TEST REPORT NO: RU1242/6987

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FCC IDS: G2X-41004A

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

TEST DATE: 2nd – 8th 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 10:49:15 +01'00' D WINSTANLEY

APPROVED BY: Peter Green I am approving this document 2006.06.12 14:37:44 +01'00' P GREEN
EMC PRODUCT MANAGER

DATE: 12th June 2006

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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:	G2X-41004A
PURPOSE OF TEST:	Certification
TEST SPECIFICATION:	FCC RULES CFR 47, Part 15.231 February 2006
TEST RESULT:	Compliant to Specification
EQUIPMENT UNDER TEST:	Wandering Detector Occupancy Sensor Enuresis Sensor
EQUIPMENT SERIAL No:	1706001 & 1706002
ITU: EMISSION CODE:	25k6F1D
EQUIPMENT TYPE:	Monitoring sensors
PRODUCT USE:	Personal Care Monitoring & Alarm System
CARRIER EMISSION:	5821.0 µV/m (Enuresis Sensor – Worst case emission)
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):	+6Vdc
TEST DATE(s):	2nd – 8th 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 10:49:05 +01'00' D WINSTANLEY
APPROVED BY:	Peter Green I am approving this document 2006.06.12 14:37:54 +01'00' P GREEN EMC PRODUCT MANAGER

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	Wandering Detector Occupancy Sensor Enuresis Sensor
EQUIPMENT TYPE:	Monitoring sensors
SERIAL NUMBER OF EUT:	1706001 & 1706002
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)	2nd – 8th May 2006
TEST REPORT No:	RU1242/6987

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	Quasi 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: 25k6F1D

4. Duty Cycle: <100%

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

6. Temperatures: Ambient (Tnom) 16^{o}C

7. Supply Voltages: Vnom +6Vdc

   Note: Vnom voltages are as stated above unless otherwise shown on the test report page

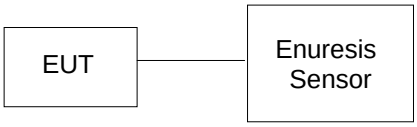
8. Equipment Category:
   Single channel [X]
   Two channel [ ]
   Multi-channel [ ]

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

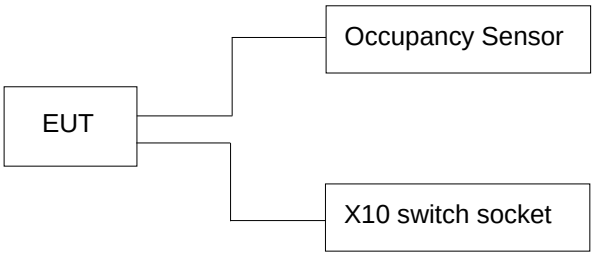
The 3 models, tested under this report differ in the connected peripherals only. The PCBs and RF circuitry for all 3 models are the same. As the units are identical the FCC ID used is the same with a variation of model number according to the sensor(s) utilised. See configuration diagrams on next page.

Configuration diagrams

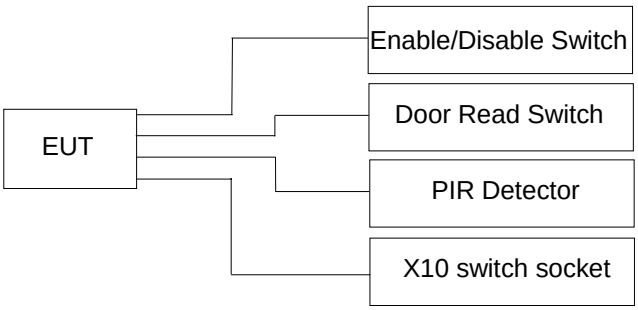
Enuresis Sensor



Occupancy Sensor



Wanderer Detector



TRANSMITTER TESTS

TRANSMITTER SPURIOUS EMISSIONS – RADIATED – PART 15.209

Ambient temperature	=	16°C(<1GHz)	3m measurements <1GHz	[X]
Relative humidity	=	48% (<1GHz),	0.3m measurements >1GHz	[X]
Conditions	=	Open Area Test Site (OATS)	3m extrapolated from 0.3m	[X]
Supply voltage	=	+6Vdc		
Channel number	=	1		

Wandering Detector	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	624.00	23.15	3.1	18.75	45.0	-	177.8	592
	936.00	26.20	3.9	21.20	51.3	-	367.3	592
960MHz - 1GHz								
1GHz - 5GHz	1248.006	33.20	0.30	24.3	57.80	20	77.62	592
	1560.080	33.11	0.30	25.5	58.91	20	88.21	592
	1872.010	35.55	0.31	26.0	61.86	20	123.88	592
	2184.016	32.91	0.39	27.8	61.10	20	113.50	592
	2496.010(r)	34.63	0.53	28.0	63.16	20	143.88	500
	2808.130(r)	29.99	0.50	29.0	59.49	20	94.29	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

The test equipment used for the Transmitter Spurious Emissions – Radiated – Part 15.209 test are shown on page 8:
Notes and test method for the Transmitter Spurious Emissions – Radiated – Part 15.209 test are shown on page 8:

Occupancy Sensor	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	624.00 936.00	25.95 26.50	3.1 3.9	18.75 21.20	47.8 51.6	- -	245.47 380.19	592 592
960MHz - 1GHz								
1GHz - 5GHz	1248.006 1560.080 1872.010 2184.016 2496.010(r) 2808.130(r)	33.95 31.36 36.60 34.45 33.78 28.10	0.30 0.30 0.31 0.39 0.53 0.50	24.3 25.5 26.0 27.8 28.0 29.0	58.55 57.16 62.91 62.64 62.31 57.60	20 20 20 20 20 20	84.63 72.11 139.79 135.52 130.46 75.86	592 592 592 592 500 500
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						

Enuresis Sensor	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	624.00 936.00	24.45 27.20	3.1 3.9	18.75 21.20	46.3 52.3	- -	206.5 412.1	592 592
960MHz - 1GHz								
1GHz - 5GHz	1248.006 1560.080 1872.010 2184.016 2496.010(r) 2808.130(r)	32.68 29.71 35.61 31.98 32.54 28.08	0.30 0.30 0.31 0.39 0.53 0.50	24.3 25.5 26.0 27.8 28.0 29.0	57.28 55.51 61.92 60.17 61.07 57.58	20 20 20 20 20 20	73.1 59.6 124.7 101.9 113.1 75.7	592 592 592 592 500 500
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						

The test equipment used for the Transmitter Spurious Emissions – Radiated – Part 15.209 test are shown on page 8:
Notes and test method for the Transmitter Spurious Emissions – Radiated – Part 15.209 test are shown on page 8:

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 1.212 seconds a unit with modified software, which allowed continuous transmission, was used during spurious emissions testing.
9 See Annex for plots.
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.
13 The radiated emissions test was performed on all 3 equipment setups to ensure addition of sensor did not cause additional noise.

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**

TRANSMITTER TESTS

TRANSMITTER INTENTIONAL EMISSION – RADIATED – Part 15.231 February 2006

Ambient temperature	=	16°C(<1GHz),	3m measurements @ fc	[X]
Relative humidity	=	48%(<1GHz),	10m measurements @ fc	[ ]
Conditions	=	Open Area Test Site (OATS)	30m measurements @ fc	[ ]
Supply voltage	=	+6Vdc	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)
Wandering Detector	312	55.60	2.07	13.33	71.0	3548.1
Occupancy Sensor	312	59.80	2.07	13.33	75.2	5754.4
Enuresis Sensor	312	60.30	2.07	13.33	75.3	5821.0
Limit value @ fc		**5916.6 (µV/m)**				
Band occupancy @ -20dBc		**f lower**			**f higher**	
		311.996640 MHz			312.022240 MHz	
		Occupied Bandwidth			**Limit**	
		25.60 kHz			780 kHz	
Transmitter on time during automatic transmission		1.212 Seconds				

For band occupancy see spectrum analyser plots – Annex C
For transmitter timing pulse 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 1.212 seconds a unit with modified software, which allowed continuous transmission, was used during the carrier power testing.
5. The EUT has no facility to initiate manual transmissions.
6. The EUT has no does not utilise supervisions transmissions as per 15.231(a)(3).
7. The Enuresis sensor unit was used for band occupancy and timings as it has the highest field strength.

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.

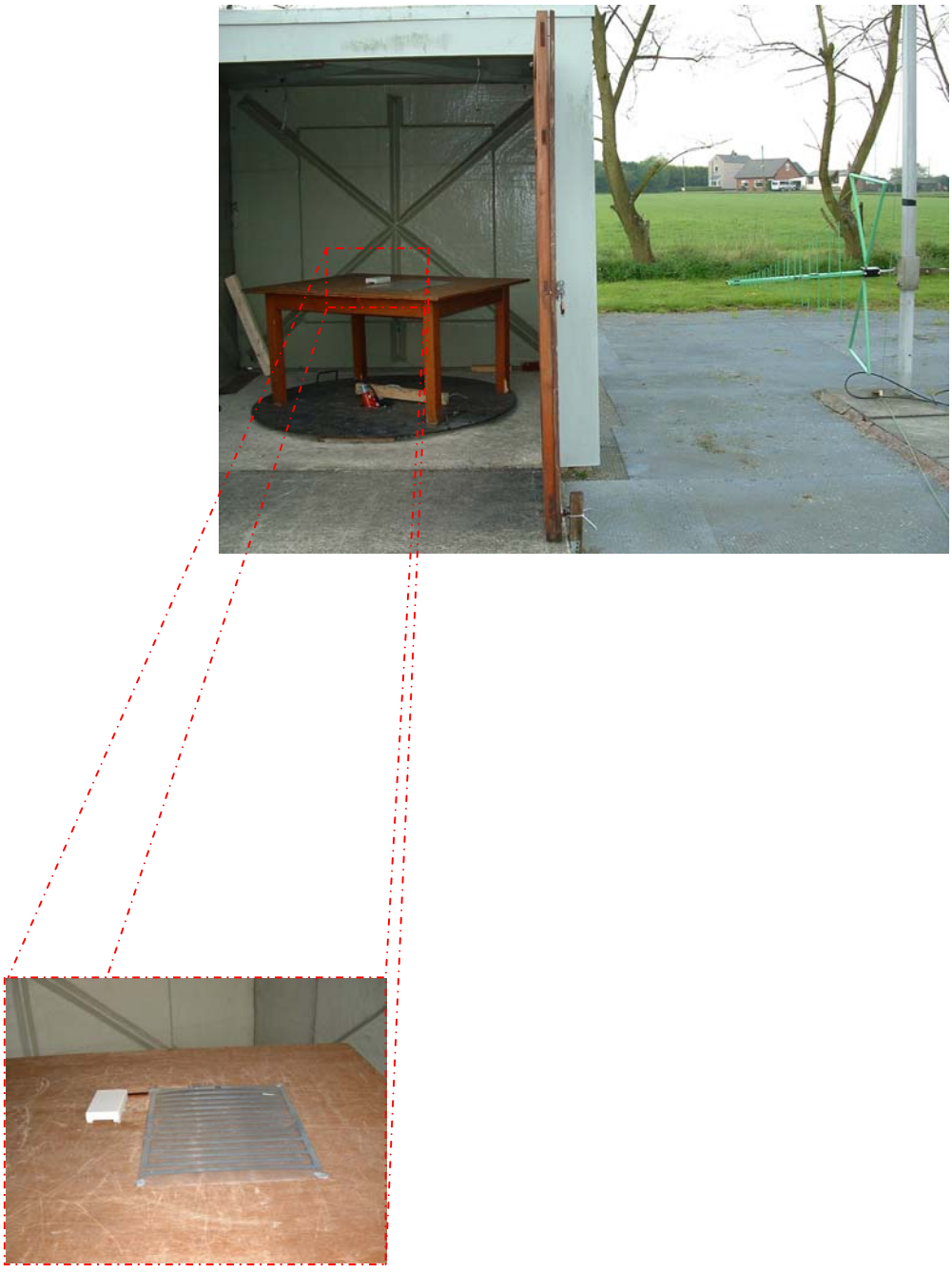
The test equipment used for the Transmitter Intentional Emission – Radiated – Part 15.231 February 2006 tests is shown overleaf:

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

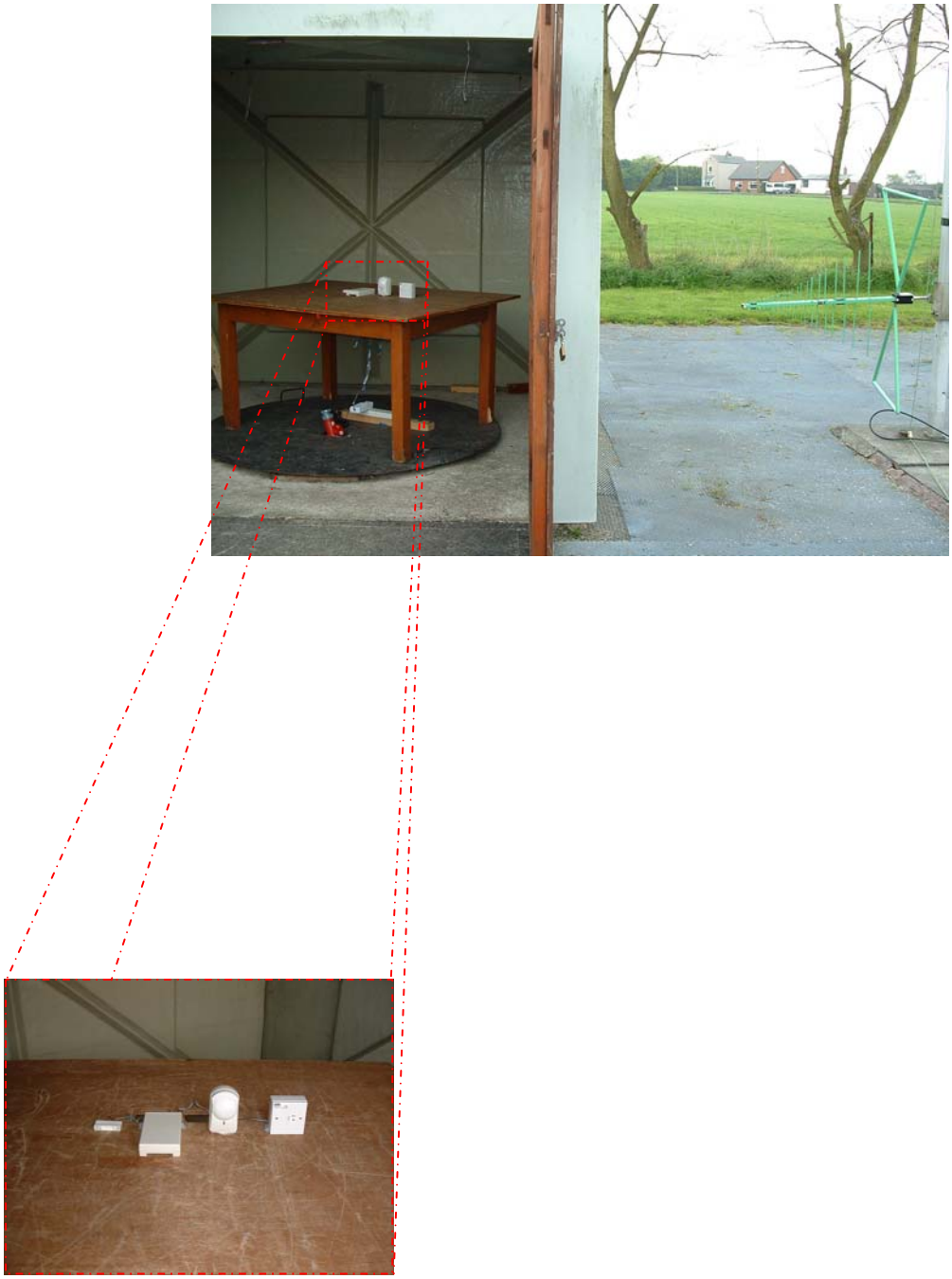
PHOTOGRAPHS

PHOTOGRAPH No. 1 **TEST SETUP – ENURESIS SENSOR**



PHOTOGRAPH No. 2 **TEST SETUP – OCCUPANCY SENSOR**

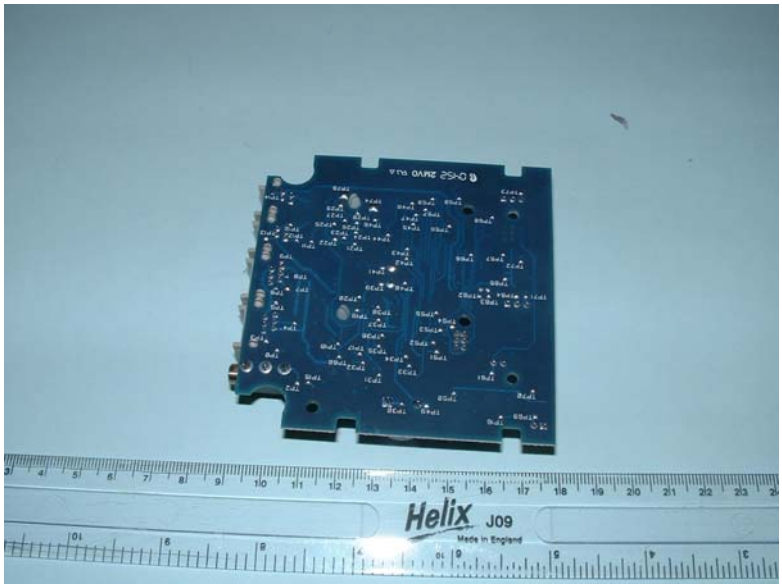
PHOTOGRAPH No. 3 **TEST SETUP – WANDERING DETECTOR**



PHOTOGRAPH No. 4 **TRANSMITTER TOP VIEW**

PHOTOGRAPH No. 5 **TRANSMITTER BOTTOM VIEW**

PHOTOGRAPH No. 6 **CONTROL PCB TRACK SIDE**



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

PHOTOGRAPH No. 8 **RF PCB TRACK SIDE**

PHOTOGRAPH No. 9 **RF PCB COMPONENT SIDE**

ANNEX B

APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

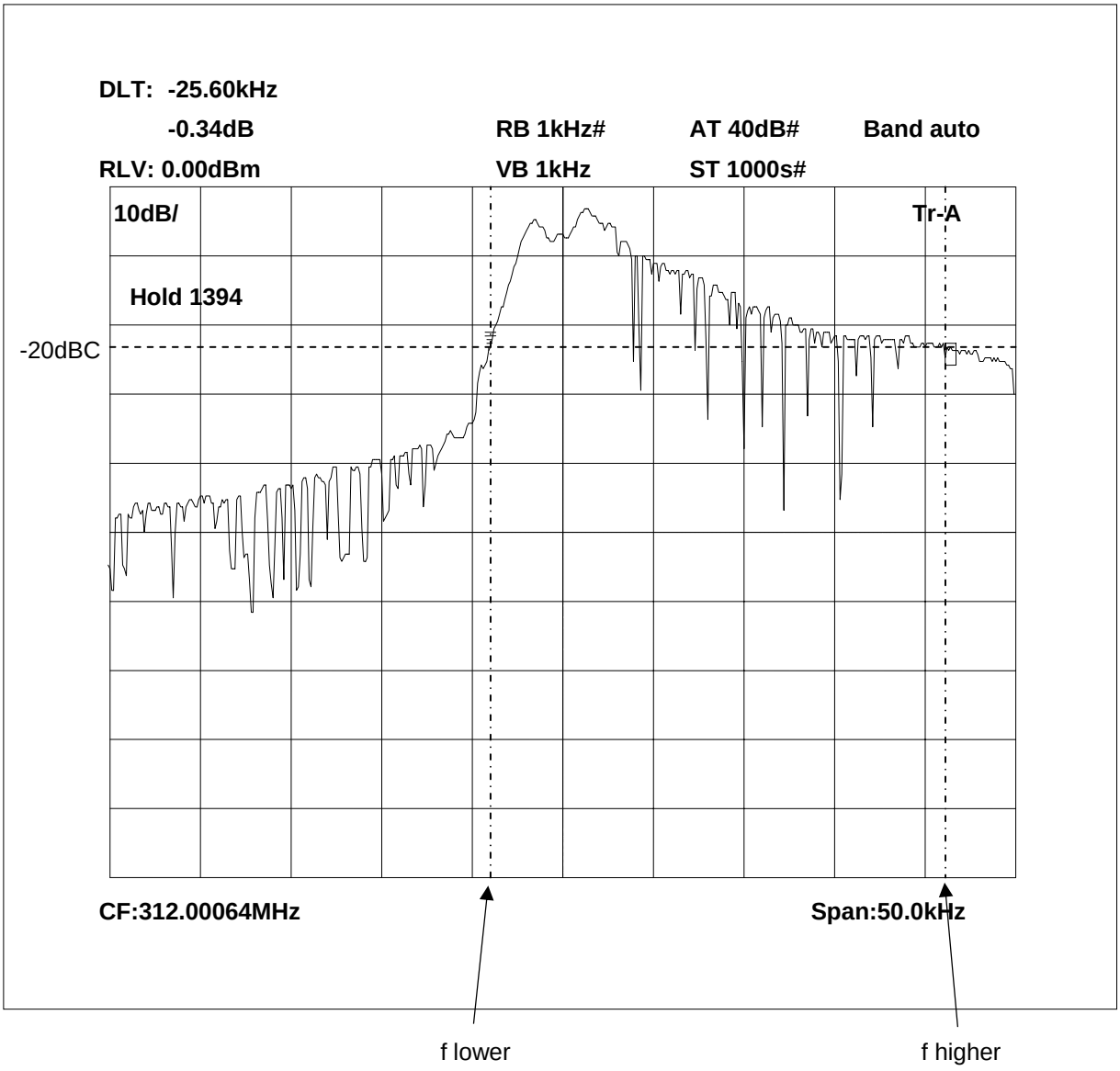
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

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

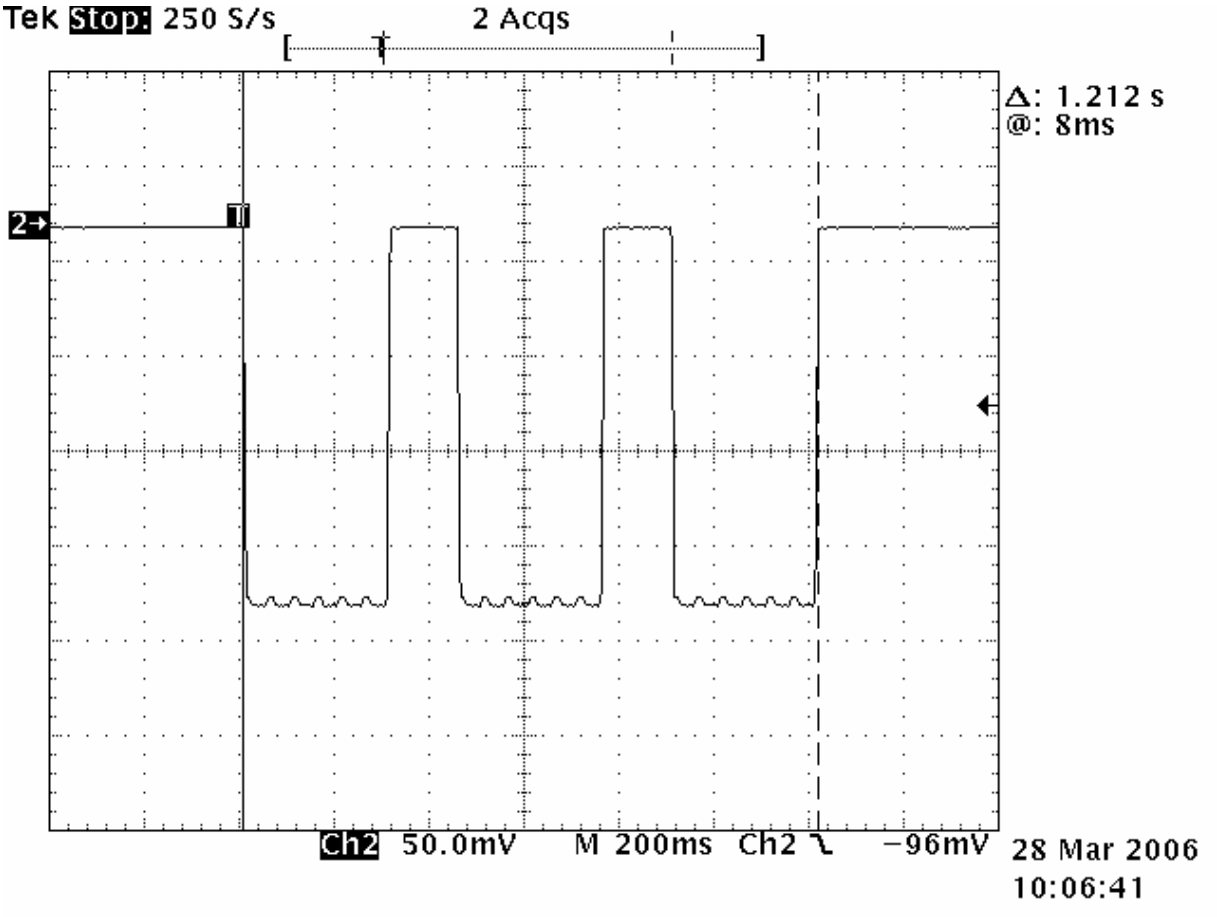
BANDWIDTH PLOT



Occupied bandwidth = 25.60 kHz
f lower = 311.996640 MHz
f higher = 312.022240 MHz

ANNEX D

TRANSMITTER TIMING PULSE



TX on time = 1.212 sec

The telecare module does not poll out a regular periodic transmission as per 15.231(a)(3). The pulse shown above occurs during the telecare module being triggered by a sensor (Alarm condition). The pulse occurs once and is not repeated at regular intervals. The pulse only reoccurs if the sensor has its trigger source (alarm condition) removed or is reset and another trigger (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**