



TEST REPORT NO: RU1105/5382  
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ISSUE NO: 1  
FCC ID: RX5 - KWTX10

**REPORT ON THE CERTIFICATION TESTING OF A  
Kenton Electronics  
Midistream  
WITH RESPECT TO  
THE FCC RULES CFR 47, PART 15.249 December 2003  
INTENTIONAL RADIATOR SPECIFICATION**

TEST DATE: 15<sup>th</sup> March – 18<sup>th</sup> March 2004

TESTED BY: \_\_\_\_\_ J CHARTERS

APPROVED BY: \_\_\_\_\_ P GREEN  
EMC PRODUCT  
MANAGER

DATE: 22<sup>nd</sup> March 2004 \_\_\_\_\_

Distribution:

Copy Nos: 1. Kenton Electronics  
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FS 21805

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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: RX5 - KWTX10

PURPOSE OF TEST: Certification

TEST SPECIFICATION: THE FCC RULES CFR 47, PART 15.249 December 2003

TEST RESULT: Compliant to Specification

EQUIPMENT UNDER TEST: Midistream

EQUIPMENT SERIAL No: KWTX0002

ITU: EMISSION CODE: 150kF1D

PRODUCT USE: UHF Wireless MIDI System

CARRIER EMISSION: 28.184 mV/m @3m

ANTENNA TYPE: Integral

ALTERNATIVE ANTENNA: Not applicable

FREQUENCY OF OPERATION: 914.5 MHz

CHANNEL SPACING: Not applicable, wideband equipment

NUMBER OF CHANNELS: 1

FREQUENCY GENERATION: SAW Resonator  Crystal  Synthesiser

MODULATION METHOD: Amplitude  Digital  Angle

POWER SOURCE(s): +9 Vdc

TEST DATE(s): 15<sup>th</sup> March – 18<sup>th</sup> March 2004

ORDER No(s): 4758

APPLICANT: Kenton Electronics

ADDRESS: Brookfield House  
1 Station Road  
South Wimbledon  
London  
SW19 2LP

TESTED BY: J CHARTERS

APPROVED BY: \_\_\_\_\_ P GREEN  
EMC PRODUCT  
MANAGER

## APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT): Midistream

SERIAL NUMBER OF EUT: KWTX0002

PURPOSE OF TEST: Certification

TEST SPECIFICATION(s): THE FCC RULES CFR 47, PART 15.249 December 2003

TEST RESULT: COMPLIANT Yes  [X]  
No  [ ]

APPLICANT'S CATEGORY: MANUFACTURER  [X]  
IMPORTER DISTRIBUTOR  [ ]  
TEST HOUSE  [ ]  
AGENT  [ ]  
 [ ]

APPLICANT'S ORDER No(s): 4758

APPLICANT'S CONTACT PERSON(s): Mr John Price

E-mail address: jkp@kenton.co.uk

APPLICANT: Kenton Electronics

ADDRESS: Brookfield House  
1 Station Road  
South Wimbledon  
London  
SW19 2LP

MANUFACTURER: Kenton Electronics

TEL: +44 (0) 20 8544 9090

FAX: +44 (0) 20 8544 9300

EUT(s) COUNTRY OF ORIGIN: United Kingdom

TEST LABORATORY: TRL EMC

UKAS ACCREDITATION No: 0728

TEST DATE(s) 15<sup>th</sup> March – 18<sup>th</sup> March 2004

TEST REPORT No: RU1105/5382

## EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.	TEST/EXAMINATION	RULE PART	DETECTOR	APPLICABILITY
	Intentional Emission Frequency:	15.249(a)	Quasi Peak	YES
	Intentional Emission Field Strength:	15.249(a)	Quasi Peak	YES
	Intentional Emission Band Occupancy:	15.215	Peak	YES
	Intentional Emission ERP (mW):	N/A	-	NO
	Spurious Emissions – Conducted:	15.207	-	NO
	Spurious Emissions – Radiated <1000MHz:	15.209	Quasi Peak	YES
	Spurious Emissions – Radiated >1000MHz:	15.209 15.249(a)	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: UHF Wireless MIDI System

3. Emission Designator: 150kF1D

4. Duty Cycle: <100%

5. Transmitter bit or pulse rate and level: 100kbps

6. Temperatures: Ambient (T<sub>nom</sub>) 11.4°C

7. Supply Voltages: V<sub>nom</sub> +9Vdc

Note: V<sub>nom</sub> 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 & 15.249

Ambient temperature	=	11.4°C(<1GHz)	3m measurements <1GHz	[X]
Relative humidity	=	44 % (<1GHz),	0.3m measurements >1GHz	[X]
Conditions	=	Open Area Test Site (OATS)	3m extrapolated from 0.3m	[X]
Supply voltage	=	+9Vdc		
Channel number	=	1		

	FREQ. (MHz)	MEAS. Rx. (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACTOR	FIELD STRENGTH (dB $\mu$ V/m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH ( $\mu$ V/m)	LIMIT ( $\mu$ V/m)
30MHz - 88MHz								
88MHz - 216MHz								
216MHz - 960MHz								
960MHz - 1GHz								
1GHz - 5GHz	1829 2743(R) 3657(R)	28.14 25.33 23.54	0.67 0.74 0.85	27.3 29.0 31.8	56.11 55.07 56.19	20 20 20	63.90 56.89 64.49	500 500 500
Limits	1.705MHz to 30MHz		30 $\mu$ V/m @ 30m					
	30MHz to 88MHz		100 $\mu$ V/m @ 3m					
	88MHz to 216MHz		150 $\mu$ V/m @ 3m					
	216MHz to 960MHz		200 $\mu$ V/m @ 3m					
	960MHz to 1GHz		500 $\mu$ V/m @ 3m					
	1GHz to 5GHz		500 $\mu$ V/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 20dB from 0.3m to 3m, as per Part 15.31f
- 4 Measurements >1GHz @ 0.3m as per Part 15.31f(1)
- 5 Receiver detector >1GHz = CISPR, Quasi-Peak, 120kHz bandwidth
- 6 Receiver detector >1GHz = Average, 1MHz resolution bandwidth
- 7 New batteries used for battery powered products.
- 8 (R) Indicates restricted bands, as per Part 15.205
- 9 Results not within 10 dB's of limit are not necessarily recorded
- 10 See annex D for scan data

#### 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.  
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 test 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	<b>X</b>
SPECTRUM ANALYSER	TEKTRONIX	2756P	B010109	164	
BICONIC ANTENNA	CHASE	BBA9106	N/A	193	
ANTENNA, LOG PERIODIC 300MHz – 1GHz	CHASE	UPA6108	1061	203	
RECEIVER	ROHDE & SCHWARZ	ESHS20	837960/003	237	
ANTENNA, BICONIC 20MHz - 300MHz	CHASE	VBA6106A	1193	251	
BILOG ANTENNA	CHASE	CBL6112	2098	274	<b>X</b>
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	
RECEIVER	ROHDE & SCHWARZ	ESVS 10	841431/014	UH186	<b>X</b>
RANGE 1	TRL	3 METRE	N/A	UH06	<b>X</b>
AE, LOOP, Z2, 9kHz - 30MHz	ROHDE & SCHWARZ	HFH2	881058 - 53	07	
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	
SPECTRUM ANALYSER	ANRITSU	MS2665C99	MT26089	479	<b>X</b>

## TRANSMITTER TESTS

### TRANSMITTER INTENTIONAL EMISSION – RADIATED – Part 15.249

Ambient temperature	=	11.4 <sup>0</sup> C(<1GHz),	3m measurements @ fc	[X]
Relative humidity	=	44%(<1GHz),	10m measurements @ fc	[ ]
Conditions	=	Open Area Test Site (OATS)	30m measurements @ fc	[ ]
Supply voltage	=	+9Vdc	30m extrapolated from 3m	[ ]
Channel number	=	1	30m extrapolated from 10m	[ ]

FREQ. (MHz)	MEASUREMENT Rx. READING (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACTOR	FIELD STRENGTH (dB $\mu$ V/m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (mV/m)
914.5	61.0	4	24.0	89	-	28.184
Limit value @ fc			50 (mV/m)			
Band occupancy @ spurious limit value		f lower		f higher		
		914.4038		914.5242		

See spectrum analyser plot – Annex C

**Notes:**

- 1 Results quoted are extrapolated as indicated
- 2 Receiver detector @ fc = Quasi Peak 120kHz bandwidth
- 3 When battery powered the EUT was powered with new batteries

**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.  
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 15.249 test 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	
BICONIC ANTENNA	CHASE	BBA9106	N/A	193	
ANTENNA, LOG PERIODIC 300MHz – 1GHz	CHASE	UPA6108	1061	203	
RECEIVER	ROHDE & SCHWARZ	ESHS20	837960/003	237	
ANTENNA, BICONIC 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	
RECEIVER	ROHDE & SCHWARZ	ESVS 10	841431/014	UH186	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	

**ANNEX A**  
**PHOTOGRAPHS**

PHOTOGRAPH No. 1

**TEST SETUP**



PHOTOGRAPH No. 2

**TRANSMITTER FRONT VIEW**



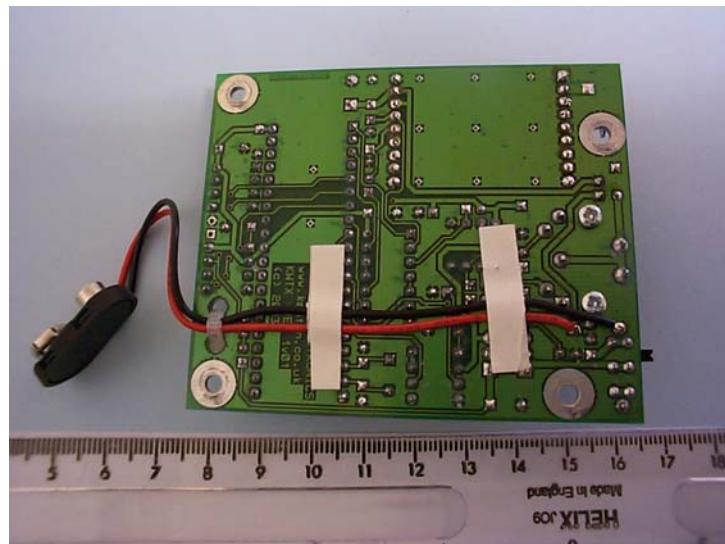
PHOTOGRAPH No. 3

**TRANSMITTER REAR VIEW**



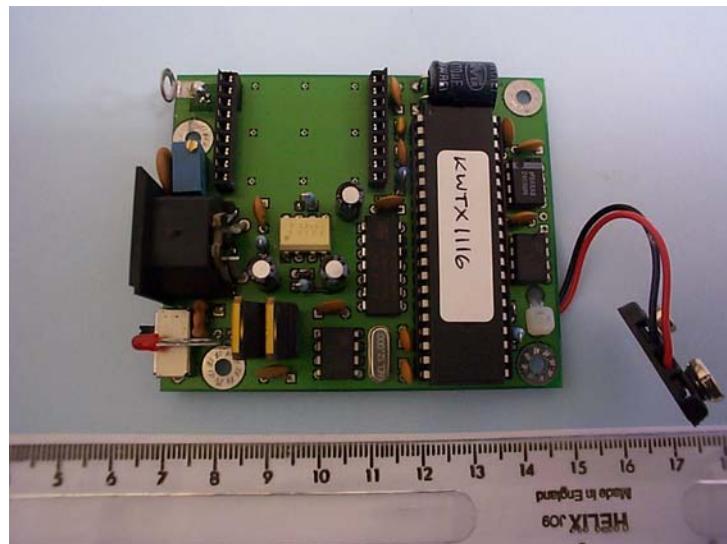
PHOTOGRAPH No. 4

## TRANSMITTER PCB TRACK SIDE



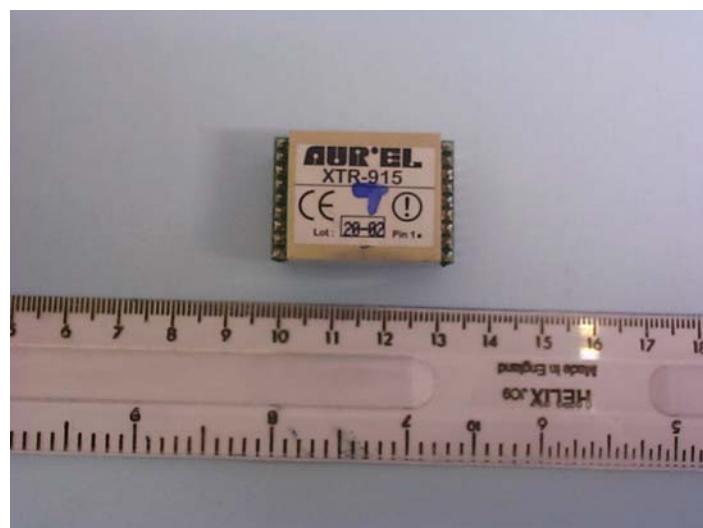
PHOTOGRAPH No. 5

**TRANSMITTER PCB COMPONENT SIDE**



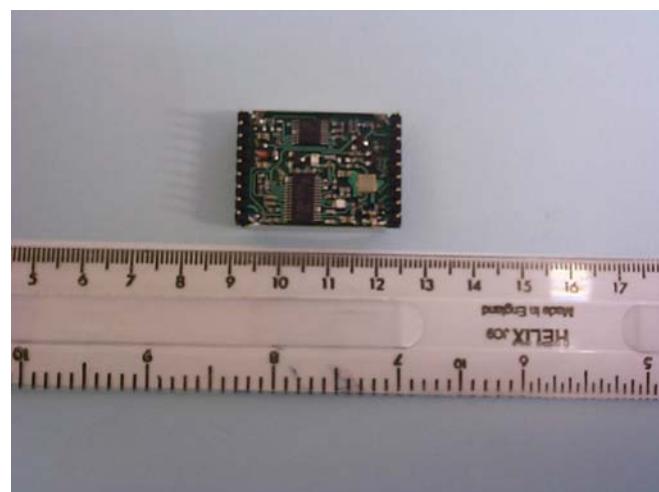
PHOTOGRAPH No. 6

**RF MODULE TOP SIDE**



PHOTOGRAPH No. 7

**RF MODULE BOTTOM SIDE**



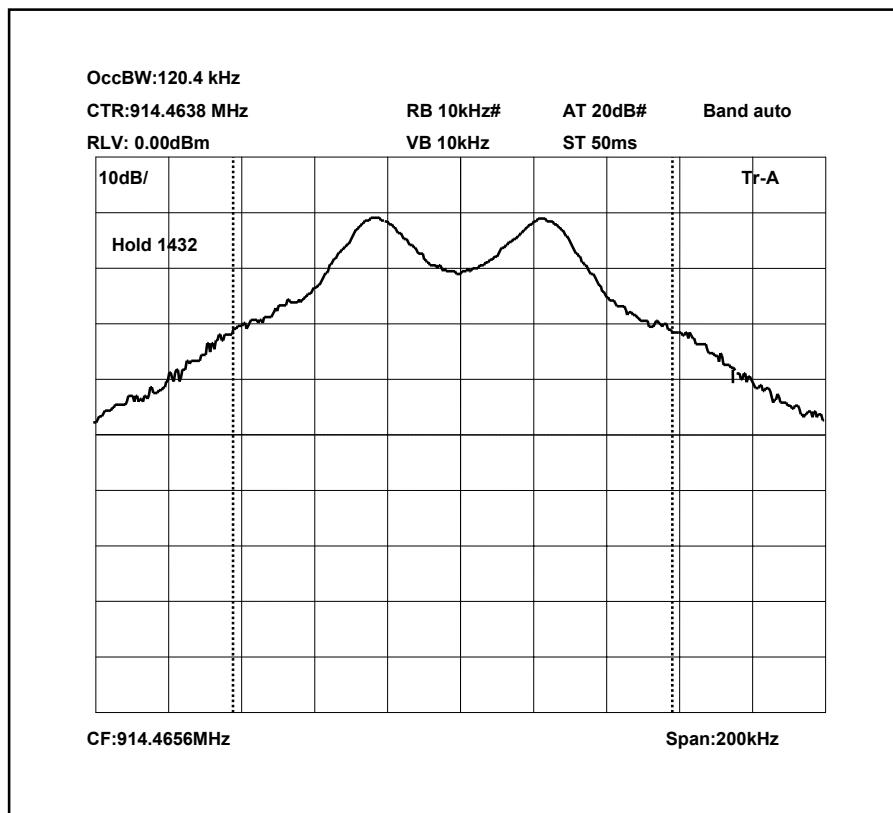
**ANNEX B**  
**APPLICANT'S SUBMISSION OF DOCUMENTATION LIST**

## APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

a.	TCB	-	APPLICATION	[X]
		-	FEE	[X]
b.	AGENT'S LETTER OF AUTHORISATION	-		[X]
c.	MODEL(s) vs IDENTITY	-		[ ]
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



$$f_{\text{occ bw}} @ -20 \text{ dB} = 120 \text{ kHz}$$

$$f_I = 914.4038 \text{ MHz}$$

$$f_h = 914.5242 \text{ MHz}$$

**ANNEX D**  
**SCAN DATA**

## E-Field Radiation

EUT: MidSTREAM  
 Manuf: Kenton  
 Op Cond: 3m Indoor Prescan  
 Operator: D Winstanley  
 Test Spec: CFR47 FCC part 15.109 (Class B)  
 Comment: Unit Transmitting, Maximum modulation, Front Face  
 Antena Vertical

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

