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Electrical

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TEST REPORT

ACCORDING TO: CFR47 FCC parts 22, 24

FOR:

Motorola Israel Ltd.

QuadBand GSM/GPRS/EGPRS module

Model:G24EDGE

Table of contents

1 Applicant information

Client name:	Motorola Israel Ltd.
Address:	3 Kremenetski street, P.O.B. 25016, 67899 Tel Aviv, Israel
Telephone:	+972 3565 8888
Fax:	+972 3565 9968
E-mail:	alfred.firouz@motorola.com
Contact name:	Mr. Alfred Firouz

2 Equipment under test attributes

Product name:	QuadBand GSM/GPRS/EGPRS module
Model(s):	G24EDGE
Serial number:	074SGDB286
Hardware version:	FCN5752A
Software release:	0C.13.01D
Receipt date	4/11/2006

3 Manufacturer information

Client name:	Motorola Israel Ltd.
Address:	3 Kremenetski street, P.O.B. 25016, 67899 Tel Aviv, Israel
Telephone:	+972 3565 8888
Fax:	+972 3565 9968
E-mail:	alfred.firouz@motorola.com
Contact name:	Mr. Alfred Firouz

4 Test details

Project ID:	17052
Location:	Hermon Laboratories Ltd. P.O.Box 23, Binyamina 30500, Israel
Test started:	4/11/2006
Test completed:	4/21/2006
Test specification(s):	FCC 47 CFR parts 22, 24:2004, part 15:2005 subpart B, §§15.107, 15.109

5 Tests summary

Test	Status
Transmitter characteristics	
Sections 22.913, 24.232, RF output power	Pass
Sections 24.238(b), 2.1049, Occupied bandwidth	Pass
Sections 22.917, 24.238, Spurious emissions at antenna terminal	Pass
Sections 22.917, 24.238, Emissions at band edges	Pass
Sections 22.917, 24.238, Radiated spurious emissions	Pass
Sections 22.355, 24.235, Frequency stability	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.

	Name and Title	Date	Signature
Tested by:	Mr. A. Adelberg, test engineer	April 21, 2006	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	May 11, 2006	
Approved by:	Mr. M. Nikishin, EMC and Radio group leader	May 11, 2006	

6 EUT description

6.1 General information

The EUT is a QuadBand GSM module, powered by DC power supply. Throughout the testing the EUT was installed into an evaluation board.

6.2 Support and test equipment

Description	Manufacturer	Model number	Serial number
Evaluation board	Motorola	G24eboard	8488899V01P1

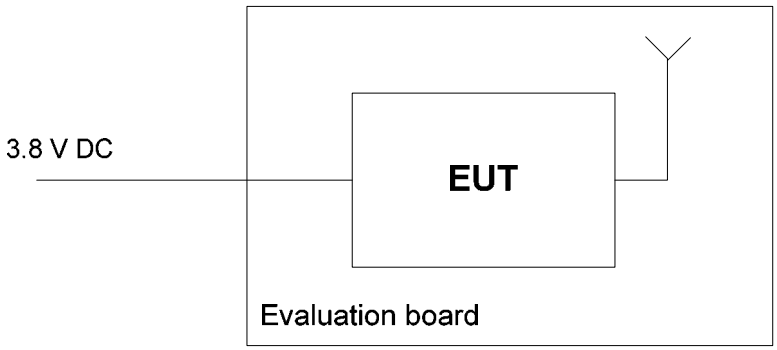
6.3 Operating frequencies

Source	Frequency, MHz		
Digital portion	26	NA	NA
Cell 850	824.2	836.4	848.8
PCS 1900	1850.2	1880	1909.8

6.4 Changes made in the EUT

No changes were implemented.

6.5 EUT test configuration



6.6 Transmitter characteristics

Type of equipment	
	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)
X	Plug-in card (Equipment intended for a variety of host systems)

Intended use		**Condition of use**
	fixed	Always at a distance more than 2 m from all people
X	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	824 – 849 MHz/1850 – 1910 MHz
Operating frequency range	824.2 – 848.8 MHz/1850.2 – 1909.8 MHz
RF channel spacing	200 kHz
Maximum rated output power	At transmitter 50 Ω RF output connector: 850 – 31.33 dBm 1900 –30.46 dBm

Is transmitter output power variable?				
	No			
X	Yes		continuous variable	
		X	stepped variable with stepsize	2 dB
		minimum RF power		0 dBm
		maximum RF power		850 – 31.33 dBm 1900 – 30.46 dBm

Antenna connection			
unique coupling	MMCX standard connector	X integral	X with temporary RF connector
			without temporary RF connector

Antenna/s technical characteristics		
Type	Frequency range	Maximum permissive gain of antenna assembly including cable loss
External	824.0 – 849.0 MHz	7.1 dBd (9.25 dBi)
	1850 – 1910 MHz	2.5 dBi

Transmitter 99% power bandwidth	250 kHz				
Transmitter aggregate data rate/s	384 kbps				
Transmitter aggregate symbol (baud) rate/s	270.883 kbps				
Type of modulation	8PSK				
Type of multiplexing	TDMA				
Modulating test signal (baseband)	Pseudo Random Sequence with midamble 0				
Maximum transmitter duty cycle in normal use	25 %	**Tx ON time**	1.1 msec	**Period**	4.5 msec
Transmitter duty cycle supplied for test	12.5 %	**Tx ON time**	0.55 msec	**Period**	4.5 msec

Transmitter power source					
X	DC	**Nominal rated voltage**	3.3 - 4.2 VDC	Battery type	

Common power source for transmitter and receiver	X	yes	no

Test specification:	Section 22.913, Peak output power		
Test procedure:	FCC part 22, Section 22.913		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

7 Transmitter tests according to 47CFR part 22 requirements

7.1 Peak output power

7.1.1 General

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

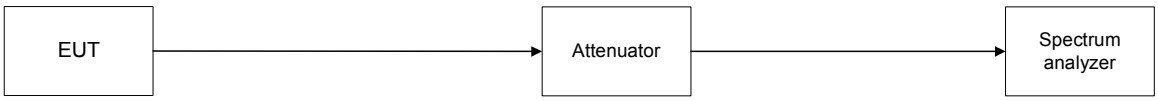
Table 7.1.1 Peak output power limits

Assigned frequency range, MHz	Maximum peak output power	
	W	dBm
824 – 849	7.0	38.45

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



Photograph 7.1.1 Peak output power test setup

Test specification:	**Section 22.913, Peak output power**		
Test procedure:	FCC part 22, Section 22.913		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 46 %	**Power Supply:** 3.8 VDC
Remarks:			

Table 7.1.2 Peak output power test results

OPERATING FREQUENCY RANGE:	824 - 849 MHz
DETECTOR USED:	Peak
RESOLUTION BANDWIDTH:	3000 kHz
VIDEO BANDWIDTH:	3000 kHz
MODULATION:	8PSK
MODULATING SIGNAL:	PRBS
SYMBOL RATE:	270 kbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum

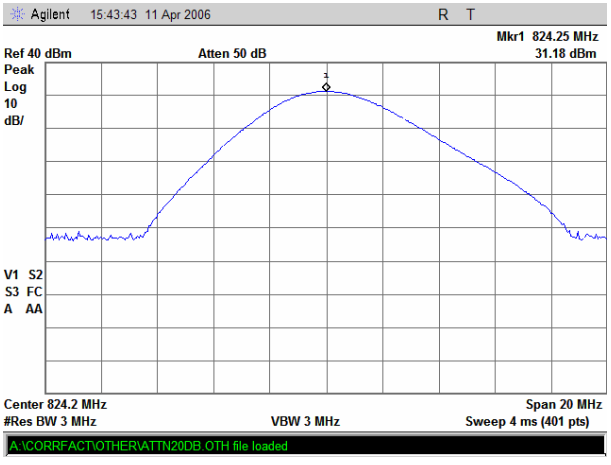
Carrier frequency, MHz	Spectrum analyzer reading, dBm	External attenuation, dB	Cable loss, dB	RF output power, dBm	Limit, dBm	Margin, dB	Verdict
824.2	31.18	Included	NA	31.18	38.45	-7.27	Pass
836.4	31.33	Included	NA	31.33	38.45	-7.12	Pass
848.8	31.16	Included	NA	31.16	38.45	-7.29	Pass

Reference numbers of test equipment used

HL 2780							

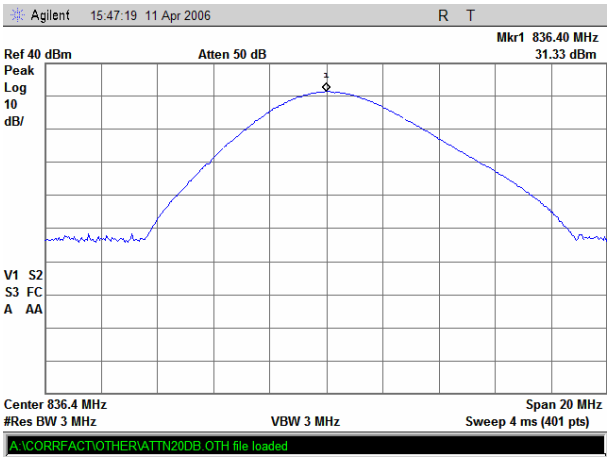
Full description is given in Appendix A.

Plot 7.1.1 Peak output power test results at low frequency

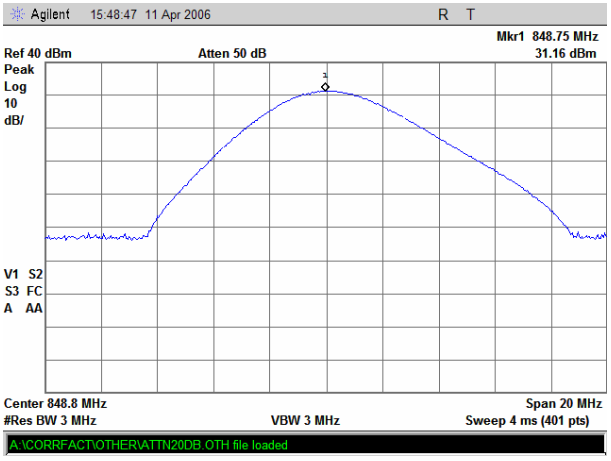


Test specification:	Section 22.913, Peak output power		
Test procedure:	FCC part 22, Section 22.913		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21°C	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.1.2 Peak output power test results at mid frequency



Plot 7.1.3 Peak output power test results at high frequency



Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	FCC part 2, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 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.

Table 7.2.1 Occupied bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points*, dBc
824 - 849	26

* - 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 the results provided in Table 7.2.2 and the associated plots.

Figure 7.2.1 Occupied bandwidth test setup

Photograph 7.2.1 Occupied bandwidth test setup

Test specification:	**Section 2.1049, Occupied bandwidth**		
Test procedure:	FCC part 2, Section 2.1049		
Test mode:	Compliance	**Verdict:**	PASS
Date:	4/11/2006		
Temperature: 21ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 46 %	**Power Supply:** 3.8 VDC
Remarks:			

Table 7.2.2 Occupied bandwidth test results

DETECTOR USED:	Peak hold
RESOLUTION BANDWIDTH:	3 kHz
VIDEO BANDWIDTH:	10 kHz
MODULATION ENVELOPE REFERENCE POINTS:	26 dBc
MODULATION:	8PSK
MODULATING SIGNAL:	PRBS
SYMBOL RATE:	270 kbps

Carrier frequency, MHz	Lower reference point, MHz	Upper reference point, MHz	Occupied bandwidth, kHz
824.2	824.0800	824.3225	242.5
836.4	836.2675	836.5275	260.0
848.8	848.6775	848.9250	247.5

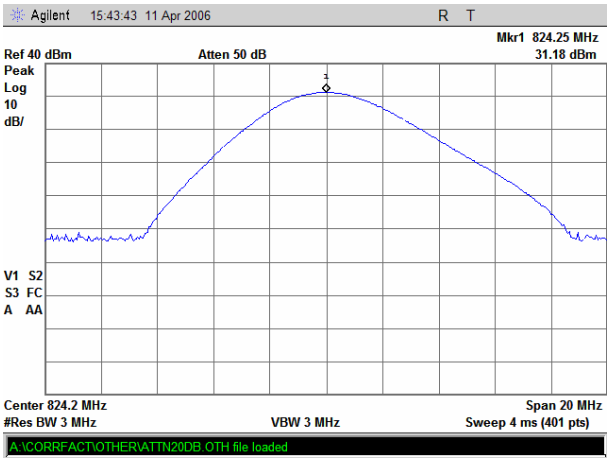
Reference numbers of test equipment used

HL 2780						

Full description is given in Appendix A.

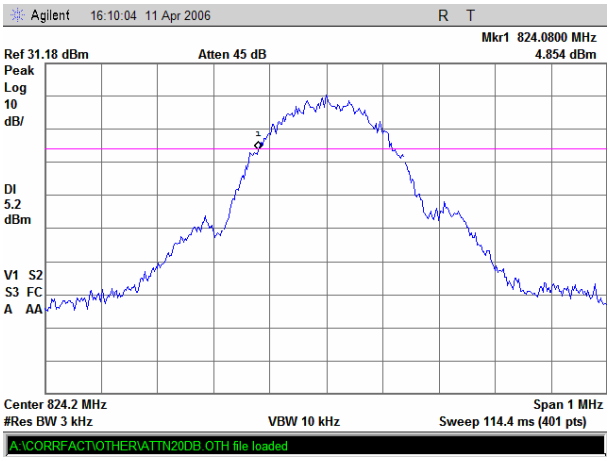
Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	FCC part 2, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21°C	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.2.1 Occupied bandwidth test result at low frequency, reference level

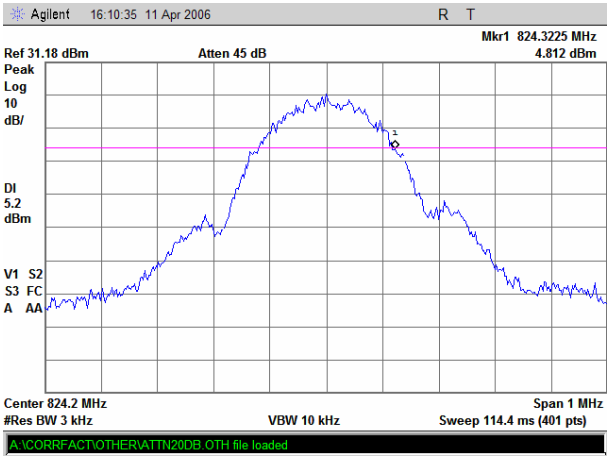


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	FCC part 2, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21°C	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.2.2 Occupied bandwidth test result at low frequency, lower reference point

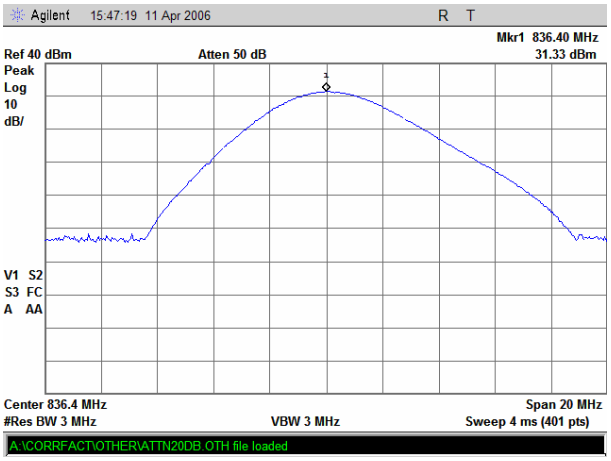


Plot 7.2.3 Occupied bandwidth test result at low frequency, higher reference point

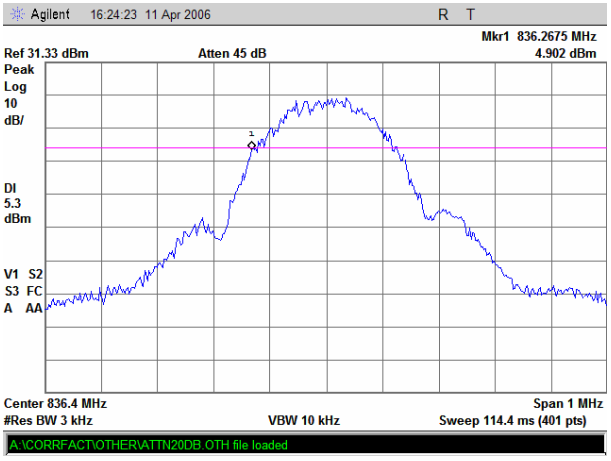


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	FCC part 2, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21°C	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.2.4 Occupied bandwidth test result at mid frequency, reference level

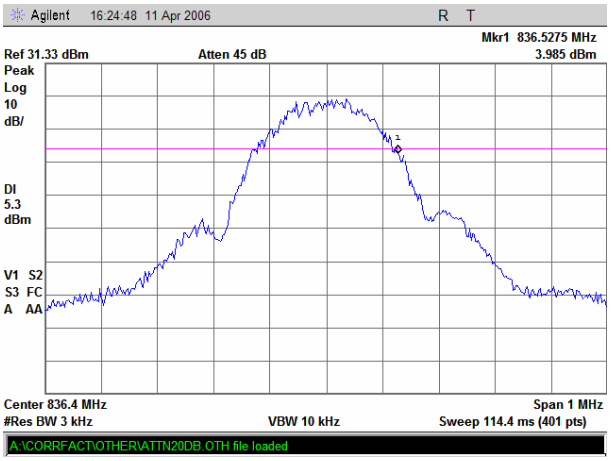


Plot 7.2.5 Occupied bandwidth test result at mid frequency, lower reference point

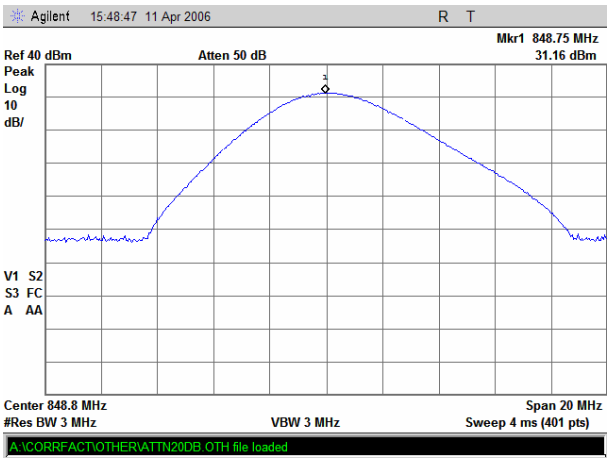


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	FCC part 2, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21°C	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.2.6 Occupied bandwidth test result at mid frequency, higher reference point

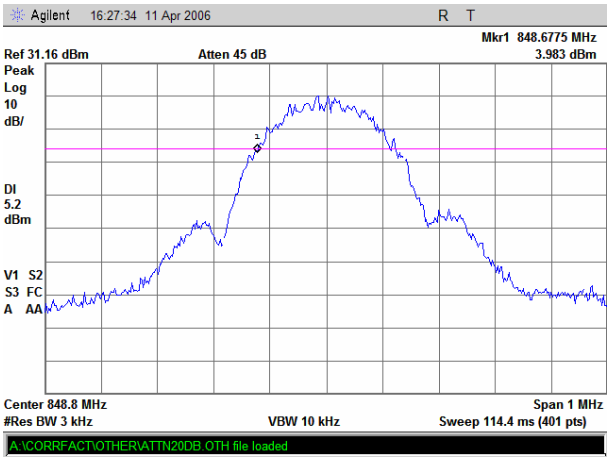


Plot 7.2.7 Occupied bandwidth test result at high frequency, reference level

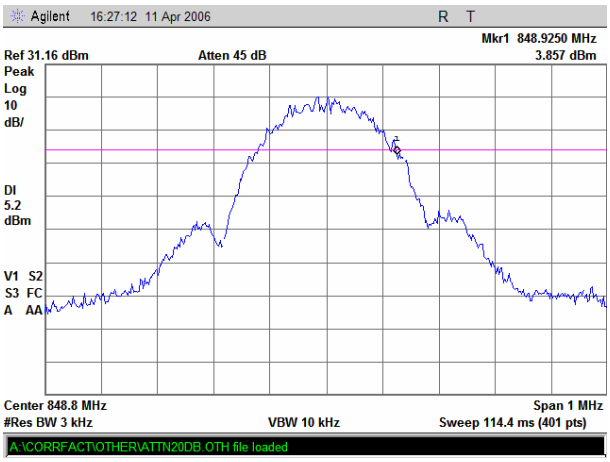


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	FCC part 2, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21°C	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.2.8 Occupied bandwidth test result at high frequency, lower reference point

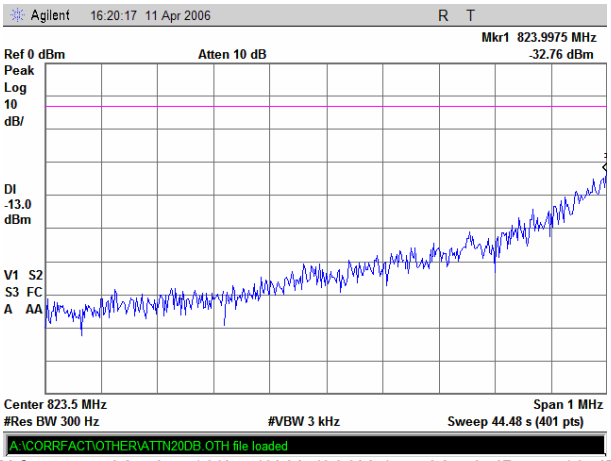


Plot 7.2.9 Occupied bandwidth test result at high frequency, higher reference point



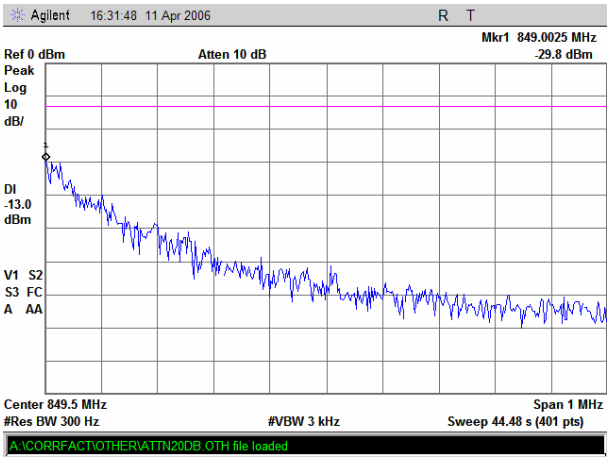
Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	FCC part 2, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21°C	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.2.10 Band edge emission measurements in 823 - 824 MHz range at low carrier frequency



Signal power = SA reading + BW factor = -32.76 + 10*log(3kHz/300Hz) = -32.76 dBm + 10 dB = -22.76 dBm

Plot 7.2.11 Band edge emission measurements in 849 - 850 MHz range at high carrier frequency



Signal power = SA reading + BW factor = -29.80 + 10*log(3kHz/300Hz) = -29.80 dBm + 10 dB = -19.80 dBm

For band edge emissions measurement procedure refer to section 7.3

Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21ºC	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

7.3 Spurious emissions at RF antenna connector test

7.3.1 General

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

Table 7.3.1 Spurious emission limits

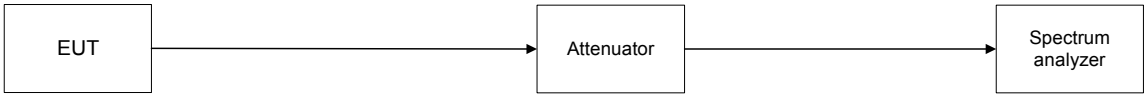
Frequency, MHz	Attenuation below carrier, dBc	ERP of spurious, dBm
0.009 – 10th harmonic*	43+10logP*	-13.0

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

7.3.2 Test procedure

7.3.2.1 The EUT was set up as shown in Figure 7.3.1, energized and its proper operation was checked.
7.3.2.2 The EUT was adjusted to produce maximum available for end user RF output power.
7.3.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.3.2 and associated plots.

Figure 7.3.1 Spurious emission test setup



Photograph 7.3.1 Spurious emission test setup

Test specification:	**Section 22.917, Spurious emission at antenna terminal**		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	**Verdict:**	PASS
Date:	4/12/2006		
Temperature: 21ºC	**Air Pressure:** 1014 hPa	**Relative Humidity:** 45 %	**Power Supply:** 3.8 VDC
Remarks:			

Table 7.3.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 824 – 849 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 – 9000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATION: 8PSK
MODULATING SIGNAL: PRBS
SYMBOL RATE: 270 kbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
TRANSMITTER OUTPUT POWER: 31.18 dBm at low frequency
31.33 dBm at mid frequency
31.16 dBm at high 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									
821.9975	-22.76	Included	NA	100	-22.76	53.94	43.12	10.82	Pass
1648.3600	-41.32	Included	NA	100	-41.32	72.50	43.12	29.38	Pass
2472.6850	-45.75	Included	NA	100	-45.75	76.93	43.12	33.81	Pass
Mid carrier frequency									
1672.8050	-41.36	Included	NA	100	-41.36	72.69	43.13	29.56	Pass
2509.1850	-45.91	Included	NA	100	-45.91	77.24	43.13	34.11	Pass
High carrier frequency									
849.0025	-19.80	Included	NA	100	-19.80	50.96	43.12	7.84	Pass
1697.5750	-41.05	Included	NA	100	-41.05	72.21	43.12	29.09	Pass
2546.3700	-46.58	Included	NA	100	-46.58	77.74	43.12	34.62	Pass

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

**- $Limit_{low} = 43+10*\log(P_W) = 43+10*\log(1.3118) = 43.12$

**- $Limit_{mid} = 43+10*\log(P_W) = 43+10*\log(1.3583) = 43.13$

**- $Limit_{high} = 43+10*\log(P_W) = 43+10*\log(1.3062) = 43.12$

***- Attenuation below $carrier_{low\ \&\ high} = 43.12 – Spurious\ emission$

***- Attenuation below $carrier_{mid} = 43.13 – Spurious\ emission$

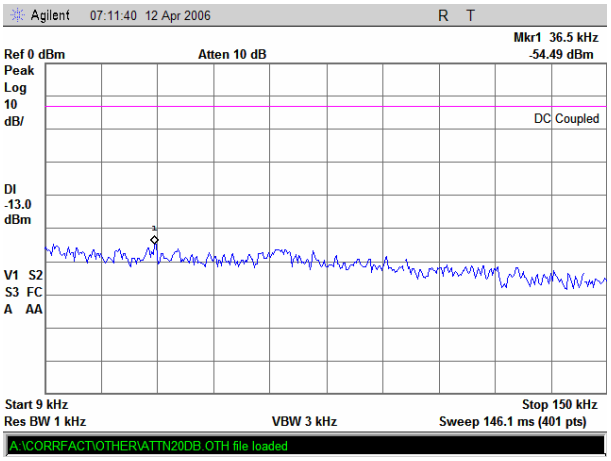
Reference numbers of test equipment used

HL 1650	HL 2780					

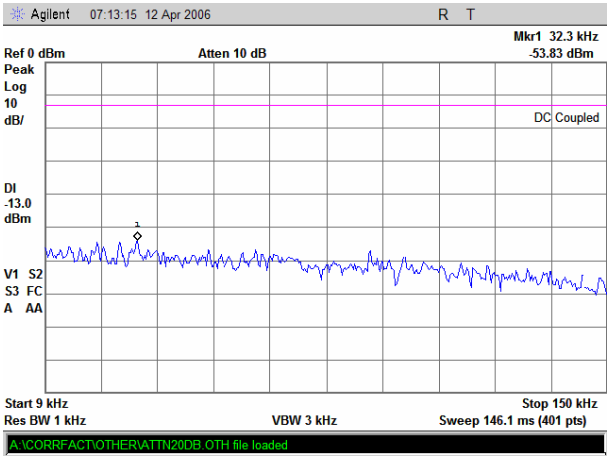
Full description is given in Appendix A.

Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.3.1 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency

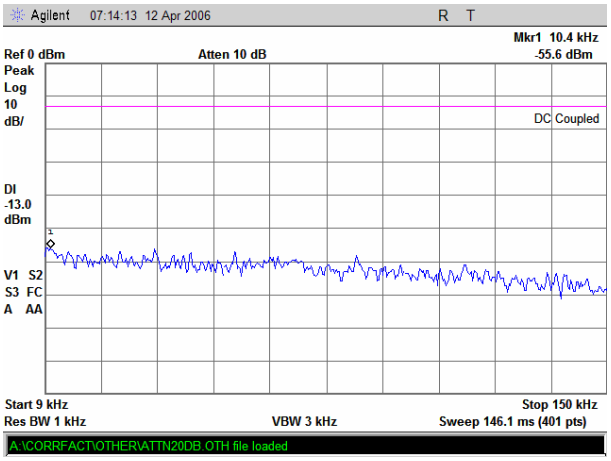


Plot 7.3.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency

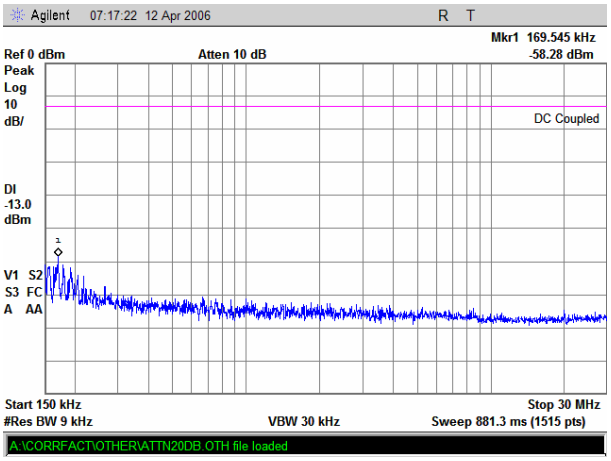


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.3.3 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency

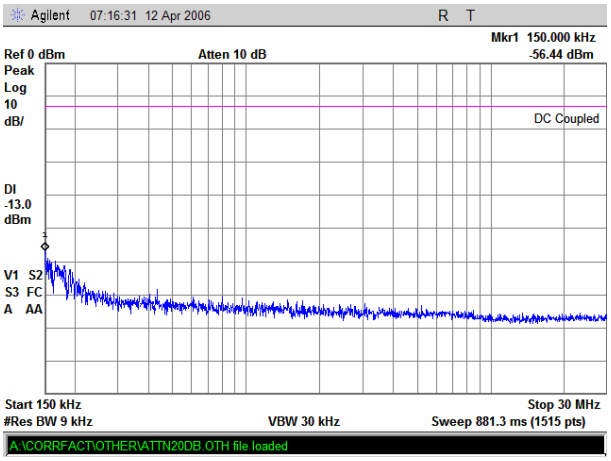


Plot 7.3.4 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency

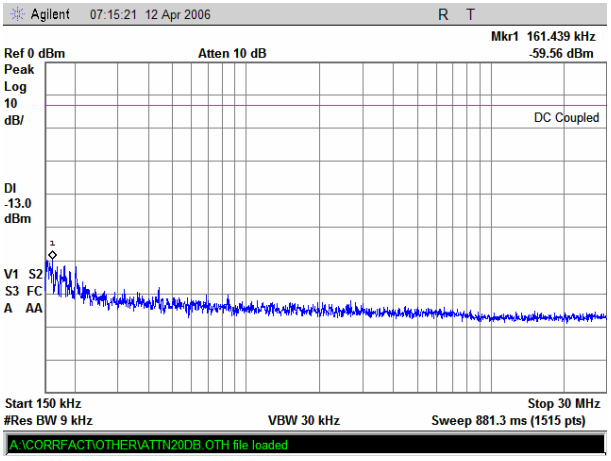


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.3.5 Spurious emission measurements in 0.15 - 30.0 MHz range at mid carrier frequency

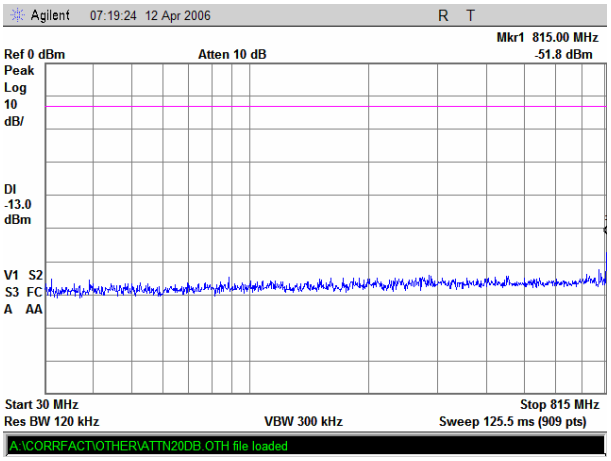


Plot 7.3.6 Spurious emission measurements in 0.15 – 30.0 MHz range at high carrier frequency

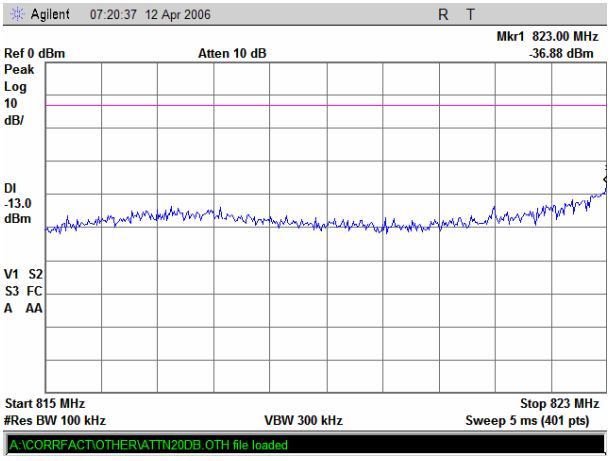


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.3.7 Spurious emission measurements in 30.0 - 815 MHz range at low carrier frequency

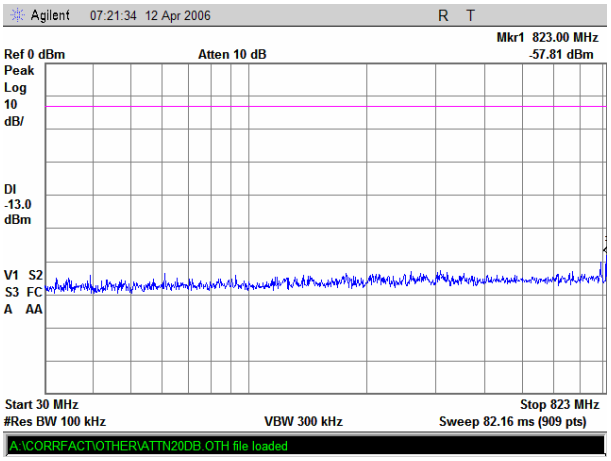


Plot 7.3.8 Spurious emission measurements in 815 - 823 MHz range at low carrier frequency

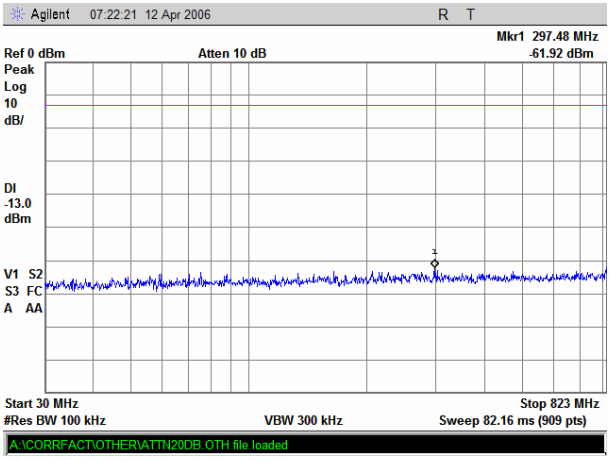


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.3.9 Spurious emission measurements in 30.0 - 823 MHz range at mid carrier frequency

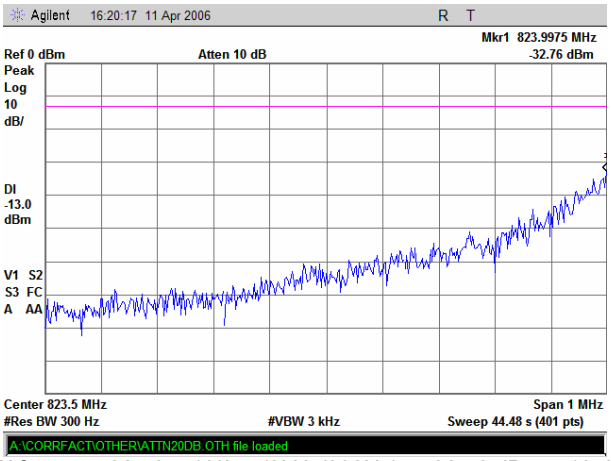


Plot 7.3.10 Spurious emission measurements in 30.0 - 823 MHz range at high carrier frequency



Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

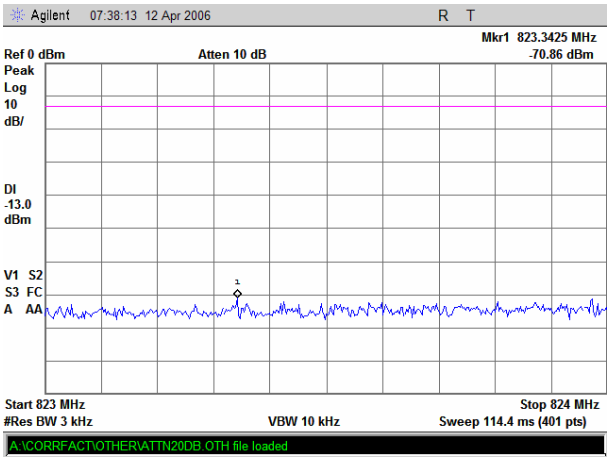
Plot 7.3.11 Spurious emission measurements in 823 - 824 MHz range at low carrier frequency



Signal power = SA reading + BW factor = -32.76 + 10*log (3kHz/300Hz) = -32.76 dBm + 10 dB = -22.76 dBm

Note: According to FCC 22.917: “In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.”

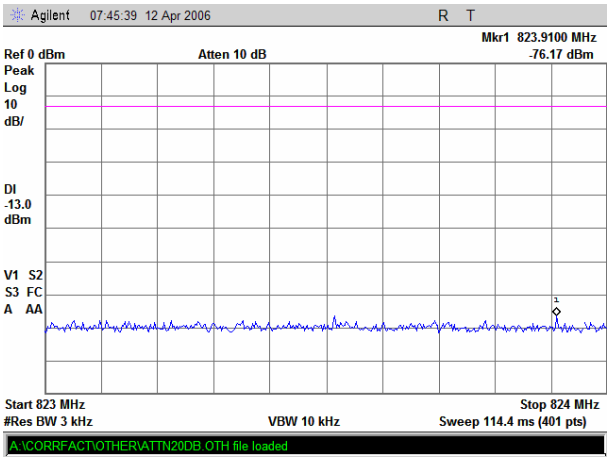
Plot 7.3.12 Spurious emission measurements in 823 - 824 MHz range at mid carrier frequency



Note: see Note to plot 7.3.11

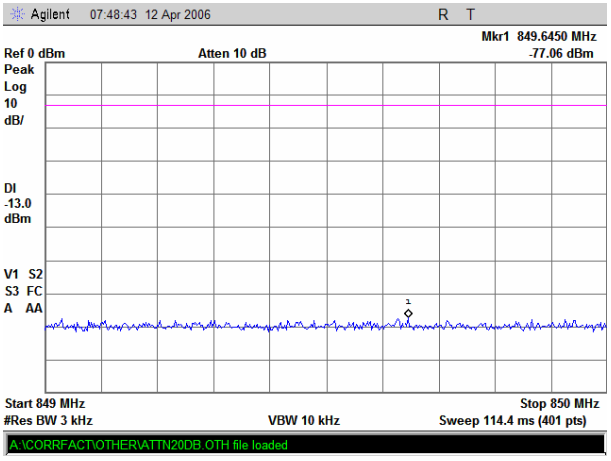
Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.3.13 Spurious emission measurements in 823 - 824 MHz range at high carrier frequency



Note: see Note to plot 7.3.11

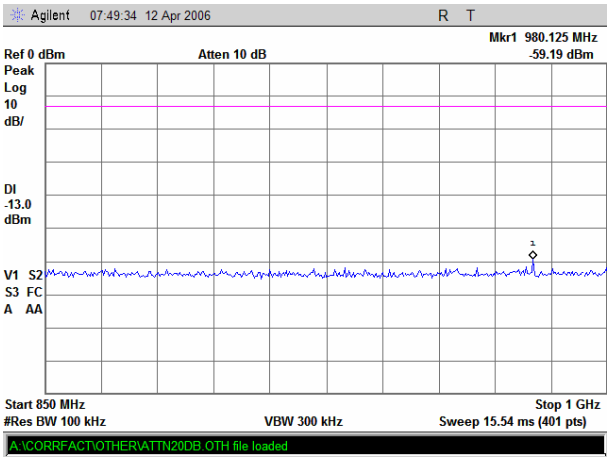
Plot 7.3.14 Spurious emission measurements in 849 - 850 MHz range at low carrier frequency



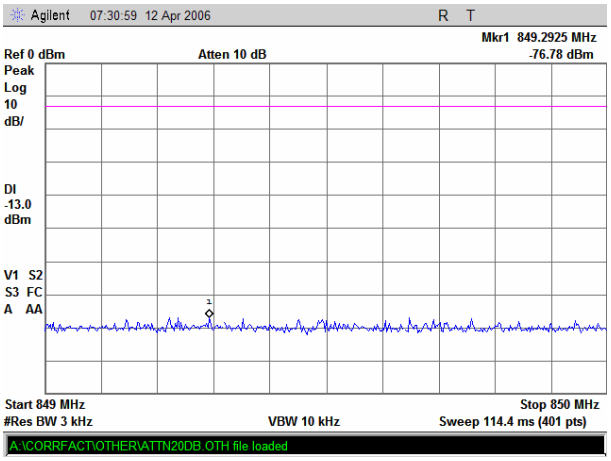
Note: see Note to plot 7.3.11

Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.3.15 Spurious emission measurements in 850 - 1000 MHz range at low carrier frequency



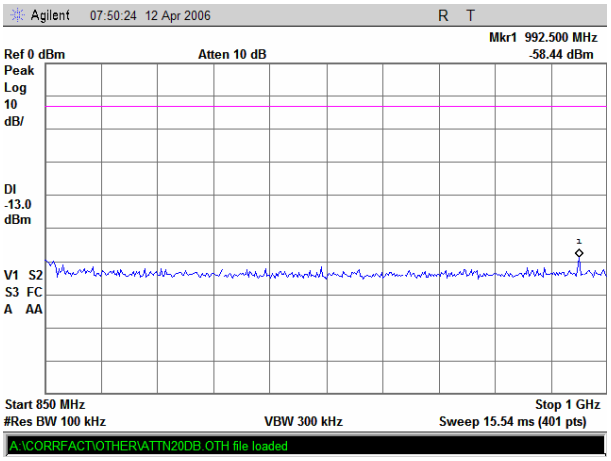
Plot 7.3.16 Spurious emission measurements in 849 - 850 MHz range at mid carrier frequency



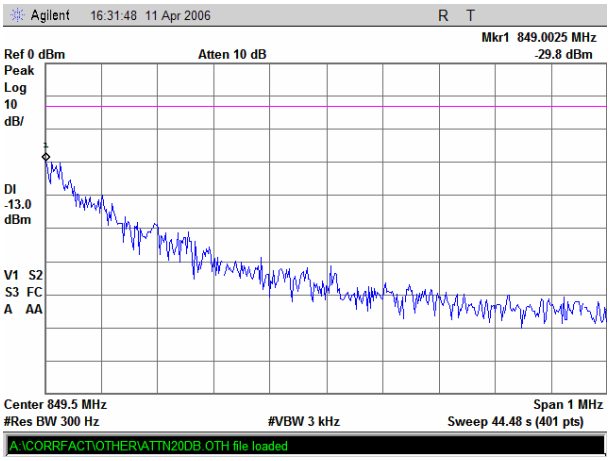
Note: see Note to plot 7.3.11

Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.3.17 Spurious emission measurements in 850 - 1000 MHz range at mid carrier frequency



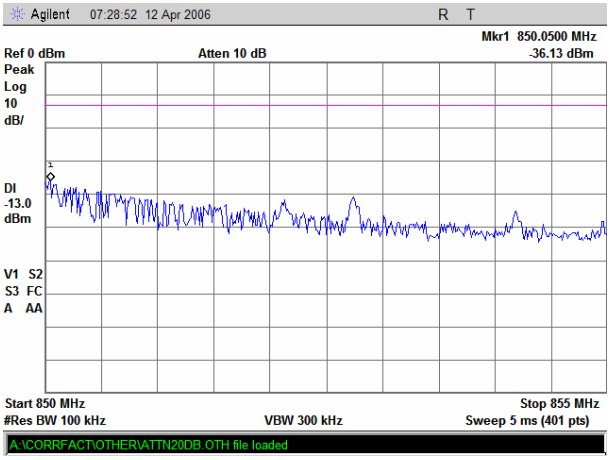
Plot 7.3.18 Spurious emission measurements in 849 - 850 MHz range at high carrier frequency



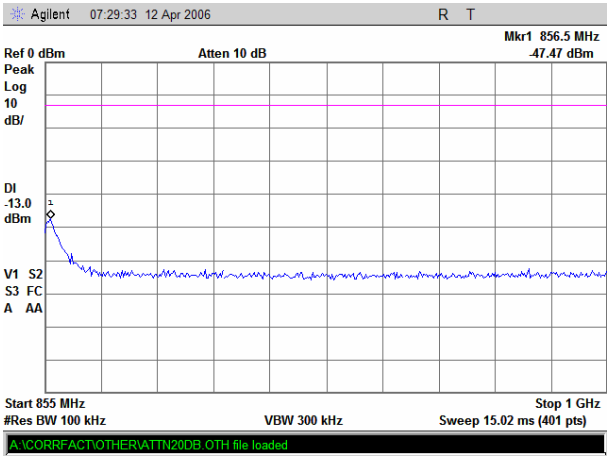
Signal power = SA reading + BW factor = -29.80 + 10*log (3kHz/300Hz) = -29.80 dBm + 10 dB = -19.80 dBm
Note: see Note to plot 7.3.11

Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.3.19 Spurious emission measurements in 850 - 855 MHz range at high carrier frequency

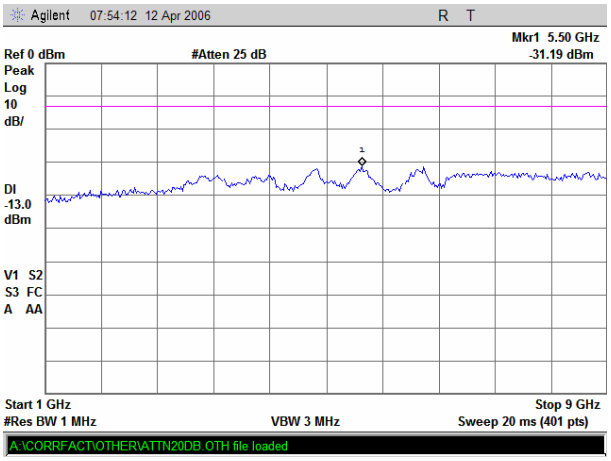


Plot 7.3.20 Spurious emission measurements in 855 - 1000 MHz range at high carrier frequency

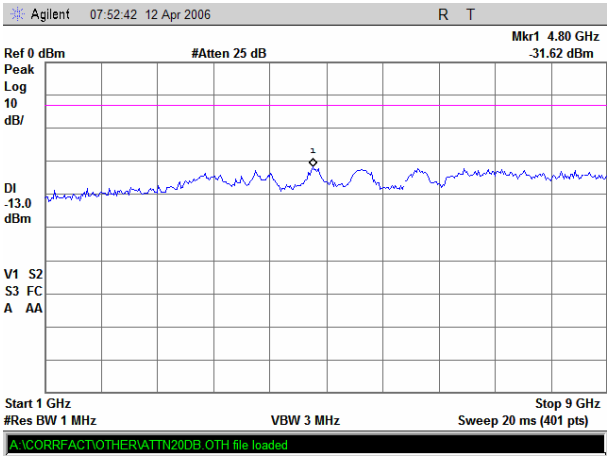


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.3.21 Spurious emission measurements in 1000 - 9000 MHz range at low carrier frequency

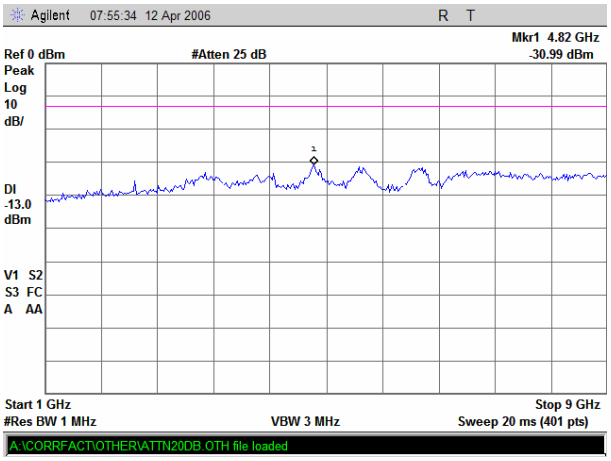


Plot 7.3.22 Spurious emission measurements in 1000 - 9000 MHz range at mid carrier frequency

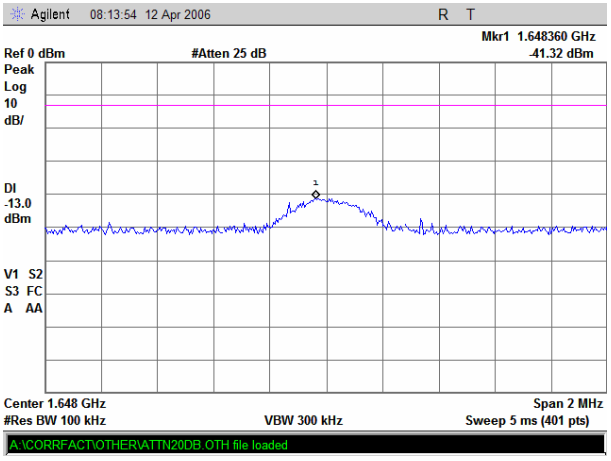


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.3.23 Spurious emission measurements in 1000 - 9000 MHz range at high carrier frequency

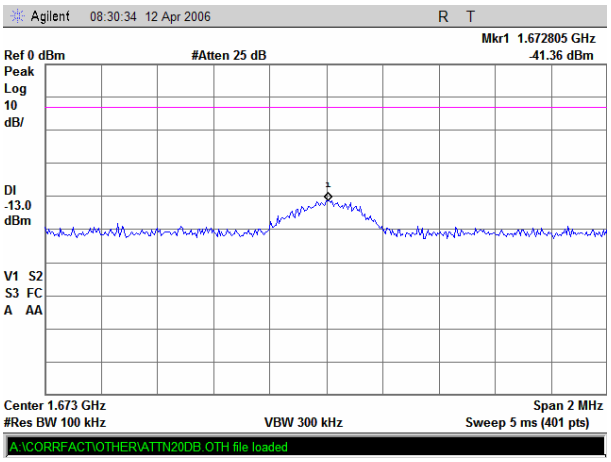


Plot 7.3.24 Conducted spurious emission measurements at the 2nd harmonic of low carrier frequency

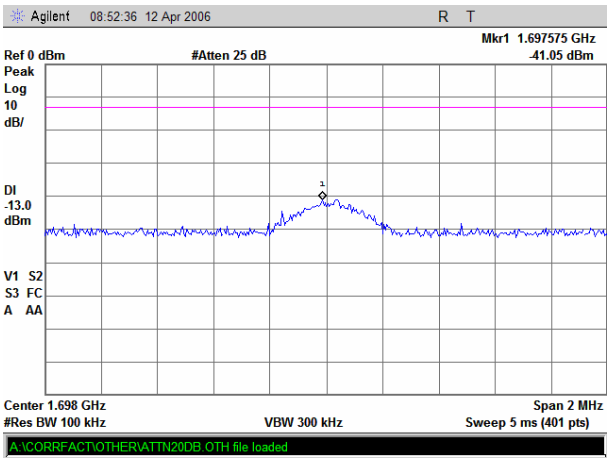


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.3.25 Conducted spurious emission measurements at the 2nd harmonic of mid carrier frequency

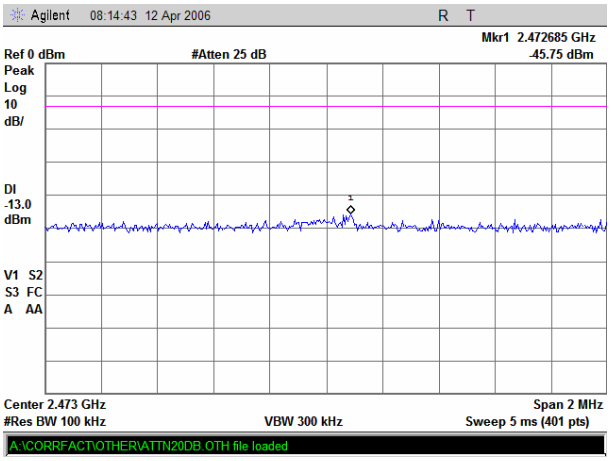


Plot 7.3.26 Conducted spurious emission measurements at the 2nd harmonic of high carrier frequency

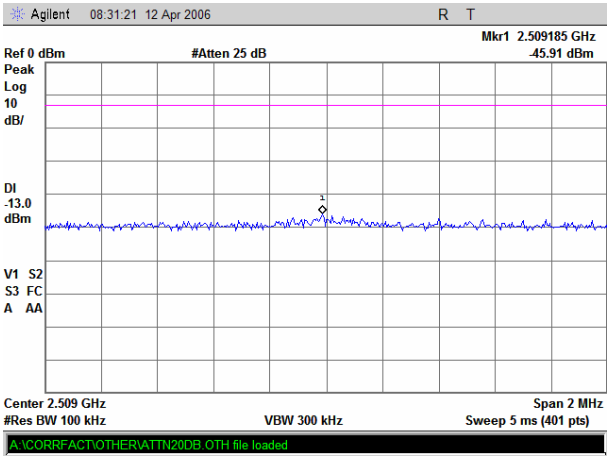


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.3.27 Conducted spurious emission measurements at the 3rd harmonic of low carrier frequency

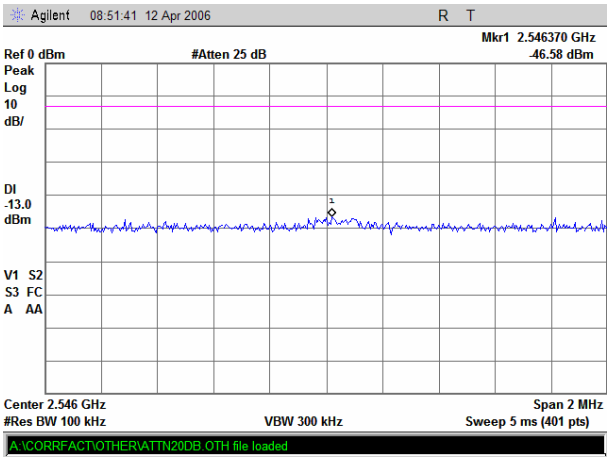


Plot 7.3.28 Conducted spurious emission measurements at the 3rd harmonic of mid carrier frequency

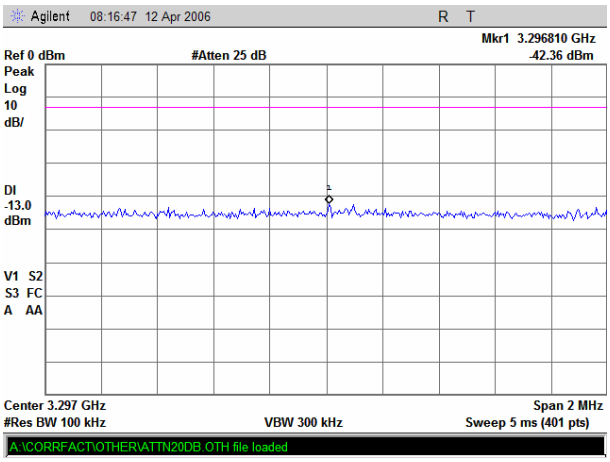


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.3.29 Conducted spurious emission measurements at the 3rd harmonic of high carrier frequency

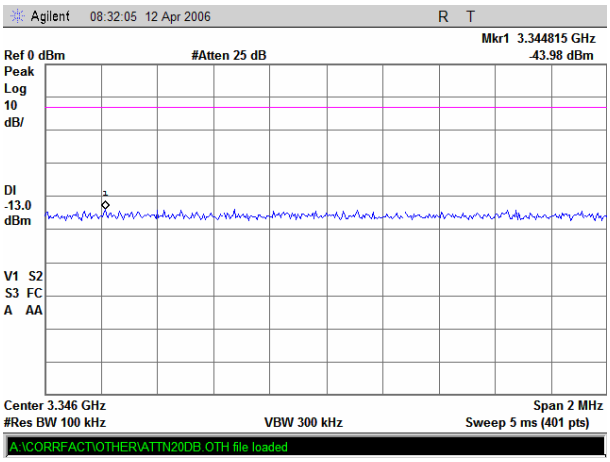


Plot 7.3.30 Conducted spurious emission measurements at the 4th harmonic of low carrier frequency

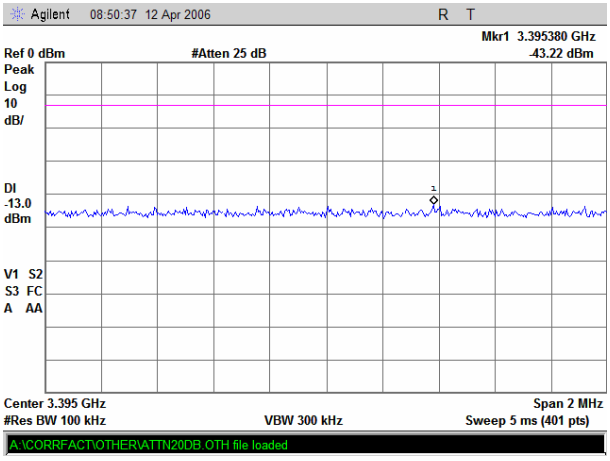


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.3.31 Conducted spurious emission measurements at the 4th harmonic of mid carrier frequency

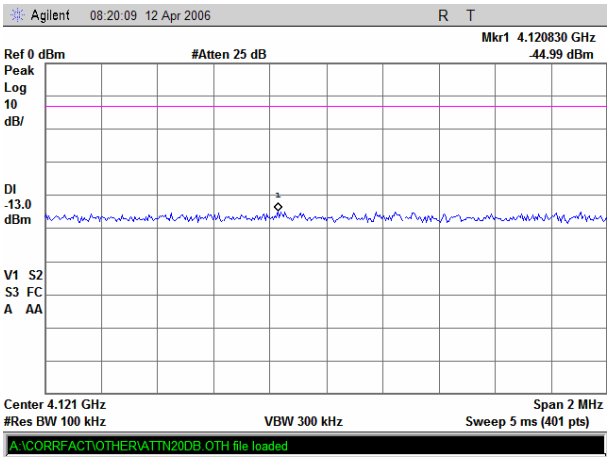


Plot 7.3.32 Conducted spurious emission measurements at the 4th harmonic of high carrier frequency

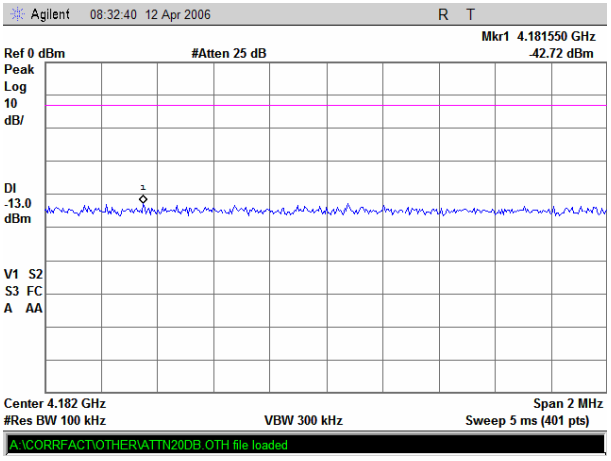


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.3.33 Conducted spurious emission measurements at the 5th harmonic of low carrier frequency

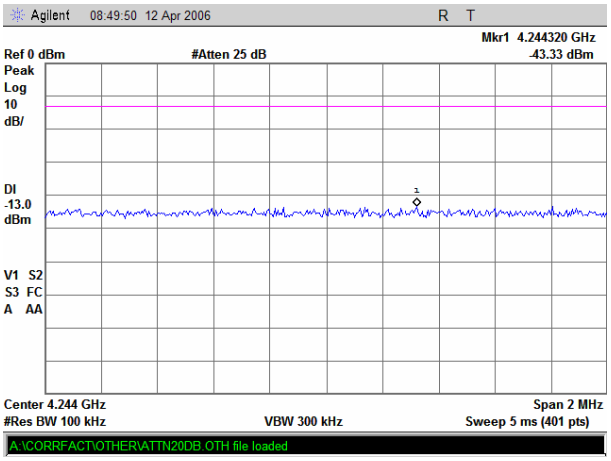


Plot 7.3.34 Conducted spurious emission measurements at the 5th harmonic of mid carrier frequency

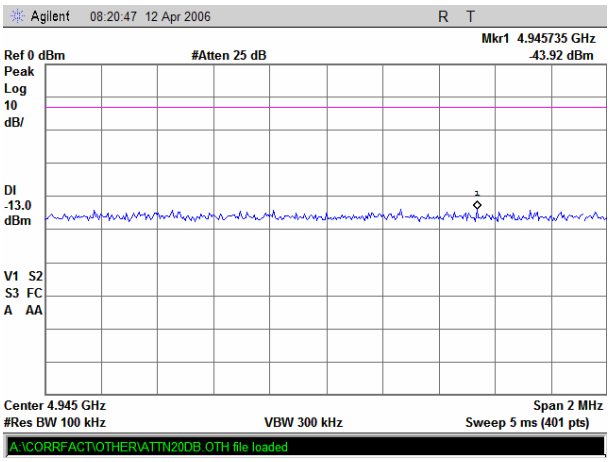


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.3.35 Conducted spurious emission measurements at the 5th harmonic of high carrier frequency

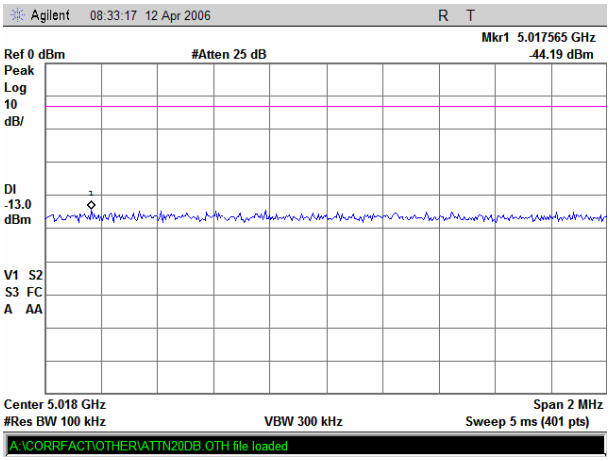


Plot 7.3.36 Conducted spurious emission measurements at the 6th harmonic of low carrier frequency

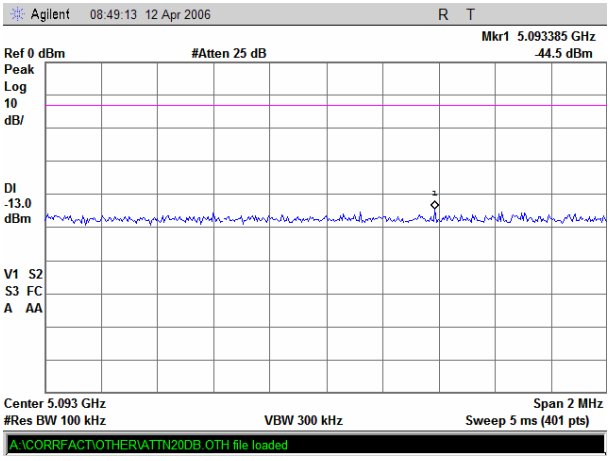


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.3.37 Conducted spurious emission measurements at the 6th harmonic of mid carrier frequency

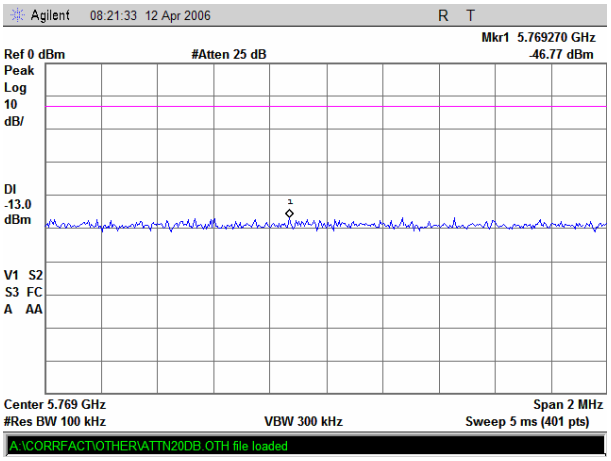


Plot 7.3.38 Conducted spurious emission measurements at the 6th harmonic of high carrier frequency

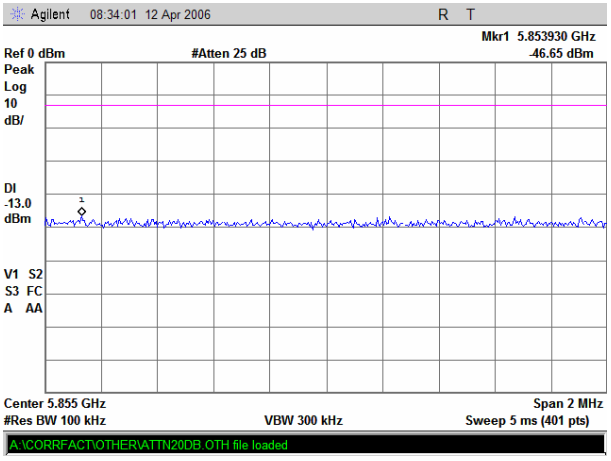


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.3.39 Conducted spurious emission measurements at the 7th harmonic of low carrier frequency

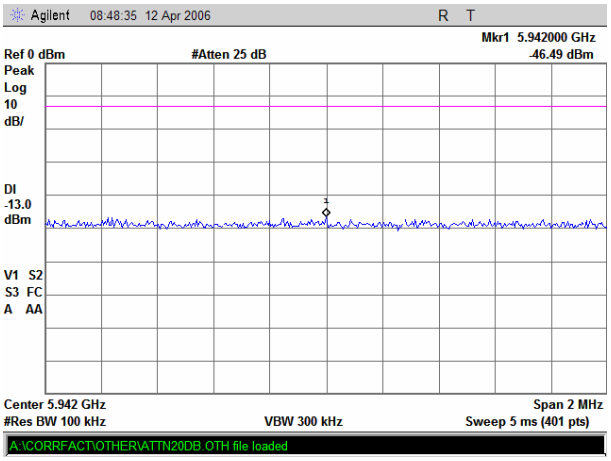


Plot 7.3.40 Conducted spurious emission measurements at the 7th harmonic of mid carrier frequency

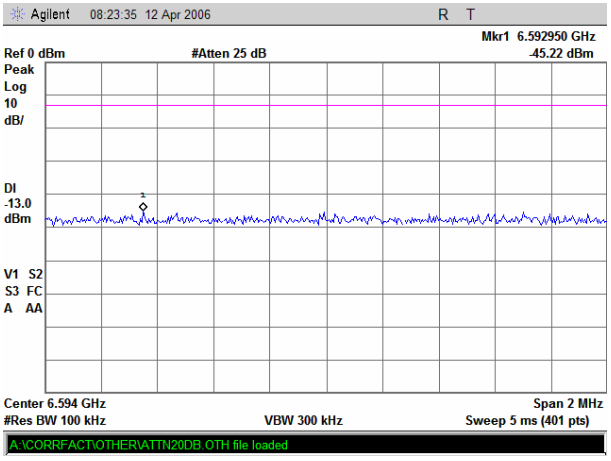


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.3.41 Conducted spurious emission measurements at the 7th harmonic of high carrier frequency

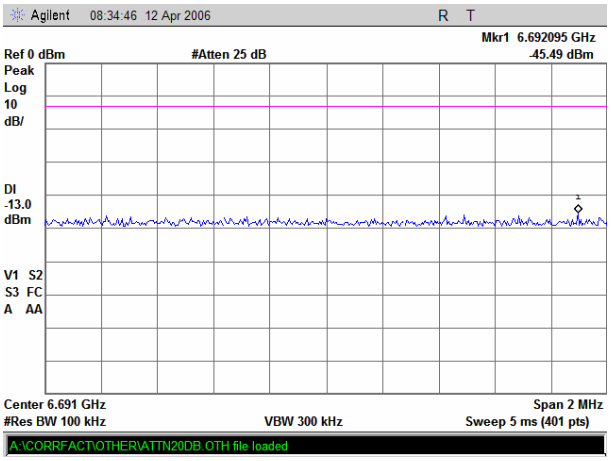


Plot 7.3.42 Conducted spurious emission measurements at the 8th harmonic of low carrier frequency

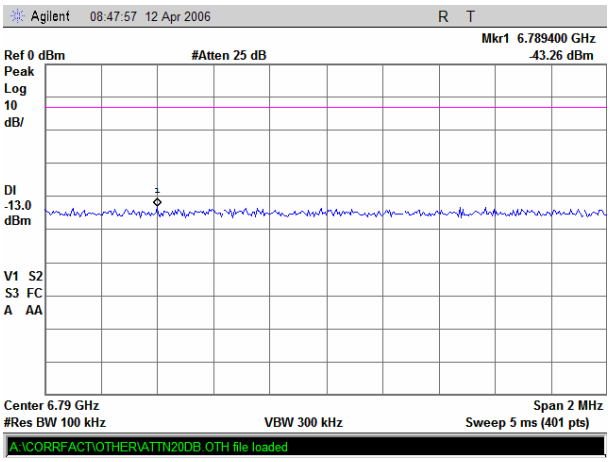


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.3.43 Conducted spurious emission measurements at the 8th harmonic of mid carrier frequency

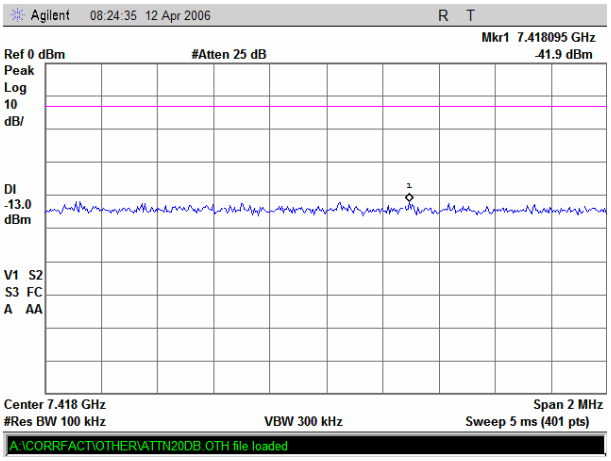


Plot 7.3.44 Conducted spurious emission measurements at the 8th harmonic of high carrier frequency

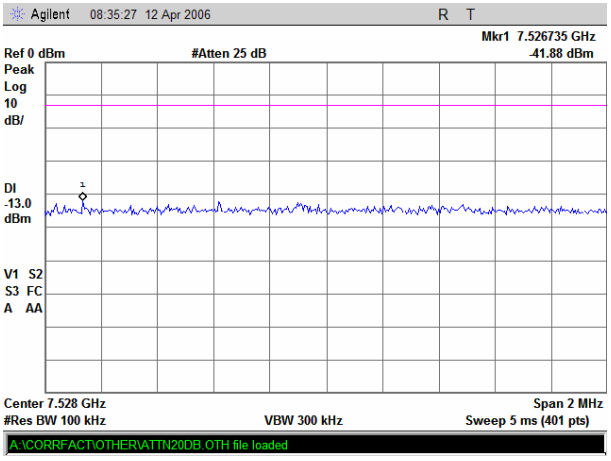


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.3.45 Conducted spurious emission measurements at the 9th harmonic of low carrier frequency

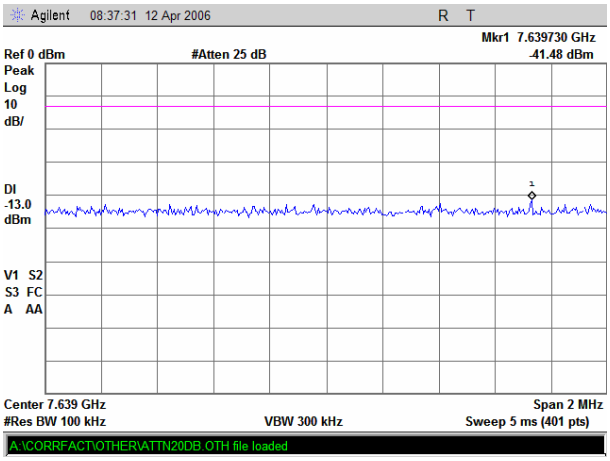


Plot 7.3.46 Conducted spurious emission measurements at the 9th harmonic of mid carrier frequency

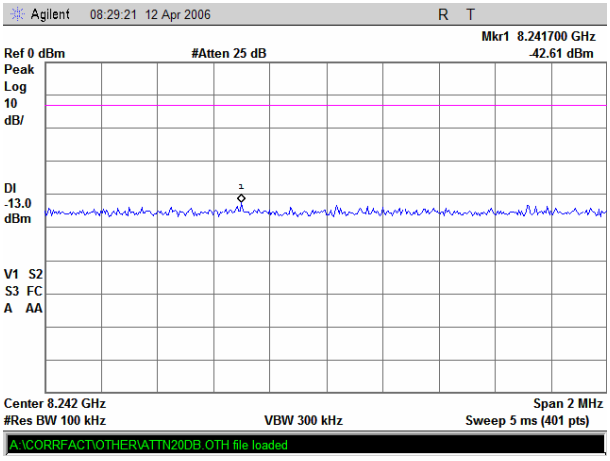


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.3.47 Conducted spurious emission measurements at the 9th harmonic of high carrier frequency

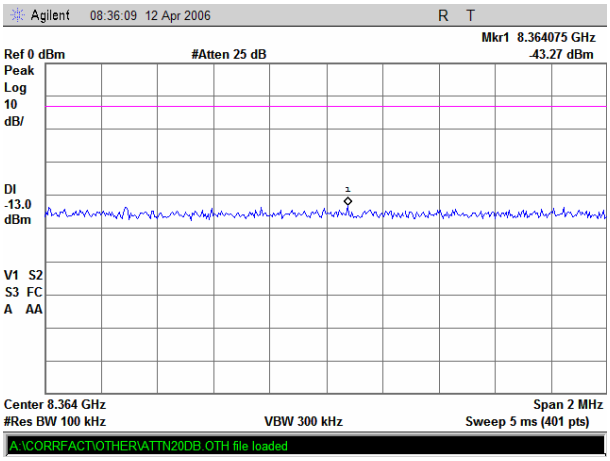


Plot 7.3.48 Conducted spurious emission measurements at the 10th harmonic of low carrier frequency

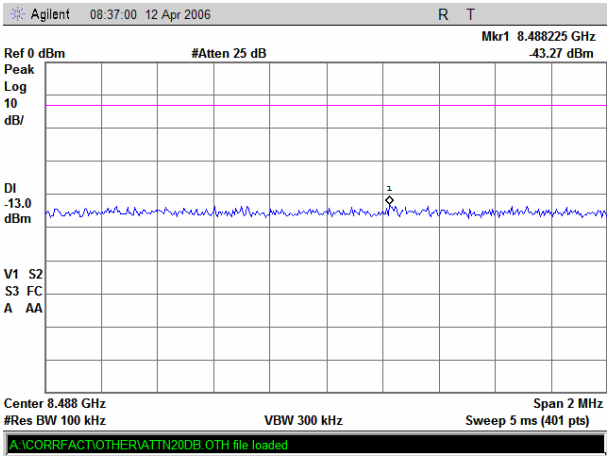


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.3.49 Conducted spurious emission measurements at the 10th harmonic of mid carrier frequency



Plot 7.3.50 Conducted spurious emission measurements at the 10th harmonic of high carrier frequency



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

7.4 Field strength of spurious emissions

7.4.1 General

This test was performed to measure field strength of spurious emissions from the EUT. Specification test limit is given in Table 7.4.1.

Table 7.4.1 Radiated spurious emissions limits

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

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

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

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

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

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

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

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

7.4.3.2 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360^0, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal.

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

Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

Figure 7.4.1 Setup for spurious emission field strength measurements below 30 MHz

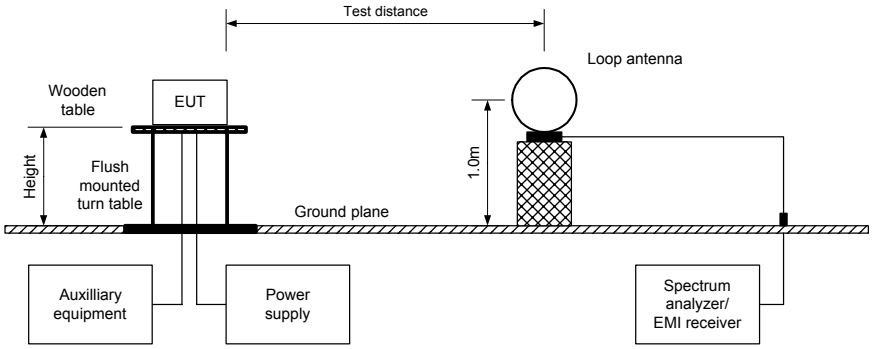
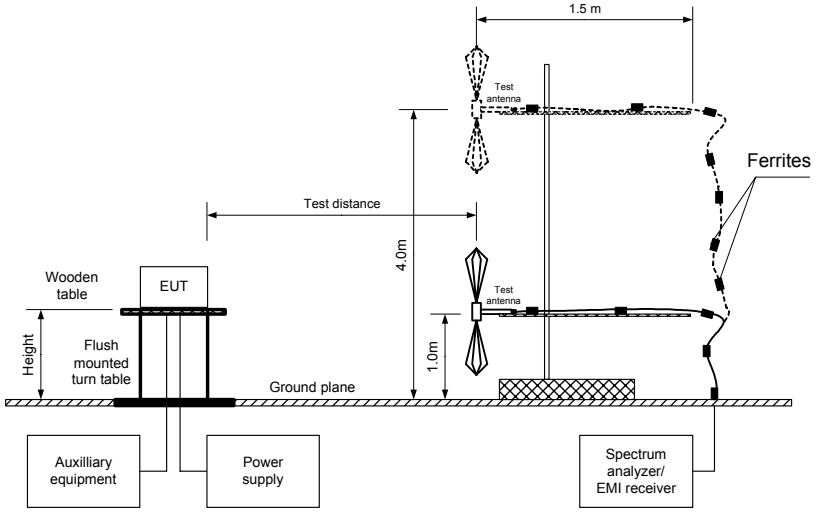


Figure 7.4.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	**Section 22.917, Radiated spurious emissions**		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	**Verdict:**	PASS
Date:	4/11/2006		
Temperature: 21ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 46 %	**Power Supply:** 3.8 VDC
Remarks:			

Table 7.4.2 Field strength of emissions

ASSIGNED FREQUENCY RANGE:	824 - 849 MHz
INVESTIGATED FREQUENCY RANGE:	0.009 – 9000 MHz
TEST DISTANCE:	3 m
MODULATION:	Modulated
DUTY CYCLE:	12.5 %
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum
TRANSMITTER OUTPUT POWER:	31.18 dBm at low carrier frequency 31.33 dBm at mid carrier frequency 31.16 dBm at high carrier frequency
DETECTOR USED:	Peak
TEST ANTENNA TYPE:	Active loop (9 kHz – 30 MHz) Biconilog (30 MHz – 1000 MHz) Double ridged guide (above 1000 MHz)

Frequency, MHz	Field strength of spurious, dB(μV/m)	Limit, dB(μV/m)	Margin, dB	Antenna polarization	Antenna height, m	Azimuth, degrees*
No spurious emissions were found						

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

Reference numbers of test equipment used

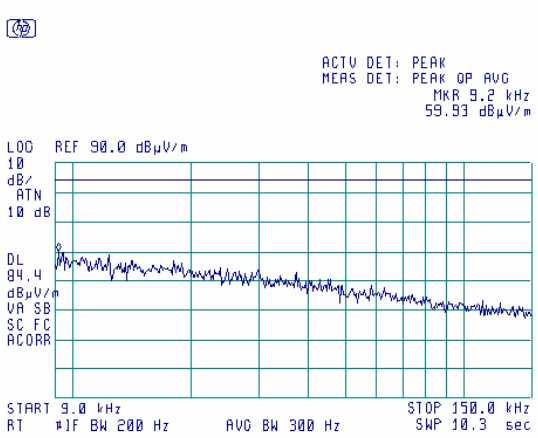
HL 0446	HL 0521	HL 0589	HL 0592	HL 0593	HL 0594	HL 0604	HL 1947
HL 1984	HL 2009	HL 2258	HL 2399				

Full description is given in Appendix A.

Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

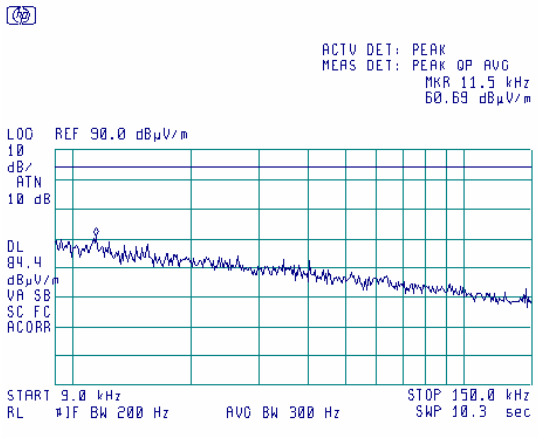
Plot 7.4.1 Radiated emission measurements from 9 to 150 kHz at the low carrier frequency

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



Plot 7.4.2 Radiated emission measurements from 9 to 150 kHz at the mid carrier frequency

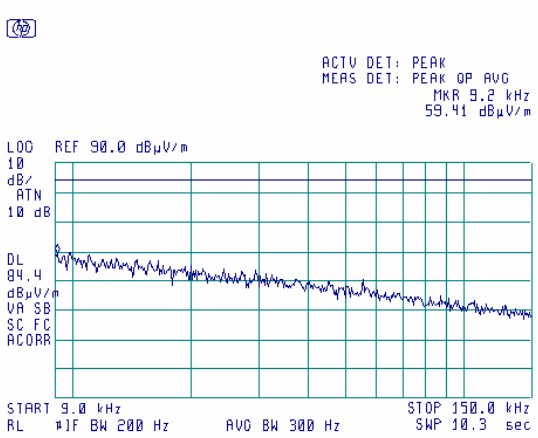
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

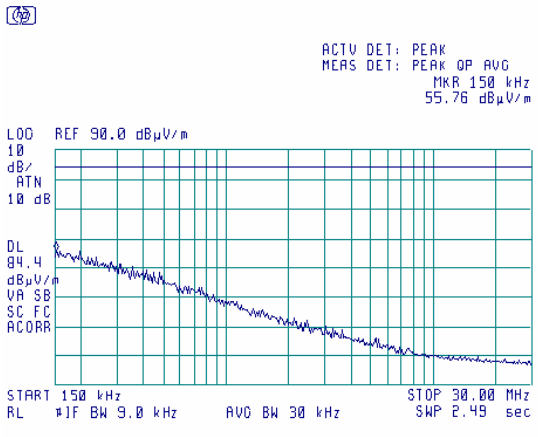
Plot 7.4.3 Radiated emission measurements from 9 to 150 kHz at the high carrier frequency

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



Plot 7.4.4 Radiated emission measurements from 0.15 to 30 MHz at the low carrier frequency

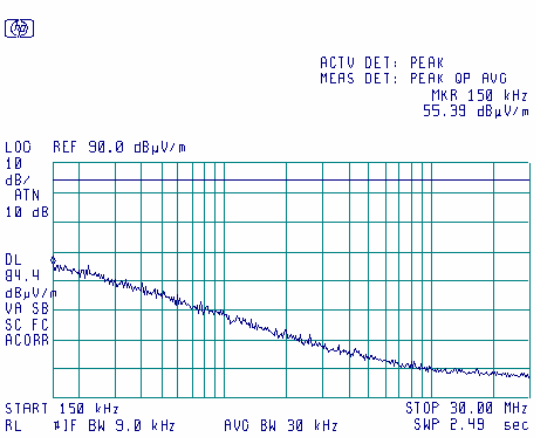
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

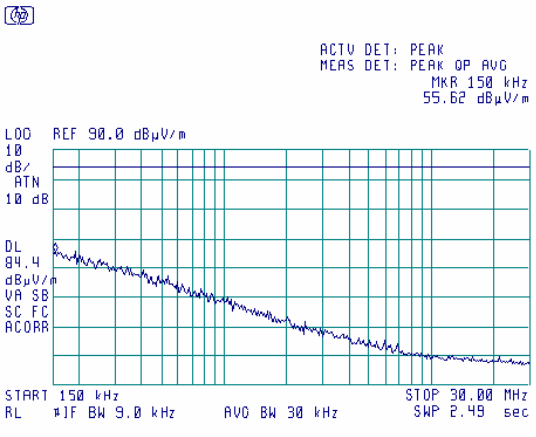
Plot 7.4.5 Radiated emission measurements from 0.15 to 30 MHz at the mid carrier frequency

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



Plot 7.4.6 Radiated emission measurements from 0.15 to 30 MHz at the high carrier frequency

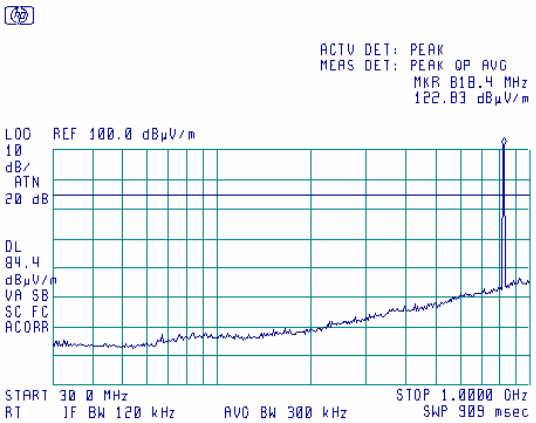
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.4.7 Radiated emission measurements from 30 to 1000 MHz at the low carrier frequency

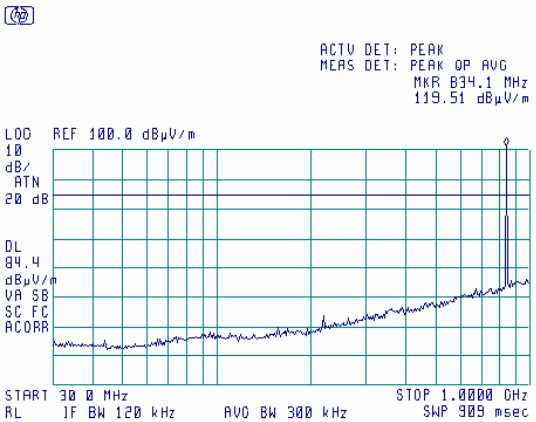
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Note: intentional radiation of RF module

Plot 7.4.8 Radiated emission measurements from 30 to 1000 MHz at the mid carrier frequency

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

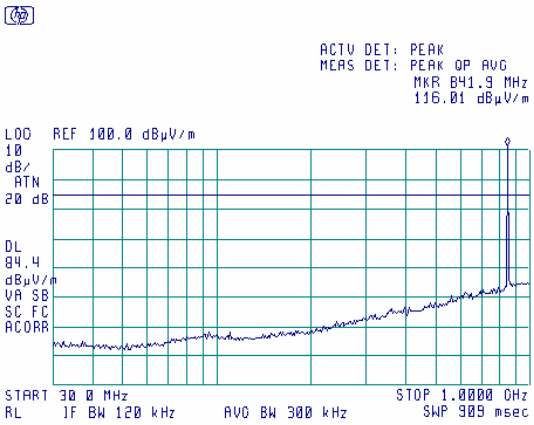


Note: intentional radiation of RF module

Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

Plot 7.4.9 Radiated emission measurements from 30 to 1000 MHz at the high carrier frequency

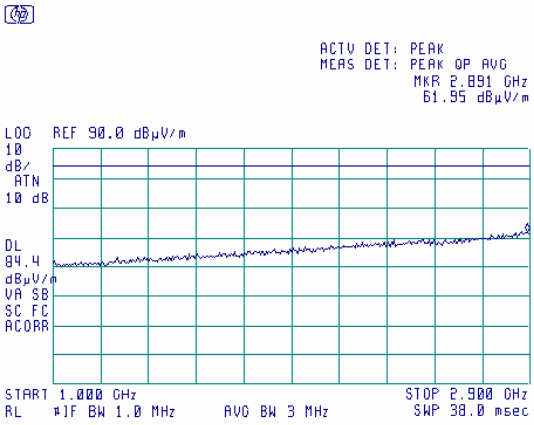
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Note: intentional radiation of RF module

Plot 7.4.10 Radiated emission measurements from 1000 to 2900 MHz at the low carrier frequency

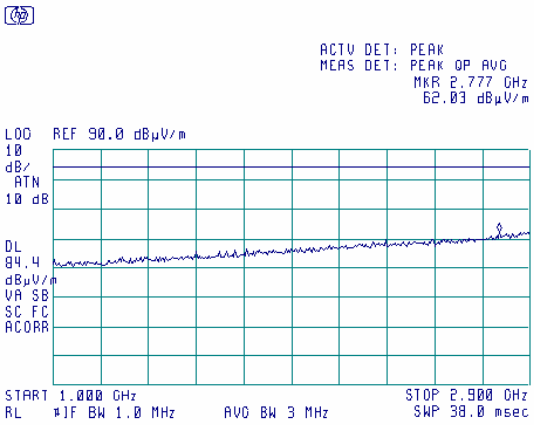
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

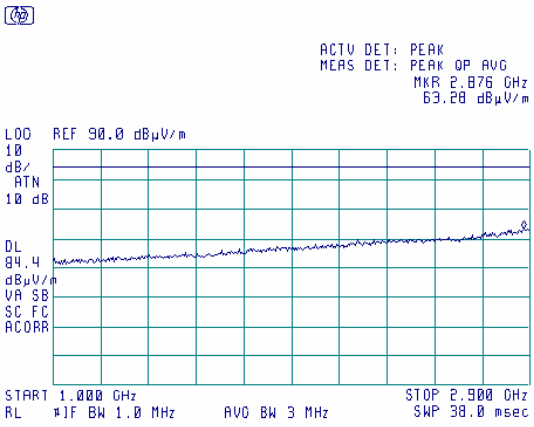
Plot 7.4.11 Radiated emission measurements from 1000 to 2900 MHz at the mid carrier frequency

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



Plot 7.4.12 Radiated emission measurements from 1000 to 2900 MHz at the high carrier frequency

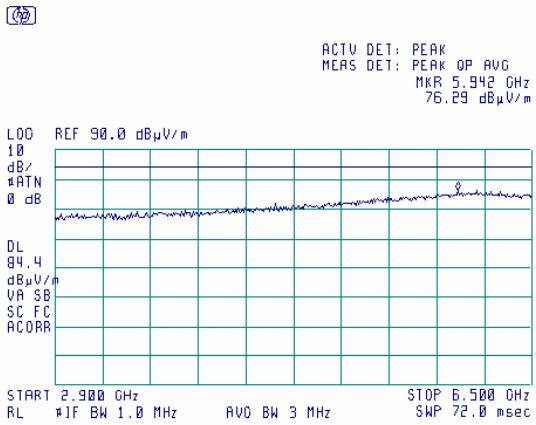
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

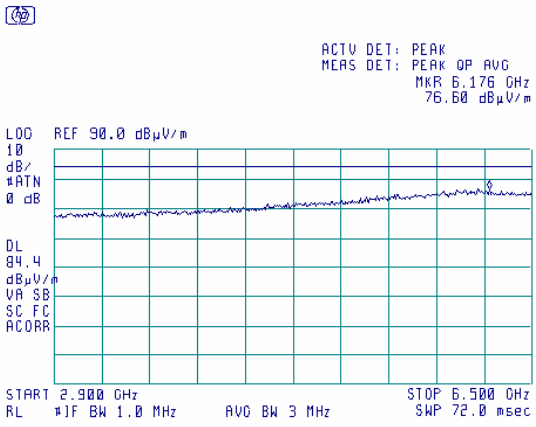
Plot 7.4.13 Radiated emission measurements from 2900 to 6500 MHz at the low carrier frequency

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



Plot 7.4.14 Radiated emission measurements from 2900 to 6500 MHz at the mid carrier frequency

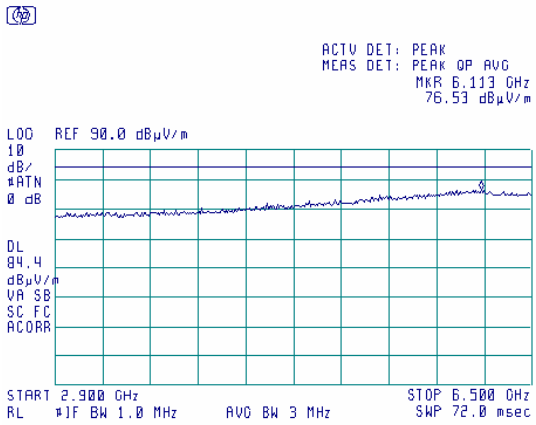
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21°C	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

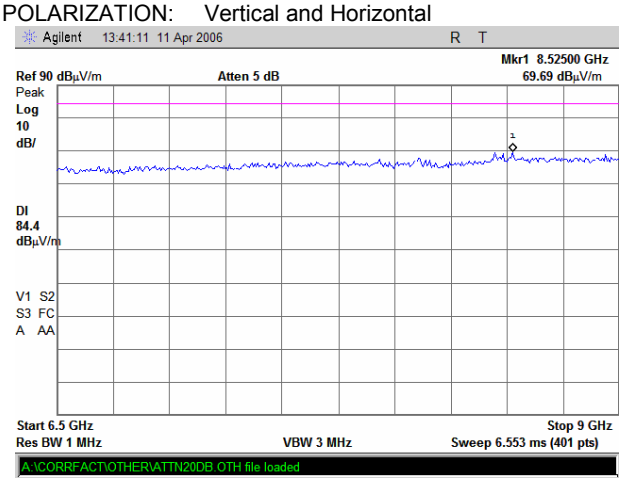
Plot 7.4.15 Radiated emission measurements from 2900 to 6500 MHz at the high carrier frequency

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



Plot 7.4.16 Radiated emission measurements from 6.5 to 9 GHz at the low carrier frequency

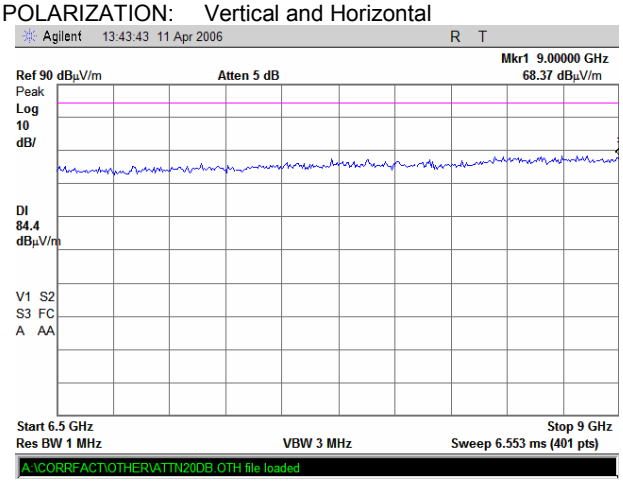
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21°C	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

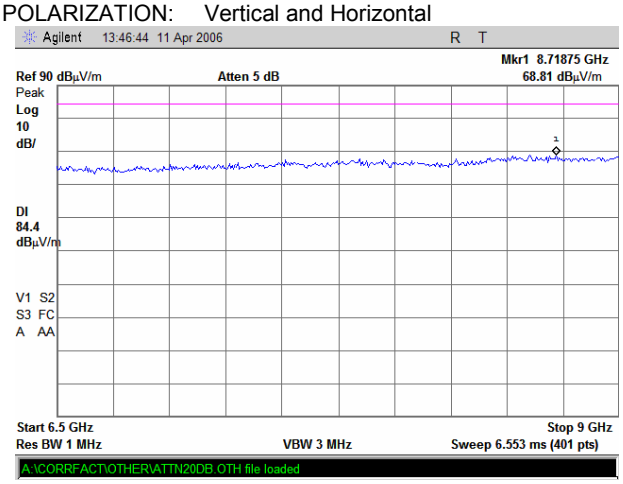
Plot 7.4.17 Radiated emission measurements from 6.5 to 9 GHz at the mid carrier frequency

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



Plot 7.4.18 Radiated emission measurements from 6.5 to 9 GHz at the high carrier frequency

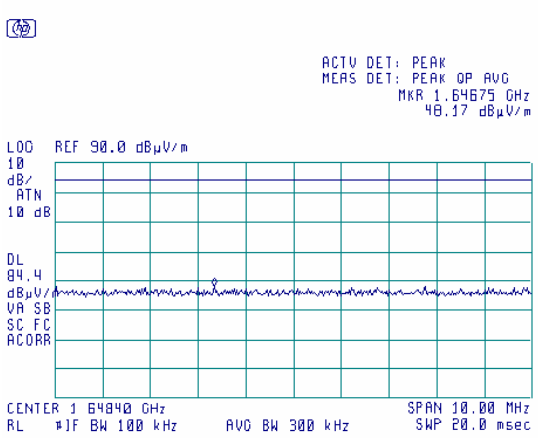
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

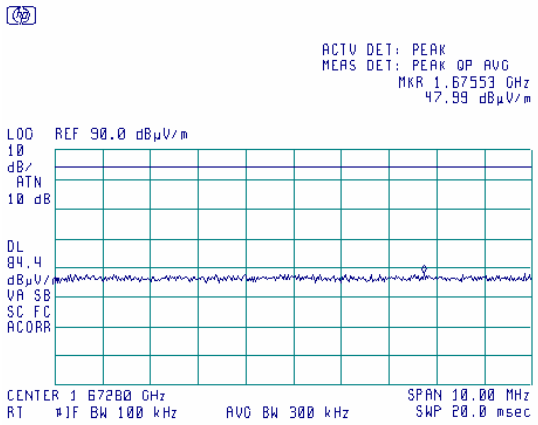
Plot 7.4.19 Radiated emission measurements at the second harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 7.4.20 Radiated emission measurements at the second harmonic of mid carrier frequency

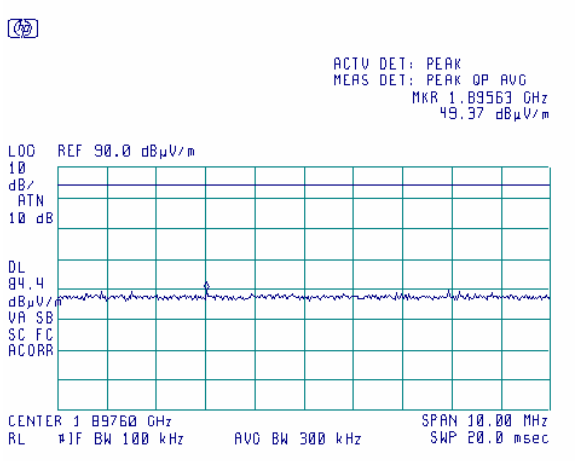
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

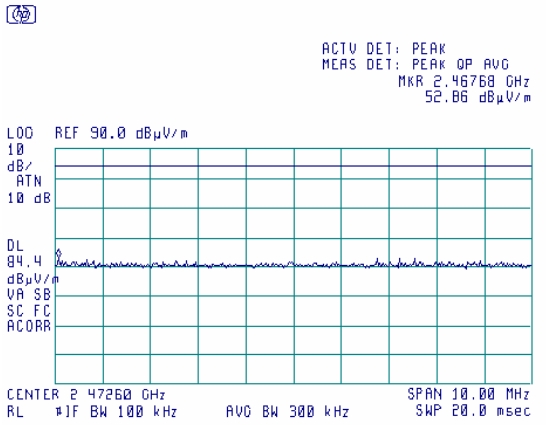
Plot 7.4.21 Radiated emission measurements at the second harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 7.4.22 Radiated emission measurements at the third harmonic of low carrier frequency

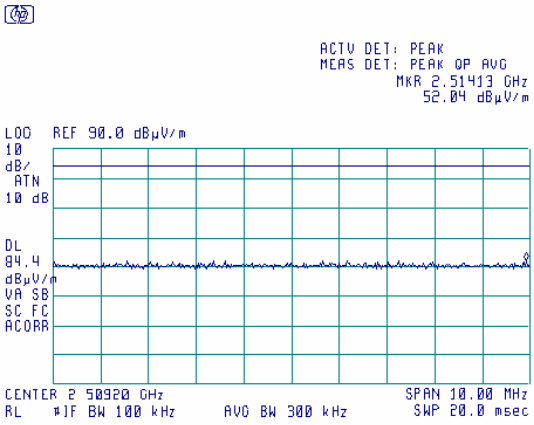
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

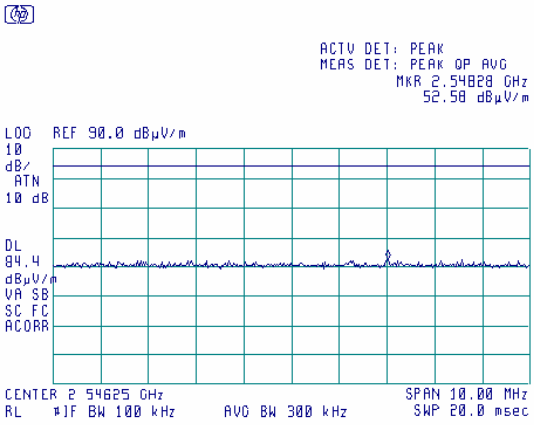
Plot 7.4.23 Radiated emission measurements at the third harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 7.4.24 Radiated emission measurements at the third harmonic of high carrier frequency

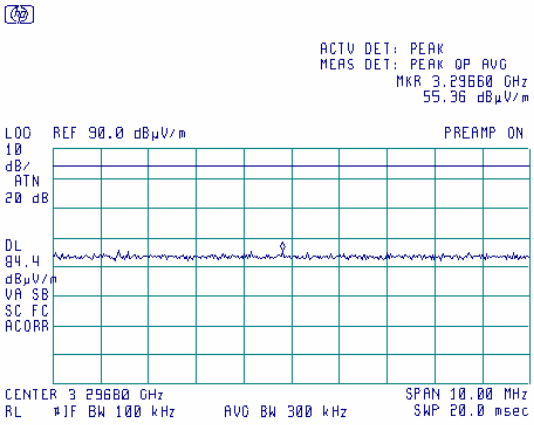
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

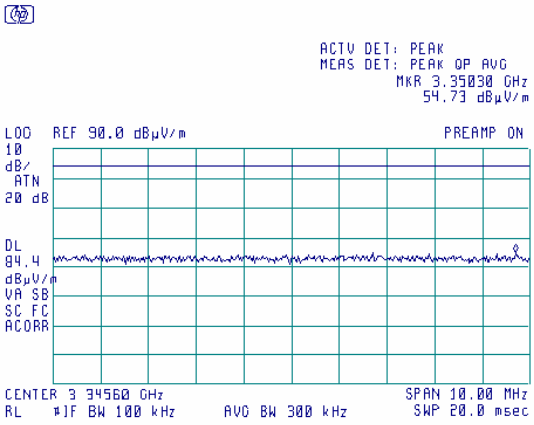
Plot 7.4.25 Radiated emission measurements at the forth harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 7.4.26 Radiated emission measurements at the forth harmonic of mid carrier frequency

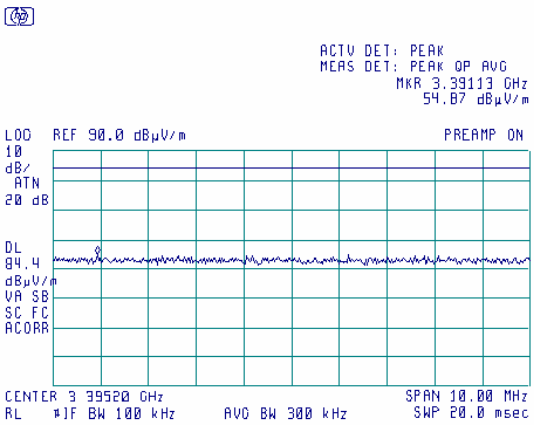
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

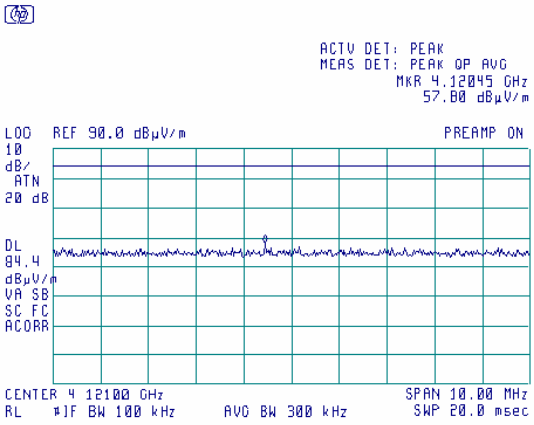
Plot 7.4.27 Radiated emission measurements at the forth harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 7.4.28 Radiated emission measurements at the fifth harmonic of low carrier frequency

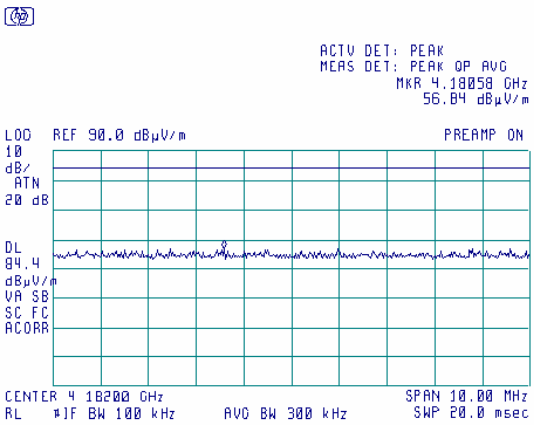
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

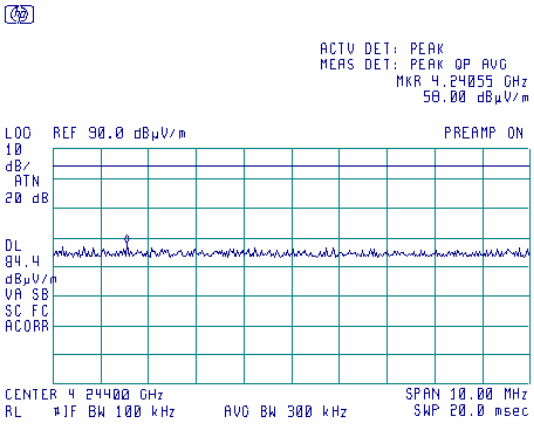
Plot 7.4.29 Radiated emission measurements at the fifth harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 7.4.30 Radiated emission measurements at the fifth harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	Section 22.355, Frequency stability test		
Test procedure:	FCC part 22, Section 22.355, part 2 section 2.1055		
Test mode:	Compliance	Verdict:	PASS
Date:	4/21/2006		
Temperature: 22ºC	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 3.8 VDC
Remarks:			

7.5 Frequency stability test

7.5.1 General

This test was performed to measure frequency stability of transmitter RF carrier. Specification test limits are given in Table 7.5.1. The test results are provided in Table 7.5.2.

Table 7.5.1 Frequency stability limits

Assigned frequency, MHz	Limit, ppm	Limits, Hz
824.2	2.5	2060
836.4		2090
848.8		2120

7.5.2 Test procedure

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

7.5.2.2 The EUT 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.

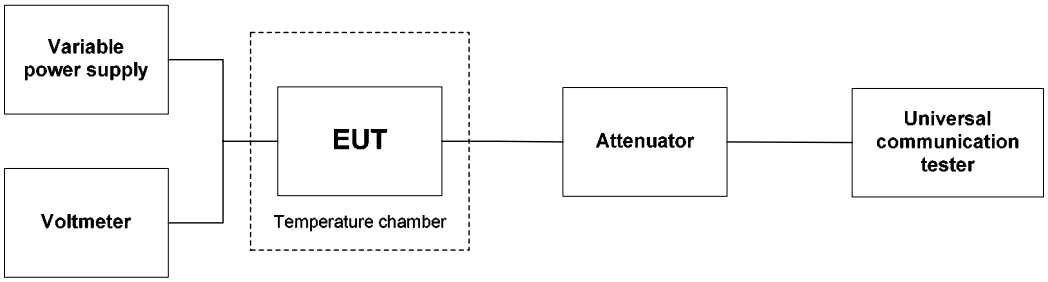
7.5.2.3 The EUT was powered on and carrier frequency was measured at start up moment and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.

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

7.5.2.5 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.

7.5.2.6 Frequency displacement was calculated and compared with the limit as provided in Table 7.5.2

Figure 7.5.1 Frequency stability test setup



Test specification:	**Section 22.355, Frequency stability test**		
Test procedure:	FCC part 22, Section 22.355, part 2 section 2.1055		
Test mode:	Compliance	**Verdict:**	PASS
Date:	4/21/2006		
Temperature: 22ºC	**Air Pressure:** 1015 hPa	**Relative Humidity:** 43 %	**Power Supply:** 3.8 VDC
Remarks:			

Table 7.5.2 Frequency stability test results

OPERATING FREQUENCY: 824.2 – 848.8 MHz
NOMINAL POWER VOLTAGE: 3.8 Vdc
TEMPERATURE STABILIZATION PERIOD: 20 min
POWER DURING TEMPERATURE TRANSITION: Off
SPECTRUM ANALYZER MODE: Counter
RESOLUTION BANDWIDTH: 100 kHz
VIDEO BANDWIDTH: 100 kHz
MODULATION: 8PSK

T, ºC	Voltage, V	Frequency, MHz							Max frequency drift, Hz	
		Start up	1st min	2nd min	3rd min	4th min	5th min	10th min	Positive	Negative
Low carrier frequency, limit 2060 Hz										
-30	nominal	824.199977	824.199990	824.199988	824.199976	824.199989	824.199986	824.199987	13	-1
-20	nominal	824.199977	NA	NA	NA	NA	NA	824.199994	17	0
-10	nominal	824.199971	NA	NA	NA	NA	NA	824.199990	13	-6
0	nominal	824.200022	824.200107	824.200001	824.200000	824.200001	824.199991	824.200009	130	0
10	nominal	824.199950	NA	NA	NA	NA	NA	824.200009	32	-27
20	+15%	824.199980	NA	NA	NA	NA	NA	824.200022	45	0
20	nominal	824.199978	NA	NA	NA	NA	NA	824.199977*	1	0
20	-15%	824.200081	NA	NA	NA	NA	NA	824.200081	104	0
30	nominal	824.200021	824.200061	824.200006	824.199990	824.199993	824.200006	824.200070	93	0
40	nominal	824.200028	NA	NA	NA	NA	NA	824.200023	51	0
50	nominal	824.199972	NA	NA	NA	NA	NA	824.199988	11	-5
Mid carrier frequency, , limit 2090 Hz										
-30	nominal	836.399989	836.399979	836.399991	836.400007	836.399989	836.399987	836.399979	30	0
-20	nominal	836.400026	NA	NA	NA	NA	NA	836.399993	49	0
-10	nominal	836.400022	NA	NA	NA	NA	NA	836.400015	45	0
0	nominal	836.399982	836.400022	836.400010	836.399988	836.399992	836.400000	836.400010	45	0
10	nominal	836.400024	NA	NA	NA	NA	NA	836.400017	47	0
20	+15%	836.399977	NA	NA	NA	NA	NA	836.400027	50	0
20	nominal	836.399981	NA	NA	NA	NA	NA	836.399977*	4	0
20	-15%	836.400019	NA	NA	NA	NA	NA	836.399980	42	0
30	nominal	836.399920	836.399981	836.399986	836.399990	836.399986	836.400015	836.399986	38	-57
40	nominal	836.399978	NA	NA	NA	NA	NA	836.399976	1	-1
50	nominal	836.399981	NA	NA	NA	NA	NA	836.399985	8	0
High carrier frequency, , limit 2120 Hz										
-30	nominal	848.800018	848.799992	848.799950	848.800001	848.799990	848.799986	848.799950	41	-27
-20	nominal	848.800034	NA	NA	NA	NA	NA	848.799988	57	0
-10	nominal	848.799982	NA	NA	NA	NA	NA	848.799982	5	0
0	nominal	848.800020	848.799989	848.799981	848.800014	848.800009	848.800000	848.800014	43	0
10	nominal	848.800017	NA	NA	NA	NA	NA	848.799993	40	0
20	+15%	848.800018	NA	NA	NA	NA	NA	848.799979	41	0
20	nominal	848.799982	NA	NA	NA	NA	NA	848.799977*	5	0
20	-15%	848.799979	NA	NA	NA	NA	NA	848.799979	2	0
30	nominal	848.799960	848.799986	848.799990	848.799990	848.799987	848.799981	848.799993	16	-17
40	nominal	848.799976	NA	NA	NA	NA	NA	848.799974	0	-3
50	nominal	848.799971	NA	NA	NA	NA	NA	848.799981	4	-6

* - Reference frequency

Verdict: Pass

Reference numbers of test equipment used

HL 0278	HL 0493	HL 1097	HL 1204	HL 1653			

Full description is given in Appendix A.

Test specification:	Section 24.232, Peak output power		
Test procedure:	FCC part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

8 Transmitter tests according to 47CFR part 24 requirements

8.1 Peak output power

8.1.1 General

This test was performed to measure the peak output power at RF antenna connector. Specification test limits are given in Table 8.1.1.

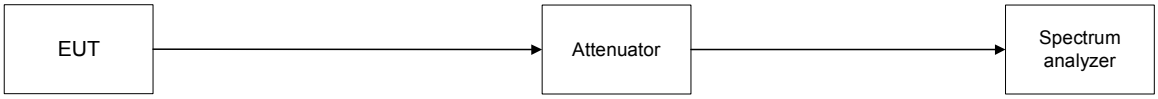
Table 8.1.1 Peak output power limits

Assigned frequency range, MHz	Maximum peak output power	
	W	dBm
1850 - 1910	2.0	33.0

8.1.2 Test procedure

8.1.2.1 The EUT was set up as shown in Figure 8.1.1, energized and its proper operation was checked.
8.1.2.2 The EUT was adjusted to produce maximum available to the end user RF output power.
8.1.2.3 The peak output power was measured with spectrum analyzer as provided in Table 8.1.2 and associated plots.

Figure 8.1.1 Peak output power test setup



Photograph 8.1.1 Peak output power test setup

Test specification:	**Section 24.232, Peak output power**		
Test procedure:	FCC part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 46 %	**Power Supply:** 3.8 VDC
Remarks:			

Table 8.1.2 Peak output power test results

OPERATING FREQUENCY RANGE:	1850 - 1910 MHz
DETECTOR USED:	Peak
RESOLUTION BANDWIDTH:	3000 kHz
VIDEO BANDWIDTH:	3000 kHz
MODULATION:	8PSK
MODULATING SIGNAL:	PRBS
SYMBOL RATE:	270 kbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum

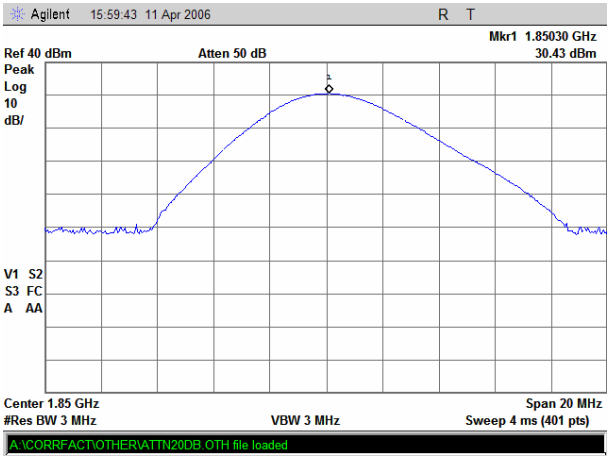
Carrier frequency, MHz	Spectrum analyzer reading, dBm	External attenuation, dB	Cable loss, dB	RF output power, dBm	Limit, dBm	Margin, dB	Verdict
1850.2	30.43	Included	NA	30.43	33.00	-2.57	Pass
1880.0	30.46	Included	NA	30.46	33.00	-2.54	Pass
1909.8	30.34	Included	NA	30.34	33.00	-2.66	Pass

Reference numbers of test equipment used

HL 2780							

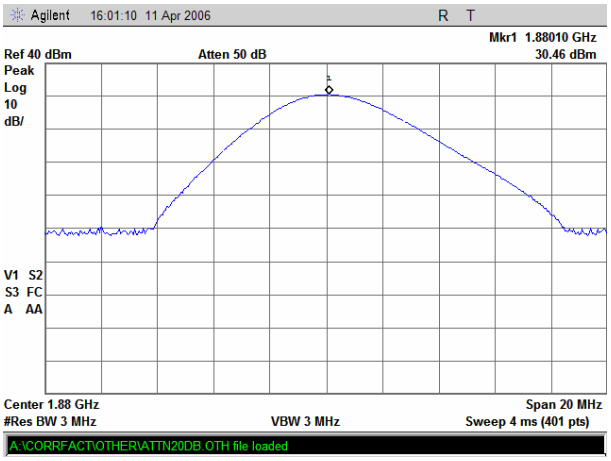
Full description is given in Appendix A.

Plot 8.1.1 Peak output power test results at low frequency

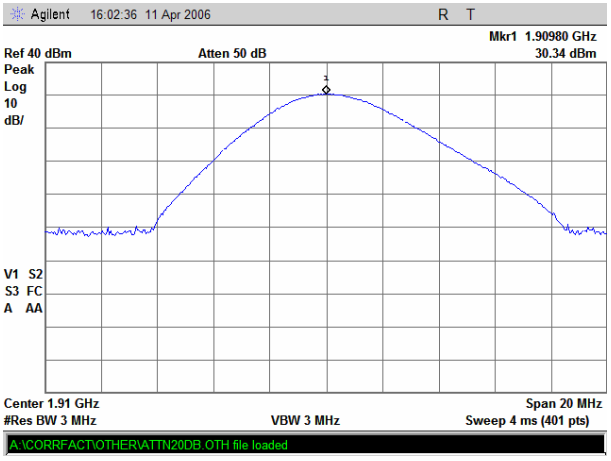


Test specification:	Section 24.232, Peak output power		
Test procedure:	FCC part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21°C	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.1.2 Peak output power test results at mid frequency



Plot 8.1.3 Peak output power test results at high frequency



Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

8.2 Occupied bandwidth test

8.2.1 General

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in Table 8.2.1

Table 8.2.1 Occupied bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points*, dBc
1850 – 1910	26

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

8.2.2 Test procedure

8.2.2.1 The EUT was set up as shown in Figure 8.2.1, energized and its proper operation was checked.
8.2.2.2 The EUT was set to transmit the unmodulated carrier and the reference peak power level was measured.
8.2.2.3 The EUT was set to transmit the normally modulated carrier.
8.2.2.4 The transmitter occupied bandwidth was measured with spectrum analyzer as a frequency delta between the reference points on modulation envelope and the results provided in Table 8.2.2 and the associated plots.

Figure 8.2.1 Occupied bandwidth test setup

Test specification:	**Section 24.238(b), Occupied bandwidth**		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	**Verdict:**	PASS
Date:	4/11/2006		
Temperature: 21ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 46 %	**Power Supply:** 3.8 VDC
Remarks:			

Table 8.2.2 Occupied bandwidth test results

DETECTOR USED:	Peak hold
RESOLUTION BANDWIDTH:	3 kHz
VIDEO BANDWIDTH:	10 kHz
MODULATION ENVELOPE REFERENCE POINTS:	26 dBc
MODULATION:	8PSK
MODULATING SIGNAL:	PRBS
SYMBOL RATE:	270 kbps

Carrier frequency, MHz	Lower reference point, MHz	Upper reference point, MHz	Occupied bandwidth, kHz
1850.2	1850.0800	1850.3250	245.0
1880.0	1879.8750	1880.1250	250.0
1909.8	1909.6750	1909.9300	255.0

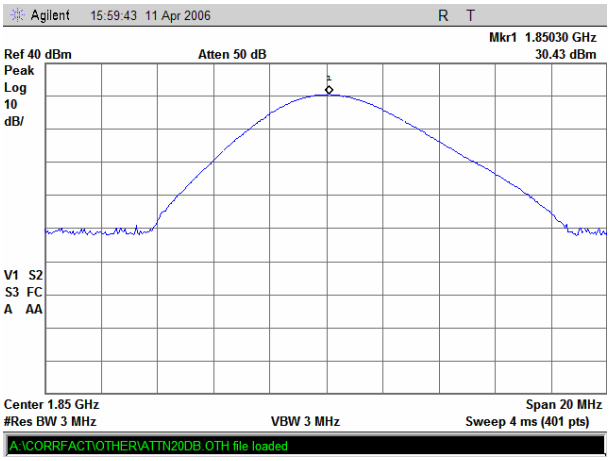
Reference numbers of test equipment used

HL 2780						

Full description is given in Appendix A.

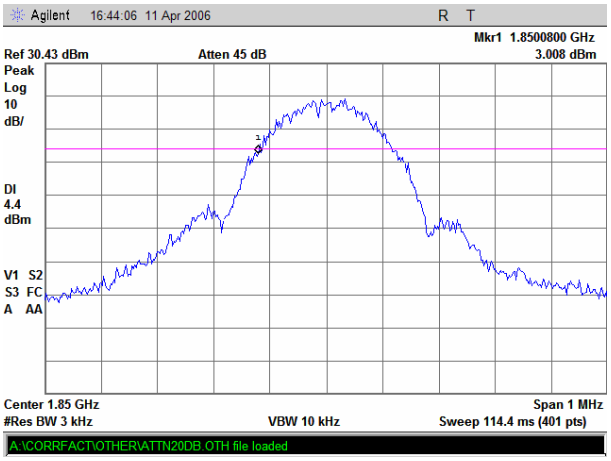
Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21°C	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.2.1 Occupied bandwidth test result at low frequency, reference level

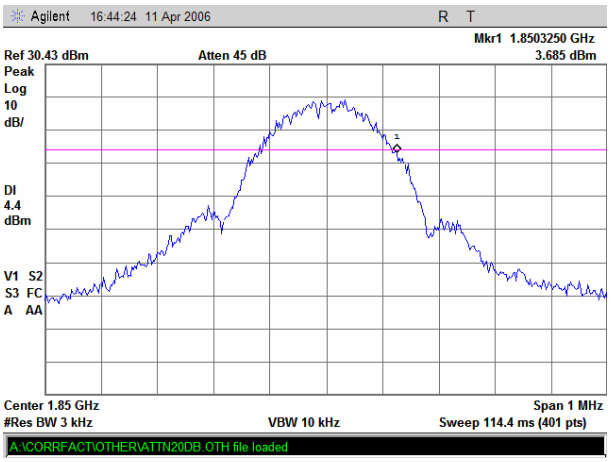


Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21°C	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.2.2 Occupied bandwidth test result at low frequency, lower reference point

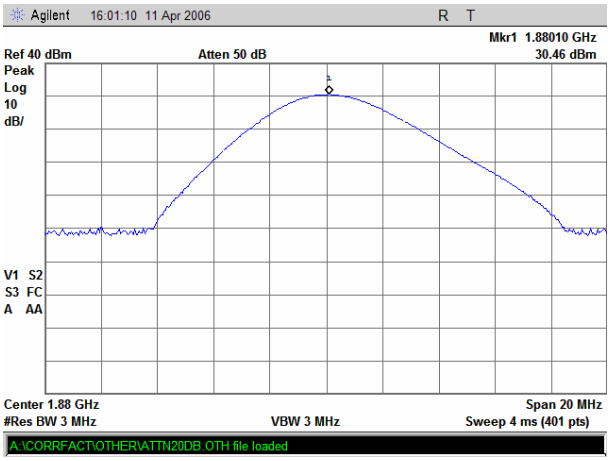


Plot 8.2.3 Occupied bandwidth test result at low frequency, higher reference point

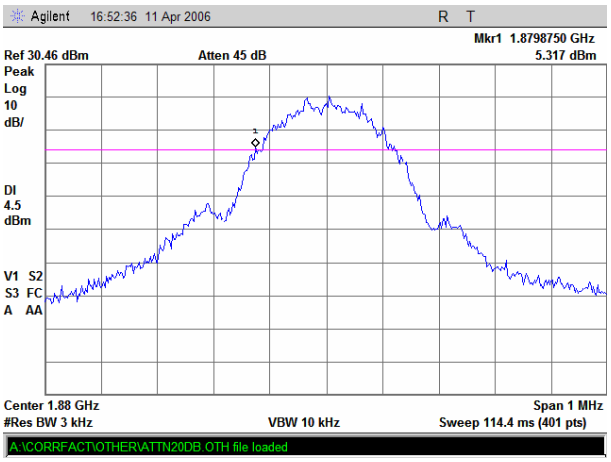


Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21°C	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.2.4 Occupied bandwidth test result at mid frequency, reference level

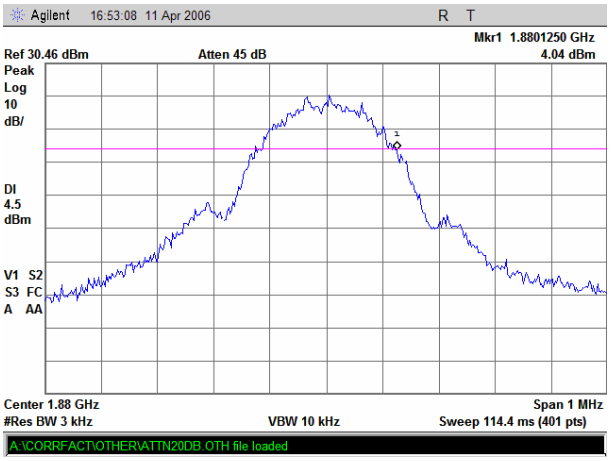


Plot 8.2.5 Occupied bandwidth test result at mid frequency, lower reference point

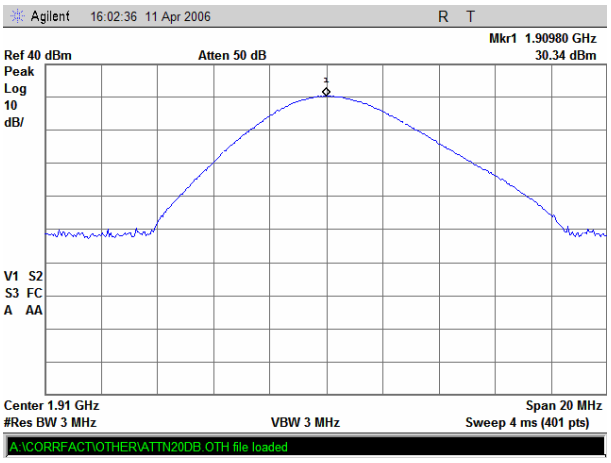


Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21°C	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.2.6 Occupied bandwidth test result at mid frequency, higher reference point

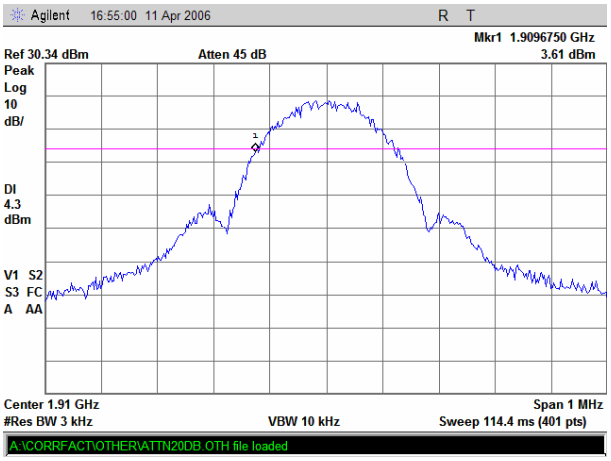


Plot 8.2.7 Occupied bandwidth test result at high frequency, reference level

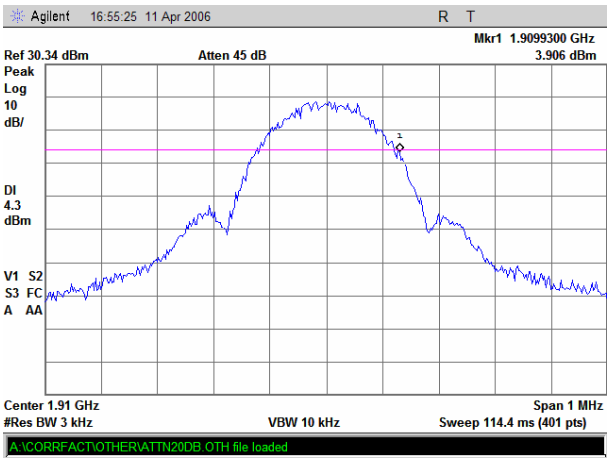


Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21°C	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.2.8 Occupied bandwidth test result at high frequency, lower reference point

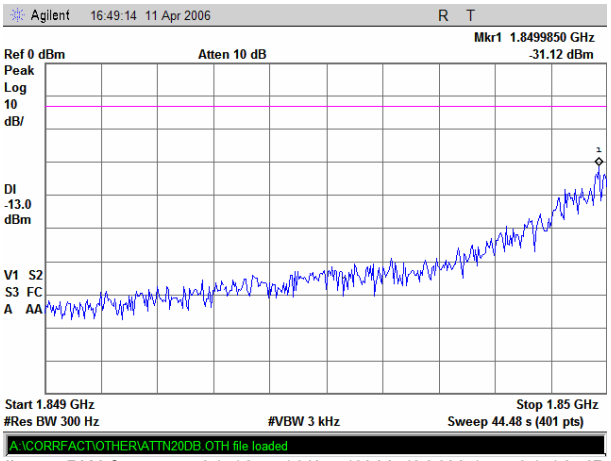


Plot 8.2.9 Occupied bandwidth test result at high frequency, higher reference point



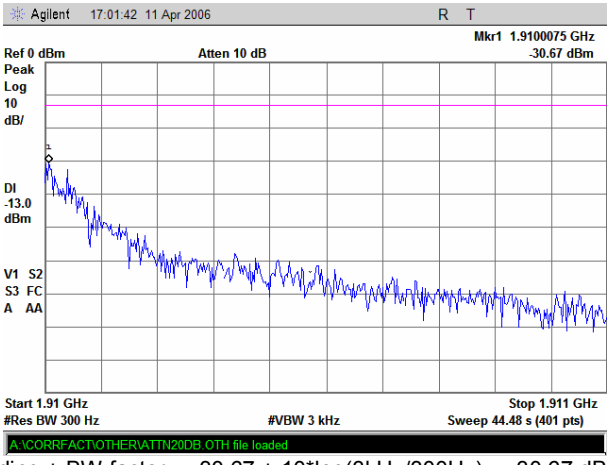
Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21°C	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.2.10 Band edge emission measurements in 1849 - 1850 MHz range at low carrier frequency



Signal power = SA reading + BW factor = -31.12 + 10*log(3kHz/300Hz) = -31.12 dBm + 10 dB = -21.12 dBm

Plot 8.2.11 Band edge emission measurements in 1910 - 1911 MHz range at high carrier frequency



Signal power = SA reading + BW factor = -30.67 + 10*log(3kHz/300Hz) = -30.67 dBm + 10 dB = -20.67 dBm

For band edge emissions measurement procedure refer to section 8.3.

Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21ºC	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

8.3 Spurious emissions at RF antenna connector test

8.3.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 8.3.1.

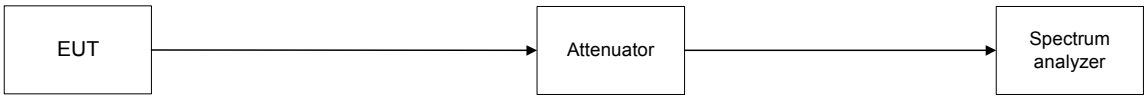
Table 8.3.1 Spurious emission limits

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

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 EUT was adjusted to produce maximum available for end user RF output power.
8.3.2.3 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 24.238, Spurious emission at antenna terminal**		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	**Verdict:**	PASS
Date:	4/12/2006		
Temperature: 21ºC	**Air Pressure:** 1014 hPa	**Relative Humidity:** 45 %	**Power Supply:** 3.8 VDC
Remarks:			

Table 8.3.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 1850 - 1910 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 – 20000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATION: 8PSK
MODULATING SIGNAL: PRBS
SYMBOL RATE: 270 kbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
TRANSMITTER OUTPUT POWER: 30.43 dBm at low frequency
30.46 dBm at mid frequency
30.34 dBm at high 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									
1848.980	-24.96	Included	NA	1000	-24.96	55.39	43.04	12.35	Pass
1849.985	-21.12	Included	NA	1000	-21.12	51.55	43.04	8.51	Pass
9251.300	-30.23	Included	NA	1000	-30.23	60.66	43.04	17.62	Pass
Mid carrier frequency									
9400.325	-30.38	Included	NA	100	-30.38	60.84	43.05	17.79	Pass
High carrier frequency									
1910.007	-20.67	Included	NA	100	-20.67	51.01	43.03	7.98	Pass
1911.000	-23.87	Included	NA	100	-23.87	54.21	43.03	11.18	Pass
9549.025	-31.64	Included	NA	100	-31.64	61.98	43.03	18.95	Pass

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

**- $Limit_{low} = 43+10*\log(P_W) = 43+10*\log(1.1041) = 43.04$

**- $Limit_{mid} = 43+10*\log(P_W) = 43+10*\log(1.1117) = 43.05$

**- $Limit_{high} = 43+10*\log(P_W) = 43+10*\log(1.0814) = 43.03$

***- Attenuation below $carrier_{low\ \&\ high} = 43.03 – Spurious\ emission$

***- Attenuation below $carrier_{mid} = 43.05 – Spurious\ emission$

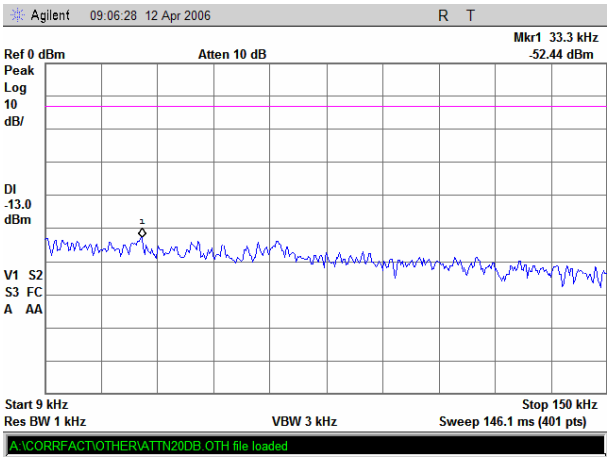
Reference numbers of test equipment used

HL 1650	HL 2780					

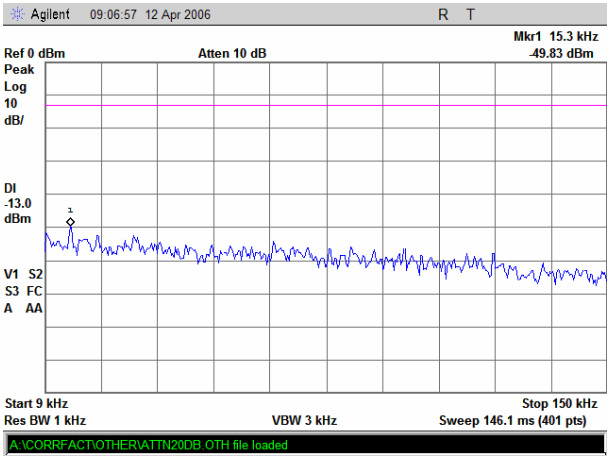
Full description is given in Appendix A.

Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.1 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency

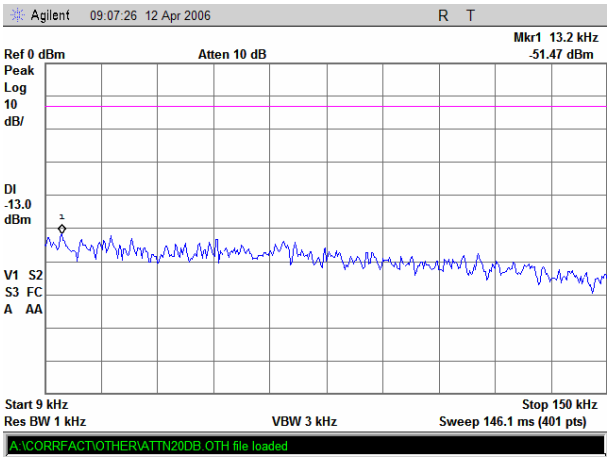


Plot 8.3.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency

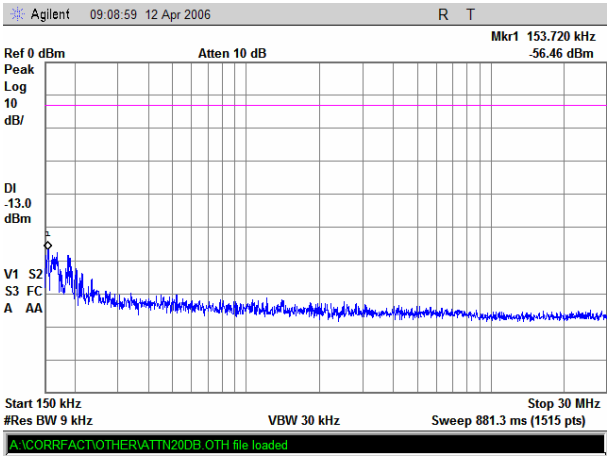


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.3 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency

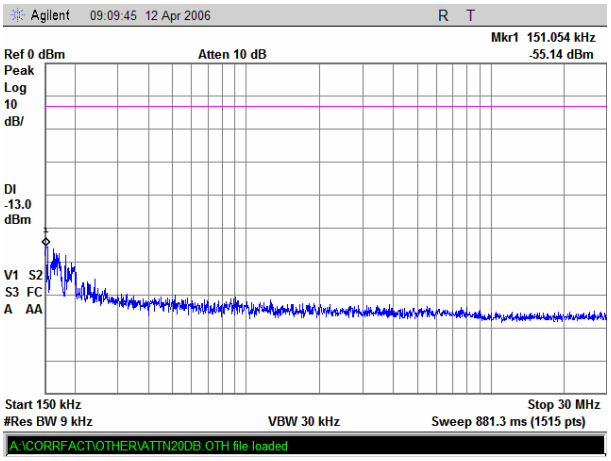


Plot 8.3.4 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency

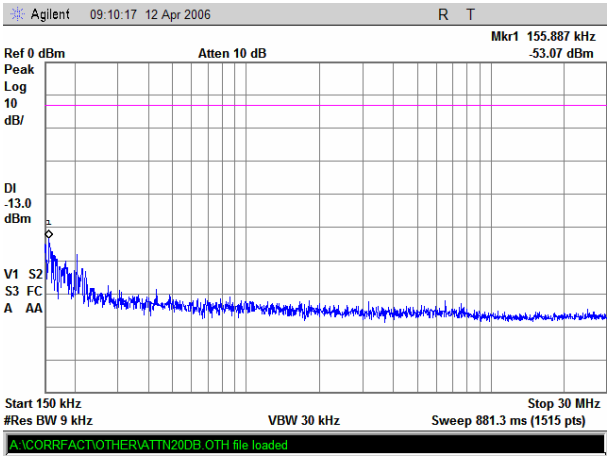


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.5 Spurious emission measurements in 0.15 - 30.0 MHz range at mid carrier frequency

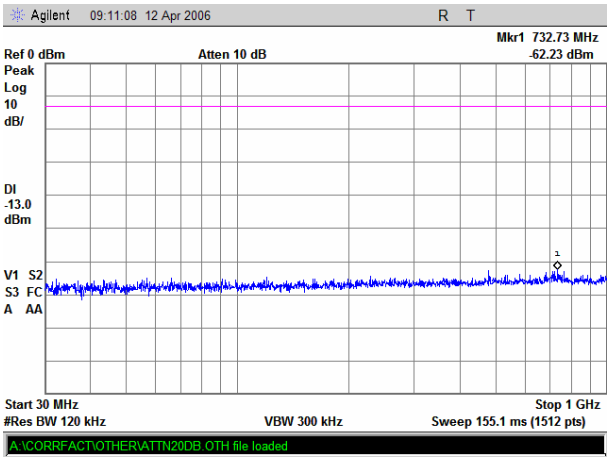


Plot 8.3.6 Spurious emission measurements in 0.15 – 30.0 MHz range at high carrier frequency

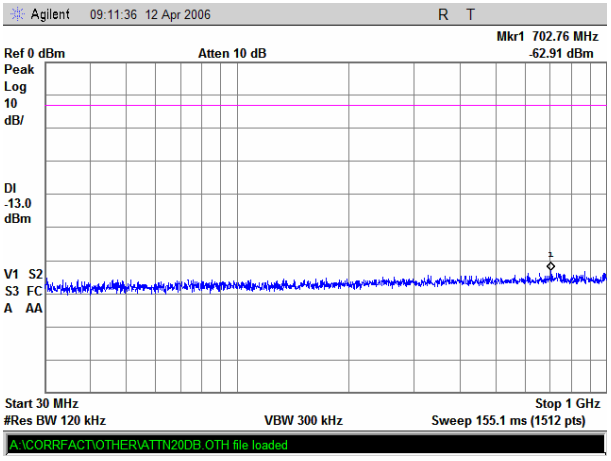


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.7 Spurious emission measurements in 30.0 - 1000 MHz range at low carrier frequency

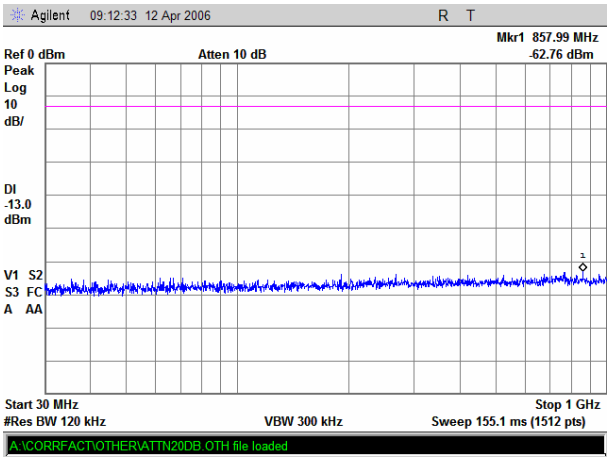


Plot 8.3.8 Spurious emission measurements in 30.0 - 1000 MHz range at mid carrier frequency

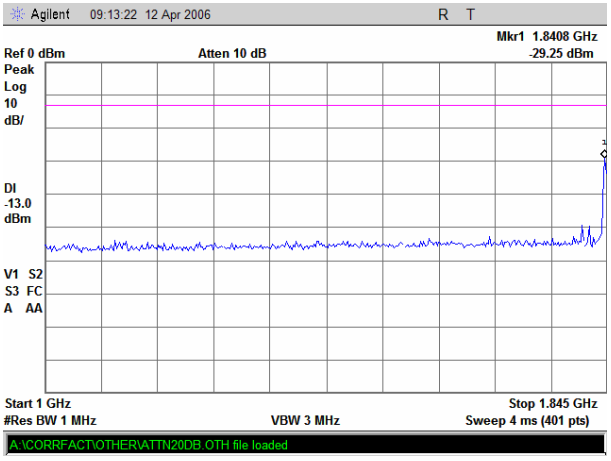


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.9 Spurious emission measurements in 30.0 - 1000 MHz range at high carrier frequency

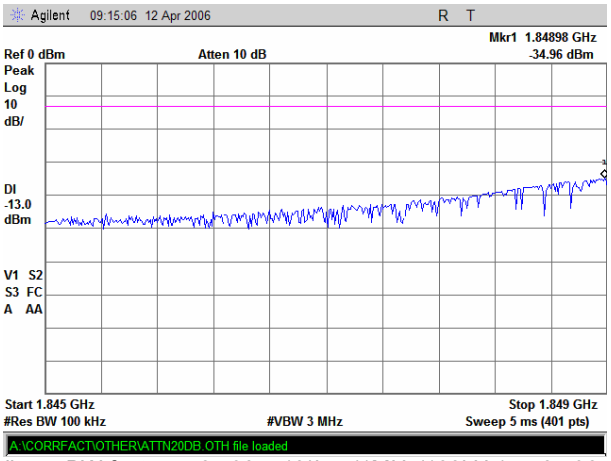


Plot 8.3.10 Spurious emission measurements in 1000 - 1845 MHz range at low carrier frequency



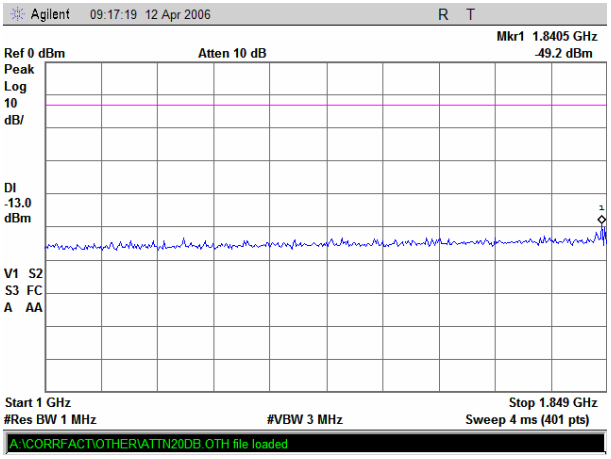
Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.11 Spurious emission measurements in 1845 - 1849 MHz range at low carrier frequency



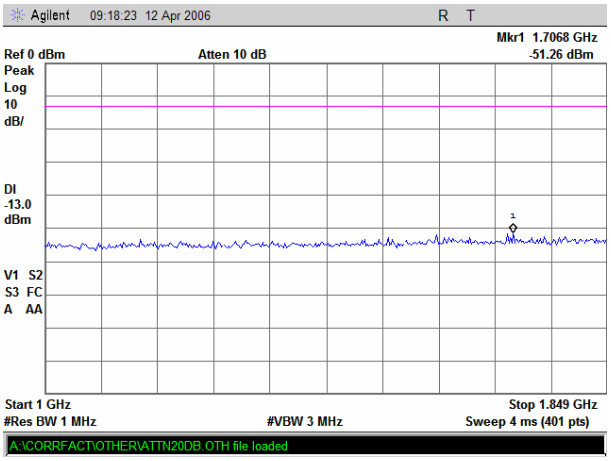
Signal power = SA reading + BW factor = -34.96 + 10*log (1MHz/100kHz) = -34.96 dBm + 10 dB = -24.96 dBm

Plot 8.3.12 Spurious emission measurements in 1000 - 1849 MHz range at mid carrier frequency

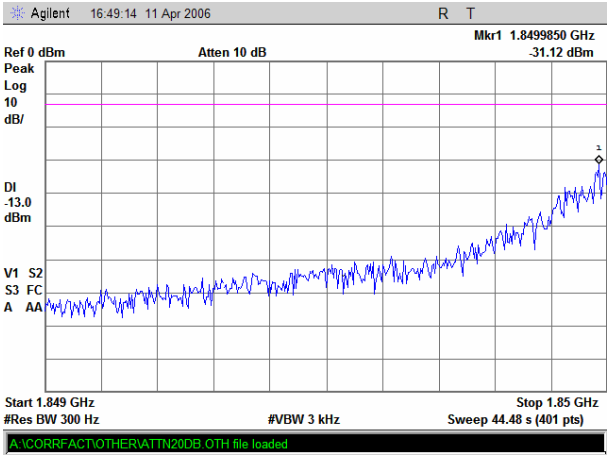


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.13 Spurious emission measurements in 1000 - 1849 MHz range at high carrier frequency



Plot 8.3.14 Spurious emission measurements in 1849 - 1850 MHz range at low carrier frequency

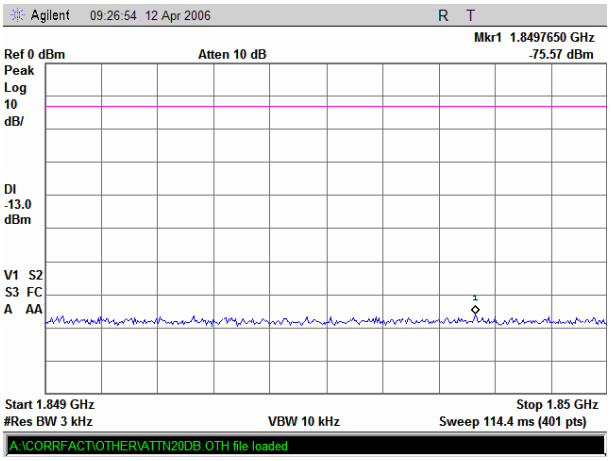


Signal power = SA reading + BW factor = -31.12 + 10*log(3kHz/300Hz) = -31.12 dBm + 10 dB = -21.12 dBm

Note: according to FCC 24.238: "…in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed."

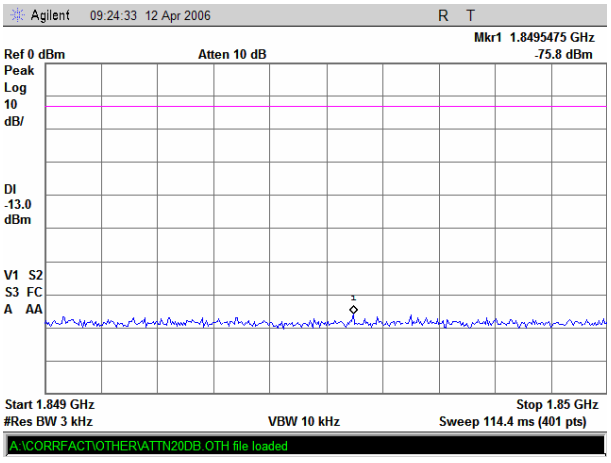
Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.15 Spurious emission measurements in 1849 - 1850 MHz range at mid carrier frequency



Note: see note to plot 8.3.14

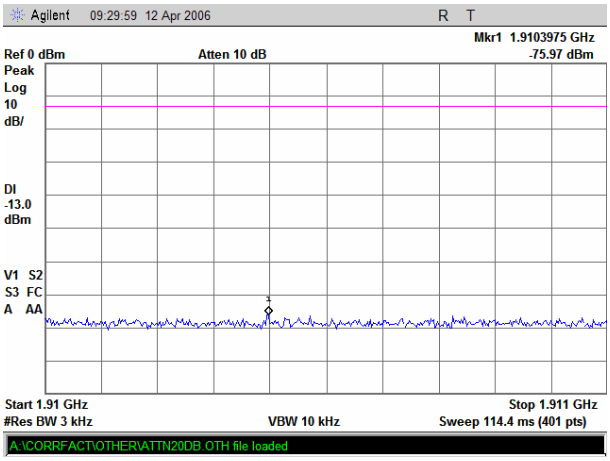
Plot 8.3.16 Spurious emission measurements in 1849 - 1850 MHz range at high carrier frequency



Note: see note to plot 8.3.14

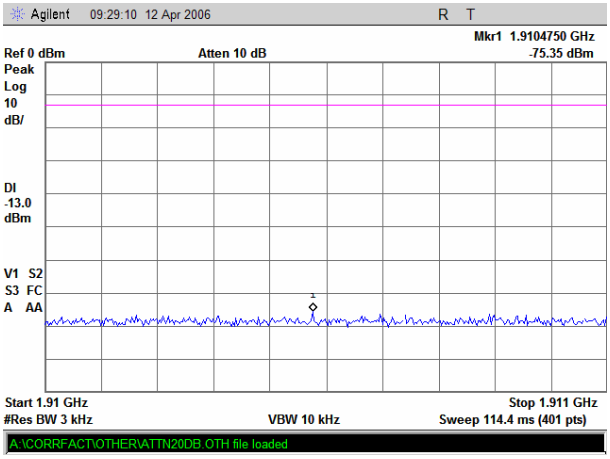
Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.17 Spurious emission measurements in 1910 - 1911 MHz range at low carrier frequency



Note: see note to plot 8.3.14

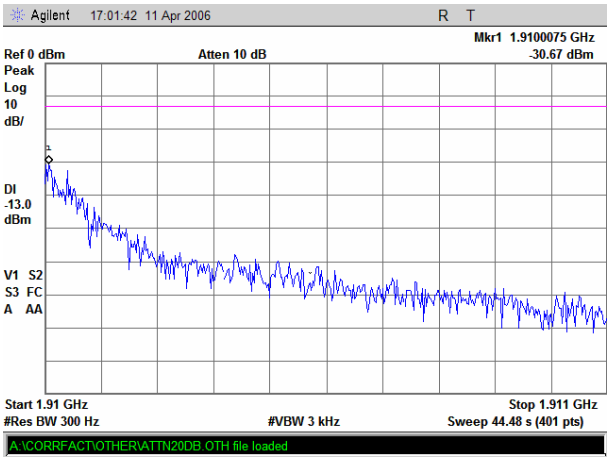
Plot 8.3.18 Spurious emission measurements in 1910 - 1911 MHz range at mid carrier frequency



Note: see note to plot 8.3.14

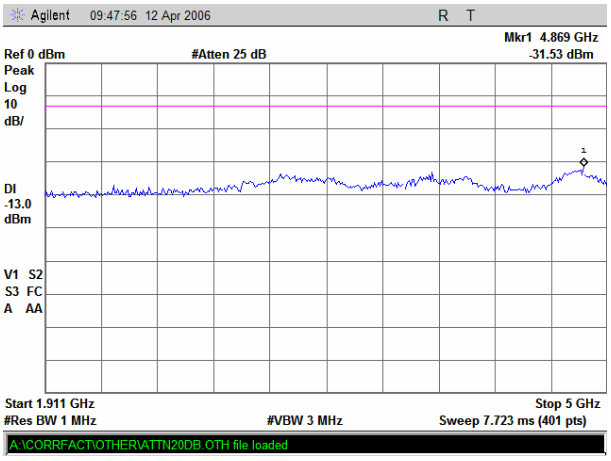
Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.19 Spurious emission measurements in 1910 - 1911 MHz range at high carrier frequency



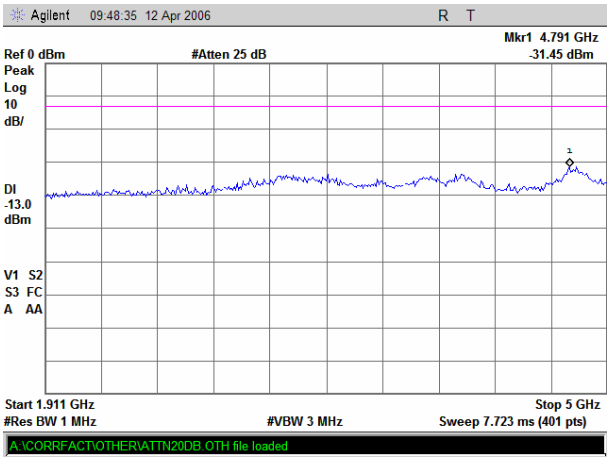
Signal power = SA reading + BW factor = -30.67 + 10*log(3kHz/300Hz) = -30.67 dBm + 10 dB = -20.67 dBm
Note: see note to plot 8.3.14

Plot 8.3.20 Spurious emission measurements in 1911 - 5000 MHz range at low carrier frequency

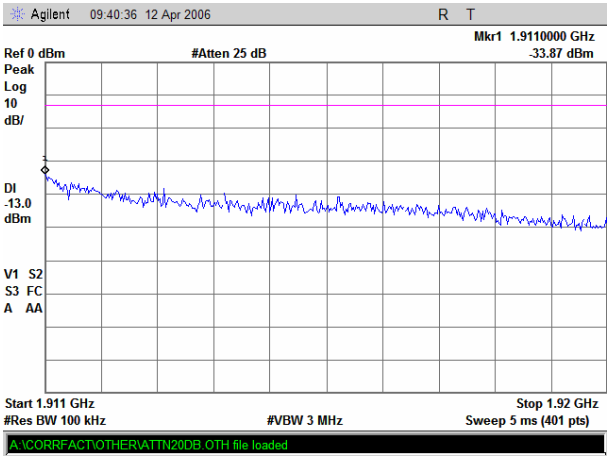


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.21 Spurious emission measurements in 1911 - 5000 MHz range at mid carrier frequency



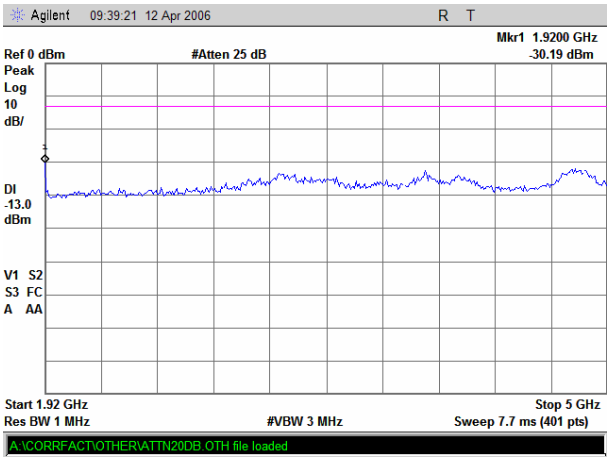
Plot 8.3.22 Spurious emission measurements in 1911 - 1920 MHz range at high carrier frequency



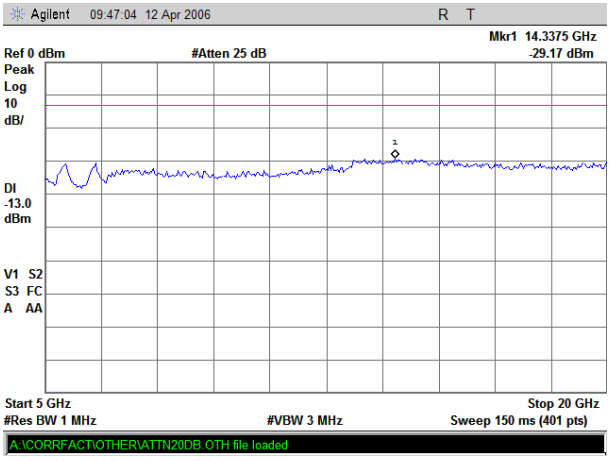
Signal power = SA reading + BW factor = -33.87 + 10*log(1MHz/100kHz) = -33.87 dBm + 10 dB = -23.87 dBm

Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.23 Spurious emission measurements in 1920 - 5000 MHz range at high carrier frequency

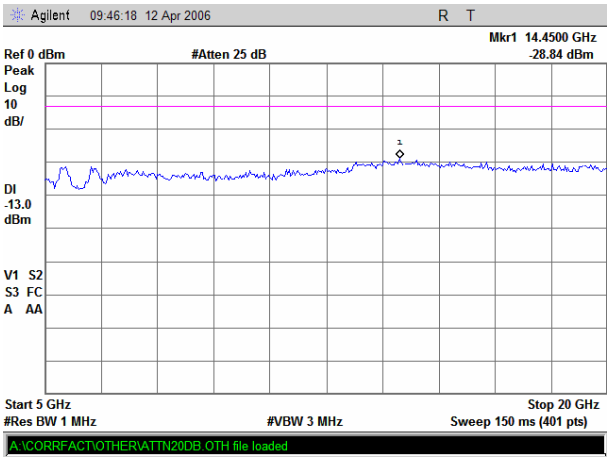


Plot 8.3.24 Spurious emission measurements in 5000 - 20000 MHz range at low carrier frequency

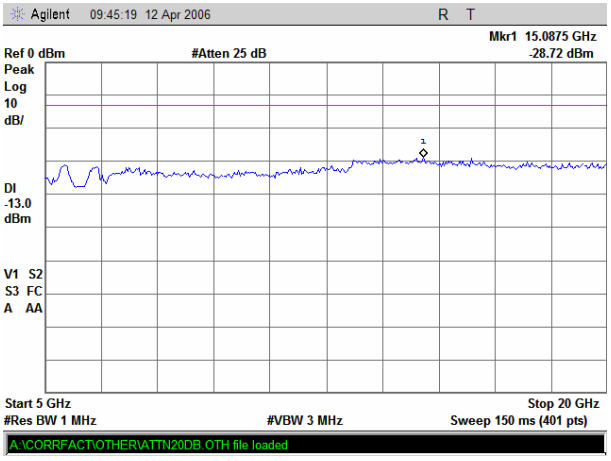


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.25 Spurious emission measurements in 5000 - 20000 MHz range at mid carrier frequency

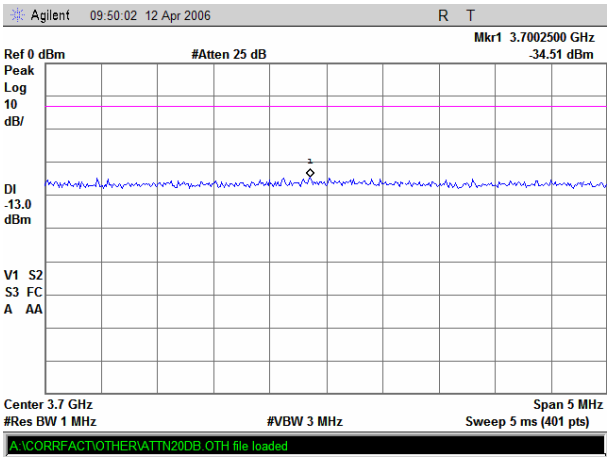


Plot 8.3.26 Spurious emission measurements in 5000 - 20000 MHz range at high carrier frequency

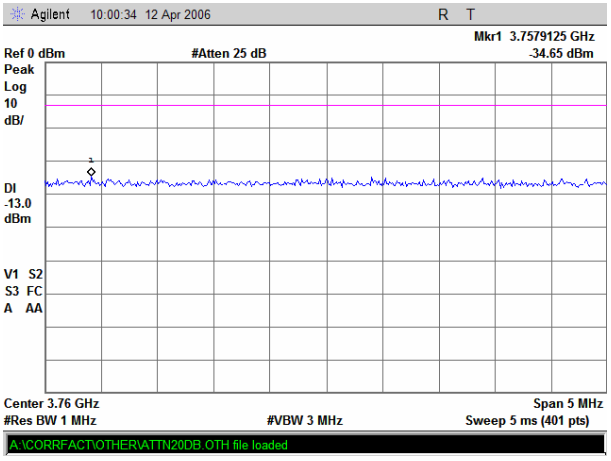


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.27 Conducted spurious emission measurements at the 2nd harmonic of low carrier frequency

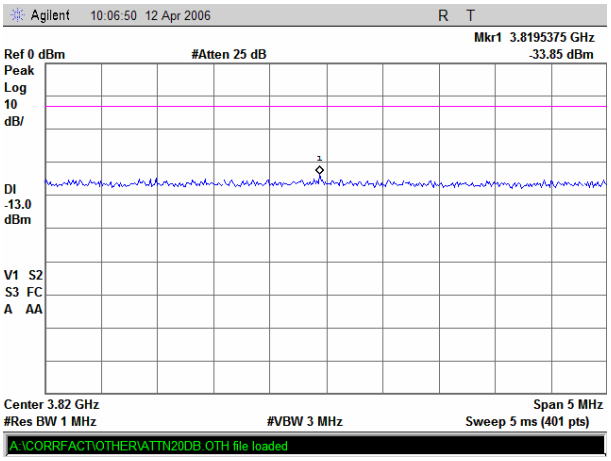


Plot 8.3.28 Conducted spurious emission measurements at the 2nd harmonic of mid carrier frequency

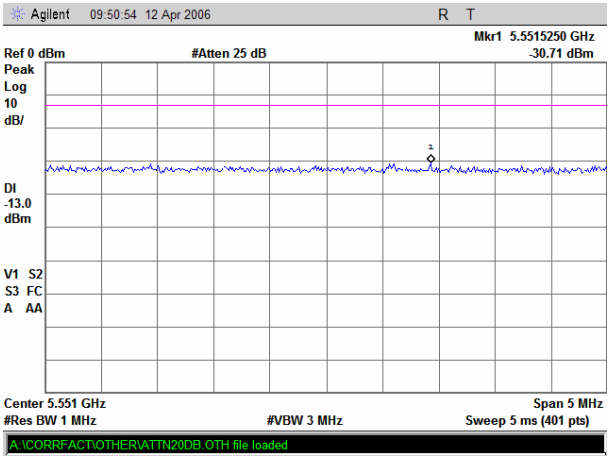


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.29 Conducted spurious emission measurements at the 2nd harmonic of high carrier frequency

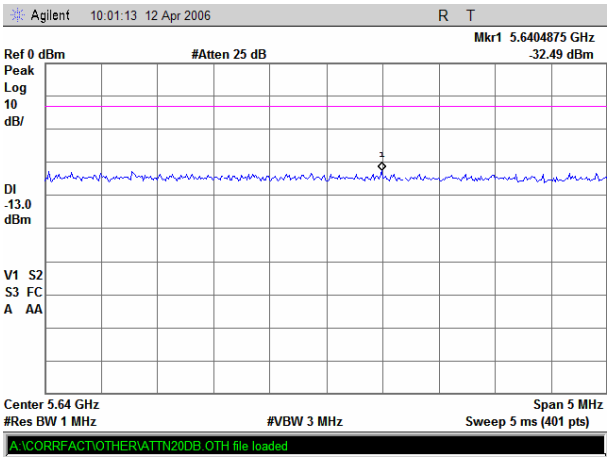


Plot 8.3.30 Conducted spurious emission measurements at the 3rd harmonic of low carrier frequency

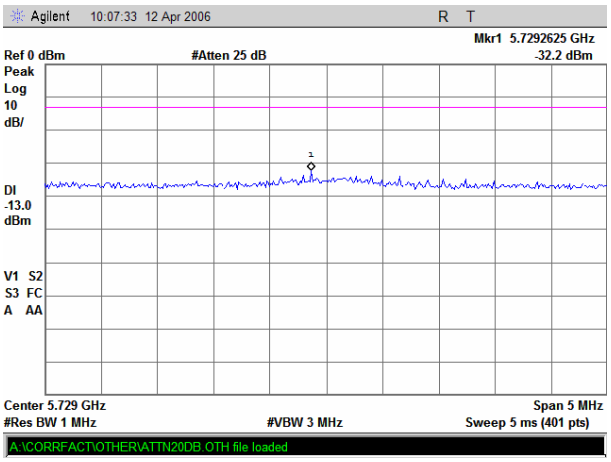


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.31 Conducted spurious emission measurements at the 3rd harmonic of mid carrier frequency

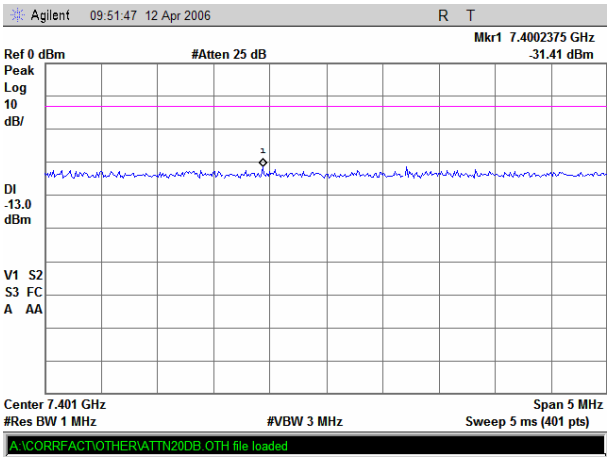


Plot 8.3.32 Conducted spurious emission measurements at the 3rd harmonic of high carrier frequency

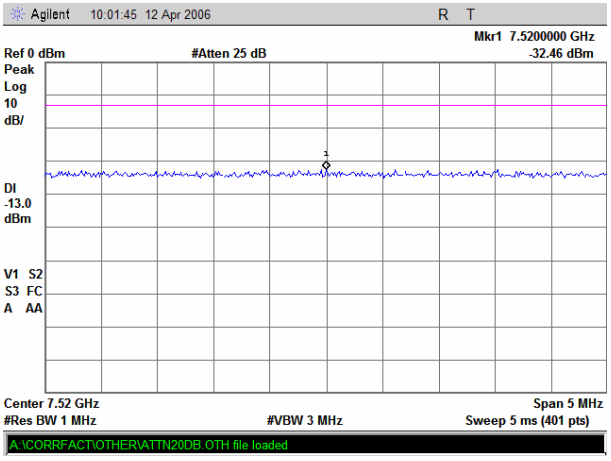


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.33 Conducted spurious emission measurements at the 4th harmonic of low carrier frequency

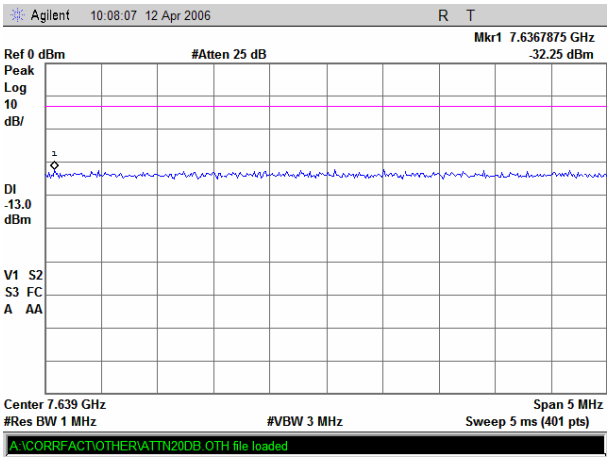


Plot 8.3.34 Conducted spurious emission measurements at the 4th harmonic of mid carrier frequency

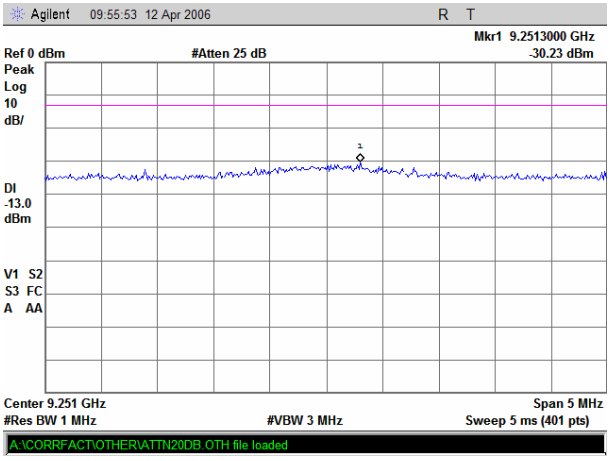


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.35 Conducted spurious emission measurements at the 4th harmonic of high carrier frequency

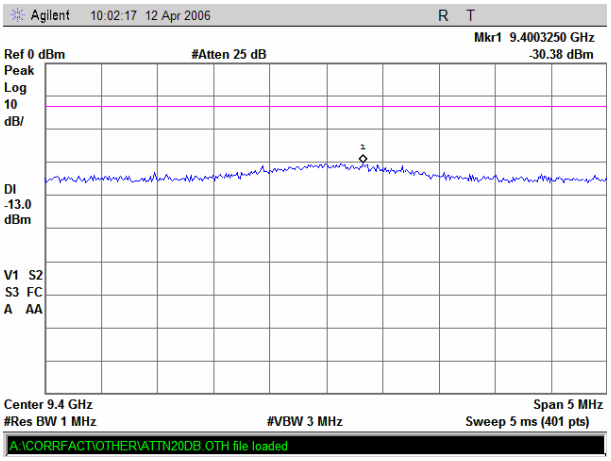


Plot 8.3.36 Conducted spurious emission measurements at the 5th harmonic of low carrier frequency

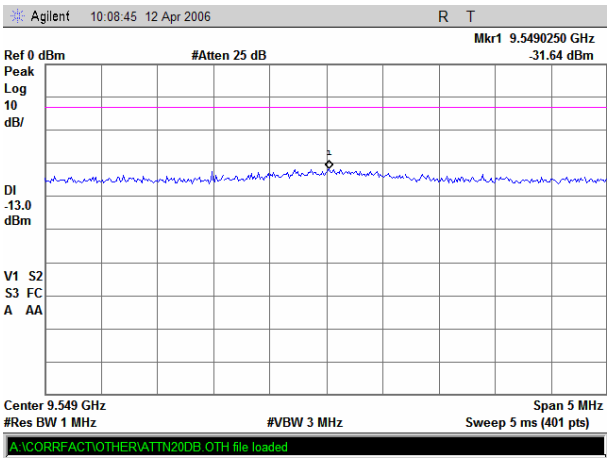


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.37 Conducted spurious emission measurements at the 5th harmonic of mid carrier frequency

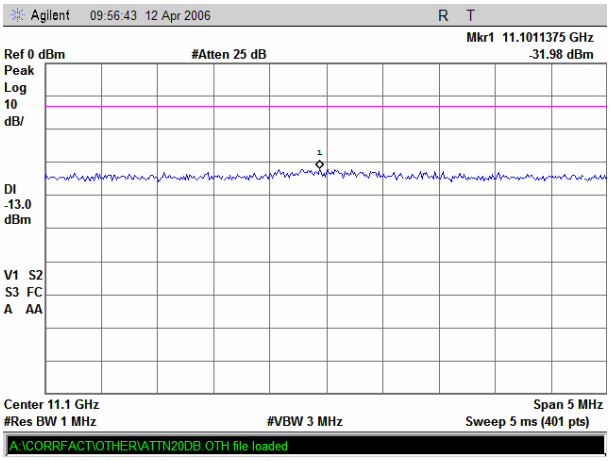


Plot 8.3.38 Conducted spurious emission measurements at the 5th harmonic of high carrier frequency

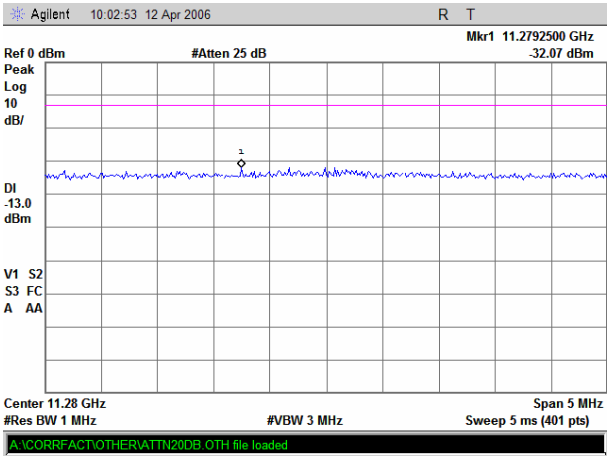


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.39 Conducted spurious emission measurements at the 6th harmonic of low carrier frequency

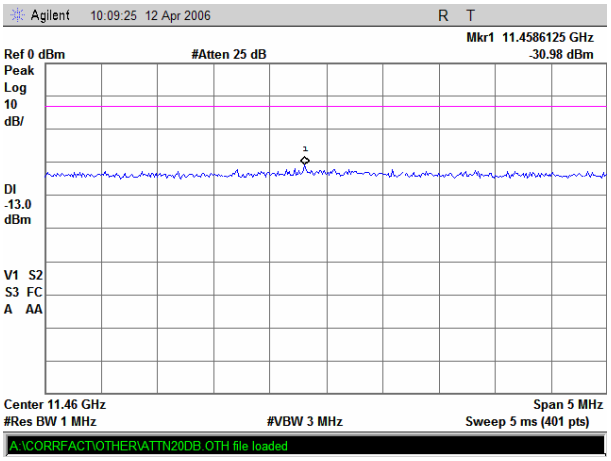


Plot 8.3.40 Conducted spurious emission measurements at the 6th harmonic of mid carrier frequency

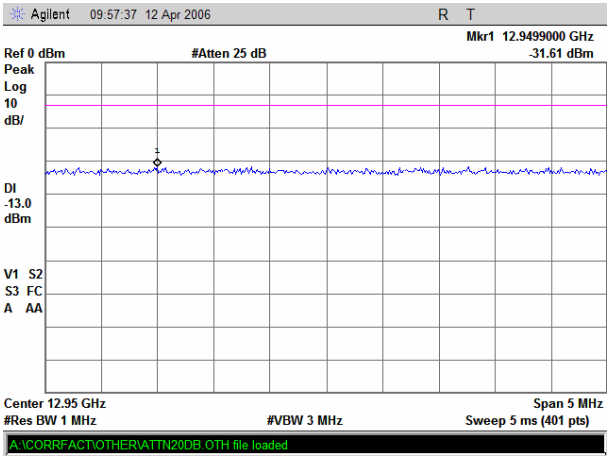


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.41 Conducted spurious emission measurements at the 6th harmonic of high carrier frequency

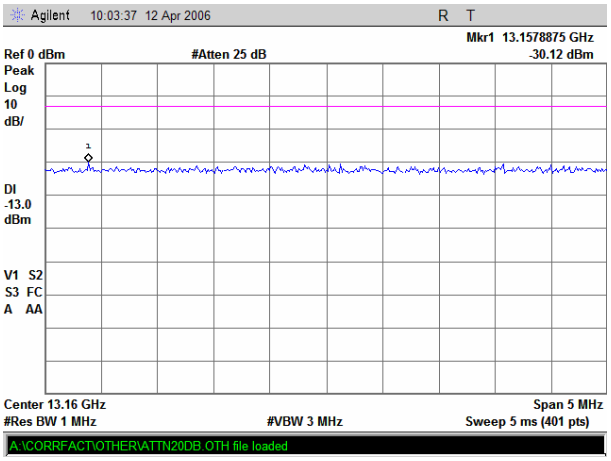


Plot 8.3.42 Conducted spurious emission measurements at the 7th harmonic of low carrier frequency

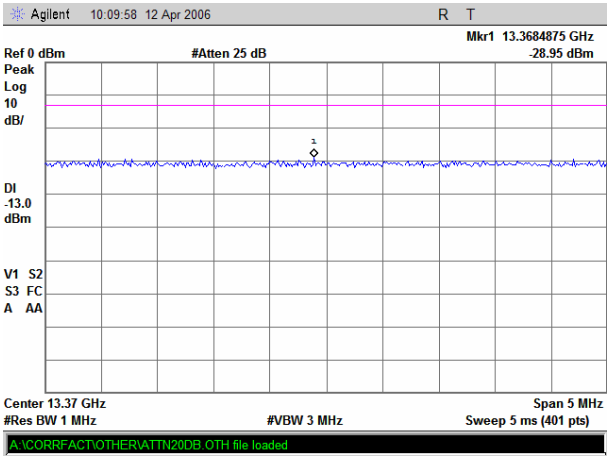


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.43 Conducted spurious emission measurements at the 7th harmonic of mid carrier frequency

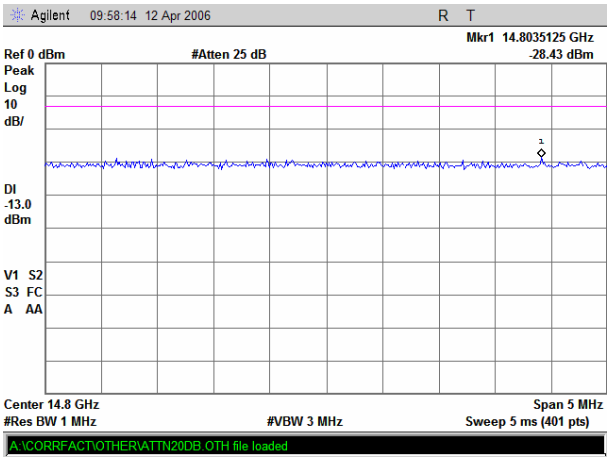


Plot 8.3.44 Conducted spurious emission measurements at the 7th harmonic of high carrier frequency

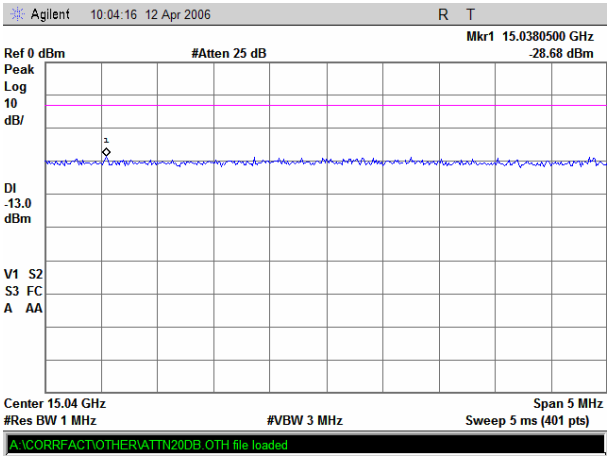


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.45 Conducted spurious emission measurements at the 8th harmonic of low carrier frequency

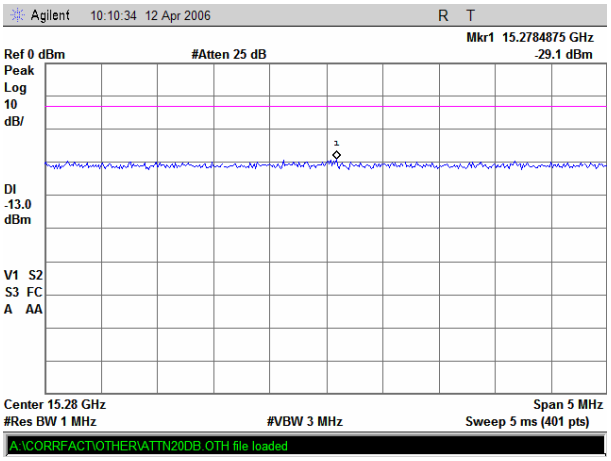


Plot 8.3.46 Conducted spurious emission measurements at the 8th harmonic of mid carrier frequency

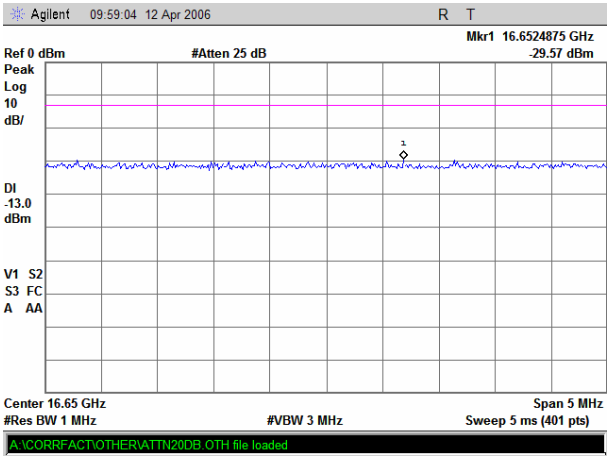


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.47 Conducted spurious emission measurements at the 8th harmonic of high carrier frequency

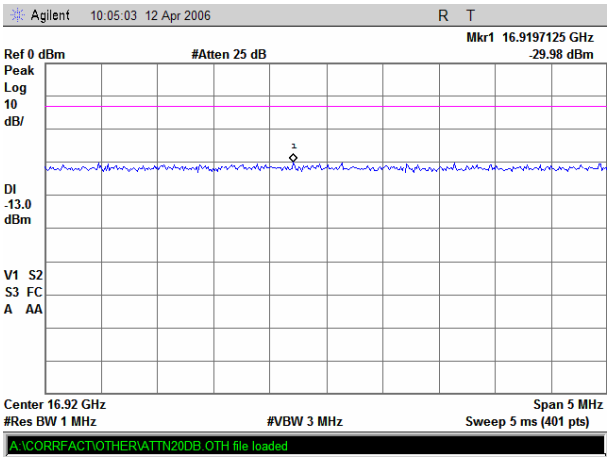


Plot 8.3.48 Conducted spurious emission measurements at the 9th harmonic of low carrier frequency

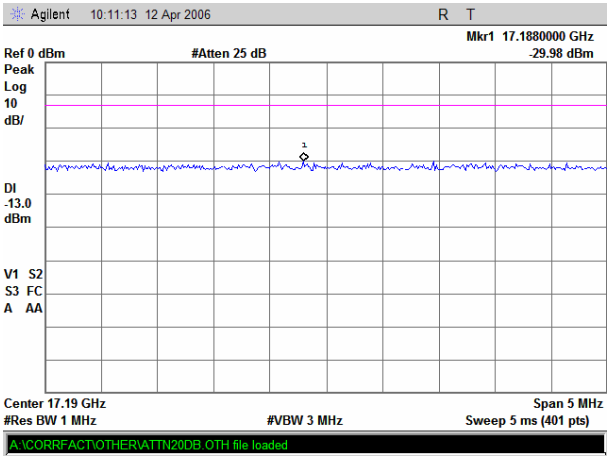


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.49 Conducted spurious emission measurements at the 9th harmonic of mid carrier frequency

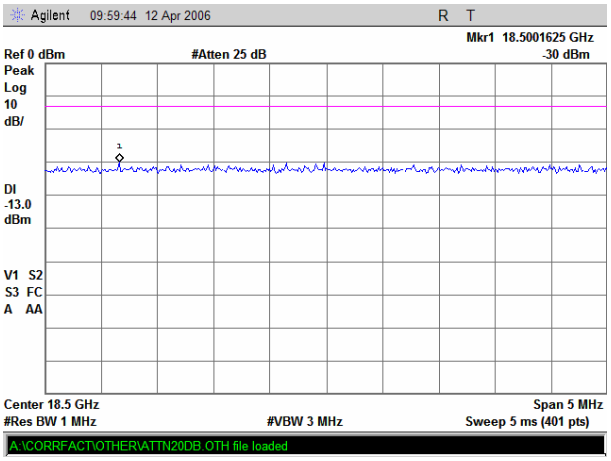


Plot 8.3.50 Conducted spurious emission measurements at the 9th harmonic of high carrier frequency

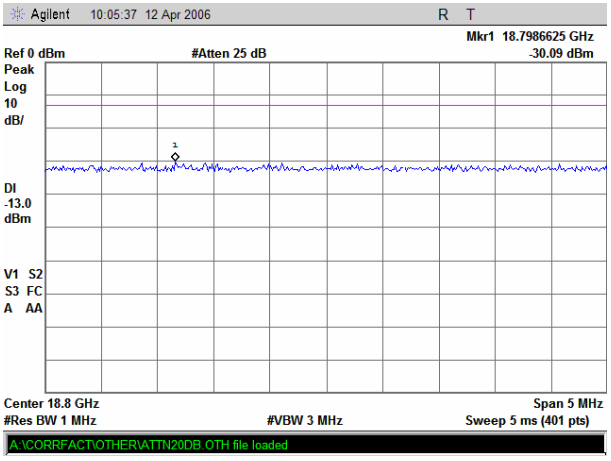


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.51 Conducted spurious emission measurements at the 10th harmonic of low carrier frequency

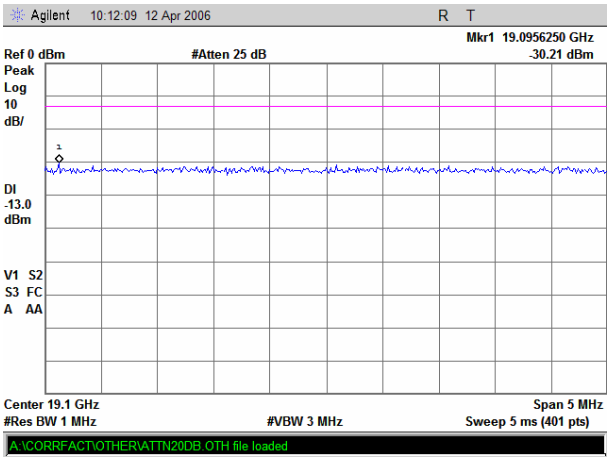


Plot 8.3.52 Conducted spurious emission measurements at the 10th harmonic of mid carrier frequency



Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/12/2006		
Temperature: 21°C	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.3.53 Conducted spurious emission measurements at the 10th harmonic of high carrier frequency



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

8.4 Field strength of spurious emissions

8.4.1 General

This test was performed to measure field strength of spurious emissions from the EUT. Specification test limit is given in Table 8.4.1.

Table 8.4.1 Radiated spurious emissions limits

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

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

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

8.4.2.1 The EUT was set up as shown inFigure 8.4.1, energized and the performance check was conducted.

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

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

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

8.4.3.1 The EUT was set up as shown inFigure 8.4.2, energized and the performance check was conducted.

8.4.3.2 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360^0, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal.

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

Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

Figure 8.4.1 Setup for spurious emission field strength measurements below 30 MHz

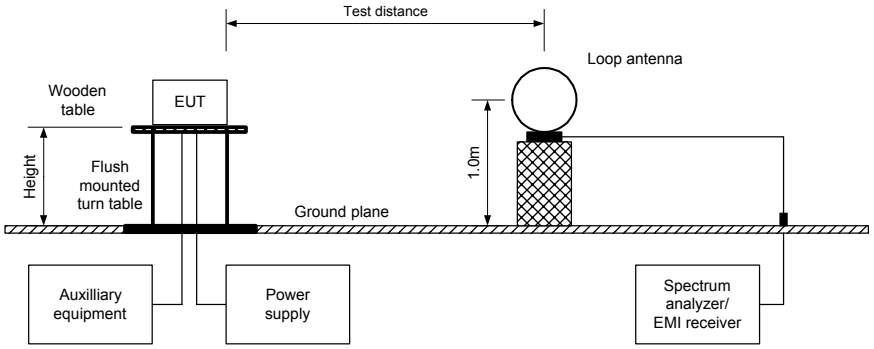
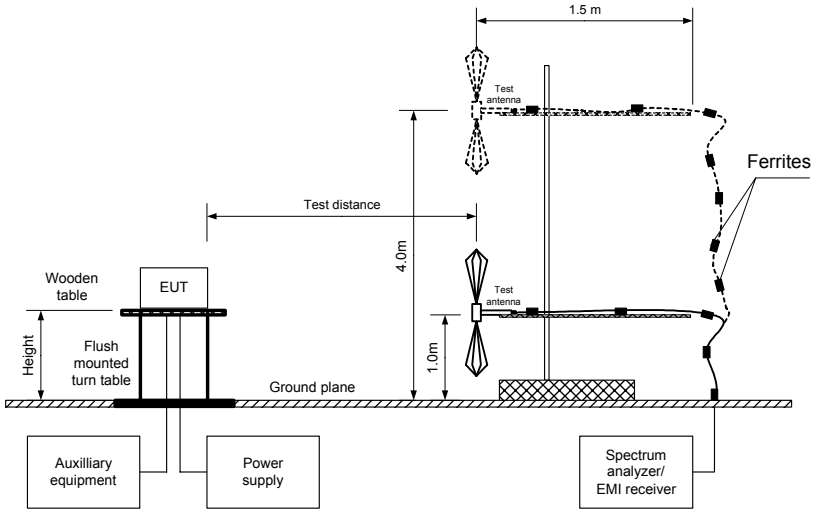


Figure 8.4.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	**Section 24.238, Radiated spurious emissions**		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	**Verdict:**	PASS
Date:	4/11/2006		
Temperature: 21ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 46 %	**Power Supply:** 3.8 VDC
Remarks:			

Table 8.4.2 Field strength of emissions

ASSIGNED FREQUENCY RANGE:	1850 - 1910 MHz
INVESTIGATED FREQUENCY RANGE:	0.009 – 20000 MHz
TEST DISTANCE:	3 m
MODULATION:	Unmodulated
DUTY CYCLE:	12.5 %
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum
TRANSMITTER OUTPUT POWER:	30.43 dBm at low carrier frequency 30.46 dBm at mid carrier frequency 30.34 dBm at high carrier frequency
DETECTOR USED:	Peak
TEST ANTENNA TYPE:	Active loop (9 kHz – 30 MHz) Biconilog (30 MHz – 1000 MHz) Double ridged guide (1000 MHz – 18000 MHz) Standard gain horn (above 18 GHz)

Frequency, MHz	Field strength of spurious, dB(μV/m)	Limit, dB(μV/m)	Margin, dB	Antenna polarization	Antenna height, m	Azimuth, degrees*
No spurious emissions were found						

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

Reference numbers of test equipment used

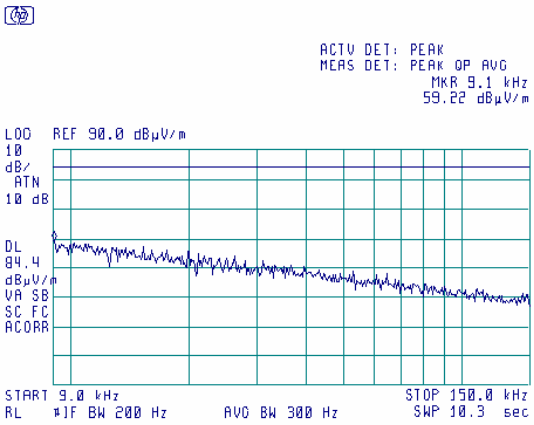
HL 0446	HL 0521	HL 0589	HL 0592	HL 0593	HL 0594	HL 0604	HL 0768
HL 1947	HL 1984	HL 2009	HL 2258	HL 2399	HL 2780		

Full description is given in Appendix A.

Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

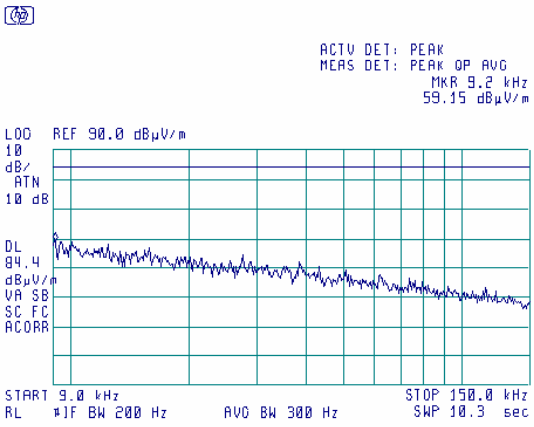
Plot 8.4.1 Radiated emission measurements from 9 to 150 kHz at the low carrier frequency

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



Plot 8.4.2 Radiated emission measurements from 9 to 150 kHz at the mid carrier frequency

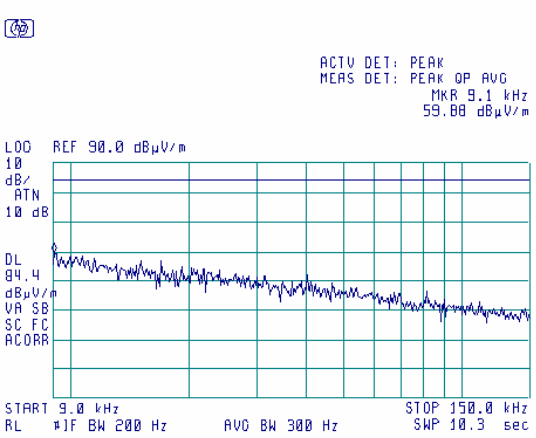
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

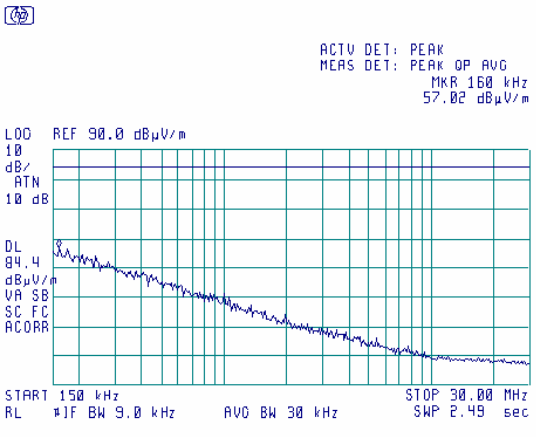
Plot 8.4.3 Radiated emission measurements from 9 to 150 kHz at the high carrier frequency

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



Plot 8.4.4 Radiated emission measurements from 0.15 to 30 MHz at the low carrier frequency

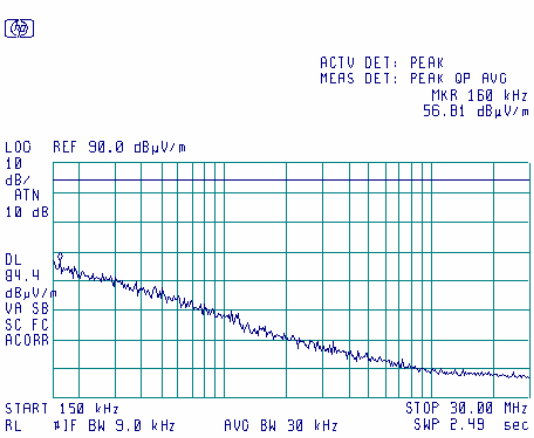
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

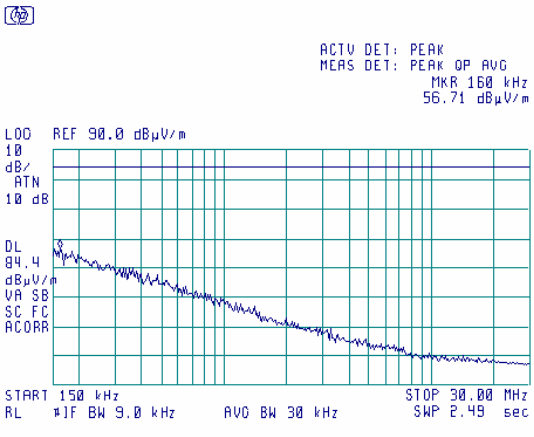
Plot 8.4.5 Radiated emission measurements from 0.15 to 30 MHz at the mid carrier frequency

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



Plot 8.4.6 Radiated emission measurements from 0.15 to 30 MHz at the high carrier frequency

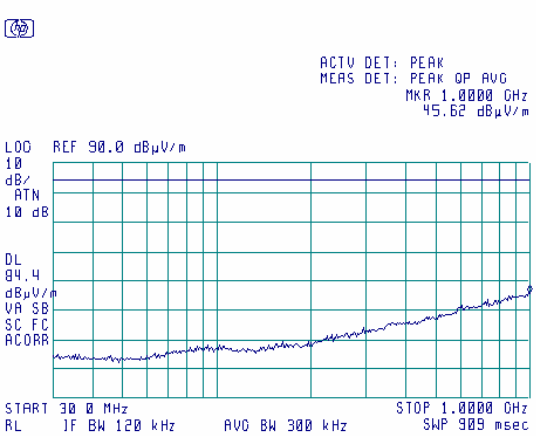
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

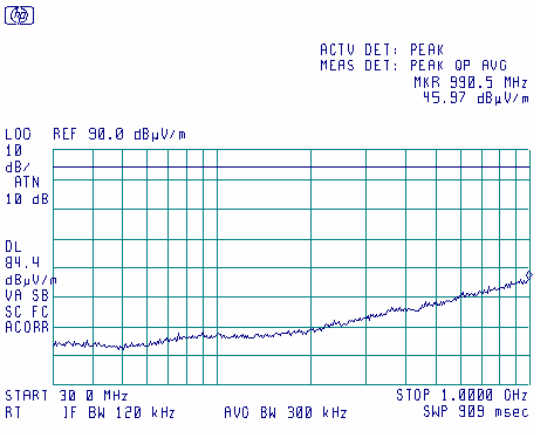
Plot 8.4.7 Radiated emission measurements from 30 to 1000 MHz at the low carrier frequency

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



Plot 8.4.8 Radiated emission measurements from 30 to 1000 MHz at the mid carrier frequency

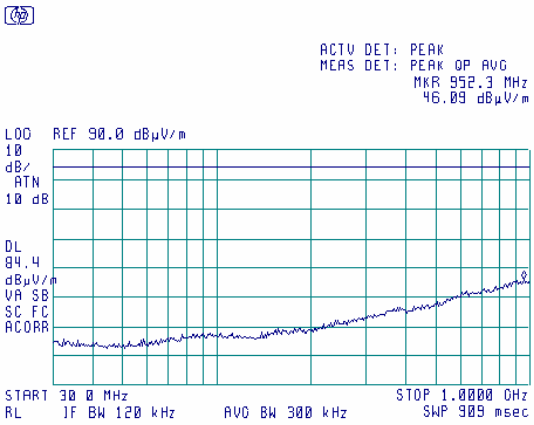
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

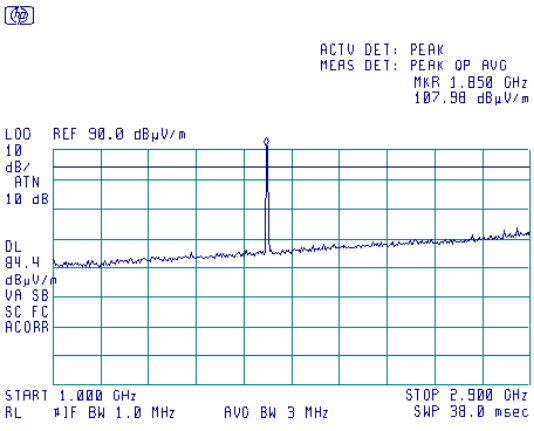
Plot 8.4.9 Radiated emission measurements from 30 to 1000 MHz at the high carrier frequency

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



Plot 8.4.10 Radiated emission measurements from 1000 to 2900 MHz at the low carrier frequency

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

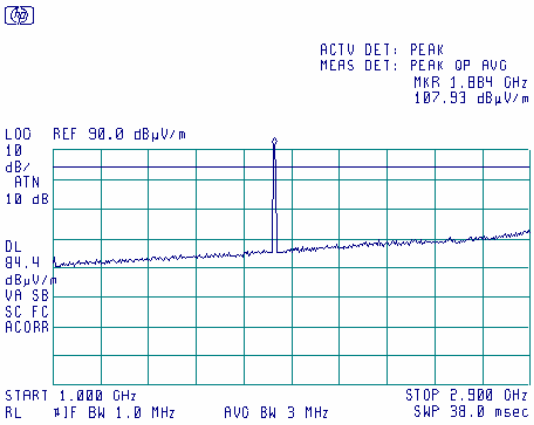


Note: intentional radiation of RF module

Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.4.11 Radiated emission measurements from 1000 to 2900 MHz at the mid carrier frequency

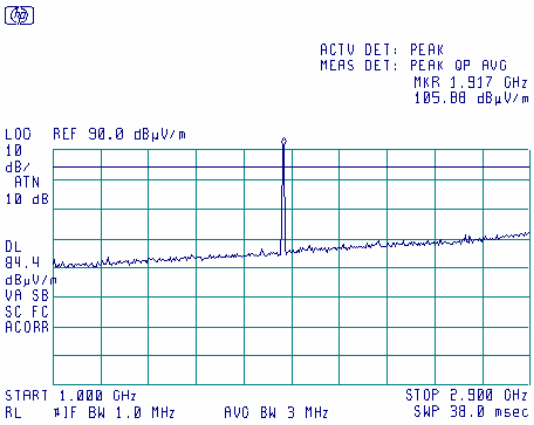
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Note: intentional radiation of RF module

Plot 8.4.12 Radiated emission measurements from 1000 to 2900 MHz at the high carrier frequency

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

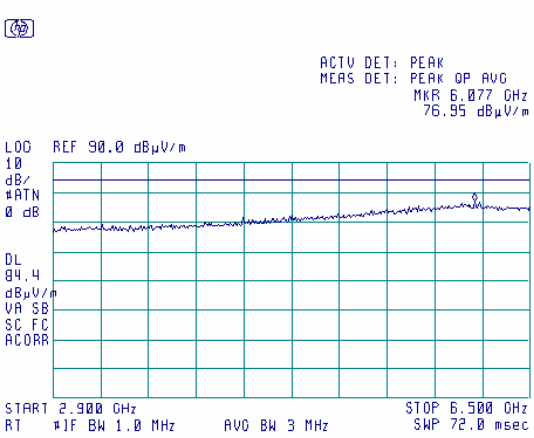


Note: intentional radiation of RF module

Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

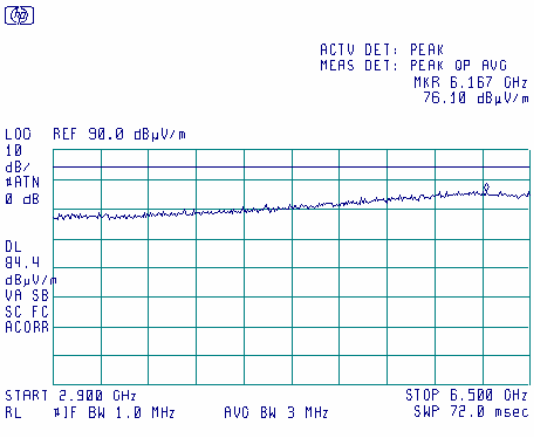
Plot 8.4.13 Radiated emission measurements from 2900 to 6500 MHz at the low carrier frequency

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



Plot 8.4.14 Radiated emission measurements from 2900 to 6500 MHz at the mid carrier frequency

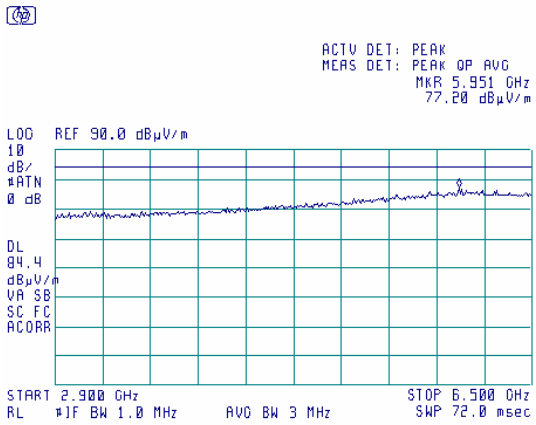
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21°C	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

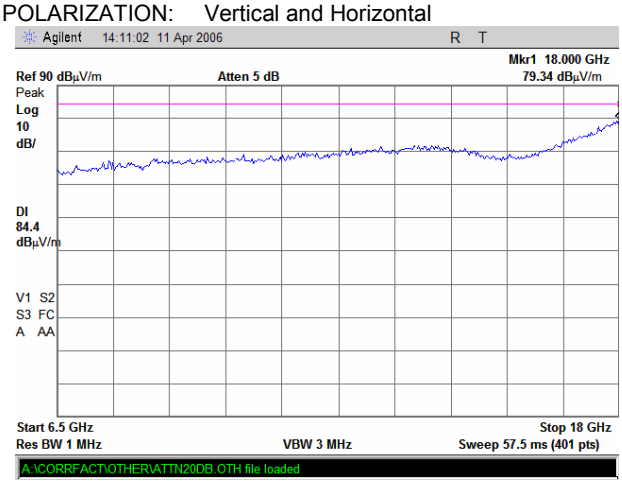
Plot 8.4.15 Radiated emission measurements from 2900 to 6500 MHz at the high carrier frequency

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



Plot 8.4.16 Radiated emission measurements from 6.5 to 18 GHz at the low carrier frequency

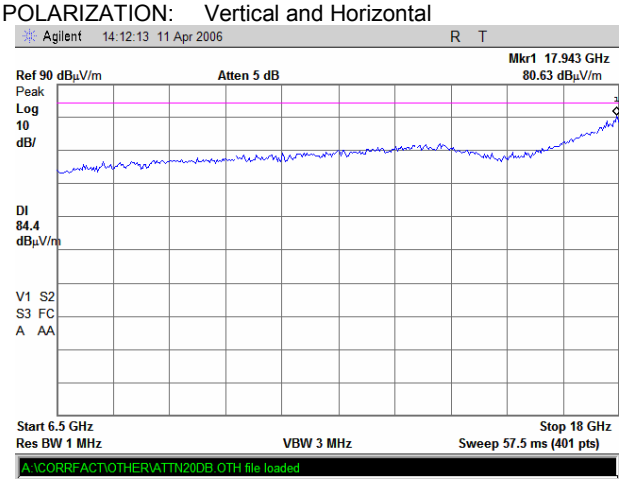
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21°C	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

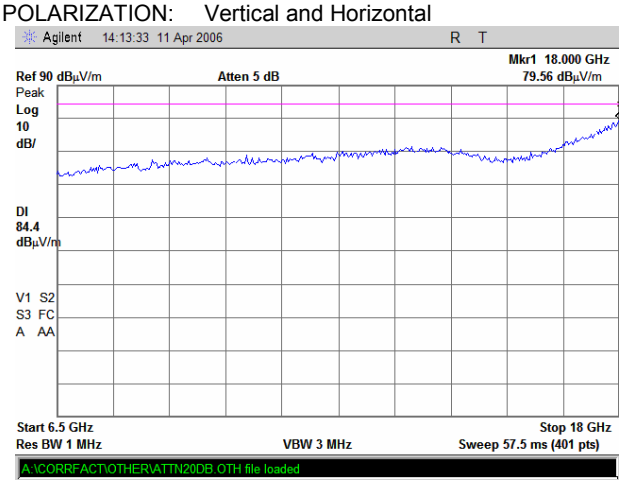
Plot 8.4.17 Radiated emission measurements from 6.5 to 18 GHz at the mid carrier frequency

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



Plot 8.4.18 Radiated emission measurements from 6.5 to 18 GHz at the high carrier frequency

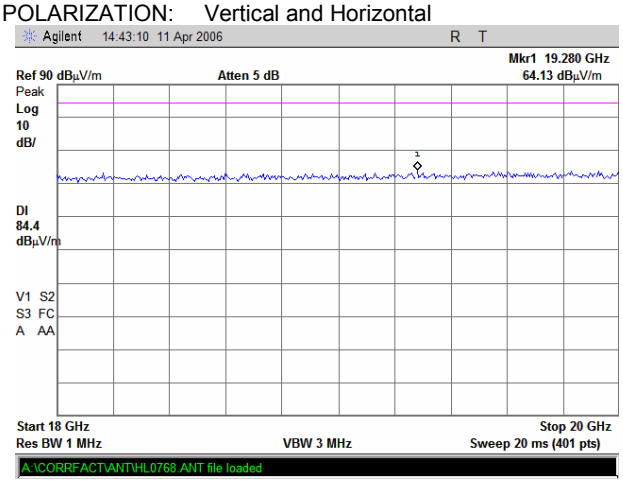
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21°C	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

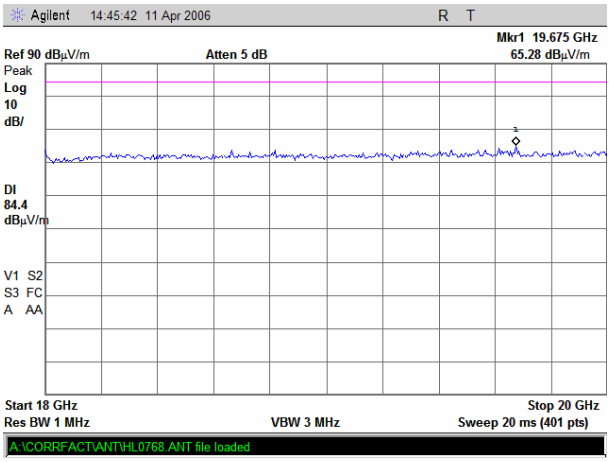
Plot 8.4.19 Radiated emission measurements from 18 to 20 GHz at the low carrier frequency

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



Plot 8.4.20 Radiated emission measurements from 18 to 20 GHz at the mid carrier frequency

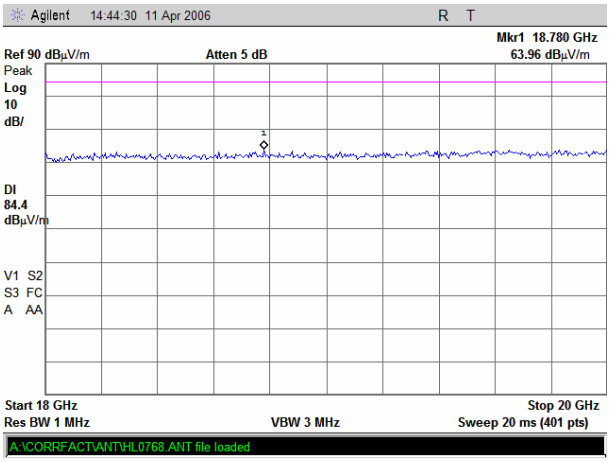
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21°C	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

Plot 8.4.21 Radiated emission measurements from 18 to 20 GHz at the high carrier frequency

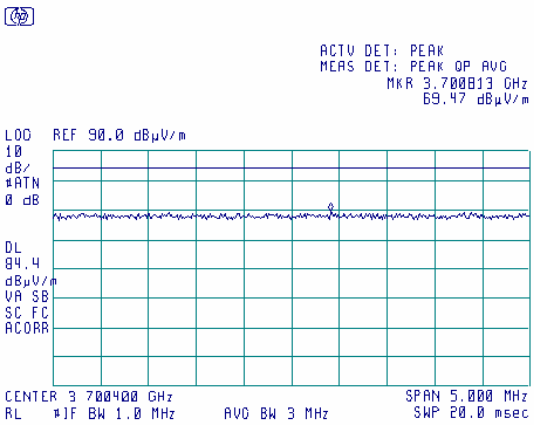
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

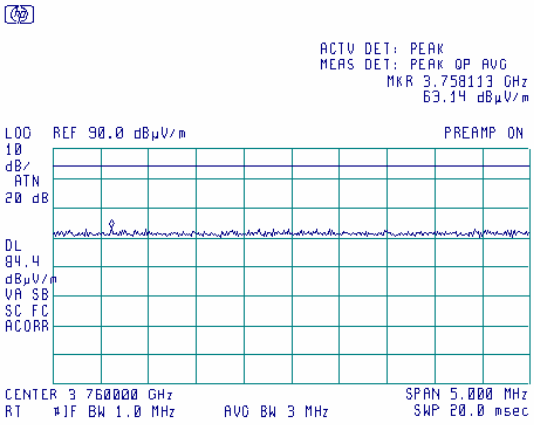
Plot 8.4.22 Radiated emission measurements at the second harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 8.4.23 Radiated emission measurements at the second harmonic of mid carrier frequency

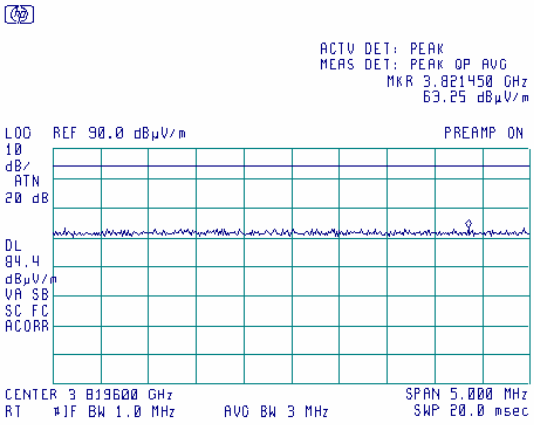
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

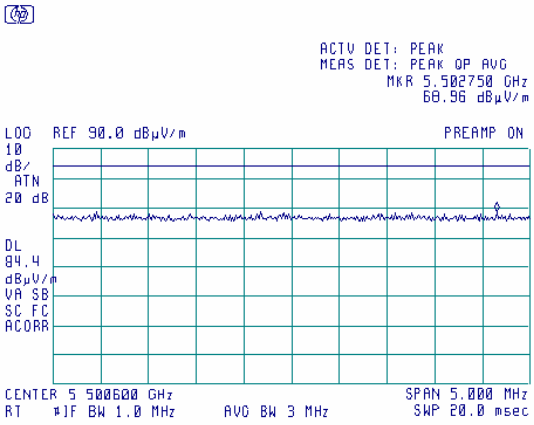
Plot 8.4.24 Radiated emission measurements at the second harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 8.4.25 Radiated emission measurements at the third harmonic of low carrier frequency

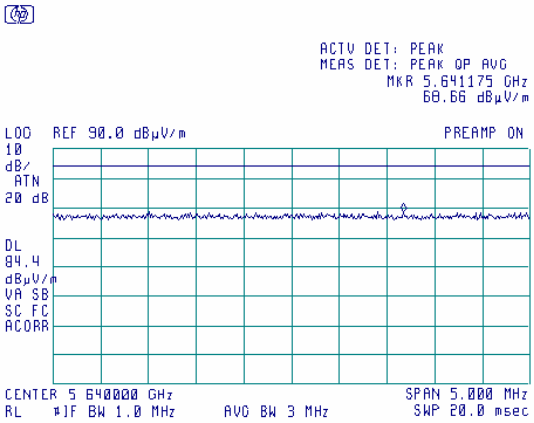
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

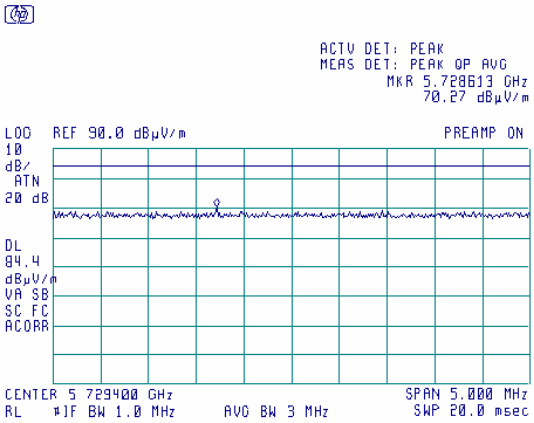
Plot 8.4.26 Radiated emission measurements at the third harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 8.4.27 Radiated emission measurements at the third harmonic of high carrier frequency

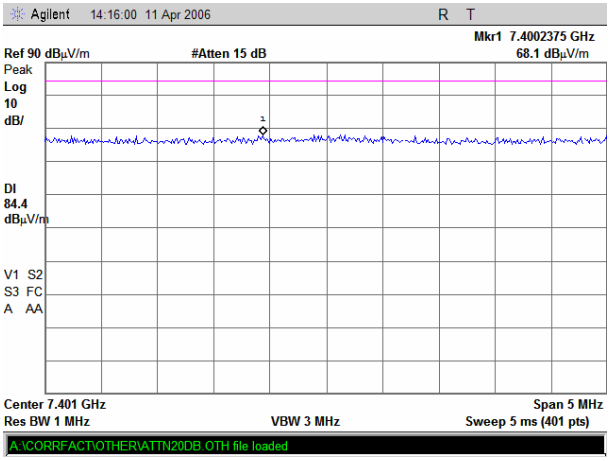
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21°C	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

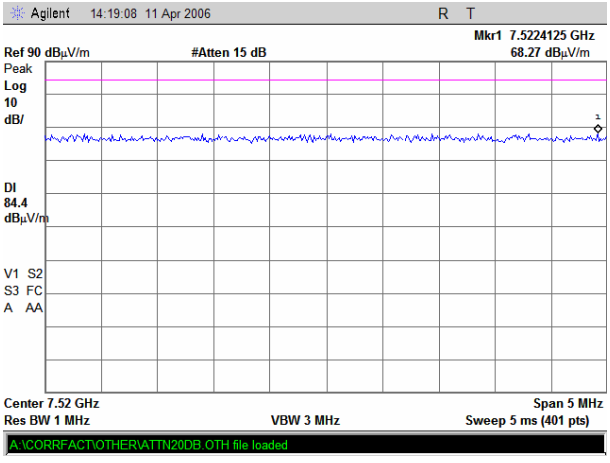
Plot 8.4.28 Radiated emission measurements at the forth harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 8.4.29 Radiated emission measurements at the forth harmonic of mid carrier frequency

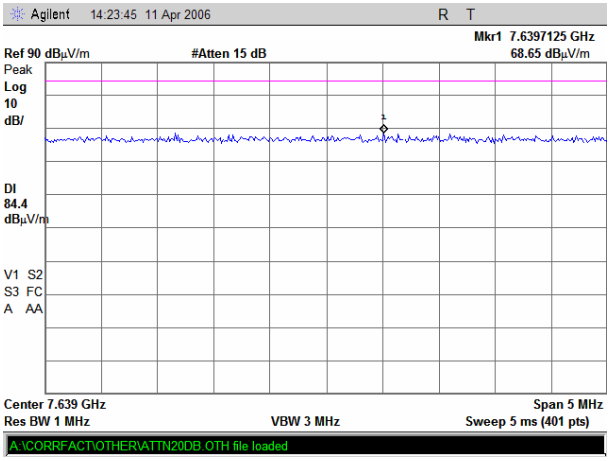
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21°C	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

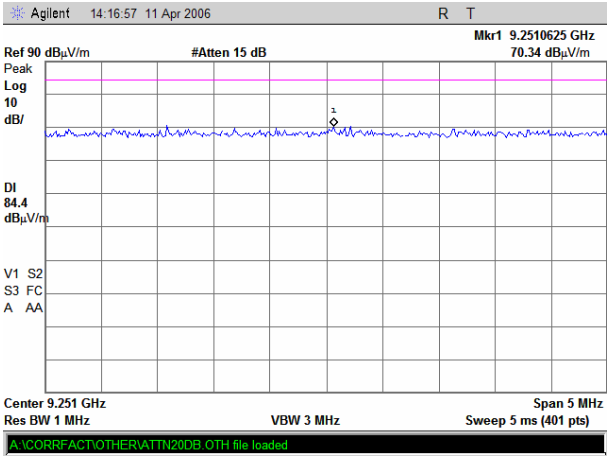
Plot 8.4.30 Radiated emission measurements at the forth harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 8.4.31 Radiated emission measurements at the fifth harmonic of low carrier frequency

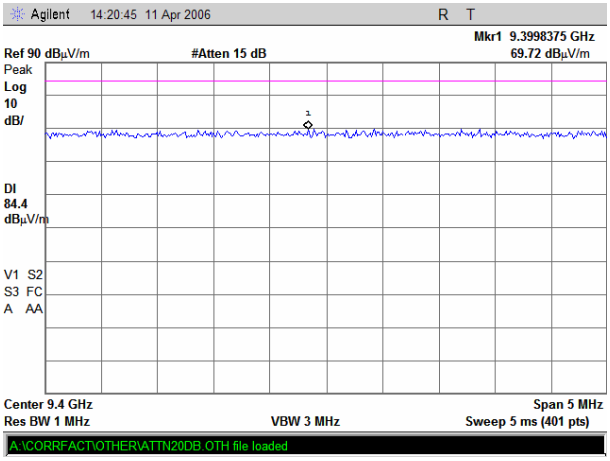
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/11/2006		
Temperature: 21°C	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 3.8 VDC
Remarks:			

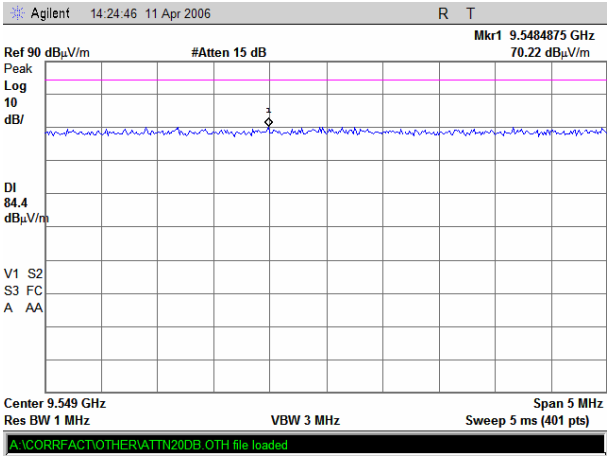
Plot 8.4.32 Radiated emission measurements at the fifth harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 8.4.33 Radiated emission measurements at the fifth harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	Section 24.235, Frequency stability test		
Test procedure:	FCC part 24, Section 24.235, part 2 section 2.1055		
Test mode:	Compliance	Verdict:	PASS
Date:	4/21/2006		
Temperature: 22ºC	Air Pressure: 1015 hPa	Relative Humidity: 43 %	Power Supply: 3.8 VDC
Remarks:			

8.5 Frequency stability test

8.5.1 General

This test was performed to measure frequency stability of transmitter RF carrier. Specification test limits are given in Table 8.5.1.

Table 8.5.1 Frequency stability limits

Assigned frequency, MHz	Limits
1850.2	26 dBc points including frequency tolerance shall remain within the authorized frequency block
1880.0	
1909.8	

8.5.2 Test procedure

8.5.2.1 The EUT was set up as shown in Figure 8.5.1, energized and its proper operation was checked.

8.5.2.2 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.

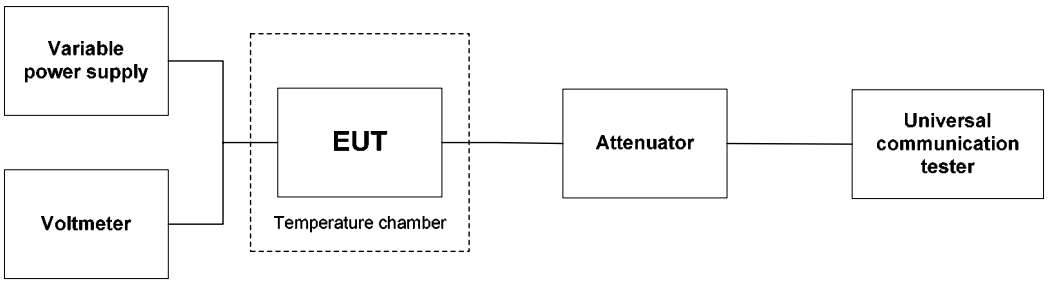
8.5.2.3 The EUT was powered on and carrier frequency was measured at start up moment and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.

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

8.5.2.5 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.

8.5.2.6 Frequency displacement was calculated and compared with the limit as provided in Table 8.5.2

Figure 8.5.1 Frequency stability test setup



Test specification:	**Section 24.235, Frequency stability test**		
Test procedure:	FCC part 24, Section 24.235, part 2 section 2.1055		
Test mode:	Compliance	**Verdict:**	PASS
Date:	4/21/2006		
Temperature: 22ºC	**Air Pressure:** 1015 hPa	**Relative Humidity:** 43 %	**Power Supply:** 3.8 VDC
Remarks:			

Table 8.5.2 Frequency stability test results

OPERATING FREQUENCY:	1850.2 – 1909.8 MHz
NOMINAL POWER VOLTAGE:	3.8 Vdc
TEMPERATURE STABILIZATION PERIOD:	20 min
POWER DURING TEMPERATURE TRANSITION:	Off
SPECTRUM ANALYZER MODE:	Counter
RESOLUTION BANDWIDTH:	100 kHz
VIDEO BANDWIDTH:	100 kHz
MODULATION:	8PSK

T, ºC	Voltage, V	Frequency, MHz							Max frequency drift, Hz	
		Start up	1st min	2nd min	3rd min	4th min	5th min	10th min	Positive	Negative
Low carrier frequency										
-30	nominal	1850.199947	1850.199987	1850.199982	1850.199910	1850.200013	1850.199985	1850.199993	119	0
-20	nominal	1850.199924	NA	NA	NA	NA	NA	1850.199987	93	0
-10	nominal	1850.199945	NA	NA	NA	NA	NA	1850.200017	123	0
0	nominal	1850.200074	1850.200014	1850.200024	1850.200018	1850.199991	1850.200021	1850.199990	180	0
10	nominal	1850.200106	NA	NA	NA	NA	NA	1850.200210	316	0
20	+15%	1850.199932	NA	NA	NA	NA	NA	1850.199932	38	0
20	nominal	1850.199931	NA	NA	NA	NA	NA	1850.199894*	37	0
20	-15%l	1850.200034	NA	NA	NA	NA	NA	1850.200046	152	0
30	nominal	1850.200000	1850.200107	1850.199972	1850.199970	1850.199975	1850.199973	1850.199970	213	0
40	nominal	1850.200092	NA	NA	NA	NA	NA	1850.199967	198	0
50	nominal	1850.200108	NA	NA	NA	NA	NA	1850.200027	214	0
Mid carrier frequency										
-30	nominal	1879.999966	1879.999977	1879.999988	1879.999978	1880.000014	1879.999979	1879.999981	48	0
-20	nominal	1880.000028	NA	NA	NA	NA	NA	1879.999987	62	0
-10	nominal	1880.000032	NA	NA	NA	NA	NA	1880.000020	66	0
0	nominal	1880.000036	1880.000025	1880.000025	1880.000013	1880.000017	1880.000022	1880.000035	70	0
10	nominal	1880.000051	NA	NA	NA	NA	NA	1880.000017	85	0
20	+15%	1879.999965	NA	NA	NA	NA	NA	1879.999965	0	-1
20	nominal	1879.999975	NA	NA	NA	NA	NA	1879.999966*	9	0
20	-15%l	1880.000031	NA	NA	NA	NA	NA	1880.000051	85	0
30	nominal	1879.999967	1879.999977	1879.999982	1879.999983	1879.999981	1879.999978	1879.999979	17	0
40	nominal	1879.999953	NA	NA	NA	NA	NA	1879.999980	14	-13
50	nominal	1879.999954	NA	NA	NA	NA	NA	1879.999964	0	-12
High carrier frequency										
-30	nominal	1909.799961	1909.799981	1909.799987	1909.799980	1909.799983	1909.799977	1909.799983	17	-9
-20	nominal	1909.800034	NA	NA	NA	NA	NA	1909.800020	64	0
-10	nominal	1909.800038	NA	NA	NA	NA	NA	1909.800016	68	0
0	nominal	1909.800038	1909.800022	1909.800021	1909.800037	1909.800031	1909.800000	1909.800018	68	0
10	nominal	1909.800066	NA	NA	NA	NA	NA	1909.800018	96	0
20	+15%	1909.800036	NA	NA	NA	NA	NA	1909.799958	66	-12
20	nominal	1909.800023	NA	NA	NA	NA	NA	1909.799970*	53	0
20	-15%l	1909.799997	NA	NA	NA	NA	NA	1909.800035	65	0
30	nominal	1909.799970	1909.799980	1909.799976	1909.799981	1909.799978	1909.799972	1909.799986	16	0
40	nominal	1909.799952	NA	NA	NA	NA	NA	1909.799947	0	-23
50	nominal	1909.799930	NA	NA	NA	NA	NA	1909.799948	0	-40

* - Reference frequency

Test specification:	**Section 24.235, Frequency stability test**		
Test procedure:	FCC part 24, Section 24.235, part 2 section 2.1055		
Test mode:	Compliance	**Verdict:**	PASS
Date:	4/21/2006		
Temperature: 22ºC	**Air Pressure:** 1015 hPa	**Relative Humidity:** 43 %	**Power Supply:** 3.8 VDC
Remarks:			

Table 8.5.3 Transmitter operating range including frequency drift

Carrier frequency, MHz	Lower reference point, MHz	Upper reference point, MHz	Maximum negative drift, Hz	Maximum positive drift, Hz	Frequency tolerance, MHz	Limit, MHz	Margin, kHz	Verdict
1850.2	1850.0800	1850.3250	0	316	1850.080000	1850	80	Pass
1880.0	1879.8750	1880.1250	-13	85	NA	NA	NA	NA
1909.8	1909.6750	1909.9300	-40	96	1909.930096	1910	-69.904	Pass

Reference numbers of test equipment used

HL 0278	HL 0493	HL 1097	HL 1204	HL 1653			

Full description is given in Appendix A.

9 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
0278	Thermometer, -200 - +760C	Fluke	51K/J	5045468	18-Apr-06	18-Apr-07
0446	Antenna, Loop active, 10kHz-30MHz	EMCO	6502	2857	28-Jun-05	28-Jun-06
0493	Oven temperature -45…175 deg C	Thermotron	S-1.2 Mini-Max	14016	08-Mar-06	08-Mar-07
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A 00319, 3448A002 53	26-Sep-05	26-Sep-06
0589	Cable Coaxial, GORE A2P01POL118, 2.3 m	HL	GORE-3	176	02-Dec-05	02-Dec-06
0592	Position Controller	HL	L2-SR3000 (HL CRL-3)	100	18-May-05	18-May-06
0593	Antenna Mast, 1-4 m Pneumatic	Madgesh	AM-F1	101	02-Feb-06	02-Feb-07
0594	Turn Table FOR ANECHOIC CHAMBER flush mount d=1.2 m Pneumatic	HL	TT-WDC1	102	26-Jan-06	26-Jan-07
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE 26 - 2000 MHz	EMCO	3141	9611-1011	10-Jan-06	10-Jan-07
0768	Antenna Standard Gain Horn,18-26.5 GHz, WR-42, K-band, Gain - 25 dB	Quinstar Technology	QWH-4200-BA	110	21-Jul-04	21-Jul-07
1097	Attenuator, 50 Ohm, 5 W, DC to 8 GHz, 20 dB	Midwest Microwave	0793-20-NN-07	1097	15-Jan-06	15-Jan-07
1204	One phase Voltage regulator, 2kVA, 0-250V	HL	TDGC-2	99	01-Jan-06	01-Jan-07
1650	Attenuators Set (2, 3, 5, 20 dB), DC-18 GHz	M/A-COM	2082	1650	03-Jan-06	03-Jan-07
1653	Analyzer EMC 9 kHz - 1.5 GHz	Agilent Technologies	E7401A	US39440281	06-Feb-06	06-Feb-07
1947	Cable 18GHz, 6.5 m, blue	Rhophase Microwave Limited	NPS-1803A-6500-NPS	T4974	17-Oct-05	17-Oct-06
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W, N-type	EMC Test Systems	3115	9911-5964	03-Mar-06	03-Mar-07
2009	Cable RF, 8 m	Alpha Wire	RG-214	C-56	02-Dec-05	02-Dec-06
2258	Amplifier Low Noise 2-20 GHz	Sophia Wireless	LNA0220-C	0222	05-Nov-05	05-Nov-06
2399	Cable 40GHz, 1.5 m, blue	Rhophase Microwave Limited	KPS-1503A-1500-KPS	X2945	24-Jun-05	24-Jun-06
2780	EMS analyzer, 100 Hz to 26.5 GHz	Agilent Technologies	E7405A	MY451024 6	11-Jun-05	11-Jun-06

9.1 Motorola's equipment used for frequency stability test

Universal Communication tester, model CMU 200, serial number 100640.

10 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Conducted carrier power at RF antenna connector	Below 12.4 GHz: ± 1.7 dB 12.4 GHz to 40 GHz: ± 2.3 dB
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB
Occupied bandwidth	± 8.0 %
Duty cycle, timing (Tx ON / OFF) and average factor measurements	± 1.0 %
Conducted emissions with LISN	9 kHz to 150 kHz: ± 3.9 dB 150 kHz to 30 MHz: ± 3.8 dB
Radiated emissions at 3 m measuring distance Horizontal polarization Vertical polarization	 Biconilog antenna: ± 5.3 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.3 dB Double ridged horn antenna: ± 5.3 dB Biconilog antenna: ± 6.0 dB Biconical antenna: ± 5.7 dB Log periodic antenna: ± 6.0 dB Double ridged horn antenna: ± 6.0 dB

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).

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12 APPENDIX D Specification references

47CFR part 22:2005	Public Mobile Services
47CFR part 24: 2005	Personal Communications Services
47CFR part 15:2005	Radio Frequency Devices
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.

13 APPENDIX E Abbreviations and acronyms

A	ampere
AC	alternating current
A/m	ampere per meter
AM	amplitude modulation
AVRG	average (detector)
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μV)	decibel referred to one microvolt
dB(μV/m)	decibel referred to one microvolt per meter
dB(μA)	decibel referred to one microampere
dBΩ	decibel referred to one Ohm
DC	direct current
DTS	digital transmission system
EIRP	equivalent isotropically radiated power
ERP	effective radiated power
EUT	equipment under test
F	frequency
FHSS	frequency hopping spread spectrum
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
μs	microsecond
NA	not applicable
NT	not tested
OATS	open area test site
Ω	Ohm
PCB	printed circuit board
PM	pulse modulation
PS	power supply
ppm	part per million (10^{-6})
QP	quasi-peak
RE	radiated emission
RF	radio frequency
rms	root mean square
Rx	receive
s	second
T	temperature
Tx	transmit
V	volt
VA	volt-ampere

14 APPENDIX F Test equipment correction factors

Antenna factor

Biconilog antenna EMCO, model 3141, serial number 1011, HL 0604

Frequency, MHz	Antenna factor, dB(1/m)	Frequency, MHz	Antenna factor, dB(1/m)	Frequency, MHz	Antenna factor, dB(1/m)
26	7.8	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, HL 1984

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(μV) to convert it into field intensity in dB(μV/m).

Antenna Factor
Active Loop Antenna
EMC Test Systems, model 6502, serial number 2857, HL 0446

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

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

Antenna factor
Standard gain horn antenna
Quinstar Technology
Model QWH
HL 0768, 0769, 0770, 0771, 0772

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

Antenna factor 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).

Cable loss
Cable Coaxial, GORE A2P01POL118, 2.3 m, model:GORE-3, HL 0589
+ Cable Coaxial, ANDREW PSWJ4, 6m, model: ANDREW-6, 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		±0.17
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		

Cable loss
Cable 18 GHz, 6.5 m, blue, model: NPS-1803A-6500-NPS, S/N T4974, HL 1947

Frequency, GHz	Cable loss, dB
0.03	0.30
0.05	0.38
0.10	0.53
0.20	0.74
0.30	0.91
0.40	1.05
0.50	1.18
0.60	1.29
0.70	1.40
0.80	1.50
0.90	1.59
1.00	1.68
1.10	1.77
1.20	1.86
1.30	1.94
1.40	2.01
1.50	2.08
1.60	2.16
1.70	2.22
1.80	2.29
1.90	2.36
2.00	2.42
2.10	2.48
2.20	2.54
2.30	2.60
2.40	2.66
2.50	2.71
2.60	2.77
2.70	2.83
2.80	2.89
2.90	2.95
3.10	3.06
3.30	3.17
3.50	3.28
3.70	3.39
3.90	3.51
4.10	3.62
4.30	3.76
4.50	3.87
4.70	4.01
4.90	4.10
5.10	4.21
5.30	4.31
5.50	4.43
5.70	4.56
5.90	4.71

Frequency, GHz	Cable loss, dB
6.10	4.87
6.30	4.95
6.50	4.94
6.70	4.88
6.90	4.87
7.10	4.83
7.30	4.85
7.50	4.86
7.70	4.91
7.90	4.96
8.10	5.03
8.30	5.08
8.50	5.13
8.70	5.21
8.90	5.22
9.10	5.34
9.30	5.35
9.50	5.52
9.70	5.51
9.90	5.66
10.10	5.70
10.30	5.78
10.50	5.79
10.70	5.82
10.90	5.86
11.10	5.94
11.30	6.06
11.50	6.21
11.70	6.44
11.90	6.61
12.10	6.76
12.40	6.68
13.00	6.66
13.50	6.81
14.00	6.90
14.50	6.90
15.00	6.97
15.50	7.17
16.00	7.28
16.50	7.27
17.00	7.38
17.50	7.68
18.00	7.92

Cable loss
RF cable 8 m, model RG-214, 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 loss
Cable coaxial, 40GHz, 1.5 m, Blue, Rhophase Microwave Limited, model: KPS-1503A-1500-KPS, HL 2399

Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB
0.03	0.07	6.5	1.57	15.50	2.50
0.05	0.10	6.7	1.60	16.00	2.51
0.1	0.16	6.9	1.55	16.50	2.58
0.2	0.26	7.1	1.65	17.00	2.65
0.3	0.33	7.3	1.65	17.50	2.73
0.5	0.38	7.5	1.70	18.00	2.74
0.7	0.41	7.7	1.71	18.50	2.67
0.9	0.58	7.9	1.73	19.00	2.67
1.1	0.64	8.1	1.79	19.50	2.74
1.3	0.70	8.3	1.81	20.00	2.69
1.5	0.75	8.5	1.84	20.50	2.80
1.7	0.79	8.7	1.85	21.00	2.82
1.9	0.83	8.9	1.90	21.50	2.87
2.1	0.88	9.1	1.95	22.00	2.87
2.3	0.93	9.3	1.93	22.50	2.92
2.5	0.97	9.5	1.98	23.50	3.04
2.7	1.01	9.7	1.96	24.00	3.05
2.9	1.04	9.9	2.03	24.50	3.03
3.1	1.08	10.1	1.99	25.00	3.11
3.3	1.14	10.30	2.02	25.50	3.10
3.5	1.17	10.50	2.02	26.00	3.17
3.7	1.21	10.70	2.02	26.50	3.11
3.9	1.24	10.90	2.08	27.00	3.16
4.1	1.26	11.10	2.02	28.00	3.19
4.3	1.26	11.30	2.09	29.00	3.19
4.5	1.29	11.50	2.05	30.00	3.30
4.7	1.34	11.70	2.11	31.00	3.31
4.9	1.34	11.90	2.11	32.00	3.35
5.1	1.40	12.10	2.12	33.00	3.46
5.3	1.43	12.40	2.17	34.00	3.45
5.5	1.45	13.00	2.29	35.00	3.49
5.7	1.47	13.50	2.31	36.00	3.54
5.9	1.40	14.00	2.43	37.00	3.62
6.1	1.53	14.50	2.43	39.00	3.69
6.3	1.55	15.00	2.46	40.00	3.75