

CETECOM ICT Services GmbH

Radio Satellite Communication

Untertürkheimer Straße 6-10 . D-66117 Saarbrücken

Telefon: +49 (0)681 598-9100

Telefax: -9075

RSC11

issue test report consist of 154 Pages

Page 1 (154)

Recognized by the
Federal Communications Commission
FCC-Identification Number: 90462
TCB ID: DE 0001



Accredited by the
German Accreditation Council
DAR-Registration Number
TTI-P-G 166/98



Independent ETSI
compliance test house



Accredited Bluetooth™ Test Facility (BQTF)

Test report no.: 2_3404-01-01/03

FCC Part 24/22/15

ONE Touch 331a

FCC ID: RAD002

CETECOM – ICT Services GmbH

Untertürkheimerstr. 6-10

66117 Saarbrücken, Germany

Telephone: + 49 (0) 681 / 598-0

Fax: + 49 (0) 681 / 598-9075

Table of Contents

1 General information

- 1.1 Notes
- 1.2 Testing laboratory
- 1.3 Details of applicant
- 1.4 Application details
- 1.5 Test item
- 1.6 Test standards

2 Technical test

- 2.1 Summary of test results
- 2.2 Test report

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 generalizations 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.

1.2 Testing laboratory

CETECOM ICT Services GmbH

Untertürkheimer Straße 6 - 10

66117 Saarbrücken

Germany

Telephone : + 49 681 598 - 9100

Telefax : + 49 681 598 - 9075

E-mail : Harro.Ames@ict.cetecom.de

Internet : www.cetecom-ict.de

Accredited testing laboratory

The Test laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025.

DAR registration number: TTI-P-G-166/98

Listed by : Federal Communications Commission (FCC)

Identification/Registration No : 90462

Accredited BluetoothTM Test Facility (BQTF)

BLUETOOTHTM is a trademark owned by Bluetooth SIG, Inc. and licensed to CETECOM

1.3 Details of applicant

Name : ALCATEL BUSINESS SYSTEMS
Street : 32 avenue Kleber
City : 92707 Colombes
Country : France
Telephone : +33 1 55 66 32 20
Telefax : + 33 1 55 66 64 02
Contact : Mr. Jean Fleuriot
Telephone : +33 1 55 66 32 20
E-mail : jean.fleuriot@alcatel.fr

1.4 Application details

Date of receipt of application : 2003-10-16
Date of receipt of test item : 2003-10-16
Date of test : 2003-10-16 to 2003-10-17

1.5 Test item

Type of equipment : **Dual Band GSM Mobile Phone (PCS 850/1900 MHz)**
Type designation : One Touch 331a
Manufacturer : Applicant
Street :
City :
Country :
Serial number : IMEI : 330587.53.387429.0

Additional informations:

Frequency : 1850.2 – 1909.8 MHz and 824.2 – 848.8 MHz
Type of modulation : 300KGXW
Number of channels : 300 (PCS1900) and 125 (PCS850)
Antenna : Integral antenna
Power supply : 3,7V DC NiMH
Output power GSM 850 : cond.: 32.70 dBm Peak , ERP: 28.8 dBm (Burst);
EIRP: 30.9 dBm (Burst)
Output power GSM 1900 : cond : 30.0 dBm Peak , ERP: 29.8 dBm (Burst);
EIRP: 31.9 dBm (Burst)
Type of equipment : Temperature range : -30°C - +60°C
FCC – ID : **RAD002**
IC : -
Hardware : 01
Software : 00

1.6 Test standards: **FCC Part 24, 22**
 FCC Part 15

2 Technical test

For Part 24/22 we use the substitution method (TIA/EIA 603).

Measurements were performed with vertical and horizontal polarisation and max hold function. Maximum peaks were found at vertical setting. This is valid for GSM 850 and for GSM 1900.

All measurements in this report are done in GSM mode.

2.1 Technical details

We had some accessories for the mobile to test according to FCC part15.

- Charger SR Leader 220V 3DS 09371AAAA
- Charger SR ASTEC 220V 3DS 09371AAAA
- Charger SR Leader 110V 3DS 09371AGAA
- Charger SR ASTEC 110V 3DS 09371AGAA
- Travel charger 220 / 110V 3DS08217AAAA
- Headset Leemax 3DS 07855AAAA
- Headset Merry 3DS 07855AAAA
- Headset Innovi 3DS 07855AAAA
- SMS Keyboard 3DS 07237AAAA
- Cigar lighter charger 3DS 07848AAAA
- Handsfree Car Kit Primax MP86

So we made different setups for testing

- Setup1: Mobile with charger SR Leader 220V and keyboard
- Setup2: Mobile with charger SR ASTEC 220V and headset Merry
- Setup3: Mobile with Travel charger and headset Innovi
- Setup4: Mobile with charger SR Leader 110V and headset Leemax
- Setup5: Mobile with charger SR ASTEC 110V and keyboard
- Setup 6: Mobile with cigar lighter charger and headset Leemax
- Setup7: Mobile with car kit Primax

We did the radiated measurements above 30 MHz for GSM 850 and GSM 1900 with Setup1.

Magnetic measurements were made with each setup,

AC conducted measurements were made with setup1 to setup5.

2.2 Summary of test results

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

FINAL VERDICT: PASS

Technical responsibility for area of testing :

2003-10-20 RSC 8414 Ames H.



Date

Section

Name

Signature

Technical responsibility for area of testing :

2003-10-20 RSC8412 Hausknecht D.



Date

Section

Name

Signature

2.3 Test report

TEST REPORT

Test report no. : 2_3404-01-01/03

TEST REPORT REFERENCE

PARAMETER TO BE MEASURED	PAGE
<u>Part 24 PCS 1900</u>	9
POWER OUTPUT SUBCLAUSE § 24.232	9
FREQUENCY STABILITY SUBCLAUSE § 24.235	11
AFC FREQ ERROR vs. VOLTAGE	12
AFC FREQ ERROR vs. TEMPERATURE	12
EMISSIONS LIMITS §24.238	14
CONDUCTED SPURIOUS EMISSIONS	27
BLOCK EDGE COMPLIANCE FOR BLOCK A AND C	36
OCCUPIED BANDWIDTH §2.989	38
<u>PART PCS850</u>	45
POWER OUTPUT SUBCLAUSE § 24.232	45
FREQUENCY STABILITY SUBCLAUSE § 24.235	47
AFC FREQ ERROR vs. VOLTAGE	48
AFC FREQ ERROR vs. TEMPERATURE	48
EMISSIONS LIMITS §24.238	50
CONDUCTED SPURIOUS EMISSIONS	62
OCCUPIED BANDWIDTH §2.989	71
EMISSION LIMITATIONS FOR CELLULAR §22.917(F)	78
CONDUCTED EMISSIONS § 15.107/207	86
RADIATED EMISSIONS § 15.109/209	92

TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS	130
TEST SETUP	132
Photographs of the equipment	135

POWER OUTPUT**SUBCLAUSE § 24.232****Summary:**

This paragraph contains both average , peak output powers and EIRP measurements for the mobile station. 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 mobile 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)

This measurements were done at 3 frequencies, 1850,2 MHz, 1880,0 MHz and 1909,8 MHz (bottom, middle and top of operational frequency range)

Limits:

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

Power Measurements:**Conducted:**

Frequency (MHz)	Power Step	Peak Output Power (dBm)	Average Output Power (dBm)
1850.2	0	29.90	29.76
1880.0	0	30.01	29.82
1909.8	0	29.23	29.05
Measurement uncertainty		±0.5 dB	

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

EIRP Measurements

Description: This is the test for the maximum radiated power from the phone.

Rule Part 24.232(b) specifies that "Mobile/portable stations are limited to 2 watts e.i.r.p. peak power..." and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

Method of Measurement:

1. In an anechoic antenna test chamber, a half-wave dipole antenna for the frequency band of interest is placed at the reference center of the chamber. An RF Signal source for the frequency band of interest is connected to the dipole with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A known (measured) power (Pin) is applied to the input of the dipole, and the power received (Pr) at the chamber's probe antenna is recorded.
2. A "reference path loss" is established as $Pin + 2.1 - Pr$.
3. The EUT is substituted for the dipole at the reference centre of the chamber. The EUT is put into CW test mode and a scan is performed to obtain the radiation pattern.
4. From the radiation pattern, the co-ordinates where the maximum antenna gain occurs is identified.
5. The EUT is then put into pulse mode at its maximum power level (Power Step 0).
6. "Gated mode" power measurements are performed with the receiving antenna placed at the co-ordinates determined in Step 3 to determine the output power as defined in FCC Rule 24.232 (b) and (c). The "reference path loss" from Step 1 is added to this result.
7. This value is EIRP since the measurement is calibrated using a half-wave dipole antenna of known gain (2.1 dBi) and known input power (Pin).
8. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.1 \text{ dBi}$.

Limits:

Power Step	Burst EIRP (dBm)
0	<33

Power Measurements:

Radiated:

Frequency (MHz)	Power Step	BURST Peak (dBm)		MODULATION AVERAGE (dBm)	
		EIRP	ERP	EIRP	ERP
1850.2	0	31.94	29.84	22.94	20.84
1880.0	0	31.42	29.32	22.42	20.32
1909.8	0	30.27	28.17	21.27	19.17
Measurement uncertainty		±3 dB			

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

FREQUENCY STABILITY

SUBCLAUSE § 24.235

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 3.6 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 3.6 Volts. Vary supply voltage from minimum 3.3 Volts to maximum 4.4 Volts, in 12 steps re-measuring carrier frequency at each voltage. Pause at 3.7 V dc 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.

Measurement Limit:

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.. This transceiver is specified to operate with an input voltage of between 3.3 V dc and 4.4 V dc, with a nominal voltage of 3.6 V dc.

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

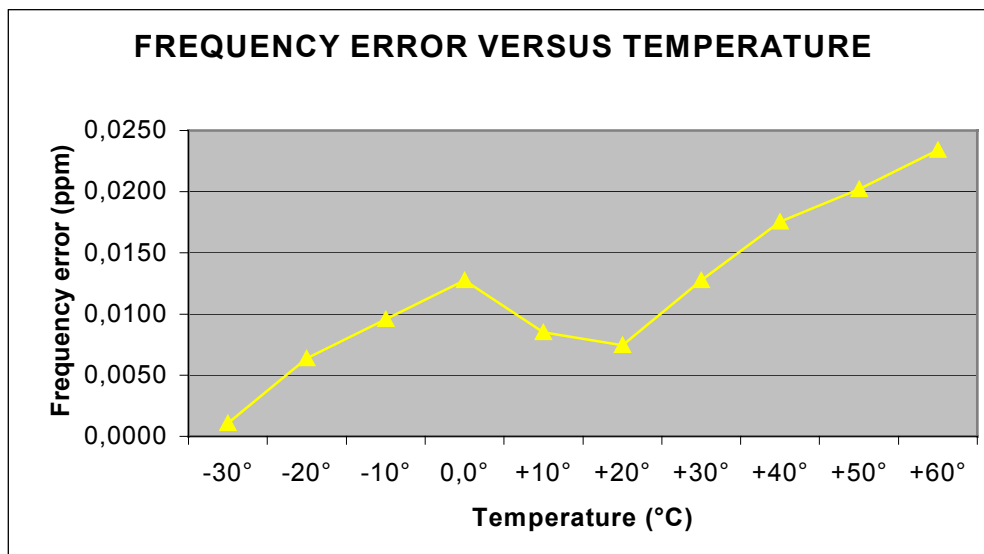
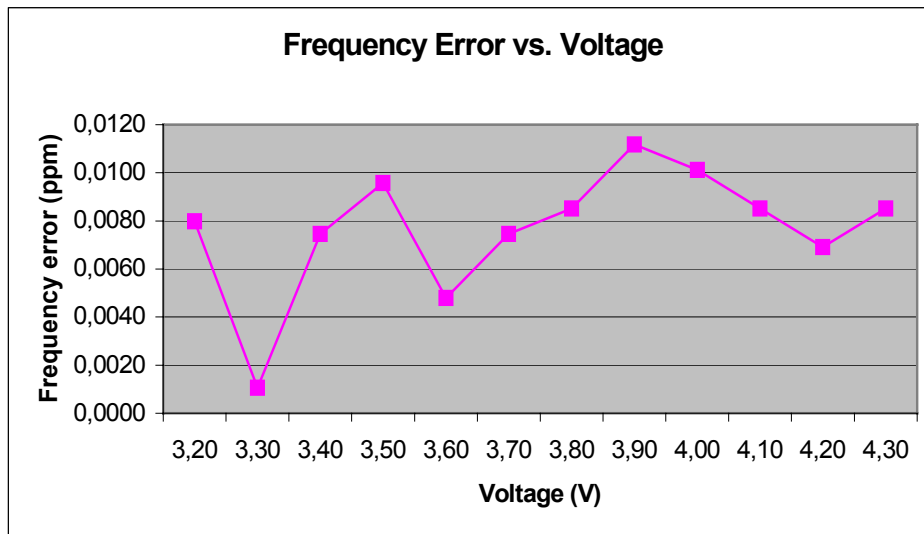
AFC FREQ ERROR vs. VOLTAGE

Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
3.2	n.a.		
3.3	15	0,00000080	0,0080
3.4	2	0,00000011	0,0011
3.5	14	0,00000074	0,0074
3.6	18	0,00000096	0,0096
3.7	9	0,00000048	0,0048
3.8	14	0,00000074	0,0074
3.9	16	0,00000085	0,0085
4.0	21	0,00000112	0,0112
4.1	19	0,00000101	0,0101
4.2	16	0,00000085	0,0085
4.3	13	0,00000069	0,0069
4.4	16	0,00000085	0,0085

AFC FREQ ERROR vs. TEMPERATURE

TEMPERATURE (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
-30	2	0,00000011	0,0011
-20	12	0,00000064	0,0064
-10	18	0,00000096	0,0096
±0.0	24	0,00000128	0,0128
+10	16	0,00000085	0,0085
+20	14	0,00000074	0,0074
+30	24	0,00000128	0,0128
+40	33	0,00000176	0,0176
+50	38	0,00000202	0,0202
+60	44	0,00000234	0,0234

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

EMISSIONS LIMITS

§24.238

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 – 1992 requirements and is recognised 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 1910 MHz. This was rounded up to 20 GHz. The resolution bandwidth is set as outlined in Part 24.238. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the USPCS 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 waveguide 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 1 MHz bandwidth. If the harmonic could not be detected above the noise floor, the ambient level was recorded.
- e) Now each detected emissions were substituted by the Substitution method, in accordance with the TIA/EIA 603.

Measurement Limit:

Sec. 24.238 Emission Limits.

(a) 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 $43 + 10 \log(P)$ 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 USPCS band (1850.2 MHz, 1879.8 MHz and 1909.8 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 USPCS 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.

RESULTS OF OPEN FIELD RADIATED TEST FOR FCC-24:

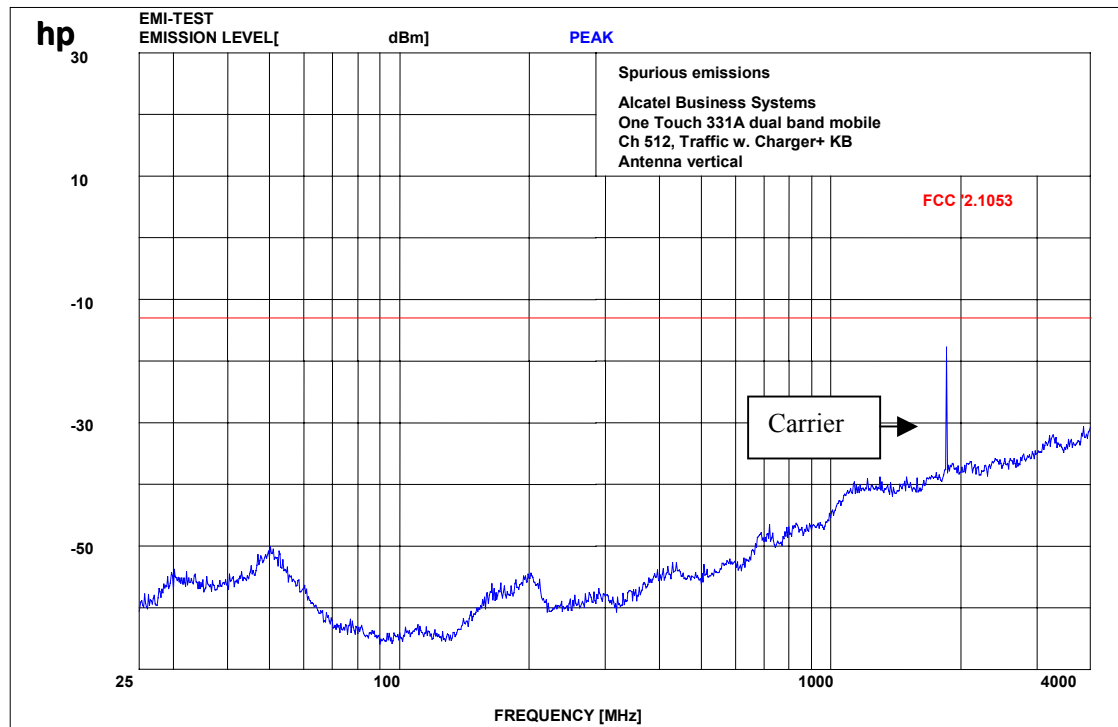
The final open field radiated levels are presented on the next pages.

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.

RESULTS OF OPEN FIELD RADIATED TEST FOR FCC-24:

EMISSION LIMITATIONS					
f (MHz)		amplitude of emission (dBm)	limit max. allowed emmission power (dBm)	actual attenuation below frequency of operation (dBc)	results
CH 512					
1850.2		31.94	-13.0 (44.94 dBc)		carrier
no other traceable signal found					
CH 661					
1880.0		31.42	-13.0 (44.42 dBc)		carrier
No other traceable signal found					
CH 810					
1909.8		30.27	-13.0 (43.27 dBc)		carrier
3820.2		-26.42		59.69	complies
No other traceable signal found					
Measurement uncertainty		± 0.5dB			

Channel 512 (up to 4 GHz)



$f < 1 \text{ GHz}$: RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$: RBW / VBW 1 MHz

Carrier suppressed with a rejection filter

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17 – 24; 64

EMI-TEST
EMISSION LEVEL[
dBm]

PEAK

Funkstoerstrahlung
Alcatel Business Systems
One Touch 331A dual band mobile
Ch 512, Traffic w. Charger+ KB
Antenna vertical

20
0
-20
-40
-60
4000 10000 12500

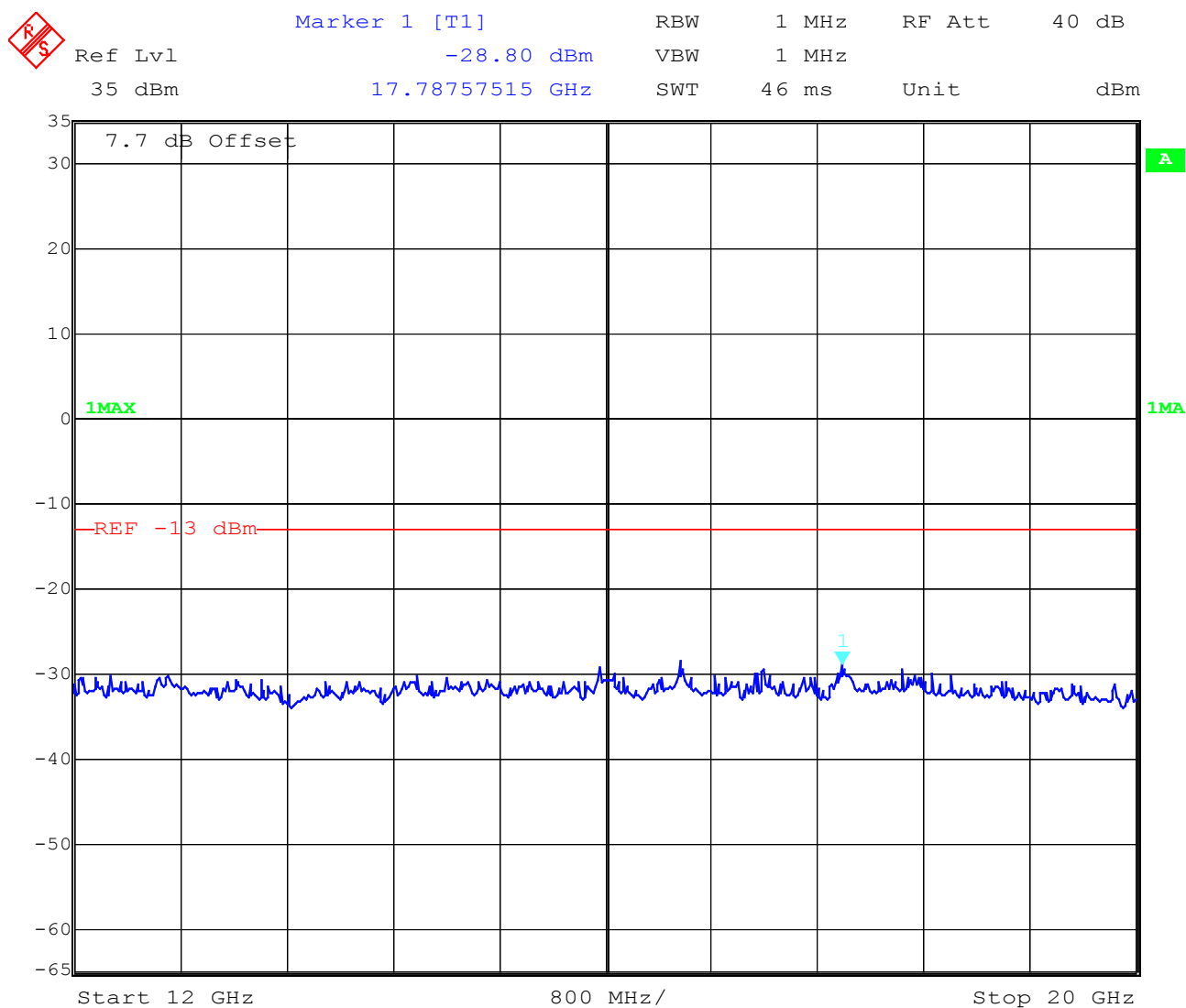
FREQUENCY [MHz]

FCC '2.1053

f ≥ 1GHz : RBW / VBW 1 MHz

17 – 24; 64

Valid for all three channels :- 20 GHz



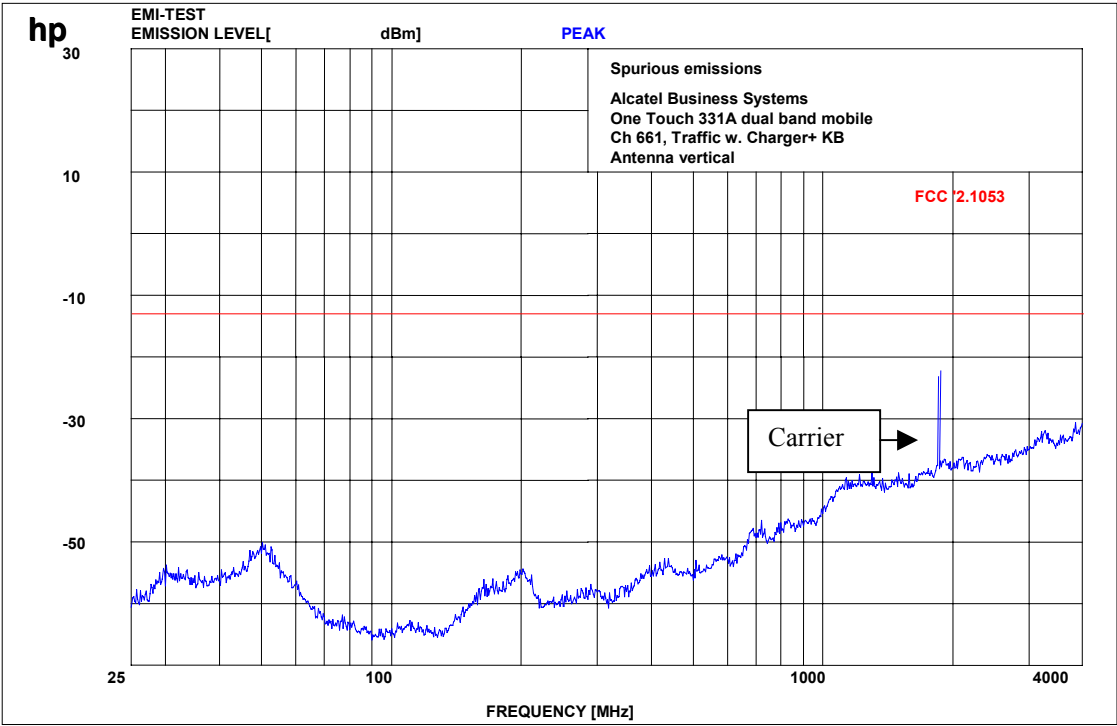
Date: 15.OCT.2003 14:38:32

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17 – 24; 64

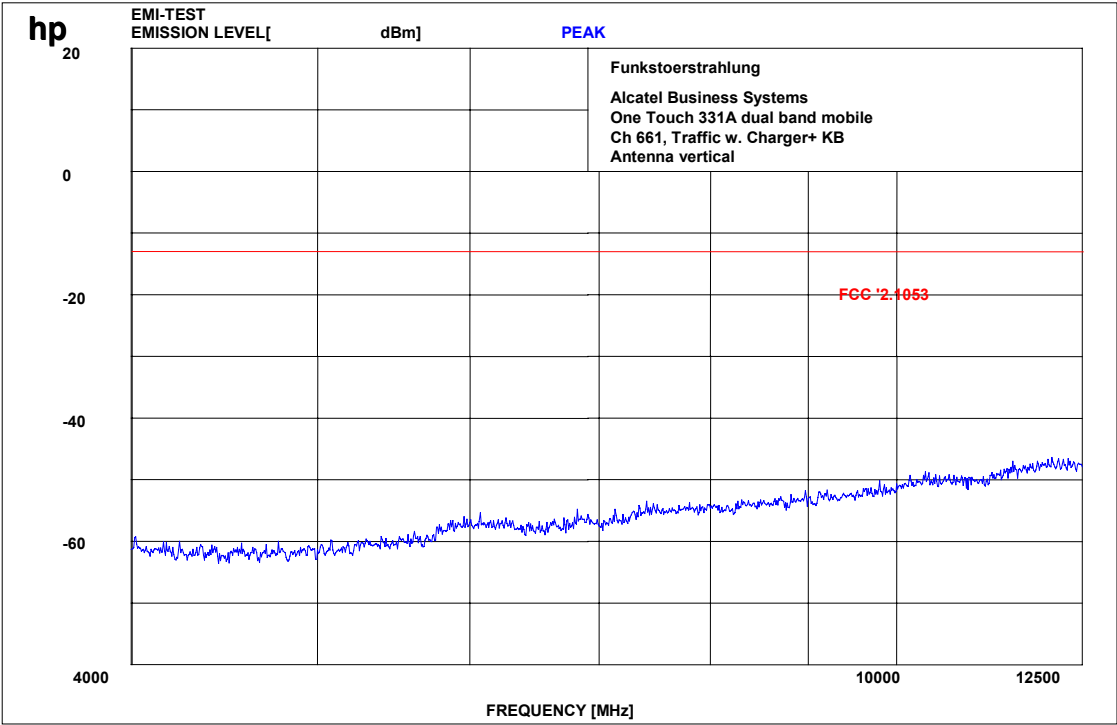
Channel 661 (up to 4 GHz)



$f < 1 \text{ GHz}$: RBW/VBW: 100 kHz $f \geq 1 \text{ GHz}$: RBW / VBW 1 MHz

Carrier suppressed with a rejection filter

Channel 661 (up to 12 GHz)



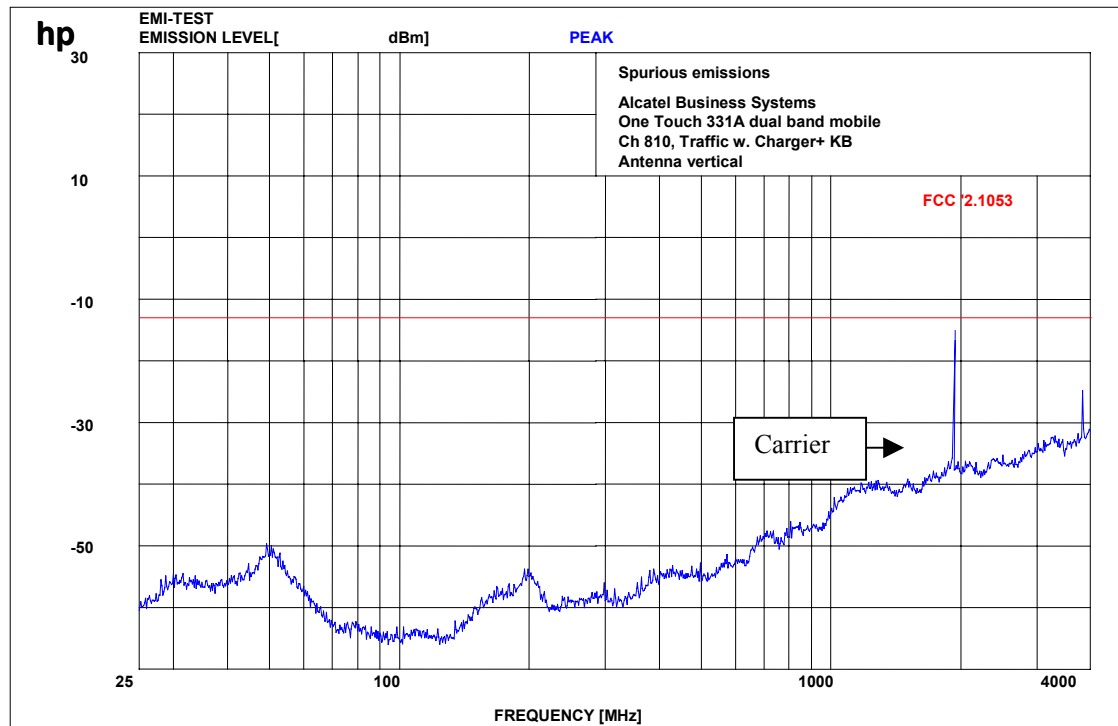
f < 1 GHz : RBW/VBW: 100 kHz

f ≥ 1GHz : RBW / VBW 1 MHz

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

17 – 24; 64

Channel 810 up to 4 GHz



$f < 1 \text{ GHz}$: RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$: RBW / VBW 1 MHz

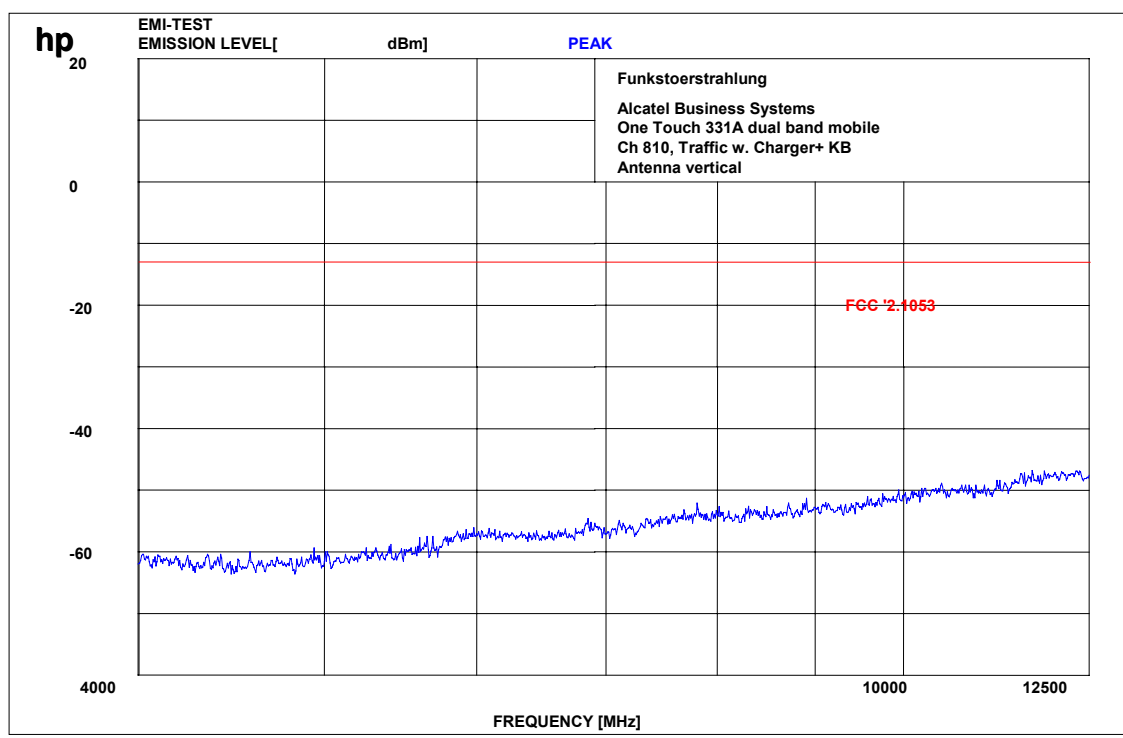
Carrier suppressed with a rejection filter

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17 – 24, 64

Channel 810 up to 12 GHz



$f < 1 \text{ GHz}$: RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$: RBW/VBW 1 MHz

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17 – 24, 64

RECEIVER SPURIOUS RADIATION
Radiated
§ 15.109

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	peaks	found						
Measurement uncertainty			±3 dB					

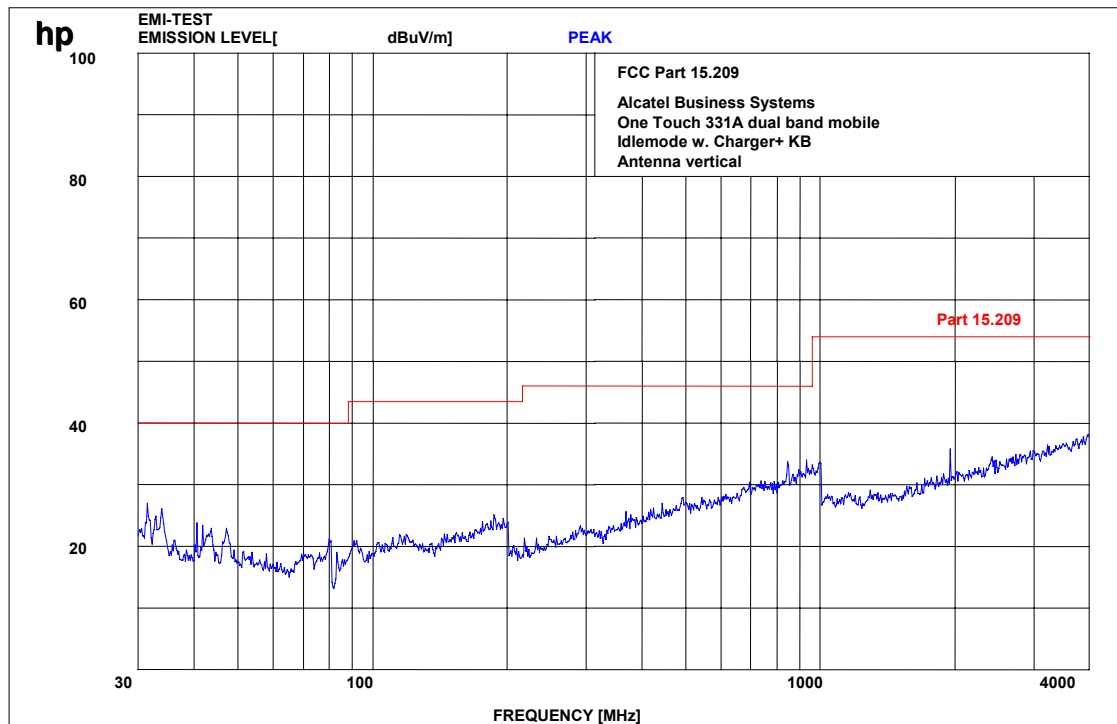
f < 1 GHz : RBW/VBW: 100 kHz
f ≥ 1GHz : RBW/VBW: 1 MHz
see above plots
Measurement distance see table
Limits
SUBCLAUSE § 15.109

Frequency (MHz)	Field strength (μV/m)	Measurement distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 - 88	100 (40 dBμV/m)	3
88 - 216	150 (43.5 dBμV/m)	3
216 - 960	200 (46 dBμV/m)	3
above 960	500 (54 dBμV/m)	3

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

Idle mode

(this is valid for all 3 channels and up to 4 GHz)



$f < 1 \text{ GHz}$: RBW/VBW: 100 kHz

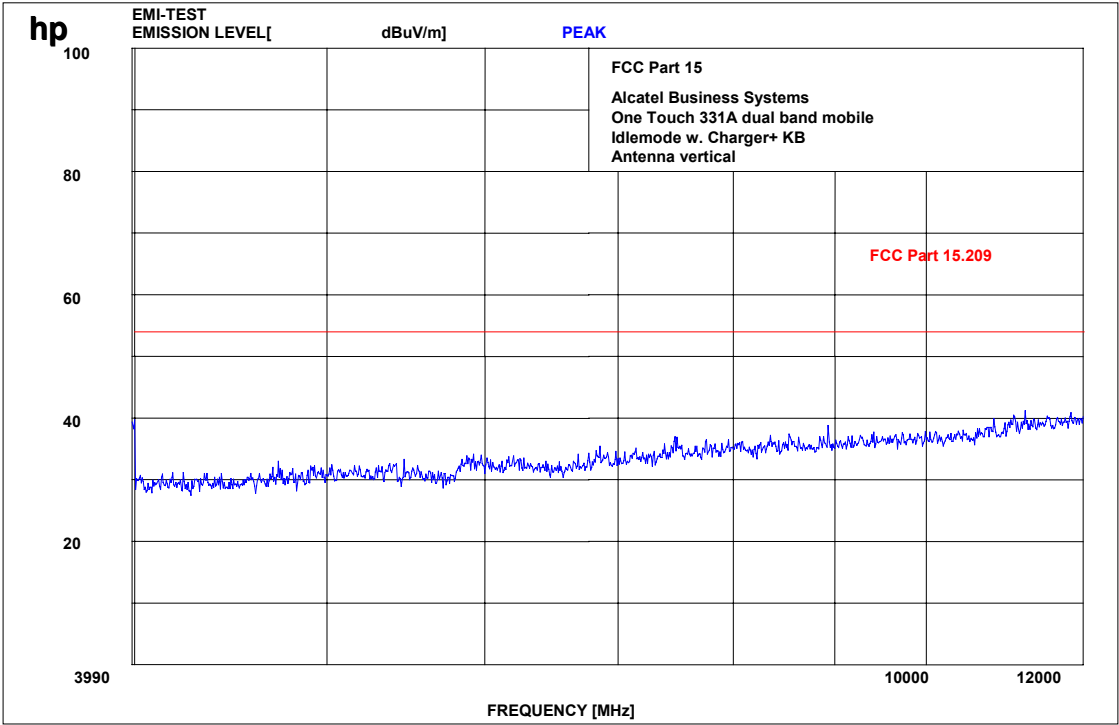
$f \geq 1 \text{ GHz}$: RBW/VBW 1 MHz

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17 – 24, 64

(this is valid for all 3 channels and up to 12 GHz)
Idle-Mode



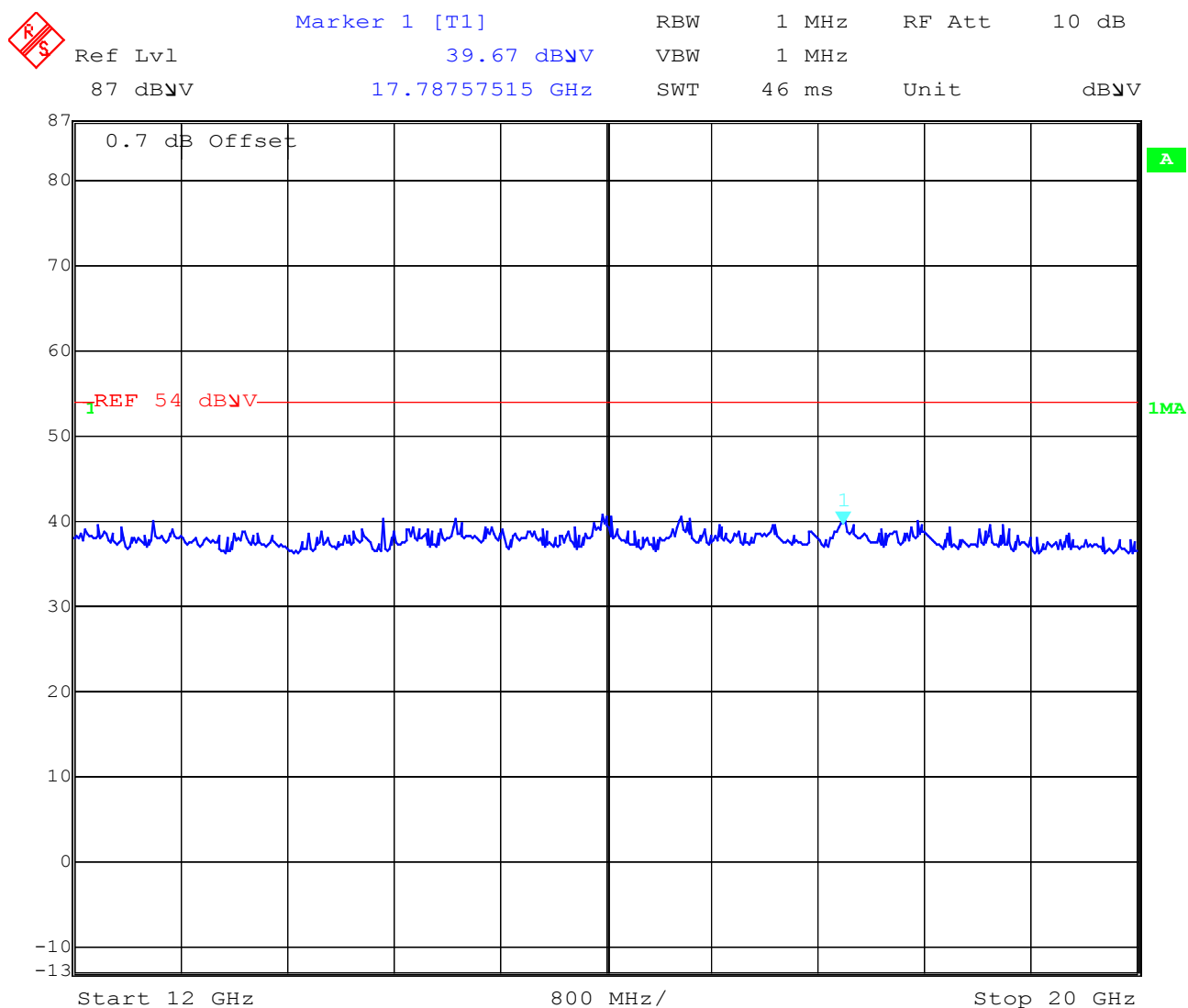
$f < 1 \text{ GHz}$: RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$: RBW/VBW 1 MHz

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

(this is valid for all 3 channels and up to 20 GHz)

Idle-Mode



Date: 15.OCT.2003 14:39:35

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17 – 24, 64

CONDUCTED SPURIOUS EMISSIONS

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 transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

USPCS Transmitter

Channel Frequency

512 1850.2 MHz

661 1880.0 MHz

810 1909.8 MHz

Measurement Limit:

Sec. 24.238 Emission Limits.

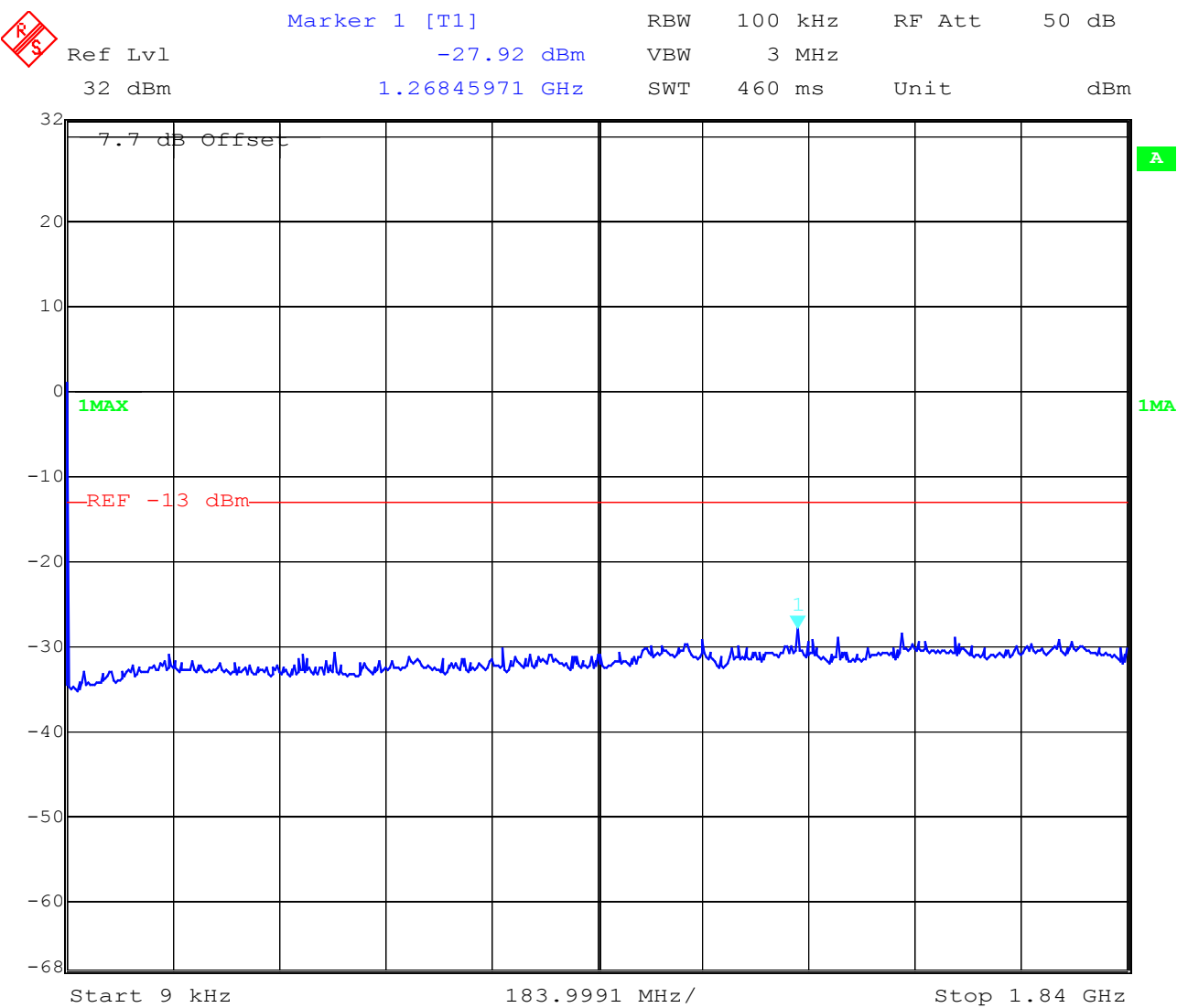
(a) On any frequency outside frequency band of the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least $43+10\log(P)$ dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

EMISSION LIMITATIONS					
f (MHz)		amplitude of emission (dBm)	limit max. allowed emission power (dBm)	actual attenuation below frequency of operation (dBc)	results
CH 512					
1850.2		30.77	-13.0 (42.90 dBc)		carrier
1849.99		-16,82		46.72	complies
CH 661					
1880.0		30.01	-13.0 (43.01 dBc)		carrier
CH 810					
1909.8		29.23	-13.0 (42.23 dBc)		carrier
1910.0		-16.26		45.49	complies
Measurement uncertainty		± 0.5dB			

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Measurements:

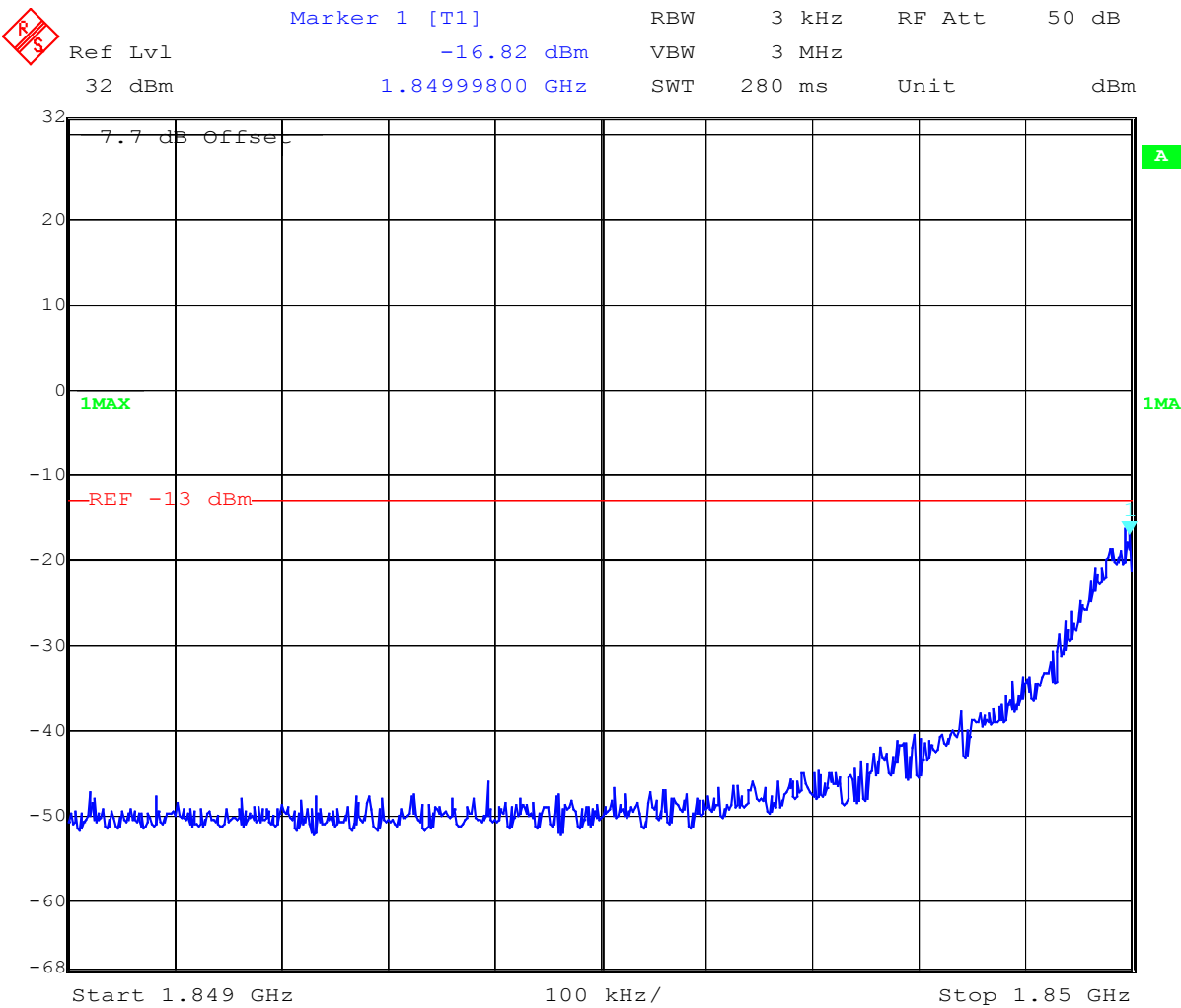
Channel: 512



Date: 16.OCT.2003 10:21:12

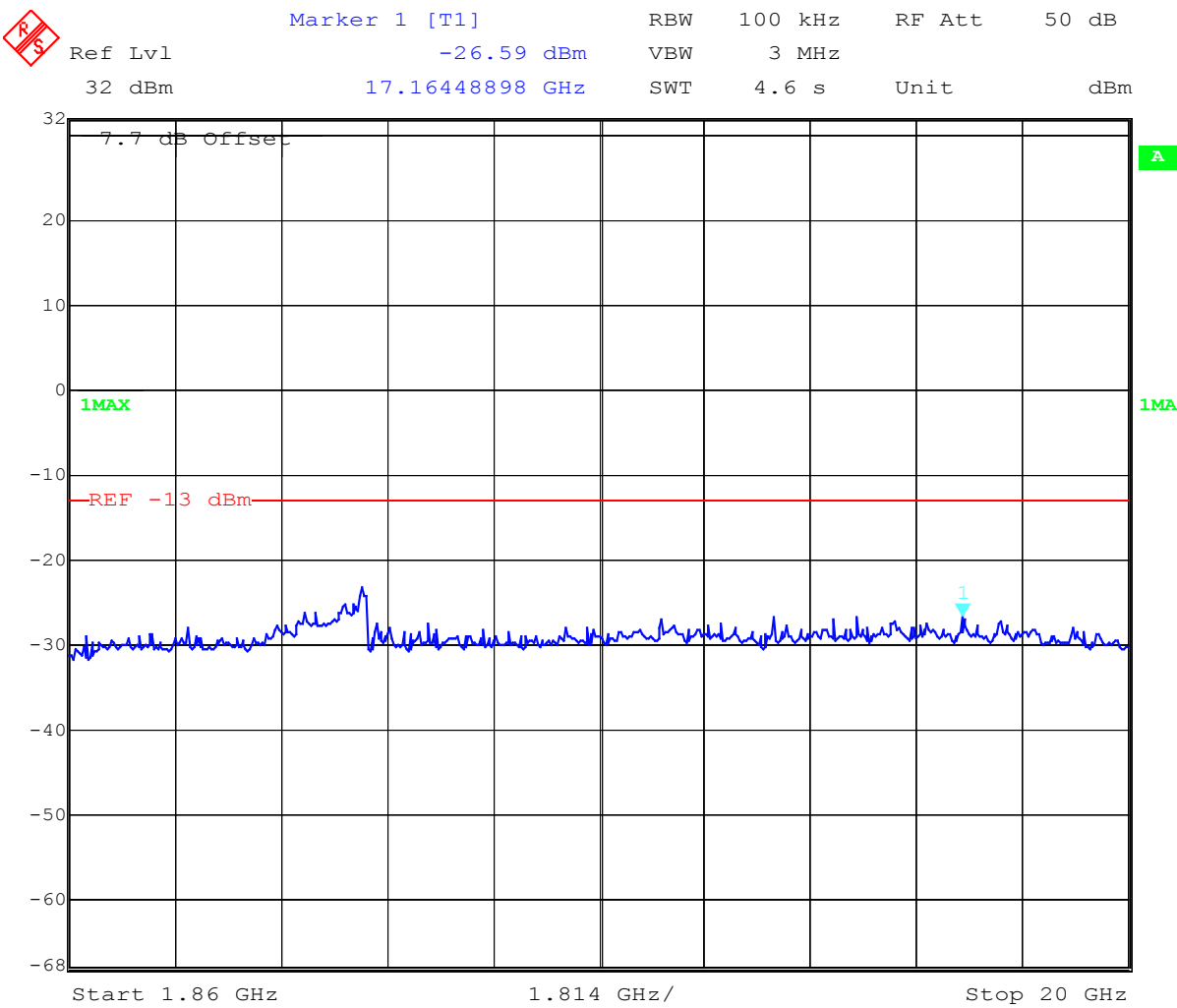
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Channel 512



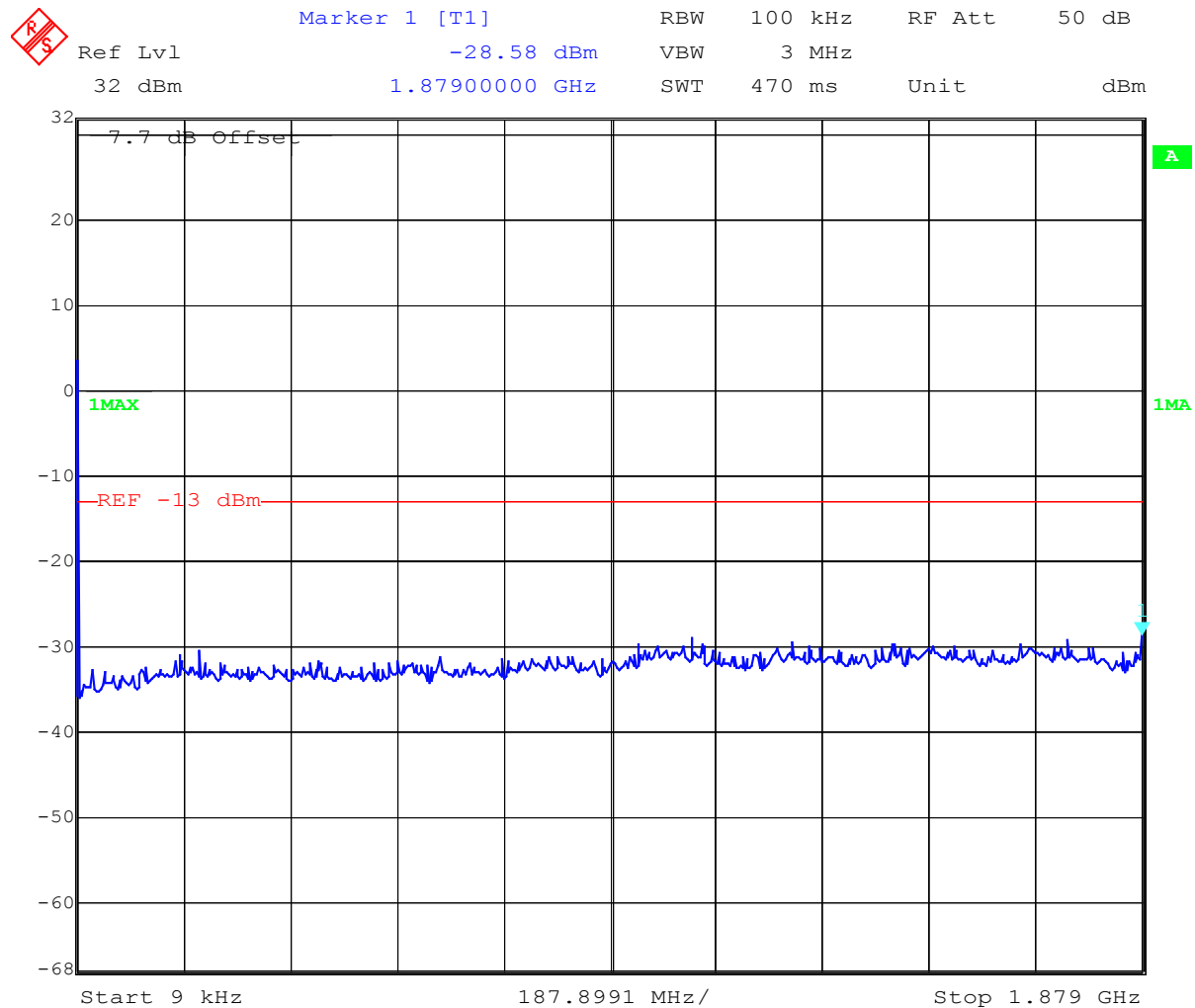
Date: 16.OCT.2003 10:26:10

Channel 512



Date: 16.OCT.2003 10:32:25

Channel 661

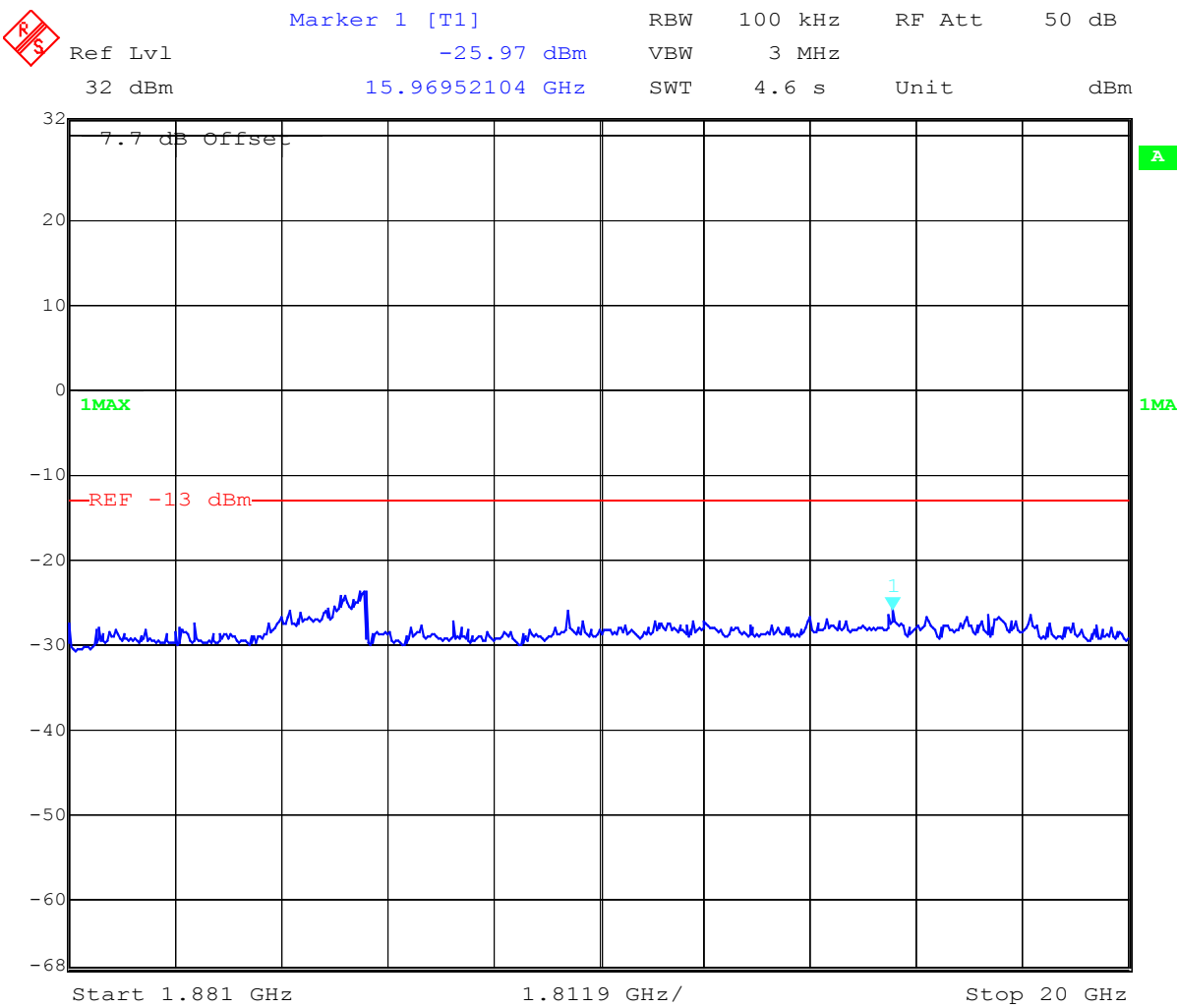


Date: 16.OCT.2003 10:33:59

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

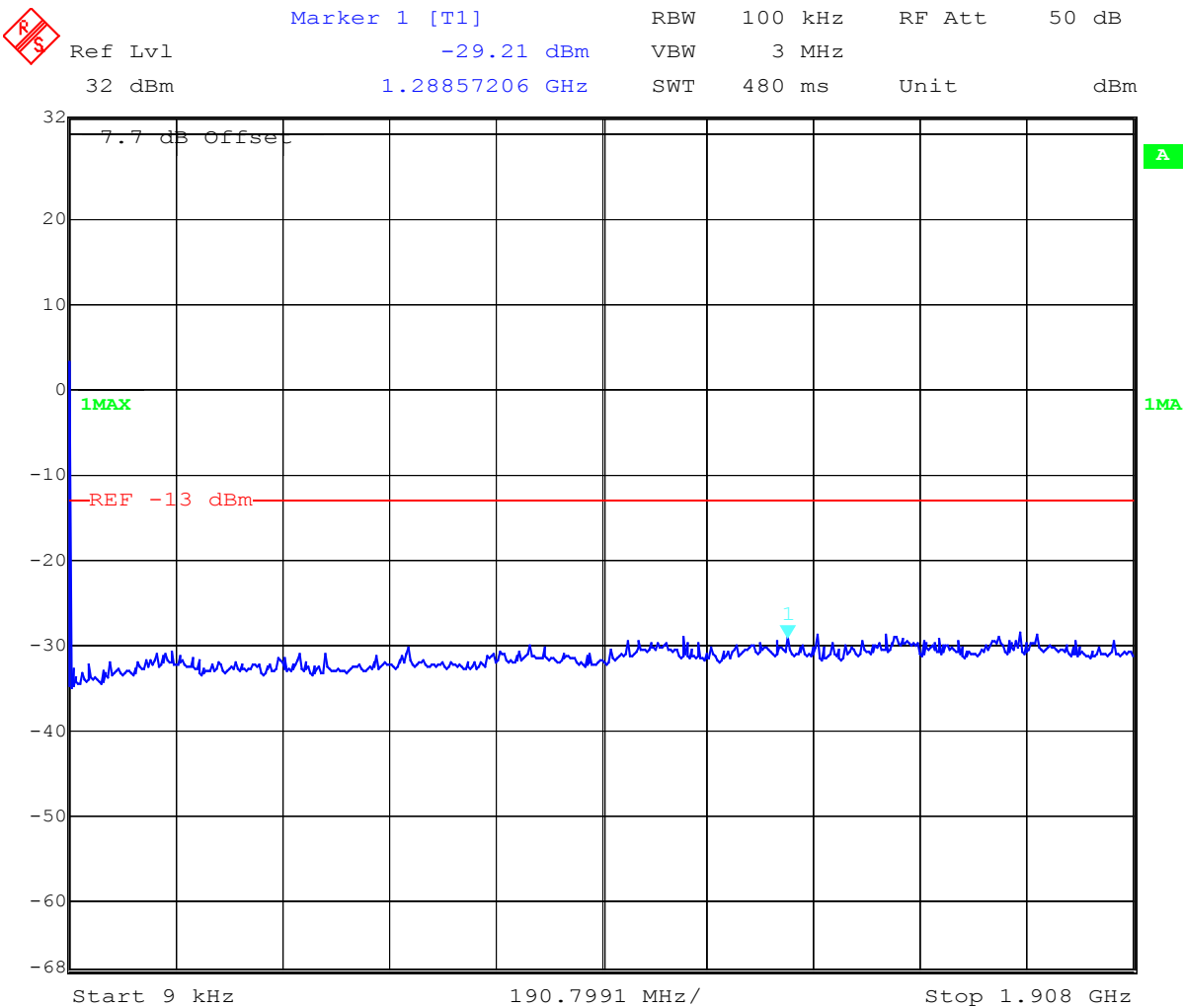
(for reference numbers see test equipment listing)

Channel 661



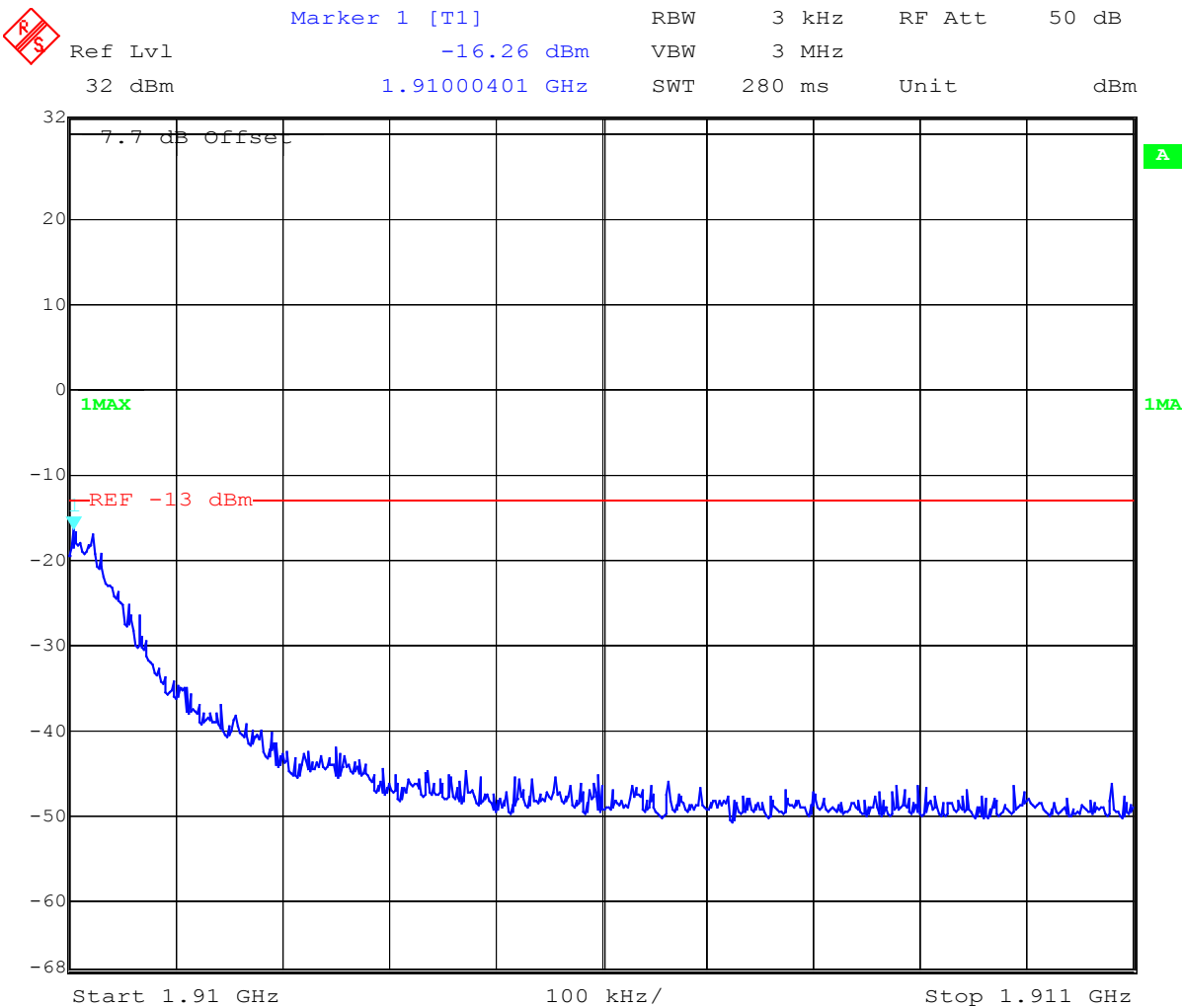
Date: 16.OCT.2003 10:36:27

Channel 810



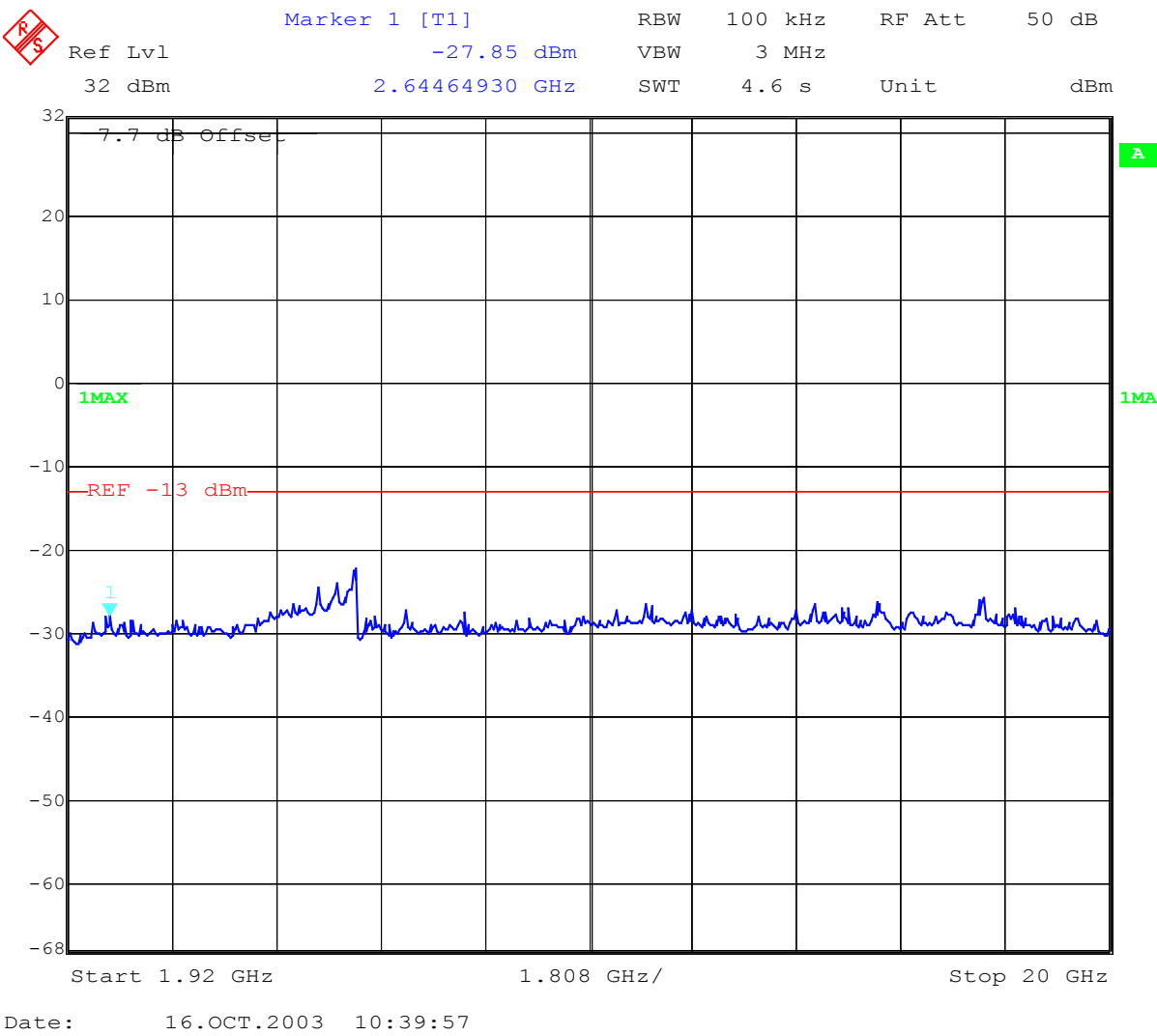
Date: 16.OCT.2003 10:37:41

Channel 810



Date: 16.OCT.2003 10:38:56

Channel 810



BLOCK EDGE COMPLIANCE FOR BLOCK A AND F

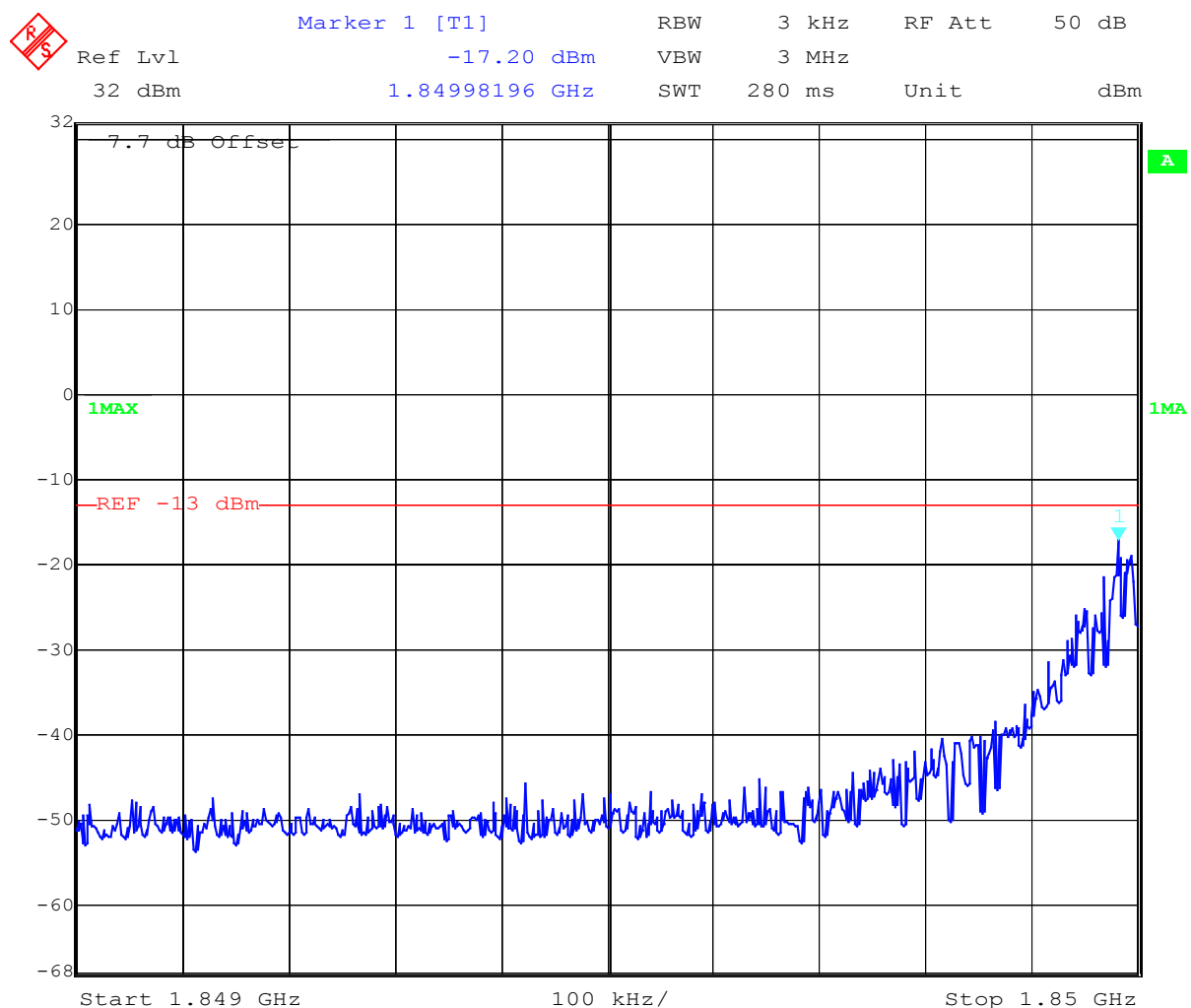
Measurement Limit:

Sec. 24.238 Emission Limits.

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

Measurements:

Block A Channel 512

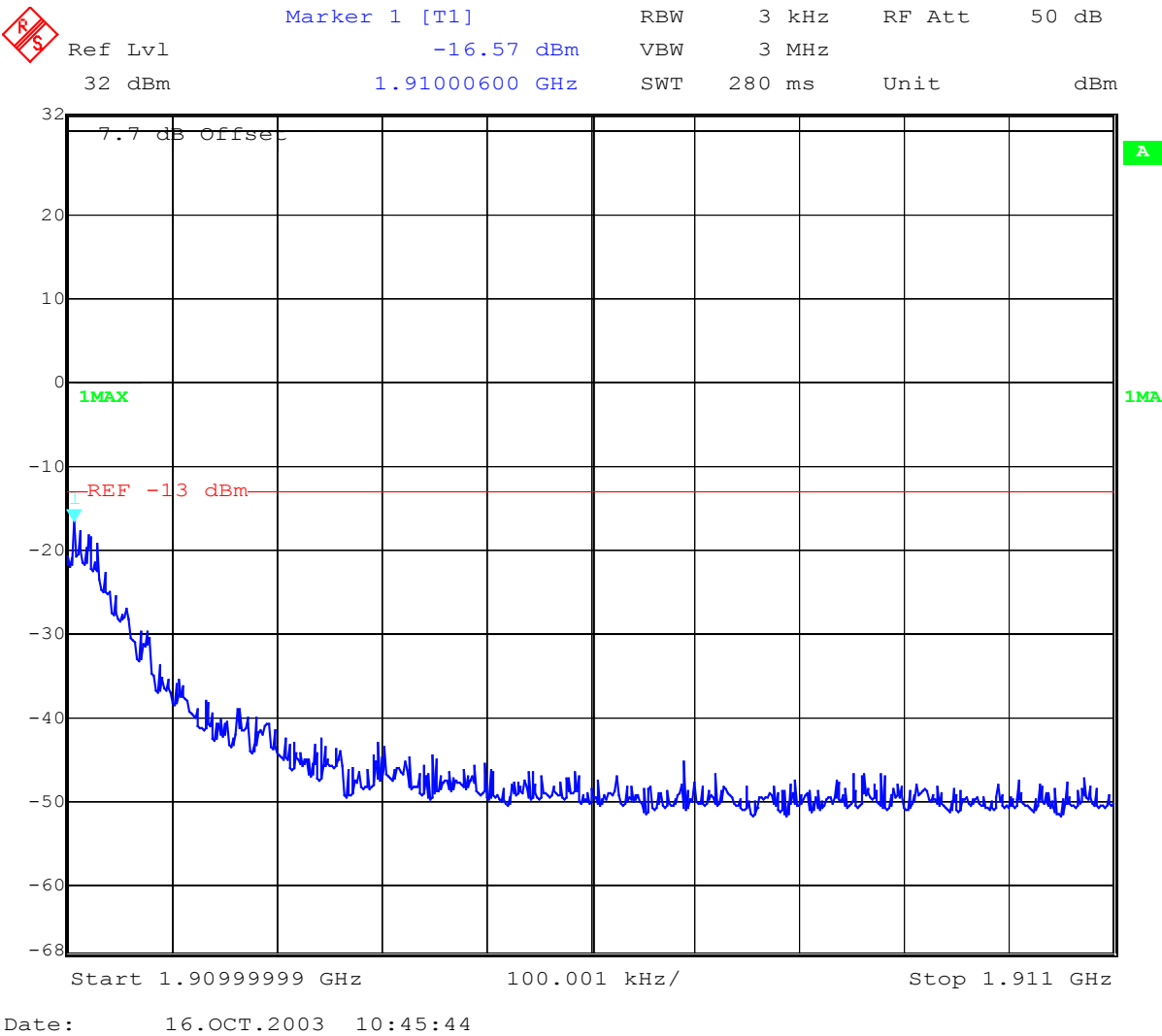


Date: 16.OCT.2003 10:46:10

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

Block C Channel 810



OCCUPIED BANDWIDTH

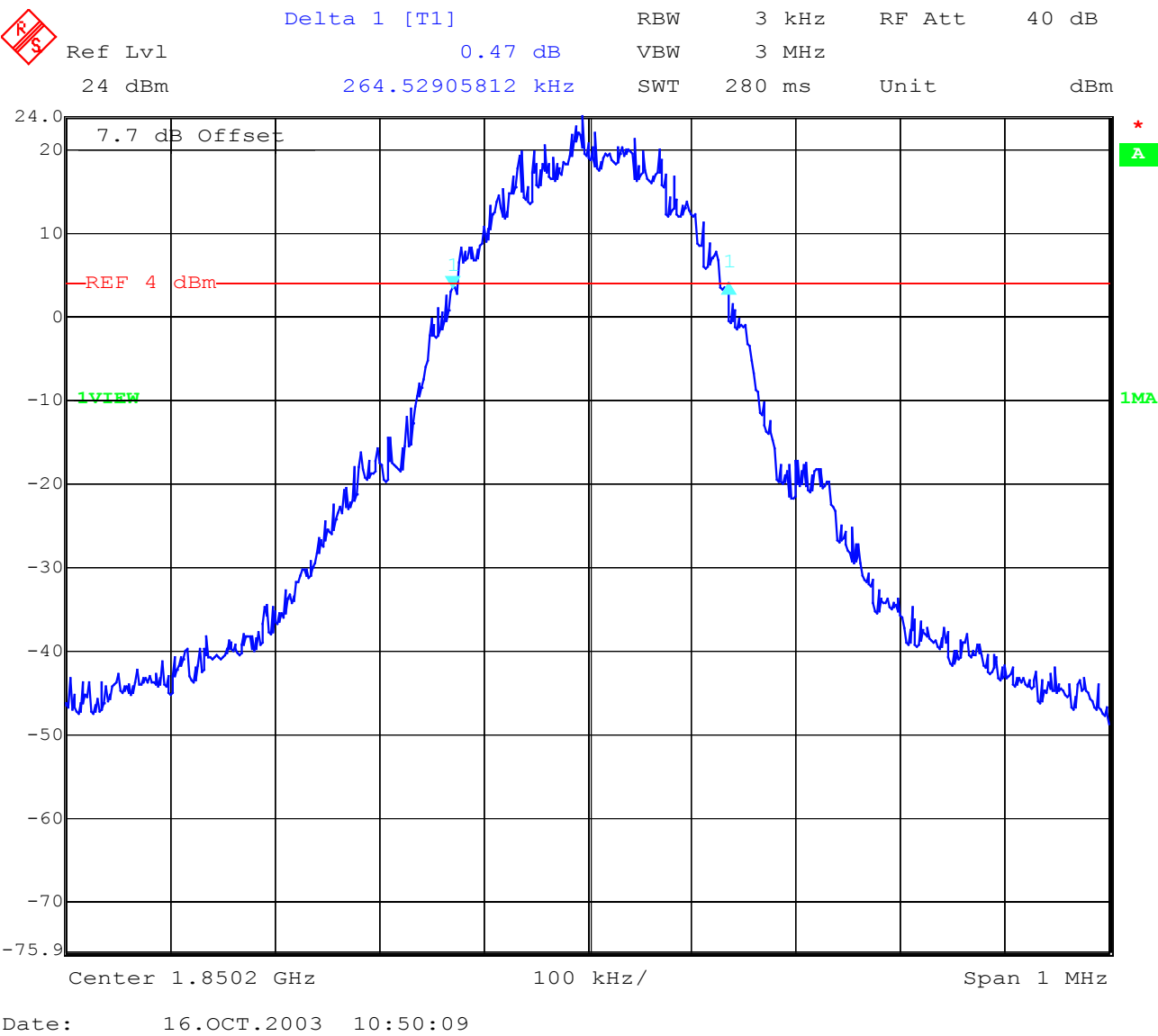
§2.989**Occupied Bandwidth Results**

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 USPCS frequency band. Table 8.2 below lists the measured 99% power and -26dBC occupied bandwidths. Spectrum analyzer plots are included on the following pages.

Frequency	99% Occupied Bandwidth	-26 dBc Bandwidth
1850.2 MHz	264.529	304.609
1880.0 MHz	276.553	312.625
1909.8 MHz	278.557	316.633

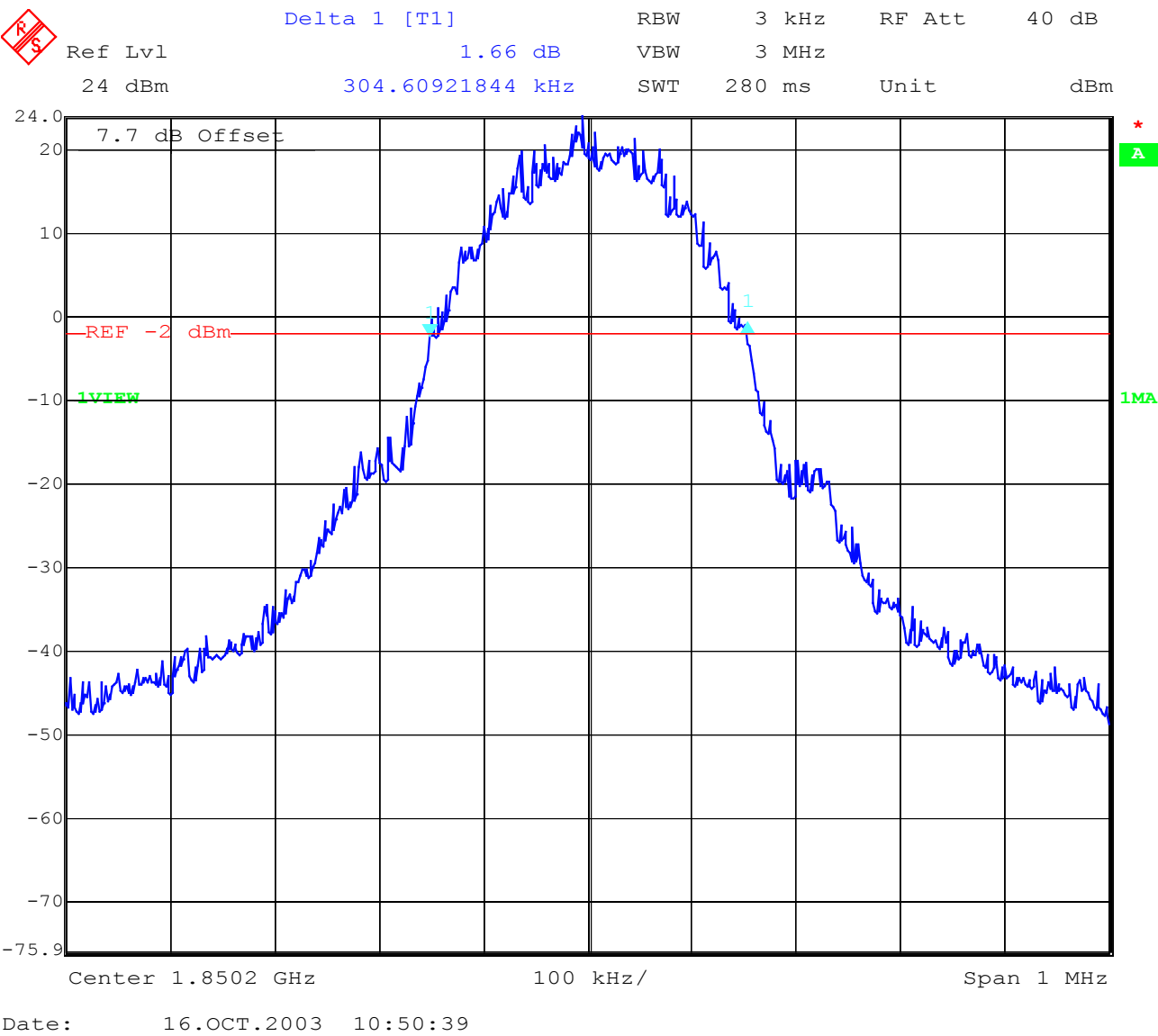
Part 24.238 (a) requires a measurement bandwidth of at least 1% of the occupied bandwidth. For ca. 281 kHz, this equates to a resolution bandwidth of at least 3.0 kHz. For this testing, a resolution bandwidth 3.0 kHz was used.

Channel 512
99% Occupied Bandwidth



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

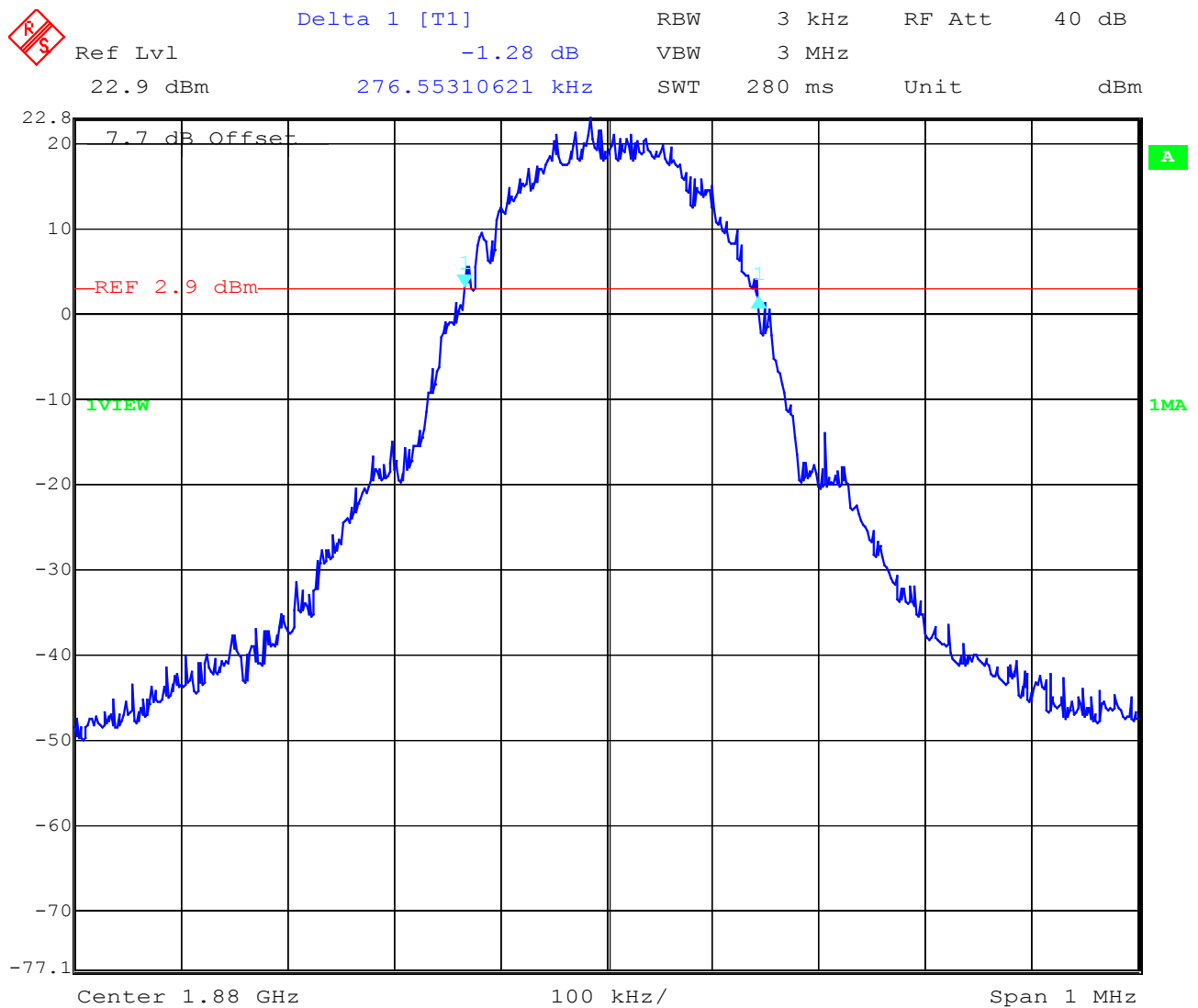
Channel 512
-26 dBc Bandwidth



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Channel 661

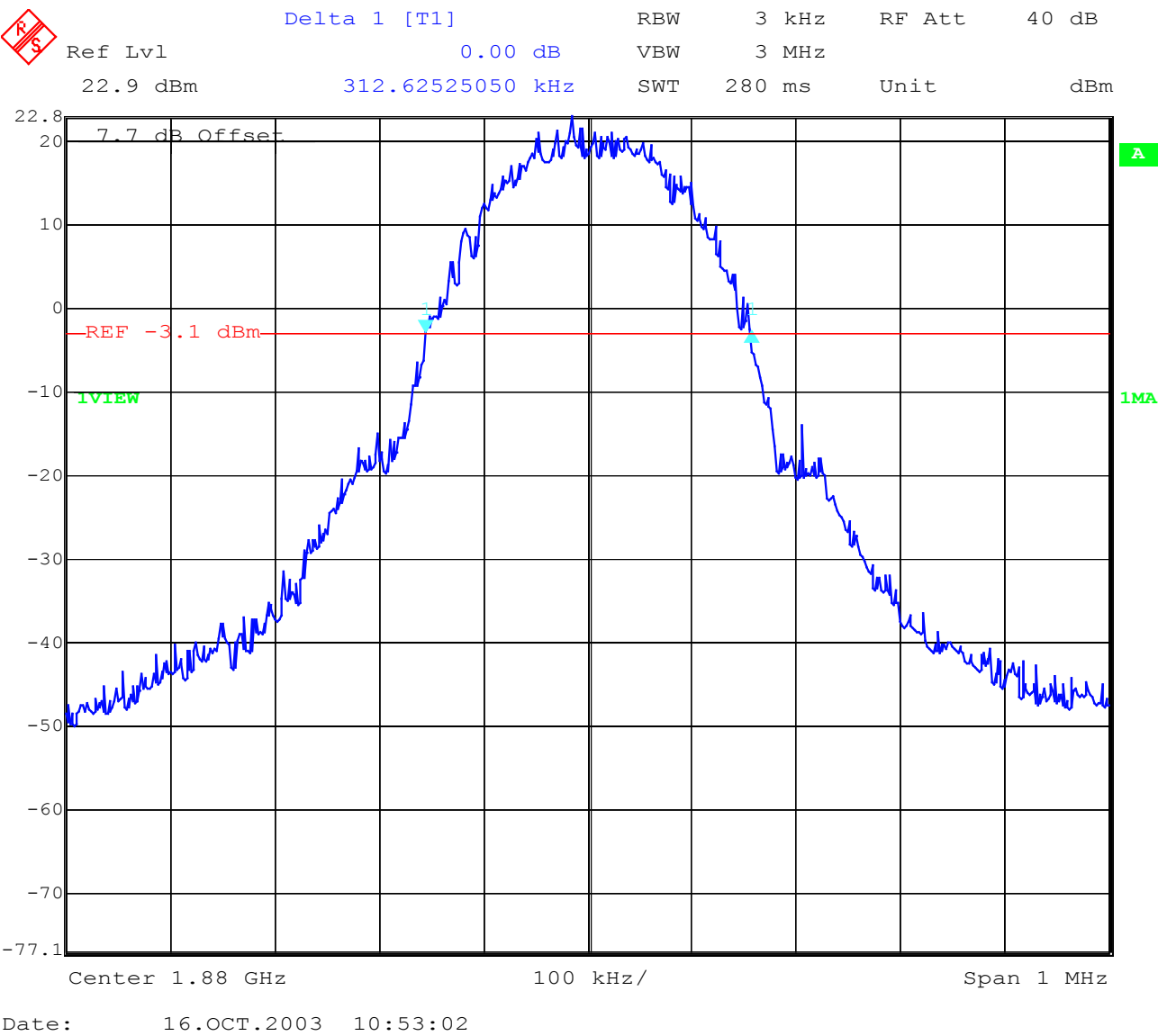
99% Occupied Bandwidth



Date: 16.OCT.2003 10:52:29

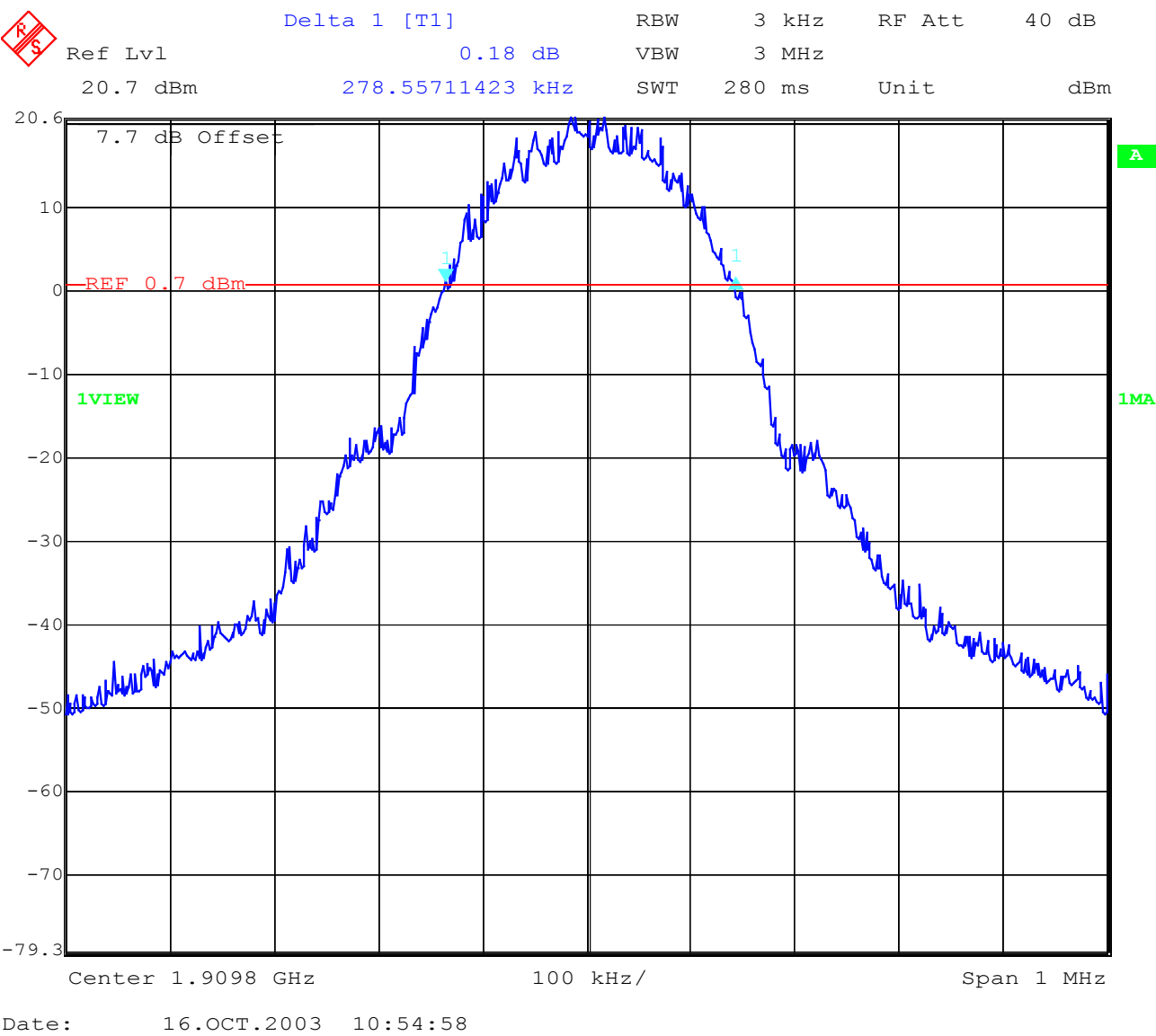
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Channel 661
-26 dBc Bandwidth



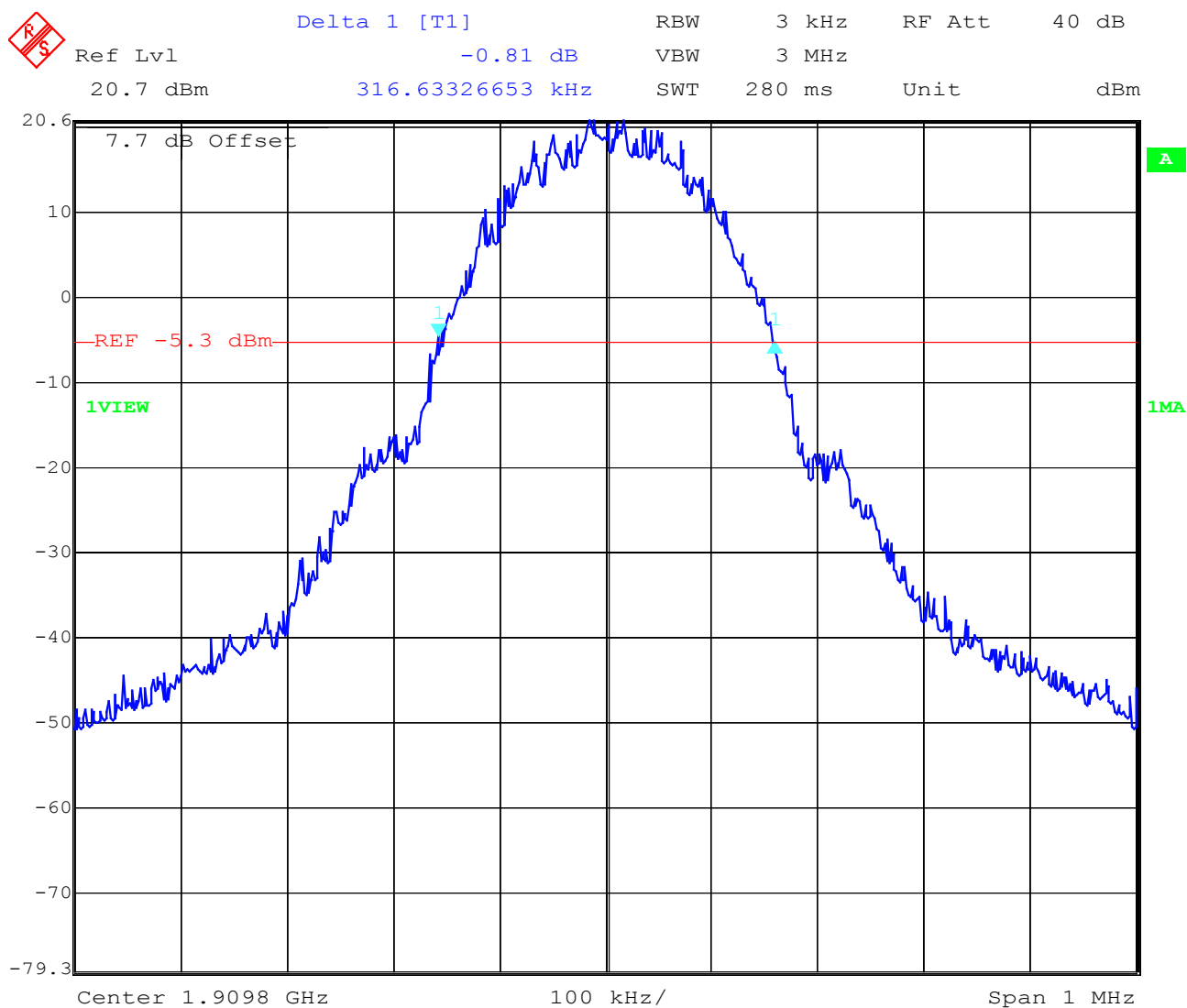
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Channel 810
99% Occupied Bandwidth



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Channel 810 -26 dBc Bandwidth



Date: 16.OCT.2003 10:55:25

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

PART PCS850**POWER OUTPUT****SUBCLAUSE § 24.232****Summery:**

This paragraph contains both average , peak output powers and EIRP measurements for the mobile station. 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 mobile 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)

This measurements were done at 3 frequencies, 824.2 MHz, 836.2 MHz and 848.8 MHz (bottom, middle and top of operational frequency range)

Limits:

Power Step	Nominal Peak Output Power (dBm)	Tolerance (dB)
0	+33	± 2

Power Measurements:**Conducted:**

Frequency (MHz)	Power Step	Peak Output Power (dBm)	Average Output Power (dBm)
824.2	0	32.70	32.52
836.4	0	32.54	32.41
848.8	0	32.49	32.36
Measurement uncertainty		±0.5 dB	

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17 – 24; 64

EIRP Measurements

Description: This is the test for the maximum radiated power from the phone.

Rule Part 24.232(b) specifies that "Mobile/portable stations are limited to 2 watts e.i.r.p. peak power..." and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

Method of Measurement:

1. In an anechoic antenna test chamber, a half-wave dipole antenna for the frequency band of interest is placed at the reference center of the chamber. An RF Signal source for the frequency band of interest is connected to the dipole with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A known (measured) power (Pin) is applied to the input of the dipole, and the power received (Pr) at the chamber's probe antenna is recorded.
2. A "reference path loss" is established as $Pin + 2.1 - Pr$.
3. The EUT is substituted for the dipole at the reference centre of the chamber. The EUT is put into CW test mode and a scan is performed to obtain the radiation pattern.
4. From the radiation pattern, the co-ordinates where the maximum antenna gain occurs is identified.
5. The EUT is then put into pulse mode at its maximum power level (Power Step 0).
6. "Gated mode" power measurements are performed with the receiving antenna placed at the co-ordinates determined in Step 3 to determine the output power as defined in FCC Rule 24.232 (b) and (c). The "reference path loss" from Step 1 is added to this result.
7. This value is EIRP since the measurement is calibrated using a half-wave dipole antenna of known gain (2.1 dBi) and known input power (Pin).
8. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.1 \text{ dBi}$.

Limits:

Power Step	Burst EIRP (dBm)
0	<33

Power Measurements:

Radiated:

Frequency (MHz)	Power Step	BURST Peak (dBm)		MODULATION AVERAGE (dBm)	
		EIRP	ERP	EIRP	ERP
824.2	0	30.20	28.10	21.20	19.10
836.2	0	30.61	28.51	21.61	19.51
848.8	0	30.92	28.82	21.92	19.82
Measurement uncertainty		±3 dB			

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

FREQUENCY STABILITY**SUBCLAUSE § 24.235****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 3.6 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 3.6 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.

Measurement Limit:

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.. This transceiver is specified to operate with an input voltage of between 3.3 V dc and 4.4 V dc, with a nominal voltage of 3.7 V dc.

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

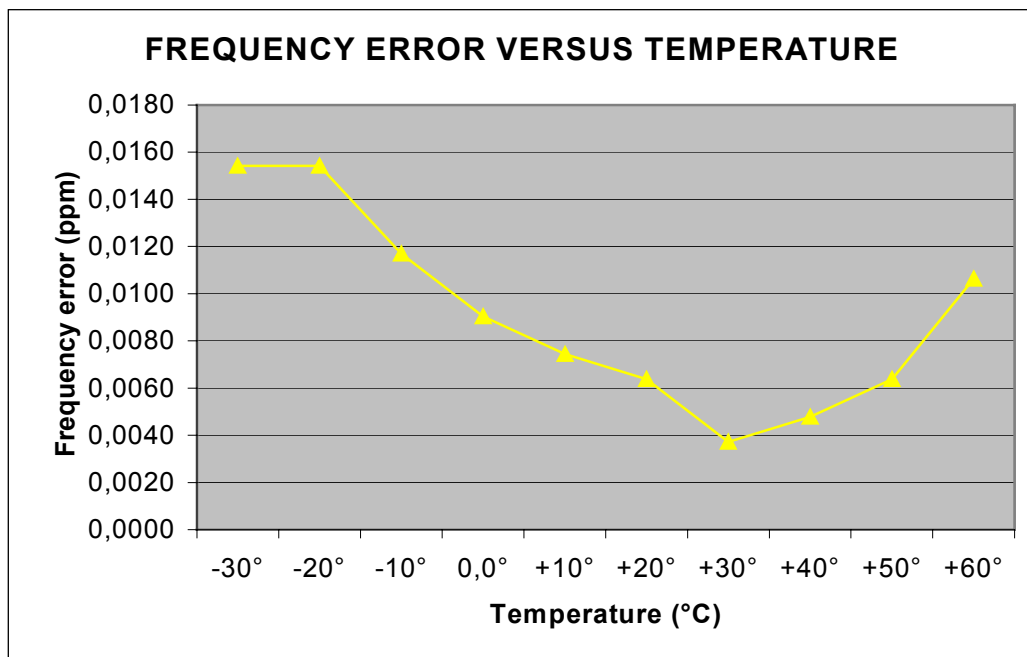
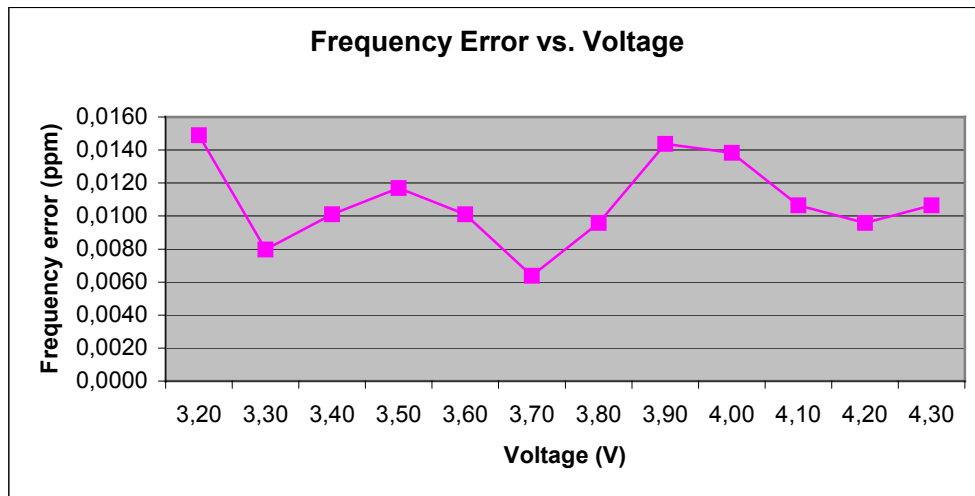
AFC FREQ ERROR vs. VOLTAGE

Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
3.2	n.a.		
3.3	28	0,00000149	0,0149
3.4	15	0,00000080	0,0080
3.5	19	0,00000101	0,0101
3.6	22	0,00000117	0,0117
3.7	19	0,00000101	0,0101
3.8	12	0,00000064	0,0064
3.9	18	0,00000096	0,0096
4.0	27	0,00000144	0,0144
4.1	26	0,00000138	0,0138
4.2	20	0,00000106	0,0106
4.3	18	0,00000096	0,0096
4.4	20	0,00000106	0,0106

AFC FREQ ERROR vs. TEMPERATURE

TEMPERATURE (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
-30	29	0,00000154	0,0154
-20	29	0,00000154	0,0154
-10	22	0,00000117	0,0117
±0.0	17	0,00000090	0,0090
+10	14	0,00000074	0,0074
+20	12	0,00000064	0,0064
+30	7	0,00000037	0,0037
+40	9	0,00000048	0,0048
+50	12	0,00000064	0,0064
+60	20	0,00000106	0,0106

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
 (for reference numbers see test equipment listing)

EMISSIONS LIMITS**§24.238****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 – 1992 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 848.8 MHz. This was rounded up to 12 GHz. The resolution bandwidth is set as outlined in Part 24.238. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the USPCS 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 waveguide 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 1 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. 24.238 Emission Limits.

(a) 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 $43 + 10 \log(P)$ 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 USPCS band (824.2 MHz, 836.2 MHz and 848.8 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 USPCS 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.

RESULTS OF OPEN FIELD RADIATED TEST FOR FCC-24:

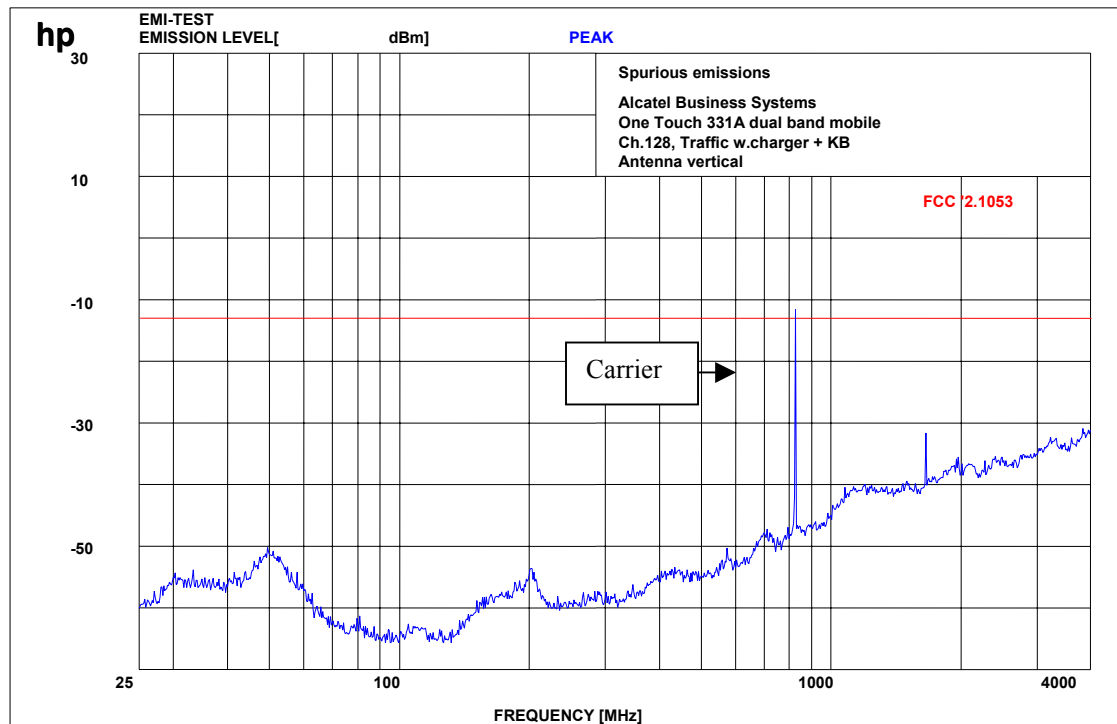
The final open field radiated levels are presented on the next pages.

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.

EMISSION LIMITATIONS					
f (MHz)		amplitude of emission (dBm)	limit max. allowed emission power (dBm)	actual attenuation below frequency of operation (dBc)	results
CH 128					
824,2		30.20	-13.0 (43.20 dBc)		carrier
1648.4		-32.5		62.70	complies
CH 189					
836,4		30.61	-13.0 (43.61 dBc)		carrier
CH 251					
848,8		30.92	-13.0 (43.92 dBc)		carrier
Measurement uncertainty		± 0.5dB			

Channel 128 (up to 4 GHz)

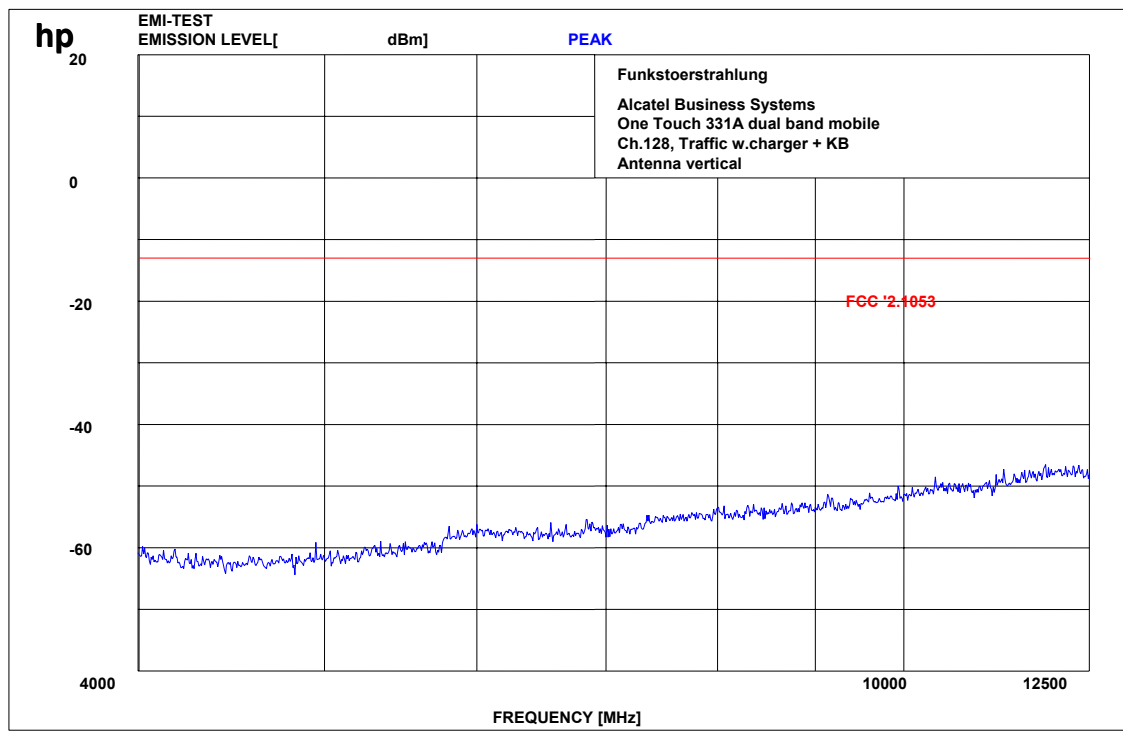


$f < 1 \text{ GHz}$: RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$: RBW/VBW 1 MHz

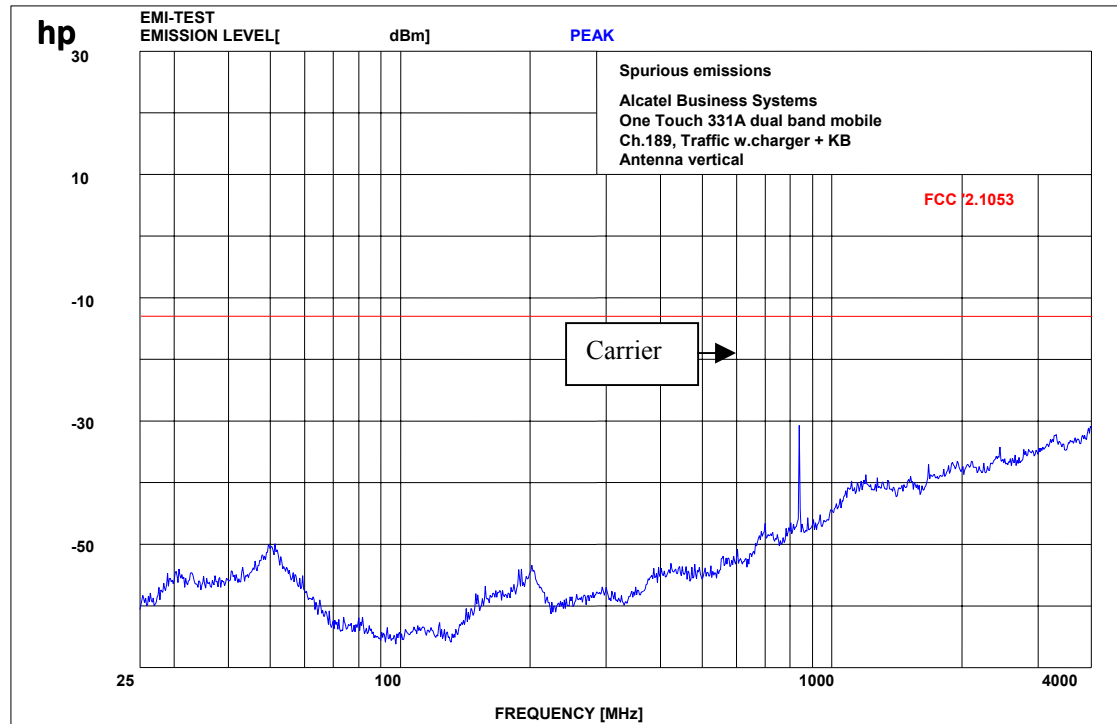
Carrier suppressed with a rejection filter

Channel 128 (up to 12 GHz)



f < 1 GHz : RBW/VBW: 100 kHz f ≥ 1GHz : RBW/VBW 1 MHz
Carrier suppressed with a rejection filter

Channel 189 (up to 4 GHz)

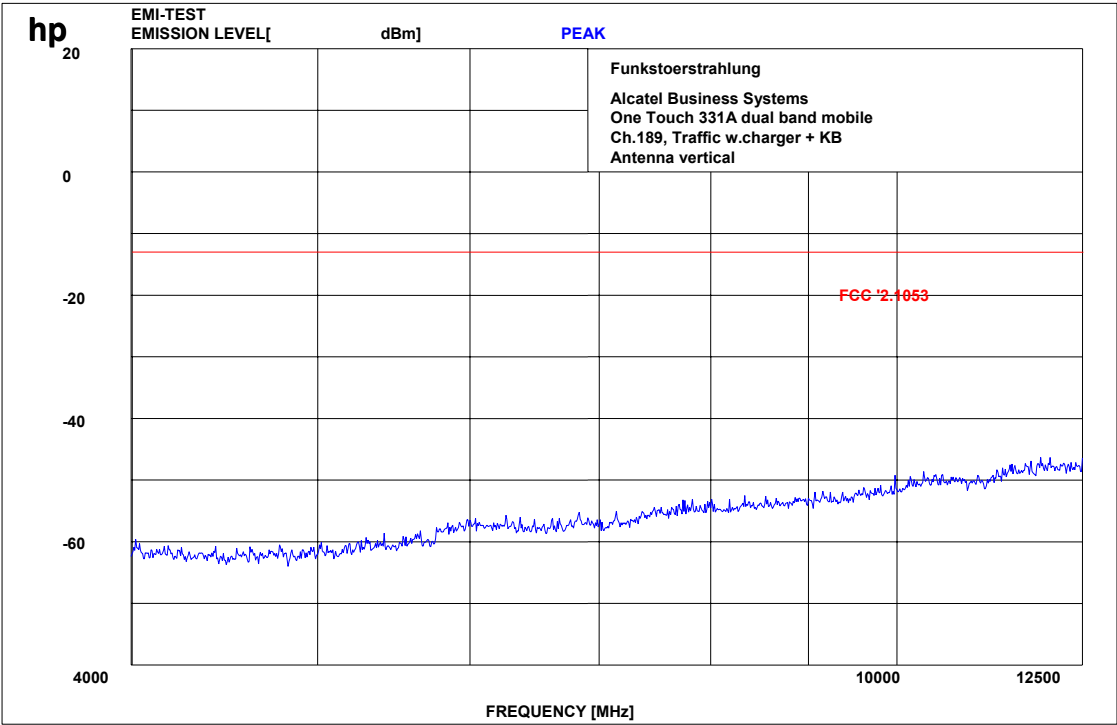


$f < 1 \text{ GHz}$: RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$: RBW/VBW 1 MHz

Carrier suppressed with a rejection filter

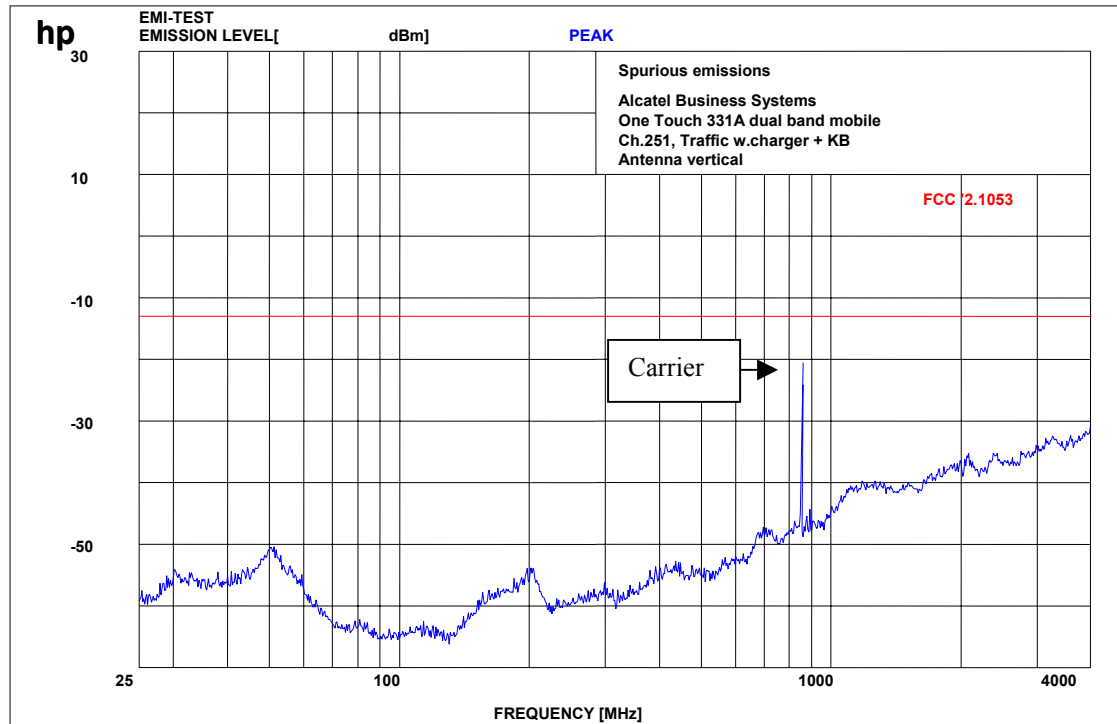
Channel 189 (up to 12 GHz)



$f < 1 \text{ GHz}$: RBW/VBW: 100 kHz $f \geq 1 \text{ GHz}$: RBW/VBW 1 MHz
Carrier suppressed with a rejection filter

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Channel 251 up to 4 GHz



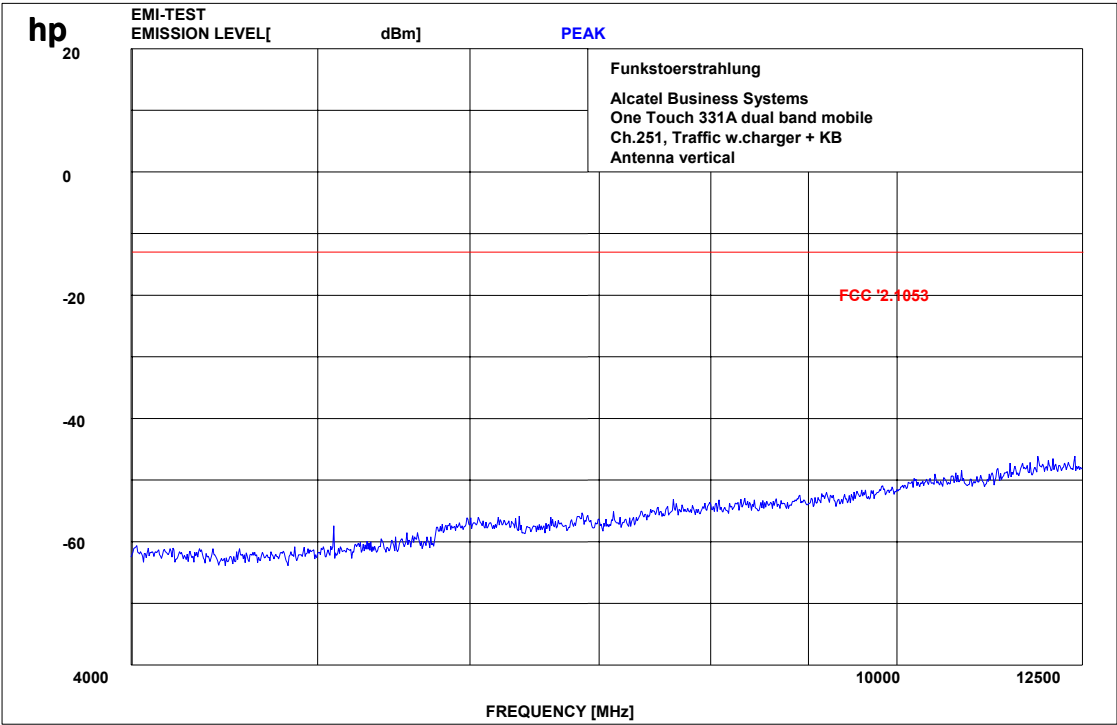
$f < 1 \text{ GHz}$: RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$: RBW/VBW 1 MHz

Carrier suppressed with a rejection filter

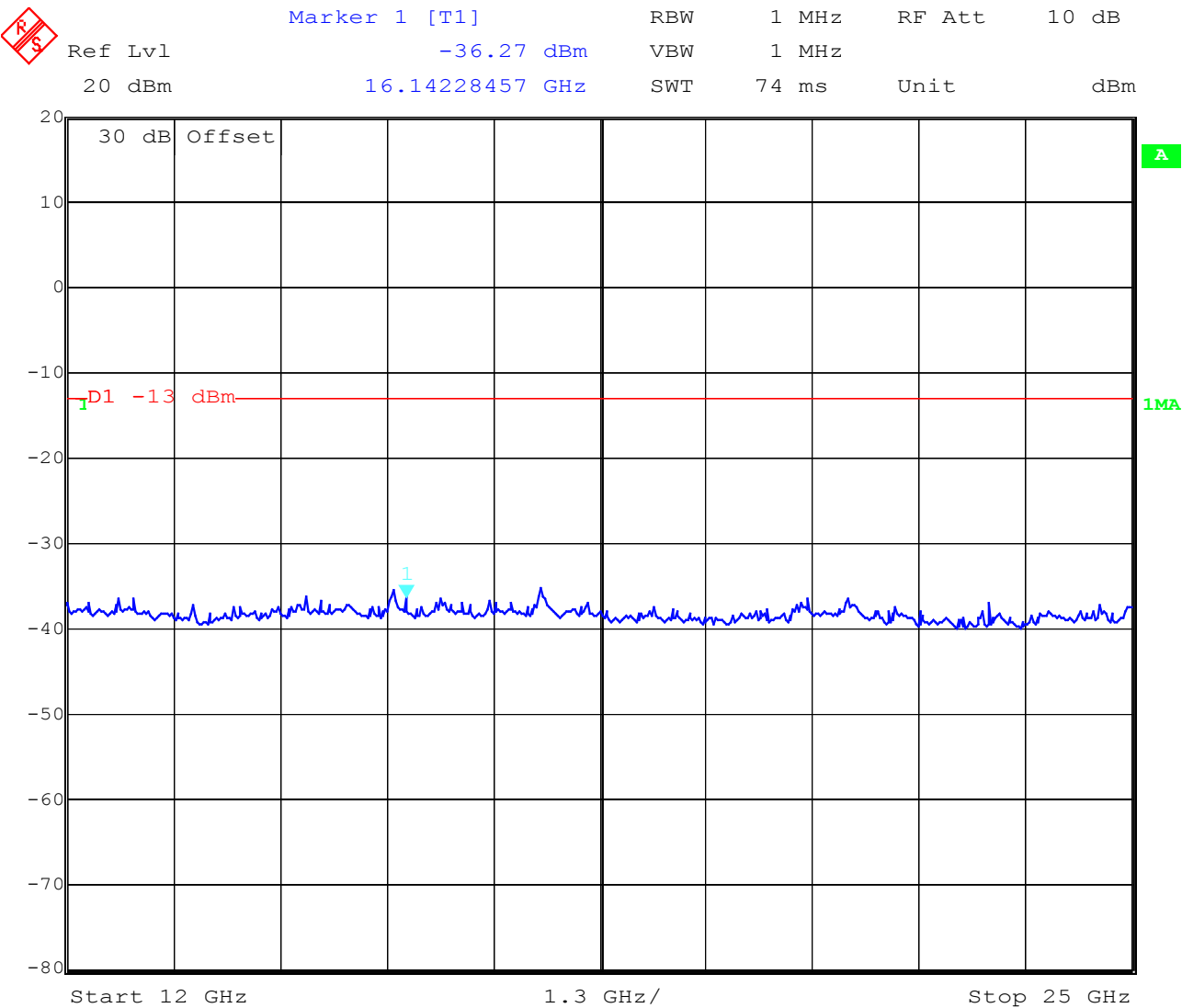
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Channel 251 up to 12 GHz



$f < 1 \text{ GHz}$: RBW/VBW: 100 kHz $f \geq 1 \text{ GHz}$: RBW/VBW 1 MHz
Carrier suppressed with a rejection filter

Channel 251 : -25 GHz



Date: 6.JUN.2003 09:09:47

Idle-Mode
RECEIVER SPURIOUS RADIATION
§ 15.109
Radiated

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	peaks	found						
Measurement uncertainty			±3 dB					

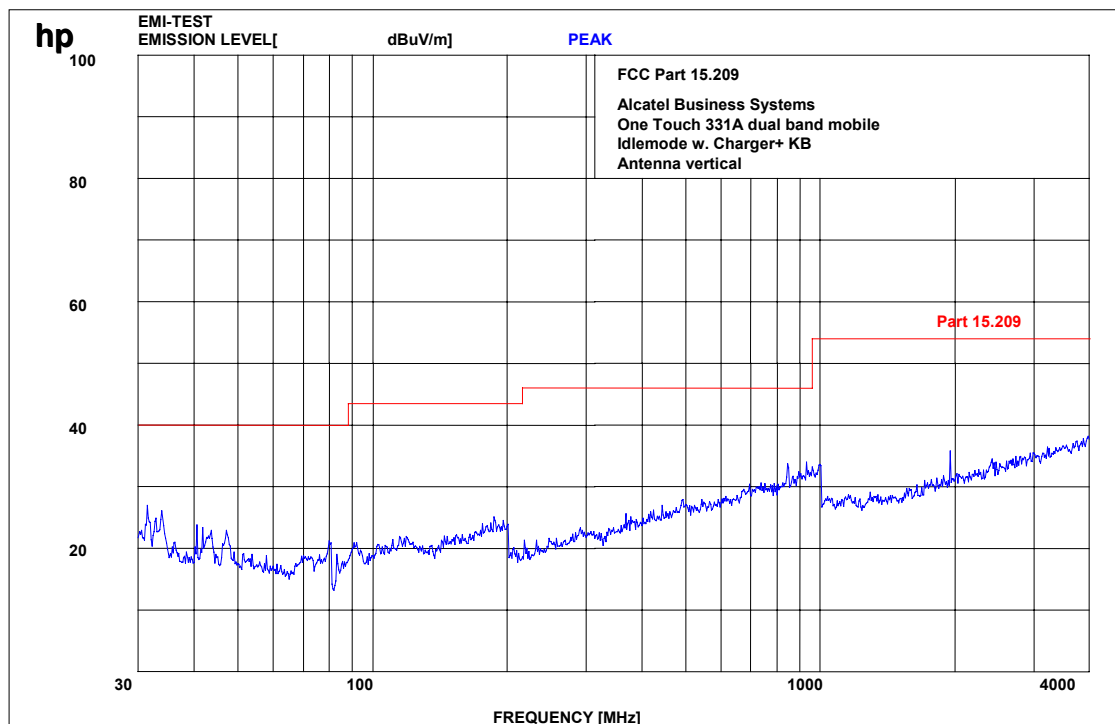
f < 1 GHz : RBW/VBW: 100 kHz
f ≥ 1GHz : RBW/VBW: 1 MHz
see above plots
Measurement distance see table
Limits
SUBCLAUSE § 15.109

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 - 88	100 (40 dBµV/m)	3
88 - 216	150 (43.5 dBµV/m)	3
216 - 960	200 (46 dBµV/m)	3
above 960	500 (54 dBµV/m)	3

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64; 52-63

Idle mode

(this is valid for all 3 channels and up to 4 GHz)



$f < 1 \text{ GHz}$: RBW/VBW: 100 kHz

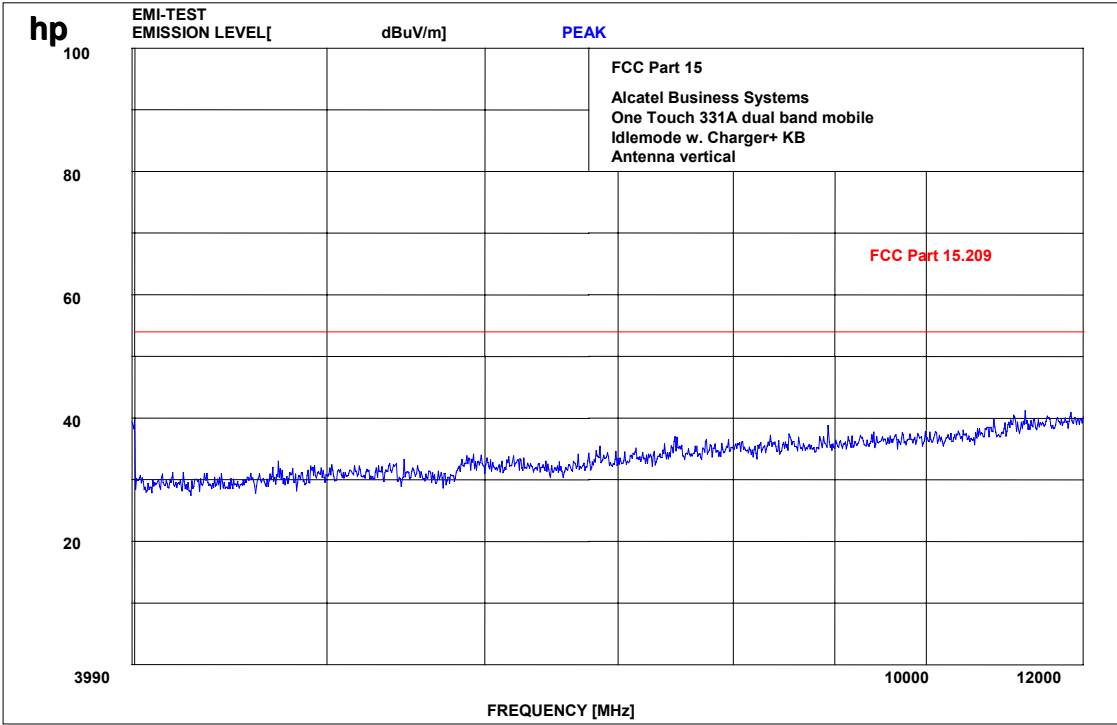
$f \geq 1 \text{ GHz}$: RBW/VBW 1 MHz

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17 – 24, 64; 52-63

(this is valid for all 3 channels and up to 12 GHz)
Idle-Mode



$f < 1 \text{ GHz}$: RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$: RBW/VBW 1 MHz

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64; 52-63

CONDUCTED SPURIOUS EMISSIONS

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 transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

USPCS Transmitter

Channel Frequency

128 824.2 MHz

189 836.2 MHz

251 848.8 MHz

Measurement Limit:

Sec. 24.238 Emission Limits.

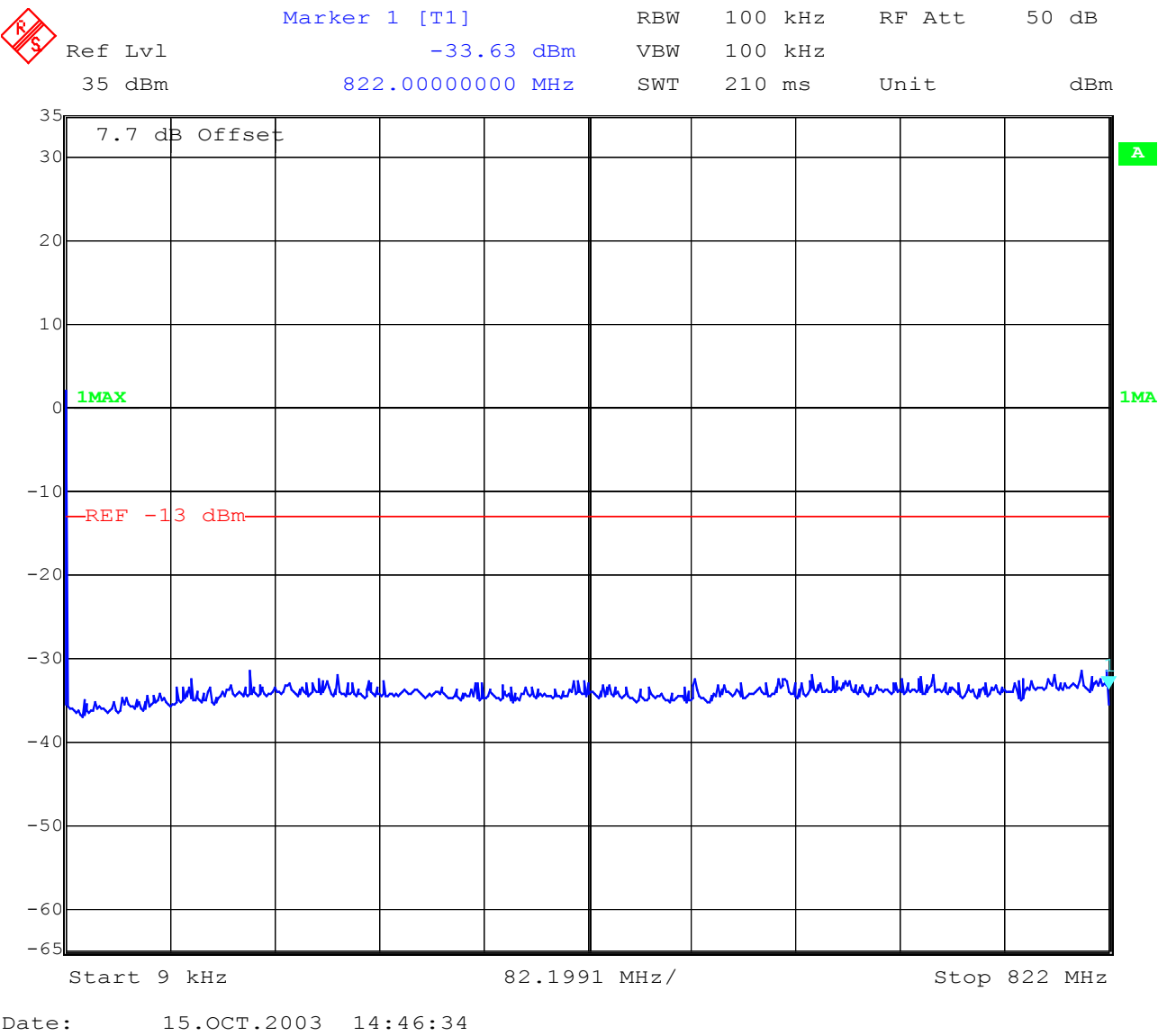
(a) On any frequency outside frequency band of the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least $43+10\log(P)$ dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

EMISSION LIMITATIONS					
f (MHz)		amplitude of emission (dBm)	limit max. allowed emission power (dBm)	actual attenuation below frequency of operation (dBc)	results
CH 128					
824,2		32.70	-13.0 (45.70 dBc)		carrier
824.00		-16.88		49.58	complies
CH 189					
836,4		32.54	-13.0 (45.54 dBc)		carrier
CH 251					
848.8		32.49	-13.0 (45.49 dBc)		carrier
849.0		-15.31		47.80	complies
Measurement uncertainty		± 0.5dB			

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

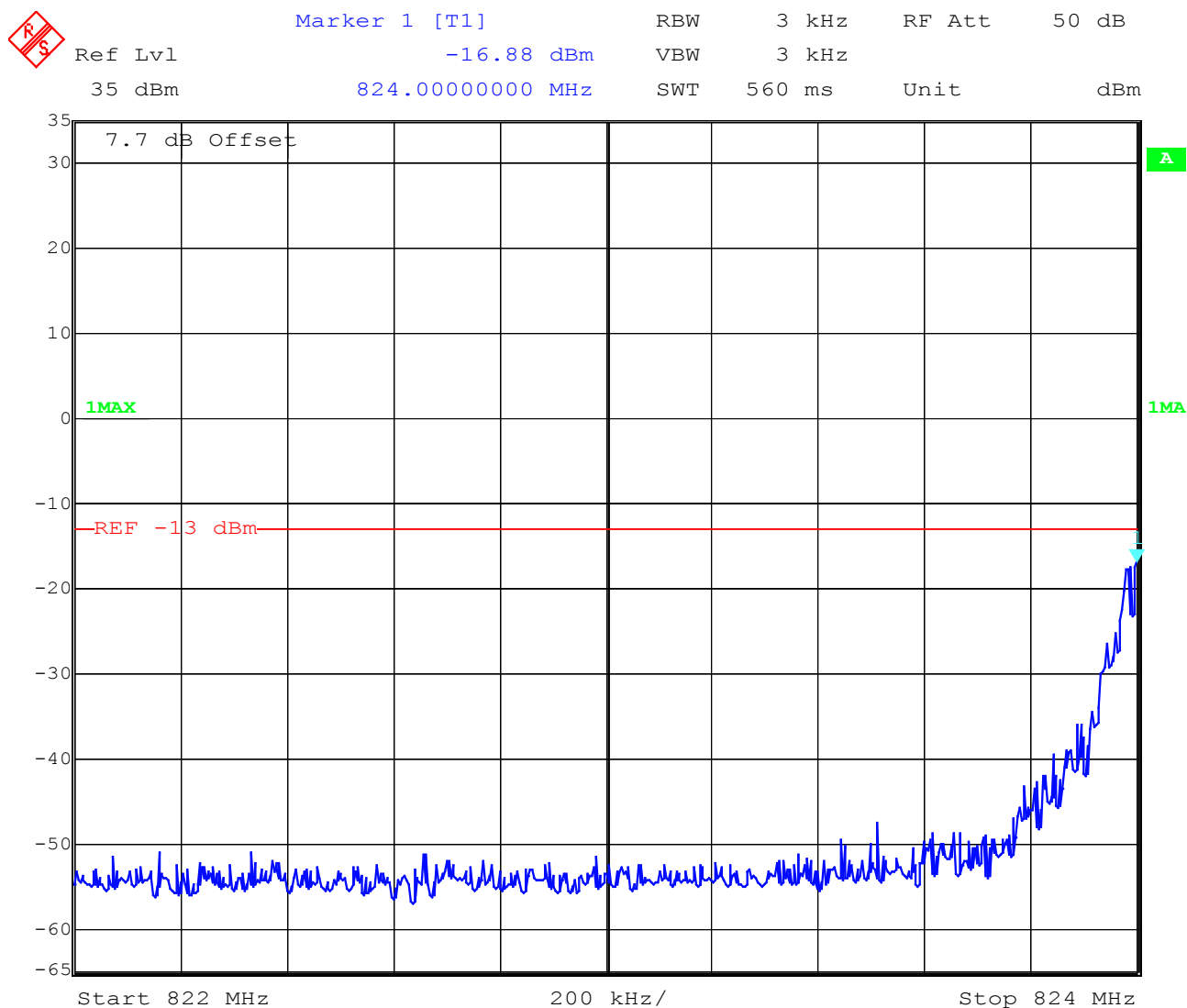
Measurements:

Channel: 128



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Channel 128



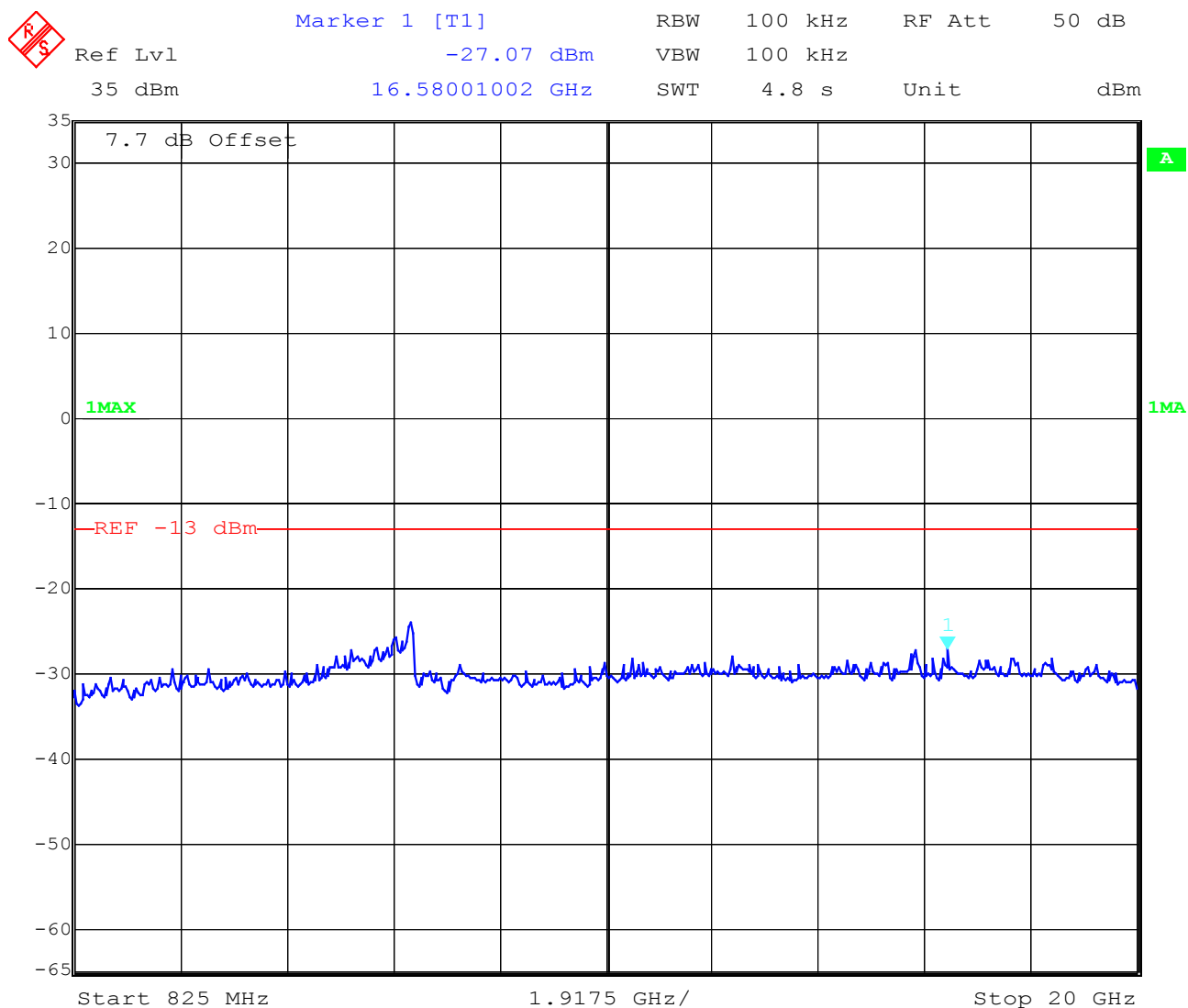
Date: 15.OCT.2003 14:47:37

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17 – 24, 64

Channel 128



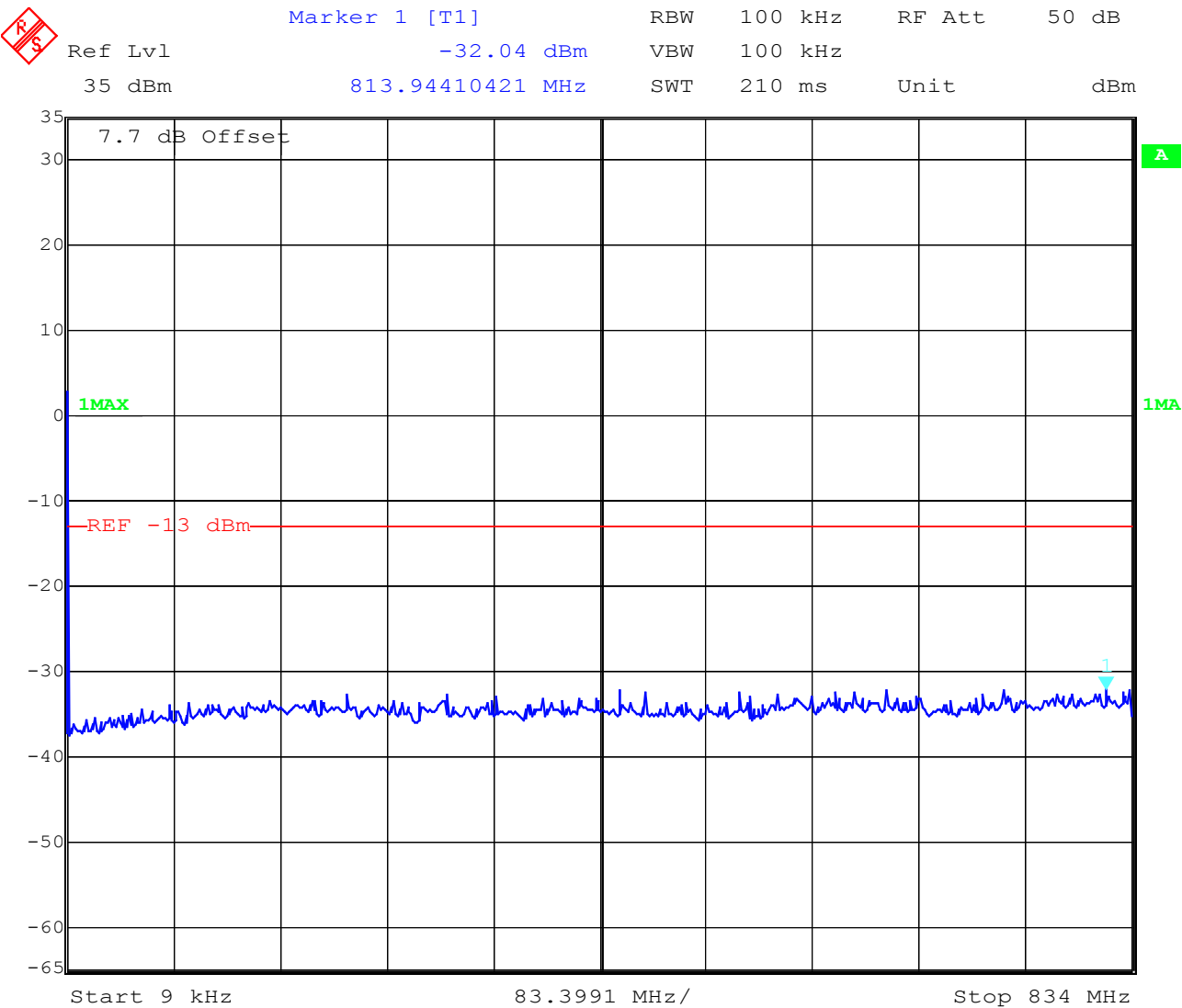
Date: 15.OCT.2003 14:48:17

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17 – 24, 64

Channel 189



Date: 15.OCT.2003 14:48:41

Channel 189



Marker 1 [T1]

RBW 100 kHz RF Att 50 dB

Ref Lvl -27.70 dBm

VBW 100 kHz

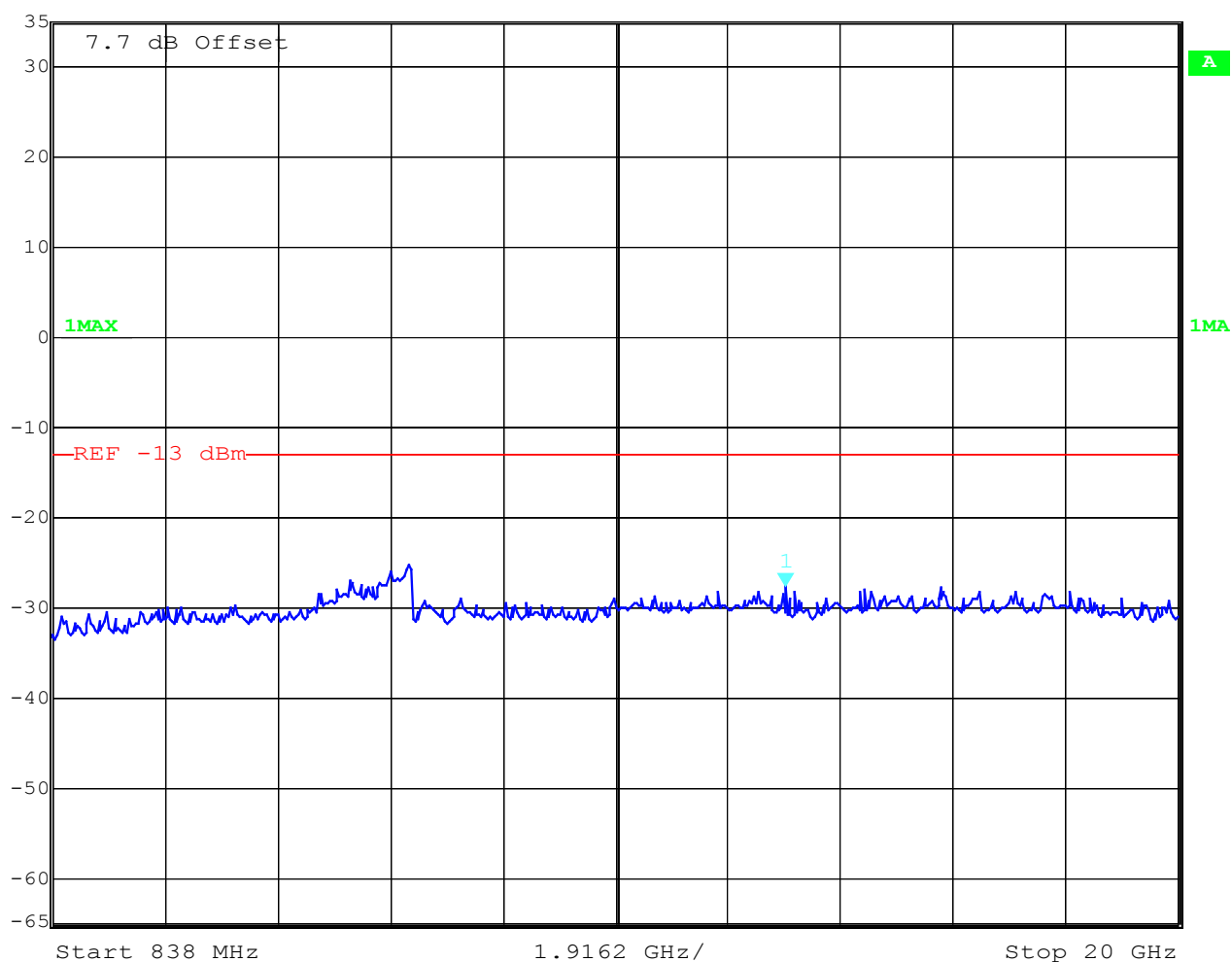
35 dBm

13.31826052 GHz

SWT 4.8 s

Unit

dBm



Date: 15.OCT.2003 14:50:14

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17 – 24, 64

Channel 251

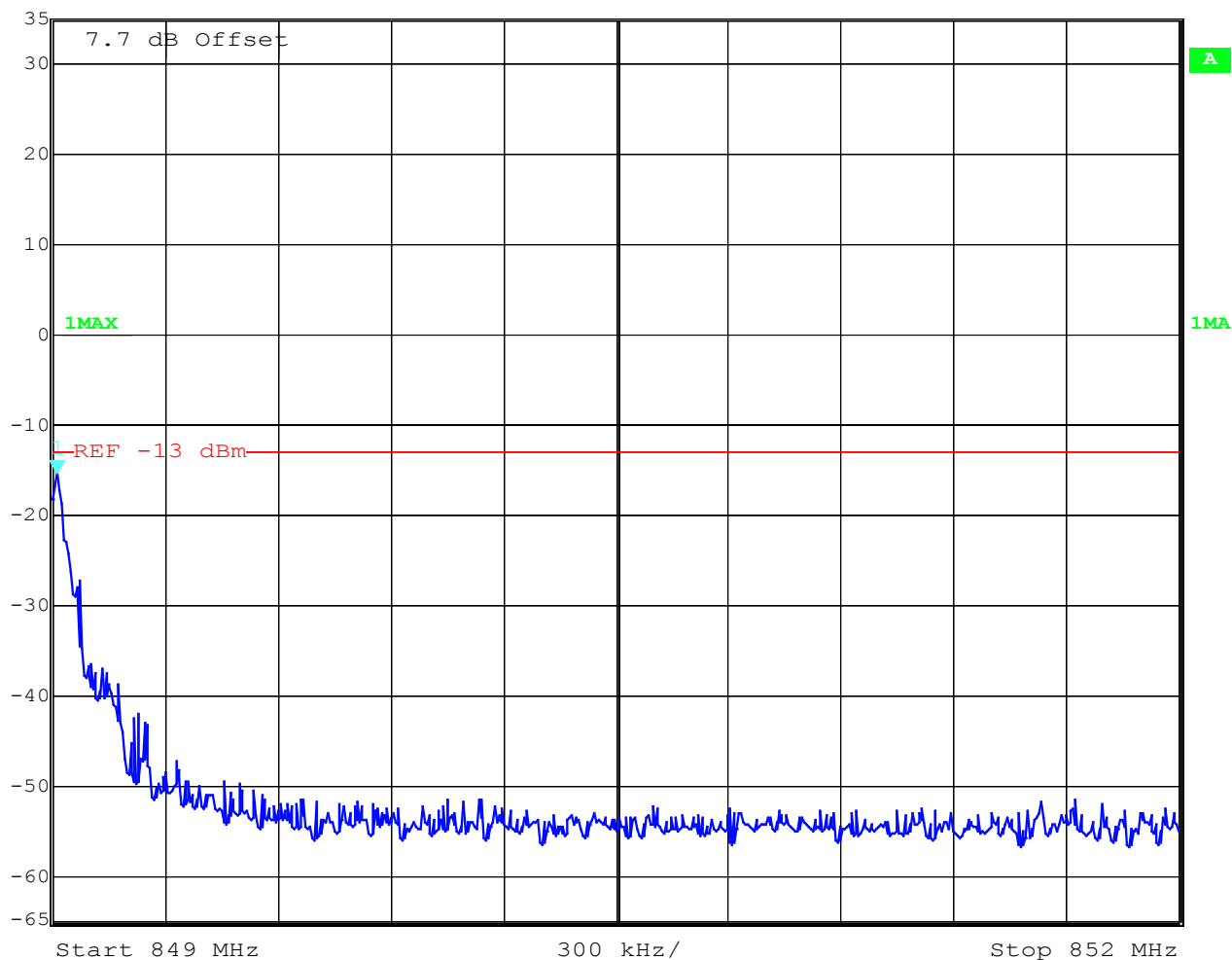


Date: 15.OCT.2003 14:51:15

Channel 251



Marker 1 [T1] RBW 3 kHz RF Att 50 dB
 Ref Lvl -15.31 dBm VBW 3 kHz
 35 dBm 849.01202405 MHz SWT 840 ms Unit dBm



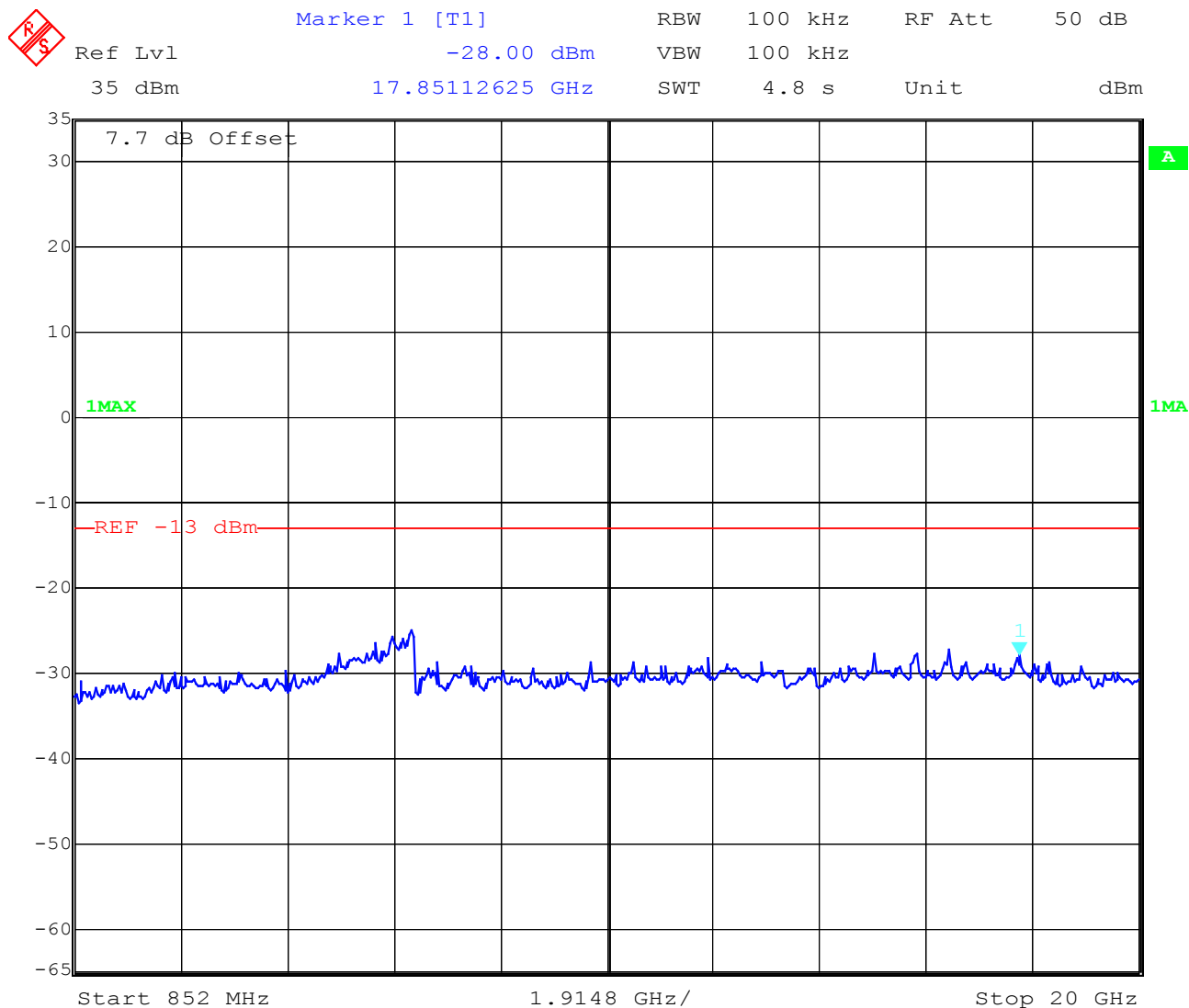
Date: 15.OCT.2003 14:51:57

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17 – 24, 64

Channel 251



Date: 15.OCT.2003 14:52:38

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17 - 24, 64

OCCUPIED BANDWIDTH**§2.989****Occupied Bandwidth Results**

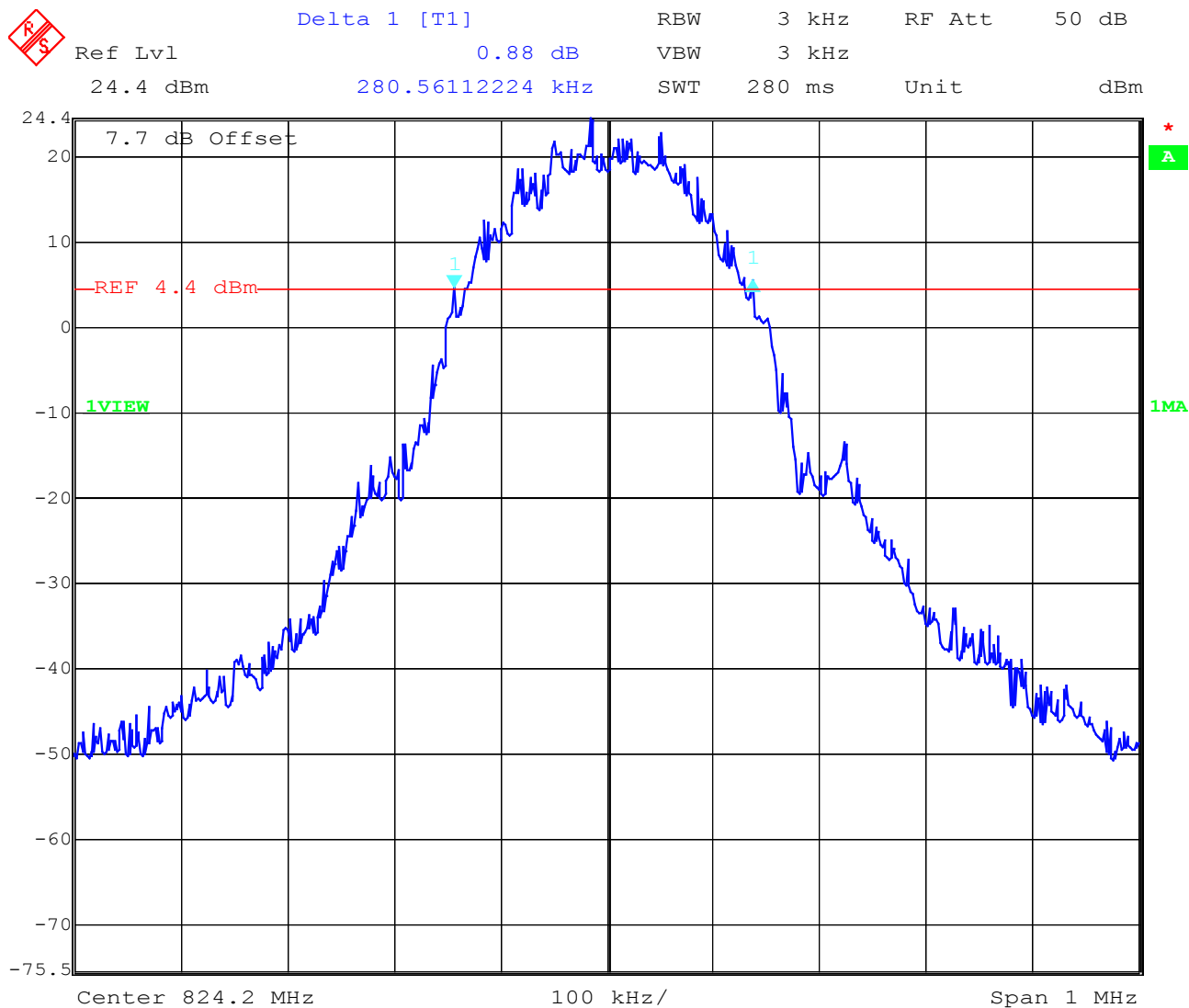
Similar to conducted emissions, occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the USPCS frequency band. Table 8.2 below lists the measured 99% power and -26dBC occupied bandwidths. Spectrum analyzer plots are included on the following pages.

Frequency	99% Occupied Bandwidth	-26 dBc Bandwidth
824.2 MHz	280.561	306.613
836.4 MHz	274.549	312.625
848.8 MHz	286.573	314.629

Part 24.238 (a) requires a measurement bandwidth of at least 1% of the occupied bandwidth. For ca. 290 kHz, this equates to a resolution bandwidth of at least 2.9 kHz. For this testing, a resolution bandwidth 3.0 kHz was used.

Channel 128

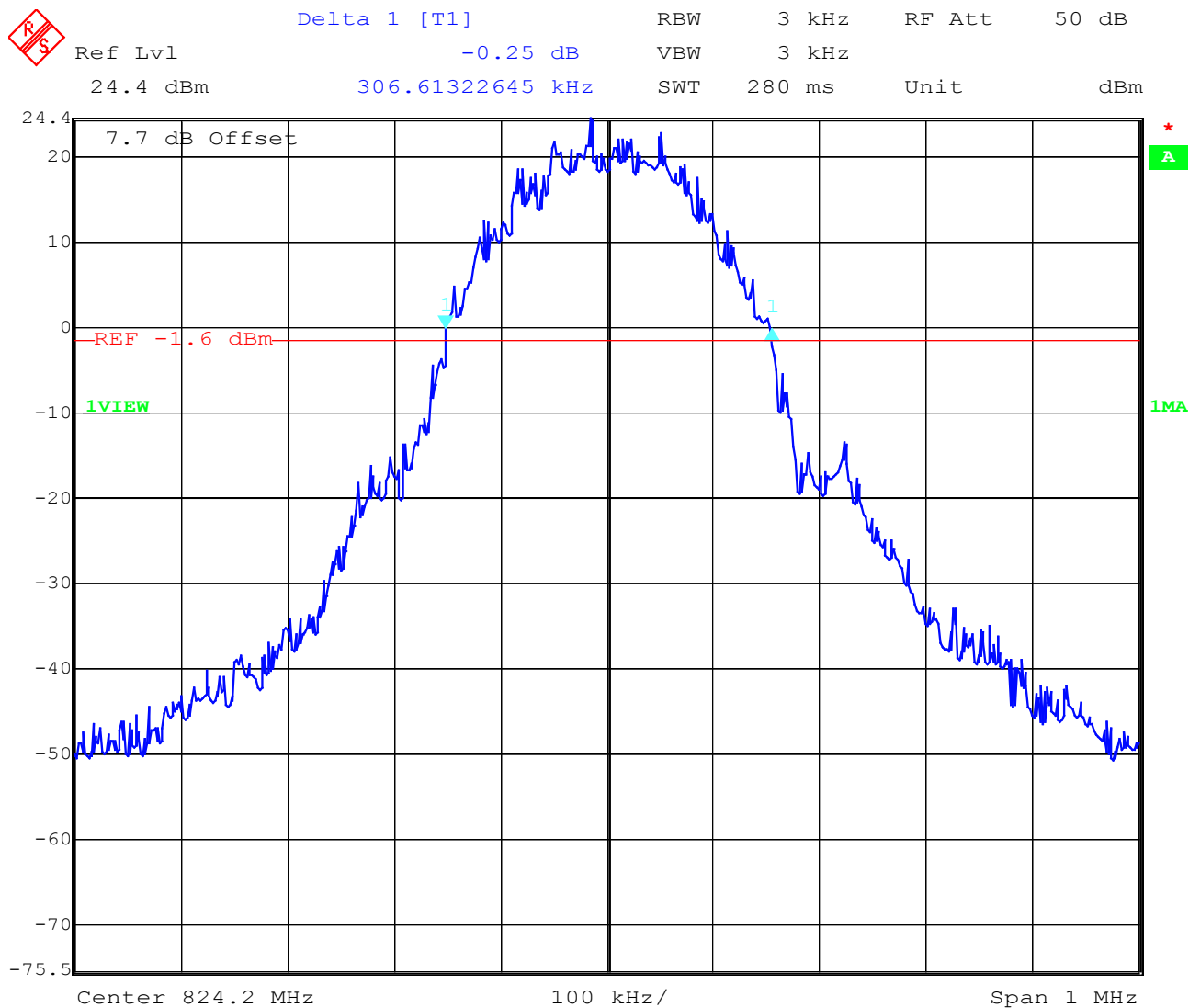
99% Occupied Bandwidth



Date: 15.OCT.2003 14:56:44

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Channel 128 -26 dBc Bandwidth

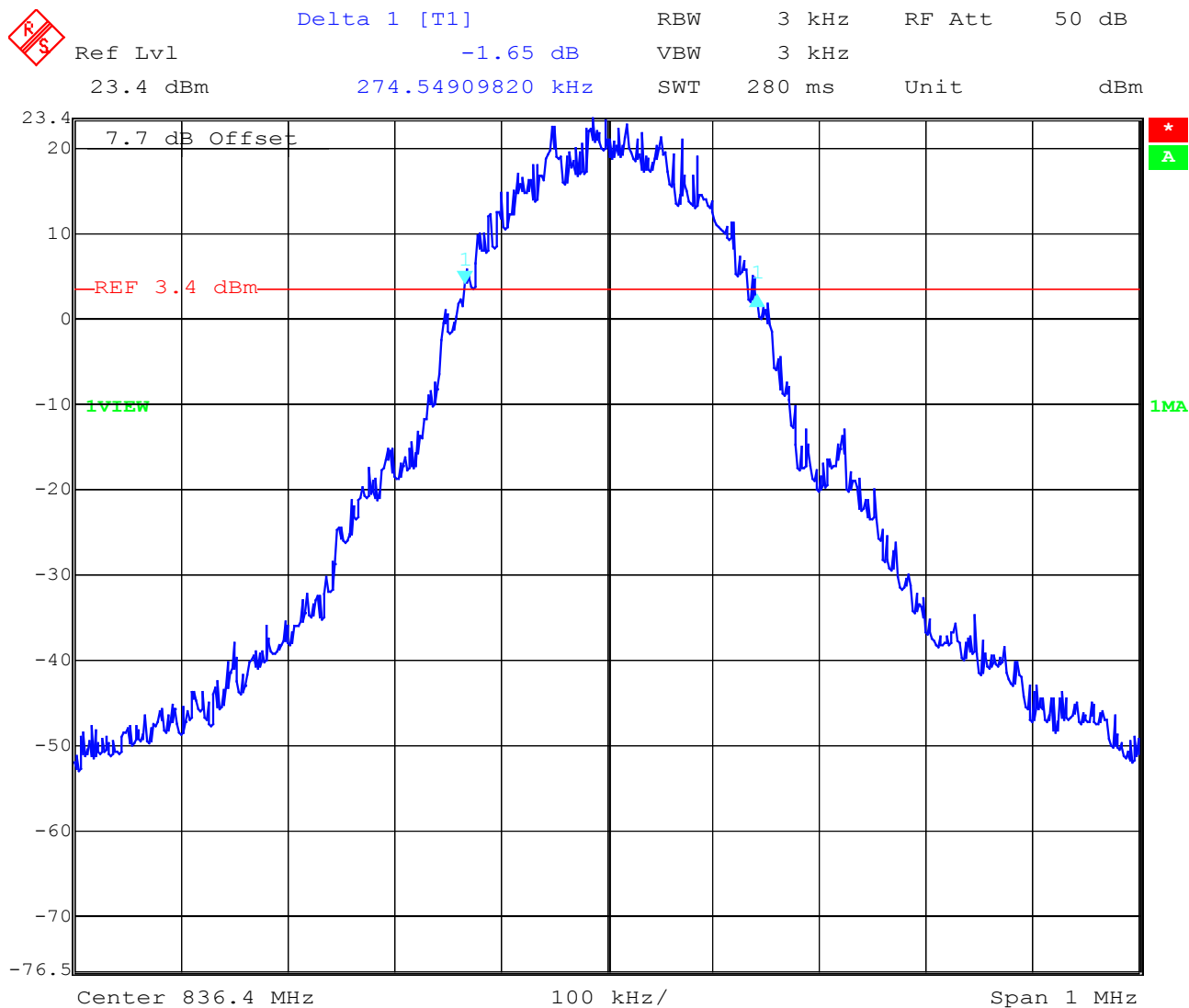


Date: 15.OCT.2003 15:01:51

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Channel 189

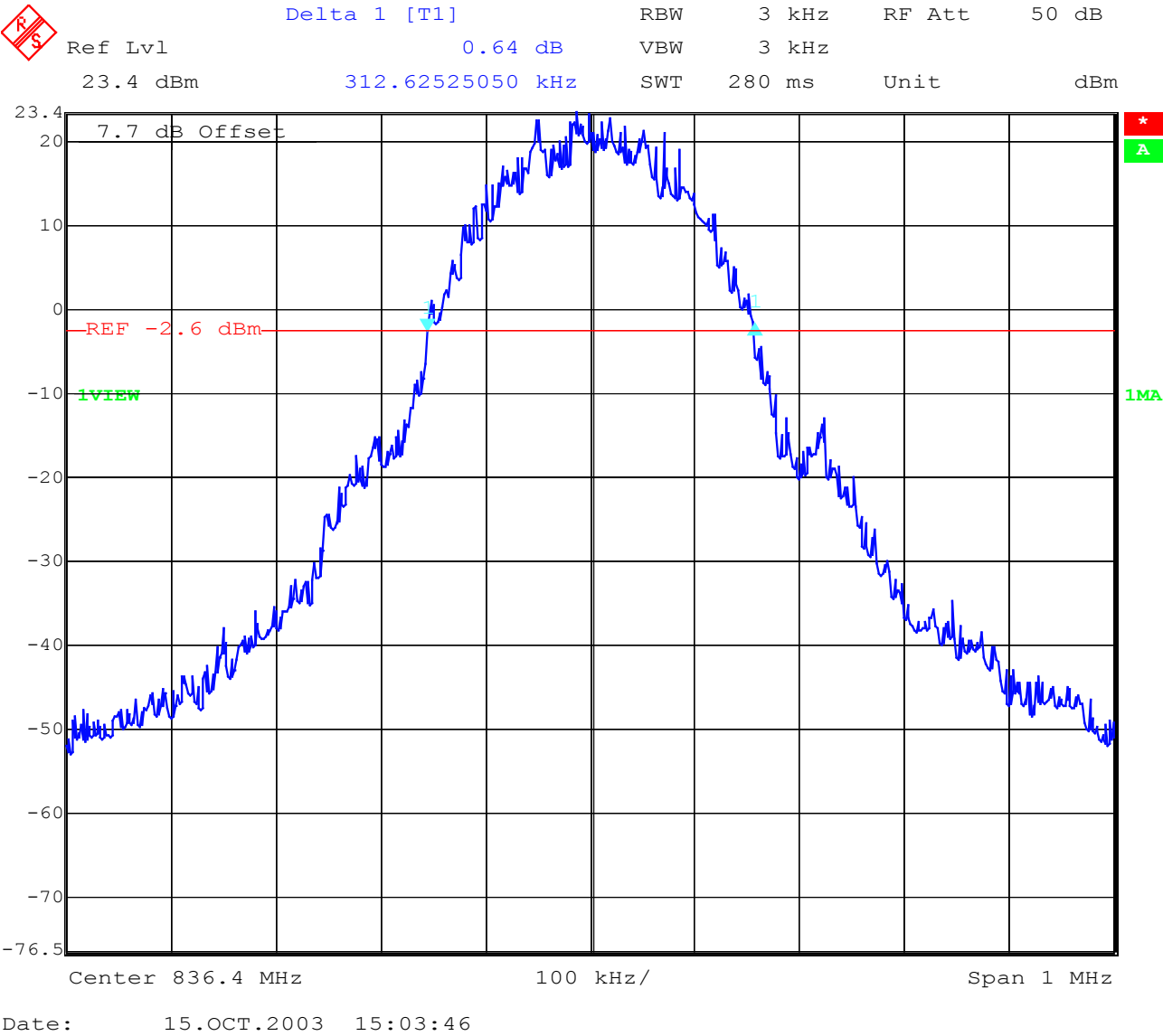
99% Occupied Bandwidth



Date: 15.OCT.2003 15:03:09

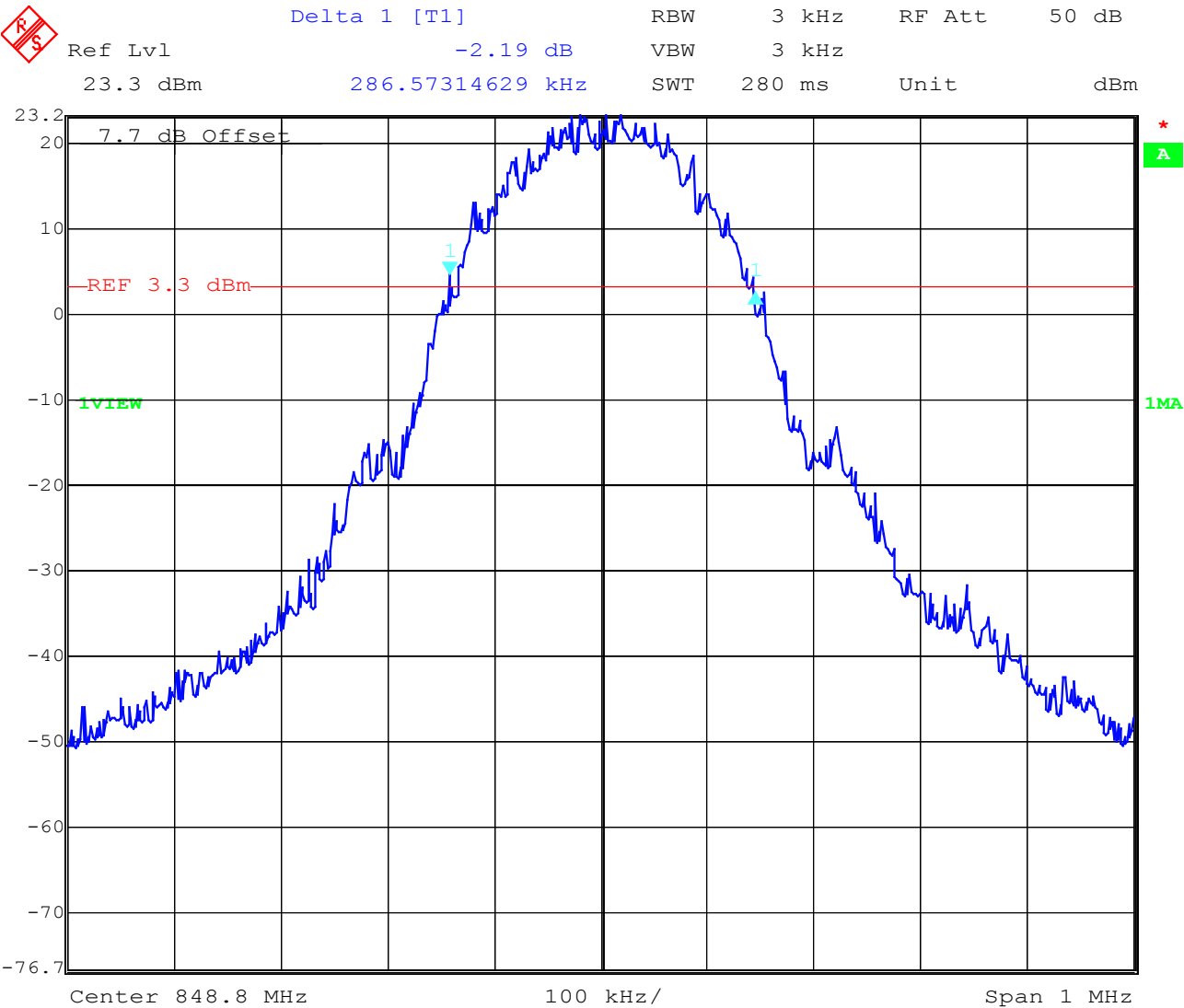
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Channel 189
-26 dBc Bandwidth



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

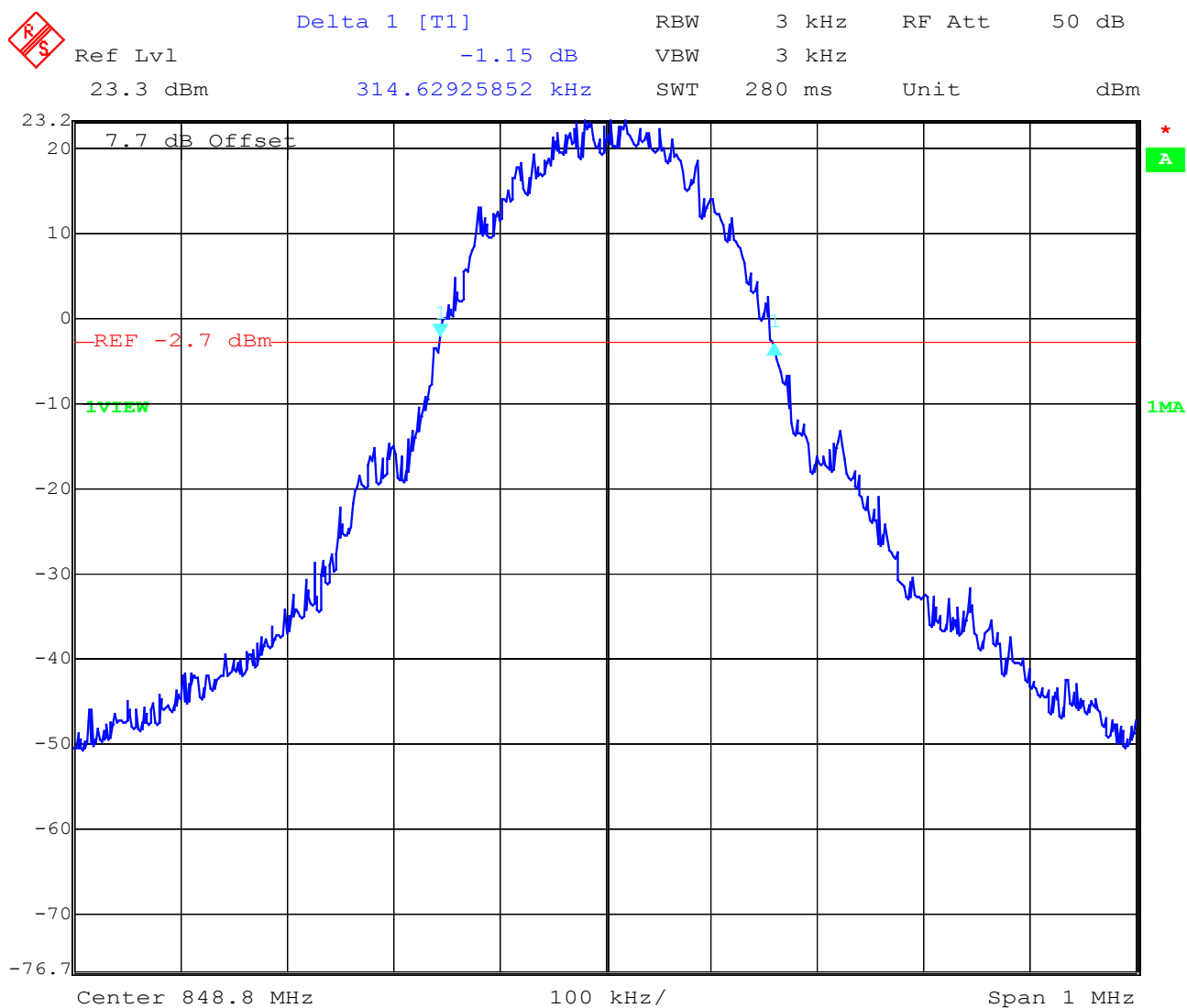
Channel 251
99% Occupied Bandwidth



Date: 15.OCT.2003 15:05:23

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Channel 251 -26 dBc Bandwidth



Date: 15.OCT.2003 15:06:16

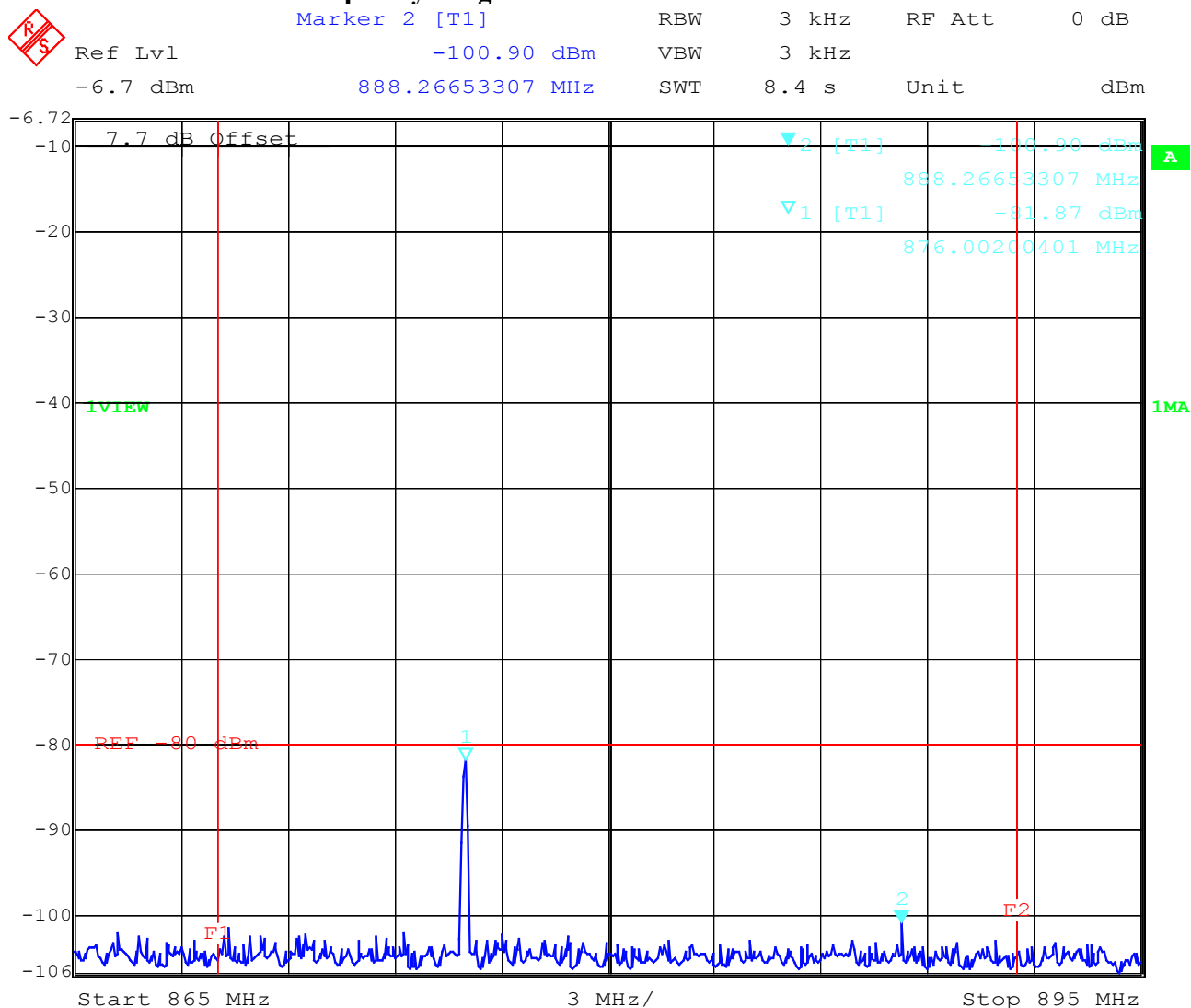
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

EMISSION LIMITATIONS FOR CELLULAR §22.917(F)

Mobile emissions in the base frequency range

As you can see in the following plots, all peaks are below –80 dBm in the base frequency range.

Idle Mode base station frequency range A



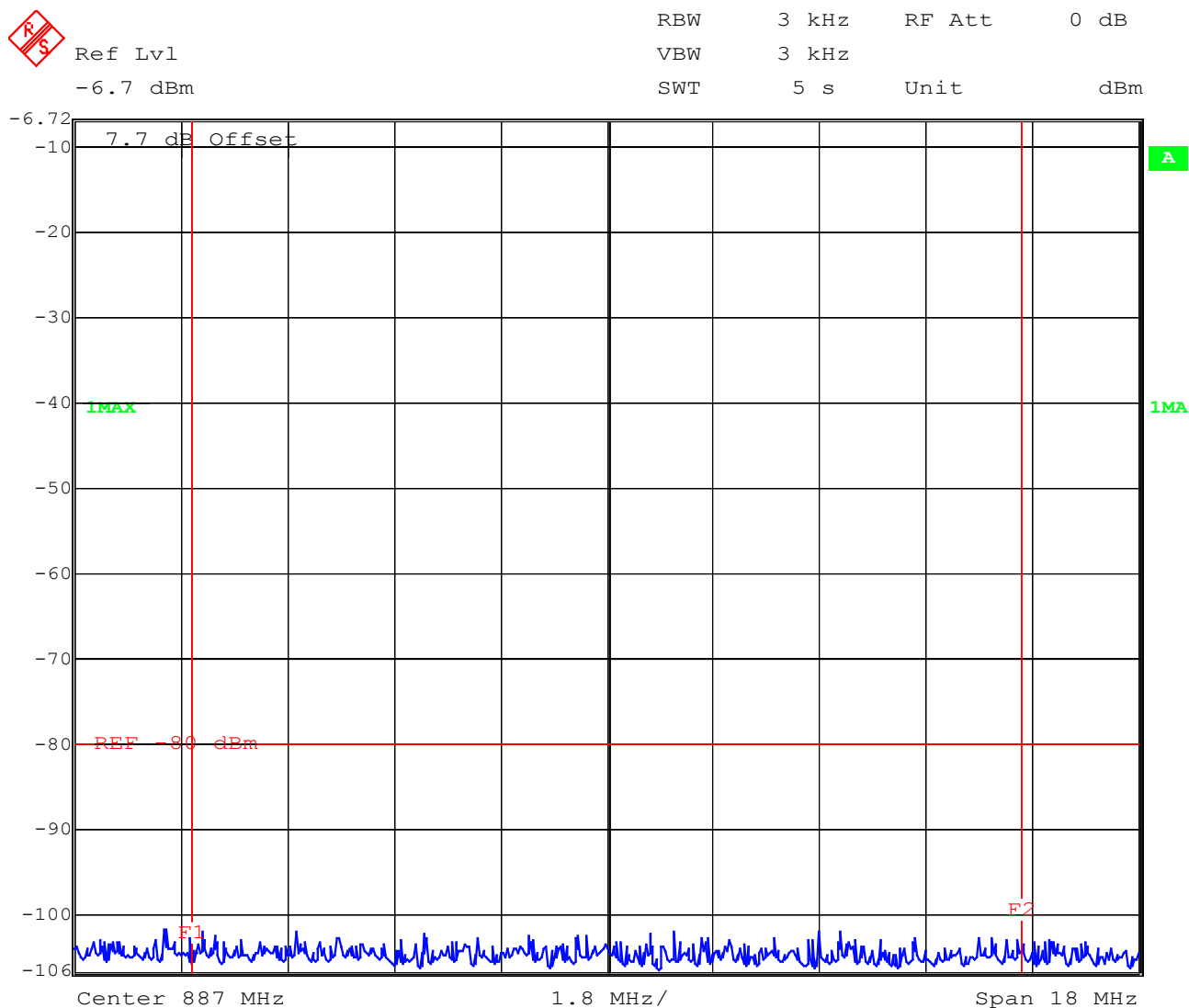
Date: 15.OCT.2003 15:39:05

LIMITS §22.917(f)

The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitters operated must be attenuated to a level not to exceed –80dBm at the transmitter antenna connector

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Mobile emissions in the base frequency range Idle Mode base station frequency range B



Date: 15.OCT.2003 15:36:53

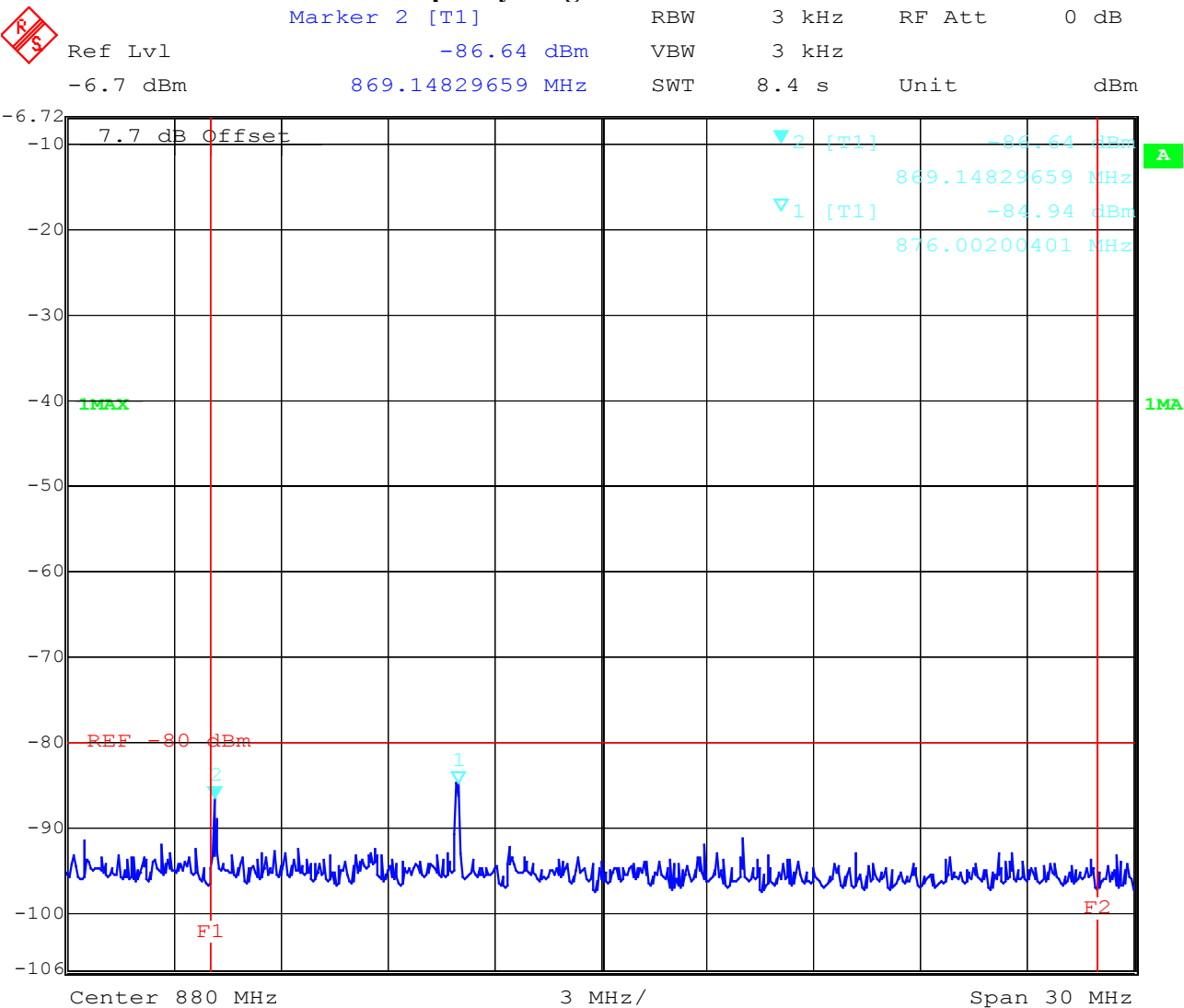
LIMITS

§22.917(f)

The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitters operated must be attenuated to a level not to exceed -80dBm at the transmitter antenna connector

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Mobile emissions in the base frequency range
TX Mode CH 128 base station frequency range A



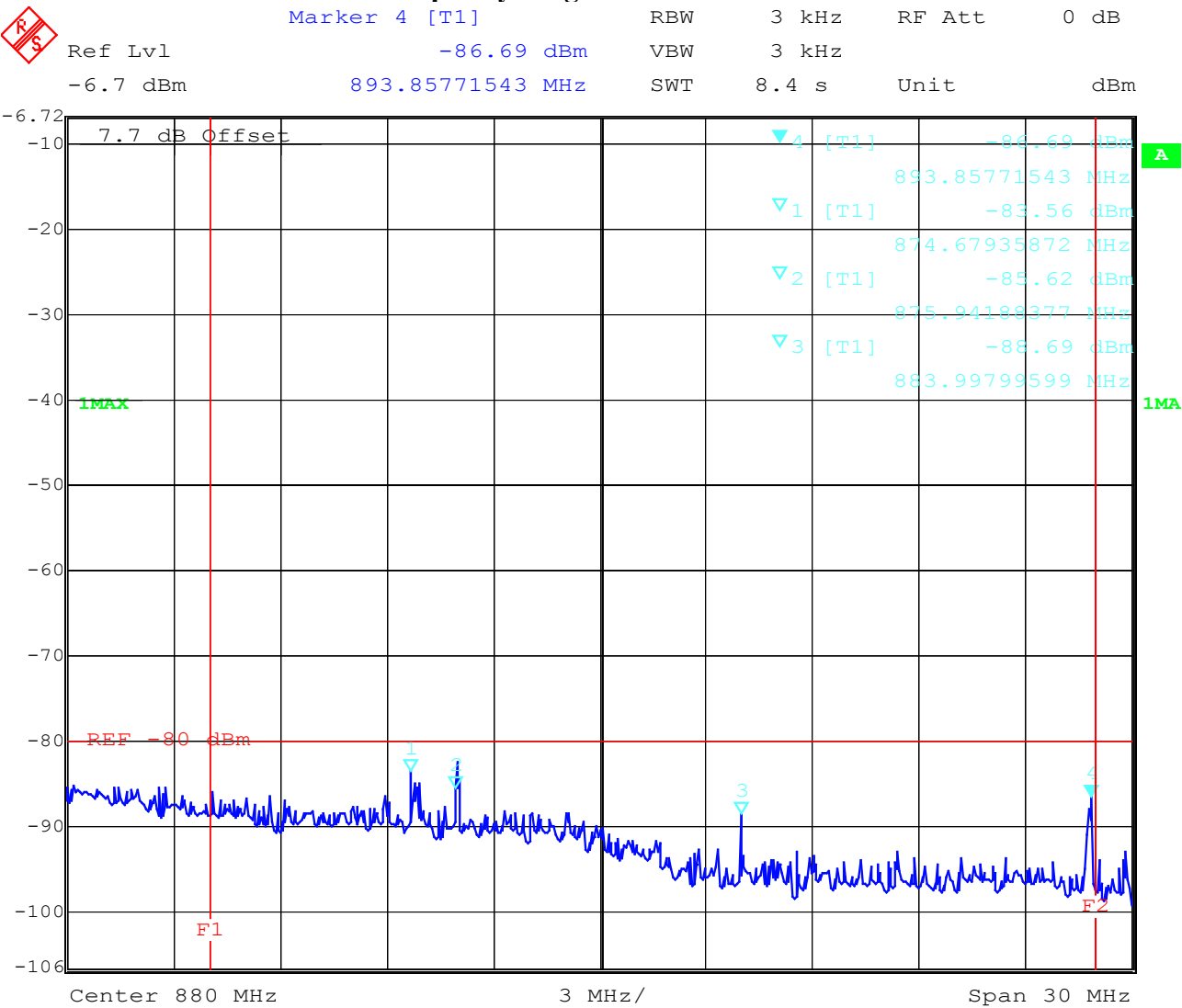
Date: 15.OCT.2003 15:18:20

LIMITS §22.917(f)

The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitters operated must be attenuated to a level not to exceed -80dBm at the transmitter antenna connector

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Mobile emissions in the base frequency range
TX Mode CH 251 base station frequency range A



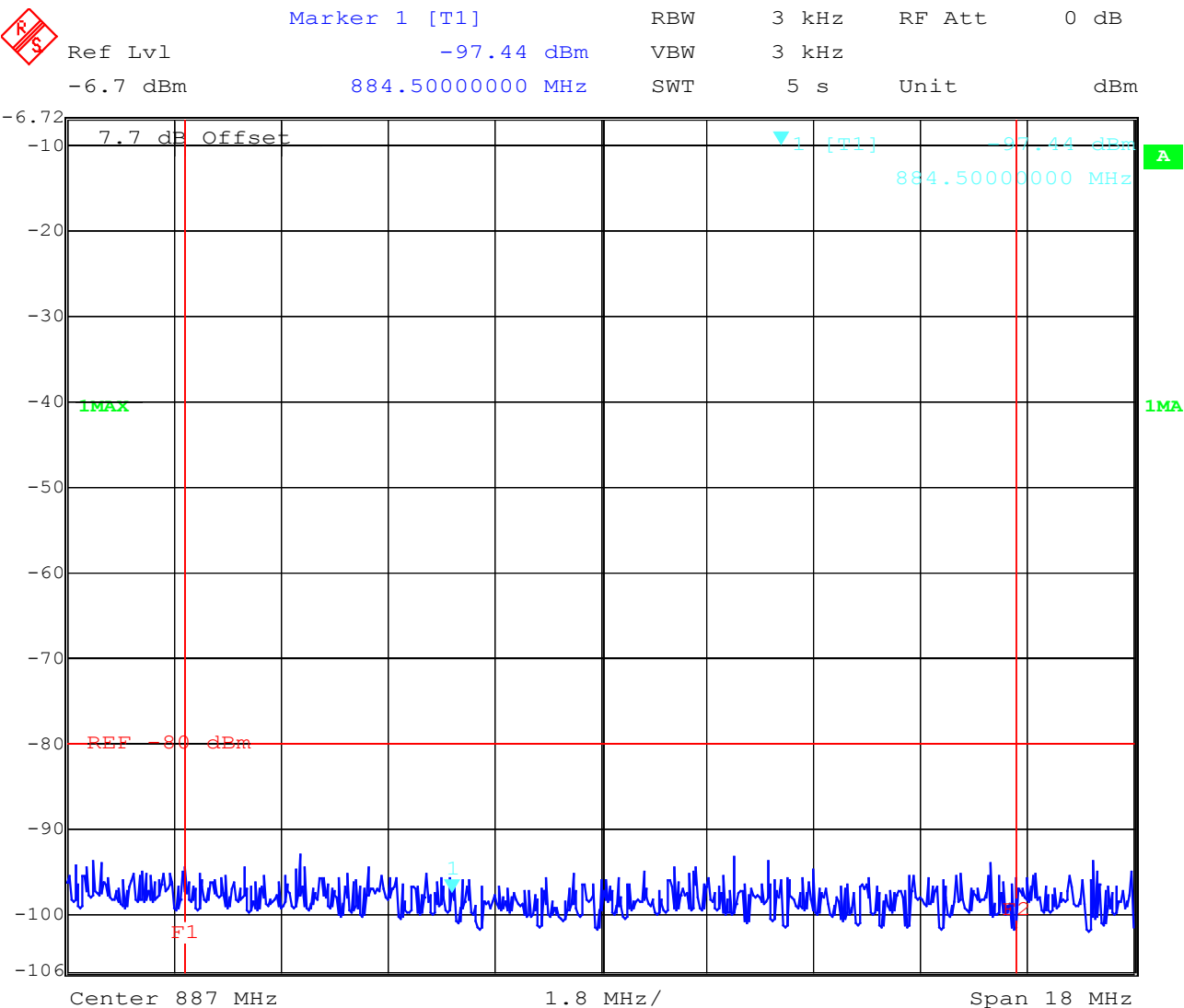
Date: 15.OCT.2003 15:29:29

LIMITS §22.917(f)

The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitters operated must be attenuated to a level not to exceed -80dBm at the transmitter antenna connector

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Mobile emissions in the base frequency range
TX Mode CH 128 base station frequency range B



Date: 15.OCT.2003 15:35:16

LIMITS

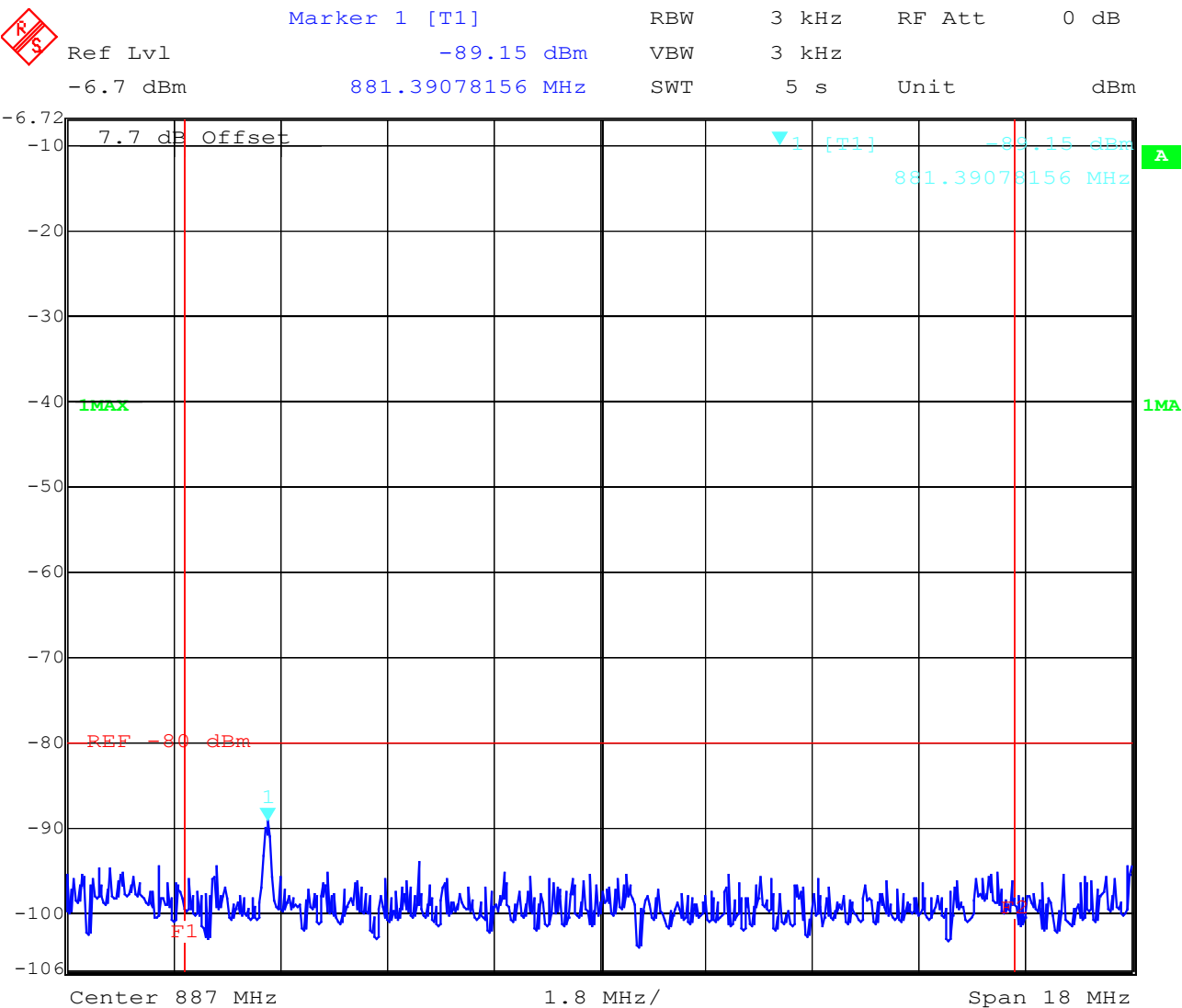
§22.917(f)

The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitters operated must be attenuated to a level not to exceed -80dBm at the transmitter antenna connector

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Mobile emissions in the base frequency range

TX Mode CH 189 base station frequency range B



Date: 15.OCT.2003 15:34:22

LIMITS

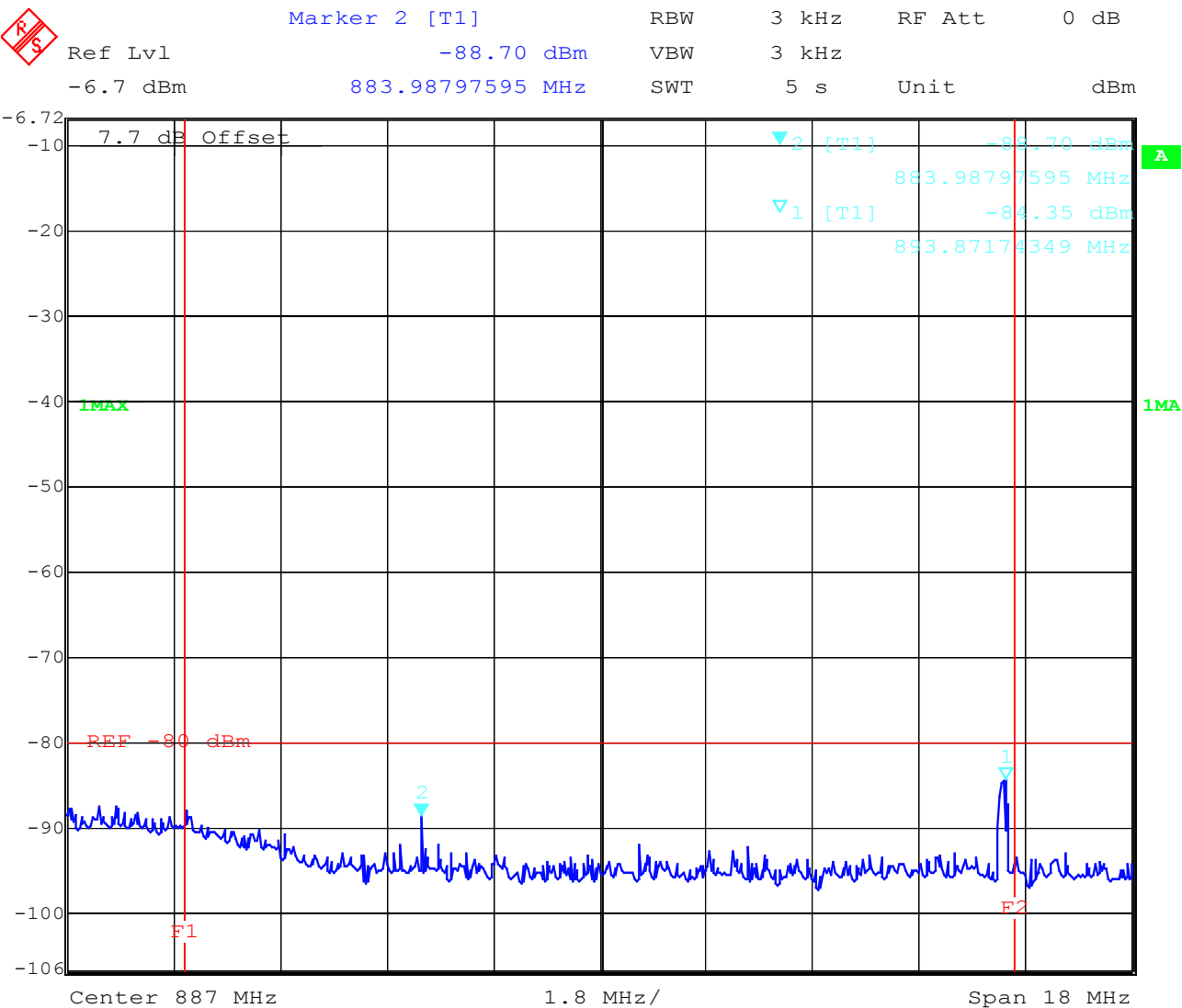
§22.917(f)

The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitters operated must be attenuated to a level not to exceed -80dBm at the transmitter antenna connector

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Mobile emissions in the base frequency range

TX Mode CH 251 base station frequency range B



Date: 15.OCT.2003 15:33:14

LIMITS

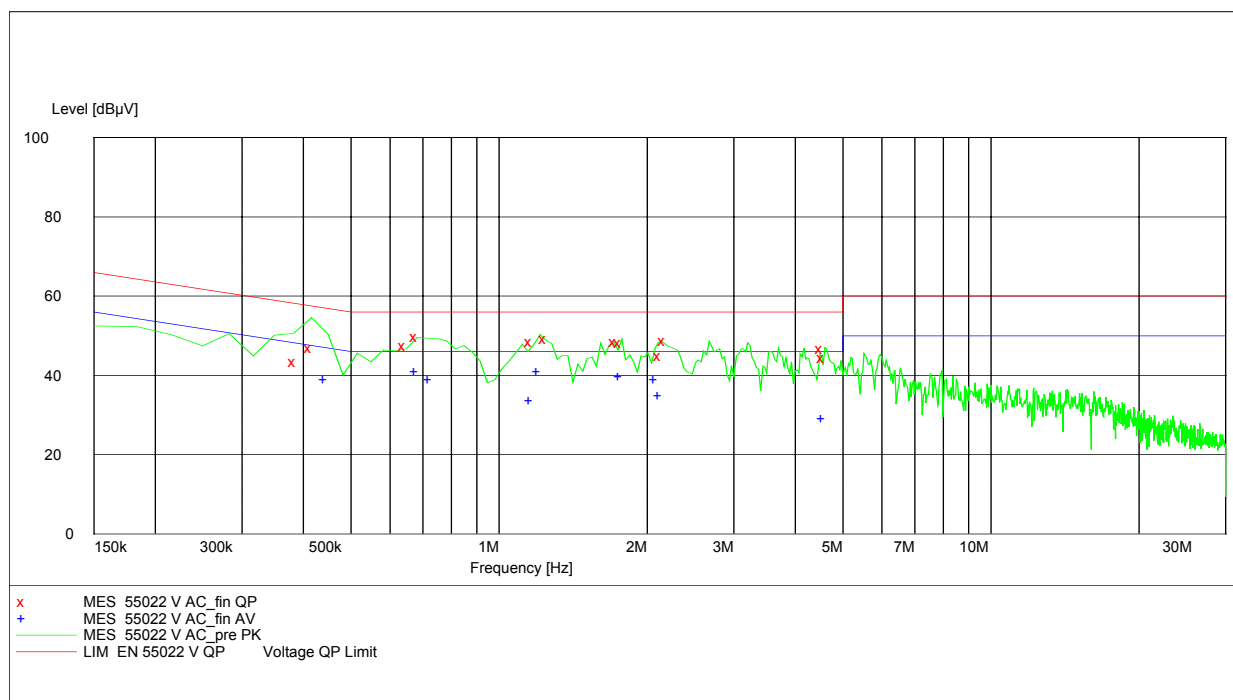
§22.917(f)

The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitters operated must be attenuated to a level not to exceed -80dBm at the transmitter antenna connector

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

CONDUCTED EMISSIONS**§ 15.107/207****SETUP 1:**

EUT: One Touch 331a
Manufacturer: Alcatel
Operating Condition: Traffic and idle mode, max hold
Test Site: Room 006
Operator:
Test Specification: CISPR 22
Comment: pass

**MEASUREMENT RESULT: "55022 V AC_fin QP"**

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.390000	43.30	10.6	58	14.8	L1	GND
0.420000	46.90	10.6	57	10.6	L1	GND
0.652500	47.50	10.4	56	8.5	L1	GND
0.690000	49.70	10.4	56	6.3	L1	GND
1.177500	48.60	10.3	56	7.4	L1	GND
1.260000	49.30	10.3	56	6.7	L1	GND
1.747500	48.60	10.4	56	7.4	L1	GND
1.792500	48.10	10.4	56	7.9	L1	GND
2.152500	45.00	10.4	56	11.0	L1	GND
2.197500	48.80	10.4	56	7.2	L1	GND
4.597500	46.80	10.5	56	9.2	L1	FLO
4.635000	44.40	10.5	56	11.6	L1	FLO

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

52-63

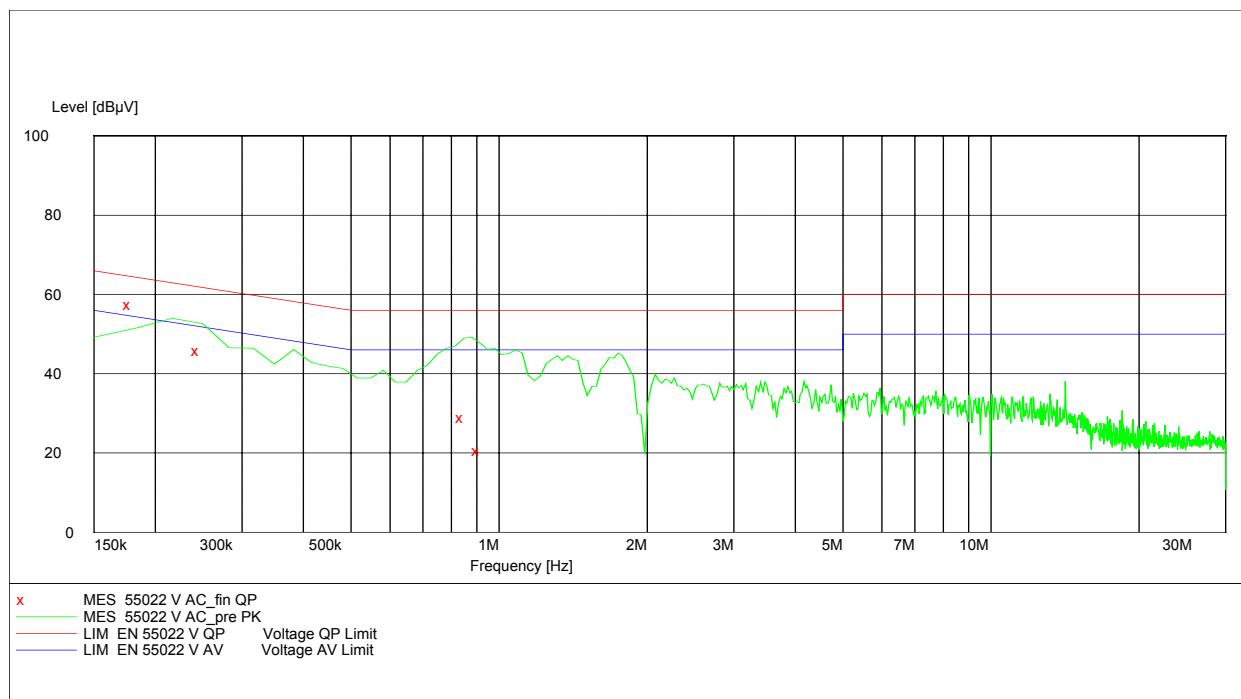
MEASUREMENT RESULT: "55022 V AC fin AV"

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.450000	38.90	10.4	47	8.0	L1	GND
0.690000	40.90	10.4	46	5.1	L1	GND
0.735000	38.90	10.4	46	7.1	L1	GND
1.177500	33.50	10.3	46	12.5	L1	GND
1.222500	40.90	10.3	46	5.1	L1	GND
1.792500	39.70	10.4	46	6.3	L1	GND
2.115000	38.90	10.4	46	7.1	L1	GND
2.152500	34.80	10.4	46	11.2	L1	GND
4.635000	29.20	10.5	46	16.8	L1	FLO

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED**(for reference numbers see test equipment listing)**

SETUP 2:

EUT: One Touch 331a
 Manufacturer: Alcatel
 Operating Condition: Traffic and idle mode, max hold
 Test Site: Room 006
 Operator:
 Test Specification: CISPR 22
 Comment: pass



MEASUREMENT RESULT: "55022 V AC_fin QP"

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.180000	57.30	11.3	65	7.2	L1	FLO
0.247500	45.80	10.9	62	16.0	L1	FLO
0.855000	28.80	10.5	56	27.2	L1	FLO
0.922500	20.60	10.4	56	35.4	L1	FLO

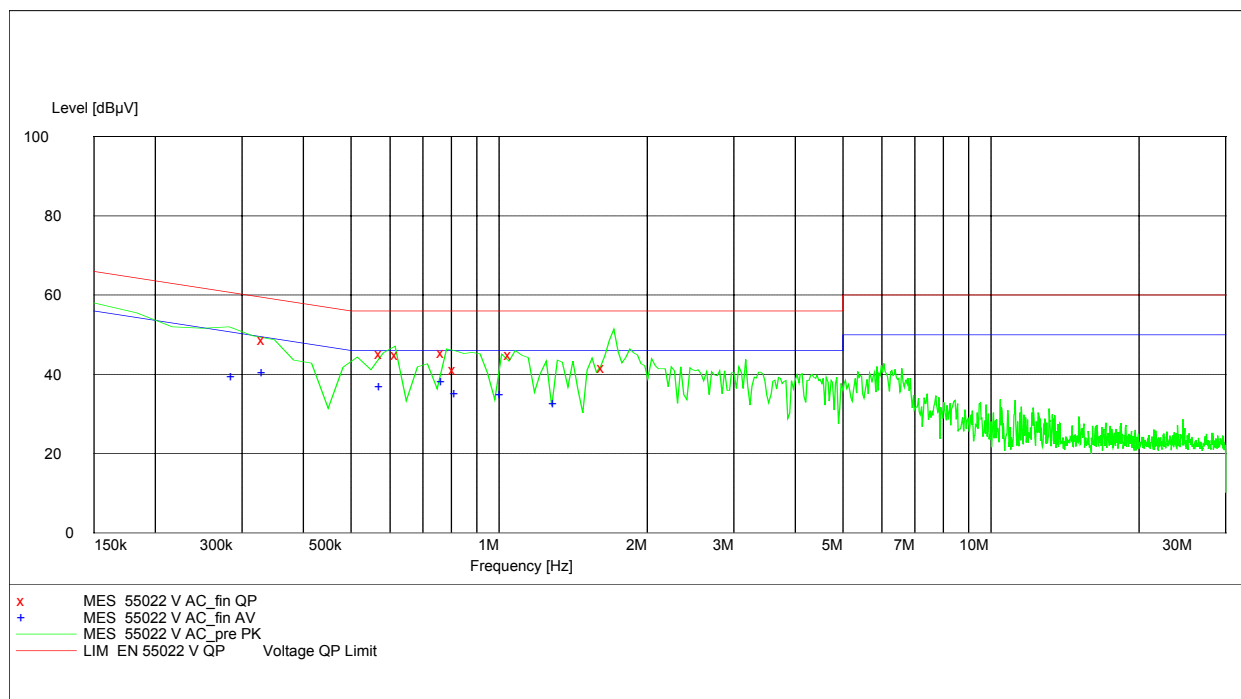
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

52-63

SETUP 3:

EUT: One Touch 331a
 Manufacturer: Alcatel
 Operating Condition: Traffic and idle mode, max hold
 Test Site: Room 006
 Operator:
 Test Specification: CISPR 22
 Comment: pass

**MEASUREMENT RESULT: "55022 V AC_fin QP"**

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.337500	48.70	10.7	59	10.6	L1	FLO
0.585000	45.10	10.4	56	10.9	L1	FLO
0.630000	45.00	10.4	56	11.0	L1	FLO
0.780000	45.50	10.4	56	10.5	L1	FLO
0.825000	41.20	10.5	56	14.8	L1	FLO
1.072500	44.90	10.3	56	11.1	L1	GND
1.657500	41.70	10.4	56	14.3	L1	GND

MEASUREMENT RESULT: "55022 V AC_fin AV"

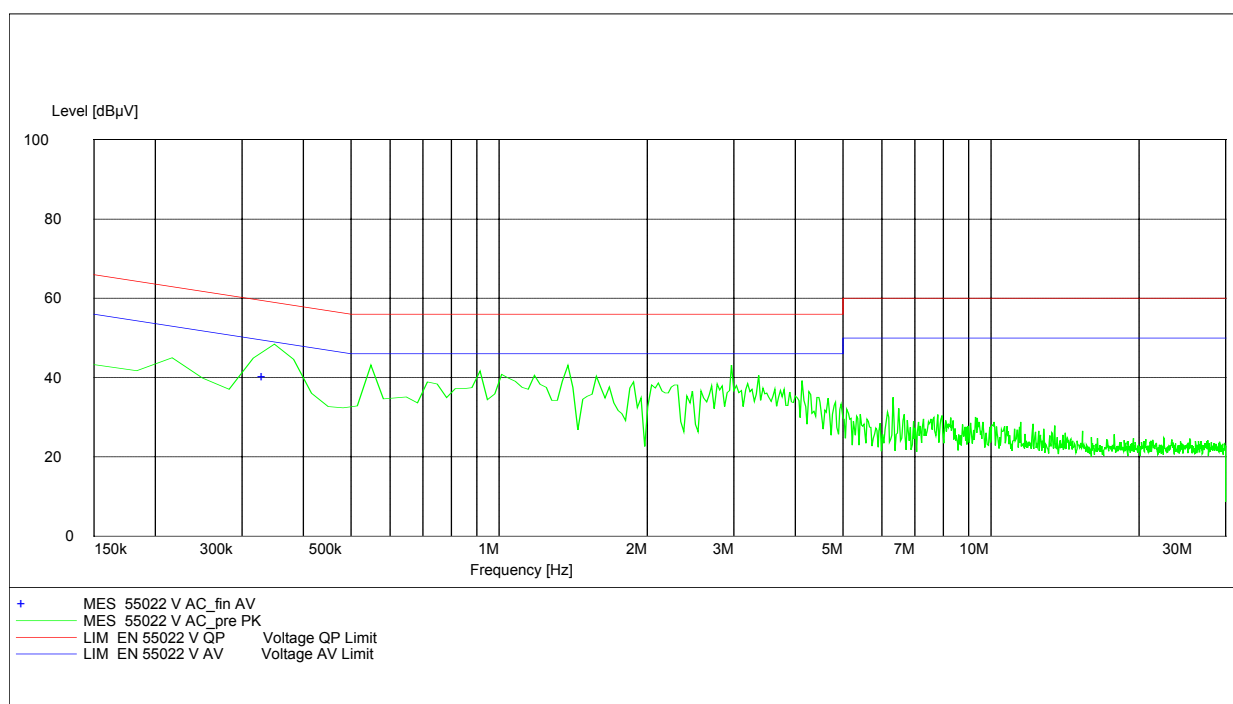
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.292500	39.40	10.7	51	11.0	L1	FLO
0.337500	40.40	10.7	49	8.9	L1	FLO
0.585000	37.00	10.4	46	9.0	L1	FLO
0.780000	38.10	10.4	46	7.9	L1	FLO
0.832500	35.10	10.5	46	10.9	L1	FLO
1.027500	34.90	10.3	46	11.1	L1	GND
1.320000	32.50	10.3	46	13.5	L1	GND

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
 (for reference numbers see test equipment listing)

52-63

SETUP 4:

EUT: One Touch 331a
 Manufacturer: Alcatel
 Operating Condition: Traffic and idle mode, max hold
 Test Site: Room 006
 Operator:
 Test Specification: CISPR 22
 Comment: pass



MEASUREMENT RESULT: "55022 V AC_fin AV"

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.337500	40.20	10.7	49	9.1 N	FLO	

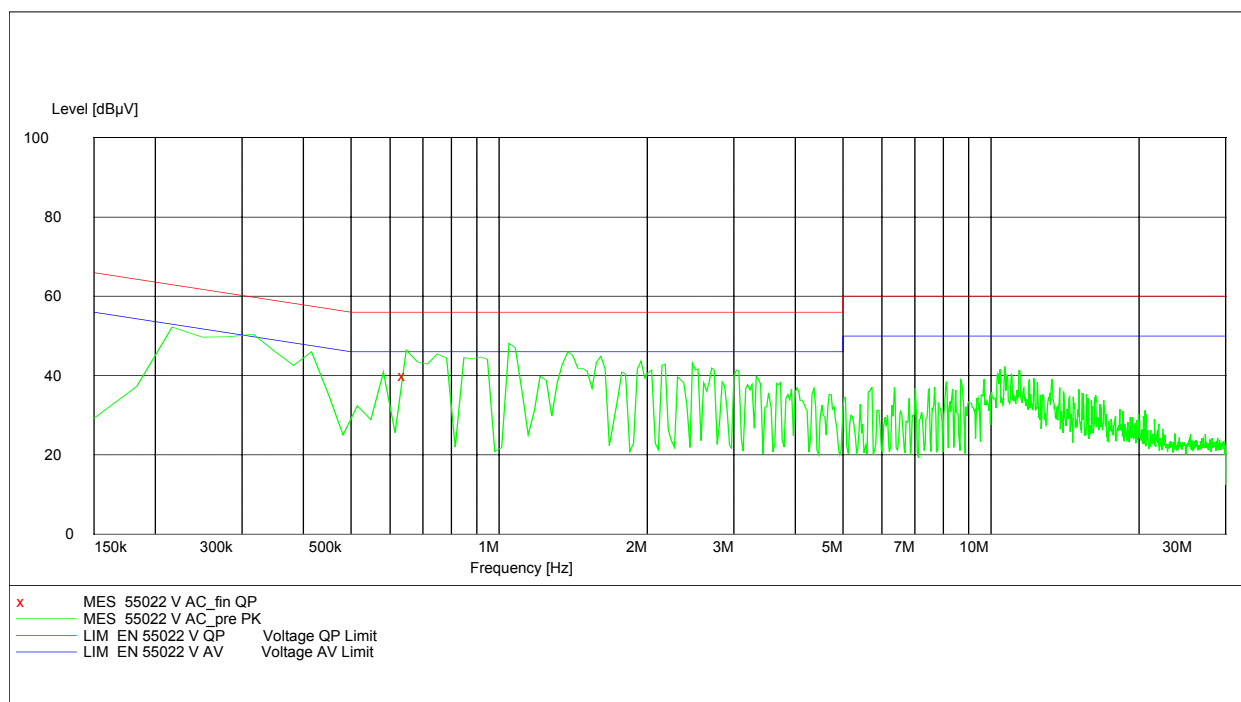
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

52-63

SETUP 5:

EUT: One Touch 331a
 Manufacturer: Alcatel
 Operating Condition: Traffic and idle mode, max hold
 Test Site: Room 006
 Operator:
 Test Specification: CISPR 22
 Comment: pass



MEASUREMENT RESULT: "55022 V AC_fin QP"

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.652500	39.90	10.4	56	16.1	L1	GND

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

Radiated emissions

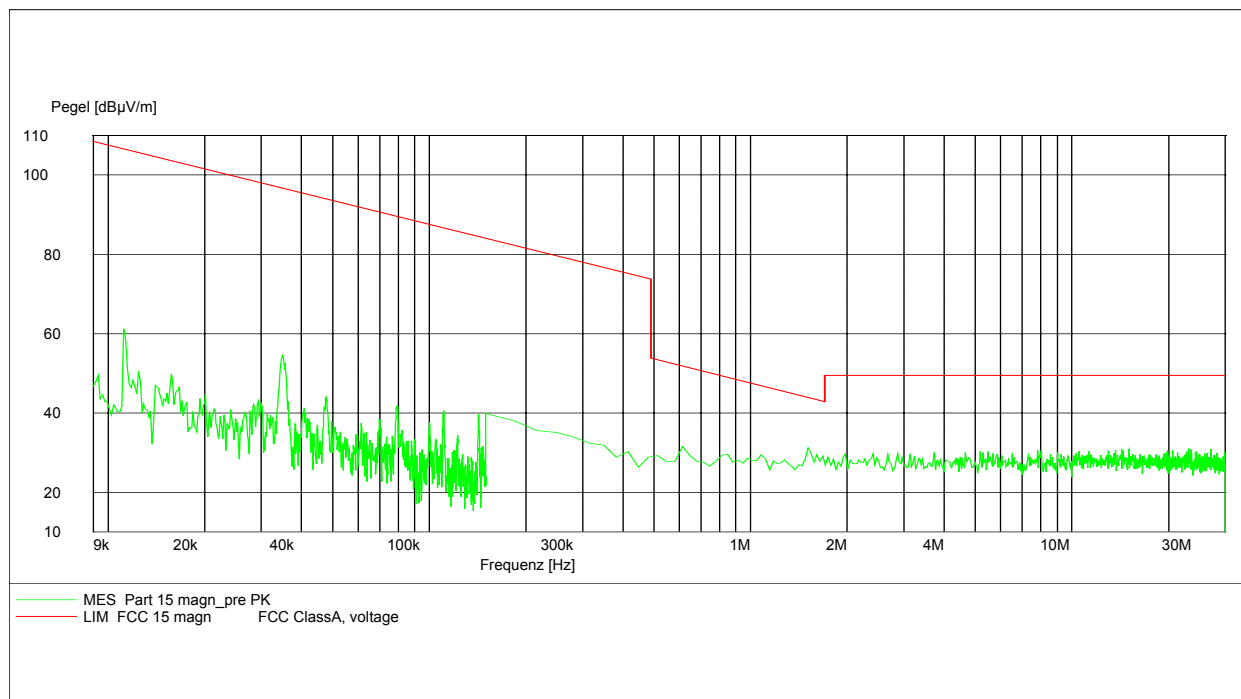
§ 15.109/209

Setup 1:

FCC Rule 47

Part 15 Magnetics

EUT:	One touch 331a
Manufacturer:	Alcatel
Operating Condition:	Traffic mode, GSM 850 and GSM 1900, max hold
Test Site:	Cetecom, Room 6
Operator:	
Test Specification:	SR Charger Leader 220V + Keyboard
Comment:	pass



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

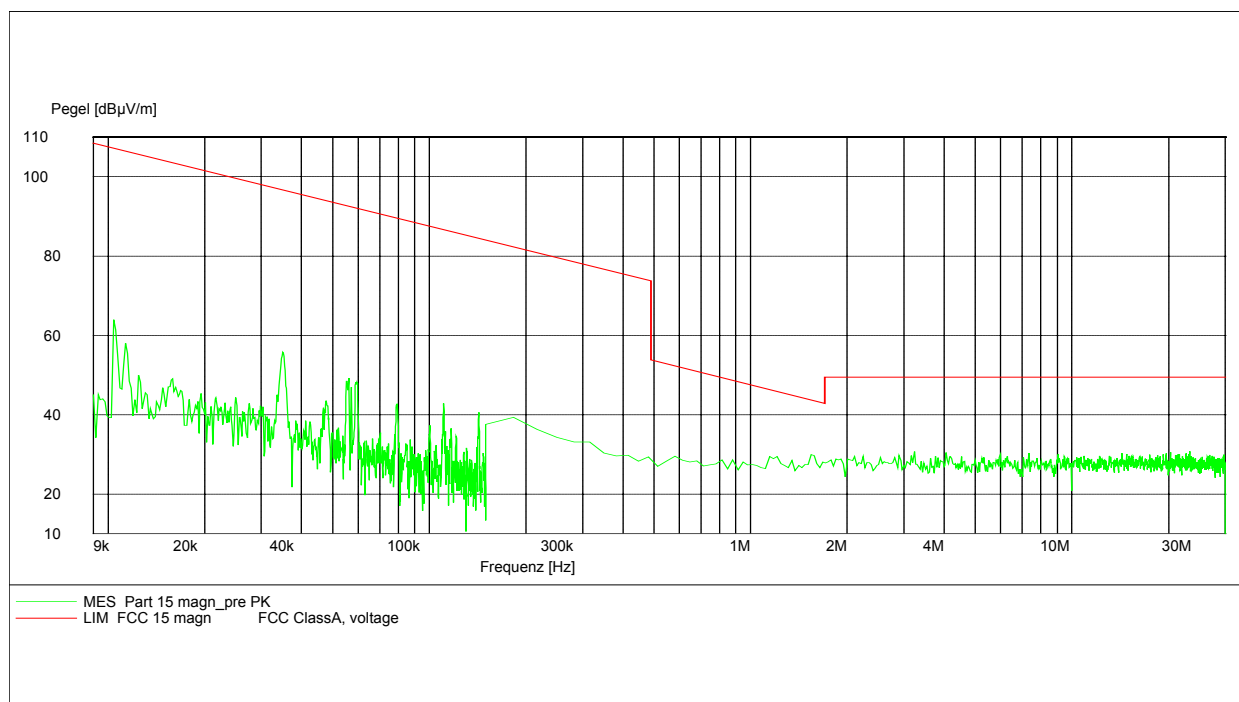
52-63

Setup 2:

FCC Rule 47

Part 15 Magnetics

EUT:	One touch 331a
Manufacturer:	Alcatel
Operating Condition:	Traffic mode, GSM 850 and GSM 1900, max hold
Test Site:	Cetecom, Room 6
Operator:	Ames
Test Specification:	SR Charger ASTEC 220V + Headset Merry
Comment:	pass



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

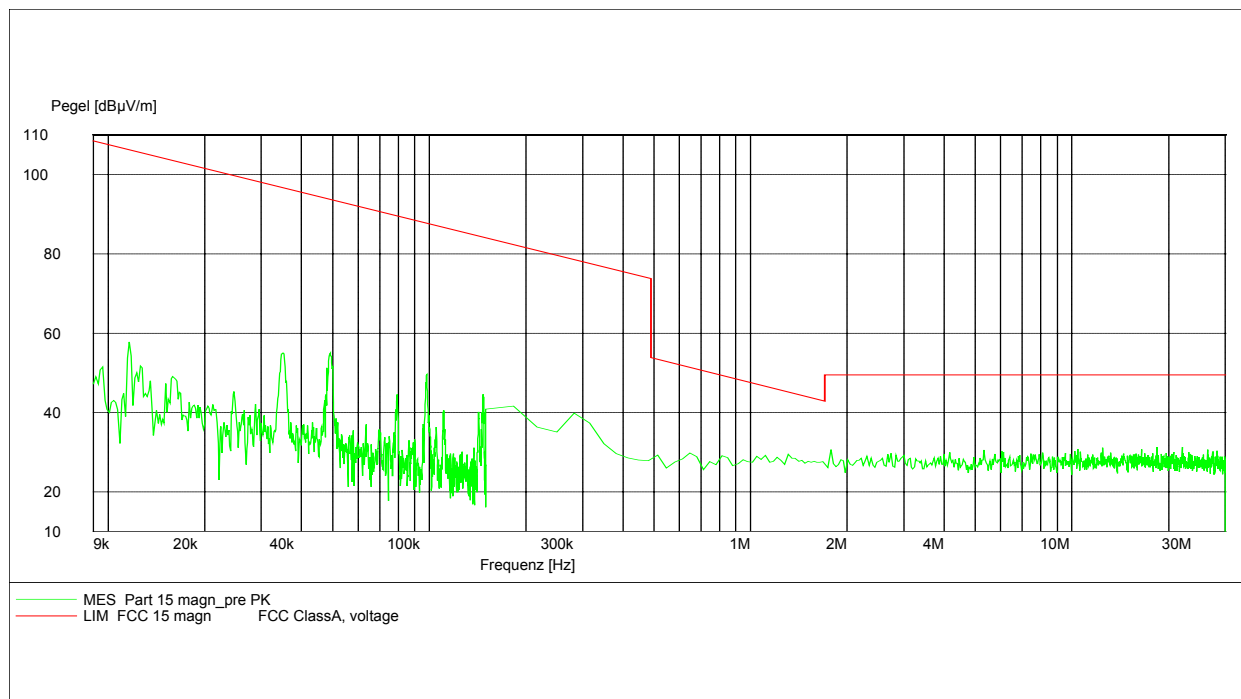
52-63

Setup 3:

FCC Rule 47

Part 15 Magnetics

EUT:	One touch 331a
Manufacturer:	Alcatel
Operating Condition:	Traffic mode, GSM 850 and GSM 1900, max hold
Test Site:	Cetecom, Room 6
Operator:	Ames
Test Specification:	Travel Charger Leader 110-220V + Headset Innovy
Comment:	pass



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

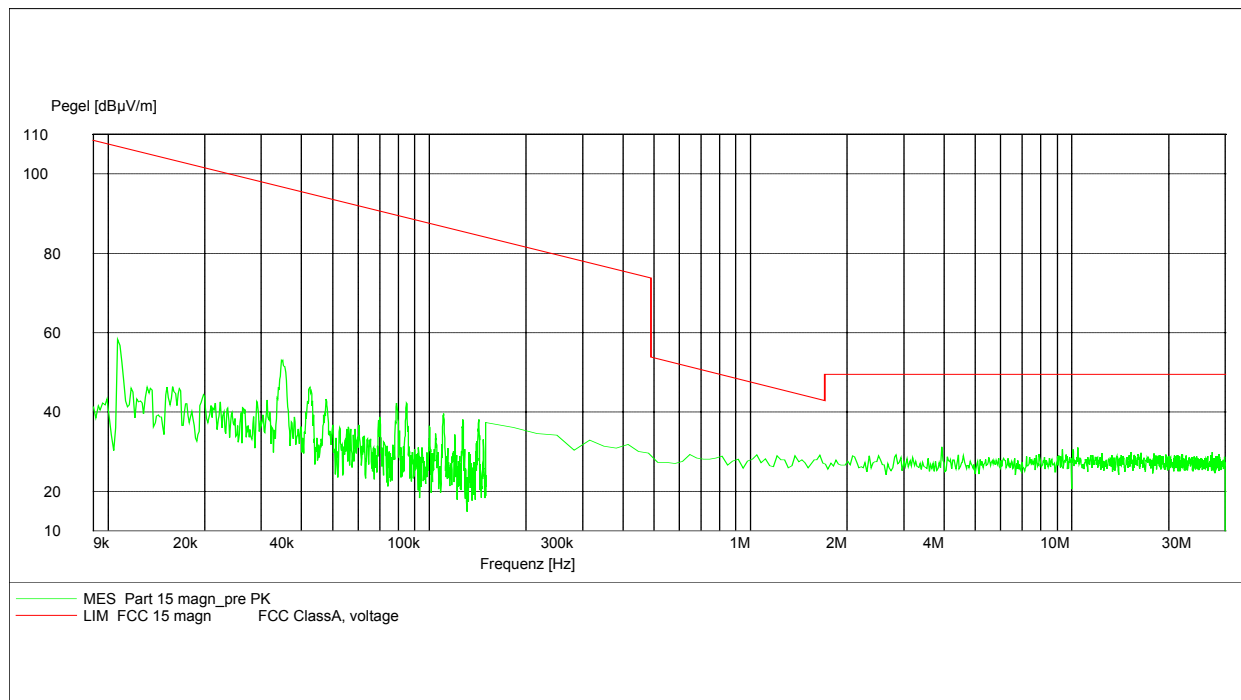
52-63

Setup 4:

FCC Rule 47

Part 15 Magnetics

EUT:	One touch 331a
Manufacturer:	Alcatel
Operating Condition:	Traffic mode, GSM 850 and GSM 1900, max hold
Test Site:	Cetecom, Room 6
Operator:	Ames
Test Specification:	SR Charger Leader 110V + headset Leemax
Comment:	pass



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

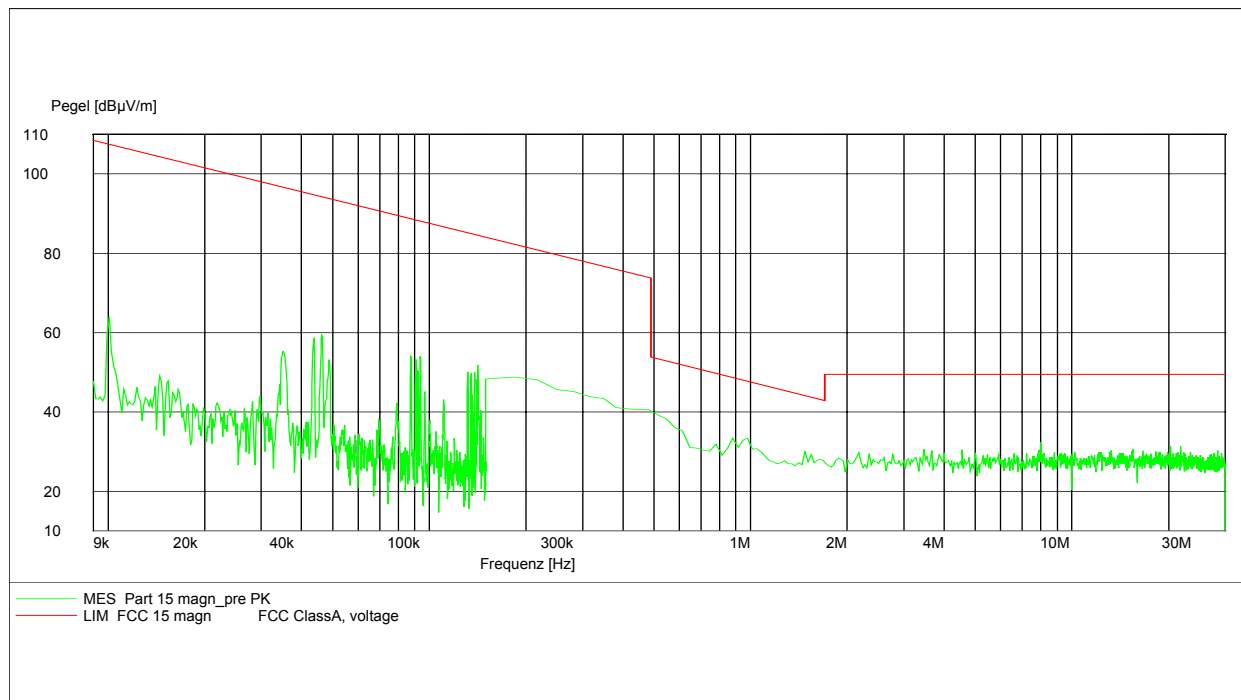
52-63

Setup 5:

FCC Rule 47

Part 15 Magnetics

EUT:	One touch 331a
Manufacturer:	Alcatel
Operating Condition:	Traffic mode, GSM 850
Test Site:	Cetecom, Room 6
Operator:	Ames
Test Specification:	Charger SR-ASTEC 110V + keyboard
Comment:	pass



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

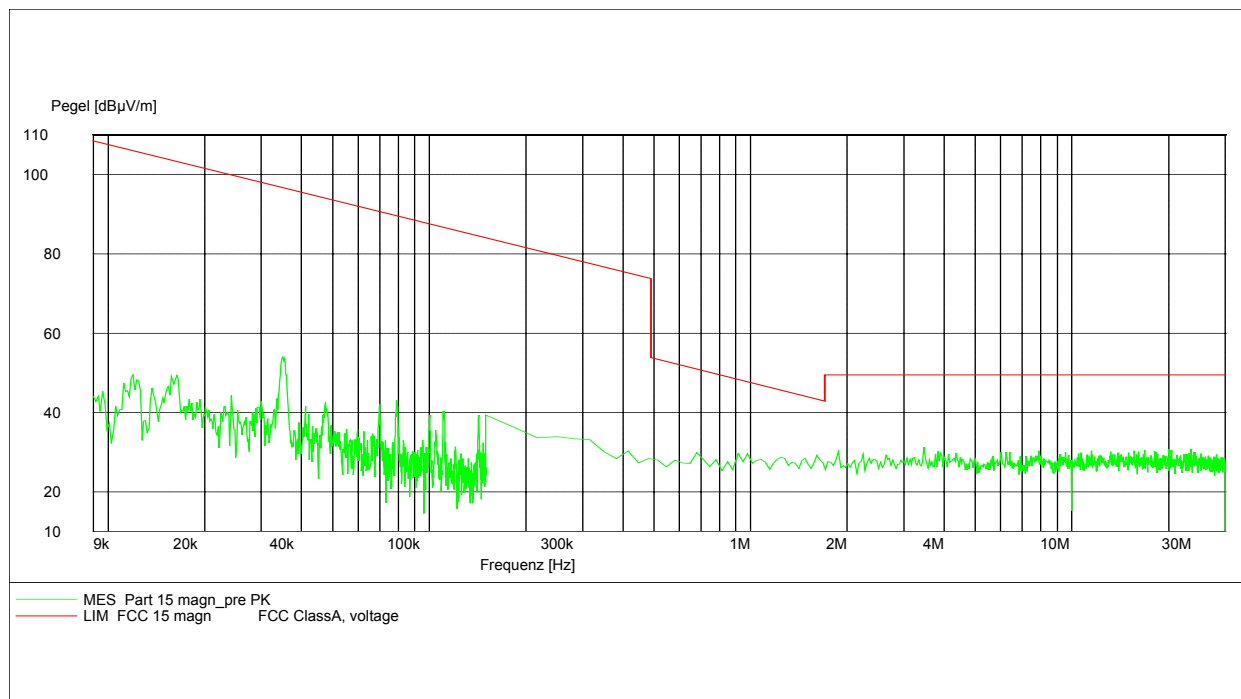
52-63

Setup 6:

FCC Rule 47

Part 15 Magnetics

EUT:	One touch 331a
Manufacturer:	Alcatel
Operating Condition:	Traffic mode, GSM 850
Test Site:	Cetecom, Room 6
Operator:	Ames
Test Specification:	Cigar lighter charger 24V DC + Headset Leemax
Comment:	pass



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

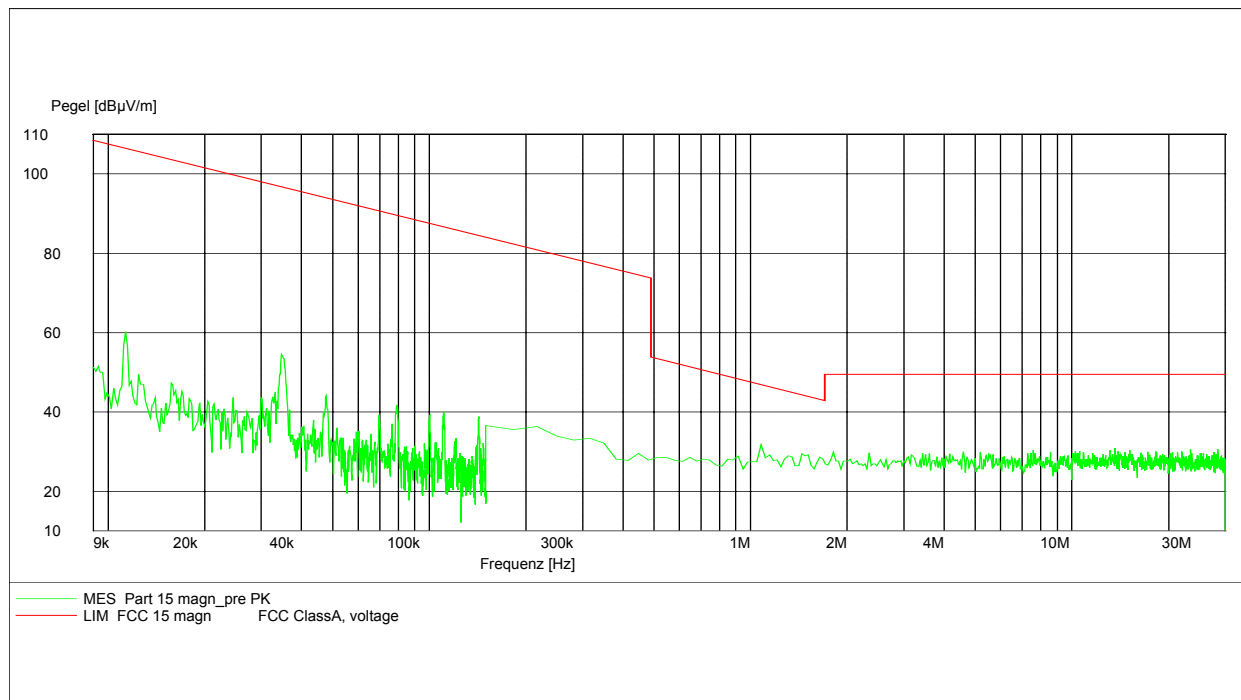
52-63

Setup 7:

FCC Rule 47

Part 15 Magnetics

EUT:	One touch 331a
Manufacturer:	Alcatel
Operating Condition:	Traffic mode, GSM 850
Test Site:	Cetecom, Room 6
Operator:	Ames
Test Specification:	Car Kit 24V
Comment:	pass



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

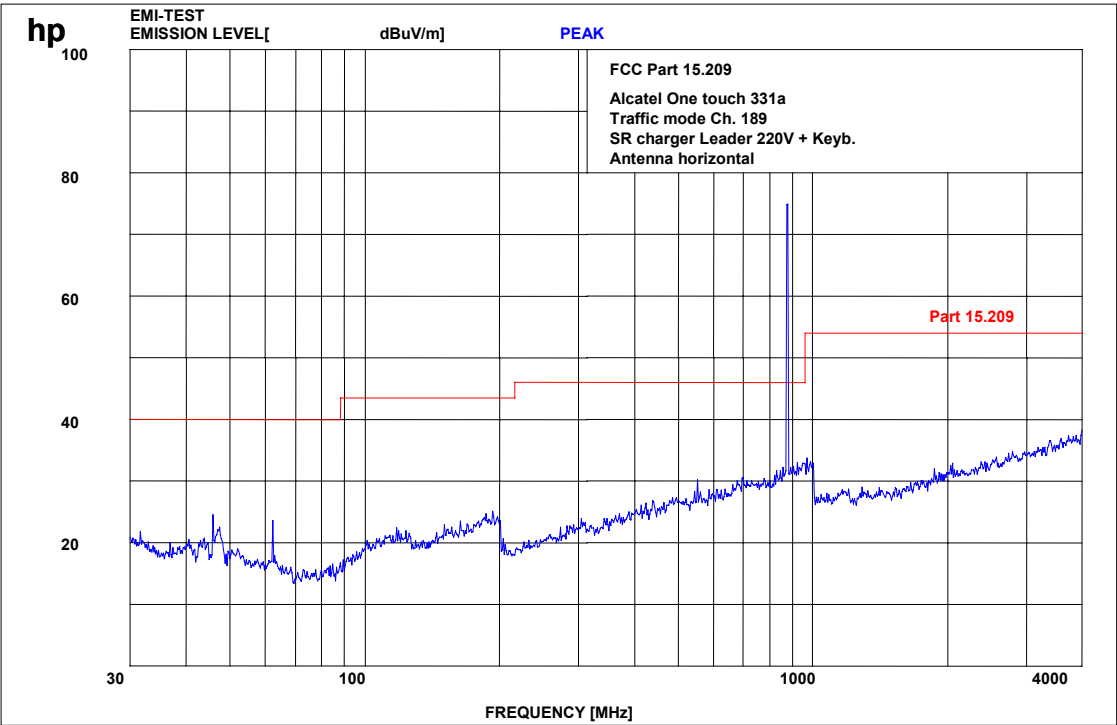
(for reference numbers see test equipment listing)

52-63

Radiated emissions

Part15.109/209

Setup 1 horizontal GSM 850 traffic mode

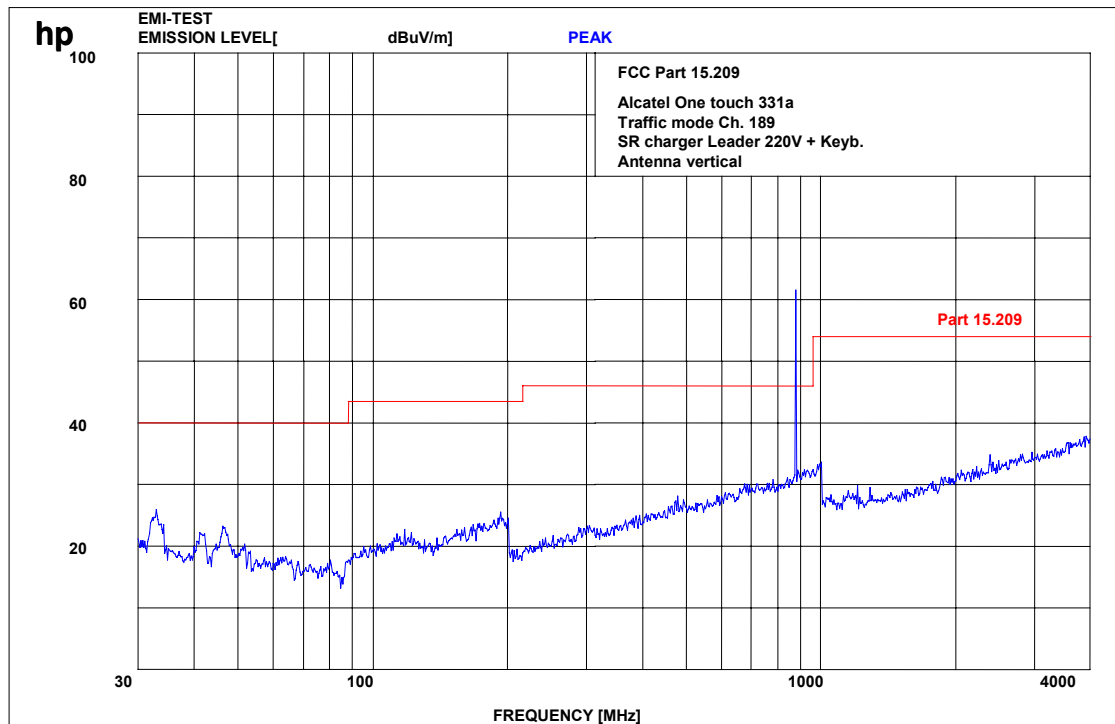


Radiated emissions

Part15.109/209

Setup 1 vertical GSM 850 traffic mode

This polarization delivers higher results, so we show plots only from vertical polarization



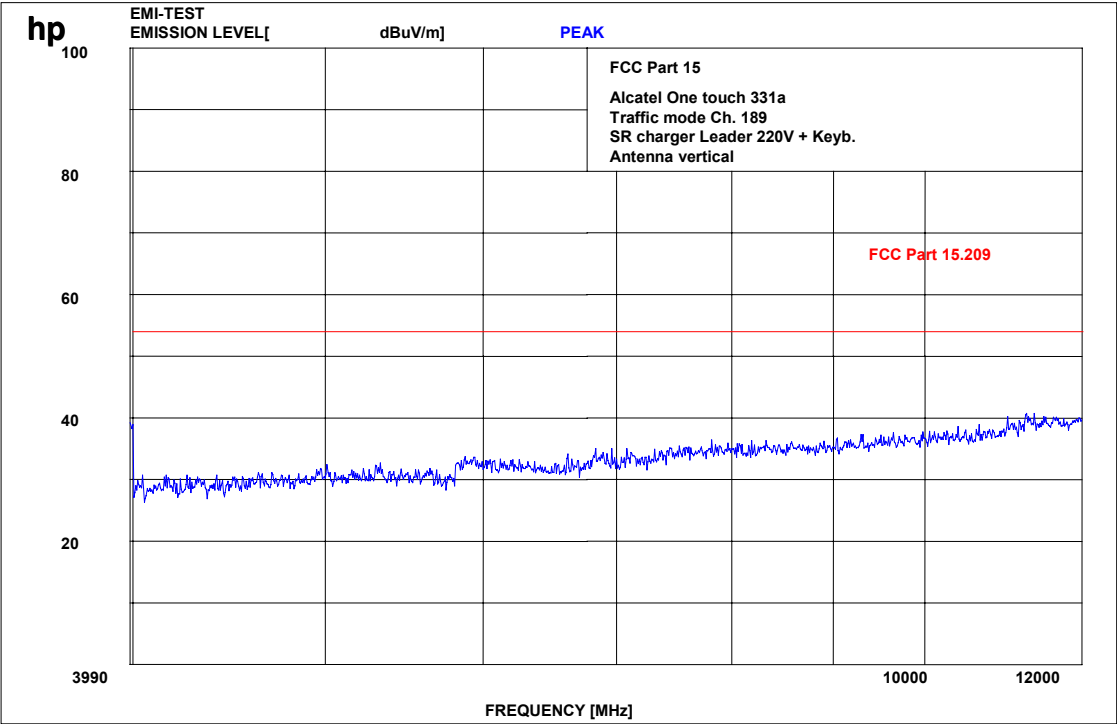
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

52-63

Radiated emissions

Part15.109/209

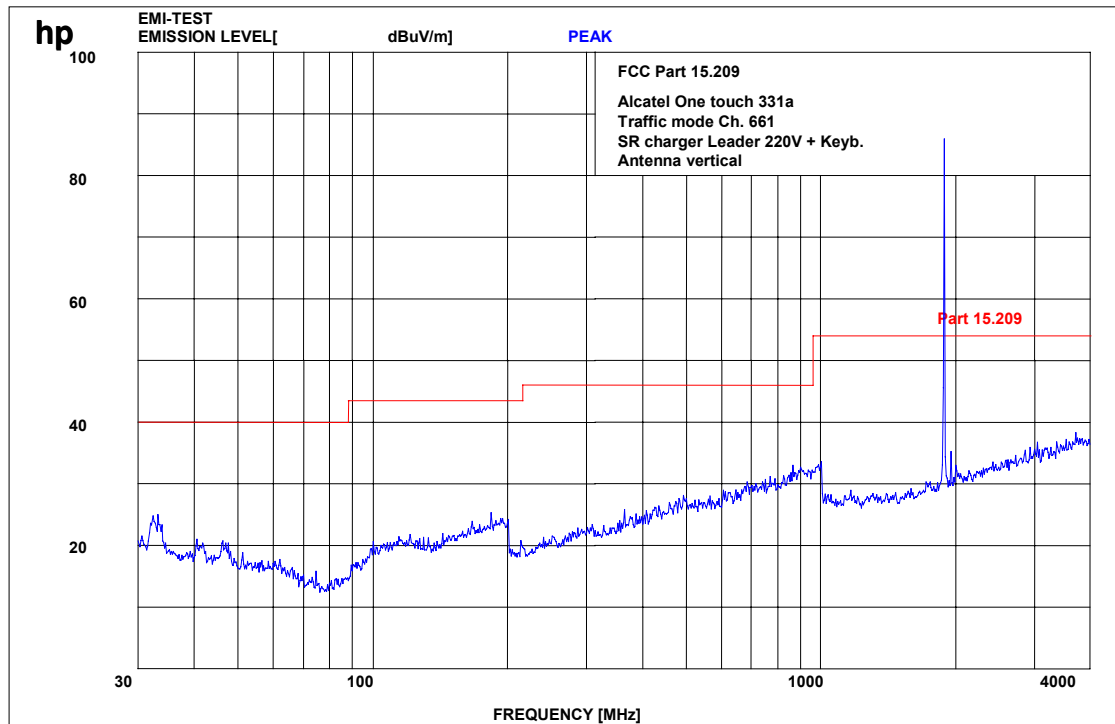
Setup 1 vertical GSM 850 traffic mode



Radiated emissions

Part15.109/209

Setup 1 vertical GSM 1900 traffic mode



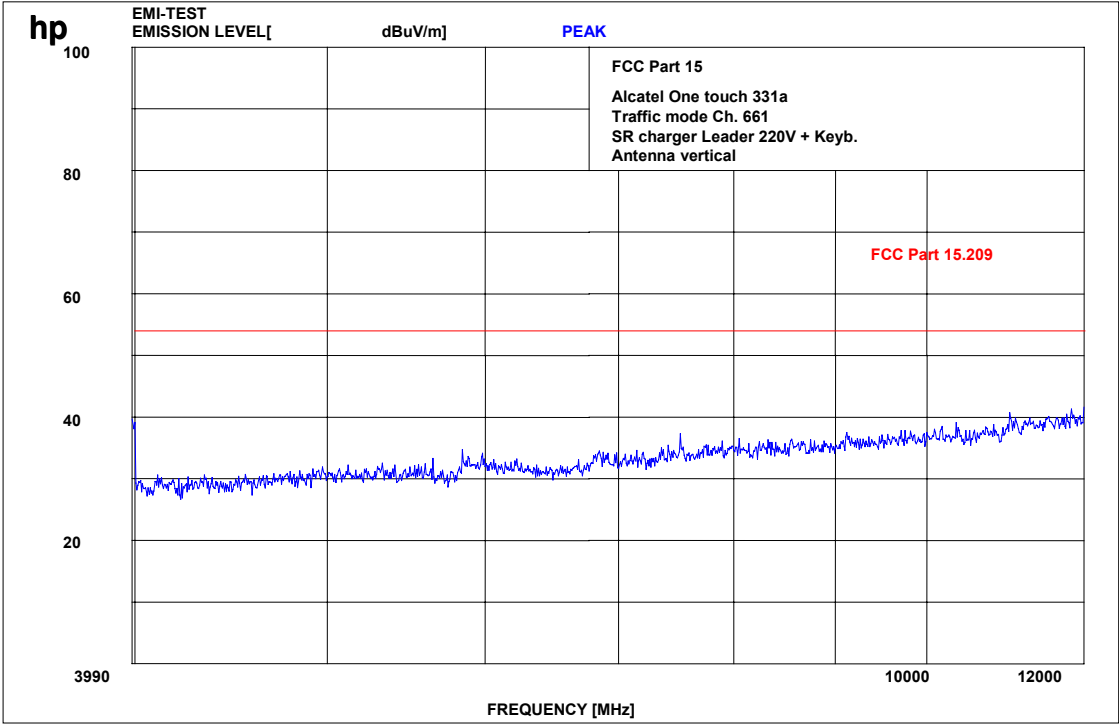
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

52-63

Radiated emissions

Part15.109/209

Setup 1 vertical GSM 1900 traffic mode

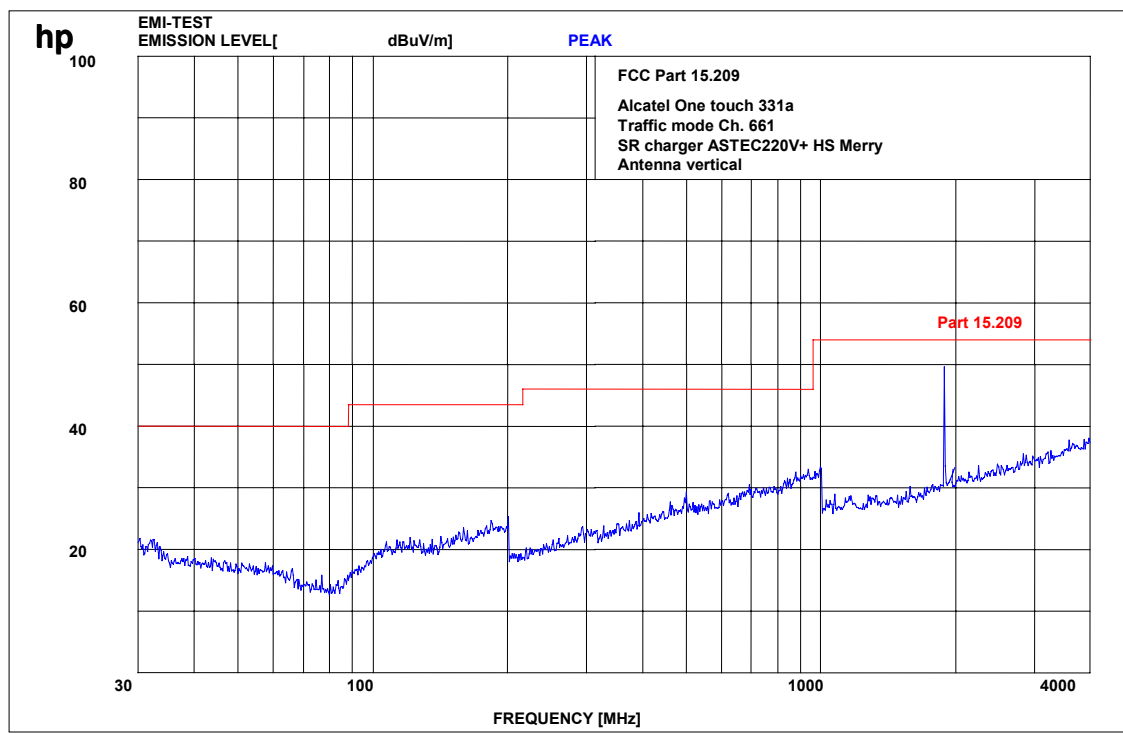


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Radiated emissions

Part15.109/209

Setup 2 vertical traffic mode GSM 1900



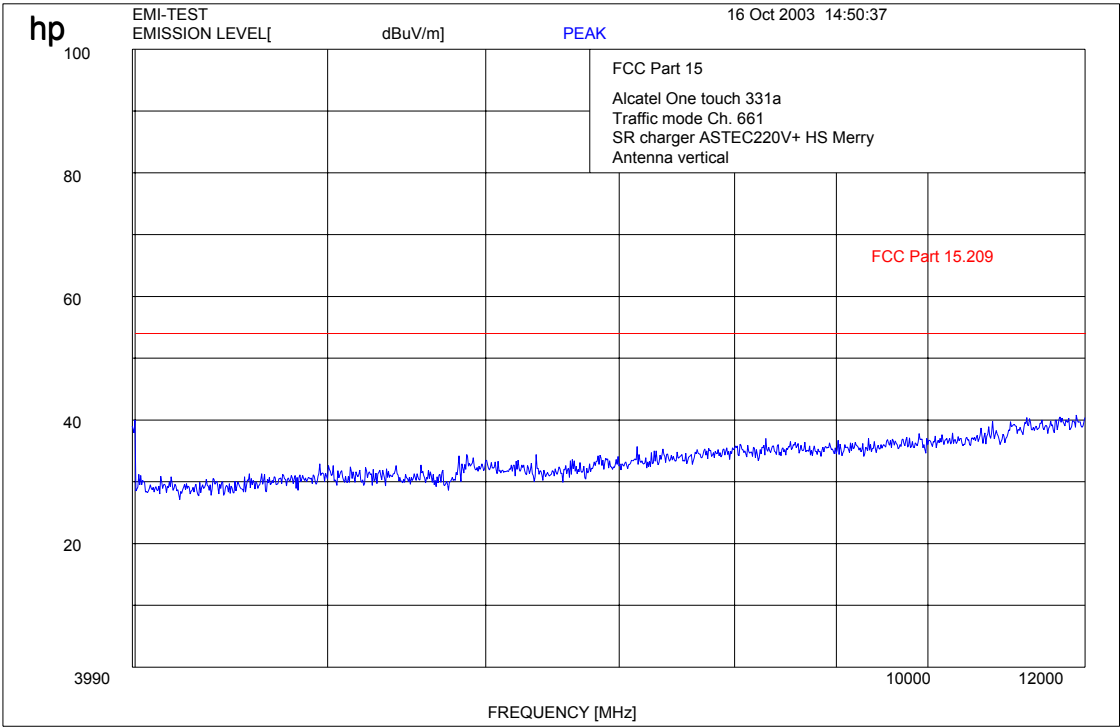
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

52-63

Radiated emissions

Part15.109/209

Setup 2 vertical traffic mode GSM 1900

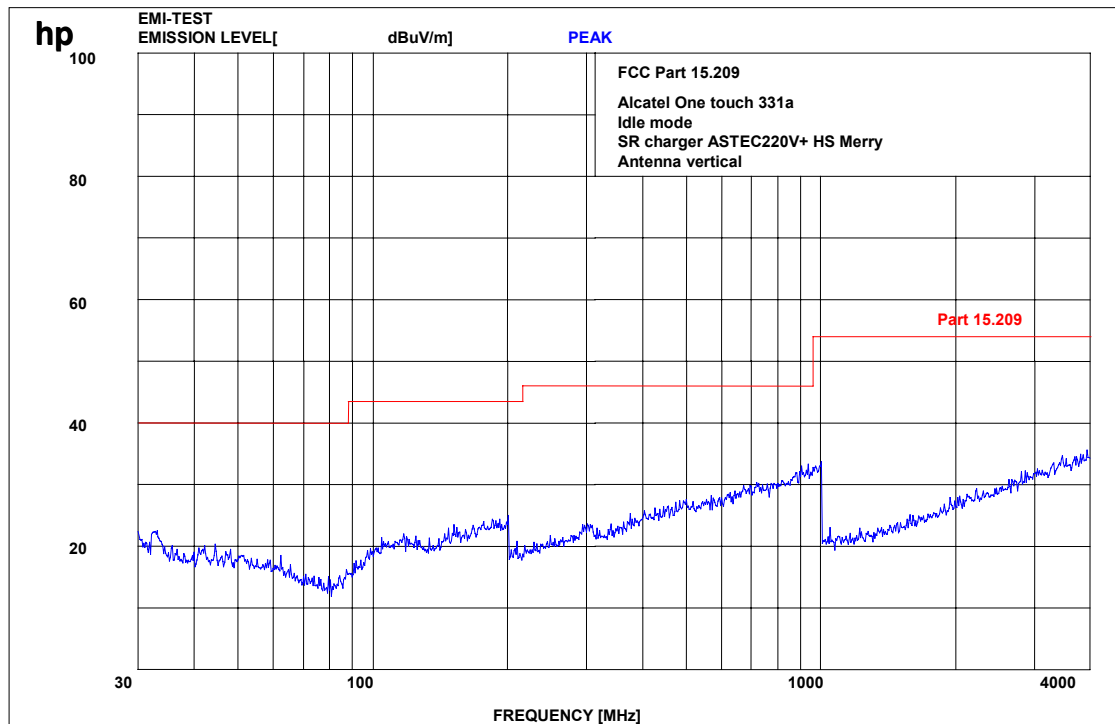


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Radiated emissions

Part15.109/209

Setup 2 vertical idle mode



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

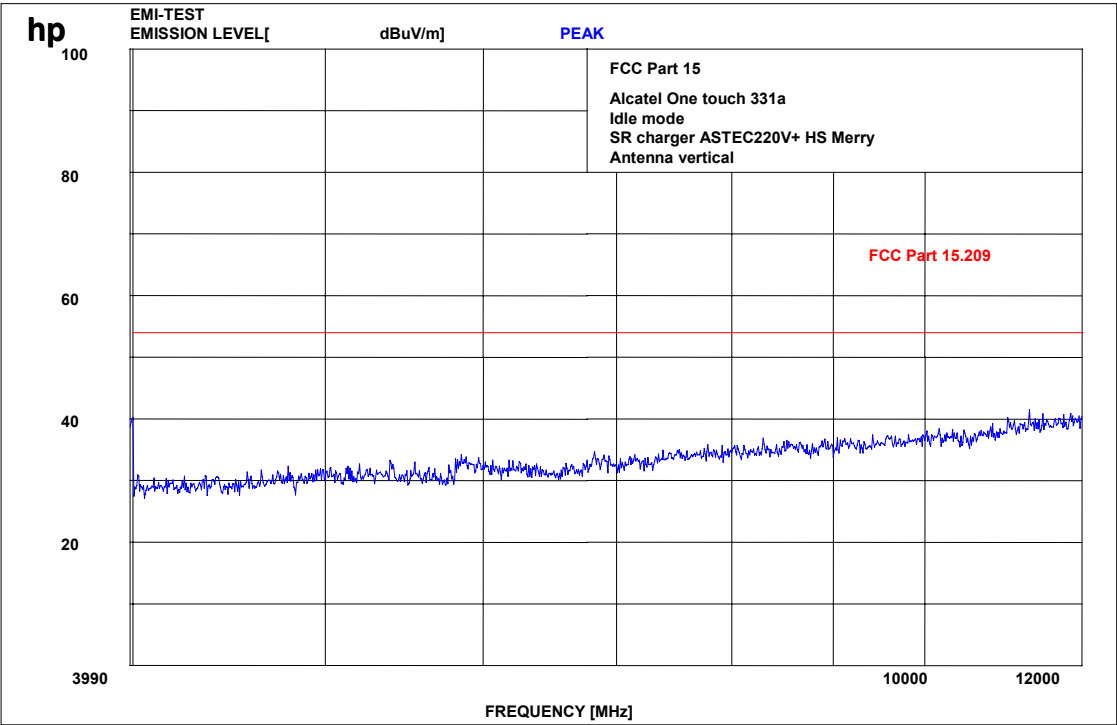
(for reference numbers see test equipment listing)

52-63

Radiated emissions

Part15.109/209

Setup 2 vertical idle mode

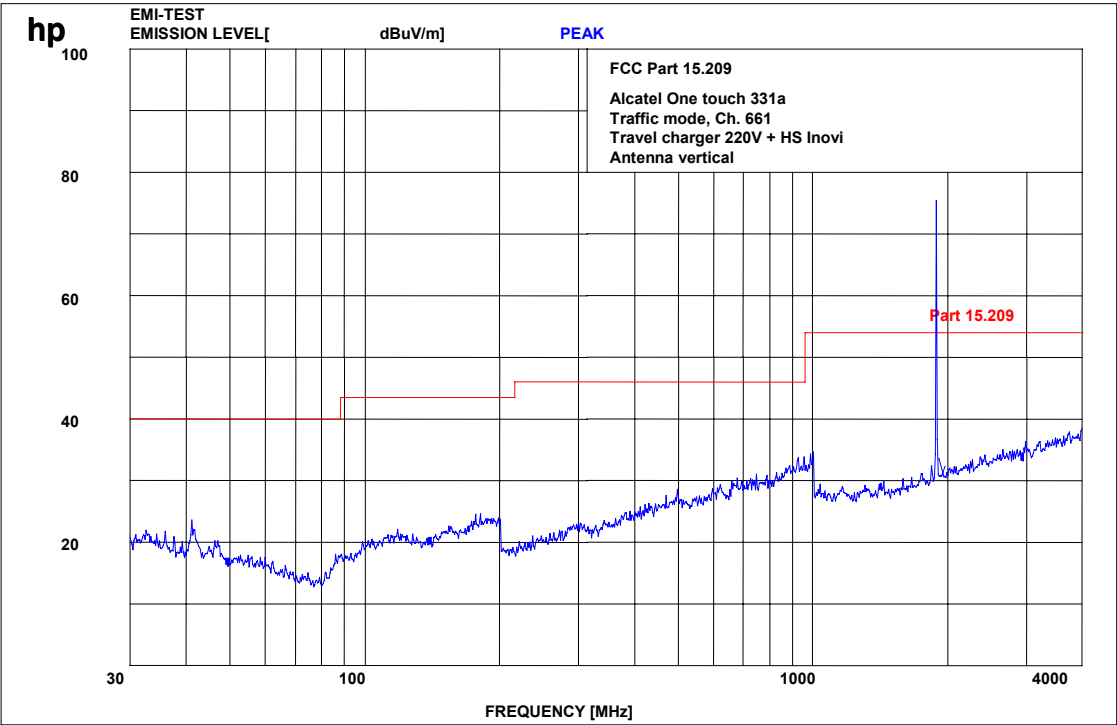


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Radiated emissions

Part15.109/209

Setup 3 vertical traffic mode GSM 1900

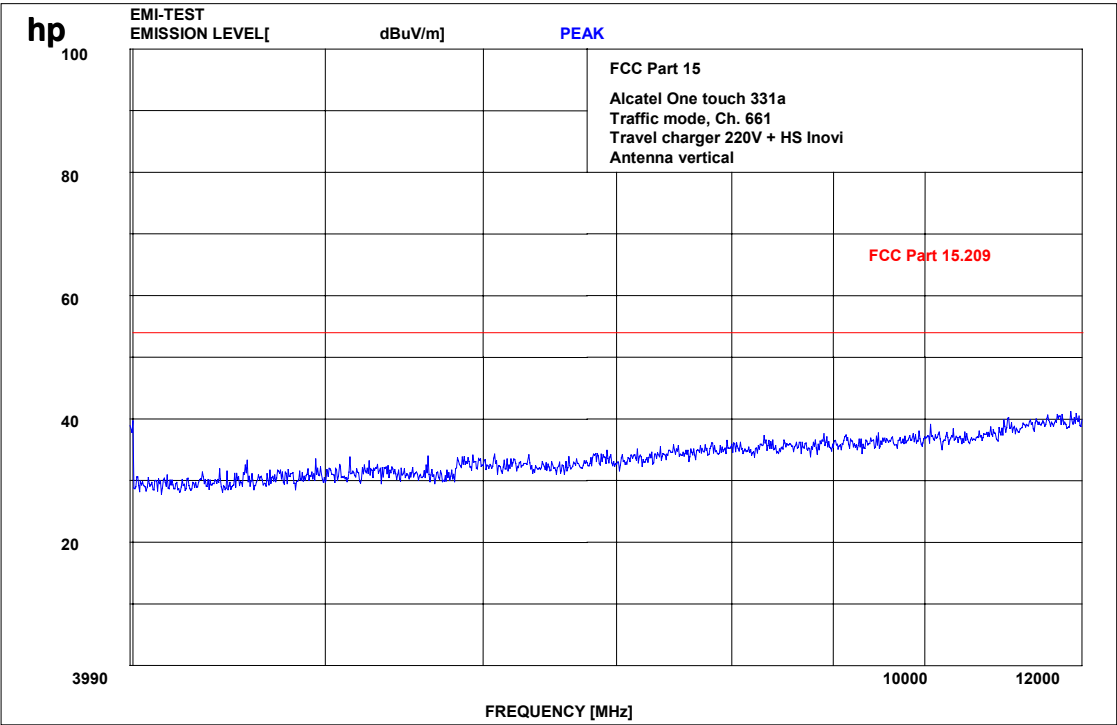


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Radiated emissions

Part15.109/209

Setup 3 vertical traffic mode GSM 1900

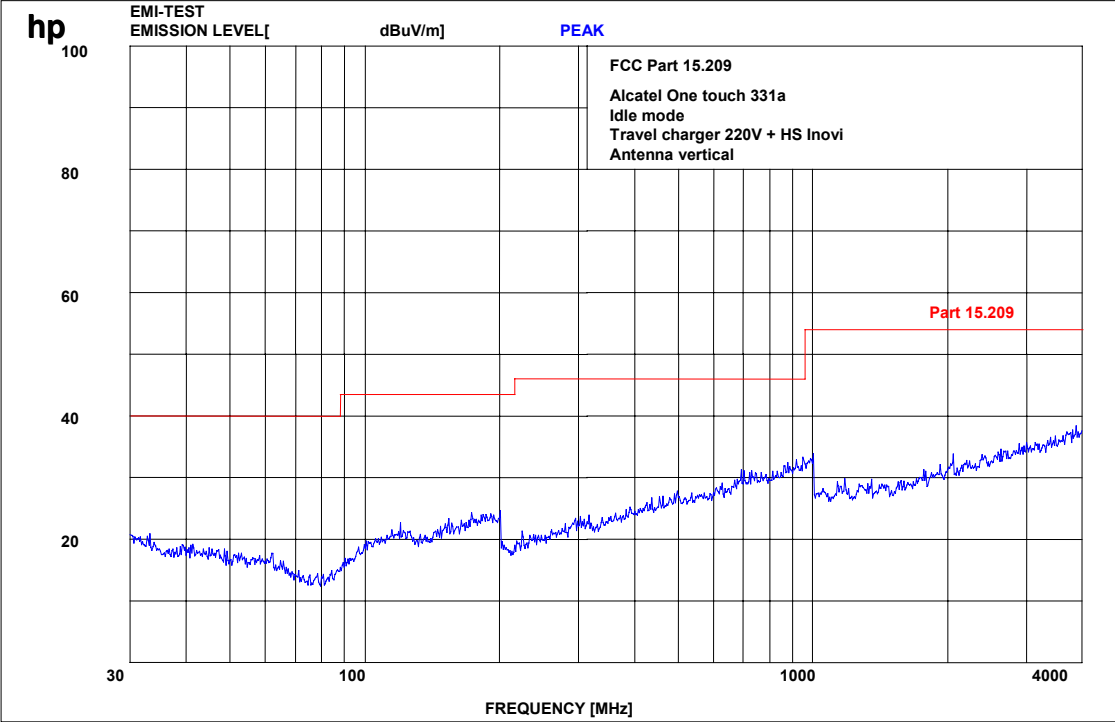


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Radiated emissions

Part15.109/209

Setup 3 vertical idle mode

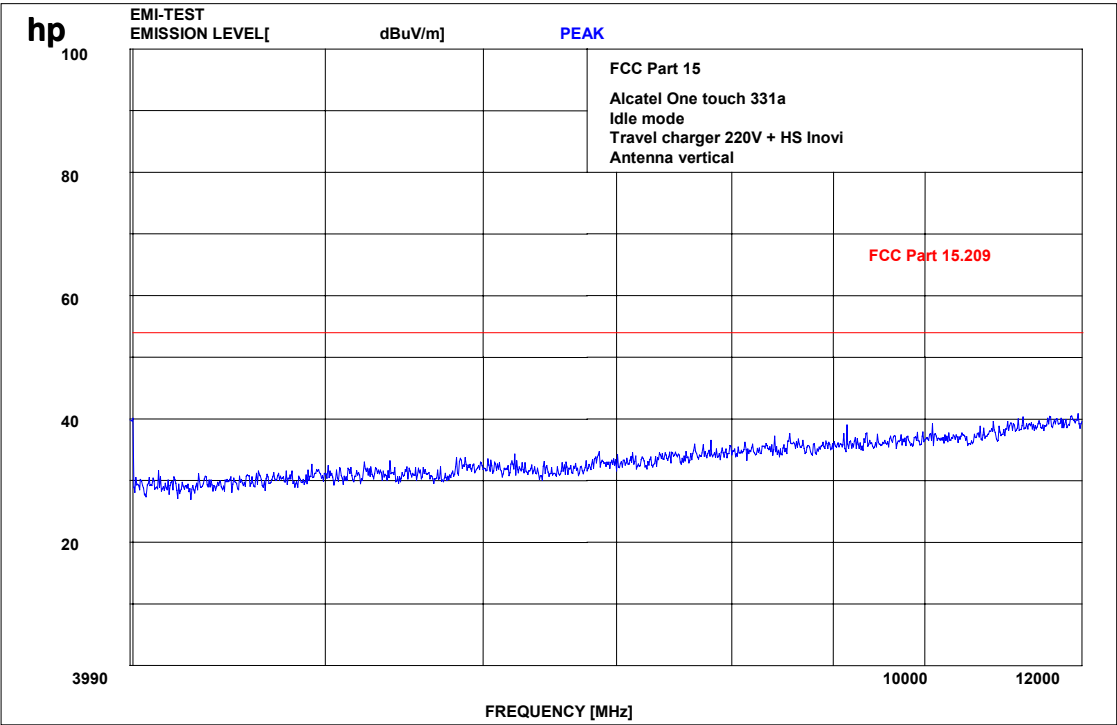


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Radiated emissions

Part15.109/209

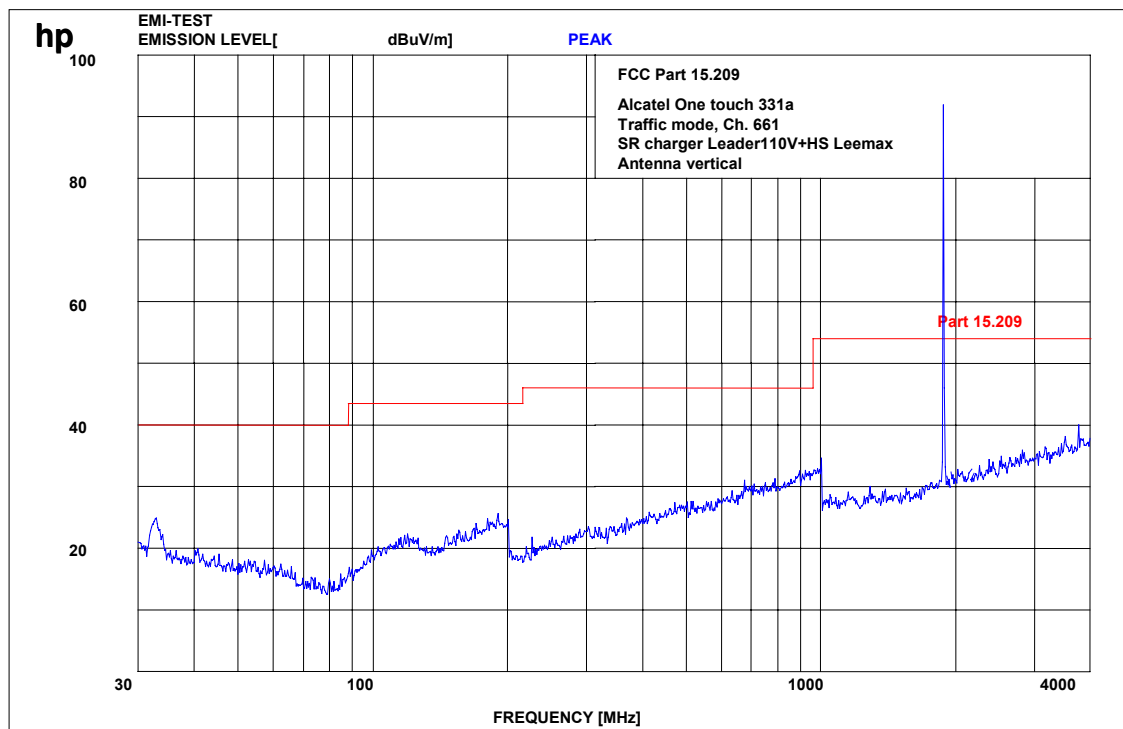
Setup 3 vertical idle mode



Radiated emissions

Part15.109/209

Setup 4 vertical traffic mode GSM 1900



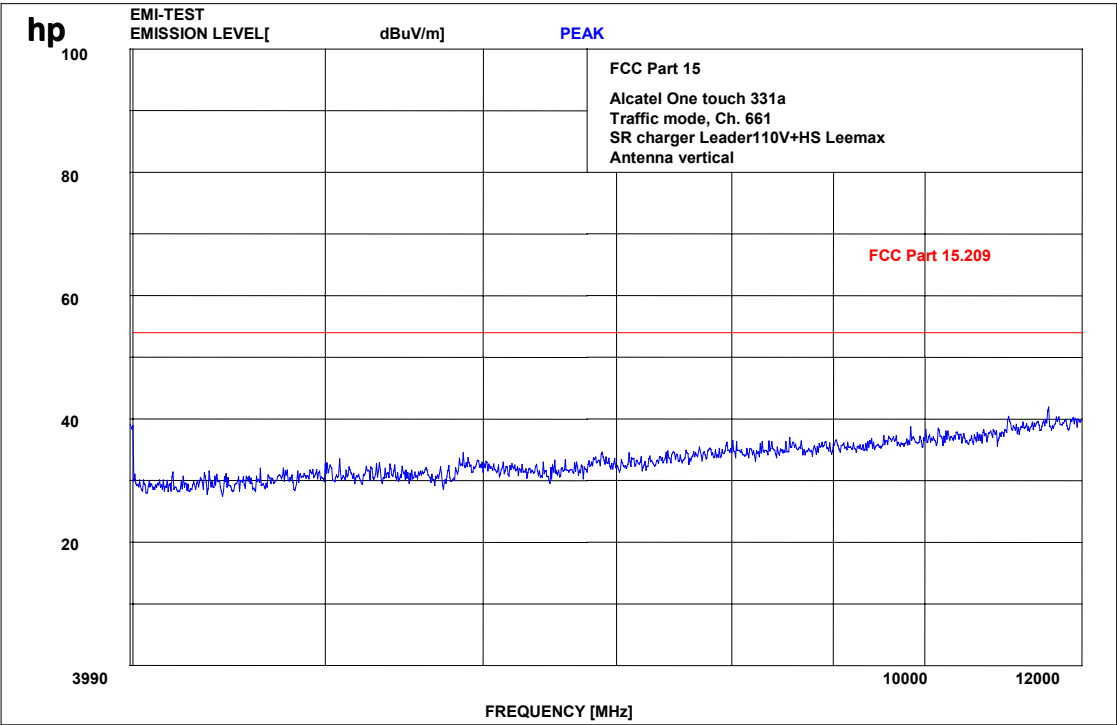
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

Radiated emissions

Part15.109/209

Setup 4 vertical traffic mode GSM 1900

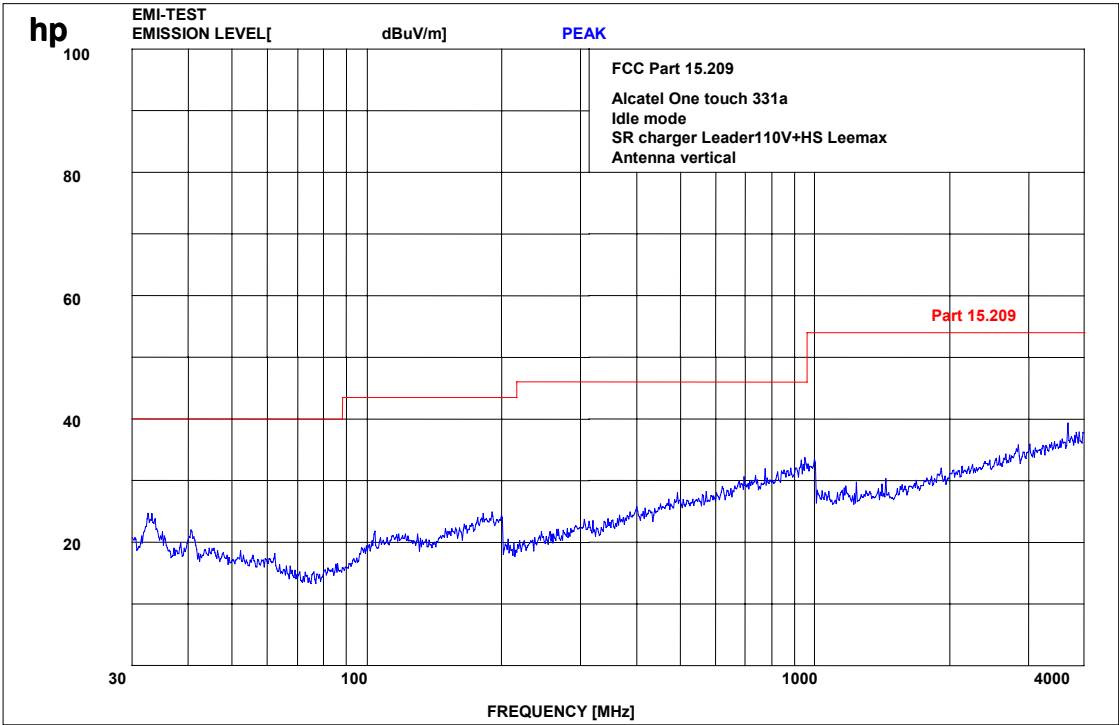


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Radiated emissions

Part15.109/209

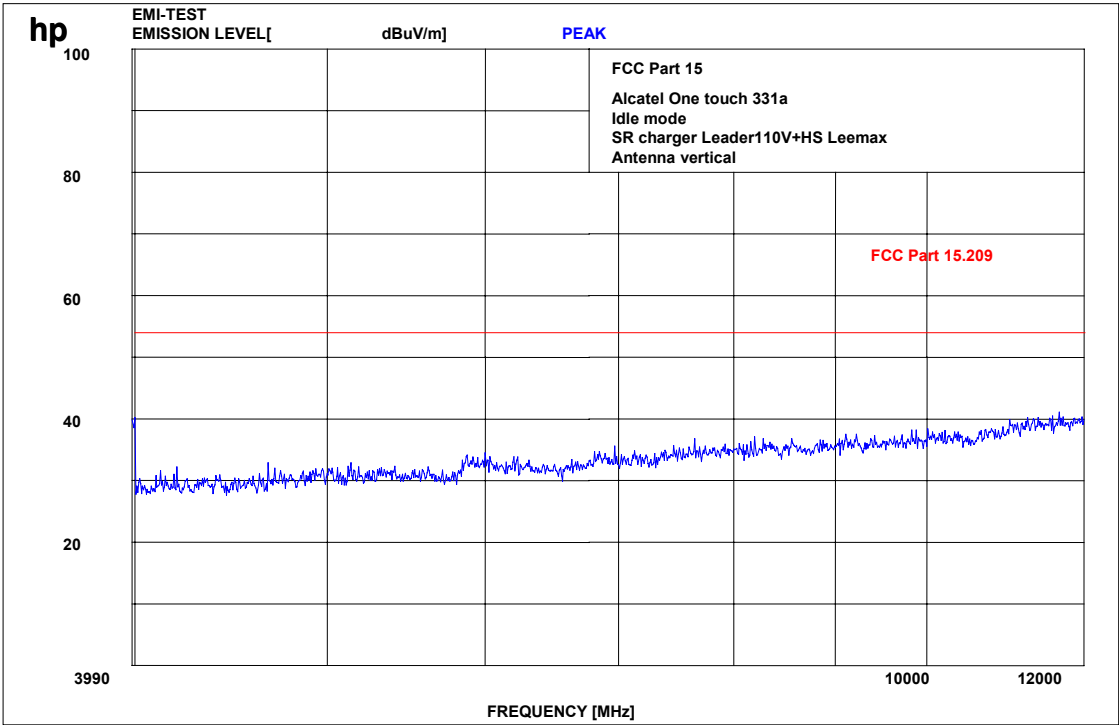
Setup 4 vertical idle mode



Radiated emissions

Part15.109/209

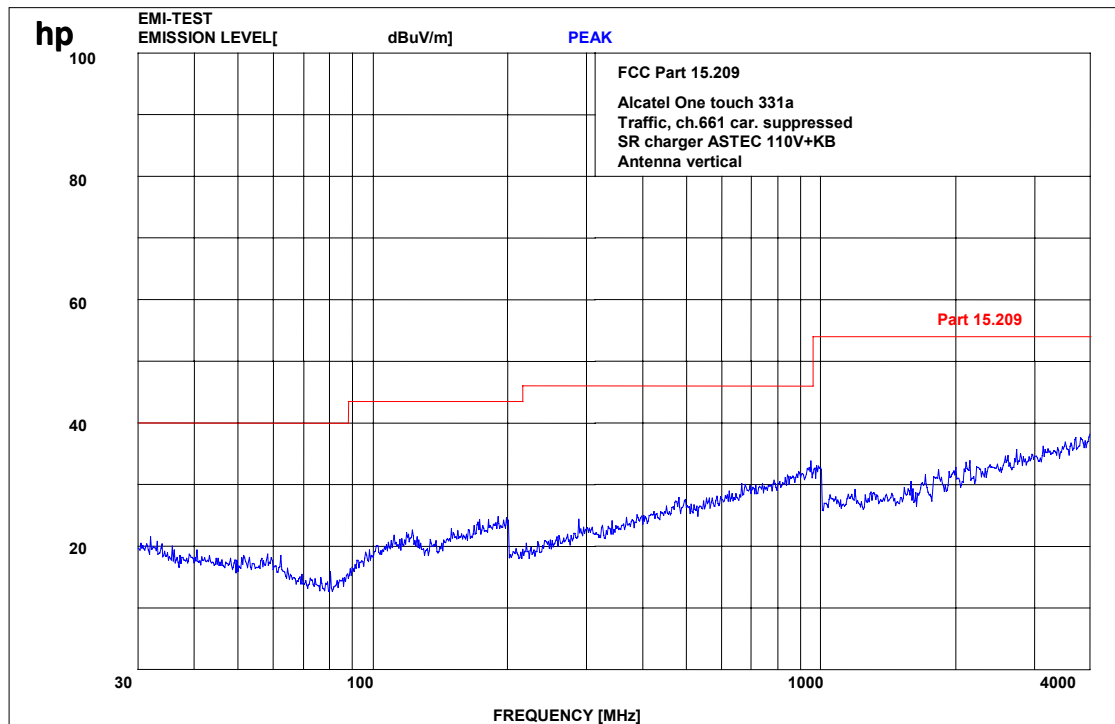
Setup 4 vertical idle mode



Radiated emissions

Part15.109/209

Setup 5 vertical traffic mode GSM 1900



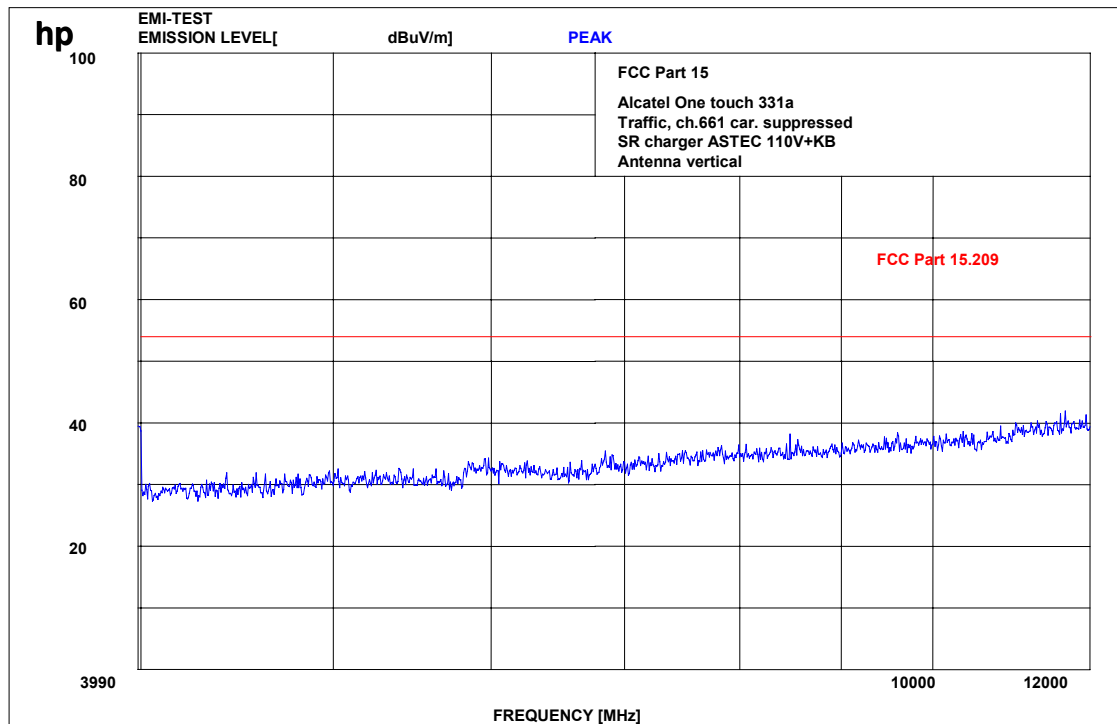
Carrier notched to avoid overload of preamp.

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

52-63

Setup 5 vertical traffic mode GSM 1900



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

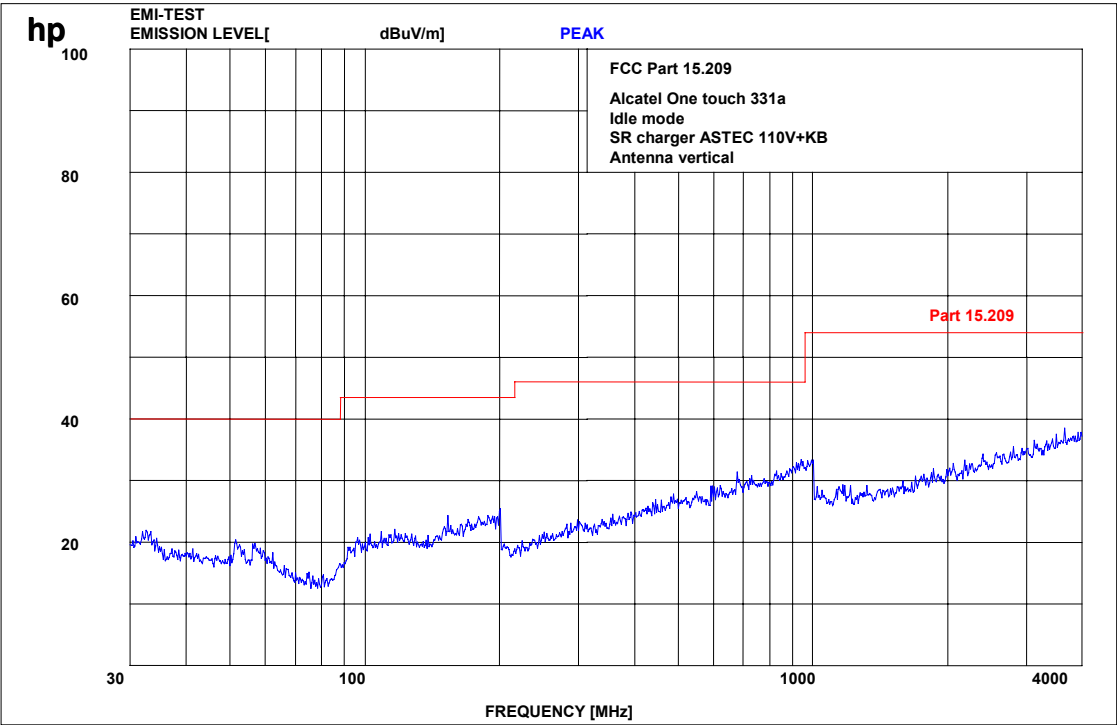
REFERENCE NUMBER(S) OF TEST EQUIPMENT
(for reference numbers see test equipment listing)

52-63

Radiated emissions

Part15.109/209

Setup 5 vertical idle mode



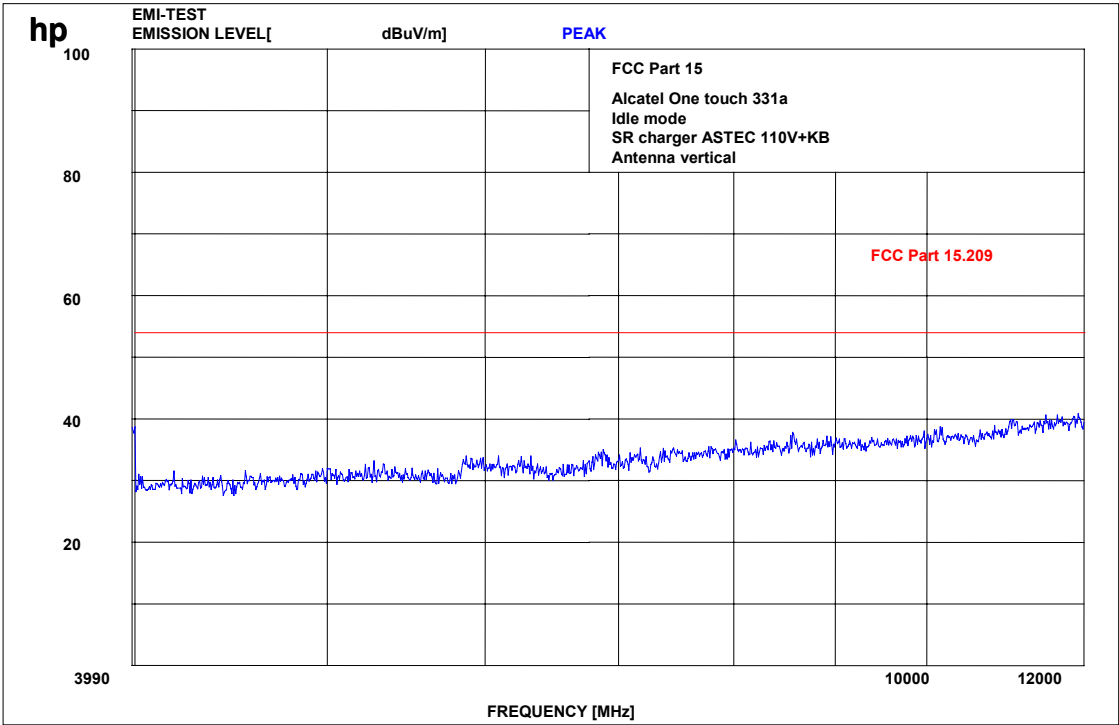
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

Radiated emissions

Part15.109/209

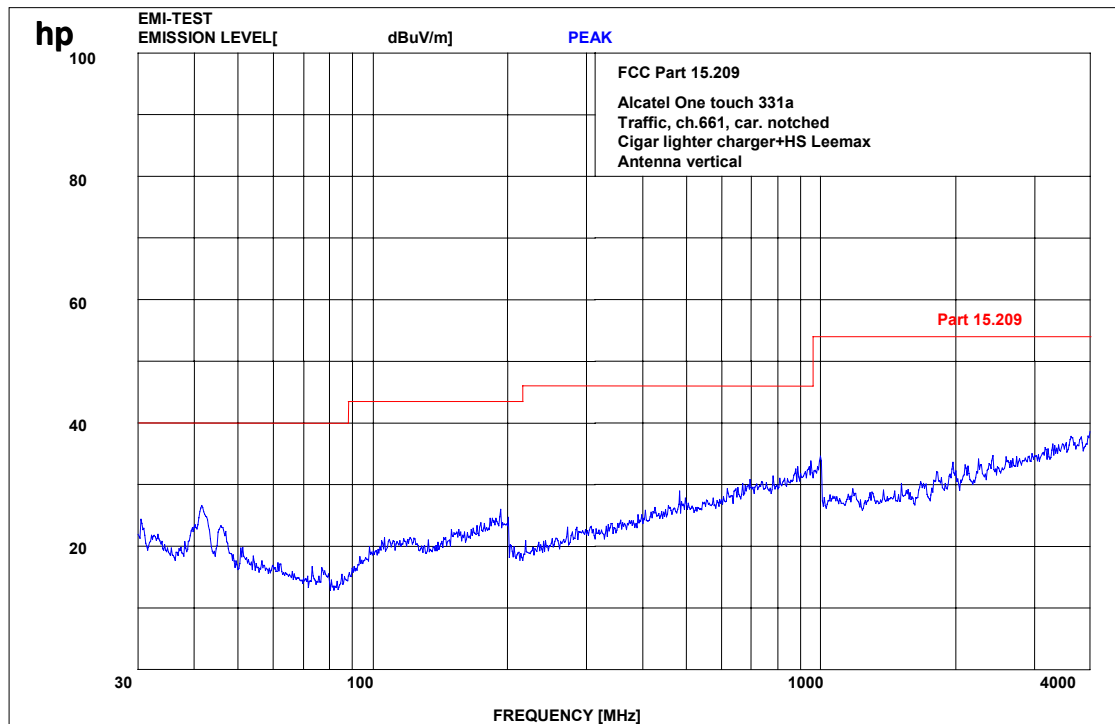
Setup 5 vertical idle mode



Radiated emissions

Part15.109/209

Setup 6 vertical traffic mode GSM 1900



Carrier notched to avoid overload of the preamp.

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

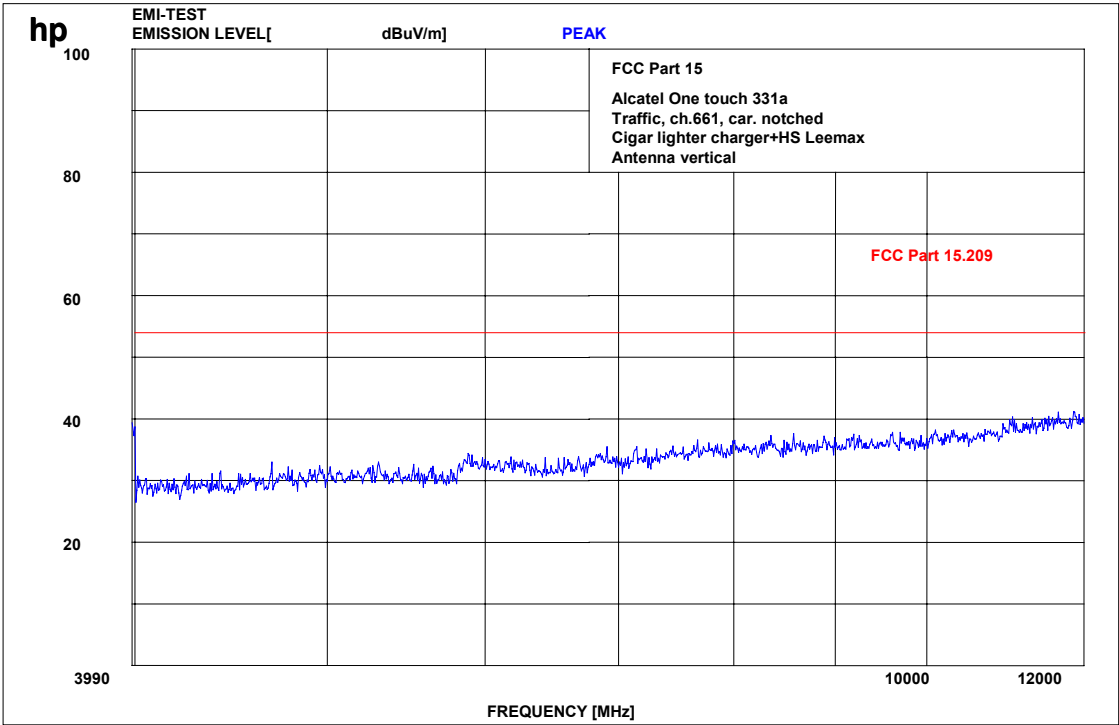
(for reference numbers see test equipment listing)

52-63

Radiated emissions

Part15.109/209

Setup 6 vertical traffic mode GSM 1900

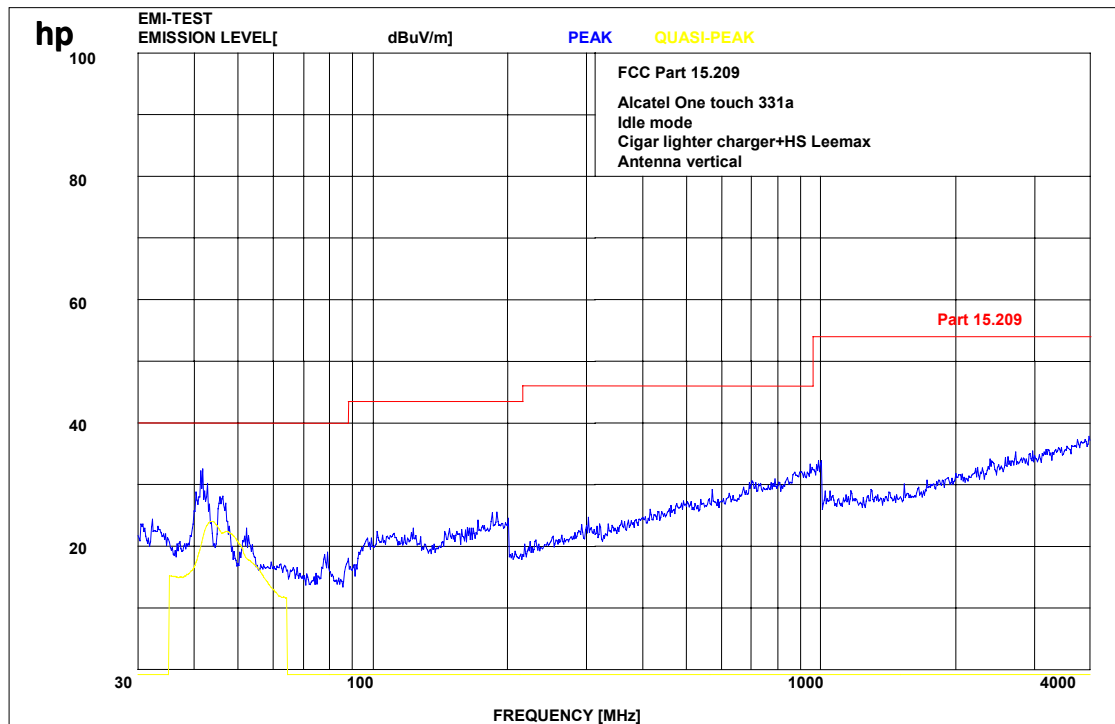


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Radiated emissions

Part15.109/209

Setup 6 vertical idle mode



43.5 MHz

24.1 dB μ V/m QP at 3m distance (yellow line)

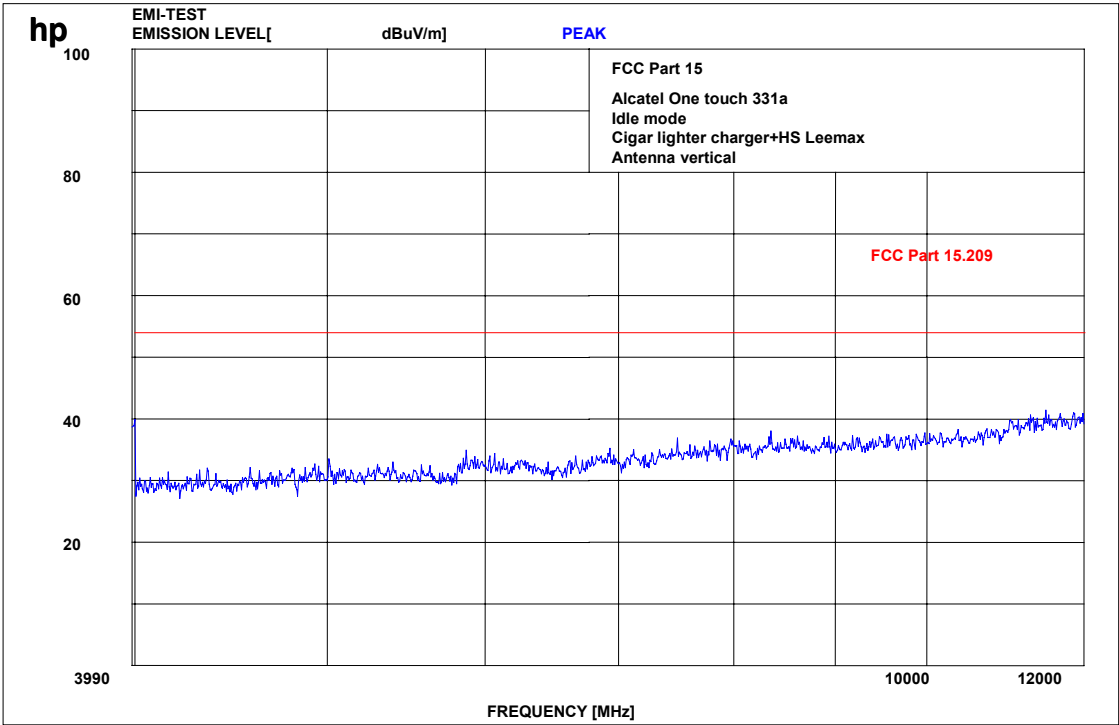
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

52-63

Radiated emissions

Part15.109/209

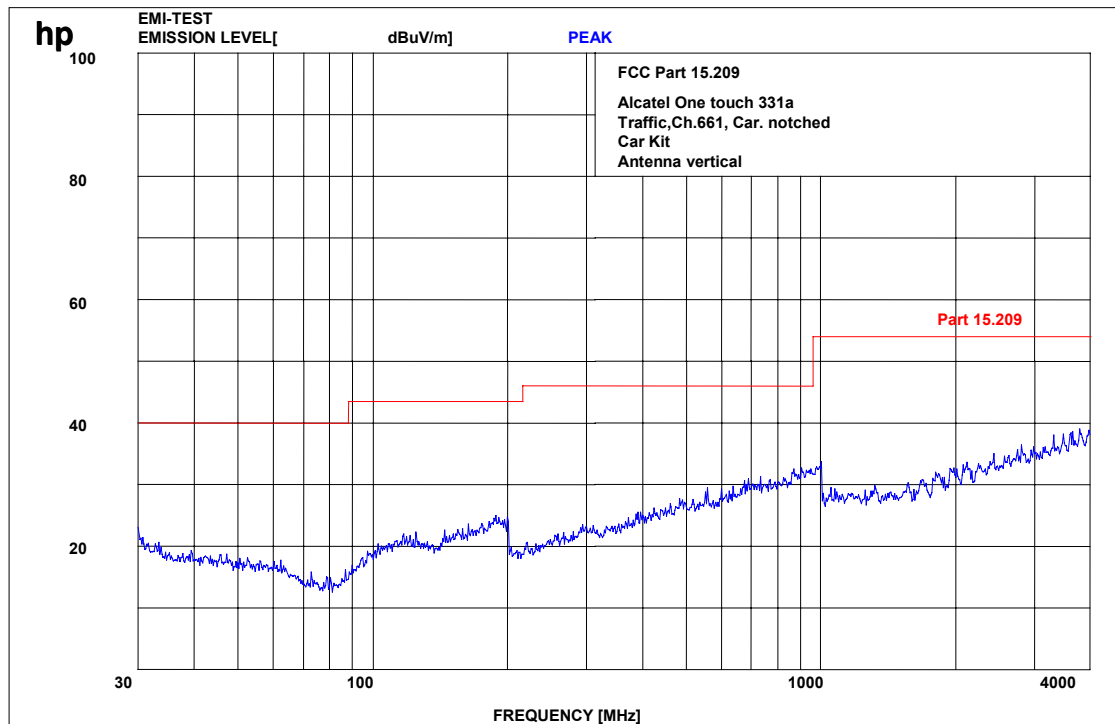
Setup 6 vertical idle mode



Radiated emissions

Part15.109/209

Setup 7 vertical traffic mode GSM 1900



Carrier notched to avoid overload of the preamp.

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

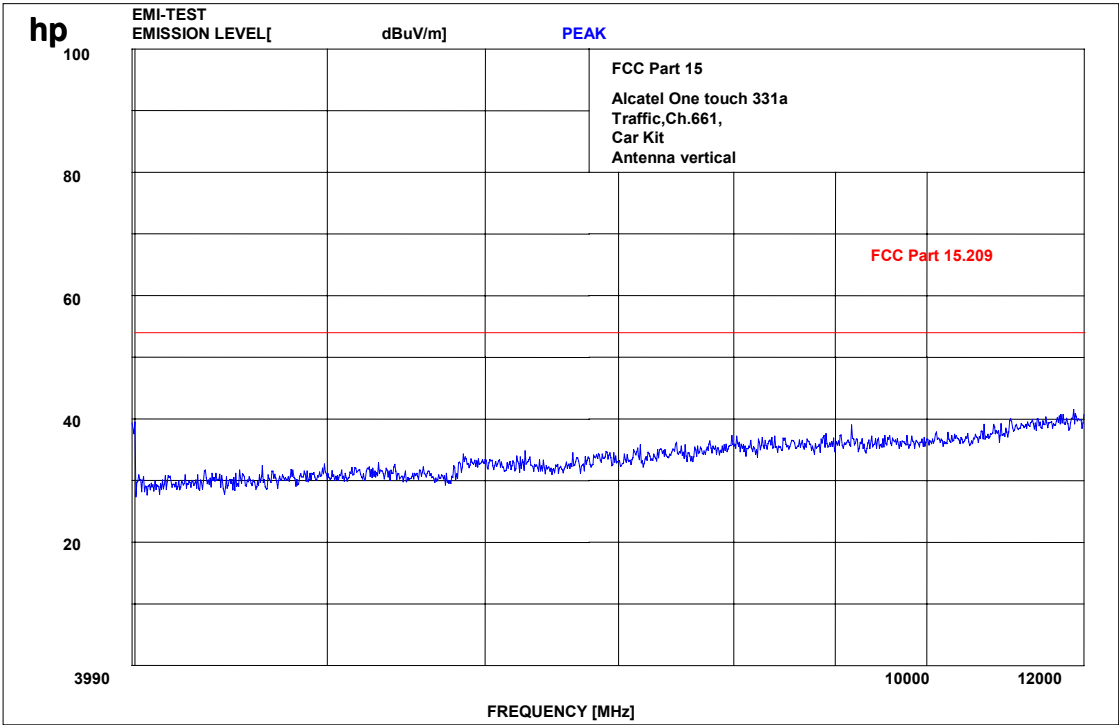
(for reference numbers see test equipment listing)

52-63

Radiated emissions

Part15.109/209

Setup 7 vertical traffic mode GSM 1900



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

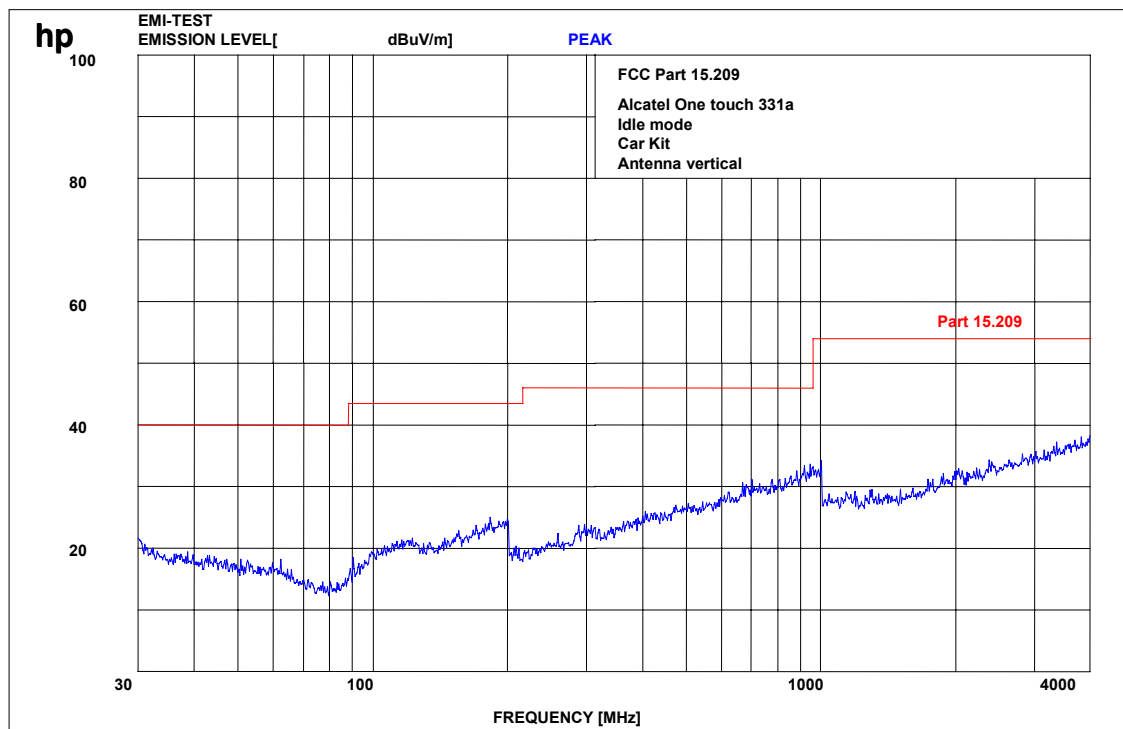
(for reference numbers see test equipment listing)

52-63

Radiated emissions

Part15.109/209

Setup 7 vertical idle mode



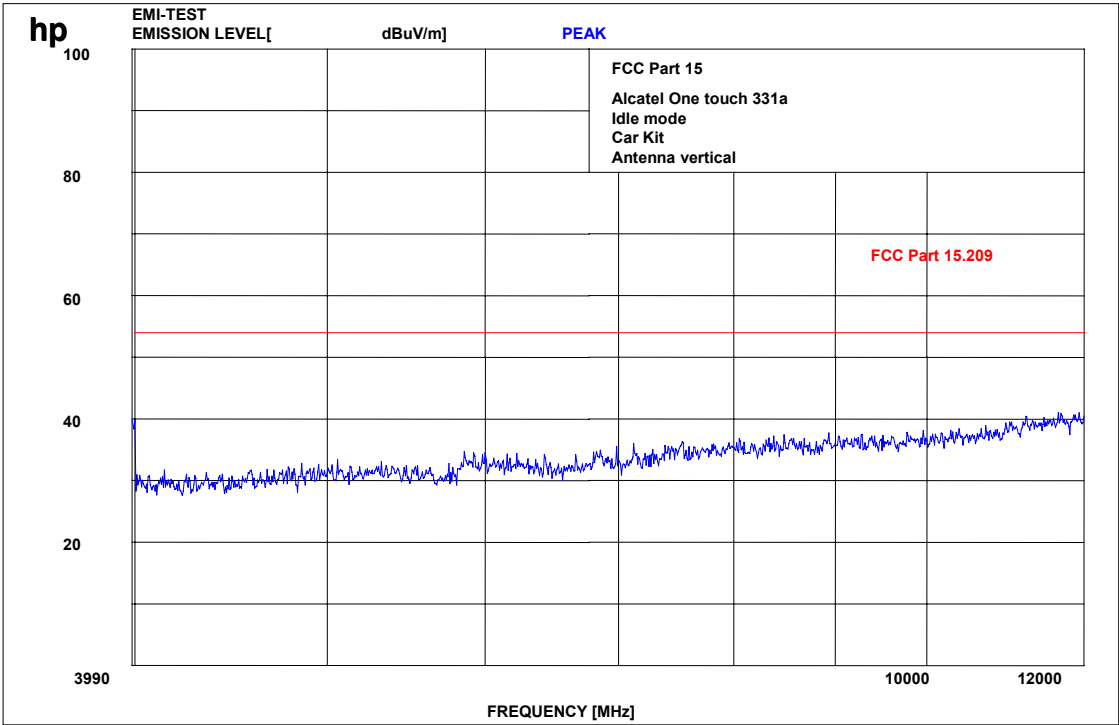
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

Radiated emissions

Part15.109/209

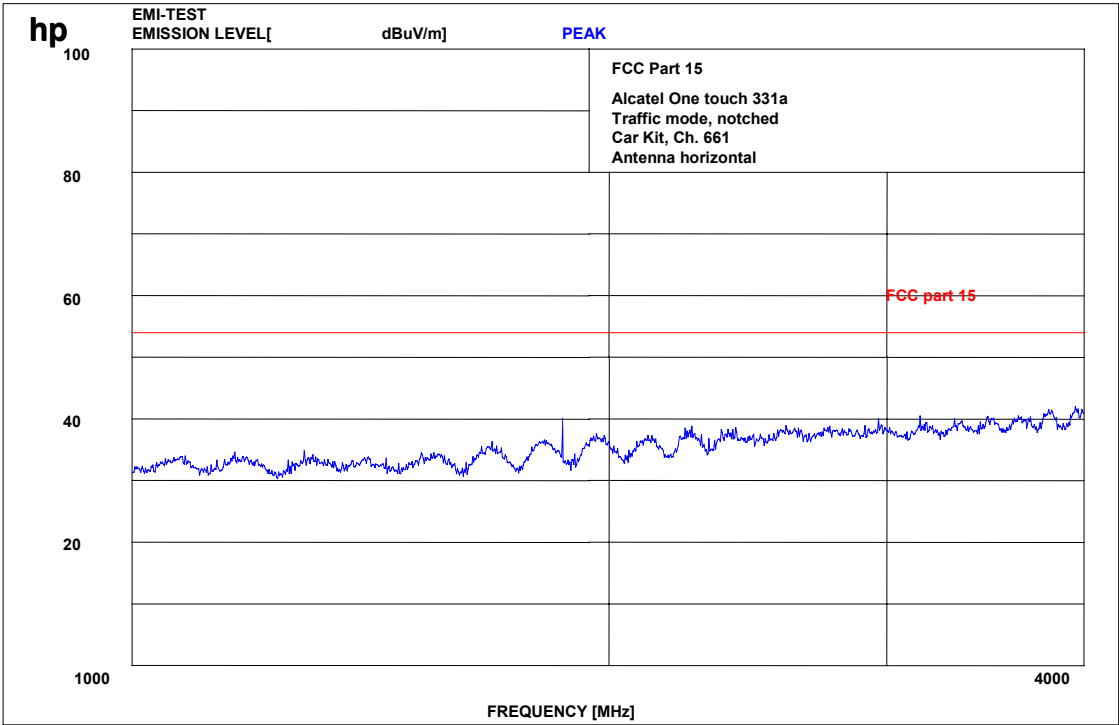
Setup 7 vertical idle mode



Radiated emissions

Part15.109/209

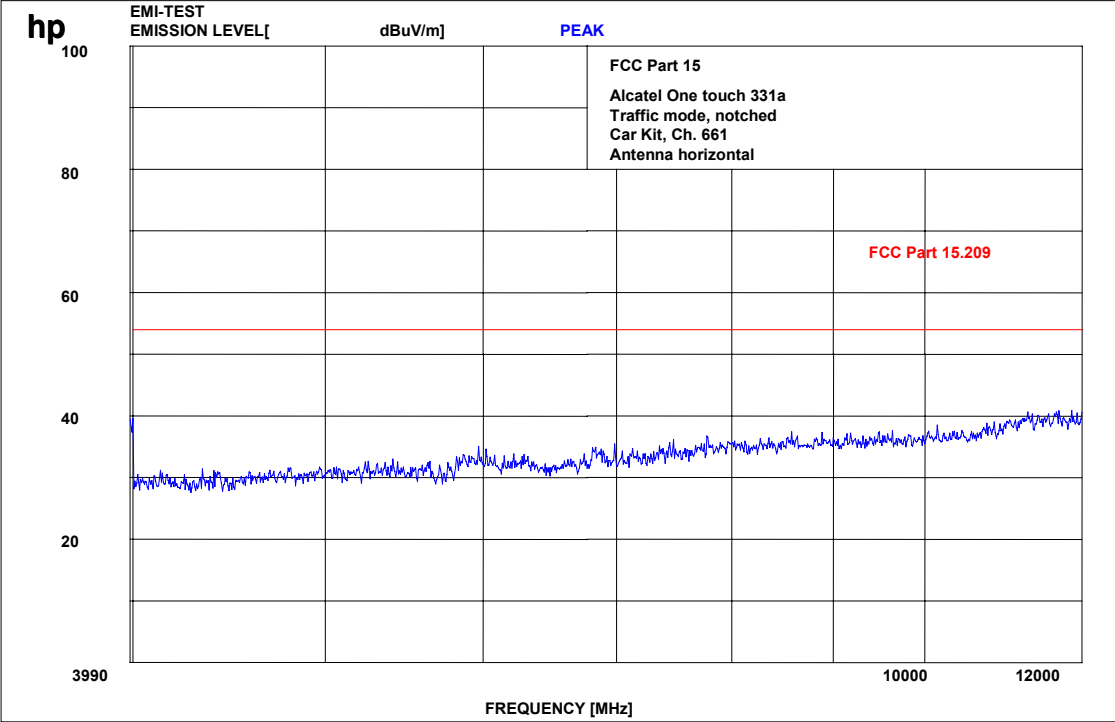
Setup 7 horizontal traffic mode GSM 1900



Radiated emissions

Part15.109/209

Setup 7 horizontal traffic mode GSM 1900



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

52-63

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.

No	Instrument/Ancillary	Type	Manufacturer	Serial No.
01	Spectrum Analyzer	8566 A	Hewlett-Packard	1925A00257
02	Analyzer Display	8566 A	Hewlett-Packard	1925A00860
03	Oscilloscope	7633	Tektronix	230054
04	Radio Communication Analyzer	CMTA 54	Rohde & Schwarz	894 043/010
05	System Power Supply	6038 A	Hewlett-Packard	2848A07027
06	Signal Generator	8111 A	Hewlett-Packard	2215G00867
07	Signal Generator	8662 A	Hewlett-Packard	2224A01012
08	Function Generator	AFGU	Rohde & Schwarz	862 480/032
09	Regulating Transformer	MPL	Erfi	91350
10	LISN	NNLA 8120	Schwarzbeck	8120331
11	Relay-Matrix	PSU	Rohde & Schwarz	893 285/020
12	Power-Meter	436 A	Hewlett-Packard	2101A12378
13	Power-Sensor	8484 A	Hewlett-Packard	2237A10156
14	Power-Sensor	8482 A	Hewlett-Packard	2237A00616
15	Modulation Meter	9008	Racal-Dana	2647
16	Frequency Counter	5340 A	Hewlett-Packard	1532A03899
17	Anechoic Chamber	---	MWB	87400/002
18	Spectrum Analyzer	85660 B	Hewlett-Packard	2747A05306
19	Analyzer Display	85662 A	Hewlett-Packard	2816A16541
20	Quasi Peak Adapter	85650 A	Hewlett-Packard	2811A01131
21	RF-Preselector	85685 A	Hewlett-Packard	2833A00768
22	Biconical Antenna	3104	Emco	3758
23	Log. Per. Antenna	3146	Emco	2130
24	Double Ridged Horn	3115	Emco	3088
25	EMI-Testreceiver	ESAI	Rohde & Schwarz	863 180/013
26	EMI-Analyzer-Display	ESAI-D	Rohde & Schwarz	862 771/008
27	Biconical Antenna	HK 116	Rohde & Schwarz	888 945/013
28	Log. Per. Antenna	HL 223	Rohde & Schwarz	825 584/002
29	Relay-Switch-Unit	RSU	Rohde & Schwarz	375 339/002
30	Highpass	HM985955	FSY Microwave	001
31	Amplifier	P42-GA29	Tron-Tech	B 23602
32	Anechoic Chamber		Frankonia	
33	Control Computer	PSM 7	Rohde & Schwarz	834 621/004
34	EMI Test Receiver	ESMI	Rohde & Schwarz	827 063/010
35	EMI Test Receiver	Display	Rohde & Schwarz	829 808/010

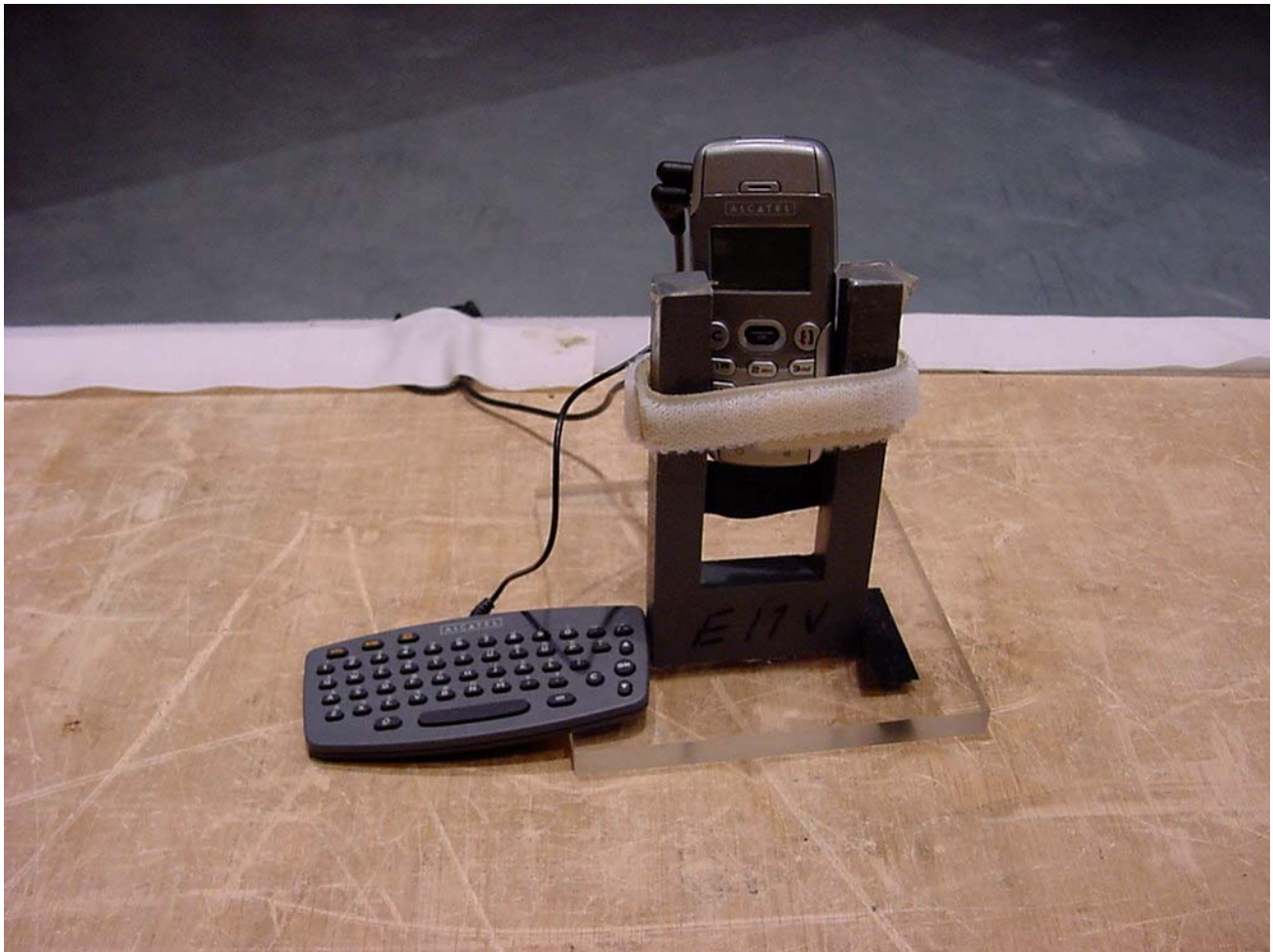
TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

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.

No	Instrument/Ancillary	Type	Manufacturer	Serial No.
36	Control Computer	HD 100	Deisel	100/322/93
37	Relay Matrix	PSN	Rohde & Schwarz	829 065/003
38	Control Unit	GB 016 A2	Rohde & Schwarz	344 122/008
39	Relay Switch Unit	RSU	Rohde & Schwarz	316 790/001
40	Power Supply	6032A	Hewlett Packard	2846A04063
41	Spectrum Monitor	EZM	Rohde & Schwarz	883 720/006
42	Measuring Receiver	ESH 3	Rohde & Schwarz	890 174/002
43	Measuring Receiver	ESVP	Rohde & Schwarz	891 752/005
44	Bicon Ant. 20-300MHz	HK 116	Rohde & Schwarz	833 162/011
45	Logper Ant. 0.3-1 GHz	HL 223	Rohde & Schwarz	832 914/010
46	Amplifier 0.1-4 GHz	AFS4	Miteq Inc.	206461
47	Logper Ant. 1-18 GHz	HL 024 A2	Rohde & Schwarz	342 662/002
48	Polarisation Network	HL 024 Z1	Rohde & Schwarz	341 570/002
49	Double Ridged Horn Antenna 1-26.5 GHz	3115	EMCO	9107-3696
50	Microw. Sys. Amplifier 0.5- 26.5 GHz	8317A	Hewlett Packard	3123A00105
51	Audio Analyzer	UPD	Rohde & Schwarz	1030.7500.04
52	Controler	PSM 7	Rohde & Schwarz	883 086/026
53	DC V-Network	ESH3-Z6	Rohde & Schwarz	861 406/005
54	DC V-Network	ESH3-Z6	Rohde & Schwarz	893 689/012
55	AC 2 Phase V-Network	ESH3-Z5	Rohde & Schwarz	861 189/014
56	AC 2 Phase V-Network	ESH3-Z5	Rohde & Schwarz	894 981/019
57	AC-3 Phase V-Network	ESH2-Z5	Rohde & Schwarz	882 394/007
58	Power Supply	6032A	Rohde & Schwarz	2933A05441
59	RF-Test Receiver	ESVP.52	Rohde & Schwarz	881 487/021
60	Spectrum Monitor	EZM	Rohde & Schwarz	883 086/026
61	RF-Test Receiver	ESH3	Rohde & Schwarz	881 515/002
62	Relay Matrix	PSU	Rohde & Schwarz	882 943/029
63	Relay Matrix	PSU	Rohde & Schwarz	828 628/007
64	Spectrum Analyzer	FSIQ 26	Rohde & Schwarz	119.6001.27
65	Spectrum Analyzer	HP 8565E	Hewlett Packard	3473A00773
66				
67				
68				

TEST SETUP

Radiated emissions



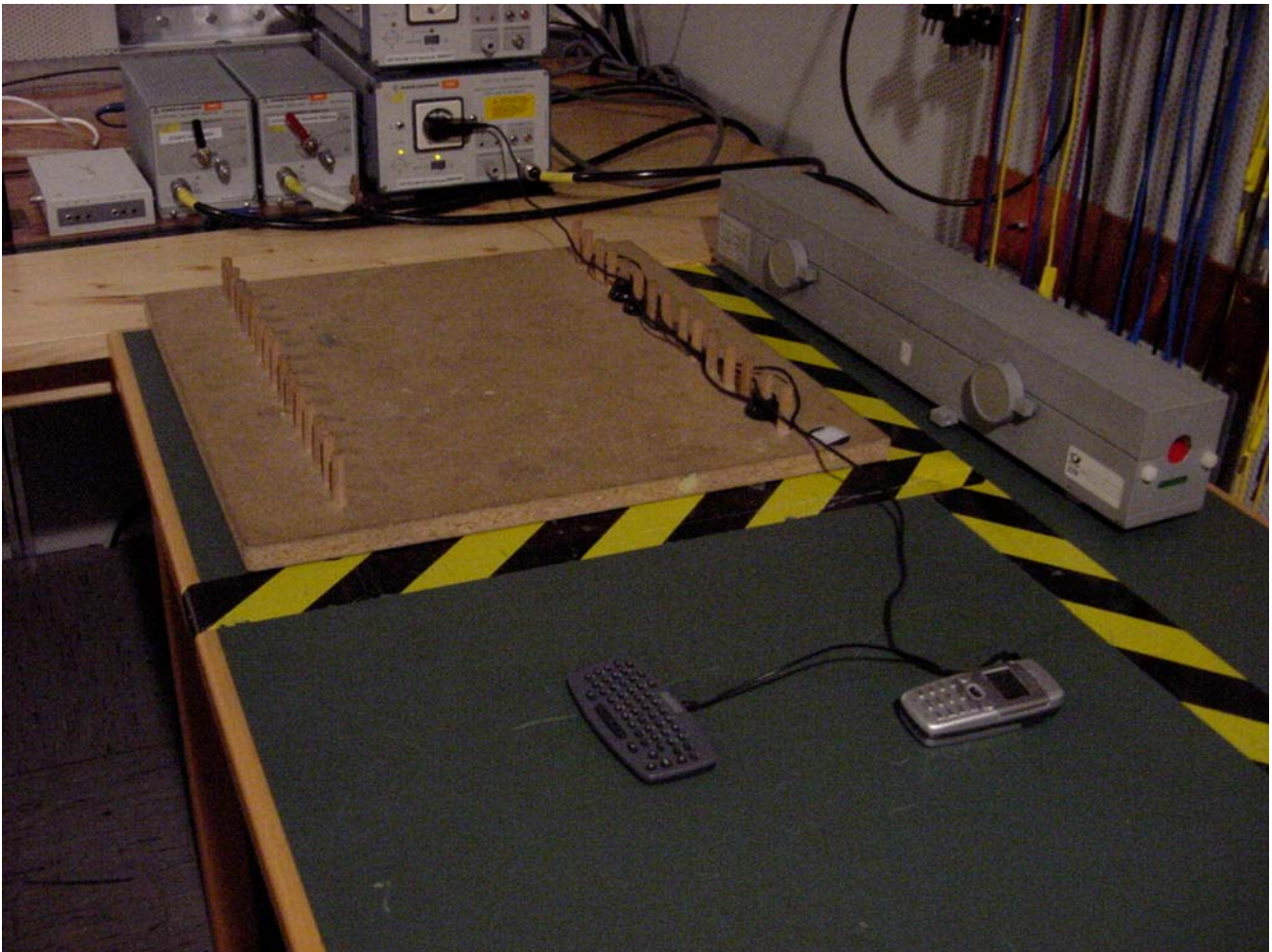
TEST SETUP

Radiated emissions



Test site

Conducted emissions



Photographs of the equipment



PHOTOGRAPH OF THE EQUIPMENT



PHOTOGRAPH OF THE EQUIPMENT



PHOTOGRAPH OF THE EQUIPMENT



PHOTOGRAPH OF THE EQUIPMENT

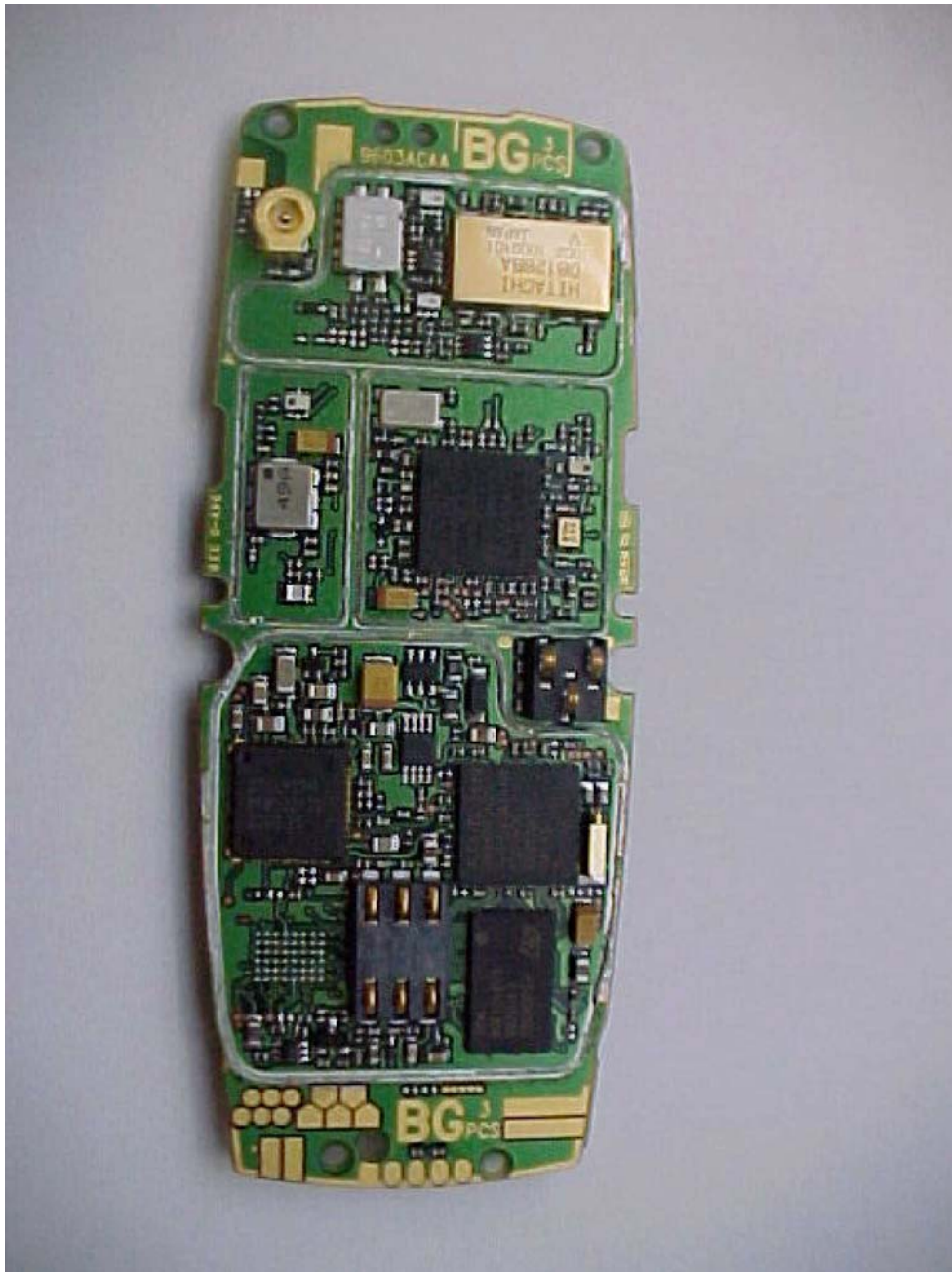


PHOTOGRAPH OF THE EQUIPMENT



PHOTOGRAPH OF THE EQUIPMENT

RF-board without shield



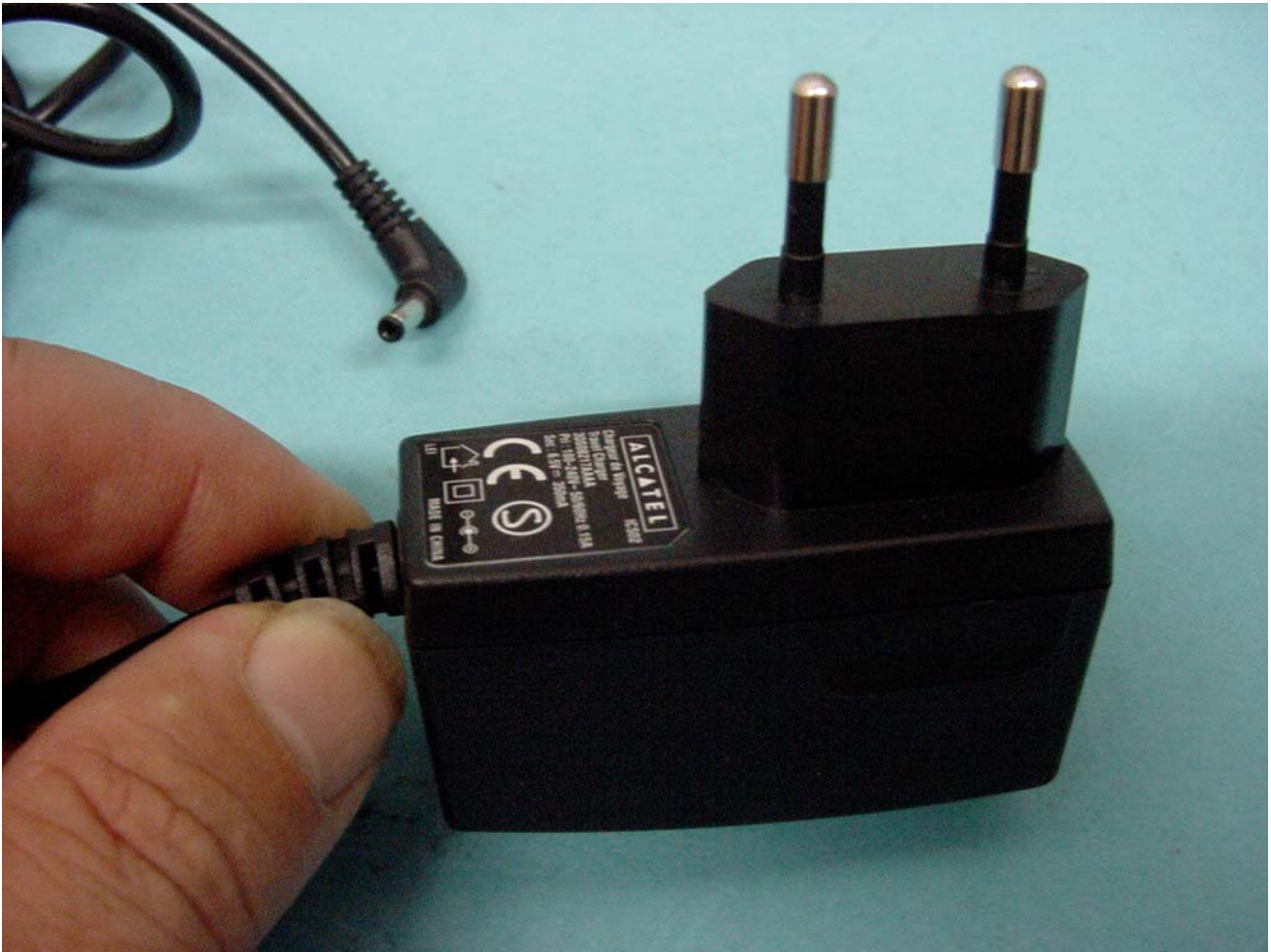
PHOTOGRAPH OF THE EQUIPMENT

SMS keyboard



PHOTOGRAPH OF THE EQUIPMENT

Travel charger



PHOTOGRAPH OF THE EQUIPMENT

SR charger Leader 220V



PHOTOGRAPH OF THE EQUIPMENT

SR charger Leader 110V



PHOTOGRAPH OF THE EQUIPMENT

SR charger ASTEC 220V



PHOTOGRAPH OF THE EQUIPMENT

SR charger ASTEC 110V



PHOTOGRAPH OF THE EQUIPMENT

Cigar lighter charger



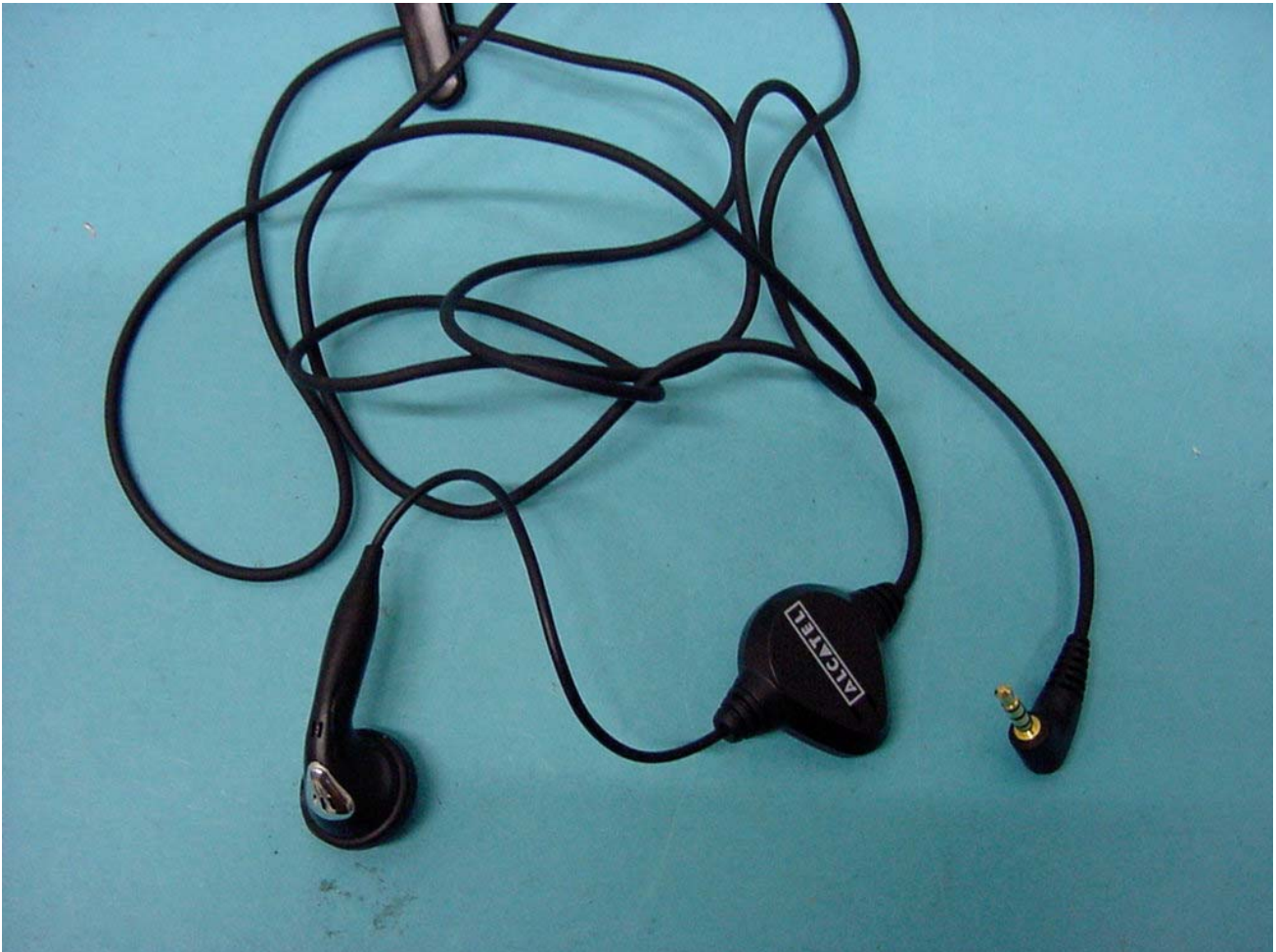
PHOTOGRAPH OF THE EQUIPMENT

Headset Innovi



PHOTOGRAPH OF THE EQUIPMENT

Headset Leemax



PHOTOGRAPH OF THE EQUIPMENT

Headset Merry



PHOTOGRAPH OF THE EQUIPMENT

Car Kit Primax



PHOTOGRAPH OF THE EQUIPMENT

Car Kit Primax Microfon



PHOTOGRAPH OF THE EQUIPMENT

Car Kit Primax RF connection kit

