HERMON LABORATORIES

ELECTRICAL TESTING
0839.01

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TEST REPORT

ACCORDING TO: FCC 47CFR part 27

FOR:

Airspan Networks Inc.
Base Station
Model: Air4G 0707 FDD LTE
FCC ID:PIDLTE700F

Table of contents

1 Applicant information

Client name:	Airspan Networks Inc.
Address:	777 Yamato, Road Suite 310 Boca Raton, FL 33431, USA
Telephone:	+1 561 893 8670
Fax:	+1 561 893 8671
E-mail:	zlevi@airspan.com
Contact name:	Mr. Zion Levi

2 Equipment under test attributes

Product name:	Base Station
Product type:	Transceiver
Model(s):	Air4G 0707 FDD LTE
Serial number:	6C11D6172ECC
Hardware version:	A1
Software release:	14.12.00.017
Receipt date	6/24/2013

3 Manufacturer information

Manufacturer name:	Airspan Networks Inc.
Address:	777 Yamato, Road Suite 310 Boca Raton, FL 33431, USA
Telephone:	+1 561 893 8670
Fax:	+1 561 893 8671
E-Mail:	zlevi@airspan.com
Contact name:	Mr. Zion Levi

4 Test details

Project ID:	24634
Location:	Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started:	6/24/2013
Test completed:	6/26/2013
Test specification(s):	FCC 47CFR part 27

5 Tests summary

Test	Status
Transmitter characteristics	
Section 27.50(c)(3), Peak output power at RF antenna connector	Pass
Section 27.52, RF safety	Pass, exhibit provided in Application for Certification
Section 27.53(a)(1)(2), Emission mask	Pass
Section 27.53(g), Spurious emissions at RF antenna connector	Pass
Section 27.53(g), Band edge emissions (emission mask) at RF antenna connector	Not required
Section 27.53(g), Radiated spurious emissions	Pass
Section 27.53(f), Radiated spurious emissions in 1559 - 1610 MHz band	Not required
Section 27.54, Frequency stability	Pass
Section 2.1049, Occupied bandwidth	Pass

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

	Name and Title	Date	Signature
Tested by:	Mr. S. Samokha, test engineer	June 26, 2013	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	July 11, 2013	
Approved by:	Mr. M. Nikishin, EMC and Radio group manager	July 17, 2013	

6 EUT description

6.1 General information

A base station radio, Air4G 0707 FDD LTE, is part of a LTE 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 Air4G's transceiver/receiver (Up to 64 QAM modulation, data rate up to 75 Mbps) uses OFDMA and operating in FDD mode, equipped with a 13.5 dBi external antenna. The maximum RF output power (not including antenna gain) is 41.64 dBm and it can be reduced by software.
The Air4G 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 LTE UE from relocating to another subscriber premises without authorization.

6.2 Ports and lines

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

* For maintance only

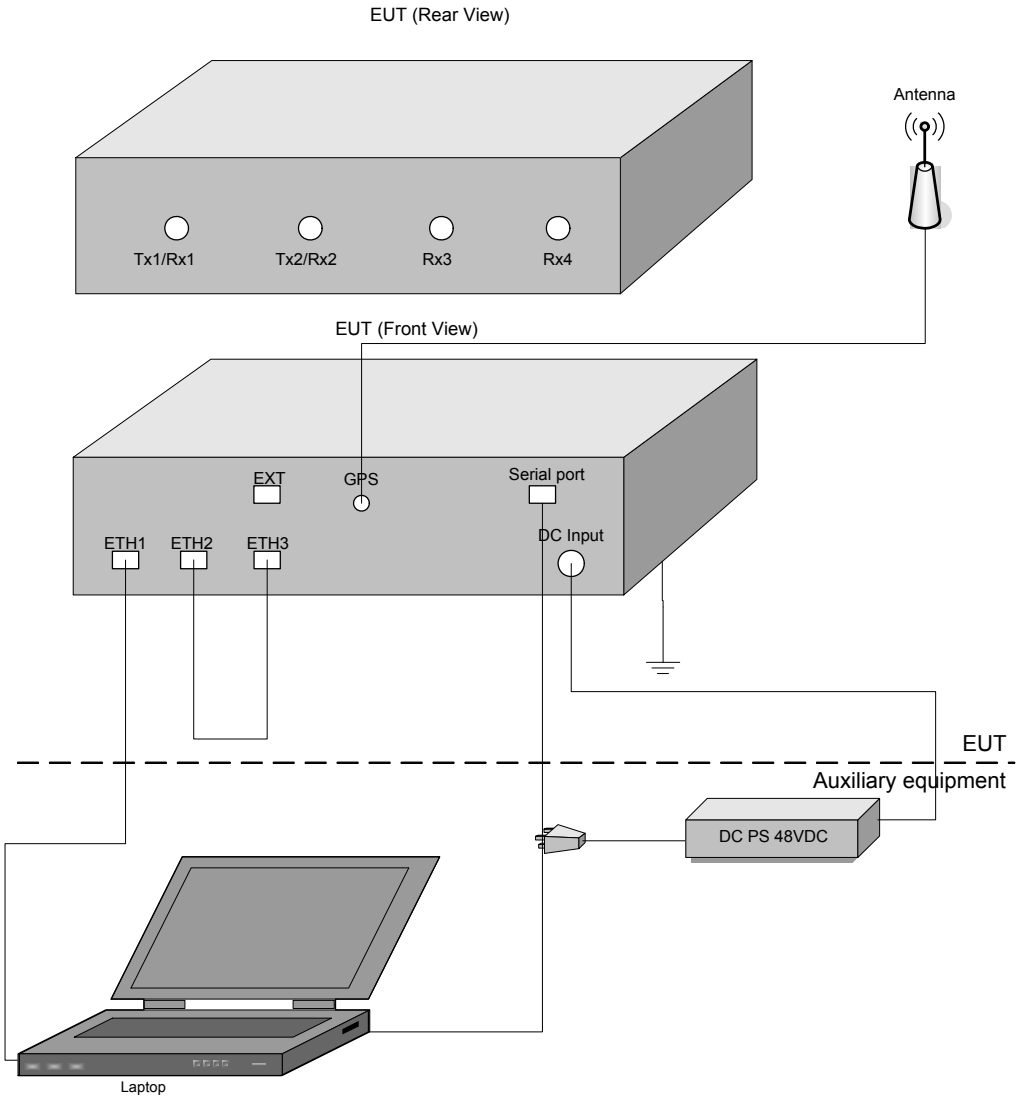
6.3 Support and test equipment

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

6.4 Changes made in EUT

No changes were implemented in the EUT.

6.5 Test configuration



6.6 Transmitter characteristics

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

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

Assigned frequency range	728.0 – 746.0 MHz
Operating frequency range	733.0 – 741.0 MHz for 10 MHz EBW
RF channel spacing	10 MHz
Maximum rated output power	At transmitter 50 Ω RF output connector (aggregate power of both RF chains) 41.64 dBm

Is transmitter output power variable?		No		
	V	Yes		continuous variable
			V	stepped variable with stepsize 0.5 dB
			minimum RF power	0 dBm
			maximum RF power (single RF chain)	38.64 dBm

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

Antenna/s technical characteristics

Type	Manufacturer	Model number	Gain
Dual Polarized 60° Sector Antenna, Fixed Tilt	Alpha Wireless	AW3052	13.5 dBi
Dual Polarized 90° Sector Antenna, Fixed Tilt	Alpha Wireless	AW3054	12.5 dBi
OMNI Directional Antenna	MTI Wireless Edge Ltd.	MT-221023/NV	6.5 dBi
OMNI Directional Antenna	MTI Wireless Edge Ltd.	MT-221024/NV	6.0 dBi

Transmitter 99% power bandwidth	10 MHz		
Transmitter aggregate data rate/s, Mbps	QPSK	16QAM	64QAM
	15.5	30.5	75
Type of modulation	QPSK, 16QAM, 64QAM		
Type of multiplexing	FDD		
Modulating test signal (baseband)	PRBS		
Maximum transmitter duty cycle in normal use	100 %		

Transmitter power source				
V	DC	Nominal rated voltage	48 VDC	
Common power source for transmitter and receiver			V yes	no

Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	6/24/2013		
Temperature: 23.4 ºC	Air Pressure: 1007 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

7 Transmitter tests according to FCC 47CFR part 27 requirements

7.1 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 Output power limits

Assigned frequency range, MHz	Maximum output power, ERP	
	W	dBm
728.0 – 746.0	1000 /1 MHz	60.00 /1 MHz

* The maximum output power limit shall be calculated by subtracting of antenna gain in dBd from maximum allowed ERP

7.1.2 Test procedure

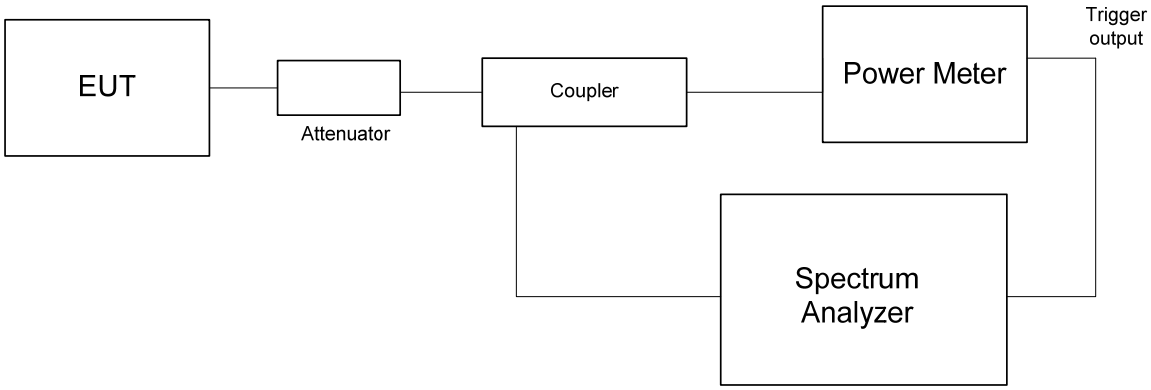
7.1.2.1 The EUT was set up as shown in Figure 7.1.1, energized and its proper operation was checked.

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

7.1.2.3 The resolution bandwidth of spectrum analyzer was set to 1 MHz and the average power was integrated over EBW as provided in Table 7.1.2 and the associated plots.

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

Figure 7.1.1 Output power test setup



Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	6/24/2013		
Temperature: 23.4 ºC	Air Pressure: 1007 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Table 7.1.2 Output power test results

ASSIGNED FREQUENCY RANGE: 728.0 – 746.0 MHz
DETECTOR USED: Average
RESOLUTION BANDWIDTH: 1000 kHz
VIDEO BANDWIDTH: 3000 kHz
MODULATING SIGNAL: PRBS
MAXIMUM ANTENNA GAIN: 13.5 dbi (11.35 dBd)

CHANNEL BANDWIDTH: 10 MHz
NUMBER OF RF OUTPUTS N = 1

Carrier frequency, MHz	SA reading, dBm/MHz	Total power, dBm/MHz**	Antenna gain, dBd	Total ERP, dBm/MHz*	Limit, dBm/MHz	Margin, dB	Verdict	Power Meter reading, dBm	Total RF power***, dBm
QPSK									
733.00	33.21	33.21	11.35	44.56	60.0	-15.44	Pass	38.64	38.64
741.00	33.13	33.13	11.35	44.48	60.0	-15.52	Pass	38.52	38.52
64QAM									
733.00	33.15	33.21	11.35	44.56	60.0	-15.44	Pass	38.53	38.53
741.00	33.23	33.13	11.35	44.48	60.0	-15.52	Pass	38.34	38.34

NUMBER OF RF OUTPUTS N = 2

Carrier frequency, MHz	SA reading, dBm/MHz	Total power, dBm/MHz	Antenna gain, dBd	Total ERP, dBm/MHz*	Limit, dBm/MHz	Margin, dB	Verdict	Power Meter reading, dBm	Total RF power***, dBm
QPSK									
733.00	33.21	36.21	11.35	47.56	60.0	-12.44	Pass	38.64	41.64
741.00	33.13	33.13	11.35	47.48	60.0	-12.52	Pass	38.52	41.52
64QAM									
733.00	33.15	36.15	11.35	47.50	60.0	-12.50	Pass	38.53	41.53
741.00	33.23	33.23	11.35	47.58	60.0	-12.42	Pass	38.34	41.34

* - ERP total, dBm/MHz = Total power**, dBm/MHz + Antenna Gain, dBd
** - Total power, dBm/MHz = SA Reading + 10log(N)
*** - Total RF power, dBm= Power Meter Reading + 10log(N)

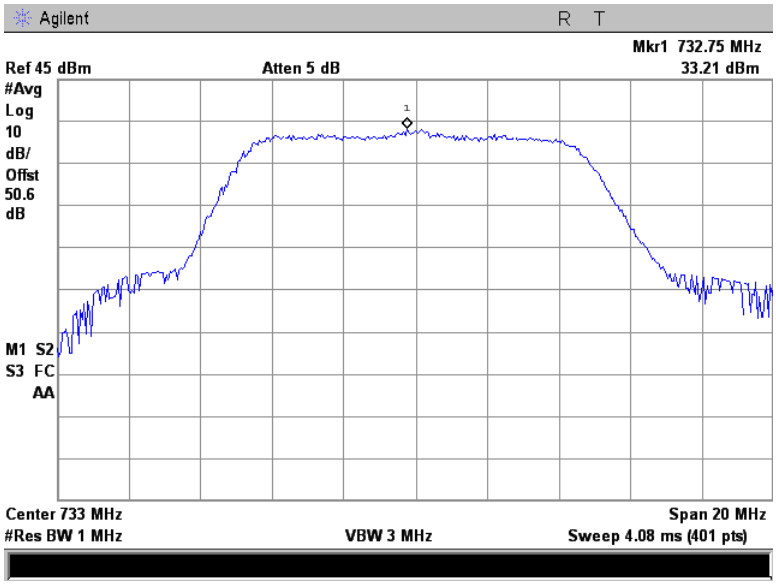
Reference numbers of test equipment used

HL 1908	HL 2909	HL 3768	HL 4274				

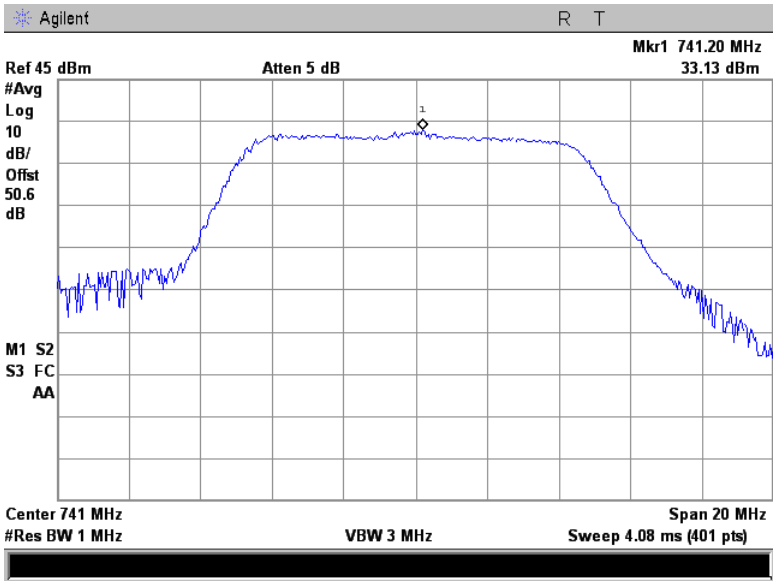
Full description is given in Appendix A.

Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	6/24/2013		
Temperature: 23.4 °C	Air Pressure: 1007 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.1.1 Peak output power test results at low frequency, QPSK modulation, 10 MHz CBW

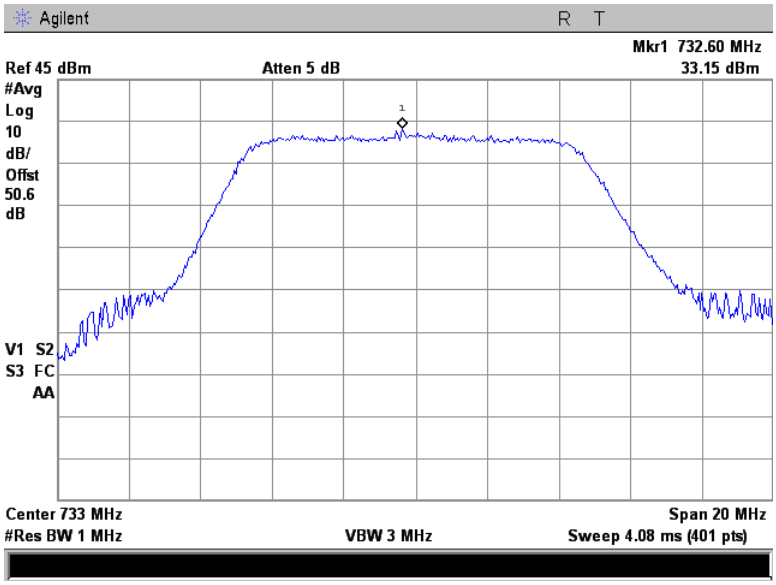


Plot 7.1.2 Peak output power test results at high frequency, QPSK modulation, 10 MHz CBW

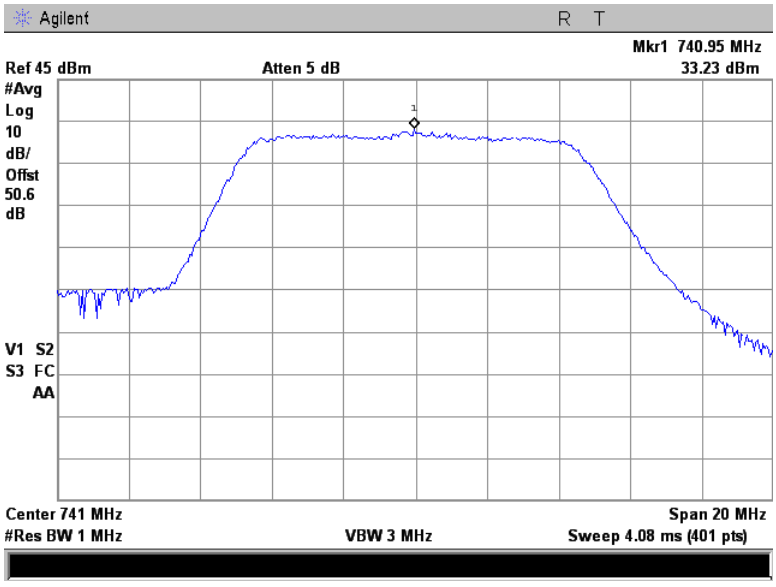


Test specification:	Section 27.50, Peak output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	6/24/2013		
Temperature: 23.4 °C	Air Pressure: 1007 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.1.3 Peak output power test results at low frequency, 64QAM modulation, 10 MHz CBW



Plot 7.1.4 Peak output power test results at high frequency, 64QAM modulation, 10 MHz CBW



Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	6/24/2013		
Temperature: 23.4 ºC	Air Pressure: 1007 hPa	Relative Humidity: 44 %	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
728.0 – 746.0	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 normally modulated carrier.

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

Figure 7.2.1 Occupied bandwidth test setup

Test specification:	**Section 2.1049, Occupied bandwidth**		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	6/24/2013		
Temperature: 23.4 ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 44 %	**Power Supply:** 48VDC
Remarks:			

Table 7.2.2 Occupied bandwidth test results

DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 100 kHz (0.5-2% of OBW)
VIDEO BANDWIDTH: 1000 kHz
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
MODULATING SIGNAL: PRBS

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
QPSK				
733.0	9318.0	NA	NA	Pass
741.0	9327.0	NA	NA	Pass
64QAM				
733.0	9318.0	NA	NA	Pass
741.0	9415.0	NA	NA	Pass

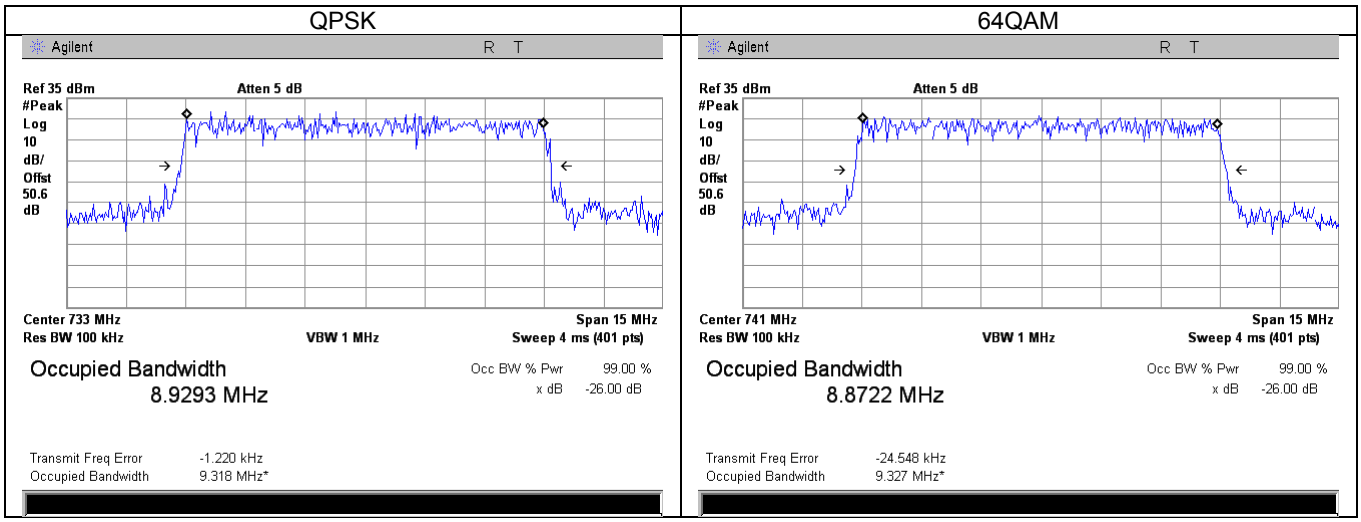
Reference numbers of test equipment used

HL 2909	HL 3768	HL 4274					

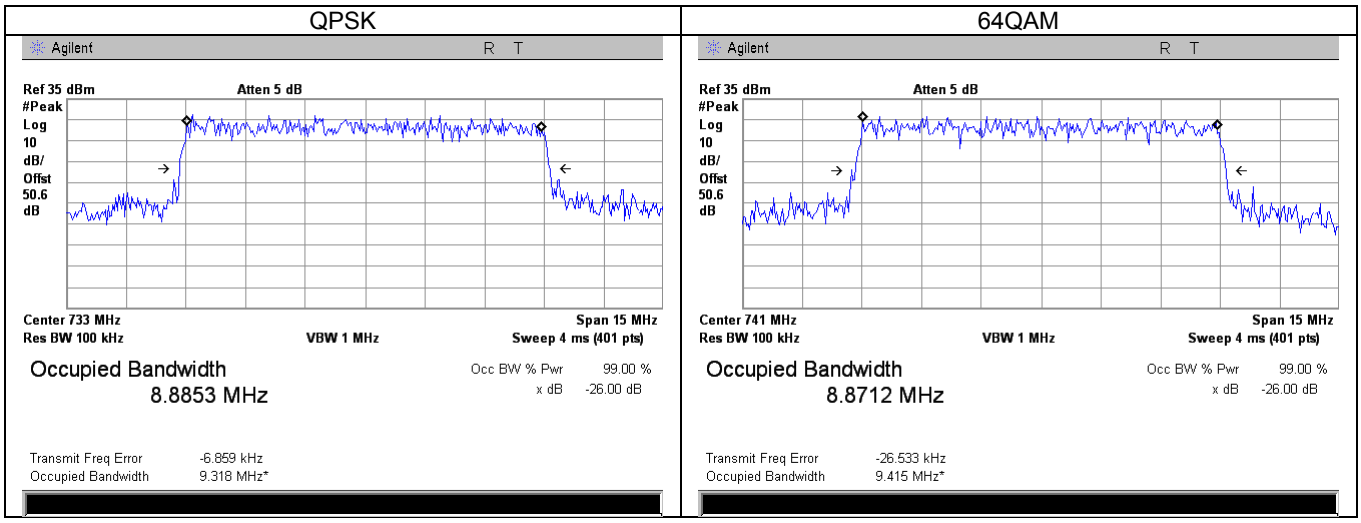
Full description is given in Appendix A.

Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date(s):	6/24/2013		
Temperature: 23.4 °C	Air Pressure: 1007 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.2.1 Occupied bandwidth test result at low frequency



Plot 7.2.2 Occupied bandwidth test result at high frequency



Test specification:	Section 27.53(a)(1)(2), Emission mask		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(a)(5)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	6/24/2013		
Temperature: 23.4 ºC	Air Pressure: 1007 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

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

OBW (MHz)	Investigated Band Edge	Attenuation below carrier, dBc
728.0 - 740.0 MHz Channel (Block A high + Block B high)		
10	727.9 – 728.0 MHz	43+10logP(W) (RBW = 30 kHz)
	740.0 – 740.1 MHz	
734.0 - 746.0 MHz Channel (Block B high + Block C high)		
10	733.9 – 734.0 MHz	43+10logP(W) (RBW = 30 kHz)
	746.0 – 746.1 MHz	

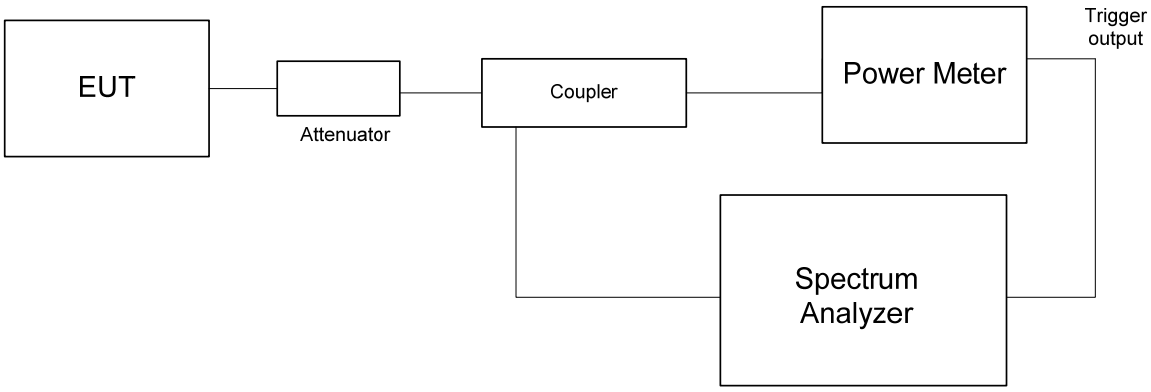
* - P is a transmitter output power in watts.

7.3.2 Test procedure

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

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

Figure 7.3.1 Emission mask test setup for single output



Test specification:	**Section 27.53(a)(1)(2), Emission mask**		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(a)(5)		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	6/24/2013		
Temperature: 23.4 ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 44 %	**Power Supply:** 48VDC
Remarks:			

Table 7.3.2 Emission mask test results

ASSIGNED FREQUENCY RANGE: 728.0 – 746.0 MHz
RBW: 100 kHz
DETECTOR USED: Average
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATING SIGNAL: PRBS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
EBW: 10 MHz

NUMBER OF RF OUTPUTS: N = 1

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm*	Limit, dBm	Margin, dB**	Verdict
QPSK, 10.0 MHz CBW, 733.0 MHz								
728.0	-20.23	Included	Included	100	-20.23	-13.0	-7.23	Pass
740.0	-24.14	Included	Included	100	-24.14	-13.0	-11.14	Pass
QPSK, 10.0 MHz CBW, 741.0 MHz								
734.0	-22.72	Included	Included	100	-22.72	-13.0	-9.72	Pass
746.0	-20.97	Included	Included	100	-20.97	-13.0	-7.97	Pass
64QAM, 10.0 MHz CBW, 733.0 MHz								
728.0	-18.98	Included	Included	100	-18.98	-13.0	-5.98	Pass
740.0	-22.70	Included	Included	100	-22.70	-13.0	-9.70	Pass
64QAM, 10.0 MHz CBW, 741.0 MHz								
734.0	-18.03	Included	Included	100	-18.03	-13.0	-5.03	Pass
746.0	-20.68	Included	Included	100	-20.68	-13.0	-7.68	Pass

NUMBER OF RF OUTPUTS: N = 2

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm*	Limit, dBm	Margin, dB**	Verdict
QPSK, 10.0 MHz CBW, 733.0 MHz								
728.0	-20.23	Included	Included	100	-17.23	-13.0	-4.23	Pass
740.0	-24.14	Included	Included	100	-21.14	-13.0	-8.14	Pass
QPSK, 10.0 MHz CBW, 741.0 MHz								
734.0	-22.72	Included	Included	100	-19.72	-13.0	-6.72	Pass
746.0	-20.97	Included	Included	100	-17.97	-13.0	-4.97	Pass
64QAM, 10.0 MHz CBW, 733.0 MHz								
728.0	-18.98	Included	Included	100	-15.98	-13.0	-2.98	Pass
740.0	-22.7	Included	Included	100	-19.70	-13.0	-6.70	Pass
64QAM, 10.0 MHz CBW, 741.0 MHz								
734.0	-18.03	Included	Included	100	-15.03	-13.0	-2.03	Pass
746.0	-20.68	Included	Included	100	-17.68	-13.0	-4.68	Pass

* - Spurious Emission, dBm = SA Reading + 10log(N)
** - Margin = Spurious emission – specification limit

Reference numbers of test equipment used

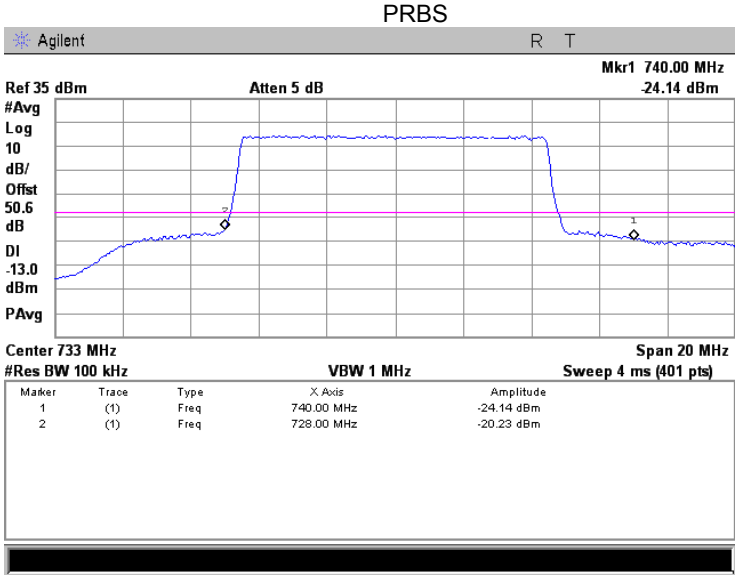
HL 2909	HL 3768	HL 4274					

Full description is given in Appendix A.

Test specification:	**Section 27.53(a)(1)(2), Emission mask**		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(a)(5)		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	6/24/2013		
Temperature: 23.4 ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 44 %	**Power Supply:** 48VDC
Remarks:			

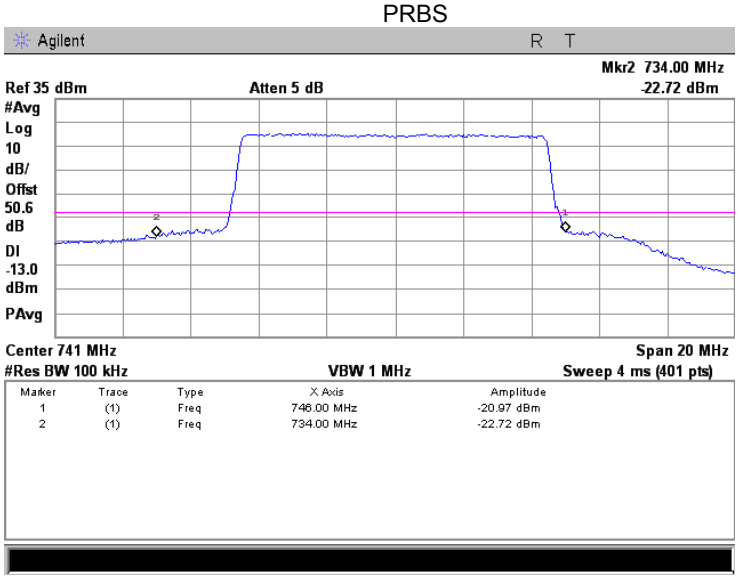
Plot 7.3.1 Emission mask test results at low carrier frequency, 10 MHz CBW

ASSIGNED FREQUENCY RANGE: 728.0 – 746.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS



Plot 7.3.2 Emission mask test results at high carrier frequency, 10 MHz CBW

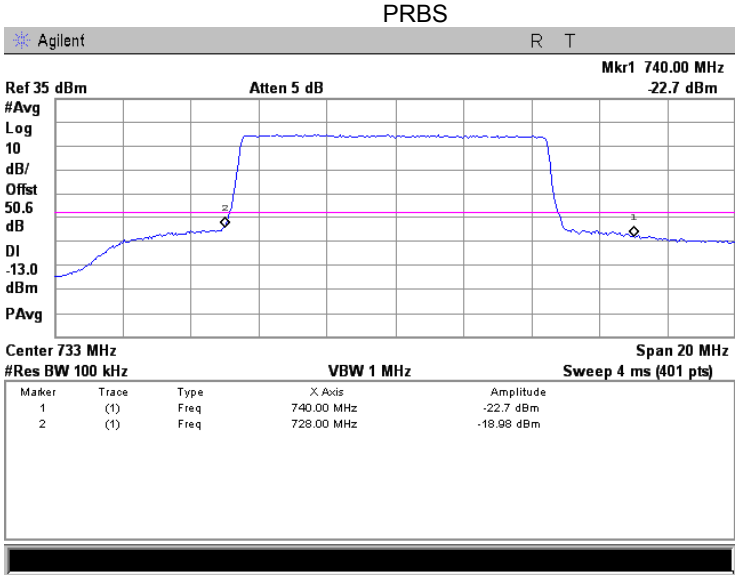
ASSIGNED FREQUENCY RANGE: 728.0 – 746.0 MHz
DETECTOR USED: Average
MODULATION: QPSK
MODULATING SIGNAL: PRBS



Test specification:	Section 27.53(a)(1)(2), Emission mask		
Test procedure:	47 CFR, Sections 2.1051 and 27.53(a)(5)		
Test mode:	Compliance	Verdict:	PASS
Date(s):	6/24/2013		
Temperature: 23.4 ºC	Air Pressure: 1007 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

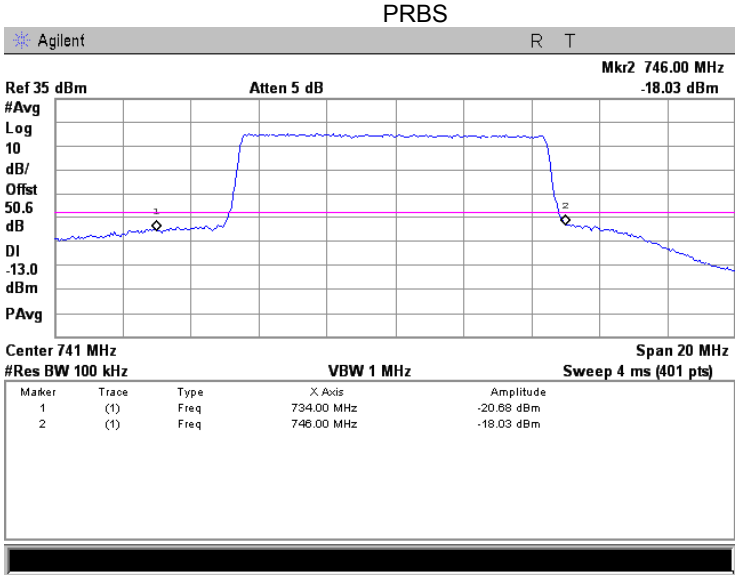
Plot 7.3.3 Emission mask test results at low carrier frequency, 10 MHz CBW

ASSIGNED FREQUENCY RANGE: 728.0 – 746.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS



Plot 7.3.4 Emission mask test results at high carrier frequency, 10 MHz CBW

ASSIGNED FREQUENCY RANGE: 728.0 – 746.0 MHz
DETECTOR USED: Average
MODULATION: 64QAM
MODULATING SIGNAL: PRBS



Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	6/24/2013		
Temperature: 23.4 ºC	Air Pressure: 1007 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

7.4 Spurious emissions at RF antenna connector test

7.4.1 General

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

Table 7.4.1 Spurious emission limits

Investigated band, MHz	Attenuation below carrier, dBc	Spurious emissions, dBm	RBW, kHz
0.009 - 10th harmonic*	43+10logP(W)**	-13.0	100
100 kHz bands immediately outside and adjacent to a licensee's frequency block	43+10logP(W)**	-13.0	30

* - spurious emission limits do not apply to the in band emission investigated in course of emission mask testing
** - P is transmitter output power in watts

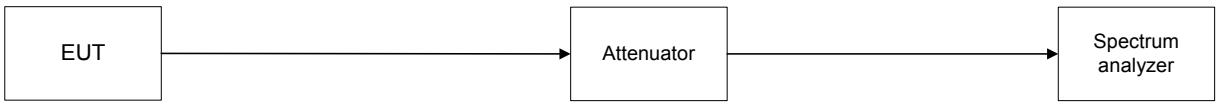
7.4.2 Test procedure

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

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

7.4.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.4.2 and associated plots.

Figure 7.4.1 Spurious emission test setup, single output



Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	6/24/2013		
Temperature: 23.4 ºC	Air Pressure: 1007 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Table 7.4.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 728.0 – 746.0 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 – 7500 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATION: 64QAM
MODULATING SIGNAL: PRBS
BIT RATE: 75 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

NUMBER OF RF OUTPUTS: N = 1

Frequency, MHz	SA reading, dBm	Attenuation, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm	Limit, dBm	Margin, dB*	Verdict
Low carrier frequency								
No spurious were found						-13.0	NA	Pass
High carrier frequency								
No spurious were found						-13.0	NA	Pass

*****- Margin = Spurious emission – specification limit.

NUMBER OF RF OUTPUTS: N = 2

Frequency, MHz	SA reading, dBm	Attenuation, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm	Limit, dBm**	Margin, dB*	Verdict
Low carrier frequency								
No spurious were found						-16.0	NA	Pass
High carrier frequency								
No spurious were found						-16.0	NA	Pass

*****- Margin = Spurious emission – specification limit.
** - Limit, dBm = Specification limit - 10log(N)

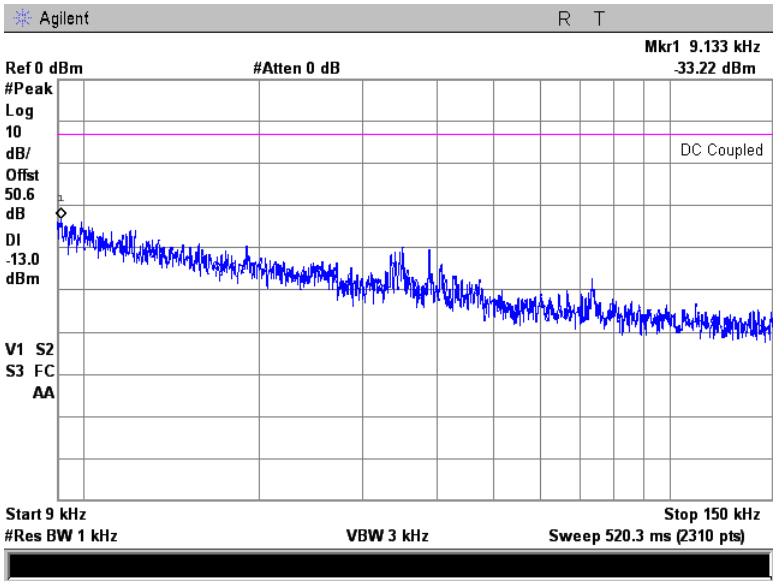
Reference numbers of test equipment used

HL 2909	HL 3768	HL 4274					

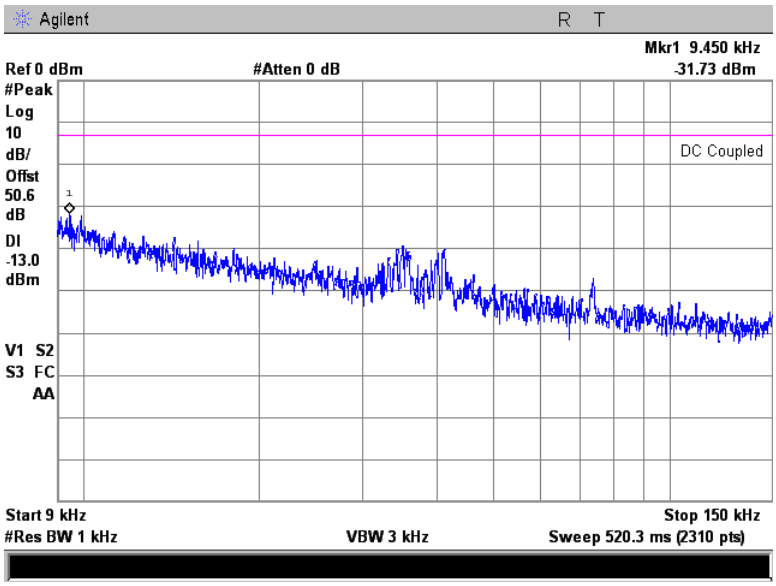
Full description is given in Appendix A.

Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	6/24/2013		
Temperature: 23.4 °C	Air Pressure: 1007 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

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

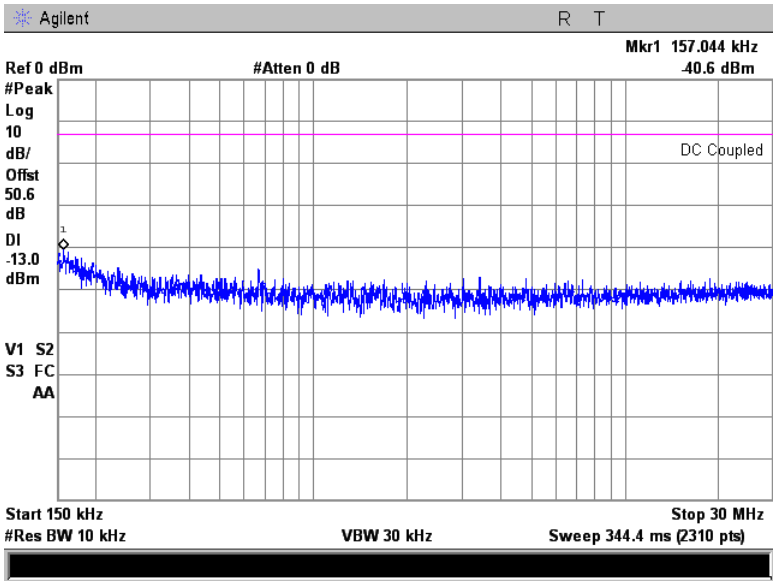


Plot 7.4.2 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency

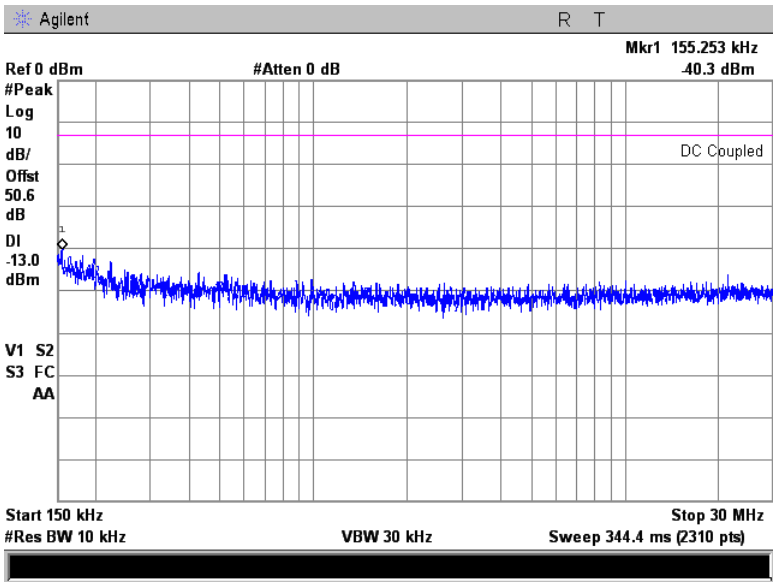


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	6/24/2013		
Temperature: 23.4 °C	Air Pressure: 1007 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.4.3 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency

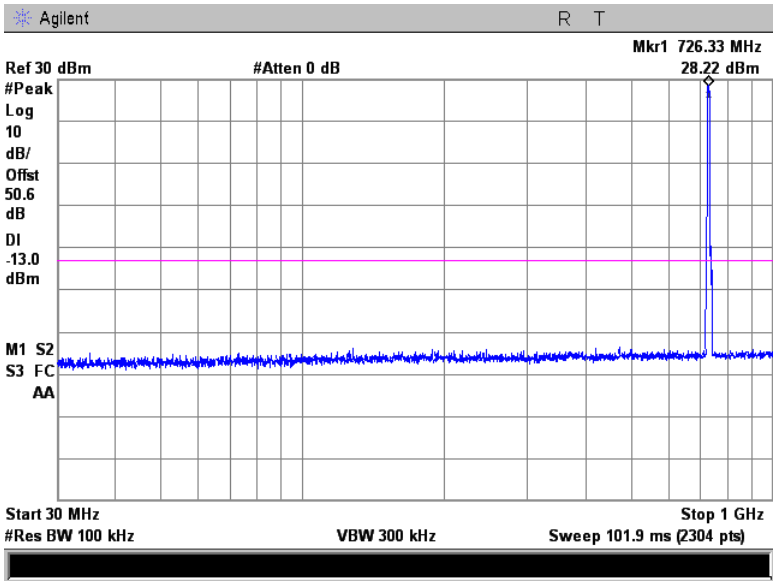


Plot 7.4.4 Spurious emission measurements in 0.15 - 30.0 MHz range at high carrier frequency

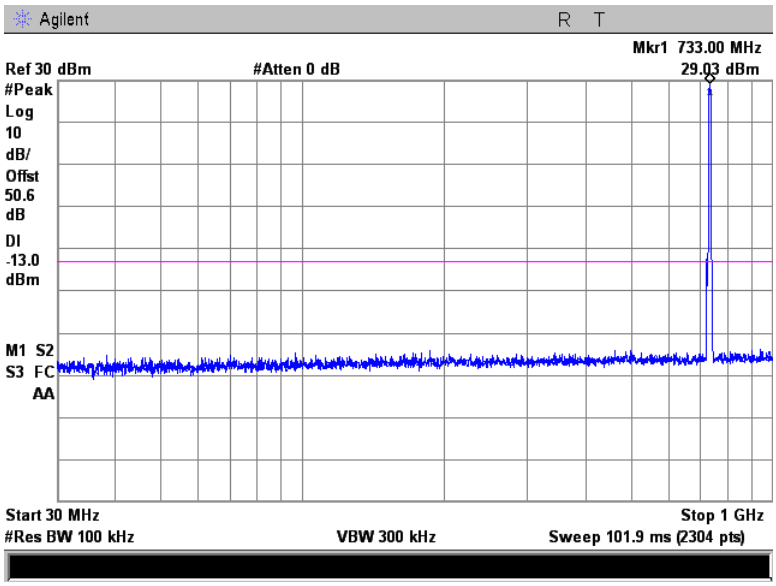


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	6/24/2013		
Temperature: 23.4 °C	Air Pressure: 1007 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.4.5 Spurious emission measurements in 30 - 1000 MHz range at low carrier frequency

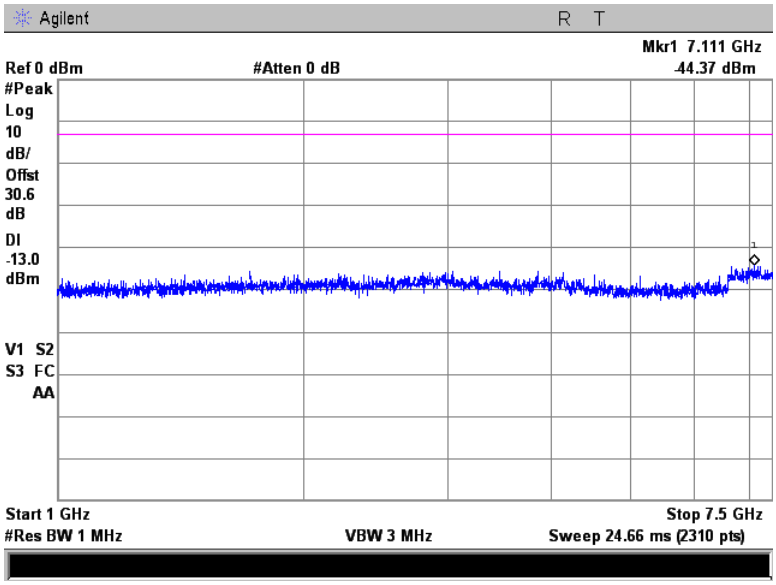


Plot 7.4.6 Spurious emission measurements in 30 - 1000 MHz range at high carrier frequency

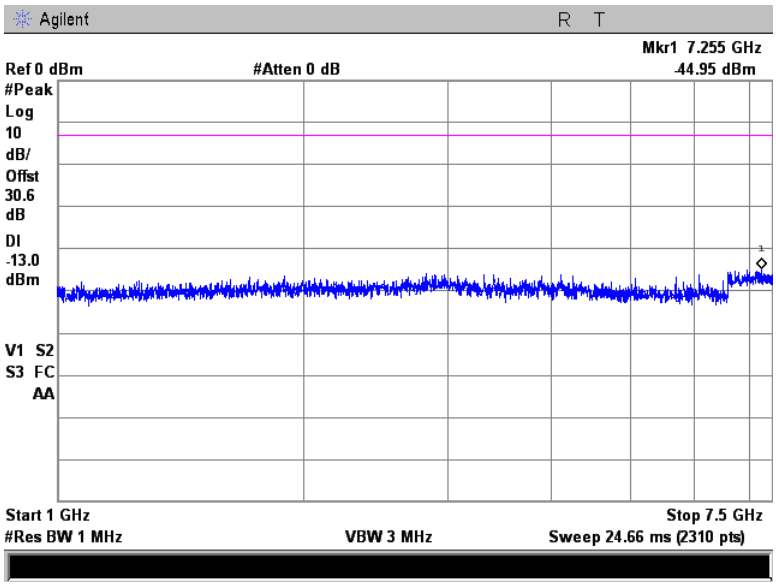


Test specification:	Section 27.53, Spurious emissions at RF antenna connector		
Test procedure:	47 CFR, Sections 2.1051, 27.53		
Test mode:	Compliance	Verdict:	PASS
Date(s):	6/24/2013		
Temperature: 23.4 °C	Air Pressure: 1007 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.4.7 Spurious emission measurements in 1000 - 7500 MHz range at low carrier frequency



Plot 7.4.8 Spurious emission measurements in 1000 - 7500 MHz at high carrier frequency



Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	6/26/2013		
Temperature: 23.5 ºC	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

7.5 Radiated spurious emission measurements

7.5.1 General

This test was performed to measure radiated spurious emissions from the EUT. Specification test limits are given in Table 7.5.1.

Table 7.5.1 Radiated spurious emission test limits

Frequency, MHz	Attenuation below carrier, dBc	ERP of spurious, dBm	Equivalent field strength limit @ 3m, dB(µV/m)***
0.009 – 10th harmonic*	43+10logP**	-13	84.4

* - Excluding the band emission
** - P is transmitter output power in Watts
*** - Equivalent field strength limit was calculated from maximum allowed ERP of spurious as follows: E=sqrt(30×P×1.64)/r, where P is ERP in Watts, 1.64 is numeric gain of ideal dipole and r is antenna to EUT distance in meters

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

7.5.2.1 The EUT was set up as shown in Figure 7.5.1, energized and the performance check was conducted.

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

7.5.2.3 The worst test results (the lowest margins) were recorded in Table 7.5.2 and shown in the associated plots.

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

7.5.3.1 The EUT was set up as shown in Figure 7.5.2, energized and the performance check was conducted.

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

7.5.3.3 The worst test results (the lowest margins) were recorded in Table 7.5.2 and shown in the associated plots.

Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	6/26/2013		
Temperature: 23.5 ºC	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Figure 7.5.1 Setup for spurious emission field strength measurements in 9 kHz to 30 MHz band

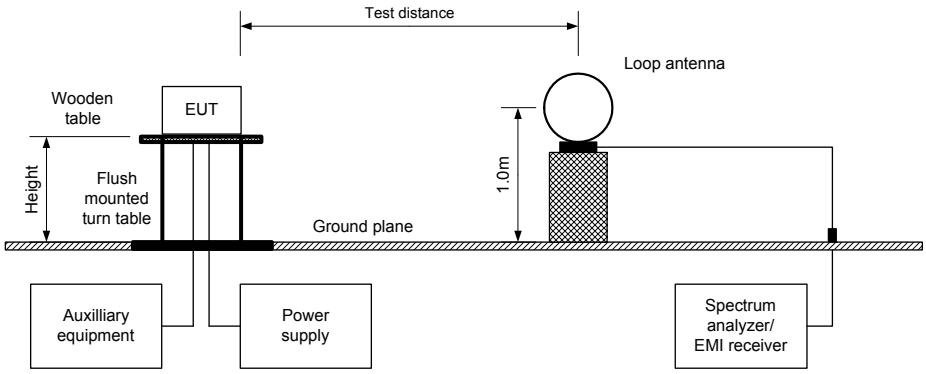
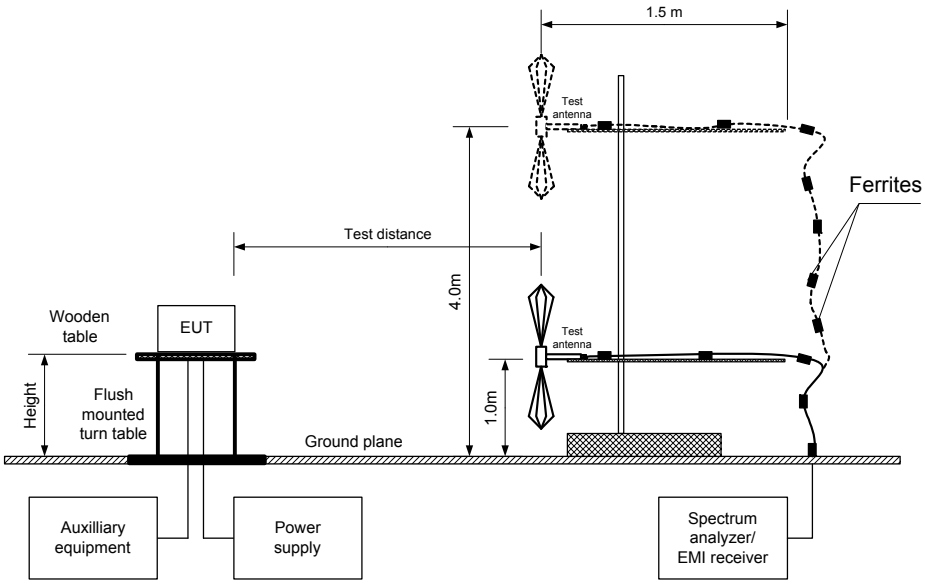


Figure 7.5.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	**Section 27.53, Radiated spurious emissions**		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	6/26/2013		
Temperature: 23.5 ºC	**Air Pressure:** 1008 hPa	**Relative Humidity:** 44 %	**Power Supply:** 48VDC
Remarks:			

Table 7.5.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE:	728.0 – 746.0 MHz
TEST DISTANCE:	3 m
TEST SITE:	Anechoic chamber
EUT HEIGHT:	0.8 m
INVESTIGATED FREQUENCY RANGE:	0.009 – 7500 MHz
DETECTOR USED:	Peak
VIDEO BANDWIDTH:	> Resolution bandwidth
TEST ANTENNA TYPE:	Active loop (9 kHz – 30 MHz) Biconilog (30 MHz – 1000 MHz) Double ridged guide (above 1000 MHz)
MODULATION:	64QAM
MODULATING SIGNAL:	PRBS
BIT RATE:	75 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							
All spurious were found at least 20 dB below the specified limit							
High carrier frequency MHz							
All spurious were found at least 20 dB below the specified limit							

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

Reference numbers of test equipment used

HL 0446	HL 2432	HL 2697	HL 4150	HL 4292	HL 4347		

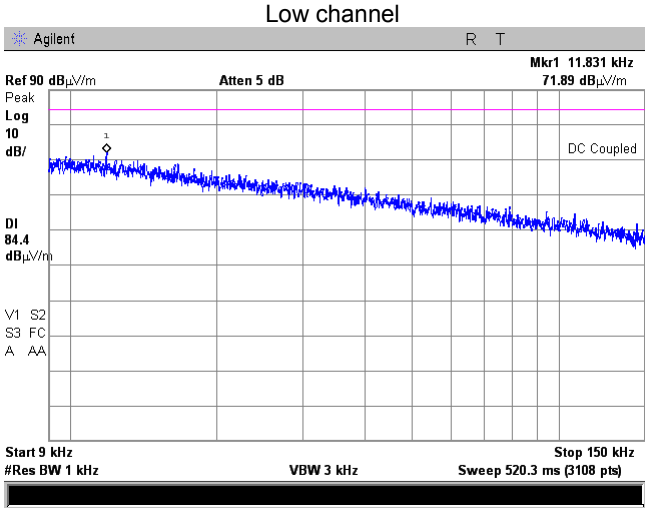
Full description is given in Appendix A.

Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	6/26/2013		
Temperature: 23.5 ºC	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

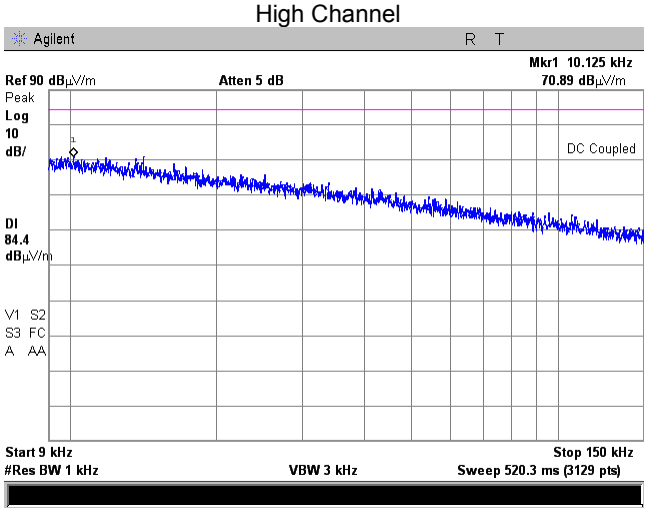
Plot 7.5.1 Radiated emission measurements in 9 - 150 kHz range

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

Low channel



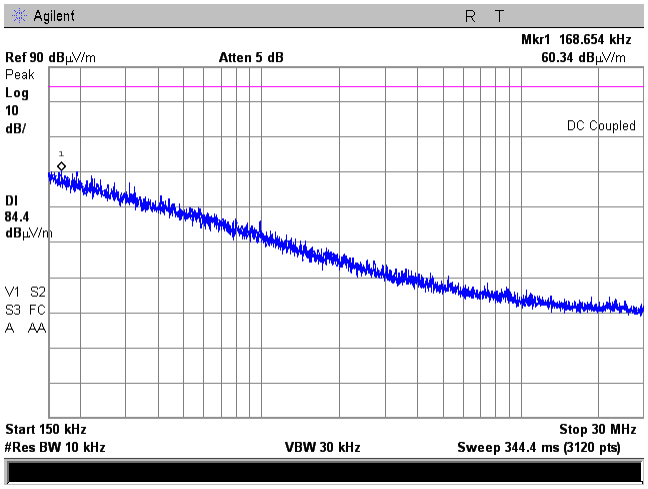
High Channel



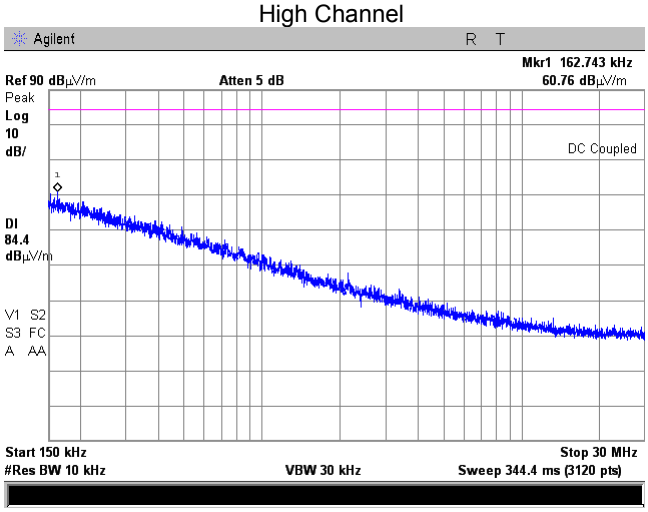
Plot 7.5.2 Radiated emission measurements in 0.15 - 30 MHz range

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

Low channel



High Channel

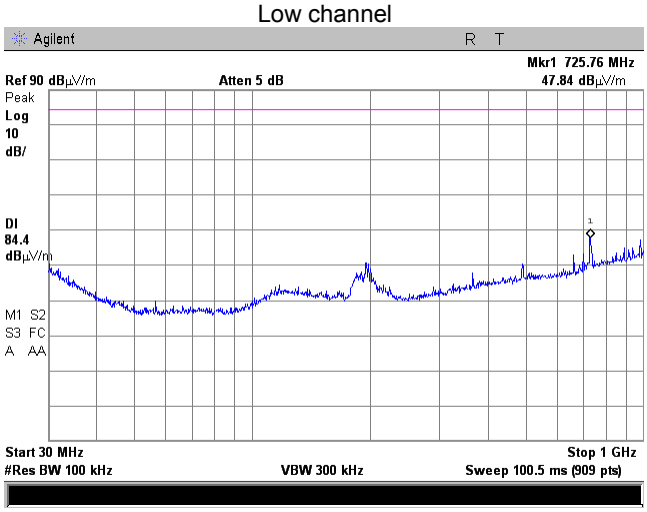


Test specification:	Section 27.53, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	6/26/2013		
Temperature: 23.5 °C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

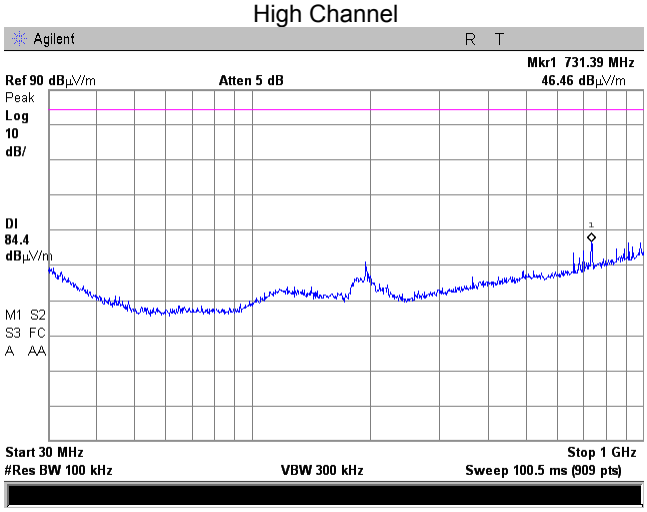
Plot 7.5.3 Radiated emission measurements in 30 - 1000 MHz range

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

Low channel



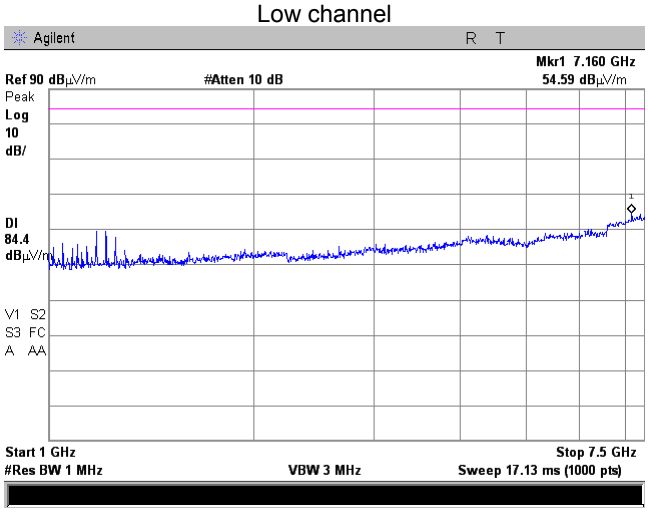
High Channel



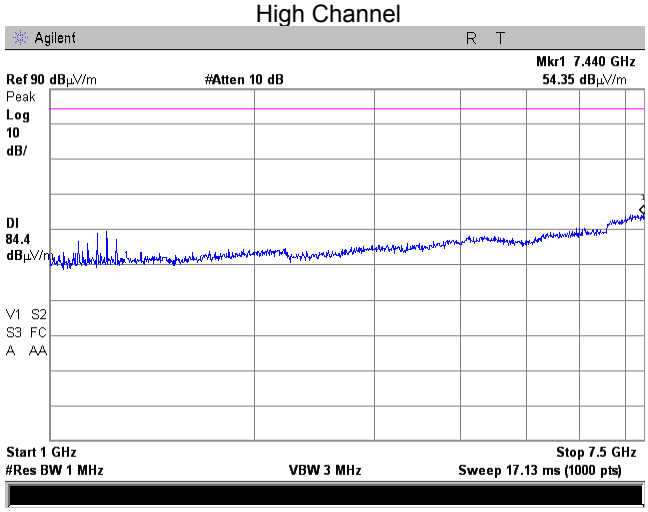
Plot 7.5.4 Radiated emission measurements in 1000 – 7500 MHz range

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

Low channel



High Channel



Test specification:	Section 27.54, Frequency stability		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date(s):	6/25/2013		
Temperature: 34.2 ºC	Air Pressure: 1007 hPa	Relative Humidity: 45 %	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
728.0 – 746.0	The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

7.6.2 Test procedure

7.6.2.1 The EUT was set up as shown in Figure 7.6.1, energized and its proper operation was checked.

7.6.2.2 The EUT power was turned off. Temperature within test chamber was set to +30˚C and a period of time sufficient to stabilize all of the oscillator circuit components was allowed.

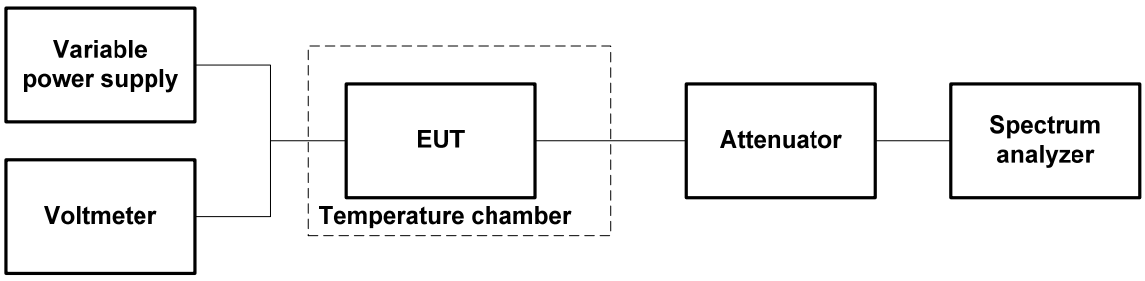
7.6.2.3 The EUT was powered on and carrier frequency was measured at start up moment and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.

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

7.6.2.5 The EUT was powered on and carrier frequency was measured at start up moment and at the end of stabilization period at the rest of test temperatures and voltages. The EUT was powered off.

7.6.2.6 Frequency displacement was calculated and provided in Table 7.6.2.

Figure 7.6.1 Frequency stability test setup



Test specification:	**Section 27.54, Frequency stability**		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	6/25/2013		
Temperature: 34.2 ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 45 %	**Power Supply:** 48VDC
Remarks:			

Table 7.6.2 Frequency stability test results

OPERATING FREQUENCY: 728.0 – 746.0 MHz
NOMINAL POWER VOLTAGE: 48 V
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, ºC	Voltage, V	Frequency, MHz							Max frequency drift, Hz		Max frequency drift,ppm	
		Start up	1st min	2nd min	3rd min	4th min	5th min	10th min	Positive	Negative	Positive	Negative
Low channel: 700.0 MHz												
-30	nominal	733.000055	733.000056	733.000050	733.000055	733.000056	733.000055	733.000055	0.00	-7.00	0.00	-0.01
-20	nominal	733.000055	NA	NA	NA	NA	NA	733.000055	0.00	-2.00	0.00	0.00
-10	nominal	733.000056	NA	NA	NA	NA	NA	733.000056	0.00	-1.00	0.00	0.00
0	nominal	733.000056	733.000056	733.000056	733.000056	733.000056	733.000055	733.000056	0.00	-2.00	0.00	0.00
10	nominal	733.000056	NA	NA	NA	NA	NA	733.000056	0.00	-1.00	0.00	0.00
20	55.2	733.000057	NA	NA	NA	NA	NA	733.000057	0.00	0.00	0.00	0.00
20	48.0	733.000057	NA	NA	NA	NA	NA	733.000057	0.00	0.00	0.00	0.00
20	40.8	733.000057	NA	NA	NA	NA	NA	733.000057	0.00	0.00	0.00	0.00
30	nominal	733.000058	733.000057	733.000057	733.000058	733.000058	733.000057	733.000058	1.00	0.00	0.00	0.00
40	nominal	733.000058	NA	NA	NA	NA	NA	733.000058	1.00	0.00	0.00	0.00
50	nominal	733.000058	733.000059	733.000059	733.000058	733.000059	733.000058	733.000059	2.00	0.00	0.00	0.00
High channel: 744.0 MHz												
-30	nominal	741.000056	741.000056	741.000056	741.000056	741.000056	741.000056	741.000056	0.00	-1.00	0.00	0.00
-20	nominal	741.000056	NA	NA	NA	NA	NA	741.000056	0.00	-1.00	0.00	0.00
-10	nominal	741.000056	NA	NA	NA	NA	NA	741.000056	0.00	-1.00	0.00	0.00
0	nominal	741.000057	741.000056	741.000057	741.000057	741.000057	741.000056	741.000057	0.00	-1.00	0.00	0.00
10	nominal	741.000057	NA	NA	NA	NA	NA	741.000057	0.00	0.00	0.00	0.00
20	55.2	741.000058	NA	NA	NA	NA	NA	741.000057	1.00	0.00	0.00	0.00
20	48.0	741.000058	NA	NA	NA	NA	NA	741.000057	1.00	0.00	0.00	0.00
20	40.8	741.000058	NA	NA	NA	NA	NA	741.000057	1.00	0.00	0.00	0.00
30	nominal	741.000058	741.000058	741.000058	741.000058	741.000058	741.000058	741.000057	1.00	0.00	0.00	0.00
40	nominal	741.000059	NA	NA	NA	NA	NA	741.000059	2.00	0.00	0.00	0.00
50	nominal	741.000059	741.000059	741.000059	741.000059	741.000059	741.000059	741.000059	2.00	0.00	0.00	0.00

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

* - Reference frequency

Reference numbers of test equipment used

HL 2909	HL 3768	HL 4274					

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./ Check	Due Cal./ Check
0446	Antenna, Loop, Active, 10 kHz - 30 MHz	EMCO	6502	2857	03-Jul-12	03-Jul-14
1908	Power Splitter / Combiner 0.5-1 GHz	Mini-Circuits	ZAPD-1	1908	02-Jul-12	02-Jul-15
2432	Antenna, Double-Ridged Waveguide Horn 1-18 GHz	EMC Test Systems	3115	00027177	07-Dec-12	07-Dec-13
2697	Antenna, 30 MHz - 3.0 GHz	Sunol Sciences. Corp. Pleasanton, California USA	JB3	A022805	04-Jun-13	04-Jun-14
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY41444762	20-Dec-12	20-Dec-13
3768	Attenuator, N-type, 20 dB, DC to 18 GHz, 5 W	Mini-Circuits	BW-N20W5+	NA	22-Aug-12	22-Aug-13
4150	Preamplifier, 0.1 to 18 GHz, Gain 25 dB, N-type(f) in, N-type(m) out.	Agilent Technologies	87405C	MY47010591	01-Jul-13	01-Jul-14
4274	Test Cable , DC-18 GHz, 1.8 m, SMA/M - N/M	Mini-Circuits	CBL-6FT-SMNM+	70047	26-Nov-12	26-Nov-13
4292	Microwave Cable Assembly, 18.0 GHz, 3.4 m, SMA/SMA	Huber-Suhner	Sucoflex P103	NA	04-Dec-12	04-Dec-13
4347	Low Loss Armored Test Cable, DC - 18 GHz, 2.0 m, N type-M/N type-M	MegaPhase	NC29-N1N1-79	12025103001	06-Mar-13	06-Mar-14

9 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

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

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 facility 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

47CFR part 27: 2012	Private land mobile radio services
47CFR part 1: 2012	Practice and procedure
47CFR part 2: 2012	Frequency allocations and radio treaty matters; general rules and regulations
ANSI C63.2: 1996	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4: 2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
ANSI/TIA/EIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

12 APPENDIX E Test equipment correction factors

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

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

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

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

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

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

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

Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain
30	22.2	-22.5	0.01	620	19.7	6.3	4.27	1215	24.9	7.0	5.05	1810	28.3	7.1	5.08	2405	30.9	6.9	4.93
35	18.5	-17.4	0.02	625	19.7	6.5	4.42	1220	24.9	7.0	4.99	1815	28.5	6.9	4.91	2410	30.9	6.9	4.89
40	14.7	-12.5	0.06	630	19.6	6.6	4.57	1225	25.1	6.9	4.91	1820	28.6	6.8	4.74	2415	31.0	6.9	4.85
45	11.3	-8.1	0.16	635	19.7	6.5	4.48	1230	25.2	6.8	4.82	1825	28.7	6.8	4.75	2420	31.0	6.8	4.82
45	11.3	-8.1	0.16	640	19.9	6.4	4.40	1235	25.1	7.0	4.96	1830	28.7	6.8	4.76	2425	31.1	6.8	4.81
50	8.9	-4.7	0.34	645	19.9	6.5	4.45	1240	25.0	7.1	5.09	1835	28.7	6.7	4.72	2430	31.0	6.9	4.87
55	7.9	-2.8	0.52	650	19.9	6.5	4.51	1245	25.0	7.1	5.12	1840	28.8	6.7	4.69	2435	31.0	6.9	4.88
60	7.8	-2.1	0.62	655	19.9	6.6	4.60	1250	25.0	7.1	5.15	1845	28.6	6.9	4.90	2440	31.2	6.8	4.74
65	8.5	-2.0	0.63	660	19.9	6.7	4.69	1255	25.0	7.2	5.25	1850	28.4	7.1	5.12	2445	31.1	6.9	4.91
70	9.0	-1.9	0.64	665	19.9	6.7	4.70	1260	24.9	7.3	5.36	1855	28.5	7.0	5.07	2450	31.0	7.0	4.96
75	8.8	-1.1	0.78	670	20.0	6.7	4.71	1265	25.0	7.3	5.31	1860	28.6	7.0	5.01	2455	31.0	7.0	5.01
80	8.4	-0.2	0.97	675	20.1	6.7	4.71	1270	25.1	7.2	5.26	1865	28.5	7.1	5.17	2460	30.9	7.2	5.19
85	8.0	0.8	1.20	680	20.1	6.7	4.71	1275	25.3	7.0	5.05	1870	28.4	7.3	5.33	2465	31.1	6.9	4.95
90	8.2	1.1	1.29	685	20.1	6.8	4.79	1280	25.5	6.8	4.84	1875	28.4	7.2	5.28	2470	31.3	6.8	4.76
95	9.2	0.5	1.13	690	20.1	6.9	4.88	1285	25.4	7.0	4.97	1880	28.5	7.2	5.22	2475	31.4	6.7	4.69
100	10.6	-0.4	0.92	695	20.2	6.8	4.82	1290	25.3	7.1	5.10	1885	28.5	7.2	5.22	2480	31.3	6.8	4.79
110	12.6	-1.6	0.70	705	20.4	6.8	4.75	1300	25.2	7.3	5.33	1895	28.6	7.2	5.24	2490	31.1	7.0	4.99
120	13.9	-2.1	0.62	715	20.5	6.8	4.80	1310	25.5	7.1	5.09	1905	28.5	7.3	5.36	2500	30.9	7.2	5.27
125	14.2	-2.0	0.63	720	20.5	6.9	4.85	1315	25.4	7.2	5.23	1910	28.5	7.4	5.45	2505	31.1	7.1	5.15
130	14.2	-1.7	0.68	725	20.6	6.8	4.81	1320	25.3	7.3	5.36	1915	28.5	7.3	5.38	2510	31.0	7.2	5.22
140	13.4	-0.3	0.94	735	20.9	6.7	4.65	1330	25.6	7.0	5.06	1925	28.6	7.3	5.35	2520	31.2	7.0	5.05
150	12.9	0.8	1.21	745	21.0	6.6	4.59	1340	25.7	7.1	5.09	1935	28.5	7.4	5.54	2530	31.0	7.3	5.37
160	12.7	1.6	1.44	755	21.0	6.8	4.74	1350	25.7	7.1	5.17	1945	28.5	7.5	5.59	2540	31.2	7.1	5.09
165	12.5	2.0	1.59	760	21.0	6.8	4.83	1355	25.8	7.0	5.06	1950	28.6	7.4	5.48	2545	31.0	7.3	5.43
170	12.2	2.6	1.83	765	21.1	6.8	4.73	1360	25.9	6.9	4.95	1955	28.6	7.5	5.57	2550	31.0	7.3	5.39
175	11.8	3.3	2.13	770	21.3	6.7	4.64	1365	26.0	6.9	4.95	1960	28.6	7.5	5.65	2555	31.1	7.2	5.30
180	11.6	3.7	2.36	775	21.3	6.7	4.68	1370	26.0	7.0	4.96	1965	28.7	7.4	5.47	2560	31.0	7.4	5.47
185	11.5	4.0	2.54	780	21.3	6.7	4.72	1375	26.0	7.0	5.01	1970	28.9	7.2	5.29	2565	30.8	7.6	5.70
190	11.6	4.2	2.61	785	21.3	6.8	4.77	1380	26.0	7.0	5.06	1975	28.9	7.2	5.22	2570	31.1	7.3	5.37
200	13.1	3.2	2.07	795	21.4	6.8	4.79	1390	26.1	6.9	4.92	1985	29.1	7.1	5.11	2580	31.6	6.9	4.87
205	12.0	4.4	2.76	800	21.5	6.8	4.77	1395	26.2	6.9	4.94	1990	29.1	7.0	5.06	2585	31.6	6.8	4.79
210	11.0	5.6	3.66	805	21.6	6.7	4.71	1400	26.2	7.0	4.96	1995	29.1	7.1	5.09	2590	31.6	6.9	4.88
215	11.3	5.6	3.59	810	21.7	6.7	4.65	1405	26.1	7.0	5.02	2000	29.1	7.1	5.11	2595	31.5	7.0	4.97
220	11.6	5.5	3.52	815	21.7	6.7	4.72	1410	26.1	7.1	5.09	2005	29.1	7.1	5.16	2600	31.6	6.9	4.86
225	11.7	5.5	3.55	820	21.7	6.8	4.80	1415	26.2	7.0	5.02	2010	29.1	7.1	5.15	2605	31.3	7.2	5.30
230	11.9	5.5	3.57	825	21.7	6.8	4.82	1420	26.3	7.0	4.96	2015	29.2	7.1	5.13	2610	31.4	7.1	5.15
235	12.1	5.5	3.56	830	21.7	6.9	4.85	1425	26.2	7.1	5.10	2020	29.2	7.1	5.18	2615	31.7	6.9	4.88
240	12.3	5.5	3.54	835	21.8	6.8	4.82	1430	26.1	7.2	5.25	2025	29.3	7.1	5.08	2620	31.6	7.0	4.97
245	12.3	5.7	3.71	840	21.9	6.8	4.80	1435	26.1	7.2	5.24	2030	29.3	7.0	5.05	2625	31.4	7.1	5.17
250	12.3	5.9	3.88	845	21.9	6.8	4.83	1440	26.2	7.2	5.24	2035	29.3	7.1	5.07	2630	31.6	7.0	5.00
255	12.5	5.9	3.85	850	21.9	6.9	4.86	1445	26.3	1	5.11	2040	29.3	7.1	5.13	2635	31.8	6.8	4.82
260	12.7	5.8	3.83	855	22.0	6.8	4.80	1450	26.5	7.0	4.98	2045	29.2	7.2	5.23	2640	31.7	7.0	4.98
265	13.2	5.5	3.54	860	22.1	6.8	4.74	1455	26.4	7.1	5.07	2050	29.2	7.2	5.27	2645	31.7	6.9	4.93
270	13.7	5.2	3.27	865	22.0	6.9	4.92	1460	26.4	7.1	5.17	2055	29.3	7.2	5.21	2650	31.8	6.9	4.85
275	13.7	5.3	3.39	870	21.9	7.1	5.11	1465	26.4	7.2	5.19	2060	29.5	7.0	5.02	2655	31.8	6.9	4.85
280	13.7	5.4	3.50	875	22.0	7.1	5.08	1470	26.4	7.2	5.22	2065	29.4	7.1	5.08	2660	31.7	7.0	5.02
285	13.7	5.6	3.61	880	22.1	7.0	5.05	1475	26.4	7.1	5.17	2070	29.4	7.1	5.10	2665	32.0	6.7	4.71
290	13.7	5.7	3.72	885	22.1	7.0	5.06	1480	26.5	7.1	5.12	2075	29.5	7.0	5.01	2670	32.0	6.7	4.67
295	13.8	5.8	3.77	890	22.1	7.0	5.06	1485	26.5	7.1	5.14	2080	29.8	6.8	4.76	2675	31.9	6.8	4.81
300	13.9	5.8	3.81	895	22.2	7.1	5.09	1490	26.5	7.1	5.17	2085	29.7	6.9	4.89	2680	31.7	7.0	5.04
305	14.0	5.9	3.85	900	22.2	7.1	5.12	1495	26.5	7.2	5.24	2090	29.7	6.9	4.86	2685	31.9	6.8	4.83
310	14.1	5.9	3.88	905	22.3	7.1	5.09	1500	26.5	7.2	5.31	2095	29.8	6.8	4.78	2690	32.1	6.7	4.72
315	14.3	5.9	3.89	910	22.3	7.0	5.05	1505	26.5	7.2	5.27	2100	29.9	6.8	4.75	2695	32.1	6.7	4.71
320	14.4	5.9	3.90	915	22.4	7.0	4.99	1510	26.6	7.2	5.23	2105	29.8	6.8	4.81	2700	32.0	6.8	4.81
325	14.5	5.9	3.92	920	22.6	6.9	4.92	1515	26.6	7.2	5.30	2110	29.9	6.8	4.78	2705	32.0	6.8	4.80
330	14.6	5.9	3.93	925	22.7	6.9	4.85	1520	26.5	7.3	5.38	2115	29.9	6.8	4.76	2710	32.1	6.8	4.79
335	14.7	6.0	4.02	930	22.8	6.8	4.77	1525	26.6	7.3	5.37	2120	29.9	6.8	4.84	2715	32.1	6.7	4.71
340	14.7	6.2	4.12	935	22.8	6.8	4.83	1530	26.6	7.3	5.36	2125	29.9	6.9	4.89	2720	32.4	6.5	4.47
345	14.9	6.1	4.06	940	22.8	6.9	4.89	1535	26.6	7.4	5.44	2130	29.9	6.9	4.90	2725	32.2	6.7	4.63
350	15.1	6.0	3.99	945	22.8	6.9	4.87	1540	26.5	7.4	5.53	2135	29.8	6.9	4.94	2730	31.9	7.0	5.05
355	15.3	5.9	3.88	950	22.9	6.9	4.85	1545	26.5	7.5	5.58	2140	29.8	7.1	5.08	2735	31.6	7.4	5.44
360	15.6	5.8	3.78	955	23.0	6.8	4.81	1550	26.5	7.5	5.63	2145	29.9	6.9	4.92	2740	31.6	7.1	5.46
365	15.5	5.9	3.89	960	23.1	6.8	4.77	1555	26.7	7.3	5.39	2150	29.9	7.0	4.98	2745	31.9	7.0	5.06
370	15.5	6.0	4.01	965	23.1	6.7	4.73	1560	26.9	7.1	5.16	2155	29.8	7.1	5.10	2750	32.0	6.9	4.94
375	15.6	6.1	4.03	970	23.2	6.7	4.69	1565	26.9	7.2	5.23	2160	29.8	7.1	5.09	2755	32.0	7.0	4.98
380	15.7	6.1	4.05	975	23.3	6.6	4.62	1570	26.9	7.2	5.30	2165	29.9	7.0	5.00	2760	32.0	7.0	5.06
385	15.7	6.2	4.15	980	23.5	6.6	4.54	1575	27.0	7.2	5.23	2170	29.9	7.1	5.07	2765	32.2	6.8	4.80
390	15.7	6.3	4.25	985	23.5	6.6	4.52	1580	27.0	7.1	5.17	2175	29.8	7.2	5.20	2770	32.3	6.8	4.73
395	15.9	6.3	4.22	990	23.6	6.5	4.50	1585	27.0	7.2	5.20	2180	29.8	7.2	5.27	2775	32.3	6.8	4.77
400	16.0	6.2	4.18	995	23.6	6.5	4.48	1590	27.0	7.2	5.22	2185	29.8	7.2	5.27	2780	32.3	6.8	4.82
405	16.3	6.1	4.07	1000	23.7	6.5	4.46	1595	27.0	7.2	5.29	2190	29.8	7.2	5.28	2785	32.7	6.4	4.41
410	16.5	6.0	3.96	1005	23.7	6.5	4.51	1600	27.0	7.3	5.36	2195	29.8	7.2	5.30	2790	32.8	6.3	4.25
415	16.5	6.0	4.00	1010	23.7	6.6	4.57	1605	27.0	7.3	5.38	2200	29.7	7.3	5.38	2795	32.8	6.4	4.33
420	16.6	6.1	4.03	1015	23.7	6.6	4.55	1610	27.0	7.3	5.41	2205	29.7	7.3	5.41	2800	32.5	6.7	4.66
425	16.6	6.1	4.10	1020	23.8	6.6	4.54	1615	27.1	7.3	5.33	2210	29.7	7.4	5.47	2805	32.5	6.6	4.62
430	16.7	6.2	4.16	1025	23.8	6.6	4.62	1620	27.2	7.2	5.27	2215	29.7	7.4	5.54	2810	32.5	6.7	4.70
435	16.9	6.1	4.05	1030	23.7	6.7	4.70	1625	27.2	7.2	5.30	2220	29.7	7.5	5.57	2815	32.3	6.9	4.85
440	17.1	5.9	3.93	1035	23.7	6.8	4.81	1630	27.2	7.3	5.33	2225	29.8	7.3	5.43	2820	32.2	7.0	5.01
445	17.2	6.0	3.97	1040	23.6	6.9	4.92	1635	27.2	7.3	5.35	2230	29.8	7.4	5.45	2825	32.3	7.0	4.96
450	17.2	6.0	4.00	1045	23.7	6.9	4.91	1640	27.2	7.3	5.36	2235	29.7	7.5	5.61	2830	32.4	6.8	4.80
455	17.3	6.1	4.04	1050	23.7	6.9	4.91	1645	27.3	7.2	5.22	2240	29.5	7.7	5.86	2835	32.5	6.7	4.68
460	17.4	6.1	4.07	1055	23.7	7.0	5.01	1650	27.5	7.1	5.09	2245	29.8	7.4	5.53	2840	32.5	6.8	4.78
465	17.5	6.1	4.05	1060	23.6	7.1	5.11	1655	27.5	7.1	5.11	2250	30.0	7.3	5.35	2845	32.6	6.6	4.62
470	17.6	6.1	4.04	1065	23.7	7.0	5.06	1660	27.5	7.1	5.13	2255	30.0	7.2	5.28	2850	32.6	6.7	4.70
475	17.7	6.0	3.99	1070	23.8	7.0	5.01	1665	27.6	7.0	5.06	2260	30.1	7.2	5.24	2855	32.4	6.9	4.88
480	17.9	5.9	3.93	1075	23.8	7.0	5.01	1670	27.7	7.0	4.99	2265	30.1	7.2	5.20	2860	32.4	7.0	4.98
485	18.0	5.9	3.88	1080	23.9	7.0	5.01	1675	27.7	7.0	5.02	2270	30.2	7.1	5.12	2865	32.8	6.5	4.52
490	18.2	5.8	3.82	1085	24.0	7.0	4.96	1680	27.7	7.0	5.05	2275	30.3	7.0	5.05	2870	33.0	6.3	4.30
495	18.0	6.0	4.02	1090	24.0	6.9	4.91	1685	27.7	7.0	5.01	2280	30.0	7.0	5.06	2875	33.0	6.4	4.38
500	17.9	6.3	4.23	1095	24.1	6.9	4.86	1690	27.8	7.0	4.98	2285	30.3	7.0	5.05	2880	32.5	6.9	4.87
505	17.9	6.3	4.29	1100	24.2	6.8	4.82	1695	27.8	7.0	5.01	2290	30.3	7.1	5.07	2885	33.0	6.4	4.40
510	18.0	6.4	4.36	1105	24.3	6.8	4.80	1700	27.8	7.0	5.03	2295	30.3	7.1	5.13	2890	33.1	6.3	4.28
515	18.1	6.4	4.34	1110	24.3	6.8	4.78	1705	27.8	7.1	5.09	2300	30.2	7.2	5.23	2895	33.1	6.4	4.34
520	18.2	6.4	4.32	1115	24.3	6.8	4.79	1710	27.7	7.1	5.16	2305	30.3	7.2	5.20	2900	33.0	6.4	4.41
525	18.2	6.4	4.36	1120	24.4	6.8	4.80	1715	27.8	7.1	5.08	2310	30.2	7.3	5.35	2905	32.9	6.6	4.58
530	18.3	6.4	4.39	1125	24.3	6.9	4.90	1720	27.9	7.0	5.00	2315	30.1	7.4	5.45	2910	32.9	6.5	4.51
535	18.3	6.4	4.41	1130	24.3	7.0	5.00	1725	28.0	7.0	4.99	2320	30.3	7.2	5.27	2915	33.1	6.4	4.33
540	18.4	6.4	4.41	1135	24.4	6.9	4.90	1730	28.0	7.0	4.98	2325	304	7.2	5.22	2920	33.3	6.2	4.16
545	18.4	6.5	4.47	1140	24.5	6.8	4.81	1735	28.0	7.0	5.02	2330	30.4	7.1	5.13	2925	33.0	6.5	4.45
550	18.4	6.6	4.53	1145	24.6	6.8	4.76	1740	28.0	7.1	5.07	2335	30.5	7.0	5.07	2930	33.0	6.5	4.51
555	18.6	6.5	4.45	1150	24.7	6.7	4.71	1745	28.0	7.0	5.04	2340	30.5	7.1	5.11	2935	33.0	6.5	4.48
560	18.8	6.4	4.37	1155	24.7	6.8	4.76	1750	28.1	7.0	5.01	2345	30.6	7.0	5.07	2940	33.0	6.5	4.52
565	18.9	6.4	4.33	1160	24.7	6.8	4.80	1755	27.9	7.1	5.17	2350	30.5	7.1	5.12	2945	33.1	6.5	4.42
570	19.0	6.3	4.28	1165	24.7	6.8	4.81	1760	27.8	7.3	5.34	2355	30.6	7.1	5.08	2950	33.2	6.4	4.32
575	19.1	6.3	4.31	1170	24.7	6.8	4.81	1765	27.9	7.3	5.31	2360	30.9	6.8	4.79	2955	33.3	6.3	4.27
580	19.1	6.4	4.33	1175	24.8	6.8	4.84	1770	27.9	7.2	5.28	2365	31.0	6.7	4.66	2960	33.3	6.3	4.30
590	19.1	6.6	4.52	1185	24.8	6.9	4.92	1780	27.9	7.3	5.35	2375	31.1	6.6	4.60	2970	33.3	6.4	4.36
595	19.0	6.6	4.62	1190	24.7	7.0	4.99	1785	28.1	7.2	5.21	2380	31.1	6.6	4.61	2975	33.0	6.6	4.60
600	19.0	6.7	4.72	1195	24.7	7.0	5.02	1790	28.2	7.0	5.07	2385	31.1	6.7	4.62	2980	32.9	6.8	4.74
610	19.1	6.8	4.76	1205	24.08	7.1	5.08	1800	28.3	7.0	5.06	2395	31.2	6.6	4.60	2990	32.9	6.8	4.82
615	19.4	6.5	4.51	1210	24.8	7.1	5.11	1805	28.3	7.1	5.07	2400	30.9	6.9	4.93	3000	33.4	6.4	4.33

Cable loss
Test cable, Mini-Circuits, S/N 70047, 18 GHz, 1.8 m, SMA/M - N/M
CBL-6FT-SMNM+, HL 4274

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.07	4800	1.69	9800	2.62	14800	3.42
30	0.11	4900	1.70	9900	2.63	14900	3.39
50	0.14	5000	1.72	10000	2.64	15000	3.38
100	0.21	5100	1.75	10100	2.64	15100	3.40
200	0.26	5200	1.76	10200	2.66	15200	3.41
300	0.30	5300	1.77	10300	2.67	15300	3.40
400	0.37	5400	1.79	10400	2.68	15400	3.39
500	0.44	5500	1.82	10500	2.68	15500	3.41
600	0.49	5600	1.85	10600	2.70	15600	3.44
700	0.54	5700	1.86	10700	2.71	15700	3.46
800	0.58	5800	1.87	10800	2.73	15800	3.45
900	0.63	5900	1.91	10900	2.74	15900	3.47
1000	0.67	6000	1.94	11000	2.76	16000	3.51
1100	0.71	6100	1.97	11100	2.77	16100	3.56
1200	0.75	6200	1.98	11200	2.78	16200	3.55
1300	0.78	6300	1.99	11300	2.79	16300	3.54
1400	0.81	6400	2.02	11400	2.80	16400	3.57
1500	0.85	6500	2.05	11500	2.82	16500	3.62
1600	0.88	6600	2.06	11600	2.83	16600	3.61
1700	0.91	6700	2.06	11700	2.84	16700	3.60
1800	0.94	6800	2.08	11800	2.85	16800	3.62
1900	0.97	6900	2.10	11900	2.87	16900	3.68
2000	1.00	7000	2.12	12000	2.88	17000	3.70
2100	1.03	7100	2.12	12100	2.89	17100	3.68
2200	1.06	7200	2.13	12200	2.90	17200	3.70
2300	1.08	7300	2.16	12300	2.92	17300	3.80
2400	1.11	7400	2.19	12400	2.94	17400	3.84
2500	1.14	7500	2.22	12500	2.95	17500	3.83
2600	1.16	7600	2.23	12600	2.96	17600	3.83
2700	1.19	7700	2.26	12700	2.98	17700	3.86
2800	1.21	7800	2.30	12800	3.00	17800	3.86
2900	1.27	7900	2.33	12900	3.02	17900	3.80
3000	1.29	8000	2.35	13000	3.03	18000	3.79
3100	1.32	8100	2.37	13100	3.06		
3200	1.35	8200	2.41	13200	3.08		
3300	1.37	8300	2.44	13300	3.09		
3400	1.38	8400	2.47	13400	3.10		
3500	1.41	8500	2.48	13500	3.13		
3600	1.43	8600	2.51	13600	3.17		
3700	1.46	8700	2.53	13700	3.17		
3800	1.47	8800	2.55	13800	3.18		
3900	1.49	8900	2.56	13900	3.22		
4000	1.52	9000	2.57	14000	3.26		
4100	1.55	9100	2.58	14100	3.28		
4200	1.56	9200	2.59	14200	3.30		
4300	1.58	9300	2.59	14300	3.35		
4400	1.60	9400	2.60	14400	3.39		
4500	1.63	9500	2.60	14500	3.39		
4600	1.65	9600	2.61	14600	3.39		
4700	1.67	9700	2.61	14700	3.41		

Cable loss
Microwave Cable Assembly, 18.0 GHz, 3.4 m, SMA/SMA, Huber-Suhner, Sucoflex P103, HL 4292

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.11	5000	2.10	10200	2.95	15400	3.64
30	0.17	5100	2.14	10300	2.96	15500	3.68
50	0.22	5200	2.16	10400	2.99	15600	3.71
100	0.30	5300	2.17	10500	2.99	15700	3.74
200	0.36	5400	2.19	10600	3.03	15800	3.71
300	0.42	5500	2.19	10700	3.03	15900	3.74
400	0.51	5600	2.22	10800	3.04	16000	3.71
500	0.59	5700	2.24	10900	3.05	16100	3.73
600	0.66	5800	2.23	11000	3.09	16200	3.76
700	0.72	5900	2.26	11100	3.07	16300	3.82
800	0.77	6000	2.27	11200	3.08	16400	3.90
900	0.82	6100	2.26	11300	3.11	16500	3.81
1000	0.88	6200	2.29	11400	3.12	16600	3.88
1100	0.93	6300	2.30	11500	3.11	16700	3.87
1200	0.98	6400	2.34	11600	3.15	16800	3.89
1300	1.02	6500	2.34	11700	3.16	16900	3.95
1400	1.06	6600	2.36	11800	3.18	17000	4.02
1500	1.10	6700	2.36	11900	3.19	17100	4.04
1600	1.14	6800	2.39	12000	3.23	17200	3.99
1700	1.19	6900	2.39	12100	3.25	17300	4.03
1800	1.23	7000	2.44	12200	3.22	17400	4.03
1900	1.27	7100	2.46	12300	3.25	17500	4.06
2000	1.30	7200	2.44	12400	3.25	17600	4.05
2100	1.35	7300	2.48	12500	3.28	17700	4.12
2200	1.38	7400	2.47	12600	3.27	17800	4.14
2300	1.42	7500	2.48	12700	3.27	17900	4.18
2400	1.45	7600	2.50	12800	3.30	18000	4.14
2500	1.48	7700	2.53	12900	3.30		
2600	1.51	7800	2.56	13000	3.27		
2700	1.55	7900	2.55	13100	3.32		
2800	1.59	8000	2.56	13200	3.32		
2900	1.65	8100	2.56	13300	3.32		
3000	1.66	8200	2.57	13400	3.35		
3100	1.69	8300	2.59	13500	3.38		
3200	1.71	8400	2.62	13600	3.39		
3300	1.74	8500	2.67	13700	3.42		
3400	1.76	8600	2.65	13800	3.47		
3500	1.78	8700	2.68	13900	3.45		
3600	1.80	8800	2.68	14000	3.49		
3700	1.85	8900	2.68	14100	3.50		
3800	1.88	9000	2.74	14200	3.55		
3900	1.90	9100	2.74	14300	3.59		
4000	1.91	9200	2.76	14400	3.58		
4100	1.93	9300	2.78	14500	3.56		
4200	1.96	9400	2.79	14600	3.57		
4300	1.97	9500	2.80	14700	3.57		
4400	1.99	9600	2.83	14800	3.57		
4500	2.02	9700	2.84	14900	3.64		
4600	2.02	9800	2.86	15000	3.64		
4700	2.04	9900	2.92	15100	3.61		
4800	2.05	10000	2.90	15200	3.67		
4900	2.09	10100	2.92	15300	3.63		

Cable loss
Low Loss Armored Test Cable, MegaPhase, 18 GHz, 6.2 m, N type-M/N type-M,
NC29-N1N1-79 S/N 12025103 001,
HL 4347

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
50	0.08	9000	0.92
100	0.11	9500	1.00
300	0.18	10000	1.05
500	0.23	10500	1.04
1000	0.32	11000	1.05
1500	0.39	11500	1.09
2000	0.45	12000	1.13
2500	0.50	12500	1.15
3000	0.54	13000	1.19
3500	0.59	13500	1.19
4000	0.62	14000	1.22
4500	0.65	14500	1.26
5000	0.69	15000	1.32
5500	0.71	15500	1.38
6000	0.77	16000	1.34
6500	0.82	16500	1.36
7000	0.84	17000	1.46
7500	0.85	17500	1.49
8000	0.88	18000	1.46
8500	0.90		

13 APPENDIX F Abbreviations and acronyms

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

END OF DOCUMENT