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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	**H78KPMT2PIT**
MODEL NUMBER	**MT2PIT**
PRODUCT DESCRIPTION	AUTOMATIC METER READING TRANSCEIVER
DATE SAMPLE RECEIVED	1/3/2017
FINAL TEST DATE	1/20/2017
TESTED BY	Tim Royer
APPROVED BY	Cory Leverett
TEST RESULTS	☒ PASS ☐ FAIL

Report Number	Version Number	Description	Issue Date
8AUT17TestReport	Rev1	Initial Issue	01/25/2017
8AUT17TestReport	Rev2	Updated pages 7, 11 & 13.	3/14/2017

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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: 1/20/2017

Reviewed and approved by:
Name and Title: Cory Leverett, Project Manager

Date:01/25/2017

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GENERAL INFORMATION

EUT Specification

EUT Description	**AUTOMATIC METER READING TRANSCEIVER**
FCC ID	**H78KPMT2PIT**
Model Number	**MT2PIT**
Operating Frequency	150.8 – 156.2475 MHz
Test Frequencies	151 & 156 MHz
Type of Emission	2K55F1D
Modulation	FM
EUT Power Source	☐ 110–120Vac/50– 60Hz
	☐ DC Power 12V
	☒ Battery Operated Exclusively
Test Item	☐ Prototype
	☐ Pre-Production
	☒ Production
Type of Equipment	☒ Fixed
	☐ Mobile
	☐ Portable
Test Conditions	Temperature: 24-26ºC 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	**Timco Engineering Inc. at 849 NW State Road 45 Newberry, FL 32669 USA.**

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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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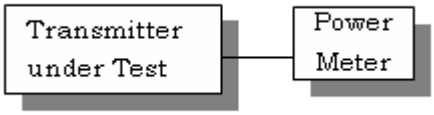
RF POWER OUTPUT

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

	RF POWER	
Tuned Frequency (MHz)	(W)	(dBm)
151	1.52	31.83
156	1.56	31.93

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

INPUT POWER: (6.24V) (0.56A) =3.5 Watts

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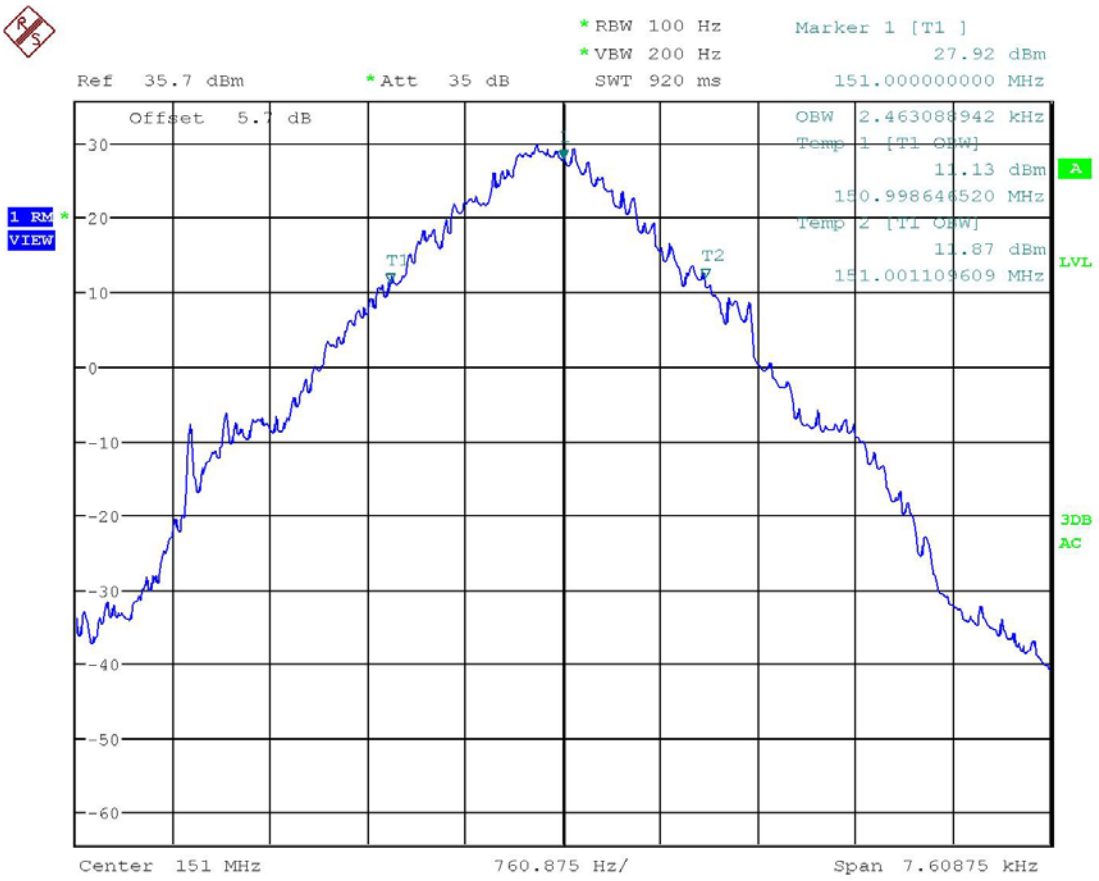
MODULATION CHARACTERISTICS

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 = 2.46 kHz



Results Meet Requirements

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OCCUPIED BANDWIDTH

RULE PART NO.: 2.1049(c) & 90.210

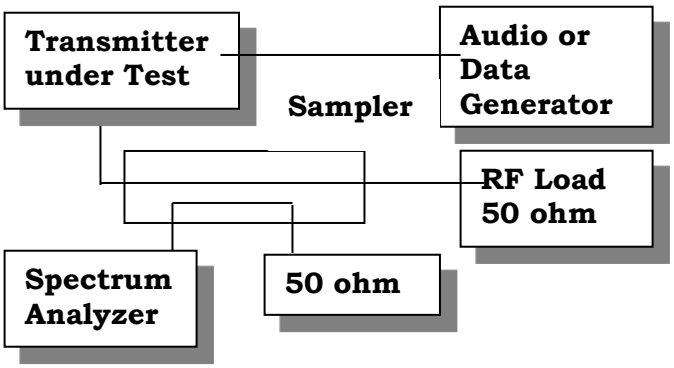
REQUIREMENTS: Applicable Emission Masks

Frequency band (MHz)	Mask for equipment with audio low pass filter	Mask for equipment without audio low pass filter
150-174 [2]	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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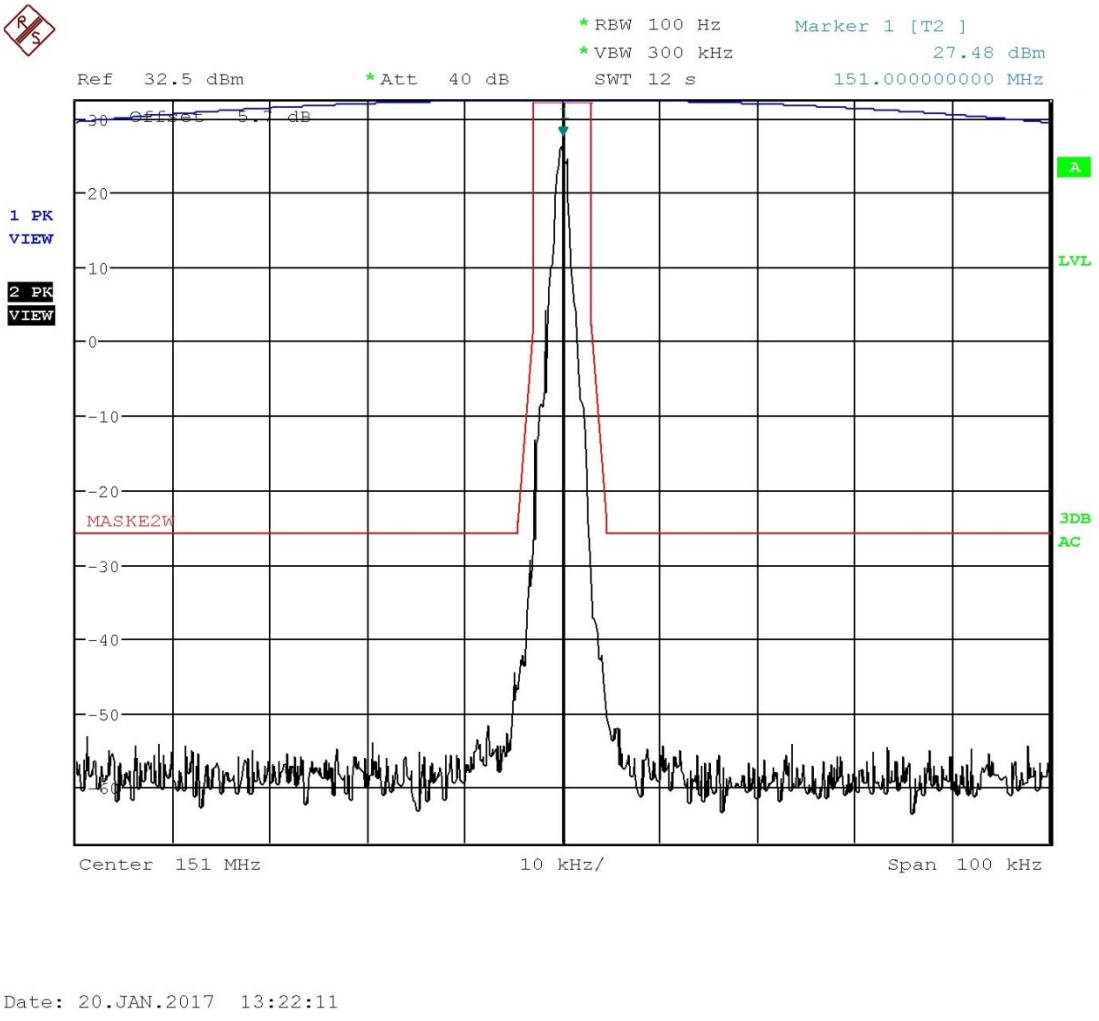
OCCUPIED BANDWIDTH

TEST FREQ. 151 MHz

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



Results Meet Requirements

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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 [2]	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: ANSI/TIA-603 § 2.2.13 Unwanted Emissions: Conducted Spurious

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

TEST FREQ. 151 MHz

	dBm	Watts	Limit
Power Output	31.83	1.52	56.83
	Frequency (MHz)	Level (dBc)	Margin (dB)
	151.00	0	0.0
	302.00	64.0	12.2
	453.00	98.3	46.5
	604.00	107.1	55.3
	755.00	104.9	53.1
*	906.00	111.4	59.6
	1057.00	104.9	53.1
	1208.00	111.0	59.2
*	1359.00	109.1	57.3
	1510.00	100.1	48.3

TEST FREQ. 156 MHz

	dBm	Watts	Limit
Power Output	31.93	1.56	56.93
	Frequency (MHz)	Level (dBc)	Margin (dB)
	156.00	0	0.0
	312.00	69.4	17.5
*	468.00	80.9	29.0
*	624.00	81.4	29.5
*	780.00	82.5	30.6
*	936.00	83.8	31.8
*	1092.00	82.1	30.2
*	1248.00	81.9	30.0
*	1404.00	81.5	29.6
	1560.00	69.8	17.9

***** Indicates only the noise floor was present

Results meet requirements

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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 [2]	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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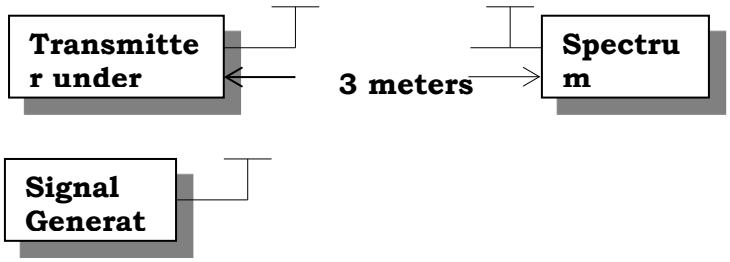
FIELD STRENGTH OF SPURIOUS RADIATION EMISSIONS

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	31.83	1.52	56.83	6.25

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
302.00	H	79.66	22.27
453.00	H	80.25	22.86
604.00	H	90.83	45.44
755.00	H	79.73	22.34
906.00	H	77.83	20.44
1,057.00	H	76.89	19.50
1,208.00	H	77.88	20.49
1,359.00	H	82.17	24.78
1,510.00	H	80.05	22.66

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	31.93	1.59	56.93	6.25

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
312.00	H	83.74	26.81
468.00	H	85.02	28.09
624.00	H	82.51	25.58
780.00	H	82.24	25.31
936.00	H	78.62	21.69
1,092.00	V	78.81	21.88
1,248.00	H	80.34	23.41
1,404.00	H	84.54	27.61
1,560.00	V	82.53	25.6

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FIELD STRENGTH OF SPURIOUS RADIATION EMISSIONS

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	05/25/17
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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