



TEST REPORT NO: RU1077/4887
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FCC ID: OE5S831

**REPORT ON THE CERTIFICATION TESTING OF A
GROUP 4 TECHNOLOGY Ltd.
S831
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.225
INTENTIONAL RADIATOR SPECIFICATION**

TEST DATE: 7th – 9th OCTOBER 2003

TESTED BY:  **JOHN CHARTERS** Digitally signed by JOHN CHARTERS
DN: cn=JOHN CHARTERS,
o=TRL COMPLIANCE
SERVICES, c=US
Date: 2003.11.04 12:32:27 Z J CHARTERS

APPROVED BY:  **Peter Green** Digitally signed by Peter Green
DN: cn=Peter Green,
o=TRL Compliance
Services Ltd., c=GB
Date: 2003.11.04 12:49:40 Z P GREEN
EMC PRODUCT
MANAGER

DATE: 4th November 2003

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 | [] |
| | | 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: OE5S831

PURPOSE OF TEST: Certification

TEST SPECIFICATION: FCC RULES CFR 47, Part 15.225

TEST RESULT: Compliant to Specification

EQUIPMENT UNDER TEST: S831

EQUIPMENT SERIAL No: 0331331078

ITU: EMISSION CODE: 12K0A1D

EQUIPMENT TYPE: S831 Tag reader

PRODUCT USE: Access and control

CARRIER EMISSION: 9.9µV/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 ☐ Crystal ☒ Synthesiser ☐

MODULATION METHOD: Amplitude ☒ Digital ☐ Angle ☐

POWER SOURCE(s): 12Vdc

TEST DATE(s): 7th – 9th OCTOBER 2003

ORDER No(s): R000015006

APPLICANT: GROUP 4 TECHNOLOGY Ltd.

ADDRESS: Challenge House
Northway Lane
Tewkesbury
Gloucester
GL19 4QH

TESTED BY:



JOHN
CHARTERS

Digitally signed by
JOHN CHARTERS
DN: cn=JOHN
CHARTERS, o=TRL
COMPLIANCE
SERVICES, c=US
Date: 2003.11.04
12:32:46 Z

J CHARTERS

APPROVED BY:



Peter Green

Digitally signed by
Peter Green
DN: cn=Peter Green,
o=TRL Compliance
Services Ltd., c=GB
Date: 2003.11.04
12:49:58 Z

P GREEN
EMC PRODUCT
MANAGER

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	S831
EQUIPMENT TYPE:	S831 Tag reader
SERIAL NUMBER OF EUT:	0331331078
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):	R000015006
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)	7 th - 9 th OCTOBER 2003
TEST REPORT No:	RU1077/4887

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 (Tnom) | 20°C |
| 6. | 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 = 20°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. (dBμV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	FIELD STRENGTH (dBμV/m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (μV/m)	LIMIT (μV/m)
1.705MHz - 30MHz	27.12	20.2	-	-	20.2	19.08	1.1	30
30MHz - 88MHz	40.65	20.7	0.6	12.7	34.0	-	50.0	100
88MHz - 216MHz	108.5	21.7	1.0	11.3	34.0	-	50.0	150
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 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 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	
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	
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	=	20°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 (dBμV/m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (μV/m)
13.56	3	52.1	32.18	9.9
13.56	10	38.9	19.08	9.79
Limit value @ fc		10,000(μV/m)		
Band occupancy @ -20dBc		f lower	f higher	
		13.546620MHz	13.581120MHz	

See spectrum analyser plot – Annex C

Notes:

- Results quoted are extrapolated as indicated
- The 3m-10m extrapolation factor is 13.1 calculated from the results above
Extrapolation factor 10-30m is 19.08dB using the extrapolation factor of 40dB/decade as per 15.331(f)
- Receiver detector @ fc = Quasi Peak 120kHz bandwidth
- When battery powered the EUT was powered with new batteries
- 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.
- For emission below 30 MHz the cable losses are assumed to be negligible.

Test Method:

- As per Radio – Noise Emissions, ANSI C63.4: 1992
- Measuring distances 3m & 10m (to produce extrapolation factor)
- EUT 0.8 metre above ground plane
- 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	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
Relative humidity = 60%

Fc @ Vnom Tnom = 13.56368MHz

TEMPERATURE	VOLTAGE	FREQUENCY MHz	DEVIATION kHz	LIMIT kHz
-20°C	12.0	13.56368	0	±1.356
+50°C	12.0	13.56364	-0.04	±1.356

TEMPERATURE	VOLTAGE	FREQUENCY MHz	DEVIATION kHz	LIMIT kHz
+20°C	13.8	13.56352	-0.16	±1.356
+20°C	10.2	13.56364	-0.04	±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 (dBµV)	DETECTOR	CONDUCTOR (L or N)	LIMIT (dBµV)
13.56	42.0	QP	N	60
27.125	47.94	QP	N	60
16.0	31.64	AV	L	50

Notes: 1 See attached plot

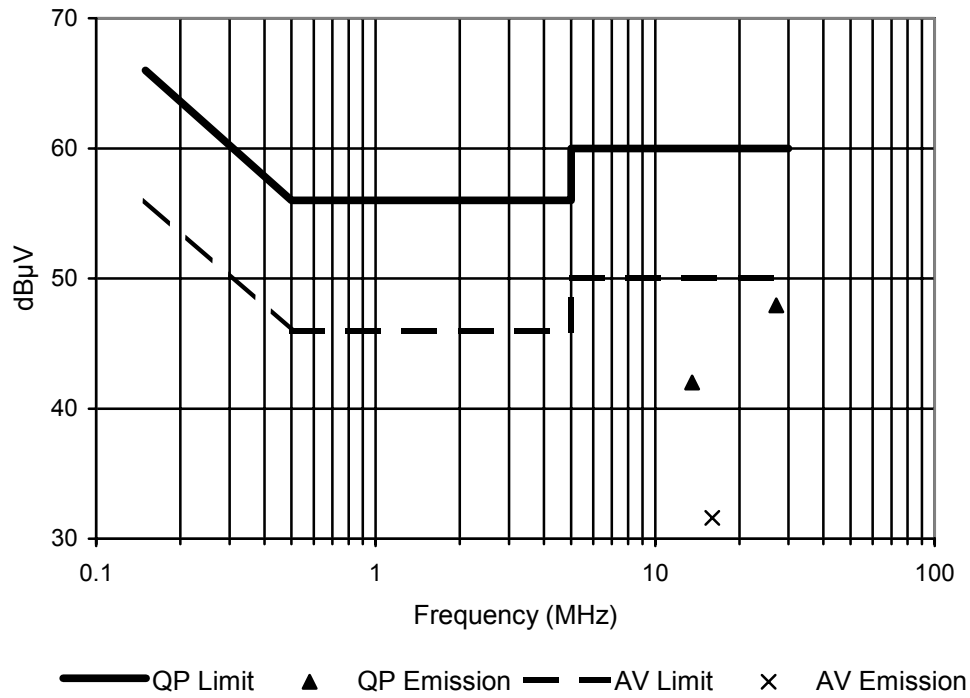
Test Method: 1 As per Radio – Noise Emissions, ANSI C63.4: 1992

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	

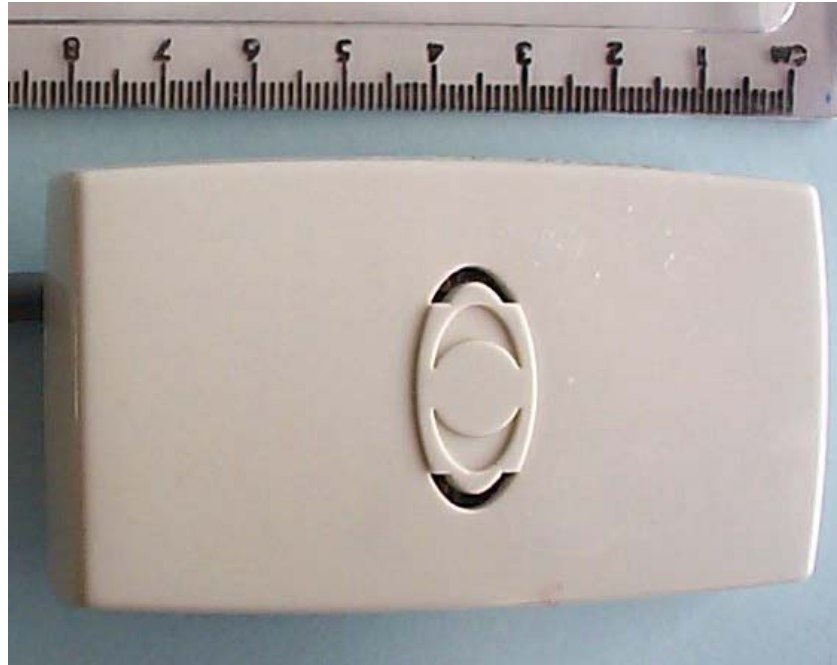
POWER LINE CONDUCTION EMISSIONS

Part 15.207



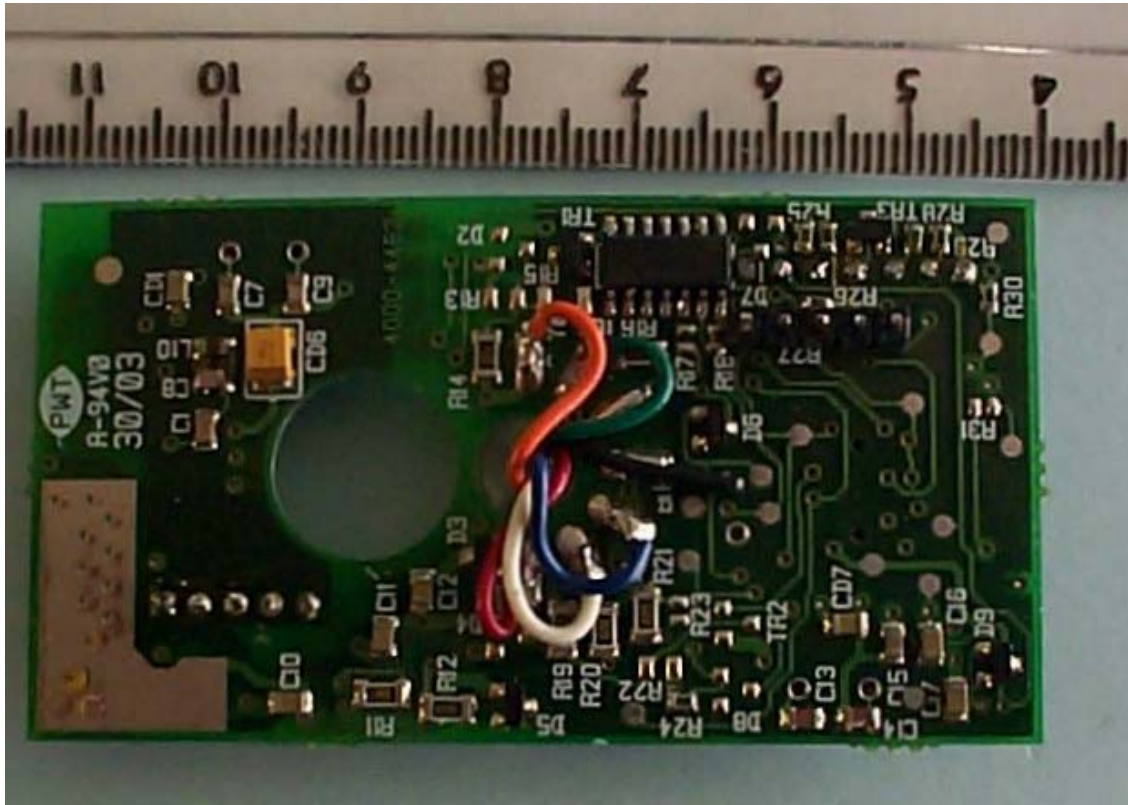
ANNEX A
PHOTOGRAPHS

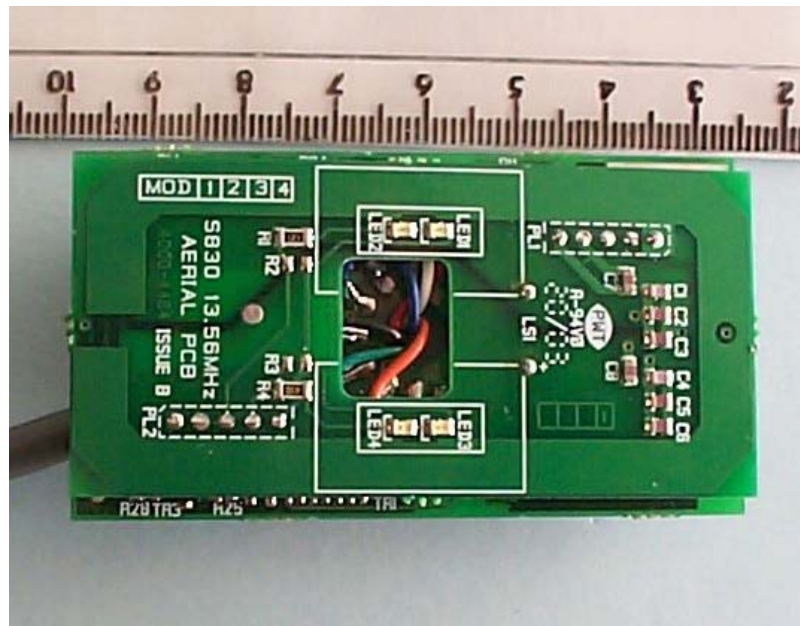
















ANNEX B

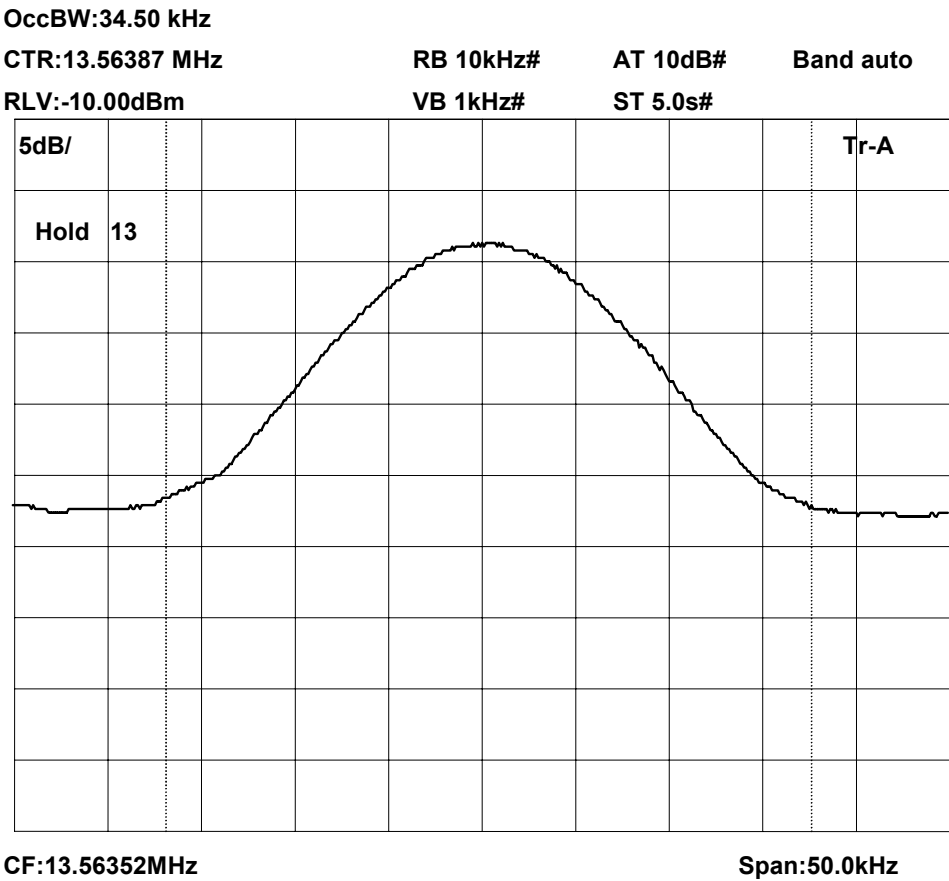
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

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

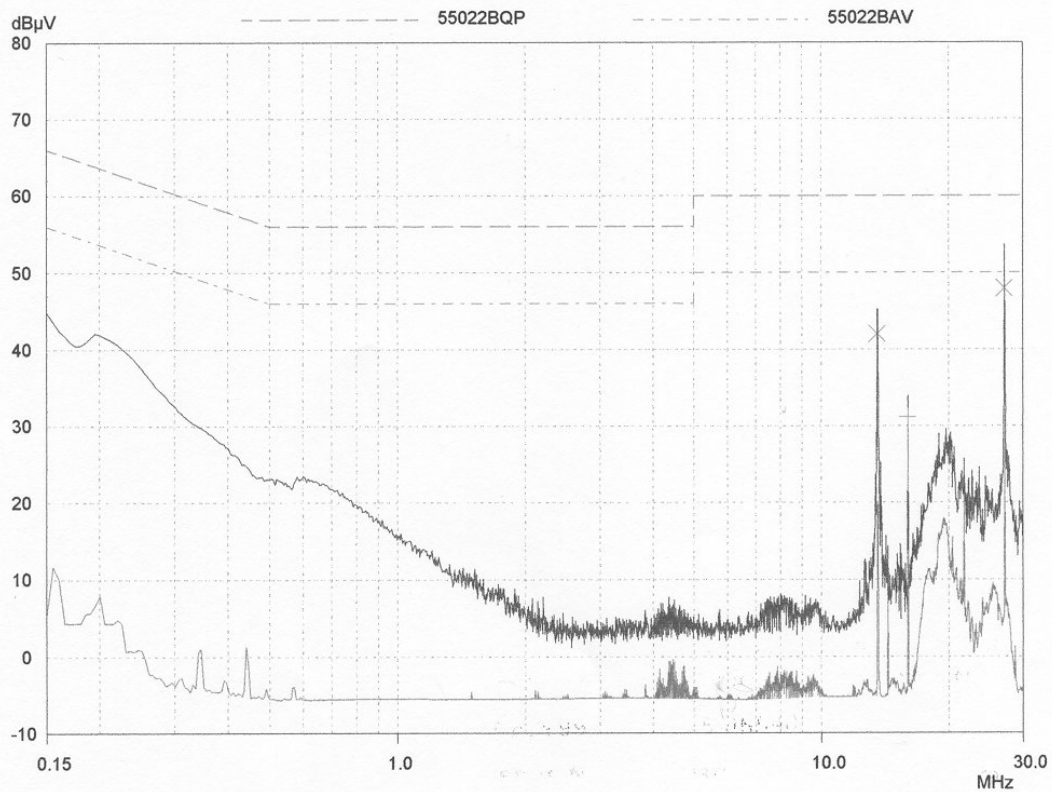
Powerline Conduction

07 Oct 2003 11:17

150kHz - 30MHz

EUT: S831
 Manuf: Group4
 Op Cond: LISN UH5, UH21
 Operator: J Charters
 Test Spec: EN55022 Class B (or Variant)
 Comment: Neutral

Scan Settings			(1 Range)			Receiver Settings			
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					



E-Field Radiation

EUT: S321
Manuf: Group 4
Op Cond: 3m Indoor Prescan
Operator: J Charters
Test Spec: EN55022
Comment: TX reading tag

Scan Settings

(1 Range)

Frequencies			Receiver Settings						
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	CBL6112B					

Final Measurement: Detector: X QP
Meas Time: 2sec
Subranges: 50
Acc Margin: 10 dB

