TEST REPORT NO: RU1242/7026

COPY NO: 1

ISSUE NO: 1

FCC IDS: G2X-6460409A

REPORT ON THE CERTIFICATION TESTING OF A
TUNSTALL TELECOM Ltd
FLOOD SENSOR
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.231 February 2006
INTENTIONAL RADIATOR SPECIFICATION

TEST DATE: 19th – 26th May 2006

TESTED BY: Daniel Winstanley Digitally signed by Daniel Winstanley DN: CN = Daniel Winstanley, C = <n Reason: I am the author of this document Date: 2006.06.12 10:51:29 +01'00' D WINSTANLEY

APPROVED BY: Peter Green I am approving this document 2006.06.12 14:43:55 +01'00' P GREEN EMC PRODUCT MANAGER

DATE: 12th June 2006

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UKAS TESTING
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:	G2X-6460409A
PURPOSE OF TEST:	Certification
TEST SPECIFICATION:	FCC RULES CFR 47, Part 15.231 February 2006
TEST RESULT:	Compliant to Specification
EQUIPMENT UNDER TEST:	Flood Sensor
EQUIPMENT SERIAL No:	1706003
ITU: EMISSION CODE:	20k5F1D
EQUIPMENT TYPE:	Flood Sensor
PRODUCT USE:	Personal Care Monitoring & Alarm System
CARRIER EMISSION:	3273.4 µV/m @ 3m
ANTENNA TYPE:	Integral
ALTERNATIVE ANTENNA:	Not Applicable
FREQUENCY OF OPERATION:	312 MHz
CHANNEL SPACING:	Not applicable, wideband
NUMBER OF CHANNELS:	1
FREQUENCY GENERATION:	SAW Resonator [ ] Crystal [X] Synthesiser [ ]
MODULATION METHOD:	Amplitude [ ] Digital [X] Angle [ ]
POWER SOURCE(s):	+3Vdc
TEST DATE(s):	19th – 26th May 2006
ORDER No(s):	57359
APPLICANT:	Tunstall Telecom Ltd
ADDRESS:	Whitley Lodge Whitley Bridge Yorkshire DN14 0HR

TESTED BY: Daniel Winstanley — Digitally signed by Daniel Winstanley DN: CN = Daniel Winstanley, C = <n Reason: I am the author of this document Date: 2006.06.12 10:51:21 +01'00' — D WINSTANLEY

APPROVED BY: Peter Green I am approving this document 2006.06.12 14:44:09 +01'00' — P GREEN EMC PRODUCT MANAGER

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	Flood Sensor
EQUIPMENT TYPE:	Flood Monitoring Sensor
SERIAL NUMBER OF EUT:	1706003
PURPOSE OF TEST:	Certification
TEST SPECIFICATION(s):	FCC RULES CFR 47, Part 15.231 February 2006
TEST RESULT:	COMPLIANT Yes [X] No [ ]
APPLICANT'S CATEGORY:	MANUFACTURER [X] IMPORTER [ ] DISTRIBUTOR [ ] TEST HOUSE [ ] AGENT [ ]
APPLICANT'S ORDER No(s):	57359
APPLICANT'S CONTACT PERSON(s):	Mr C Marcus
E-mail address:	C_MARCUS@tunstall.co.uk
APPLICANT:	Tunstall Telecom Ltd
ADDRESS:	Whitley Lodge Whitley Bridge Yorkshire DN14 0HR
TEL:	+44 (0) 1977 661234
FAX:	+44 (0) 1977 662452
EUT(s) COUNTRY OF ORIGIN:	United Kingdom
TEST LABORATORY:	TRL Compliance
UKAS ACCREDITATION No:	0728
TEST DATE(s):	19th – 26th May 2006
TEST REPORT No:	RU1242/7026

EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.

TEST/EXAMINATION	RULE PART	DETECTOR	APPLICABILITY
Intentional Emission Frequency:	15.231(b)	Quasi Peak	Yes
Intentional Emission Field Strength:	15.231(b)	Quasi Peak	Yes
Intentional Emission Band Occupancy:	15.231(c)	Peak	Yes
Intentional Emission ERP (mW):	-	-	No
Spurious Emissions – Conducted:	15.207	-	No
Spurious Emissions – Radiated <1000MHz:	15.231(b) 15.209	Quasi Peak	Yes
Spurious Emissions – Radiated >1000MHz:	15.231(b) 15.209	Peak Average	Yes
Maximum Frequency of Search:	15.33	-	Yes
Antenna Arrangements Integral:	15.203	-	Yes
Antenna Arrangements External Connector:	15.204	-	N/A
Restricted Bands	15.205	-	Yes
Extrapolation Factor	15.31(f)	-	Yes

2. Product Use: Personal Care Monitoring & Alarm System

3. Emission Designator: 20k5F1D

4. Duty Cycle: <100%

5. Transmitter bit or pulse rate and level: 1000bps

6. Temperatures: Ambient (Tnom) 14^{o}C

7. Supply Voltages: Vnom +3Vdc

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	=	14°C(<1GHz)	3m measurements <1GHz	[X]
Relative humidity	=	35% (<1GHz),	0.3m measurements >1GHz	[X]
Conditions	=	Open Area Test Site (OATS)	3m extrapolated from 0.3m	[X]
Supply voltage	=	+3Vdc		
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)
30MHz - 88MHz								
88MHz - 216MHz								
216MHz - 960MHz								
960MHz - 1GHz								
1GHz - 5GHz	1248.006	22.96	0.30	24.3	47.56	20	23.8	592
	1560.080	29.36	0.30	25.5	55.16	20	57.3	592
	1872.010	21.55	0.31	26.0	47.86	20	24.7	592
	2184.016	21.69	0.39	27.8	49.88	20	31.2	592
	2496.010(r)	26.93	0.53	28.0	55.46	20	59.3	500

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

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 = Peak Hold, 1MHz resolution bandwidth.
7 New batteries used for battery powered products.
8 Due to the transmitted signal lasting only 1.8 seconds a unit with modified software, which allowed continuous transmission, was used during spurious emissions testing.
10 (r) Denotes restricted band .
11 Spurious limit level of 592 µV/m was calculated by reducing the fundamental limit level by 20 dB, as per 15.231(b).
12 Only emissions within 20 dB's of the limit are recorded.

Test Method:

1 As per Radio – Noise Emissions, ANSI C63.4: 2003
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 orthagonal planes.
Maximum results recorded.

The test equipment used for the Transmitter Spurious Emissions – Radiated – Part 15.209 test are shown below:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
HORN ANTENNA	EMCO	3115	9010-3580	138	**X**
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	**X**
RANGE 1	TRL	3 METRE	N/A	UH06	**X**
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	**X**
RECEIVER	ROHDE & SCHWARZ	ESVS 10	841431/014	UH186	**X**
PRE AMP	AGILENT	8449B	3008A01610	TRL572	**X**

TRANSMITTER TESTS

TRANSMITTER INTENTIONAL EMISSION – RADIATED – Part 15.231 February 2006

Ambient temperature	=	14°C(<1GHz),	3m measurements @ fc	[X]
Relative humidity	=	35%(<1GHz),	10m measurements @ fc	[ ]
Conditions	=	Open Area Test Site (OATS)	30m measurements @ fc	[ ]
Supply voltage	=	+3Vdc	30m extrapolated from 3m	[ ]
Channel number	=	1	30m extrapolated from 10m	[ ]

EUT	**FREQ (MHz)**	**MEASUREMENT Rx. READING (dBµV)**	**CABLE LOSS (dB)**	**ANT FACTOR**	**FIELD STRENGTH (dBµV/m)**	**FIELD STRENGTH (µV/m)**
Flood Sensor	312	54.9	2.07	13.33	70.3	3273.4
Limit value @ fc		**5916.7 (µV/m)**				
Band occupancy @ -20dBc		**f lower**		**f higher**		
		311.99640 MHz		312.0172 MHz		
		Occupied Bandwidth		**Limit**		
		20.8 kHz		780 kHz		
Transmitter on time during automatic transmission		1.8 Seconds				

For band occupancy see spectrum analyser plots – Annex C
For transmitter timing pulses see oscilloscope plots – Annex D

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.
4. Due to the transmitted signal lasting only 1.80 seconds a unit with modified software, which allowed continuous transmission, was used during the carrier power testing.
5. The EUT has no does not utilise supervisions transmissions as per 15.231(a)(3).

Test Method:
1. As per Radio – Noise Emissions, ANSI C63.4: 2003.
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 orthagonal planes.
   Maximum results recorded.

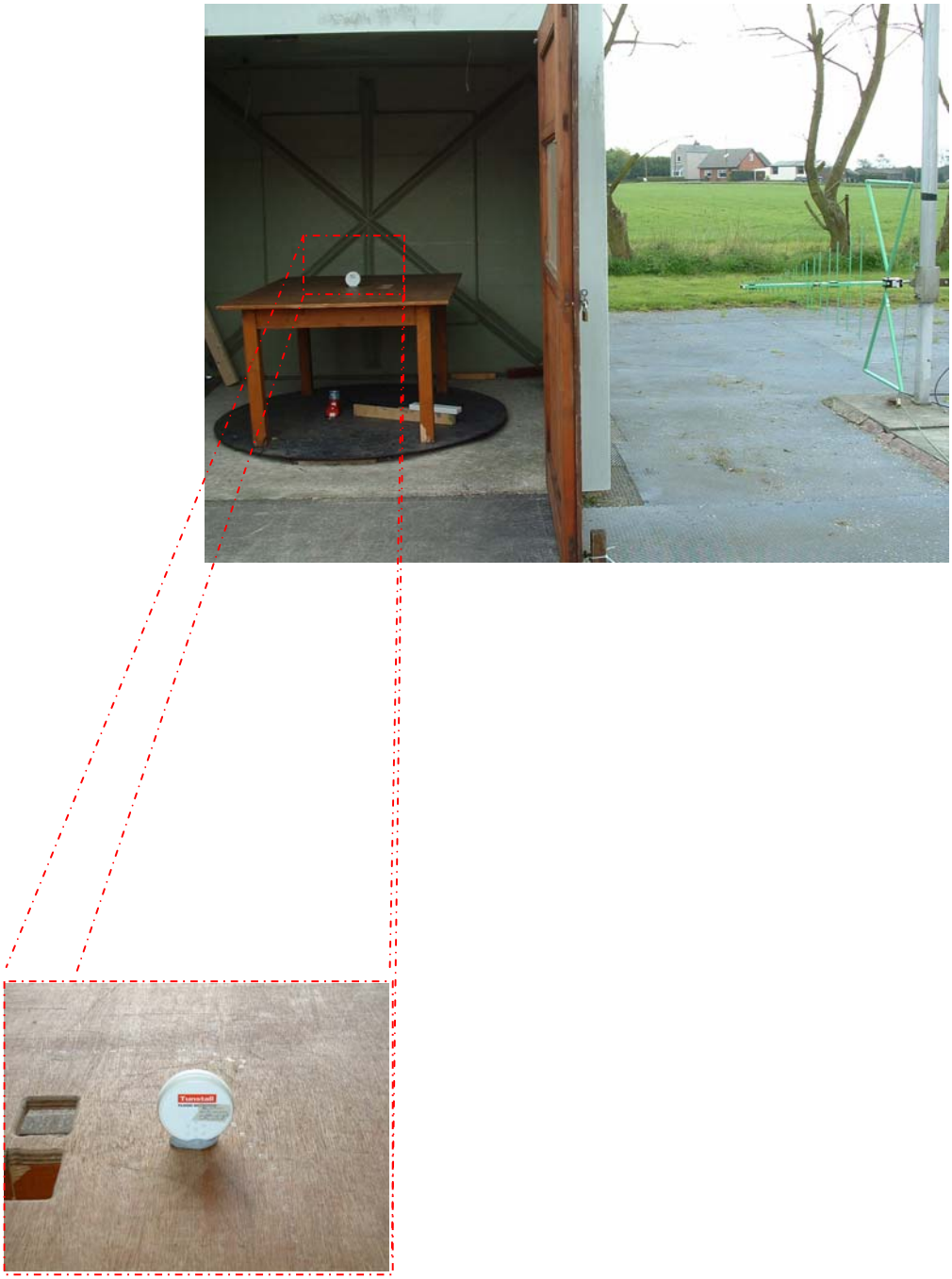
The test equipment used for the Transmitter Intentional Emission – Radiated – Part 15.231 February 2006 test is shown overleaf:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
HORN ANTENNA	EMCO	3115	9010-3580	138	
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	
RANGE 1	TRL	3 METRE	N/A	UH06	**X**
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	**X**
OSCILLOSCOPE	TEKTRONIX	TDS520B	B020491	UH122	**X**
RECEIVER	ROHDE & SCHWARZ	ESVS 10	841431/014	UH186	**X**

ANNEX A

PHOTOGRAPHS

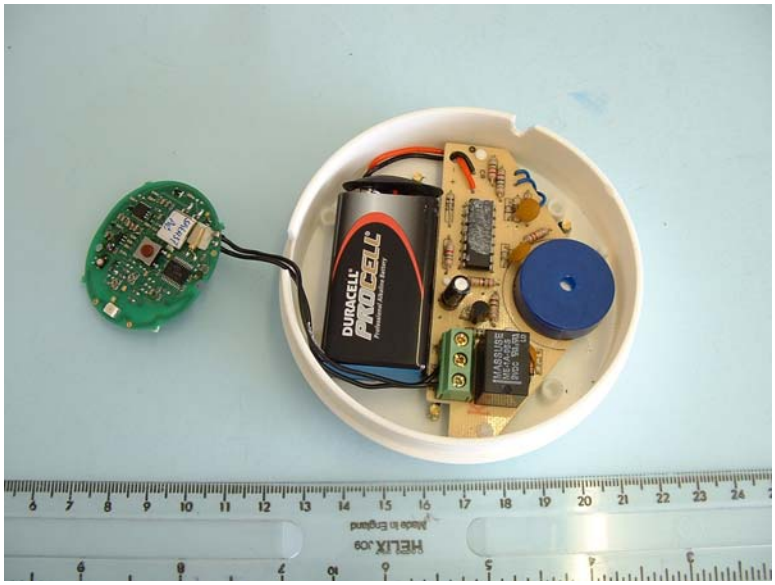
PHOTOGRAPH No. 1 **TEST SETUP**



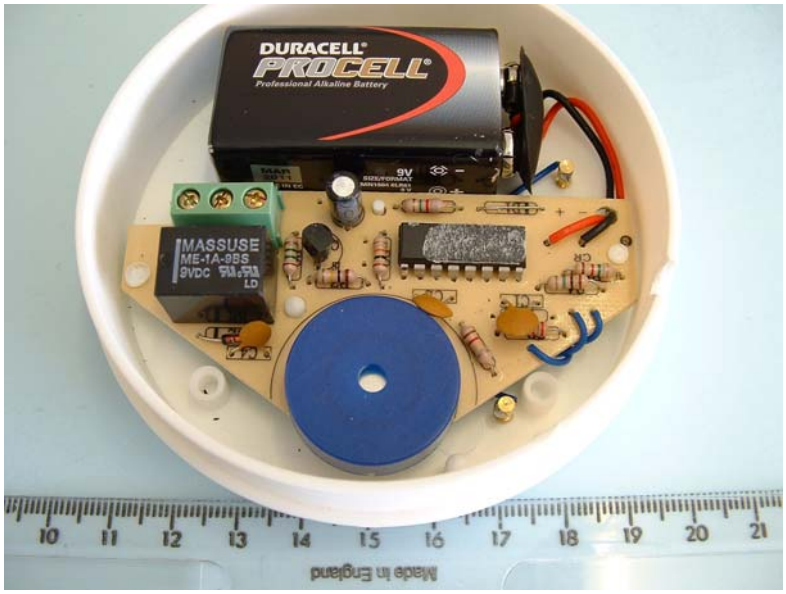
PHOTOGRAPH No. 2 **TOP VIEW**

PHOTOGRAPH No. 3 **BOTTOM VIEW**

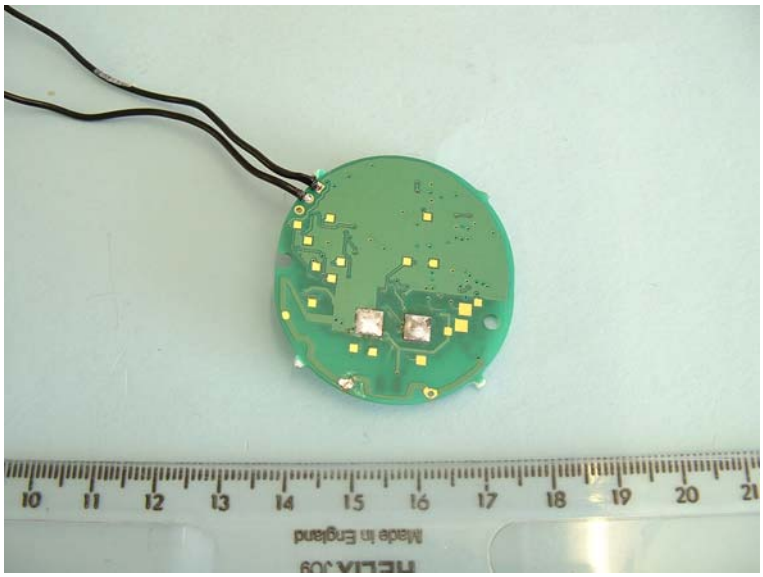
PHOTOGRAPH No. 4 **CONTROL PCB & TRANSMITTER PCB**



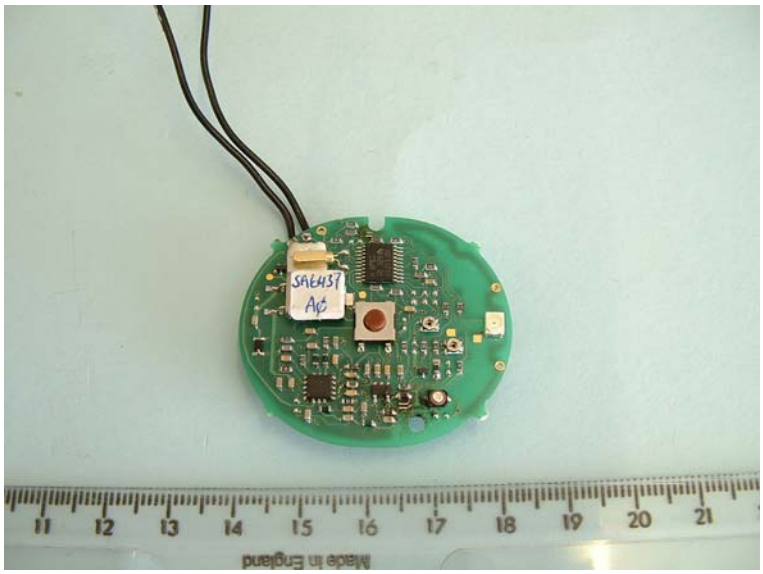
PHOTOGRAPH No. 5 **CONTROL PCB COMPONENT SIDE**



PHOTOGRAPH No. 6 **RF PCB TRACK SIDE BATTERY REMOVED**



PHOTOGRAPH No. 7 **RF PCB COMPONENT SIDE**



ANNEX B

APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

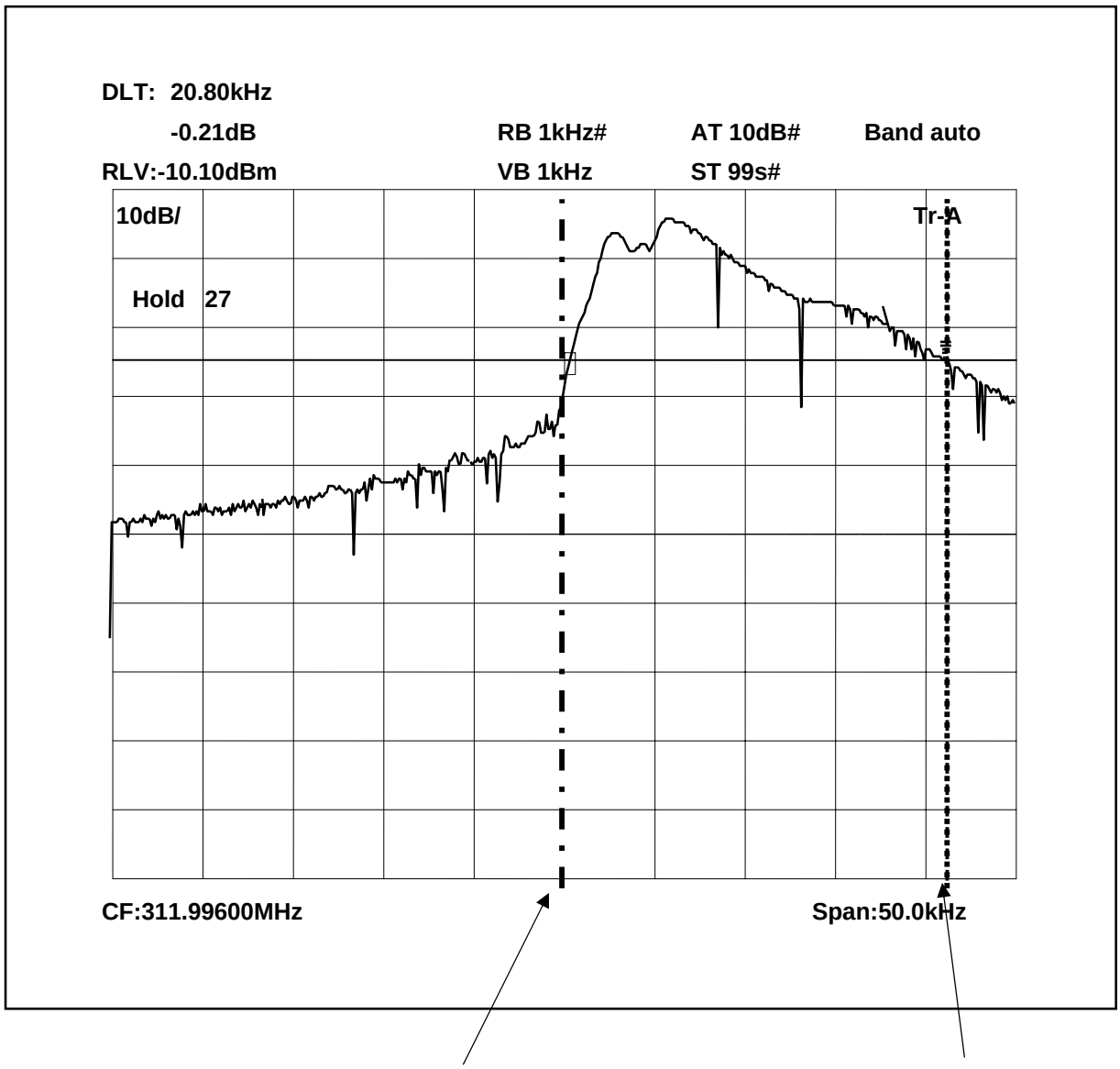
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

a.	TCB	-	APPLICATION	[X]
		-	FEE	[X]
b.	AGENT'S LETTER OF AUTHORISATION	-		[X]
c.	MODEL(s) vs IDENTITY	-		[ ]
d.	ALTERNATIVE TRADE NAME DECLARATION(s)	-		[ ]
e.	LABELLING	-	PHOTOGRAPHS	[X]
		-	DECLARATION	[ ]
		-	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

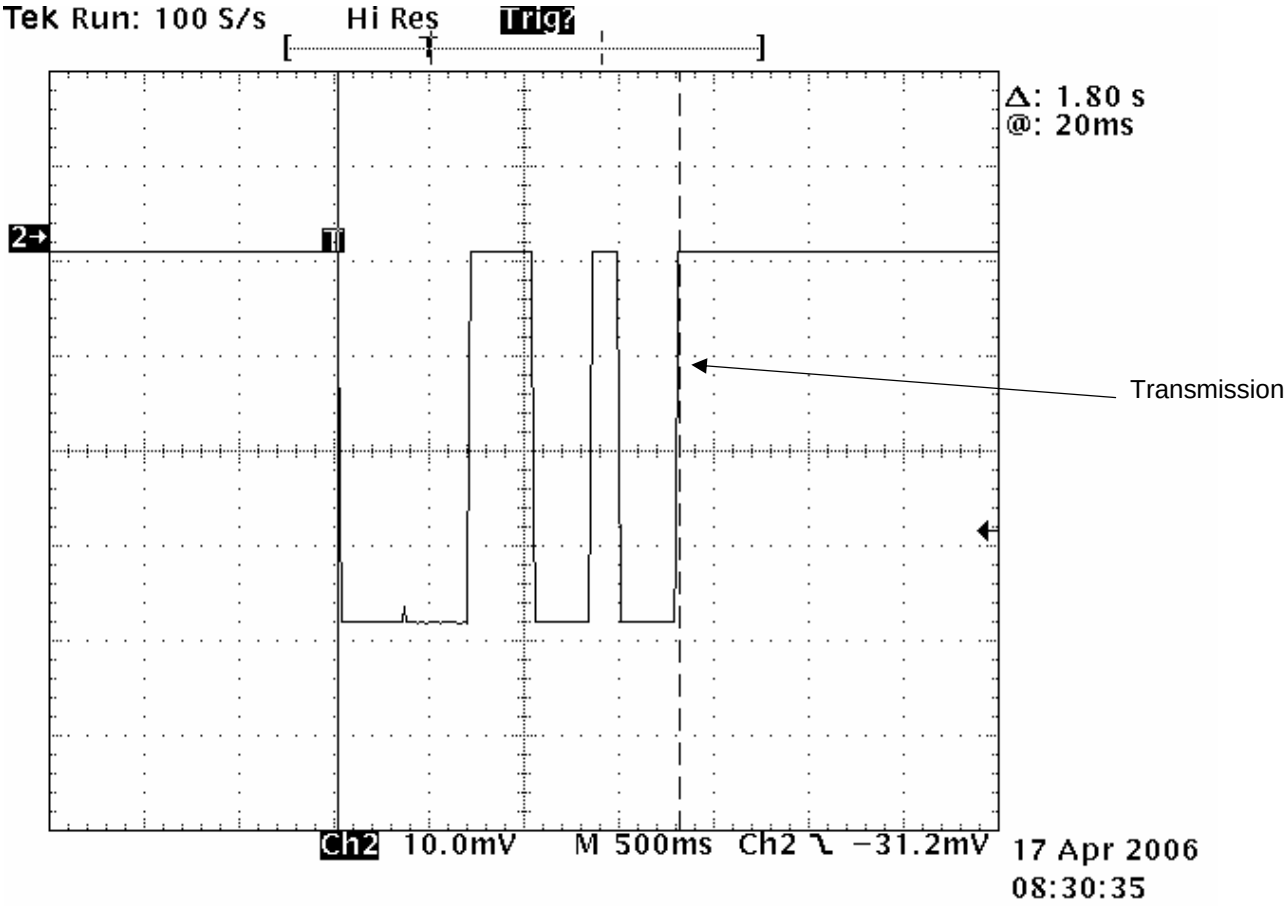


Occupied bandwidth = 20.8 kHz
f lower = 311.99640 MHz
f higher = 312.0172MHz

ANNEX D

TRANSMITTER TIMING PULSES

Single Transmission Triggered By Flood



TX on time = 1.8sec

The flood detector does not poll out a regular periodic transmission as per 15.231(a)(3). The pulse shown above occurs during the detector being triggered by a flood (alarm) condition. The pulse occurs once and is not repeated at regular intervals. The pulse only reoccurs if the flood (alarm) condition is removed from the detectors sensors and another flood (alarm) condition occurs.

ANNEX E

EQUIPMENT CALIBRATION

TRL Number	Equipment Type	Manufacturer	Last Cal Calibration	Calibration Period	Due For Calibration
UH006	3m Range ERP CAL	TRL	06/01/2006	12	06/01/2007
UH028	Log Periodic Ant	Schwarbeck	28/04/2005	24	28/04/2007
UH029	Bicone Antenna	Schwarbeck	27/04/2005	24	27/04/2007
UH041	Multimeter	AVOmeter	20/12/2005	12	20/12/2006
UH093	Bilog Antenna	Schaffner	19/08/2006	24	19/08/2008
UH122	Oscilloscope	Tektronix	07/06/2005	24	07/06/2007
UH132	Power meter	Marconi	03/01/2006	12	03/01/2007
UH162	ERP Cable Cal	TRL	06/01/2006	12	06/01/2007
UH228	Power Sensor	Marconi	03/01/2006	12	03/01/2007
UH253	1m Cable N type	TRL	23/02/2006	12	23/02/2007
UH254	1m Cable N type	TRL	05/01/2006	12	05/01/2007
UH265	Notch filer	Telonic	24/06/2005	12	24/06/2006
UH271	1m Cable N type	TRL	23/02/2006	12	23/02/2007
UH273	1m Cable N type	TRL	23/02/2006	12	23/02/2007
L005	CMTA	R&S	05/12/2005	12	05/12/2006
L007	Loop Antenna	R&S	29/03/2005	24	29/03/2007
L138	1-18GHz Horn	EMCO	15/04/2005	24	15/04/2007
L139	1-18GHz Horn	EMCO	03/05/2005	24	03/05/2007
L176	Signal Generator	Marconi	15/02/2006	12	15/02/2007
L193	Bicone Antenna	Chase	12/10/2003	24	12/10/2005
L203	Log Periodic Ant	Chase	21/10/2003	24	21/10/2005
L254	Signal Generator	Marconi	04/01/2006	12	04/01/2007
L280	18GHz Cable	Rosenberger	05/01/2006	12	05/01/2007
L343	CCIR Noise Filter	TRL	07/06/2005	12	07/06/2006
L426	Temperature Indicator	Fluke	04/01/2006	12	04/01/2007
L479	Analyser	Anritsu	18/11/2005	12	18/11/2006
L552	Signal Generator	Agilent	25/04/2005	12	25/04/2006
N/A	High Pass Filter	AFL	23/02/2006	12	23/02/2007

ANNEX F

MEASUREMENT UNCERTAINTY

Radio Testing – General Uncertainty Schedule

All statements of uncertainty are expanded standard uncertainty using a coverage factor of 1.96 to give a 95% confidence where no required test level exists.

[1] Adjacent Channel Power

Uncertainty in test result = **1.86dB**

[2] Carrier Power

Uncertainty in test result (Equipment - TRLUH120) = **2.18dB**
Uncertainty in test result (Equipment – TRL05) = **1.08dB**
Uncertainty in test result (Equipment – TRL479) = **2.48dB**

[3] Effective Radiated Power

Uncertainty in test result = **4.71dB**

[4] Spurious Emissions

Uncertainty in test result = **4.75dB**

[5] Maximum frequency error

Uncertainty in test result (Equipment - TRLUH120) = **119ppm**
Uncertainty in test result (Equipment – TRL05) = **0.113ppm**
Uncertainty in test result (Equipment – TRL479) = **0.265ppm**

[6] Radiated Emissions, field strength OATS 14kHz-18GHz Electric Field

Uncertainty in test result (14kHz – 30MHz) = **4.8dB**, Uncertainty in test result (30MHz – 1GHz) = **4.6dB**, Uncertainty in test result (1GHz-18GHz) = **4.7dB**

[7] Frequency deviation

Uncertainty in test result = **3.2%**

[8] Magnetic Field Emissions

Uncertainty in test result = **2.3dB**

[9] Conducted Spurious

Uncertainty in test result (Equipment TRL479) Up to 8.1GHz = **3.31dB**
Uncertainty in test result (Equipment TRL479) 8.1GHz – 15.3GHz = **4.43dB**
Uncertainty in test result (Equipment TRL479) 15.3GHz – 21GHz = **5.34dB**
Uncertainty in test result (Equipment TRLUH120) Up to 26GHz = **3.14dB**

[10] Channel Bandwidth

Uncertainty in test result = **15.5%**

[11] Amplitude and Time Measurement – Oscilloscope

Uncertainty in overall test level = **2.1dB**, Uncertainty in time measurement = **0.59%,** Uncertainty in Amplitude measurement = **0.82%**

[11] Power Line Conduction

Uncertainty in test result = **3.4dB**