TEST REPORT NO: RU1097/5206

COPY NO: 3

ISSUE NO: 1

FCC ID: G2X-66004A

REPORT ON THE CERTIFICATION TESTING OF A
Tunstall Telecom Limited
312MHz Fall Detector Transmitter
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.231
INTENTIONAL RADIATOR SPECIFICATION

TEST DATE: 12th – 16th January 2004

TESTED BY: JOHN CHARTERS (Signature Not Verified; Digitally signed by JOHN CHARTERS DN: cn=JOHN CHARTERS, o=TRL COMPLIANCE SERVICES, c=US Date: 2004.01.28 09:40:31 Z) J Charters

APPROVED BY: PETER GREEN (Signature Not Verified; Digitally signed by PETER GREEN DN: cn=PETER GREEN, o=TRL COMPLIANCE SERVICES, c=GB Date: 2004.01.28 09:42:15 Z) P Green
Product Manager

DATE: 27th January 2004

Distribution:

Copy Nos:
1. Tunstall Telecom Limited
2. FCC EVALUATION LABORATORIES
3. TRL EMC

TRL COMPLIANCE SERVICES LTD EMC DIVISION
MOSS VIEW NIPE LANE UP HOLLAND WEST LANCASHIRE WN8 9PY UNITED KINGDOM
TELEPHONE +44 (0)1695 556666 FAX +44 (0)1695 557077
E-MAIL test@trl-emc.co.uk www.trlcompliance.com

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-66004A					
PURPOSE OF TEST:	Certification					
TEST SPECIFICATION:	FCC RULES CFR 47, Part 15.231					
TEST RESULT:	Compliant to Specification					
EQUIPMENT UNDER TEST:	312MHz Fall Detector Transmitter					
EQUIPMENT SERIAL No:	Engineering sample					
ITU: EMISSION CODE:	3K00F1DAN					
EQUIPMENT TYPE:	66004A					
PRODUCT USE:	Nurse/help call					
CARRIER EMISSION:	2660.7μV/m					
ANTENNA TYPE:	PCB integral					
ALTERNATIVE ANTENNA:	N/A					
BAND OF OPERATION:	260MHz – 470MHz					
CHANNEL SPACING:	N/A Wideband					
NUMBER OF CHANNELS:	1					
FREQUENCY GENERATION:	SAW Resonator	[ ]	Crystal	[X]	Synthesiser	[ ]
MODULATION METHOD:	Amplitude	[ ]	Digital	[ ]	Angle	[ ]
POWER SOURCE(s):	6Vdc battery					
TEST DATE(s):	12th - 16th January 2004					
ORDER No(s):	256284					
APPLICANT:	Tunstall Telecom Limited					
ADDRESS:	Whitley Lodge Whitley Bridge Yorkshire DN14 0HR					

TESTED BY: JOHN CHARTERS — Signature Not Verified — Digitally signed by JOHN CHARTERS DN: cn=JOHN CHARTERS, o=TRL COMPLIANCE SERVICES, c=US Date: 2004.01.28 09:41:02 Z — J Charters

APPROVED BY: PETER GREEN — Signature Not Verified — Digitally signed by PETER GREEN DN: cn=PETER GREEN, o=TRL COMPLIANCE SERVICES, c=GB Date: 2004.01.28 09:42:35 Z — P Green, Product Manager

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	312MHz Fall Detector Transmitter
EQUIPMENT TYPE:	66004A
SERIAL NUMBER OF EUT:	Engineering sample
PURPOSE OF TEST:	Certification
TEST SPECIFICATION(s):	FCC RULES CFR 47, Part 15.231
TEST RESULT:	COMPLIANT Yes [X] No [ ]
APPLICANT'S CATEGORY:	MANUFACTURER [X] IMPORTER [ ] DISTRIBUTOR [ ] TEST HOUSE [ ] AGENT [ ]
APPLICANT'S ORDER No(s):	256284
APPLICANT'S CONTACT PERSON(s):	Mr R Nadin
E-mail address:	r_nadin@tustall.co.uk
APPLICANT:	Tunstall Telecom Limited
ADDRESS:	Whitley Lodge Whitley Bridge Yorkshire DN14 0HR
TEL:	+44 1977 660398
FAX:	+44 1977 660550
MANUFACTURER:	Tunstall Telecom Limited
EUT(s) COUNTRY OF ORIGIN:	United Kingdom
TEST LABORATORY:	TRL EMC
UKAS ACCREDITATION No:	0728
TEST DATE(s)	12th – 16th January 2004
TEST REPORT No:	RU1097/5206

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 Average	Yes
Spurious Emissions – Radiated >1000MHz:	15.231 15.209(b)	Quasi Peak 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: Nurse/help call

3. Emission Designator: 3K00F1DAN

4. Duty Cycle: <1%

5. Transmitter bit or pulse rate and level: 20BPS

6. Temperatures: Ambient (Tnom) 9°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]

TRANSMITTER TESTS

TRANSMITTER SPURIOUS EMISSIONS – RADIATED – PART 15.209

Ambient temperature	=	9°C(<1GHz)	3m measurements <1GHz	[X]
Relative humidity	=	73% (<1GHz),	0.3m measurements >1GHz	[X]
Conditions	=	Open Area Test Site (OATS)	0.3m extrapolated to 1m	[X]
Supply voltage	=	6Vdc		
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	624.0	27.3	2.9	18.8	49.0	-	281.83	588
960MHz - 1GHz								
1GHz - 5GHz	1247.9	33.14	0.6	24.95	58.69	20	86.0	588
	1559.9(R)	39.59	0.65	25.7	65.94	20	198.2	500
	1871.9	40.47	0.67	26.7	67.84	20	246.6	588
	2183.97	24.14	0.81	28.0	52.95	20	44.4	588
	2495.9(R)	24.4	0.72	28.9	54.02	20	50.2	500
	2807.9(R)	25.44	0.72	29.75	55.91	20	62.4	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.m to 3m, as per Part 15.31f
4 Measurements >1GHz @ 1m 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 (R) indicated frequency within restricted band from 15.205
9 Due to the transmitted signal lasting only 1.1 second. A unit with modified software, which allowed continuous transmission, was used during spurious emissions testing.
10 Spurious limit level of 588µV/m was calculated by reducing the fundamental limit by 20dB, as per 15.231(b).

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 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	**X**
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	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	**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	**X**

TRANSMITTER TESTS

TRANSMITTER INTENTIONAL EMISSION – RADIATED – Part 15.231

Ambient temperature	=	9°C(<1GHz),	3m measurements @ fc	[X]
Relative humidity	=	73%(<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	[ ]

FREQ. (MHz)	MEASUREMENT Rx. READING (dBµV)	CABLE LOSS (dB)	ANT FACTOR	FIELD STRENGTH (dBµVm)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (µV/m)
312.0	53.0	2.0	13.5	68.5	-	2660.7

Limit value @ fc	**5916.677(µV/m)**	
Band occupancy @ -20dBc	**f lower**	**f higher**
During button press	311.978 0MHz	312.021MHz
During fall alarm	311.9802MHz	312.0182MHz
During pole signal	311.9802MHz	312.0216MHz
Transmitter on time during button press	1.01Seconds	
Transmitter on time during fall alarm	1.01 Seconds	
Transmitter on time during pole	1.008Seconds	

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
4. For transmitter shut down time see annex D
5. The transmitter sends a pole signal once every 4 hours for 1 second duration
6. Due to the transmitted signal lasting only 1.0 second. A unit with modified software, which allowed continuous transmission, was used during the carrier power testing.

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 orthagonal planes.
   Maximum results recorded

The test equipment used for the Transmitter Intentional Emission – Radiated – Part 15.231 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	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	**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

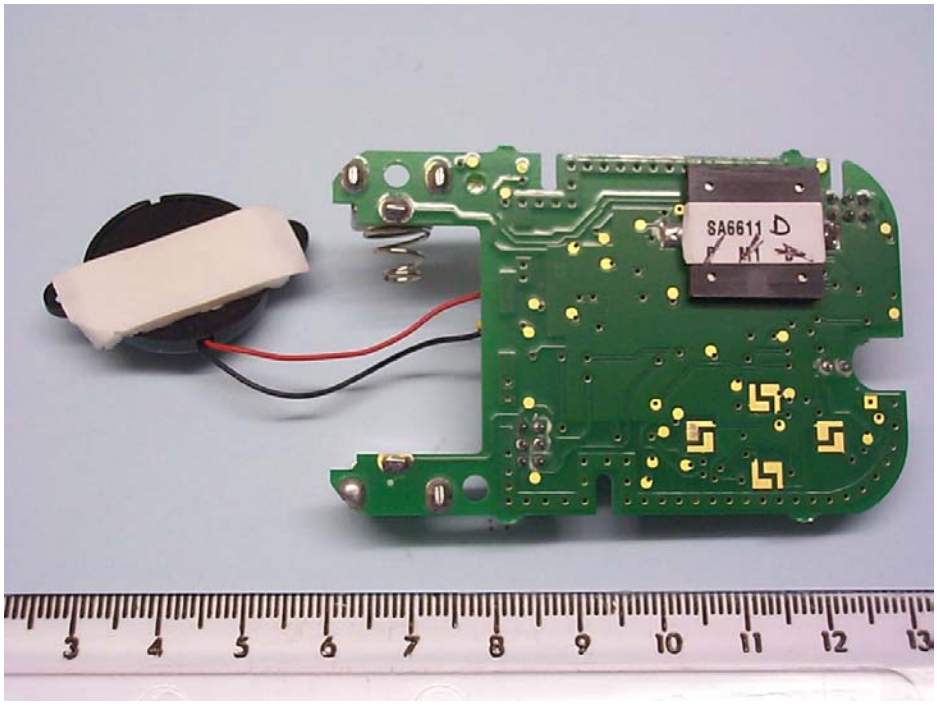
PHOTOGRAPHS

PHOTOGRAPH No. 1 **TEST SETUP**

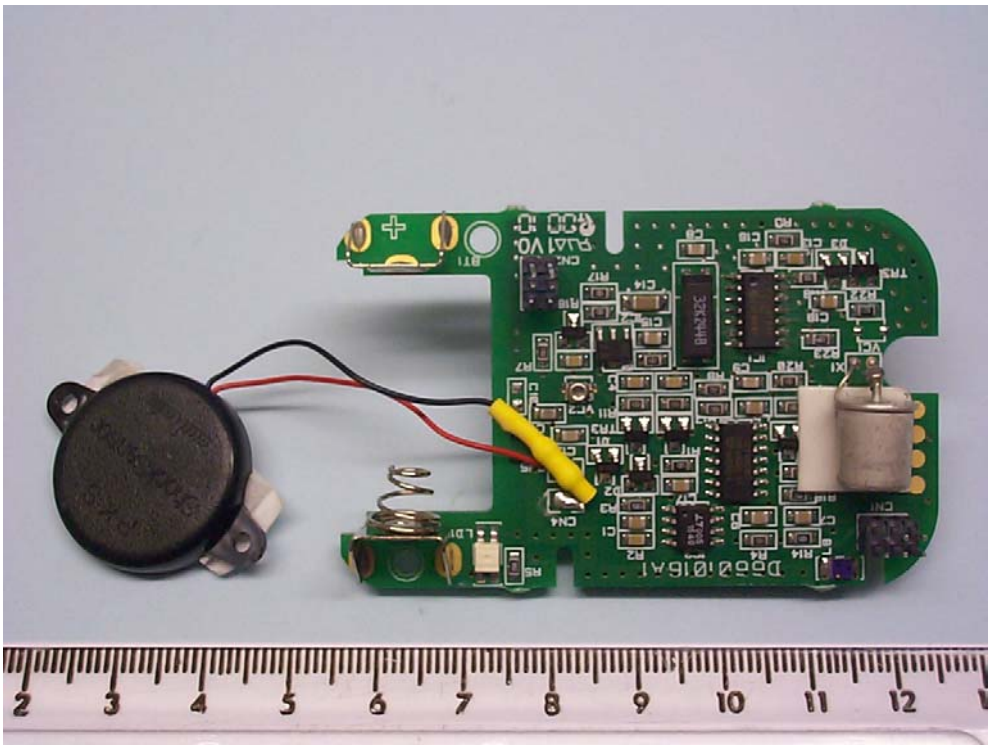
PHOTOGRAPH No. 2 **TRANSMITTER FRONT VIEW**

PHOTOGRAPH No. 3 **TRANSMITTER REAR VIEW**

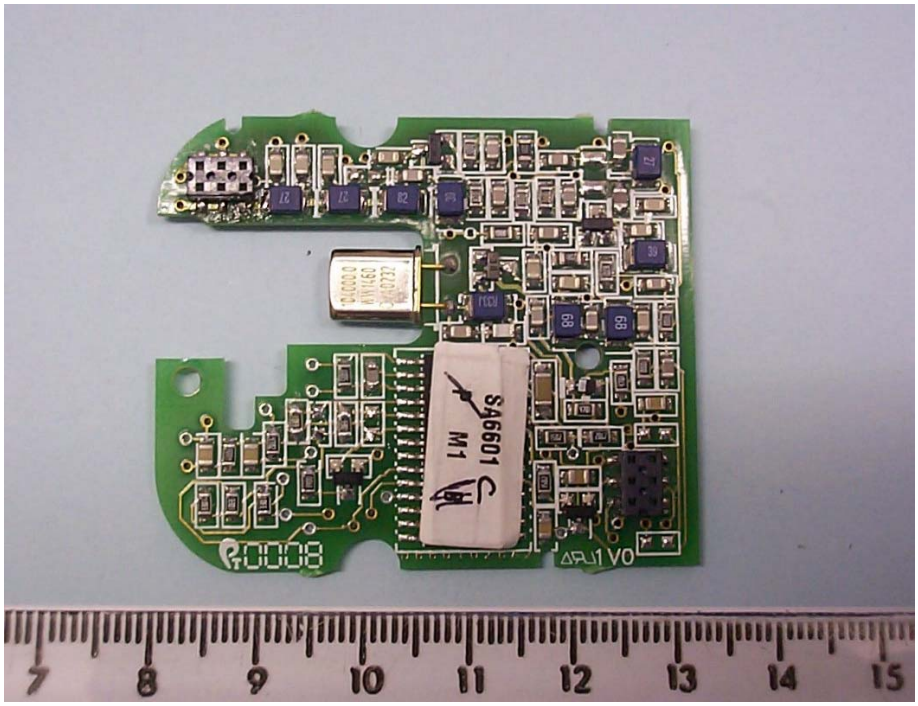
PHOTOGRAPH No. 4 **TRANSMITTER PCB TRACK SIDE**



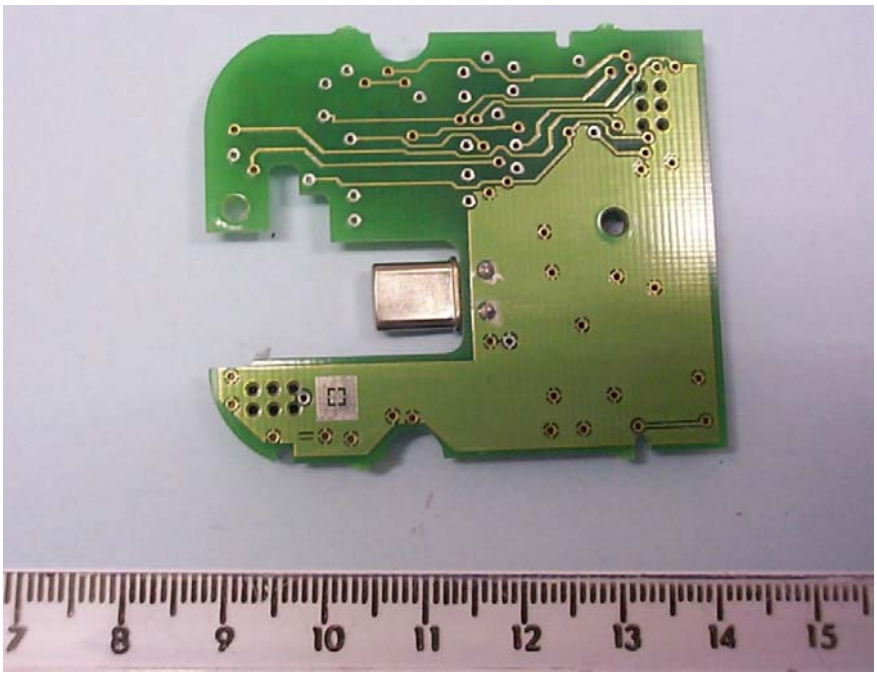
PHOTOGRAPH No. 5 **TRANSMITTER PCB COMPONENT SIDE**



PHOTOGRAPH No. 6 **PCB 2 COMPONENT SIDE**



PHOTOGRAPH No. 6 **PCB 2 TRACK SIDE**



ANNEX B

APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

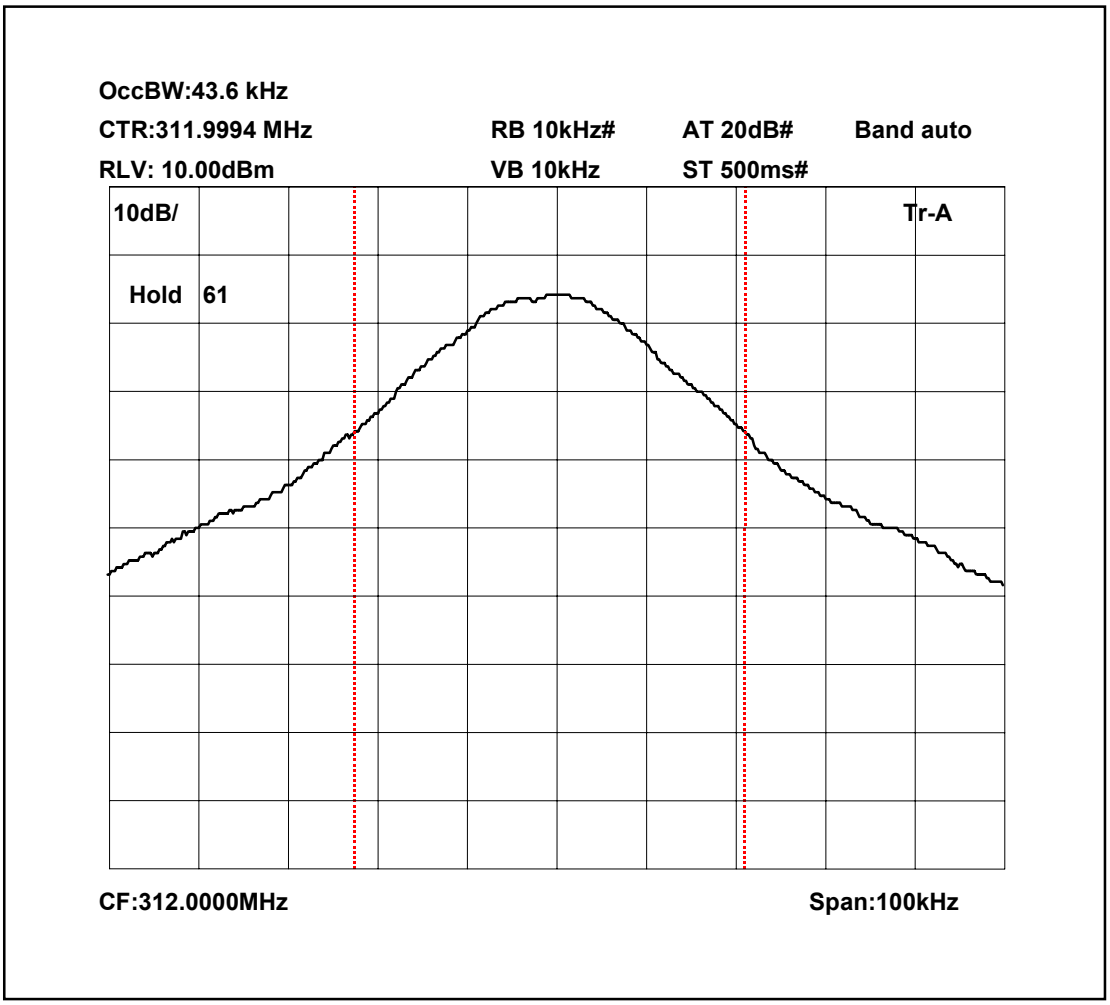
a.	TCB	-	APPLICATION	[X]
		-	FEE	[X]
b.	AGENT'S LETTER OF AUTHORISATION	-		[X]
c.	MODEL(s) vs IDENTITY	-		[X]
d.	ALTERNATIVE TRADE NAME DECLARATION(s)	-		[X]
e.	LABELLING	-	PHOTOGRAPHS	[X]
		-	DECLARATION	[ ]
		-	DRAWINGS	[ ]
f.	TECHNICAL DESCRIPTION	-		[X]
g.	BLOCK DIAGRAMS	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	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

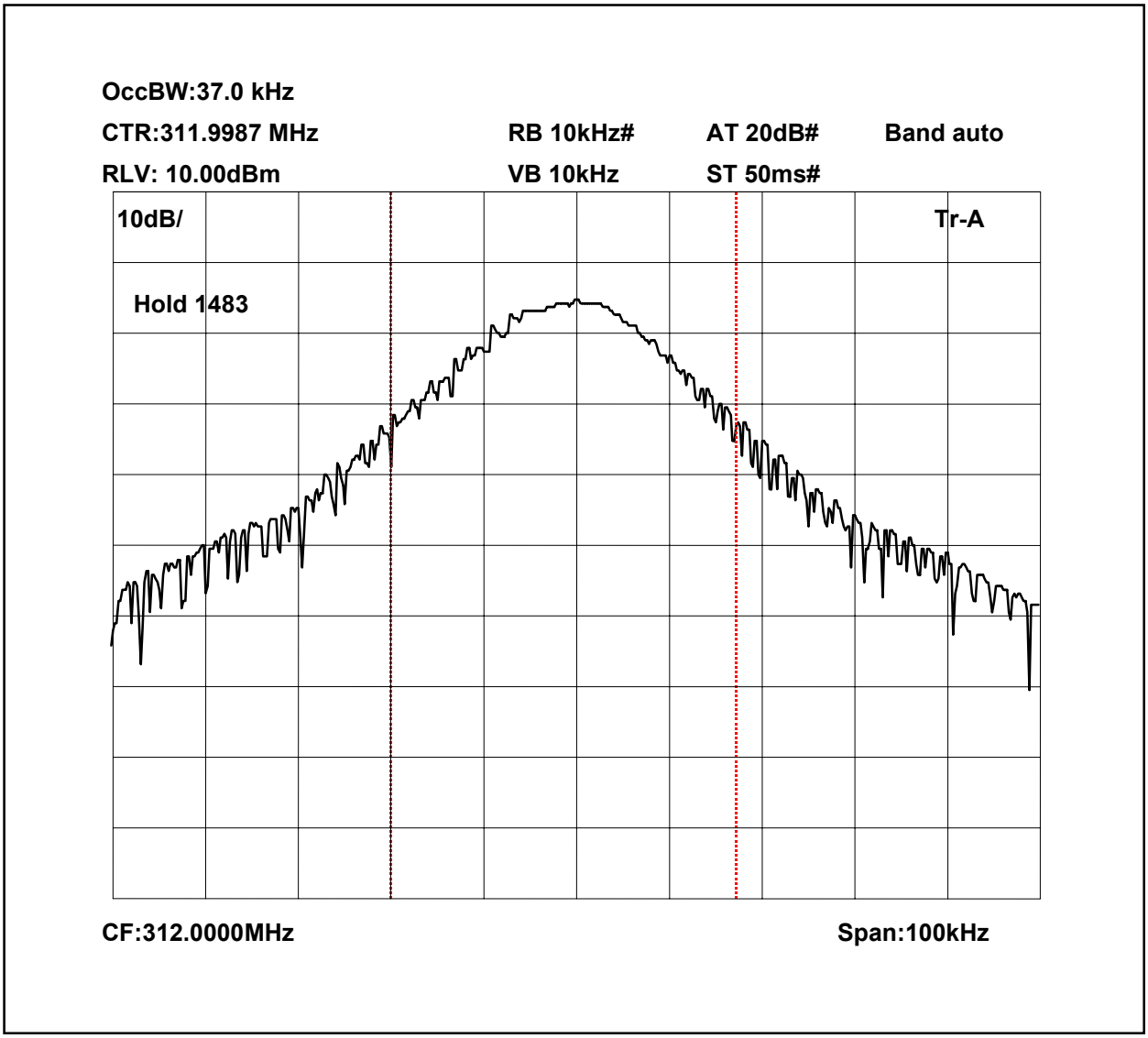
Button Pressed



Occupied Bandwidth = 43.6kHz
Fl = 311.9780MHz
Fh = 312.0216

Bandwidth Plot

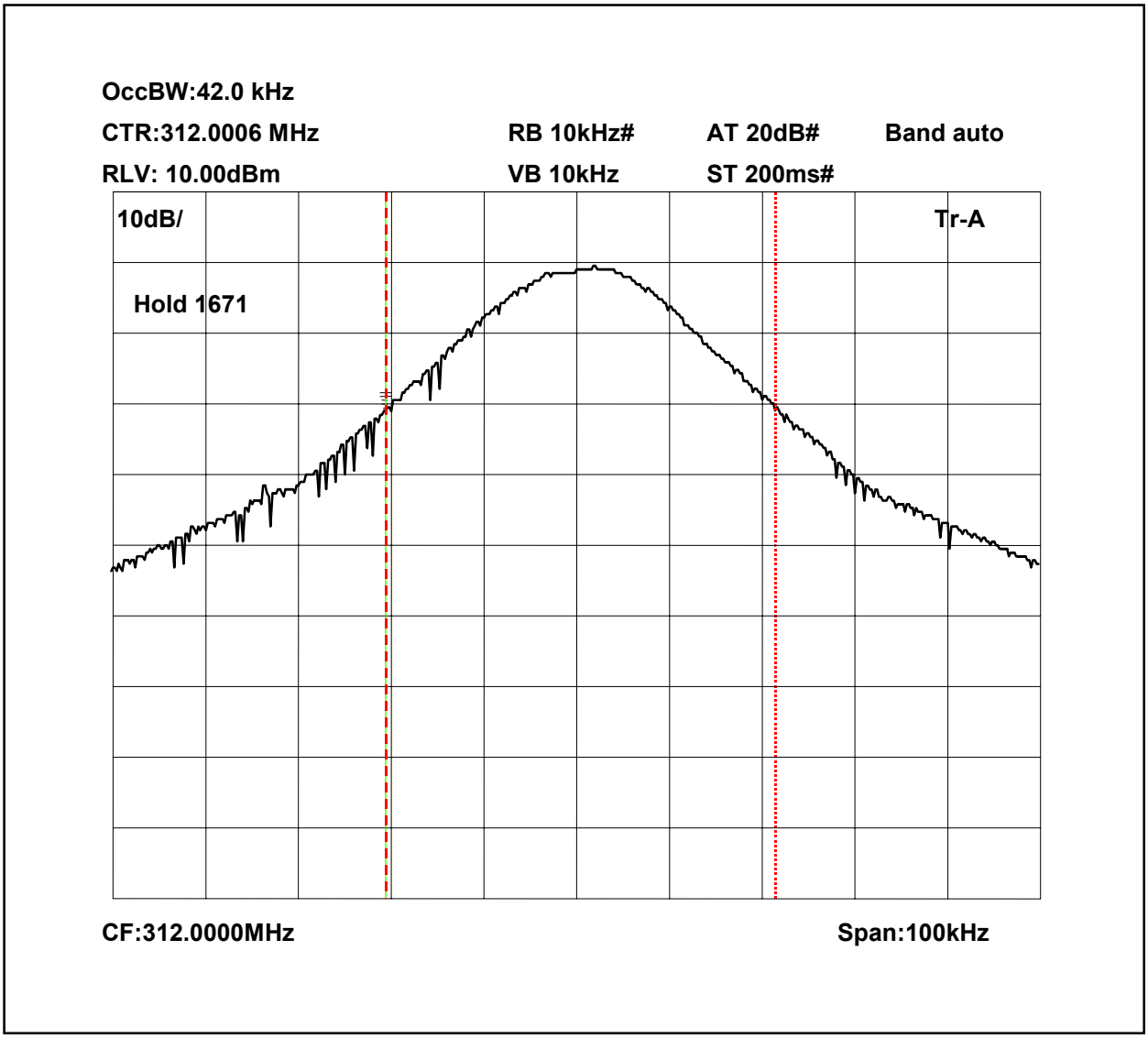
Fall Trigger



Occupied Bandwidth = 37kHz
Fl = 311.9802MHz
Fh = 312.0172MHz

Bandwidth Plot

Pole Signal

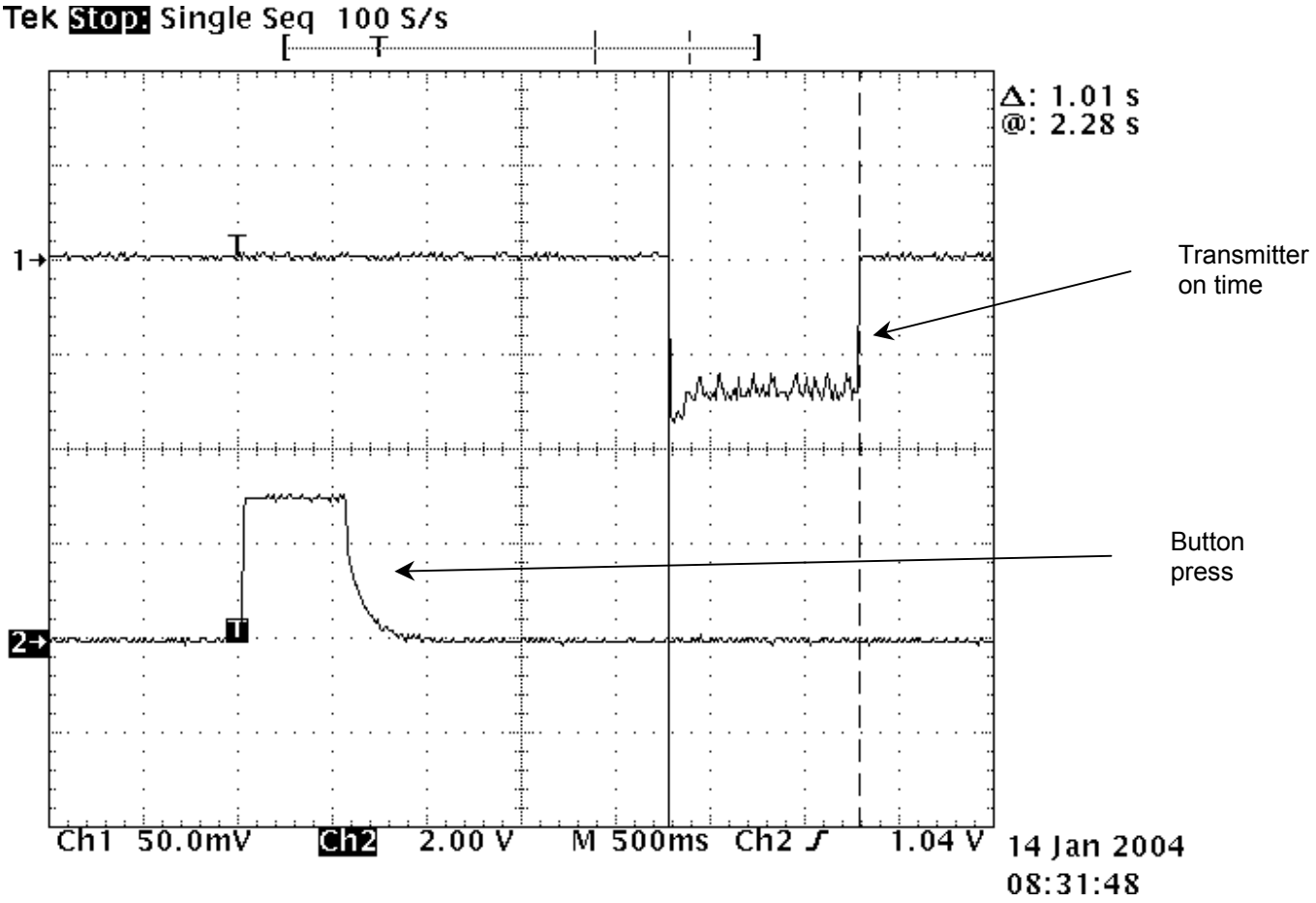


Occupied Bandwidth = 42kHz
Fl = 311.9796MHz
Fh = 312.0216MHz

ANNEX D

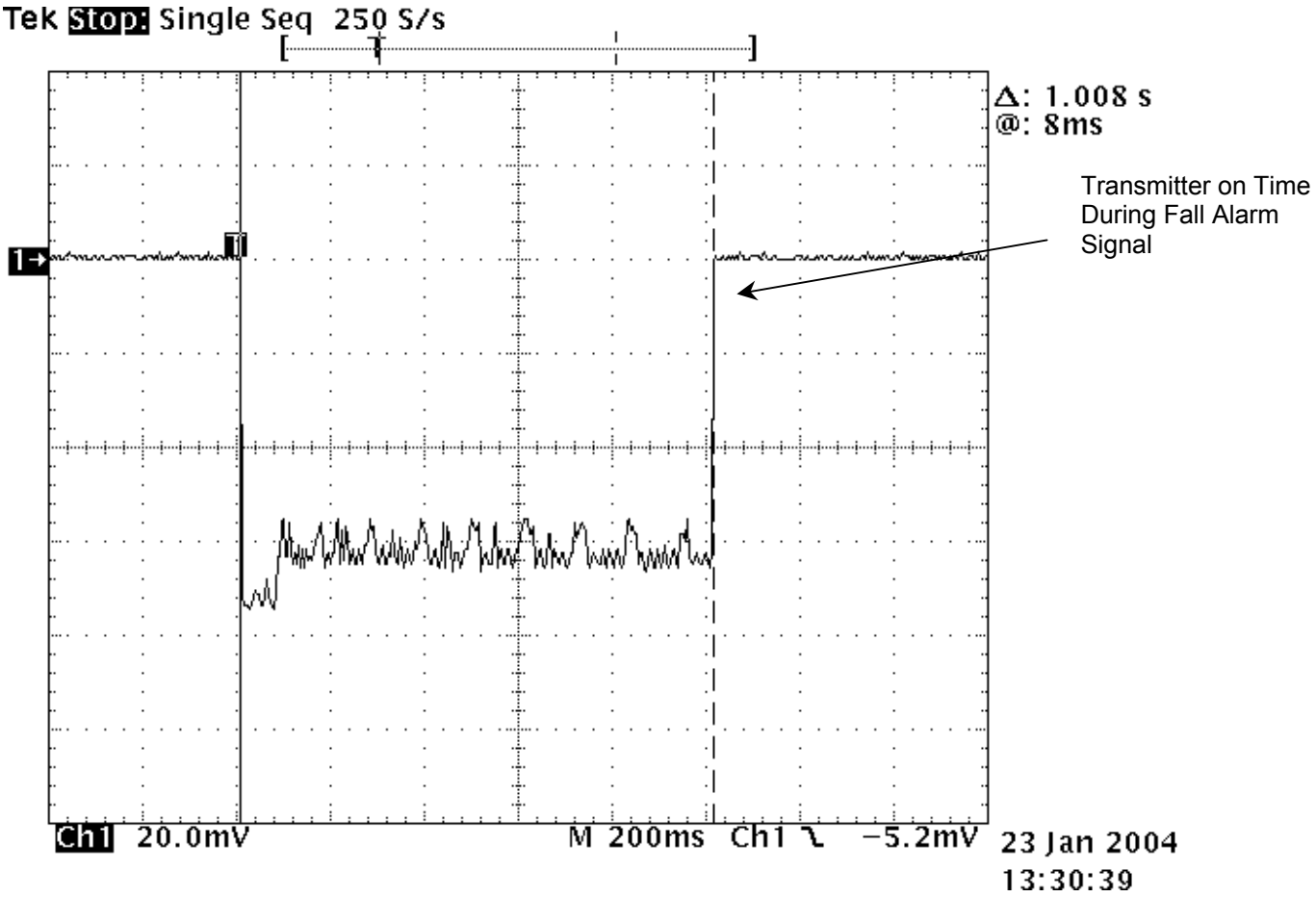
TRANSMITTER ON TIME

Transmitter on Call Button Press



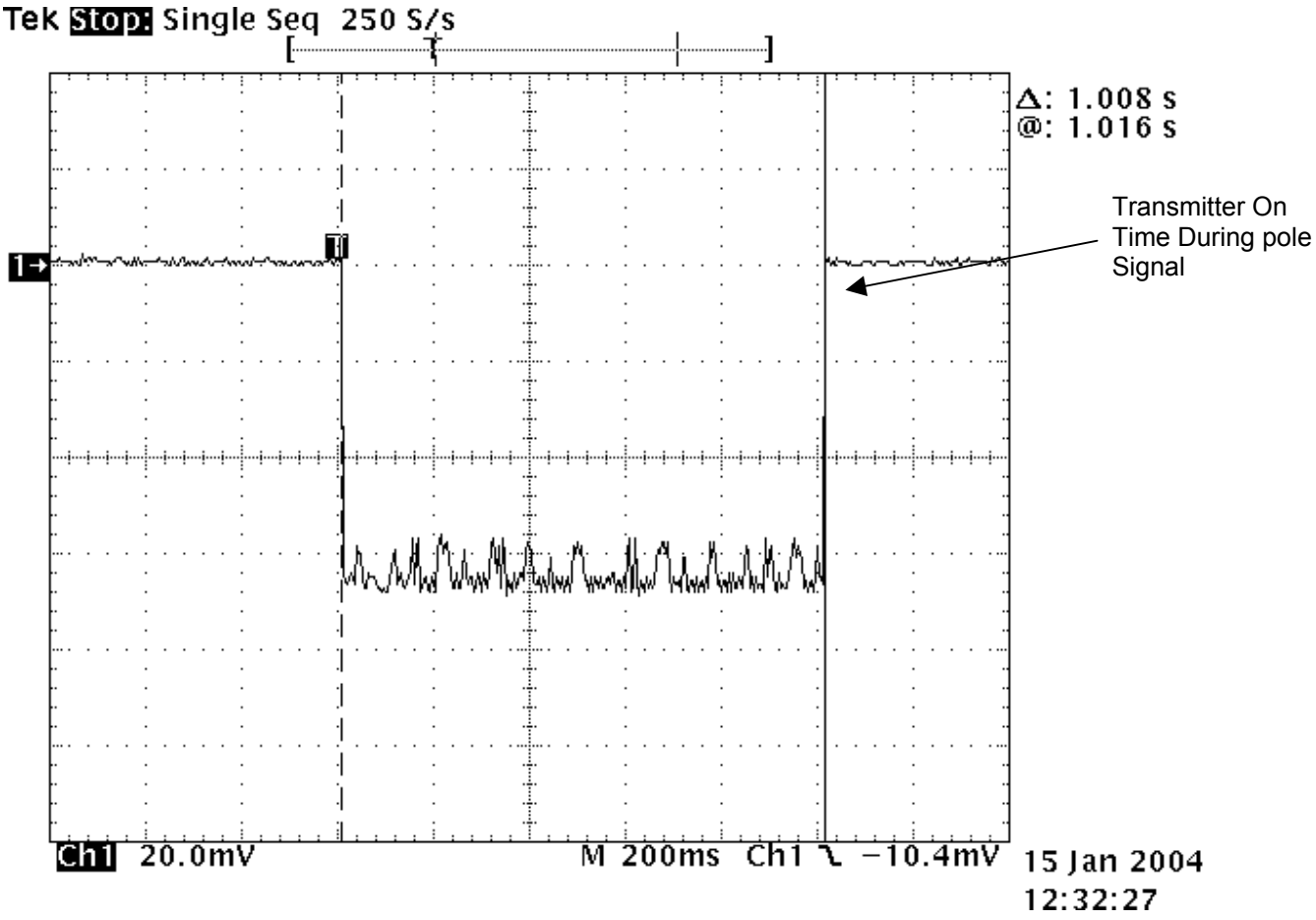
Transmitter on time during button press 1.01Seconds

Transmitter On Time Fall Alarm



Transmitter on time during Fall Alarm 1.008 Seconds

Transmitter On Time Pole Signal



Transmitter on time during pole 1.008Seconds