



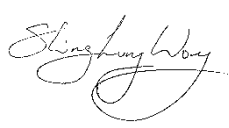


TEST REPORT FROM RADIO FREQUENCY INVESTIGATION LTD.

Test Of: Bison Bede Ltd.
Compact RFTX04 Transmitter

To: FCC Part 15.249

Test Report Serial No:
RFI/MPTB1/RP45433JD06A

This Test Report Is Issued Under The Authority Of Richard Jacklin, Operations Director: 	Checked By: 
Tested By: 	Release Version No: PDF01
Issue Date: 01 March 2004	Test Dates: 28 January 2004 to 29 January 2004

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RADIO FREQUENCY INVESTIGATION LTD

Operations Department

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Test Of: **Bison Bede Ltd.**
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1. Client Information

Company Name:	Bison Bede Limited
Address:	Unit 9 No.1 industrial Estate Consett Durham DH8 8JB
Contact Name:	Mr Duncan Dando

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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)

Brand Name:	Bison Bede
Model Name or Number:	Compact RFTX04
Unique Type Identification:	1100652
Serial Number:	None stated
FCC ID	RU3NA1
Country of Manufacture:	UK
Date of Receipt:	28 January 2004

2.2. Description Of EUT

The Bison Bede Compact RF Transmitter TX04 is a battery powered radio frequency remote control designed to operate the Bison Bede Compact range of stairlifts. It uses a Radiometrix TX3 transmitter module transmitting at 914.5 MHz. The system transmits one of three remote commands to the stairlift (up, down and park) together with identification information designed to prevent interference between lifts and other users of the frequency band.

2.3. Modifications Incorporated In 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:	9.0 V DC battery		
Intended Operating Environment:	Domestic		
Equipment Category:	Portable		
Type of Unit:	Transmitter		
Interface Ports:	Battery		
Transmit Frequency Range	Single frequency operation @ 914.5 MHz		
Transmit Channels Tested	Channel ID	Channel Number	Channel Frequency (MHz)
	N/A	N/A	914.5 MHz
Occupied Bandwidth	75 kHz		
Highest Fundamental Frequency	914.5 MHz		
Maximum Fieldstrength @ 3 metres	94.0 dB μ V/m		

2.5. Support Equipment

No support equipment was used to exercise the EUT during testing.

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3. Methods And Procedures

Reference:	FCC Part 15 Subpart C: 2002 (Section 15.249)
Title:	Code of Federal Regulations, Part 15 (47CFR15) Radio Frequency Devices.
Comments:	A description of the test facility used for this test is on file with, and has been accepted by, the Federal Communications Commission as required by Section 2.948 of Federal Rules.
Purpose of Test:	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.

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.

DA00-705 (2000)

Title: Filing and Frequency Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

3.1. 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.

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4. Deviations From The Test Specification

None.

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5. Operation Of The EUT During Testing

5.1. Operating Conditions

During testing, the EUT was powered by 9 Volt DC PP3 battery

5.2. Operating Modes

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

Transmit Mode

5.3. Configuration And Peripherals

The EUT was tested in the following configuration:

Standalone, powered by the 9V battery

The reason for choosing this configuration was that the client defined it as being likely to be the worst case with regards EMC.

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6. Summary Of Test Results

Part 15.247

Range Of Measurements	Specification Reference	Port Type	Compliance Status
Transmitter Fundamental Fieldstrength	C.F.R. 47 FCC Part 15: 2002 Section 15.249(a)	Antenna	Complied
Transmitter 20 dB Bandwidth	C.F.R. 47 FCC Part 2: 2002 Section 2.1049	Antenna	Not Applicable
Transmitter Radiated Spurious Emissions	C.F.R. 47 FCC Part 15: 2002 Section 15.249(a)(d)(e) & 15.209	Antenna	Complied
Transmitter Band Edge Radiated Emissions	C.F.R. 47 FCC Part 15: 2002 Section 15.249(d) & 15.209	Antenna	Complied

6.1. Location Of Tests

All the measurements described in this report were performed at the premises of Radio Frequency Investigation Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ, England.

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7. Measurements, Examinations And Derived Results

7.1. General Comments

7.1.1. This section contains test results only. Details of the test methods and procedures can be found in Section 9 of this report.

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 10 for details of measurement uncertainties.

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8. Test Results

8.1. Transmitter Fundamental Field strength Section 15.249(a)

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

8.1.2. Tests were performed to identify the maximum field strength of the fundamental frequency.

Result:

Frequency (MHz)	Ant. Pol.	Q-P Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
914.5	Horiz.	94.0	94.0	0.0	Complied

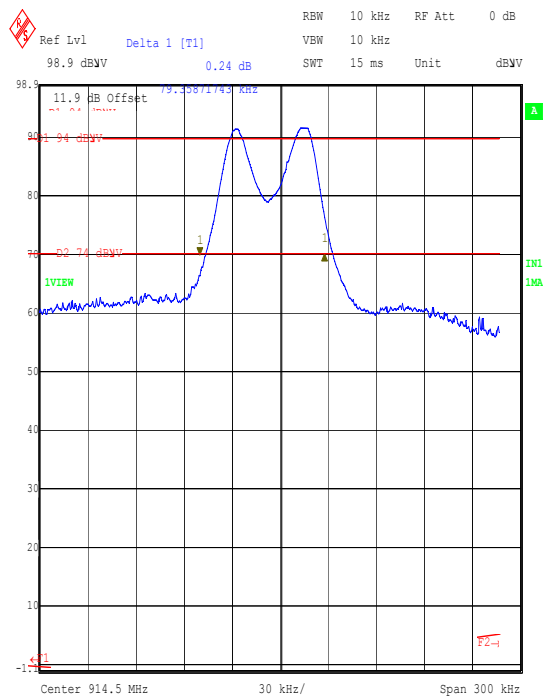
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8.2. Transmitter 20 dB Bandwidth: Section 2.1049

8.2.1. The EUT was configured as for 20 dB bandwidth measurements as described in Section 9 of this report.

8.2.2. Tests were performed to identify the 20 dB bandwidth.

Transmitter 20 dB Bandwidth (kHz)
79.359



Comment A: 20dB BANDWIDTH
GPH/45433JD06/OBW01
Date: 29.JAN.2004 12:28:41

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8.3. Transmitter Radiated Emissions: Section 15.249(a)(d)(e) & Section 15.209

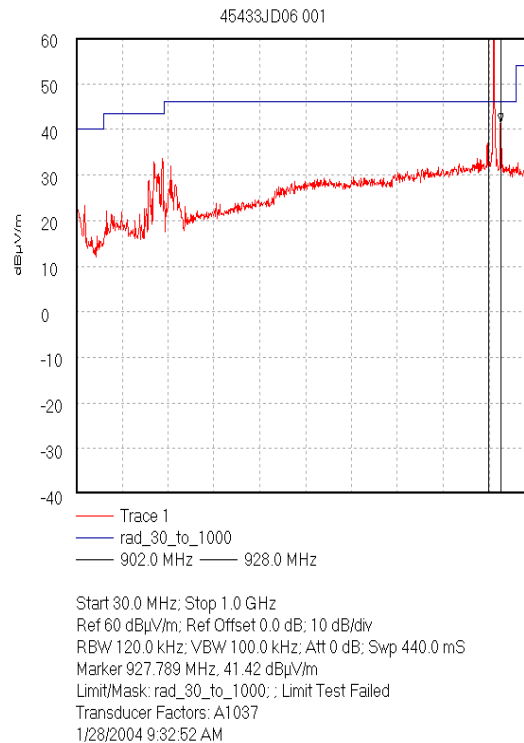
8.3.1. Electric Field Strength Measurements: 30 to 1000 MHz.

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

8.3.1.2. Tests were performed to identify the maximum radiated spurious emissions levels.

Results:

Frequency (MHz)	Ant. Pol.	Q-P Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
194.205	Horiz.	10.8	43.5	32.7	Complied
212.372	Horiz.	10.1	43.5	33.4	Complied
230.627	Vert.	14.0	46.0	32.0	Complied
900.178	Horiz.	35.0	46.0	11.0	Complied
928.789	Horiz.	40.6	46.0	5.4	Complied



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

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Transmitter Radiated Emissions (Continued)

8.3.2. Electric Field Strength Measurements: 1.0 to 9.3 GHz

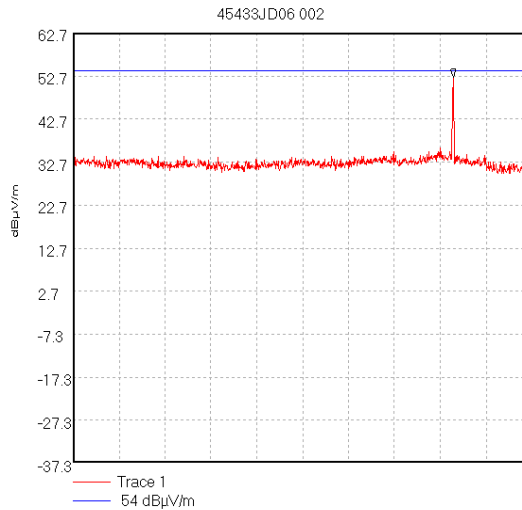
Highest Peak Level:

Frequency (MHz)	Antenna Polarity	Peak Detector level (dBμV)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Peak Margin (dB)	Result
1828.902	Horiz.	31.9	21.6	1.1	54.6	74.0	19.4	Complied
2743.428	Horiz.	22.2	21.7	1.3	45.2	74.0	28.8	Complied
3658.004	Horiz.	15.1	22.9	1.5	39.5	74.0	34.5	Complied
4572.349	Horiz.	26.6	24.2	1.7	52.5	74.0	21.5	Complied
5487.011	Horiz.	17.8	24.3	1.9	44.0	74.0	30.0	Complied
6401.472	Horiz.	17.9	26.8	2.1	46.8	74.0	27.2	Complied

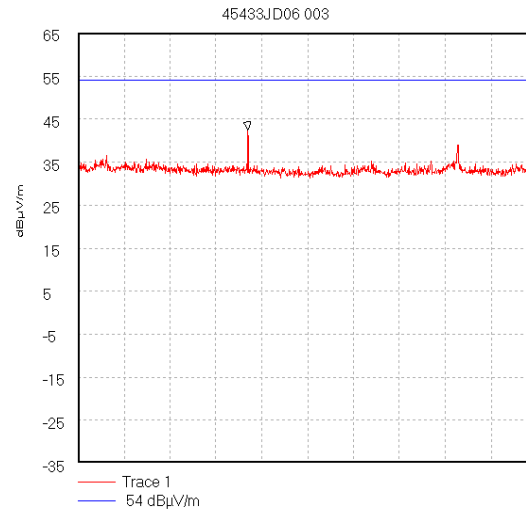
Highest Average Level:

Frequency (MHz)	Antenna Polarity	Average Detector level (dBμV)	Antenna factor (dB)	Cable loss (dB)	Actual Average Level (dBμV/m)	Average Limit (dBμV/m)	Average Margin (dB)	Result
1828.902	Horiz.	30.4	21.6	1.1	53.1	54.0	0.9	Complied
2743.428	Horiz.	21.0	21.7	1.3	44.0	54.0	10.0	Complied
3658.004	Horiz.	12.3	22.9	1.5	36.7	54.0	17.3	Complied
4572.349	Horiz.	25.8	24.2	1.7	51.7	54.0	2.3	Complied
5487.011	Horiz.	16.5	24.3	1.9	42.7	54.0	11.3	Complied
6401.472	Horiz.	17.2	26.8	2.1	46.1	54.0	7.9	Complied

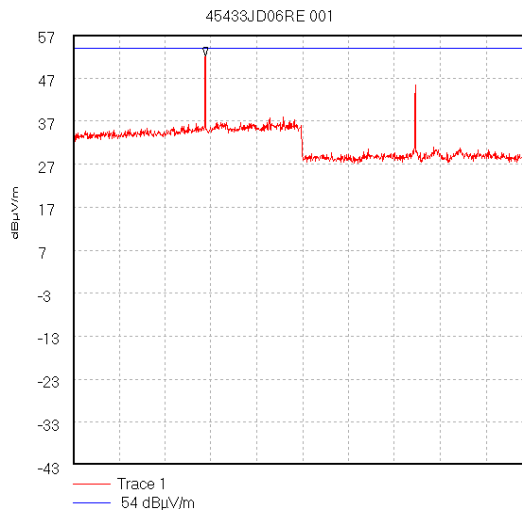
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Transmitter Radiated Emissions (Continued)

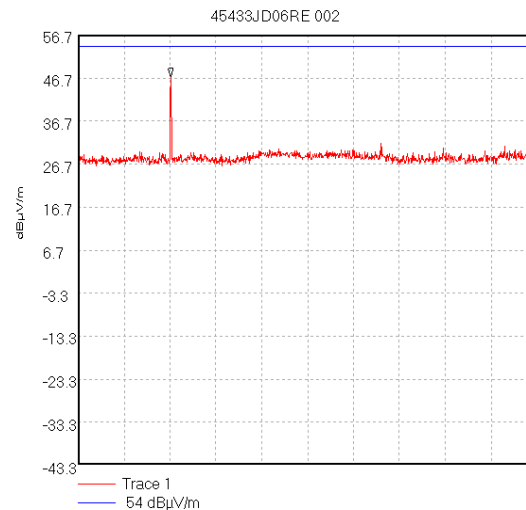
Start 1.0 GHz; Stop 2.0 GHz
 Ref 62.7 dBμV/m; Ref Offset 15.7 dB; 10 dB/div
 RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
 Peak 1.829 GHz; 52.37 dBμV/m
 Display Line: 54 dBμV/m; : Limit Test Passed
 1/28/2004 10:16:01 AM



Start 2.0 GHz; Stop 4.0 GHz
 Ref 65 dBμV/m; Ref Offset 18.0 dB; 10 dB/div
 RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
 Peak 2.74 GHz; 42.46 dBμV/m
 Display Line: 54 dBμV/m; : Limit Test Passed
 1/28/2004 10:23:50 AM



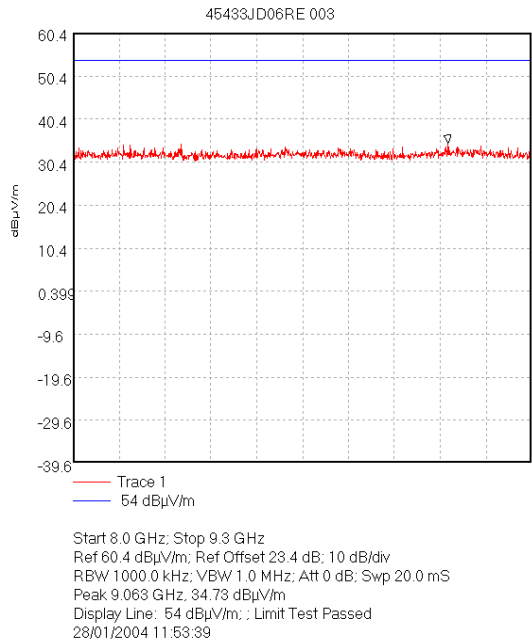
Start 4.0 GHz; Stop 6.0 GHz
 Ref 57 dBμV/m; Ref Offset 0.0 dB; 10 dB/div
 RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
 Peak 4.578 GHz; 52.1 dBμV/m
 Display Line: 54 dBμV/m; : Limit Test Passed
 28/01/2004 11:23:39



Start 6.0 GHz; Stop 8.0 GHz
 Ref 56.7 dBμV/m; Ref Offset 19.7 dB; 10 dB/div
 RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
 Peak 6.404 GHz; 46.95 dBμV/m
 Display Line: 54 dBμV/m; : Limit Test Passed
 28/01/2004 11:41:32

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

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Transmitter Radiated Emissions (Continued)

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

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8.4. Transmitter Radiated Emissions At Band Edges: Section 15.249(d) & 15.209

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

8.4.2. Tests were performed to identify the maximum emissions level at the band edges of the frequency band that the EUT will operate over.

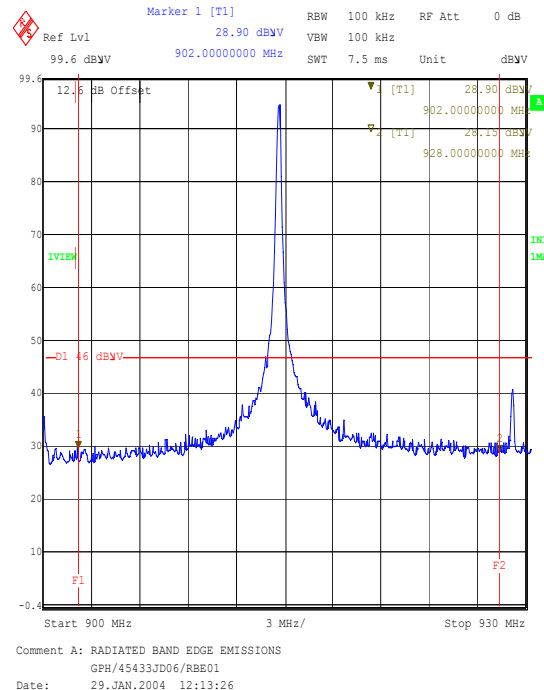
Results:

Bottom Band Edge

Frequency (MHz)	Q-P Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
902	28.9*	46.0	17.1	Complied

Top Band Edge

Frequency (MHz)	Q-P Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
928	28.2*	46.0	17.8	Complied



**Note: The results given in the above tables are peak levels taken from the above plot which is a peak max hold plot using a Resolution Bandwidth (RBW) of 100 kHz i.e. the worst case. Note that the peak level of the fundamental, when measured in a RBW of 100 kHz, was 0.2 dB greater than the quasi-peak level (note also that the measured peak level using a 300 kHz RBW was identical to that measured in a 100 kHz RBW). Note that a plot was taken in peak max hold because it was not possible to plot the quasi-peak measurement.*

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9. Measurement Methods

9.1. Radiated Emissions

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

Initial measurements covering the entire measurement band in the form of swept scans in a shielded enclosure were performed in order to identify frequencies on which the EUT was generating interference. This determined the frequencies on which the EUT should be re-measured in full on the open area test site. In order to minimise the time taken for the swept measurements, a Peak detector was used in conjunction with the appropriate detector IF measuring bandwidth (see table below). Repetitive scans were performed to allow for emissions with low repetition rates.

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. Following the initial scans, graphs were produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. Any emission within 20 dB of the limit were then measured on the open area test site, except in cases where the noise floor was within 20 dB of the limit, in these cases the highest point of the noise floor was measured.

In either case the measurement was made at the appropriate distance using a measuring receiver with a Quasi-Peak detector for measurements below 1000 MHz and an Average detector for measurements above 1000 MHz.

For the final measurements the EUT was arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 – 2001 Clause 5.4.

All measurements on the open area test site were performed using broadband antennas.

On the open area test site, at each frequency where a signal was to be measured, the trace was maximised by rotating a turntable through 360°. The angle at which the maximum signal was observed was locked out. For frequencies below 1000 MHz the test antenna was varied in height between 1 m and 4 m in order to further maximise the target emission.

For frequencies above 1000 MHz where a horn antenna was used, height searching was performed to locate the optimal height of the horn with respect to the EUT. At this point the horn was locked off and the turntable was again rotated through 360° to maximise the target signal. It should be noted that the received signal from the EUT would diminish very quickly after it exits the beam width of the horn antenna, for this reason it may not be necessary to fully height search with the horns.

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.

Scans were performed to the upper frequency limits as stated in Section 15.33

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Radiated Emissions (Continued)

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	Max Hold
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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9.2. Transmitter 20 dB Bandwidth

The EUT and spectrum analyser was configured as for transmitter radiated emissions measurements.

To determine the occupied bandwidth, a resolution bandwidth of 10 kHz was used, which is greater than 1% of the 20 dB bandwidth. A video bandwidth of at least 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 crossed the profile of the emission.

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10. Measurement Uncertainty

10.1. 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.

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

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

10.4. 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
Occupied Bandwidth	N/A	95%	+/- 0.12 %
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	+/- 5.26 dB
Radiated Spurious Emissions	1 GHz to 40 GHz	95%	+/- 1.78 dB

10.5. 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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Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
A027	Horn Antenna	Eaton	9188-2	301
A031	2 to 4 GHz Eaton Horn Antenna	Eaton	91889-2	557
A1037	Chase Bilog Antenna	Chase EMC Ltd	CBL6112B	2413
A254	WG 14 Microwave Horn	Flann Microwave	14240-20	139
A255	WG 16 Microwave Horn	Flann Microwave	16240-20	519
A259	Bilog Antenna	Chase	CBL6111	1513
A428	WG 12 horn	Flann	12240-20	134
M003	Spectrum Monitor	Rohde & Schwarz	EZM	883 580/008
M023	ESVP Receiver	Rohde & Schwarz	ESVP	872 991/027
M069	ESMI Spectrum Analyser / Receiver	Rohde & Schwarz	ESMI	829 808/007 (DU) / 827 063/008 (RU)
M088	Receiver / Spectrum Analyser System	Rohde & Schwarz	ESBI	DU:835862/018 RU:835387/006
M1124	Rohde & Schwarz	Rohde & Schwarz	ESIB26	100046K
S201	Site 1	RFI	1	
S202	Site 2	RFI	2	S202-15011990

NB In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.

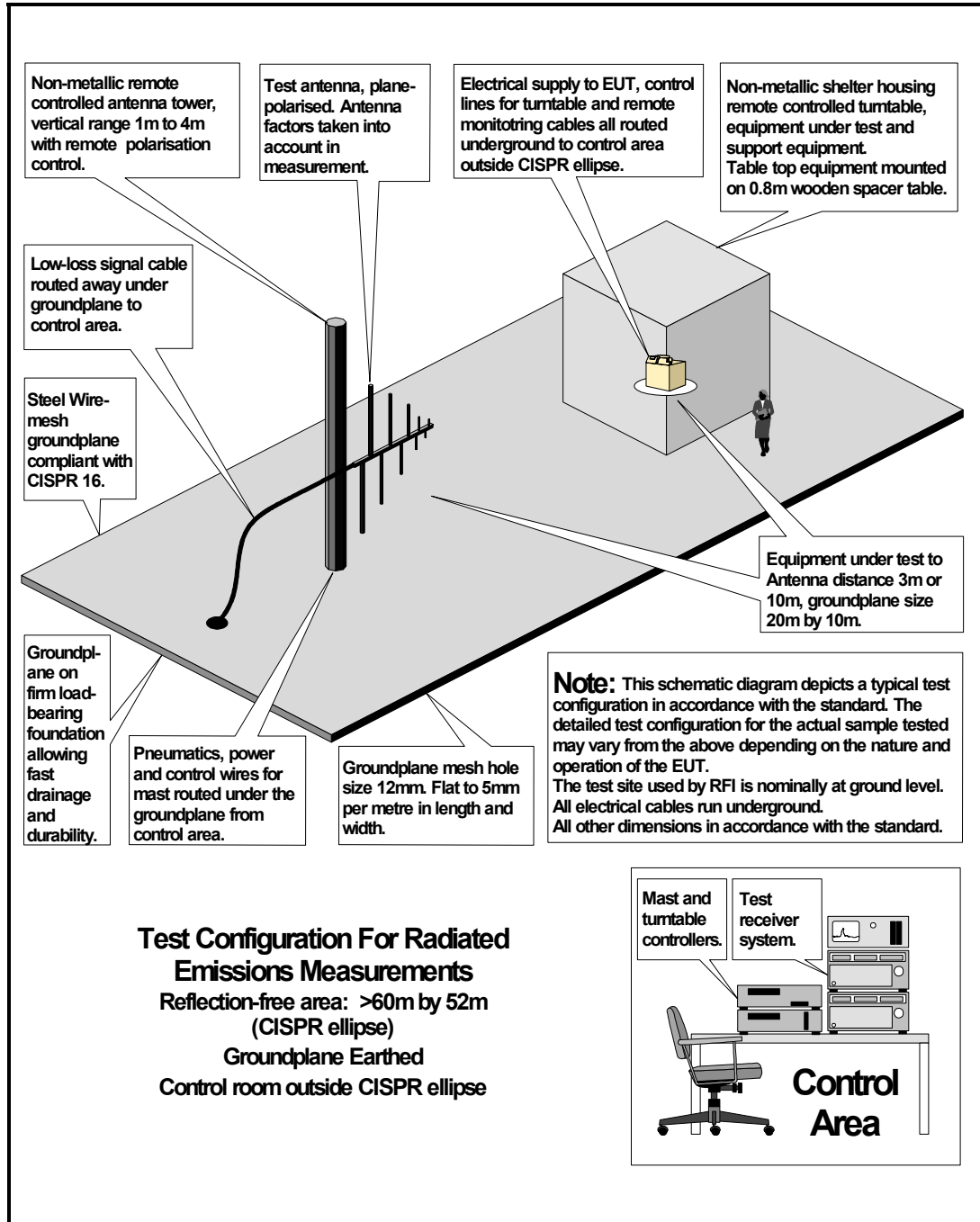
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Appendix 2. Test Configuration Drawings

This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\45433JD01\EMIRAD	Test configuration for measurement of radiated emissions

DRG\45433JD01\EMIRAD



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