



TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: Datalogic Mobile SRL
GMC-1921 RFID ENGINE R3 & SE950 DLBJET

To: FCC Part 15 Subpart C: 2007 (Sections 15.225), RSS-210 Issue 7 June 2007
& RSS-Gen Issue 2 June 2007

Test Report Serial No:
RFI/RPTE1/RP49416JD01A

This Test Report Is Issued Under The Authority Of Steve Flooks, Radio Performance Group Service Leader:	 pp Brian Watson
Checked By: Brian Watson 	Report Copy No: PDF01
Issue Date: 24 April 2008	Test Dates: 11 February 2008 to 27 March 2008

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1. Client Information

Company Name:	Datalogic Mobile SRL
Address:	Via S. Vitalino 13 Lippo di Calderara di Reno Bologna 40012 Italy
Contact Name:	Mr M DeGirolami

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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:	RFID ENGINE R3 Module for DLBJET with laser reader.
Brand Name:	Datalogic Scanning s.r.l.
Model Name or Number:	GMC-1921 RFID ENGINE R3 & SE950 DLBJET
Serial Number:	None stated
Hardware Version Number:	2
Software Version Number:	1.00
FCC ID Number:	U4F0018
Country of Manufacture:	Italy
Date of Receipt:	11 February 2008

2.2. Description of EUT

The equipment under test is a module with linear scan engine and 13.56 MHz multi standard RFID tag reader.

2.3. Modifications Incorporated in the EUT

During the course of testing the EUT was not modified.

2.4. Additional Information Related to Testing

Power Supply Requirement:	Internal battery supply of 3.7 V
Intended Operating Environment:	Residential, Commercial, Light Industry, Heavy Industry, Within GSM Coverage
Declared Temperature Range:	-20°C to 60°C
Equipment Category:	Short Range Device
Type of Unit:	Portable (Standalone battery powered device) Transceiver
Transmitter Field Strength:	23.3 dB μ V/m
Transmit Frequency:	13.56 MHz (Single Channel)

2.5. Port Identification

Port	Description	Type/Length
1	Power and communication port	N/A

2.6. Support Equipment

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

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Description:	Test Fixture
Brand Name:	Datalogic Scanning s.r.l.
Model Name or Number:	Development Unit FE2313
Serial Number:	None
Cable Length and Type:	3m, RS232 Cable
Connected to Port:	Power and communication

Description:	Laptop PC
Brand Name:	Dell
Model Name or Number:	Latitude D610
Serial Number:	CN-OD4571-48643-544-5681
Cable Length and Type:	3 m / RS232 Null modem
Connected to Port:	Serial

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3. Test Specification, Methods and Procedures

3.1. Test Specifications

Reference:	FCC Part 15 Subpart C: 2007 (Sections 15.225).
Title:	Code of Federal Regulations, Part 15 (47CFR225) Radio Frequency Devices.

Reference:	RSS-210 Issue 7 June 2007
Title:	Low-power Licence-exempt Radio communication Devices (All Frequency Bands): Category I Equipment.

Reference:	RSS-Gen Issue 2 June 2007
Title:	General Requirements and Information for the Certification of Radio communication Equipment

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:

- The EUT was operating in transmit mode on a single channel.
- For idle mode tests, the transmitter was turned off.

5.2. Configuration and Peripherals

The EUT was tested in the following configuration:

- The EUT was connected to a PCB test fixture via a 70mm ribbon cable. The EUT was controlled by a PC application through the PC serial port and test fixture. During transmitter tests an ID tag was left close to the laser and the tag was read and tag ID continuously sent to the PC application as this was found to be the worst case configuration.
- Power to the EUT was also supplied via the 70mm ribbon cable connected to the test fixture. The test fixture power was provided by an AC/DC power adaptor. The DC supply to the EUT was varied as required by adjusting a potentiometer on the test fixture and the DC voltage on pins 1 and 7 of connector 8 on the test fixture were monitored using a multimeter whenever the EUT supply voltage was adjusted.
- The PC was connected to the EUT during all tests to verify the tag was continuously read by the EUT.

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6. Summary of Test Results

Range of Measurements	FCC Part 15	IC RSS	Port Type	Compliance Status
Receiver AC Conducted Emissions (150 kHz to 30 MHz)	FCC Part 15.107	RSS-Gen 7.2.3	AC Mains	Complied
Receiver Radiated Spurious Emissions	FCC Part 15.109	RSS-Gen 4.10 RSS-Gen 6.0	Enclosure	Complied
Transmitter AC Conducted Emissions (150 kHz to 30 MHz)	FCC Part 15.207	RSS-Gen 7.2.2	AC Mains	Complied
Transmitter Fundamental Field Strength	FCC Part 15.225(a)	RSS-210 A2.6	Antenna	Complied
Transmitter Radiated Spurious Emissions	FCC Part 15.209	RSS-Gen 4.9 RSS-210 2.2 RSS-210 A2.6	Enclosure	Complied
Transmitter Band Edge Radiated Emissions	FCC Part 15.209	RSS-210 2.2 RSS-210 A2.6	Antenna	Complied
Transmitter 20 dB Bandwidth	FCC Part 2.1049	RSS-Gen 4.6.1	Antenna	Complied
Transmitter Frequency Stability (Temperature & Voltage Variation)	FCC Part 15.225(c)	RSS Gen 7.2.4 RSS-210 A2.1 RSS-210 A2.6	Antenna	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.

- 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. Receiver AC Mains Conducted Emissions

7.2.1.1. Tests were performed in accordance with C63.4 Section 7 and relevant annexes.

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

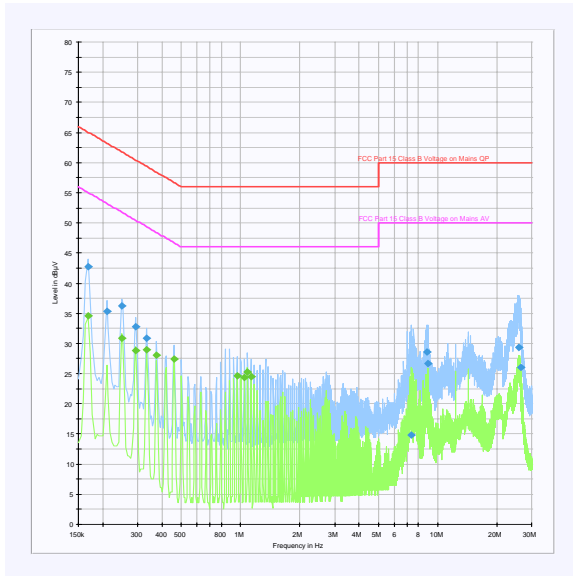
Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.168000	Live	42.8	65.1	22.3	Complied
0.208500	Live	35.4	63.3	27.9	Complied
0.249000	Neutral	36.3	61.8	25.5	Complied
0.294000	Live	32.7	60.4	27.7	Complied
0.334500	Live	30.9	59.3	28.4	Complied
7.363500	Live	14.8	60.0	45.2	Complied
8.862000	Live	28.6	60.0	31.4	Complied
8.938500	Live	26.6	60.0	33.4	Complied
25.773000	Live	29.3	60.0	30.7	Complied
26.308500	Live	26.0	60.0	34.0	Complied

Average Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.168000	Live	34.5	55.1	20.6	Complied
0.249000	Neutral	30.9	51.8	20.9	Complied
0.294000	Live	28.8	50.4	21.6	Complied
0.334500	Live	28.9	49.3	20.4	Complied
0.375000	Live	28.0	48.4	20.4	Complied
0.460500	Neutral	27.4	46.7	19.3	Complied
0.960000	Neutral	24.6	46.0	21.4	Complied
1.045500	Neutral	24.3	46.0	21.7	Complied
1.086000	Neutral	25.3	46.0	20.7	Complied
1.126500	Neutral	24.5	46.0	21.5	Complied

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Receiver AC Mains Conducted Emissions (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. Receiver Radiated Spurious Emissions

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

7.2.3.1. Tests were performed in accordance with C63.4 Section 8 and relevant annexes.

7.2.3.2. Tests were performed to identify the maximum receiver or standby radiated emission levels.

Results:

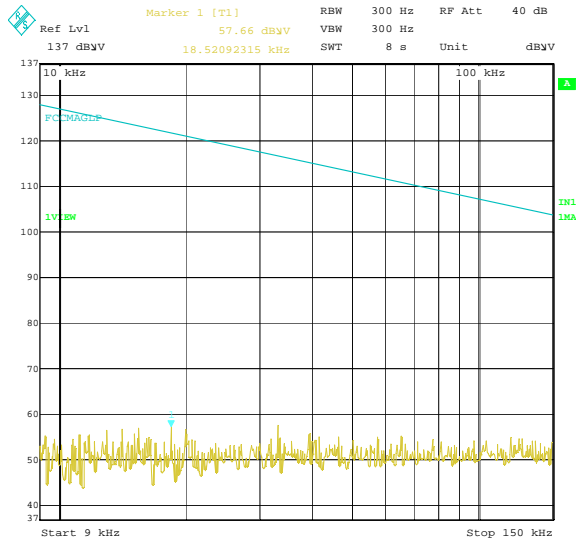
Frequency (MHz)	Antenna Polarity	Q-P Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
102.920	Horizontal	38.7	43.5	4.8	Complied
127.073	Horizontal	38.3	43.5	5.2	Complied

Note(s):

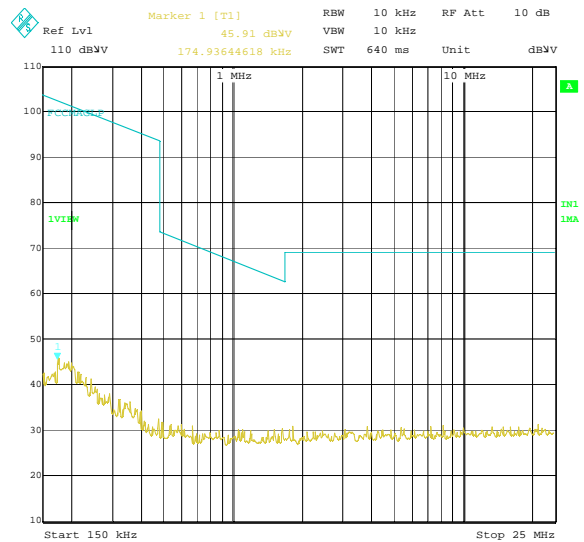
1. Both emissions recorded above were investigated and found to be ambience. All other emissions were greater than 10 dB below the applicable limits.

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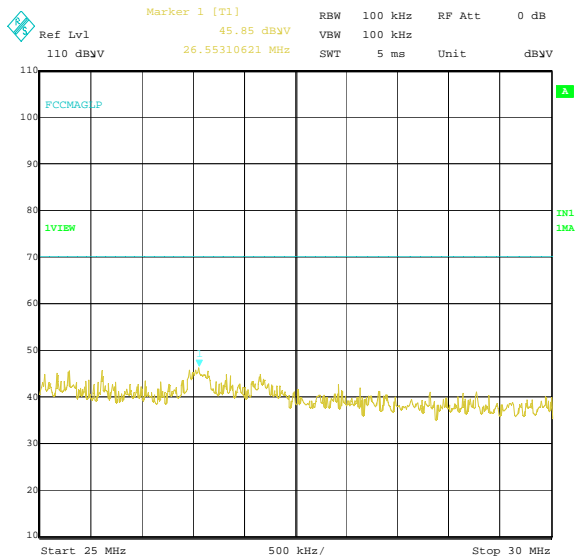
Receiver Radiated Spurious Emissions (Continued)



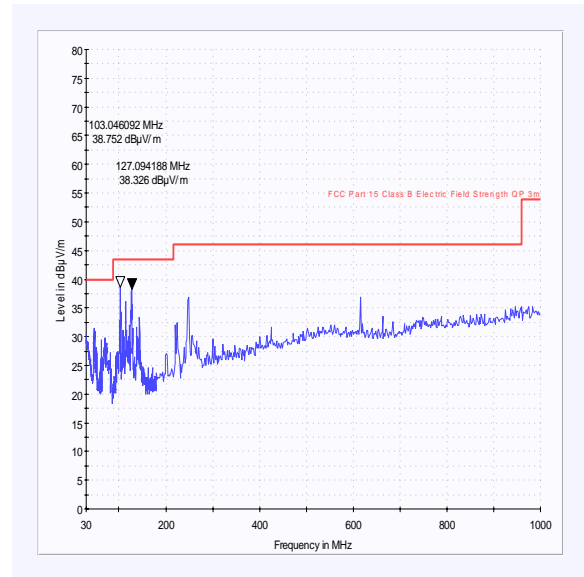
Title: 49416JD01
 Date: 19.MAR.2008 10:59:02



Title: 49416JD01
 Date: 19.MAR.2008 11:00:45



Date: 19.MAR.2008 12:39:34



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

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7.2.4. Transmitter AC Mains Conducted Emissions

7.2.4.1. Tests were performed in accordance with C63.4 Section 7 and relevant annexes.

7.2.4.2. 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

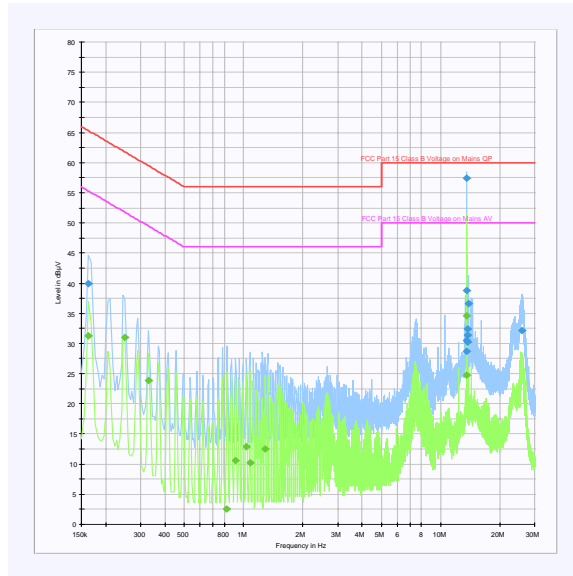
Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.163500	Live	39.9	65.3	25.4	Complied
13.465500	Live	28.7	60.0	31.3	Complied
13.546500	Live	30.5	60.0	29.5	Complied
13.560000	Live	57.4	60.0	2.6	Complied
13.569000	Live	38.8	60.0	21.2	Complied
13.636500	Live	32.4	60.0	27.6	Complied
13.659000	Live	30.3	60.0	29.7	Complied
13.681500	Live	31.4	60.0	28.6	Complied
13.771500	Live	36.6	60.0	23.4	Complied
25.890000	Live	32.1	60.0	27.9	Complied

Average Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.163500	Live	31.3	55.3	24.0	Complied
0.249000	Neutral	31.0	51.8	20.8	Complied
0.330000	Live	23.9	49.5	25.6	Complied
0.820500	Live	2.6	46.0	43.4	Complied
0.910500	Neutral	10.6	46.0	35.4	Complied
1.036500	Neutral	12.9	46.0	33.1	Complied
1.077000	Neutral	10.2	46.0	35.8	Complied
1.288500	Live	12.5	46.0	33.5	Complied
13.555500	Live	34.5	50.0	15.5	Complied
13.569000	Live	24.7	50.0	25.3	Complied

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Transmitter AC Mains Conducted Emissions (Continued)



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

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7.2.5. Transmitter Fundamental Fieldstrength

7.2.5.1. Tests were performed in accordance with C63.4 Section 8 and relevant annexes.

7.2.5.2. Measurements we performed at 3 metres and corrected to 30 metres using the square of an inverse linear distance extrapolation factor (40 dB/decade).

Results:

Frequency (MHz)	Q-P Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
13.56	26.1	84.0	57.9

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7.2.6. Transmitter Radiated Spurious Emissions

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

7.2.7.1. Tests were performed in accordance with C63.4 Section 8 and relevant annexes.

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

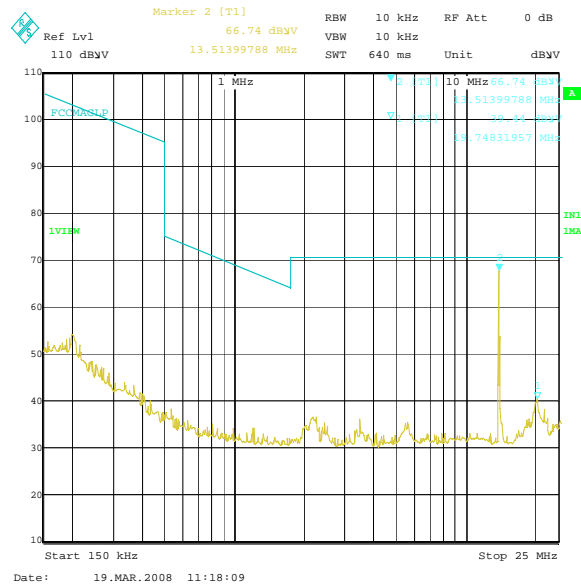
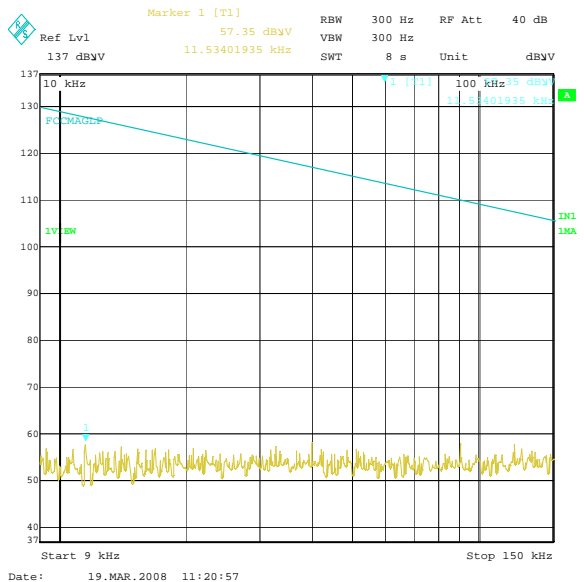
7.2.7.3. Limits below 30 MHz are specified at test distance of 30 metres, whilst below 0.49 MHz they are specified at a test distance of 300 metres. However as specified by section 15.31 (f)(2), measurements may be performed at a closer distance, and the measured level corrected to the specified measurement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

Results:

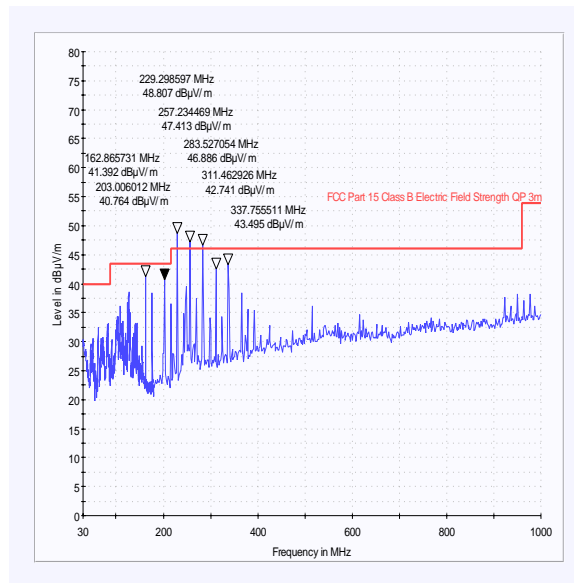
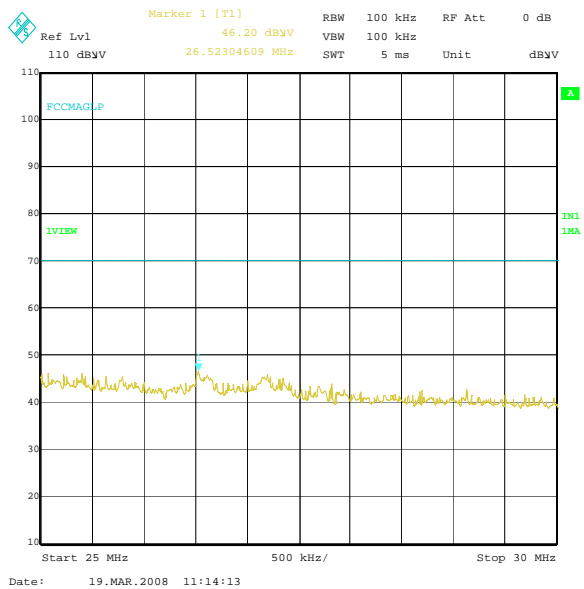
Frequency (MHz)	Antenna Polarity	Measurement distance (m)	Q-P Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
203.612	Horizontal	3	16.1	43.5	27.4
230.518	Horizontal	3	40.4	46.0	5.6
257.639	Horizontal	3	38.2	46.0	7.8
284.757	Vertical	3	35.4	46.0	10.6
311.462	Vertical	3	29.4	46.0	11.2
338.995	Vertical	3	30.1	46.0	15.9

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Transmitter Radiated Spurious Emissions (Continued)



NOTE: The carrier is shown on the above plot at 13.513 MHz



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

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7.2.8. Transmitter Radiated Emissions at Band Edges

7.2.8.1. Tests were performed in accordance with C63.4 Section 8 and relevant annexes.

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

7.2.8.3. 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).

7.2.8.4. Tests were performed at a distance of 3 metres and an offset applied to the spectrum analyser to correct to the required distance of 30 metres.

Results:

Tests were performed at a distance of 3 metres.

Lower Band Edge

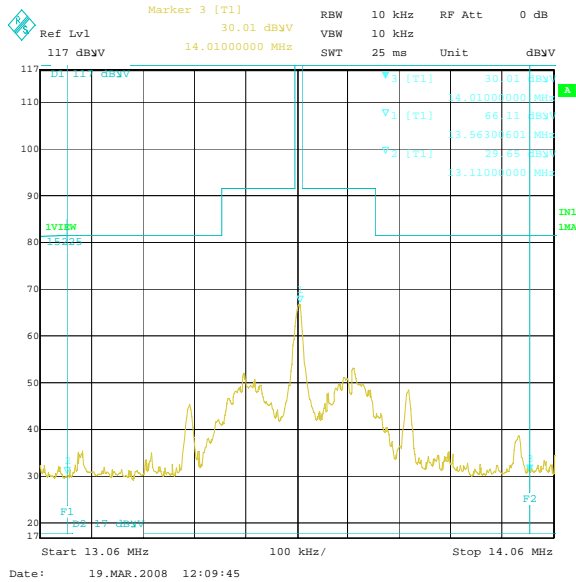
Frequency (MHz)	Level at 3 metres (dB μ V/m)	Limit at 3 metres (dB μ V/m)	Margin (dB)
13.110	29.7	69.5	39.8

Upper Band Edge

Frequency (MHz)	Level at 3 metres (dB μ V/m)	Limit at 3 metres (dB μ V/m)	Margin (dB)
14.010	30.0	69.5	39.5

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Transmitter Radiated Emissions at Band Edges (Continued)



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

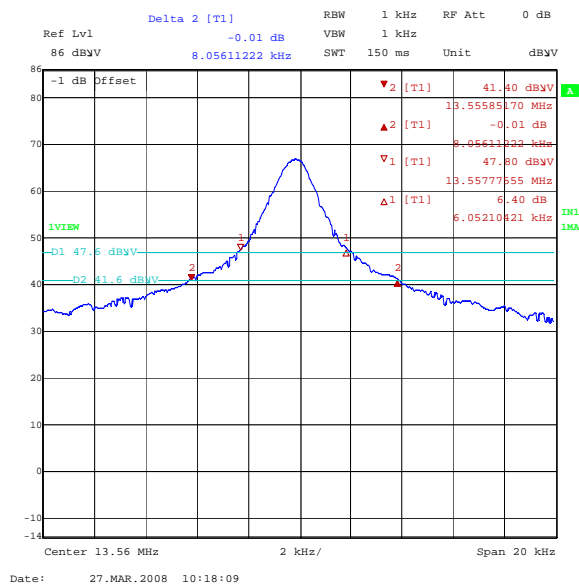
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7.2.9. Transmitter 20 dB Bandwidth

7.2.9.1. Tests were performed in accordance with C63.4 Section 10.1.8.8 and 13.1.7 and relevant annexes with the only deviation being that the 20 dBc bandwidth was reported.

7.2.9.2. This test is not required to show compliance to 15.225 but has been included for information in order to aid Industry Canada (IC) applications.

Transmitter 20 dB Bandwidth (kHz)
6.052



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7.2.10. Transmitter Frequency Stability (Temperature & Voltage Variation)

7.2.10.1. Tests were performed in accordance with C63.4 Section 10.1.8.7 and 13.1.6 and relevant annexes

7.2.10.2. Tests were performed to identify the maximum frequency error of the EUT with variations in nominal operating voltage at an ambient temperature of 20°C.

7.2.10.3. Tests were performed in accordance with FCC Part 2.1055 but over the frequency range specified in FCC Part 15.

Results:

Maximum frequency error of the EUT with variations in ambient temperature

Temp (°C)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (%)	Limit (%)	Margin (%)
-20	13.56	13.559849	-151	-0.001114	0.01	0.008886
20	13.56	13.559809	-191	-0.001409	0.01	0.008591
50	13.56	13.559769	-231	-0.001704	0.01	0.008296

Maximum frequency error of the EUT with variations in supply voltage

Tests were performed in accordance with FCC Part 2.1055. The upper voltage is set to 115% of the nominal voltage. The lower voltage is set to 85% of the nominal voltage, or the EUT cut-off voltage.

Results:

Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (%)	Limit (%)	Margin (%)
3.6	13.56	13.559769	-231	0.001704	0.01	0.008296
4.2	13.56	13.559809	-191	0.001409	0.01	0.008591
4.8	13.56	13.559829	-171	0.001261	0.01	0.008739

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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	0.15 MHz to 30 MHz	95%	±3.25 dB
Occupied Bandwidth	N/A	95%	±0.12 %
Frequency Stability	N/A	95%	±11.37 ppm
Radiated Emissions	9 kHz to 30 MHz	95%	±3.53 dB
Radiated Emissions	30 MHz to 1000 MHz	95%	±5.26 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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Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A037	Low Power Filter	RFI Ltd Basingstoke	004	A037	Calibrated before use	-
A255	Antenna	Flann Microwave	16240-20	519	17 Nov 2006	36
C151	Cable	Rosenberger	UFA210A-1- 1181-70x70	None	Calibrated before use	-
C160	Cable	Rosenberger	UFA210A-1- 1181-70x70	None	Calibrated before use	-
C340	Cable	Andrews	None	None	Calibrated before use	-
C348	Cable	Rosenberger	UFA210A-1- 1181-70x70	2993	Calibrated before use	-
C363	Cable	Rosenberger	RG142	None	Calibrated before use	-
C461	Cable	Rosenberger	UFA210A-1- 1182-704704	98H0305	Calibrated before use	-
E013	Environmental Chamber	Sanyo	ATMOS chamber	None	Calibration not required	-
M023	Test Receiver	Rohde & Schwarz	ESVP	872 991/027	24 Apr 2007	12
M024	Spectrum Monitor	Rohde & Schwarz	EZM	873 952/006	Calibrated before use	-

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Test Equipment Used (Continued)

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
M1068	Thermometer	Iso-Tech	RS55	93102884	26 Jun 2007	12
M1124	Spectrum Analyser	Rohde & Schwarz	ESIB26	100046K	18 Feb 2008	12
M1229	Digital Multimeter	Fluke	179	87640015	20 Apr 2007	12
M1263	Test Receiver	Rohde & Schwarz	ESIB7	100265	06 Feb 2008	12
S0529	DC Power Supply Unit	ISO-Tech	IPS2302A	504E005G2	Calibrated before use	-
S201	Open Area Test Site	RFI	1	None	25 May 2007	12
S207	Site 7	RFI	7	None	Calibration not required	-
S212	Emissions Screened Room	RFI	12	None	Verified before use	-

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

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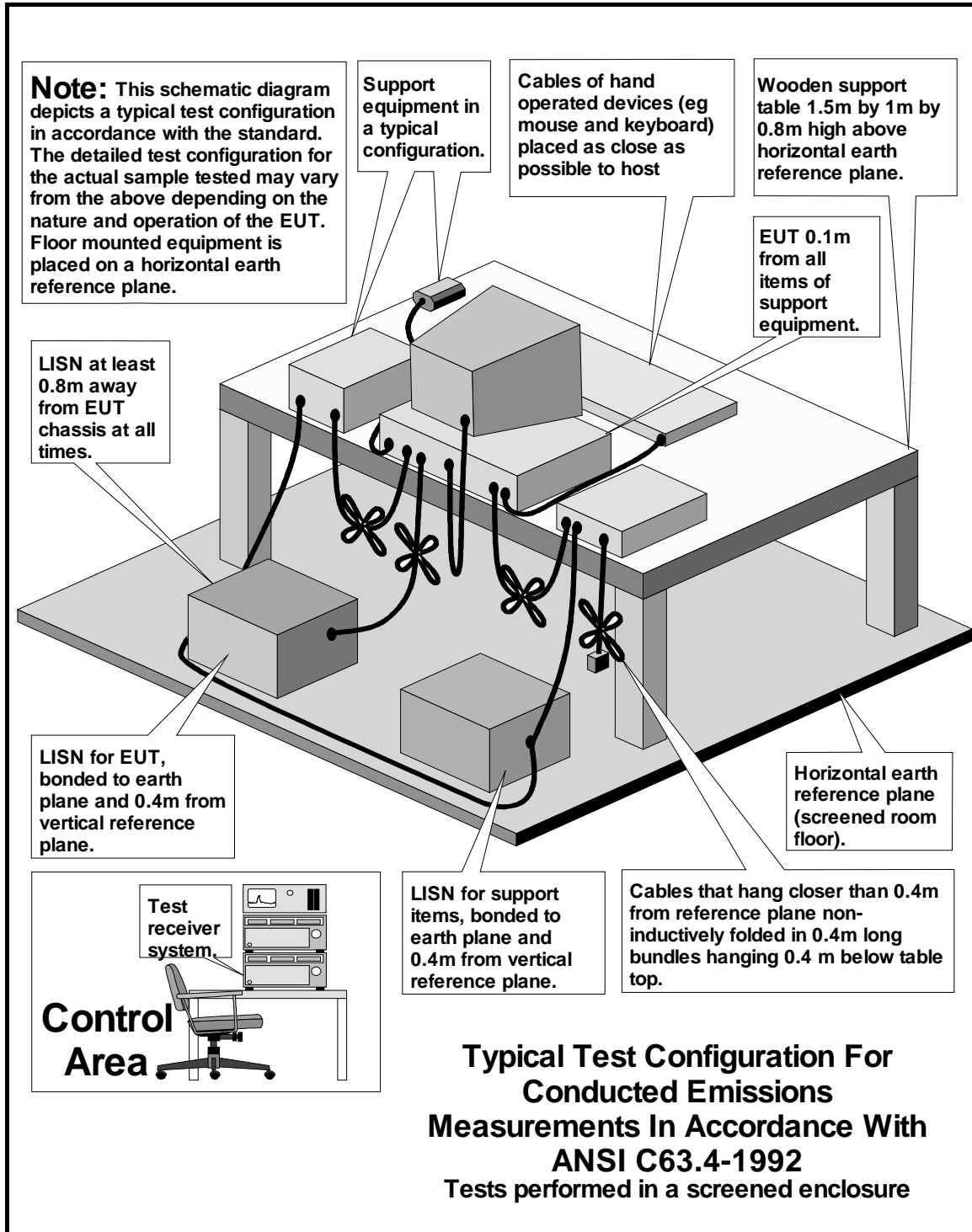
Appendix 2. Test Configuration Drawings

This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\49416JD01\EMICON	Test configuration for measurement of conducted emissions.
DRG\49416JD01\EMIRAD	Test configuration for measurement of radiated emissions.

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