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 product (UBRS4L1TR), as described in chapter 1.1 of this file, has been tested.
No difference have been encountered depending of the functional mode of the product. So, the product was powered, without receiving signal from the transmitter.

1.2 EUT Exercise software

No software is embedded in the product.

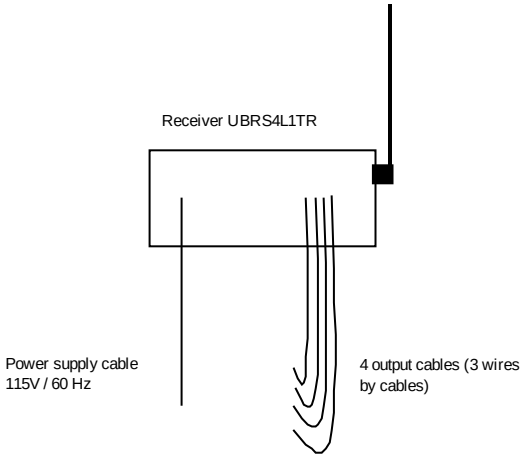
1.3 Special accessories

As shown in Figure 3.1, all interfaces cables used for compliance testing are standard ones. No special cable are recommended for the use;
The antenna used was the ½ wave antenna, reference VUB160.

1.4 Equipment modifications

No equipment modification has been necessary during testing to achieve compliance to Class B levels. The unit tested was a production unit.

1.5 Configuration of tested system.



2 CONDUCTED EMISSION DATA

2.1 Test procedure

The product has been tested according to ANSI C63.4-1992 and FCC PART 15, Subpart B, class B.
The product has been tested with 115V / 60Hz power line voltage and compared to the FCC PART 15, Subpart B, class B limits. Measurement bandwidth was 9KHz from 450 KHz to 30 MHz.

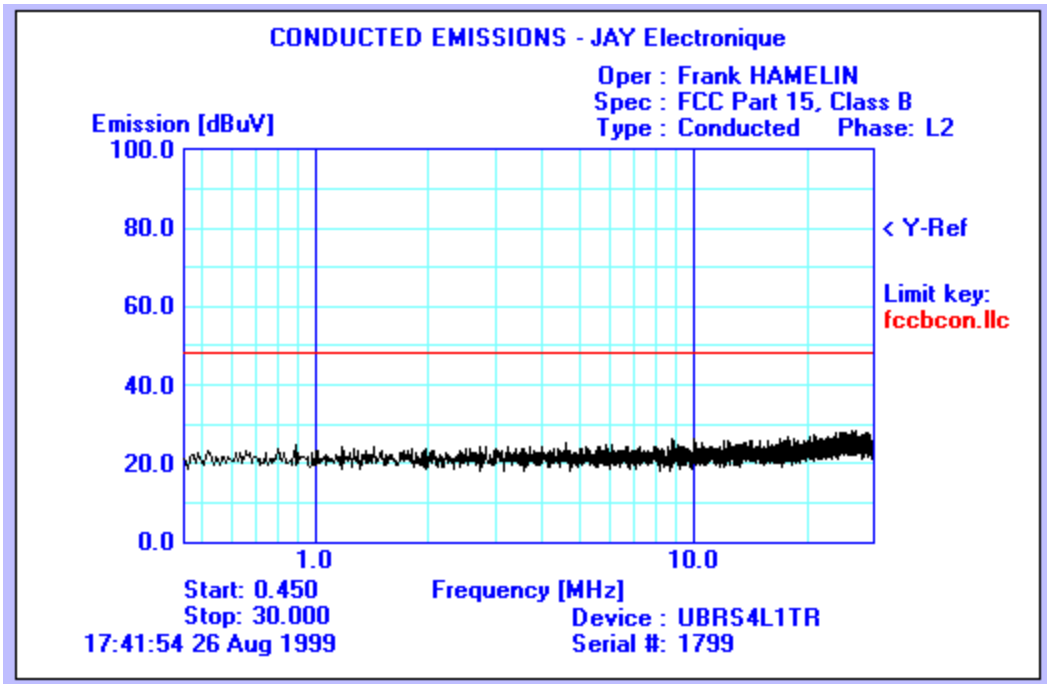
Measurement was initially made with an HP-8591EM Spectrum Analyzer in peak mode. This was followed by a Quasi-Peak, i.e. CISPR measurement with the Rohde & Schwarz ESH-3 receptor for any strong signal. If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary.

The Peak data are shown on the following plots.
The Quasi-Peak measurement were performed on each identified peak and results are detailed in a table with frequencies and levels measured.

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
Rohde & Schwarz ESH-3 receptor
EMCO 3810/2SH LISN

2.2 Neutral conducted emission data

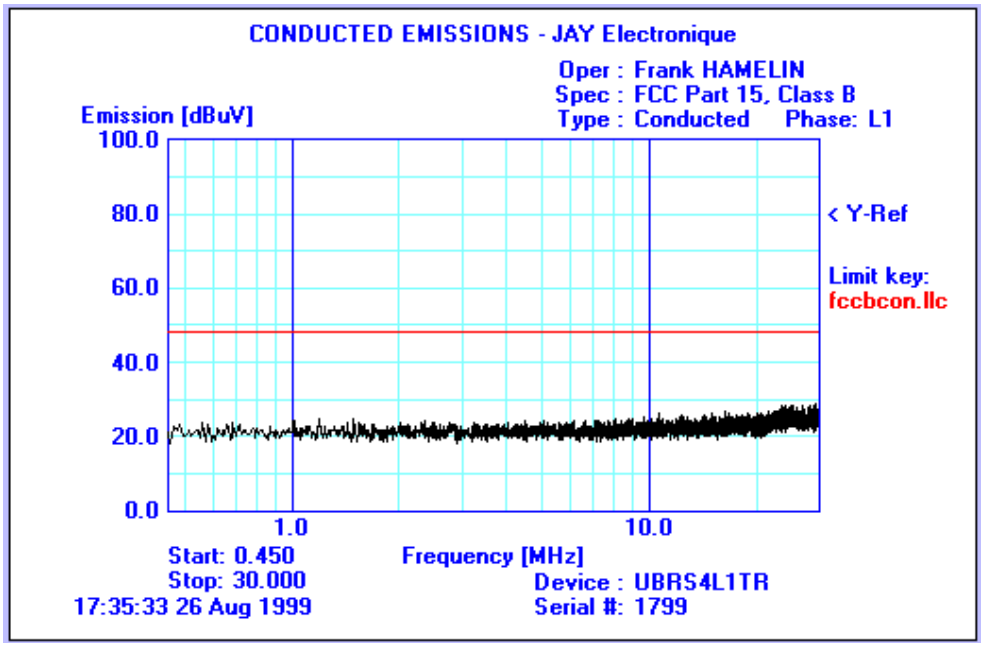


- **Quasi peak:**

```
================================================
1. CONDUCTED
   1.2  FCC PART 15, Subpart B, Class B
================================================
   Quasi-Peaks
   peak criteria = 6 dB

PEAK#    FREQ (MHz)       (dBuV)        DELTA
No peak fund
```

2.3 Line conducted emission data



- **Quasi peak:**

```
================================================
1. CONDUCTED
   1.2  FCC PART 15, Subpart B, Class B
================================================
   Quasi-Peaks
   peak criteria = 6 dB

PEAK#    FREQ (MHz)       (dBuV)        DELTA
No peak fund
```

3 RADIATED EMISSION DATA

3.1 Test Procedure

The product has been tested according to ANSI C63.4-1992 and FCC PART15, Subpart B, Class B.

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 dBµV/m, then they are corrected in µV/m in order to compare them to the FCC limit.
The following conversion is used :

L (µV/m) = inv log (L(dBµV/m) / 20)

The product has been tested with 115V / 60Hz power line voltage, at a distance of 3 meters from the antenna and compared to the FCC Part15, Subpart B, Class B limits. Measurement bandwidth was 120 KHz from 30 MHz to 1 GHz and 1 MHz upon 1 GHz.

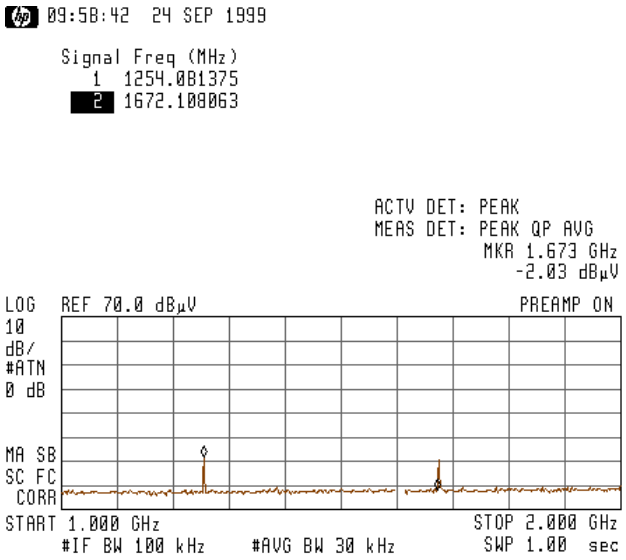
Antenna height search was performed from 0.9m to 4m for both horizontal and vertical polarization. Continuous linear turntable azimuth search was performed with 360 degrees range.

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.

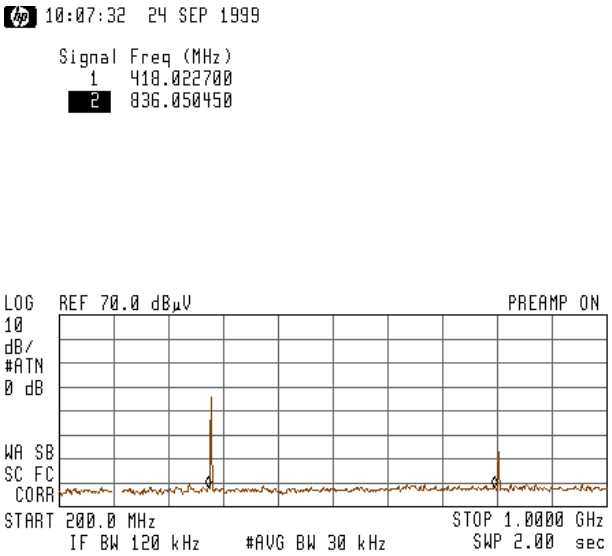
Test Equipment:
HP-8568B Analyzer + HP-85650A Quasi-Peak adapter + HP-85685A RF Preselector
HP 8591EM Spectrum analyzer
HP 8546A EMI Receiver
CHASE CBL6111A Antenna, 30-1000 MHz
EMCO 3115 Antenna, 1-18GHZ
AC Source HP6842A.

3.2 Radiated emission data

Plot of frequencies from 1 to 2 GHZ



Plot of frequencies from 200 to 1000 MHZ



Final result:

Frequency (MHz)	QPeak Lmt (uV/m)	QPeak (uV/m)	QPeak-Lmt (µV/m)	Angle (deg)	Pol	Hgt (cm)	Tot Corr (µV/m)
418	200	131.8	-68.2	44	H	302	10.35
836	200	65.3	-134.7	43	H	285	26
1254	500	36.3	-463.7	40	H	121	25.4
1672	500	94.4	-405.6	51	H	112	35.1

3.3 Field Strength Calculation

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 52.5dBµV is obtained. The antenna factor of 7.4 and a cable factor of 1.1 is added. Tha amplifier gain of 29dB is subtracted, giving a field strength of 32 dBµV/m.

FS = 52.5 + 7.4 + 1.1 – 29 = 32 dBµV/m

The 32 dBµV/m value can be mathematically converted to its corresponding level in µV/m.

Level in µV/m = Common Antilogarithm [(32dBµV/m)/20] = 39.8 µV/m.