

TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: Paxton Access Ltd
Net2 Marine Reader and Architectural Reader

To: FCC Part 15.207 and Part 15.209

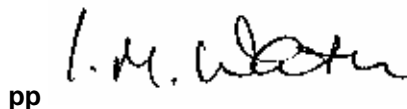
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RFI/RPTE2/RP49228JD08A

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Of Michael Derby, Radio Performance Service Leader:



Tested By: Petr Hajek


pp

Checked By: Michael Derby



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1. Client Information

Company Name:	Paxton Access Ltd
Address:	Paxton House Home Farm Brighton BN1 9HU UK
Contact Name:	Mr B Glass

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2. Equipment Under Test (EUT)

The following information (with the exception of the Date of Receipt) has been supplied by the client:

2.1. Identification of Equipment Under Test (EUT)

Description:	Proximity Marine Reader
Brand Name:	Paxton Access Ltd
Model Name or Number:	500-010
Serial Number:	None Stated
Hardware Version Number:	z-mr10 Rev.4, ppc-marr Rev.C
FCC ID:	USE500010
Country of Manufacture:	UK
Date of Receipt:	13 June 2007

Description:	Proximity Architectural Reader
Brand Name:	Paxton Access Ltd
Model Name or Number:	360-864
Serial Number:	None Stated
Hardware Version Number:	z-pa50 Rev.8, ppc-par Rev.F
FCC ID:	USE360864
Country of Manufacture:	UK
Date of Receipt:	13 June 2007

2.2. Description of EUT

The equipment under test is a 125 kHz Access Control Reader.

2.3. Modifications Incorporated in the EUT

During the course of testing the EUT was not modified.

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2.4. Additional Information Related to Testing

Power Supply Requirement:	DC Supply of 12 V		
Intended Operating Environment:	Residential Commercial Light Industry Heavy Industry		
Equipment Category:	Short Range Device		
Type of Unit:	Base Station (Fixed Use) Transceiver		
Power Characteristics, Marine device:	+0.6 dB μ V/m (at 10 m)		
Power Characteristics, Architectural device:	-5.6 dB μ V/m (at 10 m)		
Transmit Frequency:	125 kHz		
Transmit Channel:	Channel ID	Channel Number	Channel Frequency (kHz)
	Single	-	125
Receive Frequency:	125 kHz		
Receive Channel:	Channel ID	Channel Number	Channel Frequency (kHz)
	Single	-	125
Highest Fundamental Frequency:	125 kHz		
Occupied Bandwidth, Marine device:	1.413 kHz		
Occupied Bandwidth, Architectural device:	1.513 kHz		

2.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Description:	Net2 1 Door ACU with 2A PSU in plastic cabinet
Brand Name:	Paxton Access
Model Name or Number:	411-501
Serial Number:	None Stated
Cable Length and Type:	5 m, Reader Signal Cable
Connected to Port:	ACU Reader Port to Reader

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3. Test Specification, Methods and Procedures

3.1. Test Specifications

Reference:	FCC Part 15 Subpart B: 2006 (Sections 15.207 and 15.209).
Title:	Code of Federal Regulations, Part 15 (47CFR215) Radio Frequency Devices.

3.2. Methods and Procedures

The methods and procedures used were as detailed in:

ANSI C63.2 (1987)

Title: American National Standard for Instrumentation - Electromagnetic noise and field strength.

ANSI C63.4 (2001)

Title: American National Standard Methods of Measurement of Electromagnetic Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

ANSI C63.5 (1988)

Title: American National Standard for the Calibration of antennas used for Radiated Emission measurements in Electromagnetic Interference (EMI) control.

ANSI C63.7 (1988)

Title: American National Standard Guide for Construction of Open Area Test Sites for performing Radiated Emission Measurements.

CISPR 16-1: (1999)

Title: Specification For Radio Disturbance and Immunity Measuring Apparatus and Methods. Part 1: Radio Disturbance and Immunity Measuring Apparatus.

3.3. Definition of Measurement Equipment

The measurement equipment used complied with the requirements of the standards referenced in the Methods & Procedures section above. Appendix 1 contains a list of the test equipment used.

4. Deviations from the Test Specification

There were no deviations from the test specification.

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5. Operation of the EUT During Testing

5.1. Operating Modes

The EUT was tested in the following operating modes, unless otherwise stated.

Continuous transceiver mode, at 125 kHz. This was declared as the only mode of operation.

5.2. Configuration and Peripherals

The EUT was tested in the following configuration:

For Radiated spurious emissions tests, both EUT devices were tested together, connected to the Net2 1 door ACU with 2A PSU.

For the verification of transmitter power and occupied bandwidth, the two EUT were tested separately.

The EUT was powered by the Net2 1 door ACU with 2A PSU.

The Net2 1 door ACU with 2A PSU was powered by an AC supply of 110 V, 60 Hz.

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6. Summary of Test Results

Range of Measurements	Section Reference	Port Type	Compliance Status
Transmitter AC Mains Conducted Emissions (150 kHz to 30 MHz)	Section 15.207	AC Mains	Complied
Transmitter Radiated Spurious Emissions	Section 15.209	Enclosure	Complied

6.1. Location of Tests

All the measurements described in this report were performed at the premises of RFI Global Services Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ, UK.

FCC Site Registration Number: 90895

IC Site Registration Number: 3485

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7. Measurements, Examinations and Derived Results

7.1. General Comments

7.1.1. This section contains test results only.

7.1.2. Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%.

Please refer to Section 8 for details of measurement uncertainties.

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7.2. Test Results

7.2.1. Transmitter AC Mains Conducted Emissions: Section 15.207

7.2.1.1. The EUT was configured for AC conducted emissions measurements, as described in Section 9 of this report.

7.2.1.2. Tests were performed to identify the maximum emission levels on the AC mains line of the EUT.

Results:

Quasi-Peak Detector Measurements on Live and Neutral Lines

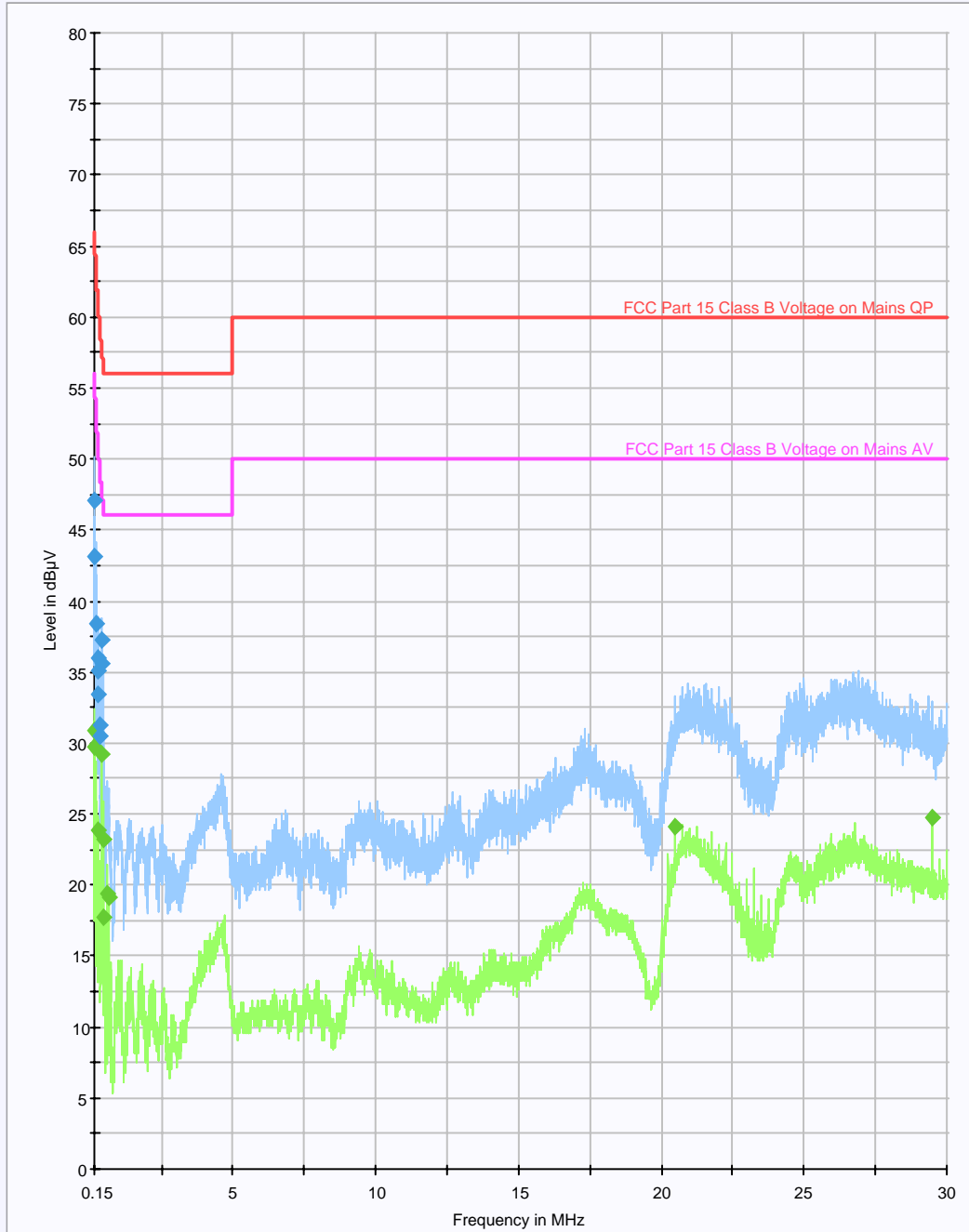
Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.150000	Live	47.1	66.0	18.9	Complied
0.178000	Neutral	43.1	64.6	21.5	Complied
0.210000	Neutral	38.4	63.2	24.8	Complied
0.250000	Neutral	36.0	61.8	25.8	Complied
0.258000	Neutral	35.1	61.5	26.4	Complied
0.294000	Neutral	33.4	60.4	27.0	Complied
0.314000	Neutral	30.5	59.9	29.4	Complied
0.338000	Neutral	31.3	59.3	28.0	Complied
0.426000	Neutral	37.2	57.3	20.1	Complied
0.434000	Neutral	35.6	57.2	21.6	Complied

Average Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.150000	Live	30.9	56.0	25.1	Complied
0.178000	Neutral	29.7	54.6	24.9	Complied
0.282000	Neutral	23.8	50.8	27.0	Complied
0.426000	Neutral	29.2	47.3	18.1	Complied
0.446000	Neutral	23.2	46.9	23.7	Complied
0.494000	Neutral	17.7	46.1	28.4	Complied
0.602000	Neutral	19.4	46.0	26.6	Complied
0.638000	Neutral	19.1	46.0	26.9	Complied
20.498000	Neutral	24.1	50.0	25.9	Complied
29.498000	Neutral	24.8	50.0	25.2	Complied

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Transmitter AC Mains Conducted Emissions: Section 15.207 (Continued)



Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.

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7.2.2. Transmitter Radiated Spurious Emissions: Section 15.209

7.2.3. Electric Field Strength Measurements (Frequency Range: 0.009 MHz to 30 MHz)

7.2.3.1. The EUT was configured for radiated emissions testing, as described in Section 9 of this report.

7.2.3.2. Tests were performed to identify the maximum radiated spurious emission levels.

7.2.3.3. Limits below 30 MHz are specified at test distance of 30 metres, whilst below 0.49 MHz they are specified at a test distance of 300 metres. However as specified by section 15.31 (f)(2), measurements may be performed at a closer distance, and the measured level corrected to the specified measurement distance by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

7.2.3.4. For measurements at 125 kHz, the two devices were tested separately.

125 kHz measurement for the Marine Reader:

Results:

Frequency (kHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Measurement Distance (m)	Margin (dB)	Result
125	Vertical	0.6	84.8	10	84.2	Complied

125 kHz measurement for the Architectural Reader:

Results:

Frequency (kHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Measurement Distance (m)	Margin (dB)	Result
125	Vertical	-5.6	84.8	10	90.4	Complied

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7.2.4. Transmitter Radiated Spurious Emissions: Section 15.209

7.2.5. Electric Field Strength Measurements (Frequency Range: 0.009 MHz to 30 MHz)

7.2.5.1. The EUT was configured for radiated emissions testing, as described in Section 9 of this report.

7.2.5.2. Tests were performed to identify the maximum radiated spurious emission levels.

7.2.5.3. Limits below 30 MHz are specified at test distance of 30 metres, whilst below 0.49 MHz they are specified at a test distance of 300 metres. However as specified by section 15.31 (f)(2), measurements may be performed at a closer distance, and the measured level corrected to the specified measurement distance by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

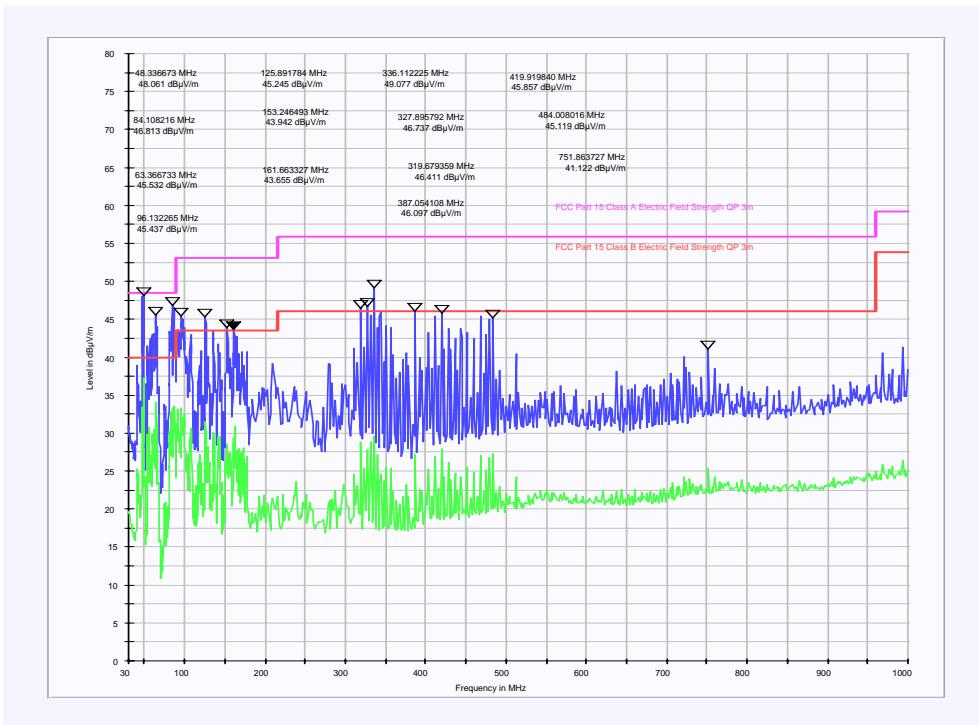
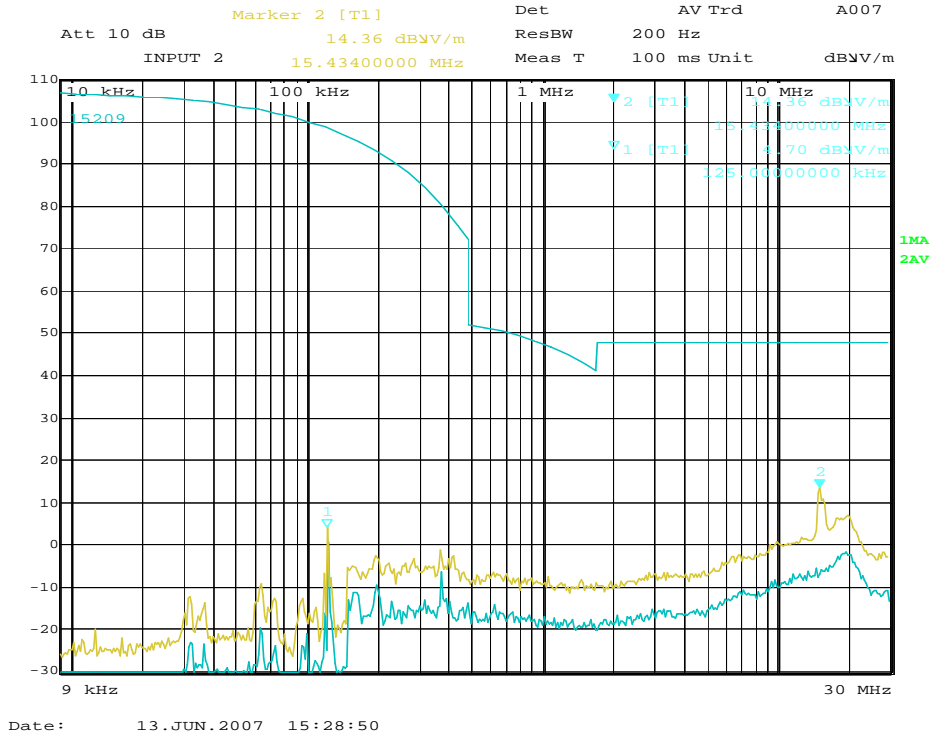
7.2.5.4. For all measurements other than 125 kHz, the two devices were tested together.

Results:

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Measurement Distance (m)	Margin (dB)	Result
15.431	Vertical	14.4	48.6	10	34.2	Complied
47.244	Vertical	22.2	40.0	3	17.8	Complied
60.019	Vertical	19.8	40.0	3	20.2	Complied
87.053	Vertical	21.4	40.0	3	18.6	Complied
93.026	Vertical	26.7	43.5	3	16.8	Complied
119.818	Vertical	25.7	43.5	3	17.8	Complied
152.173	Vertical	25.1	43.5	3	18.4	Complied
161.843	Vertical	25.9	43.5	3	17.6	Complied
320.009	Vertical	30.3	46.0	3	15.7	Complied
324.017	Vertical	30.1	46.0	3	15.9	Complied
336.051	Vertical	29.4	46.0	3	16.6	Complied
388.045	Horizontal	36.1	46.0	3	9.9	Complied
419.989	Horizontal	38.6	46.0	3	7.4	Complied
479.989	Vertical	37.1	46.0	3	8.9	Complied
751.863	Horizontal	42.1	46.0	3	3.9	Complied

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Transmitter Radiated Spurious Emissions: Section 15.209 (Continued)



Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

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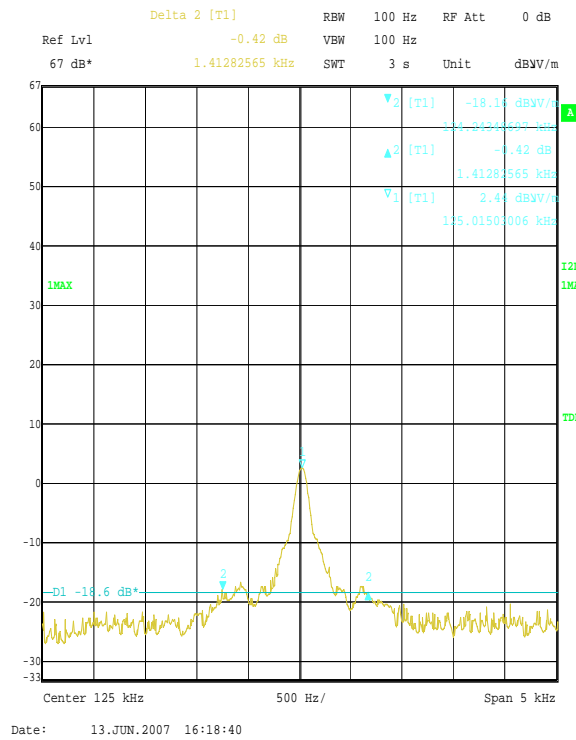
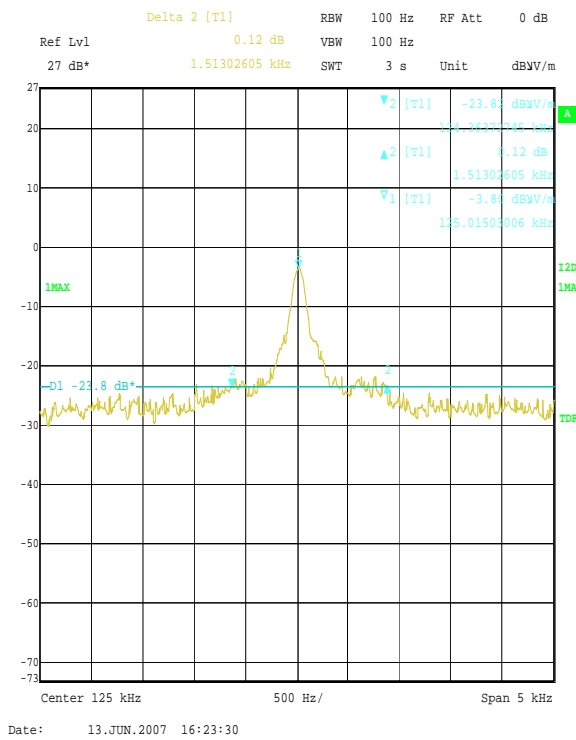
7.2.6. Transmitter Occupied Bandwidth: Section 2.1049

The EUT was configured for transmitter 20 dB bandwidth testing, as described in Section 9 of this report. Tests were performed to identify the 20 dB bandwidth.

Results:

Channel	Frequency (MHz)	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (kHz)
Architectural	0.125	0.2	0.2	1.513
Marine	0.125	0.2	0.2	1.413

Transmitter Occupied Bandwidth: Section 2.1049 (Continued)



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8. Measurement Uncertainty

8.1. No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently, the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

8.2. The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

8.3. The uncertainty of the result may need to be taken into account when interpreting the measurement results.

8.4. The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor, such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
AC Conducted Spurious Emissions	15 kHz to 30 MHz	95%	+/- 3.25 dB
Radiated Spurious Emissions	9 kHz to 1000 MHz	95%	+/- 5.26 dB
Occupied Bandwidth	All	95%	+/- 0.12%

8.5. The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty, the published guidance of the appropriate accreditation body is followed.

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9. Measurement Methods

9.1. AC Mains Conducted Emissions

AC mains conducted emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

The test was performed in a shielded enclosure with the equipment arranged as detailed in the standard on a wooden bench using the floor of the screened enclosure as the ground reference plane. The EUT was powered with 110V 60 Hz AC mains supplied via a Line Impedance Stabilisation Network (LISN).

Initial measurements in the form of swept scans covering the entire measurement band were performed in order to identify frequencies on which the EUT was generating interference. In order to minimise the time taken for these swept measurements, a Peak detector was used in conjunction with the appropriate detector IF measuring bandwidths (see table below). Repetitive scans were performed to allow for emissions with low repetition rates, and the duty cycle of the EUT. The test configuration was the same for the initial scans as for the final measurements.

Following the initial scans, a graph was produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. A tolerance line was set 6 dB below the specification limit and levels above the tolerance line were re-tested (at individual frequencies) using the appropriate detector function.

The test equipment settings for conducted emissions measurements were as follows:

Receiver Function	Initial Scan	Final Measurements
Detector Type:	Peak	Quasi-Peak (CISPR)/Average
Mode:	Max Hold	Not applicable
Bandwidth:	10 kHz	9 kHz
Amplitude Range:	60 dB	20 dB
Measurement Time:	Not applicable	> 1 s
Observation Time:	Not applicable	> 15 s
Step Size:	Continuous sweep	Not applicable
Sweep Time:	Coupled	Not applicable

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9.2. Radiated Emissions

Radiated emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

Initial pre-scans covering the entire measurement band from the lowest generated frequency declared up to the upper frequency detailed in Section 15.33(b) were performed within a screened chamber in order to identify frequencies on which the EUT was generating interference. This determined the frequencies from the EUT, which required further examination. In order to minimise the time taken for the swept measurements, a peak detector was used in conjunction with the appropriate detector measuring bandwidth (see table below). Repetitive scans were performed to allow for emissions with low repetition rates, and for the duty cycle of the EUT.

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. A limit line was set to the specification limit. Levels within 20 dB of this limit were measured where possible, on occasion, the receiver noise floor came within the 20 dB boundary. On these occasions, the system noise floor may have been recorded.

An open area test site using the appropriate test distance and measuring receiver with a Quasi-Peak detector was used for measurements below 1000 MHz, for measurements above 1000 MHz average and peak detectors were used.

For the final measurements the EUT was arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 – 2003 Clause 5.4.

On the open area test site, at each frequency where a signal was found, the levels were maximised by initially rotating the turntable through 360° and then varying the antenna height between 1 m and 4 m in the horizontal polarisation. At this point, any signals found to be between the limit and a level 6 dB below it were further maximised by changing the configuration of the EUT, e.g. re-routing cables to peripherals and moving peripherals with respect to the EUT. The procedure was repeated for the vertical polarisation.

The final field strength was determined as the indicated level in dB μ V plus cable loss and antenna factor.

The test equipment settings for radiated emissions measurements were as follows:

Receiver Function	Initial Scan	Final Measurements Below 1 GHz	Final Measurements Above 1 GHz
Detector Type:	Peak	Quasi-Peak (CISPR)	Peak/Average
Mode:	Max Hold	Not applicable	Not applicable
Bandwidth:	(120 kHz < 1 GHz) (1 MHz > 1 GHz)	120 kHz	1 MHz
Amplitude Range:	100 dB	100 dB	100 dB
Step Size:	Continuous sweep	Not applicable	Not applicable
Sweep Time:	Coupled	Not applicable	Not applicable

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9.3. 20 dB Bandwidth

To determine the bandwidth, the spectrum analyser was configured with a resolution bandwidth and video bandwidth greater than 1% of the frequency span.

The analyser was set for a maximum hold scan to capture the profile of the signal. The peak points on the two adjacent channels were noted and the separation between them recorded.

To determine the occupied bandwidth, a resolution bandwidth of 100 Hz was used, which is greater than 1% of the 20 dB bandwidth. A video bandwidth of the same value was used.

The analyser was set for a maximum hold scan to capture the profile of the signal. The peak level was then determined, and a reference line was drawn 20 dB below the peak level.

The bandwidth was determined at the points where the 20 dB reference line intercepted the power envelope of the emission.

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Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A007	H-Field Antenna	Rohde & Schwarz	HFH2-Z2	880 458/020	14 Feb 2007	12
A008	Tripod	Rohde & Schwarz	HFU-Z	None	Not calibrated	-
A1069	Single Phase LISN	Rohde & Schwarz	ESH3-Z5	837469/012	09 Feb 2007	12
A1830	Pulse Limiter	Rhode & Schwarz	ESH3-Z2	100668	08 Jan 2007	12
A259	Bilog Antenna	Chase	CBL6111	1513	13 Mar 2007	12
C1268	Cable	Rosenberger	FA210A0075 008080	49356-1	08 Jan 2007	12
C341	Cable	Andrews	None	None	Cal before use	-
C363	Cable	Rosenberger	RG142	None	Cal before use	-
C461	Cable	Rosenberger	UFA210A-1- 1182-704704	98H0305	Cal before use	-
C468	Cable	Rosenberger	UFA210A-1- 3937-504504	98L0440	Cal before use	-
M024	Spectrum Monitor	Rohde & Schwarz	EZM	873 952/006	Not calibrated	-
M044	ESVP Receiver	Rohde & Schwarz	ESVP	891 845/026	06 Mar 2007	12
M1263	EMI Test Receiver	Rohde & Schwarz	ESIB7	100265	25 Jan 2007	12
S201	3m & 10m OATS	RFI	1		25 May 2007	12
S212	Emissions Screened Room	RFI	12		Not calibrated	-

NB In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule. All equipment was within calibration at the time of the test.

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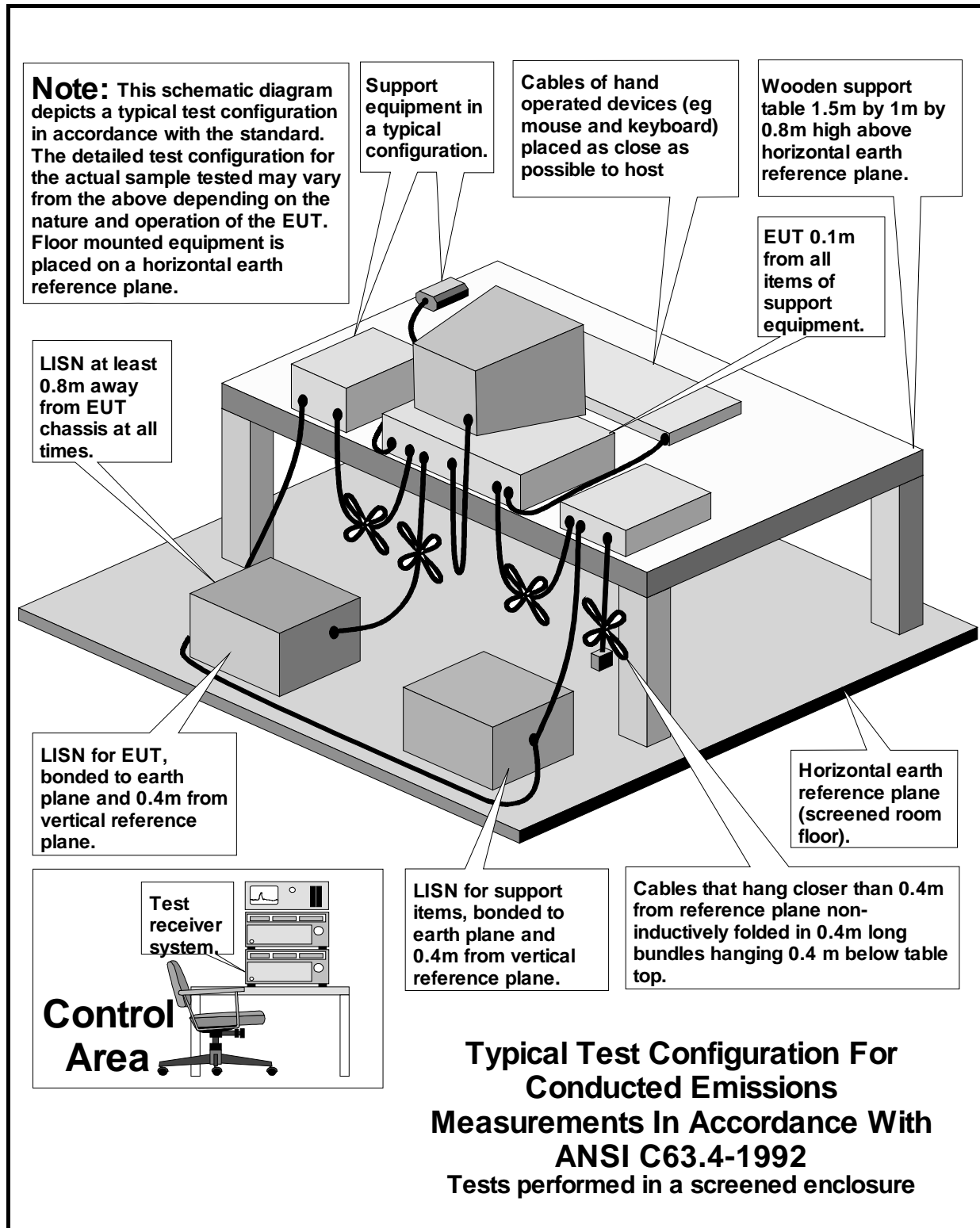
Appendix 2. Test Configuration Drawings

This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\49228JD08A\EMICON	Test configuration for measurement of conducted emissions.
DRG\49228JD08A\EMIRAD	Test configuration for measurement of radiated emissions.

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DRG\49228JD08A\EMICON



Note: The above diagram is valid for the latest version of ANSI C63.4-2003.

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DRG\49228JD08A\EMIRAD

