

	Report No: R2753 Issue No: 1	FCC ID: X92TL1000	
Test No: T3150		Test Report	Page: 1 of 19



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## REPORT ON ELECTROMAGNETIC COMPATIBILITY TESTS

Performed at:  
**TWENTY PENCE TEST SITE**

**Twenty Pence Road,  
Cottenham,  
Cambridge  
U.K.  
CB24 8PS**

on

**TJB Systems Ltd**

**TL1000 Trip Logik Logger**

dated

**7th April 2010**

### Document History

Issue	Date	Affected page(s)	Description of modifications	Revised by	Approved by
1	07/04/10		Initial release		

Based on report template:  
v090319

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Equipment Under Test (EUT):

**TL1000 Trip Logik Logger**

Test Commissioned by:

**TJB Systems Ltd  
53 Oakleigh Gardens  
Whetstone  
London  
N20 9AB**

Representative:

**Tim Box**

Test Started:

**6th April 2010**

Test Completed:

**7th April 2010**

Test Engineer:

**Dave Smith**

Date of Report:

**7th April 2010**

Written by: Dave Smith

Checked by: Derek Barlow

Signature:



Signature:



Date: 7th April 2010

Date: 7th April 2010

**dB Technology can only report on the specific unit(s) tested at its site. The responsibility for extrapolating this data to a product line lies solely with the manufacturer.**

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## Test Standards Applied

CFR 47 : 2009	<i>Code of Federal Regulations: Pt 15 Subpart B- Radio Frequency Devices - Unintentional Radiators</i>
Class B	

## Emissions Test Results Summary

CFR 47 : 2009

Test	Port	Method	Limit	PASS/FAIL	PASS	Notes
Conducted Emissions CFR47: 15.107	ac power	ANSI C63.4:2003	FCC_B	PASS		
Radiated Emissions CFR47: 15:109		ANSI C63.4:2003	CISPR22(B)	PASS		

specs\_fccv080911

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## 1 EUT Details

### 1.1 General

The EUT was a TL1000 Trip Logik Logger. It is a GPS device which is usually powered via a PSU that plugs into a vehicle 12V DC supply. It can be removed and the logged GPS data can be retrieved via a USB link to a PC. In this configuration power is provided by the USB interface. The EUT had a plastic enclosure. It included microprocessor circuitry with a maximum frequency of 48 MHz.

Details of the EUT and associated peripherals used during the tests are listed below. Figure 1 shows the interconnections between the EUT and peripherals.

Item	Manufacturer	Model	Description	Serial No:	Notes
1	TJB Systems Ltd	TL1000	GPS logger	TL1000000000 1153	
2	Acer	TravelMate 5720	Laptop PC	LXTKDOZ43983 814036200	#1
3	Liteon	PA-1650-02	PSU 19V 3.42A	8824569706	#2
4	D Link	DES 1005-D	Ethernet switch	B21B44B000635	#1
5	Joden	JOD-48B-09	Switch PSU 7.5V 1A	none	#2

#1 FCC Declaration of Conformity

#2 Power supply - only requires FCC Verification

### 1.2 Modifications to EUT and Peripherals

Details of any modifications that were required to achieve compliance are listed below. The modification numbers are referred to in the results sections as appropriate.

Mod No:	Details	Implemented for
0	As supplied 6th April 2010. No modifications were made during the course of testing.	

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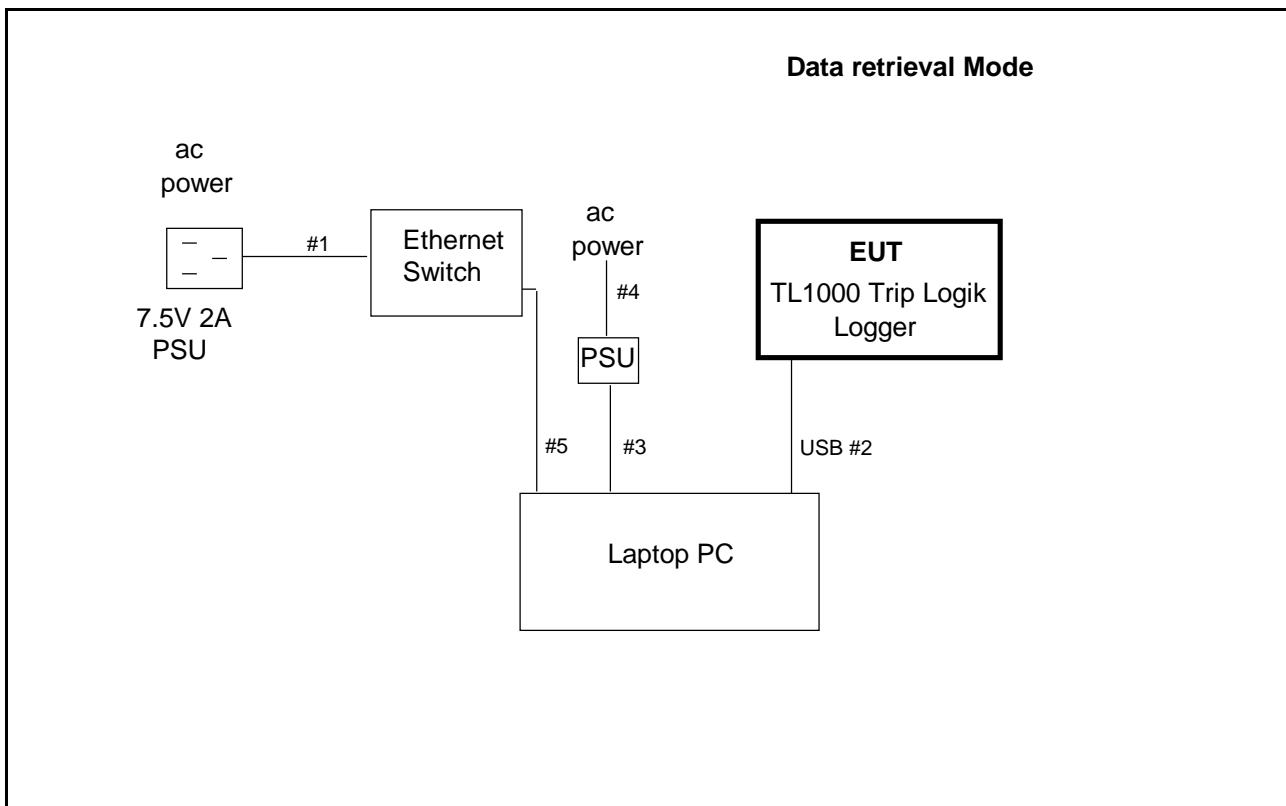
### 1.3 EUT Operating Modes

The EUT was tested in the following operating mode or modes. Generally, operating modes are chosen that will exercise the functions of the EUT as fully as possible and in a manner likely to produce maximum emission levels or susceptibility. Individual test result sheets reference the operating mode of the EUT.

Operating Mode	Details
1	EUT connected and powered via USB to a laptop computer. Computer ethernet port connected to switch. Script running which obtains the EUT status data via the USB.

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**Figure 1 General Arrangement of EUT and Peripherals - Connected to PC**

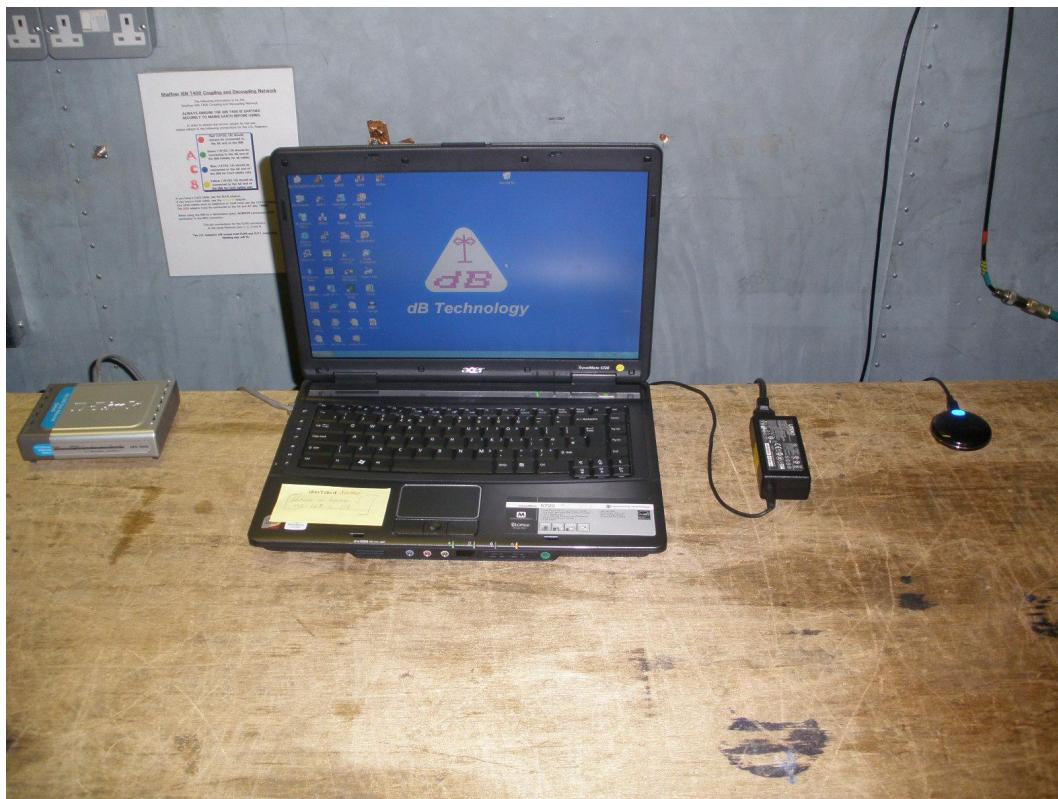


#### 1.4 Details of Interconnecting Cables

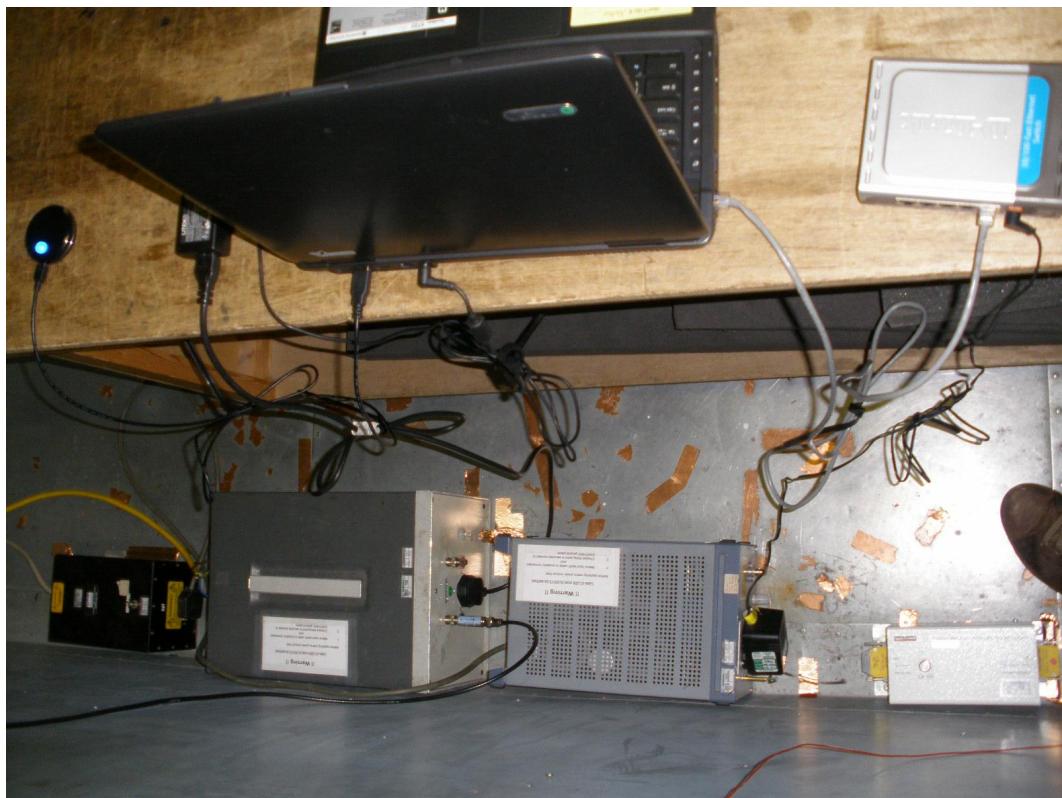
The following table lists details of the cables connected to the EUT.

From	To	Cable Type	Length	Ref.
Ethernet Switch	PSU	2 wire unscreened	1.9m	#1
EUT	Laptop	screened USB	1.5	#2
Laptop	Laptop PSU	2 wire unscreened	1.8m	#3
Laptop PSU	Mains	3 wire unscreened	1.6m	#4
Laptop	Ethernet Switch	Ethernet UTP	1.9m	#5

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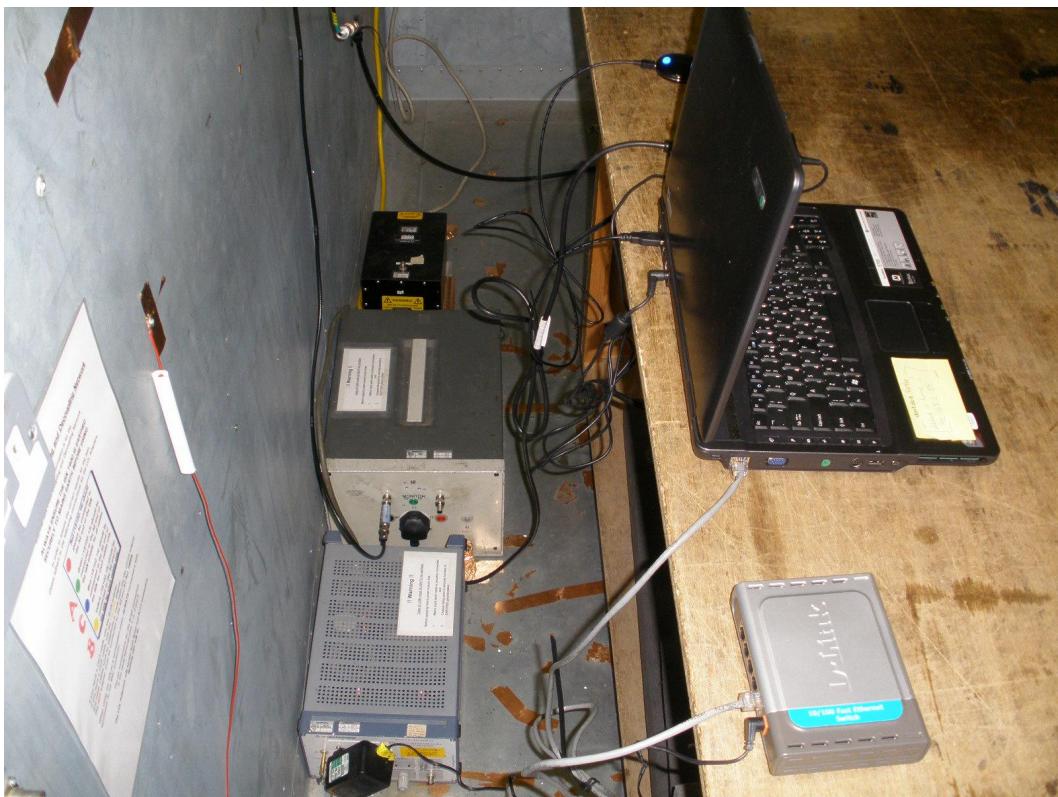


**Photograph 1 Conducted Emissions - PC Power - Front**



**Photograph 2 Conducted Emissions - PC Power - Back**

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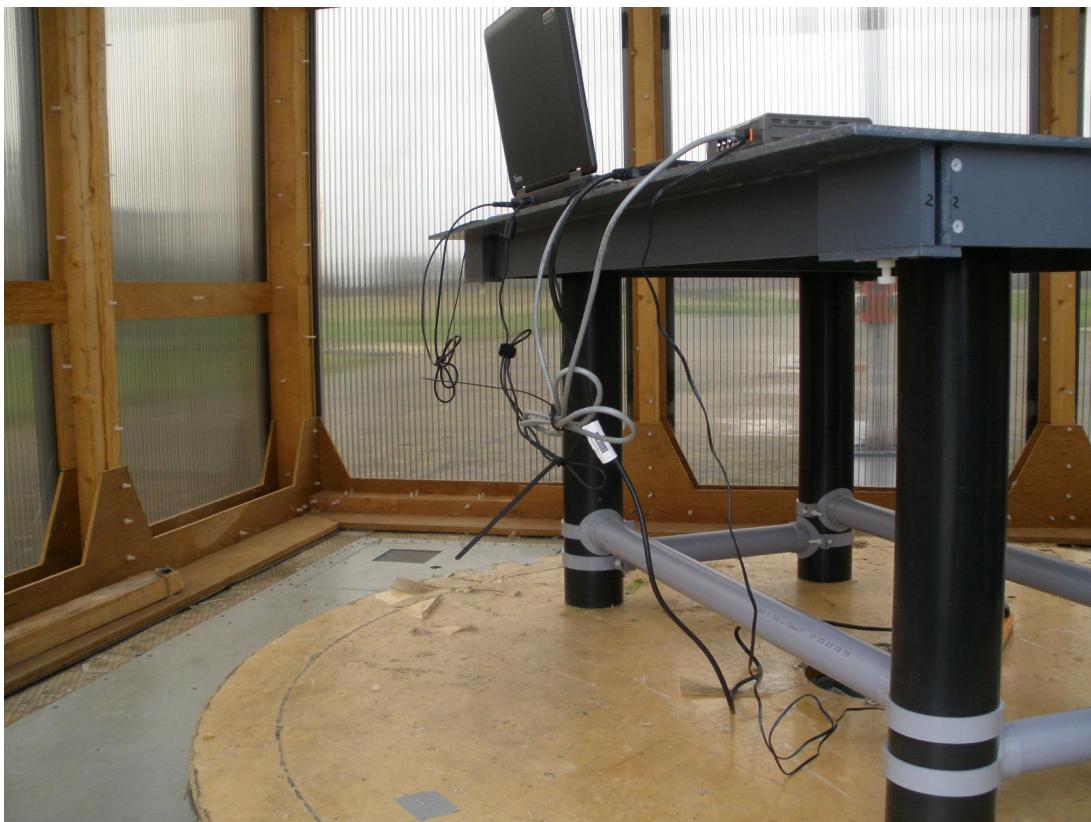


**Photograph 3 Conducted Emissions - PC Power - Back**



**Photograph 4 Radiated Emissions - Connected to PC - Front**

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**Photograph 5 Radiated Emissions - Connected to PC - Back**



**Photograph 6 Radiated Emissions - Connected to PC - Back**

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## 2 Test Equipment

The test equipment used during the tests was one or more of the items listed below. Individual test result sheets indicate which items were used.

Ref No:	Details	Serial Number	Cal Due
A5	Chase Bilog CBL6111A	1760	21/01/11
L1	EMCO 3825/2 LISN	1358	05/11/10
R1	CHASE LHR 7000	1056	22/01/11
R7	R&S ESVD	841729/003	20/11/10
R8	Agilent E7405A Spectrum Analyser	MY44212494	15/09/10

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### 3 Test Methods

#### 3.1 Conducted Emissions - ac power

This section describes the general method of performing this test. The specific method used and any deviations from this general method are listed in the appropriate results section.

Bench top EUTs and peripheral equipment are normally placed on a 0.8m high non-conducting bench, positioned 0.4m from one of the metallic walls of a screened room. Floor standing EUTs are normally placed 0.1m above the metallic floor of the screened room. Mains leads are bundled so as not to exceed 1m.

The EUT is powered using a 50ohm/50uH Line Impedance Stabilisation Network (LISN). Peripherals are powered using a second a 50ohm/50uH LISN. These LISNs are bonded to the screened room floor.

With the correct supply voltage applied to the EUT scans are performed on both the live and neutral line outputs of the LISN using quasi-peak detection over the specified frequency range. The results of these scans are shown in the plots section at the end of the report.

Significant emissions identified by the scans are measured and the results tabulated. The table of results is shown in the conducted emissions results section.

Sample calculation:

$$\text{Final Level} = \text{Receiver Reading} + \text{Combined Cable \& Attenuator Correction Factor (dB)}$$

Example:

$$@182\text{kHz} \quad \text{Final Level} = 42.1 + 10.1 = 52.2 \text{ dBuV}$$

#### 3.2 Radiated Emissions

This section describes the general method of performing this test. The specific method used and any deviations from this general method are listed in the appropriate results section.

Initial scans are performed in a semi-anechoic screened room at a distance of 3m. Scans are performed over the frequency range specified in the test standard with the antenna both horizontally and vertically polarised. During these scans the EUT and peripherals are rotated through 360°. Bench top EUTs are placed on a non-conducting bench at a height of 0.8m above the ground plane. Floor standing EUTs are placed 0.1m above the ground plane. The results of the scans are shown in the plots included at the end of the report. Cables are moved to identify the arrangement that gives highest emission levels.

Significant emissions identified by the scans are measured on an open area test site at the appropriate test distance using a CISPR16 quasi-peak receiver. Maximised readings are obtained by rotating the EUT through 360° and adjusting the height of the antenna from 1m to 4m. Measurements are made with the antenna both horizontally and vertically polarised and the results tabulated.

Sample calculation:

$$\text{Final Level} = \text{Receiver Reading} + \text{Combined Antenna \& Cable Correction Factor (dB 1/m)}$$

Example:

$$@60.12\text{MHz} \quad \text{Final Level} = 15.0 + 6.2 = 21.2 \text{ dBuV}$$

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## 4 Test Results

The following sections contain tabulated test results. Plots of various scans are included at the back of this section.

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## 4.1 Conducted Emissions (Power) - Results

Factor Set 1:	L1_10A	I2_CBL005_CBL039	-	-
Factor Set 2:	-	-	-	-
Factor Set 3:	-	-	-	-
Test Equipment:	R1 L1 CSET001			

### Conducted Emissions (Power)

Company:	TJB Systems Ltd				Product: TL1000 Trip Logik Logger									
Date:	07/04/2010				Test Eng: Dave Smith									
Ports:	ac power													
Test:	ANSI C63.4:2003 using limits of				FCC_B									
Ports:														
Test:					using limits of									
Plot	Op Mode	Mod State	Line (L/N)	Fact Set	Freq. MHz	Det qp/av	Rec. Level dBuV	Corr'n Factor dB	Total Level dBuV	Limit CISPR22(B) dBuV	Margin CISPR22(B) dB	Notes		
1	1	0	L	1	0.182	qp	42.1	10.1	52.2	64.4	12.2			
1	1	0	L	1	0.182	av	30.5	10.1	40.6	54.4	13.8			
1	1	0	L	1	0.243	qp	33.3	10.1	43.4	62.0	18.6			
1	1	0	L	1	0.243	av	20.9	10.1	31.0	52.0	21.0			
2	1	0	N	1	0.183	qp	42.6	10.1	52.7	64.3	11.7			
2	1	0	N	1	0.183	av	31.8	10.1	41.9	54.3	12.5			
2	1	0	N	1	0.243	qp	33.1	10.1	43.2	62.0	18.8			
2	1	0	N	1	0.243	av	21.8	10.1	31.9	52.0	20.1			
Results					Minimum Margin PASS/FAIL			11.7 dB						
Notes		Comments and Observations												
		Results of scans shown in plots 1 and 2.  Measurement made on Laptop PSU ac power port @115V.												

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## 4.2 Radiated Emissions Results

Factor Set 1:	A5_FS_09A	-	-	CBL015_09C	1 m cable
Factor Set 2:	-	-	-	-	-
Factor Set 3:	-	-	-	-	-
Test Equipment:	R7 A5 CSET005				

### Radiated Emissions

Company: TJB Systems Ltd								Product: TL1000 Trip Logik Logger											
Date: 06/04/2010								Test Eng: Dave Smith											
Ports:																			
Test: ANSI C63.4:2003 using limits of								CISPR22(B)											
Ports:																			
Test: using limits of																			
Plot	Op Mode	Mod State	Dist m	Fact Set	Freq. MHz	Ant Pol	Rec. Level dBuV	Corr'n Factor dB/m	Corr'n Factor dB	Total Level dBuV/m	Limit CISPR22(B) dBuV/m	Margin CISPR22(B) dB	Notes						
3	1	0	10	1	60.120	V	15.0	6.2		21.2	30.0	8.8							
3	1	0	10	1	60.120	H	2.2	6.2		8.4	30.0	21.6							
3	1	0	10	1	71.990	V	13.3	6.9		20.2	30.0	9.8							
3	1	0	10	1	71.990	H	5.7	6.9		12.6	30.0	17.4							
3	1	0	10	1	100.000	V	14.2	11.5		25.7	30.0	4.3							
3	1	0	10	1	100.000	H	14.0	11.5		25.5	30.0	4.5							
3	1	0	10	1	144.000	V	2.4	13.2		15.6	30.0	14.4							
3	1	0	10	1	144.000	H	2.5	13.2		15.7	30.0	14.3							
3	1	0	10	1	200.000	V	15.0	10.4		25.4	30.0	4.6							
3	1	0	10	1	200.000	H	13.3	10.4		23.7	30.0	6.3							
3	1	0	10	1	211.580	V	15.1	11.1		26.2	30.0	3.8							
3	1	0	10	1	211.580	H	10.4	11.1		21.5	30.0	8.5							
3	1	0	10	1	233.230	V	11.8	12.4		24.2	37.0	12.8							
3	1	0	10	1	233.230	H	10.0	12.4		22.4	37.0	14.6							
3	1	0	10	1	250.000	V	12.0	15.0		27.0	37.0	10.0							
3	1	0	10	1	250.000	H	16.4	15.0		31.4	37.0	5.6							
4	1	0	10	1	299.990	V	6.4	16.1		22.5	37.0	14.5							
4	1	0	10	1	299.990	H	16.0	16.1		32.1	37.0	4.9							
4	1	0	10	1	494.000	V	6.8	22.2		29.0	37.0	8.0							
4	1	0	10	1	494.000	H	1.1	22.2		23.3	37.0	13.7							
4	1	0	10	1	799.950	V	-1.0	28.5		27.5	37.0	9.5							
4	1	0	10	1	799.950	H	-0.4	28.5		28.1	37.0	8.9							
Results								Minimum Margin PASS/FAIL											
Notes		Comments and Observations																	
		Results of scans shown in plots 3 and 4.																	

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**Test Report**

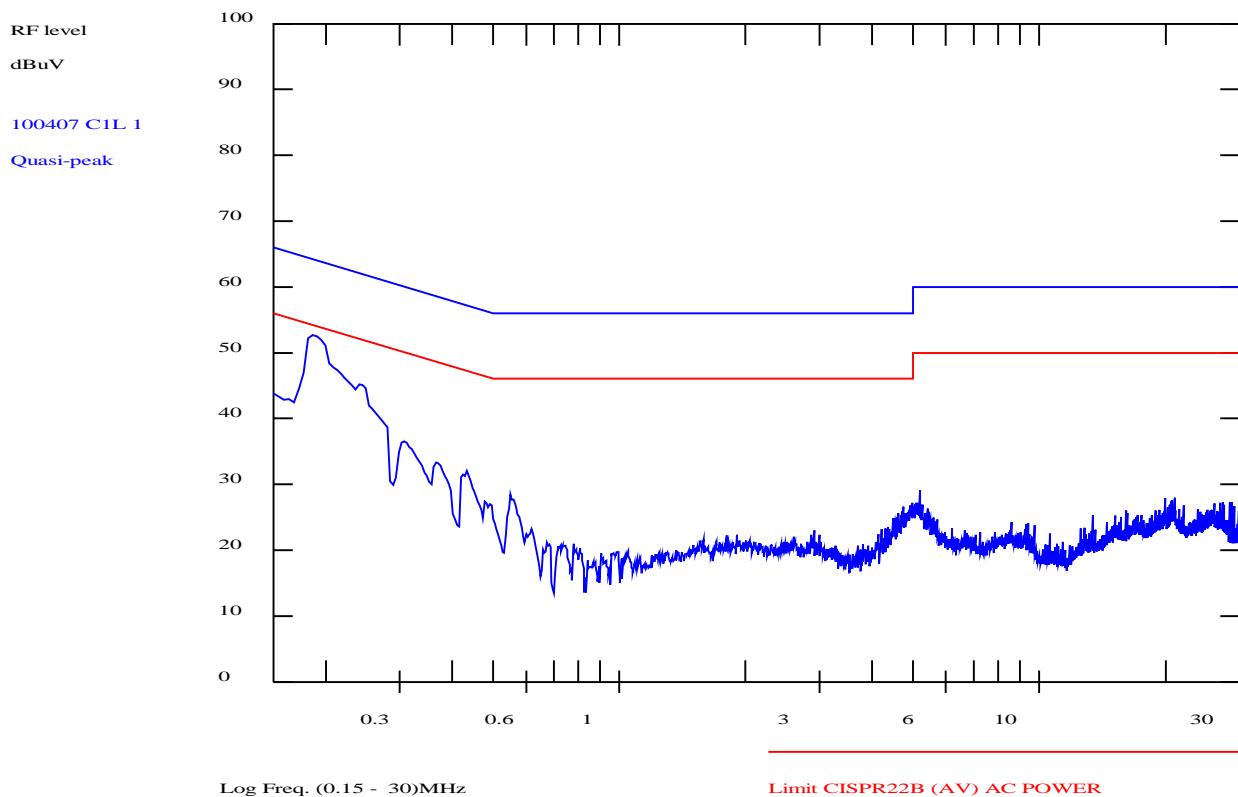
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Chase EMS 6.21

Notes

Analyse 100407 C1L 115V

Test: 150kHz-30MHz (L1+CSET001) dBuV



**PLOT 1 Conducted Emissions - PC power - Live**

Company:	TJB System Ltd	Product:	TL1000
Date:	07 Apr 10	Test Engineer:	Dave Smith
Test:	FCC pt 15	Limit:	FCC (B) QP
Notes:			
Measured on PC power supply.			
Equip:R1,L1,,AB002			
Line:	Live	Attenuator:	10dB PAD
Detector:	QuasiPeak		Operating Mode: 1
LISN:	EMCO	Filename:	Mod. State: 0
			C040740E.plt

Frequency List ( MHz )


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**Test Report**

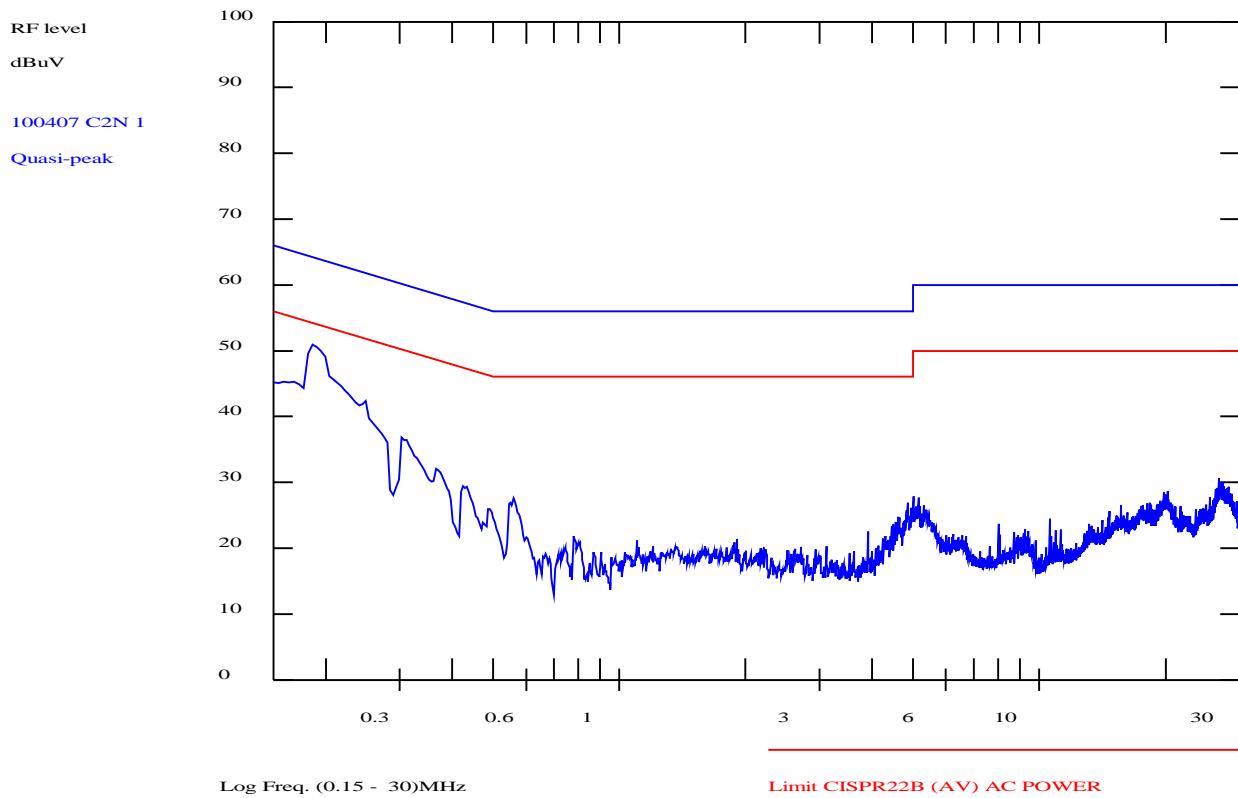
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Chase EMS 6.21

Notes

Analyse 100407 C2N 115V

Test: 150kHz-30MHz (L1+CSET001) dBuV



## PLOT 2 Conducted Emissions - PC power - Neutral

Company:	TJB System Ltd	Product:	TL1000
Date:	07 Apr 10	Test Engineer:	Dave Smith
Test:	FCC pt 15	Limit:	FCC (B) QP
Notes:			
Measured on PC power supply.			
Equip:R1,L1,,AB002			
Line:	Neutral	Attenuator:	10dB PAD
Detector:	QuasiPeak		Operating Mode: 1 Mod. State: 0
LISN:	EMCO	Filename:	C0407420.plt

### Frequency List ( MHz )

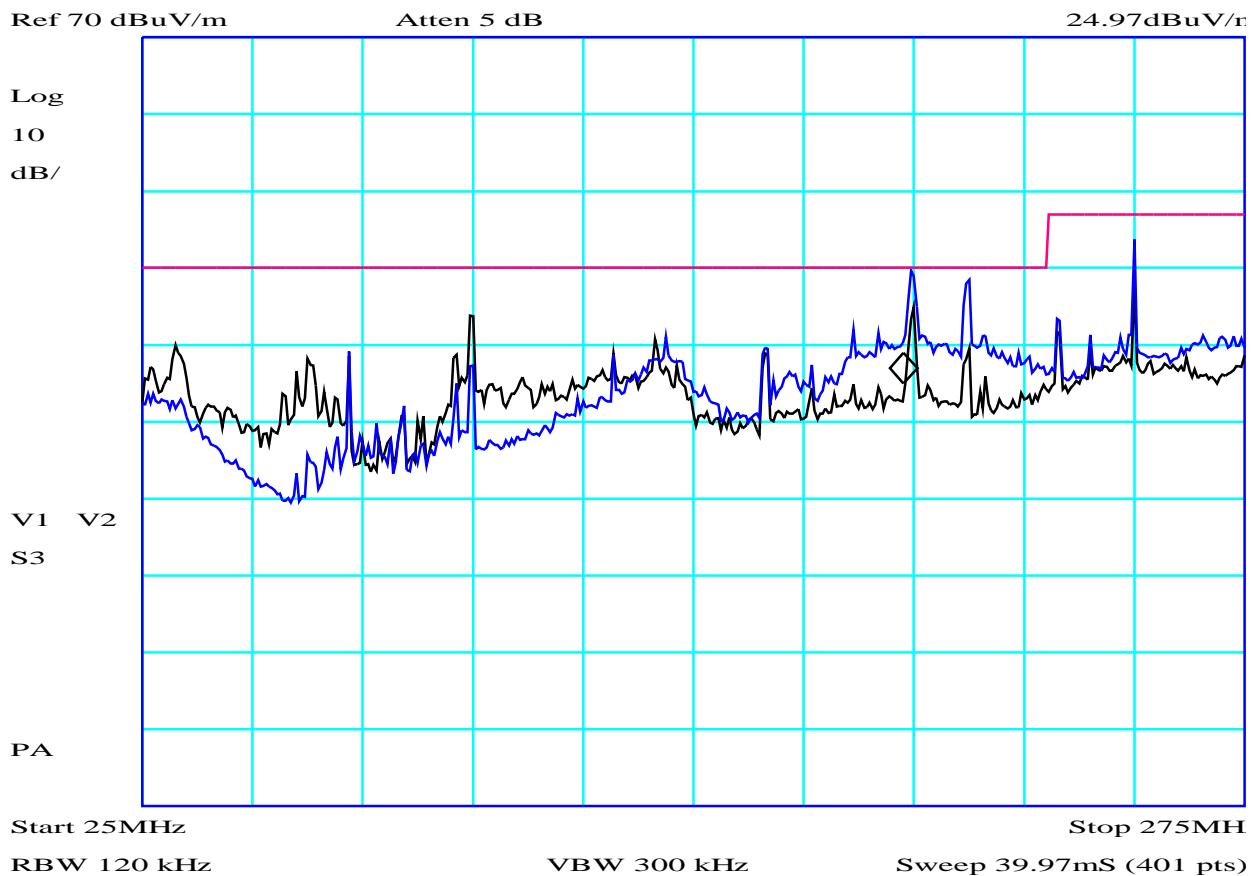

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Marker 1: 198.1MHz



**PLOT 3 Radiated Emissions - Connected to PC - 25MHz to 275MHz**

Company:	TJB Systems Ltd	Product:	TL1000
Date:	06/04/2010	Test Eng:	Dave Smith
Method:	ANSI C63.4	Method:	
Limit1:(VIO)	CISPR22_B@3m	Limit2:	
Limit3:		Limit4:	

Black: Vertical  
Blue: Horizontal

Facility:	Anech_1	Height	1m	Mode:	1
Distance	3m	Polarisation	V+H	Modification State:	0
Angle	0-360	File:	H03065C1		

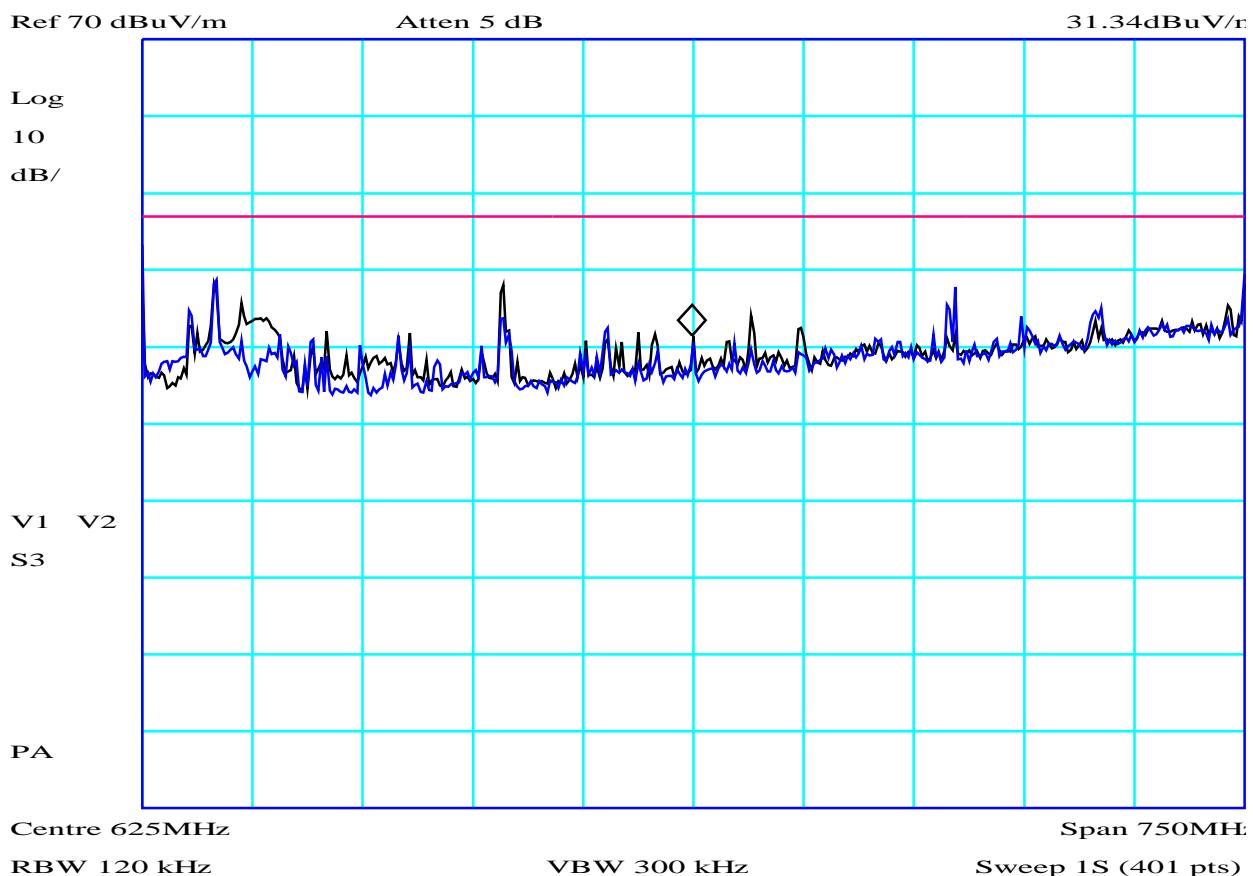
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Marker 1: 625MHz



CF1:A5\_FS\_100208 CF2:CBL002\_CBL003\_090306

#### PLOT 4 Radiated Emissions - Connected to PC - 25MHz to 275MHz

Company:	TJB Systems Ltd	Product:	TL1000
Date:	06/04/2010	Test Eng:	Dave Smith
Method:	ANSI C63.4	Method:	
Limit1:(VIO)	CISPR22_B@3m	Limit2:	
Limit3:		Limit4:	
<p>Black: Vertical Blue: Horizontal</p>			
Facility:	Anech_1	Height	1m
Distance	3m	Polarisation	V+H
Angle	0-360	File:	H03065D7