



849 NW STATE ROAD 45  
NEWBERRY, FL 32669 USA

PH: 888.472.2424 OR  
352.472.5500

FAX: 352.472.2030

EMAIL: [INFO@TIMCOENGR.COM](mailto:INFO@TIMCOENGR.COM)

[HTTP://WWW.TIMCOENGR.COM](http://WWW.TIMCOENGR.COM)

## FCC PART 90

### VHF BASE STATION

### TEST REPORT

APPLICANT	KP ELECTRONIC SYSTEMS LTD.
ADDRESS	P.O. BOX 42 TEFEN INDUSTRIAL PARK 24959 ISRAEL
FCC ID	H78KPMT2W
MODEL NUMBER	MT2W
PRODUCT DESCRIPTION	VHF AUTOMATIC METER READING TRANSCEIVER W/ 2.4 GHz TX
DATE SAMPLE RECEIVED	1/10/2017
FINAL TEST DATE	1/23/2017, 3/28/2017
TESTED BY	Tim Royer
APPROVED BY	Sid Sanders
TEST RESULTS	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL

Report Number	Version Number	Description	Issue Date
61AZUT17TestReport	Rev1	Initial Issue	3/29/2017

THE ATTACHED REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN APPROVAL OF TIMCO ENGINEERING, INC.

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## GENERAL REMARKS

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

## Summary

The device under test does:

- ☒ Fulfill the general approval requirements as identified in this test report and was selected by the customer.
- ☐ Not fulfill the general approval requirements as identified in this test report

## Attestations

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.

I attest that the necessary measurements were made at:

**Timco Engineering Inc.**  
**849 NW State Road 45**  
**Newberry, FL 32669**



### Tested by:

Name and Title: Tim Royer, Project Manager/Testing Engineer

**Date: 3/29/2017**

### Reviewed and approved by:

Name and Title: Sid Sanders, Manager



**Date: 4/10/17**

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## GENERAL INFORMATION

### EUT Specification

<b>EUT Description</b>	<b>VHF AUTOMATIC METER READING TRANSCEIVER W/ 2.4 GHz TX</b>
<b>FCC ID</b>	<b>H78KPMT2W</b>
<b>Model Number</b>	<b>MT2W</b>
Operating Frequency	150.8 – 156.2475 MHz
Test Frequencies	151 & 156 MHz
Type of Emission	2K55F1D
Modulation	FM
EUT Power Source	<input type="checkbox"/> 110–120Vac/50– 60Hz
	<input type="checkbox"/> DC Power 12V
	<input checked="" type="checkbox"/> Battery Operated Exclusively
Test Item	<input type="checkbox"/> Prototype
	<input type="checkbox"/> Pre-Production
	<input checked="" type="checkbox"/> Production
Type of Equipment	<input checked="" type="checkbox"/> Fixed
	<input type="checkbox"/> Mobile
	<input type="checkbox"/> Portable
Test Conditions	Temperature: 24-26°C Relative Humidity: 50 - 65%.
Modification to the EUT	None
Test Exercise	The EUT was powered on in a normal operational mode
Regulatory Standard	FCC CFR 47 Part 90, 90R, 90S
Measurement Standard	ANSI/TIA 603-D:2010
Test Facility	<b>Timco Engineering Inc. at 849 NW State Road 45 Newberry, FL 32669 USA.</b>

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## TEST RESULTS SUMMARY

Test Description	FCC RULE PART NO.	RESULT
Modulation Characteristics	2.1047(a)(b)	Pass
RF Power Output	2.1046(a), 90.205	Pass
Occupied Bandwidth	2.1049(c)(h), 90.210	Pass
Spurious Emissions at Antenna Terminal	2.1051(a), 90.210(b)(g)(h), 90.691, 90.543(c)	Pass
Field Strength of Spurious Radiation	2.1053, 90.210	Pass

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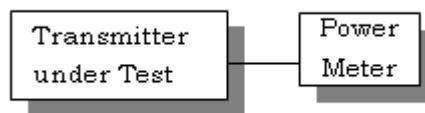
## RF POWER OUTPUT

**Rule Part No.:** Part 2.1046(a), Part 90.541(d), 90.635(b)

**Test Requirements:** Limit on power is geographically dependent. The RF power is measured and reported only

**Method of Measurement:** RF power is measured by using a 50-ohm, resistive wattmeter to the RF output connector. With a nominal battery voltage (if battery operated), or a properly adjusted power supply (if not battery operated), and the transmitter properly adjusted the RF output measures:

**Test Setup Diagram:**



### Test Data: Conducted Power Output Table

Tuned Frequency (MHz)	RF POWER	
	(W)	(dBm)
151	1.86	32.7
156	1.95	32.9

Part 2.1033 (C) (8) DC Input into the final amplifier

INPUT POWER: (12.63V) (0.503A) = 6.35 Watts

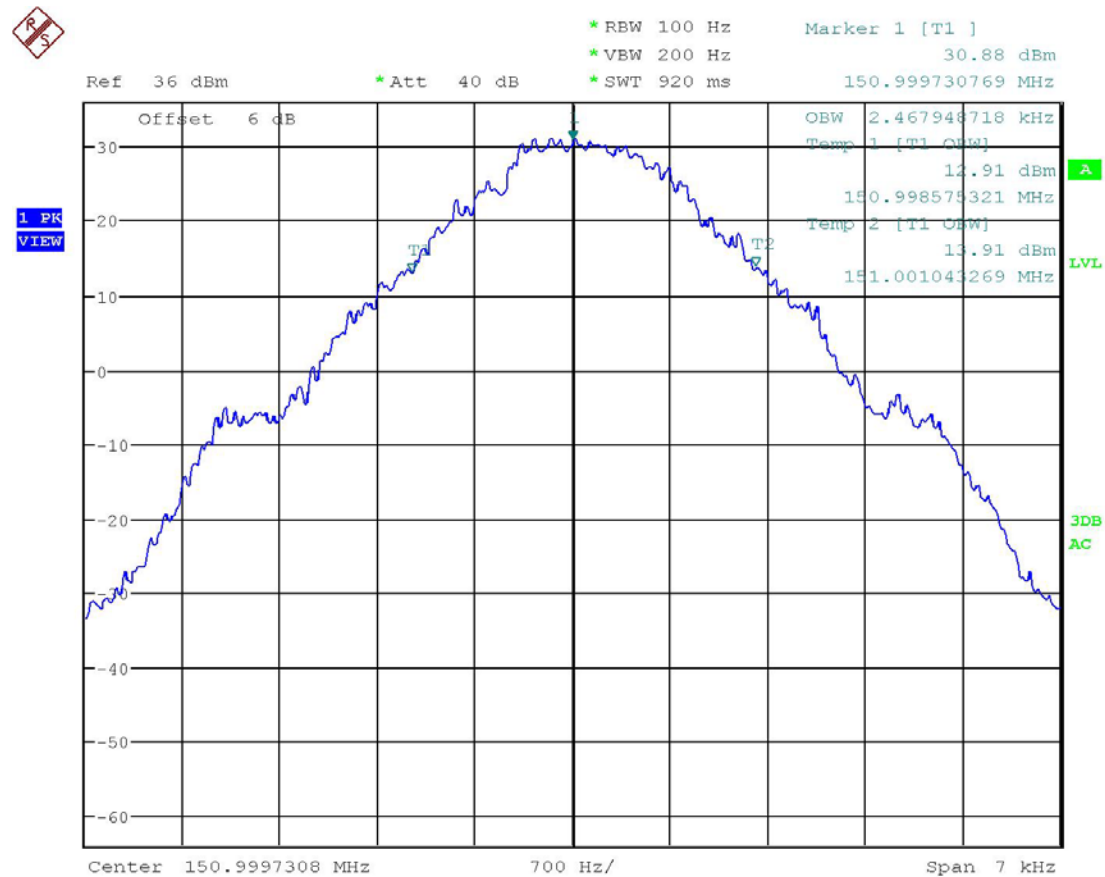
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## MODULATION CHARACTERISTICS

**Requirements:** Part 2.1033(c), 2.1033(c) (4), 2.1047(a) (b), 90.209, 90.207

**TEST FREQ. 151 MHz**

**99% dB OCC BW = 2.46kHz**



Date: 23.JAN.2017 15:22:49

**Results Meet Requirements**

## OCCUPIED BANDWIDTH

**RULE PART NO.:** 2.1049(c) & 90.210

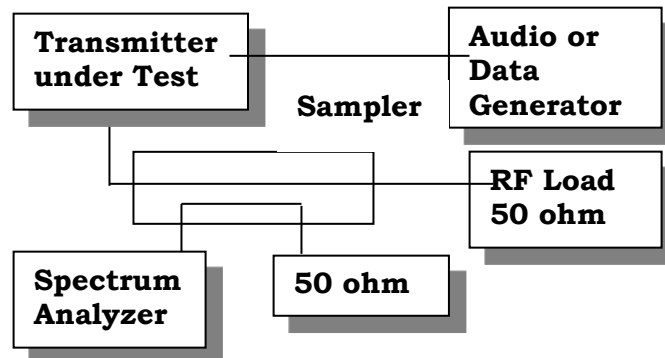
**REQUIREMENTS:** Applicable Emission Masks

Frequency band (MHz)	Mask for equipment with audio low pass filter	Mask for equipment without audio low pass filter
150-174 <sup>2</sup>	B, D or E	C, D or E

2Equipment designed to operate with a 25 kHz channel bandwidth must meet the requirements of Emission Mask B or C, as applicable. Equipment designed to operate with a 12.5 kHz channel bandwidth must meet the requirements of Emission Mask D, and equipment designed to operate with a 6.25 kHz channel bandwidth must meet the requirements of Emission Mask E.

**METHOD OF MEASUREMENT:** ANSI/TIA-603 § 2.2.11 Sideband Spectrum

**SETUP DIAGRAM:**



**TEST DATA:** See the plots on following pages.

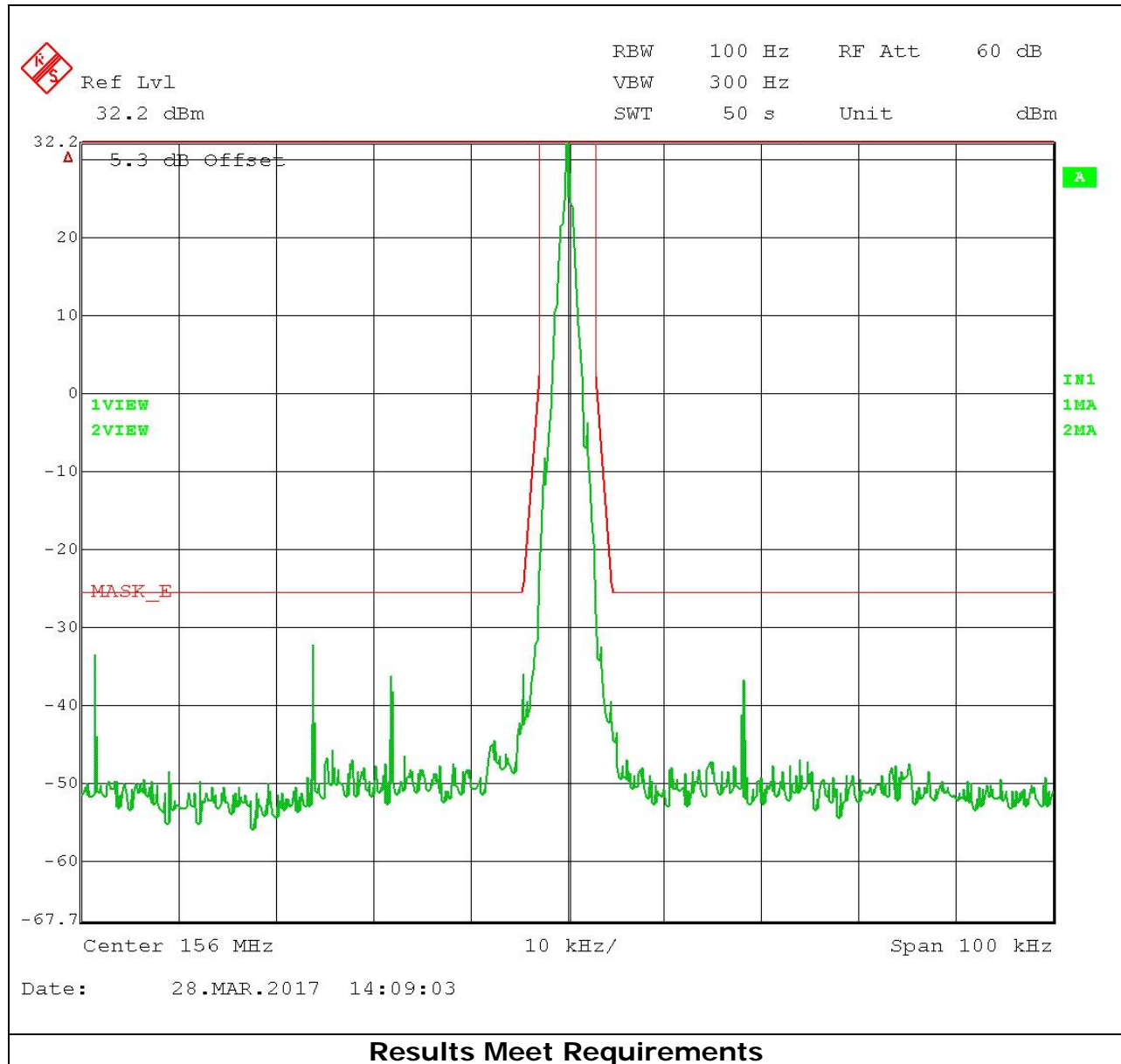
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## OCCUPIED BANDWIDTH

TEST FREQ. 151 MHz

Part 90.210(b) Emission Mask E – 6.25 KHz Equipment



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## SPURIOUS EMISSIONS AT ANTENNA TERMINALS

**RULE PART NO.:** Part 2.1051(a), 90.210

### REQUIREMENTS:

Transmit Band (MHz)	Equipment Type	Rule Part	Requirement
150-174 <sup>2</sup>	6.25 KHz equipment With or Without Audio Low Pass Filter	90.210©(3)	55 + 10 log (P) or 65 dB, whichever is the lesser attenuation
	12.5 KHz equipment With or Without Audio Low Pass Filter	90.210(d)(3)	50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.
	25 KHz equipment With or without Audio Low Pass Filter	90.210(b)(3)	43 + 10log (P) dB

<sup>2</sup>Equipment designed to operate with a 25 kHz channel bandwidth must meet the requirements of Emission Mask B or C, as applicable. Equipment designed to operate with a 12.5 kHz channel bandwidth must meet the requirements of Emission Mask D, and equipment designed to operate with a 6.25 kHz channel bandwidth must meet the requirements of Emission Mask E.

**METHOD OF MEASUREMENT:** ANSI/TIA-603 § 2.2.13 Unwanted Emissions:  
Conducted Spurious

## SPURIOUS EMISSIONS AT ANTENNA TERMINALS

TEST FREQ. 151 MHz

	dBm	Watts	Limit
Power Output	32.7	1.86	52.7
	Frequency (MHz)	Level (dBc)	Margin (dB)
	151.00	0	0.0
	302.00	66.8	14.1
	453.00	72.2	19.5
	604.00	80.5	27.8
	755.00	89.5	36.8
	906.00	89.5	36.8
	1057.00	89.5	36.8
	1208.00	89.5	36.8
	1359.00	89.5	36.8
	1510.00	74.1	21.4

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## SPURIOUS EMISSIONS AT ANTENNA TERMINALS

TEST FREQ. 156 MHz

	dBm	Watts	Limit
Power Output	32.9	1.95	52.9
	Frequency (MHz)	Level (dBc)	Margin (dB)
	156.00	0	0.0
	312.00	71.7	18.8
	468.00	71.7	18.8
*	624.00	73.3	20.4
*	780.00	72.6	19.7
*	936.00	72.2	19.3
*	1092.00	72.7	19.8
*	1248.00	72.6	19.7
*	1404.00	72.6	19.7
*	1560.00	71.7	18.8

\* Indicates only the noise floor was present

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## FIELD STRENGTH OF SPURIOUS RADIATION EMISSIONS

**RULE PARTS. NO.:** Part 2.1053, 90.210

**REQUIREMENTS:** Out of Band Emission Limits

Transmit Band (MHz)	Equipment Type	Rule Part	Requirement
150-174 <sup>2</sup>	6.25 KHz equipment With or Without Audio Low Pass Filter	90.210©(3)	55 + 10 log (P) or 65 dB, whichever is the lesser attenuation
	12.5 KHz equipment With or Without Audio Low Pass Filter	90.210(d)(3)	50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.
	25 KHz equipment With or without Audio Low Pass Filter	90.210(b)(3)	43 + 10log (P) dB

2Equipment designed to operate with a 25 kHz channel bandwidth must meet the requirements of Emission Mask B or C, as applicable. Equipment designed to operate with a 12.5 kHz channel bandwidth must meet the requirements of Emission Mask D, and equipment designed to operate with a 6.25 kHz channel bandwidth must meet the requirements of Emission Mask E.

**METHOD OF MEASUREMENT:** The following test methods were used

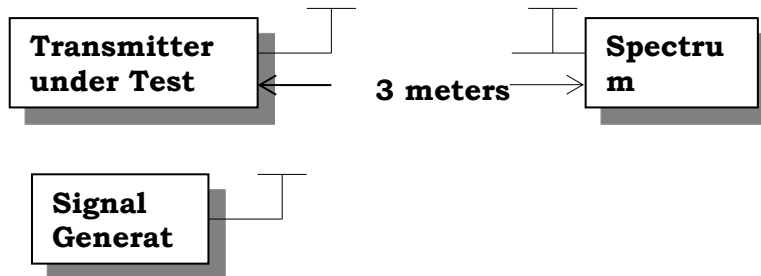
ANSI/TIA-603 § 2.2.12 Unwanted Emissions: Radiated Spurious  
(Out of Band Emissions from 9 KHz – Tenth Harmonic of Fundamental)

ANSI C63.4 § 8 Radiated emission measurements  
(EIRP of Emissions in the 1559 – 1610 MHz Band)

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## FIELD STRENGTH OF SPURIOUS RADIATION EMISSIONS

### TEST SETUP DIAGRAM:



### TEST FREQ. 151 MHz

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
151.00	Hi	32.7	1.86	57.69	6.25
Emission Frequency (MHz)	Ant. Polarity		Below Carrier (dBc)	Margin	
302.00	H		87.43	29.74	
453.00	V		78.21	20.52	
604.00	V		83.52	25.83	
755.00	V		85.62	27.93	
906.00	H		82.62	24.93	
1,057.00	V		94.93	37.24	
1,208.00	V		93.46	35.77	
1,359.00	H		92.99	35.3	
1,510.00	V		93.95	36.26	

### TEST FREQ. 156 MHz

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
156.00	Hi	32.9	1.95	57.9	6.25
Emission Frequency (MHz)	Ant. Polarity		Below Carrier (dBc)	Margin (dB)	
312.00	V		86.64	28.74	
468.00	V		75.76	17.86	
624.00	V		84.24	26.34	
780.00	V		75.66	17.76	
936.00	H		79.78	21.88	
1,092.00	H		94.41	36.51	
1,248.00	V		90.22	32.32	
1,404.00	V		88.13	30.23	
1,560.00	V		88.84	30.94	

### Results meet requirements

Applicant: KP ELECTRONIC SYSTEMS LTD.  
FCC ID: H78KPMT2W  
Report: 61AZUT17TestReport\_Rev1

## EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Attenuator K 6dB 2W DC-40	Narda	4768-6	1044-3	06/25/15	06/25/17
Antenna: Log-Periodic 1122	Electro-Metrics	LPA-25	1122	07/14/15	07/14/17
CHAMBER	Panashield	3M	N/A	04/25/16	12/31/17
Sweep/Signal Generator	Anritsu	68369B	985112	10/28/15	10/28/17
Antenna: Double-Ridged Horn/ETS Horn 2	ETS-Lindgren Chamber	3117	00041534	02/25/15	02/25/17
Software: Field Strength Program	Timco	N/A	Version 4.0	N/A	N/A
Coaxial Cable #103 - KMKM-0180-01 Aqua	Micro-Coax	UFB142A-0-0720-200200	225363-002 (#103)	08/05/15	08/05/17
EMI Test Receiver R & S ESU 40 Chamber	Rohde & Schwarz	ESU 40	100320	04/01/16	04/01/18
Coaxial Cable - BMBM-0130-00 Black	Alpha Wire		BMBM-0130-00	05/24/16	05/24/18
Coaxial Cable - Chamber 3 cable set (Primary)	Micro-Coax	Chamber 3 cable set (Primary)	KMKM-0244-01; KMKM-0670-00; KFKF-0198-01	08/08/16	08/08/18
Tunable Notch Filter 100-350 MHz	Eagle	220BFBF	100-350 MHz (#43)	07/01/15	07/01/17
Bore-sight Antenna Positioning Tower	Sunol Sciences	TLT2	N/A	N/A	N/A

### \*EMI RECEIVER SOFTWARE VERSION

The receiver firmware used was version 4.43 Service Pack 3

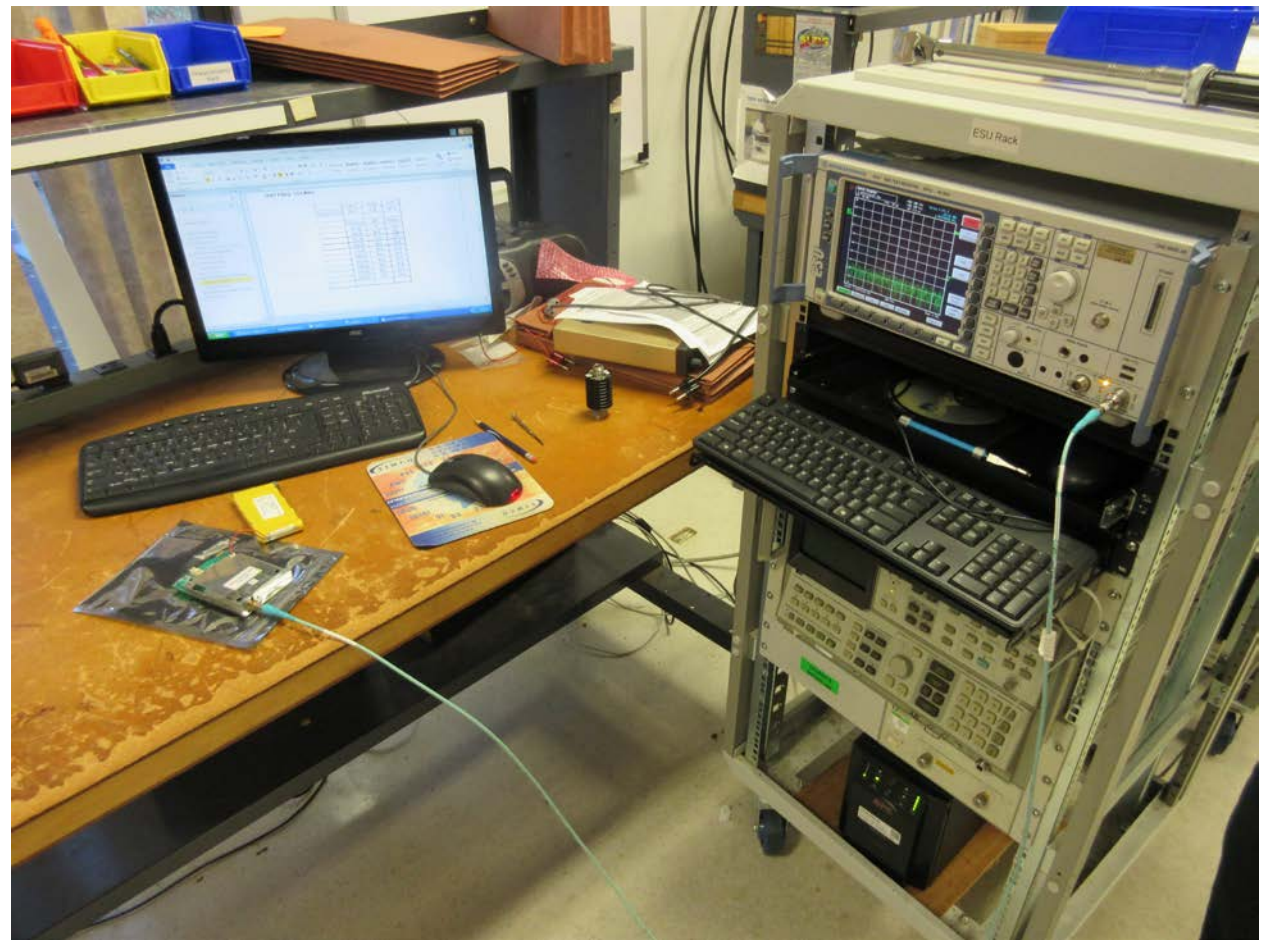
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**APPLICANT: KP ELECTRONIC SYSTEMS LTD.**

**FCC ID: H78KPMT2W**

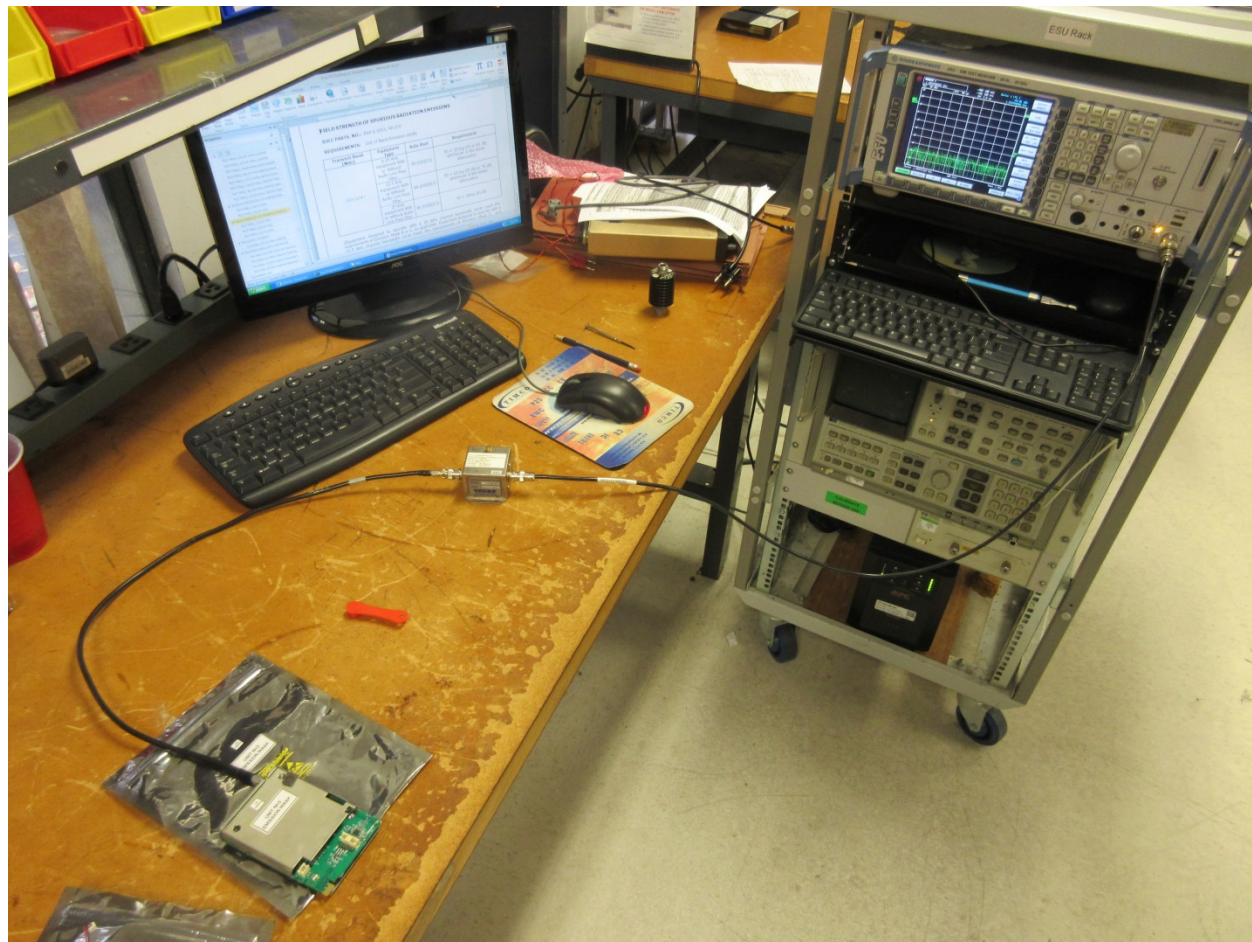
**TEST SET UP PHOTOS**

**OUTPUT POWER, OCCUPIED BANDWIDTH**

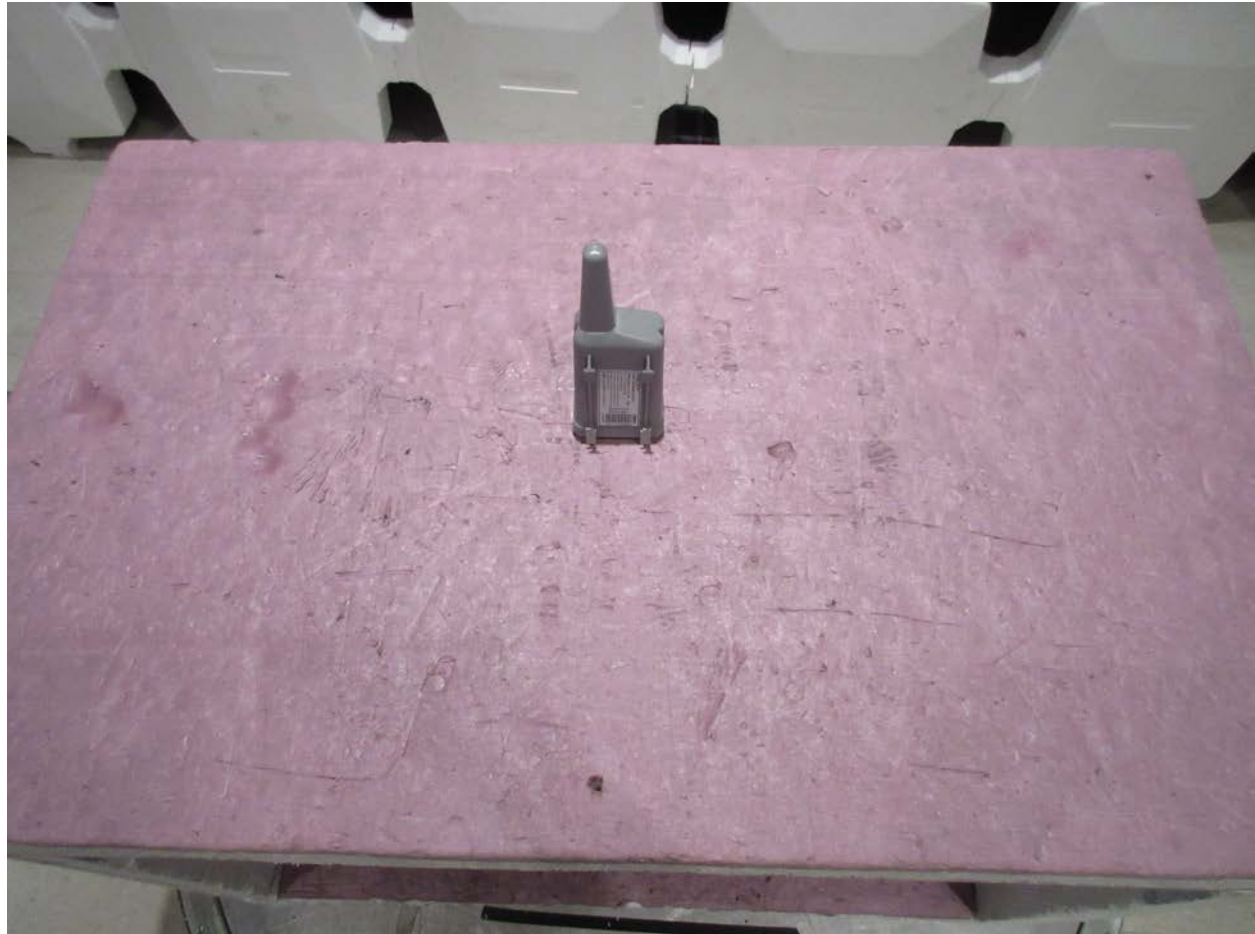




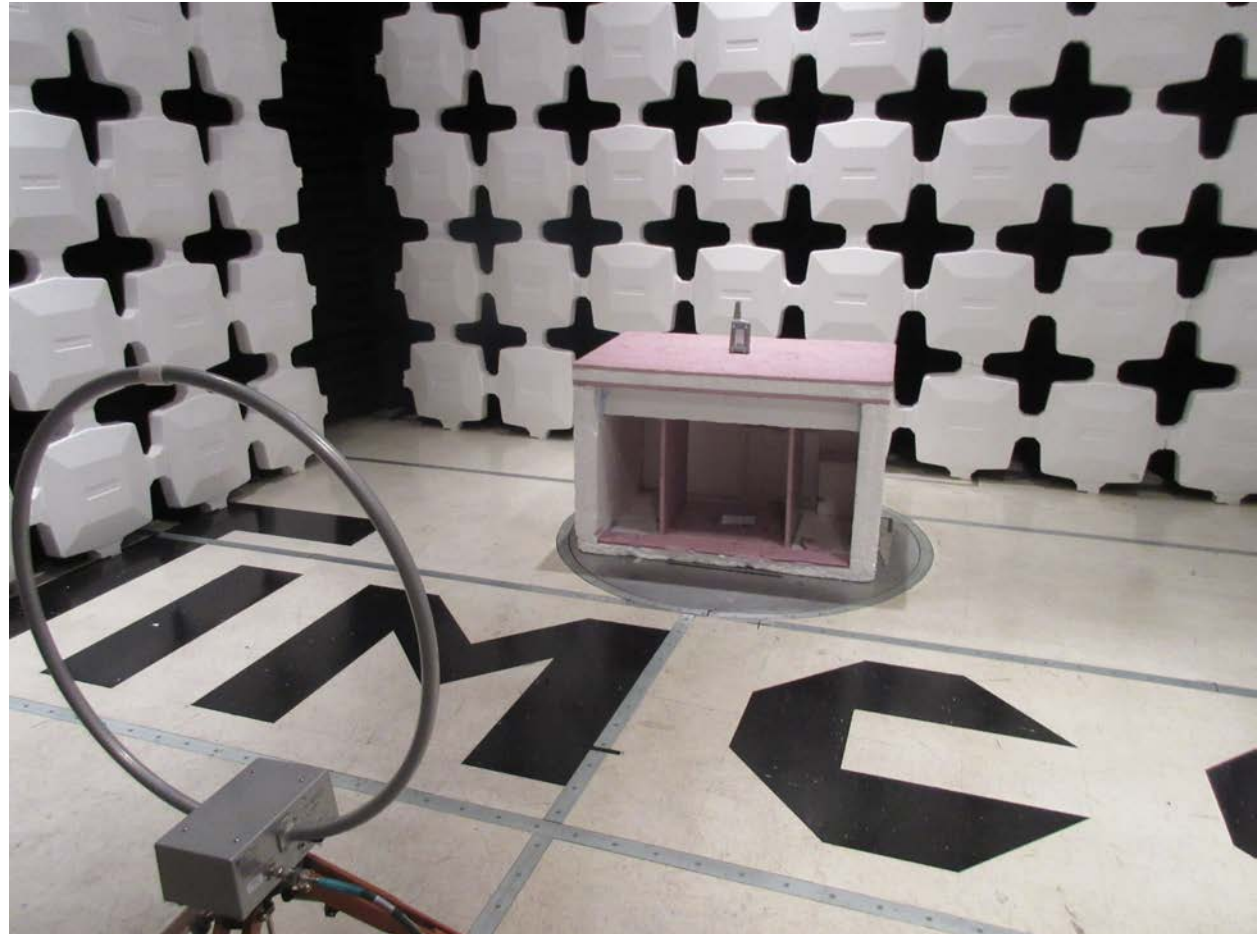
## ANT CONDUCTED EMISSIONS



**FIELD STRENGTH SPURIOUS EMISSIONS FINAL EUT SETUP**

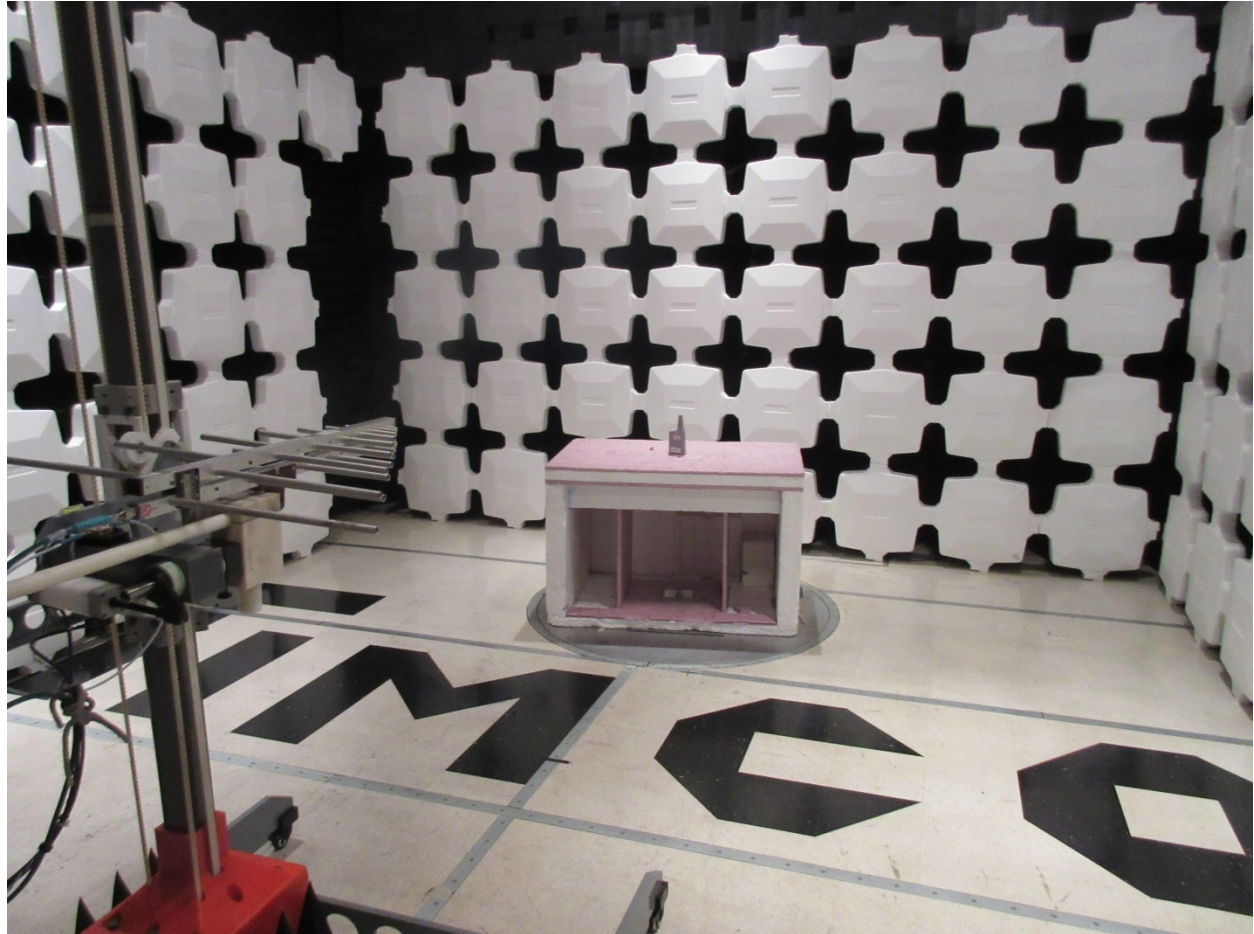


**FIELD STRENGTH SPURIOUS EMISSIONS BELOW 30 MHz**





**FIELD STRENGTH SPURIOUS EMISSIONS BELOW 1 GHz**



**FIELD STRENGTH SPURIOUS EMISSIONS ABOVE 1 GHz**

