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## FCC PART 90

### VHF BASE STATION

### TEST REPORT

|                      |                                                                        |
|----------------------|------------------------------------------------------------------------|
| APPLICANT            | KP ELECTRONIC SYSTEMS LTD.                                             |
| ADDRESS              | P.O. BOX 42<br>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<br/>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<br>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<br/>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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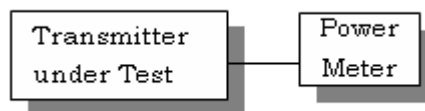
## RF POWER OUTPUT

**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

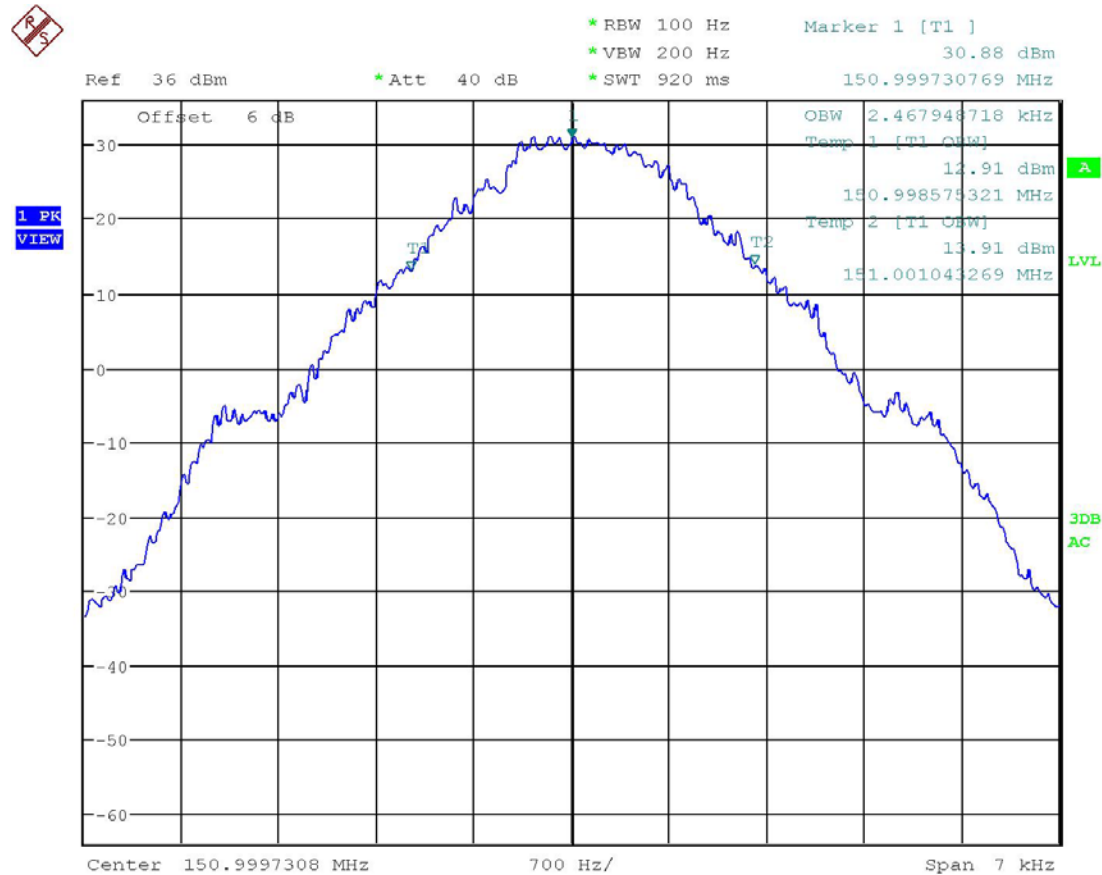
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## MODULATION CHARACTERISTICS

**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

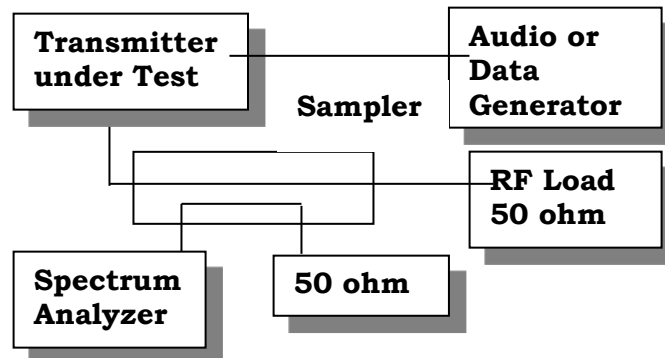
**REQUIREMENTS:** Applicable Emission Masks

| 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                                        |

<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 § 2.2.11 Sideband Spectrum

**SETUP DIAGRAM:**



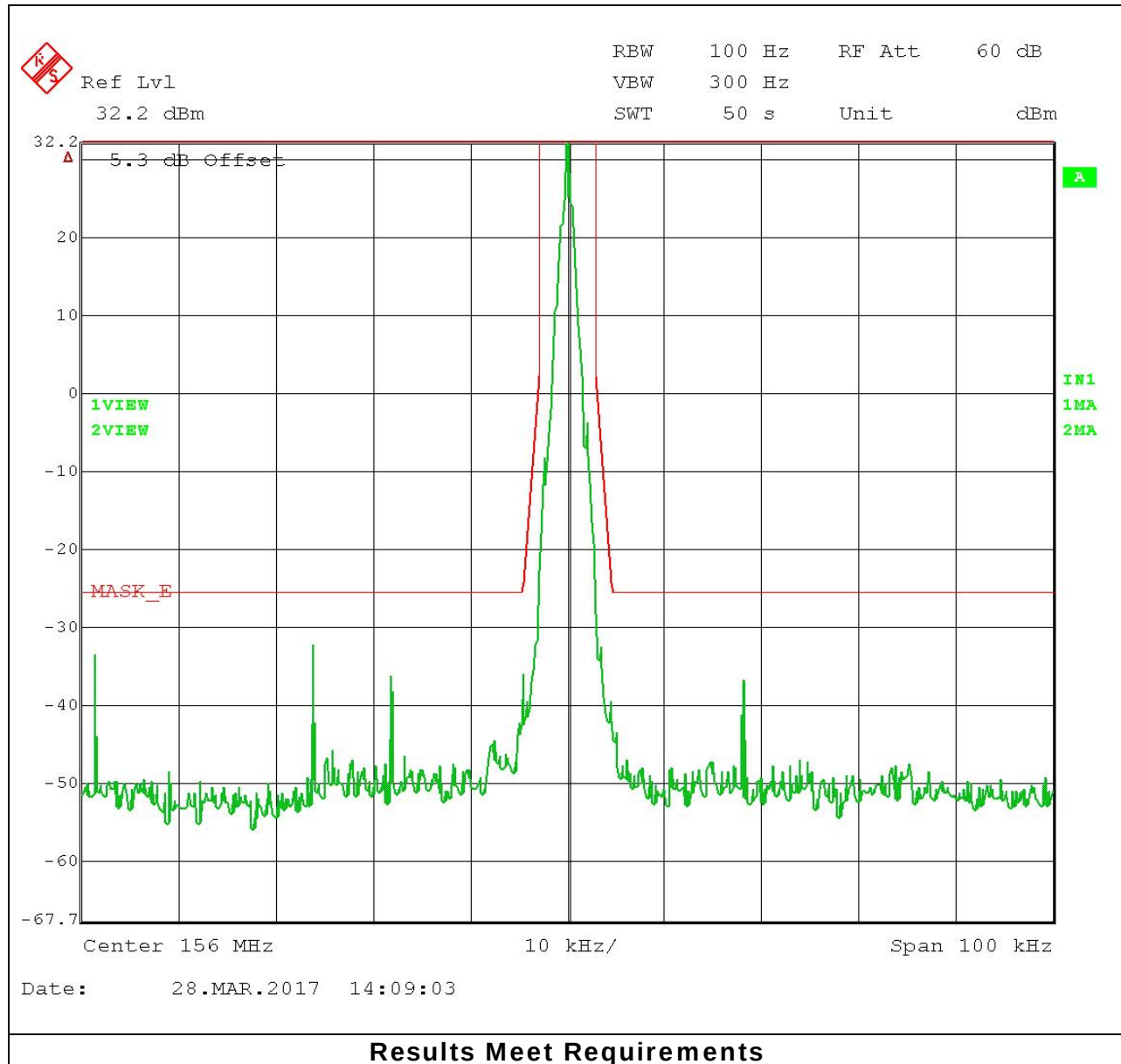
**TEST DATA:** See the plots on following pages.

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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<br>(MHz) | Level<br>(dBc) | Margin<br>(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<br>(MHz) | Level<br>(dBc) | Margin<br>(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                                                 |

<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:** The following test methods were used

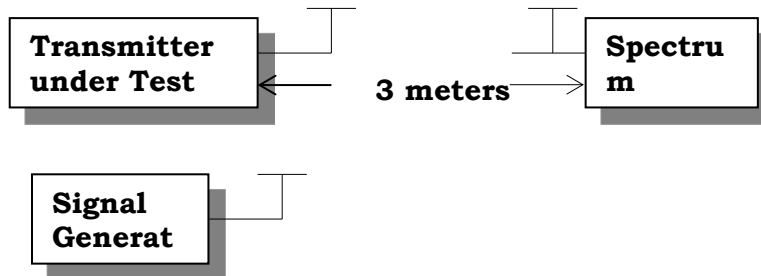
ANSI/TIA-603 § 2.2.12 Unwanted Emissions: Radiated Spurious  
(Out of Band Emissions from 9 KHz – Tenth Harmonic of Fundamental)

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

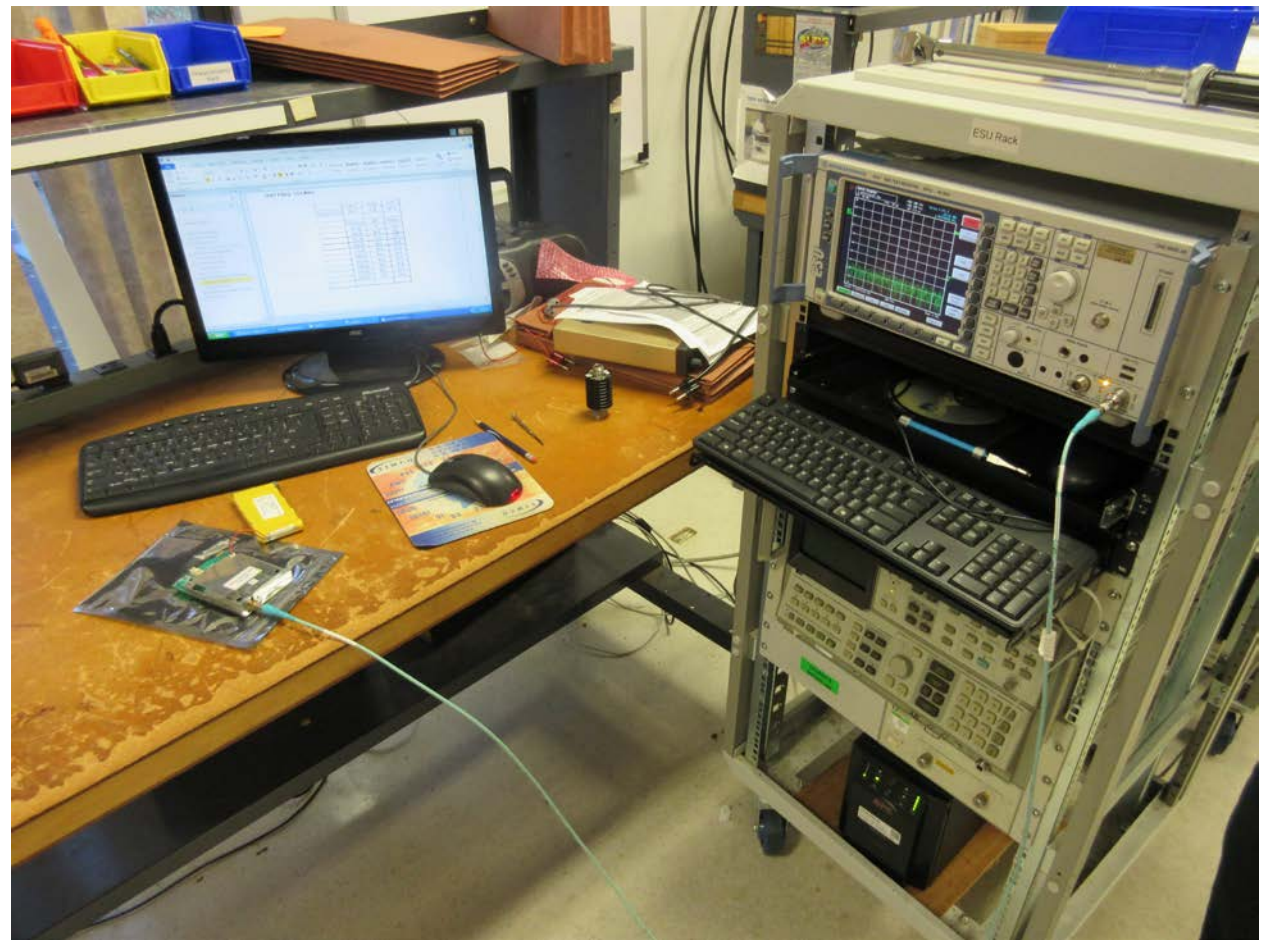
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**APPLICANT: KP ELECTRONIC SYSTEMS LTD.**

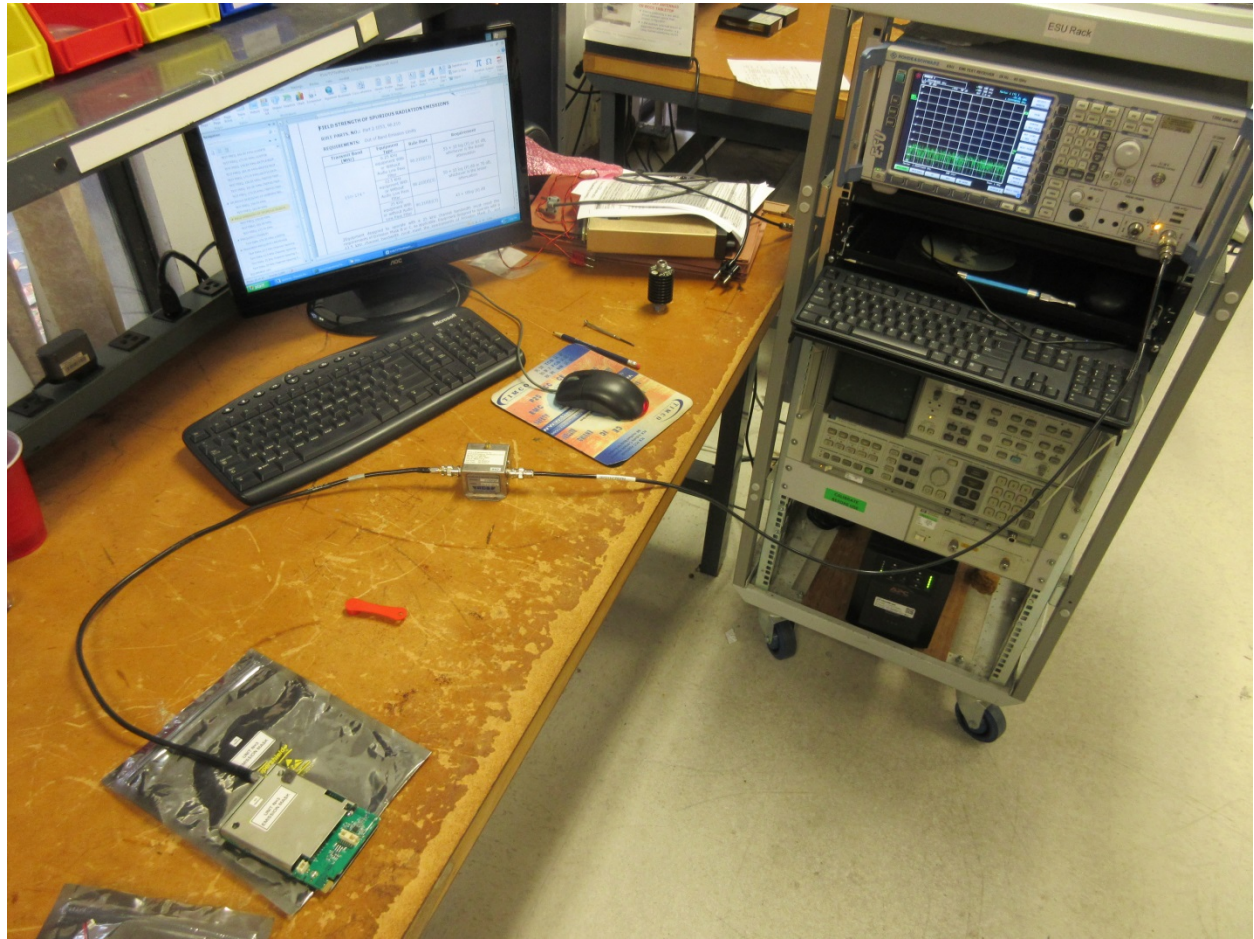
**FCC ID: H78KPMT2W**

**TEST SET UP PHOTOS**

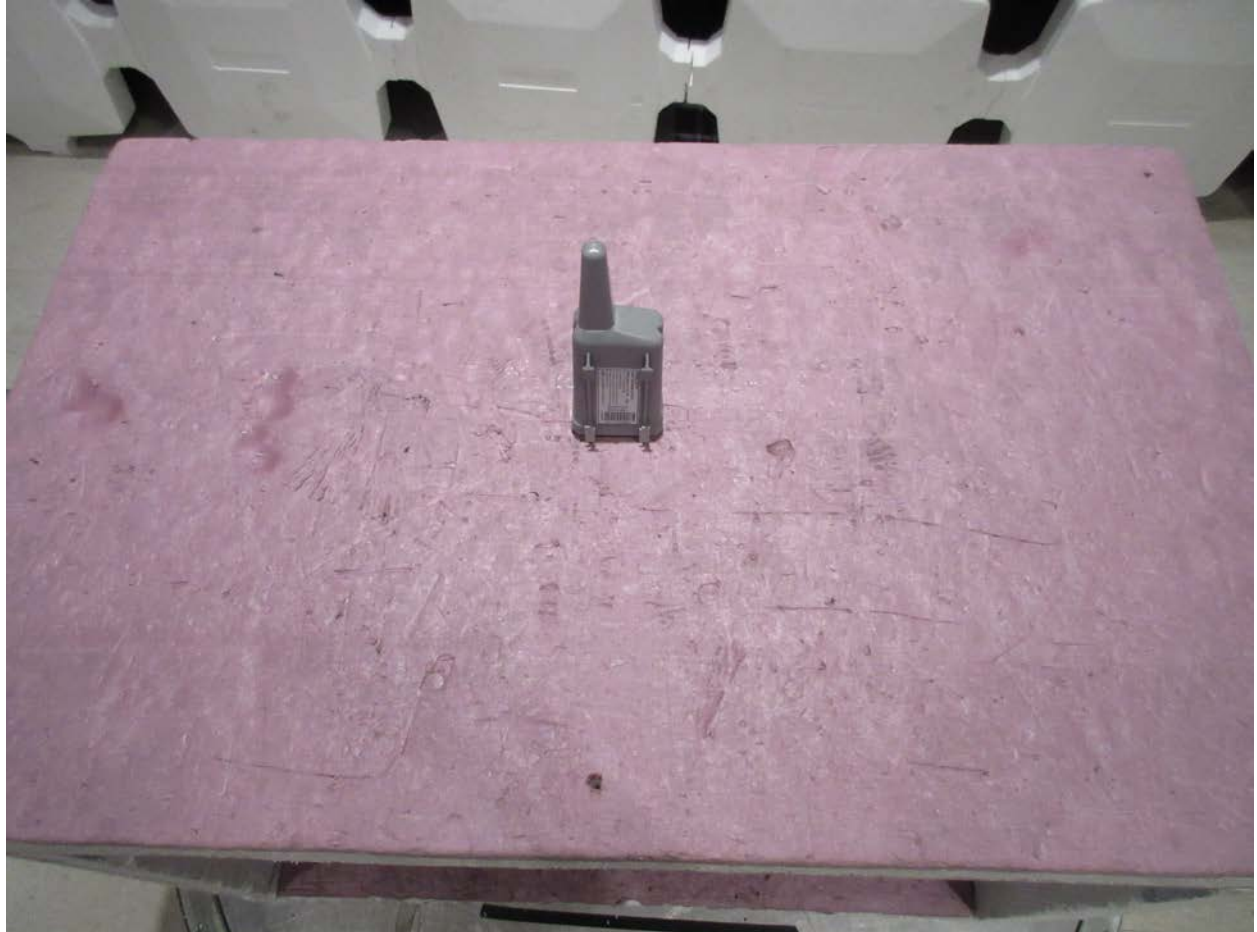
**OUTPUT POWER, OCCUPIED BANDWIDTH**



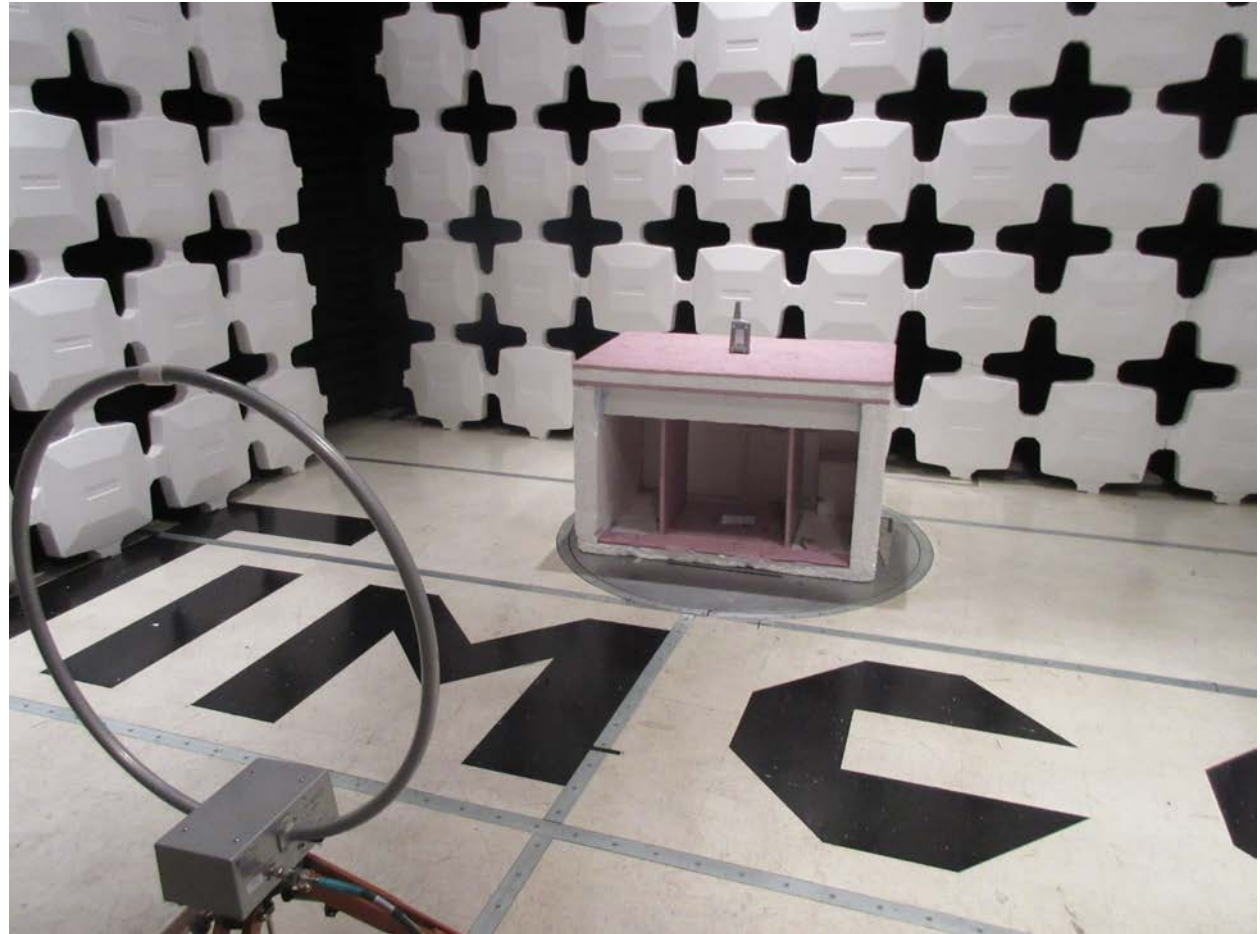
## ANT CONDUCTED EMISSIONS



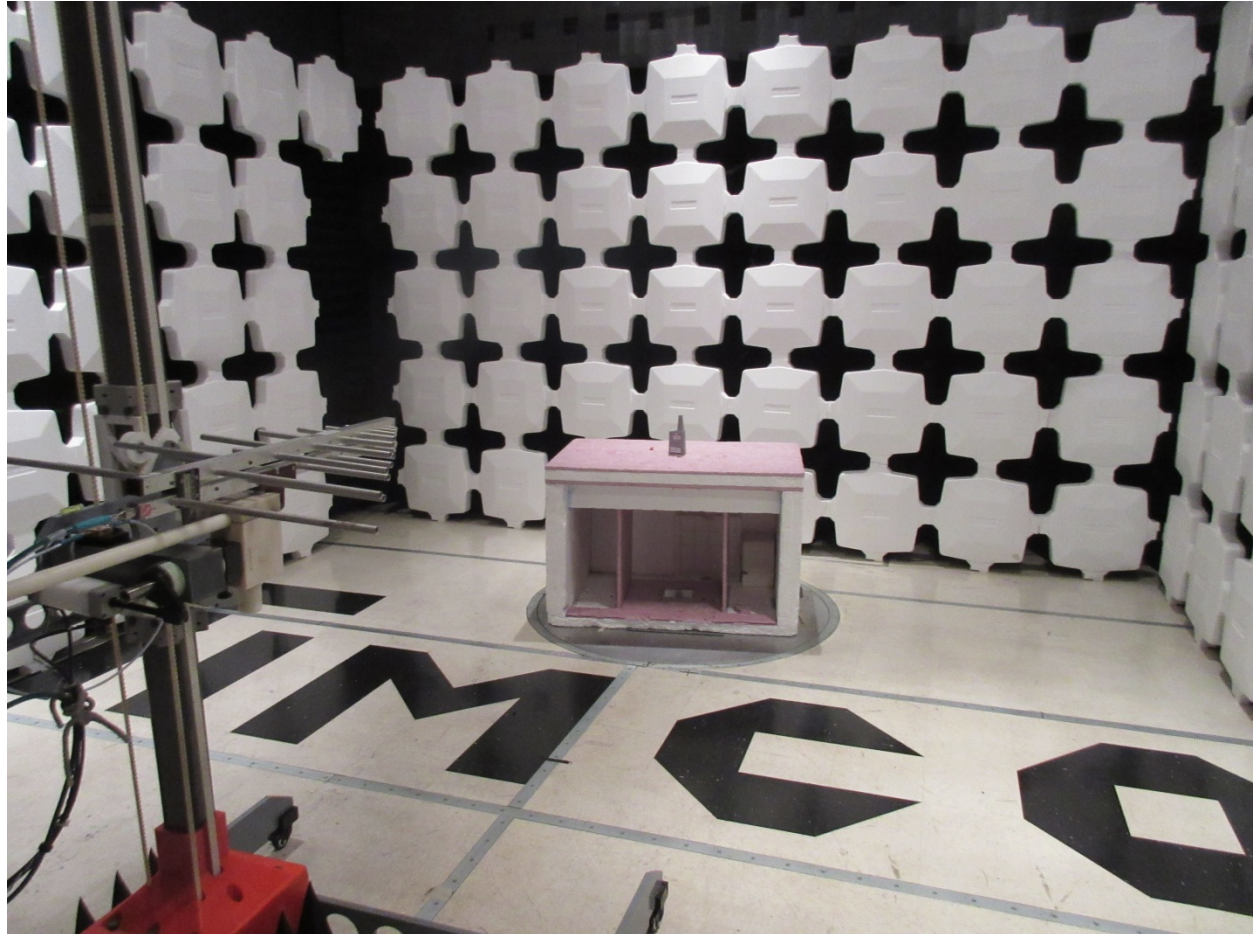
**FIELD STRENGTH SPURIOUS EMISSIONS FINAL EUT SETUP**



**FIELD STRENGTH SPURIOUS EMISSIONS BELOW 30 MHz**



**FIELD STRENGTH SPURIOUS EMISSIONS BELOW 1 GHz**



**FIELD STRENGTH SPURIOUS EMISSIONS ABOVE 1 GHz**

