



January 11, 2002

Federal Communications Commission
Equipment Approval Services
7435 Oakland Mills Road
Columbia, MD 21046
Attn: Martin Perrine

SUBJECT: Withus IT Co., Ltd.
FCC ID: POQWCE-220
731 Confirmation No.: TC707872
Correspondence Ref. No.: 3323

Dear Martin:

On behalf of Withus IT Co., Ltd., we hereby submit our response to your e-mail dated December 21, 2001 requesting additional information for the subject application.

1. Please find attached retested band edge test plots for the low and high channels showing the magnitude of the carrier at the band edges in compliance with 22.917(e).
2. Please find attached retested conducted spurious emissions test plots showing compliance with 22.917(f).
3. To accurately determine the ERP of the EUT using a substitution dipole antenna relative to an ideal dipole with 0dBd gain, two of the following three parameters must be known: incident power, reflected power, and the reflection coefficient of the substitution antenna. In the set up used to determine the ERP, a single directional coupler was used. This provided only the incident power to the dipole. The reflection coefficient of the dipole was then used and converted into transmission loss. The manufacturer also provided calibrated gain values, which correlates with the measured transmission loss. The total power therefore emitted by the dipole is the incident power plus the transmission loss relative to an ideal dipole. Please see attached list of dipole antenna gains from the manufacturer.
4. Please find attached retested occupied bandwidth test plots using video and resolution bandwidths of equal value.
5. Please see attached amendment dated December 5, 2001 and revised page 8 of the SAR report providing additional information to justify the selected probe conversion factor.
6. Please see attached amendment dated December 5, 2001. Also attached are face and body SAR test plots for the highest SAR positions/frequencies previously submitted, using 835MHz brain and muscle tissue parameters and conversion factors.
7. Please see attached letter from the applicant with additional tune-up procedure information. The submitted tune-up procedure is for a family of devices. Some models are either cellular, PCS, or both. This particular device is for the cellular band only.
8. Please see attached amendment dated December 5, 2001 showing printout of measured brain liquid dielectric parameters. Also attached is a printout and revised page 9 of the SAR report showing the measured body liquid dielectric parameters. Please note that the previously submitted measured liquid dielectric parameters on page 11 of the SAR report inadvertently stated a measurement uncertainty range. Attached is revised page 11 of the SAR report.
9. The manufacturer determined the battery voltage endpoint. When the voltage of the battery reaches 3.3 volts the device turns off.

If you have any questions or comments concerning the above, please do not hesitate to contact me.

Sincerely,

Shawn McMillen
General Manager
Celltech Research Inc.
Testing & Engineering Lab

cc: Withus IT Co., Ltd.
American TCB



11:03:26 Dec 21, 2001

WCE-220 CDMA BAND EDGE LOW CH

Ref 24 dBm

Atten 5 dB

Mkr1 824.000 MHz

-21.14 dBm

Peak

Log

10

dB/

Offst

30

dB

DI

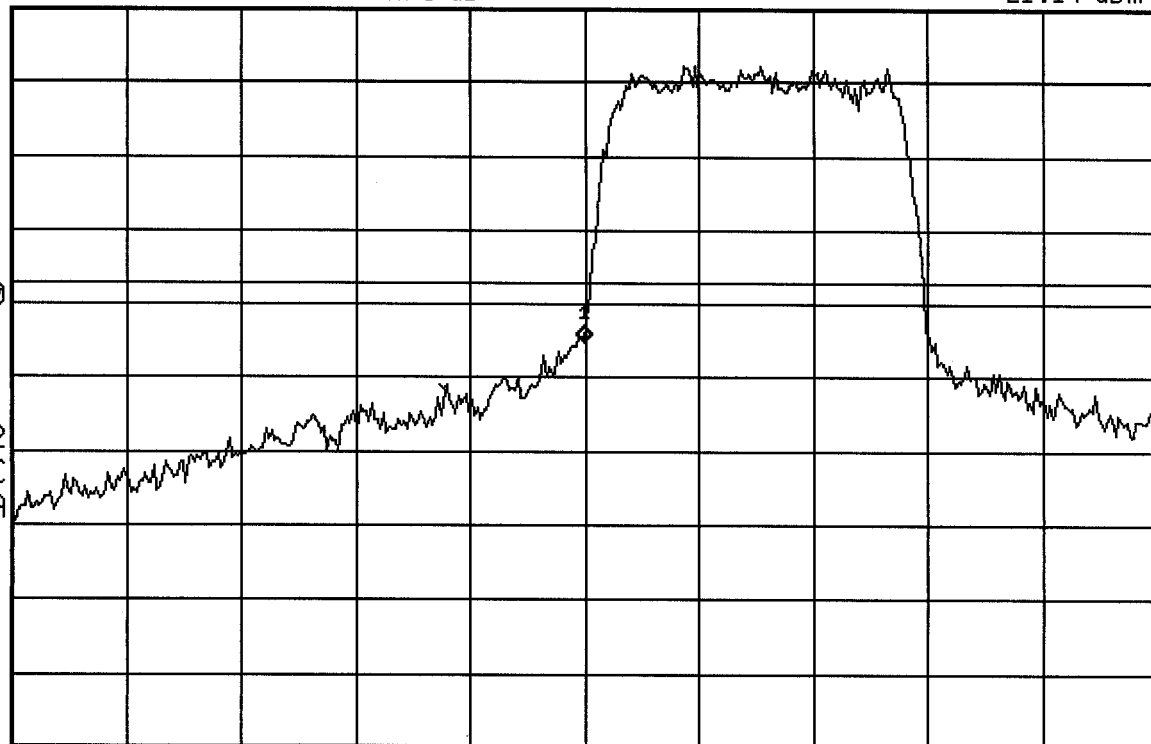
-13.0

dBm

W1 S2

S3 FC

AA



Center 824 MHz

*Res BW 30 kHz

VBW 30 kHz

Span 5 MHz

Sweep 1 s



11:15:11 Dec 21, 2001

WCE-220 CDMA BAND EDGE HIGH CH

Mkr1 849.000 MHz

Ref 24 dBm

Atten 5 dB

-21.96 dBm

Peak

Log

10

dB/

Offst

30

dB

DI

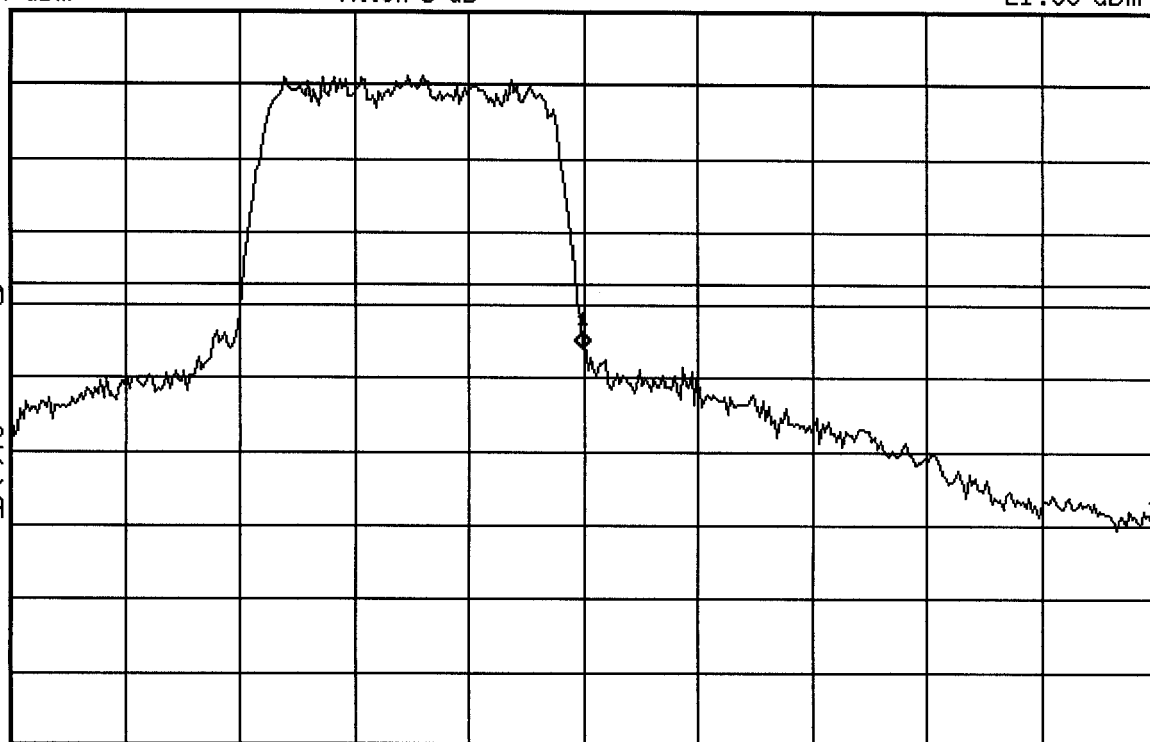
-13.0

dBm

W1 S2

S3 FC

AA



Center 849 MHz

Span 5 MHz

*Res BW 30 kHz

VBW 30 kHz

*Sweep 1 s

hp 14:50:06 Dec 21, 2001

WCE-220 CCOND SPURS CH 1013

Ref -8.55 dBm

Atten 5 dB

Mkr1 1.647 GHz

-44.18 dBm

Peak

Log

10

dB/

Offst

30

dB

DI

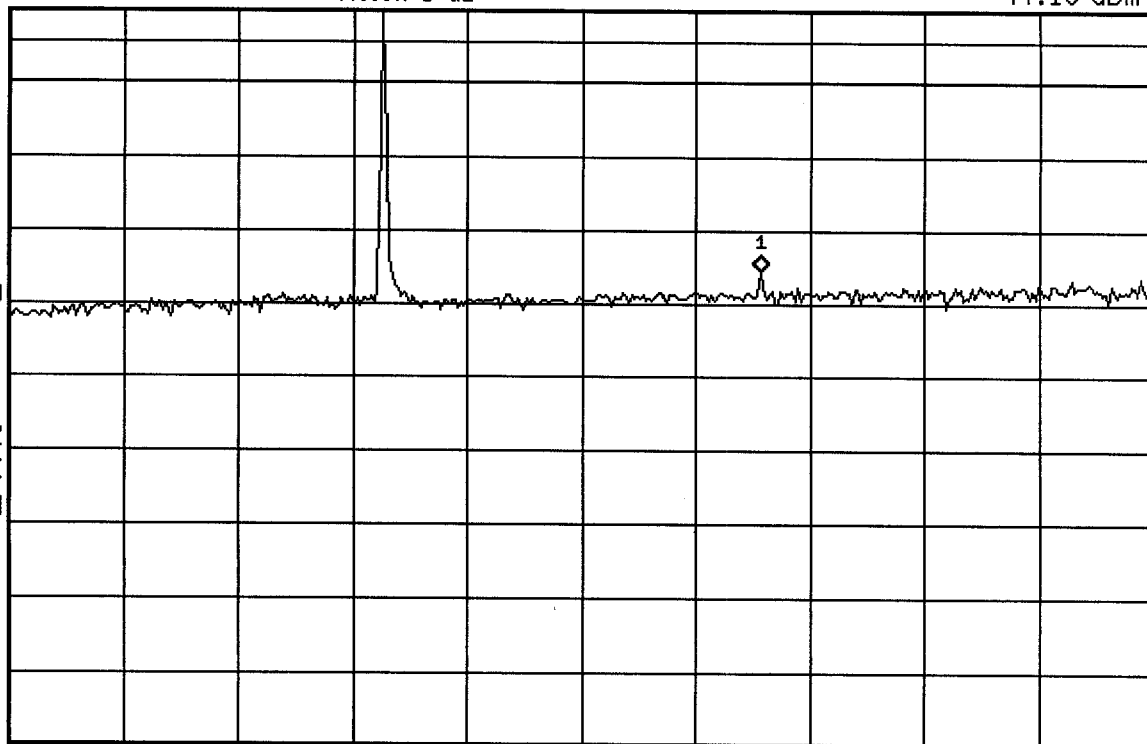
-13.0

dBm

m1 S2

S3 FC

AA



Start 10 MHz

*Res BW 1 MHz

*VBW 1 MHz

Stop 2.5 GHz

Sweep 6.225 ms



14:49:31 Dec 21, 2001

WCE-220 CCOND SPURS CH 1013

Mkr1 7.131 GHz

Ref -8.55 dBm

Atten 5 dB

-45.42 dBm

Peak

Log

10

dB/

Offst

30

dB

DI

-13.0

dBm

m1 S2

S3 FC

AA

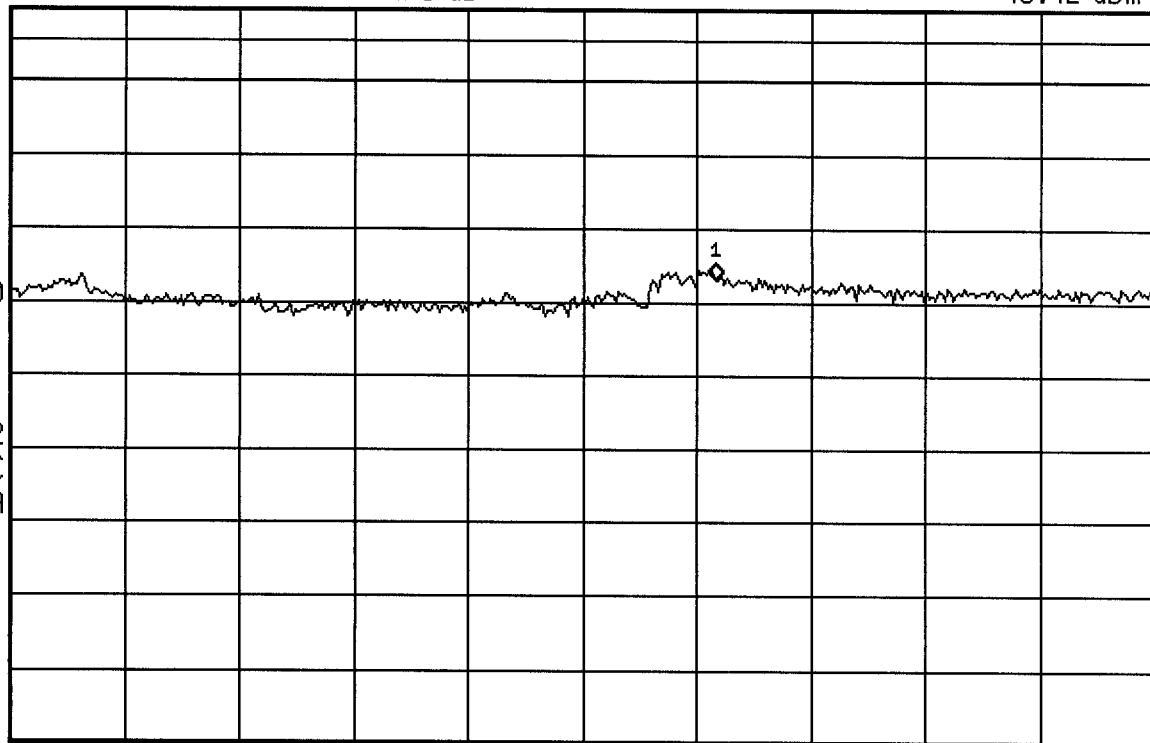
Start 2.5 GHz

*Res BW 1 MHz

*VBW 1 MHz

Stop 10 GHz

Sweep 18.75 ms



hp 14:49:02 Dec 21, 2001

WCE-220 CCOND SPURS CH 1013

Ref -8.55 dBm

Atten 5 dB

Mkr1 13.45 GHz

-40.23 dBm

Peak

Log

10

dB/

Offst

30

dB

DI

-13.0

dBm

m1 S2

S3 FC

AA

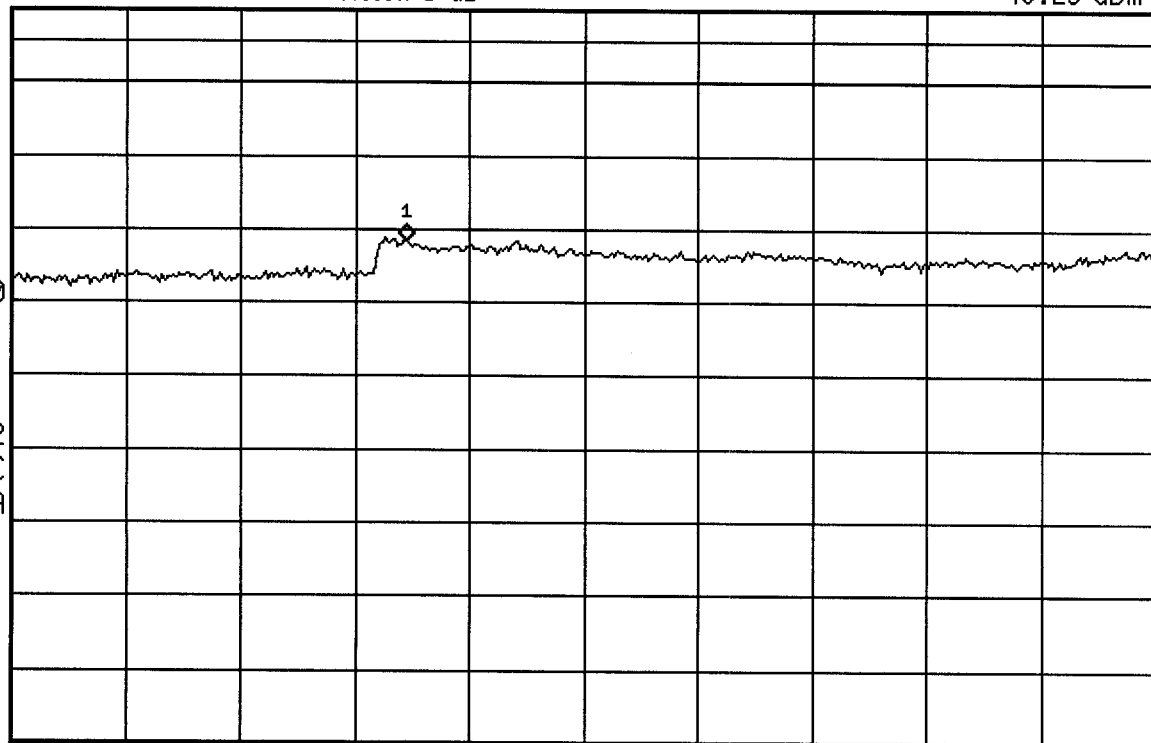
Start 10 GHz

*Res BW 1 MHz

*VBW 1 MHz

Stop 20 GHz

Sweep 100 ms





14:51:29 Dec 21, 2001

WCE-220 CCOND SPURS CH 363

Ref -8.55 dBm

Atten 5 dB

Mkr1 1.653 GHz

-45.76 dBm

Peak

Log

10

dB/

Offst

30

dB

DI

-13.0

dBm

m1 S2

S3 FC

AA

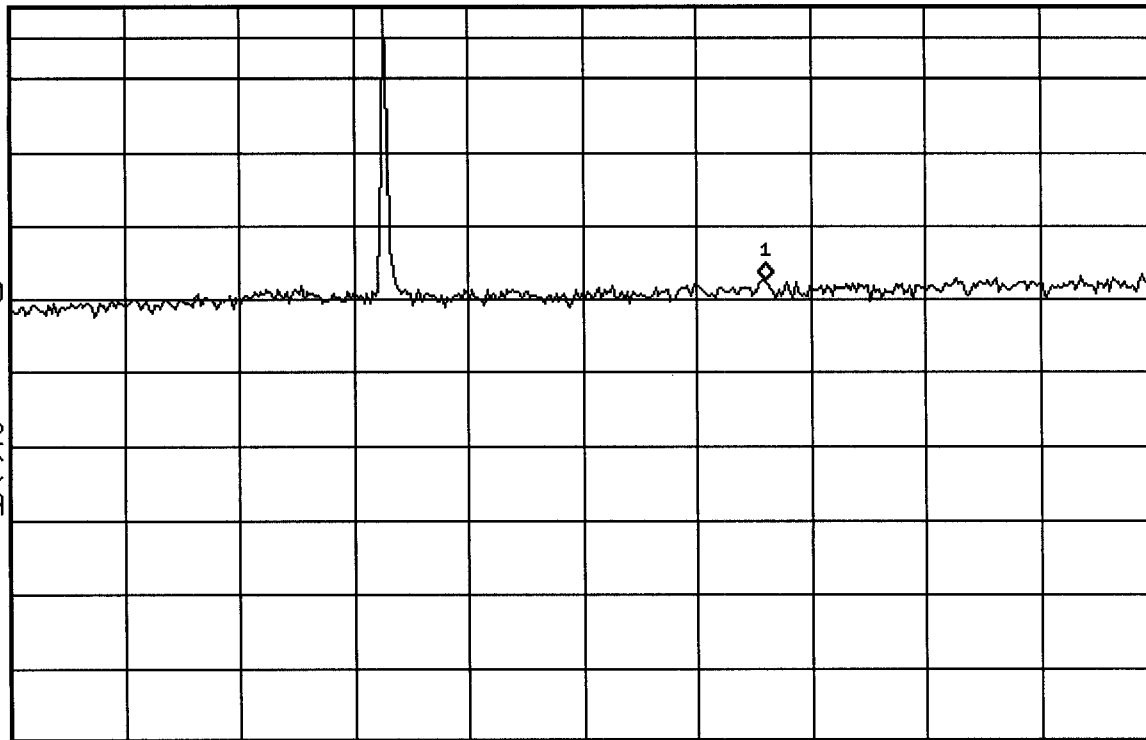
Start 10 MHz

*Res BW 1 MHz

*VBW 1 MHz

Stop 2.5 GHz

Sweep 6.225 ms



hp 14:51:51 Dec 21, 2001
WCE-220 CCOND SPURS CH 363

Mkr1 7.056 GHz
-43.99 dBm

Ref -8.55 dBm

Atten 5 dB

Peak

Log

10

dB/

Offst

30

dB

DI

-13.0

dBm

m1 S2

S3 FC

AA

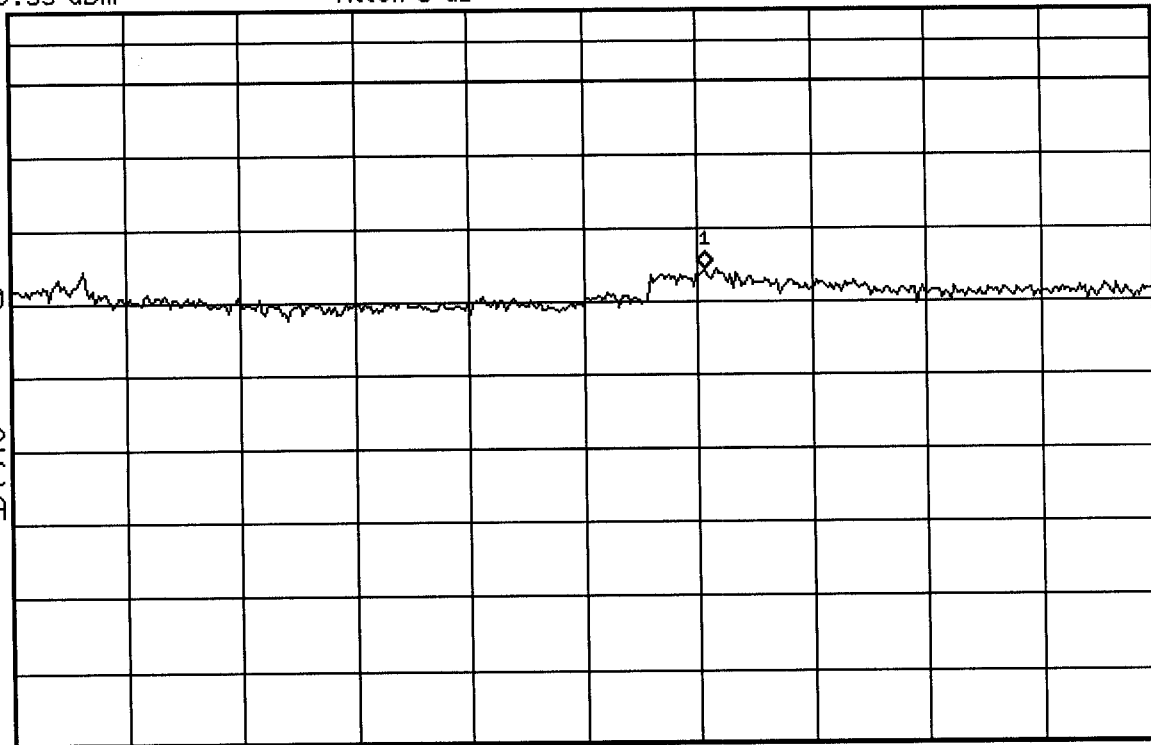
Start 2.5 GHz

*Res BW 1 MHz

*VBW 1 MHz

Stop 10 GHz

Sweep 18.75 ms



hp 14:52:12 Dec 21, 2001

WCE-220 CCOND SPURS CH 363

Mkr1 13.33 GHz

Ref -8.55 dBm

Atten 5 dB

-39.67 dBm

Peak

Log

10

dB/

Offst

30

dB

DI

-13.0

dBm

m1 S2

S3 FC

AA

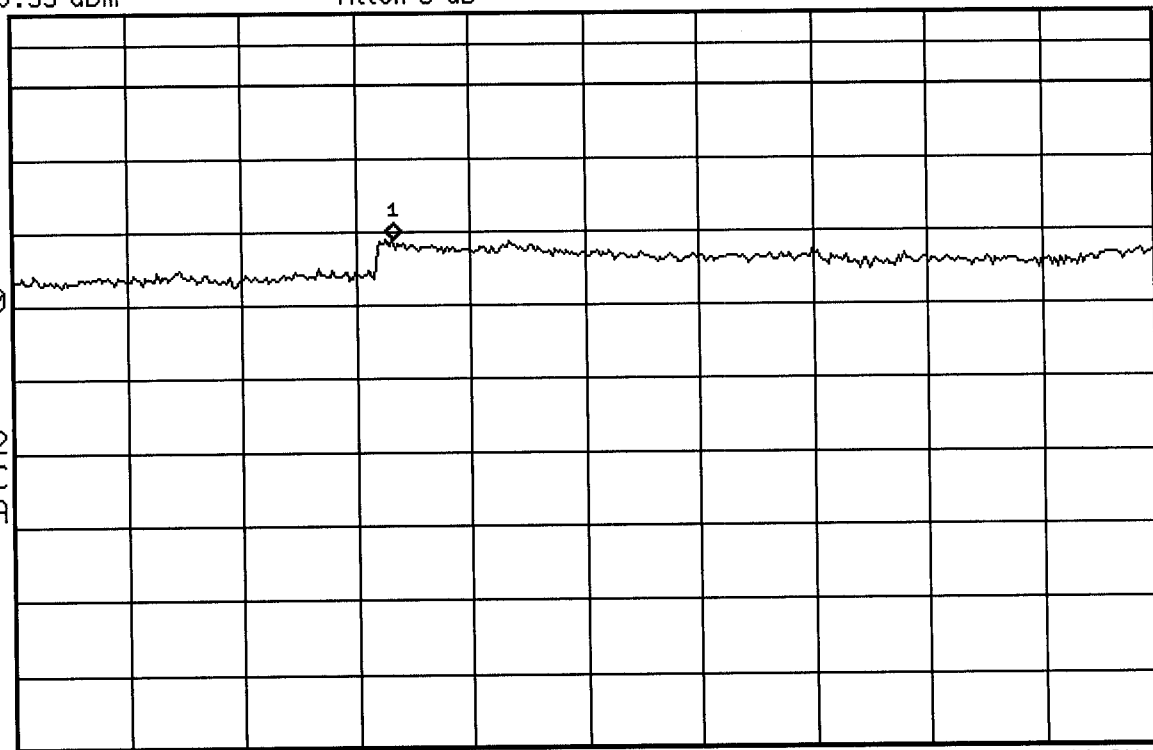
Start 10 GHz

*Res BW 1 MHz

*VBW 1 MHz

Stop 20 GHz

Sweep 100 ms



hp 14:46:17 Dec 21, 2001

WCE-220 CCOND SPURS CH 777

Ref -8.55 dBm

Atten 5 dB

Mkr1 1.700 GHz

-42.94 dBm

Peak

Log

10

dB/

Offst

30

dB

DI

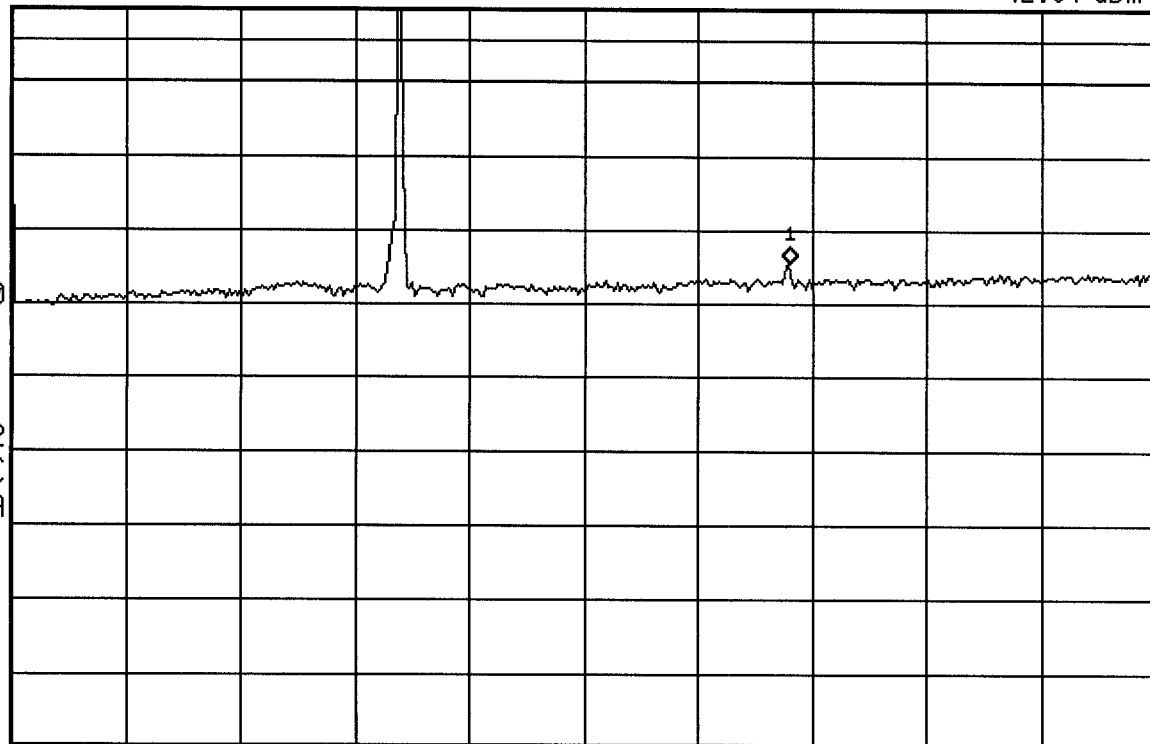
-13.0

dBm

m1 S2

S3 FC

AA



Start 10 kHz

#Res BW 1 MHz

Stop 2.5 GHz

#VBW 1 MHz

#Sweep 16.81 ms

14:47:12 Dec 21, 2001

WCE-220 CCOND SPURS CH 777

Ref -8.55 dBm

Atten 5 dB

Mkr1 2.988 GHz

-45.39 dBm

Peak

Log

10

dB/

Offst

30

dB

DI

-13.0

dBm

m1 S2

S3 FC

AA

1

Start 2.5 GHz

*Res BW 1 MHz

*VBW 1 MHz

Stop 10 GHz

Sweep 18.75 ms

hp 14:47:42 Dec 21, 2001

WCE-220 CCOND SPURS CH 777

Ref -8.55 dBm

Atten 5 dB

Mkr1 13.23 GHz

-39.96 dBm

Peak

Log

10

dB/

Offst

30

dB

DI

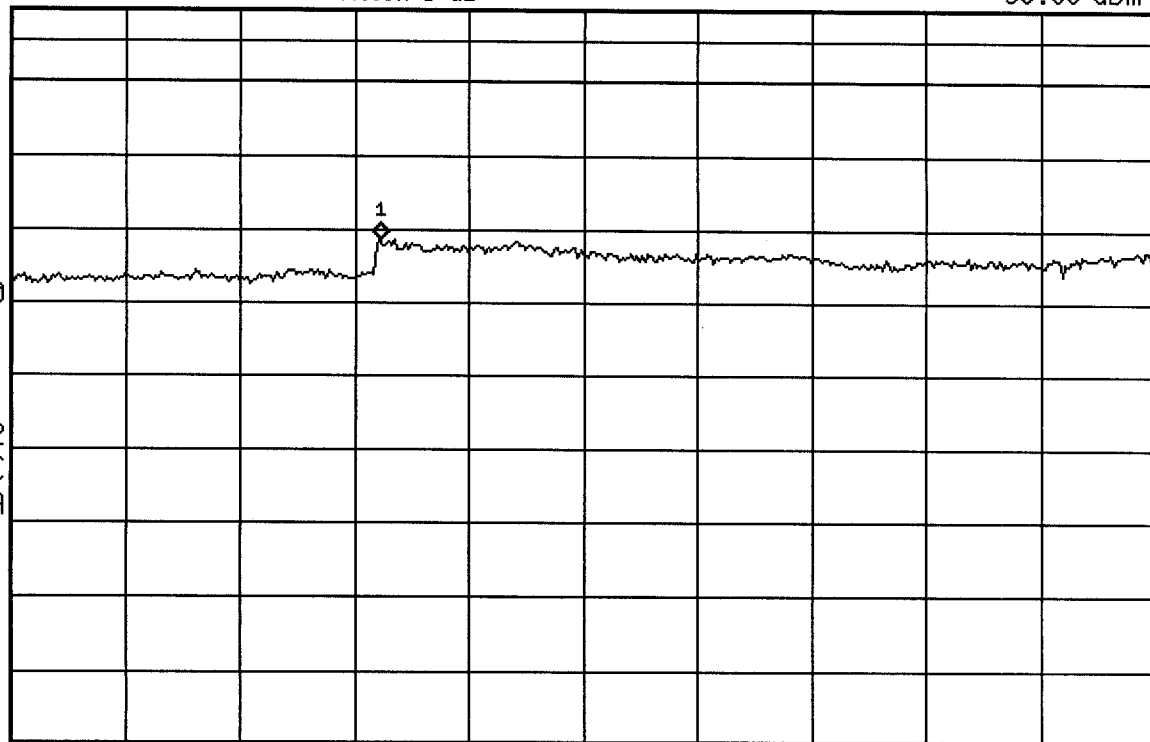
-13.0

dBm

m1 S2

S3 FC

AA



Start 10 GHz

*Res BW 1 MHz

*VBW 1 MHz

Stop 20 GHz

Sweep 100 ms



Gain and Antenna Factors for Dipole Antenna

Manufactured by EMC Test Systems

Model Number: DB-4

Serial Number: 1498

3.0 Meter Calibration

Polarization: Horizontal

3.0m

1498

Frequency (MHz)	Antenna Factor (dB/m)	Gain Numeric	Gain dBi
400	20.8	1.39	1.4
425	21.2	1.42	1.5
450	21.7	1.45	1.6
475	22.1	1.47	1.7
500	22.5	1.47	1.7
525	23.1	1.41	1.5
550	23.7	1.34	1.3
575	24.4	1.27	1.0
600	25.0	1.20	0.8
625	25.2	1.23	0.9
650	25.5	1.26	1.0
675	25.7	1.28	1.1
700	26.0	1.31	1.2
725	26.4	1.26	1.0
750	26.9	1.22	0.9
775	27.3	1.17	0.7
800	27.8	1.13	0.5
825	27.8	1.18	0.7
850	27.9	1.24	0.9
875	27.9	1.29	1.1
900	28.0	1.35	1.3
925	28.4	1.30	1.1
950	28.8	1.25	1.0
975	29.2	1.20	0.8
1000	29.6	1.16	0.6

Specification compliance testing factor (3.0 meter spacing) to be added to receiver meter reading in dBV to convert to field intensity in dBV/meter. Calibrated 27 Mar 00 (DD/MM/YYYY). Calibration per ANSI C63.5.



15:03:14 Dec 21, 2001

WCE-220 OCCUPIED BAND WIDTH

Ref 24 dBm

Atten 5 dB

Samp

Log

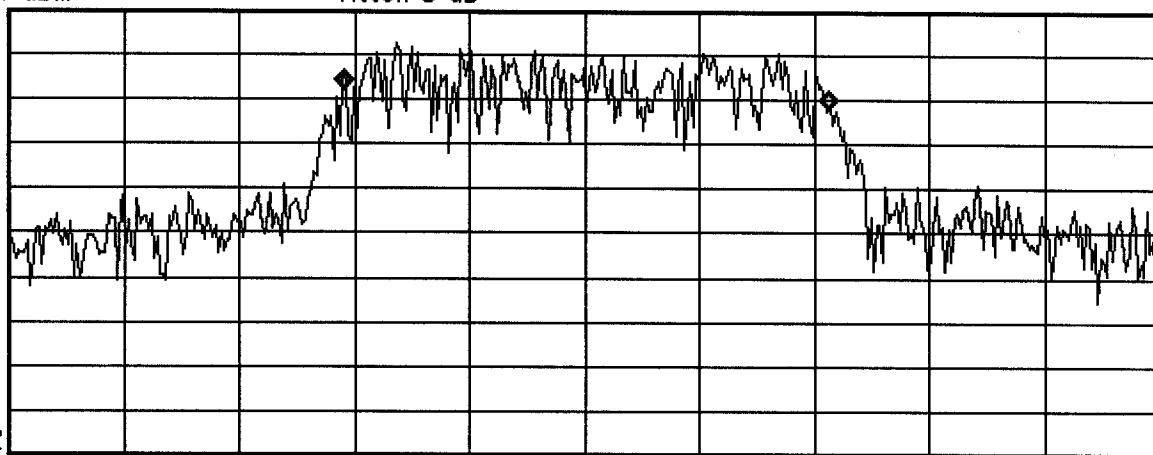
10

dB/

Offst

30

dB



W1 S2

Center 835.9 MHz

Span 3 MHz

*Res BW 30 kHz

*VBW 30 kHz

Sweep 9.167 ms

Occupied Bandwidth Results (measuring..)

Occupied Bandwidth

Occ BW % Pwr 99.00 %

1.268 MHz

Transmit Freq Error -8.374 kHz



14:49:30 Dec 21, 2001

WTHUS WCE-220 CDMA CH 1013

Ref 24 dBm

Atten 5 dB

Peak

Log

10

dB/

Offst

31

dB

DI

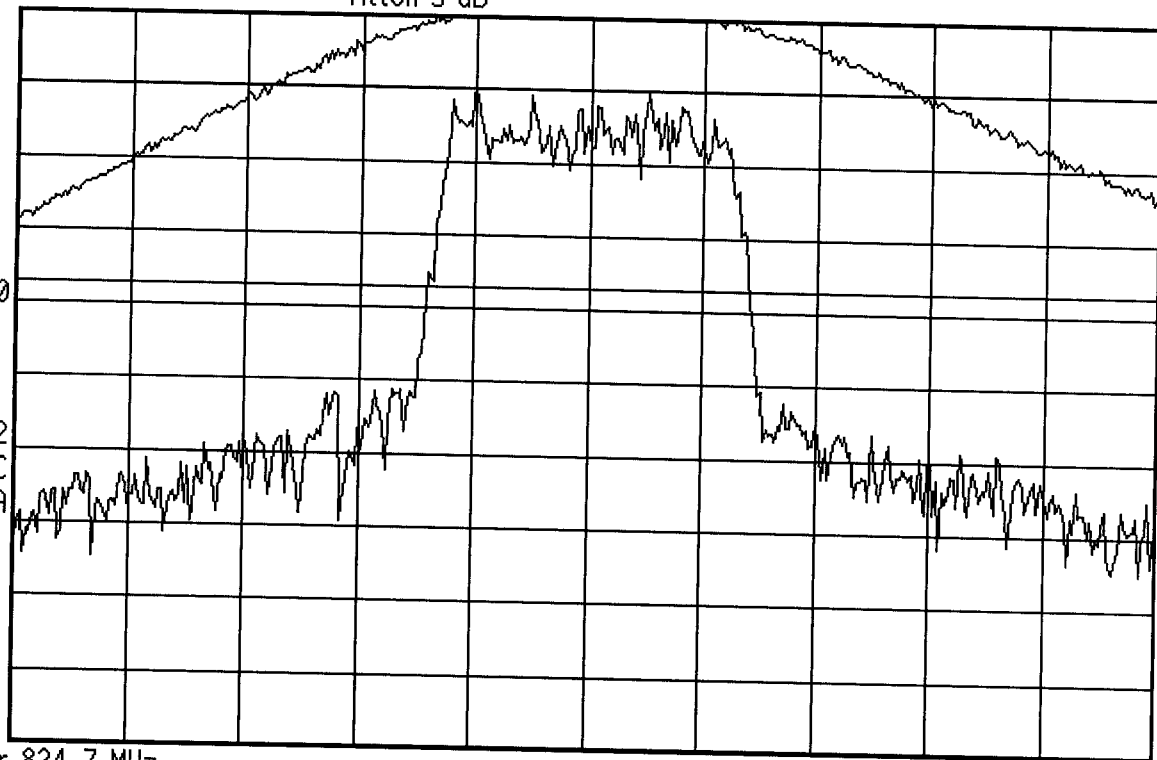
-13.0

dBm

M1 W2

S3 FC

AA



Center 824.7 MHz

*Res BW 30 kHz

VBW 30 kHz

Span 5 MHz

Sweep 13.89 ms



14:47:54 Dec 21, 2001

WITHUS WCE-220 CDMA CH 363

Ref 24 dBm

Atten 5 dB

Peak

Log

10

dB/

Offst

31

dB

DI

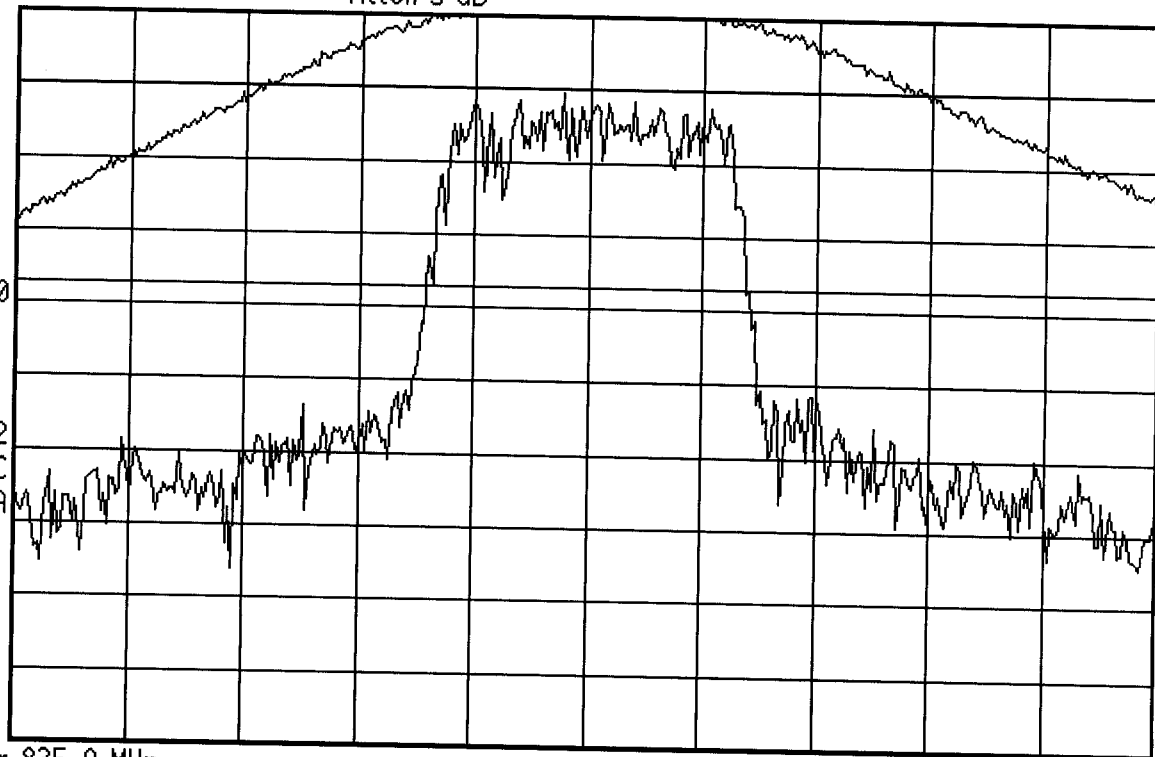
-13.0

dBm

M1 W2

S3 FC

AA



Center 835.9 MHz

*Res BW 30 kHz

VBW 30 kHz

Span 5 MHz

Sweep 13.89 ms



14:46:35 Dec 21, 2001

WITHUS WCE-220 CDMA CH 777

Ref 24 dBm

Atten 5 dB

Peak

Log

10

dB/

Offst

31

dB

DI

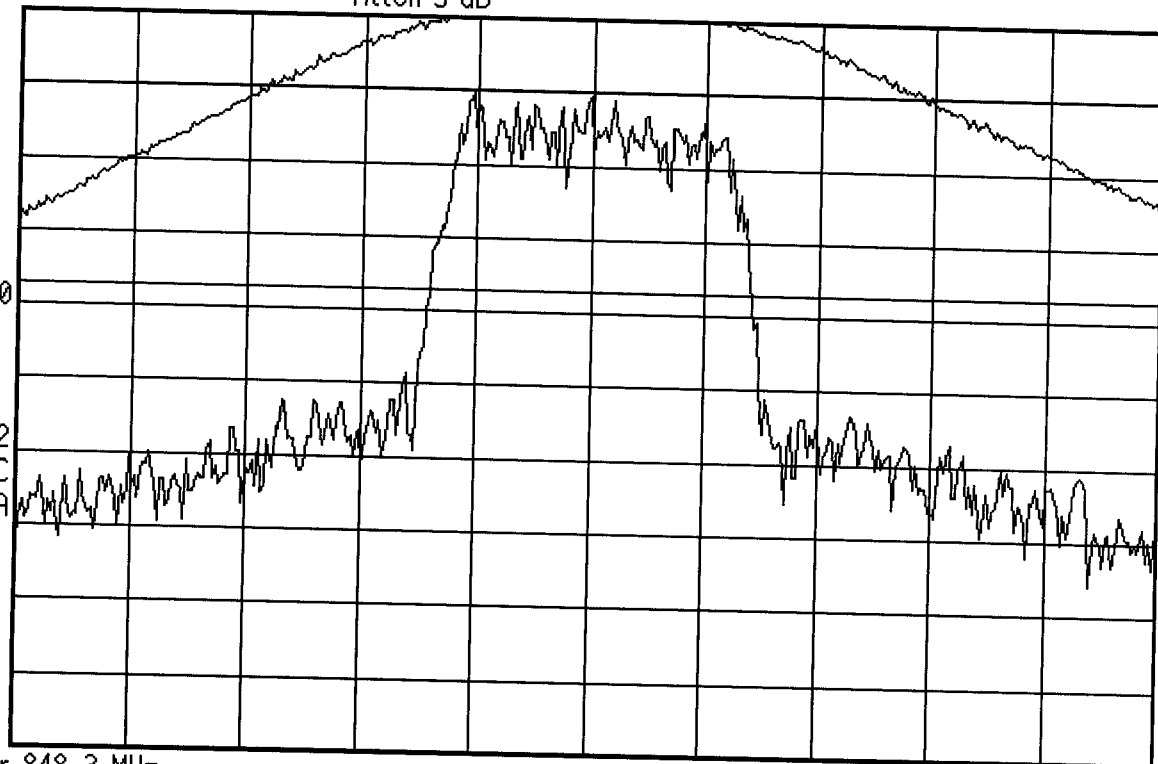
-13.0

dBm

M1 W2

S3 FC

AA



Center 848.3 MHz

*Res BW 30 kHz

VBW 30 kHz

Span 5 MHz

Sweep 13.89 ms



December 5, 2001

Federal Communications Commission
Equipment Authorization Branch
7435 Oakland Mills Road
Columbia, MD 21046

**SUBJECT: Withus IT Co., Ltd.
FCC ID: POQWCE-220**

Gentlemen,

We hereby submit a revision to page 9 of the SAR measurement report and new page 10 with data table showing the measured fluid electrical parameters performed on 11/19/01.

If you have any questions or comments, please do not hesitate to contact me.

Sincerely,

Shawn McMillen
General Manager
Celltech Research Inc.
Testing & Engineering Lab

cc: Withus IT Co., Ltd.

EVALUATION PROCEDURES (Cont.)

In order to ensure a conservative overestimation of SAR for the EUT, the following method was used. Firstly, the probe was calibrated by the system manufacturer at 900MHz and 1800MHz using simulated fluids with electrical parameters as set by OET 65 Supplement C. Prior to the SAR assessment of the EUT, the system was validated at 900MHz in the appropriate fluid to ensure system accuracy. Although the fundamental frequency of the mid channel of the EUT was approximately 835MHz, 900MHz E-field probe conversion numbers and fluid parameters were used since it provided the most accurate calibrated point within 100MHz of the EUT's mid channel. It must also be noted that the fluid used for both 835MHz and 900MHz have the same composition and therefore the probe has been calibrated in the appropriate fluid for the transmit band of the EUT. The following table shows a comparison of the measured results for the worst-case channel of the EUT using both 835MHz and 900MHz E-field probe conversion numbers with the appropriate fluid parameters.

EUT Channel	Conducted Power (dBm)	Conversion Number (CF)	Conductivity S/m	SAR Value (mW/g)	SAR Delta Å
363	24.0	900MHz CF = 6.83	0.97	1.46	7.4%
363	24.0	835MHz CF = 6.91	0.90	1.36	

The measured results above indicate that when 900MHz E-field probe conversion factors, with the associated fluid electrical parameters, were used in place of the system manufacturer's recommended 835MHz conversion factors and fluid electrical parameters, that the SAR was overestimated by approximately 7%.

835MHz BRAIN TISSUE PARAMETERS			
Equivalent Tissue	Dielectric Constant ϵ_r	Conductivity s (mho/m)	r (Kg/m³)
835MHz Brain (Target)	41.5 ±5%	0.90 ±5%	1000
835MHz Brain (Measured: 11/19/01)	42.2 ±5%	0.91 ±5%	1000

EVALUATION PROCEDURES (Cont.)

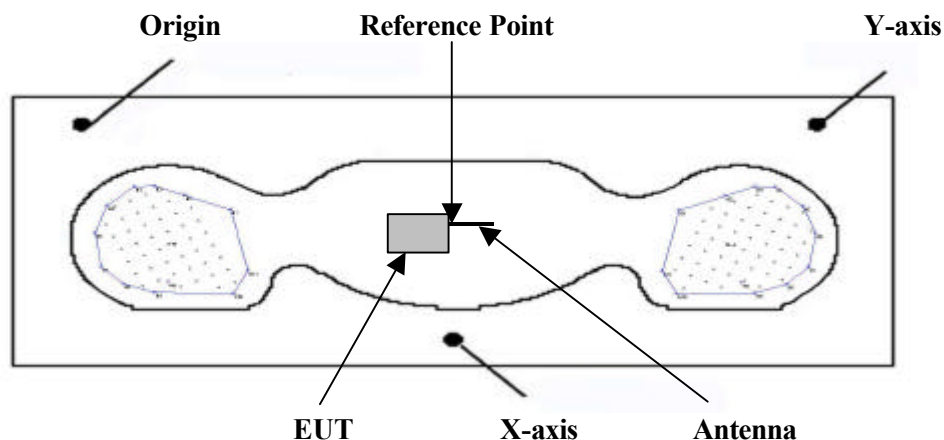
Measured Fluid Electrical Parameters (11/19/01)

Frequency	e'	e''
800.000000 MHz	42.7130	19.8086
805.000000 MHz	42.6812	19.7834
810.000000 MHz	42.6120	19.7581
815.000000 MHz	42.5312	19.7257
820.000000 MHz	42.4601	19.6858
825.000000 MHz	42.3949	19.6822
830.000000 MHz	42.3343	19.6722
835.000000 MHz	42.2531	19.6419
840.000000 MHz	42.1787	19.6313
845.000000 MHz	42.0942	19.5820
850.000000 MHz	42.0592	19.5922
855.000000 MHz	42.0082	19.5447
860.000000 MHz	41.9474	19.5316
865.000000 MHz	41.8714	19.5334
870.000000 MHz	41.8330	19.5551
875.000000 MHz	41.7684	19.5539
880.000000 MHz	41.7262	19.5564
885.000000 MHz	41.6783	19.5708
890.000000 MHz	41.6414	19.5517
895.000000 MHz	41.6098	19.4813
900.000000 MHz	41.5391	19.4781
905.000000 MHz	41.4866	19.4498
910.000000 MHz	41.4445	19.4532
915.000000 MHz	41.4170	19.4375
920.000000 MHz	41.3492	19.4001
925.000000 MHz	41.2991	19.4016
930.000000 MHz	41.2358	19.3734
935.000000 MHz	41.1821	19.3426
940.000000 MHz	41.1199	19.3438
945.000000 MHz	41.0820	19.3279
950.000000 MHz	41.0014	19.3257
955.000000 MHz	40.9541	19.2753

6.0 EVALUATION PROCEDURES

The Specific Absorption Rate (SAR) evaluation was performed in the following manner:

- a. (i) The evaluation was performed in the applicable area of the phantom depending on the type of device being tested. For devices held to the ear during normal operation both the left and right ear positions were evaluated at the low, middle, and high frequencies of the band at maximum power, and with the device antenna in both the extended and extracted positions as applicable. The positioning of the ear-held device relative to the phantom was performed in accordance with FCC OET Bulletin 65, Supplement C (Edition 01-01) using the SAM phantom.
- (ii) For face-held and body-worn devices a planar phantom was used.
- b. The SAR was determined by a pre-defined procedure within the DASY3 software. Upon completion of a reference and optical surface check, the exposed region of the phantom was scanned near the inner surface with a grid spacing of 15mm x 15mm.
- c. A 5x5x7 matrix was performed around the greatest spatial SAR distribution found during the area scan of the applicable exposed region. SAR values were then calculated using a 3-D spline interpolation algorithm and averaged over spatial volumes of 1 and 10 grams.
- d. The depth of the simulating tissue in the phantom used for the SAR evaluation was no less than 15cm.
- e. The target tissue parameters for 900MHz were used in the SAR evaluation software. If there was any appreciable variation in the measured tissue parameters from the target values specified then the SAR was adjusted using the sensitivities to SAR (see "Appendix D-SAR Sensitivities").
- f. The E-field probe conversion factors for 835MHz were determined as follows:
 - In brain and muscle tissue between 750MHz and 1GHz, the conversion factor decreases approximately 1.3% per 100MHz frequency increase.
 - In brain and muscle tissue between 1.6GHz and 2GHz, the conversion factor decreases approximately 1% per 100MHz frequency increase.



Device Positioning & Reference Point (Body & Hand SAR)

Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Right Hand Section; Position: (70°,295°)
Probe: ET3DV6 - SN1590; ConvF(6.91,6.91,6.91); Crest factor: 1.0
835 MHz Brain: $\sigma = 0.91$ mho/m $\epsilon_r = 42.2$ $\rho = 1.00$ g/cm³
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: -0.07 dB
SAR (1g): 1.36 mW/g, SAR (10g): 0.893 mW/g

Right Cheek/Touch Position

Antenna Out

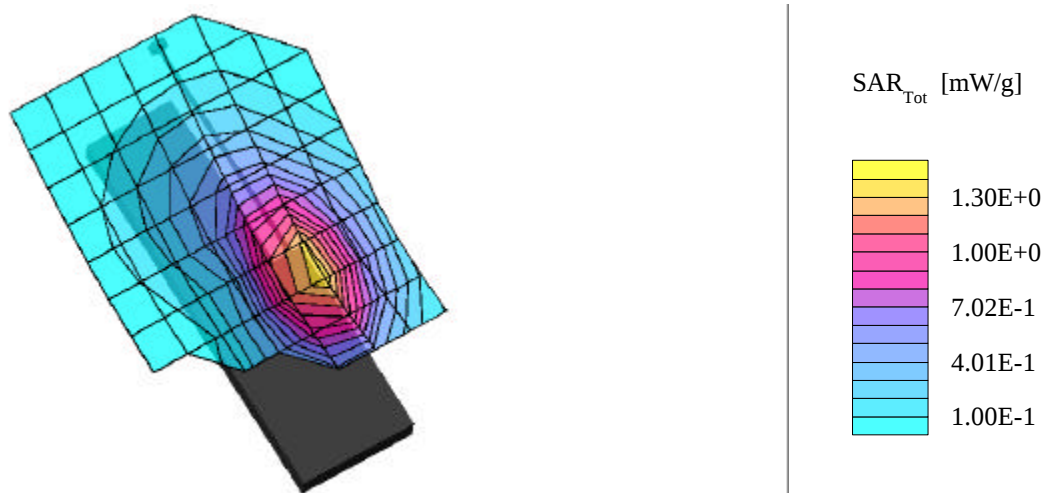
Withus Model: WCE-220

CDMA Mode

Channel 1013 [824.70 MHz]

Conducted Power: 24.0 dBm

Date Tested: Nov. 19, 2001



Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Flat Section; Position: (270°,270°)

Probe: ET3DV6 - SN1590; ConvF(6.70,6.70,6.70); Crest factor: 1.0

835 MHz Muscle: $\sigma = 0.99$ mho/m $\epsilon_r = 55.8$ $\rho = 1.00$ g/cm³

Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0

Cube 5x5x7 Powerdrift: -0.09 dB

SAR (1g): 1.24 mW/g, SAR (10g): 0.838 mW/g

Body SAR at 1.5 cm Separation Distance

Antenna Out

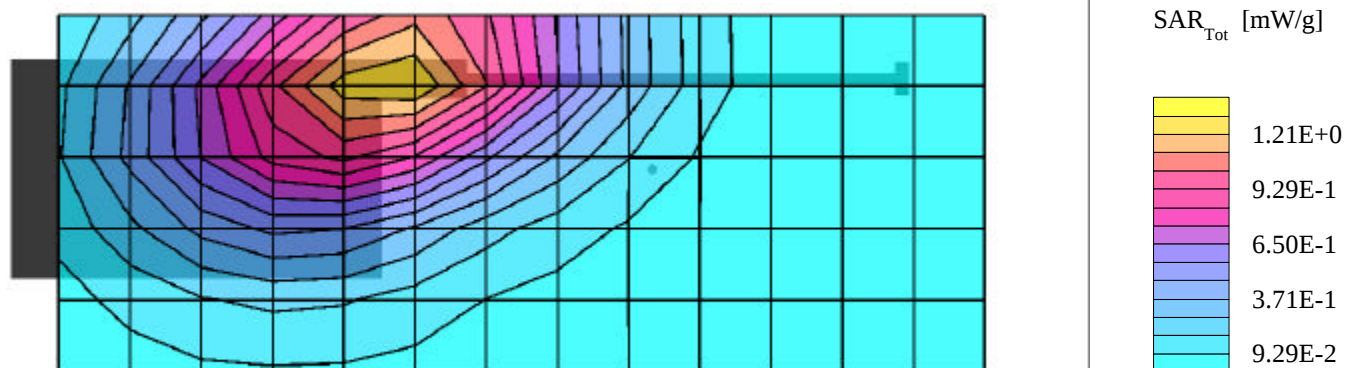
Withus Model: WCE-220

CDMA Mode

Channel 363 [835.89 MHz]

Conducted Power: 24.0 dBm

Date Tested: Nov. 20, 2001





Withus Information & Telecommunications Co., Ltd.

2F., DongNam B/D., 448-16, ShinGil-5Dong,

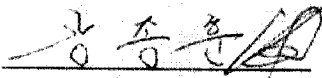
YongDungPo-Ku, Seoul, Korea

Tel : +82 2 868 3030 Fax : +82 2 847 9992

WCE-220 TUNE-UP PROCEDURE

The channel and power settings are factory set, controlled by software only and cannot be adjusted by the user. We hereby confirm that there are no adjustments that can be made to the device by the end user.

Sincerely,



Jong-Hoon Kang
Senior Engineer
R & D Department
Withus IT Co., Ltd.

835MHz & 900MHz

Measured Liquid Dielectric Parameters (Body)

November 20, 2001 10:13 AM

Frequency	ϵ'	ϵ''
800.000000 MHz	56.1186	21.6419
805.000000 MHz	56.0933	21.6278
810.000000 MHz	56.0554	21.5615
815.000000 MHz	55.9977	21.5315
820.000000 MHz	55.9479	21.5045
825.000000 MHz	55.9083	21.5020
830.000000 MHz	55.8667	21.4612
835.000000 MHz	55.7942	21.4102
840.000000 MHz	55.7400	21.3751
845.000000 MHz	55.6823	21.3858
850.000000 MHz	55.6529	21.3527
855.000000 MHz	55.5922	21.3210
860.000000 MHz	55.5267	21.3024
865.000000 MHz	55.4812	21.2764
870.000000 MHz	55.4180	21.2577
875.000000 MHz	55.3725	21.2538
880.000000 MHz	55.3372	21.2459
885.000000 MHz	55.2716	21.2395
890.000000 MHz	55.2565	21.2237
895.000000 MHz	55.2465	21.1530
900.000000 MHz	55.2263	21.1343
905.000000 MHz	55.1950	21.1252
910.000000 MHz	55.1356	21.0964
915.000000 MHz	55.0925	21.0665
920.000000 MHz	55.0629	21.0675
925.000000 MHz	55.0261	21.0613
930.000000 MHz	54.9441	21.0430
935.000000 MHz	54.9055	21.0275
940.000000 MHz	54.8490	21.0402
945.000000 MHz	54.8121	21.0243
950.000000 MHz	54.7502	21.0192
955.000000 MHz	54.7029	20.9980
960.000000 MHz	54.6570	20.9664
965.000000 MHz	54.5925	20.9832
970.000000 MHz	54.5804	20.9676

EVALUATION PROCEDURES (Cont.)

In order to ensure a conservative overestimation of SAR for the EUT, the following method was used. Firstly, the probe was calibrated by the system manufacturer at 900MHz and 1800MHz using simulated fluids with electrical parameters as set by OET 65 Supplement C. Prior to the SAR assessment of the EUT, the system was validated at 900MHz in the appropriate fluid to ensure system accuracy. Although the fundamental frequency of the mid channel of the EUT was approximately 835MHz, 900MHz E-field probe conversion numbers and fluid parameters were used since it provided the most accurate calibrated point within 100MHz of the EUT's mid channel. It must also be noted that the fluid used for both 835MHz and 900MHz have the same composition and therefore the probe has been calibrated in the appropriate fluid for the transmit band of the EUT. The following table shows a comparison of the measured results for the worst-case channel of the EUT using both 835MHz and 900MHz E-field probe conversion numbers with the appropriate fluid parameters.

EUT Channel	Conducted Power (dBm)	Conversion Number (CF)	Conductivity S/m	SAR Value (mW/g)	SAR Delta Ä
363	24.0	900MHz CF = 6.83	0.97	1.46	7.4%
363	24.0	835MHz CF = 6.91	0.91	1.36	

The measured results above indicate that when 900MHz E-field probe conversion factors, with the associated fluid electrical parameters, were used in place of the system manufacturer's recommended 835MHz conversion factors and fluid electrical parameters, that the SAR was overestimated by approximately 7%.

835MHz TISSUE PARAMETERS			
Equivalent Tissue	Dielectric Constant ϵ_r	Conductivity s (mho/m)	ρ (Kg/m³)
835MHz Brain (Target)	41.5 $\pm$ 5%	0.90 $\pm$ 5%	1000
835MHz Brain (Measured: 11/19/01)	42.2	0.91	1000
835MHz Body (Target)	55.2 $\pm$ 5%	0.97 $\pm$ 5%	1000
835MHz Body (Measured: 11/20/01)	55.8	0.99	1000

7.0 SYSTEM VALIDATION

Prior to the assessment, the system was verified in the planar section of the SAM phantom using a 900MHz dipole. A forward power of 250mW was applied to the dipole, and the system was verified to a tolerance of $\pm 10\%$. The applicable verification is as follows (see Appendix B for validation test plot):

Dipole Validation Kit	Target SAR 1g (w/kg)	Measured SAR 1g (w/kg)	Fluid Temperature	Validation Date
D900V2	2.78	2.75	$\approx 23.0^{\circ}\text{C}$	11/19/01
		2.76	$\approx 23.0^{\circ}\text{C}$	11/20/01

8.0 TISSUE PARAMETERS

The dielectric parameters of the fluids were verified prior to the SAR evaluation using an 85070C Dielectric Probe Kit and an 8753E Network Analyzer. The dielectric parameters of the fluid are as follows:

BRAIN TISSUE PARAMETERS - DIPOLE VALIDATION & EUT EVALUATION			
Equivalent Tissue	Dielectric Constant ϵ_r	Conductivity s (mho/m)	ρ (Kg/m ³)
900MHz Brain (Target)	41.5 $\pm 5\%$	0.97 $\pm 5\%$	1000
900MHz Brain (Measured: 11/19/01)	41.5	0.97	1000
900MHz Brain (Measured: 11/20/01)	41.7	0.97	1000

BODY TISSUE PARAMETERS - EUT EVALUATION			
Equivalent Tissue	Dielectric Constant ϵ_r	Conductivity s (mho/m)	ρ (Kg/m ³)
900MHz Body (Target)	55.0 $\pm 5\%$	1.05 $\pm 5\%$	1000
900MHz Body (Measured: 11/20/01)	55.2	1.05	1000