CETECOM ICT Services GmbH
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RSC-Laboratory

Accredited testing-laboratory

DAR registration number: DAT-P-176/94-D1

Federal Motor Transport Authority (KBA)
DAR registration number: KBA-P 00070-97

Recognized by the Federal Communications Commission
Anechoic chamber registration no.: 90462 (FCC)
Anechoic chamber registration no.: 3463A-1 (IC)
Certification ID: DE 0001
Accreditation ID: DE 0002

Accredited Bluetooth® Test Facility (BQTF)

Test report no.	**:**	**4-2756-01-03/07**
Type identification	**:**	**GE0307**
Applicant	**:**	**Option N.V.**
FCC ID	**:**	**NCMOGE0307**
Test standards	**:**	**47 CFR Part 27**

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1 General information

1.1 Notes

The test results of this test report relate exclusively to the test item specified in 1.5. The CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM ICT Services GmbH.

Test laboratory manager:

2007-09-04	**Stefan Bös**	
Date	Name	Signature

Technical responsibility for area of testing:

2007-09-04	**Harro Ames**	
Date	Name	Signature

1.2 Testing laboratory

CETECOM ICT Services GmbH

Untertürkheimer Straße 6 - 10
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Phone: + 49 681 5 98 - 0
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Internet: http://www.cetecom-ict.de

State of accreditation: **The test laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025**
DAR registration number: DAT-P-176/94-D1

Accredited by: **Federal Motor Transport Authority (KBA)**
DAR registration number: KBA-P 00070-97

Testing location, if different from CETECOM ICT Services GmbH:

Name :
Street :
Town :
Country :
Phone :
Fax :

1.3 Details of applicant

Name:	**Option N.V.**
Street:	**Gaston Geenslaan 14**
Town:	**3001 Leuven**
Country:	**Belgium**
Telephone:	**+32-16-317411**
Fax:	**+32-16-207164**
Contact:	**Joeri Boeckx**
E-mail:	**J.Boeckx@option.com**
Telephone:	**+32-16-317411**

1.4 Application details

Date of receipt of order:	**2007-08-27**
Date of receipt of test item:	**2007-08-29**
Date of start test:	**2007-08-29**
Date of end test	**2007-09-04**
Persons(s) who have been present during the test:	**Mr. Joeri Boeckx**

2 Test standard/s:

47 CFR Part 27	**2006-10**	**Title 47 of the Code of Federal Regulations Part 27- Miscellaneous wireless communications services; subpart C/L**

3 Technical tests

3.1 Details of manufacturer

Name:	**Option N.V.**
Street:	**Gaston Geenslaan 14**
Town:	**3001 Leuven**
Country:	**Belgium**

3.1.1 Test item

Kind of test item	:	PCI express Card
Type identification	:	GE0307
Serial Number	:	Cond.: 004401440560163/EW4476800T Rad.: 004401440560411/EW4476F00W
Frequency Bands	:	1712.4 – 1752.6 MHz
Type of modulation	:	QPSK / 16QAM
Emisson Designator	:	4M70F9W
Number of channels	:	201 (FDD IV)
Antenna Type	:	Internal PCB-antenna
Power supply (normal)	:	5 V DC via PCI express slot
Output power UMTS FDD IV/WCDMA:		cond.: 25.68 dBm Peak EIRP: 24.3 dBm (Burst)
Output power UMTS FDD IV/HSDPA:		cond : 25.94 dBm Peak EIRP: 24.1 dBm (Burst)
Output power UMTS FDD IV/HSUPA:		cond.: 26.42 dBm Peak EIRP: 23.9 dBm (Burst)
Transmitter Spurious (worst case)		Nothing found
Receiver Spurious (worst case)		Nothing found
FCC ID	:	NCMOGE0307

3.2 Test Setup

Hardware	:	4.0
Software	:	2.7.2Hd

Mobile; (cond. measurements):	004401440560163/EW4476800T
Mobile; (rad. measurements) :	004401440560411/EW4476F00W

The conducted and radiated measurements were performed with a test cradle. Aditionally radiated output power test were performed using three different host laptops.

1st Laptop – Acer TravelMate 4260 series
2nd Laptop – Fujitsu Siemens Amilo Pro V3205
3rd Laptop – HP Compaq nc 6320

4 Statement of Compliance

No deviations from the technical specification(s) were ascertained in the course of the tests performed.

4.1 Summary of Measurement Results

☒ **No deviations from the technical specifications were ascertained**

☐ There were deviations from the technical specifications ascertained

4.1.1 UMTS FDD IV

Section in This Report	Test Name	Verdict
5.1.1	RF Power Output Conducted	pass
5.1.3	RF Power Output Radiated	pass
5.1.4	Frequency Stability	pass
5.1.5	Radiated Emissions	pass
5.1.6	Receiver Radiated Emissions	pass
5.1.7	Conducted Spurious Emissions	pass
5.1.8	Block Edge Compliance	pass
5.1.9	Occupied Bandwidth	pass

5 Measurements and results

5.1 PART UMTS FDD IV

5.1.1 RF Output Power Conducted

Reference

FCC:	CFR Part 2.1046

Summary:

This paragraph contains both average and peak output power measurements for the PCI express card.
In all cases, the peak output power is within the required mask (this mask is specified in the JTC standards, TIA PN3389 Vol. 1 Chap 7, and is no FCC requirement).

Method of Measurements:

The PCI express card was set up for the max. output power with pseudo random data modulation.
The power was measured with R&S Signal Analyzer FSIQ 26 (peak and average)
These measurements were done at 3 frequencies, 1712.4 MHz, 1732.4 MHz and 1752.6 MHz (bottom, middle and top of operational frequency range).

WCDMA 1700 (RMC 12.2 kBit/s)		
Channel / frequency	Max. RMS	Peak
1312 / 1712.4 MHz	**22.15 dBm**	25.68 dBm
1412 / 1732.4 MHz	**21.79 dBm**	25.33 dBm
1513 / 1752.6 MHz	**21.91 dBm**	25.55 dBm

Table 1: Test results conducted peak power measurement WCDMA

WCDMA + HSDPA 1700			
Channel / frequency	sub-test	Max. RMS	Peak
1312 / 1712.4 MHz	1	**21.69 dBm**	25.23 dBm
1412 / 1732.4 MHz	1	**21.41 dBm**	25.01 dBm
1513 / 1752.6 MHz	1	**21.65 dBm**	25.29 dBm
1312 / 1712.4 MHz	2	21.60 dBm	25.41 dBm
1412 / 1732.4 MHz	2	21.40 dBm	25.46 dBm
1513 / 1752.6 MHz	2	21.57 dBm	25.46 dBm
1312 / 1712.4 MHz	3	21.68 dBm	25.87 dBm
1412 / 1732.4 MHz	3	21.36 dBm	25.44 dBm
1513 / 1752.6 MHz	3	21.63 dBm	25.94 dBm
1312 / 1712.4 MHz	4	21.60 dBm	25.39 dBm
1412 / 1732.4 MHz	4	21.32 dBm	25.05 dBm
1513 / 1752.6 MHz	4	21.60 dBm	25.41 dBm

Table 2: Test results conducted peak power measurement WCDMA + HSDPA

WCDMA + HSDPA + HSUPA 1700			
Channel / frequency	Sub-test	Max. RMS	Peak
1312 / 1712.4 MHz	1	20.66 dBm	26.40 dBm
1412 / 1732.4 MHz	1	20.55 dBm	26.15 dBm
1513 / 1752.6 MHz	1	20.48 dBm	26.30 dBm
1312 / 1712.4 MHz	2	19.09 dBm	26.15 dBm
1412 / 1732.4 MHz	2	18.80 dBm	25.82 dBm
1513 / 1752.6 MHz	2	19.11 dBm	26.12 dBm
1312 / 1712.4 MHz	3	19.52 dBm	26.08 dBm
1412 / 1732.4 MHz	3	18.86 dBm	25.42 dBm
1513 / 1752.6 MHz	3	18.97 dBm	25.56 dBm
1312 / 1712.4 MHz	4	19.56 dBm	25.99 dBm
1412 / 1732.4 MHz	4	19.21 dBm	25.80 dBm
1513 / 1752.6 MHz	4	19.54 dBm	26.12 dBm
1312 / 1712.4 MHz	5	**20.76 dBm**	26.25 dBm
1412 / 1732.4 MHz	5	**20.50 dBm**	25.89 dBm
1513 / 1752.6 MHz	5	**20.82 dBm**	26.42 dBm

Table 3: Test results conducted peak power measurement WCDMA + HSDPA + HSUPA

Remark : values in bold letters represent the subtest with maximum output power, which was compared to the standard WCDMA set-up to decide which modes need to be tested.

5.1.1.1 Test set-up requirements according to 3GPP 34.121

The following HSDPA sub-tests are defined by 3GPP 34.121 (table C.10.1.4)

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	CM(dB) (2)
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15 (3)	15/15 (3)	64	12/15 (3)	24/15	1.0
3	15/15	8/15	64	15/8	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5
Note 1: Δ_{ACK}, Δ_{NACK}, $\Delta_{CQI} = 8 \Leftarrow\Rightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftarrow\Rightarrow \beta_{hs} = 30/15 * \beta_c$ Note 2 : CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$ Note 3 : For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1,TF1) to $\beta_c = 11/15$ and $\beta_d = 15/15$						

Table 3: Subtests for UMTS Release 5 HSDPA

They were tested using the following settings for HSDPA FRC + H-Set 1 QPSK (see table C.8.1.1 of 3GPP 34.121)

Parameter	Value
Nominal average inf. bit rate	534 kbit/s
Inter-TTI Distance	3 TTI's
Number of HARQ Processes	2 Processes
Information Bit Payload	3202 Bits
MAC-d PDU size	336 Bits
Number Code Blocks	1 Block
Binary Channel Bits Per TTI	4800 Bits
Total Available SMLs in UE	19200 SMLs
Number of SMLs per HARQ Process	9600 SMLs
Coding Rate	0.67
Number of Physical Channel Codes	5

Table 4: settings of required H-Set 1 QPSK in HSDPA mode

The following HSUPA sub-tests are defined by 3GPP 34.121 (table C.11.1.3)

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ec} (SF)	β_{ed} (code)	CM (2) (dB)	MPR (dB)	AG (4) Index	E-TFCI
1	11/15 (3)	15/15 (3)	64	11/15 (3)	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1}:47/15 β_{ed2}:47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (4)	15/15 (4)	64	15/15 (4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK}, $\Delta_{CQI} = 8 \Longleftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Longleftrightarrow \beta_{hs} = 30/15 * \beta_c$
Note 2 : CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference
Note 3 : For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1,TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$
Note 4 : For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1,TF1) to $\beta_c = 14/15$ and $\beta_d = 15/15$
Note 5 : Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g
Note 6 : β_{ed} can not be set directly; it is set by Absolute Grant Value

Table 5: Subtests for UMTS Release 6 HSUPA

Some HSUPA sub test settings of parameters defined in the table above cannot be set directly. Instead $\Delta_{E\text{-}DPCCH}$, Reference E-TFCI and Reference E-TFCI Power Offset were set according to table 5.2B.2 of 3GPP 34.121, and CMU200 operating manual instructions of firmware V4x50.a11 were followed to reach a test condition with maximum output power and one E-TFCI.

Limits:

Power Step	Nominal Peak Output Power (dBm)	Tolerance (dB)
0	+30	± 2

5.1.2 Verification other bands (GE0301)

Band	TCH	TR GE0301	Measured	Deviation
GSM 850	128	32.1 dBm	32.3 dBm	+0.2 dBm
	190	32.1 dBm	32.3 dBm	+0.2 dBm
	251	32.1 dBm	32.4 dBm	+0.3 dBm
EDGE 850	128	27.6 dBm	27.8 dBm	+0.2 dBm
	190	27.8 dBm	27.9 dBm	+0.1 dBm
	251	27.7 dBm	27.8 dBm	+0.1 dBm
GSM 1900	512	29.2 dBm	29.4 dBm	+0.2 dBm
	661	29.4 dBm	29.5 dBm	+0.1 dBm
	810	29.2 dBm	29.4 dBm	+0.2 dBm
EDGE 1900	512	27.5 dBm	27.5 dBm	0.0 dBm
	661	27.6 dBm	27.7 dBm	+0.1 dBm
	810	27.5 dBm	27.6 dBm	+0.1 dBm
WCDMA FDD V	4132	26.1 dBm	25.9 dBm	-0.2 dBm
	4183	25.7 dBm	25.5 dBm	-0.2 dBm
	4233	25.8 dBm	25.7 dBm	-0.1 dBm

5.1.3 RF Output Power Radiated

Reference

FCC:	CFR Part 27.50(d)(2)

Summary:

This paragraph contains EIRP measurements for the PCMCIA card.
In all cases, the peak output power is within the required mask (this mask is specified in the JTC standards, TIA PN3389 Vol. 1 Chap 7, and is no FCC requirement).

Method of Measurements:

The PCMCIA card was set up for the max. output power with pseudo random data modulation.
The power was measured with R&S Signal Analyzer FSIQ 26 (peak)
These measurements were done at 3 frequencies, 1712.4 MHz, 1732.4 MHz and 1752.6 MHz (bottom, middle and top of operational frequency range).
The measurements with HSDPA and HSUPA were done with the settings with the highest conducted output power.
The EIRP Measurement were performed using the test cradle and aditionally with three laptops:

1st Laptop – Acer TravelMate 4260 series
2nd Laptop – Fujitsu Siemens Amilo Pro V3205
3rd Laptop – HP Compaq nc 6320

ERP Measurements
Description: This is the test for the maximum radiated power from the phone.
Rule Part 22.913 specifies that "Mobile/portable stations are limited to 7 watts ERP.

Measuring the EIRP of Spurious/Harmonic Emissions using Substitution Method
(a) The measurements were performed with full rf output power and modulation.
(b) Test was performed at listed 3m test site (listed with FCC, IC).
(c) The transmitter under test was placed at the specified height on a non-conducting turntable (80 cm height)
(d) The BICONILOG antenna (20 MHz to 1 GHz) or HORN antenna (1 GHz to 18 GHz) was used for measuring.
(e) Load an appropriate correction factors file in EMI Receiver for correcting the field strength reading level
Total Correction Factor recorded in the EMI Receiver = Cable Loss + Antenna Factor
E (dBuV/m) = Reading (dBuV) + Total Correction Factor (dB/m)
(f) Set the EMI Receiver and #2 as follows:
Center Frequency: test frequency
Resolution BW: 100 kHz
Video BW: same
Detector Mode: positive
Average: off
Span: 3 x the signal bandwidth
(g) The test antenna was lowered or raised from 1 to 4 meters until the maximum signal level was detected.
(h) The transmitter was rotated through 360 o about a vertical axis until a higher maximum signal was received.
(i) The test antenna was lowered or raised again from 1 to 4 meters until a maximum was obtained. This level was recorded.
(j) The recorded reading was corrected to the true field strength level by adding the antenna factor, cable loss and subtracting the pre-amplifier gain.
(k) The above steps were repeated with both transmitters' antenna and test receiving antenna placed in vertical and horizontal polarization. Both readings with the antennas placed in vertical and horizontal polarization shall be recorded.
(l) Repeat for all different test signal frequencies

Measuring the ERP of Spurious/Harmonic Emissions using Substitution Method

(a) Set the EMI Receiver (for measuring E-Field) and Receiver #2 (for measuring ERP) as follows:
Center Frequency : equal to the signal source
Resolution BW : 10 kHz
Video BW : same
Detector Mode : positive
Average : off
Span : 3 x the signal bandwidth
(b) Load an appropriate correction factors file in EMI Receiver for correcting the field strength reading level
Total Correction Factor recorded in the EMI Receiver = Cable Loss + Antenna Factor
E (dBuV/m) = Reading (dBuV) + Total Correction Factor (dB/m)
(c) Select the frequency and E-field levels for ERP/EIRP measurements.
(d) Substitute the EUT by a signal generator and one of the following transmitting antennas (substitution antenna):
.DIPOLE antenna for frequency from 30-1000 MHz or .HORN antenna for frequency above 1 GHz}.
(e) Mount the transmitting antenna at 1.5 meter high from the ground plane.
(f) Use one of the following antenna as a receiving antenna: .DIPOLE antenna for frequency from 30-1000 MHz or .HORN antenna for frequency above 1 GHz }.
(g) If the DIPOLE antenna is used, tune its elements to the frequency as specified in the calibration manual.
(h) Adjust both transmitting and receiving antenna in a VERTICAL polarization.
(i) Tune the EMI Receivers to the test frequency.
(j) Lower or raise the test antenna from 1 to 4 meters until the maximum signal level was detected.
(k) The transmitter was rotated through 360 o about a vertical axis until a higher maximum signal was received.
(l) Lower or raise the test antenna from 1 to 4 meters until the maximum signal level was detected.
(m) Adjust input signal to the substitution antenna until an equal or a known related level to that detected from the transmitter was obtained in the test receiver.
(n) Record the power level read from the Average Power Meter and calculate the ERP/EIRP as follows:
P = P1 - L1 = (P2 + L2) – L1 = P3 + A + L2 - L1
EIRP = P + G1 = P3 + L2 - L1 + A + G1
ERP = EIRP – 2.15 dB
Total Correction factor in EMI Receiver # 2 = L2 – L1 + G1
Where: P: Actual RF Power fed into the substitution antenna port after corrected.
P1: Power output from the signal generator
P2: Power measured at attenuator A input
P3: Power reading on the Average Power Meter
EIRP: EIRP after correction
ERP: ERP after correction
(o) Adjust both transmitting and receiving antenna in a HORIZONTAL polarization, then repeat step (k) to (o)
(p) Repeat step (d) to (o) for different test frequency
(q) Repeat steps (c) to (j) with the substitution antenna oriented in horizontal polarization.
(r) Actual gain of the EUT's antenna is the difference of the measured EIRP and measured RF power at the RF port. Correct the antenna gain if necessary.

Limits:

Power Step	Burst Peak (dBm)
0	<30

Results:

Channel/Mode	Test cradle	Laptop 1	Laptop 2	Laptop 3
1312 - WCDMA	24.3	24.2	24.1	24.2
1412 - WCDMA	23.9	23.8	23.8	23.7
1513 – WCDMA	23.5	23.4	23.3	23.3
1312 - WCDMA + HSDPA	24.1	24.1	24.0	23.9
1412 - WCDMA + HSDPA	23.7	23.6	23.5	23.6
1513 - WCDMA + HSDPA	23.3	23.2	23.1	23.1
1312 - WCDMA + HSUPA	23.9	23.8	23.7	23.8
1412 - WCDMA + HSUPA	23.4	23.3	23.4	23.1
1513 - WCDMA + HSUPA	23.0	23.0	22.8	22.8
Measurement uncertainty ±0.5 dB				

5.1.4 Frequency Stability

Reference

FCC:	CFR Part 27.54, 2.1055

Method of Measurement:

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the mobile station in a "call mode". This is accomplished with the use of a R&S CMU 200 DIGITAL RADIOCOMMUNICATION TESTER..

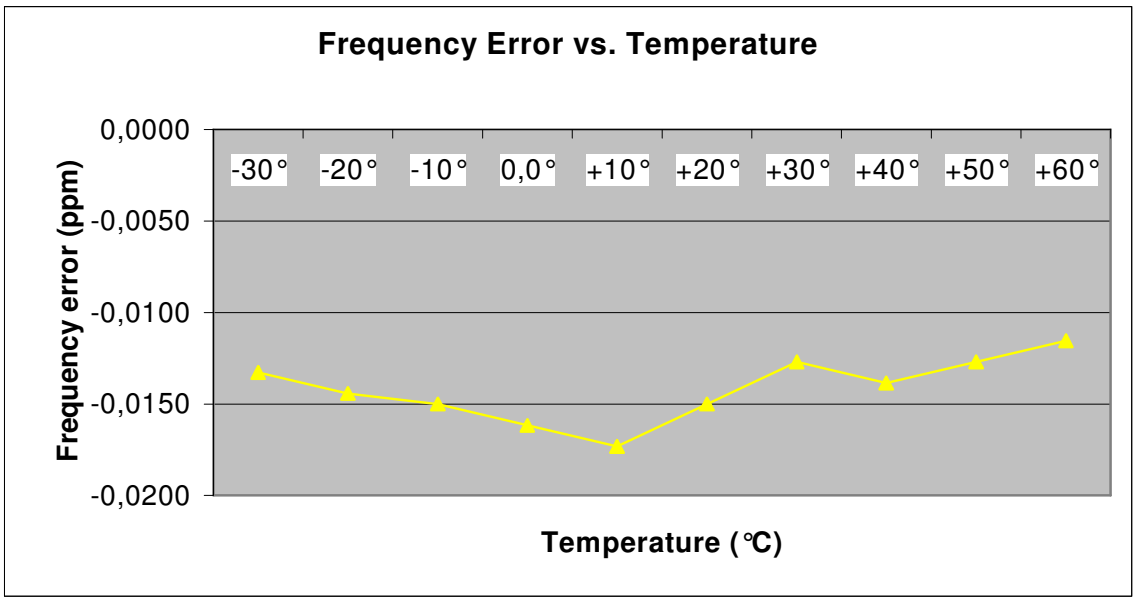
1. Measure the carrier frequency at room temperature.
2. Subject the mobile station to overnight soak at -30 C.
3. With the mobile station, powered with 3.7 Volts, connected to the CMU 200 and in a simulated call on channel 661 (centre channel), measure the carrier frequency. These measurements should be made within 2 minutes of powering up the mobile station, to prevent significant self warming.
4. Repeat the above measurements at 10 C increments from -30 C to +60 C. Allow at least 1 1/2 hours at each temperature, un-powered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal 3.7 Volts. Vary supply voltage from minimum 3.3 Volts to maximum 4.4 Volts, in 13 steps re-measuring carrier frequency at each voltage. Pause at 3.7 V ac Volts for 1 1/2 hours un-powered, to allow any self heating to stabilize, before continuing.
6. Subject the mobile station to overnight soak at +60 C.
7. With the mobile station, powered with 3.7 Volts, connected to the CMU 200 and in a simulated call on channel 661(center channel), measure the carrier frequency. These measurements should be made within 2 minutes of powering up the mobile station, to prevent significant self warming.
8. Repeat the above measurements at 10 C increments from +60 C to -30 C. Allow at least 1 1/2 hours at each temperature, un-powered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5 C during the measurement procedure.

Test Results: AFC FREQ ERROR vs. VOLTAGE

Not applicable (unit is plugged in and supported with a stabilized voltage of the laptop)

Test Results: AFC FREQ ERROR vs. TEMPERATURE

TEMPERATURE (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
-30	-23	-0,00000133	-0,0133
-20	-25	-0,00000144	-0,0144
-10	-26	-0,00000150	-0,0150
±0.0	-28	-0,00000162	-0,0162
+10	-30	-0,00000173	-0,0173
+20	-26	-0,00000150	-0,0150
+30	-22	-0,00000127	-0,0127
+40	-24	-0,00000139	-0,0139
+50	-22	-0,00000127	-0,0127
+60	-20	-0,00000115	-0,0115



5.1.5 Radiated Emissions

Reference

FCC:	CFR Part 27.53(g), 2.1053

Measurement Procedure:

The following steps outline the procedure used to measure the radiated emissions from the mobile station. The site is constructed in accordance with ANSI C63.4:2003 requirements and is recognized by the FCC to be in compliance for a 3 and a 10 meter site. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1752.6 MHz. This was rounded up to 12 GHz. The resolution bandwidth is set as outlined in Part 27.54. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the UMTS band.

The final open field emission (here 10m semi-anechoic chamber listed by FCC) test procedure is as follows:

a) The test item was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna.
b) The antenna output was terminated in a 50 ohm load.
c) A double ridged wave guide antenna was placed on an adjustable height antenna mast 3 meters from the test item for emission measurements.
d) Detected emissions were maximized at each frequency by rotating the test item and adjusting the receive antenna height and polarization. The maximum meter reading was recorded. The radiated emission measurements of the harmonics of the transmit frequency through the 10th harmonic were measured with peak detector and I MHz bandwidth. If the harmonic could not be detected above the noise floor, the ambient level was recorded. The equivalent power into a dipole antenna was calculated from the field intensity levels measured at 3 meters using the equation shown below:
e)Now each detected emissions were substituted by the Substitution method, in accordance with the TIA/EIA 603 .

Measurement Limit:

Sec. 27.54 Emission Limits.
(g) On any frequency outside a licensee' s frequency block (e.g. A, D, B, etc.) within the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log(P) dB.
The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

Measurement Results:

Radiated emissions measurements were made only at the upper, center, and lower carrier frequencies of the UMTS band (1712.4 MHz, 1732.4 MHz and 1752.6 MHz). It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the UMTS band into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

The final open field radiated levels are presented on the next pages.
All measurements were done in horizontal and vertical polarization, the plots shows the worst case.
As can be seen from this data, the emissions from the test item were within the specification limit.

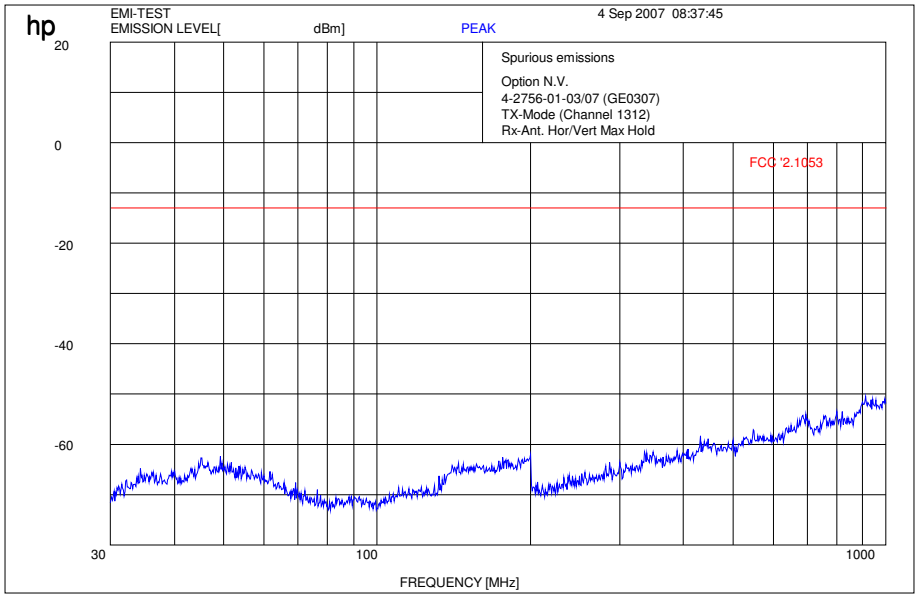
Harmonic	Tx ch.-1312 Freq. (MHz)	Level (dBm)	Tx ch.-1412 Freq. (MHz)	Level (dBm)	Tx ch.-1513 Freq. (MHz)	Level (dBm)
2	1712.4	-	1732.4	-	1752.6	-
3	3424.8	-	3464.8	-	3505.2	-
4	5137.2	-	5197.2	-	5257.8	-
5	6849.6	-	6929.6	-	7010.4	-
6	8562.0	-	8662.0	-	8763.0	-
7	10274.4	-	10394.4	-	10515.6	-
8	11986.8	-	12126.8	-	12268.2	-
9	13699.2	-	13859.2	-	14020.8	-
10	15411.6	-	15591.6	-	15773.4	-

Sample calculation:

Freg	SA Reading	SG Setting	Ant. gain	Dipol gain	Cable loss	ERP	Substitution Antenna
MHz	dBµV	dBm	dBi	dBd	dB	dBm	
1712.4	128.9	18.5	8.4	0.0	3.3	23.6	UHAP Schwarzbeck S/N 460

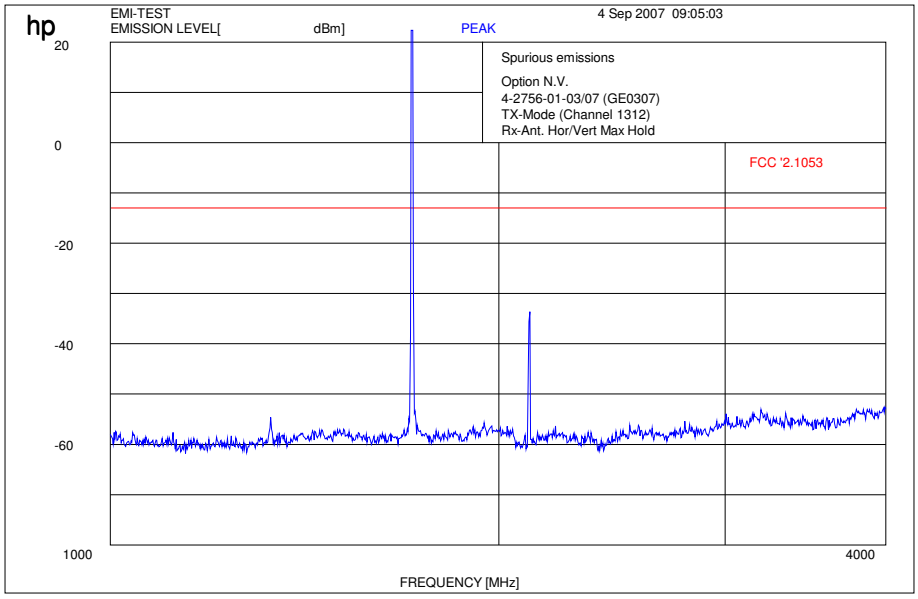
ERP = SG (dBm) - Cable Loss (dB) + Ant. gain (dB)
*ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.1dBi

Channel 1312 (30 MHz - 1 GHz)



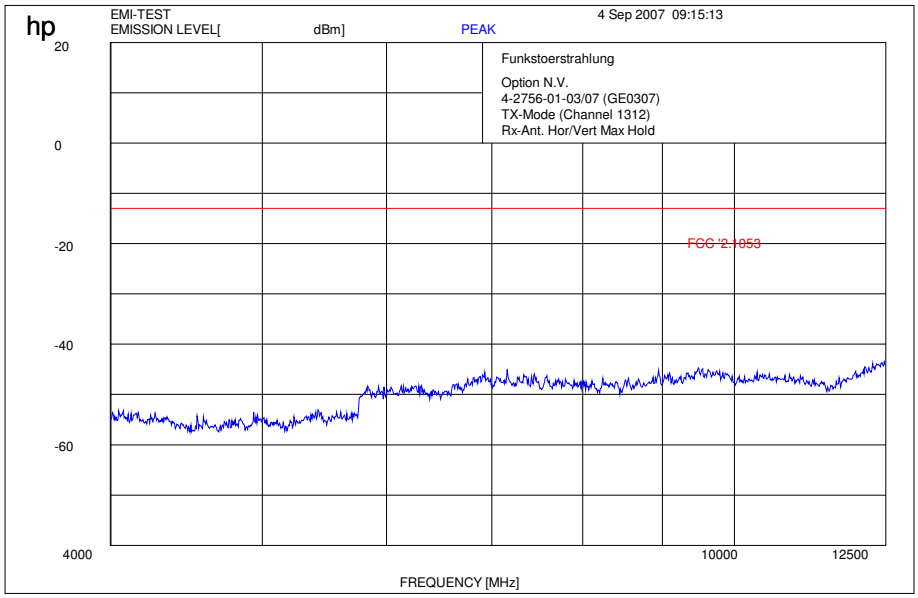
RBW/VBW: 100 kHz

Channel 1312 (1 GHz - 4 GHz)



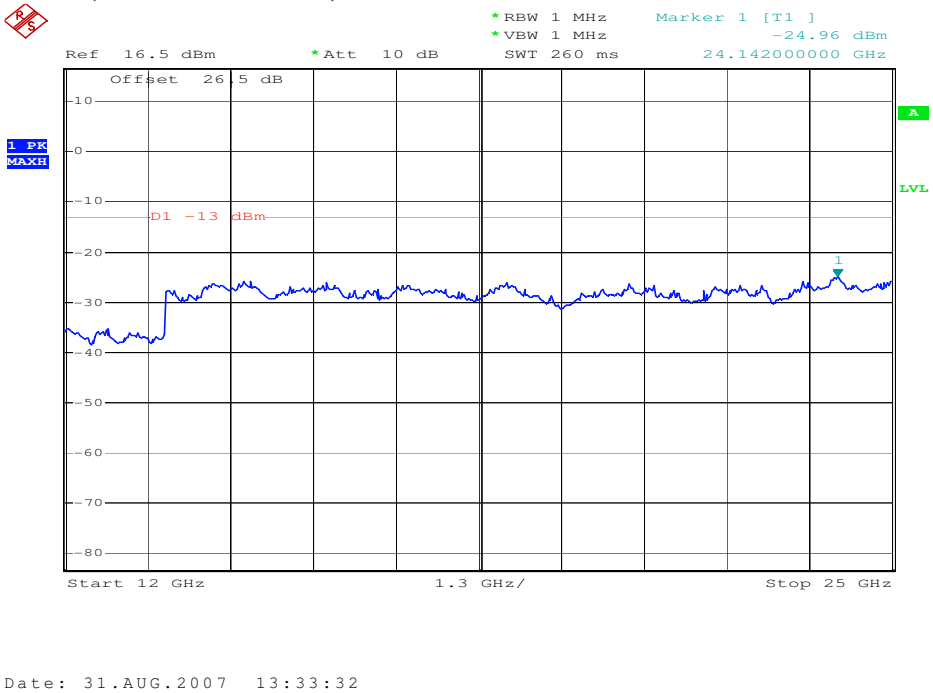
RBW / VBW 1 MHz

Channel 1312 (4 GHz – 12.5 GHz)



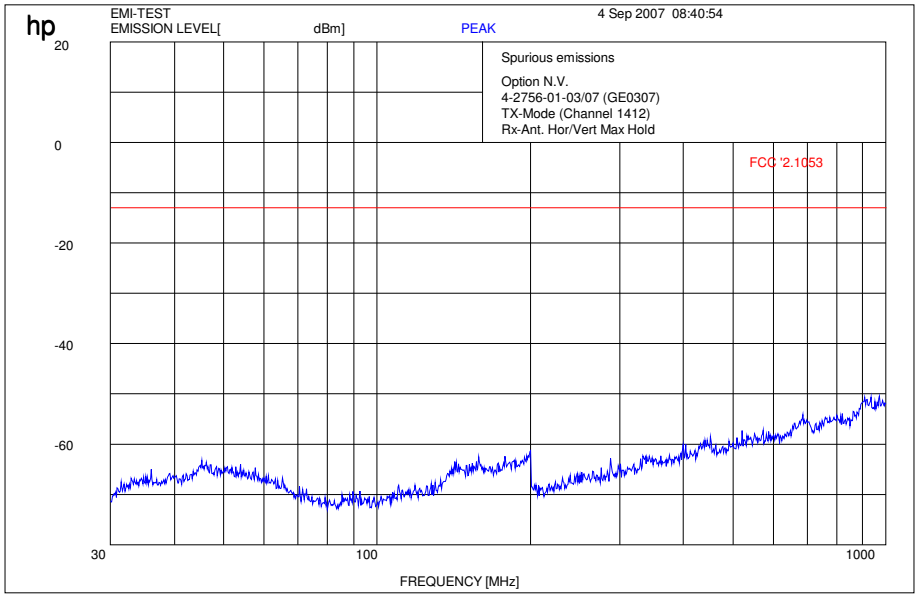
RBW / VBW 1 MHz

Channel 1312 (12 GHz - 25 GHz) valid for all 3 channels and all modes



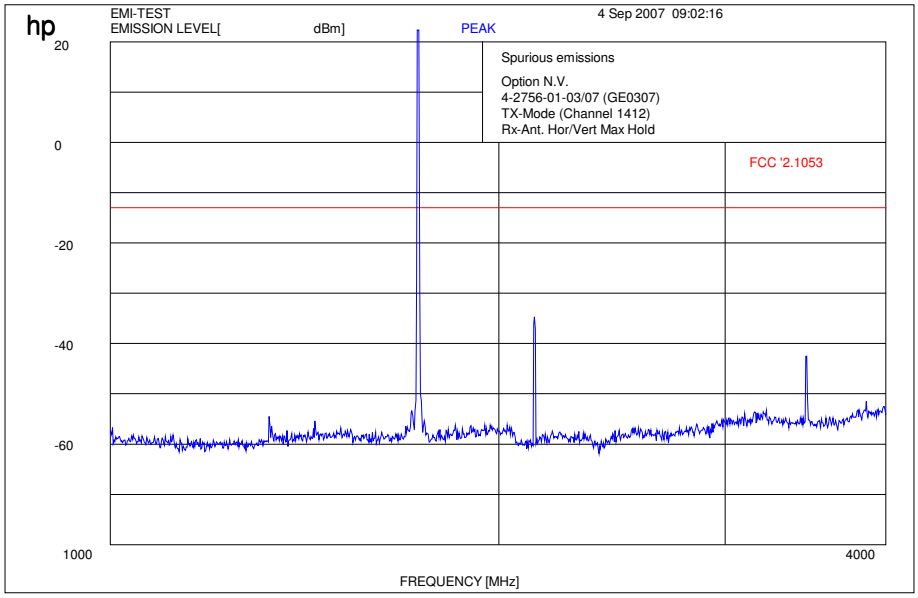
Date: 31.AUG.2007 13:33:32

Channel 1412 (30 MHz - 1 GHz)



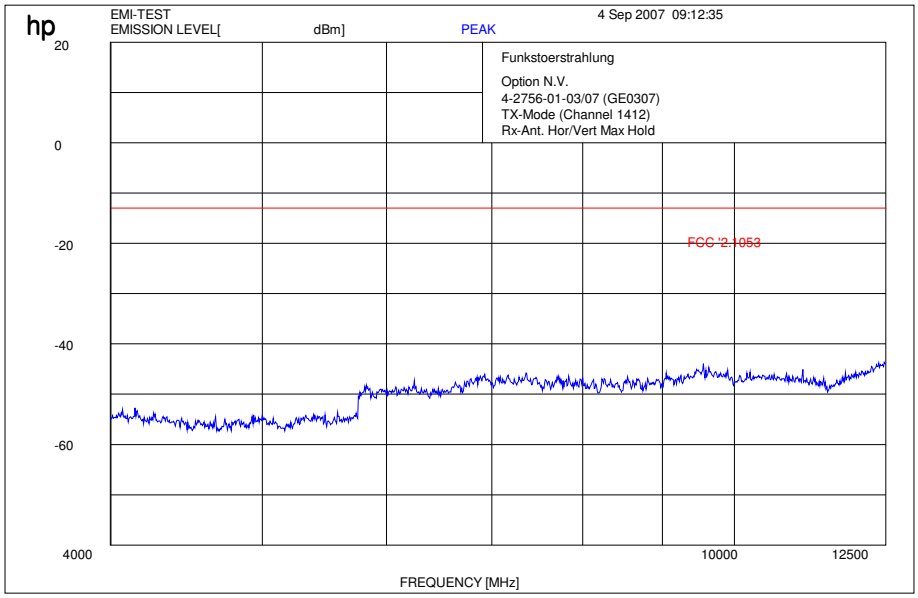
RBW/VBW: 100 kHz

Channel 1412 (1 GHz - 4 GHz)



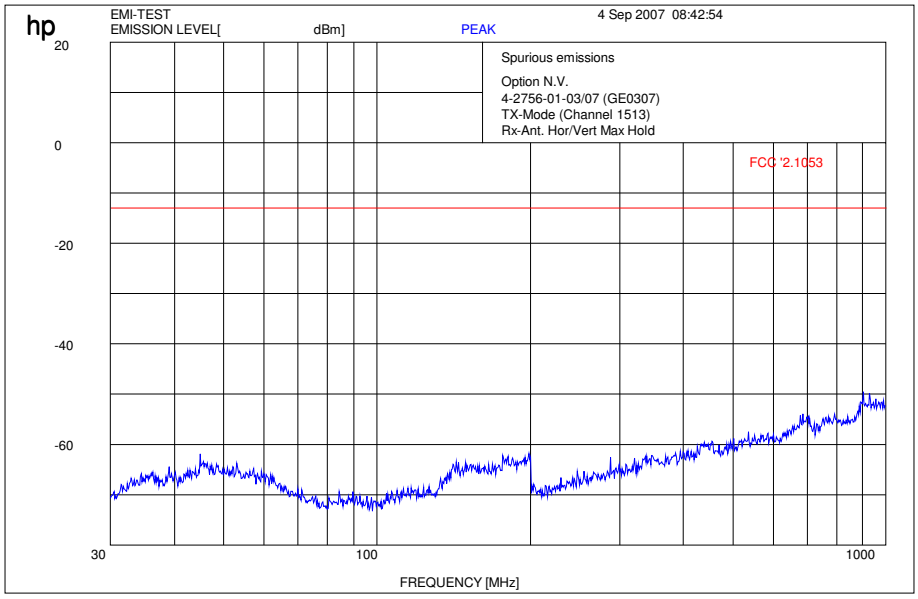
RBW / VBW 1 MHz

Channel 4180 (4 GHz – 12.5 GHz)



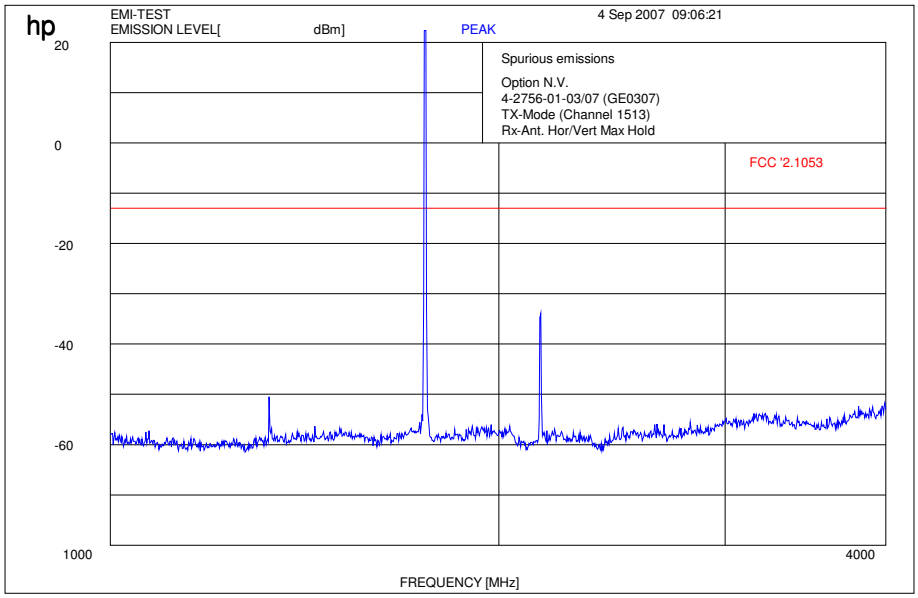
RBW / VBW 1 MHz

Channel 1513 (30 MHz - 1 GHz)



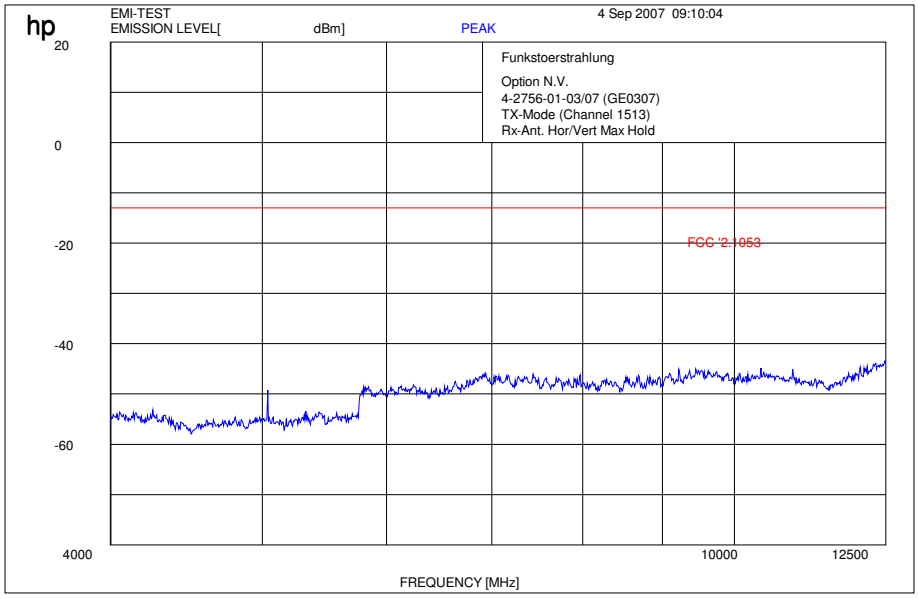
RBW/VBW: 100 kHz

Channel 1513 (1 GHz - 4 GHz)



RBW / VBW 1 MHz

Channel 1513 (4 GHz – 12.5 GHz)



RBW / VBW 1 MHz

5.1.6 Receiver Radiated Emissions

Reference

FCC:	CFR Part 15B

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 20 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber.
The receiving antennas are conform with specifications ANSI C63.2-1996 clause 15 and ANSI C63.4-2003 clause 4.1.5. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test set-ups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received.
The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.4-2003 clause 4.2.
Antennas are conform with ANSI C63.2-1996 item 15.
150 kHz - 30 MHz: Quasi Peak measurement, 9kHz Bandwidth, passive loop antenna.

30 MHz - 200 MHz: Quasi Peak measurement, 120KHz Bandwidth, biconical antenna
200MHz - 1GHz: Quasi Peak measurement, 120KHz Bandwidth, log periodic antenna
>1GHz: Average, RBW 1MHz, VBW 10 Hz, wave guide horn

All measurement settings are according to FCC 15.109 and 15.107

SPURIOUS EMISSIONS LEVEL (µV/m)								
Idle Mode								
f (MHz)	Detector	Level (µV/m)	f (MHz)	Detector	Level (µV/m)	f (MHz)	Detector	Level (µV/m)
No critical peaks found			-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
Measurement uncertainty			±3 dB					

f < 1 GHz : RBW/VBW: 100 kHz f ≥ 1GHz : RBW/VBW: 1 MHz

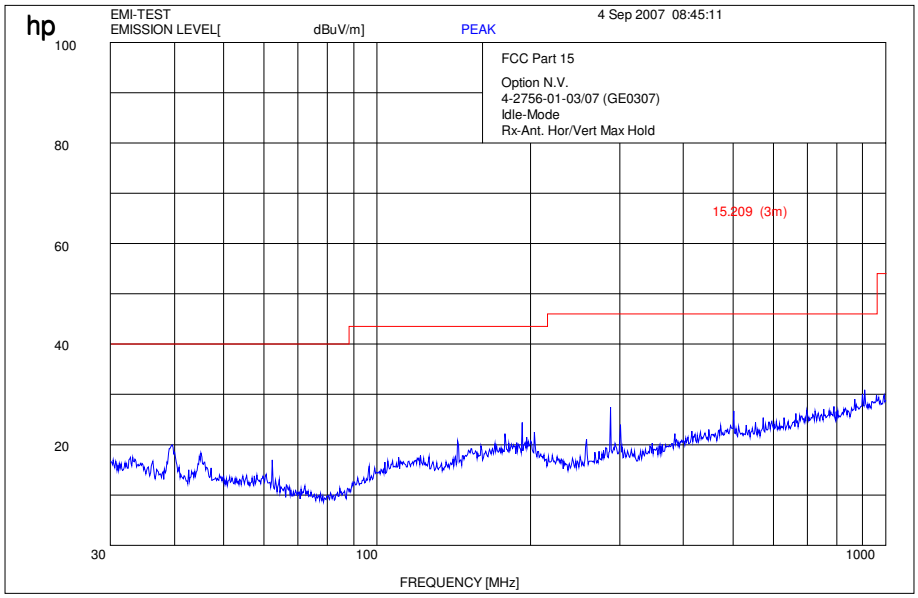
H = Horizontal; V= Vertical

Measurement distance see table

Limits: § 15.109

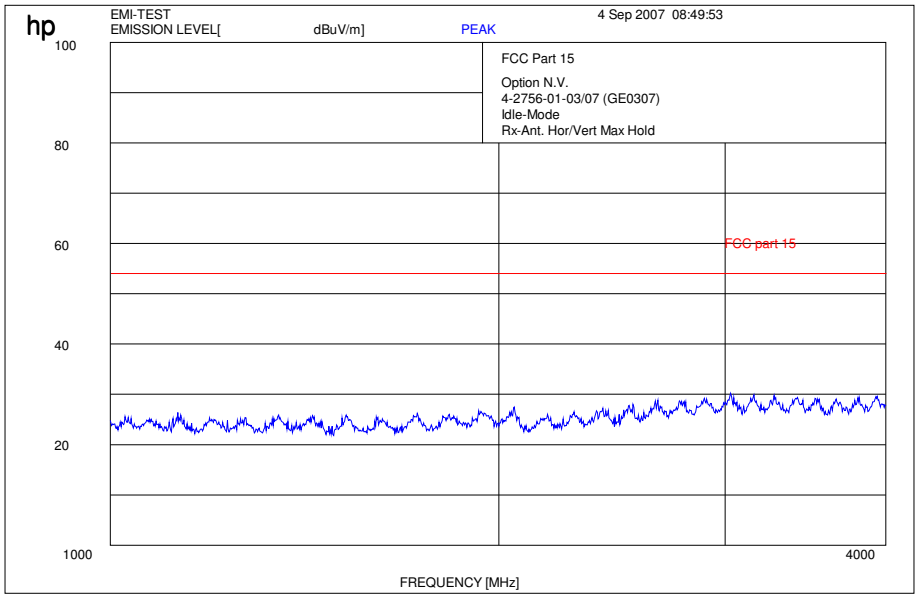
Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

Idle-Mode (30 MHz - 1 GHz)



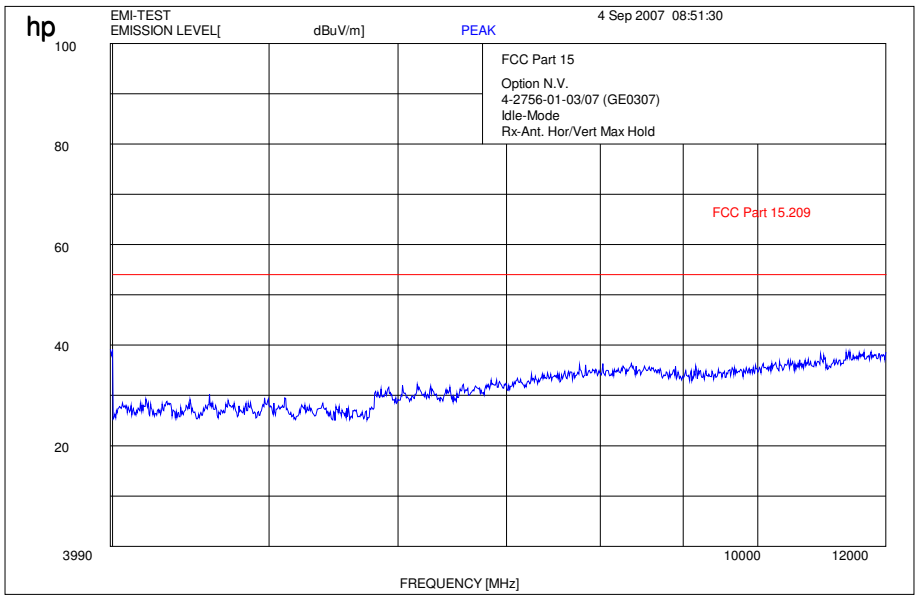
RBW/VBW: 100 kHz

Idle-Mode (1 GHz - 4 GHz)



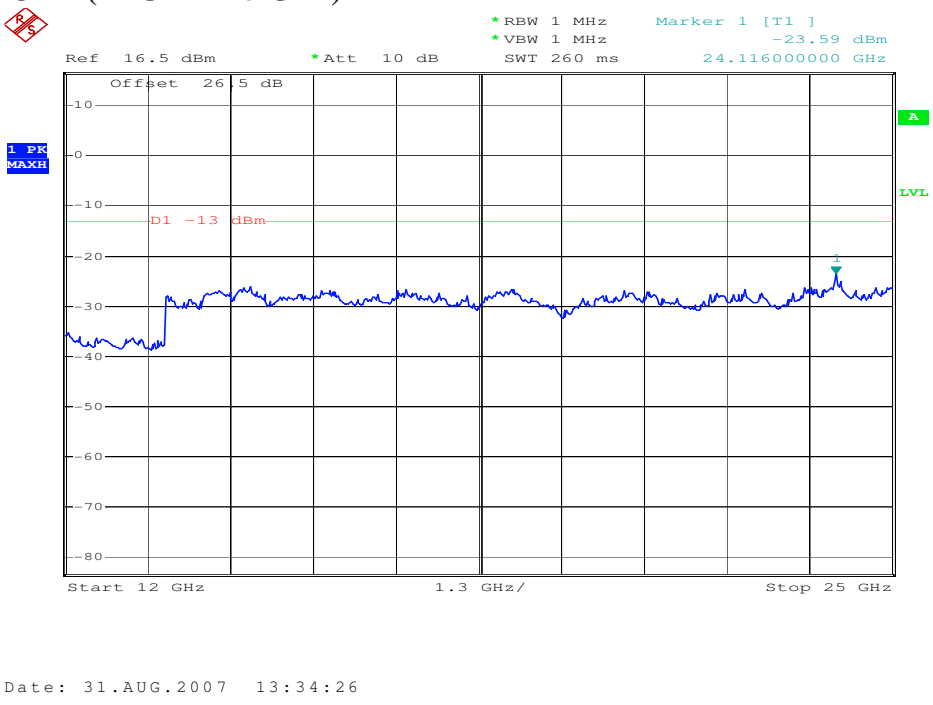
RBW / VBW 1 MHz

IDLE-MODE (4 GHz – 12.0 GHz)

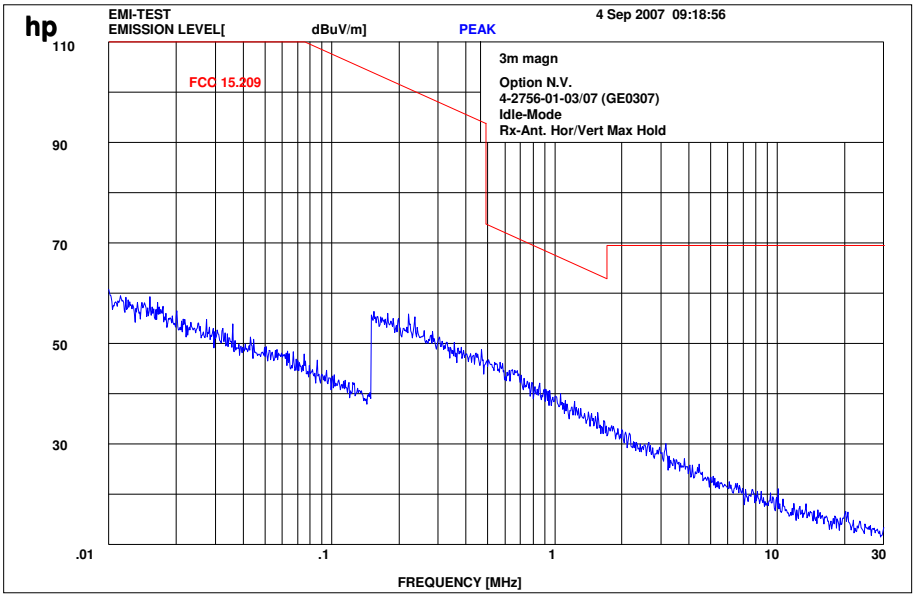


RBW / VBW 1 MHz

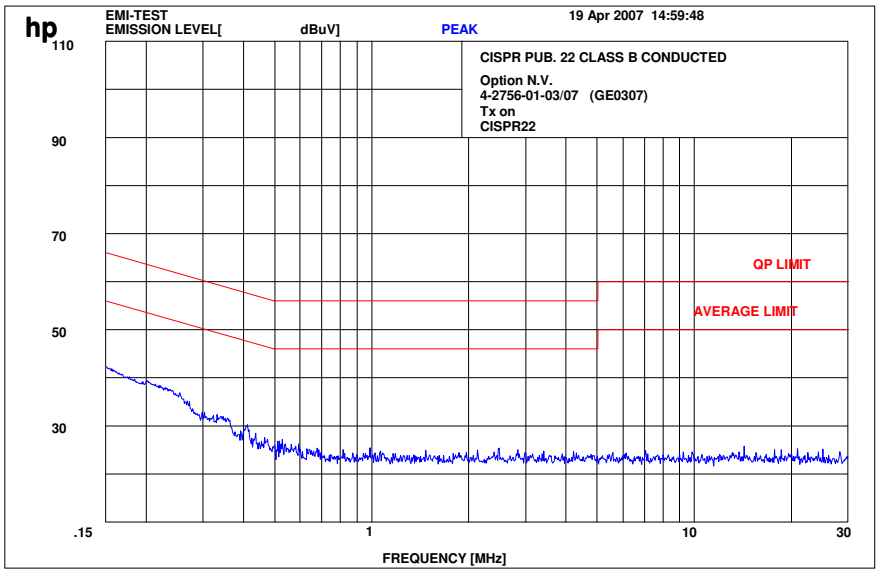
IDLE-MODE (12 GHz - 25 GHz)



IDLE-MODE (150 kHz - 30 MHz)



AC-Line conducted emissions



5.1.7 Conducted Spurious Emissions

Reference

FCC:	CFR Part 27.53(g), 2.1051

Measurement Procedure

The following steps outline the procedure used to measure the conducted emissions from the mobile station.
1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the mobile station equipment tested, this equates to a frequency range of 13 MHz to 19.1 GHz, data taken from 10 MHz to 20 GHz.
2. Determine mobile station transmits frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

UMTS Transmitter Channel Frequency
1312 1712.4 MHz
1412 1732.4 MHz
1513 1752.6 MHz

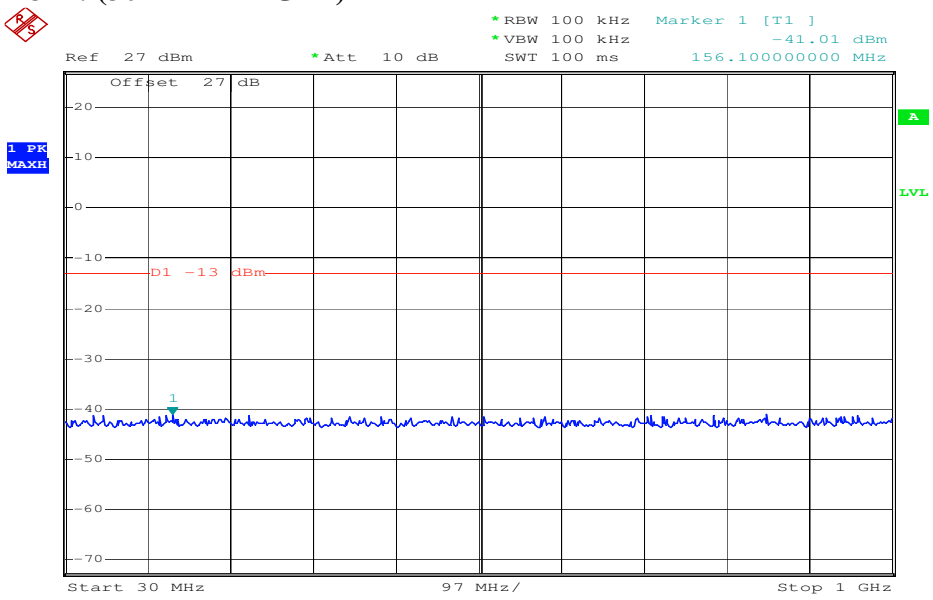
Measurement Limit

(a) On any frequency outside frequency band of the UMTS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log (P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

Measurement Results

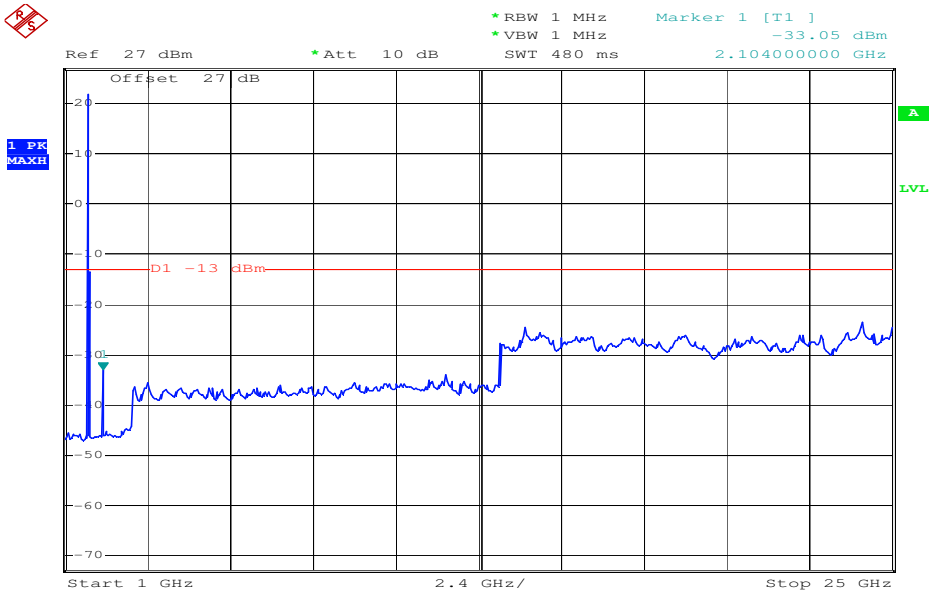
Harmonic	Tx ch.-1312 Freq. (MHz)	Level (dBm)	Tx ch.-1412 Freq. (MHz)	Level (dBm)	Tx ch.-1513 Freq. (MHz)	Level (dBm)
2	1712.4	-	1732.4	-	1752.6	-
3	3424.8	-	3464.8	-	3505.2	-
4	5137.2	-	5197.2	-	5257.8	-
5	6849.6	-	6929.6	-	7010.4	-
6	8562.0	-	8662.0	-	8763.0	-
7	10274.4	-	10394.4	-	10515.6	-
8	11986.8	-	12126.8	-	12268.2	-
9	13699.2	-	13859.2	-	14020.8	-
10	15411.6	-	15591.6	-	15773.4	-

Channel 1312: (30 MHz – 1 GHz)



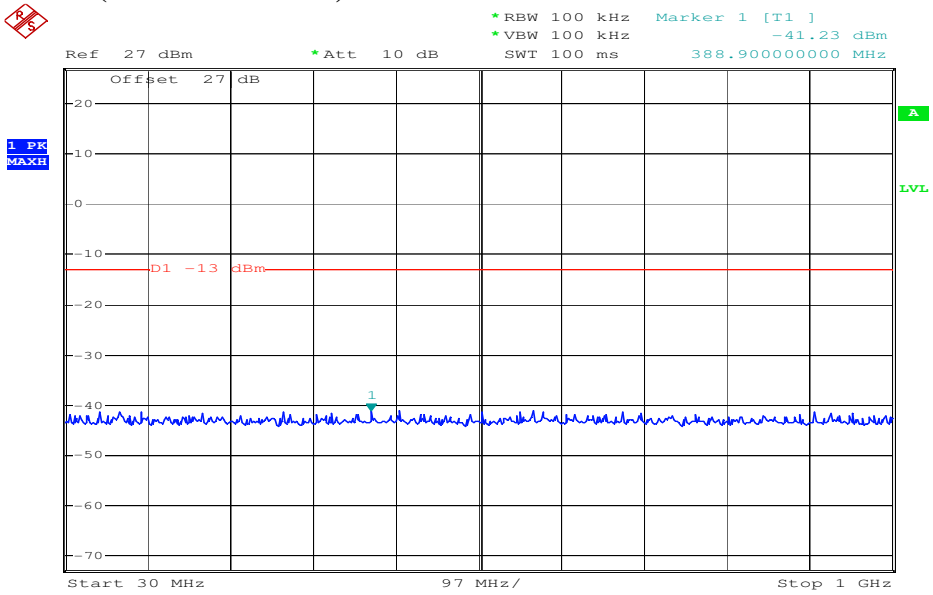
Date: 31.AUG.2007 09:30:32

Channel 4132: (1 GHz – 25 GHz)



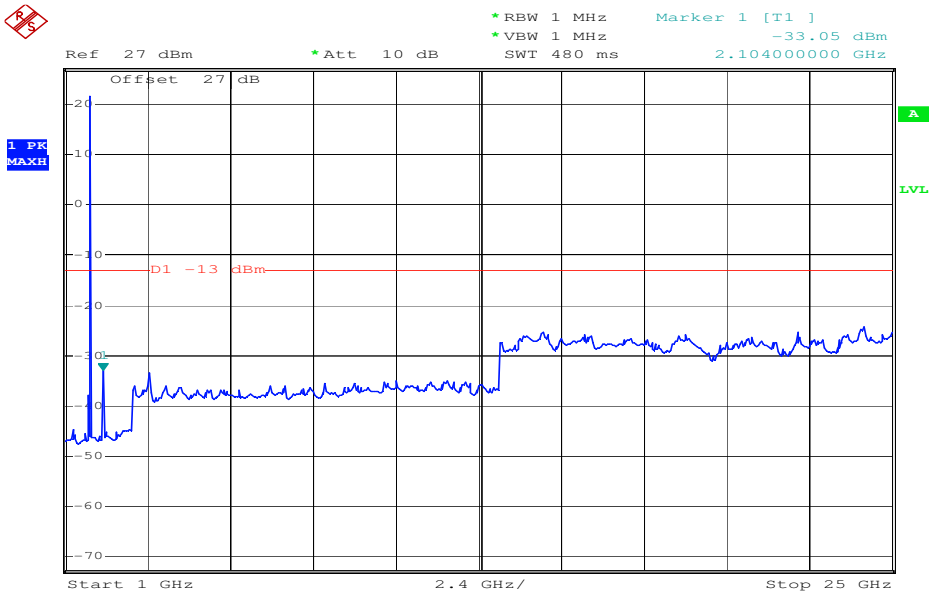
Date: 31.AUG.2007 09:42:37

Channel 1412: (30 MHz – 1 GHz)



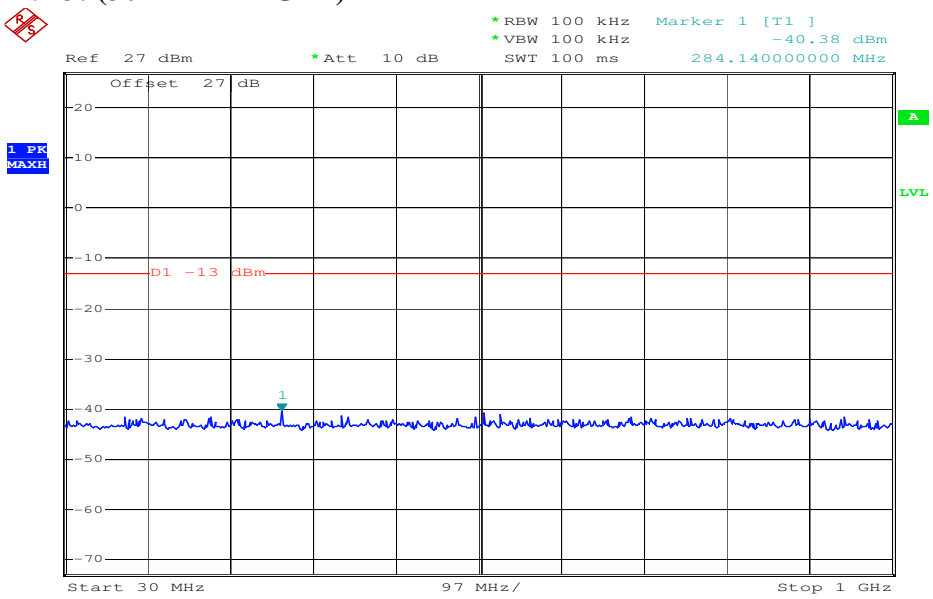
Date: 31.AUG.2007 09:32:33

Channel 1412: (1 GHz – 25 GHz)



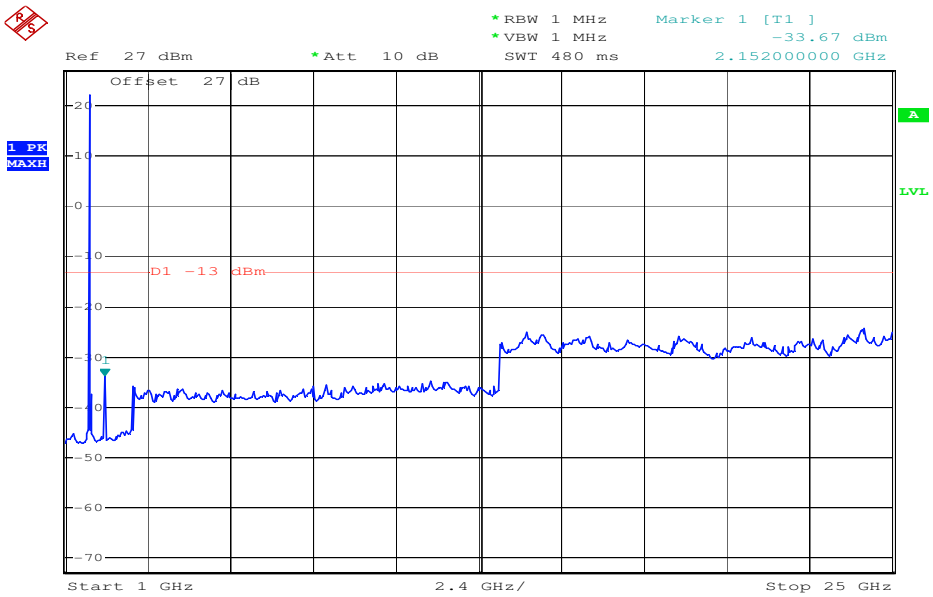
Date: 31.AUG.2007 09:41:25

Channel 1513: (30 MHz – 1 GHz)



Date: 31.AUG.2007 09:35:06

Channel 1513: (1 GHz – 25 GHz)



Date: 31.AUG.2007 09:39:52

5.1.8 Block Edge Compliance

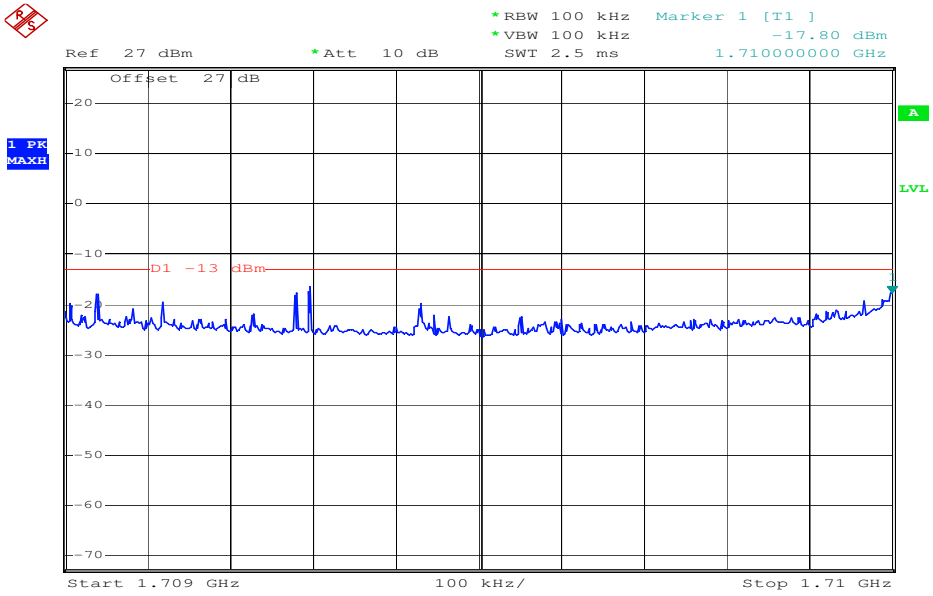
Reference

FCC:	CFR Part 27.53(g), 2.1051

Measurement Limit:

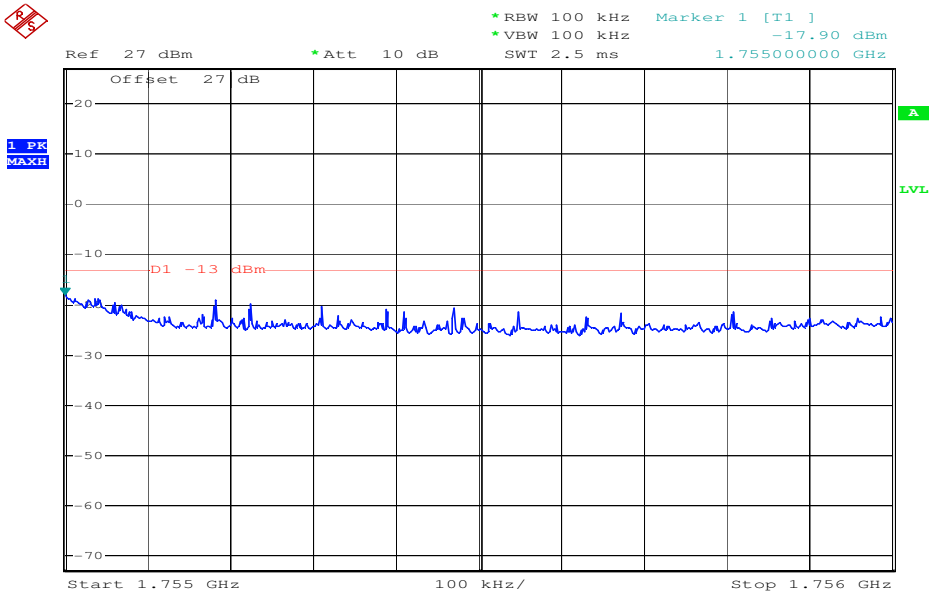
Sec. 27.53(g) Emission Limits.
(a) On any frequency outside frequency band of the UMTS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log(P) dB. For all power levels +33 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

Channel 1312



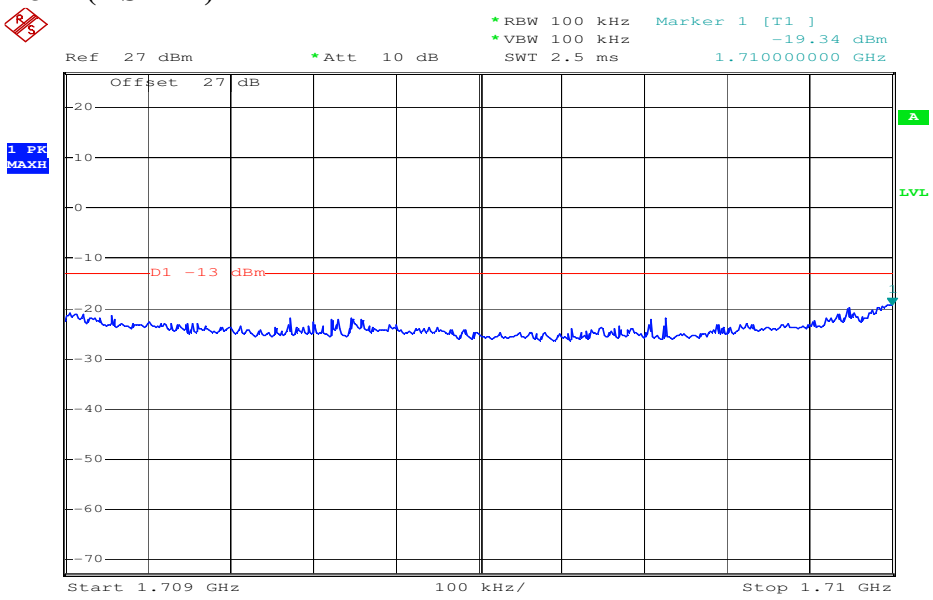
Date: 31.AUG.2007 12:10:34

Channel 1513



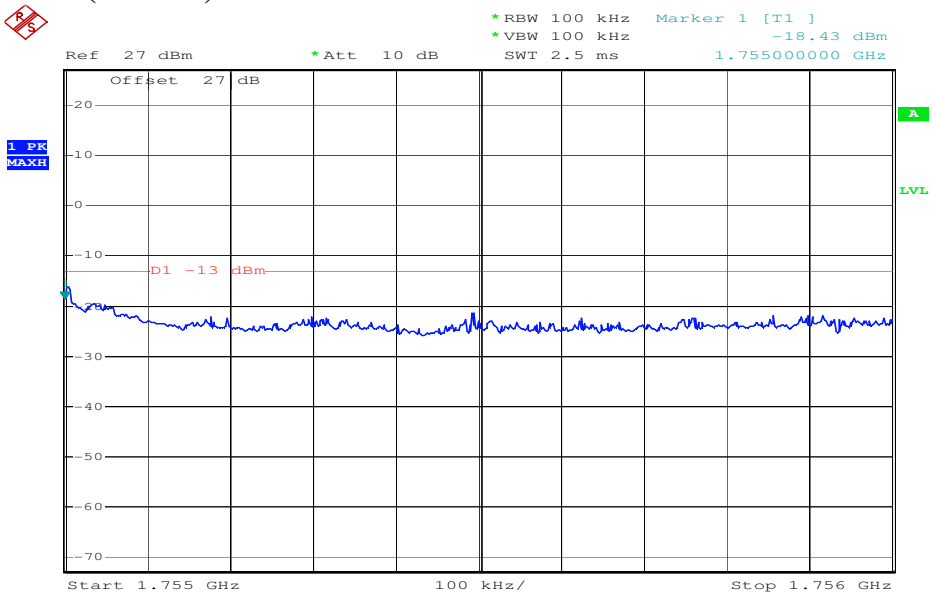
Date: 31.AUG.2007 12:11:29

Channel 1312 (HSDPA)



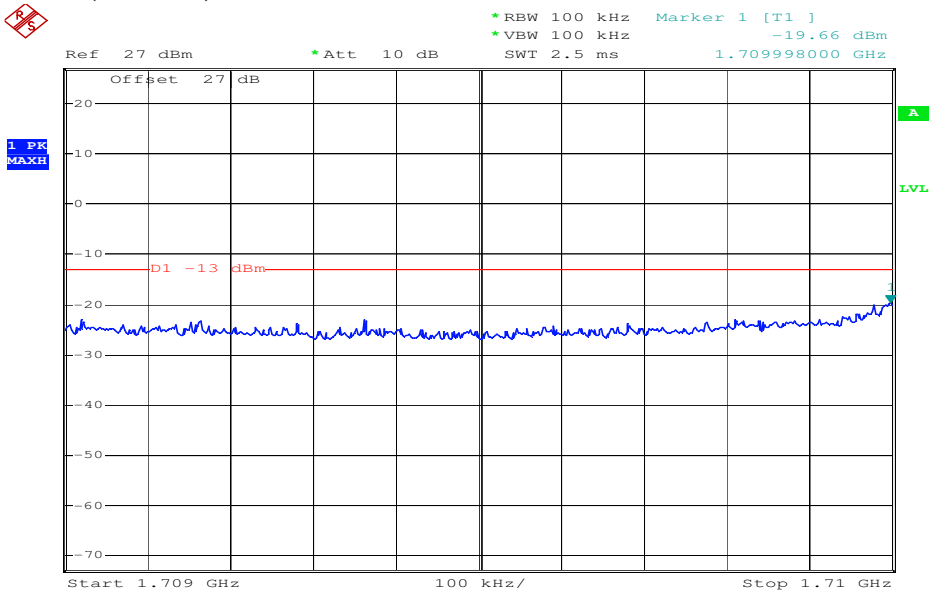
Date: 31.AUG.2007 11:54:31

Channel 1513 (HSDPA)



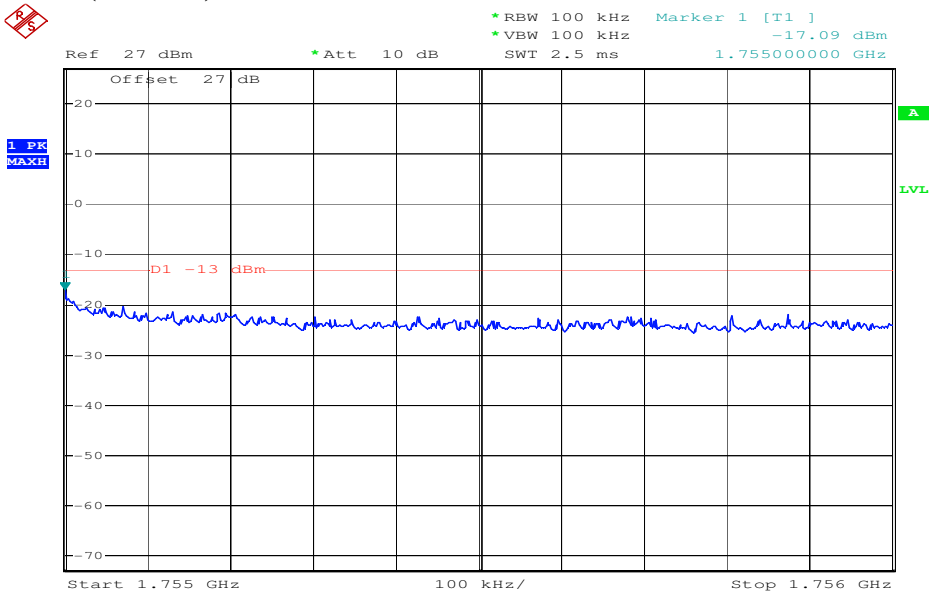
Date: 31.AUG.2007 11:53:15

Channel 1312 (HSUPA)



Date: 31.AUG.2007 11:57:51

Channel 1513 (HSUPA)



Date: 31.AUG.2007 11:59:53

5.1.9 Occupied Bandwidth

Reference

FCC:	CFR Part 27.53(g)(1), 2.1049

Occupied Bandwidth Results

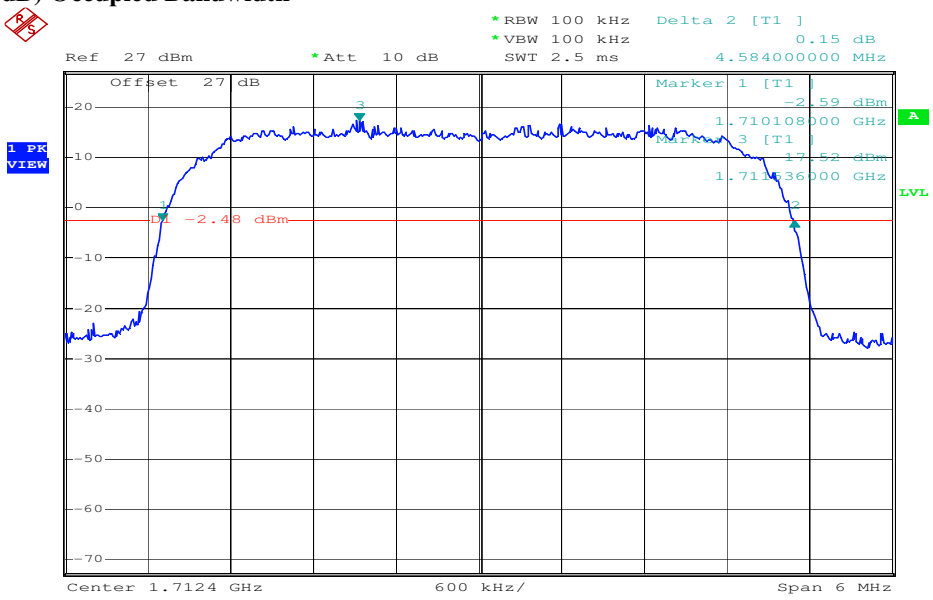
Similar to conducted emissions, occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the UMTS frequency band. Table below lists the measured 99% power and -26dBC occupied bandwidths. Spectrum analyzer plots are included on the following pages.

Normal mode

Frequency	99% Occupied Bandwidth (kHz)	-26 dBc Bandwidth (kHz)
1712.4 MHz	4584	4692
1732.4 MHz	4584	4692
1752.6 MHz	4584	4692

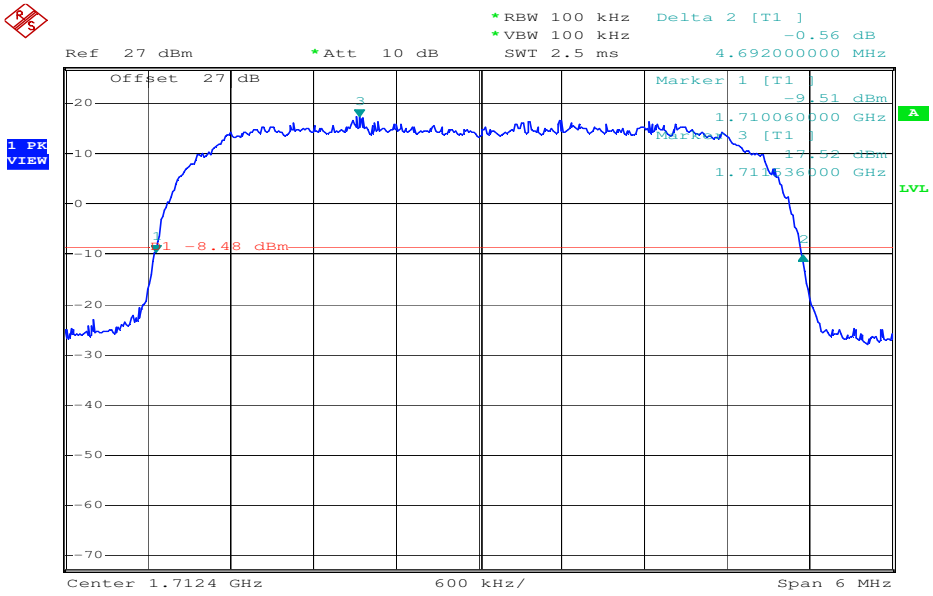
Part 27 requires a measurement bandwidth of at least 1% of the occupied bandwidth. For ca. 5 MHz, this equates to a resolution bandwidth of at least 50 kHz. For this testing, a resolution bandwidth 100 kHz was used.

Channel 1312
99% (-20 dB) Occupied Bandwidth



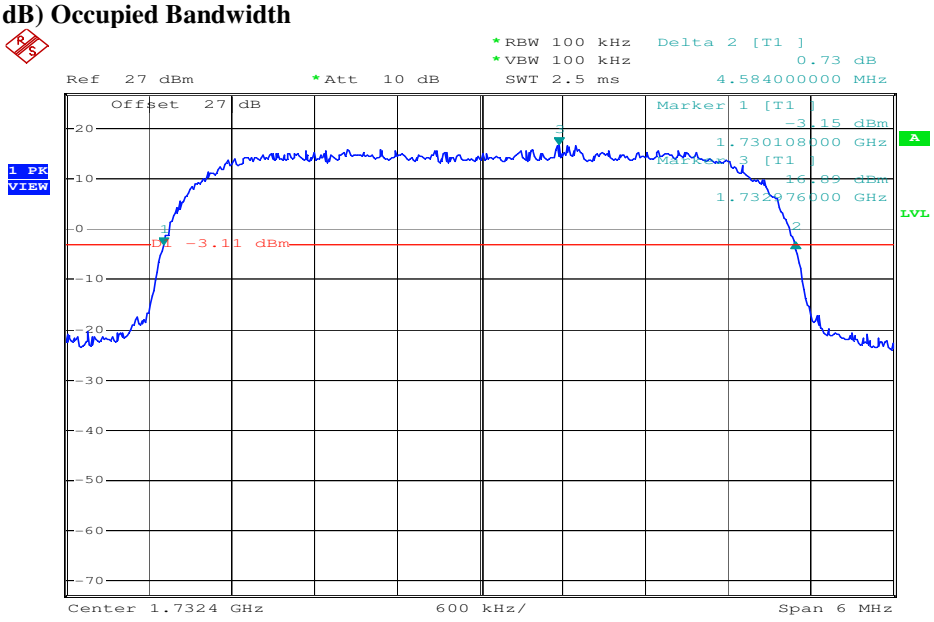
Date: 31.AUG.2007 13:01:47

Channel 1312
-26 dBc Bandwidth



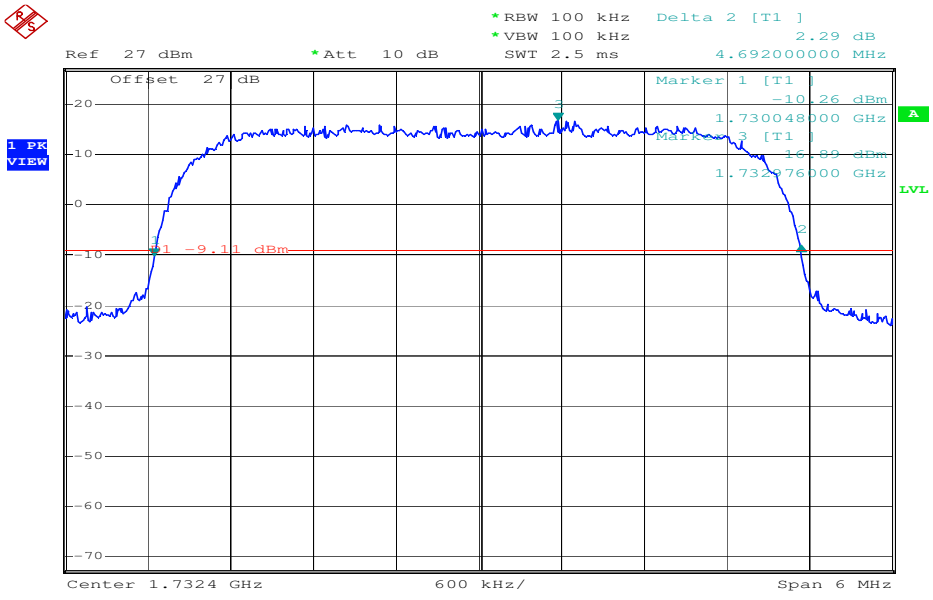
Date: 31.AUG.2007 13:02:27

Channel 1412
99% (-20 dB) Occupied Bandwidth



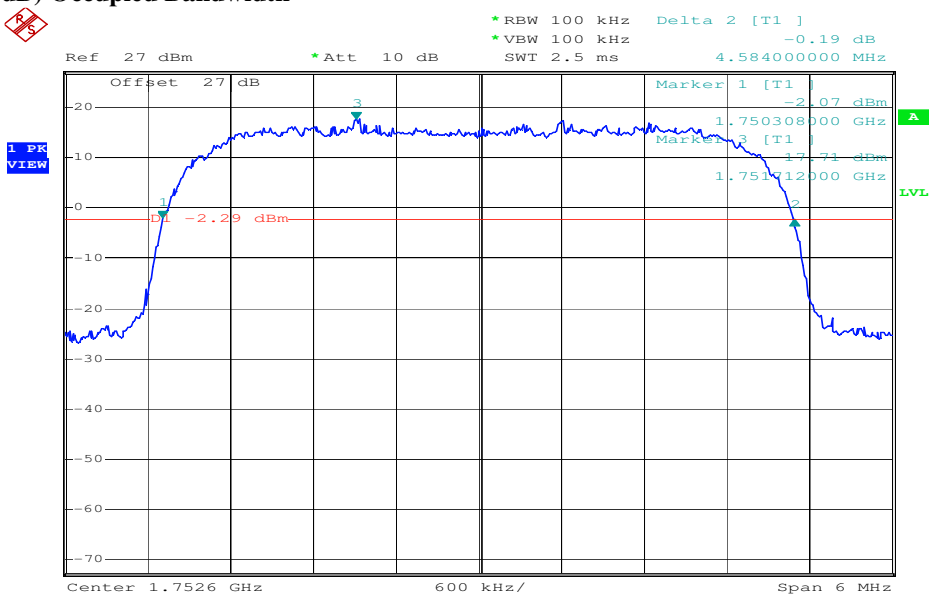
Date: 31.AUG.2007 12:59:34

Channel 1412
-26 dBc Bandwidth



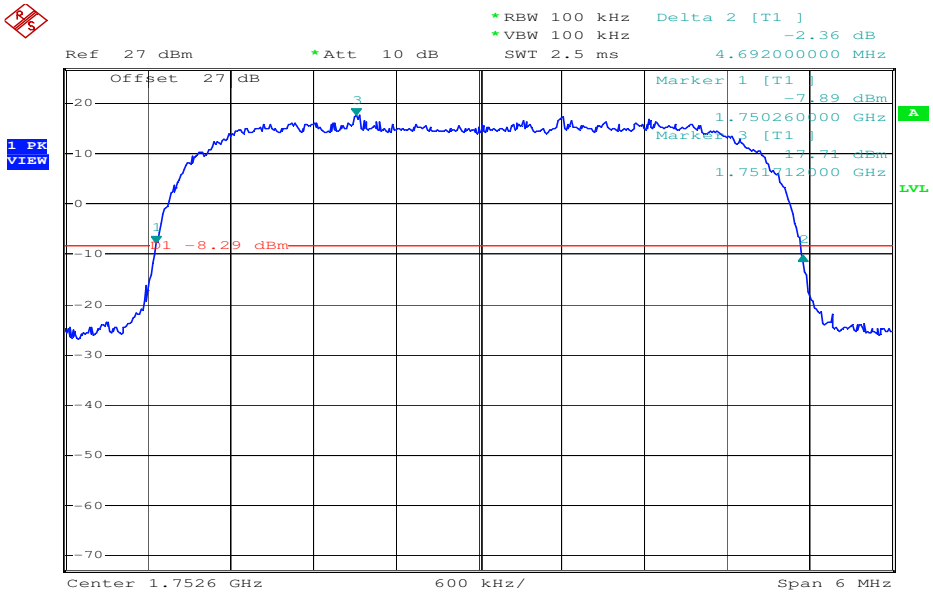
Date: 31.AUG.2007 13:00:13

Channel 1513
99% (-20 dB) Occupied Bandwidth



Date: 31.AUG.2007 12:55:43

Channel 1513
-26 dBc Bandwidth



Date: 31.AUG.2007 12:56:43

6 Test equipment and ancillaries used for tests

To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

Anechoic chamber C:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	Anechoic chamber	MWB	87400/02	300000996	Monthly verification		
2	System-Rack 85900	HP I.V.	*	300000222	n.a.		
3	Measurement System 1						
4	Spektrum Analyzer 8566B	HP	2747A05306	300001000	05.10.2006	24	05.10.2008
5	Spektrum Analyzer Display 85662A	HP	2816A16541	300002297	05.10.2006	24	05.10.2008
6	Quasi-Peak-Adapter 85650A	HP	2811A01131	300000999	05.10.2006	24	05.10.2008
7	RF-Preselector 85685A	HP	2837A00779	300000218	08.11.2006	24	08.11.2008
8	PC Vectra VL	HP		300001688	n.a.		
9	Software EMI	HP		300000983	n.a.		
10	Measurement System 2						
11	FSP 30	R&S	100623	ICT 300003464	26.10.2006	12	26.10.2007
12	PC	F+W			n.a.		
13	TILE	TILE			n.a.		
14	Biconical antenna	EMCO	S/N: 860 942/003		Monthly verification (System cal.)		
15	Log. Period. Antenna 3146	EMCO	2130	300001603	Monthly verification (System cal.)		
16	Double Ridged Antenna HP 3115P	EMCO	3088	300001032	Monthly verification (System cal.)		
17	Active Loop Antenna 6502	EMCO	2210	300001015	Monthly verification (System cal.)		
18	Power Supply 6032A	HP	2818A03450	300001040	12.05.2007	36	12.05.2010
19	Busisolator	Kontron		300001056	n.a.		
20	Leitungsteiler 11850C	HP		300000997	Monthly verification (System cal.)		
21	Power attenuator 8325	Byrd	1530	300001595	Monthly verification (System cal.)		
22	Band reject filter WRCG1855/1910	Wainwright	7	300003350	Monthly verification (System cal.)		
23	Band reject filter WRCG2400/2483	Wainwright	11	300003351	Monthly verification (System cal.)		

Bluetooth Rack:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	FSP 30	R&S		300003575	02.04.2007	24	02.04.2009
2	CBT	R&S	100313	300003516	24.10.2006	24	24.10.2008
3	Switch Matrix	HP		300000929	n.a.		
4	Power Supply	HP	3041A00544	300002270	13.05.2007	36	13.05.2010
5	Signal Generator	R&S	836206/0092	300002680	30.05.2007	36	30.05.2010

Signaling Units:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	CBT	R&S	100313	300003516	24.10.2006	24	24.10.2008
2	CBT	R&S	100185	300003416	21.02.2006	24	21.02.2008
3	CMU-200	R&S	103992	300003231	27.04.2007	12	27.04.2008
4	CMU-200	R&S	106240	300003321	02.05.2006	24	02.05.2008

SRD Laboratory Room 005:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	Spektrum Analyzer 8566B	HP	2747A05275	300000219	08.11.2006	24	08.11.2008
2	Spektrum Analyzer Display 85662A	HP	2816A16497	300001690	08.11.2006	24	08.11.2008
3	Quasi-Peak-Adapter 85650A	HP	2811A01135	300000216	08.11.2006	24	08.11.2008
4	Power Supply	Heiden	003202	300001187	12.05.2007	36	12.05.2010
5	Power Supply	Heiden	1701	300001392	12.05.2007	36	12.05.2010