



Test Report

Product Name: TRANSCEIVER MODULE

FCC ID: RM9-ABNX03

Applicant:

**ACTALL CORPORATION
3925 MONACO PARKWAY
UNIT D
DENVER COLORADO 80207
UNITED STATES**

APPLICANT: ACTALL CORPORATION

FCC ID: RM9-ABNX03

REPORT #: V:\A\ACTALL\2321AUT5\2321AUT5TestReport.doc

COVER PAGE

TABLE OF CONTENTS

TEST REPORT CONTAINING:

PAGE 1.....	TEST EQUIPMENT LIST
PAGE 2.....	TEST PROCEDURES
PAGE 3.....	METHOD OF MEASURING RADIATED EMISSIONS
PAGE 4.....	DUTY CYCLE CORRECTION FACTOR
PAGE 5-6.....	RADIATED EMISSIONS DATA

EXHIBITS INCLUDED:

CLASS II PERMISSIVE CHANGE REQUEST LETTER
PERMISSION LETTER
TEST SET UP PHOTOGRAPHS

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FCC ID: RM9-ABNX03

REPORT #: V:\A\ACTALL\2321AUT5\2321AUT5TestReport.doc

Table of Contents

EMC Equipment List

Device	Manufacturer	Model	Serial Number	Cal/Char Date Listed	Due Date
3-Meter OATS	TEI	N/A	N/A	1/13/03	1/12/06
Biconnical Antenna	Eaton	94455-1	1096	CAL 8/17/04	8/17/06
Biconnical Antenna	Electro- Metrics	BIA-25	1171	CAL 4/29/05	4/29/07
Double- Ridged Horn Antenna	Electro- Metrics	RGA-180	2319	CAL 12/29/04	12/29/06
LISN	Electro- Metrics	ANS-25/2	2604	CAL 8/27/04	8/27/06
LISN	Electro- Metrics	EM-7820	2682	CAL 4/28/05	4/28/07
Log- Periodic Antenna	Electro- Metrics	LPA-25	1122	CAL 8/26/04	8/26/06

APPLICANT: ACTALL CORPORATION

FCC ID: RM9-ABNX03

REPORT #: V:\A\ACTALL\2321AUT5\2321AUT5TestReport.doc

Page 1 of 6

TEST PROCEDURE

GENERAL: This report shall NOT be reproduced except in full without the written approval of TIMCO ENGINEERING, INC.

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI STANDARD C63.4-2003 using a 50uH LISN. Both lines were observed with the UUT transmitting. The bandwidth of the spectrum analyzer was 10kHz with an appropriate sweep speed. The ambient temperature of the UUT was 76°F with a humidity of 55%.

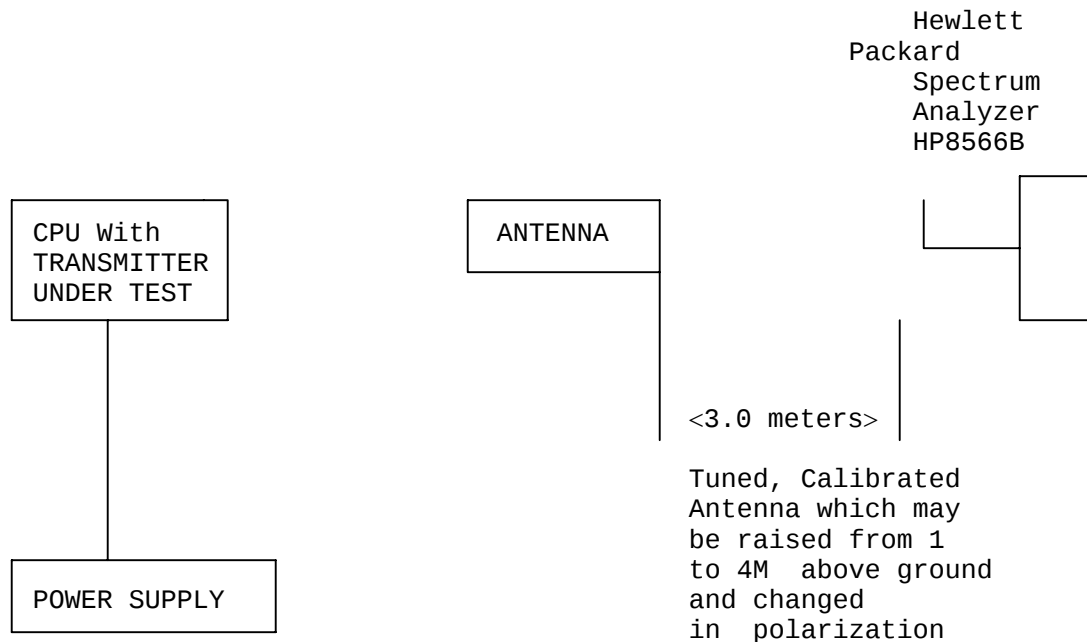
BANDWIDTH 6.0dB: The measurements were made with the spectrum analyzer's resolution bandwidth (RBW)=1.0MHz and the video bandwidth (VBW) =3.0MHz and the span set as shown on plot.

POWER OUTPUT: The RF power output was measured at the antenna feed point using a peak power meter.

ANTENNA CONDUCTED EMISSIONS: The RBW=100KHz, VBW=300KHz and the span set to 10.0MHz and the spectrum was scanned from 30MHz to the 10th Harmonic of the fundamental. Above 1.0GHz the resolution bandwidth was 1.0MHz and the VBW = 3.0MHz and the span to 50MHz.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-2003 using a HEWLETT PACKARD spectrum analyzer with a pre-selector. The bandwidth (RBW) of the spectrum analyzer was 100kHz up to 1GHz and 1.0MHz above 1GHz with an appropriate sweep speed. The VBW above 1.0GHz was = 3.0MHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The ambient temperature of the UUT was 76°F with a humidity of 55%.

Method of Measuring Radiated Spurious Emissions



Equipment placed 80cm above ground on a rotatable platform.

METHOD OF MEASUREMENT: The procedure used was ANSI STANDARD C63.4-2003 & the FCC/OET Guidance on Measurements for Direct Sequence Spread Spectrum Systems – Public Notice 54797 Dated July 12, 1995. Measurements were made at the open field test site of TIMCO ENGINEERING INC. located at 849 N.W. State Road 45, Newberry, FL 32669.

APPLICANT: ACTALL CORPORATION

FCC ID: RM9-ABNX03

REPORT #: V:\A\ACTALL\2321AUT5\2321AUT5TestReport.doc

Page 3 of 6

DUTY CYCLE CORRECTION FACTOR CALCULATION

In the original filing for this FCC Identifier there was an allowance of an Average Factor of 5.7.

The duty cycle factor allowance was calculated per the following:

$$\text{Average Factor} = 20 * \text{Log}_{10}(52 \text{ ms}/100\text{ms}) = 5.7$$

15.247(c), 15.205 & 15.209(b) Field strength of spurious emissions:

REQUIREMENTS:

FIELD STRENGTH	FIELD STRENGTH	S15.209
of Fundamental:	of Harmonics	30 - 88 MHz 40 dBuV/m @3M
902-928MHz		88 -216 MHz 43.5
2.4-2.4835GHz	127.37dBuV/m	216 -960 MHz 46
	54 dBuV/m @3m	ABOVE 960 MHz 54dBuV/m

REQUIREMENTS: Emissions that fall in the restricted bands (15.205) must be less than 54dBuV/m otherwise the spurious and harmonics must be attenuated by at least 20dB.

TEST DATA 20 dBm:

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity	Coax Loss dB	Correction Factor dB	Duty Cycle Factor	Field Strength dBuV/m	Margin dB
902.70	902.70	78.6	H	4.80	23.35	5.7	101.05	26.32
902.70	902.70	90.1	V	4.80	22.93	5.7	112.13	15.24
902.70	1,805.40	42.3	H	1.60	30.20	5.7	68.40	23.73
902.70	1,805.40	46.2	V	1.60	30.20	5.7	72.30	19.83
902.70	2,708.10 R	15.9	H	1.98	32.93	5.7	45.11	8.89
902.70	2,708.10 R	18.2	V	1.98	32.93	5.7	47.41	6.59
902.70	3,610.80 R	19.1	V	2.28	33.43	5.7	49.11	4.89
902.70	3,610.80 R	20.1	H	2.28	33.43	5.7	50.11	3.89
902.70	4,513.50 R	15.4	H	2.55	34.71	5.7	46.96	7.04
902.70	4,513.50 R	18.8	V	2.55	34.71	5.7	50.36	3.64
902.70	6,318.90	18.1	H	3.16	35.99	5.7	51.55	40.58
902.70	6,318.90	19.8	V	3.16	35.99	5.7	53.25	38.88
914.85	914.85	77.9	H	4.35	23.65	5.7	100.20	27.17
914.85	914.85	87.0	V	4.35	23.19	5.7	108.84	18.53
914.85	1,829.70	39.1	H	1.61	30.37	5.7	65.38	23.46
914.85	1,829.70	46.2	V	1.61	30.37	5.7	72.48	16.36
914.85	2,744.50 R	15.1	V	2.00	32.99	5.7	44.39	9.61
914.85	3,659.40 R	17.8	V	2.30	33.49	5.7	47.89	6.11
914.85	3,659.40 R	19.3	H	2.30	33.49	5.7	49.39	4.61
914.85	4,574.20 R	15.1	V	2.57	34.74	5.7	46.71	7.29
914.85	4,574.20 R	16.1	H	2.57	34.74	5.7	47.71	6.29
914.85	6,403.90	16.7	H	3.18	36.04	5.7	50.22	38.62
914.85	6,403.90	18.8	V	3.18	36.04	5.7	52.32	36.52
927.21	927.21	86.8	H	3.89	24.45	5.7	109.44	17.93
927.21	927.21	92.4	V	3.89	24.34	5.7	114.93	12.44
927.21	1,854.40	35.9	H	1.63	30.55	5.7	62.38	32.55
927.21	1,854.40	37.8	V	1.63	30.55	5.7	64.28	30.65
927.21	3,708.80 R	19.0	V	2.31	33.55	5.7	49.16	4.84
927.21	3,708.80 R	19.9	H	2.31	33.55	5.7	50.06	3.94
927.21	4,636.00 R	9.7	V	2.59	34.78	5.7	41.37	12.63
927.21	6,490.40	15.1	H	3.20	36.09	5.7	48.69	46.24
927.21	6,490.40	16.6	V	3.20	36.09	5.7	50.19	44.74

Harmonics were checked through the 10th harmonic

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FCC ID: RM9-ABNX03

REPORT #: V:\A\ACTALL\2321AUT5\2321AUT5TestReport.doc

15.247(c), 15.205 & 15.209(b) Field strength of spurious emissions:

REQUIREMENTS:

FIELD STRENGTH of Fundamental: 902-928MHz 2.4-2.4835GHz	FIELD STRENGTH of Harmonics 127.37dBuV/m 54 dBuV/m @3m	S15.209 30 - 88 MHz 40 dBuV/m @3M 88 -216 MHz 43.5 216 -960 MHz 46 ABOVE 960 MHz 54dBuV/m
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REQUIREMENTS: Emissions that fall in the restricted bands (15.205) must be less than 54dBuV/m otherwise the spurious and harmonics must be attenuated by at least 20dB.

TEST DATA 27 dBm:

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity	Coax Loss dB	Correction Factor dB	Duty Cycle Factor	Field Strength dBuV/m	Margin dB
902.70	902.70	94.4	H	4.80	23.35	5.7	116.85	10.52
902.70	902.70	97.9	V	4.80	22.93	5.7	119.93	7.44
902.70	1,805.40	36.7	H	1.60	30.20	5.7	62.80	37.13
902.70	1,805.40	40.6	V	1.60	30.20	5.7	66.70	33.23
902.70	2,708.10 R	23.9	H	1.98	32.93	5.7	53.11	0.89
902.70	2,708.10 R	24.6	V	1.98	32.93	5.7	53.81	0.19
902.70	3,610.80 R	22.6	H	2.28	33.43	5.7	52.62	1.38
902.70	3,610.80 R	23.9	V	2.28	33.43	5.7	53.91	0.09
902.70	4,513.50 R	10.0	H	2.55	34.71	5.7	41.56	12.44
902.70	4,513.50 R	12.4	V	2.55	34.71	5.7	43.96	10.04
902.70	5,416.20 R	7.1	H	2.87	34.83	5.7	39.10	14.90
902.70	5,416.20 R	9.1	V	2.87	34.83	5.7	41.10	12.90
902.70	6,318.90	14.1	H	3.16	35.99	5.7	47.55	52.38
902.70	6,318.90	15.4	V	3.16	35.99	5.7	48.85	51.08
902.70	7,221.60	13.0	H	3.37	35.87	5.7	46.54	53.39
902.70	7,221.60	15.7	V	3.37	35.87	5.7	49.24	50.69
902.70	8,124.30 R	13.3	V	3.62	36.10	5.7	47.32	6.68
914.85	914.85	93.8	H	4.35	23.65	5.7	116.10	11.28
914.85	914.85	95.6	V	4.35	23.19	5.7	117.44	9.94
914.85	1,829.70	37.2	H	1.61	30.37	5.7	63.48	33.96
914.85	1,829.70	45.2	V	1.61	30.37	5.7	71.48	25.96
914.85	2,744.50 R	21.6	V	2.00	32.99	5.7	50.89	3.11
914.85	2,744.50 R	23.6	H	2.00	32.99	5.7	52.89	1.11
914.85	3,659.40 R	22.4	H	2.30	33.49	5.7	52.49	1.51
914.85	3,659.40 R	23.8	V	2.30	33.49	5.7	53.89	0.11
914.85	7,318.80 R	16.3	V	3.40	35.81	5.7	49.81	4.19
927.21	927.21	91.4	H	3.89	24.45	5.7	114.04	13.34
927.21	927.21	96.4	V	3.89	24.34	5.7	118.93	8.45
927.21	1,854.40	40.3	H	1.63	30.55	5.7	66.78	32.15
927.21	1,854.40	47.9	V	1.63	30.55	5.7	74.38	24.55
927.21	2,781.60 R	20.0	H	2.01	33.05	5.7	49.36	4.64
927.21	2,781.60 R	24.2	V	2.01	33.05	5.7	53.56	0.44
927.21	3,708.80 R	23.1	H	2.31	33.55	5.7	53.26	0.74
927.21	3,708.80 R	23.7	V	2.31	33.55	5.7	53.86	0.14

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REPORT #: V:\A\ACTALL\2321AUT5\2321AUT5TestReport.doc