



TEST REPORT NO: RU1127/6787
COPY NO: .2.....
ISSUE NO: 1
FCC ID: OE5S853

**REPORT ON THE CERTIFICATION TESTING OF A
GROUP 4 TECHNOLOGY Ltd
S853
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.225
INTENTIONAL RADIATOR SPECIFICATION
ON BEHALF OF
GROUP 4 TECHNOLOGY Ltd**

TEST DATE: 13th – 14th October 2004

TESTED BY: J Charters
APPROVED BY: P Green
Product Manager
DATE: 7th December 2004

Distribution:

- Copy Nos:
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FS 21805



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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: OE5S853
PURPOSE OF TEST: CERTIFICATION
TEST SPECIFICATION: FCC RULES CFR 47, Part 15.225:JULY 2004
TEST RESULT: Compliant to Specification
EQUIPMENT UNDER TEST: S853
EQUIPMENT SERIAL No: 0437468746
ITU EMISSION CODE: 12K0A1D
EQUIPMENT TYPE: RFID Tag reader
PRODUCT USE: RFID
CARRIER EMISSION: 26.18dBµV/m
ANTENNA TYPE: Integral antenna
ALTERNATIVE ANTENNA: Not applicable
FREQUENCY OF OPERATION: 13.6523MHz
CHANNEL SPACING: N/A 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): 13th – 14th October 2004
ORDER No(s): R000020620
APPLICANT: GROUP 4 TECHNOLOGY Ltd
ADDRESS: Challenge House
Northway Lane
Tewesbury
Gloucester
GL20 8JG

TESTED BY: ----- J Charters

APPROVED BY: ----- P Green
Product Manager

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT): S853

EQUIPMENT TYPE: S853

SERIAL NUMBER OF EUT: 0437468746

PURPOSE OF TEST: CERTIFICATION

TEST SPECIFICATION(S): FCC RULES CFR 47, Part 15.225:July 2004

TEST RESULT: COMPLIANT Yes
No

APPLICANT'S CATEGORY: MANUFACTURER
IMPORTER
DISTRIBUTOR
TEST HOUSE
AGENT

APPLICANT'S ORDER No(s): R000020620

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
Tewesbury
Gloucester
GL20 8JG

TEL: 01684 850977

FAX: 01684 294845

MANUFACTURER: GROUP 4 TECHNOLOGY Ltd

EUT(s) COUNTRY OF ORIGIN: United Kingdom

TEST LABORATORY: TRL EMC

UKAS ACCREDITATION No: 0728

TEST DATE(s) 13th – 14th October 2004

TEST REPORT No: RU1127/6787

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:	15.255	Peak	Yes
	Intentional Emission ERP (mW):	-	-	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	-	Yes
	Restricted Bands	15.205	-	Yes
	Extrapolation Factor	15.31(f)	-	Yes

- 2. Product Use: Access/control RFID
- 3. Emission Designator: 12K0A1D
- 4. Duty Cycle: <100%
- 5. Transmitter bit or pulse rate and level: 106kBps
- 6. Temperatures: Ambient (Tnom) 20°C
- 7. Supply Voltages: Vnom +12Vdc

Note: Vnom 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 = 13°C(<1GHz) 3m measurements <1GHz [X]
 Relative humidity = 56% (<1GHz), 10m measurements <30MHz [X]
 Conditions = Open Area Test Site (OATS) 30m extrapolated from 10m [X]
 Supply voltage = 110Vac
 Channel number = 1

	FREQ. (MHz)	MEAS. Rx. (dBµV)	CABLE LOSS (dB)	ANT FACT.	FIELD STRENGTH (dBµV/m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (µV/m)	LIMIT (µV/m)
0.009MHz - 0.490MHz								
0.490MHz - 1.750MHz								
1.705MHz - 30.0MHz	27.124	24.5	-	-	24.5	28.18	0.66	30
30MHz - 88MHz								
88MHz - 216MHz	135.6	28.5	1.2	11.4	41.1	-	113.5	150
	162.75	31.8	1.4	9.7	42.9	-	139.6	150
	189.85	31.5	1.4	8.2	41.1	-	113.5	150
216MHz - 960MHz	217.0	32.6	1.5	8.7	42.8	-	138.03	200
	311.95	27.0	2.2	13.3	42.5	-	133.35	200
960MHz - 1GHz								
1GHz - 5GHz								
Limits	0.009MHz to 0.490MHz		2400/F(kHz) @ 300m					
	0.490MHz to 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 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 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	
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	

TRANSMITTER TESTS

TRANSMITTER INTENTIONAL EMISSION – RADIATED – Part 15.225

Ambient temperature	=	13°C(<1GHz),	3m measurements @ fc	[X]
Relative humidity	=	56%(<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)
13.562	3	54.9	28.18	21.7
13.562	10	45.8	19.08	21.7
Limit value @ fc		15,848(µV/m)		
Band occupancy @ spurious limit value		f lower	f higher	
		13.5490MHz	13.5779MHz	

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 the 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.
- 8 See annex D of compliance with emissions mask 15.225(a).

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. 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	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	
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	

TRANSMITTER TESTS

TRANSMITTER EMISSIONS – FREQUENCY TOLERANCE Part 15.225 (c)

Ambient temperature = 20°C
Relative humidity = 54%

Fc @ Vnom Tnom = 13.56231463MHz

TEMPERATURE	VOLTAGE	FREQUENCY MHz	DEVIATION kHz	LIMIT kHz
-20°C	110 Vac	13.56306613	0.75	±1.356
+50°C	110 Vac	13.56231463	0	±1.356

TEMPERATURE	VOLTAGE	FREQUENCY MHz	DEVIATION kHz	LIMIT kHz
+20°C	126.5 Vac	13.56231463	0	±1.356
+20°C	93.5 Vac	13.56231463	0	±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 = 20°C(<1GHz),
 Relative humidity = 53%(<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)
0.15	37.96	Quasi Peak	Neutral	66.00
0.225	34.68	Quasi Peak	Neutral	62.60
0.28	35.72	Quasi Peak	Neutral	60.82
0.29	35.58	Quasi Peak	Neutral	60.52
0.33	34.08	Quasi Peak	Live	59.45
0.355	33.62	Quasi Peak	Neutral	58.84
13.56	31.64	Average	Neutral	50.00
27.125	36.62	Average	Live	50.00

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

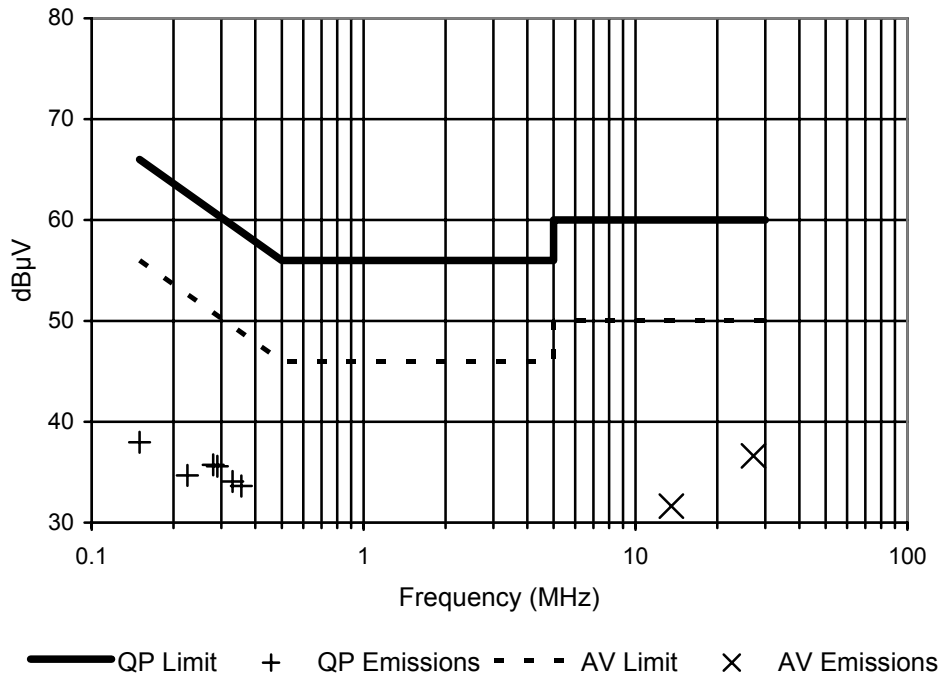
Test Method: 1 As per Radio – Noise Emissions, ANSI C63.4: 2001

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

Part 15.207



ANNEX A
PHOTOGRAPHS



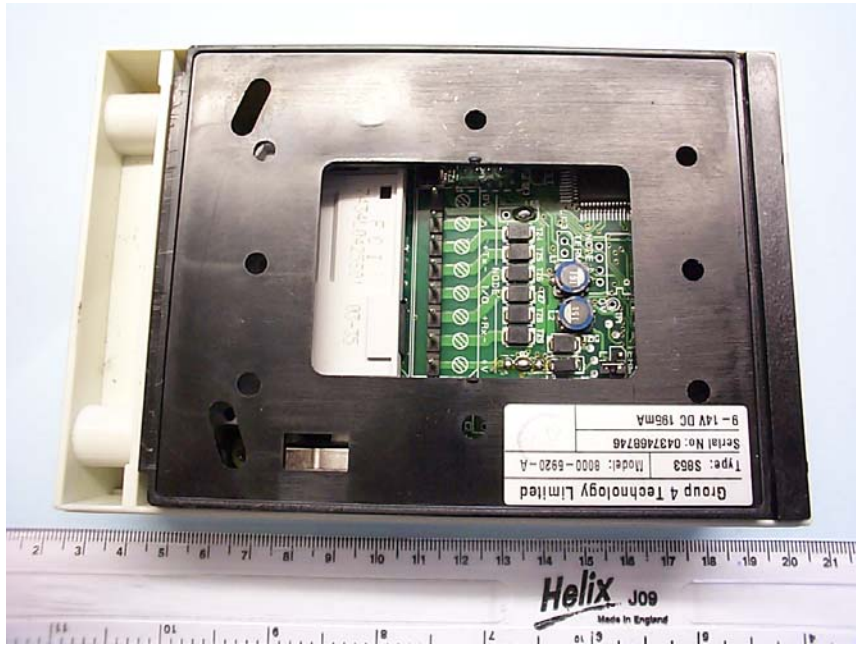
PHOTOGRAPH No. 2

TRANSMITTER FRONT VIEW



PHOTOGRAPH No. 3

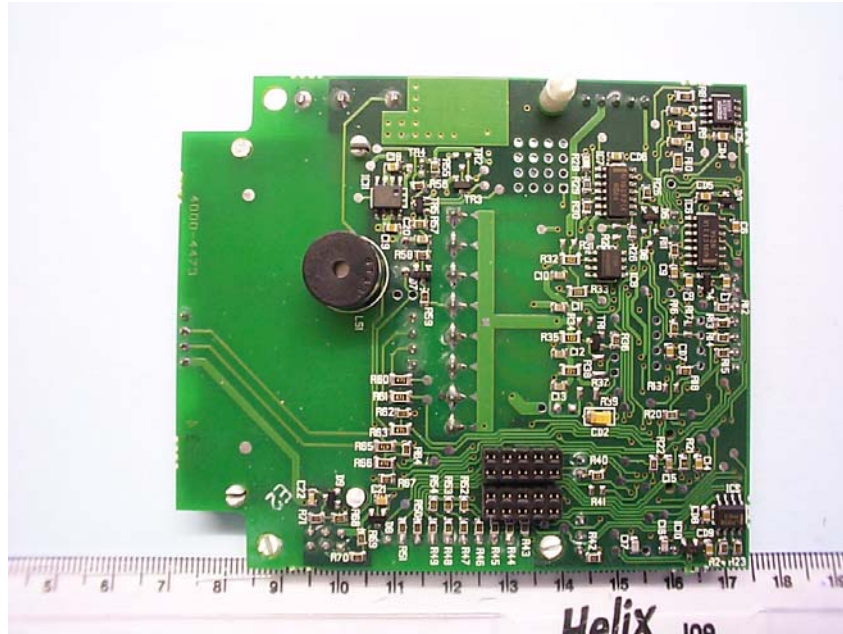
TRANSMITTER REAR VIEW



PHOTOGRAPH No. 4

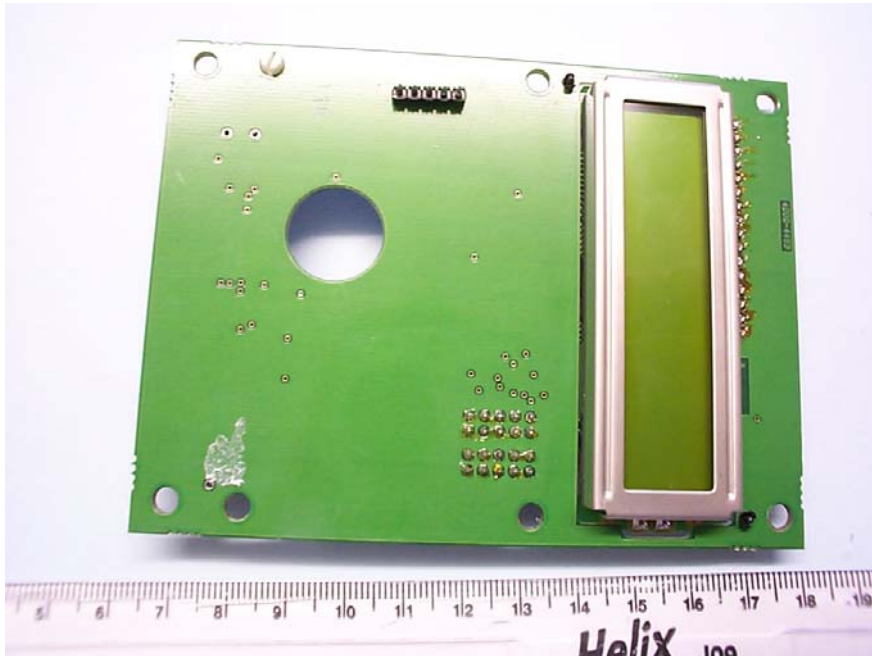
TRANSMITTER PCB TRACK SIDE





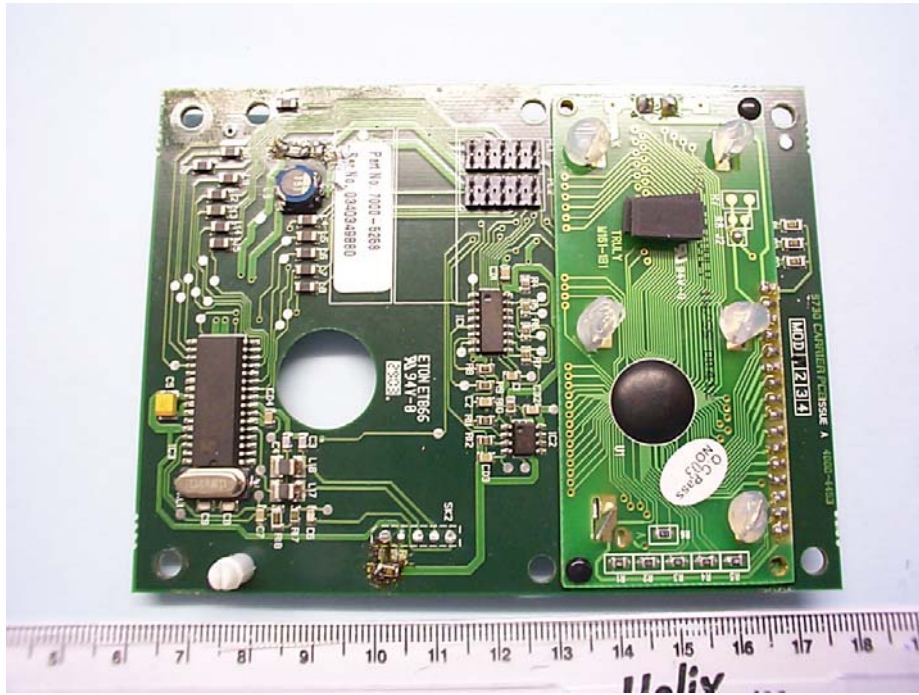
PHOTOGRAPH No. 6

DISPLAY PCB TOP



PHOTOGRAPH No. 7

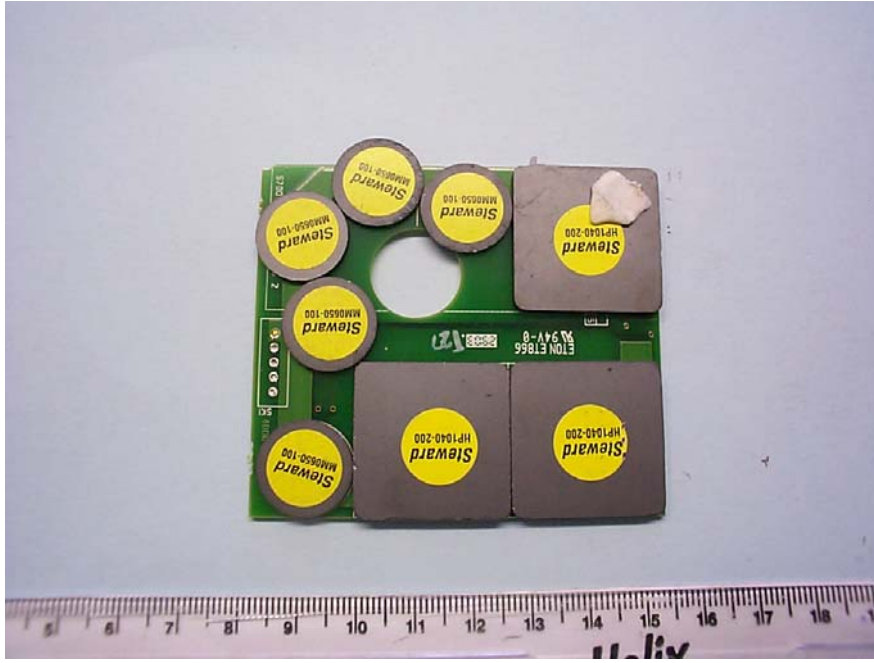
DISPLAY PCB BOTTOM



PHOTOGRAPH No. 8

ANTENNA PCB TOP





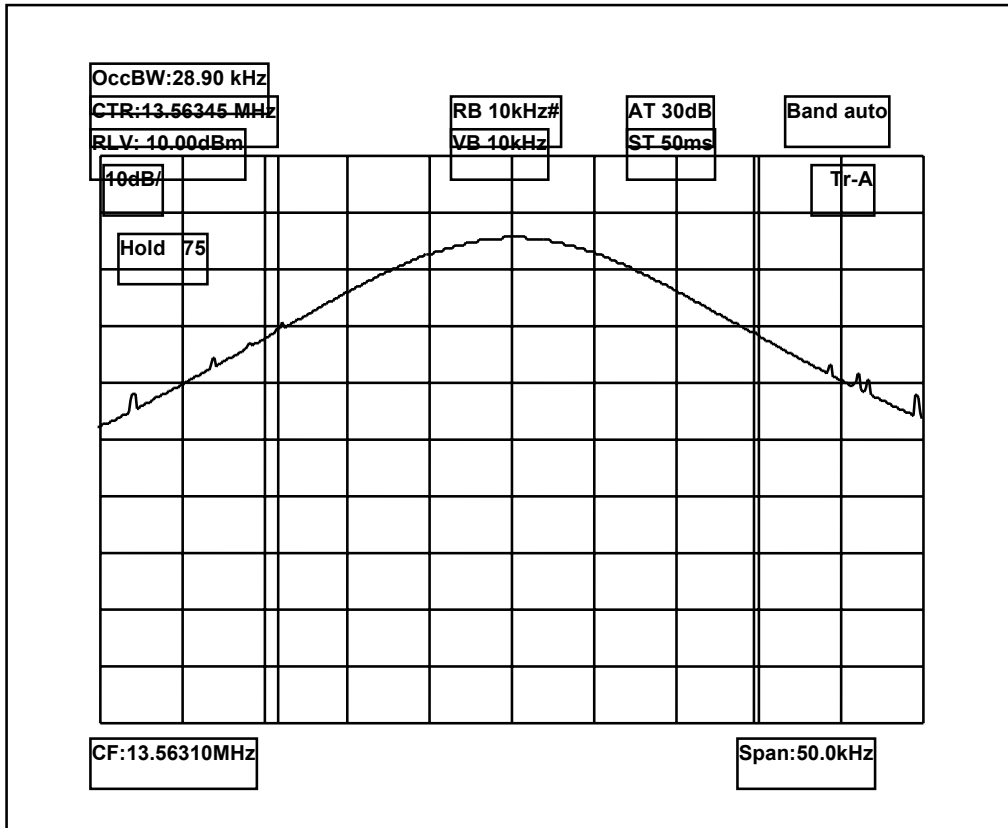
ANNEX B
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

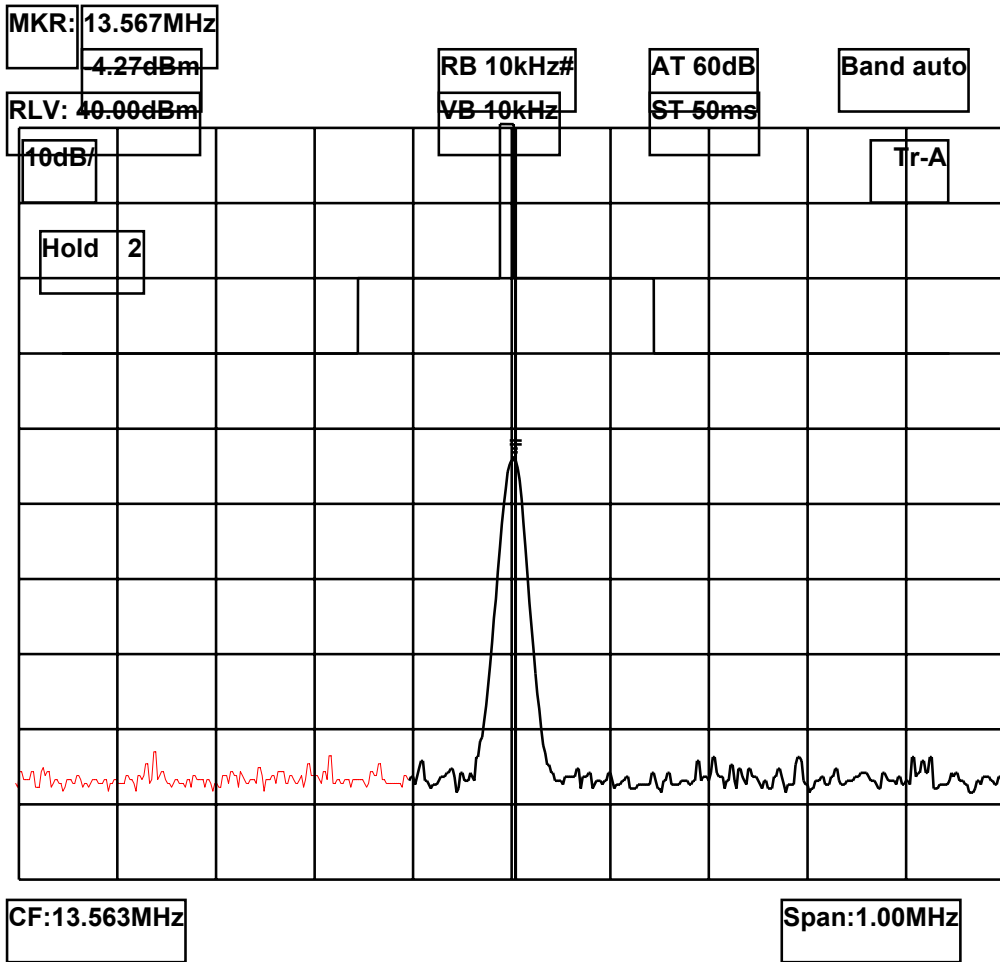
a.	TCB	-	APPLICATION	[X]
		-	FEE	[X]
b.	AGENT'S LETTER OF AUTHORISATION	-		[X]
c.	MODEL(s) vs IDENTITY	-		[X]
d.	ALTERNATIVE TRADE NAME DECLARATION(s)	-		[]
e.	LABELLING	-	PHOTOGRAPHS	[]
		-	DECLARATION	[X]
		-	DRAWINGS	[X]
f.	TECHNICAL DESCRIPTION	-		[X]
g.	BLOCK DIAGRAMS	-	Tx	[X]
		-	Rx	[]
		-	PSU	[]
		-	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



ANNEX D
MASK COMPLIANCE



ANNEX E
POWER LINE EMISSIONS

Powerline Conduction

13 Oct 2004 11:41

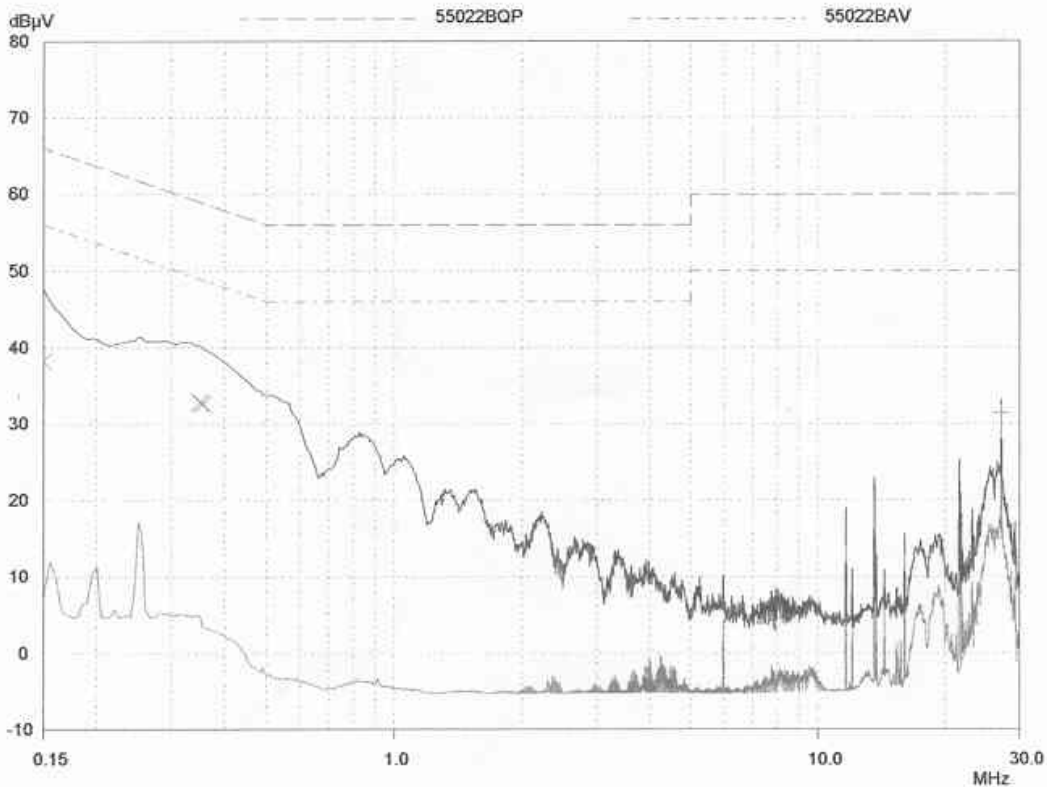
150kHz - 30MHz

EUT: S853
 Manuf: Group 4
 Op Cond: LISN UH195, cable UH21 & Receiver UH03
 Operator: D Winstanley
 Test Spec: FCC Part 15
 Comment: Live Line. No Card Present

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



Powerline Conduction

13 Oct 2004 11:57

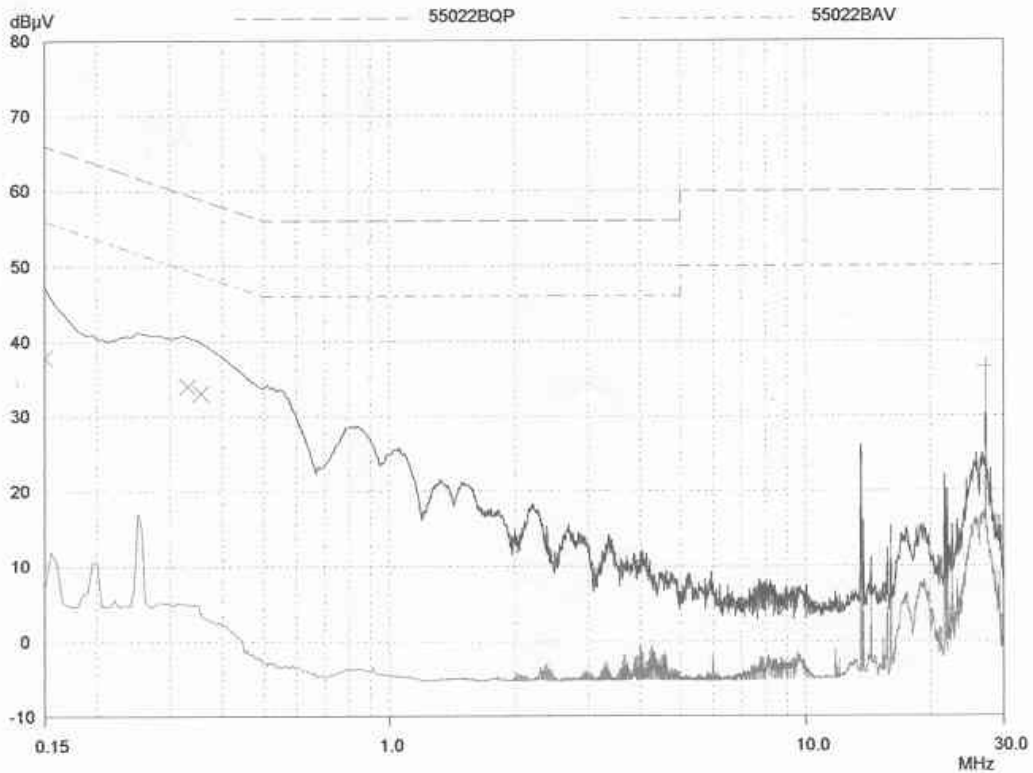
150kHz - 30MHz

EUT: S853
 Manuf: Group 4
 Op Cond: LISN UH195, cable UH21 & Receiver UH03
 Operator: D Winstanley
 Test Spec: FCC Part 15
 Comment: Live Line. Card Present

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



PAGE 1

ANNEX F
PEAK SCAN

TRL Compliance

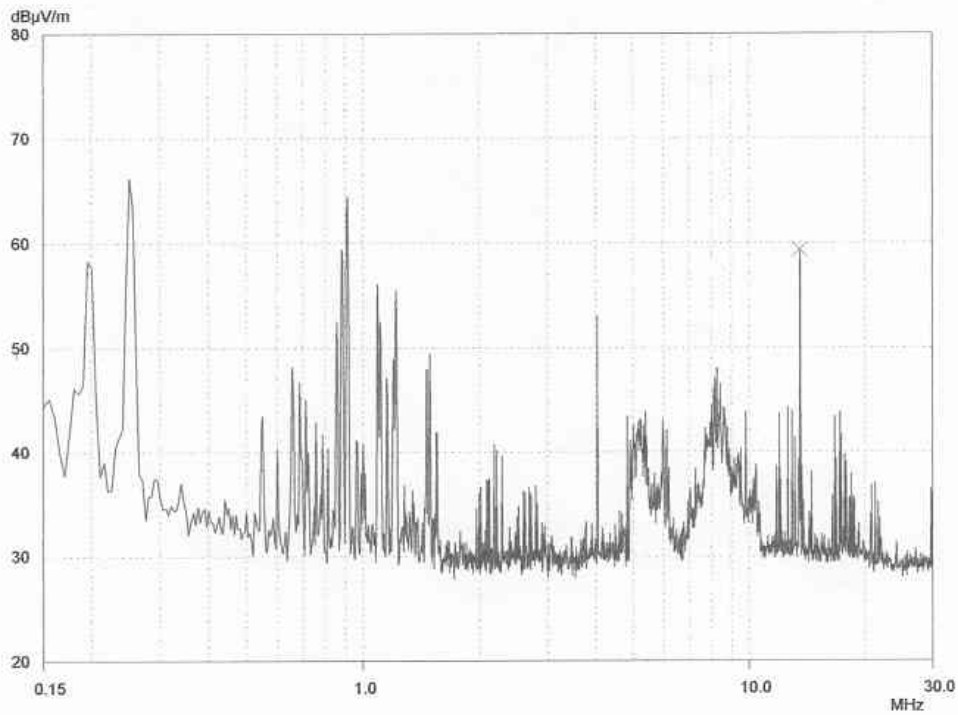
13 Oct 2004 15:27

H FIELD

EUT: S853
Manuf: Group 4
Op Cond: Prescan 150kHz-30MHz
Operator: D Winstanley
Test Spec: FCC Part 15
Comment: No Card Present

Scan Settings			(1 Range) Frequencies		Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge	
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



ANNEX G
E FIELD PRE SCAN

E-Field Radiation

EUT: S853
 Manuf: Group 4
 Op Cond: 3m Indoor Prescan
 Operator: D Winstanley
 Test Spec: CFR47 FCC part 15
 Comment: No card present
 Rx Antenna Vertical

Scan Settings				Receiver Settings				
(1 Range)								
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30MHz	1000MHz	50kHz	120kHz	PK	1msec	Auto	ON	60dB
Transducer	No.	Start	Stop	Name				
1	15	30MHz	1000MHz	TRLUH72				
	21	30MHz	1000MHz	AntUH191				
Final Measurement:		Detector:	X QP					
		Meas Time:	2sec					
		Subranges:	50					
		Acc Margin:	10 dB					

