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: Murphy Kim **Date:** 2019.04.24

Technical Manager: Jungmin Yang **Date:** 2019.04.24

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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 http://www.sgs.com/en/Terms-and-Conditions.aspx.

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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 ㎒ ~ 2 480 ㎒ (Bluetooth, Bluetooth Low Energy) 2 412 ㎒ ~ 2 462 ㎒ (11b/g/n_HT20) 2 422 ㎒ ~ 2 452 ㎒ (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 ㏈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 ㏈m
Frequency Range	LTE Band 2: 1 850 ㎒ ~ 1 910 ㎒ LTE Band 4: 1 710 ㎒ ~ 1 755 ㎒ LTE Band 13: 777 ㎒ ~ 787 ㎒

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 (㎒)	Electric Field Strength(V/m)	Magnetic Field Strength (A/m)	Power Density (㎽/㎠)	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^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 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
300-1 500	-	-	**f/1500**	**30**
1 500-100 000	-	-	**1.0**	**30**

2.1.1. Friis transmission formula: Pd = (Pout*G)/(4*pi*R^2)

Where Pd = power density in ㎽/㎠

Pout = output power to antenna in ㎽

G = gain of antenna in linear scale

Pi = 3.1416

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

Pd the limit of MPE, 1 ㎽/㎠. 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
- Maximum tune up tolerance

Frequency Range (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
2 402 ~ 2 480	6.0	3.5	0.001 773	1

Bluetooth Low Energy
- Maximum tune up tolerance

Frequency Range (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
2 402 ~ 2 480	3.5	3.5	0.000 997	1

WLAN (2.4G)
- Maximum tune up tolerance

Frequency (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
2 412 ~ 2 462	17.5	3.5	0.025 046	1

LTE - Band 2
- Maximum tune up tolerance

Frequency Range (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
1 850 ~ 1 910	24	4.1	0.128 449	1

LTE - Band 4
- Maximum tune up tolerance

Frequency Range (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
1 710 ~ 1 755	24	4.1	0.128 449	1

LTE - Band 13

- Maximum tune up tolerance

Frequency Range (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
777 ~ 787	24	1.2	0.065 876	0.52

Note;

- The power density Pd (5th column) at a distance of 20 ㎝ calculated from the friis transmission formula is far below the limit of 1 ㎽/㎠.
- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.
- This equipment should be installed and operated with minimum 20 ㎝ between the radiator and your body.
- The antenna gain of this transmitter is less than 6 dBi 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 ≤ 1.0;
Bluetooth + WLAN + LTE
= (0.001 773 / 1) + (0.025 046 / 1) + (0.128 449 / 1)
= 0.155 268 ≤ 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 -