



TEST REPORT NO: RU1083/5150

COPY NO: 2

ISSUE NO: 1

FCC ID: OE5S841

**REPORT ON THE CERTIFICATION TESTING OF A
GROUP 4 TECHNOLOGY Ltd.
S841
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.225
INTENTIONAL RADIATOR SPECIFICATION**

TEST DATE: 18th – 28th NOVEMBER 2003

TESTED BY: _____ J CHARTERS

APPROVED BY: _____ P GREEN
EMC PRODUCT
MANAGER

DATE: 5th January 2004

Distribution:

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

THIS DOCUMENT MAY BE REPRODUCED ONLY IN ITS ENTIRETY AND WITHOUT CHANGE

TRL COMPLIANCE SERVICES LTD EMC DIVISION

MOSS VIEW NIPE LANE UP HOLLAND WEST LANCASHIRE WN8 9PY UNITED KINGDOM
TELEPHONE +44 (0)1695 556666 FAX +44 (0)1695 557077
E-MAIL test@trl-emc.co.uk www.trlcompliance.com



FS 21805



0728

CONTENTS

	PAGE
CERTIFICATE OF CONFORMITY & COMPLIANCE	3
APPLICANT'S SUMMARY	4
EQUIPMENT TEST CONDITIONS	5
TESTS REQUIRED	5
TEST RESULTS	6-14

ANNEX

PHOTOGRAPHS	A
PHOTOGRAPH No. 1: Test setup	
PHOTOGRAPH No. 2: Transmitter front view	
PHOTOGRAPH No. 3: Transmitter rear view	
PHOTOGRAPH No. 4: Transmitter PCB track side	
PHOTOGRAPH No. 5: Transmitter PCB component side	
PHOTOGRAPH No. 6: Antenna PCB component side	
PHOTOGRAPH No. 7: Antenna PCB track side	
PHOTOGRAPH No. 8: Test setup	
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST	B
BAND OCCUPANCY PLOT	C
SCAN DATA	D

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:	OE5S841
PURPOSE OF TEST:	Certification
TEST SPECIFICATION:	FCC RULES CFR 47, Part 15.225
TEST RESULT:	Compliant to Specification
EQUIPMENT UNDER TEST:	S841
EQUIPMENT SERIAL No:	03433867301
ITU: EMISSION CODE:	12K0A1D
EQUIPMENT TYPE:	S841 Tag reader
PRODUCT USE:	Access and control
CARRIER EMISSION:	11.09 µV/m @ 30m
ANTENNA TYPE:	Integral
ALTERNATIVE ANTENNA:	Not applicable
BAND OF OPERATION:	13.553MHz –13.567MHz
CHANNEL SPACING:	N/A wideband
NUMBER OF CHANNELS:	1
FREQUENCY GENERATION:	SAW Resonator <input type="checkbox"/> Crystal <input checked="" type="checkbox"/> Synthesiser <input type="checkbox"/>
MODULATION METHOD:	Amplitude <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Angle <input type="checkbox"/>
POWER SOURCE(s):	12Vdc
TEST DATE(s):	18 th – 28 th NOVEMBER 2003
ORDER No(s):	PRP10115
APPLICANT:	GROUP 4 TECHNOLOGY Ltd.
ADDRESS:	Challenge House Northway Lane Tewkesbury Gloucester GL19 4QH

TESTED BY: J CHARTERS

APPROVED BY: _____ P GREEN
EMC PRODUCT
MANAGER

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT): S841

EQUIPMENT TYPE: S841 Tag reader

SERIAL NUMBER OF EUT: 03433867301

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): PRP10115

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

E-mail address: Eric.porter@g4tech.co.uk

APPLICANT: GROUP 4 TECHNOLOGY Ltd.

ADDRESS: Challenge House
Northway Lane
Tewkesbury
Gloucester
GL19 4QH

TEL: +44 (0) 1684 850997

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) 18th - 28th NOVEMBER 2003

TEST REPORT No: RU1083/5150

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:	15.225	Quasi 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:	N/A	-	No
	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 (T_{nom}) 12°C

6. Supply Voltages: V_{nom} 12Vdc

Note: V_{nom} voltages are as stated above unless otherwise shown on the test report page

8. Equipment Category: Single channel Two channel Multi-channel

9. Channel spacing: Narrowband Wideband

TRANSMITTER TESTS

TRANSMITTER SPURIOUS EMISSIONS – RADIATED – PART 15.209

Ambient temperature	=	12°C(<1GHz)	10m measurements <30MHz	[X]
Relative humidity	=	60% (<1GHz),	3m measurements >1GHz	[X]
Conditions	=	Open Area Test Site (OATS)	10m extrapolated from 30m	[X]
Supply voltage	=	12Vdc		
Channel number	=	1		

	FREQ. (MHz)	MEAS. Rx. (dB μ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	FIELD STRENGTH (dB μ V/m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (μ V/m)	LIMIT (μ V/m)
1.705MHz - 30MHz	27.12	22.4	-	-	22.4	19.08	1.5	30
30MHz - 88MHz	40.69 54.25 67.81	15.1 7.3 6.75	0.6 0.6 0.6	12.7 6.4 5.05	28.4 14.3 12.4	- - -	26.3 5.18 4.16	100 100 100
88MHz - 216MHz						-		
216MHz - 960MHz						-		
960MHz - 1GHz						-		
1GHz - 5GHz						-		
Limits	1.705MHz to 30MHz			30 μ V/m @ 30m				
	30MHz to 88MHz			100 μ V/m @ 3m				
	88MHz to 216MHz			150 μ V/m @ 3m				
	216MHz to 960MHz			200 μ V/m @ 3m				
	960MHz to 1GHz			500 μ V/m @ 3m				
	1GHz to 5GHz			500 μ V/m @ 3m				

See next page for the notes and test methods:

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 20db's below the limit were not necessarily recorded.
- 10 For emission 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 30 MHz 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	X
HORN ANTENNA	EMCO	3115	9010-3580	138	
HORN ANTENNA	EMCO	3115	9010-3581	139	
SPECTRUM ANALYSER	TEKTRONIX	2756P	B010109	164	
BICONIC ANTENNA	CHASE	BBA9106	N/A	193	
ANTENNA, LOG PERIODIC 300MHz – 1GHz	CHASE	UPA6108	1061	203	
RECEIVER	ROHDE & SCHWARZ	ESHS20	837960/003	237	
ANTENNA, BICONIC 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	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 15.225

Ambient temperature	= 12°C(<1GHz),	3m measurements @ fc	[X]
Relative humidity	= 60%(<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]

FREQ. (MHz)	MEASUREMENT DISTANCE Meters	MEASUREMENT Rx. READING (dB μ V/m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (μ V/m)
13.56	3	52.8	31.88	11.09
13.56	10	40.0	19.08	11.09
Limit value @ fc		10,000(μ V/m)		
Band occupancy @ -20dBc		f lower	f higher	
		13.5312MHz	13.5956MHz	

See spectrum analyser plot – Annex C

Notes:

- 1 Results quoted are extrapolated as indicated.
- 2 The 3m-10m extrapolation factor is 12.8dB calculated from the results above. Extrapolation factor 10-30m is 19.08dB using the extrapolation factor of 40dB/decade as per 15.331(f).
- 3 Receiver detector @ fc = Quasi Peak 120kHz bandwidth.
- 4 When battery powered the EUT was powered with new batteries.
- 5 For emission 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.
- 6 The results quoted are the maximum seen after the supply voltage was varied between 85% and 115%.
- 7 For emission below 30 MHz 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	
BICONIC ANTENNA	CHASE	BBA9106	N/A	193	
ANTENNA, LOG PERIODIC 300MHz – 1GHz	CHASE	UPA6108	1061	203	
RECEIVER	ROHDE & SCHWARZ	ESHS20	837960/003	237	
ANTENNA, BICONIC 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	X

TRANSMITTER TESTS

TRANSMITTER EMISSIONS – FREQUENCY TOLERANCE Part 15.225 (c)

Ambient temperature = 20°C Fc @ Vnom Thnom = 13.56320MHz
Relative humidity = 60%

TEMPERATURE	VOLTAGE	FREQUENCY MHz	DEVIATION kHz	LIMIT kHz
-20°C	12.0	13.56340	0.2	±1.356
+50°C	12.0	13.56316	-0.04	±1.356

TEMPERATURE	VOLTAGE	FREQUENCY MHz	DEVIATION kHz	LIMIT kHz
+20°C	13.8	13.56340	0.2	±1.356
+20°C	10.2	13.56350	0.3	±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	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

TRANSMITTER TESTS

TRANSMITTER CONDUCTED EMISSIONS – AC POWER LINE Part 15.207

Ambient temperature = 20°C(<1GHz),
Relative humidity = 60%(<1GHz),
Conditions = Power Line Laboratory
Supply voltage = 110V AC
Supply Frequency = 60Hz

SIGNIFICANT EMISSIONS

FREQUENCY (MHz)	MEASUREMENT RECEIVER READING (dB μ V)	DETECTOR	CONDUCTOR (L or N)	LIMIT (dB μ V)
0.15	42.48	QP	L	66.00
0.2	37.40	QP	L	63.61
13.56	55.65	QP	L	60.00

Notes:

- 1 See attached plot
- 2 Scans were performed on both live and neutral line. Worst case emissions are reported in the table above.
- 3 Emissions 10dB's below the limit were not necessarily recorded.

Test Method:

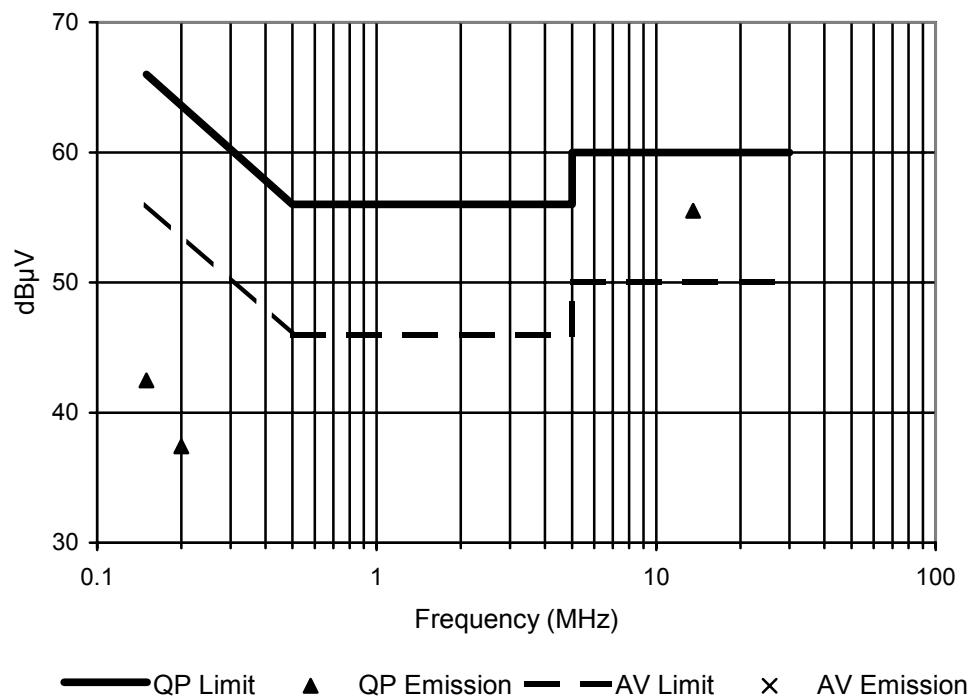
- 1 As per Radio – Noise Emissions, ANSI C63.4: 1992

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	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

Part 15.207



ANNEX A
PHOTOGRAPHS

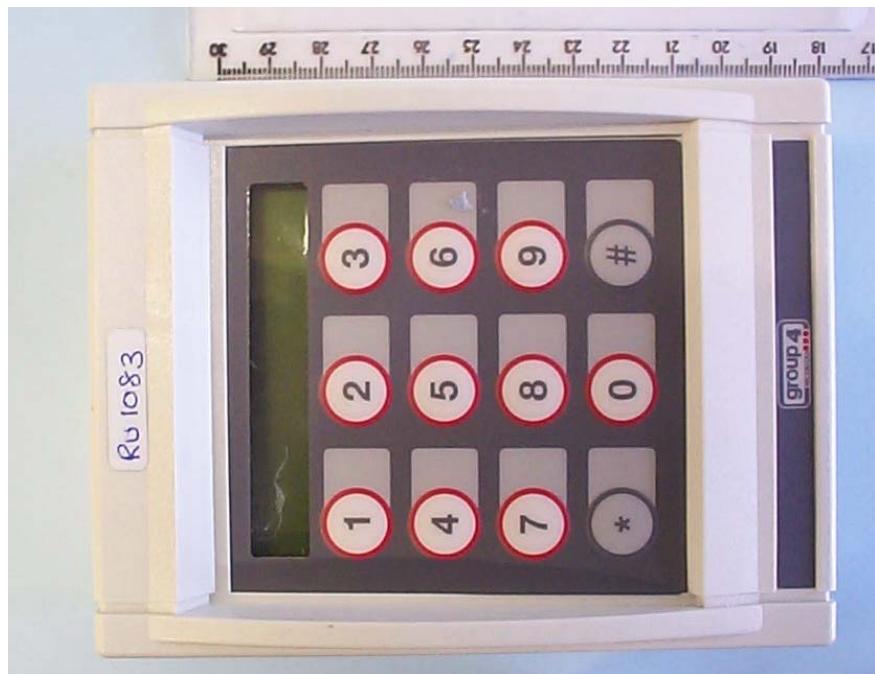
PHOTOGRAPH No. 1

TEST SETUP



PHOTOGRAPH No. 2

TRANSMITTER FRONT VIEW



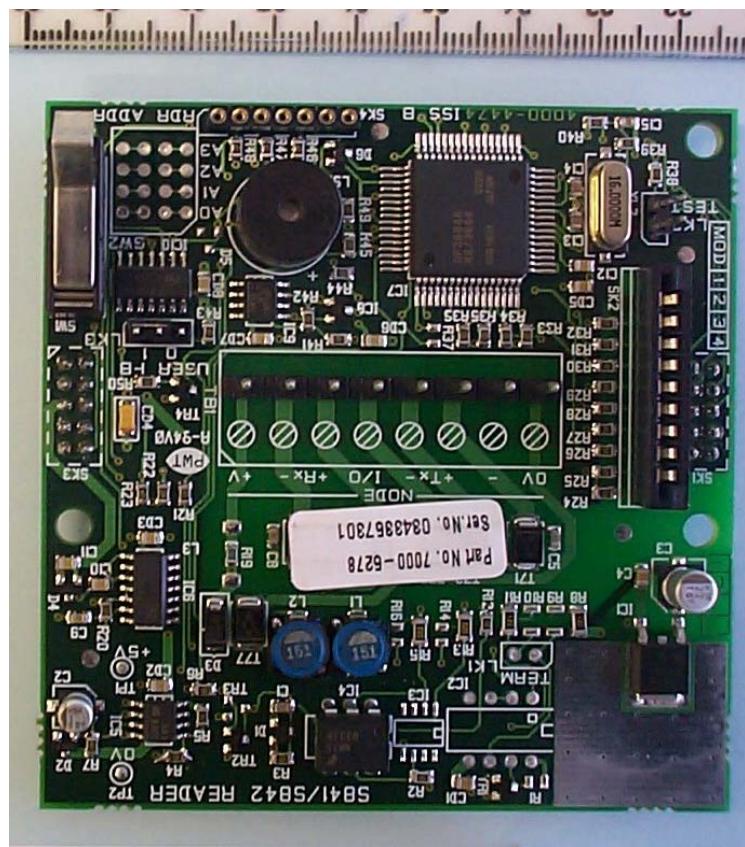
PHOTOGRAPH No. 3

TRANSMITTER REAR VIEW



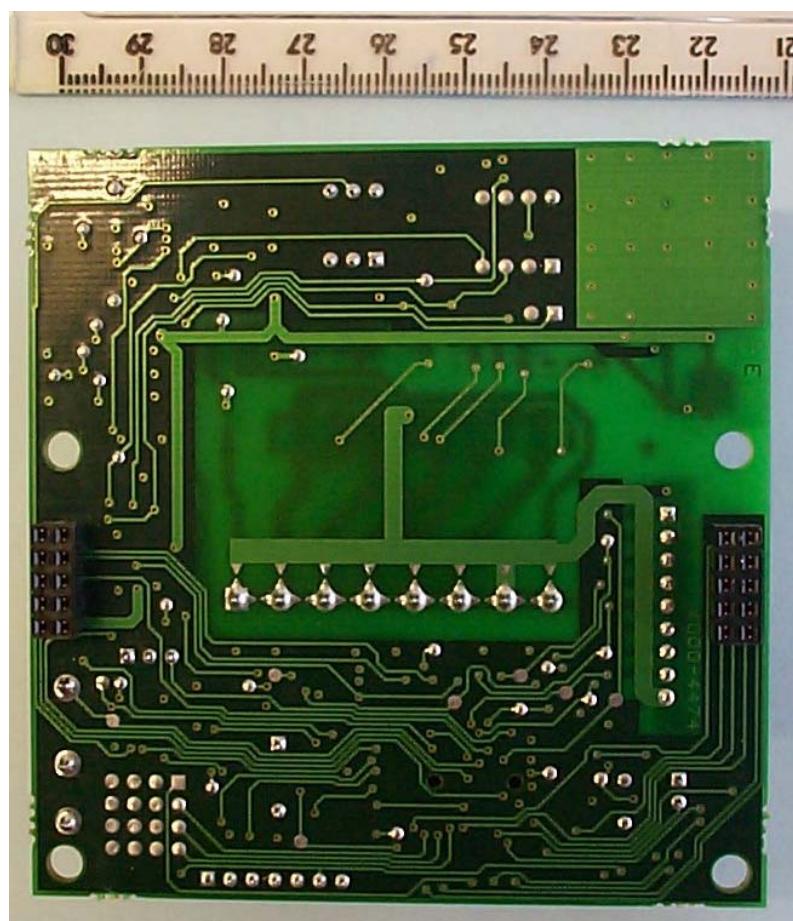
PHOTOGRAPH No. 4

TRANSMITTER PCB FRONT



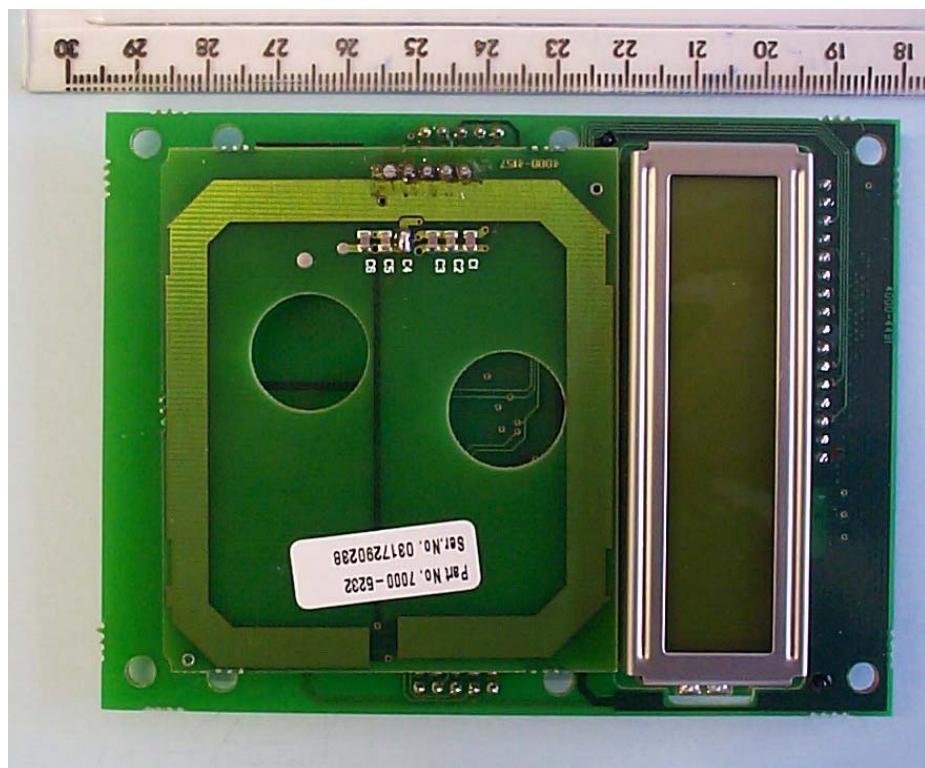
PHOTOGRAPH No. 5

TRANSMITTER PCB BACK



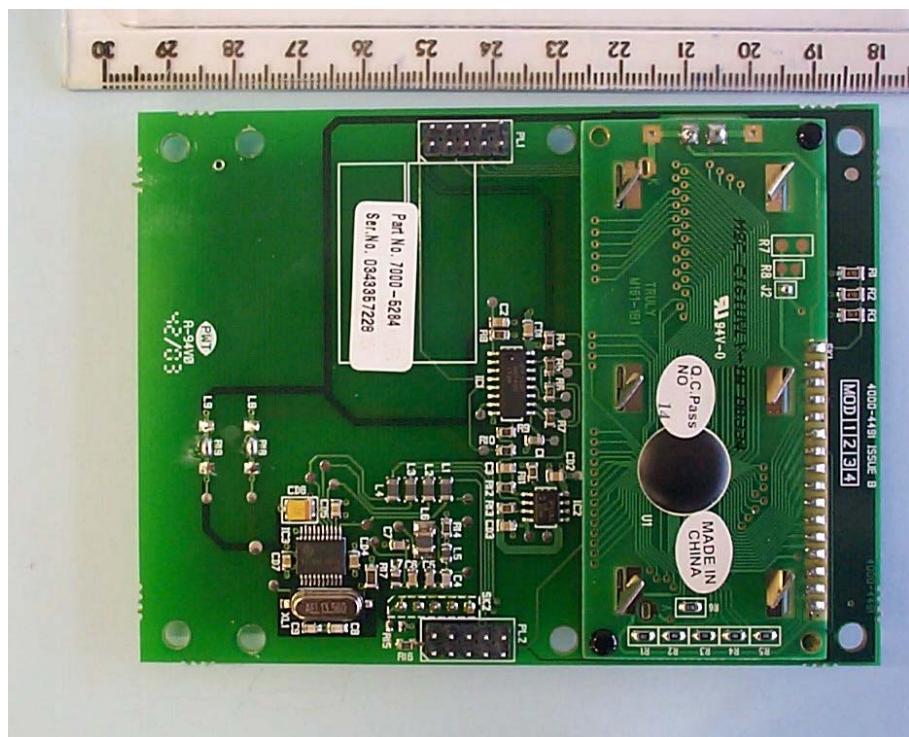
PHOTOGRAPH No. 6

ANTENNA PCB COMPONENT SIDE



PHOTOGRAPH No. 7

ANTENNA PCB TRACK SIDE



PHOTOGRAPH No. 8

TEST SETUP



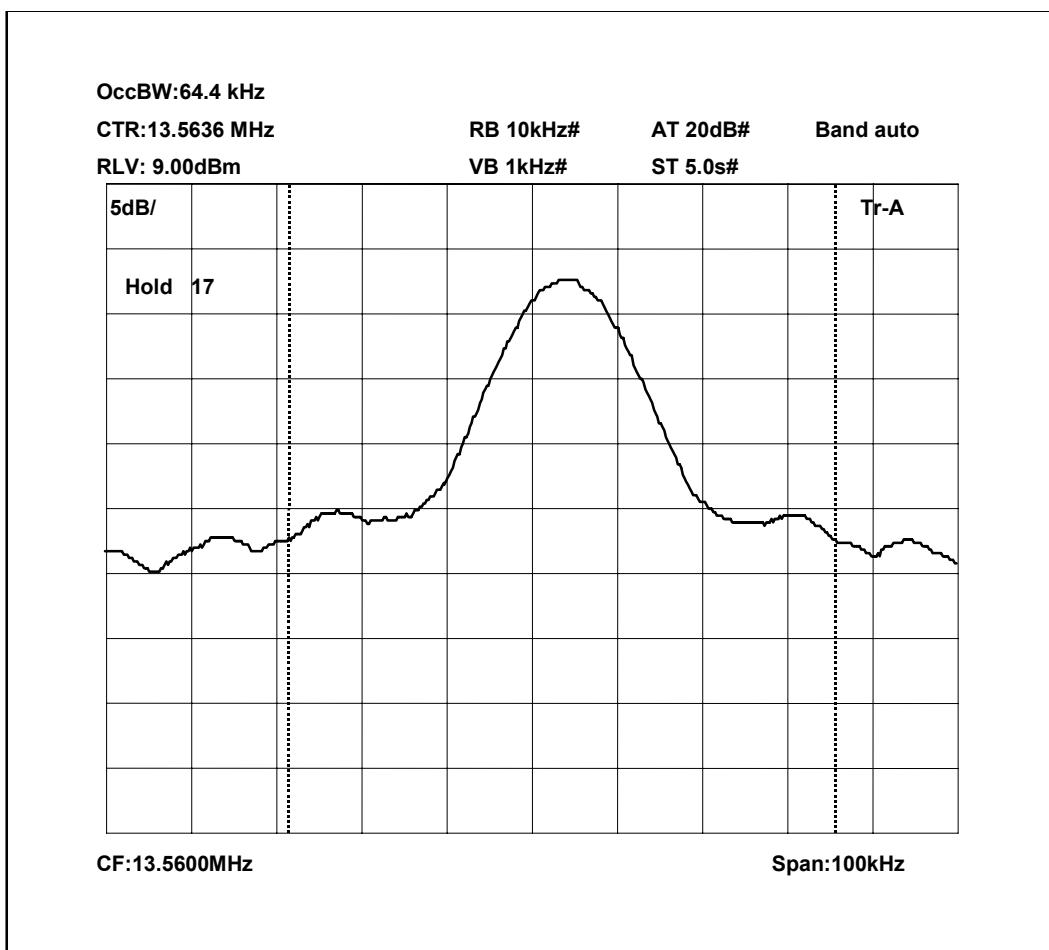
ANNEX B
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

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	[]
		-	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]

ANNEX C
BANDWIDTH PLOT

BANDWIDTH PLOT



ANNEX D

SCAN DATA

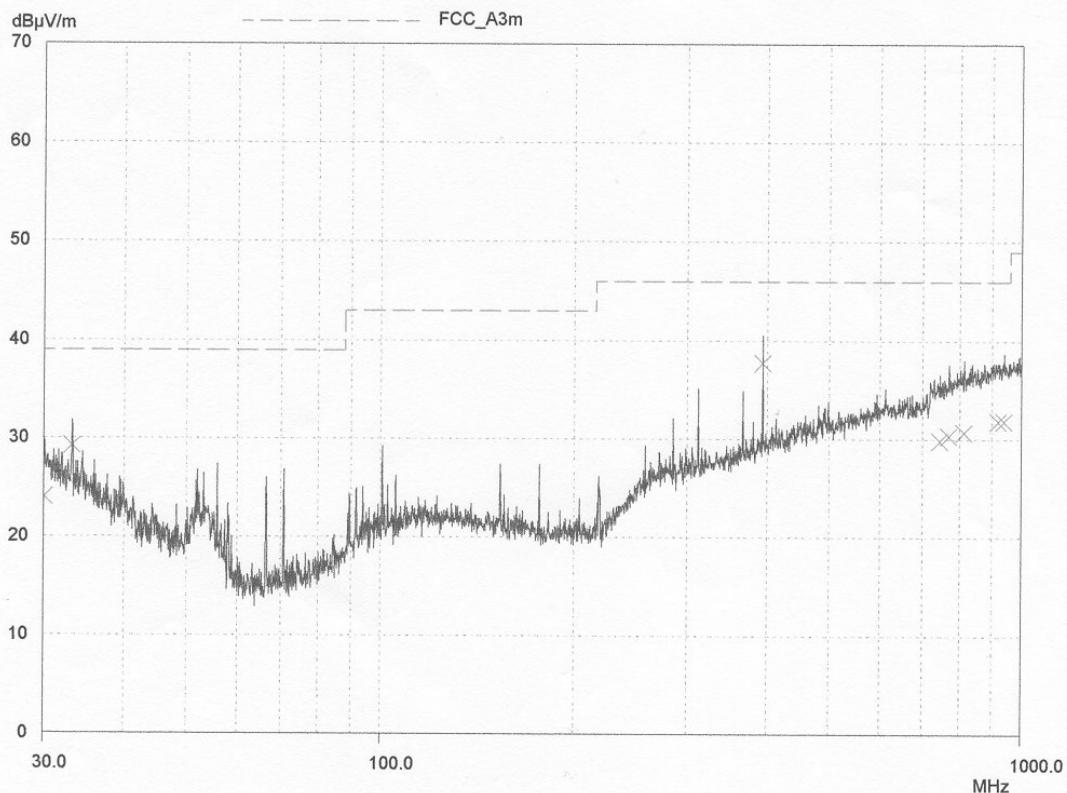
TRL Compliance Services Ltd

17 Nov 2003 10:41

E-Field Radiation

EUT: S841, RU1083
 Manuf: Group 4
 Op Cond: 3m Indoor Prescan
 Operator: J Charters
 Test Spec: CFR47 FCC part 15.109 (Class B)
 Comment: Operating at 110V AC

Scan Settings		(1 Range)				Receiver Settings				
		Frequencies		Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
Start	Stop	30MHz	1000MHz	50kHz	120kHz	PK	1msec	Auto	ON	60dB
Transducer	No.	Start	Stop			Name				
1	15	30MHz	1000MHz			TRLUH72				
	21	30MHz	1000MHz			CBL6112B				
Final Measurement:		Detector:	X QP							
		Meas Time:	2sec							
		Subranges:	50							
		Acc Margin:	10 dB							



Powerline Conduction

17 Nov 2003 11:39

150kHz - 30MHz

EUT: S841, RU1083
 Manuf: Group 4
 Op Cond: LISN UH5, UH21
 Operator: J. Charters
 Test Spec: EN55022 Class B (or Variant)
 Comment: Neutral line, 110V AC

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

