Shenzhen Global Test Service Co.,Ltd.
No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

RF Exposure evaluation

Report Reference No.....:	**GTS20210227003-1-3**
FCC ID. .....:	**2AY5M-SF-E3B**
Compiled by (position+printed name+signature) . :	File administrators Peter Xiao
Supervised by (position+printed name+signature) . :	Test Engineer Moon Tan
Approved by (position+printed name+signature) . :	Manager Simon Hu
Date of issue .....:	Apr.12, 2021

Representative Laboratory Name.:	**Shenzhen Global Test Service Co.,Ltd.**
Address .....:	No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

Applicant's name.....:	**Fuzhou Sifei Information Technology Co.,Ltd**
Address .....:	Office 426, Floor 4, Building 3, Plot A1, Fuzhou Zhengrong Fortune Center, 28 Xinbao Road, Shangjie Town, Minhou County, Fuzhou City, Fujian, China

Test specification.....**:**	
Standard.....:	**47CFR §1.1310** **47CFR §2.1091** **KDB447498 v06**
TRF Originator.....:	Shenzhen Global Test Service Co.,Ltd.
Master TRF .....:	Dated 2014-12

Test item description .....:	**Electronic Price Tag-Relay**
Trade Mark .....:	N/A
Manufacturer .....:	Fuzhou Sifei Information Technology Co.,Ltd
Model/Type reference .....:	SF-E3B
Listed Models .....:	N/A
Exposure category .....:	General population/uncontrolled environment
EUT Type .....:	Production Unit
Hardware Version .....:	V1.0.1
Software Version .....:	V1.1.2
Rating .....:	DC 12V/1A by Adapter
Result .....:	**PASS**

T E S T R E P O R T

Test Report No. :	**GTS20210227003-1-3**	Apr.12, 2021 Date of issue

Equipment under Test	:	Electronic Price Tag-Relay
Model /Type	:	SF-E3B
Listed model	:	N/A
Applicant	:	**Fuzhou Sifei Information Technology Co.,Ltd**
Address	:	Office 426, Floor 4, Building 3, Plot A1, Fuzhou Zhengrong Fortune Center, 28 Xinbao Road, Shangjie Town, Minhou County, Fuzhou City, Fujian, China
Manufacturer	:	**Fuzhou Sifei Information Technology Co.,Ltd**
Address	:	Office 426, Floor 4, Building 3, Plot A1, Fuzhou Zhengrong Fortune Center, 28 Xinbao Road, Shangjie Town, Minhou County, Fuzhou City, Fujian, China

Test Result:	**PASS**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Contents

1. SUMMARY

1.1 EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - supplied by the lab

●	/	Length (m) :	/
		Shield :	/
		Detachable :	/

1.2 Product Description

Product Name	Electronic Price Tag-Relay
Trade Mark	N/A
Model/Type reference	SF-E3B
List Models	N/A
Model Declaration	N/A
Power supply:	DC 12V/1A by Adapter
Sample ID	GTS20210227003-1-1# & GTS20210227003-1-2#
Bluetooth	
Operation frequency	2402-2480MHz
Channel Number	40 channels for Bluetooth (DTS)
Channel Spacing	2MHz for Bluetooth (DTS)
Modulation Type	GFSK for Bluetooth (DTS)
Antenna Description	Four Internal Antennas, but not support MIMO technology; Module 1(ANT2) used for Bluetooth, 2.5dBi(Max.) Module 2(ANT3) used for Bluetooth, 2.5dBi(Max.) Module 3(ANT4) used for Bluetooth, 2.5dBi(Max.) Module 4(ANT5) used for Bluetooth, 2.5dBi(Max.)
WIFI(2.4G Band)	
Frequency Range	2412MHz ~ 2462MHz
Channel Spacing	5MHz
Channel Number	11 Channel for 20MHz bandwidth(2412~2462MHz) 7 channels for 40MHz bandwidth(2422~2452MHz)
Modulation Type	802.11b: DSSS; 802.11g/n: OFDM
Antenna Description	Tow Internal Antennas;WLAN support 2*2MIMO technology. ANT0 used for WIFI TX/RX, 2.5dBi(Max.) for 2.4G Band ANT1 used for WIFI TX/RX, 2.5dBi(Max.) for 2.4G Band

2. TEST ENVIRONMENT

2.1 Address of the test laboratory

Shenzhen Global Test Service Co.,Ltd.
No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

2.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS (No. CNAS L8169)
Shenzhen Global Test Service Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2019 General Requirements) for the Competence of Testing and Calibration Laboratories.
A2LA (Certificate No. 4758.01)
Shenzhen Global Test Service Co., Ltd. has been assessed by the American Association for Laboratory Accreditation (A2LA). Certificate No. 4758.01.
Industry Canada Registration Number. is 24189.
FCC Designation Number is CN1234.
FCC Registered Test Site Number is165725.

2.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

2.4 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the Shenzhen Global Test Service Co.,Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen GTS laboratory is reported:

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.57 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3. METHOD OF MEASUREMENT

3.1 Applicable Standard

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.
According to §1.1310 and §2.1091 RF exposure is calculated.
KDB447498 v06: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies

3.2 Requirement

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.
In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.
In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0. The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

3.3 Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
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 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 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 – 100,000	/	/	1.0	30

F=frequency in MHz
*=Plane-wave equivalent power density

3.4 MPE Calculation Method

Predication of MPE limit at a given distance
Equation from page 18 of OET Bulletin 65, Edition 97-01

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

As declared by the Applicant, the EUT transmits with the maximum soure-baed Duty Cycle of 100%-see the User manual, and the EUT is a wireless device used in a mobile application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum mobile separation distance, r =20cm, as well as the gain of the used antenna is 1.06dBi for WLAN, and the power drift from Turn-up Procedure provide by manufacturer as following states, the RF power density can be obtained.

3.5 Antenna Information

SF-E3B can only use antennas certificated as follows provided by manufacturer;

Internal Identification	Antenna Identification in Internal photos	Antenna type and antenna number	Operate frequency band	Maximum antenna gain
Antenna 0	WLAN ANT0	Internal antenna	2.4 – 2.5 GHz	2.50dBi(Max.)
Antenna 1	WLAN ANT1	Internal antenna	2.4 – 2.5 GHz	2.50dBi(Max.)
Antenna 2	BLE module 1 ANT	Internal antenna	2.4 – 2.5 GHz	2.50dBi(Max.)
Antenna 3	BLE module 2 ANT	Internal antenna	2.4 – 2.5 GHz	2.50dBi(Max.)
Antenna 4	BLE module 3 ANT	Internal antenna	2.4 – 2.5 GHz	2.50dBi(Max.)
Antenna 5	BLE module 4 ANT	Internal antenna	2.4 – 2.5 GHz	2.50dBi(Max.)

4. Conducted Power Results

Antenna 0:

2.4GWLAN

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
802.11b	01	2412	16.32
	06	2437	16.59
	11	2462	16.14
802.11g	01	2412	16.66
	06	2437	16.13
	11	2462	16.25
802.11n(HT20)	01	2412	16.76
	06	2437	16.69
	11	2462	16.18
802.11n(HT40)	03	2422	16.22
	06	2437	16.45
	09	2452	16.58

Antenna 1:

2.4GWLAN

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
802.11b	01	2412	16.47
	06	2437	16.60
	11	2462	16.32
802.11g	01	2412	16.41
	06	2437	16.76
	11	2462	16.29
802.11n(HT20)	01	2412	16.28
	06	2437	16.71
	11	2462	16.59
802.11n(HT40)	03	2422	16.19
	06	2437	16.64
	09	2452	16.74

BLE module 1 :

Bluetooth

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
GFSK(BT LE)	0	2402	0.24
	19	2440	0.78
	39	2480	0.44

BLE module 2 :

Bluetooth

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
GFSK(BT LE)	0	2402	0.19
	19	2440	0.72
	39	2480	0.49

BLE module 3 :

Bluetooth

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
GFSK(BT LE)	0	2402	0.29
	19	2440	0.71
	39	2480	0.45

BLE module 4 :

Bluetooth

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
GFSK(BT LE)	0	2402	0.25
	19	2440	0.81
	39	2480	0.45

5. Manufacturing Tolerance

Antenna 0:

2.4GWLAN

IEEE 802.11b (Peak)			
Channel	Channel 01	Channel 06	Channel 11
Target (dBm)	16.0	16.0	16.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11g (Peak)			
Channel	Channel 01	Channel 06	Channel 11
Target (dBm)	16.0	16.0	16.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Peak)			
Channel	Channel 01	Channel 06	Channel 11
Target (dBm)	16.0	16.0	16.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT40 (Peak)			
Channel	Channel 03	Channel 06	Channel 09
Target (dBm)	16.0	16.0	16.0
Tolerance ±(dB)	1.0	1.0	1.0

Antenna 1:

2.4GWLAN

IEEE 802.11b (Peak)			
Channel	Channel 01	Channel 06	Channel 11
Target (dBm)	16.0	16.0	16.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11g (Peak)			
Channel	Channel 01	Channel 06	Channel 11
Target (dBm)	16.0	16.0	16.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Peak)			
Channel	Channel 01	Channel 06	Channel 11
Target (dBm)	16.0	16.0	16.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT40 (Peak)			
Channel	Channel 01	Channel 06	Channel 11
Target (dBm)	16.0	16.0	16.0
Tolerance ±(dB)	1.0	1.0	1.0

BLE module 1 :

Bluetooth

GFSK BT LE (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	0	0	0
Tolerance ±(dB)	1.0	1.0	1.0

BLE module 2 :

Bluetooth

GFSK BT LE (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	0	0	0
Tolerance ±(dB)	1.0	1.0	1.0

BLE module 3 :

Bluetooth

GFSK BT LE (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	0	0	0
Tolerance ±(dB)	1.0	1.0	1.0

BLE module 4 :

Bluetooth

GFSK BT LE (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	0	0	0
Tolerance ±(dB)	1.0	1.0	1.0

6. Measurement Results

6.1 Standalone MPE Evaluation

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, r =20cm, as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

Antenna 0:

2.4GWLAN

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW				
802.11b	17.00	50.1187	2.50	1.7783	0.0177	1.0000
802.11g	17.00	50.1187	2.50	1.7783	0.0177	1.0000
802.11n(HT20)	17.00	50.1187	2.50	1.7783	0.0177	1.0000
802.11n(HT40)	17.00	50.1187	2.50	1.7783	0.0177	1.0000

Antenna 1:

2.4GWLAN

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW				
802.11b	17.00	50.1187	2.50	1.7783	0.0177	1.0000
802.11g	17.00	50.1187	2.50	1.7783	0.0177	1.0000
802.11n(HT20)	17.00	50.1187	2.50	1.7783	0.0177	1.0000
802.11n(HT40)	17.00	50.1187	2.50	1.7783	0.0177	1.0000

BLE module 1 :

BT

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW				
GFSK(BT LE)	1.00	1.2589	2.50	1.7783	0.0004	1.0000

BLE module 2 :

BT

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW				
GFSK(BT LE)	1.00	1.2589	2.50	1.7783	0.0004	1.0000

BLE module 3 :

BT

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW				
GFSK(BT LE)	1.00	1.2589	2.50	1.7783	0.0004	1.0000

BLE module 4 :

BT

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW				
GFSK(BT LE)	1.00	1.2589	2.50	1.7783	0.0004	1.0000

Remark:
1. Output power including tune-up tolerance;
2. MPE evaluate distance is 20cm from user manual provide by manufacturer;

6.2 Simultaneous Transmission MPE

The sample support one WLAN modular and four Bluetooth modular and four Bluetooth antennas,and two WLAN antennas, WLAN support MIMO, Need consider simultaneous transmission ;

The sample supports 2T2R MIMO technology for WLAN.
According to KDB447498 for Transmitters used in mobile exposure conditions for simultaneous transmission operations;

∑ of MPE ratios ≤ 1.0

8.2.1 Summary simultaneous transmission information

Modulation Type	Work Frequency Band	Transmit Antenna		Antenna 0 Antenna 1 Synchronization transmit
		Antenna 0	Antenna 1	
802.11b	2.4G WLAN	Yes	Yes	No
802.11g	2.4G WLAN	Yes	Yes	No
802.11n(HT20)	2.4G WLAN	Yes	Yes	Yes
802.11n(HT40)	2.4G WLAN	Yes	Yes	Yes

8.2.2 Summary simultaneous transmission results

Maximum Simultaneous transmission MPE Ratios for **Antenna 0, Antenna 1, Antenna 2, Antenna 3, Antenna 4, Antenna 5**

Maximum MPE ratio Ant. 0	Maximum MPE ratio Ant. 1	Maximum MPE ratio Ant. 2	∑MPE ratios	Limit	Results
0.0177	0.0177	0.0004	0.0370	1.0	PASS
Maximum MPE ratio Ant. 3	Maximum MPE ratio Ant. 4	Maximum MPE ratio Ant. 5			
0.0004	0.0004	0.0004			

7. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure and SAR Exclusion Threshold per KDB 447498 v06, No SAR is required.

.....End of Report.....