

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan	<h1>TEST REPORT</h1>	Reference No.:A02112210 Report No.:FCCA 02112210 Page: 1 of 1 Date: Dec. 27, 2002
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Product Name: 122 KHz transmitter
 Model Number: ZT-11
 Applicant: ZENTAN TECHNOLOGY CO., LTD.
 NO. 92, HSING-SHENG RD., CHIA-LI CHENG,
 TAINAN HSIEN, TAIWAN, R.O.C.
 Date of Receipt: Dec. 08, 2002
 Finished date of Test: Dec. 20, 2002
 Applicable Standards: 47 CFR Part 15, Subpart C
 ANSI C63.4:1992

We, **Spectrum Research & Testing Laboratory Inc.**, hereby certify that one sample of the above was tested in our laboratory with positive results according to the above-mentioned standards. The records in the report are an accurate account of the results. Details of the results are given in the subsequent pages of this report.

Checked By : W. Huang , Date: Dec. 27, 2002
 (Wolfgang Huang)

Approved By : Harris W. Lai , Date: Dec. 27, 2002
 (Harris W. Lai, Director)

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan	<h1>TEST REPORT</h1>	Reference No.: A02112210 Report No.: FCCA02112210 Page: 2 of 2 Date: Dec. 27, 2002
---	----------------------	---

Table of Contents

1.	DOCUMENT POLICY AND TEST STATEMENT	3
1.1	DOCUMENT POLICY	3
1.2	TEST STATEMENT	3
2.	DESCRIPTION OF EUT AND TEST MODE	4
2.1	GENERAL DESCRIPTION OF EUT	4
2.2	DESCRIPTION OF EUT INTERNAL DEVICE	4
2.3	DESCRIPTION OF TEST MODE	4
2.4	DESCRIPTION OF SUPPORT UNIT	5
3.	DESCRIPTION OF APPLIED STANDARDS	6
4.	RADIATED EMISSION TEST	6
4.1	RADIATED EMISSION LIMIT	6
4.2	TEST EQUIPMENT	7
4.3	TEST SET-UP	8
4.4	TEST PROCEDURE	9
4.5	EUT OPERATING CONDITION	9
4.6	RADIATED EMISSION TEST RESULT	10
5.	OCCUPIED BANDWIDTH TEST	12
5.1	TEST EQUIPMENT	12
5.2	TEST SET-UP	13
5.3	TEST PROCEDURE	14
5.4	EUT OPERATING CONDITION	14
5.5	OCCUPIED BANDWIDTH TEST RESULT	15
6.	TIME DOMAIN AND DUTY CYCLE TEST	16
6.1	TEST EQUIPMENT	16
6.2	TEST SET-UP	16
6.3	TEST PROCEDURE	16
6.4	EUT OPERATING CONDITION	16
6.5	TIME DOMAIN AND DUTY CYCLE TEST RESULT	17
7.	TERMS OF ABRIVATION	20

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan	<h1>TEST REPORT</h1>	Reference No.:A02112210 Report No.: FCCA02112210 Page: 3 of 3 Date: Dec. 27, 2002
---	----------------------	--

1. DOCUMENT POLICY AND TEST STATEMENT

1.1 DOCUMENT POLICY

- The report shall not be reproduced except in full, without the written approval of SRT Lab, Inc.
- The report must not be used by the applicant to claim that the product is endorsed by NVLAP.
- The NVLAP logo applies only to the applicable standards specified in this report.

1.2 TEST STATEMENT

- The test results in the report apply only to the unit tested by SRT Lab.
- There was no deviation from the requirements of test standards during the test.
- The heartbeat simulator (see the test photo) was produced signal to EUT during the test.
- DC power source, 3V from Lithium battery, was used during the test.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan	<h1>TEST REPORT</h1>	Reference No.: A02112210 Report No.: FCCA02112210 Page: 4 of 4 Date: Dec. 27, 2002
---	----------------------	---

2. DESCRIPTION OF EUT AND TEST MODE

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT	122 KHz transmitter
MODEL NO.	ZT-11
POWER SUPPLY	DC 3V from Lithium Battery
CABLE	N/A
I/O PORT	N/A
FREQUENCY BAND	9kHz-490kHz
CARRIER FREQUENCY	122kHz±10%
NUMBER OF CHANNEL	1
CHANNEL SPACING	0
RF OUTPUT POWER	31nW
MODULATION TYPE	Pulsed
ANTENNA TYPE	Coils wound on ferrite cores and soldered to transmitter.

NOTE : The EUT is the transmitter part of a chest transmitter which can detect heartbeat automatically when on the body. For more detailed features, please refer to the User' s Manual of EUT.

2.2 DESCRIPTION OF EUT INTERNAL DEVICE

DEVICE	BRAND / MAKER	MODEL #	FCC ID/DOC	REMARK
N/A				

2.3 DESCRIPTION OF TEST MODE

N/A (It is only applicable to more than one test mode.)

	Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan	<h1>TEST REPORT</h1>	Reference No.: A02112210 Report No.: FCCA02112210 Page: 5 of 5 Date: Dec. 27, 2002
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2.4 DESCRIPTION OF SUPPORT UNIT

The EUT was configured by the requirement of ANSI C63.4. All interface ports were connected to the appropriate support units via specific cables. The support units and cables are listed below.

NO	DEVICE	BRAND	MODEL #	FCC ID / DOC	CABLE
	N/A				

NOTE : For the actual test configuration, please refer to the photos of testing.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan	<h1>TEST REPORT</h1>	Reference No.: A02112210 Report No.: FCCA02112210 Page: 6 of 6 Date: Dec. 27, 2002
---	----------------------	---

3. DESCRIPTION OF APPLIED STANDARDS

The EUT is a kind of radio product and according to the specifications provided by the applicant, it must comply with the requirements of the following standards:

- 47 CFR Part 15, Subpart C
- ANSI C63.4:1992

All tests have been performed and recorded as per the above standards.

4. RADIATED EMISSION TEST

4.1 RADIATED EMISSION LIMIT

All emission from EUT, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below :

FCC Part 15, Subpart B Section 15.209.

FREQUENCY (MHz)	DISTANCE (m)	FIELD STRENGTH (mV/m)
0.009 - 0.490	300	2400/F(kHz)
0.490-1.705	300	2400/F(kHz)
1.705-30.0	30	30
30 - 88	3	100
88 - 216	3	150
216 - 960	3	200
ABOVE 960	3	500

- NOTE** :
1. In the emission tables above , the tighter limit applies at the band edges.
 2. Distance refers to the distance between measuring instrument , antenna , and the closest point of any part of the device or system.

According to the FCC Part 15, Subpart A Section 15.31(f)(2), the extrapolation factor of 40 dB/decade is used for measurement distances different then specified in with limits for frequencies below 30 MHz.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan	<h1>TEST REPORT</h1>	Reference No.: A02112210 Report No.: FCCA02112210 Page: 7 of 7 Date: Dec. 27, 2002
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4.2 TEST EQUIPMENT

The following test equipment was used during the radiated emission test :

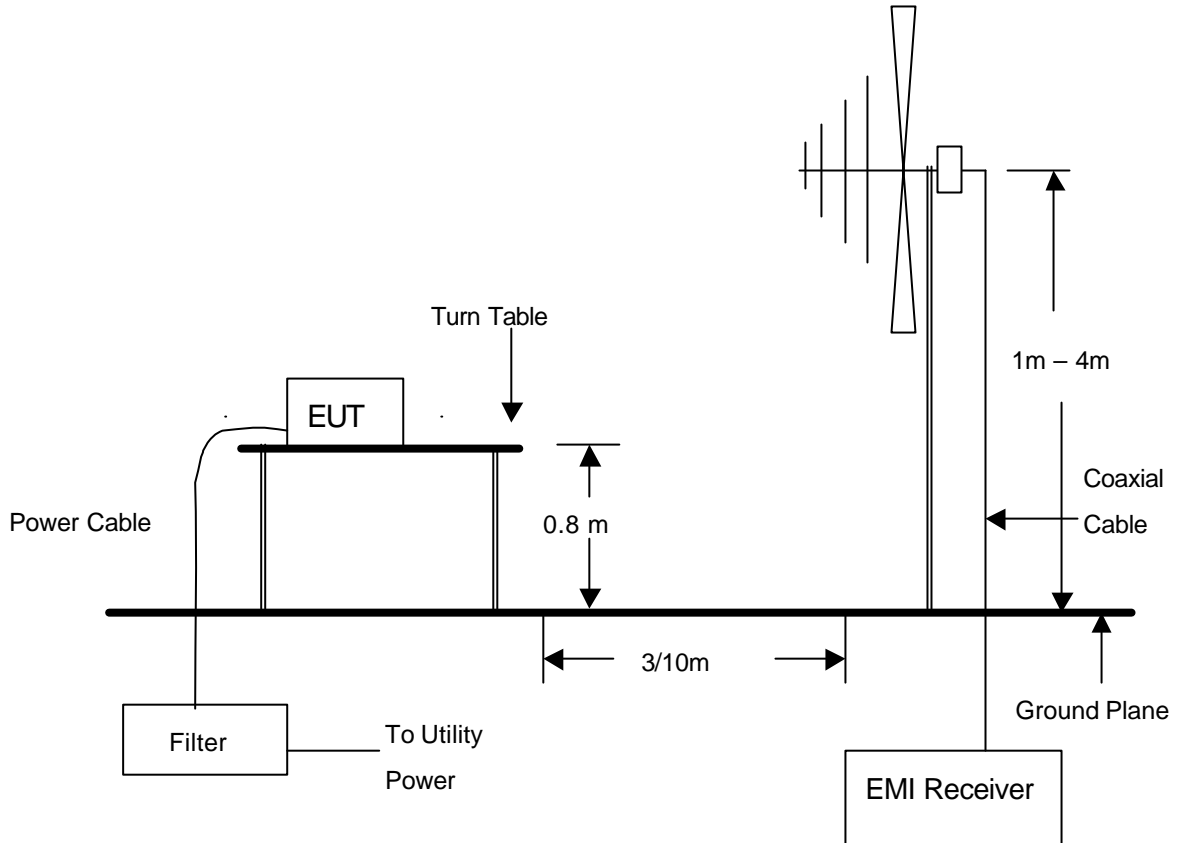
EQUIPMENT/ FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL#/ SERIAL#	DUE DATE OF CAL. & CAL. CENTER
EMI TEST RECEIVER	9 kHz TO 2750 MHz	ROHDE & SCHWARZ	ESCS30/ 836858/008	DEC. 2002 R&S
BI-LOG ANTENNA	25 MHz TO 2 GHz	EMCO	3142/9701-1124	JUL. 2003 ETC
LOOP ANTENNA	9 kHz TO 30 MHz	SCHWARZ	FHF2-Z2/ 1162 1/2	AUG.2003
OATS	3 - 10 M measurement	SRT	SRT-1	MAY 2003

NOTE:

1. The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.
2. The Open Area Test Site (SRT-1) is registered by FCC with No. 90957 and VCCI with No. R-1081.
3. The Open Area Test Site (SRT-2) is registered by FCC with No. 98458 and VCCI with No. R-1168.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan	<h1>TEST REPORT</h1>	Reference No.: A02112210 Report No.: FCCA02112210 Page: 8 of 8 Date: Dec. 27, 2002
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4.3 TEST SET-UP



NOTE :

1. The EUT system was put on a wooden table with 0.8m heights above a ground plane.
2. For the actual test configuration, please refer to the photos of testing.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan	<h1>TEST REPORT</h1>	Reference No.: A02112210 Report No.: FCCA02112210 Page: 9 of 9 Date: Dec. 27, 2002
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4.4 TEST PROCEDURE

The EUT was tested according to the requirement of ANSIC63.4. The measurements were made at an open area test site with 3 meter measurement distance. The frequency spectrum measured started from 9 kHz. All readings were peak value with 200Hz resolution bandwidth at frequency below 150kHz, and with 9kHz resolution bandwidth between 150 kHz and 30MHz . Under 30MHz to 1 GHz, all readings were peak values with 120 kHz resolution bandwidth of the test receiver. Above 1 GHz, all readings were peak or average values with 1 MHz resolution bandwidth of the test receiver. The EUT was tested in 3 orthogonal positions (X, Y and Z).

4.5 EUT OPERATING CONDITION

Set the EUT under transmission condition continuously at specific channel frequency.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan	<h1>TEST REPORT</h1>	Reference No.: A02112210
		Report No.: FCCA02112210
		Page: 10 of 10
		Date: Dec. 27, 2002

4.6 RADIATED EMISSION TEST RESULT

Temperature:	<u>25 °C</u>	Humidity:	<u>65 %RH</u>
Frequency Range:	<u>9kHz – 30MHz</u>	Measured Distance:	<u>3m</u>
Receiver Detector:	<u>PK</u>	Tested by	<u>James Lee</u>

Frequency (kHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
128.2(F)	0.2	20	72.3	92.5	105.44	-12.94
256.4	0.2	20	51.5	71.7	99.44	-27.74
384.6	0.2	20	44.3	64.5	95.85	-31.35

- NOTE :**
1. Measurement uncertainty is less than +/- 4dB
 2. "": Measurement does not apply for this frequency.
 3. Emission Level = Reading Value + Ant. Factor + Cable Loss
 4. Limit(dBuV/m)(The measurement distance at 3m)= $20\log\{2400/F(\text{kHz})\}$ (The measurement distance at 300m)+ $40\log(300/3)$
 5. The field strength of other emission frequencies were very low against the limit.
 6. (F) : Fundamental frequency of transmitter.
 7. The emission level at Y position was better than at other positions(see radiation test figure).

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan	<h1>TEST REPORT</h1>	Reference No.: A02112210
		Report No.: FCCA02112210
		Page: 11 of 11
		Date: Dec. 27, 2002

Temperature: 25 °C Humidity: 63 %RH
 Frequency Range: 30 – 1000 MHz Measured Distance: 3m
 Receiver Detector: PK. Tested by James Lee

Antenna Polarization : Horizontal

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBµV)	Emission Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	EL(m)	AZ(°)
75.6300	1.09	8.00	22.7	31.8	40.0	-8.2	45	2.1
178.7700	1.61	9.76	21.1	32.5	43.5	-11.0	78	2.3
199.0200	1.63	10.47	22.8	34.9	43.5	-8.6	66	1.9
252.4800	1.96	12.72	20.7	35.4	46.0	-10.6	326	1.5

Antenna Polarization : Vertical

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBµV)	Emission Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	EL(m)	AZ(°)
66.1800	1.02	8.28	22.5	31.8	40.0	-8.2	333	2.3
75.9000	1.09	8.00	17.3	26.4	40.0	-13.6	23	2.1
85.3300	1.10	8.20	19.3	28.6	40.0	-11.4	50	2

- NOTE :**
1. Measurement uncertainty is less than +/- 4dB
 2. "": Measurement does not apply for this frequency.
 3. Emission Level = Reading Value + Ant. Factor + Cable Loss
 4. The field strength of other emission frequencies were very low against the limit.
 5. (F) : Fundamental frequency of transmitter.
 - 6.(*):The emission always below noise.
 - 7.The emission level at Y position was better than at other positions(see radiation test figure).

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan	<h1>TEST REPORT</h1>	Reference No.: A02112210 Report No.: FCCA02112210 Page: 12 of 12 Date: Dec. 27, 2002
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5. OCCUPIED BANDWIDTH TEST

5.1 TEST EQUIPMENT

The following test equipment was used during the radiated emission test :

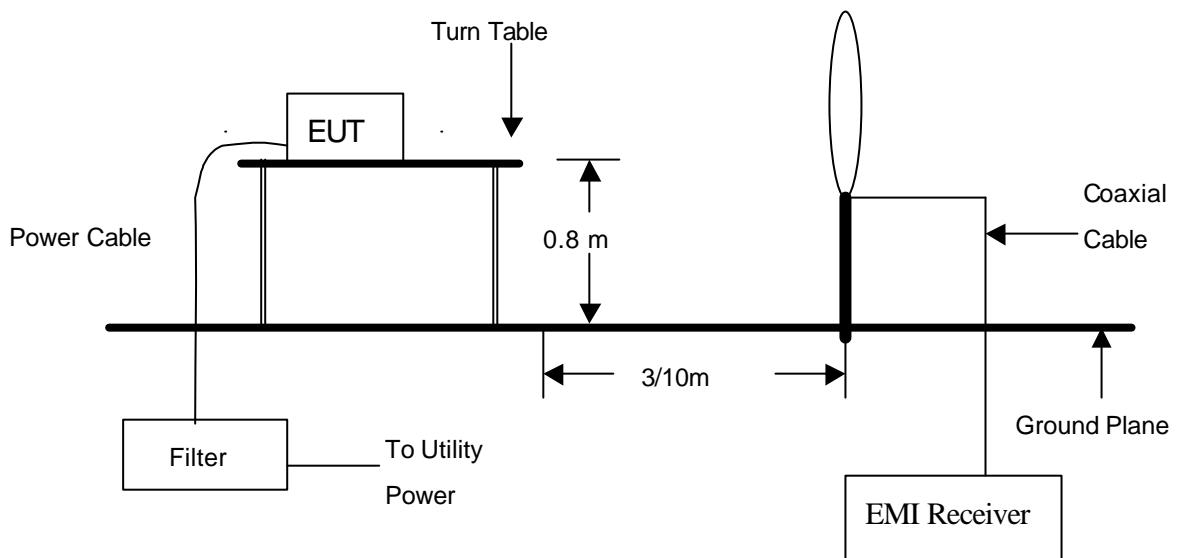
EQUIPMENT/ FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL#/ SERIAL#	DUE DATE OF CAL. & CAL. CENTER
EMI TEST RECEIVER	9 kHz TO 2750 MHz	ROHDE & SCHWARZ	ESCS30/ 836858/008	DEC. 2002 R&S
LOOP ANTENNA	9 kHz TO 30 MHz	SCHWARZ	FHF2-Z2/ 1162 1/2	AUG.2003
OATS	3 - 10 M measurement	SRT	SRT-1	MAY 2003

NOTE:

1. The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.
2. The Open Area Test Site (SRT-1) is registered by FCC with No. 90957 and VCCI with No. R-1081.
3. The Open Area Test Site (SRT-2) is registered by FCC with No. 98458 and VCCI with No. R-1168.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan	<h1>TEST REPORT</h1>	Reference No.: A02112210 Report No.: FCCA02112210 Page: 13 of 13 Date: Dec. 27, 2002
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5.2 TEST SET-UP



NOTE :

1. The EUT system was put on a wooden table with 0.8m heights above a ground plane.
2. For the actual test configuration, please refer to the photos of testing.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan	TEST REPORT	Reference No.:A02112210 Report No.: FCCA02112210 Page: 14 of 14 Date: Dec. 27, 2002
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5.3 TEST PROCEDURE

The EUT was tested according to the requirement of ANSI C63.4. The measurements were made at an open area test site with 3 meter measurement distance. The test receiver captured the test result plot and delta mark to 26dBc. Then printed out the plot on screen of the test receiver.

5.4 EUT OPERATING CONDITION

Set the EUT under transmission condition continuously at specific channel frequency.



Spectrum Research & Testing Lab., Inc.
 No. 101-10, Ling 8,
 Shan-Tong Li, Chung-Li
 City, Taoyuan, Taiwan

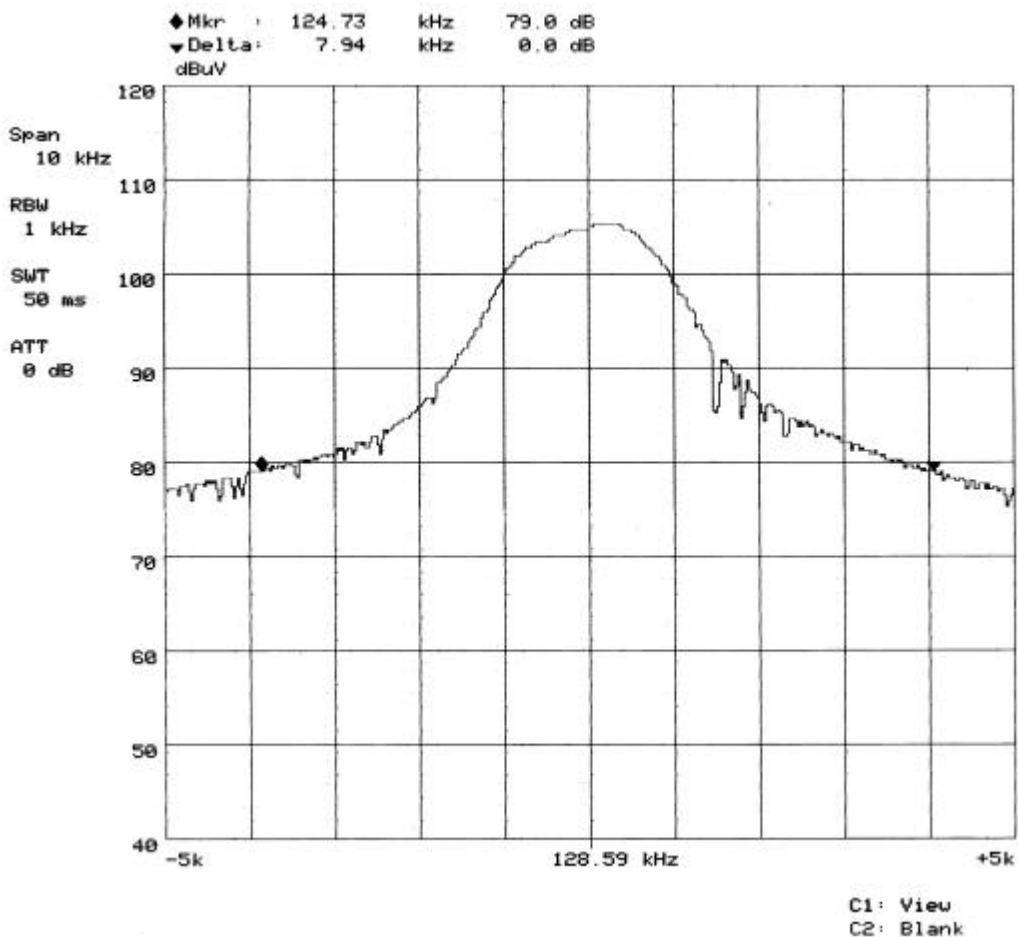
TEST REPORT

Reference No.: A02112210
 Report No.: FCCA02112210
 Page: 15 of 15
 Date: Dec. 27, 2002

5.5 OCCUPIED BANDWIDTH TEST RESULT

Temperature: 25 °C Humidity: 65 %RH
 Receiver Detector: P.K. Measured Distance: 3m
 Tested by James Lee

CHANNEL NUMBER	CHANNEL FREQUENCY (kHz)	<u>26</u> dB DOWN BW (kHz)	PASS/FAIL
1	128.59	7.94	PASS



	Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan	<h1>TEST REPORT</h1>	Reference No.: A02112210 Report No.: FCCA02112210 Page: 16 of 16 Date: Dec. 27, 2002
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6 TIME DOMAIN AND DUTY CYCLE TEST

6.1 TEST EQUIPMENT

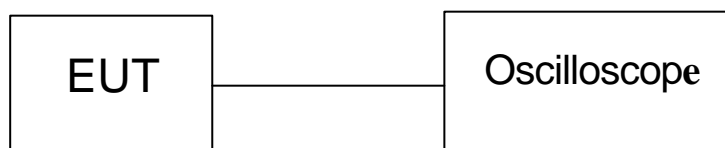
The following test equipment was used during the radiated emission test :

EQUIPMENT/ FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL#/ SERIAL#	DUE DATE OF CAL. & CAL. CENTER
Oscilloscope	100MHz 200Ms a/s	HP	54645A/ US39151317	MAR. 2003

NOTE:

1. The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.

6.2 TEST SET-UP



6.3 TEST PROCEDURE

The EUT was transmitting continuously. The oscilloscope recorded signal values. The simulator's signal was imitated for normal use mode. The number of heartbeat is 130 times at one minute during the test.

6.4 EUT OPERATING CONDITION

Set the EUT under transmission condition continuously at specific channel frequency.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan	<h1>TEST REPORT</h1>	Reference No.: A02112210
		Report No.: FCCA02112210
		Page: 17 of 17
		Date: Dec. 27, 2002

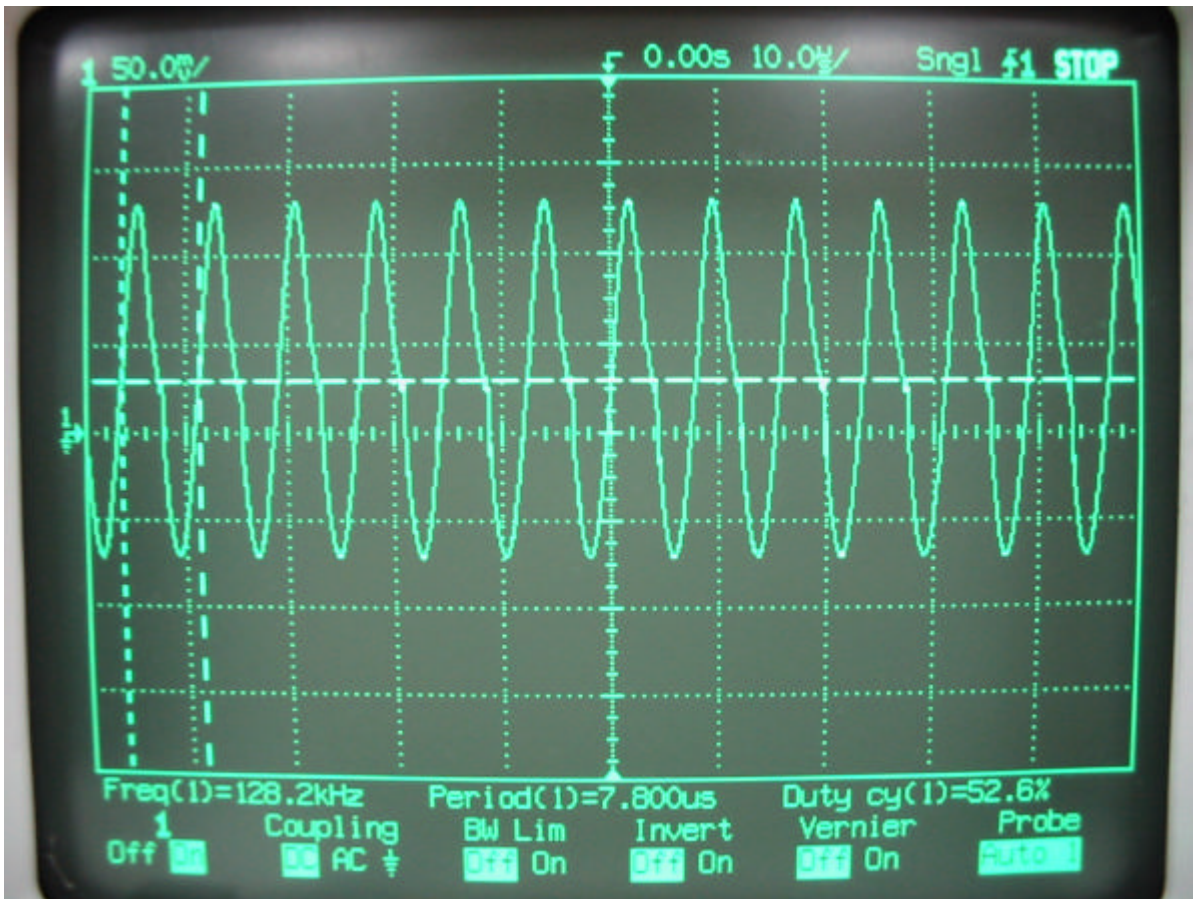
6.5 TIME DOMAIN AND DUTY CYCLE TEST RESULT

Temperature: 25 °C Humidity: 65 %RH

Tested by James Lee

TIME DOMAIN:

Frequency (kHz)	Period (us)	Duty cycle (%)	PASS/FAIL
128.2	7.8	52.6	PASS





**Spectrum Research
& Testing Lab., Inc.**
No. 101-10, Ling 8,
Shan-Tong Li, Chung-Li
City, Taoyuan, Taiwan

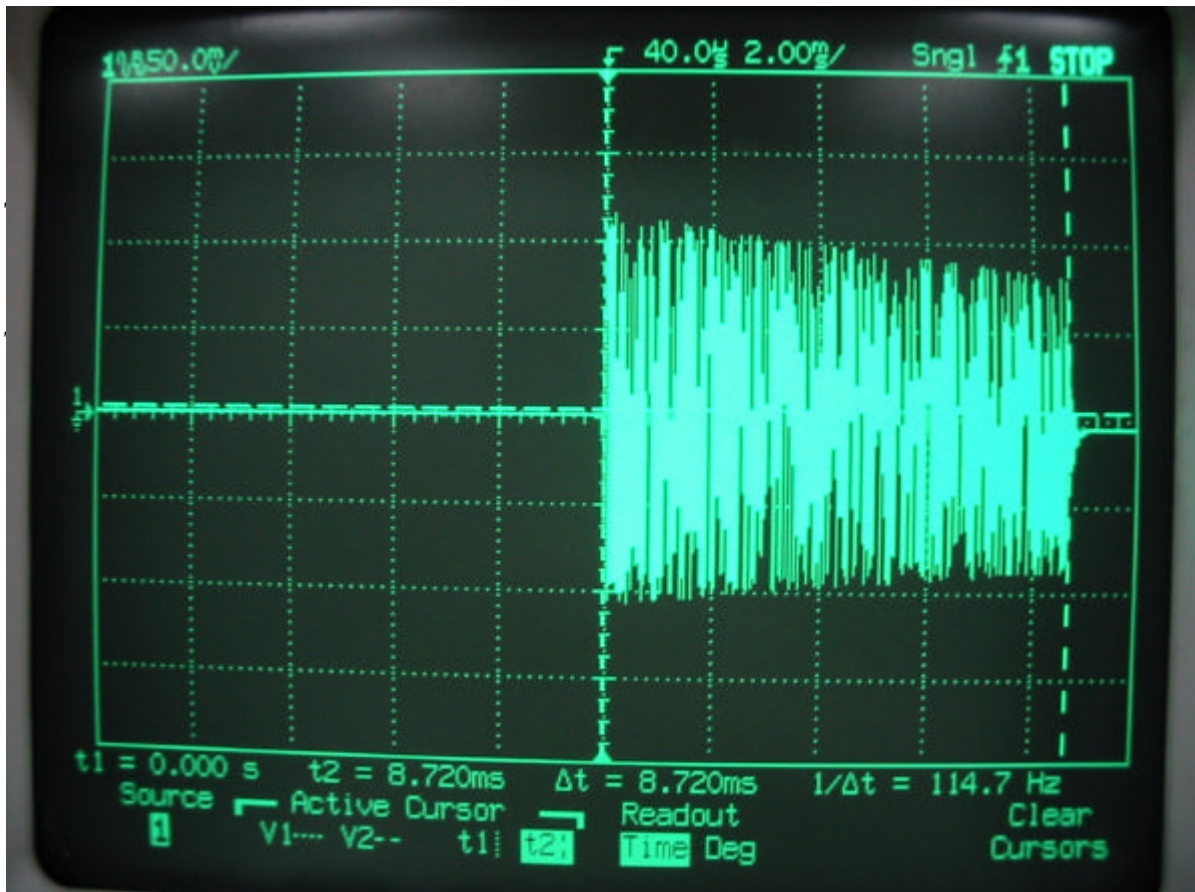
TEST REPORT

Reference No.: A02112210
Report No.: FCCA02112210
Page: 18 of 18
Date: Dec. 27, 2002

DUTY CYCLE:

Time on (ms)	TOTAL TIME (ms)	DUTY CYCLE %	PASS/FAIL
8.72	664	1.3	PASS

Time on:



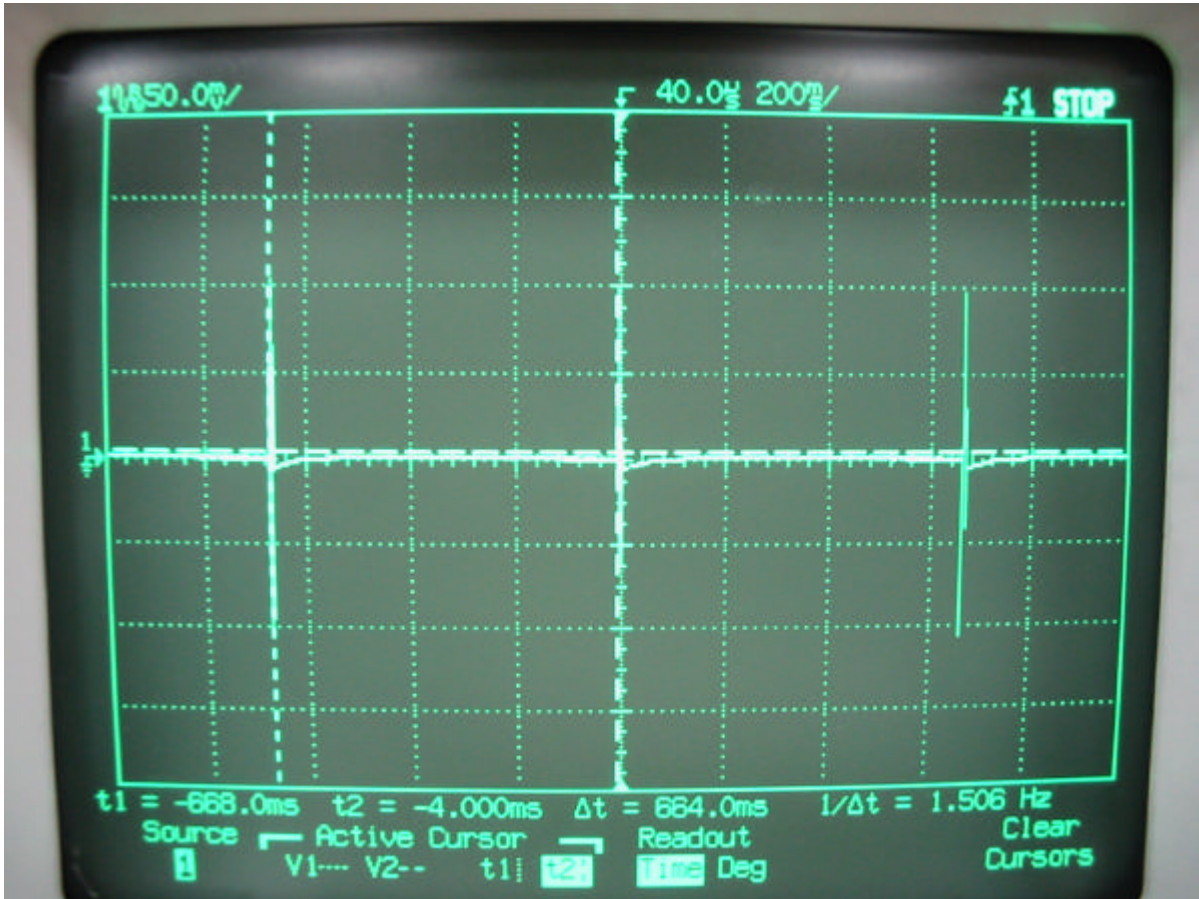


**Spectrum Research
& Testing Lab., Inc.**
No. 101-10, Ling 8,
Shan-Tong Li, Chung-Li
City, Taoyuan, Taiwan

TEST REPORT

Reference No.: A02112210
Report No.: FCCA02112210
Page: 19 of 19
Date: Dec. 27, 2002

Total Time:



 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan	<h1>TEST REPORT</h1>	Reference No.: A02112210 Report No.: FCCA02112210 Page: 20 of 20 Date: Dec. 27, 2002
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7 TERMS OF ABRIVATION

AZ(°)	Turn table azimuth
Correct.	Correction
EL(m)	Antenna height (meter)
EUT	Equipment Under Test
Horiz.	Horizontal direction
LISN	Line Impedance Stabilization Network
NSA	Normalized Site Attenuation
Q.P.	Quasi-peak detection
SRT Lab	Spectrum Research & Testing Laboratory, Inc.
Vert.	Vertical direction