TEST REPORT NO: RU1050/4381

COPY NO: ----------

ISSUE NO: 1

FCC ID: OE5S820

REPORT ON THE CERTIFICATION TESTING OF A
GROUP 4 TECHNOLOGY Ltd.
S820 HID READER
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.209
INTENTIONAL RADIATOR SPECIFICATION

TEST DATE: 19th – 20th March 2003

TESTED BY: JOHN CHARTERS Digitally signed by JOHN CHARTERS DN: cn=JOHN CHARTERS, o=TRL COMPLIANCE SERVICES, c=US Date: 2003.06.20 13:25:03 Z ---------- J CHARTERS

APPROVED BY: Peter Green Digitally signed by Peter Green DN: cn=Peter Green, o=TRL Compliance Services, c=GB Date: 2003.06.20 13:40:11 Z ---------- P GREEN
PRODUCT MANAGER

DATE: ----------

Distribution:

Copy Nos: 1. GROUP 4 TECHNOLOGY Ltd.

2. FCC EVALUATION LABORATORIES

3. TRL EMC

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To BS EN ISO 9001 (1994)
Registration FS 21805

UKAS TESTING
0728

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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:	OE5S820					
PURPOSE OF TEST:	CERTIFICATION					
TEST SPECIFICATION:	FCC RULES CFR 47, Part 15.209					
TEST RESULT:	Compliant to Specification					
EQUIPMENT UNDER TEST:	S820 HID READER					
EQUIPMENT SERIAL No:	0311273789 antenna pcb 0311273788 main pcb					
ITU: EMISSION CODE:	17K0A1D					
EQUIPMENT TYPE:	Inductive card reader					
PRODUCT USE:	Access control					
CARRIER EMISSION:	2.82dBμV/m @ 300m					
ANTENNA TYPE:	Integral					
ALTERNATIVE ANTENNA:	N/A					
BAND OF OPERATION:	0.009MHz – 0.490MHz					
CHANNEL SPACING:	N/A wideband					
NUMBER OF CHANNELS:	1					
FREQUENCY GENERATION:	SAW Resonator	[ ]	Crystal	[X]	Synthesiser	[ ]
MODULATION METHOD:	Amplitude	[X]	Digital	[ ]	Angle	[ ]
POWER SOURCE(s):	+12Vdc					
TEST DATE(s):	19th - 20th March 2003					
ORDER No(s):	PRP10059					
APPLICANT:	GROUP 4 TECHNOLOGY Ltd.					
ADDRESS:	CHALLENGE HOUSE NORHTWAY LANE TEWKESBURY GLOUCESTERSHIRE GL20 8JG UNITED KINGDOM					

TESTED BY: JOHN CHARTERS — J CHARTERS

APPROVED BY: Peter Green — P GREEN PRODUCT MANAGER

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	S820 HID READER
EQUIPMENT TYPE:	Inductive card reader
SERIAL NUMBER OF EUT:	0311273789 ant pcb 0311273788 main pcb
PURPOSE OF TEST:	CERTIFICATION
TEST SPECIFICATION(s):	FCC RULES CFR 47, Part 15.209
TEST RESULT:	COMPLIANT Yes [X] No [ ]
APPLICANT'S CATEGORY:	MANUFACTURER [X] IMPORTER [ ] DISTRIBUTOR [ ] TEST HOUSE [ ] AGENT [ ]
APPLICANT'S ORDER No(s):	PRP10059
APPLICANT'S CONTACT PERSON(s):	Mr Eric Porter
E-mail address:	Eric.porter@g4tech.co.uk
APPLICANT:	GROUP 4 TECHNOLOGY Ltd.
ADDRESS:	Challenge House Northway Lane Tewkesbury Gloucestershire GL20 8JG United kingdom
TEL:	+44 (0) 1684 850977
FAX:	+44 (0) 1684 290166
MANUFACTURER:	GROUP 4 TECHNOLOGY Ltd.
EUT(s) COUNTRY OF ORIGIN:	United Kingdom
TEST LABORATORY:	TRL EMC
UKAS ACCREDITATION No:	0728
TEST DATE(s)	19th – 20th March 2003
TEST REPORT No:	RU1050/4381

EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.

TEST/EXAMINATION	RULE PART	DETECTOR	APPLICABILITY
Intentional Emission Frequency:	15.209(a)	Average	Yes
Intentional Emission Field Strength:	15.209(a)	Average	Yes
Intentional Emission Band Occupancy:	N/A	Peak	Yes
Intentional Emission ERP (mW):	N/A	N/A	N/A
Spurious Emissions – Conducted:	15.207	Quasi Peak Average	Yes
Spurious Emissions – Radiated <1000MHz:	15.209	Quasi Peak Average	Yes
Spurious Emissions – Radiated >1000MHz:	15.209	Average	Yes
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	Yes
Restricted Bands	15.205	N/A	Yes
Extrapolation Factor	15.31(f)	N/A	Yes

2. Product Use: Access control

3. Emission Designator: 17K0A1D

4. Duty Cycle: <100%

5. Transmitter bit or pulse rate and level: 1200bps

6. Temperatures: Ambient (Tnom) 24°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 [X]
   Two channel [ ]
   Multi-channel [ ]

9. Channel spacing:
   Narrowband [ ]
   Wideband [X]

TRANSMITTER TESTS

TRANSMITTER SPURIOUS EMISSIONS – RADIATED – PART 15.209

Ambient temperature	=	24°C(<1GHz)	3m measurements <1GHz	[X]
Relative humidity	=	45% (<1GHz),	1m measurements >1GHz	[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	EXTRAP. FACT. (dB)	FIELD STRENGTH (µV/m)	LIMIT (µV/m)
9kHz - 490kHz	0.2503 0.3754	34.9 55.1	- -	80 80	0.006 0.057	9.6 6.4
490kHz - 1.705MHz	0.5006 0.6257	35.5 46.9	- -	40 40	0.6 2.21	47.9 38.4
1.705MHz - 30MHz						
30MHz - 88MHz						
88MHz - 216MHz						
216MHz - 960MHz						
960MHz - 1GHz						
1GHz - 5GHz						

Limit	9kHz – 0.490kHz	2400/F (kHz) @300m
	490kHz-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 Emissions20dB's below the limit are not 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: 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 orthagonal 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	**X**
HORN ANTENNA	EMCO	3115	9010-3581	139	
SPECTRUM ANALYSER	TEKTRONIX	2756P	B010109	164	
BICONE ANTENNA	CHASE	BBA9106	N/A	193	**X**
ANTENNA, LOG PERIODIC 300MHz – 1GHz	CHASE	UPA6108	1061	203	**X**
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	
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 15.209

Ambient temperature	=	24°C(<1GHz),	3m measurements @ fc	[X]
Relative humidity	=	45%(<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)
125.15	3	81.9	80.0	1.24
125.15	10	61.9	59.08	1.38

Limit value @ fc	**19.2µV/m @ 300 m**	
Band occupancy @ -30dBc	**f lower**	**f higher**
	107.78kHz	140.55kHz

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

Test Method:
1 As per Radio – Noise Emissions, ANSI C63.4: 1992
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 orthagonal 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	**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	**X**
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	
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	
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 = 50%(<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	40.12	QUASI PEAK	L	66.00
0.2	35.47	QUASI PEAK	L	63.61
0.23	33.16	QUASI PEAK	N	33.16
20.155	40.68	QUASI PEAK	L	40.00
8.385	31.67	AVERAGE	N	50.00
10.39	33.40	AVERAGE	L	50.00
12.645	35.10	AVERAGE	L	50.00
12.895	34.83	AVERAGE	L	50.00
14.145	36.82	AVERAGE	N	50.00
19.405	37.62	AVERAGE	L	50.00
20.155	40.06	AVERAGE	L	50.00
24.41	30.49	AVERAGE	L	50.00

Notes: 1 See attached plots annex D

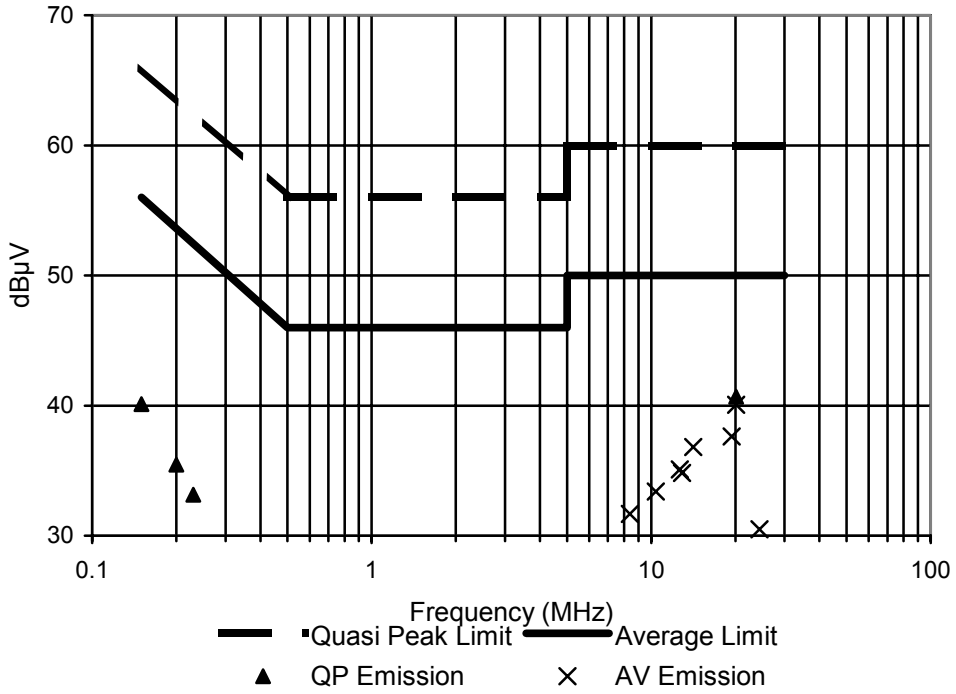
Test Method: 1 As per Radio – Noise Emissions, ANSI C63.4: 1992

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	**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

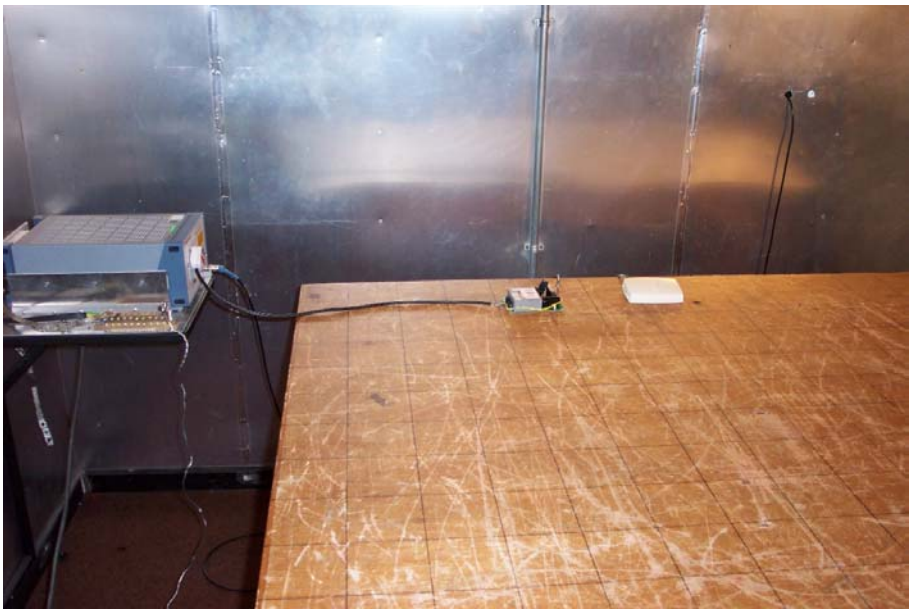


ANNEX A

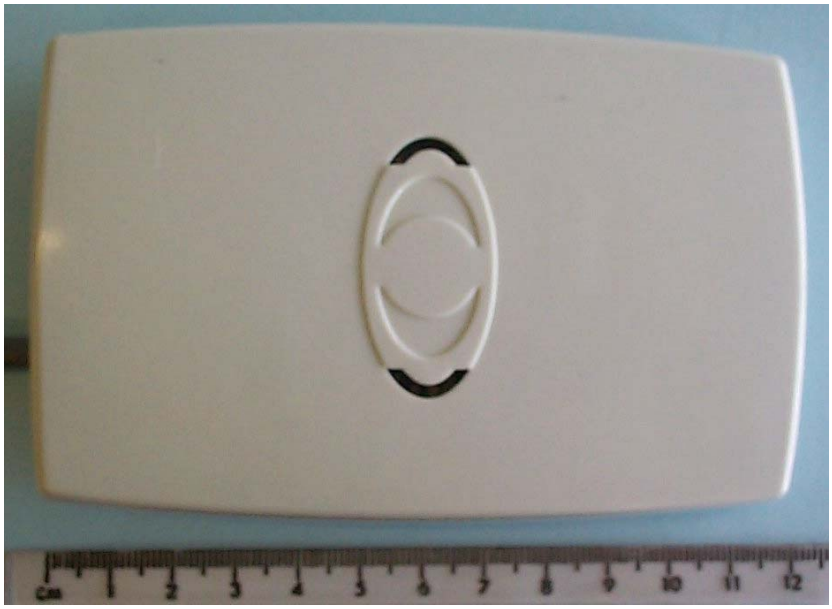
PHOTOGRAPHS

PHOTOGRAPH No. 1 **TEST SETUP**

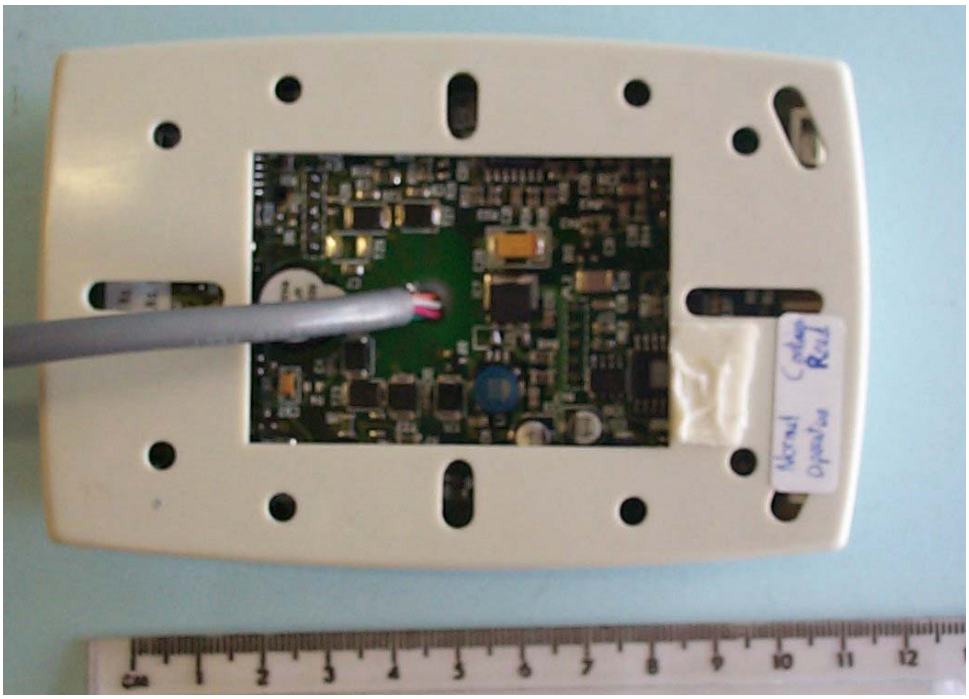
PHOTOGRAPH No. 2 **TEST SETUP**



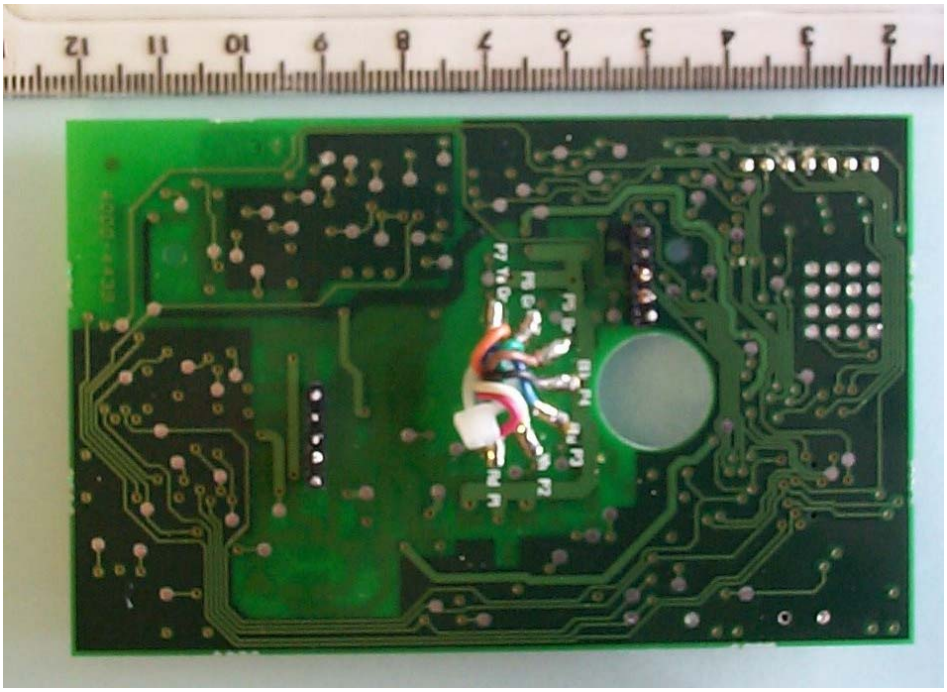
PHOTOGRAPH No. 3 **TRANSMITTER FRONT VIEW**



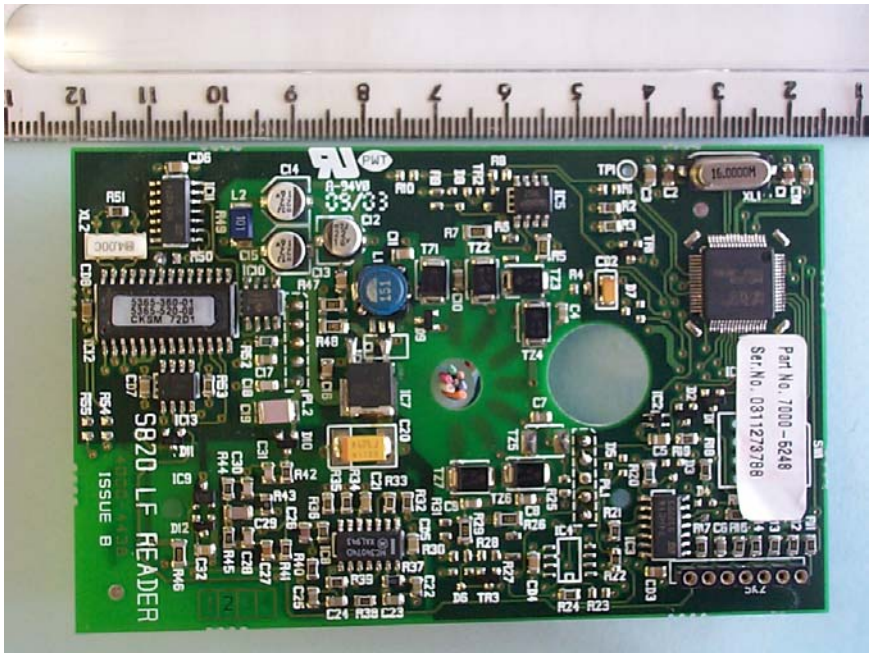
PHOTOGRAPH No. 4 **TRANSMITTER REAR VIEW**



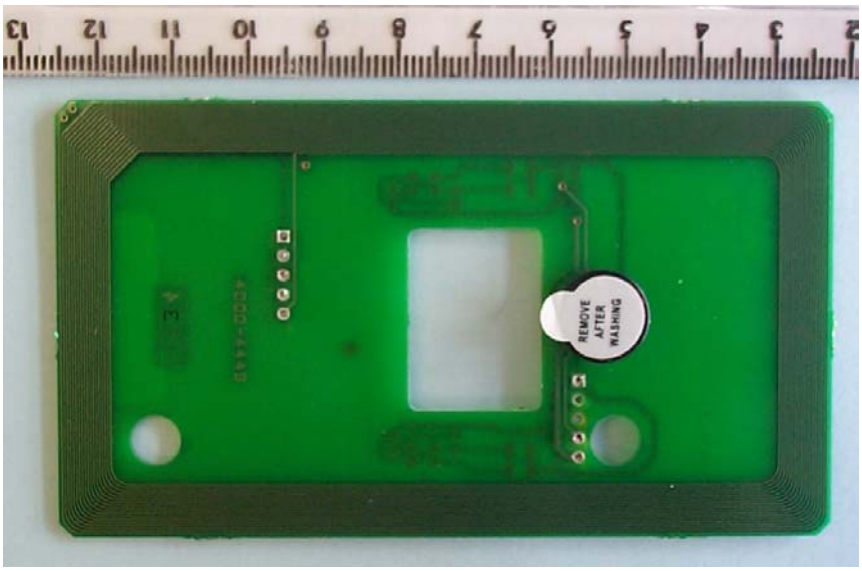
PHOTOGRAPH No. 5 **TRANSMITTER PCB TRACK SIDE**



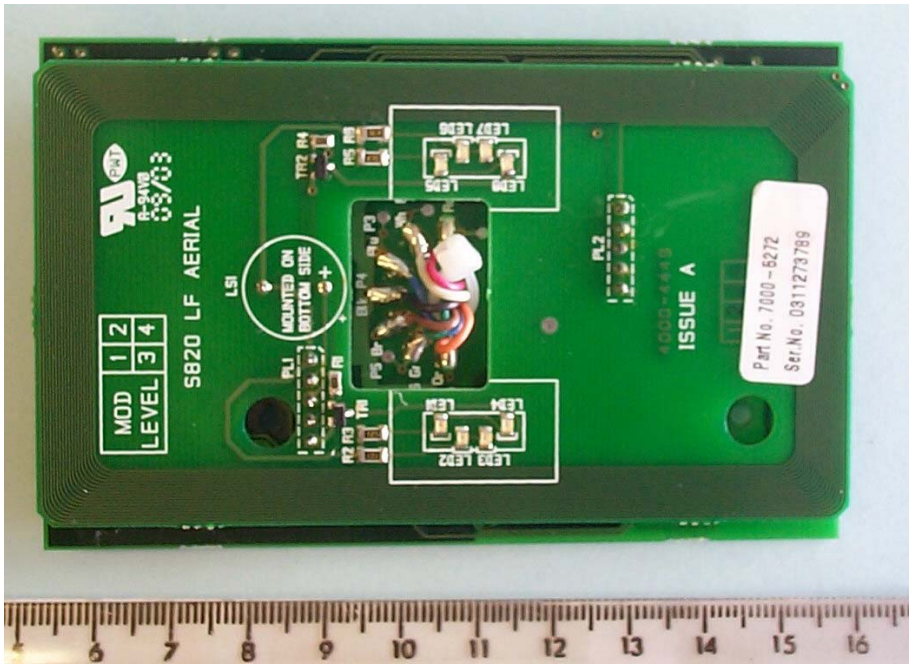
PHOTOGRAPH No. 6 **TRANSMITTER PCB COMPONENT SIDE**



PHOTOGRAPH No. 7 **ANTENNA PCB TRACK SIDE**



PHOTOGRAPH No. 8 **ANTENNA PCB COMPONENT SIDE**



ANNEX B

APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

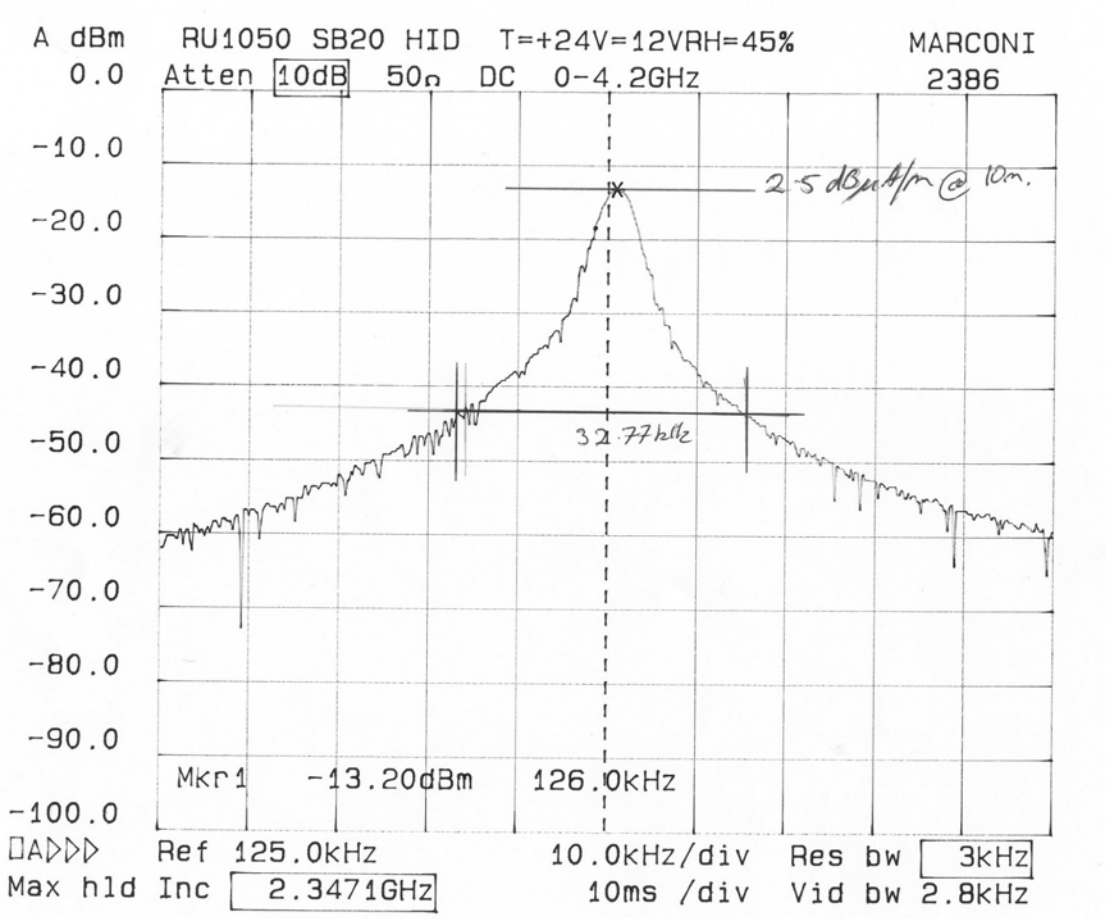
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

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)	-		[X]
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

POWER LINE PLOTS

Power Line Conducted Emissions Live

Powerline Conduction

20 Mar 2003 09:56

150kHz - 30MHz

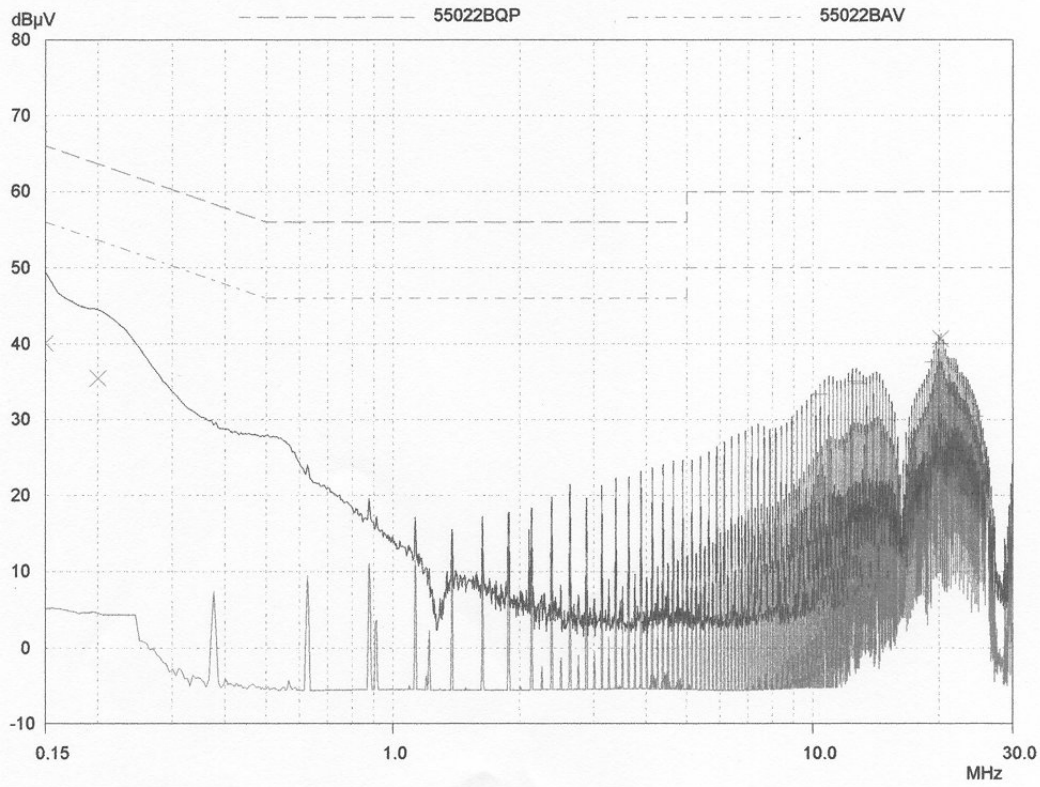
EUT:	S820
Manuf:	Grooup 4
Op Cond:	LISN UH5, UH21
Operator:	J Charters
Test Spec:	FCC part15.207
Comment:	Tested using 110V dc psu

Scan Settings (1 Range)

Frequencies			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

Final Measurement:		
	Detectors:	X QP / + AV
	Meas Time:	2sec
	Subranges:	25
	Acc Margin:	20 dB



PAGE 1

Power Line Conducted Emissions Neutral

Powerline Conduction

20 Mar 2003 10:21

150kHz - 30MHz

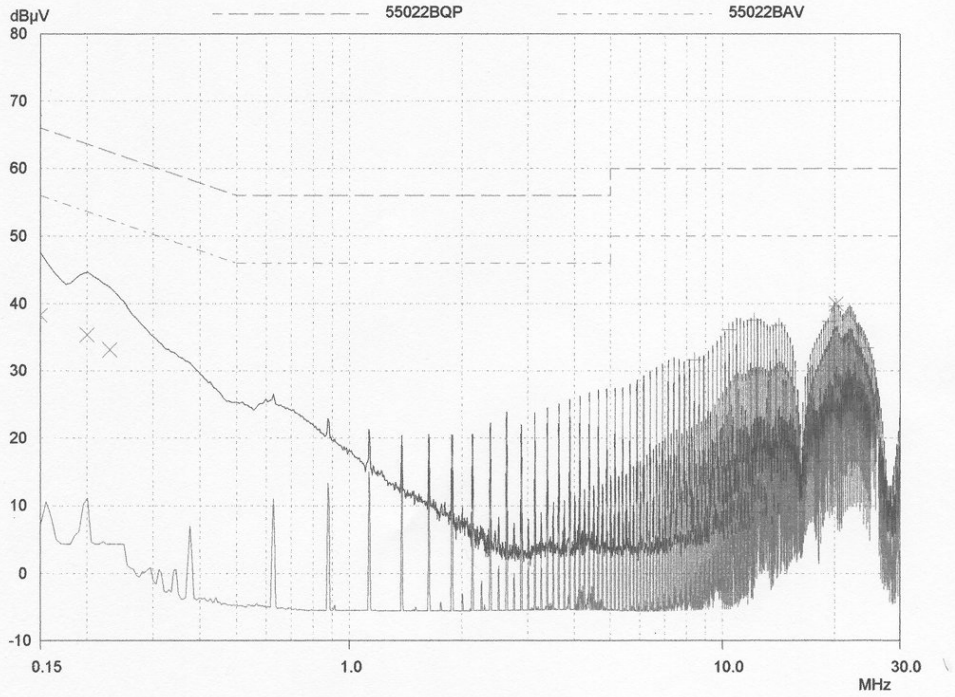
EUT:	S820
Manuf:	Grooup 4
Op Cond:	LISN UH5, UH21
Operator:	J Charters
Test Spec:	FCC part15.207
Comment:	Tested using 110V dc psu
	Neutral

Scan Settings (1 Range)

Frequencies			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

Final Measurement:		
	Detectors:	X QP / + AV
	Meas Time:	2sec
	Subranges:	25
	Acc Margin:	20 dB



ANNEX E

PEAK EMISSIONS SCANS

TRL COMPLIANCE 19 Mar 2003 13:33

H Field

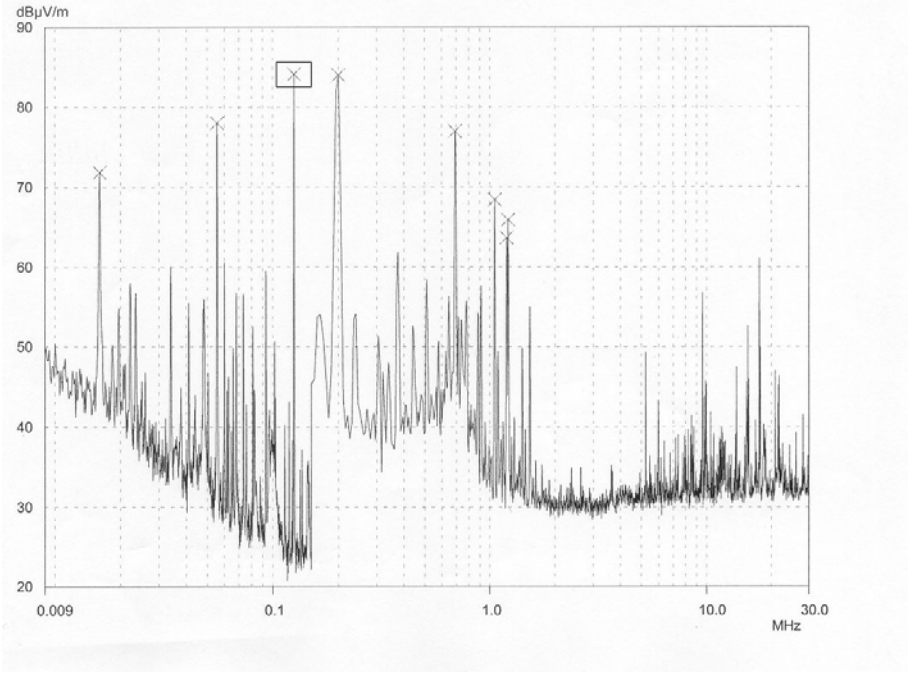
EUT:	tag reader
Manuf:	Group 4
Op Cond:	Pre Scan
Operator:	J Charters
Test Spec:	ETS EN 300 330
Comment:	TX on continous

Scan Settings (2 Ranges)

Frequencies			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



Note: Fc mark with ☐ all other emissions are ambient

TRL Compliance Services Ltd

25 Mar 2003 13:13

E-Field Radiattion

EUT:	S820
Manuf:	Group 4
Op Cond:	Pre Scan
Operator:	J Charters
Test Spec:	EN55022
Comment:	TX on

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	14	30MHz	1000MHz	Cable3m
	22	30MHz	1000MHz	CBL6112B

Prescan Measurement:		
	Detector:	X PK
	Meas Time:	see scan settings
	Peaks:	50
	Acc Margin:	10 dB