



TEST REPORT NO: RL1176/7631  
 COPY NO: .....  
 ISSUE NO: 1  
 FCC ID: OE5S813

**REPORT ON THE CERTIFICATION TESTING OF A  
 GROUP 4 TECHNOLOGY Ltd.  
 S813 FINGER PRINT READER  
 WITH RESPECT TO  
 THE FCC RULES CFR 47, PART 15.225  
 INTENTIONAL RADIATOR SPECIFICATION**

TEST DATE: 23<sup>rd</sup> –25<sup>th</sup> April 2003

TESTED BY: ..... J CHARTERS

APPROVED BY: ..... P GREEN  
 EMC PRODUCT  
 MANAGER

DATE: .....

Distribution:

- Copy Nos:
1. GROUP 4 TECHNOLOGY Ltd.
  2. FCC EVALUATION LABORATORIES
  3. TRL EMC

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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 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: OE5S813  
PURPOSE OF TEST: CERTIFICATION  
TEST SPECIFICATION: FCC RULES CFR 47, Part 15.225  
TEST RESULT: Compliant to Specification  
EQUIPMENT UNDER TEST: S813 FINGER PRINT READER  
EQUIPMENT SERIAL No: Engineering sample  
ITU: EMISSION CODE: 12K0A1D  
EQUIPMENT TYPE: S813  
PRODUCT USE: RFID card reader  
CARRIER EMISSION: 37.2µV/m @30m  
ANTENNA TYPE: INTEGRAL  
ALTERNATIVE ANTENNA: N/A  
BAND OF OPERATION: 13.553MHz – 13.567MHz  
CHANNEL SPACING: Wideband allocation  
NUMBER OF CHANNELS: 1  
FREQUENCY GENERATION: SAW Resonator [ ] Crystal [X] Synthesiser [ ]  
MODULATION METHOD: Amplitude [X] Digital [ ] Angle [ ]  
POWER SOURCE(s): +12Vdc  
TEST DATE(s): 23<sup>rd</sup> - 25<sup>th</sup> April 2003  
ORDER No(s): R000013397  
APPLICANT: GROUP 4 TECHNOLOGY Ltd.  
ADDRESS: CHALLENGE HOUSE  
NORTHWAY LANE  
TEWKESBURY  
GLOUCESTER  
GL20 8JG  
UNITED KINGDOM

TESTED BY: \_\_\_\_\_ J CHARTERS

APPROVED BY: \_\_\_\_\_ P GREEN  
EMC PRODUCT  
MANAGER

## APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT): S813 FINGER PRINT READER

EQUIPMENT TYPE: S813

SERIAL NUMBER OF EUT: Engineering sample

PURPOSE OF TEST: CERTIFICATION

TEST SPECIFICATION(s): FCC RULES CFR 47, Part 15.225

TEST RESULT: COMPLIANT Yes   
No

APPLICANT'S CATEGORY: MANUFACTURER   
IMPORTER   
DISTRIBUTOR   
TEST HOUSE   
AGENT

APPLICANT'S ORDER No(s): R000013397

APPLICANT'S CONTACT PERSON(s): Mr E Porter

E-mail address: [Eric.porter@g4tech.co.uk](mailto:Eric.porter@g4tech.co.uk)

APPLICANT: GROUP 4 TECHNOLOGY Ltd.

ADDRESS: CHALLENGE HOUSE  
NORTHWAY LANE  
TEWKESBURY  
GLOUCESTER  
GL20 8JG  
UNITED KINGDOM

TEL: +44 (0)1684 850977

FAX: +44 (0)1684 294845

MANUFACTURER: GROUP 4 TECHNOLOGY Ltd.

EUT(s) COUNTRY OF ORIGIN: UNITED KINGDOM

TEST LABORATORY: TRL EMC

UKAS ACCREDITATION No: 0728

TEST DATE(s) 23<sup>rd</sup> - 25<sup>th</sup> April 2003

TEST REPORT No: RL1176/7631

**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	Quasi Peak	Yes
	Intentional Emission Band Occupancy:		N/A	Yes
	Intentional Emission ERP (mW):	N/A	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:		N/A	No
	Maximum Frequency of Search:	15.33	N/A	Yes
	Antenna Arrangements Integral:	15.203	N/A	Yes
	Antenna Arrangements External Connector:	15.204	N/A	No
	Restricted Bands	15.205	N/A	Yes
	Extrapolation Factor	15.31(f)	N/A	Yes

- 2. Product Use: Access Control
- 3. Emission Designator: 12K0A1D
- 4. Duty Cycle: <100%
- 5. Temperatures: Ambient (Tnom) 24°C
- 6. Supply Voltages: Vnom 12V

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

- 7. Equipment Category:
  - Single channel
  - Two channel
  - Multi-channel
- 8. Channel spacing:
  - Narrowband
  - Wideband

**TRANSMITTER TESTS**

**TRANSMITTER SPURIOUS EMISSIONS – RADIATED – PART 15.209**

Ambient temperature = 25°C(<1GHz) 3m measurements <1GHz [X]  
 Relative humidity = 40% (<1GHz), 10m measurements <30GHz [X]  
 Conditions = Open Area Test Site (OATS) 3m extrapolated from 1m [ ]  
 Supply voltage = 12Vdc  
 Channel number = 1

	FREQ. (MHz)	MEAS. Rx. (dBμV/m)	CABLE LOSS (dB)	ANT FACT.	FIELD STRENGTH (dBμV/m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (μV/m)	LIMIT (μV/m)	
1.705MHz - 30MHz	27.12	29.8	-	-	29.8	19.08	3.4	30	
30MHz - 88MHz	32.0	16.0	0.5	16.9	33.4	-	46.7	100	
88MHz - 216MHz	125.0	28.3	1.1	11.4	40.8	-	109.6	150	
	135.6	25.8	1.2	11.0	38.0	-	79.4	150	
	150.0	24.6	1.4	10.0	36.0	-	63.1	150	
216MHz - 960MHz	600.0	19.0	2.9	18.6	40.5	-	105.9	200	
	700.0	20.4	3.2	18.9	42.5	-	133.3	200	
	800.0	21.4	3.6	20.1	45.1	-	179.8	200	
	850.0	21.2	3.8	20.1	45.1	-	179.8	200	
	900.0	18.9	4.0	20.2	43.1	-	142.9	200	
960MHz - 1GHz	1000.0	19.2	4.1	20.9	44.2	-	162.2	500	
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) 100MHz 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 20dB's below the limit were not 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 20dB'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: 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.(above 30MHz only.)  
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	<b>X</b>
HORN ANTENNA	EMCO	3115	9010-3580	138	<b>X</b>
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	<b>X</b>
RECEIVER	ROHDE & SCHWARZ	ESVS 10	825892/003	UH04	<b>X</b>
RANGE 1	TRL	3 METRE	N/A	UH06	
AE, LOOP, Z2, 9kHz - 30MHz	ROHDE & SCHWARZ	HFH2	881058 - 53	07	
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	<b>X</b>
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	<b>X</b>



**TRANSMITTER TESTS**

**TRANSMITTER INTENTIONAL EMISSION – RADIATED – Part 15.225 (a)**

Ambient temperature	=	25°C(<1GHz),	3m measurements @ fc	[X]
Relative humidity	=	40%(<1GHz),	10m measurements @ fc	[X]
Conditions	=	Open Area Test Site (OATS)	30m measurements @ fc	[ ]
Supply voltage	=	+12Vdc	30m extrapolated from 3m	[X]
Channel number	=	1	30m extrapolated from 10m	[X]

FREQUENCY (MHz)	MEASUREMENT DISTANCE Meters	MEASUREMENT Rx. READING (dBµV/m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (µV/m)
13.568	3	61.4	29.98	37.2
13.568	10	50.5	19.08	37.2
Limit value @ fc		10000 (µV/m)		
Band occupancy @ -20dBc		f lower		f higher
		13.5456MHz		13.58262MHz

See spectrum analyser plot – Annex C

**Notes:**

- 1 Results quoted are extrapolated as indicated.
- 2 The 3m-10m extrapolation factor is 10.9dB calculated from the results above.
- 3 Extrapolation factor 10-30m is 19.08dB using the extrapolation factor of 40dB/decade as per 15.31(f)
- 2 Receiver detector @ fc = Quasi Peak 10kHz bandwidth
- 3 When battery powered the EUT was powered with new batteries
- 4 For emissions below 30MHz the measuring receiver automatically compensates for the loss due to the antenna factor of the loop antenna. This loss is 20dB's across the measurement range 9kHz to 30MHz
- 5 For emissions below 30MHz the cable losses are assumed to be negligible.

**Test Method:**

- 1 As per Radio – Noise Emissions, ANSI C63.4: 1992
- 2 Measuring distances 3m & 10m (to produce extrapolation factor)
- 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 orthogonal planes.  
Maximum results recorded

The test equipment used for the Transmitter Intentional Emission – Radiated – Part 15.225 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	<b>X</b>
RECEIVER	ROHDE & SCHWARZ	ESVS 10	825892/003	UH04	
RANGE 1	TRL	3 METRE	N/A	UH06	
AE, LOOP, Z2, 9kHz - 30MHz	ROHDE & SCHWARZ	HFH2	881058 - 53	07	<b>X</b>
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	<b>X</b>

## TRANSMITTER TESTS

### TRANSMITTER EMISSIONS – FREQUENCY TOLERANCE Part 15.225 (c)

Ambient temperature = 25°C(<1GHz),  
Relative humidity = 40%(<1GHz),

Fc @ Vnom Tnom = 13.56385MHz

TEMPERATURE	VOLTAGE	FREQUENCY MHz	DEVIATION kHz	LIMIT kHz
-20°C	12.0	13.5634	-0.45	±1.356
+50°C	12.0	13.5637	-0.15	±1.356

TEMPERATURE	VOLTAGE	FREQUENCY MHz	DEVIATION kHz	LIMIT kHz
+20°C	13.8	13.5639	+0.05	±1.356
+20°C	10.2	13.5638	-0.05	±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 DC power was varied from an external dc 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	<b>X</b>
POWER SUPPLY	MANSON	EP603	60316619	UH177	<b>X</b>
MULTIMETER	AVO METER	M3004	M3270006	UH41	<b>X</b>
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	<b>X</b>

**TRANSMITTER TESTS**

**TRANSMITTER CONDUCTED EMISSIONS – AC POWER LINE Part 15.207**

Ambient temperature = 19°C(<1GHz),  
 Relative humidity = 54%(<1GHz),  
 Conditions = Power Line Laboratory  
 Supply voltage = 110V AC  
 Supply Frequency = 60Hz

FREQUENCY (MHz)	MEASUREMENT RECEIVER READING (dBµV)	DETECTOR	CONDUCTOR (L or N)	LIMIT (dBµV)
0.15	39.96	Quasi Peak	L	66.0
0.2	35.41	Quasi Peak	L	63.6
12.645	43.61	Quasi Peak	L	60.0
13.56	41.756	Quasi Peak	L	60.0
10.39	347.88	Average	L	50.0
12.645	42.84	Average	L	50.0
13.56	41.03	Average	L	50.0
16.0	20.69	Average	L	50.0
20.655	13.52	Average	L	50.0
25.91	31.55	Average	L	50.0

**Notes:** 1 See attached plots Appendix D

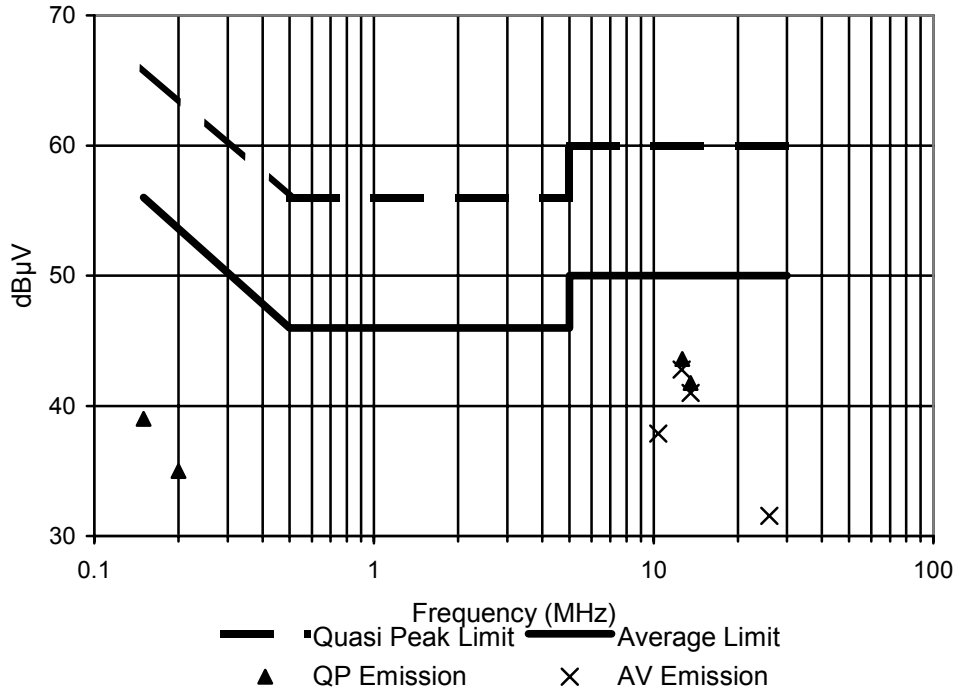
**Test Method:** 1 As per Radio – Noise Emissions, ANSI C63.4: 1992

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	ESHS 10	830051/001	UH03	<b>X</b>
LISN/AMN	ROHDE & SCHWARZ	ESH3-Z5	863906/018	UH05	<b>X</b>
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	

# POWER LINE CONDUCTION EMISSIONS

Limit Part 15.207



**ANNEX A**  
**PHOTOGRAPHS**





PHOTOGRAPH No. 2

TRANSMITTER FRONT VIEW



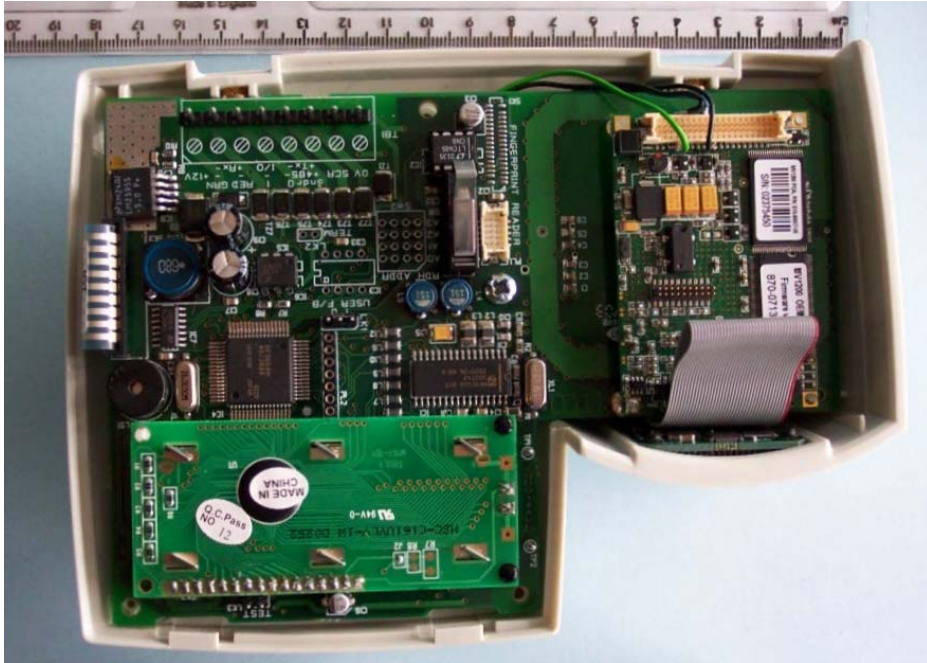
PHOTOGRAPH No. 3

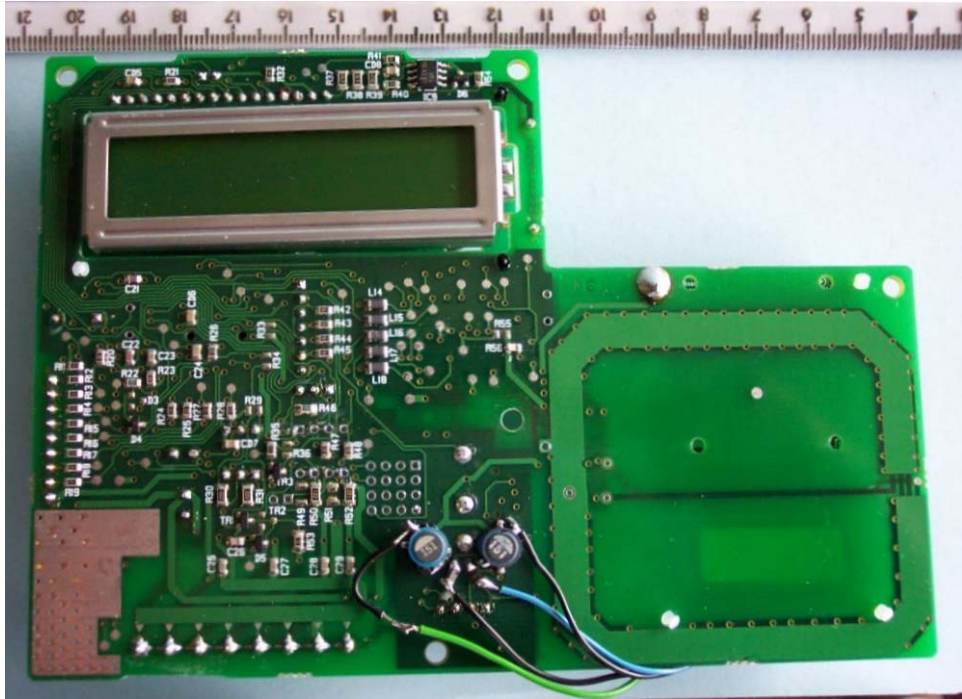
TRANSMITTER REAR VIEW



PHOTOGRAPH No. 4

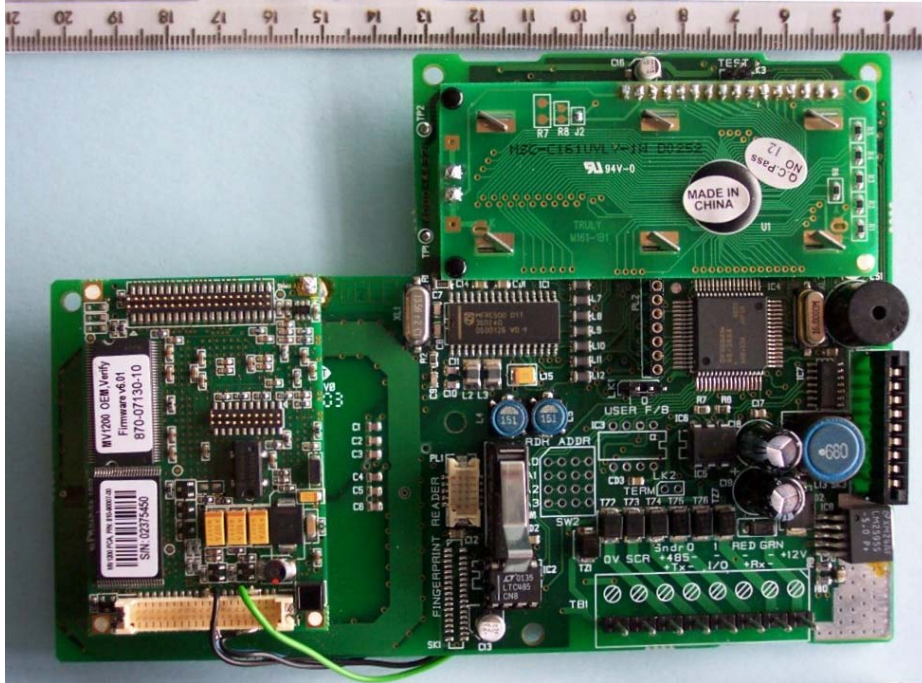
TRANSMITTER LID REMOVED



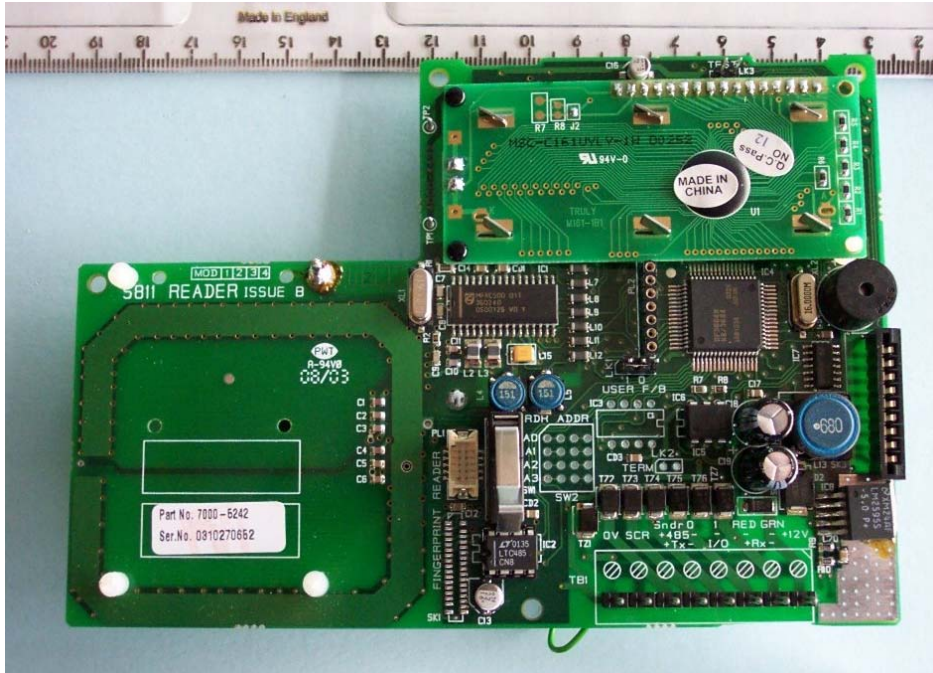


PHOTOGRAPH No. 6

TRANSMITTER PCB REAR VIEW

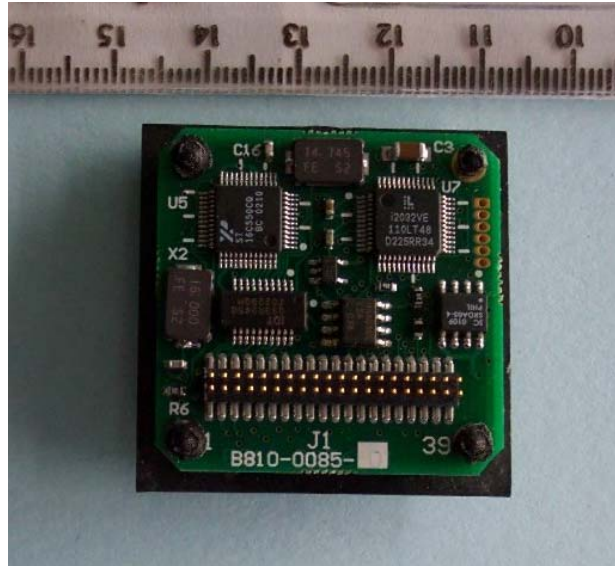


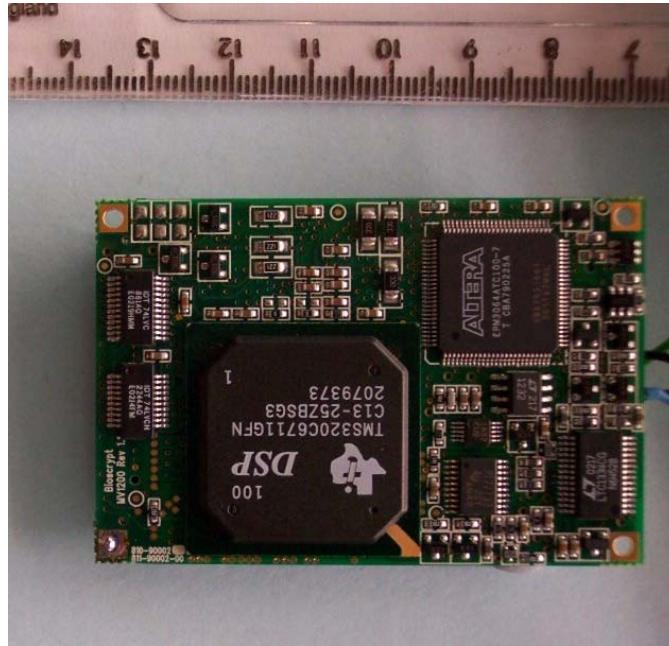
PHOTOGRAPH No. 7 TRANSMITTER PCB REAR VIEW PCB REMOVED



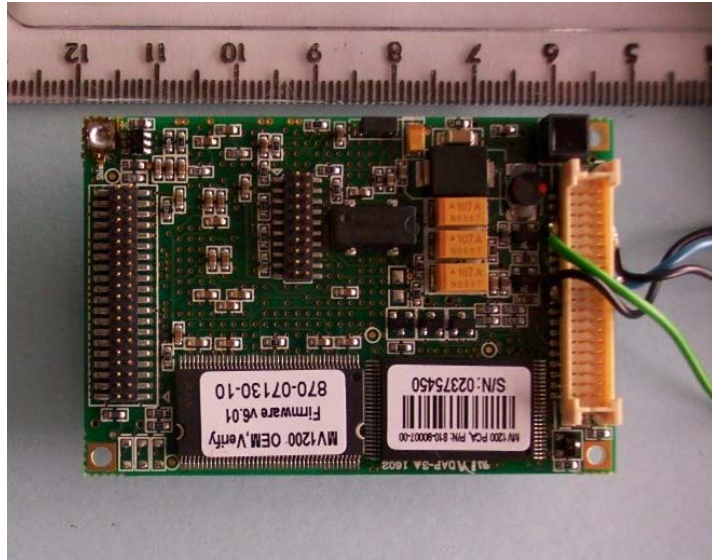
PHOTOGRAPH No. 8

**FINGER PRINT PCB COMPONENT SIDE**









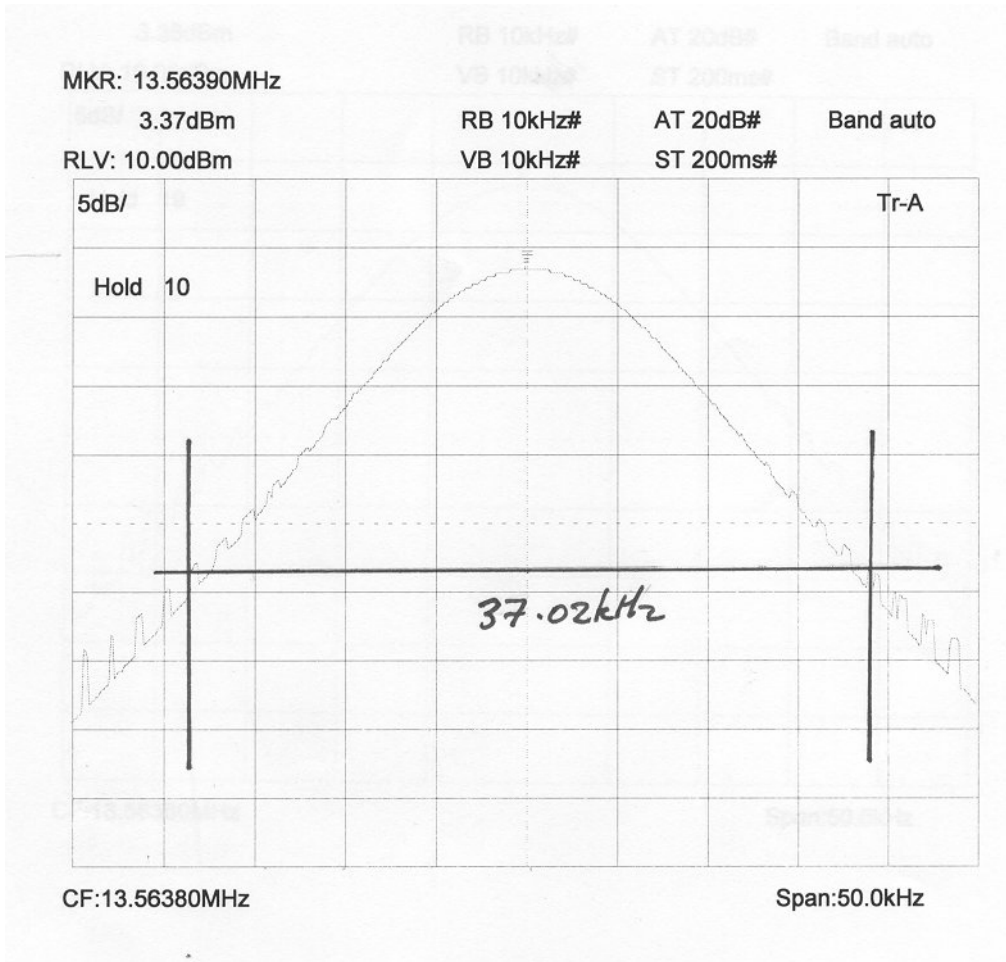
**ANNEX B**  
**APPLICANT'S SUBMISSION OF DOCUMENTATION LIST**

## APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

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

**ANNEX C**  
**BANDWIDTH PLOT**

# BANDWIDTH PLOT



**ANNEX D**  
**Power Line Conducted Emissions**

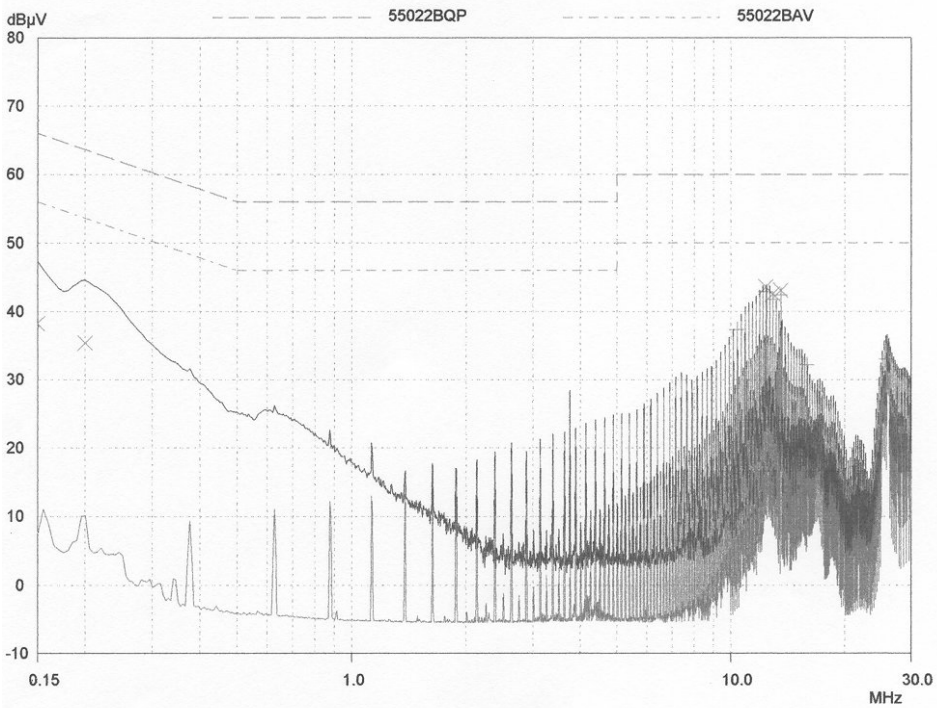
Powerline Conduction

25 Apr 2003 09:38

150kHz - 30MHz

EUT: S813 finger print reader  
 Manuf: Group 4  
 Op Cond: LISN UH5, UH21  
 Operator: John Charters  
 Test Spec: FCC part 15.207  
 Comment: Live  
 Powered Via PSU 110V

Scan Settings (1 Range)				Receiver Settings				
Frequencies		Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
Start	Stop	5kHz	10kHz	PK+AV	50msec	Auto	OFF	60dB
150kHz	30MHz							
Transducer	No.	Start	Stop	Name				
	1	150kHz	30MHz	UH21				
Final Measurement:		Detectors:	X QP / + AV					
		Meas Time:	2sec					
		Subranges:	25					
		Acc Margin:	20 dB					



Powerline Conduction

25 Apr 2003 09:20

150kHz - 30MHz

EUT: S813 finger print reader  
 Manuf: Group 4  
 Op Cond: LISN UH5, UH21  
 Operator: John Charters  
 Test Spec: FCC part 15.207  
 Comment: Neutral  
 Powered Via PSU 110V

Scan Settings				Receiver Settings					
(1 Range) Frequencies									
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						

