



FCC EMC TEST REPORT
for
COMMUNICATIONS SPECIALISTS
TRANSMITTER
Model: PT-1 Transmitter

GARWOOD LABORATORIES, INC.
TESTING AND ENGINEERING SERVICES



FCC PART 15 SUBPART C § 15.209
Intentional Radiators
EVALUATION REPORT
RADIO FREQUENCY INTERFERENCE TEST

Prepared for:
COMMUNICATIONS SPECIALISTS

Product Description:
TRANSMITTER
Model: PT-1 Transmitter



Test Completion Date:
January 19, 2004



GARWOOD LABORATORIES, INC.

950 Calle Negocio, San Clemente, CA 92673

Phone: 949-361-9189 Fax: 949-391-9597

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Report No: FR26031SE

EMC TEST REPORT FOR COMMUNICATIONS SPECIALIST, INC.

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1.0 INTRODUCTORY SUMMARY

RESPONSIBLE SIGNATURES

This report is intended for the use by the organization to whom it is addressed, and will not be made available to any other parties without the expressed written consent of the aforementioned organization. This report shall not be reproduced, except in full, without the written approval of Garwood Laboratories, Inc.

WRITTEN BY:

Stephen Heyman
EMC Technical Writer

REVIEWED BY:

Arnulfo Tapia
Senior EMC Test Engineer

REVIEWED BY:

Tony Masone
EMC Manager

DOCUMENT HISTORY

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CLIENT INFORMATION

Purchase Order	121703-SP
EUT Arrival Date	January 19, 2004
Company Name	Communications Specialist, Inc.
Address	426 West Taft Ave
City, State Zip	Orange, CA 92865
Contact Name	Spence Porter
Phone	714-998-3021
Fax	714-974-3420

GARWOOD INFORMATION

EMC Test Laboratory	Garwood Laboratories, Inc.
Address	950 Calle Negocio
City, State, Zip Code	San Clemente, CA 92673
Phone	(949) 361-9189
Fax	(949) 361-9597
Web Site	www.garwoodtestlabs.com
Contact Name	Tony Masone
Title	EMC Manager
Contact Phone	(562) 949-2727
Contact Fax	(562) 949-8757

Test Personnel	Test Dates
Terry Reysbergen – EMC Test Engineer	19 January 2004



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Accreditations:

The Open Area Test Site (OATS) and measurement facilities used to collect the test data are located at Garwood Laboratories, Incorporated test facility in San Clemente, California.

The test facility is recognized, certified, or accredited by the following organizations:



Garwood Laboratories, Inc. is accredited by the U.S. National Institute Standards Technology under NVLAP as suppliers of test results to the criteria established by ISO/IEC 17025 and ISO 9002. The accreditation is valid through September 30, 2004.

BSMI

Garwood Laboratories, Inc. has been validated by the Chinese Taipei Bureau of Standards, Metrology and Inspection (BSMI) under the Asia Pacific Economic Cooperation Mutual Recognition Arrangement (APEC MRA). Garwood Laboratories is now provisionally designated to act as a Conformity Assessment Body (CAB) under Appendix B, Phase 1 Procedures of the APEC MRA. The BSMI assigned number is SL2-IN-E-059R.

TUV

Garwood Laboratories, Inc. is approved by TUV Product Services as a test facility testing to the EMC DIRECTIVE 89/336/EEC.

Garwood Laboratories, Inc. is approved as a contractor to Radio Frequency investigation LTD, a UK Competent Body and by Radio Frequency Technologies LTD, a Competent Body of Ireland.



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EMC TEST REPORT FOR COMMUNICATIONS SPECIALIST, INC.

2.0 SUMMARY OF TEST

2.1A ADMINISTRATIVE DATA

DEVICE TESTED: Description: Transmitter
Model: PT-1 Transmitter

ACCESSORIES: N/A

APPLICANT: Communications Specialists

CONTACT: Spence Porter

MANUFACTURER: Communications Specialists

2.1B TEST DESCRIPTION

FREQUENCY RANGES: Conducted: 0.45 - 30.0 MHz
Radiated: 30.0 - 1000 MHz
Radiated: All Harmonics of Fundamental frequency

TEST LOCATION: 950 Calle Negocio, San Clemente, Calif. 92673

TEST DATES: January 19, 2004

PURPOSE OF TEST: To demonstrate compliance with the limits of FCC Part 15C §15.209

TESTS PERFORMED:

1. Conducted Emissions Per ANSI C63.4.
2. Radiated Emissions Per ANSI C63.4 at 3 Meters.
3. Engineering Evaluations

All Measurement Data is acquired according to the content of ANSI C63.4. The Test Site Data and performance complies with ANSI C63.4, unless supplemented with additional requirements as noted in the test report.



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2.2 TEST RESULTS - CONDUCTED EMISSIONS

Conducted Emission Results - High or Supply Lead

*****N/A Battery Powered**



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2.2 TEST RESULTS - CONDUCTED EMISSIONS

Conducted Emission Results – Low or Return Lead

*****N/A Battery Powered**



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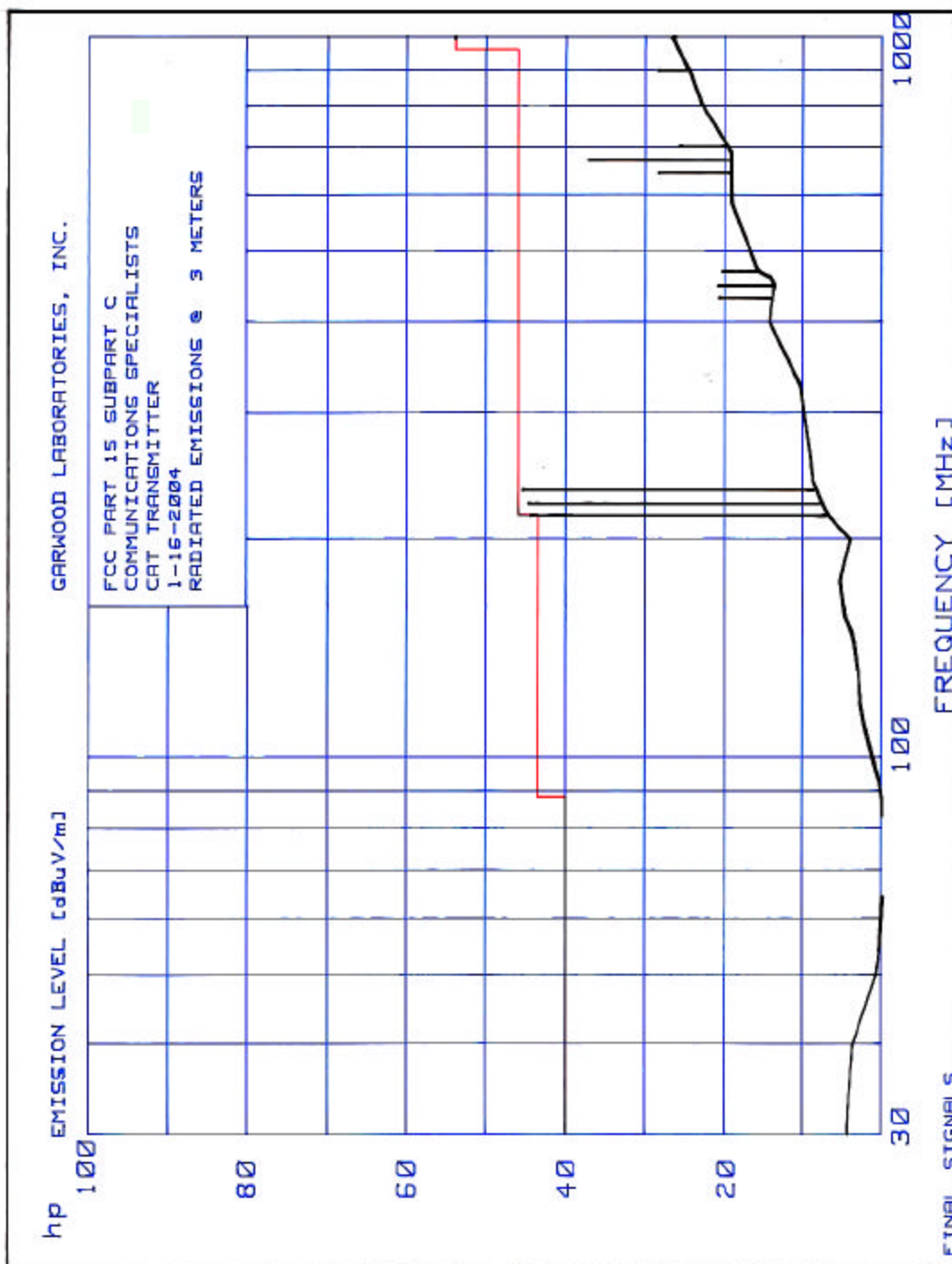
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2.3 TEST RESULTS - RADIATED EMISSIONS

Measurements taken at 3 Meters.





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PRODUCT EMISSIONS

FCC PART 15 SUBPART C

Data File: FINAL

215.025

16MS

No	EMISSION	SPEC LIMIT	MEASUREMENTS			SITE			CORR FACTOR	COMMENTS
	FREQUENCY MHz		ABS	dLIM	MODE	POL	HGT cm	AZM deg		
1	215.025	46.0	44.4	-1.6	QP	H	193	17	-6.7	
2	432.050	46.0	20.7	-25.3	PK	V	139	18	0.6	
3	648.061	46.0	26.4	-17.6	PK	V	139	18	6.6	
4	864.100	46.0	17.1	-28.9	PK	V	139	18	10.	

PRODUCT EMISSIONS

FCC PART 15 SUBPART C

Data File: FINAL

225.025

16MS

No	EMISSION	SPEC LIMIT	MEASUREMENTS			SITE			CORR FACTOR	COMMENTS
	FREQUENCY MHz		ABS	dLIM	MODE	POL	HGT cm	AZM deg		
1	225.022	46.0	44.7	-1.3	QP	H	193	17	-6.	
2	450.050	46.0	20.8	-25.2	PK	V	123	22	0.9	
3	675.07	46.0	37.1	-8.9	PK	V	123	22	6.1	
4	900.100	46.0	28.3	-17.7	PK	V	123	22	8.9	

PRODUCT EMISSIONS

FCC PART 15 SUBPART C

Data File: FINAL

235.025

16MS

No	EMISSION	SPEC LIMIT	MEASUREMENTS			SITE			CORR FACTOR	COMMENTS
	FREQUENCY MHz		ABS	dLIM	MODE	POL	HGT cm	AZM deg		
1	235.031	46.0	45.4	-0.6	QP	H	193	17	-6.	
2	470.05	46.0	20.3	-25.7	PK	H	107	18	1.5	
3	705.07	46.0	25.7	-20.3	PK	H	107	18	5.9	
4	940.100	46.0	-10.	-56.8	PK	H	107	18	-13.8	



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2.4 MODIFICATIONS

None required to demonstrate compliance.

2.5 INTENT TO INCORPORATE ENGINEERING REWORK (If required by 2.4 above)

INTENT TO INCORPORATE ENGINEERING REWORK

This is a letter of Intent to Incorporate the Engineering Rework as described in the above referenced PDE Laboratories. Test Report, Section 2.4, to achieve compliance with the intent of the testing as documented. I, the undersigned have the responsibility for marketing the device tested, and have implemented procedures to monitor the quality of the product (device tested), during continued manufacturing processes and possible product changes or enhancements, and take the responsibility to monitor continued compliance through periodic re-testing during the life of product (device tested), and re-testing any new configuration which might alter the status of the product's continued compliance to the applicable Rules and Regulations.

[NOT APPLICABLE FOR THIS TEST REPORT]

Signature

Date

Name

Title



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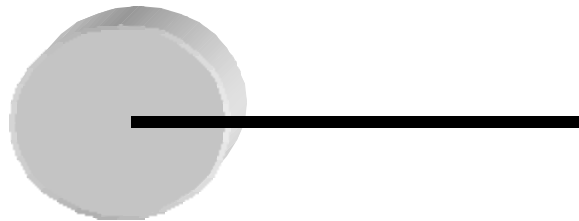
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3.0 DESCRIPTION OF EUT CONFIGURATION

3.1 SKETCH OF EQUIPMENT AND CABLE CONFIGURATION

Battery Powered





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3.2 DESCRIPTION OF EUT AND PERIPHERAL EQUIPMENT

3.2.1 DESCRIPTION OF EUT

The PT-1 transmitter generates a very low power pulsed CW signal on one operating frequency between 216.025Mhz and 235.000Mhz. The PT-1 is a synthesized design referenced to a .2PPM TCXO. The CPU controls the transmitter on/off switching and the PLL, which locks the VCO on the proper frequency. The output of the VCO feeds a single stage of amplification followed by a 5th order low pass filter connected to the antenna. The unit is powered by a CR2032 lithium battery.

Equipment: Transmitter
Manufacturer: Communications Specialists
Model No.: PT-1 Transmitter
Serial No.: N/A

Power Supply: Internal Battery Powered

RFI Suppression Features:

Powerline Filter: N/A
Ferrite chokes: N/A

Internal Components: N/A

Equipment: N/A
Manufacturer:
Model No.:
Serial No.:
Located:



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3.2.2 DESCRIPTION OF PERIPHERAL EQUIPMENT

- 1) Equipment N/A
Manufacturer:
Model No.:
Serial No:

3.3 TYPES OF CABLES USED:

Power Cords

- 1) Unit: N/A
Manufacturer:
Shielded:
Length:

I/O Cables - External

- 1) Connection: N/A
Manufacturer:
Shielded:
Connectors:
Length:



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3.4 OPERATING MODES

The Transmitter, Model: PT-1 Transmitter operated continuously during all tests.
EUT transmitted at 16ms burst, twice every minute.

Absolute emission level measurements were made with various orientations of the unit relative to the receiving antenna. Prior to actual OATS testing, a near-field RF probe was used to exhaustively survey the EUT for their internal Local Oscillator and clock frequencies. The emissions were quite weak.

All final data was taken with the EUT in the above mode of operation. The position of the peripherals (if required in the test set up) and interconnect cables (if required in the test set up) were varied to provide generally the highest emissions prior to the final tests.

Absolute emission level measurements were made in an automatic orientation fashion such that the EUT was uniquely positioned for each of the significant emissions detected in the prescan evaluation. Those data are hereby recorded.



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3.5 PHOTOGRAPHS OF TEST SETUP AND EUT (Conducted)

******N/A Battery Powered**



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3.5 PHOTOGRAPHS OF TEST SETUP AND EUT (Radiated)





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3.5 PHOTOGRAPHS OF TEST SETUP AND EUT (Radiated)





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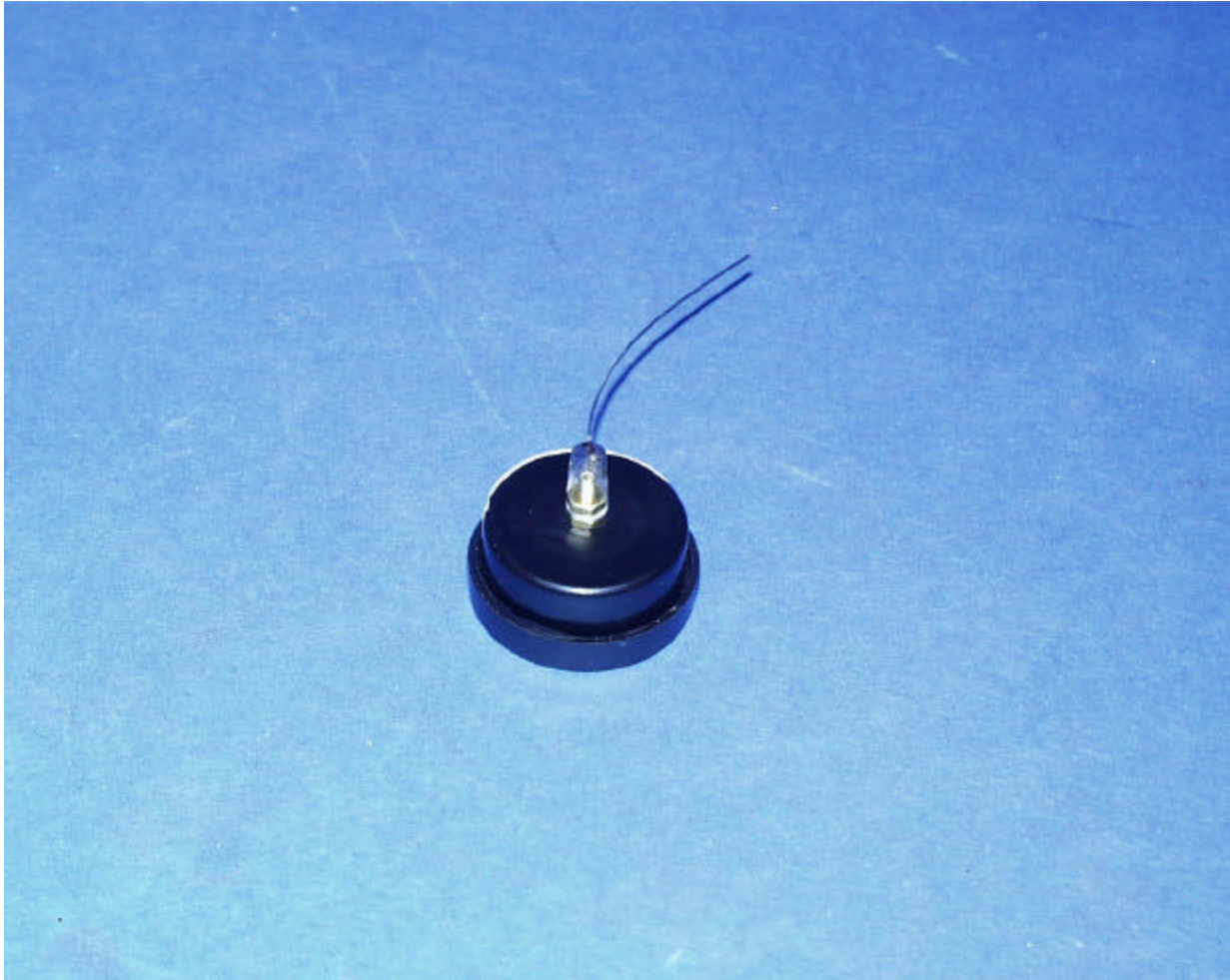
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3.5 PHOTOGRAPHS OF TEST SETUP AND EUT





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4.0 TEST EQUIPMENT AND TEST SET UPS

4.1 LIST OF EQUIPMENT USED IN TESTS. An "X" in the used column denotes applicability and use.

TEST EQUIPMENT			CALIBRATION		USED
DEVICE / MANUFACTURER	MODEL	SERIAL NO	DATE	DUE	
SITE NUMBER 2 (outside stack)	OATS	-----	8-8-03	8-8-04	X
SPECTRUM ANALYZER HEWLETT PACKARD	8566B	2427A04639	2-26-03	2-26-04	X
ANALYZER DISPLAY HEWLETT PACKARD	85662A	2848A17070	2-26-03	2-26-04	X
PRE SELECTOR HEWLETT PACKARD	85685A	2901A00858	2-26-03	2-26-04	X
QUASI-PEAK ADAPTOR HEWLETT PACKARD	85650A	2811A01210	2-26-03	2-26-04	X
PRE-AMP HEWLETT PACKARD	8447F	2805A03163	2-26-03	2-26-04	X
ANTENNA LOG PERIODICAL A. H. SYSTEMS	SAS-200-512	116	4-12-03	4-12-04	X
ANTENNA BICON A.H. SYSTEMS	SAS-200-540	343	4-12-03	4-12-04	X
ANTENNA HORN A.H. SYSTEMS	SAS-200/571	145	9-28-03	9-28-04	X
SITE NUMBER 3 (roof stack)	OATS	-----	5-02-03	5-02-04	
SPECTRUM ANALYZER HEWLETT PACKARD	8567A	2727A00415	9-22-03	9-22-04	
ANALYZER DISPLAY HEWLETT PACKARD	85662A	264815252	9-22-03	9-22-04	
PRE SELECTOR HEWLETT PACKARD	85685A	2837A00827	9-22-03	9-22-04	
QUASI-PEAK ADAPTOR HEWLETT PACKARD	85650A	2521A00678	9-22-03	9-22-04	
PRE-AMP HEWLETT PACKARD	8447F	1937A01214	9-22-03	9-22-04	
ANTENNA BICONILOG EMCO	3142	9603-1025	5-06-03	5-06-04	