

RF EXPOSURE REPORT

OF

Applicant: Keep Truckin, Inc.
55 Hawthorne St, San Francisco, CA 94105 USA

Product Name: Asset Gateway

Brand Name: KeepTruckin

Model No. / Type No.: AG-55

Model Difference: N/A

Report Number: ER/2019/80106

FCC ID 2AQM7-AG55

IC 24516-AG55

FCC Rule Part Part 2.1091 & RSS-102

IC Rule Part RSS-102

Issue Date: Sep. 18, 2019

Date of Test: Aug. 19, 2019 ~ Sep. 12, 2019

Date of EUT Received: Aug. 19, 2019

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. The test data, data evaluation in this report is in compliance with FCC Rules Part 2 & ISSED RSS-102.

The test results of this report relate only to the tested sample identified in this report.

Approved By: _____

John Yeh / Assistant Manager

John Yeh



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Revision History

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
ER/2019/80106	Rev.00	Initial creation of document	All	Sep. 18, 2019	Elle Chang

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1 DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

General:

Product Name:	Asset Gateway	
Brand Name:	KeepTruckin	
Model No. / Type No.:	AG-55	
Hardware Version:	N/A	
Software Version:	N/A	
Power Supply:	3.6Vdc from Rechargeable Li-polymer Battery	
	Battery:	Model No.: BJ-X55XX-4KXKUQ, Supplier: Kunshan Million Gold Tian Yu Trading Co., Ltd.

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Antenna Information:

Antenna Type	Supplier	Main / Aux	Antenna Part No.	Freq. (MHz)	Peak Antenna Gain (dBi)	Worst Antenna Gain
Dipole	INPAQ	Main	WA-P-LA-05-004-B	2.4GHz	3.01	V

Antenna Type	Supplier	Main / Aux	Frequency (MHz)	Main Antenna Par No.	Main Peak Antenna Gain (dBi)
Monopole	INPAQ	Main	LTE Band 2: 1850.1MHz ~ 1909.9MHz	WA-F-LTE8-03-005-B	5.36
			LTE Band 4: 1710.1MHz ~ 1754.9MHz		4.30
			LTE Band 5: 824.7MHz ~ 848.9MHz		-1.63
			LTE Band 12: 699.7MHz ~ 715.9MHz		-0.36
			LTE Band 13: 777.1MHz ~ 786.9MHz		0.18
			LTE Band 26: 824.1MHz ~ 848.9MHz		-1.63
			LTE Band 26 Part 90: 814.1MHz ~ 823.9MHz		-1.68

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Bluetooth BLE:

BT:	Freq. Range (MHz)	Channels	BT4.0/5.0	Modulation Technology	Max Avg. Output power (dBm)	Worst Case
LE	2402-2480	40	BT 4.0	GFSK	-0.55	V
			BT 5.0		-0.57	

NB IoT:

Operating Frequency (MHz)		Max. Output Power (dBm)	Antenna Gain (dBi)	EIRP / ERP (dBi / dBd)
LTE-Band 2	1850.1 ~ 1909.9	22.97	5.36	28.33 (EIRP)
LTE-Band 4	1710.1 ~ 1754.9	22.95	4.30	27.25 (EIRP)
LTE-Band 5	824.1 ~ 848.9	22.85	-1.63	21.22 (ERP)
LTE-Band 12	699.1 ~ 715.9	23.68	-0.36	23.32 (ERP)
LTE-Band 13	777.1 ~ 786.9	22.94	0.18	23.12 (ERP)
LTE-Band 26	824.1 ~ 848.9	23.11	-1.63	21.48 (ERP)
LTE-Band 26 Part 90	814.1 ~ 823.9	22.76	-1.68	21.13 (ERP)

Cat M1:

Operating Frequency (MHz)		Max. Output Power (dBm)	Antenna Gain (dBi)	EIRP / ERP (dBi / dBd)
LTE-Band 2	1850.7 ~ 1909.3	23.36	5.36	28.72 (EIRP)
LTE-Band 4	1710.7 ~ 1754.3	23.29	4.30	27.59 (EIRP)
LTE-Band 5	824.7 ~ 848.3	23.37	-1.63	21.74 (ERP)
LTE-Band 12	699.7 ~ 715.3	23.88	-0.36	23.52 (ERP)
LTE-Band 13	779.5 ~ 784.5	23.75	0.18	23.93 (ERP)
LTE-Band 26	824.7 ~ 848.3	23.18	-1.63	21.55 (ERP)
LTE-Band 26 Part 90	814.7 ~ 823.3	23.05	-1.68	21.37 (ERP)

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2 FCC MAXIMUM PERMISSIBLE EXPOSURE (MPE)

2.1 FCC Standard Applicable

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a Mobile device, the MPE is required.

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for Maximum Permissive Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-15000	/	/	1.0	30

f = frequency in MHz

* = Plane-wave equipment power density

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2.2 ISED Standard Applicable

This submittal(s) (test report) is intended to comply with RSS-102 issue 5 Radio frequency Radiation Exposure requirement.

This is a Mobile device, the MPE is required.

Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field Strength (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142 f^{0.3417}$	$0.008335 f^{0.3417}$	$0.02619 f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158 f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

F = frequency in MHz

* = Based on nerve stimulation (NS).

** = Based on specific absorption rate (SAR)

Maximum Permissible Exposure (MPE) Evaluation

Prediction of MPE limit at a given distance

$$S = PG/4\pi R^2$$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

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2.3 Power Density Calculation (Worst Case)

FCC

Operation Mode	Evaluation Frequency (MHz)	Operation Distance (cm)	Max. output Power (dBm)	Antenna Gain (dBi)	Max. output Power EIRP (mW)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Pass / Fail
BLE	2402.00	20	-0.55	3.01	1.76	0.000	1.000	Pass
NB IoT	699.10	20	23.68	-0.36	214.78	0.043	0.466	Pass
Cat M1	699.70	20	23.88	-0.36	224.91	0.045	0.466	Pass

ISED

Operation Mode	Evaluation Frequency (MHz)	Operation Distance (cm)	Max. output Power (dBm)	Antenna Gain (dBi)	Output Power EIRP (mW)	Power Density (W/m ²)	Limit (W/m ²)	Pass / Fail
BLE	2402.00	20	-0.55	3.01	1.76	0.004	5.351	Pass
NB IoT	699.10	20	23.68	-0.36	214.78	0.428	2.302	Pass
CaT M1	699.70	20	23.88	-0.36	224.91	0.448	2.303	Pass

Note: For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band.

2.4 Collocated Power Density Calculation

FCC				
Operation Mode	Power Density (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit	Σ(E- Field Strength / Limit)
BLE	0.000	1.00	0.000	0.1888
NB IoT	0.043	0.47	0.092	
CaT M1	0.045	0.47	0.097	

ISED				
Operation Mode	Power Density (W/m ²)	Limit (W/m ²)	Power Density / Limit	Σ(E- Field Strength / Limit)
BLE	0.004	5.35	0.001	0.3812
NB IoT	0.428	2.30	0.186	
CaT M1	0.448	2.30	0.195	

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Note:

1. Σ (E- Field Strength / Limit): This is a summation of [(E- Field Strength for each transmitter/antenna included in the simultaneous transmission) / (corresponding MPE limit)], for WLAN + Bluetooth + WWAN + RFID.
2. Considering the WLAN and Bluetooth transmitter, the aggregated (E- Field Strength /limit) is smaller than 1, and MPE of 3 collocated transmitters is compliant

~ End of Report ~

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