



Engineering and Testing for EMC and Safety Compliance

**Certification Application Report
FCC Part 15.249 & Industry Canada RSS-210**

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FCC ID	PVT-T70MH3	TEST REPORT DATE	March 5, 2007
IC:	4166A-T70MH3	RTL WORK ORDER NUMBER	2007117
PLATFORM	N/A	RTL QUOTE NUMBER	QRTL07-025
MODEL #	T70M		
FCC Classification	DXX – Part 15 Low Power Communication Device Transmitter		
FCC Rule Part(s)	Part 15.249: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5850 MHz, and 24.0-24.25 GHz		
Industry Canada Standard	RSS-210: Low Power License-Exempt Radio Communication Devices (All Frequency Bands)		
Digital Interface Information	Digital Interface was found to be compliant		
Receiver Information	Receiver was found to be compliant		
Frequency Range (MHz)	Output Power (W)	Frequency Tolerance	Emission Designator
902.5 - 927.45	N/A	N/A	14K50F1D

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. Modifications made to the equipment during testing, in order to achieve compliance with these standards, are listed in the report.

Furthermore, there was no deviation from, additions to, or exclusions from the FCC Part 2, FCC Part 15, Industry Canada RSS-210, and ANSI C63.4.

Signature: 

Date: March 5, 2007

Typed/Printed Name: Desmond A. Fraser

Position: President

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1 General Information

1.1 Scope

FCC Rules Part 15.249: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5850 MHz, and 24.0-24.25 GHz.

IC RSS-210 Section 6.2.2(m2): 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz.

1.2 Modifications

L16 was replaced by a 5.1H inductor (type LL1608FSL) and C113 filled with a 2.2F capacitor. These modifications were required to lower emissions of the mid channel second harmonic.

1.3 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located at Rhein Tech Laboratories (RTL), 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communication Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 2003).

1.4 Related Submittal(s)/Grant(s)

This is an original certification application for Model: T70M, FCC ID: PVT-T70MH3, IC: 4166A-T70MH3. The IF, LO, and up to the 2nd LO, were investigated and tested, and found to be compliant. Verification Reports have been completed, and are on file.

2 Test Information

2.1 Test Justification

The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. The low channel at 902.5 MHz, mid channel at 915.7 MHz, and high channel at 927.45 MHz, were tested and investigated from 9 kHz to 10 GHz. Data for all three channels is presented in this report. The test results relate only to the item(s) that was tested. The antenna transmits, receives, and is a PCB trace.

2.2 Exercising the EUT

The EUT was provided with the software to continuously transmit during testing. The carrier was also checked to verify that the information was being transmitted. There were no deviations from the test standard(s) and/or methods.

2.3 Test Result Summary

Table 2-1: Test Result Summary with FCC Rules and Regulations

Standard	Test	Pass/Fail or N/A
FCC 15.249(a)	Radiated Emissions	Pass

2.4 Test System Details

The test sample was received by RTL on February 13, 2007. The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system, are:

Table 2-2: Equipment Under Test (EUT)

Part	Manufacturer	Model	Serial Number	FCC ID	Cable Description	RTL Bar Code
(Transceiver with MCX connector) EUT	IKUSI	T70M	0107000002	PVT-T70MH3	N/A	17782
(Transceiver) EUT	IKUSI	T70M	0107000002	PVT-T70MH3	N/A	17782

2.5 Configuration of Tested System

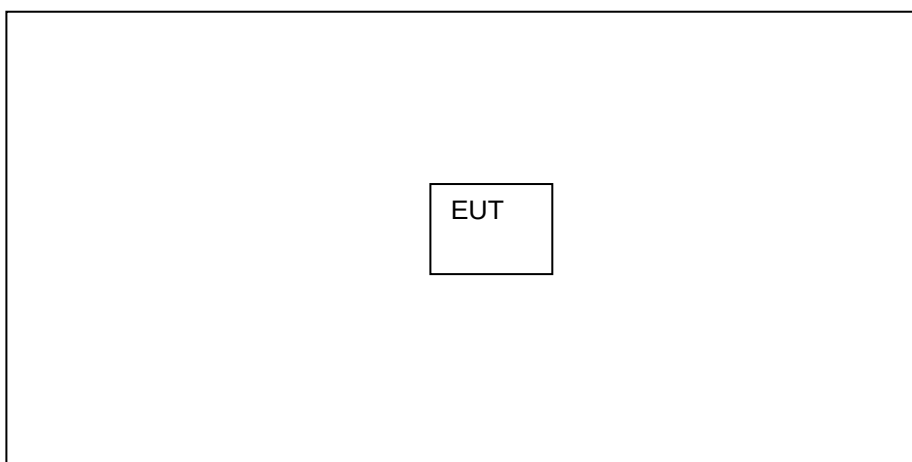


Figure 2-1: Worst Case Configuration of System under Test

3 Conducted Limits – FCC §15.207 & IC RSS-210 §9.0

No conducted emissions were performed since the device is battery operated.

4 Duty Cycle Calculation

In the standard Working Mode, the RF transmission is discontinuous: 35ms long frames are transmitted randomly inside every interval of 165 ms. Therefore, RF silences have a random length between 0 and 260 ms. Average time of transmission is 35 ms/165 ms; which is 21% of the time.

$$20\log(35/165) = -13.5 \text{ dB}$$

5 Radiated Emission Limits Fundamental Emissions – FCC §15.249 & IC RSS-210 §6.2.2(m2)

5.1 Radiated Emission Limits Test Procedure

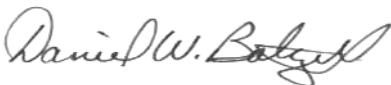
Radiated Emissions of the Fundamentals were tested at three meters, and meet the requirements of 50 millivolts/meter in average mode, and 20 dB higher in peak mode, per 15.249(e). The EUT was tested in all three orthogonal planes for the low, mid, and high channels; the worst case emissions are shown.

5.2 Radiated Emission Limits Test Data

Table 5-1: Radiated Emissions Fundamental Emissions

Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dBm)	Emission Level (dBuV/m) (Average less 13.5 dB duty cycle correction factor)	Limit (dBuV/m)	Margin (dB)
902.50	Pk	H	0	1.1	55.9	38.4	94.3	114.0	-19.7
902.50	Av	H	0	1.1	55.9	38.4	80.8	94.0	-13.2
915.70	Pk	H	0	1.0	59.3	38.6	97.9	114.0	-16.1
915.70	Av	H	0	1.0	59.3	38.6	84.4	94.0	-9.6
927.45	Pk	H	0	1.1	56.2	38.8	95.0	114.0	-19.0
902.50	Av	H	0	1.1	56.2	38.8	81.5	94.0	-12.5

TEST PERSONNEL:

Daniel Baltzell Test Engineer	 Signature	February 23, 2007 Date Of Test
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6 Radiated Emission Limits Radiated Harmonics – FCC §15.249 & IC RSS-210 §6.2.2(m2)

6.1 Radiated Emission Limits Test Procedure

Radiated Emissions of the harmonics were tested at three meters, and meet the requirements of 500 microvolts/meter in average mode, and 20 dB higher in peak mode, per 15.249(e). The EUT was tested in the X-Y, X-Z, and Y-Z orthogonal planes.

6.2 Radiated Emissions Harmonics/Spurious Test Data – Antenna S/N 2303722

Table 6-1: Radiated Emissions Harmonics/Spurious (Low Channel, 902.5 MHz)

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m) (Average less 13.5 dB duty cycle correction factor)	Limit (dBuV/m)	Margin (dB)
1805.00	Pk	53.3	11.0	64.3	74.0	-9.7
1805.00	Av	53.3	11.0	50.8	54.0	-3.2
2707.50	Pk	45.8	-0.1	45.7	74.0	-28.3
2707.50	Av	45.8	-0.1	32.2	54.0	-21.8
3610.00	Pk	31.1	0.6	31.7	74.0	-42.3
3610.00	Av	31.1	0.6	18.2	54.0	-35.8
4512.50	Pk	38.4	7.6	46.0	74.0	-28.0
4512.50	Av	38.4	7.6	32.5	54.0	-21.5
5415.00	Pk	37.8	8.0	45.8	74.0	-28.2
5415.00	Av	37.8	8.0	32.3	54.0	-21.7
6317.50	Pk	38.6	8.5	47.1	74.0	-26.9
6317.50	Av	38.6	8.5	33.6	54.0	-20.4
7220.00	Pk	37.9	9.2	47.1	74.0	-26.9
7220.00	Av	37.9	9.2	33.6	54.0	-20.4
8122.50	Pk	38.0	9.5	47.5	74.0	-26.5
8122.50	Av	38.0	9.5	34.0	54.0	-20.0
9025.00	Pk	38.2	14.8	53.0	74.0	-21.0
9025.00	Av	38.2	14.8	39.5	54.0	-14.5

Peak Resolution/Video Bandwidth is 1 MHz

Table 6-2: Radiated Emissions Harmonics/Spurious (Mid Channel, 915.7 MHz)

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m) (Average less 13.5 dB duty cycle correction factor))	Limit (dBuV/m)	Margin (dB)
1831.40	Pk	55.0	11.0	66.0	74.0	-8.0
1831.40	Av	55.0	11.0	52.5	54.0	-1.5
2747.10	Pk	43.3	0.1	43.4	74.0	-30.6
2747.10	Av	43.3	0.1	29.9	54.0	-24.1
3662.80	Pk	37.9	0.7	38.6	74.0	-35.4
3662.80	Av	37.9	0.7	25.1	54.0	-28.9
4578.50	Pk	37.7	7.7	45.4	74.0	-28.6
4578.50	Av	37.7	7.7	31.9	54.0	-22.1
5494.20	Pk	37.7	8.0	45.7	74.0	-28.3
5494.20	Av	37.7	8.0	32.2	54.0	-21.8
6409.90	Pk	38.5	8.8	47.3	74.0	-26.7
6409.90	Av	38.5	8.8	33.8	54.0	-20.2
7325.60	Pk	38.2	9.2	47.4	74.0	-26.6
7325.60	Av	38.2	9.2	33.9	54.0	-20.1
8241.30	Pk	39.8	14.9	54.7	74.0	-19.3
8241.30	Av	39.8	14.9	41.2	54.0	-12.8
9157.00	Pk	40.2	15.2	55.4	74.0	-18.6
9157.00	Av	40.2	15.2	41.9	54.0	-12.1

Peak Resolution/Video Bandwidth is 1 MHz

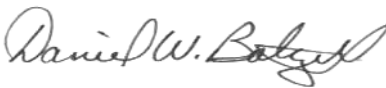
Table 6-3: Radiated Emissions Harmonics/Spurious (High Channel, 927.45 MHz)

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m) (Average less 13.5 dB duty cycle correction factor)	Limit (dBuV/m)	Margin (dB)
1854.90	Pk	52.1	11.4	63.5	74.0	-10.5
1854.90	Av	52.1	11.4	50.0	54.0	-4.0
2782.35	Pk	38.7	0.1	38.8	74.0	-35.2
2782.35	Av	38.7	0.1	25.3	54.0	-28.7
3709.80	Pk	33.3	0.9	34.2	74.0	-39.8
3709.80	Av	33.3	0.9	20.7	54.0	-33.3
4637.25	Pk	38.8	7.7	46.5	74.0	-27.5
4637.25	Av	38.8	7.7	33.0	54.0	-21.0
5564.70	Pk	40.4	8.1	48.5	74.0	-25.5
5564.70	Av	40.4	8.1	35.0	54.0	-19.0
6492.15	Pk	38.2	8.7	46.9	74.0	-27.1
6492.15	Av	38.2	8.7	33.4	54.0	-20.6
7419.60	Pk	39.8	9.3	49.1	74.0	-24.9
7419.60	Av	39.8	9.3	35.6	54.0	-18.4
8347.05	Pk	38.9	14.5	53.4	74.0	-20.6
8347.05	Av	38.9	14.5	39.9	54.0	-14.1
9274.50	Pk	38.1	15.1	53.2	74.0	-20.8
9274.50	Av	38.1	15.1	39.7	54.0	-14.3

Peak Resolution/Video Bandwidth is 1 MHz

TEST PERSONNEL:

Daniel Baltzell
Test Engineer



Signature

February 23, 2007
Date Of Test

Table 6-4: Radiated Spurious Emissions Test Equipment

RTL Asset	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901053	Schaffner & Chase	CBL6112B	Bilog antenna (20 MHz - 2 GHz)	2648	11/1/07
900932	Miteq	JS4-01002600-36-5P	Preamplifier (30 MHz – 26 GHz)	849863	2/15/08
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	5/20/07
900323	EMCO	3160-07	Horn Antenna (8.2 - 12.4 GHz)	9605-1054	5/20/07
900321	EMCO	3161-03	Horn Antenna (4.0 - 8.2 GHz)	9508-1020	5/20/07
901215	Hewlett Packard	8596EM	Portable Spectrum Analyzer (9 kHz – 12.8 GHz)	3826A00144	10/16/07
901425	Insulated Wire, Inc.	KPS-1503-2400-KPS	RF cable, 20'	NA	12/5/07
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	12/5/07
900878	Rhein Tech Labs	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	Not Required
901242	Rhein Tech Labs	WRT-000-0003	Wood rotating table	N/A	Not Required

7 Conclusion

The data in this measurement report shows that Model: T70M; FCC ID: PVT-T70MH3, IC: 4166A-T70MH3, complies with all the requirements of Parts 2 and 15 of the FCC Rules, and Industry Canada RSS-210.