

TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: Omitec Limited
OmiDetect 100

To: FCC Part 15.109 & 15.209

Test Report Serial No:
RFI/MPTE2/RP48215JD01A
Supersedes Test Report Serial No:
RFI/MPTE1/RP48215JD01A

This Test Report Is Issued Under The Authority
Of Andrew Brown, Operations Manager:

pp



Tested By: Raul Recio

pp



Checked By: Nigel Davison



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Supersedes Test Report Serial No: RFI/MPTE1/RP48215JD01A

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1. Client Information

Company Name:	Omitec Instrumentation Ltd.
Address:	Hopton Industrial Estate London Road Devizes Wiltshire SN10 2EU
Contact Name:	Mr P Parks

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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:	Omitec
Model Name or Number:	OmiDetect 100
Unique Type Identification:	OM503/1
Serial Number:	RFITESTZ
FCC ID Number:	SV4-0M503
Country of Manufacture:	UK
Date of Receipt:	21 April 2006

2.2. Description of EUT

The equipment under test is an OmiDetect 100 which allows the technician to check the basic function of a RF Transmitter in a Tyre pressure monitoring sensor is working OK.

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:	Internal battery supply of 9 V (PP3 Battery)		
Intended Operating Environment:	Commercial and light Industry		
Equipment Category:	Short Range (Low power)		
Type of Unit:	Portable (Standalone battery powered device)		
Transmit Frequency Range:	Single Frequency 125 kHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (kHz)
	Single Frequency	N/A	125.00
Receive Frequency Range:	315 MHz to 433 MHz		
Receive Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	315	1	315
	433	2	433.92
Highest Unintentionally Generated Frequency:	433.92 MHz		
Highest Fundamental Frequency:	125 kHz		
Occupied Bandwidth:	3 kHz		

2.5. Support Equipment

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

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3. Test Specification, Methods and Procedures

3.1. Test Specifications

Reference:	FCC Part 15 Subpart B: 2004 (Sections 15.109 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/TIA-603-B-2003

Land Mobile Communications Equipment, Measurements and performance Standards

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.

3.3. 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.

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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 Modes

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

For transmitter testing the EUT was transmitting continuously at 125 kHz modulated as this was found to be worse case.

The EUT was set to standby mode for receiver tests.

5.2. Configuration and Peripherals

The EUT was tested in the following configuration:

Standalone configuration.

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6. Summary of Test Results

Range of Measurements	Specification Reference	Port Type	Compliancy Status
Receiver Radiated Spurious Emissions	C.F.R. 47 FCC Part 15: 2004 Section 15.109	Enclosure	Complied
Transmitter Radiated Spurious Emissions	C.F.R. 47 FCC Part 15: 2004 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, England.

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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. Receiver Radiated Spurious Emissions: Section 15.109

7.2.1. Electric Field Strength Measurements (Frequency Range: 9 kHz to 1000 MHz)

7.2.1.1. The EUT was configured for radiated emissions testing as described in Section 9 of this report.
7.2.1.2. Tests were performed to identify the maximum receiver or standby radiated emission levels.

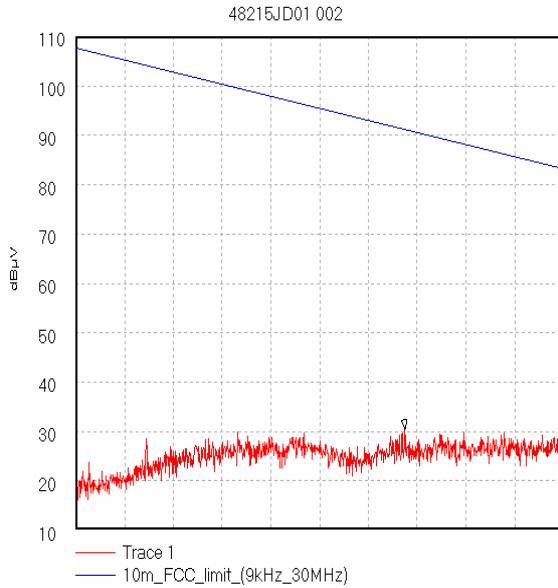
Results:

Single Channel

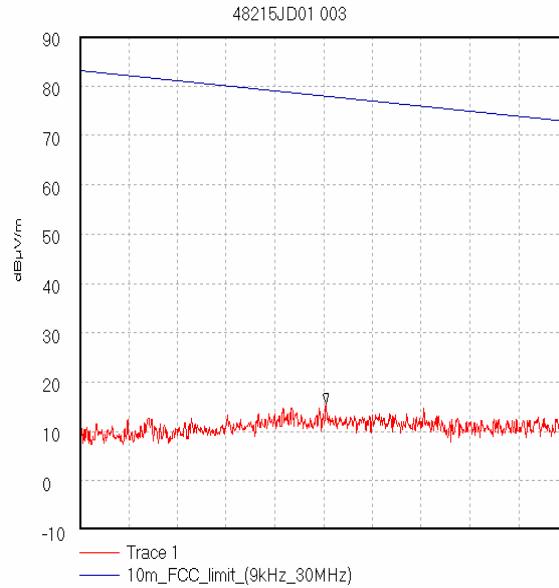
Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
316.311	Vertical	29.8	46.0	16.2	Complied

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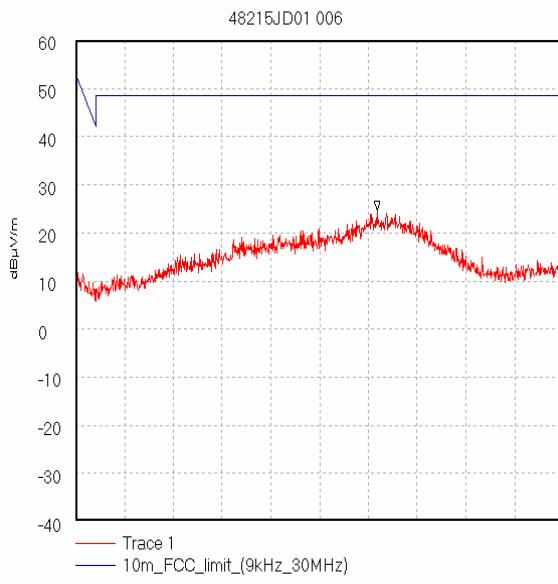
Receiver Radiated Spurious Emissions: Section 15.109 (Continued)



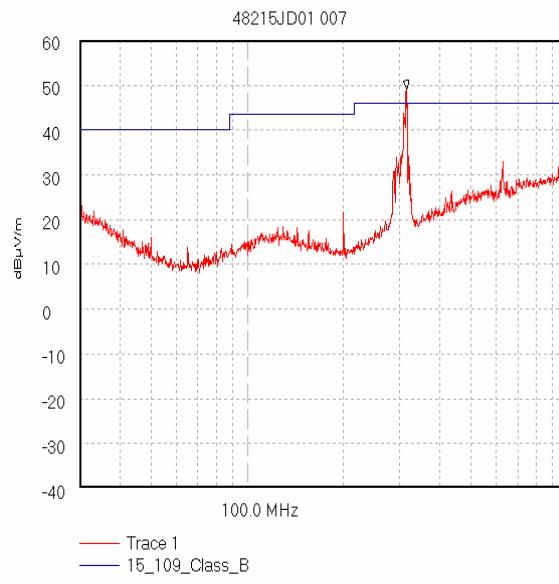
Start 9.0 kHz; Stop 150.0 kHz
Ref 110 dB μ V; Ref Offset 0.0 dB; 10 dB/div
RBW 200.0 Hz; VBW 300.0 Hz; Att 60 dB; Swp 24.0 S
Peak 104.253 kHz, 30.37 dB μ V
Limit/Mask: 10m_FCC_limit_(9kHz_30MHz); Limit Test Passed
Transducer Factors: 3mto10m_9k_490k
21/04/2006 10:20:43



Start 150.0 kHz; Stop 490.0 kHz
Ref 90 dB μ V/m; Ref Offset 0.0 dB; 10 dB/div
RBW 9.0 kHz; VBW 10.0 kHz; Att 10 dB; Swp 40.0 mS
Peak 321.889 kHz, 15.6 dB μ V/m
Limit/Mask: 10m_FCC_limit_(9kHz_30MHz); Limit Test Passed
Transducer Factors: 3mto10m_9k_490k
21/04/2006 10:26:05



Start 490.0 kHz; Stop 30.0 MHz
Ref 60 dB μ V/m; Ref Offset 0.0 dB; 10 dB/div
RBW 9.0 kHz; VBW 10.0 kHz; Att 0 dB; Swp 2.4 S
Peak 18.753 MHz, 24.63 dB μ V/m
Limit/Mask: 10m_FCC_limit_(9kHz_30MHz); Limit Test Passed
Transducer Factors: 3mto10m_490k_30M
21/04/2006 10:31:43



Start 30.0 MHz; Stop 1.0 GHz - Log Scale
Ref 60 dB μ V/m; Ref Offset 0.0 dB; 10 dB/div
RBW 120.0 kHz; VBW 300.0 kHz; Att 0 dB; Swp 80.0 mS
Peak 315.604 MHz, 49.11 dB μ V/m
Limit/Mask: 15_109_Class_B; Limit Test Failed
Transducer Factors: A1037
21/04/2006 11:04:53

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

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Receiver Radiated Spurious Emissions: Section 15.109 (Continued)

7.2.2. Electric Field Strength Measurements (Frequency Range: 1 to 2 GHz)

Results:

Single Channel - Highest Peak Level:

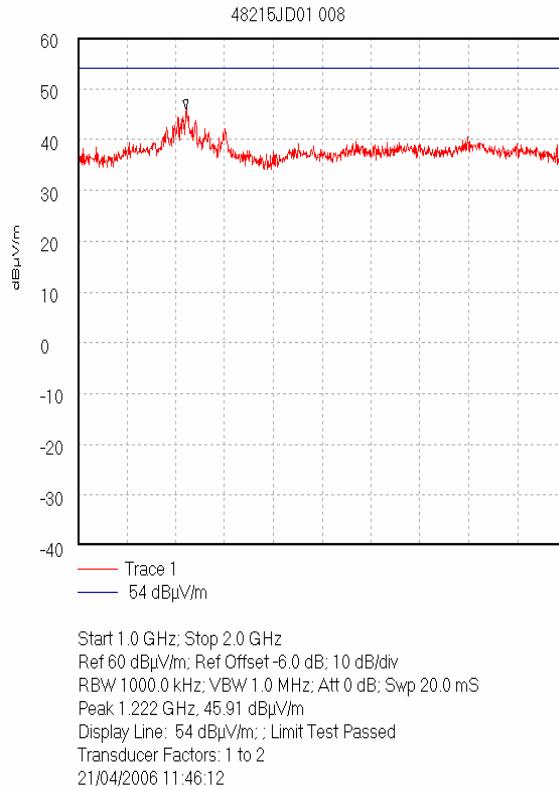
Frequency (MHz)	Antenna Polarity	Detector Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
1220.06	Vertical	32.1	21.1	5.8	59.0	74.0	1.5	Complied

Single Channel - Highest Average Level:

Frequency (MHz)	Antenna Polarity	Detector Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
1220.06	Vertical	19.3	21.1	5.8	46.2	54.0	7.8	Complied

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Receiver Radiated Spurious Emissions: Section 15.109 (Continued)



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

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7.3. Transmitter Radiated Spurious Emissions: Section 15.209

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

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

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

7.3.1.3. 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).

Results:

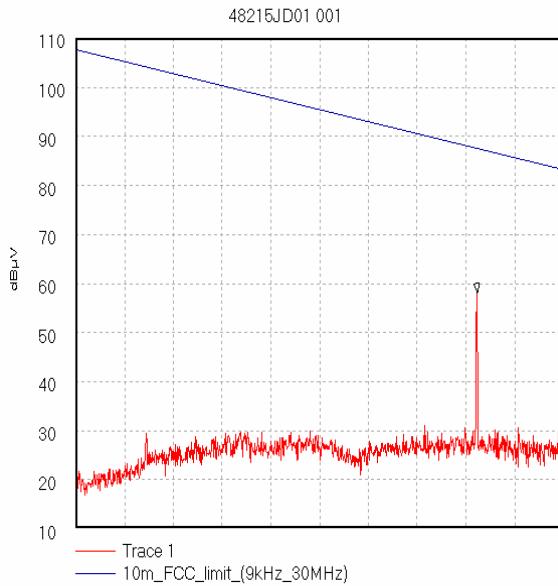
Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Measurement Distance (m)	Margin (dB)	Result
Please see note 1						

Note(s):

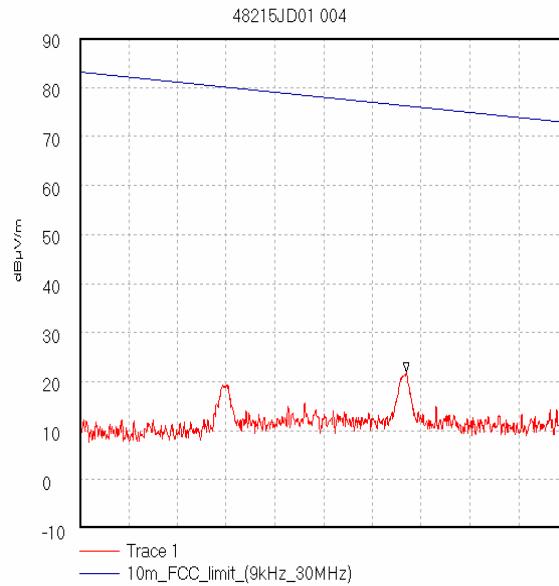
1. All emissions were at least 20 dB below the limit

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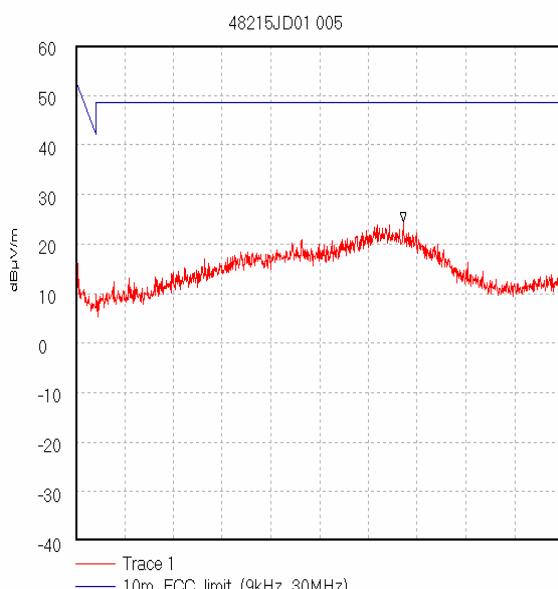
Transmitter Radiated Spurious Emissions: Section 15.209 (Continued)



Start 9.0 kHz; Stop 150.0 kHz
 Ref 110 dB μ V; Ref Offset 0.0 dB; 10 dB/div
 RBW 200.0 Hz; VBW 300.0 Hz; Att 60 dB; Swp 24.0 S
 Peak 125.09 kHz, 58.1 dB μ V
 Limit/Mask: 10m_FCC_limit_(9kHz_30MHz); Limit Test Passed
 Transducer Factors: 3mto10m_9k_490k
 21/04/2006 10:17:17



Start 150.0 kHz; Stop 490.0 kHz
 Ref 90 dB μ V/m; Ref Offset 0.0 dB; 10 dB/div
 RBW 9.0 kHz; VBW 10.0 kHz; Att 10 dB; Swp 40.0 mS
 Peak 377.8 kHz, 21.87 dB μ V/m
 Limit/Mask: 10m_FCC_limit_(9kHz_30MHz); Limit Test Passed
 Transducer Factors: 3mto10m_9k_490k
 21/04/2006 10:27:06



Start 490.0 kHz; Stop 30.0 MHz
 Ref 60 dB μ V/m; Ref Offset 0.0 dB; 10 dB/div
 RBW 9.0 kHz; VBW 10.0 kHz; Att 0 dB; Swp 2.4 S
 Peak 20.327 MHz, 24.43 dB μ V/m
 Limit/Mask: 10m_FCC_limit_(9kHz_30MHz); Limit Test Passed
 Transducer Factors: 3mto10m_490k_30M
 21/04/2006 10:30:44

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

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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
Radiated Emissions	9 kHz to 30 MHz	95%	± 3.53 dB
Radiated Emissions	30 MHz to 1000 MHz	95%	± 5.26 dB
Radiated Spurious Emissions	1 GHz to 18 GHz	95%	± 4.18 dB

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. Receiver 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 – 2001 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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Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
A007	HFH2-Z2 Loop Antenna	Rohde & Schwarz	HFH2-Z2	880 458/020
A008	HFH2-Z2 Metal Tripod	Rohde & Schwarz	HFU-Z	None
A027	Horn Antenna	Eaton	9188-2	301
A1037	Chase Bilog Antenna	Chase EMC Ltd	CBL6112B	2413
C363	BNC Cable	Rosenberger	RG142	None
C364	BNC Cable	Rosenberger	RG142	None
M505	Analyser Display Unit	Rohde & Schwarz	ESAI-D	825316/010
S202	Site 2	RFI	2	S202-15011990
S212	Site 12	RFI	12	

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\48215JD01\EMIRAD	Test configuration for measurement of radiated emissions.

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