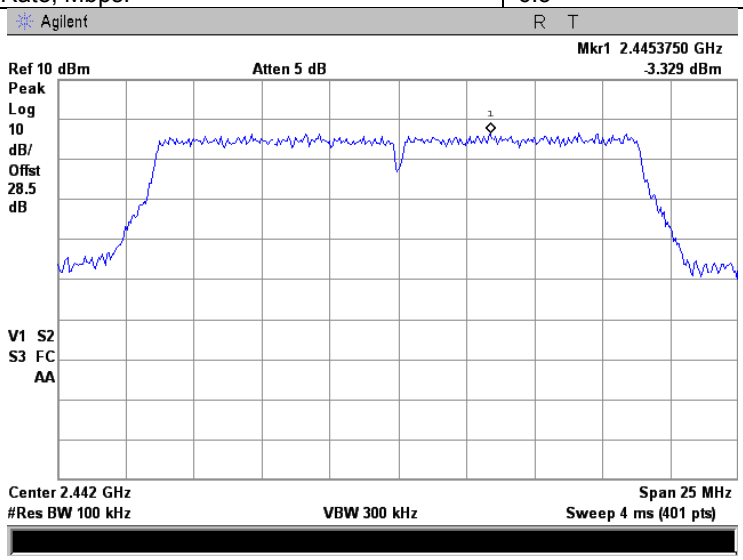
Plot 7.3.1 The highest emission level within the assigned band at low carrier frequency

Emission Bandwidth, MHz:	20
Modulation:	BPSK
Bit Rate, Mbps:	6.5



Plot 7.3.2 The highest emission level within the assigned band at mid carrier frequency

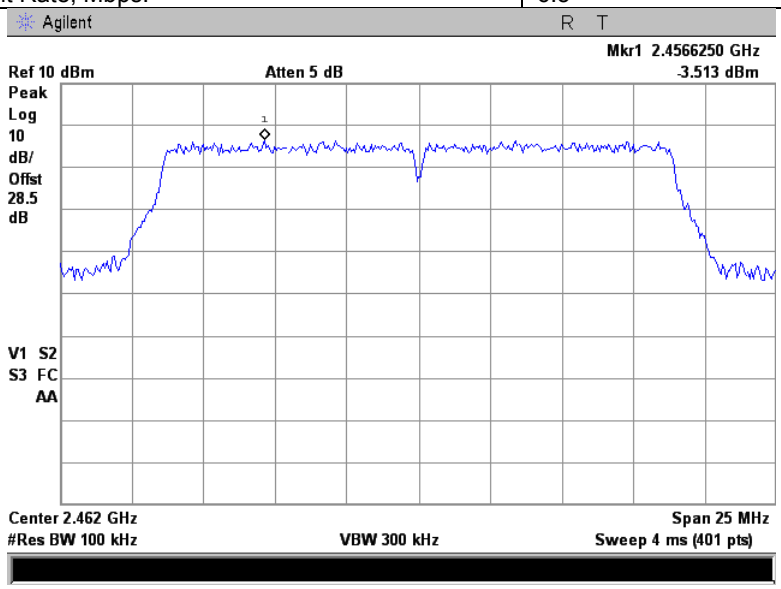
Emission Bandwidth, MHz:	20
Modulation:	BPSK
Bit Rate, Mbps:	6.5



Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Conducted spurious emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/22/2012		
Temperature: 24.2 ºC	Air Pressure: 1008 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

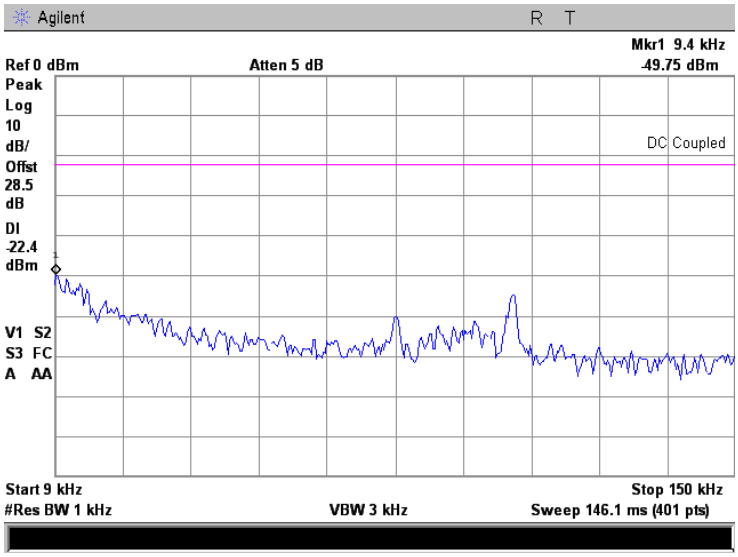
Plot 7.3.3 The highest emission level within the assigned band at high carrier frequency

Emission Bandwidth, MHz:	20
Modulation:	BPSK
Bit Rate, Mbps:	6.5

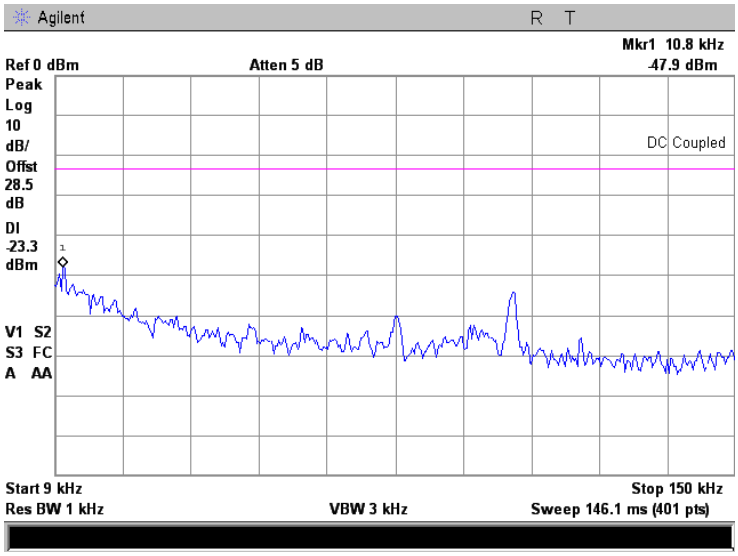


Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Conducted spurious emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/22/2012		
Temperature: 24.2 ºC	Air Pressure: 1008 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

Plot 7.3.4 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency

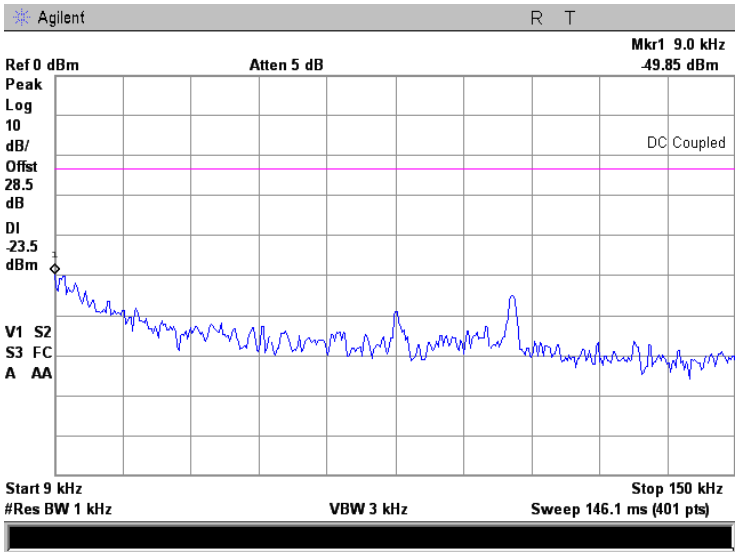


Plot 7.3.5 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency

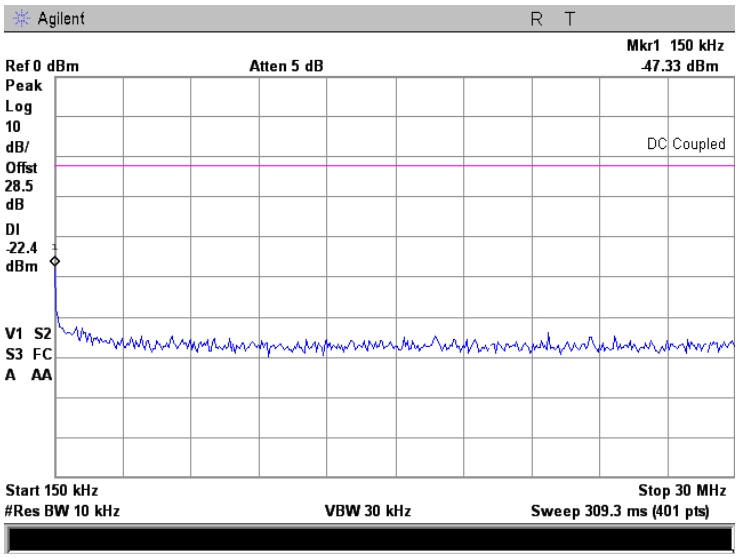


Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Conducted spurious emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/22/2012		
Temperature: 24.2 ºC	Air Pressure: 1008 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

Plot 7.3.6 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency

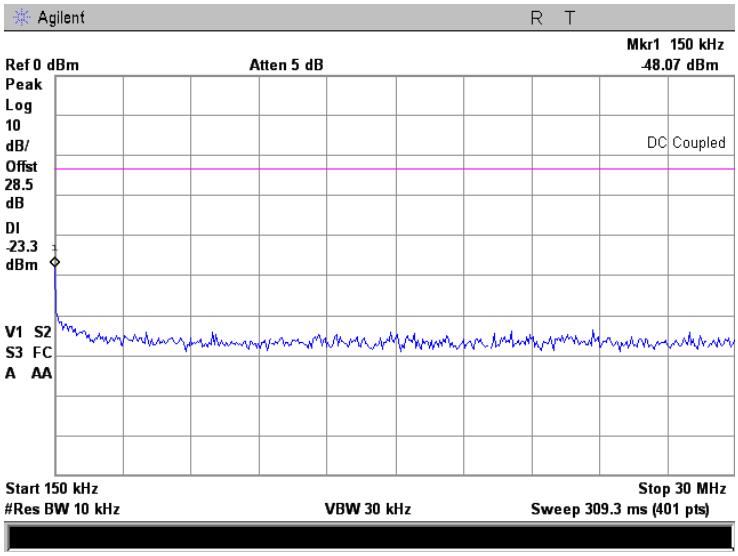


Plot 7.3.7 Spurious emission measurements in 0.15 - 30 MHz range at low carrier frequency

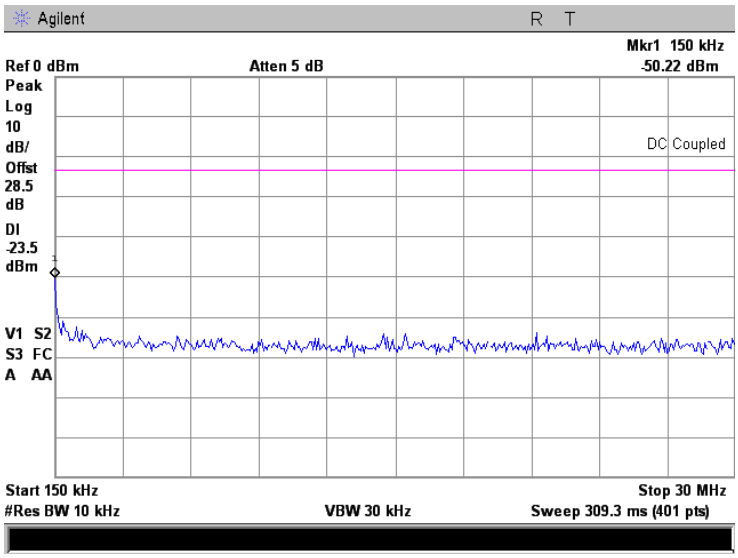


Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Conducted spurious emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/22/2012		
Temperature: 24.2 ºC	Air Pressure: 1008 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

Plot 7.3.8 Spurious emission measurements in 0.15 - 30 MHz range at mid carrier frequency

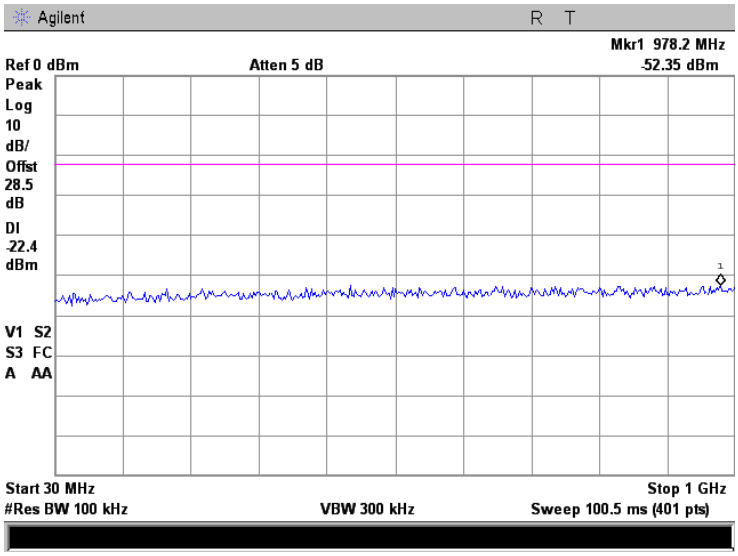


Plot 7.3.9 Spurious emission measurements in 0.15 - 30 MHz range at high carrier frequency

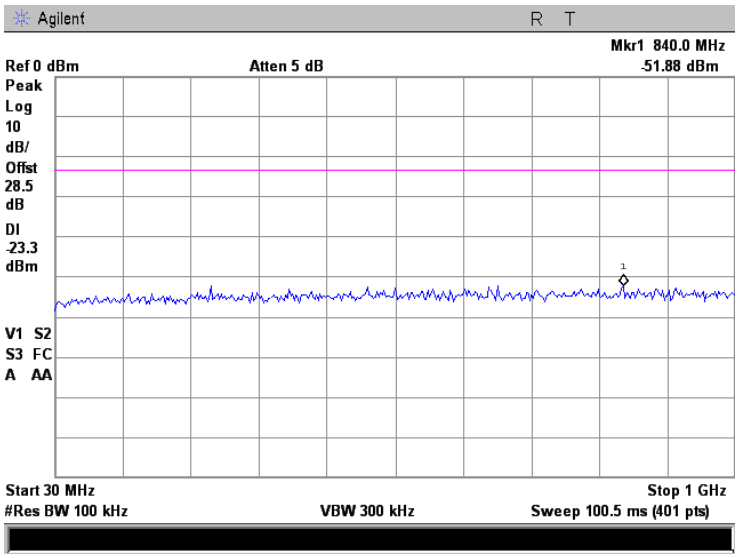


Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Conducted spurious emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/22/2012		
Temperature: 24.2 ºC	Air Pressure: 1008 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

Plot 7.3.10 Spurious emission measurements in 30 - 1000 MHz range at low carrier frequency

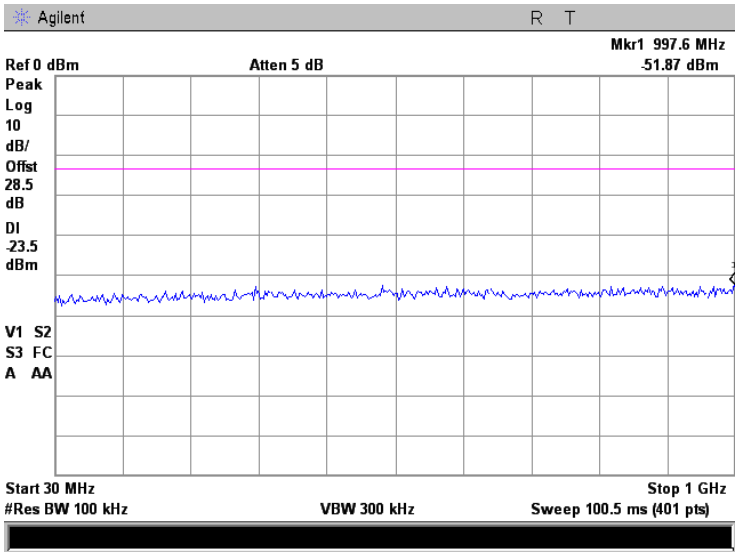


Plot 7.3.11 Spurious emission measurements in 30 - 1000 MHz range at mid carrier frequency

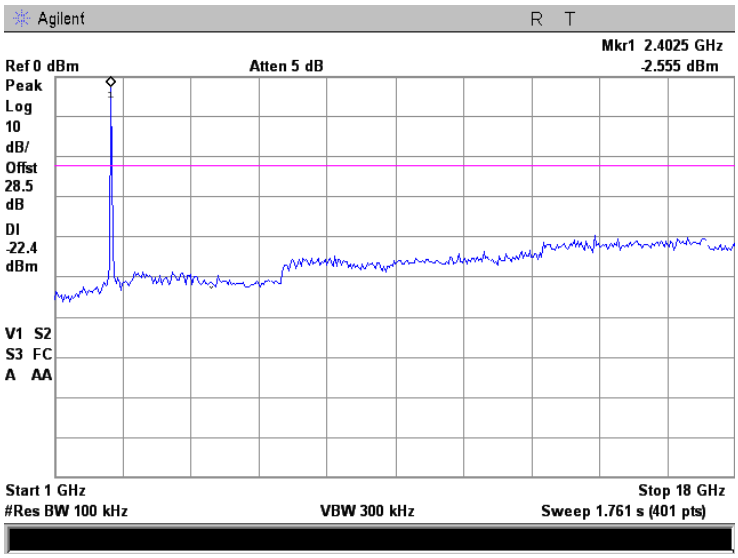


Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Conducted spurious emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/22/2012		
Temperature: 24.2 ºC	Air Pressure: 1008 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

Plot 7.3.12 Spurious emission measurements in 30 - 1000 MHz range at high carrier frequency

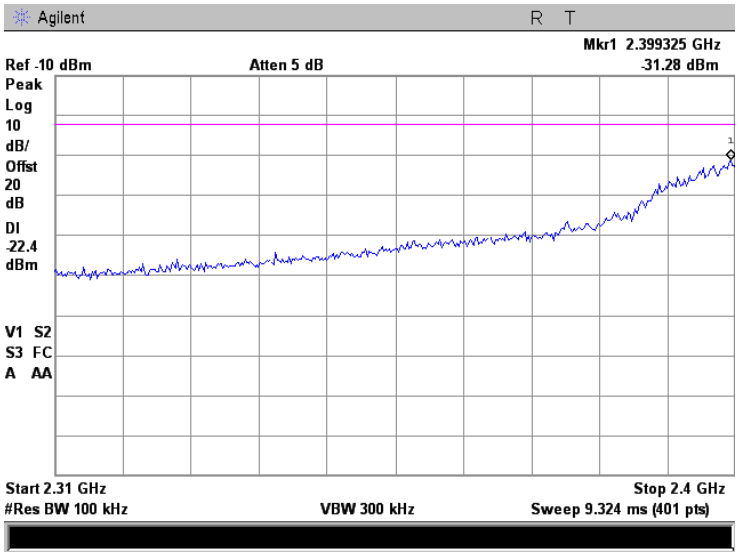


Plot 7.3.13 Spurious emission measurements in 1000 - 18000 MHz range at low carrier frequency

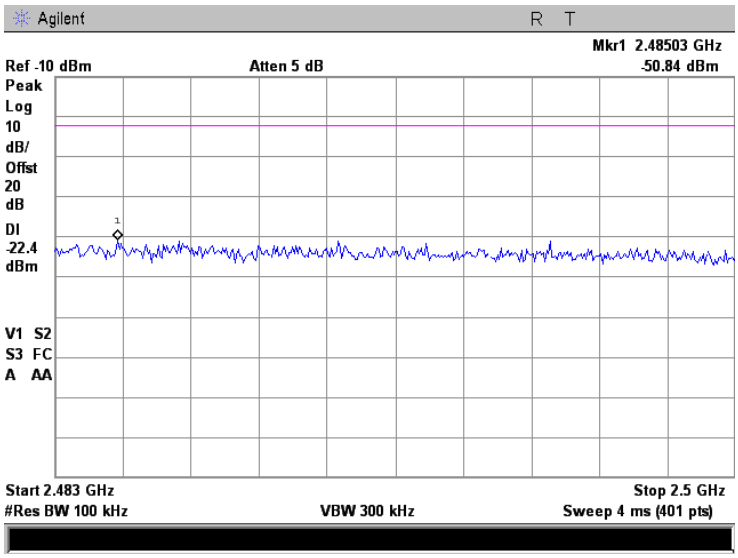


Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Conducted spurious emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/22/2012		
Temperature: 24.2 ºC	Air Pressure: 1008 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

Plot 7.3.14 Spurious emission measurements in 2310 - 2400 MHz range at low carrier frequency

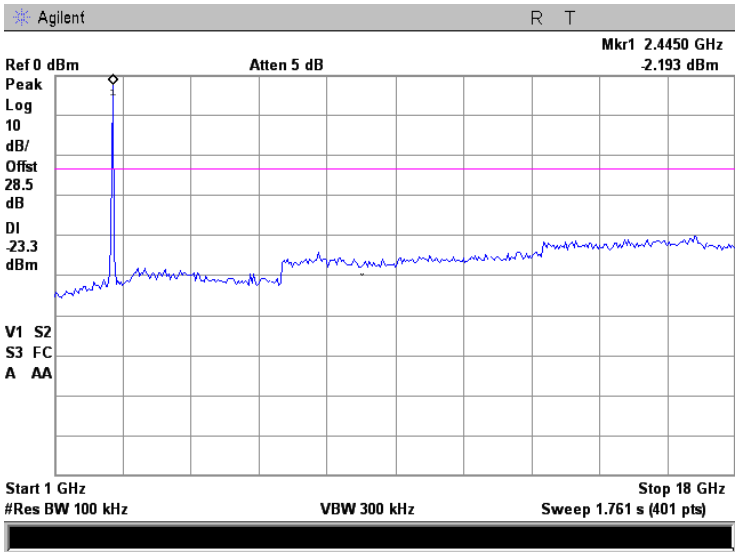


Plot 7.3.15 Spurious emission measurements in 2483.5 - 2500 MHz range at low carrier frequency

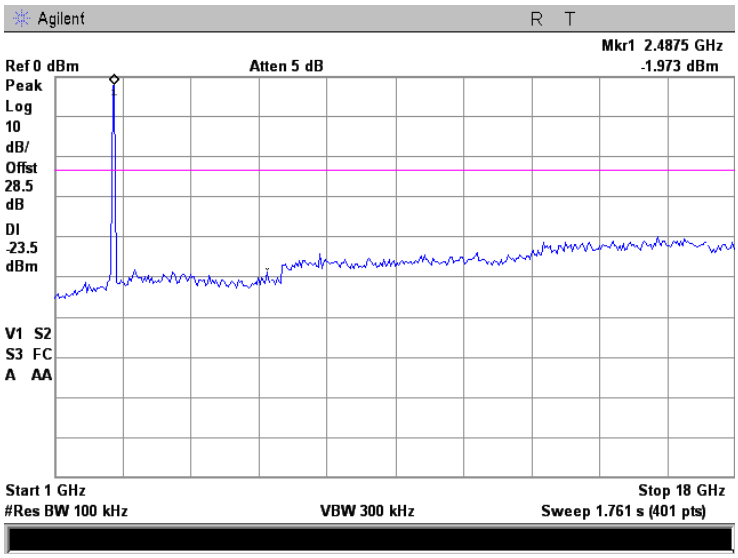


Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Conducted spurious emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/22/2012		
Temperature: 24.2 ºC	Air Pressure: 1008 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

Plot 7.3.16 Spurious emission measurements in 1000 - 18000 MHz range at mid carrier frequency

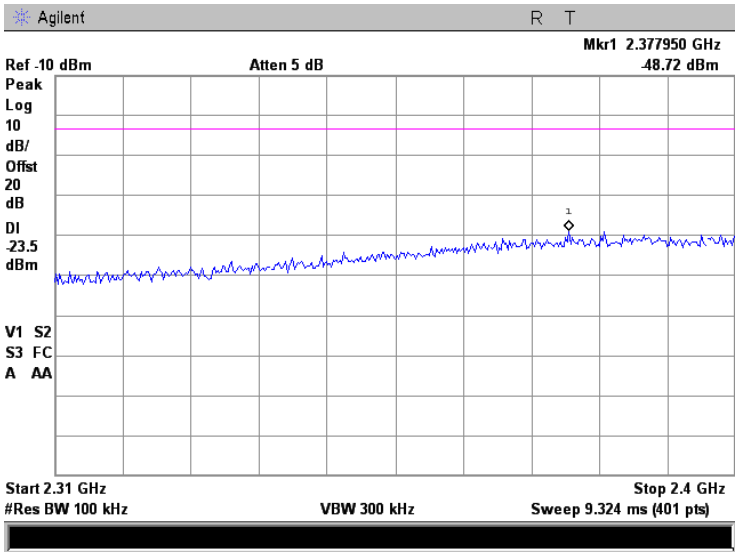


Plot 7.3.17 Spurious emission measurements in 1000 - 18000 MHz range at high carrier frequency

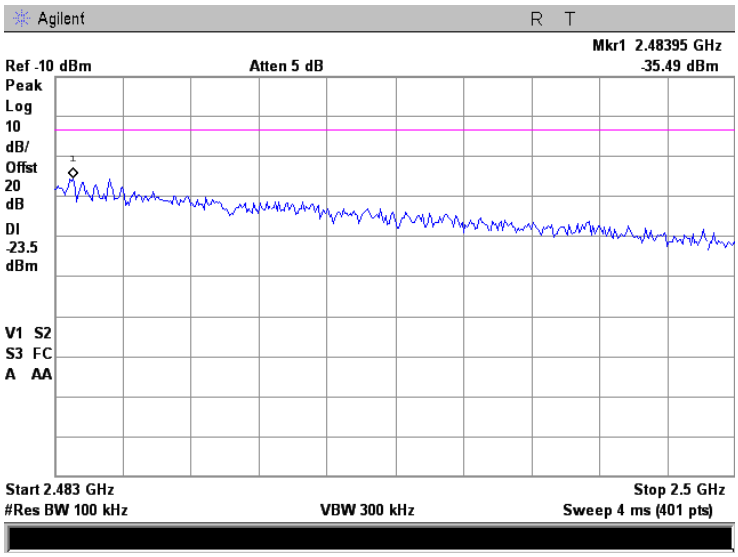


Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Conducted spurious emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/22/2012		
Temperature: 24.2 ºC	Air Pressure: 1008 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

Plot 7.3.18 Spurious emission measurements in 2310 - 2400 MHz range at high carrier frequency

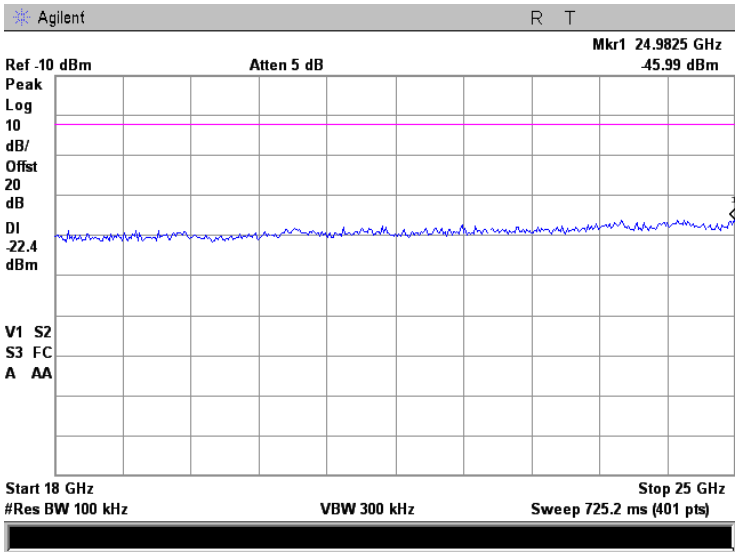


Plot 7.3.19 Spurious emission measurements in 2483.5 - 2500 MHz range at high carrier frequency

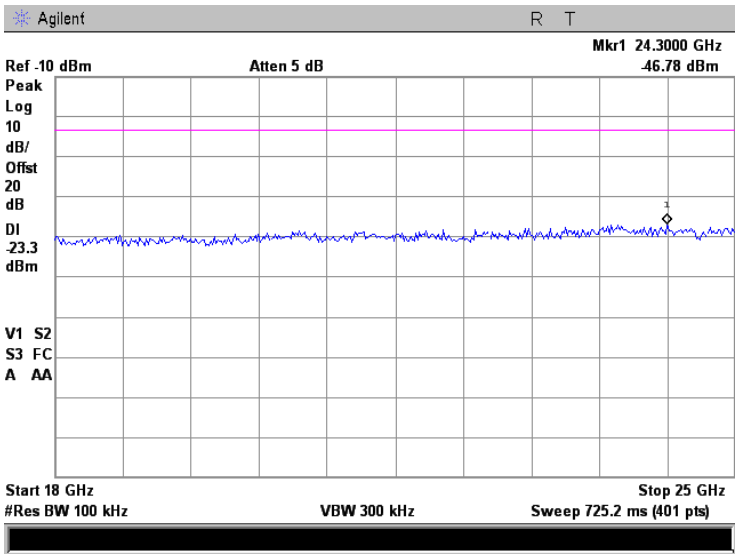


Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Conducted spurious emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/22/2012		
Temperature: 24.2 ºC	Air Pressure: 1008 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

Plot 7.3.20 Spurious emission measurements in 18000 - 25000 MHz range at low carrier frequency

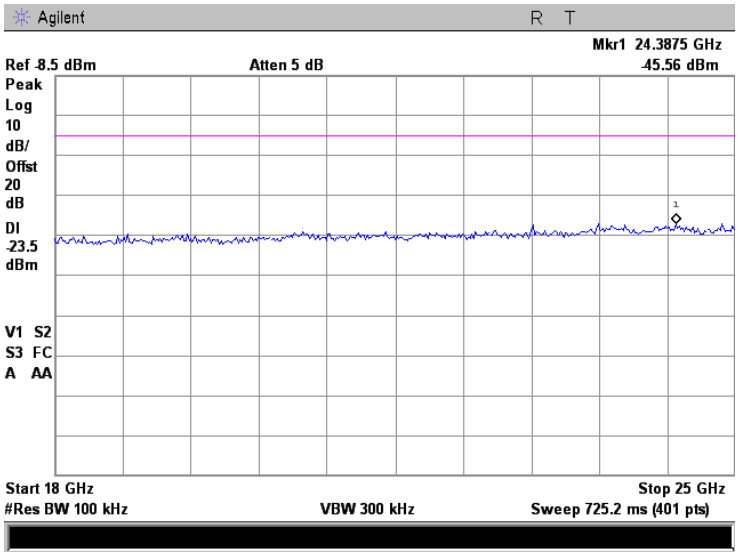


Plot 7.3.21 Spurious emission measurements in 18000 - 25000 MHz range at mid carrier frequency



Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Conducted spurious emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/22/2012		
Temperature: 24.2 ºC	Air Pressure: 1008 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

Plot 7.3.22 Spurious emission measurements in 18000 - 25000 MHz range at high carrier frequency



Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Band edge emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/23/2012		
Temperature: 24.3 ºC	Air Pressure: 1007 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

7.4 Band edge emissions at RF antenna connector

7.4.1 General

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

Table 7.4.1 Band edge emission limits

Output power	Assigned frequency, MHz	Attenuation below carrier*, dBc
Peak	902.0 – 928.0	**20.0**
	2400.0 – 2483.5	
	5725.0 – 5850.0	
Averaged over a time interval	902.0 – 928.0	30.0
	2400.0 – 2483.5	
	5725.0 – 5850.0	

* - Band edge emission limit is provided in terms of attenuation below the peak of modulated carrier measured with the same resolution bandwidth.

7.4.2 Test procedure

7.4.2.1 The EUT was set up as shown in Figure 7.4.1, energized normally modulated at the maximum data rate and its proper operation was checked.

7.4.2.2 The EUT was adjusted to produce maximum available to end user RF output power at the lowest carrier frequency.

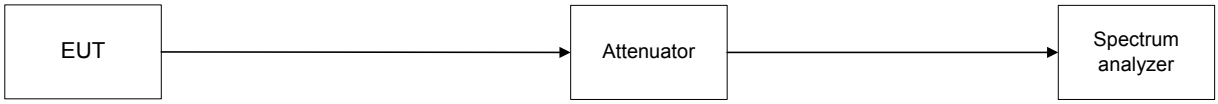
7.4.2.3 The spectrum analyzer span was set to capture the carrier frequency and associated modulation products. The resolution bandwidth was set to 100 kHz.

7.4.2.4 The spectrum analyzer was set in max hold mode and allowed trace to stabilize. The highest emission level within the authorized band was measured.

7.4.2.5 The maximum band edge emission and modulation product outside of the band were measured as provided in Table 7.4.2 and the associated plots and referenced to the highest emission level measured within the authorized band.

7.4.2.6 The above procedure was repeated with the EUT adjusted to produce maximum RF output power at the highest carrier frequency.

Figure 7.4.1 Band edge emission test setup



Test specification:	**FCC section 15.247(d), RSS-210 section A8.5, Band edge emissions**		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	8/23/2012		
Temperature: 24.3 ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 39 %	**Power Supply:** 13.8 VDC
Remarks:			

Table 7.4.2 Band edge emission test results

ASSIGNED FREQUENCY RANGE: 2400.0 – 2483.5 MHz
DETECTOR USED: Peak
MODULATION: BPSK / 64QAM
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
RESOLUTION BANDWIDTH: 100 kHz
VIDEO BANDWIDTH: 300 kHz

Frequency, MHz	Modulation/ Bit rate, Mbps	Band edge emission, dBm	Emission at carrier, dBm	Attenuation below carrier, dBc	Limit, dBc	Margin*, dB	Verdict
20 MHz BW, Low channel 2412 MHz							
2398.000	BPSK, 6.5	-31.28	-2.39	28.89	20.0	8.89	Pass
2399.210	64QAM, 65	-32.29	-2.78	29.51	20.0	9.51	Pass
20 MHz BW, High channel 2462 MHz							
2483.880	BPSK, 6.5	-35.49	-3.51	31.98	20.0	11.98	Pass
2484.26	64QAM, 65	-36.42	-3.94	32.48	20.0	12.48	Pass
40 MHz BW, Low channel 2422 MHz							
2398.920	BPSK, 13.5	-31.41	-3.57	27.84	20.0	7.84	Pass
2398.920	64QAM, 135	-32.95	-2.19	30.76	20.0	10.76	Pass
40 MHz BW, High channel 2452 MHz							
2484.450	BPSK, 13.5	-35.29	-3.12	32.17	20.0	12.17	Pass
2483.500	64QAM, 135	-35.81	-2.04	33.77	20.0	13.77	Pass

*****- Margin = Attenuation below carrier – specification limit.

Reference numbers of test equipment used

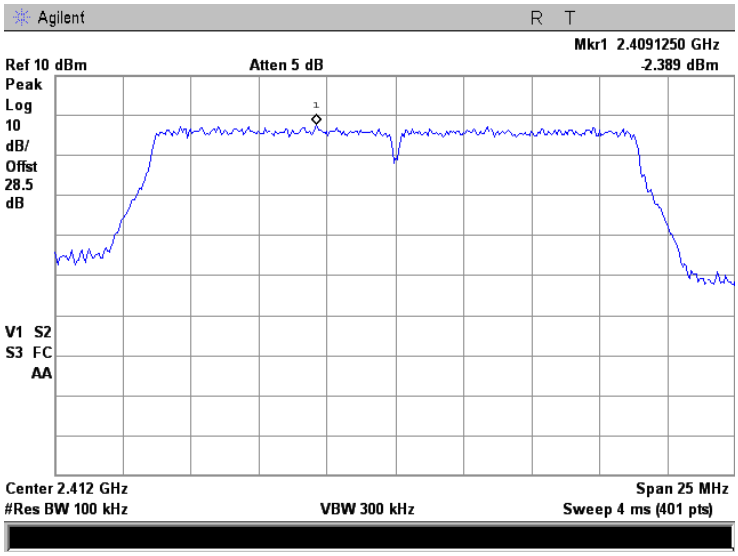
HL 3455	HL 3787	HL 3818	HL 3901				

Full description is given in Appendix A.

Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Band edge emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/23/2012		
Temperature: 24.3 ºC	Air Pressure: 1007 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

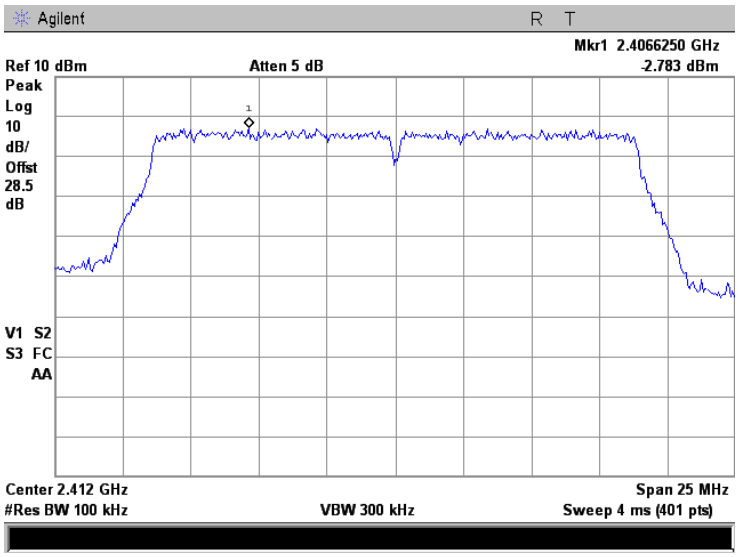
Plot 7.4.1 The highest emission level within the assigned band at low carrier frequency

Emission Bandwidth, MHz:	20
Modulation:	BPSK
Bit Rate, Mbps:	6.5



Plot 7.4.2 The highest emission level within the assigned band at low carrier frequency

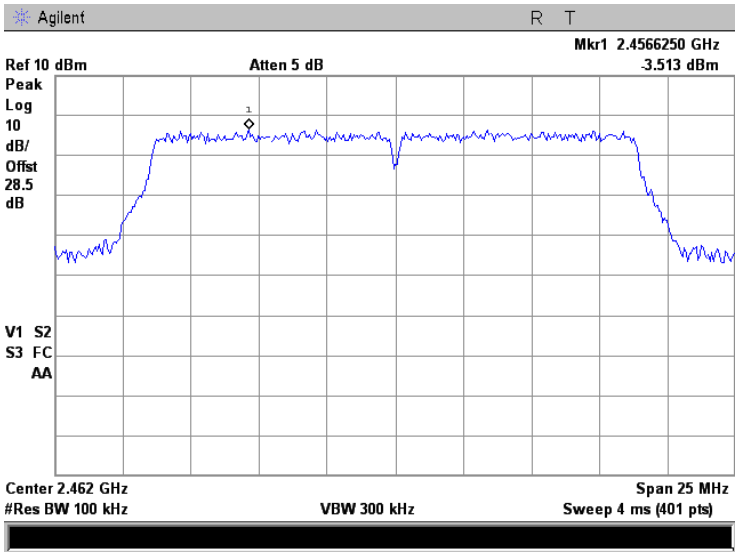
Emission Bandwidth, MHz:	20
Modulation:	64QAM
Bit Rate, Mbps:	65



Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Band edge emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/23/2012		
Temperature: 24.3 ºC	Air Pressure: 1007 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

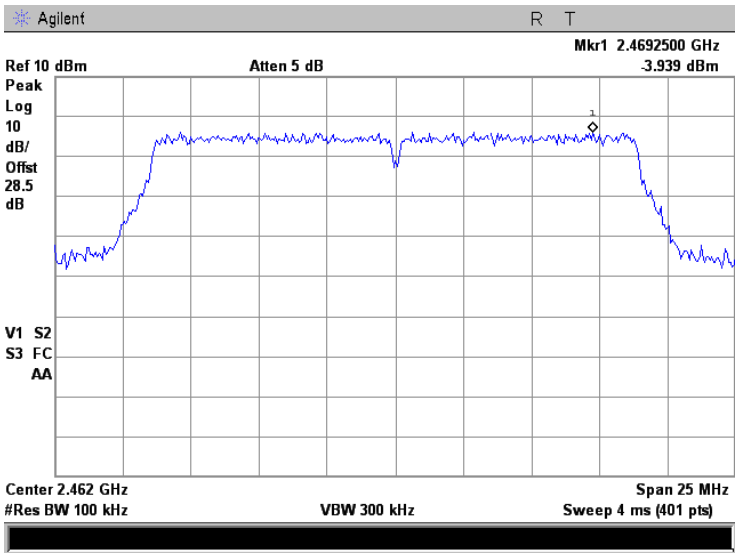
Plot 7.4.3 The highest emission level within the assigned band at high carrier frequency

Emission Bandwidth, MHz:	20
Modulation:	BPSK
Bit Rate, Mbps:	6.5



Plot 7.4.4 The highest emission level within the assigned band at high carrier frequency

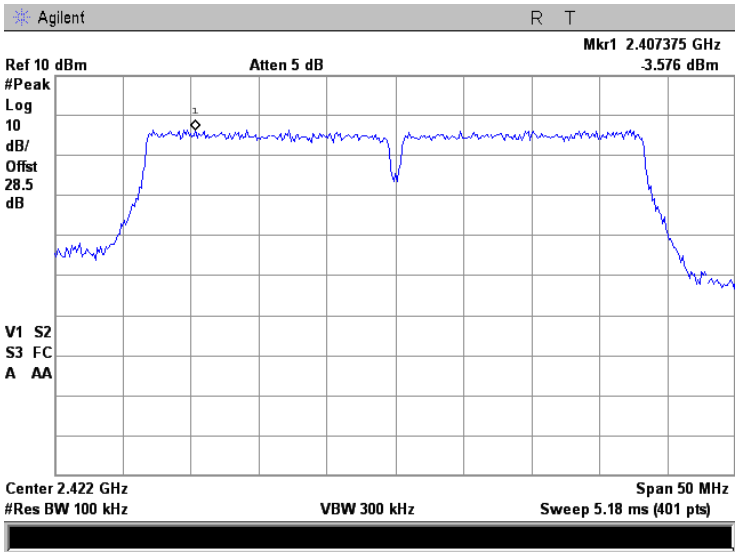
Emission Bandwidth, MHz:	20
Modulation:	64QAM
Bit Rate, Mbps:	65



Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Band edge emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/23/2012		
Temperature: 24.3 ºC	Air Pressure: 1007 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

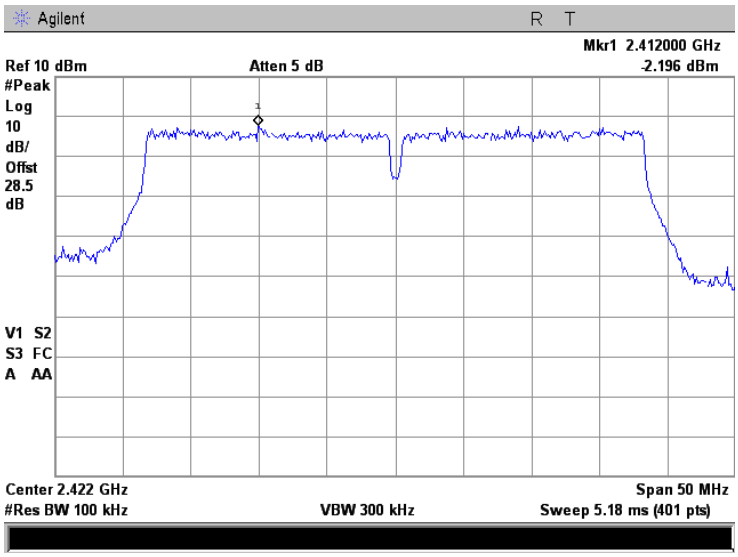
Plot 7.4.5 The highest emission level within the assigned band at low carrier frequency

Emission Bandwidth, MHz:	40
Modulation:	BPSK
Bit Rate, Mbps:	13.5



Plot 7.4.6 The highest emission level within the assigned band at low carrier frequency

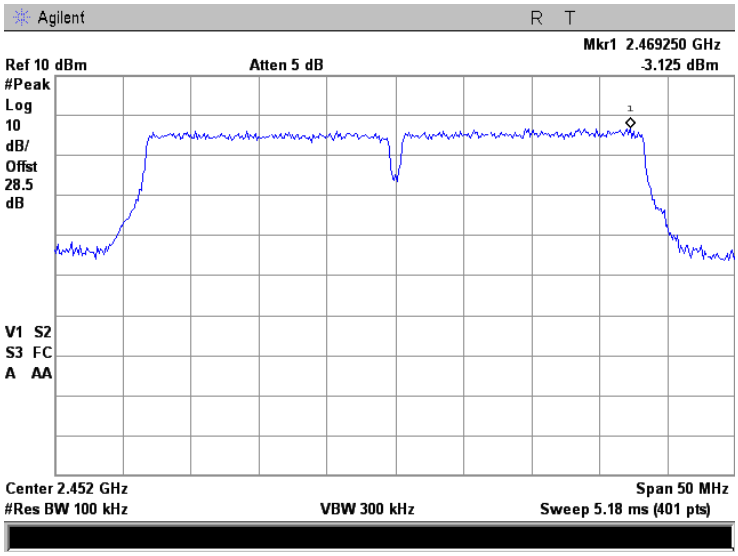
Emission Bandwidth, MHz:	40
Modulation:	64QAM
Bit Rate, Mbps:	135



Test specification:	**FCC section 15.247(d), RSS-210 section A8.5, Band edge emissions**		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	8/23/2012		
Temperature: 24.3 ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 39 %	**Power Supply:** 13.8 VDC
Remarks:			

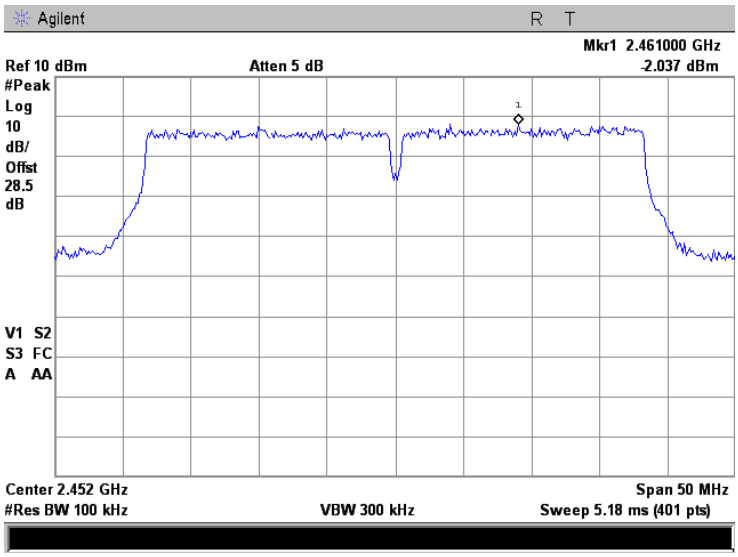
Plot 7.4.7 The highest emission level within the assigned band at high carrier frequency

Emission Bandwidth, MHz:	40
Modulation:	BPSK
Bit Rate, Mbps:	13.5



Plot 7.4.8 The highest emission level within the assigned band at high carrier frequency

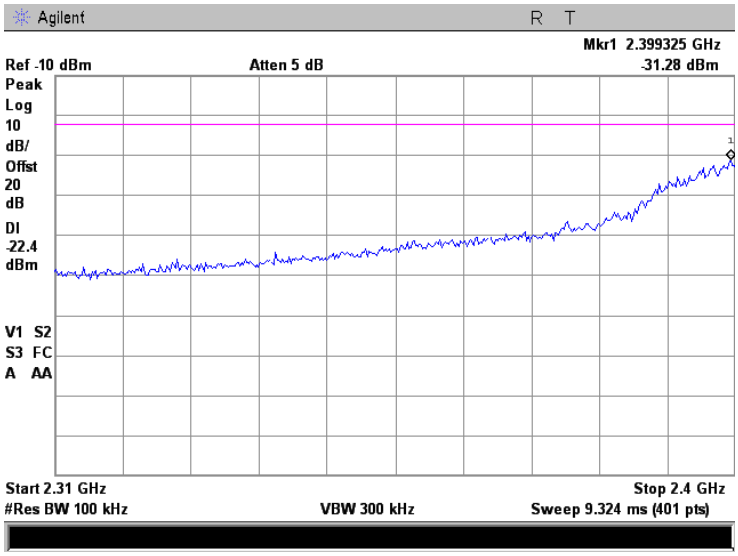
Emission Bandwidth, MHz:	40
Modulation:	64QAM
Bit Rate, Mbps:	135



Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Band edge emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/23/2012		
Temperature: 24.3 ºC	Air Pressure: 1007 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

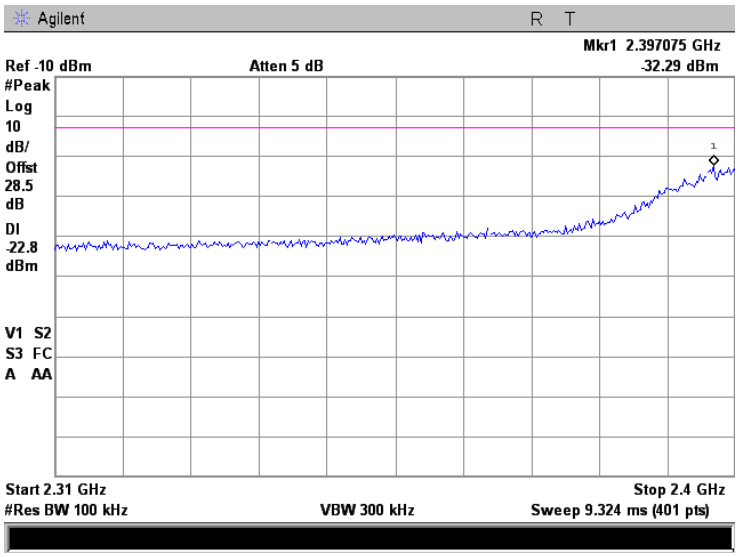
Plot 7.4.9 The highest band edge emission at low carrier frequency

Emission Bandwidth, MHz:	20
Modulation:	BPSK
Bit Rate, Mbps:	6.5



Plot 7.4.10 The highest band edge emission at low carrier frequency

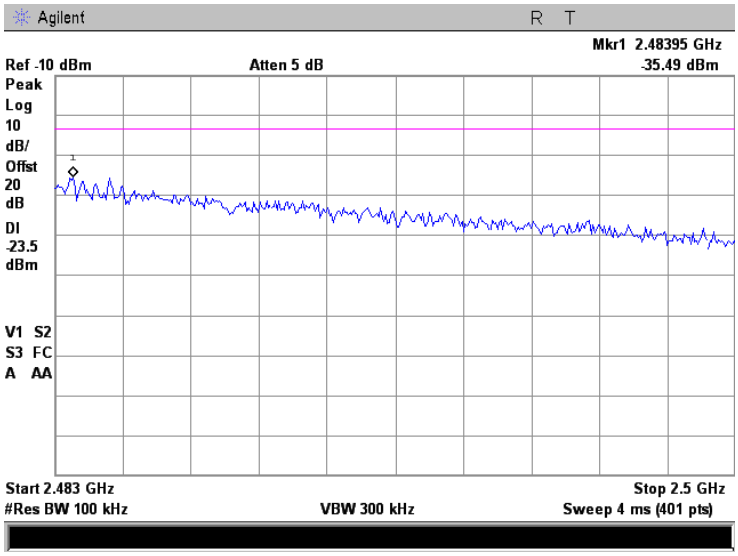
Emission Bandwidth, MHz:	20
Modulation:	64QAM
Bit Rate, Mbps:	65



Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Band edge emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/23/2012		
Temperature: 24.3 ºC	Air Pressure: 1007 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

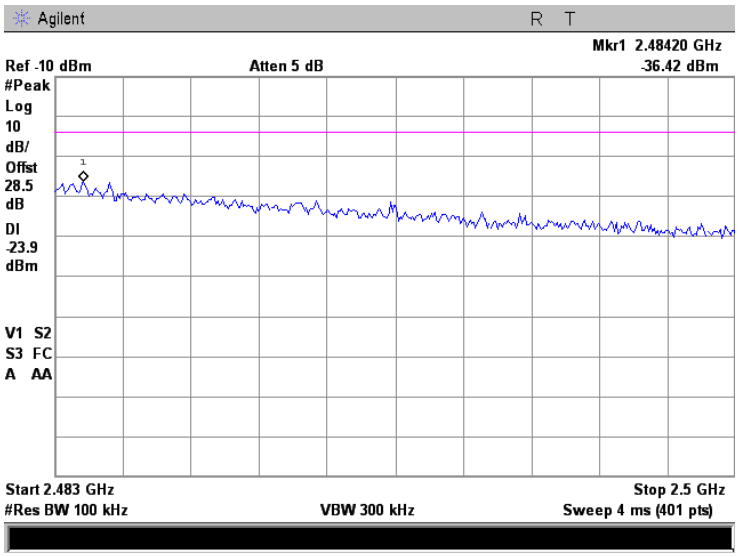
Plot 7.4.11 The highest band edge emission at high carrier frequency

Emission Bandwidth, MHz:	20
Modulation:	BPSK
Bit Rate, Mbps:	6.5



Plot 7.4.12 The highest band edge emission at high carrier frequency

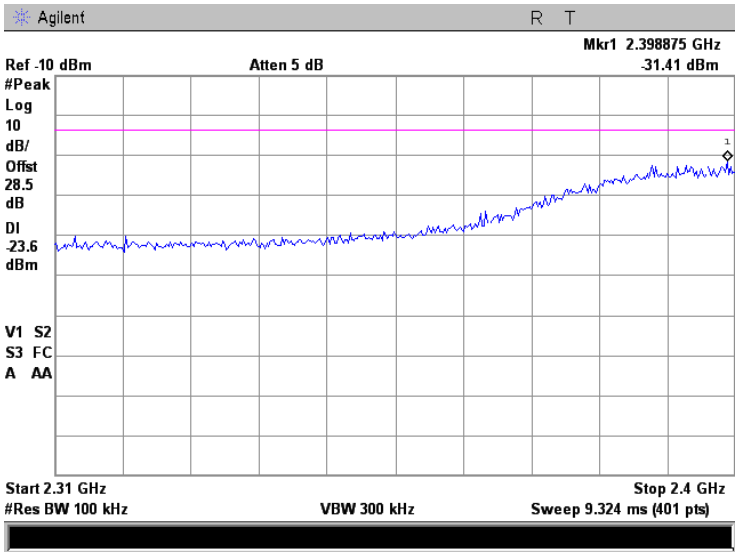
Emission Bandwidth, MHz:	20
Modulation:	64QAM
Bit Rate, Mbps:	65



Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Band edge emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/23/2012		
Temperature: 24.3 ºC	Air Pressure: 1007 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

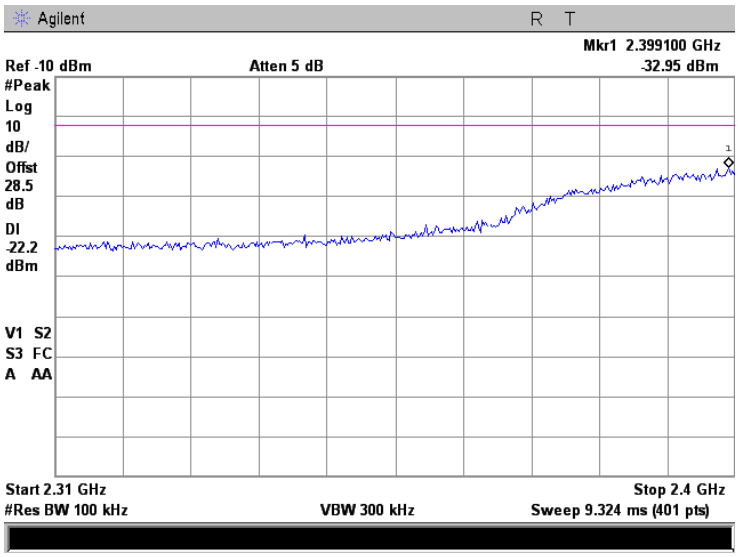
Plot 7.4.13 The highest band edge emission at high carrier frequency

Emission Bandwidth, MHz:	40
Modulation:	BPSK
Bit Rate, Mbps:	13.5



Plot 7.4.14 The highest band edge emission at high carrier frequency

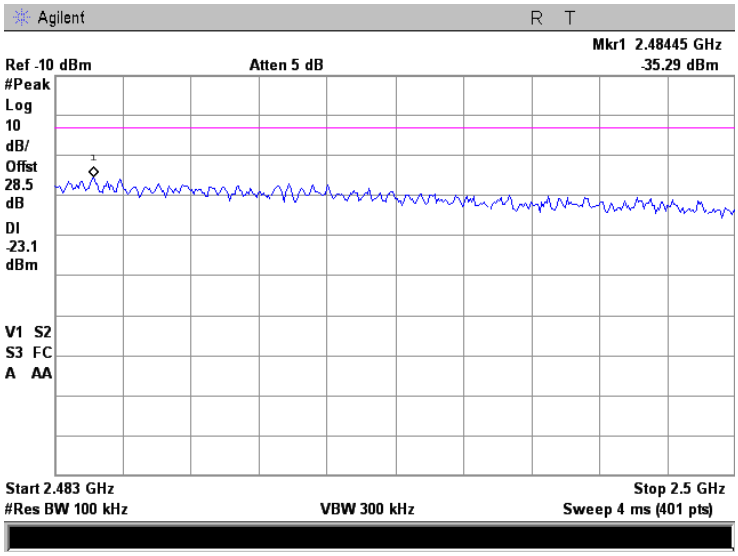
Emission Bandwidth, MHz:	40
Modulation:	64QAM
Bit Rate, Mbps:	135



Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Band edge emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/23/2012		
Temperature: 24.3 °C	Air Pressure: 1007 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

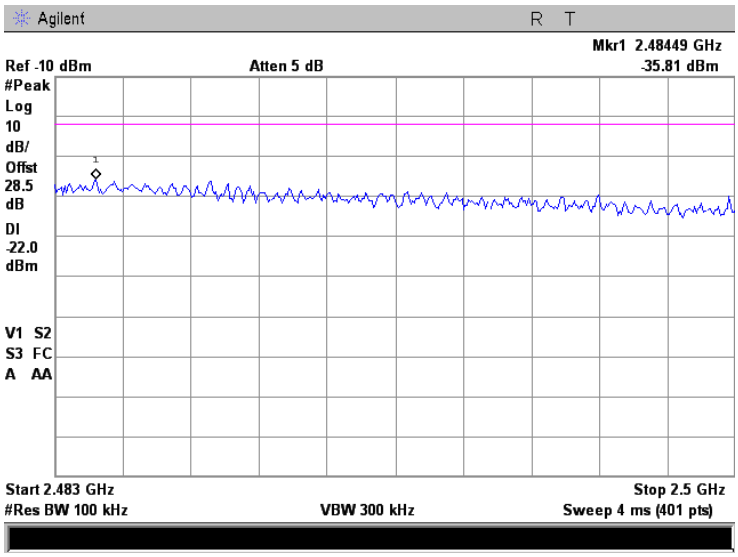
Plot 7.4.15 The highest band edge emission at high carrier frequency

Emission Bandwidth, MHz:	40
Modulation:	BPSK
Bit Rate, Mbps:	13.5



Plot 7.4.16 The highest band edge emission at high carrier frequency

Emission Bandwidth, MHz:	40
Modulation:	64QAM
Bit Rate, Mbps:	135



Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/27/2012 - 9/2/2012		
Temperature: 24.1 ºC	Air Pressure: 1007 hPa	Relative Humidity: 35 %	Power Supply: 13.8 VDC
Remarks:			

7.5 Band edge radiated emissions

7.5.1 General

This test was performed to measure emissions, radiated from the EUT at the assigned frequency band edges. Specification test limits are given in Table 7.5.1.

Table 7.5.1 Band edge emission limits

Output power	Assigned frequency, MHz	Attenuation below carrier*, dBc	Field strength at 3 m within restricted bands, dB(μV/m)	
			Peak	Average
Peak	902.0 – 928.0	20.0	74.0	54.0
	2400.0 – 2483.5			
	5725.0 – 5850.0			
Averaged over a time interval	902.0 – 928.0	30.0	74.0	54.0
	2400.0 – 2483.5			
	5725.0 – 5850.0			

* - Band edge emission limit is provided in terms of attenuation below the peak of modulated carrier measured with the same resolution bandwidth.

7.5.2 Test procedure

7.5.2.1 The EUT was set up as shown in Figure 7.5.1, energized normally modulated at the maximum data rate and its proper operation was checked.

7.5.2.2 The EUT was adjusted to produce maximum available to end user RF output power at the lowest carrier frequency.

7.5.2.3 The spectrum analyzer span was set to capture the carrier frequency and associated modulation products. The resolution bandwidth was set wider than 1 % of the frequency span.

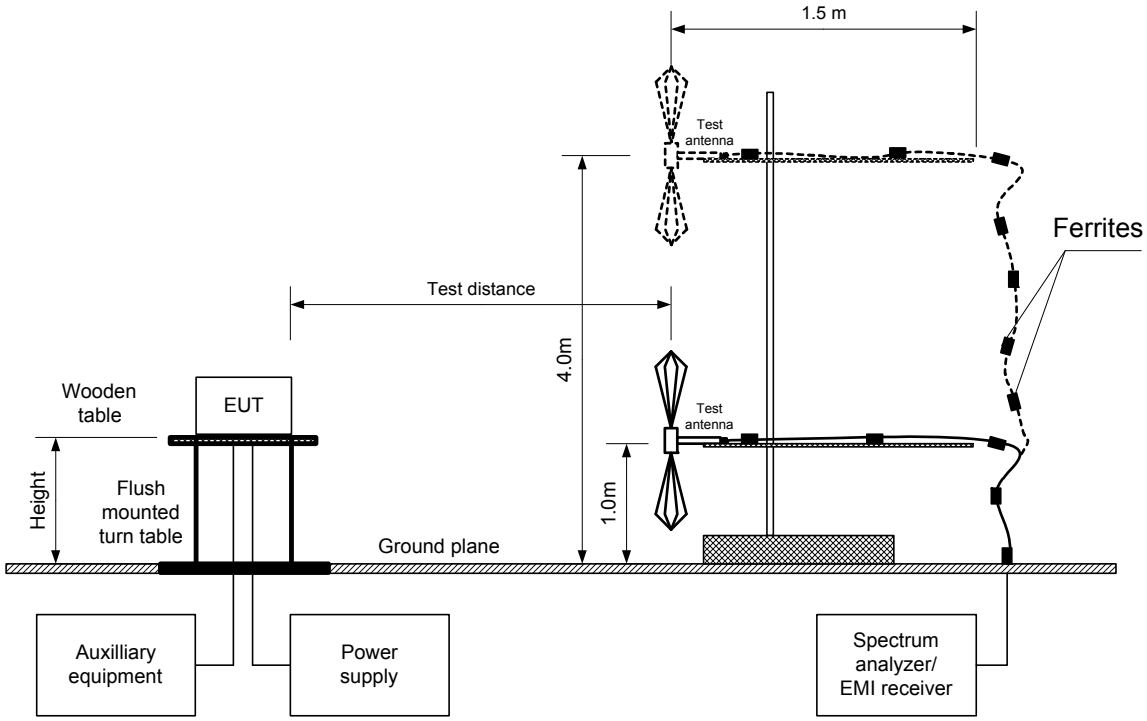
7.5.2.4 The spectrum analyzer was set in max hold mode and allowed trace to stabilize. The highest emission level within the authorized band was measured.

7.5.2.5 The maximum band edge emission and modulation product outside of the band were measured as provided in Table 7.5.2 and associated plots and referenced to the highest emission level measured within the authorized band.

7.5.2.6 The above procedure was repeated with the EUT adjusted to produce maximum RF output power at the highest carrier frequency.

Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/27/2012 - 9/2/2012		
Temperature: 24.1 ºC	Air Pressure: 1007 hPa	Relative Humidity: 35 %	Power Supply: 13.8 VDC
Remarks:			

Figure 7.5.1 Band edge emission test setup



Test specification:	**FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions**		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	8/27/2012 - 9/2/2012		
Temperature: 24.1 ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 35 %	**Power Supply:** 13.8 VDC
Remarks:			

Table 7.5.2 Band edge emission test results

ASSIGNED FREQUENCY RANGE: 2400 – 2483.5 MHz
DETECTOR USED: Peak / Average
MODULATING: BPSK / 64QAM
MODULATING SIGNAL: PRBS
DUTY CYCLE: 99 %
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
RESOLUTION BANDWIDTH: 1 MHz
VIDEO BANDWIDTH: Peak Detector VBW = 3 MHz; Average Detector VBW = 10 Hz

Frequency, MHz	Modulation/ Bit Rate, Mbps	Antenna		Azimuth, degrees*	Peak field strength (VBW=3 MHz)			Average field strength (VBW=10 Hz)			Verdict
		Polarization	Height, m		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	
EBW 20 MHz											
Low carrier frequency											
2390.000	BPSK/6.5	Vert	1.2	313	66.11	74.0	-7.89	49.43	54.0	-4.57	Pass
2390.000	64QAM/65	Vert	1.2	313	66.91	74.0	-7.09	49.61	54.0	-4.39	
High carrier frequency											
2483.500	BPSK/6.5	Vert	1.0	229	68.52	74.0	-5.48	53.37	54.0	-0.63	Pass
2483.500	64QAM/65	Vert	1.0	229	68.07	74.0	-5.93	53.18	54.0	-0.82	
EBW 40 MHz											
Low carrier frequency											
2390.000	BPSK/13	Vert	1.2	313	68.06	74.0	-5.94	53.59	54.0	-0.41	Pass
2390.000	64QAM/130	Vert	1.2	313	67.03	74.0	-6.97	53.24	54.0	-0.76	
High carrier frequency											
2483.620	BPSK/13	Vert	1.0	229	64.84	74.0	-9.16	51.75	54.0	-2.25	Pass
2483.790	64QAM/130	Vert	1.0	229	64.64	74.0	-9.36	51.3	54.0	-2.70	

*****- EUT front panel refers to 0 degrees position of turntable.
******- Margin = Measured field strength - specification limit.

Reference numbers of test equipment used

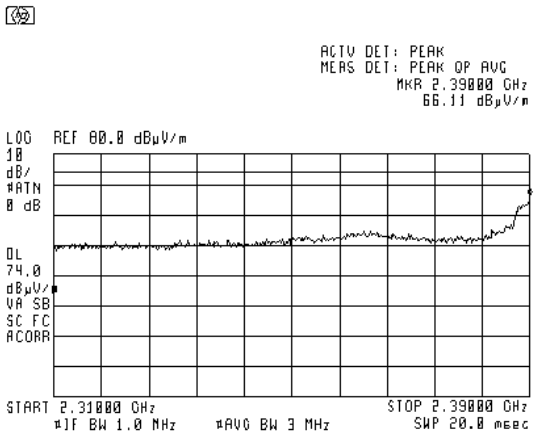
HL 0521	HL 4114	HL 4352	HL 4353				

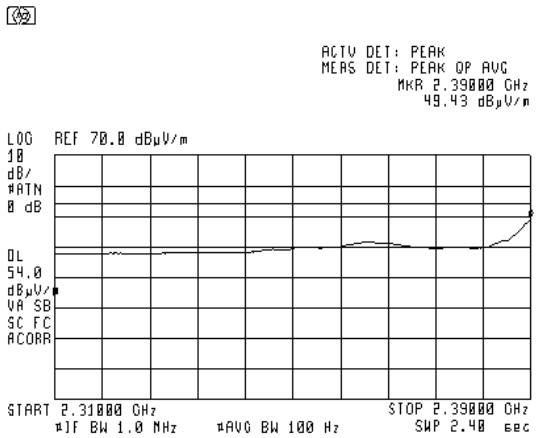
Full description is given in Appendix A.

Test specification:	**FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions**		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	8/27/2012 - 9/2/2012		
Temperature: 24.1 ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 35 %	**Power Supply:** 13.8 VDC
Remarks:			

Plot 7.5.1 Radiated emission measurements from 2310 to 2390 MHz at the low carrier frequency

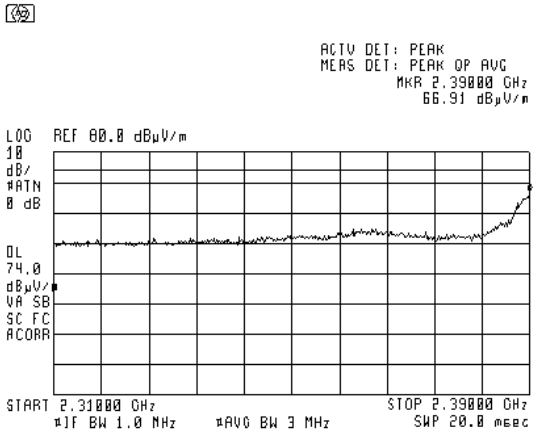
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
MODULATION/BIT RATE: QPSK/ 6.5 Mbps
DETECTOR: Peak
DETECTOR: Average

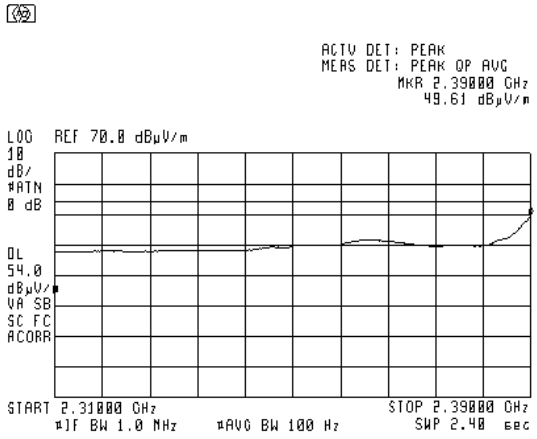




Plot 7.5.2 Radiated emission measurements from 2310 to 2390 MHz at the low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal vert 1.2m 115dgr
MODULATION/BIT RATE: 64QAM / 65 Mbps
DETECTOR: Peak
DETECTOR: Average
Power setting 12

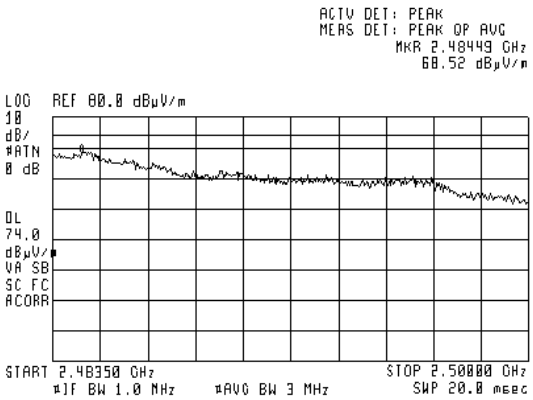




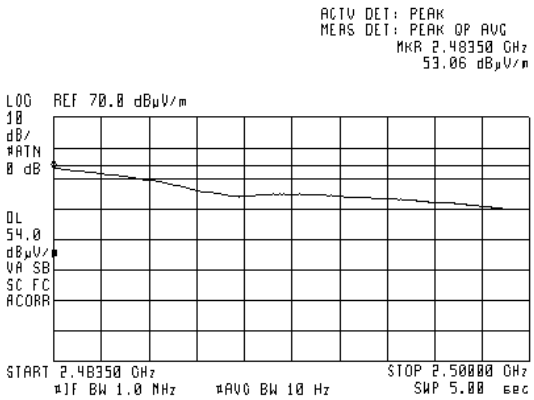
Test specification:	**FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions**		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	8/27/2012 - 9/2/2012		
Temperature: 24.1 ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 35 %	**Power Supply:** 13.8 VDC
Remarks:			

Plot 7.5.3 Radiated emission measurements from 2483.5 to 2500 MHz at the high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
MODULATION/BIT RATE: QPSK / 6.5 Mbps
DETECTOR: Peak

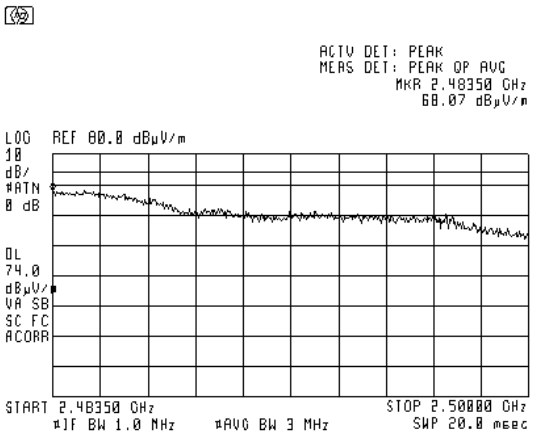


DETECTOR: Average

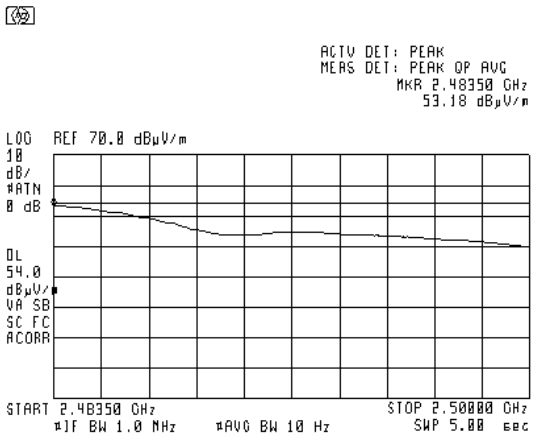


Plot 7.5.4 Radiated emission measurements from 2483.5 to 2500 MHz at the high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
MODULATION/BIT RATE: 64QAM / 65 Mbps
DETECTOR: Peak



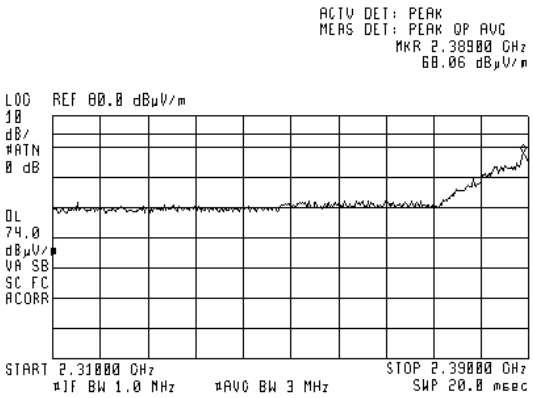
DETECTOR: Average

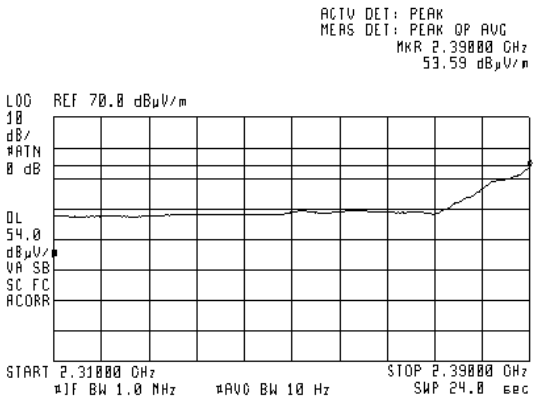


Test specification:	**FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions**		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	8/27/2012 - 9/2/2012		
Temperature: 24.1 ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 35 %	**Power Supply:** 13.8 VDC
Remarks:			

Plot 7.5.5 Radiated emission measurements from 2310 to 2390 MHz at the low carrier frequency

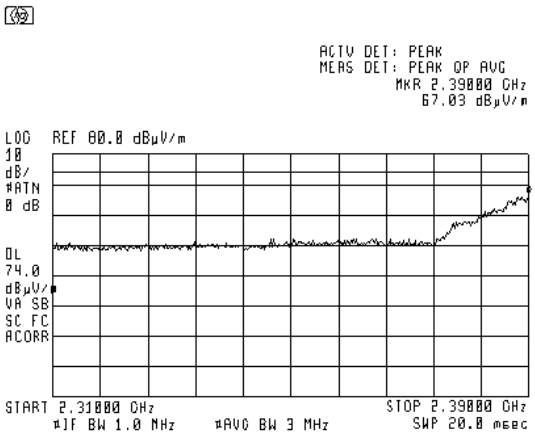
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
MODULATION/BIT RATE: QPSK / 13.5 Mbps
DETECTOR: Peak DETECTOR: Average

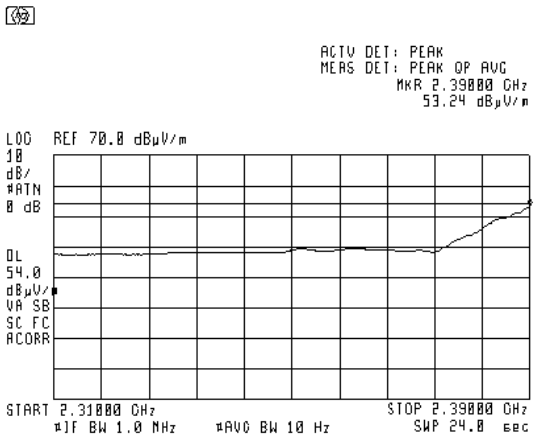




Plot 7.5.6 Radiated emission measurements from 2310 to 2390 MHz at the low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
MODULATION/BIT RATE: 64QAM / 135 Mbps
DETECTOR: Peak DETECTOR: Average

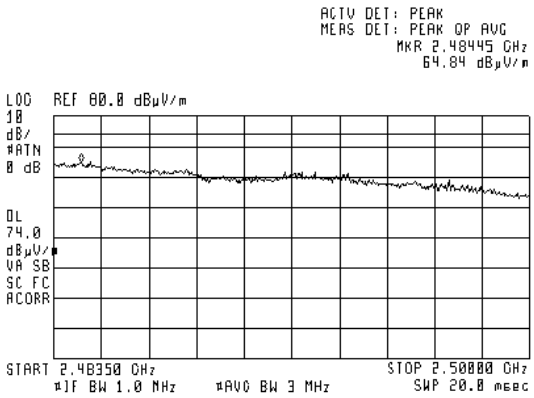




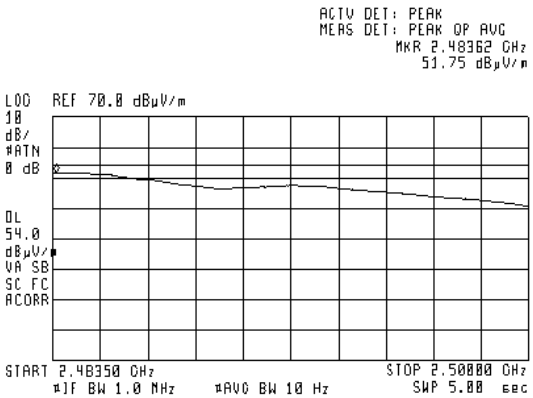
Test specification:	**FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions**		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	8/27/2012 - 9/2/2012		
Temperature: 24.1 ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 35 %	**Power Supply:** 13.8 VDC
Remarks:			

Plot 7.5.7 Radiated emission measurements from 2483.5 to 2500 MHz at the high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
MODULATION/BIT RATE: QPSK / 13.5 Mbps
DETECTOR: Peak

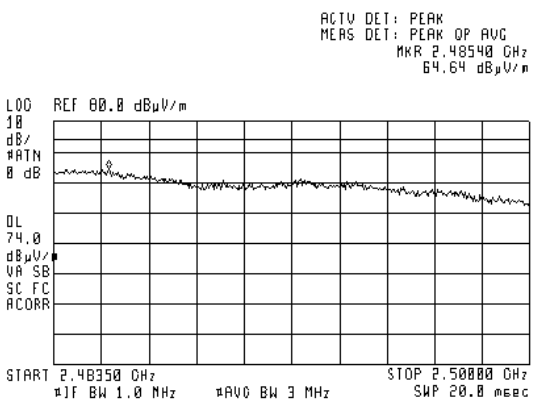


DETECTOR: Average

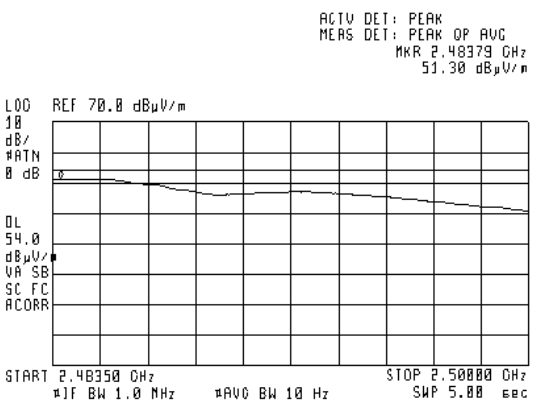


Plot 7.5.8 Radiated emission measurements from 2483.5 to 2500 MHz at the high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
MODULATION/BIT RATE: 64QAM / 135 Mbps
DETECTOR: Peak



DETECTOR: Average



Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/27/2012		
Temperature: 24.2 ºC	Air Pressure: 1006 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

7.6 Field strength of spurious emissions

7.6.1 General

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

Table 7.6.1 Radiated spurious emissions limits

Frequency, MHz	Field strength at 3 m within restricted bands, dB(μV/m)*			Attenuation of field strength of spurious versus carrier outside restricted bands, dBc***
	Peak	Quasi Peak	Average	
0.009 – 0.090	148.5 – 128.5	NA	128.5 – 108.5**	20.0
0.090 – 0.110	NA	108.5 – 106.8**	NA	
0.110 – 0.490	126.8 – 113.8	NA	106.8 – 93.8**	
0.490 – 1.705	NA	73.8 – 63.0**	NA	
1.705 – 30.0*		69.5		
30 – 88		40.0		
88 – 216		43.5		
216 – 960		46.0		
960 - 1000		54.0		
1000 – 10th harmonic	74.0	NA	54.0	

*- The limit for 3 m test distance was calculated using the inverse square distance extrapolation factor as follows:

$$Lim_{S2} = Lim_{S1} + 40 \log (S_1/S_2),$$

where S_1 and S_2 – standard defined and test distance respectively in meters.

**- The limit decreases linearly with the logarithm of frequency.

*** - The field strength limits applied from the lowest radio frequency generated in the device, without going below 9 kHz up to the tenth harmonic of the highest fundamental frequency.

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/ EMI receiver. 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 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/ EMI receiver. To find maximum radiation the turntable was rotated 360^0, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal.

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

Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/27/2012		
Temperature: 24.2 ºC	Air Pressure: 1006 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

Figure 7.6.1 Setup for spurious emission field strength measurements below 30 MHz

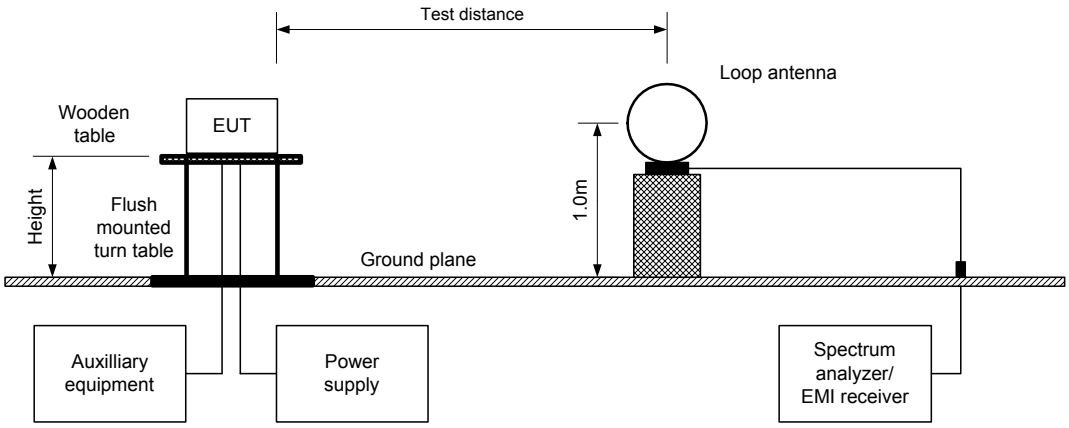
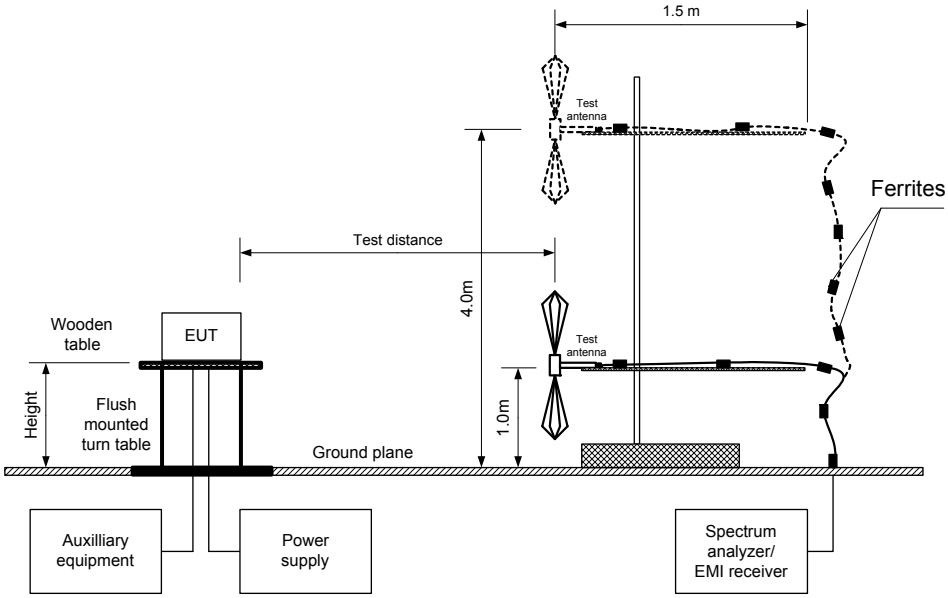


Figure 7.6.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/27/2012		
Temperature: 24.2 ºC	Air Pressure: 1006 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

Table 7.6.2 Field strength of emissions outside restricted bands

ASSIGNED FREQUENCY: 2400 – 2483.5 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 - 25000 MHz
TEST DISTANCE: 3 m
MODULATION: BPSK (Worst case)
MODULATING SIGNAL: PRBS
BIT RATE: 6.5 Mbps
DUTY CYCLE: 99 %
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 100 kHz
VIDEO BANDWIDTH: 300 kHz
TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
Biconilog (30 MHz – 1000 MHz)
Double ridged guide (above 1000 MHz)

Frequency, MHz	Field strength of spurious, dB(μV/m)	Antenna polarization	Antenna height, m	Azimuth, degrees*	Field strength of carrier, dB(μV/m)	Attenuation below carrier, dBc	Limit, dBc	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

*****- EUT front panel refers to 0 degrees position of turntable.
******- Margin = Attenuation below carrier – specification limit.

Table 7.6.3 Field strength of spurious emissions above 1 GHz within restricted bands

ASSIGNED FREQUENCY: 2400 – 2483.5 MHz
INVESTIGATED FREQUENCY RANGE: 1000 - 25000 MHz
TEST DISTANCE: 3 m
MODULATION: BPSK (Worst case)
MODULATING SIGNAL: PRBS
BIT RATE: 6.5 Mbps
DUTY CYCLE: 99 %
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 1000 kHz
TEST ANTENNA TYPE: Double ridged guide

Frequency, MHz	Antenna		Azimuth, degrees*	Peak field strength(VBW=3 MHz)			Average field strength(VBW=10 Hz)			Verdict
	Polarization	Height, m		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	
Low carrier frequency										
No emissions were found										Pass
Mid carrier frequency										
No emissions were found										Pass
High carrier frequency										
No emissions were found										Pass

*****- EUT front panel refers to 0 degrees position of turntable.
******- Margin = Measured field strength - specification limit.

Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/27/2012		
Temperature: 24.2 ºC	Air Pressure: 1006 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

Table 7.6.4 Field strength of spurious emissions below 1 GHz within restricted bands

ASSIGNED FREQUENCY:	2400 – 2483.5 MHz
INVESTIGATED FREQUENCY RANGE:	0.009 – 1000 MHz
TEST DISTANCE:	3 m
MODULATION:	Q PSK
MODULATING SIGNAL:	PRBS
BIT RATE:	6.5 Mbps
DUTY CYCLE:	99 %
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum
RESOLUTION BANDWIDTH:	1.0 kHz (9 kHz – 150 kHz) 9.0 kHz (150 kHz – 30 MHz) 120 kHz (30 MHz – 1000 MHz)
VIDEO BANDWIDTH:	> Resolution bandwidth
TEST ANTENNA TYPE:	Active loop (9 kHz – 30 MHz) Biconilog (30 MHz – 1000 MHz)

Frequency, MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
Low carrier frequency								
1000	39.2	36.3	54.0	-17.70	Vert	1.2	39	Passs
Mid carrier frequency								
1000	38.8	35.7	54.0	-18.30	Vert	1.2	49	Pass
High carrier frequency								
111.6	26.0	22.5	43.5	-21.00	Vert	1.0	26	Pass
1000.0	38.8	34.8	54.0	-19.20	Vert	1.2	89	

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

Table 7.6.5 Restricted bands

MHz	MHz	MHz	MHz	MHz	GHz
0.09 - 0.11	8.37625 - 8.38675	73 - 74.6	399.9 - 410	2690 - 2900	10.6 - 12.7
0.495 - 0.505	8.41425 - 8.41475	74.8 - 75.2	608 - 614	3260 - 3267	13.25 - 13.4
2.1735 - 2.1905	12.29 - 12.293	108 - 121.94	960 - 1240	3332 - 3339	14.47 - 14.5
4.125 - 4.128	12.51975 - 12.52025	123 - 138	1300 - 1427	3345.8 - 3358	15.35 - 16.2
4.17725 - 4.17775	12.57675 - 12.57725	149.9 - 150.05	1435 - 1626.5	3600 - 4400	17.7 - 21.4
4.20725 - 4.20775	13.36 - 13.41	156.52475 - 156.52525	1645.5 - 1646.5	4500 - 5150	22.01 - 23.12
6.215 - 6.218	16.42 - 16.423	156.7 - 156.9	1660 - 1710	5350 – 5460	23.6 - 24
6.26775 - 6.26825	16.69475 - 16.69525	162.0125 - 167.17	1718.8 - 1722.2	7250 - 7750	31.2 - 31.8
6.31175 - 6.31225	16.80425 - 16.80475	167.72 - 173.2	2200 - 2300	8025 – 8500	36.43 - 36.5
8.291 - 8.294	25.5 - 25.67	240 - 285	2310 - 2390	9000 - 9200	Above 38.6
8.362 - 8.366	37.5 - 38.25	322 - 335.4	2483.5 - 2500	9300 - 9500	

Reference numbers of test equipment used

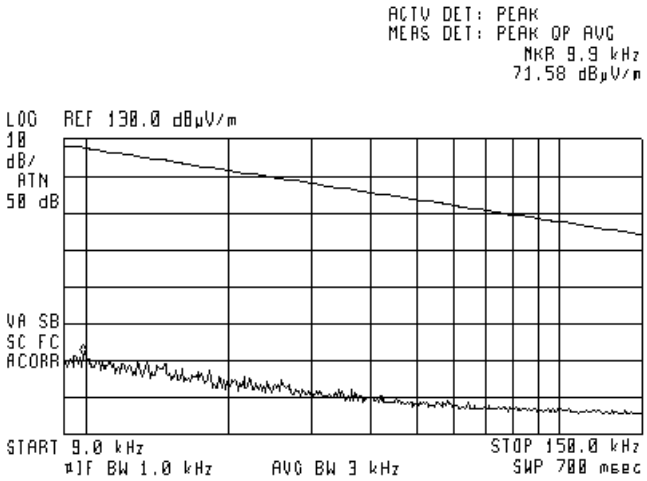
HL 0446	HL 0521	HL 0604	HL 0768	HL 3533	HL 3535	HL 3901	HL 4114
HL 4352	HL 4353						

Full description is given in Appendix A.

Test specification:	**FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions**		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	8/27/2012		
Temperature: 24.2 ºC	**Air Pressure:** 1006 hPa	**Relative Humidity:** 39 %	**Power Supply:** 13.8 VDC
Remarks:			

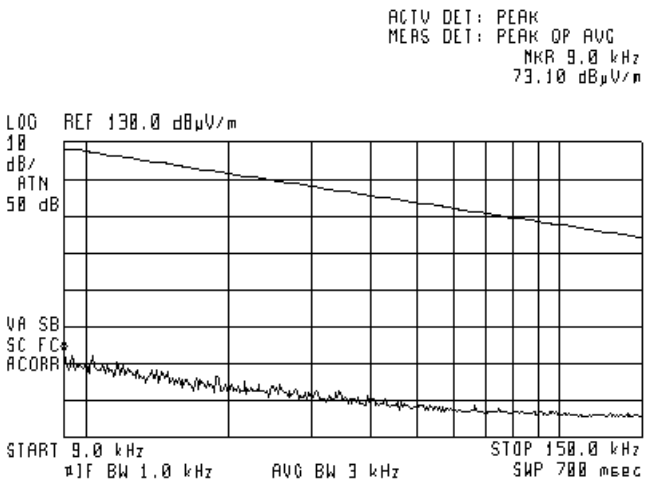
Plot 7.6.1 Radiated emission measurements from 9 to 150 kHz at the low carrier frequency

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



Plot 7.6.2 Radiated emission measurements from 9 to 150 kHz at the mid carrier frequency

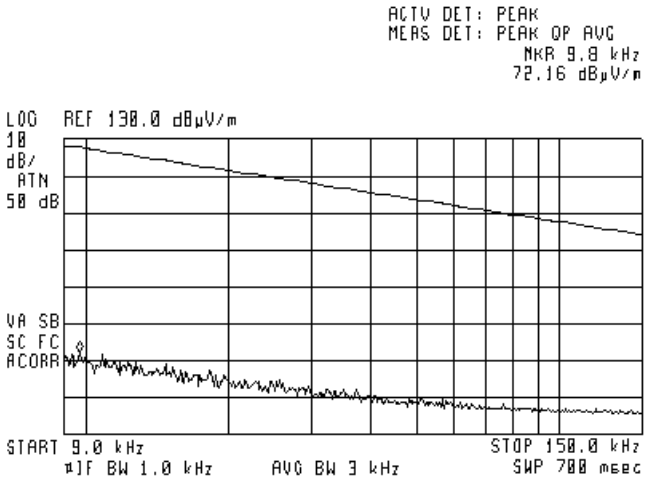
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	**FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions**		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	8/27/2012		
Temperature: 24.2 ºC	**Air Pressure:** 1006 hPa	**Relative Humidity:** 39 %	**Power Supply:** 13.8 VDC
Remarks:			

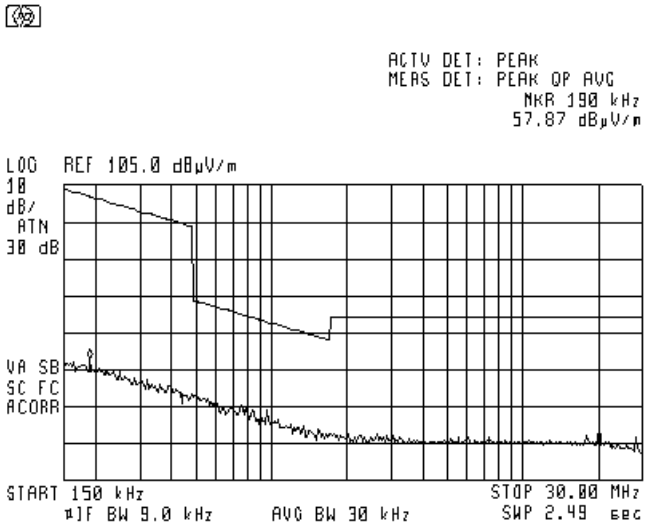
Plot 7.6.3 Radiated emission measurements from 9 to 150 kHz at the high carrier frequency

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



Plot 7.6.4 Radiated emission measurements from 0.15 to 30 MHz at the low carrier frequency

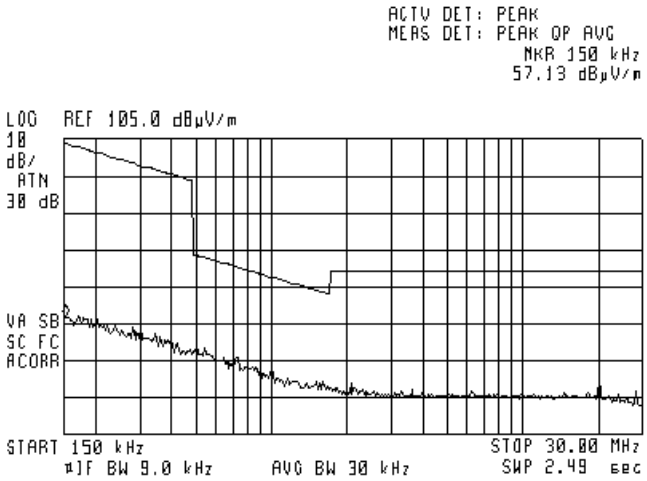
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	**FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions**		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	8/27/2012		
Temperature: 24.2 ºC	**Air Pressure:** 1006 hPa	**Relative Humidity:** 39 %	**Power Supply:** 13.8 VDC
Remarks:			

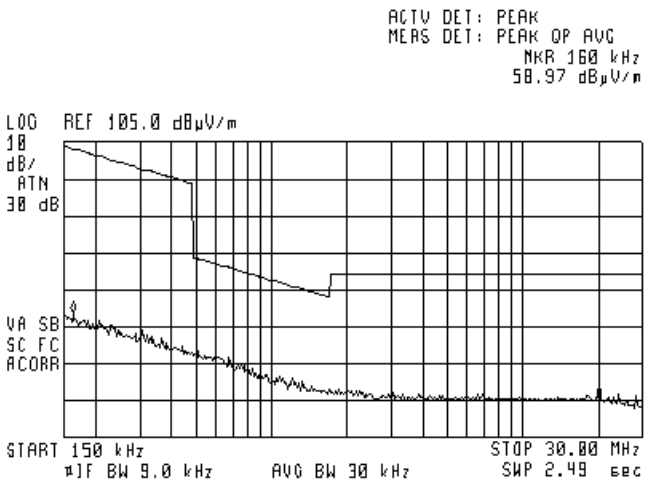
Plot 7.6.5 Radiated emission measurements from 0.15 to 30 MHz at the mid carrier frequency

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



Plot 7.6.6 Radiated emission measurements from 0.15 to 30 MHz at the high carrier frequency

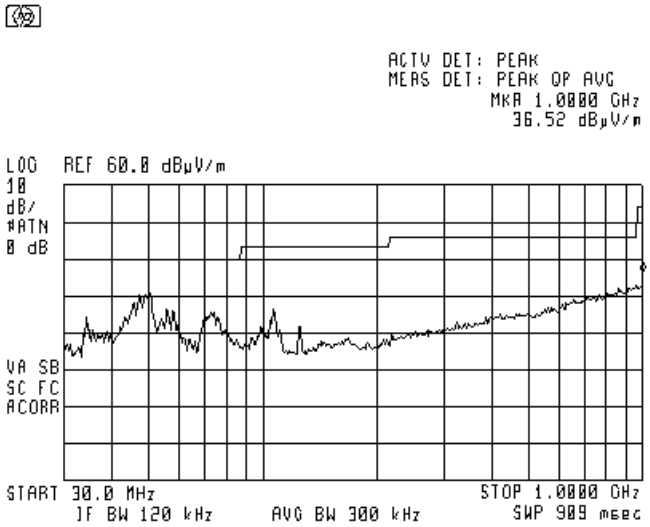
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	**FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions**		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	8/27/2012		
Temperature: 24.2 ºC	**Air Pressure:** 1006 hPa	**Relative Humidity:** 39 %	**Power Supply:** 13.8 VDC
Remarks:			

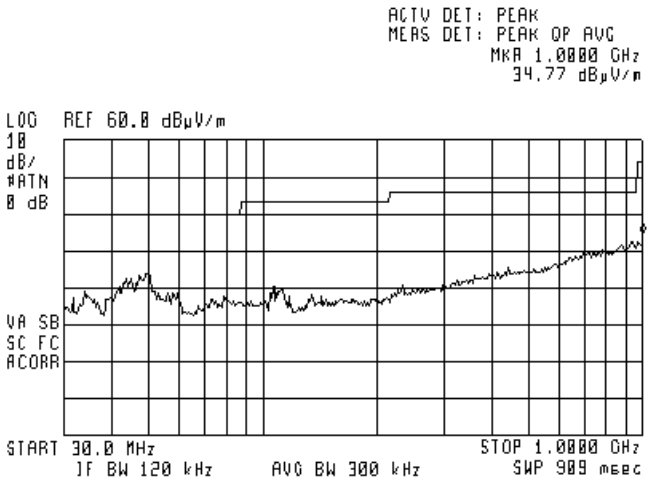
Plot 7.6.7 Radiated emission measurements from 30 to 1000 MHz at the low carrier frequency

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



Plot 7.6.8 Radiated emission measurements from 30 to 1000 MHz at the mid carrier frequency

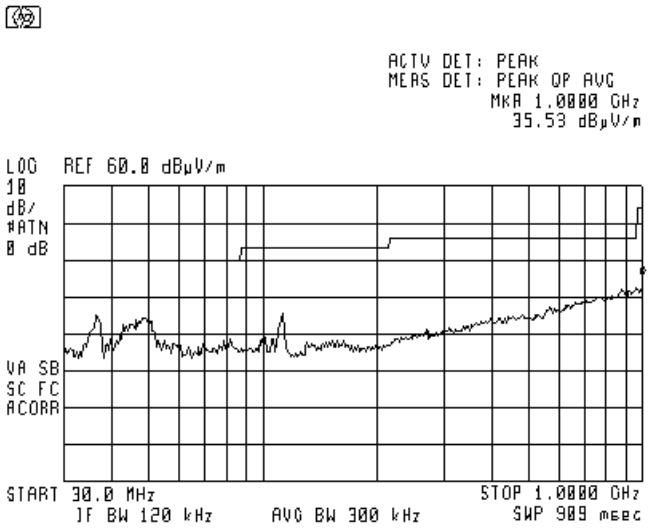
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	**FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions**		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	8/27/2012		
Temperature: 24.2 ºC	**Air Pressure:** 1006 hPa	**Relative Humidity:** 39 %	**Power Supply:** 13.8 VDC
Remarks:			

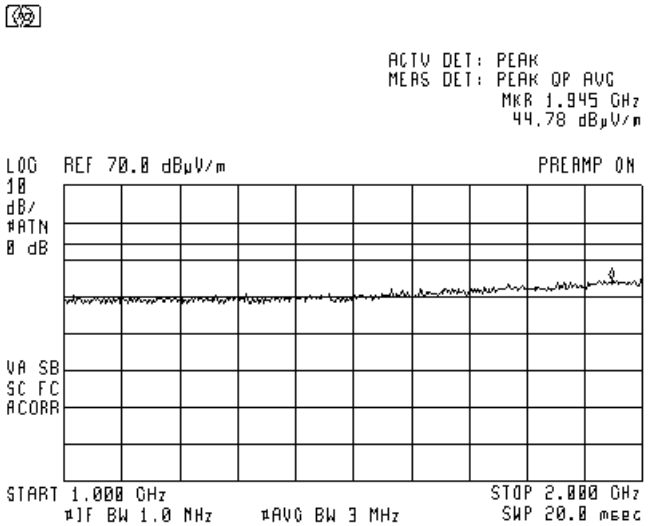
Plot 7.6.9 Radiated emission measurements from 30 to 1000 MHz at the high carrier frequency

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



Plot 7.6.10 Radiated emission measurements from 1000 to 2000 MHz at the low carrier frequency

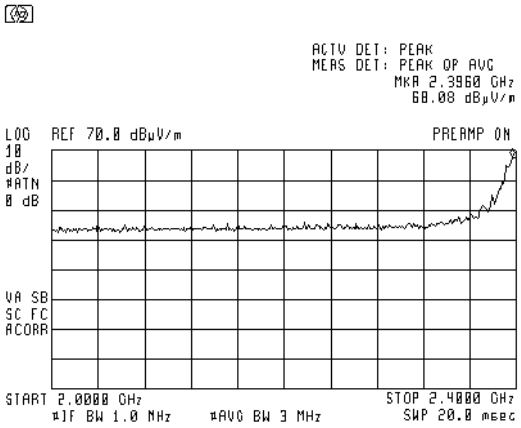
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak DETECTOR: Average

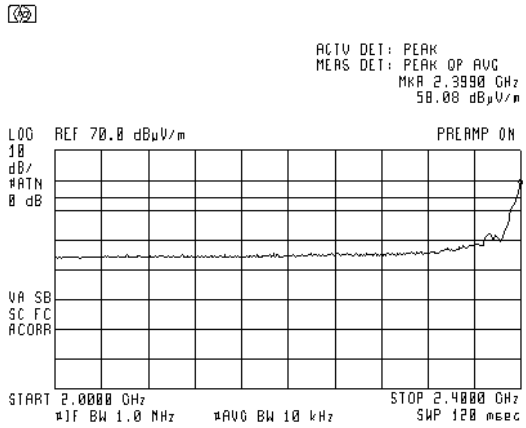


Test specification:	**FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions**		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	8/27/2012		
Temperature: 24.2 ºC	**Air Pressure:** 1006 hPa	**Relative Humidity:** 39 %	**Power Supply:** 13.8 VDC
Remarks:			

Plot 7.6.11 Radiated emission measurements from 2000 to 2400 MHz at the low carrier frequency

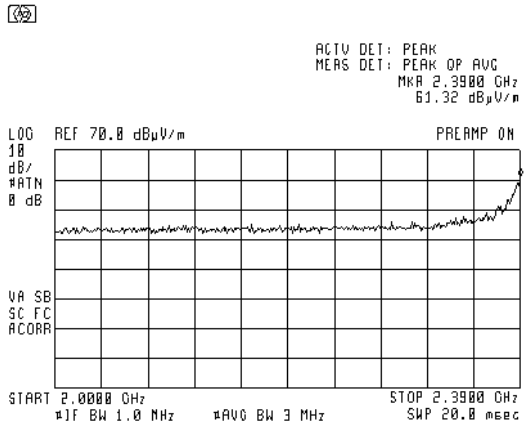
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak DETECTOR: Average

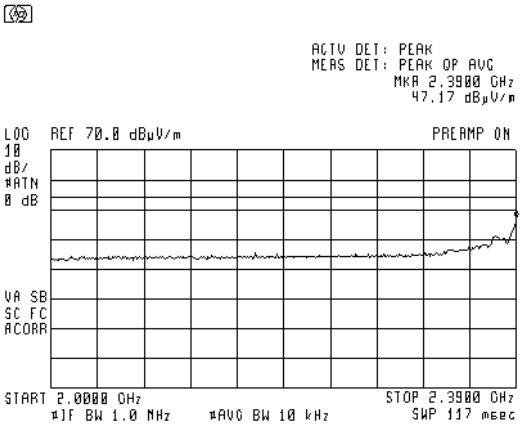




Plot 7.6.12 Radiated emission measurements from 2000 to 2390 MHz at the low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak DETECTOR: Average

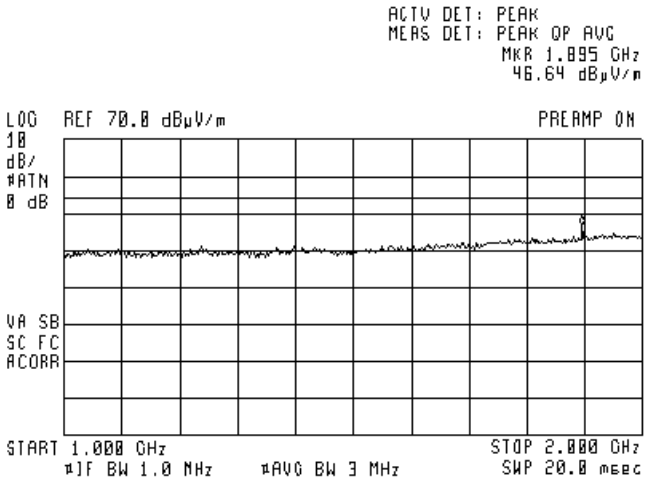




Test specification:	**FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions**		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	8/27/2012		
Temperature: 24.2 ºC	**Air Pressure:** 1006 hPa	**Relative Humidity:** 39 %	**Power Supply:** 13.8 VDC
Remarks:			

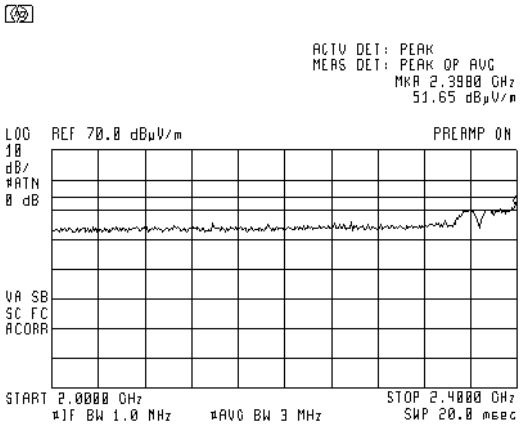
Plot 7.6.13 Radiated emission measurements from 1000 to 2000 MHz at the mid carrier frequency

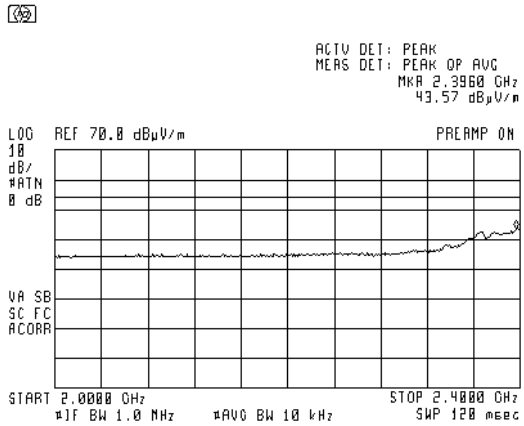
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak DETECTOR: Average



Plot 7.6.14 Radiated emission measurements from 2000 to 2400 MHz at the mid carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak DETECTOR: Average

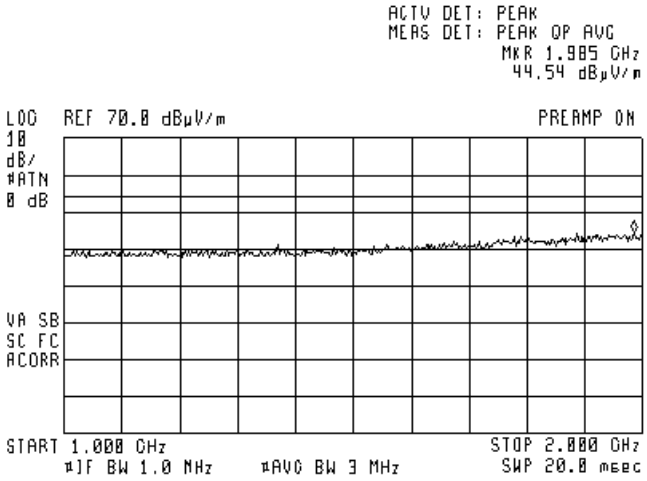




Test specification:	**FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions**		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	8/27/2012		
Temperature: 24.2 ºC	**Air Pressure:** 1006 hPa	**Relative Humidity:** 39 %	**Power Supply:** 13.8 VDC
Remarks:			

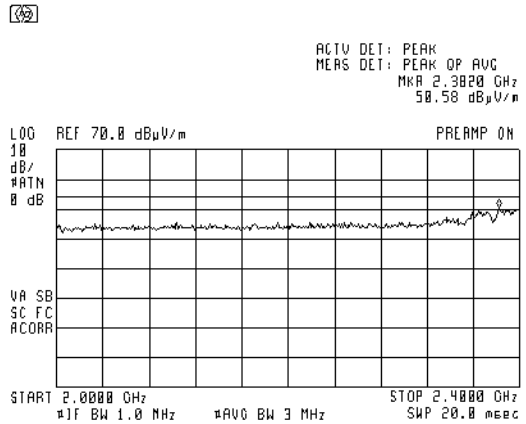
Plot 7.6.15 Radiated emission measurements from 1000 to 2000 MHz at the high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak

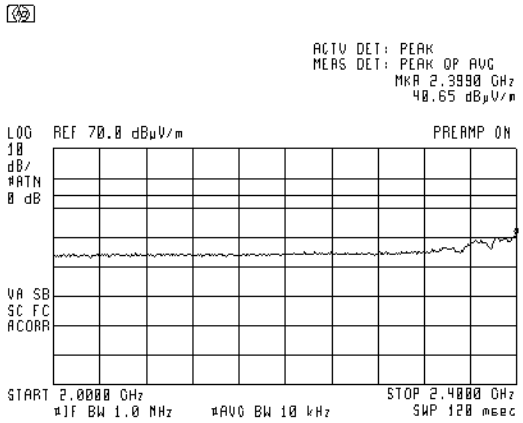


Plot 7.6.16 Radiated emission measurements from 2000 to 2400 MHz at the high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak



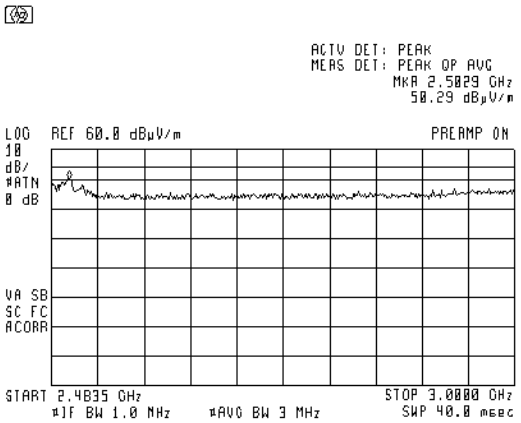
DETECTOR: Average



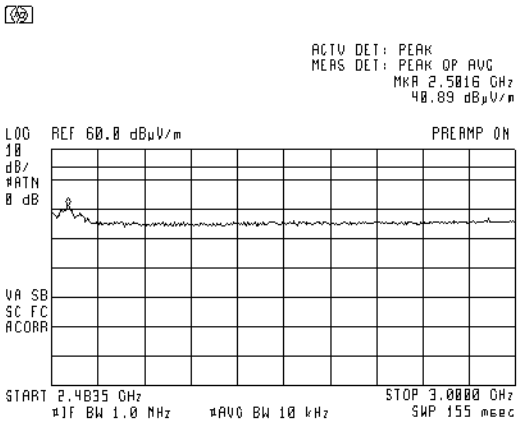
Test specification:	**FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions**		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	8/27/2012		
Temperature: 24.2 ºC	**Air Pressure:** 1006 hPa	**Relative Humidity:** 39 %	**Power Supply:** 13.8 VDC
Remarks:			

Plot 7.6.17 Radiated emission measurements from 2483.5 to 3000 MHz at the low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak

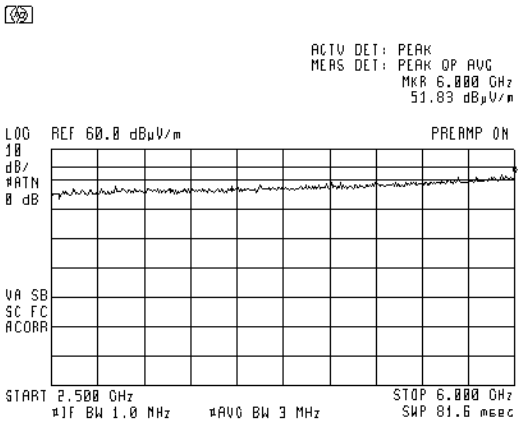


DETECTOR: Average

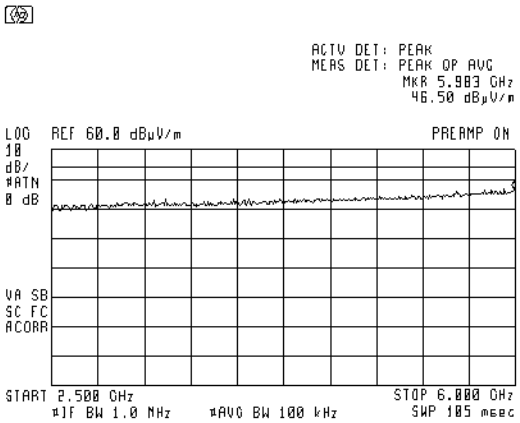


Plot 7.6.18 Radiated emission measurements from 2500 to 6000 MHz at the low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak



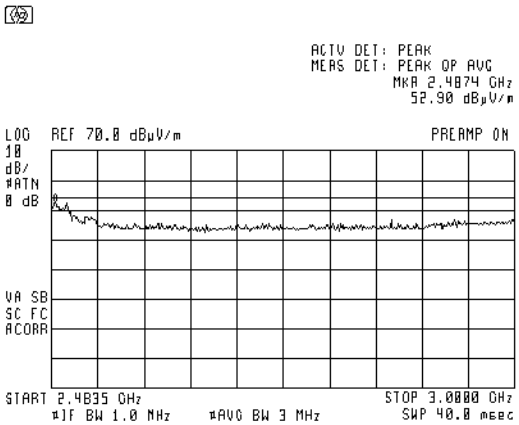
DETECTOR: Average

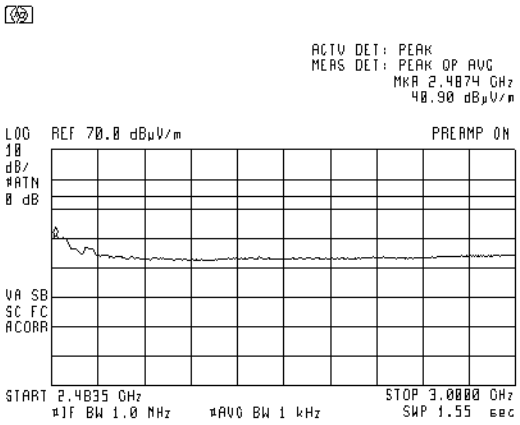


Test specification:	**FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions**		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	8/27/2012		
Temperature: 24.2 ºC	**Air Pressure:** 1006 hPa	**Relative Humidity:** 39 %	**Power Supply:** 13.8 VDC
Remarks:			

Plot 7.6.19 Radiated emission measurements from 2483.5 to 3000 MHz at the mid carrier frequency

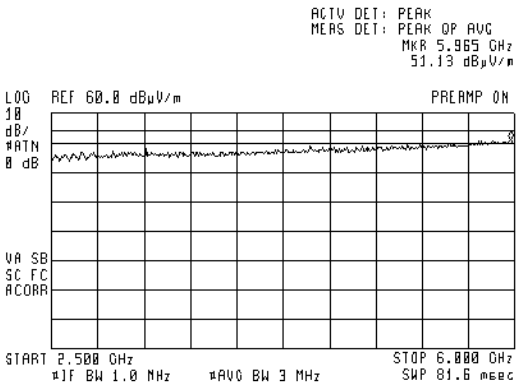
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak DETECTOR: Average

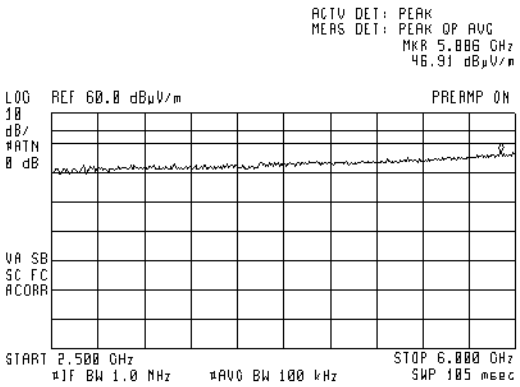




Plot 7.6.20 Radiated emission measurements from 2500 to 6000 MHz at the mid carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak DETECTOR: Average

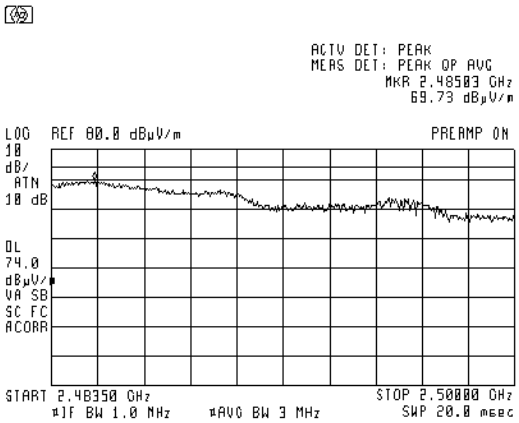


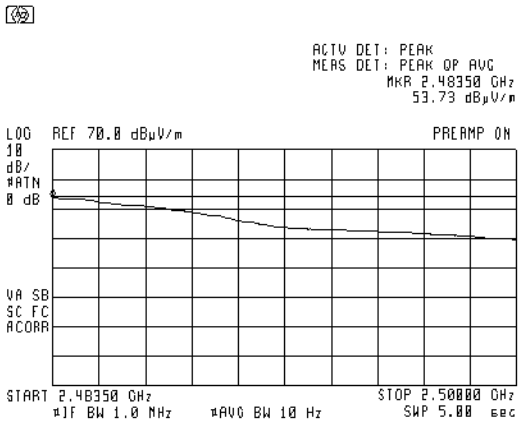


Test specification:	**FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions**		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	8/27/2012		
Temperature: 24.2 ºC	**Air Pressure:** 1006 hPa	**Relative Humidity:** 39 %	**Power Supply:** 13.8 VDC
Remarks:			

Plot 7.6.21 Radiated emission measurements from 2483.5 to 2500 MHz at the high carrier frequency

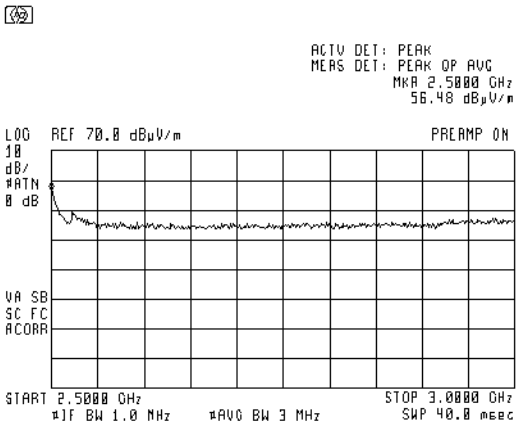
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak DETECTOR: Average

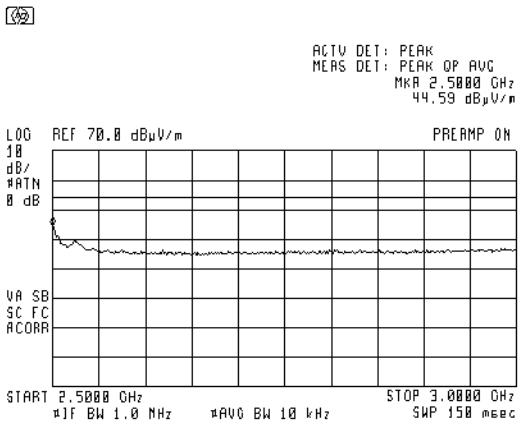




Plot 7.6.22 Radiated emission measurements from 2500 to 3000 MHz at the high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak DETECTOR: Average

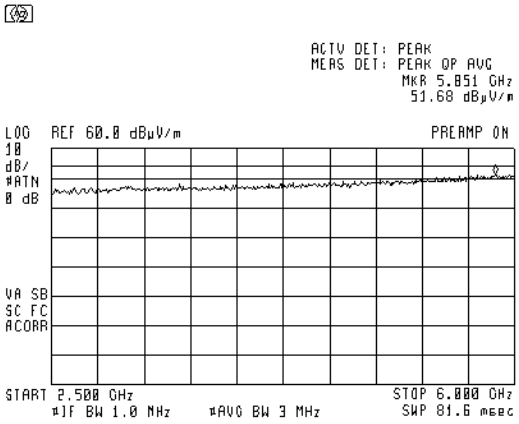


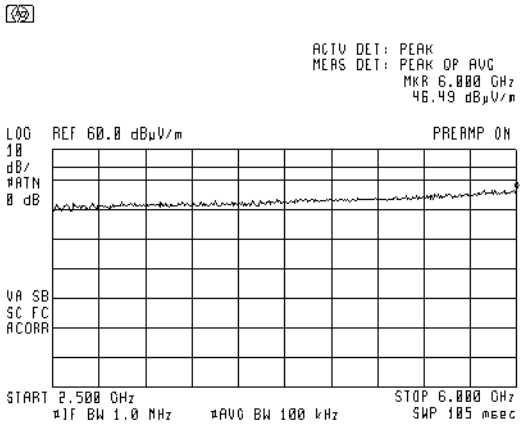


Test specification:	**FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions**		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	8/27/2012		
Temperature: 24.2 ºC	**Air Pressure:** 1006 hPa	**Relative Humidity:** 39 %	**Power Supply:** 13.8 VDC
Remarks:			

Plot 7.6.23 Radiated emission measurements from 3000 to 6000 MHz at the high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak DETECTOR: Average

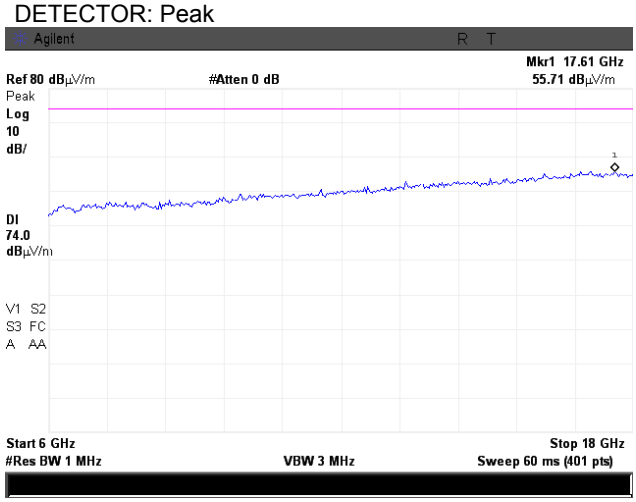




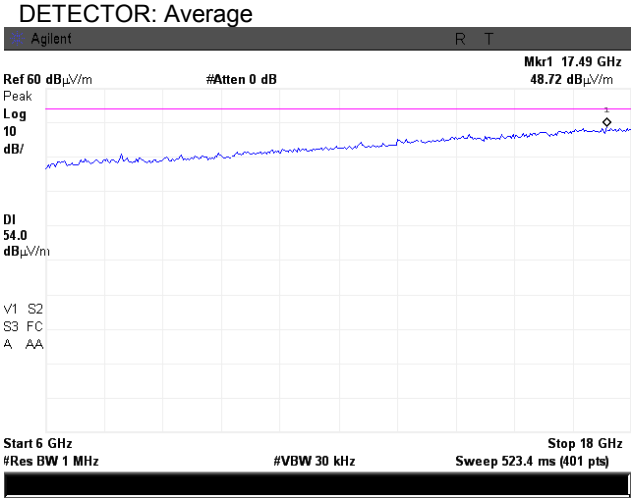
Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/27/2012		
Temperature: 24.2 °C	Air Pressure: 1006 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

Plot 7.6.24 Radiated emission measurements from 6000 to 18000 MHz at the low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak

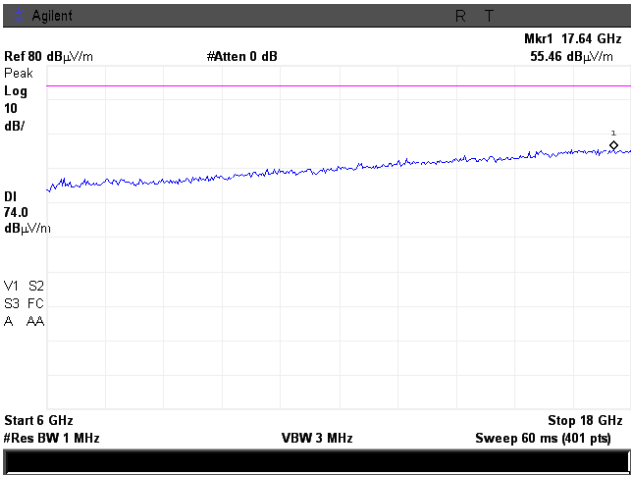


DETECTOR: Average

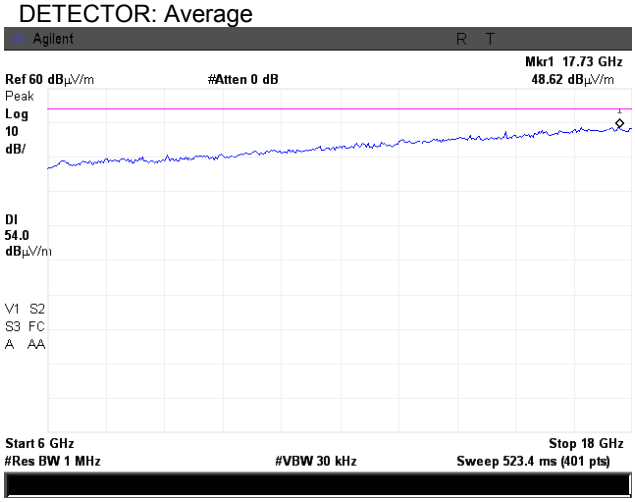


Plot 7.6.25 Radiated emission measurements from 6000 to 18000 MHz at the mid carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak



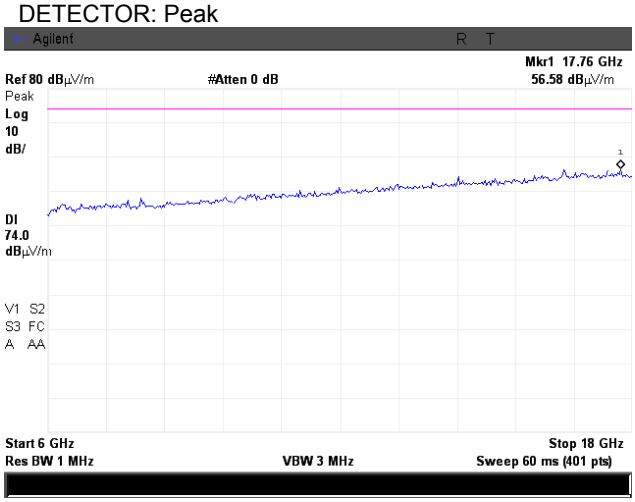
DETECTOR: Average



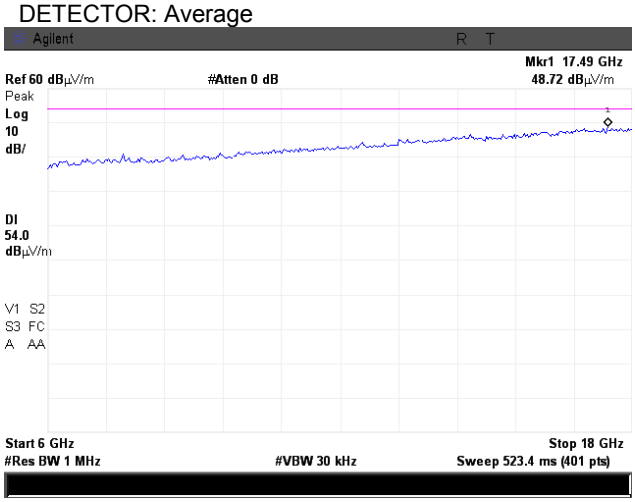
Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/27/2012		
Temperature: 24.2 °C	Air Pressure: 1006 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

Plot 7.6.26 Radiated emission measurements from 6000 to 18000 MHz at the high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak

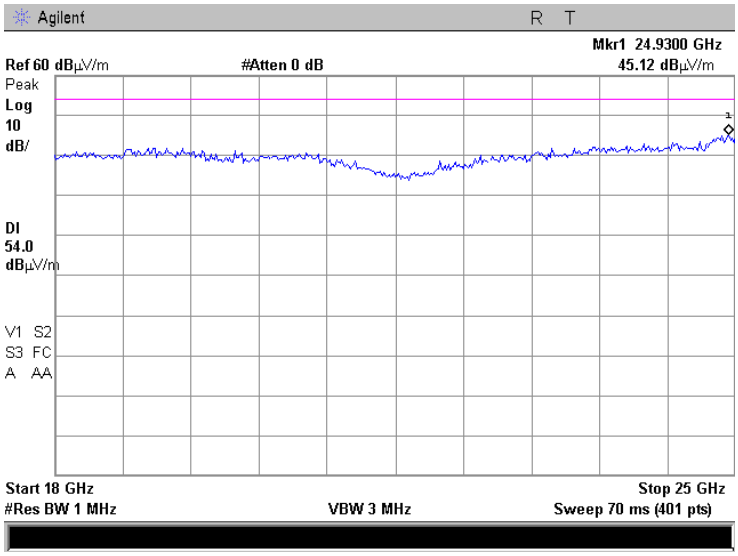


DETECTOR: Average



Plot 7.6.27 Radiated emission measurements from 18000 to 25000 MHz at the low carrier frequency

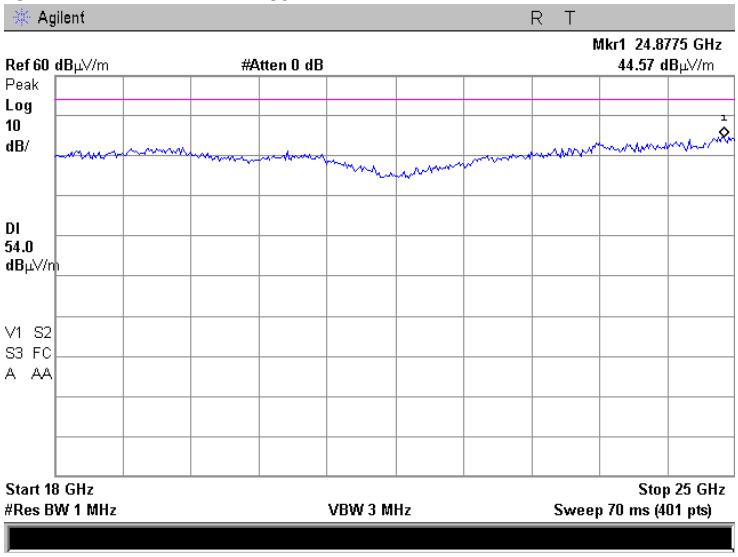
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak



Test specification:	FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	558074 D01 DTS Meas Guidance v01		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/27/2012		
Temperature: 24.2 °C	Air Pressure: 1006 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

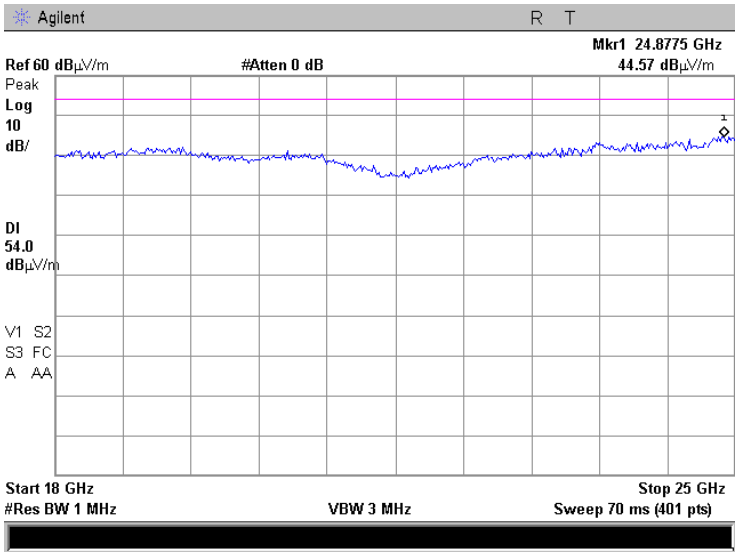
Plot 7.6.28 Radiated emission measurements from 18000 to 25000 MHz at the mid carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak



Plot 7.6.29 Radiated emission measurements from 18000 to 25000 MHz at the high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: Peak



Test specification:	Section 15.247(e), RSS-210 section A8.2(b), Peak power density		
Test procedure:	558074 D01 DTS Meas Guidance v01 section 5.3.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/21/2012		
Temperature: 24.3 ºC	Air Pressure: 1006 hPa	Relative Humidity: 41 %	Power Supply: 13.8 VDC
Remarks:			

7.7 Peak spectral power density

7.7.1 General

This test was performed to measure the peak spectral power density at the transmitter RF antenna connector. Specification test limits are given in Table 7.7.1.

Table 7.7.1 Peak spectral power density limits

Assigned frequency range, MHz	Measurement bandwidth, kHz	Peak spectral power density, dBm
2400.0 – 2483.5	3.0	8.0

7.7.2 Test procedure

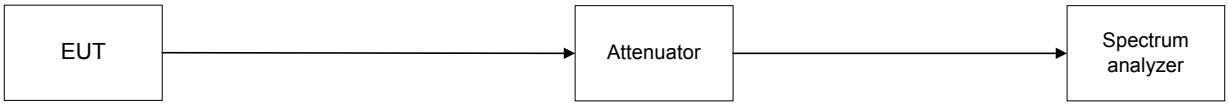
7.7.2.1 The EUT was set up as shown in Figure 7.7.1, energized and its proper operation was checked.

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

7.7.2.3 The frequency span of spectrum analyzer was set to 5-30% greater than the EBW of the transmitter. The peak power spectral density was measured in peak hold mode with resolution bandwidth set to 100 kHz, video bandwidth - 300 kHz, auto sweep time and sufficient number of sweeps was allowed for trace stabilization.

7.7.2.4 A bandwidth correction factor BWCF=10log(3 kHz/100 kHz) =-15.2 dB was applied to scale the observed power level to an equivalent value in 3 kHz as shown in the associated plots and peak spectral power density was measured as provided in Table 7.7.2 and associated plots.

Figure 7.7.1 Peak spectral power density test setup



Test specification:	Section 15.247(e), RSS-210 section A8.2(b), Peak power density		
Test procedure:	558074 D01 DTS Meas Guidance v01 section 5.3.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/21/2012		
Temperature: 24.3 ºC	Air Pressure: 1006 hPa	Relative Humidity: 41 %	Power Supply: 13.8 VDC
Remarks:			

Table 7.7.2 Peak spectral power density test results

OPERATING FREQUENCY RANGE: 2400 – 2483.5 MHz
DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 100 kHz
VIDEO BANDWIDTH: 300 kHz
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
BANDWIDTH CORRECTION FACTOR (BWCF): -15.2 dB

Modulation, Bit rate, Mbps	Spectrum analyzer reading, dBm	External attenuation, dB	Cable loss, dB	Measured power density, dBm/100kHz	Peak spectral power density**, dBm/3kHz	Limit, dBm	Margin*, dB	Verdict
20 MHz BW, low channel 2412 MHz								
BPSK, 6.5	-0.77	Included	Included	-0.77	-15.97	8.0	-23.97	Pass
64QAM, 65	-1.07	Included	Included	-1.07	-16.27	8.0	-24.27	Pass
20 MHz BW, mid channel 2442 MHz								
BPSK, 6.5	-1.04	Included	Included	-1.04	-16.24	8.0	-24.24	Pass
64QAM, 65	-0.75	Included	Included	-0.75	-15.95	8.0	-23.95	Pass
20 MHz BW, high channel 2462 MHz								
BPSK, 6.5	-0.41	Included	Included	-0.41	-15.61	8.0	-23.61	Pass
64QAM, 65	-0.48	Included	Included	-0.48	-15.68	8.0	-23.68	Pass
40 MHz BW, low channel 2422 MHz								
BPSK, 13.5	-3.25	Included	Included	-3.25	-18.45	8.0	-26.45	Pass
64QAM, 135	-2.55	Included	Included	-2.55	-17.75	8.0	-25.75	Pass
40 MHz BW, mid channel 2442 MHz								
BPSK, 13.5	-3.09	Included	Included	-3.09	-18.29	8.0	-26.29	Pass
64QAM, 135	-1.79	Included	Included	-1.79	-16.99	8.0	-24.99	Pass
40 MHz BW, high channel 2452 MHz								
BPSK, 13.5	-3.02	Included	Included	-3.02	-18.22	8.0	-26.22	Pass
64QAM, 135	-1.80	Included	Included	-1.80	-17.00	8.0	-25.00	Pass

* - Peak spectral power density (dBm/3kHz) = Measured power density (dBm/100kHz) + Bandwidth correction factor, where Bandwidth correction factor BWCF=10log(3 kHz/100 kHz) =-15.2 dB
** - Margin = Peak spectral power density – specification limit.

Reference numbers of test equipment used

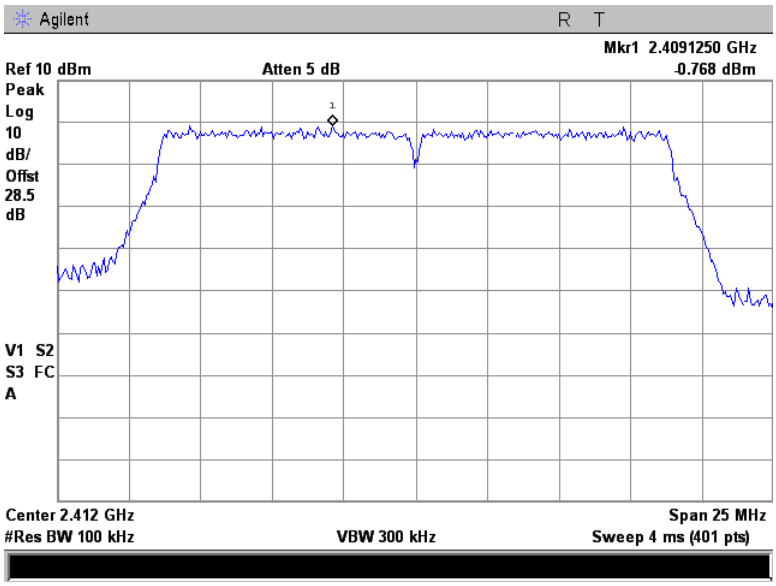
HL 3455	HL 3787	HL 3818	HL 3901				

Full description is given in Appendix A.

Test specification:	Section 15.247(e), RSS-210 section A8.2(b), Peak power density		
Test procedure:	558074 D01 DTS Meas Guidance v01 section 5.3.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/21/2012		
Temperature: 24.3 °C	Air Pressure: 1006 hPa	Relative Humidity: 41 %	Power Supply: 13.8 VDC
Remarks:			

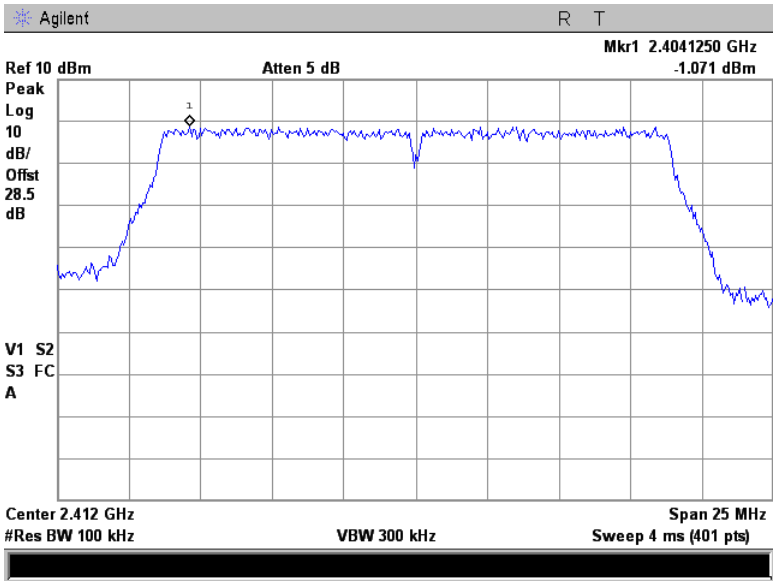
Plot 7.7.1 Peak spectral power density at low frequency within 6 dB band

Emission Bandwidth	20 MHz
Modulation / Bit rate	BPSK / 6.5 Mbps



Plot 7.7.2 Peak spectral power density at low frequency within 6 dB band

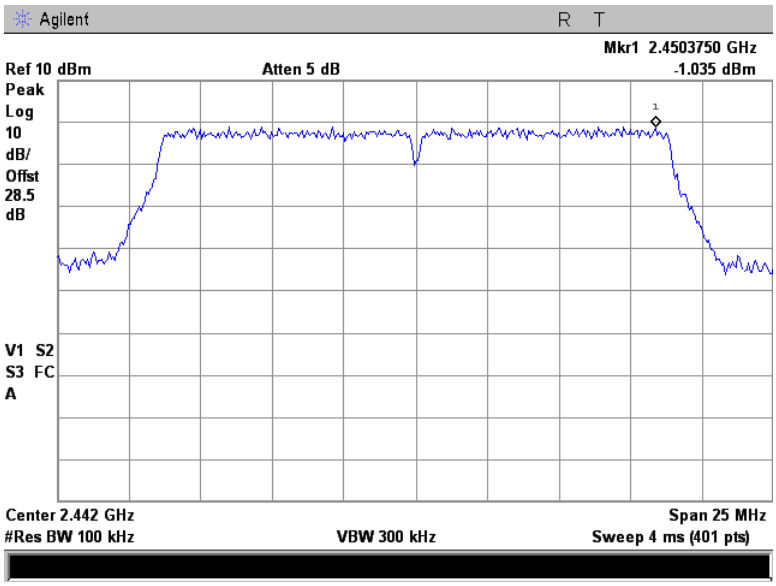
Emission Bandwidth	20 MHz
Modulation / Bit rate	64QAM / 65 Mbps



Test specification:	Section 15.247(e), RSS-210 section A8.2(b), Peak power density		
Test procedure:	558074 D01 DTS Meas Guidance v01 section 5.3.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/21/2012		
Temperature: 24.3 °C	Air Pressure: 1006 hPa	Relative Humidity: 41 %	Power Supply: 13.8 VDC
Remarks:			

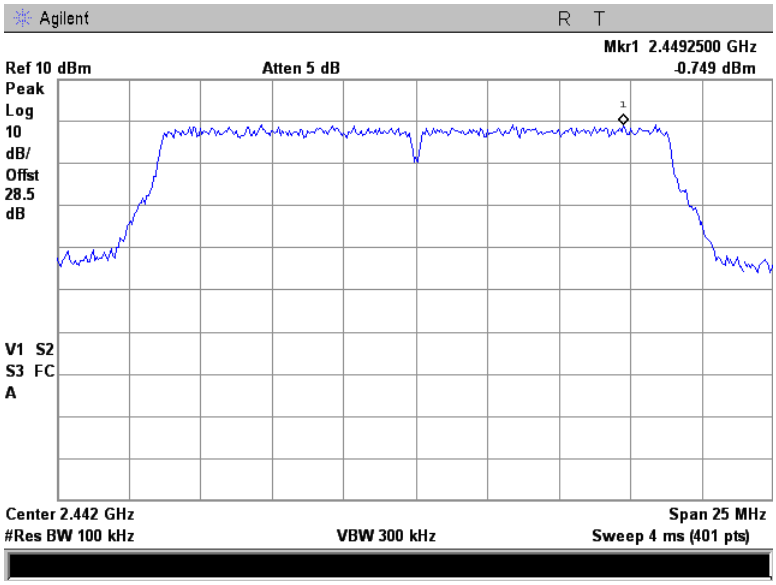
Plot 7.7.3 Peak spectral power density at mid frequency within 6 dB band

Emission Bandwidth	20 MHz
Modulation / Bit rate	BPSK / 6.5 Mbps



Plot 7.7.4 Peak spectral power density at mid frequency within 6 dB band

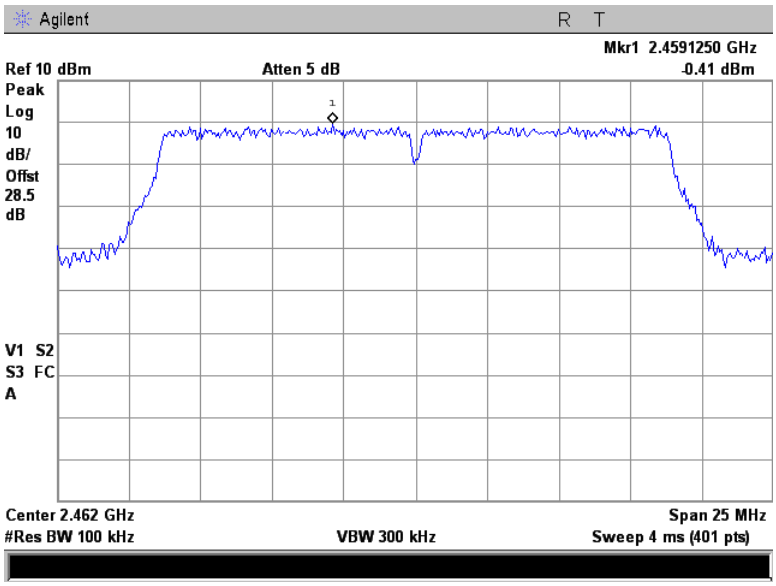
Emission Bandwidth	20 MHz
Modulation / Bit rate	64QAM / 65 Mbps



Test specification:	Section 15.247(e), RSS-210 section A8.2(b), Peak power density		
Test procedure:	558074 D01 DTS Meas Guidance v01 section 5.3.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/21/2012		
Temperature: 24.3 °C	Air Pressure: 1006 hPa	Relative Humidity: 41 %	Power Supply: 13.8 VDC
Remarks:			

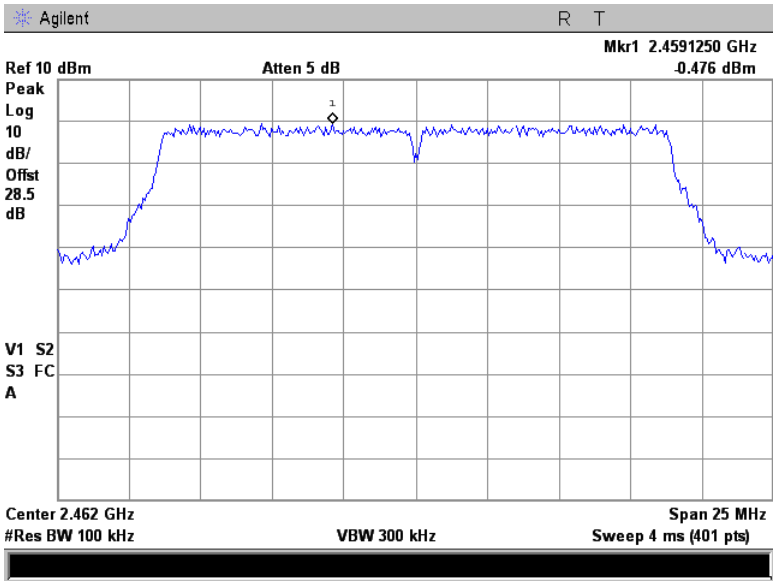
Plot 7.7.5 Peak spectral power density at high frequency within 6 dB band

Emission Bandwidth	20 MHz
Modulation / Bit rate	BPSK / 6.5 Mbps



Plot 7.7.6 Peak spectral power density at high frequency within 6 dB band

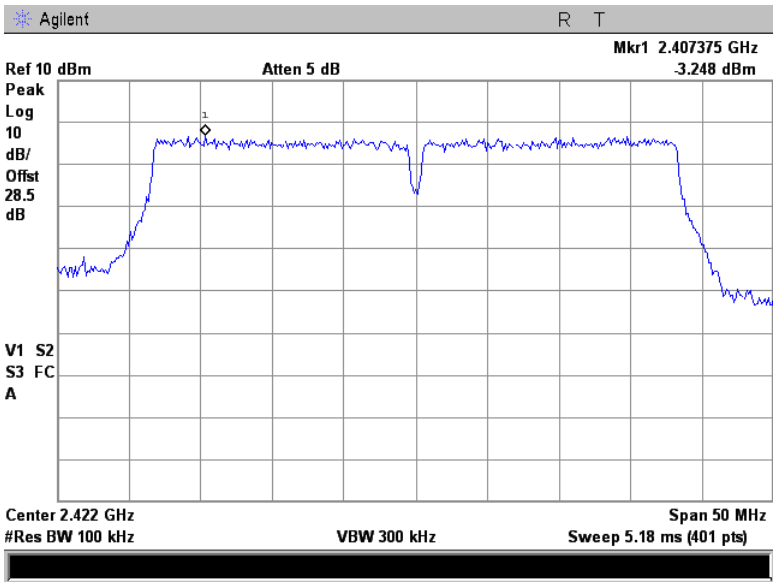
Emission Bandwidth	20 MHz
Modulation / Bit rate	64QAM / 65 Mbps



Test specification:	Section 15.247(e), RSS-210 section A8.2(b), Peak power density		
Test procedure:	558074 D01 DTS Meas Guidance v01 section 5.3.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/21/2012		
Temperature: 24.3 °C	Air Pressure: 1006 hPa	Relative Humidity: 41 %	Power Supply: 13.8 VDC
Remarks:			

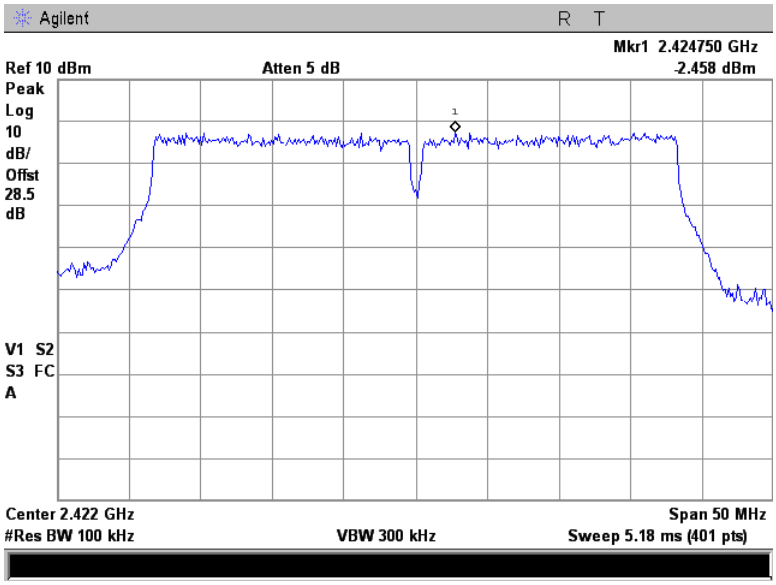
Plot 7.7.7 Peak spectral power density at low frequency within 6 dB band

Emission Bandwidth	40 MHz
Modulation / Bit rate	BPSK / 13.5 Mbps



Plot 7.7.8 Peak spectral power density at low frequency within 6 dB band

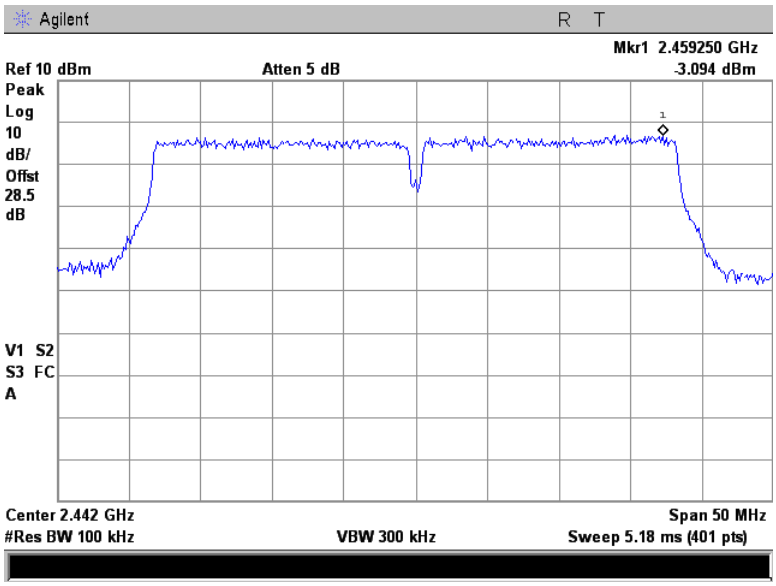
Emission Bandwidth	40 MHz
Modulation / Bit rate	64QAM / 135 Mbps



Test specification:	Section 15.247(e), RSS-210 section A8.2(b), Peak power density		
Test procedure:	558074 D01 DTS Meas Guidance v01 section 5.3.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/21/2012		
Temperature: 24.3 °C	Air Pressure: 1006 hPa	Relative Humidity: 41 %	Power Supply: 13.8 VDC
Remarks:			

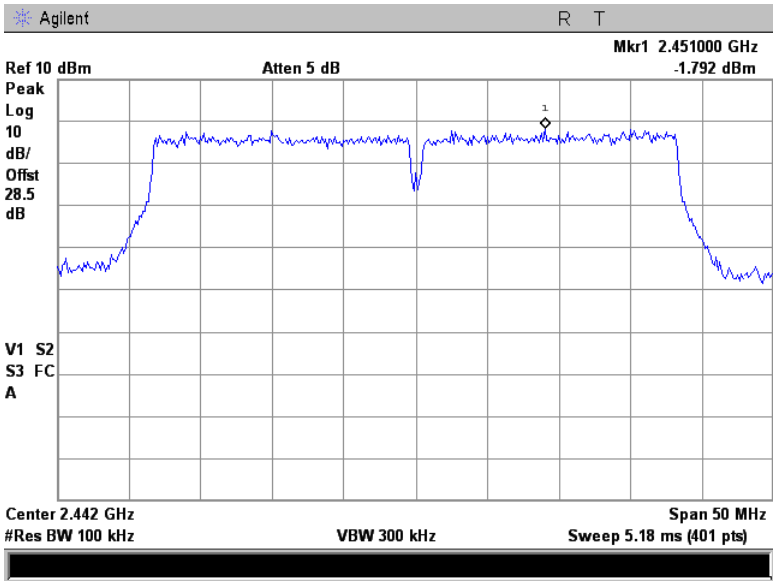
Plot 7.7.9 Peak spectral power density at mid frequency within 6 dB band

Emission Bandwidth	40 MHz
Modulation / Bit rate	BPSK / 13.5 Mbps



Plot 7.7.10 Peak spectral power density at mid frequency within 6 dB band

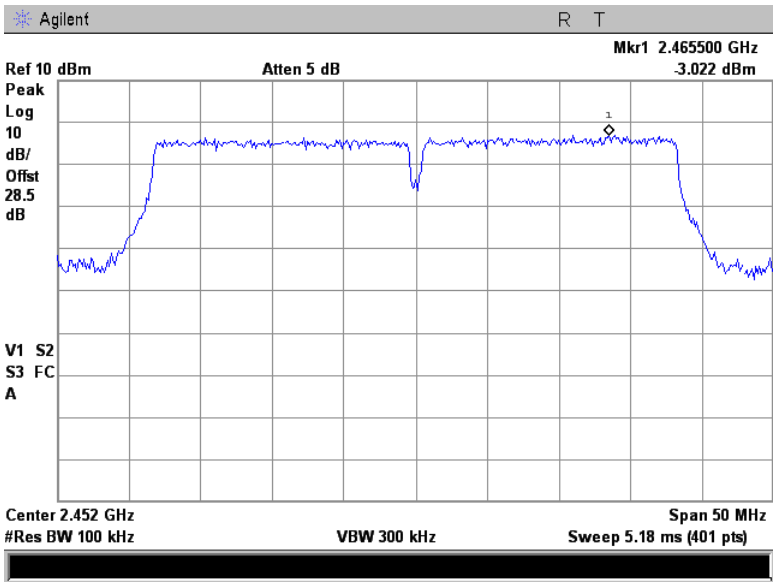
Emission Bandwidth	40 MHz
Modulation / Bit rate	64QAM / 135 Mbps



Test specification:	Section 15.247(e), RSS-210 section A8.2(b), Peak power density		
Test procedure:	558074 D01 DTS Meas Guidance v01 section 5.3.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/21/2012		
Temperature: 24.3 °C	Air Pressure: 1006 hPa	Relative Humidity: 41 %	Power Supply: 13.8 VDC
Remarks:			

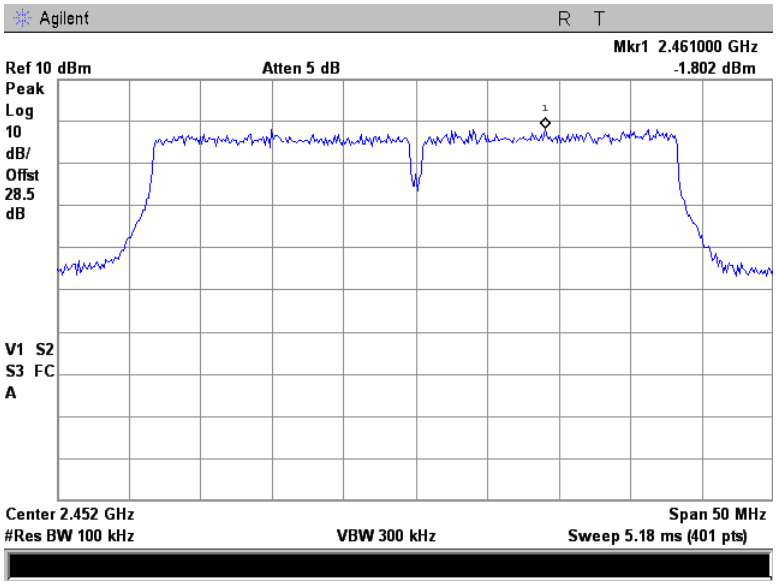
Plot 7.7.11 Peak spectral power density at high frequency within 6 dB band

Emission Bandwidth	40 MHz
Modulation / Bit rate	BPSK / 13.5 Mbps



Plot 7.7.12 Peak spectral power density at high frequency within 6 dB band

Emission Bandwidth	40 MHz
Modulation / Bit rate	64QAM / 135 Mbps



Test specification:	FCC section 15.203, RSS-Gen section 7.1.4, Antenna requirement		
Test procedure:	Visual inspection		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/23/2012		
Temperature: 24.2 ºC	Air Pressure: 1006 hPa	Relative Humidity: 37 %	Power Supply: 13.8 VDC
Remarks:			

7.8 Antenna requirements

The EUT was verified for compliance with antenna requirements. A transmitter shall be designed to ensure that no antenna other than that furnished by the responsible party will be used with the device. It may be either permanently attached or employs a unique antenna connector for every antenna proposed for use with the EUT. This requirement does not apply to professionally installed transmitters.
The rationale for compliance with the above requirements was either visual inspection results or supplier declaration. The summary of results is provided in Table 7.8.1.

Table 7.8.1 Antenna requirements

Requirement	Rationale	Verdict
The transmitter antenna is permanently attached	NA	Comply
The transmitter employs a unique antenna connector	Visual inspection	
The transmitter requires professional installation	NA	

Photograph 7.8.1 Antenna assembly

Test specification:	FCC Part 15, Section 109 / RSS-Gen, Section 6.1 / ICES-003, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4 / RSS-Gen, Section 4.10 / CISPR 22		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/23/2012		
Temperature: 24.1 ºC	Air Pressure: 1007 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

8 Unintentinal emissions tests according to 47CFR part 15 subpart B and RSS-Gen requirements

8.1 Radiated emission measurements

8.1.1 General

This test was performed to measure radiated emissions from the EUT enclosure. Specification test limits according to FCC Part 15, Section 109 are given in Table 8.1.1, according to ICES-003, Section 5 in Table 8.1.2 and according to RSS-Gen, Section 6.1 in Table 8.1.3.

Table 8.1.1 Radiated emission limits according to FCC Part 15, Section 109

Frequency, MHz	Class B limit, dB(μV/m)		Class A limit, dB(μV/m)	
	10 m distance	3 m distance	10 m distance	3 m distance
30 - 88	29.5*	40.0	39.0	49.5*
88 - 216	33.0*	43.5	43.5	54.0*
216 - 960	35.5*	46.0	46.4	56.9*
960 - 5th harmonic**	43.5*	54.0	49.5	60.0*

Table 8.1.2 Radiated emission limits according to ICES-003, Section 5

Frequency, MHz	Class B limit, dB(μV/m)	
	10 m distance	3 m distance
30 - 230	30	40.5*
230 - 1000	37	47.5*

* - The limit for test distance other than specified was calculated using the inverse linear distance extrapolation factor as follows: $Lim_{S2} = Lim_{S1} + 20 \log (S_1/S_2)$,
where S_1 and S_2 – standard defined and test distance respectively in meters.

Table 8.1.3 Radiated emission limits according to RSS-Gen, Section 6.1

Frequency, MHz	Field strength limit at 3 m test distance, dB(μV/m)
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
960 - 3rd harmonic**	54.0

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

8.1.2 Test procedure

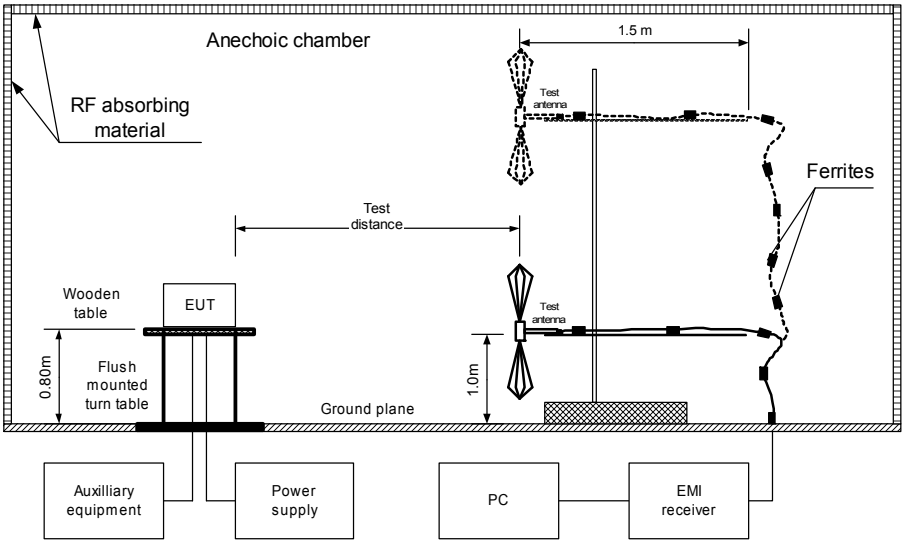
8.1.2.1 The EUT was set up as shown in Figure 8.1.1 and associated photograph/s, energized and the performance check was conducted.

8.1.2.2 The specified frequency range was investigated with biconilog antenna connected to EMI receiver. To find maximum radiation the turntable was rotated 360^0, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal and the EUT cables position was varied.

8.1.2.3 The worst test results (the lowest margins) were provided in the associated tables and plots.

Test specification:	FCC Part 15, Section 109 / RSS-Gen, Section 6.1 / ICES-003, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4 / RSS-Gen, Section 4.10 / CISPR 22		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/23/2012		
Temperature: 24.1 ºC	Air Pressure: 1007 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

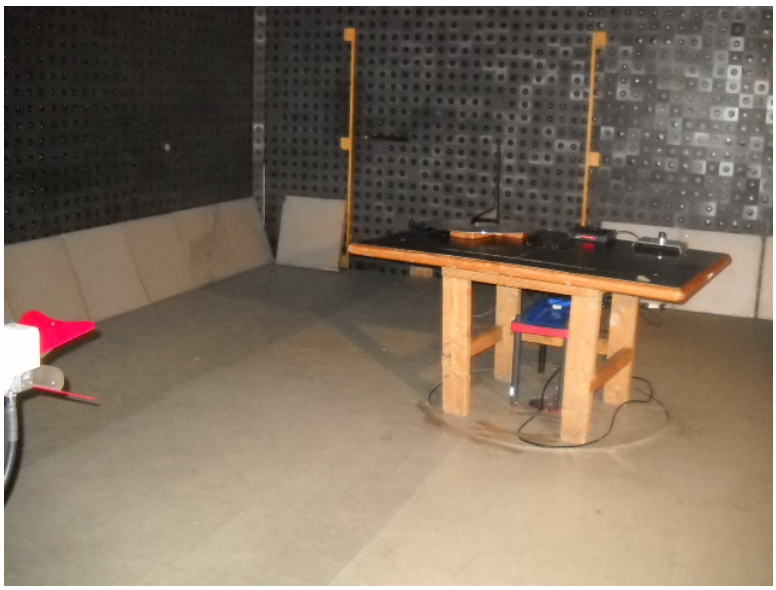
Figure 8.1.1 Setup for radiated emission measurements in anechoic chamber, table-top equipment



Photograph 8.1.1 Setup for radiated emission measurements in 30-1000 MHz

Test specification:	FCC Part 15, Section 109 / RSS-Gen, Section 6.1 / ICES-003, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4 / RSS-Gen, Section 4.10 / CISPR 22		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/23/2012		
Temperature: 24.1 ºC	Air Pressure: 1007 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

Photograph 8.1.2 Setup for radiated emission measurements above 1 GHz



Test specification:	FCC Part 15, Section 109 / RSS-Gen, Section 6.1 / ICES-003, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4 / RSS-Gen, Section 4.10 / CISPR 22		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/23/2012		
Temperature: 24.1 ºC	Air Pressure: 1007 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

Table 8.1.4 Radiated emission test results according to FCC Part 15, Section 109 and RSS-Gen, Section 6.1

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

Frequency, MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
30.870	30.7	25.8	40.0	-14.2	Vert	1.0	80	Pass
34.672	26.7	21.1	40.0	-18.9	Vert	1.0	240	
94.498	23.6	20.8	43.5	-22.7	Vert	1.0	300	
100.201	28.6	26.5	43.5	-17.0	Ver	1.0	244	
107.055	39.1	37.5	43.5	-6.0	Vert	1.0	260	

TEST SITE: SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / AVERAGE
FREQUENCY RANGE: 1000 MHz – 12500 MHz
RESOLUTION BANDWIDTH: 1000 kHz

Frequency, MHz	Peak			Average			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
	Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
No emissions were found										Pass

Test specification:	**FCC Part 15, Section 109 / RSS-Gen, Section 6.1 / ICES-003, Radiated emission**		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4 / RSS-Gen, Section 4.10 / CISPR 22		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	8/23/2012		
Temperature: 24.1 ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 39 %	**Power Supply:** 13.8 VDC
Remarks:			

Table 8.1.5 Radiated emission test results according to ICES-003, Section 5

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

Frequency, MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
30.870	30.7	25.8	40.5	-14.7	Vert	1.0	80	Pass
34.672	26.7	21.1	40.5	-19.4	Vert	1.0	240	
94.498	23.6	20.8	40.5	-19.7	Vert	1.0	300	
100.201	28.6	26.5	40.5	-14.0	Ver	1.0	244	
107.055	39.1	37.5	40.5	-3.0	Vert	1.0	260	

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

Reference numbers of test equipment used

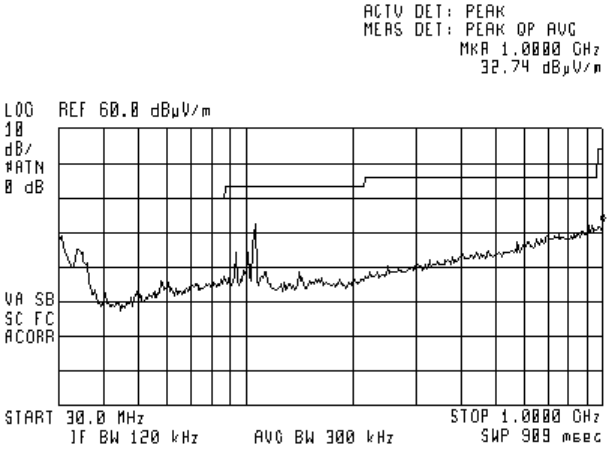
HL 0521	HL 0604	HL 2909	HL 4114	HL 4150	HL 4352	HL 4353	

Full description is given in Appendix A.

Test specification:	**FCC Part 15, Section 109 / RSS-Gen, Section 6.1 / ICES-003, Radiated emission**		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4 / RSS-Gen, Section 4.10 / CISPR 22		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	8/23/2012		
Temperature: 24.1 ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 39 %	**Power Supply:** 13.8 VDC
Remarks:			

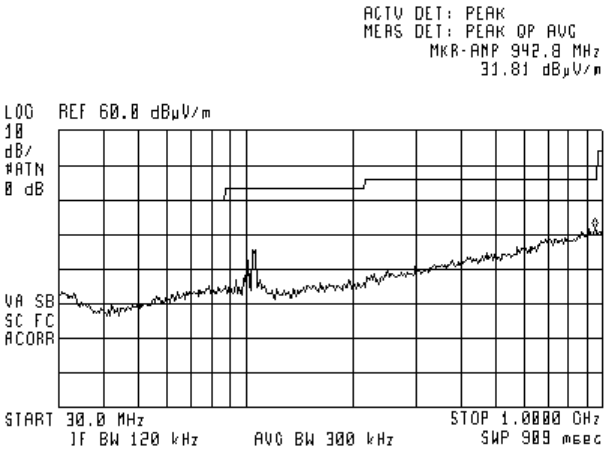
Plot 8.1.1 Radiated emission measurements in 30 - 1000 MHz range, vertical antenna polarization

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



Plot 8.1.2 Radiated emission measurements in 30 - 1000 MHz range, horizontal antenna polarization

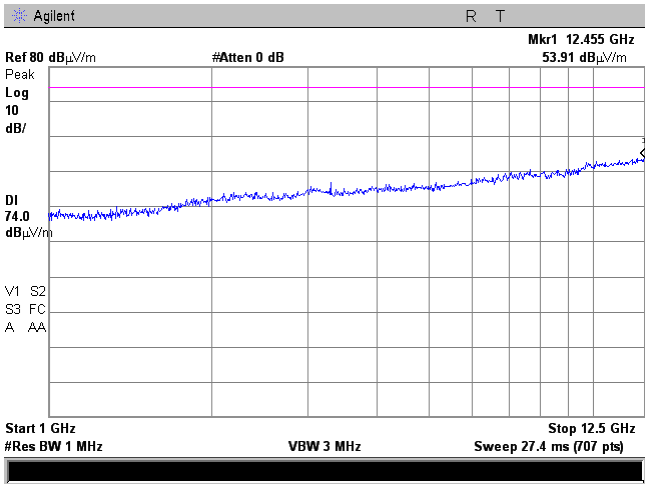
TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Stand-by



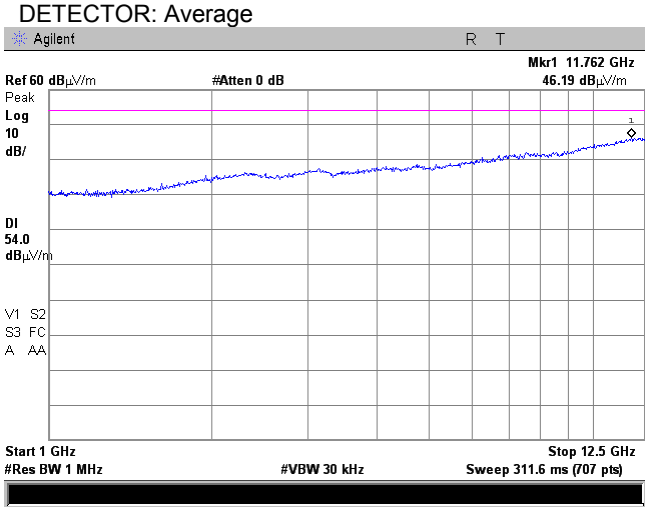
Test specification:	FCC Part 15, Section 109 / RSS-Gen, Section 6.1 / ICES-003, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4 / RSS-Gen, Section 4.10 / CISPR 22		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/23/2012		
Temperature: 24.1 ºC	Air Pressure: 1007 hPa	Relative Humidity: 39 %	Power Supply: 13.8 VDC
Remarks:			

Plot 8.1.3 Radiated emission measurements above 1000 MHz, vertical antenna polarization

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

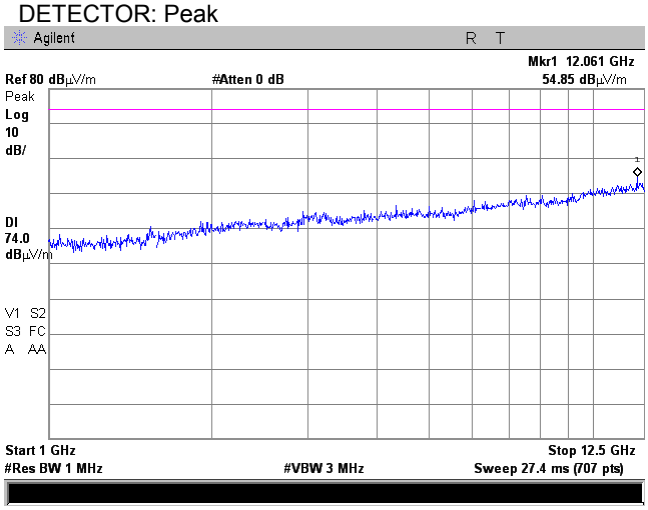


DETECTOR: Average

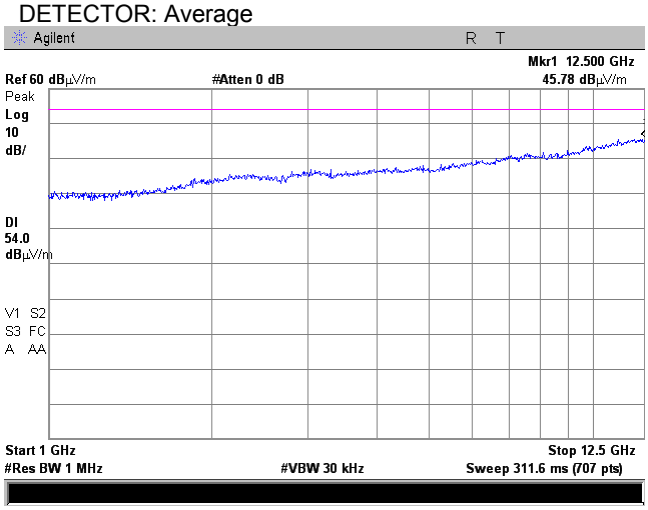


Plot 8.1.4 Radiated emission measurements above 1000 MHz, horizontal antenna polarization

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



DETECTOR: Average



9 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-12	03-Jul-13
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	20-May-12	20-May-14
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
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY41444762	08-May-12	08-May-13
3455	Medium Power Fixed Coaxial Attenuator DC to 40 GHz, 20 dB, 5 W	Aeroflex / Weinschel	75A-20-12	1182	19-Mar-12	19-Mar-13
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	10-Jul-12	10-Jul-13
3787	Precision Fixed Attenuator, 50 Ohm, 5 W, 10 dB, DC to 18 GHz	Mini-Circuits	BW-S10W5+	NA	19-Dec-11	19-Dec-12
3818	PSA Series Spectrum Analyzer, 3 Hz- 44 GHz	Agilent Technologies	E4446A	MY48250288	16-Feb-12	16-Feb-13
3901	Microwave Cable Assembly, 40.0 GHz, 3.5 m, SMA/SMA	Huber-Suhner	SUCOFLEX 102A	1225/2A	08-Feb-12	08-Feb-13
4114	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz	ETS Lindgren	3117	00123515	23-Jan-12	23-Jan-13
4150	Preamplifier, 0.1 to 18 GHz, Gain 25 dB, N-type(f) in, N-type(m) out.	Agilent Technologies	87405C	MY47010591	18-Jun-12	18-Jun-13
4352	Low Loss Armored Test Cable, DC - 18 GHz, 6.2 m, N type-M/N type-M	MegaPhase	NC29-N1N1-244	12025101002	06-Jun-12	06-Mar-13
4353	Low Loss Armored Test Cable, DC - 18 GHz, 6.2 m, N type-M/N type-M	MegaPhase	NC29-N1N1-244	12025101003	06-Jun-12	06-Mar-13

10 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Conducted carrier power at RF antenna connector	Below 12.4 GHz: ± 1.7 dB 12.4 GHz to 40 GHz: ± 2.3 dB
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
Occupied bandwidth	± 8.0 %
Duty cycle, timing (Tx ON / OFF) and average factor measurements	± 1.0 %
Conducted emissions with LISN	9 kHz to 150 kHz: ± 3.9 dB 150 kHz to 30 MHz: ± 3.8 dB
Radiated emissions at 3 m measuring distance Horizontal polarization 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.

11 APPENDIX C Test laboratory description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, safety, environmental and telecommunication testing facility.
Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47), 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.

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12 APPENDIX D Specification references

FCC 47CFR part 15: 2011	Radio Frequency Devices
558074 D01 DTS Meas Guidance v01, 1/18/2012	FCC Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247
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
RSS-210 Issue 8: 2010	Low Power Licence- Exempt Radiocommunication Devices
RSS-Gen Issue 3: 2010	General Requirements and Information for the Certification of Radiocommunication Equipment

13 APPENDIX E Test equipment correction factors

Antenna factor
Active loop antenna
Model 6502, S/N 2857, HL 0446

Frequency, MHz	Magnetic antenna factor, dB	Electric antenna factor, dB
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	9.8
0.750	-41.9	9.7
1.000	-41.4	10.1
2.000	-41.5	10.0
3.000	-41.4	10.2
4.000	-41.4	10.1
5.000	-41.5	10.1
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(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.110, HL 0768

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 strength in dB(μV/m).

Antenna factor
Biconilog antenna EMCO Model 3141
Ser.No.1011, HL 0604

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

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 waveguide horn antenna
ETS Lindgren, Model 3117, serial number: 00123515, HL 4114

Frequency, MHz	Antenna factor, dB/m		
	Measured	Manufacturer	Deviation
1000	28.0	28.4	-0.4
1500	28.0	27.4	0.6
2000	31.2	30.9	0.3
2500	32.5	33.4	-0.9
3000	32.9	32.6	0.3
3500	32.7	32.8	-0.1
4000	33.1	33.4	-0.3
4500	33.8	33.9	-0.1
5000	33.8	34.1	-0.3
5500	34.4	34.5	-0.1
6000	35.0	35.2	-0.2
6500	35.4	35.5	-0.1
7000	35.7	35.7	0.0
7500	35.9	35.7	0.2
8000	35.8	35.8	0.0
8500	35.9	35.8	0.1
9000	36.3	36.2	0.1
9500	36.6	36.6	0.0
10000	37.1	37.1	0.0
10500	37.6	37.5	0.1
11000	37.9	37.7	0.2
11500	38.5	38.1	0.4
12000	39.2	38.7	0.5
12500	39.0	38.9	0.1
13000	39.1	39.1	0.0
13500	38.9	38.8	0.1
14000	39.0	38.8	0.2
14500	39.6	39.9	-0.3
15000	39.9	39.7	0.2
15500	39.9	40.1	-0.2
16000	40.7	40.8	-0.1
16500	41.3	41.8	-0.5
17000	42.5	42.1	0.4
17500	41.3	41.2	0.1
18000	41.4	40.9	0.5

Antenna factor is to be added to receiver meter reading in dB(μV) to convert to field strength in dB(μV/meter)

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
Low Loss Armored Test Cable, MegaPhase, 18 GHz, 6.2 m, N type-M/N type-M,
NC29-N1N1-244S/N 12025101 002,
HL 4352

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
50	0.20	9000	2.81
100	0.28	9500	2.89
300	0.49	10000	3.00
500	0.63	10500	3.07
1000	0.90	11000	3.15
1500	1.10	11500	3.23
2000	1.28	12000	3.30
2500	1.44	12500	3.38
3000	1.57	13000	3.47
3500	1.71	13500	3.55
4000	1.85	14000	3.61
4500	1.95	14500	3.68
5000	2.05	15000	3.76
5500	2.14	15500	3.86
6000	2.27	16000	3.92
6500	2.38	16500	3.97
7000	2.47	17000	4.03
7500	2.58	17500	4.10
8000	2.65	18000	4.18
8500	2.74		

Cable loss
Low Loss Armored Test Cable, MegaPhase, 18 GHz, 6.2 m, N type-M/N type-M, NC29-N1N1-244S/N 12025101 003,
HL 4353

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
50	0.20	9000	2.71
100	0.27	9500	2.81
300	0.47	10000	2.90
500	0.61	10500	2.97
1000	0.87	11000	3.06
1500	1.07	11500	3.13
2000	1.24	12000	3.20
2500	1.39	12500	3.26
3000	1.53	13000	3.34
3500	1.65	13500	3.39
4000	1.77	14000	3.47
4500	1.89	14500	3.54
5000	1.99	15000	3.62
5500	2.07	15500	3.69
6000	2.20	16000	3.76
6500	2.30	16500	3.83
7000	2.39	17000	3.86
7500	2.51	17500	3.94
8000	2.58	18000	4.02
8500	2.65		

14 APPENDIX F Abbreviations and acronyms

A	ampere
AC	alternating current
A/m	ampere per meter
AM	amplitude modulation
AVRG	average (detector)
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
DC	direct current
EIRP	equivalent isotropically radiated power
ERP	effective radiated power
EUT	equipment under test
F	frequency
GHz	gigahertz
GND	ground
H	height
HL	Hermon laboratories
Hz	hertz
k	kilo
kHz	kilohertz
LO	local oscillator
m	meter
MHz	megahertz
min	minute
mm	millimeter
ms	millisecond
μs	microsecond
NA	not applicable
NB	narrow band
OATS	open area test site
Ω	Ohm
PM	pulse modulation
PS	power supply
ppm	part per million (10^{-6})
QP	quasi-peak
RE	radiated emission
RF	radio frequency
rms	root mean square
Rx	receive
s	second
T	temperature
Tx	transmit
V	volt
WB	wideband

END OF DOCUMENT