TEST REPORT NO: RU1108/5412

COPY NO: 2

ISSUE NO: 1

FCC ID: OE5S822E

REPORT ON THE CERTIFICATION TESTING OF A
Group 4 Technology Limited
S822 Enrolment Reader
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.225 December 2003
INTENTIONAL RADIATOR SPECIFICATION

TEST DATE: 2nd April – 4th April 2004

TESTED BY: JOHN CHARTERS Digitally signed by JOHN CHARTERS DN: cn=JOHN CHARTERS, o=TRL COMPLIANCE SERVICES, c=US Date: 2004.06.04 13:38:26 +01'00' J CHARTERS

APPROVED BY: Peter Green Digitally signed by Peter Green DN: cn=Peter Green, o=TRL Compliance Services, c=GB Date: 2004.06.09 09:28:48 Z P GREEN EMC PRODUCT MANAGER

DATE: 4th June 2004

Distribution:

Copy Nos:
1. Group 4 Technology Limited
2. FCC EVALUATION LABORATORIES
3. TRL EMC

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FS 21805

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:	OE5S822E
PURPOSE OF TEST:	Certification
TEST SPECIFICATION:	FCC RULES CFR 47, Part 15.225 December 2003
TEST RESULT:	Compliant to Specification
EQUIPMENT UNDER TEST:	S822 Enrolment Reader
EQUIPMENT SERIAL No:	Engineering Sample
ITU: EMISSION CODE:	12K0A1D
EQUIPMENT TYPE:	Inductive Card Reader
PRODUCT USE:	Access control
CARRIER EMISSION:	29.58 µV/m @ 30m
ANTENNA TYPE:	Integral
ALTERNATIVE ANTENNA:	Not Applicable
BAND OF OPERATION:	13.553 MHz – 13.567MHz
CHANNEL SPACING:	Not Applicable, wideband
NUMBER OF CHANNELS:	1
FREQUENCY GENERATION:	SAW Resonator [ ] Crystal [X] Synthesiser [ ]
MODULATION METHOD:	Amplitude [ ] Digital [X] Angle [ ]
POWER SOURCE(s):	110Vac
TEST DATE(s):	2nd April – 4th April 2004
ORDER No(s):	R000018146
APPLICANT:	Group 4 Technology Limited
ADDRESS:	Challenge House Northway Lane Tewkesbury Gloucester England GL20 8JG

TESTED BY: JOHN CHARTERS — Digitally signed by JOHN CHARTERS DN: cn=JOHN CHARTERS, o=TRL COMPLIANCE SERVICES, c=US Date: 2004.06.04 13:38:57 +01'00' — Signature Not Verified

J CHARTERS

APPROVED BY: Peter Green — Digitally signed by Peter Green DN: cn=Peter Green, o=TRL Compliance Services, c=GB Date: 2004.06.09 09:29:06 Z — Signature Not Verified

P GREEN
EMC PRODUCT MANAGER

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	S822 Enrolment Reader
EQUIPMENT TYPE:	Inductive Card Reader
SERIAL NUMBER OF EUT:	Engineering Sample
PURPOSE OF TEST:	Certification
TEST SPECIFICATION(s):	FCC RULES CFR 47, Part 15.225 December 2003
TEST RESULT:	COMPLIANT Yes [X] No [ ]
APPLICANT'S CATEGORY:	MANUFACTURER [X] IMPORTER [ ] DISTRIBUTOR [ ] TEST HOUSE [ ] AGENT [ ]
APPLICANT'S ORDER No(s):	R000018146
APPLICANT'S CONTACT PERSON(s):	Mr E Porter
E-mail address:	eric.porter@g4tech.co.uk
APPLICANT:	Group 4 Technology Limited
ADDRESS:	Challenge House Northway Lane Tewkesbury Gloucester GL20 8JG
TEL:	01684 299400
FAX:	01684 290166
EUT(s) COUNTRY OF ORIGIN:	United Kingdom
TEST LABORATORY:	TRL EMC
UKAS ACCREDITATION No:	0728
TEST DATE(s)	2nd April – 4th April 2004
TEST REPORT No:	RU1108/5412

EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.

TEST/EXAMINATION	RULE PART	DETECTOR	APPLICABILITY
Intentional Emission Frequency:	15.225	Quasi Peak	Yes
Intentional Emission Field Strength:	15.225(a)	Quasi Peak	Yes
Intentional Emission Band Occupancy:	15.215(c)	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	Average	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: Access control

3. Emission Designator: 12K0A1D

4. Duty Cycle: <100%

5. Temperatures: Ambient (Tnom) 10.2^{o}C

6. Supply Voltages: Vnom 110Vac

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

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

8. Channel spacing:
   - Narrowband [ ]
   - Wideband [X]

TRANSMITTER TESTS

TRANSMITTER SPURIOUS EMISSIONS – RADIATED – PART 15.209

Ambient temperature	=	10.2°C(<1GHz)	3m measurements <1GHz	[X]
Relative humidity	=	43% (<1GHz)	10m measurements <30MHz	[X]
Conditions	=	Open Area Test Site (OATS)	30m extrapolated from 10m	[X]
Supply voltage	=	110Vac		
Channel number	=	13.56 MHz		

	FREQ (MHz)	MEAS. Rx. (dBµV)	CABLE LOSS (dB)	ANT FACTOR	FIELD STRENGTH (dBµV/m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (µV/m)	LIMIT (µV/m)
1.705MHz - 30MHz	27.12	-	-	-	27.2	19.08	2.547	30
30MHz - 88MHz	40.7 54.25	25.90 21.2	0.6 0.7	12.70 6.40	39.2 28.3	- -	91.201 26.002	100 100
88MHz - 216MHz								
216MHz - 960MHz								
960MHz - 1GHz								
1GHz - 5GHz								

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

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 19.08dB from 10m to 30m, as per Part 15.31f.
5 Measurements >1GHz @ 1m as per Part 15.31f(1).
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 20 dB's below the limit were not necessarily recorded.
10 For emissions below 30MHz the measuring receiver automatically compensates for the loss due to the antenna factor of the loop antenna. This loss is 20 dB's across the measurement range 9kHz to 30MHz.
11 For emissions below 30MHz the cable losses are assumed to be negligible.

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. (above 30MHz only)
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	**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	**X**
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	**X**
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	
RECEIVER	ROHDE & SCHWARZ	ESVS 10	841431/014	UH186	**X**

TRANSMITTER TESTS

TRANSMITTER INTENTIONAL EMISSION – RADIATED – Part 15.225

Ambient temperature	=	10.2°C(<1GHz)	3m measurements @ fc	[X]
Relative humidity	=	43%(<1GHz)	10m measurements @ fc	[X]
Conditions	=	Open Area Test Site (OATS)	30m measurements @ fc	[ ]
Supply voltage	=	110Vac	30m extrapolated from 3m	[X]
Channel number	=	1	30m extrapolated from 10m	[X]

FREQ. (MHz)	MEASUREMENT DISTANCE Meters	MEASUREMENT Rx. READING (dBµV/m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (µV/m)
13.56	3	57.6	28.18	29.58
13.56	10	48.5	19.08	29.58
Limit value @ fc		**15848 (µV/m)**		
Band occupancy @ -20dBc		**f lower**		**f higher**
		13.538200MHz		13.586200MHz

See spectrum analyser plot – Annex C

Notes:

1. Results quoted are extrapolated as indicated
2. The 3m – 10m extrapolation factor is 9.1dB calculated from th results above. Extrapolation factor 10m – 30m is 19.08dB using the extrapolation factor of 40dB/decade as per 15.31(f)
3. Receiver detector @ fc = Quasi Peak 10kHz bandwidth
4. When battery powered the EUT was powered with new batteries
5. For emissions below 30MHz the measuring receiver automatically compensates for the loss due to the antenna factor of the loop antenna. This loss is 20 dB's across the measurement range 9kHz to 30MHz.
6. The results quoted are the maximum seen after the supply voltage was varied between 85% and 115%.
7. For emissions below 30MHz the cable losses are assumed to be negligible.

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. (above 30MHz only)
   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 15.225 test 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	**X**
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	**X**
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	

TRANSMITTER TESTS

TRANSMITTER EMISSIONS – FREQUENCY TOLERANCE Part 15.225 (c)

Ambient temperature = 24°C
Relative humidity = 38%

Fc @ Vnom Tnom = 13.561800MHz

TEMPERATURE	VOLTAGE	FREQUENCY MHz	DEVIATION kHz	LIMIT kHz
-20°C	110 Vac	13.562000	0.2	±1.356
+50°C	110 Vac	13.561800	0	±1.356

TEMPERATURE	VOLTAGE	FREQUENCY MHz	DEVIATION kHz	LIMIT kHz
+20°C	126.5 Vac	13.561800	0	±1.356
+20°C	93.5 Vac	13.562000	0.2	±1.356

Notes:
1 One hour was allowed for temperature stabilisation.

Test Method:
1 EUT was placed inside the environmental chamber and temperature adjusted accordingly.
2 The AC power was varied from an external ac power supply.
3 Frequency was recorded on the spectrum analyzer.

The test equipment used for the Transmitter Frequency Tolerance – Part 15.225 (c) 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	
ENVIRONMENTAL CHAMBER	SHARETREE	TCC 125-815P	CS 203	11	**X**
POWER SUPPLY	MANSON	EP603	60316619	UH177	**X**
MULTIMETER	AVO METER	M3004	M3270006	UH41	**X**
RECEIVER	ROHDE & SCHWARZ	ESHS 10	830051/001	UH03	
LISN/AMN	ROHDE & SCHWARZ	ESH3-Z5	863906/018	UH05	
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	**X**
VARIAC	RS	-	-	UH34	**X**

TRANSMITTER TESTS

TRANSMITTER CONDUCTED EMISSIONS – AC POWER LINE Part 15.207

Ambient temperature	=	22°C(<1GHz)
Relative humidity	=	43%(<1GHz)
Conditions	=	Power Line Laboratory
Supply voltage	=	110V AC
Supply Frequency	=	60Hz

SIGNIFICANT EMISSIONS

FREQUENCY (MHz)	MEASUREMENT RECEIVER READING (dBµV)	DETECTOR	CONDUCTOR (L or N)	LIMIT (dBµV)
0.985	43.08	Quasi Peak	N	56.00
1.235	40.43	Quasi Peak	N	56.00
1.25	41.94	Quasi Peak	N	56.00
2.195	41.32	Quasi Peak	L	56.00
13.56	47.67	Average	N	50.00
27.12	41.37	Average	N	50.00

Notes:
1 See attached plot in annex D
2 Scans were performed in both Live and Neutral lines. Worst case emissions are recorded in the table above
3 Emissions below 10 dB's were not necessarily recorded.

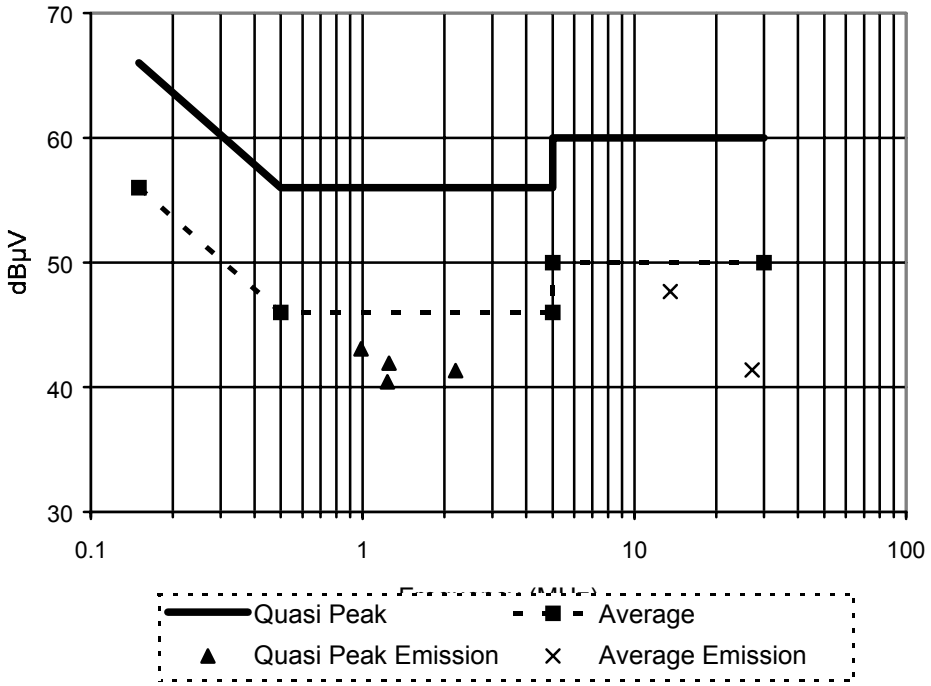
Test Method:
1 As per Radio – Noise Emissions, ANSI C63.4: 2001

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

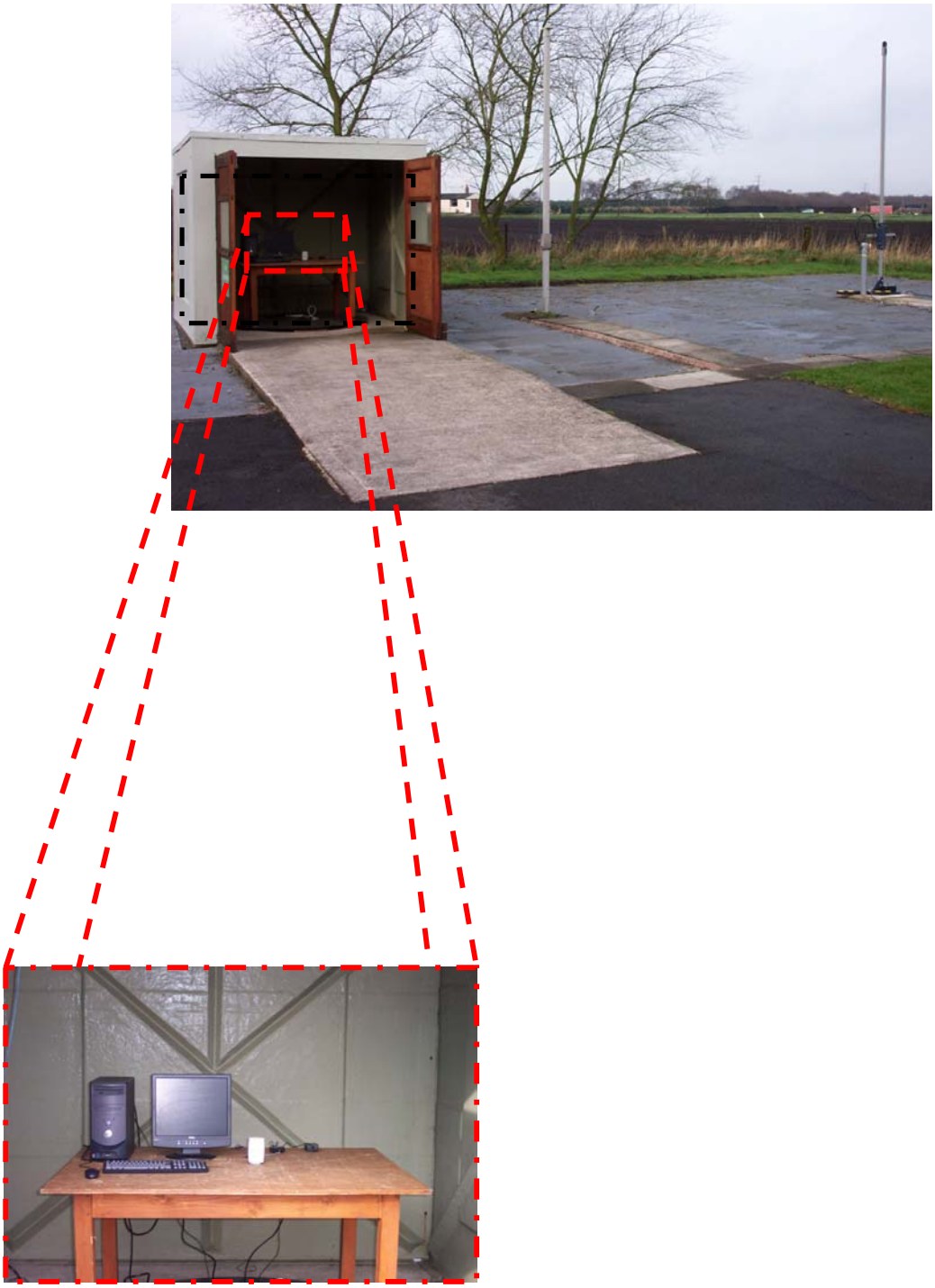
Limit Part 15.207



ANNEX A

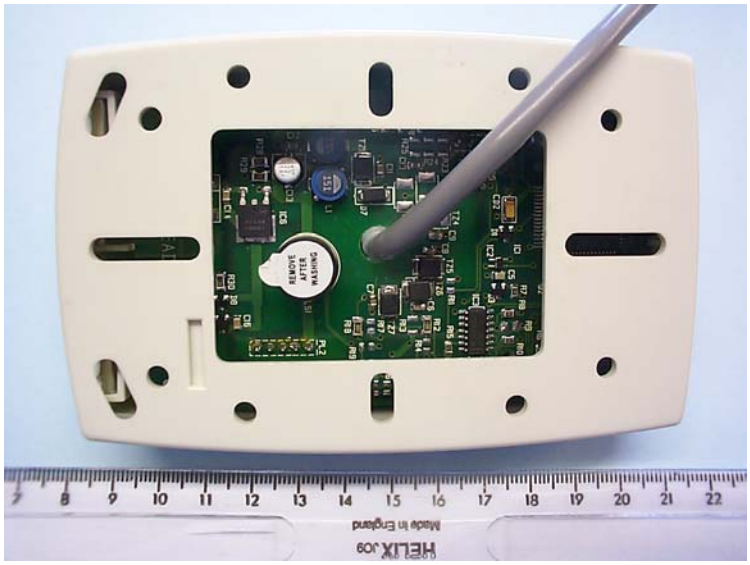
PHOTOGRAPHS

PHOTOGRAPH No. 1 **TEST SETUP**

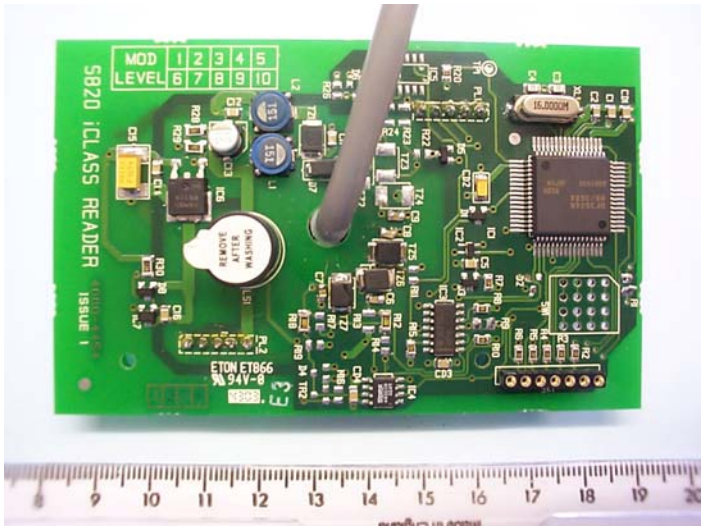


PHOTOGRAPH No. 2 **EUT FRONT VIEW**

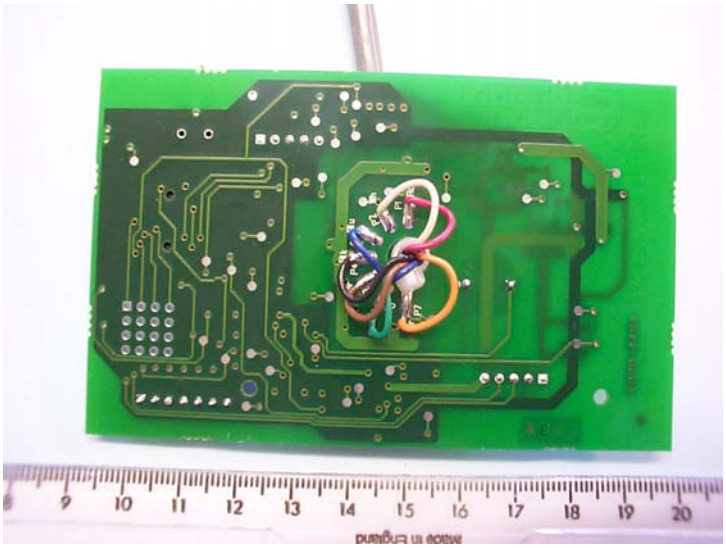
PHOTOGRAPH No. 3 **EUT REAR VIEW**



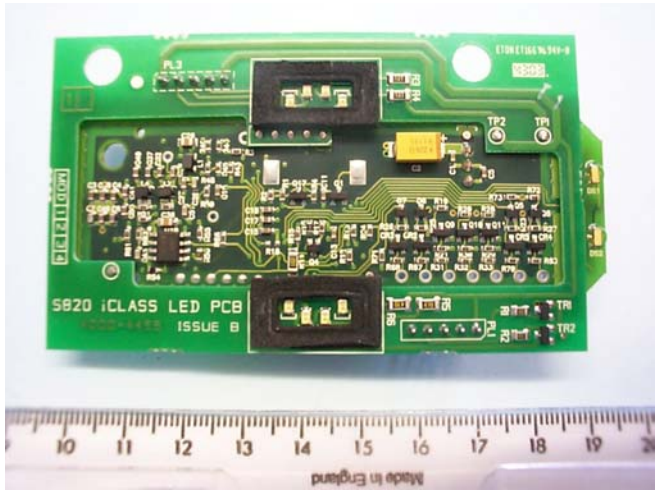
PHOTOGRAPH No. 4 **MAIN PCB COMPONENT SIDE**



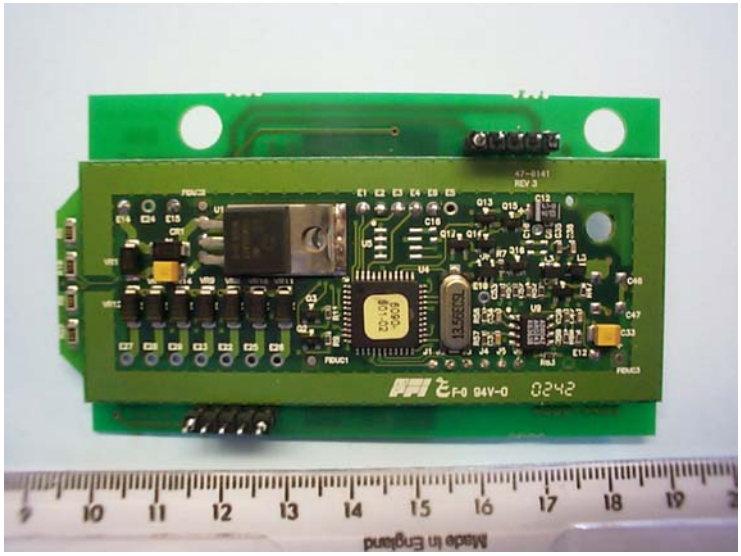
PHOTOGRAPH No. 5 MAIN **PCB TRACK SIDE**



PHOTOGRAPH No. 6 **ADD ON PCB COMPONENT SIDE**



PHOTOGRAPH No.7 **ADD ON PCB ANTENNA SIDE**



ANNEX B

APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

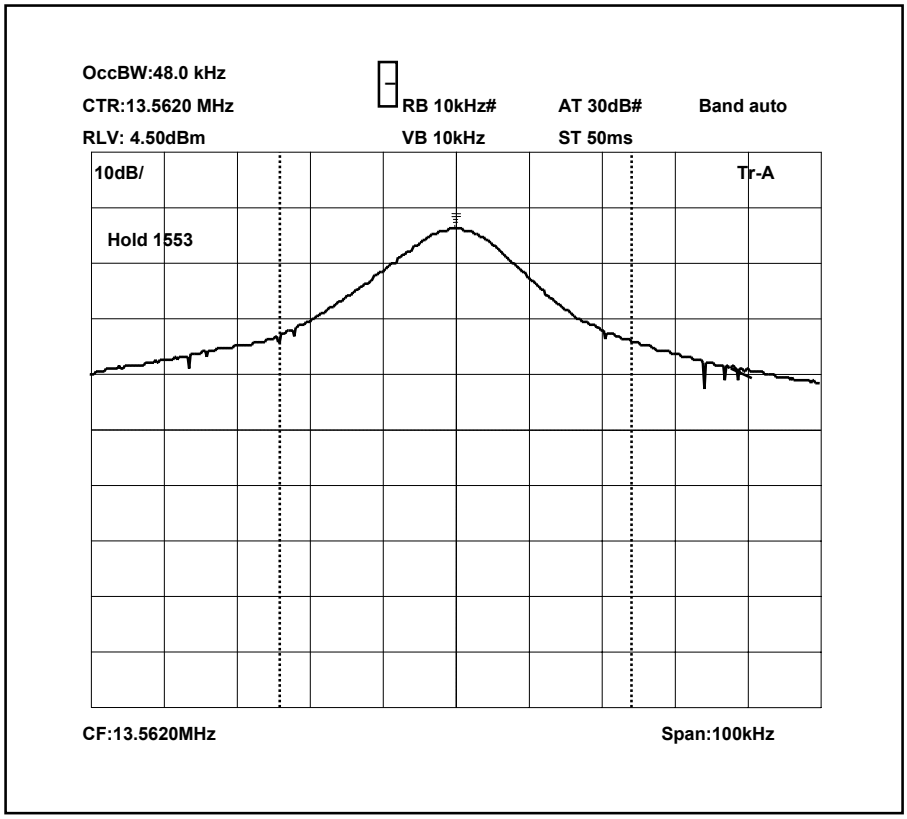
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

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	[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



Band Occupancy @ -20 dBc = 48.0 kHz
Fl = 13.538200 MHz
Fh = 13.586200 MHz

ANNEX D

SCAN DATA

Powerline Conduction

02 Apr 2004 14:14

150kHz - 30MHz

EUT:	S822e
Manuf:	Group 4
Op Cond:	LISN UH195, cable UH21 & Receiver UH187
Operator:	J Charters
Test Spec:	EN55022 Class B (or Variant)
Comment:	neutral at 110V

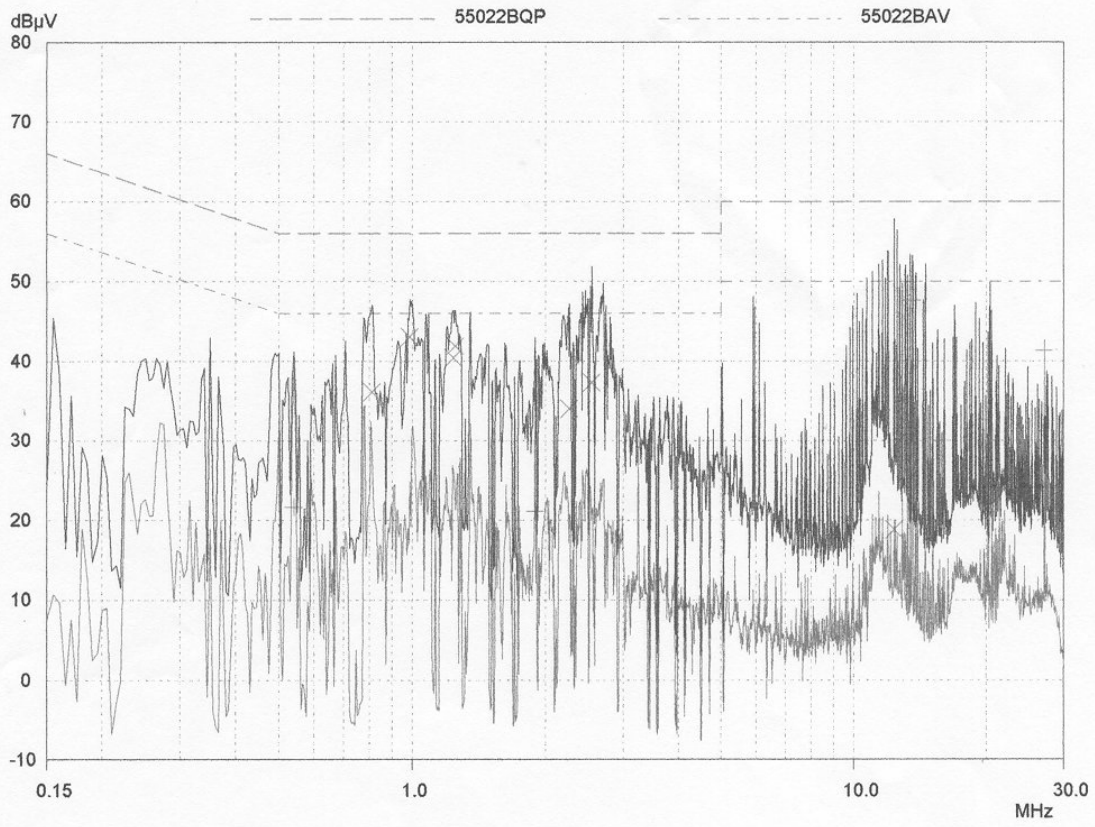
Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	5kHz	10kHz	PK+AV	50msec	Auto	OFF	60dB

Transducer	No.	Start	Stop	Name
	1	150kHz	30MHz	UH21

Final Measurement:

Detectors:	X QP / + AV
Meas Time:	2sec
Subranges:	25
Acc Margin:	20 dB



TRL Compliance

02 Apr 2004 08:33

H Field

EUT:	S822
Manuf:	Group 4
Op Cond:	Pre Scan
Operator:	D Winstanley
Test Spec:	FCC Part 15
Comment:	Tx on

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
9kHz	150kHz	100Hz	200Hz	PK	100msec	Auto	OFF	60dB
150kHz	30MHz	5kHz	10kHz	PK	20msec	Auto	OFF	60dB

Final Measurement:

Detector:	X QP
Meas Time:	1sec
Peaks:	8
Acc Margin:	25 dB