



TEST REPORT NO: RU1102/5358
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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: J CHARTERS

APPROVED BY: P GREEN
PRODUCT MANAGER

DATE: 3rd March 2004

Distribution:

- Copy Nos:
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 3. TRL EMC

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CONTENTS

	PAGE
CERTIFICATE OF CONFORMITY & COMPLIANCE	3
APPLICANT'S SUMMARY	4
EQUIPMENT TEST CONDITIONS	5
TESTS REQUIRED	6
SAMPLE CALCULATIONS	6
TEST RESULTS	7-8

ANNEX

PHOTOGRAPHS	A
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	
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST	B
BAND OCCUPANCY PLOT	C

Notes:

- | | | | |
|----|--|-----|-------------------------------------|
| 1. | Component failure during test | YES | ☐ |
| | | NO | ☒ |
| 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: 4027.170 μ V/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: ----- J CHARTERS

APPROVED BY: ----- 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 8 th DECEMBER 2003
TEST RESULT:	COMPLIANT Yes ☒ No ☐
APPLICANT'S CATEGORY:	MANUFACTURER ☒ 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)	26 th February – 1 st 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°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 Two channel Multi-channel	[X] [] []	
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:

- Results quoted are extrapolated as indicated
- Emissions were searched to: (x) 1000MHz inclusive, as per Part 15.33a
- Extrapolation factor 20dB from 0.3m to 3m, as per Part 15.31f
- Measurements >1GHz @ 1m as per Part 15.31f(1)
- Receiver detector >1GHz = CISPR, Quasi-Peak, 120kHz bandwidth
- Receiver detector >1GHz = Peak Hold, 1MHz resolution bandwidth
- New batteries used for battery powered products.
- (R) indicated frequency within restricted band from 15.205
- 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.
- Spurious limit level of 588μV/m was calculated by reducing the fundamental limit by 20dB, as per 15.231(b).

Test Method:

- As per Radio – Noise Emissions, ANSI C63.4: 2001
- Measuring distances as Notes 1 to 4 above
- EUT 0.8 metre above ground plane
- 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 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:**
- Results quoted are extrapolated as indicated.
 - Receiver detector @ fc = Quasi Peak 120kHz bandwidth.
 - When battery powered the EUT was powered with new batteries.
 - For transmitter shut down time see annex D.
 - The transmitter sends a pole signal once every 4 hours for 1second duration.
 - 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:**
- As per Radio – Noise Emissions, ANSI C63.4: 2001
 - Measuring distances 3m
 - EUT 0.8 metre above ground plane
 - 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 15.231 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	
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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

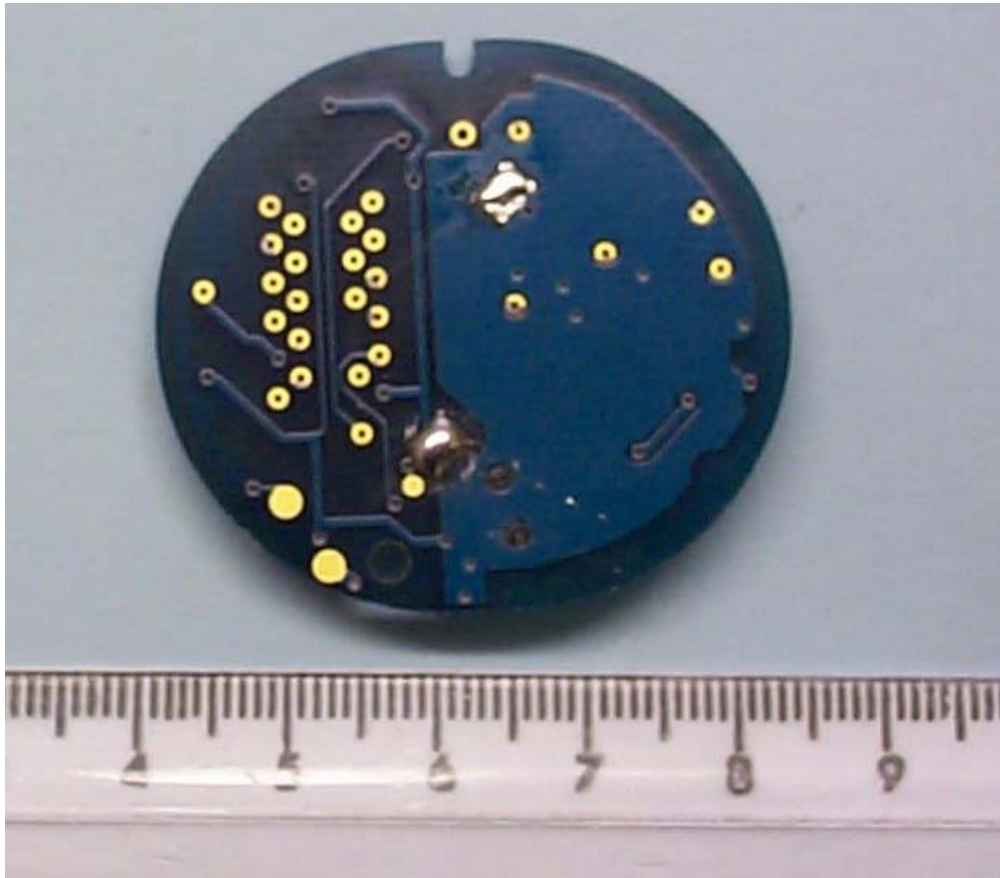


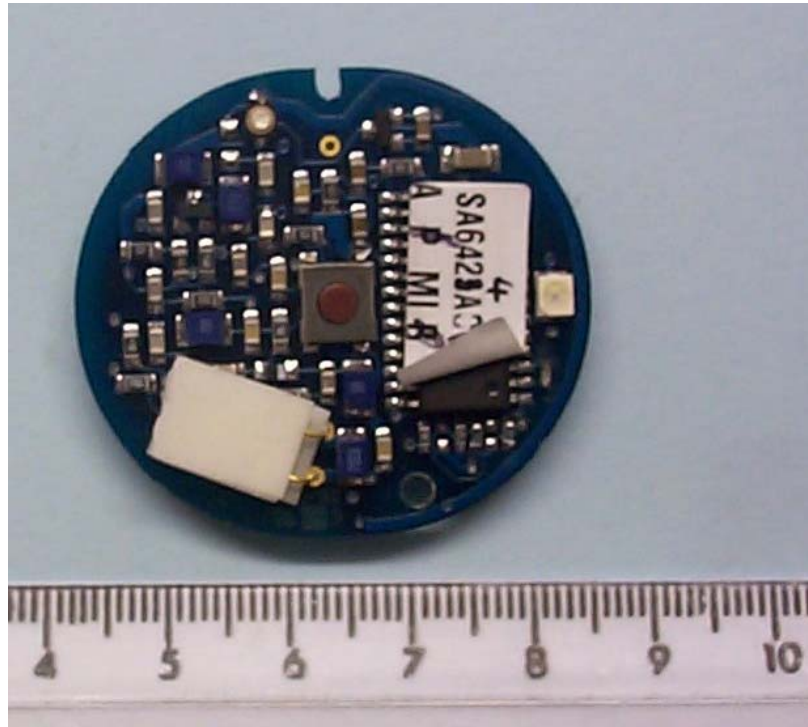
PHOTOGRAPH No. 2

TRANSMITTER FRONT VIEW

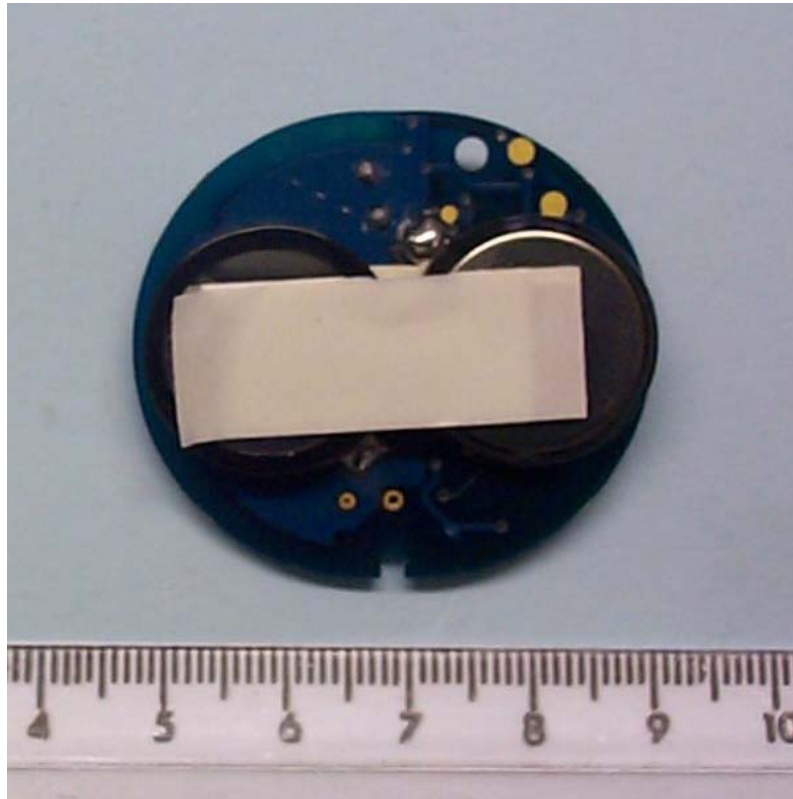








PHOTOGRAPH No. 6 TRANSMITTER BATTERY IN PLACE



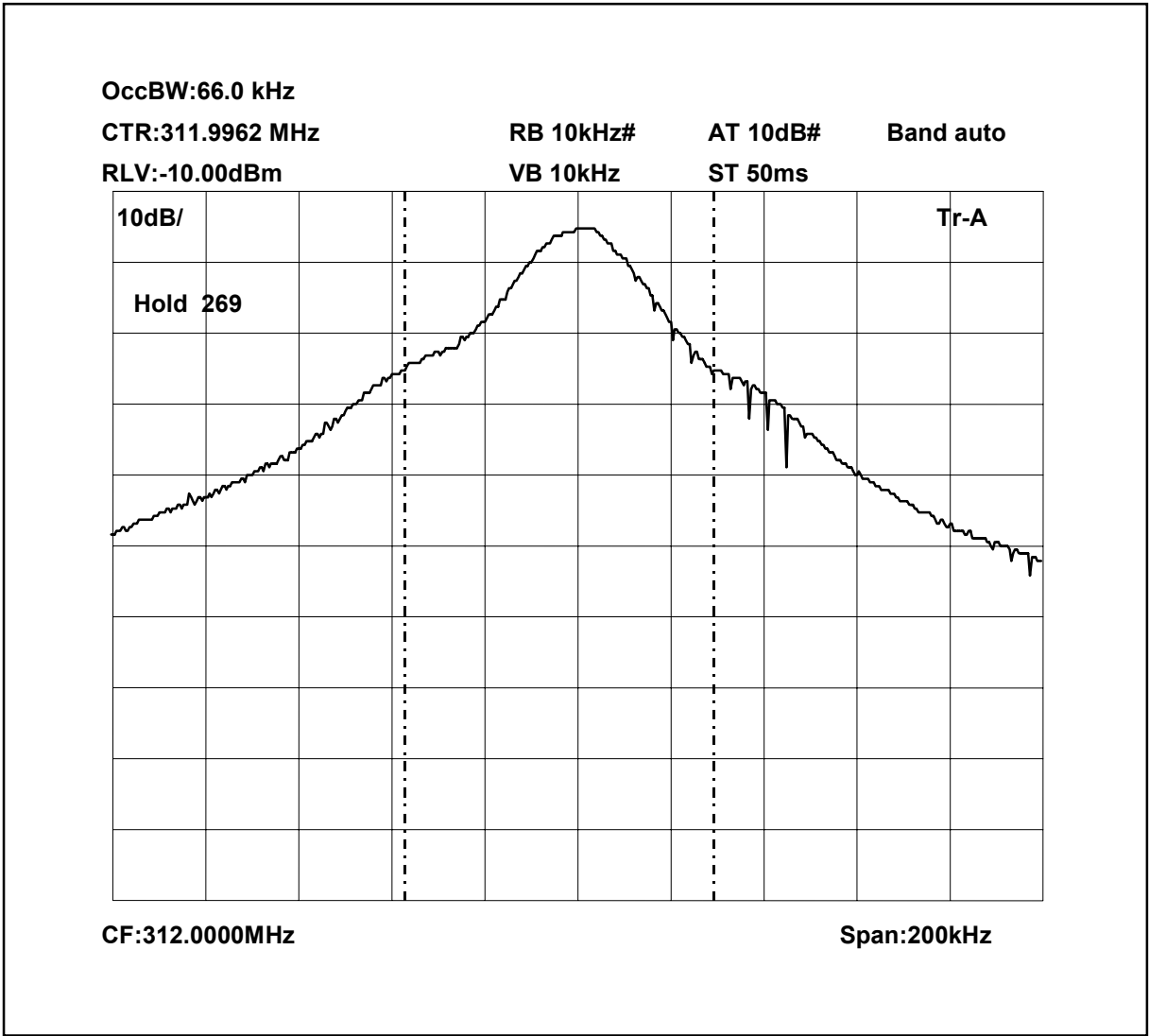
ANNEX B
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

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

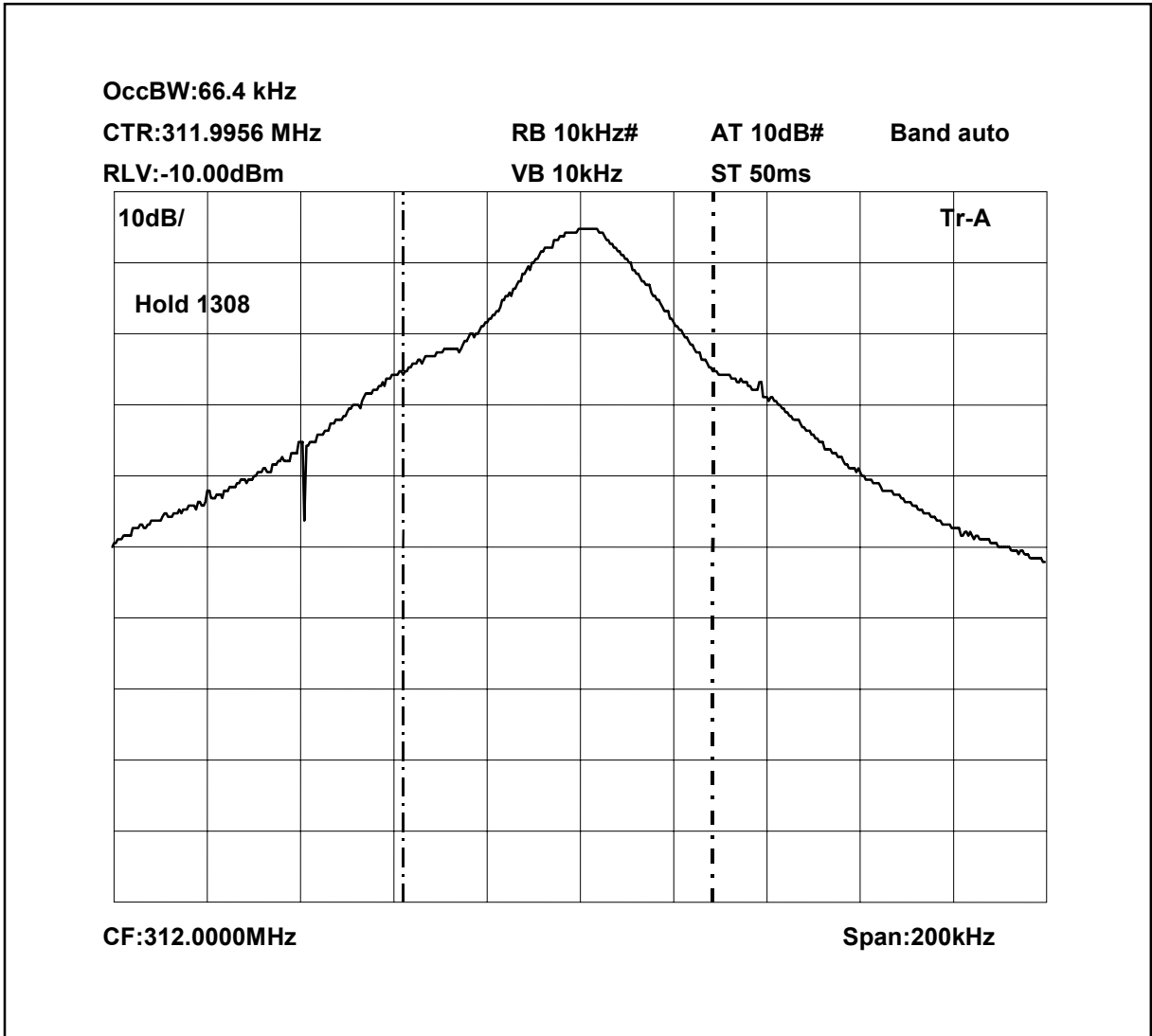
Bandwidth Plot Button Press



Band occupancy @-20dBc = 66.0kHz

Fl = 311.9628MHz
Fh = 312.0288MHz

Bandwidth Plot Pole Signal

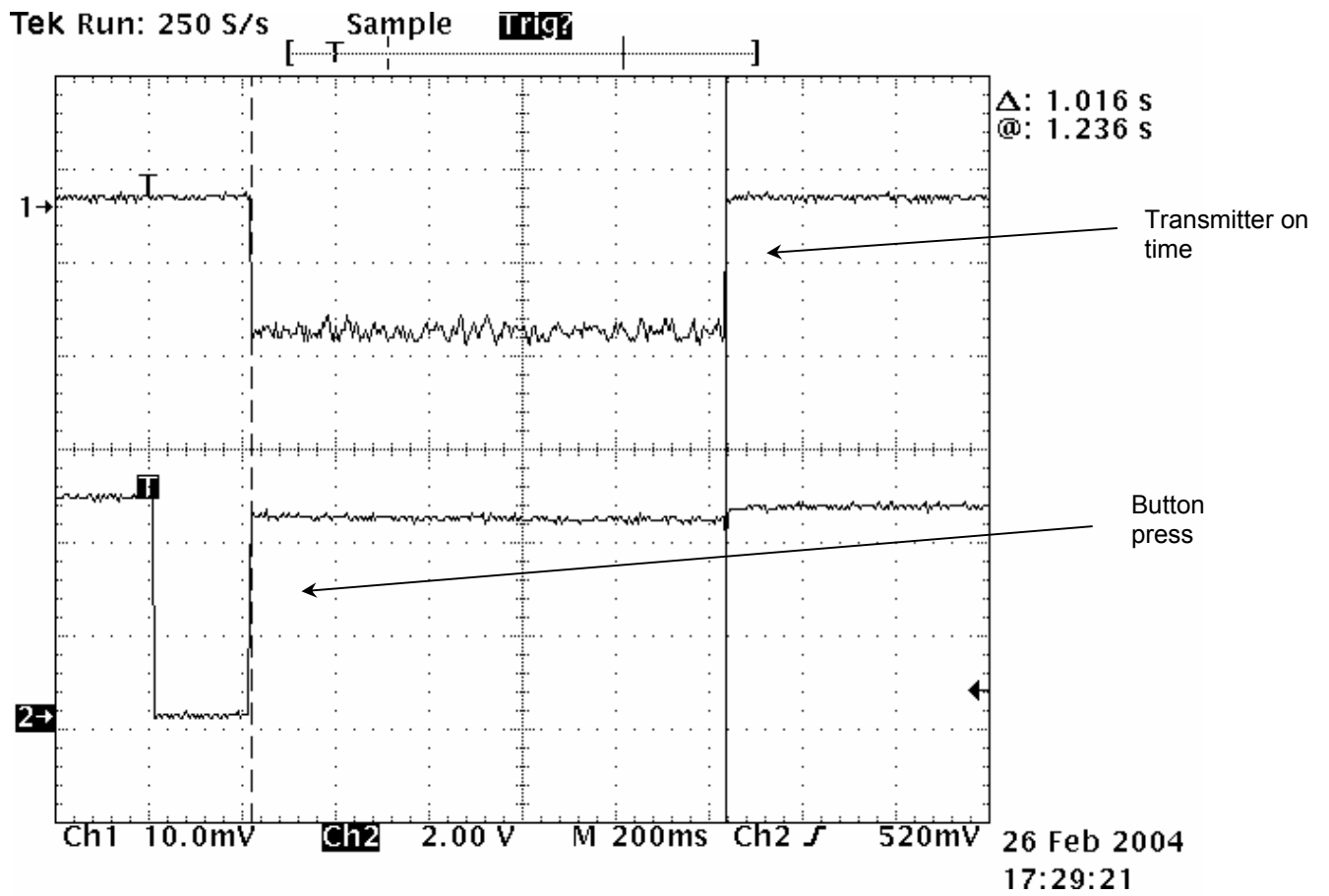


Band occupancy @-20dBc = 66.4kHz

Fl = 311.9628MHz
Fh = 312.0292MHz

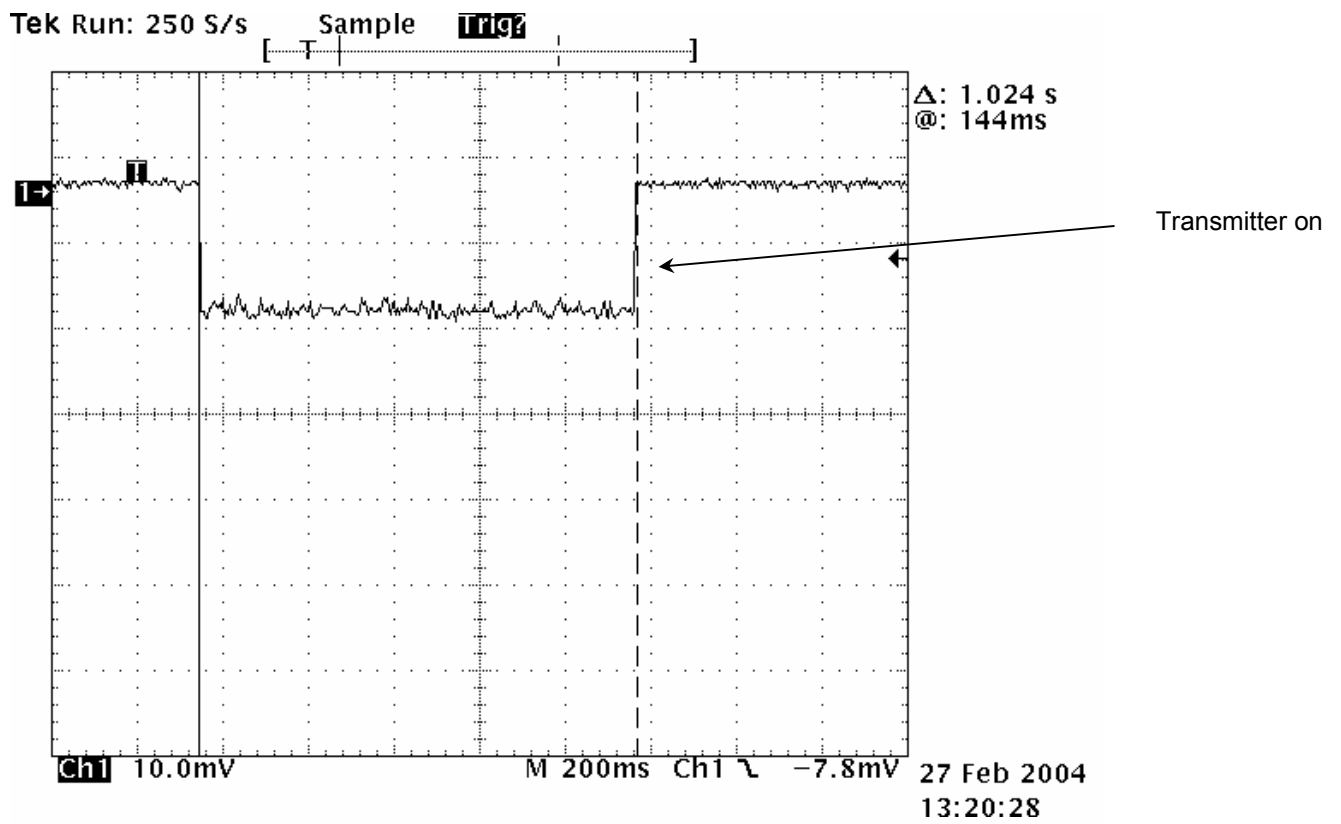
ANNEX D
TRANSMITTER ON TIME

Transmitter on time during button press



Transmitter on time = 1.016Seconds

Transmitter on time during pole signal



Transmitter on time 1.024s