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839.01
Electrical

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TEST REPORT

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

FOR:

Mobile Access Networks Ltd.

Wireless network system remote unit

Model: MA2000 cabinet

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:	Wireless network system remote unit
Model(s):	MA2000 cabinet
Type:	2000-CELL-PCSE/L
Receipt date	3/29/2006

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:	17035
Location:	Hermon Laboratories Ltd. P.O.Box 23, Binyamina 30500, Israel
Test started:	4/3/2006
Test completed:	4/9/2006
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.

This test report replaces the previously issued test report identified by Doc ID:MOBRAD_FCC.17035.

	Name and Title	Date	Signature
Tested by:	Mr. A. Adelberg, test engineer	April 9, 2006	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	May 8, 2006	
Approved by:	Mr. M. Nikishin, EMC and Radio group leader	May 9, 2006	

6 EUT description

6.1 General information

The EUT, MA2000 cabinet, 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 system remote unit (RU or 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 RU supports two different services (one high-band and one low-band) and provides coax connections to up to four antennas. The RU filters and amplifies the optic signal received from the base unit according to the service it supports.
At the base unit (BU), the RF signals are converted to optical signals and transmitted over the optic fiber to (service-specific) RUs at the remote locations. At the remote locations, the RUs, which are housed in an MA 2000 Cabinet, reconvert the optical signal to RF. At the 2000 Cabinet the services are converged and distributed over the coax antenna infrastructure.

6.2 Ports and lines

Port type	Port description	Connected		Connector type	Qty.	Cable type	Cable length
		From	To				
Power	AC	EUT	mains	IEC 60320	1	unshielded	1.5 m
Power	48 VDC	EUT	DC power supply	DC jack	1	unshielded	1.5 m
Signal	From/to base	EUT	Base unit	Fiberoptic	2	fiberoptic	10 m
Signal	RS232	EUT	Open circuit	D-type 9 pin	1	unshielded	1.5 m
RF	Antenna	EUT	50 Ohm termination	N-type	4	NA	NA
Signal	RF	EUT P1	Cavity filter	SMA	1	shielded	0.4 m
Signal	RF	EUT P5	RU port 2	SMA	1	shielded	0.4 m
Signal	RF	P2, P3, P4, P6, P7, P8	50 Ohm termination	SMA	6	NA	NA
Signal	RF	RU port 1	Cavity filter	N-type	1	shielded	0.4 m
Signal	RF	RU port 4	Cavity filter	N-type	1	shielded	0.4 m
Signal	RF	RU port 3	50 Ohm termination	N-type	1	NA	NA
Signal	RS232	RU	Open circuit	D-type 9 pin	1	unshielded	1.5 m
Power	48 V DC	EUT	RU	DC jack	1	unshielded	0.1 m

6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
Base unit	Mobile Access	8 links	NA
Power supply	Lambda	JWS150-48/A	V0A-236C03-0012W3701

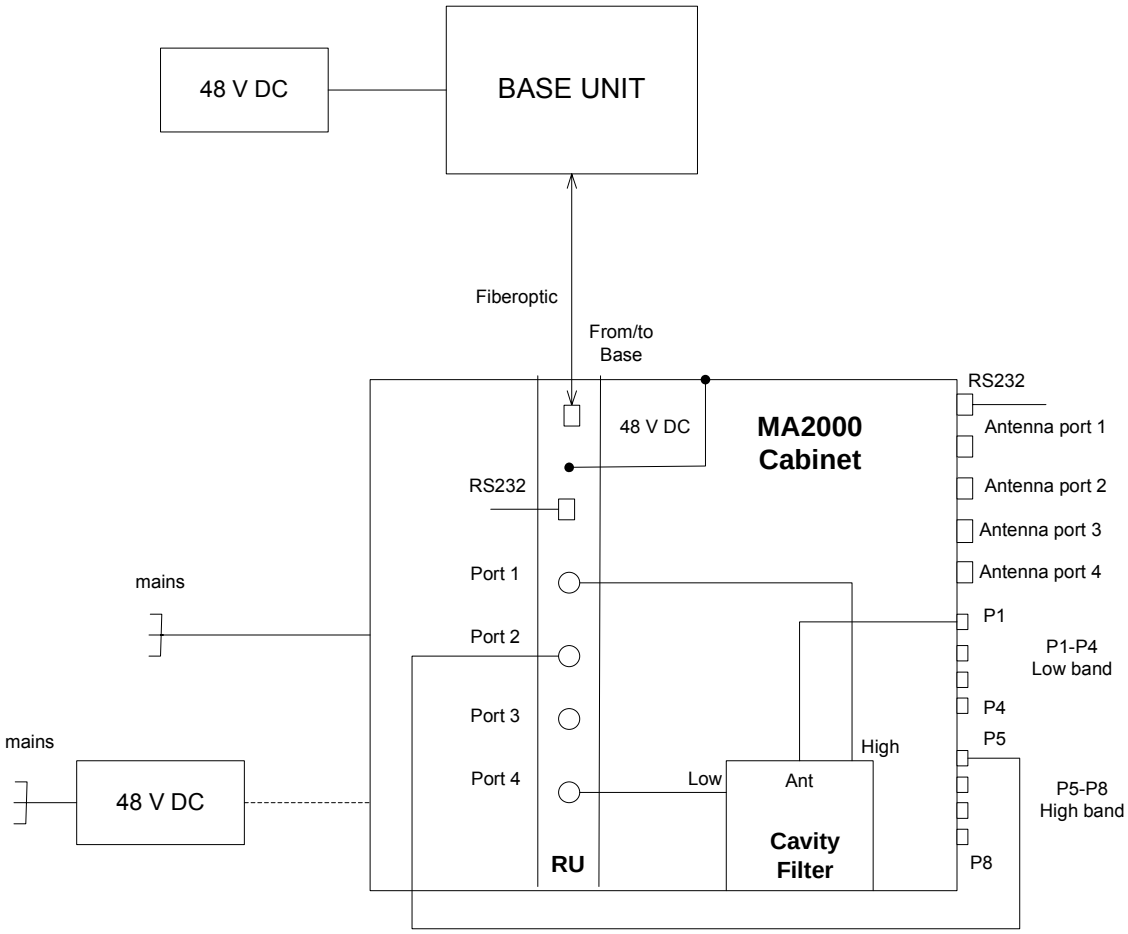
6.4 Operating frequencies

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		18 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)				
Transmitter aggregate data rate/s	48.6 kbps (TDMA), 1.2288 MBps (CDMA), 270.833 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					
	1) DC or 2) AC	**Nominal rated voltage**	20 - 48 VDC 120 V/60 Hz		

Test specification:	Section 22.913, Peak output power		
Test procedure:	FCC part 22, Section 22.913		
Test mode:	Compliance	Verdict:	PASS
Date:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
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

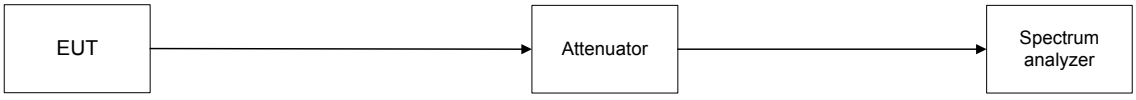
7.1.2 Test procedure

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:	4/3/2006		
Temperature: 22ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 46 %	**Power Supply:** 120 VAC
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: 48.6 kbps/1.2288 Mbps
MAXIMUM INPUT SIGNAL: -20 dBm
ANTENNA OUTPUT PORT: Port 1 (worst case)

Carrier frequency, MHz	Spectrum analyzer reading, dBm	External attenuation& cable loss, dB	RF output power, dBm	Antenna gain, dBd	ERP, dBm	Limit, dBm	Margin*, dB	Verdict
TDMA modulation								
869.00	15.01	included	15.01	7.85	22.95	57.0	-34.05	Pass
881.50	17.82	included	17.82	7.85	25.67	57.0	-31.33	Pass
894.00	15.20	included	15.20	7.85	23.05	57.0	-33.95	Pass
CDMA modulation								
870.20	16.23	included	16.23	7.85	24.08	57.0	-32.92	Pass
881.50	18.08	included	18.08	7.85	25.93	57.0	-31.07	Pass
892.80	16.66	included	16.66	7.85	24.51	57.0	-32.49	Pass

*Margin = ERP – specification limit

Reference numbers of test equipment used

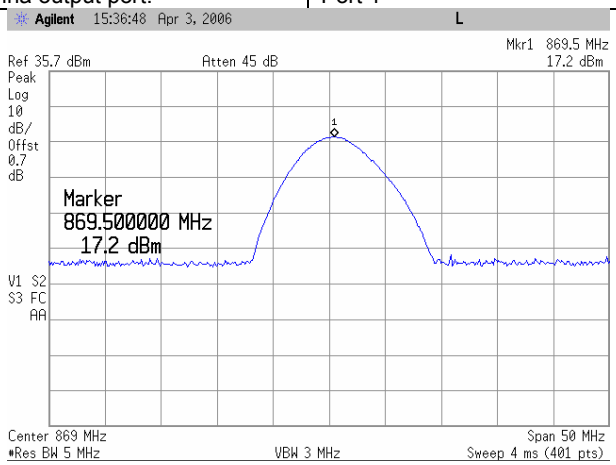
HL 2780							

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:	4/3/2006		
Temperature: 22ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 46 %	**Power Supply:** 120 VAC
Remarks:			

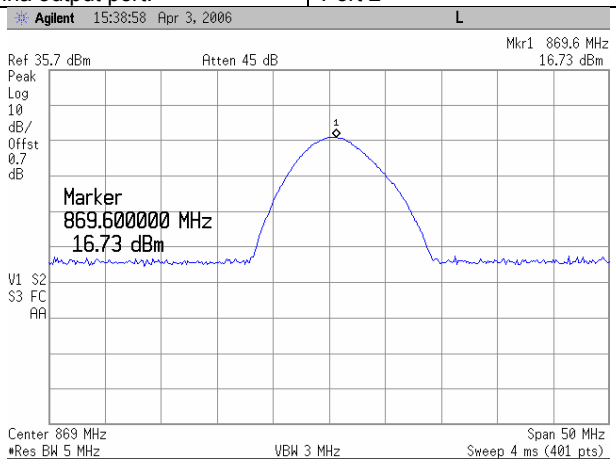
Plot 7.1.1 RF output power measurements at low frequency carrier

Worst case detection:	
Antenna output port:	Port 1



Plot 7.1.2 RF output power measurements at low frequency carrier

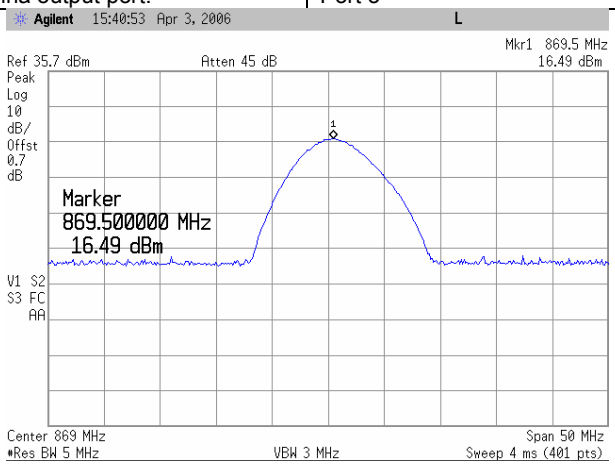
Worst case detection:	
Antenna output port:	Port 2



Test specification:	Section 22.913, Peak output power		
Test procedure:	FCC part 22, Section 22.913		
Test mode:	Compliance	Verdict:	PASS
Date:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

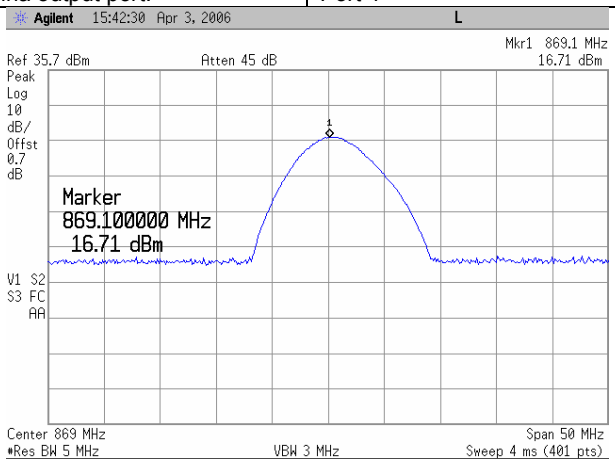
Plot 7.1.3 RF output power measurements at low frequency carrier

Worst case detection:	
Antenna output port:	Port 3



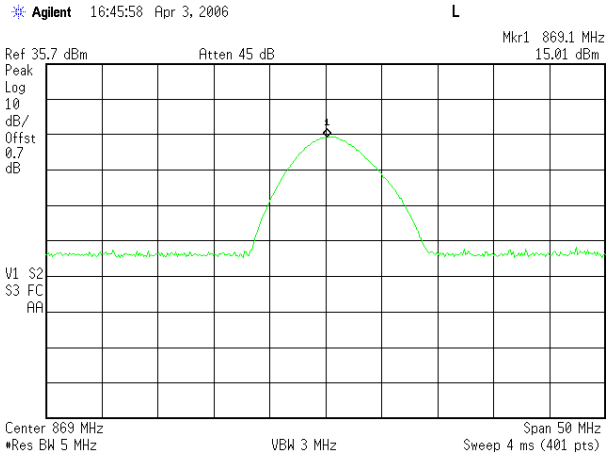
Plot 7.1.4 RF output power measurements at low frequency carrier

Worst case detection:	
Antenna output port:	Port 4

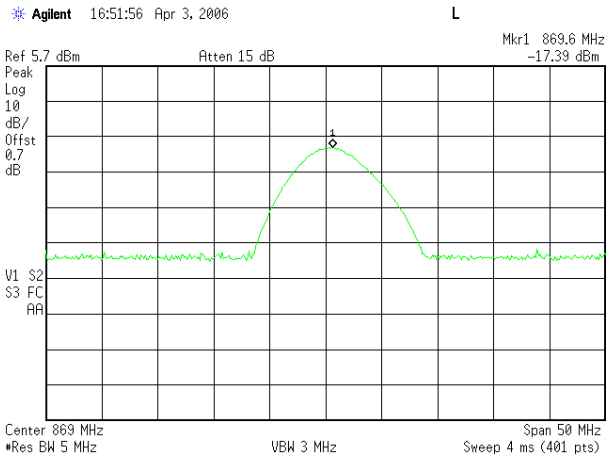


Test specification:	Section 22.913, Peak output power		
Test procedure:	FCC part 22, Section 22.913		
Test mode:	Compliance	Verdict:	PASS
Date:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

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

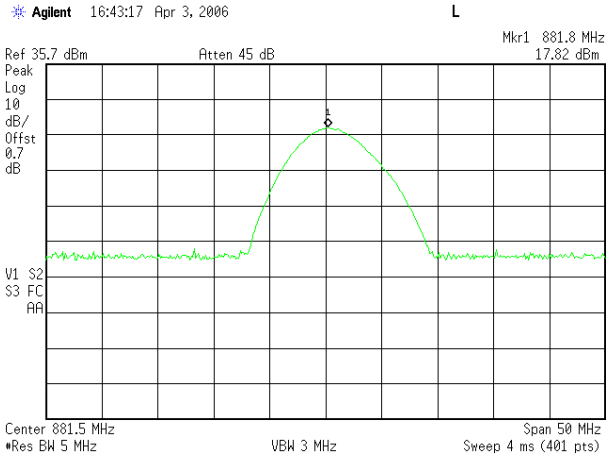


Plot 7.1.6 RF input power measurements at low frequency carrier, Cell 800, TDMA modulation

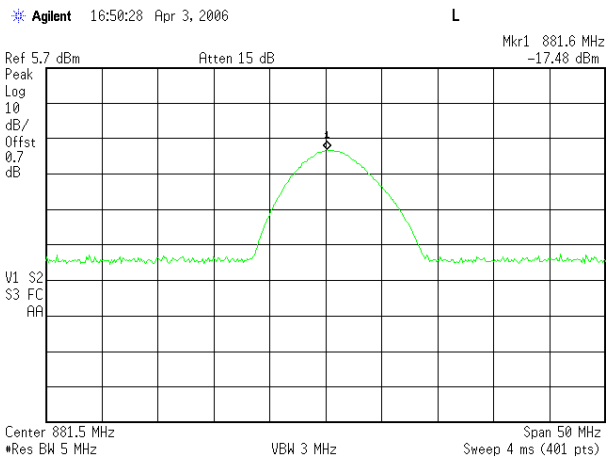


Test specification:	Section 22.913, Peak output power		
Test procedure:	FCC part 22, Section 22.913		
Test mode:	Compliance	Verdict:	PASS
Date:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.7 RF output power measurements at mid frequency carrier, Cell 800, TDMA modulation

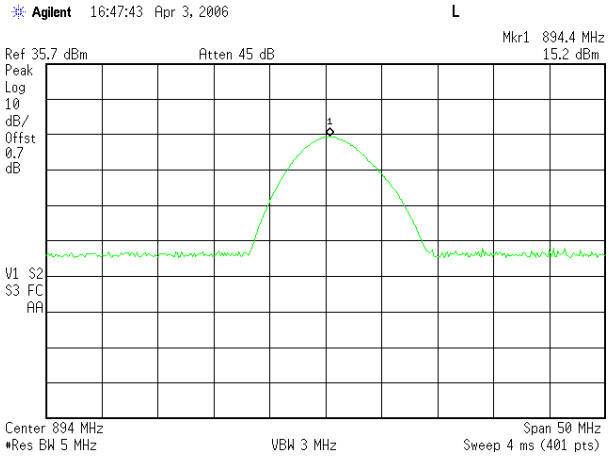


Plot 7.1.8 RF input power measurements at mid frequency carrier, Cell 800, TDMA modulation

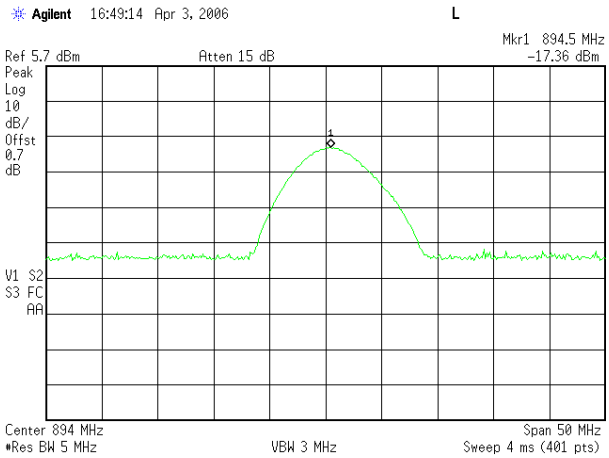


Test specification:	**Section 22.913, Peak output power**		
Test procedure:	FCC part 22, Section 22.913		
Test mode:	Compliance	Verdict:	PASS
Date:	4/3/2006		
Temperature: 22ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 46 %	**Power Supply:** 120 VAC
Remarks:			

Plot 7.1.9 RF output power measurements at high frequency carrier, Cell 800, TDMA modulation

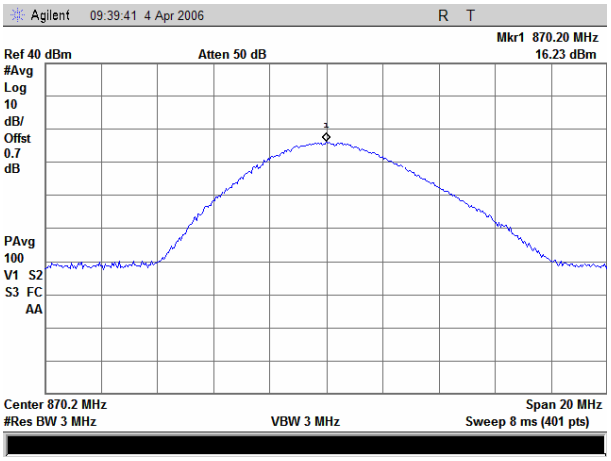


Plot 7.1.10 RF input power measurements at high frequency carrier, Cell 800, TDMA modulation

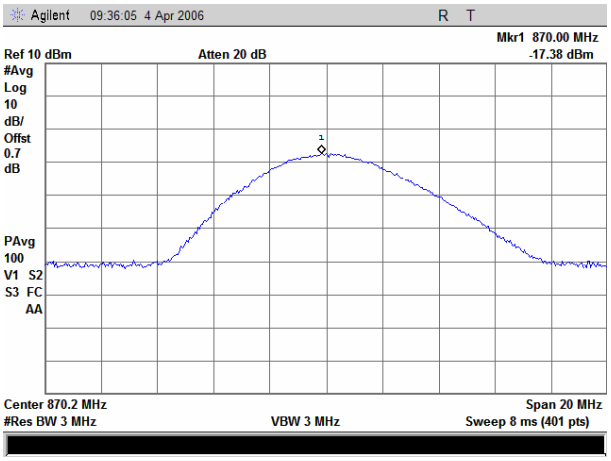


Test specification:	Section 22.913, Peak output power		
Test procedure:	FCC part 22, Section 22.913		
Test mode:	Compliance	Verdict:	PASS
Date:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

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

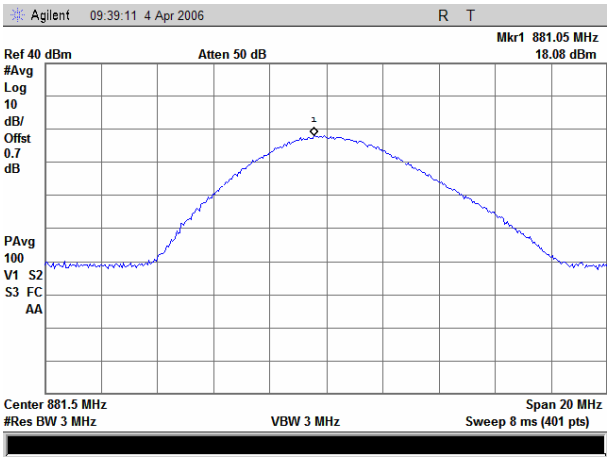


Plot 7.1.12 RF input power measurements at low frequency carrier, Cell 800, CDMA modulation

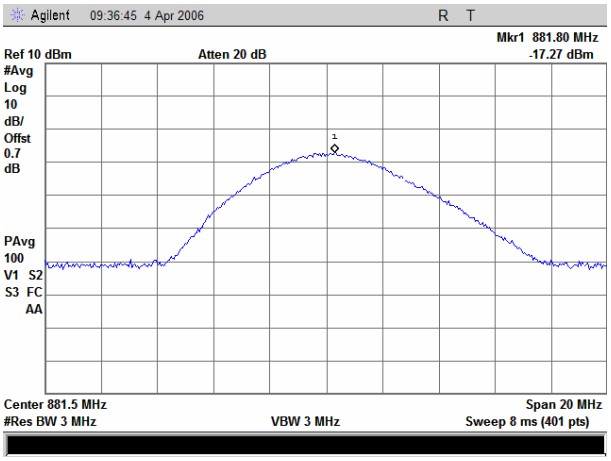


Test specification:	Section 22.913, Peak output power		
Test procedure:	FCC part 22, Section 22.913		
Test mode:	Compliance	Verdict:	PASS
Date:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.13 RF output power measurements at mid frequency carrier, Cell 800, CDMA modulation

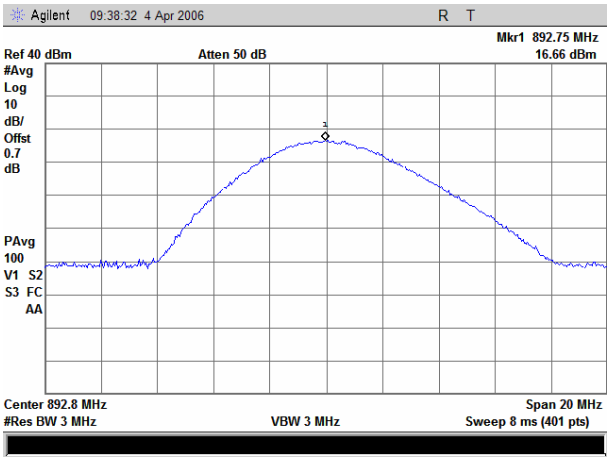


Plot 7.1.14 RF input power measurements at mid frequency carrier, Cell 800, CDMA modulation

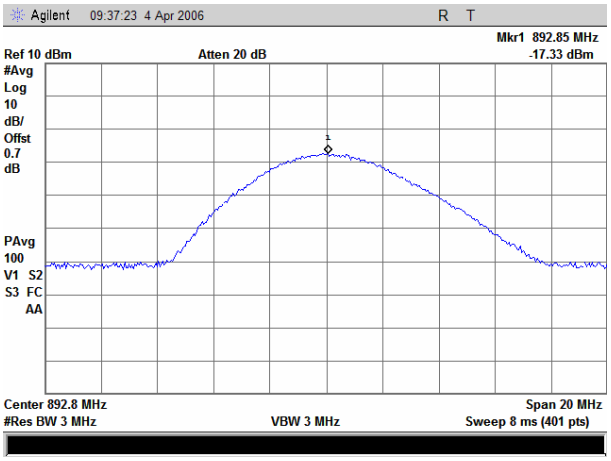


Test specification:	**Section 22.913, Peak output power**		
Test procedure:	FCC part 22, Section 22.913		
Test mode:	Compliance	Verdict:	PASS
Date:	4/3/2006		
Temperature: 22ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 46 %	**Power Supply:** 120 VAC
Remarks:			

Plot 7.1.15 RF output power measurements at high frequency carrier, Cell 800, CDMA modulation



Plot 7.1.16 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:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
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.

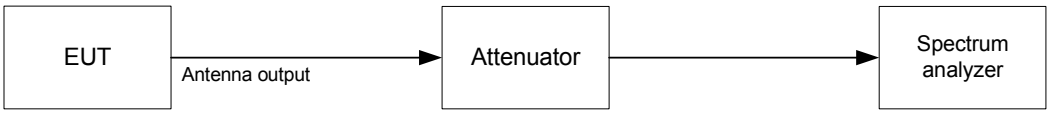
7.2.2.2 The occupied bandwidth was measured with spectrum analyzer as provided in Table 7.2.1 and associated plots. The measurements were performed at the EUT input and output ports at maximum input signals for low, middle and high carrier (channel) frequencies.

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:	4/4/2006		
Temperature: 22ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 48 %	**Power Supply:** 120 VAC
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: 48.6 kbps
RESOLUTION BANDWIDTH: 1 kHz
VIDEO BANDWIDTH: 3 kHz

Carrier frequency, MHz	Input occupied bandwidth, kHz	Output occupied bandwidth, kHz	Margin*, kHz
869.00	32.25	32.25	0.00
881.50	32.50	32.25	0.25
894.00	32.25	32.25	0.00

DETECTOR USED: RMS
MODULATION: CDMA
BIT RATE: 1.2288 Mbps
RESOLUTION BANDWIDTH: 300 kHz
VIDEO BANDWIDTH: 1 MHz

Carrier frequency, MHz	Input occupied bandwidth, kHz	Output occupied bandwidth, kHz	Margin*, kHz
870.20	1900.0	1912.5	-12.5
881.50	1900.0	1937.5	-37.5
892.80	1937.5	1925.0	12.5

*Margin = Input occupied bandwidth – output occupied bandwidth

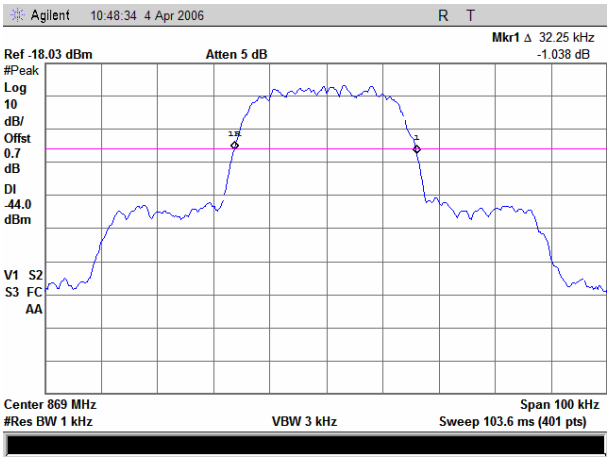
Reference numbers of test equipment used

HL 2780							

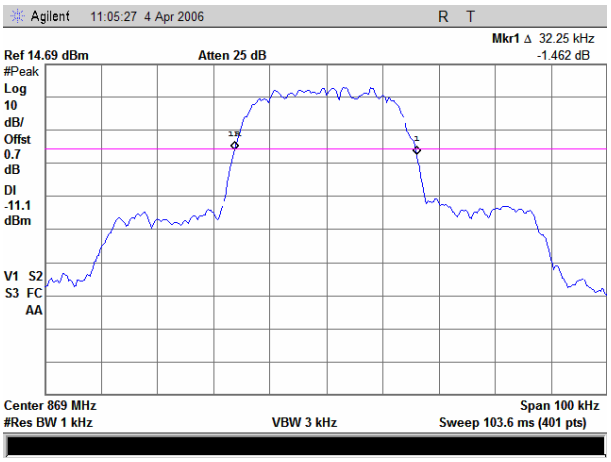
Full description is given in Appendix A.

Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	FCC part 2, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

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

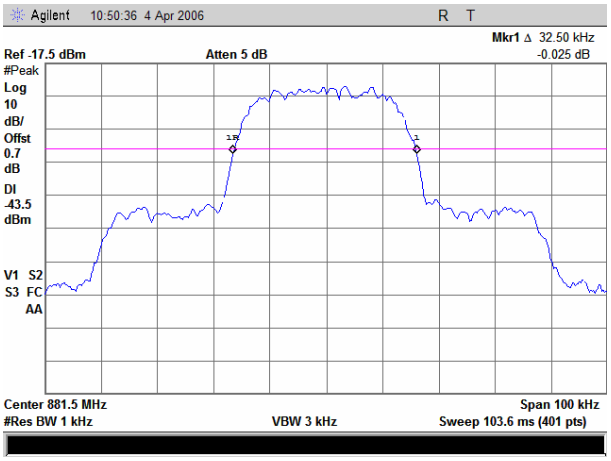


Plot 7.2.2 Output occupied bandwidth measurements at low frequency carrier, Cell 800, TDMA modulation

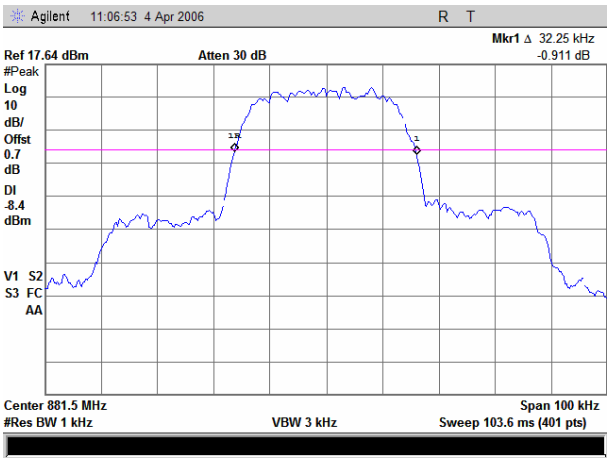


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	FCC part 2, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

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

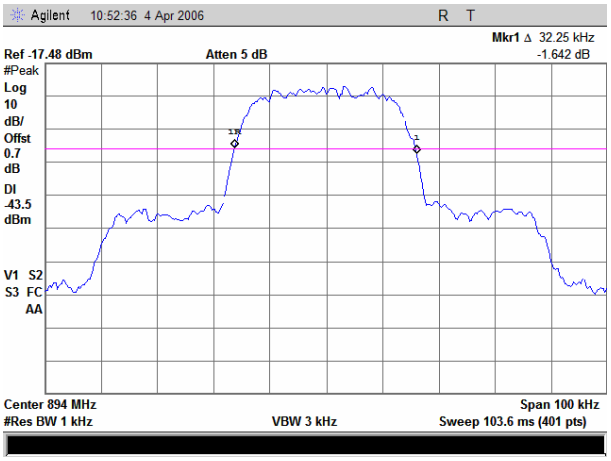


Plot 7.2.4 Output occupied bandwidth measurements at mid frequency carrier, Cell 800, TDMA modulation

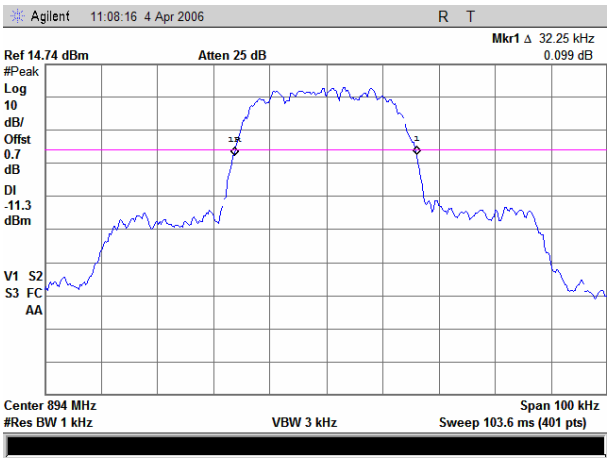


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	FCC part 2, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

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

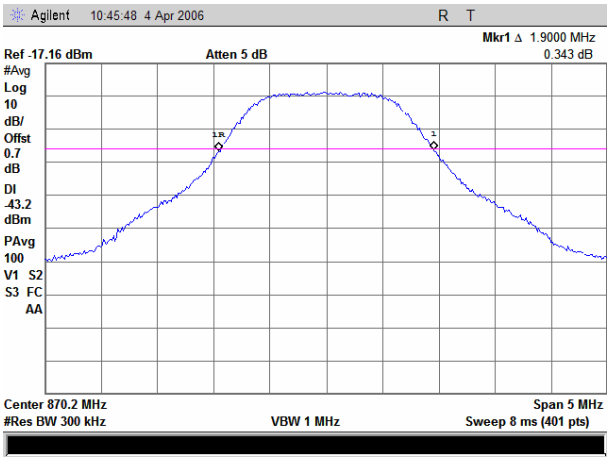


Plot 7.2.6 Output occupied bandwidth measurements at high frequency carrier, Cell 800, TDMA modulation

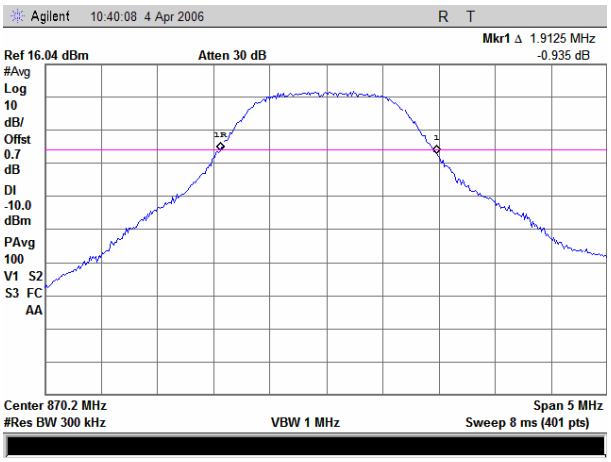


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	FCC part 2, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

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

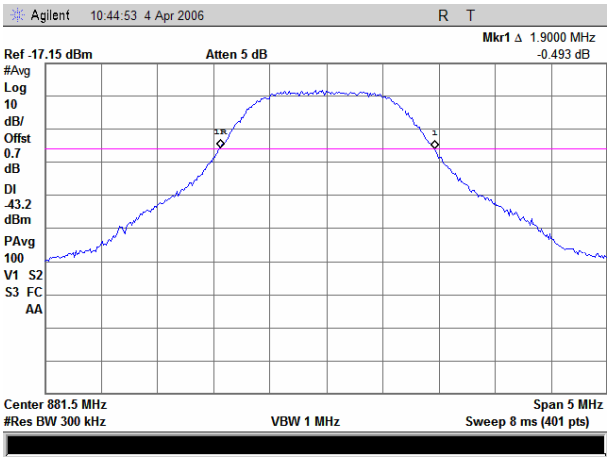


Plot 7.2.8 Output occupied bandwidth measurements at low frequency carrier, Cell 800, CDMA modulation

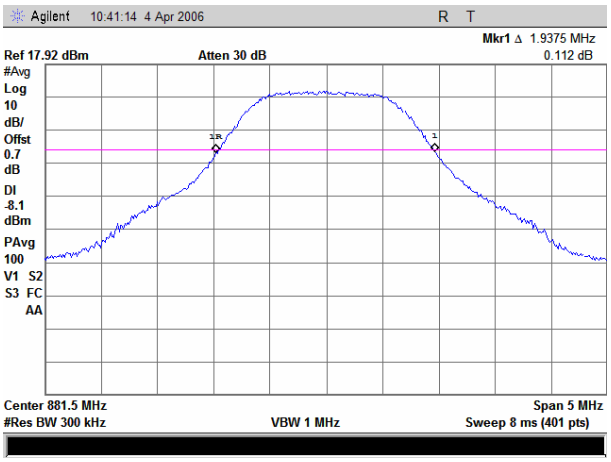


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	FCC part 2, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

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

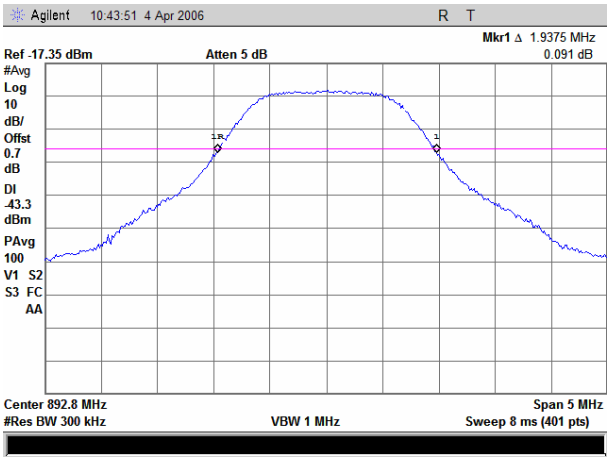


Plot 7.2.10 Output occupied bandwidth measurements at mid frequency carrier, Cell 800, CDMA modulation

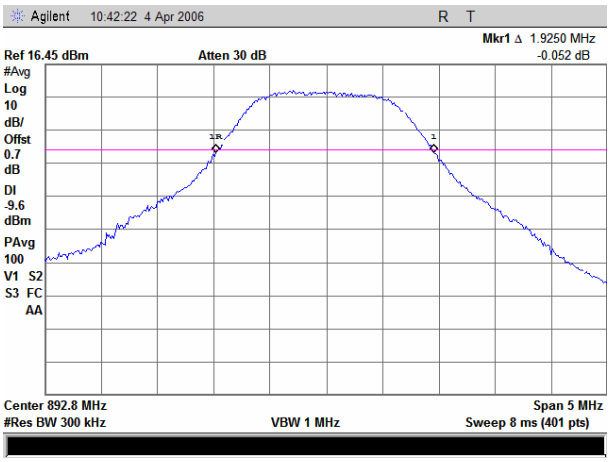


Test specification:	Section 2.1049, Occupied bandwidth		
Test procedure:	FCC part 2, Section 2.1049		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

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:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
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

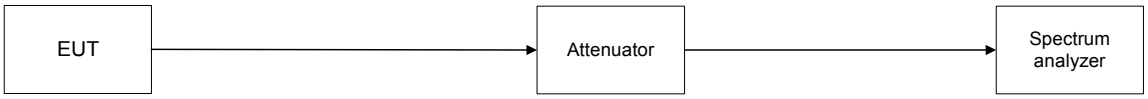
Frequency, MHz	Attenuation below carrier, dBc	ERP of spurious, dBm
0.009 – 10th harmonic*	43+10logP*	-13.0

- 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:	4/4/2006		
Temperature: 22ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 48 %	**Power Supply:** 120 VAC
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 / 1.2288 Mbps
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									
844.175	-37.42	Included	Included	100	-37.42	52.43	28.01	24.42	Pass
869.000	-15.76	Included	Included	100	-15.76	30.77	28.01	2.76	Pass
894.000	-16.67	Included	Included	100	-16.67	31.68	28.01	3.67	Pass
918.840	-42.67	Included	Included	100	-42.67	57.68	28.01	29.67	Pass
1937.000	-51.39	Included	Included	100	-51.39	66.40	28.01	38.39	Pass
1763.000	-47.23	Included	Included	100	-47.23	62.24	28.01	34.23	Pass
CDMA modulation									
868.728	-27.94	Included	Included	100	-27.94	44.17	29.23	14.94	Pass
894.015	-21.66	Included	Included	100	-21.66	37.89	29.23	8.66	Pass
1989.000	-41.82	Included	Included	100	-41.82	58.05	29.23	28.82	Pass

*****- Margin = Spurious emission – specification limit.
**- $Limit_{TDMA} = 43+10*\log(P_W) = 43+10*\log(0.032) = 28.01$ dBc
$Limit_{CDMA} = 43+10*\log(P_W) = 43+10*\log(0.042) = 29.23$ dBc
***- Attenuation below $carrier_{TDMA} = 15.01 –$ Spurious emission
Attenuation below $carrier_{CDMA} = 16.23 –$ Spurious emission

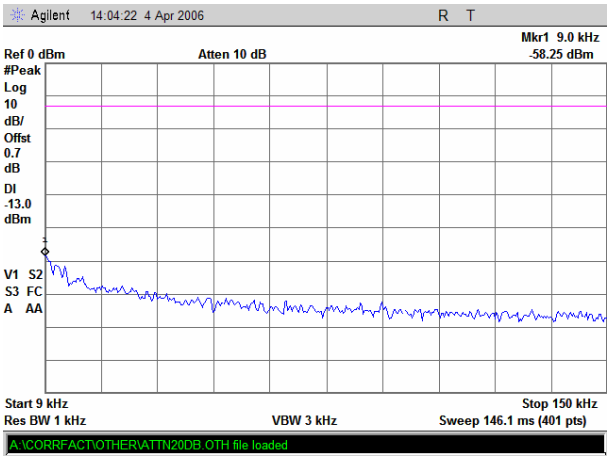
Reference numbers of test equipment used

HL 2780						

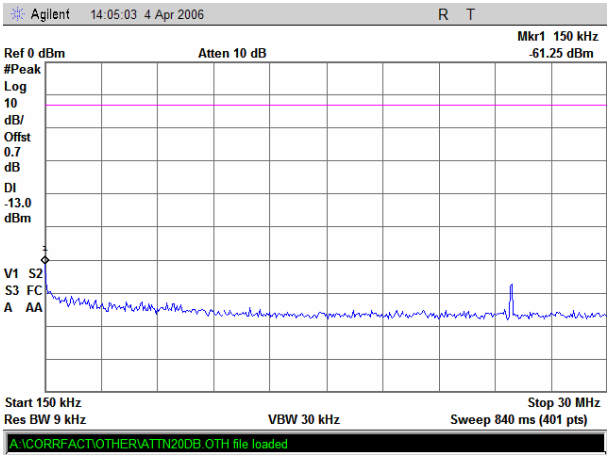
Full description is given in Appendix A.

Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

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

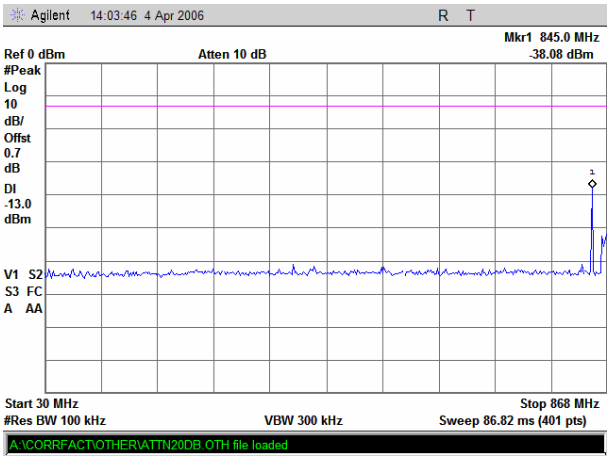


Plot 7.3.2 Spurious emission measurements in 0.15 - 30 MHz range, Cell 800, TDMA modulation

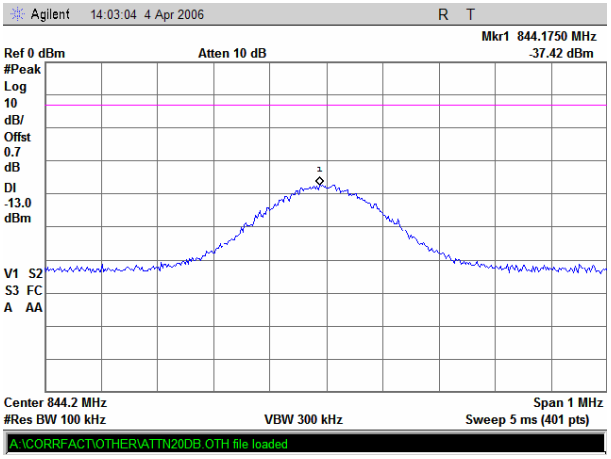


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

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

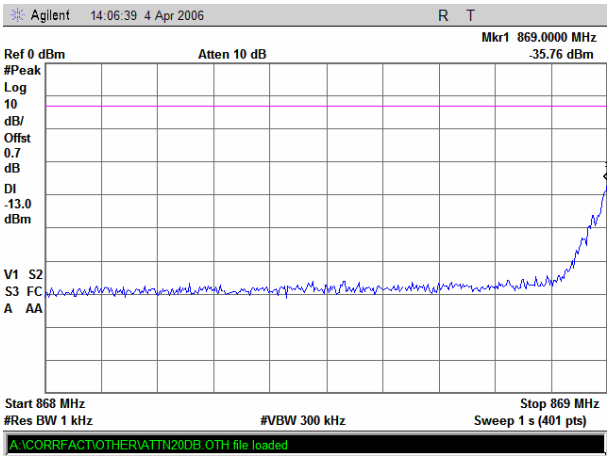


Plot 7.3.4 Spurious emission measurements at 844 MHz, Cell 800, TDMA modulation



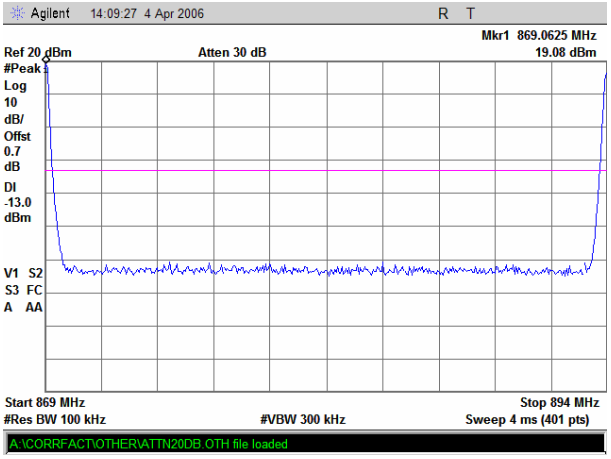
Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

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



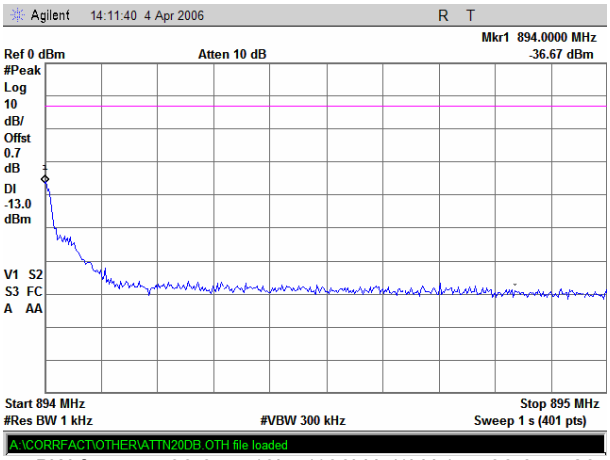
Note: Signal power = SA reading + BW factor = -35.76 + 10log(100kHz/1kHz) = -35.76 + 20 dB = -15.76 dBm

Plot 7.3.6 Spurious emission measurements in 869 - 894 MHz range, Cell 800, TDMA modulation



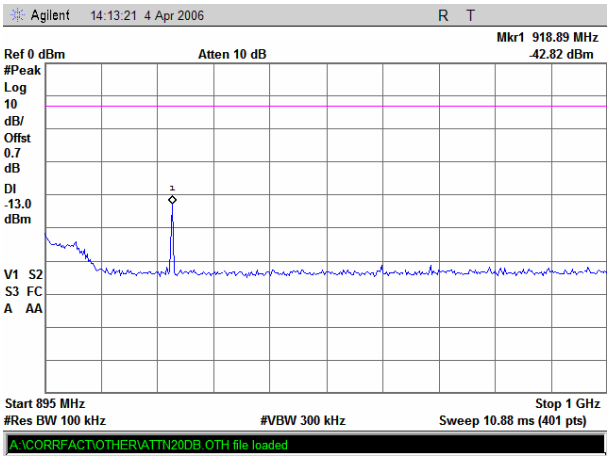
Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

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



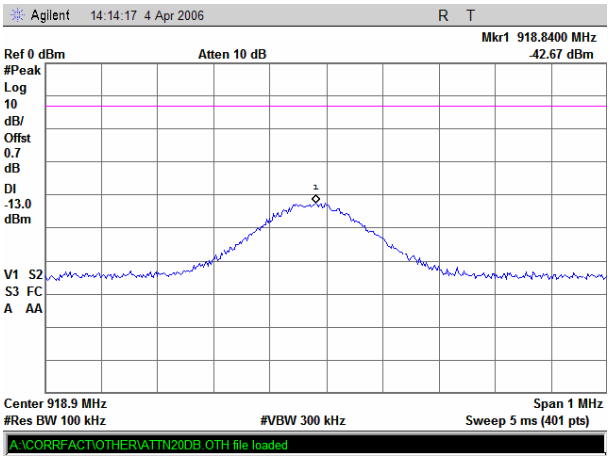
Note: Signal power = SA reading + BW factor = -36.67 + 10log(100kHz/1kHz) = -36.67 + 20 dB = -16.67 dBm

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

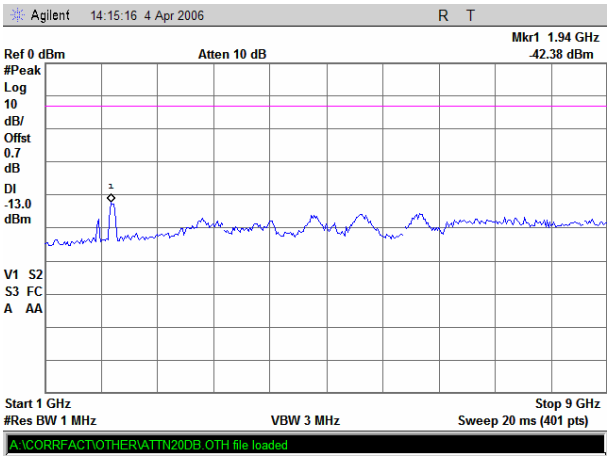


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 7.3.9 Spurious emission measurements at 919 MHz, Cell 800, TDMA modulation

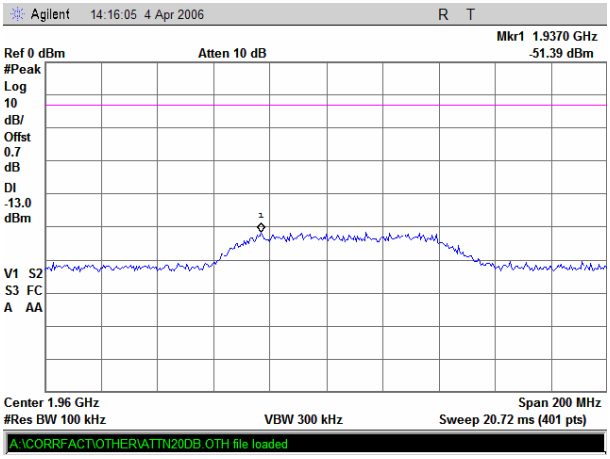


Plot 7.3.10 Spurious emission measurements in 1 - 9 GHz range, Cell 800, TDMA modulation

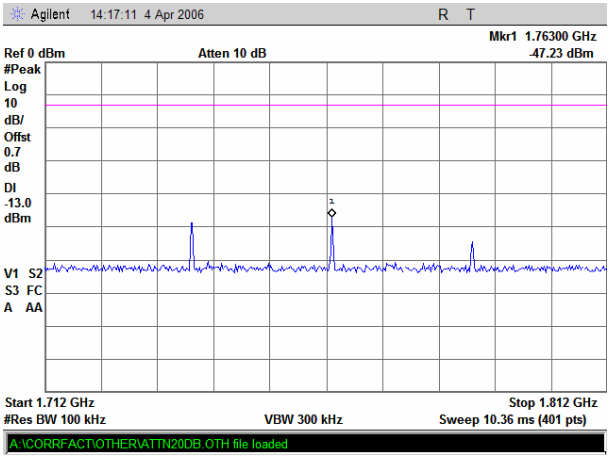


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 7.3.11 Spurious emission measurements at 1960 MHz, Cell 800, TDMA modulation

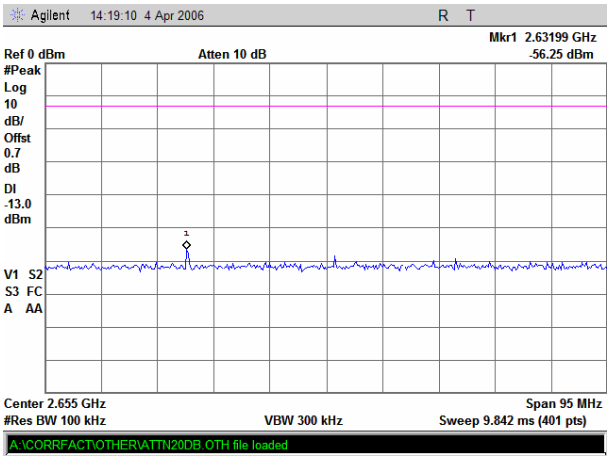


Plot 7.3.12 Conducted spurious emission measurements at the 2nd harmonic, Cell 800, TDMA modulation

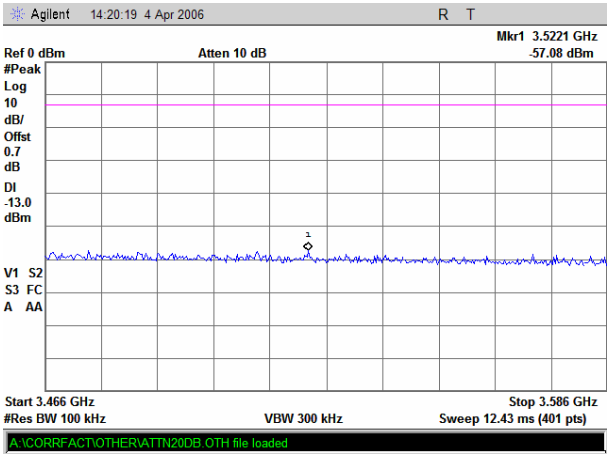


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

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

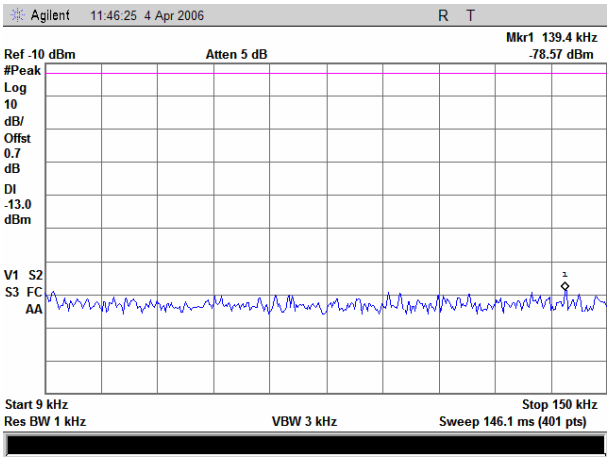


Plot 7.3.14 Conducted spurious emission measurements at the 4th harmonic, Cell 800, TDMA modulation

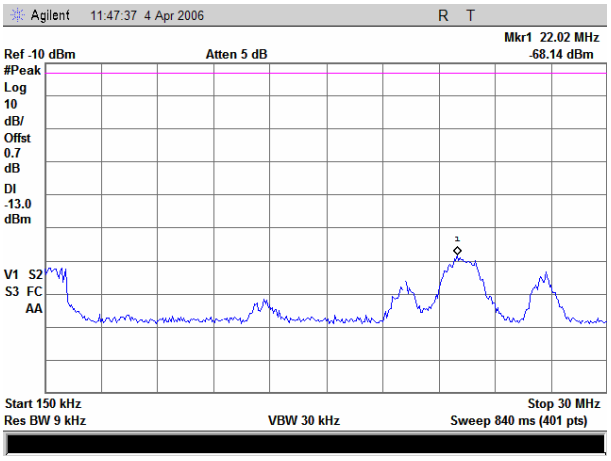


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 7.3.15 Spurious emission measurements in 9 - 150 kHz range, Cell 800, CDMA modulation

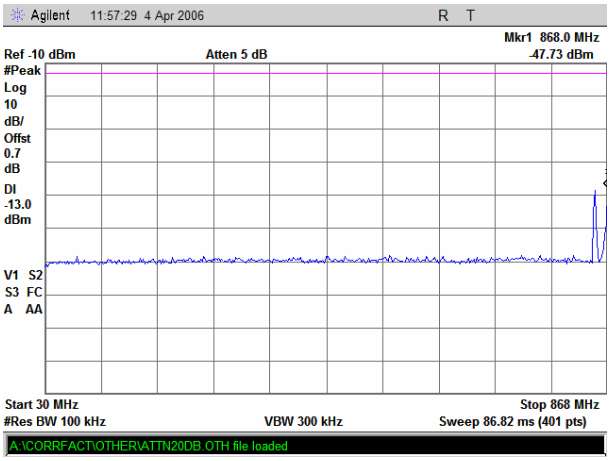


Plot 7.3.16 Spurious emission measurements in 0.15 - 30 MHz range, Cell 800, CDMA modulation

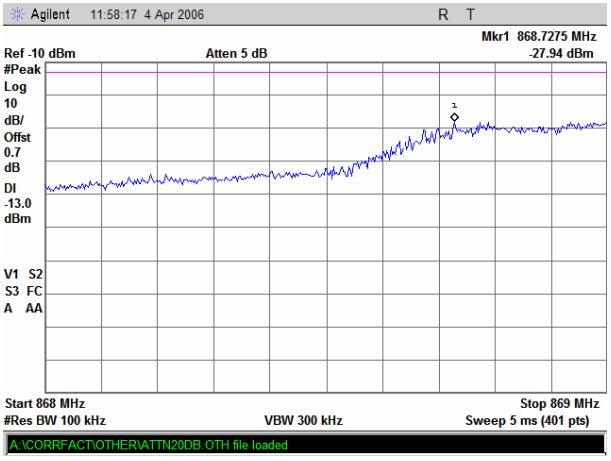


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 7.3.17 Spurious emission measurements in 30 - 868 MHz range, Cell 800, CDMA modulation

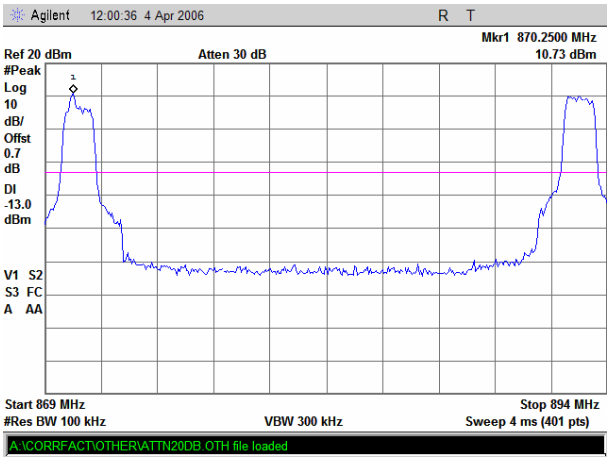


Plot 7.3.18 Spurious emission measurements in 868 - 869 MHz range, Cell 800, CDMA modulation

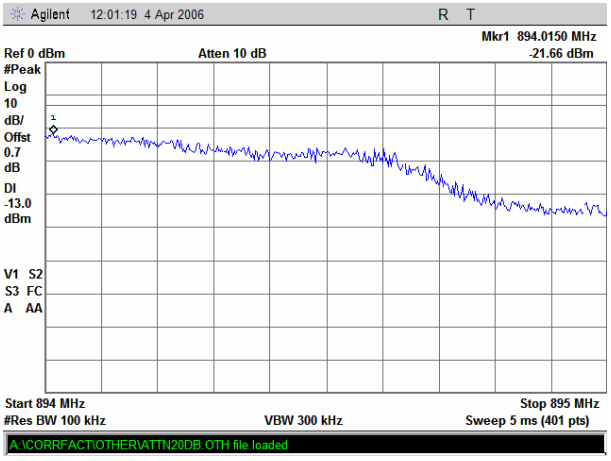


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 7.3.19 Spurious emission measurements in 868 - 894 MHz range, Cell 800, CDMA modulation

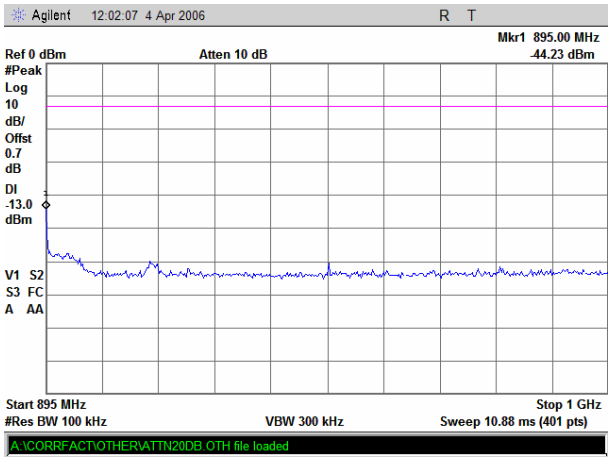


Plot 7.3.20 Spurious emission measurements in 894 - 895 MHz range, Cell 800, CDMA modulation

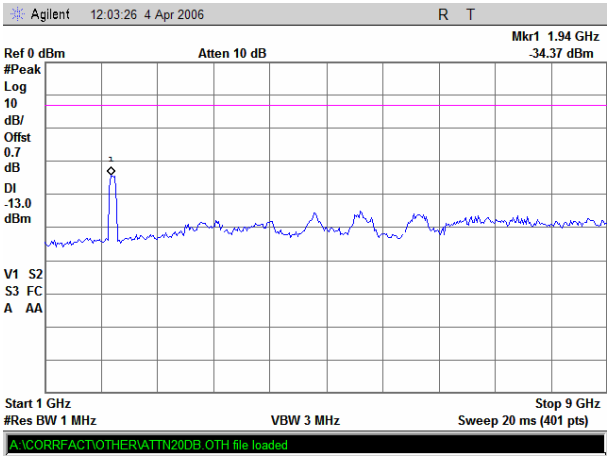


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 7.3.21 Spurious emission measurements in 895 - 1000 MHz range, Cell 800, CDMA modulation

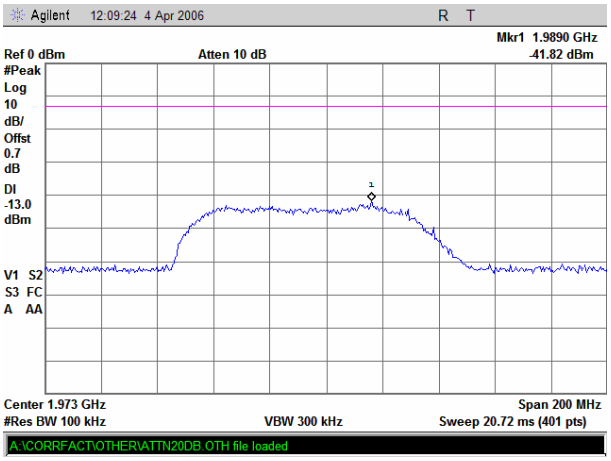


Plot 7.3.22 Spurious emission measurements in 1 - 9 GHz range, Cell 800, CDMA modulation

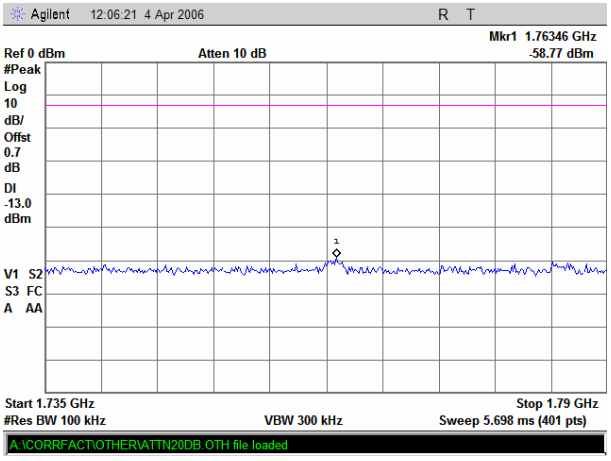


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 7.3.23 Spurious emission measurements at 1973 MHz, Cell 800, CDMA modulation

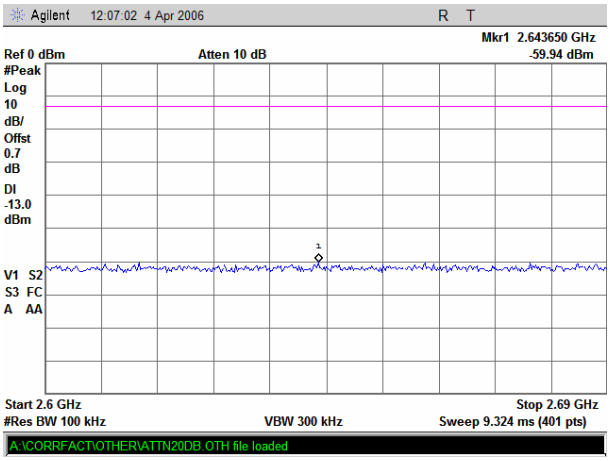


Plot 7.3.24 Conducted spurious emission measurements at the 2nd harmonic, Cell 800, CDMA modulation

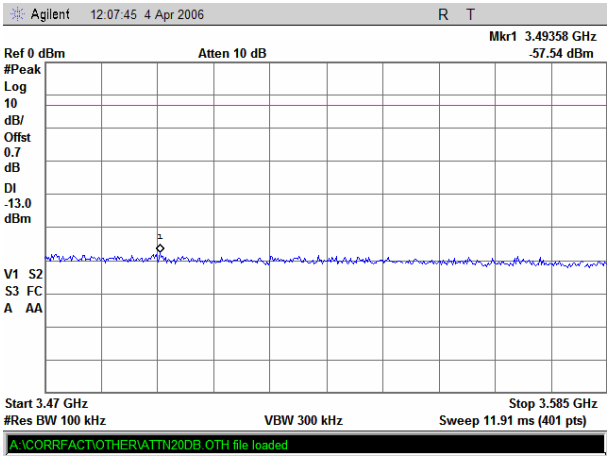


Test specification:	Section 22.917, Spurious emission at antenna terminal		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 7.3.25 Conducted spurious emission measurements at the 3rd harmonic, Cell 800, CDMA modulation



Plot 7.3.26 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:	4/7/2006		
Temperature: 21ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
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:	4/7/2006		
Temperature: 21ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

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

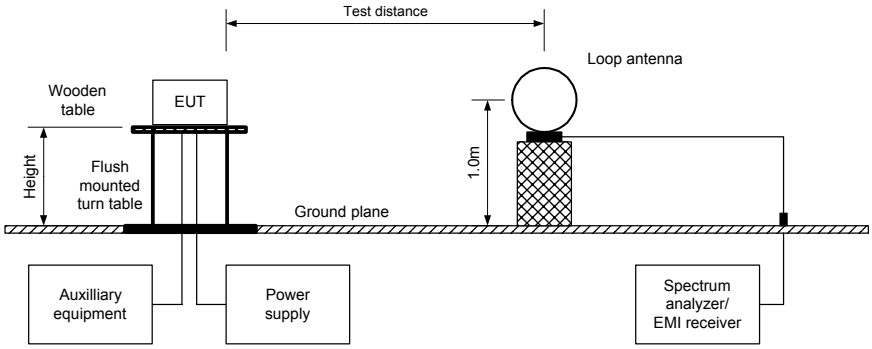
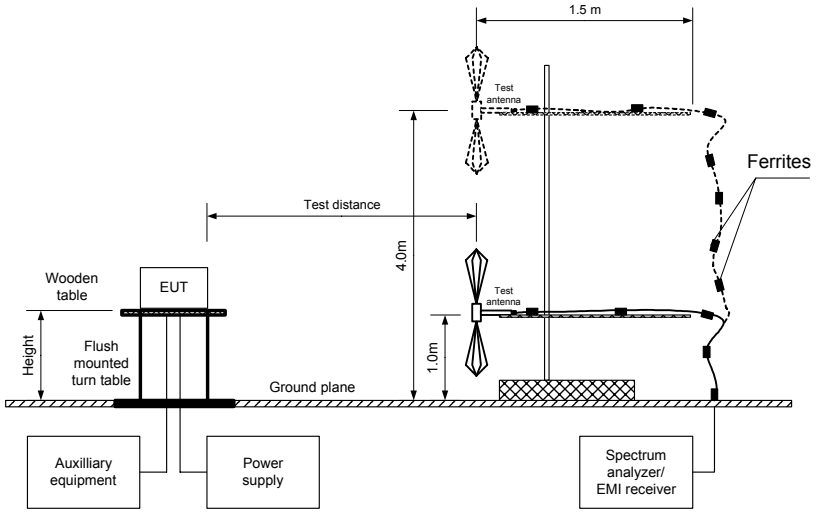


Figure 7.4.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	**Section 22.917, Radiated spurious emissions**		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	**Verdict:**	PASS
Date:	4/7/2006		
Temperature: 21ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 120 VAC
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)
3 CARRIER TONE FREQUENCIES:	869.05 MHz 881.5 MHz 893.95 MHz
MAXIMUM INPUT SIGNAL:	-20 dBm

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

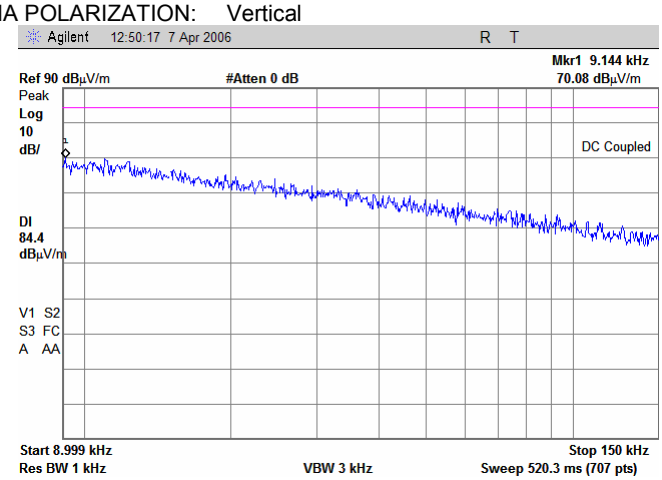
HL 0446	HL 0465	HL 0521	HL 0589	HL 0592	HL 0593	HL 0594	HL 0604
HL 0768	HL 1553	HL 1566	HL 1567	HL 1942	HL 1984	HL 2259	HL 2780

Full description is given in Appendix A.

Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/7/2006		
Temperature: 21°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

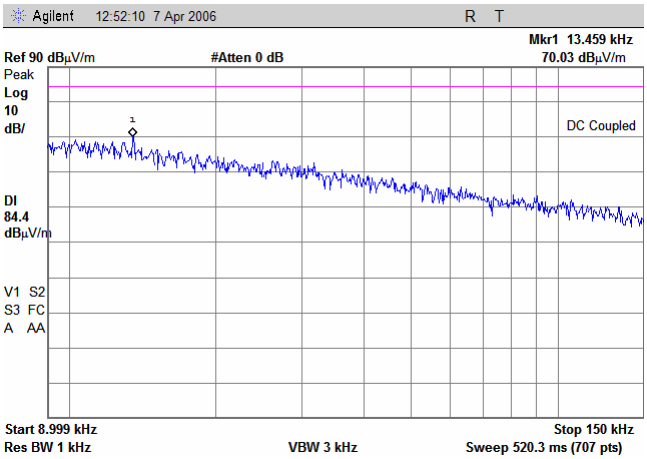
Plot 7.4.1 Radiated emission measurements from 9 to 150 kHz at the low carrier frequency

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



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

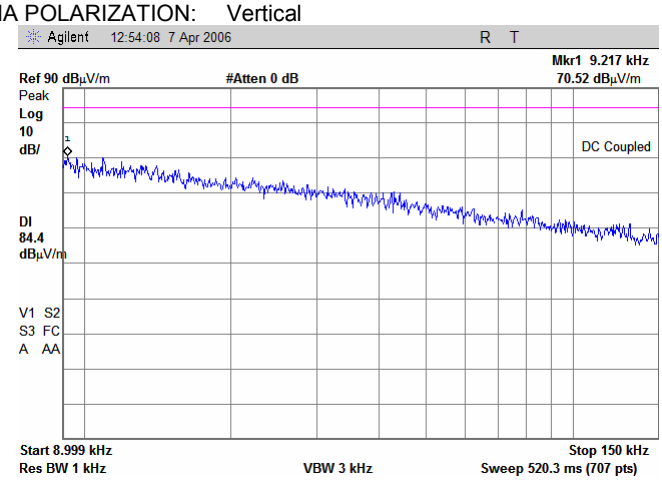
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/7/2006		
Temperature: 21°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

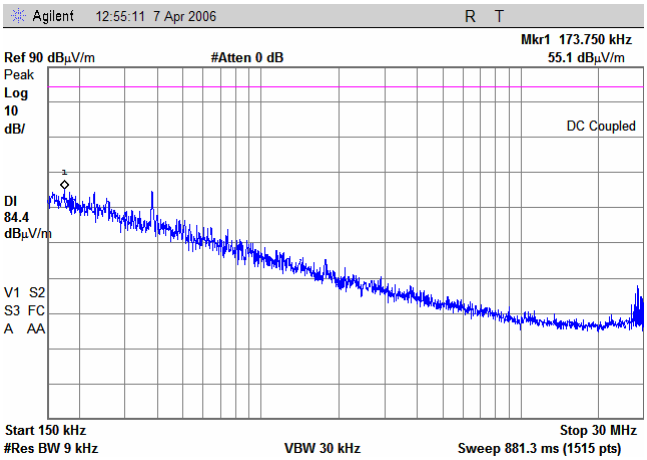
Plot 7.4.3 Radiated emission measurements from 9 to 150 kHz at the high carrier frequency

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



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

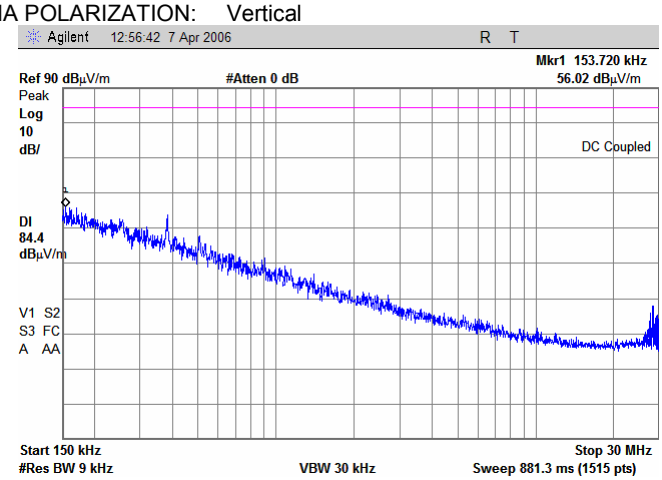
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/7/2006		
Temperature: 21°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

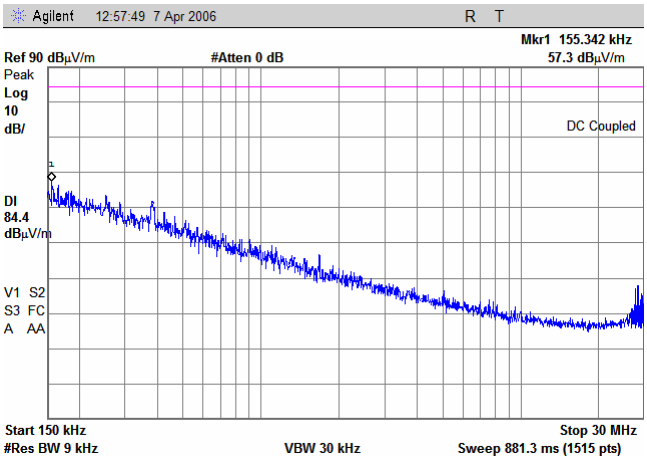
Plot 7.4.5 Radiated emission measurements from 0.15 to 30 MHz at the mid carrier frequency

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



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

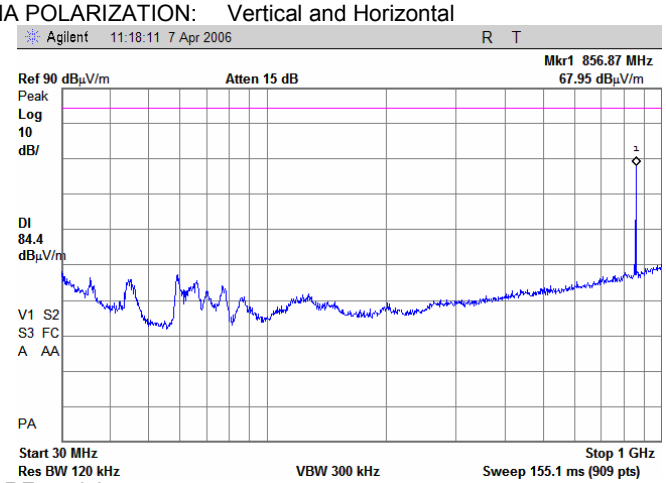
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/7/2006		
Temperature: 21ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

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

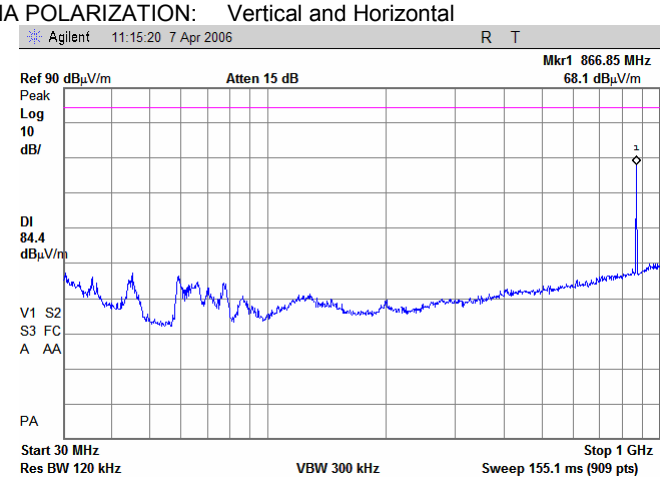
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Note: intentional radiation of RF module

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

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

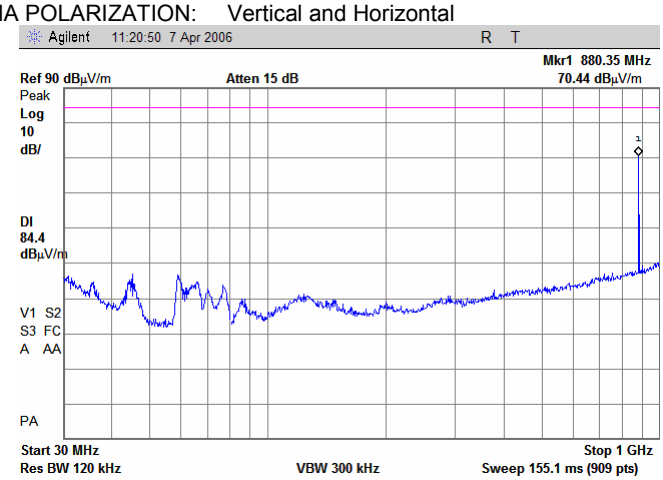


Note: intentional radiation of RF module

Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/7/2006		
Temperature: 21°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

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

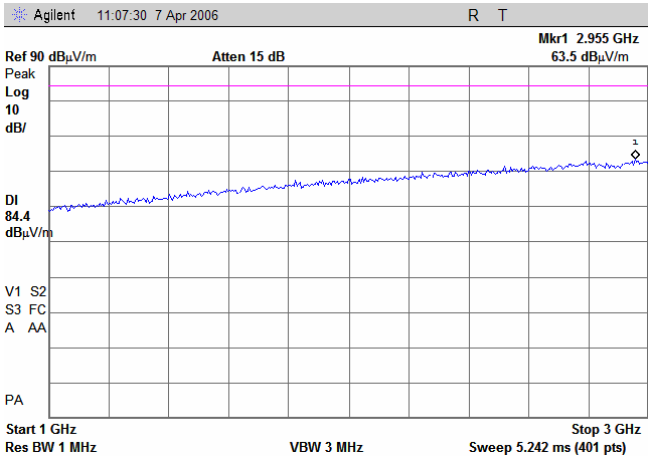
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Note: intentional radiation of RF module

Plot 7.4.10 Radiated emission measurements from 1000 to 3000 MHz at the low carrier frequency

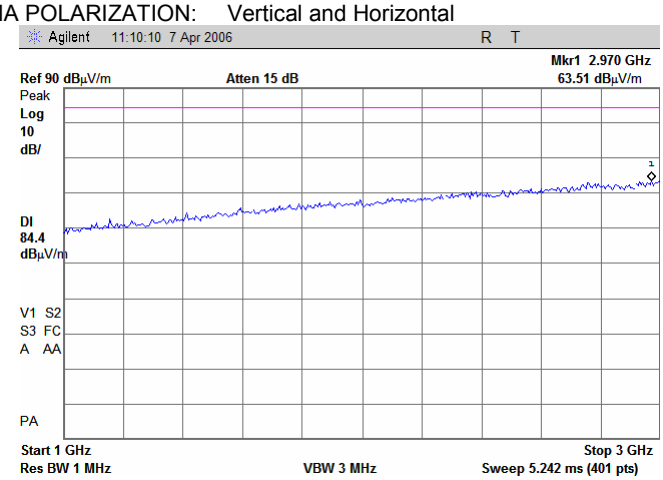
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	**Section 22.917, Radiated spurious emissions**		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	**Verdict:**	PASS
Date:	4/7/2006		
Temperature: 21°C	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 120 VAC
Remarks:			

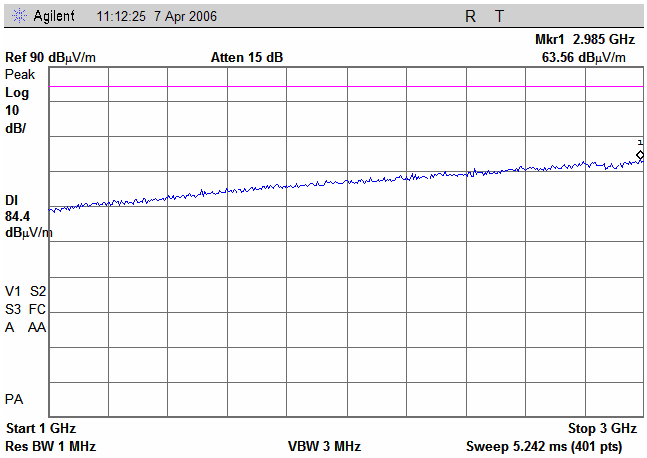
Plot 7.4.11 Radiated emission measurements from 1000 to 3000 MHz at the mid carrier frequency

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



Plot 7.4.12 Radiated emission measurements from 1000 to 3000 MHz at the high carrier frequency

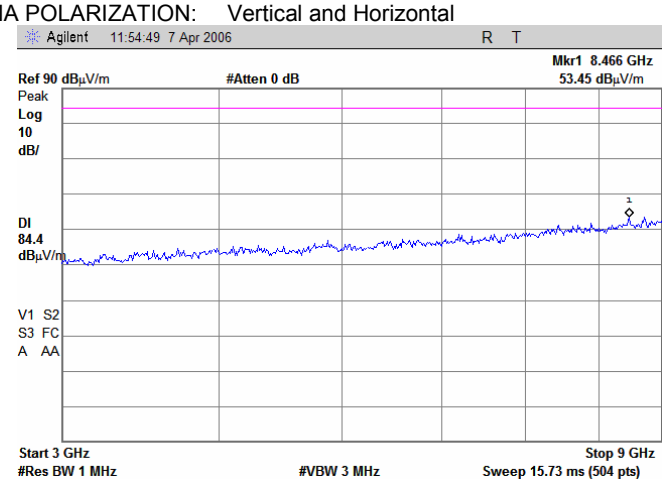
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 22.917, Radiated spurious emissions		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	Verdict:	PASS
Date:	4/7/2006		
Temperature: 21°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

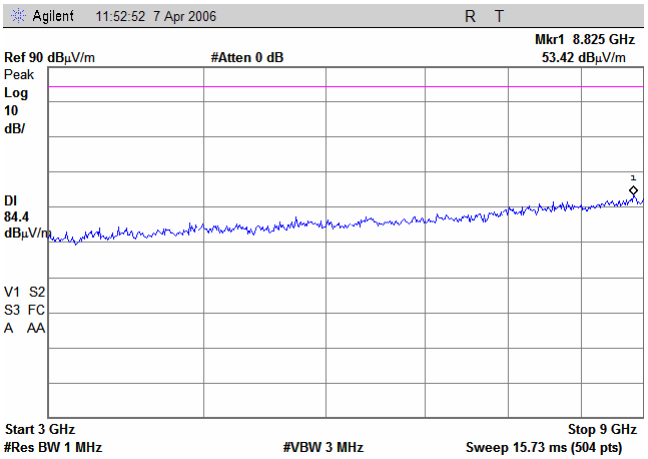
Plot 7.4.13 Radiated emission measurements from 3000 to 9000 MHz at the low carrier frequency

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



Plot 7.4.14 Radiated emission measurements from 3000 to 9000 MHz at the mid carrier frequency

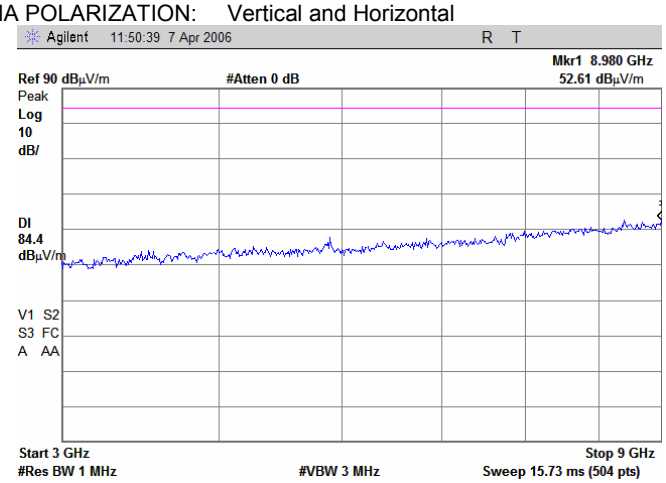
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	**Section 22.917, Radiated spurious emissions**		
Test procedure:	FCC part 22, Section 22.917		
Test mode:	Compliance	**Verdict:**	PASS
Date:	4/7/2006		
Temperature: 21°C	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 120 VAC
Remarks:			

Plot 7.4.15 Radiated emission measurements from 3000 to 9000 MHz at the high carrier frequency

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



Test specification:	Section 24.232, Peak output power		
Test procedure:	FCC part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
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:	4/3/2006		
Temperature: 22ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 46 %	**Power Supply:** 120 VAC
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 / 1.2288 Mbps / 270.833 kbps
MAXIMUM INPUT SIGNAL:	-20 dBm

Carrier frequency, MHz	Spectrum analyzer reading, dBm	External attenuation& cable loss, dB	RF output power, dBm	Antenna gain, dBi	EIRP, dBm	Limit, dBm	Margin*, dB	Verdict
TDMA modulation								
1930.00	16.65	included	16.65	10	26.65	33.0	-6.35	Pass
1960.00	17.46	included	17.46	10	27.46	33.0	-5.54	Pass
1990.00	17.97	included	17.97	10	27.97	33.0	-5.03	Pass
CDMA modulation								
1931.00	17.01	included	17.01	10	27.01	33.0	-5.99	Pass
1960.00	17.20	included	17.20	10	27.20	33.0	-5.80	Pass
1989.00	17.89	included	17.89	10	27.89	33.0	-5.11	Pass
GSM modulation								
1930.00	15.06	included	15.06	10	25.06	33.0	-7.94	Pass
1960.00	16.59	included	16.59	10	26.59	33.0	-6.41	Pass
1990.00	17.29	included	17.29	10	27.29	33.0	-5.71	Pass

*Margin = EIRP – specification limit

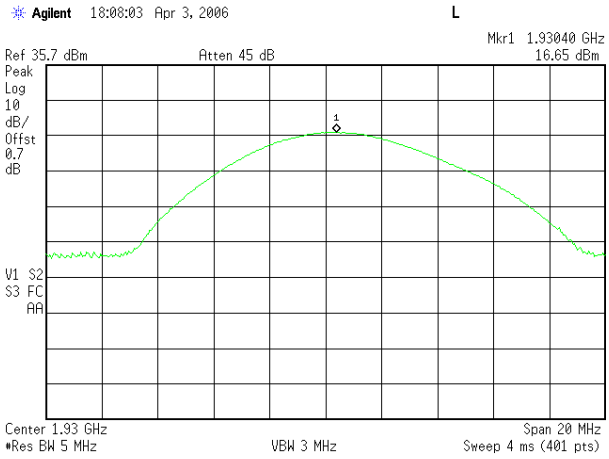
Reference numbers of test equipment used

HL 2780							

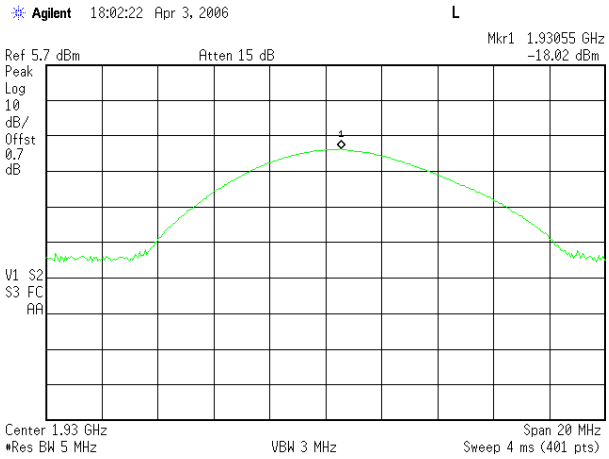
Full description is given in Appendix A.

Test specification:	**Section 24.232, Peak output power**		
Test procedure:	FCC part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	4/3/2006		
Temperature: 22ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 46 %	**Power Supply:** 120 VAC
Remarks:			

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

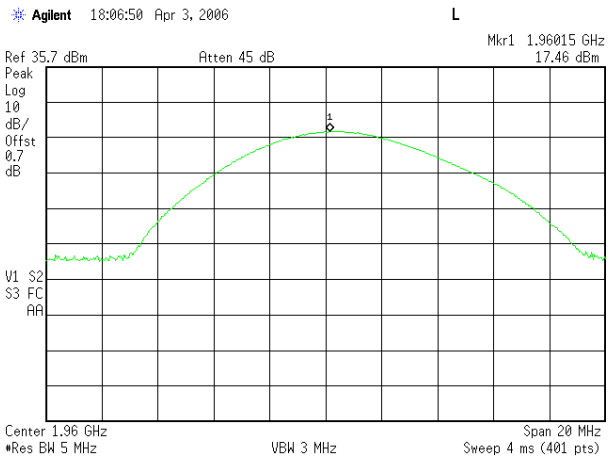


Plot 8.1.2 RF input power measurements at low frequency carrier, PCS 1900, TDMA modulation

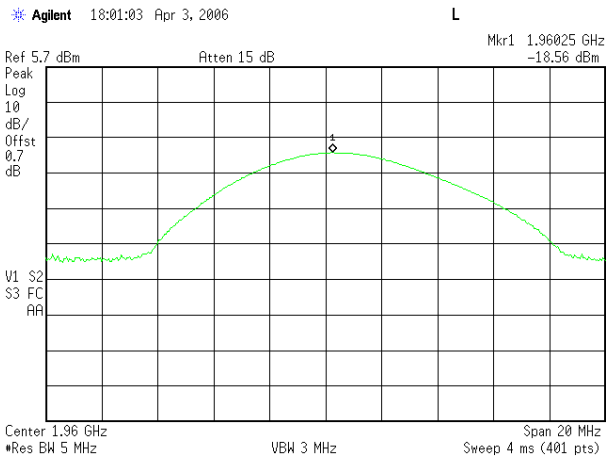


Test specification:	Section 24.232, Peak output power		
Test procedure:	FCC part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

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

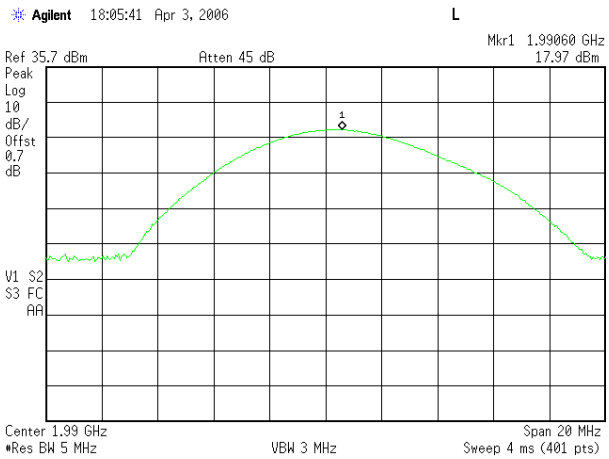


Plot 8.1.4 RF input power measurements at mid frequency carrier, PCS 1900, TDMA modulation

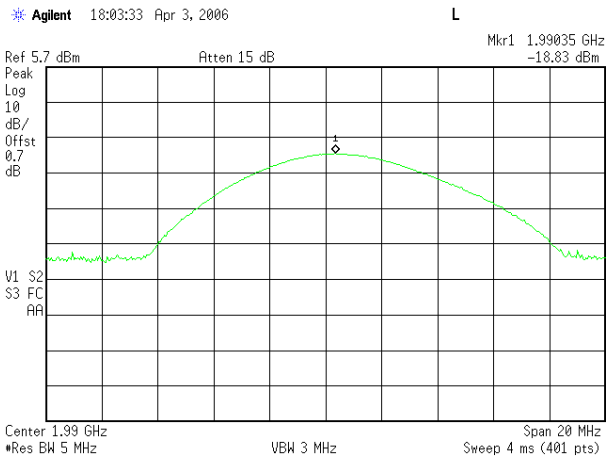


Test specification:	Section 24.232, Peak output power		
Test procedure:	FCC part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

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

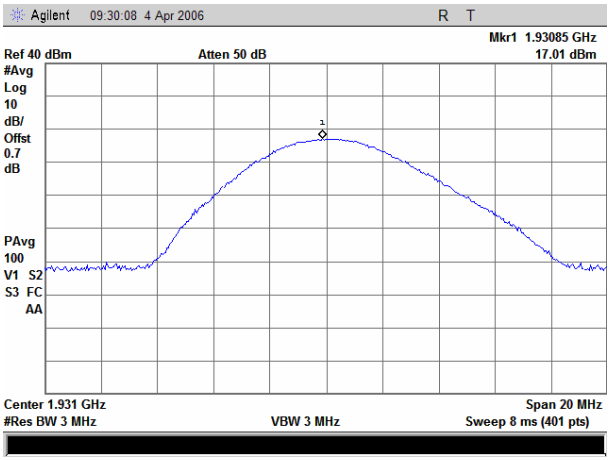


Plot 8.1.6 RF input power measurements at high frequency carrier, PCS 1900, TDMA modulation

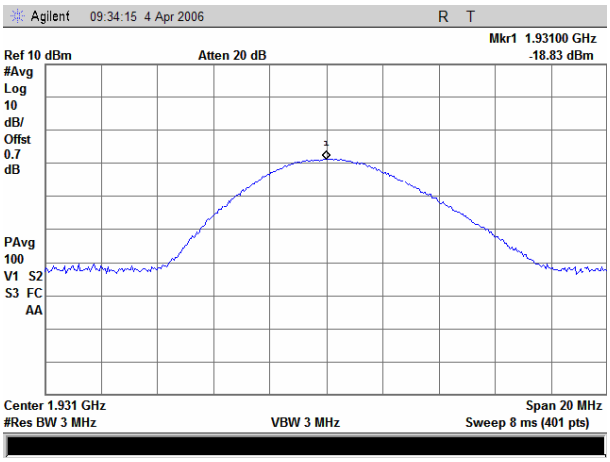


Test specification:	Section 24.232, Peak output power		
Test procedure:	FCC part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

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

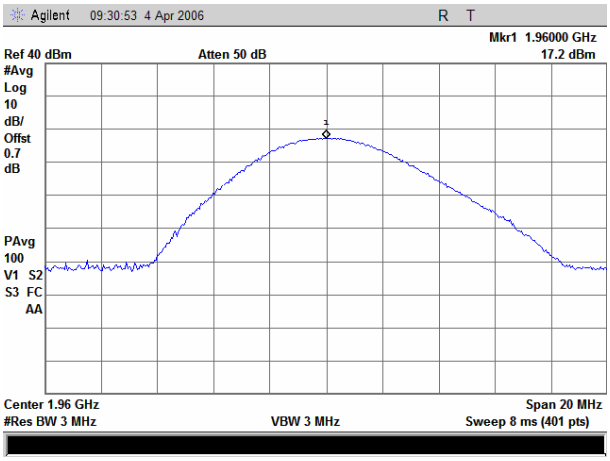


Plot 8.1.8 RF input power measurements at low frequency carrier, PCS 1900, CDMA modulation

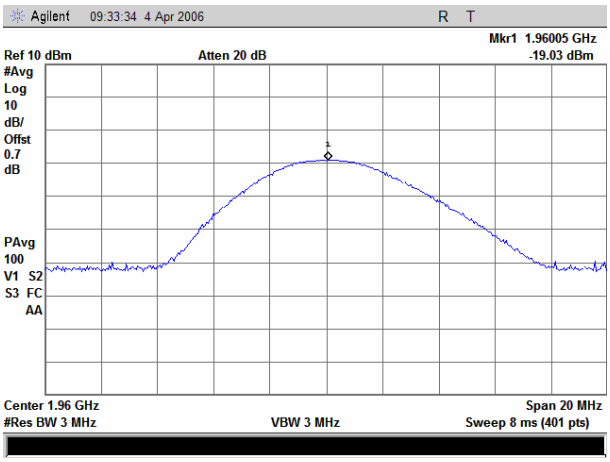


Test specification:	Section 24.232, Peak output power		
Test procedure:	FCC part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

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

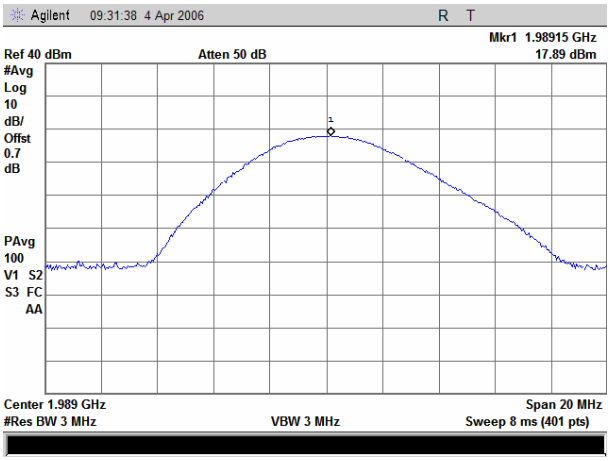


Plot 8.1.10 RF input power measurements at mid frequency carrier, PCS 1900, CDMA modulation

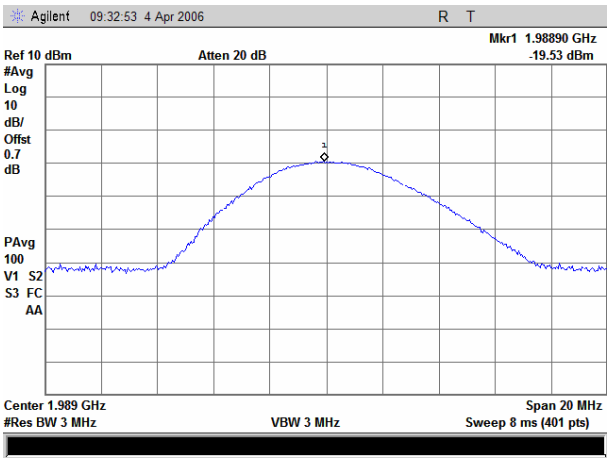


Test specification:	Section 24.232, Peak output power		
Test procedure:	FCC part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

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

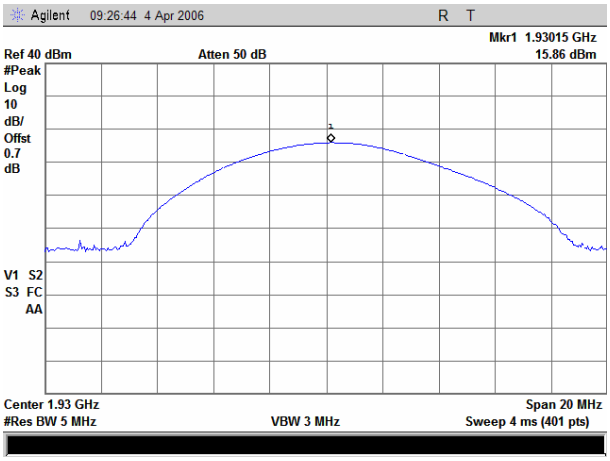


Plot 8.1.12 RF input power measurements at high frequency carrier, PCS 1900, CDMA modulation

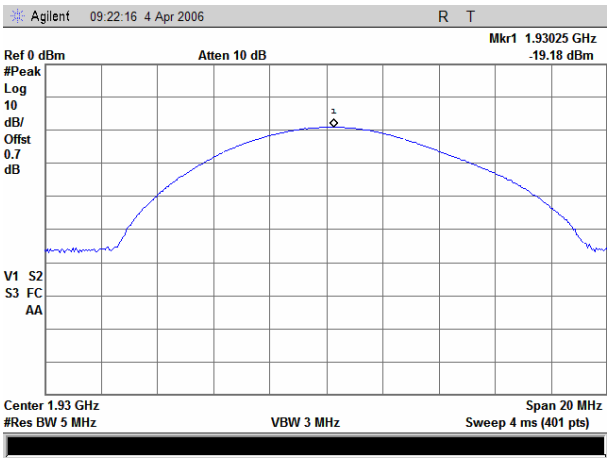


Test specification:	Section 24.232, Peak output power		
Test procedure:	FCC part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

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

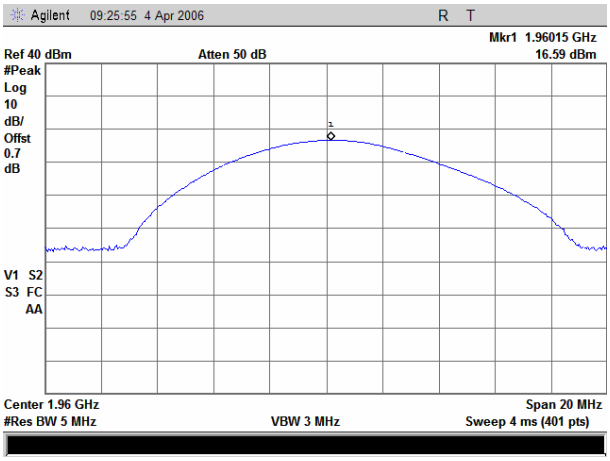


Plot 8.1.14 RF input power measurements at low frequency carrier, PCS 1900, GSM modulation

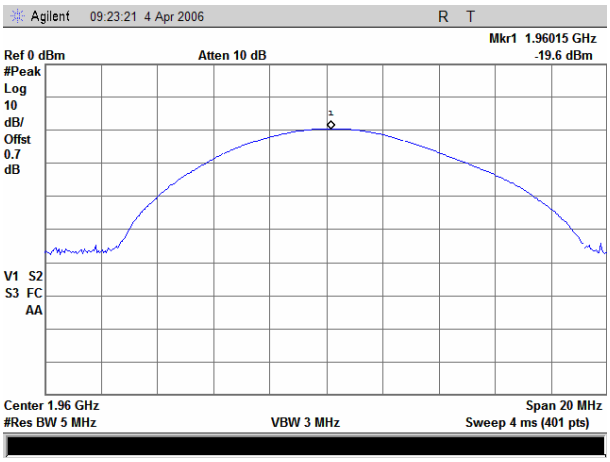


Test specification:	Section 24.232, Peak output power		
Test procedure:	FCC part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

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

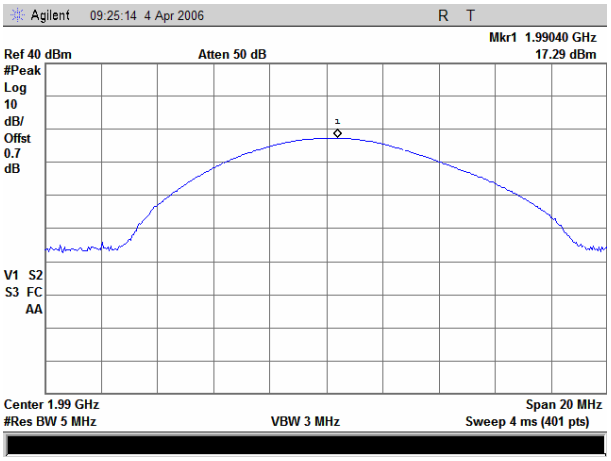


Plot 8.1.16 RF input power measurements at mid frequency carrier, PCS 1900, GSM modulation

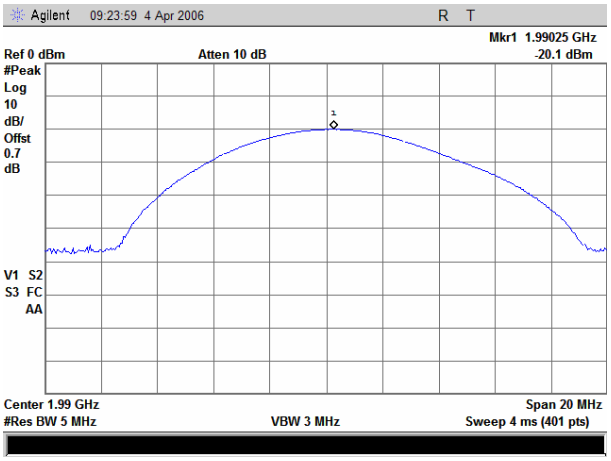


Test specification:	Section 24.232, Peak output power		
Test procedure:	FCC part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	4/3/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

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:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

8.2 Occupied bandwidth test

8.2.1 General

This test was performed to measure transmitter occupied bandwidth.

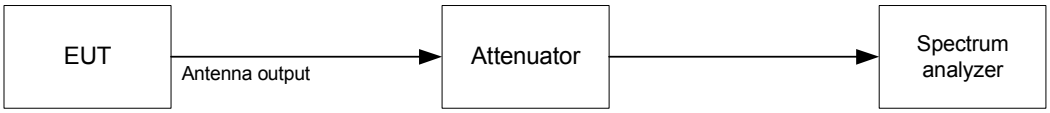
8.2.2 Test procedure

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:	4/4/2006		
Temperature: 22ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 48 %	**Power Supply:** 120 VAC
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: 48.6 kbps
RESOLUTION BANDWIDTH: 1 kHz
VIDEO BANDWIDTH: 3 kHz

Carrier frequency, MHz	Input occupied bandwidth, kHz	Output occupied bandwidth, kHz	Margin*, kHz
1930.00	1900.0	1912.5	-12.5
1960.00	1900.0	1937.5	-37.5
1990.00	1937.5	1925.0	12.5

DETECTOR USED: RMS
MODULATION: CDMA
BIT RATE: 1.2288 Mbps
RESOLUTION BANDWIDTH: 300 kHz
VIDEO BANDWIDTH: 1 MHz

Carrier frequency, MHz	Input occupied bandwidth, kHz	Output occupied bandwidth, kHz	Margin*, kHz
1931.00	39.50	39.75	-0.25
1960.00	38.75	39.75	-1.00
1989.00	39.00	39.50	-0.50

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	275.00	275.00	0.00
1960.00	275.00	275.00	0.00
1990.00	266.25	273.75	-7.50

*Margin = Input occupied bandwidth – output occupied bandwidth

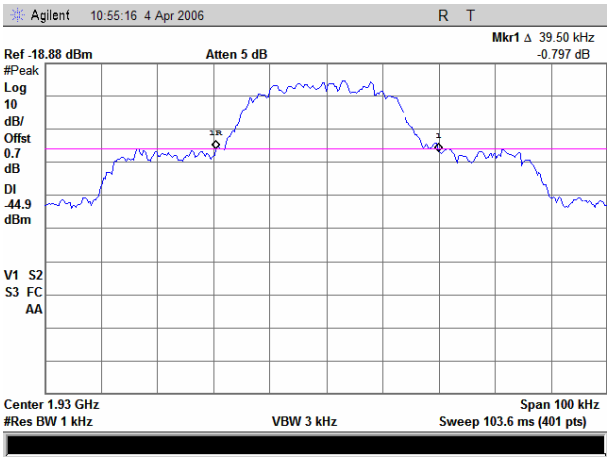
Reference numbers of test equipment used

HL 2780							

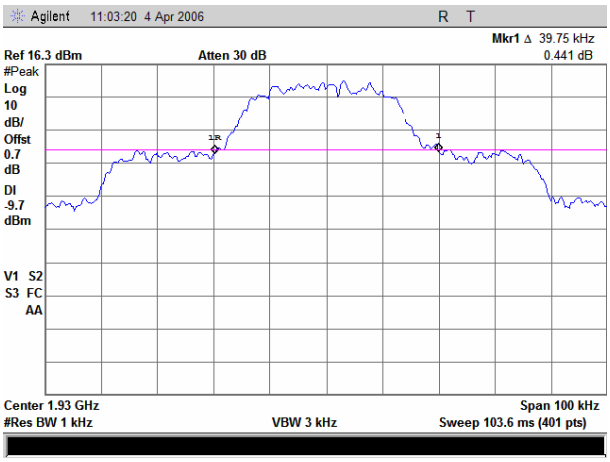
Full description is given in Appendix A.

Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

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

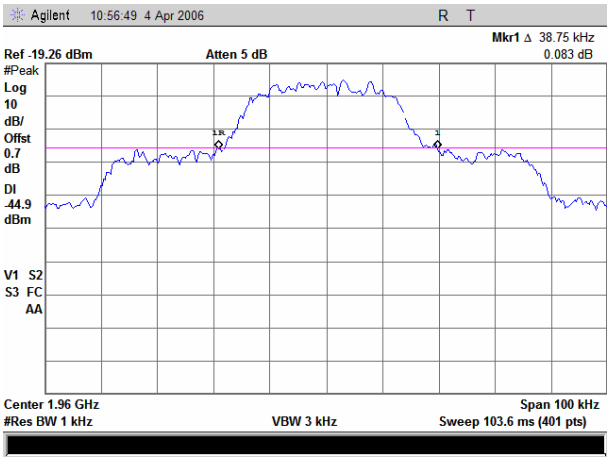


Plot 8.2.2 Output occupied bandwidth measurements at low frequency carrier, PCS 1900, TDMA modulation

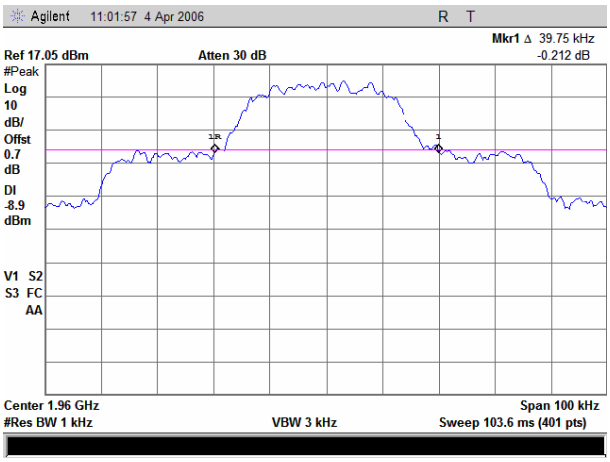


Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

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

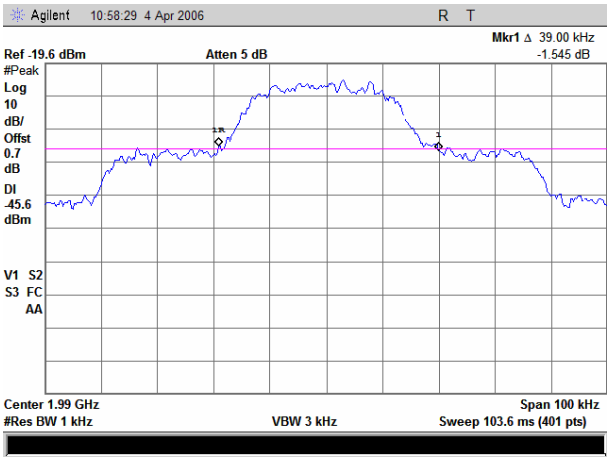


Plot 8.2.4 Output occupied bandwidth measurements at mid frequency carrier, PCS 1900, TDMA modulation

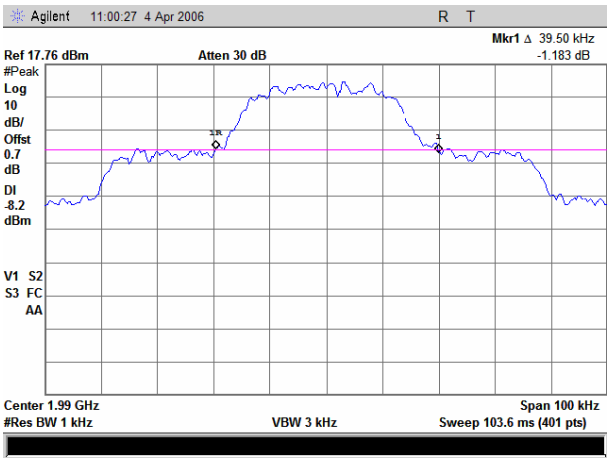


Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

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

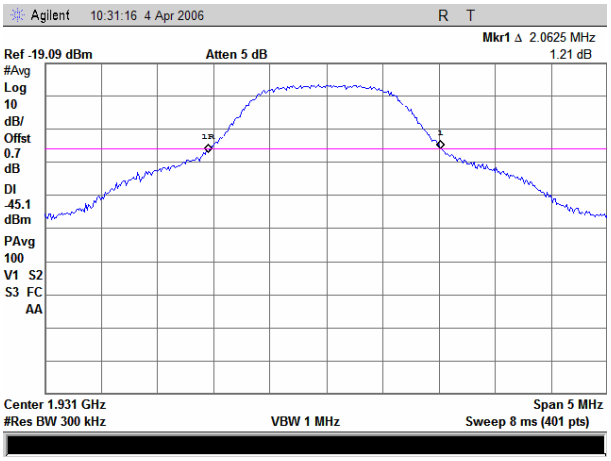


Plot 8.2.6 Output occupied bandwidth measurements at high frequency carrier, PCS 1900, TDMA modulation

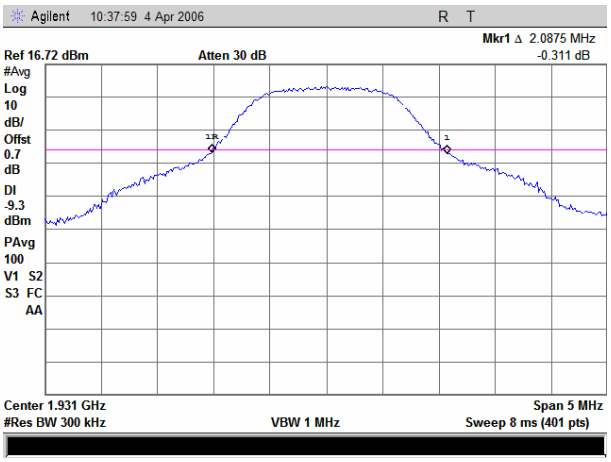


Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

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

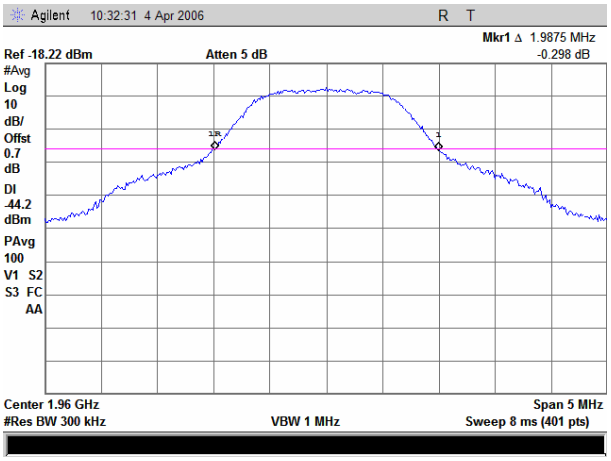


Plot 8.2.8 Output occupied bandwidth measurements at low frequency carrier, PCS 1900, CDMA modulation

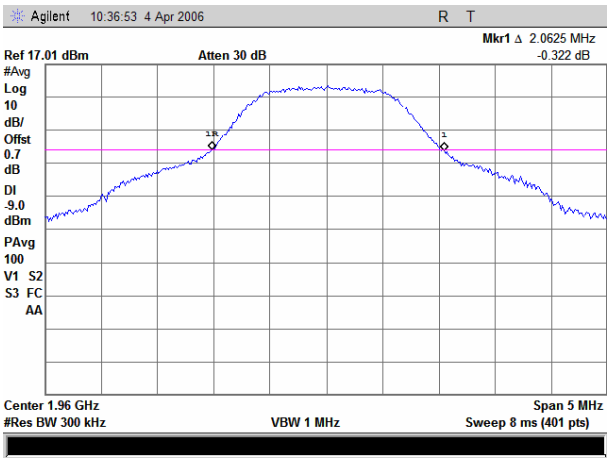


Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

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

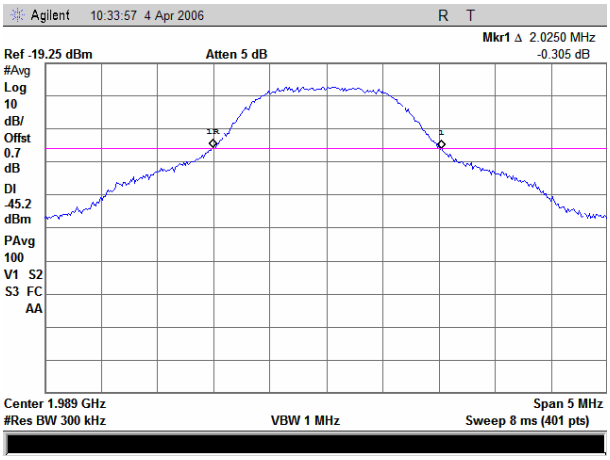


Plot 8.2.10 Output occupied bandwidth measurements at mid frequency carrier, PCS 1900, CDMA modulation

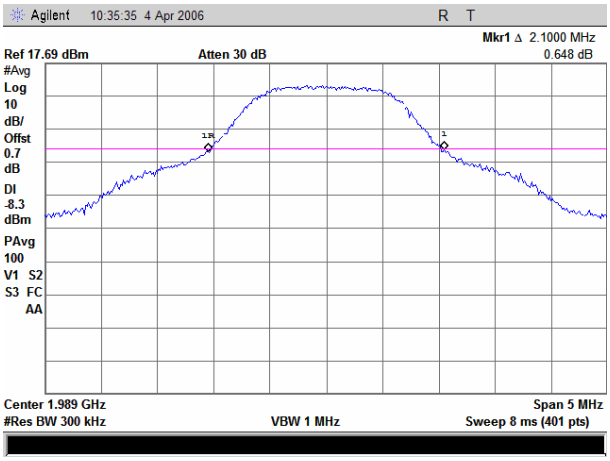


Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

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

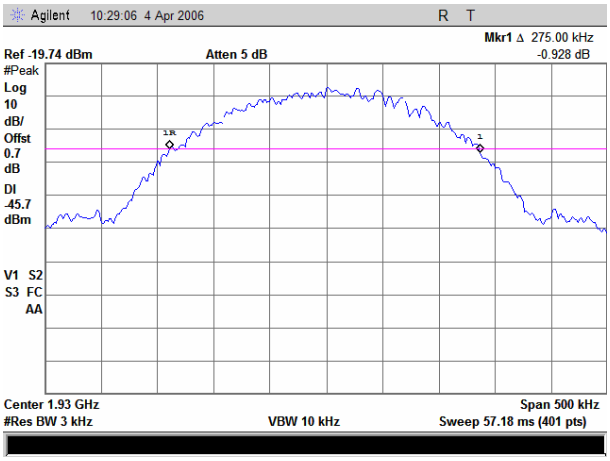


Plot 8.2.12 Output occupied bandwidth measurements at high frequency carrier, PCS 1900, CDMA modulation

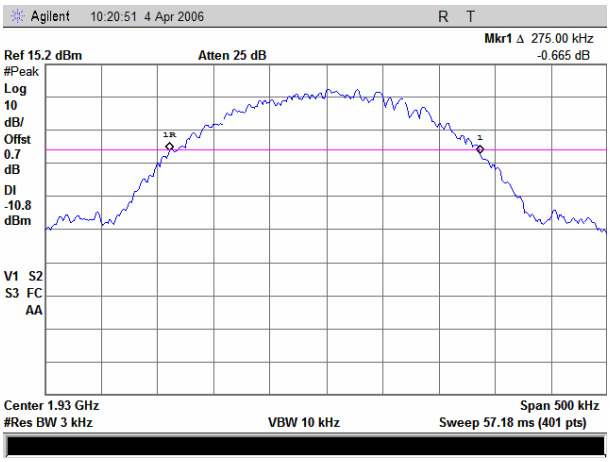


Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

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

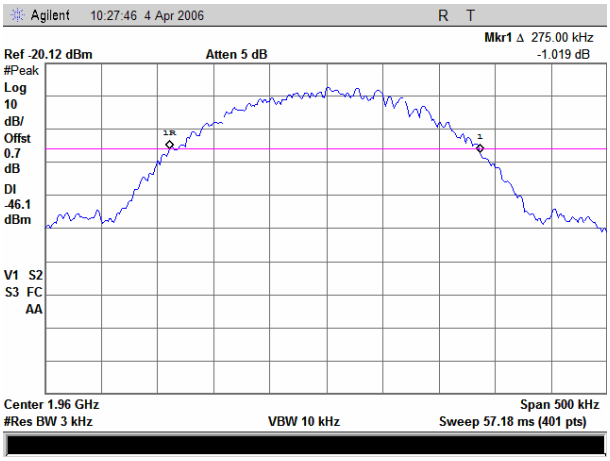


Plot 8.2.14 Output occupied bandwidth measurements at low frequency carrier, PCS 1900, GSM modulation

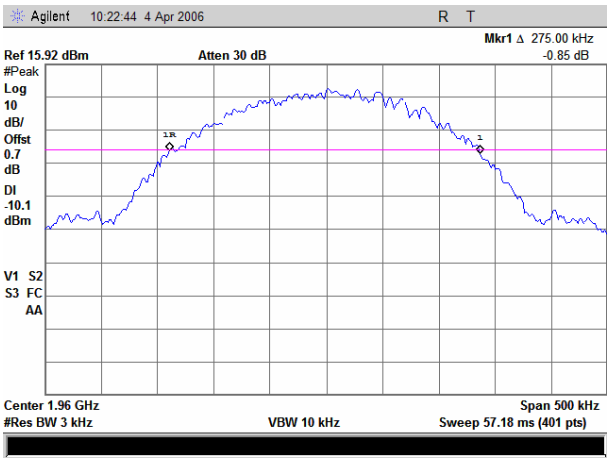


Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

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

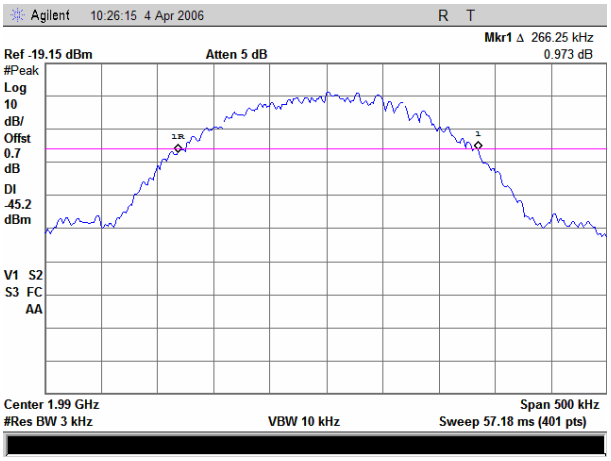


Plot 8.2.16 Output occupied bandwidth measurements at mid frequency carrier, PCS 1900, GSM modulation

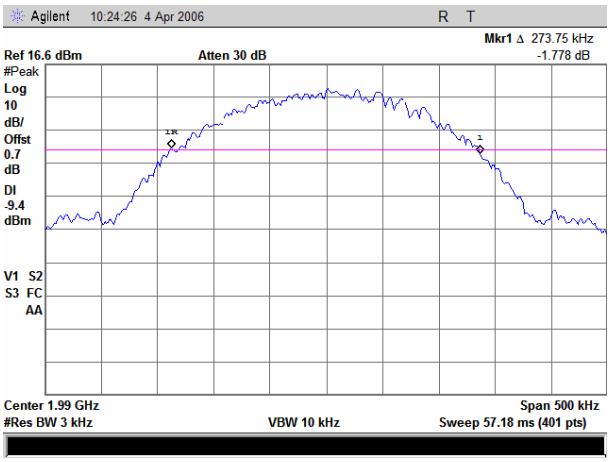


Test specification:	Section 24.238(b), Occupied bandwidth		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

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:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
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

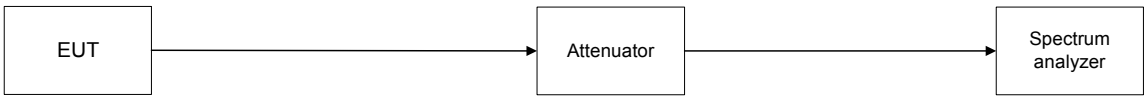
Frequency, MHz	Attenuation below carrier, dBc	ERP of spurious, dBm
0.009 – 10th harmonic*	43+10logP*	-13.0

- 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:	4/4/2006		
Temperature: 22ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 48 %	**Power Supply:** 120 VAC
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: 48.6 kbps / 1.2288 Mbps / 270.833 kbps
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									
878.450	-35.37	Included	Included	1000	-35.37	52.02	29.65	22.37	Pass
1927.830	-45.12	Included	Included	1000	-45.12	61.77	29.65	32.12	Pass
1929.993	-21.48	Included	Included	1000	-21.48	38.13	29.65	8.48	Pass
1990.018	-21.12	Included	Included	1000	-21.12	37.77	29.65	8.12	Pass
1991.675	-40.97	Included	Included	1000	-40.97	57.62	29.65	27.97	Pass
CDMA modulation									
879.500	-35.52	Included	Included	1000	-35.52	52.53	30.01	22.52	Pass
1924.680	-47.80	Included	Included	1000	-47.80	64.81	30.01	34.80	Pass
1929.963	-35.78	Included	Included	1000	-35.78	52.79	30.01	22.78	Pass
1990.020	-27.84	Included	Included	1000	-27.84	44.85	30.01	14.84	Pass
1994.420	-31.23	Included	Included	1000	-31.23	48.24	30.01	18.23	Pass
GSM modulation									
878.925	-35.06	Included	Included	1000	-35.06	50.12	28.06	22.06	Pass
1928.978	-44.30	Included	Included	1000	-44.30	59.36	28.06	31.30	Pass
1929.990	-15.88	Included	Included	1000	-15.88	30.94	28.06	2.88	Pass
1990.000	-23.88	Included	Included	1000	-23.88	38.94	28.06	10.88	Pass
1991.000	-31.98	Included	Included	1000	-31.98	47.04	28.06	18.98	Pass

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

**- $Limit_{TDMA} = 43+10*\log(P_W) = 43+10*\log(0.046) = 29.65$ dBc
$Limit_{CDMA} = 43+10*\log(P_W) = 43+10*\log(0.050) = 30.01$ dBc
$Limit_{GSM} = 43+10*\log(P_W) = 43+10*\log(0.032) = 28.06$ dBc

***- Attenuation below $carrier_{TDMA} = 16.65$ – Spurious emission
Attenuation below $carrier_{CDMA} = 17.01$ – Spurious emission
Attenuation below $carrier_{GSM} = 15.06$ – Spurious emission

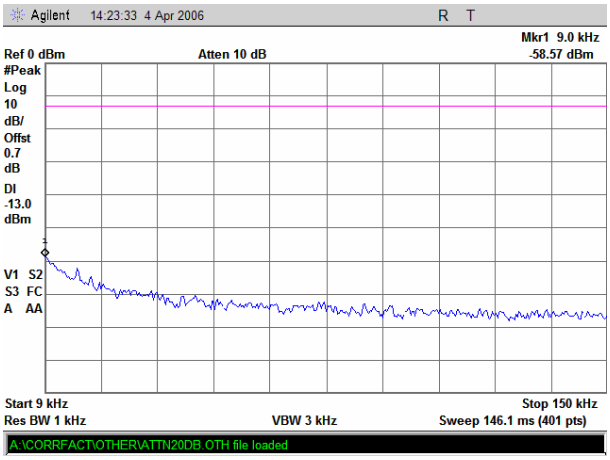
Reference numbers of test equipment used

HL 2780						

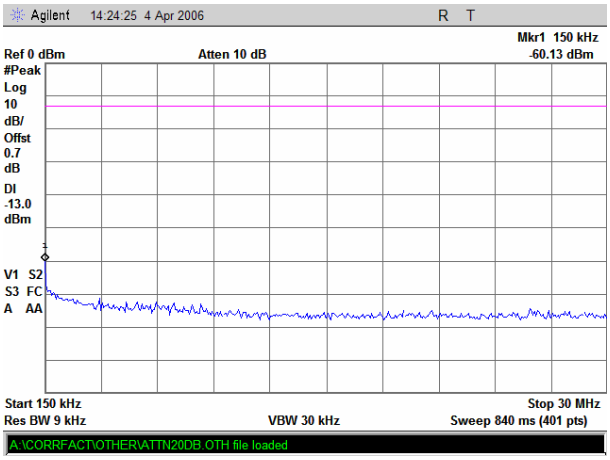
Full description is given in Appendix A.

Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

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

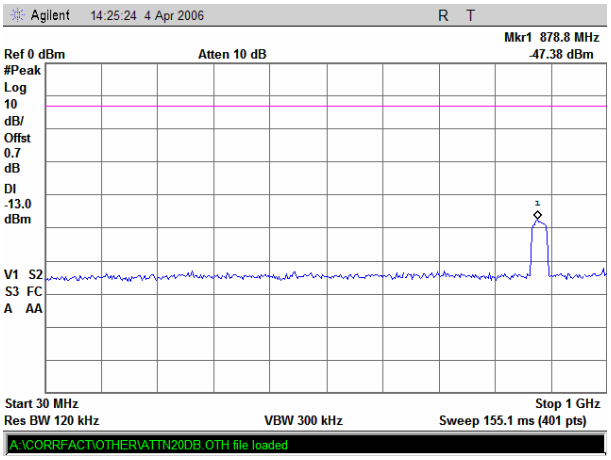


Plot 8.3.2 Spurious emission measurements in 0.15 - 30 MHz range, PCS 1900, GSM modulation

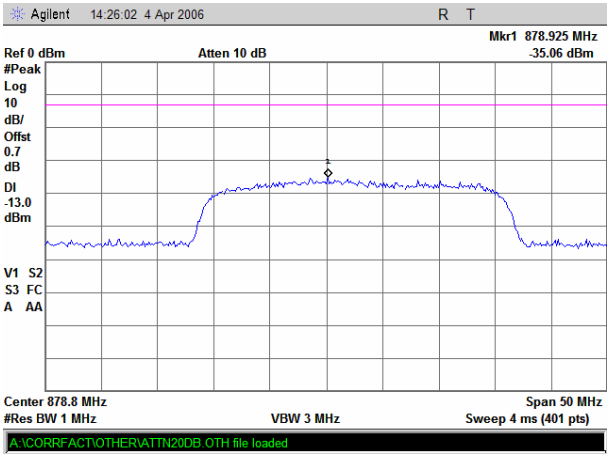


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

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

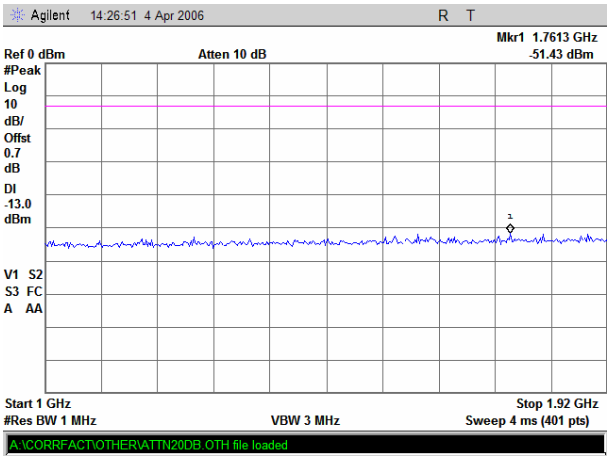


Plot 8.3.4 Spurious emission measurements at 878 MHz, PCS 1900, GSM modulation

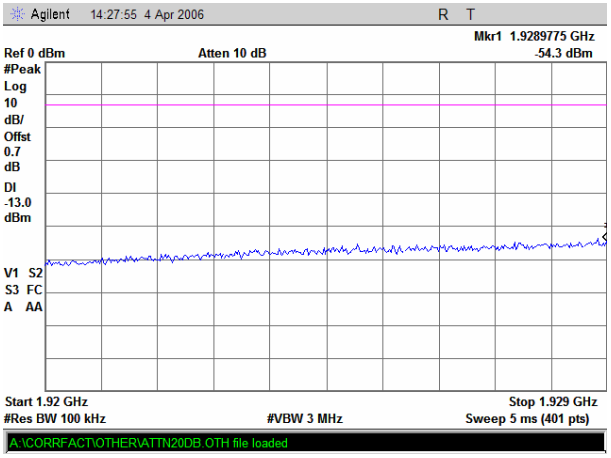


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

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



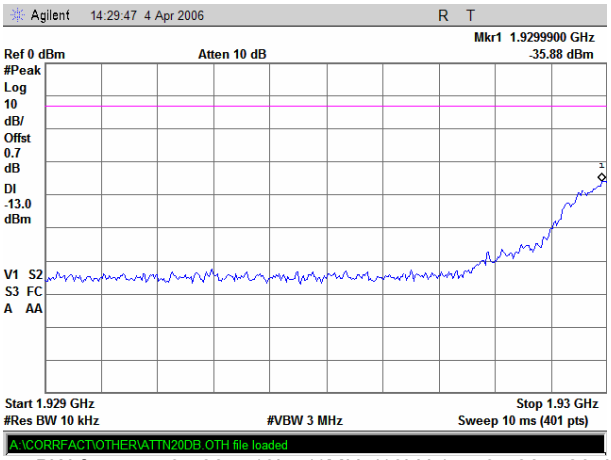
Plot 8.3.6 Spurious emission measurements in 1.92 – 1.929 GHz range, PCS 1900, GSM modulation



Note: Signal power = SA reading + BW factor = -54.3 + 10log(1MHz/100kHz) = -54.3 + 10 dB = -44.3 dBm

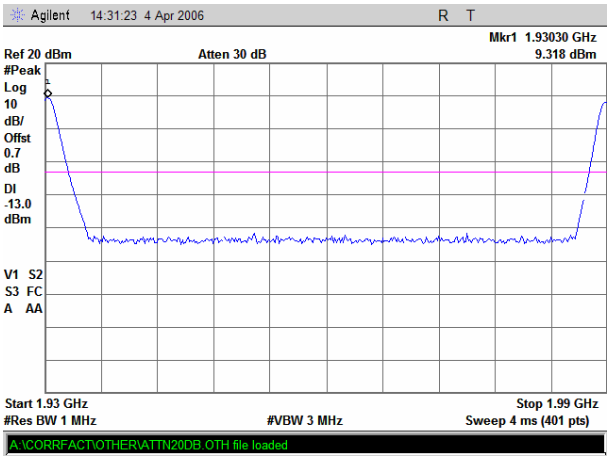
Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

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



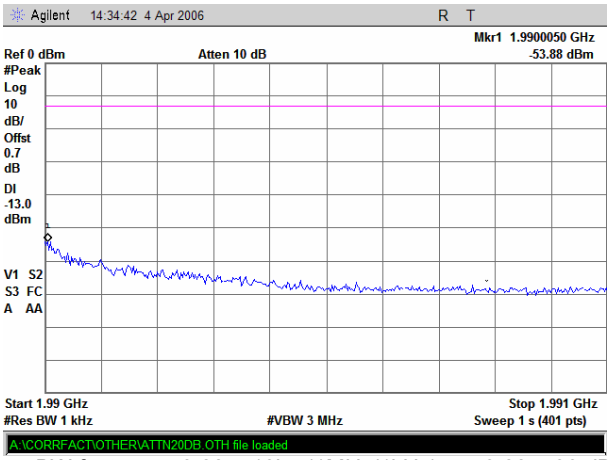
Note: Signal power = SA reading + BW factor = -35.88 + 10log(1MHz/10kHz) = -35.88 + 20 dB = -15.88 dBm

Plot 8.3.8 Spurious emission measurements in 1.93 – 1.99 GHz range, PCS 1900, GSM modulation



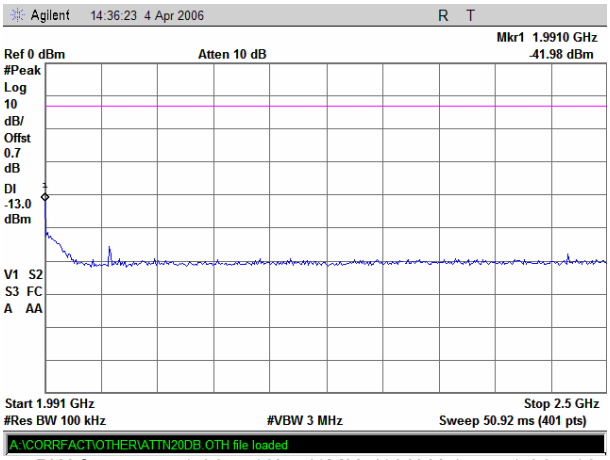
Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 8.3.9 Spurious emission measurements in 1.99 – 1.991 GHz range, PCS 1900, GSM modulation



Note: Signal power = SA reading + BW factor = -53.88 + 10log(1MHz/1kHz) = -53.88 + 30 dB = -23.88 dBm

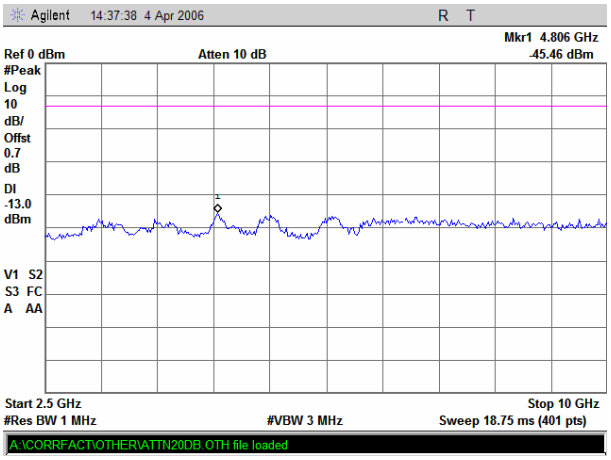
Plot 8.3.10 Spurious emission measurements in 1.991 – 2.5 GHz range, PCS 1900, GSM modulation



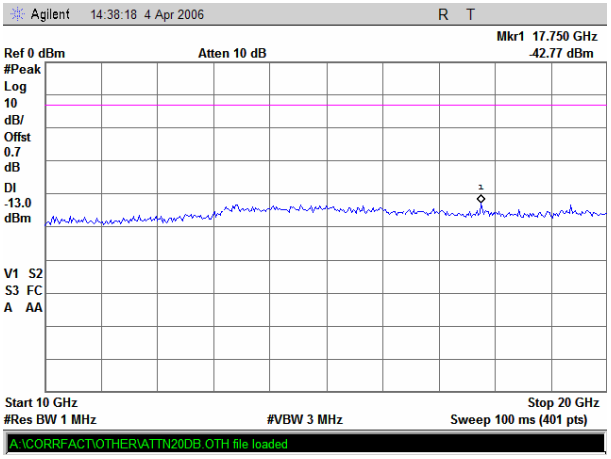
Note: Signal power = SA reading + BW factor = -41.98 + 10log(1MHz/100kHz) = -41.98+ 10 dB = -31.98dBm

Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 8.3.11 Spurious emission measurements at 2.5 – 10.0 GHz range, PCS 1900, GSM modulation

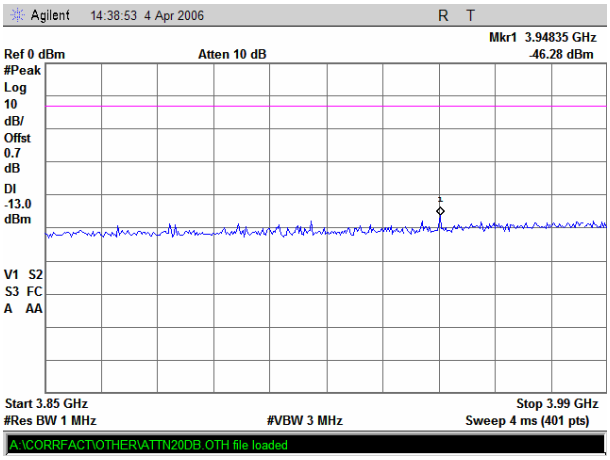


Plot 8.3.12 Spurious emission measurements at 10 – 20 GHz range, PCS 1900, GSM modulation

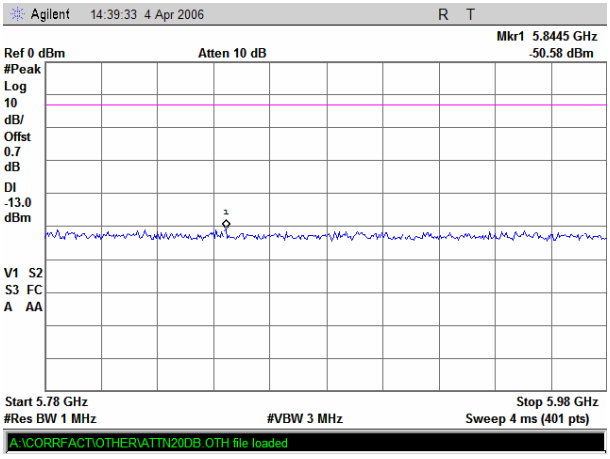


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 8.3.13 Conducted spurious emission measurements at the 2nd harmonic, PCS 1900, GSM modulation

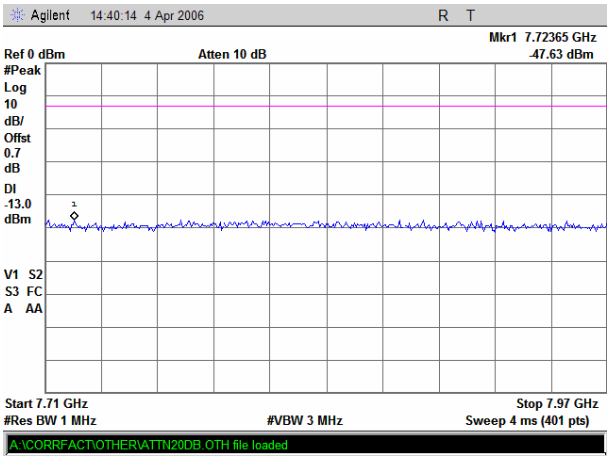


Plot 8.3.14 Conducted spurious emission measurements at the 3rd harmonic, PCS 1900, GSM modulation



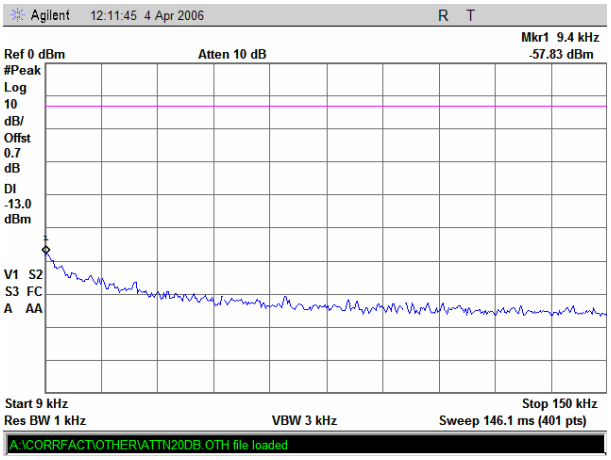
Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 8.3.15 Conducted spurious emission measurements at the 4th harmonic, PCS 1900, GSM modulation

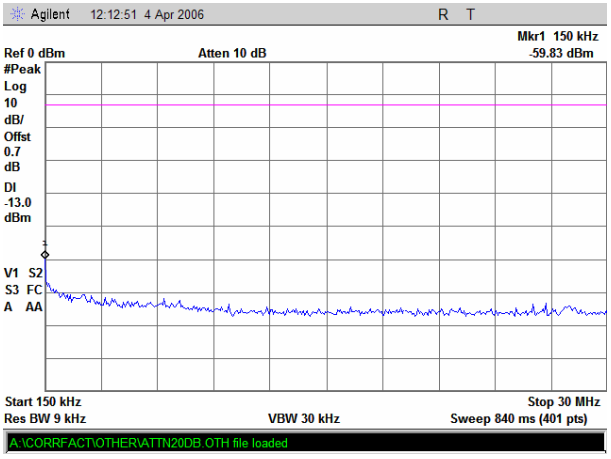


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 8.3.16 Spurious emission measurements in 9 - 150 kHz range, PCS 1900, CDMA modulation

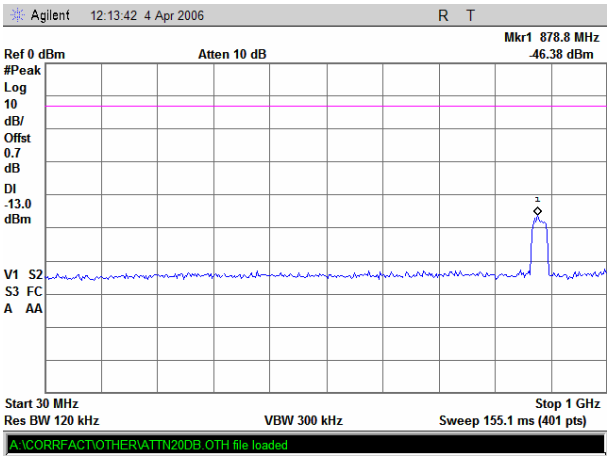


Plot 8.3.17 Spurious emission measurements in 0.15 - 30 MHz range, PCS 1900, CDMA modulation

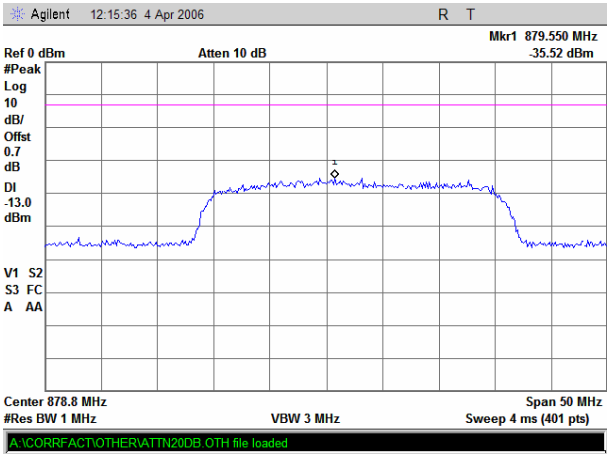


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 8.3.18 Spurious emission measurements in 30 - 1000 MHz range, PCS 1900, CDMA modulation

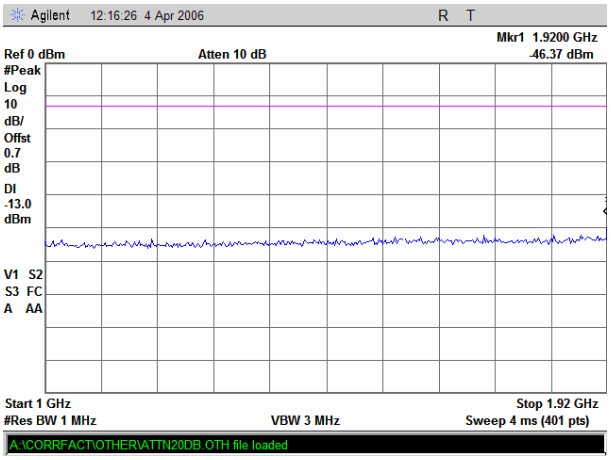


Plot 8.3.19 Spurious emission measurements at 880 MHz, PCS 1900, CDMA modulation

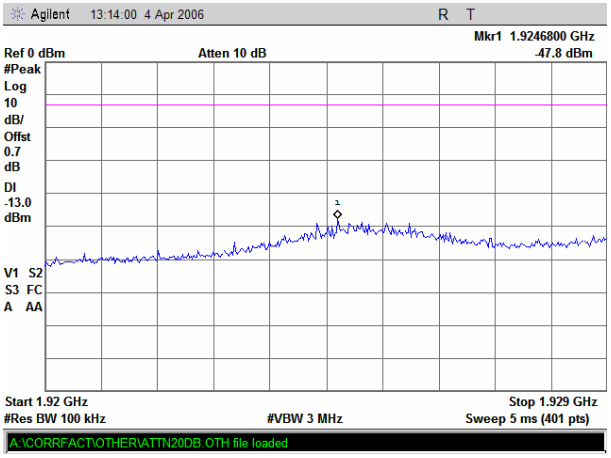


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 8.3.20 Spurious emission measurements in 1 – 1.92 GHz range, PCS 1900, CDMA modulation



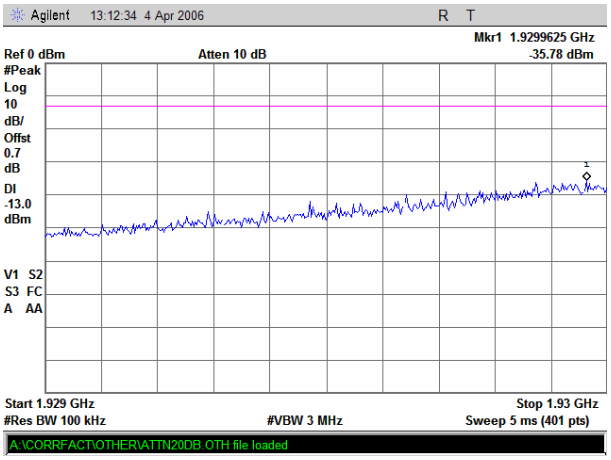
Plot 8.3.21 Spurious emission measurements in 1.920 – 1.929 GHz range, PCS 1900, CDMA modulation



Note: Signal power = SA reading + BW factor = -47.8 + 10log(1MHz/100kHz) = -47.8 + 10 dB = -37.8 dBm

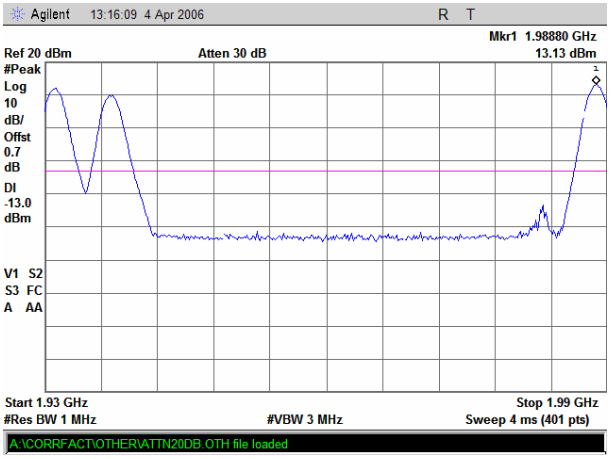
Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 8.3.22 Spurious emission measurements in 1.929 – 1.93 GHz range, PCS 1900, CDMA modulation



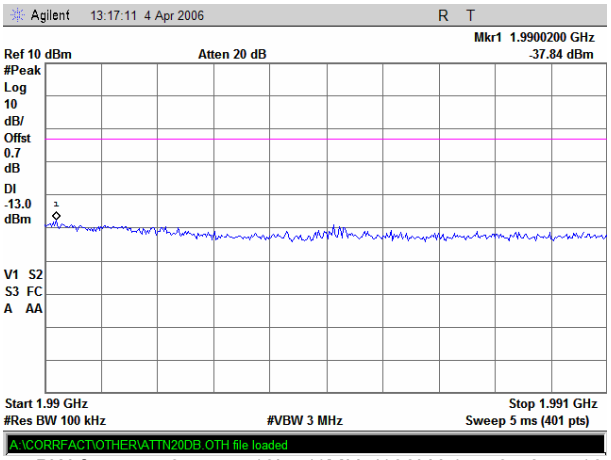
Note: Signal power = SA reading + BW factor = -35.78 + 10log(1MHz/100kHz) = -35.78 + 10 dB = -25.78 dBm

Plot 8.3.23 Spurious emission measurements in 1.93 – 1.99 GHz range, PCS 1900, CDMA modulation



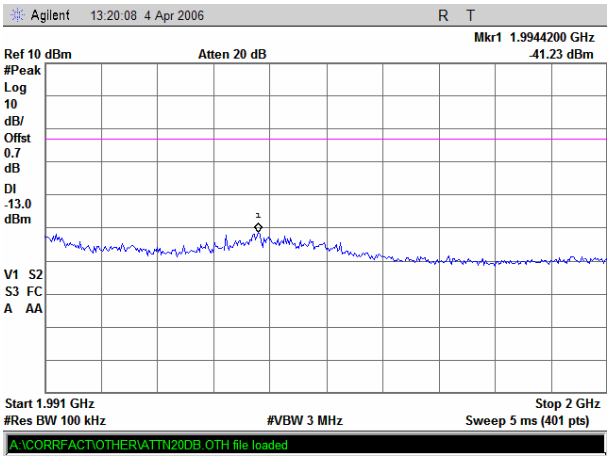
Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 8.3.24 Spurious emission measurements in 1.99 – 1.991 GHz range, PCS 1900, CDMA modulation



Note: Signal power = SA reading + BW factor = -37.74 + 10log(1MHz/100kHz) = -37.84 + 10 dB = -27.84 dBm

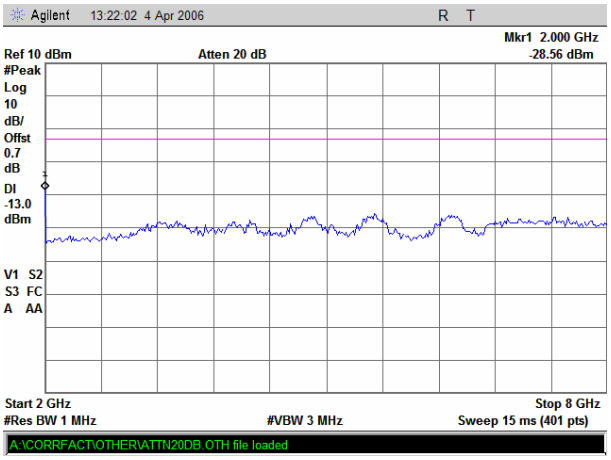
Plot 8.3.25 Spurious emission measurements in 1.991 – 2.0 GHz range, PCS 1900, CDMA modulation



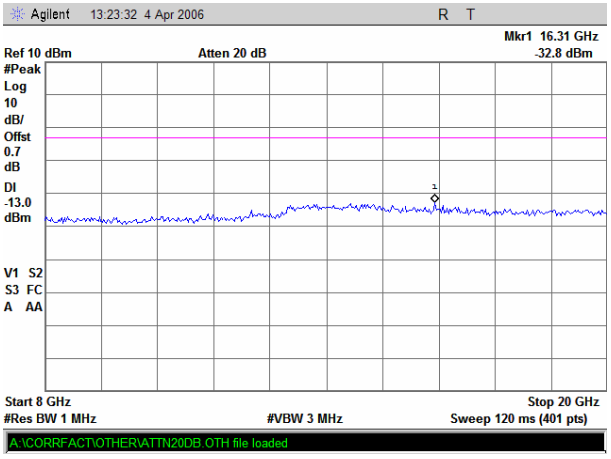
Note: Signal power = SA reading + BW factor = -41.23 + 10log(1MHz/100kHz) = -41.23 + 10 dB = -31.23dBm

Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 8.3.26 Spurious emission measurements in 2.0 – 8.0 GHz range, PCS 1900, CDMA modulation

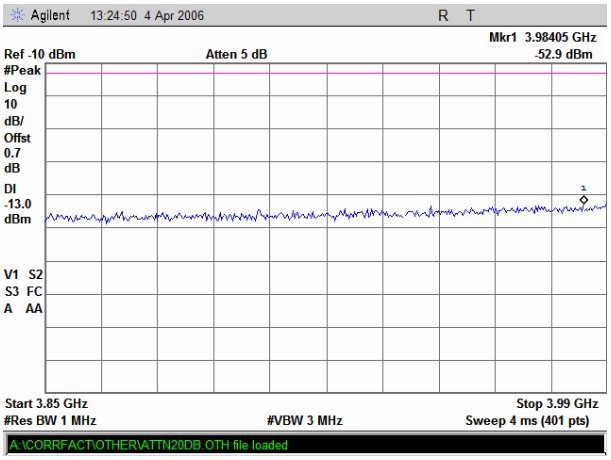


Plot 8.3.27 Spurious emission measurements in 8 - 20 GHz range, PCS 1900, CDMA modulation

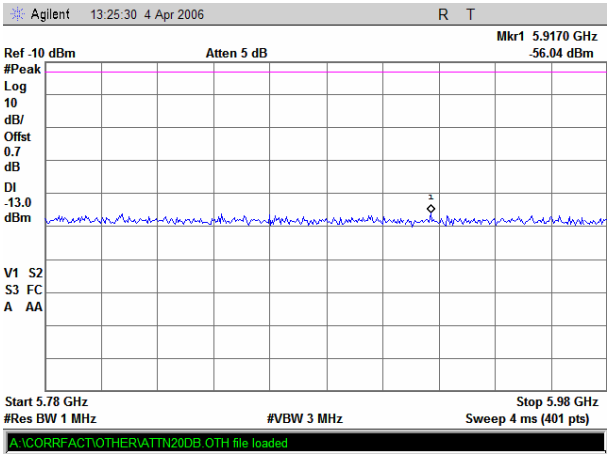


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 8.3.28 Conducted spurious emission measurements at the 2nd harmonic, PCS 1900, CDMA modulation

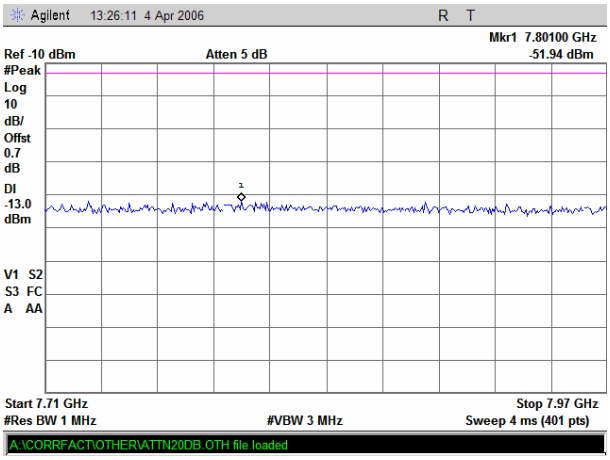


Plot 8.3.29 Conducted spurious emission measurements at the 3rd harmonic, PCS 1900, CDMA modulation



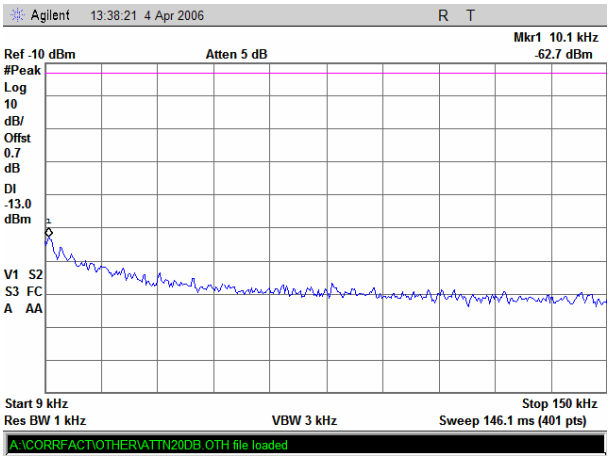
Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 8.3.30 Conducted spurious emission measurements at the 4th harmonic, PCS 1900, CDMA modulation

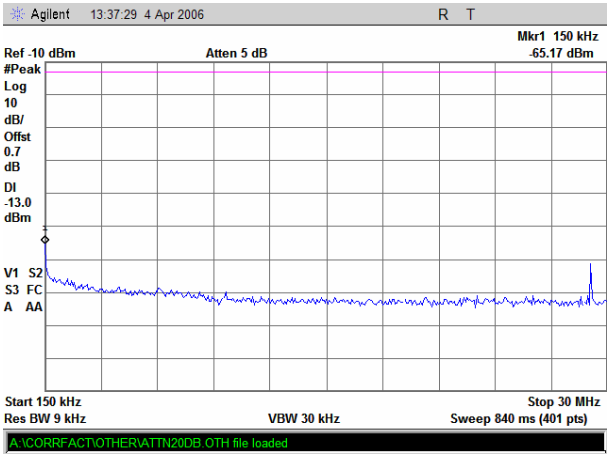


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 8.3.31 Spurious emission measurements in 9 - 150 kHz range, PCS 1900, TDMA modulation

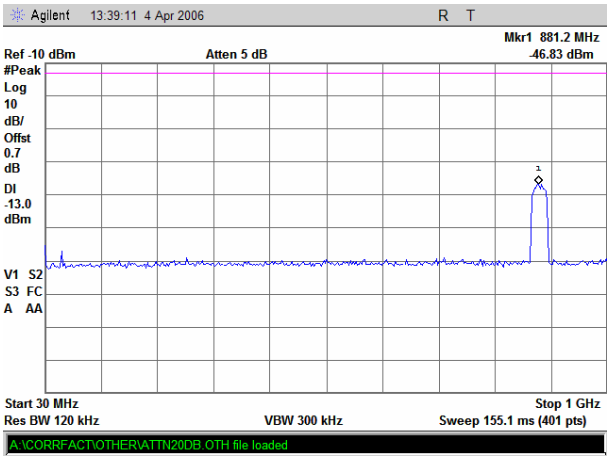


Plot 8.3.32 Spurious emission measurements in 0.15 - 30 MHz range, PCS 1900, TDMA modulation

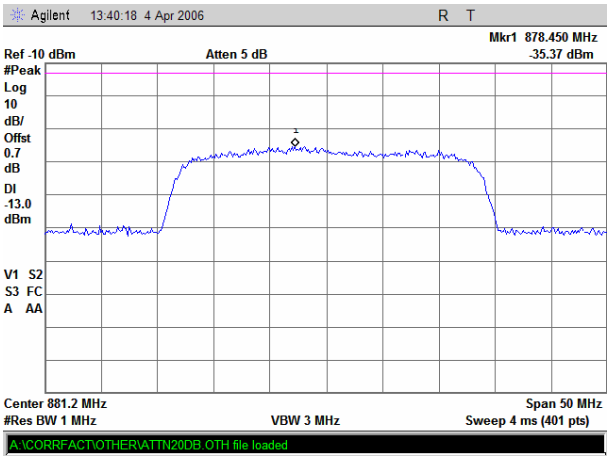


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 8.3.33 Spurious emission measurements in 30 - 1000 MHz range, PCS 1900, TDMA modulation

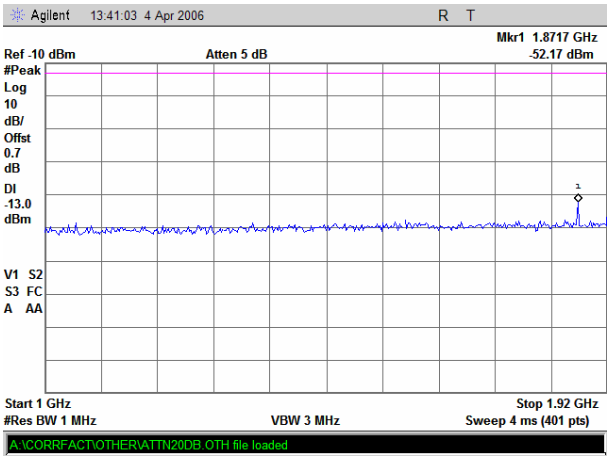


Plot 8.3.34 Spurious emission measurements at 881 MHz, PCS 1900, TDMA modulation

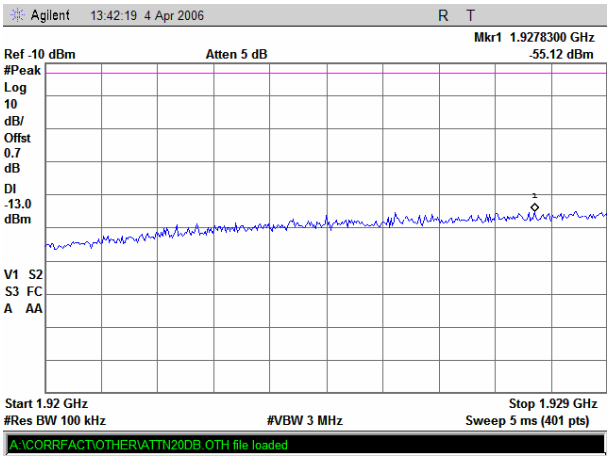


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 8.3.35 Spurious emission measurements in 1 – 1.92 GHz range, PCS 1900, TDMA modulation



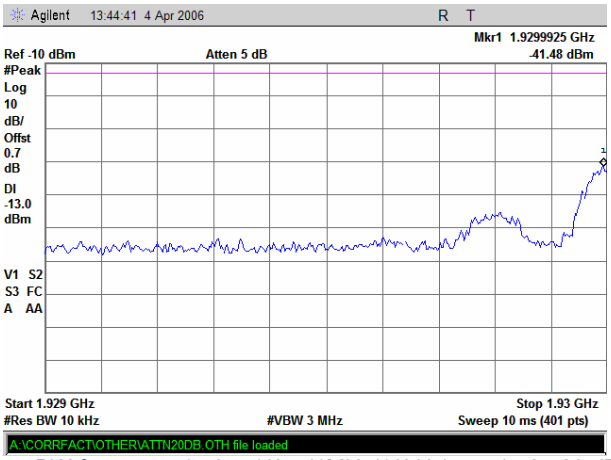
Plot 8.3.36 Spurious emission measurements in 1.920 – 1.929 GHz range, PCS 1900, TDMA modulation



Note: Signal power = SA reading + BW factor = -55.12 + 10log(1MHz/100kHz) = -55.12 + 10 dB = -45.12 dBm

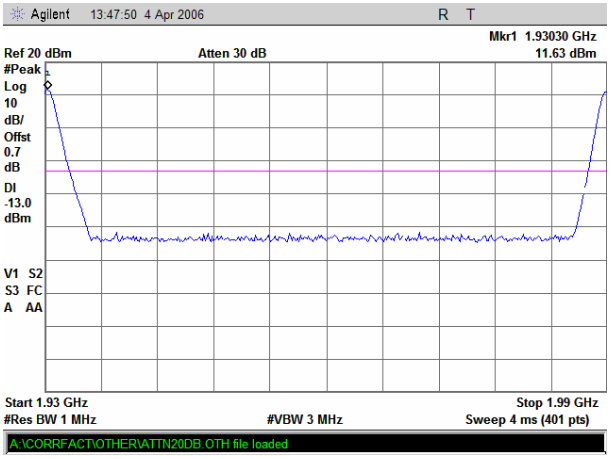
Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 8.3.37 Spurious emission measurements in 1.929 – 1.93 GHz range, PCS 1900, TDMA modulation



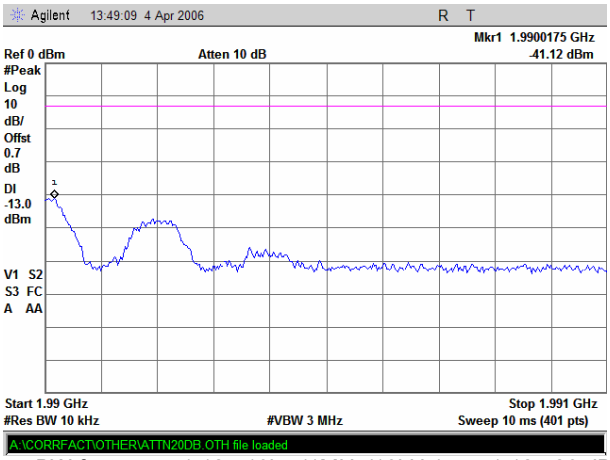
Note: Signal power = SA reading + BW factor = -41.48 + 10log(1MHz/10kHz) = -41.48+ 20 dB = -21.48 dBm

Plot 8.3.38 Spurious emission measurements in 1.93 – 1.99 GHz range, PCS 1900, TDMA modulation



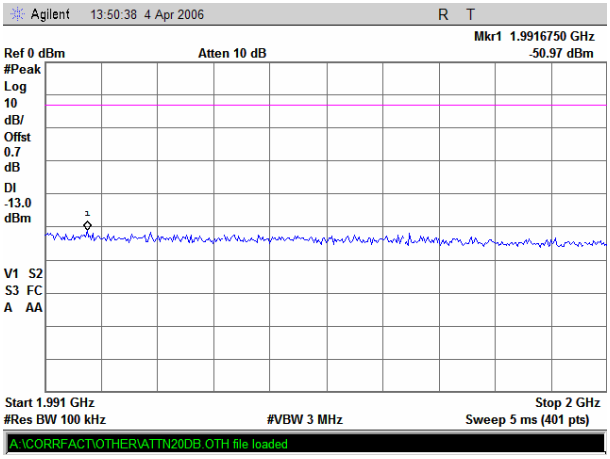
Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 8.3.39 Spurious emission measurements in 1.99 – 1.991 GHz range, PCS 1900, TDMA modulation



Note: Signal power = SA reading + BW factor = -41.12+ 10log(1MHz/10kHz) = -41.12+ 20 dB = -21.12 dBm

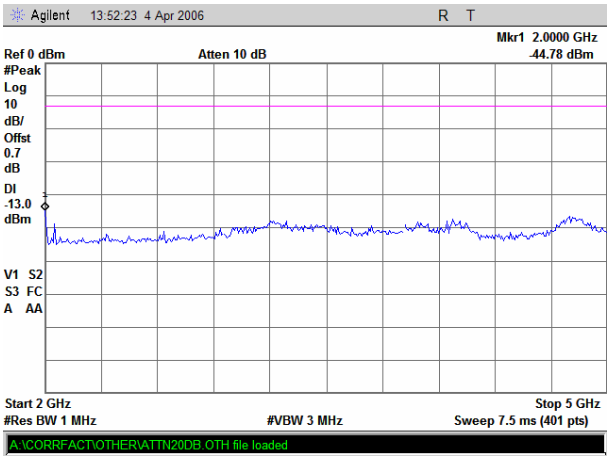
Plot 8.3.40 Spurious emission measurements in 1.991 – 2.0 GHz range, PCS 1900, TDMA modulation



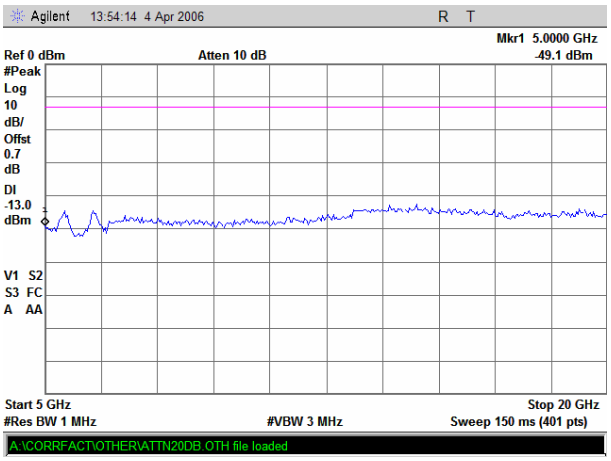
Note: Signal power = SA reading + BW factor = -50.97+ 10log(1MHz/100kHz) = -50.97+ 10 dB = -40.97 dBm

Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 8.3.41 Spurious emission measurements in 2 – 5 GHz range, PCS 1900, TDMA modulation

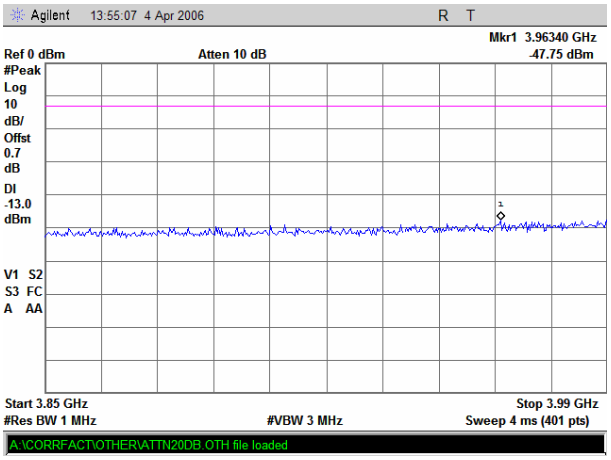


Plot 8.3.42 Spurious emission measurements at 5 – 20 GHz range, PCS 1900, TDMA modulation

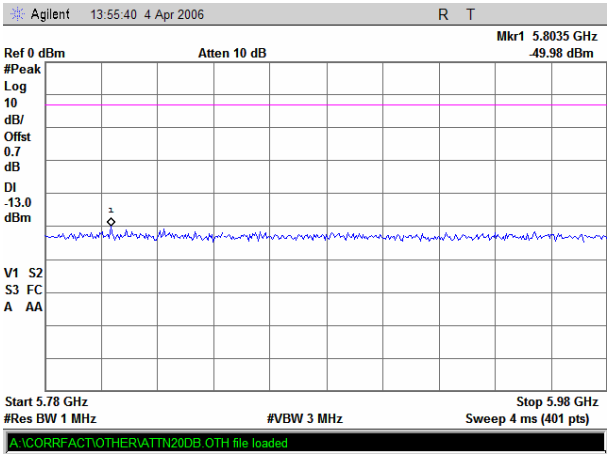


Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 8.3.43 Conducted spurious emission measurements at the 2nd harmonic, PCS 1900, TDMA modulation

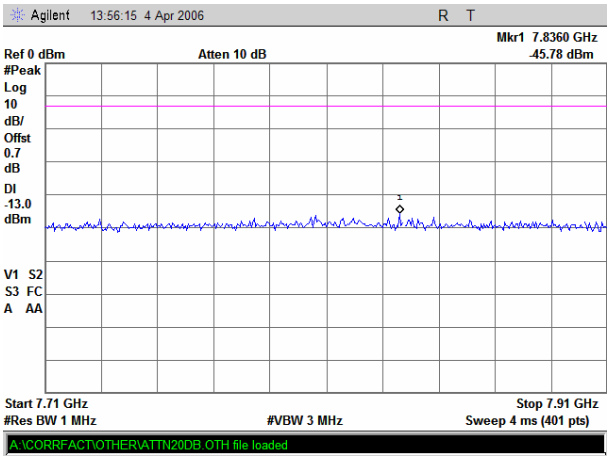


Plot 8.3.44 Conducted spurious emission measurements at the 3rd harmonic, PCS 1900, TDMA modulation



Test specification:	Section 24.238, Spurious emission at antenna terminal		
Test procedure:	FCC part 24, Section 24.238		
Test mode:	Compliance	Verdict:	PASS
Date:	4/4/2006		
Temperature: 22ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 120 VAC
Remarks:			

Plot 8.3.45 Conducted spurious emission measurements at the 4th harmonic, PCS 1900, TDMA modulation



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/7/2006		
Temperature: 21ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
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:	4/7/2006		
Temperature: 21ºC	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

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

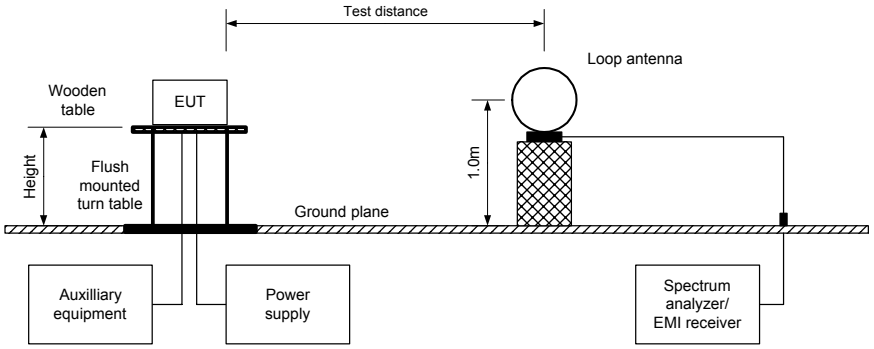
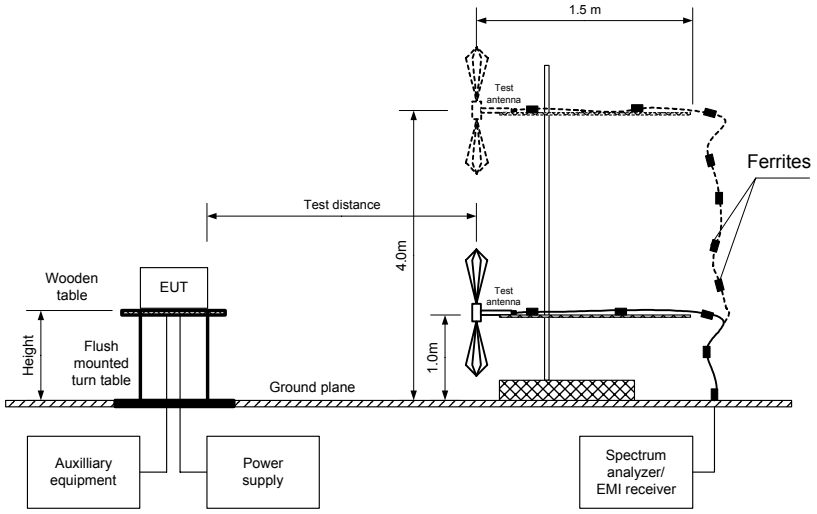


Figure 8.4.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	**Section 24.238, Radiated spurious emissions**		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	**Verdict:**	PASS
Date:	4/7/2006		
Temperature: 21ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 120 VAC
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)
3 CARRIER TONE FREQUENCIES:	1930.05 MHz 1937.00 MHz 1989.99 MHz
MAXIMUM INPUT SIGNAL:	-20 dBm

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

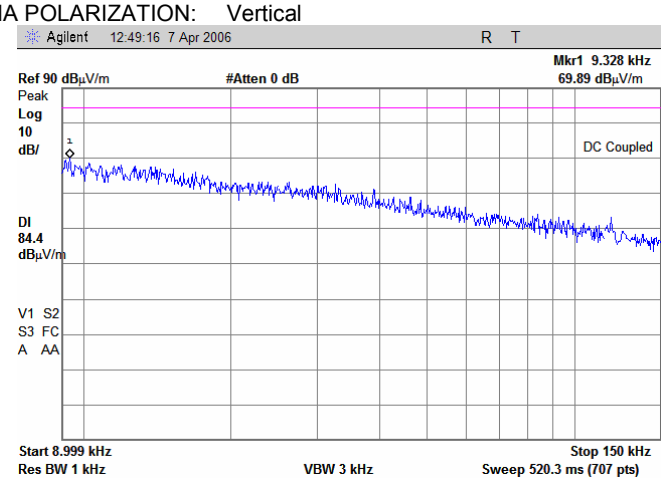
HL 0446	HL 0465	HL 0521	HL 0589	HL 0592	HL 0593	HL 0594	HL 0604
HL 0768	HL 1553	HL 1566	HL 1567	HL 1942	HL 1984	HL 2009	HL 2259
HL 2697	HL 2780						

Full description is given in Appendix A.

Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/7/2006		
Temperature: 21°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

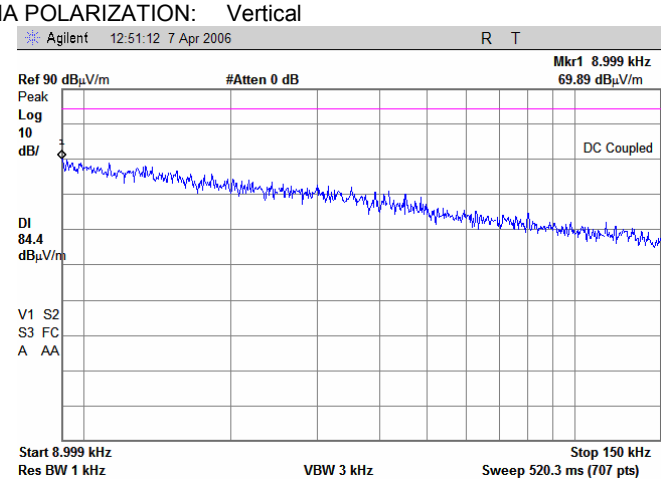
Plot 8.4.1 Radiated emission measurements from 9 to 150 kHz at the low carrier frequency

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



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

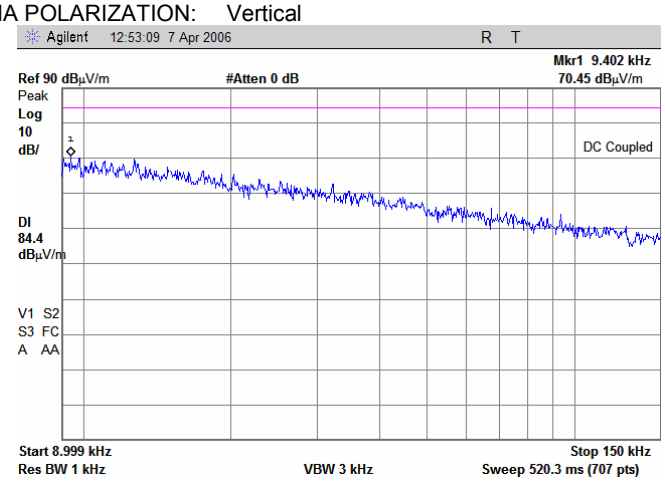
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/7/2006		
Temperature: 21°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

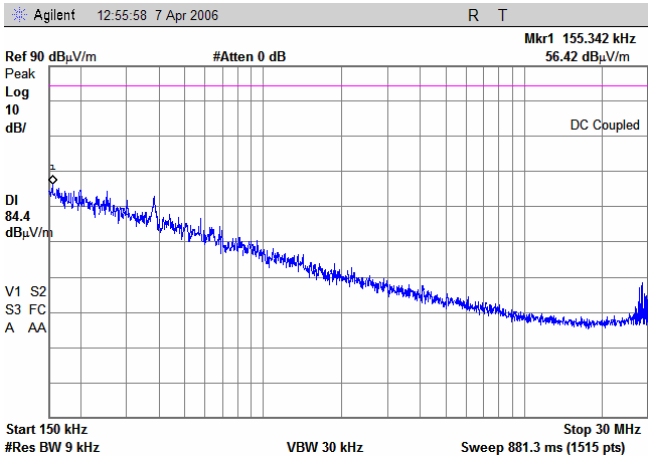
Plot 8.4.3 Radiated emission measurements from 9 to 150 kHz at the high carrier frequency

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



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

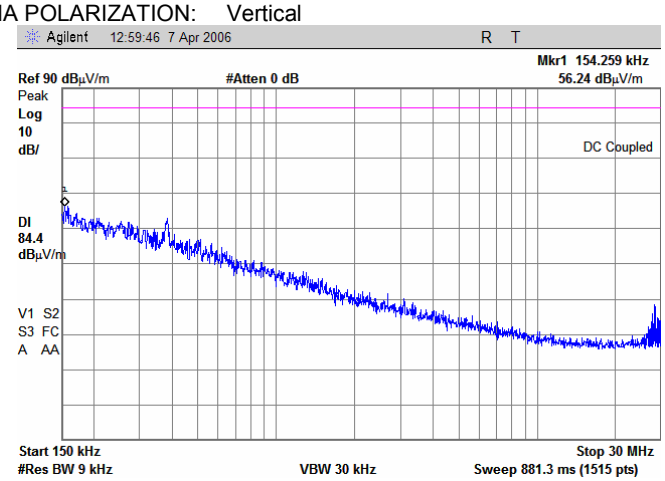
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/7/2006		
Temperature: 21°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

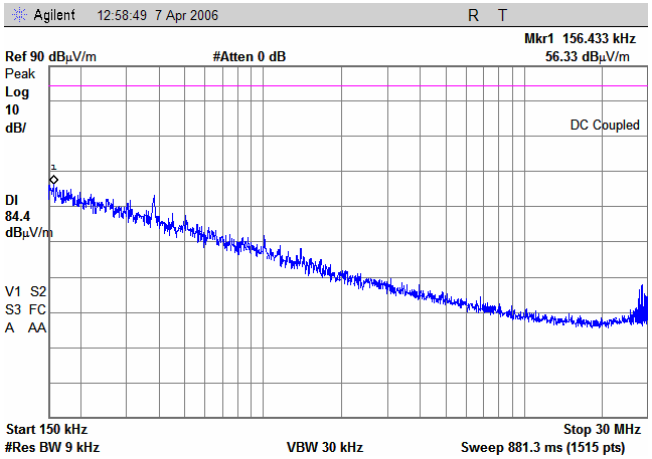
Plot 8.4.5 Radiated emission measurements from 0.15 to 30 MHz at the mid carrier frequency

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



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

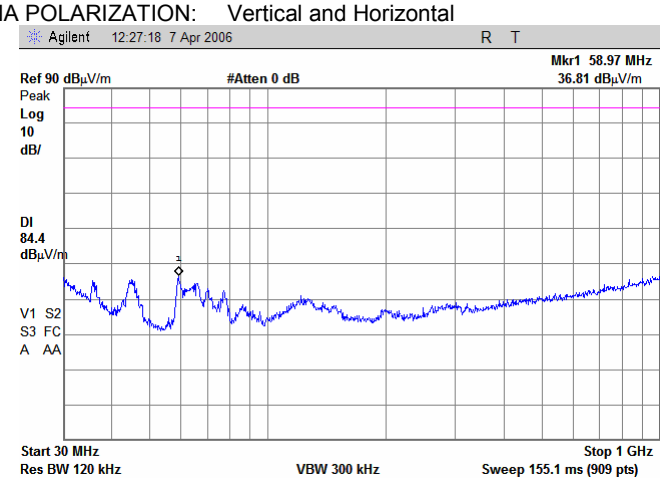
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/7/2006		
Temperature: 21°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

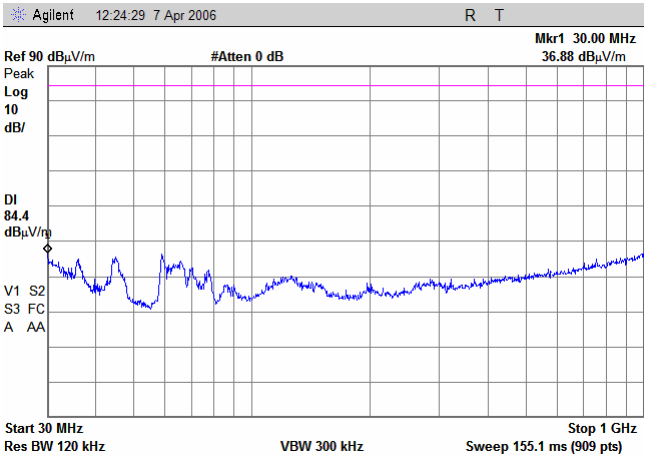
Plot 8.4.7 Radiated emission measurements from 30 to 1000 MHz at the low carrier frequency

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



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

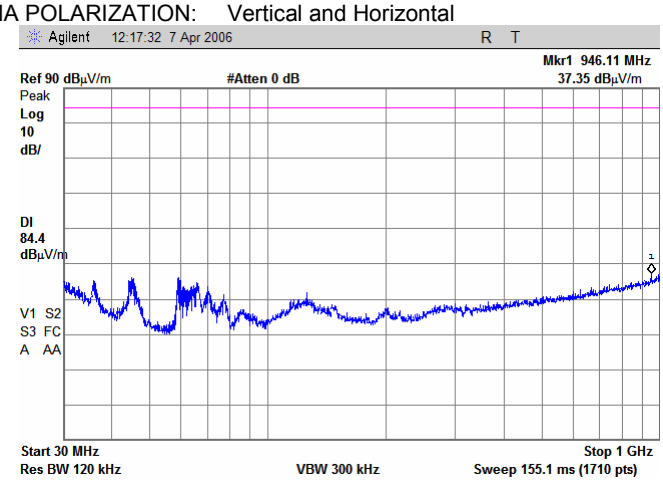
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/7/2006		
Temperature: 21°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

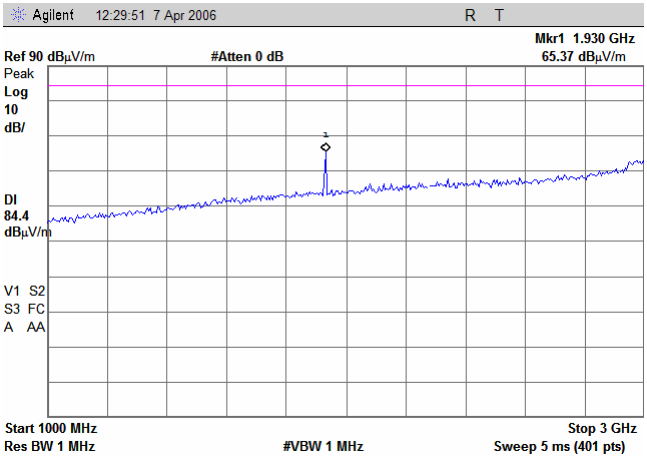
Plot 8.4.9 Radiated emission measurements from 30 to 1000 MHz at the high carrier frequency

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



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

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

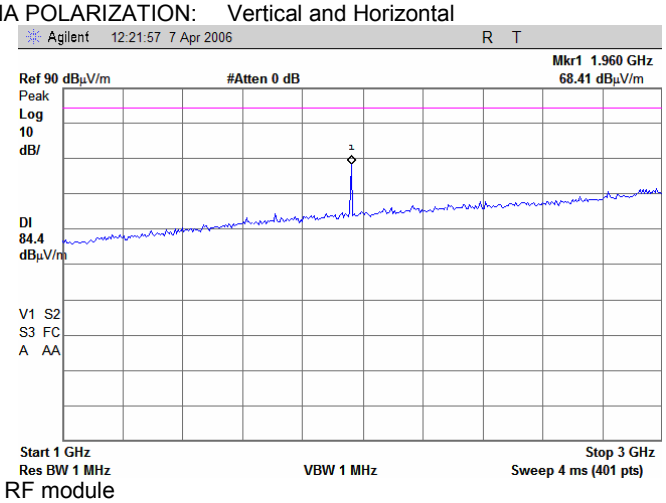


Note: intentional radiation of RF module

Test specification:	**Section 24.238, Radiated spurious emissions**		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	**Verdict:**	PASS
Date:	4/7/2006		
Temperature: 21ºC	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 120 VAC
Remarks:			

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

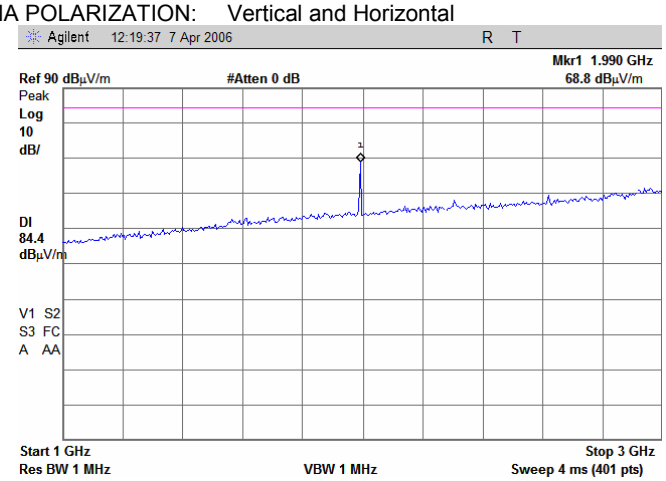
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Note: intentional radiation of RF module

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

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

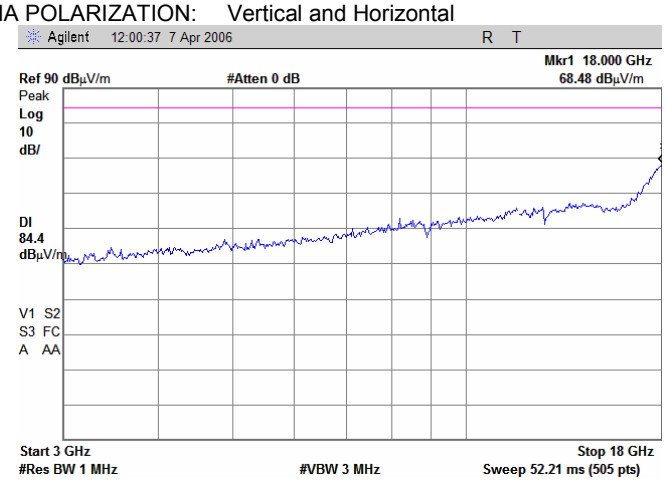


Note: intentional radiation of RF module

Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/7/2006		
Temperature: 21°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

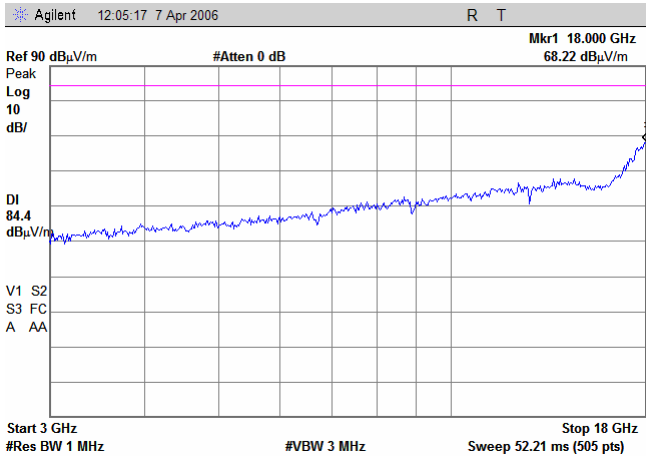
Plot 8.4.13 Radiated emission measurements from 3000 to 18000 MHz at the low carrier frequency

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



Plot 8.4.14 Radiated emission measurements from 3000 to 18000 MHz at the mid carrier frequency

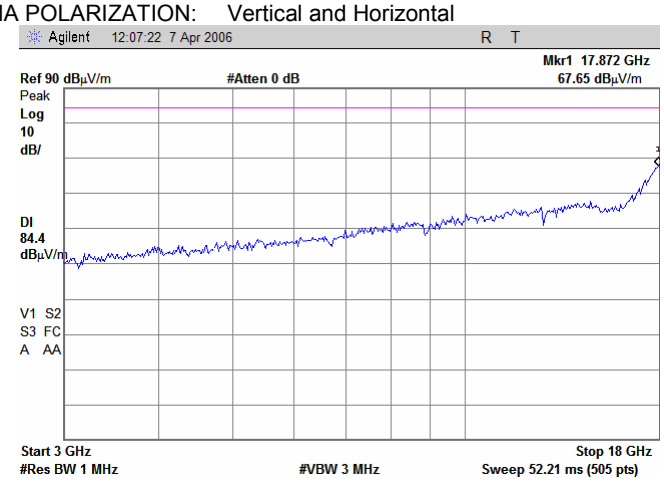
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/7/2006		
Temperature: 21°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

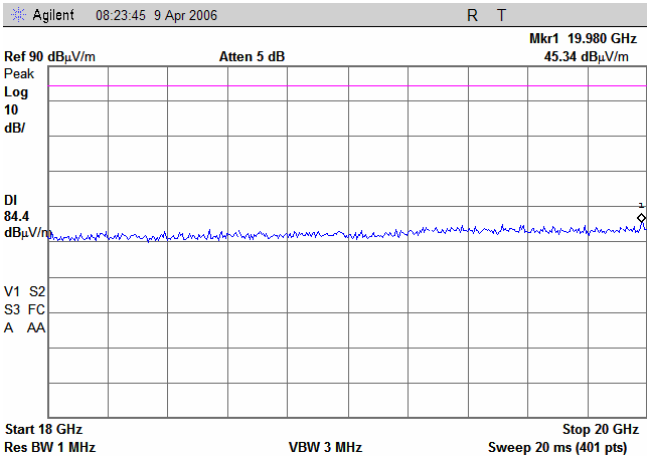
Plot 8.4.15 Radiated emission measurements from 3000 to 18000 MHz at the high carrier frequency

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



Plot 8.4.16 Radiated emission measurements from 18 to 20 GHz at the low carrier frequency

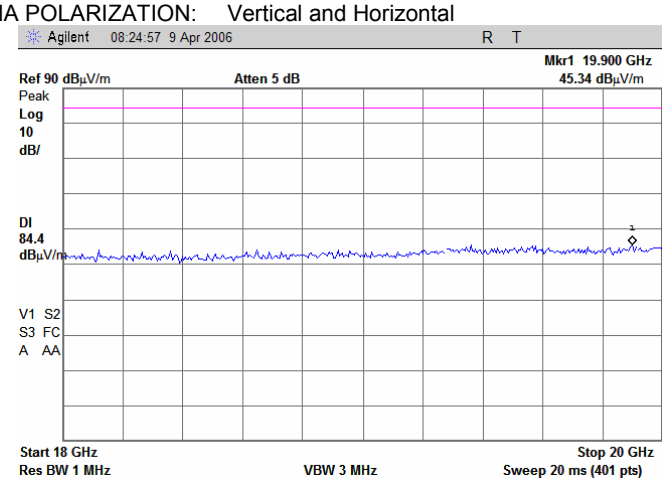
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 24.238, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	4/7/2006		
Temperature: 21°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

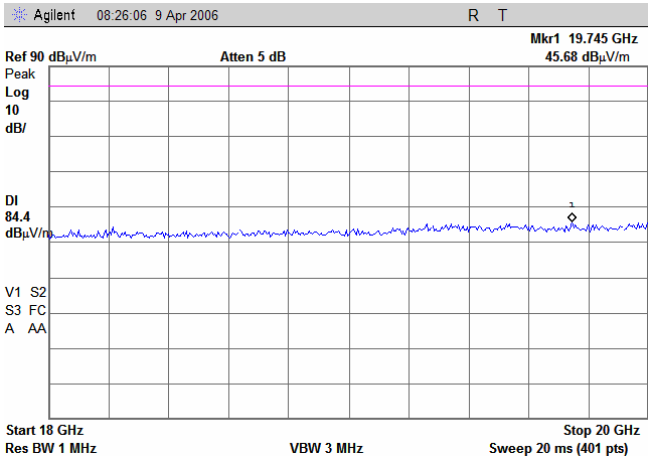
Plot 8.4.17 Radiated emission measurements from 18 to 20 GHz at the mid carrier frequency

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



Plot 8.4.18 Radiated emission measurements from 18 to 20 GHz at the high carrier frequency

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



Test specification:	Sections 22.917, 24.238, Intermodulatiom emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	5/18/2006		
Temperature: 22ºC	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

8.5 Intermodulation emissions at RF antenna connector test

8.5.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 8.5.1.

Table 8.5.1 Spurious emission limits

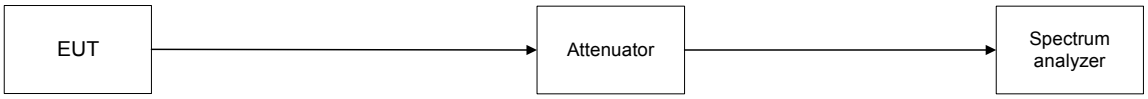
Frequency, MHz	Attenuation below carrier, dBc	ERP of spurious, dBm
0.009 – 10th harmonic*	43+10logP*	-13.0

- 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

8.5.2 Test procedure

8.5.2.1 The EUT was set up as shown in Figure 8.5.1, energized and its proper operation was checked.
8.5.2.2 The EUT was adjusted to produce maximum available for end user RF output power.
8.5.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 8.5.2 and associated plots.

Figure 8.5.1 Spurious emission test setup



Test specification:	**Sections 22.917, 24.238, Intermodulatiom emissions**		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	**Verdict:**	PASS
Date:	5/18/2006		
Temperature: 22ºC	**Air Pressure:** 1014 hPa	**Relative Humidity:** 45 %	**Power Supply:** 120 VAC
Remarks:			

Table 8.5.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 869 - 894 MHz / 1930 - 1990 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 – 25000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATION: Unmodulated
MODULATING SIGNAL: PRBS
3 CARRIER TONE FREQUENCIES: 1930.05 MHz
1937.00 MHz
1989.99 MHz

869.05 MHz
869.08 MHz
893.95 MHz

Frequency, MHz	RBW, kHz	Spurious emission, dBm	Limit, dBm	Margin, dB*	Verdict
Low carrier frequency					
869.00	100	-33.10	-13.0	-20.1	Pass
1930.00	1000	-17.59	-13.0	-4.59	Pass
Mid carrier frequency					
No spurious emissions were found					Pass
High carrier frequency					
894.00	100	-28.12	-13.0	-15.12	Pass
1990.21	1000	-35.89	-13.0	-22.89	Pass

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

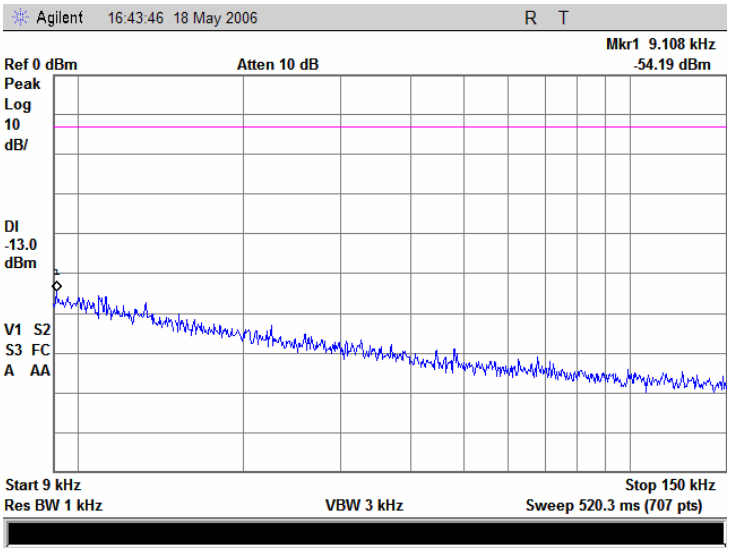
Reference numbers of test equipment used

HL 1650	HL 2399	HL 2909				

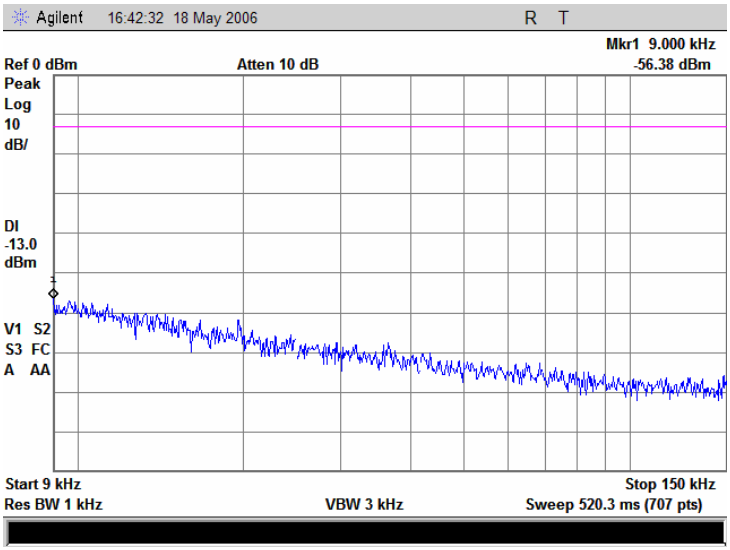
Full description is given in Appendix A.

Test specification:	Sections 22.917, 24.238, Intermodulatiom emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	5/18/2006		
Temperature: 22ºC	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 8.5.1 Spurious emission measurements in 9 - 150 kHz range, low carrier frequency

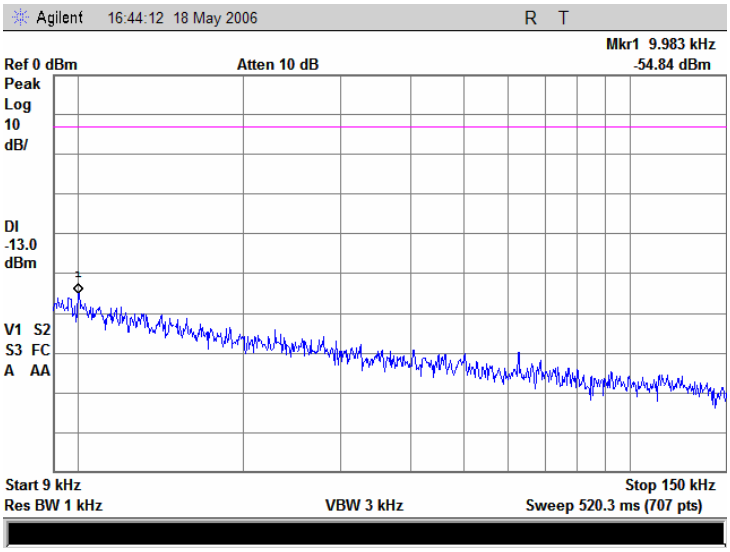


Plot 8.5.2 Spurious emission measurements in 9 - 150 kHz range, mid carrier frequency

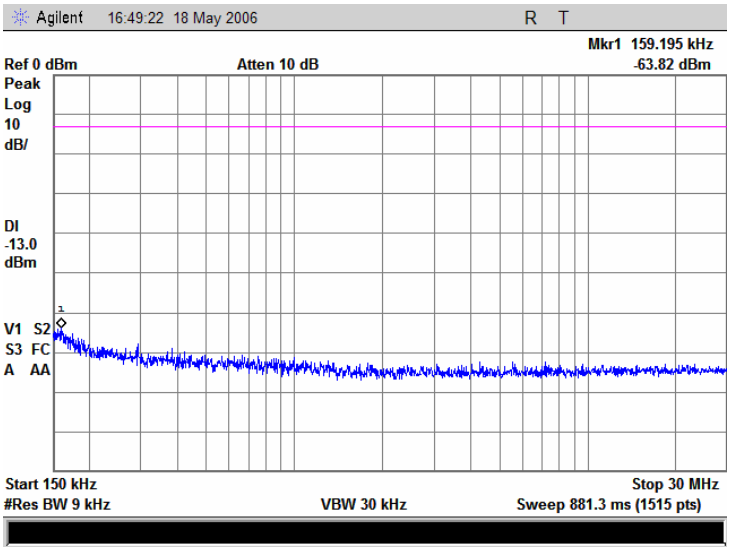


Test specification:	Sections 22.917, 24.238, Intermodulatiom emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	5/18/2006		
Temperature: 22ºC	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 8.5.3 Spurious emission measurements in 9 - 150 kHz range, high carrier frequency

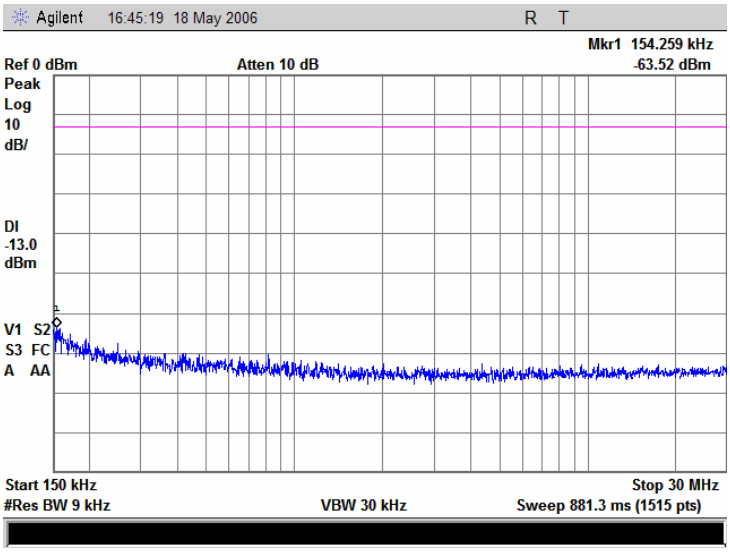


Plot 8.5.4 Spurious emission measurements in 0.15 - 30 MHz range, low carrier frequency

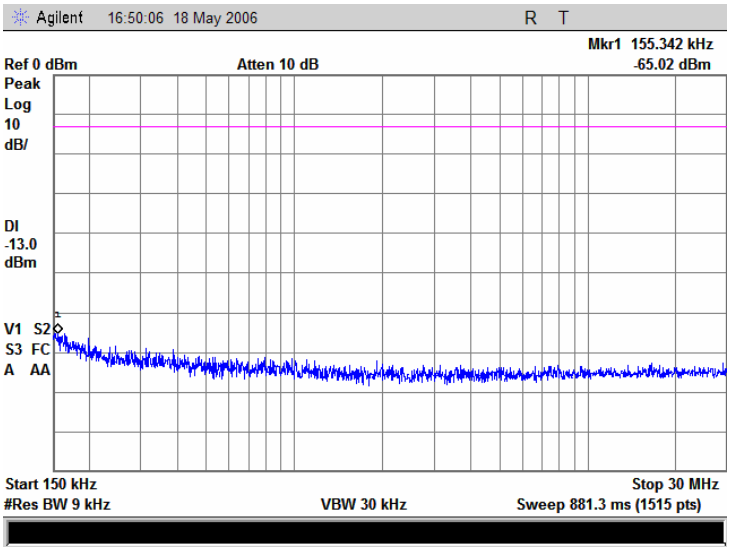


Test specification:	Sections 22.917, 24.238, Intermodulatiom emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	5/18/2006		
Temperature: 22ºC	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 8.5.5 Spurious emission measurements in 0.15 - 30 MHz range, mid carrier frequency

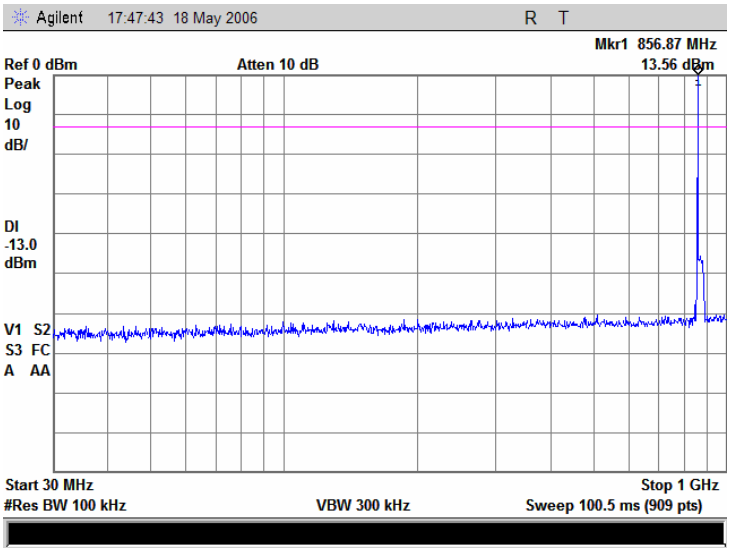


Plot 8.5.6 Spurious emission measurements in 0.15 - 30 MHz range, high carrier frequency

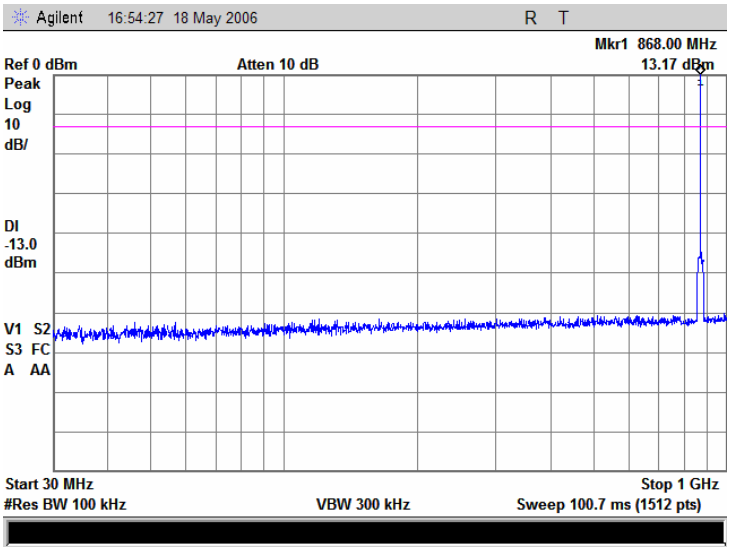


Test specification:	Sections 22.917, 24.238, Intermodulatiom emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	5/18/2006		
Temperature: 22ºC	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 8.5.7 Spurious emission measurements in 30 - 1000 MHz range, low carrier frequency

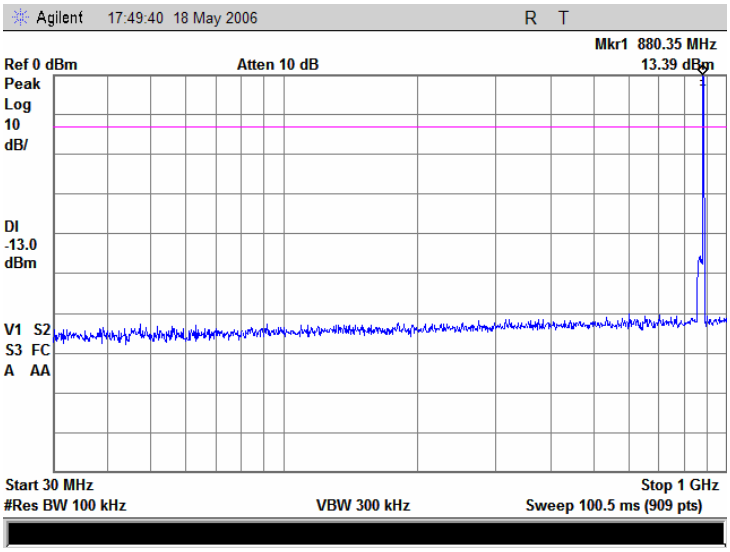


Plot 8.5.8 Spurious emission measurements in 30 - 1000 MHz range, mid carrier frequency

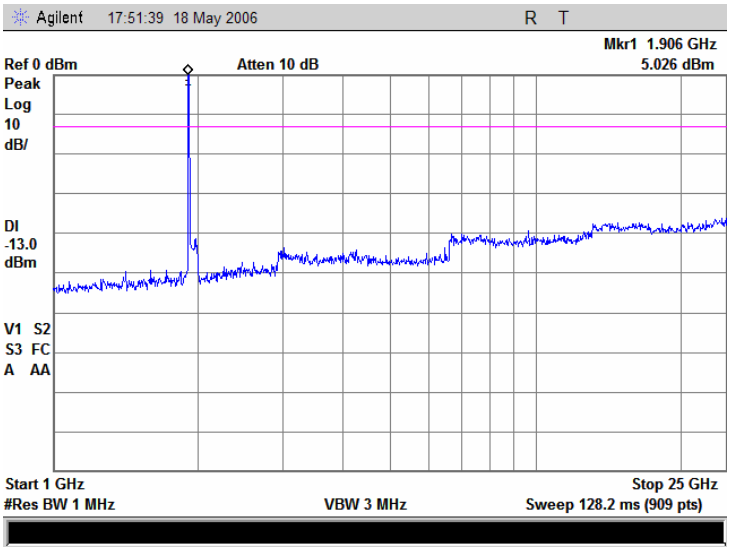


Test specification:	Sections 22.917, 24.238, Intermodulatiom emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	5/18/2006		
Temperature: 22ºC	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 8.5.9 Spurious emission measurements in 30 - 1000 MHz range, high carrier frequency

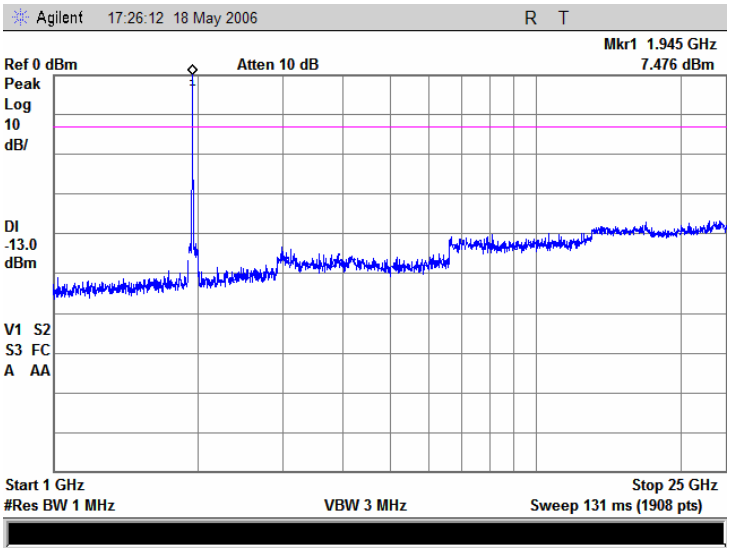


Plot 8.5.10 Spurious emission measurements in 1000 - 25000 MHz range, low carrier frequency

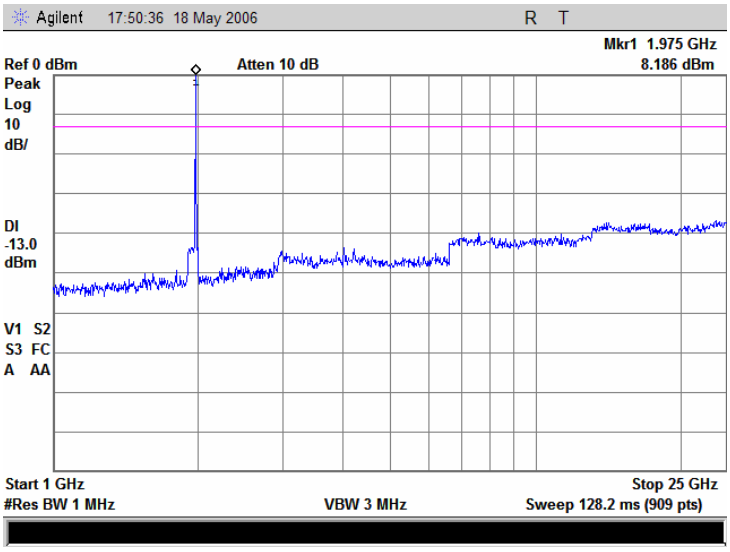


Test specification:	Sections 22.917, 24.238, Intermodulatiom emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	5/18/2006		
Temperature: 22ºC	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 8.5.11 Spurious emission measurements in 1000 - 25000 MHz range, mid carrier frequency

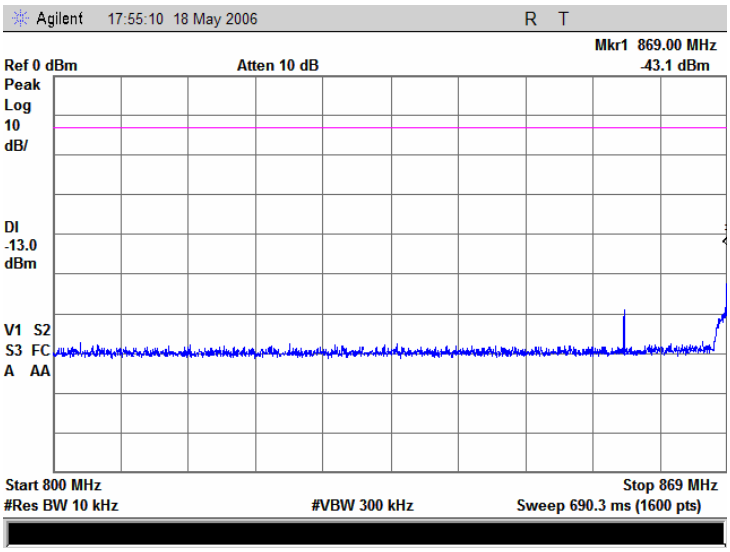


Plot 8.5.12 Spurious emission measurements in 1000 - 25000 MHz range, high carrier frequency



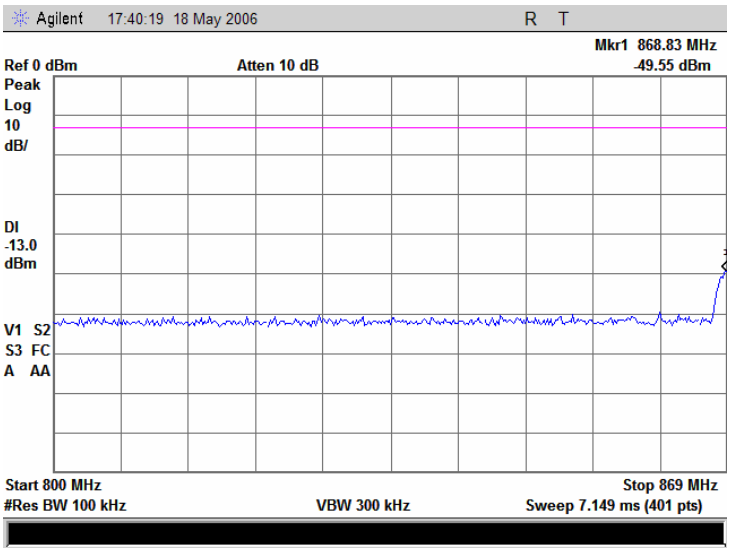
Test specification:	Sections 22.917, 24.238, Intermodulatiom emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	5/18/2006		
Temperature: 22ºC	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 8.5.13 Spurious emission measurements in 800 – 869 MHz range, low carrier frequency



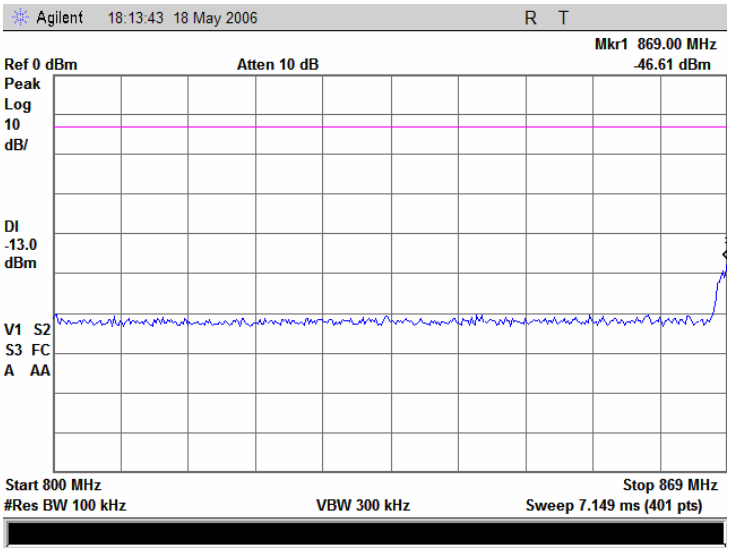
Note: Signal power = SA reading + BW factor = -43.1 + 10 log (100 kHz / 10 kHz) = -43.1 + 10 dB = -33.1 dBm

Plot 8.5.14 Spurious emission measurements in 800 – 869 MHz range, mid carrier frequency

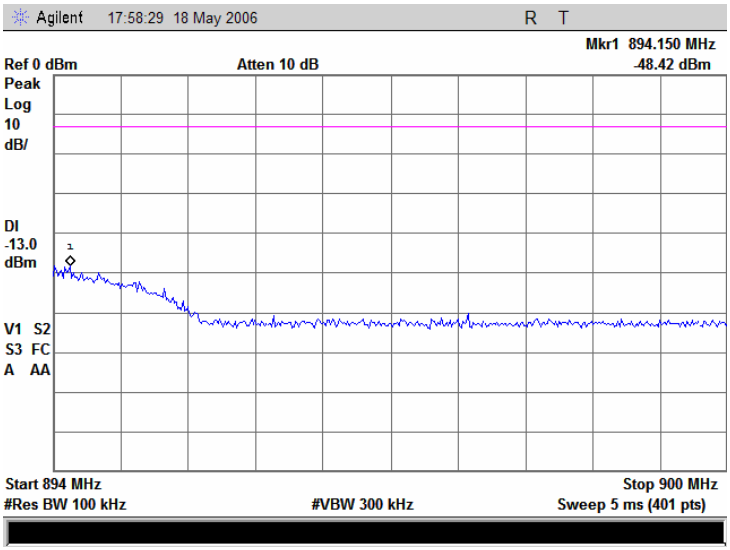


Test specification:	Sections 22.917, 24.238, Intermodulatiom emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	5/18/2006		
Temperature: 22ºC	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 8.5.15 Spurious emission measurements in 800 – 869 MHz range, high carrier frequency

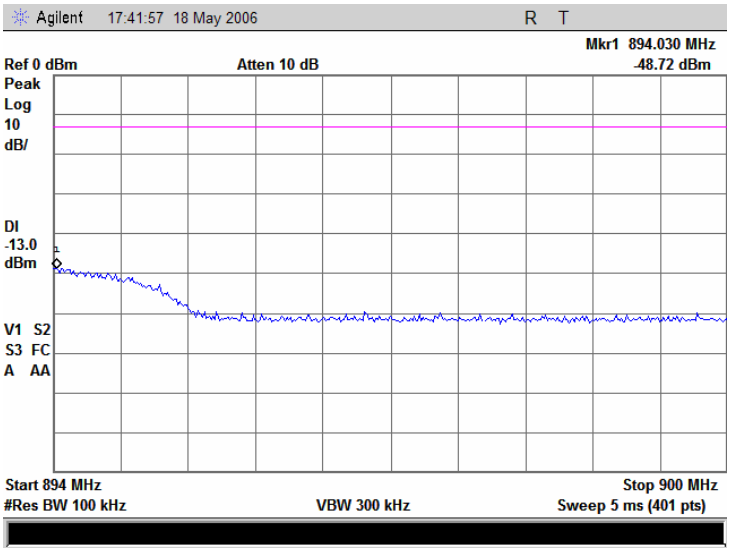


Plot 8.5.16 Spurious emission measurements in 894 – 900 MHz range, low carrier frequency

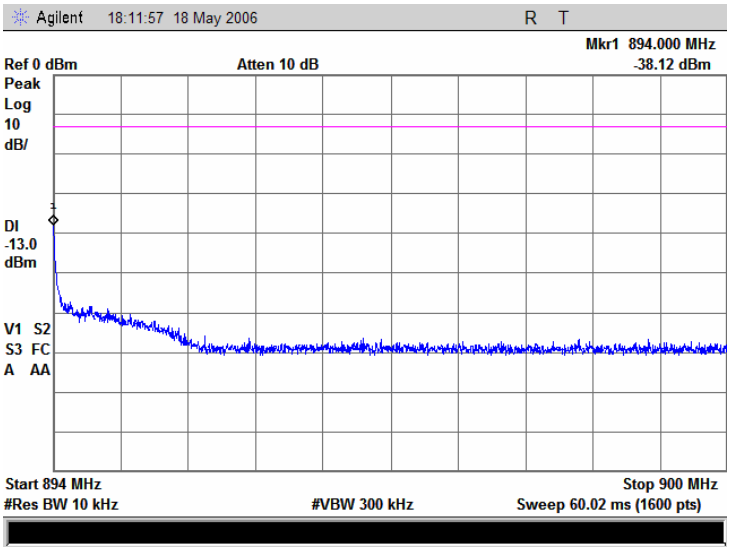


Test specification:	Sections 22.917, 24.238, Intermodulatiom emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	5/18/2006		
Temperature: 22ºC	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 8.5.17 Spurious emission measurements in 894 – 900 MHz range, mid carrier frequency



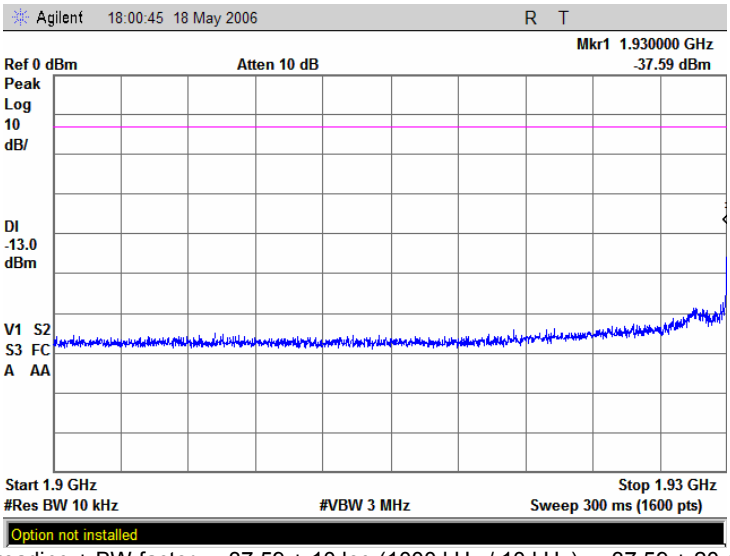
Plot 8.5.18 Spurious emission measurements in 894 – 900 MHz range, high carrier frequency



Note: Signal power = SA reading + BW factor = -38.12 + 10 log (100 kHz / 10 kHz) = -38.12 + 10 dB = -28.12 dBm

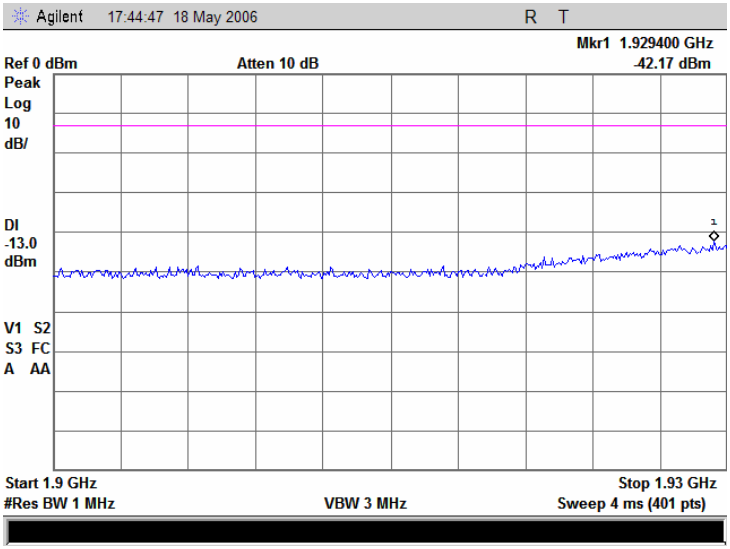
Test specification:	Sections 22.917, 24.238, Intermodulatiom emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	5/18/2006		
Temperature: 22ºC	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 8.5.19 Spurious emission measurements in 1900 – 1930 MHz range, low carrier frequency



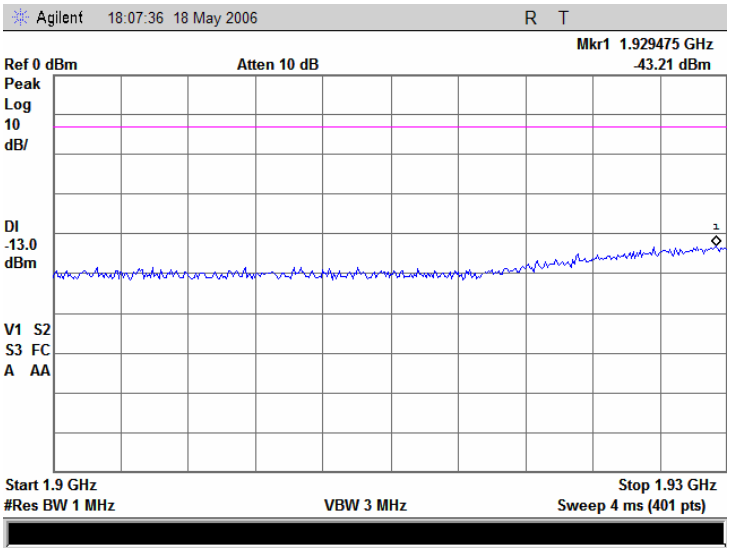
Note: Signal power = SA reading + BW factor = -37.59 + 10 log (1000 kHz / 10 kHz) = -37.59 + 20 dB = -17.59 dBm

Plot 8.5.20 Spurious emission measurements in 1900 – 1930 MHz range, mid carrier frequency

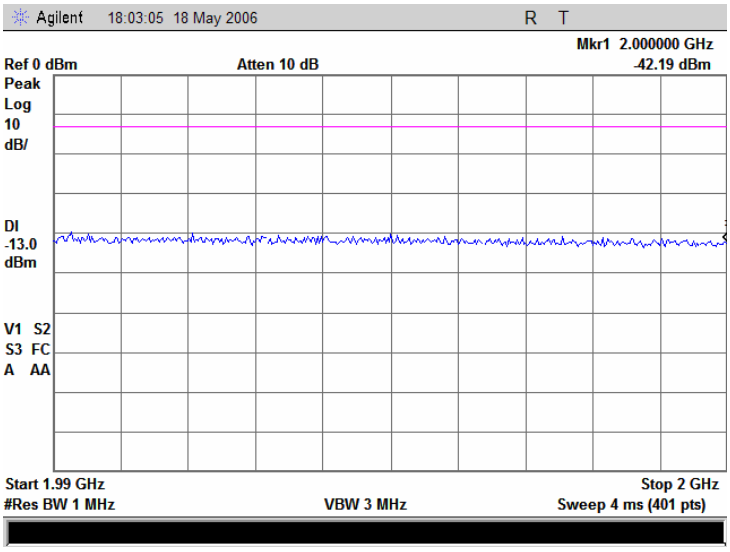


Test specification:	Sections 22.917, 24.238, Intermodulatiom emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	5/18/2006		
Temperature: 22ºC	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 8.5.21 Spurious emission measurements in 1900 – 1930 MHz range, high carrier frequency

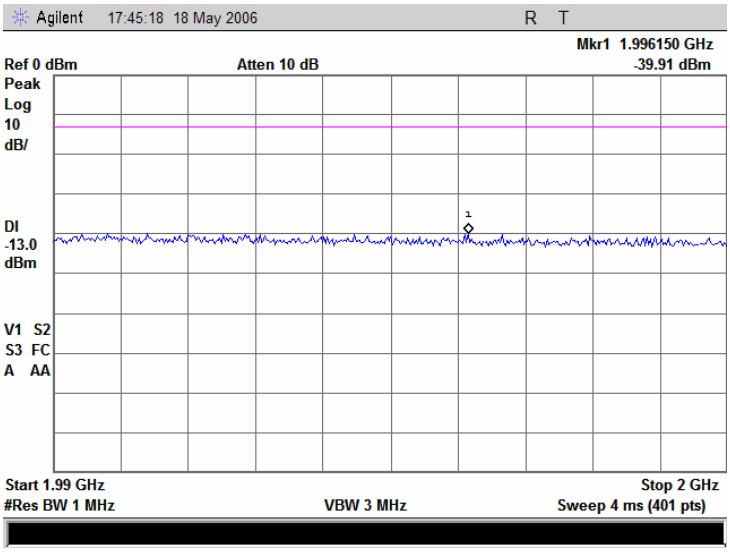


Plot 8.5.22 Spurious emission measurements in 1990 – 2000 MHz range, low carrier frequency

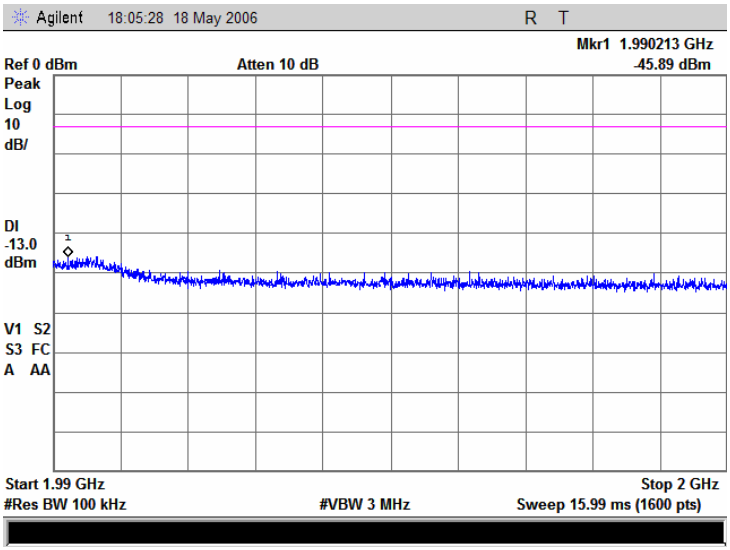


Test specification:	Sections 22.917, 24.238, Intermodulatiom emissions		
Test procedure:	Public notice DA 00-705		
Test mode:	Compliance	Verdict:	PASS
Date:	5/18/2006		
Temperature: 22ºC	Air Pressure: 1014 hPa	Relative Humidity: 45 %	Power Supply: 120 VAC
Remarks:			

Plot 8.5.23 Spurious emission measurements in 1990 – 2000 MHz range, mid carrier frequency



Plot 8.5.24 Spurious emission measurements in 1990 – 2000 MHz range, high carrier frequency



Note: Signal power = SA reading + BW factor = -45.89 + 10 log (1000 kHz / 100 kHz) = -45.89 + 10 dB = -35.89 dBm

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:	4/9/2006		
Temperature: 21ºC	Air Pressure: 1015 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC; 48 V DC
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.

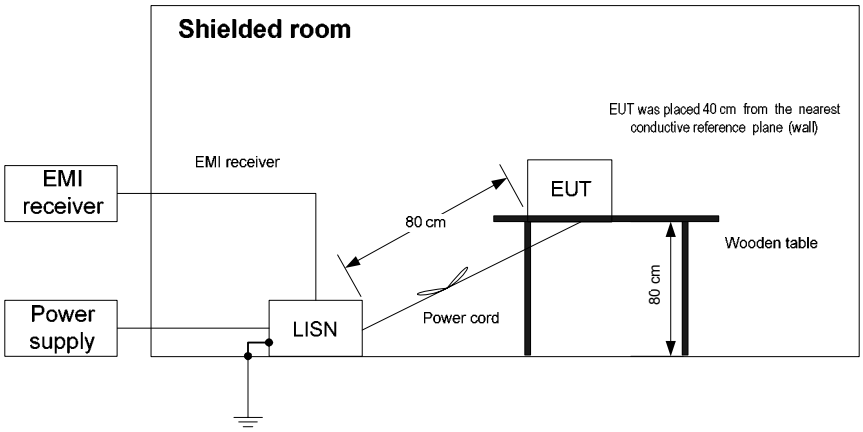
9.1.2 Test procedure

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, Table 9.1.3. 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:	4/9/2006		
Temperature: 21ºC	**Air Pressure:** 1015 hPa	**Relative Humidity:** 42 %	**Power Supply:** 120 VAC; 48 V DC
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									
0.180516	41.52	39.81	64.51	-24.70	33.21	54.51	-21.30	L1	Pass
14.026350	35.49	29.81	60.00	-30.19	23.91	50.00	-26.09		
15.594444	40.70	37.44	60.00	-22.56	31.44	50.00	-18.56		
28.352817	38.85	35.91	60.00	-24.09	29.41	50.00	-20.59		
0.180270	41.33	39.69	64.52	-24.83	33.18	54.52	-21.34	L2	Pass
13.399566	35.72	30.31	60.00	-29.69	23.42	50.00	-26.58		
28.322659	39.93	37.68	60.00	-22.32	32.23	50.00	-17.77		
Cell 800 Mid carrier frequency									
0.180696	41.61	39.81	64.50	-24.69	33.28	54.50	-21.22	L1	Pass
16.896377	38.27	36.50	60.00	-23.50	31.12	50.00	-18.88		
28.231987	38.68	35.63	60.00	-24.37	30.83	50.00	-19.17		
0.180555	41.37	39.77	64.51	-24.74	33.24	54.51	-21.27	L2	Pass
15.149793	39.96	36.94	60.00	-23.06	34.03	50.00	-15.97		
28.244231	39.74	38.05	60.00	-21.95	35.96	50.00	-14.04		
PCS 1900 Mid carrier frequency									
0.179783	41.60	39.64	64.55	-24.91	33.22	54.55	-21.33	L1	Pass
15.379781	39.22	36.24	60.00	-23.76	35.63	50.00	-14.37		
27.977876	45.18	44.19	60.00	-15.81	41.17	50.00	-8.83		
0.180288	41.54	39.82	64.52	-24.70	33.32	54.52	-21.20	L2	Pass
15.150249	40.78	37.90	60.00	-22.10	34.32	50.00	-15.68		
27.979986	46.10	44.67	60.00	-15.33	39.48	50.00	-10.52		

*****- 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:	4/9/2006		
Temperature: 21ºC	**Air Pressure:** 1015 hPa	**Relative Humidity:** 42 %	**Power Supply:** 120 VAC; 48 V DC
Remarks:			

Table 9.1.3 Conducted emission test results

LINE:	AC mains through AC/DC power supply
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									
0.155573	30.94	23.28	65.73	-42.45	8.70	55.73	-47.03	L1	Pass
9.910812	34.00	33.56	60.00	-26.44	32.98	50.00	-17.02		
11.500534	40.34	37.65	60.00	-22.35	36.83	50.00	-13.17		
15.314707	34.81	32.80	60.00	-27.20	30.94	50.00	-19.06		
28.011486	48.12	47.03	60.00	-12.97	45.25	50.00	-4.75		
0.157036	30.71	22.49	65.66	-43.17	5.81	55.66	-49.85	L2	Pass
8.044552	35.74	34.46	60.00	-25.54	31.93	50.00	-18.07		
9.418789	38.00	36.25	60.00	-23.75	32.03	50.00	-17.97		
11.988348	27.47	25.17	60.00	-34.83	21.57	50.00	-28.43		
28.016425	47.81	44.73	60.00	-15.27	38.72	50.00	-11.28		
Cell 800 Mid carrier frequency									
0.158172	31.47	23.50	65.60	-42.10	11.63	55.60	-43.97	L1	Pass
8.037189	36.10	34.57	60.00	-25.43	33.48	50.00	-16.52		
9.882225	42.32	37.26	60.00	-22.74	31.05	50.00	-18.95		
28.018125	47.04	45.86	60.00	-14.14	43.54	50.00	-6.46		
0.157663	30.82	23.04	65.63	-42.59	6.27	55.63	-49.36	L2	Pass
8.044769	37.00	35.63	60.00	-24.37	33.80	50.00	-16.20		
11.633941	34.91	32.81	60.00	-27.19	30.60	50.00	-19.40		
27.791444	47.69	45.89	60.00	-14.11	40.99	50.00	-9.01		
PCS 1900 Mid carrier frequency									
0.156663	30.82	22.75	65.67	-42.92	7.42	55.68	-48.26	L1	Pass
8.053321	35.55	34.53	60.00	-25.47	31.90	50.00	-18.10		
11.756165	34.61	33.84	60.00	-26.16	27.20	50.00	-22.80		
28.072633	44.42	43.24	60.00	-16.76	41.32	50.00	-8.68		
0.157161	30.33	22.43	65.65	-43.22	6.16	55.65	-49.49	L2	Pass
8.048298	35.65	33.33	60.00	-26.67	32.25	50.00	-17.75		
9.726091	34.79	30.67	60.00	-29.33	27.05	50.00	-22.95		
28.053557	48.41	46.35	60.00	-13.65	37.83	50.00	-12.17		

Reference numbers of test equipment used

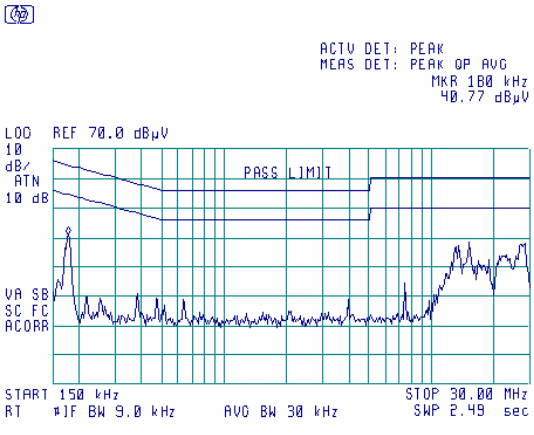
HL 0447	HL 0672	HL 0787	HL 1206	HL 1430	HL 1512	HL 2564	

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:	4/9/2006		
Temperature: 21ºC	Air Pressure: 1015 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC; 48 V DC
Remarks:			

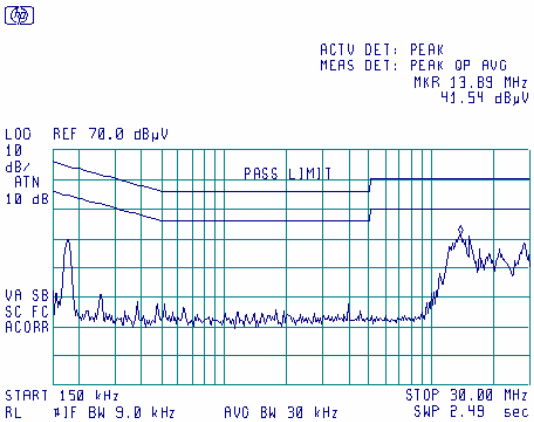
Plot 9.1.1 Conducted emission measurements

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



Plot 9.1.2 Conducted emission measurements

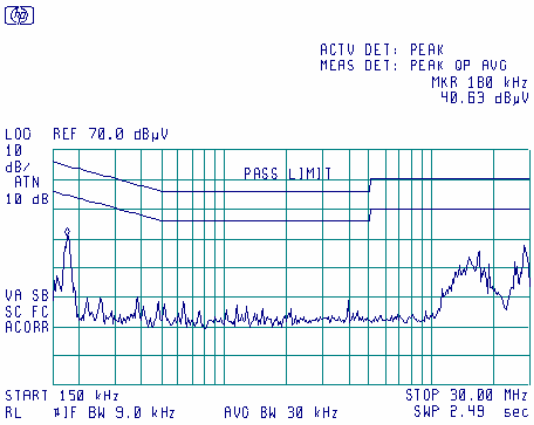
LINE:	L2
POWER LINE:	AC mains
LIMIT:	Class B
EUT OPERATING MODE:	Receive / Stand-by
LIMIT:	QUASI-PEAK, AVERAGE
DETECTOR:	PEAK



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:	4/9/2006		
Temperature: 21ºC	Air Pressure: 1015 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC; 48 V DC
Remarks:			

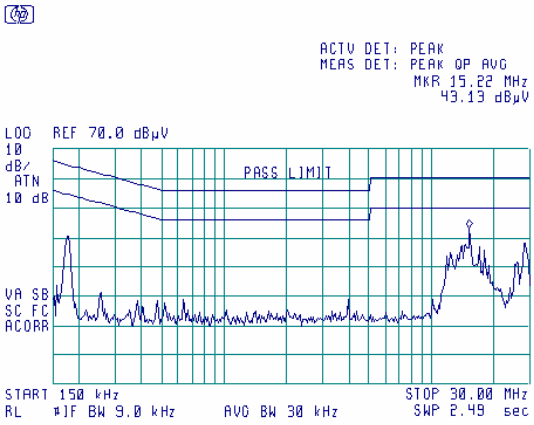
Plot 9.1.3 Conducted emission measurements

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



Plot 9.1.4 Conducted emission measurements

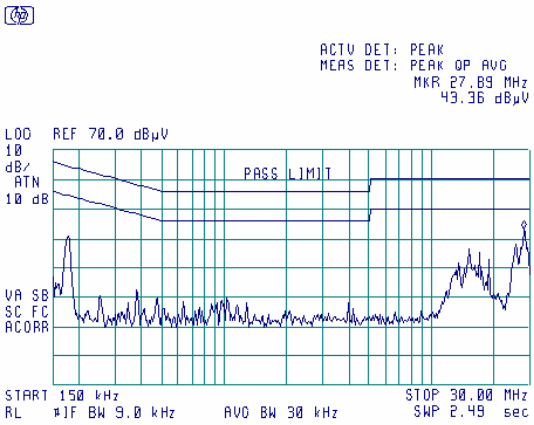
LINE:	L2
POWER LINE:	AC mains
LIMIT:	Class B
EUT OPERATING MODE:	Tx Cell 800, mid carrier frequency
LIMIT:	QUASI-PEAK, AVERAGE
DETECTOR:	PEAK



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:	4/9/2006		
Temperature: 21ºC	Air Pressure: 1015 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC; 48 V DC
Remarks:			

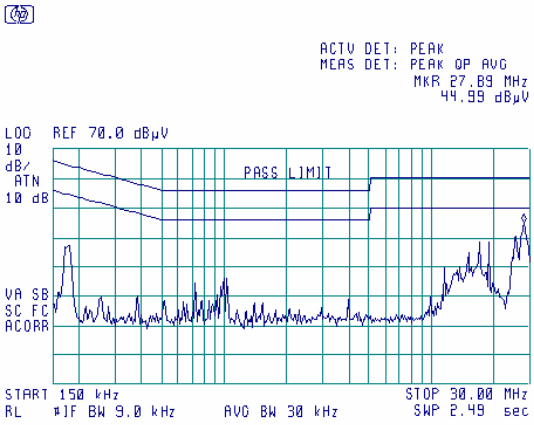
Plot 9.1.5 Conducted emission measurements

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



Plot 9.1.6 Conducted emission measurements

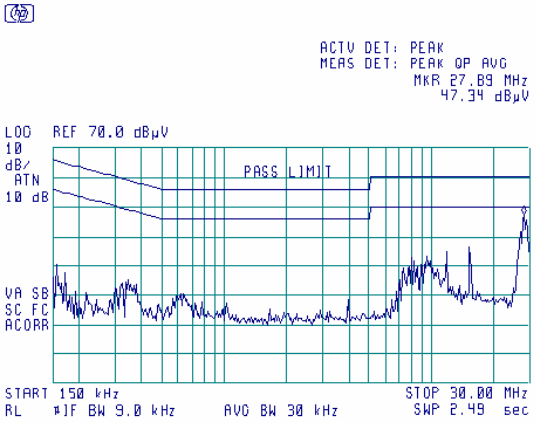
LINE:	L2
POWER LINE:	AC mains
LIMIT:	Class B
EUT OPERATING MODE:	Tx Cell 1900, mid carrier frequency
LIMIT:	QUASI-PEAK, AVERAGE
DETECTOR:	PEAK



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:	4/9/2006		
Temperature: 21ºC	Air Pressure: 1015 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC; 48 V DC
Remarks:			

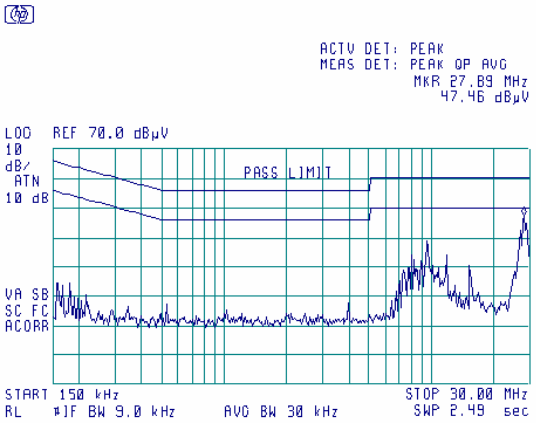
Plot 9.1.7 Conducted emission measurements

LINE:	L1
POWER LINE:	AC mains through AC/DC power supply
LIMIT:	Class B
EUT OPERATING MODE:	Receive / Stand-by
LIMIT:	QUASI-PEAK, AVERAGE
DETECTOR:	PEAK



Plot 9.1.8 Conducted emission measurements

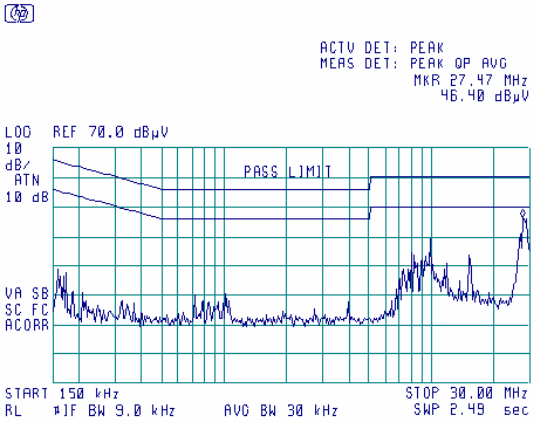
LINE:	L2
POWER LINE:	AC mains through AC/DC power supply
LIMIT:	Class B
EUT OPERATING MODE:	Receive / Stand-by
LIMIT:	QUASI-PEAK, AVERAGE
DETECTOR:	PEAK



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:	4/9/2006		
Temperature: 21ºC	Air Pressure: 1015 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC; 48 V DC
Remarks:			

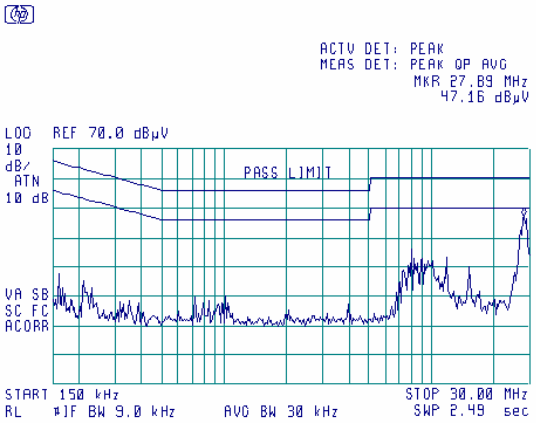
Plot 9.1.9 Conducted emission measurements

LINE:	L1
POWER LINE:	AC mains through AC/DC power supply
LIMIT:	Class B
EUT OPERATING MODE:	Tx Cell 800, mid carrier frequency
LIMIT:	QUASI-PEAK, AVERAGE
DETECTOR:	PEAK



Plot 9.1.10 Conducted emission measurements

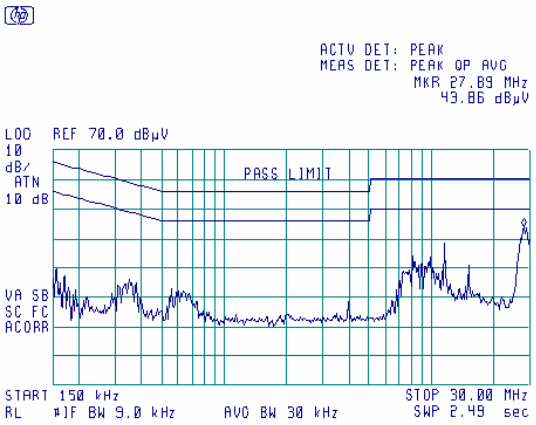
LINE:	L2
POWER LINE:	AC mains through AC/DC power supply
LIMIT:	Class B
EUT OPERATING MODE:	Tx Cell 800, mid carrier frequency
LIMIT:	QUASI-PEAK, AVERAGE
DETECTOR:	PEAK



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:	4/9/2006		
Temperature: 21ºC	Air Pressure: 1015 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC; 48 V DC
Remarks:			

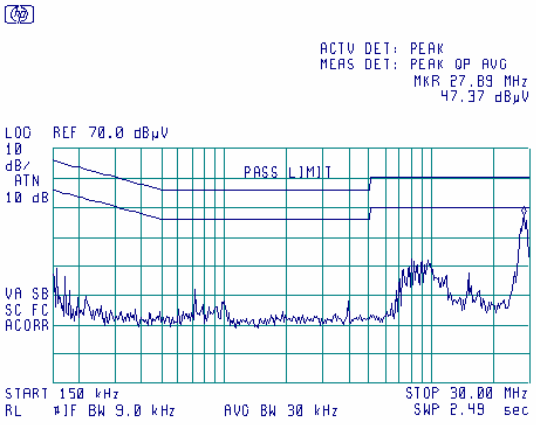
Plot 9.1.11 Conducted emission measurements

LINE:	L1
POWER LINE:	AC mains through AC/DC power supply
LIMIT:	Class B
EUT OPERATING MODE:	Tx Cell 1900, mid carrier frequency
LIMIT:	QUASI-PEAK, AVERAGE
DETECTOR:	PEAK



Plot 9.1.12 Conducted emission measurements

LINE:	L2
POWER LINE:	AC mains through AC/DC power supply
LIMIT:	Class B
EUT OPERATING MODE:	Tx Cell 1900, mid 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:	4/7/2006		
Temperature: 21ºC	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.

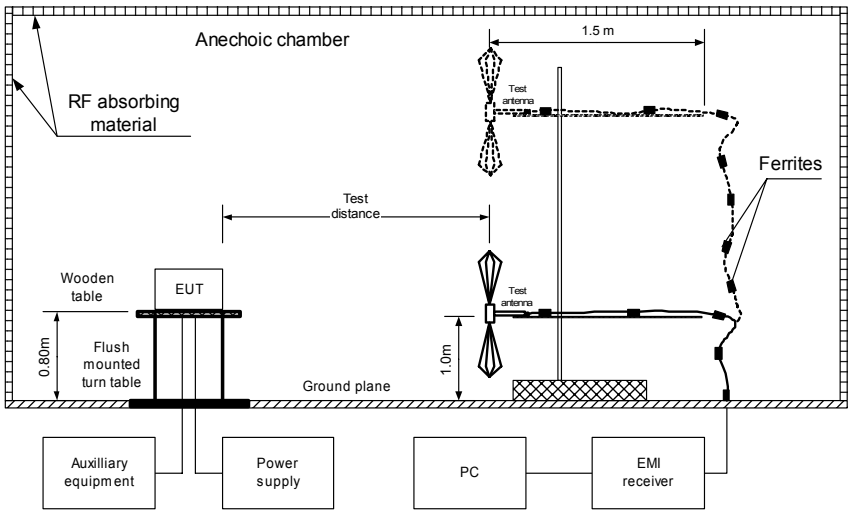
9.2.2 Test procedure for measurements in semi-anechoic chamber

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.

Figure 9.2.1 Setup for radiated emission measurements in anechoic chamber, 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:	4/7/2006		
Temperature: 21ºC	**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*				
33.189750	45.01	35.66	40.00	-4.34	Vertical	1.0	0	Pass
45.966980	38.68	28.87	40.00	-11.13	Vertical	1.1	5	
52.717743	41.43	38.43	40.00	-1.57	Horizontal	1.0	358	
71.309000	31.34	32.13	40.00	-7.87	Vertical	1.0	114	
121.650000	35.60	30.73	43.50	-12.77	Vertical	1.2	10	

Note: due to high ambient noise at OATS emissions above were measured in semi anechoic chamber only

TEST SITE: 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

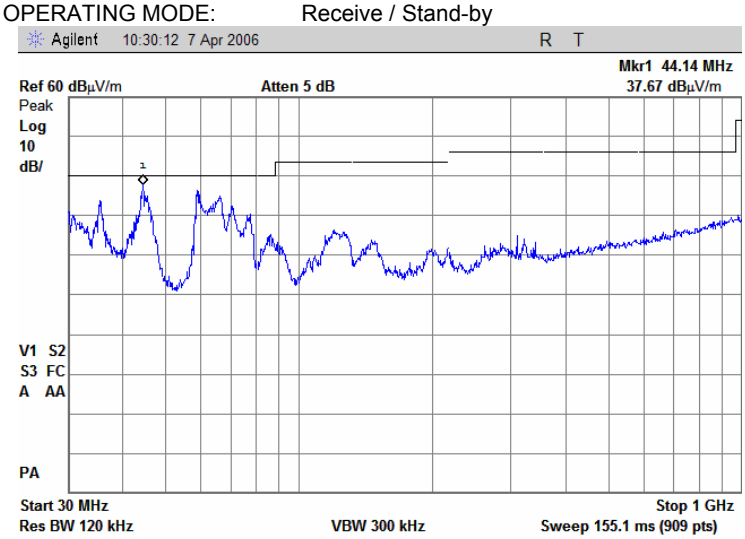
HL 0465	HL 0521	HL 0589	HL 0592	HL 0593	HL 0594	HL 0604	HL 1553
HL 1566	HL 1567	HL 1942	HL 1984	HL 2009	HL 2259	HL 2780	

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:	4/7/2006		
Temperature: 21°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

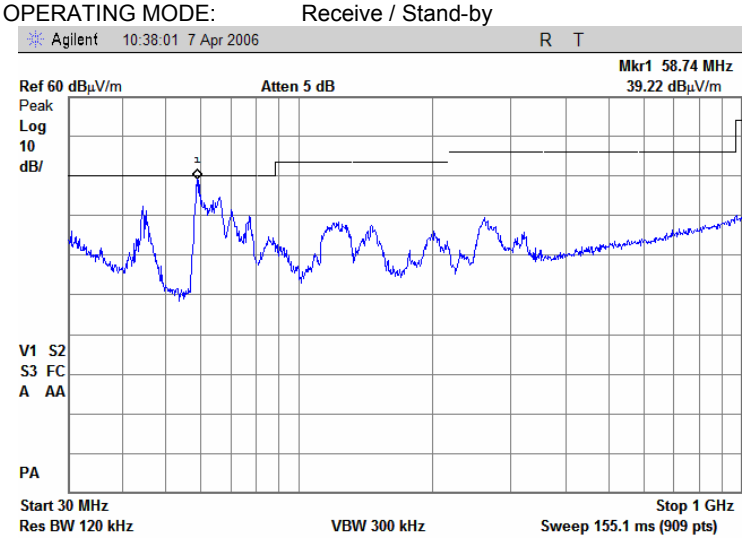
Plot 9.2.1 Radiated emission measurements in 30- 1000 MHz range, vertical antenna polarization

TEST SITE: 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

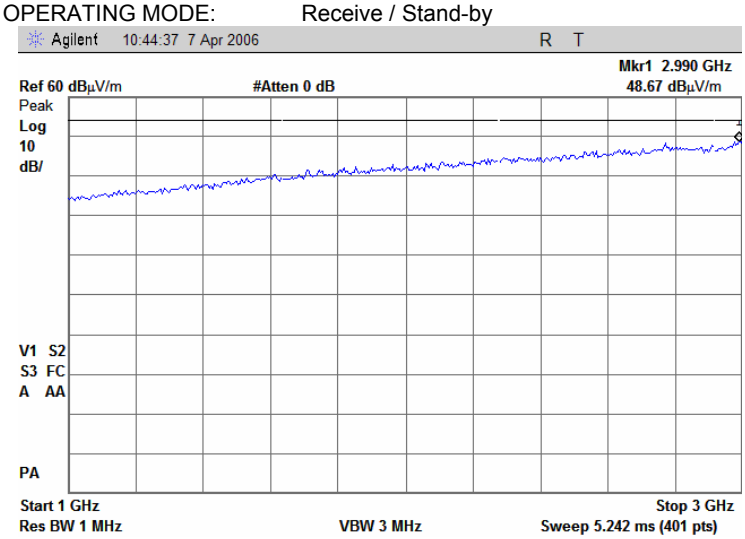
TEST SITE: Anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



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:	4/7/2006		
Temperature: 21°C	Air Pressure: 1009 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

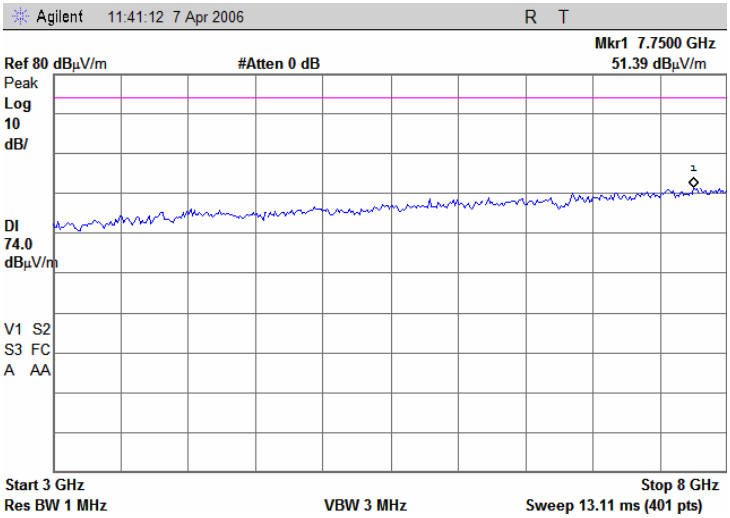
Plot 9.2.3 Radiated emission measurements in 1000 - 3000 MHz range, vertical and horizontal antenna polarization

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



Plot 9.2.4 Radiated emission measurements in 3000 - 8000 MHz range, vertical and horizontal antenna polarization

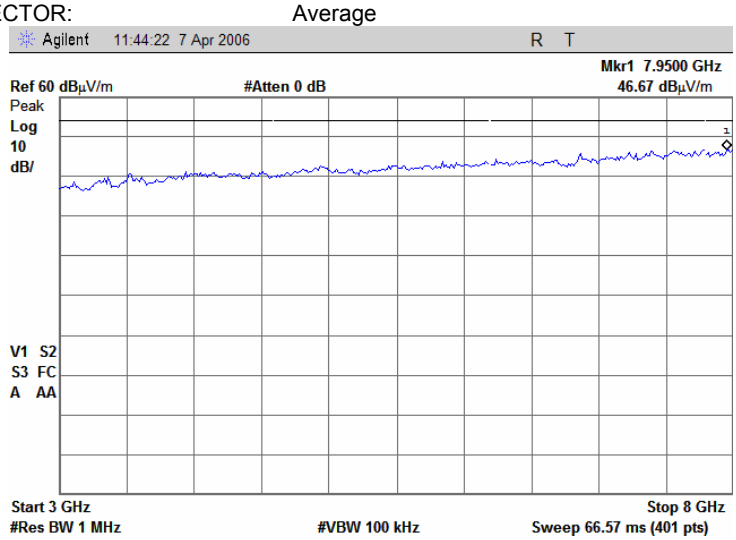
TEST SITE: Anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by
DETECTOR: Peak



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:	4/7/2006		
Temperature: 21°C	**Air Pressure:** 1009 hPa	**Relative Humidity:** 42 %	**Power Supply:** 120 VAC
Remarks:			

Plot 9.2.5 Radiated emission measurements in 3000 - 8000 MHz range, vertical and horizontal antenna polarization

TEST SITE:	Anechoic chamber
LIMIT:	Class B
TEST DISTANCE:	3 m
EUT OPERATING MODE:	Receive / Stand-by
DETECTOR:	Average



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:	4/9/2006		
Temperature: 21ºC	Air Pressure: 1015 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

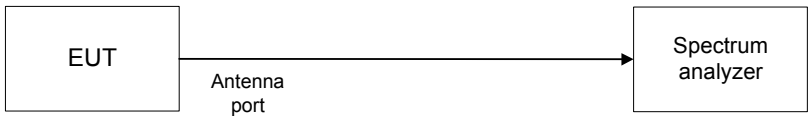
Frequency, MHz	EUT type	Power of spurious	
		nW	dBm
25 MHz – 5th harmonic*	Citizens band (CB) receiver	2.0	-57.0
30 MHz – 2nd harmonic**	Superheterodyne receiver		
30 MHz – 5th harmonic*	Other receiver operates within 30 – 960 MHz		

* - 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:	4/9/2006		
Temperature: 21ºC	**Air Pressure:** 1015 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: 120 kHz (below 1000 MHz) /1000 kHz
VIDEO BANDWIDTH: 300 kHz (below 1000 MHz) /3000 kHz

Frequency, MHz	Spurious emission, dBm	Limit, dBm	Margin, dB	Verdict
Antenna port 1				
881.20	-69.06	-57.00	-12.06	Pass
1900.00	-63.10	-57.00	-6.10	Pass
Antenna port 2				
881.20	-72.04	-57.00	-15.04	Pass
1945.00	-62.68	-57.00	-5.68	Pass
Antenna port 3				
878.80	-72.10	-57.00	-15.10	Pass
1945.00	-64.24	-57.00	-7.24	Pass
Antenna port 4				
888.50	-71.49	-57.00	-14.49	Pass
1945.00	-64.53	-57.00	-7.53	Pass

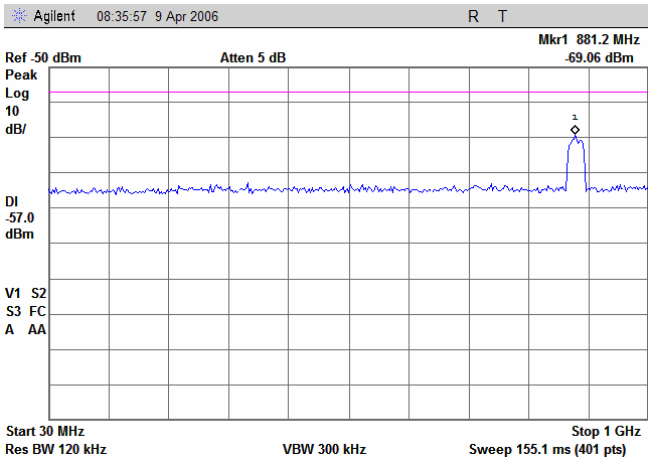
Reference numbers of test equipment used

HL 2399	HL 2780						

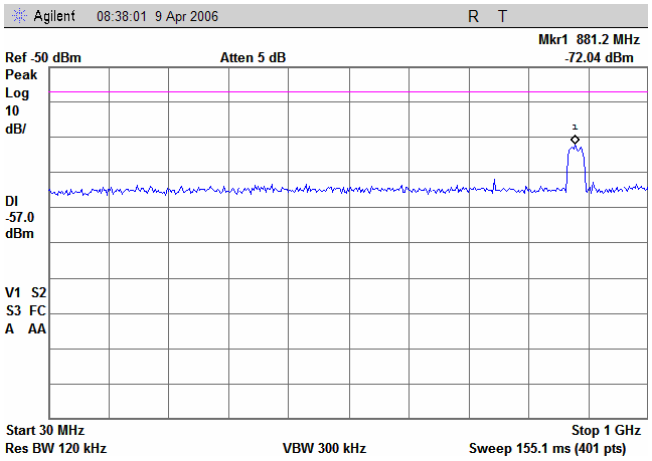
Full description is given in Appendix A.

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:	4/9/2006		
Temperature: 21°C	Air Pressure: 1015 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

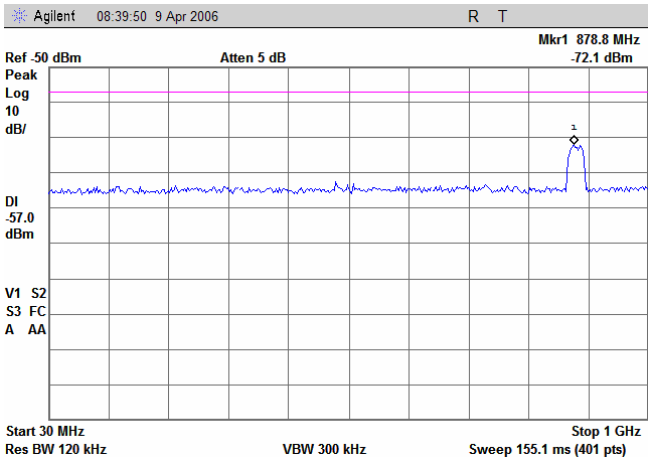


Plot 9.3.2 Spurious emission test results at antenna port 2 in 30 – 1000 MHz range

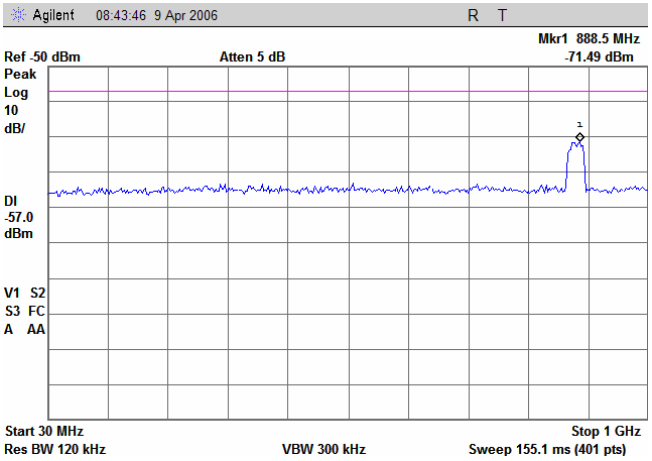


Test specification:	Section 15.111, Spurious emissions at RF antenna connector		
Test procedure:	ANSI C63.4, Section 12.1.5		
Test mode:	Compliance	Verdict:	PASS
Date:	4/9/2006		
Temperature: 21°C	Air Pressure: 1015 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

Plot 9.3.3 Spurious emission test results at antenna port 3 in 30 – 1000 MHz range

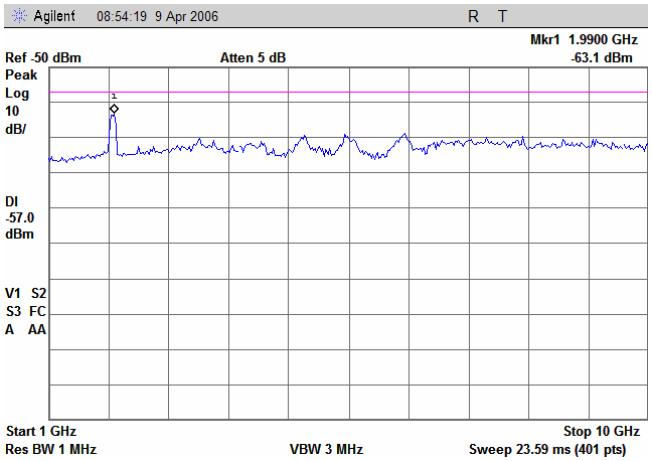


Plot 9.3.4 Spurious emission test results at antenna port 4 in 30 – 1000 MHz range

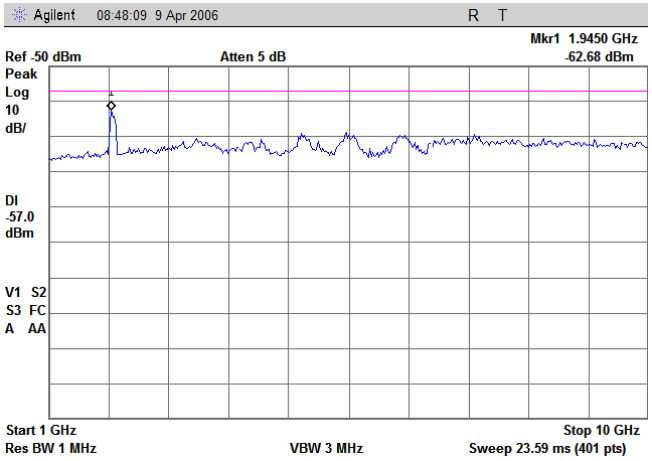


Test specification:	Section 15.111, Spurious emissions at RF antenna connector		
Test procedure:	ANSI C63.4, Section 12.1.5		
Test mode:	Compliance	Verdict:	PASS
Date:	4/9/2006		
Temperature: 21°C	Air Pressure: 1015 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

Plot 9.3.5 Spurious emission test results at antenna port 1 in 1.0 – 10.0 GHz range

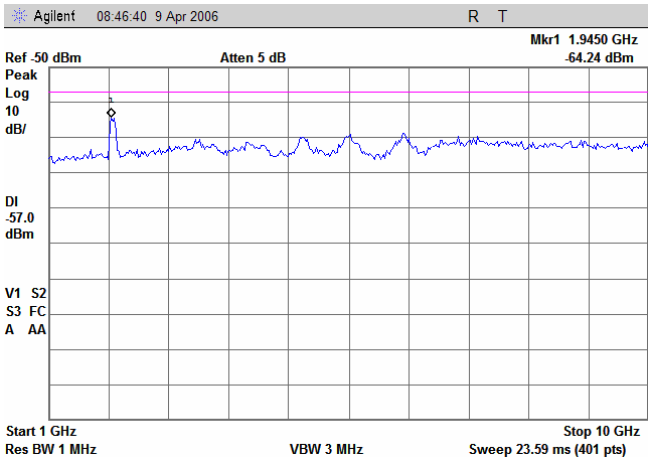


Plot 9.3.6 Spurious emission test results at antenna port 2 in 1.0 – 10.0 GHz range

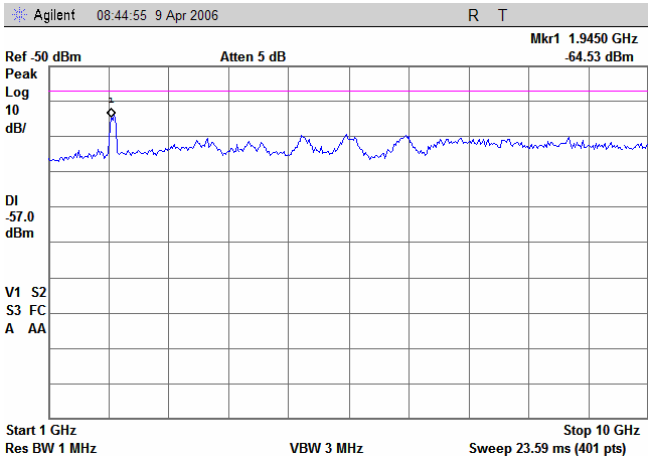


Test specification:	Section 15.111, Spurious emissions at RF antenna connector		
Test procedure:	ANSI C63.4, Section 12.1.5		
Test mode:	Compliance	Verdict:	PASS
Date:	4/9/2006		
Temperature: 21°C	Air Pressure: 1015 hPa	Relative Humidity: 42 %	Power Supply: 120 VAC
Remarks:			

Plot 9.3.7 Spurious emission test results at antenna port 3 in 1.0 – 10.0 GHz range



Plot 9.3.8 Spurious emission test results at antenna port 4 in 1.0 – 10.0 GHz range



10 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
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	11-Nov-05	11-Nov-06
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A 00319, 3448A002 53	26-Sep-05	26-Sep-06
0589	Cable Coaxial, GORE A2P01POL118, 2.3 m	HL	GORE-3	176	02-Dec-05	02-Dec-06
0592	Position Controller	HL	L2-SR3000 (HL CRL-3)	100	18-May-06	18-May-07
0593	Antenna Mast, 1-4 m Pneumatic	Madgesh	AM-F1	101	02-Feb-06	02-Feb-07
0594	Turn Table FOR ANECHOIC CHAMBER flush mount d=1.2 m Pneumatic	HL	TT-WDC1	102	26-Jan-06	26-Jan-07
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE 26 - 2000 MHz	EMCO	3141	9611-1011	10-Jan-06	10-Jan-07
0672	Shielded Room 4,6(L) x 4,2(W) x 2,4(H) m	HL	SR - 3	027	11-Nov-05	11-Nov-06
0768	Antenna Standard Gain Horn,18-26.5 GHz, WR-42, K-band, Gain - 25 dB	Quinstar Technology	QWH-4200-BA	110	21-Jul-04	21-Jul-07
0787	Transient Limiter	Hewlett Packard	11947A	3107A018 77	21-Nov-05	21-Nov-06
1206	One phase voltage regulator, 2kVA, 0-250V	HL	TDGC-2	142	04-Jun-05	04-Jun-06
1430	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1431, HL1432	Agilent Technologies	8542E	3807A002 62,3705A0 0217	01-Sep-05	01-Sep-06
1512	Cable RF, 8 m	Belden	M17/167 MIL-C-17	1512	11-Sep-05	11-Sep-06
1553	Cable RF, 3.5 m	Alpha Wire	RG-214	1553	02-Dec-05	02-Dec-06
1566	Cable RF, 2 m	Huber-Suhner	Sucoflex 104PE	13094/4PE	02-Dec-05	02-Dec-06
1567	Cable RF, 2 m	Huber-Suhner	Sucoflex 104PE	13095/4PE	02-Dec-05	02-Dec-06
1942	Cable 18GHz, 4 m, blue	Rhophase Microwave Limited	SPS-1803A-4000-NPS	T4658	17-Oct-05	17-Oct-06
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W, N-type	EMC Test Systems	3115	9911-5964	03-Mar-06	03-Mar-07
2009	Cable RF, 8 m	Alpha Wire	RG-214	C-56	02-Dec-05	02-Dec-06
2259	Amplifier Low Noise 2-20 GHz	Sophia Wireless	LNA0220-C	0223	05-Nov-05	05-Nov-06
2399	Cable 40GHz, 1.5 m, blue	Rhophase Microwave Limited	KPS-1503A-1500-KPS	X2945	24-Jun-05	24-Jun-06
2564	Termination, BNC, 50 Ohm	HL	TBNC-50	2564	13-Jun-05	13-Jun-06
2697	Antenna, 30 MHz - 3.0 GHz,	Sunol Sciences. Corp. Pleasanton, California USA	JB3	A022805	10-Jan-06	10-Jan-07

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
2780	EMS analyzer, 100 Hz to 26.5 GHz	Agilent Technologies	E7405A	MY45102406	11-Jun-05	11-Jun-06
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY41444762	10-Apr-06	10-Apr-07

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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Person for contact: Mr. Alex Usoskin, CEO.

13 APPENDIX D Specification references

47CFR part 22:2005	Public Mobile Services
47CFR part 24: 2005	Personal Communications Services
47CFR part 15:2005	Radio Frequency Devices
ANSI C63.2: 1996	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4: 2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

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 calibration
Sunol Sciences Inc., model JB3, serial number A022805

Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain
30	22.2	-22.5	0.01	620	19.7	6.3	4.27	1215	24.9	7.0	5.05	1810	28.3	7.1	5.08	2405	30.9	6.9	4.93
35	18.5	-17.4	0.02	625	19.7	6.5	4.42	1220	24.9	7.0	4.99	1815	28.5	6.9	4.91	2410	30.9	6.9	4.89
40	14.7	-12.5	0.06	630	19.6	6.6	4.57	1225	25.1	6.9	4.91	1820	28.6	6.8	4.74	2415	31.0	6.9	4.85
45	11.3	-8.1	0.16	635	19.7	6.5	4.48	1230	25.2	6.8	4.82	1825	28.7	6.8	4.75	2420	31.0	6.8	4.82
45	11.3	-8.1	0.16	640	19.9	6.4	4.40	1235	25.1	7.0	4.96	1830	28.7	6.8	4.76	2425	31.1	6.8	4.81
50	8.9	-4.7	0.34	645	19.9	6.5	4.45	1240	25.0	7.1	5.09	1835	28.7	6.7	4.72	2430	31.0	6.9	4.87
55	7.9	-2.8	0.52	650	19.9	6.5	4.51	1245	25.0	7.1	5.12	1840	28.8	6.7	4.69	2435	31.0	6.9	4.88
60	7.8	-2.1	0.62	655	19.9	6.6	4.60	1250	25.0	7.1	5.15	1845	28.6	6.9	4.90	2440	31.2	6.8	4.74
65	8.5	-2.0	0.63	660	19.9	6.7	4.69	1255	25.0	7.2	5.25	1850	28.4	7.1	5.12	2445	31.1	6.9	4.91
70	9.0	-1.9	0.64	665	19.9	6.7	4.70	1260	24.9	7.3	5.36	1855	28.5	7.0	5.07	2450	31.0	7.0	4.96
75	8.8	-1.1	0.78	670	20.0	6.7	4.71	1265	25.0	7.3	5.31	1860	28.6	7.0	5.01	2455	31.0	7.0	5.01
80	8.4	-0.2	0.97	675	20.1	6.7	4.71	1270	25.1	7.2	5.26	1865	28.5	7.1	5.17	2460	30.9	7.2	5.19
85	8.0	0.8	1.20	680	20.1	6.7	4.71	1275	25.3	7.0	5.05	1870	28.4	7.3	5.33	2465	31.1	6.9	4.95
90	8.2	1.1	1.29	685	20.1	6.8	4.79	1280	25.5	6.8	4.84	1875	28.4	7.2	5.28	2470	31.3	6.8	4.76
95	9.2	0.5	1.13	690	20.1	6.9	4.88	1285	25.4	7.0	4.97	1880	28.5	7.2	5.22	2475	31.4	6.7	4.69
100	10.6	-0.4	0.92	695	20.2	6.8	4.82	1290	25.3	7.1	5.10	1885	28.5	7.2	5.22	2480	31.3	6.8	4.79
105	11.7	-1.1	0.78	700	20.3	6.8	4.76	1295	25.3	7.2	5.22	1890	28.6	7.2	5.21	2485	31.1	7.0	5.00
110	12.6	-1.6	0.70	705	20.4	6.8	4.75	1300	25.2	7.3	5.33	1895	28.6	7.2	5.24	2490	31.1	7.0	4.99
115	13.3	-1.9	0.65	710	20.5	6.8	4.75	1305	25.3	7.2	5.21	1900	28.6	7.2	5.27	2495	31.2	7.0	4.99
120	13.9	-2.1	0.62	715	20.5	6.8	4.80	1310	25.5	7.1	5.09	1905	28.5	7.3	5.36	2500	30.9	7.2	5.27
125	14.2	-2.0	0.63	720	20.5	6.9	4.85	1315	25.4	7.2	5.23	1910	28.5	7.4	5.45	2505	31.1	7.1	5.15
130	14.2	-1.7	0.68	725	20.6	6.8	4.81	1320	25.3	7.3	5.36	1915	28.5	7.3	5.38	2510	31.0	7.2	5.22
135	13.8	-1.0	0.79	730	20.7	6.8	4.77	1325	25.5	7.2	5.21	1920	28.6	7.3	5.31	2515	31.0	7.2	5.26
140	13.4	-0.3	0.94	735	20.9	6.7	4.65	1330	25.6	7.0	5.06	1925	28.6	7.3	5.35	2520	31.2	7.0	5.05
145	13.1	0.3	1.08	740	21.0	6.6	4.53	1335	25.7	7.1	5.07	1930	28.6	7.3	5.39	2525	30.8	7.4	5.54
150	12.9	0.8	1.21	745	21.0	6.6	4.59	1340	25.7	7.1	5.09	1935	28.5	7.4	5.54	2530	31.0	7.3	5.37
155	12.7	1.3	1.34	750	21.0	6.7	4.64	1345	25.7	7.1	5.13	1940	28.4	7.6	5.70	2535	31.2	7.0	5.06
160	12.7	1.6	1.44	755	21.0	6.8	4.74	1350	25.7	7.1	5.17	1945	28.5	7.5	5.59	2540	31.2	7.1	5.09
165	12.5	2.0	1.59	760	21.0	6.8	4.83	1355	25.8	7.0	5.06	1950	28.6	7.4	5.48	2545	31.0	7.3	5.43
170	12.2	2.6	1.83	765	21.1	6.8	4.73	1360	25.9	6.9	4.95	1955	28.6	7.5	5.57	2550	31.0	7.3	5.39
175	11.8	3.3	2.13	770	21.3	6.7	4.64	1365	26.0	6.9	4.95	1960	28.6	7.5	5.65	2555	31.1	7.2	5.30
180	11.6	3.7	2.36	775	21.3	6.7	4.68	1370	26.0	7.0	4.96	1965	28.7	7.4	5.47	2560	31.0	7.4	5.47
185	11.5	4.0	2.54	780	21.3	6.7	4.72	1375	26.0	7.0	5.01	1970	28.9	7.2	5.29	2565	30.8	7.6	5.70
190	11.6	4.2	2.61	785	21.3	6.8	4.77	1380	26.0	7.0	5.06	1975	28.9	7.2	5.22	2570	31.1	7.3	5.37
195	12.1	3.9	2.47	790	21.3	6.8	4.82	1385	26.0	7.0	4.99	1980	29.0	7.1	5.16	2575	31.5	7.0	4.96
200	13.1	3.2	2.07	795	21.4	6.8	4.79	1390	26.1	6.9	4.92	1985	29.1	7.1	5.11	2580	31.6	6.9	4.87
205	12.0	4.4	2.76	800	21.5	6.8	4.77	1395	26.2	6.9	4.94	1990	29.1	7.0	5.06	2585	31.6	6.8	4.79
210	11.0	5.6	3.66	805	21.6	6.7	4.71	1400	26.2	7.0	4.96	1995	29.1	7.1	5.09	2590	31.6	6.9	4.88
215	11.3	5.6	3.59	810	21.7	6.7	4.65	1405	26.1	7.0	5.02	2000	29.1	7.1	5.11	2595	31.5	7.0	4.97
220	11.6	5.5	3.52	815	21.7	6.7	4.72	1410	26.1	7.1	5.09	2005	29.1	7.1	5.16	2600	31.6	6.9	4.86
225	11.7	5.5	3.55	820	21.7	6.8	4.80	1415	26.2	7.0	5.02	2010	29.1	7.1	5.15	2605	31.3	7.2	5.30
230	11.9	5.5	3.57	825	21.7	6.8	4.82	1420	26.3	7.0	4.96	2015	29.2	7.1	5.13	2610	31.4	7.1	5.15
235	12.1	5.5	3.56	830	21.7	6.9	4.85	1425	26.2	7.1	5.10	2020	29.2	7.1	5.18	2615	31.7	6.9	4.88
240	12.3	5.5	3.54	835	21.8	6.8	4.82	1430	26.1	7.2	5.25	2025	29.3	7.1	5.08	2620	31.6	7.0	4.97
245	12.3	5.7	3.71	840	21.9	6.8	4.80	1435	26.1	7.2	5.24	2030	29.3	7.0	5.05	2625	31.4	7.1	5.17
250	12.3	5.9	3.88	845	21.9	6.8	4.83	1440	26.2	7.2	5.24	2035	29.3	7.1	5.07	2630	31.6	7.0	5.00
260	12.7	5.8	3.83	855	22.0	6.8	4.80	1450	26.5	7.0	4.98	2045	29.2	7.2	5.23	2640	31.7	7.0	4.98
270	13.7	5.2	3.27	865	22.0	6.9	4.92	1460	26.4	7.1	5.17	2055	29.3	7.2	5.21	2650	31.8	6.9	4.85
275	13.7	5.3	3.39	870	21.9	7.1	5.11	1465	26.4	7.2	5.19	2060	29.5	7.0	5.02	2655	31.8	6.9	4.85
280	13.7	5.4	3.50	875	22.0	7.1	5.08	1470	26.4	7.2	5.22	2065	29.4	7.1	5.08	2660	31.7	7.0	5.02
285	13.7	5.6	3.61	880	22.1	7.0	5.05	1475	26.4	7.1	5.17	2070	29.4	7.1	5.10	2665	32.0	6.7	4.71
290	13.7	5.7	3.72	885	22.1	7.0	5.06	1480	26.5	7.1	5.12	2075	29.5	7.0	5.01	2670	32.0	6.7	4.67
295	13.8	5.8	3.77	890	22.1	7.0	5.06	1485	26.5	7.1	5.14	2080	29.8	6.8	4.76	2675	31.9	6.8	4.81
300	13.9	5.8	3.81	895	22.2	7.1	5.09	1490	26.5	7.1	5.17	2085	29.7	6.9	4.89	2680	31.7	7.0	5.04
305	14.0	5.9	3.85	900	22.2	7.1	5.12	1495	26.5	7.2	5.24	2090	29.7	6.9	4.86	2685	31.9	6.8	4.83
310	14.1	5.9	3.88	905	22.3	7.1	5.09	1500	26.5	7.2	5.31	2095	29.8	6.8	4.78	2690	32.1	6.7	4.72
315	14.3	5.9	3.89	910	22.3	7.0	5.05	1505	26.5	7.2	5.27	2100	29.9	6.8	4.75	2695	32.1	6.7	4.71
320	14.4	5.9	3.90	915	22.4	7.0	4.99	1510	26.6	7.2	5.23	2105	29.8	6.8	4.81	2700	32.0	6.8	4.81
325	14.5	5.9	3.92	920	22.6	6.9	4.92	1515	26.6	7.2	5.30	2110	29.9	6.8	4.78	2705	32.0	6.8	4.80
330	14.6	5.9	3.93	925	22.7	6.9	4.85	1520	26.5	7.3	5.38	2115	29.9	6.8	4.76	2710	32.1	6.8	4.79
335	14.7	6.0	4.02	930	22.8	6.8	4.77	1525	26.6	7.3	5.37	2120	29.9	6.8	4.84	2715	32.1	6.7	4.71
340	14.7	6.2	4.12	935	22.8	6.8	4.83	1530	26.6	7.3	5.36	2125	29.9	6.9	4.89	2720	32.4	6.5	4.47
345	14.9	6.1	4.06	940	22.8	6.9	4.89	1535	26.6	7.4	5.44	2130	29.9	6.9	4.90	2725	32.2	6.7	4.63
350	15.1	6.0	3.99	945	22.8	6.9	4.87	1540	26.5	7.4	5.53	2135	29.8	6.9	4.94	2730	31.9	7.0	5.05
360	15.6	5.8	3.78	955	23.0	6.8	4.81	1550	26.5	7.5	5.63	2145	29.9	6.9	4.92	2740	31.6	7.1	5.46
365	15.5	5.9	3.89	960	23.1	6.8	4.77	1555	26.7	7.3	5.39	2150	29.9	7.0	4.98	2745	31.9	7.0	5.06
370	15.5	6.0	4.01	965	23.1	6.7	4.73	1560	26.9	7.1	5.16	2155	29.8	7.1	5.10	2750	32.0	6.9	4.94
375	15.6	6.1	4.03	970	23.2	6.7	4.69	1565	26.9	7.2	5.23	2160	29.8	7.1	5.09	2755	32.0	7.0	4.98
380	15.7	6.1	4.05	975	23.3	6.6	4.62	1570	26.9	7.2	5.30	2165	29.9	7.0	5.00	2760	32.0	7.0	5.06
385	15.7	6.2	4.15	980	23.5	6.6	4.54	1575	27.0	7.2	5.23	2170	29.9	7.1	5.07	2765	32.2	6.8	4.80
390	15.7	6.3	4.25	985	23.5	6.6	4.52	1580	27.0	7.1	5.17	2175	29.8	7.2	5.20	2770	32.3	6.8	4.73
395	15.9	6.3	4.22	990	23.6	6.5	4.50	1585	27.0	7.2	5.20	2180	29.8	7.2	5.27	2775	32.3	6.8	4.77
400	16.0	6.2	4.18	995	23.6	6.5	4.48	1590	27.0	7.2	5.22	2185	29.8	7.2	5.27	2780	32.3	6.8	4.82
405	16.3	6.1	4.07	1000	23.7	6.5	4.46	1595	27.0	7.2	5.29	2190	29.8	7.2	5.28	2785	32.7	6.4	4.41
410	16.5	6.0	3.96	1005	23.7	6.5	4.51	1600	27.0	7.3	5.36	2195	29.8	7.2	5.30	2790	32.8	6.3	4.25
420	16.6	6.1	4.03	1015	23.7	6.6	4.55	1610	27.0	7.3	5.41	2205	29.7	7.3	5.41	2800	32.5	6.7	4.66
425	16.6	6.1	4.10	1020	23.8	6.6	4.54	1615	27.1	7.3	5.33	2210	29.7	7.4	5.47	2805	32.5	6.6	4.62
430	16.7	6.2	4.16	1025	23.8	6.6	4.62	1620	27.2	7.2	5.27	2215	29.7	7.4	5.54	2810	32.5	6.7	4.70
435	16.9	6.1	4.05	1030	23.7	6.7	4.70	1625	27.2	7.2	5.30	2220	29.7	7.5	5.57	2815	32.3	6.9	4.85
440	17.1	5.9	3.93	1035	23.7	6.8	4.81	1630	27.2	7.3	5.33	2225	29.8	7.3	5.43	2820	32.2	7.0	5.01
445	17.2	6.0	3.97	1040	23.6	6.9	4.92	1635	27.2	7.3	5.35	2230	29.8	7.4	5.45	2825	32.3	7.0	4.96
450	17.2	6.0	4.00	1045	23.7	6.9	4.91	1640	27.2	7.3	5.36	2235	29.7	7.5	5.61	2830	32.4	6.8	4.80
455	17.3	6.1	4.04	1050	23.7	6.9	4.91	1645	27.3	7.2	5.22	2240	29.5	7.7	5.86	2835	32.5	6.7	4.68
460	17.4	6.1	4.07	1055	23.7	7.0	5.01	1650	27.5	7.1	5.09	2245	29.8	7.4	5.53	2840	32.5	6.8	4.78
470	17.6	6.1	4.04	1065	23.7	7.0	5.06	1660	27.5	7.1	5.13	2255	30.0	7.2	5.28	2850	32.6	6.7	4.70
475	17.7	6.0	3.99	1070	23.8	7.0	5.01	1665	27.6	7.0	5.06	2260	30.1	7.2	5.24	2855	32.4	6.9	4.88
480	17.9	5.9	3.93	1075	23.8	7.0	5.01	1670	27.7	7.0	4.99	2265	30.1	7.2	5.20	2860	32.4	7.0	4.98
485	18.0	5.9	3.88	1080	23.9	7.0	5.01	1675	27.7	7.0	5.02	2270	30.2	7.1	5.12	2865	32.8	6.5	4.52
490	18.2	5.8	3.82	1085	24.0	7.0	4.96	1680	27.7	7.0	5.05	2275	30.3	7.0	5.05	2870	33.0	6.3	4.30
495	18.0	6.0	4.02	1090	24.0	6.9	4.91	1685	27.7	7.0	5.01	2280	30.0	7.0	5.06	2875	33.0	6.4	4.38
500	17.9	6.3	4.23	1095	24.1	6.9	4.86	1690	27.8	7.0	4.98	2285	30.3	7.0	5.05	2880	32.5	6.9	4.87
510	18.0	6.4	4.36	1105	24.3	6.8	4.80	1700	27.8	7.0	5.03	2295	30.3	7.1	5.13	2890	33.1	6.3	4.28
515	18.1	6.4	4.34	1110	24.3	6.8	4.78	1705	27.8	7.1	5.09	2300	30.2	7.2	5.23	2895	33.1	6.4	4.34
520	18.2	6.4	4.32	1115	24.3	6.8	4.79	1710	27.7	7.1	5.16	2305	30.3	7.2	5.20	2900	33.0	6.4	4.41
525	18.2	6.4	4.36	1120	24.4	6.8	4.80	1715	27.8	7.1	5.08	2310	30.2	7.3	5.35	2905	32.9	6.6	4.58
530	18.3	6.4	4.39	1125	24.3	6.9	4.90	1720	27.9	7.0	5.00	2315	30.1	7.4	5.45	2910	32.9	6.5	4.51
535	18.3	6.4	4.41	1130	24.3	7.0	5.00	1725	28.0	7.0	4.99	2320	30.3	7.2	5.27	2915	33.1	6.4	4.33
540	18.4	6.4	4.41	1135	24.4	6.9	4.90	1730	28.0	7.0	4.98	2325	304	7.2	5.22	2920	33.3	6.2	4.16
545	18.4	6.5	4.47	1140	24.5	6.8	4.81	1735	28.0	7.0	5.02	2330	30.4	7.1	5.13	2925	33.0	6.5	4.45
550	18.4	6.6	4.53	1145	24.6	6.8	4.76	1740	28.0	7.1	5.07	2335	30.5	7.0	5.07	2930	33.0	6.5	4.51
555	18.6	6.5	4.45	1150	24.7	6.7	4.71	1745	28.0	7.0	5.04	2340	30.5	7.1	5.11	2935	33.0	6.5	4.48
560	18.8	6.4	4.37	1155	24.7	6.8	4.76	1750	28.1	7.0	5.01	2345	30.6	7.0	5.07	2940	33.0	6.5	4.52
565	18.9	6.4	4.33	1160	24.7	6.8	4.80	1755	27.9	7.1	5.17	2350	30.5	7.1	5.12	2945	33.1	6.5	4.42
570	19.0	6.3	4.28	1165	24.7	6.8	4.81	1760	27.8	7.3	5.34	2355	30.6	7.1	5.08	2950	33.2	6.4	4.32
575	19.1	6.3	4.31	1170	24.7	6.8	4.81	1765	27.9	7.3	5.31	2360	30.9	6.8	4.79	2955	33.3	6.3	4.27
580	19.1	6.4	4.33	1175	24.8	6.8	4.84	1770	27.9	7.2	5.28	2365	31.0	6.7	4.66	2960	33.3	6.3	4.30
590	19.1	6.6	4.52	1185	24.8	6.9	4.92	1780	27.9	7.3	5.35	2375	31.1	6.6	4.60	2970	33.3	6.4	4.36
595	19.0	6.6	4.62	1190	24.7	7.0	4.99	1785	28.1	7.2	5.21	2380	31.1	6.6	4.61	2975	33.0	6.6	4.60
600	19.0	6.7	4.72	1195	24.7	7.0	5.02	1790	28.2	7.0	5.07	2385	31.1	6.7	4.62	2980	32.9	6.8	4.74
605	19.1	6.8	4.74	1200	24.7	7.0	5.05	1795	28.2	7.0	5.07	2390	31.2	6.6	4.56	2985	32.8	6.9	4.93
610	19.1	6.8	4.76	1205	24.08	7.1	5.08	1800	28.3	7.0	5.06	2395	31.2	6.6	4.60	2990	32.9	6.8	4.82

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 RF, 2m, model: Sucoflex 104PE, S/N 13094/4PE, HL 1566

No.	Frequency, MHz	Cable loss, dB	Tolerance, dB	Measurement uncertainty, dB
1	30	0.10	≤ 5.0	±0.12
2	50	0.13		
3	100	0.20		
4	300	0.33		
5	500	0.45		
6	800	0.60		
7	1000	0.65		
8	1500	0.91		
9	2000	1.08		
10	2500	1.19		
11	3000	1.28		
12	3500	1.49		
13	4000	1.63		
14	4500	1.63	≤ 5.0	±0.17
15	5000	1.66		
16	5500	1.88		
17	6000	1.96		
18	6500	1.93		
19	7000	2.07		
20	7500	2.37		
21	8000	2.34		
22	8500	2.64		
23	9000	2.68		
24	9500	2.64		
25	10000	2.70		
26	10500	2.84		
27	11000	2.88		
28	11500	3.19		
29	12000	3.15		
30	12500	3.20	≤ 5.0	±0.26
31	13000	3.22		
32	13500	3.47		
33	14000	3.41		
34	14500	3.59		
35	15000	3.79		
36	15500	4.24		
37	16000	4.12		
38	16500	4.46		
39	17000	4.50		
40	17500	4.49		
41	18000	4.45		

Cable loss
Cable RF, 2 m, model: Sucoflex 104PE, s/n 13095/4PE, HL 1567

No.	Frequency, MHz	Cable loss, dB
1	30	0.09
2	50	0.15
3	100	0.23
4	300	0.31
5	500	0.46
6	800	0.63
7	1000	0.67
8	1500	0.89
9	2000	1.05
10	2500	1.18
11	300	1.26
12	5300	1.51
13	4000	1.66
14	4500	1.61
15	5000	1.67
16	5500	1.91
17	6000	1.98
18	6500	1.91
19	7000	2.04
20	7500	2.36
21	8000	2.36
22	8500	2.61
23	9000	2.69
24	9500	2.62
25	10000	2.73
26	10500	2.83
27	11000	2.84
28	11500	3.22
29	12000	3.17
30	12500	3.17
31	13000	3.18
32	13500	3.49
33	14000	3.43
34	14500	3.57
35	15000	3.76
36	15500	4.20
37	16000	4.10
38	16500	4.49
39	17000	4.53
40	17500	4.46
41	18000	4.47

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
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