

# RF TEST REPORT

Test item : Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth, WLAN and NFC  
Model No. : LG-E975, E975, LGE975  
Order No. : DEMC1208-01448  
Date of receipt : 2012-08-10  
Test duration : 2012-09-01 ~ 2012-09-06  
Date of issue : 2012-10-04  
Use of report : FCC Original Grant

Applicant : LG Electronics MobileComm U.S.A., Inc.  
1000 Sylvan Avenue, Englewood Cliffs NJ 07632

Test laboratory : Digital EMC Co., Ltd.  
683-3, Yubang-Dong, Cheoin-Gu, Yongin-Si, Kyunggi-Do, 449-080, Korea

Test specification : FCC Part 15.225 Subpart C

Test environment : See appended test report

Test result : ☒ Pass ☐ Fail

The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose. This test report shall not be reproduced except in full, without the written approval of DIGITAL EMC CO., LTD.

Tested by:



Engineer  
J.J.LEE

Witnessed by:

N/A

Reviewed by:



Technical Director  
Harvey Sung

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## 1. Equipment information

### 1.1 Equipment description

|                          |                                                                |
|--------------------------|----------------------------------------------------------------|
| FCC Equipment Class      | Low Power Communications Device Transmitter(DXX)               |
| Equipment type           | Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth, WLAN and NFC  |
| Equipment model name     | LG-E975                                                        |
| Equipment add model name | E975, LGE975                                                   |
| Equipment serial no.     | Identical prototype                                            |
| Frequency band           | 13.56MHz                                                       |
| Modulation type          | ASK                                                            |
| Channel                  | 1                                                              |
| Power                    | Li-ion polymer Battery: DC 3.8V<br>AC-DC Adaptor: AC 120V 60Hz |
| Antenna type             | Loop Antenna                                                   |

### 1.2 Ancillary equipment

| Equipment | Model No. | Serial No. | Manufacturer | Note |
|-----------|-----------|------------|--------------|------|
| -         | -         | -          | -            | -    |
| -         | -         | -          | -            | -    |

## 2. Information about test items

### 2.1 Test mode

|                  |                              |
|------------------|------------------------------|
| <b>Test mode</b> | Continuous transmitting mode |
|------------------|------------------------------|

Note: For this test mode, a test program was supported by manufacturer.

### 2.2 Auxiliary equipment

| Equipment | Model No. | Serial No. | Manufacturer | Note |
|-----------|-----------|------------|--------------|------|
| -         | -         | -          | -            | -    |
| -         | -         | -          | -            | -    |

### 2.3 Tested frequency

|                        | TX Frequency (MHz) | RX Frequency (MHz) |
|------------------------|--------------------|--------------------|
| <b>Lowest Channel</b>  | 13.56              | 13.56              |
| <b>Middle Channel</b>  | -                  | -                  |
| <b>Highest Channel</b> | -                  | -                  |

### 2.4 Tested environment

|                                  |                                     |
|----------------------------------|-------------------------------------|
| <b>Temperature</b>               | : 23 ~ 26 °C                        |
| <b>Relative humidity content</b> | : 50 ~ 60 % R.H.                    |
| <b>Details of power supply</b>   | : Battery: DC 3.8 V<br>AC 120V 60Hz |

### 2.5 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing  
→ None

### 3. Test Report

#### 3.1 Summary of tests

| FCC Part Section(s)                                                                            | Parameter                     | Limit                                                                                                        | Test Condition    | Status Note 1 |
|------------------------------------------------------------------------------------------------|-------------------------------|--------------------------------------------------------------------------------------------------------------|-------------------|---------------|
| <b>I. Test Items</b>                                                                           |                               |                                                                                                              |                   |               |
| 2.1049                                                                                         | 20 dB Bandwidth               | N/A                                                                                                          | Radiated          | <b>C</b>      |
| 15.225 (a)                                                                                     | In-Band Emissions             | 15,848 $\mu V/m$ @ 30m<br>15.553 – 13.567 MHz                                                                |                   | <b>C</b>      |
| 15.225 (b)                                                                                     | In-Band Emissions             | 334 $\mu V/m$ @ 30m<br>13.410 – 13.553 MHz<br>13.567 – 13.710 MHz                                            |                   | <b>C</b>      |
| 15.225 (c)                                                                                     | In-Band Emissions             | 106 $\mu V/m$ @ 30m<br>13.110 – 13.410 MHz<br>13.710 – 14.010 MHz                                            |                   | <b>C</b>      |
| 15.225 (d)<br>15.205<br>15.209                                                                 | Out-of Band Emissions         | Emissions outside of the specified band (13.110-14.010 MHz) must meet the radiated limits detailed in 15.209 |                   | <b>C</b>      |
| 15.225 (e)                                                                                     | Frequency Stability Tolerance | $\pm 0.01\%$ of operating frequency                                                                          | Conducted         | <b>C</b>      |
| 15.207                                                                                         | AC Conducted Emissions        | EN 55022                                                                                                     | AC Line Conducted | <b>C</b>      |
| 15.203                                                                                         | Antenna requirements          | FCC Part 15.203                                                                                              | -                 | <b>C</b>      |
| Note 1: <b>C</b> =Comply <b>NC</b> =Not Comply <b>NT</b> =Not Tested <b>NA</b> =Not Applicable |                               |                                                                                                              |                   |               |

The sample was tested according to the following specification:  
ANSI C-63.4-2003

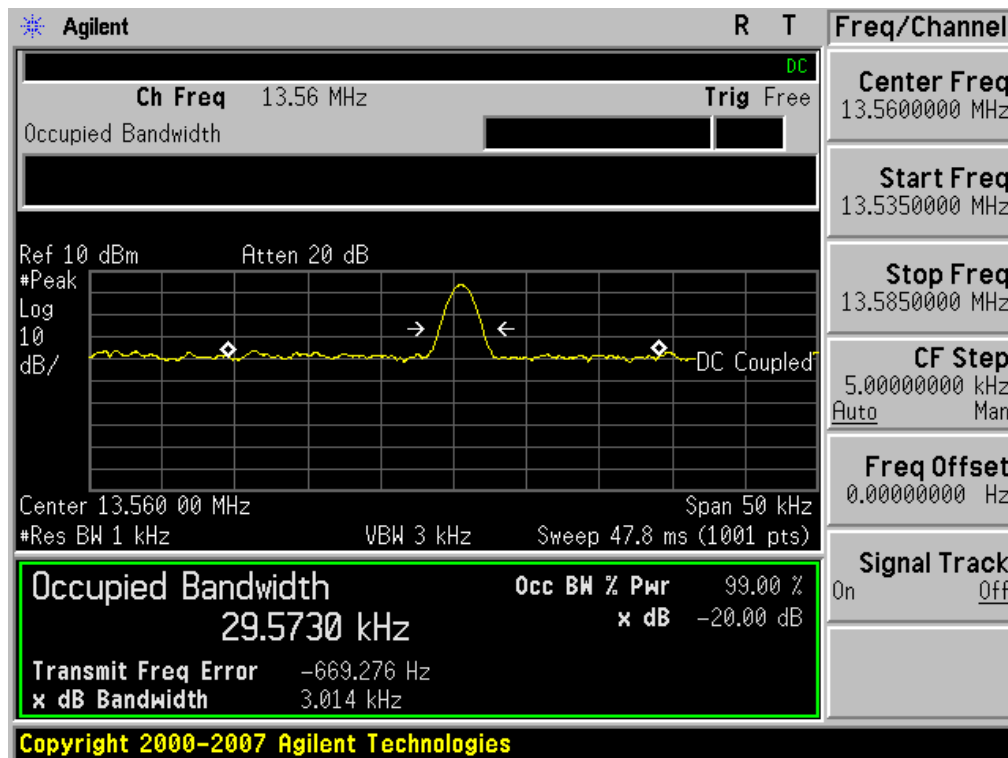
## 3.2 Transmitter requirements

### 3.2.1 20dB Bandwidth Measurement

**- Procedure:**

The 20dB Bandwidth is measured with a spectrum analyzer connected via a receive antenna placed near the EUT while the EUT is operating in transmission mode.

**- Measurement Data: Comply**



**- Minimum Standard: Part 2.1049**

None

**3.2.2 In-Band Radiated Spurious Emission****- Procedure:**

The EUT was placed on a 0.8m high wooden table inside a 10m semi anechoic chamber. An antenna was placed at 3 m distance from the EUT. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions. A loop antenna was used for this test item. And this test item was performed for both vertical and horizontal polarization.

**- Measurement Data: Comply**

| Test Frequency Band [MHz] | Freq. [MHz] | EUT Posi. | Reading Level [dBuV] | T.F    | Field Strength @3m [dBuV/m] | Field Strength @30m [dBuV/m] | Limit [dBuV/m] | Margin [dB] |
|---------------------------|-------------|-----------|----------------------|--------|-----------------------------|------------------------------|----------------|-------------|
| 13.110 ~ 13.410           | 13.349      | Z         | 43.40                | -13.90 | 29.50                       | -10.50                       | 40.51          | 51.01       |
| 13.410 ~ 13.553           | 13.553      | Z         | 53.70                | -14.00 | 39.70                       | -0.30                        | 50.47          | 50.77       |
| 13.553 ~ 13.567           | 13.560      | Z         | 59.00                | -14.00 | 45.00                       | 5.00                         | 84.00          | 79.00       |
| 13.567 ~ 13.710           | 13.569      | Z         | 52.40                | -14.00 | 38.40                       | -1.60                        | 50.47          | 52.07       |
| 13.710 ~ 14.010           | 13.773      | Z         | 50.20                | -14.00 | 36.20                       | -3.80                        | 40.51          | 44.31       |

**Note 1.** This test item was performed using a loop antenna.

**Note 2.** This test item was performed at 3m and the data were extrapolated to the specified measurement distance of 30m using the square of an inverse linear distance extrapolation factor (40 dB/decade) as specified in §15.31(f)2.

▪ Extrapolation Factor =  $20 \log_{10}(30/3)^2 = 40\text{dB}$

**Note 3.** All data were recorded using a spectrum analyzer employing a peak detector.

If PK results were meet Quasi-peak limit, Quasi-peak measurements were omitted.

**Note 4.** Sample Calculation.

Margin = Limit – Field Strength @ 30m     /     Field Strength @ 30m = Field Strength @ 3m – 40

Field Strength @ 3m = Reading + T.F     /     T.F = AF + CL – AG

Where, T.F = Total Factor,     AF = Antenna Factor,     CL = Cable Loss,     AG = Amplifier Gain

**- Minimum Standard: Part 15.225(a), (b), (c)**

| Frequency Band [MHz]           | Limit  |          |
|--------------------------------|--------|----------|
|                                | [uV/m] | [dBuV/m] |
| 13.553-13.567                  | 15,848 | 84.00    |
| 13.410-13.553<br>13.567-13.710 | 334    | 50.47    |
| 13.110-13.410<br>13.710-14.010 | 106    | 40.51    |

**3.2.3 Radiated Spurious Emission Measurements, Out-of-Band****- Procedure:**

The EUT was tested from 9kHz up to the 1GHz excluding the band 13.110-14.010MHz. All measurements were recorded with spectrum analyzer employing a peak detector for emissions below 30MHz. Above 30MHz a Quasi-peak detector was used. All out-of-band emissions must not exceed the limits §15.209. A loop antenna was used for searching for emissions below 30MHz.

**- Measurement Data: Comply** (refer to the next page)**- Minimum Standard: Part 15. 205, 209, 225(d)****• FCC Part 15.205 (a):** Only spurious emissions are permitted in any of the frequency bands listed below:

| MHz               | MHz                 | MHz                   | MHz             | GHz          | GHz           |
|-------------------|---------------------|-----------------------|-----------------|--------------|---------------|
| 0.009 ~ 0.110     | 8.41425 ~ 8.41475   | 108 ~ 121.94          | 1300 ~ 1427     | 3.6 ~ 4.4    | 14.47 ~ 14.5  |
| 0.495 ~ 0.505     | 12.29 ~ 12.293      | 123 ~ 138             | 1435 ~ 1626.5   | 4.5 ~ 5.15   | 15.35 ~ 16.2  |
| 2.1735 ~ 2.1905   | 12.51975 ~ 12.52025 | 149.9 ~ 150.05        | 1645.5 ~ 1646.5 | 5.35 ~ 5.46  | 17.7 ~ 21.4   |
| 4.125 ~ 4.128     | 12.57675 ~ 12.57725 | 156.52475 ~ 156.52525 | 1660 ~ 1710     | 7.25 ~ 7.75  | 22.01 ~ 23.12 |
| 4.17725 ~ 4.17775 | 13.36 ~ 13.41       | 156.7 ~ 156.9         | 1718.8 ~ 1722.2 | 8.025 ~ 8.5  | 23.6 ~ 24.0   |
| 4.20725 ~ 4.20775 | 16.42 ~ 16.423      | 162.0125 ~ 167.17     | 2200 ~ 2300     | 9.0 ~ 9.2    | 31.2 ~ 31.8   |
| 6.215 ~ 6.218     | 16.69475 ~ 16.69525 | 167.72 ~ 173.2        | 2310 ~ 2390     | 9.3 ~ 9.5    | 36.43 ~ 36.5  |
| 6.26775 ~ 6.26825 | 16.80425 ~ 16.80475 | 240 ~ 285             | 2483.5 ~ 2500   | 10.6 ~ 12.7  | Above 38.6    |
| 6.31175 ~ 6.31225 | 25.5 ~ 25.67        | 322 ~ 335.4           | 2655 ~ 2900     | 13.25 ~ 13.4 |               |
| 8.291 ~ 8.294     | 37.5 ~ 38.25        | 399.90 ~ 410          | 3260 ~ 3267     |              |               |
| 8.362 ~ 8.366     | 73 ~ 74.6           | 608 ~ 614             | 3332 ~ 3339     |              |               |
| 8.37625 ~ 8.38675 | 74.8 ~ 75.2         | 960 ~ 1240            | 3345.8 ~ 3358   |              |               |

**• FCC Part 15.205(b):**

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

**• FCC Part 15.209(a):**

| Frequency [MHz] | Field Strength [uV/m] | Measurement Distance [Meters] |
|-----------------|-----------------------|-------------------------------|
| 0.009 ~ 0.490   | 2400/F(kHz)           | 300                           |
| 0.490 ~ 1.705   | 24000/F(kHz)          | 30                            |
| 1.705 ~ 30      | 30                    | 30                            |
| 30 ~ 88         | 100 **                | 3                             |
| 88 ~ 216        | 150 **                | 3                             |
| 216 ~ 960       | 200 **                | 3                             |
| Above 960       | 200                   | 3                             |

\*\* Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

**• FCC Part 15.209(b):**

In the emission table above, the tighter limit applies at the band edges.

**- Measurement Data:**

Tested Frequency : 13.56MHz  
 Measurement Distance : 3 Meters

| Frequency [MHz] | EUT Posi. | ANT Pol | Reading [dBuV] | T.F [dB/m] | Distance factor | Field Strength [dBuV/m] | Limit [dBuV/m] | Margin [dB] |
|-----------------|-----------|---------|----------------|------------|-----------------|-------------------------|----------------|-------------|
| 1.884           | Z         | H       | 46.20          | -12.50     | -40.00          | -6.30                   | 29.50          | 35.80       |
| 19.385          | Z         | H       | 35.20          | -13.70     | -40.00          | -18.50                  | 29.50          | 48.00       |
| 33.109          | Z         | V       | 30.20          | -5.20      | N/A             | 25.00                   | 40.00          | 15.00       |
| 591.169         | X         | H       | 19.80          | -2.10      | N/A             | 17.70                   | 46.00          | 28.30       |
| -               | -         | -       | -              | -          | -               | -                       | -              | -           |
| -               | -         | -       | -              | -          | -               | -                       | -              | -           |

**Note 1.** All measurements were recorded using a spectrum analyzer employing a peak detector for below 30MHz and a Quasi-peak detector for above 30MHz.

**Note 2.** Both Vertical and Horizontal polarities of the receiver antenna were evaluated with the worst case emissions being reported.

**Note 3.** No other spurious and harmonic emissions were reported greater than listed emissions above table.

**Note 4.** Sample calculation

Margin = Limit – Field Strength

Field Strength = Reading + T.F – Distance factor

T.F = AF + CL – AG

Distance factor =  $20\log(\text{Measurement distance} / \text{The measured distance})^2$

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

**3.2.4 Frequency Stability****- Procedure:**

Part 15.225 requires that devices operating in the 13.553 – 13.567 MHz shall maintain the carrier frequency within 0.01% of the operating frequency over the temperature variation of -20 degrees to + 50 degrees C at normal supply voltage.

**- Measurement Data: Comply**

Operating Frequency : 13,560,523 Hz

| VOLTAGE (%)   | POWER (VDC) | TEMP (°C) | Frequency (Hz) | Freq. Dev. (Hz) | Deviation (%) |
|---------------|-------------|-----------|----------------|-----------------|---------------|
| 100%          | 3.800       | +23(ref)  | 13,560,523     | 0               | 0.000000      |
| 100%          |             | -20       | 13,560,416     | -107            | -0.000789     |
| 100%          |             | -10       | 13,560,438     | -85             | -0.000627     |
| 100%          |             | 0         | 13,560,492     | -31             | -0.000229     |
| 100%          |             | +10       | 13,560,496     | -27             | -0.000199     |
| 100%          |             | +20       | 13,560,508     | -15             | -0.000111     |
| 100%          |             | +30       | 13,560,483     | -40             | -0.000295     |
| 100%          |             | +40       | 13,560,445     | -78             | -0.000575     |
| 100%          |             | +50       | 13,560,398     | -125            | -0.000922     |
| 85%           | 3.230       | +23       | 13,560,540     | 17              | 0.000125      |
| 115%          | 4.370       | +23       | 13,560,502     | -21             | -0.000155     |
| BATT.ENDPOINT | 3.200       | +23       | 13,560,553     | 30              | 0.000221      |

**- Minimum Standard: Part 15. 225(e)**

|                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------|
| The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency. |
|-------------------------------------------------------------------------------------------------------------------|

### 3.2.5 AC Line Conducted Emissions

**- Procedure:**

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its hopping function disabled at the middle channels in line with Section 15.21(m). Emissions closest to the limit are measured in the quasi-peak and average detector mode with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

**- Measurement Data:** **Comply** (refer to the next page)

**- Minimum Standard: FCC Part 15.207(a)**

| Frequency Range<br>(MHz) | Conducted Limit (dBuV) |            |
|--------------------------|------------------------|------------|
|                          | Quasi-Peak             | Average    |
| 0.15 ~ 0.5               | 66 to 56 *             | 56 to 46 * |
| 0.5 ~ 5                  | 56                     | 46         |
| 5 ~ 30                   | 60                     | 50         |

\* Decreases with the logarithm of the frequency

## - Measurement Data:



## Results of Conducted Emission

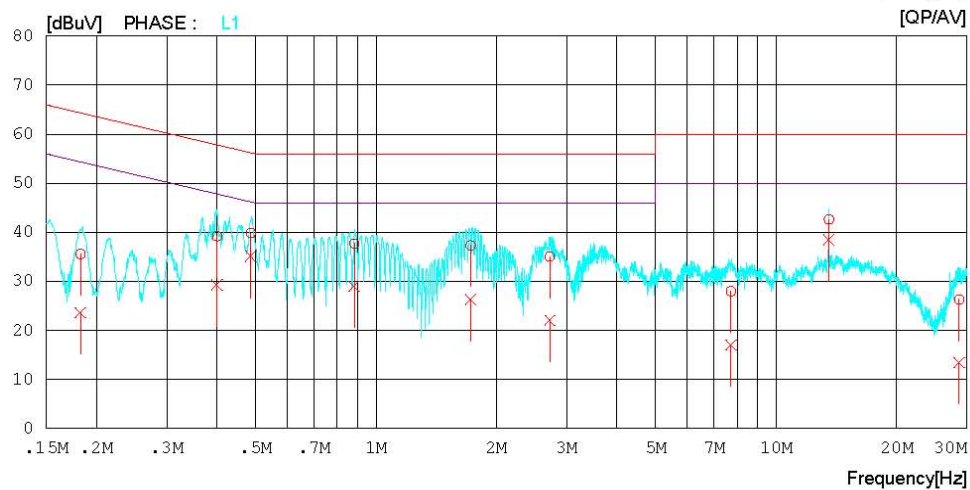
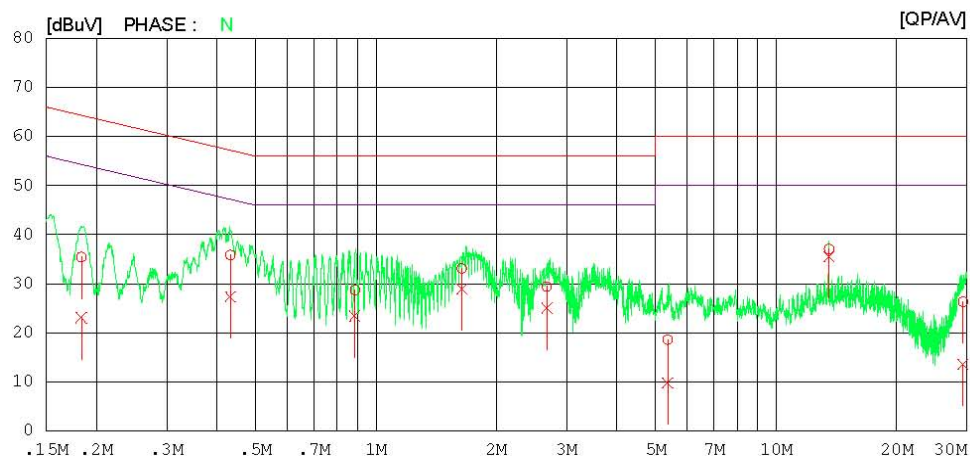
Digital EMC  
Date : 2012-09-05

Model No. : LG-E975  
Type :  
Serial No. : Identical prototype  
Test Condition : NFC

Reference No. :  
Power Supply : 120 V 60 Hz  
Temp/Humi. : 24 'C 50 % R.H.  
Operator : J.J.LEE

Memo :

LIMIT : CISPR22\_B QP  
CISPR22\_B AV



## Results of Conducted Emission

Digital EMC  
Date : 2012-09-05

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 Temp/Humi. : 24 'C 50 % R.H.  
 Operator : J.J.LEE

Memo :

LIMIT : CISPR22\_B QP  
 CISPR22\_B AV

| NO | FREQ<br>[MHz] | READING      |              | C.FACTOR<br>[dB] | RESULT       |              | LIMIT        |              | MARGIN       |              | PHASE |
|----|---------------|--------------|--------------|------------------|--------------|--------------|--------------|--------------|--------------|--------------|-------|
|    |               | QP<br>[dBuV] | AV<br>[dBuV] |                  | QP<br>[dBuV] | AV<br>[dBuV] | QP<br>[dBuV] | AV<br>[dBuV] | QP<br>[dBuV] | AV<br>[dBuV] |       |
| 1  | 0.18350       | 35.2         | 22.9         | 0.2              | 35.4         | 23.1         | 64.3         | 54.3         | 28.9         | 31.2         | N     |
| 2  | 0.43286       | 35.6         | 27.1         | 0.3              | 35.9         | 27.4         | 57.2         | 47.2         | 21.3         | 19.8         | N     |
| 3  | 0.88596       | 28.4         | 23.1         | 0.3              | 28.7         | 23.4         | 56.0         | 46.0         | 27.3         | 22.6         | N     |
| 4  | 1.63950       | 32.8         | 28.6         | 0.3              | 33.1         | 28.9         | 56.0         | 46.0         | 22.9         | 17.1         | N     |
| 5  | 2.67400       | 29.1         | 24.7         | 0.3              | 29.4         | 25.0         | 56.0         | 46.0         | 26.6         | 21.0         | N     |
| 6  | 5.35950       | 18.2         | 9.4          | 0.4              | 18.6         | 9.8          | 60.0         | 50.0         | 41.4         | 40.2         | N     |
| 7  | 13.55950      | 36.1         | 34.6         | 0.9              | 37.0         | 35.5         | 60.0         | 50.0         | 23.0         | 14.5         | N     |
| 8  | 29.31100      | 25.0         | 12.3         | 1.3              | 26.3         | 13.6         | 60.0         | 50.0         | 33.7         | 36.4         | N     |
| 9  | 0.18261       | 35.4         | 23.4         | 0.2              | 35.6         | 23.6         | 64.4         | 54.4         | 28.8         | 30.8         | L1    |
| 10 | 0.40074       | 38.9         | 29.1         | 0.3              | 39.2         | 29.4         | 57.8         | 47.8         | 18.6         | 18.4         | L1    |
| 11 | 0.48661       | 39.7         | 34.9         | 0.2              | 39.9         | 35.1         | 56.2         | 46.2         | 16.3         | 11.1         | L1    |
| 12 | 0.88303       | 37.4         | 28.7         | 0.3              | 37.7         | 29.0         | 56.0         | 46.0         | 18.3         | 17.0         | L1    |
| 13 | 1.72500       | 37.0         | 26.0         | 0.3              | 37.3         | 26.3         | 56.0         | 46.0         | 18.7         | 19.7         | L1    |
| 14 | 2.72000       | 34.7         | 21.8         | 0.3              | 35.0         | 22.1         | 56.0         | 46.0         | 21.0         | 23.9         | L1    |
| 15 | 7.71500       | 27.5         | 16.5         | 0.5              | 28.0         | 17.0         | 60.0         | 50.0         | 32.0         | 33.0         | L1    |
| 16 | 13.56150      | 41.7         | 37.6         | 0.9              | 42.6         | 38.5         | 60.0         | 50.0         | 17.4         | 11.5         | L1    |
| 17 | 28.66700      | 25.0         | 12.2         | 1.3              | 26.3         | 13.5         | 60.0         | 50.0         | 33.7         | 36.5         | L1    |

# **APPENDIX**

## **TEST EQUIPMENT FOR TESTS**

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment.

| Type                      | Manufacturer  | Model         | Cal.Date<br>(yy/mm/dd) | Next.Cal.Date<br>(yy/mm/dd) | S/N                    |
|---------------------------|---------------|---------------|------------------------|-----------------------------|------------------------|
| Spectrum Analyzer         | Agilent       | E4440A        | 11/09/30               | 12/09/30                    | MY45304199             |
| TEMP & HUMIDITY Chamber   | JISCO         | KR-100/J-RHC2 | 11/09/30               | 12/09/30                    | 30604493/021031        |
| Digital Multimeter        | H.P           | 34401A        | 12/03/05               | 13/03/05                    | 3146A13475, US36122178 |
| Vector Signal Generator   | Rohde Schwarz | SMJ100A       | 12/01/09               | 13/01/09                    | 100148                 |
| Thermo hygrometer         | BODYCOM       | BJ5478        | 12/01/13               | 13/01/13                    | 090205-2               |
| DC Power Supply           | HP            | 6622A         | 12/03/05               | 13/03/05                    | 3448A03760             |
| LOOP Antenna              | ETS           | 6502          | 10/10/29               | 12/10/29                    | 3471                   |
| EMI TEST RECEIVER         | R&S           | ESU           | 12/01/09               | 13/01/09                    | 100014                 |
| BILOG ANTENNA             | SCHAFFNER     | CBL 6112D     | 10/12/21               | 12/12/21                    | 22609                  |
| Amplifier (22dB)          | H.P           | 8447E         | 12/01/09               | 13/01/09                    | 2945A02865             |
| CVCF                      | NF Electronic | 4420          | 12/03/06               | 13/03/06                    | 304935/337980          |
| RFI/FIELD Intensity Meter | Kyoritsu      | KNM-2402      | 12/07/02               | 13/07/02                    | 4N-170-3               |
| EMI Test Receiver         | R&S           | ECSI          | 12/03/05               | 13/03/05                    | 100364                 |
| ARTIFICIAL MAINS NETWORK  | R&S           | ESH2-Z5       | 11/09/30               | 12/09/30                    | 828739/006             |