RADIO TEST REPORT

No. 309691-2

EQUIPMENT UNDER TEST

Equipment:	Repeater
Type / model:	AR 3430
Manufacturer:	LGP Allgon AB
Tested by request of:	LGP Allgon AB

SUMMARY

The equipment complies with the requirements of the following standards:

FCC Part 24 E (2002)
FCC Part 15, subpart B; class A (2002)

This report supersedes the report dated December 22, 2004.

Date of issue: June 2, 2004

Tested by: Jan Adolfsson / Linda Heikurainen

Approved by: Björn Rosenquist

Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30, www.sweden.intertek-etlsemko.com
Registered in Sweden: No SE556024059901, Registered office: As address

CONTENTS

1. CLIENT INFORMATION

The EUT has been tested by request of

Company:	LGP Allgon AB
Name of contact:	Kjell Knuutinen

2. EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT according to the manufacturer/client declaration

Equipment:	Repeater
Type/Model:	AR 3430
Brand name:	LGP Allgon
Serial number:	--
Manufacturer:	LGP Allgon AB
Rating/Supplying voltage:	115 V AC
Rating RF output power:	Uplink 33 dBm Downlink 38 dBm
External antenna connector:	YES
Operating temperature range:	-25 to +55 °C (tested to -30 to 60 °C)
Frequency range:	1,87 – 1,91 GHz 1,95 – 1,99 GHz
Modulation characteristics:	CDMA

2.2 Additional hardware information about the EUT

The EUT consists of the following unit:

Unit	Type and version	
CU board	K103/3	R1A
BSA board	K221/11	R1B
BSA board	K221/21	R1B
PA UL board	K223/13	R1A
PA DL board	K223/14	R1A
BA 19 board	K225/1	P1F2
Duplex filter	UA106 04/1	NA
LNA UL	UA107 23/3	P1A
LNA DL	UA107 23/4	P1A
DCM 18/19	UA107 18/1	R1A
DCB 18/19	UA107 19/1	P1A

2.3 Peripheral equipment

Peripheral equipment is defined as equipment needed for correct operation of the EUT, but not included as a part of the testing and evaluation of the EUT.

Equipment	Manufacturer / Type	Serial number
CDMA generator:	Agilent/ E4432B	MY41310334
Generator	HP 83712A	3314A00182

2.4 Modifications during the test

No modifications have been made during the tests.

3. TEST SPECIFICATIONS

3.1 Standards

FCC part 24 (2002): Public Mobile Services, Subpart E – Broadband PCS

FCC part 15 (2002): Subpart B, class A

3.2 Additions, deviations and exclusions from standards

No additions, deviations or exclusions have been made from standards.

4. TEST SUMMARY

The results in this report apply only to the sample tested.

FCC reference	Test	Result	Note
24.232(a)	RF output power	Pass	
24.238 (a-d)	Occupied Bandwidth, Input vs. Output	Pass	
24.238 (a-d)	Spurious emission at antenna terminal	Pass	
24.238 (a)	Spurious emission radiated	Pass	
15	Spurious emission at AC terminal	Pass	
24.235	Stability Performance	Pass	

5. RF OUTPUT POWER

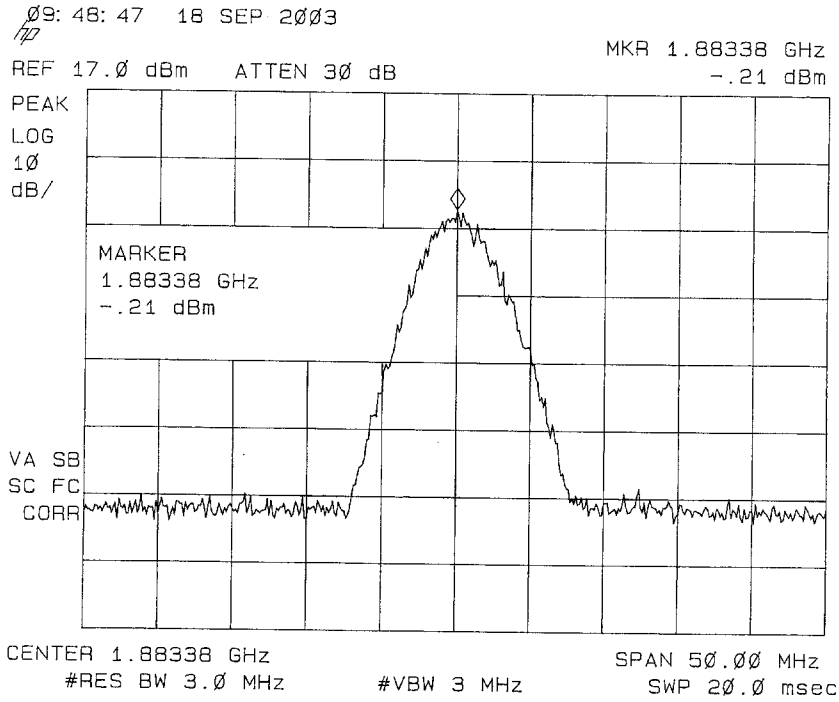
5.1 Test protocol

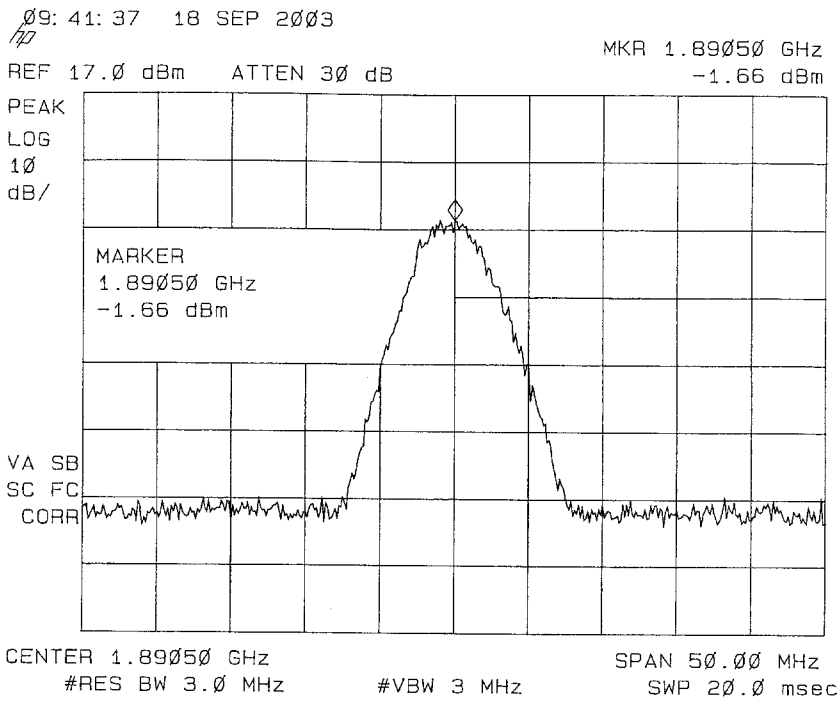
Date of test: September 18, 2003

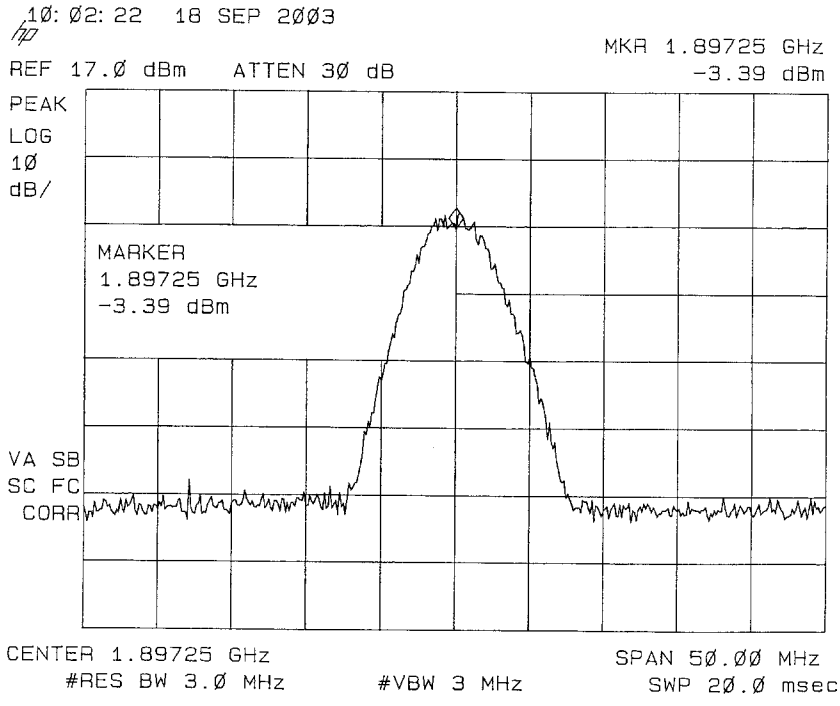
EUT mode of operation: carrier modulated with a CDMA signal.

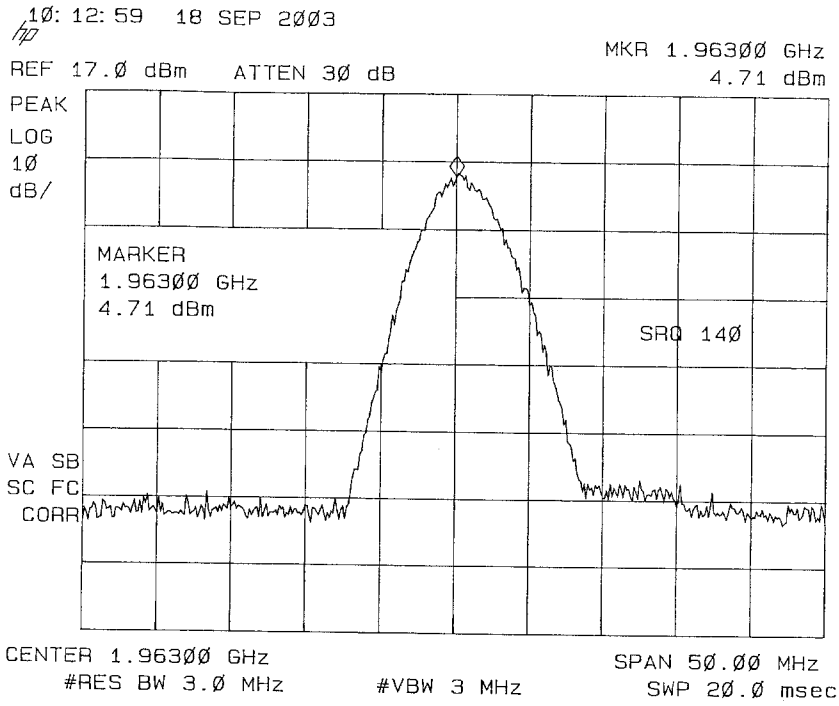
Channel (MHz)	Peak Output Power (dBm)	Limit value (dBm)
1883	39,0	
1890	37,5	< 50
1897	35,8	
1963	43,9	
1970	42,5	
1977	43,9	

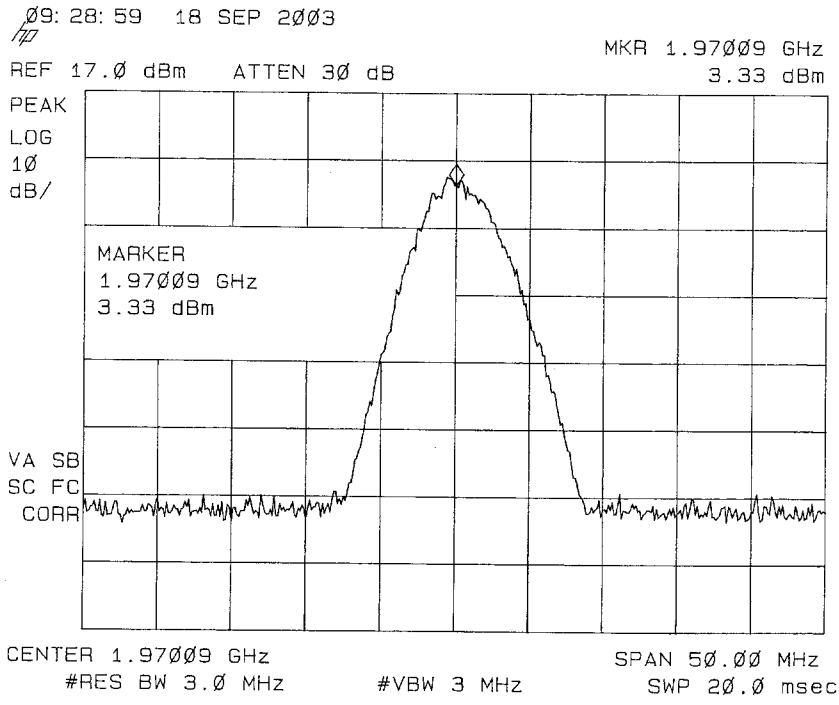
Measurement results are corrected for attenuation in the set-up configuration.

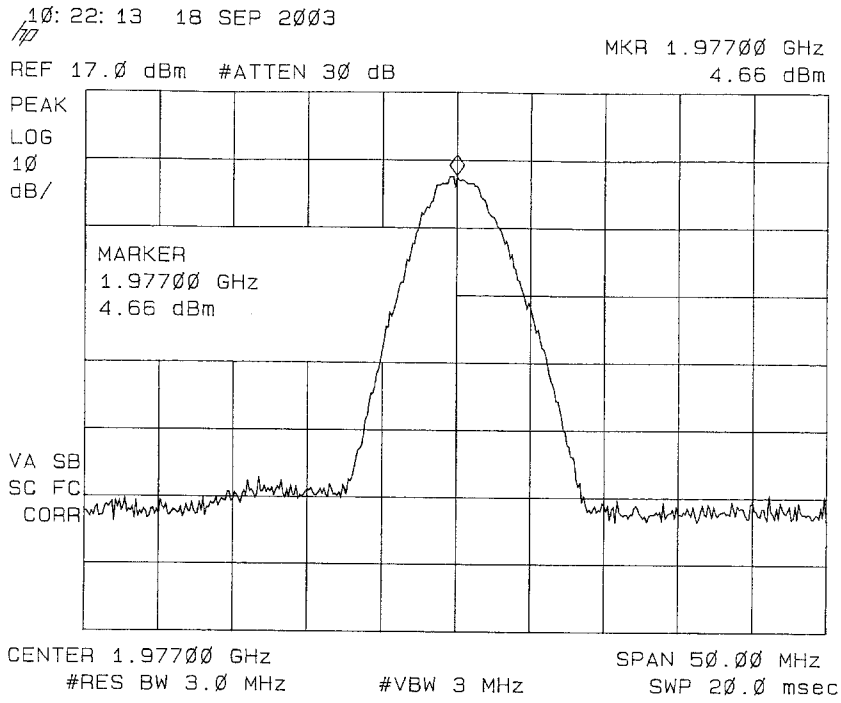



09: 41: 37 18 SEP 2003
MKR 1.8905Ø GHz
REF 17.Ø dBm ATTEN 3Ø dB
-1.66 dBm
PEAK
LOG
1Ø
dB/
MARKER
1.8905Ø GHz
-1.66 dBm
VA SB
SC FC
CORR
CENTER 1.8905Ø GHz
SPAN 5Ø.ØØ MHz
#RES BW 3.Ø MHz
#VBW 3 MHz
SWP 2Ø.Ø msec


10: Ø2: 22 18 SEP 2003
MKR 1.89725 GHz
REF 17.Ø dBm ATTEN 3Ø dB
-3.39 dBm
PEAK
LOG
1Ø
dB/
MARKER
1.89725 GHz
-3.39 dBm
VA SB
SC FC
CORR
CENTER 1.89725 GHz
SPAN 5Ø.ØØ MHz
#RES BW 3.Ø MHz
#VBW 3 MHz
SWP 2Ø.Ø msec


10: 12: 59 18 SEP 2003
MKR 1.963Ø0 GHz
4.71 dBm
REF 17.Ø dBm ATTEN 3Ø dB
PEAK
LOG
1Ø
dB/
MARKER
1.963Ø0 GHz
4.71 dBm
SRQ 14Ø
VA SB
SC FC
CORR
CENTER 1.963Ø0 GHz
SPAN 5Ø.ØØ MHz
#RES BW 3.Ø MHz
#VBW 3 MHz
SWP 2Ø.Ø msec


Ø9: 28: 59 18 SEP 2003
MKR 1.97ØØ9 GHz
3.33 dBm
REF 17.Ø dBm ATTEN 3Ø dB
PEAK
LOG
1Ø
dB/
MARKER
1.97ØØ9 GHz
3.33 dBm
VA SB
SC FC
CORR
CENTER 1.97ØØ9 GHz
SPAN 5Ø.ØØ MHz
#RES BW 3.Ø MHz
#VBW 3 MHz
SWP 2Ø.Ø msec


10: 22: 13 18 SEP 2003
MKR 1.977ØØ GHz
4.66 dBm
REF 17.Ø dBm #ATTEN 3Ø dB
PEAK
LOG
1Ø
dB/
MARKER
1.977ØØ GHz
4.66 dBm
VA SB
SC FC
CORR
CENTER 1.977ØØ GHz
SPAN 5Ø.ØØ MHz
#RES BW 3.Ø MHz
#VBW 3 MHz
SWP 2Ø.Ø msec

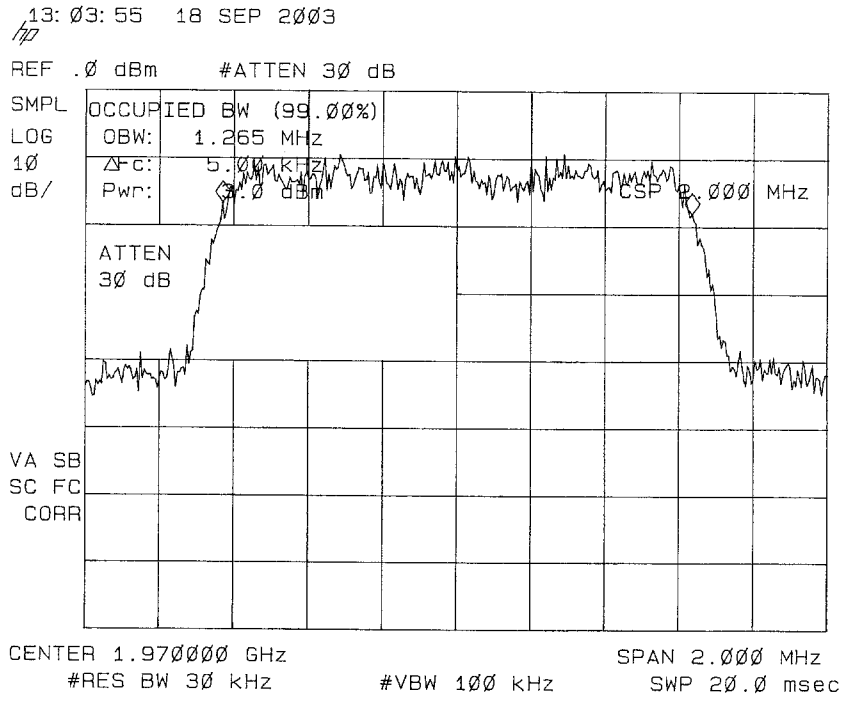
6. OCCUPIED BANDWIDTH

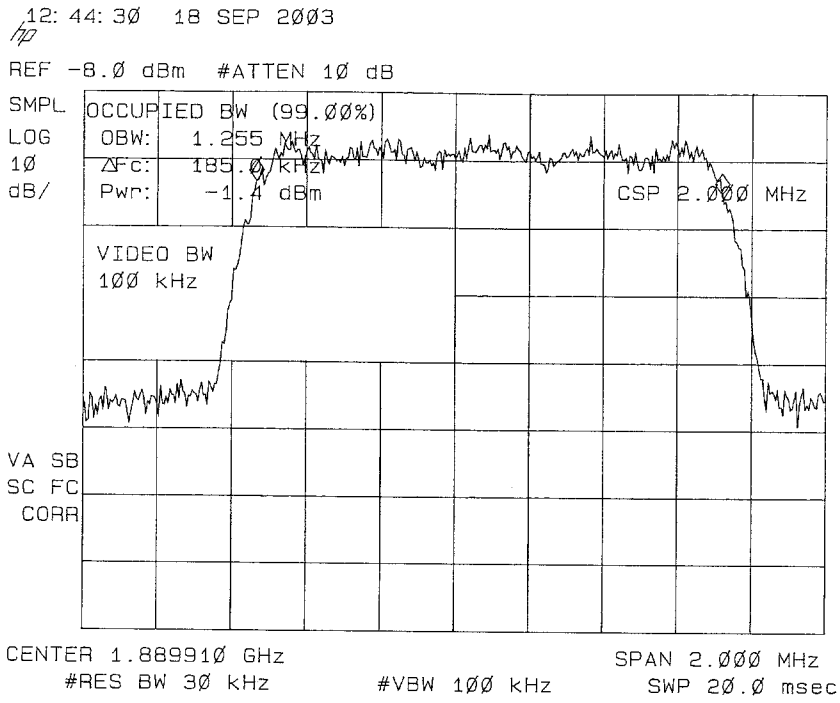
6.1 Test protocol

Date of test: September 18, 2003

EUT mode of operation: carrier modulated with a CDMA signal.

Channel	99% Bandwidth (kHz)	Limit value (kHz)
Down link	1265	< 1275
Up link	1255	




12: 44: 3Ø 18 SEP 2ØØ3
REF -8.Ø dBm #ATTEN 1Ø dB
SMPL
LOG
1Ø
dB/
OCCUPIED BW (99.ØØ%)
OBW: 1.255 MHz
ΔFc: 185.Ø kHz
Pwr: -1.4 dBm
CSP 2.ØØØ MHz
VIDEO BW
1ØØ kHz
VA SB
SC FC
CORR
CENTER 1.88991Ø GHz
#RES BW 3Ø kHz
#VBW 1ØØ kHz
SPAN 2.ØØØ MHz
SWP 2Ø.Ø msec

7. STABILITY PERFORMANCE

7.1 Test protocol

Date of test: December 10, 2003

EUT mode of operation: Carrier unmodulated

Channel (MHz)	Temperature +25 C		
	Frequency (MHz)	Output Power (dBm)	
Up link	1900,000000	39,4	
Down link	1980,000000	44,8	

Channel (MHz)	Temperature -30 C		
	Frequency (MHz)	Output Power (dBm)	
Up link	1900,000000	40,2	
Down link	1980,000000	39,4	

Channel (MHz)	Temperature +60 C		
	Frequency (MHz)	Output Power (dBm)	
Up link	1900,000000	37,5	
Down link	1980,000000	39,2	

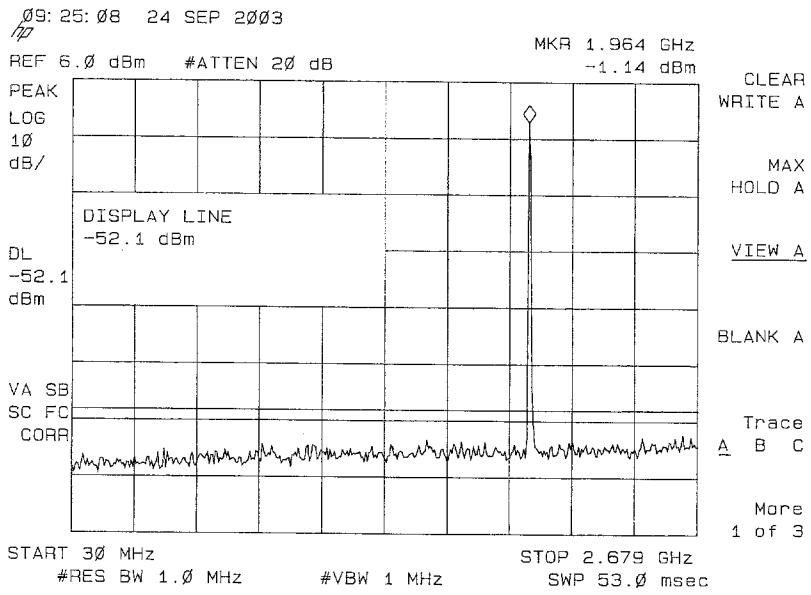
8. CONDUCTED SPURIOUS EMISSION, ANTENNA PORT

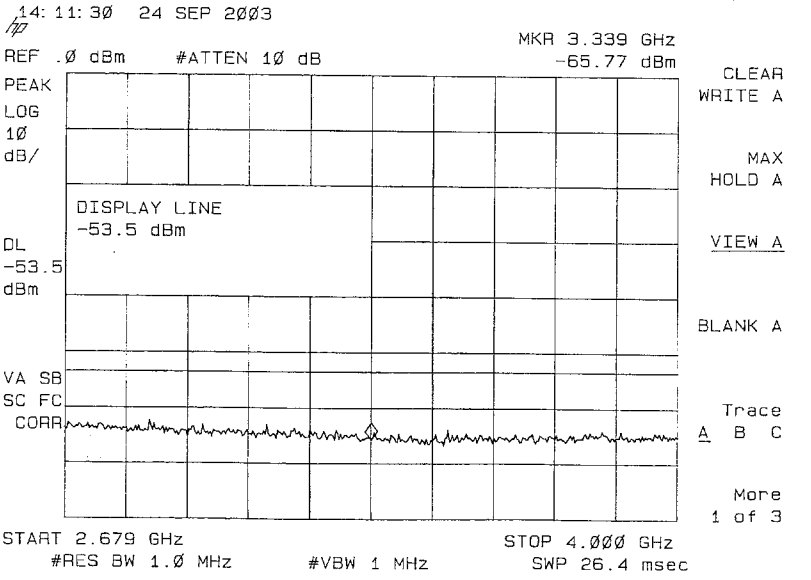
8.1 Test protocol

Date of test: September 24, 2003

EUT mode of operation: carrier modulated with a CDMA signal.

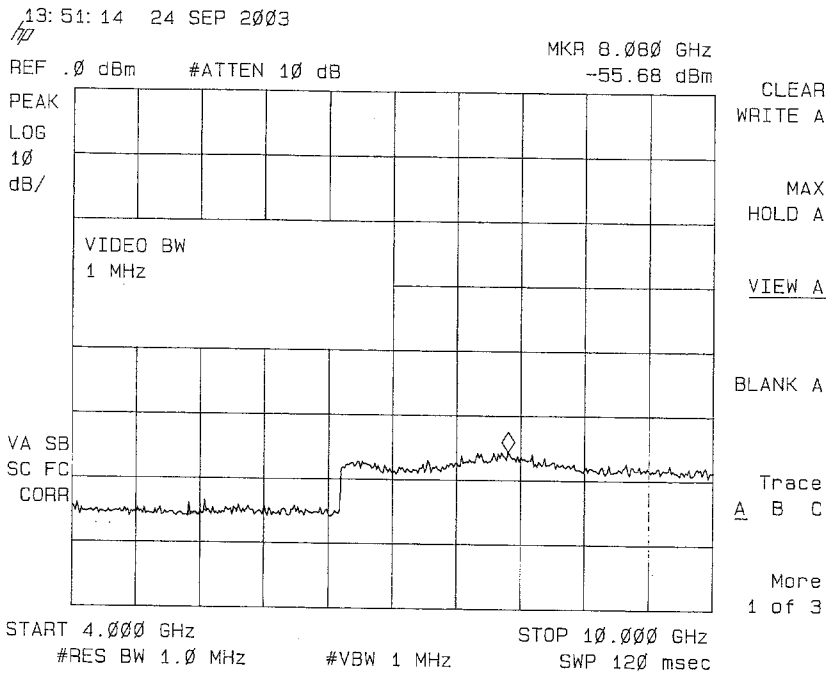
Uplink

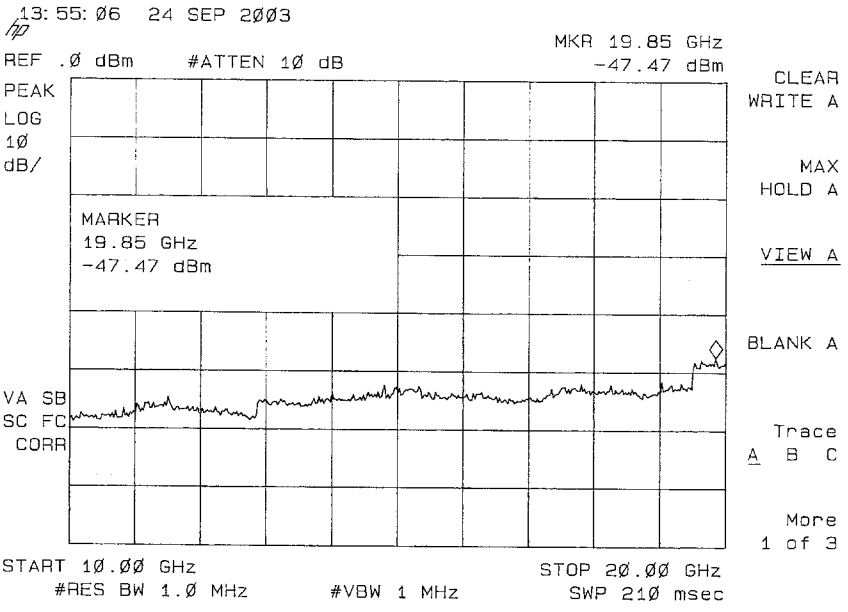




EUT mode of operation: carrier modulated with a CDMA signal.

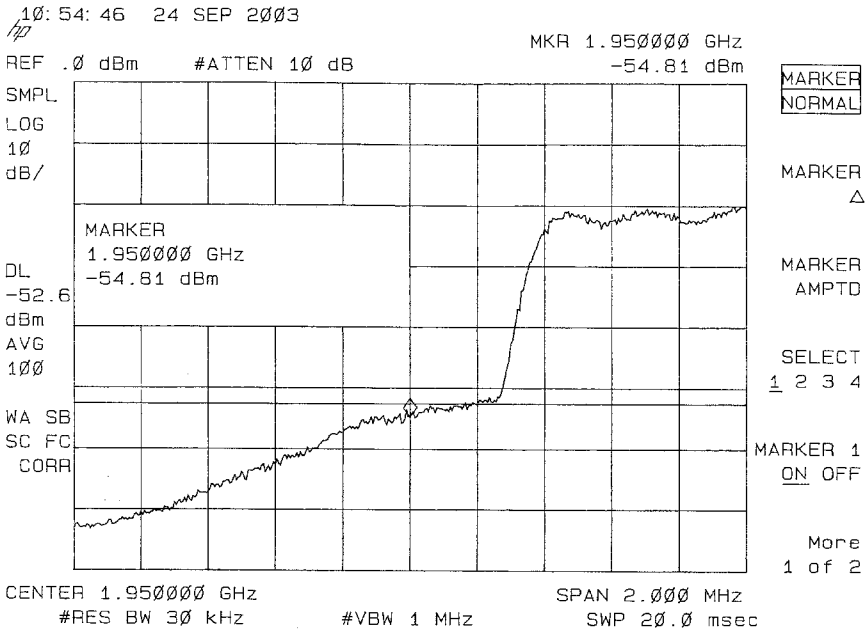
Uplink

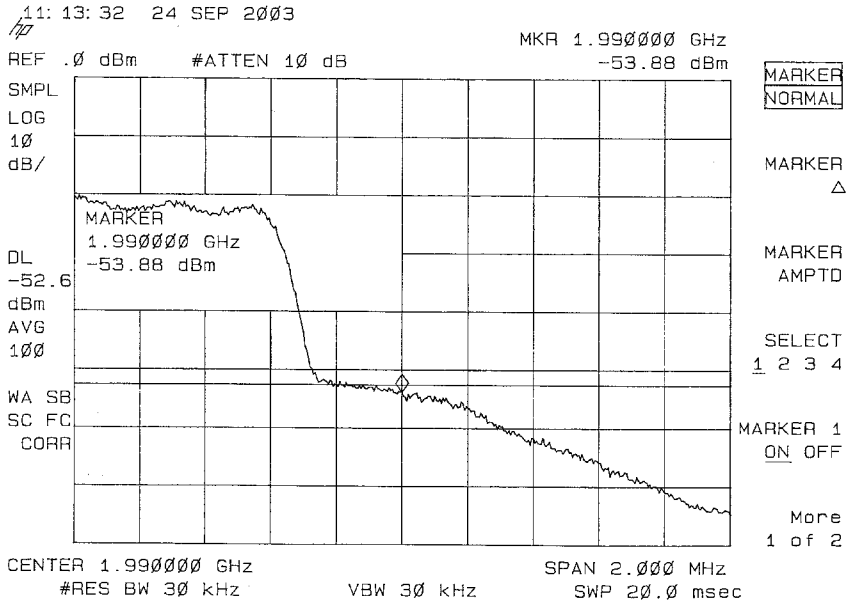




EUT mode of operation: carrier modulated with a CDMA signal.

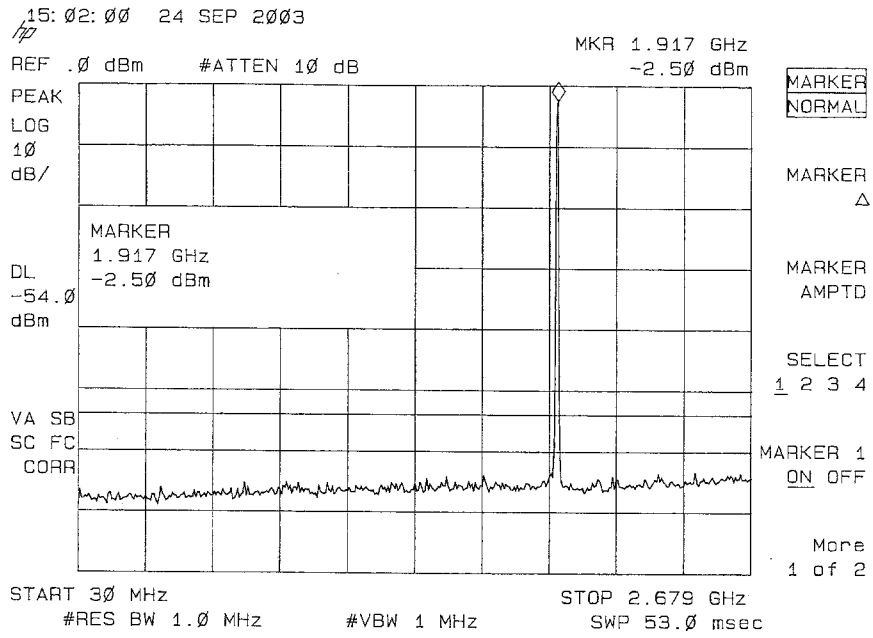
Uplink

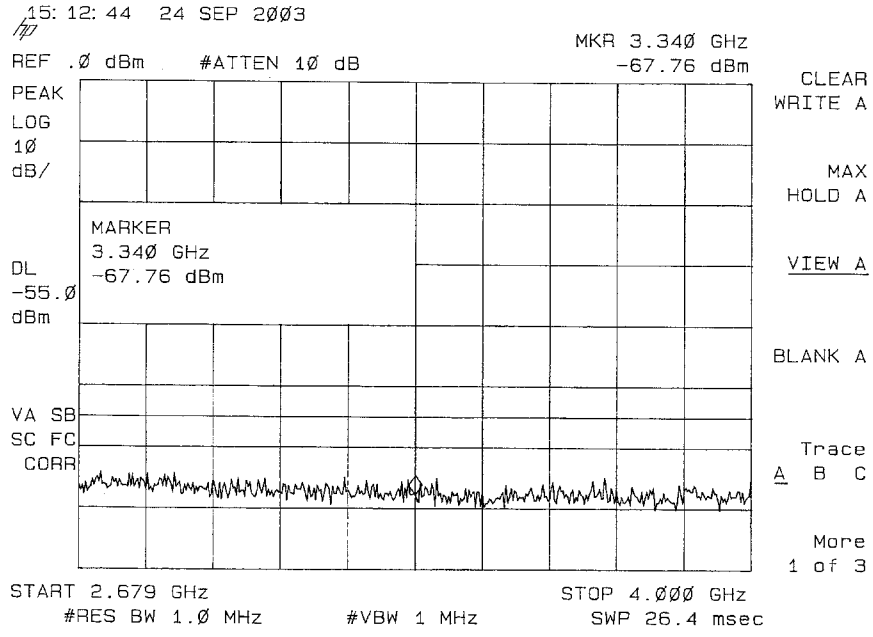




EUT mode of operation: carrier modulated with a CDMA signal.

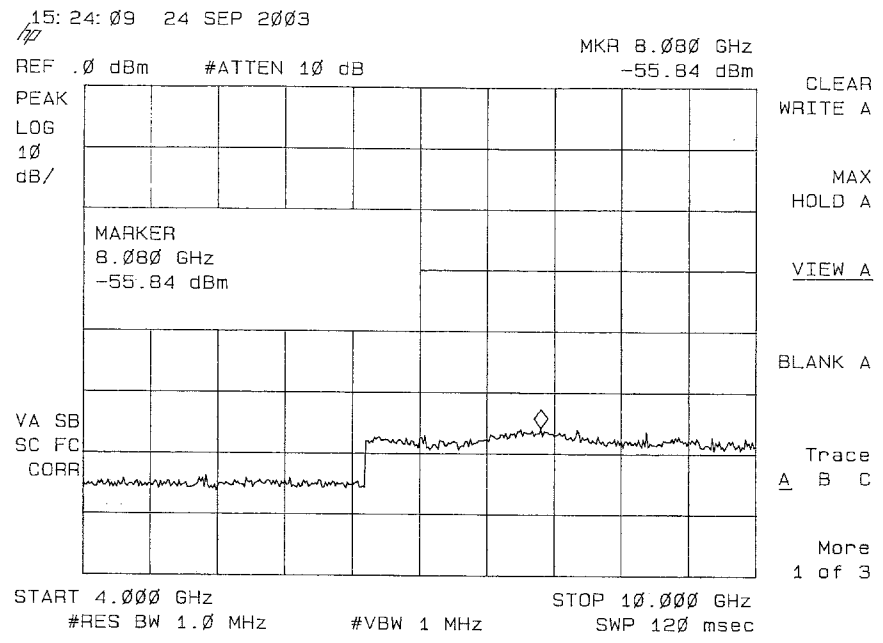
Downlink

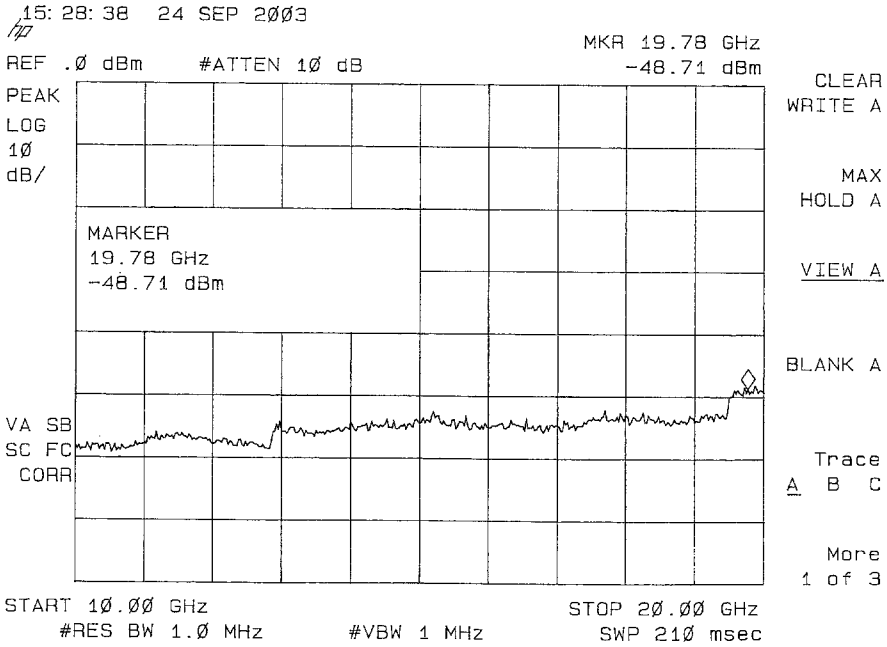




EUT mode of operation: carrier modulated with a CDMA signal.

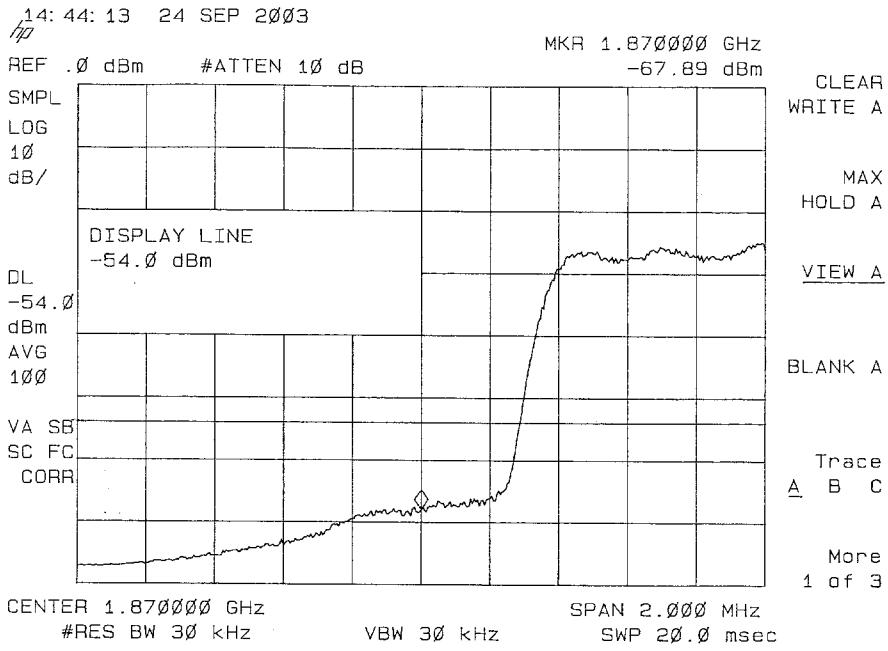
Downlink

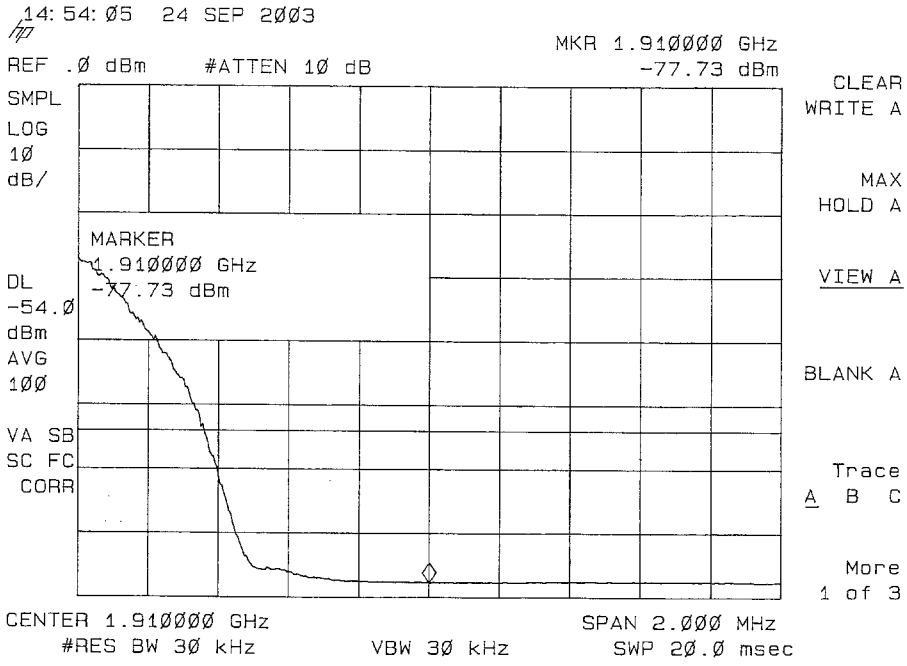




EUT mode of operation: carrier modulated with a CDMA signal.

Downlink

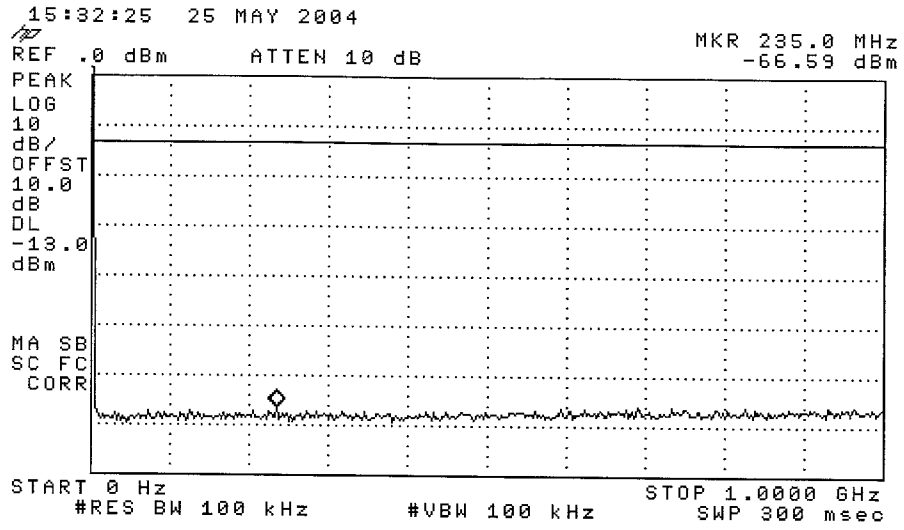


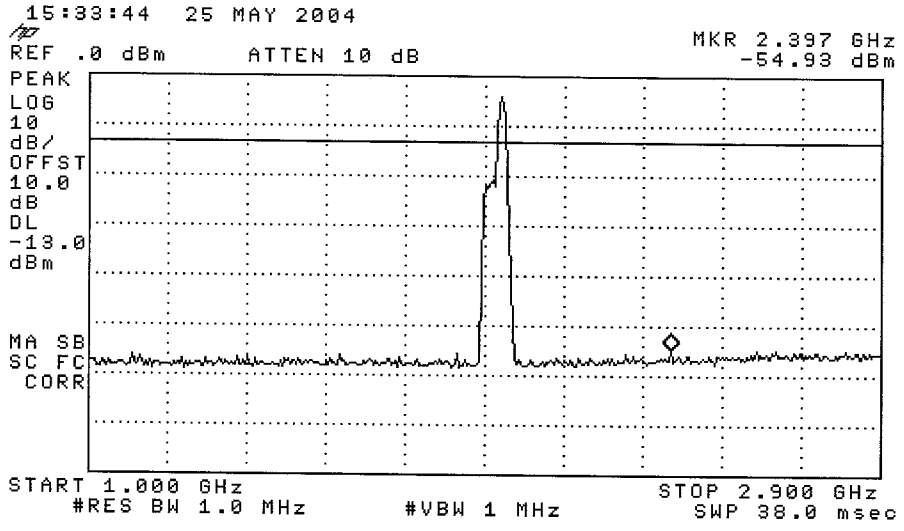


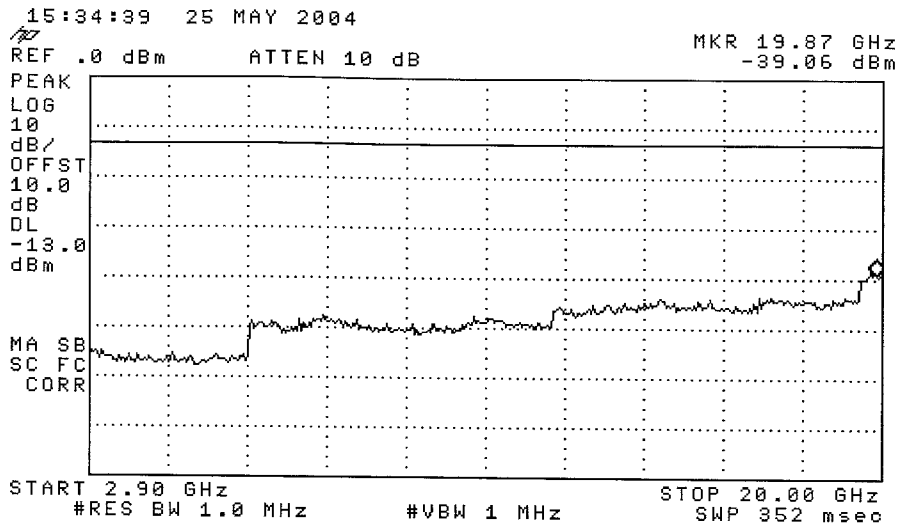
Date of test: May 25, 2004

EUT mode of operation: Low power, unmodulated carrier.

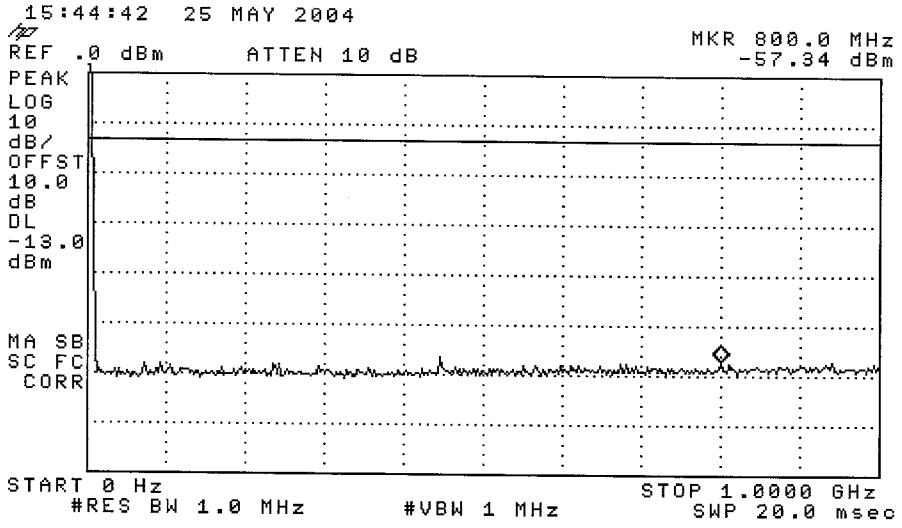
Downlink

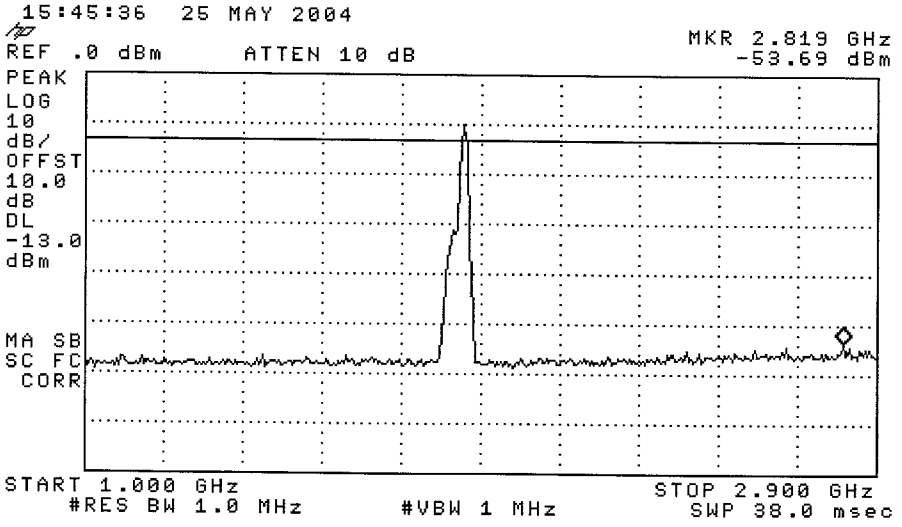


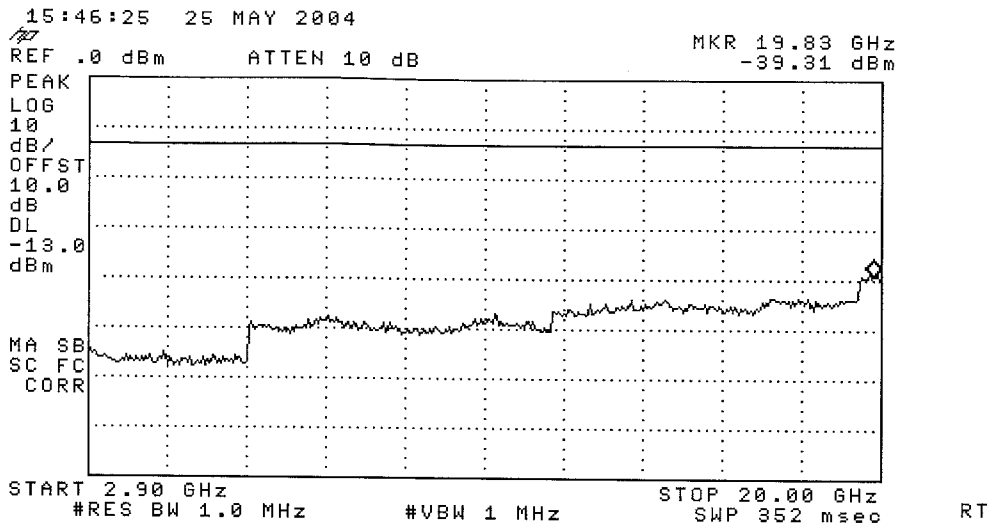



15:34:39 25 MAY 2004
REF .0 dBm
ATTEN 10 dB
MKR 19.87 GHz
-39.06 dBm
PEAK
LOG
10
dB/
OFFST
10.0
dB
DL
-13.0
dBm
MA SB
SC FC
CORR
START 2.90 GHz
#RES BW 1.0 MHz
#VBW 1 MHz
STOP 20.00 GHz
SWP 352 msec
RT

Downlink


15:44:42 25 MAY 2004
REF .0 dBm
ATTEN 10 dB
MKR 800.0 MHz
-57.34 dBm
PEAK
LOG
10
dB/
OFFST
10.0
dB
DL
-13.0
dBm
MA SB
SC FC
CORR
START 0 Hz
#RES BW 1.0 MHz
#VBW 1 MHz
STOP 1.0000 GHz
SWP 20.0 msec
RT


15:45:36 25 MAY 2004
REF .0 dBm
ATTEN 10 dB
MKR 2.819 GHz
-53.69 dBm
PEAK
LOG
10
dB/
OFFST
10.0
dB
DL
-13.0
dBm
MA SB
SC FC
CORR
START 1.000 GHz
#RES BW 1.0 MHz
#VBW 1 MHz
STOP 2.900 GHz
SWP 38.0 msec
RT



Data summary

Spurious emissions, conducted at DL Antenna port						
Frequency [MHz]	RBW [kHz]	Measured level Peak [dBm]		Limit Peak [dBm]		Note
30 – 1 000	30	-		-13		
1 000 – 2 900	100	< -28		-13		
2 900 – 20 000	1000	< - 18		-13		

Spurious emissions, conducted at UL Antenna port						
Frequency [MHz]	RBW [kHz]	Measured level Peak [dBm]		Limit Peak [dBm]		Note
30 – 1 000	30	-		-13		
1 000 – 2 900	100	< -16		-13		
2 900 – 20 000	1000	< - 18		-13		

9. RADIATED SPURIOUS EMISSIONS

9.1 Operating environment

Temperature:	21 °C	(15 - 35 °C)
Relative Humidity:	43 %	(20 - 75 %)

9.2 Measurement set-up

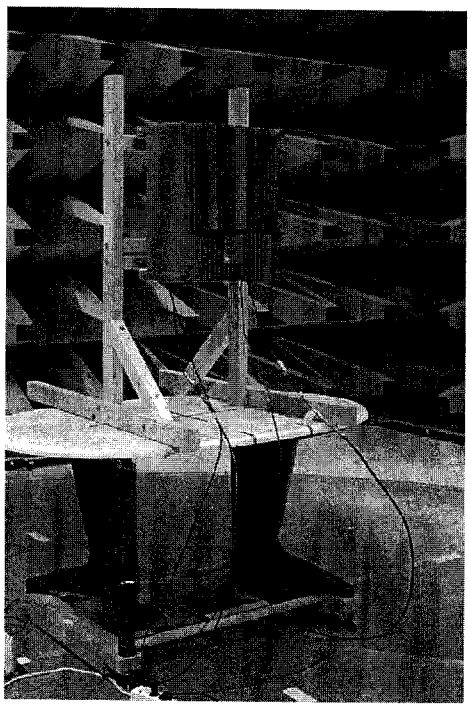
Test site: Semi-anechoic shielded chamber (30MHz – 20 GHz)

The radiated disturbance electric field intensity was measured in a semi-anechoic chamber at a distance of 10 m and the EUT was placed on a non-metallic table, 1,5 m above the reference ground plane. The specified test mode was enabled. Test set-up photo is given below.

An overview sweep with peak detection of the electric field intensity was performed with the measurement receiver in max-hold and with the antenna placed 1,5 m, 2,5 m and 3,5 m above the floor. The polarisation was horizontal and vertical. The measurements were repeated with the EUT rotated in 90-degree steps.

At the frequencies where high disturbance levels were found a search for max disturbance level was performed. With the EUT and antenna in the worst-case configuration new measurements were carried out.

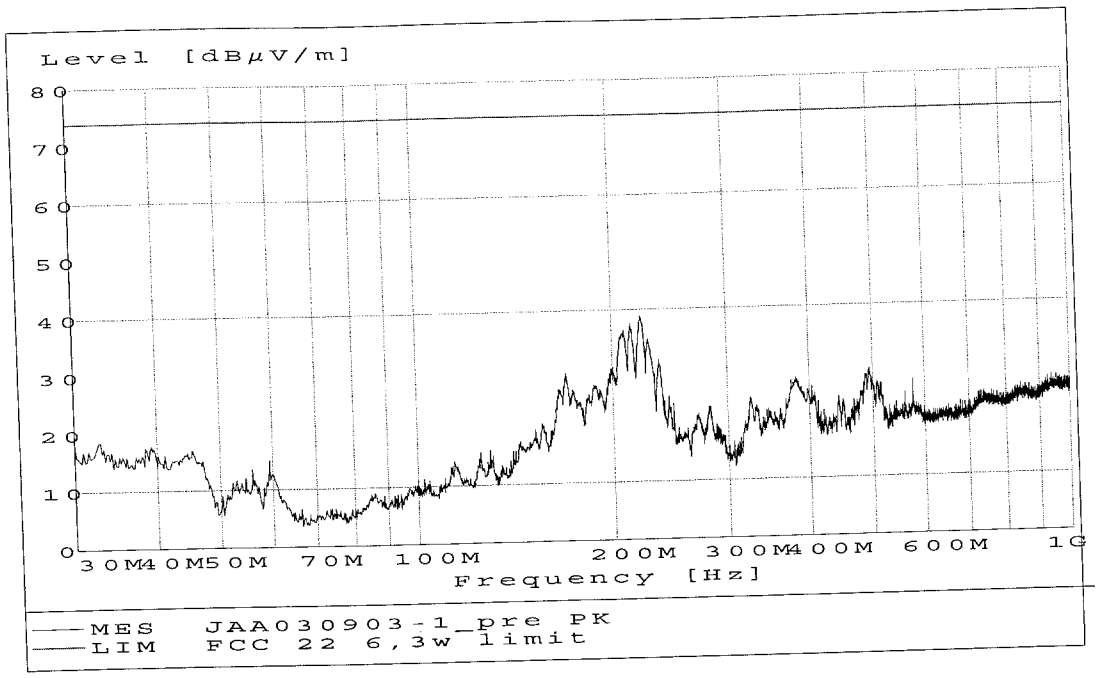
Test set-up photo:



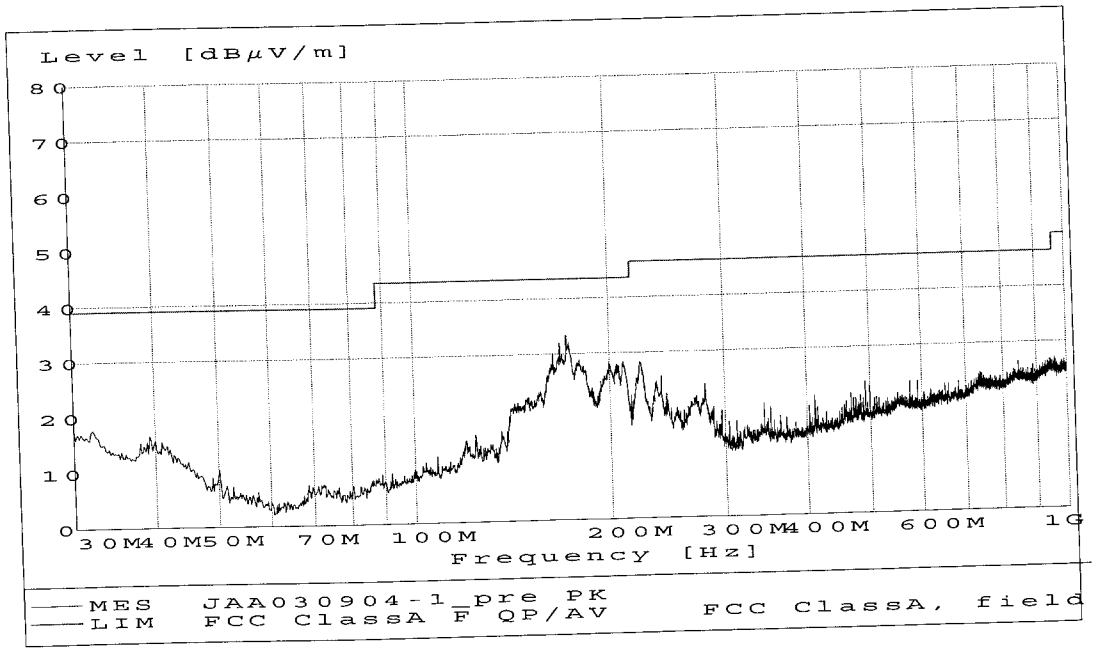
9.3 Test protocol

Semi-anechoic shielded chamber

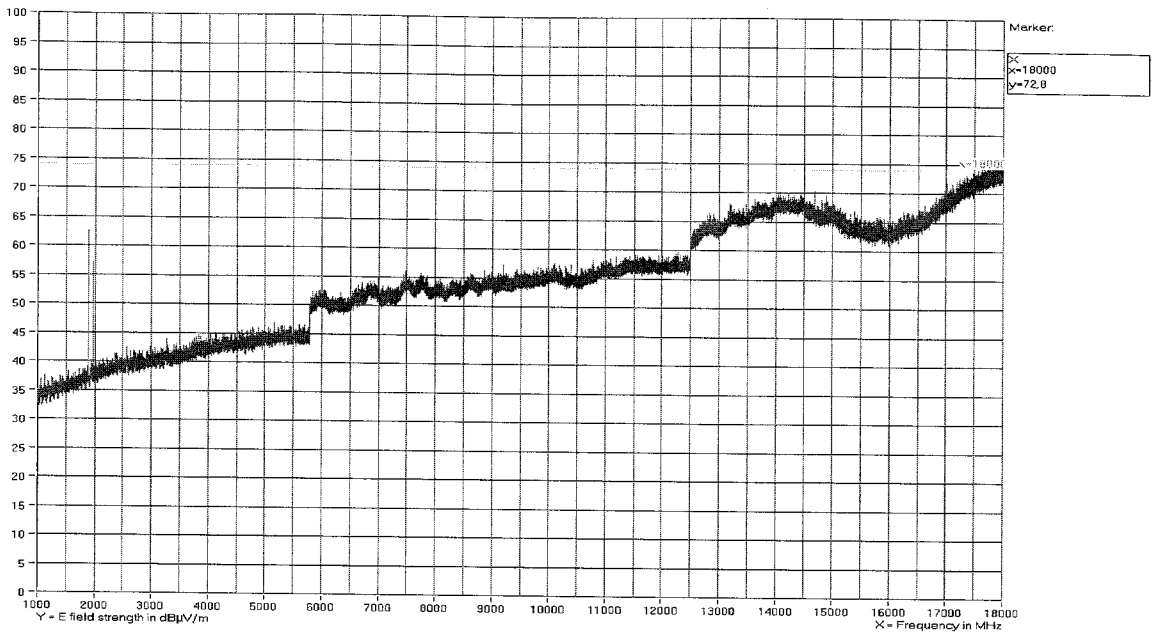
Date of test: September 3, 2003



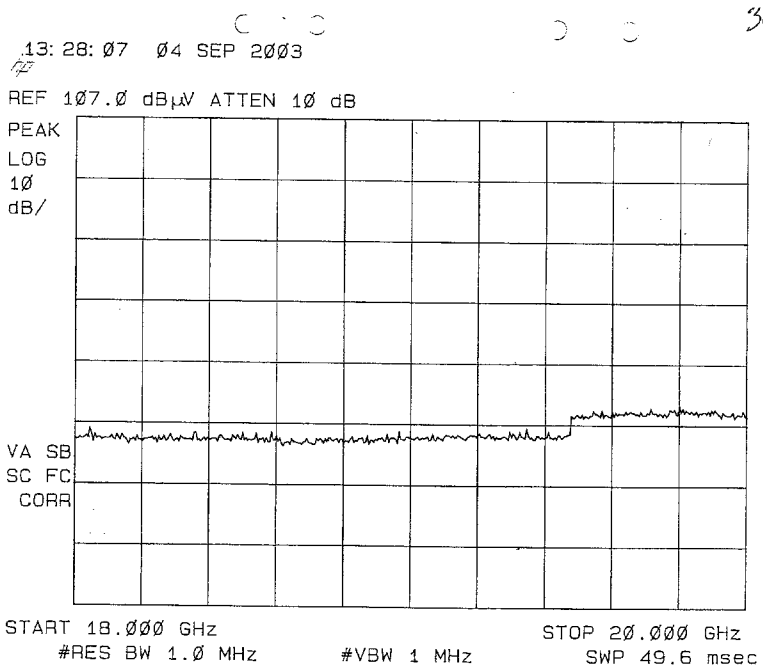
30 – 1000 MHz, max peak at a distance of 10 m TX mode.



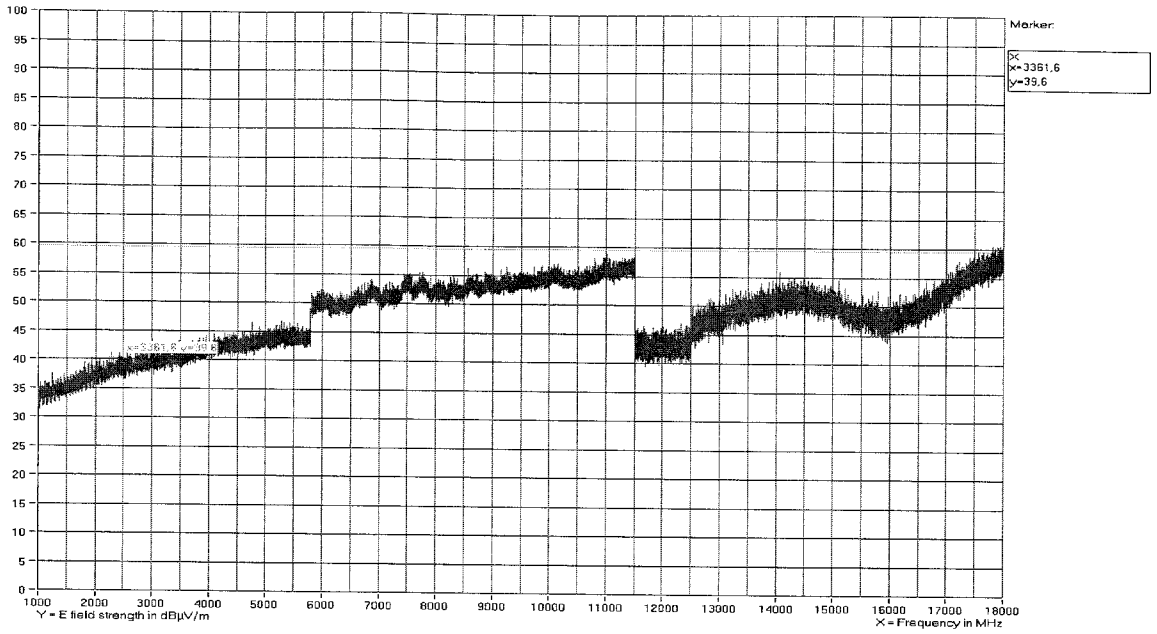
Semi-anechoic shielded chamber



TX-mode



TX-mode



RX mode

Limit in TX mode:

P= 6 W (38 dBm)

E = 7 $\sqrt{P}$ / 10 @ 10 m => E = 1,7 V/m or 124,7 dBuV/m

The spurious emission shall be attenuated by 43 + 10 log (P) => 50,7 dB

The spurious limit @ 10 m will be 124,7 – 50,7 = 73,9 dBuV/m

In analogue so will the limit @ 3 m be : 84,4 dBuV/m

10. CONDUCTED SPURIOUS EMISSION, AC PORT

10.1 Test protocol

Date of test: December 16, 2003

Frequency /MHz	Quasi-Peak Disturbance Level /dB(µV)	Quasi-Peak Permitted limit /dB(µV)	Average Permitted limit /dB(µV)
0,21	64	79	66
0,26	62	79	66
0,39	42	79	66
0,53	50	73	60

EMC-CENTER

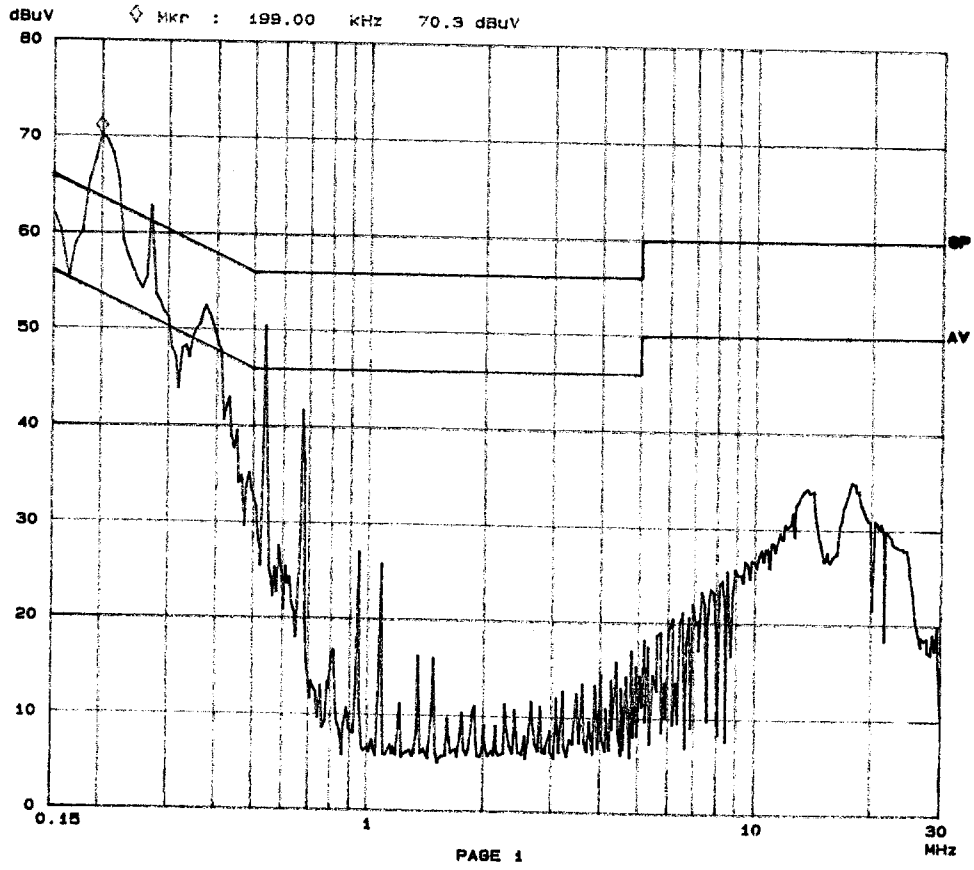
FCC part 15B, class B

16. Dec 03 13:24

EUT: AR3430
Manuf: LGP ALLGON AB
Operator: BJR
Test Spec: Mains terminals. Peak measurements.
Comment: ANSI C.63: 2001

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	30M	7k	10k	PK	20ms	AUTO LN	OFF	60dB



The limit printed in the graph is class B. The product shall only fulfil the class A limit.

The class A limit is:	QP	AV
0,15 – 0,50 MHz	79 dBuV	66 dBuV
0,50 – 30 MHz	73 dBuV	60 dBuV

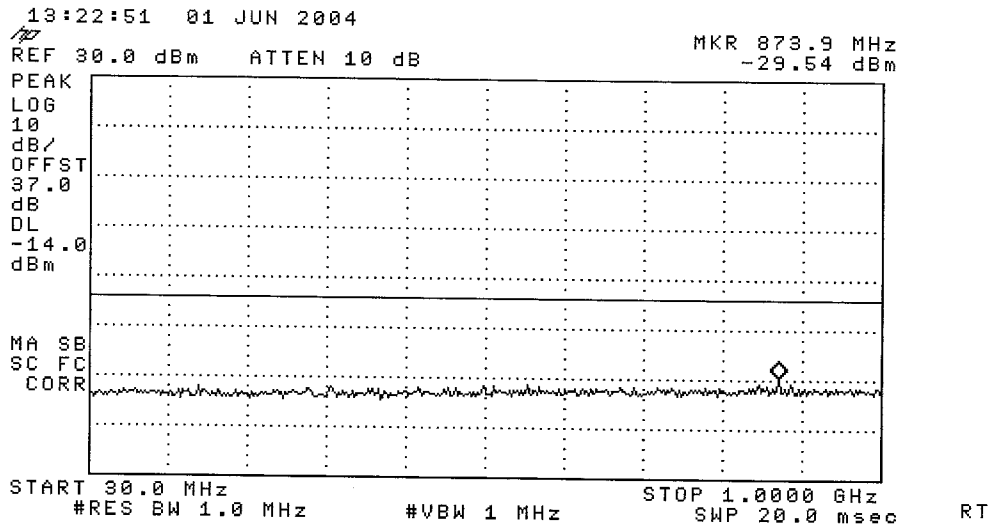
11. 3-TONE INTERMODULATION ATTENUATION

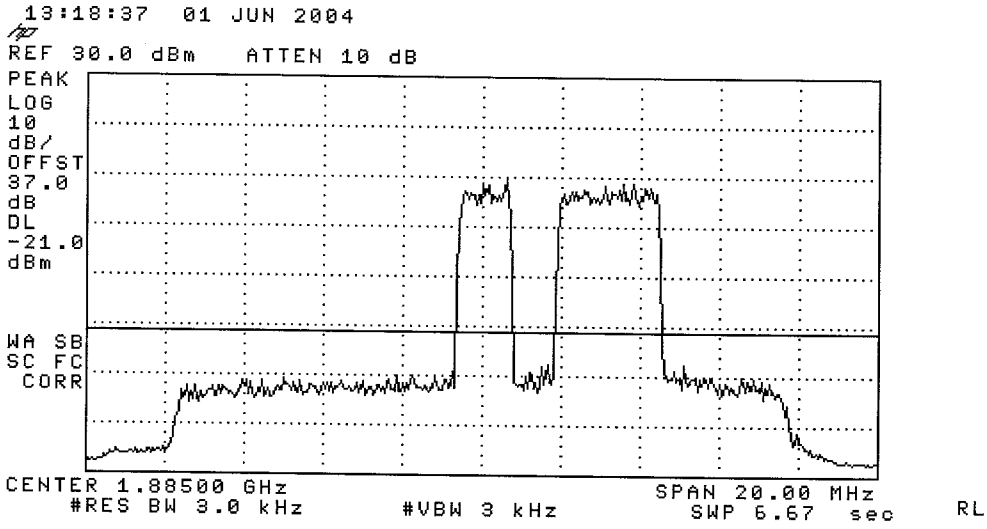
11.1 Test protocol

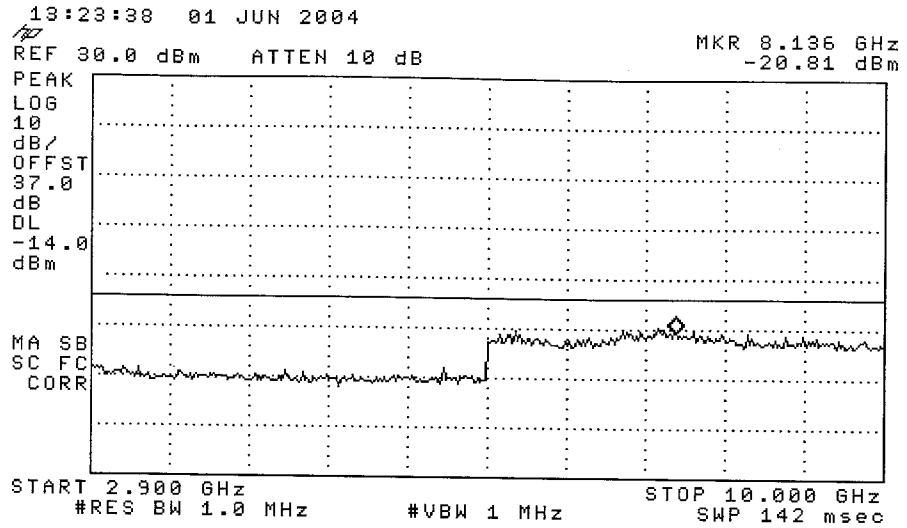
Date of test: June 1, 2004

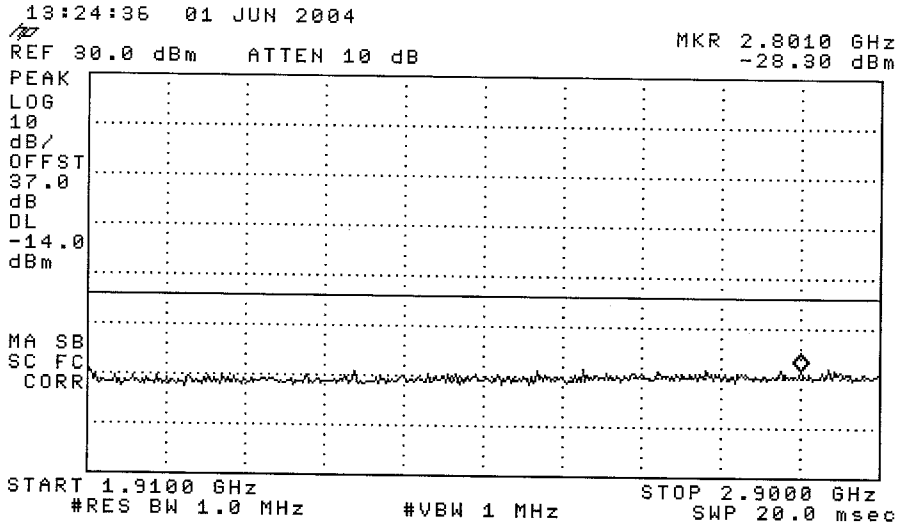
EUT mode of operation: 3 tone carrier modulated with a CDMA signal.

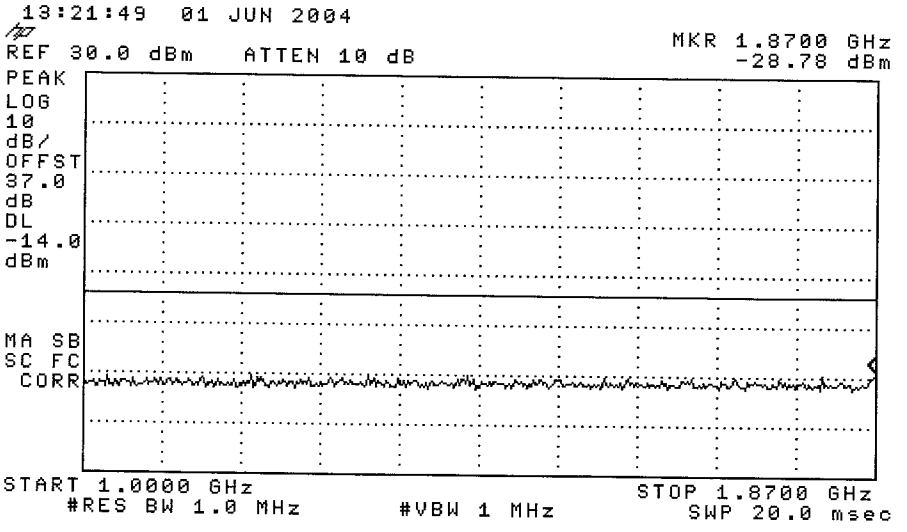
Uplink



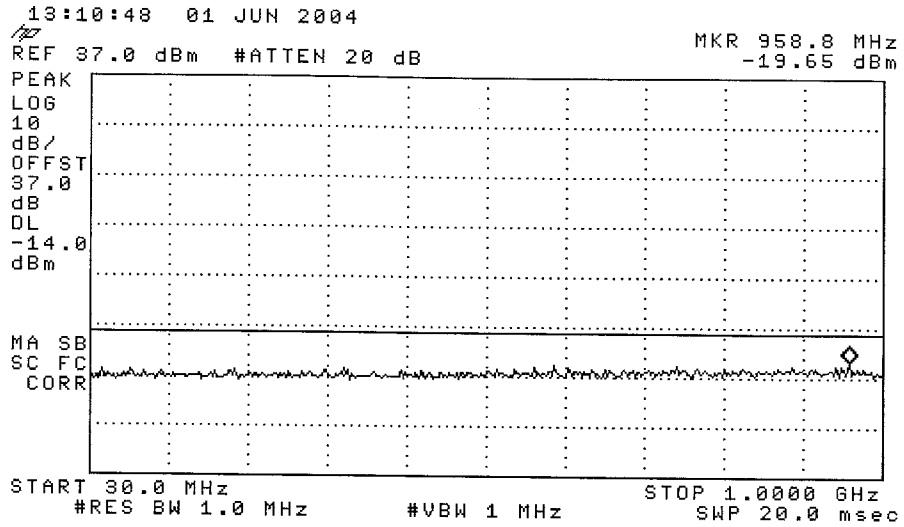


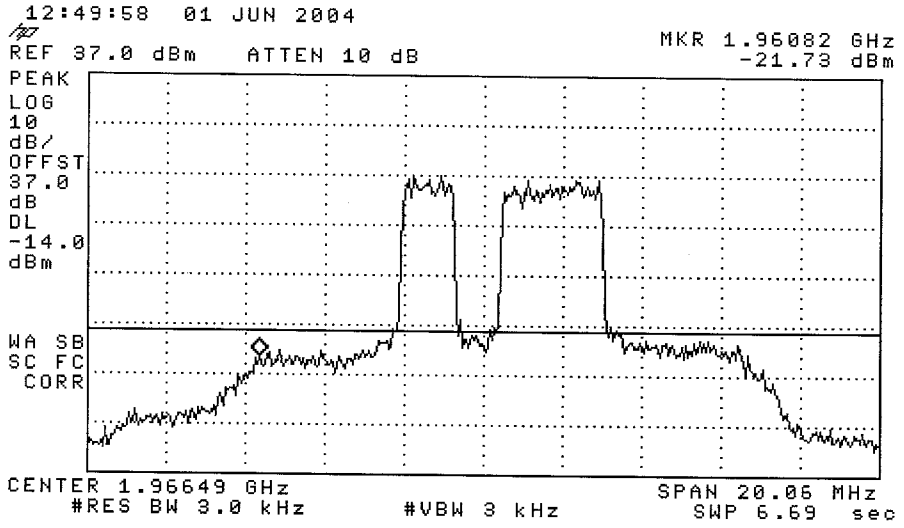

13:23:38 01 JUN 2004
REF 30.0 dBm ATTEN 10 dB
MKR 8.136 GHz
-20.81 dBm
PEAK
LOG
10
dB/
OFFST
37.0
dB
DL
-14.0
dBm
MA SB
SC FC
CORR
START 2.900 GHz
#RES BW 1.0 MHz
#VBW 1 MHz
STOP 10.000 GHz
SWP 142 msec
RT

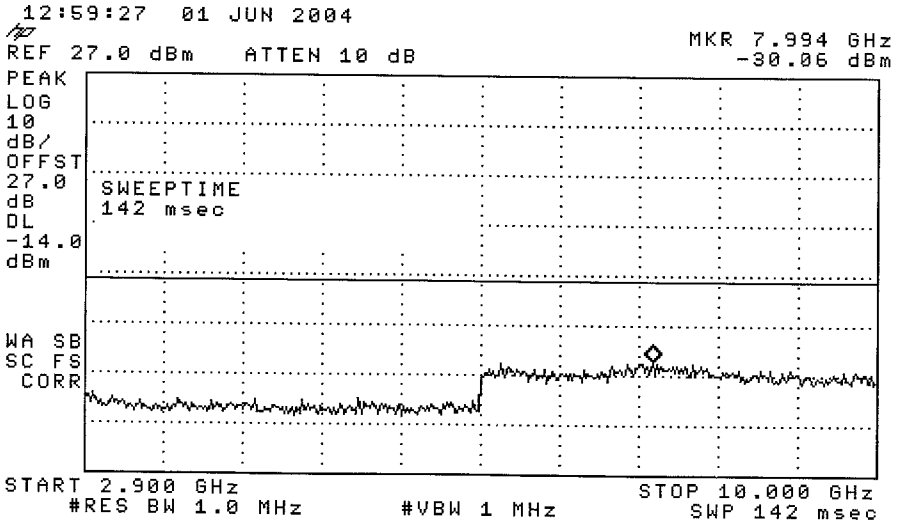

13:24:36 01 JUN 2004
REF 30.0 dBm ATTEN 10 dB
MKR 2.8010 GHz
-28.30 dBm
PEAK
LOG
10
dB/
OFFST
37.0
dB
DL
-14.0
dBm
MA SB
SC FC
CORR
START 1.9100 GHz
#RES BW 1.0 MHz
#VBW 1 MHz
STOP 2.9000 GHz
SWP 20.0 msec
RL

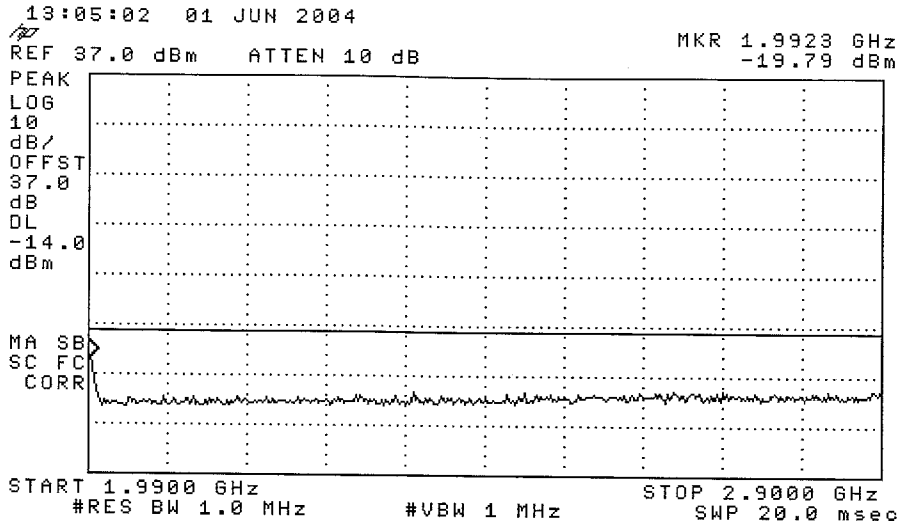

13:21:49 01 JUN 2004
REF 30.0 dBm ATTEN 10 dB
MKR 1.8700 GHz
-28.78 dBm
PEAK
LOG
10
dB/
OFFST
37.0
dB
DL
-14.0
dBm
MA SB
SC FC
CORR
START 1.0000 GHz
#RES BW 1.0 MHz
#VBW 1 MHz
STOP 1.8700 GHz
SWP 20.0 msec
RT

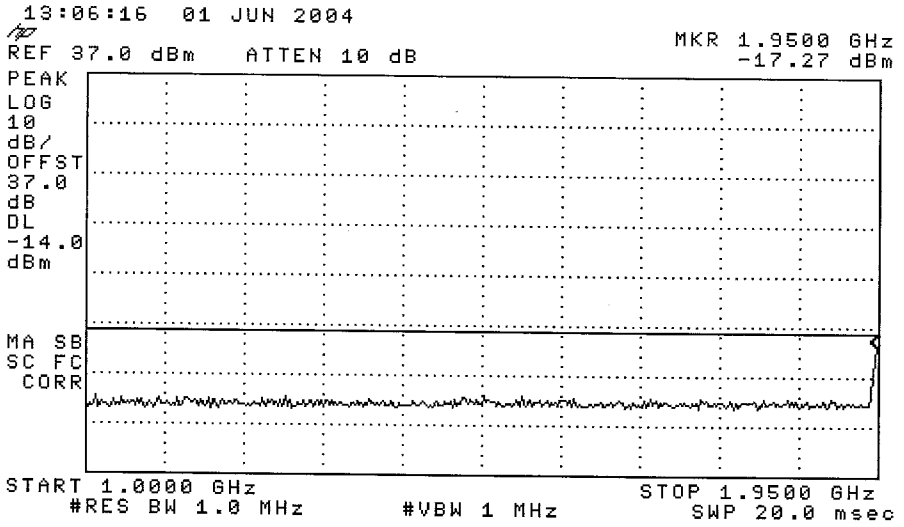
Downlink


13:10:48 01 JUN 2004
REF 37.0 dBm #ATTEN 20 dB
MKR 958.8 MHz
-19.65 dBm
PEAK
LOG
10
dB/
OFFST
37.0
dB
DL
-14.0
dBm
MA SB
SC FC
CORR
START 30.0 MHz
#RES BW 1.0 MHz
#VBW 1 MHz
STOP 1.0000 GHz
SWP 20.0 msec
RT


12:49:58 01 JUN 2004
REF 37.0 dBm ATTEN 10 dB
MKR 1.96082 GHz
-21.73 dBm
PEAK
LOG
10
dB/
OFFST
37.0
dB
DL
-14.0
dBm
WA SB
SC FC
CORR
CENTER 1.96649 GHz
#RES BW 3.0 kHz
#VBW 3 kHz
SPAN 20.06 MHz
SWP 6.69 sec
RL

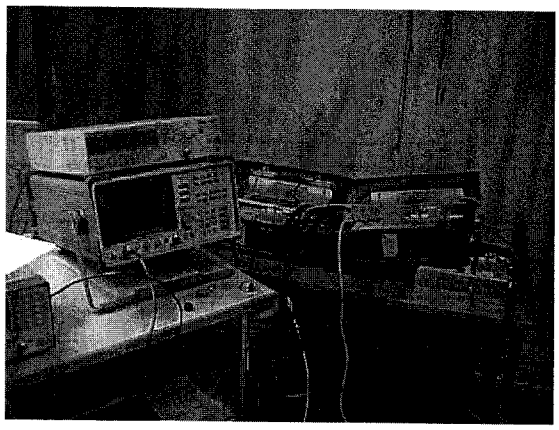

12:59:27 01 JUN 2004
REF 27.0 dBm ATTEN 10 dB
MKR 7.994 GHz
-30.06 dBm
PEAK
LOG
10
dB/
OFFST
27.0
dB
DL
-14.0
dBm
SWEEPTIME
142 msec
WA SB
SC FS
CORR
START 2.900 GHz
#RES BW 1.0 MHz
#VBW 1 MHz
STOP 10.000 GHz
SWP 142 msec
RL

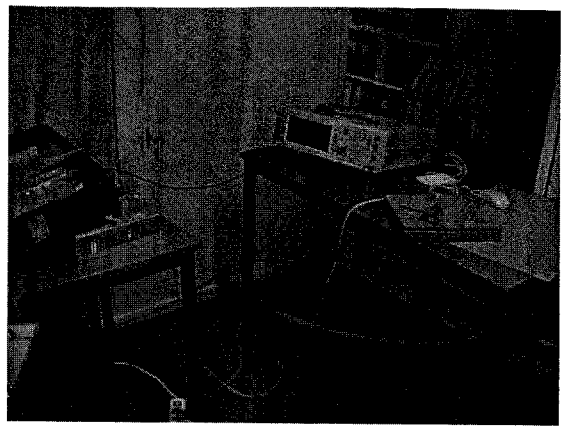


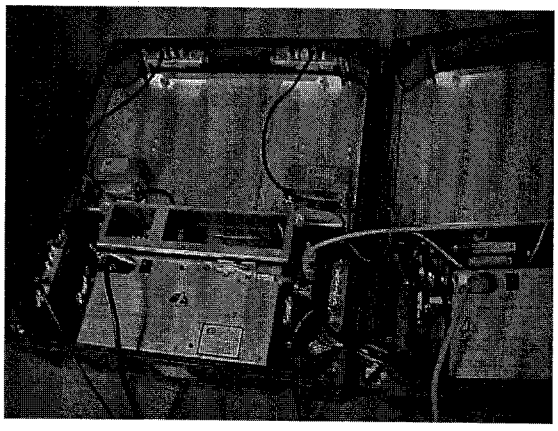


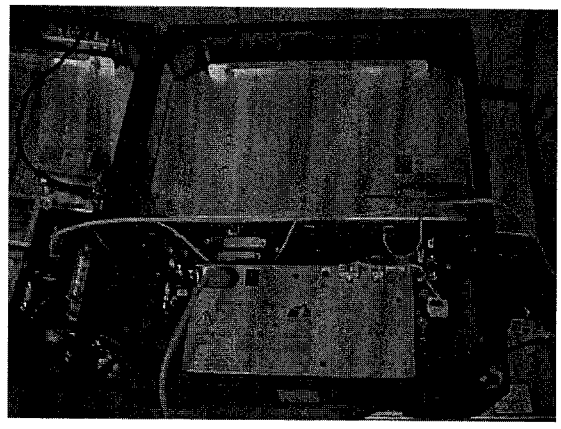
Frequency /MHz	Tested port	Intermod. product level /dBm	Permitted limit /dBm
30 – 1 000	UL	<-29	-13
1 000 – 2 900	UL	<-28	-13
2 900 – 20 000	UL	<-20	-13
30 – 1 000	DL	<-19	-13
1 000 -1 960	DL	<-21	-13
1 990– 2 900	DL	<-19	-13
2 900 – 20 000	DL	<-30	-13

APPENDIX – PHOTOS OF THE EUT









APPENDIX - TEST EQUIPMENT

Equipment	Manufacturer	Type	No.
Test site: Semi-anechoic shielded chamber, 10 x 20 x 8,5 m (W x L x H)			30300
Software:	Rohde & Schwarz	ES-K1, V1.60	
Measurement receiver:	Rohde & Schwarz	ESAI	2973/2974
Spectrum analyser:	Hewlett Packard	HP8566B	7617
Spectrum analyser:	Hewlett Packard	HP8593E	6661
Antenna amplifier:	SEMKO		7992/7993
Antenna amplifier:	Hewlett Packard	HP8449B	6685
Antenna, bilog:	Chase	CBL6111B	971
Double Ridge Guide Horn:	EMCO	3115	3006
Horn antenna:	EMCO	3160-09	30101
Filter:	K&L	4H10-X4500/18000	5133
Attenator	JFW	50FH-20dB-10W	
Attenator:	JFW	50FH-20dB-10W	
CDMA generator:	Agilent	E4432B	MY41310334
CDMA generator:	Agilent	E4432B	GB40051404
Power reflection meter	Rohde & Schwarz	NRT	100509
Power sensor (directional)	Rohde & Schwarz	NRT-Z43	100129