

TEST REPORT

ACCORDING TO: FCC 47CFR part 27

FOR:

Airspan Networks Inc.

WiMAX base station

Model: uMAXe 2310L 2.35G

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1 Applicant information

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

2 Equipment under test attributes

Product name: WiMAX base station
Product type: Transceiver
Model(s): uMAXe 2310L 2.35G
Serial number: 5B41A1111112
Hardware version: A0
Software release: 13.9.50.38
Receipt date: 2/15/2011

3 Manufacturer information

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

4 Test details

Project ID: 21500
Location: Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started: 2/15/2011
Test completed: 3/02/2011
Test specification(s): FCC 47CFR part 27

5 Tests summary

Test	Status
Transmitter characteristics	
Section 27.50(a)(1), Peak output power at RF antenna connector	Pass
Section 2.1091, 27.52, RF safety	Pass, exhibit provided in Application for certification
Section 27.53(a)(1)(3), Emission mask	Pass*
Section 27.53(a)(1)(3), Spurious emissions at RF antenna connector	Pass*
Section 27.53(a)(1)(3), Radiated spurious emissions	Pass*
Section 27.54, Frequency stability	Pass
Section 2.1049, Occupied bandwidth	Pass
* - According to Second Erratum of WT Docket No.07-293 limits	

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	March 2, 2011	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	March 9, 2011	
Approved by:	Mr. M. Nikishin, EMC and Radio group manager	March 15, 2011	

6 EUT description

6.1 General information

The EUT, base station radio, uMAXe 2310L 2.35G, is a part of a WiMAX broadband fixed cellular wireless access system. The system provides a radio link between an end-user (a subscriber) and a network to give high-speed data access. The uMAXe's transceiver/receiver (Up to 64 QAM modulation, data rate up to 46) uses OFDM and operating in TDD duplexing mode, equipped with a 18 dBi external antenna.

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

6.2 EUT modules and sub-assemblies

Description	Manufacturer	Model or P/N	Hardware rev.	Serial number
Base station	Airspan Networks Inc.	uMAXe 2310L 2.35G	A0	5B41A1111112
Filter	WEVERCOMM	WVS-2.3GDB-3.5MO1A	A0	S10100004
Filter	WEVERCOMM	WVS-2.3GDB-3.5MO1A	A0	S10100006

6.3 Ports and lines

Port type	Port description	Connected from	Connected to	Qty.	Cable type	Cable length, m
Power	DC Power	Power supply	EUT	1	Unshielded	3.5
RF	Ant1	EUT	Filter	1	Coax	1.5
RF	Ant2	EUT	Filter	1	Coax	1.5
RF	Ant3	EUT	50 Om termination	1	NA	NA
RF	Ant4	EUT	50 Om termination	1	NA	NA
Signal	GPS	EUT	GPS antenna	1	Coax	1.5
Telecom	Ethernet	EUT	Laptop	1	STP	3
Signal	RS-232	EUT	Laptop	1	STP	3

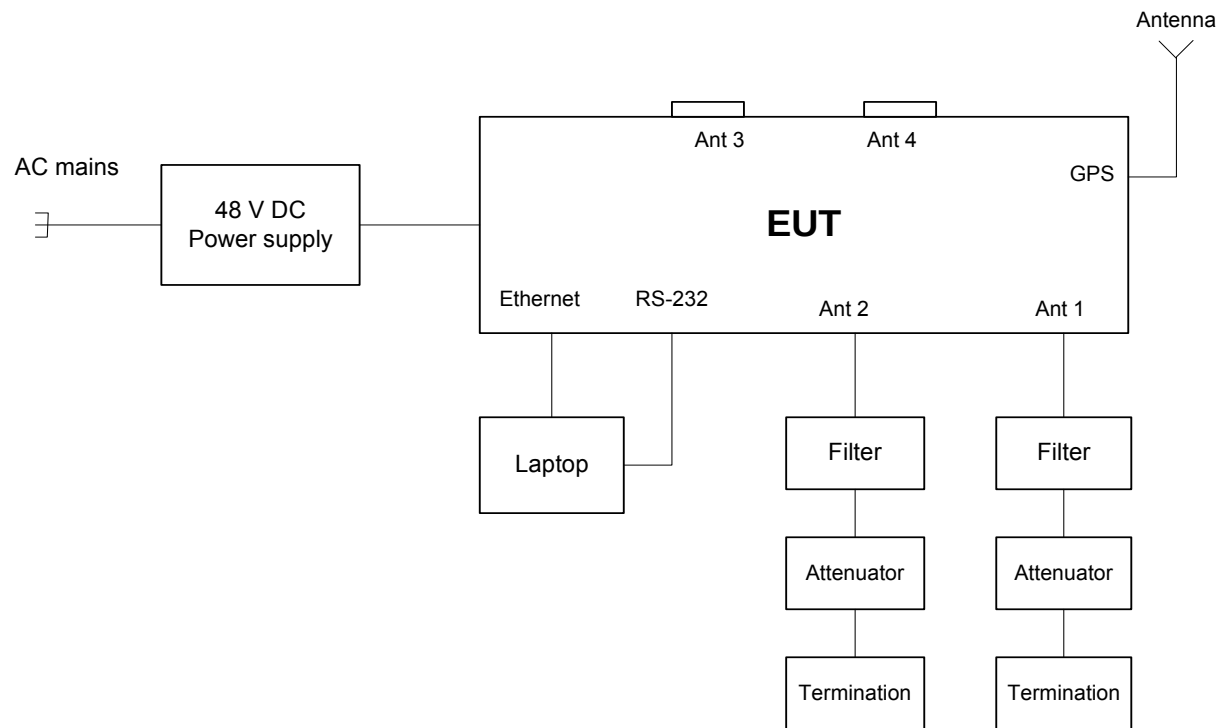
6.4 Support and test equipment

Description	Manufacturer	Model number	Serial number
DC power supply	Horizon Electronics	DHR3655D	S/N 767469
Laptop	IBM	X31	99-TXWYC
GPS Antenna	Trimble	P/N 57861-00	01880177
Attenuator 30 dB (2 units)	Aeroflex	33-30-34	NA

6.5 Changes made in EUT

No changes were implemented.

6.6 Test configuration



6.7 Transmitter characteristics

Type of equipment					
V	Stand-alone (Equipment with or without its own control provisions)				
	Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)				
	Plug-in card (Equipment intended for a variety of host systems)				
Intended use		Condition of use			
V	fixed	Always at a distance more than 2 m from all people			
	mobile	Always at a distance more than 20 cm from all people			
	portable	May operate at a distance closer than 20 cm to human body			
Assigned frequency range		2315.0 – 2320.0 MHz; 2345.0-2350.0 MHz			
Operating frequency		2316.75; 2348.25 MHz			
RF channel spacing		3.5 MHz			
Maximum rated output power		At transmitter 50 Ω RF output connector	36.12 dBm		
Is transmitter output power variable?		No			
		V	Yes	continuous variable	
				stepped variable with stepsize	0.5 dB
				minimum RF power	-30 dBm
		maximum RF power at antenna connector	36.12 dBm		
Antenna connection					
unique coupling	V	standard connector	Integral		
		with temporary RF connector without temporary RF connector			
Antenna/s technical characteristics					
Type	Manufacturer	Model number	Gain		
Dual Polarized 65° Sector Antenna, Fixed Tilt	Alpha Wireless	AW3007	18 dBi		
Dual Polarized 90° Sector Antenna, Fixed Tilt	Alpha Wireless	AW3008	17 dBi		
Transmitter aggregate data rate/s, Mbps					
Transmitter 99% power bandwidth	Type of modulation				
	QPSK	16QAM	64QAM		
3.5 MHz	4	9	14		
Type of multiplexing	OFDMA/TDD				
Modulating test signal (baseband)	PRBS				
Maximum transmitter duty cycle in normal use	75%				
Transmitter power source					
V	DC	Nominal rated voltage	48 VDC via DC power supply		
Common power source for transmitter and receiver		V	yes no		

Test specification:		Section 27.50(a)(1), Peak output power	
Test procedure:		47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1	
Test mode:		Compliance	Verdict: PASS
Date:		2/15/2011	
Temperature: 22.3 °C	Air Pressure: 1009 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks:			

7 Transmitter tests according to 47CFR part 27

7.1 Peak output power test

7.1.1 General

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

Table 7.1.1 Peak output power limits

Assigned frequency range, MHz	Maximum EIRP	
	W	dBm
2315.0 – 2320.0	2000	63
2345.0 – 2350.0	2000	63

7.1.2 Test procedure

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

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

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

Figure 7.1.1 Peak output power test setup



Test specification:	Section 27.50(a)(1), Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date:	2/15/2011		
Temperature: 22.3 °C	Air Pressure: 1009 hPa	Relative Humidity: 45 %	Power Supply: 48VDC
Remarks:			

Table 7.1.2 Peak output power test results

OPERATING FREQUENCY RANGE: 2315.0-2320.0 MHz
2345.0-2350.0 MHz

DETECTOR USED: Average

MODULATING SIGNAL: PRBS

TRANSMITTER OUTPUT POWER SETTINGS: Maximum

DUTY CYCLE: 75%

EBW: 3.5 MHz

MAXIMUM ANTENNA GAIN: 18 dBi

Carrier frequency, MHz	Power meter reading RF#1, dBm	Power meter reading RF#2, dBm	Total RF power*, dBm	Antenna gain, dBi	Total EIRP**, dBm	Limit, dBm	Margin, dB	Verdict
QPSK 4 Mbps								
2316.75	33.00	33.20	36.11	18.0	54.11	63.0	-8.89	Pass
2348.25	32.81	32.95	35.89	18.0	53.89	63.0	-9.11	Pass
64QAM 14 Mbps								
2316.75	33.03	33.19	36.12	18.0	54.12	63.0	-8.88	Pass
2348.25	33.14	33.01	36.09	18.0	54.09	63.0	-8.91	Pass

* - Total RF power, dBm = $10 \log\{10^{[P(\text{dBm}, \text{RF}\#1)/10]} + 10^{[P(\text{dBm}, \text{RF}\#2)/10]}\}$

** - EIRP total, dBm = Total RF power**, dBm + Antenna Gain, dBi

MAXIMUM ANTENNA GAIN: 17 dBi

Carrier frequency, MHz	Power meter reading RF#1, dBm	Power meter reading RF#2, dBm	Total RF power*, dBm	Antenna gain, dBi	Total EIRP**, dBm	Limit, dBm	Margin, dB	Verdict
QPSK 4 Mbps								
2316.75	33.00	33.20	36.11	17.0	53.11	63.0	-9.89	Pass
2348.25	32.81	32.95	35.89	17.0	52.89	63.0	-10.11	Pass
64QAM 14 Mbps								
2316.75	33.03	33.19	36.12	17.0	53.12	63.0	-9.88	Pass
2348.25	33.14	33.01	36.09	17.0	53.09	63.0	-9.91	Pass

* - EIRP total, dBm = Total RF power**, dBm + Antenna Gain, dBi

** - Total RF power, dBm = $10 \log\{10^{[P(\text{dBm}, \text{RF}\#1)/10]} + 10^{[P(\text{dBm}, \text{RF}\#2)/10]}\}$

Reference numbers of test equipment used

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

Test specification:		Section 2.1049, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2011	
Temperature: 22.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 47 %	Power Supply: 48VDC
Remarks:			

7.2 Occupied bandwidth test

7.2.1 General

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

Table 7.2.1 Occupied bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points*, dBc	Maximum allowed bandwidth, kHz
2305.0 – 2320.0 2345.0 – 2350.0	26	NA

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

7.2.2 Test procedure

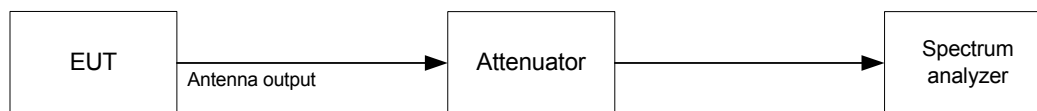
7.2.2.1 The EUT was set up as shown in Figure 7.2.1, energized and its proper operation was checked.

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

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

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

Figure 7.2.1 Occupied bandwidth test setup



Test specification:		Section 2.1049, Occupied bandwidth	
Test procedure:		47 CFR, Section 2.1049	
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2011		
Temperature: 22.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 47 %	Power Supply: 48VDC
Remarks:			

Table 7.2.2 Occupied bandwidth test results

DETECTOR USED: Peak hold
RESOLUTION BANDWIDTH: 100 kHz
VIDEO BANDWIDTH: 300 kHz
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
MODULATION: OFDM
MODULATING SIGNAL: PRBS
EBW: 3.5 MHz

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
QPSK 4 Mbps				
2316.75	3295.4	NA	NA	Pass
2348.25	3293.5	NA	NA	Pass
64QAM 14 Mbps				
2316.75	3294.1	NA	NA	Pass
2348.25	3294.1	NA	NA	Pass

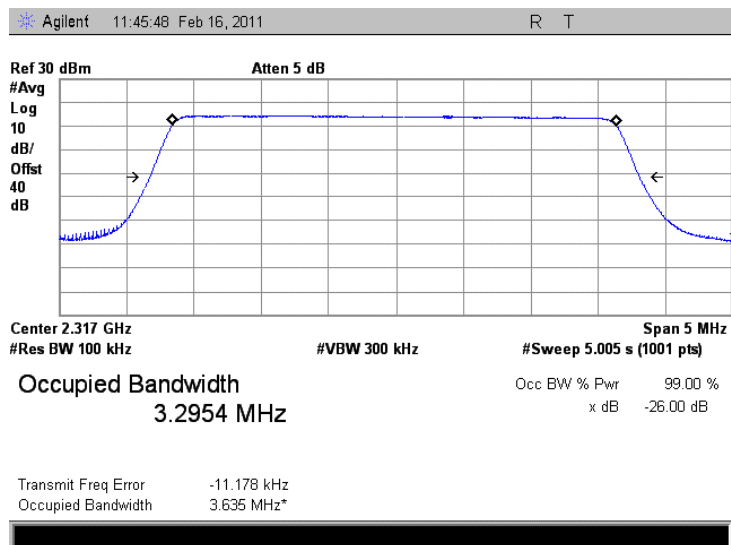
Reference numbers of test equipment used

HL 2953	HL 3787	HL 3818					
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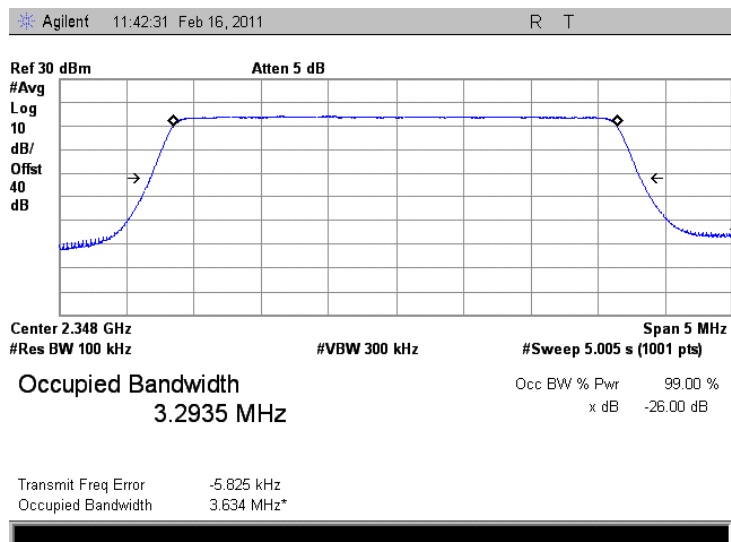
Full description is given in Appendix A.

Test specification: Section 2.1049, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance		Verdict: PASS	
Date: 2/16/2011			
Temperature: 22.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 47 %	Power Supply: 48VDC
Remarks:			

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

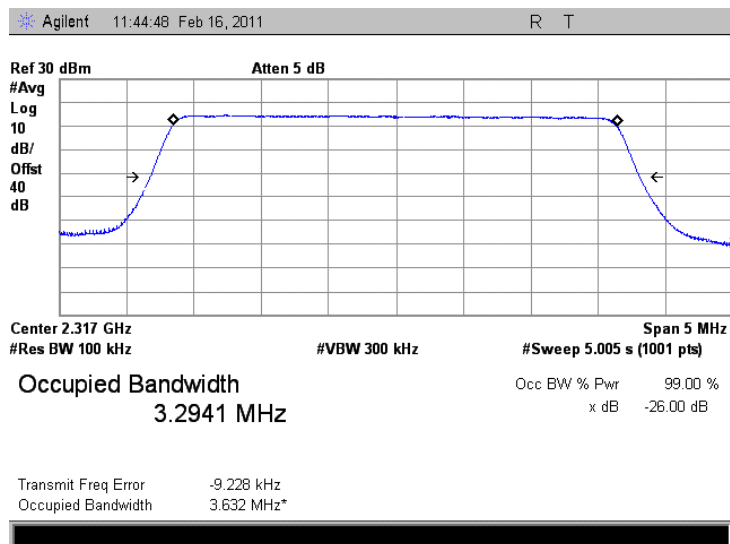


Plot 7.2.2 Occupied bandwidth test result at high frequency, 3.5 MHz EBW, QPSK

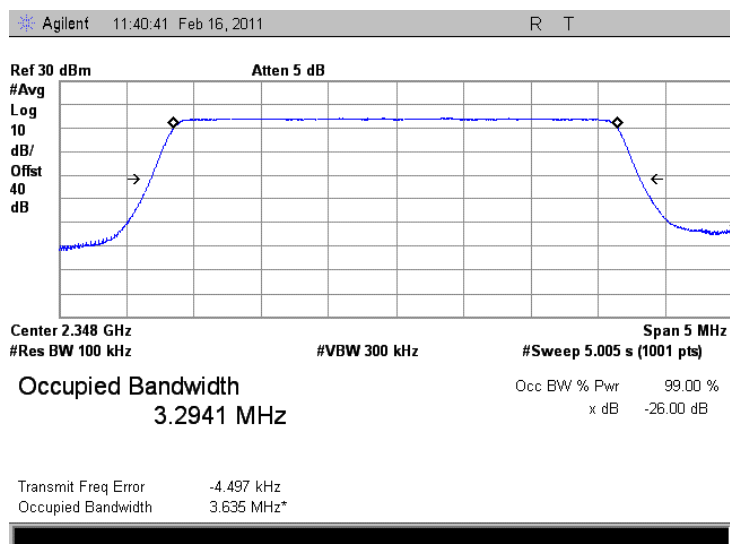


Test specification: Section 2.1049, Occupied bandwidth			
Test procedure: 47 CFR, Section 2.1049			
Test mode: Compliance	Verdict: PASS		
Date: 2/16/2011			
Temperature: 22.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 47 %	Power Supply: 48VDC
Remarks:			

Plot 7.2.3 Occupied bandwidth test results at low frequency, 3.5 MHz EBW, 64QAM



Plot 7.2.4 Occupied bandwidth test results at high frequency, 3.5 MHz EBW, 64QAM



Test specification: Second erratum of WT Docket No.07-293, Emission mask			
Test procedure: 47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13			
Test mode: Compliance	Verdict: PASS		
Date: 2/16/2011			
Temperature: 22.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

7.3 Emission mask test

7.3.1 General

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

Table 7.3.1 Emission mask limits

Channel	Frequency range	Attenuation below carrier, dBc	Limit, dBm
2316.75	Below 2285.0	$75 + 10 \cdot \log(P^*)$	-45.0
	2287.5	$72 + 10 \cdot \log(P^*)$	-42.0
	2300.0	$70 + 10 \cdot \log(P^*)$	-40.0
	2305.0	$43 + 10 \cdot \log(P^*)$	-13.0
	2305.0 – 2315.0	$43 + 10 \cdot \log(P^*)$	-13.0
	2320.0 – 2345.0	$75 + 10 \cdot \log(P^*)$	-45.0
2348.25	2320.0 – 2345.0	$75 + 10 \cdot \log(P^*)$	-45.0
	2350.0 – 2360.0	$43 + 10 \cdot \log(P^*)$	-13.0
	2362.5	$55 + 10 \cdot \log(P^*)$	-25.0
	2365.0	$70 + 10 \cdot \log(P^*)$	-40.0
	2367.5	$72 + 10 \cdot \log(P^*)$	-42.0
	Above 2370.0	$75 + 10 \cdot \log(P^*)$	-45.0

* - P is transmitter output power in Watts

7.3.2 Test procedure

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

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

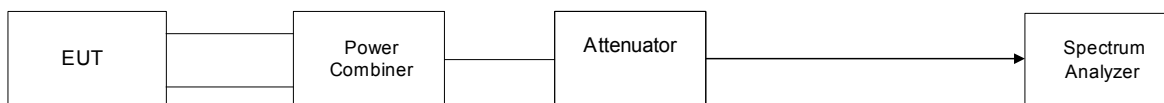
7.3.2.3 The worst case results are provided in the associated tables and shown in the associated plots.

Test specification:		Second erratum of WT Docket No.07-293, Emission mask	
Test procedure:		47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2011		
Temperature: 22.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Figure 7.3.1 Emission mask test setup



Figure 7.3.2 Emission mask test setup for combined outputs



Test specification:	Second erratum of WT Docket No.07-293, Emission mask		
Test procedure:	47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date:	2/16/2011		
Temperature: 22.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

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

ASSIGNED FREQUENCY RANGE: 2315.0 – 2320.0 MHz; 2345.0 – 2350.0 MHz
DETECTOR USED: Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
MODULATION: QPSK, 64QAM
EBW: 3.5MHz

Frequency offset, ± MHz	SA reading, dBm low range	SA reading, dBm high range	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
Low carrier frequency 2316.75 MHz QPSK						
2313.091	-20.56	NA	100	1000	-13.0	Pass
2315.000	-20.86	NA	36	NA	-13.0	
2319.994	NA	-55.28	36	NA	-45.0	
2321.096	NA	-46.15	100	1000	-45.0	
Low carrier frequency 2316.75 MHz 64QAM						
2313.892	-20.13	NA	100	1000	-13.0	Pass
2315.012	-20.86	NA	36	NA	-13.0	
2320.116	NA	-54.44	36	NA	-45.0	
2321.024	NA	-46.58	100	1000	-45.0	
High carrier frequency 2348.25 MHz QPSK						
2343.904	-45.37	NA	100	1000	-45.0	Pass
2344.611	-52.65	NA	36	NA	-45.0	
2349.988	-21.73	NA	36	NA	-13.0	
2351.126	NA	-22.07	100	1000	-13.0	
2361.290	NA	-48.10	1000	NA	-45.0	
High carrier frequency 2348.25 MHz 64QAM						
2343.904	-46.23	NA	100	1000	-45.0	Pass
2344.605	-53.92	NA	36	NA	-45.0	
2349.987	NA	-23.39	36	NA	-13.0	
2351.009	NA	-20.46	100	1000	-13.0	

Test specification: Second erratum of WT Docket No.07-293, Emission mask			
Test procedure: 47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13			
Test mode: Compliance	Verdict: PASS		
Date: 2/16/2011			
Temperature: 22.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

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

ASSIGNED FREQUENCY RANGE: 2315.0 – 2320.0 MHz; 2345.0 – 2350.0 MHz
DETECTOR USED: Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
MODULATION: QPSK, 64QAM
EBW: 3.5MHz

Frequency offset, ± MHz	SA reading, dBm low range	SA reading, dBm high range	RBW, kHz	Integration BW, kHz	Limit, dBm	Verdict
Low carrier frequency 2316.75 MHz QPSK						
2313.091	-22.22	NA	100	1000	-13.0	Pass
2315.012	-21.65	NA	36	NA	-13.0	
2320.279	NA	-52.22	36	NA	-45.0	
2321.144	NA	-56.06	100	1000	-45.0	
Low carrier frequency 2316.75 MHz 64QAM						
2313.091	-24.65	NA	100	1000	-13.0	Pass
2315.012	-22.75	NA	36	NA	-13.0	
2320.022	NA	-53.03	36	NA	-45.0	
2321.096	NA	-46.48	100	1000	-45.0	
High carrier frequency 2348.25 MHz QPSK						
2343.784	-46.64	NA	100	1000	-45.0	Pass
2344.987	-53.67	NA	36	NA	-45.0	
2349.988	-23.05	NA	36	NA	-13.0	
2351.225	NA	-25.02	100	1000	-13.0	
2360.020	NA	-49.96	1000	NA	-45.0	
High carrier frequency 2348.25 MHz 64QAM						
2343.904	-46.49	NA	100	1000	-45.0	Pass
2344.600	-51.84	NA	36	NA	-45.0	
2349.988	NA	-23.21	36	NA	-13.0	
2351.225	NA	-25.34	100	1000	-13.0	

Reference numbers of test equipment used

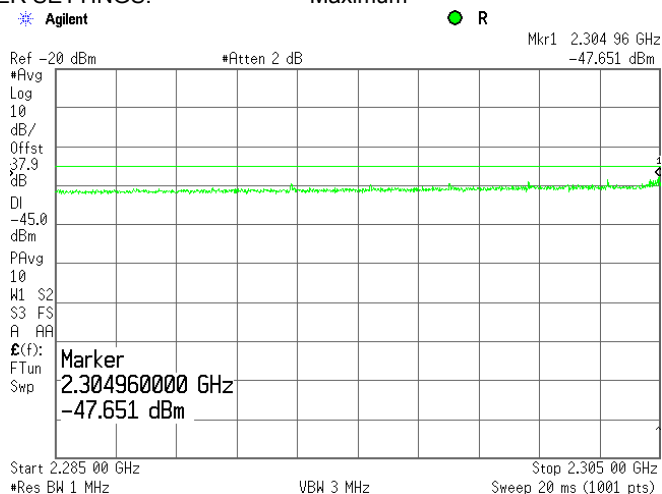
HL 1906	HL 2015	HL 2953	HL 3472	HL 3474	HL 3787	HL 3818		
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Full description is given in Appendix A.

Test specification:		Second erratum of WT Docket No.07-293, Emission mask	
Test procedure:		47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2011		
Temperature: 22.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

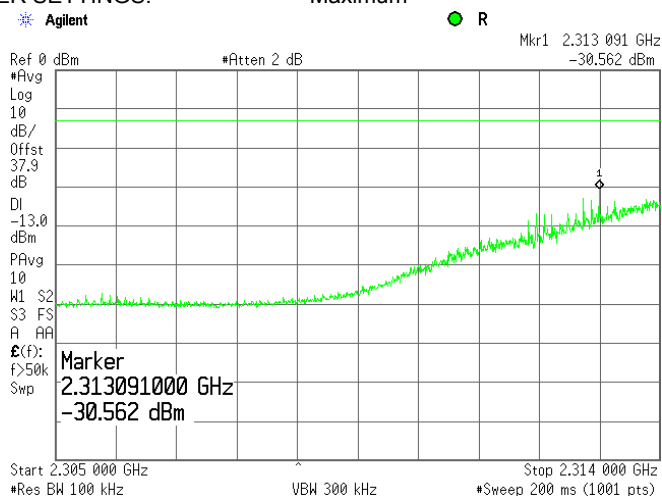
Plot 7.3.1 Emission mask test results at low carrier frequency in frequency range 2285-2305 MHz (combined output)

OPERATING FREQUENCY RANGE: 2315.0 – 2320.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
BIT RATE: 4 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.2 Emission mask test results at low carrier frequency in frequency range 2305-2314 MHz (combined output)

OPERATING FREQUENCY RANGE: 2315.0 – 2320.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
BIT RATE: 4 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Test result = SA reading + 10*log(1MHz/RBW) = -30.56 + 10 = -20.56 dBm

Test specification:		Second erratum of WT Docket No.07-293, Emission mask	
Test procedure:		47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2011	
Temperature: 22.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.3.3 Emission mask test results at low carrier frequency in frequency range 2314-2321 MHz (combined output)

OPERATING FREQUENCY RANGE:

DETECTOR USED:

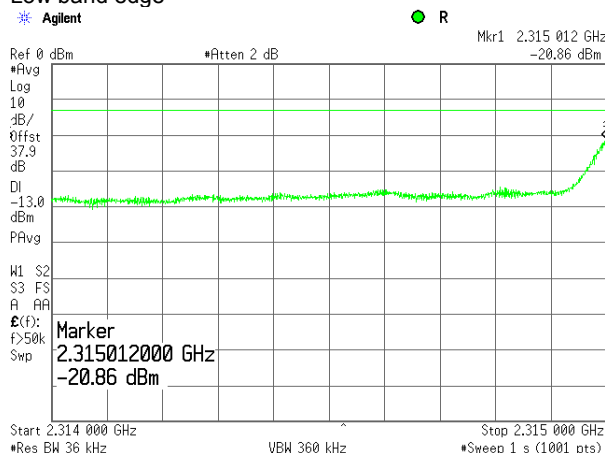
MODULATION:

BIT RATE:

TRANSMITTER OUTPUT POWER SETTINGS:

Low band edge

Agilent



2315.0 – 2320.0 MHz

Average

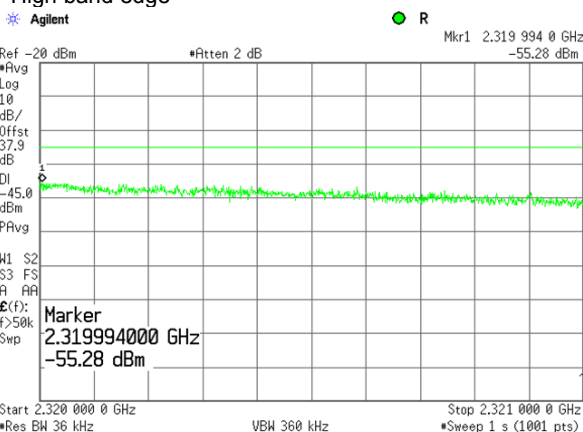
QPSK

4 Mbps

Maximum

High band edge

Agilent



Plot 7.3.4 Emission mask test results at low carrier frequency in frequency range 2321-2345 MHz (combined output)

OPERATING FREQUENCY RANGE:

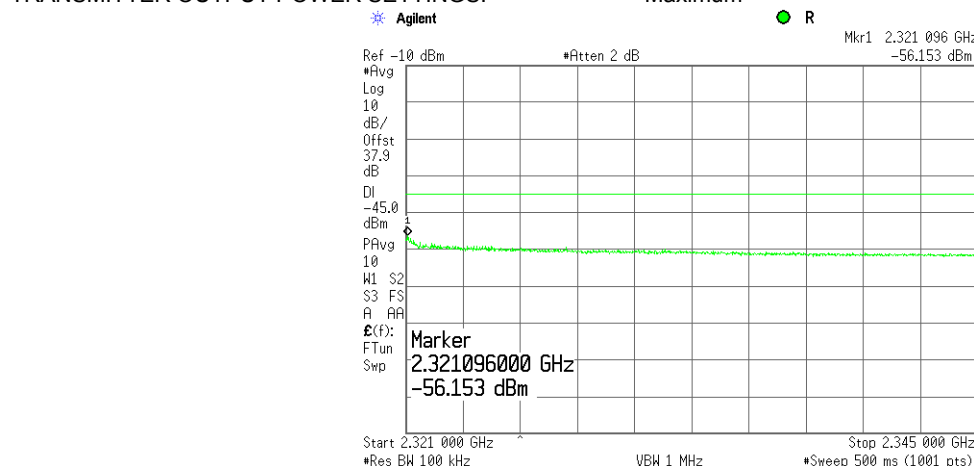
DETECTOR USED:

MODULATION:

BIT RATE:

TRANSMITTER OUTPUT POWER SETTINGS:

Agilent



2315.0 – 2320.0 MHz

Average

QPSK

4 Mbps

Maximum

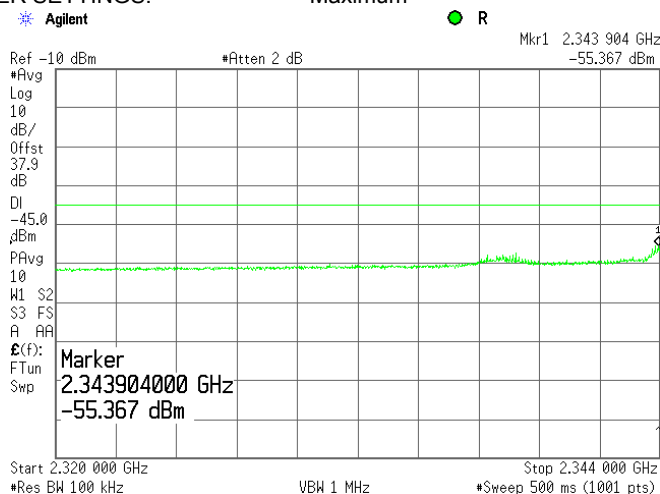
R

$$\text{Test result} = \text{SA reading} + 10 \cdot \log(1\text{MHz}/\text{RBW}) = -56.15 + 10 = -46.15 \text{ dBm}$$

Test specification:		Second erratum of WT Docket No.07-293, Emission mask	
Test procedure:		47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2011	
Temperature: 22.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.3.5 Emission mask test results at high carrier frequency in frequency range 2320-2344 MHz (combined output)

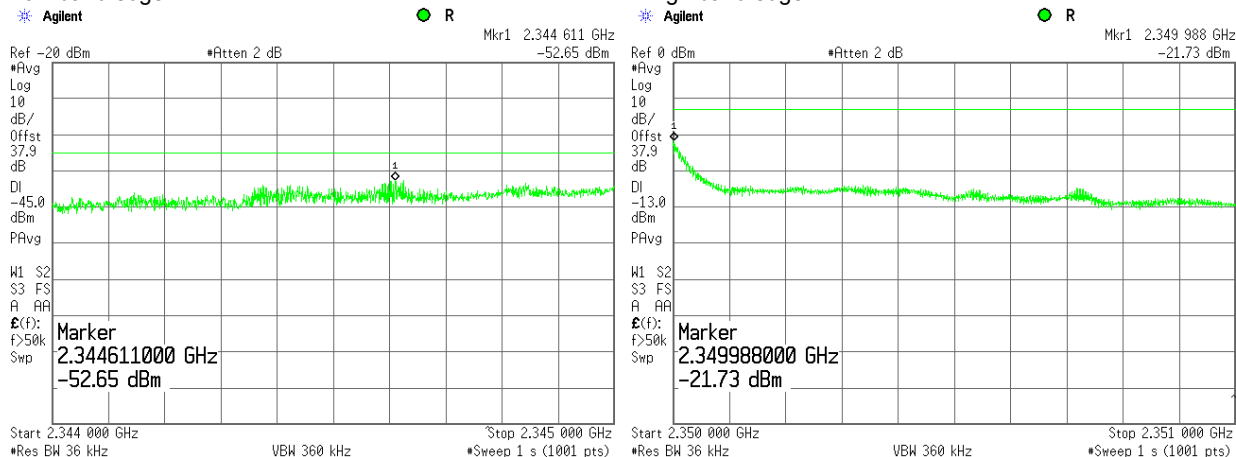
OPERATING FREQUENCY RANGE: 2345.0 – 2350.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
BIT RATE: 4 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



$$\text{Test result} = \text{SA reading} + 10 \cdot \log(1\text{MHz}/\text{RBW}) = -55.37 + 10 = -45.37 \text{ dBm}$$

Plot 7.3.6 Emission mask test results at high carrier frequency in frequency range 2344-2351 MHz (combined output)

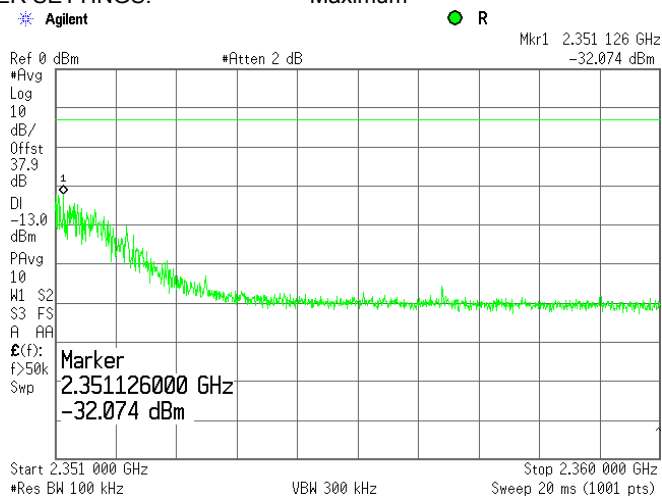
OPERATING FREQUENCY RANGE: 2344.0 – 2351.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
BIT RATE: 4 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
Low band edge
High band edge



Test specification:		Second erratum of WT Docket No.07-293, Emission mask	
Test procedure:		47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2011		
Temperature: 22.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.3.7 Emission mask test results at high carrier frequency in frequency range 2351-2360 MHz (combined output)

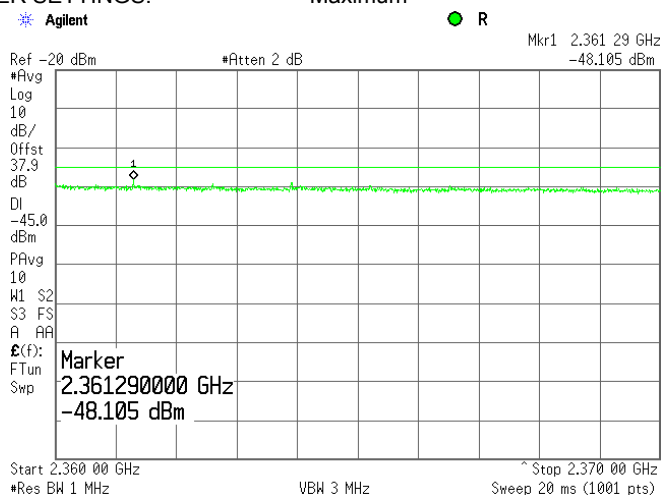
OPERATING FREQUENCY RANGE: 2344.0 – 2351.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
BIT RATE: 4 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



$$\text{Test result} = \text{SA reading} + 10 \cdot \log(1\text{MHz}/\text{RBW}) = -32.07 + 10 = -22.07 \text{ dBm}$$

Plot 7.3.8 Emission mask test results at high carrier frequency in frequency range 2360-2370 MHz (combined output)

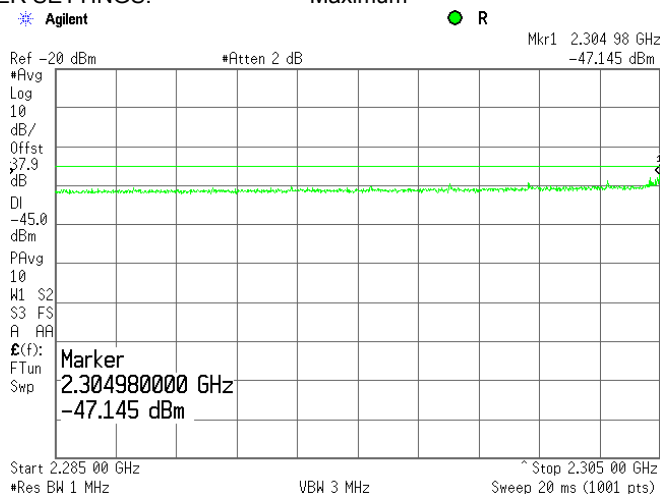
OPERATING FREQUENCY RANGE: 2345.0 – 2350.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
BIT RATE: 4 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Test specification:		Second erratum of WT Docket No.07-293, Emission mask	
Test procedure:		47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2011		
Temperature: 22.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

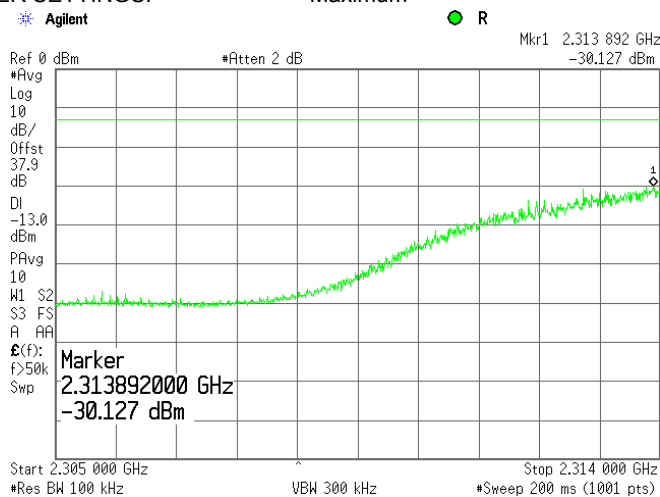
Plot 7.3.9 Emission mask test results at low carrier frequency in frequency range 2285-2305 MHz (combined output)

OPERATING FREQUENCY RANGE: 2315.0 – 2320.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
BIT RATE: 14 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.10 Emission mask test results at low carrier frequency in frequency range 2305-2314 MHz (combined output)

OPERATING FREQUENCY RANGE: 2315.0 – 2320.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
BIT RATE: 14 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Test result = SA reading + 10*log(1MHz/RBW) = -30.13 + 10 = -20.13 dBm

Test specification:		Second erratum of WT Docket No.07-293, Emission mask	
Test procedure:		47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2011	
Temperature: 22.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.3.11 Emission mask test results at low carrier frequency in frequency range 2314-2321 MHz (combined output)

OPERATING FREQUENCY RANGE:

DETECTOR USED:

MODULATION:

BIT RATE:

TRANSMITTER OUTPUT POWER SETTINGS:

Agilent

R

2315.0 – 2320.0 MHz

Average

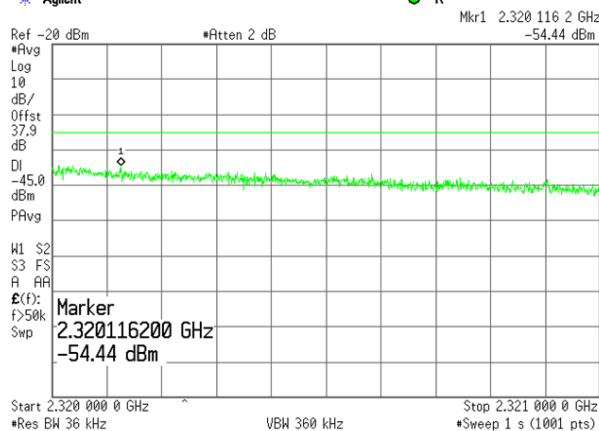
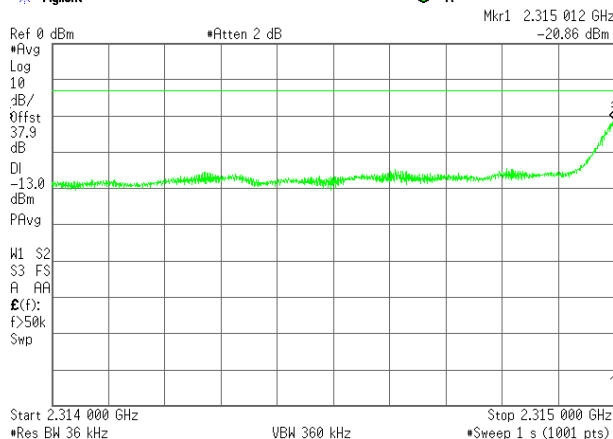
64QAM

14 Mbps

Maximum

Agilent

R



Plot 7.3.12 Emission mask test results at low carrier frequency in frequency range 2321-2345 MHz (combined output)

OPERATING FREQUENCY RANGE:

DETECTOR USED:

MODULATION:

BIT RATE:

TRANSMITTER OUTPUT POWER SETTINGS:

Agilent

R

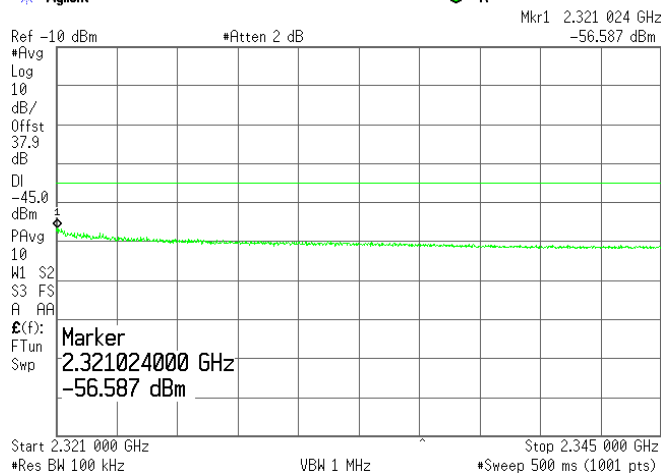
2315.0 – 2320.0 MHz

Average

64QAM

14 Mbps

Maximum

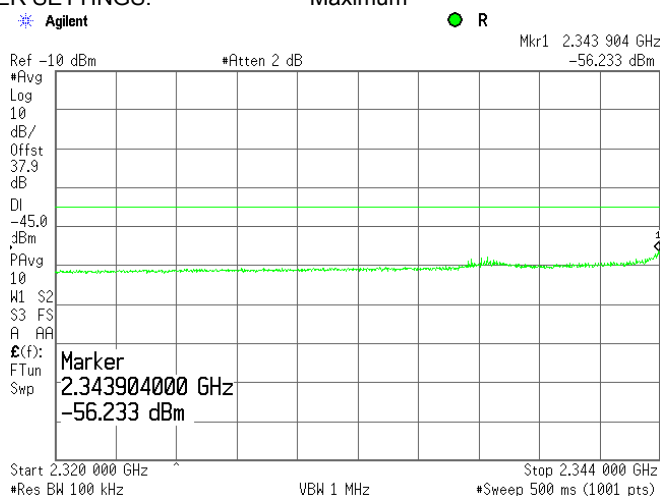


Test result = SA reading + 10*log(1MHz/RBW) = -56.58 + 10 = -46.58 dBm

Test specification:		Second erratum of WT Docket No.07-293, Emission mask	
Test procedure:		47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2011	
Temperature: 22.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.3.13 Emission mask test results at high carrier frequency in frequency range 2320-2344 MHz (combined output)

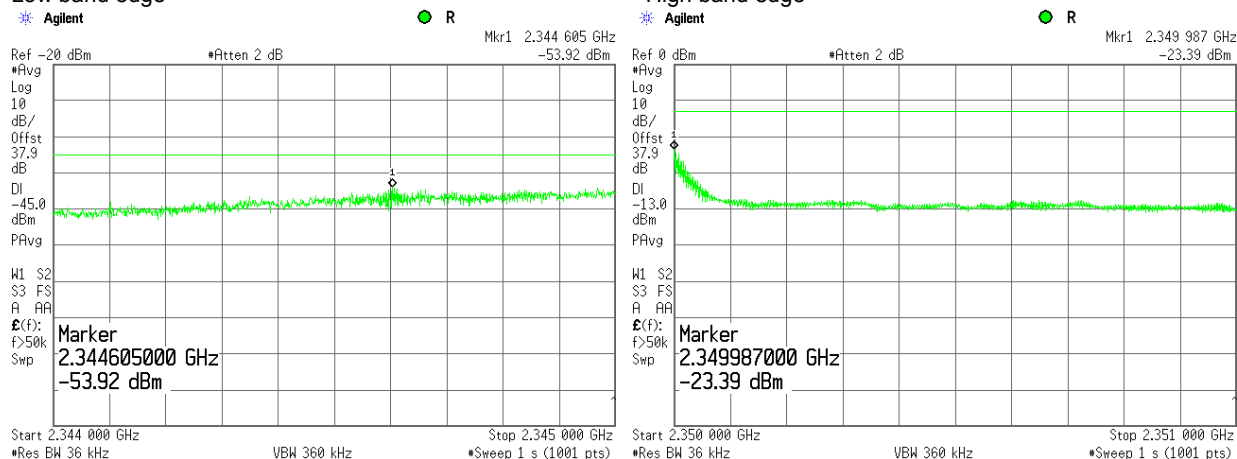
OPERATING FREQUENCY RANGE: 2345.0 – 2350.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
BIT RATE: 14 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



$$\text{Test result} = \text{SA reading} + 10 \cdot \log(1\text{MHz}/\text{RBW}) = -56.23 + 10 = -46.23 \text{ dBm}$$

Plot 7.3.14 Emission mask test results at high carrier frequency in frequency range 2344-2351 MHz (combined output)

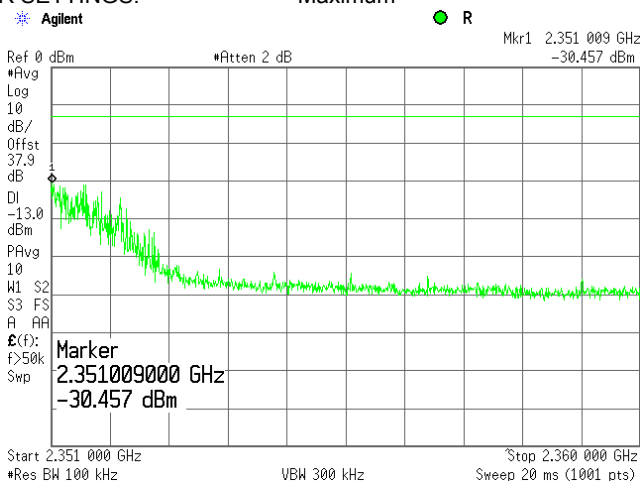
OPERATING FREQUENCY RANGE: 2345.0 – 2350.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
BIT RATE: 14 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
Low band edge
High band edge



Test specification:		Second erratum of WT Docket No.07-293, Emission mask	
Test procedure:		47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2011		
Temperature: 22.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.3.15 Emission mask test results at high carrier frequency in frequency range 2351-2360 MHz (combined output)

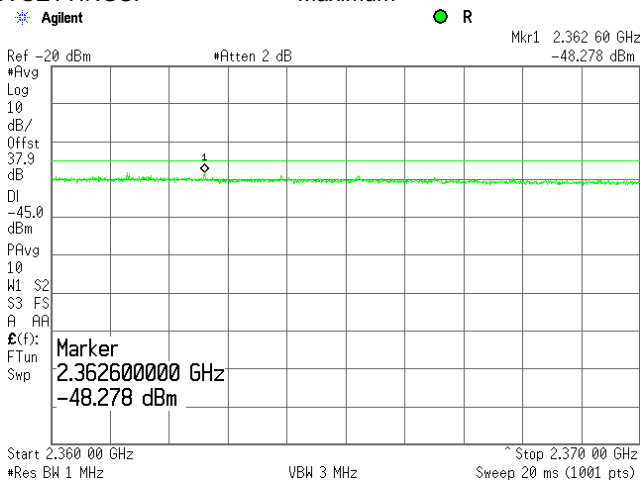
OPERATING FREQUENCY RANGE: 2345.0 – 2350.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
BIT RATE: 14 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Test result = SA reading + 10*log(1MHz/RBW) = -30.46 + 10 = -20.46 dBm

Plot 7.3.16 Emission mask test results at high carrier frequency in frequency range 2360-2370 MHz (combined output)

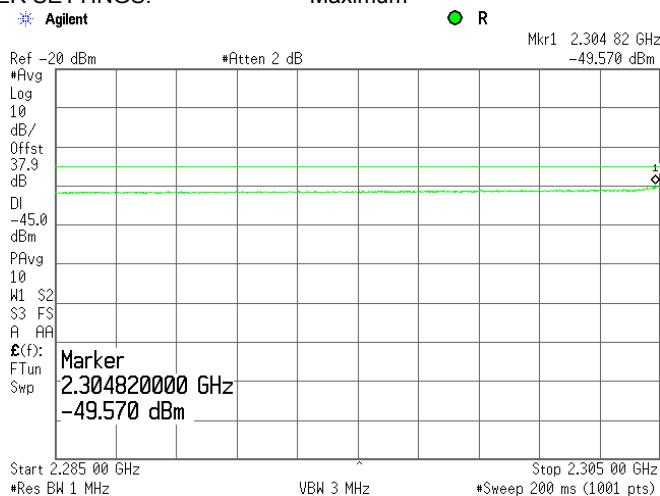
OPERATING FREQUENCY RANGE: 2345.0 – 2350.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
BIT RATE: 14 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Test specification:		Second erratum of WT Docket No.07-293, Emission mask	
Test procedure:		47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2011		
Temperature: 22.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

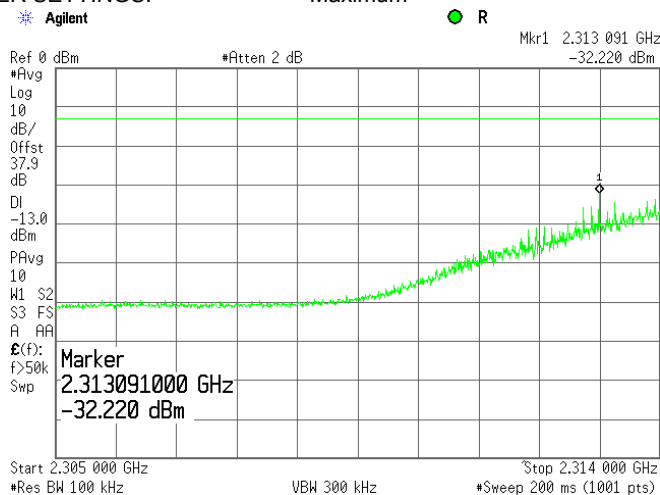
Plot 7.3.17 Emission mask test results at low carrier frequency in frequency range 2285-2305 MHz (single output)

OPERATING FREQUENCY RANGE: 2315.0 – 2320.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
BIT RATE: 4 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.18 Emission mask test results at low carrier frequency in frequency range 2305-2314 MHz (single output)

OPERATING FREQUENCY RANGE: 2315.0 – 2320.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
BIT RATE: 4 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Test result = SA reading + 10*log(1MHz/RBW) = -32.22 + 10 = -22.22 dBm

Test specification:		Second erratum of WT Docket No.07-293, Emission mask	
Test procedure:		47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2011	
Temperature: 22.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.3.19 Emission mask test results at low carrier frequency in frequency range 2314-2321 MHz (single output)

OPERATING FREQUENCY RANGE:

DETECTOR USED:

MODULATION:

BIT RATE:

TRANSMITTER OUTPUT POWER SETTINGS:

Low band edge

2315.0 – 2320.0 MHz

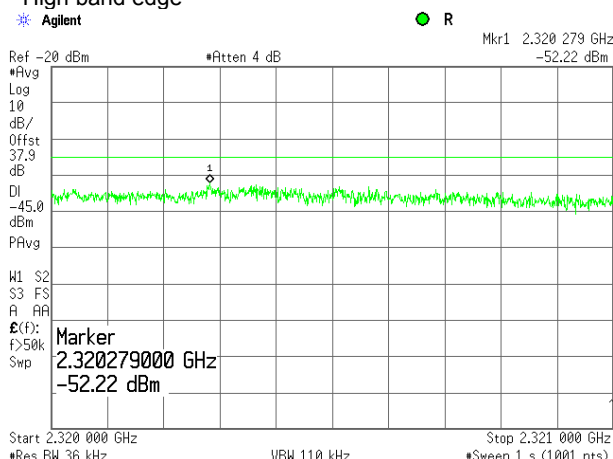
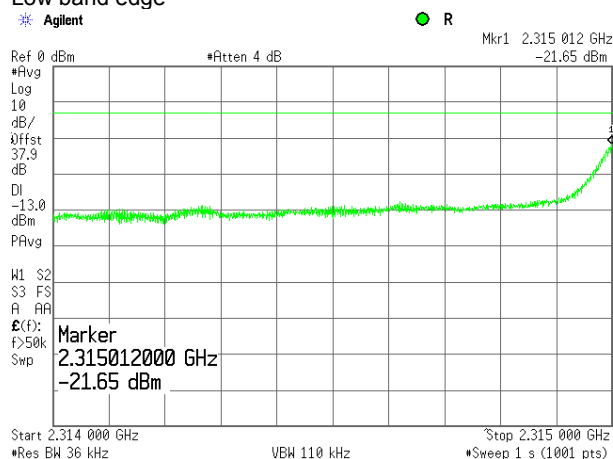
Average

QPSK

4 Mbps

Maximum

High band edge



Plot 7.3.20 Emission mask test results at low carrier frequency in frequency range 2321-2345 MHz (single output)

OPERATING FREQUENCY RANGE:

DETECTOR USED:

MODULATION:

BIT RATE:

TRANSMITTER OUTPUT POWER SETTINGS:

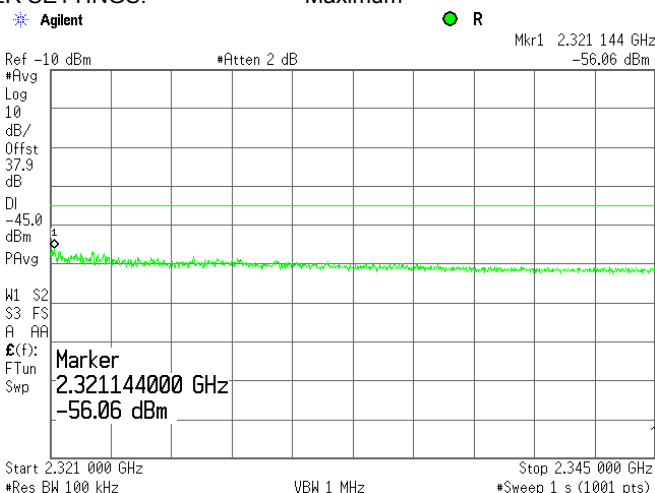
2315.0 – 2320.0 MHz

Average

QPSK

4 Mbps

Maximum

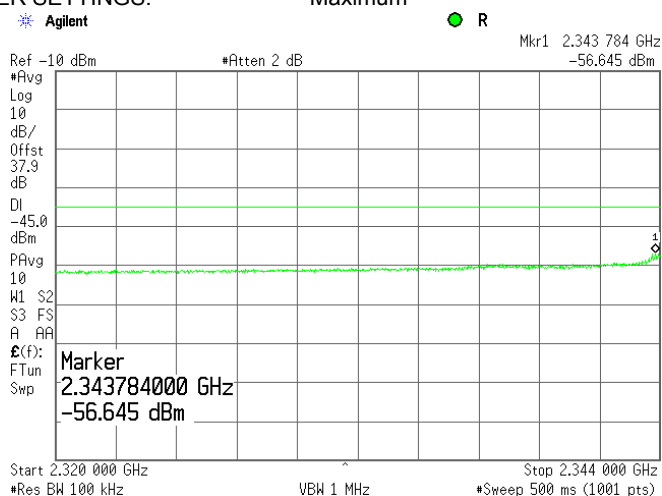


Test result = SA reading + 10*log(1MHz/RBW) = -56.06 + 10 = -46.06 dBm

Test specification:		Second erratum of WT Docket No.07-293, Emission mask	
Test procedure:		47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2011	
Temperature: 22.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.3.21 Emission mask test results at high carrier frequency in frequency range 2320-2344 MHz (single output)

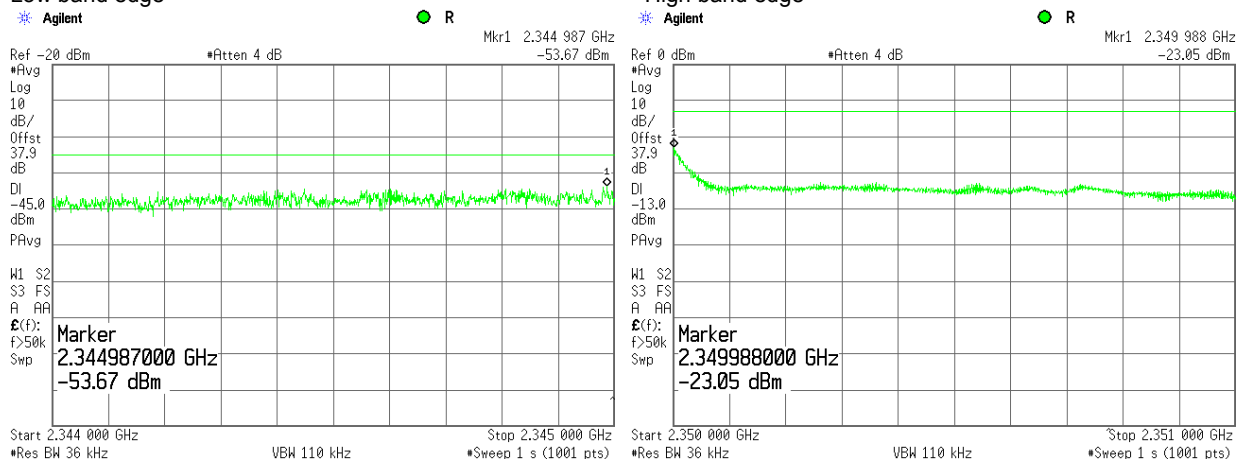
OPERATING FREQUENCY RANGE: 2345.0 – 2350.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
BIT RATE: 4 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Test result = SA reading + 10*log(1MHz/RBW) = -56.64 + 10 = -46.64 dBm

Plot 7.3.22 Emission mask test results at high carrier frequency in frequency range 2344-2351 MHz (single output)

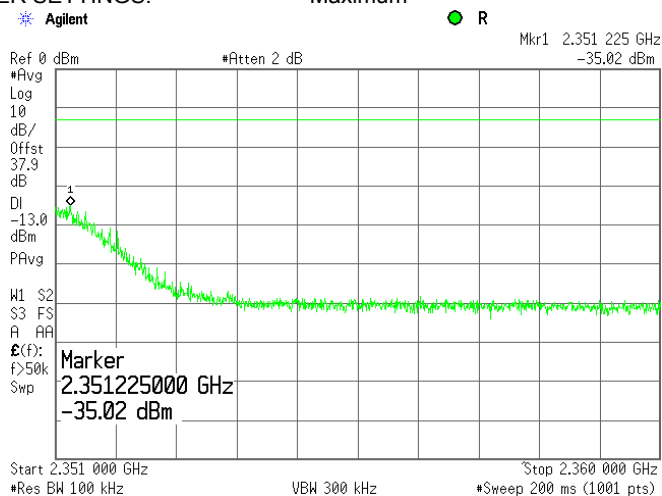
OPERATING FREQUENCY RANGE: 2344.0 – 2351.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
BIT RATE: 4 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
Low band edge
High band edge



Test specification:		Second erratum of WT Docket No.07-293, Emission mask	
Test procedure:		47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2011		
Temperature: 22.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.3.23 Emission mask test results at high carrier frequency in frequency range 2351-2360 MHz (single output)

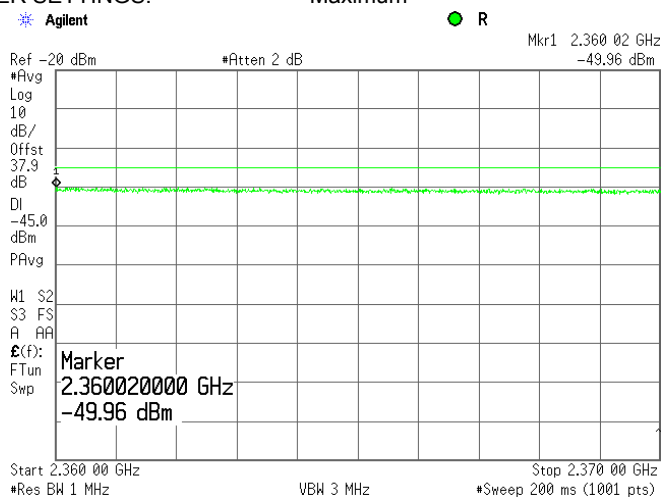
OPERATING FREQUENCY RANGE: 2344.0 – 2351.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
BIT RATE: 4 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



$$\text{Test result} = \text{SA reading} + 10 \cdot \log(1\text{MHz}/\text{RBW}) = -35.02 + 10 = -25.02 \text{ dBm}$$

Plot 7.3.24 Emission mask test results at high carrier frequency in frequency range 2360-2370 MHz (single output)

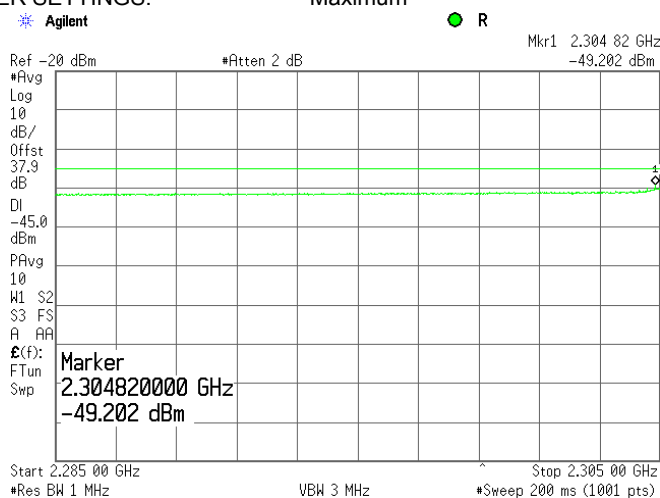
OPERATING FREQUENCY RANGE: 2345.0 – 2350.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
BIT RATE: 4 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Test specification:		Second erratum of WT Docket No.07-293, Emission mask	
Test procedure:		47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2011		
Temperature: 22.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

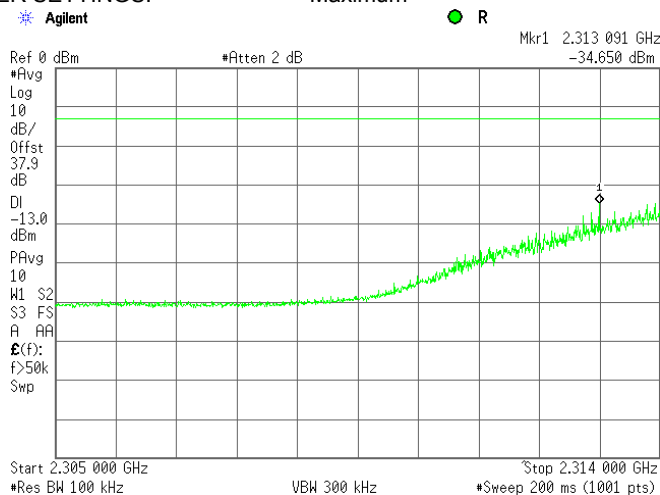
Plot 7.3.25 Emission mask test results at low carrier frequency in frequency range 2285-2305 MHz (single output)

OPERATING FREQUENCY RANGE: 2315.0 – 2320.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
BIT RATE: 14 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Plot 7.3.26 Emission mask test results at low carrier frequency in frequency range 2305-2314 MHz (single output)

OPERATING FREQUENCY RANGE: 2315.0 – 2320.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
BIT RATE: 14 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Test result = SA reading + 10*log(1MHz/RBW) = -34.65 + 10 = -24.65 dBm

Test specification:		Second erratum of WT Docket No.07-293, Emission mask	
Test procedure:		47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:	Compliance	Verdict: PASS	
Date:	2/16/2011		
Temperature: 22.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.3.27 Emission mask test results at low carrier frequency in frequency range 2314-2321 MHz (single output)

OPERATING FREQUENCY RANGE:

DETECTOR USED:

MODULATION:

BIT RATE:

TRANSMITTER OUTPUT POWER SETTINGS:

Low band edge

2315.0 – 2320.0 MHz

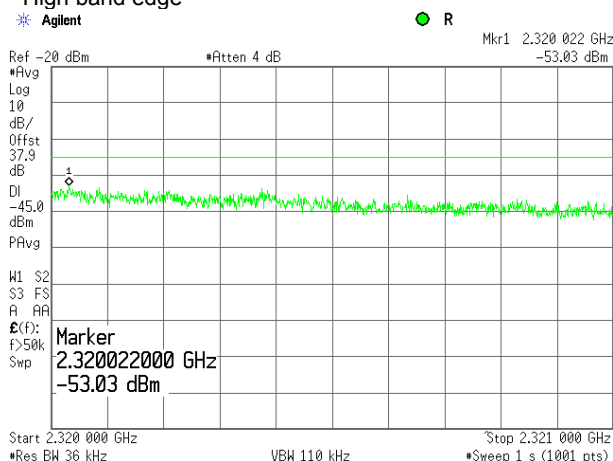
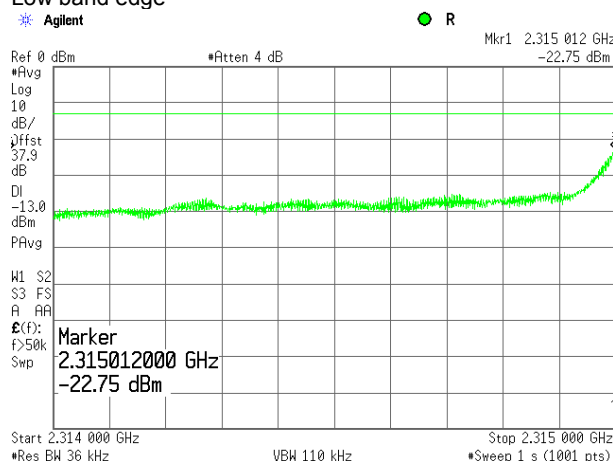
Average

64QAM

14 Mbps

Maximum

High band edge



Plot 7.3.28 Emission mask test results at low carrier frequency in frequency range 2321-2345 MHz (single output)

OPERATING FREQUENCY RANGE:

DETECTOR USED:

MODULATION:

BIT RATE:

TRANSMITTER OUTPUT POWER SETTINGS:

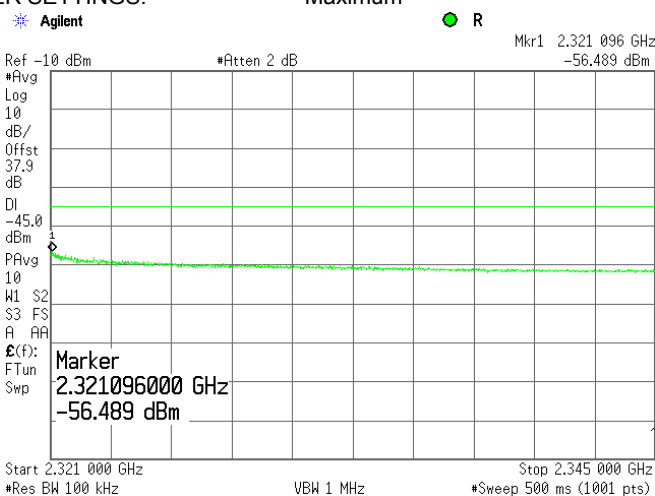
2315.0 – 2320.0 MHz

Average

64QAM

14 Mbps

Maximum

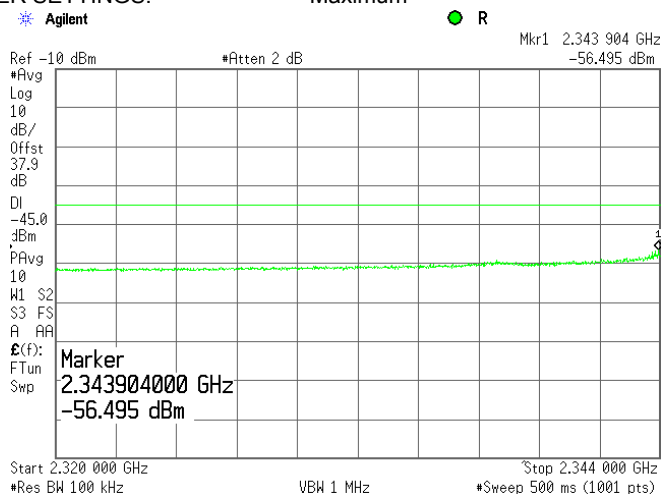


Test result = SA reading + 10*log(1MHz/RBW) = -56.48 + 10 = -46.48 dBm

Test specification:		Second erratum of WT Docket No.07-293, Emission mask	
Test procedure:		47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2011	
Temperature: 22.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.3.29 Emission mask test results at high carrier frequency in frequency range 2320-2344 MHz (single output)

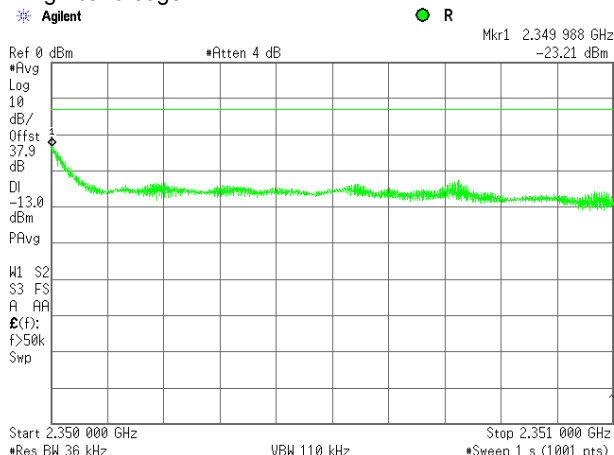
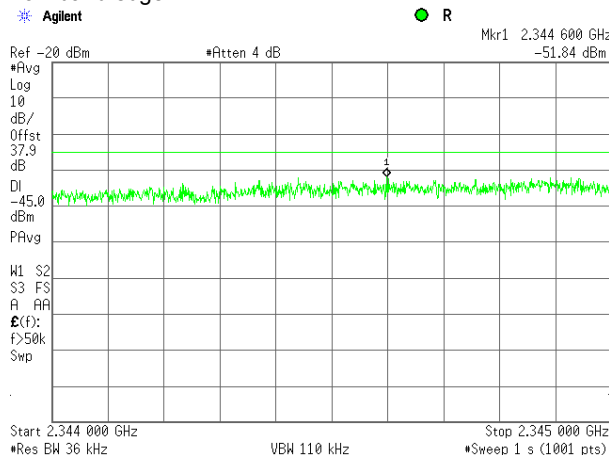
OPERATING FREQUENCY RANGE: 2345.0 – 2350.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
BIT RATE: 14 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



$$\text{Test result} = \text{SA reading} + 10 \cdot \log(1\text{MHz}/\text{RBW}) = -56.49 + 10 = -46.49 \text{ dBm}$$

Plot 7.3.30 Emission mask test results at high carrier frequency in frequency range 2344-2351 MHz (single output)

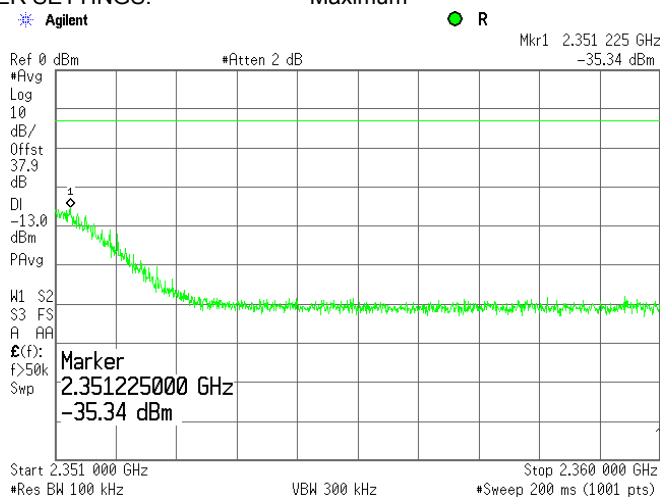
OPERATING FREQUENCY RANGE: 2345.0 – 2350.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
BIT RATE: 14 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
Low band edge
High band edge



Test specification:		Second erratum of WT Docket No.07-293, Emission mask	
Test procedure:		47 CFR, Section 2.1051; TIA/EIA-603-C, Section 2.2.13	
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2011		
Temperature: 22.4 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.3.31 Emission mask test results at high carrier frequency in frequency range 2351-2360 MHz (single output)

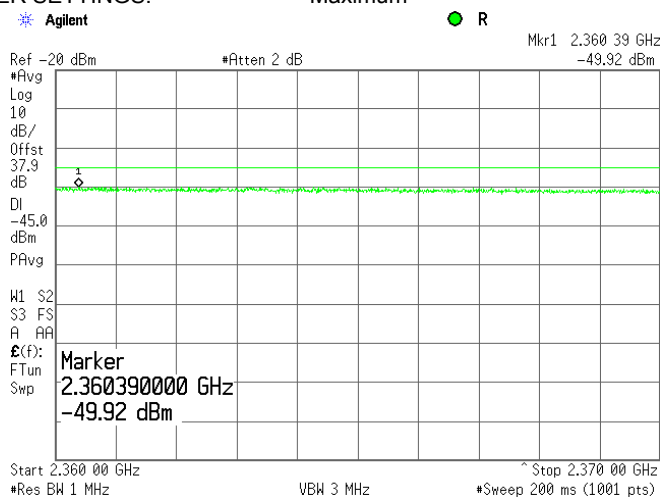
OPERATING FREQUENCY RANGE: 2345.0 – 2350.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
BIT RATE: 14 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Test result = SA reading + 10*log(1MHz/RBW) = -35.34 + 10 = -25.34 dBm

Plot 7.3.32 Emission mask test results at high carrier frequency in frequency range 2360-2370 MHz (single output)

OPERATING FREQUENCY RANGE: 2345.0 – 2350.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
BIT RATE: 14 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum



Test specification:		Second erratum of WT Docket No.07-293, Radiated spurious emissions	
Test procedure:		47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date:	2/20/2011		
Temperature: 22.3 °C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

7.4 Radiated spurious emission measurements

7.4.1 General

This test was performed to measure radiated spurious emissions from the EUT. Specification test limits are given in Table 7.4.1.

Table 7.4.1 Radiated spurious emission test limits

Frequency, MHz	Attenuation below carrier dBc	ERP of spurious, dBm	Equivalent field strength limit @ 3m, dB(μV/m)***
2305 – 2320 2345 - 2360	43+10logP**	-13	82.2
0.009 – 10th harmonic*	75+10logP**	-45	50.2

* - Excluding the in band emission within ± 250 % of the authorized bandwidth from the carrier

** - P is transmitter output power in Watts

*** - Equivalent field strength limit was calculated from maximum allowed ERP of spurious as follows:
 $E = \sqrt{30 \times P \times 1.64} / r$, where P is ERP in Watts, 1.64 is numeric gain of ideal dipole and r is antenna to EUT distance in meters

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

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

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

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

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

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

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

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

7.4.4 Test procedure for substitution ERP measurements of spurious

7.4.4.1 The test equipment was set up as shown in Figure 7.4.3 and energized.

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

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

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

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

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

7.4.4.7 The worst test results (the lowest margins) were recorded in Table 7.4.3 and shown in the associated plots.

Test specification:	Second erratum of WT Docket No.07-293, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict: PASS	
Date:	2/20/2011		
Temperature: 22.3 °C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

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

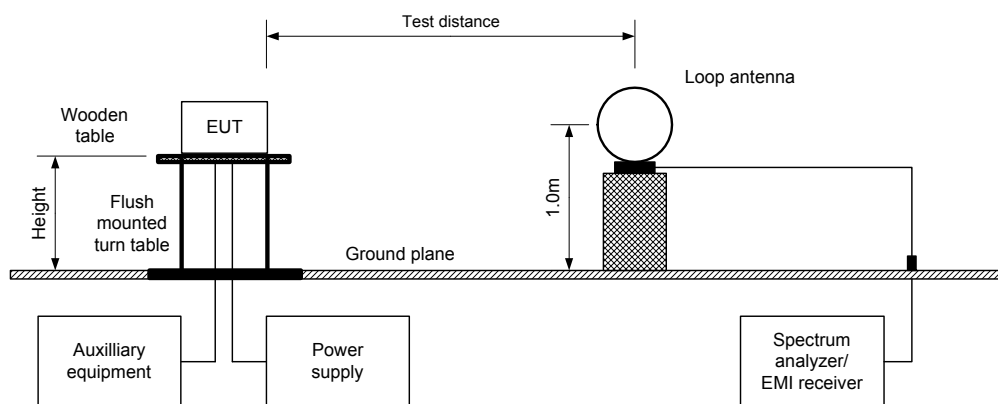
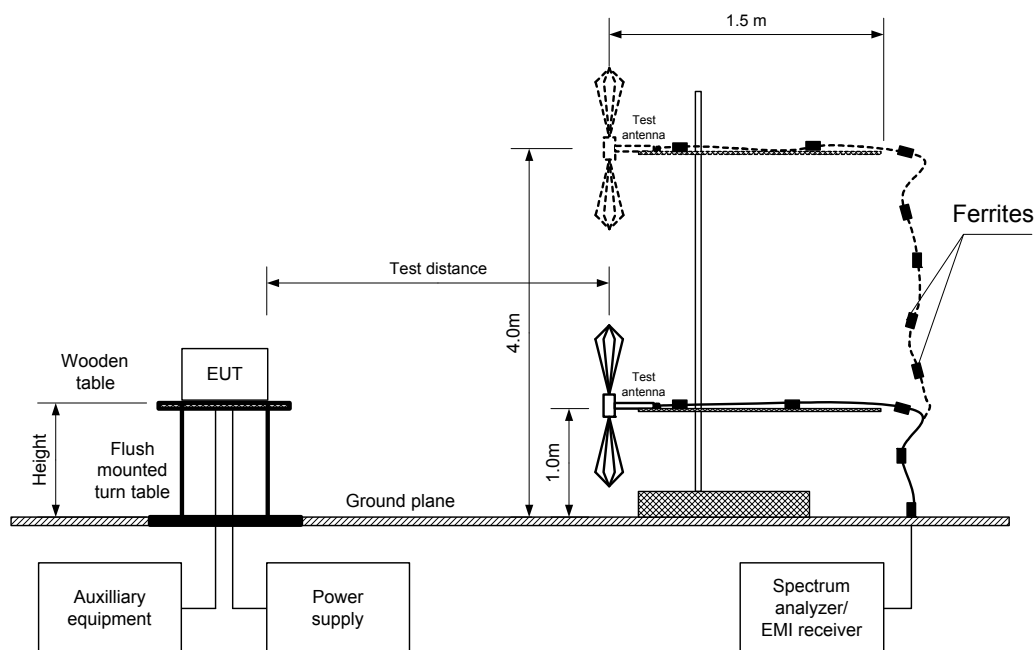
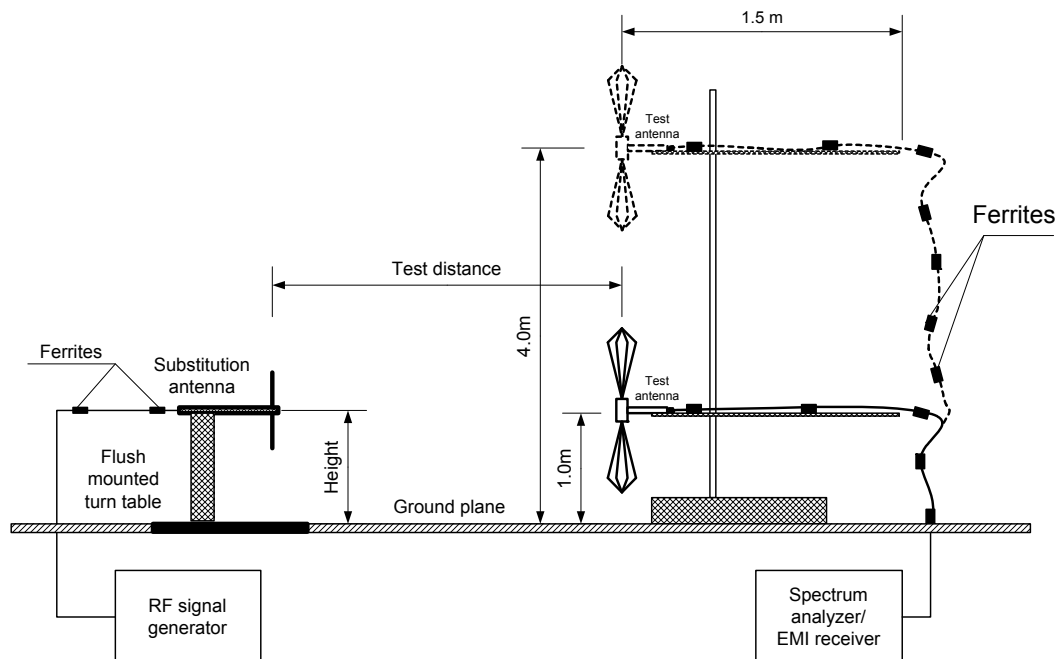


Figure 7.4.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification: Second erratum of WT Docket No.07-293, Radiated spurious emissions			
Test procedure: 47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12			
Test mode: Compliance		Verdict: PASS	
Date: 2/20/2011			
Temperature: 22.3 °C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Figure 7.4.3 Setup for substitution ERP measurements of spurious



Test specification: Second erratum of WT Docket No.07-293, Radiated spurious emissions			
Test procedure: 47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12			
Test mode: Compliance	Verdict: PASS		
Date: 2/20/2011			
Temperature: 22.3 °C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Table 7.4.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE: 2315.0 – 2320.0 MHz; 2345.0 – 2350.0 MHz
 TEST DISTANCE: 3 m
 TEST SITE: Semi anechoic chamber
 EUT HEIGHT: 0.8 m
 INVESTIGATED FREQUENCY RANGE: 0.009 – 24000 MHz
 DETECTOR USED: Peak
 VIDEO BANDWIDTH: > Resolution bandwidth
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
 Biconilog (30 MHz – 1000 MHz)
 Double ridged guide (above 1000 MHz)
 MODULATION: 64QAM
 MODULATING SIGNAL: PRBS
 BIT RATE: 14 Mbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	Field strength, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	RBW, kHz	Antenna polarization	Antenna height, m	Turn-table position**, degrees
Low carrier frequency MHz							
74.045	41.48	50.2	-8.72	100	Vert	1.0	0
141.338	48.71	50.2	-1.49	100	Vert	1.0	0
151.225	44.89	50.2	-5.31	100	Vert	1.0	0
158.018	46.49	50.2	-3.71	100	Vert	1.0	0
266.930	48.86	50.2	-1.34	100	Hor	1.35	270
1000.00	46.87	50.2	-3.33	100	Vert	1.0	0
1250.00	45.95***	50.2	-4.25	1000	Vert	1.0	0
4633.00	41.90***	50.2	-8.30	1000	Vert	1.0	0
High carrier frequency MHz							
74.045	41.48	50.2	-8.72	100	Vert	1.0	0
99.995	42.93	50.2	-7.27	100	Vert	1.0	0
148.360	47.69	50.2	-2.51	100	Vert	1.0	0
151.225	44.89	50.2	-5.31	100	Vert	1.0	0
158.018	46.49	50.2	-3.71	100	Vert	1.0	0
267.013	49.03	50.2	-1.17	100	Hor	1.4	277
1000.00	47.37	50.2	-2.83	100	Vert	1.0	0
1250.00	46.07**	50.2	-6.13	1000	Vert	1.0	0
4697.05	39.53**	50.2	-10.67	1000	Vert	1.0	0

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

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

*** - The measurement was performed with VBW = 1 kHz

Test specification:		Second erratum of WT Docket No.07-293, Radiated spurious emissions			
Test procedure:		47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12			
Test mode:		Compliance		Verdict: PASS	
Date:		2/20/2011			
Temperature: 22.3 °C	Air Pressure: 1008 hPa	Relative Humidity: 44 %		Power Supply: 48VDC	
Remarks:					

Table 7.4.3 Substitution ERP of spurious test results

ASSIGNED FREQUENCY RANGE: 2315.0 – 2320.0 MHz; 2345.0 – 2350.0 MHz
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
SUBSTITUTION ANTENNA HEIGHT: 0.8 m
DETECTOR USED: Peak
VIDEO BANDWIDTH: > Resolution bandwidth
SUBSTITUTION ANTENNA TYPE: Tunable dipole (30 MHz – 1000 MHz)
Double ridged guide (above 1000 MHz)

Frequency, MHz	Field strength, dB(μV/m)	RBW, kHz	Antenna polarization	RF generator output, dBm	Ant gain, dBd	Cable loss, dB	ERP, dBm	Limit, dBm	Margin*, dB	Verdict
Low carrier frequency										
74.045	41.48	100	Vert	-55.36	1.16	0.28	-54.48	-45.00	-9.48	Pass
141.338	48.71	100	Vert	-48.62	0.50	0.38	-48.50	-45.00	-3.50	Pass
151.225	44.89	100	Vert	-51.72	0.29	0.39	-51.82	-45.00	-6.82	Pass
158.018	46.49	100	Vert	-49.17	0.12	0.40	-49.45	-45.00	-4.45	Pass
266.930	48.86	100	Hor	-47.37	1.25	0.51	-46.63	-45.00	-1.63	Pass
1000.00	46.87	100	Vert	-53.46	5.70	0.89	-48.65	-45.00	-3.65	Pass
1250.00	45.95	1000	Vert	-56.67	7.44	1.01	-50.26	-45.00	-5.26	Pass
4633.00	41.90	1000	Vert	-62.46	10.33	2.11	-54.24	-45.00	-9.24	Pass
High carrier frequency										
74.045	41.48	100	Vert	-55.36	1.16	0.28	-54.48	-45.00	-9.48	Pass
99.995	42.93	100	Vert	-53.53	0.80	0.33	-53.06	-45.00	-8.06	Pass
148.360	47.69	100	Vert	-49.64	0.92	0.38	-49.10	-45.00	-4.10	Pass
151.225	44.89	100	Vert	-51.72	0.29	0.39	-51.82	-45.00	-6.82	Pass
158.018	46.49	100	Vert	-49.17	0.12	0.40	-49.45	-45.00	-4.45	Pass
267.013	49.03	100	Hor	-47.2	1.25	0.51	-46.46	-45.00	-1.46	Pass
1000.00	47.37	100	Vert	-52.96	5.70	0.89	-48.15	-45.00	-3.15	Pass
1250.00	46.07	1000	Vert	-56.81	7.44	1.01	-50.38	-45.00	-5.38	Pass
4697.05	39.53	1000	Vert	-64.83	10.45	2.11	-56.49	-45.00	-11.49	Pass

*- Margin = Spurious emission – specification limit.

Reference numbers of test equipment used

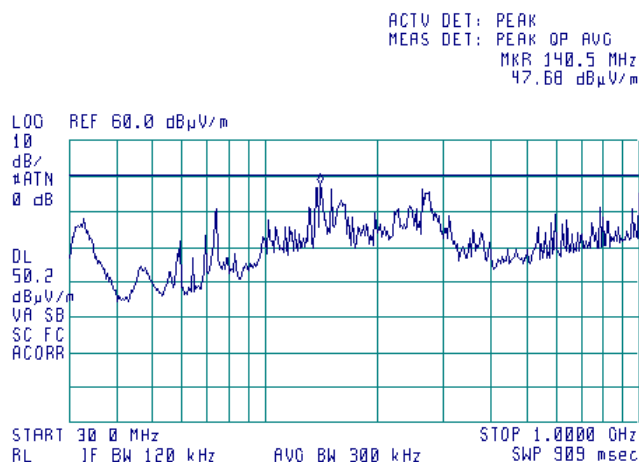
HL 0446	HL 0521	HL 0604	HL 1984	HL 2870	HL 2871	HL 2909	HL 3623
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Full description is given in Appendix A.

Test specification:		Second erratum of WT Docket No.07-293, Radiated spurious emissions	
Test procedure:		47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date:	2/20/2011		
Temperature: 22.3 °C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

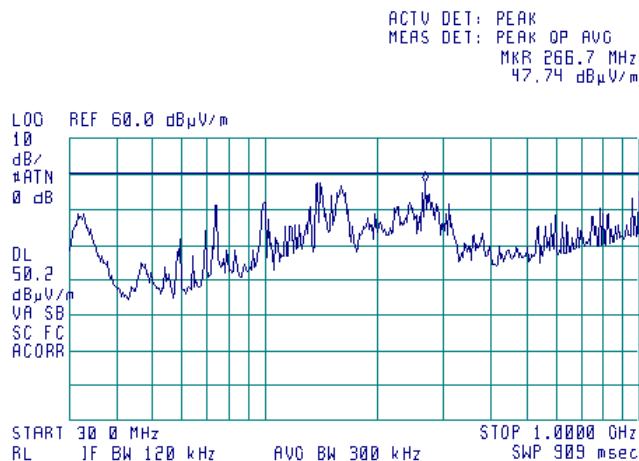
Plot 7.4.1 Radiated emission measurements in 30 - 1000 MHz range

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



Plot 7.4.2 Radiated emission measurements in 30 - 1000 MHz range

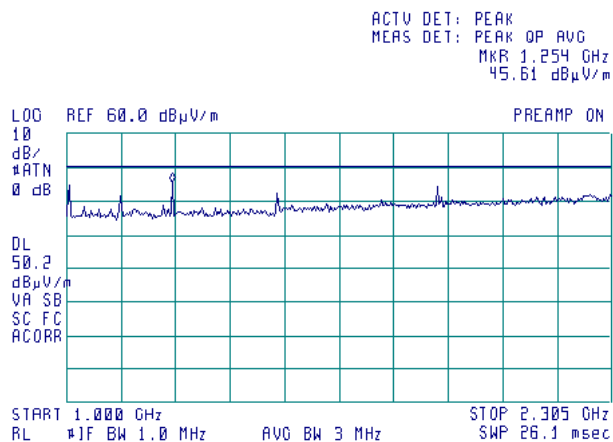
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:		Second erratum of WT Docket No.07-293, Radiated spurious emissions	
Test procedure:		47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date:	2/20/2011		
Temperature: 22.3 °C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

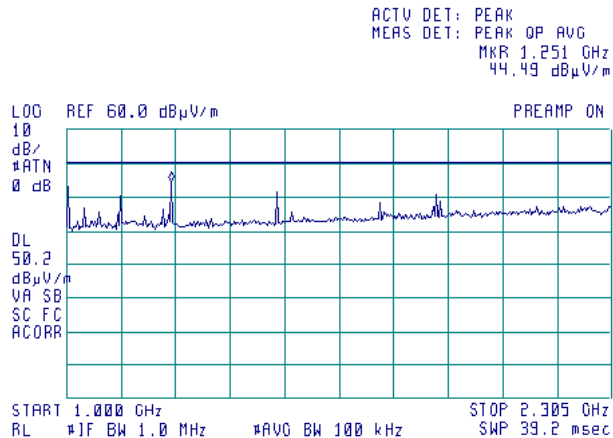
Plot 7.4.3 Radiated emission measurements in 1000 – 2305 MHz range

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



Plot 7.4.4 Radiated emission measurements in 1000 – 2305 MHz range

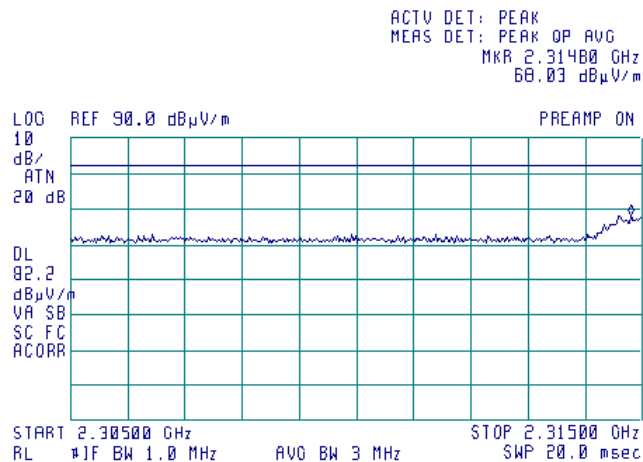
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m
DETECTOR: Average



Test specification:		Second erratum of WT Docket No.07-293, Radiated spurious emissions	
Test procedure:		47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:		Compliance	Verdict: PASS
Date:		2/20/2011	
Temperature: 22.3 °C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.4.5 Radiated emission measurements in 2305 – 2315 MHz range

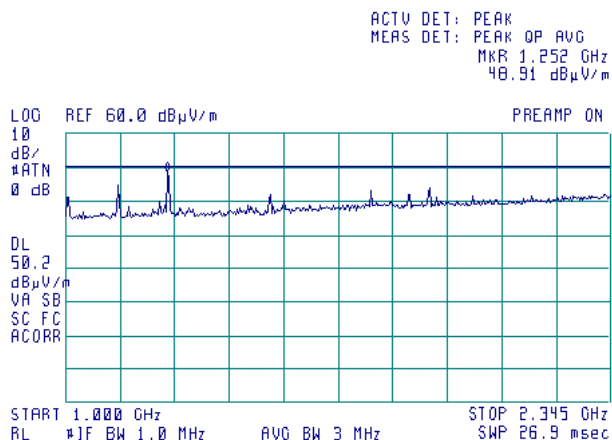
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:		Second erratum of WT Docket No.07-293, Radiated spurious emissions	
Test procedure:		47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:		Compliance	Verdict: PASS
Date:		2/20/2011	
Temperature: 22.3 °C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

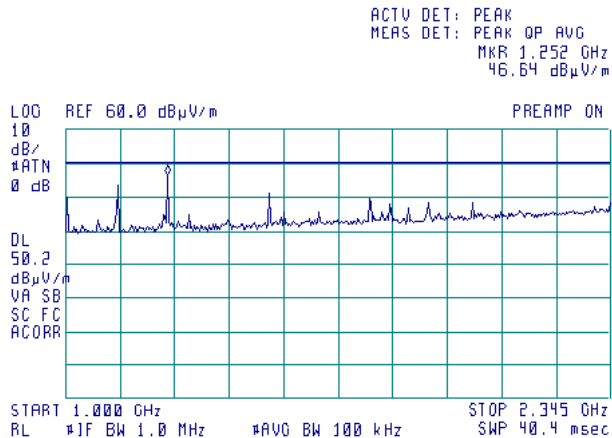
Plot 7.4.6 Radiated emission measurements in 1000 – 2345 MHz range

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



Plot 7.4.7 Radiated emission measurements in 1000 – 2345 MHz range

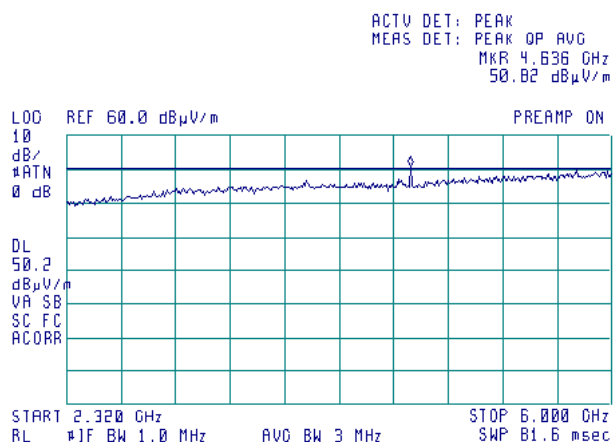
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m
DETECTOR: Average



Test specification:		Second erratum of WT Docket No.07-293, Radiated spurious emissions	
Test procedure:		47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:		Compliance	Verdict: PASS
Date:		2/20/2011	
Temperature: 22.3 °C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

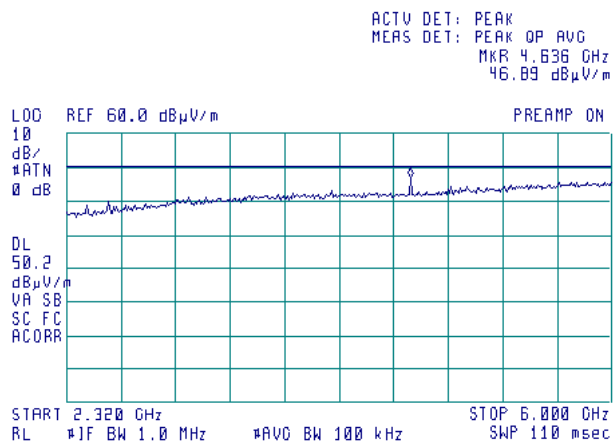
Plot 7.4.8 Radiated emission measurements in 2320 – 6000 MHz range

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



Plot 7.4.9 Radiated emission measurements in 2320 – 6000 MHz range

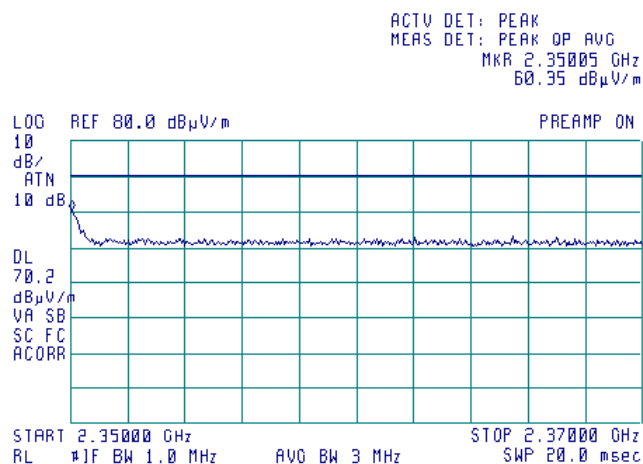
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: Low
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m
DETECTOR: Average



Test specification:		Second erratum of WT Docket No.07-293, Radiated spurious emissions	
Test procedure:		47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:		Compliance	Verdict: PASS
Date:		2/20/2011	
Temperature: 22.3 °C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.4.10 Radiated emission measurements in 2350 – 2370 MHz range

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

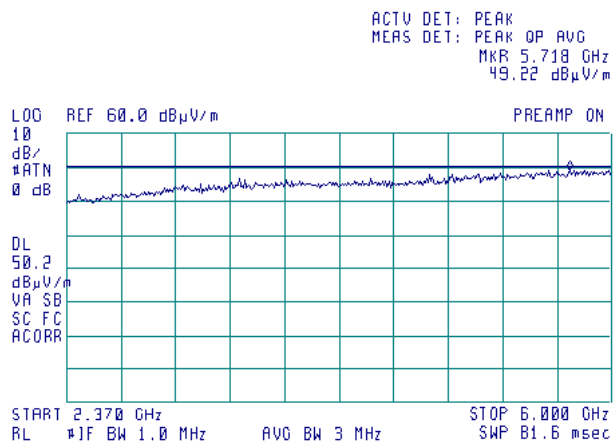


NOTE: limit 82.2 dBuV/m was applied

Test specification:		Second erratum of WT Docket No.07-293, Radiated spurious emissions	
Test procedure:		47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date:	2/20/2011		
Temperature: 22.3 °C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

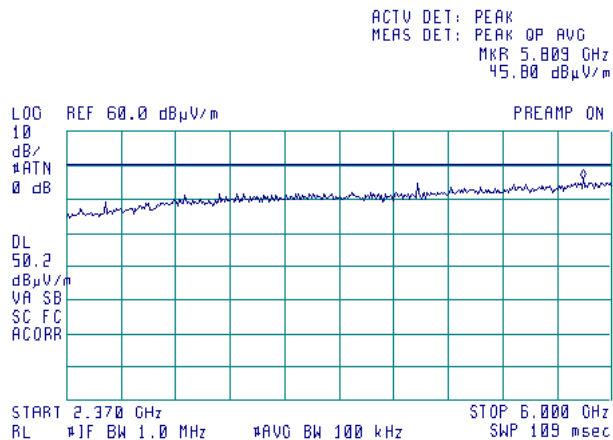
Plot 7.4.11 Radiated emission measurements in 2370 – 6000 MHz range

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



Plot 7.4.12 Radiated emission measurements in 2370 – 6000 MHz range

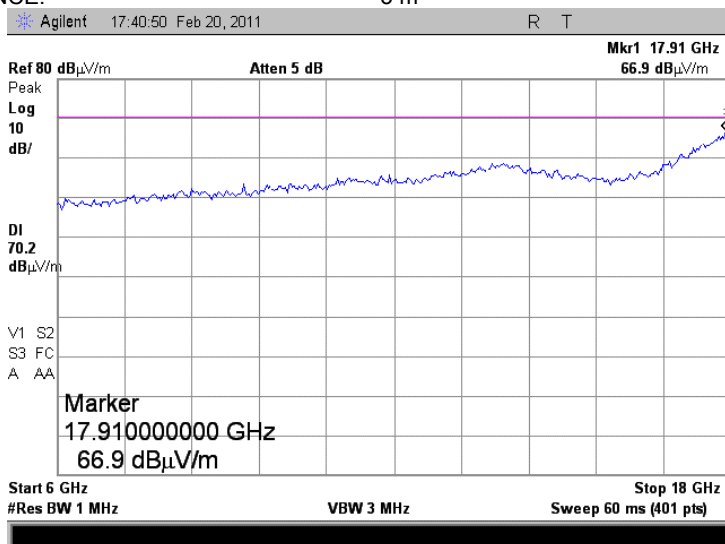
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m
DETECTOR: Average



Test specification:		Second erratum of WT Docket No.07-293, Radiated spurious emissions	
Test procedure:		47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:		Compliance	Verdict: PASS
Date:		2/20/2011	
Temperature: 22.3 °C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

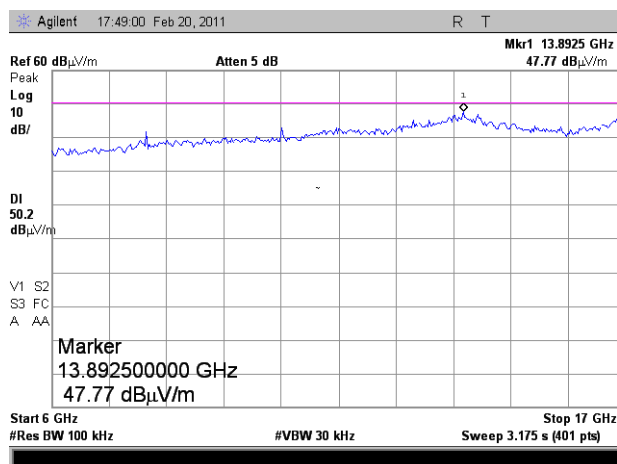
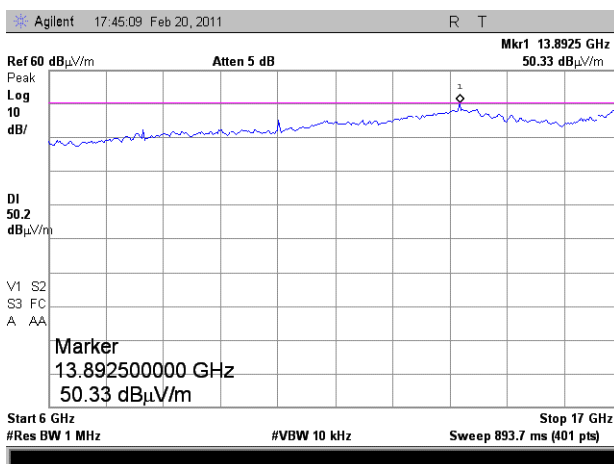
Plot 7.4.13 Radiated emission measurements in 6000 – 18000 MHz range

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



Plot 7.4.14 Radiated emission measurements in 6000 – 17000 MHz range

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

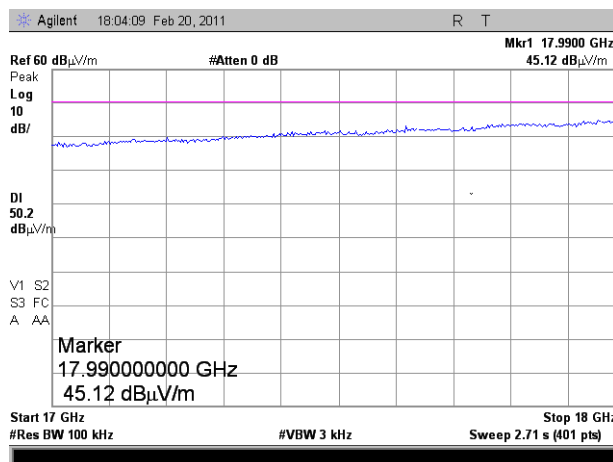
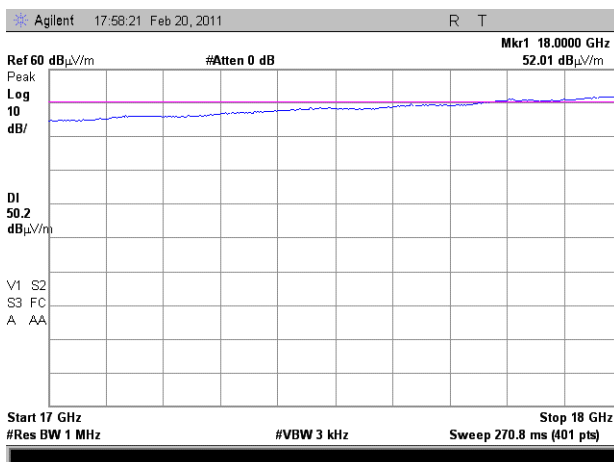


Test specification:		Second erratum of WT Docket No.07-293, Radiated spurious emissions	
Test procedure:		47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:		Compliance	Verdict: PASS
Date:		2/20/2011	
Temperature: 22.3 °C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.4.15 Radiated emission measurements in 17000 – 18000 MHz range

TEST SITE:
CARRIER FREQUENCY:
ANTENNA POLARIZATION:
TEST DISTANCE:

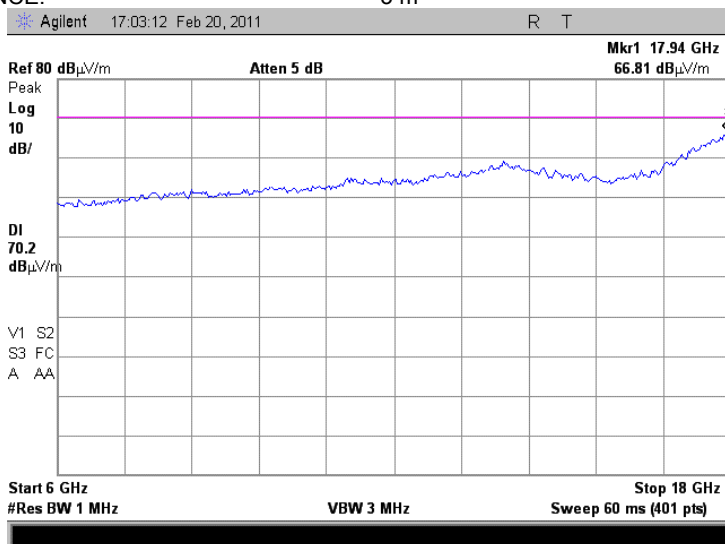
Semi anechoic chamber
Low
Vertical and Horizontal
3 m



Test specification:		Second erratum of WT Docket No.07-293, Radiated spurious emissions	
Test procedure:		47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:		Compliance	Verdict: PASS
Date:		2/20/2011	
Temperature: 22.3 °C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

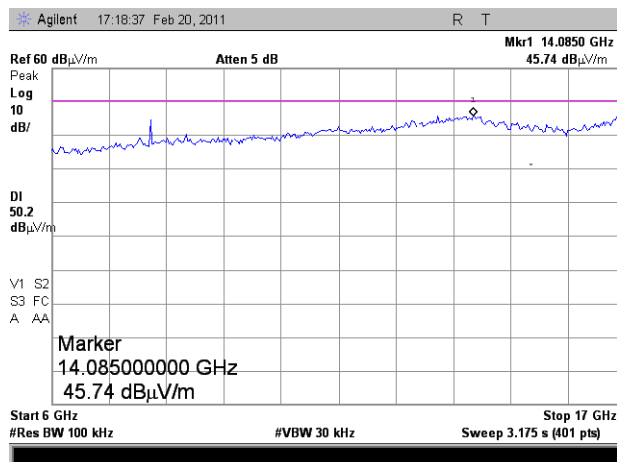
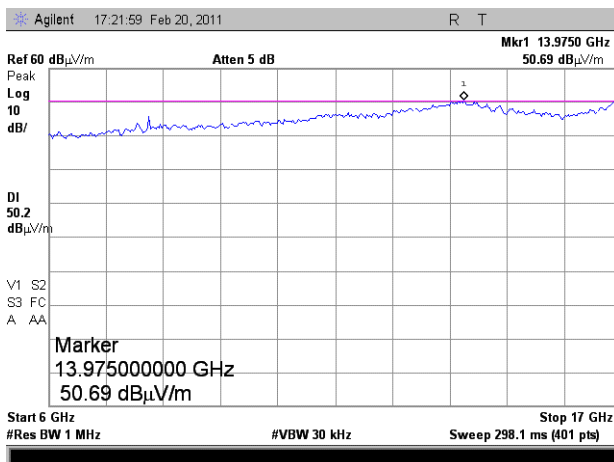
Plot 7.4.16 Radiated emission measurements in 6000 – 18000 MHz range

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



Plot 7.4.17 Radiated emission measurements in 6000 – 17000 MHz range

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

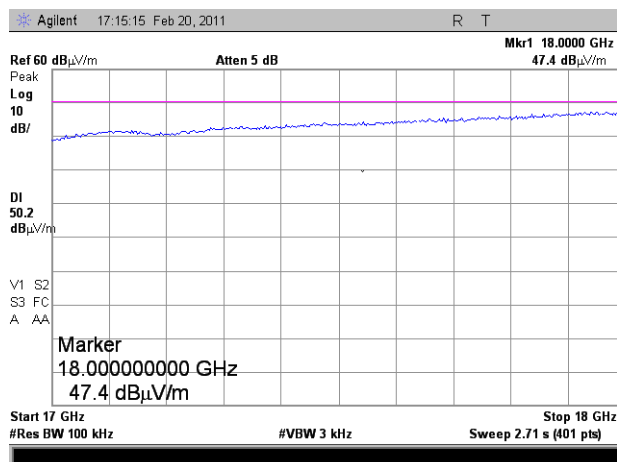
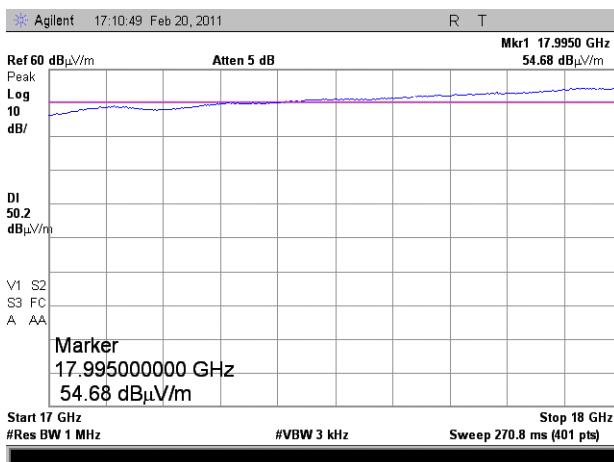


Test specification:		Second erratum of WT Docket No.07-293, Radiated spurious emissions	
Test procedure:		47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:		Compliance	Verdict: PASS
Date:		2/20/2011	
Temperature: 22.3 °C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.4.18 Radiated emission measurements in 17000 – 18000 MHz range

TEST SITE:
CARRIER FREQUENCY:
ANTENNA POLARIZATION:
TEST DISTANCE:

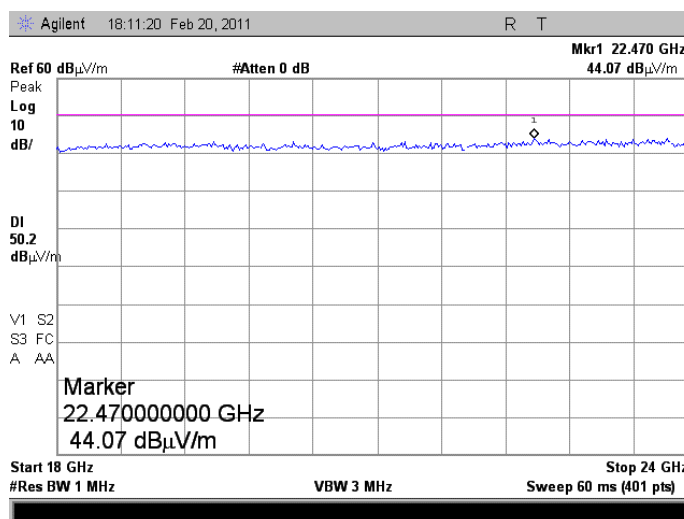
Semi anechoic chamber
High
Vertical and Horizontal
3 m



Test specification:		Second erratum of WT Docket No.07-293, Radiated spurious emissions	
Test procedure:		47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:		Compliance	Verdict: PASS
Date:		2/20/2011	
Temperature: 22.3 °C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

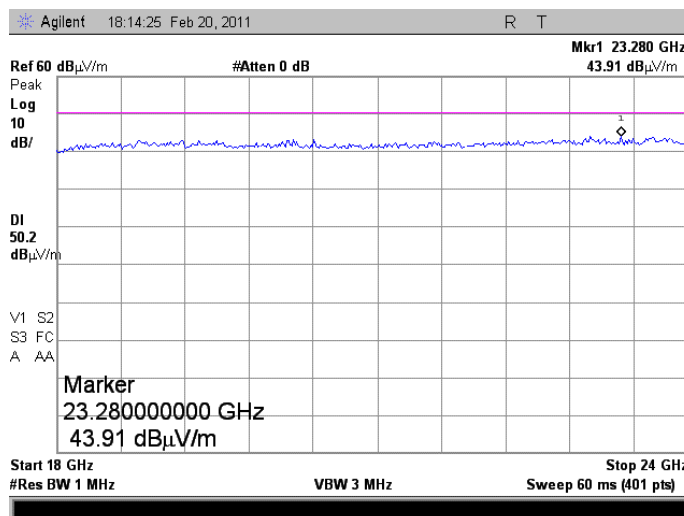
Plot 7.4.19 Radiated emission measurements in 18000 – 24000 MHz range

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



Plot 7.4.20 Radiated emission measurements in 18000 – 24000 MHz range

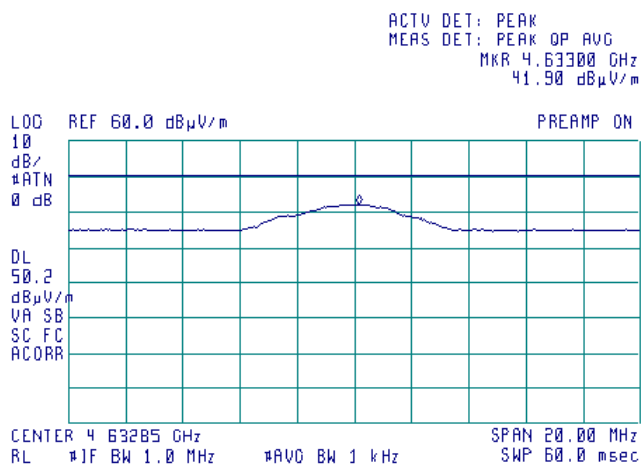
TEST SITE: OATS
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:		Second erratum of WT Docket No.07-293, Radiated spurious emissions	
Test procedure:		47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:	Compliance	Verdict:	PASS
Date:	2/20/2011		
Temperature: 22.3 °C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

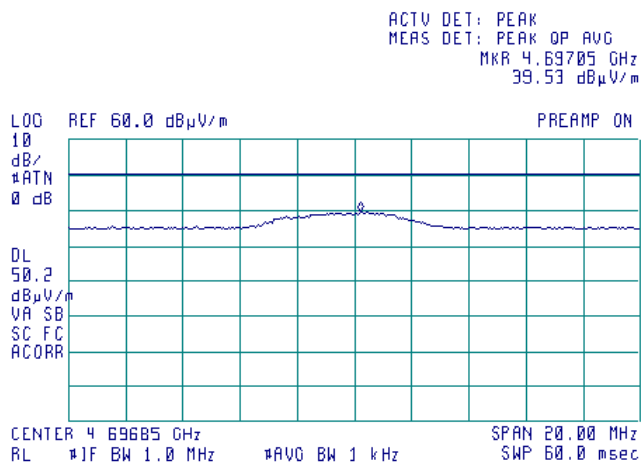
Plot 7.4.21 Radiated emission measurements at the 2nd harmonic

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



Plot 7.4.22 Radiated emission measurements at the 2nd harmonic

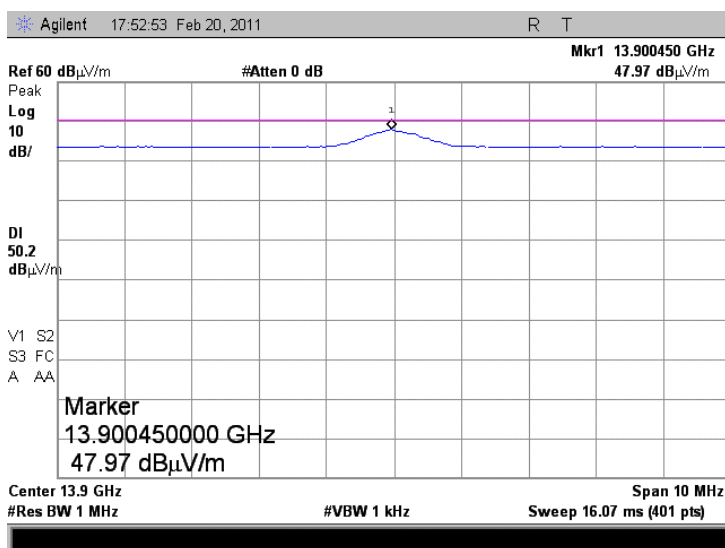
TEST SITE: Semi anechoic chamber
CARRIER FREQUENCY: High
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:		Second erratum of WT Docket No.07-293, Radiated spurious emissions	
Test procedure:		47 CFR, Section 2.1053; TIA/EIA-603-C, Section 2.2.12	
Test mode:		Compliance	Verdict: PASS
Date:		2/20/2011	
Temperature: 22.3 °C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.4.23 Radiated emission measurements at the 5th harmonic

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



Test specification:		Second erratum of WT Docket No.07-293, Conducted spurious emissions	
Test procedure:		47 CFR, Section 2.1051 TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2011	
Temperature: 22.3 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

7.5 Spurious emissions at RF antenna connector test

7.5.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 7.5.1. The test results are provided in Table 7.5.2 and associated plots.

Table 7.5.1 Spurious emission limits

Frequency, MHz	Attenuation below carrier, dBc	ERP of spurious, dBm
0.009 – 10th harmonic*	75+10logP**	-45.0

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

** - P is transmitter output power in Watts

7.5.2 Test procedure

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

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

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

Figure 7.5.1 Spurious emission test setup

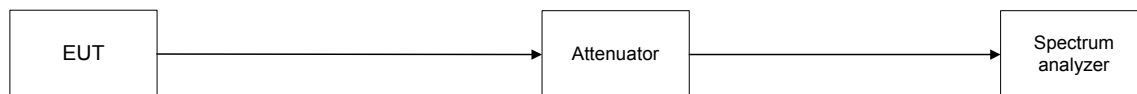
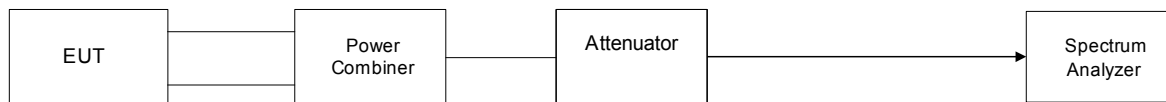


Figure 7.5.2 Emission mask test setup for combined outputs



Test specification:		Second erratum of WT Docket No.07-293, Conducted spurious emissions	
Test procedure:		47 CFR, Section 2.1051 TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2011	
Temperature: 22.3 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Table 7.5.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 2315.0 – 2320.0 MHz; 2345.0 – 2350.0 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 24000 MHz
 DETECTOR USED: Peak
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 MODULATION: 64QAM
 MODULATING SIGNAL: PRBS
 BIT RATE: 14.0 Mbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum

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

*- Margin = Spurious emission – specification limit.

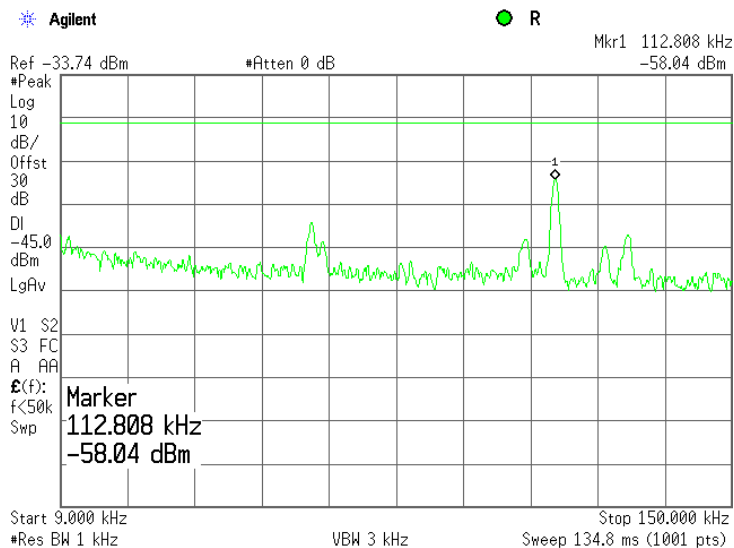
Reference numbers of test equipment used

HL 1906	HL 2015	HL 2953	HL 3472	HL 3474	HL 3787	HL 3818	
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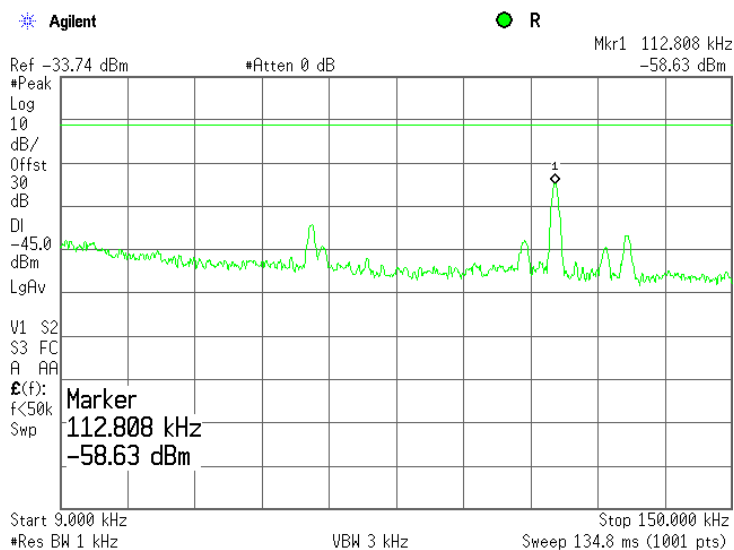
Full description is given in Appendix A.

Test specification:		Second erratum of WT Docket No.07-293, Conducted spurious emissions	
Test procedure:		47 CFR, Section 2.1051 TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2011	
Temperature: 22.3 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

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

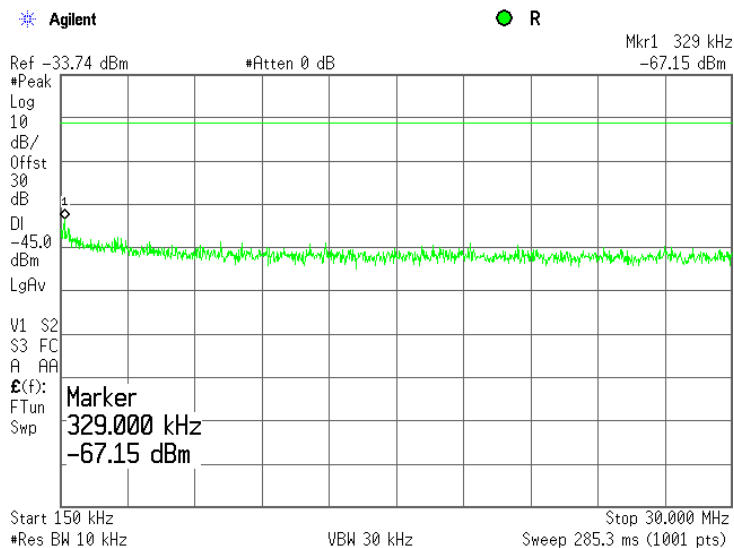


Plot 7.5.2 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency, single output

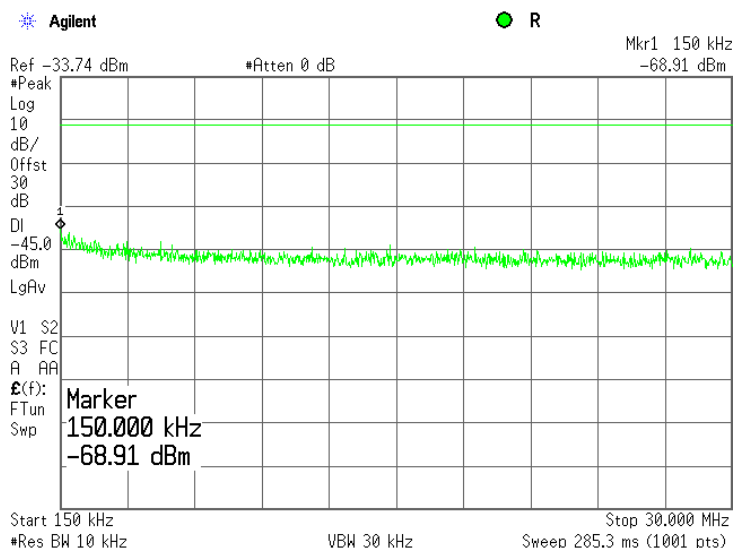


Test specification:		Second erratum of WT Docket No.07-293, Conducted spurious emissions	
Test procedure:		47 CFR, Section 2.1051 TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2011	
Temperature: 22.3 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.3 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency, single output

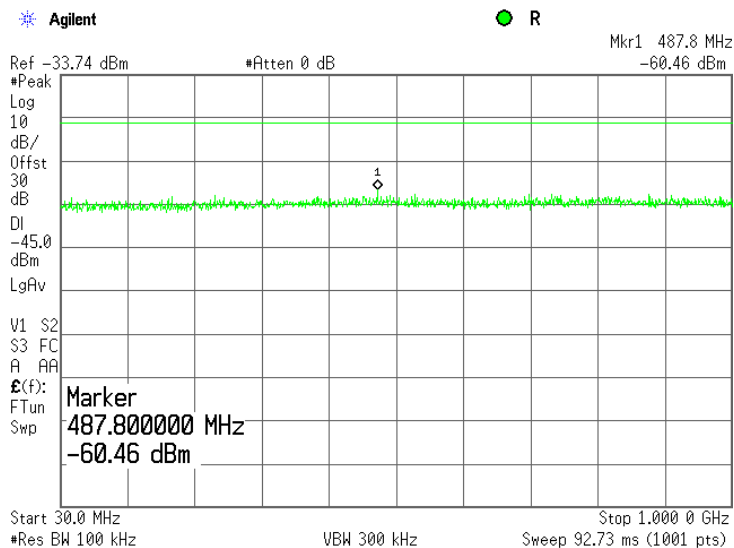


Plot 7.5.4 Spurious emission measurements in 0.15 - 30.0 MHz range at high carrier frequency, single output

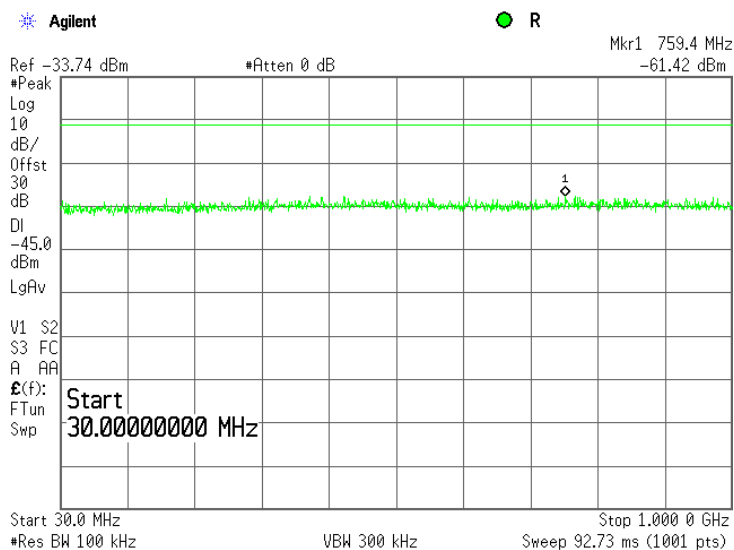


Test specification:		Second erratum of WT Docket No.07-293, Conducted spurious emissions	
Test procedure:		47 CFR, Section 2.1051 TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2011	
Temperature: 22.3 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.5 Spurious emission measurements in 30.0 – 1000.0 MHz range at low carrier frequency, single output

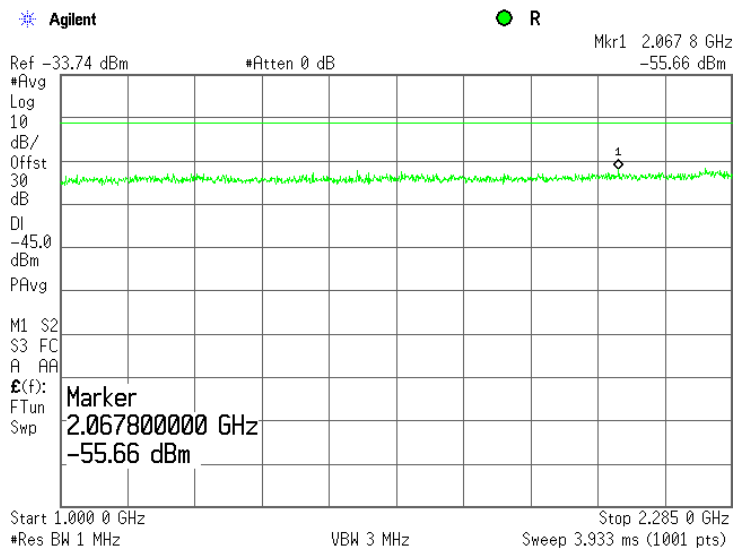


Plot 7.5.6 Spurious emission measurements in 30.0 – 1000.0 MHz range at high carrier frequency, single output

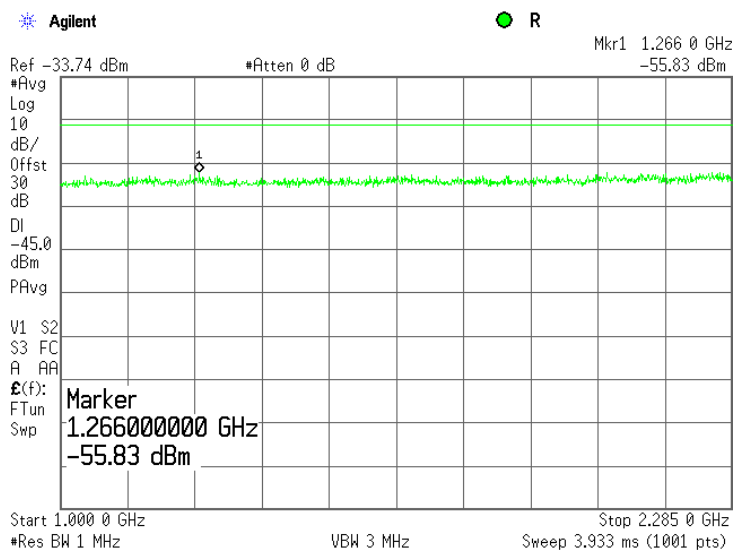


Test specification:	Second erratum of WT Docket No.07-293, Conducted spurious emissions		
Test procedure:	47 CFR, Section 2.1051 TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2011		
Temperature: 22.3 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.7 Spurious emission measurements in 1000.0 – 2285.0 MHz range at low carrier frequency, single output

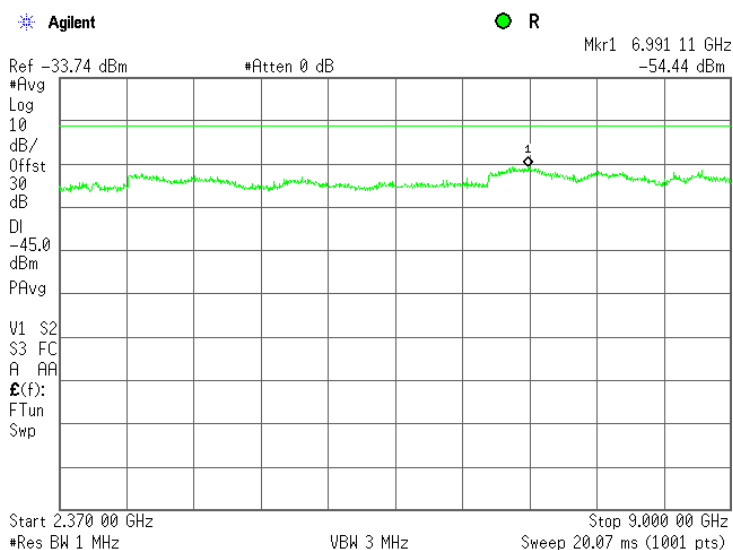


Plot 7.5.8 Spurious emission measurements in 1000.0 – 2285.0 MHz at high carrier frequency, single output

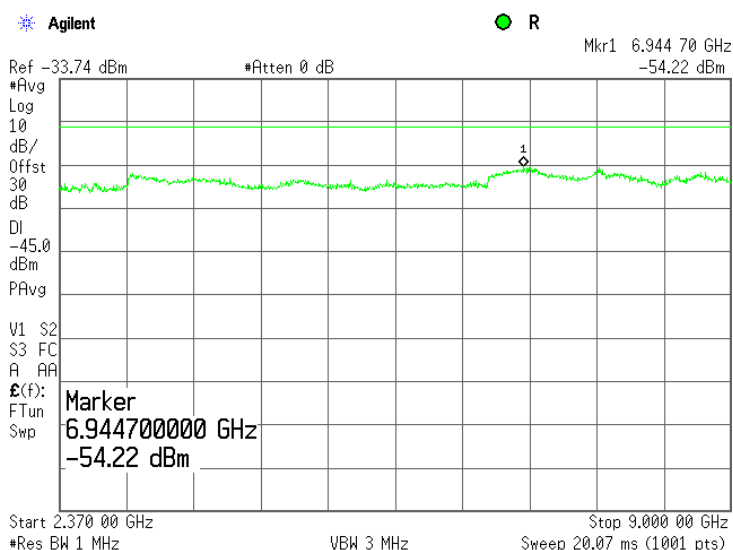


Test specification:		Second erratum of WT Docket No.07-293, Conducted spurious emissions	
Test procedure:		47 CFR, Section 2.1051 TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2011	
Temperature: 22.3 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.9 Spurious emission measurements in 2370 – 9000 MHz range at low carrier frequency, single output

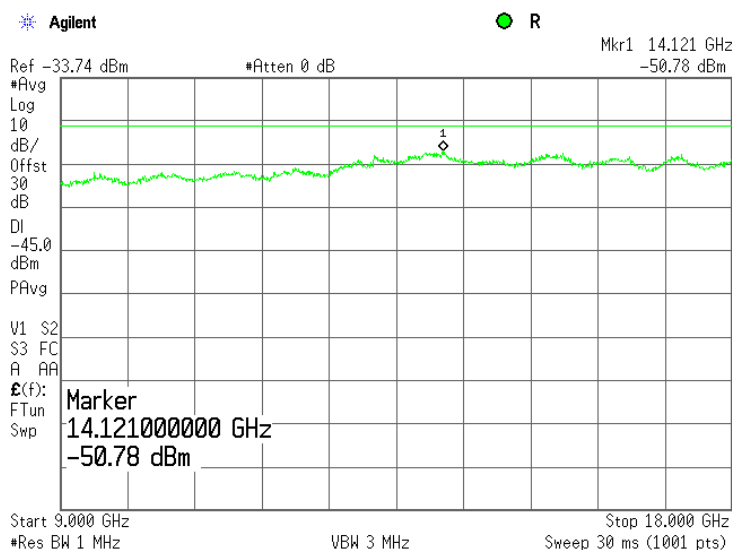


Plot 7.5.10 Spurious emission measurements in 2370 – 9000 MHz range at high carrier frequency, single output

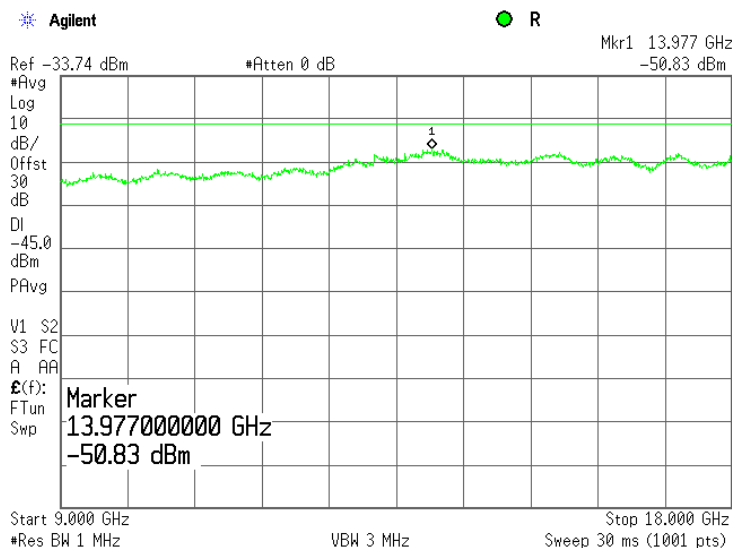


Test specification:		Second erratum of WT Docket No.07-293, Conducted spurious emissions	
Test procedure:		47 CFR, Section 2.1051 TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2011	
Temperature: 22.3 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.11 Spurious emission measurements in 9000 – 18000 MHz range at low carrier frequency, single output

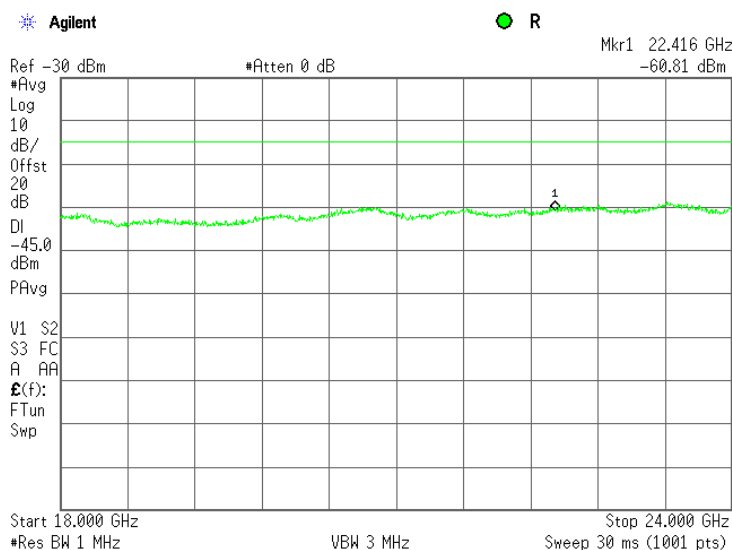


Plot 7.5.12 Spurious emission measurements in 9000 – 18000 MHz range at high carrier frequency, single output

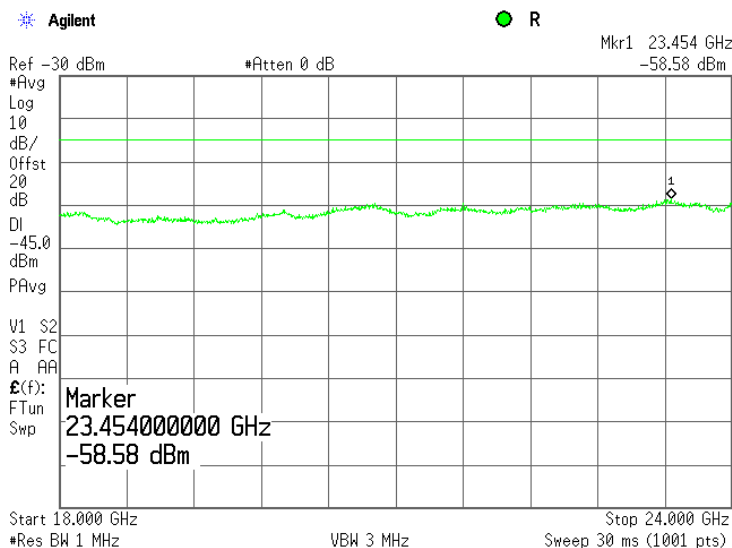


Test specification:		Second erratum of WT Docket No.07-293, Conducted spurious emissions	
Test procedure:		47 CFR, Section 2.1051 TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2011	
Temperature: 22.3 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.13 Spurious emission measurements in 18000 – 24000 MHz range at low carrier frequency, single output

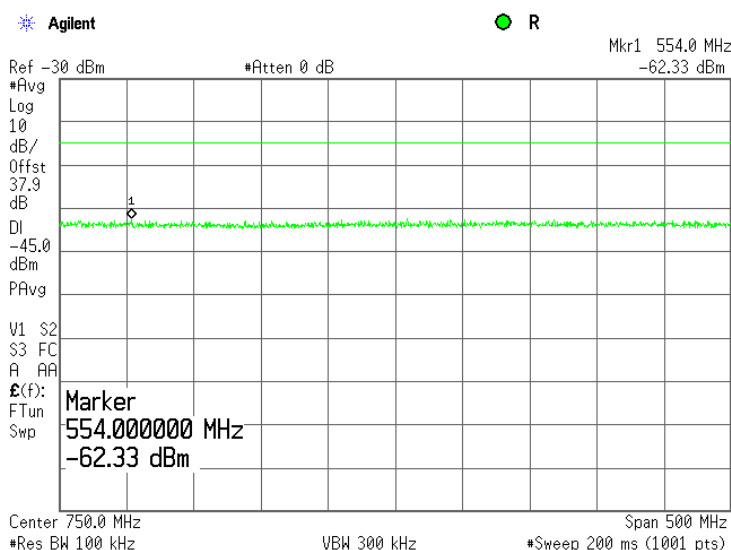


Plot 7.5.14 Spurious emission measurements in 18000 – 24000 MHz range at high carrier frequency, single output

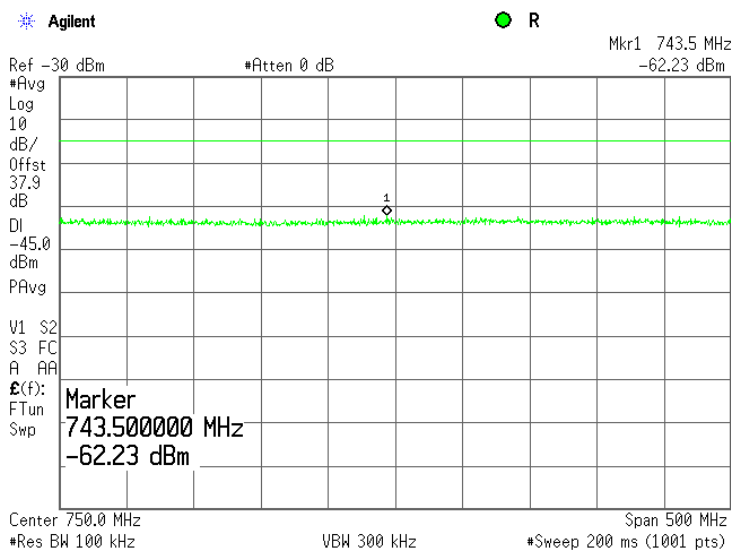


Test specification:		Second erratum of WT Docket No.07-293, Conducted spurious emissions	
Test procedure:		47 CFR, Section 2.1051 TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2011	
Temperature: 22.3 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.15 Spurious emission measurements in 500.0 – 1000.0 MHz range at low carrier frequency, combined outputs

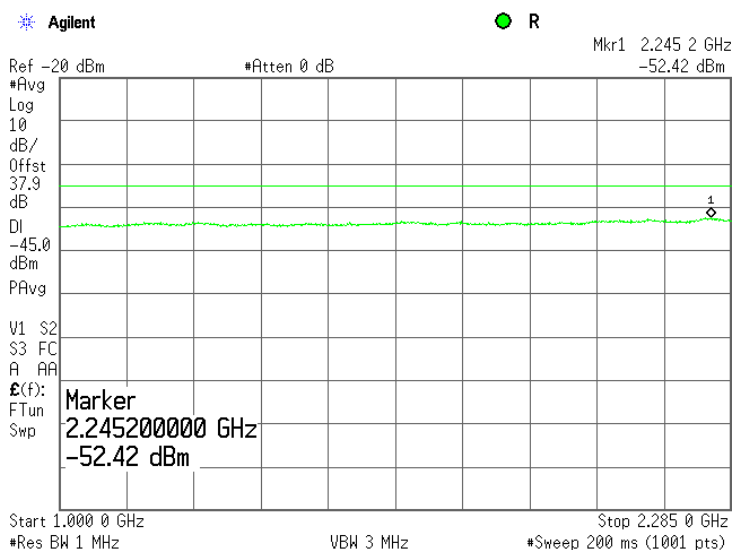


Plot 7.5.16 Spurious emission measurements in 500.0 – 1000.0 MHz range at high carrier frequency, combined outputs

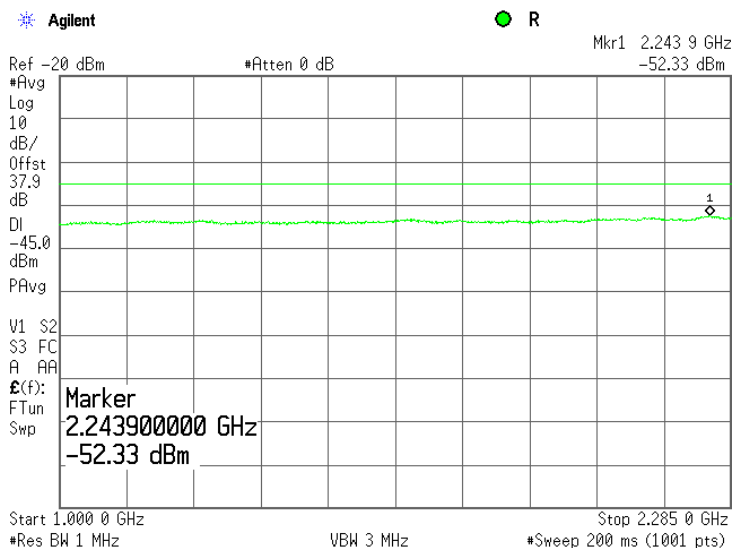


Test specification:		Second erratum of WT Docket No.07-293, Conducted spurious emissions	
Test procedure:		47 CFR, Section 2.1051 TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2011	
Temperature: 22.3 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.17 Spurious emission measurements in 1000.0 – 2285.0 MHz range at low carrier frequency, combined outputs

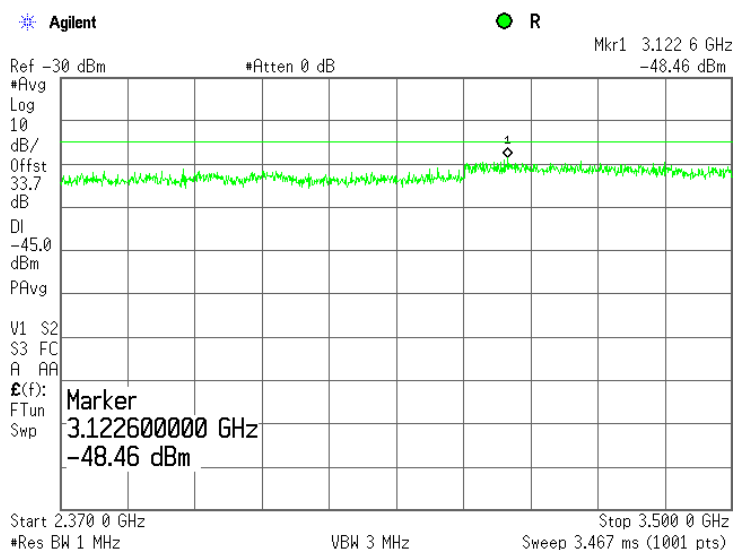


Plot 7.5.18 Spurious emission measurements in 1000.0 – 2285.0 MHz range at high carrier frequency, combined outputs

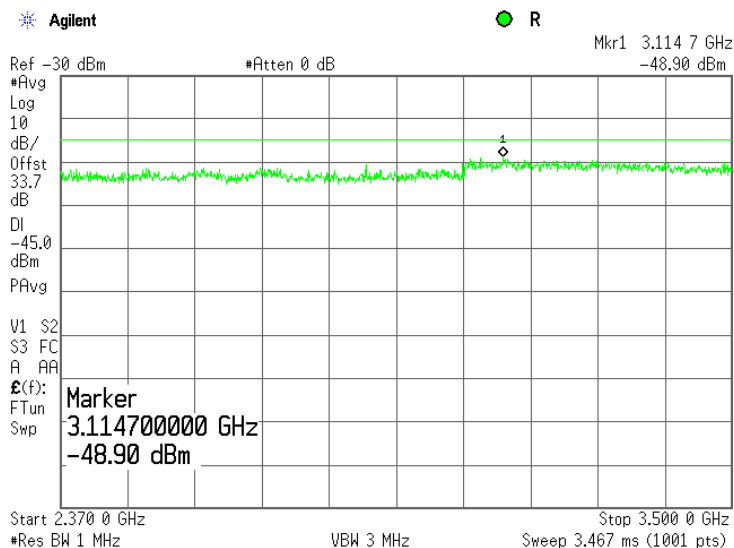


Test specification:		Second erratum of WT Docket No.07-293, Conducted spurious emissions	
Test procedure:		47 CFR, Section 2.1051 TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2011	
Temperature: 22.3 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.19 Spurious emission measurements in 2370 – 3500 MHz range at low carrier frequency, combined outputs

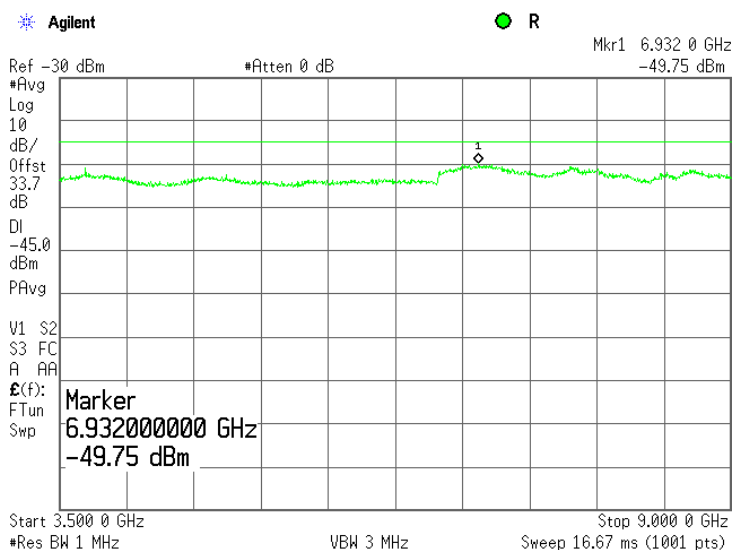


Plot 7.5.20 Spurious emission measurements in 2370 – 3500 MHz range at high carrier frequency, combined outputs

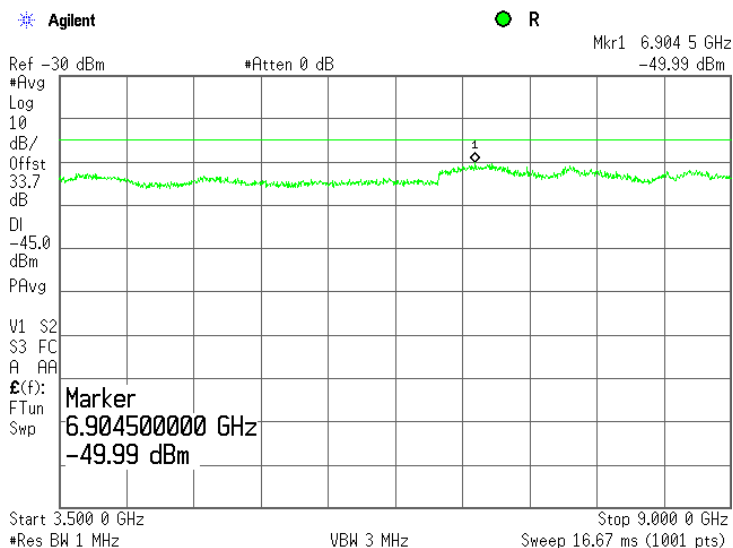


Test specification:		Second erratum of WT Docket No.07-293, Conducted spurious emissions	
Test procedure:		47 CFR, Section 2.1051 TIA/EIA-603-C, Section 2.2.13	
Test mode:		Compliance	Verdict: PASS
Date:		2/16/2011	
Temperature: 22.3 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.21 Spurious emission measurements in 3500 – 9000 MHz range at low carrier frequency, combined outputs



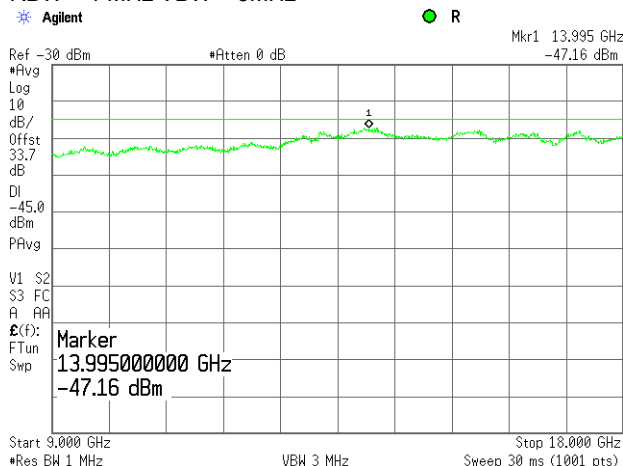
Plot 7.5.22 Spurious emission measurements in 3500 – 9000 MHz range at high carrier frequency, combined outputs



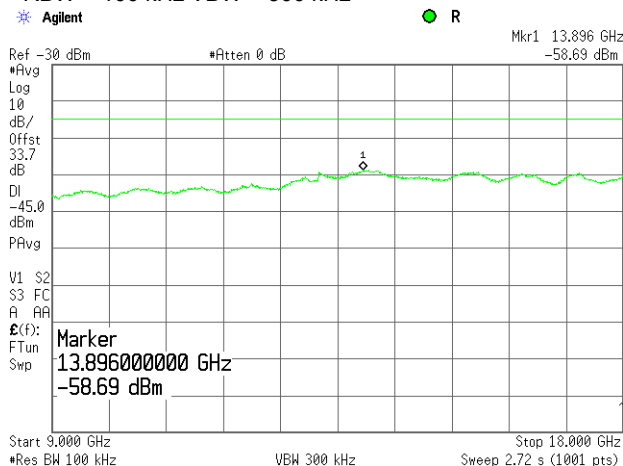
Test specification:	Second erratum of WT Docket No.07-293, Conducted spurious emissions		
Test procedure:	47 CFR, Section 2.1051 TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict: PASS	
Date:	2/16/2011		
Temperature: 22.3 °C	Air Pressure: 1006 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.5.23 Spurious emission measurements in 9000 – 18000 MHz range at low carrier frequency, combined outputs

RBW = 1 MHz VBW = 3MHz

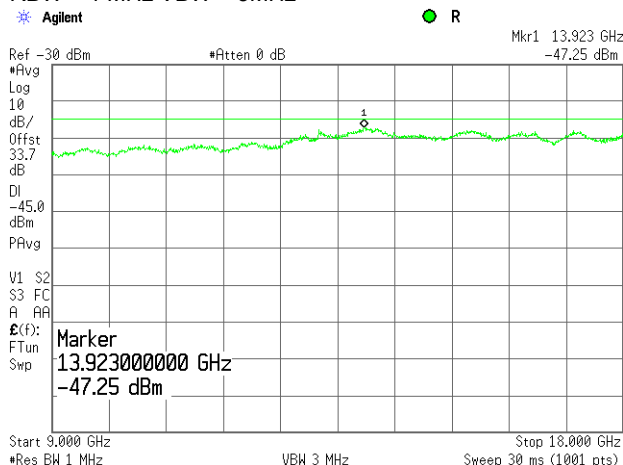


RBW = 100 kHz VBW = 300 kHz

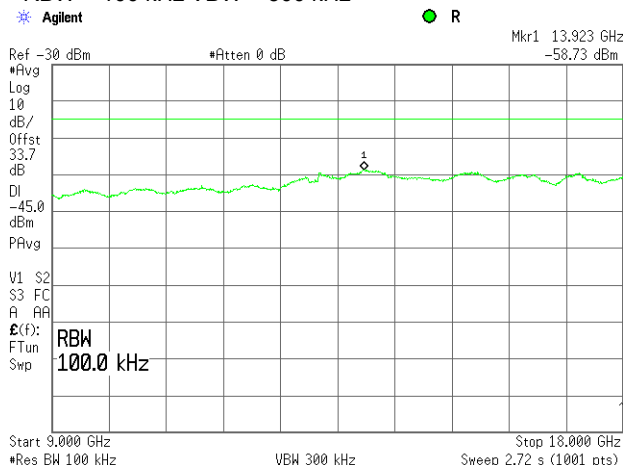


Plot 7.5.24 Spurious emission measurements in 9000 – 18000 MHz range at high carrier frequency, combined outputs

RBW = 1 MHz VBW = 3MHz



RBW = 100 kHz VBW = 300 kHz



Test specification:	Section 27.54, Frequency stability		
Test procedure:	47 CFR, Section 2.1055		
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2011 - 2/17/2011		
Temperature: 23.7 °C	Air Pressure: 1018 hPa	Relative Humidity: 43 %	Power Supply: 48VDC
Remarks:			

7.6 Frequency stability test

7.6.1 General

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

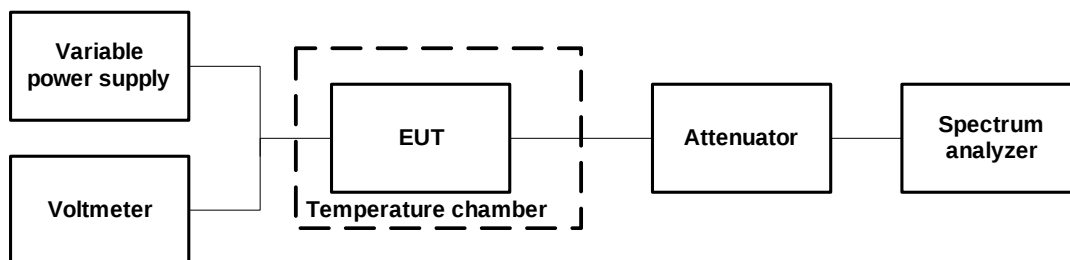
Table 7.6.1 Frequency stability limits

Assigned frequency, MHz	Maximum allowed frequency displacement
2315.0 – 2320.0 2345.0 – 2350.0	The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation

7.6.2 Test procedure

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

Figure 7.6.1 Frequency stability test setup



Test specification:	Section 27.54, Frequency stability			
Test procedure:	47 CFR, Section 2.1055			
Test mode:	Compliance	Verdict:		PASS
Date:	2/16/2011 - 2/17/2011			
Temperature: 23.7 °C	Air Pressure: 1018 hPa	Relative Humidity: 43 %	Power Supply: 48VDC	
Remarks:				

Table 7.6.2 Frequency stability test results

ASSIGNED FREQUENCY RANGE: 2315.0 – 2320.0 MHz
2345.0 – 2350.0 MHz

NOMINAL POWER VOLTAGE: 48 VDC

TEMPERATURE STABILIZATION PERIOD: 20 min

POWER DURING TEMPERATURE TRANSITION: Off

SPECTRUM ANALYZER MODE: Counter

RESOLUTION BANDWIDTH: 1 KHz

VIDEO BANDWIDTH: 3 KHz

MODULATION: Unmodulated

T, °C	Voltage, V	Frequency, MHz							Max frequency drift Hz	
		Start up	1 st min	2 nd min	3 rd min	4 th min	5 th min	10 th min	Positive	Negative
Low carrier frequency 2316.75 MHz										
-30	nominal	2316.747578	2316.747577	2316.747577	2316.747578	2316.747577	2316.747577	2316.747577	0	-81
-20	nominal	2316.747573	NA	NA	NA	NA	NA	2316.747571	0	-87
-10	nominal	2316.747574	NA	NA	NA	NA	NA	2316.747564	0	-94
0	nominal	2316.747664	2316.747631	2316.747609	2316.747605	2316.747598	2316.747609	2316.747607	6	-60
10	nominal	2316.747619	NA	NA	NA	NA	NA	2316.747611	0	-47
20	15%	2316.747500	NA	NA	NA	NA	NA	2316.747436	0	-222
20	nominal	2316.747571	NA	NA	NA	NA	NA	2316.747658*	0	-87
20	-15%	2316.747784	NA	NA	NA	NA	NA	2316.747825	167	0
30	nominal	2316.747703	2316.747587	2316.747582	2316.747521	2316.747517	2316.747561	2316.747633	45	-141
40	nominal	2316.747644	NA	NA	NA	NA	NA	2316.747561	0	-97
50	nominal	2316.747665	NA	NA	NA	NA	NA	2316.747401	0	-257
High carrier frequency 2348.25 MHz										
-30	nominal	2348.247370	2348.247313	2348.247304	2348.247307	2348.247301	2348.247303	2348.247292	0	-261
-20	nominal	2348.247349	NA	NA	NA	NA	NA	2348.247358	0	-204
-10	nominal	2348.247507	NA	NA	NA	NA	NA	2348.247475	0	-78
0	nominal	2348.247349	2348.247397	2348.247447	2348.247493	2348.247551	2348.247548	2348.247512	0	-204
10	nominal	2348.247627	NA	NA	NA	NA	NA	2348.247596	74	0
20	15%	2348.247567	NA	NA	NA	NA	NA	2348.247631	78	0
20	nominal	2348.247549	NA	NA	NA	NA	NA	2348.247553*	0	-4
20	-15%	2348.247633	NA	NA	NA	NA	NA	2348.247520	80	-33
30	nominal	2348.247589	2348.247456	2348.247393	2348.247607	2348.247514	2348.247519	2348.247406	54	-160
40	nominal	2348.247545	NA	NA	NA	NA	NA	2348.247434	0	-119
50	nominal	2348.247608	NA	NA	NA	NA	NA	2348.247415	55	-138

* - Reference frequency

Test specification:	Section 27.54, Frequency stability		
Test procedure:	47 CFR, Section 2.1055		
Test mode:	Compliance	Verdict:	PASS
Date:	2/16/2011 - 2/17/2011		
Temperature: 23.7 °C	Air Pressure: 1018 hPa	Relative Humidity: 43 %	Power Supply: 48VDC
Remarks:			

Table 7.6.3 Maximum frequency displacement

Channel	Maximum frequency displacement			
	ppm		Hz	
	Negative	Positive	Negative	Positive
Low (2316.75 MHz)	0.11	0.07	257	167
High (2348.25 MHz)	0.11	0.03	261	80

Table 7.6.4 Transmission occupied bandwidth with frequency drift test results

Lower measured* band edge, MHz	Upper measured* band edge, MHz	Lower calculated** band edge, MHz	Upper calculated** band edge, MHz	Lower specified band edge, MHz	Upper specified band edge, MHz	Lower margin***, MHz	Upper margin***, MHz	Verdict
QPSK								
2315.030000	2319.280000	2315.029743	2319.280167	2315.000000	2320.000000	0.029743	-0.719833	Pass
2315.025000	2319.475000	2315.024743	2319.475167	2315.000000	2320.000000	0.024743	-0.524833	Pass
64QAM								
2345.720000	2349.940000	2345.719739	2349.940080	2345.000000	2350.000000	0.719739	-0.059920	Pass
2345.358400	2349.941600	2345.358139	2349.941680	2345.000000	2350.000000	0.358139	-0.058320	Pass

* - Measured under normal test conditions at 26 dBc points

** - Measured band edge with proper drift addition

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

Reference numbers of test equipment used

HL 1451	HL 2909	HL 3787					
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Full description is given in Appendix A.

8 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
0446	Antenna, Loop, Active, 10 kHz - 30 MHz	EMCO	6502	2857	29-Jun-10	29-Jun-11
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A 00319, 3448A002 53	25-Aug-10	25-Aug-11
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	11-Jan-11	11-Jan-12
1451	Cable, 1.5 m, N/N-Type	Harbour Industries	MIL 17/60-RG142	1451	01-Sep-10	01-Sep-11
1906	Power Divider, 0.5-18.0 GHz, 80 W	Omni Spectra	2090-6204-00	1906	01-Dec-10	01-Dec-12
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W	EMC Test Systems	3115	9911-5964	11-Jun-10	11-Jun-11
2015	Power Divider, 0.5-18.0 GHz, 80 W	Omni Spectra	2090-6204-00	2015	01-Dec-10	01-Dec-12
2870	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-9155-00	2870	14-Sep-10	14-Sep-11
2871	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-8155-00	2871	14-Sep-10	14-Sep-11
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY414447 62	07-May-10	07-May-11
2953	Cable, RF, 18 GHz, 1.2 m, SMA-SMA	Gore	10020014	NA	04-Oct-10	04-Oct-11
3301	Power Meter, P-series, 50 MHz to 40 GHz	Agilent Technologies	N1911A	MY451010 57	13-Dec-10	13-Dec-11
3302	Power sensor, P-Series, 50 MHz to 40 GHz, -35/30 to 20 dBm	Agilent Technologies	N1922A	MY452405 86	13-Dec-10	13-Dec-11
3472	Cable, Coax, Microwave, DC-18 GHz, SMA-SMA, 1.0 m	Gore	GORE 65474	1003478	09-May-10	09-May-11
3474	Cable, Coax, Microwave, DC-18 GHz, SMA-SMA, 0.6 m	Gore	GORE 65475	1640102	09-May-10	09-May-11
3623	Cable RF, 6.0 m, N type-N type, DC-6.5 GHz	Belden	MIL C-17	NA	27-May-10	27-May-11
3787	Precision Fixed Attenuator, 50 Ohm, 5 W, 10 dB, DC to 18 GHz	Mini-Circuits	BW-S10W5+	NA	07-Dec-10	07-Dec-11
3818	PSA Series Spectrum Analyzer, 3 Hz- 44 GHz	Agilent Technologies	E4446A	MY482502 88	26-Sep-10	26-Sep-11

9 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Transmitter tests	
Carrier power conducted at antenna connector	± 1.7 dB
Carrier power radiated (substitution method)	± 4.5 dB
Occupied bandwidth	$\pm 8\%$
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB
Spurious emissions radiated 30 MHz – 40 GHz (substitution method)	± 4.5 dB
Frequency error	30 – 300 MHz: ± 50.5 Hz (1.68 ppm) 300 – 1000 MHz: ± 168 Hz (0.56 ppm)
Transient frequency behaviour	187 Hz $\pm 13.9\%$
Duty cycle, timing (Tx ON / OFF) and average factor measurements	$\pm 1.0\%$

Hermon Laboratories is accredited by A2LA for calibration according to present requirements of ISO/IEC 17025 and NCSL Z540-1. The accreditation is granted to perform calibration of parameters that are listed in the Scope of Hermon Laboratories Accreditation.

Hermon Laboratories calibrates its reference and transfer standards by calibration laboratories accredited to ISO/IEC 17025 by a mutually recognized Accreditation Body or by a recognized national metrology institute. All reference and transfer standards used in the calibration system are traceable to national or international standards.

In-house calibration of all test and measurement equipment is performed on a regular basis according to Hermon Laboratories calibration procedures, manufacturer calibration/verification procedures or procedures defined in the relevant standards. The Hermon Laboratories test and measurement equipment is calibrated within the tolerances specified by the manufacturers and/or by the relevant standards.

10 APPENDIX C Test laboratory description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, safety, environmental and telecommunication testing facility.

Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47), Registration Numbers 90624 for OATS and 90623 for the anechoic chamber; by Industry Canada for electromagnetic emissions (file numbers IC 2186A-1 for OATS, IC 2186A-2 for anechoic chamber, IC 2186A-3 for full-anechoic chamber for RE measurements above 1 GHz), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, G-27 for full-anechoic chamber for RE measurements above 1 GHz, C-845 for conducted emissions site, T-1606 for conducted emissions at telecommunication ports), has a status of a Telefication - Listed Testing Laboratory, Certificate No. L138/00. The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing and environmental simulation (for exact scope please refer to Certificate No. 839.01). The FCC Designation Number is US1003.

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11 APPENDIX D Specification references

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

12 APPENDIX E Test equipment correction factors

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

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

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

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

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

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

Antenna factor
Double-ridged wave guide horn antenna
Model 3115, S/N 9911-5964, HL1984

Frequency, MHz	Antenna factor, dB(1/m)
1000.0	24.7
1500.0	25.7
2000.0	27.6
2500.0	28.9
3000.0	31.2
3500.0	32.0
4000.0	32.5
4500.0	32.7
5000.0	33.6
5500.0	35.1
6000.0	35.4
6500.0	34.9
7000.0	36.1
7500.0	37.8
8000.0	38.0
8500.0	38.1
9000.0	39.1
9500.0	38.3
10000.0	38.6
10500.0	38.2
11000.0	38.7
11500.0	39.5
12000.0	40.0
12500.0	40.4
13000.0	40.5
13500.0	41.1
14000.0	41.6
14500.0	41.7
15000.0	38.7
15500.0	38.2
16000.0	38.8
16500.0	40.5
17000.0	42.5
17500.0	45.9
18000.0	49.4

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

Cable loss
Cable coaxial, Huber-Suhner, 18 GHz, 6.4 m, SMA - SMA, model 198-9155-00,
HL 2870

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.09	5750	2.49	12000	3.71
30	0.17	6000	2.53	12250	3.81
100	0.32	6250	2.58	12500	3.84
250	0.49	6500	2.64	12750	3.88
500	0.70	6750	2.69	13000	3.92
750	0.86	7000	2.75	13250	3.96
1000	1.00	7250	2.80	13500	3.98
1250	1.11	7500	2.87	13750	4.01
1500	1.23	7750	2.93	14000	4.03
1750	1.34	8000	2.94	14250	4.09
2000	1.41	8250	3.00	14500	4.08
2250	1.51	8500	3.04	14750	4.10
2500	1.59	8750	3.08	15000	4.15
2750	1.68	9000	3.14	15250	4.22
3000	1.76	9250	3.16	15500	4.31
3250	1.83	9500	3.22	15750	4.42
3500	1.91	9750	3.26	16000	4.48
3750	1.97	10000	3.36	16250	4.54
4000	2.05	10250	3.41	16500	4.56
4250	2.11	10500	3.46	16750	4.57
4500	2.18	10750	3.50	17000	4.59
4750	2.24	11000	3.54	17250	4.66
5000	2.30	11250	3.58	17500	4.70
5250	2.36	11500	3.63	17750	4.76
5500	2.43	11750	3.66	18000	4.72

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

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

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

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

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

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

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

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

Cable loss
Cable coaxial, MIL C-17, N type-N type, 6 m
Belden, HL 3623

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.13	2600	4.38	5400	7.76
30	0.25	2700	4.53	5500	7.79
50	0.33	2800	4.64	5600	7.88
100	0.49	2900	4.79	5700	7.93
200	0.76	3000	4.93	5800	8.05
300	0.97	3100	5.02	5900	8.03
400	1.18	3200	5.18	6000	8.07
500	1.38	3300	5.27	6100	8.14
600	1.54	3400	5.41	6200	8.21
700	1.71	3500	5.57	6300	8.28
800	1.88	3600	5.65	6400	8.35
900	2.04	3700	5.82	6500	8.43
1000	2.19	3800	5.89		
1100	2.38	3900	6.02		
1200	2.61	4000	6.15		
1300	2.63	4100	6.26		
1400	2.79	4200	6.37		
1500	2.90	4300	6.52		
1600	3.08	4400	6.63		
1700	3.21	4500	6.74		
1800	3.31	4600	6.86		
1900	3.47	4700	6.98		
2000	3.59	4800	7.09		
2100	3.74	4900	7.17		
2200	3.86	5000	7.30		
2300	3.98	5100	7.41		
2400	4.12	5200	7.59		
2500	4.24	5300	7.71		

13 APPENDIX F Abbreviations and acronyms

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

END OF DOCUMENT