

Report Number: F690501/RF-RTL013646-2

TEST REPORT

of

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

FCC ID: 2AQ2S-CP2-VZ-LTE

| Equipment Under Test | : | Vehicle Recorder |
|----------------------|---|--------------------------|
| Model Name | : | CP2-VZ-LTE |
| Applicant | : | SmartWitness USA, LLC |
| Manufacturer | : | D-TEG Security Co., Ltd. |
| Date of Receipt | : | 2019.02.01 |
| Date of Test(s) | : | 2019.02.21 ~ 2019.03.30 |
| Date of Issue | : | 2019.04.24 |

In the configuration tested, the EUT complied with the standards specified above.

| Tested By: | 135 | Date: | 2019.04.24 | |
|-----------------------|--------------|-------|------------|--|
| | Murphy Kim | | | |
| Technical Manager: | yen | Date: | 2019.04.24 | |
| | Jungmin Yang | | | |

The results of this test report are effective only to the items tested. The SGS Korea is not responsible for the sampling, the results of this test report apply to the sample as received. This test report cannot be reproduced, except in full, without prior written permission of the Company. This test report does not assure KOLAS accreditation

 SGS Korea Co., Ltd. (Gunpo Laboratory)
 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
 http://www.sgsgroup.kr

 RTT5041-19(2019.04.24)(1)
 Tel. +82 31 428 5700 / Fax. +82 31 427 2370
 A4(210 mm x 297 mm)



Report Number: F690501/RF-RTL013646-2

INDEX

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



1. General Information

1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)

- 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- 10-2, 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 <u>http://www.sgs.com/en/Terms-and-Conditions.aspx</u>. Phone No. : +82 31 688 0901

| Fax No. | +82 31 688 0921 |
|----------|-----------------|
| 1 a. NU. | TUZ 31 000 0321 |

1.2. Details of Applicant

| Applicant | : | SmartWitness USA, LLC |
|----------------|---|--|
| Address | : | 1108 Lunt Avenue, Schaumburg, Illinois, United States, 60193 |
| Contact Person | : | CHRIS PFLANZ |
| Phone No. | : | +2 312 981 8774 |

1.3. Details of Manufacturer

| Company | : | D-TEG Security Co., Ltd. |
|---------|---|--|
| Address | : | 3F, Jungmin Bldg, 53 Maewha-ro, Bundang-gu, Seongnam, Gyeonggi-do 13505, |
| | | Korea |

1.4. Description of EUT

| Kind of Product | Vehicle Recorder |
|----------------------|---|
| Model Name | CP2-VZ-LTE |
| Power Supply | DC 12 V, DC 24 V |
| Frequency Range | 2 402 M± ~ 2 480 M± (Bluetooth, Bluetooth Low Energy) 2 412 M± ~ 2 462 M± (11b/g/n_HT20) 2 422 M± ~ 2 452 M± (11n_HT40) |
| Modulation Technique | GFSK, π/4DQPSK, 8DPSK, DSSS, OFDM |
| Number of Channels | 79 channels (Bluetooth), 40 channels (Bluetooth Low Energy), 11 channels (11b/g/n_HT20), 7 channels (11n_HT40) |
| Antenna Type | Multilayer Chip Antenna |
| Antenna Gain | 3.50 dB i |



1.5. Declaration by the Manufacturer

- Bluetooth, Wi-Fi, WWAN can transmit simultaneously.

1.6. Test Report Revision

| Revision | Report number | Date of Issue | Description |
|----------|------------------------|---------------|--|
| 0 | F690501/RF-RTL013646 | 2019.03.30 | Initial |
| 1 | F690501/RF-RTL013646-1 | 2019.04.23 | Added the LTE module information and MPE measurement |
| 2 | F690501/RF-RTL013646-2 | 2019.04.24 | Added the LTE mode for simultaneous transmission MPE test exclusion |

1.7. Information of Approved Module

| Approved Module LE910-SV V2 (FCC ID : RI7LE910SVV2) | |
|---|--|
| Rated Power | LTE Band 2, 4, 13: 23 dB m |
| Frequency Range | LTE Band 2: 1 850 Mz ~ 1 910 Mz LTE Band 4: 1 710 Mz ~ 1 755 Mz LTE Band 13: 777 Mz ~ 787 Mz |



2. RF Exposure Evaluation

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

| Frequency Range (쌘) | Electric Field Strength(V/m) | Magnetic Field Strength (A/m) | Power Density (ﷺ/ﷺ) | Average Time |
|------------------------|---------------------------------|-------------------------------------|------------------------|--------------|
| | (A) Limits for | Occupational/Control | led Exposure | |
| 0.3-3.0 | 614 | 1.63 | *100 | 6 |
| 3.0-30 | 1842/f | 4.89/f | *900/f ² | 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 Ger | neral Population/Unco | ntrolled 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 |
| <u>300-1 500</u> | - | - | <u>f/1500</u> | <u>30</u> |
| <u>1 500-100 000</u> | - | - | <u>1.0</u> | <u>30</u> |

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

2.1.1. Friis transmission formula: Pd = (Pout*G)/(4*pi*R²)

Where Pd = power density in mW/cm²

Pout = 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 $\ {\rm cm}$

Pd the limit of MPE, 1 mW/cm². 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.

 SGS Korea Co., Ltd. (Gunpo Laboratory)
 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
 http://www.sgsgroup.kr

 RTT5041-19(2019.04.24)(1)
 Tel. +82 31 428 5700 / Fax. +82 31 427 2370
 A4(210 mm × 297 mm)

The results of this test report are effective only to the items tested. The SGS Korea is not responsible for the sampling, the results of this test report apply to the sample as received. This test report cannot be reproduced, except in full, without prior written permission of the Company. This test report does not assure KOLAS accreditation



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

- Maximum tune up tolerance

| Frequency Range (版) | Output Average Power to Antenna (dB m) | Antenna Gain (dB i) | Power Density at 20 cm (㎡/c㎡) | Limits (n₩/cn²) |
|------------------------|--|---------------------------|-------------------------------------|--------------------|
| 2 402 ~ 2 480 | 6.0 | 3.5 | 0.001 773 | 1 |

Bluetooth Low Energy

- Maximum tune up tolerance

| Frequency Range (₩₂) | | Output Average Power to Antenna (dB m) | Antenna Gain (dB i) | Power Density at 20 cm (ਛੋ/ਟਾਟੀ) | Limits (n₩/c㎡) |
|-------------------------|---------------|--|---------------------------|--|-------------------|
| | 2 402 ~ 2 480 | 3.5 | 3.5 | 0.000 997 | 1 |

WLAN (2.4G)

- Maximum tune up tolerance

| Frequency (₩₂) | Output Average Power to Antenna (ⓓB m) | Antenna Gain (dB i) | Power Density at 20 cm (n\/cm) | Limits (nW/cn²) |
|-------------------|--|---------------------------|--------------------------------------|--------------------|
| 2 412 ~ 2 462 | 17.5 | 3.5 | 0.025 046 | 1 |

LTE - Band 2

- Maximum tune up tolerance

| Frequency Range (账) | Output Average Power to Antenna (dB m) | Antenna Gain (dB i) | Power Density at 20 cm (mW/cm/) | Limits (nW/cn²) |
|------------------------|--|---------------------------|---------------------------------------|--------------------|
| 1 850 ~ 1 910 | 24 | 4.1 | 0.128 449 | 1 |

LTE - Band 4

- Maximum tune up tolerance

| Frequency Range (脞) | Output Average Power to Antenna (dB m) | Antenna Gain (dB i) | Power Density at 20 cm (m\/cm) | Limits (ய⊮/சீ) |
|------------------------|--|---------------------------|--------------------------------------|-------------------|
| 1 710 ~ 1 755 | 24 | 4.1 | 0.128 449 | 1 |

SGS Korea Co., Ltd. (Gunpo Laboratory) 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807 <u>http://www.sgsgroup.kr</u>



LTE - Band 13

- Maximum tune up tolerance

| Frequency Range (₩₂) | Output Average Power to Antenna (dB m) | Antenna Gain (dB i) | Power Density at 20 cm (mW/cm/) | Limits (n₩/cn²) |
|-------------------------|--|---------------------------|---------------------------------------|--------------------|
| 777 ~ 787 | 24 | 1.2 | 0.065 876 | 0.52 |

Note;

- 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/cm².
- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.
- This equipment should be installed and operated with minimum 20 $\,\,{\rm cm}\,$ 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.

Simultaneous transmission of MPE test exclusion for worst case configuration.

Bluetooth: the ratio is $0.001\ 773/1$ WLAN: the ratio is $0.025\ 046/1$ LTE: the ratio is $0.128\ 449/1$

Confirm the sum result of individual MPEs ratio is \leq 1.0; Bluetooth + WLAN + LTE = (0.001 773 / 1) + (0.025 046 / 1) + (0.128 449 / 1) = 0.155 268 \leq 1.0

So this device meets the KDB447498 D01 v06 section 7.2 requirement of "Simultaneous transmission MPE test exclusion"

- End of the Test Report -

The results of this test report are effective only to the items tested. The SGS Korea is not responsible for the sampling, the results of this test report apply to the sample as received. This test report cannot be reproduced, except in full, without prior written permission of the Company. This test report does not assure KOLAS accreditation

SGS Korea Co., Ltd. (Gunpo Laboratory) 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807 http://www.sgsgroup.kr