TEST REPORT NO: RU1122/5703

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ISSUE NO: 1

FCC ID: SMD870TR

REPORT ON THE CERTIFICATION TESTING OF A
493K Limited
K KONTROL DATA RELAY
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.249 December 2003
INTENTIONAL RADIATOR SPECIFICATION

TEST DATE: 6th August 2004 – 10th August 2004

TESTED BY: JOHN CHARTERS PP D WINSTANLEY

APPROVED BY: Peter Green P GREEN
EMC PRODUCT MANAGER

DATE: 9th September 2004

Distribution:

Copy Nos: 1. 493K Limited

2. FCC EVALUATION LABORATORIES

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FS 21805

0728

CONTENTS

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:	SMD870TR					
PURPOSE OF TEST:	Certification					
TEST SPECIFICATION:	FCC RULES CFR 47, Part 15.249 December 2003					
TEST RESULT:	Compliant to Specification					
EQUIPMENT UNDER TEST:	K Kontrol Data Relay					
EQUIPMENT SERIAL No:	Engineering Sample					
ITU: EMISSION CODE:	85K0F1D					
EQUIPMENT TYPE:	Data logger					
PRODUCT USE:	Temperature sensor					
CARRIER EMISSION:	40.3 (mV/m) @ 3m					
ANTENNA TYPE:	Integral					
ALTERNATIVE ANTENNA:	Not applicable					
CHANNEL SPACING:	Wideband					
NUMBER OF CHANNELS:	1					
FREQUENCY GENERATION:	SAW Resonator	[ ]	Crystal	[X]	Synthesiser	[ ]
MODULATION METHOD:	Amplitude	[ ]	Digital	[X]	Angle	[ ]
POWER SOURCE(s):	+ 3 Vdc					
TEST DATE(s):	6th August 2004 – 10th August 2004					
ORDER No(s):	N/A					
APPLICANT:	493K Limited					
ADDRESS:	42 University Road Belfast Ireland BT7 1NJ					

TESTED BY: JOHN CHARTERS (Signature Not Verified) Digitally signed by JOHN CHARTERS DN: cn=JOHN CHARTERS, o=TRL COMPLIANCE SERVICES, c=US Date: 2004.09.14 11:41:16 +01'00' — PP D WINSTANLEY

APPROVED BY: Peter Green (Signature Not Verified) Digitally signed by Peter Green DN: cn=Peter Green, o=TRL Compliance Services, c=GB Date: 2004.09.14 10:59:14 Z — P GREEN EMC PRODUCT MANAGER

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	K Kontrol Data Relay
EQUIPMENT TYPE:	Data logger
SERIAL NUMBER OF EUT:	Engineering Sample
PURPOSE OF TEST:	Certification
TEST SPECIFICATION(s):	FCC RULES CFR 47, Part 15.249 December 2003
TEST RESULT:	COMPLIANT Yes [X] No [ ]
APPLICANT'S CATEGORY:	MANUFACTURER [X] IMPORTER [ ] DISTRIBUTOR [ ] TEST HOUSE [ ] AGENT [ ]
APPLICANT'S ORDER No(s):	N/A
APPLICANT'S CONTACT PERSON(s):	Mr Gareth McDowell
E-mail address:	gareth.mcdowell@493k.com
APPLICANT:	493K Limited
ADDRESS:	42 University Road Belfast Ireland BT7 1NJ
TEL:	+44 (0) 28 90 45 70 77
FAX:	+44 (0) 28 90 31 36 36
MANUFACTURER:	493K Limited
EUT(s) COUNTRY OF ORIGIN:	United Kingdom
TEST LABORATORY:	TRL EMC
UKAS ACCREDITATION No:	0728
TEST DATE(s)	6th August 2004 – 10th August 2004
TEST REPORT No:	RU1122/5703

EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.

TEST/EXAMINATION	RULE PART	DETECTOR	APPLICABILITY
Intentional Emission Frequency:	15.249(a)	Quasi Peak	YES
Intentional Emission Field Strength:	15.249(a)	Quasi Peak	YES
Intentional Emission Band Occupancy:	15.215	Peak	YES
Intentional Emission ERP (mW):	N/A	-	NO
Spurious Emissions – Conducted:	15.207	Quasi Peak Average	YES
Spurious Emissions – Radiated <1000MHz:	15.209	Quasi Peak	YES
Spurious Emissions – Radiated >1000MHz:	15.209 15.249(a)	Average	YES
Maximum Frequency of Search:	15.33	-	YES
Antenna Arrangements Integral:	15.203	-	YES
Antenna Arrangements External Connector:	15.204	-	YES
Restricted Bands	15.205	-	YES
Extrapolation Factor	15.31(f)	-	YES

2. Product Description: Master Unit: Receives data from slave unit and its own thermocouples then communicates this data to a PC.
Slave Unit: Records data from thermocouples and transmits data to master unit
Both units contain the same transmitter/receiver circuit.
Master or slave functionality is set by the manufacture in software.

3. Product Use: Temperature Sensing and Data logging

4. Emission Designator: 85K0F1D

5. Duty Cycle: <100%

6. Transmitter bit or pulse rate and level: 64K bps — Maximum data rate defined by radio module manufacturers radiometrix

7. Temperatures: Ambient (Tnom) — 21°C – 26°C

8. Supply Voltages: Vnom — + 3 Vdc

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

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

10 Channel spacing:
Narrowband [ ]
Wideband [X]

TRANSMITTER TESTS

TRANSMITTER SPURIOUS EMISSIONS – RADIATED – PART 15.209

Ambient temperature	=	26°C(<1GHz)	3m measurements <1GHz	[X]
Relative humidity	=	62% (<1GHz),	0.3m measurements >1GHz	[X]
Conditions	=	Open Area Test Site (OATS)	3m extrapolated from 0.3m	[X]
Supply voltage	=	+ 3 Vdc		
Channel number	=	914.45MHz		

	FREQ. (MHz)	MEAS. Rx. (dBµV)	CABLE LOSS (dB)	ANT FACTOR (dB/m)	FIELD STRENGTH (dBµV/m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (µV/m)	LIMIT (µV/m)
30MHz - 88MHz	68 MHz	13.2	0.7	5.1	19.00	-	8.9	100
88MHz - 216MHz								
216MHz - 960MHz	903.8	17.0	4.0	20.2	41.20	-	114.8	200
960MHz - 1GHz								
1GHz - 5GHz	1828.8 2743.3(R)	35.27 28.32	0.85 0.98	27.9 29.5	44.02 38.80	20 20	158.9 87.1	500 500

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:

1 Results quoted are extrapolated as indicated
2 Emissions were searched to: (**x**) 1000MHz inclusive, as per Part 15.33a
3 Extrapolation factor 20dB from 0.3m to 3m, as per Part 15.31f
4 Measurements >1GHz @ 0.3m as per Part 15.31f(1)
5 Receiver detector <1GHz = CISPR, Quasi-Peak, 120kHz bandwidth
6 Receiver detector >1GHz = Average, 1MHz resolution bandwidth
7 New batteries used for battery powered products.
8 (R) Indicates restricted bands, as per Part 15.205
9 Results not within 10 dB's of limit are not necessarily recorded
10 See annex E for scan data
11 Emissions recorded cover slave unit in receive and transmit mode and master and slave units communicating with master connected to computer.

Test Method:

1 As per Radio – Noise Emissions, ANSI C63.4: 2001
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 orthagonal 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	
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	**X**
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	**X**

TRANSMITTER TESTS

TRANSMITTER INTENTIONAL EMISSION – RADIATED – Part 15.249 December 2003

Ambient temperature	=	21°C(<1GHz),	3m measurements @ fc	[X]
Relative humidity	=	58%(<1GHz),	10m measurements @ fc	[ ]
Conditions	=	Open Area Test Site (OATS)	30m measurements @ fc	[ ]
Supply voltage	=	+ 3 Vdc	30m extrapolated from 3m	[ ]
Channel number	=	1	30m extrapolated from 10m	[ ]

FREQ. (MHz)	MEASUREMENT Rx. READING (dBµV)	CABLE LOSS (dB)	ANT FACTOR (dB/m)	FIELD STRENGTH (dBµV/m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (mV/m)
914.45	67.9	4	20.2	92.1	-	40.3
Limit value @ fc			**50 (mV/m) @ 3m**			
Band occupancy @ spurious limit value			**f lower**		**f higher**	
			914.4172 MHz		914.5264 MHz	

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 The results quoted are the maximum seen after the supply voltage was varied between 85% and 115%.

Test Method:
1 As per Radio – Noise Emissions, ANSI C63.4: 2001
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 orthagonal planes.
Maximum results recorded

The test equipment used for the Transmitter Intentional Emission – Radiated – Part 15.249 December 2003 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	
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	
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	**X**
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	

TRANSMITTER TESTS

TRANSMITTER CONDUCTED EMISSIONS – AC POWER LINE Part 15.207

Ambient temperature	=	25°C(<1GHz),
Relative humidity	=	54%(<1GHz),
Conditions	=	Power Line Laboratory
Supply voltage	=	110V AC
Supply Frequency	=	60Hz

SIGNIFICANT EMISSIONS

FREQUENCY (MHz)	MEASUREMENT RECEIVER READING (dBµV)	DETECTOR	LISN CORRECTION (dB)	CONDUCTOR (L or N)	EMISSION (µV)
No significant emissions within 20 dB's of limit					

Notes:
1 See attached plots in annex D
2 Plots cover slave unit in transmit and receive mode and master and slave communicating with master connected to computer.

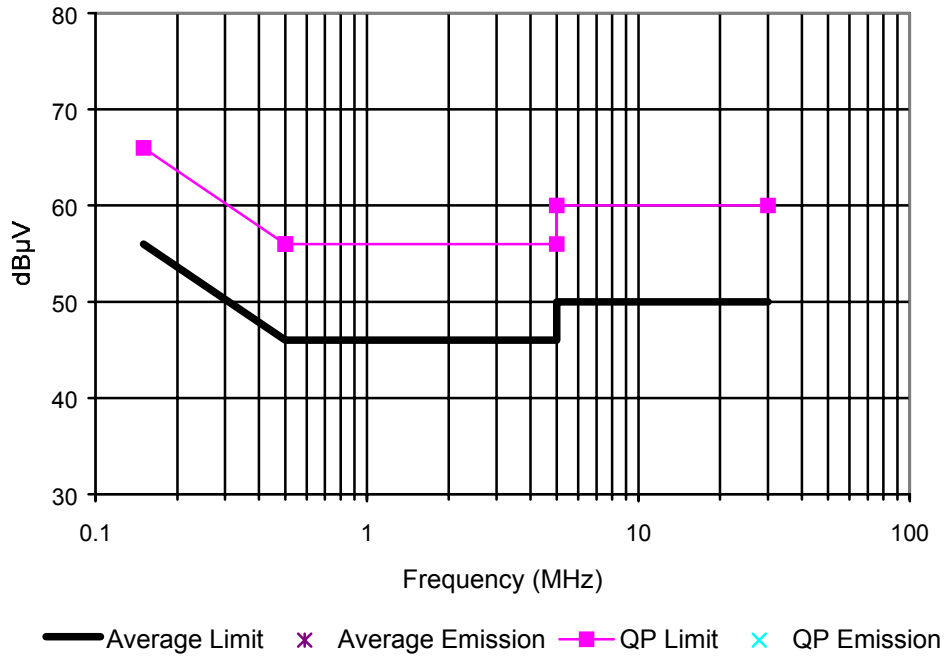
Test Method:
1 As per Radio – Noise Emissions, ANSI C63.4: 2001

The test equipment used for the Transmitter Conducted Emissions – AC Power Line Part 15.207 test was:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
RECEIVER	ROHDE & SCHWARZ	ESHS20	837960/003	237	
LISN / AMN	ROHDE & SCHWARZ	ESH3-Z5	83746/010	289	
RECEIVER	ROHDE & SCHWARZ	ESHS10	844077/019	353	
RECEIVER	ROHDE & SCHWARZ	ESHS 10	830051/001	UH03	**X**
LISN/AMN	ROHDE & SCHWARZ	ESH3-Z5	863906/018	UH05	**X**
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	

POWER LINE CONDUCTION EMISSIONS

Limit Part 15.207



No significant emissions within 20 dB's of limit

ANNEX A

PHOTOGRAPH

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 P GREEN DECLARATION(s)	-		[ ]
e.	LABELLING	-	PHOTOGRAPHS	[ ]
		-	DECLARATION	[ ]
		-	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]