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	Test No: T1804	Test Report	Page: 1 of 20



dB Technology

|----- (Cambridge Ltd.) -----|

EMC
Testing

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REPORT ON ELECTROMAGNETIC COMPATIBILITY TESTS

Performed at:
TWENTY PENCE TEST SITE

**Twenty Pence Road,
Cottenham,
Cambridge
U.K.
CB4 8PS**

on

O2M8 Ltd

WebBrick

dated

13th December 2005


Document History

Issue	Date	Affected page(s)	Description of modifications	Revised by	Approved by
1	14/12/05		Initial release		

Based on report template:

v031111

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	Report No: R2120	
	Issue No: 1	
Test No: T1804	Test Report	Page: 2 of 20

Equipment Under Test (EUT):

WebBrick

Test Commissioned by:

O2M8 Ltd
9 Brewery Court
Theale
Berkshire
RG7 5AH

Representative:

Andrew Harris

Test Started:

8th December 2005

Test Completed:

8th December 2005

Test Engineer:

Stephen Browning

Date of Report:

13th December 2005

Written by: _ _ _ Derek Barlow _ _ _

Checked by: _ _ _ Claire Arber _ _ _

Signature:

D. Barlow

Signature:

C. Arber

Date: _ _ 13th December 2005 _ _

Date: _ _ 14th December 2005 _ _

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.

Test Standards Applied


EN55022:1998
(+ A1/A2)

*Information technology equipment - Radio disturbance characteristics
Limits and methods of measurement*

Class B Emissions

EN55024:1998
(+ A1/A2)

*Information technology equipment - Immunity characteristics
Limits and methods of measurement*

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Emissions Test Results Summary

EN55022:1998


PASS

Test	Port	Method	Limit	PASS/FAIL	Notes
Conducted Emissions	ac power	EN55022:1998	EN55022 Class B = CISPR22(B)	PASS	
Conducted Emissions	telecom	EN55022:1998	EN55022 Class B = CISPR22(B)	PASS	
Radiated Emissions		EN55022:1998	EN55022 Class B = CISPR22(B)	PASS	

specs_ITv031110

EN61000-3-2 Mains Harmonics test not applicable because EUT power rating is less than 75W.

EN61000-3-3 Mains Flicker test not applicable as the EUT does not switch internal high current loads.

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Immunity Test Results Summary

EN55024:1998


Test	Port	Method	Severity	Perf. Criterion (Rec'd) Ach'd		Notes
Radiated Field Immunity		IEC61000-4-3	3V/m 80-1000MHz 80%1kHz am mod	(A)	A	
Conducted RF Immunity	power signal/control	IEC61000-4-6	3Vrms 0.15-80MHz 80%1kHz am mod	(A)	N/T	#1
Electrical Fast Transients	ac power	IEC61000-4-4	1kV	(B)	N/T	#1
	signal/control dc power	IEC61000-4-4	0.5kV	(B)	N/T	#1
Electrostatic Discharge		IEC61000-4-2	8kV air	(B)	N/T	#1
		IEC61000-4-2	4kV contact	(B)	N/T	#1
Surge	ac power	IEC61000-4-5	1.0kV Line - Line 2.0kV Line - Earth	(B)	N/A	#2
	signal lines to outdoor cables	IEC61000-4-5	1.0kV Line - Earth	(B)	N/T	#1
	dc power to outdoor cables	IEC61000-4-5	0.5kV Line - Earth	(B)	N/T	#1
Voltage Dips and Interruptions	ac power	IEC61000-4-11	> 95% reduction 10msec	(B)	N/T	#1
		IEC61000-4-11	30% reduction 500msec	(C)	N/T	#1
		IEC61000-4-11	> 95% reduction 5 seconds	(C)	N/T	#1
Power Frequency Magnetic Field		IEC61000-4-8	50Hz 1A/m	(A)	N/A	#3

specs_ITv031110

- #1 Not tested. Manufacturer is to use history of performance in the field to justify immunity compliance.
 #2 Not applicable as EUT is powered by an external power brick which will carry its own CE compliance.
 #3 Not applicable as EUT did not contain any devices likely to be susceptible to a magnetic field.


Performance Criterion (Rec'd) = Minimum performance criterion recommended by standards
 Ach'd = Performance criterion achieved during actual test

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1 EUT Details

1.1 General

The EUT was a Web Brick which performs the function of reading and controlling devices within the home via a web page interface which is accessible over the Internet. It has an ethernet connection to a modem and various analogue and digital i/o ports and mains switching ports for direct switching of mains operated devices. The EUT runs from low voltage DC and is powered by an external "power brick".

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	O2M8	WebBrick 6	Home automation controller	130307118	
2	CPC	EP920	Bench Power Supply		
3	O2M8		Lamp panel for AC load		
4	O2M8		Switch panel for inputs		
5	O2M8		Temperature sensors		

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 received for testing on 8th December 2005 (included grounding of Ethernet connector can)	Ethernet cond emissions
1	As above plus outboard Ethernet centre tap capacitor reduced to 100pF and inboard centre tap capacitor at 10nF	

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	Monitoring temperature inputs and running external mains loads (lamp panel) and communication with a computer over the web interface.

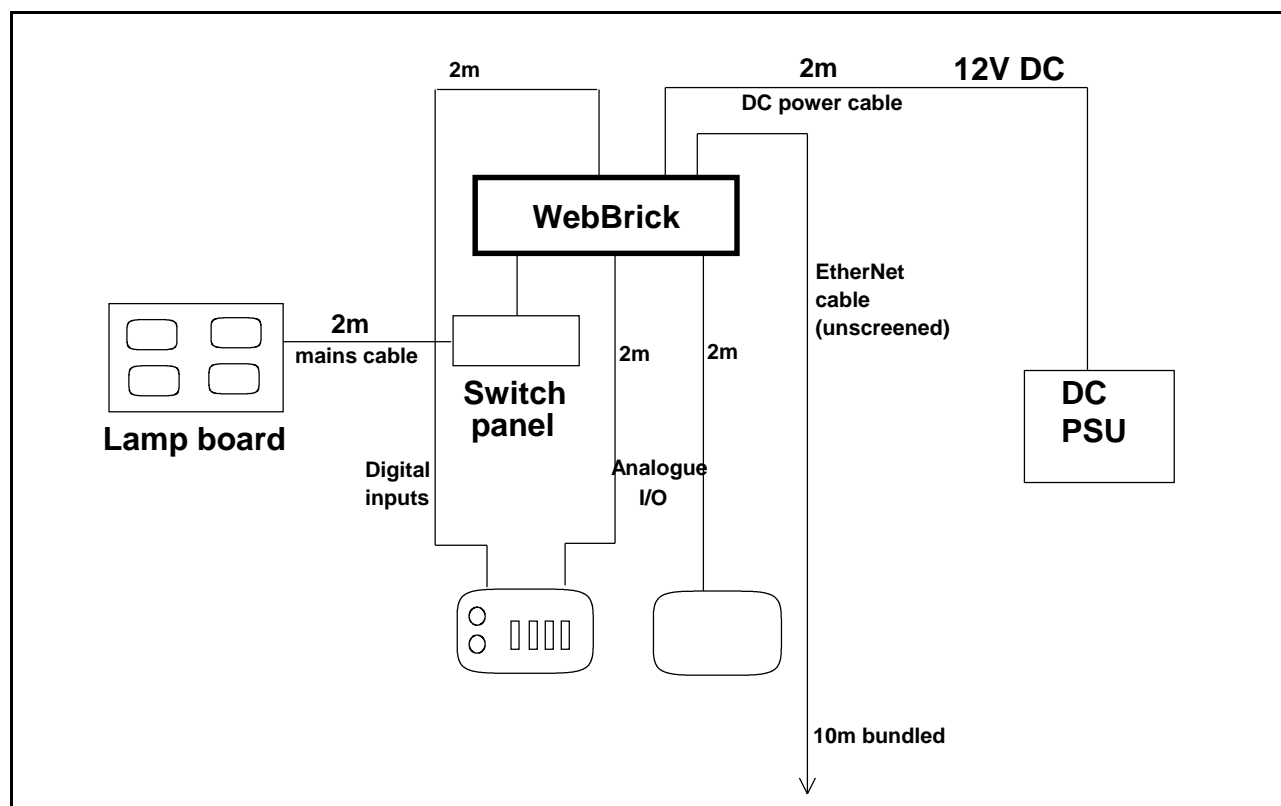
1.4 EUT Performance Criteria


To assess the immunity performance of the EUT the performance criteria listed below were applied. The criteria specify the functions that were monitored during the tests and the levels of performance that were considered acceptable.

Criterion	Details
A	There should be no effect outside of specification on observed readings, no changes in outputs and no changes in stored states either during or after the completion of the test.
B	There may be temporary effects on the EUT providing full automatic recovery occurs after the test.
C	Full loss of functionality may occur providing full recovery is possible after the test, with the aid of user intervention if necessary.

Performance Criterion A is normally applied to tests where the phenomenon is likely to be continuous in nature - the EUT should continue to perform within the specified performance limits during the test. *Performance Criterion B* is normally applied to tests where the phenomenon is likely to be transient in nature - in this case temporary loss of performance is usually acceptable during the test as long as the EUT automatically returns to normal operation after the test. *Performance Criterion C* is normally associated with power supply failures - in this case loss of performance is usually acceptable as long as the EUT can recover with the aid of user intervention if necessary.

Figure 1 General Arrangement of EUT and Peripherals

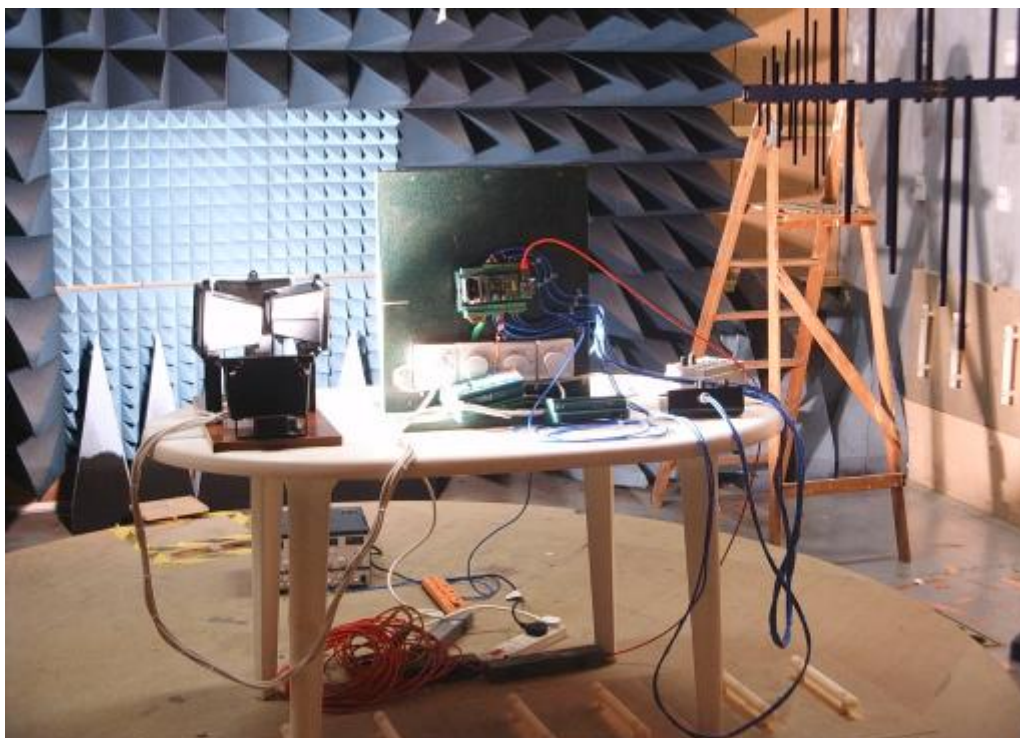



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Photograph 1 Arrangement of EUT and Peripherals - Conducted Emissions



Photograph 2 Arrangement of EUT and Peripherals - Radiated Emissions




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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
A12	Chase Bilog CBL6111A	1012
A5	Chase Bilog CBL6111A	1760
AMP1	KALMUS Power amp	72690
DC002	DC6180A Directional Coupler	305100
ISN2b	Schaffner T444 ISN (with yellow CAT5 adapter)	19102
L1	EMCO 3825/2 LISN	1358
PM1	Marconi 6960A RF Power Meter	2785
PS2	Marconi 6920 RF Power Sensor	112
R1	CHASE LHR 7000	1056
R4	R&S ESVS10	421872
R5	HP 8595E Spec. Analyser	3412A00701
R5B	dB Technology Pre-amp	dB001
SG9	HP 8648C 9kHz-3.2GHz Signal Generator	3847A05254

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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.

3.2 Conducted Emissions - telecommunication ports

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 telecomms lead to be tested is connected to an ISN with the appropriate number of lines, presenting a common-mode impedance of 150 ohms. The ISN is bonded to the wall of the screened room. The length of signal lead between the EUT and the ISN is no longer than 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.

Scans are performed 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.

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3.3 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.

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.

3.4 RF Fields Immunity

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 EUT is placed on a non-conducting wooden bench at a height of 0.8m above the floor of an anechoic screened room. Floor standing EUT is placed 0.1m from the floor of the screened room. The transmitting aerial is placed at the relevant calibration distance from the EUT and driven by means of a power amplifier and signal generator. An isotropic field strength meter is placed on the bench adjacent to the EUT to monitor the local field strength.


The signal generator frequency is swept over the appropriate frequency range whilst the amplitude of the signal is controlled either:

using the real-time field strength meter reading;

using a profile previously determined in a calibration run without the EUT in place.

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_04B	CSET001_04A	-	-
Factor Set 2:	-	-	-	-
Factor Set 3:	-	-	-	-
Test Equipment: R1 L1 CSET001 ISN2b				

Conducted Emissions (Power)

Company: O2M8 Ltd										Product: WebBrick			
Date: 8/12/2005										Test Eng: Stephen Browning			
Ports: ac power													
Test: EN55022:1998 using limits of EN55022 Class B =CISPR22(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	
Results										Minimum Margin PASS/FAIL		PASS	
Notes		Comments and Observations											
		Results of scans shown in plots 1 and 2. All conducted emissions were more than 10dB below the average limit line so it was not considered necessary to tabulate spot frequencies.											

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4.3 Radiated Emissions Results

Factor Set 1:	A5_10m_04A	-	-	RG214_04A	25 m cable
Factor Set 2:	-	-	-	-	
Factor Set 3:	-	-	-	-	
Test Equipment: R4 A5 CSET005					

Radiated Emissions

Company: O2M8 Ltd					Product: WebBrick								
Date: 08/12/2005					Test Eng: Stephen Browning								
Ports:													
Test: EN55022:1998					using limits of				EN55022 Class B =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
8	1	0	10	1	40.050	v	9.6	13.7		23.3	30.0	6.7	#1
8	1	0	10	1	40.050	h	5.3	13.7		19.0	30.0	11.0	
8	1	0	10	1	49.880	v	14.5	9.0		23.5	30.0	6.5	
8	1	0	10	1	49.880	h	0.0	9.0		9.0	30.0	21.0	
8	1	0	10	1	80.053	v	10.4	8.8		19.2	30.0	10.8	
8	1	0	10	1	80.053	h	0.0	8.8		8.8	30.0	21.2	
8	1	0	10	1	113.800	v	6.0	13.4		19.4	30.0	10.6	
8	1	0	10	1	113.800	h	4.5	13.4		17.9	30.0	12.1	
8	1	0	10	1	180.150	v	11.0	11.5		22.5	30.0	7.5	
8	1	0	10	1	180.150	h	12.3	11.5		23.8	30.0	6.2	
8	1	0	10	1	220.145	v	8.0	12.1		20.1	30.0	9.9	
8	1	0	10	1	220.145	h	11.7	12.1		23.8	30.0	6.2	
8	1	0	10	1	521.900	v	11.1	22.5		33.6	37.0	3.4	
8	1	0	10	1	521.900	h	11.7	22.5		34.2	37.0	2.8	
Results											Minimum Margin PASS/FAIL		
											2.8 dB PASS		
Notes		Comments and Observations											
#1		Results of scans are shown in plots 4 and 5. Ambient subtraction method used (according ro CISPR11):- Receiver readings :- EUT + Amb = 23.5' Ambient only = 21.5 Calculated EUT = 23.5 - 11.8 = 11.7 (+ 12.1 corr fact = 23.8dBuV/m)											



RF_Immunity

Company: O2M8 Ltd

Product: WebBrick

Date: 30/11/2005

Test Eng: James Booth

Test Equipment: SG9 AMP1 PM1 PS2 CSET003 DC002 A12

RESULT

Ports:

Tests: IEC61000-4-3 3V/m 80-1000MHz 80%1kHz am mod

Recm'd Crit (A)

Ach'd Crit. A

Ports:

Tests:

Recm'd Crit

Ach'd Crit.

Ports:

Tests:


Recm'd Crit

Ach'd Crit.

Oper. Mode	Mod State	EUT orientation	Filename	Ant-enna	Frequency Range MHz	Step Size %	Sweep Time mins	Polaris-ation	Field Strength V/m	Modulation %AM / freq	Notes
1	0	Front	02391F68	A12	80-200	0.33	4.57	V	3	80%, 1kHz	#1
1	0	Front	02391FC0	A12	80-200	0.33	9.70	H	3	80%, 1kHz	#1
1	0	Front	02392048	A12	200-1000	0.33	8.12	V	3	80%, 1kHz	#1
1	0	Front	023920C0	A12	200-1000	0.33	8.10	H	3	80%, 1kHz	#1
1	0	Front	02392166	A12	900	N/A	0.25	V	3	200Hz, pulse	#1
1	0	Front	0239217B	A12	900	N/A	0.20	H	3	200Hz, pulse	#1

V = Vertical, H = Horizontal polarisation #1, 2, 3.... see Observations Table below

Notes	Comments and Observations
#1	No effect observed.
	Stored profile method used.

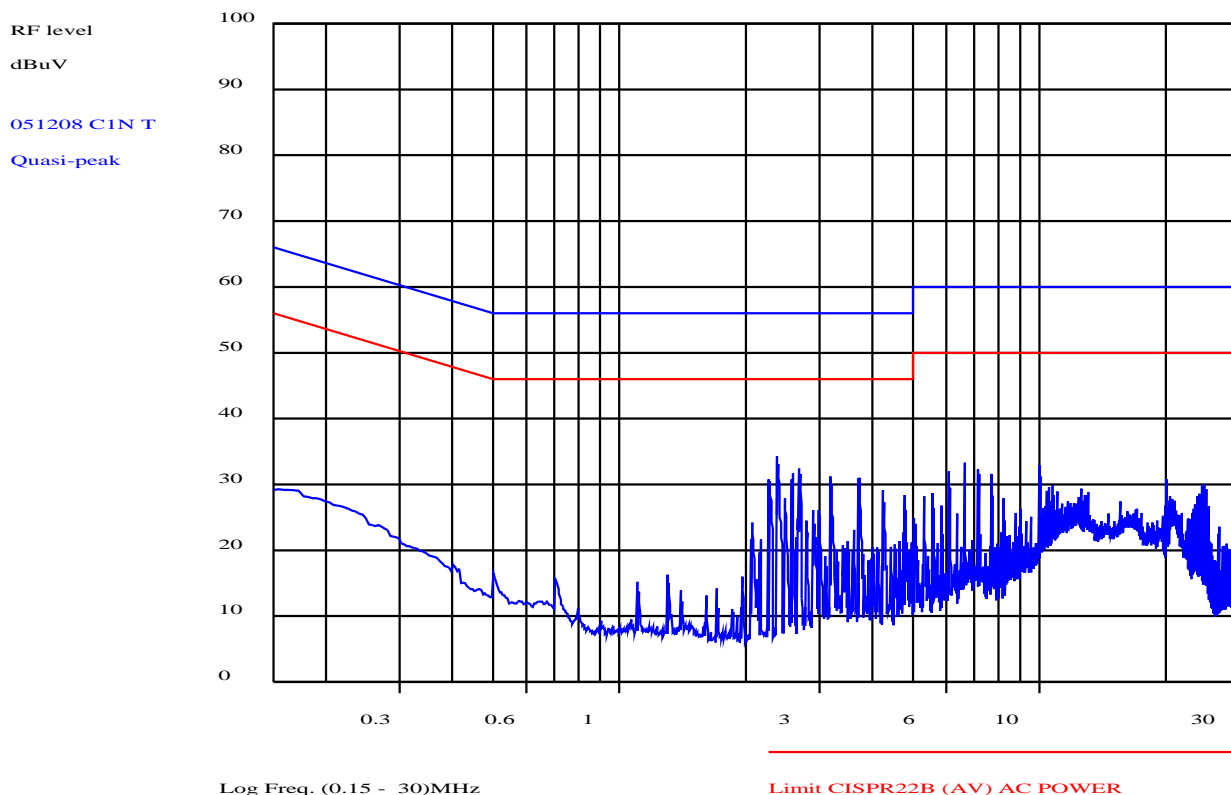
	Report No: R2120	<div></div>
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Chase EMS 6.21

Notes

Analyse 051208 C1N T1804 O2 M8 Web Brick

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



PLOT 1 Conducted Emissions - Neutral line

Company:	O2 M8	Product:	Web Brick
Date:	08 Dec 05	Test Engineer:	Stephen Browning
Test:	EN55022	Limit:	EN (B) QP + AV


Notes:

Fully loaded system.

Equip:R1,L1,L2,AB002,CBL005,Patch5,CBL007.

Line:	Neutral	Attenuator:	10dB PAD	Operating Mode:	1
Detector:	QuasiPeak			Mod. State:	0
LISN:	EMCO	Filename:	C5C0874F.plt		

Frequency List (MHz)

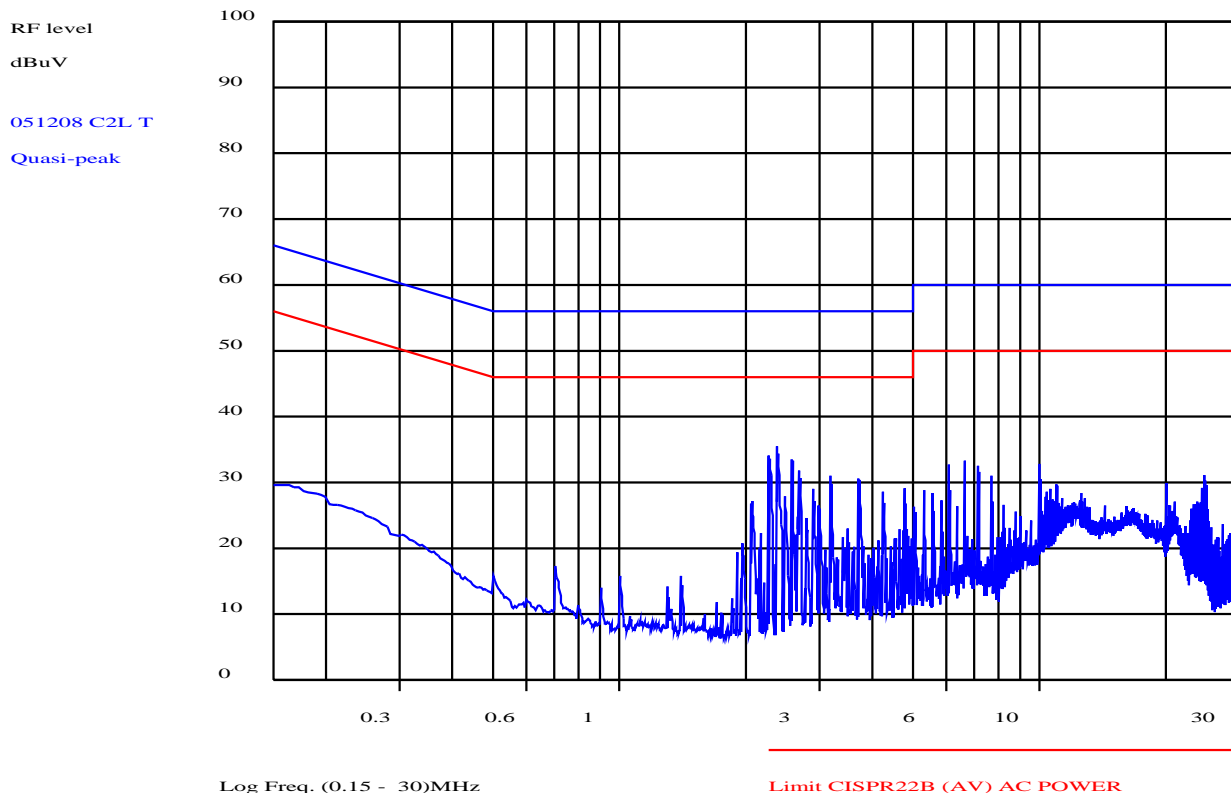
	Report No: R2120	<div></div>
	Issue No: 1	
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Chase EMS 6.21

Notes

Analyse 051208 C2L T1804 O2 M8 Web Brick

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



PLOT 2 Conducted Emissions - Live line

Company:	O2 M8	Product:	Web Brick
Date:	08 Dec 05	Test Engineer:	Stephen Browning
Test:	EN55022	Limit:	EN (B) QP + AV


Notes:

Fully loaded system.

Equip:R1,L1,L2,AB002,CBL005,Patch5,CBL007.

Line:	Live	Attenuator:	10dB PAD	Operating Mode:	1
Detector:	QuasiPeak			Mod. State:	0
LISN:	EMCO	Filename:	C5C0875D.plt		

Frequency List (MHz)

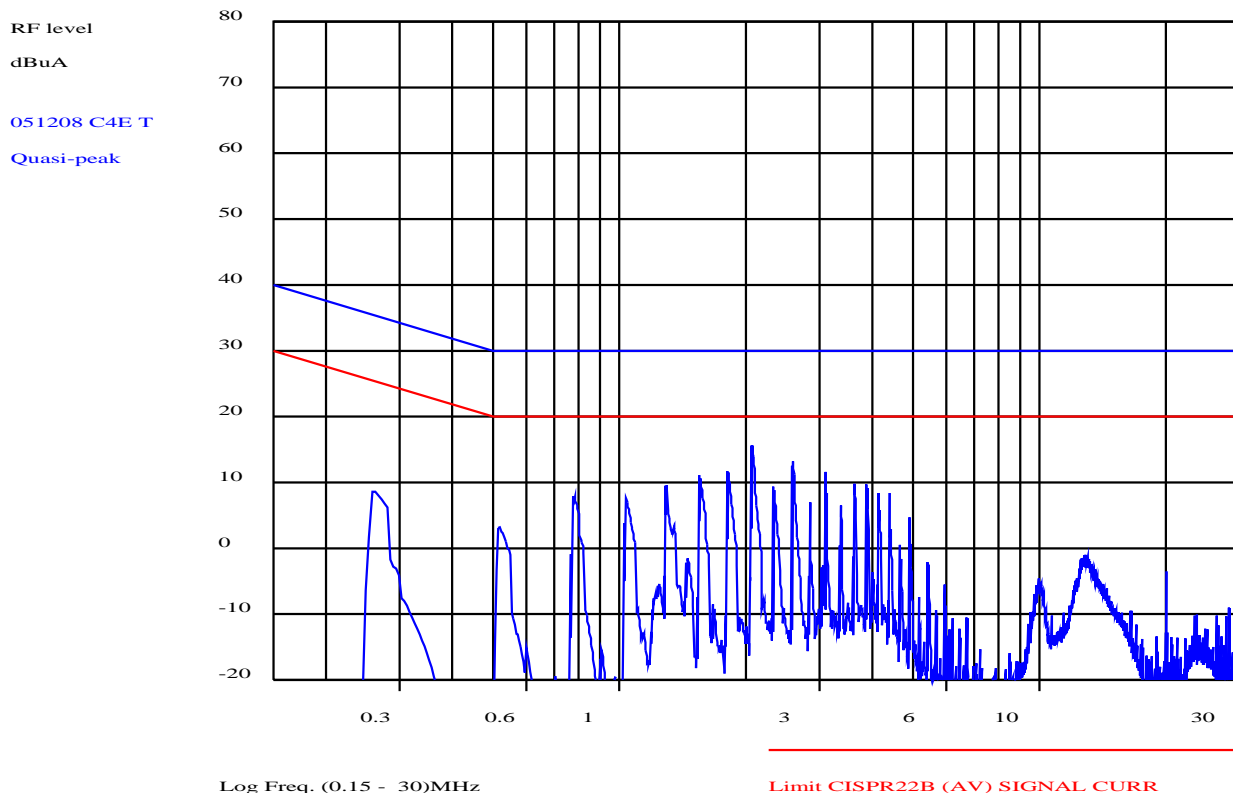
	Report No: R2120		
	Issue No: 1		
	Test No: T1804	Test Report	Page: 18 of 20

Chase EMS 6.21

Notes

Analyse 051208 C4E T1804 O2 M8 Web Brick

Test: 150kHz-30MHz (ISN2+CSET001) dBuA

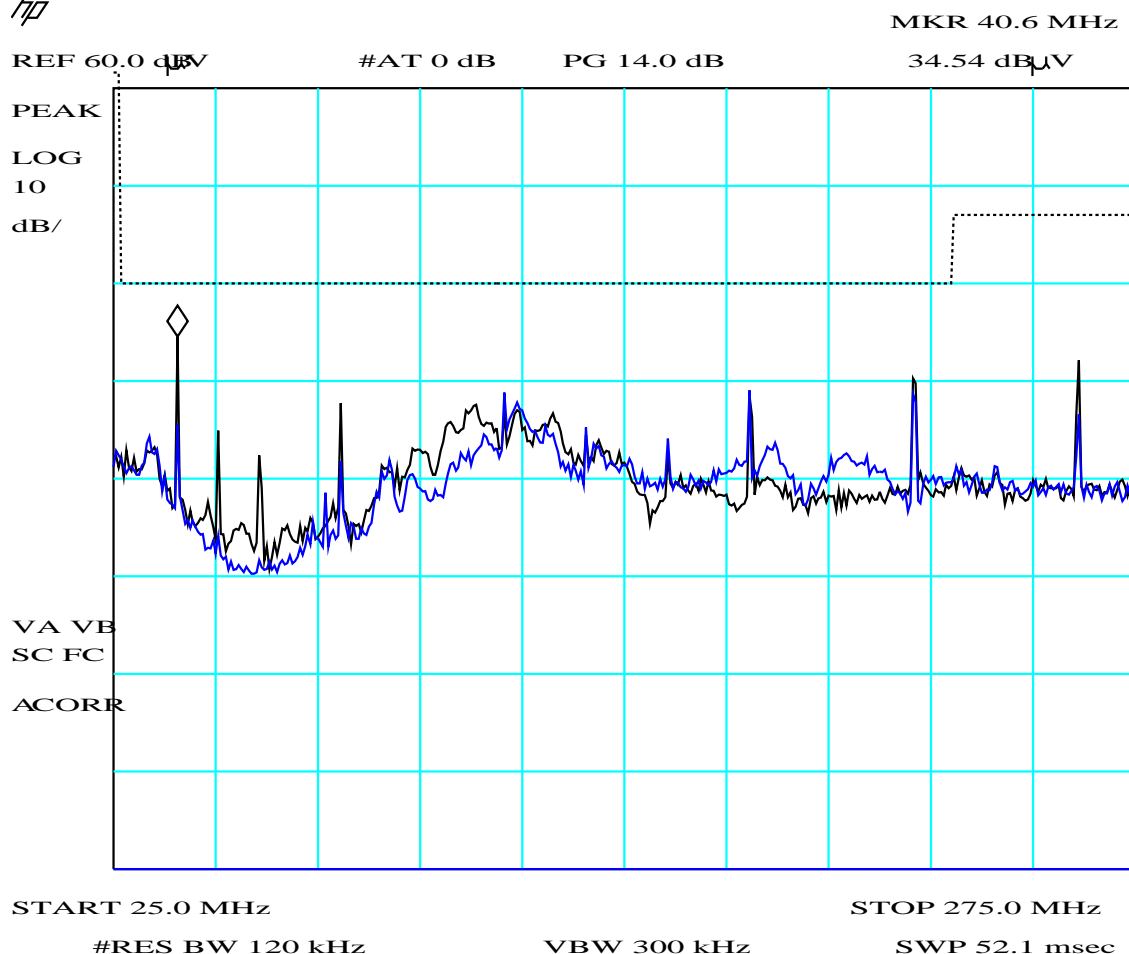


PLOT 3 Conducted Emissions - Ethernet

Company:	O2 M8	Product:	Web Brick
Date:	08 Dec 05	Test Engineer:	Stephen Browning
Test:	EN55022	Limit:	EN (B) QP + AV
Notes:			
Fully loaded system.			
10nF inboard centre-tap, 100pF outboard centre-tap.			
Equip:R1,L1,L2,AB002,CBL005,Patch5,CBL007. ISN2			
Line:	Ethernet	Attenuator:	10dB PAD
Detector:	QuasiPeak	Operating Mode:	1
LISN:	EMCO	Mod. State:	1
	Filename:	C5C0884F.plt	

Frequency List (MHz)

HP

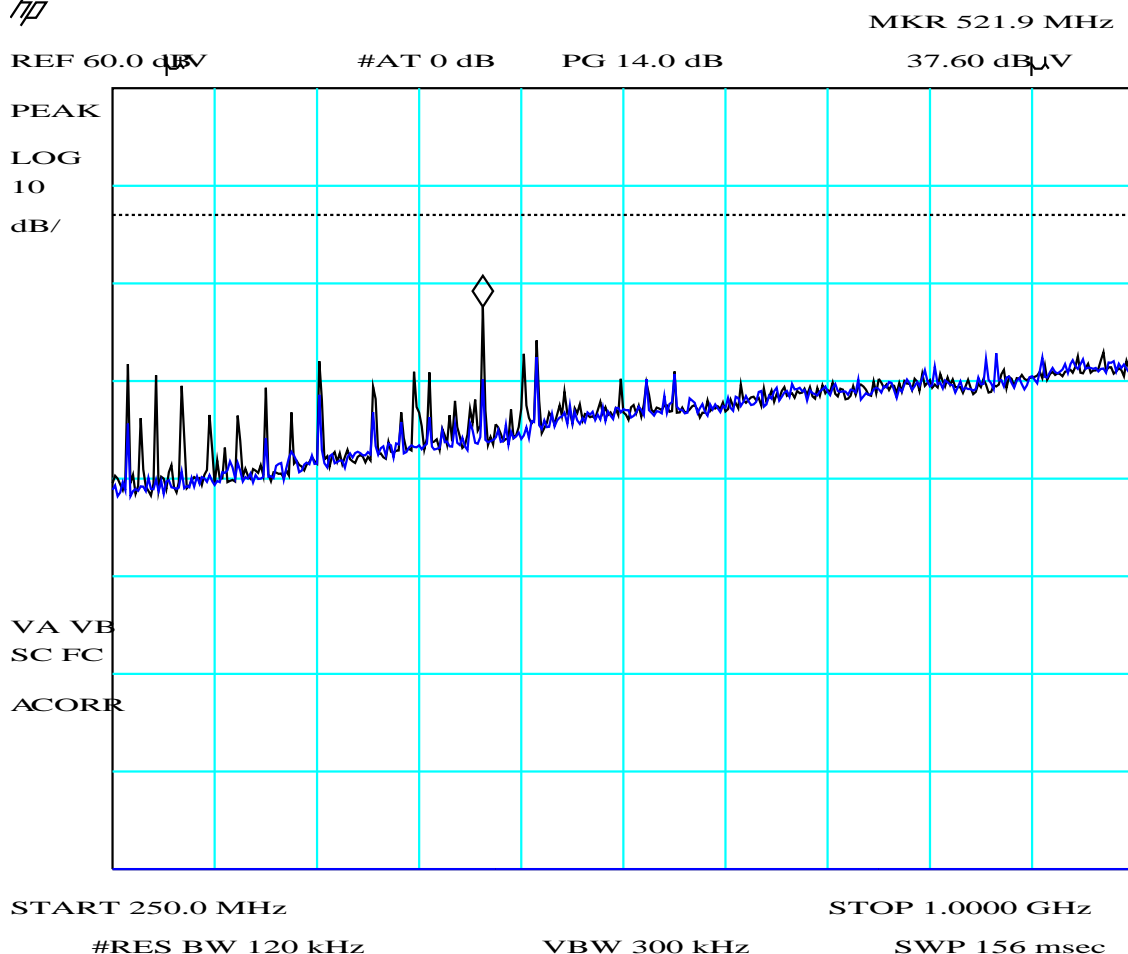


PLOT 4 Radiated Emissions - 25MHz to 275MHz

Company:	02 M8	Product:	Web Brick
Date:	08 Dec 05	Test Engineer:	Stephen Browning
Test:	EN55022	Limit:	EN (B)
Notes:			
Fully loaded, 8m cables. Using dBTech PSU instead of customer PSU.			
Original Web Brick with 40MHz clock.			
Equip: R5,R5B,CBL002,Patch1,CBL003,A12. Vertical - Black Trace, Horizontal - Blue Trace.			
Polarisation:	V + H	Orientation:	0 - 360°
Distance:	3m	Antenna:	Bilog
Height:	1m	Filename:	H5C08432.plt
		Operating Mode:	1
		Mod. State:	0

Frequency List (MHz)

hp



PLOT 5 Radiated Emissions - 250MHz to 1GHz

Company:	02 M8	Product:	Web Brick
Date:	08 Dec 05	Test Engineer:	Stephen Browning
Test:	EN55022	Limit:	EN (B)
Notes:			
Fully loaded, 8m cables. Using dBTech PSU instead of customer PSU.			
Original Web Brick with 40MHz clock.			
Equip: R5,R5B,CBL002,Patch1,CBL003,A12. Vertical - Black Trace, Horizontal - Blue Trace.			
Polarisation:	V + H	Orientation:	0 - 360°
Distance:	3m	Antenna:	Bilog
Height:	1m	Filename:	H5C08442.plt
		Operating Mode:	1
		Mod. State:	0

Frequency List (MHz)
