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TEST REPORT

ACCORDING TO: FCC CFR 47 PART 90 subpart Z

FOR:

Airspan Networks Inc. LTE Base Station Model: Synergy 2000, 3.7GHz (B43) FCC ID:PIDSYN3650

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



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1 Applicant information

Client name:	Airspan Networks Inc.
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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:	LTE Base Station
Product type:	Transceiver
Model(s):	Synergy 2000, 3.7GHz (B43)
Serial number:	76E1E3173DA4
Hardware version:	00A00A173DA4
Software release:	14.12.50.82
Receipt date	11-May-14

3 Manufacturer information

Manufacturer name:	Airspan Networks Inc.
Address:	777 Yamato Rd, Suite 310, Boca Raton 33431, Florida, 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:	25757
Location:	Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started:	11-May-14
Test completed:	19-May-14
Test specification(s):	47CFR part 90 subpart Z



5 Tests summary

Test	Status
Transmitter characteristics	
FCC Section 90.1321, Maximum conducted output power	Pass
FCC Section 90.1321, Peak EIRP power density	Pass
FCC Section 90.209, Occupied bandwidth	Pass
FCC Section 90.210(b), Emission mask	Pass
FCC Section 90.1323, Spurious emissions at RF antenna connector	Pass
FCC Section 90.1323, Radiated spurious emissions	Pass
FCC Section 90.213, Frequency stability	Pass
FCC Section 90.1335, RF exposure	Pass, Exhibit attached to Application for certification

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 resul	lts rela	te only	to the	eitems	tested.	Pass/	fail	decision	was	based	on	nominal	val	ues.

	Name and Title	Date	Signature
Tested by:	Mr. V. Einem, test engineer	May 19, 2014	Not the second second
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	May 29, 2014	Chun
Approved by:	Mr. M. Nikishin, EMC and Radio group manager	June 16, 2014	ft b



6 EUT description

6.1 General information

A Base station radio, Synergy 2000- Band 43 TDD 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 Synergy's' transceiver/receiver (Up to 64 QAM modulation, data rate up to 150 Mbps) uses OFDM and operating in TDD mode, equipped with a 2 dBi external antenna. The maximum total RF output power (not including antenna gain) is 34.91 dBm and it can be reduced by software. Information about output power vs maximum and minimum antenna gains provided in the table below.

Frequency band, MHz	RF output power, dBm	Antenna gain, dBi	EIRP, dBm
3650-3675	34.91	2	36.91
3030-3075	18.91	18	36.91

The Synergy 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	Connected from	Connected to	Qty.	Cable type	Cable length, m
Power	DC power	DC power supply	EUT	1	Unshielded	10
Signal	Ethernet	ETH1 port	Laptop	1	Shielded	10
Signal	Antenna	EUT	GPS external antenna	1	Coax	5
RF	Antenna	EUT	Termination 50 Ohm	2	Coax	NA
Signal*	RS-232	EUT	Laptop	1	Unshielded	2

* For maintance only

6.3 Support and test equipment

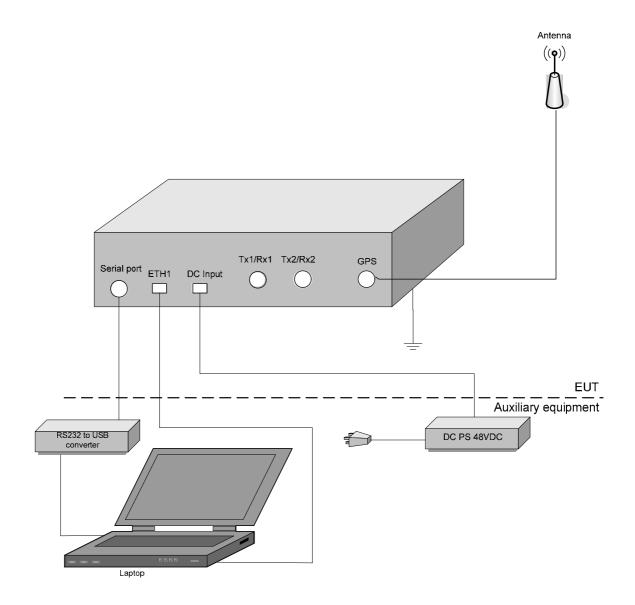
Description	Manufacturer	Model number	Serial number
DC power supply	Mean Well	PSP-600-48	RB29063683
GPS antenna	Tallysman Wireless	32-3030-0	20110606
Laptop	DELL	E6410	PO1038624
4 Port USB to RS-232 hub	ATEN INTERNATIONAL	UC2324	Z3CA2180AB40199

6.4 Changes made in the EUT

No changes were implemented in the EUT during testing.



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 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	uipment)								
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	uipment)								
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									
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									
mobile Always at a distance more than 20 cm from all people									
portable May operate at a distance closer than 20 cm to human body									
Assigned frequency range 3650.0 – 3675.0 MHz									
Operating frequency range3655 – 3670 MHz for10 MHz EBW3660 – 3665 MHz for 20 MHz EBW									
RF channel spacing 10 MHz, 20 MHz									
Maximum rated output power At transmitter 50 Ω RF output connector (aggregate power both RF chains)	of 34.20 dBm – 10 MHz OBW 34.91 dBm – 20 MHz OBW								
No									
continuous variable									
Is transmitter output power variable? V stepped variable with stepsize	0.1 dB								
V Yes minimum RF power	0 dBm								
maximum RF power	dBm								
Antenna connection									
unique coupling V standard connector Integral	emporary RF connector								
witho	ut temporary RF connector								
Antenna/s technical characteristics									
	ain								
Manual Tilt Panel Antenna, Dual Argus Technologies Pty SSPX310M	18.0 dBi								
Slant ± 45° Ltd. Slave 100 / X0 / 000 / X0 /	2.0 dBi								
	2.0 001								
Transmitter aggregate data rate/s, Mbps									
Transmitter 99% power bandwidth Type of modulation QPSK 16QAM	64QAM								
10 MHz 15.5 30.5	75								
	150								
20 MHz 31 61	OFDMA/TDD								
Type of multiplexingOFDMA/TDDModulating test signal (baseband)PRBS									
Type of multiplexingOFDMA/TDDModulating test signal (baseband)PRBSMaximum transmitter duty cycle in normal use100 %									
Type of multiplexingOFDMA/TDDModulating test signal (baseband)PRBS									



Test specification:	Section 90.1321, Maximu	Section 90.1321, Maximum output power							
Test procedure:	47 CFR, Section 2.1046; TIA	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1							
Test mode:	Compliance	Verdict: PASS							
Date(s):	12-May-14	Verdict:	PASS						
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC						
Remarks:									

7 Transmitter tests according to 47CFR part 90 requirements

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.

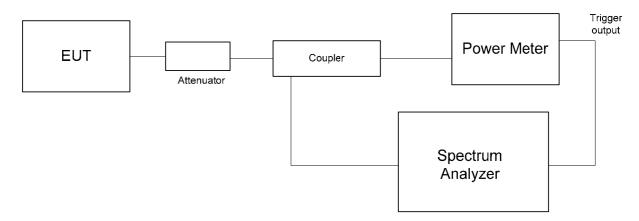
Assigned	Occupied	Maximum peak output power, EIRP				
frequency range, MHz	Bandwidth, MHz	W	dBm			
3650.0 - 3675.0	10	10	40.00			
3050.0 - 3075.0	20	20	43.00			
Assigned	Occupied	Maximum peak power spectral density, EIRP				
frequency range, MHz	Bandwidth, MHz	W	dBm/MHz			
3650.0 - 3675.0	10 20	1	30			

Table 7.1.1 Peak output power limits

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 power meter as provided in Table 7.1.2 and the associated plots.
- **7.1.2.4** The peak output power density was measured with spectrum analyzer as provided in Table 7.1.3 and the associated plots.

Figure 7.1.1 Peak output power test setup





Test specification:	Section 90.1321, Maxim	Section 90.1321, Maximum output power						
Test procedure:	47 CFR, Section 2.1046; TIA	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1						
Test mode:	Compliance	Verdict:	PASS					
Date(s):	12-May-14	verdict:	FA33					
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC					
Remarks:								

Table 7.1.2 Peak EIRP output power test results

OPERATING FREQUENCY RANGE: DETECTOR USED: MODULATION: MODULATING SIGNAL: TRANSMITTER OUTPUT POWER SETTINGS: EBW: 3650.0 – 3675.0 MHz Average (Power Meter) QPSK/64QAM PRBS Maximum (see NOTE1) **10 MHz**

Channel, MHz	Modulation	Pmeas (RF#1), dBm	Pmeas (RF#2), dBm	P _{meas} *,dBm	Antenna gain, dBi	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
3655.00	QPSK	30.00	31.25	33.68	2.00	35.68	40.00	-4.32	Pass
3663.00	QPSK	30.59	31.54	34.10	2.00	36.10	40.00	-3.90	Pass
3670.00	QPSK	30.77	31.58	34.20	2.00	36.20	40.00	-3.80	Pass
						•			
3655.00	64QAM	29.90	31.20	33.61	2.00	35.61	40.00	-4.39	Pass
3663.00	64QAM	30.51	31.50	34.04	2.00	36.04	40.00	-3.96	Pass
3670.00	64QAM	30.74	31.60	34.20	2.00	36.20	40.00	-3.80	Pass

EBW:									
Channel, MHz	Modulation	Pmeas (RF#1), dBm	Pmeas (RF#2), dBm	P _{meas} *,dBm	Antenna gain, dBi	EIRP total**, dBm	Limit, dBm	Margin, dB	Verdict
3660.00	QPSK	31.16	32.24	34.74	2.00	36.74	43.00	-6.26	Pass
3663.00	QPSK	31.29	32.31	34.84	2.00	36.84	43.00	-6.16	Pass
3665.00	QPSK	31.37	32.37	34.91	2.00	36.91	43.00	-6.09	Pass
3660.00	64QAM	29.70	30.21	32.97	2.00	34.97	43.00	-8.03	Pass
3663.00	64QAM	29.87	30.33	33.12	2.00	35.12	43.00	-7.88	Pass
3665.00	64QAM	29.97	30.35	33.17	2.00	35.17	43.00	-7.83	Pass

* - Pmeas ,dBm = 10 log(10^((P(dBm,RF#1)/10)+ 10^((P(dBm, RF#2))/10))

** - EIRP total, dBm = Pmeas, dBm + Antenna Gain, dBi

NOTE1: the EUT was configured to produce maximum conducted RF power for minimum declared Antenna gain of 2 dBi. RF output power will vary depending on the antenna assembly gain to ensure that the total EIRP power and power limits withstand with EIRP limits. For actual settings of power levels with respect to actual antenna assembly used, please refer to the User's Manual.

Power Settings	RF CI	hain 1	RF Chain 2		
Power Settings	QPSK	64QAM	QPSK	64QAM	
10MHz	20 HEX	20 HEX	20 HEX	20 HEX	
20MHz	19 HEX	14 HEX	19 HEX	17 HEX	



Test specification:	Section 90.1321, Maximu	Section 90.1321, Maximum output power							
Test procedure:	47 CFR, Section 2.1046; TIA	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1							
Test mode:	Compliance	Verdict:	PASS						
Date(s):	12-May-14	veraict:	FA33						
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC						
Remarks:									

Table 7.1.3 Peak EIRP power density test results

DETECTOR RESOLUTI VIDEO BAN MODULAT MODULAT	ON BANDWI NDWIDTH:	DTH:			Averag 1000 k 3000 k QPSK/ PRBS	Hz /64QAM um (see NO			
Channel, MHz	Modulation	Pmeas (RF#1), dBm/MHz	Pmeas (RF#2), dBm/MHz	P _{meas} *, dBm/MHz	Antenna gain, dBi	EIRP total**, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
3655.00	QPSK	21.79	23.1	25.50	2.00	27.50	30.00	-2.50	Pass
3663.00	QPSK	22.10	23.33	25.77	2.00	27.77	30.00	-2.23	Pass
3670.00	QPSK	22.39	23.17	25.81	2.00	27.81	30.00	-2.19	Pass
3655.00	64QAM	21.73	22.83	25.33	2.00	27.33	30.00	-2.67	Pass
3663.00	64QAM	22.62	23.26	25.96	2.00	27.96	30.00	-2.04	Pass
3670.00	64QAM	22.56	23.53	26.08	2.00	28.08	30.00	-1.92	Pass

Ε	В	٧	V	:

EBM:					20 MH	Z			
Channel, MHz	Modulation	Pmeas (RF#1), dBm/MHz	Pmeas (RF#2), dBm/MHz	P _{meas} *, dBm/MHz	Antenna gain, dBi	EIRP total**, dBm/MHz	Limit, dBm/MHz	Margin, dB	Verdict
3660.00	QPSK	20.02	21.73	23.97	2.00	25.97	30.00	-4.03	Pass
3663.00	QPSK	20.25	21.49	23.92	2.00	25.92	30.00	-4.08	Pass
3665.00	QPSK	20.31	21.66	24.05	2.00	26.05	30.00	-3.95	Pass
					-				
3660.00	64QAM	19.24	19.10	22.18	2.00	24.18	30.00	-5.82	Pass
3663.00	64QAM	19.10	19.29	22.21	2.00	24.21	30.00	-5.79	Pass
3665.00	64QAM	19.09	19.59	22.36	2.00	24.36	30.00	-5.64	Pass
* - Pmeas	dBm = 10 loc	(10^((P(dBr	n/MHz RF#1	$1)(10) + 10^{(1)}$	P(dBm/MH	7 RF#2))/10))		

00 8411-

* - Pmeas ,dBm = 10 log(10^((P(dBm/MHz,RF#1)/10)+ 10^((P(dBm/MHz, RF#2))/10))

** - EIRP total, dBm/MHz = Pmeas, dBm/MHz + Antenna Gain, dBi

NOTE1: The EUT was configured to produce maximum conducted RF power for minimum declared Antenna gain of 2 dBi. RF output power will vary depending on the antenna assembly gain to ensure that the total EIRP power and power limits withstand with EIRP limits. For actual settings of power levels with respect to actual antenna assembly used, please refer to the User's Manual.

Power Settings	RF CI	hain 1	RF Chain 2		
Power Settings	QPSK	64QAM	QPSK	64QAM	
10MHz	20 HEX	20 HEX	20 HEX	20 HEX	
20MHz	19 HEX	14 HEX	19 HEX	17 HEX	

Reference numbers of test equipment used

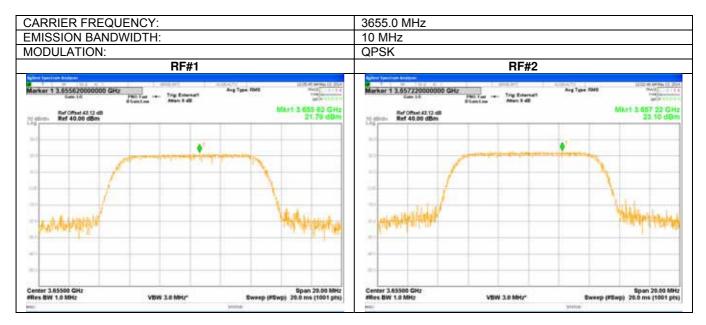
HL 3301	HL 3302	HL 3770	HL 4229	HL 4273	HL 4275	HL 4367	HL 4575
 . Il al a a anim ti a m	·	a va alta a A					

Full description is given in Appendix A.

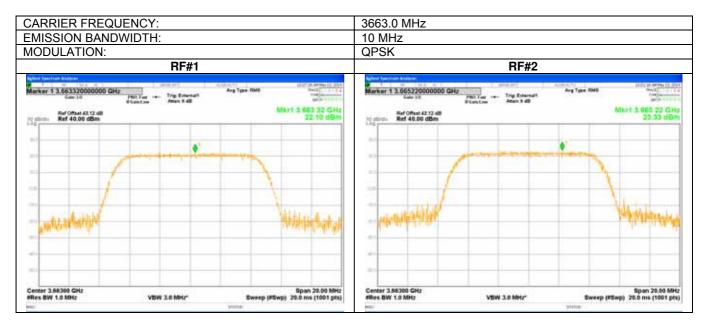


Test specification:	Section 90.1321, Maximum output power				
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1				
Test mode:	Compliance	Verdict: PASS			
Date(s):	12-May-14	verdict:	FA33		
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC		
Remarks:			· · · · ·		

Plot 7.1.1 Peak output power test results at low frequency



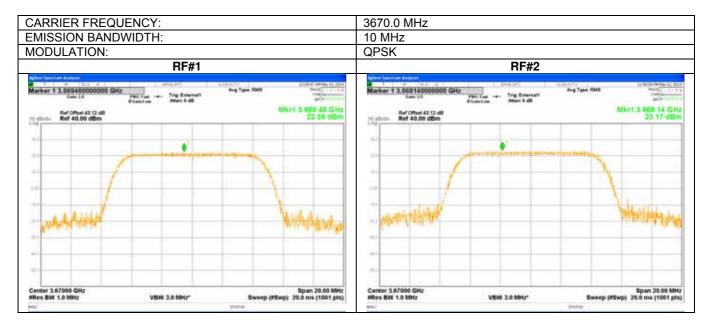
Plot 7.1.2 Peak output power test results at mid frequency



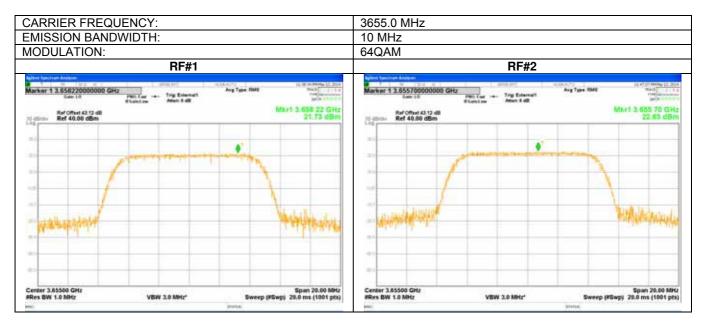


Test specification:	Section 90.1321, Maximum output power				
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1				
Test mode:	Compliance	Verdict: PASS			
Date(s):	12-May-14	verdict:	FA33		
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC		
Remarks:					

Plot 7.1.3 Peak output power test results at high frequency



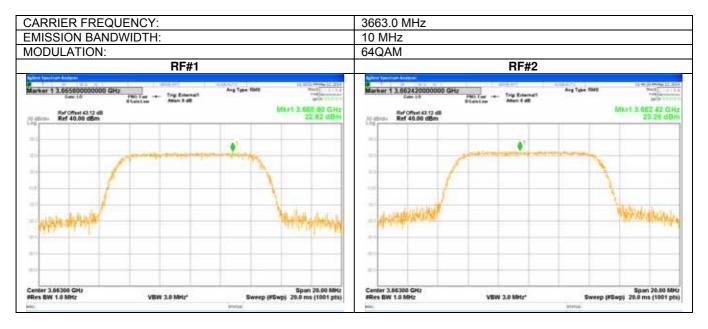
Plot 7.1.4 Peak output power test results at low frequency





Test specification:	Section 90.1321, Maximum output power			
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1			
Test mode:	Compliance	Verdict: PASS		
Date(s):	12-May-14	Verdict:	PA33	
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC	
Remarks:				

Plot 7.1.5 Peak output power test results at mid frequency



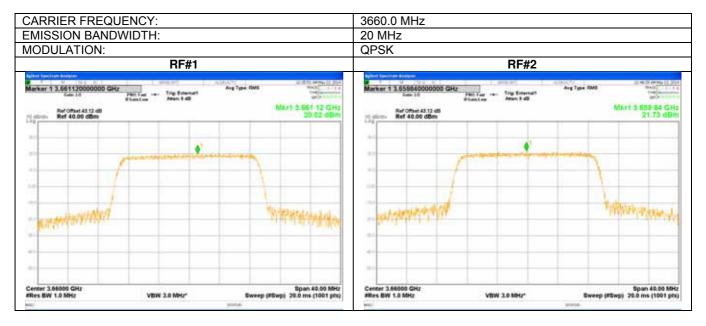
Plot 7.1.6 Peak output power test results at high frequency

CARRIER FREQUENCY:		3670.0 MHz	
EMISSION BANDWIDTH:		10 MHz	
MODULATION:		64QAM	
RF#1		RF#2	
Marker 13.671120000000 GHz Marker 13.671120000000 GHz Russian R	Ang Type Hall Ang Type Hall Mich 1 2 50 dB Mich 2 50 dB Mich 2 50 dB	Marker 1 3.665240000000 GHz Arg Type RMS Arg	1 668 24 GHz 23.53 dBm
	· · · · · · · · · · · · · · · · · · ·		Merelini, and
Center 3.87000 GHz FRes BW 1.0 MHz VBW 3.0 MHz	Span 20.00 MHz Sweep (#Swpj 20.0 ms (1001 pts)	Center 3.67000 GHz #Res BW 1.0 MHz VBW 3.0 MHz* Sweep (#Swp) 7/	Span 20.00 MH 1.0 ms (1001 pe

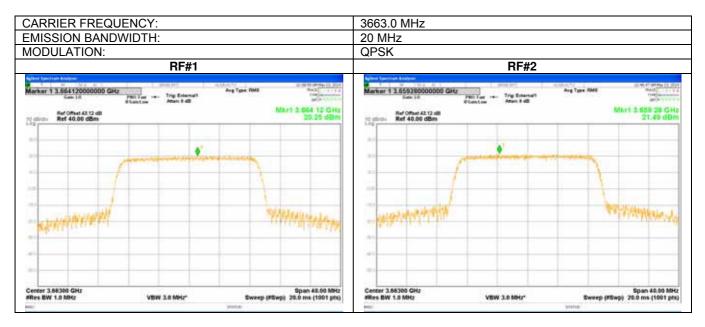


Test specification:	Section 90.1321, Maximum output power				
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1				
Test mode:	Compliance	Verdict: PASS			
Date(s):	12-May-14	verdict:	FA33		
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC		
Remarks:					

Plot 7.1.7 Peak output power test results at low frequency



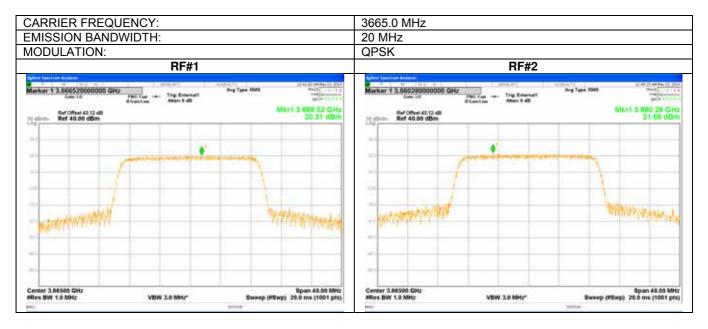
Plot 7.1.8 Peak output power test results at mid frequency



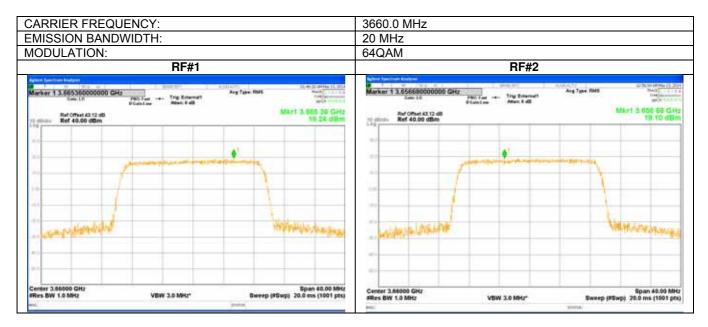


Test specification:	Section 90.1321, Maximum output power				
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1				
Test mode:	Compliance	Verdict: PASS			
Date(s):	12-May-14	verdict:	FA33		
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC		
Remarks:			· · · · ·		

Plot 7.1.9 Peak output power test results at high frequency



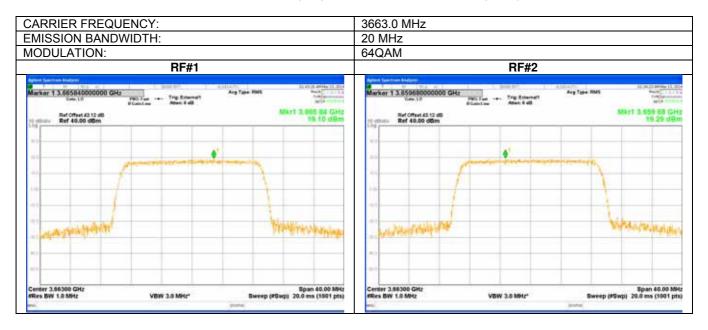
Plot 7.1.10 Peak output power test results at low frequency



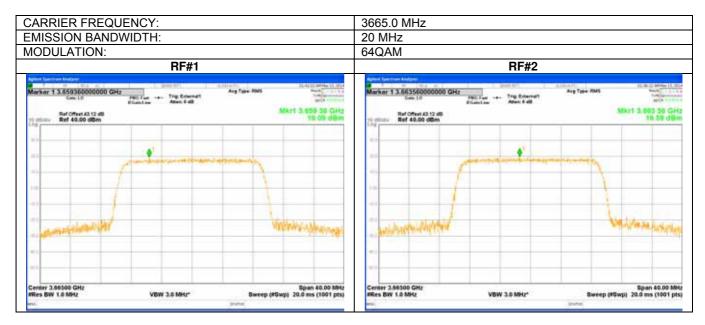


Test specification:	Section 90.1321, Maximum output power				
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1				
Test mode:	Compliance	Verdict: PASS			
Date(s):	12-May-14	Verdict:	PASS		
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC		
Remarks:					

Plot 7.1.11 Peak output power test results at mid frequency



Plot 7.1.12 Peak output power test results at high frequency





Test specification:	Section 90.209, Occupie	Section 90.209, Occupied bandwidth			
Test procedure:	47 CFR, Section 2.1049				
Test mode:	Compliance	Verdict:	PASS		
Date(s):	13-May-14	verdict:	FA33		
Temperature: 25 °C	Air Pressure: 1014 hPa	Relative Humidity: 48 %	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

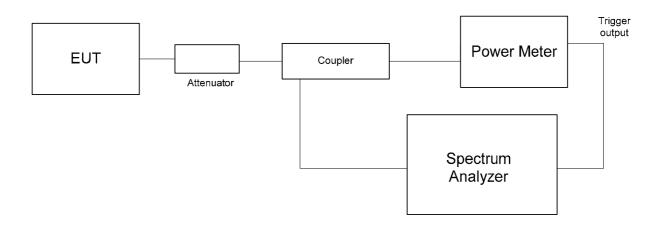
Assigned frequency,	Modulation envelope reference points*,	Maximum allowed bandwidth,
MHz	dBc	MHz
3650.0 - 3675.0	26	25

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

7.2.2 Test procedure

- **7.2.2.1** The EUT was set up as shown in Figure 7.2.1, energized and its proper operation was checked.
- **7.2.2.2** The EUT was set to transmit the normally modulated carrier.
- **7.2.2.3** The transmitter occupied bandwidth was measured with spectrum analyzer as a frequency delta between the reference points on modulation envelope and provided in Table 7.2.2 and the associated plots.

Figure 7.2.1 Occupied bandwidth test setup





Test specification:	Section 90.209, Occupie	Section 90.209, Occupied bandwidth			
Test procedure:	47 CFR, Section 2.1049				
Test mode:	Compliance	Verdict:	PASS		
Date(s):	13-May-14	verdict:	FA33		
Temperature: 25 °C	Air Pressure: 1014 hPa	Relative Humidity: 48 %	Power Supply: 48VDC		
Remarks:					

Table 7.2.2 Occupied bandwidth test results

DETECTOR USED: RESOLUTION BANDWIDTH: VIDEO BANDWIDTH: MODULATION ENVELOPE REFERENCE POINTS: MODULATION: MODULATING SIGNAL: RF Chain Peak 1% of the Emission bandwidth 3 times RBW 99% / 26 dB below total average power QPSK/64QAM PRBS 1

Carrier frequency, MHz	Modulation	99% Occupied bandwidth, MHz	26 dBc Occupied bandwidth, MHz	Emission Bandwidth, MHz	Verdict
3652.5	QPSK	8.9362	9.400	10.0	Pass
3663.0	QPSK	8.9173	9.311	10.0	Pass
3672.5	QPSK	8.9024	9.416	10.0	Pass
3652.5	64QAM	8.9310	9.233	10.0	Pass
3663.0	64QAM	8.9111	9.371	10.0	Pass
3672.5	64QAM	8.9210	9.282	10.0	Pass
3653.5	QPSK	17.803	18.760	20.0	Pass
3663.0	QPSK	17.785	18.910	20.0	Pass
3671.5	QPSK	17.810	18.610	20.0	Pass
3653.5	64QAM	17.868	18.780	20.0	Pass
3663.0	64QAM	17.769	18.940	20.0	Pass
3671.5	64QAM	17.759	19.190	20.0	Pass

RF Chain

2

Carrier frequency, MHz	Modulation	99% Occupied bandwidth, MHz	26 dBc Occupied bandwidth, MHz	Emission Bandwidth, MHz	Verdict
3652.5	QPSK	8.9154	9.407	10.0	Pass
3663.0	QPSK	8.8992	9.556	10.0	Pass
3672.5	QPSK	8.9381	9.527	10.0	Pass
3652.5	64QAM	8.9218	9.367	10.0	Pass
3663.0	64QAM	8.9083	9.683	10.0	Pass
3672.5	64QAM	8.9372	9.440	10.0	Pass
3653.5	QPSK	17.823	18.770	20.0	Pass
3663.0	QPSK	17.793	19.040	20.0	Pass
3671.5	QPSK	17.845	18.920	20.0	Pass
3653.5	64QAM	17.799	18.880	20.0	Pass
3663.0	64QAM	17.766	18.870	20.0	Pass
3671.5	64QAM	17.790	18.870	20.0	Pass

NOTE1: Power Meter used to ensure maximum of power and power density.

NOTE2: Measurement was performed at the worst case of power and power density settings.

Dowor Sottings	RF C	RF Chain 1		hain 2
Power Settings	QPSK	64QAM	QPSK	64QAM
10MHz	20 HEX	20 HEX	20 HEX	20 HEX
20MHz	19 HEX	14 HEX	19 HEX	17 HEX

Reference numbers of test equipment used

|--|

Full description is given in Appendix A.



Test specification:	Section 90.209, Occupied bandwidth				
Test procedure:	47 CFR, Section 2.1049				
Test mode:	Compliance	Vardiate	PASS		
Date(s):	13-May-14	Verdict:	FA33		
Temperature: 25 °C	Air Pressure: 1014 hPa	Relative Humidity: 48 %	Power Supply: 48VDC		
Remarks:			-		

Plot 7.2.1 Occupied bandwidth test results at low carrier frequency, RF Output #1, 10 MHz EBW

OPERATING FREQUENC DETECTOR USED: MODULATION:	CY RANGE:		3650. Peak QPSk	0 - 3675.0 (MHz	
TRANSMITTER OUTPUT	POWER:		NOTE	2		
	Center Freq 3.655000000 GH	Z rFGaikLow •	Center Freq 3,6550000	ALERANTI 20 GMa	Radio Stat Radio Devi	
	10 otbidis Ref 40.00 dBm					
	101 101					
	201 201	-	de prinspratie and	string along		
	and which the start of the star				NR Planey	disting
	(C) (R)					
	Center 3.655 GHz #Res BW 100 kHz		#VBW 300 kF	łz -		pan 20 MHz veep 20 ms
	Occupied Bandwidth 8.93	62 MHz	Total Power	32.9 dBm		
	Transmit Freq Error x dB Bandwidth	2.431 kHz 9.400 MHz	OBW Power x dB	99.00 % -26.00 dB		
				status		-

Plot 7.2.2 Occupied bandwidth test results at mid carrier frequency, RF Output #1, 10 MHz EBW

OPERATING FREQUENC' DETECTOR USED: MODULATION: TRANSMITTER OUTPUT F	-	S:	3650. Peak QPSH NOTE	<) MHz
	Center Freq 3.663000000 Gi	HZ	Center Freq 3.6630000	00 GHa	Radio Stat Note Radio Stat Note Radio Device: 875
	Ref Offset 43.12 dB 10 eBidle Ref 40.00 dBm				
	312 212	NANA MAN	ner en	urherster statio	
	na na parte (NM) (NA)				his an international states of the second states of
	Center 3.663 GHz				Span 20 MHz
	Res BW 100 kHz Occupied Bandwidth		#VBW 300 ki	4z 33.6 dBm	Sweep 20 ms
	0.000	173 MHz	, orall i criter		
	Transmit Freq Error x dB Bandwidth	-1.244 kHz 9.311 MHz	OBW Power x dB	99,00 % -26.00 dB	
	MIG-			status	



Test specification:	Section 90.209, Occupied bandwidth				
Test procedure:	47 CFR, Section 2.1049				
Test mode:	Compliance	Vardiat	PASS		
Date(s):	13-May-14	Verdict:	FA33		
Temperature: 25 °C	Air Pressure: 1014 hPa	Relative Humidity: 48 %	Power Supply: 48VDC		
Remarks:			-		

Plot 7.2.3 Occupied bandwidth test results at high carrier frequency, RF Output #1, 10 MHz EBW

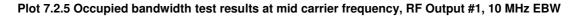
OPERATING FREQUENC DETECTOR USED: MODULATION:	Y RANGE:		3650. Peak QPSk	0 - 3675.0 K	MHz
TRANSMITTER OUTPUT	POWER SETTING	S:	NOTE	2	
	Center Freq 3.670000000		Center Freq 3,6700000	ecena/10 0 90 GHz	Biche 47 Mehine 13, 2014 Radio Stat: Norte Radio Device: 875
	Ref Offset 43.12 di Ref 40.00 dBm	в			
	1.1				
	21.0 42.0 6.00	and alterna	************	are about	
	and the state of t	1			harioranichest
	Center 3,67 GHz				Span 20 MHz
	#Res BW 100 kHz		#VBW 300 k3	ŧz	Sweep 20 ms
	Occupied Bandwidth 8.9	024 MHz	Total Power	33.8 dBm	
	Transmit Freq Error x dB Bandwidth	-4.375 kHz 9.416 MHz	OBW Power x dB	99.00 % -26.00 dB	
	1907			status	

Plot 7.2.4 Occupied bandwidth test results at low carrier frequency, RF Output #1, 10 MHz EBW

OPERATING FREQUENC' DETECTOR USED: MODULATION: TRANSMITTER OUTPUT I	-	-	3650. Peak 64QA NOTE	M	ЛНz
	Center Freq 3.655000000 Galer 10		Center Freq 3.6550000	NO GMa	Radio Stat Norte Radio Device: 875
	Ref Offset 43.12 d Ref 40.00 dBm				
	1.X 5.0	nslyin-bythab	uni,tenneterieternete	www.entering	
	an a	14 ⁴		4	the the desired by the
	Center 3,655 GHz #Res BW 100 kHz		#VBW 300 k	Hz	Span 20 MHz Sweep 20 ms
	Occupied Bandwidth 8.5	9310 MHz	Total Power	33.0 dBm	
	Transmit Freq Error x dB Bandwidth	3.739 kHz 9.233 MHz	OBW Power x dB	99,00 % -26.00 dB	
	M95			stans	



Test specification:	Section 90.209, Occupied bandwidth				
Test procedure:	47 CFR, Section 2.1049				
Test mode:	Compliance	Vardiat	PASS		
Date(s):	13-May-14	Verdict:	FA33		
Temperature: 25 °C	Air Pressure: 1014 hPa	Relative Humidity: 48 %	Power Supply: 48VDC		
Remarks:			-		



OPERATING FREQUENCY R DETECTOR USED: MODULATION:	ANGE:		3650. Peak 64QA	0 - 3675.0 .M) MHz
TRANSMITTER OUTPUT PO	WER SETTINGS	5:	NOTE	2	
	nter Freg 3.663000000 Gi Cale: 10	lz rFGaixLow	Center Freq 3.6630000	et anno 11 60 GMa	ISON 11 INVier 11, 2014 Radio Stat. Norse Radio Device: 815
	Ref Offset 43.12 dB Ref 40.00 dBm				
L 00 2011 2011 2011		Histophinin	(maronikalinaan	-	
8 14 45 5 25 - 4	http://www.com/autorial/autorial/autorial/autorial/autorial/autorial/autorial/autorial/autorial/autorial/autori				haladan dalam
	nter 3.663 GHz es BW 100 kHz		#VBW 300 ki	łz	Span 20 MHz Sweep 20 ms
c	Occupied Bandwidth 8.91	11 MHz	Total Power	33.6 dBm	
	ransmit Freq Error dB Bandwidth	-5.177 kHz 9.371 MHz	OBW Power x dB	99.00 % -26.00 dB	
				status	

Plot 7.2.6 Occupied bandwidth test results at high carrier frequency, RF Output #1, 10 MHz EBW

OPERATING FREQUENCY DETECTOR USED: MODULATION: TRANSMITTER OUTPUT F	-	S:	3650. Peak 64QA NOTE		0 MHz
	Center Freq 3.670000000 G	HZ rEGainLow	Center Freq: 3.6700000	et en activitation 90 GHz	Radio Stat Nore Radio Stat Nore Radio Device: 815
	Ref Offset 43.12 dB Ref 40.00 dBm	-			
	212	(Alter Alian	energy and	-	
	2. Marthattan				Weiter and the second
	Center 3.67 GHz				Span 20 MHz
	PRes BW 100 kHz Occupied Bandwidth 8.92	210 MHz	#VBW 300 k3 Total Power	33.9 dBm	Sweep 20 ms
	Transmit Freq Error x dB Bandwidth	-2.554 kHz 9.282 MHz	OBW Power x dB	99.00 % -26.00 dB	
	MUT.			status	



Test specification:	Section 90.209, Occupied bandwidth				
Test procedure:	47 CFR, Section 2.1049				
Test mode:	Compliance	Vardiate	PASS		
Date(s):	13-May-14	Verdict:	FA33		
Temperature: 25 °C	Air Pressure: 1014 hPa	Relative Humidity: 48 %	Power Supply: 48VDC		
Remarks:					

Plot 7.2.7 Occupied bandwidth test results at low carrier frequency, RF Output #1, 20 MHz EBW

OPERATING FREQUENCY RANGE: DETECTOR USED: MODULATION:				3650.0 - 3675.0 MHz Peak QPSK			
TRANSMITTER OUTPUT F	POWER	SETTING	iS:	NOTE			
	Agricent Spin Street	3.660000000 Cel: 10	F	Center Freg 3,6600000	NUMATE I	Radio Stat. N Radio Stat. N Radio Device	
	to ebidie	Ref Offset 43.12 di Ref 40.00 dBm					
	101					1 1	
	104		- Contraction	inal Marine - dep	an and a second		
	((10)						
		er information	1.4		Ng	extensively allow	(with the
	401						
	Center 3.66 #Res BW 20			#VBW 620 ki	Hz		an 40 MHz eep 20 ms
	Occupie	d Bandwidth 17	803 MHz	Total Power	35.3 dBm		
	Transmit x dB Ban	Freq Error dwidth	-2.511 kHz 18.76 MHz	OBW Power x dB	99.00 % -26.00 dB		
	M 95				status		

Plot 7.2.8 Occupied bandwidth test results at mid carrier frequency, RF Output #1, 20 MHz EBW

OPERATING FREQUENCY DETECTOR USED: MODULATION: TRANSMITTER OUTPUT F	POWER SETTINGS:			3650. Peak QPSF NOTE	MHz	
		3.663000000 Galer 1.0		Center Freq: 3.6630000	ed and the GO GHa	Radio Stat None Radio Stat None Radio Device: 813
	to abide	Ref Offset 43.12 d Ref 40.00 dBm				
	263 213 724				aprove later	
	110 101	-			N	ter a free mentioned
	201 01					
	Center 3.663 #Res BW 20			#VBW 620 ki	Hz	Span 40 MHz Sweep 20 ms
	Occupie	d Bandwidti 17	785 MHz	Total Power	35.4 dBm	
	Transmit x dB Ban	Freq Error dwidth	2.774 kHz 18.91 MHz	OBW Power x dB	99.00 % -26.00 dB	
	MST .				status	0



Test specification:	Section 90.209, Occupied bandwidth				
Test procedure:	47 CFR, Section 2.1049				
Test mode:	Compliance	Verdict:	PASS		
Date(s):	13-May-14	verdict:	FA33		
Temperature: 25 °C	Air Pressure: 1014 hPa	Relative Humidity: 48 %	Power Supply: 48VDC		
Remarks:					

Plot 7.2.9 Occupied bandwidth test results at high carrier frequency, RF Output #1, 20 MHz EBW

OPERATING FREQUENC	Y RANGE:		Peak	0 - 3675.0 ,	MHz
MODULATION:			QPSK		
TRANSMITTER OUTPUT			NOTE	2	
	Center Freq 3.865000000 GHz	rFGalation *	Center Freq: 3.66500000 Trig: Free Run #Reter: 10 dB	I BIAN TU IO GHa	EDDe De Delher 11, 2014 Radie Stat, Norre Radie Device: 875
	10 abids Ref 40.00 dBm				
	201				
	-	Selwandin-19	by the second	and the stand	
	100				
	WALL BURNESS PROVIDENT)	stadio with the internation
	01				
	10 1				
	Center 3.665 GHz #Res BW 200 kHz		#VBW 620 kH	z	Span 40 MHz Sweep 20 ms
	Occupied Bandwidth 17.81	10 MHz	Total Power	35.5 dBm	
		8.441 kHz 18.61 MHz	OBW Power x dB	99.00 % -26.00 dB	
	MNG .			stans	

Plot 7.2.10 Occupied bandwidth test results at low carrier frequency, RF Output #1, 20 MHz EBW

OPERATING FREQUENCY RANGE: DETECTOR USED: MODULATION:			3650.0 - 3675.0 MHz Peak 64QAM			
TRANSMITTER OUTPUT F	POWER SETTINGS:		NOTE	2		
	Center Freq 3.550000000 GHz	rFGalation •	Center Freq 3.66000000 Trig Free Run AAtten: 10 dB	o GMa	1013 3414 Mar 13, 2014 Radio Stat, None Radio Device: 875	
	Ref Offset 43.12 dB Ref 40.00 dBm					
	212	annature	alineter all	and the second second		
	101 HIN		a sir the spir			
	an antistic data with all				Association and the second	
	40 E					
	Center 3.66 GHz #Res BW 200 kHz		#VBW 620 kH	1	Span 40 MHz Sweep 20 ms	
	Occupied Bandwidth 17.86	8 MHz	Total Power	33.8 dBm		
		6.654 kHz 18.78 MHz	OBW Power x dB	99.00 % -26.00 dB		
	ansc.			status		



Test specification:	Section 90.209, Occupied bandwidth				
Test procedure:	47 CFR, Section 2.1049				
Test mode:	Compliance	Verdict:	PASS		
Date(s):	13-May-14	verdict:	FA33		
Temperature: 25 °C	Air Pressure: 1014 hPa	Relative Humidity: 48 %	Power Supply: 48VDC		
Remarks:					



OPERATING FREQUENC DETECTOR USED: MODULATION:		3650.0 - 3675.0 MHz Peak QPSK				
TRANSMITTER OUTPUT		ç.	NOTE	-		
	Aginet Spectrum Analyzer - Docupied MI	0.	NOTE			
	Gate Holdoff -100 µs Gee 10	rFieldlew •	Center Freq 3.6630000 Trig Free Run &Attain: 10 dB	OC GHz	Radio Stat. Norre Radio Device: 875	1,2094
	10 etbidie Ref 00set 43.12 dE Ref 40.00 dBm	Ú.				
	21.2		uning (18) index in the	Ser Month		
	29		A REAL PROPERTY AND A REAL			
	- in the second s				4	
	TO POPER HAND	had			No. New John	-
	6 年					
	Center 3.663 GHz #Res BW 200 kHz		#VBW 620 k3	4z	Span 40 Sweep 2	
	Occupied Bandwidth 17.	769 MHz	Total Power	34.0 dBm		
	Transmit Freq Error x dB Bandwidth	2.0154 MHz 18.94 MHz	OBW Power x dB	99.00 % -26.00 dB		
	Mag.			status		

Plot 7.2.12 Occupied bandwidth test results at high carrier frequency, RF Output #1

OPERATING FREQUENC' DETECTOR USED: MODULATION: TRANSMITTER OUTPUT F	-	3650. Peak 64QA NOTE	IHz		
	Center Freq 3.665000000		Center Freq 3,6650000	eo GHa	IDOT STRANG 11, 2004 Radio Stat Norte Radio Device: 875
	Ho abidis Ref 40.00 dBm	8			0
	102 213 919	1.01100-174	100 TON STVIN	Participan	
	610 640 804				4
	and the second s	(va		310	and the first state of the
	Center 3.665 GHz #Res BW 200 kHz		#VBW 620 k3	42	Span 40 MHz Sweep 20 ms
	Occupied Bandwidth 17	.759 MHz	Total Power	34.0 dBm	
	Transmit Freq Error x dB Bandwidth	33.296 kHz 19.19 MHz	OBW Power x dB	99.00 % -26.00 dB	
	M97			status	



Test specification:	Section 90.209, Occupied bandwidth				
Test procedure:	47 CFR, Section 2.1049				
Test mode:	Compliance	Verdict:	PASS		
Date(s):	13-May-14	verdict:	FA33		
Temperature: 25 °C	Air Pressure: 1014 hPa	Relative Humidity: 48 %	Power Supply: 48VDC		
Remarks:		-	-		

Plot 7.2.13 Occupied bandwidth test results at low carrier frequency, RF Output #2, 10 MHz EBW

OPERATING FREQUENCY DETECTOR USED: MODULATION: TRANSMITTER OUTPUT F	-	3650. Peak QPSH NOTE	MHz		
	Center Freq 3.655000000 Gent 10	GHz r#GaleLow	Center Freq: 3.6550000	ellerwyfel 90 GMa	III 28 47 PM Nor 13, 2014 Radio Shit, Norte Radio Device: BTS
	to ethidia Ref 40.00 dBn				
	212 212 00			-	
	and and a start in the start in the	w		-	-
	40 B 90 B				
	Center 3.655 GHz #Res BW 100 kHz		#VBW 300 ki	4z	Span 20 MHz Sweep 20 ms
	Occupied Bandwidt 8.	h 9154 MHz	Total Power	34.3 dBm	
	Transmit Freq Error x dB Bandwidth	20.426 kHz 9.407 MHz	OBW Power x dB	99.00 % -26.00 dB	
	M107			status	

Plot 7.2.14 Occupied bandwidth test results at mid carrier frequency, RF Output #2, 10 MHz EBW

OPERATING FREQUENCY RA DETECTOR USED: MODULATION: TRANSMITTER OUTPUT POW			3650.0 - 3 Peak QPSK NOTE2	675.0 MH	lz	
	Center Freq 3.663000000 G Center Freq 3.663000000 G	Hz	Center Freq 3.6630000	economia di Golgena	Radio Stat. None Radio Device: B	252
	Arf Official Alia Constant Ali	-	a the second second	war-low wards		
					he water	otiop
	Center 3.663 GHz FRes BW 100 kHz		#VBW 300 ki	Hz		20 MHz 20 ms
	Occupied Bandwidth 8.89	92 MHz	Total Power	34.7 dBm		
	Transmit Freq Error x dB Bandwidth	15.444 kHz 9.556 MHz	OBW Power x dB	99.00 % -26.00 dB		
	646G			status		0

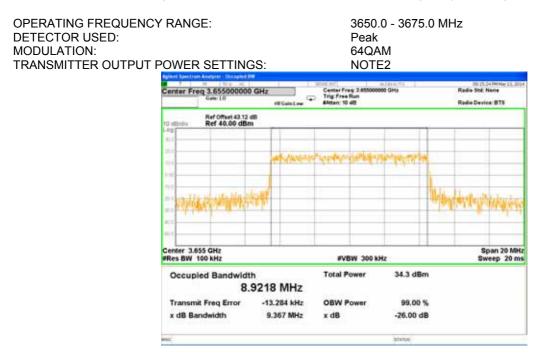


Test specification:	Section 90.209, Occupie	Section 90.209, Occupied bandwidth				
Test procedure:	47 CFR, Section 2.1049					
Test mode:	Compliance	Vardiate	PASS			
Date(s):	13-May-14	Verdict:	FA33			
Temperature: 25 °C	Air Pressure: 1014 hPa	Relative Humidity: 48 %	Power Supply: 48VDC			
Remarks:						

Plot 7.2.15 Occupied bandwidth test results at high carrier frequency, RF Output #2, 10 MHz EBW

OPERATING FREQUENC DETECTOR USED: MODULATION: TRANSMITTER OUTPUT		S:	3650. Peak QPSk NOTE		lHz	
	Center Freq 3.670000000 G	HZ rFGalaLow 🐨	Center Freq 3.6700000 Trig Free Run Atten: 10 dB	LERACTE IO GHa	Radio Stat N Radio Device	110 m
	10 etbidie Ref 40.00 dBm				10 - 51	
	202 213 00	patricipant	ljagenskoplastavita og	erthoused		
	an an ing the set of all	/		t _{ij} t	* Mitrice	Magdalad
	Center 3.67 GHz PRes BW 100 kHz		#VBW 300 kH	tz	Sp	an 20 MHz ep 20 ms
	Occupied Bandwidth 8.93	381 MHz	Total Power	34.6 dBm		
	Transmit Freq Error x dB Bandwidth	-4.250 kHz 9.527 MHz	OBW Power x dB	99.00 % -26.00 dB		
	MSG			status		

Plot 7.2.16 Occupied bandwidth test results at low carrier frequency, RF Output #2, 10 MHz EBW





Test specification:	Section 90.209, Occupied bandwidth				
Test procedure:	47 CFR, Section 2.1049				
Test mode:	Compliance	Vardiat	PASS		
Date(s):	13-May-14	Verdict:	FA33		
Temperature: 25 °C	Air Pressure: 1014 hPa	Relative Humidity: 48 %	Power Supply: 48VDC		
Remarks:					

Plot 7.2.17 Occupied bandwidth test results at mid carrier frequency, RF Output #2, 10 MHz EBW

OPERATING FREQUENCY DETECTOR USED: MODULATION: TRANSMITTER OUTPUT F	-		3650. Peak 64QA NOTE		MHz
	Center Freq 3.663000000 G		Center Freg 3.6630000	ADDA(S)	BP 20 20 20 20 20 20 20 20 20 20 20 20 20
	10 ethidie Ref 40.00 dBm	11 1			
	10. 11. 14.	parates	uleterant sta	WARAN	
	and the second second	N.		ļ,	the second second
	40 E				
	Center 3.663 GHz #Res BW 100 kHz		#VBW 300 k3	4z	Span 20 MHz Sweep 20 ms
	Occupied Bandwidth 8.90	83 MHz	Total Power	34.8 dBm	
	Transmit Freq Error x dB Bandwidth	555 Hz 9.683 MHz	OBW Power x dB	99.00 % -26.00 dB	
	ans:			atoma:	

Plot 7.2.18 Occupied bandwidth test results at high carrier frequency, RF Output #2, 10 MHz EBW

OPERATING FREQUENCY DETECTOR USED: MODULATION: TRANSMITTER OUTPUT F	Pe 640 POWER SETTINGS: NC			3650.0 - 3675.0 MHz Peak 64QAM NOTE2			
	Center Freq 3.67000000		Center Freq: 3.6700000	ed GHa	Radio Stat. None Radio Stat. None Radio Device: 875		
	to abide Ref 40.00 dBr						
	212	history	Provident Starting	NA MARINA			
		wat		-	NAME AND A		
	40 0 40 0						
	Center 3.67 GHz #Res BW 100 kHz		#VBW 300 ks	ŧz	Span 20 MHz Sweep 20 ms		
	Occupied Bandwidt 8.	th .9372 MHz	Total Power	34.5 dBm			
	Transmit Freq Error x dB Bandwidth	-7.699 kHz 9.440 MHz	OBW Power x dB	99.00 % -26.00 dB			
	MAGE .			status	0		



Test specification:	Section 90.209, Occupied bandwidth			
Test procedure:	47 CFR, Section 2.1049			
Test mode:	Compliance	Verdict:	PASS	
Date(s):	13-May-14	verdict:	FA33	
Temperature: 25 °C	Air Pressure: 1014 hPa	Relative Humidity: 48 %	Power Supply: 48VDC	
Remarks:				

Plot 7.2.19 Occupied bandwidth test results at low carrier frequency, RF Output #2, 20 MHz EBW

OPERATING FREQUENC DETECTOR USED: MODULATION:	CY RANGE:		3650. Peak QPSk	0 - 3675.0 I K	MHz	
TRANSMITTER OUTPUT	POWER SETTINGS	S:	NOTE	2		
	Center Freq 3.66000000 Gi	HZ rEGaixLow •	Center Freq 3.6600000	od GHa	(6-0) Radio Stat Radio Devi	
	to utbidie Ref 0ffset 43.12 dB Ref 40.00 dBm					
	101 213 214	Nep Series Pro	e y bitre recorde	-		
	an <mark>defendenter er elegen.</mark> an	M		- W	-	C. Frangela
	40.8 40.8					
	Center 3.66 GHz #Res BW 200 kHz		#VBW 620 ks	łz .		pan 40 MHz veep 20 ms
	Occupied Bandwidth 17.8	323 MHz	Total Power	36.6 dBm		
	Transmit Freq Error x dB Bandwidth	-9.814 kHz 18.77 MHz	OBW Power x dB	99,00 % -26.00 dB		
	and the second se			status		

Plot 7.2.20 Occupied bandwidth test results at mid carrier frequency, RF Output #2, 20 MHz EBW

OPERATING FREQUENCY DETECTOR USED: MODULATION: TRANSMITTER OUTPUT F	POWER	SETTING		3650. Peak QPSF NOTE	<	MHz
	M 10.1	q 3.663000000 Gene 1.0		Center Freq: 3.6630000	NET CANADA	Radio Stat. None Radio Device: 875
	to abidie	Ref Offset 43.12 d Ref 40.00 dBm				
	201		marialitati	and a first part of the	Partition .	
	na na na jej Nak	under the second	p strik		1	Warney Warney Ka
	202 402 1941					
	Center 3.66 Res BW 21			#VBW 620 ki	Hz	Span 40 MHz Sweep 20 ms
	Occupie	ed Bandwidth 17	793 MHz	Total Power	36.6 dBm	
	Transmit x dB Ban	Freq Error ndwidth	3.307 kHz 19.04 MHz	OBW Power x dB	99,00 % -26.00 dB	
	M95				status	



Test specification:	Section 90.209, Occupie	Section 90.209, Occupied bandwidth				
Test procedure:	47 CFR, Section 2.1049					
Test mode:	Compliance	Verdict:	PASS			
Date(s):	13-May-14	verdict:	FA33			
Temperature: 25 °C	Air Pressure: 1014 hPa	Relative Humidity: 48 %	Power Supply: 48VDC			
Remarks:						

Plot 7.2.21 Occupied bandwidth test results at high carrier frequency, RF Output #2, 20 MHz EBW

OPERATING FREQUENC' DETECTOR USED: MODULATION: TRANSMITTER OUTPUT I			3650.0 Peak QPSK NOTE		MHz	
	Center Freq 3.665000000 GHz	rFGalcLow *	Center Freq: 3.6650000 Trig: Free Run #Atten: 10 dB	CERACTO O GHa	Radio Stat. Nore Radio Device: 8	
	10 dBidle Ref Offset 43.12 dB Ref 40.00 dBm					
	11 11 11		an the state	madalan		
	- war shapetor distant				and second	Anthrop
	2011 4011 1011					
	Center 3.665 GHz #Res BW 200 kHz		#VBW 620 kH	z		20 ms
	Occupied Bandwidth 17.84	5 MHz	Total Power	36.4 dBm		
		1.091 kHz 18.92 MHz	OBW Power x dB	99,00 % -26.00 dB		
	MSG.			status		

Plot 7.2.22 Occupied bandwidth test results at low carrier frequency, RF Output #2, 20 MHz EBW

OPERATING FREQUENC` DETECTOR USED: MODULATION: TRANSMITTER OUTPUT I	POWER SETTING		3650. Peak 64QA NOTE		1Hz
	Center Freq 3.660000000		Center Freq: 3.6600000	eo GHz	Radio Stat None 13, 2014 Radio Stat None Radio Device: 815
	10 etbidie Ref 40.00 dBm				
	201 201 201	mestagen	and the stand	w.e.th.panie	
	and and a second second start				-
	61 61				
	Center 3.66 GHz #Res BW 200 kHz		#VBW 620 ki	4z	Span 40 MHz Sweep 20 ms
	Occupied Bandwidth 17	799 MHz	Total Power	34.3 dBm	
	Transmit Freq Error x dB Bandwidth	30.820 kHz 18.88 MHz	OBW Power x dB	99.00 % -26.00 dB	
	1955-			status	

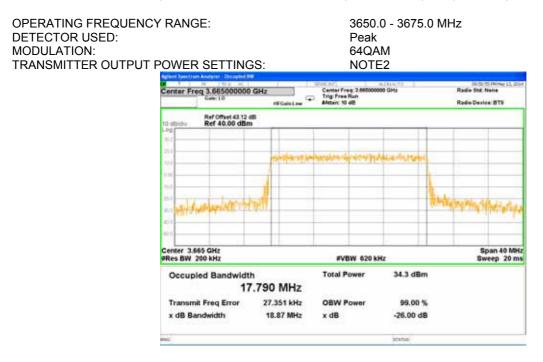


Test specification:	Section 90.209, Occupied bandwidth				
Test procedure:	47 CFR, Section 2.1049				
Test mode:	Compliance	Verdict:	PASS		
Date(s):	13-May-14	verdict:	FA33		
Temperature: 25 °C	Air Pressure: 1014 hPa	Relative Humidity: 48 %	Power Supply: 48VDC		
Remarks:					

Plot 7.2.23 Occupied bandwidth test results at mid carrier frequency, RF Output #2, 20 MHz EBW

OPERATING FREQUENC DETECTOR USED: MODULATION: TRANSMITTER OUTPUT	Pi			3650.0 - 3675.0 MHz Peak QPSK NOTE2			
	Center Freq 3.663000000 GHz	rFGalsLew *	Center Freq: 3.66300000	C GHz	Radio Stat 1 Radio Devic		
	to utbidie Ref 0ffset 43.12 dB Ref 40.00 dBm						
	01 201 01	p. Mar. bag- yer same	water and the state of the	Carlin Proping			
	na na na stanana karantur turi				Halay Vice	Aleren .	
	enter 3.663 GHz #Res BW 200 kHz		#VBW 620 kH	z		oan 40 MHz eep 20 ms	
	Transmit Freq Error 4	6 MHz 7.341 kHz	Total Power	34.2 dBm 99,00 %			
	x dB Bandwidth 1	18.87 MHz	x dB	-26.00 dB			

Plot 7.2.24 Occupied bandwidth test results at high carrier frequency, RF Output #2, 20 MHz EBW





Test specification:	FCC Section 90.210(b), Emission mask			
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13			
Test mode:	Compliance	Verdict: PASS		
Date(s):	13-May-14	Verdict:	FA33	
Temperature: 25 °C	Air Pressure: 1012 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

Attenuation below carrier, dBc
0
25
35
43 + 10 log(P)
0
25
35
43 + 10 log(P)

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

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



Test specification:	FCC Section 90.210(b), Emission mask			
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13			
Test mode:	Compliance	Verdict: PASS		
Date(s):	13-May-14			
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC	
Remarks:				

Table 7.3.2 Emission mask test results

Carrier frequency, MHz	Limit	Reference to Plot	Verdict			
	10 MHz EBW					
3655.00		7.3.1, 7.3.4; 7.3.13, 7.3.16				
3663.00	Emission mask B	7.3.2, 7.3.5; 7.3.14, 7.3.17	Pass			
3670.00		7.3.3, 7.3.6; 7.3.15, 7.3.18				
	20 MHz EBW					
3660.00		7.3.7, 7.3.10; 7.3.19, 7.3.22				
3663.00	Emission mask B	7.3.8, 7.3.11; 7.3.20, 7.3.23	Pass			
3665.00	7	7.3.9, 7.3.12; 7.3.21, 7.3.24				

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

NOTE2: Measurement was performed at the worst case of power and power density settings.

Dowor Sottings	RF Chain 1		RF Chain 2	
Power Settings	QPSK	64QAM	QPSK	64QAM
10MHz	20 HEX	20 HEX	20 HEX	20 HEX
20MHz	19 HEX	14 HEX	19 HEX	17 HEX

Reference numbers of test equipment used

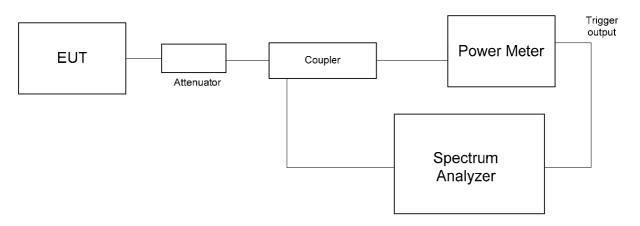
HL 3301	HL 3302	HL 3770	HL 4229	HL 4273	HL 4275	HL 4367	HL 4575

Full description is given in Appendix A.



Test specification:	FCC Section 90.210(b), Emission mask				
Test procedure:	47 CFR, Sections 2.1051, 2.	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13			
Test mode:	Compliance	Verdict: PASS			
Date(s):	13-May-14	Verdict:	FA33		
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC		
Remarks:					

Figure 7.3.1 Emission mask test setup





Test specification:	FCC Section 90.210(b), Emission mask				
Test procedure:	47 CFR, Sections 2.1051, 2.1	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13			
Test mode:	Compliance	Verdict: PASS			
Date(s):	13-May-14	verdict:	FA33		
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC		
Remarks:					

Plot 7.3.1 Emission mask test results at low carrier frequency

OPERATING FREQUENCY RANGE: 3650.0 - 3675.0 MHz DETECTOR USED: Average MODULATION: QPSK MODULATING SIGNAL: PRBS CHANNEL BANDWIDTH: 10 MHz TRANSMITTER OUTPUT POWER: NOTE2 **RF** Chain 1 Radio Std. Nem Center Freq 3.65 Trig Free Run #Atten: 10 dB Center Freq 3.655000000 GHz -IEC also from Radio Device: BTS Ref Offset 43.12 dB Ref 30.0 dBm Center 3.655 GHz Span 50 MHz **Total Power Ref** 29.01 dEm / 10 MP Stat Freq Friet(Hz) FreqUes SLIM(dB) dEn **BLIMEUER** dBrit 0.0 Hz 5.000 MHz 10.00 MHz 25.00 MHz 12.50 MHz 12.50 MHz 5 000 MHz 10 00 MHz 25 00 MHz 25 00 MHz 12 50 MHz 15 00 MHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz (---) (-15.87) (-13.02) -24.98 6.10 6.675 M -21.06 5.025 M 11.30 M 18 99 100.0 MHz

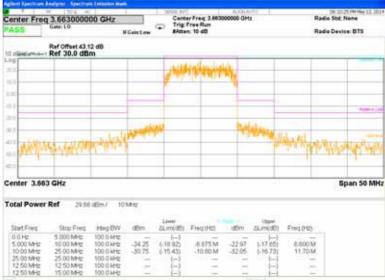
*Attenuation below carrier provided in terms of attenuation below total average power within occupied bandwidth. Measurement was performed with RBW set to 100 kHz and the limit mask was reduced by 10 dB to compensate the lower RBW (10*log(1 MHz/ 100 kHz) = 10 dB)



Test specification:	FCC Section 90.210(b), Emission mask			
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13			
Test mode:	Compliance	Verdict: PASS		
Date(s):	13-May-14	Verdict:	FA33	
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC	
Remarks:			-	

Plot 7.3.2 Emission mask test results at mid carrier frequency

OPERATING FREQUENCY RANGE: DETECTOR USED: MODULATION: MODULATING SIGNAL: CHANNEL BANDWIDTH: TRANSMITTER OUTPUT POWER SETTINGS: RF Chain 3650.0 - 3675.0 MHz Average QPSK PRBS 10 MHz NOTE2 1



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



Test specification:	FCC Section 90.210(b), Emission mask			
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13			
Test mode:	Compliance	Verdict: PASS		
Date(s):	13-May-14			
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC	
Remarks:			-	

Plot 7.3.3 Emission mask test results at high carrier frequency

OPERATING FREQUENCY RANGE: 3650.0 - 3675.0 MHz DETECTOR USED: Average MODULATION: QPSK MODULATING SIGNAL: PRBS CHANNEL BANDWIDTH: 10 MHz TRANSMITTER OUTPUT POWER SETTINGS: NOTE2 **RF** Chain 1 Radio Std. None Center Freq 3.670 Trig Free Run #Atten: 10 dll enter Freq 3.670000000 GHz -IE Cale 1 on Radio Device: BTS Ref Offset 43.12 dB Ref 30.0 dBm WYCH P Center 3.67 GHz Span 50 MHz **Total Power Ref** 29.83 dEm / 10 MP Stat Freq Friet(Hz) FreqUes dEr **BLIMEUER** dBrit SLm(dB) 0.0 Hz 5.000 MHz 10.00 MHz 25.00 MHz 12.50 MHz 12.50 MHz 5 000 MHz 10 00 MHz 25 00 MHz 25 00 MHz 12 50 MHz 15 00 MHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz -22.44 -30.25 6-17-261 -5.125 M -10.45 M -23.68 -30.31 1-18.71 1-15.14 5 500 M 10 35 M 100.0 MHz

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



RF Chain

Test specification:	FCC Section 90.210(b), Emission mask			
Test procedure:	47 CFR, Sections 2.1051, 2.1	tions 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS	
Date(s):	13-May-14	verdict:	FA33	
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC	
Remarks:				

Plot 7.3.4 Emission mask test results at low carrier frequency

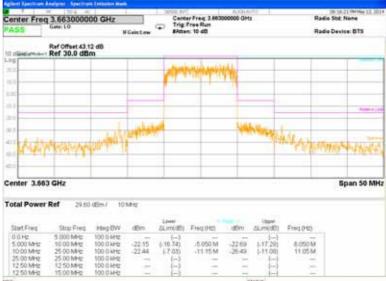
OPERATING FREQUENCY RANGE: 3650.0 - 3675.0 MHz DETECTOR USED: Average MODULATION: 64QAM MODULATING SIGNAL: PRBS CHANNEL BANDWIDTH: 10 MHz TRANSMITTER OUTPUT POWER: NOTE2 1 Radio Std. Nem Center Freq 3.60 Trig Free Run BAtten: 10 dB Center Freq 3.655000000 GHz -IEC also from Radio Device: BTS Ref Offset 43.12 dB Ref 30.0 dBm Center 3.655 GHz Span 50 MHz **Total Power Ref** 29 19 dEm / 10 MPH Stat Freq Friet(Hz) Frequest dEm **BLIMEUER** dEm SLm(dB) 0.0 Hz 5.000 MHz 10.00 MHz 25.00 MHz 12.50 MHz 12.50 MHz 5 000 MHz 10 00 MHz 25 00 MHz 25 00 MHz 12 50 MHz 15 00 MHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 22.52 6-16.717 5.025 M 21 21 1-15-40) 5 100 M 10 40 M 100.0 MHz



Test specification:	FCC Section 90.210(b), Emission mask			
Test procedure:	47 CFR, Sections 2.1051, 2.1	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS	
Date(s):	13-May-14	verdict:	FA33	
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC	
Remarks:			-	

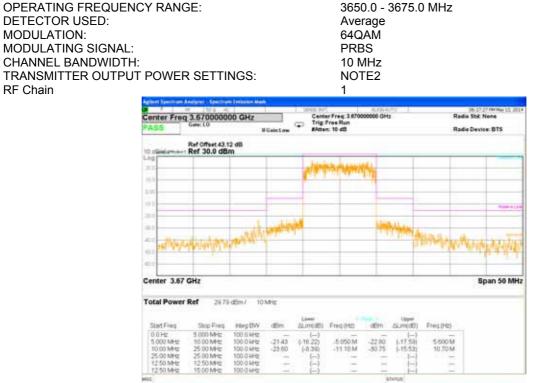
Plot 7.3.5 Emission mask test results at mid carrier frequency

OPERATING FREQUENCY RANGE: DETECTOR USED: MODULATION: MODULATING SIGNAL: CHANNEL BANDWIDTH: TRANSMITTER OUTPUT POWER SETTINGS: RF Chain 3650.0 - 3675.0 MHz Average 64QAM PRBS 10 MHz NOTE2 1





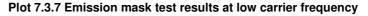
Test specification:	FCC Section 90.210(b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	13-May-14	verdict:	FA33
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			



Plot 7.3.6 Emission mask test results at high carrier frequency



Test specification:	FCC Section 90.210(b), Emission mask			
Test procedure:	47 CFR, Sections 2.1051, 2.1	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS	
Date(s):	13-May-14	verdict:	FA33	
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC	
Remarks:			-	



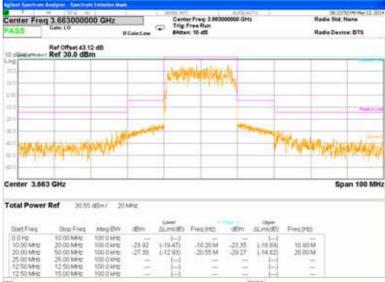
OPERATING FREQUENCY RANGE: 3650.0 - 3675.0 MHz DETECTOR USED: Average MODULATION: QPSK MODULATING SIGNAL: PRBS CHANNEL BANDWIDTH: 20 MHz TRANSMITTER OUTPUT POWER: NOTE2 **RF** Chain 1 Radio Std. None Center Freq 3.8 Trig Free Run BAtten: 10 dtl Center Freq 3.66000000 GHz -IEC also from Radio Device: BTS Ref Offset 43.12 dB Ref 30.0 dBm 1111 10. Center 3.66 GHz Span 100 MHz **Total Power Ref** 30.36 dEm / 20 MB-10 Stat Freq FreqUest Friet(Hz) SLIM(dB) dEm **BLITTEIRE** dBrit 0.0 Hz 10.00 MHz 20.00 MHz 25.00 MHz 12.50 MHz 12.50 MHz 50 00 MHz 20 00 MHz 50 00 MHz 25 00 MHz 12 50 MHz 15 00 MHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz (-15.95) -24 23 -20 35 6-13-73 -11.00 M -20.55 M -23.39 -30.55 10.60 M 22.00 M 100.0 MHz



Test specification:	FCC Section 90.210(b), Emission mask			
Test procedure:	47 CFR, Sections 2.1051, 2.1	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS	
Date(s):	13-May-14	verdict:	FA33	
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC	
Remarks:			-	

Plot 7.3.8 Emission mask test results at mid carrier frequency

OPERATING FREQUENCY RANGE: DETECTOR USED: MODULATION: MODULATING SIGNAL: CHANNEL BANDWIDTH: TRANSMITTER OUTPUT POWER SETTINGS: RF Chain 3650.0 - 3675.0 MHz Average QPSK PRBS 20 MHz NOTE2 1





Test specification:	FCC Section 90.210(b), Emission mask			
Test procedure:	47 CFR, Sections 2.1051, 2.1	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS	
Date(s):	13-May-14	verdict:	FA33	
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC	
Remarks:			-	

Plot 7.3.9 Emission mask test results at high carrier frequency

OPERATING FREQUENCY RANGE: 3650.0 - 3675.0 MHz DETECTOR USED: Average MODULATION: QPSK MODULATING SIGNAL: PRBS CHANNEL BANDWIDTH: 20 MHz TRANSMITTER OUTPUT POWER SETTINGS: NOTE2 **RF** Chain 1 Radio Std. Nor Center Freq 3.8 Trig Free Run BAtten: 10 dtl enter Freq 3.665000000 GHz -IE Cale 1 on Radio Device: BTS Ref Offset 43.12 dB Ref 30.0 dBm 10. Center 3.665 GHz Span 100 MHz **Total Power Ref** 30.67 dEm / 20 MB-10 Stat Freq FreqUest Friet(Hz) SLIM(dB) dEn **BLIMEUER** dBrit 0.0 Hz 10.00 MHz 20.00 MHz 25.00 MHz 12.50 MHz 12.50 MHz 50.00 MHz 20.00 MHz 50.00 MHz 25.00 MHz 12.50 MHz 15.00 MHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz (--) (-18.67) (-14.34) -23.46 618.12 10.25 M -23.00 12.95 M 22.15 M 100.0 MHz



Test specification:	FCC Section 90.210(b), Emission mask			
Test procedure:	47 CFR, Sections 2.1051, 2.1	tions 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS	
Date(s):	13-May-14	verdict:	FA33	
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC	
Remarks:				

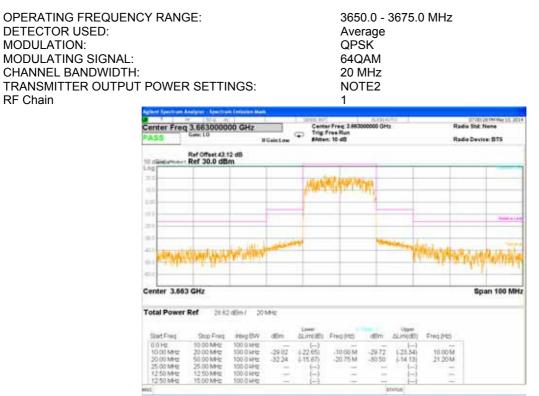


OPERATING FREQUENCY RANGE: 3650.0 - 3675.0 MHz DETECTOR USED: Average MODULATION: 64QAM MODULATING SIGNAL: PRBS CHANNEL BANDWIDTH: 20 MHz TRANSMITTER OUTPUT POWER: NOTE2 **RF** Chain 1 Radio Std. Non Center Freq 3.8 Trig Free Run BAtten: 10 dtl Center Freq 3.66000000 GHz -IEC also from Radio Device: BTS Ref Offset 43.12 dB Ref 30.0 dBm THE OWNER WATCHING Center 3.66 GHz Span 100 MHz **Total Power Ref** 26.47 dlim / 20 MB-10 Stat Freq FreqUest Friet(Hz) dEm **BLIMEUER** dBrit SLm(dB) 0.0 Hz 10.00 MHz 20.00 MHz 25.00 MHz 12.50 MHz 12.50 MHz 50 00 MHz 20 00 MHz 50 00 MHz 25 00 MHz 12 50 MHz 15 00 MHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz -29.41 -35.50 1.22.88) -10.00 M -23.15 M .78.99 -28.80 (-12.40) (-12.27) 11.45M 20.90M 100.0 MHz



Test specification:	FCC Section 90.210(b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Vardiate	PASS
Date(s):	13-May-14	Verdict:	FA33
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.3.11 Emission mask test results at mid carrier frequency





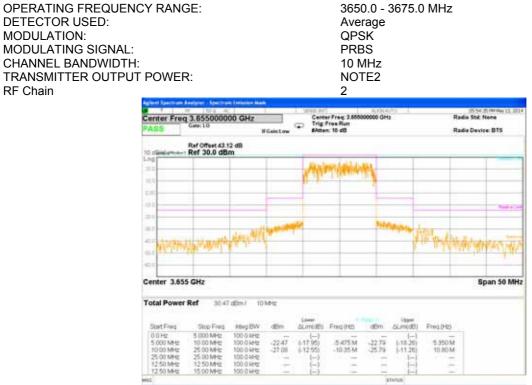
Test specification:	FCC Section 90.210(b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	13-May-14	verdict:	FA33
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.3.12 Emission mask test results at high carrier frequency

OPERATING FREQUENCY RANGE: 3650.0 - 3675.0 MHz DETECTOR USED: Average MODULATION: 64QAM MODULATING SIGNAL: PRBS CHANNEL BANDWIDTH: 20 MHz TRANSMITTER OUTPUT POWER SETTINGS: NOTE2 **RF** Chain 1 Radio Std Non Center Freq 3.8 Trig Free Run BAtten: 10 dtl enter Freq 3.665000000 GHz -IE Cale 1 on Radio Device: BTS Ref Offset 43.12 dB Ref 30.0 dBm THE REAL PROPERTY. 10. Center 3.665 GHz Span 100 MHz **Total Power Ref** 28.69 dEm / 20 MB-10 Stat Freq FreqUest Freq (Hz) dEm **BLIMEUER** dBrit SLm(dB) 0.0 Hz 10.00 MHz 20.00 MHz 25.00 MHz 12.50 MHz 12.50 MHz 50 00 MHz 20 00 MHz 50 00 MHz 25 00 MHz 12 50 MHz 15 00 MHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz -29.57 6.23.26) (-17.52) 11.103M -23.20 M -29.88 -32.58 (-16.25) 10.00 M 100.0 MHz



Test specification:	FCC Section 90.210(b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Vardiat	PASS
Date(s):	13-May-14	Verdict:	FA33
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			· · · · · ·



Plot 7.3.13 Emission mask test results at low carrier frequency



Test specification:	FCC Section 90.210(b), Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Vardiate	PASS
Date(s):	13-May-14	Verdict:	FA33
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC
Remarks:			

Plot 7.3.14 Emission mask test results at mid carrier frequency

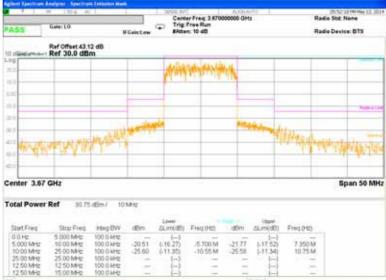
OPERATING FREQUENCY RANGE: 3650.0 - 3675.0 MHz DETECTOR USED: Average MODULATION: QPSK MODULATING SIGNAL: PRBS CHANNEL BANDWIDTH: 10 MHz TRANSMITTER OUTPUT POWER SETTINGS: NOTE2 **RF** Chain 2 Radio Std. Non Center Freq 3.66 Trig Free Run #Atten: 10 dtl enter Freq 3.663000000 GHz -IE Cale 1 on Radio Device: BTS Ref Offset 43.12 dB Ref 30.0 dBm Center 3.663 GHz Span 50 MHz **Total Power Ref** 30.58 dEm / 10 MP Stat Freq Friet(Hz) FreqUes dEn BLIME BLIME dEm SLm(dB) 0.0 Hz 5.000 MHz 10.00 MHz 25.00 MHz 12.50 MHz 12.50 MHz 5 000 MHz 10 00 MHz 25 00 MHz 25 00 MHz 12 50 MHz 15 00 MHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 20.84 6.16.42 -5 700 M -20.98 (-10.65) 5.075M 10.25M 100.0 MHz



Test specification:	FCC Section 90.210(b), Emission mask			
Test procedure:	47 CFR, Sections 2.1051, 2.1	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS	
Date(s):	13-May-14	verdict:	FA33	
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC	
Remarks:			-	

Plot 7.3.15 Emission mask test results at high carrier frequency

OPERATING FREQUENCY RANGE: DETECTOR USED: MODULATION: MODULATING SIGNAL: CHANNEL BANDWIDTH: TRANSMITTER OUTPUT POWER SETTINGS: RF Chain 3650.0 - 3675.0 MHz Average QPSK PRBS 10 MHz NOTE2 2





Test specification:	FCC Section 90.210(b), Emission mask					
Test procedure:	47 CFR, Sections 2.1051, 2.1	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13				
Test mode:	Compliance	Verdict: PASS				
Date(s):	13-May-14	verdict:	FA33			
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC			
Remarks:						

Plot 7.3.16 Emission mask test results at low carrier frequency

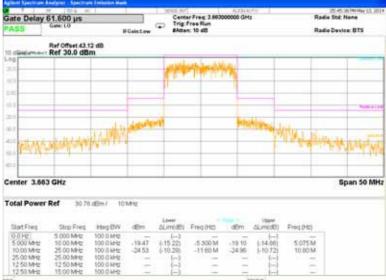
OPERATING FREQUENCY RANGE: 3650.0 - 3675.0 MHz DETECTOR USED: Average MODULATION: 64QAM MODULATING SIGNAL: PRBS CHANNEL BANDWIDTH: 10 MHz TRANSMITTER OUTPUT POWER: NOTE2 **RF** Chain 2 Radio Std. Nem Center Freq 3.60 Trig Free Run BAtten: 10 dB Reference Value 30.0 dBm -IEC also from Radio Device: BTS Ref Offset 43.12 dB Ref 30.0 dBm Center 3.655 GHz Span 50 MHz **Total Power Ref** 30.50 dEm / 10 MHz Stat Freq Friet(Hz) FreqUes dEm **BLITTEIRE** dBrit SLm(dB) 0.0 Hz 5.000 MHz 10.00 MHz 25.00 MHz 12.50 MHz 12.50 MHz 5 000 MHz 10 00 MHz 25 00 MHz 25 00 MHz 12 50 MHz 15 00 MHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz (--) (-16:01) (-12:10) -21.09 6-10.607 .5.525 M -20.50 5.075M 10.80 M 100.0 MHz



Test specification:	FCC Section 90.210(b), Emission mask					
Test procedure:	47 CFR, Sections 2.1051, 2.1	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13				
Test mode:	Compliance	Verdict: PASS				
Date(s):	13-May-14	Verdict:	FA33			
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC			
Remarks:						

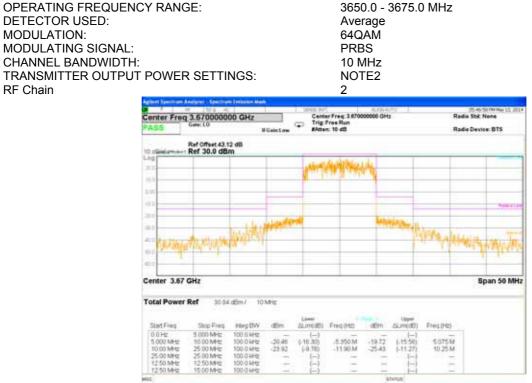
Plot 7.3.17 Emission mask test results at mid carrier frequency

OPERATING FREQUENCY RANGE: DETECTOR USED: MODULATION: MODULATING SIGNAL: CHANNEL BANDWIDTH: TRANSMITTER OUTPUT POWER SETTINGS: RF Chain 3650.0 - 3675.0 MHz Average 64QAM PRBS 10 MHz NOTE2 2





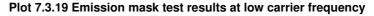
Test specification:	FCC Section 90.210(b), I	FCC Section 90.210(b), Emission mask				
Test procedure:	47 CFR, Sections 2.1051, 2.	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13				
Test mode:	Compliance	Verdict: PASS				
Date(s):	13-May-14	verdict:	FA33			
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC			
Remarks:						



Plot 7.3.18 Emission mask test results at high carrier frequency



Test specification:	FCC Section 90.210(b), Emission mask					
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13					
Test mode:	Compliance	Verdict: PASS				
Date(s):	13-May-14	verdict:	FA33			
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC			
Remarks:			-			



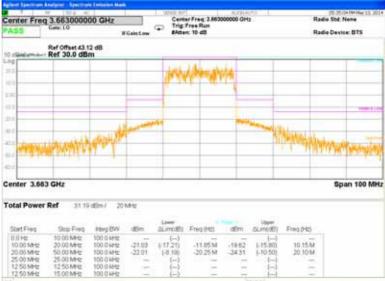
OPERATING FREQUENCY RANGE: 3650.0 - 3675.0 MHz DETECTOR USED: Average MODULATION: QPSK MODULATING SIGNAL: PRBS CHANNEL BANDWIDTH: 20 MHz TRANSMITTER OUTPUT POWER: NOTE2 **RF** Chain 2 Radio Std. Nem Center Freq 3.8 Trig Free Run BAtten: 10 dtl • Gate: LO IEC also from Radio Device: BTS Ref Offset 43.12 dB Ref 30.0 dBm -40 111 Center 3.66 GHz Span 100 MHz **Total Power Ref** 3140 dEm / 20 MB-10 Stat Freq FreqUest Friet(Hz) dEm **BLIMEUER** dBrit SLm(dB) 0.0 Hz 10.00 MHz 20.00 MHz 25.00 MHz 12.50 MHz 12.50 MHz 50 00 MHz 20 00 MHz 50 00 MHz 25 00 MHz 12 50 MHz 15 00 MHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz -20.71 -23.54 6.17.11 -11.65 M -23.35 M -19.06 (-16.20) 10.05 M 20.15 M 6.8.94 100.0 MHz



Test specification:	FCC Section 90.210(b), Emission mask				
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13				
Test mode:	Compliance	Verdict: PASS			
Date(s):	13-May-14	Verdict:	FA33		
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC		
Remarks:			-		

Plot 7.3.20 Emission mask test results at mid carrier frequency

OPERATING FREQUENCY RANGE: DETECTOR USED: MODULATION: MODULATING SIGNAL: CHANNEL BANDWIDTH: TRANSMITTER OUTPUT POWER SETTINGS: RF Chain 3650.0 - 3675.0 MHz Average QPSK PRBS 20 MHz NOTE2 2



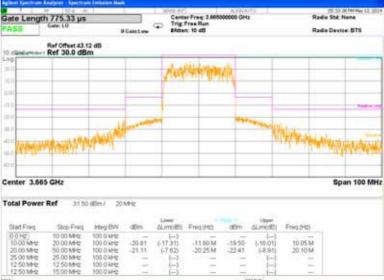


Test specification:	FCC Section 90.210(b), Emission mask				
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13				
Test mode:	Compliance	Verdict: PASS			
Date(s):	13-May-14	Verdict:	FA33		
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC		
Remarks:			-		

Plot 7.3.21 Emission mask test results at high carrier frequency

OPERATING FREQUENCY RANGE: 33 DETECTOR USED: A MODULATION: Q MODULATING SIGNAL: P CHANNEL BANDWIDTH: 20 TRANSMITTER OUTPUT POWER SETTINGS: N RF Chain 2 Gate Length 775.33 µs Content for the former former for the former former former for the former former

3650.0 - 3675.0 MHz Average QPSK PRBS 20 MHz NOTE2





Test specification:	FCC Section 90.210(b), Emission mask					
Test procedure:	47 CFR, Sections 2.1051, 2.1	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13				
Test mode:	Compliance	Verdict: PASS				
Date(s):	13-May-14	verdict:	FA33			
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC			
Remarks:						

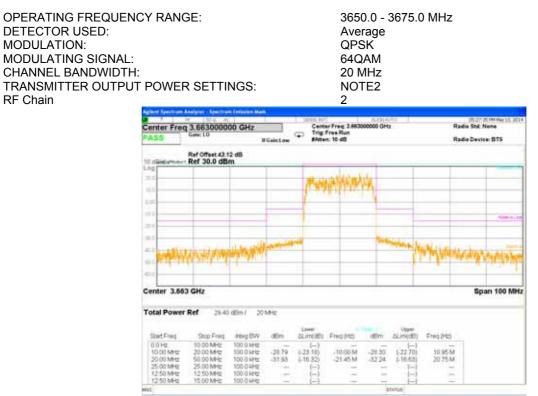


OPERATING FREQUENCY RANGE: 3650.0 - 3675.0 MHz DETECTOR USED: Average MODULATION: 64QAM MODULATING SIGNAL: PRBS CHANNEL BANDWIDTH: 20 MHz TRANSMITTER OUTPUT POWER: NOTE2 **RF** Chain 2 Radio Std. Neme Center Freq 3.6 Trig Free Run BAtten: 10 dB Offset A Res BW 100.00 kHz -IEC also from Radio Device: BTS Ref Offset 43.12 dB Ref 30.0 dBm A CONTRACTOR OF -43 10. Center 3.66 GHz Span 100 MHz **Total Power Ref** 29.32 dEm / 20 MB-10 Stat Freq FreqUest Friet(Hz) SLim(dB) dEm **BLITTEIRE** dBrit 0.0 Hz 10.00 MHz 20.00 MHz 25.00 MHz 12.50 MHz 12.50 MHz 50 00 MHz 20 00 MHz 50 00 MHz 25 00 MHz 12 50 MHz 15 00 MHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz 100.0 kHz (-2277) (-2277) (-17.64) -29.73 6.24.06) 6-17.500 -10.70 M -25.25 M -38.44 10.50 M 23.60 M 100 0 MHz



Test specification:	FCC Section 90.210(b), Emission mask				
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13				
Test mode:	Compliance	Verdict: PASS			
Date(s):	13-May-14	verdict:	PASS		
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC		
Remarks:			· · · · · · · · · · · · · · · · · · ·		

Plot 7.3.23 Emission mask test results at mid carrier frequency



Span 100 MHz



Test specification:	FCC Section 90.210(b), Emission mask				
Test procedure:	47 CFR, Sections 2.1051, 2.1047, 90.210; TIA/EIA-603-C, Section 2.2.13				
Test mode:	Compliance	Verdict: PASS			
Date(s):	13-May-14	Verdict:	FA33		
Temperature: 25 °C	Air Pressure: 1012 hPa	Relative Humidity: 44 %	Power Supply: 48VDC		
Remarks:			-		

Plot 7.3.24 Emission mask test results at high carrier frequency

OPERATING FREQUENCY RANGE: 3650.0 - 3675.0 MHz DETECTOR USED: Average MODULATION: 64QAM MODULATING SIGNAL: PRBS CHANNEL BANDWIDTH: 20 MHz NOTE2 TRANSMITTER OUTPUT POWER SETTINGS: **RF** Chain 2 Radio Std. None Center Freq 3.8 Trig Free Run BAtten: 10 dtl Center Freq 3.665000000 GHz -IEC also from Radio Device: BTS Ref Offset 43.12 dB Ref 30.0 dBm 1111 10 Center 3.665 GHz

otal Power		dEm / 20	MHE					
StatFree	Stop Freq	Heg BW	dBm	Lower BLITTERED	Frequest	dBm	Upper (JLIM)(dB)	Freq (Hz)
0.0 Hz 10.00 MHz 20.00 MHz	50.00 MHz 20.00 MHz 50.00 MHz	100.0 kHz 100.0 kHz 100.0 kHz	-28.47 -33.30	() 6-22.77) 6-17.60)	-10.00 M	-21.35 -30.87	() (-22.65) (-15.17)	11.40 M 21.60 M
25.00 MHz 12.50 MHz	25.00 MHz 52.50 MHz	100 0 HHz 100 0 HHz	-	E				-
12:50 MHz	15:00 MHz	500.0 MHz		()			1-1	



Test specification:	Section 90.1323, Radiated spurious emissions				
Test procedure:	47 CFR, Section 2.1053; 90.13	47 CFR, Section 2.1053; 90.1323; TIA/EIA-603-C, Section 2.2.12			
Test mode:	Compliance	Verdict: PASS			
Date(s):	14-May-14 - 15-May-14	Verdict: PASS			
Temperature: 25 °C	Air Pressure: 1016 hPa	Relative Humidity: 53 %	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,	Attenuation below carrier,	ERP of spurious,	Equivalent field strength limit @ 3m,
MHz	dBc	dBm	dB(µV/m)***
0.009 – 10 th harmonic*	43+10logP**	-13	84.4

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

** - P is transmitter output power in Watts

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

7.4.2 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 360⁰ 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.

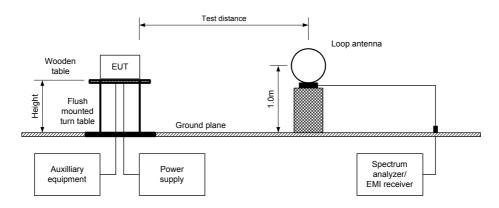
7.4.3 Test procedure for spurious emission field strength measurements above 30 MHz

- 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 360⁰ and the measuring antenna height was swept from 1 to 4 m in both, vertical and horizontal, polarizations.
- 7.4.3.3 The worst test results (the lowest margins) were recorded in Table 7.4.2 and shown in the associated plots.

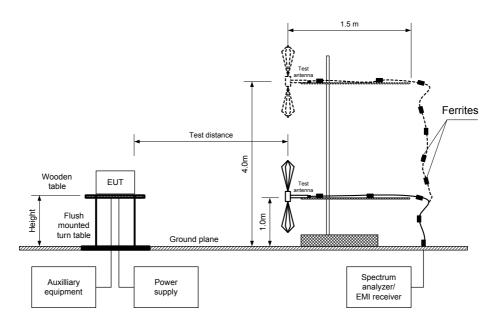


Test specification:	Section 90.1323, Radiated spurious emissions			
Test procedure:	47 CFR, Section 2.1053; 90.	1323; TIA/EIA-603-C, Section 2.2	.12	
Test mode:	Compliance	Verdict: PASS		
Date(s):	14-May-14 - 15-May-14	veraict:	FA33	
Temperature: 25 °C	Air Pressure: 1016 hPa	Relative Humidity: 53 %	Power Supply: 48VDC	
Remarks:				

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









Test specification:	Section 90.1323, Radiated spurious emissions			
Test procedure:	47 CFR, Section 2.1053; 90.1323; TIA/EIA-603-C, Section 2.2.12			
Test mode:	Compliance	Verdict: PASS		
Date(s):	14-May-14 - 15-May-14	verdict:	FA33	
Temperature: 25 °C	Air Pressure: 1016 hPa	Relative Humidity: 53 %	Power Supply: 48VDC	
Remarks:				

Table 7.4.2 Spurious emission field strength test results

TEST DISTANC TEST SITE: EUT HEIGHT: INVESTIGATED DETECTOR US VIDEO BANDW TEST ANTENN EMISSION BAN MODULATION: MODE: MODULATING	D FREQUENCY RAN SED: VIDTH: A TYPE: IDWIDTH:			3 m Semi anea 0.8 m 0.009 – 36 Peak > Resoluti Active loo Biconilog Double ric 20 MHz (F	on bandwidth p (9 kHz – 30 M (30 MHz – 100 Iged guide (abo lighest power s prst case power	/Hz) 0 MHz) ove 1000 MHz) settings)	
Frequency, Field strength, Limit, Margin, MHz dB(μV/m) dB(μV/m) dB*				RBW, kHz	Antenna polarization	Antenna height, m	Turn-table position**, degrees
Low carrier free	quency 3660.0 MHz						
		All spurio	us emissions	are 20 dB b	pelow the limit		
Mid carrier freq	uency 3663.0 MHz						
		All spurio	us emissions	are 20 dB b	pelow the limit		
High carrier fre	quency 3665.0 MHz						
		All spurio	us emissions	are 20 dB b	pelow the limit		

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

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

NOTE1: EUT was configured to produce maximum conducted RF power for minimum declared Antenna gain of 2 dBi. RF output power will vary depending on the antenna assembly gain to ensure that the total EIRP power and power limits withstand with EIRP limits. For actual settings of power levels with respect to actual antenna assembly used, please refer to the User's Manual.

Power	RF Chain 1		RF Chain 2		
Settings	QPSK	64QAM	QPSK	64QAM	
10MHz	20 HEX	20 HEX	20 HEX	20 HEX	
20MHz	19 HEX	14 HEX	19 HEX	17 HEX	

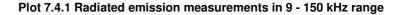
Reference numbers of test equipment used

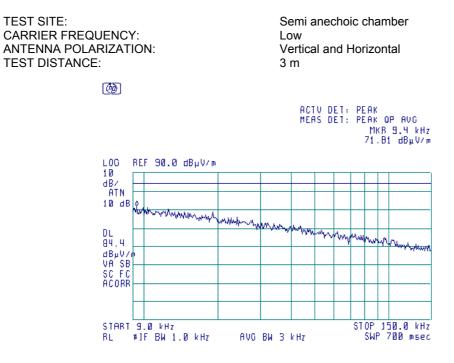
HL 0446	HL 0521	HL 0604	HL 0768	HL 0769	HL 1424	HL 2432	HL 2871
HL 2909	HL 3535	HL 3901	HL 4160	HL 4353			

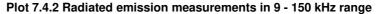
Full description is given in Appendix A.



Test specification:	Section 90.1323, Radiated spurious emissions			
Test procedure:	47 CFR, Section 2.1053; 90.	1323; TIA/EIA-603-C, Section 2.2	.12	
Test mode:	Compliance	Verdict:	PASS	
Date(s):	14-May-14 - 15-May-14	verdict:	FA33	
Temperature: 25 °C	Air Pressure: 1016 hPa	Relative Humidity: 53 %	Power Supply: 48VDC	
Remarks:				



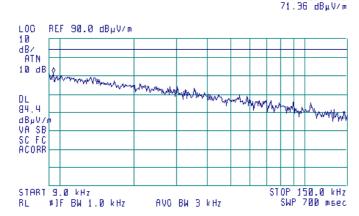




TEST SITE: CARRIER FREQUENCY: ANTENNA POLARIZATION: TEST DISTANCE: Semi anechoic chamber Mid Vertical and Horizontal 3 m

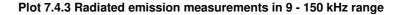


ACTV DET: PEAK MEAS DET: PEAK OP AVG MKR 9.5 kHz 74 26 HR.W.s

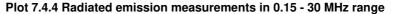




Test specification:	Section 90.1323, Radiated spurious emissions			
Test procedure:	47 CFR, Section 2.1053; 90.1	323; TIA/EIA-603-C, Section 2.2	.12	
Test mode:	Compliance	Verdict: PASS		
Date(s):	14-May-14 - 15-May-14	verdict:	FA33	
Temperature: 25 °C	Air Pressure: 1016 hPa	Relative Humidity: 53 %	Power Supply: 48VDC	
Remarks:			_	







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



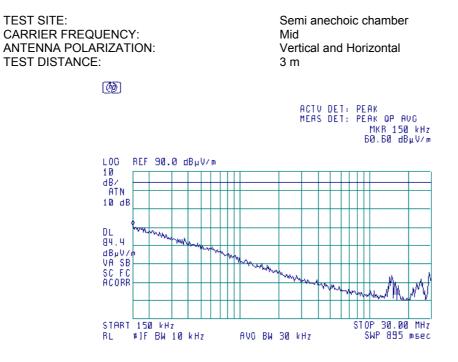
ACTV DET: PEAK MEAS DET: PEAK OP AVG MKR 170 kHz

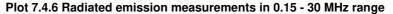




Test specification:	Section 90.1323, Radiated spurious emissions			
Test procedure:	47 CFR, Section 2.1053; 90.1	323; TIA/EIA-603-C, Section 2.2	.12	
Test mode:	Compliance	Verdict:	PASS	
Date(s):	14-May-14 - 15-May-14	verdict:	FA33	
Temperature: 25 °C	Air Pressure: 1016 hPa	Relative Humidity: 53 %	Power Supply: 48VDC	
Remarks:				

Plot 7.4.5 Radiated emission measurements in 0.15 - 30 MHz range

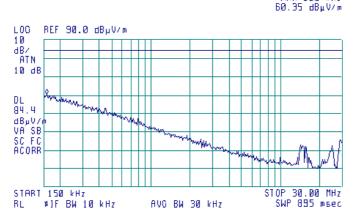




TEST SITE: CARRIER FREQUENCY: ANTENNA POLARIZATION: TEST DISTANCE: Semi anechoic chamber High Vertical and Horizontal 3 m

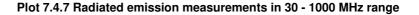


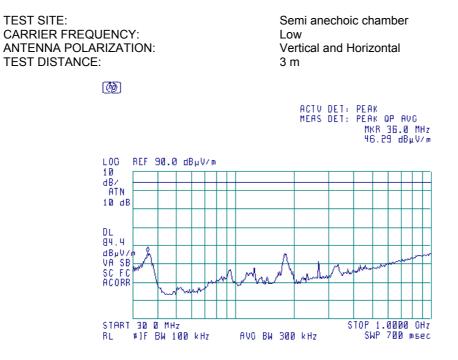
ACTU DET: PEAK MEAS DET: PEAK OP AVG MKR 160 kHz

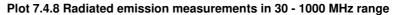




Test specification:	Section 90.1323, Radiated spurious emissions			
Test procedure:	47 CFR, Section 2.1053; 90.1	323; TIA/EIA-603-C, Section 2.2	.12	
Test mode:	Compliance	Verdict:	PASS	
Date(s):	14-May-14 - 15-May-14	verdict:	FA33	
Temperature: 25 °C	Air Pressure: 1016 hPa	Relative Humidity: 53 %	Power Supply: 48VDC	
Remarks:				







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



ACTV DET: PEAK



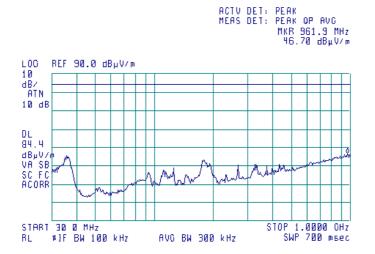


Test specification:	Section 90.1323, Radiated spurious emissions			
Test procedure:	47 CFR, Section 2.1053; 90.1	323; TIA/EIA-603-C, Section 2.2	.12	
Test mode:	Compliance	Verdict:	PASS	
Date(s):	14-May-14 - 15-May-14	verdict:	FA33	
Temperature: 25 °C	Air Pressure: 1016 hPa	Relative Humidity: 53 %	Power Supply: 48VDC	
Remarks:				

Plot 7.4.9 Radiated emission measurements in 30 - 1000 MHz range

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

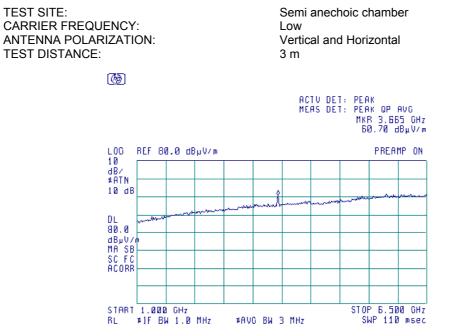






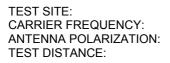
Test specification:	Section 90.1323, Radiated spurious emissions			
Test procedure:	47 CFR, Section 2.1053; 90.1	323; TIA/EIA-603-C, Section 2.2	.12	
Test mode:	Compliance	Verdict:	PASS	
Date(s):	14-May-14 - 15-May-14	verdict:	FA33	
Temperature: 25 °C	Air Pressure: 1016 hPa	Relative Humidity: 53 %	Power Supply: 48VDC	
Remarks:			-	

Plot 7.4.10 Radiated emission measurements in 1000 - 6500 MHz range









Semi anechoic chamber Mid Vertical and Horizontal 3 m

Ø

 LOC
 REF 80.0 dBµV/m

 ACTV DET: PEAK MEAS DET: PEAK OP AVG MKR 3.665 GHz 60.05 dBµV/m

 NERF 80.0 dBµV/m

 PREAMP ON

 10
 0

 dB/ HATN
 0

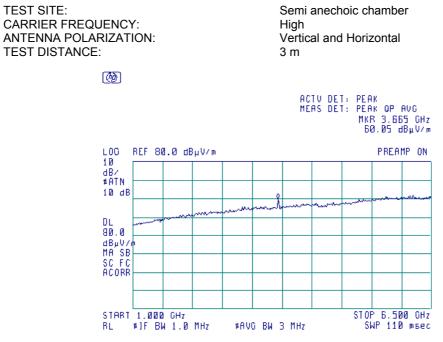
 0L
 0

 0L



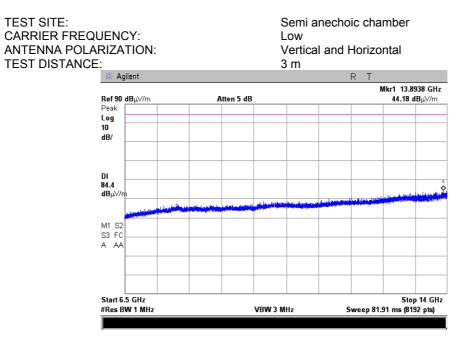
Test specification:	Section 90.1323, Radiated spurious emissions			
Test procedure:	47 CFR, Section 2.1053; 90.1	323; TIA/EIA-603-C, Section 2.2	.12	
Test mode:	Compliance	Verdict:	PASS	
Date(s):	14-May-14 - 15-May-14	verdict:	FA33	
Temperature: 25 °C	Air Pressure: 1016 hPa	Relative Humidity: 53 %	Power Supply: 48VDC	
Remarks:				





^{3665.0} MHz is high carrier frequency

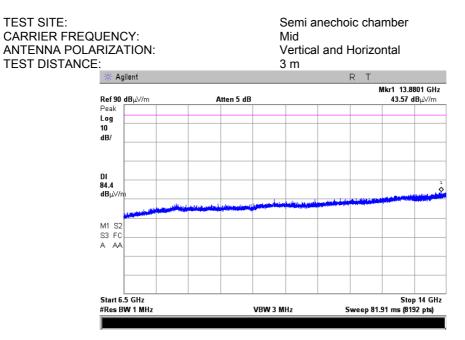




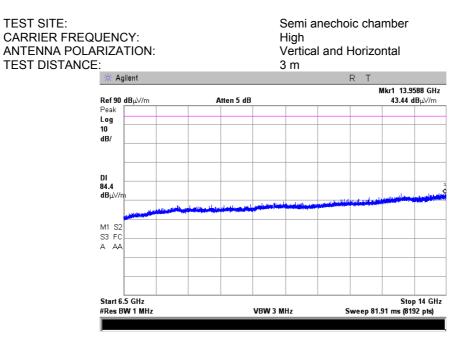


Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-May-14 - 15-May-14		
Temperature: 25 °C	Air Pressure: 1016 hPa	Relative Humidity: 53 %	Power Supply: 48VDC
Remarks:			· · · · · · · · · · · · · · · · · · ·



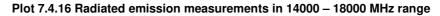


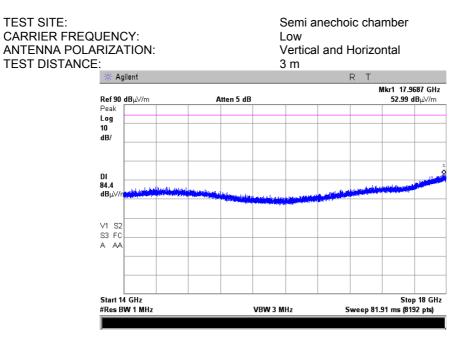
Plot 7.4.15 Radiated emission measurements in 6500 - 14000 MHz range



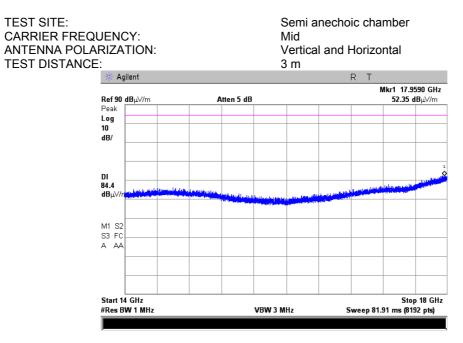


Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Vardiate	PASS
Date(s):	14-May-14 - 15-May-14	Verdict:	FA33
Temperature: 25 °C	Air Pressure: 1016 hPa	Relative Humidity: 53 %	Power Supply: 48VDC
Remarks:			· · · · · · · · · · · · · · · · · · ·





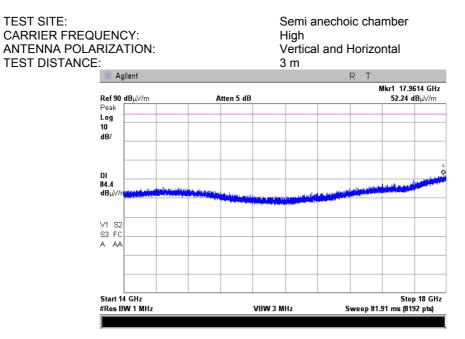




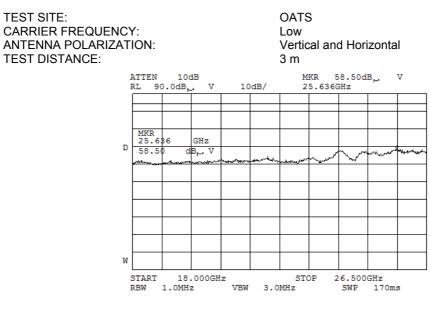


Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-May-14 - 15-May-14		
Temperature: 25 °C	Air Pressure: 1016 hPa	Relative Humidity: 53 %	Power Supply: 48VDC
Remarks:			







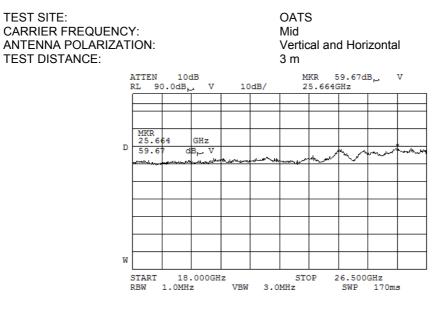


dBuV units correspond to dBuV/m



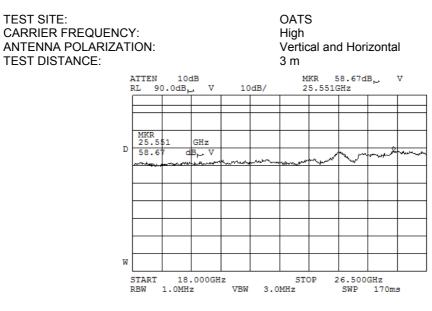
Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-May-14 - 15-May-14		
Temperature: 25 °C	Air Pressure: 1016 hPa	Relative Humidity: 53 %	Power Supply: 48VDC
Remarks:			





dBuV units correspond to dBuV/m



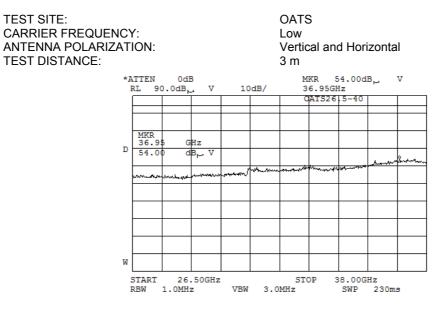


dBuV units correspond to dBuV/m



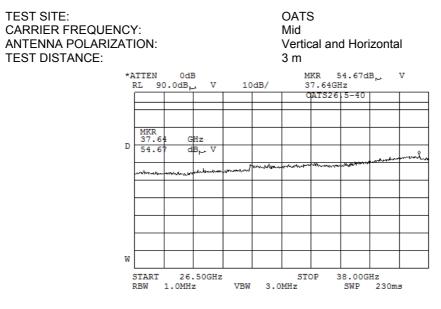
Test specification:	Section 90.1323, Radiated spurious emissions		
Test procedure:	47 CFR, Section 2.1053; 90.1323; TIA/EIA-603-C, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date(s):	14-May-14 - 15-May-14		FA33
Temperature: 25 °C	Air Pressure: 1016 hPa	Relative Humidity: 53 %	Power Supply: 48VDC
Remarks:			

Plot 7.4.22 Radiated emission measurements in 26500 - 38000 MHz range



dBuV units correspond to dBuV/m



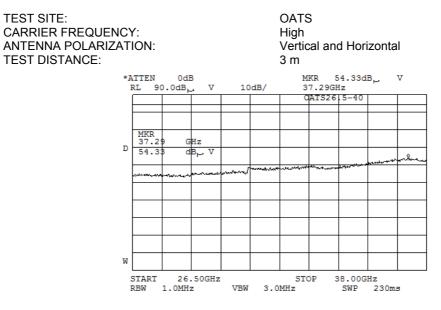


dBuV units correspond to dBuV/m



Test specification:	Section 90.1323, Radiated spurious emissions			
Test procedure:	47 CFR, Section 2.1053; 90.1323; TIA/EIA-603-C, Section 2.2.12			
Test mode:	Compliance	Verdict:	PASS	
Date(s):	14-May-14 - 15-May-14	verdict:	FA33	
Temperature: 25 °C	Air Pressure: 1016 hPa	Relative Humidity: 53 %	Power Supply: 48VDC	
Remarks:			· • • •	





dBuV units correspond to dBuV/m



Test specification:	Section 90.1323, Conducted spurious emissions		
Test procedure:	47 CFR, Section 2.1051; 90.1323; TIA/EIA-603-C, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date(s):	15-May-14	verdict:	FA33
Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 43 %	Power Supply: 48VDC
Remarks:			

7.5 Spurious emissions at RF antenna connector test

7.5.1 General

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

Table 7.5.1 Spurious emission limits

Frequency, MHz	Attenuation below carrier, dBc	ERP of spurious, dBm
0.009 – 10th harmonic*	43+10logP** (mask B)	-13.0

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

** - P is transmitter output power in Watts

7.5.2 Test procedure

- 7.5.2.1 The EUT was set up as shown in Figure 7.5.1, energized and its proper operation was checked.
- 7.5.2.2 The EUT was adjusted to produce maximum available for end user RF output power.
- 7.5.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.5.2 and the associated plots.

Figure 7.5.1 Spurious emission test setup for single antenna mode





Test specification:	Section 90.1323, Conducted spurious emissions			
Test procedure:	47 CFR, Section 2.1051; 90.1323; TIA/EIA-603-C, Section 2.2.13			
Test mode:	Compliance	Verdict:	PASS	
Date(s):	15-May-14	verdict:	FA33	
Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 43 %	Power Supply: 48VDC	
Remarks:				

Table 7.5.2 Spurious emission test results

ASSIGNED F INVESTIGAT DETECTOR I VIDEO BAND MODULATIO MODULATIN EMISSION B	ed frequen USED: WIDTH: N: G SIGNAL:	-		0.009 – 36 Peak ≥ Resoluti QPSK PRBS	3675.0 MHz 6750 MHz ion bandwidth vorst case outp	out power and density)		
TRANSMITTER OUTPUT POWER:				See Note				
Frequency, MHzSA reading, dBmAttenuator, dBCable loss, dBRBW, kHzSpurious emission, dBmLimit, dBmMargin, dB*				Verdict				
	All spurious emissions are 20 dB below the limit					Pass		

*- Margin = Spurious emission – specification limit.

NOTE1: The spurious emissions worst case was found during single antenna mode configuration. NOTE2: Measurement was performed at QPSK modulation and 20 MHz EBW - the worst case according to power and power density tests.

Dowor Sottings	RF Chain 1		RF Chain 2	
Power Settings	QPSK	64QAM	QPSK	64QAM
10MHz	20 HEX	20 HEX	20 HEX	20 HEX
20MHz	19 HEX	14 HEX	19 HEX	17 HEX

Reference numbers of test equipment used

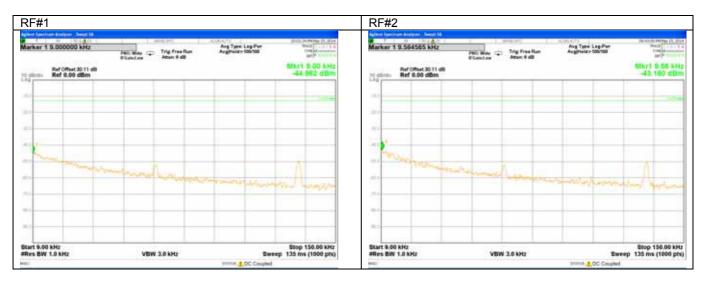
HL 1424	HL 3322	HL 3455	HL 3770	HL 3901	HL 3903	HL 4229	HL 4273
HL 4575							

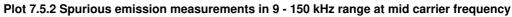
Full description is given in Appendix A.

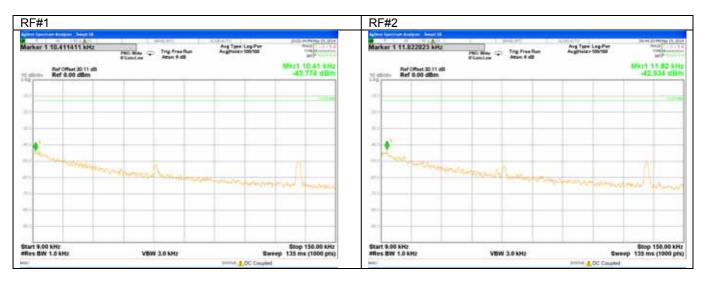


Test specification:	Section 90.1323, Conducted spurious emissions			
Test procedure:	47 CFR, Section 2.1051; 90.1323; TIA/EIA-603-C, Section 2.2.13			
Test mode:	Compliance	Verdict:	PASS	
Date(s):	15-May-14	verdict:	FA33	
Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 43 %	Power Supply: 48VDC	
Remarks:				

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



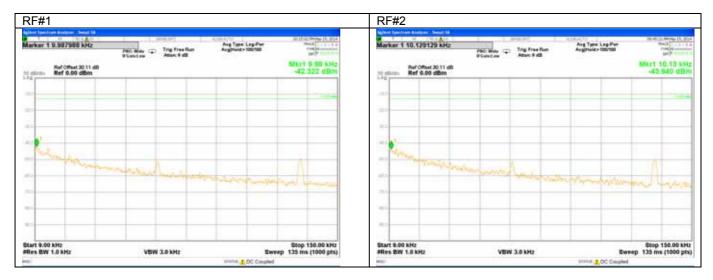




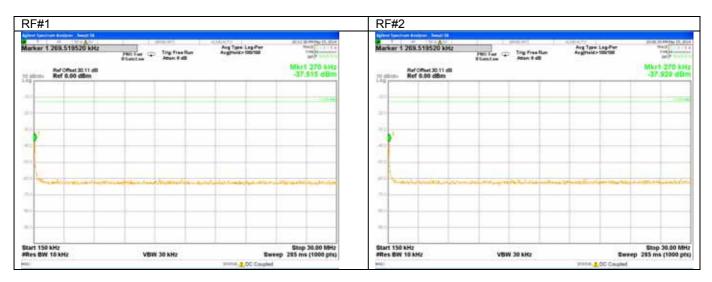


Test specification:	Section 90.1323, Conducted spurious emissions			
Test procedure:	47 CFR, Section 2.1051; 90.1323; TIA/EIA-603-C, Section 2.2.13			
Test mode:	Compliance	Vardiate	PASS	
Date(s):	15-May-14	Verdict:	PA33	
Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 43 %	Power Supply: 48VDC	
Remarks:			· · · · ·	

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



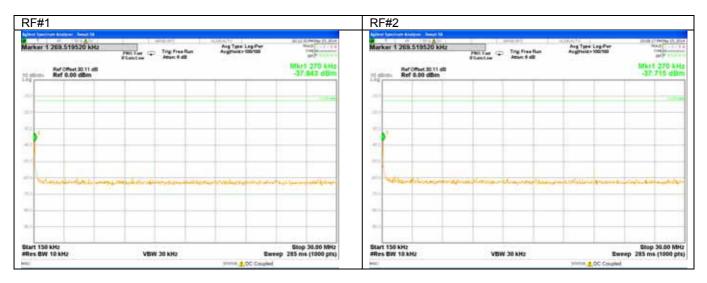
Plot 7.5.4 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency



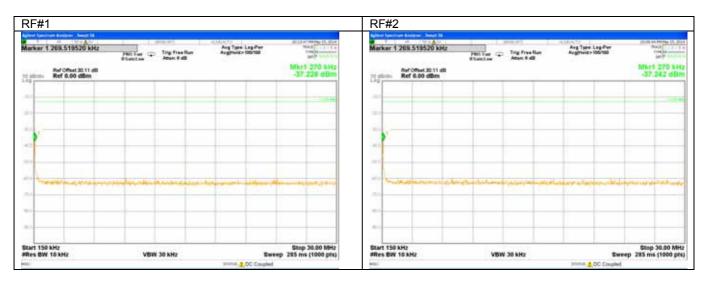


Test specification:	Section 90.1323, Conducted spurious emissions			
Test procedure:	47 CFR, Section 2.1051; 90.1323; TIA/EIA-603-C, Section 2.2.13			
Test mode:	Compliance	Verdict: PASS		
Date(s):	15-May-14	Verdict:	PA33	
Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 43 %	Power Supply: 48VDC	
Remarks:			· · · · ·	

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



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



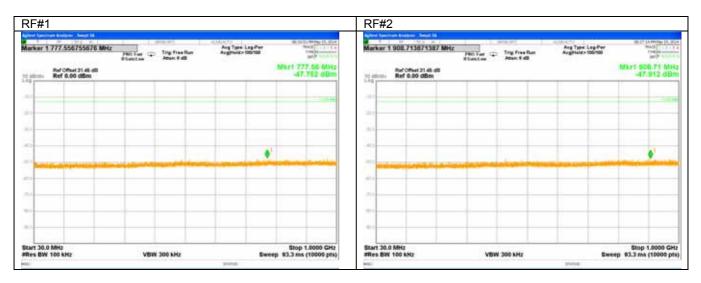


Test specification:	Section 90.1323, Conducted spurious emissions			
Test procedure:	47 CFR, Section 2.1051; 90.1323; TIA/EIA-603-C, Section 2.2.13			
Test mode:	Compliance	Verdict:	PASS	
Date(s):	15-May-14	verdict:	FA33	
Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 43 %	Power Supply: 48VDC	
Remarks:				

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



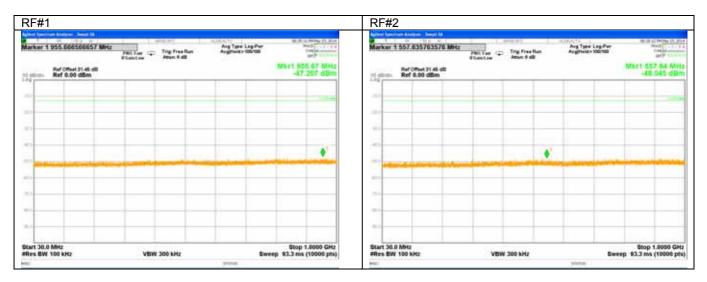
Plot 7.5.8 Spurious emission measurements in 30.0 - 1000 MHz range at mid carrier frequency



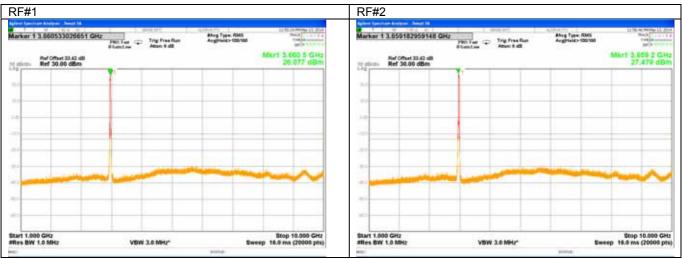


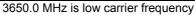
Test specification:	Section 90.1323, Conducted spurious emissions			
Test procedure:	47 CFR, Section 2.1051; 90.1323; TIA/EIA-603-C, Section 2.2.13			
Test mode:	Compliance	Vardiat	PASS	
Date(s):	15-May-14	Verdict:	FA33	
Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 43 %	Power Supply: 48VDC	
Remarks:		· •	· • • •	

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



Plot 7.5.10 Spurious emission measurements in 1000 - 10000 MHz range at low carrier frequency

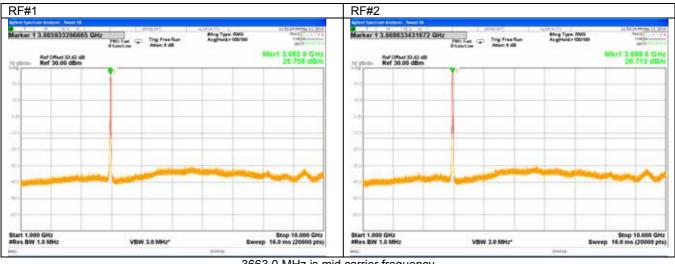






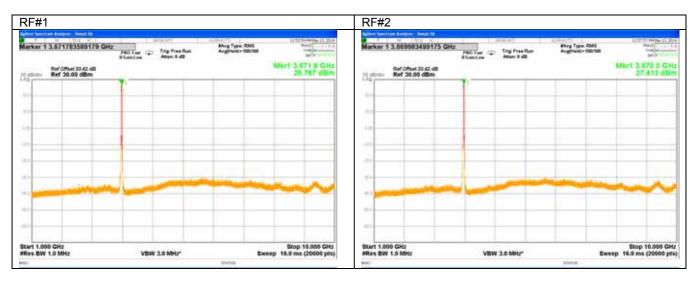
Test specification:	Section 90.1323, Conducted spurious emissions					
Test procedure:	47 CFR, Section 2.1051; 90.	1323; TIA/EIA-603-C, Section 2.2				
Test mode:	Compliance	Vardiate	PASS			
Date(s):	15-May-14	Verdict:	FA33			
Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 43 %	Power Supply: 48VDC			
Remarks:						

Plot 7.5.11 Spurious emission measurements in 1000 - 10000 MHz range at mid carrier frequency



3663.0 MHz is mid carrier frequency

Plot 7.5.12 Spurious emission measurements in 1000 - 10000 MHz range at high carrier frequency

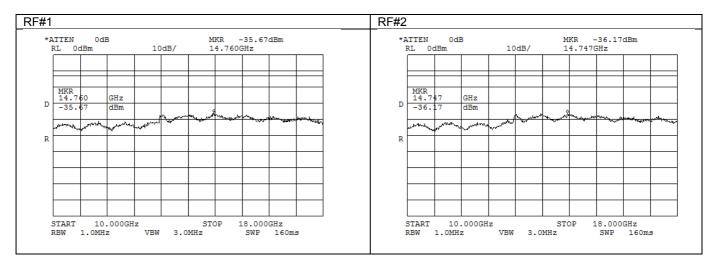


3665.0 MHz is high carrier frequency

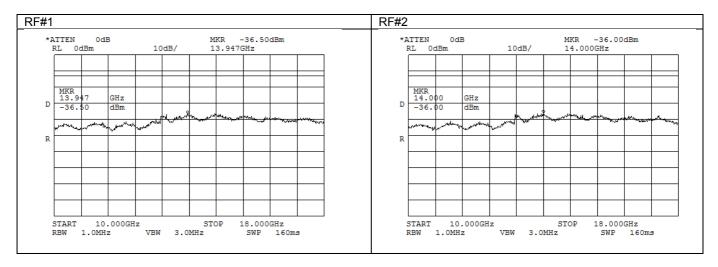


Test specification:	Section 90.1323, Conduc	Section 90.1323, Conducted spurious emissions					
Test procedure:	47 CFR, Section 2.1051; 90.	1323; TIA/EIA-603-C, Section 2.2	.13				
Test mode:	Compliance	Verdict:	PASS				
Date(s):	15-May-14	veraict:	FA33				
Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 43 %	Power Supply: 48VDC				
Remarks:							

Plot 7.5.13 Spurious emission measurements in 10000 - 18000 MHz range at low carrier frequency



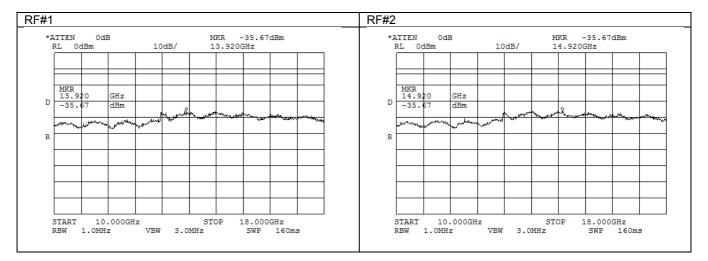
Plot 7.5.14 Spurious emission measurements in 10000 - 18000 MHz at mid carrier frequency



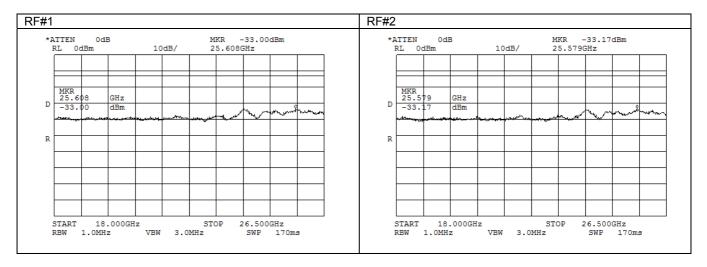


Test specification:	Section 90.1323, Conducted spurious emissions					
Test procedure:	47 CFR, Section 2.1051; 90.	1323; TIA/EIA-603-C, Section 2.2	2.13			
Test mode:	Compliance	Vardiate	PASS			
Date(s):	15-May-14	Verdict:	PA33			
Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 43 %	Power Supply: 48VDC			
Remarks:						

Plot 7.5.15 Spurious emission measurements in 10000 - 18000 MHz at high carrier frequency



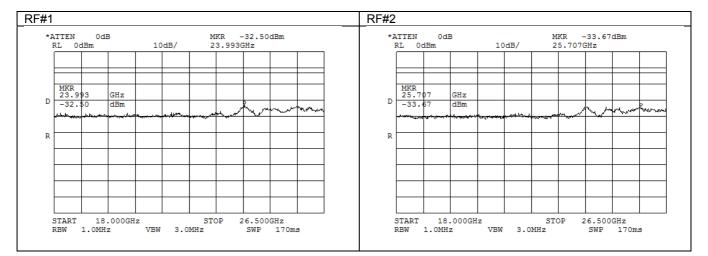
Plot 7.5.16 Spurious emission measurements in 18000 - 26500 MHz range at low carrier frequency



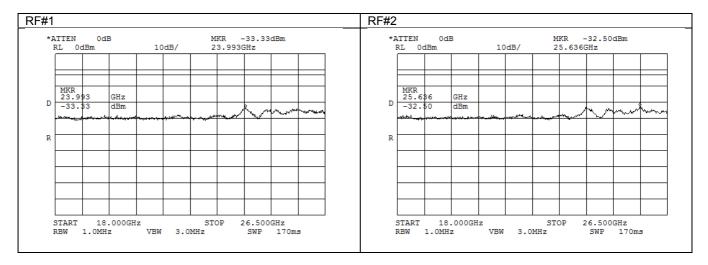


Test specification:	Section 90.1323, Conducted spurious emissions					
Test procedure:	47 CFR, Section 2.1051; 90.	1323; TIA/EIA-603-C, Section 2.2	2.13			
Test mode:	Compliance	Vardiate	PASS			
Date(s):	15-May-14	Verdict:	PA33			
Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 43 %	Power Supply: 48VDC			
Remarks:						

Plot 7.5.17 Spurious emission measurements in 18000 - 26500 MHz at mid carrier frequency



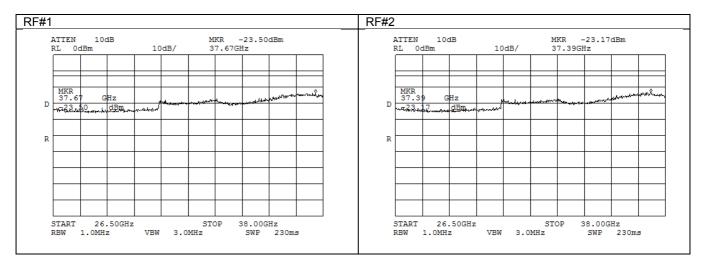
Plot 7.5.18 Spurious emission measurements in 18000 - 26500 MHz at high carrier frequency



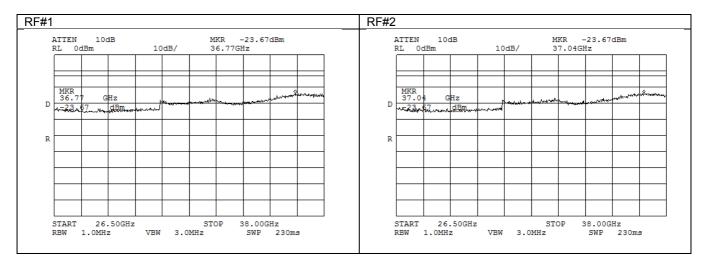


Test specification:	Section 90.1323, Conduc	Section 90.1323, Conducted spurious emissions					
Test procedure:	47 CFR, Section 2.1051; 90.	1323; TIA/EIA-603-C, Section 2.2	.13				
Test mode:	Compliance	Verdict:	PASS				
Date(s):	15-May-14	veraict:	FA33				
Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 43 %	Power Supply: 48VDC				
Remarks:							

Plot 7.5.19 Spurious emission measurements in 26500 - 38000 MHz range at low carrier frequency



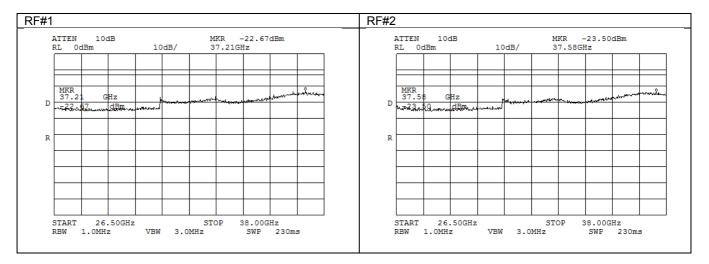
Plot 7.5.20 Spurious emission measurements in 26500s - 38000 MHz range at mid carrier frequency





Test specification:	Section 90.1323, Conducted spurious emissions					
Test procedure:	47 CFR, Section 2.1051; 90.	1323; TIA/EIA-603-C, Section 2.2	13			
Test mode:	Compliance	Verdict:	PASS			
Date(s):	15-May-14	verdict:	FA33			
Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 43 %	Power Supply: 48VDC			
Remarks:						

Plot 7.5.21 Spurious emission measurements in 26500 - 38000 MHz range at high carrier frequency





Test specification:	Section 90.213, Frequency stability					
Test procedure:	47 CFR, Section 2.1055; TIA	47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2				
Test mode:	Compliance	Verdict:	PASS			
Date(s):	18-May-14 - 19-May-14	verdict:	FA33			
Temperature: 25 °C	Air Pressure: 1015 hPa	Relative Humidity: 39 %	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.

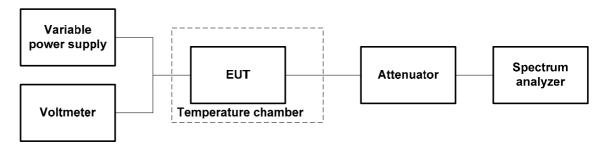
Table 7.6.1 Frequency stability limits

Assigned frequency, MHz	Maximum allowed frequency displacement		
Assigned nequency, Minz	ppm	Hz	
3650.0 – 3675.0	Ν	A	

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 90.213, Frequen	Section 90.213, Frequency stability					
Test procedure:	47 CFR, Section 2.1055; TIA	/EIA-603-C Section 2.2.2					
Test mode:	Compliance	Verdict:	PASS				
Date(s):	18-May-14 - 19-May-14	verdict:	FA33				
Temperature: 25 °C	Air Pressure: 1015 hPa	Relative Humidity: 39 %	Power Supply: 48VDC				
Remarks:							

Table 7.6.2 Frequency stability test results

	OPERATING F NOMINAL POY TEMPERATUF POWER DURI SPECTRUM A RESOLUTION VIDEO BANDY MODULATION	WER VOL RE STABIL ING TEMP NALYZER I BANDWII WIDTH:	TAGE: LIZATION ERATURE MODE:		TON:		48 20 Off Cc 1 k 3 k	50.0 – 3675 VDC min founter Hz Hz modulated	.0 MHz			
	Voltage,				Frequency, MI	łz			Max freque	ncy drift, Hz	Max frequen	cy drift,ppm
T, ºC	VDC	Start up	1st min	2nd min	3rd min	4th min	5th min	10th min	Positive	Negative	Positive	Negative
Low ch	annel 3655.0 MHz	•										
-30	nominal	3655.972920	3655.973520	3655.972760	3655.972000	3655.972280	3655.972750	3655.972770	0.00	-2620.00	0.00	-0.72
-20	nominal	3655.973120	NA	NA	NA	NA	NA	3655.972830	0.00	-1790.00	0.00	-0.49
-10	nominal	3655.973200	NA	NA	NA	NA	NA	3655.973650	0.00	-1420.00	0.00	-0.39
0	nominal	3655.974020	3655.973450	3655.973890	3655.972880	3655.973340	3655.972970	3655.972860	0.00	-1760.00	0.00	-0.48
10	nominal	3655.973470	NA	NA	NA	NA	NA	3655.974250	0.00	-1150.00	0.00	-0.31
20	55.2	3655.975490	NA	NA	NA	NA	NA	3655.973640	870.00	-980.00	0.24	-0.27
20	48.0	3655.975230	NA	NA	NA	NA	NA	3655.974620	610.00	0.00	0.17	0.00
20	40.8	3655.974670	NA	NA	NA	NA	NA	3655.974110	50.00	-510.00	0.01	-0.14
30	nominal	3655.974830	3655.975770	3655.975170	3655.975000	3655.974870	3655.976100	3655.974580	1480.00	-40.00	0.40	-0.01
40	nominal	3655.975930	NA	NA	NA	NA	NA	3655.976060	1440.00	0.00	0.39	0.00
50	nominal	3655.974530	3655.974610	3655.974590	3655.974670	3655.974100	3655.974270	3655.974870	250.00	-520.00	0.07	-0.14
Mid Ch	annel 3663.0 MHz											
-30	nominal	3663.973120	3663.972600	3663.972270	3663.972190	3663.973280	3663.973000	3663.972110	0.00	-2280.00	0.00	-0.62
-20	nominal	3663.972310	NA	NA	NA	NA	NA	3663.973170	0.00	-2080.00	0.00	-0.57
-10	nominal	3663.972660	NA	NA	NA	NA	NA	3663.972890	0.00	-1730.00	0.00	-0.47
0	nominal	3663.974680	3663.973830	3663.973970	3663.973740	3663.973040	3663.973550	3663.972910	290.00	-1480.00	0.08	-0.40
10	nominal	3663.973940	NA	NA	NA	NA	NA	3663.973010	0.00	-1380.00	0.00	-0.38
20	55.2	3663.974760	NA	NA	NA	NA	NA	3663.974500	370.00	0.00	0.10	0.00
20	48.0	3663.974740	NA	NA	NA	NA	NA	3663.974390	350.00	0.00	0.10	0.00
20	40.8	3663.973970	NA	NA	NA	NA	NA	3663.974380	0.00	-420.00	0.00	-0.11
30	nominal	3663.974600	3663.974860	3663.974650	3663.974560	3663.974250	3663.974130	3663.973950	470.00	-440.00	0.13	-0.12
40	nominal	3663.975530	NA	NA	NA	NA	NA	3663.974590	1140.00	0.00	0.31	0.00
50	nominal	3663.974560	3663.976070	3663.974870	3663.974900	3663.974840	3663.974420	3663.974750	1680.00	0.00	0.46	0.00
High cl	nannel 3670.0 MHz											
-30	nominal	3670.972940	3670.972470	3670.973030	3670.972570	3670.973020	3670.972590	3670.972360	0.00	-2280.00	0.00	-0.62
-20	nominal	3670.973390	NA	NA	NA	NA	NA	3670.973670	0.00	-1250.00	0.00	-0.34
-10	nominal	3670.973340	NA	NA	NA	NA	NA	3670.973970	0.00	-1300.00	0.00	-0.35
0	nominal	3670.973390	3670.973080	3670.973740		3670.973480	3670.972640	3670.974230	0.00	-2000.00	0.00	-0.54
10	nominal	3670.974090	NA	NA	NA	NA	NA	3670.973640	0.00	-1000.00	0.00	-0.27
20	55.2	3670.974620	NA	NA	NA	NA	NA	3670.974160	0.00	-480.00	0.00	-0.13
20	48.0	3670.974840	NA	NA	NA	NA	NA	3670.974640	200.00	0.00	0.05	0.00
20	40.8	3670.974760	NA	NA	NA	NA	NA	3670.974330	120.00	-310.00	0.03	-0.08
30	nominal	3670.974250	3670.974070	3670.974150	3670.974680	3670.973770	3670.973870	3670.974120	40.00	-870.00	0.01	-0.24
40	nominal	3670.974380	NA	NA	NA	NA	NA	3670.974850	210.00	-260.00	0.06	-0.07
50	nominal	3670.974500	3670.974660	3670.974280	3670.974680	3670.974650	3670.975720	3670.975430	1080.00	-360.00	0.29	-0.10

	Maximum frequency displacement				
Channel	p	om	Hz		
	Negative	Positive	Negative	Positive	
3655.0	1480.00	-2620.00	0.40	-0.72	
3663.0	1680.00	-2280.00	0.46	-0.62	
3670.0	1080.00	-2280.00	0.29	-0.62	

Note1: As no limit is specified by the applicable rule for 3650.0 – 3675.0 MHz band the test results are given in Table above is for information purpose only.

Reference numbers of test equipment used

	HL 1424	HL 1480	HL 3286	HL 3308	HL 4164	HL 4229		
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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./ Check	Due Cal./ Check
0446	Antenna, Loop, Active, 10 kHz - 30 MHz	EMCO	6502	2857	21-Jan-14	21-Jan-15
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A 00319, 3448A002 53	28-Oct-13	28-Oct-14
0604	Antenna BiconiLog Log-Periodic/T Bow- TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	04-Jun-13	04-Jun-14
0768	Antenna Standard Gain Horn, 18-26.5 GHz, WR-42, 25 dB gain	Quinstar Technology	QWH- 4200-BA	110	12-Dec-12	12-Dec-15
0769	Antenna Standard Gain Horn, 26.5-40 GHz, WR28, 25 dB gain	Quinstar Technology	QWH- 2800-BA	112	12-Dec-12	12-Dec-15
1424	Spectrum Analyzer, 30 Hz- 40 GHz	Agilent Technologies	8564EC	3946A002 19	10-Oct-13	10-Oct-14
1480	Cable, 1 m	Harbour Industries	MIL 17/60- RG142	1480	02-Dec-13	02-Dec-14
2432	Antenna, Double-Ridged Waveguide Horn 1-18 GHz	EMC Test Systems	3115	00027177	03-Jan-14	03-Jan-15
2871	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-8155- 00	2871	04-Dec-13	04-Dec-14
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY414447 62	23-Dec-13	23-Dec-14
3286	Temperature Chamber, (-50 to +170) °C	Thermotron	EL-8-CH- 1-1-CO2	21-9048	30-Sep-13	30-Sep-14
3301	Power Meter, P-series, 50 MHz to 40 GHz	Agilent Technologies	N1911A	MY451010 57	12-Feb-14	12-Feb-15
3302	Power sensor, P-Series, 50 MHz to 40 GHz, -35/30 to 20 dBm	Agilent Technologies	N1922A	MY452405 86	12-Feb-14	12-Feb-15
3308	Multimeter	Fluke	115C	94321808	14-Jul-13	14-Jul-14
3322	Attenuator DC to 22 GHz, 30 dB, 50 W	Aeroflex / Weinschel	86-30-12	448	16-Sep-13	16-Sep-14
3455	Medium Power Fixed Coaxial Attenuator DC to 40 GHz, 20 dB, 5 W	Aeroflex / Weinschel	75A-20-12	1182	09-Mar-14	09-Mar-15
3535	Amplifier, low noise, 18 to 40 GHz	Quinstar Technology	QLJ- 18404537 -J0	111590030 01	30-Dec-13	30-Dec-14
3770	Attenuator, N-type, 20 dB, DC to 18 GHz, 5 W	Mini-Circuits	BW- N20W5+	NA	25-Aug-13	25-Aug-14
3901	Microwave Cable Assembly, 40.0 GHz, 3.5 m, SMA/SMA	Huber-Suhner	SUCOFLE X 102A	1225/2A	06-Feb-14	06-Feb-15
3903	Microwave Cable Assembly, 40.0 GHz, 1.5 m, SMA/SMA	Huber-Suhner	SUCOFLE X 102A	1226/2A	06-Feb-14	06-Feb-15
4160	Preamplifier, 0.1 to 18 GHz, Gain 25 dB, N-type(f) in, N-type(m) out	Agilent Technologies	87405C	MY470105 94	11-Aug-13	11-Aug-14
4164	DC Power Supply, 60V, 5A	Standig	605D	NA	15-Jan-14	15-Jan-15



HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./ Check	Due Cal./ Check
4229	Precision Fixed Attenuator, 50 Ohm, 5W, 10dB, DC to 18000 MHz	Mini-Circuits	BW- N10W5+	NA	07-Mar-14	07-Mar-15
4273	Test Cable , DC-18 GHz, 1.8 m, SMA/M - N/M	Mini-Circuits	CBL-6FT- SMNM+	70045	27-Nov-13	27-Nov-14
4275	Test Cable , DC-18 GHz, 1.8 m, SMA/M - N/M	Mini-Circuits	CBL-6FT- SMNM+	70050	27-Nov-13	27-Nov-14
4353	Low Loss Armored Test Cable, DC - 18 GHz, 6.2 m, N type-M/N type-M	MegaPhase	NC29- N1N1-244	12025101 003	16-Mar-14	16-Mar-15
4367	Directional coupler, 1 GHz to 18 GHz, 10 dB, SMA Female	Tiger Micro- Electronics Institute	TGD- A1101-10	01e- JSDE805- 006	30-Dec-13	30-Dec-14
4575	EXA Signal Analyzer, 9 kHz - 26.5 GHz	Agilent Technologies	N9010A	MY480301 10	29-Apr-14	29-Apr-15



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: 2013	Private land mobile radio services
47CFR part 1: 2013	Practice and procedure
47CFR part 2: 2013	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 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 Standard gain horn antenna Quinstar Technology Model QWH Ser.No.112, HL 0768, 0769, 0770, 0771, 0772

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



Antenna factor 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



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



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

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



Cable loss Microwave Cable Assembly, Huber-Suhner, 40 GHz, 1.5 m, SMA-SMA, S/N 1226/2A HL 3903

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	-0.02	9500	1.84	21000	2.98
100	0.15	10000	1.86	22000	3.07
500	0.38	10500	1.93	23000	3.13
1000	0.56	11000	1.99	24000	3.21
1500	0.69	11500	2.04	25000	3.26
2000	0.82	12000	2.10	26000	3.48
2500	0.90	12500	2.15	27000	3.44
3000	0.98	13000	2.21	28000	3.53
3500	1.06	13500	2.25	29000	3.59
4000	1.11	14000	2.29	30000	3.66
4500	1.17	14500	2.34	31000	3.70
5000	1.24	15000	2.36	32000	3.79
5500	1.32	15500	2.40	33000	3.88
6000	1.40	16000	2.45	34000	3.94
6500	1.50	16500	2.48	35000	3.91
7000	1.56	17000	2.56	36000	4.05
7500	1.62	17500	2.58	37000	4.22
8000	1.68	18000	2.60	38000	4.25
8500	1.74	19000	2.84	39000	4.27
9000	1.78	20000	2.88	40000	4.33



CBL-6FT-SMNM+, HL 4273							
Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.09	4800	1.76	9800	2.70	14800	3.59
30	0.11	4900	1.78	9900	2.71	14900	3.59
50	0.14	5000	1.81	10000	2.73	15000	3.60
100	0.20	5100	1.82	10100	2.75	15100	3.63
200	0.30	5200	1.86	10200	2.76	15200	3.67
300	0.38	5300	1.89	10300	2.79	15300	3.70
400	0.45	5400	1.92	10400	2.81	15400	3.68
500	0.50	5500	1.96	10500	2.82	15500	3.70
600	0.55	5600	2.00	10600	2.83	15600	3.71
700	0.60	5700	2.03	10700	2.87	15700	3.77
800	0.65	5800	2.04	10800	2.87	15800	3.75
900	0.69	5900	2.07	10900	2.88	15900	3.77
1000	0.73	6000	2.10	11000	2.89	16000	3.79
1100	0.77	6100	2.10	11100	2.91	16100	3.85
1200	0.80	6200	2.10	11200	2.92	16200	3.82
1300	0.84	6300	2.11	11300	2.92	16300	3.83
1400	0.88	6400	2.11	11400	2.94	16400	3.88
1500	0.88	6500	2.14	11500	2.95	16500	3.89
1600		6600	2.15	11600	3.00	16600	3.92
	0.95						
1700	0.98	6700	2.16	11700	3.02	16700	3.88
1800	1.01	6800	2.19	11800	3.04	16800	3.95
1900	1.04	6900	2.22	11900	3.08	16900	3.91
2000	1.07	7000	2.24	12000	3.09	17000	3.97
2100	1.09	7100	2.26	12100	3.12	17100	3.92
2200	1.13	7200	2.29	12200	3.13	17200	3.94
2300	1.15	7300	2.32	12300	3.16	17300	3.94
2400	1.18	7400	2.36	12400	3.17	17400	3.98
2500	1.21	7500	2.39	12500	3.19	17500	3.93
2600	1.24	7600	2.41	12600	3.20	17600	3.95
2700	1.27	7700	2.43	12700	3.21	17700	3.96
2800	1.30	7800	2.46	12800	3.21	17800	3.97
2900	1.34	7900	2.49	12900	3.22	17900	3.96
3000	1.36	8000	2.52	13000	3.22	18000	3.97
3100	1.38	8100	2.52	13100	3.24		
3200	1.41	8200	2.54	13200	3.24		
3300	1.45	8300	2.59	13300	3.27		
3400	1.46	8400	2.61	13400	3.28		
3500	1.49	8500	2.60	13500	3.31		
3600	1.51	8600	2.63	13600	3.31		
3700	1.55	8700	2.65	13700	3.35		
3800	1.34	8800	2.65	13800	3.37		
3900	1.36	8900	2.65	13900	3.40		
4000	1.38	9000	2.66	14000	3.43		
4100	1.41	9100	2.66	14100	3.45		
4200	1.45	9200	2.67	14200	3.46		
4300	1.46	9300	2.67	14300	3.46		
4400	1.49	9400	2.67	14400	3.49		
4500	1.51	9500	2.68	14500	3.50		1
4600	1.55	9600	2.69	14600	3.50		
4700	1.34	9700	2.69	14700	3.52		

Cable loss Test cable, Mini-Circuits, S/N 70045, 18 GHz, 1.8 m, SMA/M - N/M CBL-6FT-SMNM+, HL 4273



CBL-6FT-SMNM+, HL 4275							
Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.08	5000	1.71	10200	2.64	15400	3.46
30	0.11	5100	1.73	10300	2.65	15500	3.47
50	0.14	5200	1.75	10400	2.66	15600	3.52
100	0.21	5300	1.76	10500	2.67	15700	3.55
200	0.30	5400	1.77	10600	2.70	15800	3.55
300	0.37	5500	1.82	10700	2.71	15900	3.55
400	0.43	5600	1.84	10800	2.72	16000	3.61
500	0.49	5700	1.86	10900	2.73	16100	3.62
600	0.54	5800	1.86	11000	2.75	16200	3.63
700	0.58	5900	1.89	11100	2.77	16300	3.62
800	0.62	6000	1.94	11200	2.78	16400	3.66
900	0.66	6100	1.95	11300	2.80	16500	3.71
1000	0.70	6200	1.96	11400	2.82	16600	3.71
1100	0.74	6300	1.97	11500	2.83	16700	3.67
1200	0.78	6400	2.01	11600	2.84	16800	3.69
1300	0.81	6500	2.03	11700	2.86	16900	3.74
1400	0.84	6600	2.02	11800	2.88	17000	3.73
1500	0.88	6700	2.02	11900	2.89	17100	3.71
1600	0.91	6800	2.05	12000	2.90	17200	3.73
1700	0.94	6900	2.06	12100	2.92	17300	3.77
1800	0.97	7000	2.07	12200	2.93	17400	3.77
1900	1.00	7100	2.07	12300	2.94	17500	3.76
2000	1.02	7200	2.08	12400	2.96	17600	3.76
2100	1.05	7300	2.11	12500	2.98	17700	3.78
2200	1.07	7400	2.13	12600	2.99	17800	3.80
2300	1.10	7500	2.15	12700	3.01	17900	3.79
2400	1.13	7600	2.16	12800	3.03	18000	3.78
2500	1.15	7700	2.18	12900	3.05		
2600	1.18	7800	2.21	13000	3.07		
2700	1.20	7900	2.24	13100	3.09		
2800	1.24	8000	2.25	13200	3.12		
2900	1.26	8100	2.26	13300	3.13		
3000	1.28	8200	2.29	13400	3.14		
3100	1.30	8300	2.31	13500	3.16		
3200	1.33	8400	2.33	13600	3.18		
3300	1.36	8500	2.33	13700	3.19		
3400	1.37	8600	2.34	13800	3.21		
3500	1.39	8700	2.36	13900	3.23		
3600	1.42	8800	2.38	14000	3.25		
3700	1.45	8900	2.39	14100	3.26		
3800	1.46	9000	2.40	14200	3.27		
3900	1.48	9100	2.42	14300	3.30		
4000	1.50	9200	2.45	14400	3.32		
4100	1.53	9300	2.46	14500	3.33		
4200	1.55	9400	2.48	14600	3.34		
4300	1.57	9500	2.50	14700	3.36		
4400	1.59	9600	2.52	14800	3.39		
4500	1.61	9700	2.54	14900	3.40		
4600	1.64	9800	2.56	15000	3.41		
4700	1.66	9900	2.58	15100	3.41		
4800	1.67	10000	2.60	15200	3.44		
4900	1.69	10100	2.61	15300	3.46		

Cable loss Test cable, Mini-Circuits, S/N 70050, 18 GHz, 1.8 m, SMA/M - N/M CBL-6FT-SMNM+. HL 4275



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

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



13 APPENDIX F Abbreviations and acronyms

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

END OF DOCUMENT