



FCC RF Test Report

APPLICANT : LugTrack, LLC.
EQUIPMENT : GLOBAL LOCATOR
BRAND NAME : TUMI, SAMSONITE, MONTBLANC
MODEL NAME : 014341D, 110548-1090, 110574-1090,
110620-1090, LTCS1
MARKETING NAME : TUMI Global Locator, Samsonite Track&Go
FCC ID : 2AFPZ-TGL001
STANDARD : FCC 47 CFR Part 2, 22(H), 24(E)
CLASSIFICATION : PCS Licensed Transmitter (PCB)

The product was completed on Jan. 13, 2018. We, Sporton International (Shenzhen) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI/TIA-603-E and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Shenzhen) Inc., the test report shall not be reproduced except in full.

Approved by: Eric Shih / Manager



Sporton International (Shenzhen) Inc.

***1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan Shenzhen City
Guangdong Province 518055 China***



TABLE OF CONTENTS

1	GENERAL DESCRIPTION	5
1.1	Applicant.....	5
1.2	Manufacturer	5
1.3	Product Feature of Equipment Under Test	5
1.4	Product Specification of Equipment Under Test	6
1.5	Modification of EUT	6
1.6	Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator	7
1.7	Testing Location	7
1.8	Applicable Standards	8
2	TEST CONFIGURATION OF EQUIPMENT UNDER TEST	9
2.1	Test Mode.....	9
2.2	Connection Diagram of Test System	10
2.3	Support Unit used in test configuration	10
3	CONDUCTED TEST RESULT	11
3.1	Measuring Instruments.....	11
3.2	Test Setup	11
3.3	Test Result of Conducted Test.....	11
3.4	Conducted Output Power	12
4	RADIATED TEST ITEMS	13
4.1	Measuring Instruments.....	13
4.2	Test Setup	13
4.3	Test Result of Radiated Test.....	13
4.4	Effective Radiated Power and Effective Isotropic Radiated Power Measurement	14
4.5	Field Strength of Spurious Radiation Measurement	16
5	LIST OF MEASURING EQUIPMENT	17
6	UNCERTAINTY OF EVALUATION	18

APPENDIX A. TEST RESULTS OF CONDUCTED TEST

APPENDIX B. TEST RESULTS OF RADIATED TEST

APPENDIX C. TEST SETUP PHOTOGRAPHS

APPENDIX D. PRODUCT EQUALITY DECLARATION



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG582403-04	Rev. 01	Initial issue of report	Jan. 19, 2018
FG582403-04	Rev. 02	Upgrade the Brand Name and Model Name	Jan. 23, 2018

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	Reporting Only	PASS	-
-	§24.232(d)	Peak-to-Average Ratio	< 13 dB	Not Require	-
-	§2.1049 §22.917(b) §24.238(b)	Occupied Bandwidth	Reporting Only	Not Require	-
-	§2.1051 §22.917(a) §24.238(a)	Band Edge Measurement	< 43+10log10(P[Watts])	Not Require	-
-	§2.1051 §22.917(a) §24.238(a)	Conducted Emission	< 43+10log10(P[Watts])	Not Require	-
-	§2.1055 §22.355	Frequency Stability for Temperature & Voltage	< 2.5 ppm for Part 22	Not Require	-
	§2.1055 §24.235		Within Authorized Band		
4.4	§22.913(a)(2)	Effective Radiated Power	< 7 Watts	PASS	-
	§24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
4.5	§2.1053 §22.917(a) §24.238(a)	Field Strength of Spurious Radiation	< 43+10log10(P[Watts])	PASS	Under limit 35.66 dB at 1697.60 MHz

Remark:

“Not Require” means according to the product equality declaration, the changes have no influence on the test items.



1 General Description

1.1 Applicant

LugTrack, LLC.

225 US Highway 35, Suite #201, Red Bank, New Jersey, 07701 USA

1.2 Manufacturer

LugTrack, LLC.

225 US Highway 35, Suite #201, Red Bank, New Jersey, 07701 USA

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	GLOBAL LOCATOR
Brand Name	TUMI, SAMSONITE, MONTBLANC
Model Name	014341D, 110548-1090, 110574-1090, 110620-1090, LTCS1
Marketing Name	TUMI Global Locator, Samsonite Track&Go
FCC ID	2AFPZ-TGL001
EUT supports Radios application	GPRS/EGPRS/WCDMA/HSPA/ HSPA+(16QAM uplink is not supported)/ WLAN 2.4GHz 802.11b/g/n HT20/HT40/ Bluetooth v2.1+EDR/Bluetooth v4.0 LE
IMEI Code	Conducted: 014646000008340 Radiation: 014646000011829 ERP/EIRP: 014646000016661
HW Version	LGT-001-V1
SW Version	MOLY.WR8.W1315.MD.WG.MP.V35.P4
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. This is a variant report for 014341D, 110548-1090, 110574-1090, 110620-1090, LTCS1. The product equality declaration could be referred to Appendix D. Based on the similarity between current and previous project, only the conducted power and the worst cases of ERP/EIRP/RSE from original test report (Sporton Report Number FG582403) were verified for the differences.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	GPRS/EDGE: 850: 824.2 MHz ~ 848.8 MHz 1900: 1850.2 MHz ~ 1909.8MHz WCDMA: Band V: 826.4 MHz ~ 846.6 MHz Band II: 1852.4 MHz ~ 1907.6 MHz
Rx Frequency	GPRS/EDGE: 850: 869.2 MHz ~ 893.8 MHz 1900: 1930.2 MHz ~ 1989.8 MHz WCDMA: Band V: 871.4 MHz ~ 891.6 MHz Band II: 1932.4 MHz ~ 1987.6 MHz
Maximum Output Power to Antenna	GPRS/EDGE: 850: 32.37 dBm 1900: 29.80 dBm WCDMA: Band V: 22.57 dBm Band II: 22.85 dBm
Antenna Type	PIFA Antenna
Type of Modulation	GPRS: GMSK EDGE: GMSK / 8PSK WCDMA : BPSK (Uplink) HSDPA : QPSK (Uplink) HSUPA : QPSK (Uplink) HSPA+ : 16QAM (16QAM uplink is not supported)

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator

FCC Rule	System	Type of Modulation	Maximum ERP/EIRP (W)	Frequency Tolerance (ppm)	Emission Designator
Part 22	GSM850 GPRS class 8	GMSK	0.3676	-	-
Part 22	GSM850 EDGE class 8	8PSK	0.0573	-	-
Part 22	WCDMA Band V RMC 12.2Kbps	BPSK	0.0517	-	-
Part 24	GSM1900 GPRS class 8	GMSK	0.4402	-	-
Part 24	GSM1900 EDGE class 8	8PSK	0.1899	-	-
Part 24	WCDMA Band II RMC 12.2Kbps	BPSK	0.0634	-	-

1.7 Testing Location

Sporton International (Shenzhen) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600156-0) and the FCC designation No are CN5018 and CN5019.

Test Site	Sporton International (Shenzhen) Inc.	
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan Shenzhen City Guangdong Province 518055 China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595	
Test Site No.	Sporton Site No.	FCC Test Firm Registration No.
	TH01-SZ	251365

Test Site	Sporton International (Shenzhen) Inc.	
Test Site Location	No. 3 Bldg the third floor of south, Shahe River west, Fengzeyuan Warehouse, Nanshan District Shenzhen City Guangdong Province 518055 China TEL: +86-755-3320-2398	
Test Site No.	Sporton Site No.	FCC Test Firm Registration No.
	03CH03-SZ	577730

Note: The test site complies with ANSI C63.4 2014 requirement.



1.8 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR Part 2, 22(H), 24(E)
- ♦ ANSI/TIA-603-E
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v03

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

2.1 Test Mode

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas. License Digital Systems v03 with maximum output power.

Radiated measurements were performed with rotating EUT in different three orthogonal test planes to find the maximum emission.

Radiated emissions were investigated as following frequency range:

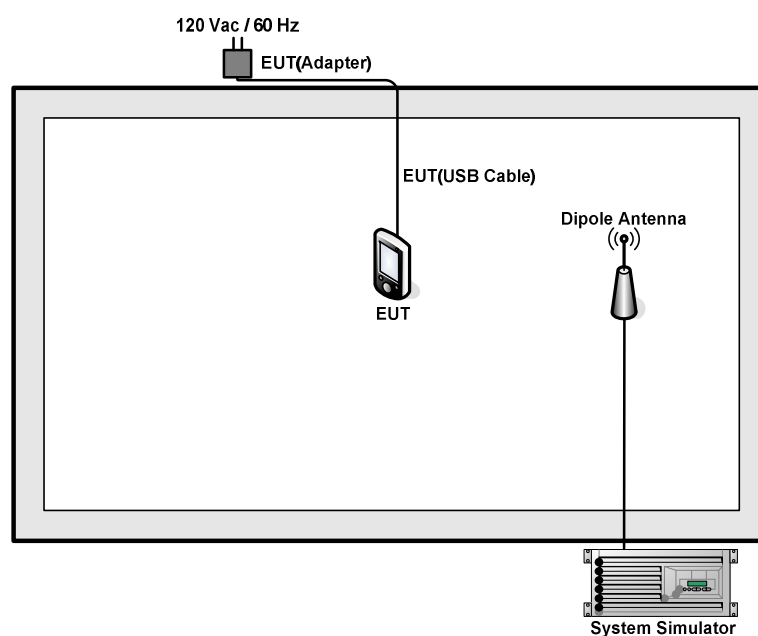
1. 30 MHz to 9000 MHz for GSM850 and WCDMA Band V.
2. 30 MHz to 19100 MHz for GSM1900 and WCDMA Band II.

All modes and data rates and positions were investigated.

Test modes are chosen to be reported as the worst case configuration below:

Test Modes		
Band	Radiated TCs	Conducted TCs
GSM 850	■ GPRS class 8 Link	■ GPRS class 8 Link
	■ EDGE class 8 Link	■ EDGE class 8 Link
GSM 1900	■ GPRS class 8 Link	■ GPRS class 8 Link
	■ EDGE class 8 Link	■ EDGE class 8 Link
WCDMA Band V	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link
WCDMA Band II	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	DC Power Supply	GW	GPS-3030D	N/A	N/A	Unshielded, 1.8 m

3 Conducted Test Result

3.1 Measuring Instruments

See list of measuring instruments of this test report.

3.2 Test Setup

3.2.1 Conducted Output Power



3.3 Test Result of Conducted Test

Please refer to Appendix A.



3.4 Conducted Output Power

3.4.1 Description of the Conducted Output Power

A system simulator was used to establish communication with the EUT. Its parameters were set to enforce EUT transmitting at the maximum power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

3.4.2 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure the maximum burst average power for GSM and maximum average power for other modulation signal.

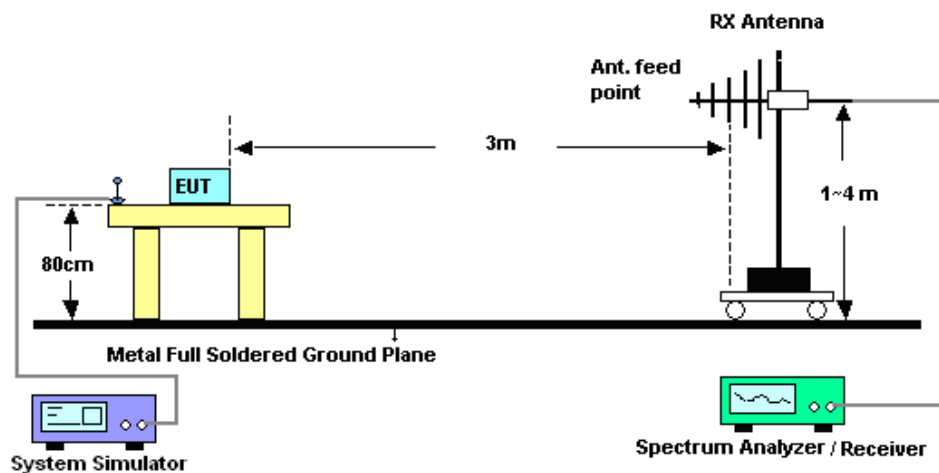
4 Radiated Test Items

4.1 Measuring Instruments

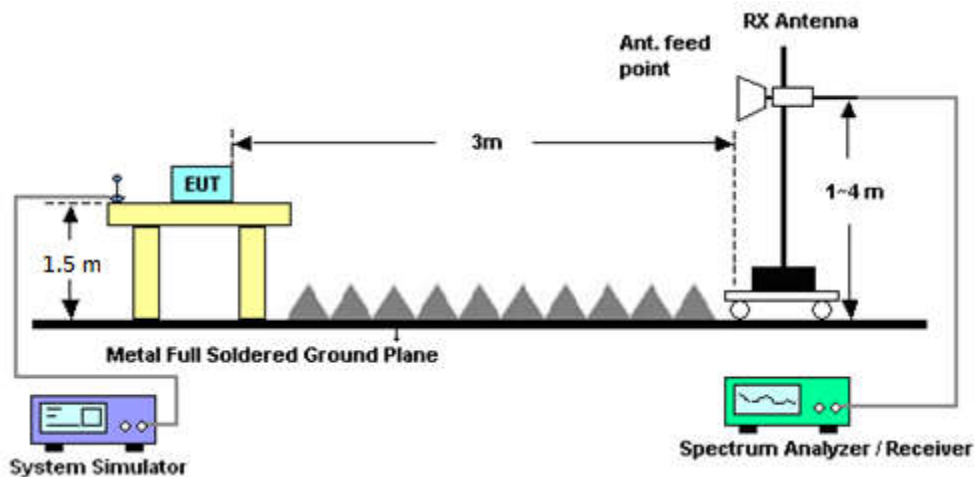
See list of measuring instruments of this test report.

4.2 Test Setup

4.2.1 For radiated test from 30MHz to 1GHz



4.2.2 For radiated test above 1GHz



4.3 Test Result of Radiated Test

Please refer to Appendix B.

4.4 Effective Radiated Power and Effective Isotropic Radiated Power Measurement

4.4.1 Description of the ERP/EIRP Measurement

The substitution method, in ANSI/TIA-603-E, was used for ERP/EIRP measurement, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v03. The ERP of mobile transmitters must not exceed 7 Watts (Cellular Band) and the EIRP of mobile transmitters are limited to 2 Watts (PCS Band).

4.4.2 Test Procedures

1. The testing follows FCC KDB 971168 D01 v03 Section 5.2.1. (for CDMA/WCDMA), Section 5.2.2.2 (for GSM/GPRS/EDGE) and ANSI/TIA-603-E Section 2.2.17.
2. The EUT was placed on a non-conductive rotating platform (0.8 meters for frequency below 1GHz and 1.5 meter for frequency above 1GHz) in a semi-anechoic chamber. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and a spectrum analyzer with RMS detector per section 5. of KDB 971168 D01.
3. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power. The maximum emission was recorded from analyzer power level (LVL) from the 360 degrees rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.
4. Effective Isotropic Radiated Power (EIRP) was measured by substitution method according to TIA/EIA-603-D. The EUT was replaced by the substitution antenna at same location, and then a known power from S.G. was applied into the dipole antenna through a Tx cable, and then recorded the maximum Analyzer reading through raised and lowered the test antenna. The correction factor (in dB) = S.G. - Tx Cable loss + Substitution antenna gain - Analyzer reading. Then the EUT's EIRP was calculated with the correction factor, $EIRP = LVL + \text{Correction factor}$ and $ERP = EIRP - 2.15$. Take the record of the output power at substitution antenna.



	GSM/GPRS/EDGE	WCDMA/HSPA
SPAN	500kHz	10MHz
RBW	10kHz	100kHz
VBW	30kHz	300kHz
Detector	RMS	RMS
Trace	Average	Average
Average Type	Power	Power
Sweep Count	100	100

4.5 Field Strength of Spurious Radiation Measurement

4.5.1 Description of Field Strength of Spurious Radiated Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

4.5.2 Test Procedures

1. The testing follows FCC KDB 971168 D01 v03 Section 5.8 and ANSI/TIA-603-E Section 2.2.12.
2. The EUT was placed on a rotatable wooden table 0.8 meters for frequency below 1GHz and 1.5 meter for frequency above 1GHz above the ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
9. Taking the record of output power at antenna port.
10. Repeat step 7 to step 8 for another polarization.
11. $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
12. $ERP \text{ (dBm)} = EIRP - 2.15$
13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
14. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)
 $= P(W) - [43 + 10\log(P)] \text{ (dB)}$
 $= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$
 $= -13\text{dBm}.$



5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr.20, 2017	Jan. 10, 2018	Apr.19, 2018	Conducted (TH01-SZ)
System Simulator	R&S	CMU200	112569	2G/3G	Sep.14, 2017	Jan. 10, 2018	Sep.13, 2018	Conducted (TH01-SZ)
EMI Test Receiver&SA	KEYSIGHT	N9038A	MY54450083	20Hz~8.4GHz	Apr. 20, 2017	Jan. 13, 2018	Apr.19, 2018	Radiation (03CH03-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150246	10Hz~44GHz;	Apr. 20, 2017	Jan. 13, 2018	Apr.19, 2018	Radiation (03CH03-SZ)
Bilog Antenna	TeseQ	CBL6112D	35408	30MHz-2GHz	May. 14, 2017	Jan. 13, 2018	May. 13, 2018	Radiation (03CH03-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1355	1GHz~18GHz	Jul. 09, 2017	Jan. 13, 2018	Jul. 08, 2018	Radiation (03CH03-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Jun.16, 2017	Jan. 13, 2018	Jun.15, 2018	Radiation (03CH03-SZ)
Amplifier	Burgeon	BPA-530	102210	0.01Hz ~3000MHz	Oct.19, 2017	Jan. 13, 2018	Oct.18, 2018	Radiation (03CH03-SZ)
Amplifier	Agilent	8449B	3008A01023	1GHz~26.5GHz	Oct.19, 2017	Jan. 13, 2018	Oct 18, 2018	Radiation (03CH03-SZ)
AC Power Source	Chroma	61601	616010001985	N/A	NCR	Jan. 13, 2018	NCR	Radiation (03CH03-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Jan. 13, 2018	NCR	Radiation (03CH03-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Jan. 13, 2018	NCR	Radiation (03CH03-SZ)

NCR: No Calibration Required

6 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.0dB
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.6dB
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Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.8dB
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Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

Conducted Power (*Unit: dBm)						
Band	GSM850			GSM1900		
Channel	128	189	251	512	661	810
Frequency	824.2	836.4	848.8	1850.2	1880.0	1909.8
GPRS class 8	32.31	32.35	32.37	29.79	29.76	29.80
GPRS class 10	31.68	31.77	31.77	29.09	29.11	29.15
GPRS class 11	30.02	30.10	30.13	27.43	27.44	27.51
GPRS class 12	29.02	29.10	29.14	26.40	26.45	26.49
EGPRS class 8	25.98	25.73	25.49	27.05	27.12	27.05
EGPRS class 10	24.99	24.89	24.56	26.08	26.00	26.02
EGPRS class 11	22.98	22.88	22.61	24.02	23.87	23.94
EGPRS class 12	21.97	21.73	21.48	22.80	22.71	22.72

Conducted Power (*Unit: dBm)						
Band	WCDMA Band V			WCDMA Band II		
Channel	4132	4182	4233	9262	9400	9538
Frequency	826.4	836.4	846.6	1852.4	1880	1907.6
RMC 12.2K	22.53	22.45	22.57	22.85	22.72	22.57
HSDPA Subtest-1	21.18	21.28	21.15	21.33	21.38	21.56
HSDPA Subtest-2	21.19	21.25	21.16	21.28	21.40	21.54
HSDPA Subtest-3	20.76	20.82	20.70	20.84	20.92	21.08
HSDPA Subtest-4	20.70	20.81	20.68	20.83	20.91	21.06
HSUPA Subtest-1	19.29	19.36	19.54	19.32	19.34	19.19
HSUPA Subtest-2	19.26	19.36	19.53	19.28	19.30	19.20
HSUPA Subtest-3	20.29	20.33	20.52	20.24	20.28	20.18
HSUPA Subtest-4	18.76	18.82	18.99	18.73	18.78	18.66
HSUPA Subtest-5	21.30	21.30	21.50	21.30	21.20	21.20



Appendix B. Test Results of Radiated Test

ERP/EIRP

Channel	Mode	Horizontal		Vertical	
		ERP(dBm)	ERP(W)	ERP(dBm)	ERP(W)
Lowest	GSM850 GPRS class 8	-	-	-	-
Middle		-	-	-	-
Highest		25.65	0.3676	23.23	0.2106
Lowest	GSM850 EDGE class 8	17.58	0.0573	11.16	0.0131
Middle		-	-	-	-
Highest		-	-	-	-
Lowest	WCDMA Band V RMC 12.2Kbps	17.13	0.0517	13.97	0.0250
Middle		-	-	-	-
Highest		-	-	-	-
Limit	ERP < 7W	Result		PASS	

Channel	Mode	Horizontal		Vertical	
		EIRP(dBm)	EIRP(W)	EIRP(dBm)	EIRP(W)
Lowest	GSM1900 GPRS class 8	26.44	0.4402	24.30	0.2689
Middle		-	-	-	-
Highest		-	-	-	-
Lowest	GSM1900 EDGE class 8	-	-	-	-
Middle		-	-	-	-
Highest		21.73	0.1488	22.79	0.1899
Lowest	WCDMA Band II RMC 12.2Kbps	-	-	-	-
Middle		18.02	0.0634	11.28	0.0134
Highest		-	-	-	-
Limit	EIRP < 2W	Result		PASS	

**Radiated Spurious Emission**

GSM850 (GPRS class 8)									
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Highest	1697.6	-55.58	-13	-42.58	-57.29	-59.93	2.92	9.42	H
	2546.4	-61.10	-13	-48.10	-67.16	-66.95	2.63	10.63	H
	3395.2	-60.39	-13	-47.39	-68.39	-66.14	4.74	12.64	H
	4244	-62.35	-13	-49.35	-74.43	-67.70	5.11	12.61	H
	5092.8	-49.09	-13	-36.09	-63.77	-53.35	6.31	12.72	H
	5941.6	-55.73	-13	-42.73	-68.48	-57.47	9.14	13.03	H
	1697.6	-48.66	-13	-35.66	-52.36	-53.01	2.92	9.42	V
	2546.4	-66.30	-13	-53.30	-72.25	-72.15	2.63	10.63	V
	3395.2	-58.78	-13	-45.78	-66.81	-62.53	4.74	10.64	V
	4244	-65.21	-13	-52.21	-77.17	-70.56	5.11	12.61	V
	5092.8	-60.25	-13	-47.25	-74.07	-64.51	6.31	12.72	V
	5941.6	-60.16	-13	-47.16	-73.64	-61.90	9.14	13.03	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.



WCDMA Band V(RMC 12.2Kbps)									
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	1652.8	-65.09	-13	-52.09	-66.80	-69.60	2.76	9.42	H
	2479.2	-56.44	-13	-43.44	-62.50	-62.50	2.42	10.63	H
	3305.6	-65.10	-13	-52.10	-73.10	-70.95	4.64	12.64	H
	1652.8	-59.74	-13	-46.74	-61.58	-64.25	2.76	9.42	V
	2479.2	-54.73	-13	-41.73	-60.68	-60.79	2.42	10.63	V
	3305.6	-68.52	-13	-55.52	-76.55	-72.37	4.64	10.64	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.



Appendix D. Product Equality Declaration

LugTrack, LLC.

225 US Highway 35, Suite #201, Red Bank, New Jersey, 07701 USA

Date: January 19, 2018

Product Equality Declaration

We, LugTrack, LLC., declare on our sole responsibility for the differences between initially FCC-certified product:

FCC ID: 2AFPZ-TGL001

BRAND NAME: TUMI

MODEL NAME: 014341D

MARKETING NAME: TUMI Global Locator

and the current product:

FCC ID: 2AFPZ-TGL001

BRAND NAME: "TUMI" or "SAMSONITE" or "MONTBLANC"

MODEL NAME: "014341D" or "110548-1090" or "110574-1090" or "110620-1090" or "LTCSI"

MARKETING NAME: "TUMI Global Locator" or "Samsonite Track&Go"

which are listed as below:

1. Change of RAM

Description:

Original component defined and used on the first risk batch production as during certification , namely, ELPIDA with p.n. B4432BAPA-8D-F had to be substituted by the market equivalent component by LEAHKINN with p.n KPN005DS-ZHw1.

The LEAHKINN product is equivalent in terms of layout, performance and electrical specs:

512Mb LP-DDR2

Density: 4G bits

Organization 16M words × 32 bits × 8 banks

Package: 168-ball FBGA

Package size: 12.0mm × 12.0mm

Power supply: VDD1 = 1.70V to 1.95V

Cause:

ELPID Memory failure and relative obsolescence and lack of availability of their market led to the selection of a pin to pin compatible solution which was found in the LEAHKINN RAM.

The new component has been tested internally and as there has not been any PCBA rerouting, no Software adaptation/modification, seen the exact "characteristics" of both components, we can declare the component has no impact in the overall device RF or power management nor electrical safety.

2. Change of ROM

Description:

Longsys FORESEE eMMC NCEFES88-04G eMMC ROM has been substituted with the equivalent component FORESEE NCEMAD7B-08G provided by the same Manufacturer but with upgraded storage capacity from 4GB to 8GB.

Cause:

Shenzhen based Longsys Technology has stopped producing the 04GB eMMC ROM components FORESEE NCEFES86-04G and actually the 4GB eMMC chips in general as the market is requiring a higher minimum storage standard, which is now 8 GB.

To be able to produce our device we had to adapt to market decisions and switch to the upgraded version of the same vendor.

The component does not have any difference in the logic, layout nor electrical characteristics.

The substitution did not impact the PCBA layout nor the SW hence non impact in the overall RF and power management.

3. Change of RF amplifier:

SKY77592 is a transmit and receive Front End Module (FEM) that has the same function and electrical parameters characteristics of the VANCHIP VC7590-21.

Cause:

Limited availability during supply management

4. Visual change of USB daughter board :

slight visual difference and removal of a not used IC.

Cause:

industrialization of a sample used for certification purposes only, gerber files prove the routing is exactly the same.

5. WIFI and main RF antenna change.

Description:

Copper trace modification.

Cause:

the antenna was changed to adapt to 3GPP / ATT&T standard of TRP and TIS, the copper traces are slightly different in shape but the values are inside the parameters as confirmed by the result testing from PTCRB OTA.

Except for those mentioned above, the remaining parts are identical.
Should you have any questions or comments regarding this matter, please have my best attention.

Sincerely yours,

Davide Fattor
Project Manager
LugTrack, LLC.
dfattor@lugtrack.com

A handwritten signature in black ink, appearing to read 'Davide Fattor', positioned to the right of the typed name and contact information.