深圳市安华光电技术有限公司
SHENZHEN ANHUA OPTOELECTRONICS TECHNOLOGYCO.,LTD.

0.47 4K Control Interface Specification

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Doc. No. :	**WI-EL00069(V06)**
Model :	**D16/DF10 Series**
Date :	**2022-10-27**
Version :	**V06**

Editor	Core	**Date**	2022-10-27
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Record

Ver.	Date	Description	Editor
05	2021-08-17	First English Version.	Elyn
06	2022-10-27	1. Add power on and power off command 2. Update the Uart command list 3. Add the FAN speed command	Core

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1 Introduction

For Win XP, Win7/8/10, Mac OS, Linux operation system, the resolution is 3840*2160.

2 I2C interface file for reference

DLPC6421:

https://www.ti.com/product/DLPC6421

DLPC6540:

https://www.ti.com/product/DLPC6540?keyMatch=6540&tisearch=Search-EN-everything&usecase=GPN

3 The Serial Command

Communication method: USB TO TTL serial communication tool

Note: Serial level is 3.3V.

Data format: Parameters and the format show as below:

Baud Rate	Data bit	Stop bit	Check bit
9600	8	1	0

3.1 Power on command(Fans on but LED off)

Issue: 0x2A 0xFA 0x0D
Feedback:0x2A 0xFA 0x00 0x0D
Error: 0x2A 0xFA 0xFF 0x0D

3.2 Power off command(Fans off and LED off)

Issue: 0x2A 0xFB 0x0D
Feedback: 0x2A 0xFB 0x00 0x0D
Error: 0x2A 0xFB 0xFF 0x0D

3.3 LED light on command

Issue: 0x2A 0x4B 0x0D
Feedback:0x2A 0x4B 0x00 0x0D
Error: 0x2A 0x4B 0xFF 0x0D

3.4 LED light off command

Issue: 0x2A 0x47 0x0D
Feedback: 0x2A 0x47 0x00 0x0D
Error: 0x2A 0x47 0xFF 0x0D

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3.5 Command query (to check LED state)

Issue: 0x2A 0x53 0x0D
Feedback: LED light on: 0x2A 0x4B 0x00 0x0D
LED light off: 0x2A 0x47 0x00 0x0D
Error: 0x2A 0x53 0xFF 0x0D

3.6 Save electronic current value and screen rotation state

Issue: 0x2A 0xFC 0x0D
Feedback: 0x2A 0xFC 0x00 0x0D
Error: 0x2A 0xFC 0xFF 0x0D

3.7 Engine current value change

DLPC6421（EOL):
Issue: 0x55 0x0D 0xCE Red_L Red_M Green_L Green_M Blue_L Blue_M 0x00 0x00 0x00 0x00 0x00 0x00 checksum
Feedback: 0x2A 0xCE 0x00 0x0D
Error: 0x2A 0xCE 0xXX 0x0D ('0xXX' indicates checksum)
Note: _L stands lower-byte, _M stands upper-byte, and current range from 91 to 1023.

DLPC6540:
Issue: 0x55 0x07 0x84 Red_L Red_M Green_L Green_M Blue_L Blue_M checksum
Feedback: 0x2A 0x84 0x00 0x0D
Error: 0x2A 0x84 0xXX 0x0D ('0xXX' indicates checksum)
Note: _L stands lower-byte, _M stands upper-byte, and current range from 0 to 874.

3.8 LED temperature detection

Issue: 0x2A 0x4E 0x0D
Feedback: 0x2A 0x4E 0xXX 0x0D('0xXX' stands for temperature, unit: ℃)
Error: 0x2A 0x4E 0xFF 0x0D

3.9 Get LED working time

Issue: 0x2A 0x4F 0x0D
Feedback: 0x2A 0x4F 0xAA 0xXX 0x0D ('0xAA' shows the lower-byte, while '0xXX' is the upper-byte; unit: hour; the max is 65534 hours)
Error: 0x2A 0x4F 0xFF 0x0D

3.10 Reset LED working time (Reset LED working time to zero)

Issue: 0x2A 0xFE 0x0D
Feedback: 0x2A 0xFE 0x00 0x0D
Error: 0x2A 0xFE 0xFF 0x0D

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3.11 Get current software version information(Feeding back with ASCII code)

Issue: 0x2A 0xF5 0x0D
Feedback: Feeding back a string of characters, for example, “release date:20181012_FG”
Error: 0x2A 0xF5 0xFF 0x0D

3.12 Set FAN 2 speed

Issue: 0x2A 0xEF 0xXX（0xXX is speed,range is 0-100%）
Feedback: 0x2A 0xEF 0x00 0x0D
Error: 0x2A 0xEF 0xFF 0x0D

3.13 Set FAN 1 speed

Issue: 0x2A 0xEE 0xXX（0xXX is speed,range is 0-100%）
Feedback: 0x2A 0xEE 0x00 0x0D
Error: 0x2A 0xEE 0xFF 0x0D

3.14 Set screen rotation

Issue: 0x2A 0xF6 0xXX
Feedback: 0x2A 0xF6 0x00 0x0D
Error: 0x2A 0xF6 0xFF 0x0D
Note: 0xXX indicates 00/01/02/03 four status, correspond four rotation states, and it can be saved by executing command 3.4.

3.15 Read PWM value

Issue: 0x2A 0x54 0x0D
Feedback: 0x2A 0x54 PWM_H PWM_L 0x0D
Error: 0x2A 0x54 0xFF 0x0D
Note: PWM_H indicates upper-byte, PWM_L indicates lower-byte.

4 Serial command transfer to I2C command

Communication method: USB TO TTL serial communication tool
Note: Serial level is 3.3V.
Data format: Parameters and the format show as below:

Baud Rate	Data bit	Stop bit	Check bit
9600	8	1	0

Communication format:

Header identifier	Message data length	Command domain	{Data domain}	Checksum

The sending or receiving protocols should obey the above communication formats.
Header identifier: In the message sending by the host, header identifier is ‘0x55’;

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- Message data length: It is the sum of command domain and data domain;
- Command domain: Command characters, indicates the control function of the message;
- Data domain: It indicates the data required by the control, and it is optional;
- Checksum: It is the data inversed the sum of Header identifier, Message data length, Command domain and Data domain.

All the commands should transform as it is the original format; for instance, to change RGB's current, the I2C command should be:

Address 0x54 Red_L Red_M Green_L Green_M Blue_L Blue_M 0x00 0x00 0x00 0x00 0x00 0x00

The serial port corresponding:

0x55 0x07 0x54 Red_L Red_M Green_L Green_M Blue_L Blue_M 0x00 0x00 0x00 0x00 0x00 0x00 checksum

Other commands can transform as similar.

For the feedback message, if the command was right, it will feed back: 0x2A+'command domain'+0x00+0x0D; if the command was wrong, it will feed back: 0x2A+'command domain'+'checksum'+0x0D, to correct the checksum to ensure the command can be executed exactly.

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4.1 Checksum computing formula

```
Checksum = 0;
total = USART_RX_BUF[1] + 3;

/*for(t=0;t<total;t++)
{
    USART_SendData(USART1, USART_RX_BUF[t]);
    while(USART_GetFlagStatus(USART1,USART_FLAG_TC)!=SET);
}*/

for(t=0;t<(total - 1);t++)
{
    Checksum += USART_RX_BUF[t];
}

Checksum = ~(Checksum & 0xff);
```

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5 Regular serial command example

DLPC6421(EOL):

	报文意义	报文内容
1	LED enable（LED灯亮起）	2a 4b 0d
2	LED disable（LED灯熄灭）	2a 47 0d
3	LED enable（LED灯亮起）	2a 4b 0d
4	Change current fe(254)（LED灯暗）	55 0D CE FE 00 FE 00 FE 00 00 00 00 00 00 00 D5
5	Change current 1ff(511)（LED灯亮）	55 0D CE FF 01 FF 01 FF 01 00 00 00 00 00 00 CF
6	Change current 190(400)（LED灯亮）	55 0D CE 90 01 90 01 90 01 00 00 00 00 00 00 1C
7	Change current 181(385)（LED灯暗）	55 0D CE 81 01 81 01 81 01 00 00 00 00 00 00 49
8	Change current 2bc(700)（LED灯亮）	55 0D CE BC 02 BC 02 BC 02 00 00 00 00 00 00 95
9	Change current 3ff(1023)（LED灯最亮）	55 0D CE FF 03 FF 03 FF 03 00 00 00 00 00 00 C9
10	mirror cmd（把画面设置正向）	2a f6 01
11	Store current（LED电流和图像翻转保存）	2a fc 0d
12	LED enable（LED灯亮起）	2a fa 0d
13	LED disable（LED灯熄灭）	2a fb 0d
14	version cmd（返回版本号字符串）	2a f5 0d（34 4B 20 72 65 6C 65 61 73 65 20 64 61 74 65 3A 32 30 32 30 30 32 32 37 0D 0A）
15	LED enable（LED灯亮起）	55 02 31 01 76
16	LED disable（LED灯熄灭）	55 02 31 00 77
17	mirror cmd（画面会翻转）	2a f6 00
18	Read PWM(PWM值读取)	2a 54 0d

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DLPC6540:

	报文意义	报文内容
1	LED enable（LED灯亮起并且风扇转动）	2a fa 0d
2	LED disable（LED灯熄灭）	2a 47 0d
3	LED enable（LED灯亮起）	2a 4b 0d
4	Change current fe(254)（LED灯暗）	55 07 84 FE 00 FE 00 FE 00 25
5	Change current 1ff(511)（LED灯亮）	55 07 84 FF 01 FF 01 FF 01 1F
6	Change current 190(400)（LED灯亮）	55 07 84 90 01 90 01 90 01 6C
7	Change current 181(385)（LED灯暗）	55 07 84 81 01 81 01 81 01 99
8	Change current 2bc(700)（LED灯亮）	55 07 84 BC 02 BC 02 BC 02 E5
9	Change current 36a(874)（LED灯最亮）	55 07 84 6a 03 6a 03 6a 03 D8
10	mirror cmd（把画面设置正向）	2a f6 01
11	work time reset	2a fe 0d
12	Store current（LED电流和图像翻转保存）	2a fc 0d
13	LED disable（LED灯熄灭并且风扇停转）	2a fb 0d
14	LED enable（LED灯亮起并且风扇转动）	2a fa 0d
15	version cmd（返回版本号字符串）	2a f5 0d（34 4B 20 72 65 6C 65 61 73 65 20 64 61 74 65 3A 32 30 32 30 30 32 32 37 0D 0A）
16	mirror cmd（画面会翻转）	2a f6 00
17	Read PWM(PWM值读取)	2a 54 0d
18	X方向振镜开	55 07 B5 00 00 00 00 00 00 EE
19	X方向振镜关	55 07 B5 00 00 01 00 00 00 ED
20	Y方向振镜开	55 07 B5 00 01 00 00 00 00 ED
21	Y方向振镜关	55 07 B5 00 01 01 00 00 00 EC
22	Xpr Orientation Number=08	55 02 B4 08 EC
23	Xpr Orientation Number=06	55 02 B4 06 EE
24	切换到splash	55 02 11 03 94
25	切换到calibration画面	55 02 1b 0f 7E
26	切换到external	55 02 11 00 97
27	切换到testpattern	55 02 11 01 96
28	LED ON 6540	55 02 80 07 21
29	LED OFF 6540	55 02 80 00 28
30	fan 2 control	2a ef 64
31	fan 2 control	2a ef 00
32	fan 1 control	2a ee 64
33	fan 1 control	2a ee 00
34	work time	2a 4f 0d

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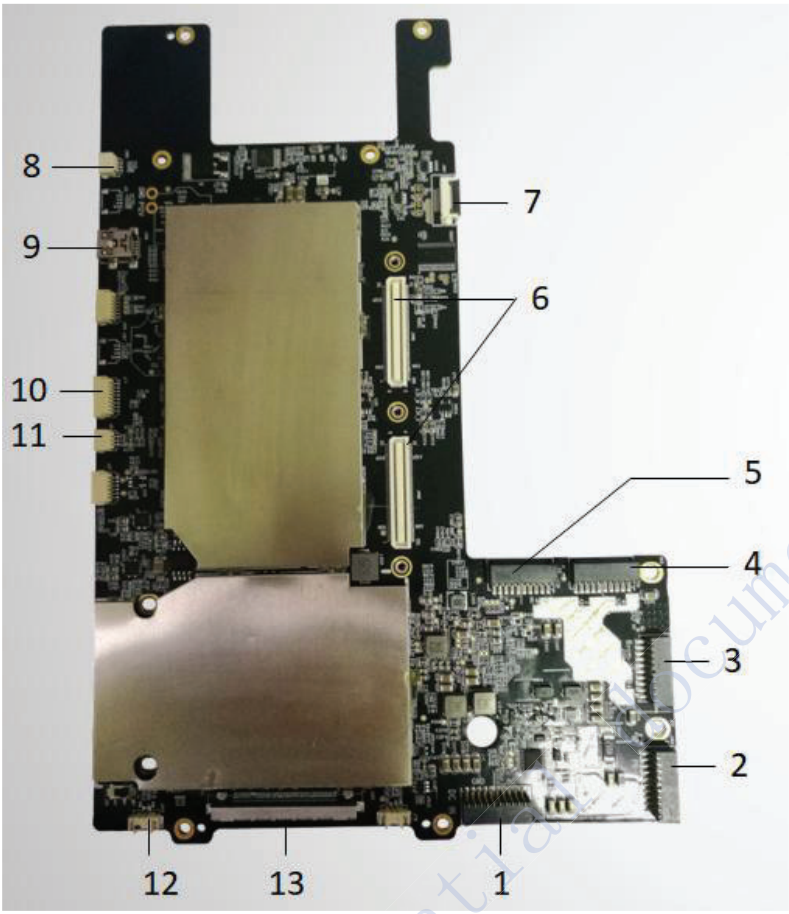
6 DLPC6421 Driver Board outlook



No.	Descriptions	Details	No.	Descriptions	Details
1	Power interface (19V)	1.5mm 10P	8	I2C	1.0mm 3P
2	LED PB connector	1.5mm 10P	9	USB	Mini USB
3	LED B connector	1.5mm 10P	10	MCU-Button interface	1.5mm 8P
4	LED G connector	1.5mm 10P	11	MCU-UART	1.0mm 3P
5	LED R connector	1.5mm 10P	12	Fan connector (5V/12V)	1.25mm 2P
6	DMD connector	AXK500137YG	13	V-By One	FI-RE51S-HF
7	Actuator connector	0.5MM-SMT-12P	-	-	-

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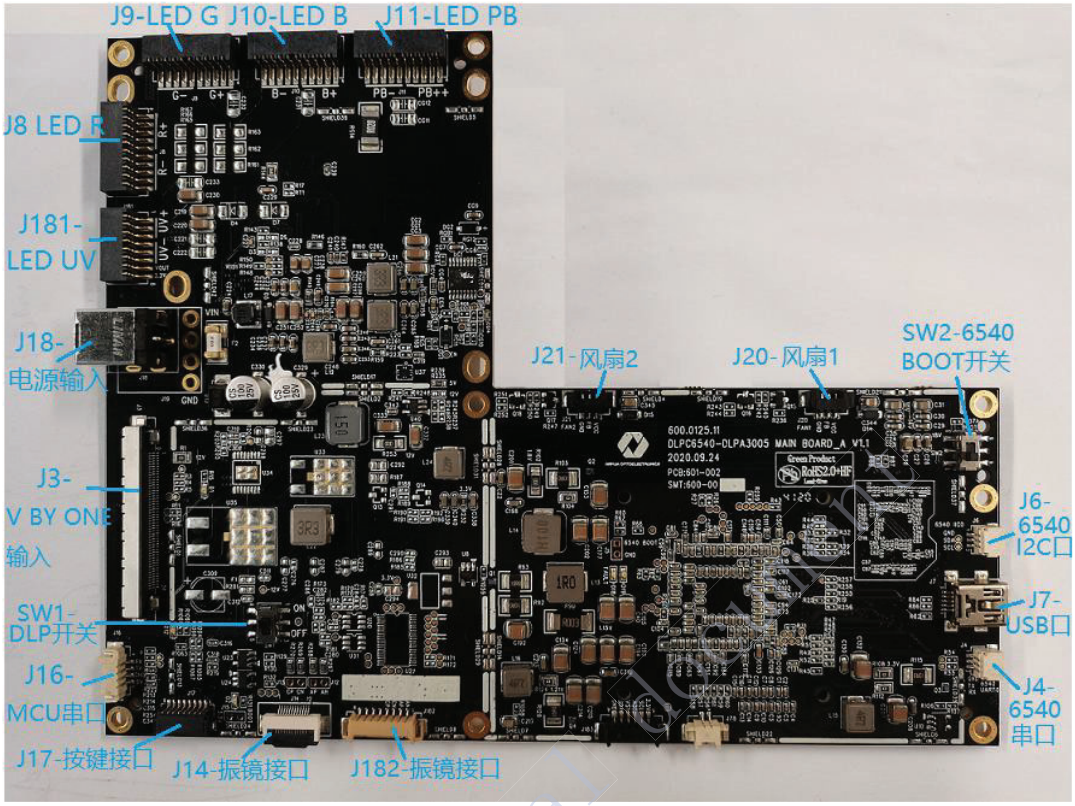
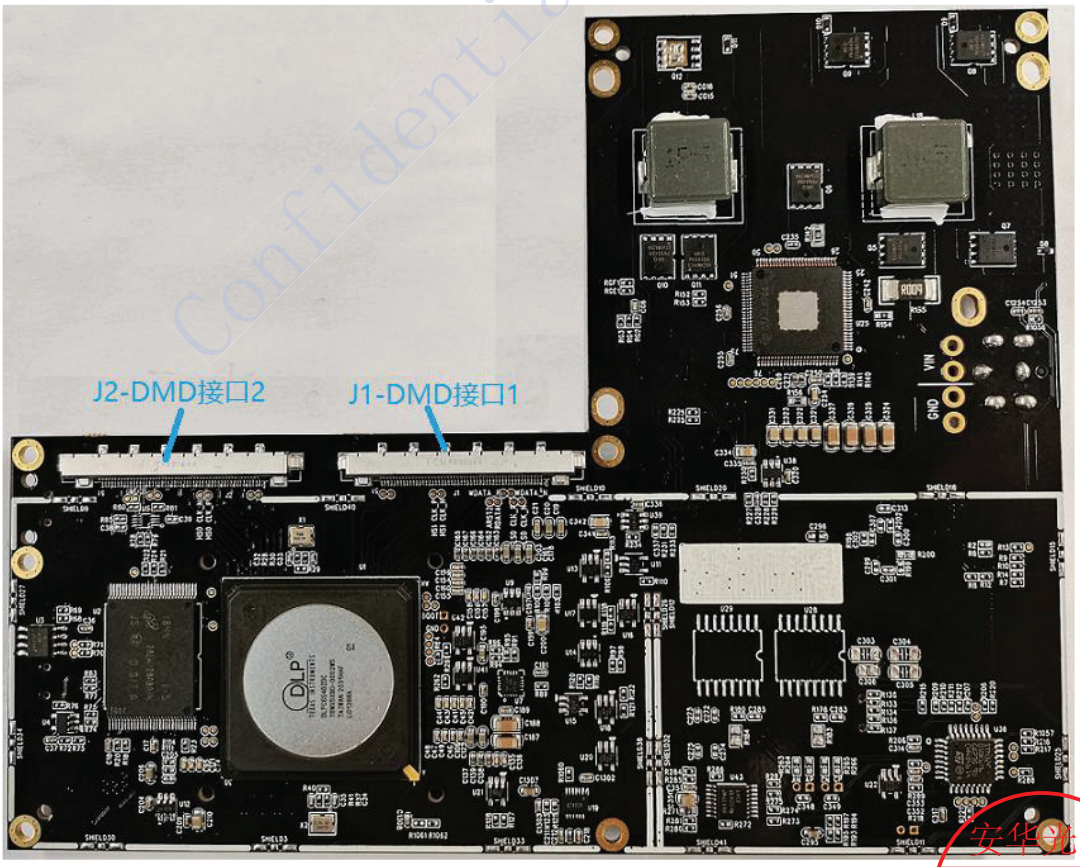
7 DLPC6540 Driver Board outlook





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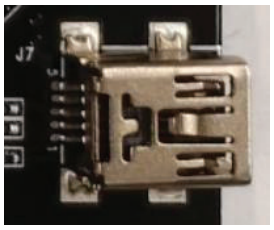
Location	Description	Connector	Pin	Pin definition
J16	MCU UART	Molex:532610471 1.25mm 4P	1	5V
			2	GND
			3	TX
			4	RX

Location	Description	Connector	Pin	Pin definition
J6	DLPC6540 I²C interface	JST:SM03B-SRS 1.0mm 3P	1	GND
			2	SDA
			3	SCL



Mini USB Port (Typical mini USB), location: J7
Function: To debug and burn software for DLPC6540.

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