DMG80480F043_01WTCRJ

Features:

- **Powered by T5L0 ASIC, running DGUS II HMI platform.**
- **4.3 inch, 480*800 resolution, IPS-TFT LCD.**
- **LCD and TP OCA bonding process, with high structural reliability.**
- **CTP cover plate adopts a fillet design (R = 5mm) for easy installation.**
- **COF structure. The entire core circuit of the smart screen is fixed on the FPC of LCM, featured by light and thin structure, low cost and easy production.**

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1. External interface

PIN	Definition	I/O	Functional Description
1	+5V	I	Power supply, DC3.6-5.5V.
2	+5V	I	
3	GND	GND	GND
4	GND	GND	
5	GND	GND	
6	AD7	I	5 input ADCs. 12-bit resolution in case of 3.3V power supply. 0-3.3V input voltage. Except for AD6, the rest data is sent to OS core via UART3 in real time with 16KHz sampling rate. AD1 and AD5 can be used in parallel, and AD3 and AD7 can be used in parallel, which equals to two 32KHz sampling AD. AD1, AD3, AD5, AD7 can be used in parallel, which equals to a 64KHz sampling AD; the data is summed 1024 times and then divided by 64 to obtain a 64Hz 16bit AD value by oversampling.
7	AD6	I	
8	AD5	I	
9	AD3	I	
10	AD1	I	
11	+3.3	O	3.3V output, maximum load of 150mA.
12	SPK	O	External MOSFET to drive buzzer or speaker. The external 10K resistor should be pulled down to the ground to ensure that power-on is low level.
13	SD_CD	IO	SD/SDHC interface,The SD_CK connects a 22pF capacitor to GND near the SD card interface.
14	SD_CK	O	
15	SD_D3	IO	
16	SD_D2	IO	
17	SD_D1	IO	
18	SD_D0	IO	

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19	PWM0	O	2 16-bit PWM output. The external 10K resistor should be pulled down to the ground to ensure that power-on is low level. The OS core can be controlled in real time via UART3.
20	PWM1	O	
21	P3.3	IO	If using RX8130 or SD2058 I2C RTC to connect to both IOs, SCL should be connected to P3.2,and SDA connected to P3.3 in parallel with 10K resistor pull-up to 3.3V.
22	P3.2	IO	
23	P3.1/EX1	IO	It can be used as an external interrupt 1 input at the same time, and supports both low voltage level or trailing edge interrupt modes.
24	P3.0/EX0	IO	It can be used as an external interrupt 0 input at the same time, and supports both low voltage level or trailing edge interrupt modes.
25	P2.7	IO	IO interface
26	P2.6	IO	IO interface
27	P2.5	IO	IO interface
28	P2.4	IO	IO interface
29	P2.3	IO	IO interface
30	P2.2	IO	IO interface
31	P2.1	IO	IO interface
32	P2.0	IO	IO interface
33	P1.7	IO	IO interface
34	P1.6	IO	IO interface
35	P1.5	IO	IO interface
36	P1.4	IO	IO interface
37	P1.3	IO	IO interface
38	P1.2	IO	IO interface
39	P1.1	IO	IO interface
40	P1.0	IO	IO interface
41	UART4_TXD	O	UART4
42	UART4_RXD	I	
43	UART5_TXD	O	UART5
44	UART5_RXD	I	
45	P0.0	IO	IO interface
46	P0.1	IO	IO interface
47	P0.0	IO	IO interface
48	P0.1	IO	IO interface
49	UART2_TXD	O	UART2 (UART0 serial port of OS core)
50	UART2_RXD	I	

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2. Specification parameters

2.1 Product parameters

Main Chip	T5L0
User Interface	50Pin_0.5mm FPC
FLASH	8M Bytes
UI Version	DGUS II / TA
Debugging Tools	HDL662S adapter board power supply
Size	4.3 inch
Resolution	480*800
Active Area (AA)	56.16mm (W)×93.60mm (H)
Viewing Area (VA)	56.56mm (W)×94.00mm (H)
Viewing Angle	Wide viewing angle, typical value of 85°/85°/85°/85°(L/R/U/D)
Backlight Service Life	>10,000 hours
Brightness	250nit
Brightness Control	100-level brightness adjustment (Flickering may occur at 1%-30% of max brightness; not recommended for use in this range)
Note: Use dynamic screen saver to prevent afterimages from prolonged fixed page display.	
Type	Capacitive Touch Panel
Structure	G+G structure with tempered glass surface and hardness≥6H
Light Transmittance	>85%

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2.2 Interface parameters

Item	Conditions	Min	Typ	Max	Unit
Baud Rate	User Set(Configure the CFG file)	3150	115200	3225600	bps
Output Voltage(TXD)	Output 1	3.0	3.3	-	V
	Output 0	-	0	0.3	V
Input Voltage(RXD)	Input 1	-	-	3.3	V
	Input 0	0	-	0.5	V
Interface	UART2: TTL; UART4: TTL; (Only available after OS configuration) UART5: TTL; (Only available after OS configuration)				
Data Format	UART2: N81; UART4: N81/E81/O81/N82; 4 modes (OS configuration) UART5: N81/E81/O81/N82; 4 modes (OS configuration)				

2.3 Electrical specifications

Rated Power	<5W	
Operating Voltage	3.6-5.5V, typical value of 5V.	
Operating Current	230mA	VCC=5V, max backlight.
	100mA	VCC=5V, backlight off.
Recommended power supply: 5V 1A DC		

2.4 Operating environment

Operating Temperature	-10℃ to 60℃ (5V @ 60% RH)
Storage Temperature	-20℃ to 70℃
Operating Humidity	10%-90%RH, typical value of 60% RH.

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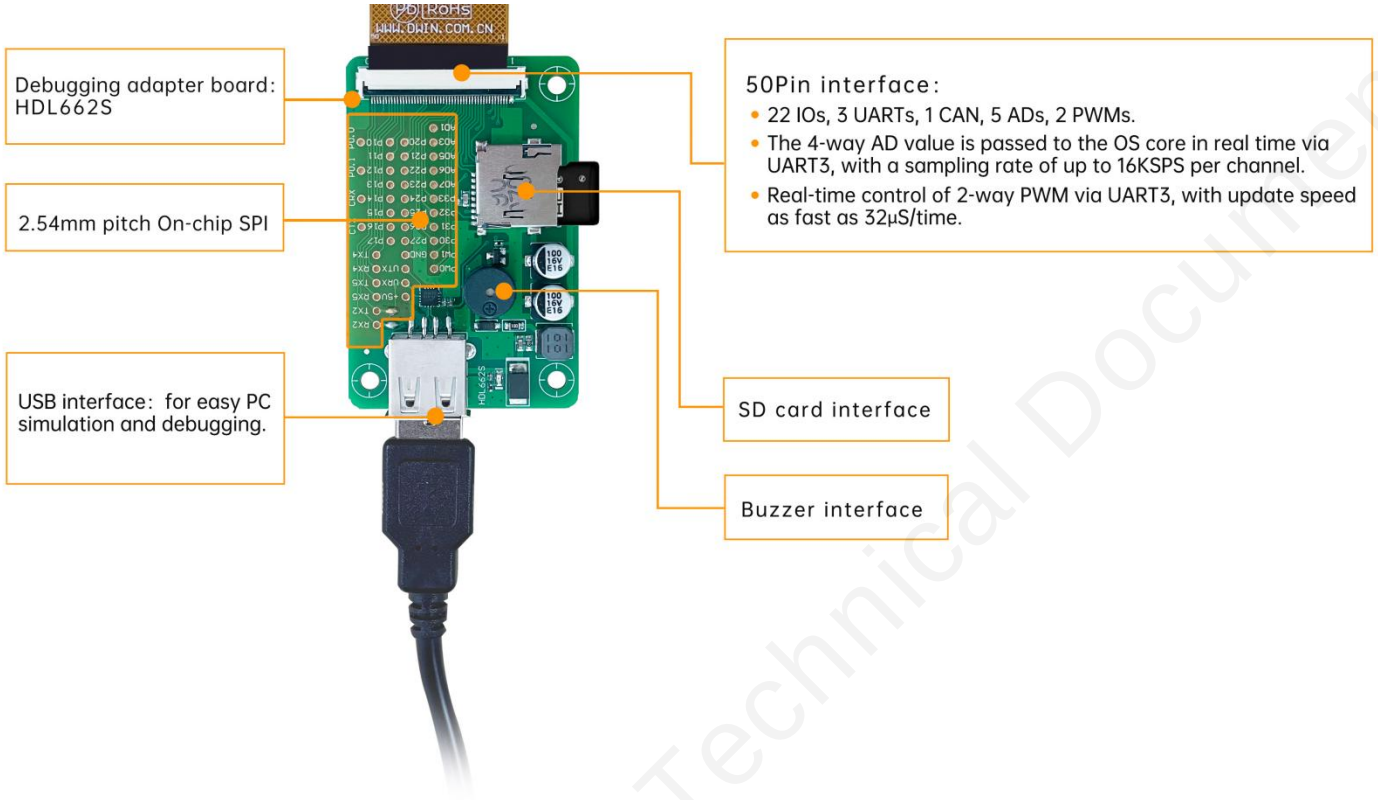
3. Debug

It is recommended for new users of DWIN smart LCMs to purchase official accessories. For more details, please refer to customer service center.



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Operation steps: open serial assistant - custom function command - set command - send.

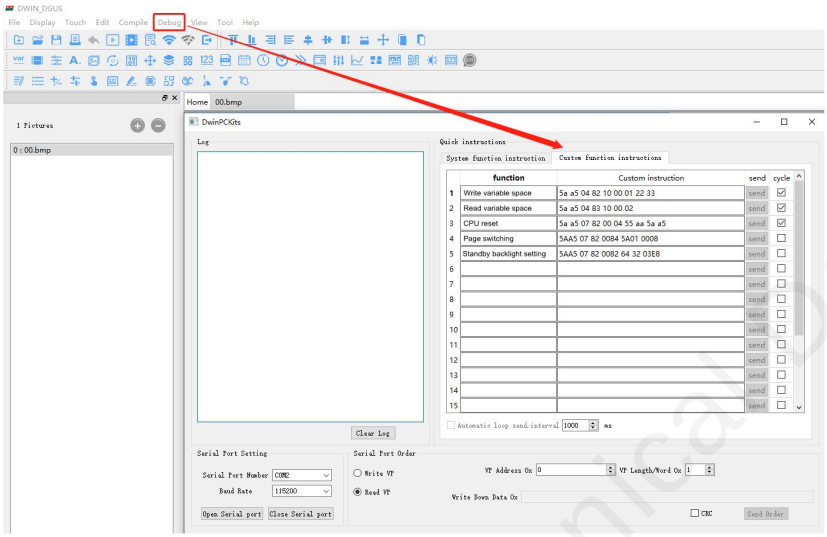
For example:

(1) Page switching

Tx：5AA5 07 82 0084 5A01 0008

(2) Standby backlight setting

Tx：5AA5 07 82 0082 64 32 03E8



DGUS operation

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4. T5L0 ASIC

T5L0 ASIC is a low-power, cost-effective, GUI and application highly integrated single-chip dual-core ASIC designed by DWIN Technology for small-size LCD and mass produced in 2020.

(1) Mature and stable 8051 core which is the most widely used with the maximum operating frequency of T5L is up to 250MHz, 1T(single instruction cycle)high speed operation.

(2) Separate GUI CPU core running DGUS II System:

- High-speed display memory, 2.4GB/S bandwidth. 18-bit color display resolution support up to 1024*768 (TA mode), 854*480 (DGUS mode).
- 2D hardware acceleration and the UI with animation and icons as its main feature is extremely cool and smooth.
- Images and icons stored in JPEG format. Adopt Low-cost 16Mbytes SPI Flash.
- High quality ratio and sound restoration and playback.
- 128Kbytes variable storage space for exchanging data with OS CPU Core and memory.
- 2 10-bit 800KHz DC/DC controllers simplify LED backlight, analog power design and save cost and space.
- Support DGUS development and simulation on PC. Support backend remote upgrade.

(3) Separate CPU (OS CPU) core runs user 8051 code or DWIN OS system and user CPU is omitted in practical application:

- Standard 8051 core and instruction set, 64Kbytes code space, 32Kbytes on-chip RAM.
- 64-bit integer mathematical operation unit (MDU), including 64-bit MAC and 64-bit divider.
- Built-in software WDT, 3 16-bit Timers, 12 interrupt signals support up to four levels of interrupt nesting.
- Support IAP online simulation and debugging with unlimited breakpoints.
- Upgrade code online through DGUS system.

(4) 1Mbytes on-chip Flash with DWIN patent encryption technology ensure code and data security.

(5) Operating temperature ranges from -40℃ to +85℃(IC operating temperature customizable from -55℃ to 105℃).

Low power consumption and strong anti-interference ability. It can work stably on double-sided PCB and passes EMC/EMI test easily.

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5. COF Screen Secondary Development

Standard 8051 core, easy to develop in C language and assembly language.

(1) 22 IOs:

To use output function of IO, you need to open the output control, output strength and peripheral multiplexing power-on initialization configuration. Subsequent use of IO is consistent with the standard 8051 as follows.

```
#include "sys.h"
sbit LED1 = P1^0;
sbit KEY1 = P1^1;
//IOPin initialization
void io_init()
{
	PORTDRV = 0x01;//Driving current is 8mA
	P1MDOUT |= 0x01;//Set P1.0 as output to drive LED1 light
	P1MDOUT &= 0xFD;//Set P1.1 as input to read the voltage level change of the pin
}
void main(void)
{
	u16 cnt_1ms;
	u16 key1_sta;//Store the voltage level state of the KEY1 pin
	sys_init();//System initialization
	io_init();//IOPin initialization
	cnt_1ms = 0;
	key1_sta = KEY1;
	while(1)
	{
		cnt_1ms++;
		sys_delay_ms(1);//Delay sub-function, LED1 blinks every 500ms.
		if(cnt_1ms==500)
		{
			LED1 = !LED1;
			cnt_1ms = 0;
		}
		//If the voltage level of the pin has changed, it will be updated in the interface
		if(key1_sta!=KEY1)
		{
			key1_sta = KEY1;
			sys_write_vp(0x1000,(u8*)&key1_sta,1);
		}
	}
}
```

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(2) 3 UARTs:

High-speed serial port, supporting up to 3225600bps,as follows.

```
#include "sys.h"
#include "uart2.h"
void main(void)
{
	u16 len;
	sys_init();/System initialization
	uart2_init(115200);//Initialize serial port 2
	while(1)
	{
		if(uart2_rx_sta&UART2_PACKET_OK)//Received serial packet
		{
		 len = uart2_rx_sta&UART2_PACKET_LEN;//Get the length of the serial packet without "\r\n" or '\n' terminator
		 uart2_buf[len++] = 0;//Add 2 empty strings at the end
		 uart2_buf[len++] = 0;
		printf("T5L_C51:%s\r\n",uart2_buf);//Return the received packet to the sender with the prefix "T5L_C51:"
		sys_write_vp(0x2000,uart2_buf,len/2+1);//At the same time display the packet to the interface
		uart2_rx_sta = 0;//Reset means that this serial port packet has been processed

		}
	}
}
```

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(3) 1 CAN:

Only the special function registers of the CAN need to be configured as follows.

```
void CanInit()
{
    P0MDOUT = 0x04;    //P0.2(CAN_TX) is configured as output
    P0 = 0xFF;         //Output high voltage level
    ADR_H = 0xFF;      //Configuring DGUS variable memory addresses
    ADR_M = 0x00;
    ADR_L = 0x60;
    ADR_INC = 1;       //Configure address increments
    RAMMODE = 0x8F;    // Write mode
    while(!APP_ACK);   //Waiting for confirmation,
     Among answers of Hardware to 8051 occupied variable memory request, 1=OK and 0=BUSY, which need to continue to wait.
    DATA3 = 0x1A;      //Variable memory address 0xFF:0060 assignment
    DATA2 = 0x17;
    DATA1 = 0x0F;
    DATA0 = 0;
    APP_EN = 1;
    while(APP_EN);     //Wait for the data operation to be completed, and reset after the operation is completed
    DATA3 = 0;         // Acceptance register 0xFF:0061 assignment reset
    DATA2 = 0;
    DATA1 = 0;
    DATA0 = 0;
    APP_EN = 1;
    while(APP_EN);     //Wait for the data operation to be completed, and reset after the operation is completed
    DATA3 = 0xFF;      //Acceptance Mask Register 0xFF:0062 all set to 1, and no acceptance of reception
    DATA2 = 0xFF;
    DATA1 = 0xFF;
    DATA0 = 0xFF;
    APP_EN = 1;
    while(APP_EN);     //Wait for the data operation to be completed, and reset after the operation is completed
    RAMMODE = 0;       //Terminate access to DGUS variable memory
    CAN_CR = 0xA0;     //Open CAN and configure FF0060-FF0062
    while(CAN_CR&0x20);  //Execute the configuration of FF0060-FF0062
    ECAN = 1;          //Open the CAN interrupt
    EA = 1;            //Open the total interrupt
}
```

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(4) 5 A/Ds: 12-bit, supports sampling to 16-bit.

Only the special function registers of the A/Ds need to be configured as follows.

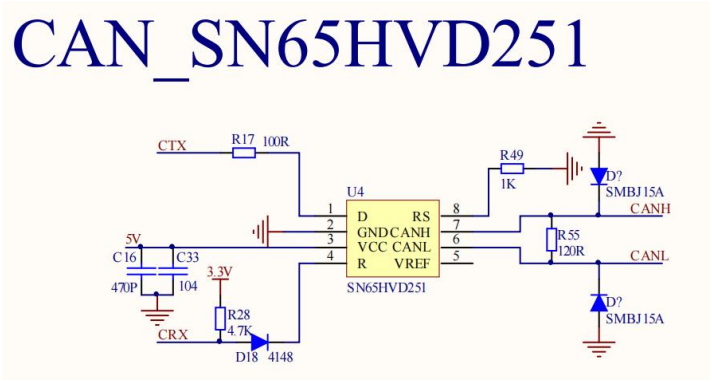
```
#include "sys.h"
#include "adc.h"
void main(void)
{
	u16 ad;
	float vol;
	sys_init();//System initialization
	while(1)
	{
		ad = adc_read_avg(ADC_CHANNEL0,10);//1.Read the ad value of channel 0
		vol = ad*(3300.0f/4095);//2.Calculate the voltage in mV
		sys_write_vp(0x2000,(u8*)&ad,1);//Update the ad value
		sys_write_vp(0x2001,(u8*)&vol,2);/Update the voltage value
	}
}
```

(5) 2 PWMs: 16-bit high accuracy, adjustable resolution.

Only need to configure the frequency and duty cycle of PWM as follows.

```
void Pwm_0()
{
	u8 i=0;
	u8 temp[6]={0xAA,0x20,0x42,0x56,0x78,0};//Configure the duty cycle of pwm_0 to 100%
	Write_Dgus(0x87,0x2042);//Configure the frequency to 100khz
	Write_Dgus(0x86,0x5A01);//
	for(i=0;i<5;i++) //Calculate the checksum
	    temp[5]+=temp[i];
	for(i=0;i<6;i++)//Configure the duty cycle
	   OneSendData3(temp[i]);
}
```

(6) CAN circuit design parameters.



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6. Packing capacity & dimension

Dimension				
Dimension	68.26(W) ×109.47 (H) ×4.50(T) mm			
Net Weight	65g			
Packing Capacity				
Model	**Dimensions**	**Layer**	**Quantity/Layer**	**Quantity(Pcs)**
Carton1：	220mm(L)×160mm(W)×47mm(H)	1	4	4
Carton2：	250mm(L)×200mm(W)×80mm(H)	1	8	8
Carton3：	320mm(L)×270mm(W)×80mm(H)	1	16	16
Carton4：	415mm(L)×315mm(W)×240mm(H)	-	-	100

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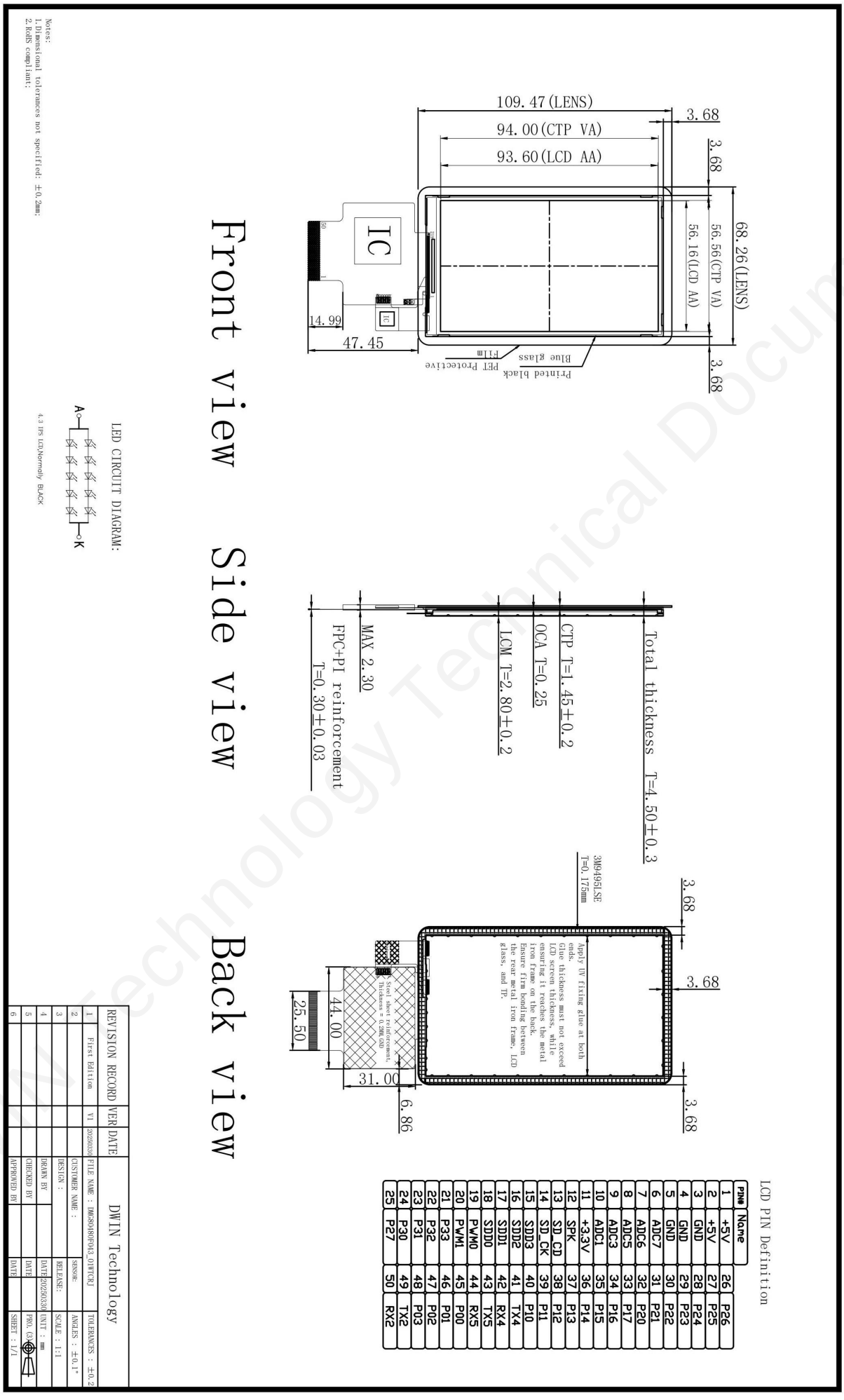

PIN#	Name			Name	PIN#
1	+5V			P26	26
2	+5V			P25	27
3	GND			P24	28
4	GND			P23	29
5	GND			P22	30
6	ADC7			P21	31
7	ADC6			P20	32
8	ADC5			P17	33
9	ADC3			P16	34
10	ADC1			P15	35
11	+3.3V			P14	36
12	SPK			P13	37
13	SD_CD			P12	38
14	SD_CK			P11	39
15	SDD3			P10	40
16	SDD2			TX4	41
17	SDD1			RX4	42
18	SDD0			TX5	43
19	PWM0			RX5	44
20	PWM1			P00	45
21	P33			P01	46
22	P32			P02	47
23	P31			P03	48
24	P30			TX2	49
25	P27			RX2	50

REVISION RECORD			VER	DATE
1	First Edition		V1	20250330
2				
3				
4				
5				
6				

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FILE NAME : DMG80480F043_01WTCRJ
CUSTOMER NAME :
DESIGN :
DRAWN BY
CHECKED BY
APPROVED BY

TOLERANCES : ±0.2
SENSOR
RELEASE:
ANGLES : ±0.1°
SCALE : 1:1
DATE 20250330 UNIT : mm
DATE PRO.
DATE SHEET : 1/1

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7. Revision records

Rev	Revise Date	Content	Editor
00	2025-05-09	First Edition	Xu Ying

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