



# FCC Test Report

## FCC Part 15B

FOR:

Portable Data Terminal

MODEL #: Dolphin7850

Honeywell International Inc.  
9680 Old Bailes Road  
Fort Mill, SC 29715  
U.S.A

FCC ID: HD57850LPGE

TEST REPORT #: EMC\_HONEY\_013\_HD57850LPGE  
DATE: 2008-07-17



FCC listed  
A2LA  
accredited

IC recognized #  
3462B

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Board of Directors: Dr. Harald Ansorge, Dr. Klaus Matkey, Hans Peter May

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## 1 Assessment

The following is in compliance with the applicable criteria specified in FCC rules Part 15B of the Code of Federal Regulations.

| Company                      | Description            | Model #      |
|------------------------------|------------------------|--------------|
| Honeywell International Inc. | Portable Data Terminal | Dolphin 7850 |

Technical responsibility for area of testing:

Lothar Schmidt  
(Director Regulatory and  
Antenna Services )

2008-07-17 EMC & Radio

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| Date | Section | Name | Signature |
|------|---------|------|-----------|
|------|---------|------|-----------|

Project Leader:

Marc Douat  
(Project Engineer)

2008-07-17 EMC & Radio

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| Date | Section | Name | Signature |
|------|---------|------|-----------|
|------|---------|------|-----------|

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

## **2 Administrative Data**

### **2.1 Identification of the Testing Laboratory Issuing the EMC Test Report**

|                               |                                                                 |
|-------------------------------|-----------------------------------------------------------------|
| Company Name:                 | <b>CETECOM Inc.</b>                                             |
| Department:                   | <b>EMC</b>                                                      |
| Address:                      | <b>411 Dixon Landing Road<br/>Milpitas, CA 95035<br/>U.S.A.</b> |
| Telephone:                    | <b>+1 (408) 586 6200</b>                                        |
| Fax:                          | <b>+1 (408) 586 6299</b>                                        |
| Responsible Test Lab Manager: | <b>Lothar Schmidt</b>                                           |
| Responsible Project Leader:   | <b>Marc Douat</b>                                               |

### **2.2 Identification of the Client**

|                   |                                      |
|-------------------|--------------------------------------|
| Applicant's Name: | <b>Honeywell International Inc.</b>  |
| Street Address:   | <b>9680 Old Bailes Road</b>          |
| City/Zip Code     | <b>Fort Mill, SC 29715</b>           |
| Country           | <b>U S A</b>                         |
| Contact Person:   | <b>Mandana Mobasher</b>              |
| Phone No.         | <b>803-835-8190</b>                  |
| Fax:              | <b>803-835-8097</b>                  |
| e-mail :          | <b>Mandana.Mobasher@handheld.com</b> |

### **2.3 Identification of the Manufacturer**

|                        |                                     |
|------------------------|-------------------------------------|
| Manufacturer's Name:   | <b>Honeywell International Inc.</b> |
| Manufacturers Address: | <b>9680 Old Bailes Road</b>         |
| City/Zip Code          | <b>Fort Mill, SC 29715</b>          |
| Country                | <b>U S A</b>                        |

### **3 Equipment under Test (EUT)**

#### **3.1 Specification of the Equipment under Test**

|                 |                               |
|-----------------|-------------------------------|
| Marketing Name: | <b>Dolphin 7850</b>           |
| Description:    | <b>Portable Data Terminal</b> |
| Model No:       | <b>Dolphin 7850</b>           |
| FCC ID:         | <b>HD57850LPGE</b>            |

#### **3.2 Identification of the Equipment Under Test (EUT)**

| <b>EUT #</b> | <b>TYPE</b>            | <b>MANF.</b>       | <b>MODEL</b> |
|--------------|------------------------|--------------------|--------------|
| 1            | Portable Data Terminal | Hand Held Products | 7850         |

#### **3.3 Identification of Accessory equipment**

| <b>AE #</b> | <b>TYPE</b>     | <b>MANF.</b>       | <b>MODEL</b>   |
|-------------|-----------------|--------------------|----------------|
| 1           | AC/DC ADAPTER   | DVL                | DSA-0421S-09 1 |
| 2           | Charging Cradle | Hand Held Products | 7850-HB        |

#### **4 Subject of Investigation**

All testing was performed on the Portable Data Terminal model Dolphin 7850.

Radiated Emission tests are carried out to show that the EUT complies with FCC15.109 (a) radiated emissions limit for Class B device.

Conducted Emission tests are carried out to show that the EUT complies with FCC15.107 Class B.

## 5 Radiated Emissions

### 5.1 Limits:

**§ 15.109 Radiated emission limits.** (a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

| Frequency of emission (MHz) | Field strength (microvolts/ meter) |
|-----------------------------|------------------------------------|
| 30–88 .....                 | 100                                |
| 88–216 .....                | 150                                |
| 216–960 .....               | 200                                |
| Above 960 .....             | 500                                |

**§ 15.109 Radiated emission limits.** (b) The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the following:

| Frequency of emission (MHz) | Field strength (microvolts/ meter) |
|-----------------------------|------------------------------------|
| 30–88 .....                 | 90                                 |
| 88–216 .....                | 150                                |
| 216–960 .....               | 210                                |
| Above 960 .....             | 300                                |

## 5.2 Measurement Procedure:

### ANSI C63.4 Section 8.3.1.1: Exploratory radiated emission measurements

Exploratory radiated measurements shall be performed at the measurement distance or at a closer distance than that specified for compliance to determine the emission characteristics of the EUT. At near distances, for EUTs of comparably small size, it is relatively easy to determine the spectrum signature of the EUT and, if applicable, the EUT configuration that produces the maximum level of emissions. A shielded room may be used for exploratory testing, but may have anomalies that can lead to significant errors in amplitude measurements.

Broadband antennas and a spectrum analyzer or a radio-noise meter with a panoramic display are often useful in this type of testing. It is recommended that either a headset or loudspeaker be connected as an aid in detecting ambient signals and finding frequencies of significant emission from the EUT when the exploratory and final testing is performed in an OATS with strong ambient signals. Caution should be taken if either antenna height between 1 and 4 meters or EUT azimuth is not fully explored. Not fully exploring these parameters during exploratory testing may require complete testing at the OATS or semi-anechoic chamber when the final full spectrum testing is conducted.

The EUT should be set up in its typical configuration and arrangement, and operated in its various modes. For tabletop systems, cables or wires should be manipulated within the range of likely arrangements. For floor-standing equipment, the cables or wires should be located in the same manner as the user would install them and no further manipulation is made. For combination EUTs, the tabletop and floor-standing portions of the EUT shall follow the procedures for their respective setups and cable manipulation. If the manner of cable installation is not known, or if it changes with each installation, cables or wires for floor-standing equipment shall be manipulated to the extent possible to produce the maximum level of emissions.

For each mode of operation required to be tested, the frequency spectrum shall be monitored. Variations in antenna height between 1 and 4 m, antenna polarization, EUT azimuth, and cable or wire placement (each variable within bounds specified elsewhere) shall be explored to produce the emission that has the highest amplitude relative to the limit. A step-by-step technique for determining this emission can be found in Annex C.

When measuring emissions above 1 GHz, the frequencies of maximum emission shall be determined by manually positioning the antenna close to the EUT and by moving the antenna over all sides of the EUT while observing a spectral display. It will be advantageous to have prior knowledge of the frequencies of emissions above 1 GHz. If the EUT is a device with dimensions approximately equal to that of the measurement antenna beamwidth, the measurement antenna shall be aligned with the EUT.

#### ANSI C63.4 Section 8.3.1.2: **Final radiated emission measurements**

Based on the measurement results in 8.3.1.1, the one EUT, cable and wire arrangement, and mode of operation that produces the emission that has the highest amplitude relative to the limit is selected for the final measurement. The final measurement is then performed on a site meeting the requirements of 5.3, 5.4, or 5.5 as appropriate without variation of the EUT arrangement or EUT mode of operation. If the EUT is relocated from an exploratory test site to a final test site, the highest emission shall be remaximized at the final test location before final radiated emissions measurements are performed. However, antenna height and polarity and EUT azimuth are to be varied. In addition, the full frequency spectrum (for the range to be checked for meeting compliance) shall be investigated.

This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. During the full frequency spectrum investigation, particular focus should be made on those frequencies found in exploratory testing that were used to find the final test configuration, mode of operation, and arrangement (associated with achieving the least margin with respect to the limit). This full spectrum test constitutes the compliance measurement.

For measurements above 1 GHz, use the cable, EUT arrangement, and mode of operation determined in the exploratory testing to produce the emission that has the highest amplitude relative to the limit. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the antenna in the “cone of radiation” from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response. The antenna may have to be higher or lower than the EUT, depending on the EUT’s size and mounting height, but the antenna should be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. If the transmission line for the measurement antenna restricts its range of height and polarization, the steps needed to ensure the correct measurement of the maximum emissions, shall be described in detail in the report of measurements. Data collected shall satisfy the report requirements of Clause 10.

#### NOTES

- 1— Where limits are specified by agencies for both average and peak (or quasi-peak) detection, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.
- 2—Use of waveguide and flexible waveguide may be necessary at frequencies above 10 GHz to achieve usable signal-to noise ratios at required measurement distances. If so, it may be necessary to restrict the height search of the antenna, and special care should be taken to ensure that maximum emissions are correctly measured.
- 3—All presently known devices causing emissions above 10 GHz are physically small compared with the beam-widths of typical horn antennas used for EMC measurements. For such EUTs and frequencies, it may be preferable to vary the height and polarization of the EUT instead of the receiving antenna to maximize the measured emissions.

### 5.3 Results

#### Results for the radiated measurements below 30MHz according § 15.33

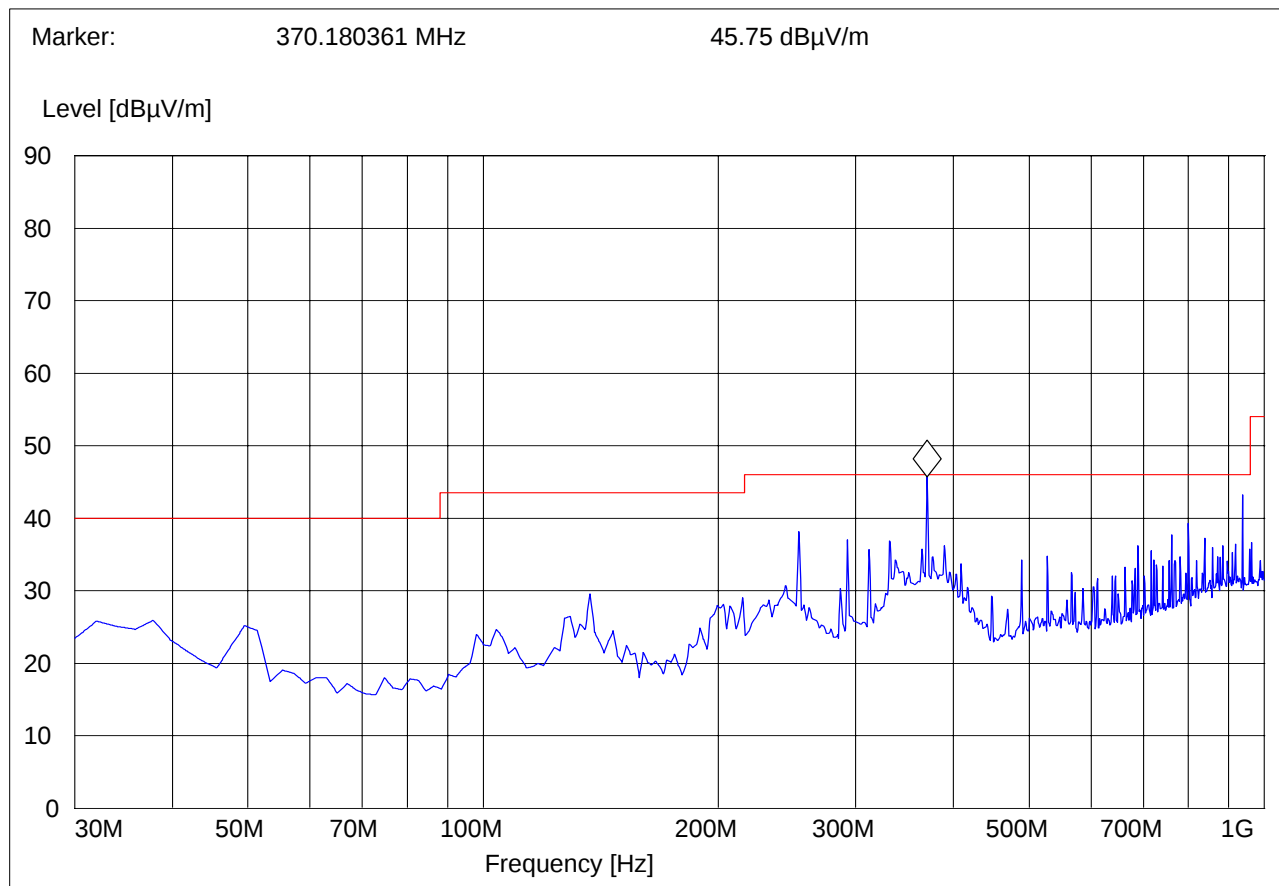
| Frequency    | Measured values                       | Remarks |
|--------------|---------------------------------------|---------|
| 9KHz – 30MHz | No emissions found, caused by the EUT |         |

**30MHz – 1GHz**  
**Antenna: vertical**

EUT: 7850  
Customer:: HHP  
Test Mode: IDLE  
ANT Orientation: V  
EUT Orientation: V  
Test Engineer: SAM  
Voltage: AC (120v) Model: DSA-0421S-09 1  
Comments: Cont. Scan

**SWEEP TABLE: "FCC15.247\_30M-1G\_Ver"**

| Start<br>Frequency | Stop<br>Frequency | Detector | Meas.<br>Time | IF<br>Bandw. | Transducer      |
|--------------------|-------------------|----------|---------------|--------------|-----------------|
| 30.0 MHz           | 1.0 GHz           | MaxPeak  | Coupled       | 100 kHz      | 3141-#1186_Vert |



**30MHz – 1GHz**  
**Antenna: horizontal**

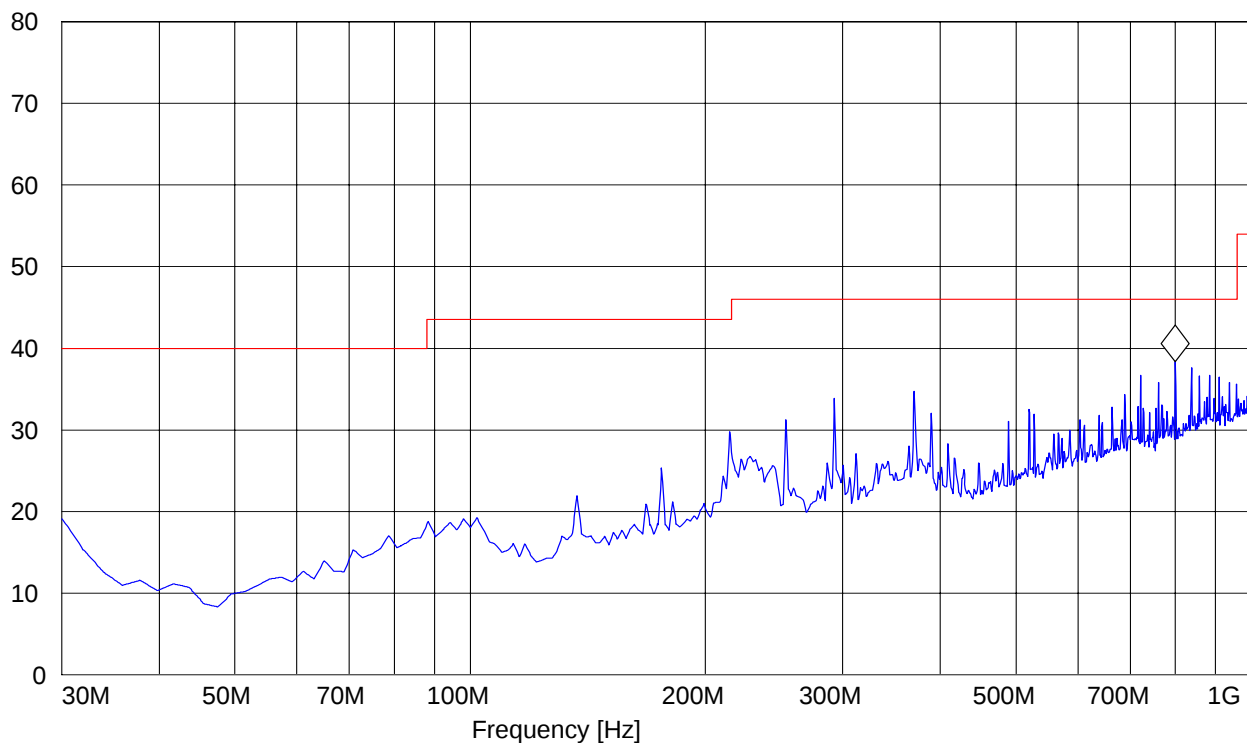
EUT: 7850  
Customer:: HHP  
Test Mode: IDLE  
ANT Orientation: H  
EUT Orientation: V  
Test Engineer: SAM  
Voltage: AC (120v) Model: DSA-0421S-09 1  
Comments: Cont. Scan

***SWEEP TABLE: "FCC15.247\_30M-1G\_Hor"***

| Start<br>Frequency | Stop<br>Frequency | Detector | Meas.<br>Time | IF<br>Bandw. | Transducer      |
|--------------------|-------------------|----------|---------------|--------------|-----------------|
| 30.0 MHz           | 1.0 GHz           | MaxPeak  | Coupled       | 100 kHz      | 3141-#1186_Horz |

Marker: 799.779559 MHz 38.37 dB $\mu$ V/m

Level [dB $\mu$ V/m]



## 6 AC POWER LINE CONDUCTED EMISSIONS

### 6.1 LIMIT SUB CLAUSE § 15.107

**Technical specification: 15.107 (Revised as of August 20, 2002)**

§15.107 (a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

#### **Limit**

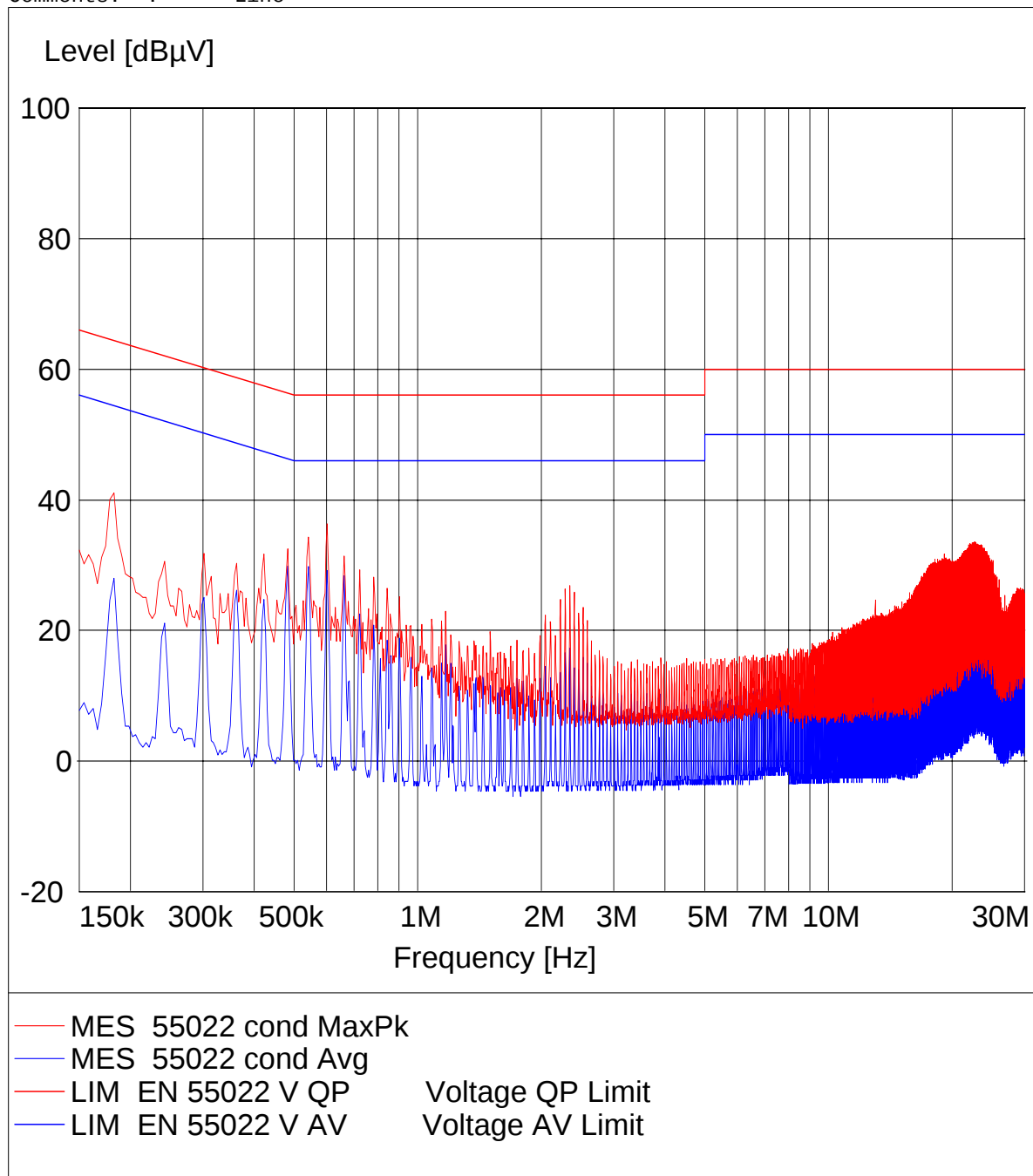
| Frequency of Emission (MHz)                 | Conducted Limit (dB $\mu$ V) |           |
|---------------------------------------------|------------------------------|-----------|
|                                             | Quasi-Peak                   | Average   |
| 0.15 – 0.5                                  | 66 to 56*                    | 56 to 46* |
| 0.5 – 5                                     | 56                           | 46        |
| 5 – 30                                      | 60                           | 50        |
| * Decreases with logarithm of the frequency |                              |           |

**ANALYZER SETTINGS: RBW = 10KHz**

**VBW = 10KHz**

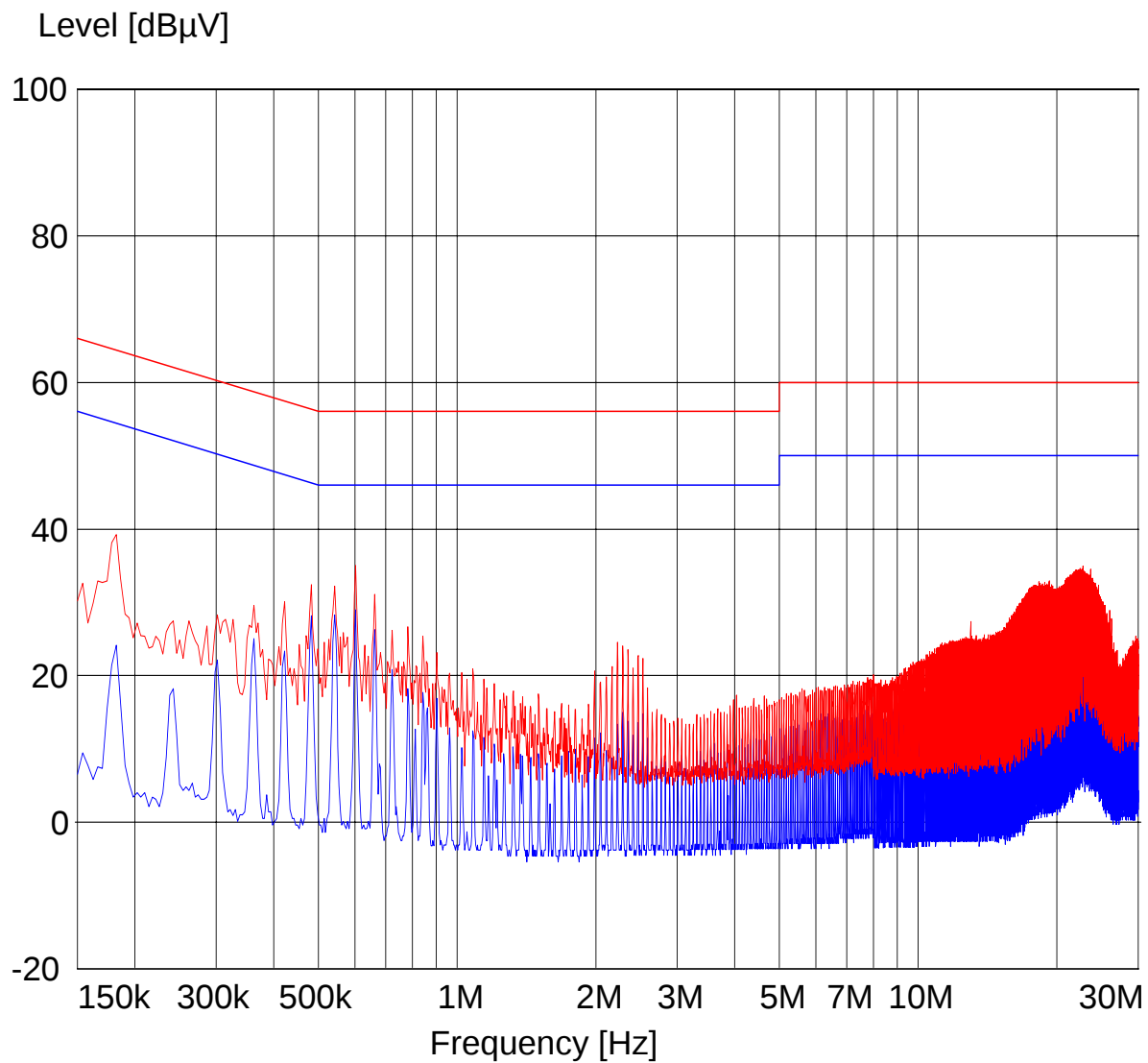
## 6.2 RESULTS:

EUT: 7850  
Manufacturer: HHP  
Test Mode: Continuous Laser  
ANT Orientation:: Conducted  
EUT Orientation:: On Base Station  
Test Engineer:: Chris  
Power Supply: : 120V  
Comments: : Line





EUT: 7850  
Manufacturer: HHP  
Test Mode: Continuous Laser  
ANT Orientation:: Conducted  
EUT Orientation:: On Base Station  
Test Engineer:: Chris  
Power Supply: : 120V  
Comments: : Neutral



— MES 55022 cond MaxPk  
— MES 55022 cond Avg  
— LIM EN 55022 V QP Voltage QP Limit  
— LIM EN 55022 V AV Voltage AV Limit

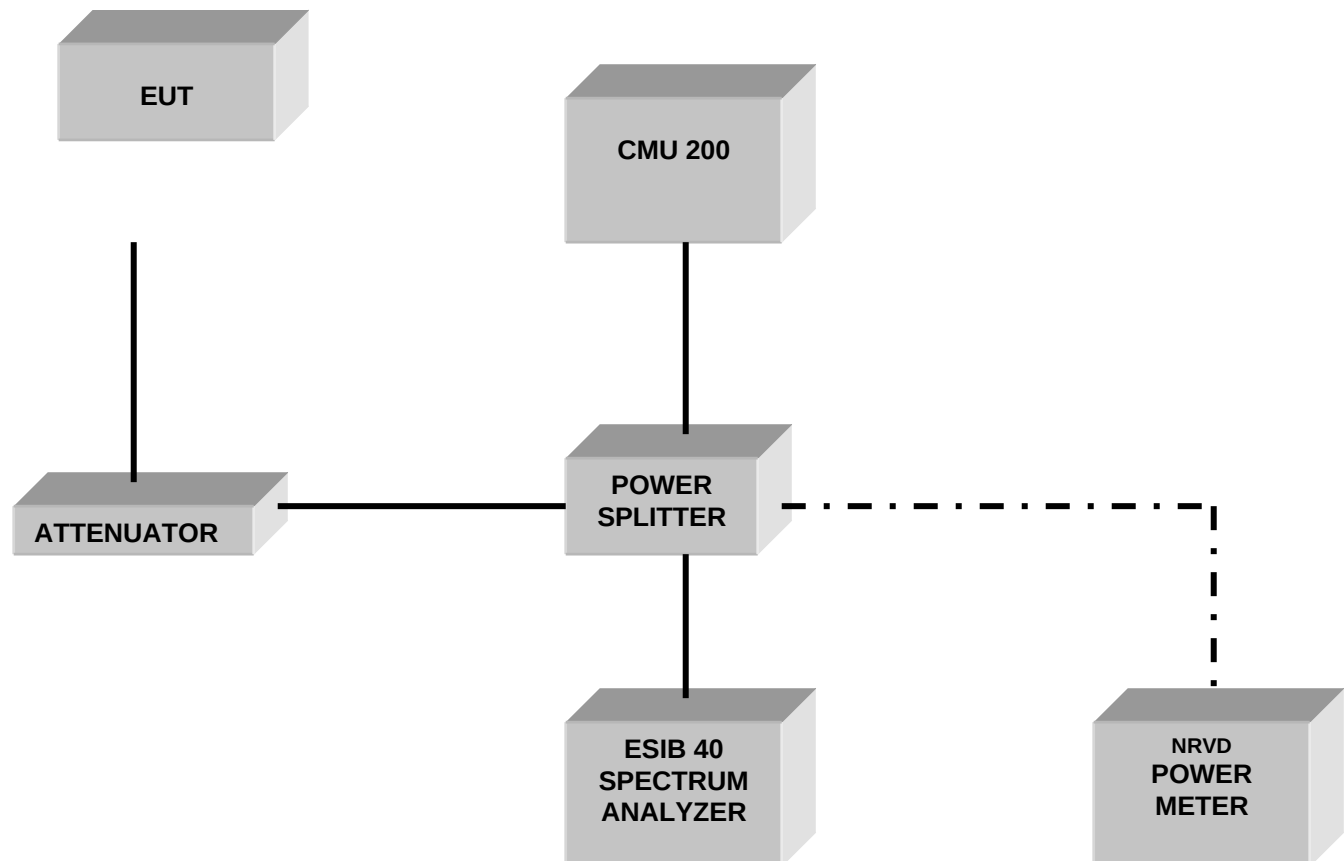


## **7 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS**

| <b>No</b> | <b>Instrument/Ancillary</b>  | <b>Type</b>  | <b>Manufacturer</b> | <b>Serial No.</b> | <b>Cal Due</b> | <b>Interval</b> |
|-----------|------------------------------|--------------|---------------------|-------------------|----------------|-----------------|
| <b>01</b> | Spectrum Analyzer            | ESIB 40      | Rohde & Schwarz     | 100107            | May 2009       | 1 year          |
| <b>02</b> | Spectrum Analyzer            | FSEM 30      | Rohde & Schwarz     | 100017            | May 2009       | 1 year          |
| <b>03</b> | Signal Generator             | SMY02        | Rohde & Schwarz     | 836878/011        | May 2009       | 1 year          |
| <b>04</b> | Power-Meter                  | NRVD         | Rohde & Schwarz     | 0857.8008.02      | May 2009       | 1 year          |
| <b>05</b> | Biconilog Antenna            | 3141         | EMCO                | 0005-1186         | June 2009      | 1 year          |
| <b>06</b> | Horn Antenna (1-18GHz)       | SAS-200/571  | AH Systems          | 325               | June 2009      | 1 year          |
| <b>07</b> | Horn Antenna (18-26.5GHz)    | 3160-09      | EMCO                | 1240              | June 2009      | 1 year          |
| <b>08</b> | Power Splitter               | 11667B       | Hewlett Packard     | 645348            | n/a            | n/a             |
| <b>09</b> | Climatic Chamber             | VT4004       | Voltsch             | G1115             | May 2009       | 1 year          |
| <b>10</b> | High Pass Filter             | 5HC2700      | Trilithic Inc.      | 9926013           | n/a            | n/a             |
| <b>11</b> | High Pass Filter             | 4HC1600      | Trilithic Inc.      | 9922307           | n/a            | n/a             |
| <b>12</b> | Pre-Amplifier                | JS4-00102600 | Miteq               | 00616             | May 2009       | 1 year          |
| <b>13</b> | Power Sensor                 | URV5-Z2      | Rohde & Schwarz     | DE30807           | May 2009       | 1 year          |
| <b>14</b> | Universal Radio Comm. Tester | CMU 200      | Rohde & Schwarz     | 832221/06         | May 2009       | 1 year          |
| <b>15</b> | LISN                         | ESH3-Z5      | Rohde & Schwarz     | 836679/003        | May 2009       | 1 year          |
| <b>16</b> | Loop Antenna                 | 6512         | EMCO                | 00049838          | July 2010      | 2 years         |

## 8 BLOCK DIAGRAMS

### Conducted Testing



## Radiated Testing

### ANECHOIC CHAMBER

