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Electrical

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TEST REPORT

ACCORDING TO: FCC parts 22, 24 and part 15 subpart B

FOR:

Mobile Access Networks Ltd.

Remote Hub Unit

Model: RHU1000

Table of contents

1 Applicant information

Client name:	Mobile Access Networks Ltd.
Address:	Ofek One Center Building 2, Northern Industrial Zone, Lod 71293, Israel
Telephone:	+972 8918 3888
Fax:	+972 8918 3844
E-mail:	kochavy@mobileaccess.com
Contact name:	Mr. Kochav Yadid, QA and Integration director

2 Equipment under test attributes

Product name:	Remote hub unit
Model(s):	RHU1000
Type:	10L-D-CELL-PCS24 Dual band –Cell/PCS
Receipt date	9/26/2005

3 Manufacturer information

Client name:	Mobile Access Networks Ltd.
Address:	Ofek One Center Building 2, Northern Industrial Zone, Lod 71293, Israel
Telephone:	+972 8918 3888
Fax:	+972 8918 3844
E-mail:	kochavy@mobileaccess.com
Contact name:	Mr. Kochav Yadid, QA and Integration director

4 Test details

Project ID:	16708
Location:	Hermon Laboratories Ltd. P.O.Box 23, Binyamina 30500, Israel
Test started:	9/26/2005
Test completed:	11/29/2005
Test specification(s):	FCC 47 CFR parts 22, 24:2004, part 15:2005 subpart B, §§15.107, 15.109, 15.111

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	Not required, the EUT does not convert RF frequency
Unintentional emissions	
Section 15.107, Conducted emission at AC power port	Pass
Section 15.109, Radiated emission	Pass
Section 15.111, Conducted emission at receiver antenna port	Pass

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

	Name and Title	Date	Signature
Tested by:	Mr. A. Adelberg, test engineer	November 29, 2005	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	December 13, 2005	
Approved by:	Mr. M. Nikishin, EMC group leader	December 15, 2005	

6 EUT description

6.1 General information

The EUT, Remote Hub Unit, is a part of the MobileAccess™ system providing in-building coverage by routing RF signals from base transmit station or BDA (bi-directional amplifier) units, through optic fibers to remote areas where the signals are converted back to RF and interfaced to antennas covering the remote area.
The RHU converts the optic signal to an RF signal and feeds it to the antennas in the remote areas in order to provide the required coverage. Each RHU supports two different services (one high-band and one low-band) and provides coax connections to up to four antennas. The RHU filters and amplifies the optic signal received from the base unit according to the service it supports.
The RHU intended to provide two bands of cellular operation.

6.2 Ports and lines

Port type	Port description	Connected to	Connector type	Qty.	Cable type	Cable length
Power	48 VDC	Power supply	DC jack	1	Unshielded	1.5 m
Signal	Add on control	Open circuit	D type 9	1	Shielded	1.5 m
Signal	Antenna (J1 – J4)	Termination	N type	4	NA	NA
Signal	Fiber optic	Base unit	Fiber optic	1	Fiber optic	6 m
Signal	RS232	Open circuit	D type 9	1	Shielded	1.5 m
Signal	RF	Termination	SMA	4	NA	NA

6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
Base unit	Mobile Access	8 links	NA
Radio interface unit (RIU)	Mobile Access	RIU	NA
NMS Controller	Mobile Access	NMS410	495
Power supply	Lambda	JWS150-48/A	V0A-236C03-0012W3701
ESG Series signal generator 250 kHz – 3 GHz	Hewlett Packard	E4432B	GB39340672
ESG Series signal generator 250 kHz – 3 GHz	Hewlett Packard	E4432B	GB38450502
Signal generator 100 kHz – 3.2 GHz	Hewlett Packard	HP 8648C	3426A00540
Combiner	Mini Circuits	ZAPD-1	NA
Combiner	Mini Circuits	ZAPD-1	NA
Power supply	Mean Well	ESP-240-54	CA3A072725

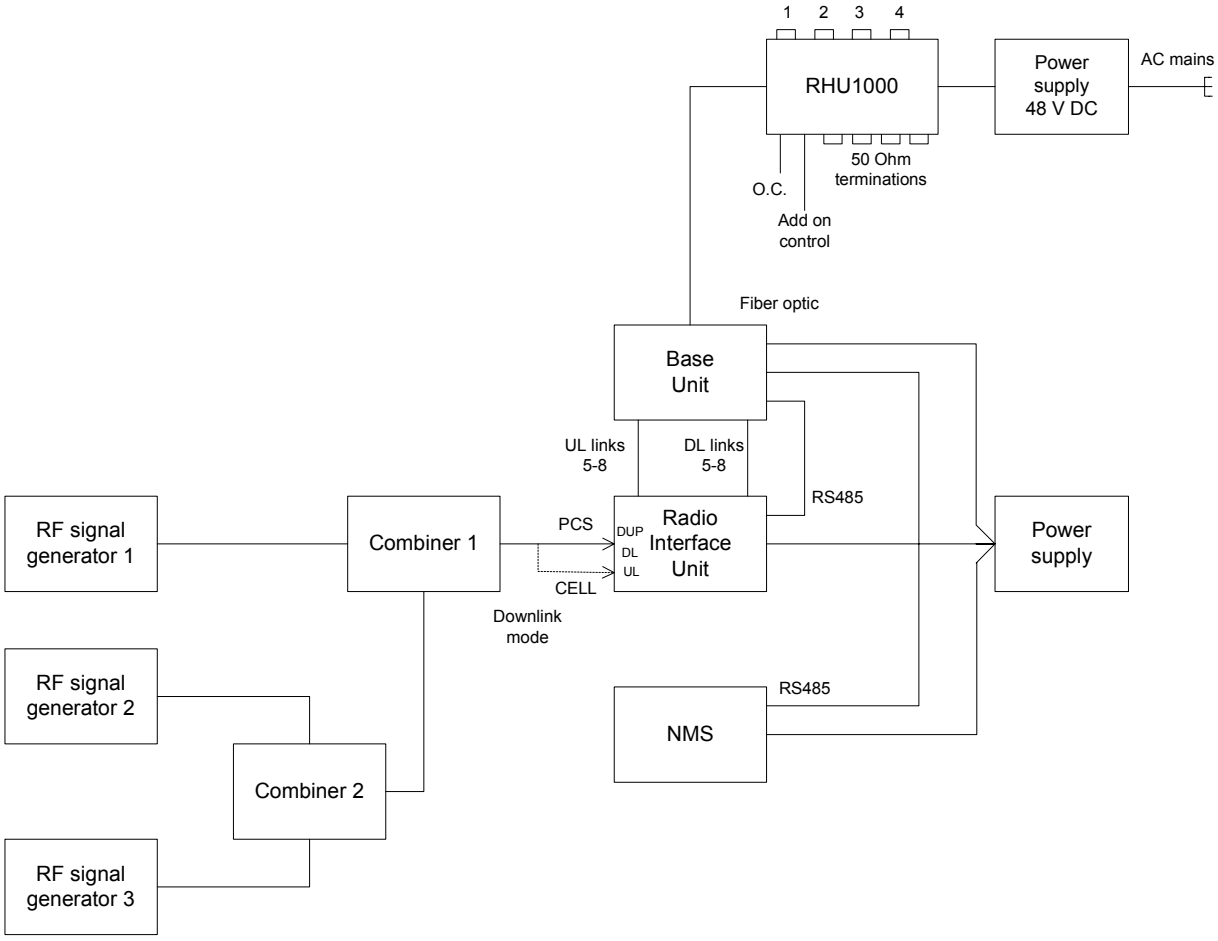
6.4 Operating frequencies

Source	Frequency, MHz
Digital portion	11.059
Cell 800	869 - 894
PCS 1900	1930-1990

6.5 Changes made in the EUT

No changes were implemented.

6.6 Test configuration



6.7 Transmitter characteristics

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

Intended use		**Condition of use**
	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	869 – 894 MHz/1930 – 1990 MHz
Operating frequency range	869.00 – 894.00 MHz/1930.00 – 1990.00 MHz

Maximum rated output power	At transmitter 50 Ω RF output connector	
	Effective radiated power (for equipment with no RF connector)	

Is transmitter output power variable?		No		
	X	Yes		continuous variable
			X	stepped variable with stepsize: 1 dB
				minimum RF power: NA
				maximum RF power: 20 dBm

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

Transmitter 99% power bandwidth	30 kHz (TDMA), 1.25 MHz (CDMA), 200 kHz (GSM)
Transmitter aggregate data rate/s	48 kbps (TDMA), 48.6 kbps (CDMA), 270.883 kbps (GSM)
Type of modulation	PRBS
Type of multiplexing	TDMA, CDMA
Modulating test signal (baseband)	

Maximum transmitter duty cycle in normal use		**Tx ON time**		**Period**	
Transmitter duty cycle supplied for test		**Tx ON time**		**Period**	

Transmitter power source					
X	DC	**Nominal rated voltage**	20 - 48 VDC	Battery type	

Frequency conversion	Uplink	X	No		Yes		Different LO for up and down conversion		The same LO for up and down conversion	
	Downlink	X	No		Yes					
Automatic gain control (AGC)	Uplink	X	No		Yes		Input range	20 dBm	Output level	
	Downlink		No	X	Yes	10 -.36.dBm		20 dBm		

Test specification:	Section 22.913, Peak output power		
Test procedure:	FCC part 22, Section 22.913		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 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 for signal boosters

Assigned frequency range, MHz	Maximum peak output power	
	W	dBm
869 - 894	500	57.0

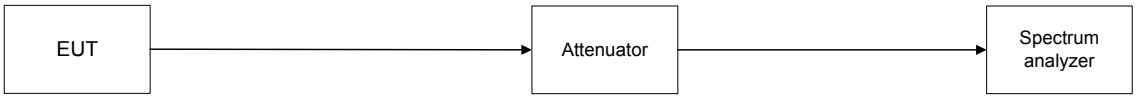
7.1.2 Test procedure

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. The measurements were performed at the EUT input and output ports in downlink and uplink transmit modes of operation at maximum input signals for low, middle and high carrier (channel) frequencies.

Figure 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:	11/8/2005		
Temperature: 22ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 46 %	**Power Supply:** 48 VDC
Remarks:			

Table 7.1.2 Peak output power test results, per channel

ASSIGNED FREQUENCY RANGE: 869 - 894 MHz
DETECTOR USED: Peak - TDMA/RMS - CDMA
VIDEO BANDWIDTH: ≥ Resolution bandwidth
RESOLUTION BANDWIDTH: 3 / 5 MHz
VIDEO BANDWIDTH: 3 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
MODULATION: TDMA / CDMA
MODULATING SIGNAL: PRBS
BIT RATE: 48 / 48.6 kbps
MAXIMUM INPUT SIGNAL: -20 dBm

Carrier frequency, MHz	Spectrum analyzer reading, dBm	External attenuation& cable loss, dB	RF output power, dBm	Limit, dBm	Margin*, dB	Verdict
TDMA modulation						
869.00	20.67	included	20.67	57.0	-36.33	Pass
881.50	20.03	included	20.03	57.0	-36.97	Pass
894.00	19.91	included	19.91	57.0	-37.09	Pass
CDMA modulation						
870.20	20.56	included	20.56	57.0	-36.44	Pass
881.50	19.83	included	19.83	57.0	-37.17	Pass
892.80	20.04	included	20.04	57.0	-36.96	Pass

*Margin = RF output power – specification limit

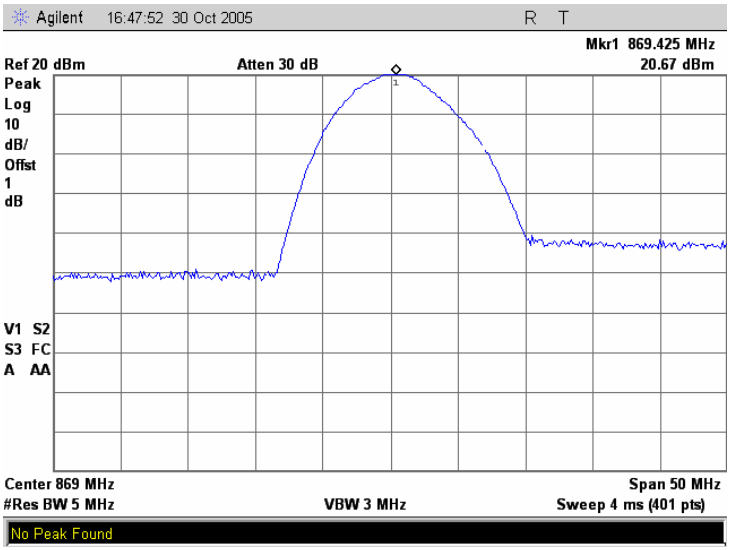
Reference numbers of test equipment used

HL 2780							

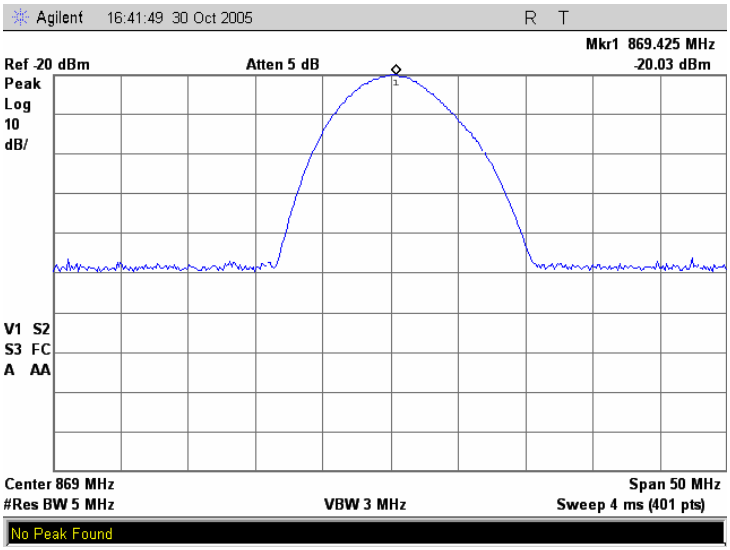
Full description is given in Appendix A.

Test specification:	Section 22.913, Peak output power		
Test procedure:	FCC part 22, Section 22.913		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.1 RF output power measurements at low frequency carrier, Cell 800, TDMA modulation

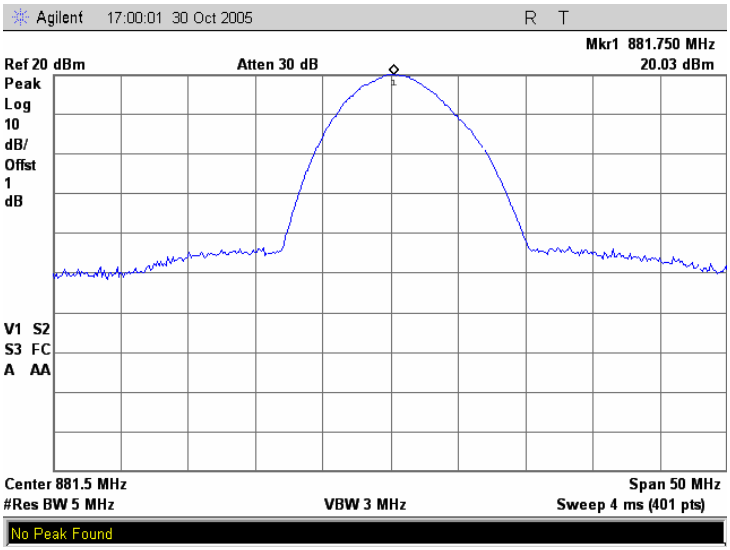


Plot 7.1.2 RF input power measurements at low frequency carrier, Cell 800, TDMA modulation

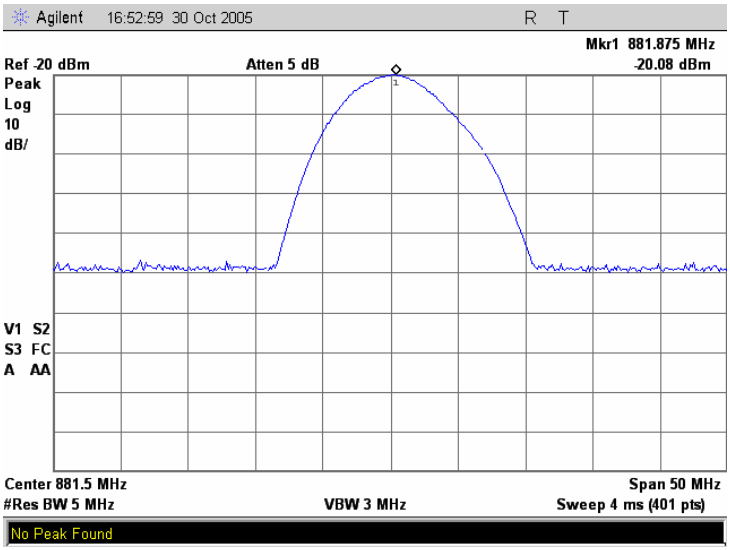


Test specification:	Section 22.913, Peak output power		
Test procedure:	FCC part 22, Section 22.913		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.3 RF output power measurements at mid frequency carrier, Cell 800, TDMA modulation

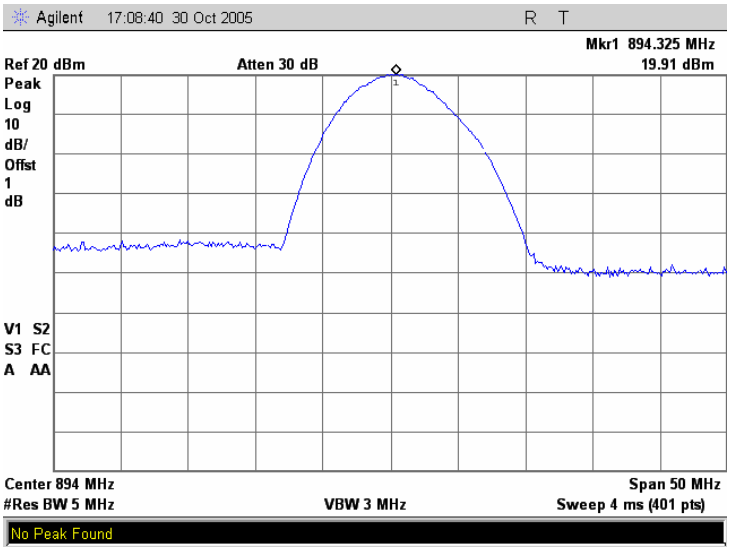


Plot 7.1.4 RF input power measurements at mid frequency carrier, Cell 800, TDMA modulation

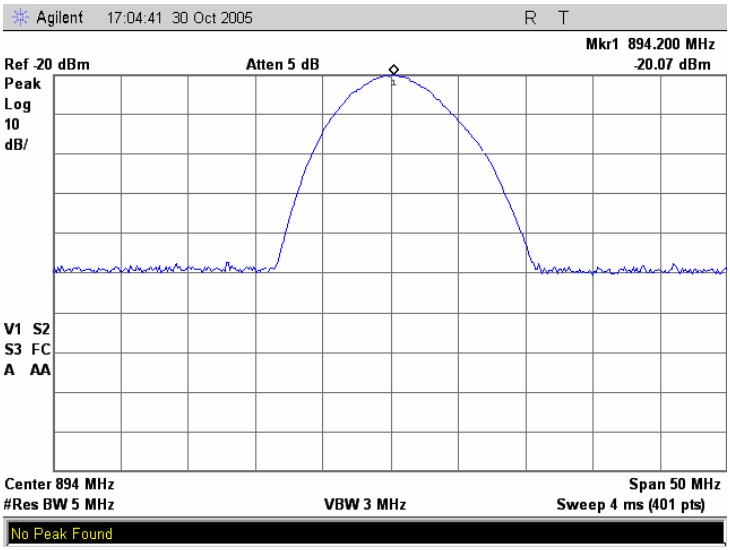


Test specification:	Section 22.913, Peak output power		
Test procedure:	FCC part 22, Section 22.913		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.5 RF output power measurements at high frequency carrier, Cell 800, TDMA modulation

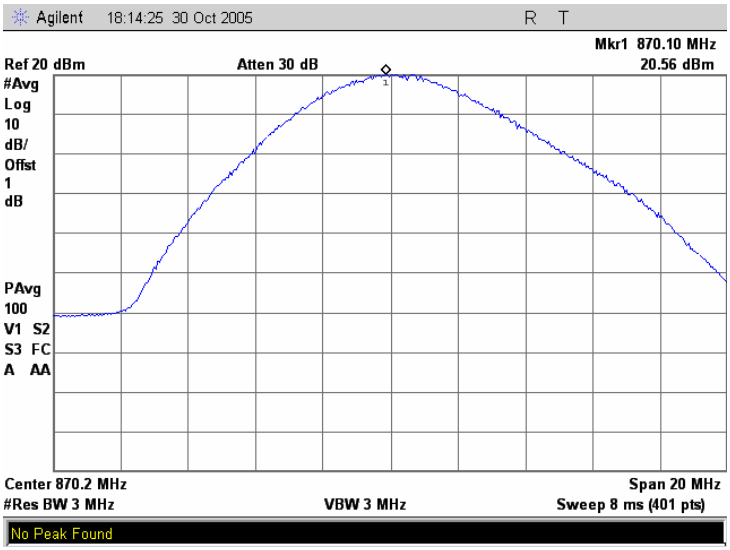


Plot 7.1.6 RF input power measurements at high frequency carrier, Cell 800, TDMA modulation

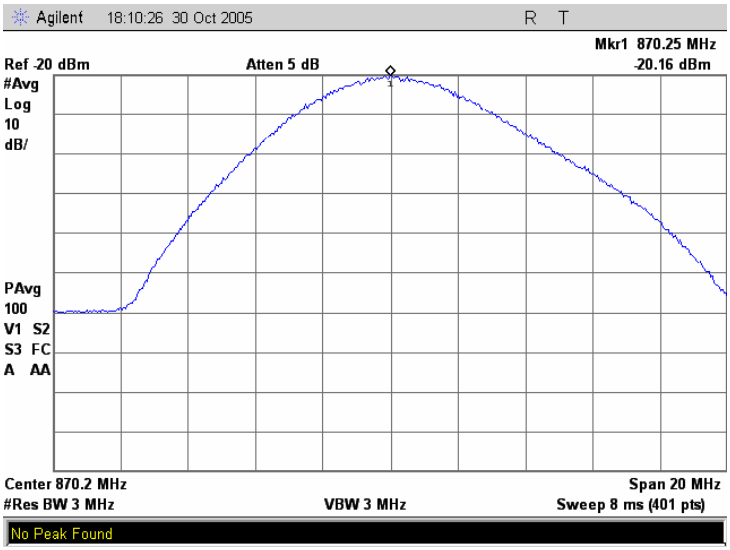


Test specification:	**Section 22.913, Peak output power**		
Test procedure:	FCC part 22, Section 22.913		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 46 %	**Power Supply:** 48 VDC
Remarks:			

Plot 7.1.7 RF output power measurements at low frequency carrier, Cell 800, CDMA modulation

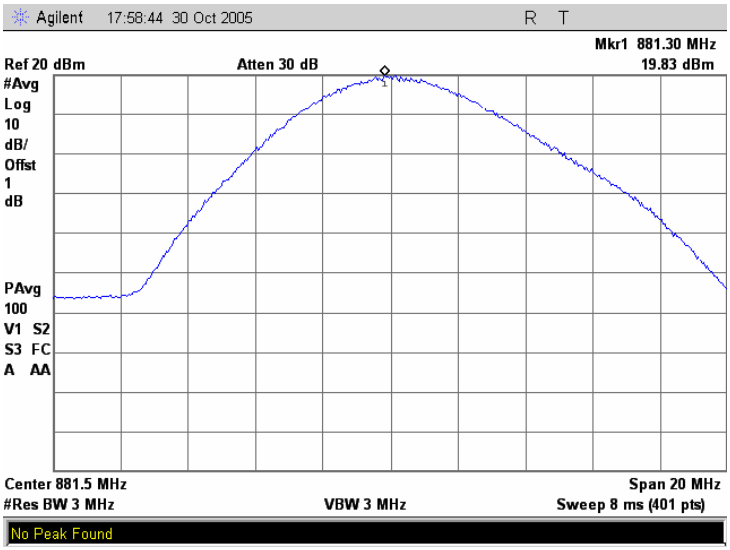


Plot 7.1.8 RF input power measurements at low frequency carrier, Cell 800, CDMA modulation

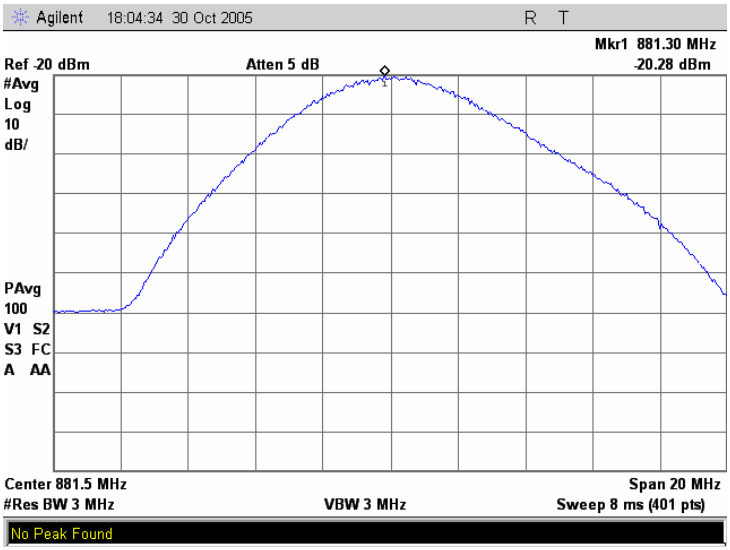


Test specification:	**Section 22.913, Peak output power**		
Test procedure:	FCC part 22, Section 22.913		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 46 %	**Power Supply:** 48 VDC
Remarks:			

Plot 7.1.9 RF output power measurements at mid frequency carrier, Cell 800, CDMA modulation

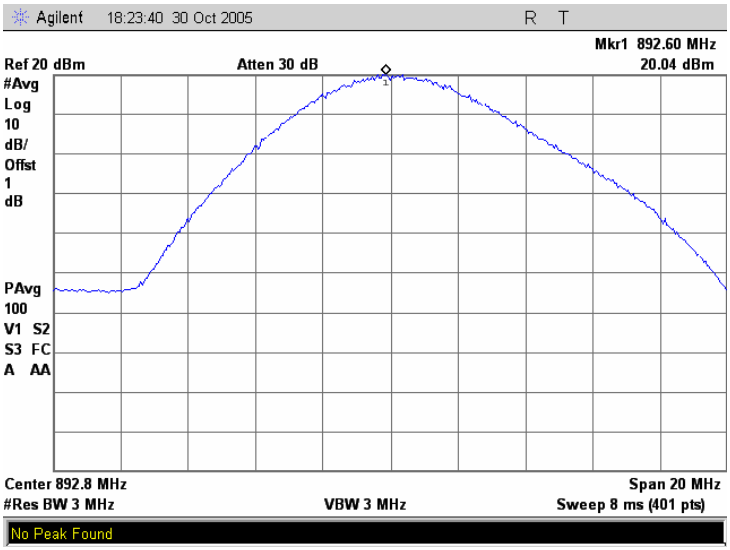


Plot 7.1.10 RF input power measurements at mid frequency carrier, Cell 800, CDMA modulation

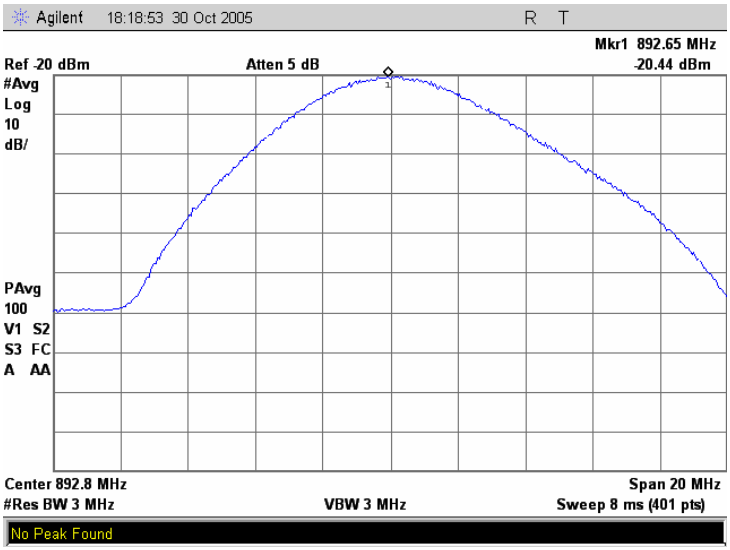


Test specification:	Section 22.913, Peak output power		
Test procedure:	FCC part 22, Section 22.913		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.1.11 RF output power measurements at high frequency carrier, Cell 800, CDMA modulation



Plot 7.1.12 RF input power measurements at high frequency carrier, Cell 800, CDMA modulation



Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	FCC part 2, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

7.2 Occupied bandwidth test

7.2.1 General

This test was performed to measure transmitter occupied bandwidth.

7.2.2 Test procedure

7.2.2.1 The EUT was set up as shown in The EUT was adjusted to produce maximum available to the end user RF output power.

7.2.2.2 The occupied bandwidth was measured with spectrum analyzer as provided in Table 7.2.1 and associated plots. The measurements were performed at the EUT input and output ports at maximum input signals for low, middle and high carrier (channel) frequencies.

7.2.2.3 Figure 7.2.1, energized and its proper operation was checked.

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

7.2.2.5 The occupied bandwidth was measured with spectrum analyzer as provided in Table 7.2.1 and associated plots. The measurements were performed at the EUT input and output ports at maximum input signals for low, middle and high carrier (channel) frequencies.

Figure 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:	11/8/2005		
Temperature: 22ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 46 %	**Power Supply:** 48 VDC
Remarks:			

Table 7.2.1 Occupied bandwidth test results

ASSIGNED FREQUENCY RANGE: 869 - 894 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
MODULATING SIGNAL: PRBS
MAXIMUM INPUT SIGNAL: -20 dBm

DETECTOR USED: Peak
MODULATION: TDMA
BIT RATE: 48 kbps
RESOLUTION BANDWIDTH: 1 kHz
VIDEO BANDWIDTH: 3 kHz

Carrier frequency, MHz	Input occupied bandwidth, kHz	Output occupied bandwidth, kHz	Margin*, kHz
869.00	32.00	32.00	0.00
881.50	32.00	32.00	0.00
894.00	32.25	32.75	-0.50

DETECTOR USED: RMS
MODULATION: CDMA
BIT RATE: 48.6 kbps
RESOLUTION BANDWIDTH: 300 kHz
VIDEO BANDWIDTH: 1 MHz

Carrier frequency, MHz	Input occupied bandwidth, kHz	Output occupied bandwidth, kHz	Margin*, kHz
870.20	2100.00	2100.00	0.00
881.50	2100.00	2100.00	0.00
892.80	2112.50	2137.50	-25

*Margin = Input occupied bandwidth – output occupied bandwidth

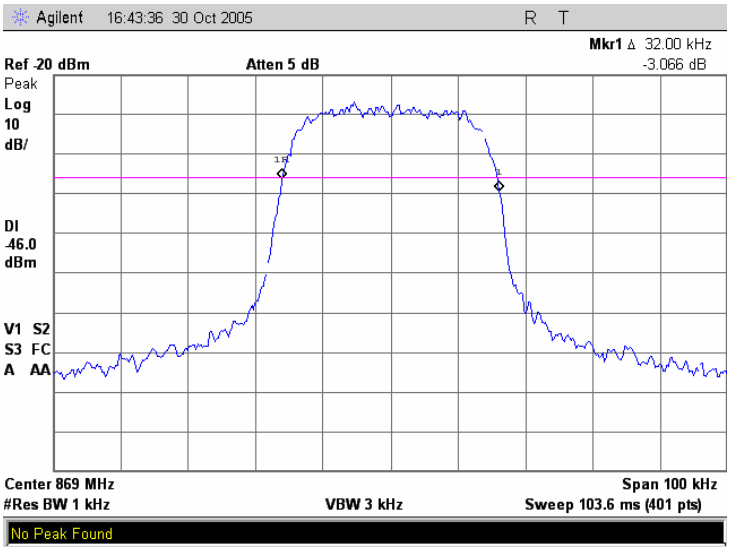
Reference numbers of test equipment used

HL 2780							

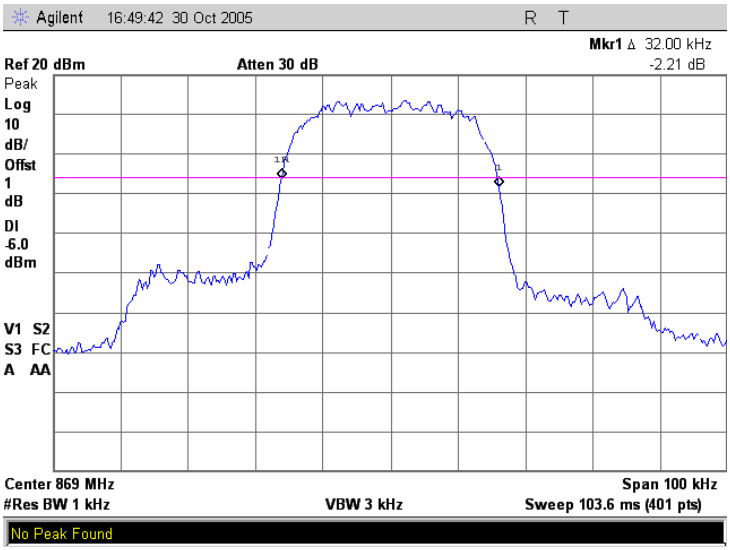
Full description is given in Appendix A.

Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	FCC part 2, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.1 Input occupied bandwidth measurements at low frequency carrier, Cell 800, TDMA modulation

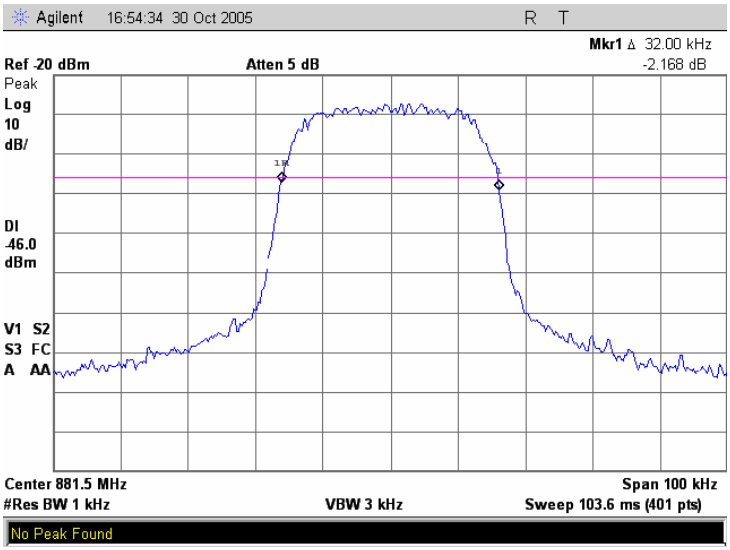


Plot 7.2.2 Output occupied bandwidth measurements at low frequency carrier, Cell 800, TDMA modulation

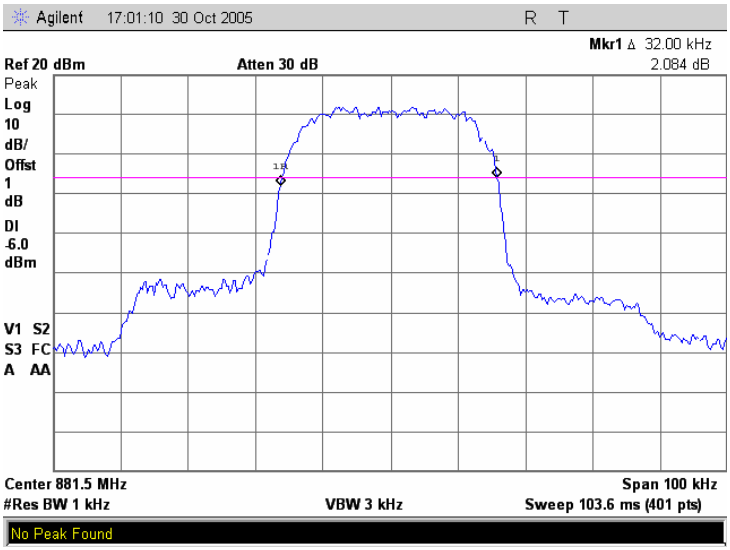


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	FCC part 2, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.3 Input occupied bandwidth measurements at mid frequency carrier, Cell 800, TDMA modulation

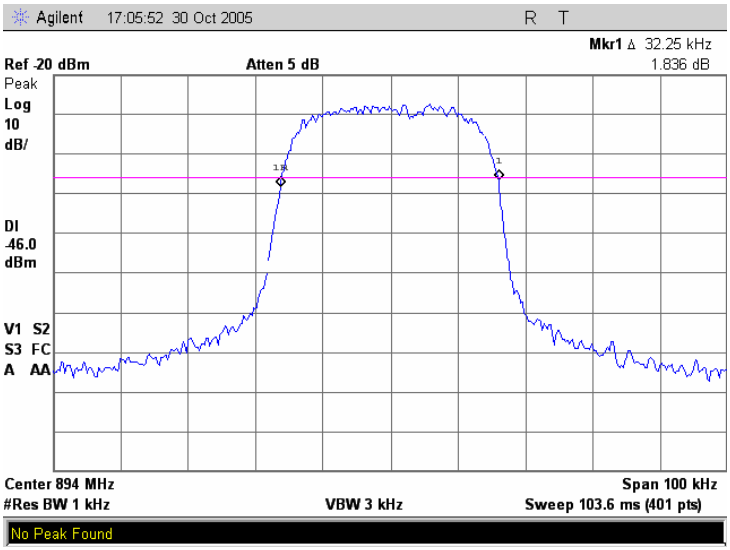


Plot 7.2.4 Output occupied bandwidth measurements at mid frequency carrier, Cell 800, TDMA modulation

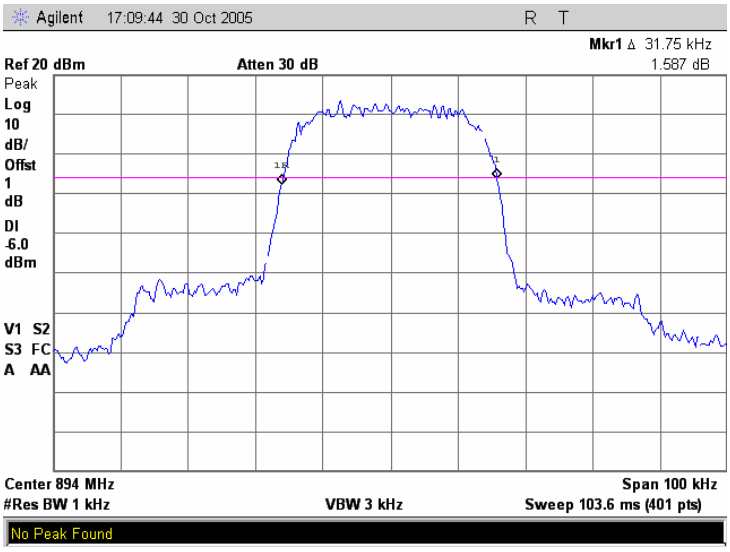


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	FCC part 2, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.5 Input occupied bandwidth measurements at high frequency carrier, Cell 800, TDMA modulation

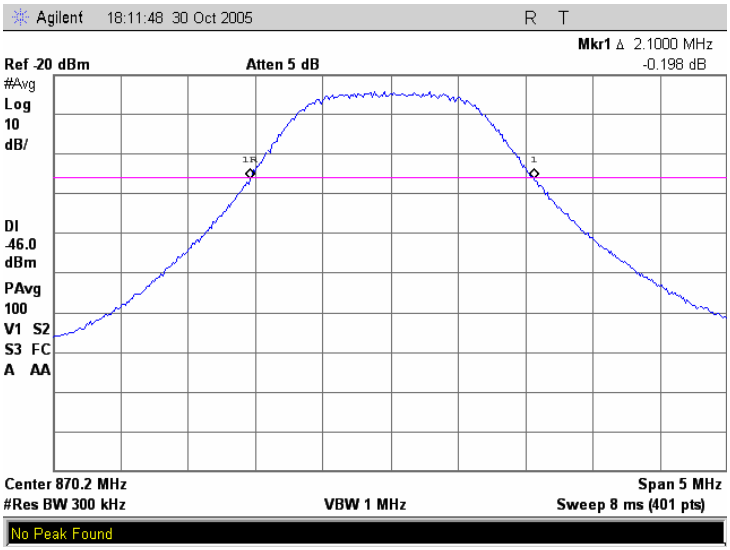


Plot 7.2.6 Output occupied bandwidth measurements at high frequency carrier, Cell 800, TDMA modulation

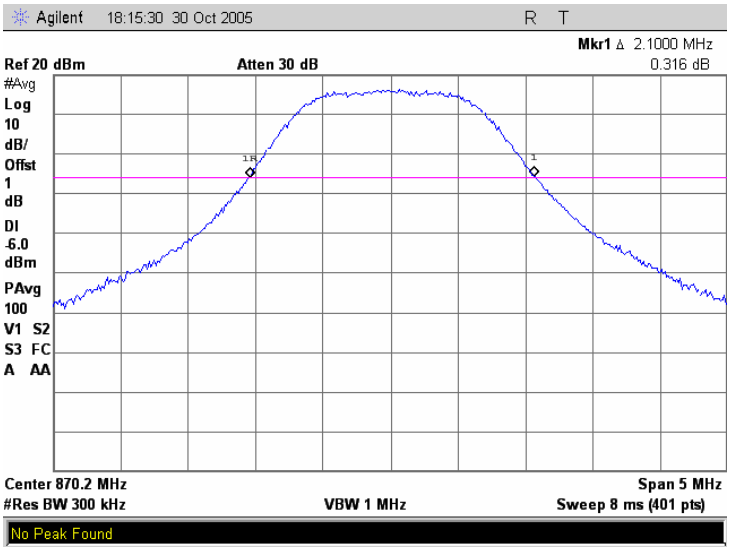


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	FCC part 2, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.7 Input occupied bandwidth measurements at low frequency carrier, Cell 800, CDMA modulation

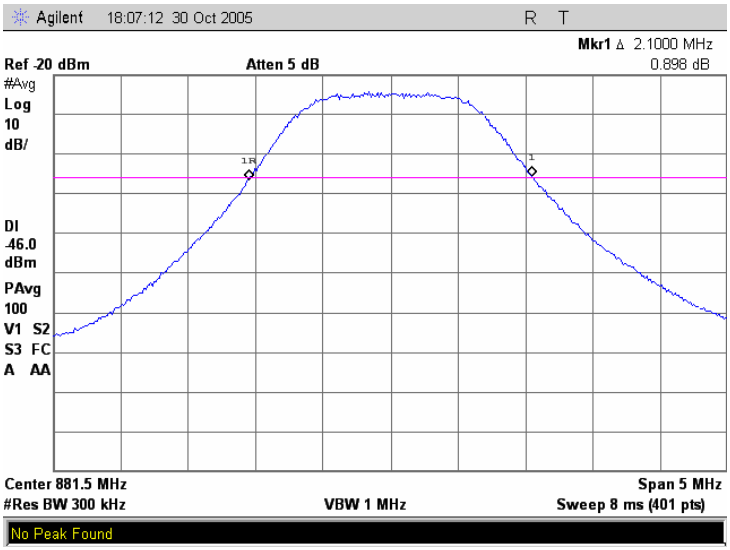


Plot 7.2.8 Output occupied bandwidth measurements at low frequency carrier, Cell 800, CDMA modulation

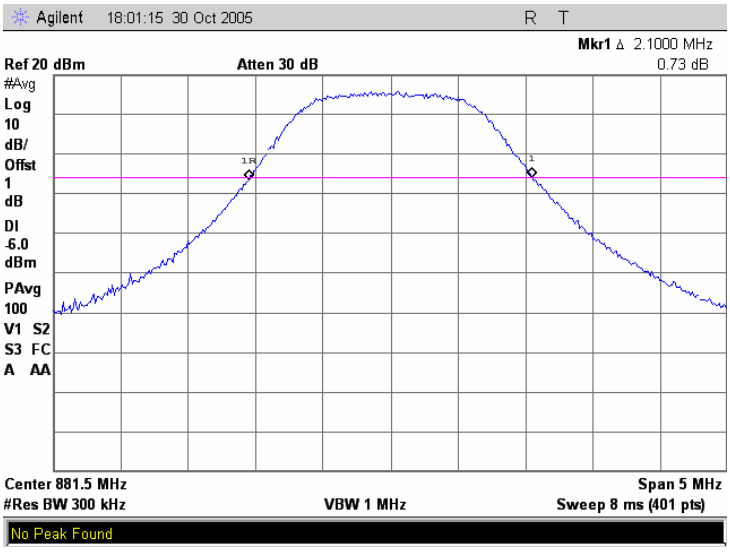


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	FCC part 2, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.9 Input occupied bandwidth measurements at mid frequency carrier, Cell 800, CDMA modulation

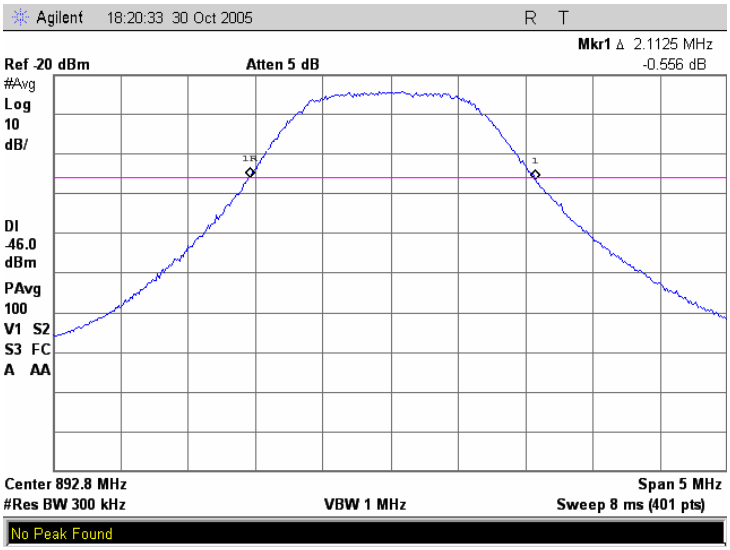


Plot 7.2.10 Output occupied bandwidth measurements at mid frequency carrier, Cell 800, CDMA modulation

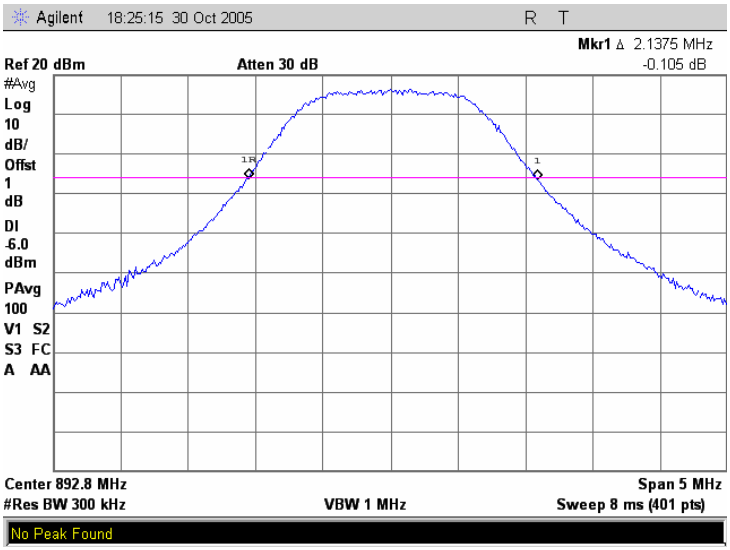


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	FCC part 2, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.2.11 Input occupied bandwidth measurements at high frequency carrier, Cell 800, CDMA modulation



Plot 7.2.12 Output occupied bandwidth measurements at high frequency carrier, Cell 800, CDMA modulation



Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 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

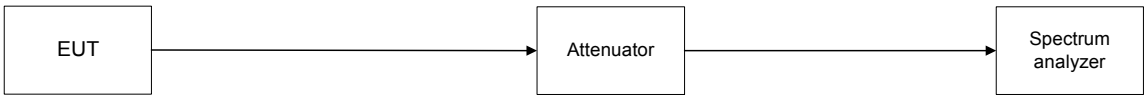
Frequency, MHz	Attenuation below carrier, dBc	ERP of spurious, dBm
0.009 – 10th harmonic*	43+10logP*	-13.0

- 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 the associated plots.

Figure 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:	11/8/2005		
Temperature: 22ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 46 %	**Power Supply:** 48 VDC
Remarks:			

Table 7.3.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 869 - 894 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 – 9000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATION: TDMA, CDMA
MODULATING SIGNAL: PRBS
BIT RATE: 48.6 kbps
MAX COMPOSITE OUTPUT POWER for 3 carriers: 15.2 dBm at first channel
15.2 dBm at second channel
15.2 dBm at last channel

3 CARRIER TONE FREQUENCIES:
TDMA modulation (Cell 850) 869.05 MHz
869.08 MHz
893.95 MHz

CDMA modulation (Cell 850) 870.225 MHz
870.500 MHz
892.775 MHz

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict
TDMA modulation									
844.1850	-38.74	Included	Included	120	-38.74	53.94	28.2	25.74	Pass
918.8475	-31.32	Included	Included	120	-31.32	46.52	28.2	18.32	Pass
1763.0000	-45.39	Included	Included	1000	-45.39	60.59	28.2	32.39	Pass
1949.5000	-29.71	Included	Included	1000	-29.71	44.91	28.2	16.71	Pass
2607.1300	-42.54	Included	Included	1000	-42.54	57.74	28.2	29.54	Pass
2631.9700	-43.61	Included	Included	1000	-43.61	58.81	28.2	30.61	Pass
CDMA modulation									
915.5300	-51.82	Included	Included	120	-51.82	67.02	28.2	38.82	Pass
1981.0000	-29.70	Included	Included	1000	-29.70	44.90	28.2	16.70	Pass
2610.5750	-46.17	Included	Included	1000	-46.17	61.37	28.2	33.17	Pass

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

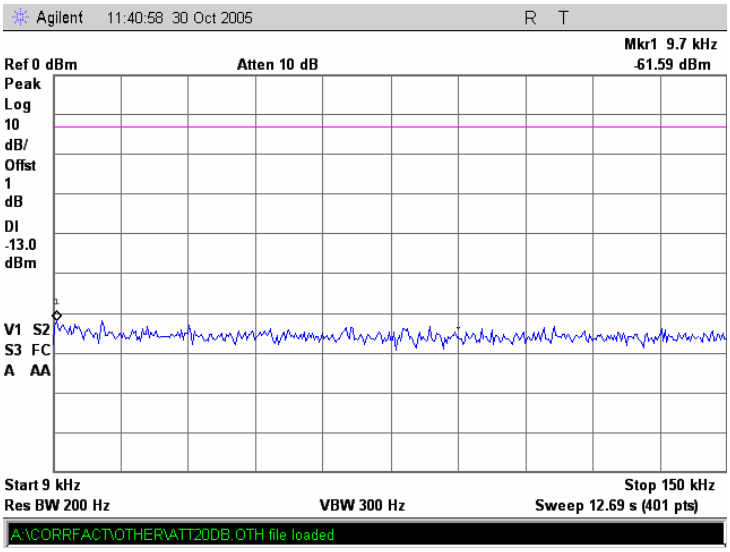
Reference numbers of test equipment used

HL 2780						

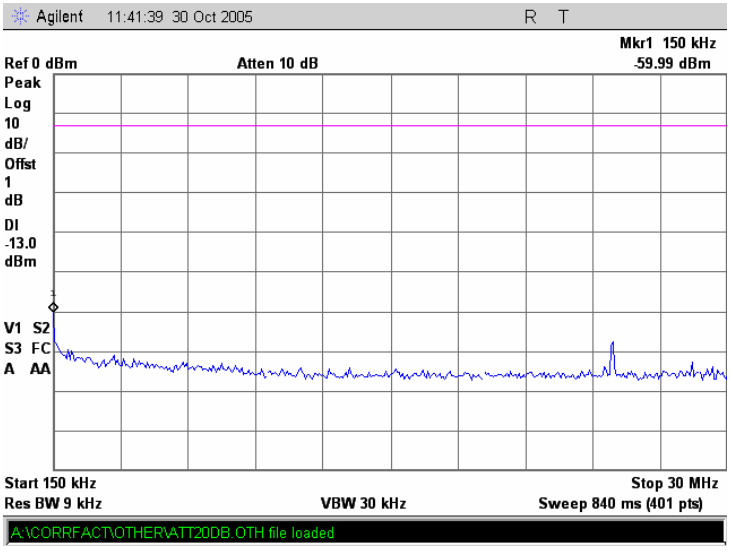
Full description is given in Appendix A.

Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.3.1 Spurious emission measurements in 9 - 150 kHz range, Cell 800, TDMA modulation

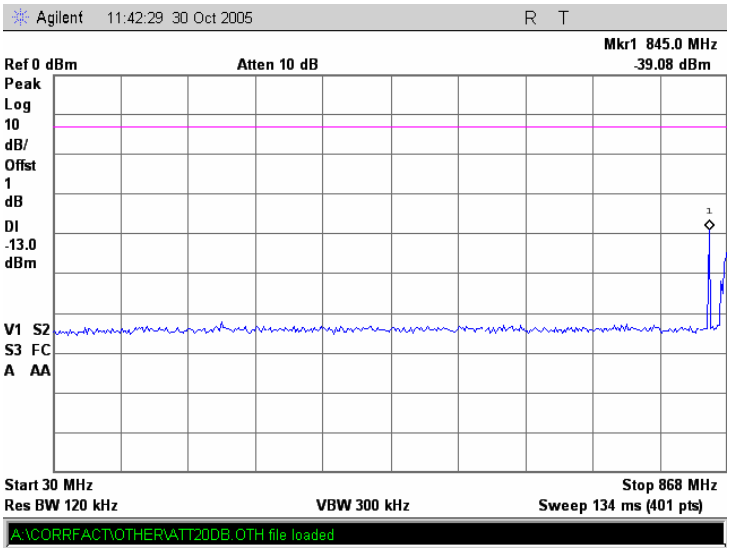


Plot 7.3.2 Spurious emission measurements in 0.15 - 30 MHz range, Cell 800, TDMA modulation

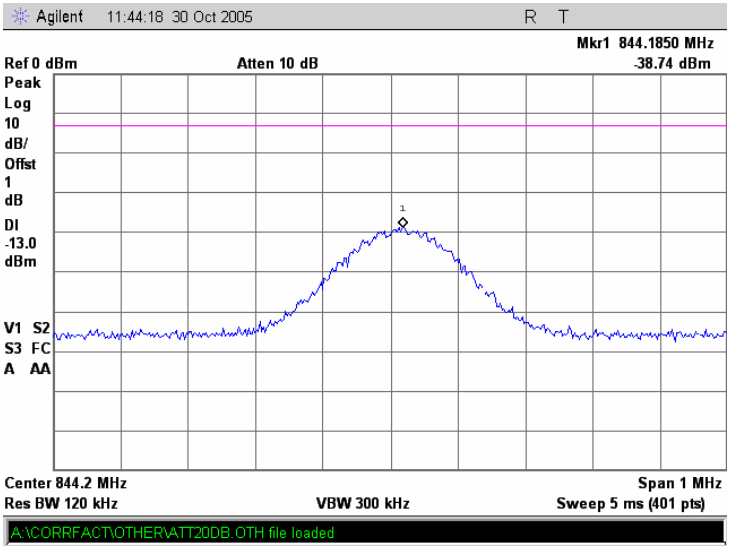


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.3.3 Spurious emission measurements in 30 - 868 MHz range, Cell 800, TDMA modulation

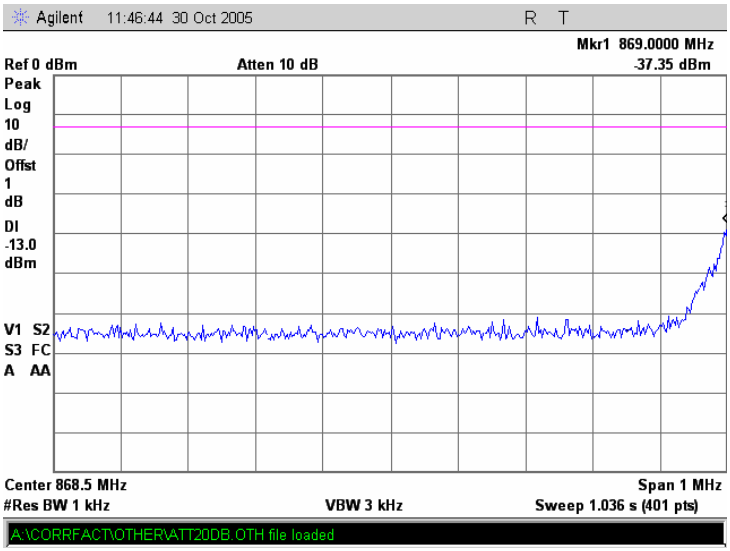


Plot 7.3.4 Spurious emission measurements at 844 MHz, Cell 800, TDMA modulation

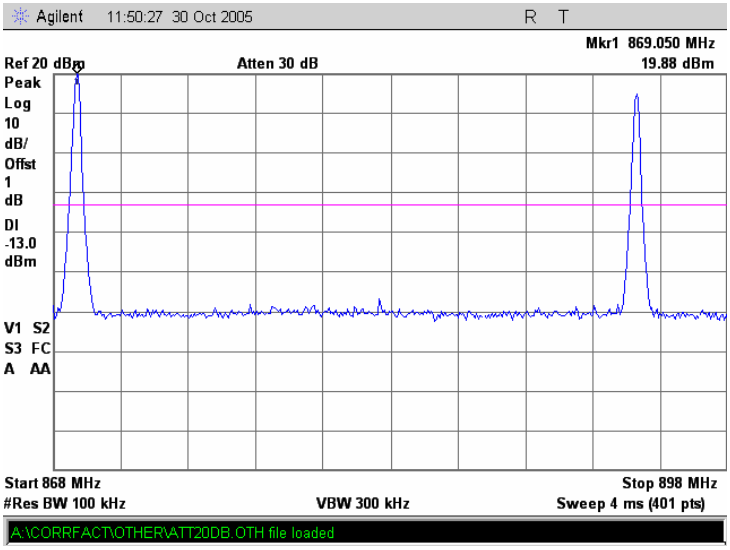


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.3.5 Spurious emission measurements in 868 - 869 MHz range, 1 kHz RBW, Cell 800, TDMA modulation

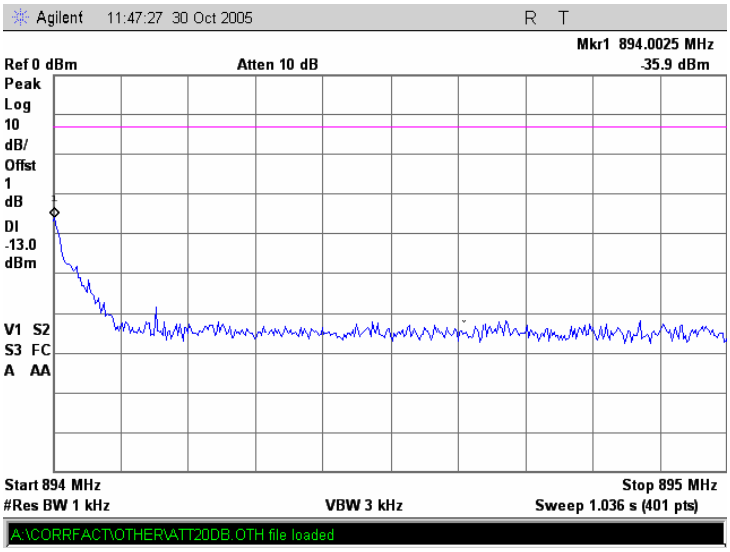


Plot 7.3.6 Spurious emission measurements in 868 - 898 MHz range, Cell 800, TDMA modulation

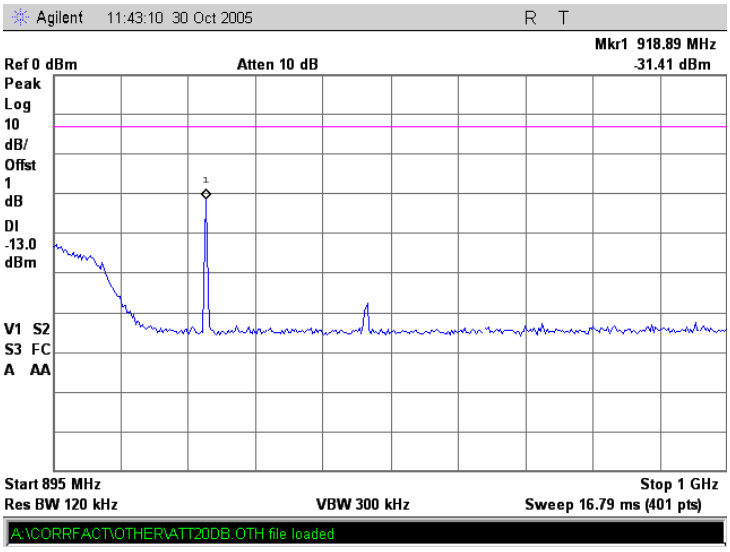


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.3.7 Spurious emission measurements in 894 - 895 MHz range, 1 kHz RBW, Cell 800, TDMA modulation

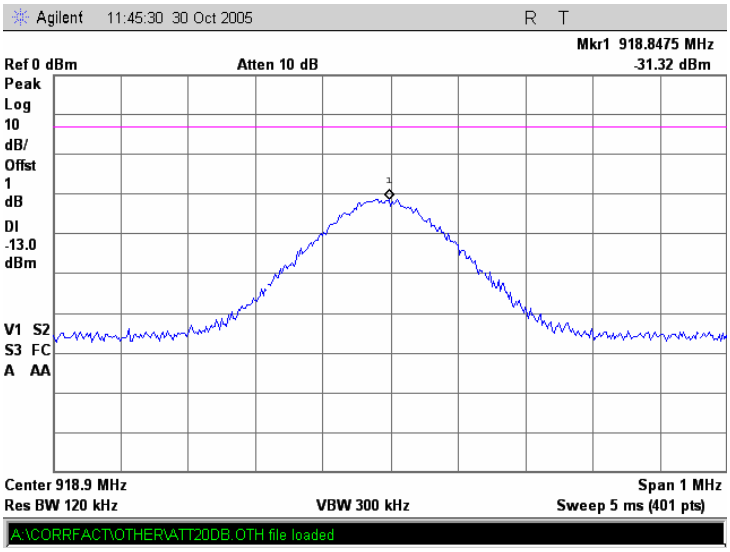


Plot 7.3.8 Spurious emission measurements in 895 - 1000 MHz range, Cell 800, TDMA modulation

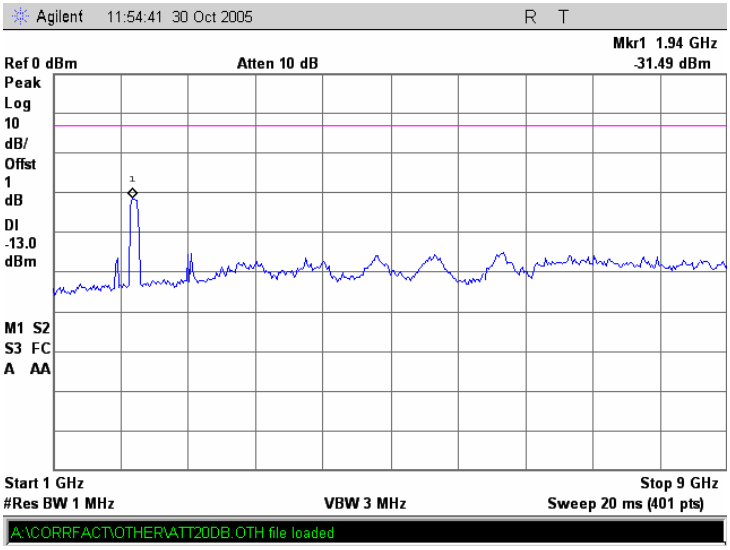


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.3.9 Spurious emission measurements at 918 MHz, Cell 800, TDMA modulation

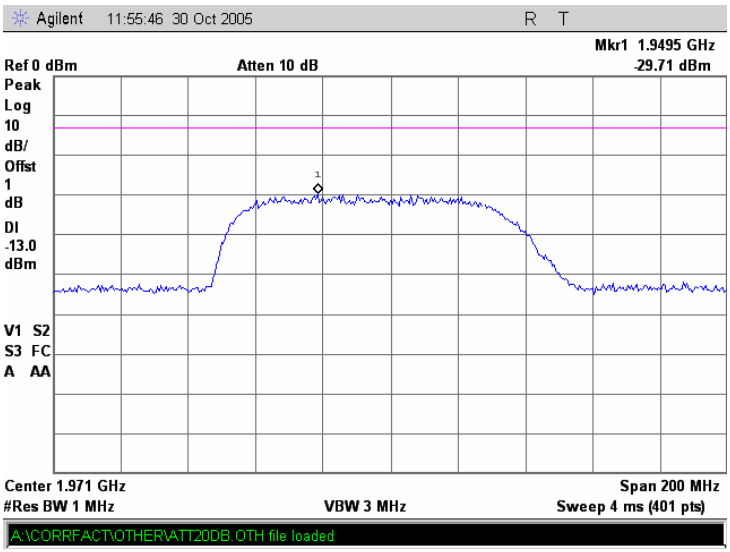


Plot 7.3.10 Spurious emission measurements in 1 - 9 GHz range, Cell 800, TDMA modulation

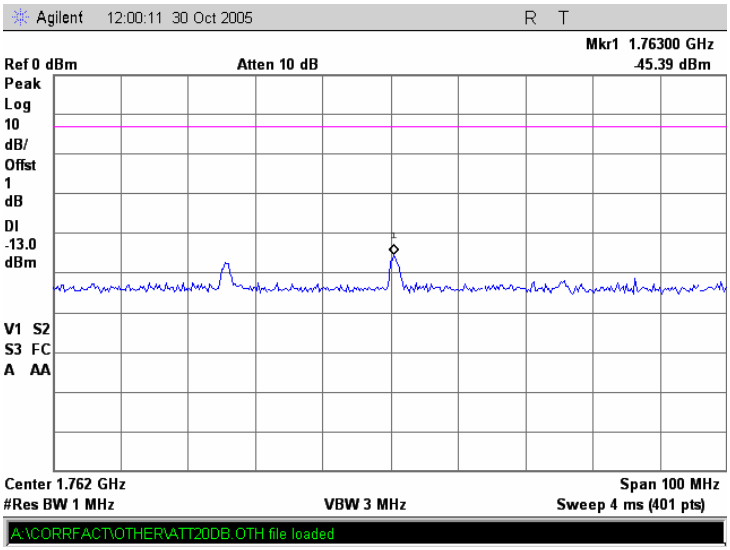


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.3.11 Spurious emission measurements at 1949 MHz, Cell 800, TDMA modulation

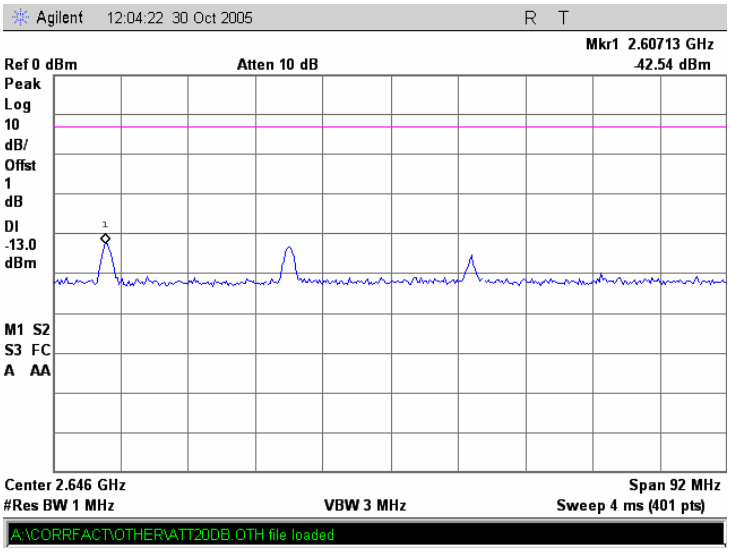


Plot 7.3.12 Conducted spurious emission measurements at the 2nd harmonic, Cell 800, TDMA modulation

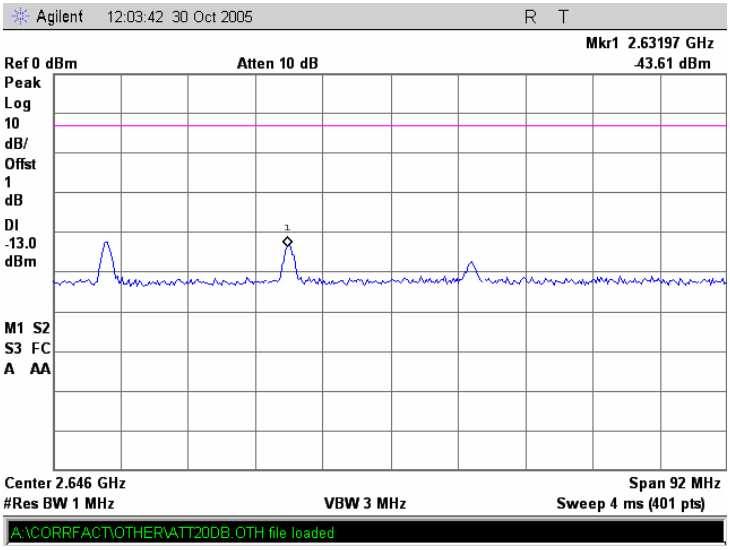


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.3.13 Conducted spurious emission measurements at the 3rd harmonic, Cell 800, TDMA modulation

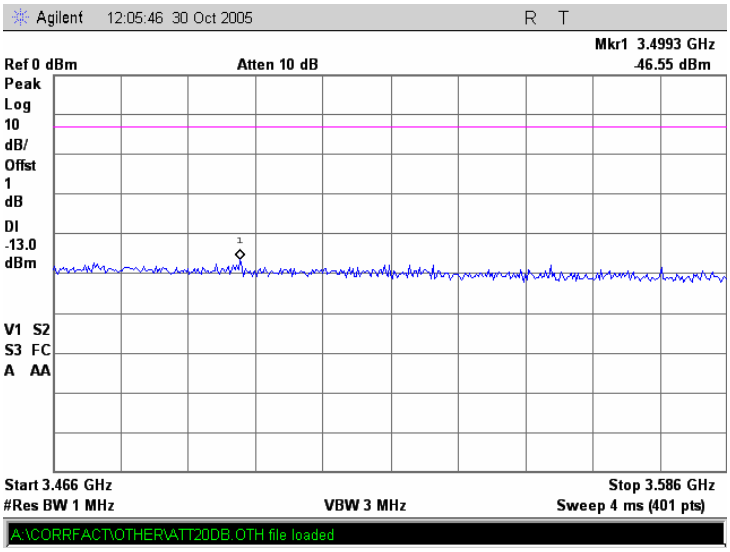


Plot 7.3.14 Conducted spurious emission measurements at the 3rd harmonic, Cell 800, TDMA modulation



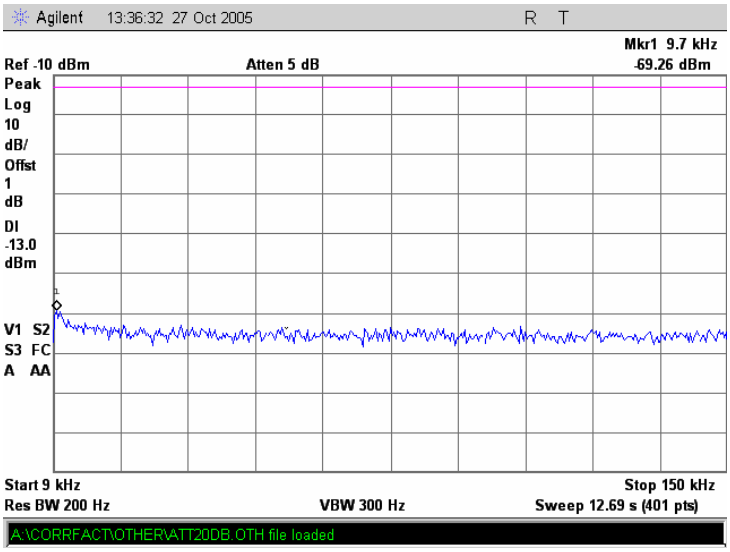
Test specification:	**Section 22.917, Spurious emission at antenna terminal**		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	**Verdict:**	PASS
Date:	11/8/2005		
Temperature: 22ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 46 %	**Power Supply:** 48 VDC
Remarks:			

Plot 7.3.15 Conducted spurious emission measurements at the 4th harmonic, Cell 800, TDMA modulation

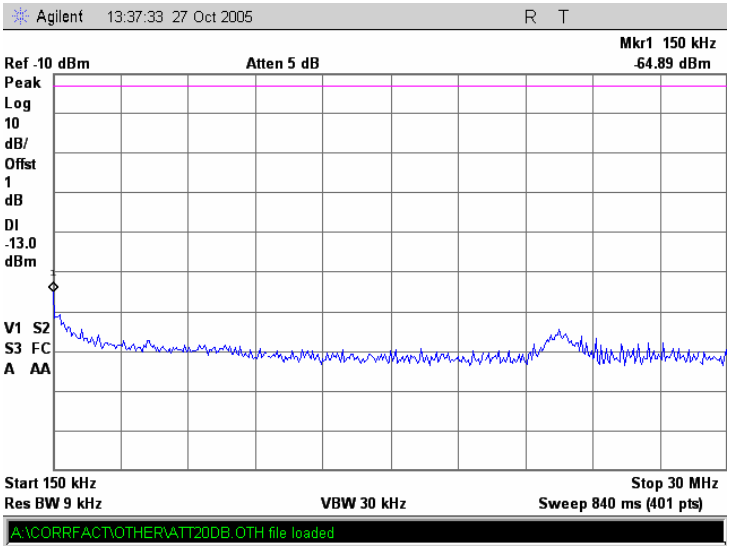


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.3.16 Spurious emission measurements in 9 - 150 kHz range, Cell 800, CDMA modulation

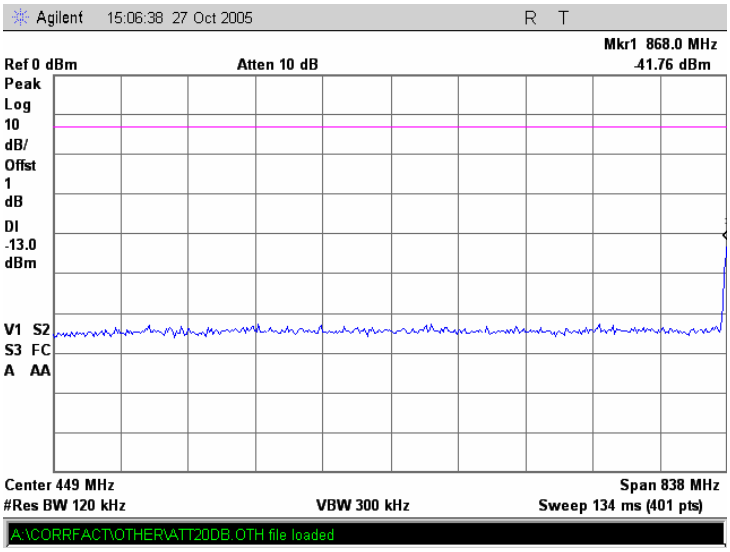


Plot 7.3.17 Spurious emission measurements in 0.15 - 30 MHz range, Cell 800, CDMA modulation

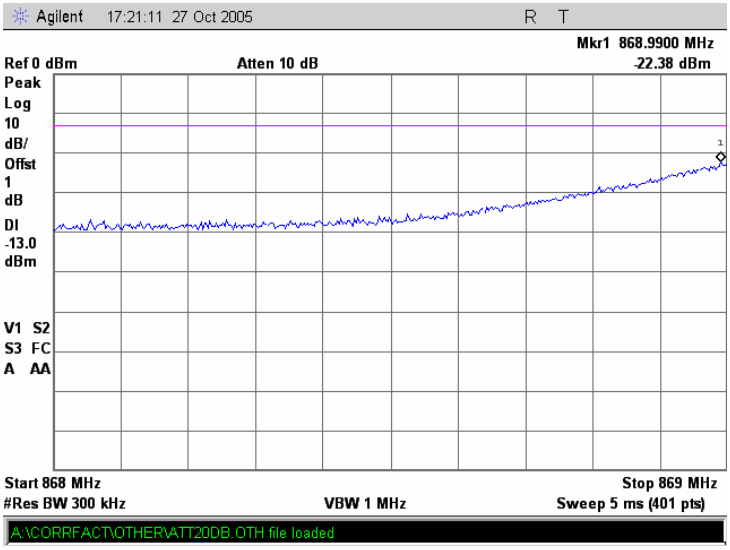


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.3.18 Spurious emission measurements in 30 - 868 MHz range, Cell 800, CDMA modulation

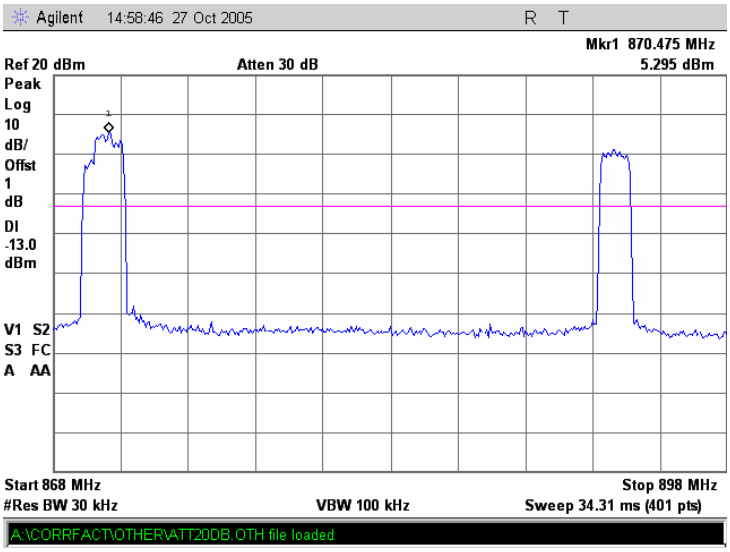


Plot 7.3.19 Spurious emission measurements in 868 - 869 MHz range, Cell 800, CDMA modulation

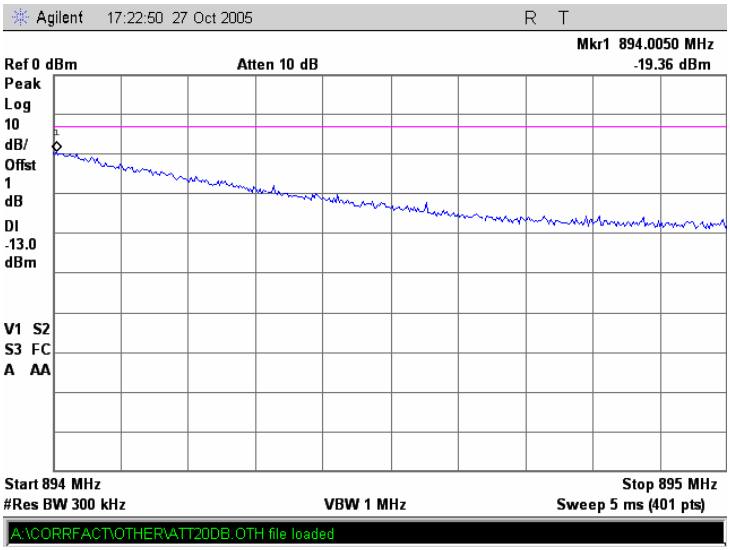


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.3.20 Spurious emission measurements in 868 - 898 MHz range, Cell 800, CDMA modulation

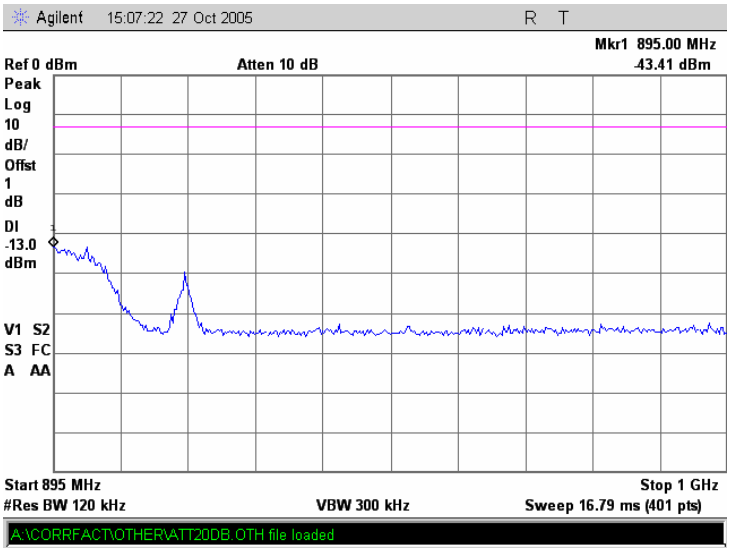


Plot 7.3.21 Spurious emission measurements in 894 - 895 MHz range, Cell 800, CDMA modulation

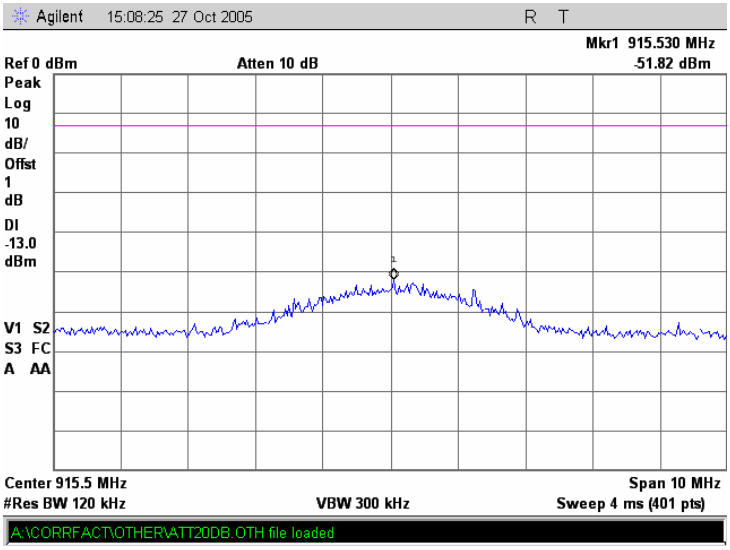


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.3.22 Spurious emission measurements in 895 - 1000 MHz range, Cell 800, CDMA modulation

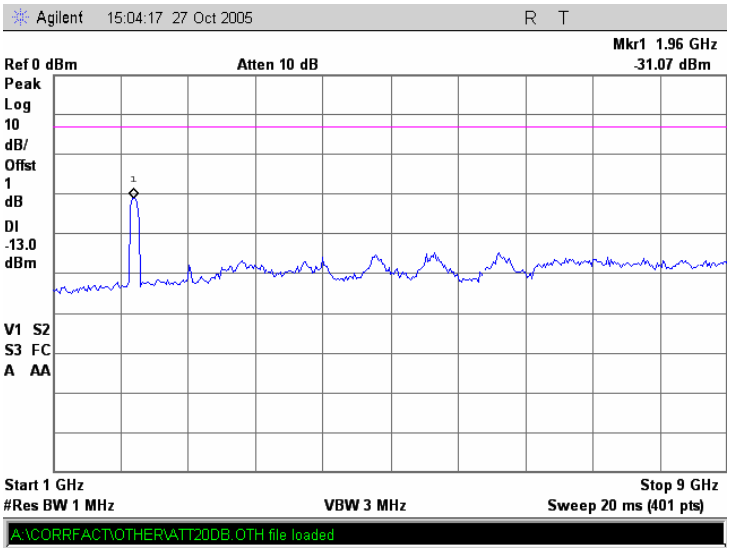


Plot 7.3.23 Spurious emission measurements in 916 MHz, Cell 800, CDMA modulation

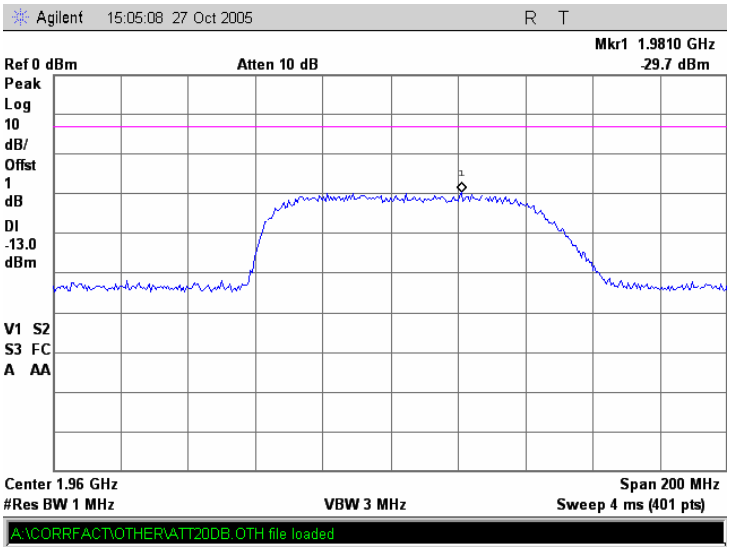


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.3.24 Spurious emission measurements in 1 - 9 GHz range, Cell 800, CDMA modulation

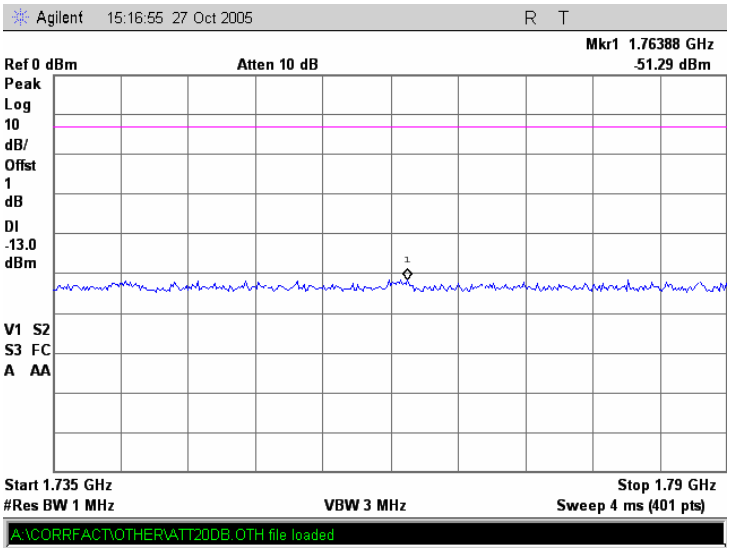


Plot 7.3.25 Spurious emission measurements at 1962 MHz, Cell 800, CDMA modulation

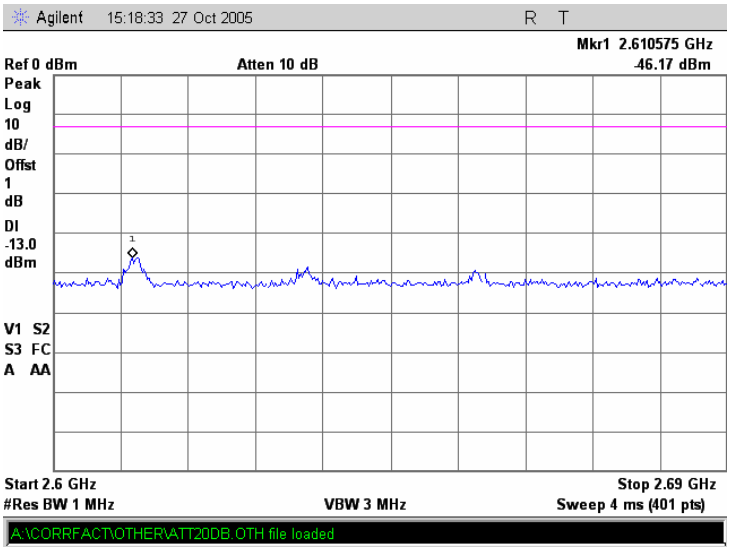


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 7.3.26 Conducted spurious emission measurements at the 2nd harmonic, Cell 800, CDMA modulation

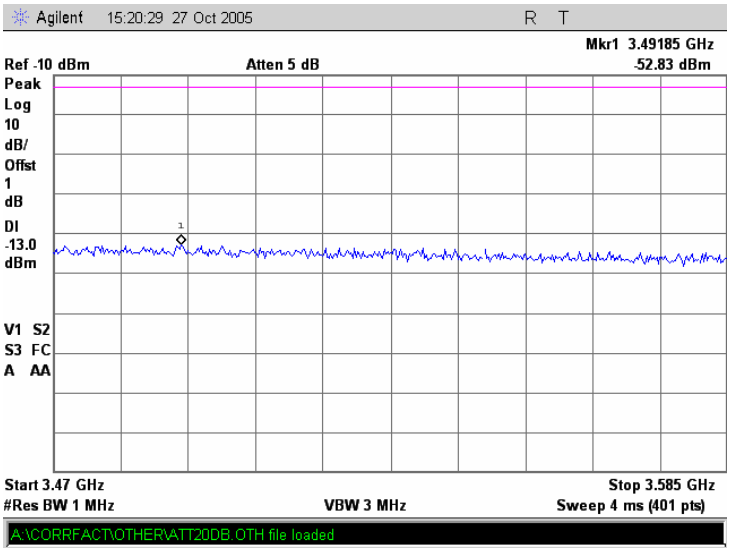


Plot 7.3.27 Conducted spurious emission measurements at the 3rd harmonic, Cell 800, CDMA modulation



Test specification:	**Section 22.917, Spurious emission at antenna terminal**		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	**Verdict:**	PASS
Date:	11/8/2005		
Temperature: 22ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 46 %	**Power Supply:** 48 VDC
Remarks:			

Plot 7.3.28 Conducted spurious emission measurements at the 4th harmonic, Cell 800, CDMA modulation



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 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 – 9000	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:	9/28/2005		
Temperature: 24ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48 VDC
Remarks:			

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

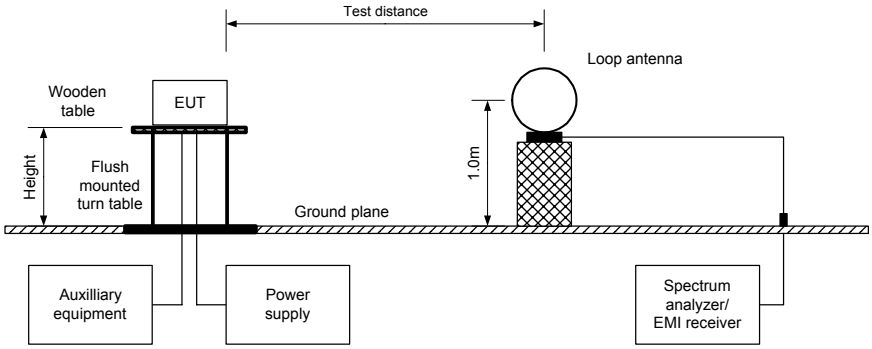
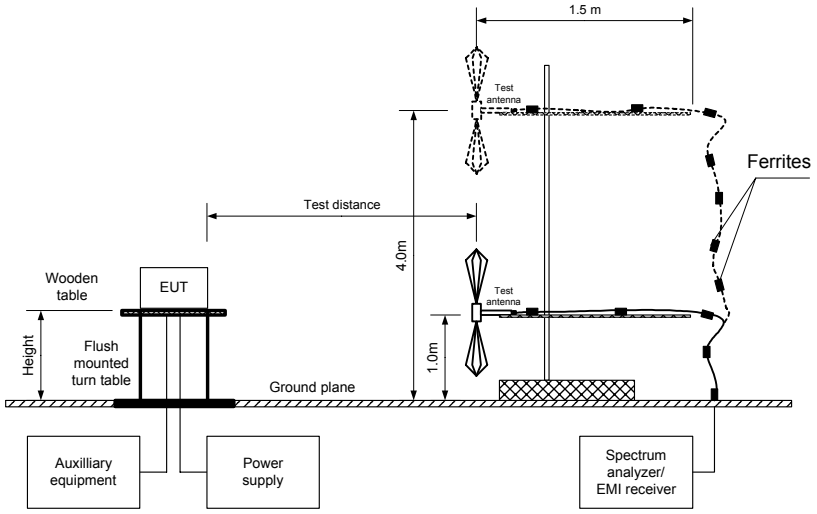


Figure 7.4.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	**Section 22.917, Radiated spurious emissions**		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	**Verdict:**	PASS
Date:	9/28/2005		
Temperature: 24ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48 VDC
Remarks:			

Table 7.4.2 Field strength of emissions

ASSIGNED FREQUENCY RANGE:	869 - 894 MHz
INVESTIGATED FREQUENCY RANGE:	0.009 – 9000 MHz
TEST DISTANCE:	3 m
MODULATION:	Unmodulated
DUTY CYCLE:	100 %
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum
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*
All spurious emissions were more than 20 dB below the 84.4 dB(μV/m) limit						

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

Reference numbers of test equipment used

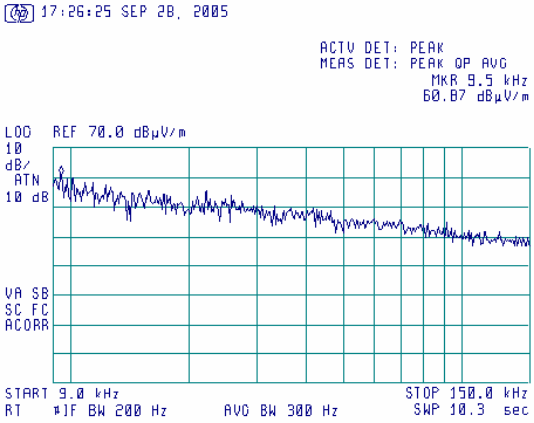
HL 0410	HL 0446	HL 0465	HL 0521	HL 0589	HL 0592	HL 0593	HL 0594
HL 0604	HL 0768	HL 1200	HL 1424	HL 1941	HL 1947	HL 1984	HL 2009
HL 2259	HL 2387	HL 2399	HL 2499				

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:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

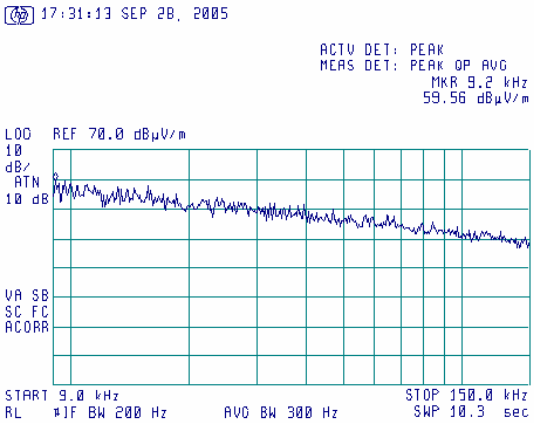
Plot 7.4.1 Radiated emission measurements from 9 to 150 kHz at the low carrier frequency

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

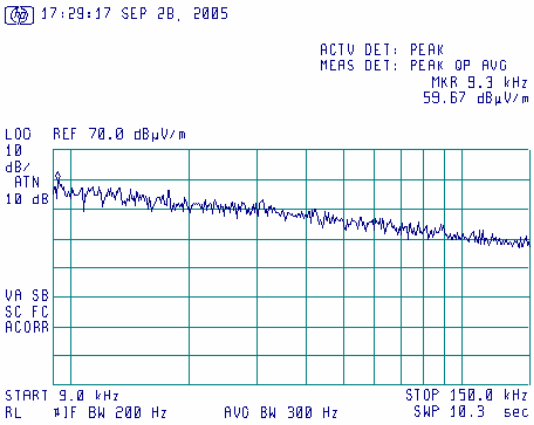
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

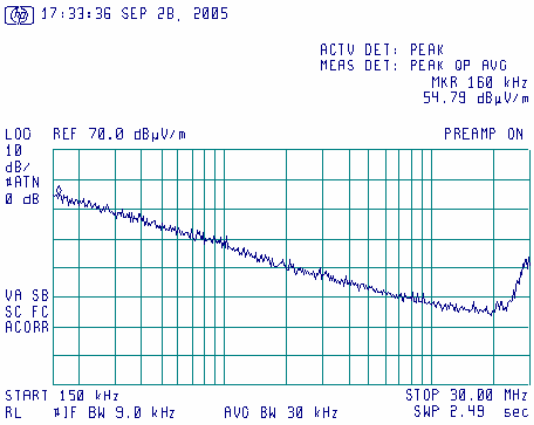
Plot 7.4.3 Radiated emission measurements from 9 to 150 kHz at the high carrier frequency

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

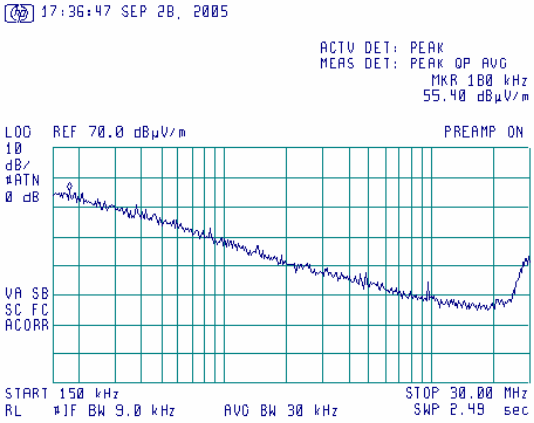
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

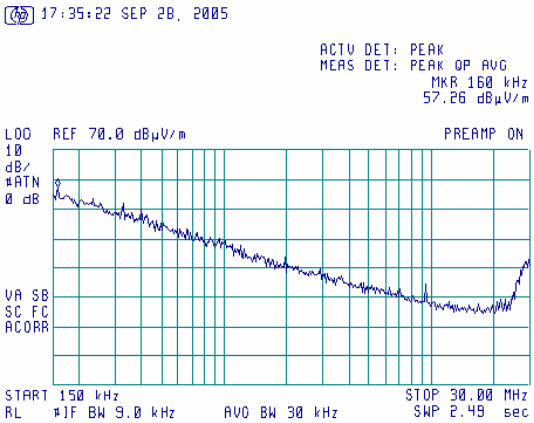
Plot 7.4.5 Radiated emission measurements from 0.15 to 30 MHz at the mid carrier frequency

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

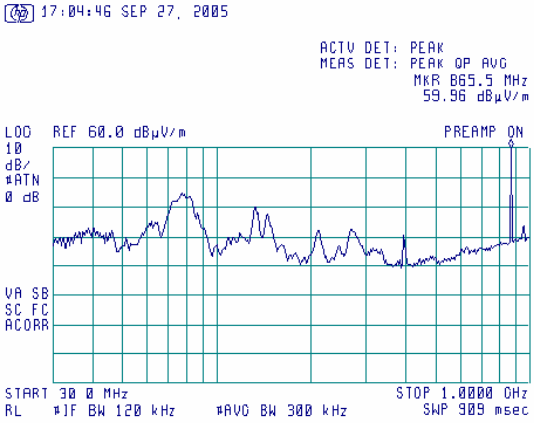
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

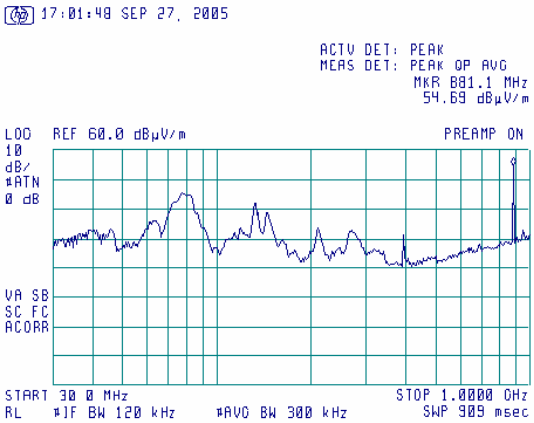
Plot 7.4.7 Radiated emission measurements from 30 to 1000 MHz at the low carrier frequency

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



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

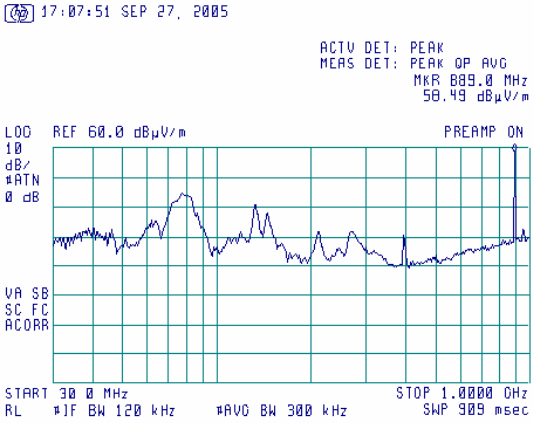
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

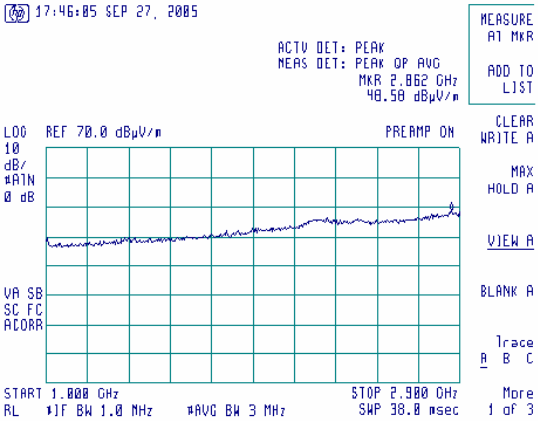
Plot 7.4.9 Radiated emission measurements from 30 to 1000 MHz at the high carrier frequency

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



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

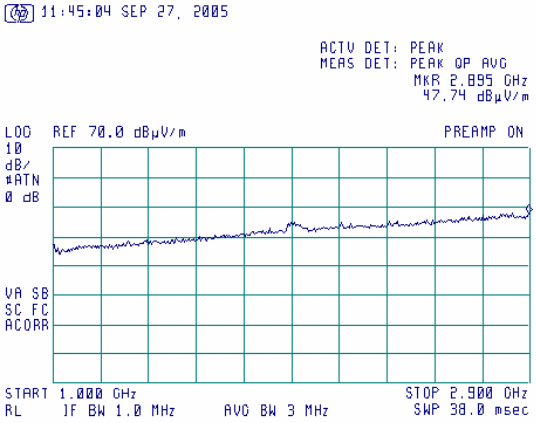
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

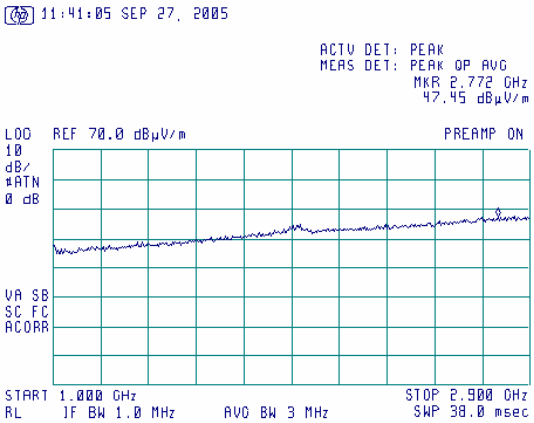
Plot 7.4.11 Radiated emission measurements from 1000 to 2900 MHz at the mid carrier frequency

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

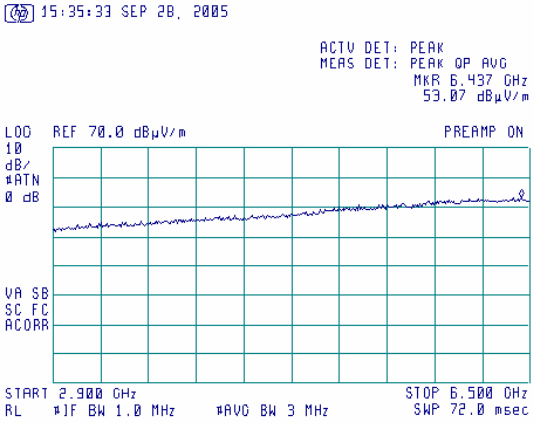
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	**Section 22.917, Radiated spurious emissions**		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	**Verdict:**	PASS
Date:	9/28/2005		
Temperature: 24ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48 VDC
Remarks:			

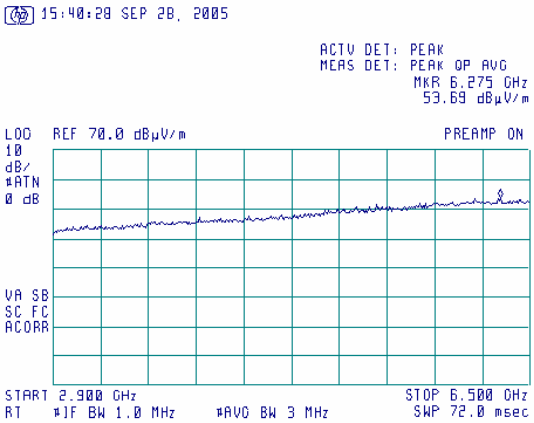
Plot 7.4.13 Radiated emission measurements from 2900 to 6500 MHz at the low carrier frequency

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

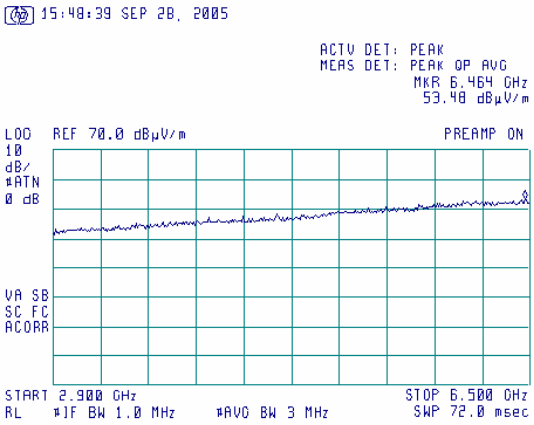
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	**Section 22.917, Radiated spurious emissions**		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	**Verdict:**	PASS
Date:	9/28/2005		
Temperature: 24ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48 VDC
Remarks:			

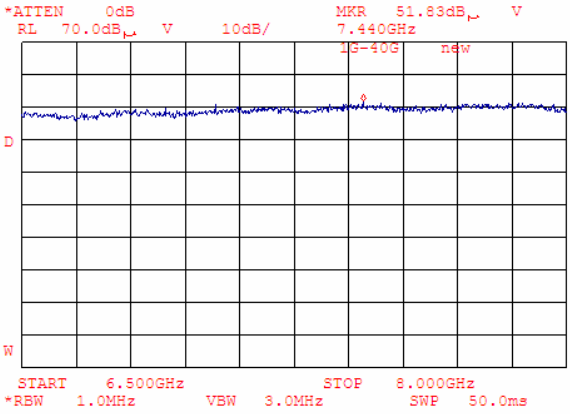
Plot 7.4.15 Radiated emission measurements from 2900 to 6500 MHz at the high carrier frequency

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 8 GHz at the low carrier frequency

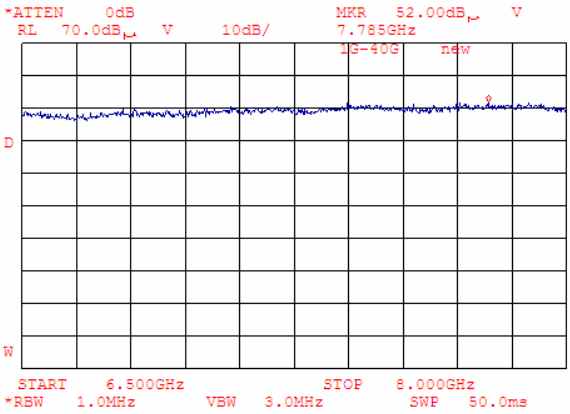
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

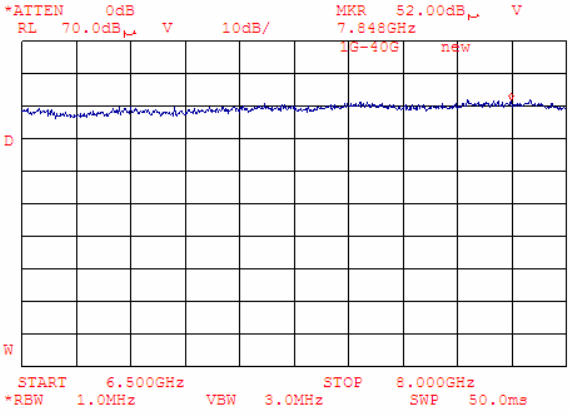
Plot 7.4.17 Radiated emission measurements from 6.5 to 8 GHz at the mid carrier frequency

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 8 GHz at the high carrier frequency

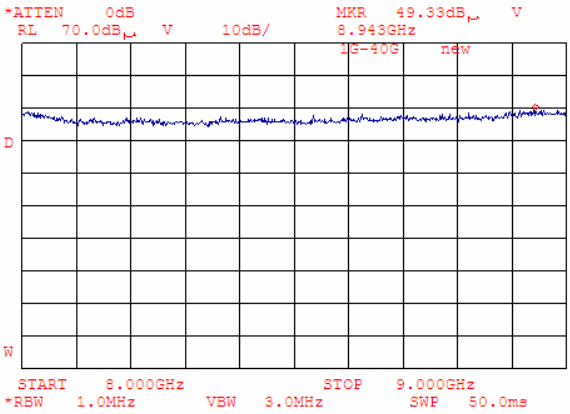
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

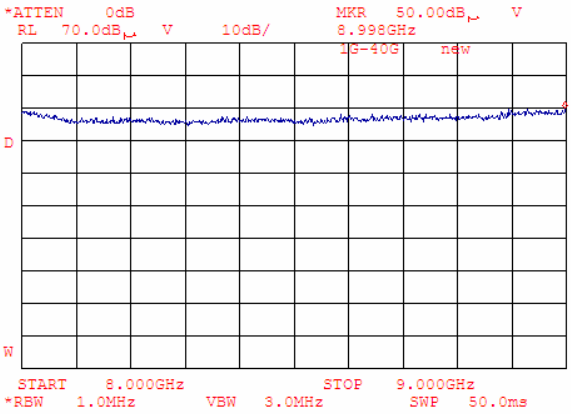
Plot 7.4.19 Radiated emission measurements from 8 to 9 GHz at the low carrier frequency

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



Plot 7.4.20 Radiated emission measurements from 8 to 9 GHz at the mid carrier frequency

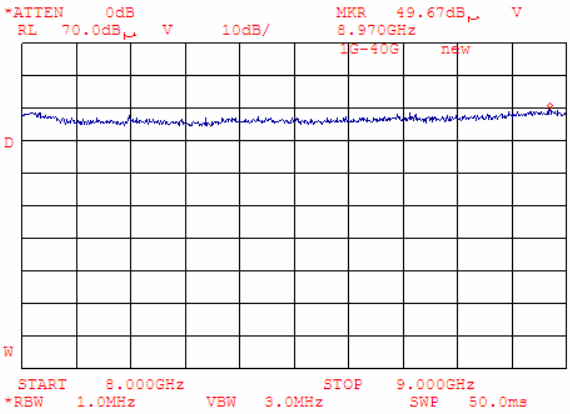
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	**Section 22.917, Radiated spurious emissions**		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	**Verdict:**	PASS
Date:	9/28/2005		
Temperature: 24ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48 VDC
Remarks:			

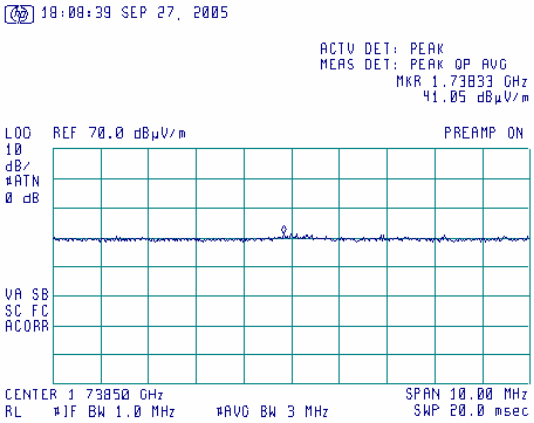
Plot 7.4.21 Radiated emission measurements from 8 to 9 GHz at the high carrier frequency

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



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

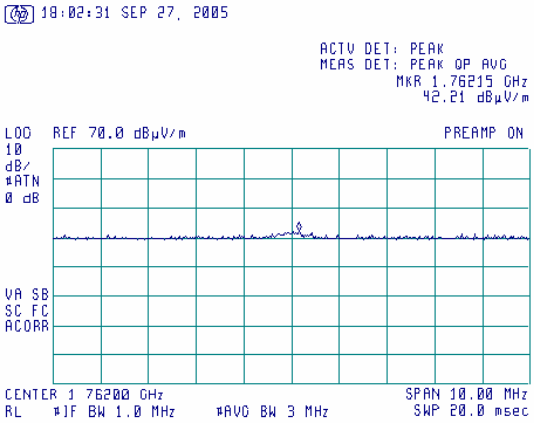
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

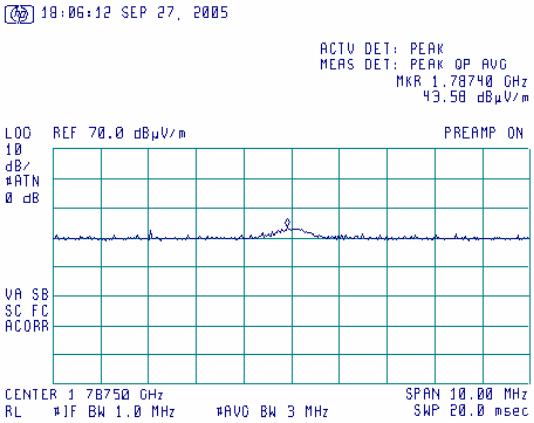
Plot 7.4.23 Radiated emission measurements at the second harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



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

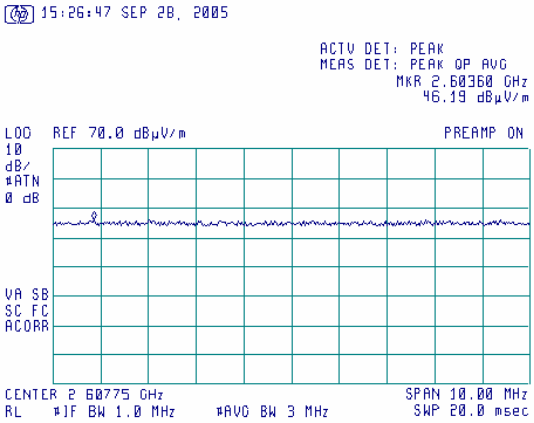
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

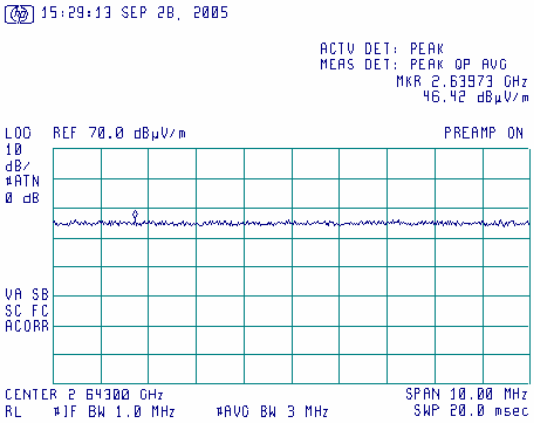
Plot 7.4.25 Radiated emission measurements at the third harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



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

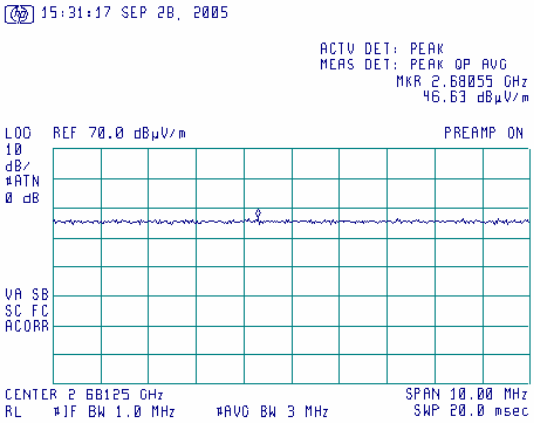
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

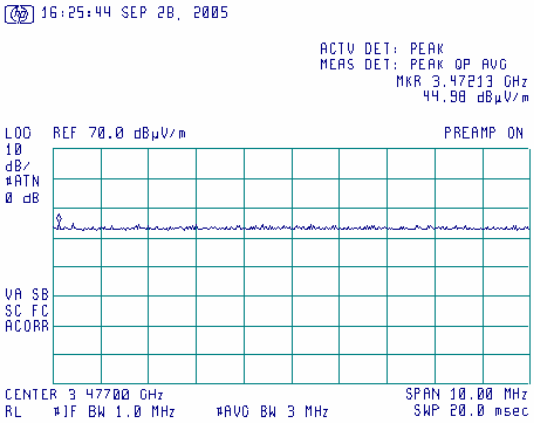
Plot 7.4.27 Radiated emission measurements at the third harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



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

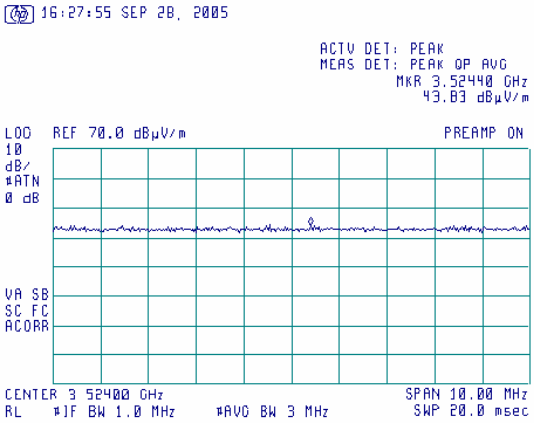
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

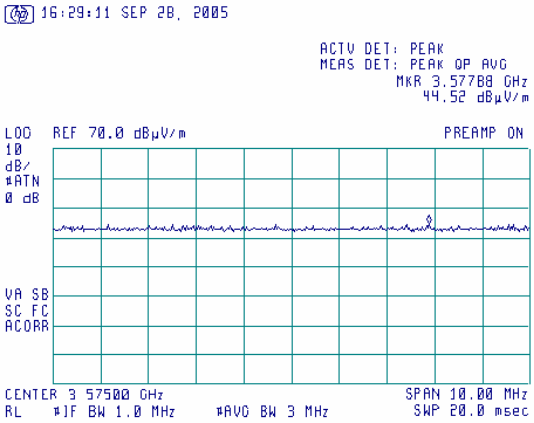
Plot 7.4.29 Radiated emission measurements at the forth harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



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

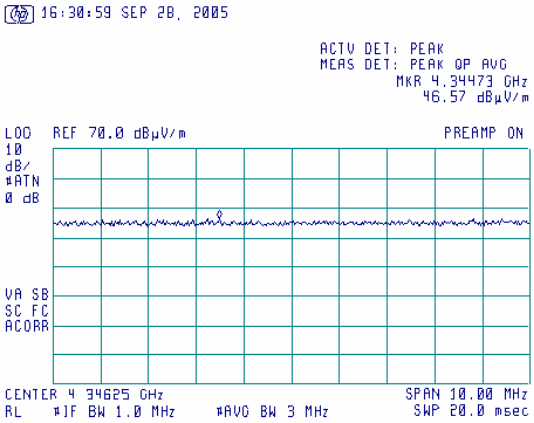
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

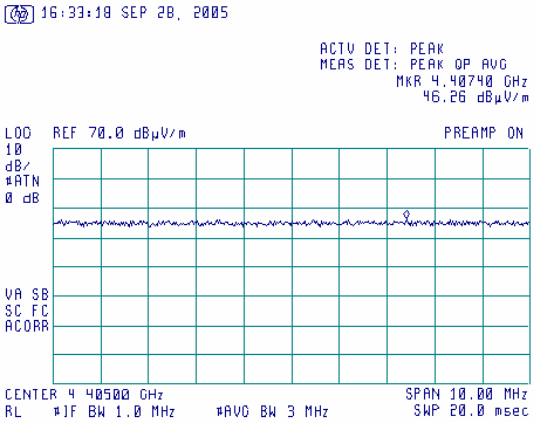
Plot 7.4.31 Radiated emission measurements at the fifth harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 7.4.32 Radiated emission measurements at the fifth harmonic of mid carrier frequency

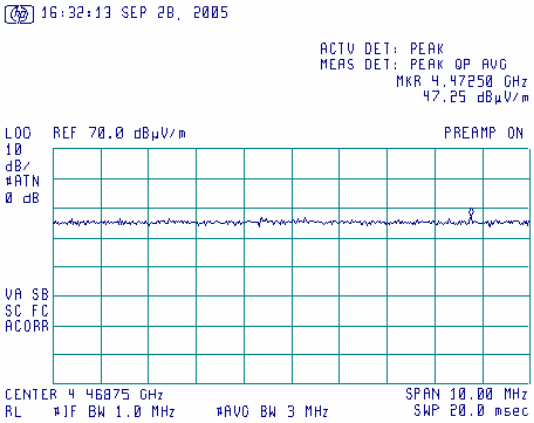
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

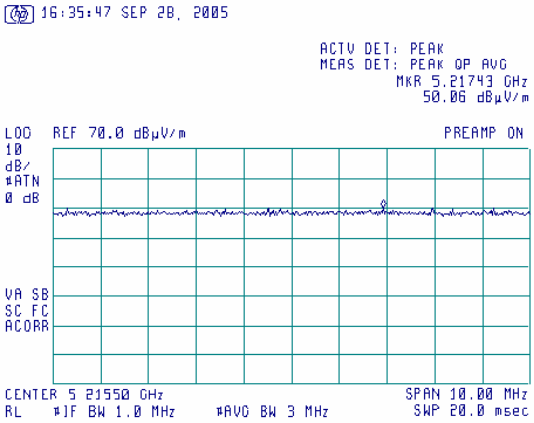
Plot 7.4.33 Radiated emission measurements at the fifth harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 7.4.34 Radiated emission measurements at the sixth harmonic of low carrier frequency

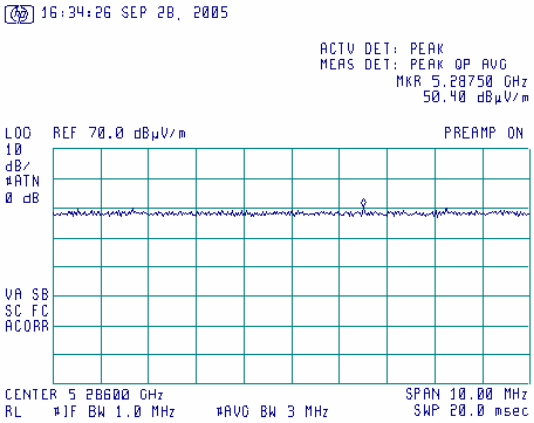
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

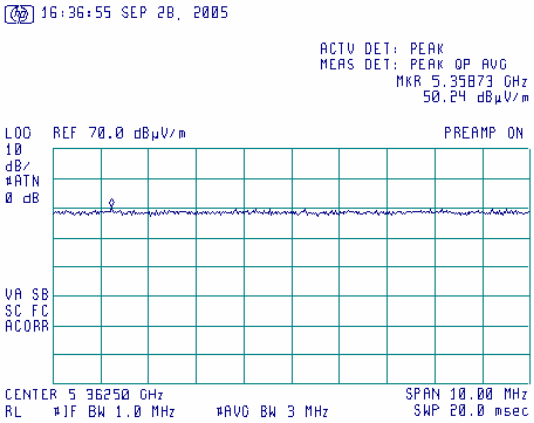
Plot 7.4.35 Radiated emission measurements at the sixth harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 7.4.36 Radiated emission measurements at the sixth harmonic of high carrier frequency

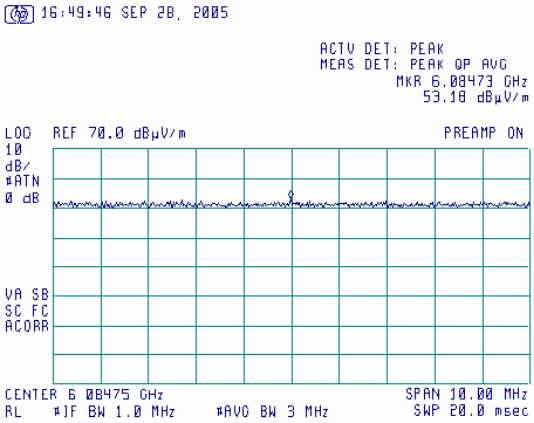
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

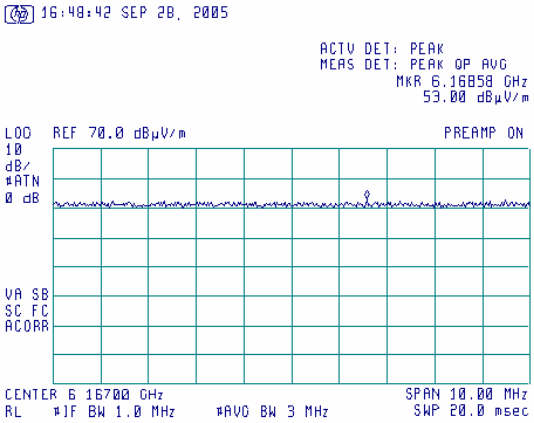
Plot 7.4.37 Radiated emission measurements at the seventh harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 7.4.38 Radiated emission measurements at the seventh harmonic of mid carrier frequency

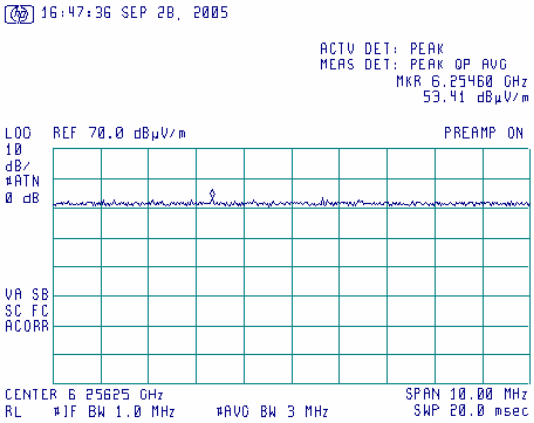
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	**Section 22.917, Radiated spurious emissions**		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	**Verdict:**	PASS
Date:	9/28/2005		
Temperature: 24ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48 VDC
Remarks:			

Plot 7.4.39 Radiated emission measurements at the seventh harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	Section 24.232, Peak output power		
Test procedure:	FCC part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 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
1930 - 1990	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. The measurements were performed at the EUT input and output ports in downlink and uplink transmit modes of operation at maximum input signals for low, middle and high carrier (channel) frequencies

Figure 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:	11/8/2005		
Temperature: 22ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 46 %	**Power Supply:** 48 VDC
Remarks:			

Table 8.1.2 Peak output power test results, per channel

ASSIGNED FREQUENCY RANGE: 1930 - 1990 MHz
DETECTOR USED: Peak, RMS
VIDEO BANDWIDTH: ≥ Resolution bandwidth
RESOLUTION BANDWIDTH: 3 / 5 MHz
VIDEO BANDWIDTH: 3 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
MODULATION: TDMA / CDMA / GSM
MODULATING SIGNAL: PRBS
BIT RATE: 48.6 kbps / 270.833 kbps
MAXIMUM INPUT SIGNAL: -20 dBm

Carrier frequency, MHz	Spectrum analyzer reading, dBm	External attenuation& cable loss, dB	RF output power, dBm	Limit, dBm	Margin*, dB	Verdict
TDMA modulation						
1930.00	19.60	included	19.60	33.0	-13.40	Pass
1960.00	20.08	included	20.08	33.0	-12.92	Pass
1990.00	19.79	included	19.79	33.0	-13.21	Pass
CDMA modulation						
1931.00	19.84	included	19.84	33.0	-13.16	Pass
1960.00	20.24	included	20.24	33.0	-12.76	Pass
1989.00	19.46	included	19.46	33.0	-13.54	Pass
GSM modulation						
1930.00	19.73	included	19.73	33.0	-13.27	Pass
1960.00	20.09	included	20.09	33.0	-12.91	Pass
1990.00	19.73	included	19.73	33.0	-13.27	Pass

*Margin = RF output power – specification limit

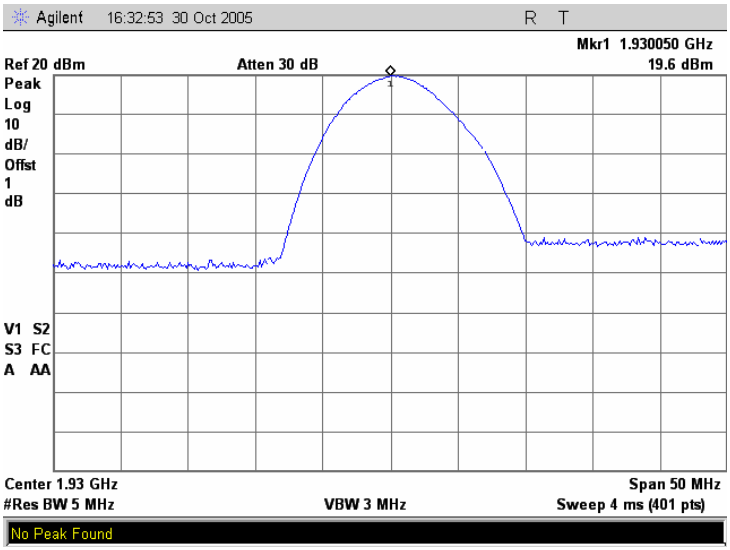
Reference numbers of test equipment used

HL 2780							

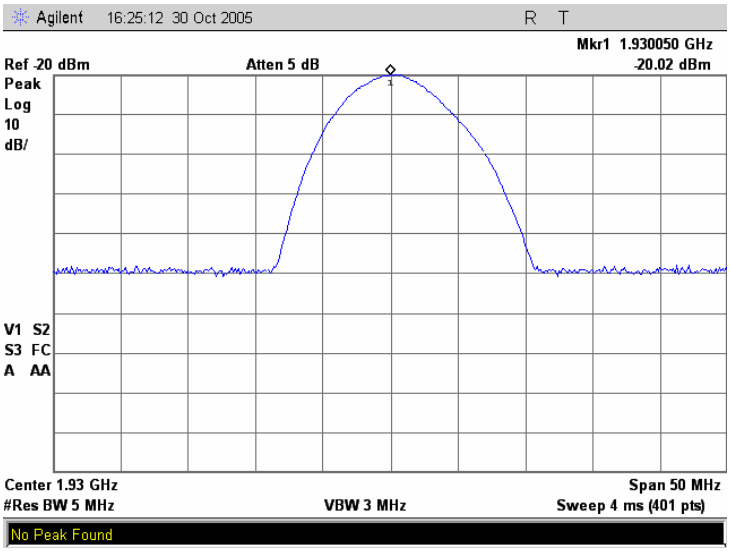
Full description is given in Appendix A.

Test specification:	Section 24.232, Peak output power		
Test procedure:	FCC part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 8.1.1 RF output power measurements at low frequency carrier, PCS 1900, TDMA modulation

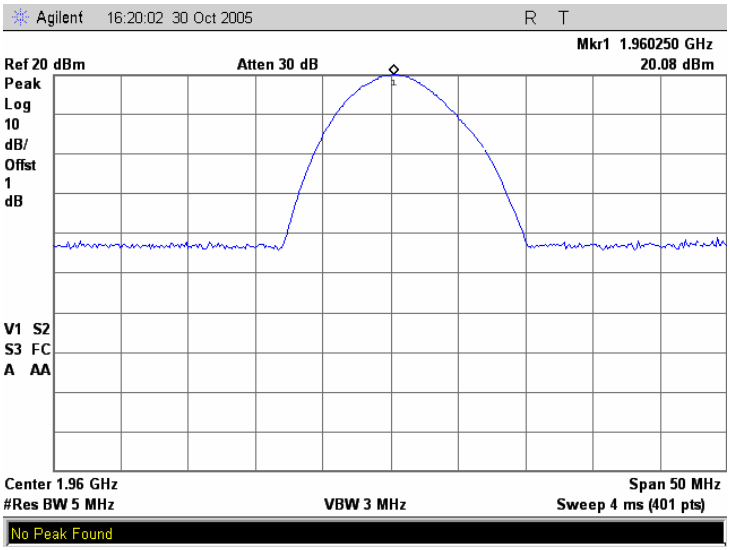


Plot 8.1.2 RF input power measurements at low frequency carrier, PCS 1900, TDMA modulation

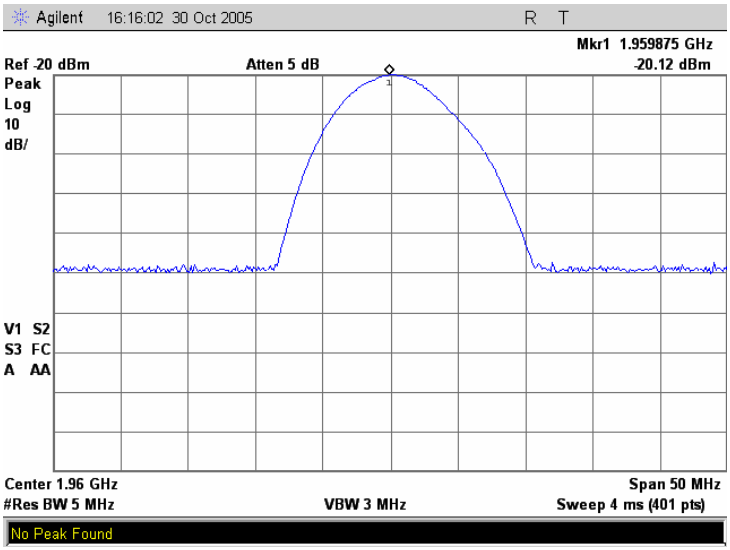


Test specification:	Section 24.232, Peak output power		
Test procedure:	FCC part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 8.1.3 RF output power measurements at mid frequency carrier, PCS 1900, TDMA modulation

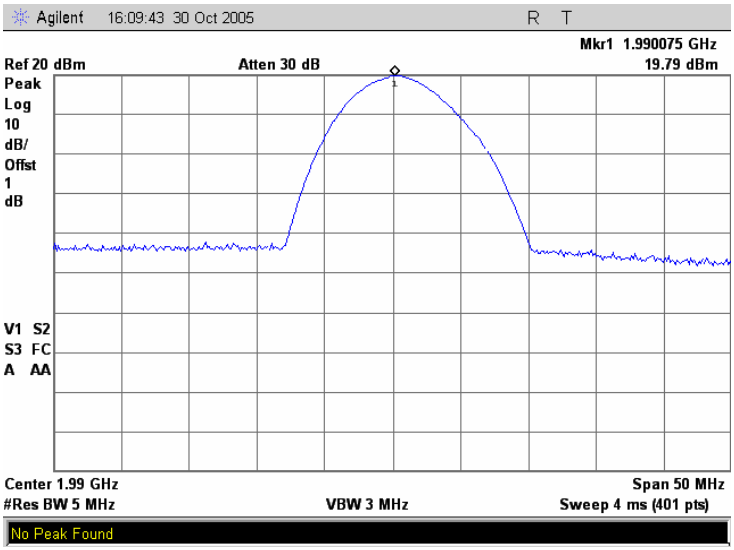


Plot 8.1.4 RF input power measurements at mid frequency carrier, PCS 1900, TDMA modulation

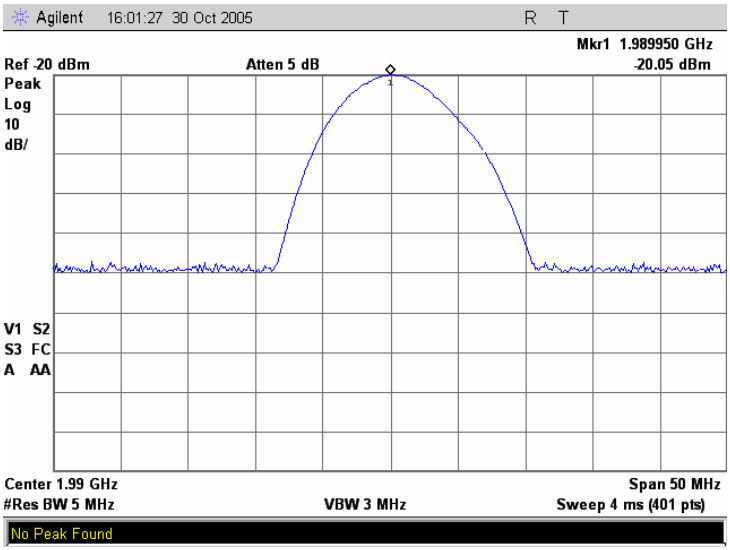


Test specification:	Section 24.232, Peak output power		
Test procedure:	FCC part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 8.1.5 RF output power measurements at high frequency carrier, PCS 1900, TDMA modulation

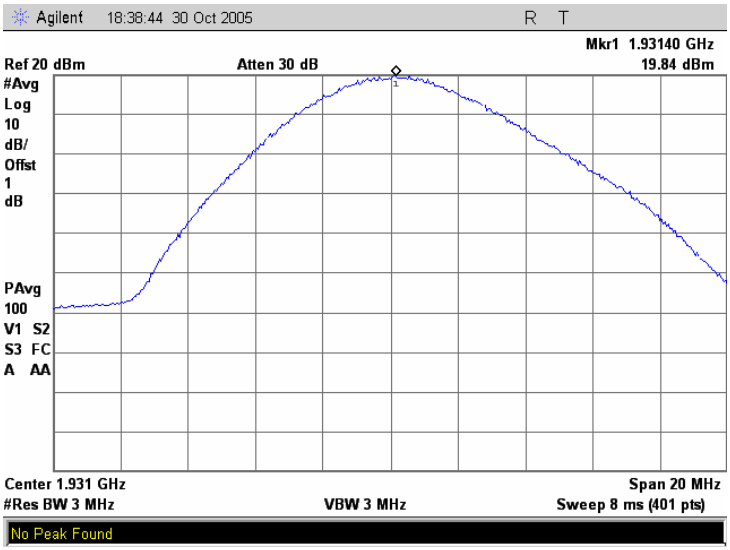


Plot 8.1.6 RF input power measurements at high frequency carrier, PCS 1900, TDMA modulation

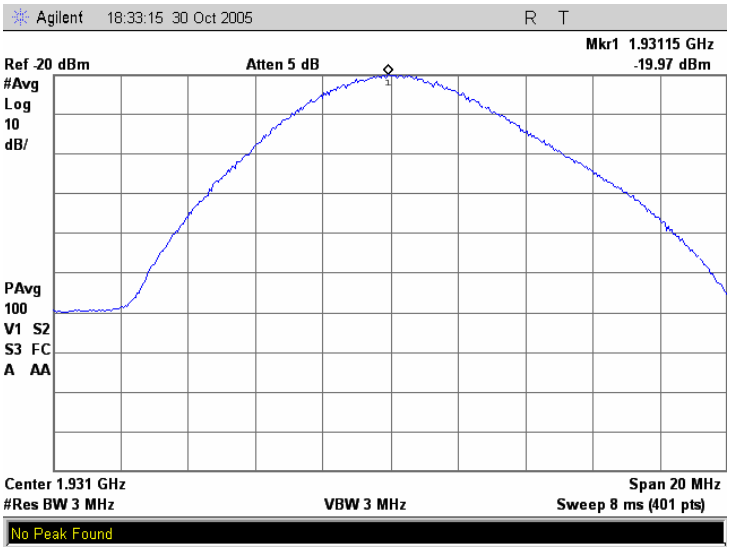


Test specification:	Section 24.232, Peak output power		
Test procedure:	FCC part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 8.1.7 RF output power measurements at low frequency carrier, PCS 1900, CDMA modulation

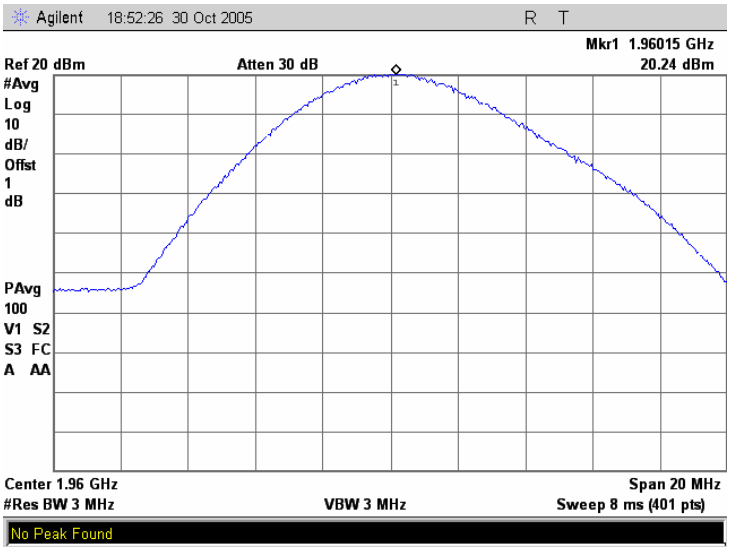


Plot 8.1.8 RF input power measurements at low frequency carrier, PCS 1900, CDMA modulation

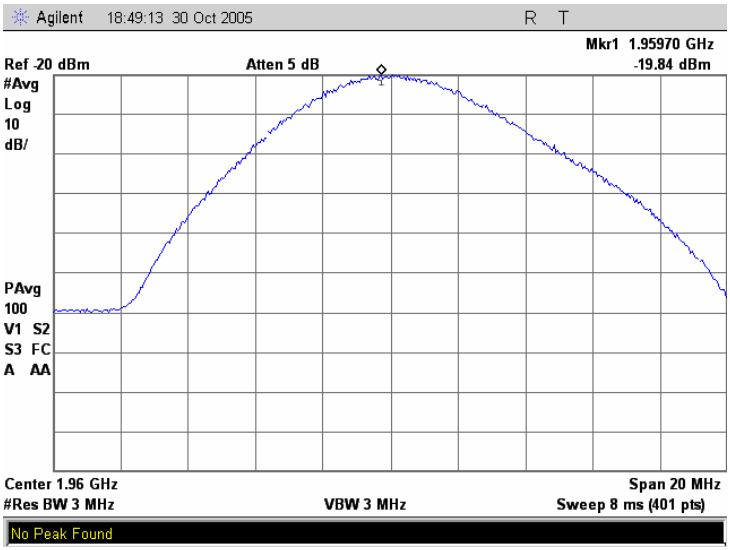


Test specification:	Section 24.232, Peak output power		
Test procedure:	FCC part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 8.1.9 RF output power measurements at mid frequency carrier, PCS 1900, CDMA modulation

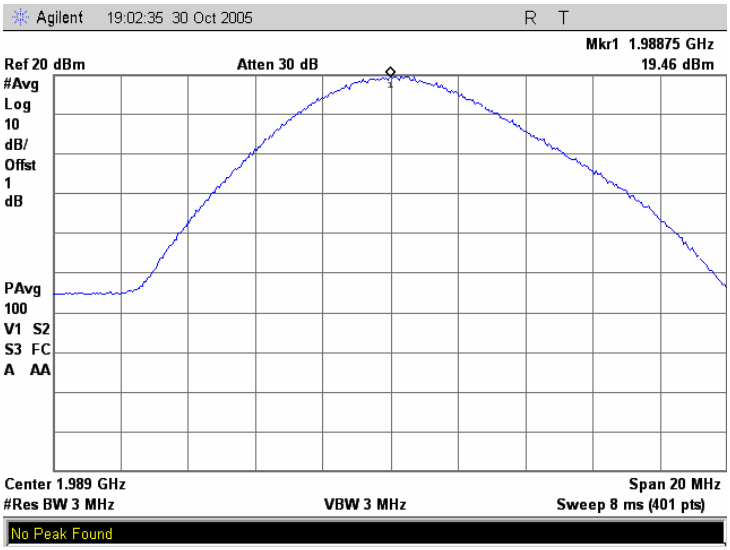


Plot 8.1.10 RF input power measurements at mid frequency carrier, PCS 1900, CDMA modulation

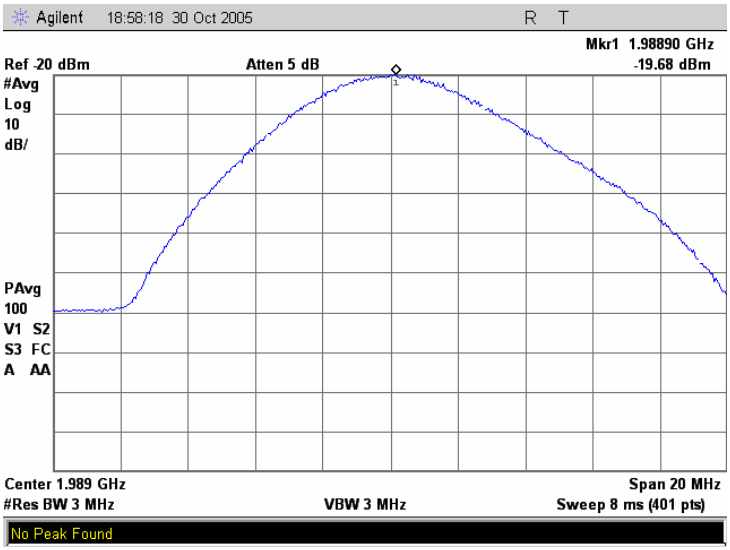


Test specification:	Section 24.232, Peak output power		
Test procedure:	FCC part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 8.1.11 RF output power measurements at high frequency carrier, PCS 1900, CDMA modulation

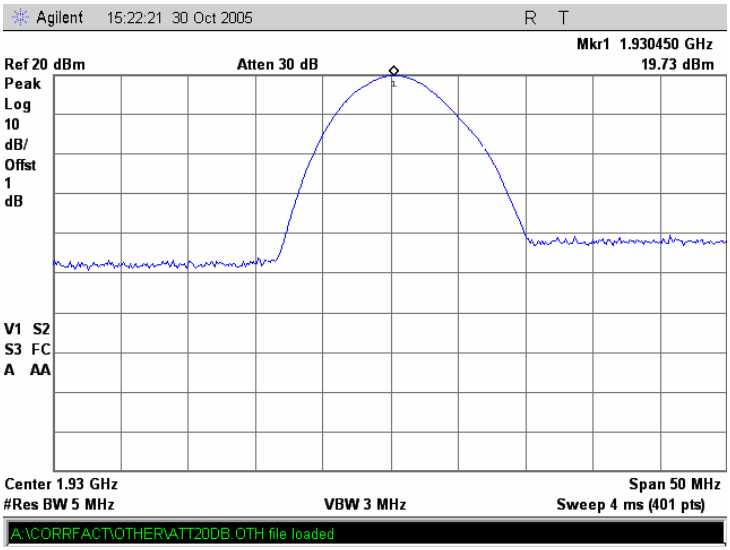


Plot 8.1.12 RF input power measurements at high frequency carrier, PCS 1900, CDMA modulation

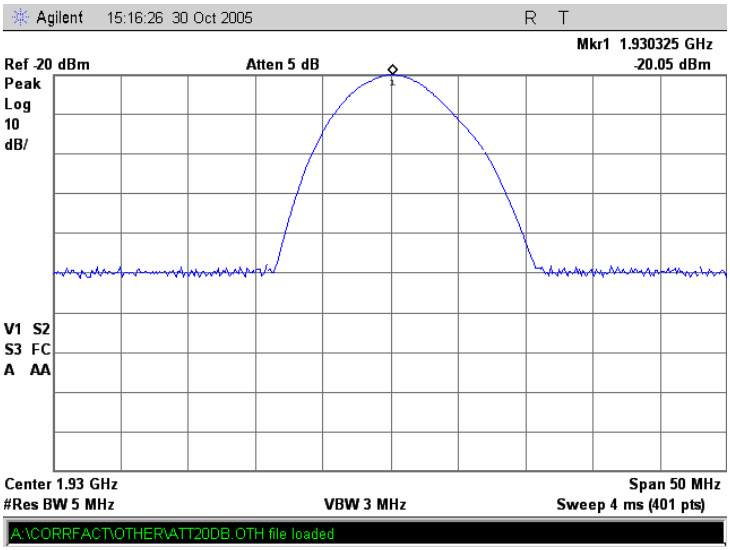


Test specification:	Section 24.232, Peak output power		
Test procedure:	FCC part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 8.1.13 RF output power measurements at low frequency carrier, PCS 1900, GSM modulation

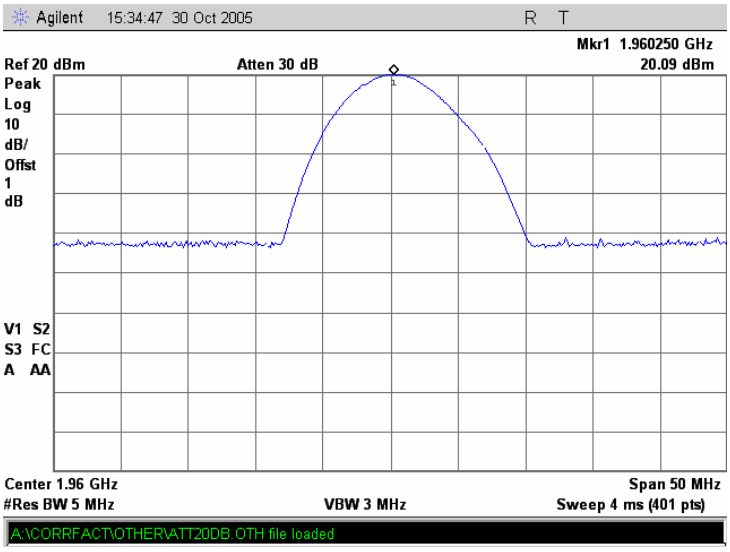


Plot 8.1.14 RF input power measurements at low frequency carrier, PCS 1900, GSM modulation

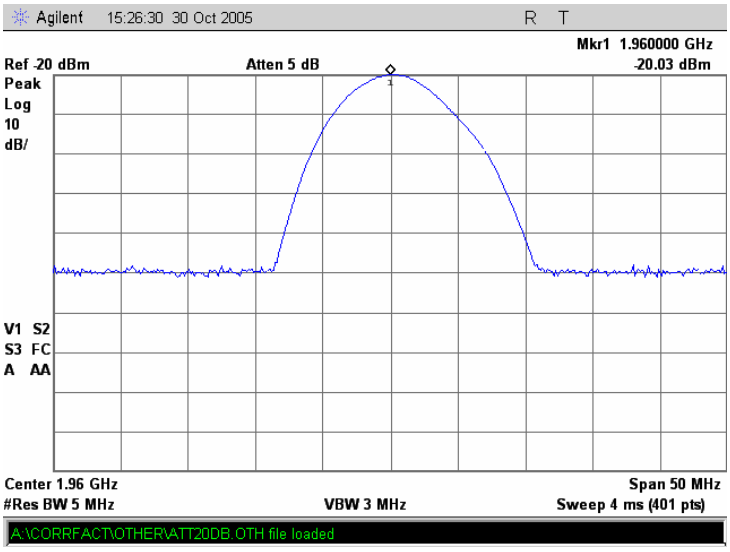


Test specification:	Section 24.232, Peak output power		
Test procedure:	FCC part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 8.1.15 RF output power measurements at mid frequency carrier, PCS 1900, GSM modulation

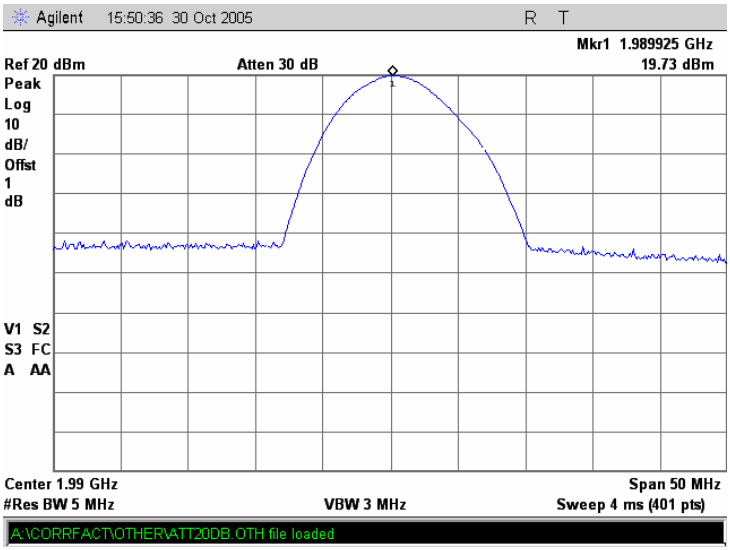


Plot 8.1.16 RF input power measurements at mid frequency carrier, PCS 1900, GSM modulation

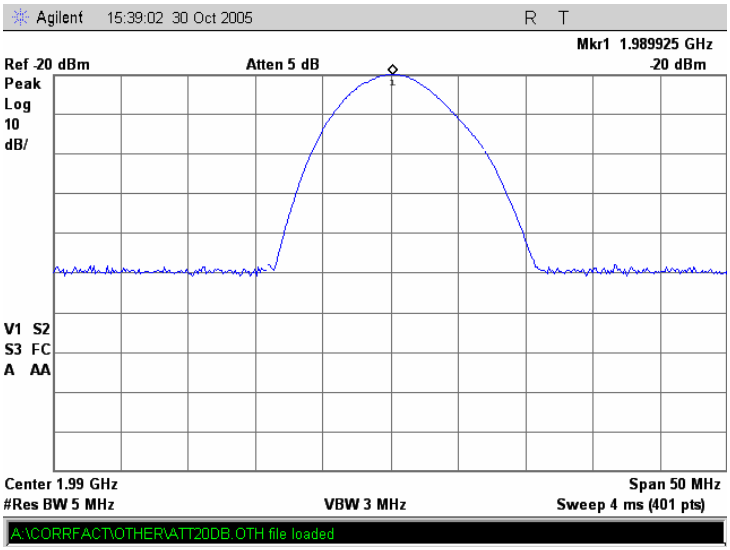


Test specification:	Section 24.232, Peak output power		
Test procedure:	FCC part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 8.1.17 RF output power measurements at high frequency carrier, PCS 1900, GSM modulation



Plot 8.1.18 RF input power measurements at high frequency carrier, PCS 1900, GSM modulation



Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

8.2 Occupied bandwidth test

8.2.1 General

This test was performed to measure transmitter occupied bandwidth.

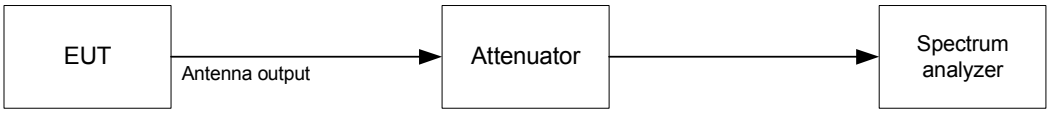
8.2.2 Test procedure

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 adjusted to produce maximum available to the end user RF output power.

8.2.2.3 The occupied bandwidth was measured with spectrum analyzer as provided in Table 8.2.1 and associated plots. The measurements were performed at the EUT input and output ports at maximum input signals for low, middle and high carrier (channel) frequencies.

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:	11/8/2005		
Temperature: 22ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 46 %	**Power Supply:** 48 VDC
Remarks:			

Table 8.2.1 Occupied bandwidth test results

ASSIGNED FREQUENCY RANGE: 1930 - 1990 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
MODULATING SIGNAL: PRBS
MAXIMUM INPUT SIGNAL: -20 dBm

DETECTOR USED: Peak
MODULATION: TDMA
BIT RATE: 48 kbps
RESOLUTION BANDWIDTH: 1 kHz
VIDEO BANDWIDTH: 3 kHz

Carrier frequency, MHz	Input occupied bandwidth, kHz	Output occupied bandwidth, kHz	Margin*, kHz
1930.00	32.00	32.00	0.00
1960.00	32.00	32.75	-0.75
1990.00	32.25	32.25	0.00

DETECTOR USED: Peak
MODULATION: GSM
BIT RATE: 270.833 kbps
RESOLUTION BANDWIDTH: 3 kHz
VIDEO BANDWIDTH: 10 kHz

Carrier frequency, MHz	Input occupied bandwidth, kHz	Output occupied bandwidth, kHz	Margin*, kHz
1930.00	282.50	281.25	0.25
1960.00	285.00	286.25	-1.25
1990.00	290.00	285.00	5.00

DETECTOR USED: RMS
MODULATION: CDMA
BIT RATE: 48.6 kbps
RESOLUTION BANDWIDTH: 300 kHz
VIDEO BANDWIDTH: 1 MHz

Carrier frequency, MHz	Input occupied bandwidth, kHz	Output occupied bandwidth, kHz	Margin*, kHz
1931.00	2125.00	2125.00	0
1960.00	2150.00	2125.00	25
1989.00	2112.50	2087.50	25

*Margin = Input occupied bandwidth – output occupied bandwidth

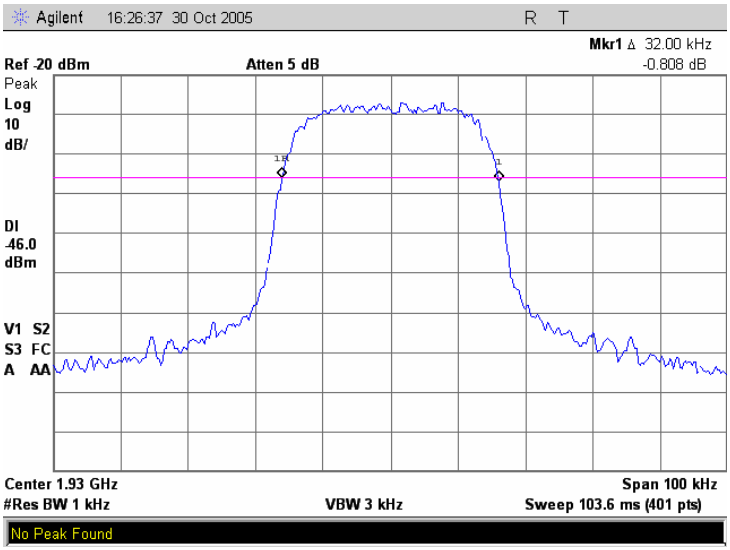
Reference numbers of test equipment used

HL 2780							

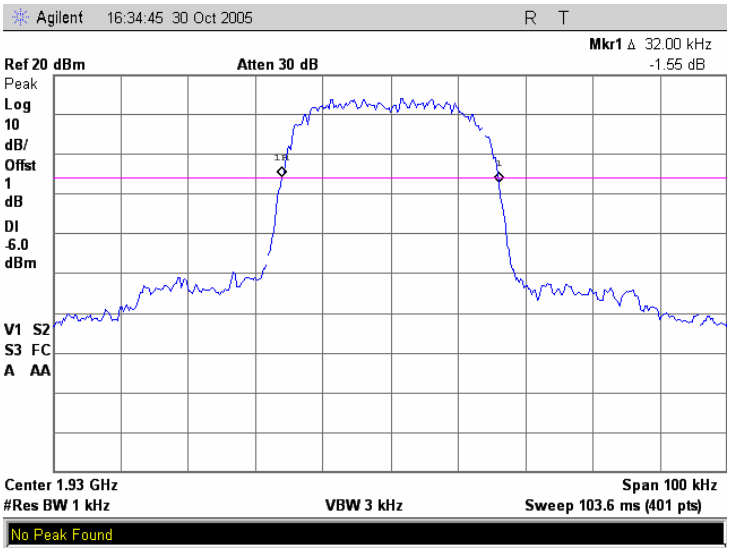
Full description is given in Appendix A.

Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 8.2.1 Input occupied bandwidth measurements at low frequency carrier, PCS 1900, TDMA modulation

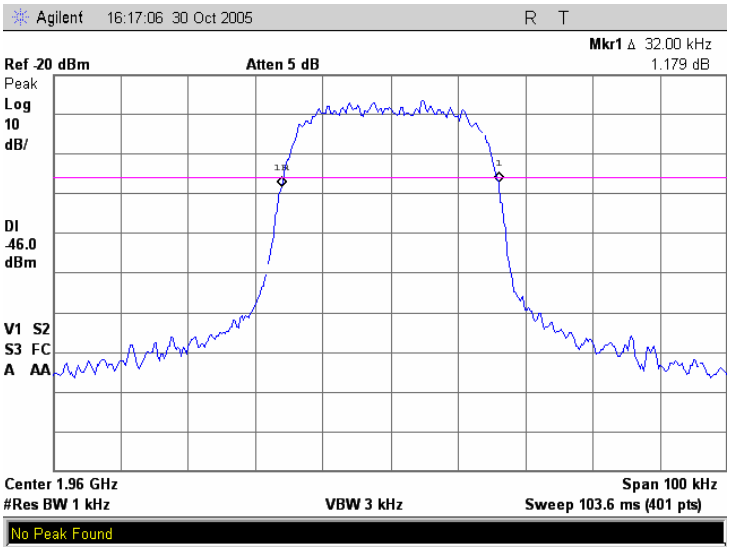


Plot 8.2.2 Output occupied bandwidth measurements at low frequency carrier, PCS 1900, TDMA modulation

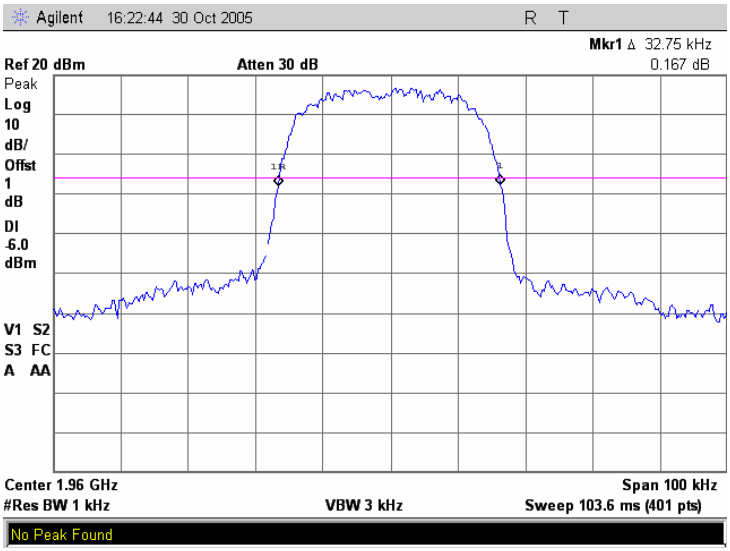


Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 8.2.3 Input occupied bandwidth measurements at mid frequency carrier, PCS 1900, TDMA modulation

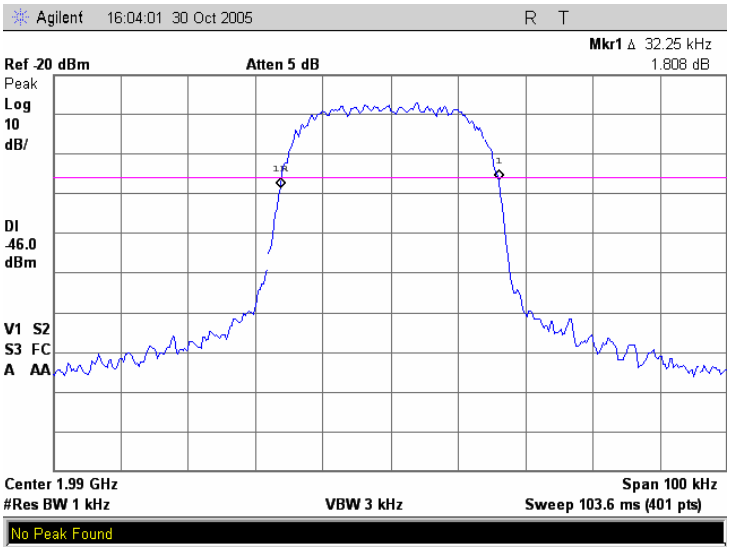


Plot 8.2.4 Output occupied bandwidth measurements at mid frequency carrier, PCS 1900, TDMA modulation

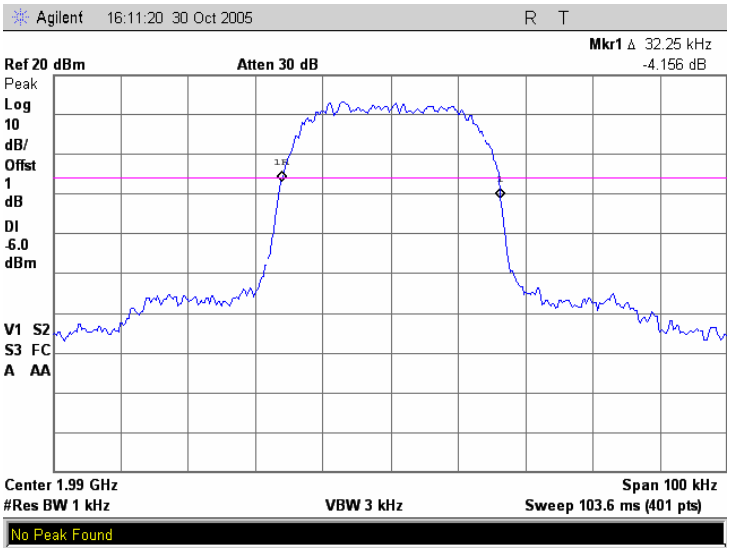


Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 8.2.5 Input occupied bandwidth measurements at high frequency carrier, PCS 1900, TDMA modulation

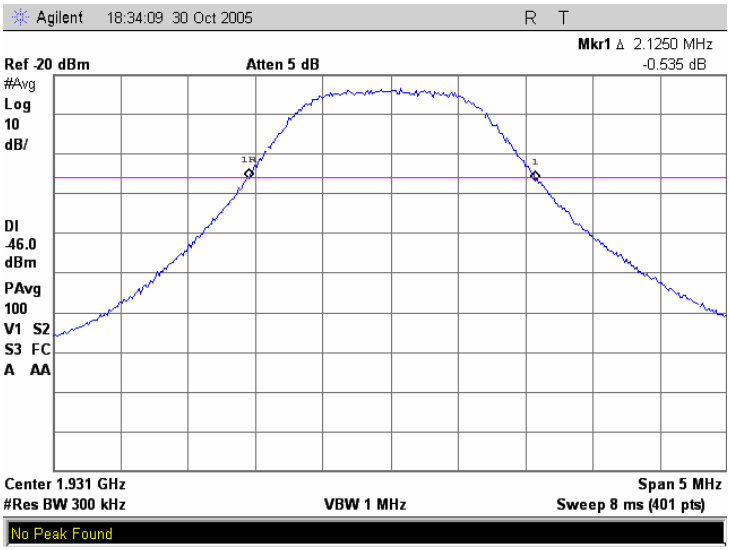


Plot 8.2.6 Output occupied bandwidth measurements at high frequency carrier, PCS 1900, TDMA modulation

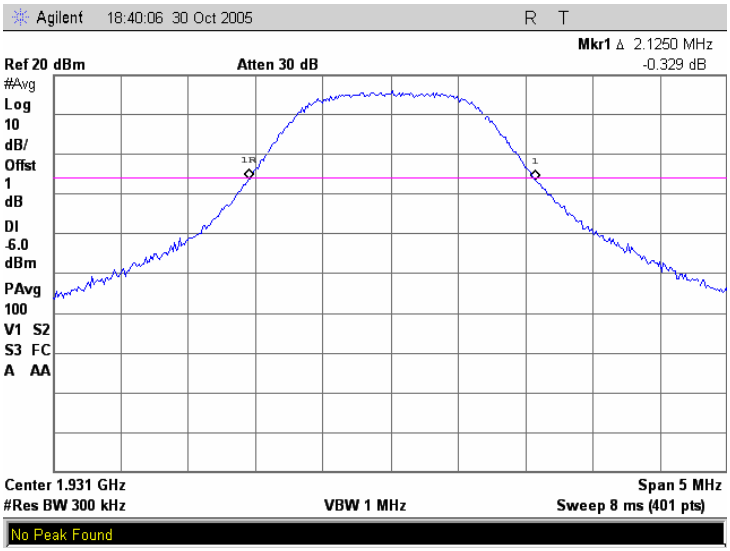


Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 8.2.7 Input occupied bandwidth measurements at low frequency carrier, PCS 1900, CDMA modulation

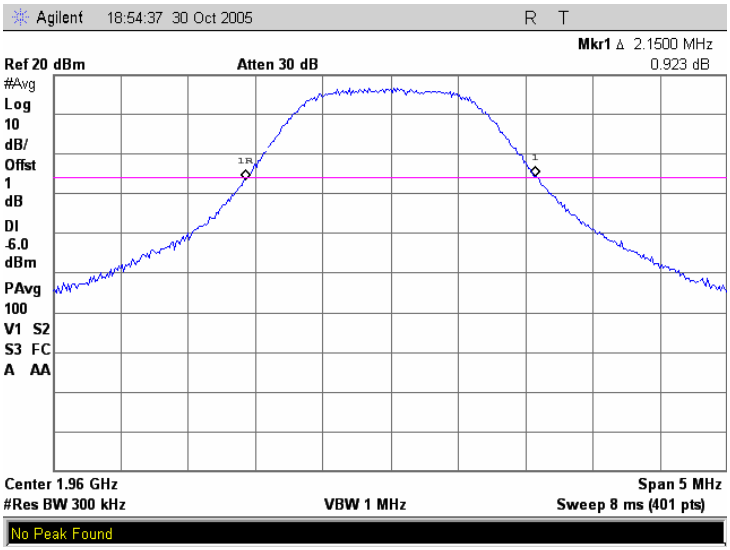


Plot 8.2.8 Output occupied bandwidth measurements at low frequency carrier, PCS 1900, CDMA modulation

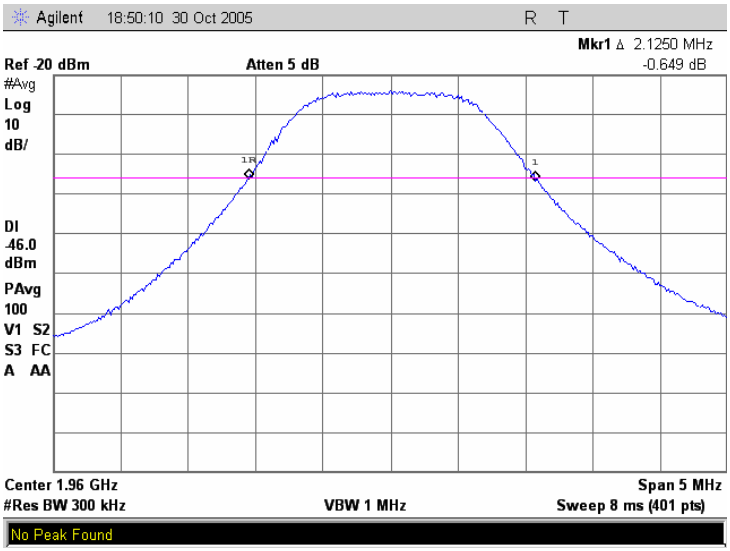


Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 8.2.9 Input occupied bandwidth measurements at mid frequency carrier, PCS 1900, CDMA modulation

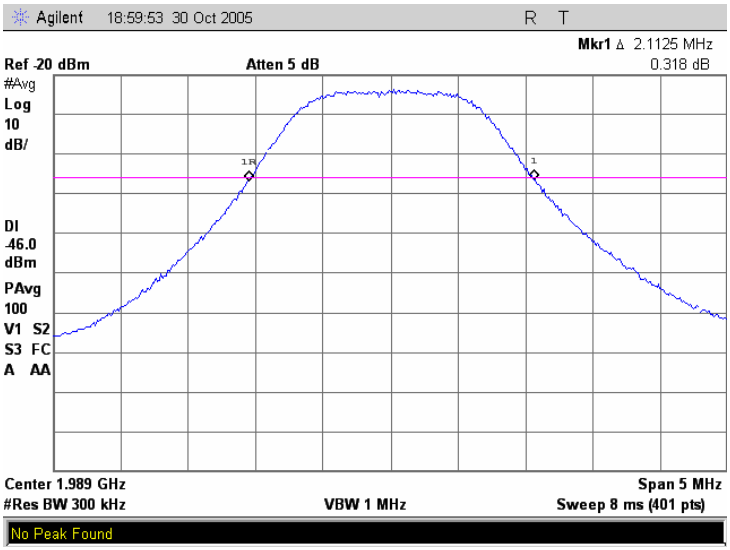


Plot 8.2.10 Output occupied bandwidth measurements at mid frequency carrier, PCS 1900, CDMA modulation

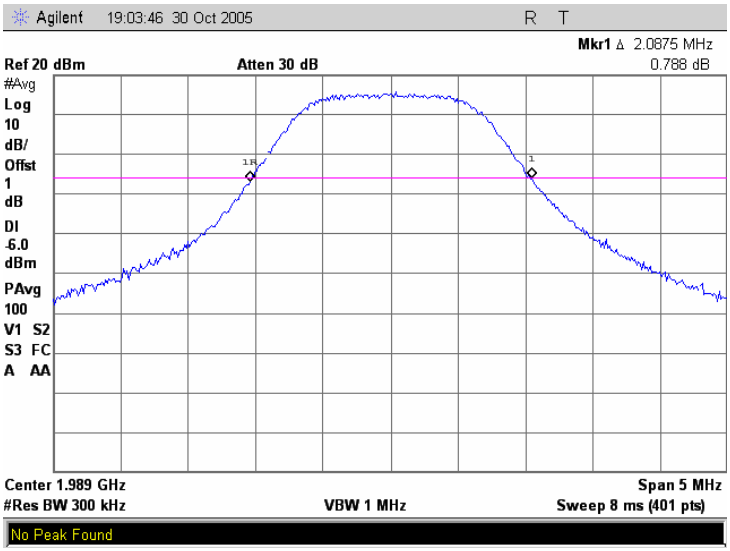


Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 8.2.11 Input occupied bandwidth measurements at high frequency carrier, PCS 1900, CDMA modulation

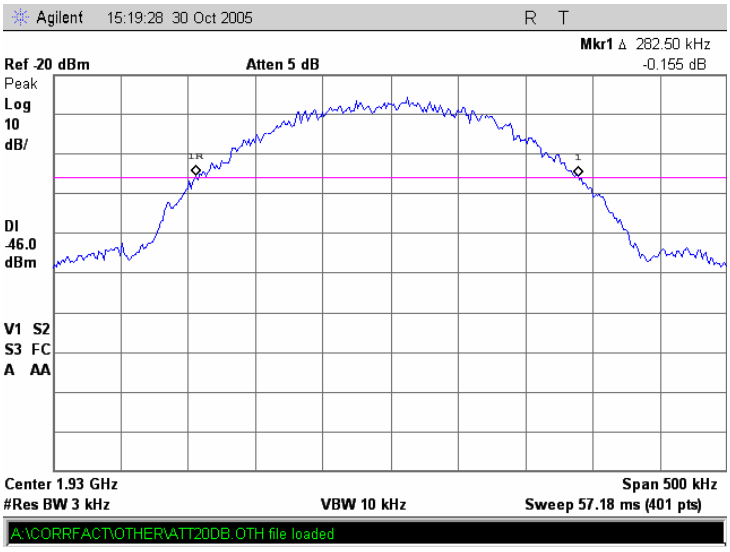


Plot 8.2.12 Output occupied bandwidth measurements at high frequency carrier, PCS 1900, CDMA modulation

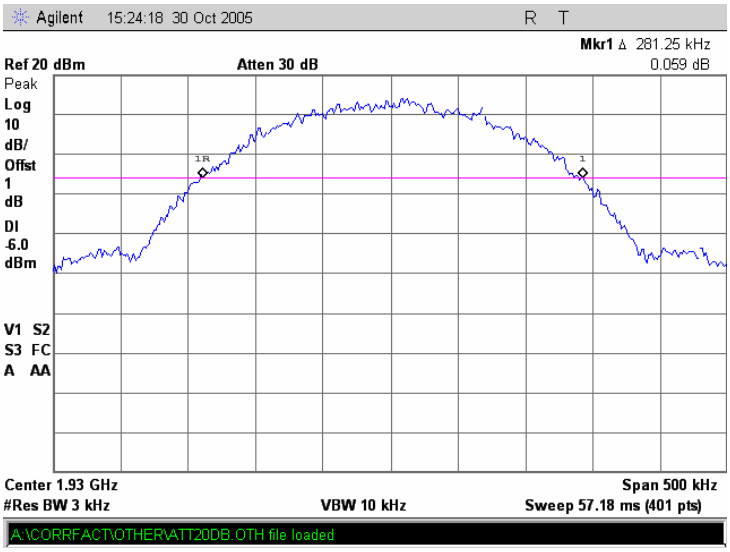


Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 8.2.13 Input occupied bandwidth measurements at low frequency carrier, PCS 1900, GSM modulation

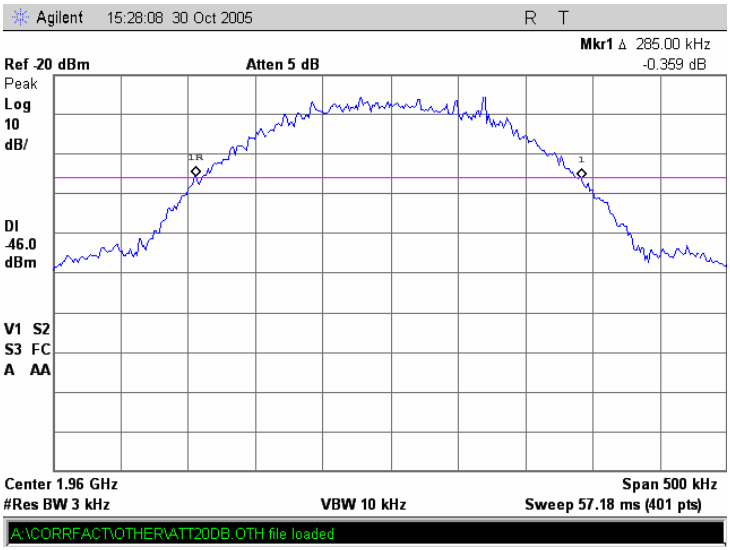


Plot 8.2.14 Output occupied bandwidth measurements at low frequency carrier, PCS 1900, GSM modulation

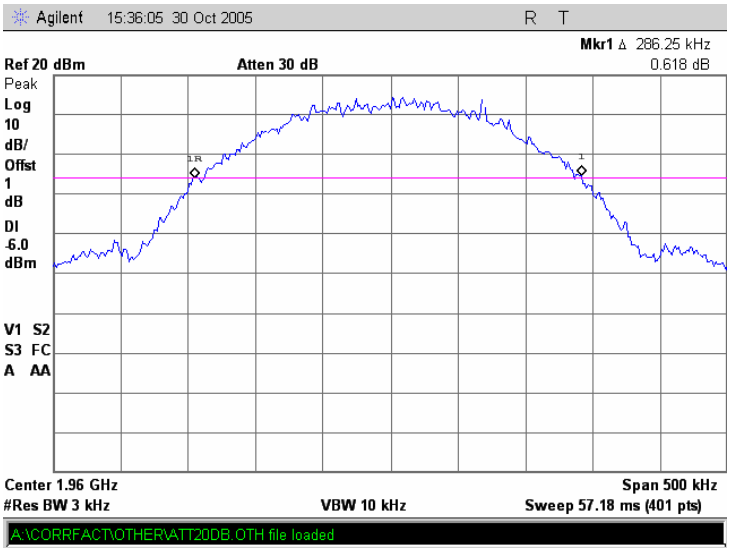


Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 8.2.15 Input occupied bandwidth measurements at mid frequency carrier, PCS 1900, GSM modulation

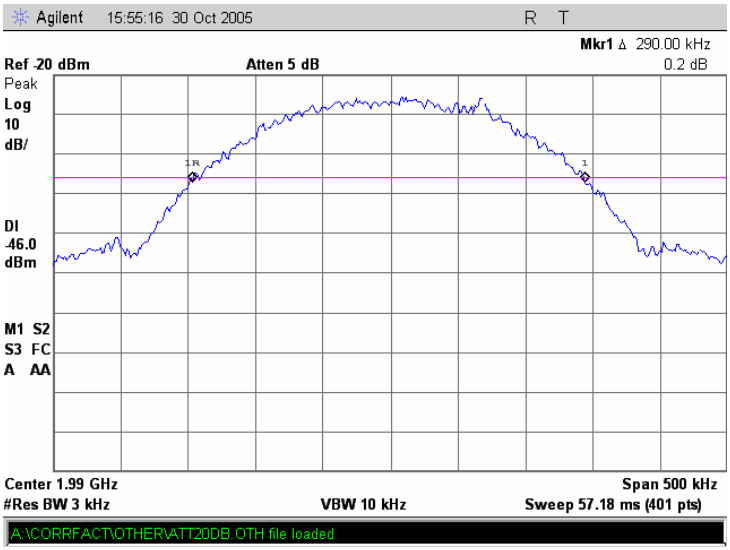


Plot 8.2.16 Output occupied bandwidth measurements at mid frequency carrier, PCS 1900, GSM modulation

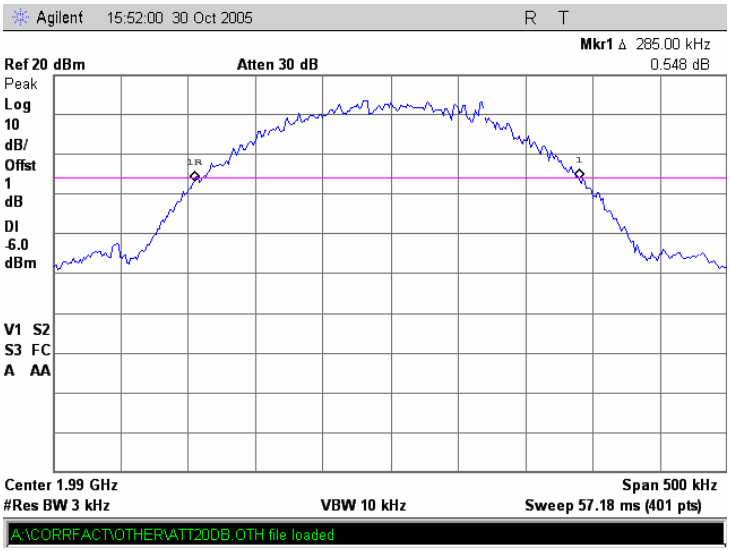


Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	11/8/2005		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 48 VDC
Remarks:			

Plot 8.2.17 Input occupied bandwidth measurements at high frequency carrier, PCS 1900, GSM modulation



Plot 8.2.18 Output occupied bandwidth measurements at high frequency carrier, PCS 1900, GSM modulation



Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	10/30/2005		
Temperature: 21ºC	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48 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

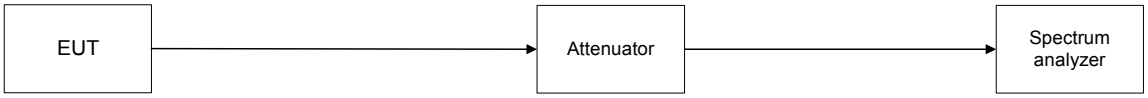
Frequency, MHz	Attenuation below carrier, dBc	ERP of spurious, dBm
0.009 – 10th harmonic*	43+10logP*	-13.0

- 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

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:	10/30/2005		
Temperature: 21ºC	**Air Pressure:** 1008 hPa	**Relative Humidity:** 44 %	**Power Supply:** 48 VDC
Remarks:			

Table 8.3.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 1930 - 1990 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 – 20000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATION: TDMA / CDMA / GSM
MODULATING SIGNAL: PRBS
BIT RATE: 48 kbps / 48.6 kbps / 270.833 kbps
MAX COMPOSITE OUTPUT POWER for 3 carriers: 15.2 dBm at first channel
15.2 dBm at second channel
15.2 dBm at last channel

3 CARRIER TONE FREQUENCIES:
TDMA modulation (PCS 1900) 1930.05 MHz
1937.00 MHz
1989.99 MHz

CDMA modulation (PCS 1900) 1931.00 MHz
1937. 00 MHz
1988.775 MHz

GSM 1900 1930.20 MHz
1930. 40 MHz
1989.80 MHz

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict
TDMA modulation									
885.4500	-41.93	Included	Included	120	-41.93	57.13	28.2	28.93	Pass
1923.2750	-25.12	Included	Included	1000	-25.12	40.32	28.2	12.12	Pass
1943.9000	-21.41	Included	Included	1000	-21.41	36.61	28.2	8.41	Pass
1983.2750	-23.67	Included	Included	1000	-23.67	38.87	28.2	10.67	Pass
1996.9000	-22.62	Included	Included	1000	-22.62	37.82	28.2	9.62	Pass
CDMA modulation									
881.1000	-41.97	Included	Included	120	-41.97	57.17	28.2	28.97	Pass
2033.4600	-48.84	Included	Included	1000	-48.84	64.04	28.2	35.84	Pass
2038.4100	-44.18	Included	Included	1000	-44.18	59.38	28.2	31.18	Pass
2044.8600	-46.61	Included	Included	1000	-46.61	61.81	28.2	33.61	Pass
GSM modulation									
881.4500	-41.64	Included	Included	120	-41.64	56.84	28.2	28.64	Pass
1870.7000	-39.29	Included	Included	1000	-39.29	54.49	28.2	26.29	Pass
2049.4500	-39.21	Included	Included	1000	-39.21	54.41	28.2	26.21	Pass

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

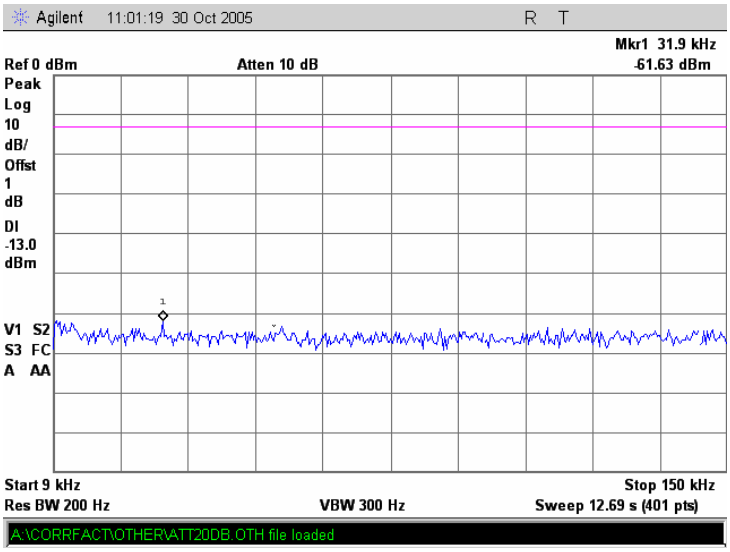
Reference numbers of test equipment used

HL 2780						

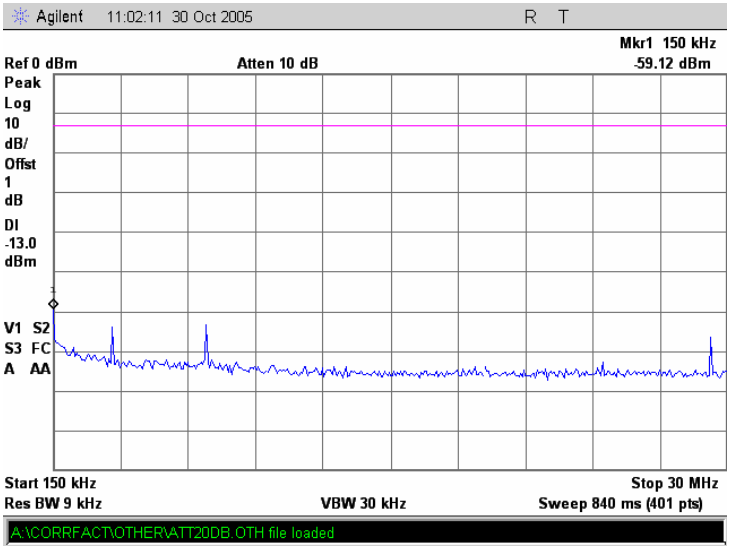
Full description is given in Appendix A.

Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	10/30/2005		
Temperature: 21°C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 8.3.1 Spurious emission measurements in 9 - 150 kHz range, PCS 1900, TDMA modulation

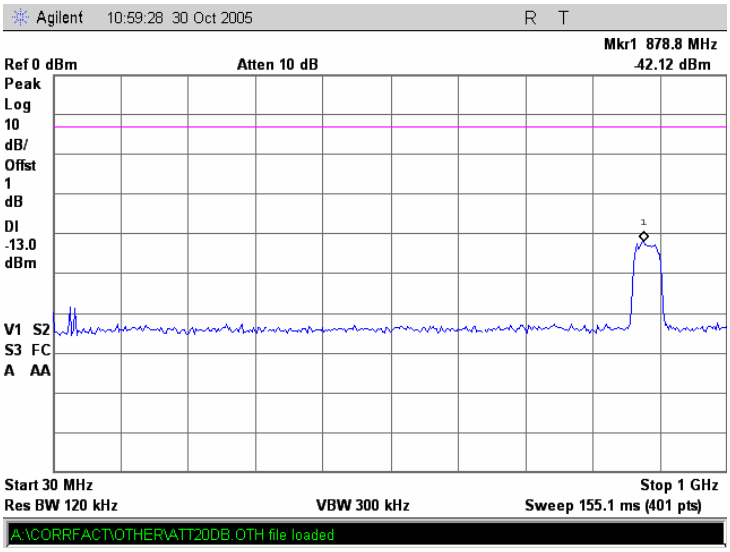


Plot 8.3.2 Spurious emission measurements in 0.15 - 30 MHz range, PCS 1900, TDMA modulation

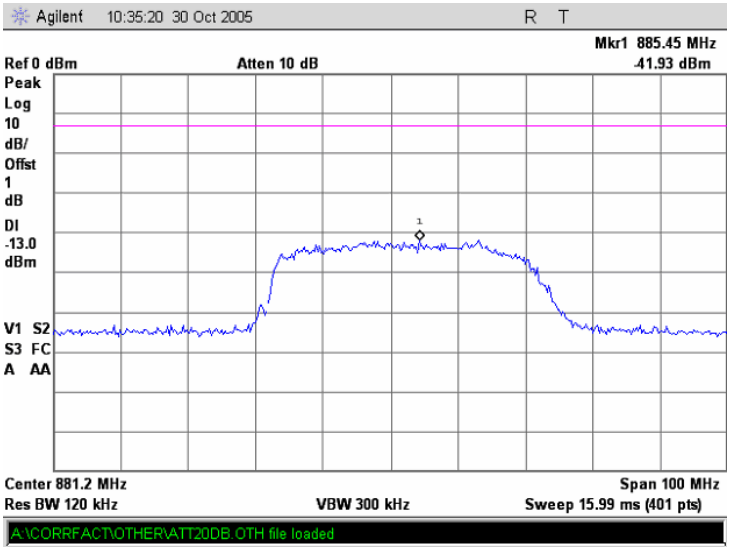


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	10/30/2005		
Temperature: 21°C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 8.3.3 Spurious emission measurements in 30 - 1000 MHz range, PCS 1900, TDMA modulation

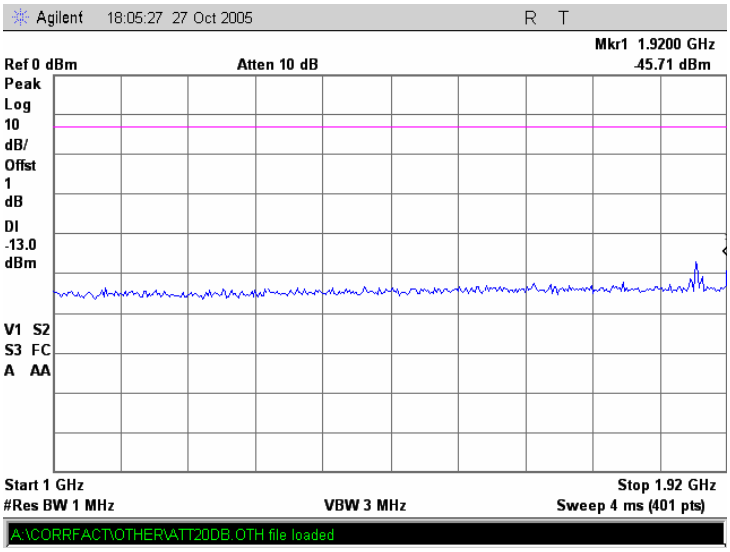


Plot 8.3.4 Spurious emission measurements at 885 MHz, PCS 1900, TDMA modulation

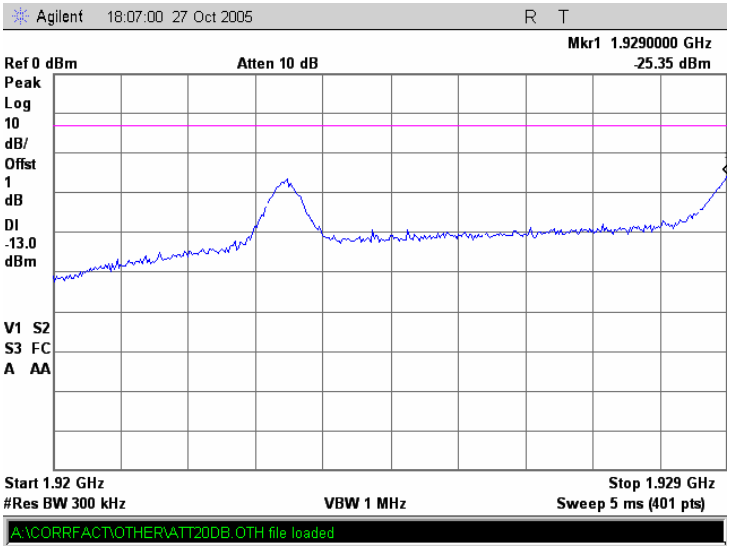


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	10/30/2005		
Temperature: 21°C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 8.3.5 Spurious emission measurements in 1 – 1.92 GHz range, PCS 1900, TDMA modulation



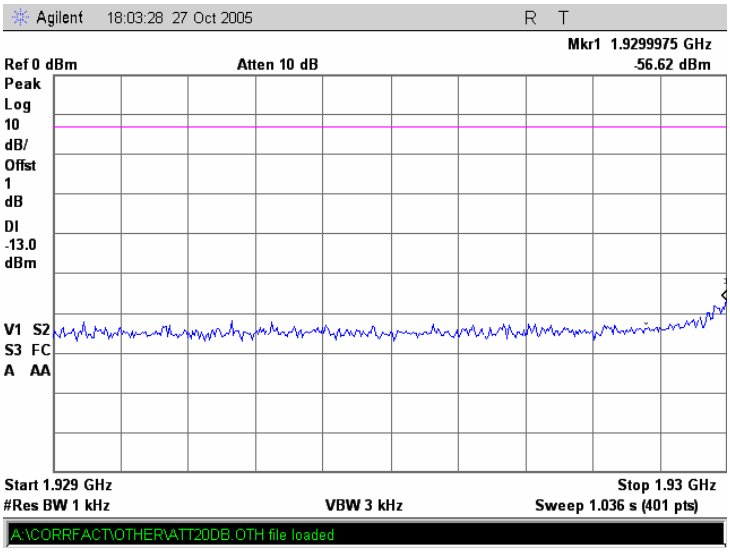
Plot 8.3.6 Spurious emission measurements in 1.920 – 1.929 GHz range, PCS 1900, TDMA modulation



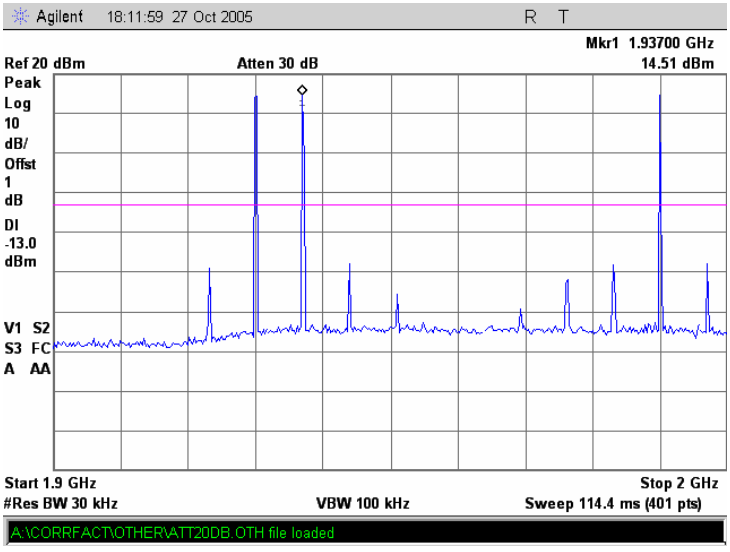
Psig = Psa-10log(RBW/1MHz)=-25.35-10log(300/1000)=-20.1 dBm

Test specification:	**Section 24.238, Spurious emission at antenna terminal**		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	**Verdict:**	PASS
Date:	10/30/2005		
Temperature: 21°C	**Air Pressure:** 1008 hPa	**Relative Humidity:** 44 %	**Power Supply:** 48 VDC
Remarks:			

Plot 8.3.7 Spurious emission measurements in 1.929 – 1.93 GHz range, PCS 1900, TDMA modulation

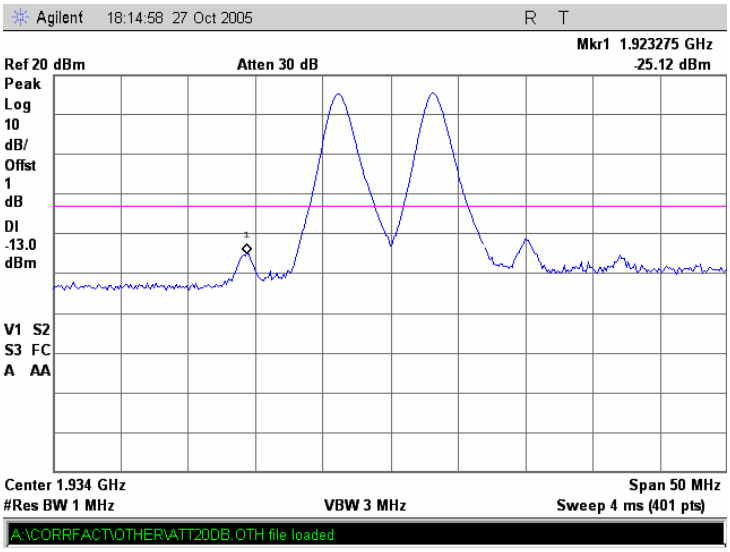


Plot 8.3.8 Spurious emission measurements in 1.9 – 2.0 GHz range, PCS 1900, TDMA modulation

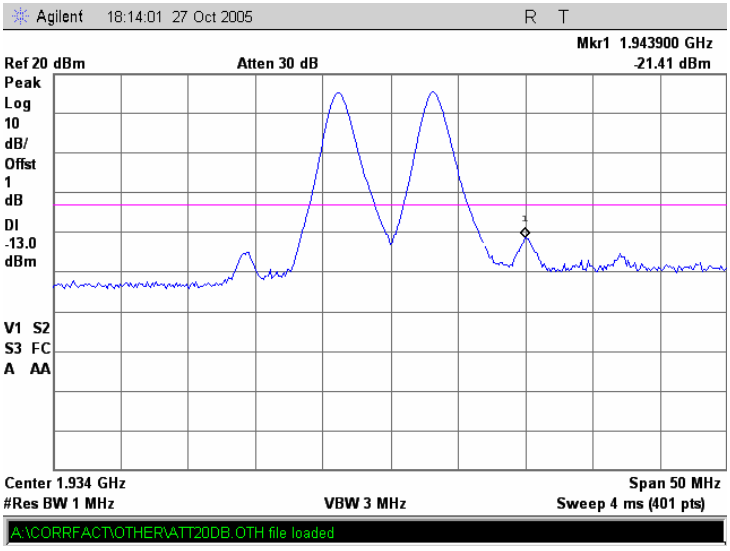


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	10/30/2005		
Temperature: 21°C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 8.3.9 Spurious emission measurements at 1.9233 GHz, PCS 1900, TDMA modulation

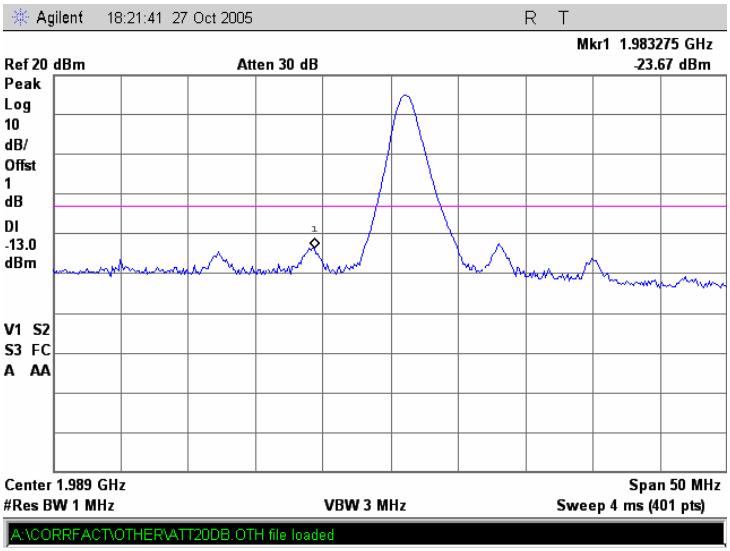


Plot 8.3.10 Spurious emission measurements at 1.9439 GHz, PCS 1900, TDMA modulation

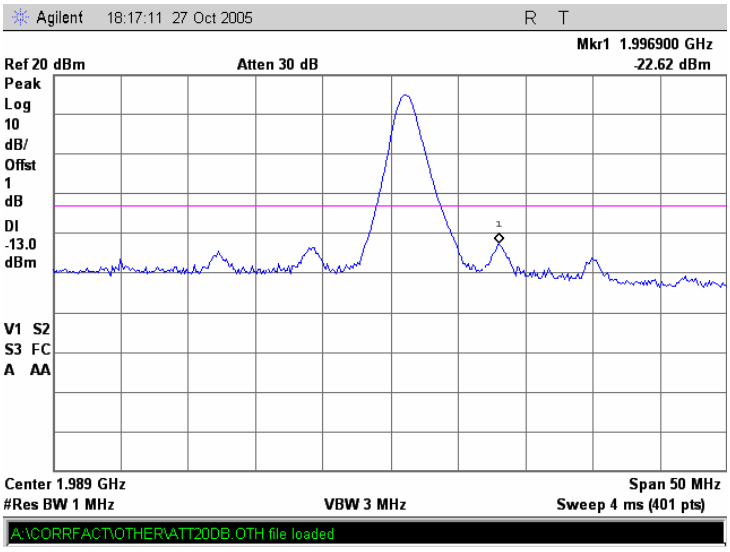


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	10/30/2005		
Temperature: 21°C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 8.3.11 Spurious emission measurements at 1.9833 GHz, PCS 1900, TDMA modulation

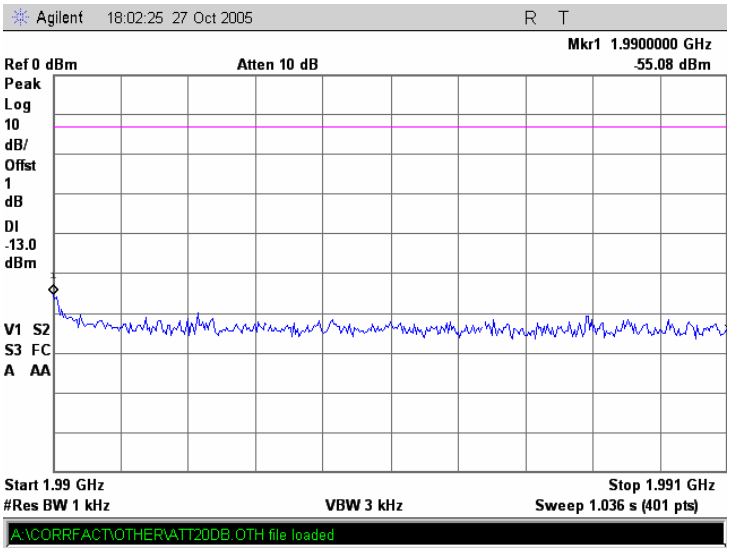


Plot 8.3.12 Spurious emission measurements at 1.9969 GHz, PCS 1900, TDMA modulation

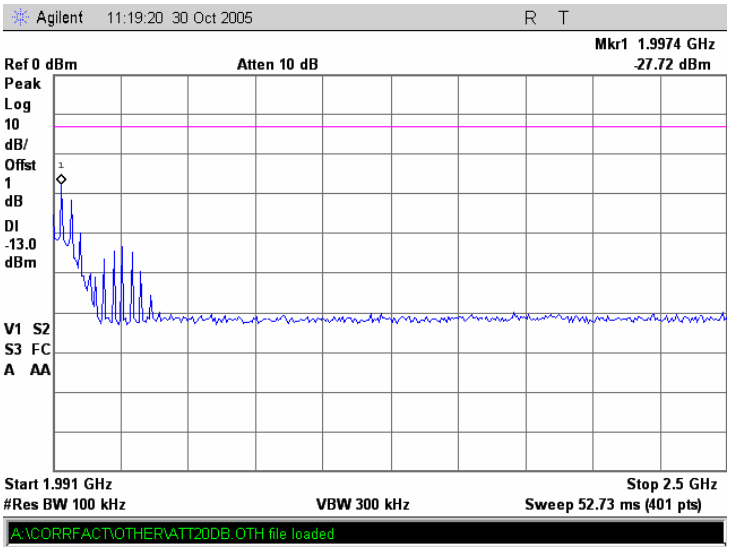


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	10/30/2005		
Temperature: 21°C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 8.3.13 Spurious emission measurements in 1.99 – 1.991 GHz range, PCS 1900, TDMA modulation



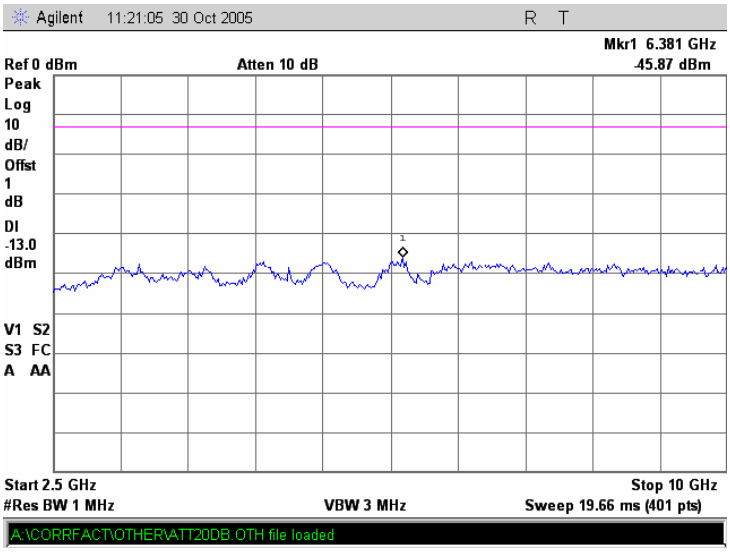
Plot 8.3.14 Spurious emission measurements in 1.991 – 2.5 GHz range, PCS 1900, TDMA modulation



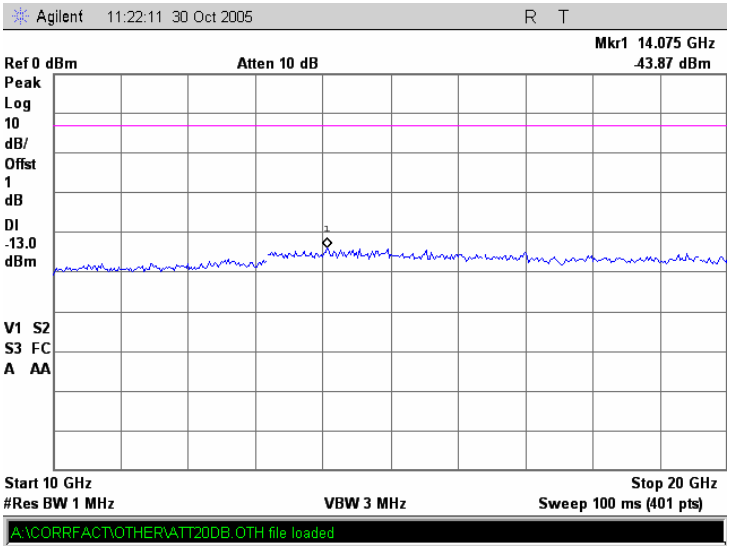
Psig = Psa-10log(RBW/1MHz)=-27.72-10log(100/1000)=-17.72 dBm

Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	10/30/2005		
Temperature: 21°C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 8.3.15 Spurious emission measurements at 2.5 – 10.0 GHz range, PCS 1900, TDMA modulation

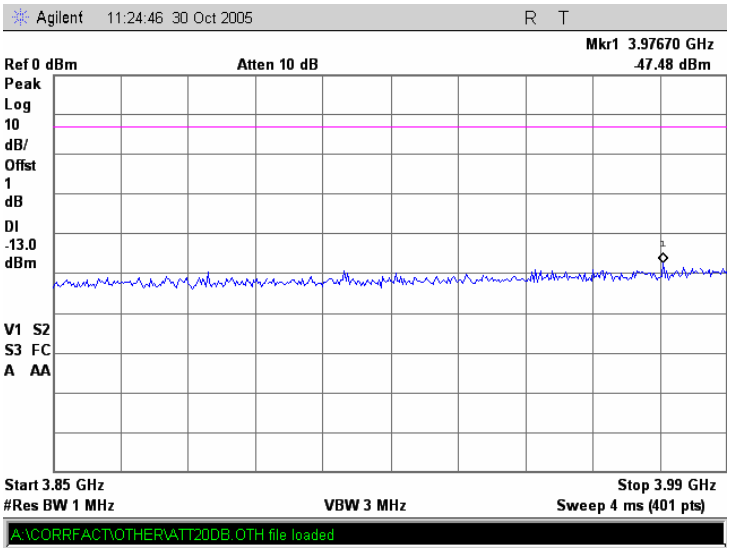


Plot 8.3.16 Spurious emission measurements at 10 – 20 GHz range, PCS 1900, TDMA modulation

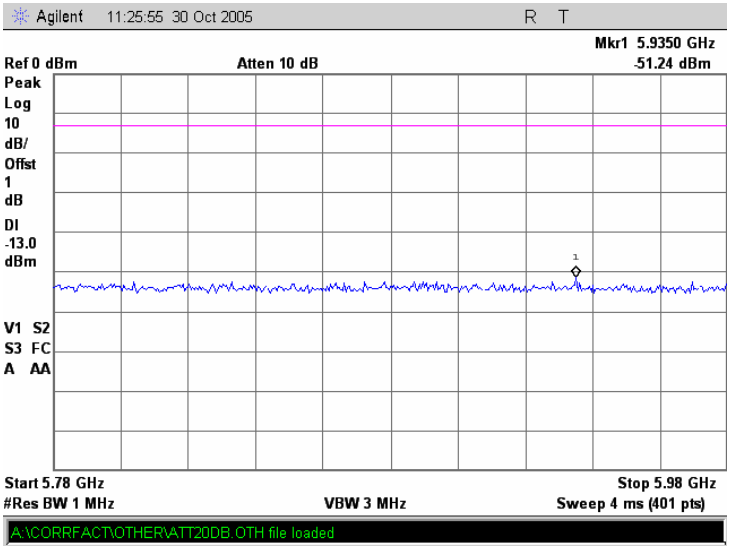


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	10/30/2005		
Temperature: 21°C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 8.3.17 Conducted spurious emission measurements at the 2nd harmonic, PCS 1900, TDMA modulation

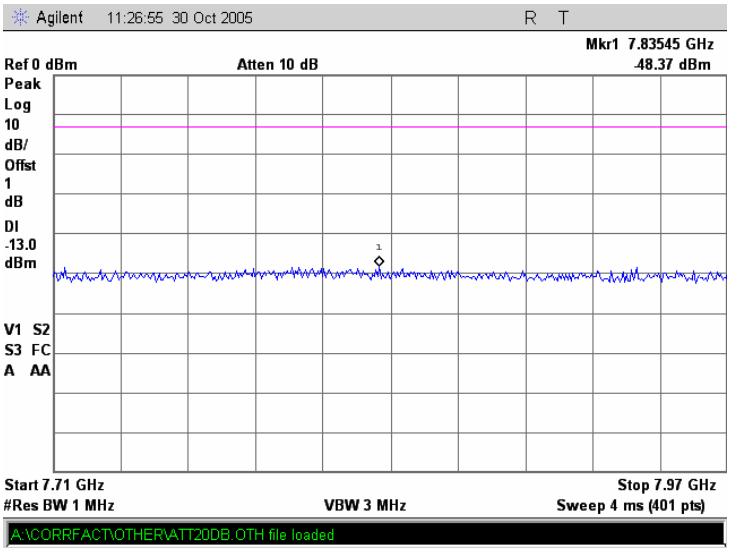


Plot 8.3.18 Conducted spurious emission measurements at the 3rd harmonic, PCS 1900, TDMA modulation



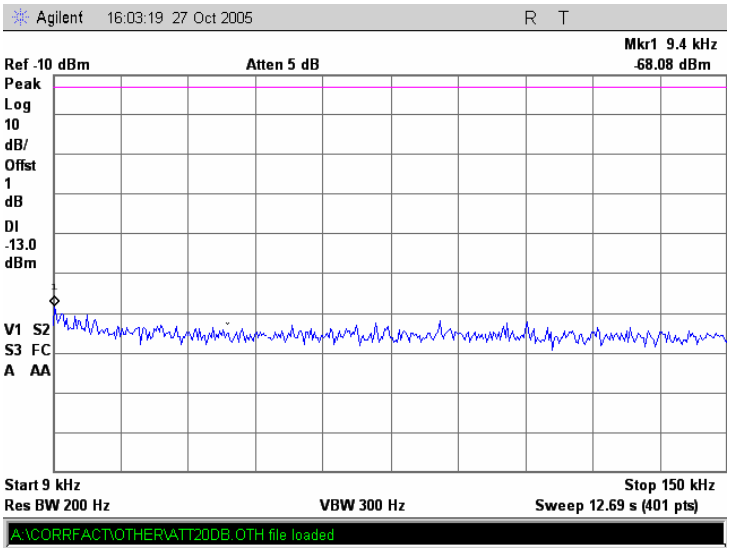
Test specification:	**Section 24.238, Spurious emission at antenna terminal**		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	**Verdict:**	PASS
Date:	10/30/2005		
Temperature: 21°C	**Air Pressure:** 1008 hPa	**Relative Humidity:** 44 %	**Power Supply:** 48 VDC
Remarks:			

Plot 8.3.19 Conducted spurious emission measurements at the 4th harmonic, PCS 1900, TDMA modulation

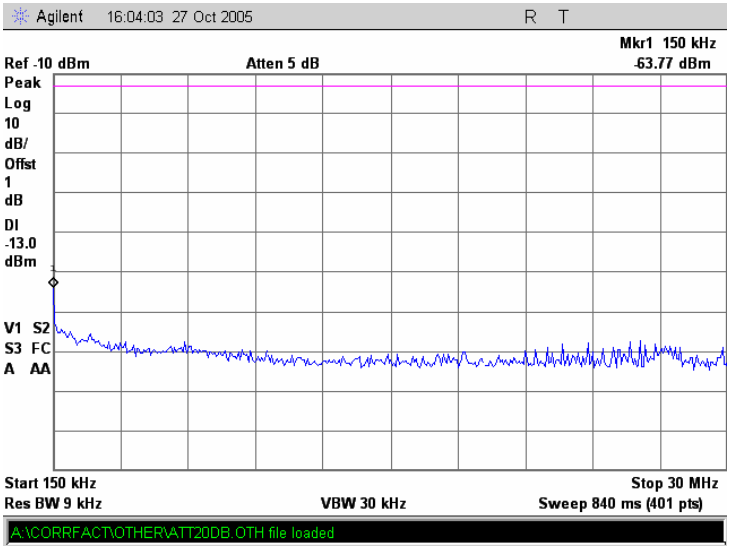


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	10/30/2005		
Temperature: 21°C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 8.3.20 Spurious emission measurements in 9 - 150 kHz range, PCS 1900, CDMA modulation

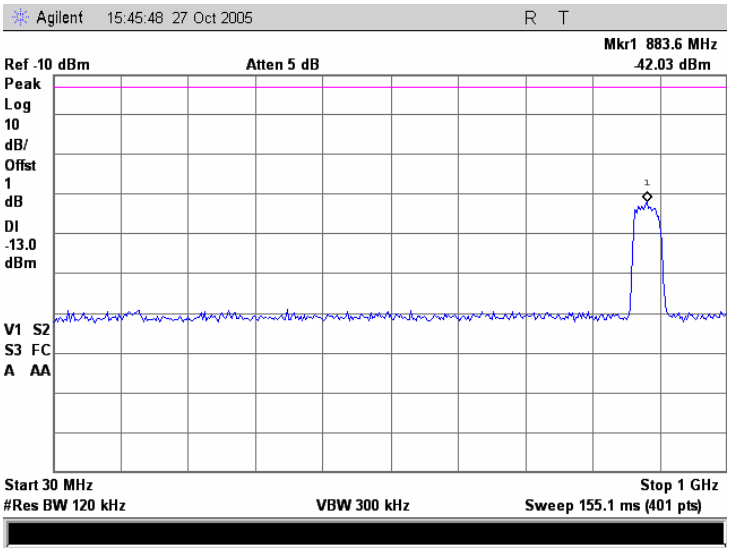


Plot 8.3.21 Spurious emission measurements in 0.15 - 30 MHz range, PCS 1900, CDMA modulation

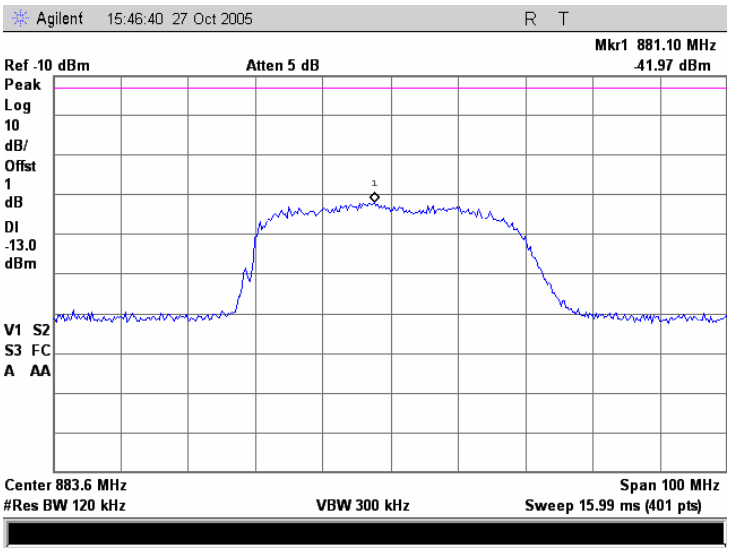


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	10/30/2005		
Temperature: 21°C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 8.3.22 Spurious emission measurements in 30 - 1000 MHz range, PCS 1900, CDMA modulation

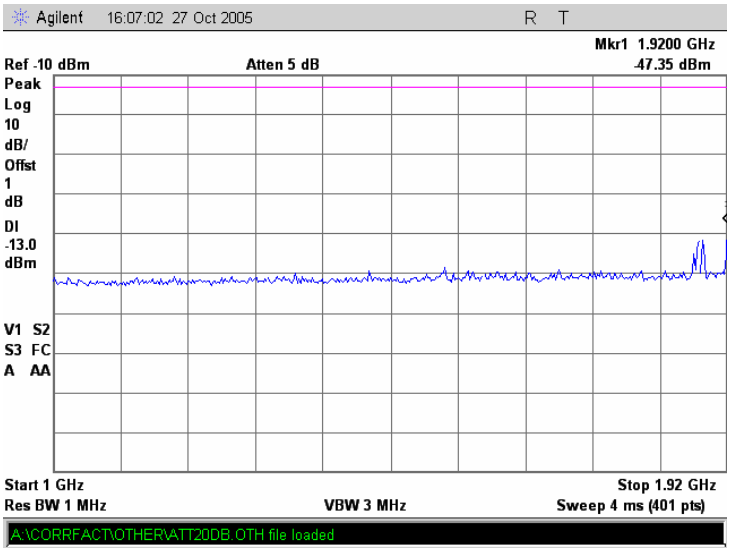


Plot 8.3.23 Spurious emission measurements at 880 MHz, PCS 1900, CDMA modulation

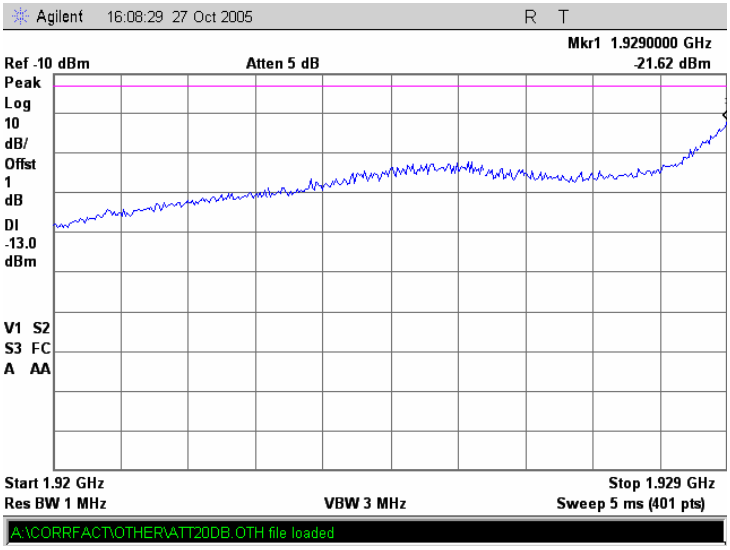


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	10/30/2005		
Temperature: 21°C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 8.3.24 Spurious emission measurements in 1 – 1.92 GHz range, PCS 1900, CDMA modulation

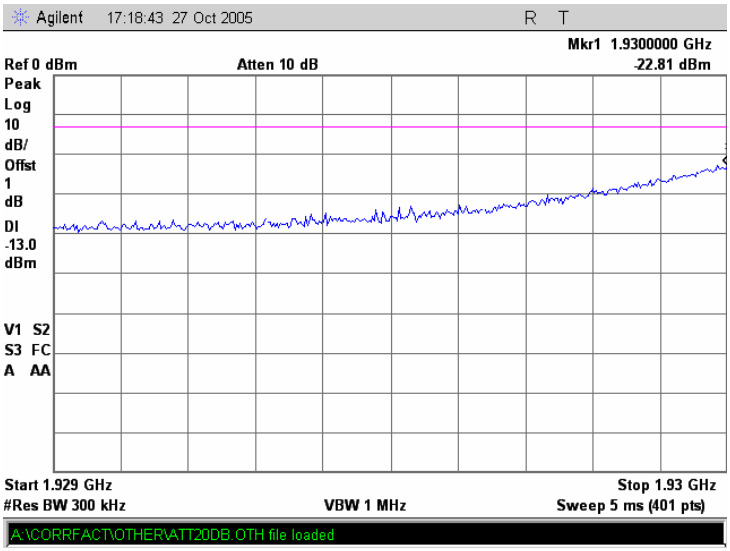


Plot 8.3.25 Spurious emission measurements in 1.920 – 1.929 GHz range, PCS 1900, CDMA modulation

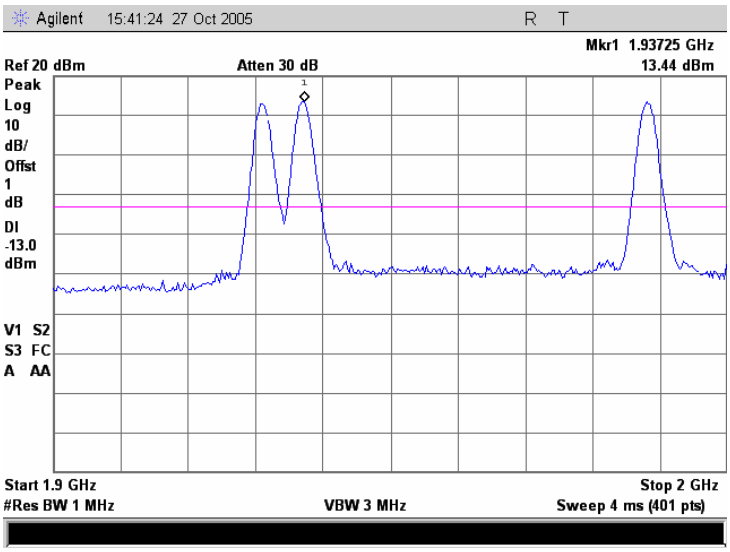


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	10/30/2005		
Temperature: 21°C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 8.3.26 Spurious emission measurements in 1.929 – 1.93 GHz range, 300 kHz RBW, PCS 1900, CDMA modulation

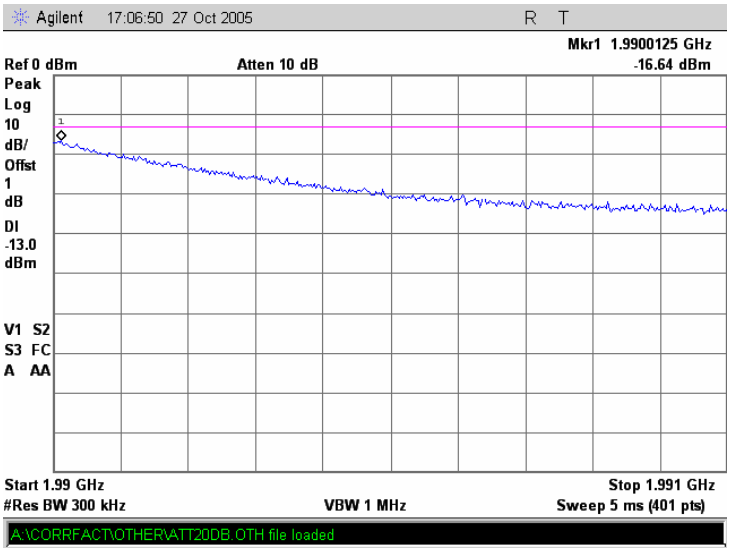


Plot 8.3.27 Spurious emission measurements in 1.9 – 2.0 GHz range, PCS 1900, CDMA modulation

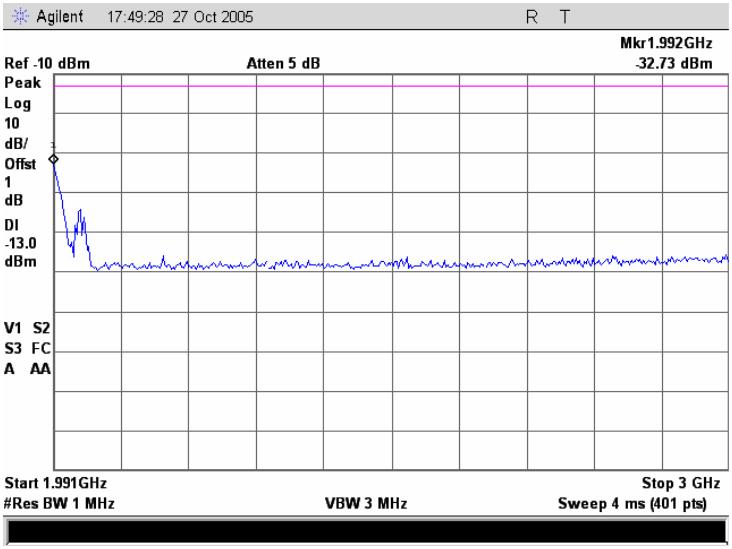


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	10/30/2005		
Temperature: 21°C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 8.3.28 Spurious emission measurements in 1.99 – 1.991 GHz range, 300 kHz RBW, PCS 1900, CDMA modulation

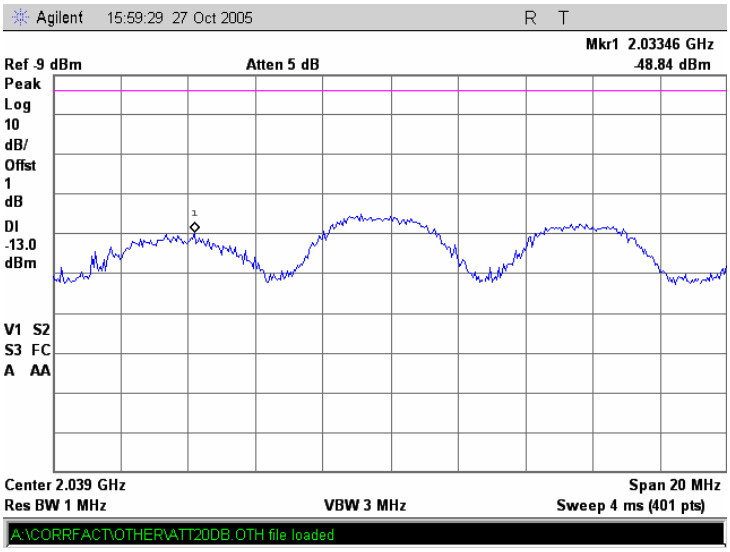


Plot 8.3.29 Spurious emission measurements in 1.991 – 3.0 GHz range, PCS 1900, CDMA modulation

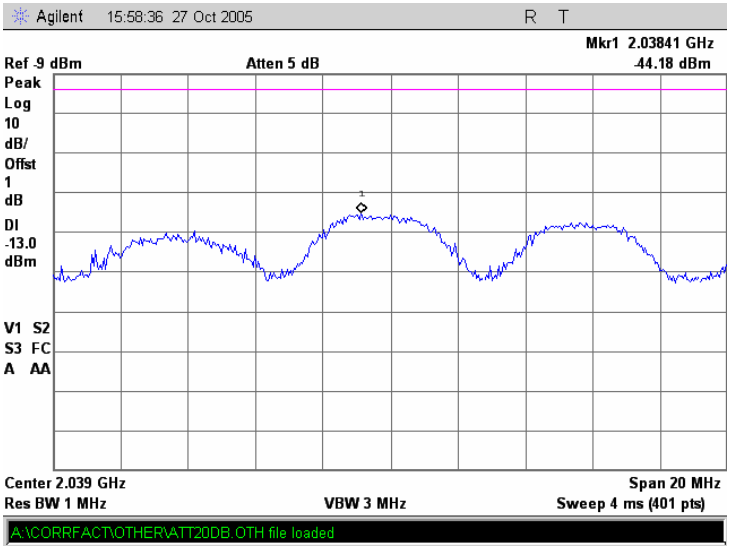


Test specification:	**Section 24.238, Spurious emission at antenna terminal**		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	**Verdict:**	PASS
Date:	10/30/2005		
Temperature: 21°C	**Air Pressure:** 1008 hPa	**Relative Humidity:** 44 %	**Power Supply:** 48 VDC
Remarks:			

Plot 8.3.30 Spurious emission measurements at 2.033 GHz, PCS 1900, CDMA modulation

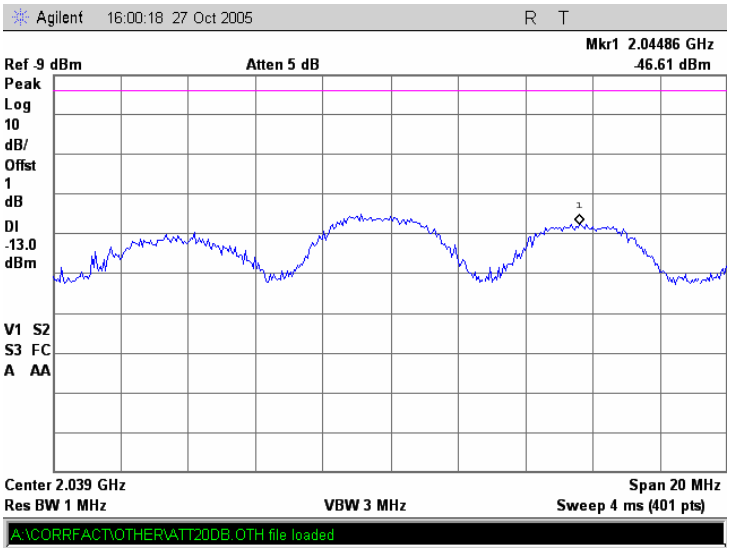


Plot 8.3.31 Spurious emission measurements at 2.038 GHz, PCS 1900, CDMA modulation

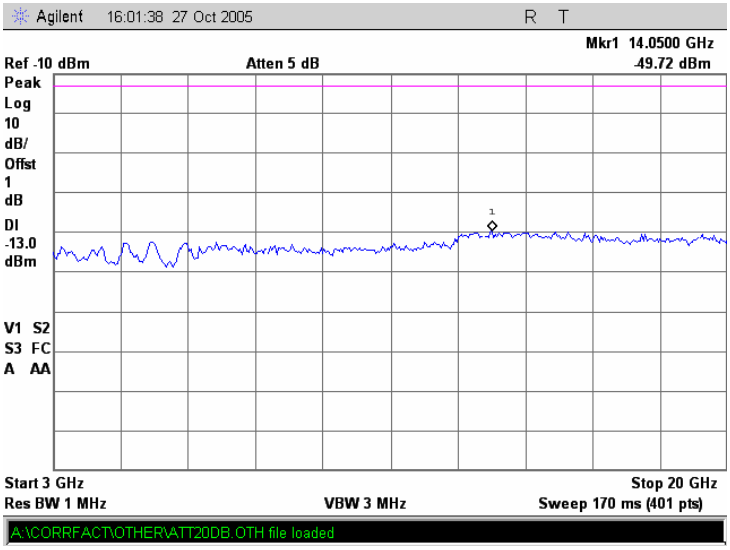


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	10/30/2005		
Temperature: 21°C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 8.3.32 Spurious emission measurements at 2.044 GHz, PCS 1900, CDMA modulation

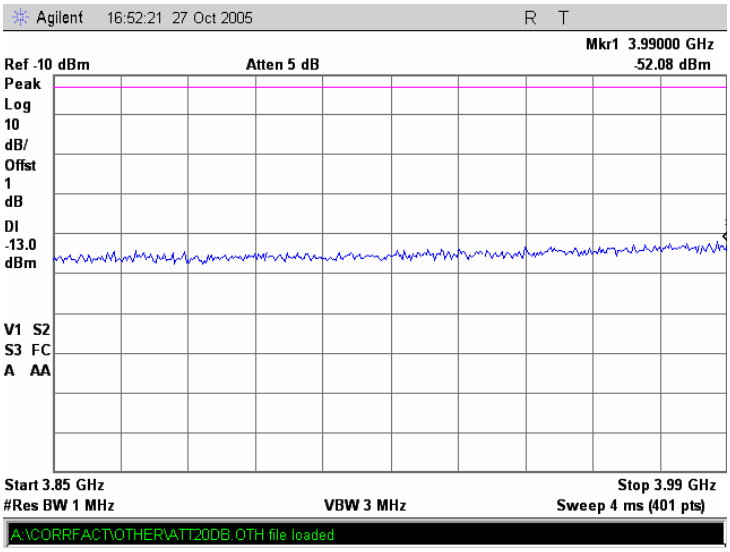


Plot 8.3.33 Spurious emission measurements in 3 - 20 GHz range, PCS 1900, CDMA modulation

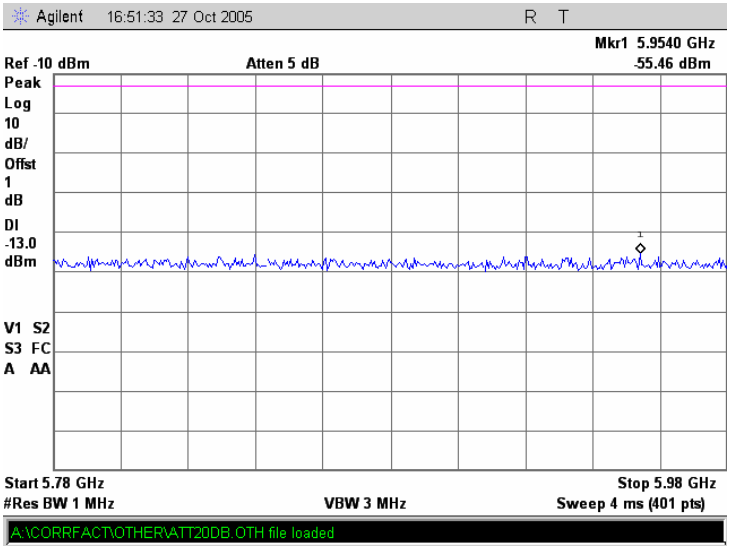


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	10/30/2005		
Temperature: 21°C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 8.3.34 Conducted spurious emission measurements at the 2nd harmonic, PCS 1900, CDMA modulation

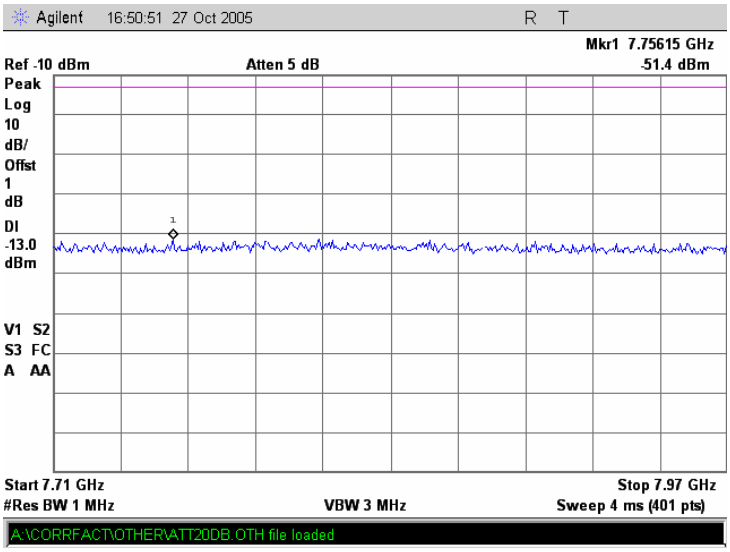


Plot 8.3.35 Conducted spurious emission measurements at the 3rd harmonic, PCS 1900, CDMA modulation



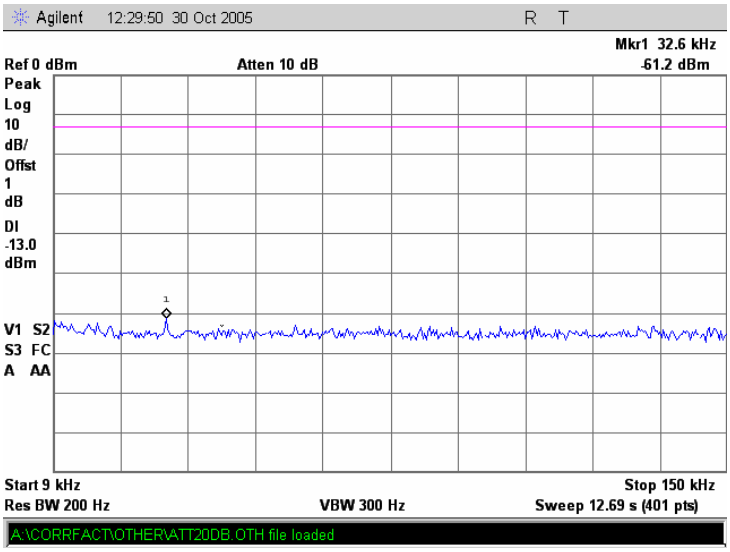
Test specification:	**Section 24.238, Spurious emission at antenna terminal**		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	**Verdict:**	PASS
Date:	10/30/2005		
Temperature: 21°C	**Air Pressure:** 1008 hPa	**Relative Humidity:** 44 %	**Power Supply:** 48 VDC
Remarks:			

Plot 8.3.36 Conducted spurious emission measurements at the 4th harmonic, PCS 1900, CDMA modulation

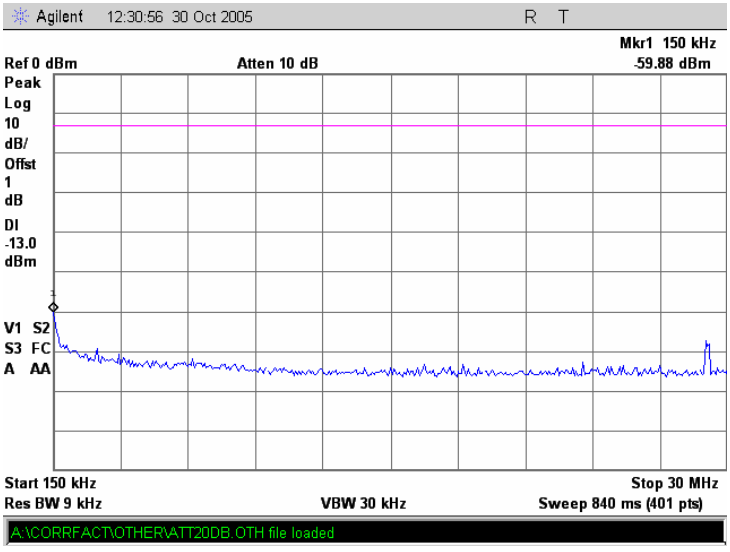


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	10/30/2005		
Temperature: 21°C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 8.3.37 Spurious emission measurements in 9 - 150 kHz range, PCS 1900, GSM modulation

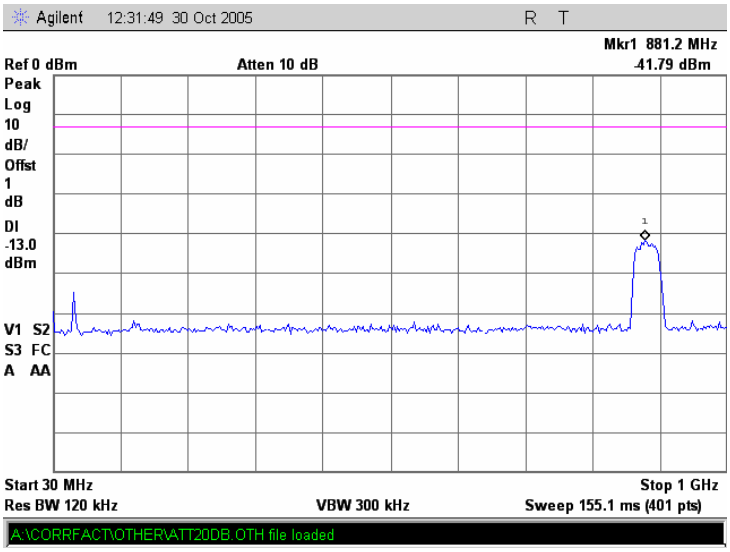


Plot 8.3.38 Spurious emission measurements in 0.15 - 30 MHz range, PCS 1900, GSM modulation

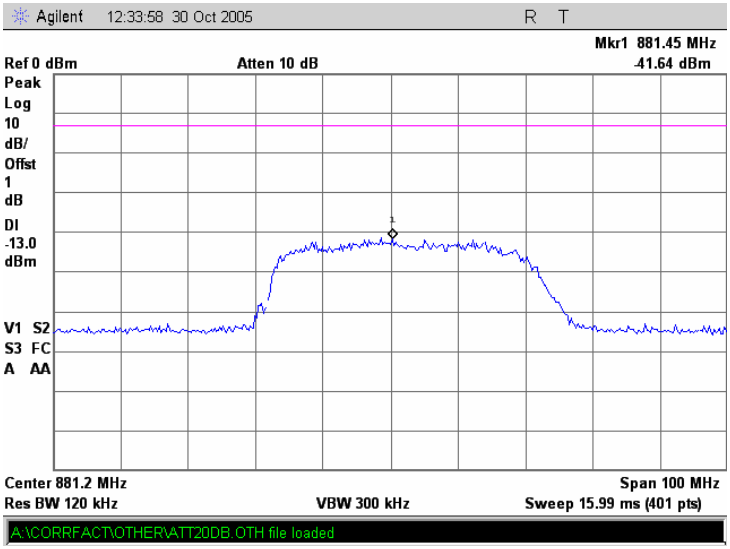


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	10/30/2005		
Temperature: 21°C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 8.3.39 Spurious emission measurements in 30 - 1000 MHz range, PCS 1900, GSM modulation

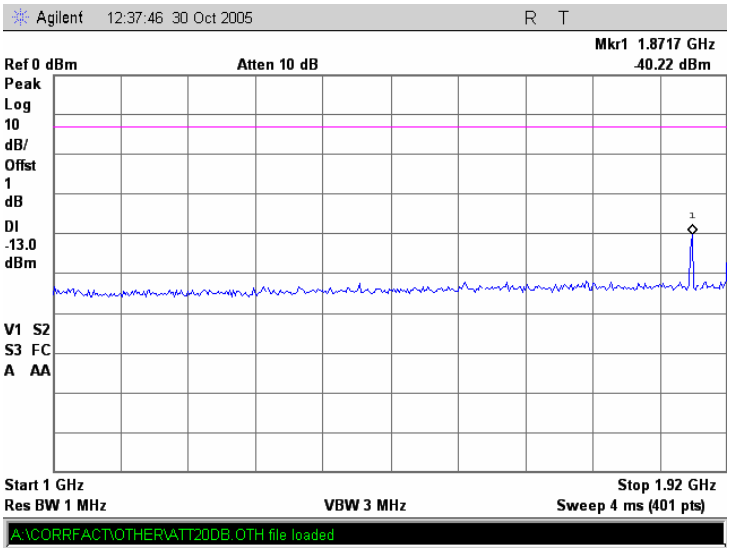


Plot 8.3.40 Spurious emission measurements at 881 MHz, PCS 1900, GSM modulation

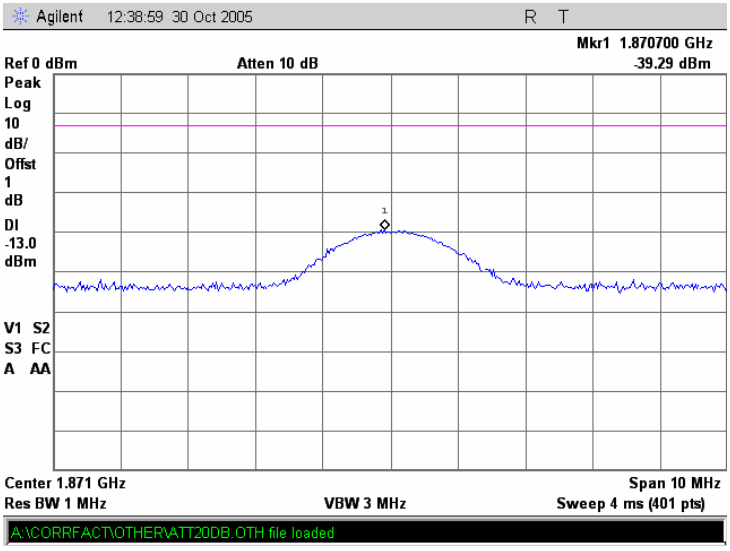


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	10/30/2005		
Temperature: 21°C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 8.3.41 Spurious emission measurements in 1 – 1.92 GHz range, PCS 1900, GSM modulation

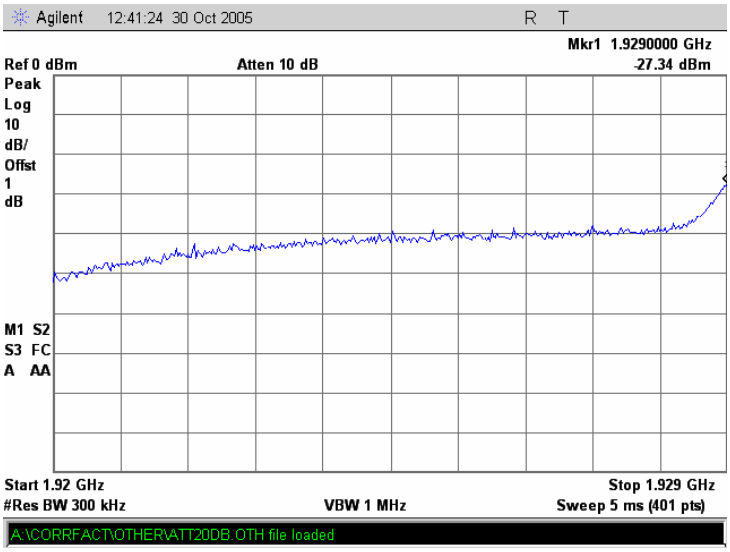


Plot 8.3.42 Spurious emission measurements at 1870 MHz, PCS 1900, GSM modulation



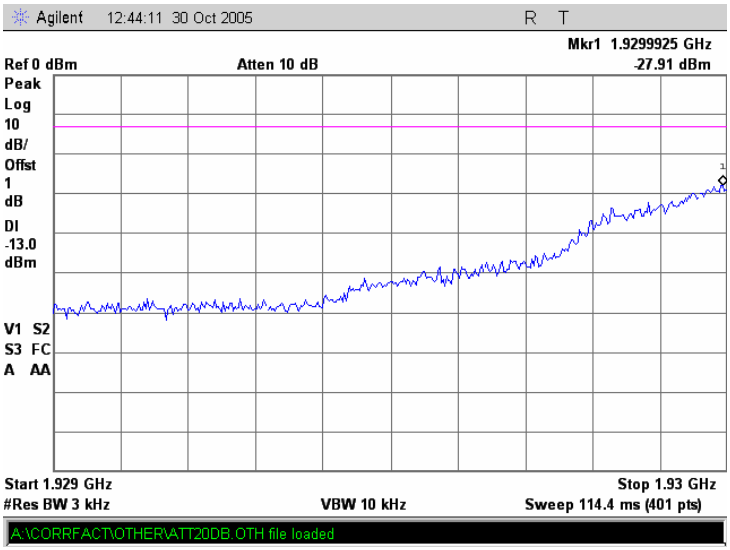
Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	10/30/2005		
Temperature: 21°C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 8.3.43 Spurious emission measurements in 1.920 – 1.929 GHz range, PCS 1900, GSM modulation



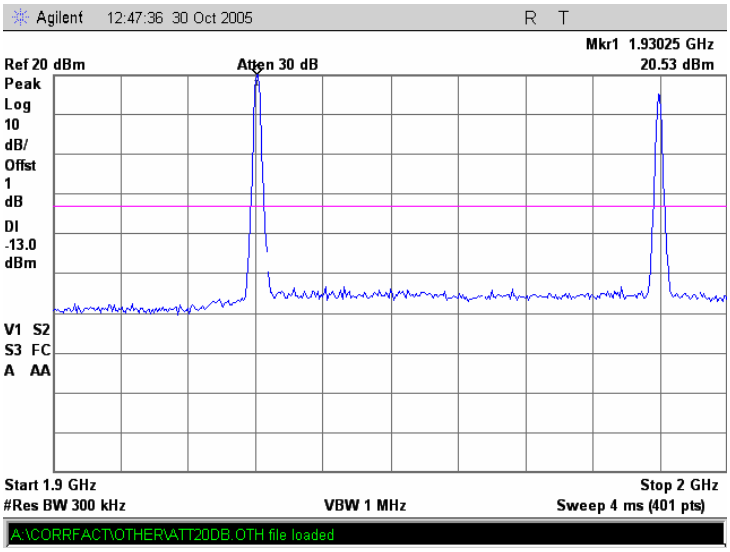
Psig = Psa-10log(RBW/1MHz)=-27.34-10log(300/1000)=-22.11 dBm

Plot 8.3.44 Spurious emission measurements in 1.929 – 1.93 GHz range, 3 kHz RBW, PCS 1900, GSM modulation

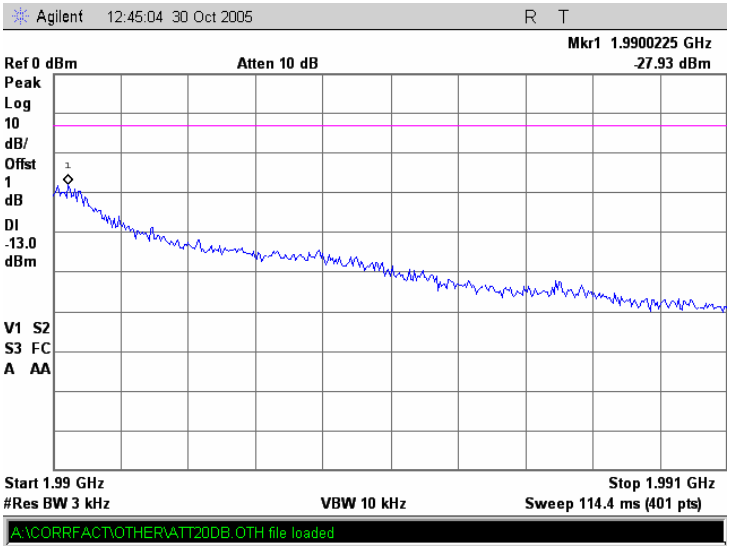


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	10/30/2005		
Temperature: 21°C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 8.3.45 Spurious emission measurements in 1.9 – 2.0 GHz range, PCS 1900, GSM modulation

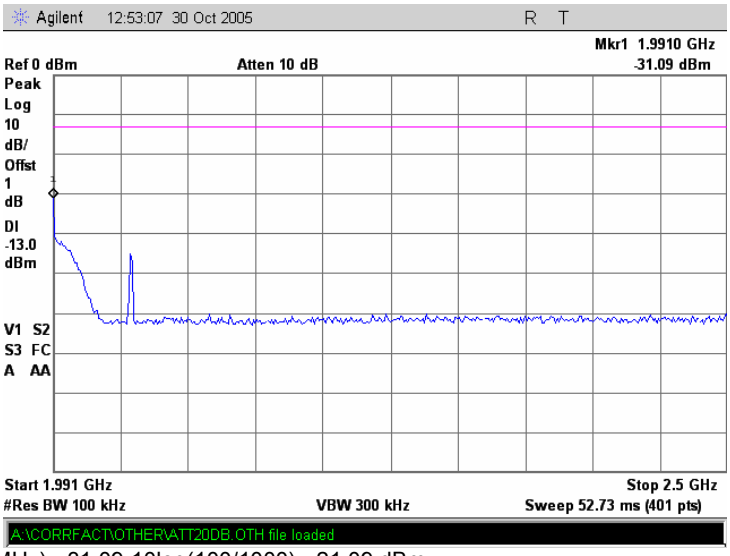


Plot 8.3.46 Spurious emission measurements in 1.99 – 1.991 GHz range, 3 kHz RBW, PCS 1900, GSM modulation



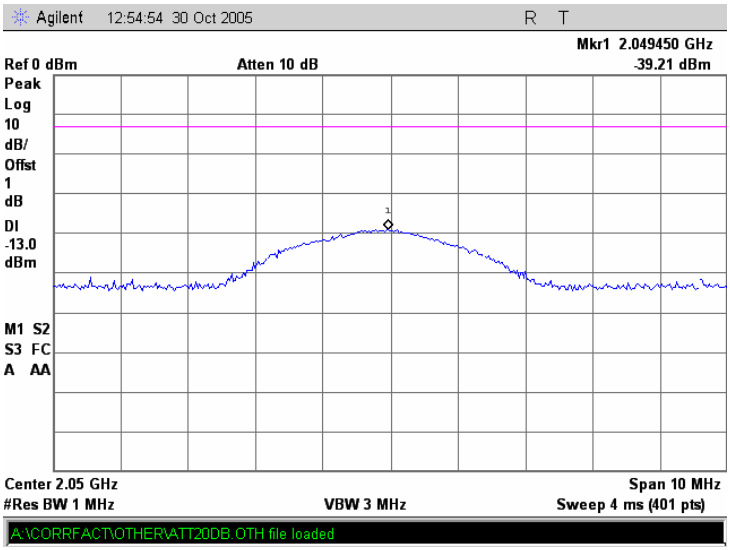
Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	10/30/2005		
Temperature: 21°C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 8.3.47 Spurious emission measurements in 1.991 – 2.5 GHz range, PCS 1900, GSM modulation



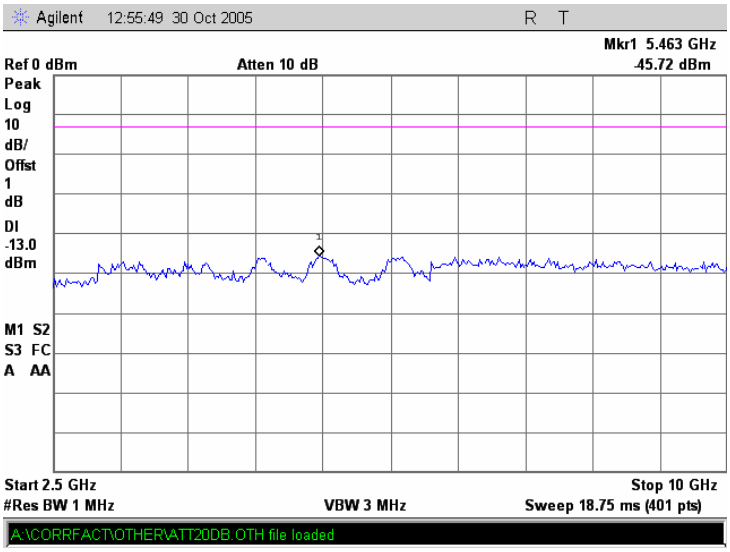
Psig = Psa-10log(RBW/1MHz)=-31.09-10log(100/1000)=-21.09 dBm

Plot 8.3.48 Spurious emission measurements at 2.049 GHz, PCS 1900, GSM modulation

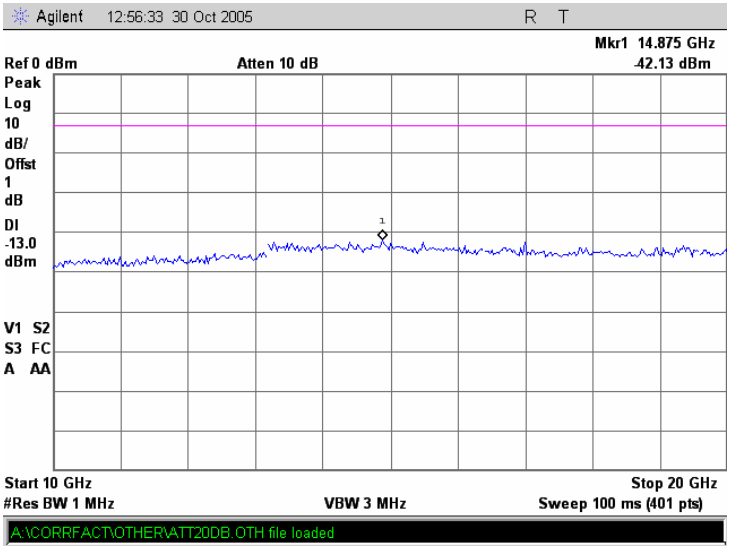


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	10/30/2005		
Temperature: 21°C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 8.3.49 Spurious emission measurements at 2.5 – 10.0 GHz range, PCS 1900, GSM modulation

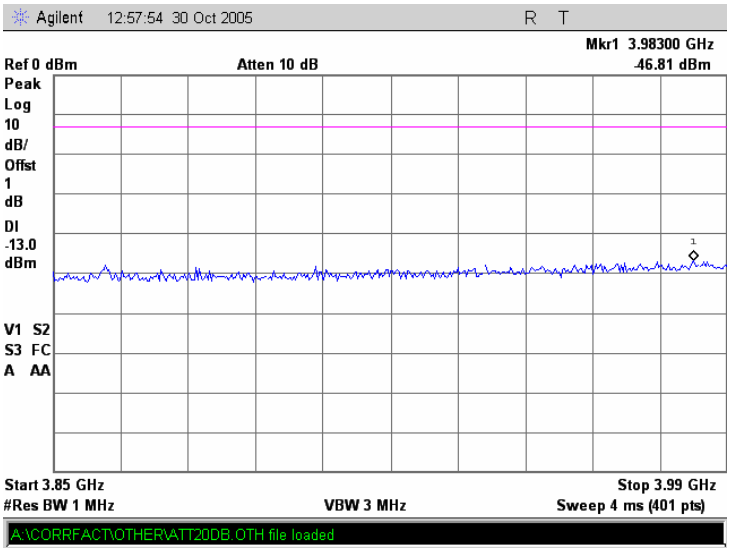


Plot 8.3.50 Spurious emission measurements at 10 – 20 GHz range, PCS 1900, GSM modulation

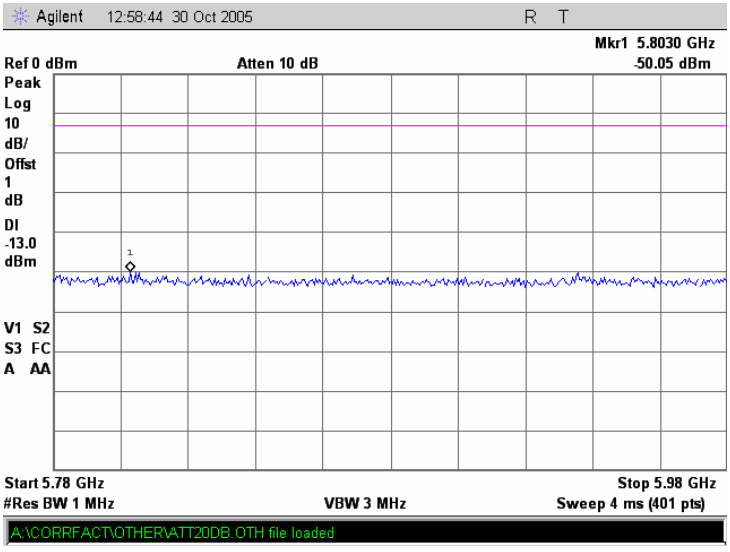


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	10/30/2005		
Temperature: 21°C	Air Pressure: 1008 hPa	Relative Humidity: 44 %	Power Supply: 48 VDC
Remarks:			

Plot 8.3.51 Conducted spurious emission measurements at the 2nd harmonic, PCS 1900, GSM modulation

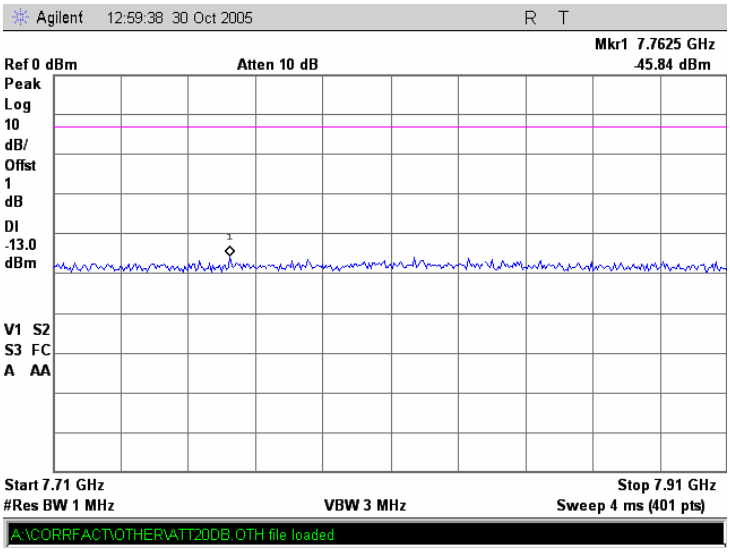


Plot 8.3.52 Conducted spurious emission measurements at the 3rd harmonic, PCS 1900, GSM modulation



Test specification:	**Section 24.238, Spurious emission at antenna terminal**		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	**Verdict:**	PASS
Date:	10/30/2005		
Temperature: 21°C	**Air Pressure:** 1008 hPa	**Relative Humidity:** 44 %	**Power Supply:** 48 VDC
Remarks:			

Plot 8.3.53 Conducted spurious emission measurements at the 4th harmonic, PCS 1900, GSM modulation



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 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 – 20000	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:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

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

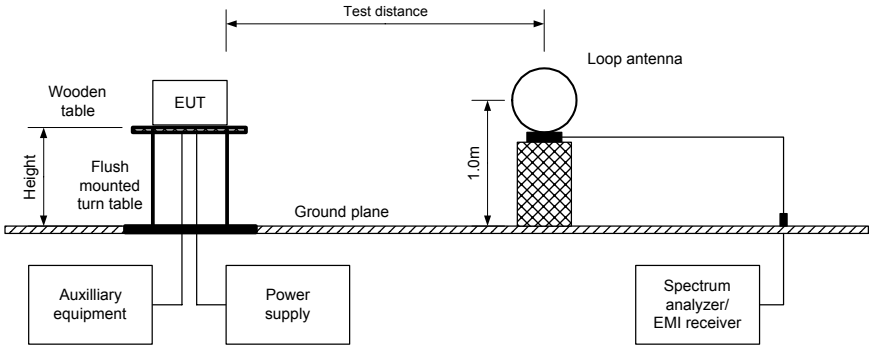
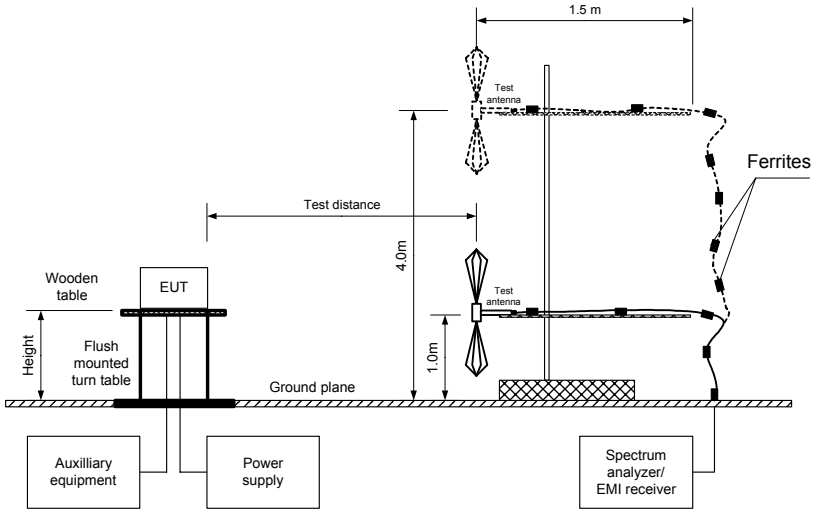


Figure 8.4.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	**Section 24.238, Radiated spurious emissions**		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	**Verdict:**	PASS
Date:	9/28/2005		
Temperature: 24ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48 VDC
Remarks:			

Table 8.4.2 Field strength of emissions

ASSIGNED FREQUENCY RANGE: 1930 - 1990 MHz MHz
INVESTIGATED FREQUENCY RANGE: 0.009 – 20000 MHz
TEST DISTANCE: 3 m
MODULATION: Unmodulated
DUTY CYCLE: 100 %
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
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*
All spurious emissions were found at least 20 dB below the 84.4 dB(μV/m) limit						

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

Reference numbers of test equipment used

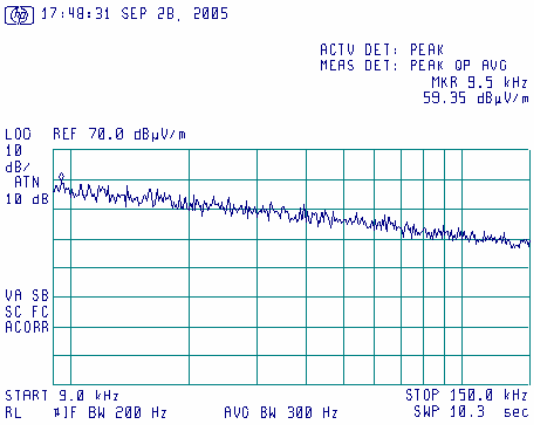
HL 0410	HL 0446	HL 0465	HL 0521	HL 0589	HL 0592	HL 0593	HL 0594
HL 0604	HL 0768	HL 1200	HL 1424	HL 1941	HL 1947	HL 1984	HL 2009
HL 2259	HL 2387	HL 2399	HL 2499				

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:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

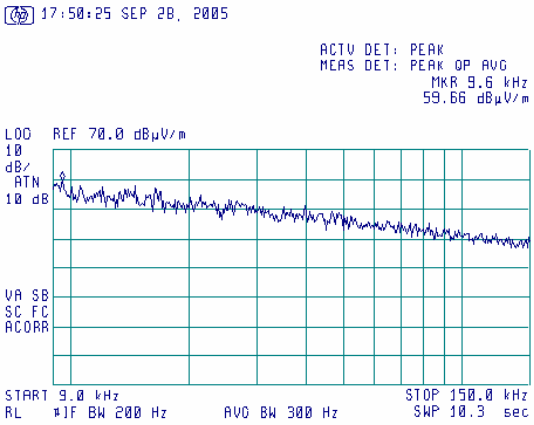
Plot 8.4.1 Radiated emission measurements from 9 to 150 kHz at the low carrier frequency

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

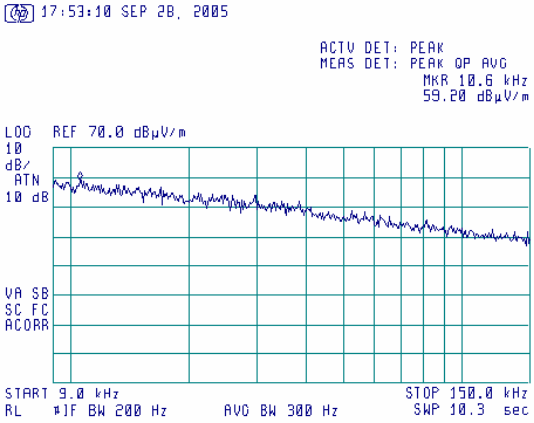
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

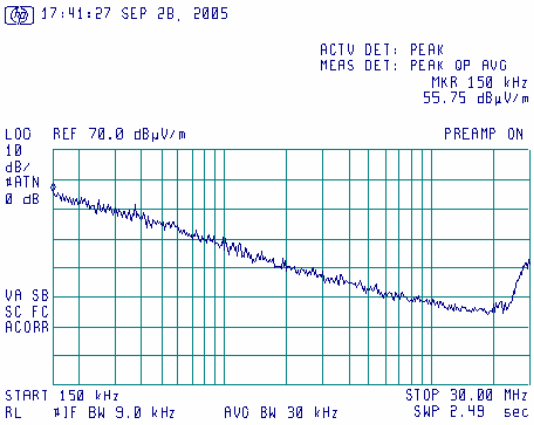
Plot 8.4.3 Radiated emission measurements from 9 to 150 kHz at the high carrier frequency

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

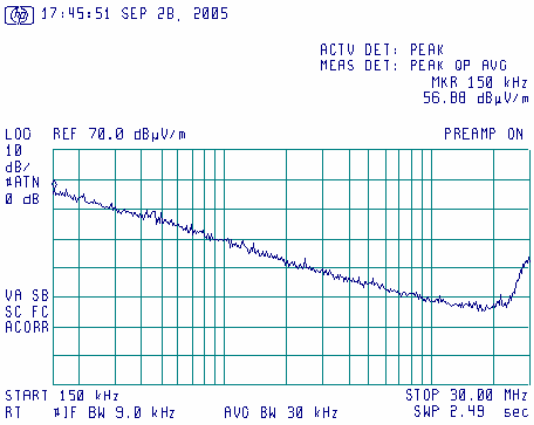
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	**Section 24.238, Radiated spurious emissions**		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	**Verdict:**	PASS
Date:	9/28/2005		
Temperature: 24ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48 VDC
Remarks:			

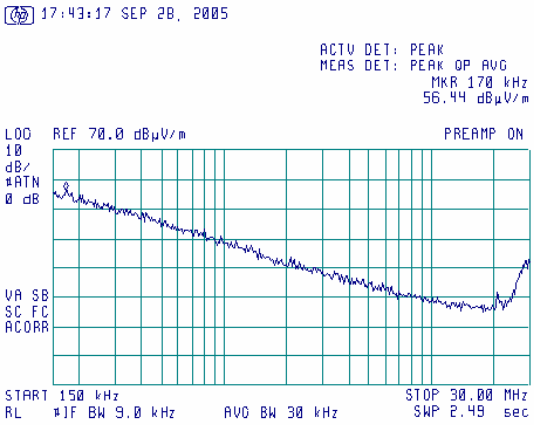
Plot 8.4.5 Radiated emission measurements from 0.15 to 30 MHz at the mid carrier frequency

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

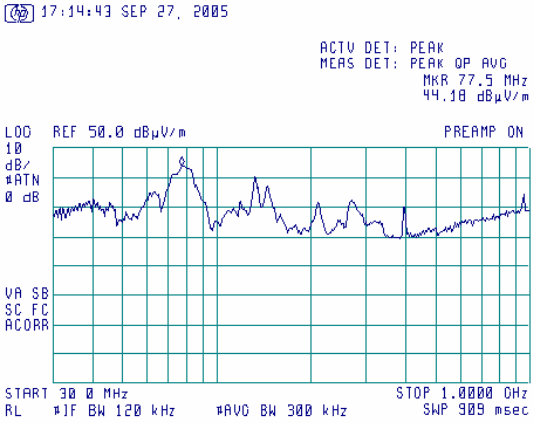
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

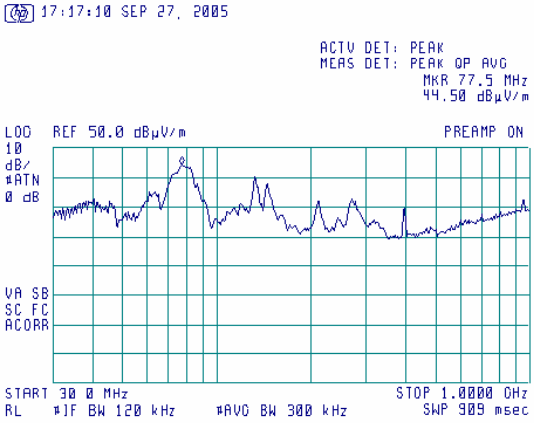
Plot 8.4.7 Radiated emission measurements from 30 to 1000 MHz at the low carrier frequency

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

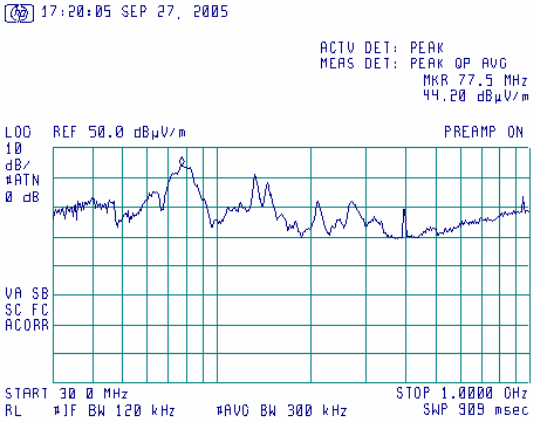
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

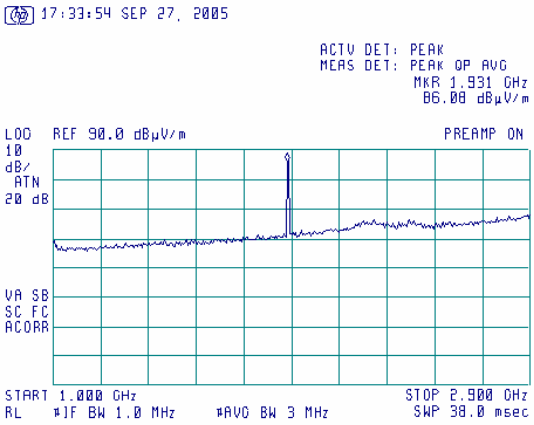
Plot 8.4.9 Radiated emission measurements from 30 to 1000 MHz at the high carrier frequency

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

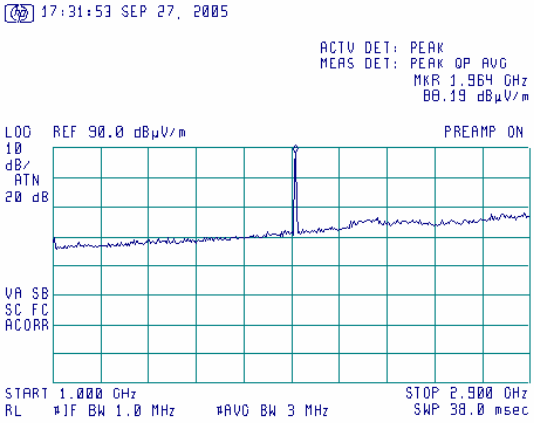
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

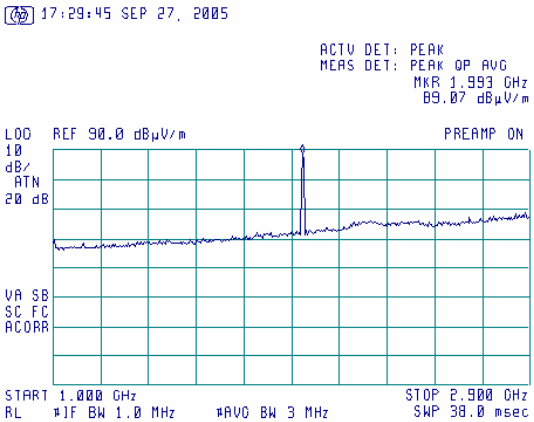
Plot 8.4.11 Radiated emission measurements from 1000 to 2900 MHz at the mid carrier frequency

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



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

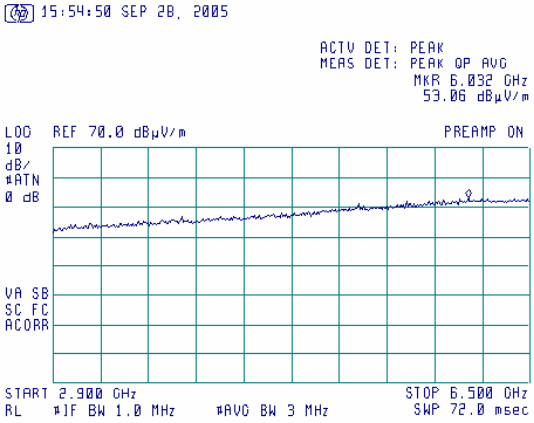
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

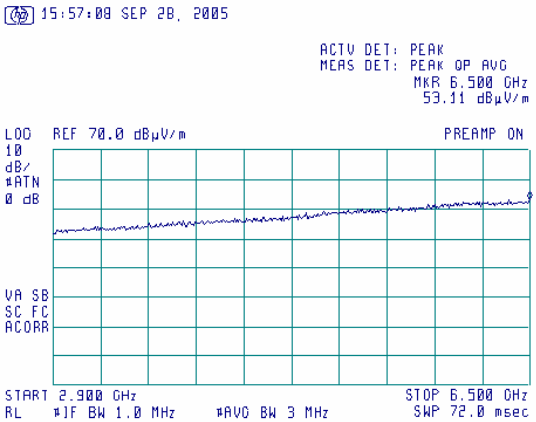
Plot 8.4.13 Radiated emission measurements from 2900 to 6500 MHz at the low carrier frequency

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

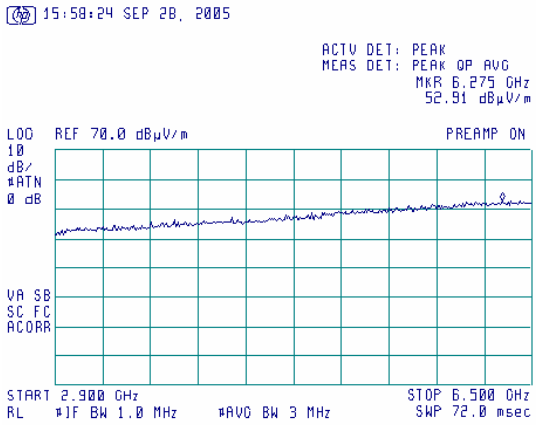
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

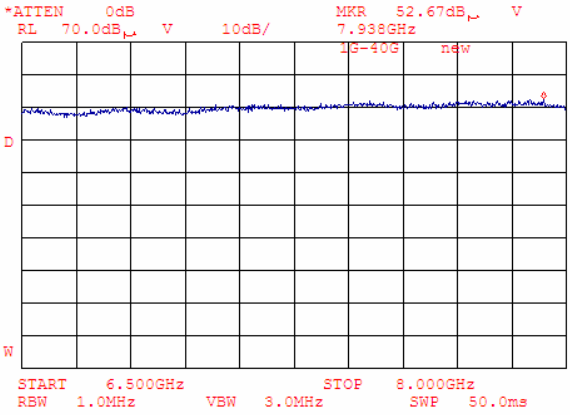
Plot 8.4.15 Radiated emission measurements from 2900 to 6500 MHz at the high carrier frequency

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 8 GHz at the low carrier frequency

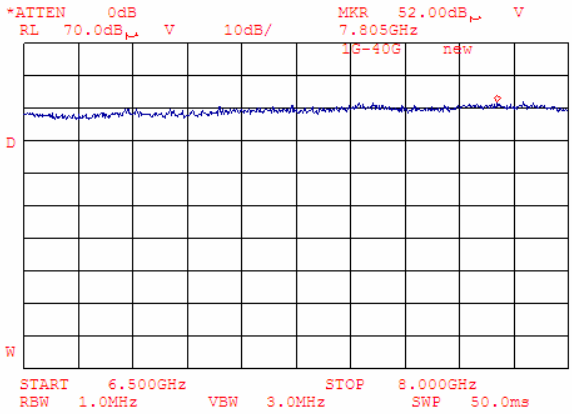
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

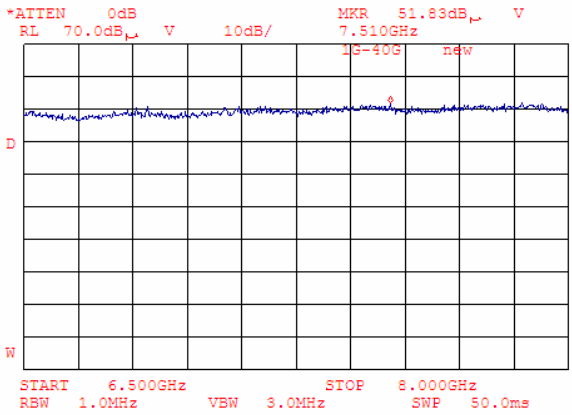
Plot 8.4.17 Radiated emission measurements from 6.5 to 8 GHz at the mid carrier frequency

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



Plot 8.4.18 Radiated emission measurements from 6.5 to 8 GHz at the high carrier frequency

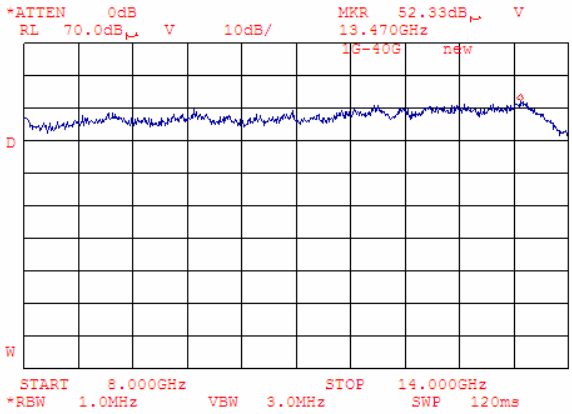
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

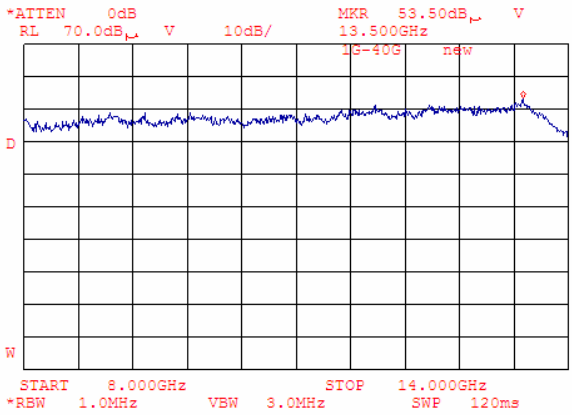
Plot 8.4.19 Radiated emission measurements from 8 to 14 GHz at the low carrier frequency

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



Plot 8.4.20 Radiated emission measurements from 8 to 14 GHz at the mid carrier frequency

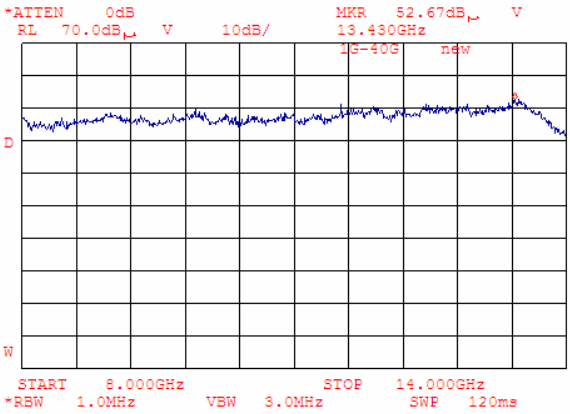
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

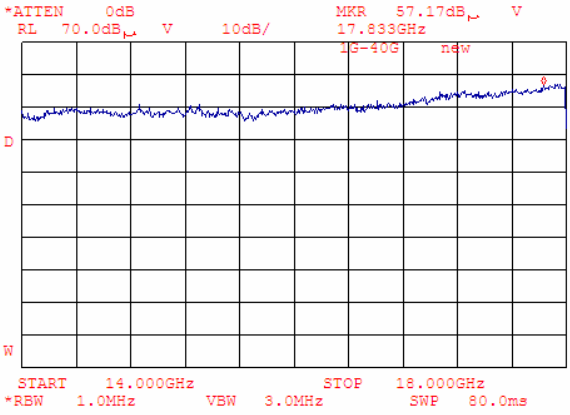
Plot 8.4.21 Radiated emission measurements from 8 to 14 GHz at the high carrier frequency

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



Plot 8.4.22 Radiated emission measurements from 14 to 18 GHz at the low carrier frequency

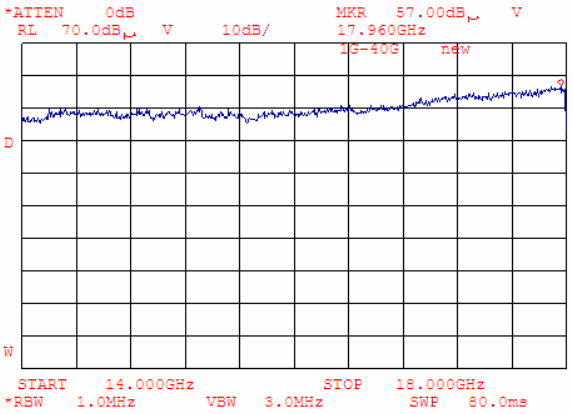
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

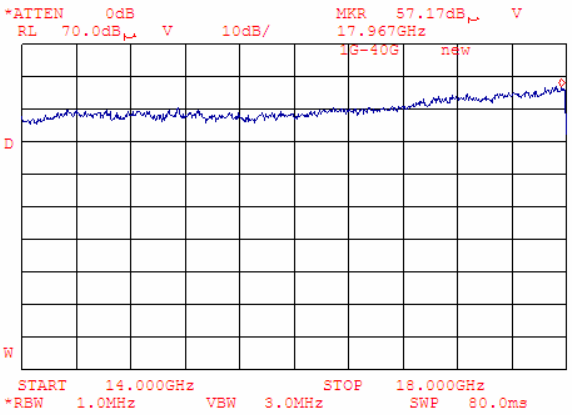
Plot 8.4.23 Radiated emission measurements from 14 to 18 GHz at the mid carrier frequency

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



Plot 8.4.24 Radiated emission measurements from 14 to 18 GHz at the high carrier frequency

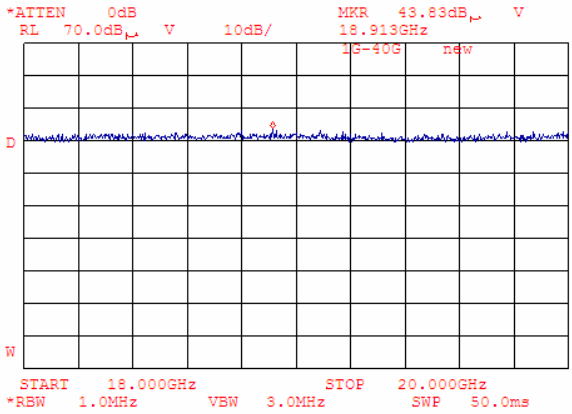
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

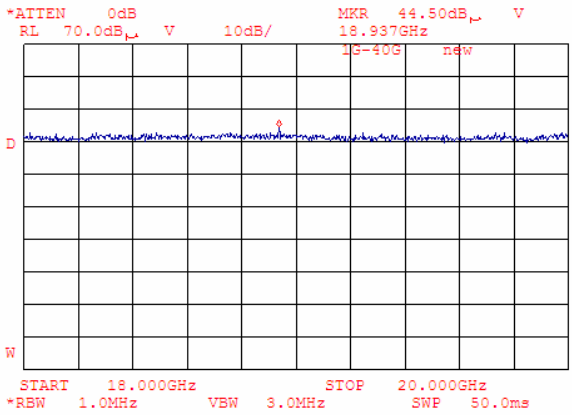
Plot 8.4.25 Radiated emission measurements from 18 to 20 GHz at the low carrier frequency

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



Plot 8.4.26 Radiated emission measurements from 18 to 20 GHz at the mid carrier frequency

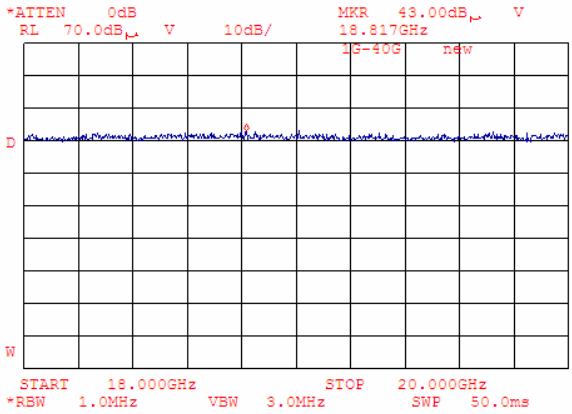
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	**Section 24.238, Radiated spurious emissions**		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	**Verdict:**	PASS
Date:	9/28/2005		
Temperature: 24ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48 VDC
Remarks:			

Plot 8.4.27 Radiated emission measurements from 18 to 20 GHz at the high carrier frequency

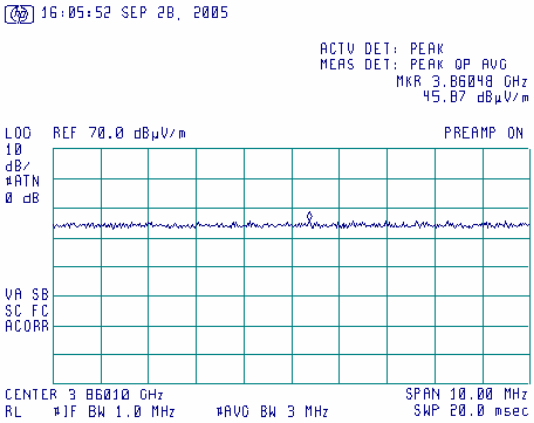
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

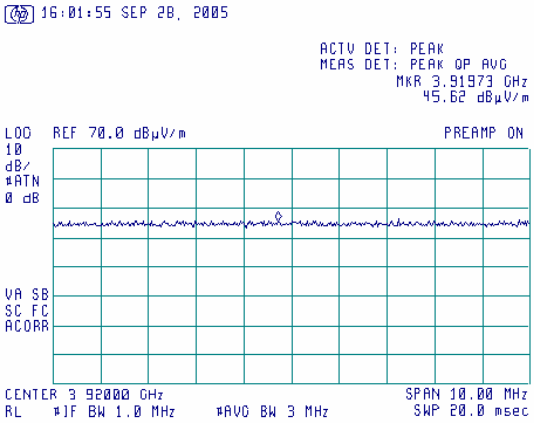
Plot 8.4.28 Radiated emission measurements at the second harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



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

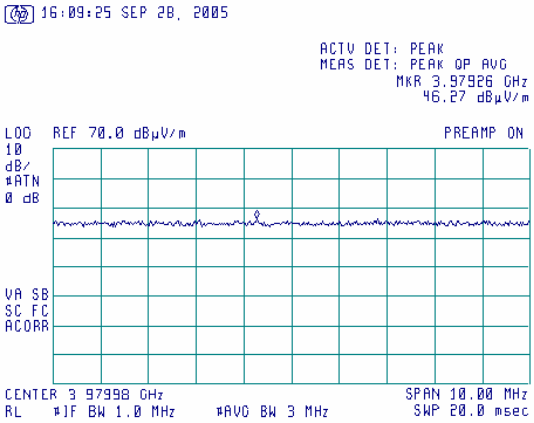
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

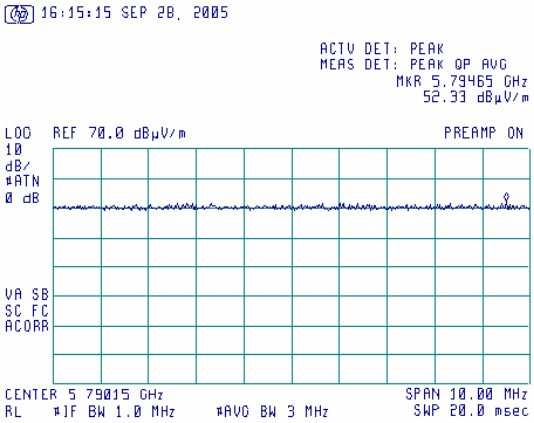
Plot 8.4.30 Radiated emission measurements at the second harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



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

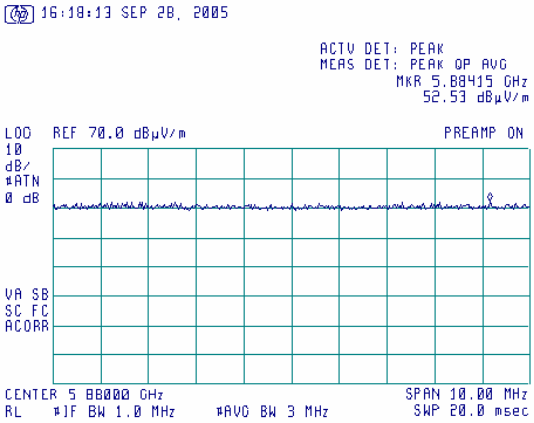
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	**Section 24.238, Radiated spurious emissions**		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	**Verdict:**	PASS
Date:	9/28/2005		
Temperature: 24ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 48 VDC
Remarks:			

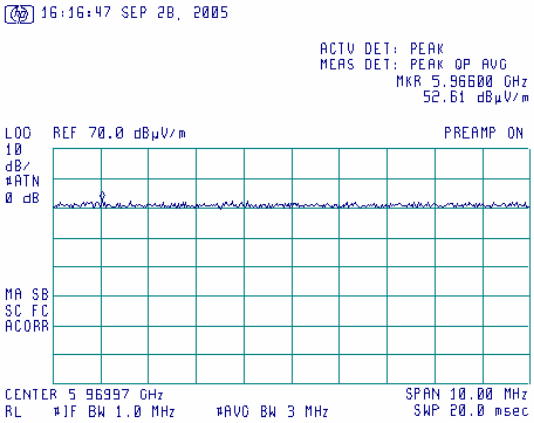
Plot 8.4.32 Radiated emission measurements at the third harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



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

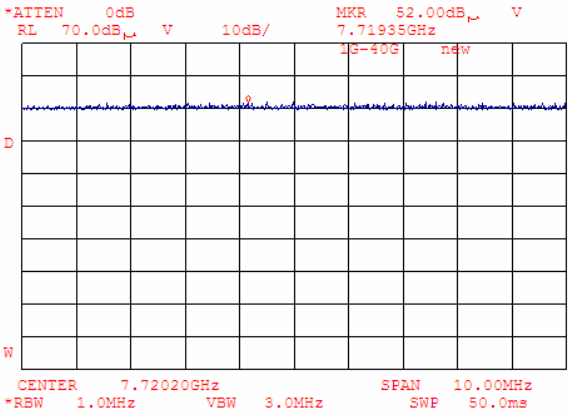
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

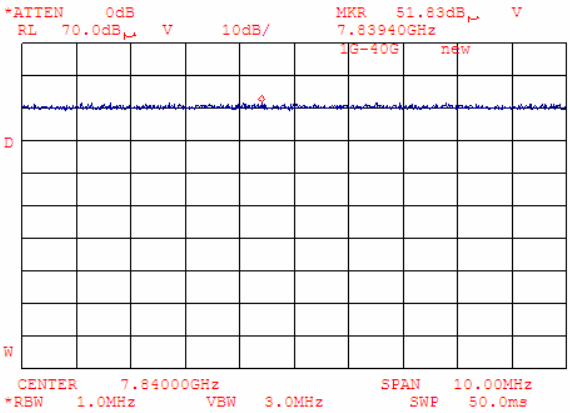
Plot 8.4.34 Radiated emission measurements at the forth harmonic of low carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m



Plot 8.4.35 Radiated emission measurements at the forth harmonic of mid carrier frequency

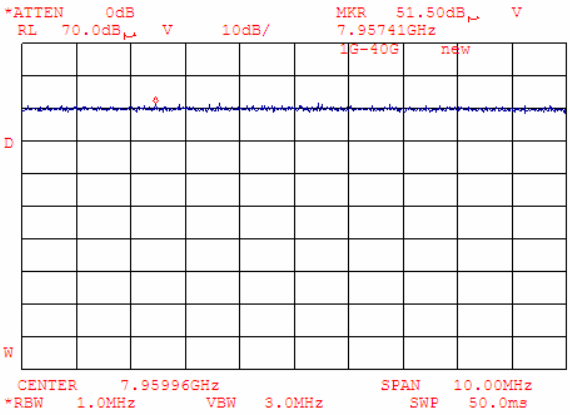
TEST SITE: OATS
TEST DISTANCE: 3 m



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

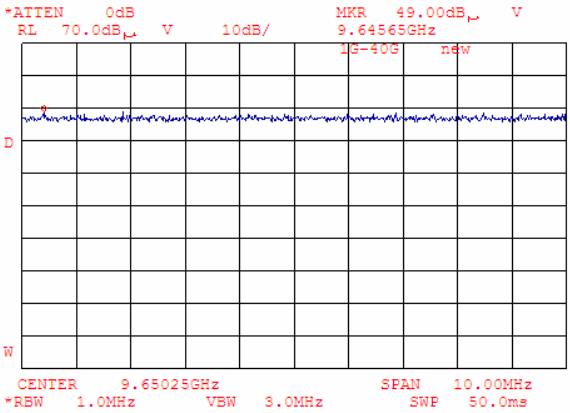
Plot 8.4.36 Radiated emission measurements at the forth harmonic of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m



Plot 8.4.37 Radiated emission measurements at the fifth harmonic of low carrier frequency

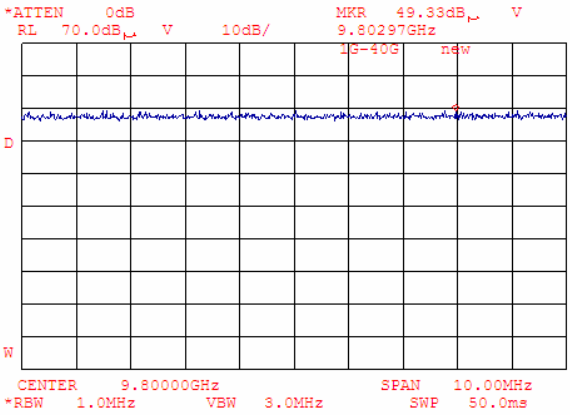
TEST SITE: OATS
TEST DISTANCE: 3 m



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

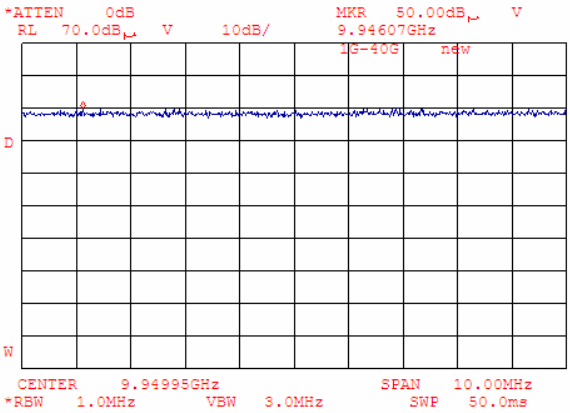
Plot 8.4.38 Radiated emission measurements at the fifth harmonic of mid carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m



Plot 8.4.39 Radiated emission measurements at the fifth harmonic of high carrier frequency

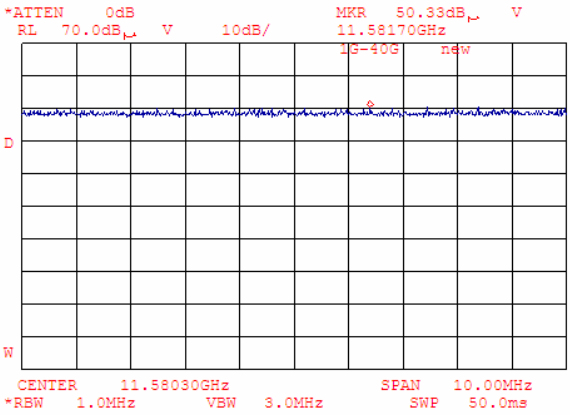
TEST SITE: OATS
TEST DISTANCE: 3 m



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

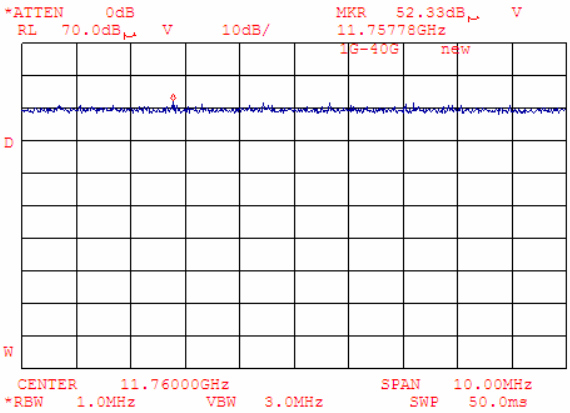
Plot 8.4.40 Radiated emission measurements at the sixth harmonic of low carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m



Plot 8.4.41 Radiated emission measurements at the sixth harmonic of mid carrier frequency

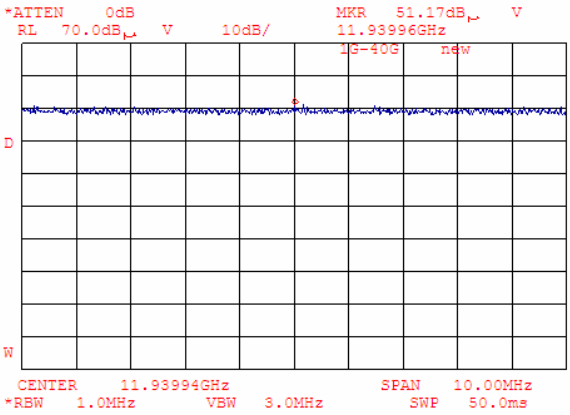
TEST SITE: OATS
TEST DISTANCE: 3 m



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

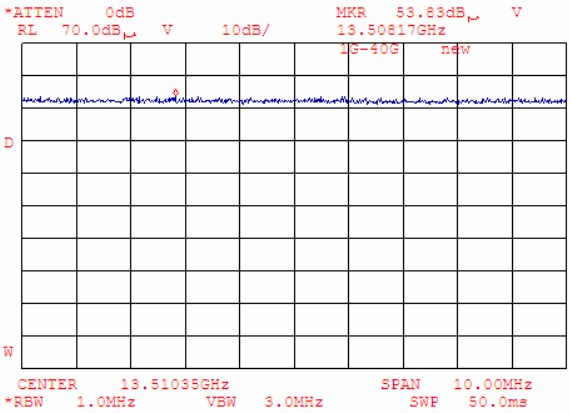
Plot 8.4.42 Radiated emission measurements at the sixth harmonic of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m



Plot 8.4.43 Radiated emission measurements at the seventh harmonic of low carrier frequency

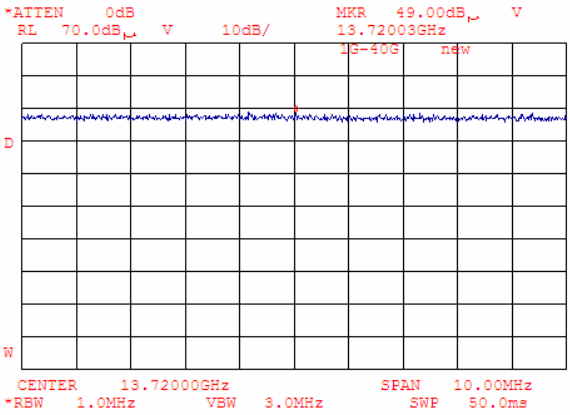
TEST SITE: OATS
TEST DISTANCE: 3 m



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 48 VDC
Remarks:			

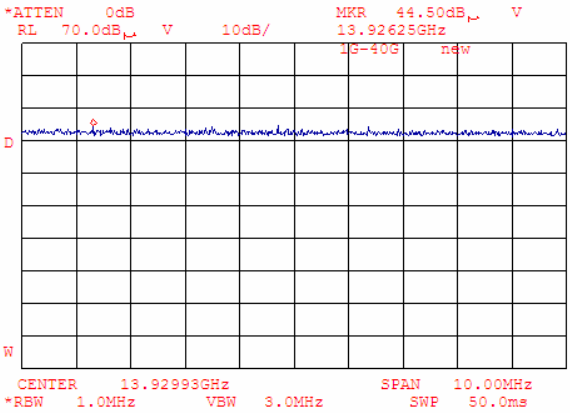
Plot 8.4.44 Radiated emission measurements at the seventh harmonic of mid carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m



Plot 8.4.45 Radiated emission measurements at the seventh harmonic of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m



Test specification:	Section 15.107 Conducted emission		
Test procedure:	ANSI C63.4, Section 13.1.3; Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

9 Unintentional radiation tests according to 47CFR part 15 subpart B requirements

9.1 Conducted emissions

9.1.1 General

This test was performed to measure common mode conducted emissions at the power port. Specification test limits are given in Table 9.1.1. The worst test results (the lowest margins) were recorded in Table 9.1.2 and shown in the associated plots.

Table 9.1.1 Limits for conducted emissions

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

* The limit decreases linearly with the logarithm of frequency.

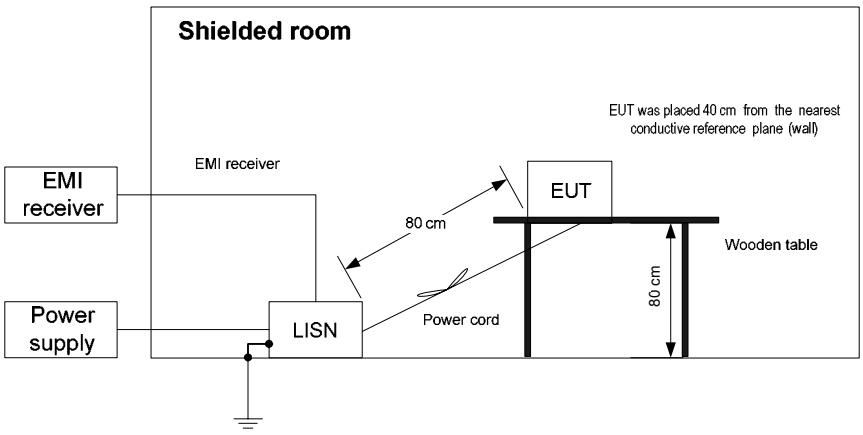
9.1.2 Test procedure

9.1.2.1 The EUT was set up as shown in Figure 9.1.1, energized and the performance check was conducted.

9.1.2.2 The measurements were performed at power terminals with the LISN, connected to a spectrum analyzer in the frequency range referred to in Table 9.1.2. Unused coaxial connector of the LISN was terminated with 50 Ohm. Quasi-peak and average detectors were used throughout the testing.

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

Figure 9.1.1 Setup for conducted emission measurements, table-top equipment



Test specification:	**Section 15.107 Conducted emission**		
Test procedure:	ANSI C63.4, Section 13.1.3; Sections 11.5 and 12.1.3		
Test mode:	Compliance	**Verdict:**	PASS
Date:	9/28/2005		
Temperature: 24ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 120 VAC
Remarks:			

Table 9.1.2 Conducted emission test results

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

Frequency, MHz	Peak emission, dB(µV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(µV)	Limit, dB(µV)	Margin, dB*	Measured emission, dB(µV)	Limit, dB(µV)	Margin, dB*		
Stand by / Receive									
13.843660	44.08	43.09	60.00	-16.91	41.94	50.00	-8.06	L1	Pass
13.846151	43.93	43.19	60.00	-16.81	40.90	50.00	-9.10		
21.457405	39.89	39.12	60.00	-20.88	37.00	50.00	-13.00		
29.757049	48.11	47.06	60.00	-12.94	44.51	50.00	-5.49		
13.039339	46.40	45.87	60.00	-14.13	44.02	50.00	-5.98	L2	Pass
13.270052	46.30	45.73	60.00	-14.27	45.04	50.00	-4.96		
22.359925	46.80	45.87	60.00	-14.13	43.66	50.00	-6.34		
29.119097	47.84	46.71	60.00	-13.29	43.70	50.00	-6.30		
Cell 800 Low carrier frequency									
0.158533	54.71	47.07	65.58	-18.51	14.61	55.58	-40.97	L1	Pass
11.988617	43.39	42.93	60.00	-17.07	42.18	50.00	-7.82		
12.916755	48.23	47.46	60.00	-12.54	46.93	50.00	-3.07		
21.208914	42.58	41.57	60.00	-18.43	39.83	50.00	-10.17		
28.808134	46.57	45.60	60.00	-14.40	43.33	50.00	-6.67		
0.159276	55.19	46.28	65.55	-19.27	13.75	55.55	-41.80	L2	Pass
0.159460	54.98	46.39	65.54	-19.15	13.84	55.54	-41.70		
12.980461	50.24	49.64	60.00	-10.36	49.05	50.00	-0.95		
13.893008	48.75	47.93	60.00	-12.07	45.17	50.00	-4.83		
22.220761	47.46	46.21	60.00	-13.79	45.23	50.00	-4.77		
28.924207	48.62	47.58	60.00	-12.42	44.18	50.00	-5.82		
Cell 800 Mid carrier frequency									
0.152063	57.02	48.85	65.90	-17.05	16.36	55.90	-39.54	L1	Pass
0.163086	55.05	46.66	65.36	-18.70	14.99	55.36	-40.37		
12.878651	48.36	47.76	60.00	-12.24	46.92	50.00	-3.08		
13.570850	49.13	47.94	60.00	-12.06	47.22	50.00	-2.78		
29.431416	48.26	47.29	60.00	-12.71	44.62	50.00	-5.38		
0.145080	57.17	49.07	60.00	-10.93	17.13	50.00	-32.87	L2	Pass
0.165783	54.06	46.26	65.23	-18.97	13.48	55.23	-41.75		
12.846817	49.81	49.13	60.00	-10.87	48.81	50.00	-1.19		
13.536926	51.23	49.22	60.00	-10.78	47.45	50.00	-2.55		
22.018663	47.68	46.04	60.00	-13.96	42.52	50.00	-7.48		
28.443720	48.03	46.36	60.00	-13.64	44.73	50.00	-5.27		

*- Margin = Measured emission - specification limit.

Test specification:	**Section 15.107 Conducted emission**		
Test procedure:	ANSI C63.4, Section 13.1.3; Sections 11.5 and 12.1.3		
Test mode:	Compliance	**Verdict:**	PASS
Date:	9/28/2005		
Temperature: 24ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 120 VAC
Remarks:			

Table 9.1.2 Conducted emission test results, continued

Frequency, MHz	Peak emission, dB(µV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(µV)	Limit, dB(µV)	Margin, dB*	Measured emission, dB(µV)	Limit, dB(µV)	Margin, dB*		
Cell 800 High carrier frequency									
0.157512	54.79	47.57	65.63	-18.06	15.37	55.63	-40.26	L1	Pass
0.164013	53.83	45.55	65.32	-19.77	13.45	55.32	-41.87		
12.792841	47.65	46.78	60.00	-13.22	46.49	50.00	-3.51		
13.492968	48.87	48.06	60.00	-11.94	46.77	50.00	-3.23		
13.711089	47.31	46.44	60.00	-13.56	44.83	50.00	-5.17		
28.560198	45.98	44.72	60.00	-15.28	42.27	50.00	-7.73		
0.161028	54.15	46.10	65.46	-19.36	13.80	55.46	-41.66	L2	Pass
0.183070	50.96	41.63	64.39	-22.76	9.42	54.39	-44.97		
12.816777	49.28	48.79	60.00	-11.21	46.70	50.00	-3.30		
13.515746	50.78	50.23	60.00	-9.77	49.45	50.00	-0.55		
21.986985	47.74	46.90	60.00	-13.10	45.31	50.00	-4.69		
28.616712	48.22	47.07	60.00	-12.93	42.17	50.00	-7.83		
PCS 1900 Low carrier frequency									
0.152515	55.59	47.90	65.88	-17.98	15.42	55.88	-40.46	L1	Pass
0.168158	53.67	44.24	65.11	-20.87	11.69	55.11	-43.42		
0.188241	49.64	40.27	64.13	-23.86	8.48	54.13	-45.65		
12.788570	47.52	46.92	60.00	-13.08	46.41	50.00	-3.59		
13.472968	48.61	47.80	60.00	-12.20	46.95	50.00	-3.05		
29.453236	48.19	47.09	60.00	-12.91	45.16	50.00	-4.84		
0.152974	56.15	46.78	65.85	-19.07	14.23	55.85	-41.62	L2	Pass
0.165429	51.49	43.56	65.25	-21.69	11.80	55.25	-43.45		
12.781910	48.91	48.42	60.00	-11.58	45.28	50.00	-4.72		
13.465397	50.58	50.02	60.00	-9.98	46.87	50.00	-3.13		
21.912301	47.54	46.94	60.00	-13.06	45.12	50.00	-4.88		
29.445626	49.36	47.79	60.00	-12.21	39.12	50.00	-10.88		
PCS 1900 Mid carrier frequency									
0.151064	54.36	46.37	65.95	-19.58	14.34	55.95	-41.61	L1	Pass
0.158778	53.01	45.27	65.57	-20.30	13.14	55.57	-42.43		
0.184864	48.02	39.79	64.30	-24.51	8.41	54.30	-45.89		
12.766105	47.45	46.87	60.00	-13.13	46.40	50.00	-3.60		
13.448156	48.56	47.36	60.00	-12.64	42.59	50.00	-7.41		
29.403588	48.07	47.04	60.00	-12.96	41.86	50.00	-8.14		
0.153746	53.13	46.08	65.82	-19.74	14.29	55.82	-41.53	L2	Pass
0.173060	49.48	41.23	64.88	-23.65	9.49	54.88	-45.39		
12.772330	49.07	48.58	60.00	-11.42	47.71	50.00	-2.29		
13.463216	50.83	49.92	60.00	-10.08	45.82	50.00	-4.18		
21.898685	47.64	46.88	60.00	-13.12	45.66	50.00	-4.34		
29.419035	49.22	48.37	60.00	-11.63	43.29	50.00	-6.71		

Test specification:	Section 15.107 Conducted emission		
Test procedure:	ANSI C63.4, Section 13.1.3; Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

Table 9.1.2 Conducted emission test results, continued

Frequency, MHz	Peak emission, dB(µV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(µV)	Limit, dB(µV)	Margin, dB*	Measured emission, dB(µV)	Limit, dB(µV)	Margin, dB*		
PCS 1900 High carrier frequency									
0.152718	55.27	47.55	65.87	-18.32	14.63	55.87	-41.24	L1	Pass
0.183305	49.91	42.01	64.38	-22.37	11.74	54.38	-42.64		
12.757945	47.59	46.90	60.00	-13.10	46.36	50.00	-3.64		
13.445247	49.14	47.98	60.00	-12.02	46.67	50.00	-3.33		
13.672128	47.49	46.18	60.00	-13.82	44.19	50.00	-5.81		
29.033295	20.13	15.12	60.00	-44.88	8.99	50.00	-41.01		
0.153996	54.69	46.56	65.81	-19.25	13.79	55.81	-42.02	L2	Pass
0.174374	50.35	42.84	64.81	-21.97	10.59	54.81	-44.22		
12.750190	49.11	48.58	60.00	-11.42	48.09	50.00	-1.91		
13.429983	50.91	50.00	60.00	-10.00	47.47	50.00	-2.53		
21.855105	47.84	46.99	60.00	-13.01	44.98	50.00	-5.02		
29.359130	48.94	47.03	60.00	-12.97	40.50	50.00	-9.50		

*****- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

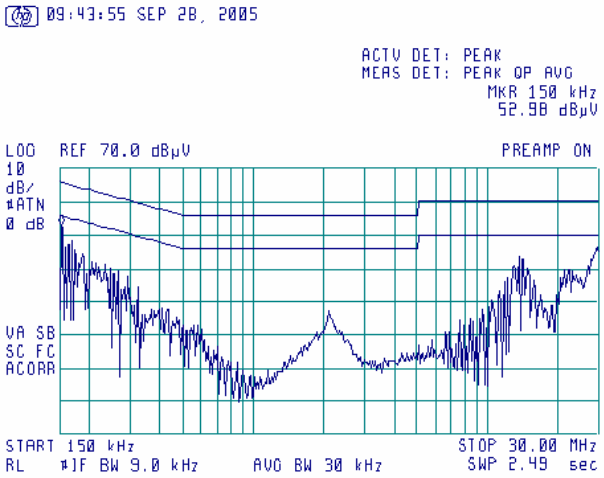
HL 0447	HL 0672	HL 0787	HL 1430	HL 1502	HL 1510		

Full description is given in Appendix A.

Test specification:	**Section 15.107 Conducted emission**		
Test procedure:	ANSI C63.4, Section 13.1.3; Sections 11.5 and 12.1.3		
Test mode:	Compliance	**Verdict:**	PASS
Date:	9/28/2005		
Temperature: 24ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 120 VAC
Remarks:			

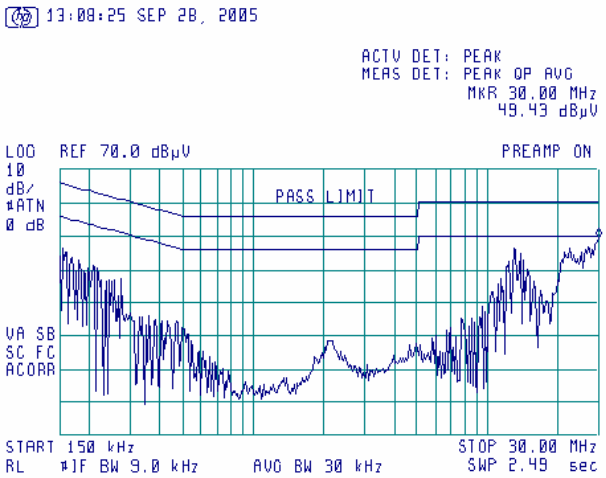
Plot 9.1.1 Conducted emission measurements

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



Plot 9.1.2 Conducted emission measurements

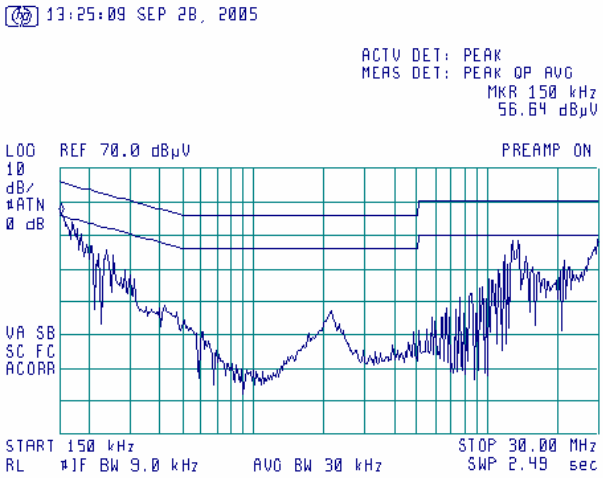
LINE:	L2
LIMIT:	Class B
EUT OPERATING MODE:	Receive / Stand-by
LIMIT:	QUASI-PEAK, AVERAGE
DETECTOR:	PEAK



Test specification:	**Section 15.107 Conducted emission**		
Test procedure:	ANSI C63.4, Section 13.1.3; Sections 11.5 and 12.1.3		
Test mode:	Compliance	**Verdict:**	PASS
Date:	9/28/2005		
Temperature: 24ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 120 VAC
Remarks:			

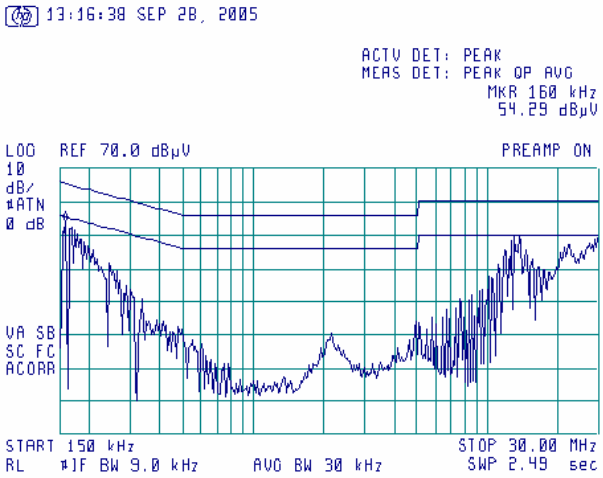
Plot 9.1.3 Conducted emission measurements

LINE:	L1
LIMIT:	Class B
EUT OPERATING MODE:	Tx Cell 800, low carrier frequency
LIMIT:	QUASI-PEAK, AVERAGE
DETECTOR:	PEAK



Plot 9.1.4 Conducted emission measurements

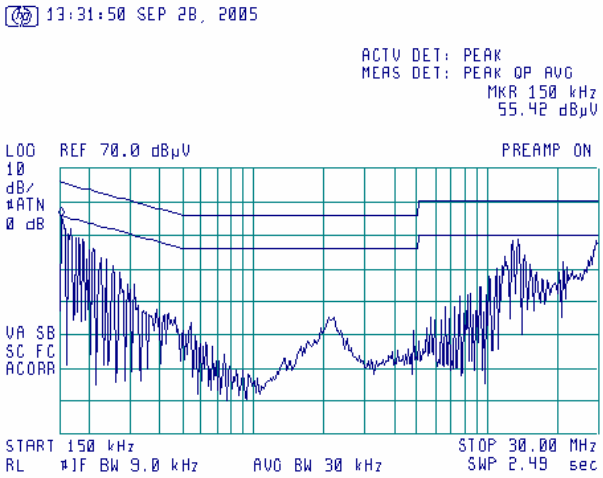
LINE:	L2
LIMIT:	Class B
EUT OPERATING MODE:	Tx Cell 800, low carrier frequency
LIMIT:	QUASI-PEAK, AVERAGE
DETECTOR:	PEAK



Test specification:	Section 15.107 Conducted emission		
Test procedure:	ANSI C63.4, Section 13.1.3; Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

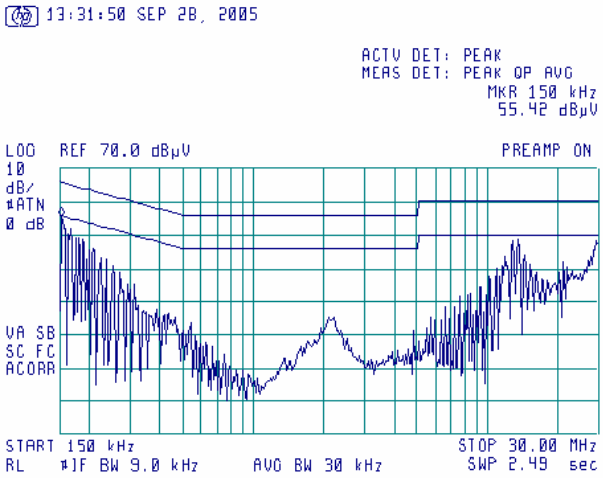
Plot 9.1.5 Conducted emission measurements

LINE:	L1
LIMIT:	Class B
EUT OPERATING MODE:	Tx Cell 800, mid carrier frequency
LIMIT:	QUASI-PEAK, AVERAGE
DETECTOR:	PEAK



Plot 9.1.6 Conducted emission measurements

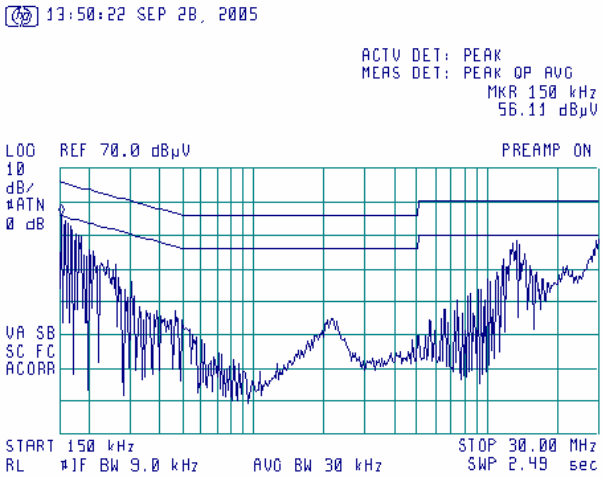
LINE:	L2
LIMIT:	Class B
EUT OPERATING MODE:	Tx Cell 800, mid carrier frequency
LIMIT:	QUASI-PEAK, AVERAGE
DETECTOR:	PEAK



Test specification:	Section 15.107 Conducted emission		
Test procedure:	ANSI C63.4, Section 13.1.3; Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

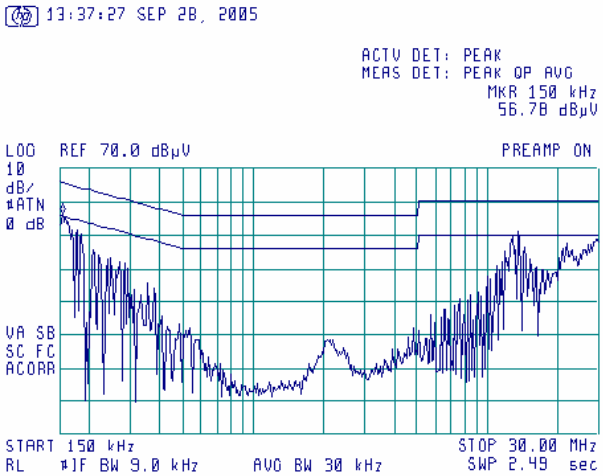
Plot 9.1.7 Conducted emission measurements

LINE:	L1
LIMIT:	Class B
EUT OPERATING MODE:	Tx Cell 800, high carrier frequency
LIMIT:	QUASI-PEAK, AVERAGE
DETECTOR:	PEAK



Plot 9.1.8 Conducted emission measurements

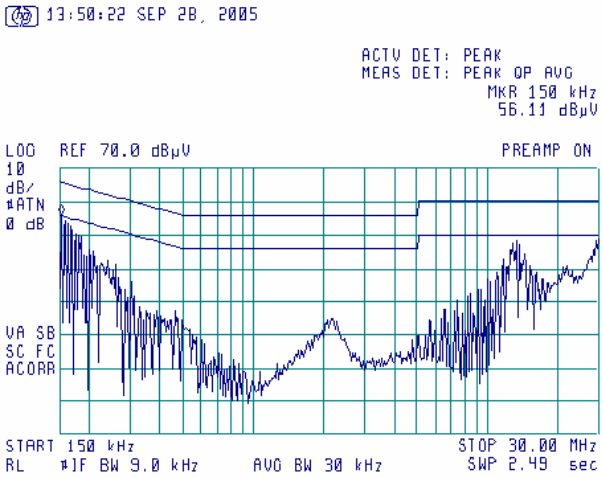
LINE:	L2
LIMIT:	Class B
EUT OPERATING MODE:	Tx Cell 800, high carrier frequency
LIMIT:	QUASI-PEAK, AVERAGE
DETECTOR:	PEAK



Test specification:	**Section 15.107 Conducted emission**		
Test procedure:	ANSI C63.4, Section 13.1.3; Sections 11.5 and 12.1.3		
Test mode:	Compliance	**Verdict:**	PASS
Date:	9/28/2005		
Temperature: 24ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 120 VAC
Remarks:			

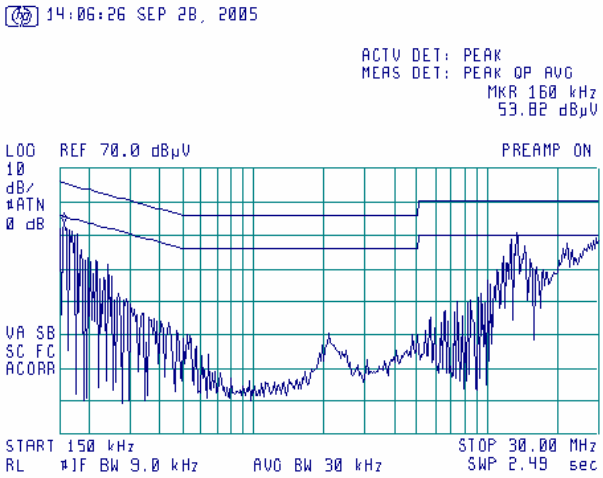
Plot 9.1.9 Conducted emission measurements

LINE:	L1
LIMIT:	Class B
EUT OPERATING MODE:	Tx PCS 1900, low carrier frequency
LIMIT:	QUASI-PEAK, AVERAGE
DETECTOR:	PEAK



Plot 9.1.10 Conducted emission measurements

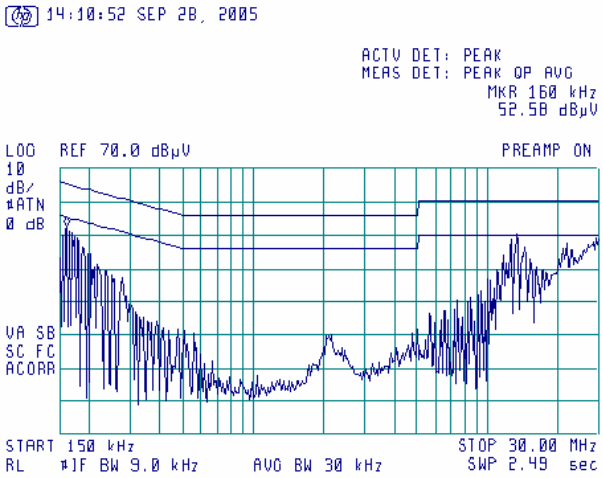
LINE:	L2
LIMIT:	Class B
EUT OPERATING MODE:	Tx Cell 1900, low carrier frequency
LIMIT:	QUASI-PEAK, AVERAGE
DETECTOR:	PEAK



Test specification:	Section 15.107 Conducted emission		
Test procedure:	ANSI C63.4, Section 13.1.3; Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

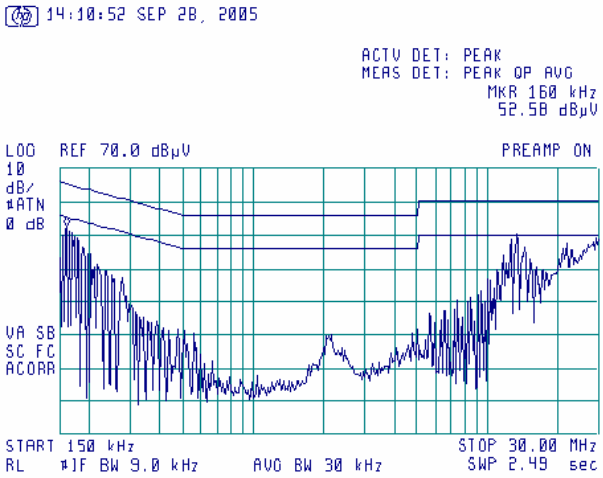
Plot 9.1.11 Conducted emission measurements

LINE:	L1
LIMIT:	Class B
EUT OPERATING MODE:	Tx PCS 1900, mid carrier frequency
LIMIT:	QUASI-PEAK, AVERAGE
DETECTOR:	PEAK



Plot 9.1.12 Conducted emission measurements

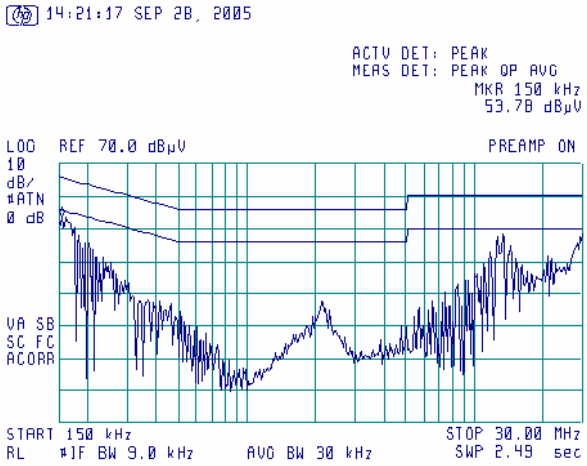
LINE:	L2
LIMIT:	Class B
EUT OPERATING MODE:	Tx Cell 1900, mid carrier frequency
LIMIT:	QUASI-PEAK, AVERAGE
DETECTOR:	PEAK



Test specification:	Section 15.107 Conducted emission		
Test procedure:	ANSI C63.4, Section 13.1.3; Sections 11.5 and 12.1.3		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

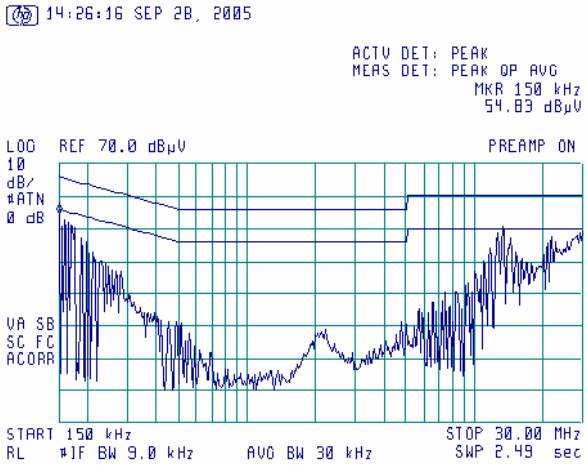
Plot 9.1.13 Conducted emission measurements

LINE: L1
LIMIT: Class B
EUT OPERATING MODE: Tx PCS 1900, high carrier frequency
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



Plot 9.1.14 Conducted emission measurements

LINE: L2
LIMIT: Class B
EUT OPERATING MODE: Tx Cell 1900, high carrier frequency
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



Test specification:	Section 15.109, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

9.2 Radiated emissions

9.2.1 General

This test was performed to measure radiated emissions from the EUT enclosure. Specification test limits are given in Table 9.2.1.

Table 9.2.1 Radiated emission test limits

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

* The limit for test distance other than specified was calculated using the inverse linear distance extrapolation factor as follows: $Lim_{S2} = Lim_{S1} + 20 \log (S_1/S_2)$,
where S_1 and S_2 – standard defined and test distance respectively in meters.

9.2.2 Test procedure for measurements in semi-anechoic chamber

9.2.2.1 The EUT was set up as shown in Figure 9.2.1 and associated photograph/s, energized and the performance check was conducted.

9.2.2.2 The specified frequency range was investigated with biconilog antenna connected to EMI receiver. To find maximum radiation the turntable was rotated 360^0, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal and the EUT cables position was varied.

9.2.2.3 The worst test results (the lowest margins) were recorded in Table 9.2.2 and shown in the associated plots.

9.2.3 Test procedure for measurements at OATS

9.2.3.1 The EUT was set up as shown in Figure 9.2.1 and associated photograph/s, energized and the performance check was conducted.

9.2.3.2 Preliminary measurements were performed in the anechoic chamber at 3 m test distance. The specified frequency range was investigated with biconical and log periodic antennas connected to EMI receiver. To find maximum radiation the turntable was rotated 360^0, the measuring antenna height was changed, its polarization was switched from vertical to horizontal and the EUT cables position was varied.

9.2.3.3 The EUT was set up as shown in **Error! Reference source not found.**, energized and the performance check was conducted.

9.2.3.4 Final measurements were performed at the open area test site at 10 m test distance. The EUT wires and cables were arranged to produce maximum emission as it was found during preliminary measurements. The frequencies yield the worst test results (the lowest margins) during preliminary testing were investigated with biconilog antenna connected to EMI receiver. To find maximum radiation the turntable was rotated 360^0, the measuring antenna height was changed from 1 to 4 m and its polarization was changed from vertical to horizontal. At frequencies where high ambient noise was encountered, the final measurements were taken in the anechoic chamber at 3 m distance.

9.2.3.5 The worst test results (the lowest margins) were recorded in Table 9.2.2 and shown in the associated plots.

Test specification:	Section 15.109, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

Figure 9.2.1 Setup for radiated emission measurements in anechoic chamber, table-top equipment

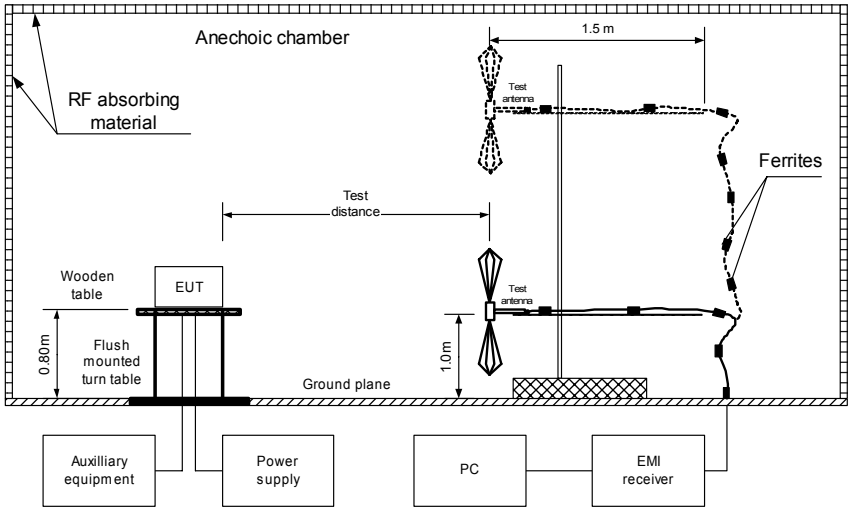
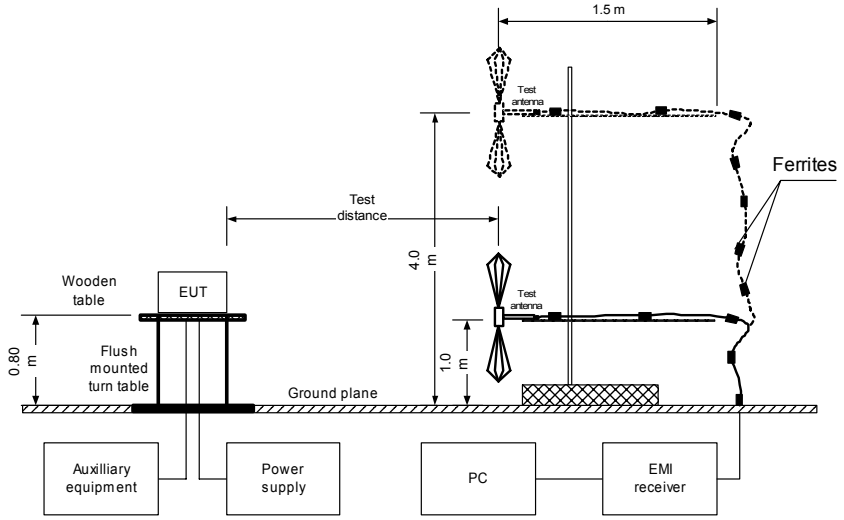


Figure 9.2.2 Setup for radiated emission measurements at OATS, table-top equipment



Test specification:	**Section 15.109, Radiated emission**		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	**Verdict:**	PASS
Date:	9/28/2005		
Temperature: 24ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 120 VAC
Remarks:			

Table 9.2.2 Radiated emission test results

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

Frequency, MHz	Peak emission, dB(µV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(µV/m)	Limit, dB(µV/m)	Margin, dB*				
37.234500	31.85	30.72	40.00	-9.28	Vertical	1.0	123	Pass
62.987500	27.65	25.74	40.00	-14.26	Vertical	1.1	231	
78.002976	37.08	34.81	40.00	-5.19	Horizontal	1.1	11	
222.559500	20.02	14.46	46.00	-31.54	Vertical	1.0	89	
276.149785	30.40	27.43	46.00	-18.57	Vertical	1.2	360	
278.000000	30.05	27.33	46.00	-18.67	Vertical	1.1	356	
398.860000	32.66	30.87	46.00	-15.13	Horizontal	1.0	122	

TEST SITE: OATS / SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / AVERAGE
FREQUENCY RANGE: 1000 MHz – 8000 MHz
RESOLUTION BANDWIDTH: 1000 kHz

Frequency, MHz	Peak emission, dB(µV/m)	Average			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(µV/m)	Limit, dB(µV/m)	Margin, dB*				
No emissions were found								Pass

*****- Margin = Measured emission - specification limit.
******- EUT front panel refer to 0 degrees position of turntable.

Reference numbers of test equipment used

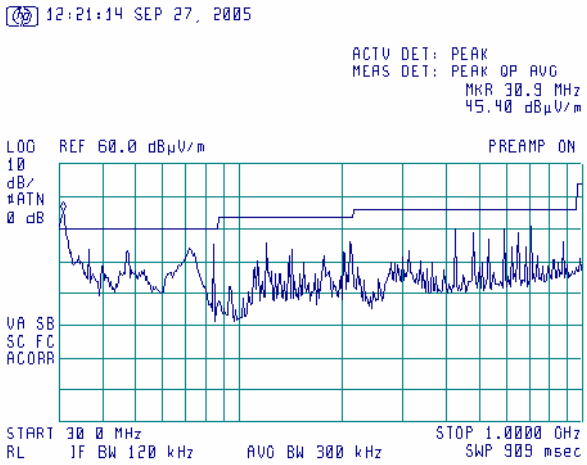
HL 0410	HL 0465	HL 0521	HL 0589	HL 0592	HL 0593	HL 0594	HL 0604
HL 1200	HL 1424	HL 1942	HL 1947	HL 2009	HL 2259	HL 2432	

Full description is given in Appendix A.

Test specification:	Section 15.109, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

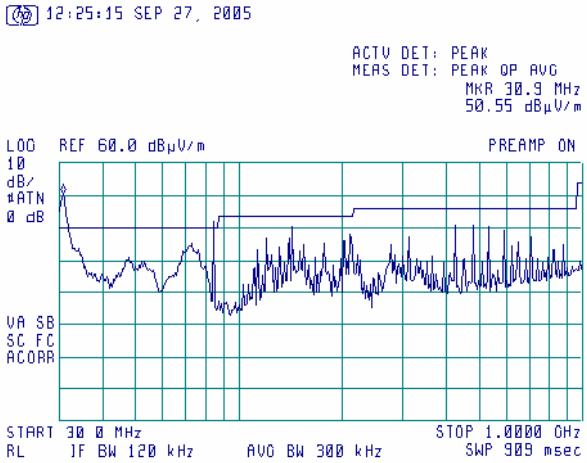
Plot 9.2.1 Radiated emission measurements in 30- 1000 MHz range, vertical antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



Plot 9.2.2 Radiated emission measurements in 30 - 1000 MHz range, horizontal antenna polarization

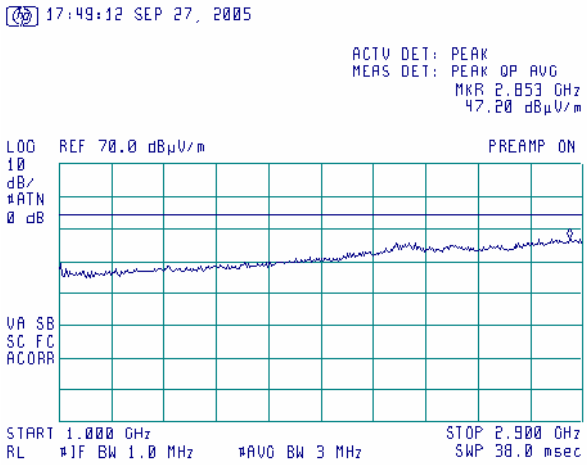
TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



Test specification:	Section 15.109, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

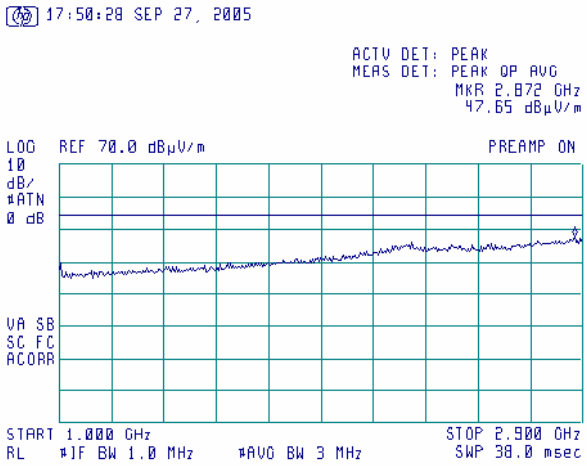
Plot 9.2.3 Radiated emission measurements in 1000 - 2900 MHz range, vertical antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



Plot 9.2.4 Radiated emission measurements in 1000 - 2900 MHz range, horizontal antenna polarization

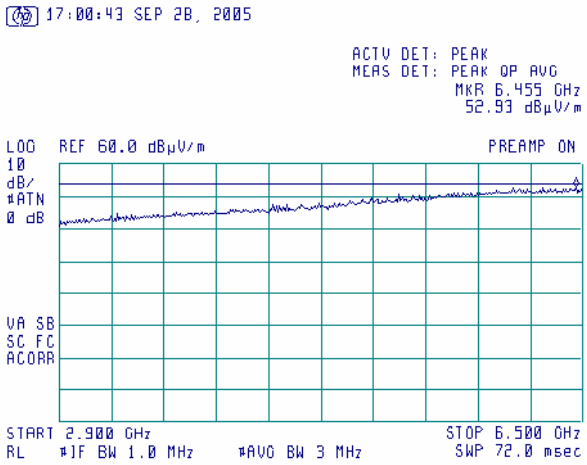
TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



Test specification:	Section 15.109, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

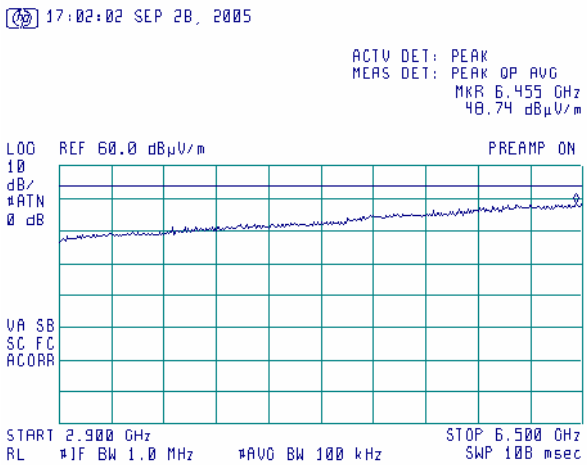
Plot 9.2.5 Radiated emission measurements in 2900 - 6500 MHz range, vertical antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



Plot 9.2.6 Radiated emission measurements in 2900 - 6500 MHz range, vertical antenna polarization

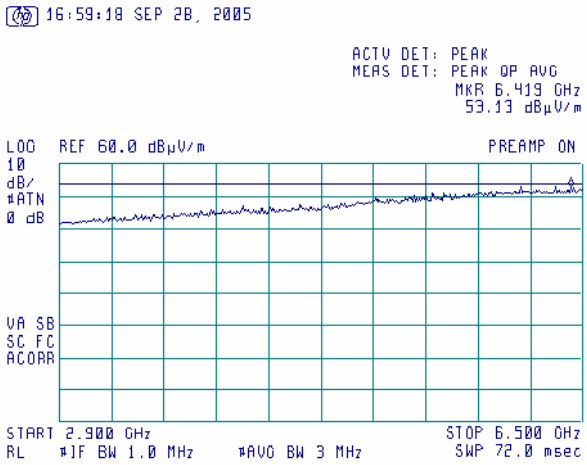
TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



Test specification:	Section 15.109, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

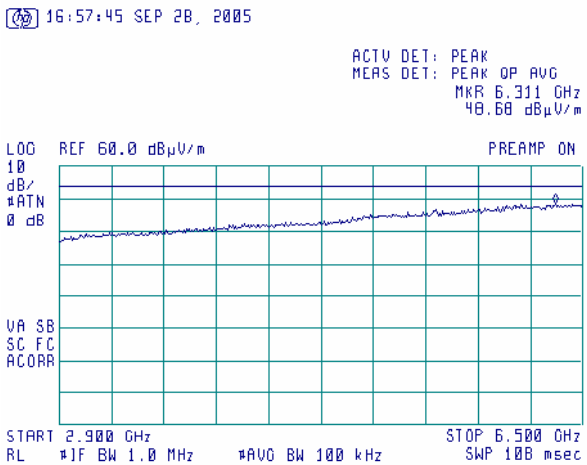
Plot 9.2.7 Radiated emission measurements in 2900 - 6500 MHz range, horizontal antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



Plot 9.2.8 Radiated emission measurements in 2900 - 6500 MHz range, horizontal antenna polarization

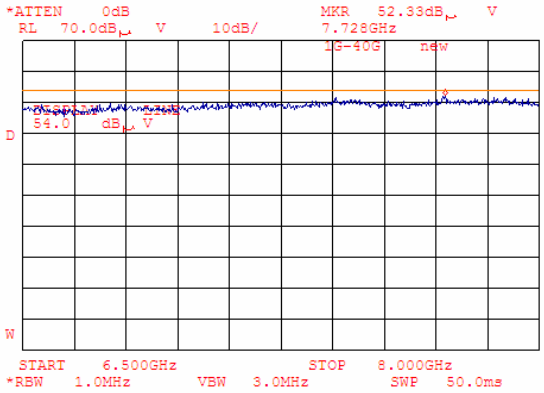
TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



Test specification:	**Section 15.109, Radiated emission**		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	**Verdict:**	PASS
Date:	9/28/2005		
Temperature: 24ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 120 VAC
Remarks:			

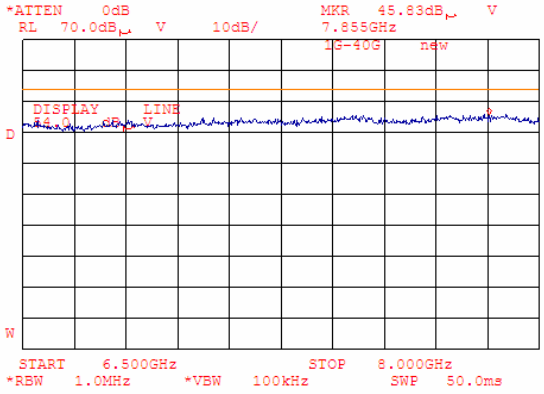
Plot 9.2.9 Radiated emission measurements in 6500 - 8000 MHz range, vertical antenna polarization

TEST SITE: OATS
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



Plot 9.2.10 Radiated emission measurements in 6500 - 8000 MHz range, vertical antenna polarization

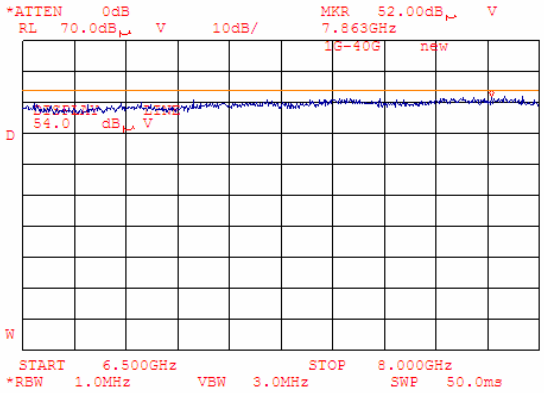
TEST SITE: OATS
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



Test specification:	**Section 15.109, Radiated emission**		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4		
Test mode:	Compliance	**Verdict:**	PASS
Date:	9/28/2005		
Temperature: 24ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 120 VAC
Remarks:			

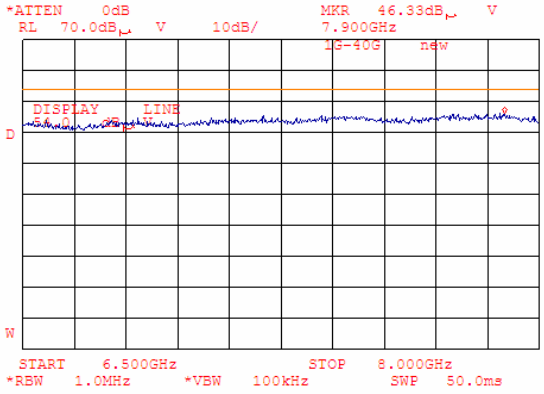
Plot 9.2.11 Radiated emission measurements in 6500 - 8000 MHz range, horizontal antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



Plot 9.2.12 Radiated emission measurements in 6500 - 8000 MHz range, horizontal antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



Test specification:	**Section 15.111, Spurious emissions at RF antenna connector**		
Test procedure:	ANSI C63.4, Section 12.1.5		
Test mode:	Compliance	**Verdict:**	PASS
Date:	9/28/2005		
Temperature: 24ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 120 VAC
Remarks:			

9.3 Spurious emissions at RF antenna connector

9.3.1 General

This test was performed to measure spurious emissions at RF antenna connector of receiver operated within 30 to 960 MHz band or a citizens band (CB) receiver which was tested for compliance with radiated emission limits with the antenna port connected to resistive termination. Specification test limits are given in Table 9.3.1. The test results are provided in Table 9.3.2 and associated plots.

Table 9.3.1 Spurious emission limits

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

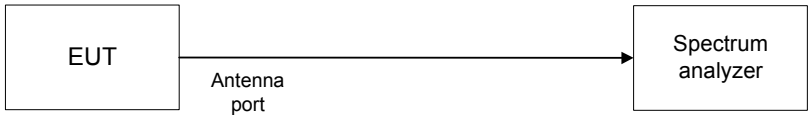
* - harmonic of the highest frequency the EUT generates, uses, operates or tunes to.
** - harmonic of the local oscillator frequency.

9.3.2 Test procedure

9.3.2.1 The EUT was set up as shown in Figure 9.3.1, energized and its proper operation was checked.

9.3.2.2 The spurious emission was measured with spectrum analyzer as provided in Table 9.3.2 and associated plots.

Figure 9.3.1 Spurious emission test setup



Test specification:	**Section 15.111, Spurious emissions at RF antenna connector**		
Test procedure:	ANSI C63.4, Section 12.1.5		
Test mode:	Compliance	**Verdict:**	PASS
Date:	9/28/2005		
Temperature: 24ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 120 VAC
Remarks:			

Table 9.3.2 Spurious emission test results

INVESTIGATED FREQUENCY RANGE: 30 – 10000 MHz
RECEIVER TYPE: Other than CB or superheterodyne
EUT OPERATING MODE: Receive
DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 100 kHz
VIDEO BANDWIDTH: 300 kHz

Frequency, MHz	Spurious emission, dBm	Limit, dBm	Margin, dB	Verdict
Antenna port 1				
149.05	-73.17	-57.0	-16.17	Pass
1970.80	-70.33		-13.33	Pass
Antenna port 2				
1995.30	-70.17	-57.0	-13.17	Pass
Antenna port 3				
1985.70	-70.83	-57.0	-13.83	Pass
Antenna port 4				
1982.30	-70.17	-57.0	-13.17	Pass

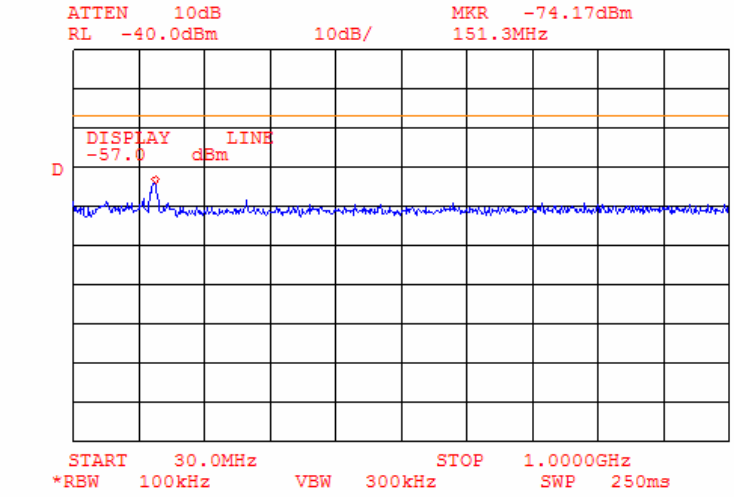
Reference numbers of test equipment used

HL 1424	HL 2399						

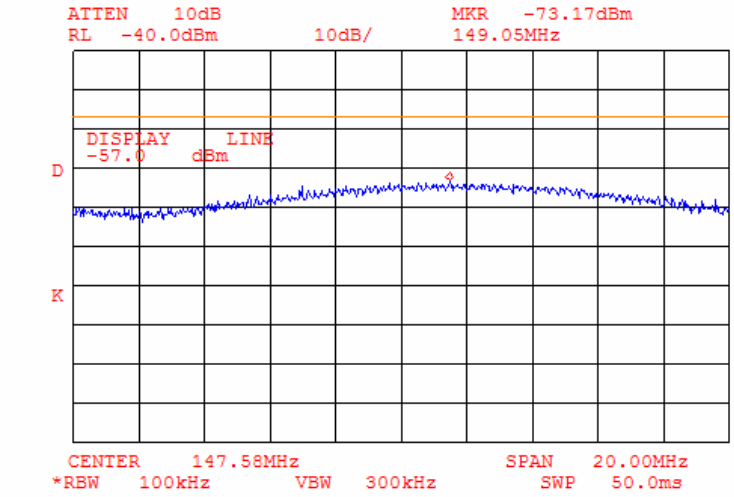
Full description is given in Appendix A.

Test specification:	Section 15.111, Spurious emissions at RF antenna connector		
Test procedure:	ANSI C63.4, Section 12.1.5		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

Plot 9.3.1 Spurious emission test results at antenna port 1 in 30 – 1000 MHz range

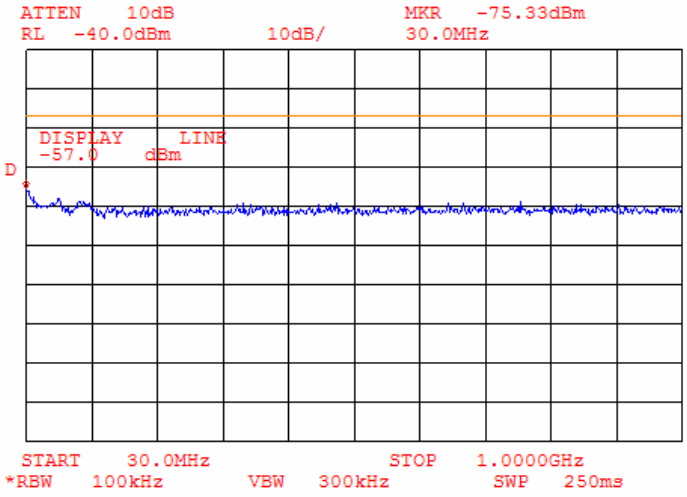


Plot 9.3.2 Spurious emission test results at antenna port 1 at 150 MHz



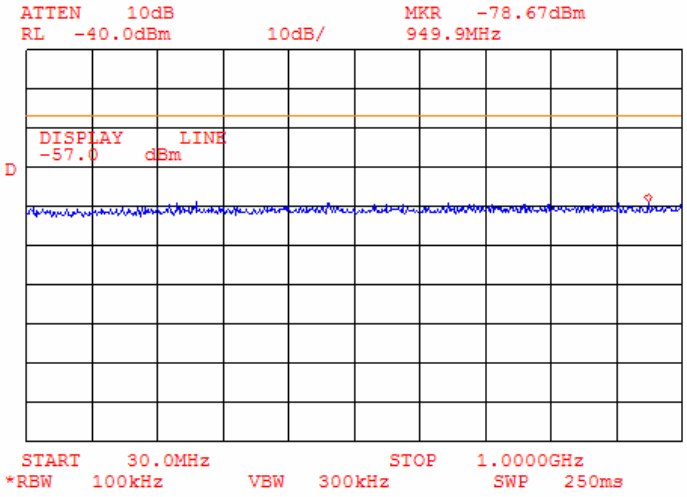
Test specification:	Section 15.111, Spurious emissions at RF antenna connector		
Test procedure:	ANSI C63.4, Section 12.1.5		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

Plot 9.3.3 Spurious emission test results at antenna port 2 in 30 – 1000 MHz range

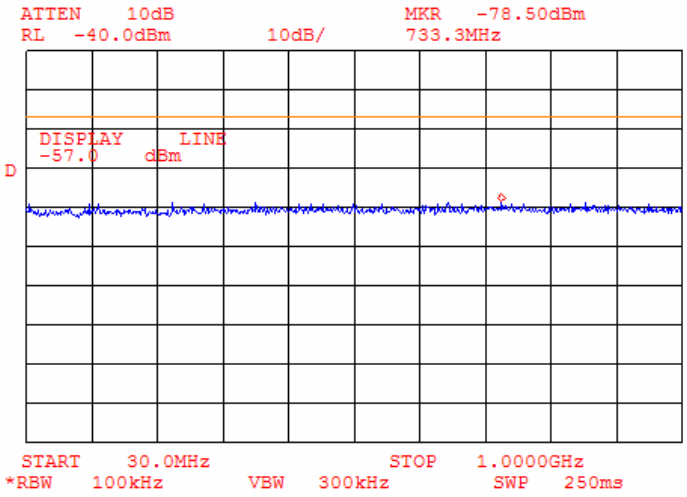


Test specification:	Section 15.111, Spurious emissions at RF antenna connector		
Test procedure:	ANSI C63.4, Section 12.1.5		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

Plot 9.3.4 Spurious emission test results at antenna port 3 in 30 – 1000 MHz range

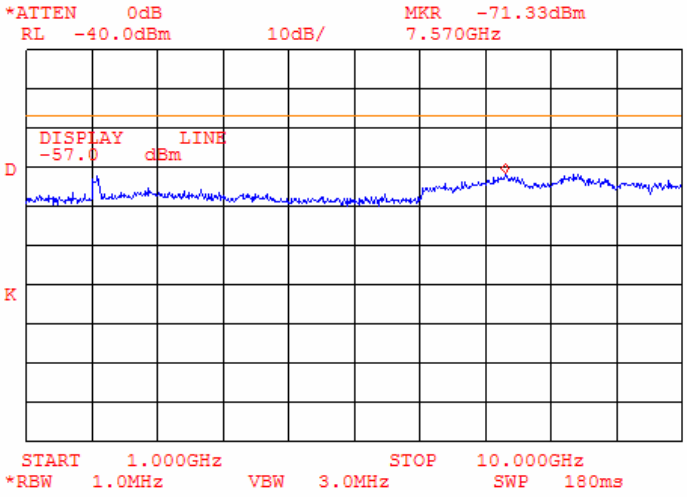


Plot 9.3.5 Spurious emission test results at antenna port 4 in 30 – 1000 MHz range

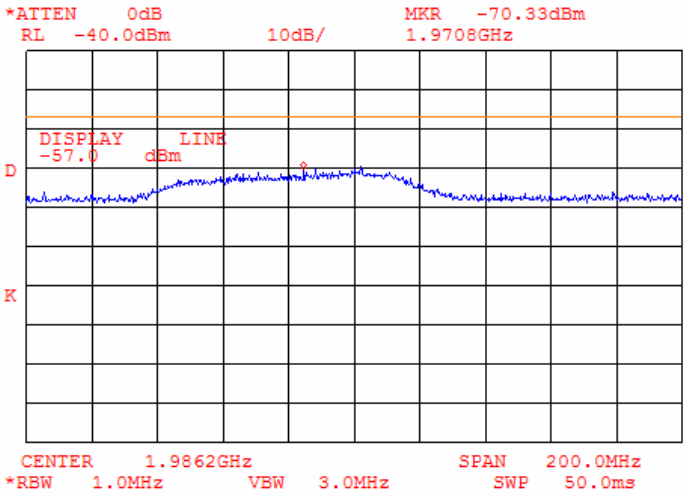


Test specification:	Section 15.111, Spurious emissions at RF antenna connector		
Test procedure:	ANSI C63.4, Section 12.1.5		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

Plot 9.3.6 Spurious emission test results at antenna port 1 in 1.0 – 10.0 GHz range

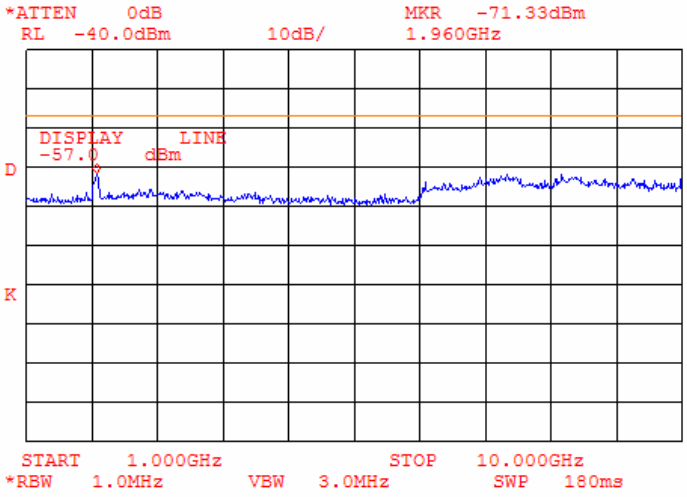


Plot 9.3.7 Spurious emission test results at antenna port 1 at 1.98 GHz

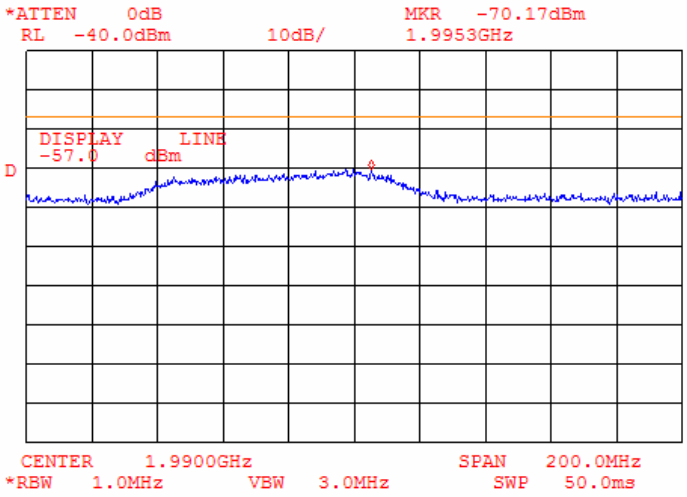


Test specification:	Section 15.111, Spurious emissions at RF antenna connector		
Test procedure:	ANSI C63.4, Section 12.1.5		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

Plot 9.3.8 Spurious emission test results at antenna port 2 in 1.0 – 10.0 GHz range

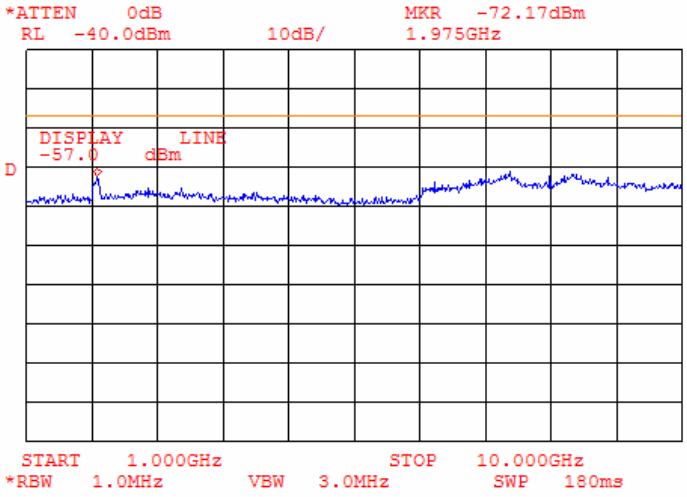


Plot 9.3.9 Spurious emission test results at antenna port 2 at 1.99 GHz

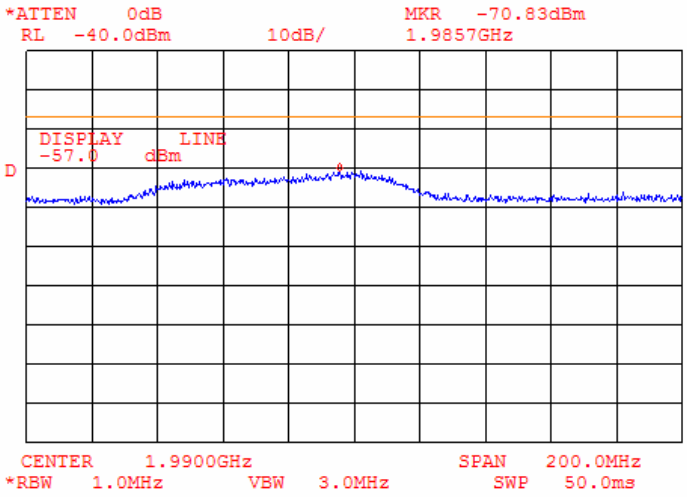


Test specification:	Section 15.111, Spurious emissions at RF antenna connector		
Test procedure:	ANSI C63.4, Section 12.1.5		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

Plot 9.3.10 Spurious emission test results at antenna port 3 in 1.0 – 10.0 GHz range

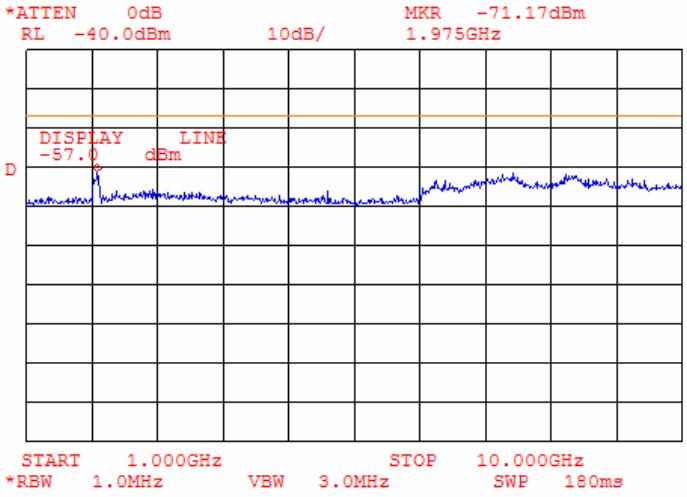


Plot 9.3.11 Spurious emission test results at antenna port 3 at 1.99 GHz

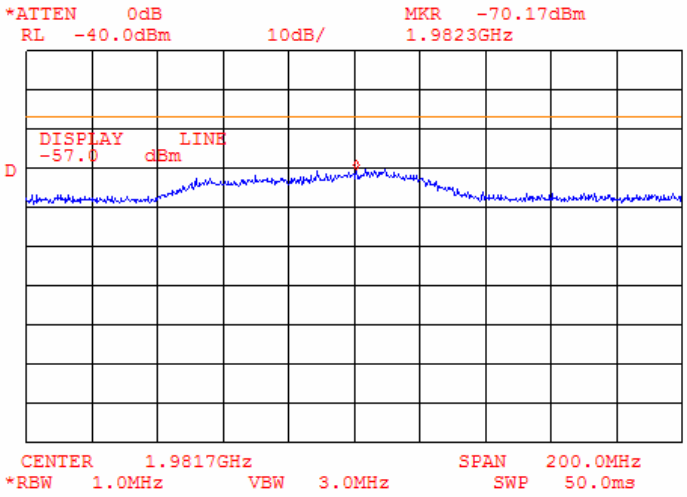


Test specification:	Section 15.111, Spurious emissions at RF antenna connector		
Test procedure:	ANSI C63.4, Section 12.1.5		
Test mode:	Compliance	Verdict:	PASS
Date:	9/28/2005		
Temperature: 24ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

Plot 9.3.12 Spurious emission test results at antenna port 4 in 1.0 – 10.0 GHz range



Plot 9.3.13 Spurious emission test results at antenna port 4 at 1.99 GHz



10 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
0410	Cable, Coax, Microwave, DC-18 GHz, N-N, 1 m	Gore	PFP01P01039.4	9338767	17-Oct-05	17-Oct-06
0446	Antenna, Loop active, 10kHz-30MHz	EMCO	6502	2857	28-Jun-05	28-Jun-06
0447	LISN, 16/2, 300V RMS	HL	LISN 16 - 1	066	03-Nov-05	03-Nov-06
0465	Anechoic Chamber 9(L) x 6.5(W) x 5.5(H) m	HL	AC - 1	023	10-Oct-05	10-Oct-06
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A00319, 3448A00253	10-Oct-05	10-Oct-06
0589	Cable Coaxial, GORE A2P01POL118, 2.3 m	HL	GORE-3	176	10-Oct-05	10-Oct-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	03-Feb-05	03-Feb-06
0594	Turn Table FOR ANECHOIC CHAMBER flush mount d=1.2 m Pneumatic	HL	TT-WDC1	102	27-Jan-05	27-Jan-06
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE 26 - 2000 MHz	EMCO	3141	9611-1011	27-Jan-05	27-Jan-06
0672	Shielded Room 4.6(L) x 4.2(W) x 2.4(H) m	HL	SR - 3	027	10-Jan-05	10-Jan-06
0768	Antenna Standard Gain Horn,18-26.5 GHz, WR-42, K-band, Gain - 25 dB	Quinstar Technology	QWH-4200-BA	110	10-Jan-05	10-Jan-06
0787	Transient Limiter	Hewlett Packard	11947A	3107A01877	21-Nov-05	21-Nov-06
1200	Quadruplexer 1-12 GHz (1-2 GHz; 2-4GHz;4-8 GHz; 8-12GHz)	Elettronica S.p.A. - Roma	UE 84	D/00240	10-Feb-05	10-Feb-06
1424	Spectrum Analyzer, 30 Hz- 40 GHz	Agilent Technologies (HP)	8564EC	3946A00219	30-Aug-05	30-Aug-06
1430	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1431, HL1432	Agilent Technologies (HP)	8542E	3807A00262,3705A00217	01-Sep-05	01-Sep-06
1502	Cable RF, 6 m	Belden	M17/167 MIL-C-17	1502	12-Feb-05	12-Feb-06
1510	Cable RF, 8 m	Belden	M17/167 MIL-C-17	1510	02-Dec-04	02-Dec-05
1941	Cable 18GHz, 4 m, green	Rhophase Microwave Limited	SPS-1803A-4000-NPS	T4657	17-Oct-05	17-Oct-06
1942	Cable 18GHz, 4 m, blue	Rhophase Microwave Limited	SPS-1803A-4000-NPS	T4658	17-Oct-05	17-Oct-06
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	22-Mar-05	22-Mar-06
2009	Cable RF, 8 m	Alpha Wire	RG-214	C-56	02-Dec-05	02-Dec-06
2259	Amplifier Low Noise 2-20 GHz	Sophia Wireless	LNA0220-C	0223	05-Nov-05	05-Nov-06

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
2387	Filter Bandpass, 8-14 GHz	HL	FBP8-14	2387	05-Jun-05	05-Jun-06
2399	Cable 40GHz, 1.5 m, blue	Rhophase Microwave Limited	KPS-1503A-1500-KPS	X2945	24-Jun-05	24-Jun-06
2432	Antenna, Double-Ridged Waveguide Horn 1-18 GHz	EMC Test Systems	3115	00027177	22-Mar-05	22-Mar-06
2499	Quadruplexer 1-12 GHz (1-2 GHz; 2-4GHz;4-8 GHz; 8-12GHz)	Elettronica S.p.A. - Roma	UE 84	D/00239	10-Feb-05	10-Feb-06
2780	EMS analyzer, 100 Hz to 26.5 GHz	Agilent Technologies (HP)	E7405A	MY45102466	11-Jun-05	11-Jun-06

11 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.

12 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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website: www.hermonlabs.com

Person for contact: Mr. Alex Usoskin, CEO.

13 APPENDIX D Specification references

47CFR part 22:2004	Public Mobile Services
47CFR part 24: 2004	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.

14 APPENDIX E Abbreviations and acronyms

A	ampere
AC	alternating current
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
GHz	gigahertz
GND	ground
H	height
HL	Hermon laboratories
Hz	hertz
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
QP	quasi-peak
RE	radiated emission
RF	radio frequency
rms	root mean square
Rx	receive
s	second
T	temperature
Tx	transmit
V	volt

15 APPENDIX F Test equipment correction factors

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

Frequency, kHz	Correction factor, dB
10	4.9
15	2.86
20	1.83
25	1.25
30	0.91
35	0.69
40	0.53
50	0.35
60	0.25
70	0.18
80	0.14
90	0.11
100	0.09
125	0.06
150	0.04

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

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).

Antenna factor
Double-ridged guide horn antenna
Model 3115, serial number: 00027177, HL2432

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

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

Cable loss
Cable GORE, HL 0410

No.	Frequency, GHz	Cable loss, dB
1	0.5	0.16
2	1	0.28
3	2	0.38
4	4	0.55
5	6	0.85
6	8	0.90
7	10	1.07
8	12	1.11
9	14	1.29
10	16	1.41
11	18	1.73

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 coaxial, 6 m, model: M17/167 MIL-C-17, HL 1502

Frequency, MHz	Cable loss, dB
0.1	0.02
1	0.07
3	0.15
5	0.17
10	0.26
30	0.43
50	0.57
80	0.72
100	0.81
300	1.48
500	2.00
800	2.70
1000	3.09

Cable loss
Cable M17/167 MIL-C-17, HL 1510

No.	Frequency, MHz	Cable loss, dB
1	0.1	0.05
2	1	0.09
3	3	0.16
4	5	0.18
5	10	0.27
6	30	0.44
7	50	0.58
8	80	0.69
9	100	0.82
10	300	1.48
11	500	2.01
12	800	2.65
13	1000	3.12

Cable loss
Cable 18 GHz, 4 m, green, model: SPS-1803A-4000-NPS, S/N T4657, HL 1941

Frequency, GHz	Cable loss, dB
0.03	0.39
0.05	0.49
0.1	0.68
0.2	0.95
0.3	1.30
0.5	1.58
0.7	1.84
0.9	2.08
1.1	2.28
1.3	2.56
1.5	2.91
1.7	2.95
1.9	3.17
2.1	3.22
2.3	3.25
2.5	3.39
2.7	3.51
2.9	3.67
3.1	3.81
3.3	3.92
3.5	4.05
3.7	4.14
3.9	4.30
4.1	4.44
4.3	4.55
4.5	4.68
4.7	4.75
4.9	4.84
5.1	4.86
5.3	4.89
5.5	5.00
5.7	5.05
5.9	5.19
6.1	5.28
7.7	5.58

Frequency, GHz	Cable loss, dB
7.9	5.63
8.1	5.67
8.3	5.70
8.5	5.74
8.7	5.78
8.9	5.84
9.1	5.89
9.3	5.94
9.5	6.02
9.7	6.10
9.9	6.12
10.1	6.09
10.3	6.03
10.5	6.01
10.7	6.05
10.9	6.08
11.1	6.10
11.3	6.18
11.5	6.23
11.7	6.20
11.9	6.16
12.1	6.18
12.4	6.33
13.0	6.51
13.5	6.51
14.0	6.75
14.5	6.82
15.0	6.93
15.5	7.16
16.0	7.10
16.5	7.18
17.0	7.67
17.5	7.71
18.0	7.61

Cable loss
Cable 18 GHz, 4 m, blue, model: SPS-1803A-4000-NPS, S/N T4658, HL 1942

Frequency, GHz	Cable loss, dB
0.03	0.21
0.05	0.26
0.10	0.36
0.20	0.50
0.30	0.61
0.40	0.70
0.50	0.78
0.60	0.85
0.70	0.93
0.80	0.99
0.90	1.04
1.00	1.10
1.10	1.16
1.20	1.22
1.30	1.26
1.40	1.31
1.50	1.35
1.60	1.41
1.70	1.45
1.80	1.49
1.90	1.53
2.00	1.57
2.10	1.61
2.20	1.65
2.30	1.69
2.40	1.72
2.50	1.76
2.60	1.79
2.70	1.83
2.80	1.87
2.90	1.90
3.10	1.97
3.30	2.04
3.50	2.11
3.70	2.18
3.90	2.24
4.10	2.31
4.30	2.38
4.50	2.43
4.70	2.53
4.90	2.53
5.10	2.63
5.30	2.65
5.50	2.72
5.70	2.76
5.90	2.79

Frequency, GHz	Cable loss, dB
6.10	2.88
6.30	2.90
6.50	2.97
6.70	3.02
6.90	3.04
7.10	3.07
7.30	3.12
7.50	3.13
7.70	3.19
7.90	3.24
8.10	3.30
8.30	3.36
8.50	3.45
8.70	3.41
8.90	3.45
9.10	3.42
9.30	3.55
9.50	3.48
9.70	3.58
9.90	3.61
10.10	3.66
10.30	3.68
10.50	3.70
10.70	3.70
10.90	3.75
11.10	3.78
11.30	3.86
11.50	3.98
11.70	4.10
11.90	4.12
12.10	4.09
12.40	4.13
13.00	4.23
13.50	4.35
14.00	4.40
14.50	4.44
15.00	4.57
15.50	4.66
16.00	4.64
16.50	4.66
17.00	4.75
17.50	4.85
18.00	4.93

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