EMC TEST REPORT

Nr 3544-FCC

This test report applies only on equipment described hereafter.

Proposal number: 200509-2762

Date of test..... : October 3rd, 2005

Location..... : **LCIE**
ZI des Blanchisseries
38500 VOIRON - FRANCE

Performed by..... : Laurent CHAPUS

Customer..... : **ID3**
5 rue de la verrerie
38000 Le Fontanil Le Cornillon
FRANCE

Product..... : **CERTIS (FCC ID: TPD2H19Ø)**

Type of test ..... : **Radiated and Conducted Emission Test**

Applied standards or specification: EN55022 (1999) + A1 (2000) + A2 (2003)
CISPR22 (1997) + A1 (2000) + A2 (2002)
ANSI C63-4 (2003)

Level ..... : CISPR 22 Class B

Test objective..... : Qualification

Results ..... : **Samples tested in configuration and description presented in this test report complies with prescriptions and limits of EN 55022 and CISPR 22 standards (class B), in radiated and conducted emissions.**

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Written by..... : Laurent CHAPUS

Approved by .....: Jean-Pierre ORY

Date : December 1st, 2005

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 biometric reader CERTIS is connected to a PC, through the USB link.

1.2. HARDWARE IDENTIFICATION:

*** Equipment Under Test (EUT):** **CERTIS** **Sn: 01040029**
FCC ID: TPD2H19Ø

- Input/output :
- 1x USB port (cable 1m, shielded)

- Frequencies :
- 12MHz, 2MHz, 100kHz

1.3. AUXILIARIES:

The FCC IDs for all equipment, plus description of all cables used in the tested system are:

Trade Mark – Model Number (Serial number)	FCC ID	Description	Cable description
CERTIS * **Sn: 01040029**	**TPD2H19Ø**	**USB biometric reader**	USB cable, shielded (1m attached to the equipment)
PC IBM 300PL Model: 6562-340 sn : 55784X1	DOC	Personal computer	AC mains cable, 1.8m unshielded SVGA standard cable, 1.5m
Keyboard IBM KB-7953		Keyboard	PS2 cable
Monitor HP D2817-60014	DOC	Monitor	AC mains cable,1.8m unshielded SVGA cable
Mouse TREKKER		Mouse	PS2 cable

* : Equipment under test

1.4. Running mode:

The biometric reader is connected to the USB port of a PC. The software used during the test permits the acquisition of fingerprints, read on the tested CERTIS sensor. Tests are performed while the reader is waiting for an acquisition.

1.5. I/O CABLES:

- 2x Power cords, unshielded: 1.5m (PC and monitor)
- 1x SVGA standard cable, shielded, with ferrite at each end: 1.5m
- 1x USB cable, shielded, attached to the CERTIS reader : 1m

1.6. EQUIPMENT MODIFICATIONS:

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

2. Radiated emission data

2.1. TEST SET-UP:

Mains: 230V/50Hz
The equipment under test and auxiliaries are set on a non-conducted table of 80cm height, above the ground plane.

Radiated test setup

The installation of EUT is identical for pre-characterization measures in a 3 meters full anechoic chamber and for measures on a 10 meters Open site.

2.2. TEST EQUIPMENT:

Test Equipment from 30MHz to 1GHz on 10 meters open site:

Equipment	Company	Model	Serial
Spectrum Analyzer	HP	8568B	2732A04140
Quasi-Peak adapter	HP	85650A	2811A01136
RF Pre-selector	HP	85685A	2833A00773
Biconical Antenna	EMCO	3104C	9401-4636
Log Periodic Antenna	EMCO	3146	2178
Absorbing clamp	LÜTHI	MDS21	2826
Absorbing clamp	R&S	85024A	194.0100.50
OATS			

EMCO-1050, 6 meters height antenna mast & EMCO-1060, 3 meters diameter Turntable.
A 10 meters Open site located in **LCIE** - Voiron (FRANCE).

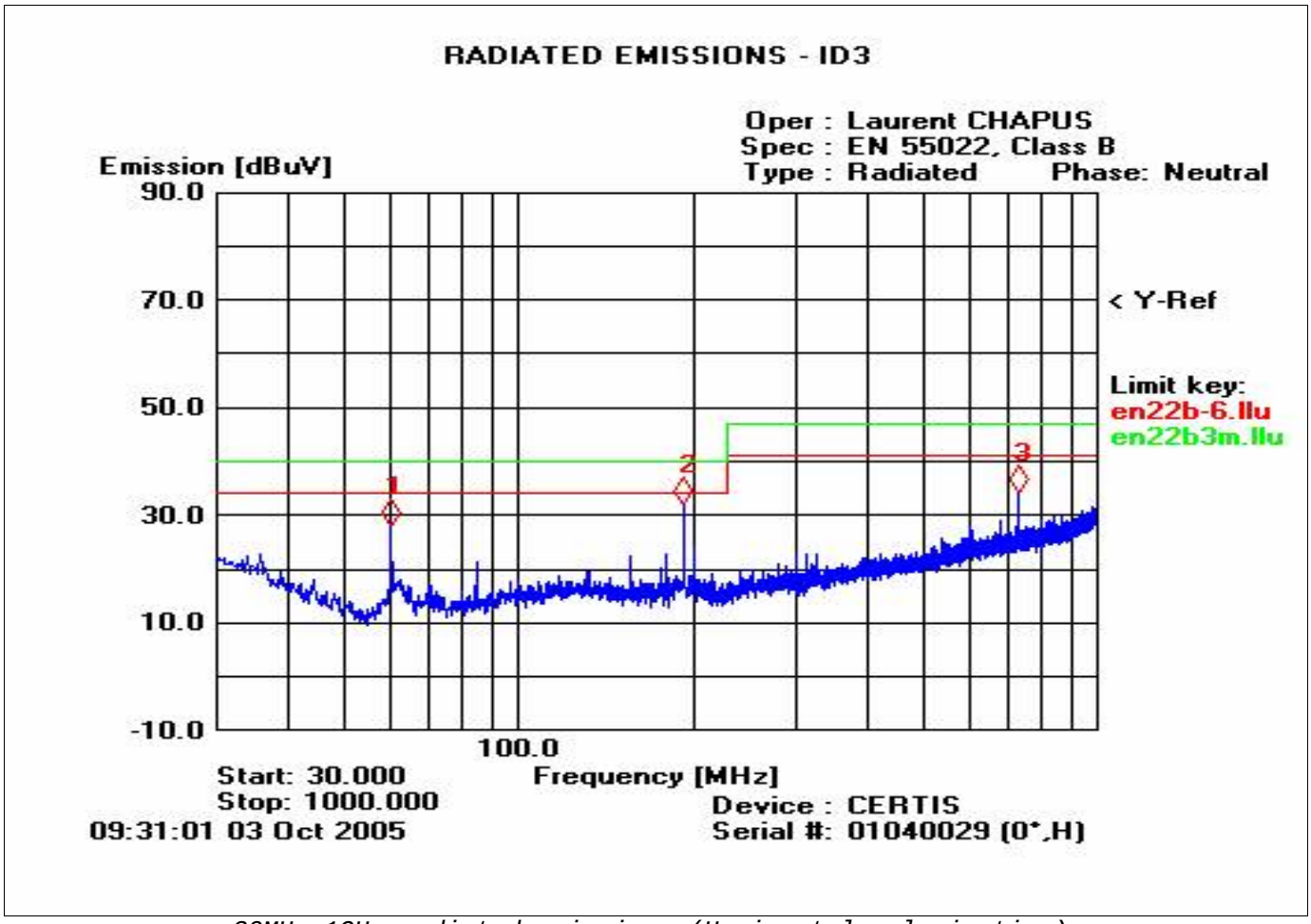
Pre-scan, test Equipment from 30MHz to 1GHz:

Equipment	Company	Model	Serial
EMC Analyzer	HP	8591EM	3536A00384
Amplifier	HP	8447F H64	3113A06394
Antenna (30MHz-1GHz)	CHASE	CBL6111A	1628
Absorbing clamp	LÜTHI	MDS21	2826
Absorbing clamp	R&S	85024A	194.0100.50

2.3. TEST SEQUENCE AND RESULTS:

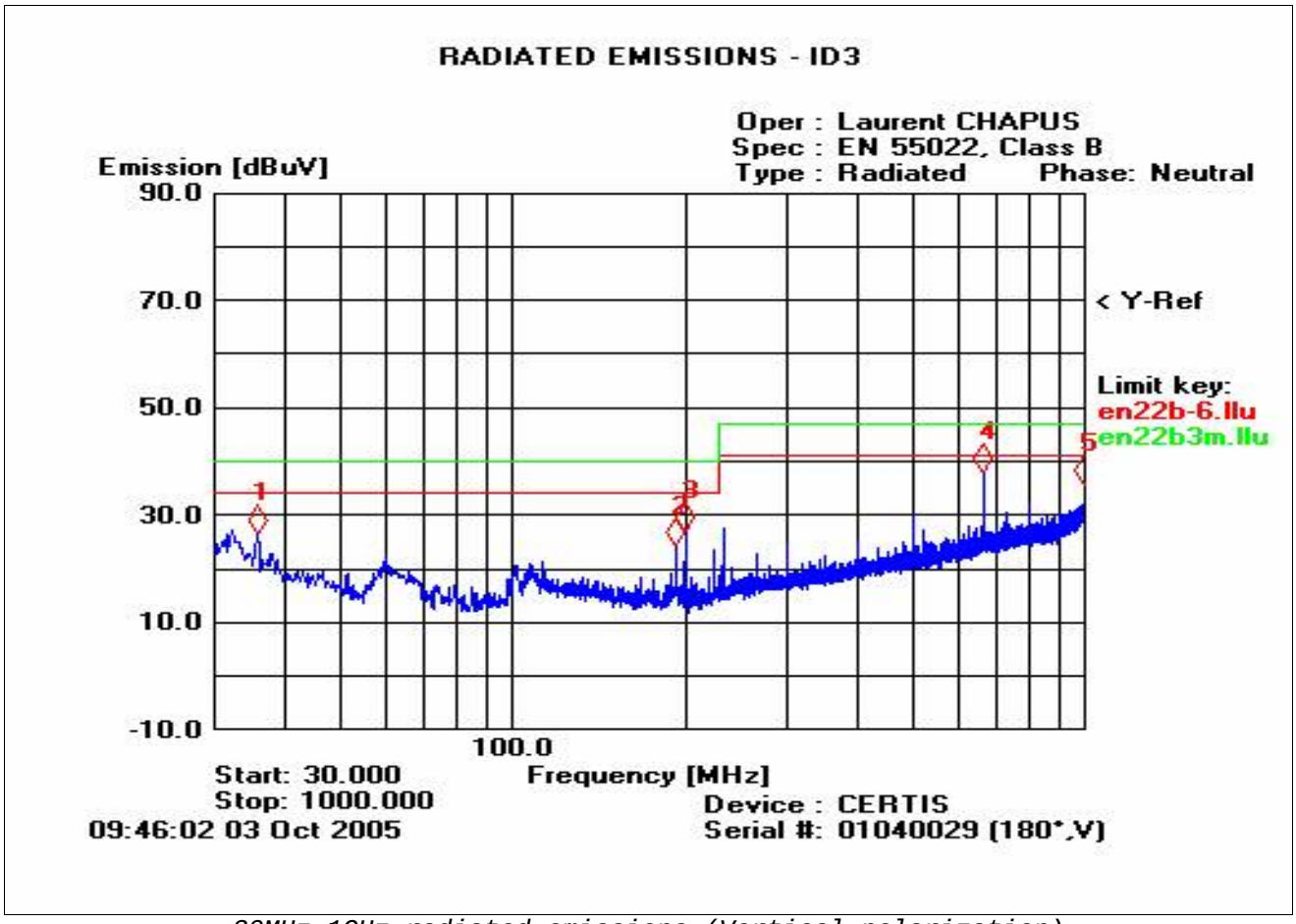
2.3.1.Pre-characterization at 3 meters

A pre-scan of all the setup has been performed in a 3 meters full anechoic chamber. The distance between EUT and antenna is 3 meters. Test is performed in horizontal (H) and vertical (V) polarization, and on 4 faces of the EUT.
See below for graphs examples. Graphs are obtained using a PEAK detector.



30MHz-1GHz radiated emissions (Horizontal polarization)

Marker	Freq. [MHz]	Peak [dBuV]	Comments
1	59.98	27.78	
2	192.5	31.83	
3	731.5	34.08	



30MHz-1GHz radiated emissions (Vertical polarization)

Marker	Freq. [MHz]	Peak [dBuV]	Comments
1	35.73	26.44	
2	192.5	24.21	
3	200.0	26.95	
4	664.9	37.90	
5	997.4	35.70	

2.3.2.Characterization on 10 meters open site from 30MHz to 1GHz

The product has been tested according to ANSI C63.4(2003), CISPR22-1997/A1:2000/A2:2002 and EN55022:1998/A1:2000/A2:2003. Radiated emissions were measured on an open area test site. A description of the facility is on file with the FCC.

The product has been tested with 230V/50Hz power line voltage, at a distance of 10 meters from the antenna and compared to the CISPR 22 Class B limits. Measurement bandwidth was 120kHz from 30MHz to 1GHz.
Antenna height search was performed from 1m to 4m for both horizontal and vertical polarization. Continuous linear turntable azimuth search was performed with 360 degrees range.

Interconnecting cables and equipments were moved to position that maximized emission. A summary of the worst case emissions found in all test configurations and modes is shown on clause 2.3.1.

Frequency list has been created with anechoic chamber pre-scan results.

2.3.3.Qualification results

Frequency list has been created with anechoic chamber pre-characterization results. Measurements are performed in QUASI-PEAK detection.

No	Frequency (MHz)	Q-peak Limit (dBµV/m)	Q-peak (dBµV/m)	Q-peak -Limit (dB)	Angle (deg)	Hgt (cm)	Pol	Tot Corr. (dB)	Comments
1	35.990	30.0	18.5	**-11.5**	335	100	V	11.5	
2	60.025	30.0	28.9	**-1.1**	335	100	V	11.4	Worst margin
3	192.001	30.0	28.2	**-1.8**	85	100	H	18.8	
4	200.036	30.0	18.4	**-11.6**	15	260	V	13.1	
5	224.982	30.0	16.9	**-13.1**	65	120	V	13.7	
6	664.781	37.0	28.1	**-8.9**	165	240	V	24.4	
7	731.225	37.0	30.8	**-6.2**	40	220	V	25.5	
8	997.132	37.0	35.5	**-1.5**	190	180	V	28.8	

Results: COMPLY.

2.4. 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. The 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.

3. Conducted emission data

The product has been tested according to ANSI C63.4(2003), CISPR22-1997/A1:2000/A2:2002 and EN55022:1998/A1:2000/A2:2003.

The product has been tested with 110V/60Hz power line voltage and compared to the CISPR22 Class B limits. Measurement bandwidth was 9kHz from 150kHz to 30MHz.

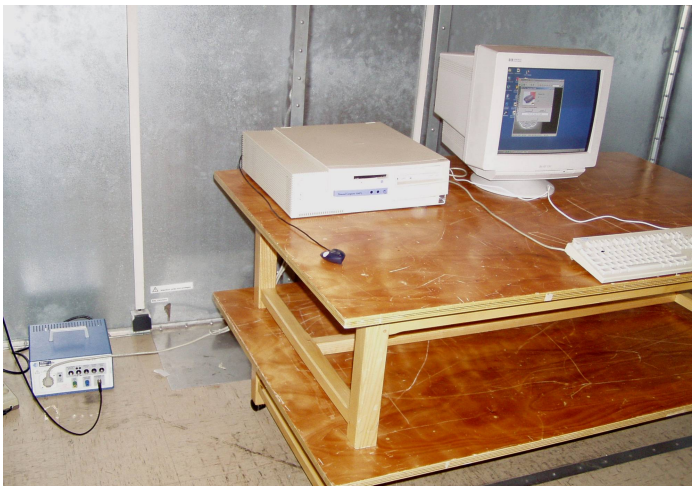
Measurement was initially made with an HP-8591EM Spectrum Analyzer in peak mode. This was followed by a Quasi-Peak, i.e. CISPR measurement with the Rohde & Schwarz ESH3 receiver for any strong signal. If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits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

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.

3.1. TEST SET-UP:

Mains: 110V/60Hz



The equipment under test with its auxiliaries are set 80cm above the ground reference plane on a non-conducting table. The distance between the EUT and the LISN is 80cm.
The distance between the EUT with its auxiliaries and the vertical plane is 40cm.
The EUT is powered through a LISN (measure - 50Ω / 50µH) and auxiliaries are powered by another LISN.
The distance between the EUT and each auxiliary is 10cm.

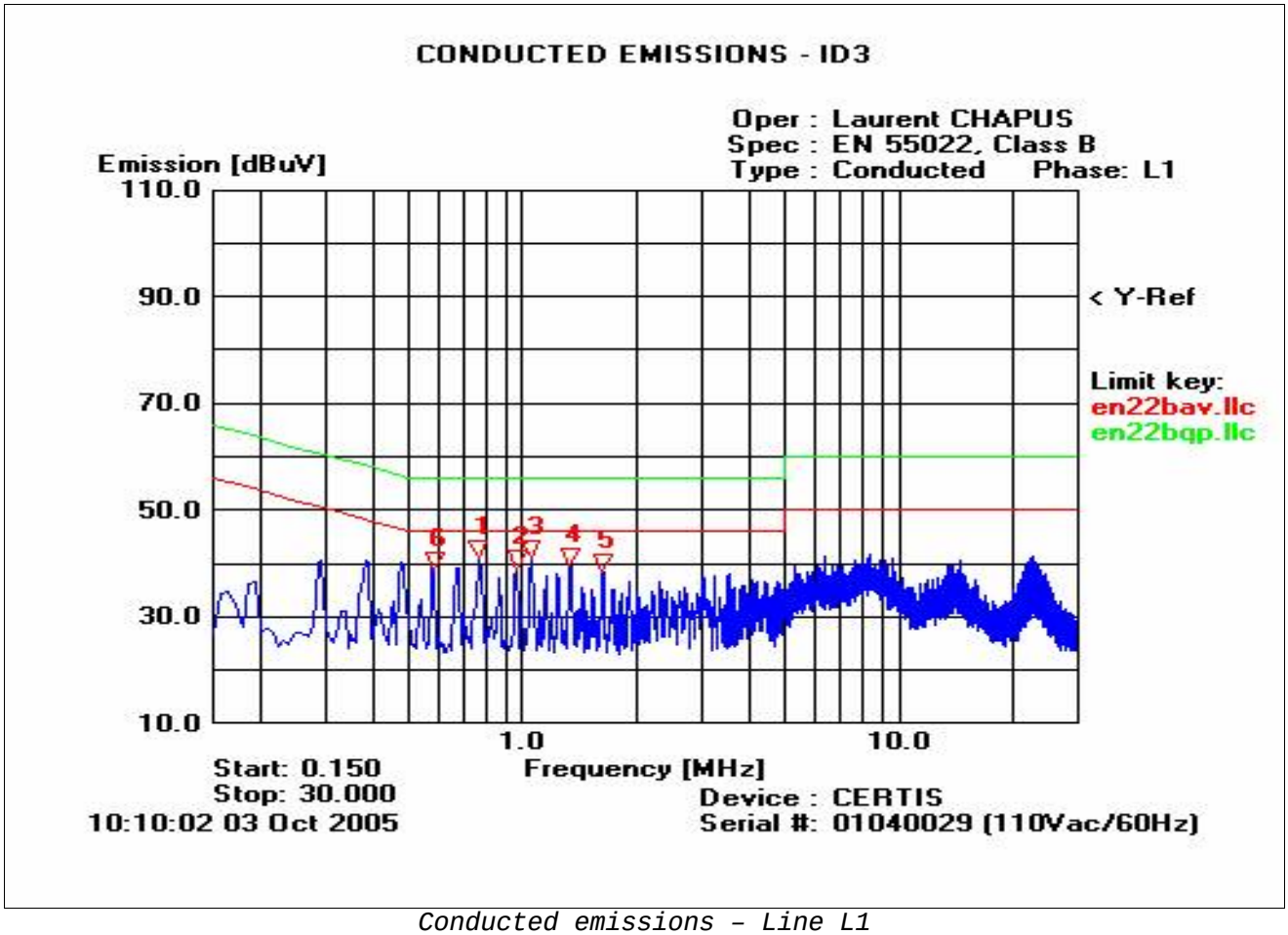
3.2. TEST EQUIPMENT:

Equipment	Company	Model	Serial
EMC Analyzer	HP	8591EM	3536A00384
Test receiver	Rohde&Schwarz	ESH3	872079/117
Transient Limiter	HP	11947A	3107A01596
LISN(auxiliary)	EMCO	3825/2	9309-2122
LISN(measure) 50Ω / 50µH	Telemeter Electronis	TGmbH NNB 2/16	9511-11821628
Faraday room	Rayproof		4854

3.3. TEST SEQUENCE AND RESULTS:

Measures are performed on line 1 and neutral of the power supply of the PC.
(EUT connected on the USB port of the PC)

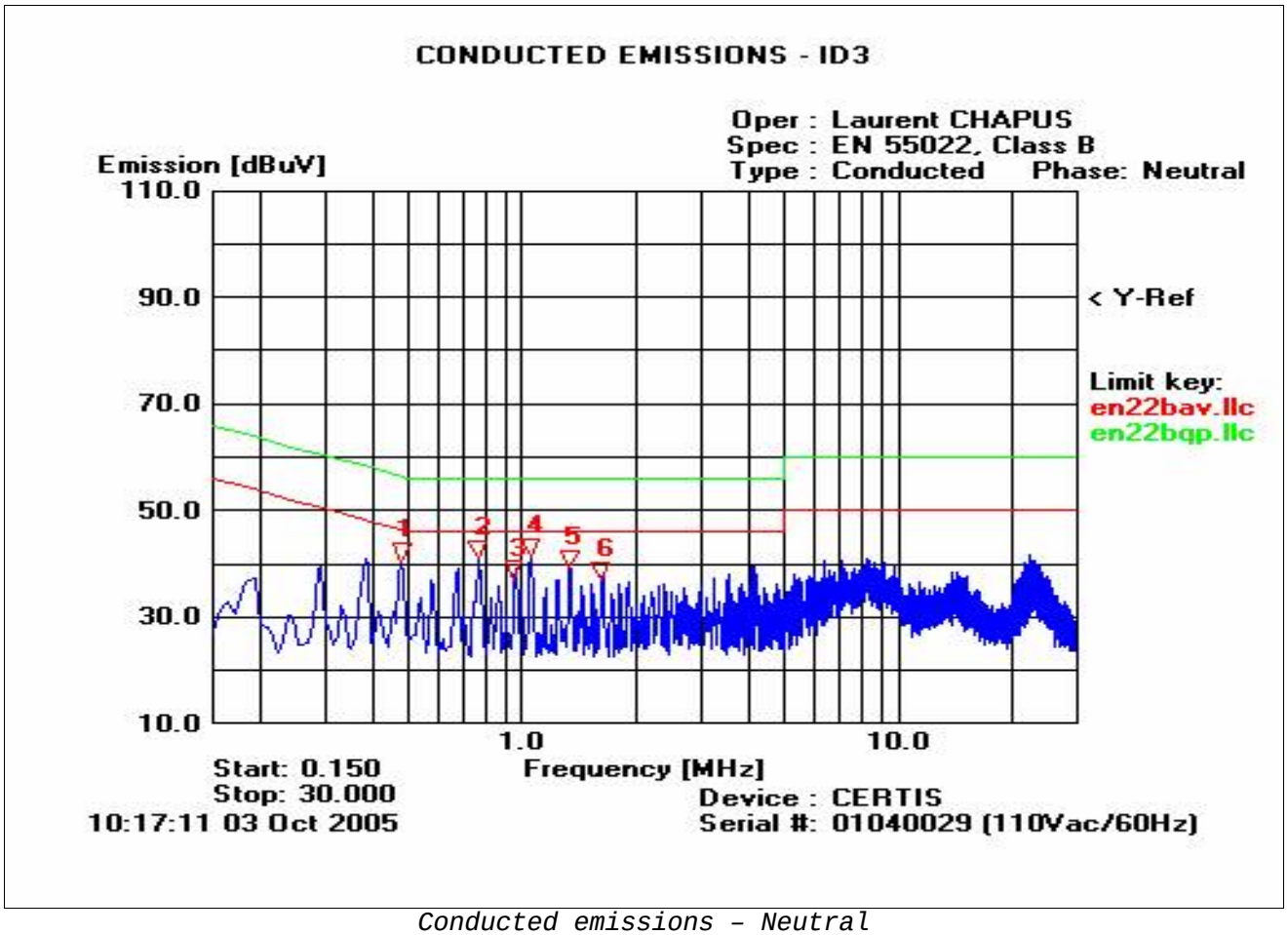
3.3.1.Line conducted emission data (110V/60Hz)



Conducted emissions – Line L1

Marker	Freq. [MHz]	Peak [dBuV]	Q-Peak [dBuV]	Average [dBuV]	Limit [dBuV]
1	0.760	41.53	40.36	37.38	46.00
2	0.960	39.38	38.01	34.41	46.00
3	1.050	41.19	39.78	36.54	46.00
4	1.340	39.69	38.15	33.79	46.00
5	1.630	39.15	36.93	31.05	46.00
6	0.580	39.77	37.83	33.46	46.00

3.3.2.Neutral conducted emission data (110V/60Hz)



Conducted emissions – Neutral

Marker	Freq. [MHz]	Peak [dBuV]	Q-Peak [dBuV]	Average [dBuV]	Limit [dBuV]
1	0.480	40.47	38.99	35.96	46.00
2	0.760	41.18	40.04	37.27	46.00
3	0.950	39.60	37.87	33.56	46.00
4	1.050	41.77	40.10	36.88	46.00
5	1.340	39.72	38.02	33.64	46.00
6	1.620	38.50	36.87	30.87	46.00