TEST REPORT NO: RU1102/5358

COPY NO: 2

ISSUE NO: 1

FCC ID: G2X-64004A

REPORT ON THE CERTIFICATION TESTING OF A
TUNSTALL TELECOM Ltd.
GEM Radio Trigger
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.231 DECEMBER 2003
INTENTIONAL RADIATOR SPECIFICATION

TEST DATE: 26th February – 1st March 2004

TESTED BY: JOHN CHARTERS J CHARTERS

APPROVED BY: Peter Green P GREEN
PRODUCT MANAGER

DATE: 3rd March 2004

Distribution:

Copy Nos:
1. TUNSTALL TELECOM Ltd.
2. FCC EVALUATION LABORATORIES
3. TRL EMC

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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:	G2X-64004A					
PURPOSE OF TEST:	CERTIFICATION					
TEST SPECIFICATION:	FCC RULES CFR 47, PART 15.231 DECEMBER 2003					
TEST RESULT:	Compliant to Specification					
EQUIPMENT UNDER TEST:	GEM Radio Trigger					
EQUIPMENT SERIAL No:	Engineering sample					
ITU: EMISSION CODE:	3K00F1DAN					
EQUIPMENT TYPE:	64004A/02					
PRODUCT USE:	Nurse call					
CARRIER EMISSION:	4027.170μV/m @ 3m					
ANTENNA TYPE:	Integral					
ALTERNATIVE ANTENNA:	N/A					
FREQUENCY OF OPERATION:	312.00MHz					
CHANNEL SPACING:	N/A 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):	26th February – 1st March 2004					
ORDER No(s):	256739					
APPLICANT:	TUNSTALL TELECOM Ltd.					
ADDRESS:	Whitley Lodge Whitley Bridge Yorkshire DN14 0HR					

TESTED BY: JOHN CHARTERS — Digitally signed by JOHN CHARTERS DN: cn=JOHN CHARTERS, o=TRL COMPLIANCE SERVICES, c=US Date: 2004.04.01 12:38:58 +01'00' — J CHARTERS

APPROVED BY: Peter Green — Digitally signed by Peter Green DN: cn=Peter Green, o=TRL Compliance Services, c=GB Date: 2004.04.01 12:14:34 Z — P GREEN PRODUCT MANAGER

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	GEM Radio Trigger
EQUIPMENT TYPE:	64004A/02
SERIAL NUMBER OF EUT:	Engineering sample
PURPOSE OF TEST:	CERTIFICATION
TEST SPECIFICATION(s):	FCC RULES CFR 47, PART 15.231 8th DECEMBER 2003
TEST RESULT:	COMPLIANT Yes [X] No [ ]
APPLICANT'S CATEGORY:	MANUFACTURER [X] IMPORTER [ ] DISTRIBUTOR [ ] TEST HOUSE [ ] AGENT [ ]
APPLICANT'S ORDER No(s):	256739
APPLICANT'S CONTACT PERSON(s):	Mr R Nadin
E-mail address:	R_nadin@tunstall.co.uk
APPLICANT:	TUNSTALL TELECOM Ltd.
ADDRESS:	Whitley Lodge Whitley Bridge Yorkshire DN14 0HR
TEL:	01977 661234
FAX:	01977 662452
MANUFACTURER:	TUNSTALL TELECOM Ltd.
EUT(s) COUNTRY OF ORIGIN:	United Kingdom
TEST LABORATORY:	TRL EMC
UKAS ACCREDITATION No:	0728
TEST DATE(s)	26th February – 1st March 2004
TEST REPORT No:	RU1102/5358

EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.

TEST/EXAMINATION	RULE PART	DETECTOR	APPLICABILITY
Intentional Emission Frequency:	15.231	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:	15.209	Quasi-Peak	Yes
Spurious Emissions – Radiated >1000MHz:		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 Call

3. Emission Designator: 3K00F1DAN

4. Duty Cycle: <0.1%

5. Temperatures: Ambient (Tnom) 9.0^{o}C

6. Supply Voltages: Vnom +6Vdc

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

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

8. 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	=	40% (<1GHz),	0.3m measurements >1GHz	[X]
Conditions	=	Open Area Test Site (OATS)	3m extrapolated from 0.3m	[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	624.0 936.0	28.7 29.9	2.9 4.0	18.8 20.2	50.4 54.1	-	331.13 506.99	588.0 588.0
960MHz - 1GHz								
1GHz - 5GHz	1559.97(R) 1871.95 2183.94	27.97 30.49 30.39	0.67 0.7 0.7	25.7 26.9 28.0	54.34 58.09 59.09	-20 -20 -20	52.12 80.26 90.05	500.0 588.0 588.0
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 @ 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	=	40%(<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 (dBµV/m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (µV/m)
312.0	58.6	2.0	13.5	72.1	-	4027.17

Limit value @ fc	**5916.677(µV/m)**	
Band occupancy @ -20dBc	**f lower**	**f higher**
During button press	311.9628MHz	312.0288MHz
During pole	311.9628MHz	312.0292MHz
Transmitter on time during button press	1.016 Seconds	
Transmitter on time during pole	1.024 Seconds	

See spectrum analyser plot – Annex C
See Oscilloscope plot – 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 For transmitter shut down time see annex D.
5 The transmitter sends a pole signal once every 4 hours for 1second 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	
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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

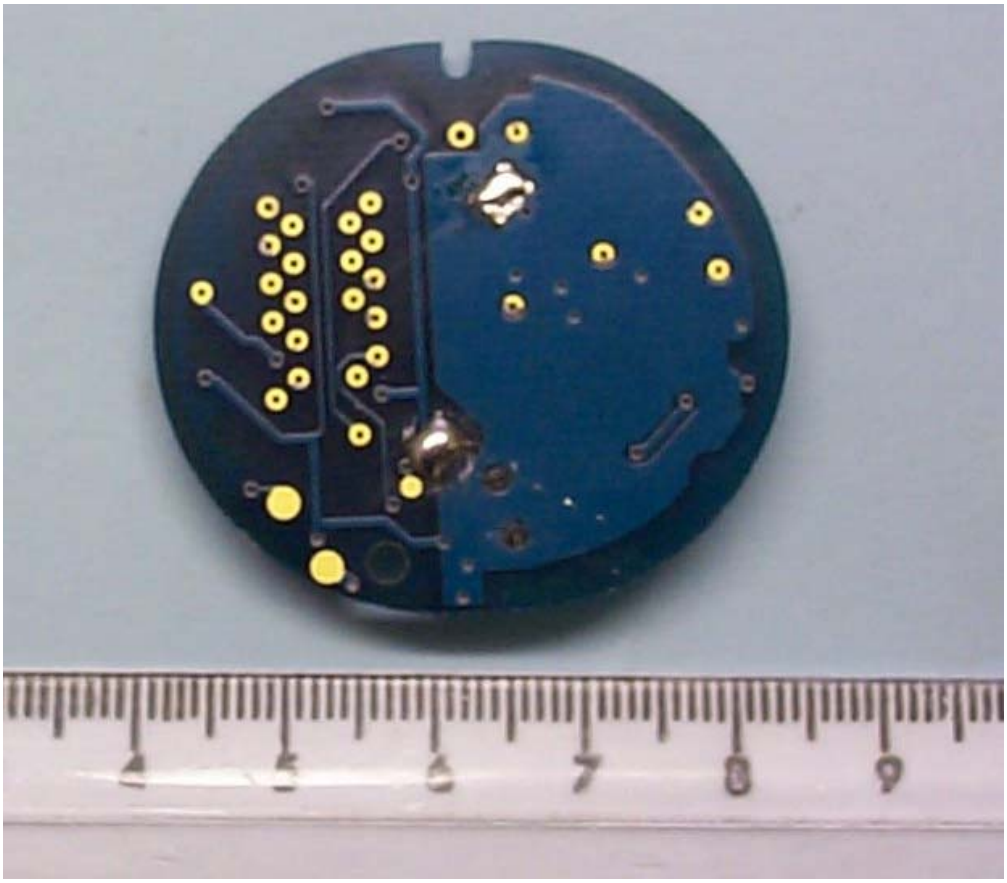
PHOTOGRAPHS

PHOTOGRAPH No. 1 **TEST SETUP**

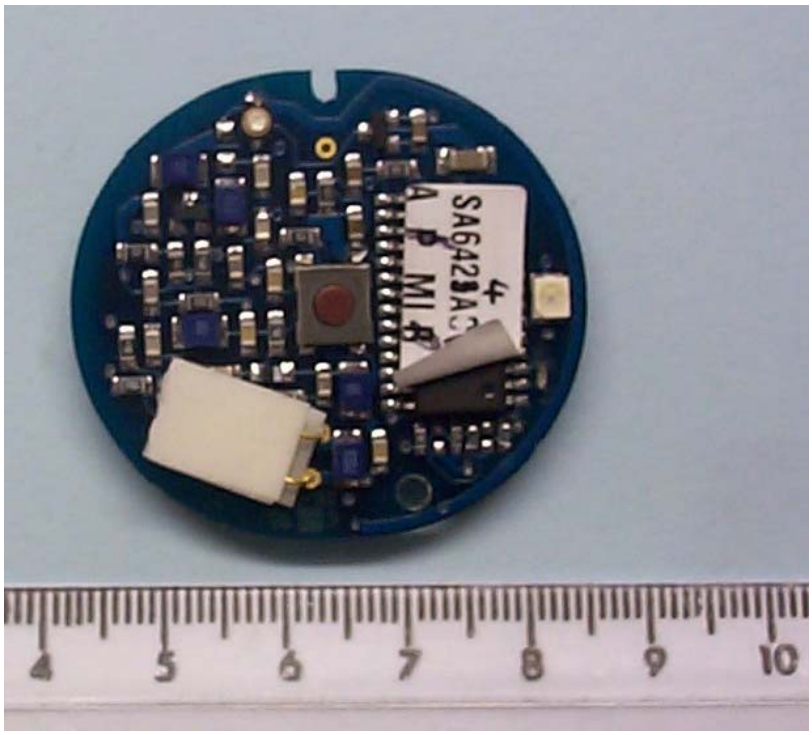
PHOTOGRAPH No. 2 **TRANSMITTER FRONT VIEW**

PHOTOGRAPH No. 3 **TRANSMITTER REAR VIEW**

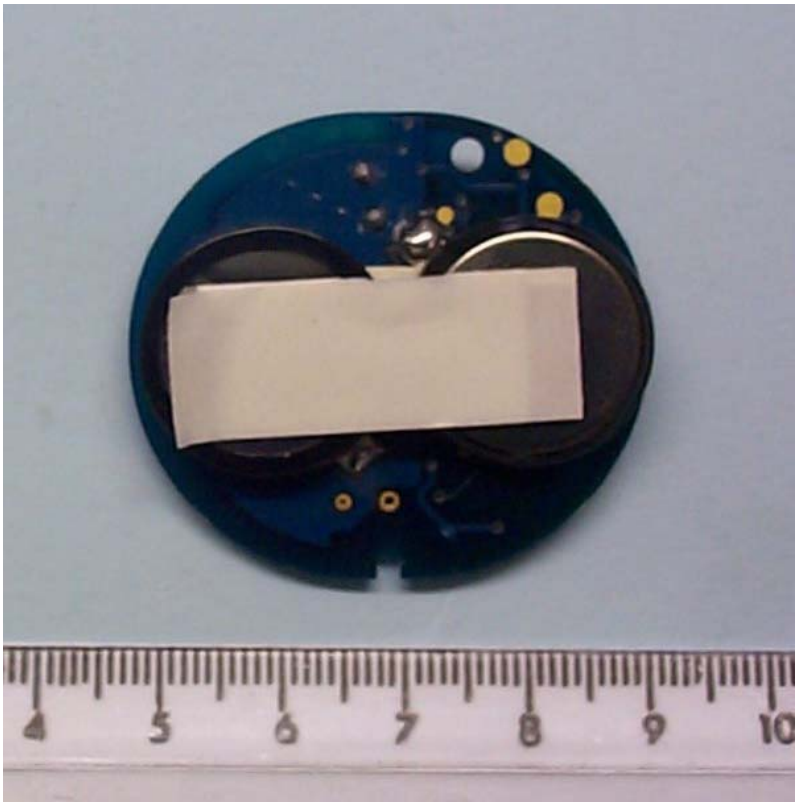
PHOTOGRAPH No. 4 **TRANSMITTER PCB TRACK SIDE**



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



PHOTOGRAPH No. 6 TRANSMITTER BATTERY IN PLACE



ANNEX B

APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

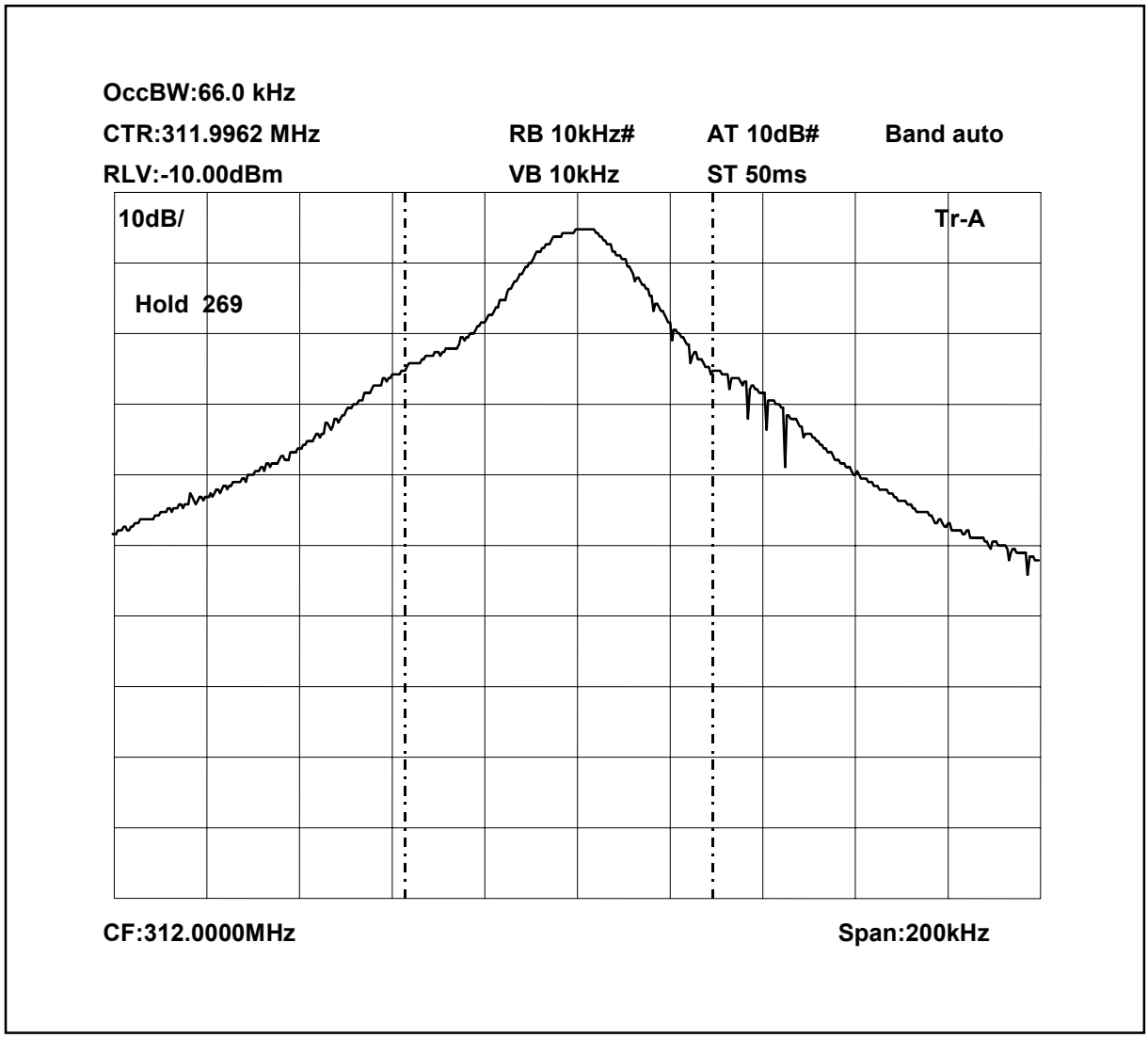
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

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

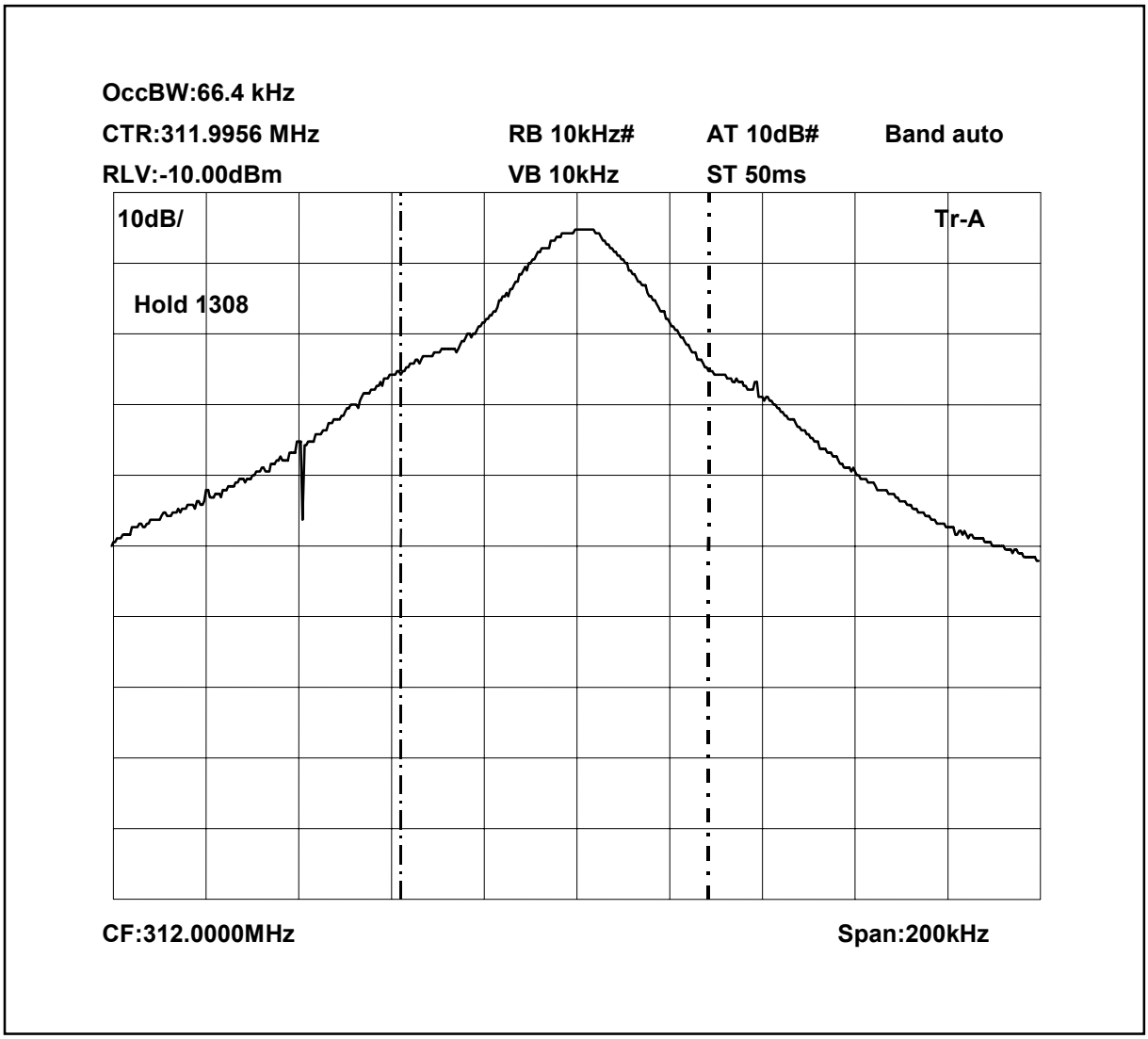
Bandwidth Plot Button Press



Band occupancy @-20dBc = 66.0kHz

Fl = 311.9628MHz
Fh = 312.0288MHz

Bandwidth Plot Pole Signal



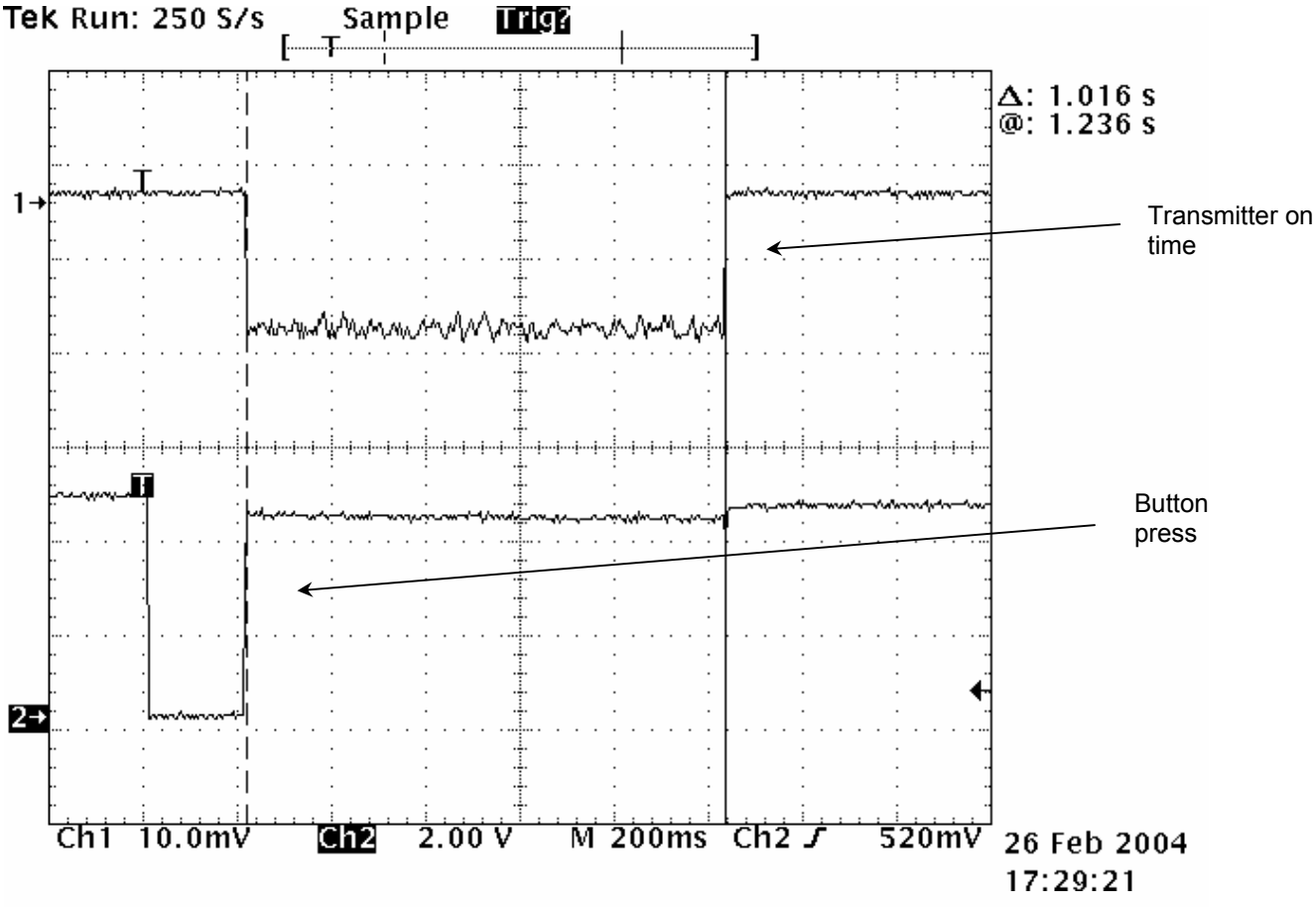
Band occupancy @-20dBc = 66.4kHz

Fl = 311.9628MHz
Fh = 312.0292MHz

ANNEX D

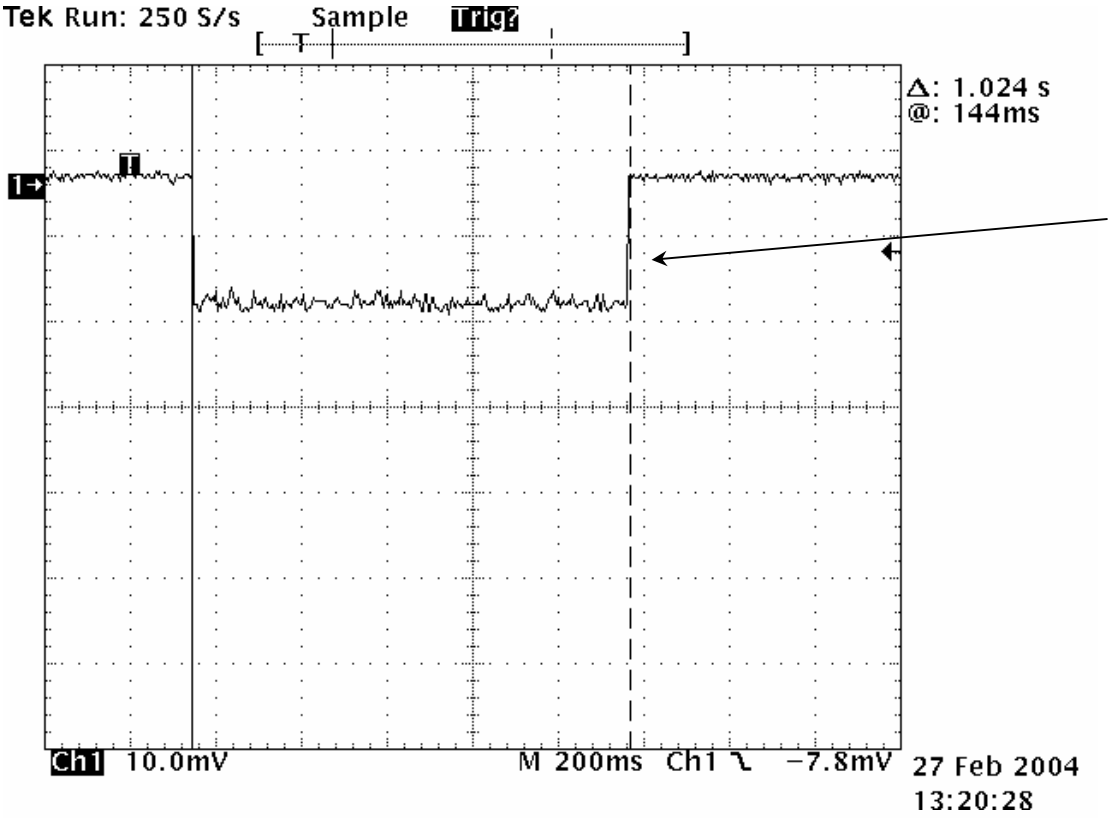
TRANSMITTER ON TIME

Transmitter on time during button press



Transmitter on time = 1.016Seconds

Transmitter on time during pole signal



Transmitter on time 1.024s