

TEST REPORT

of

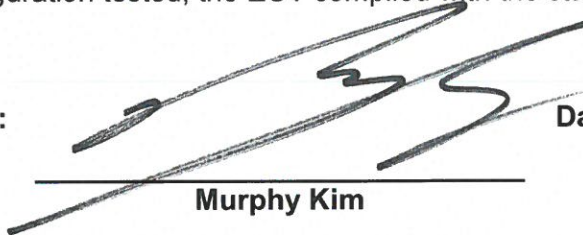
FCC CFR 47 part 1, 1.1307(b), 1.1310

FCC ID: 2AQ2S-CP2-NA-LTE

Equipment Under Test : Vehicle Recorder
Model Name : CP2-NA-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 : 2019.04.22

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

Tested By:



Murphy Kim

Date:

2019.04.22

Technical
Manager:



Jungmin Yang

Date:

2019.04.22

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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>.

Phone No. : +82 31 688 0901

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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-NA-LTE
Power Supply	DC 12 V, DC 24 V
Frequency Range	2 402 MHz ~ 2 480 MHz (Bluetooth, Bluetooth Low Energy) 2 412 MHz ~ 2 462 MHz (11b/g/n_HT20) 2 422 MHz ~ 2 452 MHz (11n_HT40)
Modulation Technique	GFSK, $\pi/4$ DQPSK, 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 dBi

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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-RTL013650	2019.03.30	Initial
1	F690501/RF-RTL013650-1	2019.04.22	Added the LTE module information and MPE measurement

1.7. Information of Approved Module

Approved Module	LE910-NA V2 (FCC ID : RI7LE910NAV2)
Rated Power	WCDMA 2, 5: 23.5 dB m LTE Band 2, 4, 5, 12, 13: 23 dB m
Frequency Range	WCDMA 2: 1 850 MHz ~ 1 910 MHz WCDMA 5: 824 MHz ~ 849 MHz LTE Band 2: 1 850 MHz ~ 1 910 MHz LTE Band 4: 1 710 MHz ~ 1 755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz

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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 (MHz)	Electric Field Strength(V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	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
<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>

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

Where P_d = power density in mW/cm^2

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

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

P_d the limit of MPE, $1 mW/cm^2$. 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.

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

Bluetooth Low Energy

- Maximum tune up tolerance

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

WLAN (2.4G)

- Maximum tune up tolerance

Frequency (MHz)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
2 412 ~ 2 462	15.5	3.5	0.015 803	1

WCDMA - Band 2

- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
1 850 ~ 1 910	24.5	4.1	0.144 122	1

WCDMA - Band 5

- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
824 ~ 849	24.5	1.2	0.073 915	0.55

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LTE - Band 2
- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
1 850 ~ 1 910	24	4.1	0.128 449	1

LTE - Band 4
- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
1 710 ~ 1 755	24	4.1	0.128 449	1

LTE - Band 5
- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
824 ~ 849	24	1.2	0.065 876	0.55

LTE - Band 12
- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
699 ~ 716	24	1.2	0.065 876	0.47

LTE - Band 13
- Maximum tune up tolerance

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

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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 cm 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 0.015 803 / 1

WCDMA: the ratio is 0.144 122 / 1

Confirm the sum result of individual MPEs ratio is ≤ 1.0 ;

Bluetooth + WLAN + WCDMA

= (0.001 773 / 1) + (0.015 803 / 1) + (0.144 122 / 1)

= 0.161 698 ≤ 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 -

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