

**TEST REPORT
FROM
RFI GLOBAL SERVICES LTD**

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader

To: FCC Part 15.249

Test Report Serial No:
RFI\MPTE3\RP47673JD01A

Supersedes Test Report Serial No:
RFI\MPTE2\RP47673JD01A

This Test Report Is Issued Under The Authority Of Andrew Brown, Operations Manager:	
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Tested By: Fara Razally  pp: Raul Recio	Checked By: Nigel Davison 
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Issue Date: 19 December 2005	Test Dates: 16 September 2005 to 02 December 2005

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Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

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Test of: Datalogic S.p.A
 Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

Table of Contents

1. Client Information4

2. Equipment Under Test (EUT)5

3. Test Specification, Methods and Procedures10

4. Deviations from the Test Specification.....11

5. Operation of the EUT During Testing.....12

6. Summary of Test Results – OM Dragon Cradle Charger.....13

7. Summary of Test Results – Dragon Gun Reader14

8. Measurements, Examinations and Derived Results15

9. Test Results – OM Dragon Cradle Charger16

10. Test Results – Dragon Gun Reader.....32

11. Measurement Methods46

12. Measurement Uncertainty49

Appendix 1. Test Equipment Used50

Appendix 2. Test Configuration Drawings.....51

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

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

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

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)

Dragon Cradle Charger

Brand Name:	Datalogic S.p.A
Model Name or Number:	Radio Star – Module 910
Unique Type Identification:	None Stated
Serial Number:	C05G52165
Country of Manufacture:	Italy
FCC ID:	OMJ0015
Date of Receipt:	16 September 2005

Dragon Gun Reader

Brand Name:	Datalogic S.p.A.
Model Name or Number:	Radio Star – Module 910
Unique Type Identification:	None Stated
Serial Number:	None Stated
Country of Manufacture:	Italy
FCC ID:	OMJ0015
Date of Receipt:	16 September 2005

2.2. Accessories

The following accessories were supplied with the EUT:

Description:	AC Adaptor
Brand Name:	FPS1
Model Name or Number:	A30907G
Serial Number:	None Stated
Cable Length and Type:	2 Wire Core, 1.6m
Connected to Port:	DC External Supply Port

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

Accessories (Continued)

Description:	RJ45 to Serial Cable
Brand Name:	None Stated
Model Name or Number:	CAB 350
Serial Number:	None Stated
Cable Length and Type:	1.8m, Multicore
Connected to Port:	RJ45 Interface

Description:	CAT 5 Cable
Brand Name:	None Stated
Model Name or Number:	None Stated
Serial Number:	None Stated
Cable Length and Type:	1.8m, Multicore
Connected to Port:	Ethernet Port

Description:	CAT 5 Cable
Brand Name:	None Stated
Model Name or Number:	None Stated
Serial Number:	None Stated
Cable Length and Type:	1.8m, Multicore
Connected to Port:	Ethernet Port

2.3. Description of EUT

The Dragon gun reader and Dragon gun cradle are single channel units incorporating 910MHz FSK half duplex transceivers modules.

The modules are being approved for limited modular approval only.

2.4. Modifications Incorporated in the EUT

The client requested the EUT be returned for hardware modification to increase the Receive Frequency range by 100 kHz. This was done by adding a switching circuit on the receiver. Receiver Radiated Spurious Emissions test was performed again after the modification from 30Mhz to 5 GHz.

There is no modification in Transmission behaviour.

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

2.5. Additional Information Related to Testing – OM Dragon Cradle Charger

Power Supply Requirement:	Nominal 115 V 60 Hz AC Mains supply		
Intended Operating Environment:	Commercial and Light Industry		
Equipment Category:	Short Range (Low Power)		
Type of Unit:	Portable (Standalone battery powered devise)		
Interface Ports:	Host Communication,Power Supply Port and Antenna Port		
Transmit Frequency Range:	910 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Unique	1	910
Highest Unintentionally Generated Frequency:	Not Stated (taken as 910 MHz for test purposes)		
Receive Frequency Range:	909.900 MHz to 910 MHz		
Receive Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Unique	1	910
Highest Unintentionally Generated Frequency:	910 MHz		
Highest Fundamental Frequency:	910 MHz		
Occupied Bandwidth:	322.5 kHz		

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

2.6. Additional Information Related to Testing – Dragon Gun Reader

Power Supply Requirement:	Internal battery supply of 3.13 V DC		
Intended Operating Environment:	Commercial and Light Industry		
Equipment Category:	Short Range (Low Power)		
Type of Unit:	Portable (Standalone battery powered devise) Limited Modular Transmitter Approval		
Interface Ports:	None		
Transmit Frequency Range:	910 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Unique	1	910
Highest Unintentionally Generated Frequency:	Not Stated (taken as 910 MHz for test purposes)		
Receive Frequency Range:	910 MHz		
Receive Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Unique	1	910
Highest Unintentionally Generated Frequency:	910 MHz		
Highest Fundamental Frequency:	910 MHz		
Occupied Bandwidth:	450 kHz		

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

2.7. Support Equipment

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

Description:	Personal Computer
Brand Name:	Dell Latitude C840
Model Name or Number:	PP01X
Serial Number:	6J044 A01
Cable Length and Type:	Multicore, 1.8m
Connected to Port:	Host Communication

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

3. Test Specification, Methods and Procedures

3.1. Test Specifications

Reference:	FCC Part 15 Subpart C: 2004 (Sections 15.249).
Title:	Code of Federal Regulations, Part 15 (47CFR215) 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.

3.2. Methods and Procedures

The methods and procedures used were as detailed in:

ANSI C63.2 (1996)

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.

3.3. 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.

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

4. Deviations from the Test Specification

None.

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

5. Operation of the EUT During Testing

5.1. Operating Modes – OM Dragon Cradle Charger and Dragon Gun Reader

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

Testing performed with the EUT transmitting in 'Continuous Modulated Transmit Mode' for all Transmit tests. The EUT was in 'Receive Mode' for Receiver Emissions test.

5.2. Configuration and Peripherals – OM Dragon Cradle Charger

The EUT was tested in the following configuration:

The EUT was connected to a PC via an RJ45 to Serial cable, powered by a nominal 115V AC supply via an AC Adaptor and terminated with two Cat-5 cables.

5.3. Configuration and Peripherals – Dragon Gun Reader

The EUT was tested in the following configuration:

As Standalone.

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

6. Summary of Test Results – OM Dragon Cradle Charger

Range of Measurements	Specification Reference	Port Type	Compliance Status
Receiver AC Conducted Spurious 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 Fundamental Fieldstrength	C.F.R. 47 FCC Part 15: 2004 Section 15.249(a)	Antenna	Complied
Transmitter 20 dB Bandwidth	C.F.R. 47 FCC Part 2: 2004 Section 2.1049	Antenna	Complied
Transmitter Radiated Spurious Emissions	C.F.R. 47 FCC Part 15: 2004 Section 15.249(a)(d)(e) & 15.209	Antenna	Complied
Transmitter Band Edge Radiated Emissions	C.F.R. 47 FCC Part 15: 2004 Section 15.249(d) & 15.209	Antenna	Complied

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

7. Summary of Test Results – Dragon Gun Reader

Range of Measurements	Specification Reference	Port Type	Compliance Status
Receiver Radiated Spurious Emissions	C.F.R. 47 FCC Part 15: 2004 Section 15.109	Enclosure	Complied
Transmitter Fundamental Fieldstrength	C.F.R. 47 FCC Part 15: 2004 Section 15.249(a)	Antenna	Complied
Transmitter 20 dB Bandwidth	C.F.R. 47 FCC Part 2: 2004 Section 2.1049	Antenna	Complied
Transmitter Radiated Spurious Emissions	C.F.R. 47 FCC Part 15: 2004 Section 15.249(a)(d)(e) & 15.209	Antenna	Complied
Transmitter Band Edge Radiated Emissions	C.F.R. 47 FCC Part 15: 2004 Section 15.249(d) & 15.209	Antenna	Complied

7.1. 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.
RFI Global Services Ltd, Ashwood Park, Ashwood Way, Basingstoke, Hampshire, RG23 8BG, England.

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

8. Measurements, Examinations and Derived Results

8.1. General Comments

8.1.1. This section contains test results only.

8.1.2. 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 12 for details of measurement uncertainties.

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

9. Test Results – OM Dragon Cradle Charger

9.1. Receiver AC Conducted Spurious Emissions: Section 15.107

9.1.1. The EUT was configured for AC conducted emissions measurements as described in Section 11 of this report.

9.1.2. 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

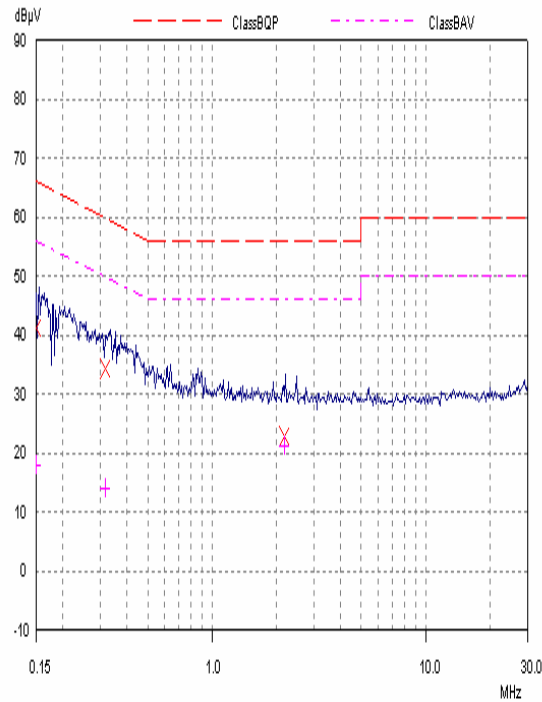
Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.15005	Live	41.10	66.00	24.90	Complied
0.31556	Neutral	34.14	59.82	25.68	Complied
2.20075	Neutral	22.84	56.00	33.16	Complied

Average Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.15005	Neutral	17.99	56.00	38.01	Complied
0.31556	Live	13.85	49.82	35.97	Complied
2.20075	Neutral	21.06	46.00	24.94	Complied

Test of: Datalogic S.p.A
 Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

Receiver AC Conducted Spurious Emissions: Section 15.107 (Continued)



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

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

9.2. Receiver Radiated Spurious Emissions: Section 15.109

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

9.2.1.1. The EUT was configured for radiated emissions testing as described in Section 11 of this report.

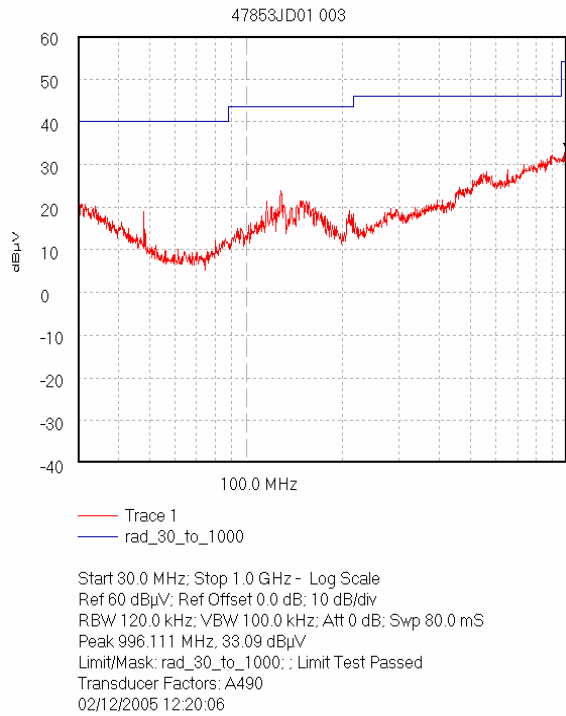
9.2.1.2. Tests were performed to identify the maximum receiver or standby radiated emission levels.

Results:

Frequency (MHz)	Antenna Polarity	Q-P Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
127.953	Vert	24.0	43.5	19.5	Complied

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

Receiver 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.

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

9.3. Receiver Radiated Spurious Emissions: Section 15.109 (Continued)**9.3.1. Electric Field Strength Measurements (Frequency Range: 1 to 5 GHz)****Results:****Highest Peak Level:**

Frequency (GHz)	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
1.814	Vert.	19.2	21.5	1.2	41.9	74.0	32.1	Complied

Highest Average Level:

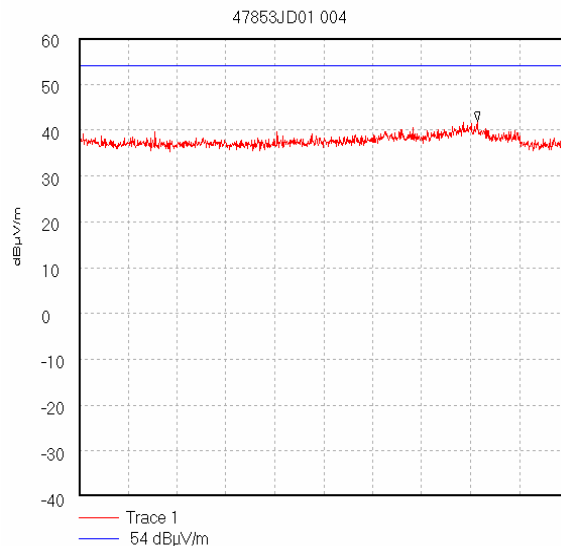
Frequency (GHz)	Antenna Polarity	Detector Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
1.814	Vert.	4.9	21.5	1.2	27.6	54.0	26.4	Complied

Note(s):

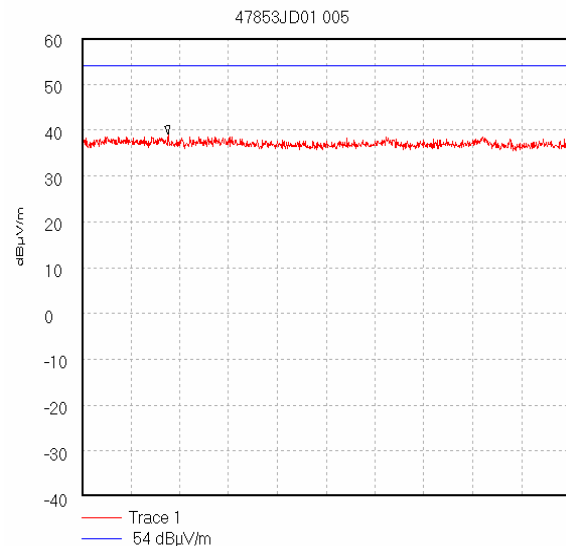
1. No spurious emissions were detected above the noise floor of the measuring receiver; therefore, the highest peak noise floor reading of the measuring receiver was recorded as shown in the table above.

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

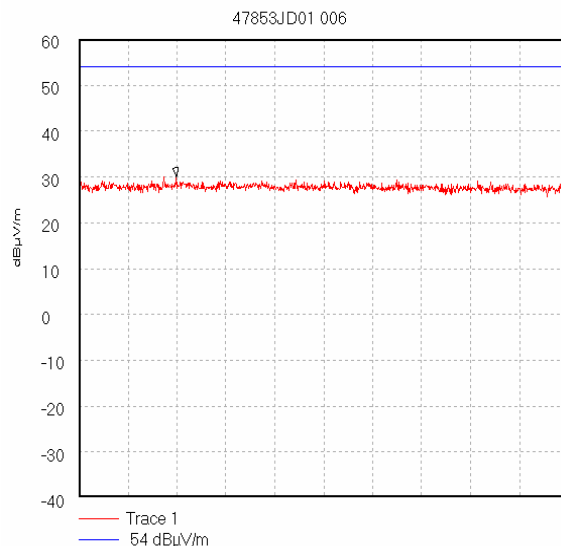
Receiver Radiated Spurious Emissions: Section 15.109 (Continued)



Start 1.0 GHz; Stop 2.0 GHz
Ref 60 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 1.814 GHz, 41.87 dBμV/m
Display Line: 54 dBμV/m; ; Limit Test Passed
Transducer Factors: 1 to 2
02/12/2005 14:02:36



Start 2.0 GHz; Stop 4.0 GHz
Ref 60 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 2.353 GHz, 39.11 dBμV/m
Display Line: 54 dBμV/m; ; Limit Test Passed
Transducer Factors: 2 to 4
02/12/2005 14:05:10



Start 4.0 GHz; Stop 5.0 GHz
Ref 60 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 4.199 GHz, 29.99 dBμV/m
Display Line: 54 dBμV/m; ; Limit Test Passed
Transducer Factors: 4G-6G_Horn(@1m,3m_cable)
02/12/2005 14:36:22

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

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

9.4. Transmitter Fundamental Fieldstrength Section 15.249(a)

9.4.1. The EUT was configured for radiated emissions testing as described in Section 11 of this report.

9.4.2. Tests were performed to identify the maximum fieldstrength of the fundamental frequency.

Results:**AC Powered Devices**

Frequency (MHz)	Antenna Polarity	Input Voltage (AC)	Q-P Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
910.044	Vert.	110.0	93.6	94.0	0.4	Complied
910.044	Vert.	93.5	93.6	94.0	0.4	Complied
910.044	Vert.	126.5	93.6	94.0	0.4	Complied

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

9.5. Transmitter 20 dB Bandwidth: Section 2.1049

9.5.1. The EUT was configured for 20 dB bandwidth measurements as described in Section 11 of this report.

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

Results:

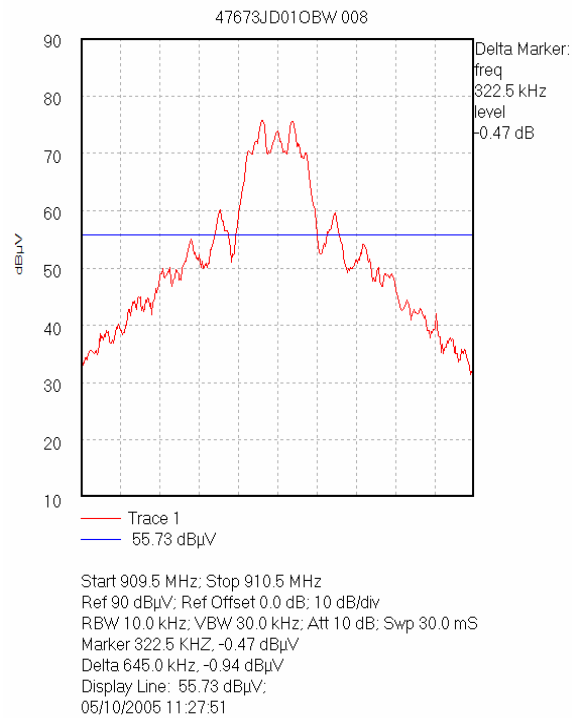
Transmitter 20 dB Bandwidth (kHz)
322.5

Note(s):

1. The EUT was exercised with pseudorandom pattern FSK modulation mode, as worst-case mode of operation.

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

Transmitter 20 dB Bandwidth: Section 2.104 (Continued)



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

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

9.6. Transmitter Radiated Emissions: Section 15.249(a)(d)(e) & Section 15.209**9.6.1. Electric Field Strength Measurements: 30 to 1000 MHz**

9.6.1.1. The EUT was configured for radiated emissions testing as described in Section 11 of this report.

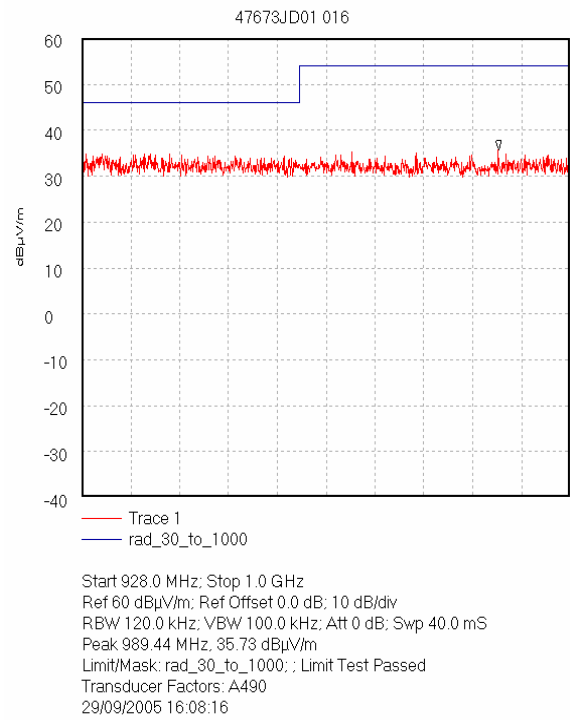
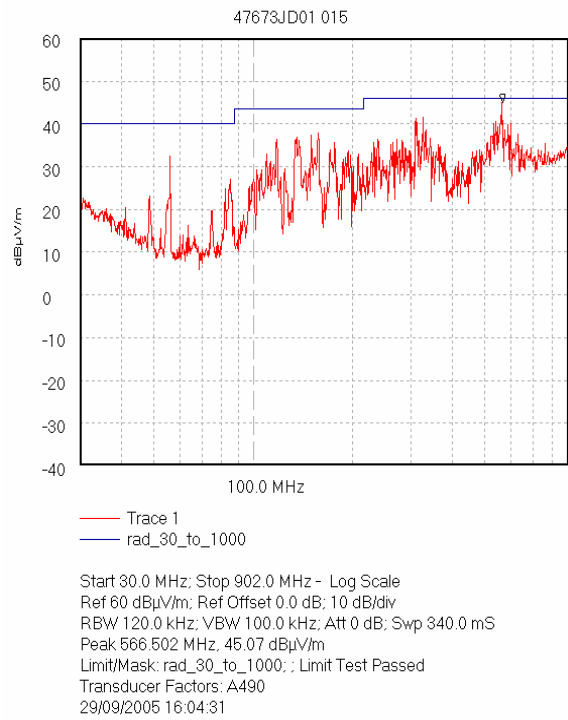
9.6.1.2. Tests were performed to identify the maximum radiated spurious emission levels.

Results:

Frequency (MHz)	Antenna Polarity	Q-P Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
55.947	Vert.	20.9	40.0	19.1	Complied
156.684	Vert.	25.3	43.5	18.2	Complied
564.000	Horiz.	31.0	46.0	15.0	Complied

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

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



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

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

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

9.6.2. Electric Field Strength Measurements (Frequency Range: 1 to 10 GHz)

Results:

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
4549.950	Vert.	51.6	-9.2	3.3	45.7	74.0	28.3	Complied
5459.597	Vert.	51.2	-9.2	3.5	45.5	74.0	28.5	Complied
6369.670	Vert.	49.8	-7.0	3.7	46.5	74.0	27.5	Complied
8189.657	Vert.	40.5	-2.5	3.7	41.7	74.0	32.3	Complied
9362.847	Vert.	32.3	-2.0	3.7	34.0	74.0	40.0	Complied

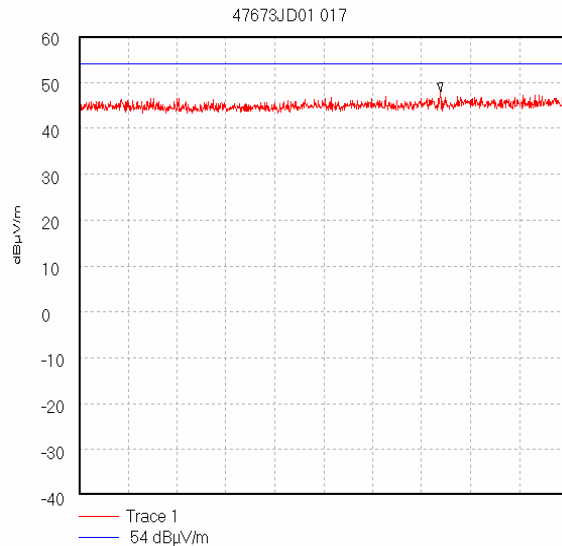
**Note: -50 dBc limit*

Highest Average Level:

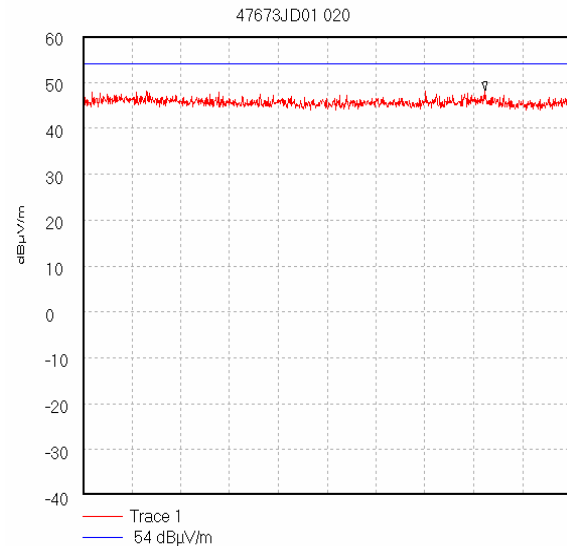
Frequency (MHz)	Antenna Polarity	Detector Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
4549.950	Vert.	50.9	-9.2	3.3	45.0	54.0	9.0	Complied
5459.597	Vert.	50.2	-9.2	3.5	44.5	54.0	9.5	Complied
6369.670	Vert.	49.1	-7.0	3.7	45.8	54.0	8.2	Complied
8189.657	Vert.	37.8	-2.5	3.7	39.0	54.0	15.0	Complied
9362.847	Vert.	18.6	-2.0	3.7	20.3	54.0	33.7	Complied

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

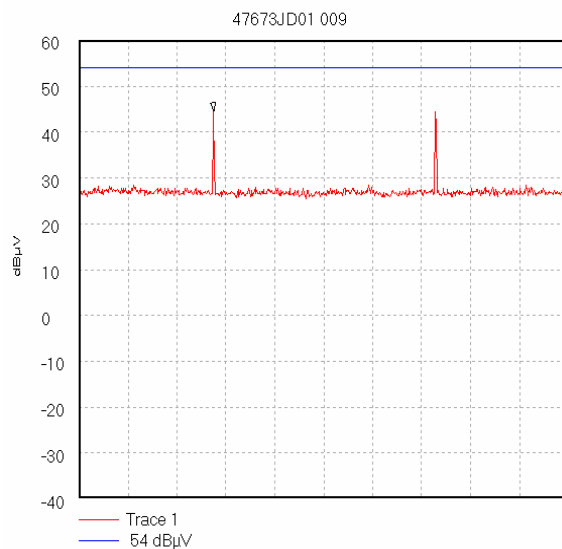
Transmitter Radiated Emissions: Section 15.249(a)(d)(e) & Section 15.209 (Continued)



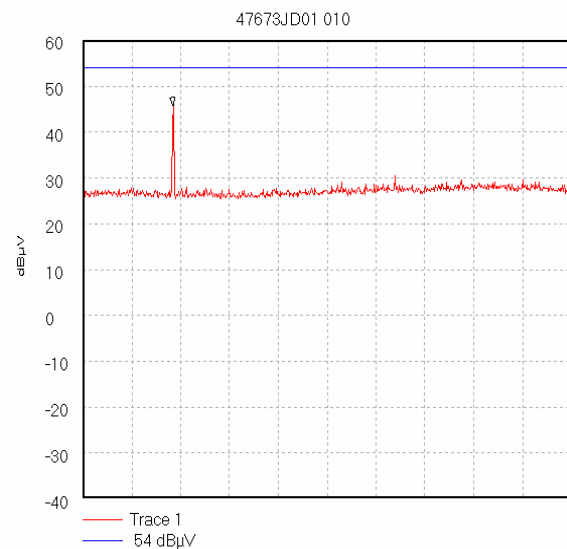
Start 1.0 GHz; Stop 2.0 GHz
Ref 60 dBμV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 1.739 GHz, 47.97 dBμV/m
Display Line: 54 dBμV/m;
Transducer Factors: 1 to 2
29/09/2005 16:13:38



Start 2.0 GHz; Stop 4.0 GHz
Ref 60 dBμV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 3.647 GHz, 48.25 dBμV/m
Display Line: 54 dBμV/m;
Transducer Factors: 2 to 4
29/09/2005 16:18:36



Start 4.0 GHz; Stop 6.0 GHz
Ref 60 dBμV; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 50.0 mS
Peak 4.55 GHz, 44.5 dBμV
Display Line: 54 dBμV; : Limit Test Passed
Transducer Factors: 4G-6G_Horn(@1m,3m_cable,A1534)
23/09/2005 12:16:07

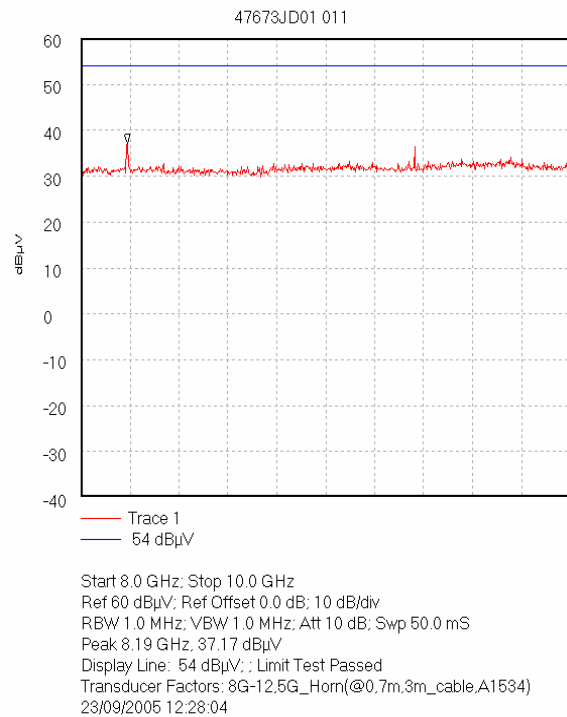


Start 6.0 GHz; Stop 8.0 GHz
Ref 60 dBμV; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 50.0 mS
Peak 6.37 GHz, 45.67 dBμV
Display Line: 54 dBμV; : Limit Test Passed
Transducer Factors: 6G-8G_Horn(@0.7m,3m_cable,A1534)
23/09/2005 12:20:31

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

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

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



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

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

9.7. Transmitter Radiated Emissions at Band Edges: Section 15.249(d) & 15.209

9.7.1. The EUT was configured for transmitter radiated emissions testing described in Section 11 of this report.

9.7.2. 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**

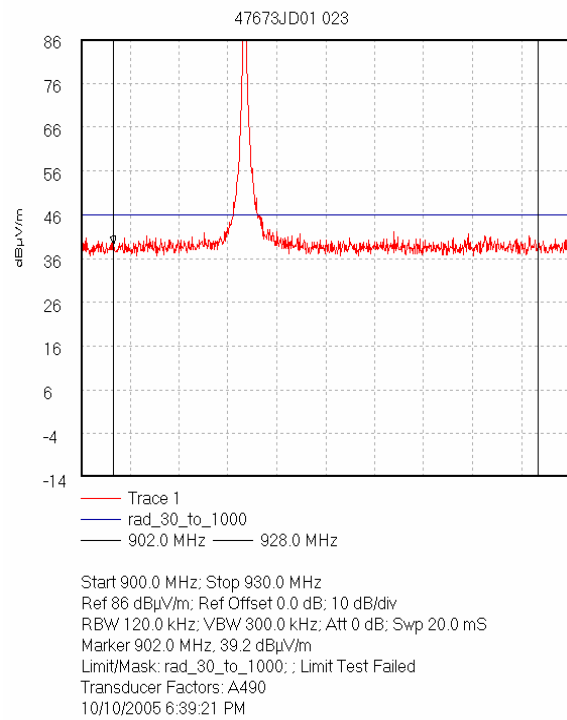
Frequency (MHz)	Q-P Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
902	39.2	46.0	6.8	Complied

Top Band Edge

Frequency (MHz)	Q-P Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
928	38.3	46.0	7.7	Complied

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

Transmitter Radiated Emissions at Band Edges: Section 15.249(d) & 15.209 (Continued)



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

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

10. Test Results – Dragon Gun Reader

10.1. Receiver Radiated Spurious Emissions: Section 15.109

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

10.1.1.1. The EUT was configured for radiated emissions testing as described in Section 11 of this report.

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

Results:

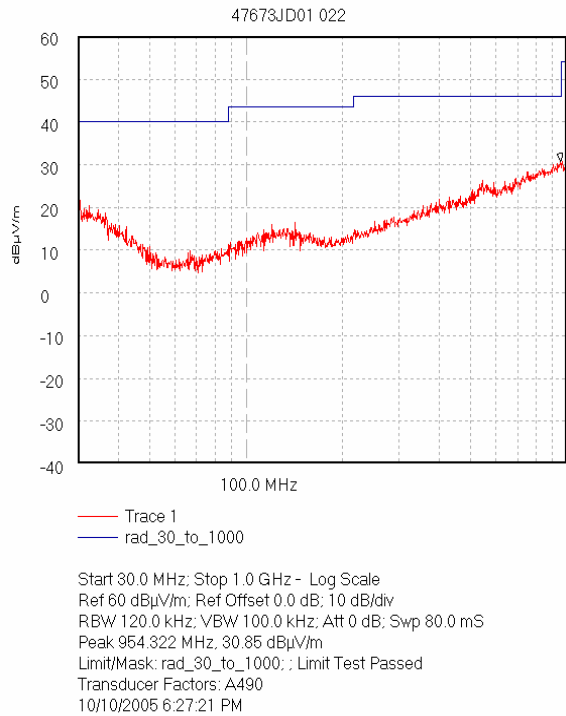
Frequency (MHz)	Antenna Polarity	Q-P Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
954.322	Vertical.	30.9	46.0	15.1	Complied

Note(s):

1. No spurious emissions were detected above the noise floor of the measuring receiver, the highest peak noise floor reading of the measuring receiver recorded.

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

Receiver 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.

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

10.2. Receiver Radiated Spurious Emissions: Section 15.109 (Continued)**10.2.1. Electric Field Strength Measurements (Frequency Range: 1 to 5 GHz)****Results:****Highest Peak Level:**

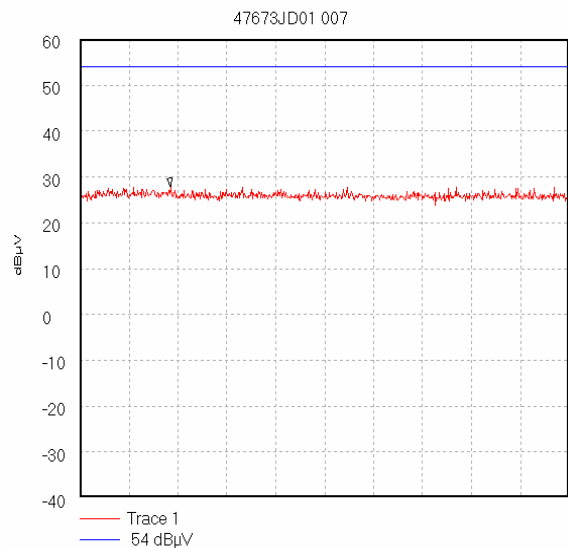
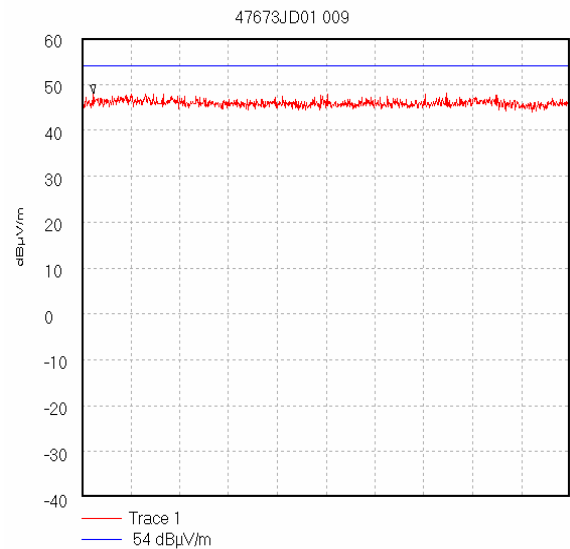
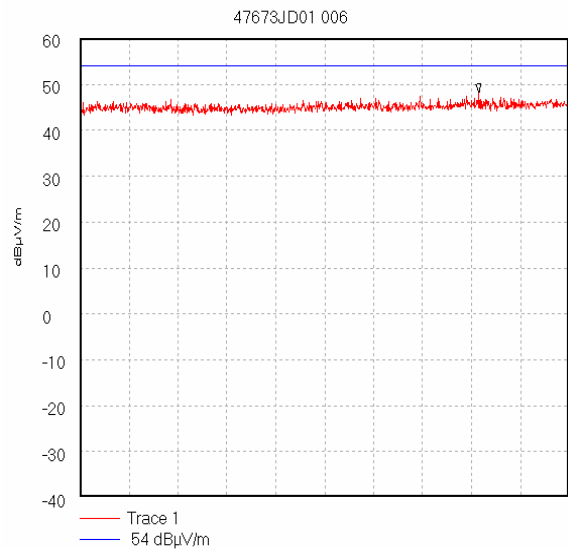
Frequency (MHz)	Antenna Polarity	Detector Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
3639.785	Vertical	15.5	23.4	13.6	52.5	74.0	21.5	Complied

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
3639.785	Vertical	2.4	23.4	13.6	39.4	54.0	14.6	Complied

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

Receiver 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.

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

10.3. Transmitter Fundamental Fieldstrength Section 15.249(a)

10.3.1. The EUT was configured for radiated emissions testing as described in Section 11 of this report.

10.3.2. Tests were performed to identify the maximum fieldstrength of the fundamental frequency.

Results:**Battery Powered Devices**

Frequency (MHz)	Antenna Polarity	Q-P Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
910.046	Vertical.	93.8	94.0	0.2	Complied

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

10.4. Transmitter 20 dB Bandwidth: Section 2.1049

10.4.1. The EUT was configured for 20 dB bandwidth measurements as described in Section 11 of this report.

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

Results:

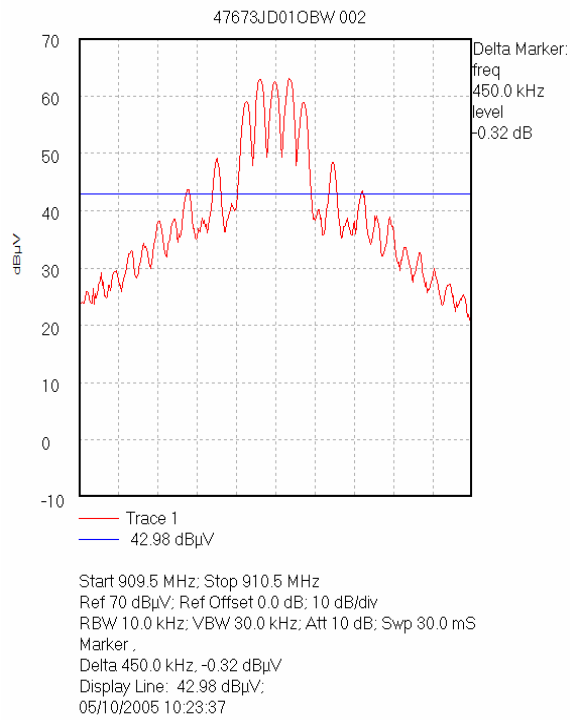
Transmitter 20 dB Bandwidth (kHz)
450.0

Note(s):

1. The EUT was exercised with an FSK modulated periodic pattern, as this is the worst-case mode of operation found for this test.

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

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.

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

10.5. Transmitter Radiated Emissions: Section 15.249(a)(d)(e) & Section 15.209**10.5.1. Electric Field Strength Measurements: 30 to 1000 MHz**

10.5.1.1. The EUT was configured for radiated emissions testing as described in Section 8 of this report.

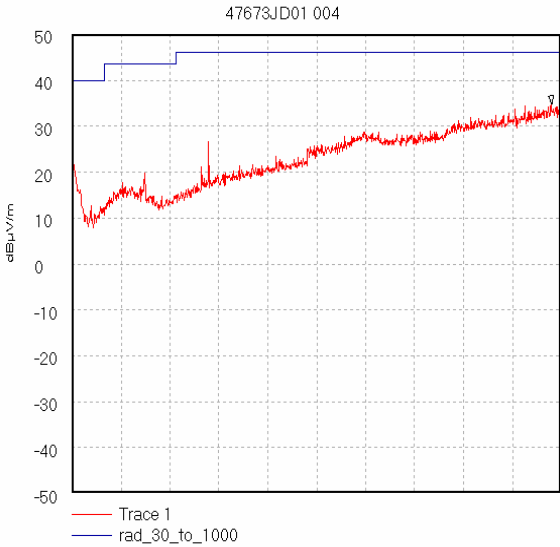
10.5.1.2. Tests were performed to identify the maximum radiated spurious emission levels.

Results:

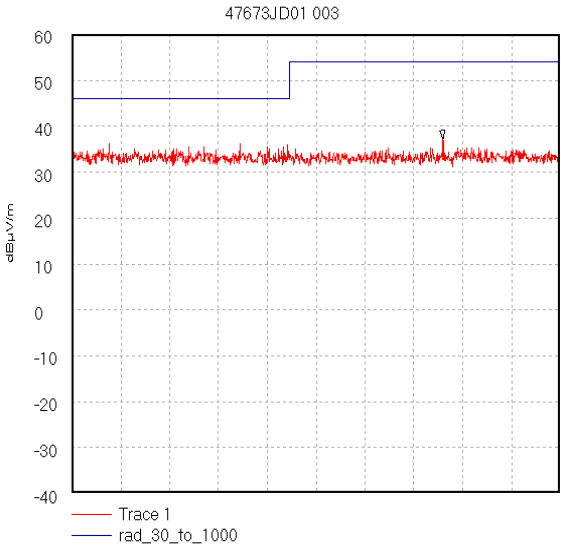
Frequency (MHz)	Antenna Polarity	Q-P Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
156.660	Vertical.	13.0	40.0	27.0	Complied

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

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



Start 30.0 MHz; Stop 902.0 MHz
Ref 50 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 120.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 400.0 mS
Peak 884.56 MHz; 34.77 dBµV/m
Limit/Mask: rad_30_to_1000; ; Limit Test Passed
Transducer Factors: A490
16/09/2005 10:49:22



Start 928.0 MHz; Stop 1.0 GHz
Ref 60 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 120.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 40.0 mS
Peak 982.72 MHz; 37.28 dBµV/m
Limit/Mask: rad_30_to_1000; ; Limit Test Passed
Transducer Factors: A490
16/09/2005 10:41:27

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

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

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

10.5.2. Electric Field Strength Measurements (Frequency Range: 1 to 10 GHz)

Results:

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
4550.250	Vertical.	59.6	-9.2	3.2	47.1	74.0	28.3	Complied
5460.140	Vertical.	57.9	-9.2	3.4	45.3	74.0	28.5	Complied
6370.213	Vertical.	59.4	-6.9	3.7	48.8	74.0	27.5	Complied
7280.297	Vertical.	46.6	-6.7	3.7	36.2	74.0	32.3	Complied
8190.552	Vertical.	47.5	-2.0	3.7	41.8	74.0	40.0	Complied

Highest Average Level:

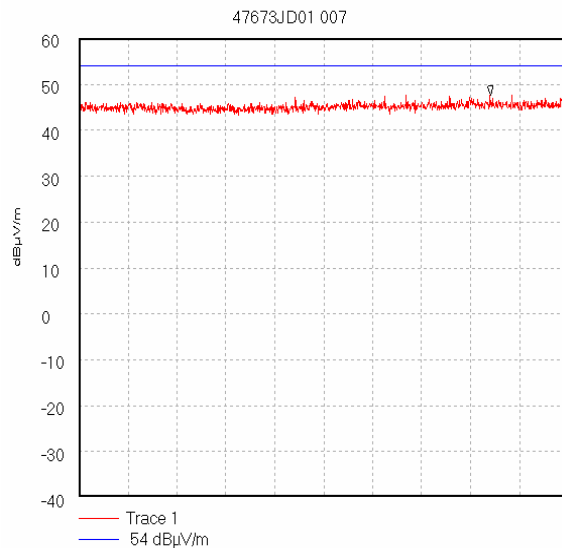
Frequency (MHz)	Antenna Polarity	Detector Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
4550.250	Vertical.	58.9	-9.2	3.2	46.5	54.0	9.0	Complied
5460.140	Vertical.	56.8	-9.2	3.4	44.2	54.0	9.5	Complied
6370.213	Vertical.	58.7	-6.9	3.7	48.3	54.0	8.2	Complied
7280.297	Vertical.	42.9	-6.7	3.7	32.5	54.0	15.0	Complied
8190.552	Vertical.	44.2	-2.0	3.7	38.5	54.0	33.7	Complied

Note(s):

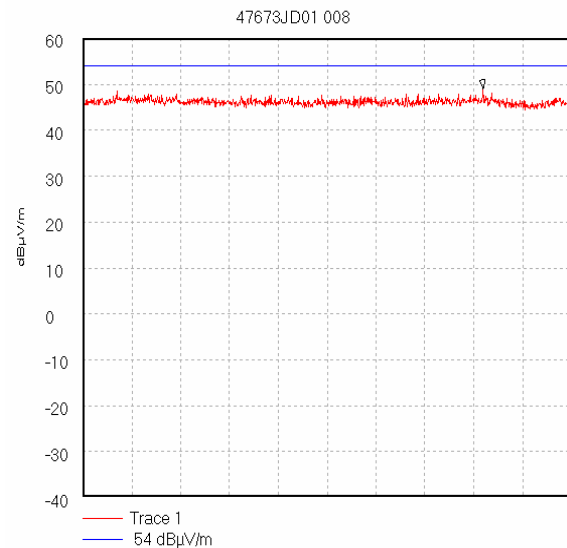
1. The indicated antenna factor incorporates antenna factor and amplifier gain.

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

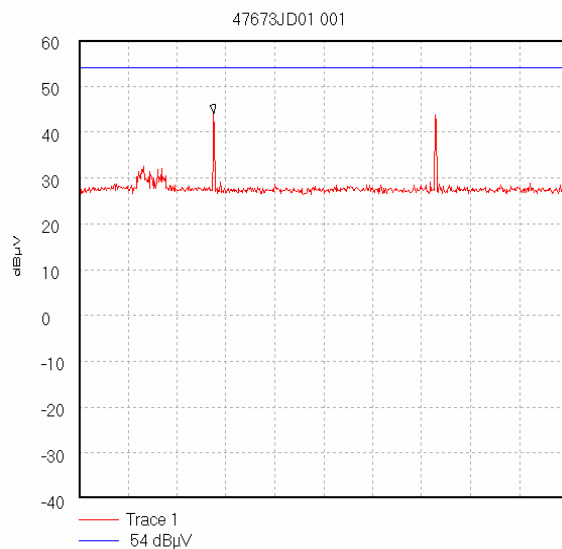
Transmitter Radiated Emissions: Section 15.249(a)(d)(e) & Section 15.209 (Continued)



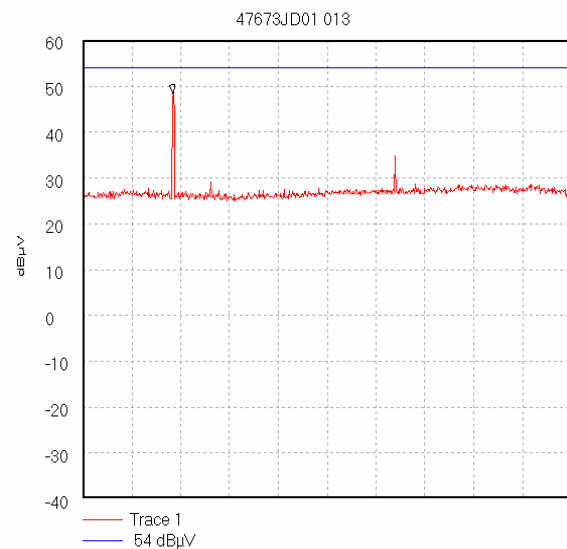
Start 1.0 GHz; Stop 2.0 GHz
Ref 60 dBμV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 1.841 GHz, 47.69 dBμV/m
Display Line: 54 dBμV/m;
Transducer Factors: 1 to 2
16/09/2005 11:16:19



Start 2.0 GHz; Stop 4.0 GHz
Ref 60 dBμV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 3.64 GHz, 49.01 dBμV/m
Display Line: 54 dBμV/m;
Transducer Factors: 2 to 4
16/09/2005 11:37:54



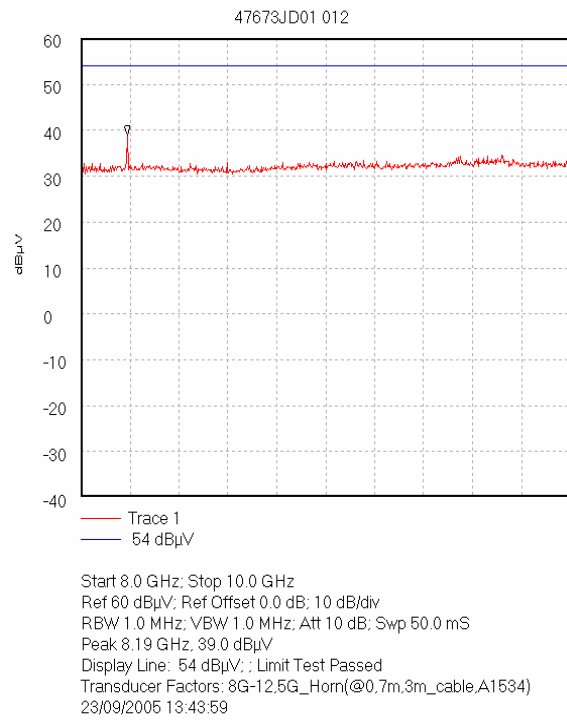
Start 4.0 GHz; Stop 6.0 GHz
Ref 60 dBμV; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 50.0 mS
Peak 4.55 GHz, 44.0 dBμV
Display Line: 54 dBμV; ; Limit Test Passed
Transducer Factors: 4G-6G_Horn(@1m,3m_cable,A1534)
23/09/2005 10:57:13



Start 6.0 GHz; Stop 8.0 GHz
Ref 60 dBμV; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 50.0 mS
Peak 6.37 GHz, 48.33 dBμV
Display Line: 54 dBμV; ; Limit Test Passed
Transducer Factors: 6G-8G_Horn(@0.7m,3m_cable,A1534)
23/09/2005 13:53:50

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

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



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

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

10.6. Transmitter Radiated Emissions at Band Edges: Section 15.249(d) & 15.209

10.6.1. The EUT was configured for transmitter radiated emissions testing described in Section 11 of this report.

10.6.2. 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**

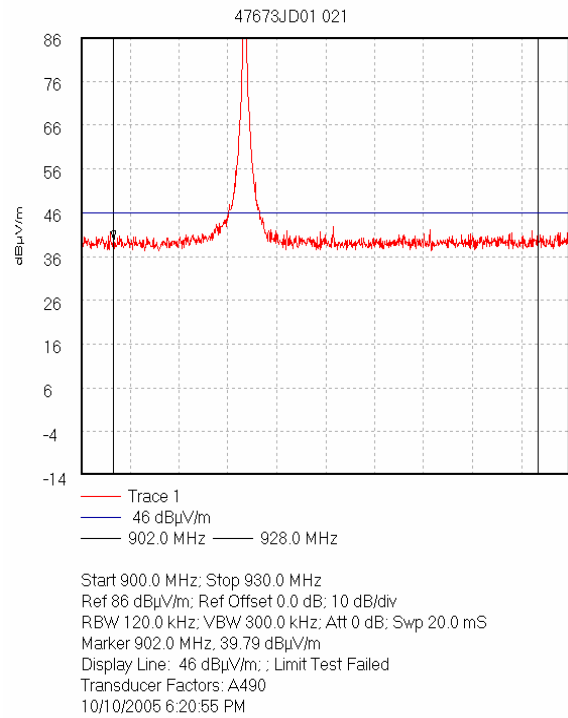
Frequency (MHz)	Q-P Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
902	39.8	46.0	6.2	Complied

Top Band Edge

Frequency (MHz)	Q-P Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
928	35.6	46.0	10.4	Complied

Test of: Datalogic S.p.A
 Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

Transmitter Radiated Emissions at Band Edges: Section 15.249(d) & 15.209 (Continued)



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

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

11. Measurement Methods

11.1. 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 115V 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

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

11.2. 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

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

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

11.3. Transmitter 20 dB Bandwidth

The EUT and spectrum analyser was configured 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.

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

12. Measurement Uncertainty

12.1. 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.

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

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

12.4. 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 %
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	+/- 5.26 dB
Radiated Spurious Emissions	1 GHz to 40 GHz	95%	+/- 1.78 dB

12.5. 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.

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

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
A1069	ESH3-Z5	Rohde & Schwarz	ESH3-Z5	837469/012
A1360	ESH3-Z2 Pulse Limiter	Rohde & Schwarz	ESH3-Z2	A1360-20112003
A1534	Preamplifier 1-26.5 GHz	Hewlett Packard	8449B OPT H02	3008A00405
A253	WG 12 Microwave Horn	Flann Microwave	12240-20	128
A254	WG 14 Microwave Horn	Flann Microwave	14240-20	139
A259	Bilog Antenna	Chase	CBL6111	1513
A276	OATS Positioning Controller	Rohde & Schwarz	HCC	
A288	Bilog Antenna	Chase	CBL6111A	1589
A392	3 dB attenuator (9)	Suhner	6803.17.B	None
A429	WG 16 horn	Flann	16240-20	561
C1082	Rosenberger Cable 2m	Rosenberger	FA210A1020M5050	28463-1
M003	Spectrum Monitor	Rohde & Schwarz	EZM	883 580/008
M023	ESVP Receiver	Rohde & Schwarz	ESVP	872 991/027
M053	HP 8594A Spectrum Analyser	HP	8594A	3108U00205
M090	Receiver / Spectrum Analyser System	Rohde & Schwarz	ESBI	DU:838494/005 RU:836833/001
M1008	HP 8563E	Hewlett Packard	8563E	3551A04412
M173	Turntable Controller	R.H.Electrical Services	RH351	3510020
S003	Power Control	Zen	E08	736699
S201	Site 1	RFI	1	
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.

Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

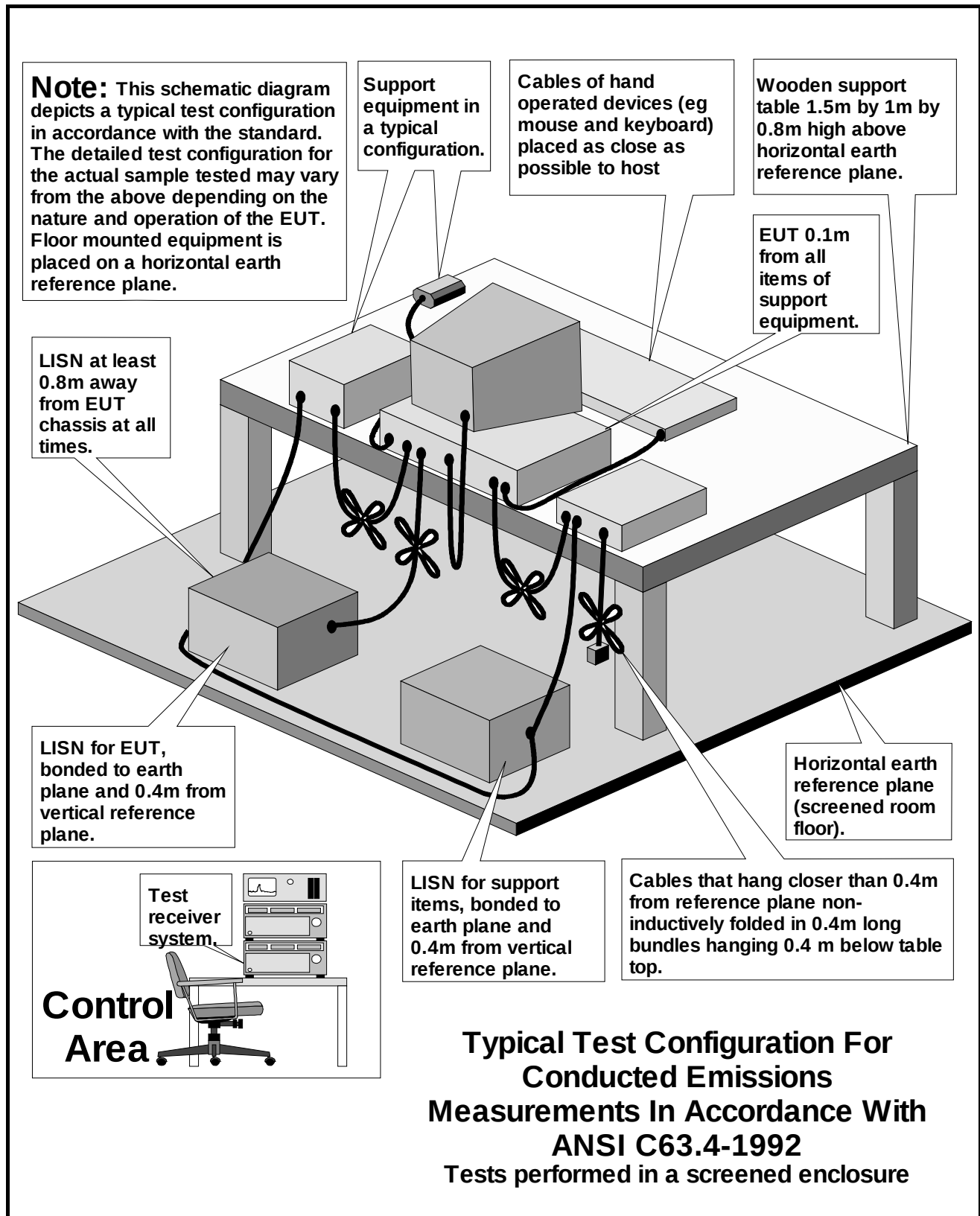
Appendix 2. Test Configuration Drawings

This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\47673JD01\EMICON	Test configuration for measurement of conducted emissions.
DRG\47673JD01\EMIRAD	Test configuration for measurement of radiated emissions.

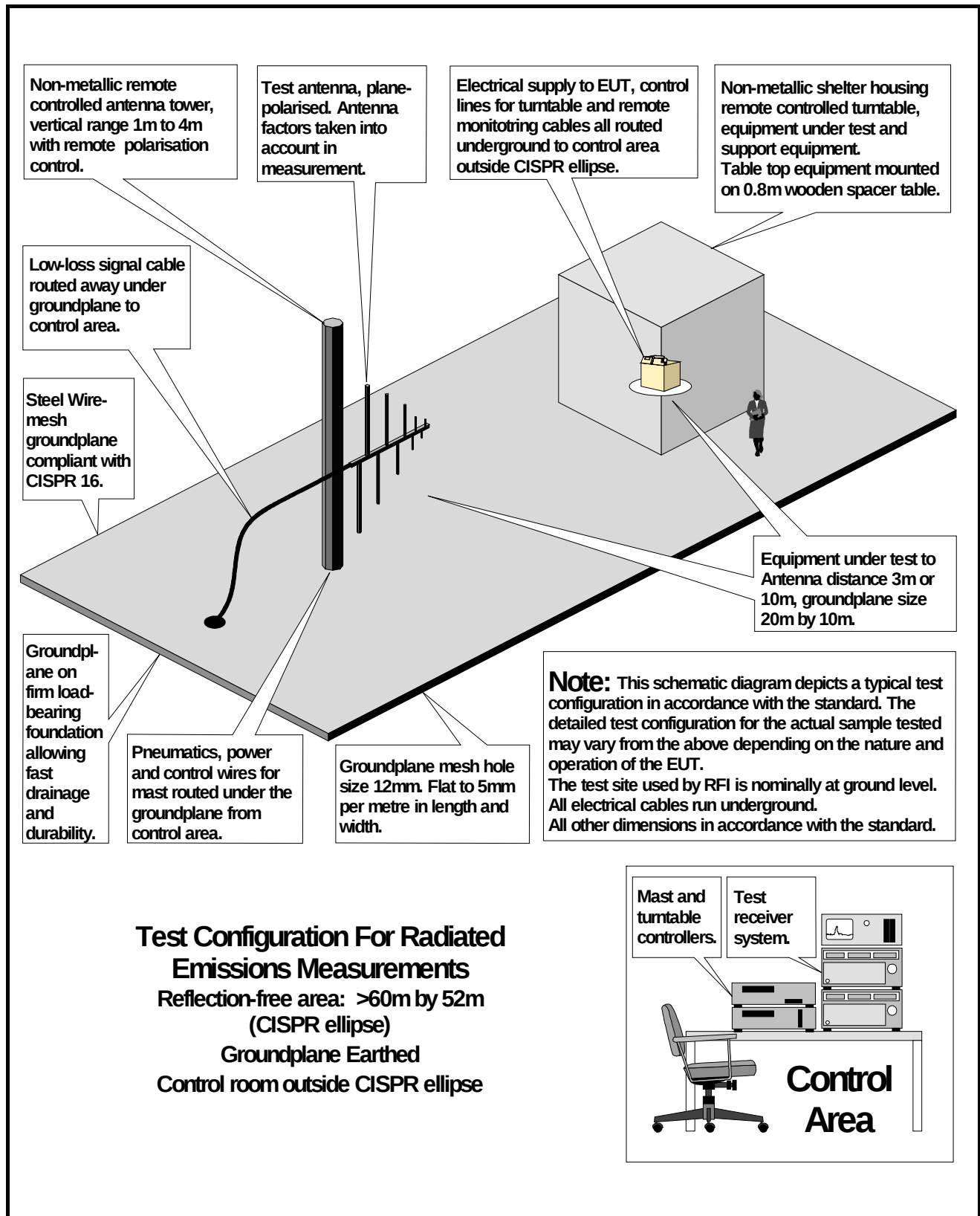
Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

DRG\47673JD01\EMICON



Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

DRG\47673JD01\EMIRAD



Test of: Datalogic S.p.A
Dragon Cradle Charger and Dragon Gun Reader
To: FCC Part 15.249

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