



HERMON LABORATORIES



Electrical

Hermon Laboratories Ltd.
P.O.Box 23, Binyamina 30500, Israel
Tel. +972 4628 8001
Fax. +972 4628 8277
E-mail: mail@hermonlabs.com

TEST REPORT

ACCORDING TO: FCC part 90, subpart I and part 15, subpart B

FOR:

Telematics Wireless Ltd.

ASTM Reader

Model: FP-300RA

This report is in conformity with ISO/ IEC 17025. The A2LA logo endorsement applies only to the test methods and the standards 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.



Table of contents

- 1 Applicant information 3
- 2 Equipment under test attributes 3
- 3 Manufacturer information 3
- 4 Test details 3
- 5 Tests summary 4
- 6 EUT description 5
 - 6.1 General information 5
 - 6.2 Ports and lines 5
 - 6.3 Auxiliary equipment 5
 - 6.4 Changes made in the EUT 5
 - 6.5 Test configuration 5
 - 6.6 Transmitter characteristics 6
- 7 Transmitter tests according to FCC 47 CFR part 90 requirements 7
 - 7.1 Peak output power test 7
 - 7.2 Occupied bandwidth test 14
 - 7.3 Emission mask test 17
 - 7.4 Spurious emissions at RF antenna connector test 19
 - 7.5 Radiated spurious emission measurements 34
 - 7.6 Frequency stability test 61
- 8 Emissions tests according to FCC 47CFR part 15 subpart B requirements 63
 - 8.1 Conducted emissions 63
 - 8.2 Radiated emission measurements 70
 - 8.3 Spurious emissions at RF antenna connector 74
- 9 APPENDIX A Test equipment and ancillaries used for tests 77
- 10 APPENDIX B Measurement uncertainties 79
- 11 APPENDIX C Test facility description 80
- 12 APPENDIX D Specification references 80
- 13 APPENDIX E Abbreviations and acronyms 81
- 14 APPENDIX F Test equipment correction factors 82

1 Applicant information

Client name: Telematics Wireless Ltd.
Address: 26 Hamelaha, POB 1911, Holon, 58117, Israel
Telephone: +972 3557 5767
Fax: +972 3557 5753
E-mail: gyorak@tlmw.com
Contact name: Mr. Gyora Keydar

2 Equipment under test attributes

Product name: ASTM Reader
Model: FP-300RA
Receipt date: 7/7/2005

3 Manufacturer information

Manufacturer name: Telematics Wireless Ltd.
Address: 26 Hamelaha, POB 1911, Holon, 58117, Israel
Telephone: +972 3557 5767
Fax: +972 3557 5753
E-mail: gyorak@tlmw.com
Contact name: Mr. Gyora Keydar

4 Test details

Project ID: 16547
Location: Hermon Laboratories Ltd. P.O.Box 23, Binyamina 30500, Israel
Test started: 7/7/2005
Test completed: 7/18/2005
Test specifications: FCC part 90, subpart I; part 15, subpart B, §§15.107, 15.111, 15.109
Test suite: FCC_90_BS_with_RF_connector (3/2/2005 6:04:18 PM, modified)



5 Tests summary

Test	Status
Transmitter characteristics	
Section 90.205, Maximum output power	Pass
Section 90.209, Occupied bandwidth	Pass
Section 90.210, Emission mask	Pass
Section 90.210, Radiated spurious emissions	Pass
Section 90.210, Conducted spurious emissions	Pass
Section 90.213, Frequency stability	Tested with no limit
Section 90.214, Transient frequency behaviour	Not required
Section 2.1091, RF radiation exposure evaluation	Pass
Unintentional emissions	
Section 15.107, Conducted emission at AC power port, Class B	Pass
Section 15.109, Radiated emission, Class B	Pass
Section 15.111, Conducted emission at receiver antenna port	Pass

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

This test report replaces the previously issued test report identified by Doc. ID: TELRAD_FCC.16547.

	Name and Title	Date	Signature
Tested by:	Mr. A. Adelberg, test engineer	July 18, 2005	
Reviewed by:	Ms. N. Averin, certification engineer	August 17, 2005	
	Mr. M. Nikishin, EMC group leader	August 17, 2005	
Approved by:	Mr. A. Usoskin, C.E.O.	August 17, 2005	



6 EUT description

6.1 General information

The EUT is the roadside reader of a vehicle identification system, operating in 912 MHz - 918 MHz with ASK modulation and utilizing external antenna. Data bit rate is 500 kbps. The EUT is powered from 8 – 30 VDC sources including batteries.

During conducted emission test the EUT was powered from AC mains via AC/12 VDC adapter.

The frequencies generated or used in the EUT are: 50 kHz, 16 MHz (reference clock), 70 MHz (Tx IF), 422.5 MHz (Tx VCO), 925 MHz (Rx LO).

The conducted measurements were performed at “Ant main” port because of lesser attenuation from the RF amplifier output (connectors “Ant 1” – “Ant 4” can be used instead of “Ant main”, in this case the additional multiplexer is involved, as shown in RF switch block diagram attached to this Application).

6.2 Ports and lines

Port type	Port description	Connected		Connector type	Qty.	Cable type	Cable length
		From	To				
Power	DC power	EUT	DC PS / AC/DC adapter	DC IN 4 pin	1	Unshielded	1.5 m
Power	AC power	AC/DC adapter	AC mains	IEC 320	1	Unshielded	1 m
Signal	HOST (RS232)	EUT	Open circuit	D-type 9 pin	1	Unshielded	2 m
Signal	AUX (RS232/422)	EUT	Open circuit	D-type 9 pin	1	Unshielded	2 m
Signal	Maintenance (RS232)	EUT	PC	D-type 9 pin	1	Unshielded	2 m
Signal	I/O	EUT	Open circuit	D-type 25 pin	1	Unshielded	1 m
Signal	Antenna	EUT	50 Ohm termination	SMA	5	NA	NA

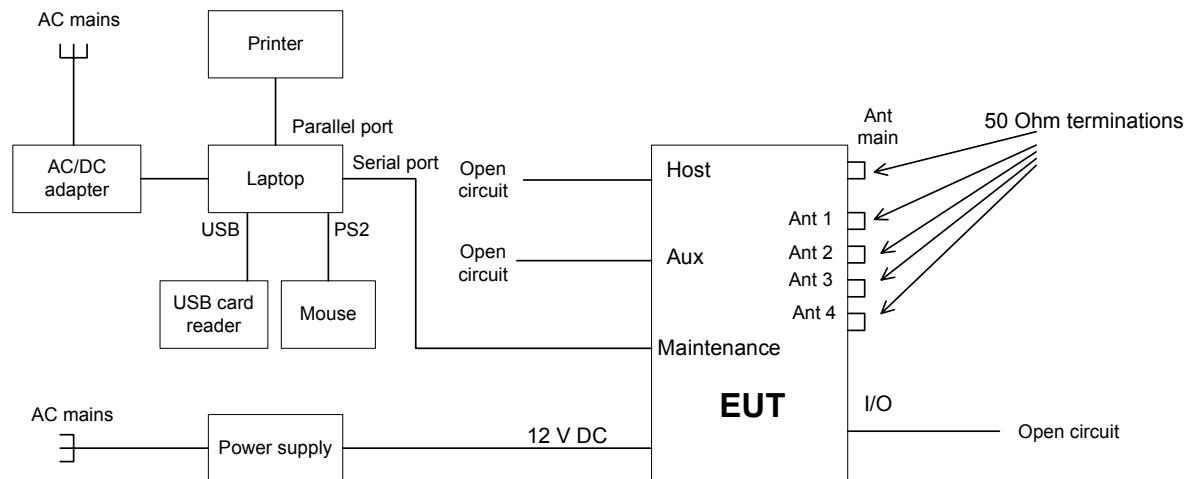
6.3 Auxiliary equipment

Description	Manufacturer	Model number	Serial number
Laptop	Toshiba	PA1262E	28012460
AC/DC adapter of laptop	Toshiba	PA2444U	0/44642
ITE power supply (AC/DC adapter for CE test)	Potrans Electrical Corp.	UP30437	1711-030-A
Printer	Epson	LX-810	44B1127035
Mouse	IBM	BH6690	06H4590
USB card reader	Delkin Devices	DDREADER-12	115700263

6.4 Changes made in the EUT

No changes were implemented.

6.5 Test configuration





6.6 Transmitter characteristics

Type of equipment						
X	Stand-alone (Equipment with or without its own control provisions)					
	Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)					
	Plug-in card (Equipment intended for a variety of host systems)					
Intended use		Condition of use				
X	fixed	Always at a distance more than 2 m from all people				
	mobile	Always at a distance more than 20 cm from all people				
	portable	May operate at a distance closer than 20 cm to human body				
Assigned frequency range		902 - 928 MHz				
Operating frequencies		912 MHz - 918 MHz				
RF channel spacing		100 kHz				
Maximum rated output power		At transmitter 50 Ω RF output connector			31.17 dBm	
		Effective radiated power (for equipment with no RF connector)			dBm	
Is transmitter output power variable?		No				
		continuous variable				
		X	Yes	stepped variable with stepsize		1 dB
				minimum RF power		1.17 dBm
		maximum RF power		31.17 dBm		
Antenna connection						
unique coupling	X	standard connector	integral	with temporary RF connector		
				without temporary RF connector		
Antenna/s technical characteristics						
Type	Manufacturer		Model number		Gain	
Flat	OR ANTENNA		OR-900-930-8		8 dB	
Transmitter 99% power bandwidth		2.575 MHz				
Transmitter aggregate data rate/s		0.5 Mbps				
Type of modulation		ASK				
Modulating test signal (baseband)		PRBS				
Maximum transmitter duty cycle in normal use		12 %	Tx ON time	1.2 ms	Period	
Transmitter duty cycle supplied for test		12.5 %	Tx ON time	10 ms	Period	
Transmitter power source						
	Battery	Nominal rated voltage	VDC	Battery type		
X	DC	Nominal rated voltage	12 VDC			
	AC mains	Nominal rated voltage	VAC	Frequency	Hz	
Common power source for transmitter and receiver		X	yes	no		
Emission designator		2M575K1D				



Test specification:	Section 90.205, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 11:22:49 AM		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 12 VDC
Remarks:			

7 Transmitter tests according to FCC 47 CFR 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. The test results are provided in Table 7.1.2 and the associated plots.

Table 7.1.1 Peak output power limits

Assigned frequency range, MHz	Maximum peak output power	
	W	dBm
902 - 928	30	44.7

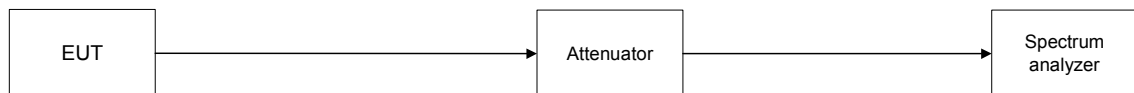
7.1.2 Test procedure

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 spectrum analyzer as provided in Table 7.1.2 and associated plots.

Figure 7.1.1 Peak output power test setup





Test specification:	Section 90.205, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 11:22:49 AM		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 12 VDC
Remarks:			

Table 7.1.2 Peak output power test results

ASSIGNED FREQUENCY RANGE: 902 - 928 MHz
DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 2000 kHz
VIDEO BANDWIDTH: 3000 kHz
MODULATION: ASK
MODULATING SIGNAL: PRBS
BIT RATE: 0.5 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Carrier frequency, MHz	Spectrum analyzer reading, dBm	External attenuation, dB	Cable loss, dB	RF output power, dBm	Limit, dBm	Margin, dB	Verdict
912	30.83	Included	Included	30.83	44.70	-13.87	Pass
915	31.17	Included	Included	31.17	44.70	-13.53	Pass
918	30.83	Included	Included	30.83	44.70	-13.87	Pass

Reference numbers of test equipment used

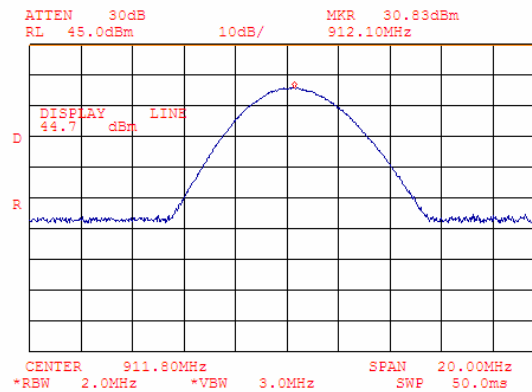
HL 1424	HL 2399	HL 2524					
---------	---------	---------	--	--	--	--	--

Full description is given in Appendix A.

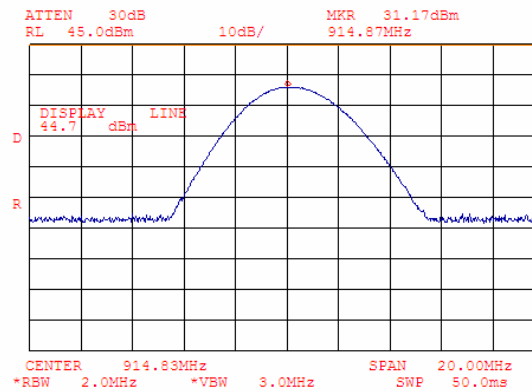


Test specification:	Section 90.205, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 11:22:49 AM		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 12 VDC
Remarks:			

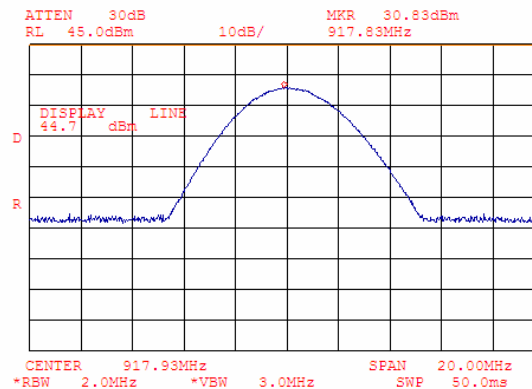
Plot 7.1.1 Peak output power test results at main antenna at low carrier frequency



Plot 7.1.2 Peak output power test results at main antenna at mid carrier frequency



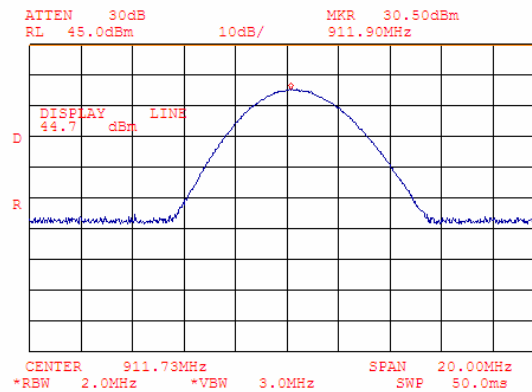
Plot 7.1.3 Peak output power test results at main antenna at high carrier frequency



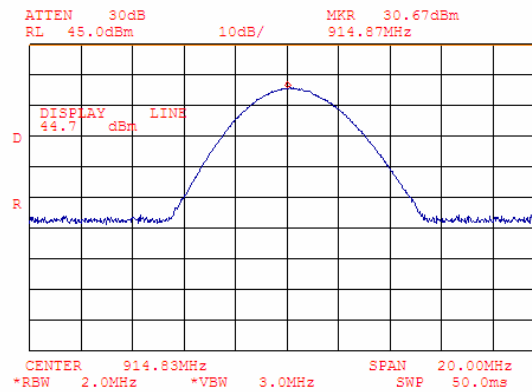


Test specification:	Section 90.205, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 11:22:49 AM		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 12 VDC
Remarks:			

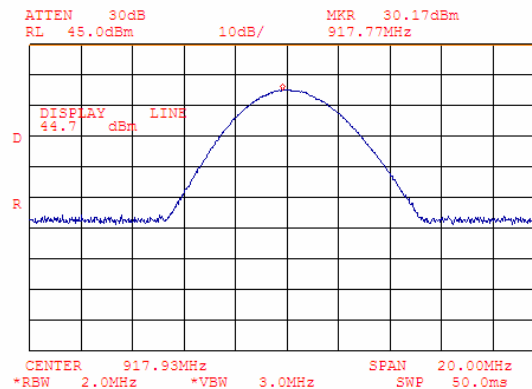
Plot 7.1.4 Peak output power test results at antenna No.1 at low carrier frequency



Plot 7.1.5 Peak output power test results at antenna No.1 at mid carrier frequency



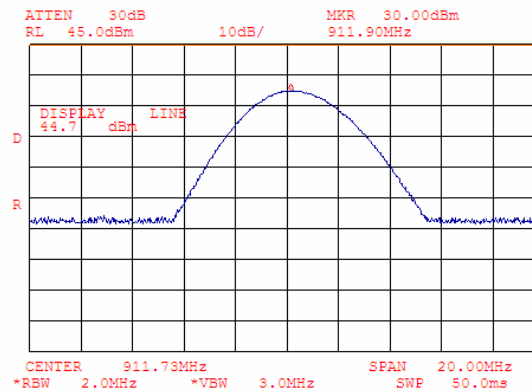
Plot 7.1.6 Peak output power test results at antenna No.1 at high carrier frequency



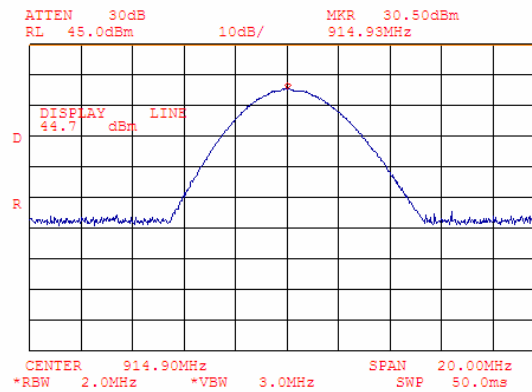


Test specification:	Section 90.205, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 11:22:49 AM		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 12 VDC
Remarks:			

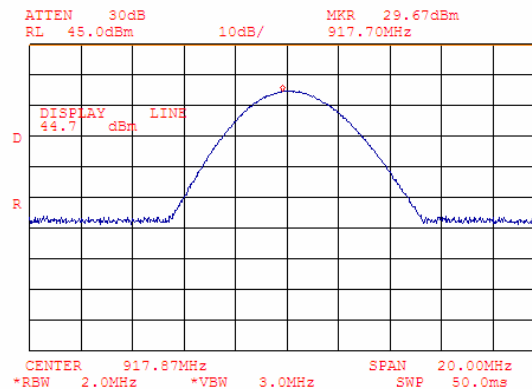
Plot 7.1.7 Peak output power test results at antenna No.2 at low carrier frequency



Plot 7.1.8 Peak output power test results at antenna No.2 at mid carrier frequency



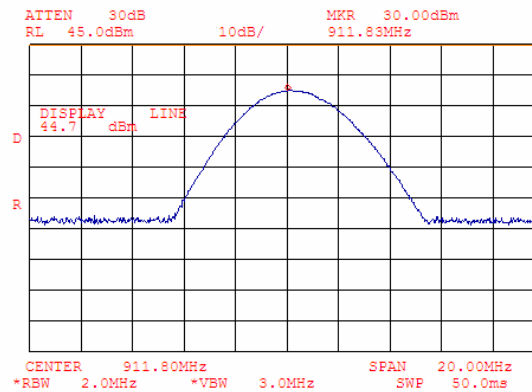
Plot 7.1.9 Peak output power test results at antenna No.2 at high carrier frequency



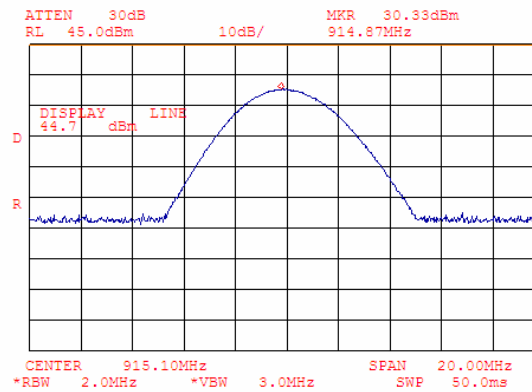


Test specification:	Section 90.205, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 11:22:49 AM		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 12 VDC
Remarks:			

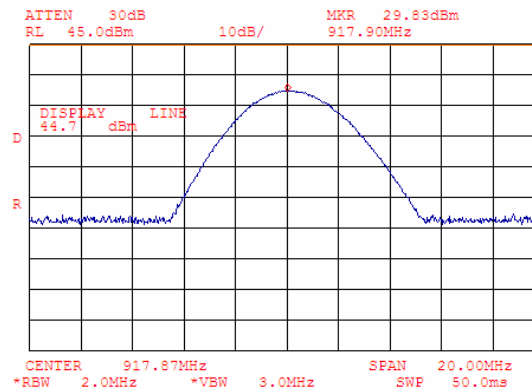
Plot 7.1.10 Peak output power test results at antenna No.3 at low carrier frequency



Plot 7.1.11 Peak output power test results at antenna No.3 at mid carrier frequency



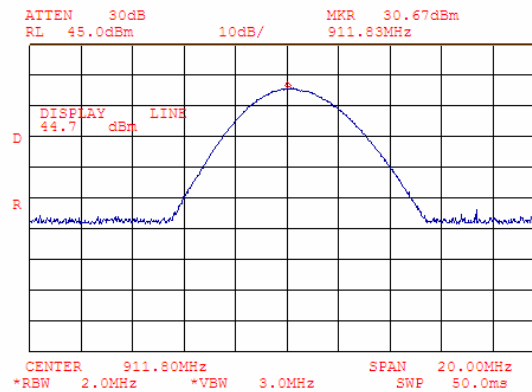
Plot 7.1.12 Peak output power test results at antenna No.3 at high carrier frequency



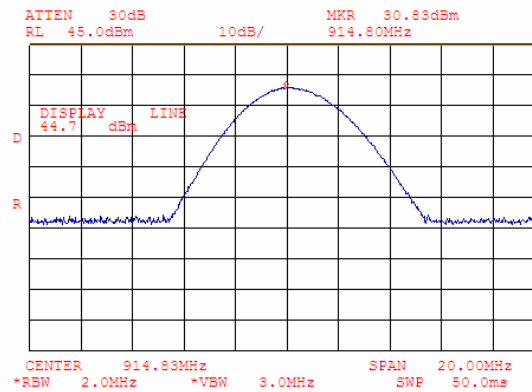


Test specification:	Section 90.205, Maximum output power		
Test procedure:	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 11:22:49 AM		
Temperature: 24 °C	Air Pressure: 1011 hPa	Relative Humidity: 46 %	Power Supply: 12 VDC
Remarks:			

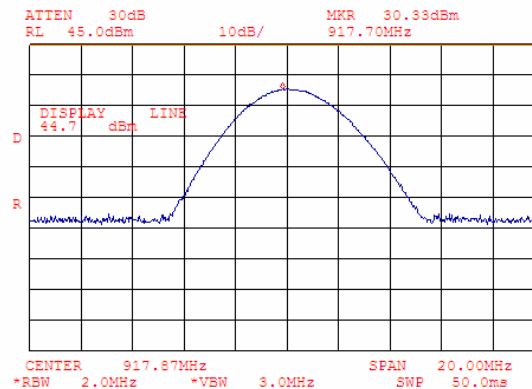
Plot 7.1.13 Peak output power test results at antenna No.4 at low carrier frequency



Plot 7.1.14 Peak output power test results at antenna No.4 at mid carrier frequency



Plot 7.1.15 Peak output power test results at antenna No.4 at high carrier frequency





Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 11:57:06 AM		
Temperature: 24 °C	Air Pressure: 1010 hPa	Relative Humidity: 43 %	Power Supply: 12 VDC
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. The test results are provided in Table 7.2.2 and the associated plots.

Table 7.2.1 Occupied bandwidth limits

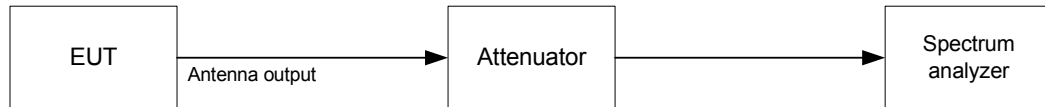
Assigned frequency, MHz	Modulation envelope reference points*, dBc	Maximum allowed bandwidth, MHz
902 - 928	26	12

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

7.2.2 Test procedure

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

Figure 7.2.1 Occupied bandwidth test setup





Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 11:57:06 AM		
Temperature: 24 °C	Air Pressure: 1010 hPa	Relative Humidity: 43 %	Power Supply: 12 VDC
Remarks:			

Table 7.2.2 Occupied bandwidth test results

MODE OF OPERATION: Continuous transmission
DETECTOR USED: Peak hold
RESOLUTION BANDWIDTH: 30 kHz*
VIDEO BANDWIDTH: 100 kHz
MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
MODULATION: ASK
MODULATING SIGNAL: PRBS
BIT RATE: 500 kbps

Carrier frequency, MHz	Occupied bandwidth, MHz	Limit, MHz	Margin, MHz	Verdict
912	2.550	12.0	-9.450	Pass
915	2.550	12.0	-9.450	Pass
918	2.575	12.0	-9.425	Pass

* RBW > 1% of OBW, if 1% of 2.6 MHz is 26 kHz, then RBW = 30 kHz

Reference numbers of test equipment used

HL 1653	HL 2399	HL 2524					
---------	---------	---------	--	--	--	--	--

Full description is given in Appendix A.



Test specification:	Section 90.209, Occupied bandwidth		
Test procedure:	47 CFR, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 11:57:06 AM		
Temperature: 24 °C	Air Pressure: 1010 hPa	Relative Humidity: 43 %	Power Supply: 12 VDC
Remarks:			

Plot 7.2.1 Occupied bandwidth test result at low carrier frequency



Plot 7.2.2 Occupied bandwidth test result at mid carrier frequency



Plot 7.2.3 Occupied bandwidth test result at high carrier frequency





Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 11:19:07 AM		
Temperature: 23 °C	Air Pressure: 1010 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
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. The test results are provided in Table 7.3.2 and the associated plots.

Table 7.3.1 Emission mask limits

Frequency displacement from carrier	Attenuation below carrier, dBc
Emission mask K (3)	
0 – 12.0 MHz	0
More than 12.0 MHz	55+10logP(W)

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 associated plots.

Figure 7.3.1 Emission mask test setup

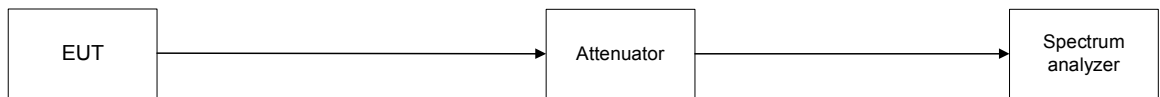


Table 7.3.2 Emission mask test results

ASSIGNED FREQUENCY RANGE: 902 - 928 MHz
DETECTOR USED: Peak
MODULATION: ASK
MODULATING SIGNAL: PRBS
BIT RATE: 0.5 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Carrier frequency, MHz	Limit	Verdict
912	Emission mask K	Pass
915		
918		

Reference numbers of test equipment used

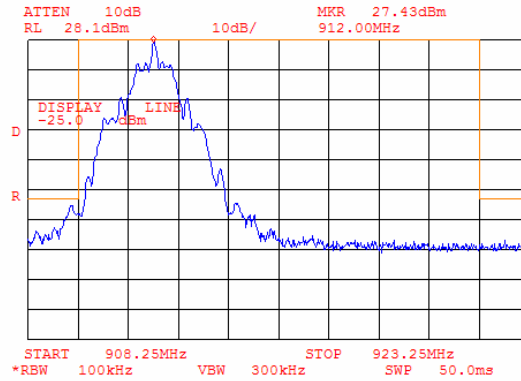
HL 1424	HL 2399	HL 2524				
---------	---------	---------	--	--	--	--

Full description is given in Appendix A.



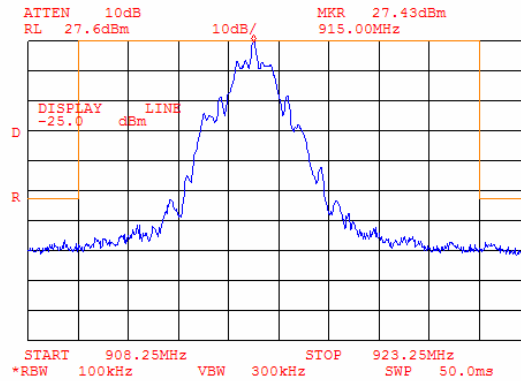
Test specification:	Section 90.210, Emission mask		
Test procedure:	47 CFR, Sections 2.1051, 2.1047 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 11:19:07 AM		
Temperature: 23 °C	Air Pressure: 1010 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks:			

Plot 7.3.1 Emission mask test results at low carrier frequency



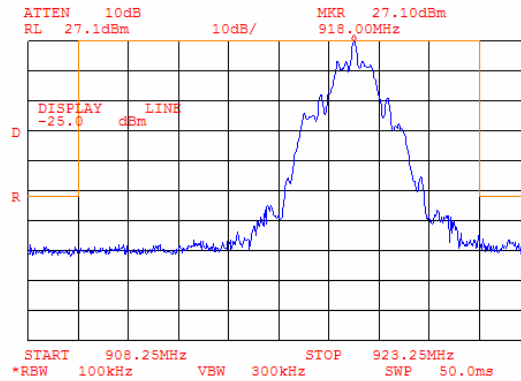
Attenuation below carrier: $55 + 10 \log P(W) = 55.83$ (dBc)

Plot 7.3.2 Emission mask test results at mid carrier frequency



Attenuation below carrier: $55 + 10 \log P(W) = 56.17$ (dBc)

Plot 7.3.3 Emission mask test results at high carrier frequency



Attenuation below carrier: $55 + 10 \log P(W) = 55.83$ (dBc)



Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 1:14:02 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 47 %	Power Supply: 12 VDC
Remarks:			

7.4 Spurious emissions at RF antenna connector test

7.4.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 7.4.1. The test results are provided in Table 7.4.2 and associated plots.

Table 7.4.1 Spurious emission limits

Frequency, MHz	Attenuation below carrier, dBc	ERP of spurious, dBm
0.009 – 10 th harmonic*	55+10logP** (mask K(3))	-25.0

* - 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

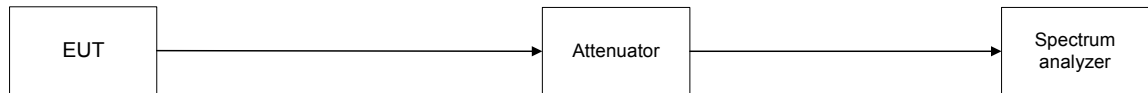
7.4.2 Test procedure

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

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

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

Figure 7.4.1 Spurious emission at RF antenna connector test setup





Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 1:14:02 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 47 %	Power Supply: 12 VDC
Remarks:			

Table 7.4.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 902 - 928 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 10000 MHz
 DETECTOR USED: Peak
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 MODULATION: ASK
 MODULATING SIGNAL: PRBS
 BIT RATE: 0.5 Mbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 TRANSMITTER OUTPUT POWER: 30.83 dBm at low carrier frequency
 31.17 dBm at mid carrier frequency
 30.83 dBm at high carrier frequency

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict
Low carrier frequency									
0.249	-41.00	Included	Included	10	-41.00	71.83	55.83	16.00	Pass
0.842	-36.79	Included	Included	100	-36.79	67.62	55.83	11.79	Pass
0.614	-39.42	Included	Included	100	-39.42	70.25	55.83	14.42	Pass
0.925	-26.96	Included	Included	100	-26.96	57.79	55.83	1.96	Pass
1824.000	-36.74	Included	Included	100	-36.74	67.57	55.83	11.74	Pass
2735.975	-42.90	Included	Included	100	-42.90	73.73	55.83	17.90	Pass
Mid carrier frequency									
0.249	-40.83	Included	Included	10	-40.83	72.00	56.17	15.83	Pass
0.845	-34.53	Included	Included	100	-34.53	65.70	56.17	9.53	Pass
0.612	-39.86	Included	Included	100	-39.86	71.03	56.17	14.86	Pass
0.925	-27.58	Included	Included	100	-27.58	58.75	56.17	2.58	Pass
1830.000	-36.87	Included	Included	100	-36.87	68.04	56.17	11.87	Pass
2744.987	-43.34	Included	Included	100	-43.34	74.51	56.17	18.34	Pass
High carrier frequency									
0.250	-41.33	Included	Included	10	-41.33	72.16	55.83	16.33	Pass
0.848	-32.31	Included	Included	100	-32.31	63.14	55.83	7.31	Pass
0.615	-39.67	Included	Included	100	-39.67	70.50	55.83	14.67	Pass
0.925	-27.87	Included	Included	100	-27.87	58.70	55.83	2.87	Pass
1836.000	-37.77	Included	Included	100	-37.77	68.60	55.83	12.77	Pass
2754.075	-43.63	Included	Included	100	-43.63	74.46	55.83	18.63	Pass

*- Margin = Attenuation below carrier – specification limit.

Reference numbers of test equipment used

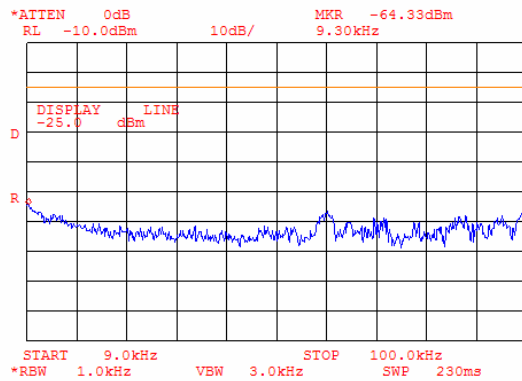
HL 1424	HL 2399	HL 2524				
---------	---------	---------	--	--	--	--

Full description is given in Appendix A.

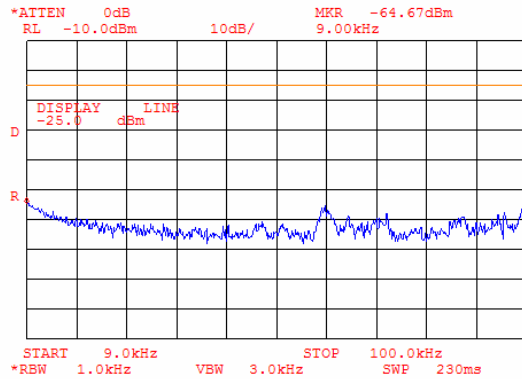


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 1:14:02 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 47 %	Power Supply: 12 VDC
Remarks:			

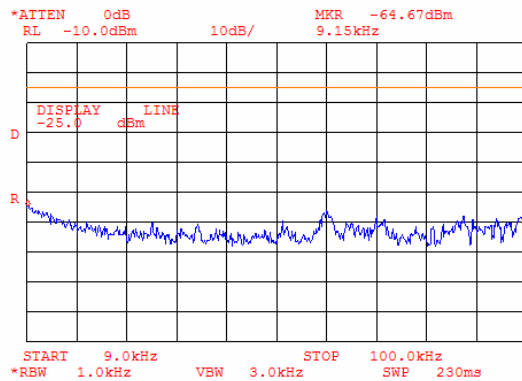
Plot 7.4.1 Spurious emission measurements in 9 - 100 kHz range at low carrier frequency



Plot 7.4.2 Spurious emission measurements in 9 - 100 kHz range at mid carrier frequency



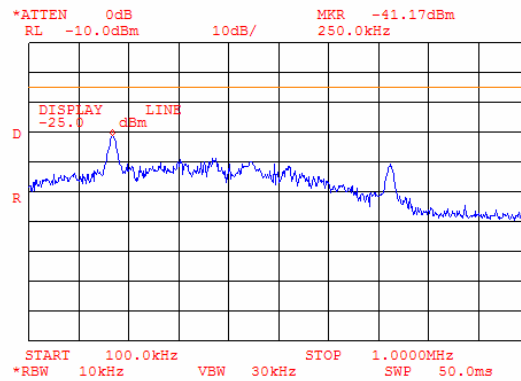
Plot 7.4.3 Spurious emission measurements in 9 - 100 kHz range at high carrier frequency





Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 1:14:02 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 47 %	Power Supply: 12 VDC
Remarks:			

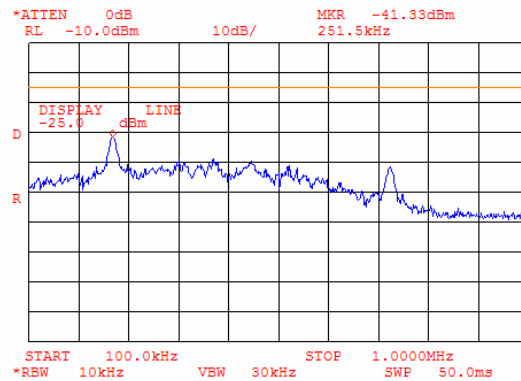
Plot 7.4.4 Spurious emission measurements in 0.10 - 1.0 MHz range at low carrier frequency



Plot 7.4.5 Spurious emission measurements in 0.10 - 1.0 MHz range at mid carrier frequency



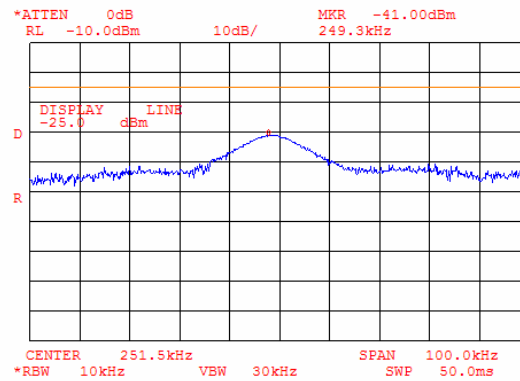
Plot 7.4.6 Spurious emission measurements in 0.10 - 1.0 MHz range at high carrier frequency



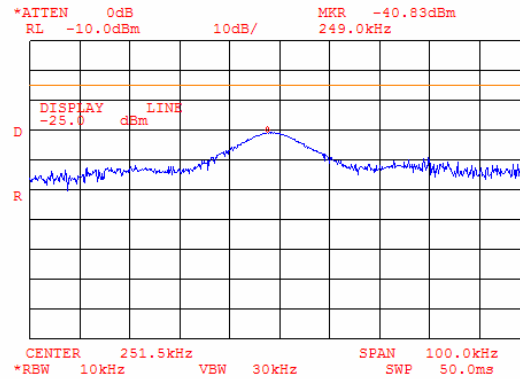


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 1:14:02 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 47 %	Power Supply: 12 VDC
Remarks:			

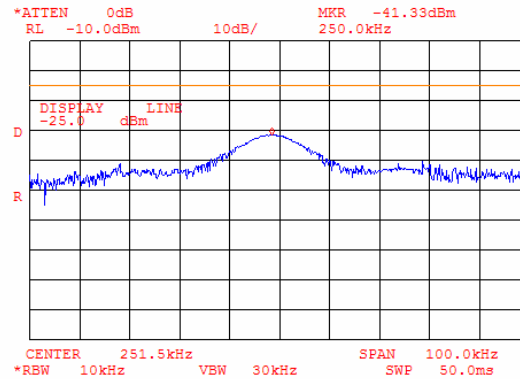
Plot 7.4.7 Spurious emission measurement at 250 kHz at low carrier frequency



Plot 7.4.8 Spurious emission measurement at 250 kHz at mid carrier frequency



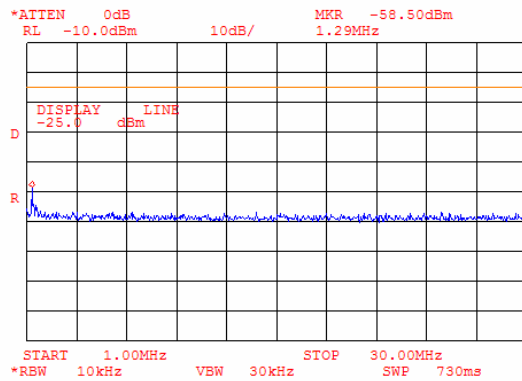
Plot 7.4.9 Spurious emission measurement at 250 kHz at high carrier frequency



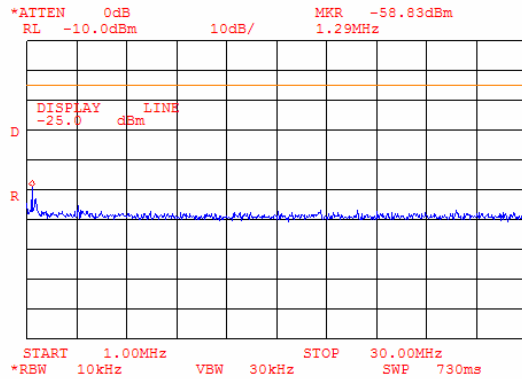


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 1:14:02 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 47 %	Power Supply: 12 VDC
Remarks:			

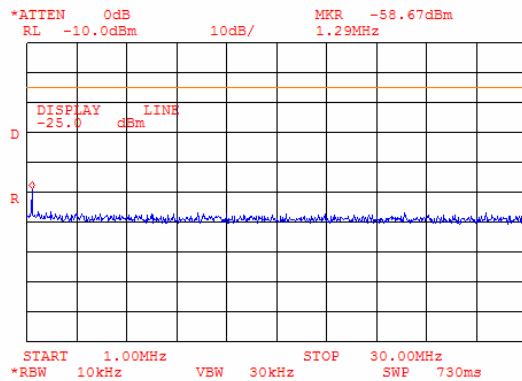
Plot 7.4.10 Spurious emission measurements in 1.0 - 30 MHz range at low carrier frequency



Plot 7.4.11 Spurious emission measurements in 1.0 - 30 MHz range at mid carrier frequency



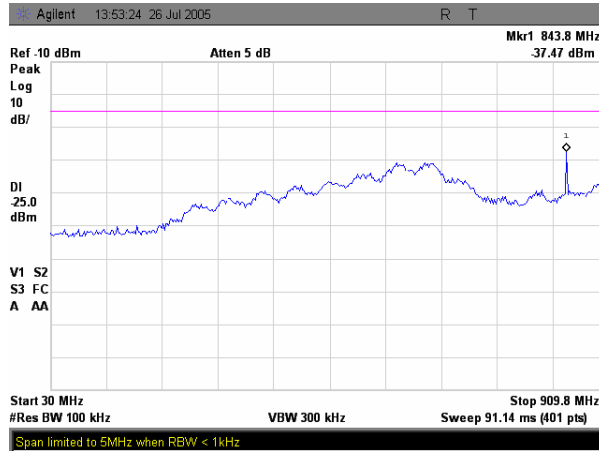
Plot 7.4.12 Spurious emission measurements in 1.0 - 30 MHz range at high carrier frequency



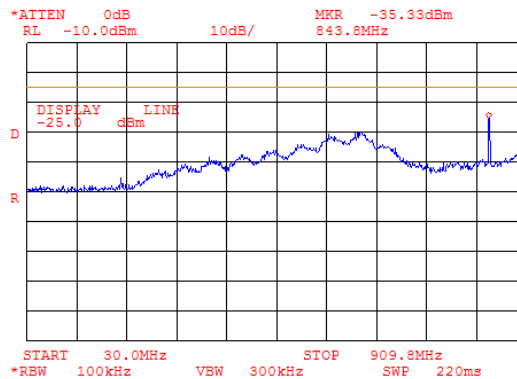


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 1:14:02 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 47 %	Power Supply: 12 VDC
Remarks:			

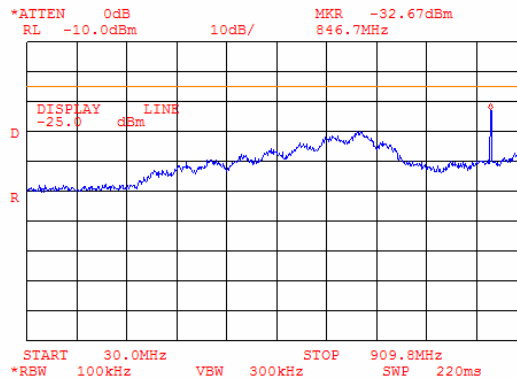
Plot 7.4.13 Spurious emission measurements in 30 – 909.75 MHz range at low carrier frequency



Plot 7.4.14 Spurious emission measurements in 30 – 909.8 MHz range at mid carrier frequency



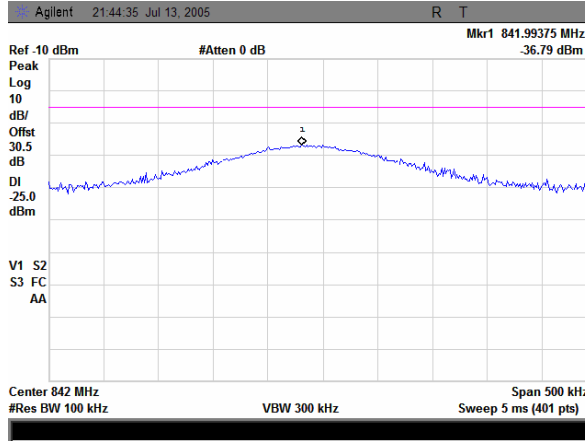
Plot 7.4.15 Spurious emission measurements in 30 – 909.8 MHz range at high carrier frequency



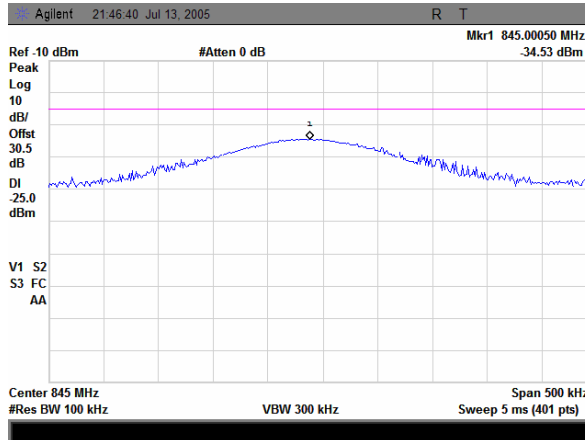


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 1:14:02 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 47 %	Power Supply: 12 VDC
Remarks:			

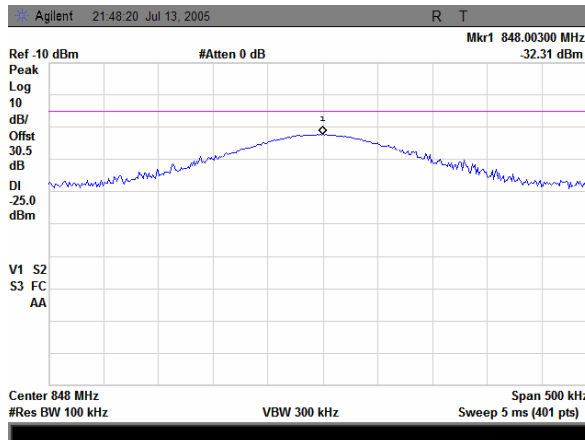
Plot 7.4.16 Spurious emission measurement at 842 MHz at low carrier frequency



Plot 7.4.17 Spurious emission measurement at 845 MHz at mid carrier frequency



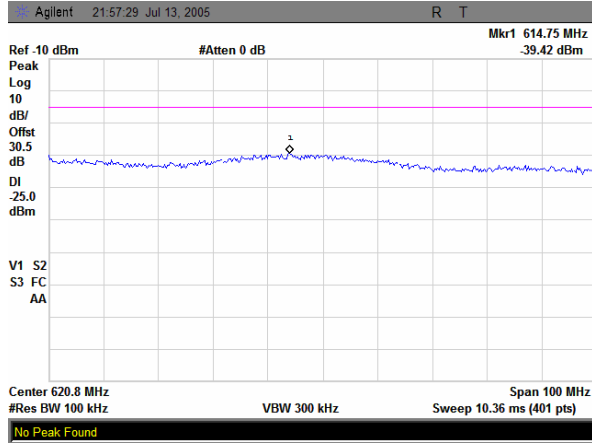
Plot 7.4.18 Spurious emission measurement at 848 MHz at high carrier frequency



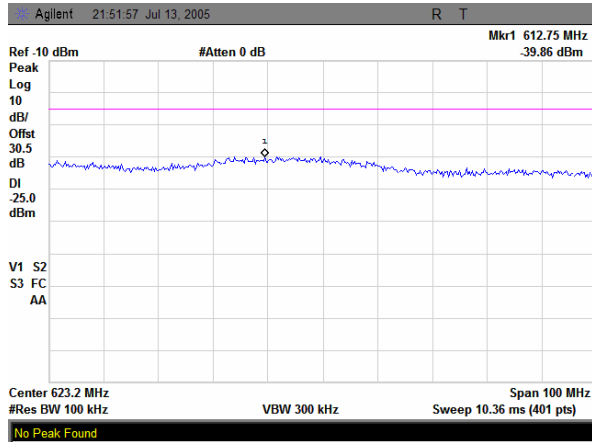


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 1:14:02 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 47 %	Power Supply: 12 VDC
Remarks:			

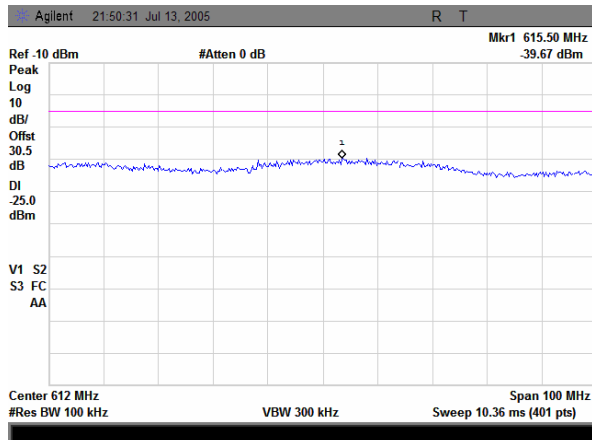
Plot 7.4.19 Spurious emission measurement at 614 MHz at low carrier frequency



Plot 7.4.20 Spurious emission measurement at 612 MHz at mid carrier frequency



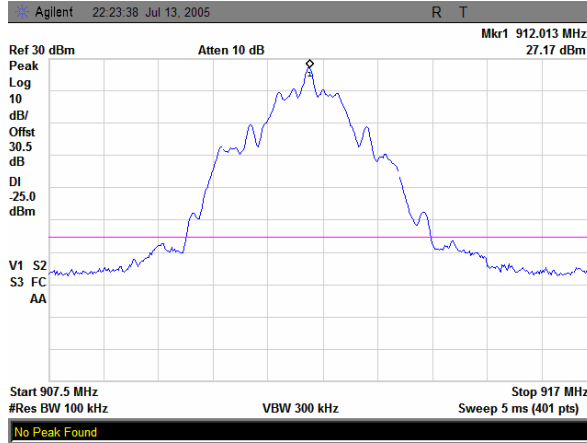
Plot 7.4.21 Spurious emission measurement at 615 MHz at high carrier frequency





Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 1:14:02 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 47 %	Power Supply: 12 VDC
Remarks:			

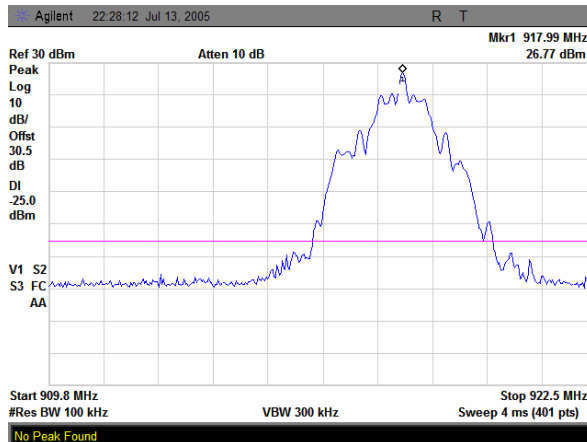
Plot 7.4.22 Spurious emission measurements in 907.5 – 917 MHz range at low carrier frequency



Plot 7.4.23 Spurious emission measurements in 909.8 – 919.5 MHz range at mid carrier frequency



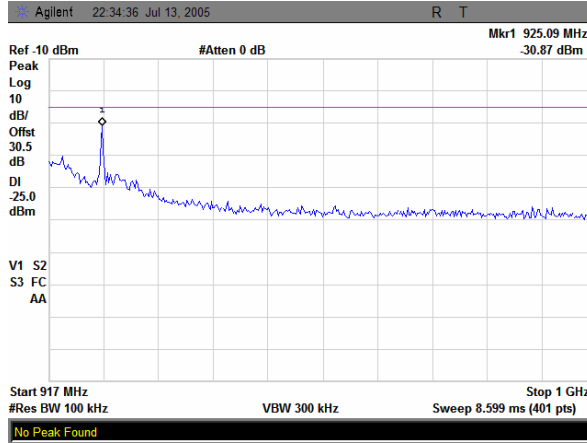
Plot 7.4.24 Spurious emission measurements in 909.8 – 922.5 MHz range at high carrier frequency



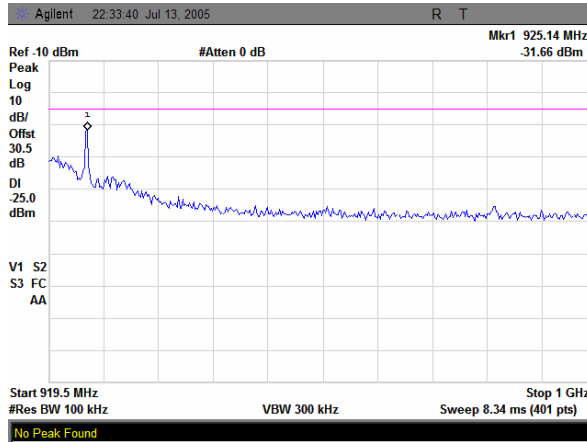


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 1:14:02 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 47 %	Power Supply: 12 VDC
Remarks:			

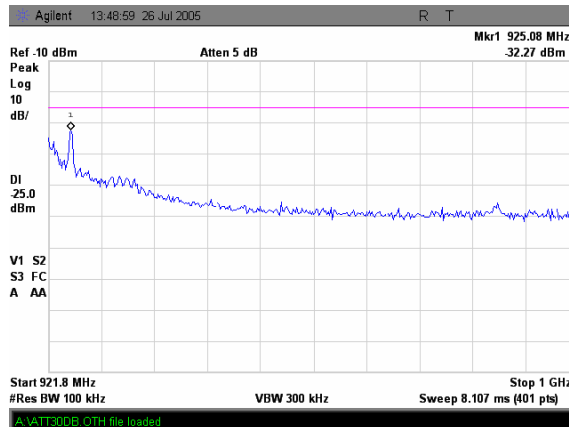
Plot 7.4.25 Spurious emission measurements in 917 – 1000 MHz range at low carrier frequency



Plot 7.4.26 Spurious emission measurements in 919.5 – 1000 MHz range at mid carrier frequency



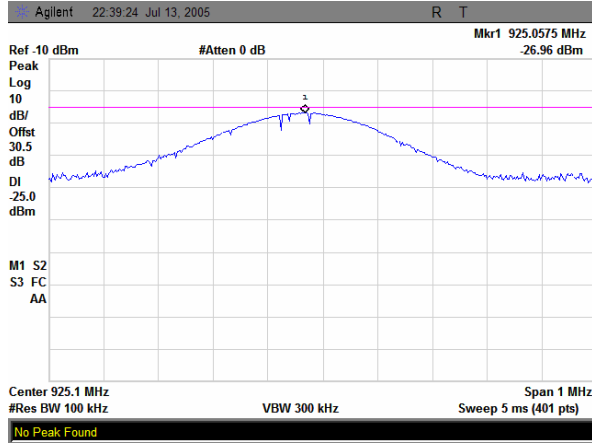
Plot 7.4.27 Spurious emission measurements in 921.75 – 1000 MHz range at high carrier frequency



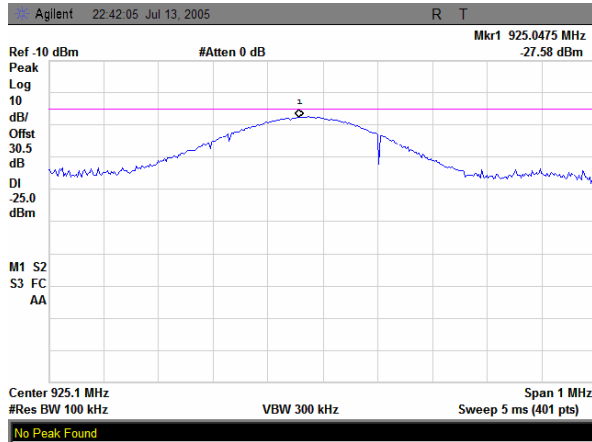


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 1:14:02 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 47 %	Power Supply: 12 VDC
Remarks:			

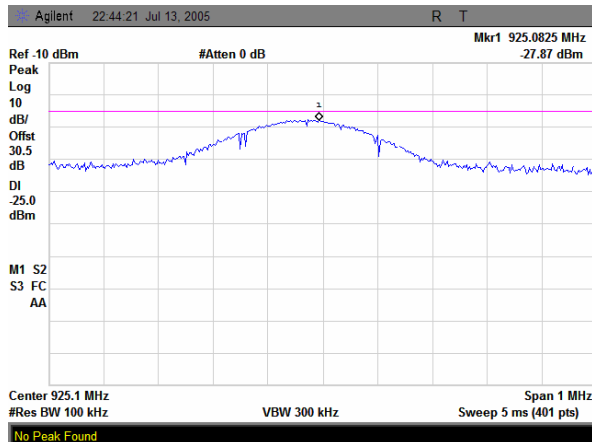
Plot 7.4.28 Spurious emission measurement at 925 MHz at low carrier frequency



Plot 7.4.29 Spurious emission measurement at 925 MHz at mid carrier frequency



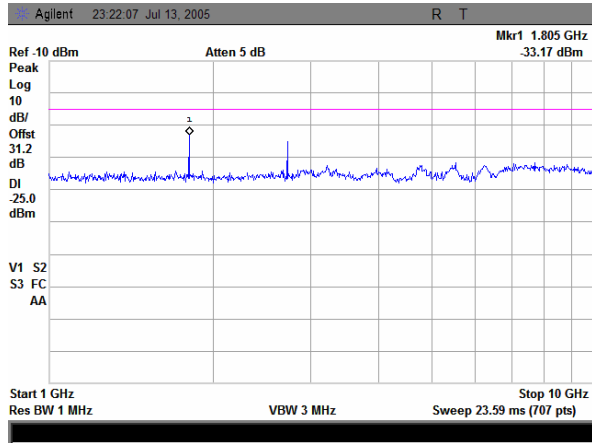
Plot 7.4.30 Spurious emission measurement at 925 MHz at high carrier frequency



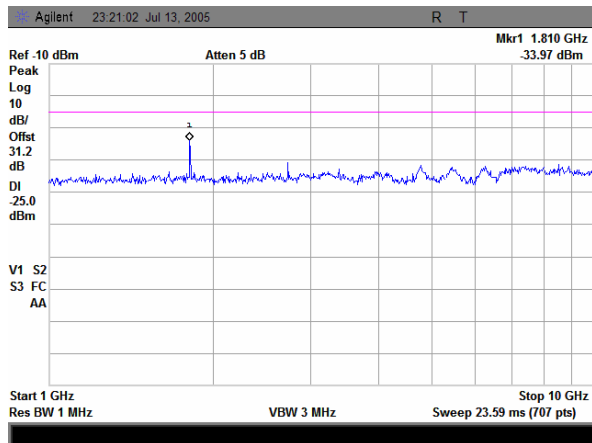


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 1:14:02 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 47 %	Power Supply: 12 VDC
Remarks:			

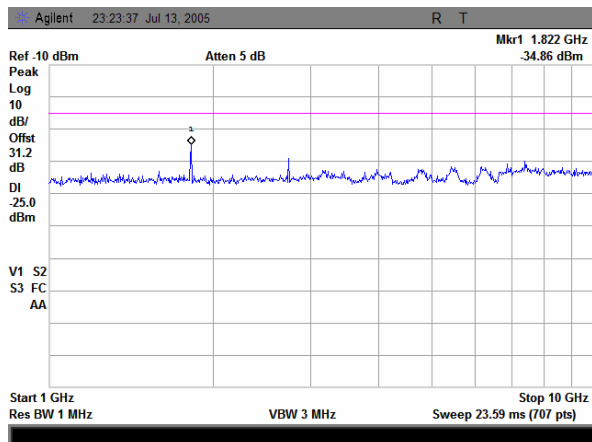
Plot 7.4.31 Spurious emission measurements in 1000 - 10000 MHz range at low carrier frequency



Plot 7.4.32 Spurious emission measurements in 1000 - 10000 MHz at mid carrier frequency



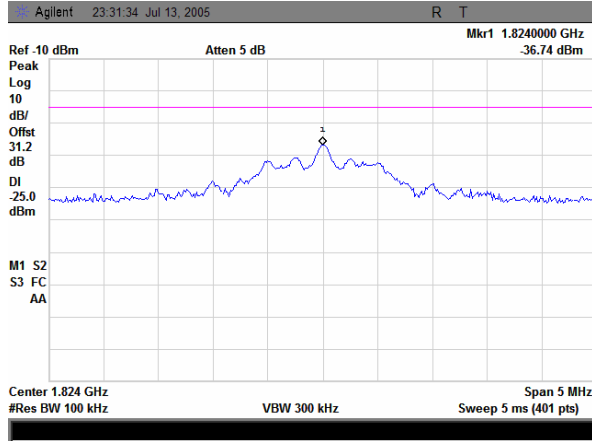
Plot 7.4.33 Spurious emission measurements in 1000 - 10000 MHz at high carrier frequency



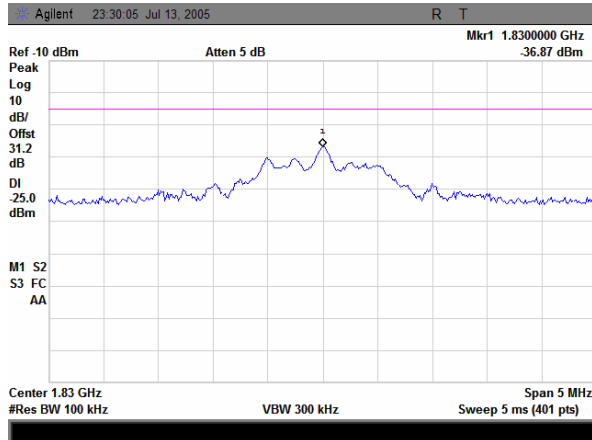


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 1:14:02 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 47 %	Power Supply: 12 VDC
Remarks:			

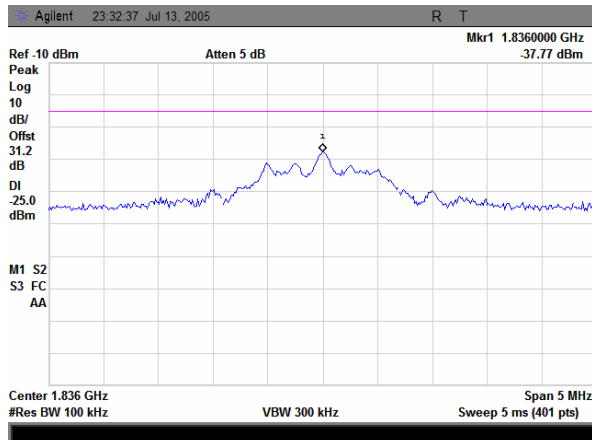
Plot 7.4.34 Conducted spurious emission measurements at the 2nd harmonic of low carrier frequency



Plot 7.4.35 Conducted spurious emission measurements at the 2nd harmonic of mid carrier frequency



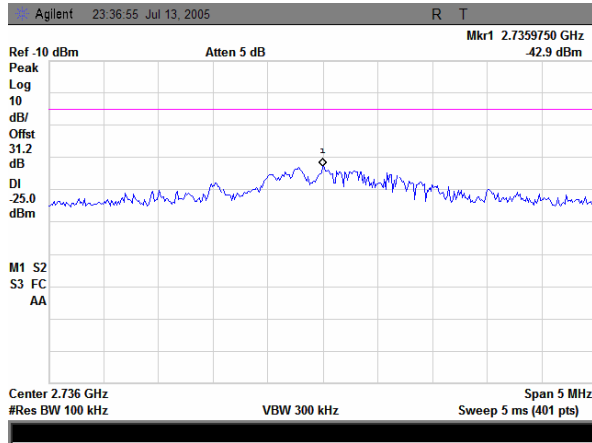
Plot 7.4.36 Conducted spurious emission measurements at the 2nd harmonic of high carrier frequency



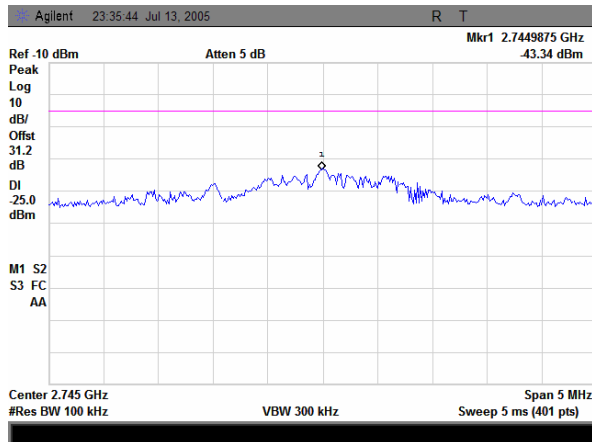


Test specification:	Section 90.210, Conducted spurious emissions		
Test procedure:	47 CFR, Sections 2.1051 and 90.210(m); TIA/EIA-603-A, Section 2.2.13		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 1:14:02 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 47 %	Power Supply: 12 VDC
Remarks:			

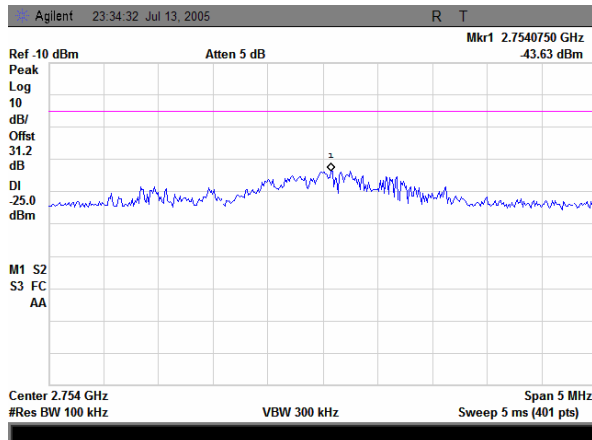
Plot 7.4.37 Conducted spurious emission measurements at the 3rd harmonic of low carrier frequency



Plot 7.4.38 Conducted spurious emission measurements at the 3rd harmonic of mid carrier frequency



Plot 7.4.39 Conducted spurious emission measurements at the 3rd harmonic of high carrier frequency





Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

7.5 Radiated spurious emission measurements

7.5.1 General

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

Table 7.5.1 Radiated spurious emission test limits

Frequency, MHz	Attenuation below carrier, dBc	ERP of spurious, dBm	Equivalent field strength limit @ 3m, dB(μ V/m) ^{***}
0.009 – 10 th harmonic*	55+10logP ^{**}	-25	72.4

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

** - P is transmitter output power in Watts

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

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

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

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

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

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

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

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

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

7.5.4 Test procedure for substitution ERP measurements of spurious

7.5.4.1 The test equipment was set up as shown in Figure 7.5.3 and energized.

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

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

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

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

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

7.5.4.7 The worst test results (the lowest margins) were recorded in Table 7.5.3 and shown in the associated plots.



Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

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

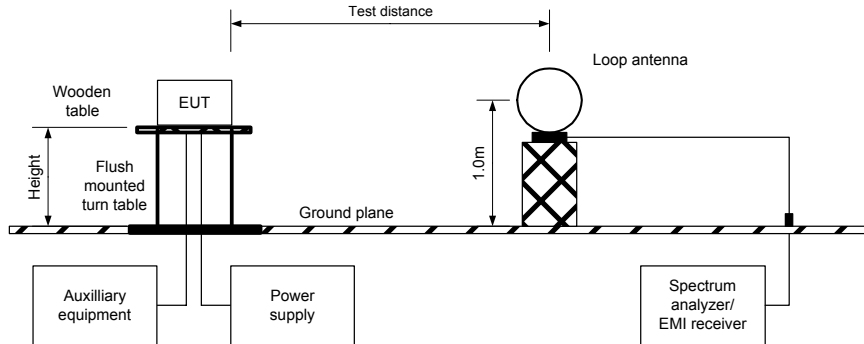
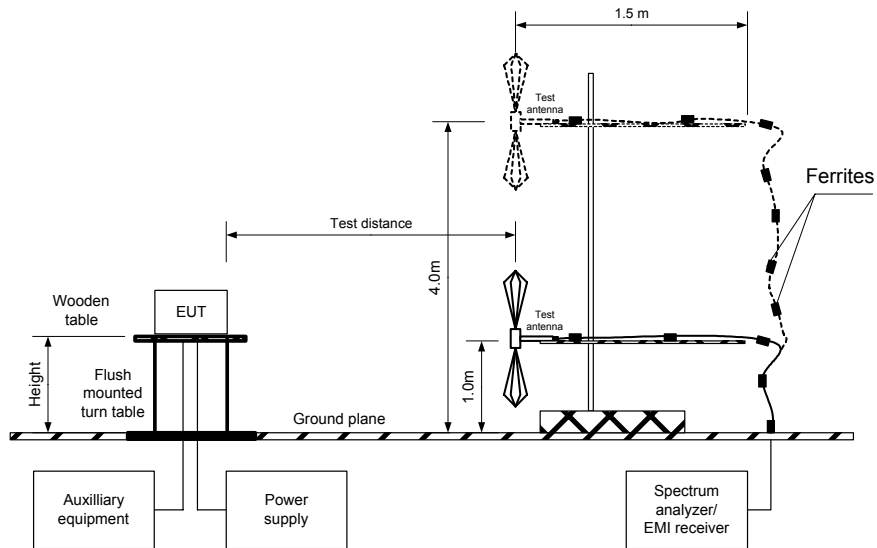


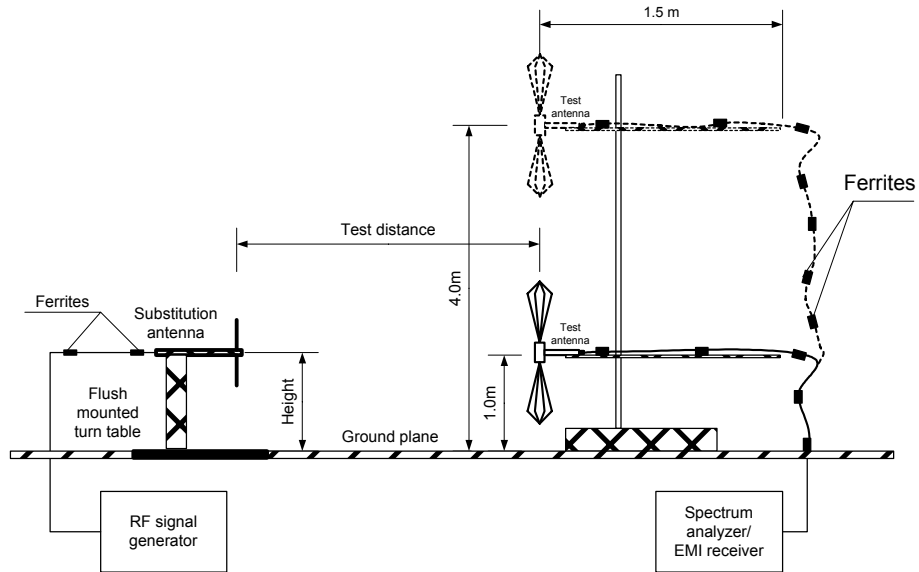
Figure 7.5.2 Setup for spurious emission field strength measurements above 30 MHz





Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

Figure 7.5.3 Setup for substitution ERP measurements of spurious





Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

Table 7.5.2 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE: 902 - 928 MHz
TEST DISTANCE: 3 m
TEST SITE: Semi anechoic chamber / OATS
EUT HEIGHT: 0.8 m
INVESTIGATED FREQUENCY RANGE: 0.009 – 10000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: > Resolution bandwidth
TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
Biconilog (30 MHz – 1000 MHz)
Double ridged guide (above 1000 MHz)

MODULATION: ASK
MODULATING SIGNAL: PRBS
BIT RATE: 0.5 Mbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	Field strength, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	RBW, kHz	Antenna polarization	Antenna height, m	Turn-table position**, degrees
Low carrier frequency							
2736.200	51.50	72.4	-20.9	1000	Vertical	1.1	118
Mid carrier frequency							
2745.130	53.00	72.4	-19.4	1000	Vertical	1.0	133
High carrier frequency							
2754.320	51.00	72.4	-21.4	1000	Vertical	1.0	129

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

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

Table 7.5.3 Substitution ERP of spurious test results

ASSIGNED FREQUENCY RANGE: 902 - 928 MHz
TRANSMITTER CARRIER ERP: 30.83 dBm at low frequency
31.17 dBm at mid frequency
30.83 dBm at high frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
SUBSTITUTION ANTENNA HEIGHT: 0.8 m
DETECTOR USED: Peak
VIDEO BANDWIDTH: > Resolution bandwidth
SUBSTITUTION ANTENNA TYPE: Double ridged guide (above 1000 MHz)

Frequency, MHz	Field strength, dB(μV/m)	RBW, kHz	Antenna polarization	RF generator output, dBm	Ant gain, dBd	Cable loss, dB	ERP, dBm	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict
Low carrier frequency											
2736.200	51.50	1000	Vertical	-48.52	5.47	3.48	-46.53	77.36	55.83	21.53	Pass
Mid carrier frequency											
2745.130	53.00	1000	Vertical	-47.02	5.49	3.54	-40.77	71.94	56.17	15.77	Pass
High carrier frequency											
2754.320	51.00	1000	Vertical	-49.02	5.51	3.61	-42.82	73.65	55.83	17.82	Pass

*- Margin = Spurious emission – specification limit.

Reference numbers of test equipment used

HL 0410	HL 0446	HL 0521	HL 0589	HL 0604	HL 0661	HL 1200	HL 1424
HL 1941	HL 1984	HL 2009	HL 2259	HL 2399	HL 2400	HL 2432	HL 2499

Full description is given in Appendix A.

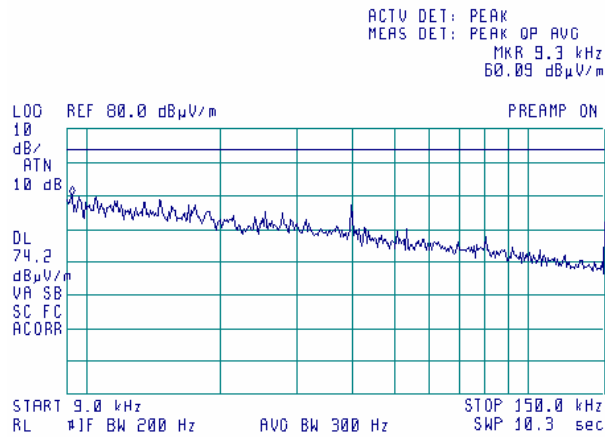


Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

Plot 7.5.1 Radiated emission measurements in 9 - 150 kHz range

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

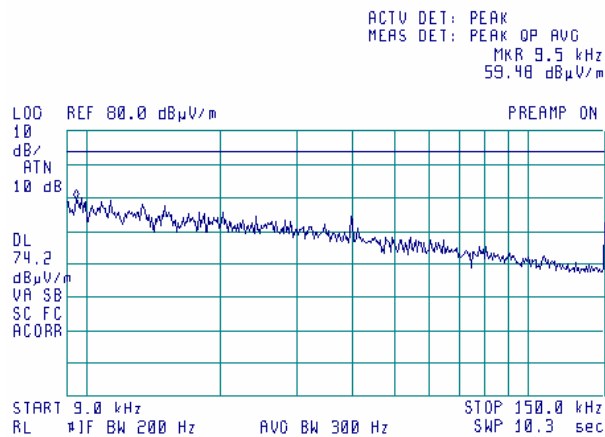
13:20:26 JUL 07, 2005



Plot 7.5.2 Radiated emission measurements in 9 - 150 kHz range

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

13:15:16 JUL 07, 2005



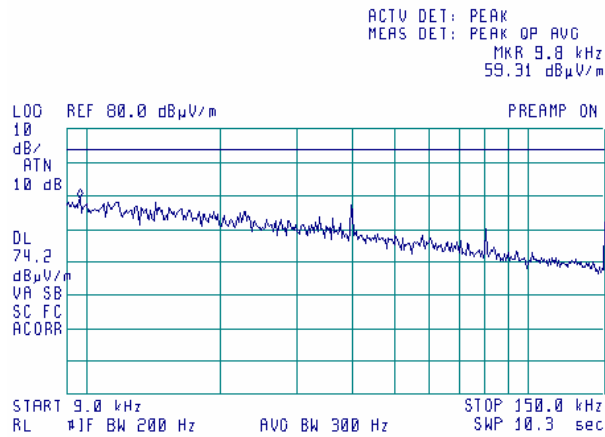


Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

Plot 7.5.3 Radiated emission measurements in 9 - 150 kHz range

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

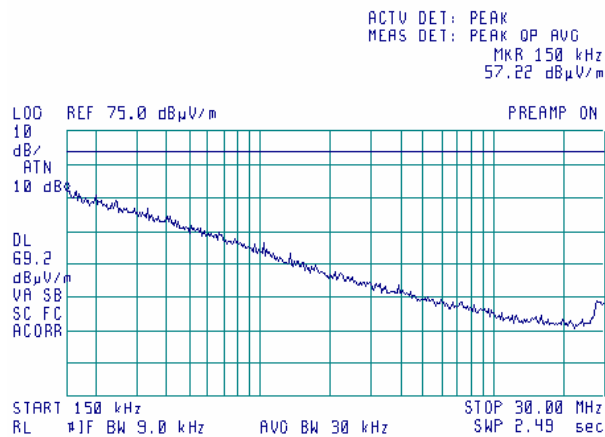
13:24:25 JUL 07, 2005



Plot 7.5.4 Radiated emission measurements in 0.15 - 30 MHz range

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

13:36:02 JUL 07, 2005



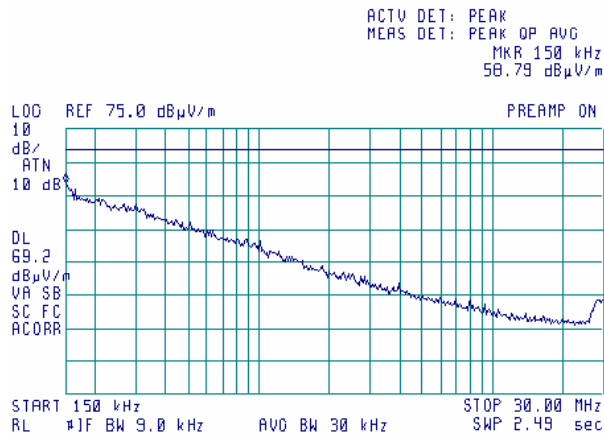


Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

Plot 7.5.5 Radiated emission measurements in 0.15 - 30 MHz range

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

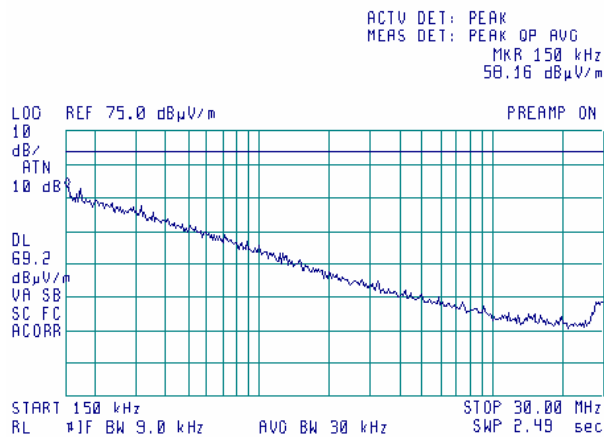
13:31:49 JUL 07, 2005



Plot 7.5.6 Radiated emission measurements in 0.15 - 30 MHz range

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

13:28:11 JUL 07, 2005



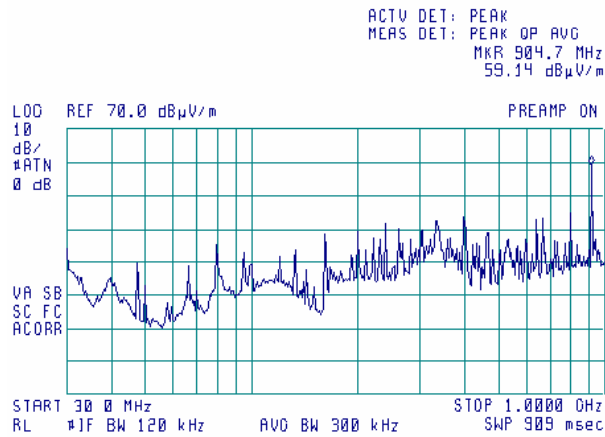


Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

Plot 7.5.7 Radiated emission measurements in 30 - 1000 MHz range

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

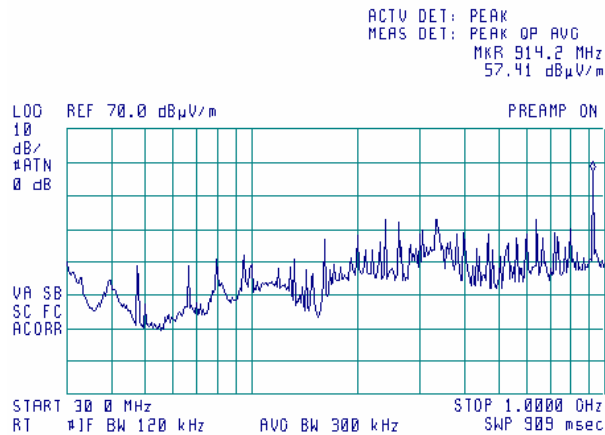
12:21:23 JUL 07, 2005



Plot 7.5.8 Radiated emission measurements in 30 - 1000 MHz range

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

12:34:24 JUL 07, 2005



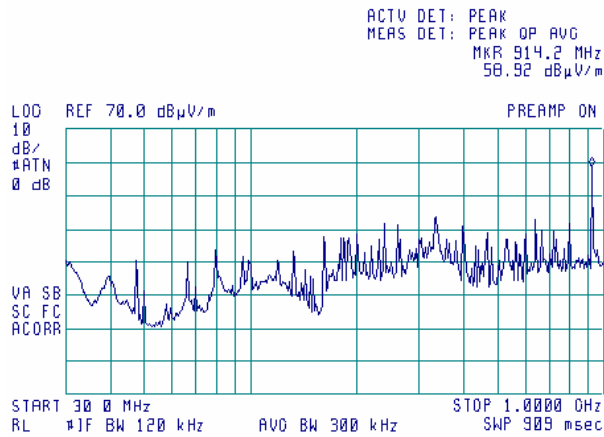


Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

Plot 7.5.9 Radiated emission measurements in 30 - 1000 MHz range

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

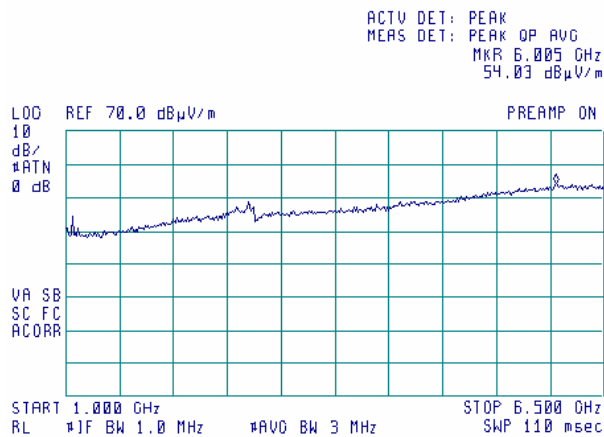
12:30:57 JUL 07, 2005



Plot 7.5.10 Radiated emission measurements in 1000 – 6500 MHz range

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

11:11:46 JUL 07, 2005



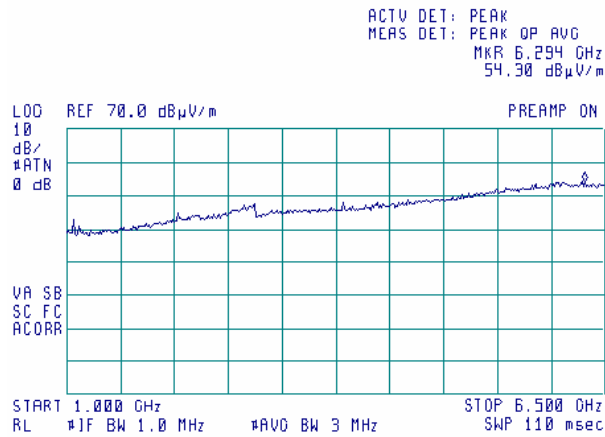


Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

Plot 7.5.11 Radiated emission measurements in 1000 – 6500 MHz range

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

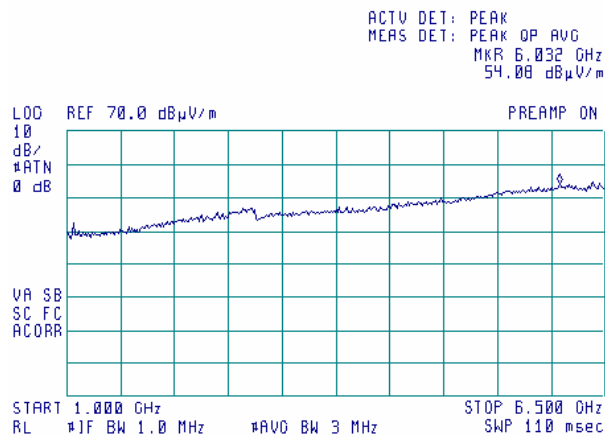
11:18:27 JUL 07, 2005



Plot 7.5.12 Radiated emission measurements in 1000 – 6500 MHz range

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

11:22:46 JUL 07, 2005

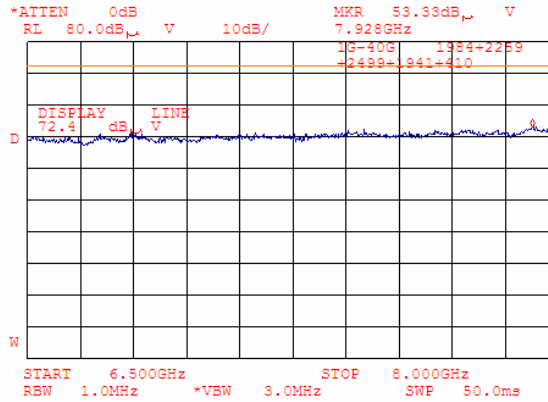




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

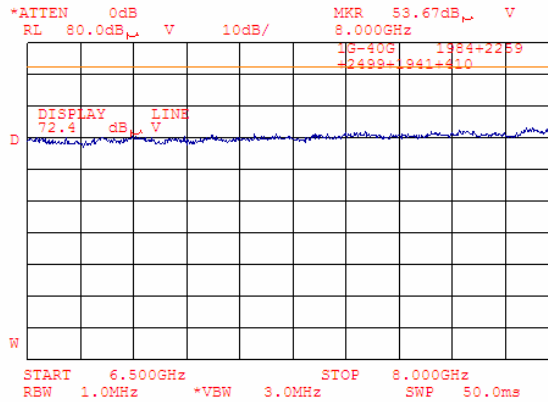
Plot 7.5.13 Radiated emission measurements in 6.5 – 8.0 GHz range

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



Plot 7.5.14 Radiated emission measurements in 6.5 – 8.0 GHz range

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

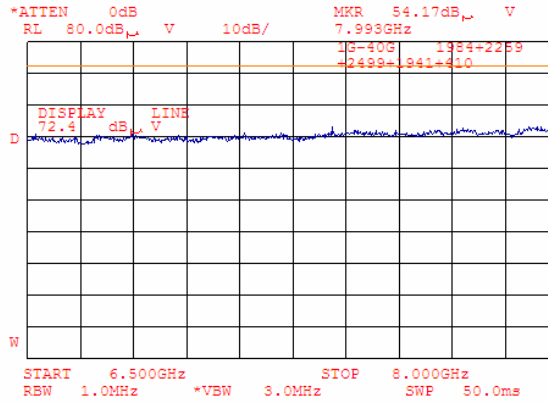




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

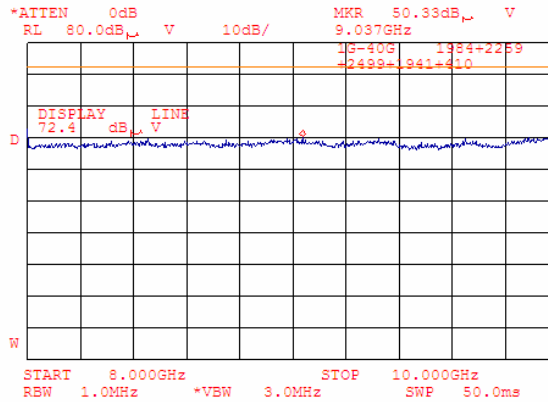
Plot 7.5.15 Radiated emission measurements in 6.5 – 8.0 GHz range

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



Plot 7.5.16 Radiated emission measurements in 8 – 10 GHz range

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

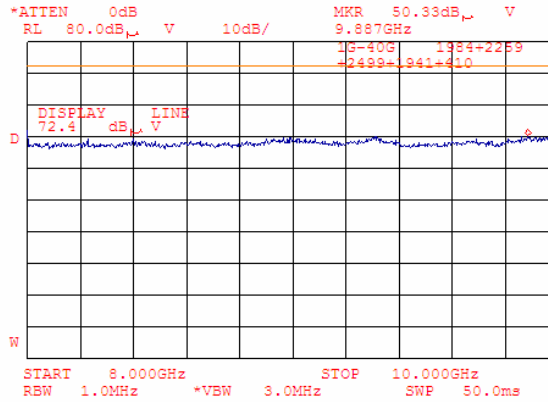




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

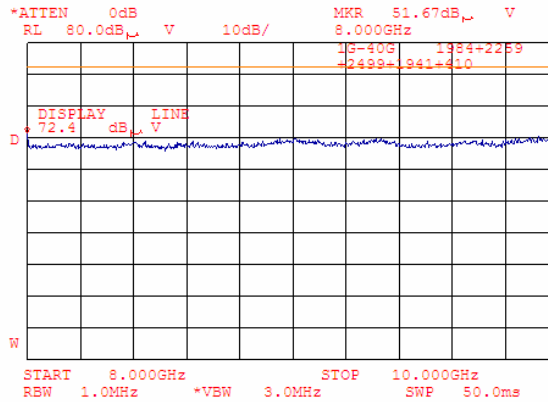
Plot 7.5.17 Radiated emission measurements in 8 – 10 GHz range

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



Plot 7.5.18 Radiated emission measurements in 8 – 10 GHz range

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



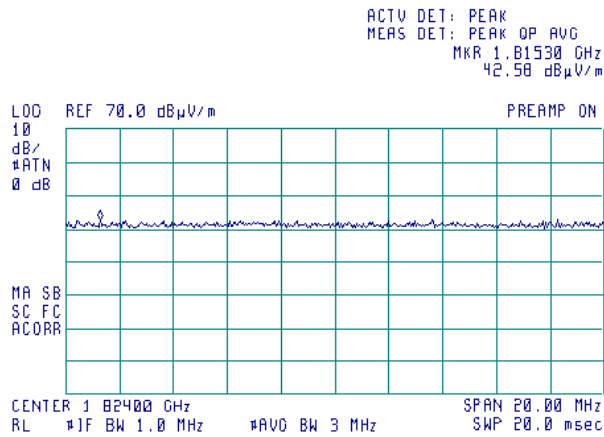


Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

Plot 7.5.19 Radiated emission measurements at the 2nd harmonic

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

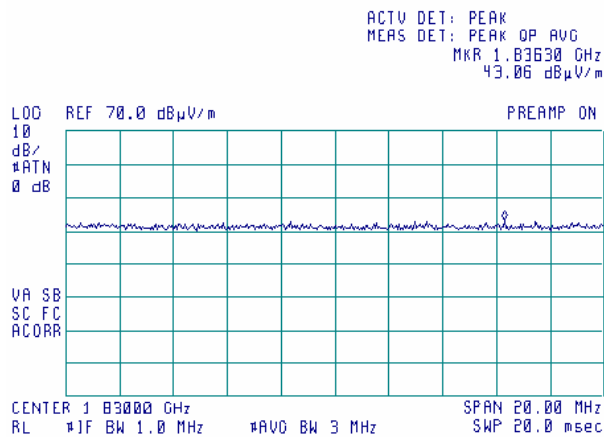
14:24:27 JUL 08, 2005



Plot 7.5.20 Radiated emission measurements at the 2nd harmonic

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

14:29:38 JUL 08, 2005



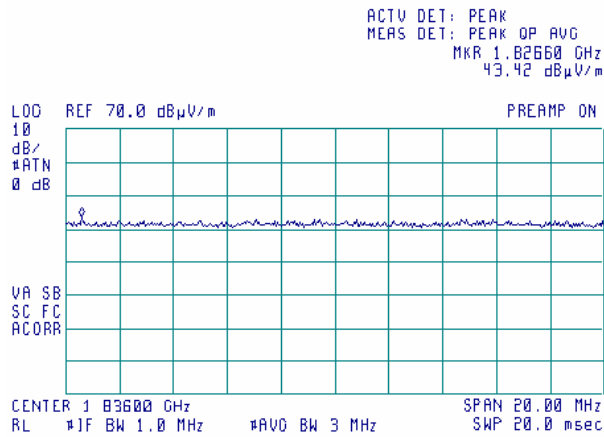


Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

Plot 7.5.21 Radiated emission measurements at the 2nd harmonic

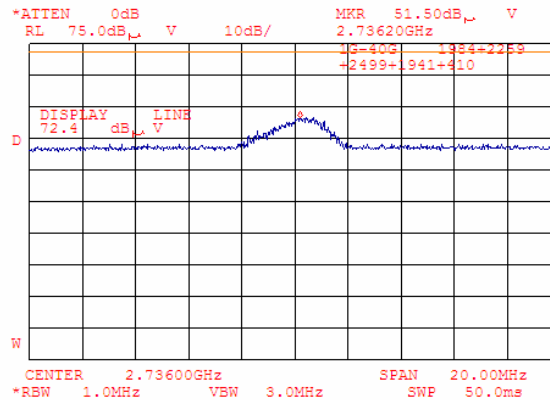
TEST SITE: Semi anechoic chamber
 CARRIER FREQUENCY: High
 ANTENNA POLARIZATION: Vertical and horizontal
 TEST DISTANCE: 3 m

14:35:17 JUL 08, 2005



Plot 7.5.22 Radiated emission measurements at the 3rd harmonic

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

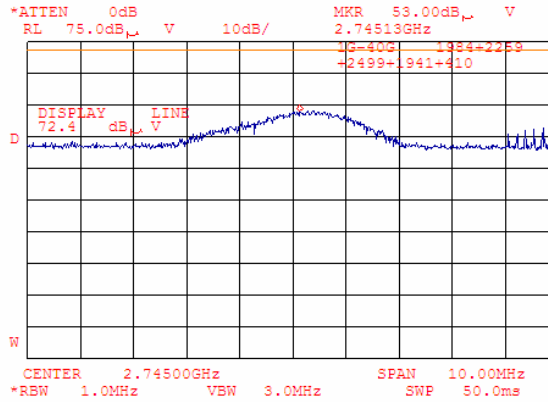




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

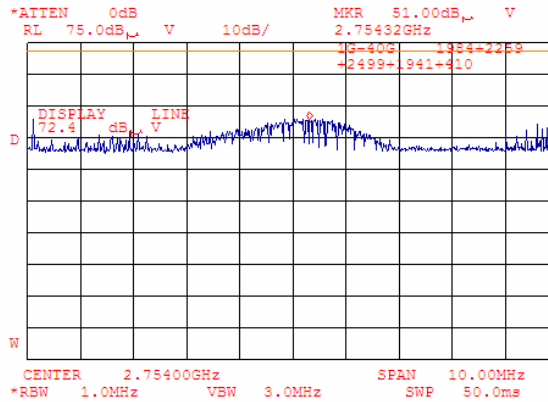
Plot 7.5.23 Radiated emission measurements at the 3rd harmonic

TEST SITE: OATS
 CARRIER FREQUENCY: Mid
 ANTENNA POLARIZATION: Vertical
 TEST DISTANCE: 3 m



Plot 7.5.24 Radiated emission measurements at the 3rd harmonic

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

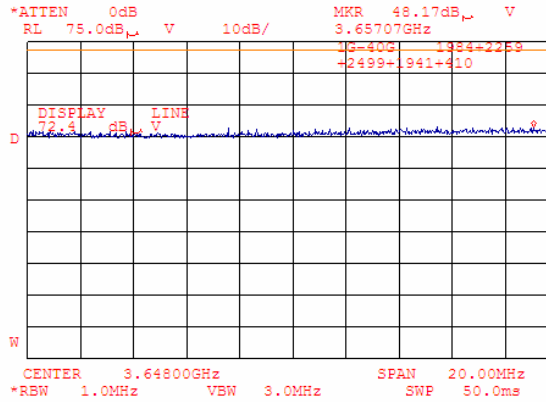




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

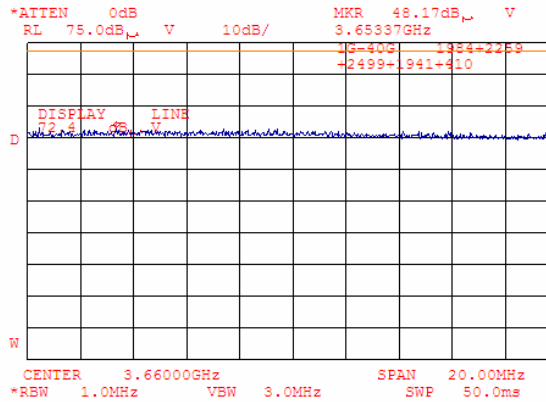
Plot 7.5.25 Radiated emission measurements at the 4th harmonic

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



Plot 7.5.26 Radiated emission measurements at the 4th harmonic

TEST SITE: OATS
 CARRIER FREQUENCY: Mid
 ANTENNA POLARIZATION: Vertical and horizontal
 TEST DISTANCE: 3 m

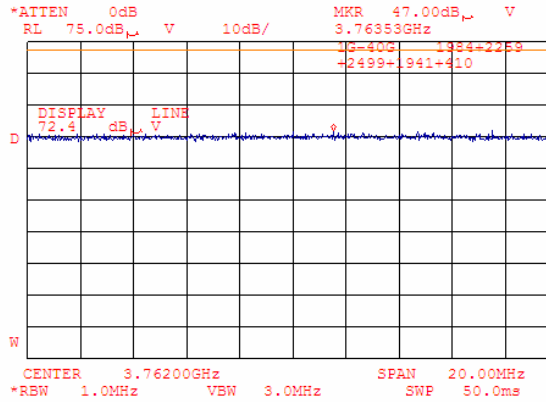




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

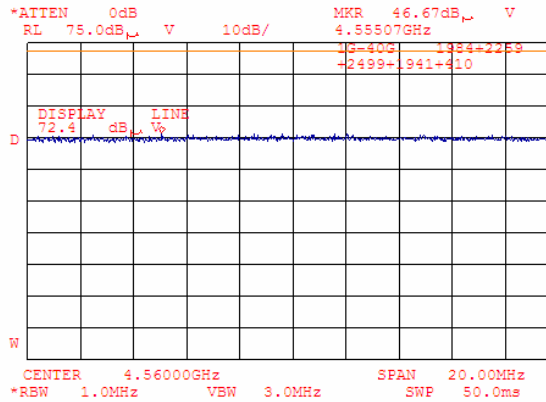
Plot 7.5.27 Radiated emission measurements at the 4th harmonic

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



Plot 7.5.28 Radiated emission measurements at the 5th harmonic

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

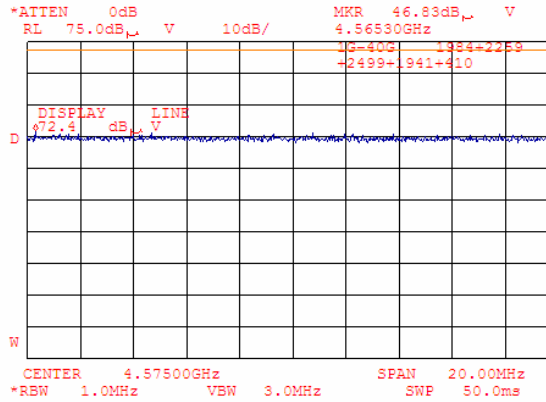




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

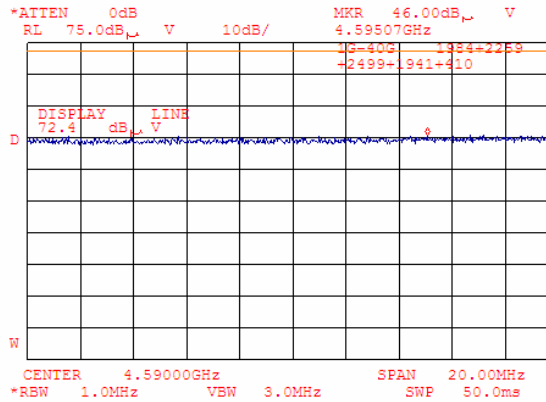
Plot 7.5.29 Radiated emission measurements at the 5th harmonic

TEST SITE: OATS
 CARRIER FREQUENCY: Mid
 ANTENNA POLARIZATION: Vertical and horizontal
 TEST DISTANCE: 3 m



Plot 7.5.30 Radiated emission measurements at the 5th harmonic

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

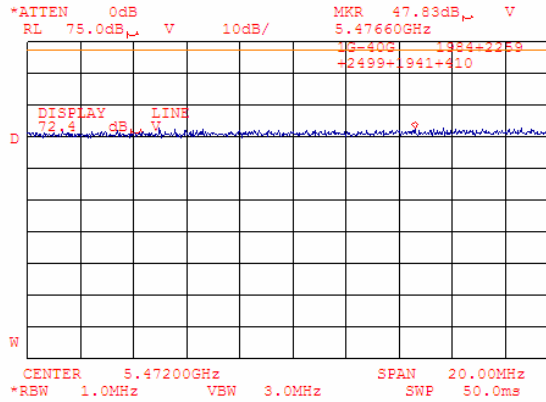




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

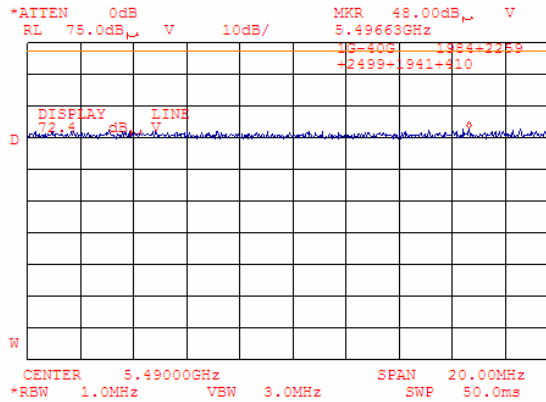
Plot 7.5.31 Radiated emission measurements at the 6th harmonic

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



Plot 7.5.32 Radiated emission measurements at the 6th harmonic

TEST SITE: OATS
 CARRIER FREQUENCY: Mid
 ANTENNA POLARIZATION: Vertical and horizontal
 TEST DISTANCE: 3 m

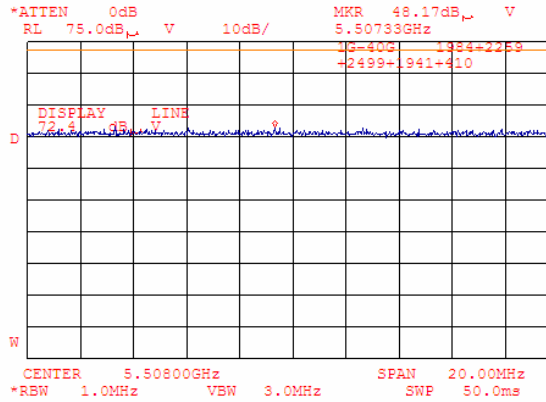




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

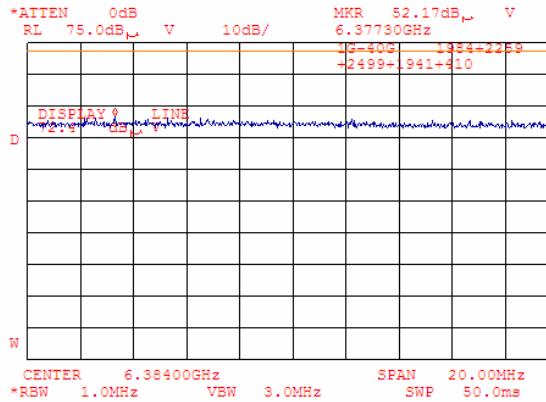
Plot 7.5.33 Radiated emission measurements at the 6th harmonic

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



Plot 7.5.34 Radiated emission measurements at the 7th harmonic

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

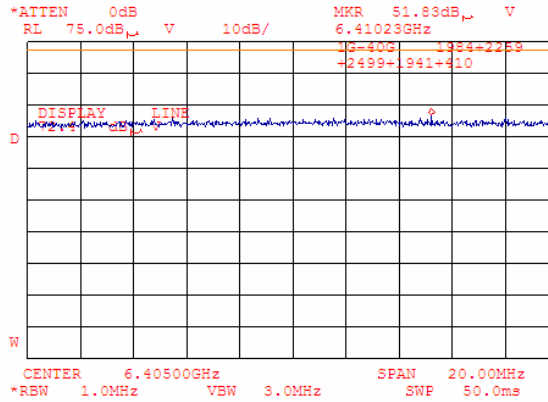




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

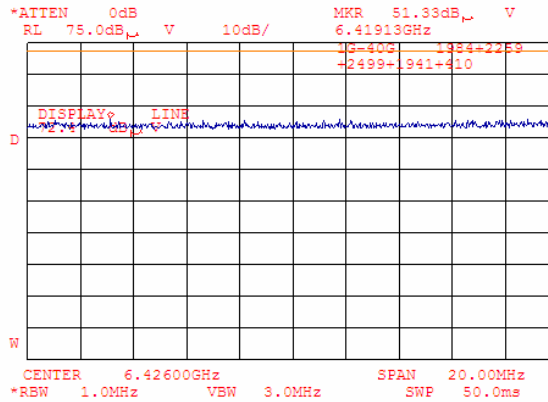
Plot 7.5.35 Radiated emission measurements at the 7th harmonic

TEST SITE: OATS
 CARRIER FREQUENCY: Mid
 ANTENNA POLARIZATION: Vertical and horizontal
 TEST DISTANCE: 3 m



Plot 7.5.36 Radiated emission measurements at the 7th harmonic

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

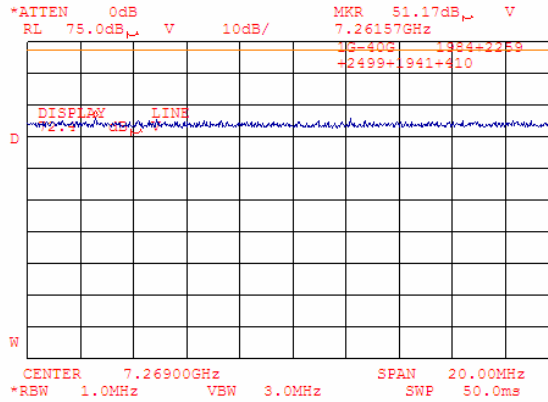




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

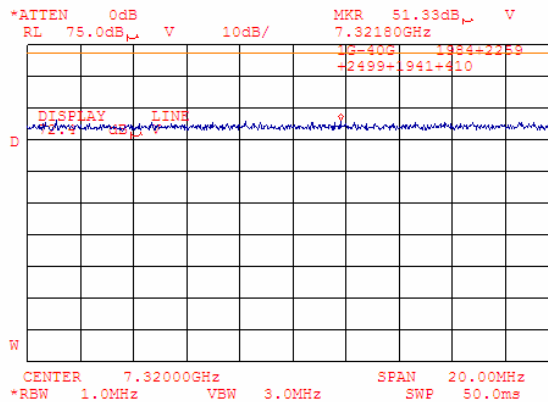
Plot 7.5.37 Radiated emission measurements at the 8th harmonic

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



Plot 7.5.38 Radiated emission measurements at the 8th harmonic

TEST SITE: OATS
 CARRIER FREQUENCY: Mid
 ANTENNA POLARIZATION: Vertical and horizontal
 TEST DISTANCE: 3 m

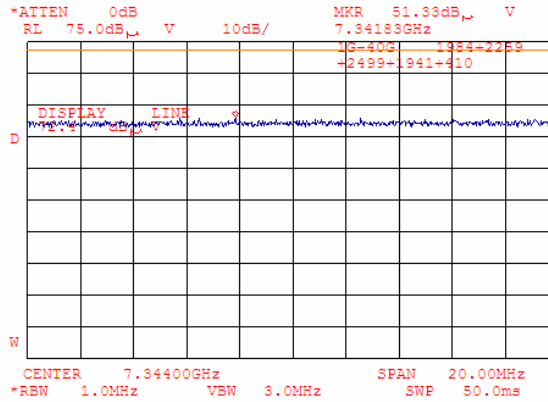




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

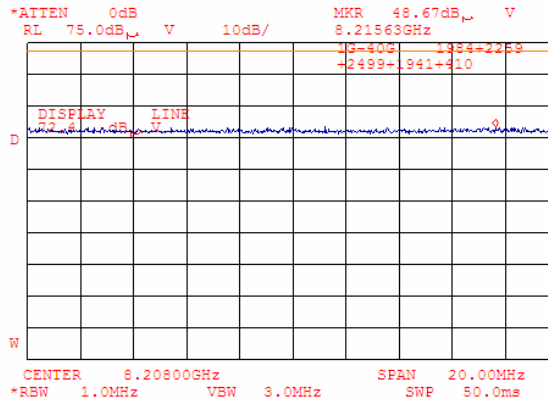
Plot 7.5.39 Radiated emission measurements at the 8th harmonic

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



Plot 7.5.40 Radiated emission measurements at the 9th harmonic

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

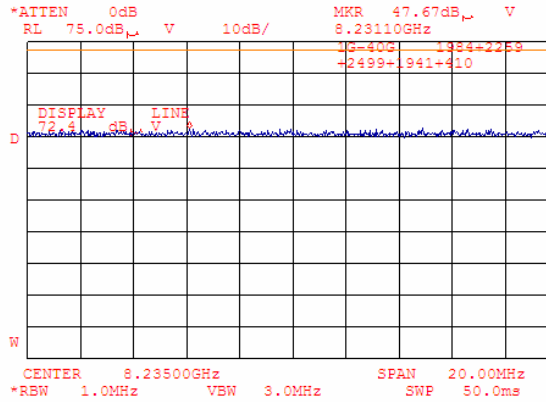




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

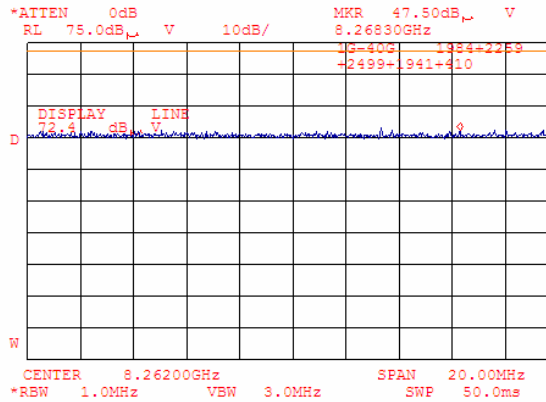
Plot 7.5.41 Radiated emission measurements at the 9th harmonic

TEST SITE: OATS
 CARRIER FREQUENCY: Mid
 ANTENNA POLARIZATION: Vertical and horizontal
 TEST DISTANCE: 3 m



Plot 7.5.42 Radiated emission measurements at the 9th harmonic

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

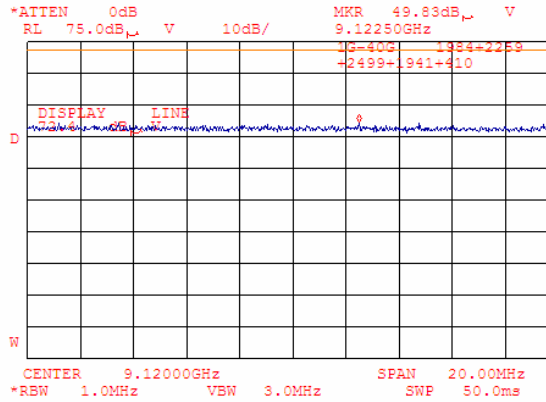




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

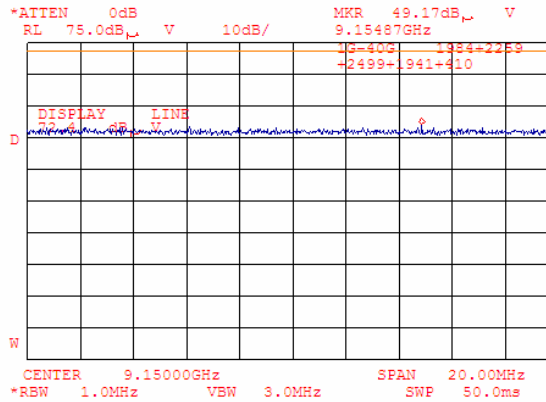
Plot 7.5.43 Radiated emission measurements at the 10th harmonic

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



Plot 7.5.44 Radiated emission measurements at the 10th harmonic

TEST SITE: OATS
 CARRIER FREQUENCY: Mid
 ANTENNA POLARIZATION: Vertical and horizontal
 TEST DISTANCE: 3 m

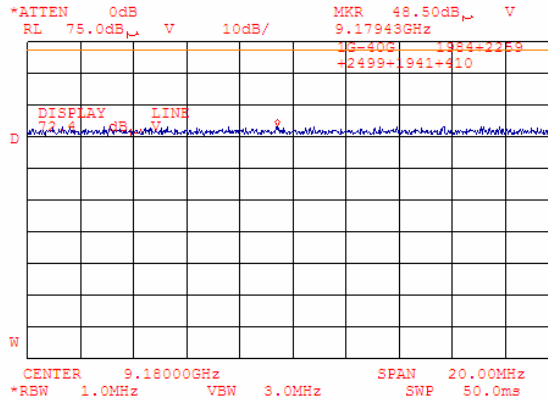




Test specification:	Section 90.210, Radiated spurious emissions		
Test procedure:	47 CFR, Sections 2.1053 and 90.210(m); TIA/EIA-603-A, Section 2.2.12		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 12:15:18 PM		
Temperature: 28 °C	Air Pressure: 1012 hPa	Relative Humidity: 40 %	Power Supply: 12 VDC
Remarks:			

Plot 7.5.45 Radiated emission measurements at the 10th harmonic

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





Test specification:	Section 90.213, Frequency stability		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-A Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 1:21:29 PM		
Temperature: 25 °C	Air Pressure: 1008 hPa	Relative Humidity: 46 %	Power Supply: 12 VDC
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. The test results are provided in Table 7.6.2.

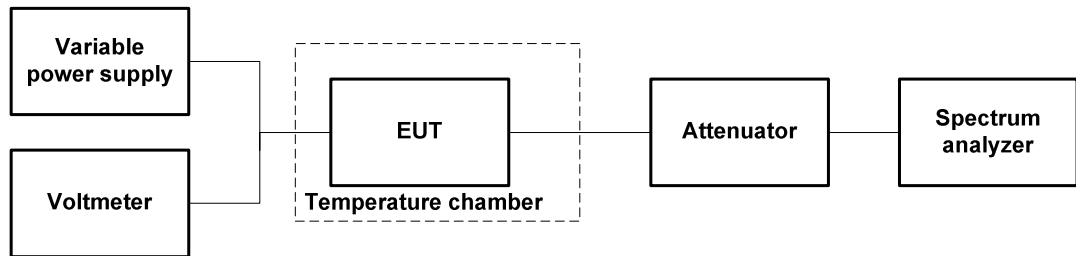
Table 7.6.1 Frequency stability limits

Assigned frequency, MHz	Maximum allowed frequency displacement	
	ppm	Hz
912	2.5	2280
915		2288
918		2295

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, Frequency stability		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-A Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 1:21:29 PM		
Temperature: 25 °C	Air Pressure: 1008 hPa	Relative Humidity: 46 %	Power Supply: 12 VDC
Remarks:			

Table 7.6.2 Frequency stability test results

ASSIGNED FREQUENCY RANGE: 902 - 928 MHz
 NOMINAL POWER VOLTAGE: 12 V
 TEMPERATURE STABILIZATION PERIOD: 20 min
 POWER DURING TEMPERATURE TRANSITION: Off
 SPECTRUM ANALYZER MODE: Counter
 RESOLUTION BANDWIDTH: 1000 Hz
 VIDEO BANDWIDTH: 1000 Hz
 MODULATION: Unmodulated

T, °C	Voltage, V	Frequency, MHz							Max frequency drift, Hz		Limit, Hz	Margin, Hz
		Start up	1 st min	2 nd min	3 rd min	4 th min	5 th min	10 th min	Positive	Negative		
Low carrier frequency												
-30	nominal	911.708252	911.708113	911.708010	911.708068	911.707731	911.707815	911.708153	0	-716	NA	NA
-20	nominal	911.707185	NA	NA	NA	NA	NA	911.707711	0	-1262		NA
-10	nominal	911.709156	NA	NA	NA	NA	NA	911.710068	1621	0		NA
0	nominal	911.705537	911.704777	911.705161	911.705341	911.705144	911.705226	911.706151	0	-3670		NA
10	nominal	911.720777	NA	NA	NA	NA	NA	911.721416	12969	0		NA
20	+15%	911.709447	NA	NA	NA	NA	NA	911.709993	1546	0		NA
20	nominal	911.709626	NA	NA	NA	NA	NA	911.708447*	1179	0		NA
20	-15%	911.709229	NA	NA	NA	NA	NA	911.708388	782	-59		NA
30	nominal	911.708853	911.708257	911.708382	911.707983	911.708813	911.708854	911.708920	473	-464		NA
40	nominal	911.707556	NA	NA	NA	NA	NA	911.707669	0	-891		NA
50	nominal	911.708231	NA	NA	NA	NA	NA	911.707665	0	-782	NA	
Mid carrier frequency												
-30	nominal	914.707004	914.707723	914.707364	914.707249	914.707439	914.707413	914.707165	0	-2244	NA	NA
-20	nominal	914.710405	NA	NA	NA	NA	NA	914.707074	1157	-2174		NA
-10	nominal	914.710779	NA	NA	NA	NA	NA	914.707142	1531	-2106		NA
0	nominal	914.708168	914.709011	914.709239	914.709199	914.709178	914.709335	914.709849	601	-1080		NA
10	nominal	914.698807	NA	NA	NA	NA	NA	914.699320	0	-10441		NA
20	+15%	914.708145	NA	NA	NA	NA	NA	914.708086	0	-1162		NA
20	nominal	914.708095	NA	NA	NA	NA	NA	914.709248*	0	-1153		NA
20	-15%	914.707482	NA	NA	NA	NA	NA	914.708215	0	-1766		NA
30	nominal	914.707421	914.707773	914.707401	914.707117	914.707421	914.707499	914.708100	0	-2131		NA
40	nominal	914.708054	NA	NA	NA	NA	NA	914.708721	0	-1194		NA
50	nominal	914.707665	NA	NA	NA	NA	NA	914.707991	0	-1583	NA	
High carrier frequency												
-30	nominal	917.707285	917.707811	917.707163	917.708326	917.707823	917.707427	917.706932	2024	0	NA	NA
-20	nominal	917.708153	NA	NA	NA	NA	NA	917.708087	1851	0		NA
-10	nominal	917.708505	NA	NA	NA	NA	NA	917.708570	2268	0		NA
0	nominal	917.705602	917.705982	917.706672	917.705455	917.705497	917.706127	917.706383	370	-847		NA
10	nominal	917.700125	NA	NA	NA	NA	NA	917.700548	0	-6177		NA
20	+15%	917.707913	NA	NA	NA	NA	NA	917.708271	1969	0		NA
20	nominal	917.706856	NA	NA	NA	NA	NA	917.706302*	554	0		NA
20	-15%	917.706751	NA	NA	NA	NA	NA	917.706479	449	0		NA
30	nominal	917.706625	917.706161	917.707001	917.706211	917.706620	917.706637	917.706711	699	-141		NA
40	nominal	917.706251	NA	NA	NA	NA	NA	917.707800	1498	-51		NA
50	nominal	917.706466	NA	NA	NA	NA	NA	917.706990	688	0	NA	

* - Reference frequency

Note: According to Note 13 of – FCC 47 CFR part 90 subpart I §90.213 (a) “Fixed non-multilateration transmitters with an authorized bandwidth is more than 40 kHz from the band edge are not subject to frequency tolerance restrictions”
 According to occupied bandwidth test, authorized bandwidth is more than 40 kHz from the band edges.

Reference numbers of test equipment used

HL 0493	HL 1460	HL 1653	HL 2524			
---------	---------	---------	---------	--	--	--

Full description is given in Appendix A.



Test specification:	Section 15.107, Conducted emission at AC power port, Class B		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 2:45:57 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

8 Emissions tests according to FCC 47CFR part 15 subpart B requirements

8.1 Conducted emissions

8.1.1 General

This test was performed to measure common mode conducted emissions at the mains power port. Specification test limits are given in Table 8.1.1. The worst test results (the lowest margins) were recorded in Table 8.1.2 and shown in the associated plots.

Table 8.1.1 Limits for conducted emissions

Frequency, MHz	Class B limit, dB(μV)		Class A limit, dB(μV)	
	QP	AVRG	QP	AVRG
0.15 - 0.5	66 - 56*	56 - 46*	79	66
0.5 - 5.0	56	46	73	60
5.0 - 30	60	50	73	60

* The limit decreases linearly with the logarithm of frequency.

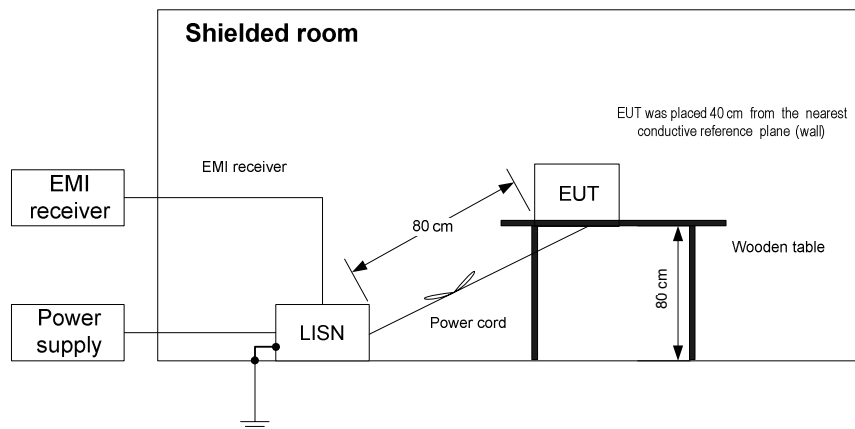
8.1.2 Test procedure

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

8.1.2.2 The measurements were performed at power terminals with the LISN, connected to a spectrum analyzer in the frequency range referred to in Table 8.1.2. Unused coaxial connector of the LISN was terminated with 50 Ohm. Quasi-peak and average detectors were used throughout the testing.

8.1.2.3 The position of the device cables was varied to determine maximum emission level.

Figure 8.1.1 Setup for conducted emission measurements, table-top EUT





Test specification:	Section 15.107, Conducted emission at AC power port, Class B		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 2:45:57 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

Table 8.1.2 Conducted emission test results

LINE: AC mains
EUT SET UP: TABLE-TOP
TEST SITE: SHIELDED ROOM
DETECTORS USED: PEAK / QUASI-PEAK / AVERAGE
FREQUENCY RANGE: 150 kHz - 30 MHz
RESOLUTION BANDWIDTH: 9 kHz

Frequency, MHz	Peak emission, dB(μV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*	Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*		
AC mains input of EUT power adapter, EUT in transmit mode									
0.173989	47.40	40.64	64.83	-24.19	34.29	54.83	-14.19	L1	Pass
0.232654	42.89	35.87	62.40	-26.53	27.64	52.40	-16.53		
0.233362	43.80	36.50	62.37	-25.87	28.55	52.37	-15.87		
0.235156	41.29	37.04	62.30	-25.26	28.99	52.30	-15.26		
2.111204	38.21	34.71	56.00	-21.29	30.45	46.00	-11.29		
2.754379	37.97	34.00	56.00	-22.00	27.15	46.00	-12.00	L2	Pass
0.229990	39.20	32.11	62.50	-30.39	25.62	52.50	-20.39		
0.253412	41.14	26.85	61.68	-34.83	2.96	51.68	-24.83		
0.932025	29.08	24.78	56.00	-31.22	22.51	46.00	-21.22		
1.110573	29.41	25.63	56.00	-30.37	22.29	46.00	-20.37		
9.451289	33.43	28.56	60.00	-31.44	21.20	50.00	-21.44	L2	Pass
14.358223	36.05	33.05	60.00	-26.95	25.26	50.00	-16.95		
AC mains input of EUT power adapter, EUT in receive/standby mode									
0.174822	41.34	40.54	64.79	-24.25	36.82	54.79	-14.25	L1	Pass
0.232343	34.77	33.61	62.41	-28.80	31.47	52.41	-18.80		
0.757165	33.75	32.81	56.00	-23.19	31.91	46.00	-13.19		
2.039034	36.48	34.04	56.00	-21.96	31.65	46.00	-11.96		
2.739380	34.66	33.49	56.00	-22.51	29.73	46.00	-12.51		
2.855183	34.35	33.23	56.00	-22.77	28.88	46.00	-12.77	L2	Pass
0.174802	39.45	38.59	64.79	-26.20	35.33	54.79	-16.20		
2.039650	34.31	32.49	56.00	-23.51	29.93	46.00	-13.51		
2.155845	34.21	30.94	56.00	-25.06	26.55	46.00	-15.06		
2.798661	33.55	32.23	56.00	-23.77	27.24	46.00	-13.77		
2.855803	32.90	31.67	56.00	-24.33	25.57	46.00	-14.33	L2	Pass
15.273183	34.32	32.53	60.00	-27.47	30.24	50.00	-17.47		

*- Margin = Measured emission - specification limit.



Test specification:	Section 15.107, Conducted emission at AC power port, Class B		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 2:45:57 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

Table 8.1.2 (continued) Conducted emission test results

Frequency, MHz	Peak emission, dB(μV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*	Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*		
AC mains input of laptop power adapter, EUT in transmit mode									
0.157728	54.70	47.90	65.62	-17.72	17.98	55.62	-7.72	L1	Pass
0.173436	52.96	45.95	64.86	-18.91	32.23	54.86	-8.91		
0.190951	50.17	43.37	64.00	-20.63	13.85	54.00	-10.63		
0.316092	38.90	32.38	59.83	-27.45	7.42	49.83	-17.45		
0.698729	35.96	34.68	56.00	-21.32	32.22	46.00	-11.32		
1.806951	35.86	34.65	56.00	-21.35	32.73	46.00	-11.35	L2	Pass
0.165124	54.07	46.92	65.26	-18.34	17.64	55.26	-8.34		
0.173543	52.92	45.81	64.85	-19.04	32.09	54.85	-9.04		
0.186428	50.64	43.87	64.22	-20.35	14.90	54.22	-10.35		
0.292072	44.04	35.87	60.51	-24.64	31.66	50.51	-14.64		
0.640344	36.01	34.42	56.00	-21.58	32.48	46.00	-11.58	L2	Pass
1.223265	35.62	34.59	56.00	-21.41	26.45	46.00	-11.41		
AC mains input of laptop power adapter, EUT in receive/standby mode									
0.152893	54.56	47.94	65.86	-17.92	19.23	55.86	-7.92	L1	Pass
0.155704	54.43	47.69	65.72	-18.03	17.94	55.72	-8.03		
0.175105	53.00	45.43	64.78	-19.35	34.38	54.78	-9.35		
0.699134	36.36	35.16	56.00	-20.84	35.05	46.00	-10.84		
1.107170	34.49	33.83	56.00	-22.17	33.68	46.00	-12.17		
1.572992	35.66	35.02	56.00	-20.98	34.91	46.00	-10.98	L2	Pass
0.175261	52.80	45.73	64.77	-19.04	34.53	54.77	-9.04		
0.200194	49.05	42.23	63.65	-21.42	14.15	53.65	-11.42		
0.230098	46.23	39.32	62.50	-23.18	24.77	52.50	-13.18		
0.291724	44.39	37.31	60.52	-23.21	35.06	50.52	-13.21		
0.641155	36.68	35.18	56.00	-20.82	35.07	46.00	-10.82	L2	Pass
1.572836	35.71	35.11	56.00	-20.89	34.98	46.00	-10.89		

*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

HL 0447	HL 0672	HL 0787	HL 1430	HL 1502	HL 1510		
---------	---------	---------	---------	---------	---------	--	--

Full description is given in Appendix A.

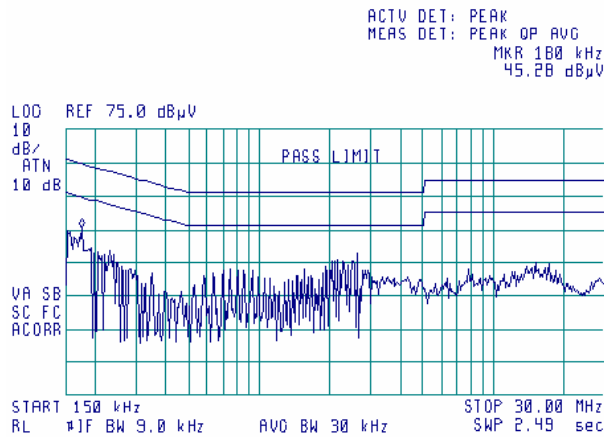


Test specification:	Section 15.107, Conducted emission at AC power port, Class B		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 2:45:57 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

Plot 8.1.1 Conducted emission measurements, AC mains input of EUT power adapter

LINE: L1
 EUT OPERATING MODE: Transmit
 LIMIT: QUASI-PEAK, AVERAGE
 DETECTOR: PEAK

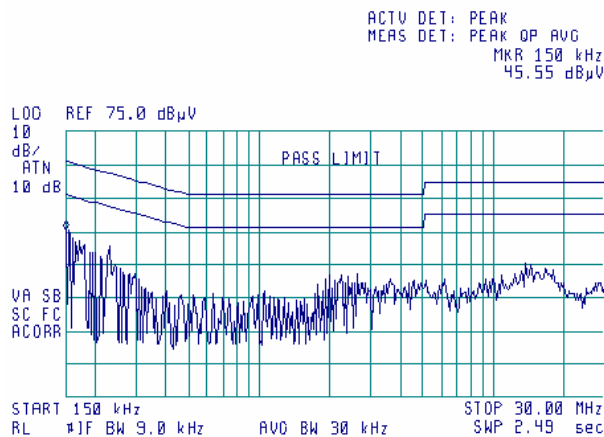
12:10:20 JUL 18, 2005



Plot 8.1.2 Conducted emission measurements, AC mains input of EUT power adapter

LINE: L2
 EUT OPERATING MODE: Transmit
 LIMIT: QUASI-PEAK, AVERAGE
 DETECTOR: PEAK

12:36:47 JUL 18, 2005



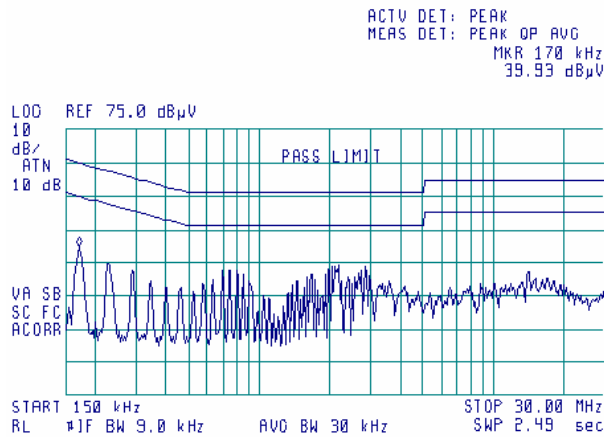


Test specification:	Section 15.107, Conducted emission at AC power port, Class B		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 2:45:57 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

Plot 8.1.3 Conducted emission measurements, AC mains input of EUT power adapter

LINE: L1
EUT OPERATING MODE: Receive / Standby
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK

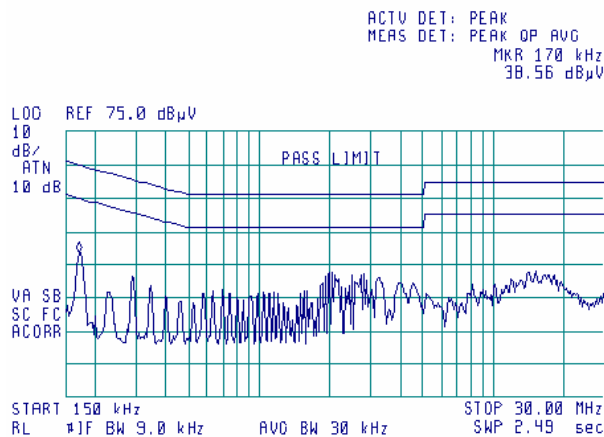
13:31:48 JUL 18, 2005



Plot 8.1.4 Conducted emission measurements, AC mains input of EUT power adapter

LINE: L2
EUT OPERATING MODE: Receive / Standby
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK

13:22:52 JUL 18, 2005



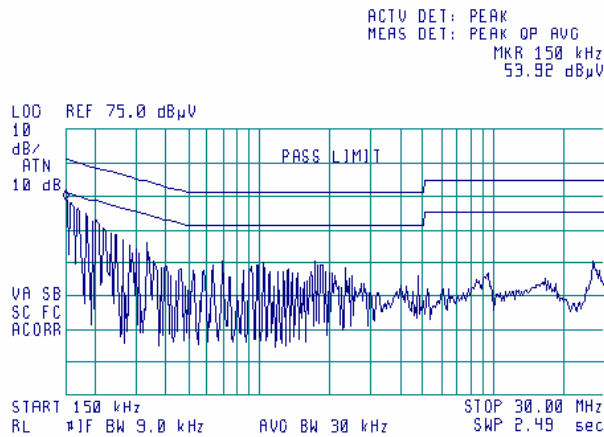


Test specification:	Section 15.107, Conducted emission at AC power port, Class B		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 2:45:57 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

Plot 8.1.5 Conducted emission measurements, AC mains input of laptop power adapter

LINE: L1
 EUT OPERATING MODE: Transmit
 LIMIT: QUASI-PEAK, AVERAGE
 DETECTOR: PEAK

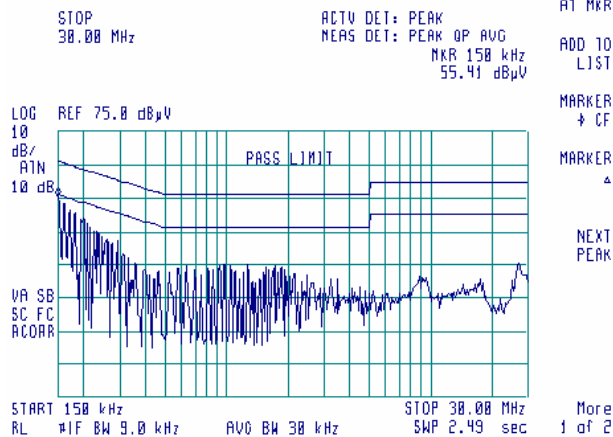
14:25:01 JUL 18, 2005



Plot 8.1.6 Conducted emission measurements, AC mains input of laptop power adapter

LINE: L2
 EUT OPERATING MODE: Transmit
 LIMIT: QUASI-PEAK, AVERAGE
 DETECTOR: PEAK

14:09:41 JUL 18, 2005



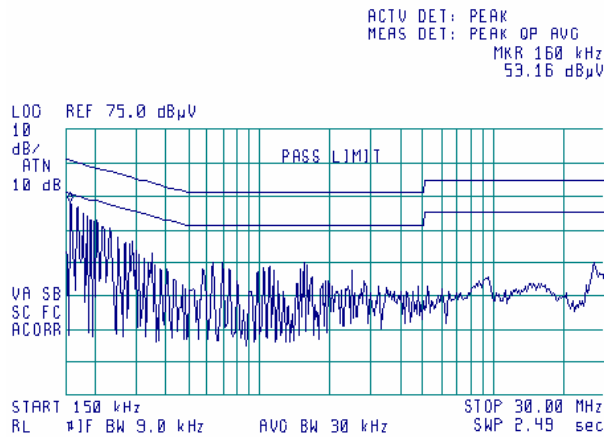


Test specification:	Section 15.107, Conducted emission at AC power port, Class B		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 2:45:57 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

Plot 8.1.7 Conducted emission measurements, AC mains input of laptop power adapter

LINE: L1
 EUT OPERATING MODE: Receive / Stand-by
 LIMIT: QUASI-PEAK, AVERAGE
 DETECTOR: PEAK

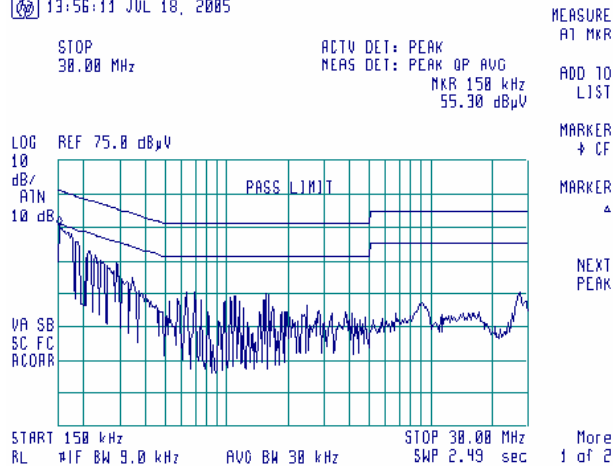
13:43:43 JUL 18, 2005



Plot 8.1.8 Conducted emission measurements, AC mains input of laptop power adapter

LINE: L2
 EUT OPERATING MODE: Receive / Stand-by
 LIMIT: QUASI-PEAK, AVERAGE
 DETECTOR: PEAK

13:56:11 JUL 18, 2005





Test specification:	Section 15.109, Radiated emission, Class B		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 1:29:59 PM		
Temperature: 24 °C	Air Pressure: 1012 hPa	Relative Humidity: 45 %	Power Supply: 12 VDC
Remarks:			

8.2 Radiated emission measurements

8.2.1 General

This test was performed to measure radiated emissions from the EUT enclosure. Specification test limits are given in Table 8.2.1.

Table 8.2.1 Radiated emission test limits

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

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

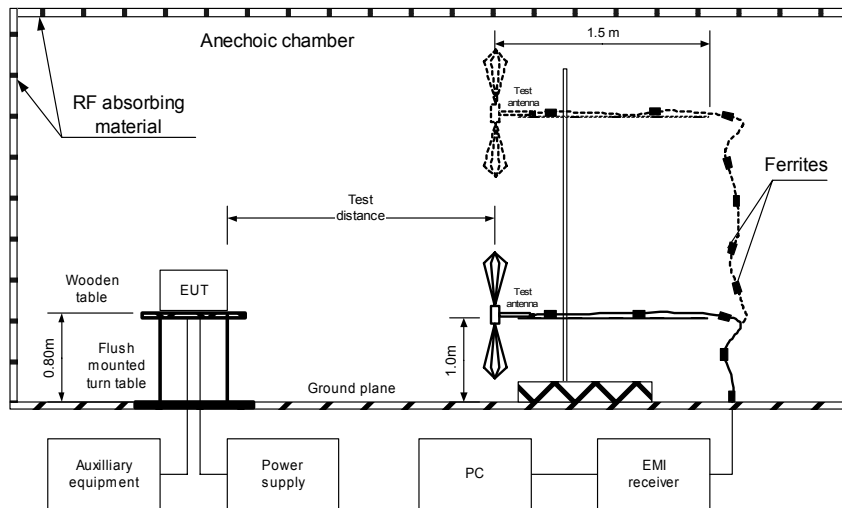
8.2.2 Test procedure

8.2.2.1 The EUT was set up as shown in Figure 8.2.1, energized and the performance check was conducted.

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

8.2.2.3 The worst test results (the lowest margins) were recorded in Table 8.2.2 and shown in the associated plots.

Figure 8.2.1 Setup for radiated emission measurements in anechoic chamber, table-top equipment





Test specification:	Section 15.109, Radiated emission, Class B		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 1:29:59 PM		
Temperature: 24 °C	Air Pressure: 1012 hPa	Relative Humidity: 45 %	Power Supply: 12 VDC
Remarks:			

Table 8.2.2 Radiated emission test results

EUT SET UP: TABLE-TOP
EUT OPERATING MODE: Receive / Standby
TEST SITE: SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / QUASI-PEAK
FREQUENCY RANGE: 30 MHz – 1000 MHz
RESOLUTION BANDWIDTH: 120 kHz

Frequency, MHz	Peak emission, dB(µV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(µV/m)	Limit, dB(µV/m)	Margin, dB*				
160.010000	40.99	40.40	43.50	-3.10	Vertical	1.0	150	Pass
199.965000	39.22	38.09	43.50	-5.41	Horizontal	1.6	303	
240.537500	44.29	42.22	46.00	-3.78	Horizontal	1.0	58	
299.912500	35.68	33.16	46.00	-12.84	Vertical	1.8	342	
333.250000	46.50	45.47	46.00	-0.53	Vertical	1.1	128	
533.166828	46.00	45.21	46.00	-0.79	Vertical	1.7	167	
640.000000	46.36	45.43	46.00	-0.57	Horizontal	1.0	155	
666.475000	42.70	41.53	46.00	-4.47	Vertical	1.1	186	

DETECTORS USED: PEAK / AVERAGE
FREQUENCY RANGE: 1000 MHz – 5000 MHz
RESOLUTION BANDWIDTH: 1000 kHz

Frequency, MHz	Peak emission, dB(µV/m)	Average			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(µV/m)	Limit, dB(µV/m)	Margin, dB*				
1066.37500	48.67	31.09	54.00	-22.91	Vertical	1.5	86	Pass

*- Margin = Measured emission - specification limit.

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

Reference numbers of test equipment used

HL 0465	HL 0521	HL 0589	HL 0604	HL 1947	HL 1984	HL 2009	
---------	---------	---------	---------	---------	---------	---------	--

Full description is given in Appendix A.

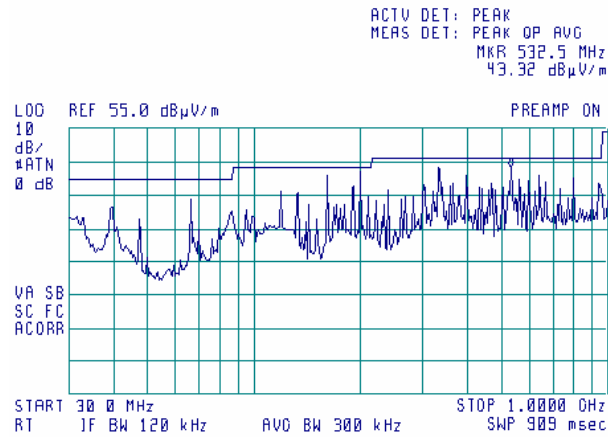


Test specification:	Section 15.109, Radiated emission, Class B		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 1:29:59 PM		
Temperature: 24 °C	Air Pressure: 1012 hPa	Relative Humidity: 45 %	Power Supply: 12 VDC
Remarks:			

Plot 8.2.1 Radiated emission measurements in 30 - 1000 MHz range, vertical antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Standby

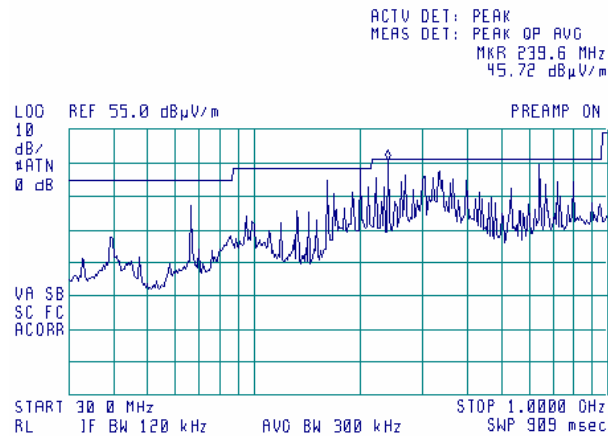
09:07:34 JUL 07, 2005



Plot 8.2.2 Radiated emission measurements in 30 - 1000 MHz range, horizontal antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Standby

08:57:06 JUL 07, 2005



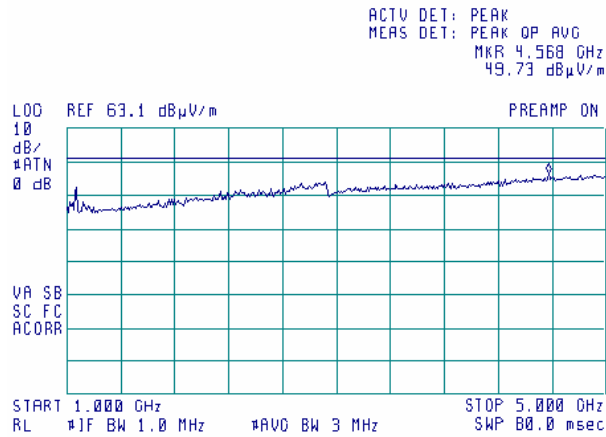


Test specification:	Section 15.109, Radiated emission, Class B		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 1:29:59 PM		
Temperature: 24 °C	Air Pressure: 1012 hPa	Relative Humidity: 45 %	Power Supply: 12 VDC
Remarks:			

Plot 8.2.3 Radiated emission measurements in 1000 - 5000 MHz range, vertical antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Standby

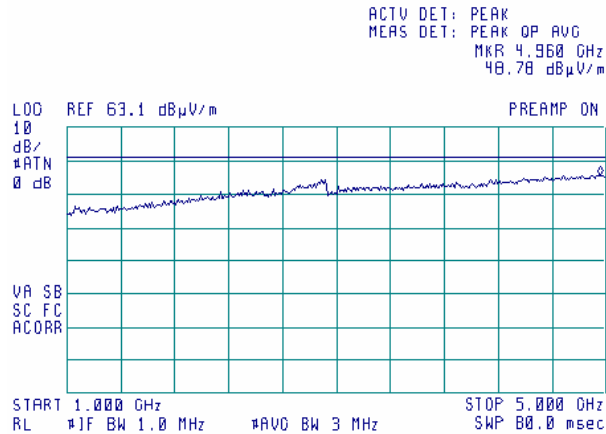
10:11:04 JUL 07, 2005



Plot 8.2.4 Radiated emission measurements in 1000 - 5000 MHz range, horizontal antenna polarization

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Standby

10:15:38 JUL 07, 2005





Test specification:	Section 15.111, Conducted emission at receiver antenna port		
Test procedure:	ANSI C63.4, Section 12.1.5		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 1:31:41 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 47 %	Power Supply: 12 VDC
Remarks:			

8.3 Spurious emissions at RF antenna connector

8.3.1 General

This test was performed to measure spurious emissions at RF antenna connector of receiver operated within 30 to 960 MHz band which was tested for compliance with radiated emission limits with the antenna port connected to resistive termination. Specification test limits are given in Table 8.3.1. The test results are provided in Table 8.3.2 and associated plots.

Table 8.3.1 Spurious emission limits

Frequency, MHz	EUT type	Power of spurious	
		nW	dBm
25 MHz – 5 th harmonic*	Citizens band (CB) receiver	2.0	-57.0
30 MHz – 2 nd harmonic**	Superheterodyne receiver		
30 MHz – 5 th harmonic*	Other receiver operates within 30 – 960 MHz		

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

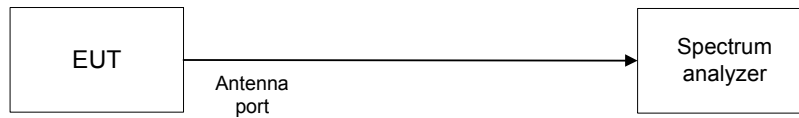
** - harmonic of the local oscillator frequency.

8.3.2 Test procedure

8.3.2.1 The EUT was set up as shown in Figure 8.3.1, energized and its proper operation was checked.

8.3.2.2 The spurious emission was measured with spectrum analyzer as provided in Table 8.3.2 and associated plots.

Figure 8.3.1 Spurious emission test setup





Test specification:	Section 15.111, Conducted emission at receiver antenna port		
Test procedure:	ANSI C63.4, Section 12.1.5		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 1:31:41 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 47 %	Power Supply: 12 VDC
Remarks:			

Table 8.3.2 Spurious emission test results

INVESTIGATED FREQUENCY RANGE: 30 MHz – 4.6 GHz
 RECEIVER TYPE: Other than CB or superheterodyne
 EUT OPERATING MODE: Receive
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 100 kHz
 VIDEO BANDWIDTH: 300 kHz

Frequency, MHz	Spurious emission, dBm	Limit, dBm	Margin, dB	Verdict
925.070	-75.04	-57.0	-18.04	Pass

Reference numbers of test equipment used

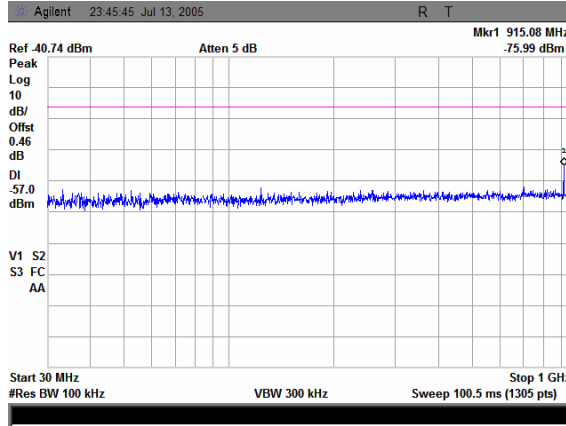
HL 2254	HL 2780						
---------	---------	--	--	--	--	--	--

Full description is given in Appendix A.

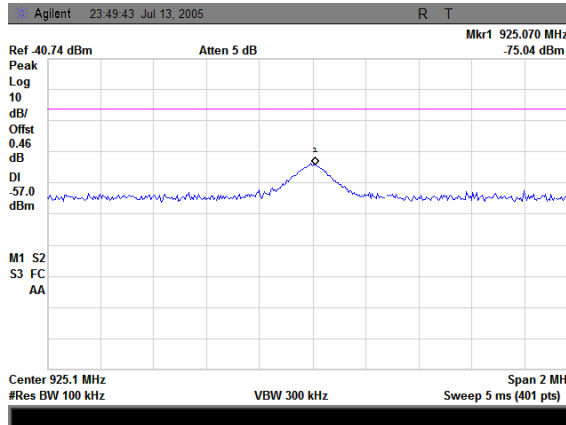


Test specification:	Section 15.111, Conducted emission at receiver antenna port		
Test procedure:	ANSI C63.4, Section 12.1.5		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	7/18/2005 1:31:41 PM		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 47 %	Power Supply: 12 VDC
Remarks:			

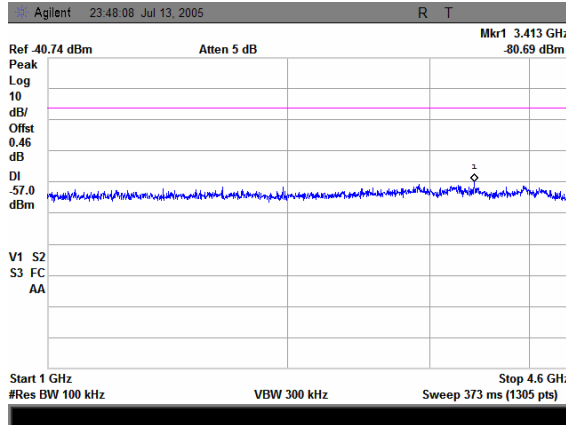
Plot 8.3.1 Spurious emission test results in 30 – 1000 MHz frequency range



Plot 8.3.2 Spurious emission test result at 925 MHz



Plot 8.3.3 Spurious emission test results in 1.0 – 4.6 GHz frequency range



**9 APPENDIX A Test equipment and ancillaries used for tests**

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
0174	Monitor, Field, 10kHz-1GHz, 1-300 V/m, w/fiberoptic	Amplifier Research	FM1000	60525	13-Feb-05	13-Feb-06
0410	Cable, Coax, Microwave, DC-18 GHz, N-N, 1 m	Gore	PPF01P0 1039.4	9338767	13-Feb-05	13-Feb-06
0446	Antenna, Loop active, 10kHz-30MHz	EMCO	6502	2857	13-Feb-05	13-Feb-06
0447	LISN, 16/2, 300V RMS	HL	LISN 16 - 1	066	13-Feb-05	13-Feb-06
0465	Anechoic Chamber 9(L) x 6.5(W) x 5.5(H) m	HL	AC - 1	023	03-Nov-04	03-Nov-05
0493	Oven temperature -45...175 deg C	Thermotron	S-1.2 Mini-Max	14016	10-Oct-04	10-Oct-05
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A 00319, 3448A002 53	10-Oct-04	10-Oct-05
0589	Cable Coaxial, GORE A2P01POL118, 2.3 m	HL	GORE-3	176	02-Dec-04	02-Dec-05
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE 26 - 2000 MHz	EMCO	3141	9611-1011	10-Jan-05	10-Jan-06
0661	Generator Swept Signal, 10 MHz to 40 GHz, + 10 dBm	Hewlett Packard	83640B	3614A002 66	10-Oct-04	10-Oct-05
0672	Shielded Room 4,6(L) x 4,2(W) x 2,4(H) m	HL	SR - 3	027	11-Nov-04	11-Nov-05
0787	Transient Limiter	Hewlett Packard	11947A	3107A018 77	21-Nov-04	21-Nov-05
1200	Quadruplexer 1-12 GHz (1-2 GHz; 2-4GHz;4-8 GHz; 8-12GHz)	Elettronica S.p.A. - Roma	UE 84	D/00240	10-Feb-05	10-Feb-06
1424	Spectrum Analyzer, 30 Hz- 40 GHz	Agilent Technologies (HP)	8564EC	3946A002 19	11-Nov-04	11-Nov-05
1430	EMI Receiver, 9 kHz - 2.9 GHz	Agilent Technologies (HP)	8542E	3807A002 62,3705A0 0217	11-Nov-04	11-Nov-05
1460	Cable, 1 m	Harbour Industries	MIL 17/60-RG142	1460	23-Sep-04	23-Sep-05
1502	Cable RF, 6 m	Belden	M17/167 MIL-C-17	1502	12-Feb-05	12-Feb-06
1510	Cable RF, 8 m	Belden	M17/167 MIL-C-17	1510	02-Dec-04	02-Dec-05
1628	Isotropic Field Probe 0.01-1000 MHz, 1-300 V/m	Amplifier Research	FP2000	22122	06-Apr-05	06-Apr-06
1653	Analyzer EMC 9 kHz - 1.5 GHz	Agilent Technologies (HP)	E7401A	US394402 81	06-Feb-05	06-Feb-06
1941	Cable 18GHz, 4 m, green	Rhophase Microwave Limited	SPS-1803A-4000-NPS	T4657	17-Oct-04	17-Oct-05
1947	Cable 18GHz, 6.5 m, blue	Rhophase Microwave Limited	NPS-1803A-6500-NPS	T4974	17-Oct-04	17-Oct-05
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W, N-type	EMC Test Systems	3115	9911-5964	22-Mar-05	22-Mar-06



HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
2009	Cable RF, 8 m	Alpha Wire	RG-214	C-56	02-Dec-04	02-Dec-05
2254	Cable 40GHz, 0.8 m, blue	Rhophase Microwave Limited	KPS-1503A-800-KPS	W4907	23-Sep-04	23-Sep-05
2259	Amplifier Low Noise 2-20 GHz	Sophia Wireless	LNA0220-C	0223	05-Nov-04	05-Nov-05
2399	Cable 40GHz, 1.5 m, blue	Rhophase Microwave Limited	KPS-1503A-1500-KPS	X2945	24-Jun-05	24-Jun-06
2400	Cable 40GHz, 1.5 m, green	Rhophase Microwave Limited	KPS-1503A-1500-KPS	X2946	23-Sep-04	23-Sep-05
2432	Antenna, Double-Ridged Waveguide Horn 1-18 GHz	EMC Test Systems	3115	00027177	22-Mar-05	22-Mar-06
2499	Quadruplexer 1-12 GHz (1-2 GHz; 2-4GHz;4-8 GHz; 8-12GHz)	Elettronica S.p.A. - Roma	UE 84	D/00239	10-Feb-05	10-Feb-06
2524	Attenuator, 10 dB, DC-18 GHz	Midwest Microwave	263-10	2524	03-Jan-05	03-Jan-06
2780	EMS analyzer, 100 Hz to 26.5 GHz	Agilent Technologies (HP)	E7405A	MY4510246	11-Jun-05	11-Jun-06

**10 APPENDIX B Measurement uncertainties****Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements**

Test description	Expanded uncertainty
Transmitter tests	
Carrier power conducted at antenna connector	± 1.7 dB
Carrier power radiated (substitution method)	± 4.5 dB
Occupied bandwidth	±8%
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB
Spurious emissions radiated 30 MHz – 40 GHz (substitution method)	± 4.5 dB
Frequency error	30 – 300 MHz: ± 50.5 Hz (1.68 ppm) 300 – 1000 MHz: ± 168 Hz (0.56 ppm)
Transient frequency behaviour	187 Hz ± 13.9 %
Duty cycle, timing (Tx ON / OFF) and average factor measurements	± 1.0 %
Unintentional radiator tests	
Conducted emissions with LISN	9 kHz to 150 kHz: ± 3.9 dB 150 kHz to 30 MHz: ± 3.8 dB
Radiated emissions at 3 m measuring distance	
Horizontal polarization	Biconilog antenna: ± 5.3 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.3 dB
Vertical polarization	Double ridged horn antenna: ± 5.3 dB Biconilog antenna: ± 6.0 dB Biconical antenna: ± 5.7 dB Log periodic antenna: ± 6.0 dB Double ridged horn antenna: ± 6.0 dB

The test equipment has been calibrated according to its recommended procedures and is within the manufacturer's published limit of error. The standards and instruments used in the calibration system conform to the present requirements of ISO/IEC 17025 (or alternately ANSI/NCSL Z540-1).

The laboratory calibrates its measurement standards by a third party (traceable to NIST, USA) on a regular basis according to equipment manufacturer requirements. The Hermon Labs EMC measurements uncertainty is given in the table above.



11 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) and by Industry Canada for electromagnetic emissions (file numbers IC 2186-1 for OATS and IC 2186-2 for anechoic chamber), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, C-845 for conducted emissions site), assessed by TNO Certification EP&S (Netherlands) for a number of EMC, telecommunications, environmental, safety standards, and by AMTAC (UK) for safety of medical devices. 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).

Address: P.O. Box 23, Binyamina 30500, Israel.
Telephone: +972 4628 8001
Fax: +972 4628 8277
e-mail: mail@hermonlabs.com
website: www.hermonlabs.com

Person for contact: Mr. Alex Usoskin, CEO.

12 APPENDIX D Specification references

47CFR part 90: 2004	Private land mobile radio services
47CFR part 1: 2004	Practice and procedure
47CFR part 2: 2004	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-A:2001	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

**13 APPENDIX E Abbreviations and acronyms**

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

**14 APPENDIX F Test equipment correction factors**

Correction factor
Line impedance stabilization network
Model LISN 16 – 1, Hermon Laboratories

Frequency, MHz	Correction factor, dB
0.01	5.0
0.02	2.2
0.03	1.1
0.04	0.7
0.05	0.5
0.1	0.2
0.2	0.1
0.4	0.1
0.6	0.1
0.8	0.1
1	0.1
2	0.1
3	0.1
4	0.1
6	0.2
10	0.3
12	0.4
16	0.5
18	0.6
20	0.7
25	0.9
28	1.2
30	1.3

The correction factor in dB is to be added to meter readings of an interference analyzer or a spectrum analyzer.

Antenna Factor
Active Loop Antenna, EMC Test Systems, model 6502, serial number 2857

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

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



Antenna factor

Biconilog antenna EMCO, model 3141, serial number 1011

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

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



Antenna factor
Double-ridged wave guide horn antenna
EMC Test Systems, model 3115, serial no: 9911-5964

Frequency, MHz	Antenna gain, dBi	Antenna factor. dB(1/m)
1000.0	5.8	24.5
1500.0	9.0	24.8
2000.0	8.6	27.7
2500.0	9.5	28.7
3000.0	8.9	30.8
3500.0	8.2	32.9
4000.0	9.6	32.7
4500.0	11.2	32.1
5000.0	10.6	33.6
5500.0	9.8	35.3
6000.0	10.1	35.7
6500.0	10.7	35.8
7000.0	10.9	36.2
7500.0	10.5	37.2
8000.0	11.1	37.2
8500.0	10.8	38.1
9000.0	10.7	38.6
9500.0	11.5	38.3
10000.0	11.8	38.4
10500.0	12.3	38.3
11000.0	12.3	38.8
11500.0	11.5	39.9
12000.0	12.2	39.6
12500.0	12.6	39.5
13000.0	12.0	40.5
13500.0	11.7	41.1
14000.0	11.7	41.5
14500.0	12.7	40.8
15000.0	14.2	39.5
15500.0	16.0	38.1
16000.0	16.2	38.1
16500.0	14.5	40.1
17000.0	12.2	42.6
17500.0	9.7	45.4
18000.0	6.6	48.7

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



Antenna factor
Double-ridged wave guide horn antenna
EMC Test Systems, model 3115, serial no: 00027177

Frequency, MHz	Antenna gain, dBi	Antenna factor. dB(1/m)
1000.0	5.5	24.7
1500.0	8.0	25.7
2000.0	8.4	27.8
2500.0	9.3	28.9
3000.0	9.0	30.7
3500.0	9.3	31.8
4000.0	9.3	33.0
4500.0	10.4	32.8
5000.0	10.0	34.2
5500.0	10.1	34.9
6000.0	10.6	35.2
6500.0	11.0	35.4
7000.0	10.8	36.3
7500.0	10.4	37.3
8000.0	10.8	37.5
8500.0	10.8	38.0
9000.0	11.0	38.3
9500.0	11.5	38.3
10000.0	11.5	38.7
10500.0	11.9	38.7
11000.0	12.2	38.9
11500.0	11.9	39.5
12000.0	12.3	39.5
12500.0	12.7	39.4
13000.0	12.0	40.5
13500.0	12.0	40.8
14000.0	11.6	41.5
14500.0	12.2	41.3
15000.0	13.6	40.2
15500.0	15.3	38.7
16000.0	15.8	38.5
16500.0	14.8	39.8
17000.0	12.9	41.9
17500.0	9.2	45.8
18000.0	6.2	49.1

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



Cable loss

Cable coaxial, GORE A2P01POL118, 2.3 m, model GORE-3, serial number 176, HL 0589
+ Cable coaxial, ANDREW PSWJ4, 6 m, model: ANDREW-6, serial number 163, HL 1004

No.	Frequency, MHz	Cable loss, dB	Tolerance (Specification), dB	Measurement uncertainty, dB
1	30	0.33	≤ 6.5	±0.12
2	50	0.40		
3	100	0.57		
4	300	0.97		
5	500	1.25		
6	800	1.59		
7	1000	1.81		
8	1200	1.97		
9	1400	2.15		
10	1600	2.28		
11	1800	2.43		
12	2000	2.61		
13	2200	2.75		
14	2400	2.89		
15	2600	2.97		
16	2800	3.21	≤ 6.5	±0.12
17	3000	3.32		
18	3300	3.47		
19	3600	3.62		
20	3900	3.84		
21	4200	3.92		
22	4500	4.07		
23	4800	4.36		
24	5100	4.62		
25	5400	4.78		
26	5700	5.16		
27	6000	5.67		
28	6500	5.99		±0.17



Cable loss
RF cable 8 m, model RG-214, serial number C-56, HL 2009

No.	Frequency, MHz	Cable loss, dB	Tolerance (Specification), dB	Measurement uncertainty, dB
1	1	0.10	NA	±0.12
2	10	0.14		
3	30	0.25		
4	50	0.34		
5	100	0.53		
6	300	0.99		
7	500	1.31		
8	800	1.73		
9	1000	1.98		
10	1100	2.11		
11	1200	2.21		
12	1300	2.35		
13	1400	2.46		
14	1500	2.55		
15	1600	2.68		
16	1700	2.78		
17	1800	2.88		
18	1900	2.98		
19	2000	3.09		



Cable 40 GHz, 0.8 m, blue, model KPS-1503A-800-KPS, serial number W4907 (HL 2254), insertion loss

Frequency, GHz	Insertion loss, dB	Frequency, GHz	Insertion loss, dB
0.03	0.05	10.30	1.20
0.05	0.09	10.50	1.22
0.1	0.10	10.70	1.30
0.2	0.16	10.90	1.21
0.3	0.21	11.10	1.19
0.5	0.26	11.30	1.26
0.7	0.31	11.50	1.25
0.9	0.36	11.70	1.23
1.1	0.39	11.90	1.29
1.3	0.42	12.10	1.25
1.5	0.46	12.40	1.33
1.7	0.47	13.00	1.41
1.9	0.51	13.50	1.42
2.1	0.55	14.00	1.61
2.3	0.54	14.50	1.53
2.5	0.56	15.00	1.63
2.7	0.60	15.50	1.53
2.9	0.61	16.00	1.53
3.1	0.63	16.50	1.54
3.3	0.66	17.00	1.67
3.5	0.68	17.50	1.88
3.7	0.72	18.00	1.76
3.9	0.70	18.50	2.03
4.1	0.75	19.00	1.66
4.3	0.75	19.50	1.71
4.5	0.80	20.00	1.65
4.7	0.78	20.50	1.87
4.9	0.81	21.00	1.75
5.1	0.82	21.50	1.86
5.3	0.84	22.00	1.81
5.5	0.84	22.50	2.03
5.7	0.86	23.00	1.91
5.9	0.90	23.50	1.87
6.1	0.91	24.00	1.97
6.3	0.95	24.50	1.85
6.5	0.92	25.00	2.01
6.7	0.91	25.50	2.02
6.9	0.95	26.00	2.15
7.1	0.98	26.50	2.11
7.3	1.03	27.00	2.00
7.5	0.98	28.00	2.04
7.7	1.06	29.00	1.97
7.9	1.08	30.00	1.97
8.1	1.06	31.00	2.31
8.3	1.10	32.00	2.24
8.5	1.10	33.00	2.31
8.7	1.12	34.00	2.36
8.9	1.12	35.00	2.33
9.1	1.14	36.00	2.47
9.3	1.18	37.00	2.56
9.5	1.16	38.00	2.45
9.7	1.18	39.00	2.68
9.9	1.17	40.00	2.60
10.1	1.18		



Cable 18GHz, 4 m, green, model: SPS-1803A-4000-NPS, s/n T4657 (HL 1941)
Calibration data

Frequency, GHz	Insertion loss, dB
0.03	0.19
0.05	0.24
0.10	0.33
0.20	0.46
0.30	0.57
0.40	0.65
0.50	0.73
0.60	0.80
0.70	0.87
0.80	0.92
0.90	0.98
1.00	1.03
1.10	1.08
1.20	1.14
1.30	1.18
1.40	1.22
1.50	1.27
1.60	1.32
1.70	1.35
1.80	1.40
1.90	1.43
2.00	1.46
2.10	1.50
2.20	1.54
2.30	1.57
2.40	1.61
2.50	1.64
2.60	1.67
2.70	1.70
2.80	1.74
2.90	1.77
3.10	1.83
3.30	1.89
3.50	1.95
3.70	2.01
3.90	2.07
4.10	2.14
4.30	2.18
4.50	2.26
4.70	2.31
4.90	2.32
5.10	2.42
5.30	2.45
5.50	2.47
5.70	2.53
5.90	2.59

Frequency, GHz	Insertion loss, dB
6.10	2.63
6.30	2.66
6.50	2.72
6.70	2.77
6.90	2.78
7.10	2.81
7.30	2.87
7.50	2.92
7.70	2.94
7.90	3.02
8.10	3.06
8.30	3.13
8.50	3.14
8.70	3.16
8.90	3.23
9.10	3.20
9.30	3.22
9.50	3.31
9.70	3.32
9.90	3.39
10.10	3.42
10.30	3.46
10.50	3.46
10.70	3.48
10.90	3.50
11.10	3.58
11.30	3.63
11.50	3.65
11.70	3.85
11.90	3.81
12.10	3.84
12.40	3.91
13.00	3.87
13.50	3.99
14.00	4.12
14.50	4.17
15.00	4.27
15.50	4.33
16.00	4.38
16.50	4.38
17.00	4.42
17.50	4.61
18.00	4.78



Insertion loss
Cable coax microwave, 1 m, model: PFP01P10394, HL 0410

Frequency, GHz	Insertion loss, dB
0.03	0.04
0.05	0.06
0.1	0.08
0.2	0.11
0.3	0.13
0.5	0.19
0.7	0.23
0.9	0.26
1.1	0.30
1.3	0.32
1.5	0.33
1.7	0.39
1.9	0.38
2.1	0.43
2.3	0.44
2.5	0.48
2.7	0.49
2.9	0.49
3.1	0.53
3.3	0.50
3.5	0.58
3.7	0.56
3.9	0.71
4.1	0.66
4.3	0.79
4.5	0.72
4.7	0.71
4.9	0.68
5.1	0.65
5.3	0.66
5.5	0.78
5.7	0.86
5.9	0.85
6.1	0.99
6.3	0.82
6.5	0.87
6.7	0.77
6.9	0.81
7.1	0.84
7.3	0.97
7.5	0.90
7.7	0.90

Frequency, GHz	Insertion loss, dB
7.9	0.96
8.1	0.83
8.3	1.02
8.5	0.94
8.7	1.14
8.9	1.06
9.1	1.23
9.3	1.02
9.5	1.04
9.7	1.09
9.9	1.05
10.1	1.29
10.3	1.24
10.5	1.39
10.7	1.17
10.9	1.39
11.1	1.11
11.3	1.31
11.5	1.15
11.7	1.18
11.9	1.20
12.1	1.21
12.4	1.20
13.0	1.22
13.5	1.38
14.0	1.56
14.5	1.34
15.0	1.56
15.5	1.65
16.0	1.35
16.5	1.47
17.0	1.60
17.5	1.55
18.0	1.93



Cable RF 40 GHz, 1.5m, blue, model: KPS-1503A-1500-KPS, s/n X2945 (HL 2399)
Insertion loss

Frequency, GHz	Insertion Loss, dB
0.03	0.26
0.05	0.25
0.1	0.34
0.2	0.47
0.3	0.56
0.5	0.71
0.7	0.83
0.9	0.93
1.1	1.01
1.3	1.08
1.5	1.16
1.7	1.22
1.9	1.29
2.1	1.33
2.3	1.38
2.5	1.45
2.7	1.50
2.9	1.55
3.1	1.60
3.3	1.66
3.5	1.71
3.7	1.75
3.9	1.79
4.1	1.84
4.3	1.87
4.5	1.91
4.7	1.95
4.9	1.98
5.1	2.02
5.3	2.04
5.5	2.07
5.7	2.11
5.9	2.12
6.1	2.16
6.3	2.20
6.5	2.23
6.7	2.23
6.9	2.27
7.1	2.32
7.3	2.32
7.5	2.34
7.7	2.38
7.9	2.39
8.1	2.39
8.3	2.43
8.5	2.51
8.7	2.48
8.9	2.51
9.1	2.54
9.3	2.53
9.5	2.56
9.7	2.54
9.9	2.57



Cable 40 GHz, 1.5 m, green; model KPS-1503A-1500-KPS, serial number X2946 (HL 2400)

Frequency, GHz	Insertion loss, dB
0.03	0.06
0.05	0.08
0.1	0.15
0.2	0.23
0.3	0.29
0.5	0.37
0.7	0.46
0.9	0.53
1.1	0.58
1.3	0.65
1.5	0.66
1.7	0.72
1.9	0.76
2.1	0.79
2.3	0.85
2.5	0.90
2.7	0.91
2.9	0.97
3.1	0.97
3.3	1.03
3.5	1.06
3.7	1.10
3.9	1.13
4.1	1.16
4.3	1.18
4.5	1.21
4.7	1.23
4.9	1.26
5.1	1.28
5.3	1.31
5.5	1.32
5.7	1.36
5.9	1.37
6.1	1.38
6.3	1.44
6.5	1.46
6.7	1.49
6.9	1.50
7.1	1.51
7.3	1.55
7.5	1.56
7.7	1.58
7.9	1.60
8.1	1.61
8.3	1.68
8.5	1.68
8.7	1.75
8.9	1.74
9.1	1.81
9.3	1.79
9.5	1.86
9.7	1.85
9.9	1.87
10.1	1.88

Frequency, GHz	Insertion loss, dB
10.30	1.82
10.50	1.92
10.70	1.86
10.90	1.96
11.10	1.90
11.30	1.99
11.50	1.95
11.70	2.00
11.90	2.01
12.10	1.99
12.40	2.06
13.00	2.11
13.50	2.17
14.00	2.36
14.50	2.32
15.00	2.30
15.50	2.34
16.00	2.34
16.50	2.40
17.00	2.46
17.50	2.54
18.00	2.61
18.50	2.59
19.00	2.59
19.50	2.67
20.00	2.62
20.50	2.73
21.00	2.71
21.50	2.78
22.00	2.83
22.50	2.81
23.00	2.91
23.50	2.97
24.00	2.98
24.50	2.97
25.00	3.03
25.50	3.04
26.00	3.11
26.50	2.97
27.00	3.15
28.00	3.07
29.00	3.13
30.00	3.13
31.00	3.18
32.00	3.31
33.00	3.32
34.00	3.37
35.00	3.36
36.00	3.46
37.00	3.49
38.00	3.52
39.00	3.62
40.00	3.77



Cable RF, 8m, model: M17/167 MIL-C-17, s/n 1510 (HL 1510)
Calibration data (0.1 – 1000 MHz)

No.	Parameter	Set, MHz	Measured, dB	Deviation	Tolerance (specification), dB	Measured uncertainty dB
1	Attenuation	0.1	0.05	NA	NA	±0.12
2		1	0.09			
3		3	0.16			
4		5	0.18			
5		10	0.27			
6		30	0.44			
7		50	0.58			
8		80	0.69			
9		100	0.82			
10		300	1.48			
11		500	2.01			
12		800	2.65			
13		1000	3.12			



Cable RF, 6m, model: M17/167 MIL-C-17, s/n 1502 (HL 1502)
Calibration data (0.1 – 1000 MHz)

No.	Parameter	Set, MHz	Measured, dB	Deviation	Tolerance (specification), dB	Measured uncertainty dB
1	Attenuation	0.1	0.02	NA	NA	±0.12
2		1	0.07			
3		3	0.15			
4		5	0.17			
5		10	0.26			
6		30	0.43			
7		50	0.57			
8		80	0.72			
9		100	0.81			
10		300	1.48			
11		500	2.00			
12		800	2.70			
13		1000	3.09			