

# TEST REPORT

*GemAccess 608*

FCC ID: MES608ACC

# 1 SYSTEM TEST CONFIGURATION

## 1.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it).

The worst case position of the transmitter has been fund in vertical position, as shown on photographs. The card is set up at 5cm from the card reader, which simulates the current position when the card is held by hand.

## 1.2 EUT Exercise software

A read and write software emulates the read and allows to read and write data stored in the contactless card in repetitive way.

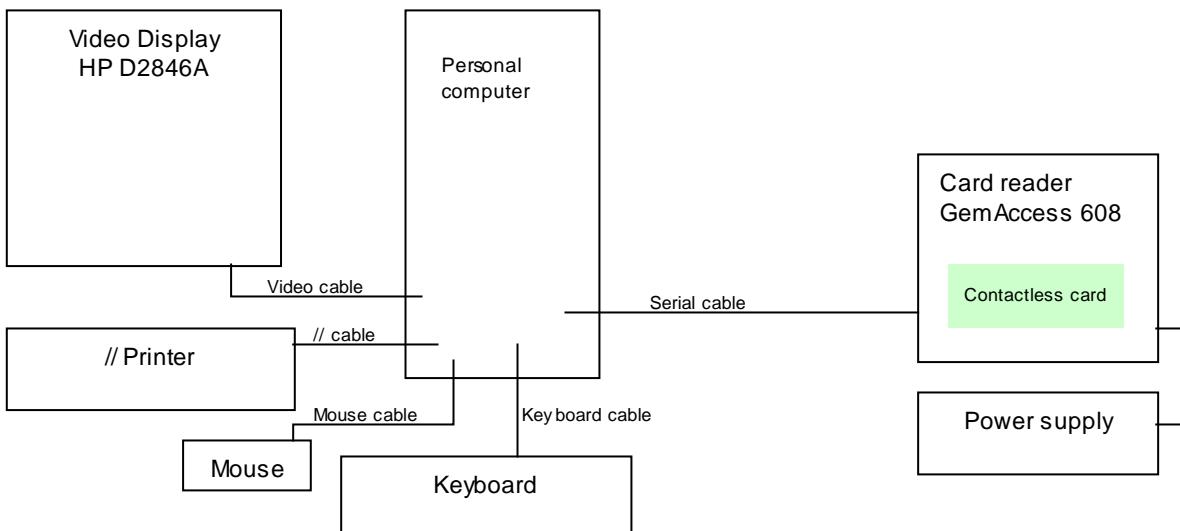
## 1.3 Special accessories

No special accessories were necessary to perform the test.

## 1.4 Equipment modifications

No equipment modification has been necessary during testing to achieve compliance to FCC Part15, Subpart C levels. The unit tested was a production unit.

## 1.5 Configuration of tested system.



## 1.6 Tested System Details

The FCC IDs for all equipment, plus description of all cables used in the tested system (including inserted cards, which have grants) are :

| Trade Mark – Model Number<br>(Serial number) | FCC ID             | Description  | Cable description              |
|--|--------------------|--|--------------------------------|
| GEMPLUS GemAccess608                         | MES608ACC          | Contactless card reader                            | Shielded signal cables         |
| COMATEC AL0120-120-IT                        | NA                 | Linear Power supply for GemAccess608 (12VDC, 1.2A) | Unshielded power cord, 2 poles |
| HP VECTRA 515 Series D4136A (FR62365527)     | B94VECTRA500T      | Personal computer                                  | Unshielded power cord          |
| HP C3751B (LZA62831289)                      | DZL211029          | Mouse  | Shielded cable                 |
| HP C2106A (3041S18664)                       | B94C2106X          | DESKJET 500 Parallel printer                       | HP24542D – Shielded cable      |
| HP C4737-60101 (M97060565)                   | GYUR38SK           | Keyboard   | Shielded cable                 |
| HP D2846A <sup>(2)</sup> (JP74001000)        | NA – DoC procedure | 21" video monitor                                  | Shielded video cable           |

(1) EUT submitted for grant

## 2 RADIATED EMISSION DATA

### 2.1 Test Procedure (15.225)

The product has been tested according to ANSI C63.4-1992 and FCC PART15, Subpart C, Section 15.225.

In first, the frequencies are identified in the full anechoic chamber and then are measured on the Open Area Test Site.

*The plots on the following page shown only the frequency identification.*

The table just after shown the measured levels.

Measured levels are in dB $\mu$ V/m, then they are corrected in  $\mu$ V/m in order to compare them to the FCC limit.

The following conversion is used :

$$L (\mu\text{V}/\text{m}) = \text{inv log} (L(\text{dB}\mu\text{V}/\text{m})) / 20$$

From 30 to 1000 MHz, the product has been tested at a distance of 3 meters from the antenna and compared to the FCC Part15, Subpart C, chapter 15.209 limits. Measurement bandwidth was 120 KHz from 30 MHz to 1 GHz.

From 1.705 to 30 MHz, the product has been tested at a distance of 10 meters from the antenna and compared to the FCC Part15, Subpart C, chapter 15.209 limits. Measurement bandwidth was 120 KHz from 30 MHz to 1 GHz. Requirements of 15.209.e) have been observed.

Under 1GHz, measurement are Quasi Peak measurements, according to CISPR requirements.

Above 30MHz, antenna height search was performed from 0.9m to 4m for both horizontal and vertical polarization.

Continuous linear turntable azimuth search was performed with 360 degrees range.

Under 30MHz, a rod antenna has been used, according to provisions of ANSI C63.4

A summary of the worst case emissions found in all test configurations and modes is shown on the following page.

#### Test Equipment:

HP-8568B Analyzer + HP-85650A Quasi-Peak adapter + HP-85685A RF Preselector

HP 8591EM Spectrum analyzer

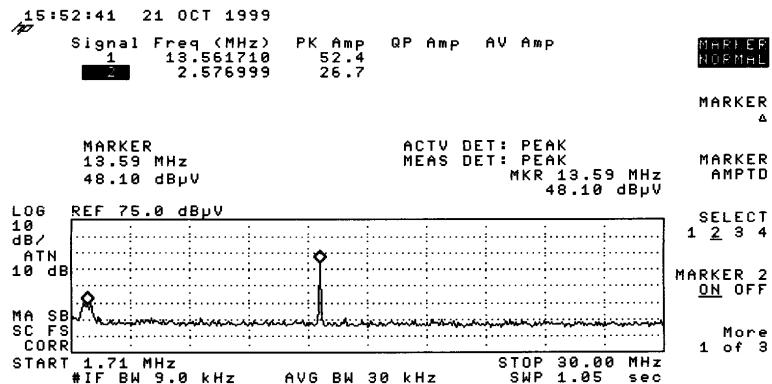
HP 8546A EMI Receiver

CHASE CBL6111A Antenna, 30-1000 MHz

AILTECH 94607-1, sn119, preamplifier associated with EATON 92197-3 ROD Antenna for frequencies identification.  
ElectroMetrics Model RVR-30M, sn 593, Passive Rod Antenna for final results measurement.

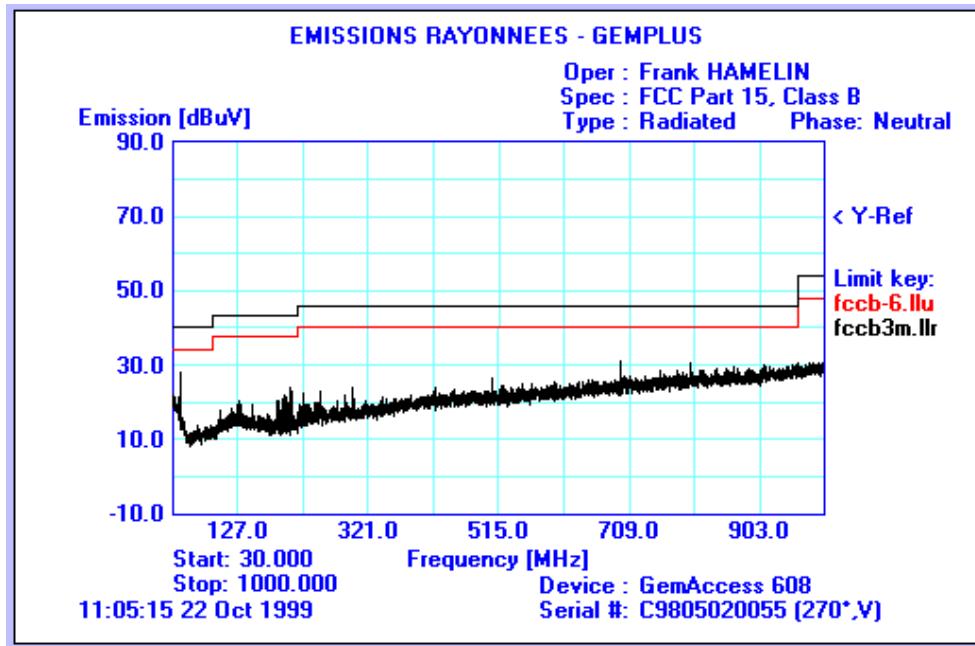
## 2.2 Radiated emission data (15.225.b)

### Plot of frequencies from 1.705 to 30 MHz



No signal appears in the restricted bands from 1.705 to 30 MHz.

### Plot of frequencies from 30MHz to 1GHz



Final result:

| Frequency (MHz) | Restricted bands | Limits (Lmt) (uV/m) | Measurement Distance | Measure* (Mea) (uV/m) | Mea-Lmt (uV/m) | Angle (deg) | Pol | Hgt (cm) | Tot Corr (uV/m)      | Comments                    |
|-----------------|------------------|---------------------|----------------------|-----------------------|----------------|-------------|-----|----------|----------------------|-----------------------------|
| 2.57            | No               | 30                  | 30* <sup>1</sup>     |                       |                |             |     |          | Not traceable signal |                             |
| 13.56           | No               | 10000               | 30* <sup>1</sup>     | 124.45                | 9875.55        | 3           | V   | 1m       | 14.22                | Fundamental - 15.225 limits |
| 40.68           | No               | 100                 | 3                    | 94.4                  | 5.6            | 112         | V   | 103      | 3.59                 | 15.209 limits               |
| 54.268          | No               | 100                 | 3                    | 21.87                 | 78.13          | 125         | V   | 102      | 3.84                 | 15.209 limits               |
| 67.785          | No               | 100                 | 3                    | 27.22                 | 72.78          | 123         | V   | 102      | 3.23                 | 15.209 limits               |
| 81.383          | No               | 100                 | 3                    | 17.99                 | 82.01          | 149         | V   | 113      | 2.98                 | 15.209 limits               |
| 108.480         | No               | 100                 | 3                    | 13.33                 | 86.67          | 103         | V   | 102      | 6.45                 | 15.209 limits               |
| 144.080         | No               | 100                 | 3                    | 45.70                 | 54.3           | 141         | V   | 129      | 6.02                 | 15.209 limits               |
| 196.140         | No               | 150                 | 3                    | 30.20                 | 119.8          | 204         | H   | 160      | 10.47                | 15.209 limits               |
| 204.143         | No               | 150                 | 3                    | 42.66                 | 107.34         | 213         | H   | 155      | 5.13                 | 15.209 limits               |
| 212.153         | No               | 150                 | 3                    | 43.15                 | 106.85         | 71          | H   | 121      | 5.31                 | 15.209 limits               |
| 288.217         | No               | 150                 | 3                    | 41.21                 | 108.79         | 87          | H   | 101      | 7.58                 | 15.209 limits               |

| Frequency (MHz) | Restricted bands | Limits (Lmt) (uV/m) | Measurement Distance | Measure* (Mea) (uV/m) | Mea-Lmt (uV/m) | Angle (deg) | Pol | Hgt (cm) | Tot Corr (uV/m) | Comments      |
|-----------------|------------------|---------------------|----------------------|-----------------------|----------------|-------------|-----|----------|-----------------|---------------|
| 298.842         | No               | 150                 | 3                    | 24.55                 | 125.45         | 91          | H   | 112      | 8.03            | 15.209 limits |
| 595..629        | No               | 200                 | 3                    | 26                    | 174            | 202         | H   | 261      | 16.22           | 15.209 limits |

\* : (A) denotes an average unit, (Q) denotes a Quasi Peak unit, (P) denotes a peak unit.

\*<sup>1</sup> : Measurement have been done at 10m distance and corrected following requirements of 15.209.e).

## 2.3 Field Strength Calculation (15.225.a & b)

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follow :

$$FS = RA + AF + CF - AG$$

Where      FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Factor

AG = Amplifier Gain

Assume a receiver reading of 52.5dB $\mu$ V is obtained. The antenna factor of 7.4 and a cable factor of 1.1 is added. The amplifier gain of 29dB is subtracted, giving a field strength of 32 dB $\mu$ V/m.

$$FS = 52.5 + 7.4 + 1.1 - 29 = 32 \text{ dB}\mu\text{V/m}$$

The 32 dB $\mu$ V/m value can be mathematically converted to its corresponding level in  $\mu$ V/m.

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m.}$$

## 2.4 Conducted emission data

### 2.4.1 Test procedure

The product has been tested according to ANSI C63.4-1992, and FCC Part15, Subpart C, chapter 15.207.

The product has been tested with 120V / 60Hz power line voltage and compared to the FCC limits. Measurement bandwidth was 9KHz from 150 KHz to 30 MHz.

Measurement was initially made with an HP-8591EM Spectrum Analyzer in peak mode. This was followed by a Quasi-Peak, i.e. CISPR measurement with the Rohde & Schwarz ESH3 receiver for any strong signal. If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary.

The Peak data are shown on the following plots. Quasi-Peak and Average measurements are detailed in a table with frequencies and levels measured.

The 13.56MHz frequency, which is the fundamental frequency exceeds the level when the product is tested in normal configuration. In order to show that the product electronic isn't the cause, we had performed another test with a dummy load (50  $\Omega$ ) instead of the actual antenna. The results, in this configuration, are compliant with FCC limits. The graphs are shown hereafter.

Interconnecting cables and equipment's were moved to position that maximized emission. A summary of the worst case emissions found in all test configurations and modes is shown on the following page.

Test equipment :

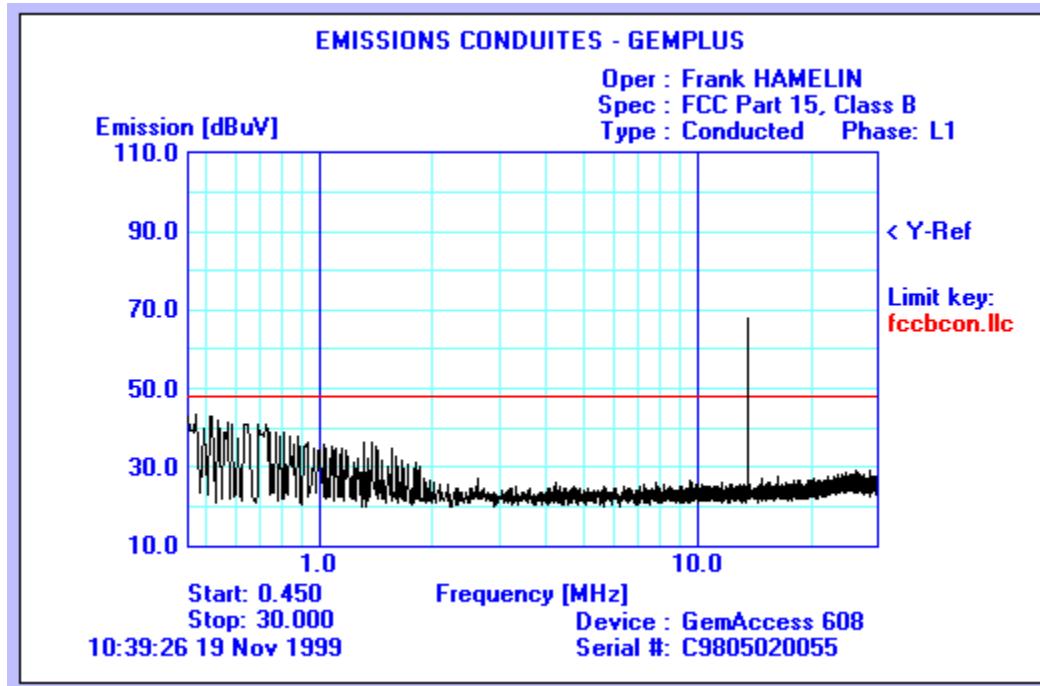
HP 8591EM Spectrum Analyzer

Rhode & Schwarz ESH3 Receiver

EMCO 3810/2SH LISN N°1

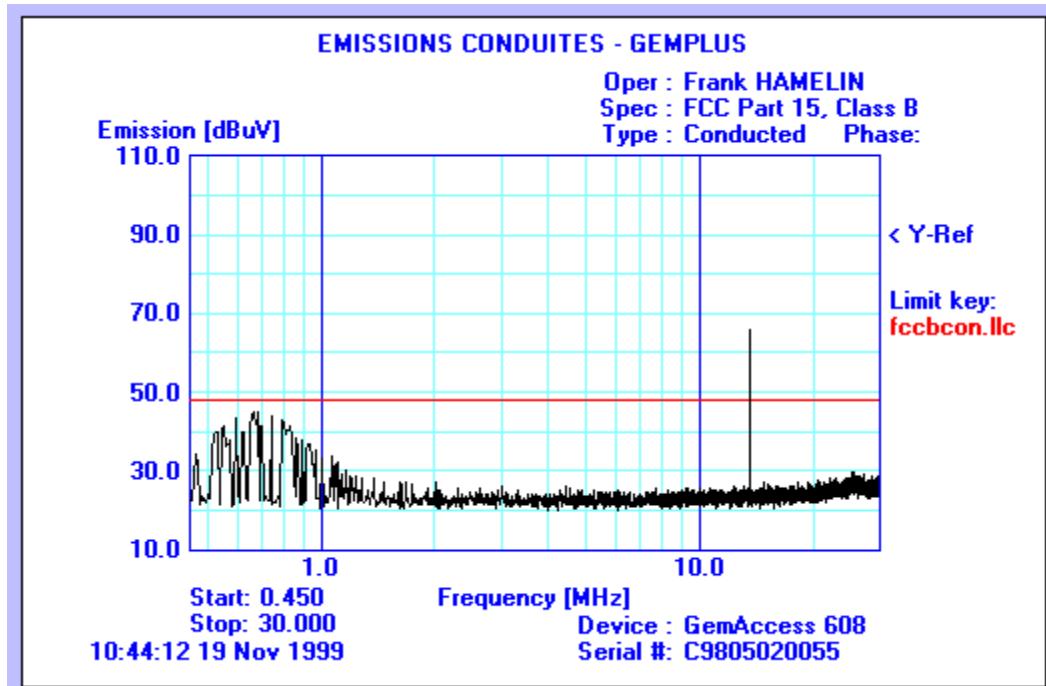
TELEMETER NNB-2/16L LISN N°2

### 1.1.2 Neutral conducted emission data on *GemAccess608*



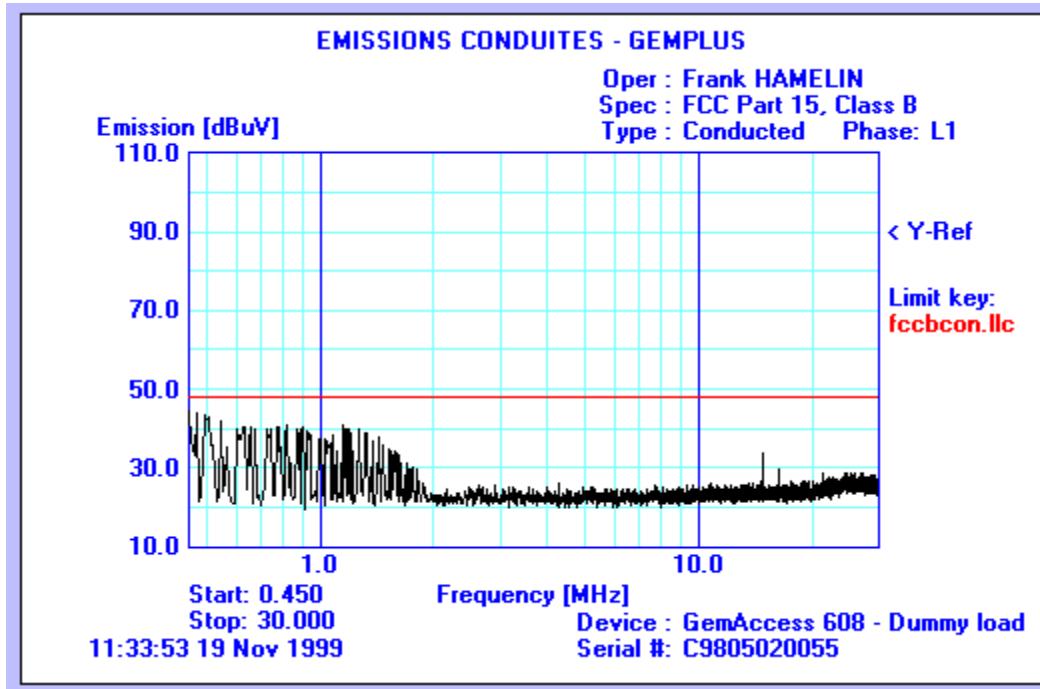
| Num. | Freq. | Peak         | Q-Peak       | QP limit     | <i>QP delta</i> |
|------|-------|--------------|--------------|--------------|-----------------|
|      | [MHz] | [dB $\mu$ V] | [dB $\mu$ V] | [dB $\mu$ V] | [dB $\mu$ V]    |
| 1    | 0.470 | 43.89        | 35.83        | 48           | 12.17           |
| 2    | 0.520 | 42.67        | 34.49        | 48           | 13.51           |
| 3    | 0.570 | 42.17        | 34.09        | 48           | 13.91           |
| 4    | 0.640 | 41.05        | 33.31        | 48           | 14.69           |
| 5    | 0.730 | 39.95        | 33.23        | 48           | 14.77           |
| 6    | 13.57 | 68.21 *      | 67.89 *      | 48           | -19.89          |

### 1.1.3 Line conducted emission data on *GemAccess608*

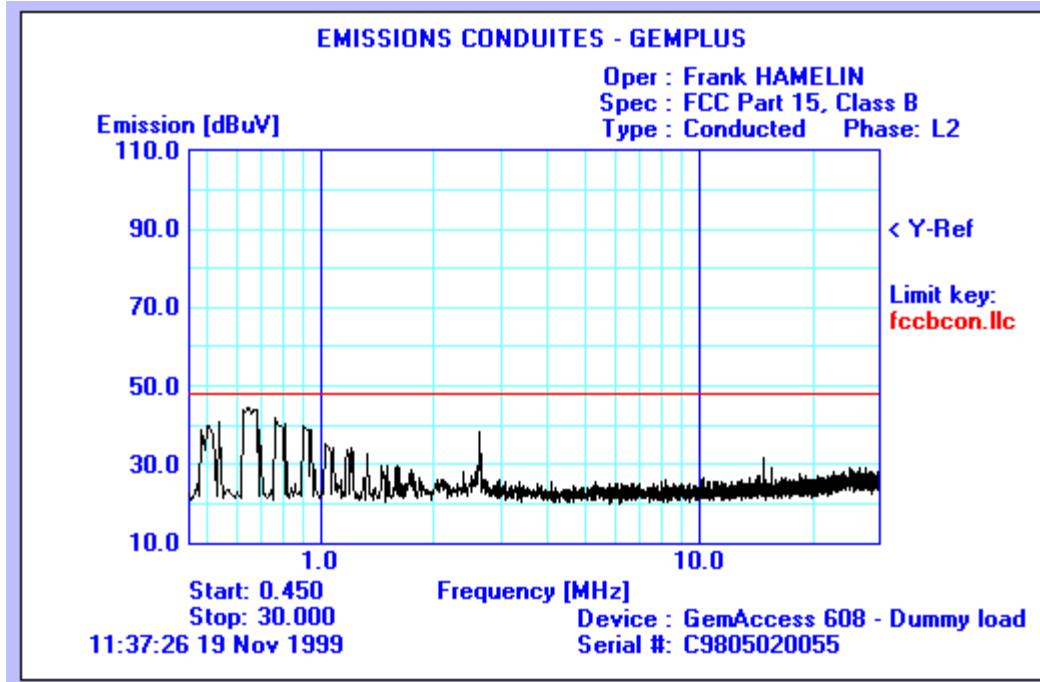


| Num. | Freq. | Peak         | Q-Peak       | QP limit     | <i>QP delta</i> |
|------|-------|--------------|--------------|--------------|-----------------|
|      | [MHz] | [dB $\mu$ V] | [dB $\mu$ V] | [dB $\mu$ V] | [dB $\mu$ V]    |
| 1    | 0.600 | 44.08        | 35.96        | 48.00        | 12.04           |
| 2    | 0.660 | 44.72        | 36.93        | 48.00        | 11.07           |
| 3    | 0.740 | 43.99        | 36.57        | 48.00        | 11.43           |
| 4    | 0.790 | 43.02        | 35.75        | 48.00        | 12.25           |
| 5    | 13.57 | 66.10        | 65.75        | 48.00        | -17.75          |

1.1.4 Neutral conducted emission data on *GemAccess608* with dummy load (50Ω)



1.1.5 Line conducted emission data on *GemAccess608* with dummy load (50W)



## 1.2 Fundamental field strength (15.225.a)

Emission frequency is : 13.56 MHz

Limit level is 10000 $\mu$ V/m at 30m.

**Measured level = 124.45  $\mu$ V/m**

## 1.3 Fundamental Frequency tolerance (15.225.c)

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency.

Fundamental = 13.56 MHz

$13.56 + 0.01\% = 13.561356$  MHz

$13.56 - 0.01\% = 13.558644$  MHz

### 1.3.1 Voltage fluctuation

The power supply has been set at 85% and 115% of nominal voltage, at 20°C.

|                   | Nominal voltage (230V) | 85% nom. Volt. (195.5V) | 115% nom. Volt. (264.5V) |
|-------------------|------------------------|-------------------------|--------------------------|
| Fundamental (MHz) | 13.56                  | 13.55950                | 13.560950                |
| Result            | -                      | PASS                    | PASS                     |

### 1.3.2 Temperature fluctuation

The temperature has been set at -20°C and +50°C, at nominal voltage

|                   | 20°C  | -20°C     | +50°C     |
|-------------------|-------|-----------|-----------|
| Fundamental (MHz) | 13.56 | 13.560325 | 13.559545 |
| Result            | -     | PASS      | PASS      |