

# TEST REPORT

of

FCC CFR 47 part 1, 1.1307(b), 1.1310

FCC ID: WHBUTR2

1. Equipment Under Test : UTR 2.0
2. Model Name : UTR 2.0
3. Variant Model Name(s) : Refer to page 3
4. Applicant : Mobile Appliance, Inc.
5. Manufacturer : Mobile Appliance, Inc.
6. Date of Receipt : 2020.06.16
7. Date of Test(s) : 2020.07.15 ~ 2020.07.23
8. Date of Issue : 2020.07.24

In the configuration tested, the EUT complied with the standards specified above. This test report does not assure KOLAS accreditation.

- 1) The results of this test report are effective only to the items tested.
- 2) The SGS Korea is not responsible for the sampling, the results of this test report apply to the sample as received.

Tested by:



Jinhyoung Cho

Technical  
Manager:



Jungmin Yang

**SGS Korea Co., Ltd. Gunpo Laboratory**



**SGS Korea Co., Ltd.**

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Report Number: F690501-RF-RTL001013

Page: 2 of 7

# INDEX

| <u>Table of Contents</u>        | Page |
|---------------------------------|------|
| 1. General Information -----    | 3    |
| 2. RF Exposure Evaluation ----- | 5    |

## 1. General Information

### 1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)

- 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- Designation number: KR0150

All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>.

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### 1.2. Details of Applicant

Applicant : Mobile Appliance, Inc.

Address : 401, Simin-daero, Dongan-gu, #1701-1706, Daerung Techno Town 15,  
Gwangyang-dong, Anyang-si, Gyeonggi-do, Korea, 14057

Contact Person : Choi, Jin-oh

Phone No. : +82 31 421 8071

### 1.3. Details of Manufacturer

Company : Same as applicant

Address : Same as applicant

### 1.4. Description of EUT

|                              |                                                                                                                                                                                        |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Kind of Product</b>       | UTR 2.0                                                                                                                                                                                |
| <b>Model Name</b>            | UTR 2.0                                                                                                                                                                                |
| <b>Power Supply</b>          | DC 12 V                                                                                                                                                                                |
| <b>Variant Model Name(s)</b> | Porsche Dashcam, Universal Traffic Recorder 2                                                                                                                                          |
| <b>Frequency Range</b>       | 2 402 MHz ~ 2 480 MHz (Bluetooth Low Energy)<br>2 412 MHz ~ 2 462 MHz (11b/g/n_HT20)<br>5 755 MHz (Band 3: 11n_HT40)<br>5 775 MHz (Band 3: 11ac_VHT80)<br>24.22 GHz (24 GHz Radar)     |
| <b>Modulation Technique</b>  | DSSS, OFDM, GFSK, FMCW                                                                                                                                                                 |
| <b>Number of Channels</b>    | 40 channels (Bluetooth Low Energy)<br>11 channels (11b/g/n_HT20)<br>1 channel (Band 3: 11n_HT40)<br>1 channel (Band 3: 11ac_VHT80)<br>1 channel (24 GHz Radar)                         |
| <b>Antenna Type</b>          | Chip antenna<br>Patch antenna                                                                                                                                                          |
| <b>Antenna Gain</b>          | 2 400 MHz ~ 2 483.5 MHz: 1.99 dBi (Bluetooth Low Energy)<br>2 400 MHz ~ 2 483.5 MHz: 2.24 dBi (WLAN 2.4G)<br>5 725 MHz ~ 5 850 MHz: 1.52 dBi (WLAN 5G)<br>24 GHz: 7 dBi (24 GHz Radar) |
| <b>H/W Version</b>           | V1.0                                                                                                                                                                                   |
| <b>S/W Version</b>           | V1.0                                                                                                                                                                                   |

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Report Number: F690501-RF-RTL001013

Page: 4 of 7

**1.5. Test Report Revision**

| Revision | Report Number        | Date of Issue | Description |
|----------|----------------------|---------------|-------------|
| 0        | F690501-RF-RTL001013 | 2020.07.24    | Initial     |

## 2. RF Exposure Evaluation

### 2.1. Environmental evaluation and exposure limit according to FCC CFR 47 part 1, 1.1307(b), 1.1310

#### LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

| Frequency Range<br>(MHz)                                | Electric Field<br>Strength<br>(V/m) | Magnetic Field<br>Strength<br>(A/m) | Power Density<br>(mW/cm <sup>2</sup> ) | Average Time     |
|---------------------------------------------------------|-------------------------------------|-------------------------------------|----------------------------------------|------------------|
| (A) Limits for Occupational/Controlled Exposure         |                                     |                                     |                                        |                  |
| 0.3-3.0                                                 | 614                                 | 1.63                                | *100                                   | 6                |
| 3.0-30                                                  | 1842/f                              | 4.89/f                              | *900/f <sup>2</sup>                    | 6                |
| 30-300                                                  | 61.4                                | 0.163                               | 1.0                                    | 6                |
| 300-1 500                                               | -                                   | -                                   | f/300                                  | 6                |
| 1 500-100 000                                           | -                                   | -                                   | 5                                      | 6                |
| (B) 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 <sup>2</sup>                    | 30               |
| 30-300                                                  | 27.5                                | 0.073                               | 0.2                                    | 30               |
| 300-1 500                                               | -                                   | -                                   | f/1500                                 | 30               |
| <b><u>1 500-100 000</u></b>                             | -                                   | -                                   | <b><u>1.0</u></b>                      | <b><u>30</u></b> |

#### 2.1.1. Friis transmission formula: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2)$

Where  $P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

G = gain of antenna in linear scale

$\pi$  = 3.1416

R = distance between observation point and center of the radiator in cm

$P_d$  the limit of MPE, 1 mW/cm<sup>2</sup>. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

### 2.1.2. Test Result of RF Exposure Evaluation

Test Item : RF Exposure Evaluation Data

Test Mode : Normal Operation

### 2.1.3. Output Power into Antenna & RF Exposure Evaluation Distance

#### Bluetooth Low Energy

##### - Maximum tune up tolerance

| Frequency Range<br>(MHz) | Output Average<br>Power to Antenna<br>(dB m) | Antenna<br>Gain<br>(dB i) | Power Density<br>at 20 cm<br>(mW/cm <sup>2</sup> ) | Limits<br>(mW/cm <sup>2</sup> ) |
|--------------------------|----------------------------------------------|---------------------------|----------------------------------------------------|---------------------------------|
| 2 400 ~ 2 483.5          | -4                                           | 1.99                      | 0.000 125                                          | 1                               |

#### WLAN (2.4G)

##### - Maximum tune up tolerance

| Frequency Range<br>(MHz) | Output Average<br>Power to Antenna<br>(dB m) | Antenna<br>Gain<br>(dB i) | Power Density<br>at 20 cm<br>(mW/cm <sup>2</sup> ) | Limits<br>(mW/cm <sup>2</sup> ) |
|--------------------------|----------------------------------------------|---------------------------|----------------------------------------------------|---------------------------------|
| 2 400 ~ 2 483.5          | 15                                           | 2.24                      | 0.010 537                                          | 1                               |

#### WLAN (5G)

##### - Maximum tune up tolerance

| Frequency Range<br>(MHz) | Output Average<br>Power to Antenna<br>(dB m) | Antenna<br>Gain<br>(dB i) | Power Density<br>at 20 cm<br>(mW/cm <sup>2</sup> ) | Limits<br>(mW/cm <sup>2</sup> ) |
|--------------------------|----------------------------------------------|---------------------------|----------------------------------------------------|---------------------------------|
| 5 725 ~ 5 850            | 1                                            | 1.52                      | 0.000 355                                          | 1                               |

#### 24 GHz Radar

##### - Maximum tune up tolerance

| Frequency<br>(GHz) | Radiated Filed Strength<br>(dBμV/m) | Convert Field Strength<br>to E.I.R.P.<br>(dB m) | Power Density<br>at 20 cm<br>(mW/cm <sup>2</sup> ) | Limits<br>(mW/cm <sup>2</sup> ) |
|--------------------|-------------------------------------|-------------------------------------------------|----------------------------------------------------|---------------------------------|
| 24.22              | 102.11                              | 6.88                                            | 0.000 970                                          | 1                               |

#### Note;

- According to KDB 412172, E.I.R.P. = (Filed Strength (V/m) x d (m))<sup>2</sup> / 30,  
d = measurement distance in meters (m)
- The power density Pd (5th column) at a distance of 20 cm calculated from the friis transmission formula is far below the limit of 1 mW/cm<sup>2</sup>.
- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.
- This equipment should be installed and operated with minimum 20 cm between the radiator and your body.
- The antenna gain of this transmitter is less than 6 dB i and must not be collocated or operating in conjunction with any other antenna or transmitter unless authorized to do so by the FCC.
- According to KDB 447498 D01 RF Exposure Guidance 4.1.

**Simultaneous transmission of RF Exposure test exclusion for worst case configuration.**

Bluetooth Low Energy: the ratio is 0.000 125 / 1

WLAN: the ratio is 0.010 537 / 1

Confirm the sum result of individual MPEs ratio is  $\leq 1.0$ ;

Bluetooth Low Eenergy + WLAN:  $(0.000\ 125 / 1) + (0.010\ 537 / 1) = 0.010\ 662 \leq 1.0$

- EUT can transmit simultaneously only Bluetooth Low Energy and WLAN.

**- End of the Test Report -**