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TEST REPORT

Report Number: 102314536LEX-002
Project Number: G102314536

Report Issue Date: 8/18/2016

Product Name: Smart MDT with MC7750

Standards: Title 47 CFR Part 22
Title 47 CFR Part 24
Title 47 CFR Part 27

Tested by:
Intertek Testing Services NA, Inc.
731 Enterprise Drive
Lexington, KY 40510

Client:
Trapeze Software Group, Inc
5265 Rockwell Dr NE
Cedar Rapids, IA 52402-2014

Report prepared by

Brian Daffin,
Engineer

Report reviewed by

Bryan Taylor,
Team Leader

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1 Introduction and Conclusion

The tests indicated in section 2 were performed on the product constructed as described in section 3. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test method, a list of the actual test equipment used, documentation photos, results and raw data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested complied with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested.

The INTERTEK-Lexington is located at 731 Enterprise Drive, Lexington Kentucky, 40510. The radiated emission test site is a 10-meter semi-anechoic chamber. The chamber meets the characteristics of CISPR 16-1 and ANSI C63.4. For measurements, a remotely controlled flush-mount metal-top turntable is used to rotate the EUT a full 360 degrees. A remote controlled non-conductive antenna mast is used to scan the antenna height from one to four meters. The test site is listed with the FCC under registration number 485103. The test site is listed with Industry Canada under site number IC 2042M-1.

2 Test Summary

Page	Test full name	FCC Reference	IC Reference	Result
-	Output Power	§ 22.913(a) § 24.232(c) §27.50(b)	RSS-132 (5.4) RSS-133 (6.4) RSS-130 (4.4)	Note[1]
6	Radiated Spurious Emissions (Transmitter)	§2.1053 §22.917(a)(b), §24.238(a)(b) §27.53(f)	RSS-132 (5.5) RSS-133 (6.5) RSS-130 (4.6)	Pass
-	Conducted Output Power	§2.1046 §24.232(d) §27.50(b)	RSS-132 (5.4) RSS-133 (6.4) RSS-130 (4.4)	Note[1]
-	Occupied Bandwidth	§2.1049 §22.917(b)(d) §24.238(a) §27.53(c)	RSS-GEN (6.6) RSS-133 (2.3)	Note[1]
-	Conducted Spurious Emissions at Antenna Terminals	§2.1049 §2.1051, §22.917(a)(b) §24.238(a)(b) §27.53(c)	RSS-132 (5.5) RSS-133 (6.5) RSS-130 (4.6)	Note[1]
-	Frequency Stability	§2.1055 §22.355 §24.235 §27.54	RSS-132 (5.3) RSS-133 (6.3) RSS-130 (4.3)	Note[1]

1 See module test report exhibit.

3 Description of Equipment Under Test

Equipment Under Test	
Manufacturer	Trapeze Software Group, Inc
Model Number	Smart MDT with MC7750
Receive Date	10/19/2015
Test Start Date	10/20/2015
Test End Date	10/29/2015
Device Received Condition	Good
Test Sample Type	Production
Frequency Band	824MHz - 849MHz (CDMA Cell Band) 1850MHz - 1910MHz (CDMA PCS Band) 777MHz - 787MHz (LTE Band 13)
Modulation Type	CDMA, QPSK, 16-QAM
Transmission Control	Base Station Simulator
Maximum Output Power (Conducted)	32.60dBm (Cell Band) 29.54dBm (PCS Band) 23.56dBm (LTE Band 13)
Test Channels	1013, 384, and 777 (CDMA Cell Band) 25, 600, and 1075 (CDMA PCS Band) 779.5MHz, 782MHz, and 784.5MHz (LTE Band 13)
Antenna Type	External
Antenna Gain	2.38dBi (Cell Band), 2.59dBi (PCS Band), 3.44dBi(LTE Band 13)
Operating Voltage	12 VDC

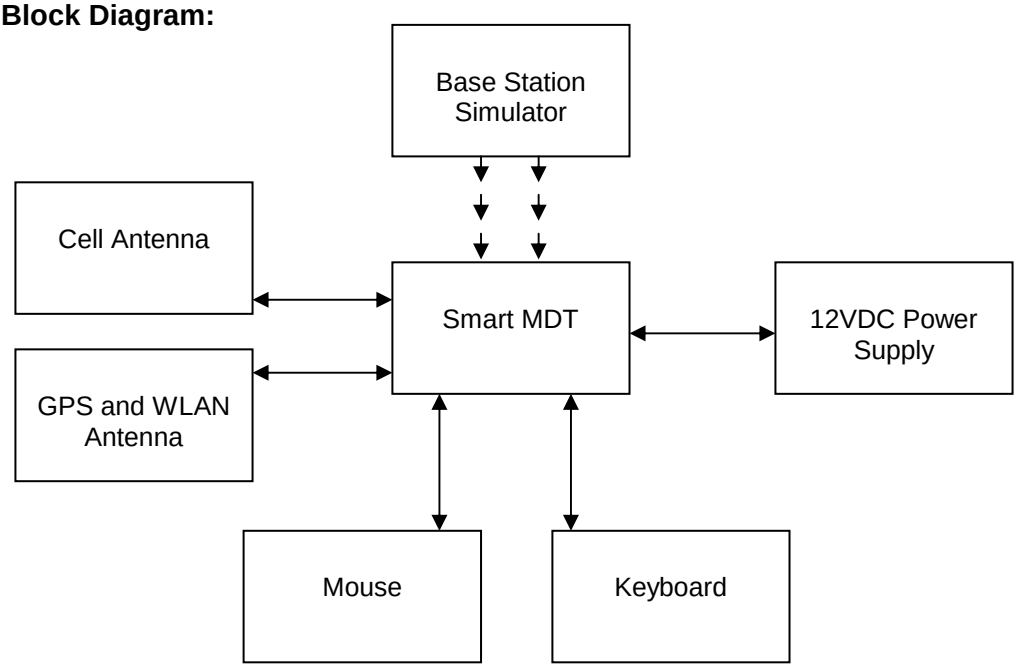
Description of Equipment Under Test
Trapeze's Mobile Data Terminal (MDT) provides transit agencies with real-time interaction between the vehicle fleet and dispatch center for safer and more efficient operations. MDTs also help ensure control and accuracy with an onboard information and communication system.

Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	Powered on in idle mode.
2	Powered on and transmitting with a base station simulator.

3.1 System setup including cable interconnection details, support equipment and simplified block diagram

3.2 EUT Block Diagram:



Block Diagram for Radiated Tests

3.3 Cables:

Cables					
Description	Length	Shielding	Ferrites	Connection	
				From	To
Power	1m	No	No	Power Port	DC Power Supply
Cell Antenna	2m	No	No	Cell and Cell Aux	Antenna
WLAN and GPS Antenna	3m	No	No	GPS and WLAN	Antenna
Keyboard	1m	No	No	USB	Keyboard
Mouse	1m	No	No	USB	Mouse
Serial Cables	1m	No	No	Serial Port	No Termination

4 Radiated Spurious Emissions (Transmitter)

4.1 Test Limits

§ 2.1053

(a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of §2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.

§ 22.917

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

§ 24.238

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

§ 27.53

(c) For operations in the 746-758 MHz band and the 776-788MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB.

4.2 Test Procedure

The EUT was placed on a non-conductive turntable. The measurement antenna was placed at a distance of 3 meters from the EUT. The EUT was forced to transmit at its maximum output power setting. During the tests, the antenna height and EUT azimuth were varied in order to identify the maximum level of emissions from the EUT.

The frequency range up to tenth harmonic was investigated in order to identify the spurious emission. Once the spurious emissions were identified, the power of the emission was determined using the substitution method described in TIA-603-C. The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and at the spurious emissions frequency.

4.3 Test Equipment Used:

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
EMI Test Receiver	1302.6005.40	Rohde&Schwarz	ESU40	9/19/2015	9/19/2016
Preamplifier	122005	Rohde&Schwarz	TS-PR18	11/26/2014	11/26/2015
Horn Antenna	00156319	ETS	3117	5/15/2015	5/15/2016
Horn Antenna	00154521	ETS	3117	11/3/2015	11/3/2016
Bilog Antenna	00051864	ETS	3142C	1/20/2015	1/20/2016
System Controller	121701-1	Sunol Sciences	SC99V	Time of Use	Time of Use
High Pass Filter	1	Wainwright	WHKX12-2533.85-2710-18000-40SS	Time of Use	Time of Use
High Pass Filter	25	Wainwright	WHKX12-1028.5-1100-1500-40SS	Time of Use	Time of Use
Base Station Simulator	2522	Rohde&Schwarz	CMU200	9/22/2015	9/22/2016
Base Station Simulator	3982	Rohde&Schwarz	CMW500	9/24/2015	9/24/2016
Signal Generator	3915	Rohde&Schwarz	SMB100A	9/18/2015	9/18/2016

4.4 Results:

All radiated spurious emissions were attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB which is equivalent to -13dBm.

Worst Case Spurious Measurements

CDMA Cell

Radiated Spurious Emissions Measurement								
Test Engineer:	Bryan Taylor		**Start Date:**	10/20/2015		**End Date:**	10/21/2015	
Temperature:	23.5C		**Humidity:**	54.00%		**Pressure:**	988.9mBar	
RBW:	1MHz		**VBW:**	3MHz				
Notes:	Results represent the worst case from 3 orthogonal axis positions.							
			A	**B**	**C**	**D**	**E**	**F**
Band/Channel	**Spurious Frequency (MHz)**	**Polarity**	**Device Reading (dBm)**	**Signal Generator Level (dBm)**	**Cable Loss (dB)**	**Tx Antenna Gain (dBd)**	**Limit (dBm)**	**Radiated Spurious Emission Level (dBm)**
CDMA Cell Band Low Channel (1013)	1649.673	V	-65.864	-58.334	3.26	5.64	-13	-55.95
	2475.213	V	-66.517	-58.087	4.17	5.87	-13	-56.39
	3299.106	H	-69.495	-58.065	4.58	7.32	-13	-55.33
	4123.734	H	-67.949	-55.069	5.33	8.91	-13	-51.49
	4946.994	V	-67.51	-55.092	5.82	9.90	-13	-51.01
	5773.4325	H	-67.77	-54.961	6.98	10.66	-13	-51.28
	6600.45	V	-66.66	-52.99	7.45	10.87	-13	-49.57
	7423.4745	V	-68.90	-55.219	7.78	11.84	-13	-51.16
	8239.9155	V	-72.68	-56.905	8.23	12.58	-13	-52.56
	9078.288	V	-72.22	-56.469	8.93	13.08	-13	-52.32
CDMA Cell Band Mid Channel (384)	1672.7205	V	-66.22	-57.874	3.30	5.64	-13	-55.53
	2510.571	V	-65.27	-56.157	3.97	5.65	-13	-54.48
	3346.1895	H	-66.73	-54.763	4.63	7.67	-13	-51.72
	4181.3985	V	-70.06	-56.489	5.19	8.91	-13	-52.77
	5020.917	V	-63.90	-51.288	6.19	9.99	-13	-47.49
	5857.1235	H	-67.89	-54.871	7.28	10.60	-13	-51.55
	6694.2495	V	-65.70	-51.91	7.47	10.87	-13	-48.51
	7527.45	V	-66.98	-53.095	8.31	11.93	-13	-49.48
	8368.1445	V	-70.86	-55.512	8.56	12.66	-13	-51.41
	9200.949	H	-70.81	-55.417	9.28	13.19	-13	-51.51
CDMA Cell Band High Channel (777)	1697.19	V	-64.42	-55.644	3.48	5.64	-13	-53.48
	2546.5095	H	-58.76	-48.817	4.09	5.65	-13	-47.26
	3394.02	H	-66.86	-54.973	4.84	7.67	-13	-52.14
	4241.736	H	-67.14	-53.98	5.00	9.01	-13	-49.97
	5091.624	V	-65.20	-52.348	6.25	9.99	-13	-48.61
	5936.7525	H	-66.97	-53.587	7.03	10.51	-13	-50.11
	6784.824	V	-67.30	-53.159	7.71	11.01	-13	-49.86
	7635.756	V	-69.83	-55.616	8.15	11.98	-13	-51.79
	8484.2205	V	-69.93	-54.47	8.57	12.76	-13	-50.28
	9328.8855	H	-71.92	-56.076	9.07	13.15	-13	-52.00
								F=B-C+D

Worst Case Spurious Measurements

CDMA PCS

Radiated Spurious Emissions Measurement								
Test Engineer:	Bryan Taylor		**Start Date:**	10/20/2015		**End Date:**	10/21/2015	
Temperature:	23.5C		**Humidity:**	54.00%		**Pressure:**	988.9mBar	
RBW:	1MHz		**VBW:**	3MHz				
Notes:	Results represent the worst case from 3 orthogonal axis positions.							
			A	**B**	**C**	**D**	**E**	**F**
Band/Channel	**Spurious Frequency (MHz)**	**Polarity**	**Device Reading (dBm)**	**Signal Generator Level (dBm)**	**Cable Loss (dB)**	**Tx Antenna Gain (dBd)**	**Limit (dBm)**	**Radiated Spurious Emission Level (dBm)**
CDMA PCS Band Low Channel (25)	3703.196	V	-57.134	-42.984	4.85	8.26	-13	-39.57
	5551.7175	V	-69.685	-55.835	6.91	10.40	-13	-52.35
	7406.29	H	-71.369	-55.509	7.75	11.84	-13	-51.42
	9248.9015	V	-71.707	-55.797	9.21	13.19	-13	-51.82
	11102.565	V	-70.868	-52.538	10.47	13.23	-13	-49.78
	12961.102	V	-68.137	-50.157	10.82	13.03	-13	-47.95
	14804.255	H	-66.948	-47.368	12.75	13.87	-13	-46.25
	16662.8115	V	-62.306	-42.646	14.36	12.90	-13	-44.11
CDMA PCS Band Mid Channel (600)	1876.3805	V	-76.109	-61.059	3.51	5.17	-13	-59.40
	3759.373	V	-65.144	-50.344	5.20	8.26	-13	-47.28
	5635.449	H	-71.31	-56.09	7.09	10.56	-13	-52.62
	7517.492	V	-71.095	-55.775	8.01	11.93	-13	-51.86
	9405.5695	V	-73.465	-54.855	9.15	13.12	-13	-50.89
	11277.732	H	-71.693	-53.343	10.16	13.26	-13	-50.24
	13157.8415	H	-71.445	-50.915	11.01	13.43	-13	-48.50
	15033.2575	V	-68.559	-47.959	12.20	13.92	-13	-46.24
	16921.869	V	-65.63	-41.3	14.87	12.80	-13	-43.37
CDMA PCS Band High Channel (1175)	3818.085	V	-57.45	-42.74	5.00	8.25	-13	-39.49
	5723.733	H	-71.901	-57.551	6.61	10.66	-13	-53.50
	7630.0725	V	-72.606	-55.476	8.15	11.98	-13	-51.65
	9547.8045	H	-73.135	-56.075	8.41	13.09	-13	-51.40
	11445.7395	H	-72.147	-54.157	9.13	13.25	-13	-50.04
	13355.145	V	-68.276	-50.306	11.29	13.54	-13	-48.06
	15264.186	H	-68.742	-47.932	12.35	13.91	-13	-46.37
	17180.2275	H	-62.929	-41.899	15.28	13.33	-13	-43.85
								F=B-C+D

Worst Case Spurious Measurements

LTE Band 13

Radiated Spurious Emissions Measurement								
Test Engineer:	Brian Daffin		**Start Date:**	10/26/2015		**End Date:**	10/27/2015	
Temperature:	23.5C		**Humidity:**	54.00%		**Pressure:**	988.9mBar	
RBW:	1MHz		**VBW:**	3MHz				
Notes:	Results represent the worst case from 3 orthogonal axis positions.							
			A	**B**	**C**	**D**	**E**	**F**
Band/Channel	**Spurious Frequency (MHz)**	**Polarity**	**Device Reading (dBm)**	**Signal Generator Level (dBm)**	**Cable Loss (dB)**	**Tx Antenna Gain (dBd)**	**Limit (dBm)**	**Radiated Spurious Emission Level (dBm)**
Band 13 Low Ch (779.5MHz)	1559	H	-46.27	-35.37	3.03	5.40	-13	-33.00
	1559	V	-47.24	-43.78	3.03	5.40	-13	-41.41
	2338.5	H	-70.31	-64.43	4.18	6.07	-13	-62.54
	2338.5	V	-71.69	-63.12	4.18	6.07	-13	-61.23
	3118	H	-72.52	-52.3	4.36	7.09	-13	-49.57
	3118	V	-72.23	-56.32	4.36	7.09	-13	-53.59
	3897.5	H	-72.94	-62.19	5.05	8.25	-13	-58.99
	3897.5	V	-72.31	-60.66	5.05	8.25	-13	-57.46
	4677	H	-72.69	-55.84	5.28	9.33	-13	-51.79
	4677	V	-71.88	-56.27	5.28	9.33	-13	-52.22
Band 13 Mid Ch (782MHz)	1564	H	-49.65	-38.94	3.03	5.40	-13	-36.57
	1564	V	-47.97	-44.57	3.03	5.40	-13	-42.20
	2346	H	-70.82	-64.97	4.18	6.07	-13	-63.08
	2346	V	-71.39	-62.72	4.18	6.07	-13	-60.83
	3128	H	-71.72	-51.47	4.36	7.09	-13	-48.74
	3128	V	-72.77	-57.26	4.36	7.09	-13	-54.53
	3910	H	-73.43	-57.66	5.04	8.43	-13	-54.27
	3910	V	-72.37	-60.91	5.04	8.43	-13	-57.52
	4692	H	-72.55	-55.25	5.54	9.33	-13	-51.46
	4692	V	-72.73	-56.71	5.54	9.33	-13	-52.92
Band 13 High Ch (784.5MHz)	1569	H	-41.51	-30.86	3.03	5.40	-13	-28.49
	1569	V	-45.3	-41.9	3.03	5.40	-13	-39.53
	2353.5	H	-71.45	-65.54	4.07	6.07	-13	-63.54
	2353.5	V	-71.28	-62.09	4.07	6.07	-13	-60.09
	3138	H	-71.97	-51.75	4.45	7.09	-13	-49.11
	3138	V	-72.62	-57.66	4.45	7.09	-13	-55.02
	3922.5	H	-72.17	-61.52	5.04	8.43	-13	-58.13
	3922.5	V	-71.98	-60.81	5.04	8.43	-13	-57.42
	4707	H	-72.74	-55.67	5.54	9.39	-13	-51.82
	4707	V	-73.34	-56.49	5.54	9.39	-13	-52.64
								F=B-C+D

5 Measurement Uncertainty

The measured value related to the corresponding limit will be used to decide whether the equipment meets the requirements.

The measurement uncertainty figures were calculated and correspond to a coverage factor of k = 2, providing a confidence level of respectively 95.45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian).

Measurement uncertainty Table

Parameter	Uncertainty	Notes
Radiated emissions, 30 to 1000 MHz	±3.9dB	
Radiated emissions, 1 to 18 GHz	±4.2dB	
Radiated emissions, 18 to 40 GHz	±4.3dB	
Power Port Conducted emissions, 150kHz to 30 MHz	±2.8dB	

6 Revision History

Revision Level	Date	Report Number	Notes
0	8/18/2016	102314536LEX-002	Original Issue