



TEST REPORT NO: RU1027/4085
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**REPORT ON THE CERTIFICATION TESTING OF A
RADIODETECTION Ltd.
VECTOR BAR 20ft
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.231 (e)
INTENTIONAL RADIATOR SPECIFICATION**

TEST DATE: 25th October – 9th November 2002

TESTED BY: J CHARTERS

APPROVED BY: P GREEN
PRINCIPAL ENGINEER

DATE: 18th November 2002

Distribution:

- Copy Nos:
1. RADIODETECTION Ltd.
 2. FCC EVALUATION LABORATORIES
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CONTENTS

	PAGE
CERTIFICATE OF CONFORMITY & COMPLIANCE	3
APPLICANT'S SUMMARY	4
TESTS REQUIRED	5
SAMPLE CALCULATIONS	5
TEST RESULTS	6 -9

	ANNEX
PHOTOGRAPHS	A
PHOTOGRAPH No. 1: Test Setup	
PHOTOGRAPH No. 2: Main PCB Top	
PHOTOGRAPH No. 3: Main PCB Bottom	
PHOTOGRAPH No. 4: RS232 PCB Top	
PHOTOGRAPH No. 5: RS232 PCB Bottom	
PHOTOGRAPH No. 6: Sensor PCB Top	
PHOTOGRAPH No. 7: Sensor PCB Bottom	
PHOTOGRAPH No. 8: Sensor 2 PCB Top	
PHOTOGRAPH No. 9: Sensor 2 PCB Bottom	
PHOTOGRAPH No. 10: Wiring Board PCB Top	
PHOTOGRAPH No. 11: Wiring Board PCB Bottom	
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST	B
BAND OCCUPANCY PLOT	C
TRANSMIT PERIOD	D

Notes:

- | | | | |
|----|--|-----------|------------|
| 1. | Component failure during test | YES
NO | []
[X] |
| 2. | If Yes, details of failure: | | |
| 3. | The facilities used for the testing of the product contain 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: K68AA2614

PURPOSE OF TEST: Certification

TEST SPECIFICATION: FCC RULES CFR 47, Part 15.231(e)

TEST RESULT: Compliant to Specification

EQUIPMENT UNDER TEST: VECTOR BAR 20ft

EQUIPMENT SERIAL No: Engineering sample

ITU: EMISSION CODE: 100KF7D

EQUIPMENT TYPE: 10/AA2614

PRODUCT USE: Data

CARRIER EMISSION: 3238.9 μ V/m

ANTENNA TYPE: Integral antenna

ALTERNATIVE ANTENNA: Not applicable

BAND OF OPERATION: 260MHz – 470MHz

CHANNEL SPACING: Not applicable

NUMBER OF CHANNELS: 1

FREQUENCY GENERATION: SAW Resonator ☒ Crystal ☐ Synthesiser ☐

MODULATION METHOD: Amplitude ☐ Digital ☒ Angle ☐

POWER SOURCE(s): 6Vdc

TEST DATE(s): 25th October – 9th November 2002

ORDER No(s): 11282

APPLICANT: RADIODETECTION Ltd.

ADDRESS: Western Drive
Bristol
BS14 0AY
United Kingdom

TESTED BY: _____ J CHARTERS

APPROVED BY: _____ P GREEN
PRINCIPAL
ENGINEER

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	VECTOR BAR 20ft
EQUIPMENT TYPE:	10/AA2614
SERIAL NUMBER OF EUT:	Engineering Sample
PURPOSE OF TEST:	Certification
TEST SPECIFICATION(s):	FCC RULES CFR 47, Part 15.231(e)
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):	11282
APPLICANT'S CONTACT PERSON(s):	Mr Keith Jones
E-mail address:	keith.jones@radiodetection.com
APPLICANT:	RADIODETECTION Ltd.
ADDRESS:	Western Drive Bristol BS14 0AZ United Kingdom
TEL:	+44 (0)117 988 6433
FAX:	+44 (0)117 976 7775
MANUFACTURER:	RADIODETECTION Ltd.
EUT(s) COUNTRY OF ORIGIN:	United Kingdom
TEST LABORATORY:	TRL EMC
UKAS ACCREDITATION No:	0728
TEST DATE(s)	25 th October – 9 th November 2002
TEST REPORT No:	RU1027/4085

EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.	TEST/EXAMINATION	RULE PART	DETECTOR	APPLICABILITY
	Intentional Emission Frequency:	15.231(e)	Quasi Peak	Yes
	Intentional Emission Field Strength:	15.231(e)	Quasi Peak	Yes
	Intentional Emission Band Occupancy:	15.231(c)		Yes
	Intentional Emission ERP (mW):			No
	Spurious Emissions – Conducted:			No
	Spurious Emissions – Radiated <1000MHz:	15.209 & 15.213(e)	Quasi Peak	Yes
	Spurious Emissions – Radiated >1000MHz:	15.213(e)	Peak	Yes
	Maximum Frequency of Search:	15.33		Yes
	Antenna Arrangements Integral:	15.203		Yes
	Antenna Arrangements External Connector:	15.204		No
	Restricted Bands	15.205		Yes
	Extrapolation Factor	15.31(f)		Yes

- | | | | |
|----|--|----------------|---------|
| 2. | Product Use: | Data Telemetry | |
| 3. | Emission Designator: | 100KF7D | |
| 4. | Duty Cycle: | | 4% |
| 5. | Transmitter bit or pulse rate and level: | | 1000Bps |
| 6. | Temperatures: | Ambient (Tnom) | 16°C |
| 7. | Supply Voltages: | Vnom | 6Vdc |
- 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 & 15.231(e)

Ambient temperature	=	16°C(<1GHz)	3m measurements <1GHz	[X]
Relative humidity	=	50% (<1GHz),	0.3m measurements >1GHz	[X]
Conditions	=	Open Area Test Site (OATS)	3m extrapolated from 0.3m	[X]
Supply voltage	=	6Vdc		
Channel number	=	418.0385MHz		

	FREQ. (MHz)	MEAS. Rx. (dBµV)	CABLE LOSS (dB)	ANT FACT.	FIELD STRENGTH (dBµV/m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (µV/m)	LIMIT (µV/m)
30MHz - 88MHz	58.7	26.3	1.2	5.6	33.1	-	45.1	100
88MHz - 216MHz								
216MHz - 960MHz	278.9(R) 325.0(R) 335.0(R)	21.2 26.4 25.3	1.7 2.0 2.0	12.4 13.5 13.7	35.3 41.9 41.0	- - -	58.1 124.4 112.2	200 200 200
960MHz - 1GHz								
1GHz - 5GHz	2090.19	6.0	1.0	27.8	34.8	20.0	5.49	500
Limits	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					

Notes:

- Results quoted are extrapolated as indicated
- Emissions were searched to: (x) 1000MHz inclusive, as per Part 15.33a
- Extrapolation factor 9.5dB from 1m to 3m, as per Part 15.31f
- Measurements >1GHz @ 0.3m as per Part 15.31f(1)
- Receiver detector <1GHz = CISPR, Quasi-Peak, 120kHz bandwidth
- Receiver detector >1GHz = Peak Hold, 1MHz resolution bandwidth
- New batteries used for battery powered products.
- (R) Indicates frequency within restricted band from Part 15.205
- (E) indicates limit from Pt.15.231(e) was applied.

Test Method:

- As per Radio – Noise Emissions, ANSI C63.4: 1992
- Measuring distances as Notes 1 to 4 above
- EUT 0.8 metre above ground plane
- Emissions maximised by rotation of EUT, on an automatic turntable.
Raising and lowering the receiver antenna between 1m & 4m.
Horizontal and vertical polarisation's, 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	
HORN ANTENNA	EMCO	3115	9010-3580	138	
HORN ANTENNA	EMCO	3115	9010-3581	139	X
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	844077/019	353	
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	X
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	X

TRANSMITTER TESTS

TRANSMITTER INTENTIONAL EMISSION – RADIATED – Part 15.231 (e)

Ambient temperature	=	16°C(<1GHz),	3m measurements @ fc	[X]
Relative humidity	=	50%(<1GHz),	10m measurements @ fc	[]
Conditions	=	Open Area Test Site (OATS)	30m measurements @ fc	[]
Supply voltage	=	6Vdc	30m extrapolated from 3m	[]
Channel number	=	1	30m extrapolated from 10m	[]

FREQ. (MHz)	MEASUREMENT Rx. READING (dBµV)	CABLE LOSS (dB)	ANT FACTOR	FIELD STRENGTH (dBµV/m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (µV/m)
418.0385	51.5	2.3	16.4	70.2	-	3235.9
Limit value @ fc			4133.3473(µV/m)			
Band occupancy @ -20dBc			f lower	f higher	Band Occupancy	Limit
			417.9959MHz	418.0413MHz	45.4kHz	1.045MHz
Transmitter Operating Time			Transmitter on time		Time between transmissions	
			516ms		15.6s	

See spectrum analyser plot – Annex C

- Notes:**
- 1 Results quoted are extrapolated as indicated
 - 2 Receiver detector @ fc = Quasi Peak 120kHz bandwidth
 - 3 When battery powered the EUT was powered with new batteries
 - 4 For transmitter on/off time see Appendix D

- Test Method:**
- 1 As per Radio – Noise Emissions, ANSI C63.4: 1992
 - 2 Measuring distances 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 15.231(e) 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	
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	
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BILOG ANTENNA	CHASE	CBL6112	2098	274	
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RECEIVER	ROHDE & SCHWARZ	ESHS10	844077/019	353	
V / UHF RECEIVER 20MHz - 1GHz	ROHDE & SCHWARZ	ESVS 20	838804 / 005	415	
BILOG ANTENNA	SCHAFFNER	CBL6112B	2761	431	
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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	
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	X
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	X

ANNEX A
PHOTOGRAPHS

ANNEX B

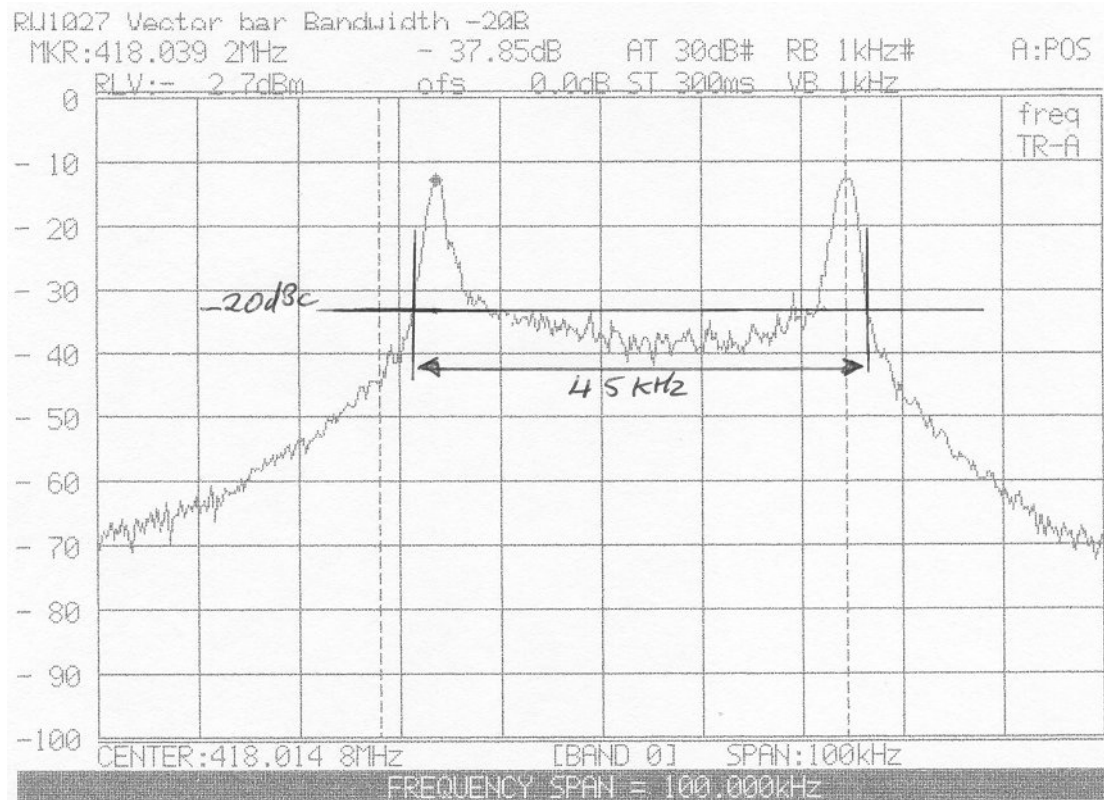
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

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

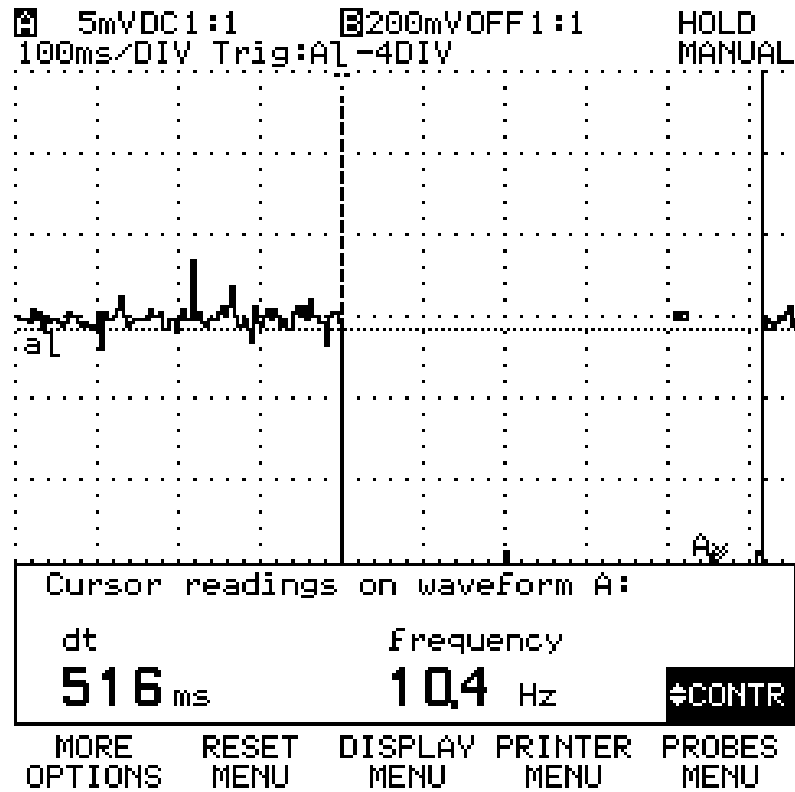
ANNEX C
BANDWIDTH PLOT

BANDWIDTH PLOT



ANNEX D
TRANSMIT PERIOD

TRANSMITTER ON TIME



TRANSMITTER OFF TIME

