TEST REPORT NO: RU1124/5699

COPY NO: 2

ISSUE NO: 1

FCC ID: OE5S280

REPORT ON THE CERTIFICATION TESTING OF A
GROUP 4 TECHNOLOGY LIMITED
S820
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.209 December 2003
INTENTIONAL RADIATOR SPECIFICATION

TEST DATE: 6th August 2004 – 11th August 2004

TESTED BY: JOHN CHARTERS Digitally signed by JOHN CHARTERS DN: cn=JOHN CHARTERS, o=TRL COMPLIANCE SERVICES, c=US Date: 2004.09.02 17:17:56 + 01'00' PP D WINSTANLEY

APPROVED BY: Peter Green Digitally signed by Peter Green DN: cn=Peter Green, o=TRL Compliance Services, c=GB Date: 2004.09.03 08:56:23 Z P GREEN
EMC PRODUCT MANAGER

DATE: 1st September 2004

Distribution:

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

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E-MAIL test@trl-emc.co.uk www.trlcompliance.com

FS 21805 0728

CONTENTS

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:	OE5S280					
PURPOSE OF TEST:	Certification					
TEST SPECIFICATION:	FCC RULES CFR 47, Part 15.209 December 2003					
TEST RESULT:	Compliant to Specification					
EQUIPMENT UNDER TEST:	S820					
EQUIPMENT SERIAL No:	Engineering Sample					
ITU: EMISSION CODE:	17k0A1D					
EQUIPMENT TYPE:	Inductive Card Reader					
PRODUCT USE:	Access Control					
CARRIER EMISSION:	0.148 µV/m @ 300m					
ANTENNA TYPE:	Integral					
ALTERNATIVE ANTENNA:	Not applicable					
CHANNEL SPACING:	Not applicable, Wideband					
NUMBER OF CHANNELS:	1					
FREQUENCY GENERATION:	SAW Resonator	[ ]	Crystal	[ ]	Synthesiser	[X]
MODULATION METHOD:	Amplitude	[ ]	Digital	[ ]	Angle	[X]
POWER SOURCE(s):	+12 Vdc					
TEST DATE(s):	6th August 2004 – 11th August 2004					
ORDER No(s):	PRP10146					
APPLICANT:	Group 4 Technology Limited					
ADDRESS:	Challenge House Northway Lane Tewkesbury GL20 8JG					

TESTED BY: JOHN CHARTERS (Signature Not Verified; Digitally signed by JOHN CHARTERS DN: cn=JOHN CHARTERS, o=TRL COMPLIANCE SERVICES, c=US Date: 2004.09.02 17:18:14 +01'00') PP D WINSTANLEY

APPROVED BY: Peter Green (Signature Not Verified; Digitally signed by Peter Green DN: cn=Peter Green, o=TRL Compliance Services, c=GB Date: 2004.09.03 08:56:45 Z)
P GREEN
EMC PRODUCT MANAGER

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	S820
EQUIPMENT TYPE:	Inductive Card Reader
SERIAL NUMBER OF EUT:	Engineering Sample
PURPOSE OF TEST:	Certification
TEST SPECIFICATION(s):	FCC RULES CFR 47, Part 15.209 December 2003
TEST RESULT:	COMPLIANT Yes [X] No [ ]
APPLICANT'S CATEGORY:	MANUFACTURER [X] IMPORTER [ ] DISTRIBUTOR [ ] TEST HOUSE [ ] AGENT [ ]
APPLICANT'S ORDER No(s):	PRP10164
APPLICANT'S CONTACT PERSON(s):	Mr E Porter
E-mail address:	Eric.porter@g4tech.co.uk
APPLICANT:	Group 4 Technology Limited
ADDRESS:	Challenge House Northway Lane Tewkesbury GL20 8JG
TEL:	+44 (0)1684 850977
FAX:	+44 (0)1684 294845
MANUFACTURER:	Group 4 Technology Limited
EUT(s) COUNTRY OF ORIGIN:	United Kingdom
TEST LABORATORY:	TRL EMC
UKAS ACCREDITATION No:	0728
TEST DATE(s)	6th August 2004 – 11th August 2004
TEST REPORT No:	RU1124/5699

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	YES
Spurious Emissions – Radiated >1000MHz:	-	-	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: Access Control

3. Emission Designator: 17k0A1D

4. Duty Cycle: <100%

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

6. Temperatures: Ambient (Tnom) 25^{o}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 December 2003

Ambient temperature	=	25°C(<1GHz)	3m measurements <30MHz	[X]
Relative humidity	=	55% (<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 FACTOR (dB/m)	FIELD STRENGTH (dBµV/m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (µV/m)
0.009 MHz - 0.49 MHz	No Significant Emissions Detected						
0.49 MHz - 1.705 MHz	No Significant Emissions Detected						
1.705 MHz - 30 MHz	No Significant Emissions Detected						
30MHz - 88MHz	No Significant Emissions Detected						
88MHz - 216MHz	No Significant Emissions Detected						
216MHz - 960MHz	No Significant Emissions Detected						
960MHz - 1GHz	No Significant Emissions Detected						
1GHz - 5GHz	No Significant Emissions Detected						

Limits	0.009 MHz to 0.49 MHz	2400/F(kHz)	@ 300m
	0.49 MHz to 1.705 MHz	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

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 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.
14 F(kHz) is the frequency of operation
15 See Annex E for 150 kHz – 30MHz scan plot and Annex F for 30MHz – 1000MHz scan plot.

Test
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 >30MHz.
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	
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	209 December 20038	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	

TRANSMITTER TESTS

TRANSMITTER INTENTIONAL EMISSION – RADIATED – Part 15.209 December 2003

Ambient temperature	=	25°C(<1GHz),	3m measurements @ fc	[X]
Relative humidity	=	55%(<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. (kHz)	MEASUREMENT DISTANCE (Metres)	MEASUREMENT Rx. READING (dBµV/m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (µV/m)
125.55	3	71.9	88.5	0.148
125.55	10	43.2	59.8	0.148

Limit value @ fc	**19.2 (µV/m) @ 300m**	
Band occupancy @ 20dB Bandwidth value	**f lower**	**f higher**
	123.390 kHz See note Annex C	127.990 kHz See note Annex C

See spectrum analyser plot – Annex C

Notes:

1 Results quoted are extrapolated as indicated
2 Receiver detector @ fc = Average 200Hz bandwidth, measurement time 1s
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 20 dB greater then 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:

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 >30MHz
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	
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	209 December 20038	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 = 25°C(<1GHz),
Relative humidity = 55%(<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)**
24.225	40.44	QUASI PEAK	LIVE	60
24.48	42.98	QUASI PEAK	LIVE	60
25.23	41.80	QUASI PEAK	NEUTRAL	60

Notes:
1 See attached plot in Annex D
2 Measurements were taken on both live & neutral lines, levels are recorded in the table.
3 Emissions 20dB's below the limit are not recorded.

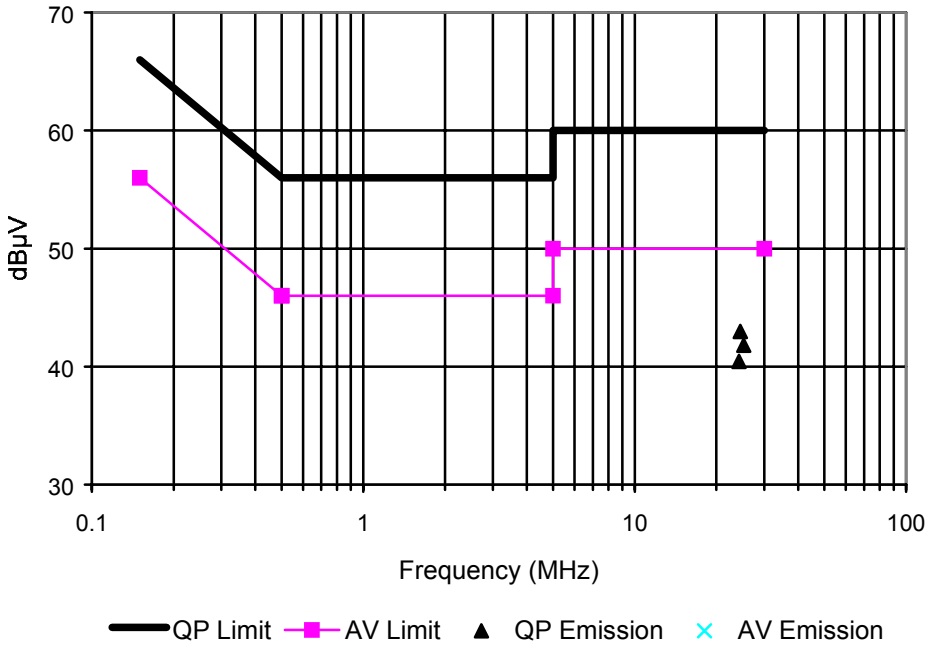
Test Method:
1 As per Radio – Noise Emissions, ANSI C63.4: 2001

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	UH195	**X**
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	

POWER LINE CONDUCTION EMISSIONS

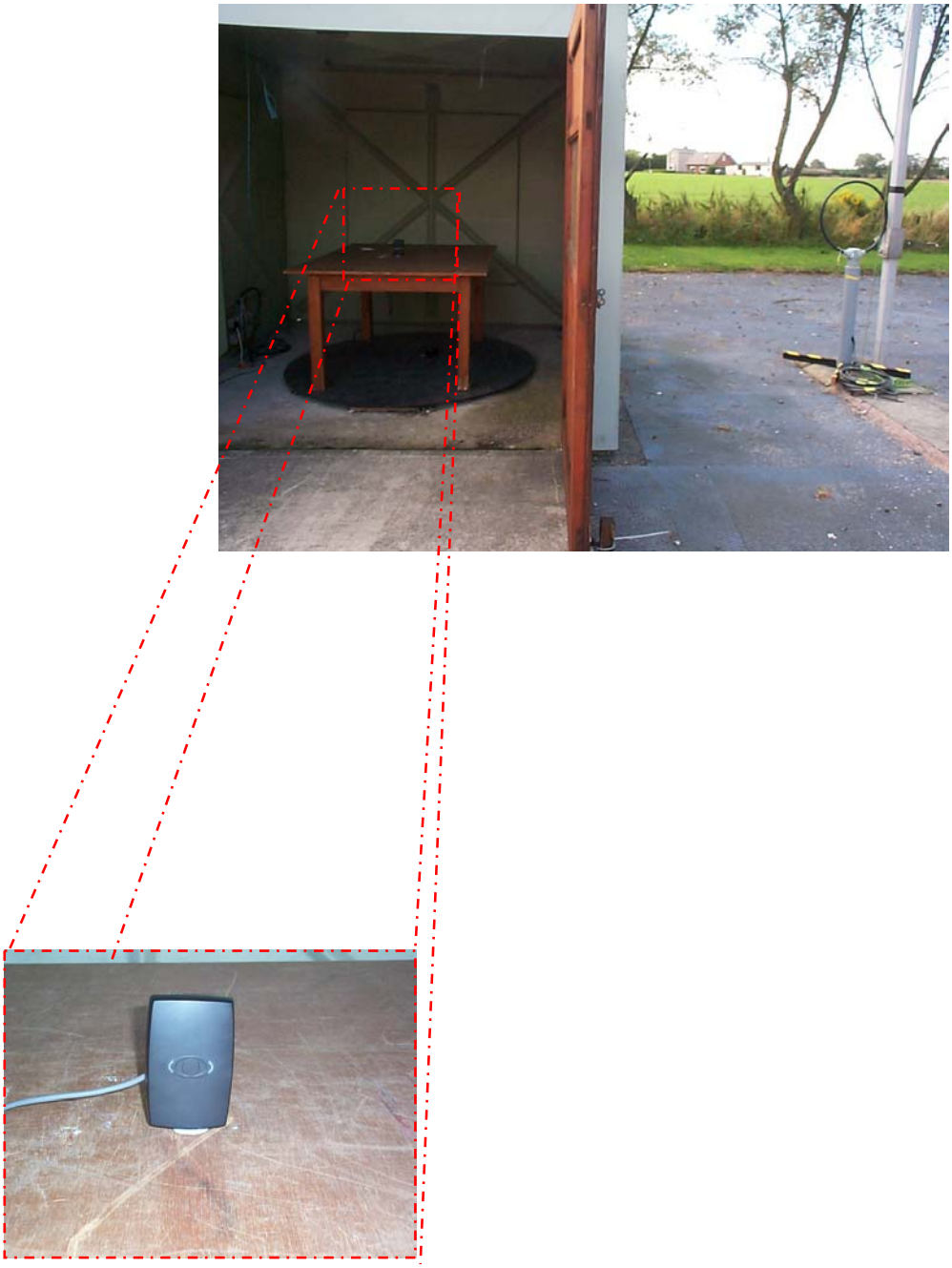
Quasi Peak Limit Part 15.207
(Levels below the limit are only displayed if
within 20dB of the limit)



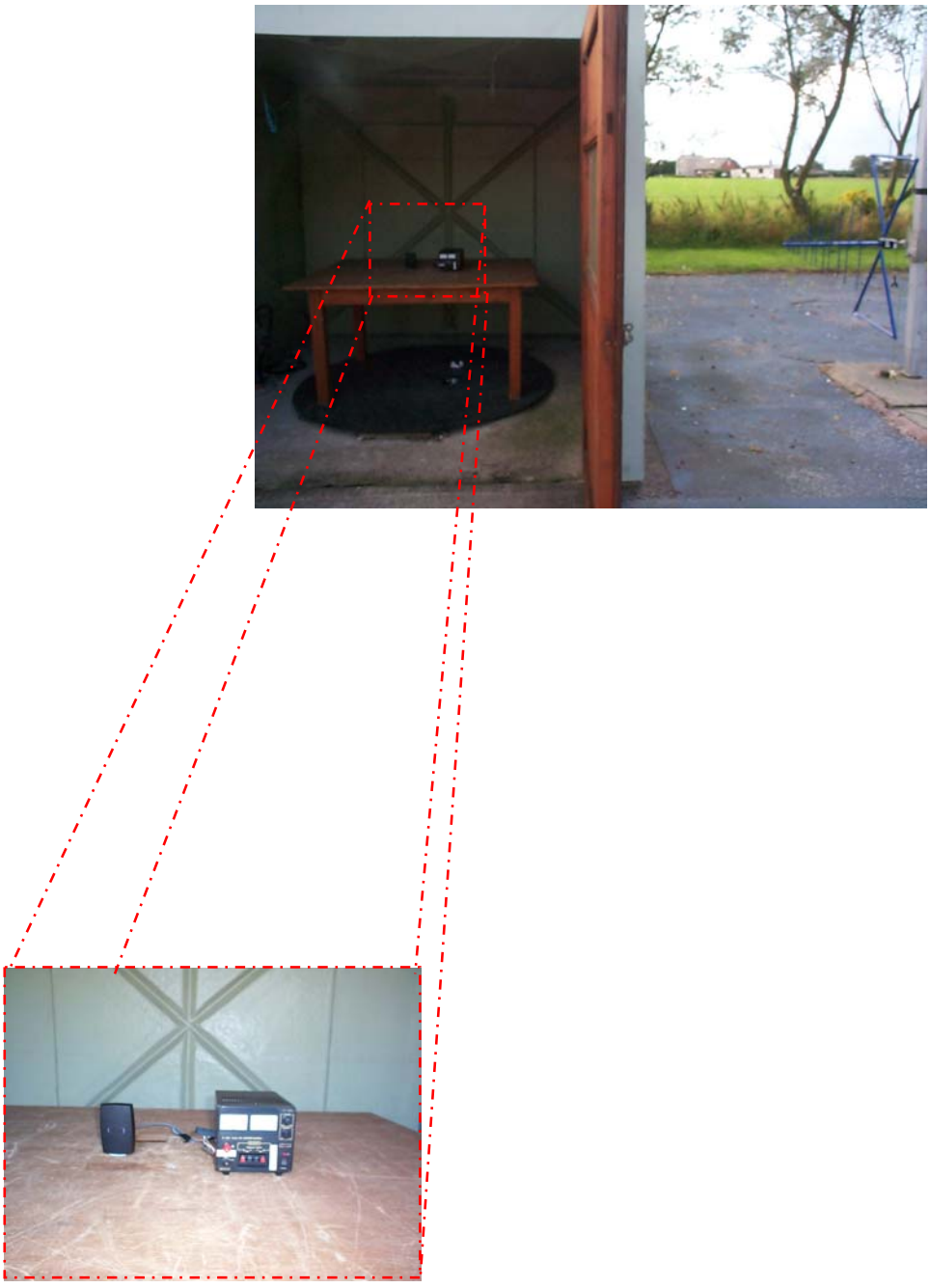
ANNEX A

PHOTOGRAPHS

PHOTOGRAPH No. 1 **TEST SETUP H FIELD**



PHOTOGRAPH No. 2 **TEST SETUP E FIELD**

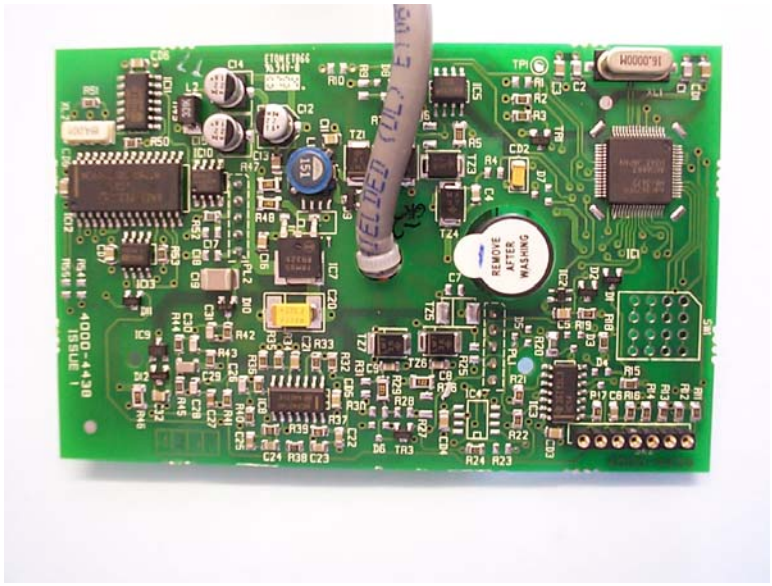


PHOTOGRAPH No. 3 **TRANSMITTER FRONT VIEW**

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

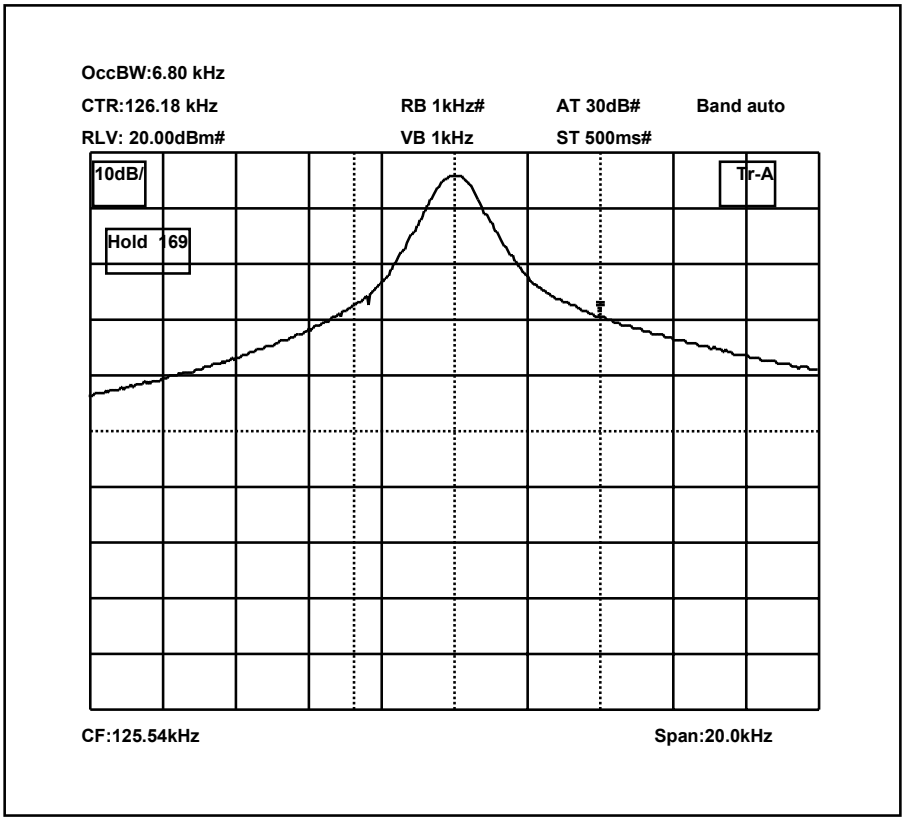
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

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)	-		[ ]
e.	LABELLING	-	PHOTOGRAPHS	[ ]
		-	DECLARATION	[X]
		-	DRAWINGS	[ ]
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



Occupied Bandwidth	=	6.80 kHz
Fl	=	122.760 kHz
Fh	=	129.560 kHz

ANNEX D

CONDUCTED EMISSIONS PLOT(s)

Powerline Conduction

09 Aug 2004 15:48

150kHz - 30MHz

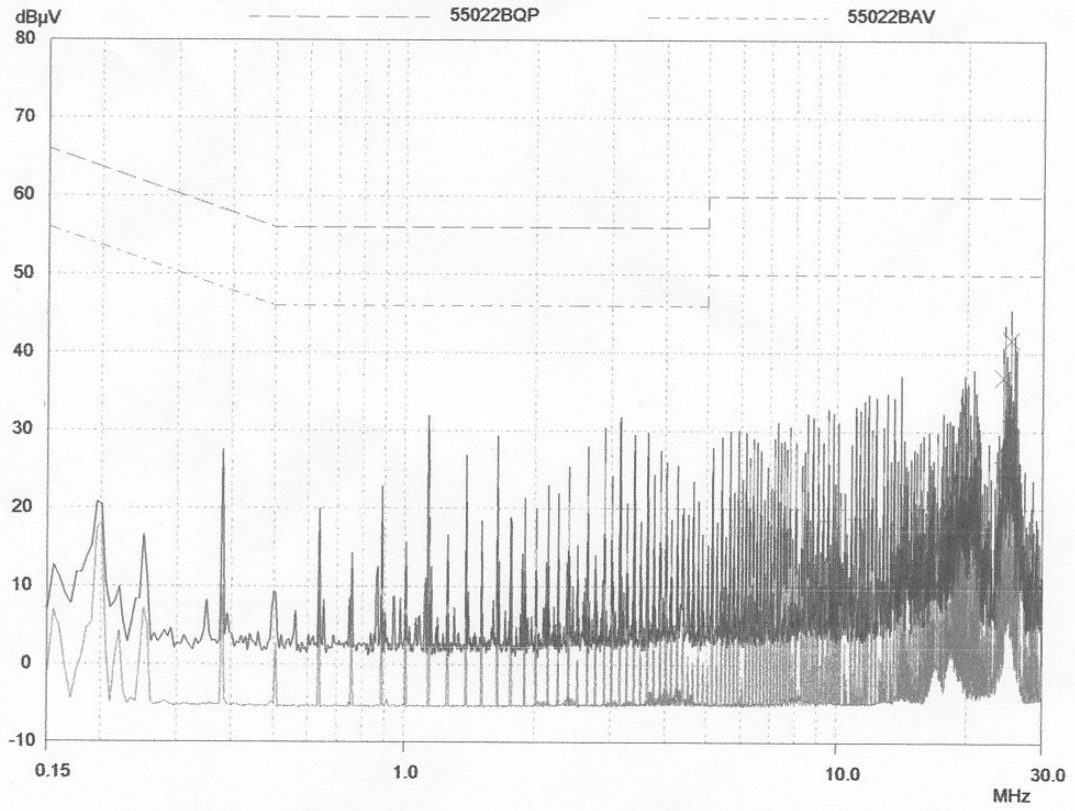
EUT:	S820
Manuf:	Group 4
Op Cond:	LISN UH195, cable UH21 & Receiver UH03
Operator:	D Winstanley
Test Spec:	FCC Part15
Comment:	Neutral Line. Card Present

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	5kHz	10kHz	PK+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



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Powerline Conduction

10 Aug 2004 08:24

150kHz - 30MHz

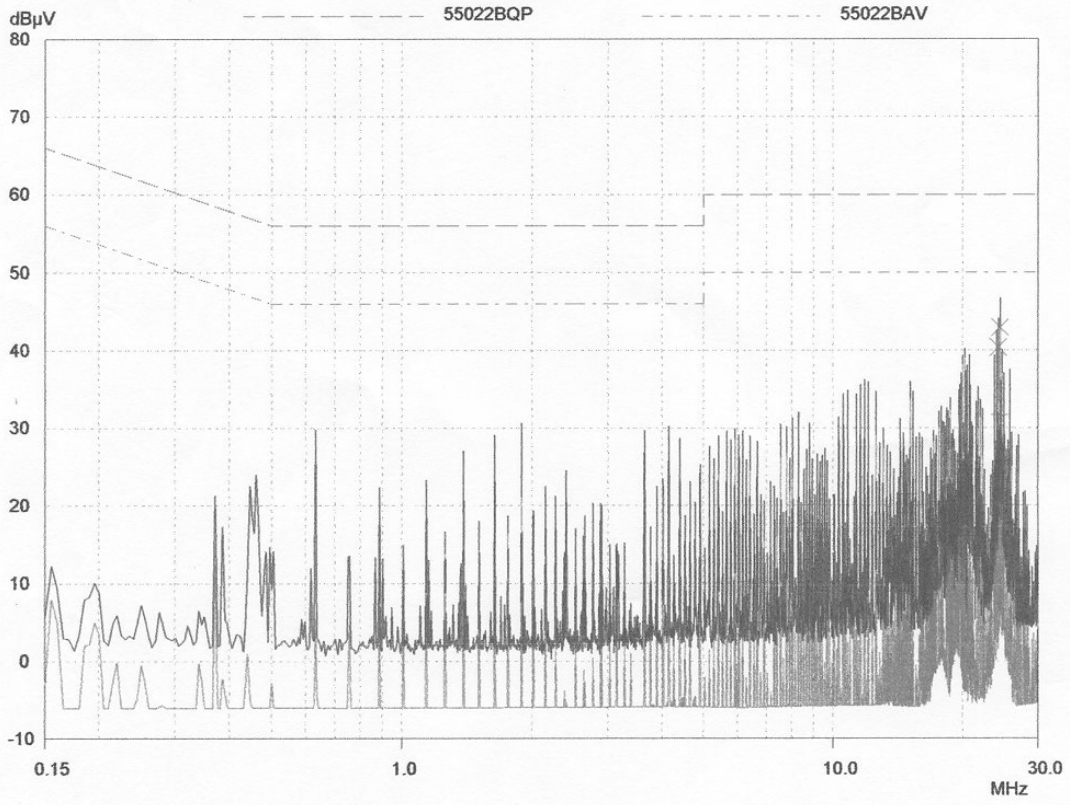
EUT:	S820
Manuf:	Group 4
Op Cond:	LISN UH195, cable UH21 & Receiver UH03
Operator:	D Winstanley
Test Spec:	FCC Part 15
Comment:	Live Line. Card Present

Scan Settings (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



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ANNEX E

150 kHz – 30MHz SCAN PLOT

H Field Pre Scan

11 Aug 2004 11:54

150kHz - 30 MHz

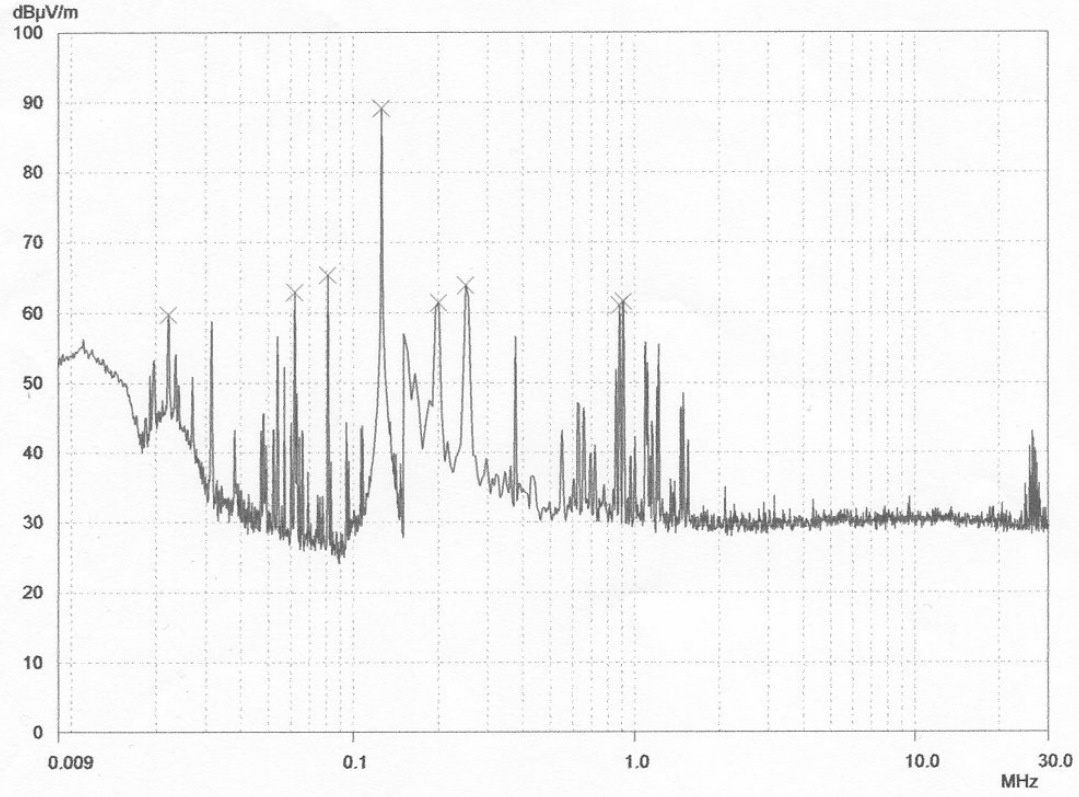
EUT:	S820
Manuf:	Group 4
Op Cond:	Pre Scan 150klHz - 30MHz
Operator:	D Winstanley
Test Spec:	FCC Part 15
Comment:	Uniy operating. No Card Present

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



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ANNEX F

30MHz – 1000MHz SCAN PLOT

TRL Compliance Services Ltd

06 Aug 2004 11:40

E-Field Radiation

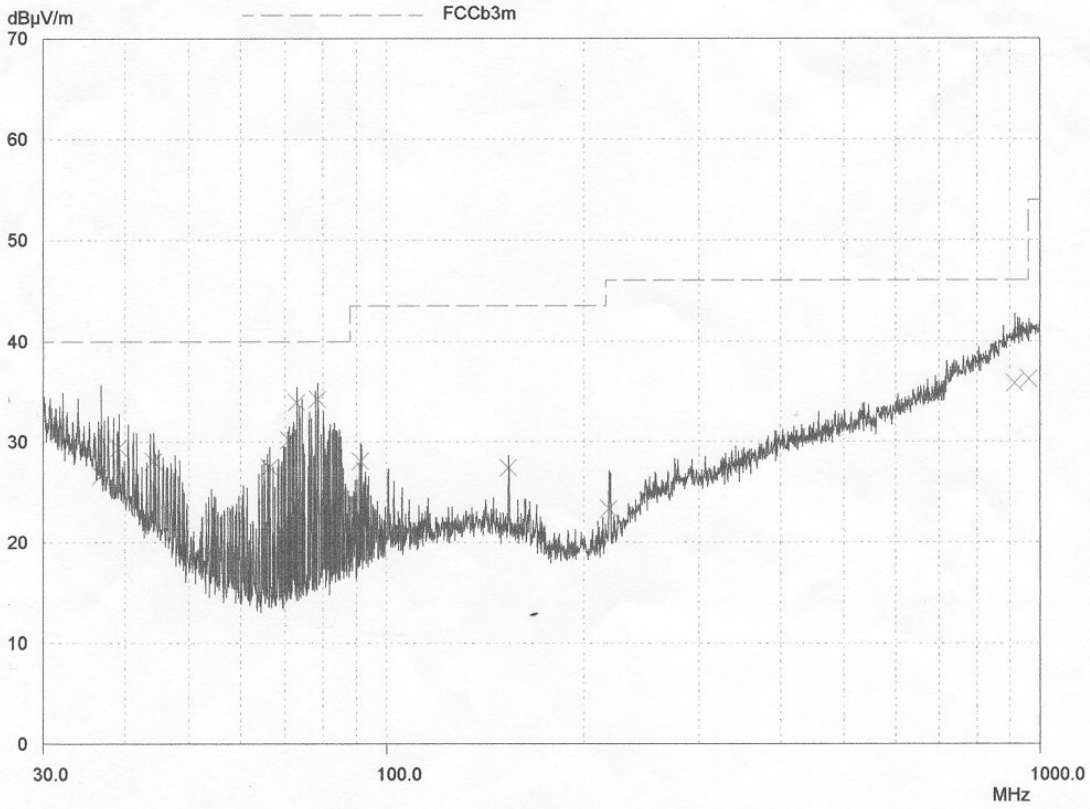
EUT:	S820
Manuf:	Group 4
Op Cond:	3m Indoor Prescan
Operator:	D Winstanley
Test Spec:	CFR47 FCC part 15.109 (Class B)
Comment:	No Tag Present

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	AntUH191

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



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