TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Test of: Datalogic S.p.A
DLBJET with RF-ID Capability

To: FCC Part 15.225: 2005

Test Report Serial No:
RFI/MPTE3/RP48517JD04A

Supersedes Test Report Serial No:
RFI/MPTE2/RP48517JD04A

This Test Report Is Issued Under The Authority Of Andrew Brown, Operations Manager: 	
Tested By: Steven Wong 	**Checked By: Nigel Davison**  **pp**
Report Copy No: PDF01	
Issue Date: 31 October 2006	**Test Dates: 21 August 2006 to 22 August 2006**

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Table of Contents

1. Client Information

Company Name:	Datalogic S.p.A
Address:	Via Candini, 2 Lippo di Calderara di Reno Bologna Italy 40012
Contact Name:	Mr P Guerzoni

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:	Datalogic S.p.A
Model Name or Number:	DLBJET 511-424-455
Unique Type Identification:	944151013
Serial Number:	D06G07890
Hardware Version:	None Stated
Software Version:	Build 1400
Software Version Number:	MS WCE V5
FCC ID Number:	OMJ0023
Country of Manufacture:	Italy
Date of Receipt:	08 August 2006

2.2. Accessories

Description:	AC Charger
Brand Name:	ONTOP
Model Name or Number:	SAL115A-1213U-6
Serial Number:	None Stated
Cable Length and Type:	3.3m, 2 Wire
Connected to Port:	AC Charger

2.3. Description of EUT

The equipment under test is a Personal Digital Assistant used for inventory monitoring, Health Care, Field Service etc. It is fitted with *Bluetooth,* WIFI, GSM, Laser and RFID. Operating with 13.56 MHz (RFID), 2.4 GHz (*Bluetooth* and WIFI). (Only the RFID aspect is covered within this report)

2.4. Modifications Incorporated in EUT

During the course of testing the EUT was not modified.

2.5. Additional Information Related to Testing

Power Supply Requirement:	DC supply of 12 V Internal battery supply of 3.7		
Intended Operating Environment:	Residential and Commercial		
Equipment Category:	Short Range (Low Power) GSM900/GSM1800 GSM850/GSM1900		
Type of Unit:	Portable (Standalone battery powered device)		
Transmit Frequency Range:	13.553 to 13.567		
Transmit Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	1	Single	13.56
Receive Frequency Range:	13.553 to 13.567		
Receive Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	1	Single	13.56
Maximum Field Strength	31.5 dBuV/m		

3. Test Results

Reference:	FCC Part 15.225: 2005
Title:	Code of Federal Regulations, Part 15.225 (47CFR15) Radio Frequency Devices

3.1. 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 (2003)
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.

3.2. 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.

5. Operation of the EUT during Testing

5.1. Operating Modes

The EUT was tested in the following operating modes, unless otherwise stated.
With all radio capabilities off and only RFID on.

5.2. Configuration and Peripherals

The EUT was tested in the following configuration unless otherwise stated:
While charging on 110 V AC network.

6. Summary of Tests

Range of Measurements	Specification Reference	Port Type	Compliancy Status
Receiver AC Conducted Emissions (150 kHz to 30 MHz)	C.F.R. 47 FCC Part 15: 2004 Section 15.107	AC Mains	Complied
Receiver Radiated Spurious Emissions	C.F.R. 47 FCC Part 15: 2004 Section 15.109	Enclosure	Complied
Transmitter AC Mains Conducted Emissions (150 kHz to 30 MHz)	C.F.R. 47 FCC Part 15: 2004 Section 15.207	AC Mains	Complied
Transmitter Fundamental Fieldstrength	C.F.R. 47 FCC Part 15: 2004 Section 15.225(a)	Antenna	Complied
Transmitter Radiated Spurious Emissions	C.F.R. 47 FCC Part 15: 2004 Section 15.209	Enclosure	Complied
Transmitter Band Edge Radiated Emissions	C.F.R. 47 FCC Part 15: 2004 Section 15.209	Antenna	Complied
Transmitter 20 dB Bandwidth	C.F.R. 47 FCC Part 2: 2004 Section 2.1049	Antenna	Complied
Transmitter Frequency Stability (Temperature & Voltage Variation)	C.F.R. 47 FCC Part 15: 2004 Section 15.225(c)	Antenna	Complied

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.

7.2. Test Results

7.2.1. Receiver/Idle AC Conducted Spurious Emissions: Section 15.107

Results:

Quasi-Peak Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.193189	Neutral	46.5	63.9	17.4	Complied
0.196365	Live	52.7	63.8	11.1	Complied
0.197142	Live	52.6	63.7	11.2	Complied
0.200050	Neutral	46.8	63.6	16.8	Complied
0.262461	Live	43.1	61.4	18.3	Complied
0.264162	Neutral	45.1	61.3	16.2	Complied
0.327451	Live	40.3	59.5	19.2	Complied
0.327734	Neutral	39.9	59.5	19.6	Complied
0.393547	Neutral	37.3	58.0	20.6	Complied
0.458922	Live	35.8	56.7	20.9	Complied
1.116223	Neutral	20.9	56.0	35.1	Complied
1.122896	Live	8.1	56.0	47.9	Complied
1.152355	Live	8.7	56.0	47.3	Complied
1.185181	Neutral	13.0	56.0	43.0	Complied

Average Detector Measurements on Live and Neutral Lines

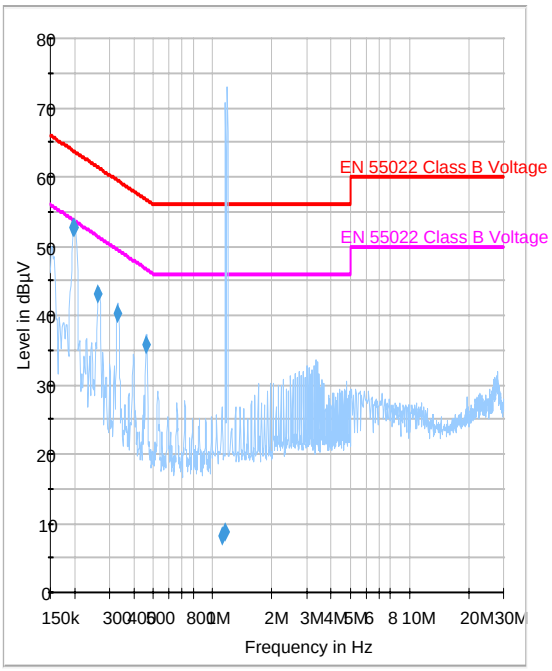
Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
Refer to Note 1					

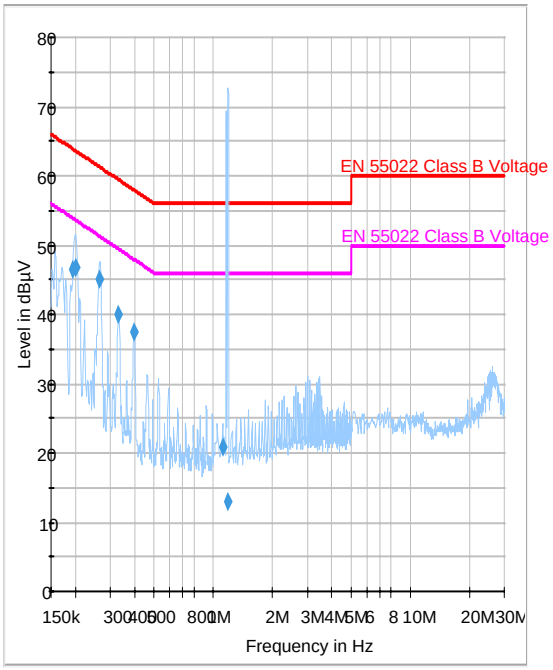
Note(s):

1. Average measurements were not performed as the levels were at least 20 dB below the limit, therefore final measurements were not required.

Test of: Datalogic S.p.A
DLBJET with RF-ID Capability
To: FCC Part 15.225: 2005

Receiver/Idle Mode AC Conducted Spurious Emissions: Section 15.107 (Continued)





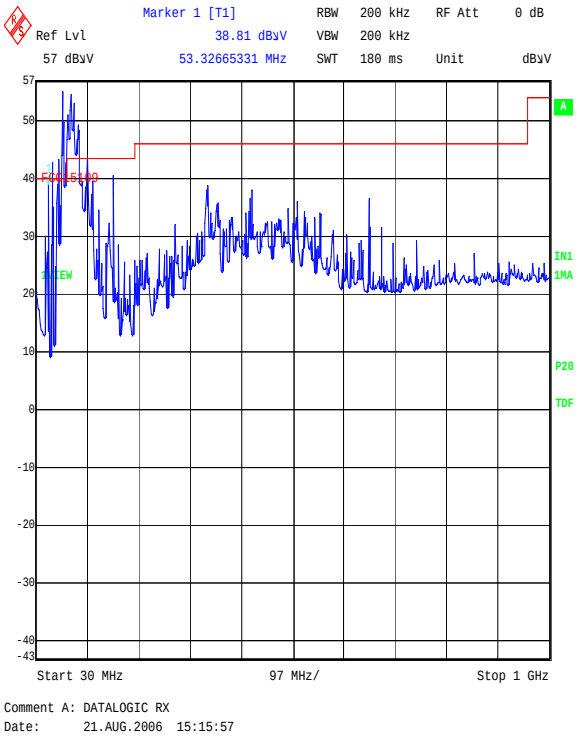
Note: These plots are a pre-scan and for indication purposes only. For final measurements, see accompanying tables.

7.2.2. Receiver/Idle Radiated Emissions: Section 15.109

Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz)

Frequency (MHz)	Antenna Polarity	Q-P Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
53.275899	Vertical	15.6	40.0	24.4	Complied
60.991780	Vertical	12.6	40.0	27.4	Complied
80.551020	Vertical	26.5	40.0	13.5	Complied
128.206024	Vertical	14.6	23.5	28.9	Complied
176.000000	Vertical	25.6	43.5	17.9	Complied
354.078000	Vertical	13.4	46.0	32.6	Complied
438.666901	Vertical	17.9	46.0	28.1	Complied
659.949000	Vertical	43.5	46.0	25.0	Complied

Receiver/Idle Mode Radiated Spurious Emissions: Section 15.109 (Continued)



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

7.2.3. Transmitter AC Mains Conducted Emissions: Section 15.207

Results:

Quasi-Peak Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.177271	Live	49.2	64.6	15.4	Complied
1.154419	Live	17.5	56.0	38.5	Complied
1.161133	Live	18.8	56.0	37.2	Complied
0.181407	Neutral	44.2	64.4	20.2	Complied
0.233976	Neutral	42.5	62.3	19.8	Complied
0.292467	Neutral	41.0	60.5	19.4	Complied
0.347507	Neutral	39.8	59.0	19.2	Complied

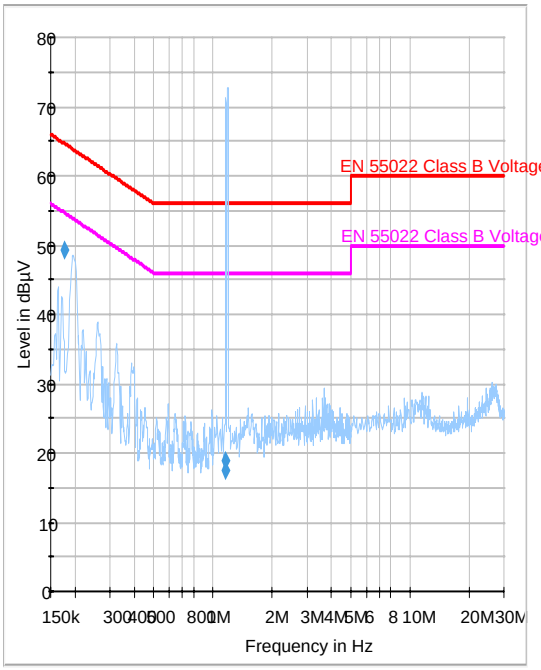
Average Detector Measurements on Live and Neutral Lines

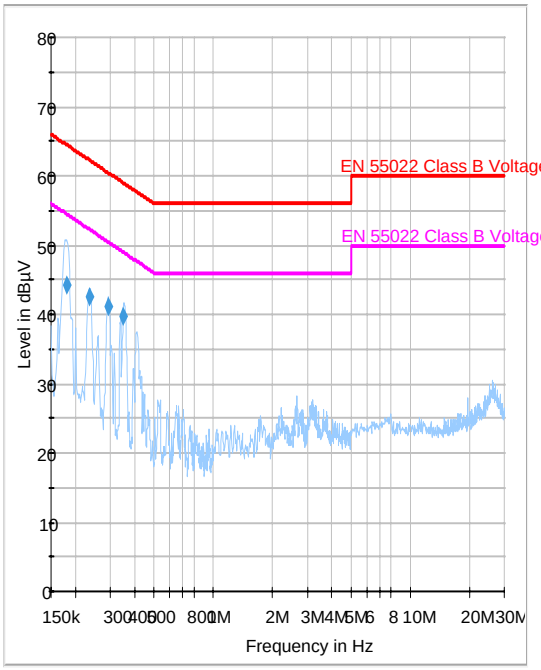
Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
Refer to Note 1					

Note(s):

1. Average measurements were not performed as the levels were at least 20 dB below the limit, therefore final measurements were not required.

Transmitter AC Mains Conducted Emissions: Section 15.207 (Continued)





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

7.2.4. Transmitter Fundamental Fieldstrength Section 15.225 (a)

Results:

The limit is specified at a test distance of 30 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).

Battery Powered Devices

Frequency (MHz)	Antenna Polarity	Q-P Level (dBμV/m)	Limit at 30 Metres (dBμV/m)	Margin (dB)	Result
13.56	Vertical	31.5	84.0	52.5	Complied

7.2.5. Transmitter Radiated Spurious Emissions: Section 15.209

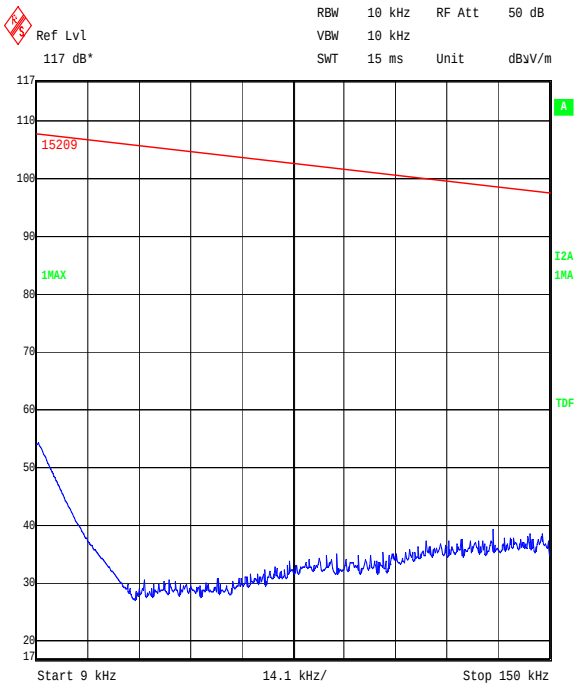
Electric Field Strength Measurements (Frequency Range: 9 kHz to 1000 MHz)

Results:

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).

Frequency (MHz)	Antenna Polarity	Q-P Level (dBμV/m)	Limit (dBμV/m)	Measurement Distance (m)	Margin (dB)	Result
53.275899	Vertical	15.6	40.0	3	24.4	Complied
60.991780	Vertical	12.6	40.0	3	27.4	Complied
80.551020	Vertical	26.5	40.0	3	13.5	Complied
128.206024	Vertical	14.6	43.5	3	28.9	Complied
176.000000	Vertical	25.6	43.5	3	17.9	Complied
354.078000	Vertical	13.4	46.0	3	32.6	Complied
438.666901	Vertical	17.9	46.0	3	28.1	Complied
659.949000	Vertical	43.5	46.0	3	2.5	Complied

Transmitter Radiated Spurious Emissions: Section 15.209 (Continued)



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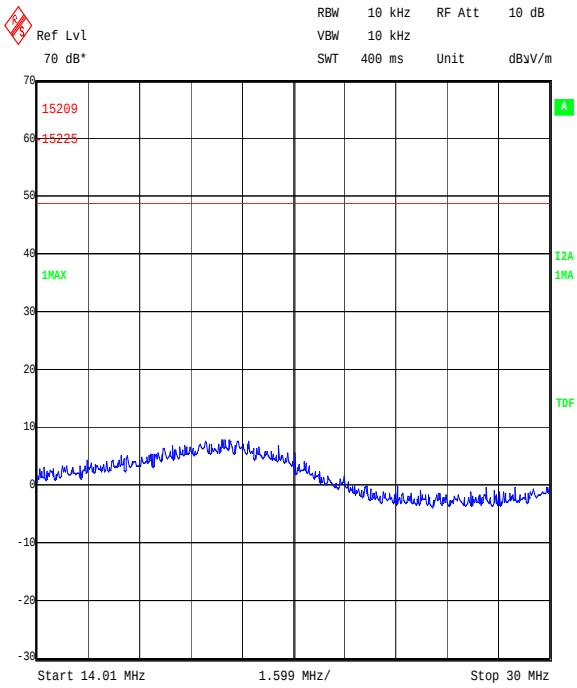

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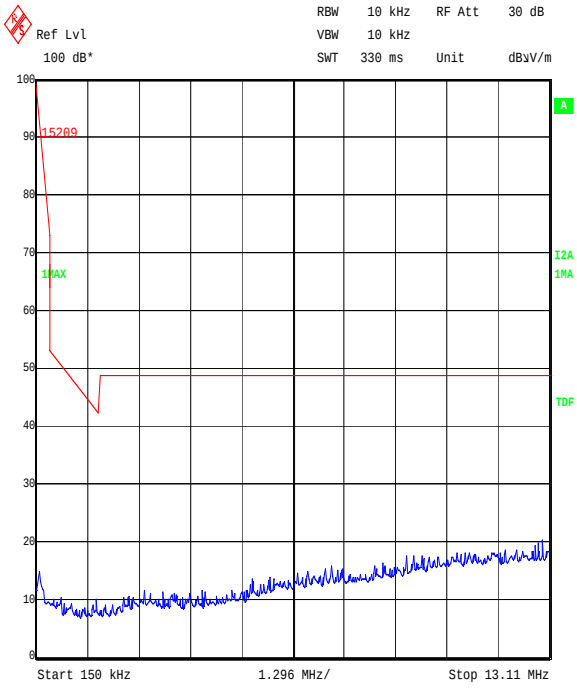

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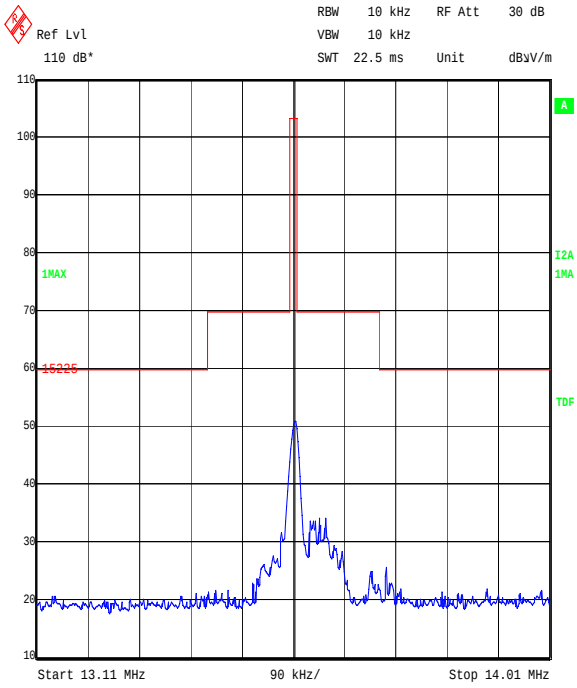

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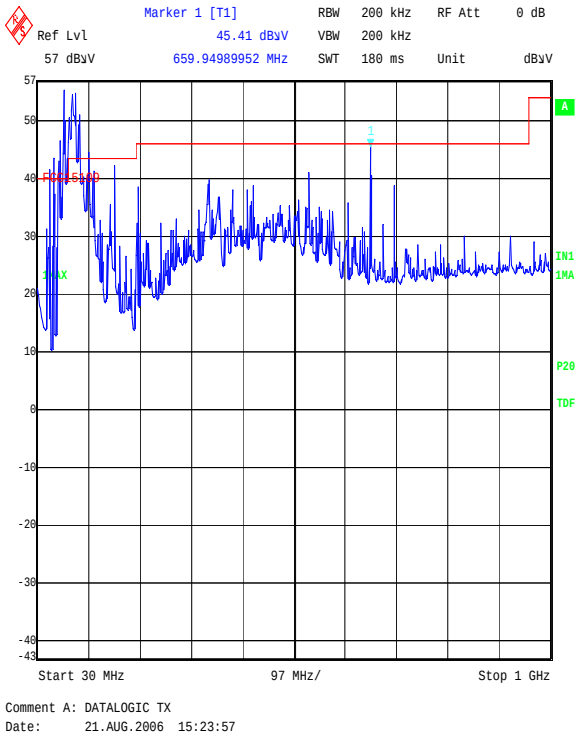
Transmitter Radiated Spurious Emissions: Section 15.209 (Continued)



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

7.2.6. Transmitter Radiated Emissions at Band Edges: Section 15.209

Results:

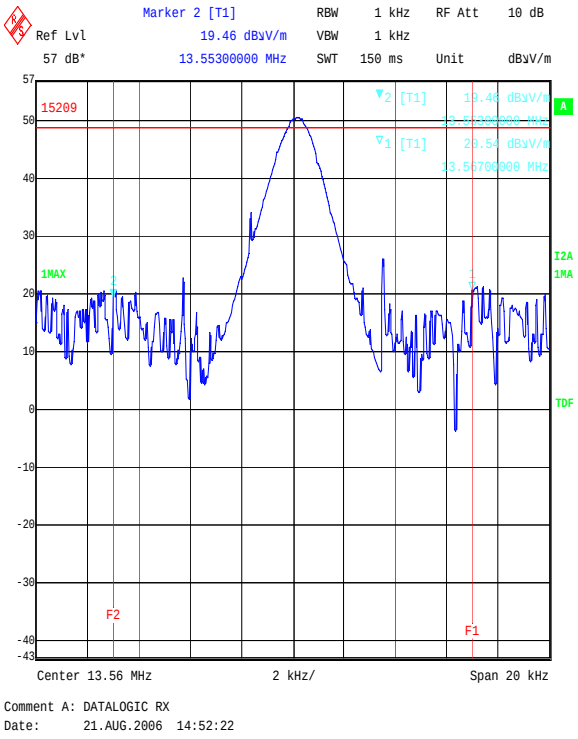
Bottom Band Edge

Frequency (MHz)	Q-P Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
13.553	19.5	59.6	40.1	Complied

Top Band Edge

Frequency (MHz)	Q-P Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
13.567	20.5	59.6	39.1	Complied

Transmitter Radiated Emissions at Band Edges: Section 15.209 (Continued)



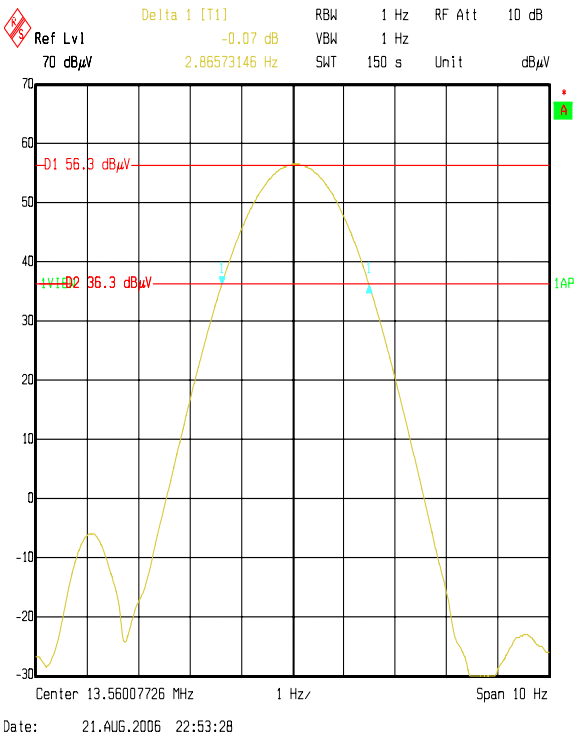
Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.

7.2.7. Transmitter 20 dB Bandwidth: Section 2.1049

Results:

Transmitter 20 dB Bandwidth
2.9 Hz

Transmitter 20 dB Bandwidth: Section 2.1049 (Continued)



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

7.2.8. Transmitter Frequency Stability (Temperature & Voltage Variation): Section 15.225 (c)

Results:

Maximum frequency error of the EUT with variations in ambient temperature

Temp (°C)	Nominal Frequency	Measured Frequency	Frequency Error (Hz)	Frequency Error (%)	Limit (%)	Margin (%)	Result
-20	13.56	13.560148	148	0.00109	0.01	0.00891	Complied
-10	13.56	13.560131	131	0.00097	0.01	0.00903	Complied
0	13.56	13.560109	109	0.00080	0.01	0.00920	Complied
10	13.56	13.560078	78	0.00058	0.01	0.00942	Complied
20	13.56	13.560056	56	0.00041	0.01	0.00959	Complied
30	13.56	13.560042	42	0.00031	0.01	0.00969	Complied
40	13.56	13.560049	49	0.00036	0.01	0.00964	Complied
50	13.56	13.560070	70	0.00052	0.01	0.00948	Complied

Maximum frequency error of the EUT with variations in nominal operating voltage at an ambient temperature of 20°C

Supply Voltage (V)	Nominal Frequency	Measured Frequency	Frequency Error (Hz)	Frequency Error (%)	Limit (%)	Margin (%)	Result
93.5	13.56	13.560056	56	0.00041	0.01	0.00959	Complied
110.0	13.56	13.560056	56	0.00041	0.01	0.00959	Complied
126.5	13.56	13.560056	56	0.00041	0.01	0.00959	Complied

8. Measurement Uncertainty

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.

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

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

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

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.

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

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 were performed within a screened chamber 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, and for the duty cycle of the EUT. The test configuration was the same for the initial scans as for the final measurements.

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. A tolerance line was set 6 dB below the specification limit and levels above the tolerance line were re-tested on the open area test site, at the appropriate distance, using a measuring receivers with a Quasi-Peak (or Average) detector (below 1000 MHz), where applicable, for measurements above 1000 MHz average and peak detectors were used.

For the main (final) measurements the EUT was arranged on a non-conducting table on an open area test site, as detailed in the specification.

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 found, the levels were maximised by initially rotating the turntable through 360° and then varying the antenna height between 1 m and 4 m. 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.

Radiated Emissions (Continued)

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

Receiver Function	**Initial Scan (Below 30 MHz)**	**Final Measurements (Below 30 MHz)**
Detector Type:	Peak	Quasi-Peak (CISPR) or Average
Mode:	Max Hold	Not applicable
Bandwidth:	9 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

Receiver Function	**Initial Scan (30 to 1000 MHz)**	**Final Measurements (30 to 1000 MHz)**
Detector Type:	Peak	Quasi-Peak (CISPR)
Mode:	Max Hold	Not applicable
Bandwidth:	100 kHz	120 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

9.3. 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 1 Hz was used, which is greater than 1% of the 20 dB bandwidth. A video bandwidth of a 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.

9.4. FCC Part 2.1055: Frequency Stability

The EUT was situated within an environmental test chamber and monitored on the test equipment via an antenna test fixture.

Measurements were performed with the EUT operating under extremes of temperature in 10 degree increments within the range -20°C to 50°C.

Measurements were also performed at voltage extremes between the declared nominal supply voltage and at the declared endpoint voltage (for hand carried battery operated equipment) or by varying the primary supply voltage from 85% to 115% of the nominal value for all other equipment types.

The requirement was to determine the frequency stability of the device under specified environmental operating conditions.

The EUT was switched off for a minimum of 30 minutes between each stage of testing while the environmental chamber stabilised at the next temperature within the stated temperature range.

The frequency error measured was converted to an error in % using the following formula as defined by TIA-603-B :-

$$\% \text{ error} = \left(\frac{MCF_{MHz}}{ACF_{MHz}} - 1\right) * 10^2$$

where MCF_{MHz} *is the measured carrier frequency in MHz*
ACF_{MHz} *is the assigned carrier frequency in MHz*

The measured % had to be less then the relevant limits in order to comply.

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval
A1069	ESH3-Z5	Rohde & Schwarz	ESH3-Z5	837469/012	31 Jan 2006	12
A259	Bilog Antenna	Chase	CBL6111	1513	03 Mar 2006	12
C1024	Rosenberger Cable	Rosenberger	FA210A-1-020m	FA00B 7565	Cal before Use	12
C160	Cables	Rosenberger	UFA210A-1-1181-70x70	None	Feb 2006	12
C363	BNC Cable	Rosenberger	RG142	None	Feb 2006	12
C375	Cable	Rosenberger	RG400	None	Feb 2006	12
C393	Cable	RFI	None	None	Feb 2006	12
E013	PCN Environmental Chamber	Sanyo	ATMOS chamber	None	Cal before use	12
M1263	ESIB7	Rohde & Schwarz	ESIB7	100265	12 Jan 2006	12
M1269	True RMS Multimeter	Fluke	179	90250210	16 Feb 2006	12
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016	07 Aug 2006	12
S201	Site 1	RFI	1		18 July 2006	12
S202	Site 2	RFI	2	S202-15011990	Cal before use	12
S207	Site 7	RFI	7		N/A	12

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

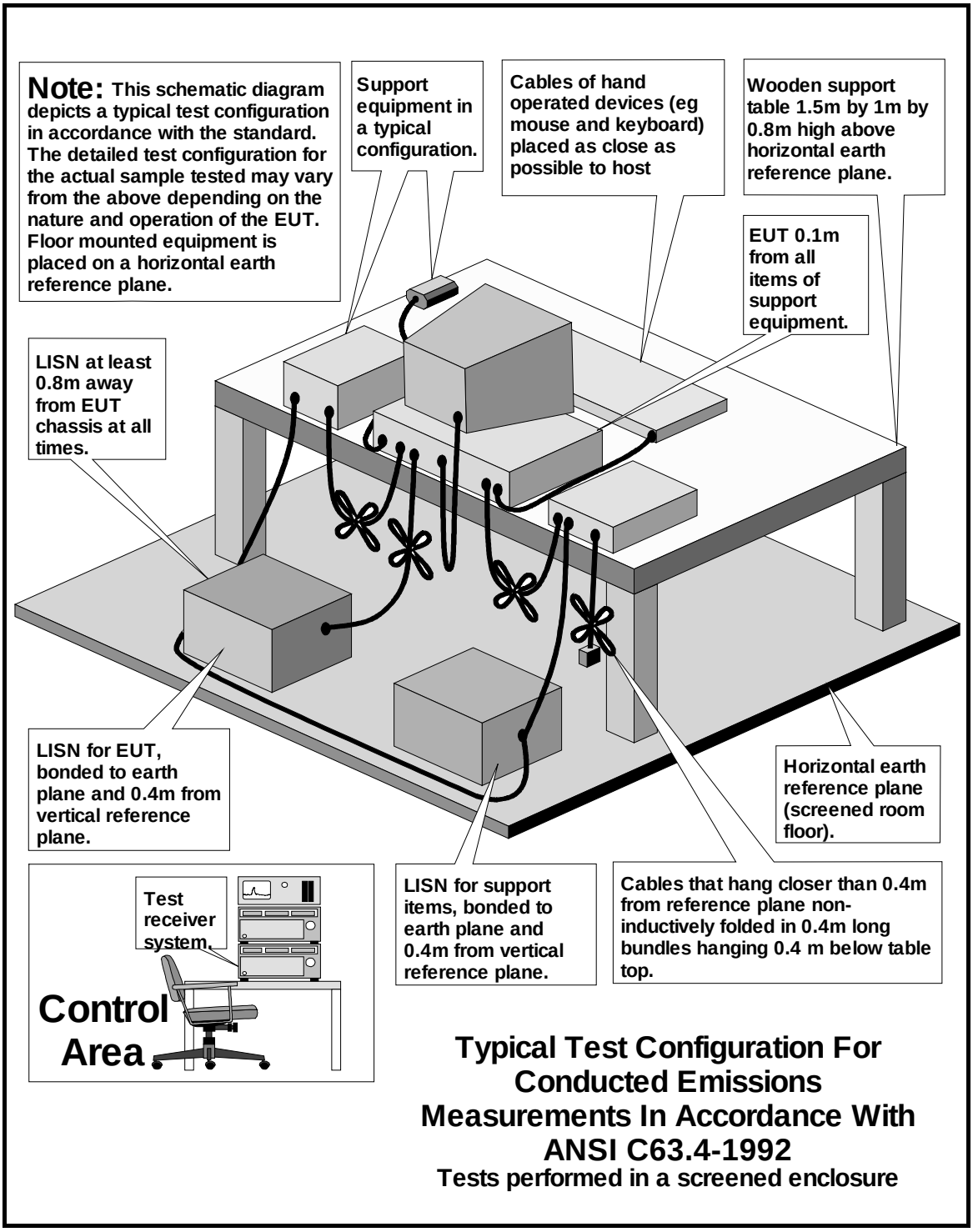
Appendix 2. Test Configuration Drawings

This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\48517JD04\EMICON	Test configuration for measurement of conducted emissions.
DRG\48517JD04\EMIRAD	Test configuration for measurement of radiated emissions.

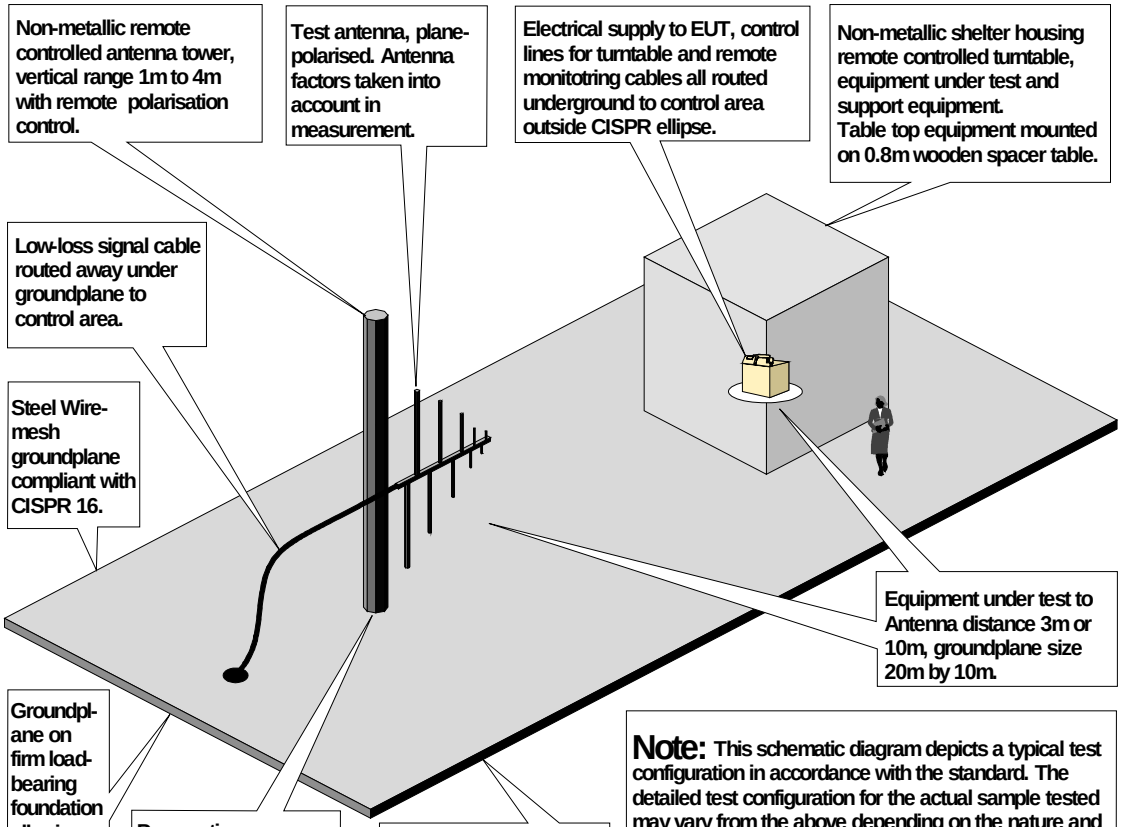
Test of: Datalogic S.p.A
DLBJET with RF-ID Capability
To: FCC Part 15.225: 2005

DRG\48517JD04\EMICON



Typical Test Configuration For Conducted Emissions Measurements In Accordance With ANSI C63.4-1992
Tests performed in a screened enclosure

DRG\48517JD04\EMIRAD



Note: This schematic diagram depicts a typical test configuration in accordance with the standard. The detailed test configuration for the actual sample tested may vary from the above depending on the nature and operation of the EUT.
The test site used by RFI is nominally at ground level.
All electrical cables run underground.
All other dimensions in accordance with the standard.

Test Configuration For Radiated Emissions Measurements

Reflection-free area: >60m by 52m
(CISPR ellipse)
Groundplane Earthed
Control room outside CISPR ellipse