Test Report

Verified code: 100896

Report No.: E202307262325-19

Customer:	BYD Auto Industry Company Limited
Address:	No.3001,3007,HengPing Road, Pingshan, Shenzhen,P.R.China
Sample Name:	DiLink, BYD Di3.0F
Sample Model:	DiLink 3.0F, MTCF03
Receive Sample Date:	Jul.28,2023
Test Date:	Oct.25,2023 ~ Oct.26,2023
Reference Document:	CFR 47, FCC Part 2.1091 Radio frequency radiation exposure evaluation: mobile devices
Test Result:	Pass

Prepared by: Huang Lifang Reviewed by: Peng Huarui Approved by: Zhao Zetian

GRG METROLOGY & TEST GROUP CO., LTD.

Issued Date: 2023-11-08

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Statement

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5. Without the agreement of the laboratory, the client is not authorized to use the test results for unapproved propaganda.

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REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E202307262325-19	Original Issue	2023-10-27

Note:

1. Based on the report number E20211217696105-9, E20211217696105-9& E202307262325-19 are the following changes:

Report No.	Product Name:	Adding Product Name:	Model No.:	Adding Model:	Note:
E20211217696105-9	DiLink	/	DiLink 3.0F	/	/
E202307262325-19	DiLink	BYD Di3.0F	DiLink 3.0F	MTCF03	Adding the product name BYD Di3.0F and the model MTCF03

1) Both models DiLink 3.0F and MTCF03 are identical except model number.The difference between the two versions of DiLink 3.0F is the broadcasting(AM/FM/DAB) chip only. in this report adding the product name BYD Di3.0F and the model MTCF03.
2) Except for the above changes, there are no other differences.

2. After evaluation, this report does not need to be retested, in this report we only updates the section 2.2, adding the product name BYD Di3.0F and the model MTCF03, all test datas come from E20211217696105-9 report(FCC ID: SD4-DILINK6125F, Issued Date: 2022-06-08).

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1. GENERAL DESCRIPTION OF EUT

1.1. APPLICANT

Name:	BYD Auto Industry Company Limited
Address:	No. 3001, 3007, Hengping Road, Pingshan, Shenzhen, P. R. China

1.2. MANUFACTURER

Name:	BYD Auto Industry Company Limited
Address:	No. 3001, 3007, Hengping Road, Pingshan, Shenzhen, P. R. China

1.3. FACTORY

Name:	Huizhou BYD Electronics Co., Ltd.
Address:	Xiangshui River, Economic Development Zone, Daya Bay, Huizhou, Guangdong, P. R. China

1.4. BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment:	DiLink
Adding Equipment Name:	BYD Di3.0F
Model No.:	DiLink 3.0F
Adding Model:	MTCF03
Models discrepancy:	Both models DiLink 3.0F and MTCF03 are identical except model number. The difference between the two versions of DiLink 3.0F is the broadcasting (AM/FM/DAB) chip only.
Trade Name:	BYD
FCC ID:	SD4-DILINK6125F
Power Supply:	DC 12V
Adapter Specification:	/
Frequency Range:	GSM 850: 824 MHz ~ 849 MHz GSM 1900: 1850 MHz ~ 1910 MHz WCDMA Band 2: 1850 MHz ~ 1910 MHz WCDMA Band 4: 1710 MHz ~ 1755 MHz WCDMA Band 5: 824 MHz ~ 849 MHz FDD LTE Band 2: 1850 MHz ~ 1910 MHz FDD LTE Band 4: 1710 MHz ~ 1755 MHz FDD LTE Band 5: 824 MHz ~ 849 MHz FDD LTE Band 7: 2500 MHz ~ 2570 MHz FDD LTE Band 12: 699 MHz ~ 716 MHz FDD LTE Band 13: 777 MHz ~ 787 MHz FDD LTE Band 17: 704 MHz ~ 716 MHz TDD LTE Band 38: 2570 MHz ~2620 MHz TDD LTE Band 41: 2496 MHz ~2690 MHz BT&BLE: 2402 MHz ~ 2480 MHz

	2.4G WIFI: 2412 MHz ~ 2462 MHz U-NII-1: 5180 MHz ~ 5240 MHz U-NII-2A: 5260 MHz ~ 5320 MHz U-NII-2C: 5500 MHz ~ 5700 MHz U-NII-3: 5745 MHz ~ 5825 MHz
Transmit Power:	Reference Section 5 Table 2
Modulation type:	GSM: GMSK,8PSK WCDMA: QPSK LTE: QPSK, 16QAM BLE: GFSK BT: GFSK, π/4-DQPSK, 8DPSK 2.4G RLAN: DSSS, OFDM 5G RLAN: OFDM
Antenna Specification:	Reference Section 5 Table 1
Temperature Range:	-30℃~70℃
Hardware Version:	DiLink HW 6125F
Software Version:	DiLink SW 4.0F
Sample No:	/
Note:	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.

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2. LABORATORY AND ACCREDITATIONS

2.1. LABORATORY

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

Add.:	No.1301 Guanguang Road Xinlan Community, Guanlan Street, Longhua District Shenzhen, 518110, People's Republic of China.
P.C.:	518110
Tel :	0755-61180008
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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, http://www.grgtest.com

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3. EVALUATION METHOD

Exposure category: General population/uncontrolled environment
EUT Type: Production Unit
Device Type: Mobile Device

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 KDB447498D04 Either SAR-based or MPE-based exemption may be considered for test exemption for fixed, mobile, or portable device exposure conditions; therefore, the contributions from each exemption in conjunction with the measured SAR (*Evaluated*$_k$ term) shall be used to determine exemption for simultaneous transmission according to Formula (C.1)

$$\sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1 \qquad (C.1)$$

Evaluated$_k$	the maximum reported SAR or MPE of fixed, mobile, or portable RF source *k* either in the device or at the transmitter site from an existing evaluation.
Exposure Limit$_k$	either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable sources, as applicable

the sum of the ratios of the applicable terms for SAR-based, MPE-based and measured SAR or MPE shall be less than 1, to determine simultaneous transmission exposure compliance

4. LIMITS FOR GENERAL POPULATION/UNCONTROLLEDEXPOSURE

For mobile devices at distances from 20 cm to 40 cm and in 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in Table B.2 is necessary if the ERP of the device is greater than ERP_{20cm} in Formula (B.1)

$$P_{th}\,(\text{mW}) = ERP_{20\,cm}\,(\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \leq f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \leq f \leq 6\ \text{GHz} \end{cases} \qquad (B.1)$$

(B.2)Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength(H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-100,000	/	/	1.0	30

Note: f=frequency in MHz; *Plane-wave equivalent power density

5. 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 anisotropic radiator
R=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 density can be obtained.

Table 1 Antenna Specification

Frequency Band	Antenna type	Internal Identification	Maximum antenna gain
GSM 850	External antenna	Antenna 1	-0.63 dBi
GSM 1900			-2.95 dBi
WCDMA Band 2			-2.95 dBi
WCDMA Band 4			-1.00 dBi
WCDMA Band 5			-0.63 dBi
FDD LTE Band 2			-1.94 dBi
FDD LTE Band 4			-1.00 dBi
FDD LTE Band 5			-0.63 dBi
FDD LTE Band 7			-0.37 dBi
FDD LTE Band 12			-1.02 dBi
FDD LTE Band 13			-1.02 dBi
FDD LTE Band 17			-1.02 dBi
TDD LTE Band 38			-0.37 dBi
TDD LTE Band 41			-0.37 dBi
2.4 GHz WIFI	External antenna	Antenna 2	-1.77 dBi
U-NII-1			-3.81 dBi
U-NII-2A			-4.34 dBi
U-NII-2C			-4.34 dBi
U-NII-3			-4.39 dBi
BT			-1.77 dBi
BLE			-1.77 dBi

Table 2 Transmit Power

Frequency Band	Mode	Maximum Output Power (dBm)	Maximum Tune-up Output power (dBm)
GSM 850	GPRS 4slots	29.68	30.00
GSM 1900	GPRS 4slots	26.53	27.00
WCDMA Band 2	RMC	23.41	24.50
WCDMA Band 4	RMC	23.67	24.50
WCDMA Band 5	RMC	23.66	24.50
FDD LTE Band 2	20MHz	23.15	24.50
FDD LTE Band 4	1.4MHz	23.42	24.50
FDD LTE Band 5	3MHz	23.21	24.50
FDD LTE Band 7	10MHz	23.59	24.50
FDD LTE Band 12	5MHz	23.41	24.50
FDD LTE Band 13	5MHz	23.43	24.50
FDD LTE Band 17	5MHz	23.38	24.50
TDD LTE Band 38	20MHz	24.16	24.50
TDD LTE Band 41	10MHz	23.56	24.50
2.4 GHz WIFI	802.11g	21.16	21.50
U-NII-1	802.11a	14.67	15.00
U-NII-2A	802.11a	15.88	16.00
U-NII-2C	802.11a	16.14	16.50
U-NII-3	802.11a	16.22	16.50
BT	DH5	-0.14	0.00
BLE	1M	5.08	5.50

Note:

Other configurations of GSM / 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 1og (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

6. ESTIMATION RESULT

6.1. MEASUREMENT RESULTS

STANDALONE MPE

Mode	Frequency (MHz)	Tune-up Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
		(dBm)	(mW)				
GSM 850	824 - 849	30.00	1000.00	-0.63	0.86	0.17	0.55
GSM 1900	1850 - 1910	27.00	501.19	-2.95	0.51	0.05	1.00
WCDMA Band 2	1850 - 1910	24.50	281.84	-2.95	0.51	0.03	1.00
WCDMA Band 4	1710 -1755	24.50	281.84	-1.00	0.79	0.04	1.00
WCDMA Band 5	824 - 849	24.50	281.84	-0.63	0.86	0.05	0.55
FDD LTE Band 2	1850 - 1910	24.50	281.84	-1.94	0.64	0.04	1.00
FDD LTE Band 4	1710 -1755	24.50	281.84	-1.00	0.79	0.04	1.00
FDD LTE Band 5	824 - 849	24.50	281.84	-0.63	0.86	0.05	1.00
FDD LTE Band 7	2500 - 2570	24.50	281.84	-0.37	0.92	0.05	1.00
FDD LTE Band 12	699 - 716	24.50	281.84	-1.02	0.79	0.04	0.47
FDD LTE Band 13	777 - 787	24.50	281.84	-1.02	0.79	0.04	0.52
FDD LTE Band 17	704 - 716	24.50	281.84	-1.02	0.79	0.04	0.47
TDD LTE Band 38	2570 - 2620	24.50	281.84	-0.37	0.92	0.05	1.00
TDD LTE Band 41	2496 - 2690	24.50	281.84	-0.37	0.92	0.05	1.00
2.4 GHz WIFI	2412 - 2462	21.50	141.25	-1.77	0.67	0.02	1.00
U-NII-1	5180 - 5240	15.00	31.62	-3.81	0.41	0.00	1.00
U-NII-2A	5260 - 5320	16.00	39.81	-4.34	0.37	0.00	1.00
U-NII-2C	5500 - 5700	16.50	44.67	-4.34	0.37	0.00	1.00
U-NII-3	5745 - 5825	16.50	44.67	-4.39	0.36	0.00	1.00
BT	2402 - 2480	0.00	1.00	-1.77	0.67	0.00	1.00
BLE	2402 - 2480	5.50	3.55	-1.77	0.67	0.00	1.00

Remark: 1. MPE use distance is 20cm from manufacturer declaration of user manual.
2. All test datas come from E20211217696105-9.

Maximum Simultaneous transmission MPE Ratio for WWLAN & WLAN & BT(BR+EDR&BLE)

Maximum MPE ratio (GSM 850)	Maximum MPE ratio (2.4 GHz WIFI)	Maximum MPE ratio (BLE)	∑ MPE ratios	Limit	Results
0.31	0.02	0.00	0.33	1.000	Pass

Note: The estimation distance is 20cm.

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7. 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 ----------