



UL International EMC Services  
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October 18, 2002

Motorola CDMA Wireless Products  
Customer Integration Engineering  
Attn: Mr. Terry Schwenk  
IL75-Room F520  
1455 Shure Dr.  
Arlington Heights, IL 60004

UL Reference: File MC1281, Project 02NK40683

Subject: EMC Test and Measurement Report for  
SC4812ETL 1X @ 800MHz CDMA BTS Cellular Phone Base Station

Dear Mr. Schwenk:

We have provided with this letter your EMC Test Report for the above referenced model. The product was determined to comply with the requirements noted in the report.

Please review the attached report and direct any questions or comments to me. Samples were returned following testing. This closes Project No. 02NK40683.

We appreciate your interest in UL's EMC Services, and encourage you to contact us in the future should you need EMC test services.

Best regards,

Reviewed by:

A handwritten signature in blue ink, appearing to read 'Lou Madjarov'.

A handwritten signature in blue ink, appearing to read 'Jack Steiner'.

Lou Madjarov (Ext 43957)  
EMC Sr. Project Engineer  
International EMC Services

Jack Steiner  
Engineering Group Leader  
International EMC Services

# EMC – TEST REPORT

Issue Date: October 18, 2002

## ✓ EMISSIONS IMMUNITY

Test Report File No. : **MC1281**  
Project No. : **02NK40683**

Model / Type : **SC4812ETL 1X @ 800MHz CDMA BTS**  
Kind of Product : **Cellular Phone Base Station**

Applicant : **Motorola CDMA Wireless Products  
Customer Integration Engineering**  
License Holder : **Motorola CDMA Wireless Products  
Customer Integration Engineering**

Address : **IL75-Room F520  
1455 Shure Dr.  
Arlington Heights, IL 60004**  
Manufacturer : **Same as Applicant**

**Test Result : COMPLIANT**

This report without appendices consists of 14 pages. Appendix A contains test photos, and Appendix B contains original test data, Appendix C contains sample calculations and Appendix D contains Transmit Power, Occupied Bandwidth or RHO and Conducted Spurious and Harmonic Emissions test set-up.

The data contained in this report reflects only the items tested in the configurations and mode of operations described. An attempt has been made to arrange the EUT, with the equipment provided, into a test configuration which maximizes the observed emissions of the EUT while simulating, as close as practical, a typical end-use installation.

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Underwriters Laboratories Inc. 333 Pingsten Rd. Northbrook, IL 60062  
Fax: (847) 272-8864

# REPORT DIRECTORY

| <u>SECTION</u> | <u>TITLE</u> |
|----------------|--------------|
|----------------|--------------|

**GENERAL**

|     |                                                       |
|-----|-------------------------------------------------------|
| 1.0 | Revision History                                      |
| 1.1 | General Product Description                           |
| 1.2 | Model Differences                                     |
| 1.3 | Environmental Conditions in Test Lab                  |
| 1.4 | Calibration Details of Equipment Used for Measurement |
| 1.5 | EUT (Equipment Under Test) Configuration              |
| 1.6 | EUT Operating Mode                                    |
| 1.7 | Device Modifications                                  |

**EMISSIONS**

|     |                                          |
|-----|------------------------------------------|
| 2.0 | Emissions Test Regulations               |
|     | Conducted Voltage                        |
|     | Conducted Spurious                       |
|     | Radiated Electric Field Emissions        |
|     | Radiated Emissions – Substitution Method |
|     | Occupied Bandwidth                       |
|     | Rho                                      |

**IMMUNITY**

|     |                           |
|-----|---------------------------|
| 3.0 | Immunity Test Regulations |
|-----|---------------------------|

**CONCLUSION**

|     |                 |
|-----|-----------------|
| 4.0 | General Remarks |
| 4.1 | Summary         |

**APPENDICES**

|   |                                             |
|---|---------------------------------------------|
| A | Test Setups (Photos, Diagrams and Drawings) |
| B | Test Data                                   |
| C | Sample calculations                         |
| D | Motorola Equipment and Test Set-Up          |

**1.0 REVISION HISTORY**

| Revision | Changes         | Date             |
|----------|-----------------|------------------|
| 1.0      | Initial Release | October 10, 2002 |

**1.1 GENERAL PRODUCT DESCRIPTION**

The rated maximum average power out of the SC4812ETL 1X @ 800MHz unit is 60 W (47.78dBm)

**1.1.1 Equipment Mobility:**

Floor standing

**1.1.2 Test Voltage and Frequency:**

Voltage (V)                      Frequency (Hz)  
240V                                      AC

**1.2 MODEL DIFFERENCES**

Any other model(s) represented by the models tested in this investigation will be documented by the manufacturer.

**1.3 ENVIRONMENTAL CONDITIONS IN TEST LAB**

Temperature:                      20-25 °C  
Relative Humidity:                30-60% RH  
Atmospheric Pressure:            860-1060 mbar

**1.4 CALIBRATION OF EQUIPMENT USED FOR MEASUREMENT**

All test equipment and test accessories are calibrated on a regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less.

All test equipment calibrations are traceable to the National Institute of Standards and Technology (NIST), therefore, all test data recorded in this report is traceable to NIST.

The test laboratory facilities used for the collection of test data reported herein are accredited to comply with ISO Guide 25 quality measurements by the NVLAP. The test procedures and techniques for radiated emissions up to 2000MHz and AC Mains conducted emissions up to 30MHz are also NVLAP accredited, as applicable.

**1.5 EUT CONFIGURATION(s)**

See Appendix A for individual set-up configuration(s). In addition to the EUT, the following peripheral devices and/or cables were connected during the measurement:

| Device                         | Manufacturer | Model  | Serial #    | FCC ID   |
|--------------------------------|--------------|--------|-------------|----------|
| SC4812ETL 1X @ 800MHz CDMA BTS | Motorola     | SG1489 | T89DAAU0386 | IHET5C5I |

**1.6 EUT OPERATING MODE(s)**

The equipment under test was operated during the measurements under the following conditions:

Base station set at High Power 60W (47.78dBm) and Low Power 400mW (26dBm) operation at Low Channel 1013 (869.7 MHz) and at High Channel 777 (893.3 MHz). Refer to Appendix D for more information.

**1.7 DEVICE MODIFICATIONS**

The following modifications were necessary for compliance:

None.

## **2.0 EMISSIONS TEST REGULATIONS**

**The EUT was considered to be a Class B device.**

Emissions testing was performed according to the following regulations:

47 CFR Part 15 Subpart B: 2000 + ANSI C63.4 – 1992

47 CFR Part 22/24: 2001

Per manufacturer's specifications the following test were conducted:

- Conducted Voltage: 150KHz – 30MHz
- Conducted Spurious Emissions: 30MHz – 10GHz
- Radiated Electric Field Emissions: 30MHz – 1000MHz
- Radiated Electric Field Spurious Emissions: 1GHz – 10GHz
- Substitution Method - Radiated Spurious Harmonics Emissions
- Occupied Bandwidth
- Rho

Radiated Spurious Emissions - Substitution Method was performed per  
ANSI/TIA/EIA-603-1992, Section 2.2.12

**CONDUCTED VOLTAGE EMISSIONS**

Test Location

Ground Plane (Test Station 3)

UL Procedure

3014ANBK-LPG-001

Test Instruments

Spectrum Analyzer / Quasi-peak Adapter

Advantest Model 3261A Spectrum Analyzer No. EMC4084  
Model R3551 Preselector No. EMC4088

Line Impedance Stabilization Networks (LISNs)

SOLAR Model 8610-50-TS-100-N    No. EMC4048  
SOLAR Model 8610-50-TS-100-N    No. EMC4049  
SOLAR Model 8610-50-TS-100-N    No. EMC4050

Transient Limiter

Hewlett Packard Model 11947A    No. EMC4019

Frequency Range on each line

150 kHz to 30MHz

Test Results

The requirements are:  
MET

Remarks

See App. B for complete test results.

## CONDUCTED SPURIOUS EMISSIONS

### Test Location

10 Meter Semi-Anechoic Chamber

### UL Procedure

3014ANBK-LPG-001CSE

### Test Instruments

### Spectrum Analyzer

Rhode & Schwarz, Spectrum Analyzer, 9KHz-40GHz, EMC 4182

### Motorola Measurement Equipment

30dB attenuator, NARDA High Power Attenuator, Model 769-30 S/N 04405  
Bidirectional coaxial coupler, model #3022, NARDA  
Band pass filter, Filtronix  
High power 50ohm load, (58883464-R01)

### Frequency Range on each line

30MHz – 10GHz

### Test Results

The requirements are:  
MET

### Remarks

See App. B for complete test results.

**RADIATED ELECTRIC FIELD EMISSIONS, 30 TO 1000MHZ**

Test Location

10 Meter Semi-Anechoic Chamber

UL Procedure

3014ANBK-LPG-002

Test Instruments

Spectrum Analyzer / Quasi-peak Adapter / Preamplifier / Preselector

Hewlett Packard Model 8566B Spectrum Analyzer

Model 85650A Quasi-peak Adapter

Miteq AM-3A-000110-N Preamp No. FCA4003, EMC4016, EMC4151

Model 85685A RF Preselector No. EMC4015

Antennas

Chase EMC Ltd., Biconical Antenna Model VBA6106A

S/N 1237

Chase EMC Ltd, Log Periodic Antenna Model UPA6108

S/N 1120

Frequency Range of Measurement

30-1000MHz

Measurement Distance

10 meters

Test Results

The requirements are:  
MET

Remarks

See App. B for complete test results.

**RADIATED ELECTRIC FIELD EMISSIONS, 1 TO 10 GHz**

Test Location

10 Meter Semi-Anechoic Chamber

UL Procedure

3014ANBK-LPG-002A

Test Instruments

Spectrum Analyzer:

Hewlett Packard Model 8566B Spectrum Analyzer

Hewlett Packard Preamplifier Model 8449A, EMC4201

Antennas:

EMCO, Model 3115, EMC No. 4033

Frequency Range of Measurement

1 to 10 GHz

Measurement Distance

3 meters

Test Results

The requirements are:

MET

Remarks

See App. B for complete test results.

**RADIATED SPURIOUS EMISSIONS – SUBSTITUTION METHOD**

Test Location

10 Meter Semi-Anechoic Chamber

UL Procedure

3014ANBK-LPG-002SM

Test Instruments

Spectrum Analyzer

Rhode & Schwarz, Spectrum Analyzer, 9KHz-40GHz, EMC 4182

Signal Generator

Anritsu, Model 68369B 10MHz – 40GHz,

Antennas

EMCO, Horn Model 3115, S/N 8812-3032  
EMCO, Horn Model 3115, S/N 3012

Frequency Range on each line

30MHz – 10GHz

Measurement Distance

3 meters

Test Results

The requirements are:  
MET

Remarks

See App. B for complete test results.

**OCCUPIED BANDWIDTH MEASUREMENTS**

Test Location

10 Meter Semi-Anechoic Chamber

Test Instruments

Power Meter

Hewlett Packard, Model 437B, S/N 3125U15845,  
Last Cal. 6-13-02, Next Cal. 6-13-03  
(Motorola equipment)

HEWLETT PACKARD POWER SENSOR

MODEL: 8481A  
LAST CAL: 12/5/01  
CAL DUE: 12/5/02  
S/N: 2702A57644  
(Motorola equipment)

HEWLETT PACKARD VSA SERIES TRANSMIT TESTER

MODEL: E4406A  
LAST CAL: 11/1/01  
CAL DUE: 11/1/02  
S/N: US38450220  
(Motorola equipment)

Test Results

The requirements are: MET

Remarks

See App. B for complete test results.

**RHO MEASUREMENTS**

Test Location

10 Meter Semi-Anechoic Chamber

Test Instruments

Power Meter

Hewlett Packard, Model 437B, S/N 3125U15845,  
Last Cal. 6-13-02, Next Cal. 6-13-03  
(Motorola equipment)

HEWLETT PACKARD POWER SENSOR

MODEL: 8481A  
LAST CAL: 12/5/01  
CAL DUE: 12/5/02  
S/N: 2702A57644  
(Motorola equipment)

HEWLETT PACKARD VSA SERIES TRANSMIT TESTER

MODEL: E4406A  
LAST CAL: 11/1/01  
CAL DUE: 11/1/02  
S/N: US38450220  
(Motorola equipment)

Test Results

The requirements are: MET

Remarks

See App. B for complete test results.

### **3.0 IMMUNITY TEST REGULATIONS**

**Immunity testing was not performed.**

#### 4.0 GENERAL REMARKS

Sample Receipt Date : September 10, 2002

Test Dates

Start : September 10, 2002  
End : October 4, 2002

#### 4.1 SUMMARY

The requirements according to the technical regulations are:

MET

Underwriters Laboratories Inc.  
333 Pfingsten Road  
Northbrook, IL 60062 USA

Test Engineer,



Reviewed by:



Lou Madiarov (Ext 43957)  
EMC Sr. Project Engineer  
International EMC Services

Jack Steiner  
Engineering Group Leader  
International EMC Services

## APPENDIX A

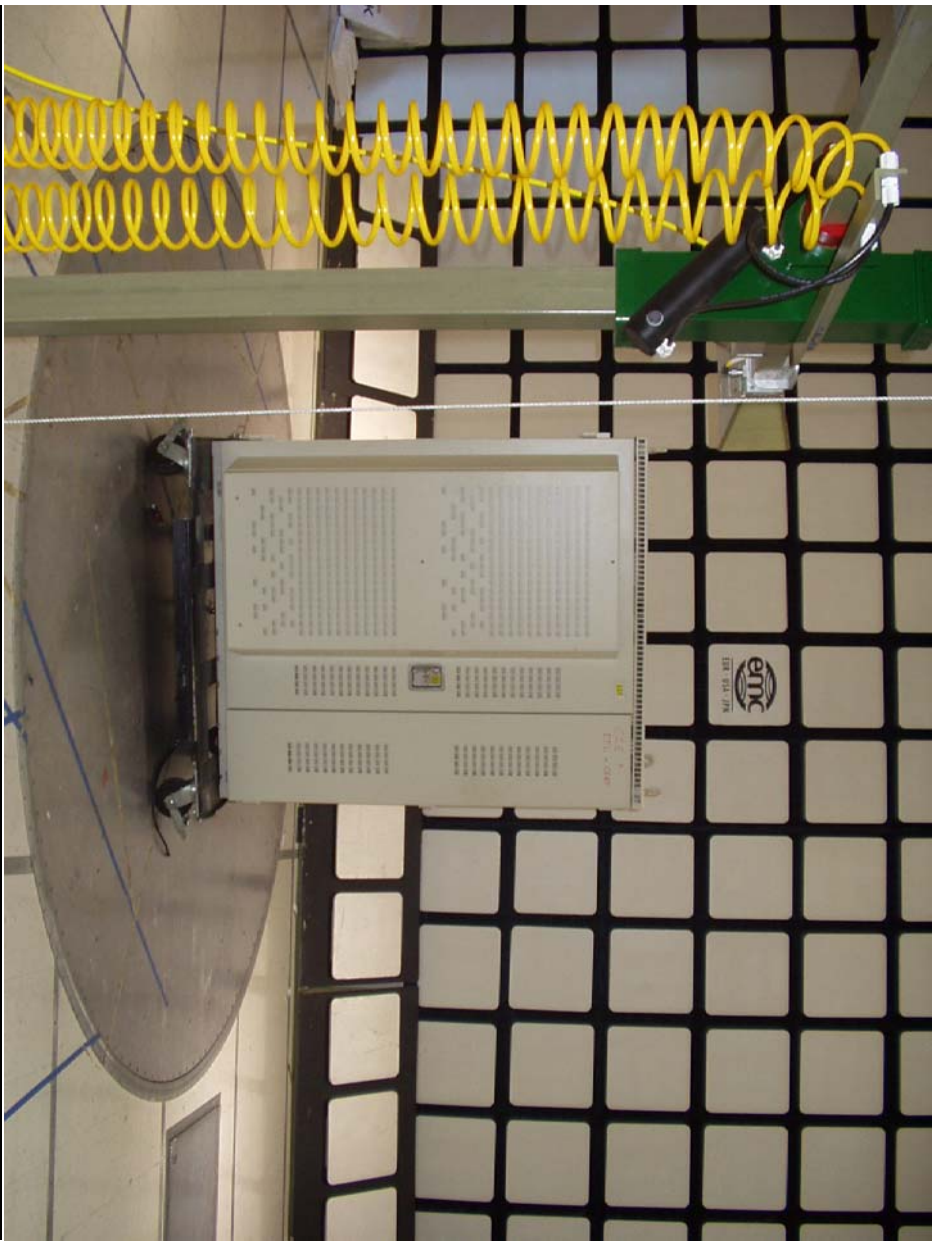
### PHOTOS



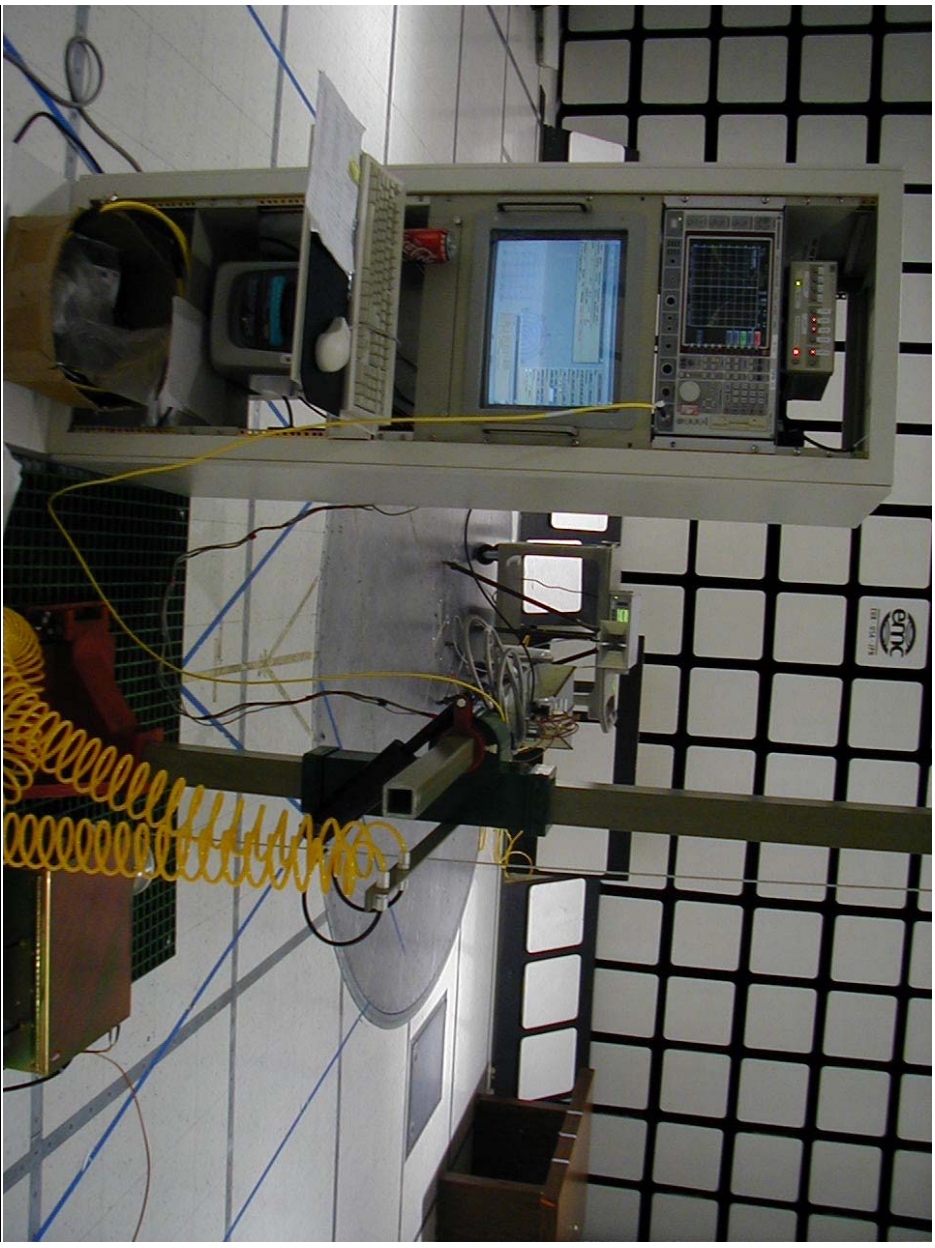
### Conducted Emissions



### Conducted Spurious Emissions



### Radiated Emissions



**Substitution Method - Radiated Emissions**

## **APPENDIX B**

### **TEST DATA**

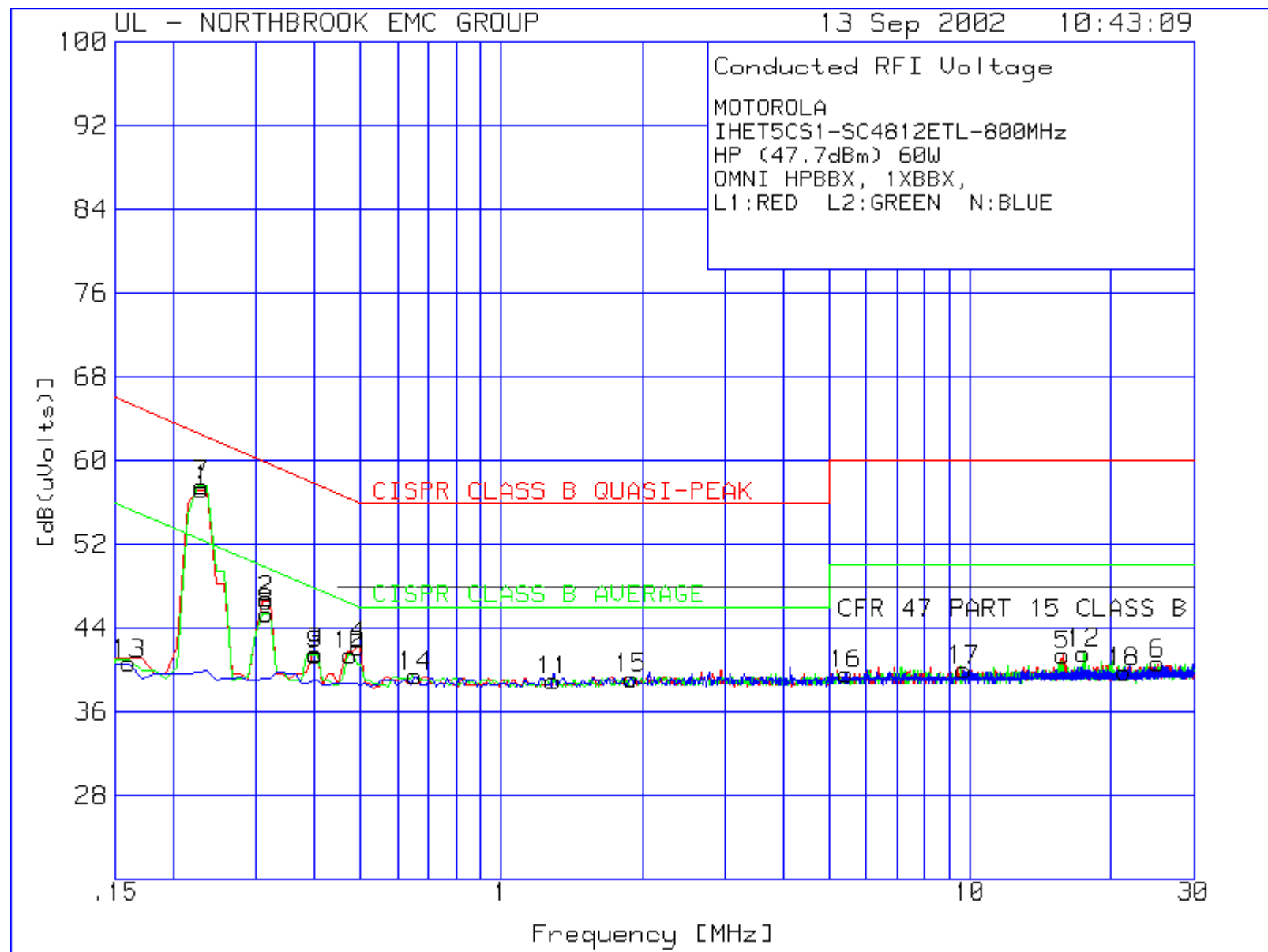
#### **EMISSIONS**

Conducted Emissions 150KHz – 30MHz  
Radiated Electric Field Emissions 30MHz - 1000MHz  
Radiated Electric Field Emissions 1GHz - 10GHz  
Conducted Spurious Emissions 30MHz – 10GHz  
Substitution Method - Radiated Emissions  
Occupied Bandwidth  
Rho

**UNDERWRITERS LABORATORIES INC.**  
**Conducted Emissions**

Date Tested: 9-13-2002

|                             |                                                                                        |
|-----------------------------|----------------------------------------------------------------------------------------|
| <b>Manufacturer</b>         | : Motorola CDMA Wireless Products<br>Customer Integration Engineering                  |
| <b>Equipment Under Test</b> | : SC4812ETL 1X 800MHz Cellular Phone Base Station HP                                   |
| <b>Requirement</b>          | : CFR 47 PART 15 B Class B                                                             |
| <b>Detection Mode</b>       | : Quasi-peak (qp) or Peak (pk) or Average (ave)                                        |
| <b>Bandwidth</b>            | : 200 Hz for measurements 9 kHz to 150 kHz<br>9 kHz for measurements 150 kHz to 30 MHz |
| <b>Line</b>                 | : L1 and L2                                                                            |



MOTOROLA  
 IHET5CS1-SC4812ETL-800MHz  
 HP (47.7dBm) 60W  
 OMNI HPBBX, 1XBBX,  
 L1:RED L2:GREEN N:BLUE

| Test<br>Frequency<br>[MHz] | Meter<br>Reading<br>[dB(uV)] | Gain/Loss<br>Factor<br>[dB] | Transducer<br>Factor<br>[dB] | Level<br>[dB(uVolts)] | Limit:1 | 2      |
|----------------------------|------------------------------|-----------------------------|------------------------------|-----------------------|---------|--------|
| =====                      |                              |                             |                              |                       |         |        |
| Line - L1 .15 - 30MHz      |                              |                             |                              |                       |         |        |
| .2594                      | 45.82qp                      | 9.5                         | 0                            | 55.32                 | 61.5    | 51.5   |
|                            |                              |                             | Margin [dB]:                 |                       | -6.18   | 3.82   |
| .2575                      | 45.77qp                      | 9.5                         | 0                            | 55.27                 | 61.5    | 51.5   |
|                            |                              |                             | Margin [dB]:                 |                       | -6.23   | 3.77   |
| .3446                      | 32.82qp                      | 9.6                         | 0                            | 42.42                 | 59.1    | 49.1   |
|                            |                              |                             | Margin [dB]:                 |                       | -16.68  | -6.68  |
| .4328                      | 27.6qp                       | 9.7                         | 0                            | 37.3                  | 57.2    | 47.2   |
|                            |                              |                             | Margin [dB]:                 |                       | -19.9   | -9.9   |
| Line - L2 .15 - 30MHz      |                              |                             |                              |                       |         |        |
| .1916                      | 26.82qp                      | 9.4                         | 0                            | 36.22                 | 64      | 54     |
|                            |                              |                             | Margin [dB]:                 |                       | -27.78  | -17.78 |
| .2645                      | 22.97qp                      | 9.5                         | 0                            | 32.47                 | 61.3    | 51.3   |
|                            |                              |                             | Margin [dB]:                 |                       | -28.83  | -18.83 |
| .3139                      | 21.62qp                      | 9.6                         | 0                            | 31.22                 | 59.9    | 49.9   |
|                            |                              |                             | Margin [dB]:                 |                       | -28.68  | -18.68 |
| .3667                      | 22.55qp                      | 9.6                         | 0                            | 32.15                 | 58.6    | 48.6   |
|                            |                              |                             | Margin [dB]:                 |                       | -26.45  | -16.45 |

NOTE: "+" - Indicates an emission level in excess of the  
 applicable limit (s).

pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - denotes average log detection

LIMIT 1: CISPR CLASS B QUASI-PEAK  
 LIMIT 2: CISPR CLASS B AVERAGE  
 LIMIT 3: CFR 47 PART 15 CLASS B  
 LIMIT 4: NONE  
 LIMIT 5: NONE  
 LIMIT 6: NONE

MOTOROLA  
 IHET5CS1-SC4812ETL-800MHz  
 HP (47.7dBm) 60W  
 OMNI HPBBX, 1XBBX,  
 L1:RED L2:GREEN N:BLUE

| Test<br>Frequency<br>[MHz] | Meter<br>Reading<br>[dB(uV)] | Gain/Loss<br>Factor<br>[dB] | Transducer<br>Factor<br>[dB] | Level<br>[dB(uVolts)] | Limit:1 | 2      | 3      |
|----------------------------|------------------------------|-----------------------------|------------------------------|-----------------------|---------|--------|--------|
| =====                      |                              |                             |                              |                       |         |        |        |
| Line - L1 .15 - 30MHz      |                              |                             |                              |                       |         |        |        |
| .26194                     | 37.36av                      | 9.6                         | 0                            | 46.96                 | 61.4    | 51.4   |        |
|                            |                              |                             | Margin [dB]:                 |                       | -14.44  | -4.44  |        |
| .31506                     | 16.37av                      | 9.6                         | 0                            | 25.97                 | 59.8    | 49.8   |        |
|                            |                              |                             | Margin [dB]:                 |                       | -33.83  | -23.83 |        |
| .40026                     | 18.31av                      | 9.6                         | 0                            | 27.91                 | 57.8    | 47.8   |        |
|                            |                              |                             | Margin [dB]:                 |                       | -29.89  | -19.89 |        |
| .4961                      | 14.12av                      | 9.7                         | 0                            | 23.82                 | 56.1    | 46.1   | 48     |
|                            |                              |                             | Margin [dB]:                 |                       | -32.28  | -22.28 | -24.18 |
| Line - L2 .15 - 30MHz      |                              |                             |                              |                       |         |        |        |
| .26194                     | 16.72av                      | 9.5                         | 0                            | 26.22                 | 61.4    | 51.4   |        |
|                            |                              |                             | Margin [dB]:                 |                       | -35.18  | -25.18 |        |
| .31506                     | 17.08av                      | 9.6                         | 0                            | 26.68                 | 59.8    | 49.8   |        |
|                            |                              |                             | Margin [dB]:                 |                       | -33.12  | -23.12 |        |
| .40026                     | 15.12av                      | 9.6                         | 0                            | 24.72                 | 57.8    | 47.8   |        |
|                            |                              |                             | Margin [dB]:                 |                       | -33.08  | -23.08 |        |
| .4748                      | 14.01av                      | 9.7                         | 0                            | 23.71                 | 56.4    | 46.4   | 48     |
|                            |                              |                             | Margin [dB]:                 |                       | -32.69  | -22.69 | -24.29 |

NOTE: "+" - Indicates an emission level in excess of the  
 applicable limit (s).

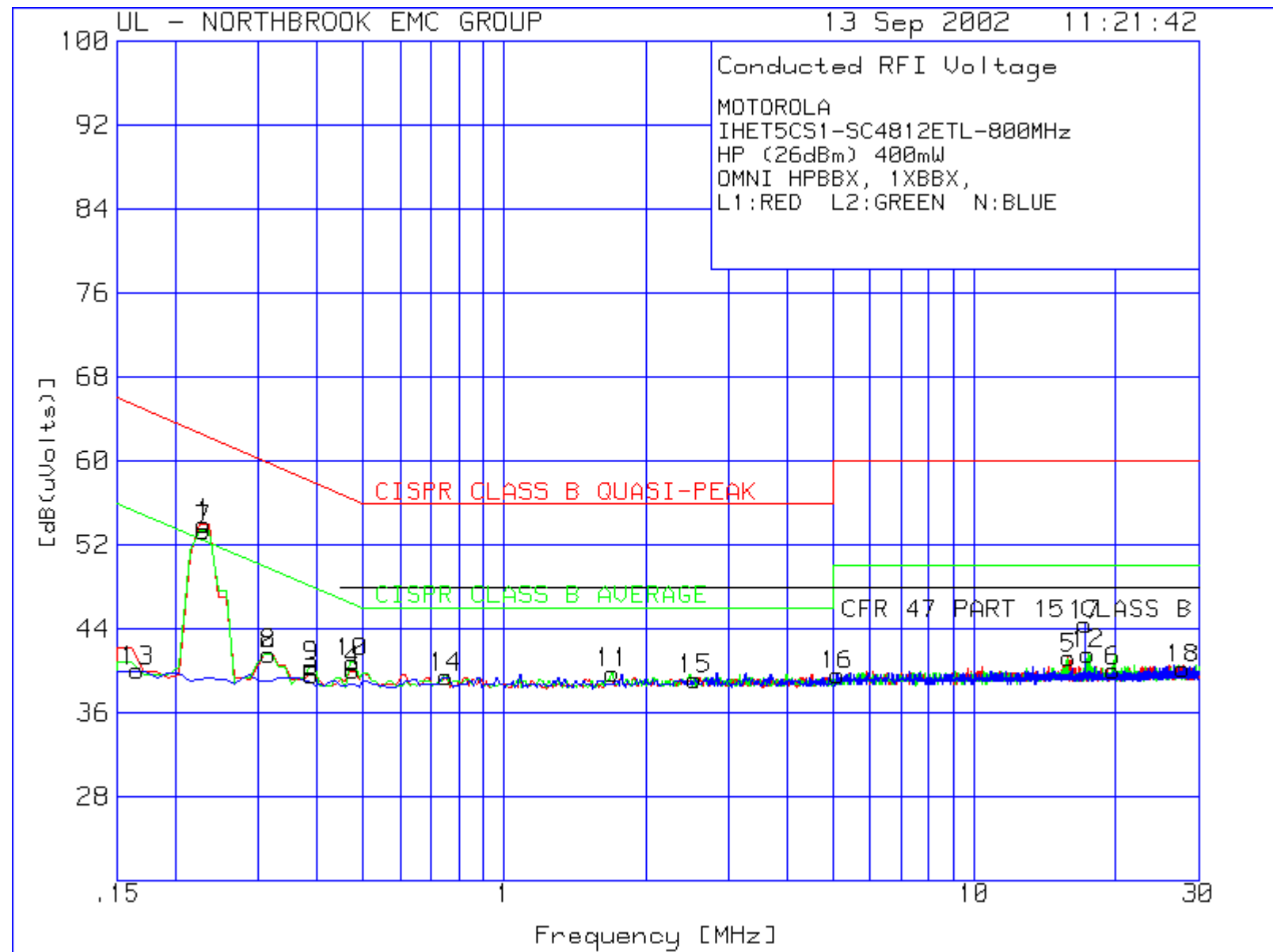
pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - denotes average log detection

LIMIT 1: CISPR CLASS B QUASI-PEAK  
 LIMIT 2: CISPR CLASS B AVERAGE  
 LIMIT 3: CFR 47 PART 15 CLASS B  
 LIMIT 4: NONE  
 LIMIT 5: NONE  
 LIMIT 6: NONE

**UNDERWRITERS LABORATORIES INC.**  
**Conducted Emissions**

Date Tested: 9-13-2002

|                             |                                                                                        |
|-----------------------------|----------------------------------------------------------------------------------------|
| <b>Manufacturer</b>         | : Motorola CDMA Wireless Products<br>Customer Integration Engineering                  |
| <b>Equipment Under Test</b> | : SC4812ETL 1X 800MHz Cellular Phone Base Station LP                                   |
| <b>Requirement</b>          | : CFR 47 PART 15 B Class B                                                             |
| <b>Detection Mode</b>       | : Quasi-peak (qp) or Peak (pk) or Average (ave)                                        |
| <b>Bandwidth</b>            | : 200 Hz for measurements 9 kHz to 150 kHz<br>9 kHz for measurements 150 kHz to 30 MHz |
| <b>Line</b>                 | : L1 and L2                                                                            |



MOTOROLA  
 IHET5CS1-SC4812ETL-800MHz  
 HP (26dBm) 400mW  
 OMNI HPBBX, 1XBBX,  
 L1:RED L2:GREEN N:BLUE

| Test Frequency [MHz]  | Meter Reading [dB(uV)] | Gain/Loss Factor [dB] | Transducer Factor [dB] | Level [dB(uVolts)] | Limit:1 | 2    |
|-----------------------|------------------------|-----------------------|------------------------|--------------------|---------|------|
| Line - L1 .15 - 30MHz |                        |                       |                        |                    |         |      |
| .26                   | 41.67qp                | 9.6                   | 0                      | 51.27              | 61.4    | 51.4 |
|                       |                        |                       | Margin [dB]:           |                    | -10.13  | -.13 |

|                       |        |     |              |      |       |       |
|-----------------------|--------|-----|--------------|------|-------|-------|
| Line - L2 .15 - 30MHz |        |     |              |      |       |       |
| .1634                 | 27.8qp | 9.4 | 0            | 37.2 | 65.3  | 55.3  |
|                       |        |     | Margin [dB]: |      | -28.1 | -18.1 |

| Test Frequency [MHz]  | Meter Reading [dB(uV)] | Gain/Loss Factor [dB] | Transducer Factor [dB] | Level [dB(uVolts)] | Limit:1 | 2     |
|-----------------------|------------------------|-----------------------|------------------------|--------------------|---------|-------|
| Line - L1 .15 - 30MHz |                        |                       |                        |                    |         |       |
| .26194                | 34.29av                | 9.6                   | 0                      | 43.89              | 61.4    | 51.4  |
|                       |                        |                       | Margin [dB]:           |                    | -17.51  | -7.51 |
|                       |                        |                       | Margin [dB]:           |                    |         |       |
| Line - L2 .15 - 30MHz |                        |                       |                        |                    |         |       |
| .26194                | 19.4av                 | 9.5                   | 0                      | 28.9               | 61.4    | 51.4  |
|                       |                        |                       | Margin [dB]:           |                    | -32.5   | -22.5 |

NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).

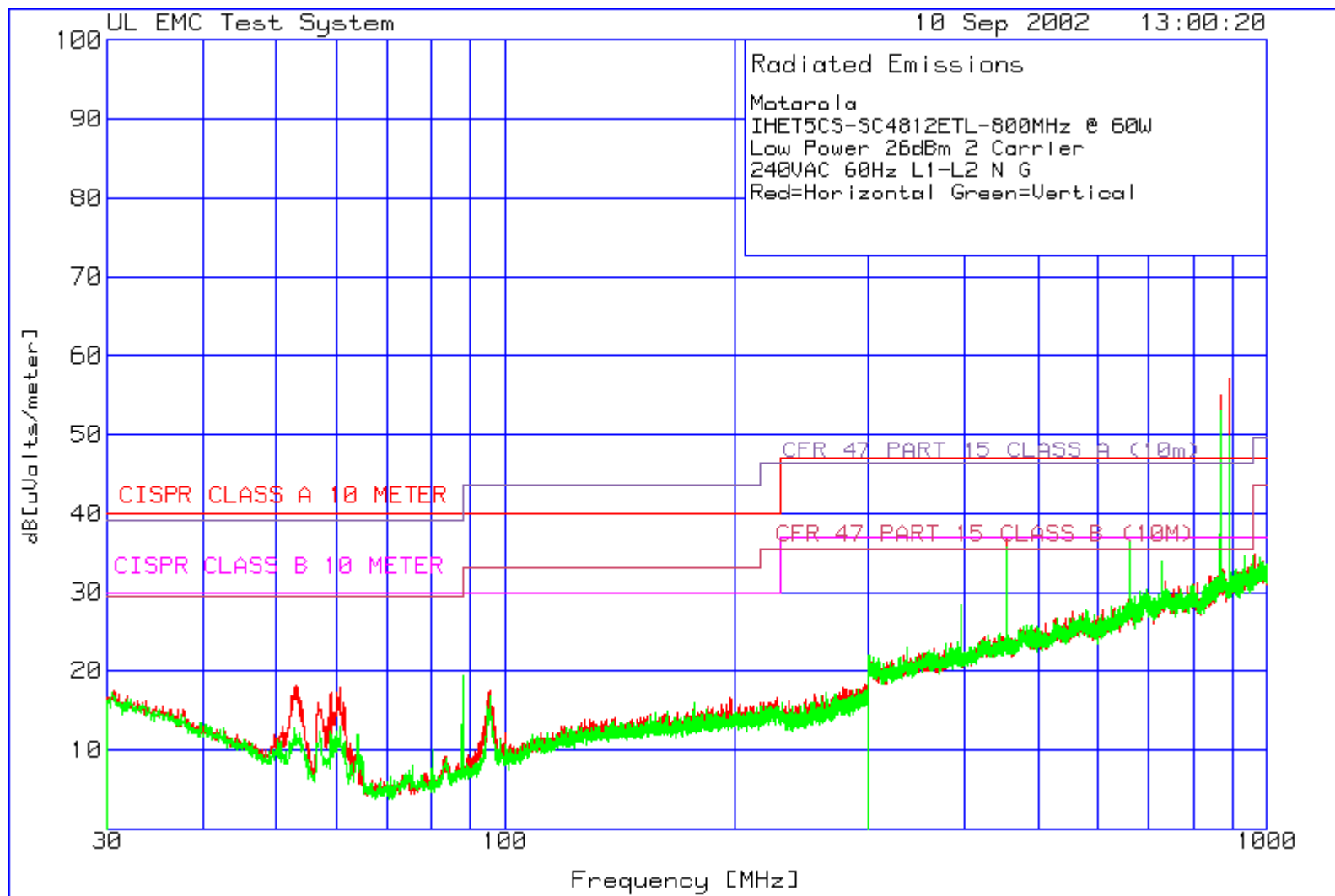
pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - denotes average log detection

LIMIT 1: CISPR CLASS B QUASI-PEAK  
 LIMIT 2: CISPR CLASS B AVERAGE  
 LIMIT 3: CFR 47 PART 15 CLASS B  
 LIMIT 4: NONE

**UNDERWRITERS LABORATORIES INC.**  
**Radiated Emissions**

Date Tested: 9-10-2002

|                             |                                                                       |
|-----------------------------|-----------------------------------------------------------------------|
| <b>Manufacturer</b>         | : Motorola CDMA Wireless Products<br>Customer Integration Engineering |
| <b>Equipment Under Test</b> | : SC4812ETL 800MHz 1X Cellular Phone Base Station                     |
| <b>Requirement</b>          | : CFR 47 PART 15 B Class B                                            |
| <b>Detection Mode</b>       | : Quasi-peak (qp)                                                     |
| <b>Bandwidth</b>            | : 120 kHz, 30-1000MHz                                                 |
| <b>Measurement Distance</b> | : 10 meter                                                            |
| <b>Antenna Type</b>         | : 30 - 300MHz, Biconical<br>300 - 1000MHz, Log-Periodic               |

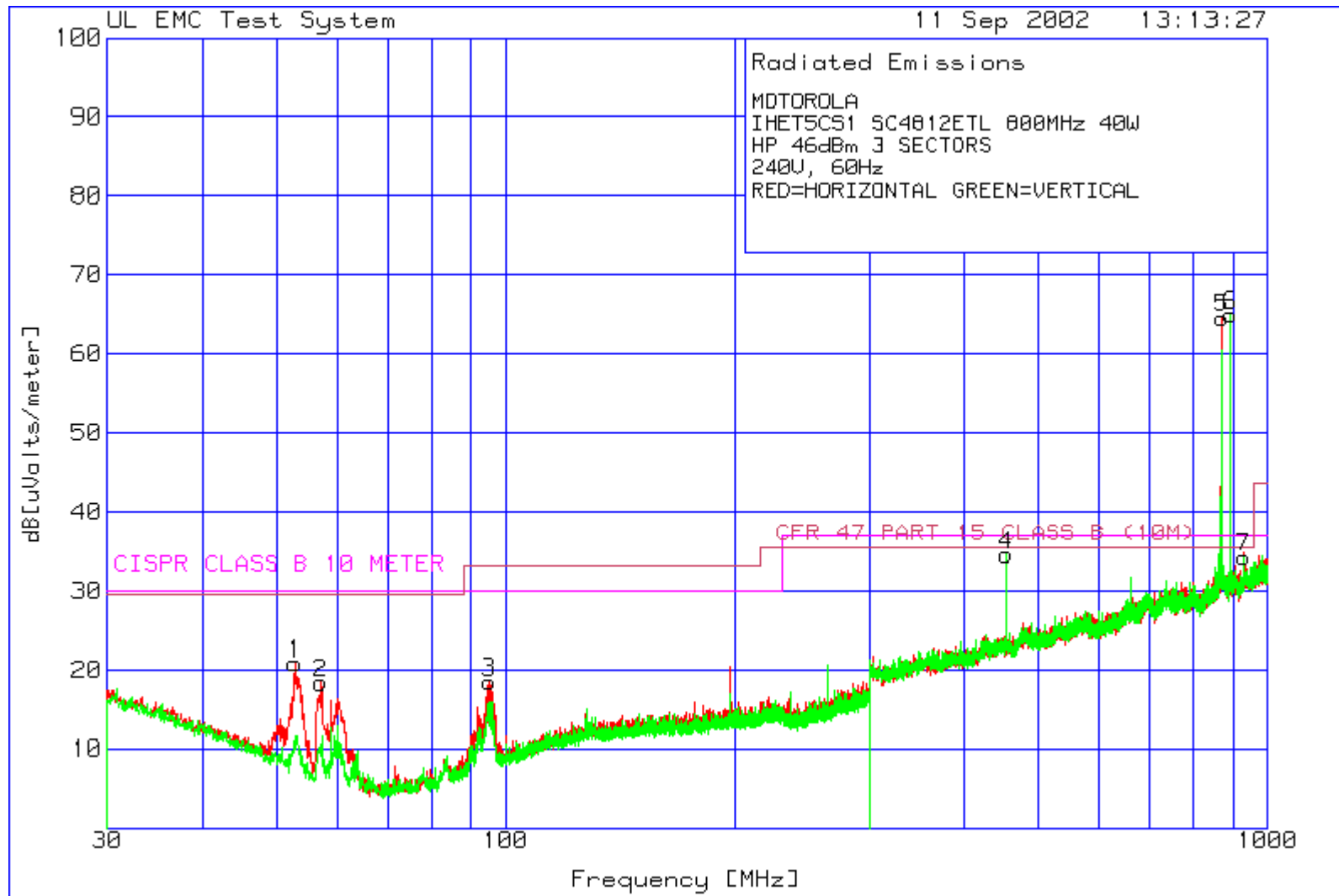


Motorola  
 IHET5CS-SC4812ETL-800MHz @ 60W  
 Low Power 26dBm 2 Carrier  
 240VAC 60Hz L1-L2 N G  
 Red=Horizontal Green=Vertical

| Test                     | Meter    | Detector     | Gain/Loss |         | Transducer       |        | Level  | Limit 1 Margin 1[dB] |          | Limit 2 Margin 2[dB] |        | Limit 3 Margin 3[dB] |       |     |     |      |
|--------------------------|----------|--------------|-----------|---------|------------------|--------|--------|----------------------|----------|----------------------|--------|----------------------|-------|-----|-----|------|
|                          | Limit 4  | Margin 4[dB] |           | Azimuth | [deg]            | Height | [cm]   |                      | Polarity |                      |        |                      |       |     |     |      |
| Frequency                |          | Reading Type | Factor    | Factor  | dB[uVolts/meter] |        |        |                      |          |                      |        |                      |       |     |     |      |
| [MHz]                    | [dB(uV)] |              | [dB]      | [dB]    |                  |        |        |                      |          |                      |        |                      |       |     |     |      |
| Horizontal 300 - 1000MHz |          |              |           |         |                  |        |        |                      |          |                      |        |                      |       |     |     |      |
| 660.0087                 | 11.65    | qp           | 2.9       | 20.5    | 35.05            | 47     | -11.95 | 37                   | -1.95    | 46.4                 | -11.35 | 35.6                 | -.55  | 59  | 120 | Vert |
| 726.0109                 | 8.46     | qp           | 3.2       | 21.1    | 32.76            | 47     | -14.24 | 37                   | -4.24    | 46.4                 | -13.64 | 35.6                 | -2.84 | 208 | 101 | Vert |
| 935.2572                 | .89      | qp           | 3.8       | 24.2    | 28.89            | 47     | -18.11 | 37                   | -8.11    | 46.4                 | -17.51 | 35.6                 | -6.71 | 2   | 119 | Vert |
| 958.8344                 | 1.19     | qp           | 3.7       | 24.2    | 29.09            | 47     | -17.91 | 37                   | -7.91    | 46.4                 | -17.31 | 35.6                 | -6.51 | 55  | 175 | Vert |

LIMIT 1: CISPR CLASS A 10 METER  
 LIMIT 2: CISPR CLASS B 10 METER  
 LIMIT 3: CFR 47 PART 15 CLASS A (10m)  
 LIMIT 4: CFR 47 PART 15 CLASS B (10M)  
 LIMIT 5: NONE  
 LIMIT 6: NONE

pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - Average log detector  
 avem - EMI Average detector

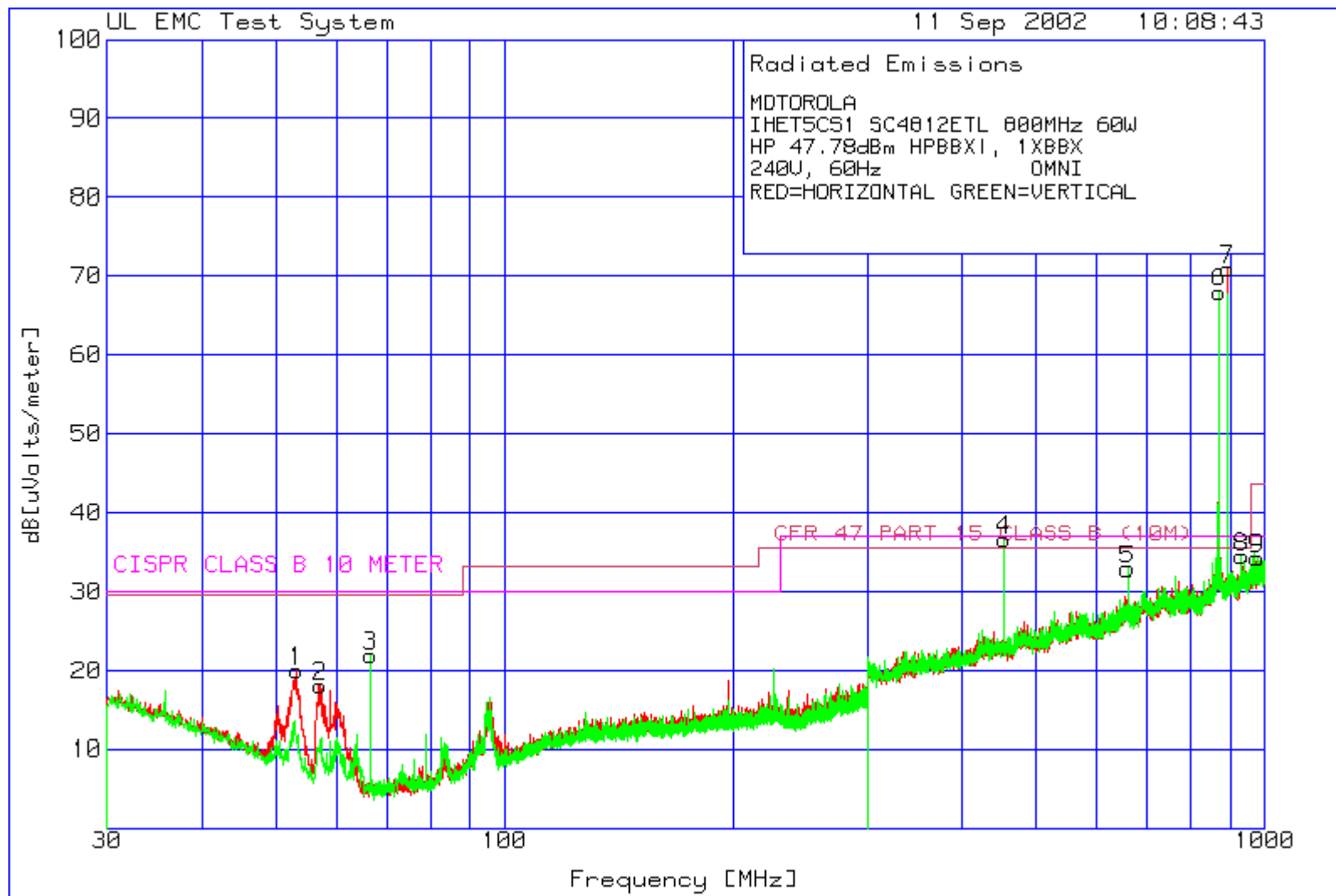


MOTOROLA  
 IHET5CS1 SC4812ETL 800MHz 40W  
 HP 46dBm 3 SECTORS  
 240V, 60Hz  
 RED=HORIZONTAL GREEN=VERTICAL

| Test                   | Meter    | Detector     | Gain/Loss | Transducer | Level  | Limit 1  | Margin 1[dB] | Limit 2 | Margin 2[dB] | Limit 3 | Margin 3[dB] |
|------------------------|----------|--------------|-----------|------------|--------|----------|--------------|---------|--------------|---------|--------------|
| Frequency              | Limit 4  | Margin 4[dB] | Factor    | Azimuth    | Height | Polarity |              |         |              |         |              |
| [MHz]                  | [dB(uV)] | Reading Type | [dB]      | [deg]      | [cm]   |          |              |         |              |         |              |
| Vertical 300 - 1000MHz |          |              |           |            |        |          |              |         |              |         |              |
| 454.1827               | 2.08     | qp           | 2.3       | 16.9       | 21.28  | 37       | -15.72       | 35.6    | -14.32       | 0       | 330          |
| 929.9823               | .47      | qp           | 3.8       | 24         | 28.27  | 37       | -8.73        | 35.6    | -7.33        | 282     | 172          |

LIMIT 1: NONE  
 LIMIT 2: CISPR CLASS B 10 METER  
 LIMIT 3: NONE  
 LIMIT 4: CFR 47 PART 15 CLASS B (10M)  
 LIMIT 5: NONE  
 LIMIT 6: NONE

pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - Average log detector  
 avem - EMI Average detector



MOTOROLA

IHET5CS1 SC4812ETL 800MHz 60W

HP 47.78dBm HPBBX1, 1XBBX

240V, 60Hz OMNI

RED=HORIZONTAL GREEN=VERTICAL

| Test                   | Meter            | Detector     | Gain/Loss   | Transducer    | Level            | Limit 1  | Margin 1[dB] | Limit 2 | Margin 2[dB] | Limit 3 | Margin 3[dB] |
|------------------------|------------------|--------------|-------------|---------------|------------------|----------|--------------|---------|--------------|---------|--------------|
|                        | Limit 4          | Margin 4[dB] |             | Azimuth [deg] | Height [cm]      | Polarity |              |         |              |         |              |
| Frequency [MHz]        | Reading [dB(uV)] | Type         | Factor [dB] | Factor [dB]   | dB[uVolts/meter] |          |              |         |              |         |              |
| Vertical 300 - 1000MHz |                  |              |             |               |                  |          |              |         |              |         |              |
| 454.0899               | .52              | qp           | 2.3         | 16.9          | 19.72            | 37       | -17.28       | 35.6    | -15.88       | 3       | 263 Vert     |
| 658.3161               | .48              | qp           | 2.9         | 20.5          | 23.88            | 37       | -13.12       | 35.6    | -11.72       | 56      | 200 Vert     |
| 931.3722               | .48              | qp           | 3.8         | 24.1          | 28.38            | 37       | -8.62        | 35.6    | -7.22        | 327     | 151 Vert     |

LIMIT 1: NONE

LIMIT 2: CISPR CLASS B 10 METER

LIMIT 3: NONE

LIMIT 4: CFR 47 PART 15 CLASS B (10M)

LIMIT 5: NONE

LIMIT 6: NONE

pk - Peak detector

qp - Quasi-Peak detector

av - Average detector

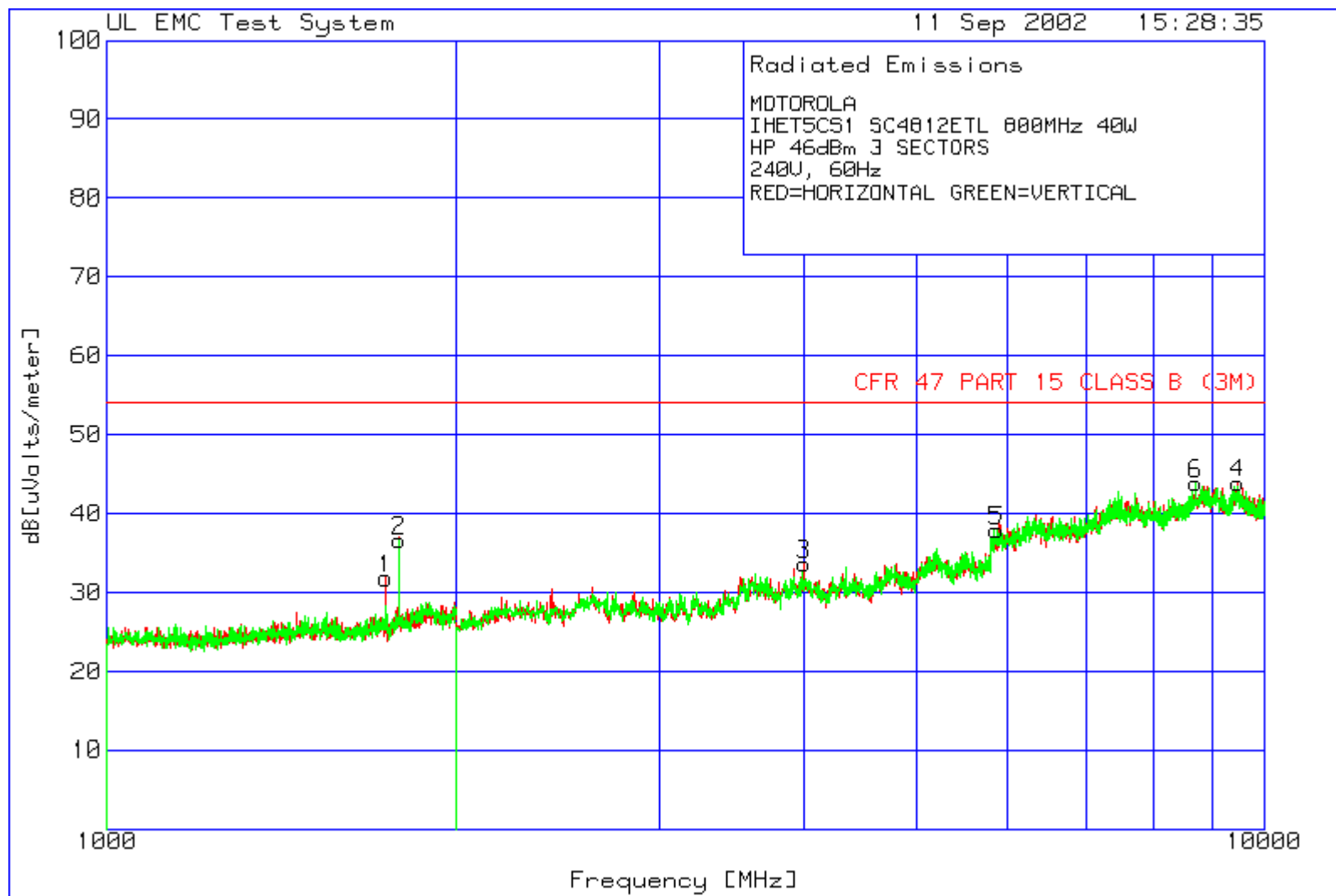
avlg - Average log detector

avem - EMI Average detector

**UNDERWRITERS LABORATORIES INC.**  
**Radiated Emissions**

Date Tested: 9-11-2002

|                             |                                                                       |
|-----------------------------|-----------------------------------------------------------------------|
| <b>Manufacturer</b>         | : Motorola CDMA Wireless Products<br>Customer Integration Engineering |
| <b>Equipment Under Test</b> | : SC4812ETL 1X 800MHz Cellular Phone Base Station                     |
| <b>Requirement</b>          | : CFR 47 PART 15 B Class B                                            |
| <b>Detection Mode</b>       | : Average (av)                                                        |
| <b>Bandwidth</b>            | : 100KHz, 1-10GHz                                                     |
| <b>Measurement Distance</b> | : 3 meter                                                             |
| <b>Antenna Type</b>         | : 1-10GHz, Horn                                                       |



MOTOROLA

IHET5CS1 SC4812ETL 800MHz 40W

HP 46dBm 3 SECTORS

240V, 60Hz

RED=HORIZONTAL GREEN=VERTICAL

| Marker                     | Test      | Meter    | Detector | Gain/Loss | Transducer | Level            | Limit | 1     | Margin | 1[dB] | Azimuth | [deg] | Height |
|----------------------------|-----------|----------|----------|-----------|------------|------------------|-------|-------|--------|-------|---------|-------|--------|
| [cm]                       | Polarity  |          |          |           |            |                  |       |       |        |       |         |       |        |
| Number                     | Frequency | Reading  | Type     | Factor    | Factor     | dB[uVolts/meter] |       |       |        |       |         |       |        |
|                            | [MHz]     | [dB(uV)] | [dB]     | [dB]      |            |                  |       |       |        |       |         |       |        |
| Horizontal 1000 - 2000MHz  |           |          |          |           |            |                  |       |       |        |       |         |       |        |
| 1                          | 1739      | 34       | pk       | -30       | 27.8       | 31.8             | 54    | -22.2 | 63     | 200   | Horz    |       |        |
| Horizontal 1000 - 2000MHz  |           |          |          |           |            |                  |       |       |        |       |         |       |        |
| 2                          | 1786      | 38.3     | pk       | -29.8     | 28.1       | 36.6             | 54    | -17.4 | 2      | 100   | Vert    |       |        |
| Horizontal 2000 - 10000MHz |           |          |          |           |            |                  |       |       |        |       |         |       |        |
| 3                          | 3998.668  | 27.1     | pk       | -28       | 34.5       | 33.6             | 54    | -20.4 | 337    | 199   | Horz    |       |        |
| 4                          | 9472.352  | 26.1     | pk       | -20.8     | 38.6       | 43.9             | 54    | -10.1 | 337    | 199   | Horz    |       |        |
| Horizontal 2000 - 10000MHz |           |          |          |           |            |                  |       |       |        |       |         |       |        |
| 5                          | 5864.091  | 26.3     | pk       | -25.1     | 36.7       | 37.9             | 54    | -16.1 | 358    | 199   | Vert    |       |        |
| 6                          | 8704.863  | 26.2     | pk       | -21.4     | 39         | 43.8             | 54    | -10.2 | 352    | 199   | Vert    |       |        |

LIMIT 1: CFR 47 PART 15 CLASS B (3M)

LIMIT 2: NONE

LIMIT 3: NONE

LIMIT 4: NONE

LIMIT 5: NONE

LIMIT 6: NONE

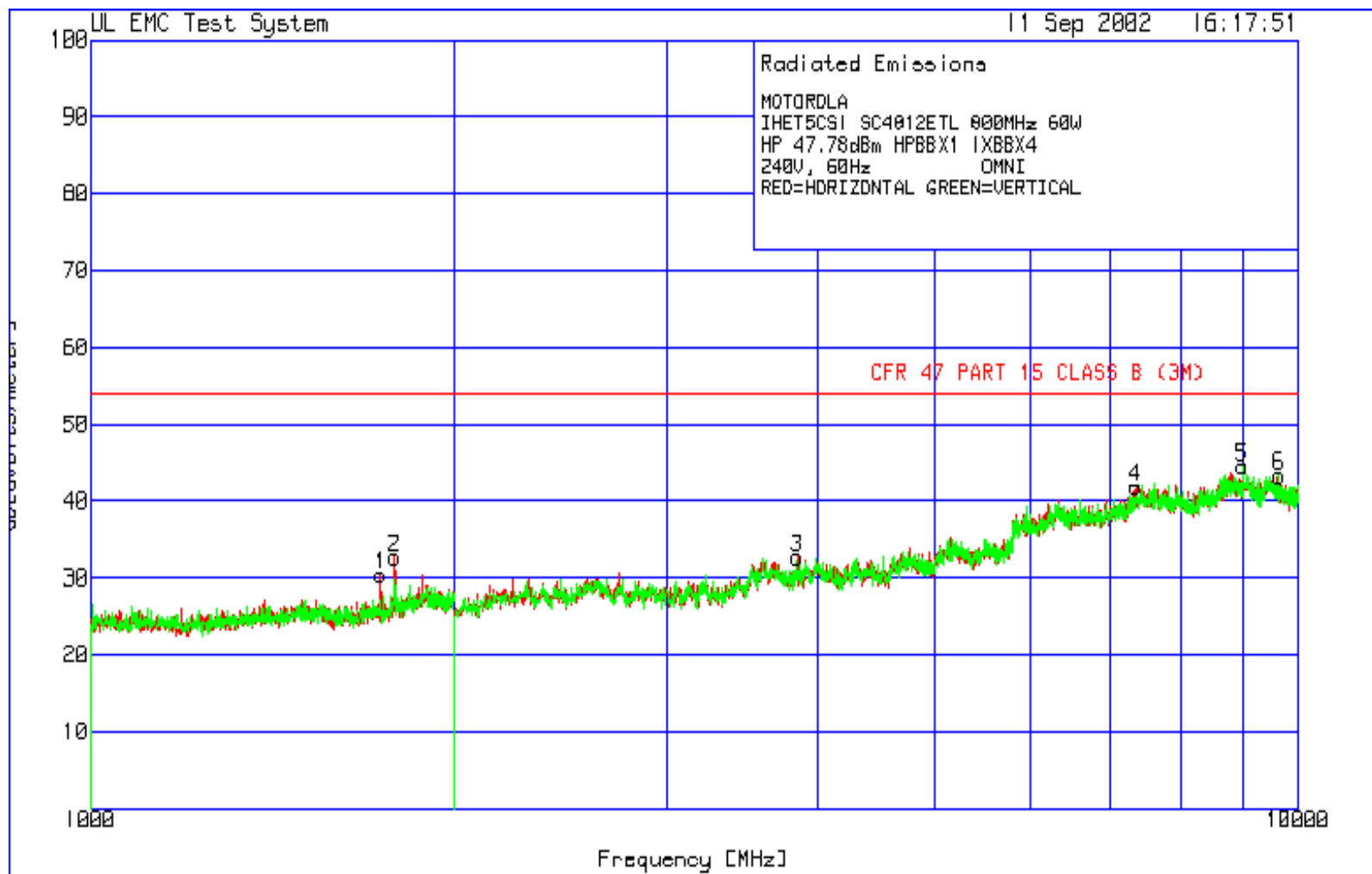
pk - Peak detector

qp - Quasi-Peak detector

av - Average detector

avlg - Average log detector

avem - EMI Average detector

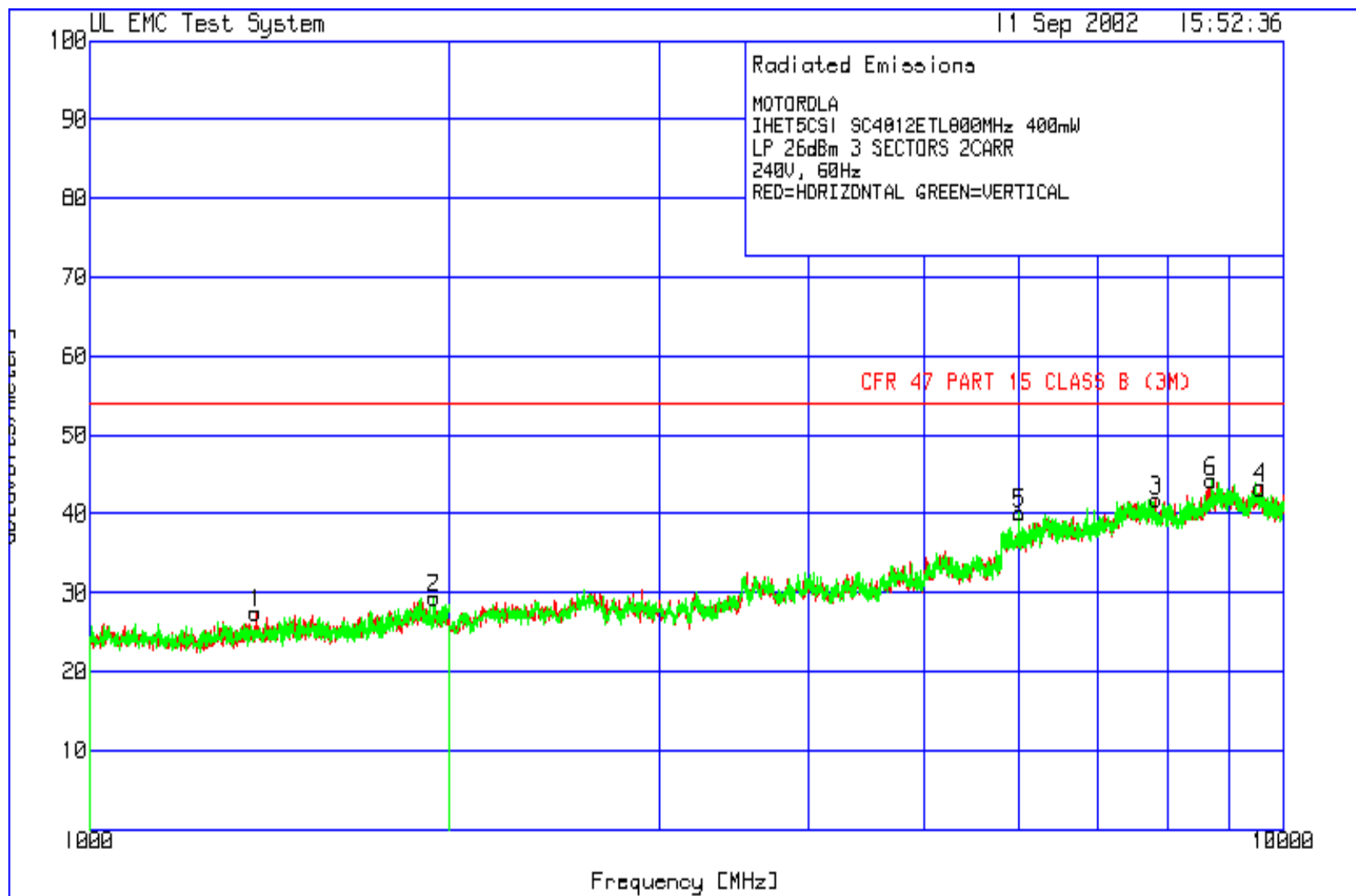


MOTOROLA  
 IHET5CS1 SC4812ETL 800MHz 60W  
 HP 47.78dBm HPBBX1 1XBBX4  
 240V, 60Hz OMNI  
 RED=HORIZONTAL GREEN=VERTICAL

| Marker                     | Test            | Meter            | Detector | Gain/Loss   | Transducer  | Level       | Limit 1     | Margin 1[dB] | Azimuth [deg] | Height      |
|----------------------------|-----------------|------------------|----------|-------------|-------------|-------------|-------------|--------------|---------------|-------------|
| [cm]                       | Polarity        |                  |          |             |             |             |             |              |               |             |
| Number                     | Frequency [MHz] | Reading [dB(uV)] | Type     | Factor [dB] | Factor [dB] | Factor [dB] | Factor [dB] | Factor [dB]  | Factor [dB]   | Factor [dB] |
| Horizontal 1000 - 2000MHz  |                 |                  |          |             |             |             |             |              |               |             |
| 1                          | 1739            | 32.6             | pk       | -30         | 27.8        | 30.4        | 54          | -23.6        | 82            | 199         |
| 2                          | 1786            | 34.4             | pk       | -29.8       | 28.1        | 32.7        | 54          | -21.3        | 22            | 199         |
| Horizontal 2000 - 10000MHz |                 |                  |          |             |             |             |             |              |               |             |
| 3                          | 3849.434        | 27.3             | pk       | -28.6       | 34          | 32.7        | 54          | -21.3        | 337           | 199         |
| 4                          | 7340.44         | 25.7             | pk       | -21.7       | 37.9        | 41.9        | 54          | -12.1        | 6             | 199         |
| Horizontal 2000 - 10000MHz |                 |                  |          |             |             |             |             |              |               |             |
| 5                          | 8998.001        | 27               | pk       | -22.4       | 39.9        | 44.5        | 54          | -9.5         | 337           | 199         |
| 6                          | 9637.575        | 26.9             | pk       | -22.2       | 38.6        | 43.3        | 54          | -10.7        | 124           | 199         |

LIMIT 1: CFR 47 PART 15 CLASS B (3M)  
 LIMIT 2: NONE  
 LIMIT 3: NONE  
 LIMIT 4: NONE  
 LIMIT 5: NONE  
 LIMIT 6: NONE

pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - Average log detector  
 avem - EMI Average detector



MOTOROLA

IHET5CS1 SC4812ETL800MHz 400mW

LP 26dBm 3 SECTORS 2CARR

240V, 60Hz

RED=HORIZONTAL GREEN=VERTICAL

| Marker                     | Test        | Meter    | Detector | Gain/Loss | Transducer | Level | Limit 1 | Margin 1[dB] | Azimuth      |
|----------------------------|-------------|----------|----------|-----------|------------|-------|---------|--------------|--------------|
| [deg]                      | Height [cm] | Polarity |          |           |            |       |         |              |              |
| Number                     | Frequency   | Reading  | Type     | Factor    | Factor     |       |         |              |              |
|                            | [MHz]       | [dB(uV)] | [dB]     |           |            |       |         |              |              |
| Horizontal 1000 - 2000MHz  |             |          |          |           |            |       |         |              |              |
| 1                          | 1378        | 30.7     | pk       | -29.5     | 26.3       | 27.5  | 54      | -26.5        | 263 199 Horz |
| Horizontal 1000 - 2000MHz  |             |          |          |           |            |       |         |              |              |
| 2                          | 1944        | 30.2     | pk       | -29.6     | 28.8       | 29.4  | 54      | -24.6        | 243 199 Vert |
| Horizontal 2000 - 10000MHz |             |          |          |           |            |       |         |              |              |
| 3                          | 7822.785    | 26.3     | pk       | -22.3     | 37.8       | 41.8  | 54      | -12.2        | 6 199 Horz   |
| 4                          | 9562.958    | 26       | pk       | -21.2     | 38.5       | 43.3  | 54      | -10.7        | 11 199 Horz  |
| Horizontal 2000 - 10000MHz |             |          |          |           |            |       |         |              |              |
| 5                          | 6007.995    | 28.2     | pk       | -25       | 36.9       | 40.1  | 54      | -13.9        | 326 199 Vert |
| 6                          | 8699.534    | 26.8     | pk       | -21.5     | 38.9       | 44.2  | 54      | -9.8         | 352 199 Vert |

LIMIT 1: CFR 47 PART 15 CLASS B (3M)

LIMIT 2: NONE

LIMIT 3: NONE

LIMIT 4: NONE

LIMIT 5: NONE

LIMIT 6: NONE

pk - Peak detector

qp - Quasi-Peak detector

av - Average detector

avlg - Average log detector

avem - EMI Average detector

**UNDERWRITERS LABORATORIES INC.**  
**Radiated Emissions Substitution Method**

Date Tested: 10-4-2002

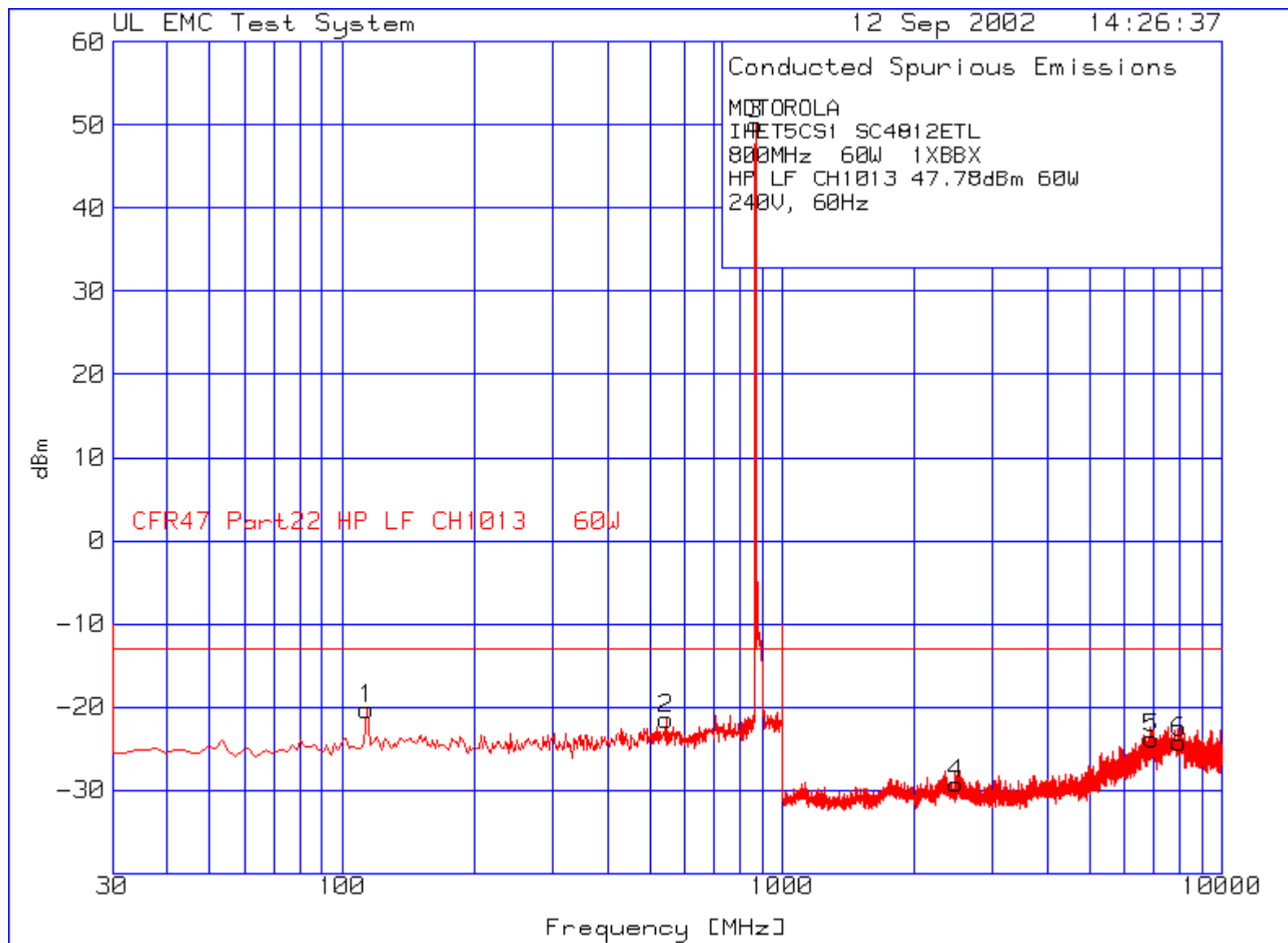
**Manufacturer** : MOTOROLA  
**Equipment Under Test** : IHET5CS1 SC4812ETL 1X 800MHz 40W  
: HP 46dBm 3 sectors  
**Requirement** : FCC Part 22/24 : Substitution Method–TIA/EIA–603 :1992, : Section 2.2.12\*  
**Detection Mode** : Pick  
**Measurement Distance** : 3 meter

| Radiated                                           |                  |                                           | Substituted Power                   |                                   |                                 |                       |                         |                                |
|----------------------------------------------------|------------------|-------------------------------------------|-------------------------------------|-----------------------------------|---------------------------------|-----------------------|-------------------------|--------------------------------|
| Spurious Fr. (MHz)<br>channel<br>mode of operation | Antenna Polarity | Measured Radiated Field Strength (dBuV/m) | Signal Generator Output Level (dBm) | Tx Antenna Terminal Voltage (dBm) | Substitution Antenna Gain (dBi) | Calculated EIRP (dBm) | EDRP (EIRP -2.15) (dBm) | FCC Part 22/24 MAX LIMIT (dBm) |
| 1739                                               | H                | 31.8                                      | -66.8                               | -68.3                             | 7                               | -61.3                 | -63.45                  | - 13                           |
| 1786                                               | V                | 36.6                                      | -62.3                               | -63.8                             | 7                               | -56.8                 | -58.95                  | - 13                           |

**UNDERWRITERS LABORATORIES INC.**  
**Conducted Spurious Emissions**

Date Tested: 9-12-2002

**Manufacturer** : Motorola CDMA Wireless products Customer Integration  
Engineering  
**Equipment Under Test** : SC4812ETL 1X 800MHz Cellular Phone Base Station  
**Requirement** : CFR47 Part 22/24 , ANSI/TIAEIA-603-1992, Section 2.2.12  
**Detection Mode** : Quasi-peak (qp) or Peak (pk) or Average (ave)

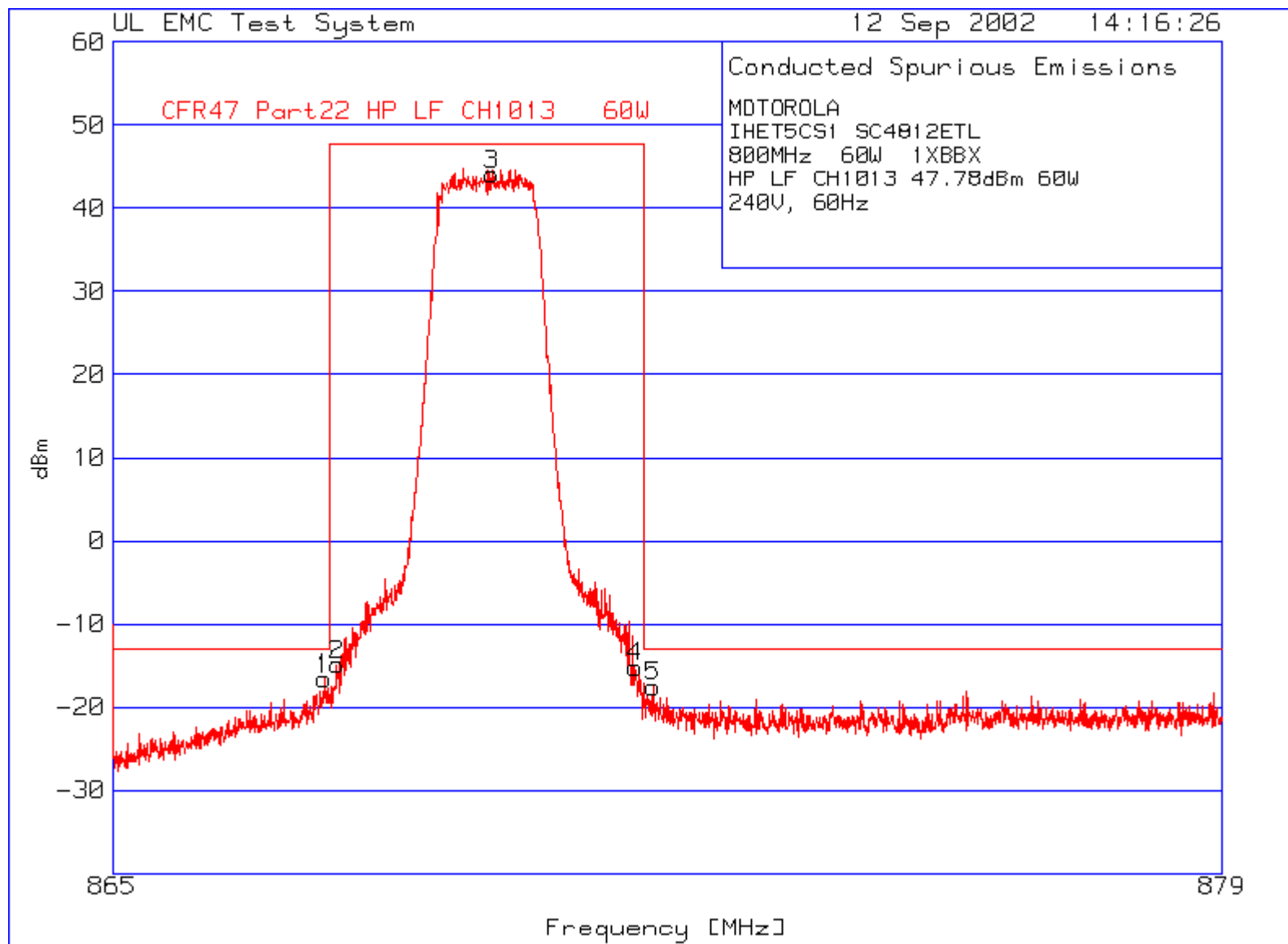


MOTOROLA  
 IHET5CS1 SC4812ETL  
 800MHz 60W 1XBBX  
 HP LF CH1013 47.78dBm 60W  
 240V, 60Hz

| Marker<br>Number         | Test<br>Frequency<br>[MHz] | Meter<br>Reading<br>[dB(uV)] | Detector<br>Reading<br>[dB] | Gain/Loss<br>Type<br>[dB] | Factor | Transducer<br>Factor | Level<br>dBm | Limit 1<br>dBm | Margin 1[dB] |
|--------------------------|----------------------------|------------------------------|-----------------------------|---------------------------|--------|----------------------|--------------|----------------|--------------|
| Range: 1 30 - 1000MHz    |                            |                              |                             |                           |        |                      |              |                |              |
| 1                        | 113.5872                   | 36.66                        | pk                          | 50.1                      | -107   | -20.24               | -13          | -7.24          |              |
| 2                        | 545.1303                   | 34.95                        | pk                          | 50.6                      | -107   | -21.45               | -13          | -8.45          |              |
| carrier frequency        |                            |                              |                             |                           |        |                      |              |                |              |
| 3                        | 869.7595                   | 106.1                        | pk                          | 51                        | -107   | 50.1 47.8            | 2.3          |                |              |
| Range: 2 1000 - 10000MHz |                            |                              |                             |                           |        |                      |              |                |              |
| 4                        | 2485.297                   | 25.87                        | pk                          | 51.9                      | -107   | -29.23               | -13          | -16.23         |              |
| 5                        | 6917.784                   | 29.62                        | pk                          | 53.6                      | -107   | -23.78               | -13          | -10.78         |              |
| 6                        | 7994.399                   | 28.68                        | pk                          | 54.1                      | -107   | -24.22               | -13          | -11.22         |              |

LIMIT 1: CFR47 Part22 HP LF CH1013 60W  
 LIMIT 2: NONE  
 LIMIT 3: NONE  
 LIMIT 4: NONE  
 LIMIT 5: NONE  
 LIMIT 6: NONE

pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - Average log detector  
 avem - EMI Average detector

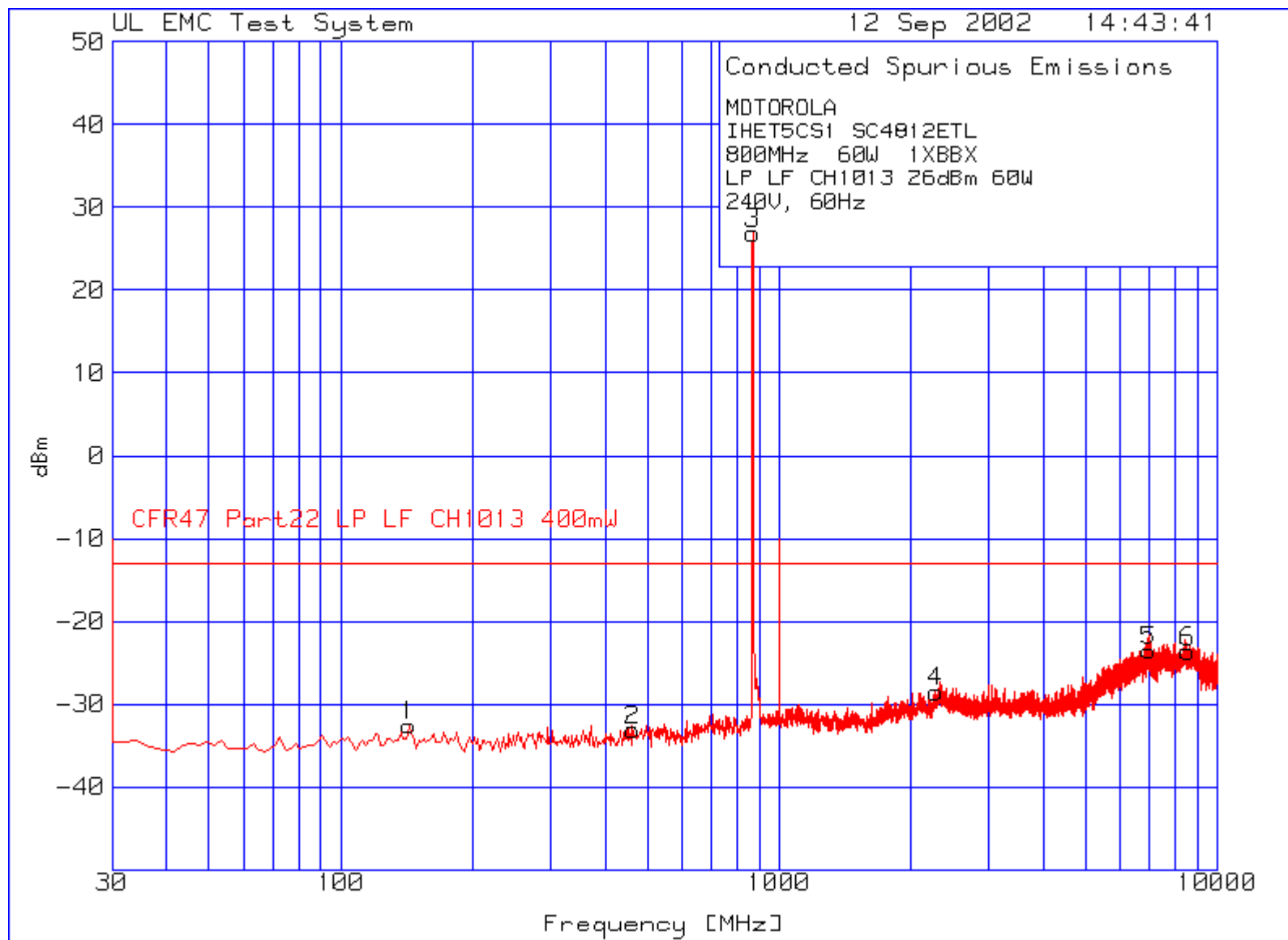


MOTOROLA  
 IHET5CS1 SC4812ETL  
 800MHz 60W 1XBBX  
 HP LF CH1013 47.78dBm 60W  
 240V, 60Hz

| Marker<br>Number      | Test<br>Frequency<br>[MHz] | Meter<br>Reading<br>[dB(uV)] | Detector<br>[dB] | Gain/Loss<br>Type<br>[dB] | Factor | Transducer<br>Factor | Level<br>dBm | Limit 1<br>dBm | Margin 1[dB] |
|-----------------------|----------------------------|------------------------------|------------------|---------------------------|--------|----------------------|--------------|----------------|--------------|
| Range: 1 865 - 879MHz |                            |                              |                  |                           |        |                      |              |                |              |
| 1                     | 867.6543                   | 39.42                        | pk               | 51                        | -107   | -16.58               | -13          | -3.58          |              |
| 2                     | 867.8154                   | 41.12                        | pk               | 51                        | -107   | -14.88               | 47.8         | -62.68         |              |
| 3                     | 869.7624                   | 100.07                       | pk               | 51                        | -107   | 44.07 47.8           | -3.73        |                |              |
| 4                     | 871.5623                   | 40.86                        | pk               | 51                        | -107   | -15.14               | 47.8         | -62.94         |              |
| 5                     | 871.7934                   | 38.51                        | pk               | 51                        | -107   | -17.49               | -13          | -4.49          |              |

LIMIT 1: CFR47 Part22 HP LF CH1013 60W  
 LIMIT 2: NONE  
 LIMIT 3: NONE  
 LIMIT 4: NONE  
 LIMIT 5: NONE  
 LIMIT 6: NONE

pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - Average log detector  
 avem - EMI Average detector

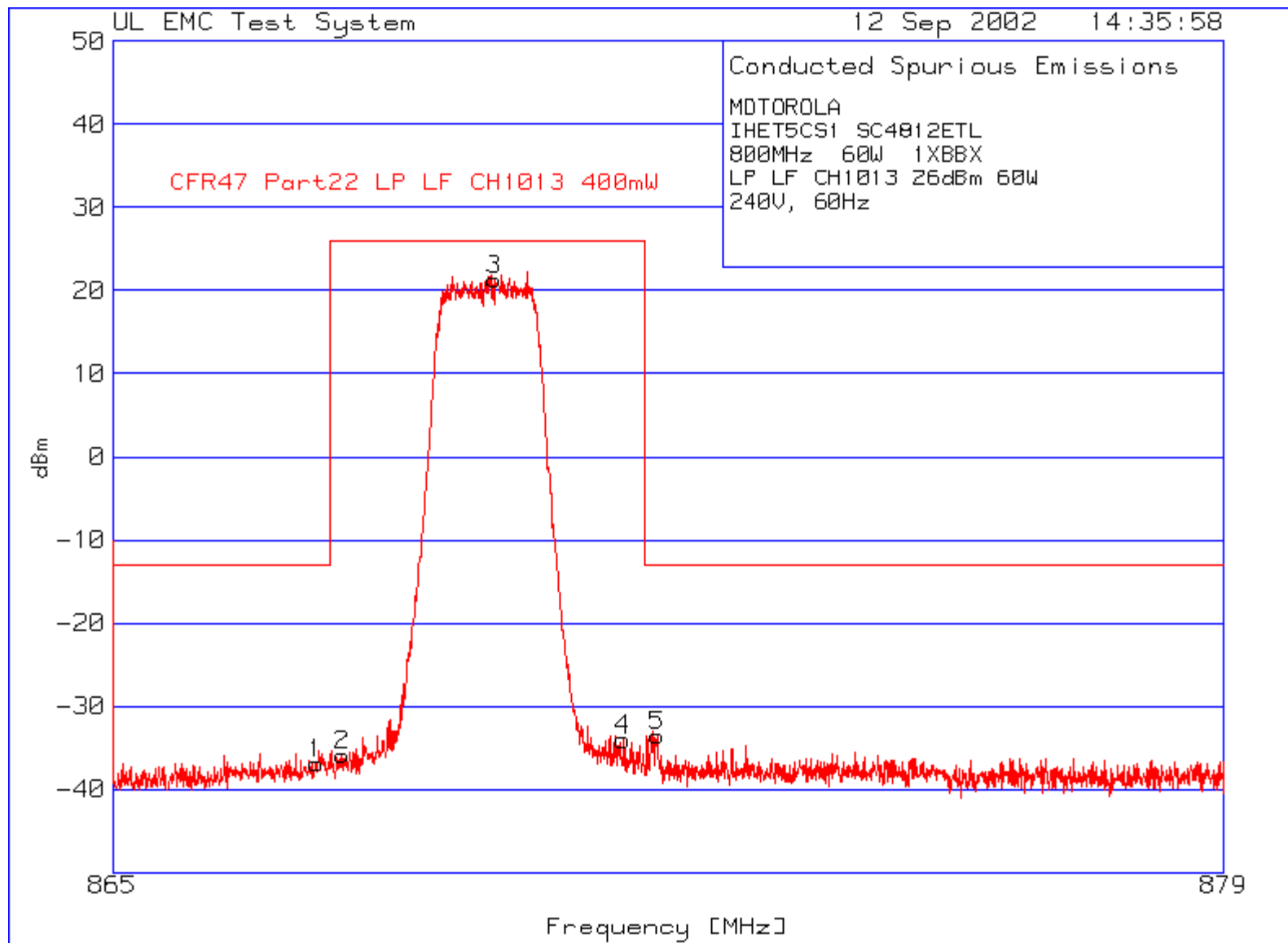


MOTOROLA  
 IHET5CS1 SC4812ETL  
 800MHz 60W 1XBBX  
 LP LF CH1013 26dBm 60W  
 240V, 60Hz

| Marker<br>Number         | Test<br>Frequency<br>[MHz] | Meter<br>[dB(uV)] | Detector<br>Reading<br>[dB] | Gain/Loss<br>Type<br>[dB] | Factor | Transducer<br>Factor | Level | Limit 1<br>dBm | Margin 1[dB] |
|--------------------------|----------------------------|-------------------|-----------------------------|---------------------------|--------|----------------------|-------|----------------|--------------|
| Range: 1 30 - 1000MHz    |                            |                   |                             |                           |        |                      |       |                |              |
| 1                        | 142.7455                   | 24.36             | pk                          | 50.1                      | -107   | -32.54               | -13   | -19.54         |              |
| 2                        | 463.487                    | 23.4              | pk                          | 50.5                      | -107   | -33.1                | -13   | -20.1          |              |
|                          | carrier frequency          |                   |                             |                           |        |                      |       |                |              |
| 3                        | 869.7595                   | 82.9              | pk                          | 51                        | -107   | 26.9                 | 26    | .9             |              |
| Range: 2 1000 - 10000MHz |                            |                   |                             |                           |        |                      |       |                |              |
| 4                        | 2271.054                   | 26.69             | pk                          | 51.8                      | -107   | -28.51               | -13   | -15.51         |              |
| 5                        | 6975.395                   | 29.64             | pk                          | 53.8                      | -107   | -23.56               | -13   | -10.56         |              |
| 6                        | 8559.712                   | 29.53             | pk                          | 53.8                      | -107   | -23.67               | -13   | -10.67         |              |

LIMIT 1: CFR47 Part22 LP LF CH1013 400mW  
 LIMIT 2: NONE  
 LIMIT 3: NONE  
 LIMIT 4: NONE  
 LIMIT 5: NONE  
 LIMIT 6: NONE

pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - Average log detector  
 avem - EMI Average detector

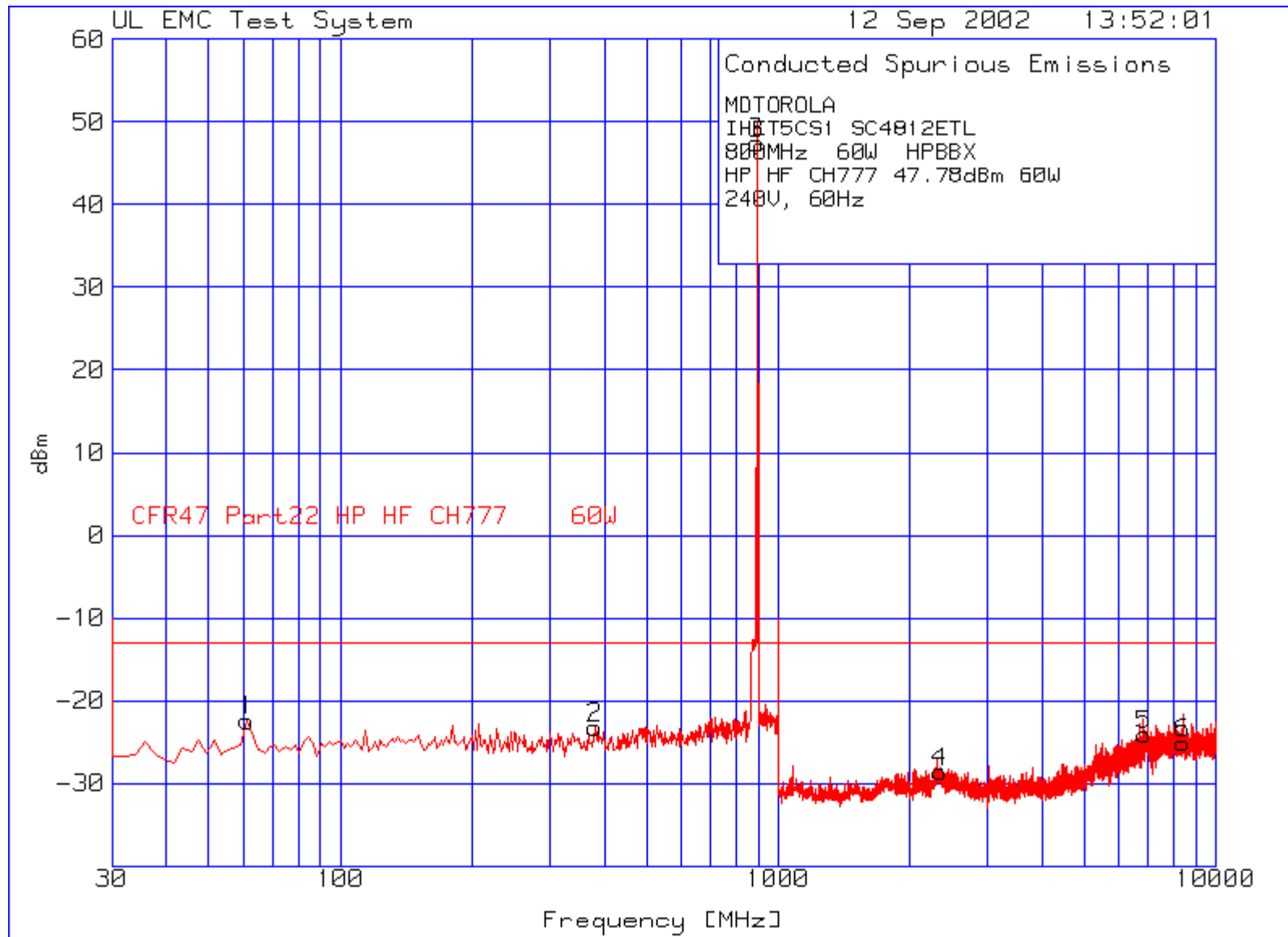


MOTOROLA  
 IHET5CS1 SC4812ETL  
 800MHz 60W 1XBBX  
 LP LF CH1013 26dBm 60W  
 240V, 60Hz

| Marker<br>Number      | Test<br>Frequency<br>[MHz] | Meter<br>Reading<br>[dB(uV)] | Detector<br>Reading<br>[dB] | Gain/Loss<br>Type<br>[dB] | Factor | Transducer<br>Factor | Level<br>[dB] | Limit 1<br>dBm | Margin 1[dB] |
|-----------------------|----------------------------|------------------------------|-----------------------------|---------------------------|--------|----------------------|---------------|----------------|--------------|
| Range: 1 865 - 879MHz |                            |                              |                             |                           |        |                      |               |                |              |
| 1                     | 867.5493                   | 19.14                        | pk                          | 51                        | -107   | -36.86               | -13           | -23.86         |              |
| 2                     | 867.8714                   | 20.12                        | pk                          | 51                        | -107   | -35.88               | 26            | -61.88         |              |
| 3                     | 869.7904                   | 77.3                         | pk                          | 51                        | -107   | 21.3                 | 26            | -4.7           |              |
| 4                     | 871.4082                   | 21.99                        | pk                          | 51                        | -107   | -34.01               | 26            | -60.01         |              |
| 5                     | 871.8354                   | 22.46                        | pk                          | 51                        | -107   | -33.54               | -13           | -20.54         |              |

LIMIT 1: CFR47 Part22 LP LF CH1013 400mW  
 LIMIT 2: NONE  
 LIMIT 3: NONE  
 LIMIT 4: NONE  
 LIMIT 5: NONE  
 LIMIT 6: NONE

pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - Average log detector  
 avem - EMI Average detector

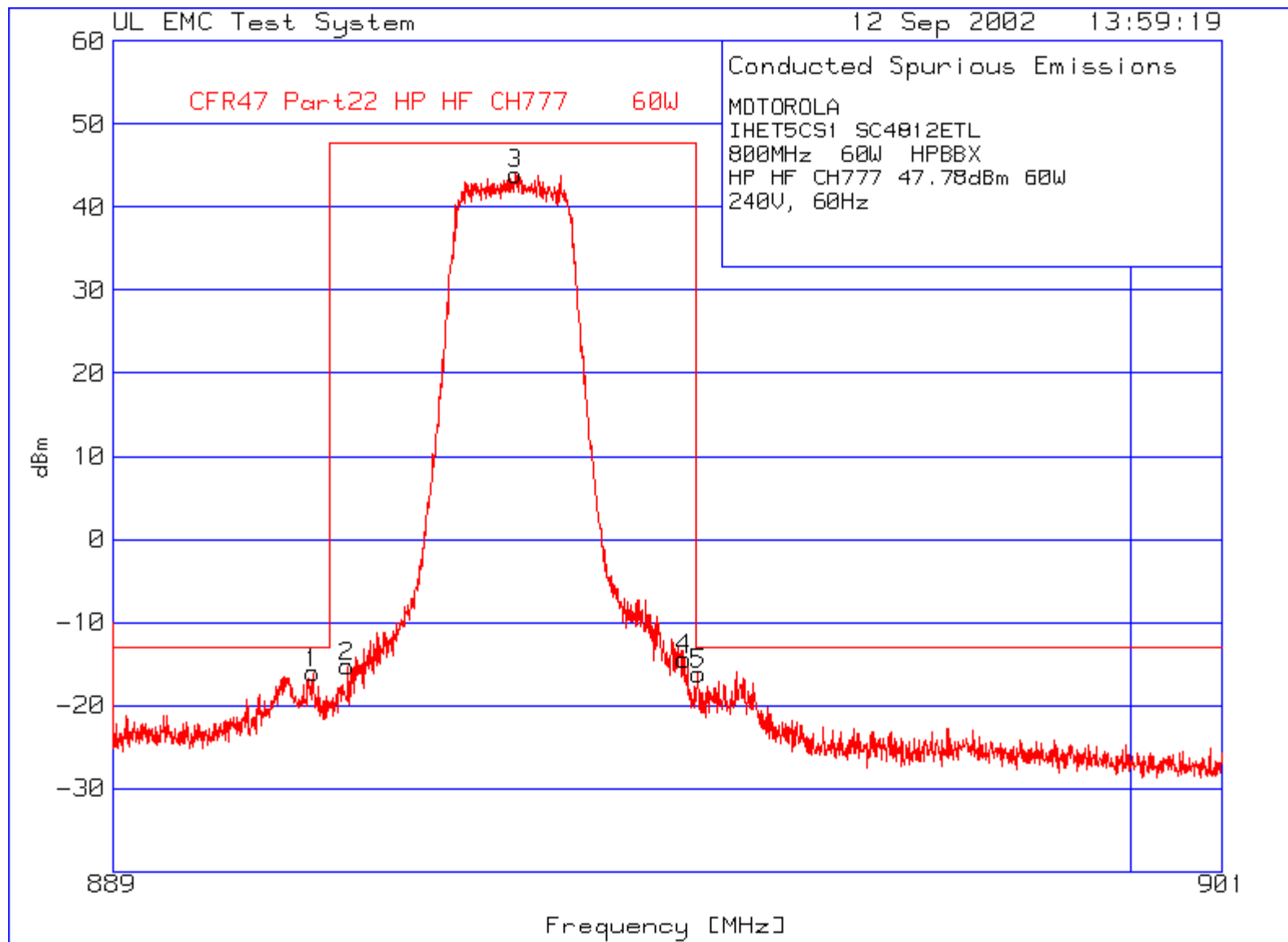


MOTOROLA  
 IHET5CS1 SC4812ETL  
 800MHz 60W HPBBX  
 HP HF CH777 47.78dBm 60W  
 240V, 60Hz

| Marker<br>Number         | Test<br>Frequency<br>[MHz] | Meter<br>Frequency<br>[dB(uV)] | Detector<br>Reading<br>[dB] | Gain/Loss<br>Type<br>[dB] | Factor | Transducer<br>Factor | Level<br>dBm | Limit 1<br>dBm | Margin 1[dB] |
|--------------------------|----------------------------|--------------------------------|-----------------------------|---------------------------|--------|----------------------|--------------|----------------|--------------|
| Range: 1 30 - 1000MHz    |                            |                                |                             |                           |        |                      |              |                |              |
| 1                        | 61.1022                    | 34.61                          | pk                          | 50                        | -107   | -22.39               | -13          | -9.39          |              |
| 2                        | 381.8437                   | 33.38                          | pk                          | 50.4                      | -107   | -23.22               | -13          | -10.22         |              |
|                          | carrier frequency          |                                |                             |                           |        |                      |              |                |              |
| 3                        | 893.0862                   | 103.41                         | pk                          | 51                        | -107   | 47.41                | 47.8         | -.39           |              |
| Range: 2 1000 - 10000MHz |                            |                                |                             |                           |        |                      |              |                |              |
| 4                        | 2344.869                   | 26.52                          | pk                          | 51.9                      | -107   | -28.58               | -13          | -15.58         |              |
| 5                        | 6858.372                   | 29.4                           | pk                          | 53.5                      | -107   | -24.1                | -13          | -11.1          |              |
| 6                        | 8410.282                   | 27.48                          | pk                          | 54.4                      | -107   | -25.12               | -13          | -12.12         |              |

LIMIT 1: CFR47 Part22 HP HF CH777 60W  
 LIMIT 2: NONE  
 LIMIT 3: NONE  
 LIMIT 4: NONE  
 LIMIT 5: NONE  
 LIMIT 6: NONE

pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - Average log detector  
 avem - EMI Average detector

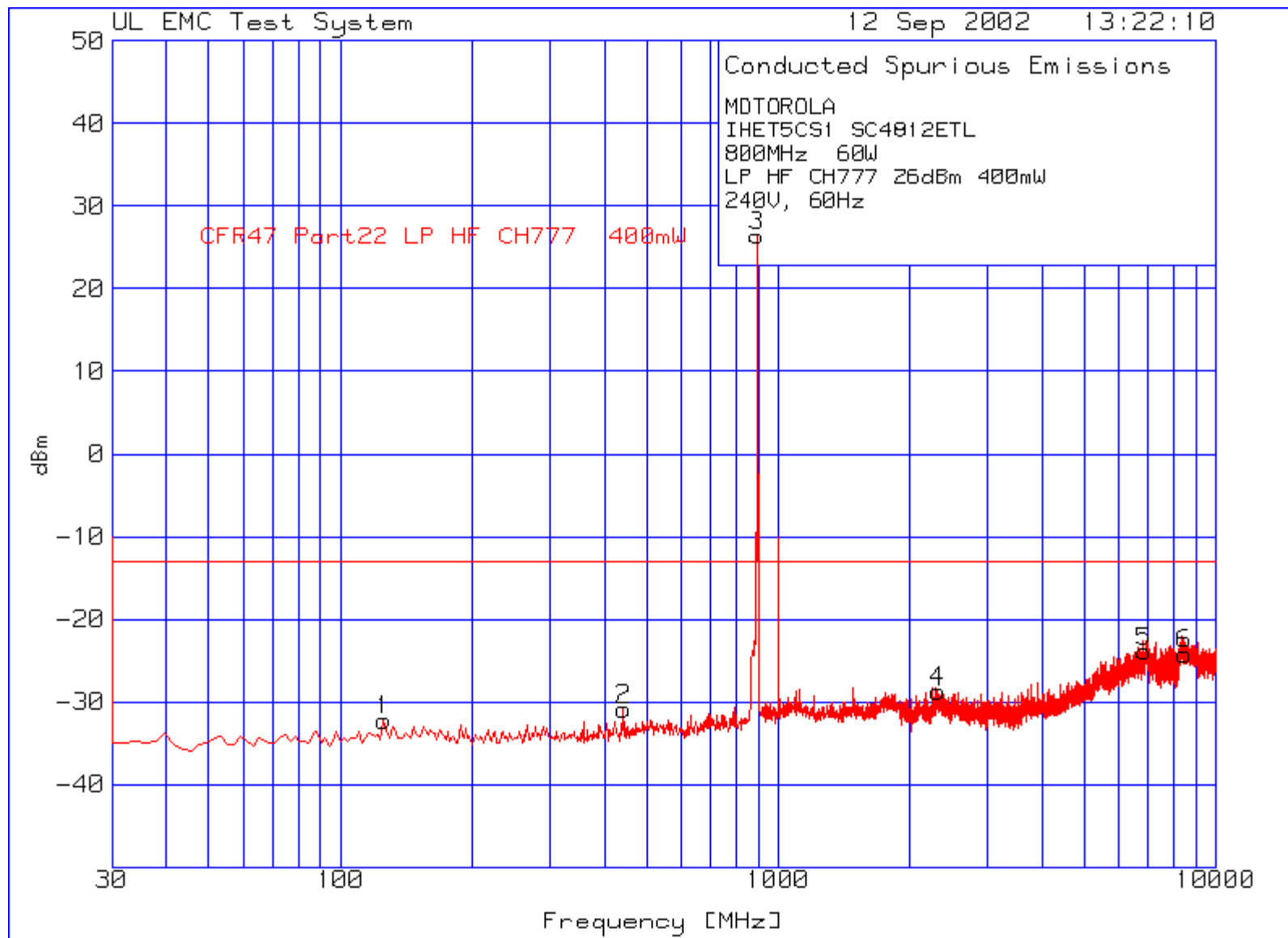


MOTOROLA  
 IHET5CS1 SC4812ETL  
 800MHz 60W HPBBX  
 HP HF CH777 47.78dBm 60W  
 240V, 60Hz

| Marker<br>Number      | Test<br>Frequency<br>[MHz] | Meter<br>Reading<br>[dB(uV)] | Detector<br>Reading<br>[dB] | Gain/Loss<br>Type<br>[dB] | Factor | Transducer<br>Factor | Level<br>dBm | Limit 1<br>dBm | Margin 1[dB] |
|-----------------------|----------------------------|------------------------------|-----------------------------|---------------------------|--------|----------------------|--------------|----------------|--------------|
| Range: 1 889 - 901MHz |                            |                              |                             |                           |        |                      |              |                |              |
| 1                     | 891.1551                   | 39.95                        | pk                          | 51                        | -107   | -16.05               | -13          | -3.05          |              |
| 2                     | 891.5273                   | 40.72                        | pk                          | 51                        | -107   | -15.28               | 47.8         | -63.08         |              |
| 3                     | 893.3402                   | 100                          | pk                          | 51                        | -107   | 44                   | 47.8         | -3.8           |              |
| 4                     | 895.1651                   | 41.55                        | pk                          | 51                        | -107   | -14.45               | 47.8         | -62.25         |              |
| 5                     | 895.3122                   | 39.83                        | pk                          | 51                        | -107   | -16.17               | -13          | -3.17          |              |

LIMIT 1: CFR47 Part22 HP HF CH777 60W  
 LIMIT 2: NONE  
 LIMIT 3: NONE  
 LIMIT 4: NONE  
 LIMIT 5: NONE  
 LIMIT 6: NONE

pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - Average log detector  
 avem - EMI Average detector

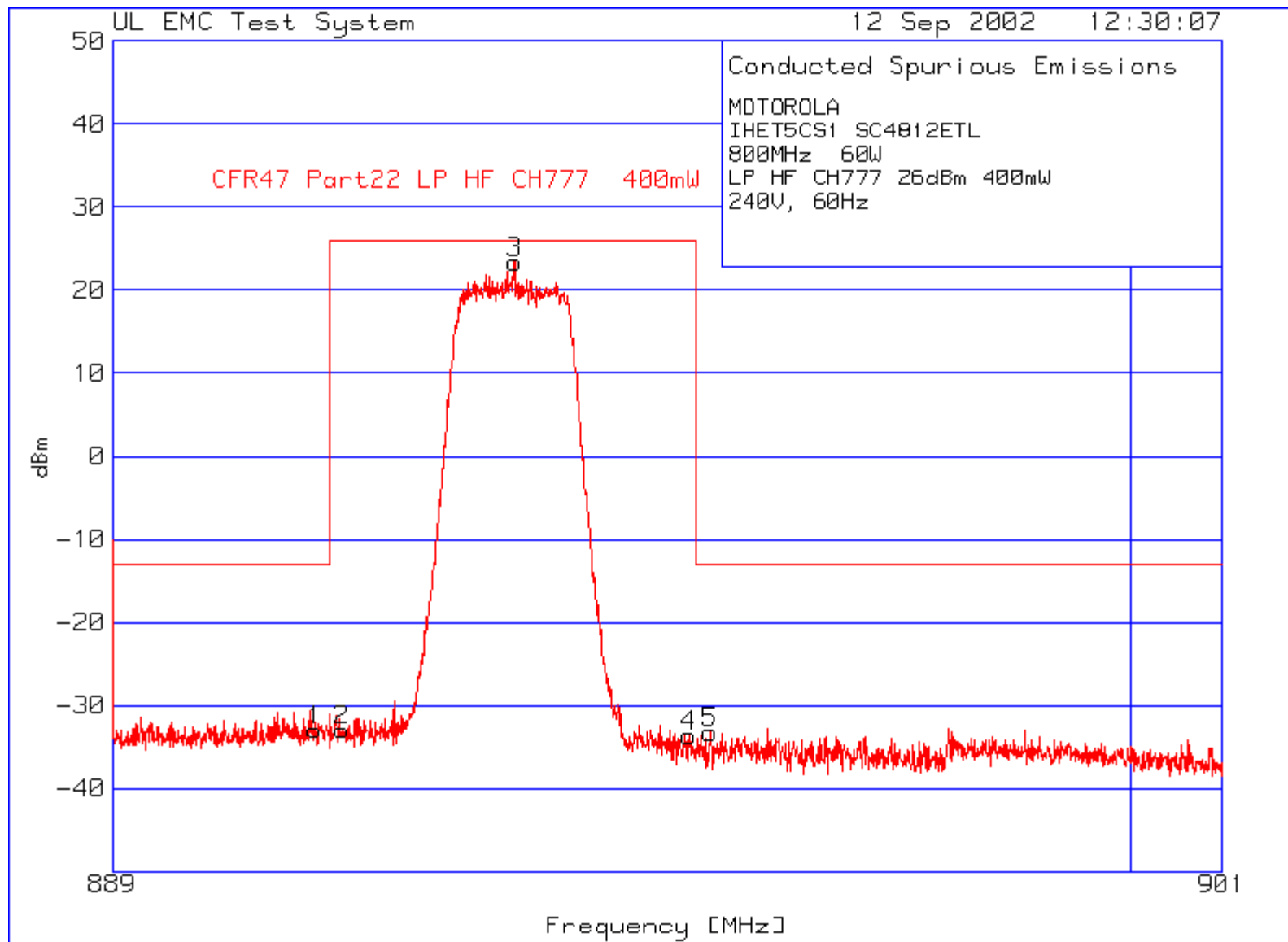


MOTOROLA  
 IHET5CS1 SC4812ETL  
 800MHz 60W  
 LP HF CH777 26dBm 400mW  
 240V, 60Hz

| Marker<br>Number         | Test<br>Frequency<br>[MHz] | Meter<br>Frequency<br>[dB(uV)] | Detector<br>Reading<br>[dB] | Gain/Loss<br>Type<br>[dB] | Factor | Transducer<br>Factor | Level<br>dBm | Limit 1<br>dBm | Margin 1[dB] |
|--------------------------|----------------------------|--------------------------------|-----------------------------|---------------------------|--------|----------------------|--------------|----------------|--------------|
| Range: 1 30 - 1000MHz    |                            |                                |                             |                           |        |                      |              |                |              |
| 1                        | 125.2505                   | 24.69                          | pk                          | 50.1                      | -107   | -32.21               | -13          | -19.21         |              |
| 2                        | 442.1042                   | 25.61                          | pk                          | 50.5                      | -107   | -30.89               | -13          | -17.89         |              |
|                          | carrier frequency          |                                |                             |                           |        |                      |              |                |              |
| 3                        | 895.0301                   | 82.38                          | pk                          | 51                        | -107   | 26.38                | 26           | .38            |              |
| Range: 2 1000 - 10000MHz |                            |                                |                             |                           |        |                      |              |                |              |
| 4                        | 2308.862                   | 26.35                          | pk                          | 51.9                      | -107   | -28.75               | -13          | -15.75         |              |
| 5                        | 6858.372                   | 29.61                          | pk                          | 53.5                      | -107   | -23.89               | -13          | -10.89         |              |
| 6                        | 8482.296                   | 29.01                          | pk                          | 53.8                      | -107   | -24.19               | -13          | -11.19         |              |

LIMIT 1: CFR47 Part22 LP HF CH777 400mW  
 LIMIT 2: NONE  
 LIMIT 3: NONE  
 LIMIT 4: NONE  
 LIMIT 5: NONE  
 LIMIT 6: NONE

pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - Average log detector  
 avem - EMI Average detector



MOTOROLA  
 IHET5CS1 SC4812ETL  
 800MHz 60W  
 LP HF CH777 26dBm 400mW  
 240V, 60Hz

| Marker<br>Number      | Test<br>Frequency<br>[MHz] | Meter<br>Frequency<br>[dB(uV)] | Detector<br>Reading<br>[dB] | Gain/Loss<br>Type<br>[dB] | Factor | Transducer<br>Factor | Level<br>[dB] | Limit 1<br>dBm | Margin 1[dB] |
|-----------------------|----------------------------|--------------------------------|-----------------------------|---------------------------|--------|----------------------|---------------|----------------|--------------|
| Range: 1 889 - 901MHz |                            |                                |                             |                           |        |                      |               |                |              |
| 1                     | 891.1791                   | 23.05                          | pk                          | 51                        | -107   | -32.95               | -13           | -19.95         |              |
| 2                     | 891.4732                   | 23.03                          | pk                          | 51                        | -107   | -32.97               | 26            | -58.97         |              |
| 3                     | 893.3342                   | 79.34                          | pk                          | 51                        | -107   | 23.34                | 26            | -2.66          |              |
| 4                     | 895.2131                   | 22.36                          | pk                          | 51                        | -107   | -33.64               | 26            | -59.64         |              |
| 5                     | 895.4412                   | 22.76                          | pk                          | 51                        | -107   | -33.24               | -13           | -20.24         |              |

LIMIT 1: CFR47 Part22 LP HF CH777 400mW  
 LIMIT 2: NONE  
 LIMIT 3: NONE  
 LIMIT 4: NONE  
 LIMIT 5: NONE  
 LIMIT 6: NONE

pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - Average log detector  
 avem - EMI Average detector

**UNDERWRITERS LABORATORIES INC.**  
**Occupied Bandwidth**

Date Tested: 9-20-2002  
10-01-2002

**Manufacturer** : Motorola CDMA Wireless products Customer Integration Engineering  
**Equipment Under Test** : SC4812ETL 800MHz Cellular Phone Base Station  
**Requirement** : CFR47 Part 22/24

Section 2.1047 Measurement Required: **Occupied Bandwidth**

**DEFINITION**

The measured spectral width of an emission. The measurement determines occupied bandwidth as the difference between upper and lower frequencies where 0.5% of the emission power is above the upper frequency and 0.5% of the emission power is below the lower frequency at rated power, with Pilot, Page, Sync, and Traffic Channel modulation.

Data to show the bandwidth occupied by this transmitter and output power is presented in the form of Channel Power Measurement plots from a spectrum analyzer. The Channel Power Measurement divides the Channel Power Bandwidth into increments (defined by the Resolution Bandwidth Setting selected), then sums the energy contained in each of those increments to provide an integrated measurement of the power in the Channel Power Bandwidth.

**METHOD OF MEASUREMENT**

Connect a spectrum analyzer to the BTS RF Transmit Port. Set the CDMA signal power to maximum. Setup the spectrum analyzer to make the following integrated Channel Power Measurements:

1. Channel Power Measurement of the CDMA Carrier Centered at 869.70 (Ch. 1013).

Channel Power Bandwidth: 1.30 MHz

Resolution Bandwidth: 30 KHz

2. Channel Power Measurement of the CDMA Carrier Centered at 893.31 (Ch. 777).

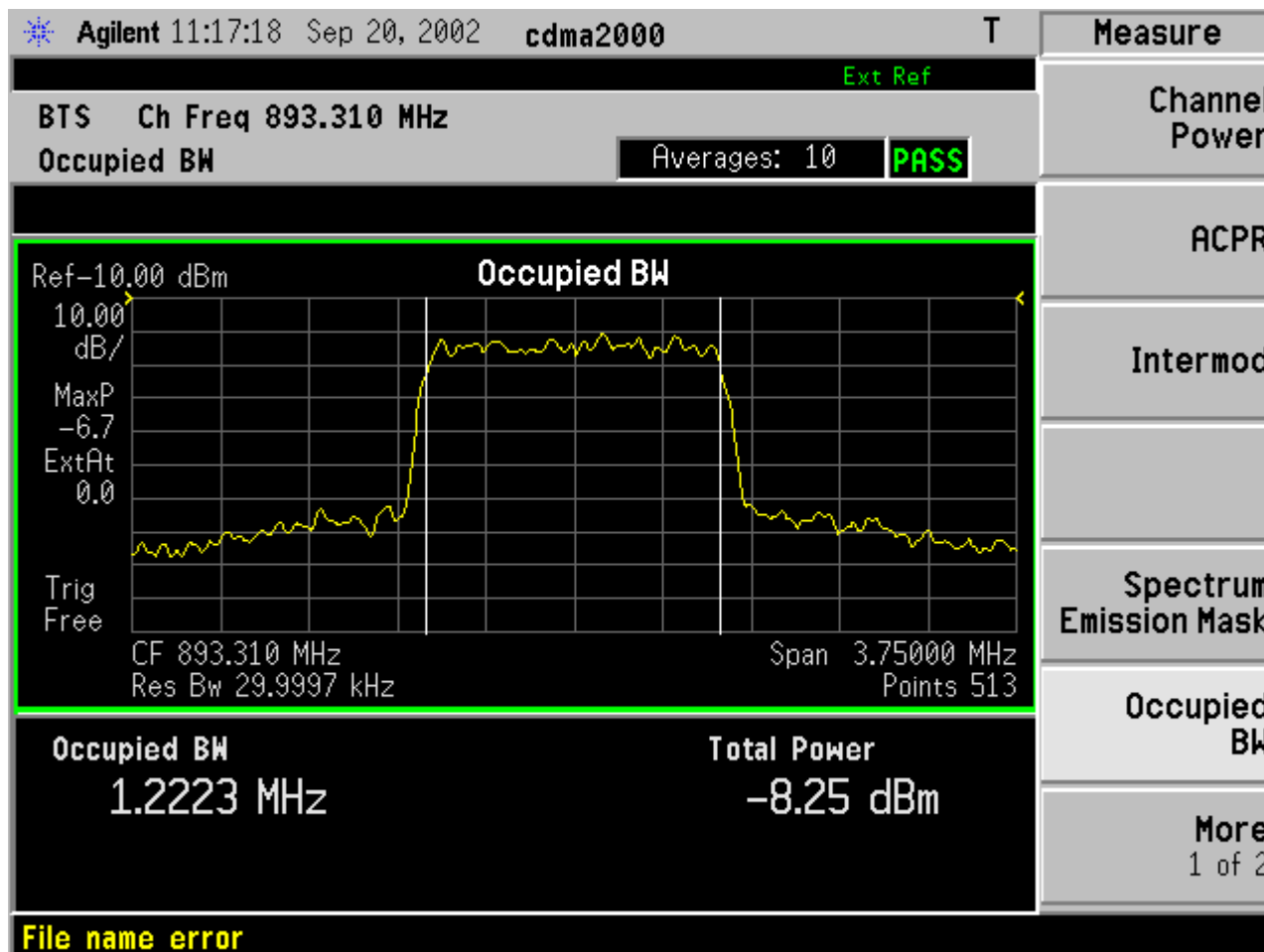
Channel Power Bandwidth: 1.30 MHz

Resolution Bandwidth: 30 KHz

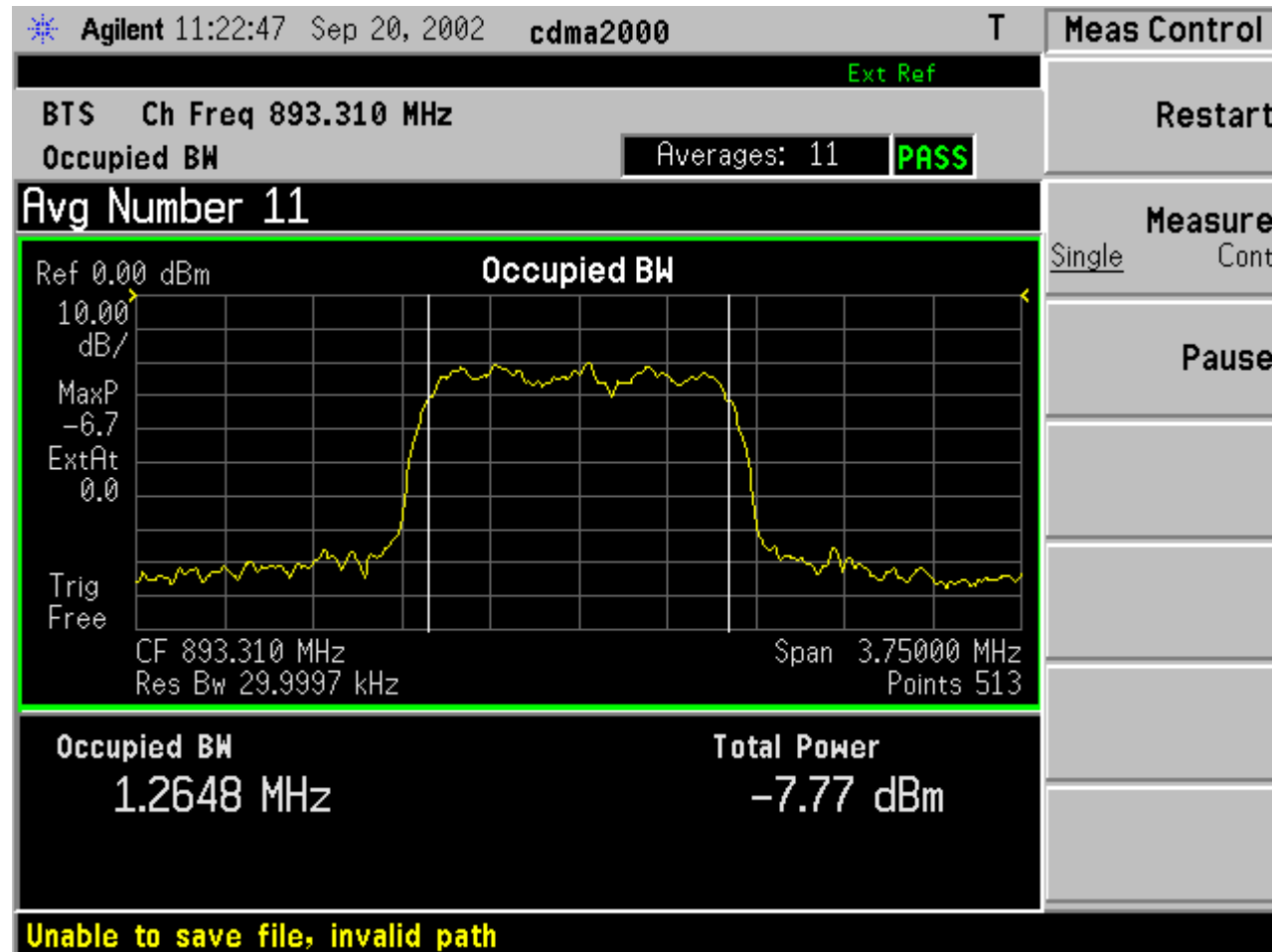
Record the Channel Power Measurements.

Repeat the procedure with the CDMA signal power set to Minimum level.

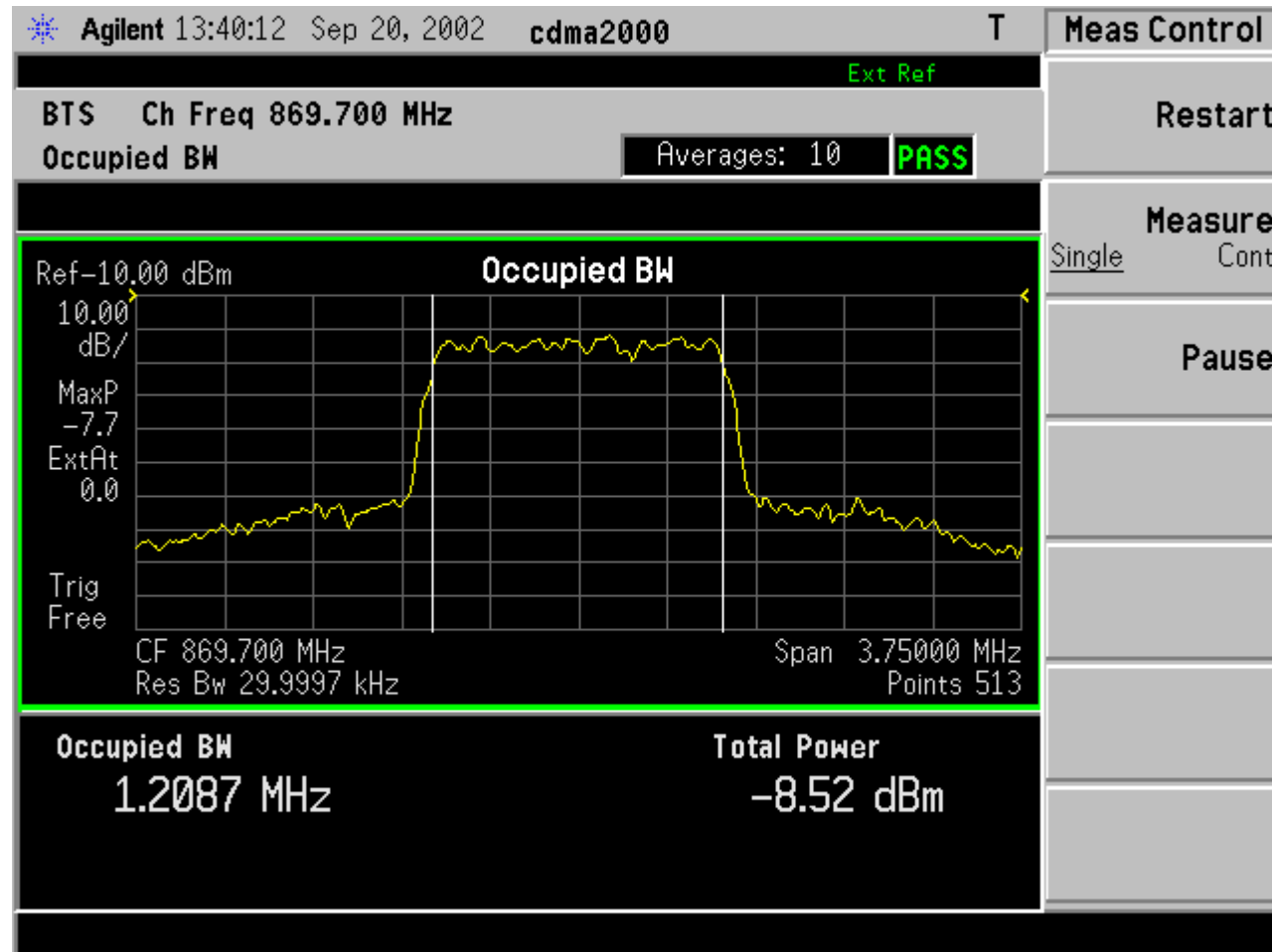
Measurements conducted with both long filter (LF) and short filter (SF).



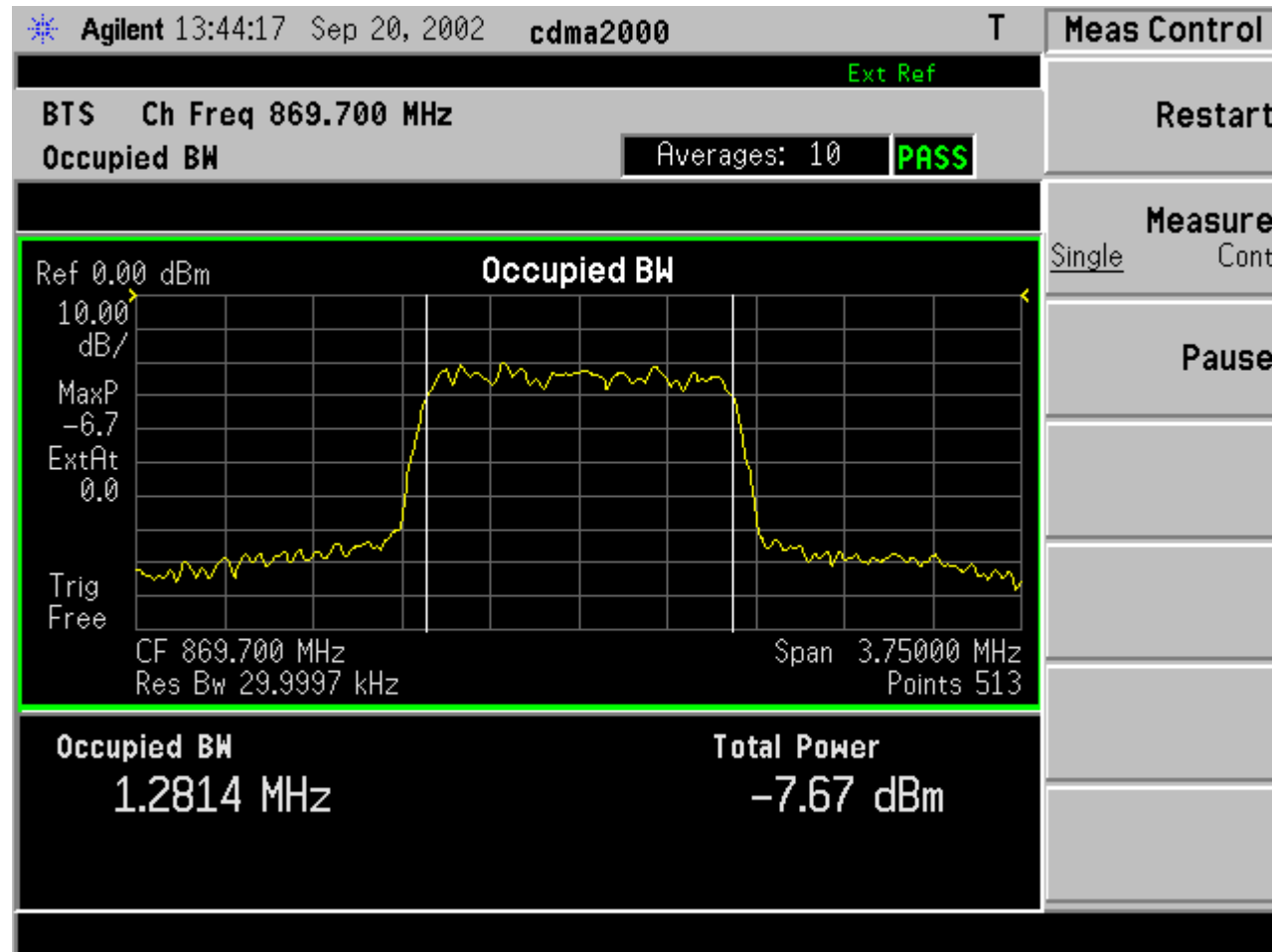
OBW 777 60W LF



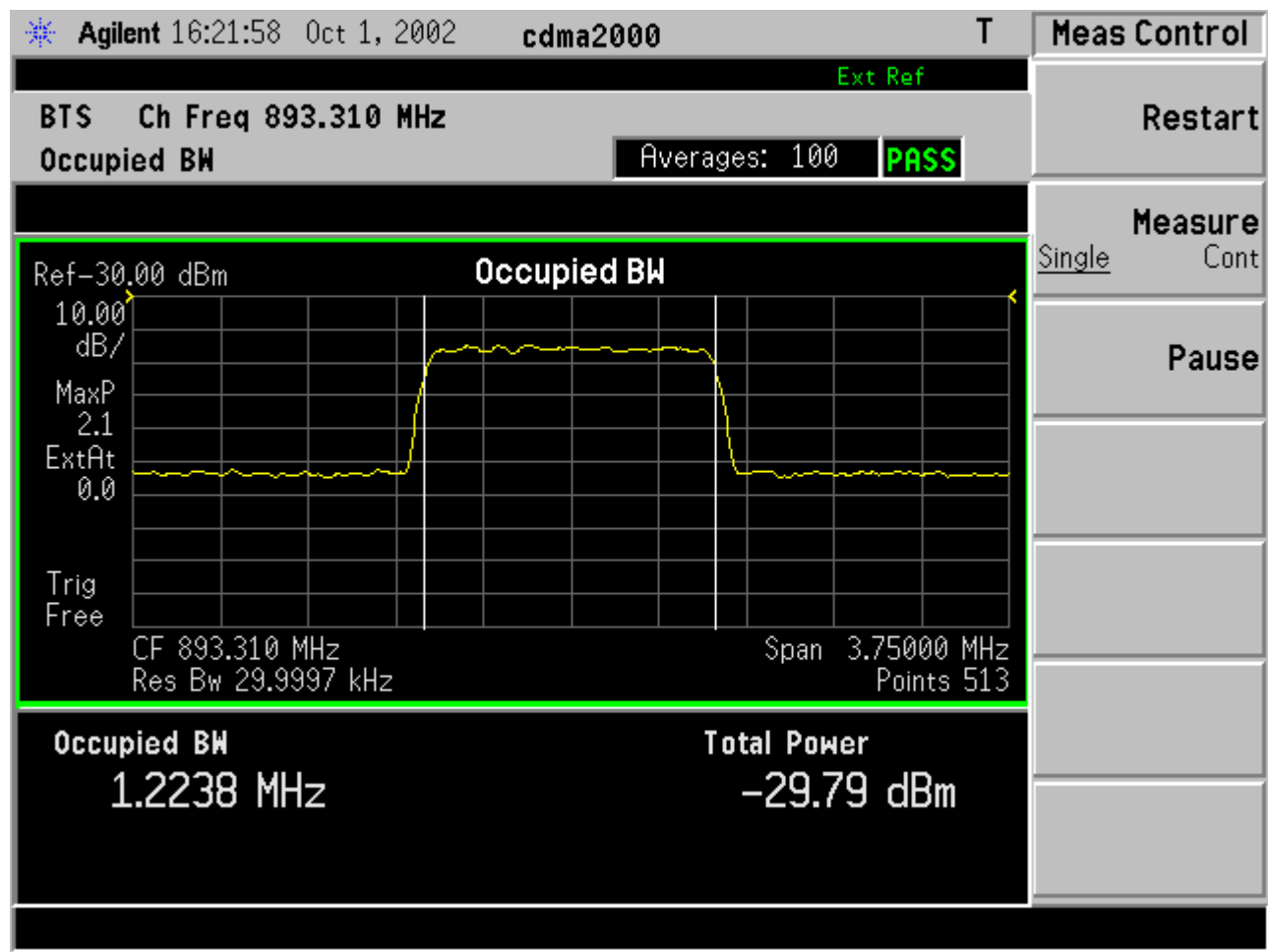
OBW 777 60W SF



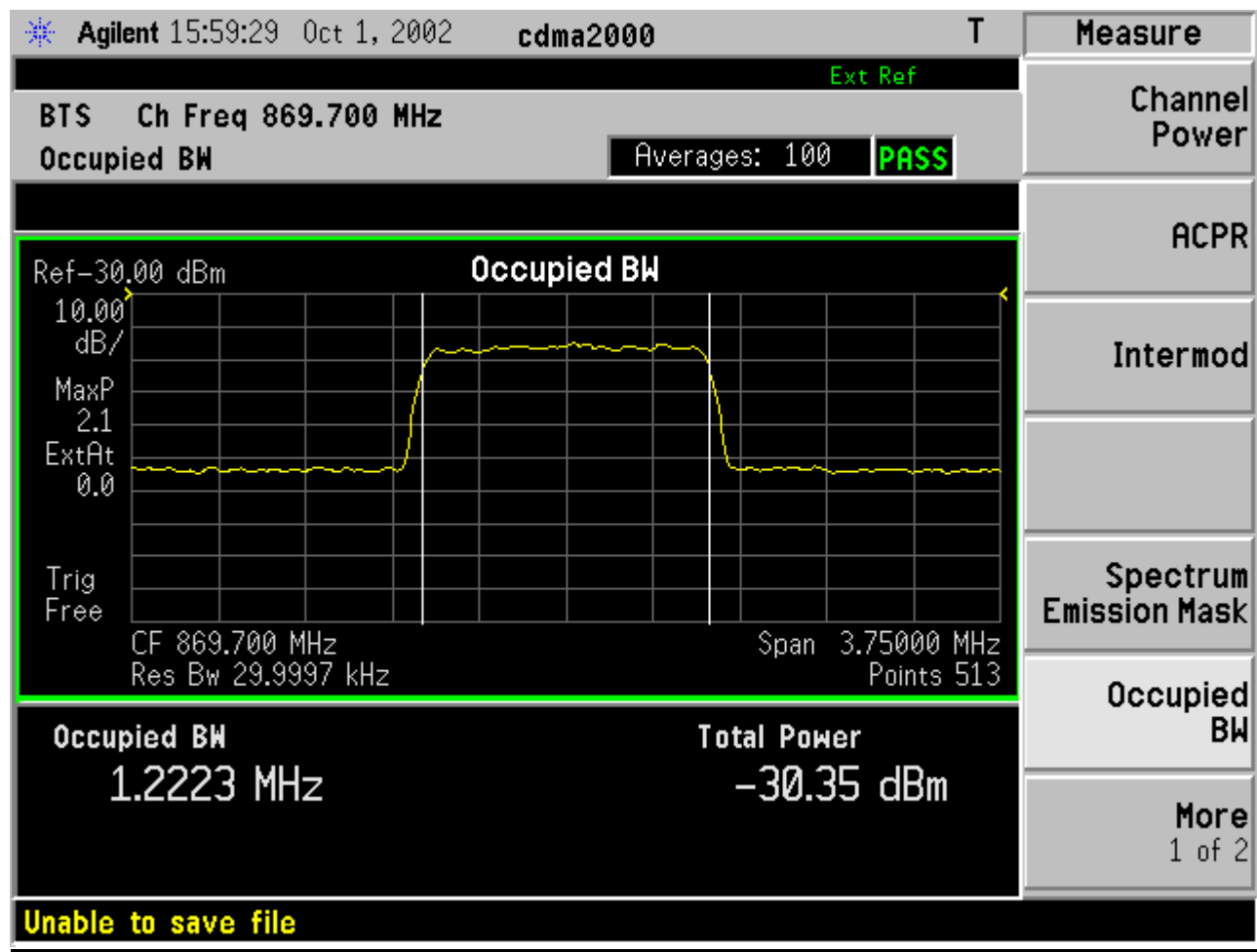
OBW 1013 60W LF



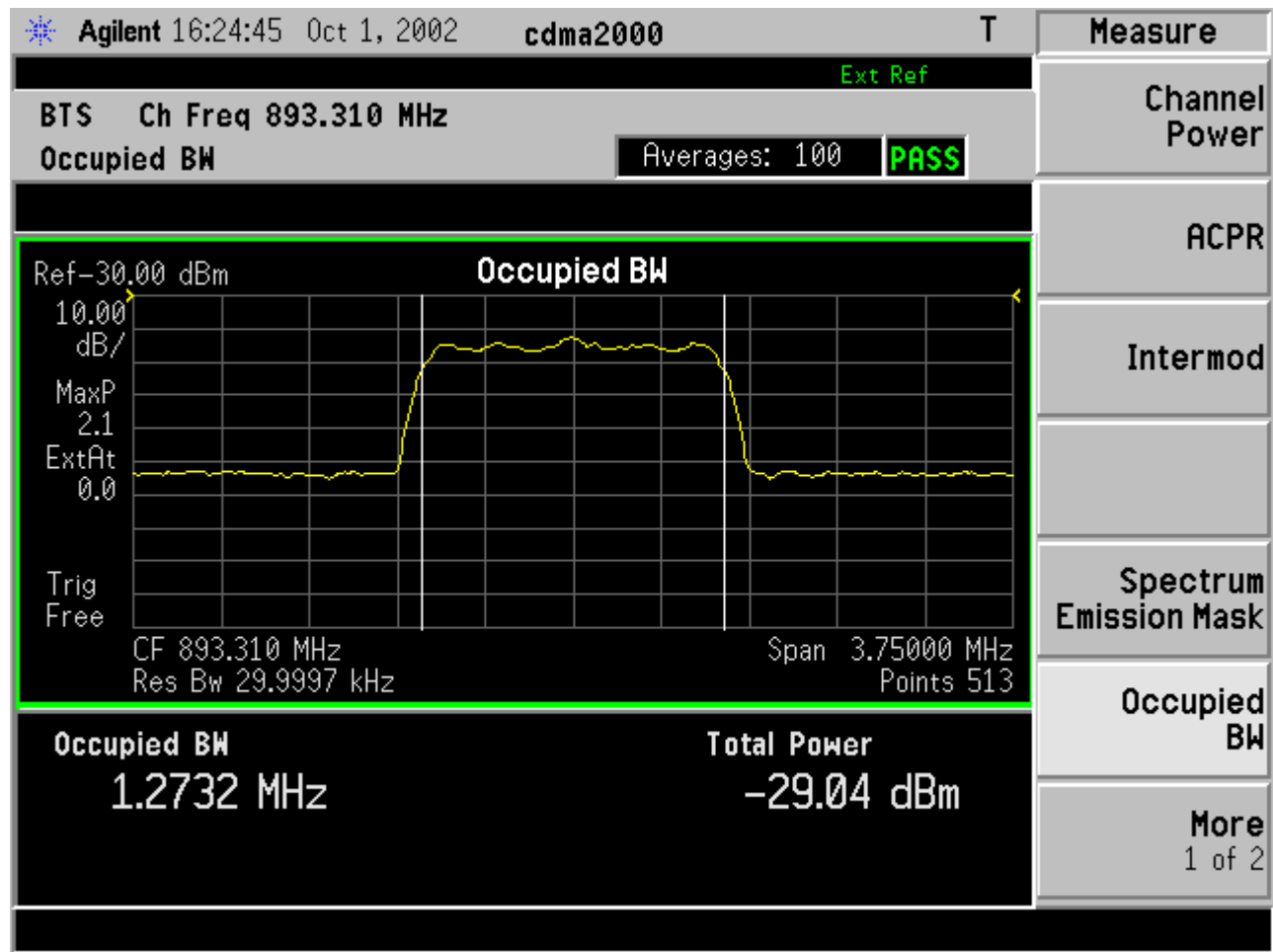
OBW 1013 60W SF



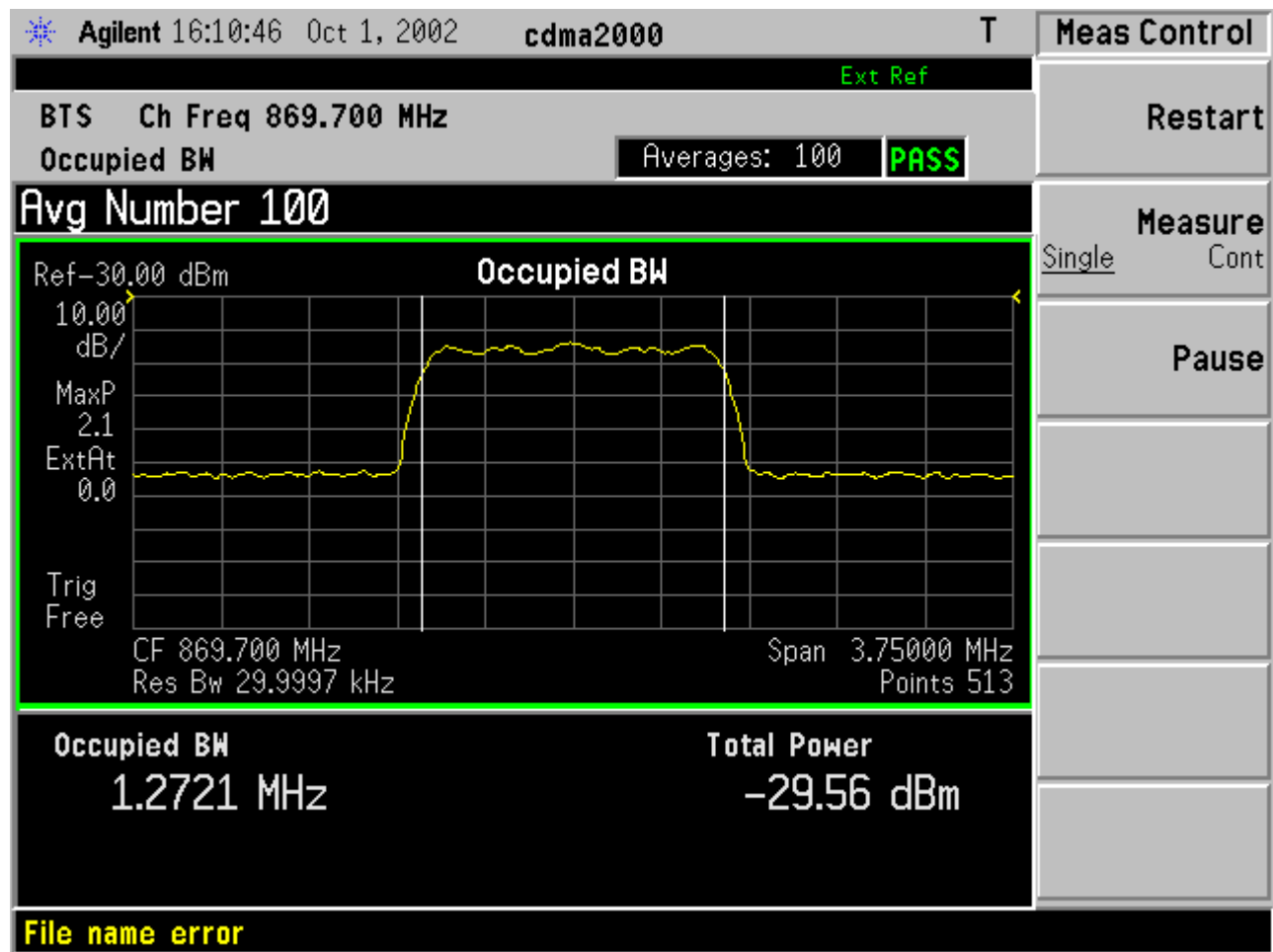
OBW 777 400mW LF



OBW 1013 400mW LF



OBW 777 400mW SF



OBW 1013 400mW SF

## UNDERWRITERS LABORATORIES INC.

### Rho

Date Tested: 9-20-2002  
10-1, 4-2002

**Manufacturer** : Motorola CDMA Wireless products Customer Integration Engineering  
**Equipment Under Test** : SC4812ETL 800MHz Cellular Phone Base Station  
**Requirement** : CFR47 Part 22/24

Section 2.987(d) Measurements Required: **Modulation Characteristics**  
Waveform Quality ( $\rho$ )

#### DEFINITION

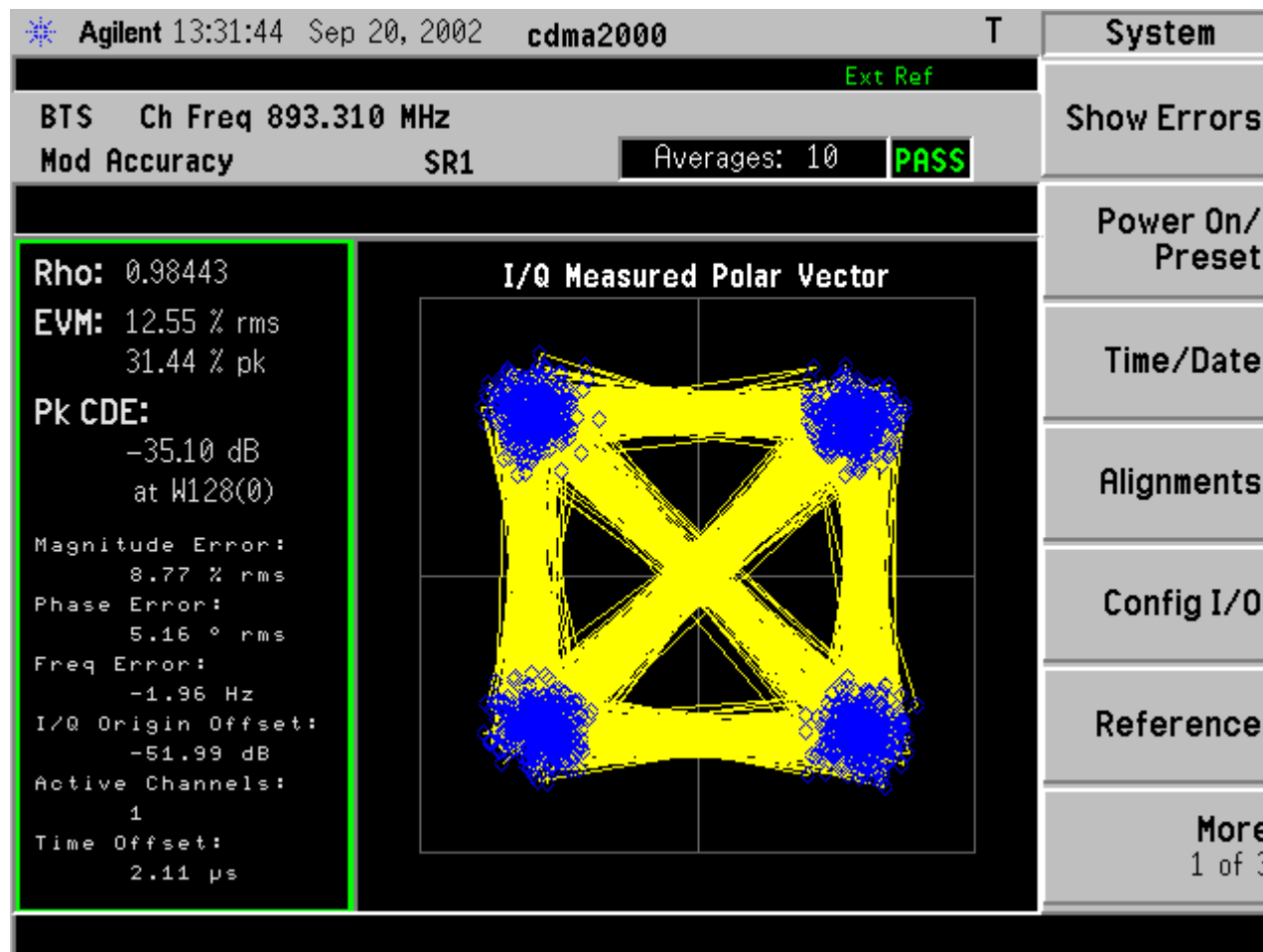
Transmit waveform quality is the normalized correlated power between the actual waveform and the ideal waveform. The range of values for the transmit waveform quality is from 1.0, a perfect CDMA waveform, to 0.0, a non-CDMA signal. As an example, a base station with a -0.4 dB degradation in its transmit waveform would have a quality ( $\rho$ ) of  $10^{(-0.4/10)} = 0.912$ .

#### MINIMUM STANDARD

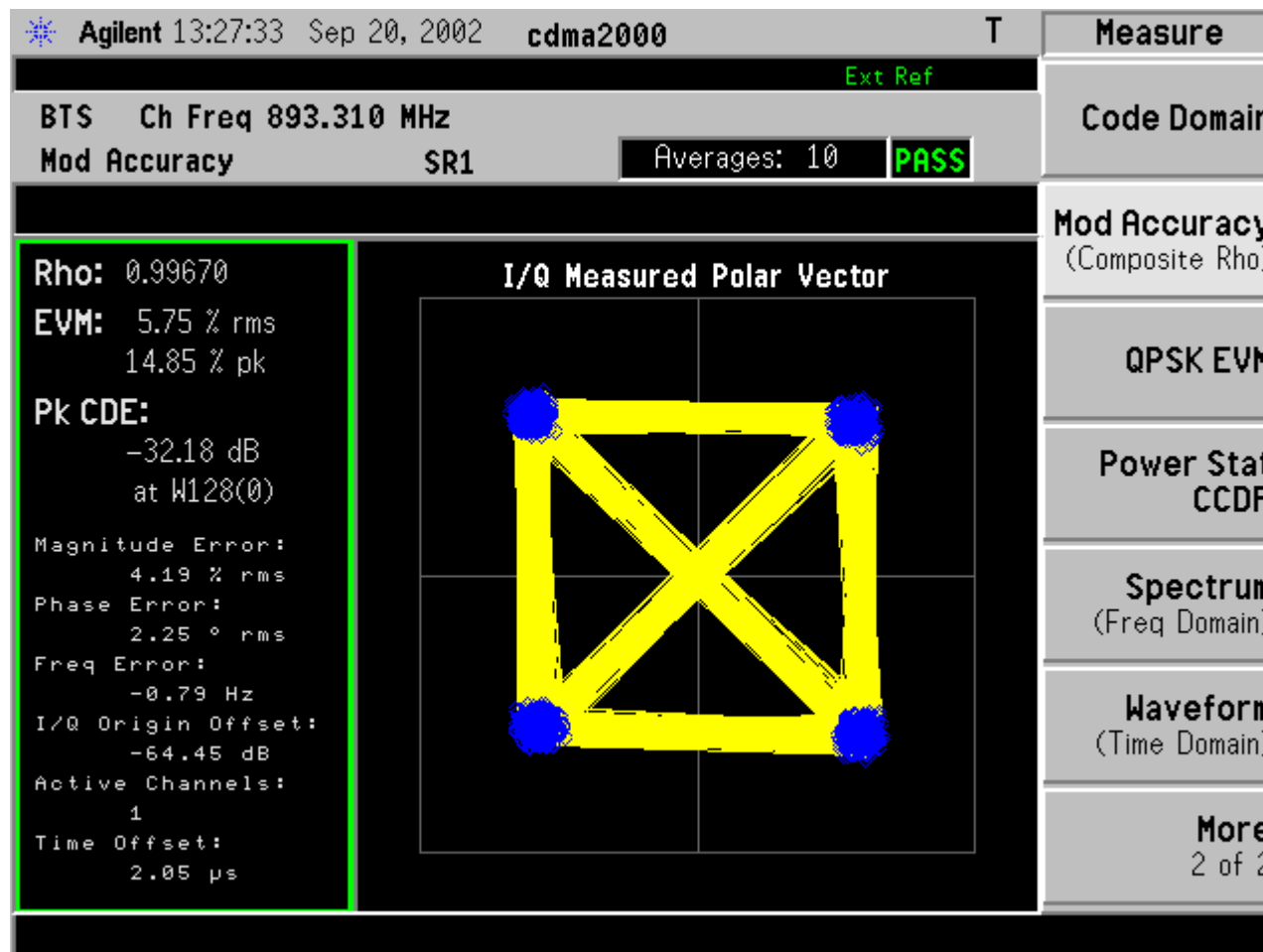
The minimum waveform quality figure for a spread-spectrum CDMA signal is -0.4 dB or 0.912 as measured with a Rho meter.

#### METHOD OF MEASUREMENT

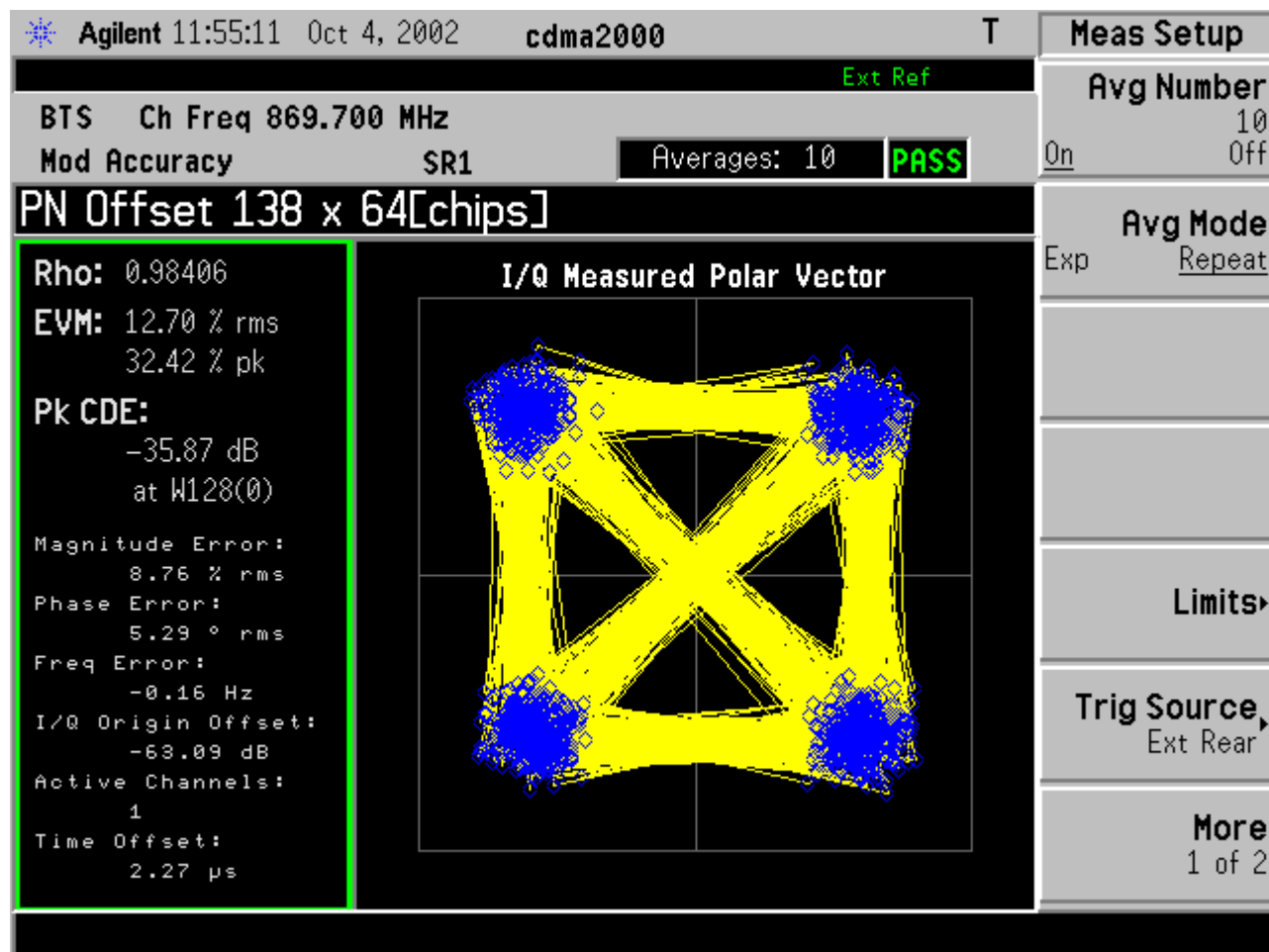
Set the pilot level to 20% of the CDMA Avg. power, and transmit the pilot signal only. Connect the Rho meter directly to the transmit port. On the CDMA Rho Meter, disable the RF generator and set the tuning mode to manual. Enter the base station's RF transmit frequency and set the input attenuation to hold. Set the input attenuation to 20 dB. Now, set the DSP Analyzer test mode to continuous and chose the Rho measurement as the measurement type. Set the channel to forward and choose amplitude middle as the trigger qualifier. Set the gain to 0 dB. Set the reference frequency to 19.6608 MHz. Select internal to lock-on to the CDMA time base reference. Read the measured value for Rho on the Rho meter.  
Measurements conducted with both long filter (LF) and short filter (SF).



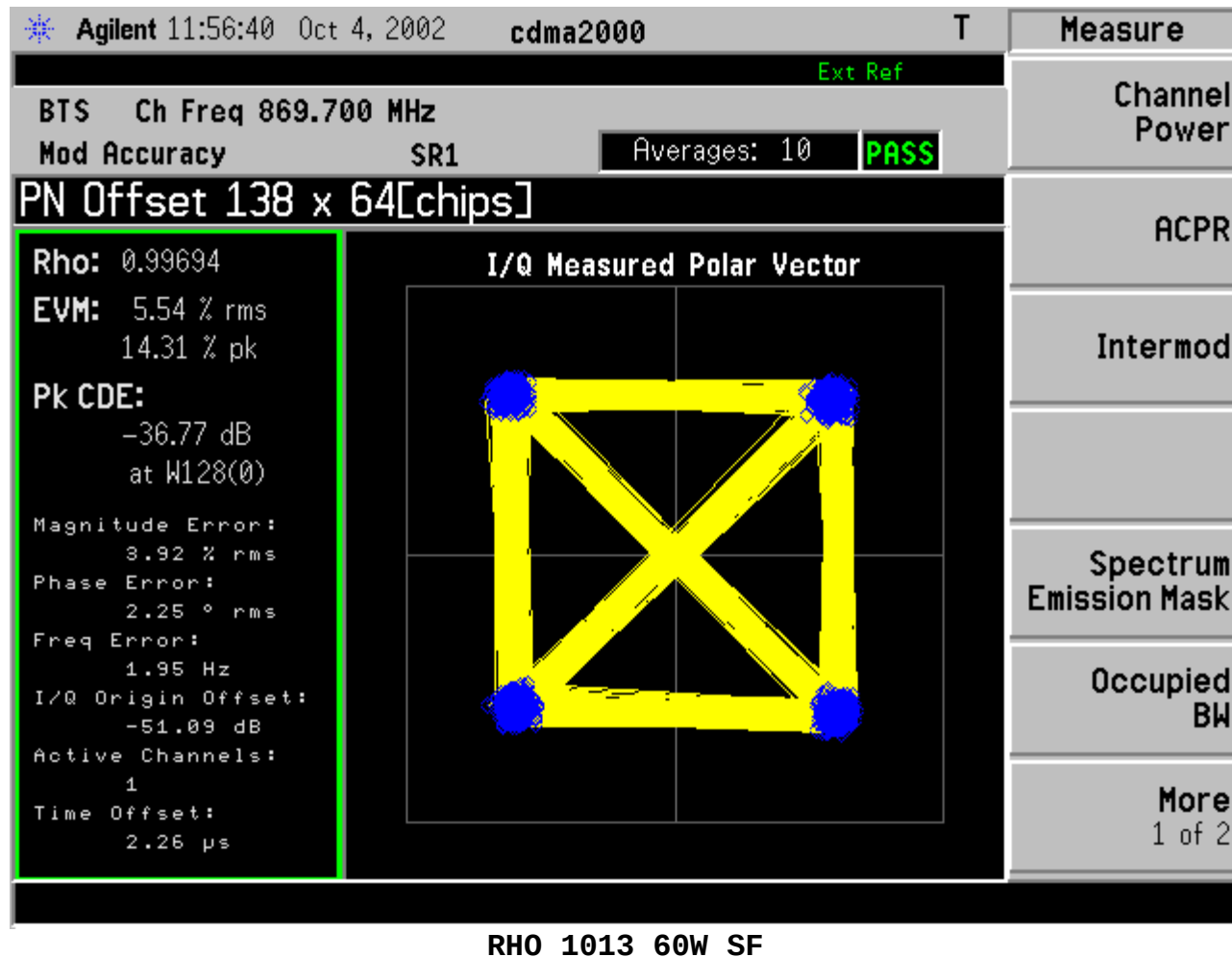
RHO 777 60W LF

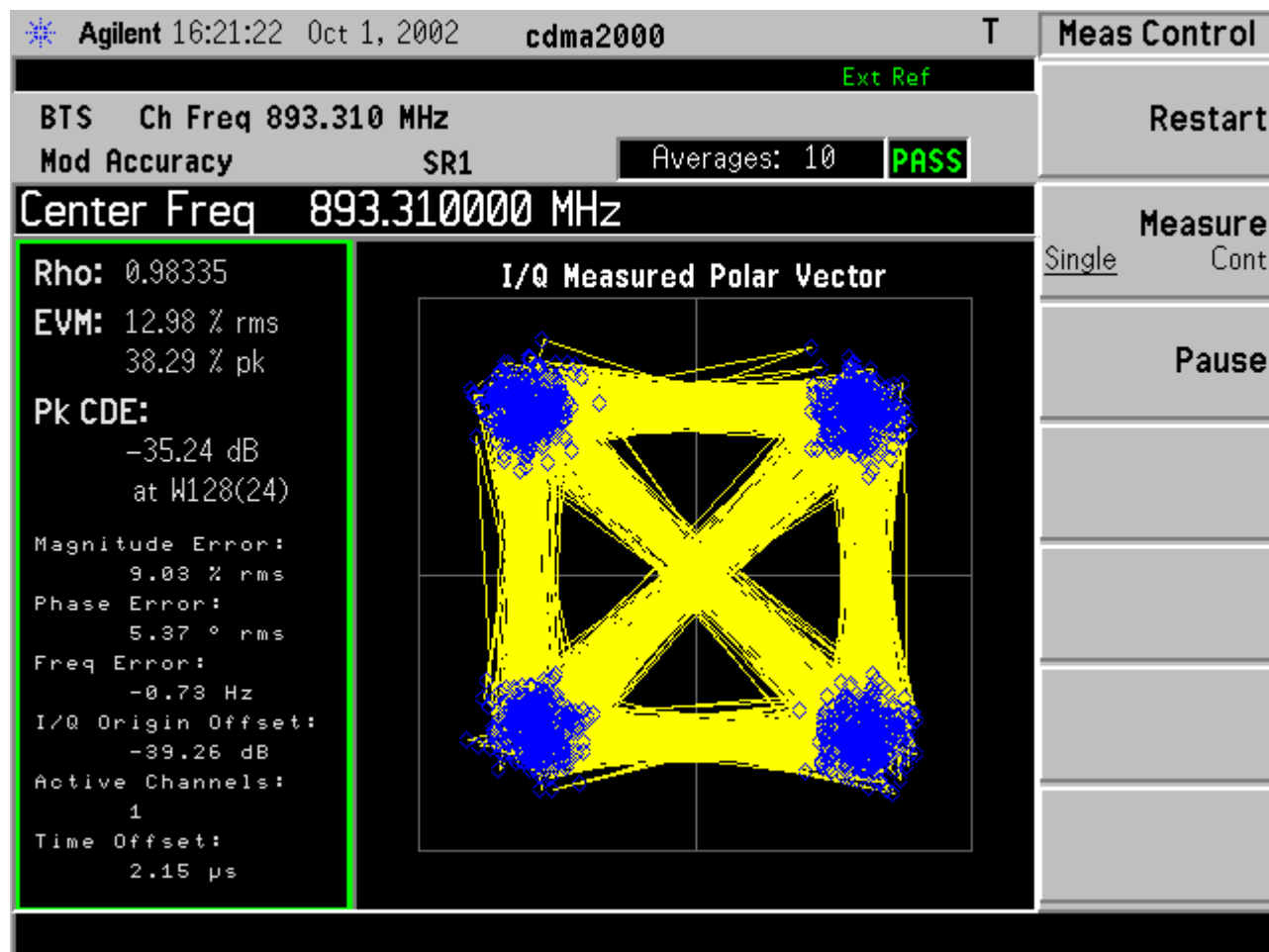


RHO 777 60W SF

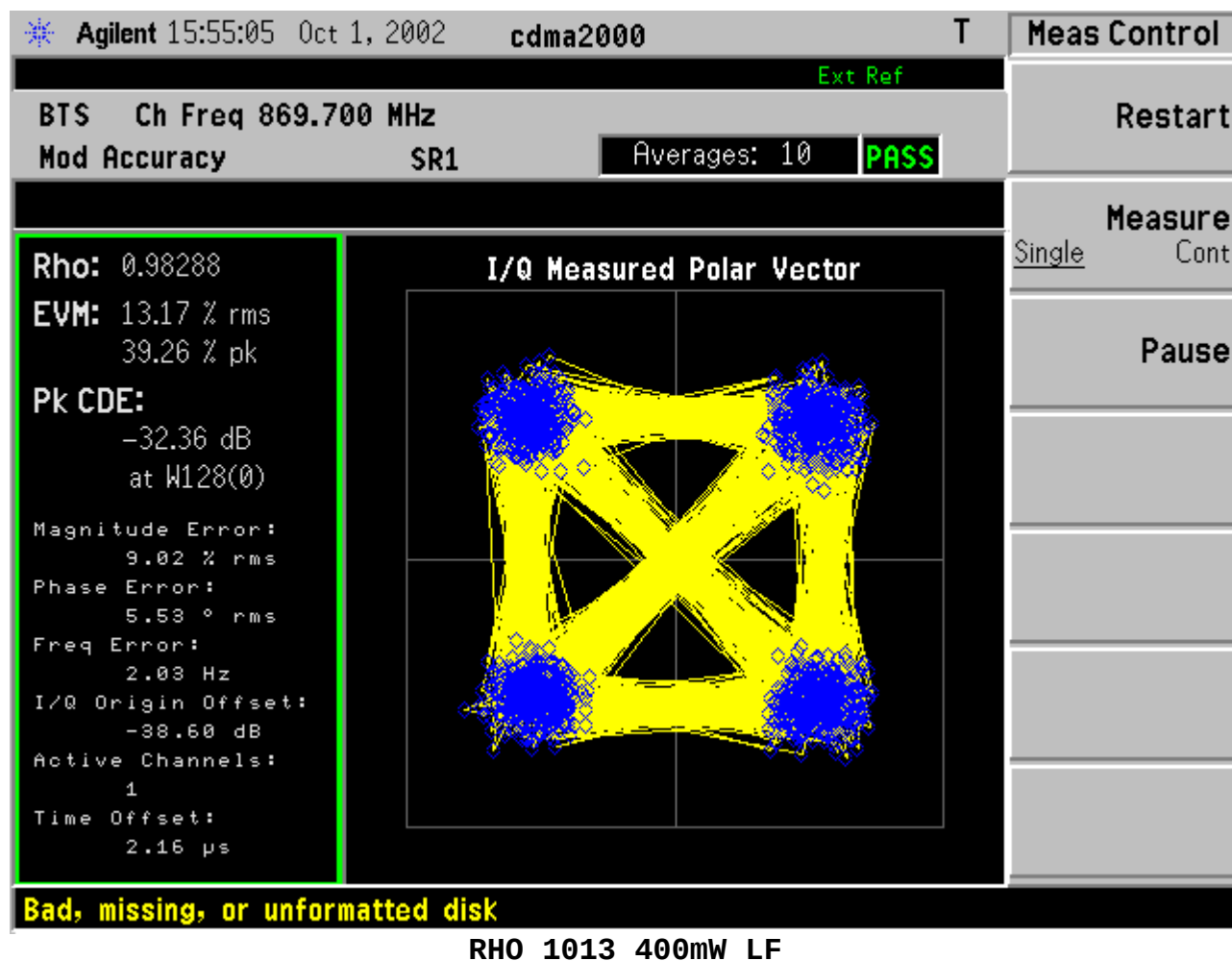


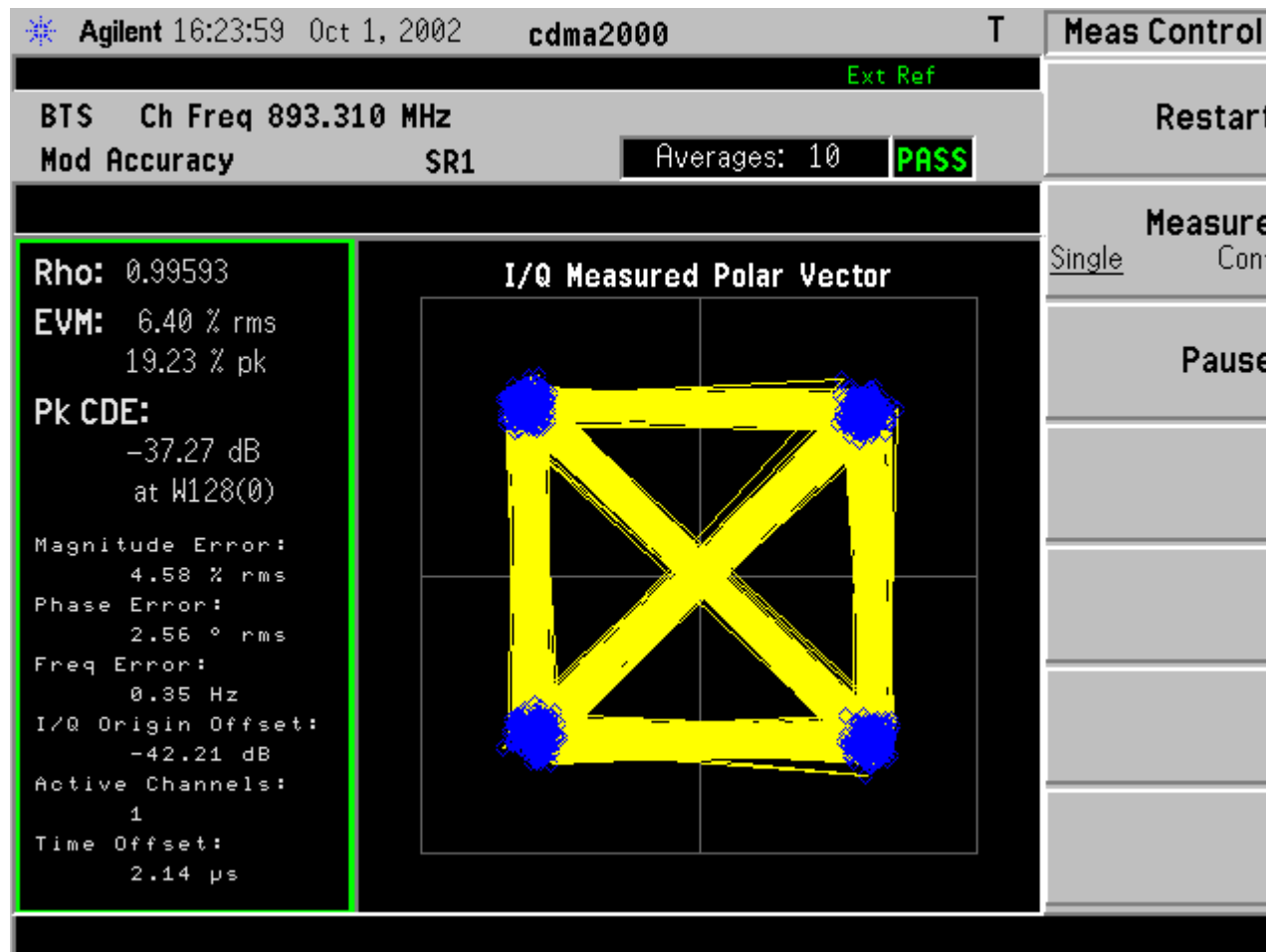
RHO 1013 60W LF



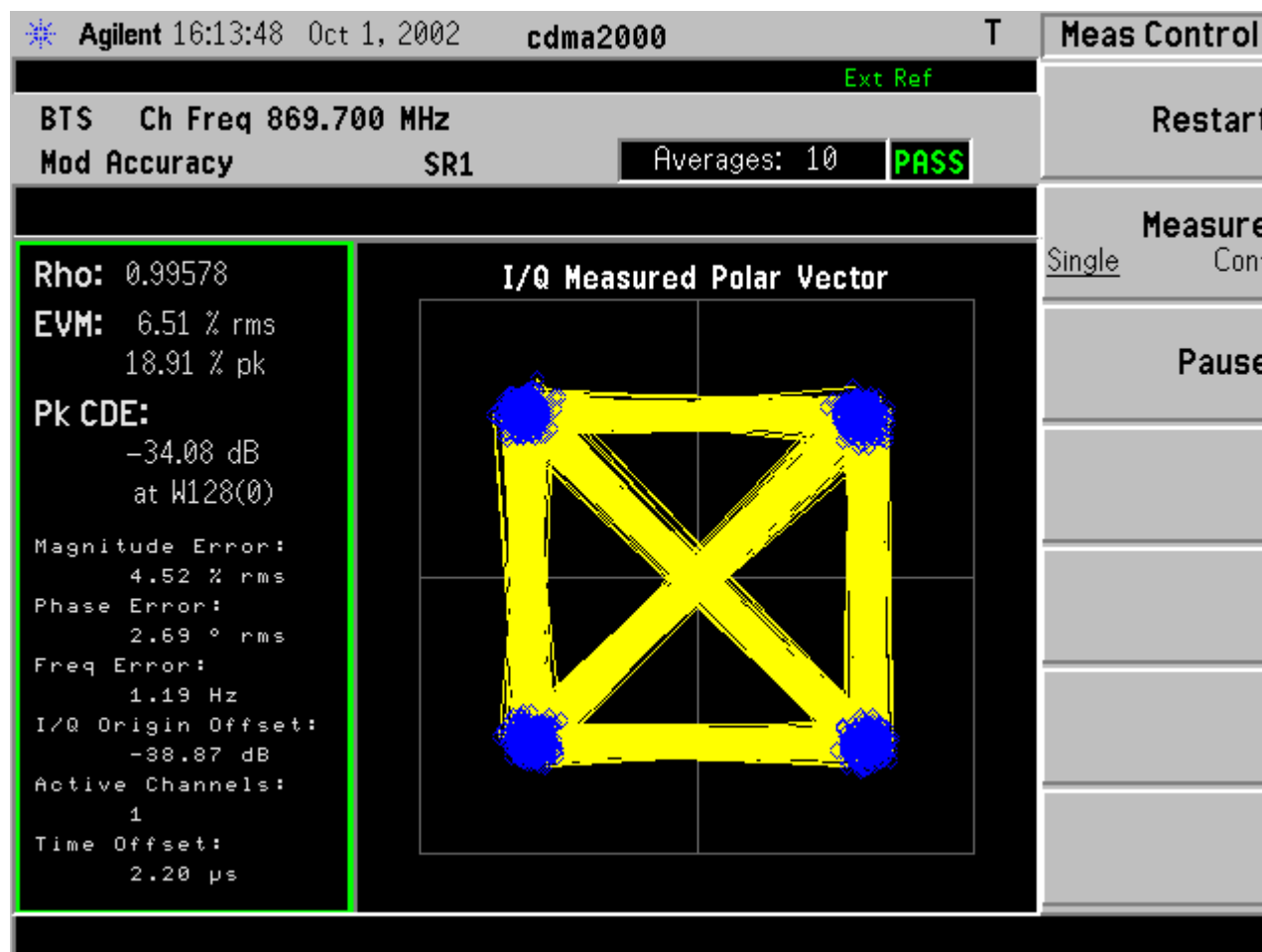


RHO 777 400mW LF





RHO 777 400mW SF



RH0 1013 400mW SF

## APPENDIX C

### Sample Calculations

Per 22.917 (b) (2) any frequency removed from the carrier was attenuated below the mean power of the unmodulated carrier wave by  $43+10\log P$  (dBc) as follows:

#### Low Power

$$P = 400\text{mW} = 0.4\text{W} = 26\text{dBm} = 133\text{dB}\mu\text{V}$$

$$43 + 10\log(0.4) = 39\text{dB}$$

$$\text{Limit} = 26\text{dBm} - 39\text{dB} = -13\text{dBm} = 94\text{dB}\mu\text{V}$$

#### High Power

$$P = 60\text{W} = 47.78\text{dBm} = 154.78\text{dB}\mu\text{V}$$

$$43 + 10\log(60) = 60.78\text{dB}$$

$$\text{Limit} = 47.78\text{dBm} - 60.78\text{dB} = -13\text{dBm} = 94\text{dB}\mu\text{V}$$

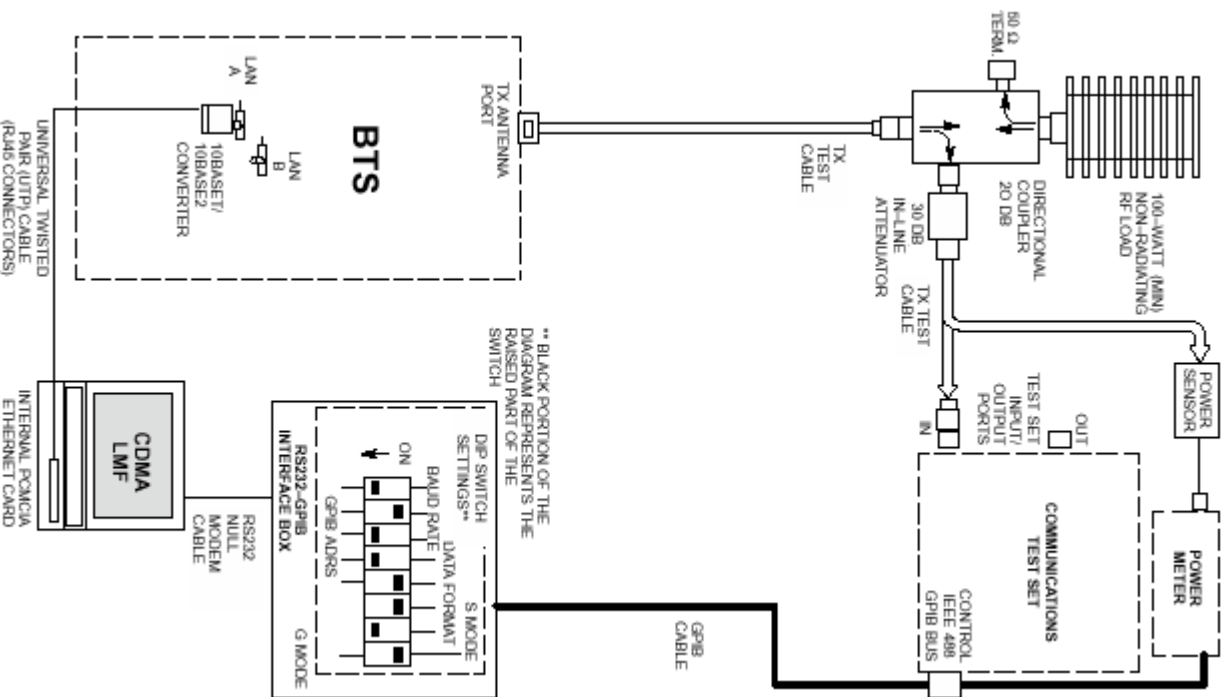
## APPENDIX D

### Transmit Power, Occupied Bandwidth or RHO

#### TEST SET-UP

The following test set-up below was used either to test for Transmit Power, Occupied Bandwidth or RHO. The BTS was configured for maximum power out of 47.78 dBm and minimum power out of 26.0 dBm respectively. The output power was set respectively to 60.0 Watts or 400 mWatts using an HP437B power meter.

#### Transmit Power Out, Occupied Bandwidth and RHO TEST SET-UP



## Conducted Spurious and Harmonic Emissions

NOTE: In Band Spurious Emissions plots are measured in a 100 kHz resolution bandwidth. The following formula is used to obtain the correct zero dB reference point relative to the bandwidth of the 1.2288 MHz CDMA signal.

Power (measured in 100 kHz bandwidth) + 10 log (1.2288 MHz/ 100 kHz)

UL witnessed that the BTS was configured for maximum power out of 60.0 dBm and minimum power out of 26.0 dBm respectively.

The output power was set respectively to 60.0 Watts or 400 mWatts using an HP437B power meter.

NOTE: Out of Band Spurious and Harmonic Emissions plots are measured in a 1MHz resolution bandwidth.

## OCCUPIED BANDWIDTH

NOTE: The occupied bandwidth plots are measured in a 30 kHz resolution bandwidth. The following formula is used to obtain the correct zero dB reference point relative to the bandwidth of the 1.2288 MHz CDMA signal.

Power (measured in 30 kHz bandwidth) + 10 log (1.2288 MHz/ 30 kHz)

UL witnessed that the BTS was configured for maximum power out of 60.0 dBm and minimum power out of 26.0 dBm respectively.

The output power was set respectively to 60.0 Watts or 400 mWatts using an HP437B power meter.