

# TIMCO ENGINEERING INC.

849 NW State Road 45  
Newberry, Florida 32669  
<http://www.timcoengr.com>  
888.472.2424 F 352.472.2030 email: [tei@timcoengr.com](mailto:tei@timcoengr.com)



## Test Report

Product Name: KEYPAD TRANSMITTER

FCC ID: QV4-LRL0004

Applicant:

**ENTERPRISE ELECTRONICS, L.L.C.  
2120 AUSTIN DRIVE  
ROCHESTER HILLS MI 48309  
USA**

**Date Receipt: 12/16/2005**

**Date Tested: 12/16/2005**

APPLICANT: ENTERPRISE ELECTRONICS, L.L.C.  
FCC ID: QV4-LRL0004  
REPORT #: E\ENTERPRISE\_QV4\2529AUT5\2529AUT5TestReport.doc

COVER SHEET

# TIMCO ENGINEERING INC.

849 NW State Road 45  
Newberry, Florida 32669  
<http://www.timcoengr.com>  
888.472.2424 F 352.472.2030 email: [tei@timcoengr.com](mailto:tei@timcoengr.com)

## TABLE OF CONTENTS

**APPLICANT:** ENTERPRISE ELECTRONICS, L.L.C.

**FCC ID:** QV4-LRL0004

### TEST REPORT CONTAINING:

PAGE 1-2.....TEST EQUIPMENT LIST & TEST PROCEDURE  
PAGE 3-5.....RADIATION INTERFERENCE TEST DATA  
PAGE 6.....CALCULATION OF DUTY CYCLE  
PAGE 7.....OCCUPIED BANDWIDTH

### EXHIBIT INCLUDING:

CONFIDENTIAL REQUEST LETTER  
BLOCK DIAGRAM  
SCHEMATIC  
PARTS LIST  
INSTRUCTION MANUAL  
LABEL SAMPLE  
LABEL LOCATION  
EXTERNAL PHOTOGRAPHS  
INTERNAL PHOTOGRAPHS  
OPERATIONAL DESCRIPTION  
TEST SET UP PHOTOGRAPH

APPLICANT: ENTERPRISE ELECTRONICS, L.L.C.  
FCC ID: QV4-LRL0004  
REPORT #: E\ENTERPRISE\_QV4\2529AUT5\2529AUT5TestReport.doc

# TIMCO ENGINEERING INC.

849 NW State Road 45  
 Newberry, Florida 32669  
 http://www.timcoengr.com  
 888.472.2424 F 352.472.2030 email: tei@timcoengr.com

EMC Equipment List						
Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date	
3-Meter OATS	TEI	N/A	N/A	Listed 1/13/03	1/12/06	
3/10-Meter OATS	TEI	N/A	N/A	Listed 3/27/04	3/26/07	
Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 12/7/05	12/7/07	
Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 12/7/05	12/7/07	
Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 12/8/05	12/8/07	
Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CAL 12/8/05	12/8/07	
Blue Tower Spectrum Analyzer	HP	8568B	2928A04729 2848A18049	CAL 4/13/05	4/13/07	
Blue Tower RF Preselector	HP	85685A	2926A00983	CAL 9/5/05	9/5/07	
Blue Tower Quasi-Peak Adapter	HP	85650A	2811A01279	CAL 4/13/05	4/13/07	
Silver Tower Spectrum Analyzer	HP	8566B Opt 462	3552A22064 3638A08608	CAL 12/8/04	12/8/06	
Silver Tower RF Preselector	HP	85685A	2620A00294	CAL 4/27/04	4/27/06	
Silver Tower Quasi-Peak Adapter	HP	85650A	3303A01844	CAL 12/8/04	12/8/06	
Open-Frame Tower Preamplifier	HP	8449B	3008A01075	CAL 8/8/05	8/8/07	
Biconnical Antenna	Electro-Metrics	BIA-25	1171	CAL 4/29/05	4/29/07	
Biconnical Antenna	Eaton	94455-1	1096	CAL 8/17/04	8/17/06	
Biconnical Antenna	Eaton	94455-1	1057	CAL 3/18/03	3/18/05	
Log-Periodic Antenna	Electro-Metrics	LPA-25	1122	CAL 8/26/04	8/26/06	

APPLICANT: ENTERPRISE ELECTRONICS, L.L.C.  
 FCC ID: QV4-LRL0004  
 REPORT #: E\ENTERPRISE\_QV4\2529AUT5\2529AUT5TestReport.doc

# TIMCO ENGINEERING INC.

849 NW State Road 45  
Newberry, Florida 32669  
<http://www.timcoengr.com>  
888.472.2424 F 352.472.2030 email: [tei@timcoengr.com](mailto:tei@timcoengr.com)

## TEST PROCEDURE

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

**RADIATION INTERFERENCE:** The test procedure used was ANSI STANDARD C63.4-2003 using a HEWLETT PACKARD spectrum analyzer with a preselector. The bandwidth of the spectrum analyzer was 100 kHz with an appropriate sweep speed. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100 kHz and the video bandwidth was 300 kHz. The ambient temperature of the UUT was 98.3°F with a humidity of 40%.

**FORMULA OF CONVERSION FACTORS:** The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

**Example:**

Freq (MHz) METER READING + ACF = FS  
33            20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m

**ANSI STANDARD C63.4-2003 10.1.7 MEASUREMENT PROCEDURES:** The UUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The UUT was placed in the center of the table. The table used for radiated measurements is capable of continuous rotation. The spectrum was scanned from 30 MHz to 10th harmonic of the fundamental.

Peak readings were taken in three (3) orthogonal planes and the highest readings were converted to average readings based on the duration of "ON" time.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

Measurements were made by TIMCO ENGINEERING INC. at the registered open field test site located at 849 N.W. State Road 45, Newberry, Fl 32669.

APPLICANT: ENTERPRISE ELECTRONICS, L.L.C.  
FCC ID: QV4-LRL0004  
REPORT #: E\ENTERPRISE\_QV4\2529AUT5\2529AUT5TestReport.doc

# TIMCO ENGINEERING INC.

849 NW State Road 45  
Newberry, Florida 32669  
http://www.timcoengr.com  
888.472.2424 F 352.472.2030 email: tei@timcoengr.com

**APPLICANT:** ENTERPRISE ELECTRONICS, L.L.C.  
**FCC ID:** QV4-LRL0004  
**NAME OF TEST:** RADIATION INTERFERENCE  
**RULES PART NO.:** 15.231

## REQUIREMENTS:

Fundamental Frequency MHz	Field Strength of Fundamental dBuV	Field Strength of Harmonics and Spurious Emissions (dBuV/m @ 3m)
40.66 to 40.70	67.04	47.04
70 to 130	61.94	41.94
130 to 174	61.94 to 71.48	41.94 to 51.48
174 to 260	71.48	51.48
260 to 470	71.48 to 81.94	51.48 to 61.94
470 and above	81.94	61.94

THE LIMIT FOR AVERAGE FIELD STRENGTH dBuV/m FOR THE FUNDAMENTAL FREQUENCY = 75.62 dBuV/m. NO FUNDAMENTAL IS ALLOWED IN THE RESTRICTED BANDS.

THE LIMIT FOR AVERAGE FIELD STRENGTH dBuV/m FOR THE HARMONICS AND SPURIOUS FREQUENCIES = 60.82 dBuV/m. SPURIOUS IN THE RESTRICTED BANDS MUST BE LESS THAN 54 dBuV/m OR 15.209.

## TEST DATA:

Emission Frequency MHz	*	Meter Reading dBuV	Ant. PoL.	Coax Loss dB	Correction Factor dB	Duty Cycle Factor dB	Field Strength dBuV/m	Margin dB
314.87	X	49.1	V	1.11	15.62	9.20	56.63	18.98
314.87	X	66.9	H	1.11	15.76	9.20	74.57	1.04
629.74	X	28.0	V	1.63	19.19	9.20	39.62	16.00
629.74	X	34.5	H	1.63	19.99	9.20	46.92	8.70
944.61	X	11.3	V	2.02	22.90	9.20	27.02	28.60
944.61	X	11.7	H	2.02	24.05	9.20	28.57	27.05
1,259.48	X	22.7	V	2.31	27.77	9.20	43.58	12.04
1,259.48	X	24.2	H	2.31	27.77	9.20	45.08	10.54
1,574.35	X	23.7	V	2.56	28.65	9.20	45.71	8.29
1,574.35	X	26.3	H	2.56	28.65	9.20	48.31	5.69
1,889.22	X	20.8	H	2.81	30.54	9.20	44.95	10.66
1,889.22	X	22.4	V	2.81	30.54	9.20	46.55	9.06

APPLICANT: ENTERPRISE ELECTRONICS, L.L.C.  
FCC ID: QV4-LRL0004  
REPORT #: E\ENTERPRISE\_QV4\2529AUT5\2529AUT5TestReport.doc

# TIMCO ENGINEERING INC.

849 NW State Road 45  
Newberry, Florida 32669  
http://www.timcoengr.com  
888.472.2424 F 352.472.2030 email: tei@timcoengr.com

APPLICANT: ENTERPRISE ELECTRONICS, L.L.C.

FCC ID: QV4-LRL0004

NAME OF TEST: RADIATION INTERFERENC

## TEST DATA:

Emission Frequency MHz	*	Meter Reading dBuV	Ant. PoL.	Coax Loss dB	Correc tion Factor dB	Duty Cycle Factor dB	Field Streng th dBuV/m	Margin dB
2,518.96	X	15.1	V	3.26	32.62	9.20	41.78	13.83
2,518.96	X	16.0	H	3.26	32.62	9.20	42.68	12.93
2,833.83	X	14.5	V	3.48	33.00	9.20	41.78	12.22
2,833.83	X	19.9	H	3.48	33.00	9.20	47.18	6.82
3,148.70	X	16.3	V	3.73	33.23	9.20	44.06	11.55
3,148.70	X	23.3	H	3.73	33.23	9.20	51.06	4.55
314.88	Y	59.7	H	1.11	15.76	9.20	67.37	8.24
314.88	Y	61.8	V	1.11	15.61	9.20	69.32	6.29
629.74	Y	34.0	V	1.63	19.19	9.20	45.62	16.32
629.74	Y	35.9	H	1.63	19.99	9.20	48.32	13.62
944.61	Y	11.0	H	2.02	24.05	9.20	27.87	34.07
944.61	Y	12.6	V	2.02	22.90	9.20	28.32	33.62
1,259.48	Y	27.3	V	2.31	27.77	9.20	48.18	13.76
1,259.48	Y	29.6	H	2.31	27.77	9.20	50.48	11.46
1,574.35	Y	26.4	V	2.56	28.65	9.20	48.41	5.59
1,574.35	Y	30.4	H	2.56	28.65	9.20	52.41	1.59
1,889.22	Y	22.2	V	2.81	30.54	9.20	46.35	15.59
1,889.22	Y	24.4	H	2.81	30.54	9.20	48.55	13.39
2,518.96	Y	15.4	V	3.26	32.62	9.20	42.08	19.86
2,518.96	Y	15.8	H	3.26	32.62	9.20	42.48	19.46
2,833.83	Y	15.2	H	3.48	33.00	9.20	42.48	11.52
2,833.83	Y	17.1	V	3.48	33.00	9.20	44.38	9.62
3,148.70	Y	19.2	V	3.73	33.23	9.20	46.96	14.98
3,148.70	Y	20.0	H	3.73	33.23	9.20	47.76	14.18
314.89	Z	59.2	H	1.11	15.76	9.20	66.87	8.74
314.89	Z	63.6	V	1.11	15.61	9.20	71.12	4.49
629.74	Z	30.3	H	1.63	19.99	9.20	42.72	12.90
629.74	Z	38.8	V	1.63	19.19	9.20	50.42	5.20
944.61	Z	10.8	H	2.02	24.05	9.20	27.67	27.95
944.61	Z	10.9	V	2.02	22.90	9.20	26.62	29.00
1,259.48	Z	20.9	H	2.31	27.77	9.20	41.78	13.84
1,259.48	Z	31.4	V	2.31	27.77	9.20	52.28	3.34
1,574.35	Z	21.5	H	2.56	28.65	9.20	43.51	10.49
1,574.35	Z	29.9	V	2.56	28.65	9.20	51.91	2.09
1,889.22	Z	19.7	H	2.81	30.54	9.20	43.85	11.77
1,889.22	Z	22.8	V	2.81	30.54	9.20	46.95	8.67
2,204.09	Z	14.3	H	3.04	31.77	9.20	39.91	14.09

APPLICANT: ENTERPRISE ELECTRONICS, L.L.C.

FCC ID: QV4-LRL0004

REPORT #: E\ENTERPRISE\_QV4\2529AUT5\2529AUT5TestReport.doc

# TIMCO ENGINEERING INC.

849 NW State Road 45  
Newberry, Florida 32669  
<http://www.timcoengr.com>  
888.472.2424 F 352.472.2030 email: [tei@timcoengr.com](mailto:tei@timcoengr.com)

## TEST DATA CONTD.

Emission Frequency MHz	* Meter Reading dBuV	Ant. PoL.	Coax Loss dB	Correc tion Factor dB	Duty Cycle Factor dB	Field Streng th dBuV/m	Margin dB
2,518.96	Z	H	3.26	32.62	9.20	42.38	13.23
2,518.96	Z	V	3.26	32.62	9.20	42.68	12.93
2,833.83	Z	V	3.48	33.00	9.20	41.58	12.42
2,833.83	Z	H	3.48	33.00	9.20	41.98	12.02
3,148.70	Z	V	3.73	33.23	9.20	45.86	9.75
3,148.70	Z	H	3.73	33.23	9.20	48.06	7.55

Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows:

- 1) for the band 130-174 MHz, uV/m at 3 meters =  $56.81818(F) - 6136.3636$ ;
- 2) for the band 260-470 MHz, uV/m at 3 meters =  $41.6667(F) - 7083.3333$ .

SAMPLE CALCULATION OF LIMIT @ 315 MHz:

$$41.6667 (315) - 7083.3333 = 6041.68 \text{ uV/m}$$
$$20\log(6041.68) = 75.62\text{dBuV/m limit @ 315 MHz}$$

APPLICANT: ENTERPRISE ELECTRONICS, L.L.C.  
FCC ID: QV4-LRL0004  
REPORT #: E\ENTERPRISE\_QV4\2529AUT5\2529AUT5TestReport.doc

# TIMCO ENGINEERING INC.

849 NW State Road 45  
Newberry, Florida 32669  
<http://www.timcoengr.com>  
888.472.2424 F 352.472.2030 email: [tei@timcoengr.com](mailto:tei@timcoengr.com)

**APPLICANT:** ENTERPRISE ELECTRONICS, L.L.C.

**FCC ID:** QV4-LRL0004

## **CALCULATION OF DUTY CYCLE:**

The "wakeup burst" is the limiting transmission for duty cycle correction allowance in the Enterprise transmitter. It occurs only once at the beginning of each activation of the transmitter. It is approximately 116ms. long, consisting of a stream of 88 equally spaced pulses of 440 $\mu$ s. each. The off time between pulses is 880 $\mu$ s. giving a  $\frac{1}{3}$  or 33% on-time in any 100ms. window. This results in a duty cycle correction factor of -9.24dB.

See Exhibit #2

APPLICANT: ENTERPRISE ELECTRONICS, L.L.C.  
FCC ID: QV4-LRL0004  
REPORT #: E\ENTERPRISE\_QV4\2529AUT5\2529AUT5TestReport.doc



# TIMCO ENGINEERING INC.

849 NW State Road 45  
Newberry, Florida 32669  
<http://www.timcoengr.com>  
888.472.2424 F 352.472.2030 email: [tei@timcoengr.com](mailto:tei@timcoengr.com)

**APPLICANT:** ENTERPRISE ELECTRONICS, L.L.C.

**FCC ID:** QV4-LRL0004

**NAME OF TEST:** Occupied Bandwidth

**RULES PART NO.:** 15.231(C)

**REQUIREMENTS:** The bandwidth of the emission shall be no wider than .25% of the center frequency for devices operating between 70 and 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

SEE Exhibit #1

**METHOD OF MEASUREMENT:** A small sample of the transmitter output was fed into the spectrum analyzer and the following plot was generated. The vertical scale is set to 10 dB per division: the horizontal scale is set to 100 kHz per division.

APPLICANT: ENTERPRISE ELECTRONICS, L.L.C.  
FCC ID: QV4-LRL0004  
REPORT #: E\ENTERPRISE\_QV4\2529AUT5\2529AUT5TestReport.doc