



TEST REPORT NO: RU1094/5213
COPY NO: 2
ISSUE NO: 1
FCC ID: OE5S840

**REPORT ON THE CERTIFICATION TESTING OF A
Group 4 Technology Limited
S840
WITH RESPECT TO
THE FCC RULES CFR 47,
PART 15.209
INTENTIONAL RADIATOR SPECIFICATION**

TEST DATE: 18th – 19th December 2003

TESTED BY: _____ J CHARTERS
APPROVED BY: _____ P GREEN
PRODUCT MANAGER
DATE: 3rd February 2004

Distribution:

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

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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: OE5S840
PURPOSE OF TEST: Certification
TEST SPECIFICATION: FCC RULES CFR 47, Part 15.209
TEST RESULT: Compliant to Specification
EQUIPMENT UNDER TEST: S840
EQUIPMENT SERIAL No: 0348369709
ITU: EMISSION CODE: 17k0F1D
PRODUCT USE: Access/control
CARRIER EMISSION: 3.6µV/m @ 300m
ANTENNA TYPE: Integral
ALTERNATIVE ANTENNA: Not applicable
BAND OF OPERATION: 0.009kHz – 0.490kHz
CHANNEL SPACING: Wideband
NUMBER OF CHANNELS: 1
FREQUENCY GENERATION: SAW Resonator [] Crystal [X] Synthesiser []
MODULATION METHOD: Amplitude [] Digital [X] Angle []
POWER SOURCE(s): +12Vdc
TEST DATE(s): 18th - 19th December 2003
ORDER No(s): R000016295
APPLICANT: Group 4 Technology Limited
ADDRESS: Challenge House
Northway Lane
Tewkesbury
Gloucester
GL20 8JG

TESTED BY: ----- J CHARTERS

APPROVED BY: ----- P GREEN
PRODUCT
MANAGER

EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.	TEST/EXAMINATION	RULE PART	DETECTOR	APPLICABILITY
	Intentional Emission Frequency:	15.209	Average	Yes
	Intentional Emission Field Strength:	15.209	Average	Yes
	Intentional Emission Band Occupancy:	15.215(c)	Peak	Yes
	Intentional Emission ERP (mW):	-	-	No
	Spurious Emissions – Conducted:	15.207	Quasi Peak Average	Yes
	Spurious Emissions – Radiated <1000MHz:	15.209	Quasi Peak Average	Yes
	Spurious Emissions – Radiated >1000MHz:		Average	No
	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 Use: Security/Access control
3. Emission Designator: 17k0F1D
4. Duty Cycle: <100%
5. Temperatures: Ambient (Tnom) 11°C
6. Supply Voltages: Vnom 12Vdc
- 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 = 14°C(<1GHz) 3m measurements <30MHz [X]
 Relative humidity = 56% (<1GHz), 3m measurements <1GHz [X]
 Conditions = Open Area Test Site (OATS) 300m extrapolated from 3m [X]
 Supply voltage = 12Vdc
 Channel number = 1

	FREQ. (MHz)	MEAS. Rx. (dBµV)	CABLE LOSS (dB)	ANT FACT (dB/m)	FIELD STRENGTH (dBµV/m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (µV/m)	LIMIT (µV/m)
0.009MHz - 0.490MHz	0.375	-	-	-	52.2	80 (see note 4)	0.04	6.4
0.490MHz - 1.705MHz	0.625	-	-	-	42.6	40 (see note 5)	1.3	38.4
1.705MHz - 30.0MHz								
30MHz - 88MHz	32.0	16.9	0.6	16.9	34.4	-	52.4	100
	33.9	17.9	0.6	16.0	34.5	-	53.0	100
	35.1	18.7	0.6	15.2	34.5	-	53.0	100
	38.75	18.4	0.7	13.9	33.0	-	44.6	100
	43.55	22.3	0.7	11.2	34.2	-	51.2	100
	46.05	16.7	0.7	9.4	26.8	-	21.8	100
	51.1	11.9	0.8	7.4	20.1	-	10.1	100
64.0	13.25	0.85	5.0	19.1	-	9.0	100	
88MHz - 216MHz	139.4	4.2	1.3	10.5	16.0	-	6.3	150
	140.7	19.1	1.4	10.5	31.0	-	35.5	150
	160.0	7.4	1.5	9.6	18.5	-	8.4	150
	167.9	7.2	1.5	9.1	17.8	-	7.7	150
	174.2	12.8	1.5	9.8	24.1	-	16.0	150
216MHz - 960MHz								
960MHz - 1GHz								
1GHz - 5GHz								
Limits	0.009MHz – 0.49MHz			2400/F (kHz) @300m				
	0.490MHz – 1.705MHz			24000/F (kHz) @ 30m				
	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 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 80dB from 3m to 300m as per Part 15.31f
- 5 Extrapolation factor 40dB from 3m to 30m as per Part 15.31f
- 6 Measurements >1GHz @ 1m as per Part 15.31f(1)
- 7 Receiver detector 9kHz – 30MHz CISPR, Quasi-Peak, 10kHz bandwidth.
Apart from the bands 9kHz-90kHz and 110kHz-490kHz where an Average detector is used.
- 8 Receiver detector 30MHz<1GHz = CISPR, Quasi-Peak, 120kHz bandwidth
- 9 Receiver detector >1GHz = Peak Hold, 1MHz resolution bandwidth
- 10 New batteries used for battery powered products.
- 11 Emissions 20dB's below the limit are not necessarily recorded.
- 12 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.
- 13 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 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	
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	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 15.209

Ambient temperature	=	12°C(<1GHz),	3m measurements @ fc	[X]
Relative humidity	=	64%(<1GHz),	10m measurements @ fc	[X]
Conditions	=	Open Area Test Site (OATS)	30m measurements @ fc	[]
Supply voltage	=	+12Vdc	300m extrapolated from 3m	[X]
Channel number	=	1	300m extrapolated from 10m	[X]

FREQ. (kHz)	MEASUREMENT DISTANCE (Metres)	MEASUREMENT Rx. READING (dBµV/m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (µV/m)
125.48	3	90.4	80	3.3
125.48	10	70.4	59.08	3.6
Limit value @ fc		19.2(µV/m) @ 300m		
Band occupancy @ -20dBc		f lower		f higher
		109.00kHz		142.00kHz

See spectrum analyser plot – Annex C

Notes:

- 1 Results quoted are extrapolated as indicated
- 2 Receiver detector @ fc = Average 10kHz bandwidth, measurement time = 100ms
- 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.
- 6 Peak emissions were found to be less than or equal to the average emission therefore deemed to comply with 15.35(b). See scan data Annex E
- 7 The test results quoted are the maximum seen after the supply voltage was varied between 85% and 115% of Vnom.

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 orthogonal planes.
Maximum results recorded

The test equipment used for the Transmitter Intentional Emission – 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	
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 CONDUCTED EMISSIONS – AC POWER LINE Part 15.207

Ambient temperature = 20°C(<1GHz),
 Relative humidity = 64%(<1GHz),
 Conditions = Power Line Laboratory
 Supply voltage = 110V AC
 Supply Frequency = 60Hz

SIGNIFICANT EMISSIONS

FREQUENCY (MHz)	MEASUREMENT RECEIVER READING (dBµV)	DETECTOR (dB)	CONDUCTOR (L or N)	LIMIT (dBµV)
15.685	32.62	Average	Neutral	50.0
16.69	37.80	Average	Neutral	50.0
29.74	32.44	Average	Neutral	50.0

Notes:

- 1 See attached plot Annex D
- 2 Measurements were taken both live & neutral lines, worst case levels are recorded in the table.

Test Method:

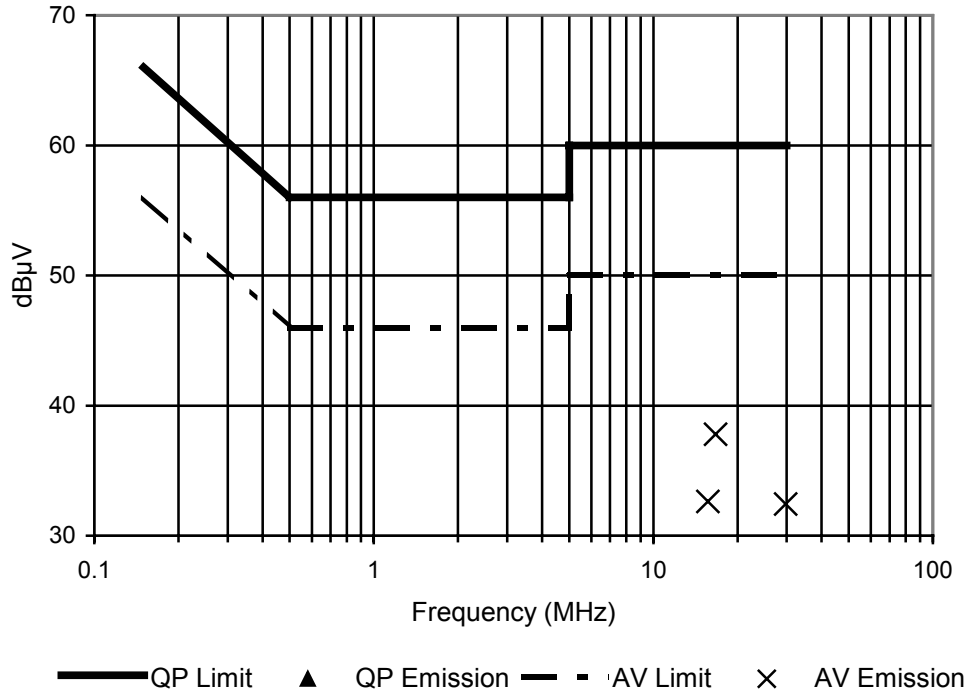
- 1 As per Radio – Noise Emissions, ANSI C63.4: 2001

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

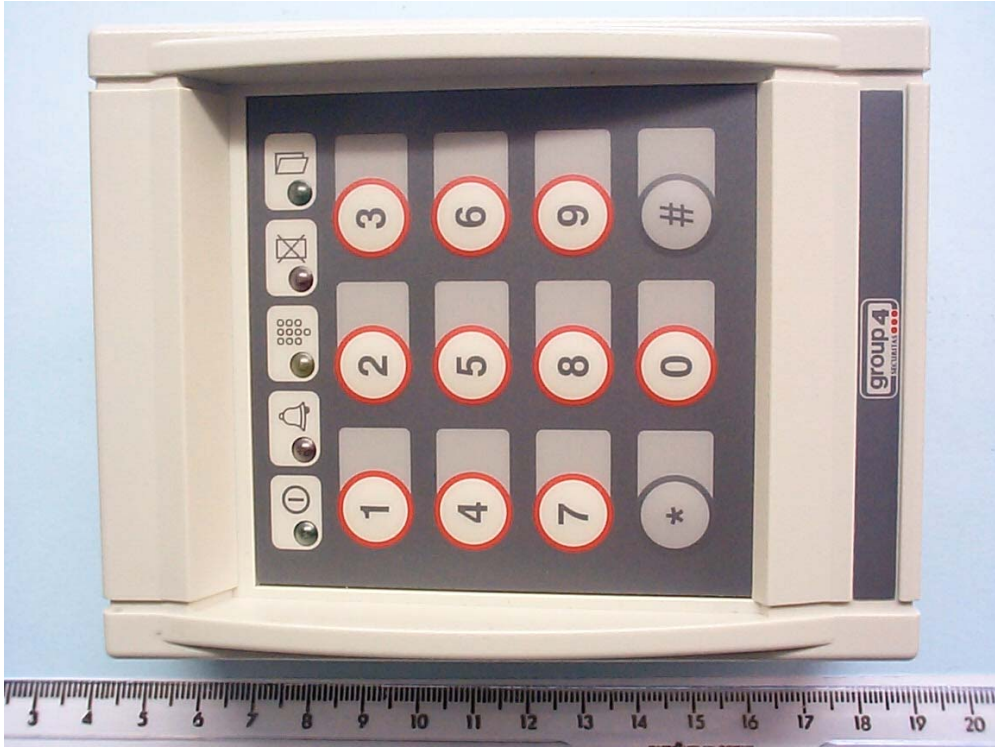
PHOTOGRAPH No. 1

TEST SETUP



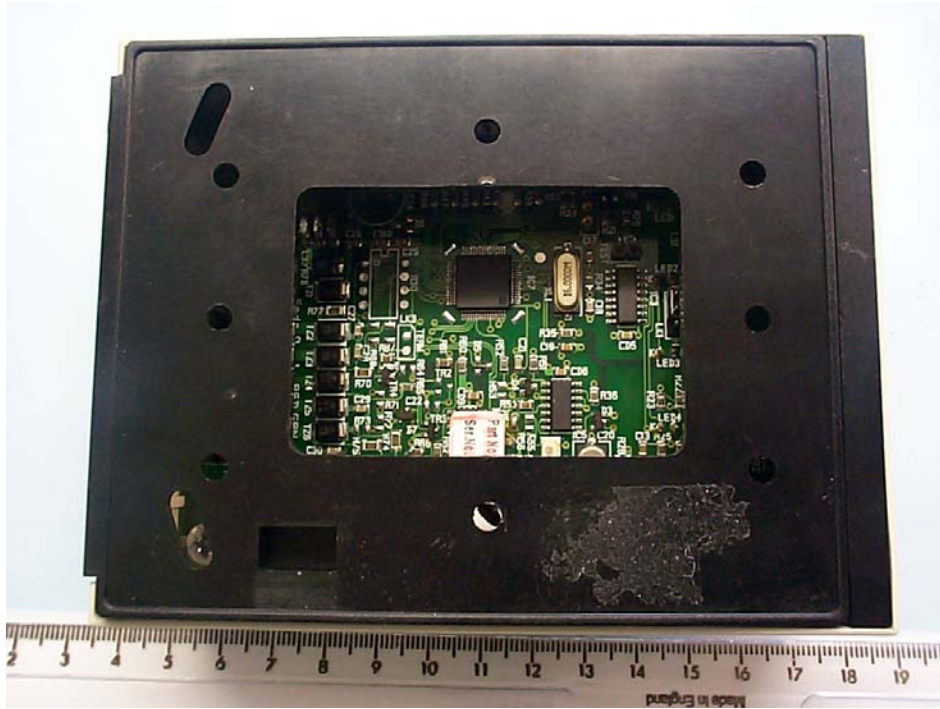
PHOTOGRAPH No. 2

TRANSMITTER FRONT VIEW



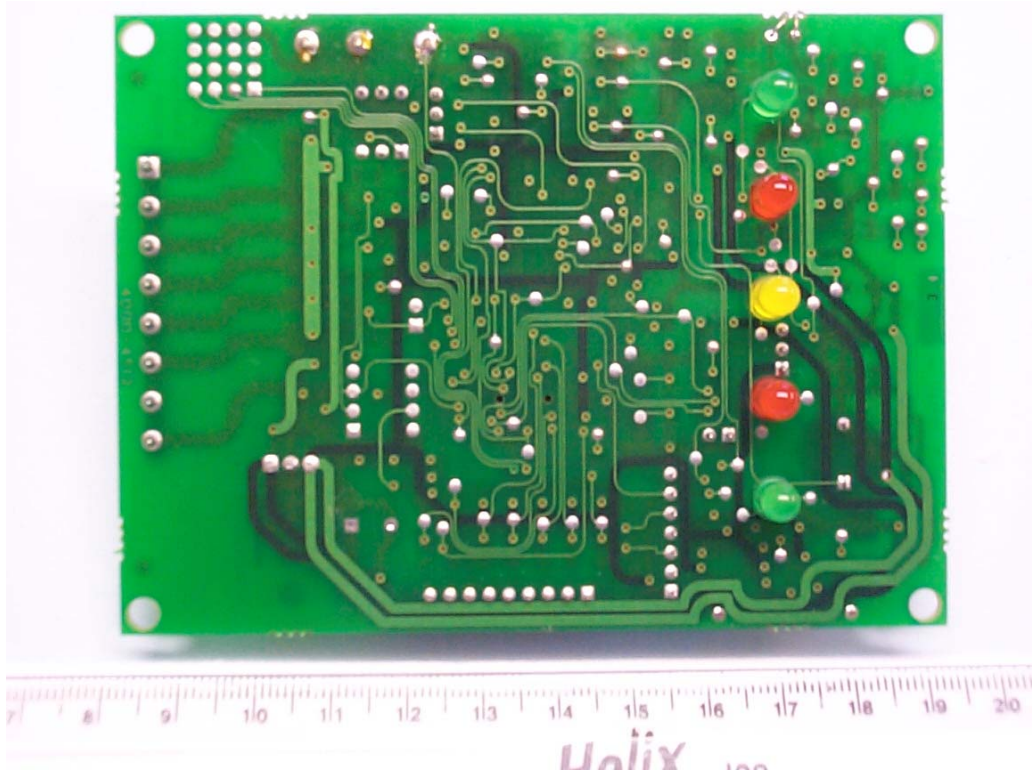
PHOTOGRAPH No. 3

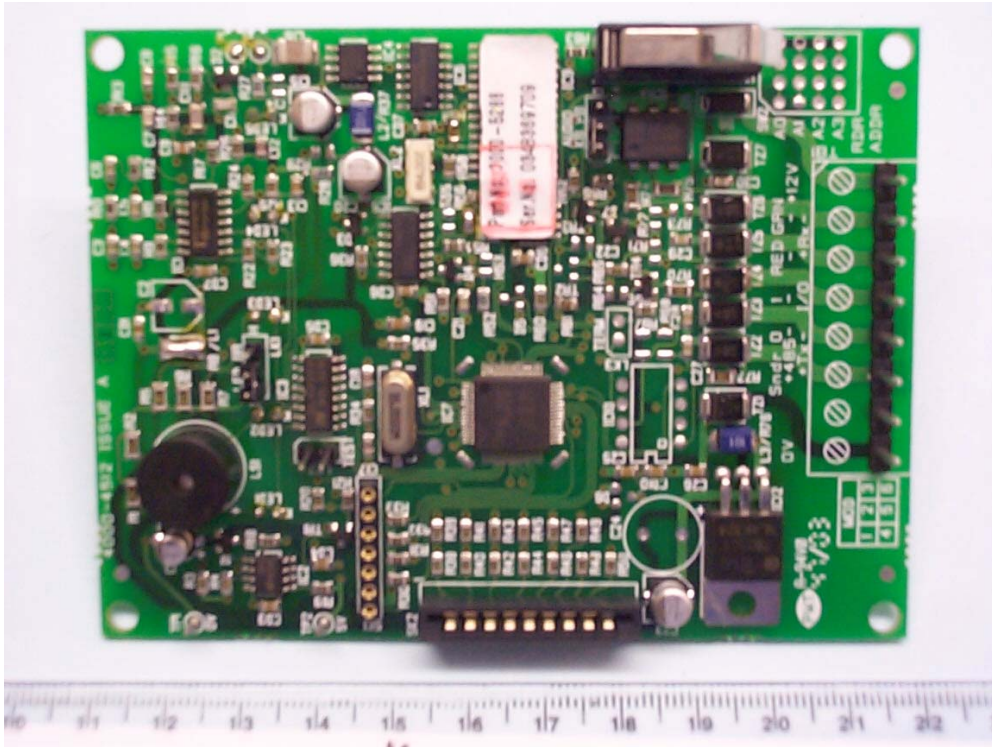
TRANSMITTER REAR VIEW



PHOTOGRAPH No. 4

TRANSMITTER PCB TRACK SIDE





PHOTOGRAPH No. 6

ANTENNA



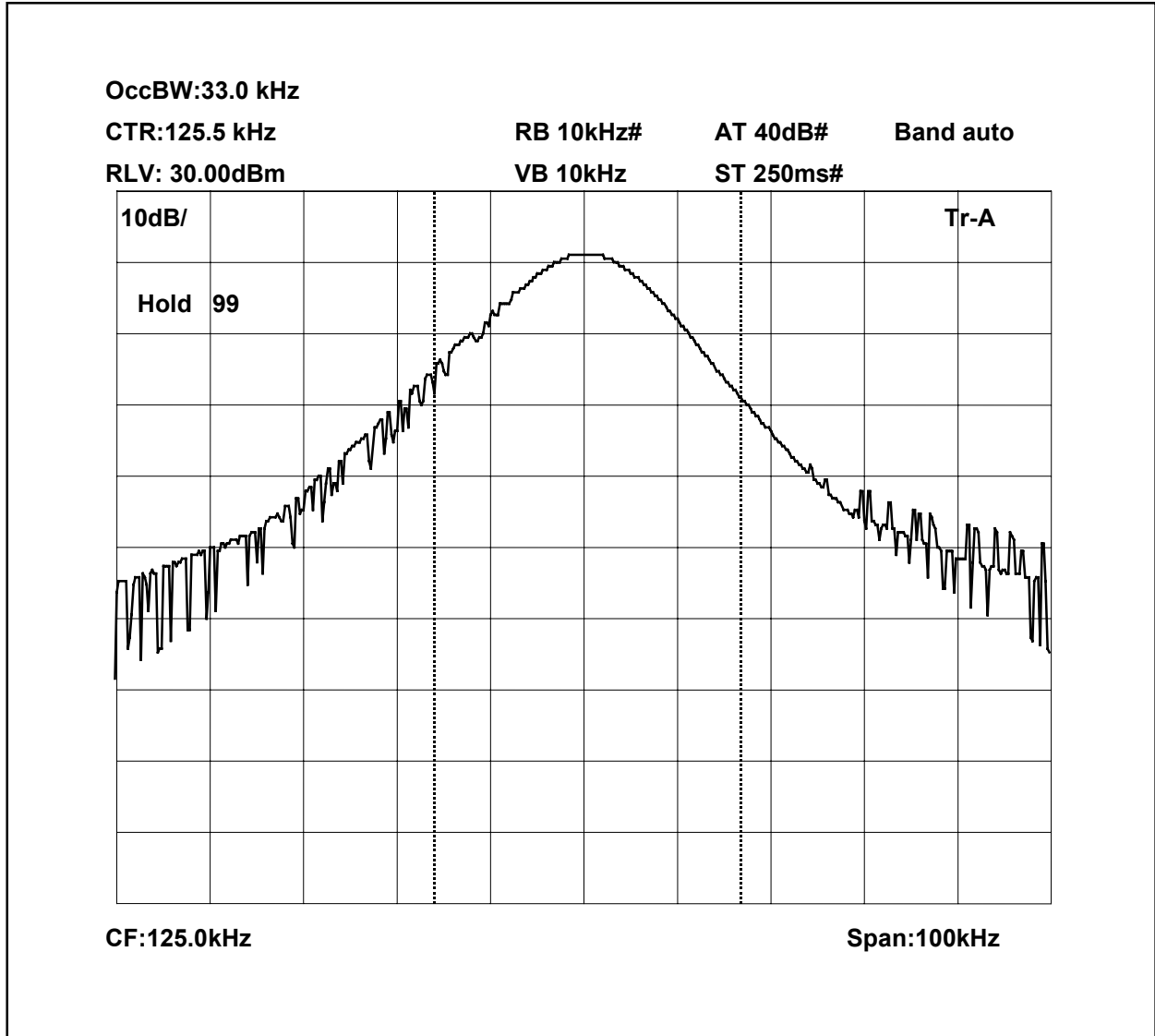
ANNEX B
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

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 checked="" type="checkbox"/>
d.	ALTERNATIVE TRADE NAME DECLARATION(s)	-		<input type="checkbox"/>
e.	LABELLING	-	PHOTOGRAPHS	<input type="checkbox"/>
		-	DECLARATION	<input checked="" type="checkbox"/>
		-	DRAWINGS	<input 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



Occupied Bandwidth = 33.0kHz
 Fl = 109.00kHz
 Fh = 142.00kHz

ANNEX D
CONDUCTED EMISSIONS PLOTS

Powerline Conduction

18 Dec 2003 09:16

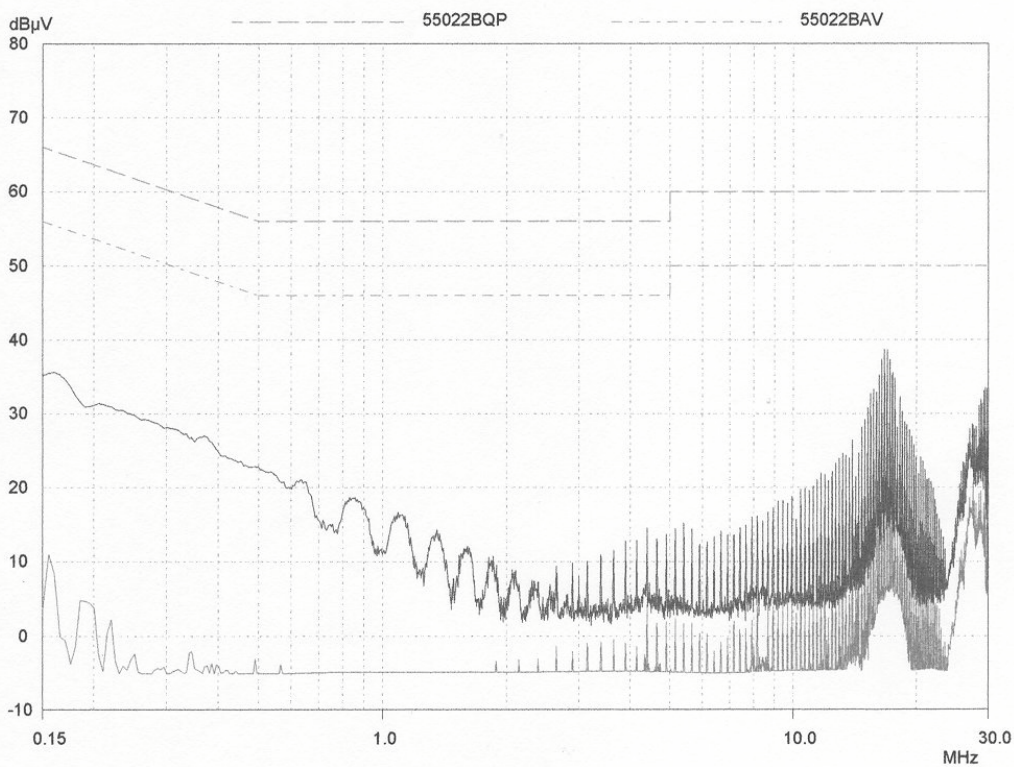
150kHz - 30MHz

EUT: S840
 Manuf: Group 4
 Op Cond: LISN UH5, UH21
 Operator: J Charters
 Test Spec: EN55022 Class B (or Variant)
 Comment: FCC part 15
 110VAC

Scan Settings			(1 Range)		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

Prescan Measurement: Detectors: X PK / + AV
 Meas Time: see scan settings
 Subranges: 25
 Acc Margin: 20 dB



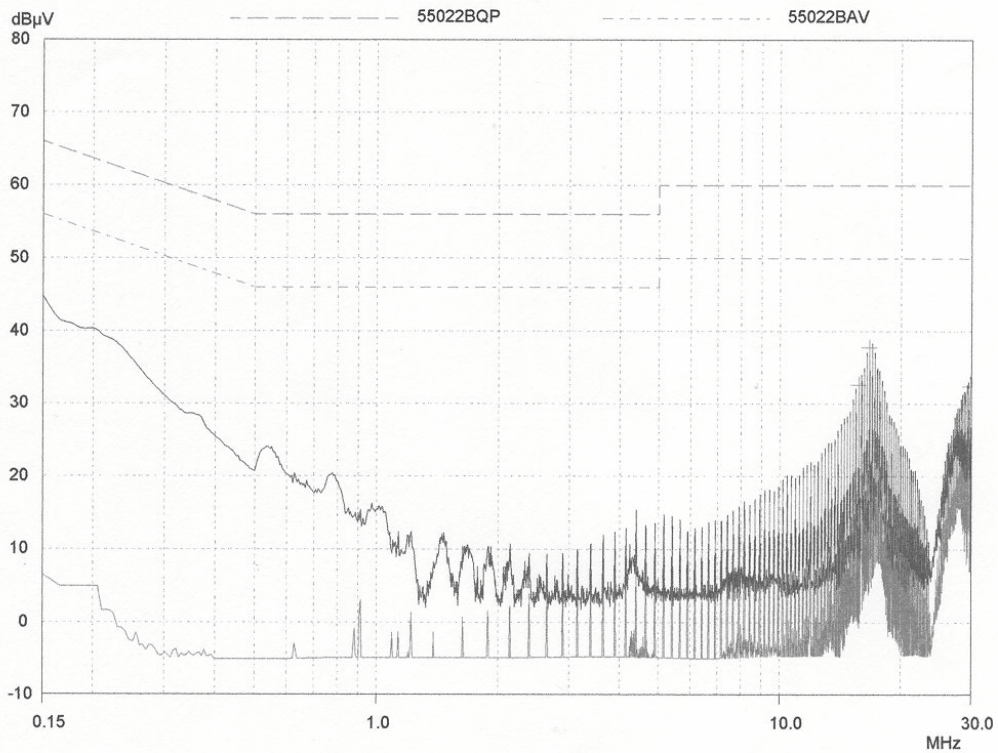
Powerline Conduction

18 Dec 2003 09:49

150kHz - 30MHz

EUT: S840
 Manuf: Group 4
 Op Cond: LISN UH5, UH21
 Operator: J Charters
 Test Spec: EN55022 Class B (or Variant)
 Comment: FCC part 15
 110VAC neutral

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					
Prescan Measurement:		Detectors:		X PK / + AV					
		Meas Time:		see scan settings					
		Subranges:		25					
		Acc Margin:		20 dB					



ANNEX E
9kHz – 30MHz SCAN PLOT

TRL COMPLIANCE

29 Jan 2004 15:54

H FIELD

EUT: S840
Manuf: Group 4
Op Cond: Loop ant @ 3m
Operator: J Charters
Test Spec: FCC part15
Comment: TX on

Scan Settings (2 Ranges)			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

Prescan Measurement: Detector: X PK
 Meas Time: see scan settings
 Peaks: 8
 Acc Margin: 25 dB

