



TEST REPORT NO: RU1014/3804
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**REPORT ON THE CERTIFICATION TESTING OF A
Radiodetection Ltd.
Wireline DataSonde
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.209
INTENTIONAL RADIATOR SPECIFICATION**

TEST DATE: 21st - 22nd May 2002

TESTED BY: J CHARTERS
APPROVED BY: P GREEN
PRINCIPAL ENGINEER
DATE: 8th July 2002

Distribution:

- Copy Nos:
1. Radiodetection Ltd.
 2. FCC EVALUATION LABORATORIES
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Notes:

- | | | | |
|----|--|-----|-------------------------------------|
| 1. | Component failure during test | YES | <input type="checkbox"/> |
| | | NO | <input checked="" type="checkbox"/> |
| 2. | If Yes, details of failure: | | |
| 3. | The facilities used for the testing of the product contained in this report are FCC Listed. | | |
| 4. | The contents of the attached applicants declarations and other supplied information are not covered by the scope of this laboratory's UKAS or FCC accreditations' and is provided in good faith. | | |



CERTIFICATE OF CONFORMITY & COMPLIANCE

FCC IDENTITY: K68ND2585

PURPOSE OF TEST: Certification

TEST SPECIFICATION: FCC RULES CFR 47, Part 15.209

TEST RESULT: Compliant to Specification

EQUIPMENT UNDER TEST: Wireline DataSonde

EQUIPMENT SERIAL No: Engineering sample

ITU EMISSION CODE: 4K80A3D

EQUIPMENT TYPE: 10/ND2585 Wireline DataSonde

PRODUCT USE: Location of horizontal boring machine drill bits

CARRIER EMISSION: 0.00698 μ V/m @ 300metres

ANTENNA TYPE: Integral

ALTERNATIVE ANTENNA: None

BAND OF OPERATION: 9kHz – 90kHz

CHANNEL SPACING: Wideband

NUMBER OF CHANNELS: 1

FREQUENCY GENERATION: SAW Resonator [] Crystal [] Synthesiser [X]

MODULATION METHOD: Amplitude [] Digital [X] Angle []

POWER SOURCE(s): +24Vdc

TEST DATE(s): 21st – 22nd May 2002

ORDER No(s): 9186

APPLICANT: Radiodetection Ltd.

ADDRESS: Western Drive
Bristol
BS14 0AZ
United Kingdom

TESTED BY: _____ J Charters

APPROVED BY: _____ P Green
Principal Engineer

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	Wireline DataSonde
EQUIPMENT TYPE:	10/ND2585 Wireline DataSonde
SERIAL NUMBER OF EUT:	Engineering Sample
PURPOSE OF TEST:	Certification
TEST SPECIFICATION(s):	FCC RULES CFR 47, Part 15.209
TEST RESULT:	COMPLIANT Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
APPLICANT'S CATEGORY:	MANUFACTURER <input checked="" type="checkbox"/> IMPORTER <input type="checkbox"/> DISTRIBUTOR <input type="checkbox"/> TEST HOUSE <input type="checkbox"/> AGENT <input type="checkbox"/>
APPLICANT'S ORDER No(s):	9186
APPLICANT'S CONTACT PERSON(s):	Mr Keith Jones
E-mail address:	keith.jones@radiodection.com
APPLICANT:	Radiodetection Ltd.
ADDRESS:	Western Drive Bristol BS14 0AZ United Kingdom
TEL:	0117 988 6433
FAX:	0117 976 7775
EUT(s) COUNTRY OF ORIGIN:	United Kingdom
TEST LABORATORY:	TRL EMC
UKAS ACCREDITATION No:	0728
TEST DATE(s)	21 st – 22 nd May 2002
TEST REPORT No:	RU1014/3804

EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.	TEST/EXAMINATION	RULE PART	DETECTOR	APPLICABILITY
	Intentional Emission Frequency:	15.209	Average	Yes
	Intentional Emission Field Strength:	15.209	Average	Yes
	Intentional Emission Band Occupancy:	Performed for information		Yes
	Intentional Emission ERP (mW):			No
	Spurious Emissions – Conducted:			No
	Spurious Emissions – Radiated <1000MHz:	15.209	Quasi Peak & Average	Yes
	Spurious Emissions – Radiated >1000MHz:			No
	Maximum Frequency of Search:	15.33	N/A	Yes
	Antenna Arrangements Integral:	15.203	N/A	Yes
	Antenna Arrangements External Connector:			No
	Restricted Bands			No
	Extrapolation Factor	15.31(f)	N/A	Yes

2. Product Use: Location of horizontal boring machine drill bits

3. Emission Designator: 4K80A3D

4. Duty Cycle: <100%

5. Transmitter bit or pulse rate and level: 4800Bps

6. Temperatures: Ambient (Tnom) 18°C

7. Supply Voltages: Vnom +24.0Vdc

Note: Vnom voltages are as stated above unless otherwise shown on the test report page

8. Equipment Category: Single channel [X]
Two channel []
Multi-channel []

9. Channel spacing: Narrowband []
Wideband [X]

TRANSMITTER TESTS

TRANSMITTER SPURIOUS EMISSIONS – RADIATED – PART 15.209

Ambient temperature	=	18°C(<1GHz)	3m measurements <1GHz	[X]
Relative humidity	=	58% (<1GHz),	1m measurements >1GHz	[]
Conditions	=	Open Area Test Site (OATS)	3m extrapolated from 1m	[]
Supply voltage	=	+24Vdc		
Channel number	=	1		

	FREQUENCY (MHz)	FIELD STRENGTH (dBµV/m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (µV/m)	LIMIT (µV/m)
0.009MHz - 0.490MHz	0.06758	38.7	126	0.000043	35.5
	0.10137	75.0	126	0.0028	23.6
	0.16895	81.4	126	0.0059	14.2
	0.20274	55.8	126	0.00031	11.8
0.490MHz - 1.750MHz					
1.750MHz - 30MHz					
30MHz - 88MHz					
88MHz - 216MHz					
216MHz - 960MHz					
960MHz - 1GHz					
1GHz - 5GHz					
Limits	0.009MHz to 0.490MHz	2400/F(kHz) @ 300m			
	0.490MHz to 1.705MHz	24000/F(kHz) @ 30m			
	1.705MHz to 30MHz	30µV/m @ 30m			
	30MHz to 88MHz	100µV/m @ 3m			
	88MHz to 216MHz	150µV/m @ 3m			
	216MHz to 960MHz	200µV/m @ 3m			
	960MHz to 1GHz	500µV/m @ 3m			
	1GHz to 5GHz	500µV/m @ 3m			

See next page for notes and test method.

Notes:

- 1 Results quoted are extrapolated as indicated
- 2 Emissions were searched to: (x) 1000MHz inclusive, as per Part 15.33a
- 3 Extrapolation factor 9.5dB from 1m to 3m, as per Part 15.31f
- 4 Extrapolation factor 126dB from 3m to 300m, as per Part 15.31f
- 5 Measurements >1GHz @ 1m as per Part 15.31f(1)
Receiver detector <30GHz = CISPR, Quasi-Peak, 10kHz bandwidth apart from 9kHz-90kHz and 110kHz-490kHz were Average detector was used at per Part 15.31d
- 6 Receiver detector >1GHz = CISPR, Quasi-Peak, 120kHz bandwidth
- 7 Receiver detector >1GHz = Peak Hold, 1MHz resolution bandwidth
- 8 New batteries used for battery powered products.
- 9 Emissions below 20dBs of the limits are not recorded

Test Method:

- 1 As per Radio – Noise Emissions, ANSI C63.4: 1992
- 2 Measuring distances as Notes 1 to 4 above
- 3 EUT 0.8 metre above ground plane
- 4 Emissions maximised by rotation of EUT, on an automatic turntable.
Raising and lowering the receiver antenna between 1m & 4m.
Horizontal and vertical polarisations, of the receive antenna.
EUT orientation in three orthogonal planes.
Maximum results recorded.

The test equipment used for the Transmitter Spurious Emissions – Radiated – Part 15.209 tests is shown overleaf:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
AE, LOOP, Z2, 9kHz - 30MHz	ROHDE & SCHWARZ	HFH2	881058 - 53	07	X
HORN ANTENNA	EMCO	3115	9010-3580	138	
HORN ANTENNA	EMCO	3115	9010-3581	139	
SPECTRUM ANALYSER	TEKTRONIX	2756P	B010109	164	
BICONE ANTENNA	CHASE	BBA9106	N/A	193	
ANTENNA, LOG PERIODIC 300MHz – 1GHz	CHASE	UPA6108	1061	203	
RECEIVER	ROHDE & SCHWARZ	ESHS20	837960/003	237	
ANTENNA, BICONE 20MHz - 300MHz	CHASE	VBA6106A	1193	251	
BILOG ANTENNA	CHASE	CBL6112	2098	274	
RECEIVER	ROHDE & SCHWARZ	ESVS10	837948/003	317	
RECEIVER	ROHDE & SCHWARZ	ESVS10	844594/003	352	
RECEIVER	ROHDE & SCHWARZ	ESHS10	825892/003	UH03	X
V / UHF RECEIVER 20MHz - 1GHz	ROHDE & SCHWARZ	ESVS 20	838804 / 005	415	
BILOG ANTENNA	SCHAFFNER	CBL6112B	2761	431	
RECEIVER	ROHDE & SCHWARZ	ESHS 10	830051/001	UH03	
RECEIVER	ROHDE & SCHWARZ	ESVS 10	825892/003	UH04	X
RANGE 1	TRL	3 METRE	N/A	UH06	X
AE, LOOP, Z2, 9kHz - 30MHz	ROHDE & SCHWARZ	HFH2	881058 - 53	07	X
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	X

TRANSMITTER TESTS

TRANSMITTER INTENTIONAL EMISSION – RADIATED – Part 15.209

Ambient temperature	=	18°C(<1GHz),	3m measurements @ fc	[]
Relative humidity	=	58%(<1GHz),	10m measurements @ fc	[]
Conditions	=	Open Area Test Site (OATS)	30m measurements @ fc	[]
Supply voltage	=	+24Vdc	300m extrapolated from 3m	[X]
Channel number	=	1	30m extrapolated from 10m	[]

FREQ. (kHz)	FIELD STRENGTH (dBμV/m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (μV/m)
33.79	102.9	126	0.0698
Limit value @ fc		71.0μV/m	
Band occupancy @ -20dBc See spectrum analyser plot – Annex D		f lower	f higher
		33.686kHz	34.097kHz

- Notes:**
- 1 Results quoted are extrapolated as indicated
 - 2 Receiver detector @ fc = Average 10kHz bandwidth
 - 3 When battery powered the EUT was powered with new batteries

- Test Method:**
- 1 As per Radio – Noise Emissions, ANSI C63.4: 1992
 - 2 Measuring distance 3m
 - 3 EUT 0.8 metre above ground plane
 - 4 Emissions maximised by rotation of EUT, on an automatic turntable.
Raising and lowering the receiver antenna between 1m & 4m.
Horizontal and vertical polarisations, of the receive antenna.
EUT orientation in three orthogonal planes.
Maximum results recorded

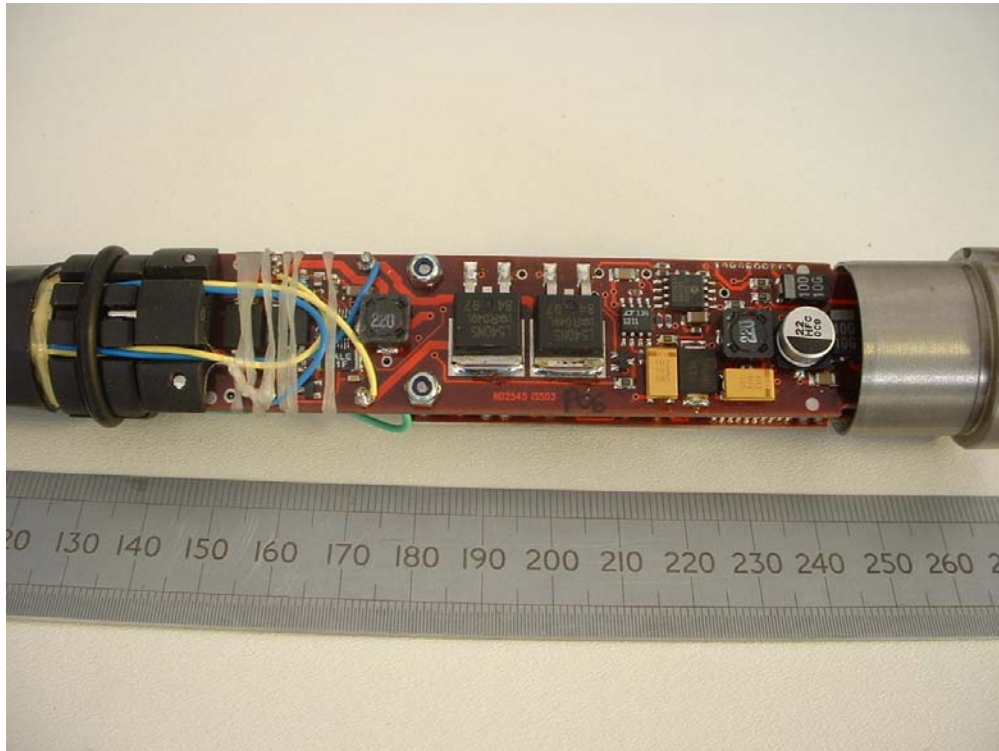
The test equipment used for the Transmitter Intentional Emission – Radiated – Part 15.209 tests is shown overleaf:

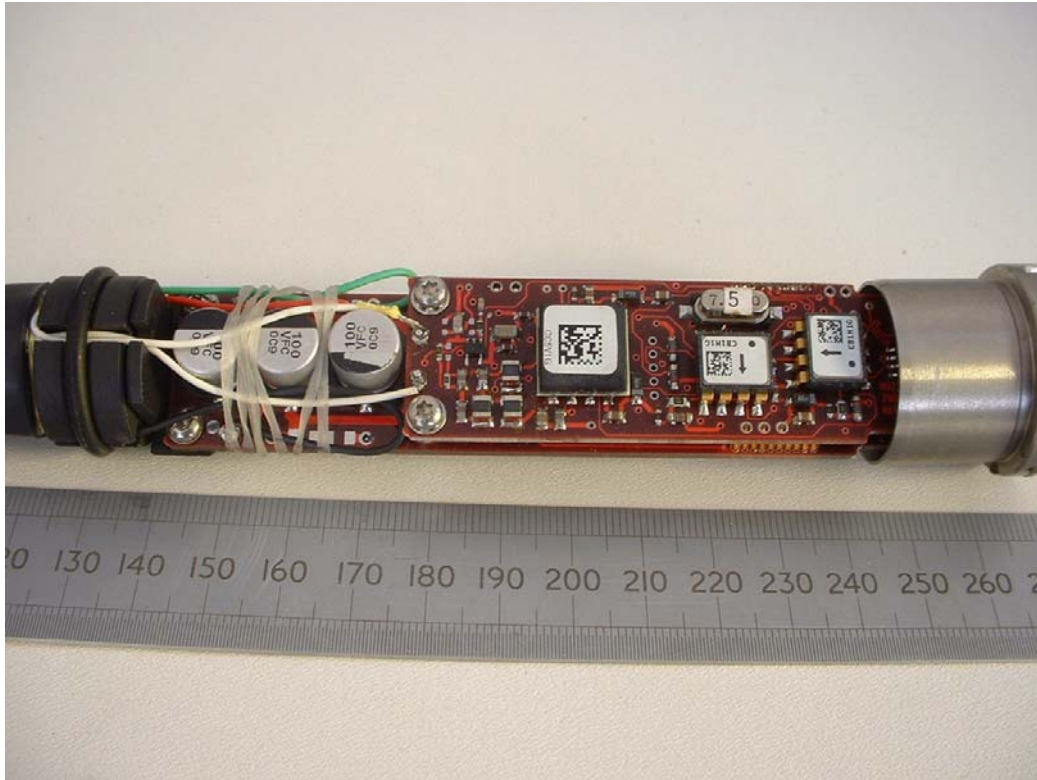
TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
AE, LOOP, Z2, 9kHz - 30MHz	ROHDE & SCHWARZ	HFH2	881058 - 53	07	X
HORN ANTENNA	EMCO	3115	9010-3580	138	
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RECEIVER	ROHDE & SCHWARZ	ESVS 10	825892/003	UH04	
RANGE 1	TRL	3 METRE	N/A	UH06	X
AE, LOOP, Z2, 9kHz - 30MHz	ROHDE & SCHWARZ	HFH2	881058 - 53	07	
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	X

ANNEX A
PHOTOGRAPHS









ANNEX B

APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

a.	TCB	-	APPLICATION	[X]
		-	FEE	[X]
b.	AGENT'S LETTER OF AUTHORISATION	-		[X]
c.	MODEL(s) vs IDENTITY	-		[X]
d.	ALTERNATIVE TRADE NAME DECLARATION(s)	-		[X]
e.	LABELLING	-	PHOTOGRAPHS	[X]
		-	DECLARATION	[X]
		-	DRAWINGS	[X]
f.	TECHNICAL DESCRIPTION	-		[X]
g.	BLOCK DIAGRAMS	-	Tx	[X]
		-	Rx	[]
		-	PSU	[]
		-	AUX	[]
h.	CIRCUIT DIAGRAMS	-	Tx	[X]
		-	Rx	[]
		-	PSU	[]
		-	AUX	[]
i.	COMPONENT LOCATION	-	Tx	[X]
		-	Rx	[]
		-	PSU	[]
		-	AUX	[]
j.	PCB TRACK LAYOUT	-	Tx	[X]
		-	Rx	[]
		-	PSU	[]
		-	AUX	[]
k.	BILL OF MATERIALS	-	Tx	[X]
		-	Rx	[]
		-	PSU	[]
		-	AUX	[]
l.	USER INSTALLATION / OPERATING INSTRUCTIONS	-		[X]

ANNEX C
BANDWIDTH PLOT

BANDWIDTH PLOT

