

Test Report

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Report No.: E202409184352-8

Customer: Huizhou Foryou General Electronics Co., Ltd.

Address: No.2 District A, Foryou Industry Park, No. 1 North Shangxia Road, Dongjiang Hi tech Industry Park, 516005 Huizhou city, Guangdong Province, China(PROC)

Sample Name: Intelligent cabin controller

Sample Model: HS7024

Receive Sample Date: Sep.18,2024

Test Date: Sep.20,2024 ~ Oct.12,2024

Reference Document: 47 CFR, FCC Part 2.1091 Radio frequency radiation exposure evaluation: mobile devices

Test Result: Pass

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REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E202409184352-8	Original Issue	2024-10-15

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1. GENERAL DESCRIPTION OF EUT

1.1 APPLICANT

Name: Huizhou Foryou General Electronics Co., Ltd.

Address: No.2 District A, Foryou Industry Park, No. 1 North Shangxia Road, Dongjiang Hi tech Industry Park, 516005 Huizhou city, Guangdong Province, China(PROC)

1.2 MANUFACTURER

Name: Huizhou Foryou General Electronics Co., Ltd.

Address: No.2 District A, Foryou Industry Park, No. 1 North Shangxia Road, Dongjiang Hi tech Industry Park, 516005 Huizhou city, Guangdong Province, China(PROC)

1.3 FACTORY

Name: Huizhou Foryou General Electronics Co., Ltd.

Address: No.2 District A, Foryou Industry Park, No. 1 North Shangxia Road, Dongjiang Hi tech Industry Park, 516005 Huizhou city, Guangdong Province, China(PROC)

1.4 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment: Intelligent cabin controller

Model No.: HS7024

Trade Mark: ADAYO

FCC ID: 2AEIN-HS7024

Power Supply: DC 12V

Battery: Ni-MH BATTERY AA1000mAh, LTT-HS7012A, LTT-AAP1000X3 3.6V

BT: 2402MHz~2480MHz

BLE: 2402MHz~2480MHz

2.4G WiFi: 2412MHz~2462MHz

5G WiFi U-NII-3: 5745MHz~5825MHz

GSM850: Tx 824MHz~849MHz, Rx 869MHz ~ 894 MHz

GSM1900: Tx 1850MHz~1910MHz, Rx 1930MHz ~ 1990 MHz

UMTS Band 2: Tx 1850MHz~1910MHz, Rx 1930MHz ~ 1990 MHz

Frequency Band: UMTS Band 4: Tx 1710MHz~1755MHz, Rx 2110MHz ~ 2155 MHz

UMTS Band 5: Tx 824MHz~849MHz, Rx 869MHz ~ 894 MHz

Band 2: Tx 1850MHz~1910MHz, Rx 1930MHz ~ 1990MHz

Band 4: Tx 1710MHz~1755MHz, Rx 2110MHz ~ 2155MHz

Band 5: Tx 824MHz~849MHz, Rx 869MHz ~ 894MHz

Band 12: Tx 699MHz~716MHz, Rx 729MHz ~ 746MHz

Band 13: Tx 777MHz~787MHz, Rx 746MHz ~ 756MHz

Band 17: Tx 704MHz~716MHz, Rx 734MHz ~ 746MHz

Modulation Type: BT: FHSS (GFSK for 1Mbps, $\pi/4$ -DQPSK for 2Mbps, 8DPSK for 3Mbps);

	BLE: GFSK; 2.4G WiFi: DSSS for 802.11b mode, OFDM for 802.11g/n HT20/n HT40 mode; 5G WiFi U-NII-3: IEEE 802.11a: OFDM, IEEE 802.11n: OFDM, IEEE 802.11ac: OFDM; GSM850: GMSK,8PSK; GSM1900: GMSK,8PSK; UMTS Band 2: QPSK; UMTS Band 4: QPSK; UMTS Band 5: QPSK; LTE: QPSK, 16QAM;
Antenna Specification:	BT: Internal Antenna with 4.98dBi gain (Max); BLE: Internal Antenna with 4.98dBi gain (Max); 2.4G WiFi: Internal antenna with 5.71dBi gain (Max); 5G WiFi U-NII-3: Internal antenna 1 with 5.45dBi antenna gain(max), Internal antenna 2 with 7.26dBi antenna gain(max); GSM850: 2.37dBi GSM1900: 3.62Bi UMTS Band 2:3.62dBi UMTS Band 4:3.69dBi UMTS Band 5:2.37dBi Band 2:3.62dBi Band 4: 3.69dBi Band 5:2.37dBi Band 12: -1.06dBi Band 13: 0.84dBi Band 17: -1.06dBi
Temperature Range:	-40℃~75℃
Voltage Range	9V~16V
Hardware Version:	B.0.1
Software Version:	SWC.0007
Sample submitting way:	☒ Provided by customer ☐ Sampling
Sample No:	E202409184352-0001, E202409184352-0002

- 1.The EUT antenna gain is provided by the applicant. This report is made solely on the basis of such data and/or information. We accept no responsibility for the authenticity and completeness of the above data and information and the validity of the results and/or conclusions.
- Note: 2. This EUT (Intelligent cabin controller) the model name HS7024 with High, Low two configuration. The two configuration have the same technical construction including circuit diagram, PCB LAYOUT, hardware version, software, except the High configuration with full function but the Low configuration without some functions as below table. These difference which are

not affect the RF performance. So only tested the high configuration of HS7024.

HS7024 Function	Configuration	
	High	Low
4MIC port	Y	N
DMS port	Y	N
Ethernet port	Y	N
Support PTZ camera port	Y	N
Integrated projection headlights port	Y	N

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2. LABORATORY

2.1 LABORATORY

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of GRG METROLOGY & TEST GROUP CO., LTD.

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2.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to GB/T 27025(ISO/IEC 17025:2017)

USA A2LA(Certificate #2861.01)

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada ISED (Company Number: 24897, CAB identifier:CN0069)

USA FCC (Registration Number: 759402, Designation Number:CN1198)

Copies of granted accreditation certificates are available for downloading from our web site,
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3. LIMITS FOR GENERAL POPULATION/UNCONTROLLED EXPOSURE

General

According to the KDB 447498 D04 Interim General RF Exposure Guidance v01, General frequency and separation-distance dependent MPE-based effective radiated power (ERP) thresholds are in Table 4.1 to support an exemption from further evaluation from 300 kHz through 100 GHz.

TABLE 4.1—THRESHOLDS FOR SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION

RF Source Frequency			Minimum Distance			Threshold ERP
f_L MHz		f_H MHz	$\lambda_L / 2\pi$		$\lambda_H / 2\pi$	W
0.3	–	1.34	159 m	–	35.6 m	$1,920 R^2$
1.34	–	30	35.6 m	–	1.6 m	$3,450 R^2/f^2$
30	–	300	1.6 m	–	159 mm	$3.83 R^2$
300	–	1,500	159 mm	–	31.8 mm	$0.0128 R^2 f$
1,500	–	100,000	31.8 mm	–	0.5 mm	$19.2 R^2$
Subscripts L and H are low and high; λ is wavelength. From § 1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.						

For mobile devices that are not exempt per Table 4.1 at distances from 20 cm to 40 cm and in 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in §1.1310 is necessary if the ERP of the device is greater than $ERP_{20\text{cm}}$ in Formula (4.1).

Formula (4.1):

$$P_{\text{th}} (\text{mW}) = ERP_{20 \text{ cm}} (\text{mW}) = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

4. CALCULATION METHOD

Predication of MPE limit at a given distance

$EIRP(dBm) = \text{Maximum Tune-up Output power (dBm)} + \text{Maximum antenna gain(dBi)}$

$ERP(dBm) = EIRP(dBm) - 2.15$

R=minimum distance to the center of radiation of the antenna

From the EUT RF output power, the minimum mobile separation distance, d=20cm, as well as the maximum gain of the used as following information, the RF power ERP can be obtained.

Table 1 Antenna Specification

Mode	Antenna type	Internal Identification	Maximum antenna gain
BT	Internal antenna	Antenna 1	4.98dBi
BLE	Internal antenna	Antenna 1	4.98dBi
2.4G WiFi	Internal antenna	Antenna 1	5.71dBi
5G WiFi (U-NII-3)	Internal antenna	Antenna 1, 2	5.45dBi, 7.26dBi
GSM 850	Internal antenna	Main	2.37dBi
PCS 1900	Internal antenna	Main	3.62dBi
UMTS Band 2	Internal antenna	Main	3.62dBi
UMTS Band 4	Internal antenna	Main	3.69dBi
UMTS Band 5	Internal antenna	Main	2.37dBi
LTE Band 2	Internal antenna	Main	3.62dBi
LTE Band 4	Internal antenna	Main	3.69dBi
LTE Band 5	Internal antenna	Main	2.37dBi
LTE Band 12	Internal antenna	Main	-1.06dBi
LTE Band 13	Internal antenna	Main	0.84dBi
LTE Band 17	Internal antenna	Main	-1.06dBi

Table 2 Transmit Power

Mode	Maximum Output Power (dBm)	Maximum Tune-up Output power (dBm)
BT	6.65	6.00 ±2.00
BLE	2.33	2.00 ±2.00
2.4G WiFi	15.44	15.00 ±2.00
GSM 850	25.29	25.00 ±2.00
PCS 1900	23.30	23.00 ±2.00
UMTS Band 2	23.22	23.00 ±2.00
UMTS Band 4	23.48	23.00 ±2.00
UMTS Band 5	23.30	23.00 ±2.00
LTE Band 2	22.97	22.00 ±2.00
LTE Band 4	23.02	23.00 ±2.00
LTE Band 5	23.48	23.00 ±2.00
LTE Band 12	24.35	24.00 ±2.00
LTE Band 13	24.35	24.00 ±2.00

LTE Band 17	24.62	24.00 ±2.00
5GHz WiFi U-NII-3-antenna 1	4.84	4.00 ±2.00
5GHz WiFi U-NII-3-antenna 2	3.72	3.00 ±2.00

Note: The Maximum Output Power refer to report E202409184352-1/2/4/5/6/7. Other configurations of GPRS / EDGE are considered as secondary modes. The frame-averaged power is linearly reported the maximum burst averaged power over 8 time slots. The calculated method are shown as below:

The duty cycle “x” of different time slots as below:

1 TX slot is 1/8, 2 TX slots is 2/8, 3 TX slots is 3/8 and 4 TX slots is 4/8

Based on the calculation formula:

Frame-averaged power = Burst averaged power + 10 log (x)

So,

Frame-averaged power (1 TX slot) = Burst averaged power (1 TX slot)– 9.03

Frame-averaged power (2 TX slots) = Burst averaged power (2 TX slots)– 6.02

Frame-averaged power (3 TX slots) = Burst averaged power (3 TX slots)– 4.26

Frame-averaged power (4 TX slots) = Burst averaged power (4 TX slots) – 3.01

5. ESTIMATION RESULT

5.1 MEASUREMENT RESULTS

STANDALONE MPE

Mode	Frequency (MHz)	Maximum Tune-up Output power (dBm)	Antenna Gain (dBi)	Maximum Tune-up EIRP (dBm)	ERP (dBm)	Maximum Tune-up ERP (W)	Threshold ERP(W)
BT	2402-2480	8	4.98	12.98	10.83	0.0121	0.768
BLE	2402-2480	4	4.98	8.98	6.83	0.0048	0.768
2.4G WiFi	2412-2462	17	5.71	22.71	20.56	0.1138	0.768
GSM 850	824-849	27	2.37	29.37	27.22	0.5272	4.219
PCS 1900	1850-1910	25	3.62	28.62	26.47	0.4436	0.768
UMTS Band 2	1850-1910	25	3.62	28.62	26.47	0.4436	0.768
UMTS Band 4	1710-1755	25	3.69	28.69	26.54	0.4508	0.768
UMTS Band 5	824-849	25	2.37	27.37	25.22	0.3327	4.219
LTE Band 2	1850-1910	24	3.62	27.62	25.47	0.3524	0.768
LTE Band 4	1710-1755	25	3.69	28.69	26.54	0.4508	0.768
LTE Band 5	824-849	25	2.37	27.37	25.22	0.3327	4.219
LTE Band 12	699-716	26	-1.06	24.94	22.79	0.1901	3.579
LTE Band 13	777-787	26	0.84	26.84	24.69	0.2944	3.978
LTE Band 17	704-716	26	-1.06	24.94	22.79	0.1901	3.604
5GHz WiFi U-NII-3-antenna 1	5745-5825	6	5.45	11.45	9.3	0.0085	0.768

5GHz WiFi U-NII-3 -antenna 2	5745-5825	5	7.26	12.26	10.11	0.0103	0.768
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Remark:

1. RF Exposure use distance is 20cm from manufacturer declaration of user manual.
2. For 1.5G-100GHz Threshold $ERP(W) = 19.2R^2(W) = 19.2 \times 0.2 \times 0.2(W) = 0.768(W)$. For 300MHz-1.5GHz Threshold $ERP(W) = 0.0128 R^2$.
3. $ERP(dBm) = EIRP(dBm) - 2.15$.

Maximum Simultaneous transmission MPE Ratio for BT, BLE, 2.4G WiFi, 5G WiFi, GSM, WCDMA, LTE:

Maximum MPE ratio BT	Maximum MPE ratio 2.4G wifi	Maximum MPE ratio 5G WiFi-antenna 1	Maximum MPE ratio 5G WiFi-antenna 2	Maximum MPE ratio GSM	$\sum$ MPEratios	Limit	Results
0.016	0.148	0.011	0.013	0.578	0.766	1.000	Pass

Maximum MPE ratio BT	Maximum MPE ratio 2.4G wifi	Maximum MPE ratio 5G WiFi-antenna 1	Maximum MPE ratio 5G WiFi-antenna 2	Maximum MPE ratio WCDMA	$\sum$ MPEratios	Limit	Results
0.016	0.148	0.011	0.013	0.587	0.775	1.000	Pass

Maximum MPE ratio BT	Maximum MPE ratio 2.4G wifi	Maximum MPE ratio 5G WiFi-antenna 1	Maximum MPE ratio 5G WiFi-antenna 2	Maximum MPE ratio LTE	$\sum$ MPEratios	Limit	Results
0.016	0.148	0.011	0.013	0.587	0.775	1.000	Pass

Maximum MPE ratio BLE	Maximum MPE ratio 2.4G wifi	Maximum MPE ratio 5G WiFi-antenna 1	Maximum MPE ratio 5G WiFi-antenna 2	Maximum MPE ratio GSM	$\sum$ MPEratios	Limit	Results
0.006	0.148	0.011	0.013	0.578	0.756	1.000	Pass

Maximum MPE ratio BLE	Maximum MPE ratio 2.4G wifi	Maximum MPE ratio 5G WiFi-antenna 1	Maximum MPE ratio 5G WiFi-antenna 2	Maximum MPE ratio WCDMA	$\sum$ MPEratios	Limit	Results
0.006	0.148	0.011	0.013	0.587	0.765	1.000	Pass

Maximum MPE ratio BLE	Maximum MPE ratio 2.4G wifi	Maximum MPE ratio 5G WiFi-antenna 1	Maximum MPE ratio 5G WiFi-antenna 2	Maximum MPE ratio LTE	Σ MPEratios	Limit	Results
0.006	0.148	0.011	0.013	0.587	0.765	1.000	Pass

Remark:

According to KDB447498 for Transmitters used in mobile exposure conditions for simultaneous transmission operations;

Σof MPE ratios≤ 1.0

6. CONCLUSION

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

----- End of Report -----