Beijing DWIN Technology Co., Ltd

Product Specifications

Description	**HMI (UART LCM)**
Model Name	**DMG10768K084_01W**
Date	**2011/05/11**
Revision	**V2.3**

Customer Approval	
Date	
The above signature represents that the product specifications, testing regulation, and warrantly in the specifications are accepted	

Prepared	**Check**		**Approved**
	R&D	**Manufacture**	
2011.5.11	2011.5.11	2011.5.11	2011.5.11

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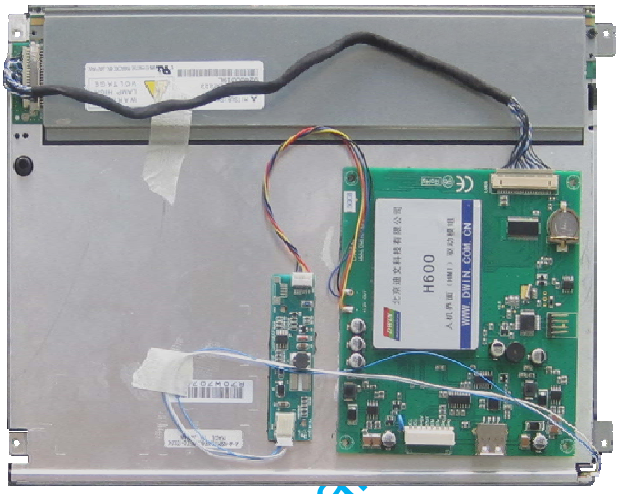
DMG10768K084_01WN:



DMG10768K084_01W

Intelligent Display Terminal

Data Sheet

Size: 8.4inch

Resolution: 1024×768

Version	Content	Revise Date
VER 2.0	English Version	2009-11-01
VER 2.1	24 bits color H600 drive terminal	2010-07-01
VER 2.2	Updated reliability test and assembly dimensions chart	2011-01-16
VER 2.3	Updated dimensions	2011-05-11

TFT HMI MODULE

THE FULL RANGE OF PRODUCTS:
BASIC TYPE, STANDARD TYPE, ENHANCED TYPE

To satisfy the widely applications of different industry.

Basic Type: Simple in external, inexpensive, a substitution for TN, STN without the function of GUI. Available for most of the working environments.

Standard Type: 100% preburning, temperature testing and dead pixels rejection before delivery based on Basic Type, the price is 30%—50% higher in bulk price.

Enhanced Type: Based on Standard Type, it was manufactured with high-standard screen and special disposals for adapting the rigors environment (e.g. Intrinsic Safety Anti-explosion).

Integrated standard fonts & Extensible user fonts

Intelligent LCD terminal was assembled with 5 fonts before delivery, which include 8*8 ASCII, 16*16 GBK, 32*32 GB2312, 12*12 GBK, and 24*24 GB 2312.

Moreover, extensible fonts are also available according to the requirement of users such as GBK, BIG5, SJIS, HANGUL, and UNICODE. Fonts designing function is supported in same time.

Optional operation modes

The module can be operated by Keyboard or Touch Screen.

The coordinate numerical values of the touched screen could be obtained directly, as well as key assignments. With PC-settings and touching/keyboard-control configuration files downloading, operation effects will be visual.

Visual display

Wide in viewing angle, various in color; the brightness of screen can be adjusted in 64 levels (**CCFL and OLED are not included**), which could provide an easier operation and monitoring environment for users.

Graphical User Interface(GUI) operation

All the Intelligent LCD terminals are operated under the GUI environment; the development of GUI and software/hardware could be carried out in the sometime, which saves the manufacturing cost and circle.

Multi-controller option

Connecting to the controllers (including PC, SCM, PLC, DSP, and ARM) with Serial port.

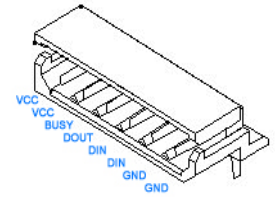
The terminal could be driven with the level of TTL / CMOS and RS232 mostly. Moreover, USB download function is available for specific terminals, which could provide the baud rates up to 921600bps.

CONTENTS

Technical Specification

Terminal Characteristics		
Terminal Type	DMG10768K084_01W	
Driver	H600	
Category	Advanced Type	
TFT-ID	0x04	
Display COLORS	16.7M color TFT HMI	
Size （inch）	8.4”	
Resolution (wxRGBxh，pixel)	1024xRGBx768 [1]	
Backlight	LED	
Brightness	Typical Brightness 500nit(N),400nit(T)	
Contrast Ratio	600	
Reaction Time（ms)	12	
Viewing Angle（L/R/U/D）	80/80/60/80	
Screen Mode	Digital	
Note [1]: 1.Modules can work in the 90°pattern rotation after software modification. (768x1024). 2. Viewing angle is also adjustable to 6 o’clock or 12 o’clock position. (Pre-order required before purchase).		
Direct current electric characteristics		
Input Power Voltage（V）	7.0 – 26.0	
Electric Current（mA, Typical value） （input [2]：VCC=12V）	Backlight on	Backlight off
	870	250
Note [2]：The input voltage and current are measured at the pin socket of the terminal in the DC Electrical Characteristics Test		

Customer Interface [3]



Pin Name	Number	Type	Illustration
VCC	1,2	P	Power input
BUSY	2	O	Full signal of serial buffer
DOUT	3	O	Serial output [3]
DIN	5,6	I	Serial input [3]
GND	7,8	P	Public place

I:INPUT，O:OUTPUT，

Note [3]: 1. Using 8Pin 2.54 mm spacing socket: Molex 0022057085

2. Direction of the signal was defined with HMI，'I' refers to the signal from the user's system transmitted to the HMI.

3. The same defined pin has connected together in the HMI

Interface	
Serial Mode [4]	Universal Asynchronous Receiver/Transmitter (UART),8N1 mode(1 start bit, 1 stop bit,8 data bits, no parity bit), baud rate:1200-115200bps.
USB Interface [4]	Support 921600bps USB/UART Converter
Touch Panel	No （DMG10768K084_01WN） Support 4line resistance touch panel(DMG10768K084_01WT)Accuracy is ±1%
Key-board Interface	No
Video Interface	No
Real-time clock(RTC)(Backup battery)	Support Gregorian calendar and lunar calendar RTC(2000-2099)
Notes[4]： Baud rate available for Serial or USB.	

1. Serial：

(bps)	1200	2400	4800	9600	19200	38600	57600	115200 (Default)
Bode Set	0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07

2. USB： 921600bps;
3. Use 0xE0 configured the serial port baud rate (see Command Set), not lose when power off.

Memory Space	
Font Space [5]	32MB ,60 fonts:GBK,BIG5,SJIS,HANGUL,UNICODE ,fonts designed by users are also available.
Image Space	352MB(Up to 118 full-screen images storage space) , can extended to 3GB
Serial Access Memory Space (RMA)	Up to 32MB and overlapping with the image memory space.

note[5]：1.pre-loaded with 5 fonts before delivery, located at 0x00 (ASCII) , 0x20 (12 lattice GBK) 0x21 (16 lattice GBK) , 0x22 (24 lattice GB2312) , 0x23 (32 lattice GB2312) 。

Dimension	
Active area size	170.5(w)×127.9(h) mm
Dimensions	214.4 (w)×151.2(h)×37.6 (N) /37.6 (T) mm
Net Weight	475g(DMG10768K084_01WN) 555g(DMG10768K084_01WT)
Working Environment (limited by the temperature range of LCD screen)	
Working Temperature	-40℃ —+85℃
Storage Temperature	-40℃ —+85℃
Command Set	
Command Set	Using the unified Command Set “DWIN HMI command set”
Model Selection	
Models	DMG10768K084_01WN support RTC DMG10768K084_01WT support touch panel, RTC

Command List

Categories	Command	Command Parameter	Illustration	Support
Hand shake	0x00	No	Check the configuration and version	√
Parameter Configuration	0x40	Fcolor+Bcolor	Palette setting	√
	0x41	D_X（0x00-0x7F）+D_Y（0x00-0x7F）	Character space setting	√
	0x42	X+Y	Move the appointed color to background color palette	√
	0x43	X+Y	Move the appointed color to foreground color palette.	√
	0x44	Mode+X+Y+Wide（0x01-0x1F）+Height（0x01-0x1F）	Cursor display mode setting	√
Text Display	0x53	X+Y+String	8X8 lattice ASCII character	√
	0x54		16×16lattice GBK	√
	0x55		32×32 GB2312	√
	0x6E		12×12 GBK	√
	0x6F		24×24 GB2312	√
	0x98	X+Y+Lib_ID+C_mode+C_dot+Fcolor+Bcolor+String	Display any lattice，any encoded string.	√
Points Setting	0x50	（x,y）$_0$+（x,y）$_1$+……+（x,y）$_n$	More points setting in the background color.(delete point)	√
	0x51		More points in the foreground color.	√
	0x74	X+Y_s+Y_e +Bcolor+（y, Fcolor）$_1$+……+（y, Fcolor）$_n$	Dynamic curve display.	√
	0x72	Address(H:M:L)+Data_word$_0$+……+ Data_word$_n$	Operation to the buffer of video card.	√
Lines &Polygon	0x56	$(x,y)_0$+$(x,y)_1$+……+$(x,y)_n$	Polygon display: Line the points with foreground colored segment.	√
	0x5D		Polygon delete: Line the points with background colored segment	√
	0x75	X+Y+Height_max+Height$_0$+ Height$_1$+……+ Height$_n$	Spectrum display: display a continuous vertical line with the same end in a fast rhythm.	√
	0x76	X+X_dis(0x00-0xFF)+Y_0+ Y_1+……+ Y_n	Line chat display（Xi=X+i*X_dis,Yi=Yi）	√
Arcs	0x57	$(Type,x,y,r)_0$+$(Type,x,y,r)_1$+……+ $(Type,x,y,r)_n$	Arcs display	√
Rectangles	0x59	$(x_s,y_z,x_c,y_c)_0$+$(x_s,y_z,x_c,y_c)_1$+……+ $(x_s,y_z,x_c,y_c)_n$	Show rectangles: display rectangles by foreground color）	√
	0x69		Delete rectangles: display rectangles by background color	√
Areas Operation	0x64	X+Y+Color	Fill in the appointed area	√
	0x52	无	Clear screen	√
	0x5A	$(x_s,y_z,x_c,y_c)_0$+$(x_s,y_z,x_c,y_c)_1$+……+ $(x_s,y_z,x_c,y_c)_n$	Areas deleting	√
	0x5B		Fill in more than one appointed areas.	√
	0x5C		Areas color changing	√
	0x60	$(x_s,y_z,x_c,y_c,n)_0$+$(x_s,y_z,x_c,y_c,n)_1$+……+ $(x_s,y_z,x_c,y_c,n)_n$	Appointed areas ring-shifting to the left	√
	0x61		Appointed areas ring-shifting to the right	√
	0x62		Appointed areas shifting to the left	√
	0x63		Appointed areas shifting to the right	√
Pictures & Icons	0x70	Picture_ID	Display a full screen image	√
	0x7B	Picture_ID	Display a full screen image and calculate the cumulative sum.	√
	0x71	Picture_ID+X_s+Y_s+X_e+Y_e+X+Y	Display part of a picture in the memory（background display）	√
	0x9C	Picture_ID+X_s+Y_s+X_e+Y_e+X+Y	Display a part from an image which stored in the module (background not shown), automatically restore the current image background.	√
	0x9D	Picture_ID+Xs+Ys+Xe+Ye+X+Y	Display part of a picture in the memory（background does not display）	√
	0xE2	Picture_ID	Picture saving	√
	0x99	$(x,y,Icon\_ID)_0$+$(x,y,Icon\_ID)_1$+……+ $(x,y,Icon\_ID)_n$/无	User-defined icons display	√
Animation	0x9A	0xFF/Pack_ID	Turn off/on the automatic implementation of the user’s pre-setting command set	√
Temporary Buffer Operation	0xC0	Address(H:L)+ Data_word$_0$+ ……+ Data_word$_n$	Writing data to the temporary buffer	√
	0xC1	0x01+Address+Pixel_Number(H:L)	Display the pre-set date points in the temporary buffer	√
		0x02+Address+Line_Number(H:L)	Display the pre-set date lines in the temporary buffer	
		0x03+Address+X+Y+ Line_Number+D_x+Dis_x+K_y+Color	dynamic curve scaling: connecting the data points in the temporary buffer zone	
		0x04+Addr1+X+Y+Line_Number+0x01+Dis_x+Color1+ Addr0+ Color0	Oscillometer: connecting the data points in temporary buffer in a flicker-free high-speed	
		0x05+Address+X+Y+Line_Number+D_x+Dis_x+M_y+D_y+	Using the data in the temporary buffer to display line charts.	

Temporary Buffer Operation	**0xC1**	Color		√
		0x06+Address+X+Y+Line_Number+D_x+Dis_x+M_y+D_y+Color+Ymin+Ymax	Using the data in the temporary buffer zoom to display a window-constrained bi-directional line chart	
		0x10+Address+Frame_Number	Using the command in the temporary buffer to perform a synchronize display	
	0XC2	<Address>+<Data_length>	Read back data from the temporary buffer.	√
Database Operation	**0xF2**	0xF2+0xF2+0x5A+0xA5+Lib_ID	Font modification	√
	0x90	0x55+0xAA+0x5A+0xA5+Address（H:MH:ML:L）+Data	Write data to the user’s database（32MB）	√
	0x91	Address+Read_Length(H:L)	Read data from the database（32MB）	√
Key board Operation	**0x71**	K_code	Key code uploading	
	0xE5	0x55+0xAA+0x5A+0xA5+K_Code$_0$+ ……+K_Code$_n$	Key code port modification	
Touch pad Operation	**0x72**	Touch_X+Touch_Y	Uploading the last data after the touch-screen is released, (which can turn off by 0xE0 command)	√
	0x73		Uploading data when pressing the touch panel(uploading once only by setting the command of 0xE0)	√
	0xE4	0x55+0xAA+0x5A+0xA5	Touch panel adjusting	√
	0x78	Touch_Code	Uploading the defaulted key code when switching the touch interface.	√
	0x79			
Buzzer Operation	**0x79**	BZ_time	Buzzing once only（10×Bz_time mS）	√
Video Operation	**0x7A**	Work_Mode+Video_mode+Video_CH	Switching HMI and video mode (support CVBS/S-Video signal input, NTSC/PAL formats)	
Backlight Control	**0x5E**	Non or 0x55+0xAA+0x5A+0xA5 + V_ON+V_OFF+ON_TIME	Turn off the backlight or control the backlight mode by touching or keying.	√
	0x5F	Non or PWM_T(0x00-0x3F)	Turn the backlight on or adjusting the brightness by PWM.	√
Clock Operation	**0x9B**	0x5A、0x5B(read)/0x00(off)/0xFF+M+TM+Color+X+Y(ON)	Clock on/off ; read the clock	√
	0xE7	0x55+0xAA+0x5A+0xA5 + YY:MM:DD:HH:MM:SS	Clock adjusting	√
Parameter Configuration	**0xE0**	0x55+0xAA+0x5A+0xA5+Panel_Set+Bode_Set+Para1	Configuring the user's serial port speed and the touch-screen data uploading.	√
Algorithm	**0xB0**	Downlode:0x01+PY_Code answer: 0x01+HZ_num+String		√
		Download :0x02+A+B+C+D answer: 0x02+E+F	Calculating(A × B + C) / D, E is 4 bytes quotient, F is 2 bytes remainder	
		Download :0x03+Data_Pack0 answer: 0x03+ Data_Pack1	Array listing of unsigned integers(2 bytes)	
		Downlode:0x04+PY_Code answer: 0x04+HZ_num+String	PINYIN input based on GBK	√
Volume Operation	**0x30**	Start_Seg+Play_number+Play_time	Play the music in the appointed zoom	
	0x32	Volume_L+Volume_R+0x00	Volume adjusting	
	0x33	0x55+0xAA+0x5A	Stop playing	
	0x3F	‘OK’	Sound-op response	
Configuration file Operation	Pic_Now+(x_s,y_z,x_e,y_e)+P_next+P_cut+Touch_Code		Touch interface automatically switching (0x1E font files)	√
	Pic_Now+0x00:K_Code+Pnext+P_cut+Touch_Code		Touch interface automatically switching (0x1B font files)	√
	Delay+Length+ Command		Play auto-instruction(0x1C font files)	√
	Pic_ID+(x_s,y_z,x_e,y_e)		Icon Character Definition (0x1D font files)	√
	Command_Length+Command+String		Uploading the commands pre-settled by users(0x1A font file)	√
Upgrading	DWIN_M600_BOOT!		Upgrading the core software on line through Serial	√

Note ：√ **Command available in this module**

Reliability Test

Temperature and humidity test

Test Item	Test Method
High temperature-working	85℃，240H
High temperature-storage	85℃，240H
High temperature high humidity-working	60℃，90%RH，240H
Low temperature-working	-40℃，240H
Low temperature-working	-40℃，240H
Cold and hot impact	-40℃（1Hr）~ 85℃(1Hr)，200 cycles

Impact and vibration test

Test Item	Test Method
Impact test (without power)	1 .Vibration level: 1470m / s 2 (equivalent to 150G.) 2. Waveform: half sine, 2ms 3.Vibration frequency：total three vibration inputs（each direction of three mutually perpendicular axis has a vibration input）
Vibration test (with power)	1.Frequency range: 8-55 Hz 2. Stoke: 1.5mm 3.Vibration: half-wave, vertical axis（X，Y，Z axis：2 hours） 4.Scan: 10G, 55-400 Hz 5.Period: 15 minutes

Precautions

1. Applied for LCD terminals:

LCD terminals are precise instrument. For preventing LCD terminals from damage, please read the following precautions carefully before using:

1) Please use the mounting hole on the module’s corners for installation and avoid bending or wrenching during assembling process. Do not drop, bend or twist the TFT-LCD module during handling;

2) The protective film(Laminator) applied on the screen should be peeled off in the course of using, otherwise, it may affects the sensitivity or leads to malfunction ;

3) Modules are fragile products that any drops, beats and strong vibrations may cause damages ;

4) The visual effectiveness of the terminal changes along with the viewing angles. So, users should take a full account of the viewing position.

5) Caution with the polarizing film from being scratched by hard objects.

6) Avoid touching the power inverter, which may cause unnecessary damages.

7) Using and saving the modules in its temperature range to avoid damages. LCD crystallization occurs if working below lowest temperature requirements, resulting in permanent damages.

8) Disassembling the module might cause permanent damages, which should be strictly avoided;

9) Do not wipe the terminals with gasoline, alcohol and other chemicals. Cottons and soft cloths are available.

10) To continuously improve the performance of HMI module, the terminals and data sheet will do continuously upgrade and revision, the information is subject to change without prior notice!

2, Storage:

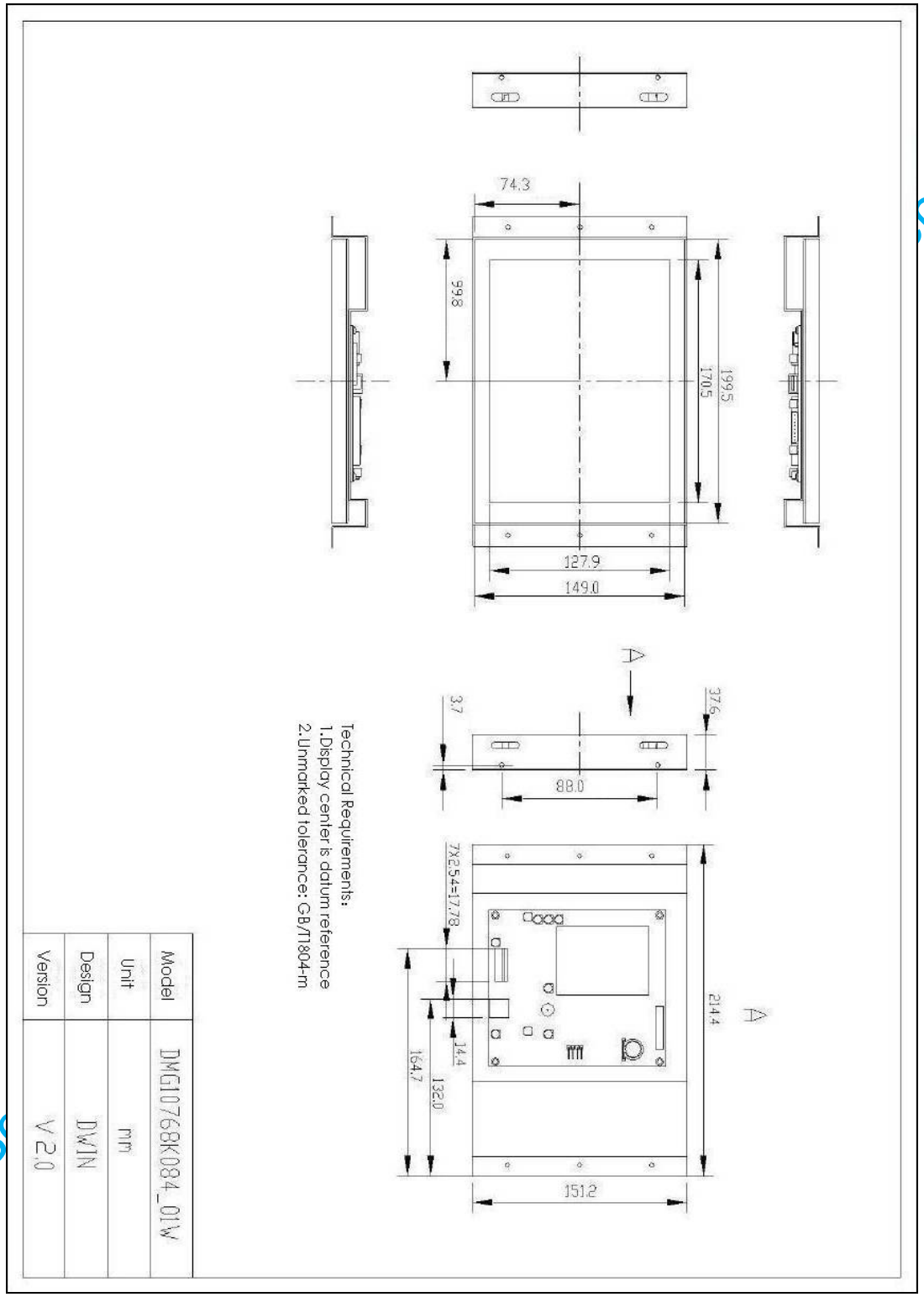
If you need to storage the modules for a long time, we recommend you of the following ways:

1) Keep in dark and avoid exposure of bright light ;

2) Do not put anything on the screen;

3) Store the module at a room temperature place.

Assembly Dimension Chart



Appendix 1 Naming Rules

Naming Rules

e.g. DMT48270K043_01WN		
Illustration	DM	DWIN HMI
	T	T=65K color HMI G=16.7M color D=256 color
	48	48: resolution in width. 48=480, 64=640
	270	270: resolution in height
	K	K=advanced type, T=basic type, S=standard type [1] C=Consumption Type
	043	dimension,056=5.6 inch,035=3.5 inch
	_0	0=with shell,1=no shell
	1	Series number of different hardware
	W	W=wide temperature range N=normal temperature
	N	N=no TP,T=with TP, K=with keyboard, Z=ODM [2]

Note [1]: T=Basic, simple peripherals, low price, mainly replace the applications of monochrome or no GUI function color screen.
S=Standard, compare with the basic, 100% aging, high and low temperature testing, bad point eliminate in the factory. Batch price higher than the same type of basic about 30%-50%
K=Enhanced, compare with the standard, the main difference is the choice, special protective of screen, etc, in order to satisfy a few demanding application requirements(such as explosion proof)

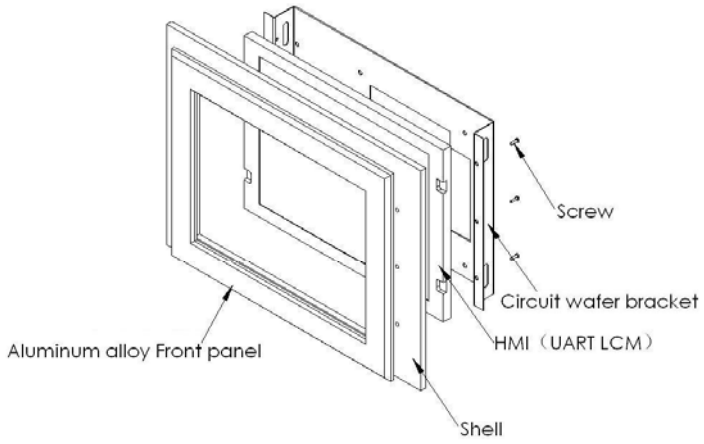
Note [2]: Peripherals explanation
TP(Touch Panel): touch screen(4 line resistance screen)
KB(Keyboard): matrix keyboard interface, according to different type configuration 4*4, 6*6 and 8*8 matrix keyboard interface.
RTC(Real Time Clock): real time clock, 2000-2099 years in the Gregorian calendar and the lunar clock, can be display on the screen.(0x9B command)

Appendix 2 Accessories

Accessories

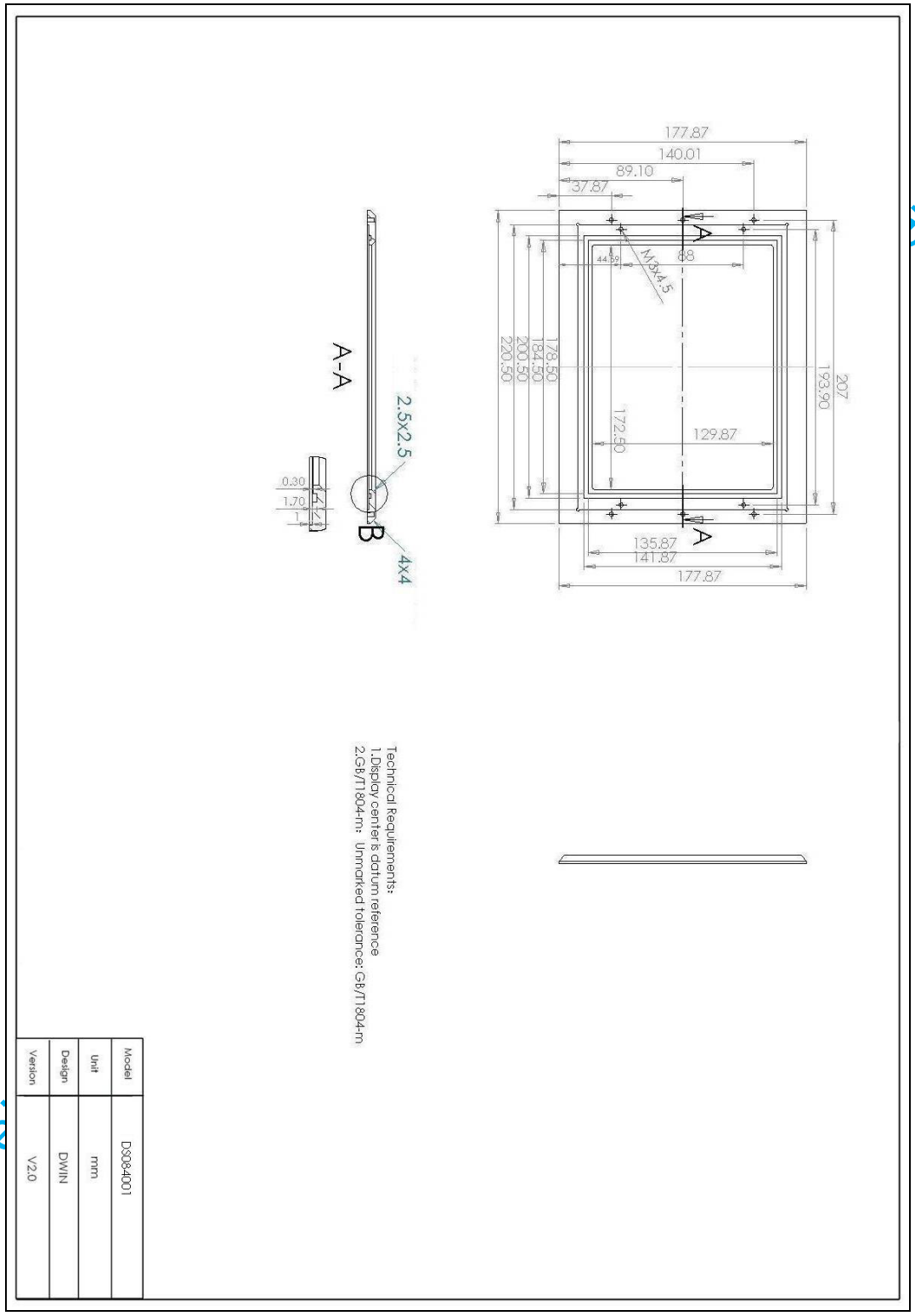
Configuration Method	Name	Model	Illumination	Picture
Optional	Aluminum alloy panel	DS084001		
Notes: More information about the accessories please check the DWIN Accessory Book or contact with sales manager.				

Assembly Sketch Map(DS084001)



DMG10768k084-01w

Panel Dimensions Chart



Appendix 3 Testing Summary:

There are 4 classes of the LCD panel quality defined by ISO in 2001: Class 1 is the highest rating and does not allowed any dead pixels. The last rating is Class 4, allowed 10N dead pixels. Under normal circumstances, we are using the panels of Class 2 in serial T which allows three dead pixels, but if there are two dead pixels appeared within 5 * 5 pixels are also not allowed.

1) Dead pixels.

The pixels appears pure black under the totally black background or pure black under white and in the color switching of red, green and blue, it also displays in black or white in the same position that can be assumed to be a dead pixel.

2) Bright pixels

Pixels that showing the color of red, green and blue when the background color is black are called bright pixels which are also unnormal.

3) Dark pixels

Pixels that showing the color of non-pure red, green and blue when the background color is black are called dark pixels which are also unnormal.

Appendix 4 FAQ:

Q1. When the terminal and the MCU are connected, it displays normally on the single-step implementation of the control procedure. But when the terminal is powered directly, it doesn't response.

A: Please check whether the input power to the MCU are delayed or the shakehand acknowledgment are reset; you may connecting the MCU to the PC, using the Terminalassistant Software to check the baud rate or the commands sent by MCU. If both the MCU and terminal can communicate with PC rather than communicate with each other, then measure whether the output signal of MCU are standard RS232 signal by using an oscilloscope.

Q2. Do we need to clear the screen before showing up texts?

A: We don't need to clear the screen except when displaying the transparent command (0x98).

Q3. Why the terminal didn't response to the commands sent by MCU?

A: Dropping Frames maybe the reason for the unimplementation of commands, check with the BUSY signal or add delay before the lost commands.

Q4. About power voltage;

A: Make sure the voltage in the terminal interface is corresponding to the basic requirement.

Q5.Terminal cannot display normally after received the configuration instruction of 0xE0.

A: Reset the TFT_ID (command **of 0xE0)**.

Q6. Some terminals cannot display normally after updating the standard M600 procedure.

A: Some terminals are not using the standard procedure.

Q7. Could the module simulate the instrument Mode?

A: AA 71 commands are available.

Q8. How to extend the terminal font?

A: Use the fonts generating software to make a new font and then download the new font to the terminal by Terminalassistant (Do not overlap with other fonts).

Q9. How to connect the module with PC and SCM?

A: The MCU to PC and terminal to PC are all connected with TXD/RXD of the RS232. Cross connect the 2 and 3 pin foot when connecting the SCM to HMI terminal.

Q10. Steps of making a touch interface.

A: 1) Design interfaces;

2) Using the Sysdef.exe software to configuration the logical relationships between interfaces, then, generating the configuration file;

3) Download the file to the terminal;

4) Texting and modification.

Appendix 5 Typical applications

1, An illustration of C51 and ASM51.

1.ASM51 Program：

```
;STC12C2052  22.1184MHz
;EKTC52A

              $INCLUDE(MOD52)

               DL10MS   EQU    32H              ; defination  delay 10ms register

               ORG      0000H
               LJMP     MAIN

               ORG      000BH
               LJMP     SYSCLK                  ; 10mS timer INTERRUPT

               ORG      0100H
     MAIN:     CLR      EA                      ; initializing MCU,CLEAR EA
               MOV      SP,#60H                 ; SP=60H
               ORL      PCON,#80H               ; serial initialization
               MOV      SCON,#50H
               MOV      TMOD,#21H
               MOV      TH1,#255                ; 115200bps ;115200/(256-TH1)
               MOV      TL1,#255
               SETB     TR1
               CLR      ES
               MOV      TH0,#0B8H               ; 10mS timer0
               MOV      TL0,#00H
               SETB     TR0
               SETB     ET0
               SETB     EA                      ; EA=1
               MOV      DL10MS,#100             ; power on 1 sencond delay
               LCALL    DELAY                   ; waiting HMI for initializing
               MOV      DPTR,#CMDTTL            ; send stop bit
               LCALL    TXROMS
;***************text display*******************************
     START:    MOV      DL10MS,100              ; delay 1 second
               LCALL    DELAY
               MOV      DPTR,#MENUTAB
               LCALL    TXROMS                  ; call the output function
               SJMP     START
               NOP

;***************sent text**********************************
     MENUTAB:  DB   0AAH,55H                    ; sent text:"北京迪文科技有限公"
               DW   00H,00H
               DB   '北京迪文科技有限公司'
               DB   0CCH,33H,0C3H,3CH,0FEH

;***************timer interception ************************
     SYSCLK:   PUSH     ACC
               PUSH     PSW
               CLR      TF0                     ; reset the timer and register
               MOV      TH0,#0B8H
               MOV      TL0,#00H
               DEC      DL10MS                  ; delay the declination of register
     SYSCKE:   POP      PSW
               POP      ACC
               RETI

;***************DELAY subroutine***************************
     DELAY:    MOV      A,DL10MS                ; delay 10MS*DL10MS
               JNZ      DELAY
               RET

;***************show subroutine****************************
     TXROMS:   CLR      A
               MOVC     A,@A+DPTR
               INC      DPTR
               CJNE     A,#0FEH,TXROMS1         ; End of the table?
               RET
     TXROMS1:  MOV      SBUF,A
               JNB      TI,$
               CLR      TI
               SJMP     TXROMS
               NOP

     CMDTTL:   DB 0CCH,33H,0C3H,3CH,0FEH        ; ended with 0XCC,0X33,0XC3,0X3C.

               END                              ; program ending
```

2，C51 program：

```
//-------------------------------------------------------------------------
//STC12C2052  22.1184MHz
//EKTC52A

//-------------------------------------------------------------------------
// Includes
//-------------------------------------------------------------------------

#include<reg52.h>

//-------------------------------------------------------------------------
// sbit  Definitions
//-------------------------------------------------------------------------

sbit  LED=P1^0;

//-------------------------------------------------------------------------
// Global CONSTANTS
//-------------------------------------------------------------------------

#define SYSCLK       22118400                                   // SYSCLK frequency(Hz)
#define BAUD_RATE    115200                                     // baud rate
#define uchar        unsigned char
#define uint         unsigned int

//-------------------------------------------------------------------------
// Function PROTOTYPES
//-------------------------------------------------------------------------

void Uart0_transmit(unsigned char i);                           //statement Serial subfunction
void send_str(unsigned char *p,unsigned char s);                //Statement of sending a string subfunction

void delay_ms(unsigned char n);                                 //statement of delay subfunction
void SysInit(void);                                             //statement of initialization systerm subfunction

void WenbenChange1(void);                                       // The statement to send the text subfunction

//-------------------------------------------------------------------------
// Uart0_transmit,one byte send to the serial
//-------------------------------------------------------------------------
void Uart0_transmit(unsigned char i)                            //one byte send to the serial
{
            ES=0;
            TI=0;
            SBUF=i;                                             // send data to uart0
            while (!TI);
            TI=0 ;                                              // clear suspending
            ES=1;
}
void send_str(unsigned char *p,unsigned char s)                 //send a data string to the serial
{
            unsigned char m;
            for(m=0;m<s;m++)
            {
                Uart0_transmit(*p);
                p++;
            }
}

//-------------------------------------------------------------------------
// delay
//-------------------------------------------------------------------------

void delay_ms(unsigned char n)
{
             int i,j;
             for(i=1000;i>0;i--) {
             for(j=25*n;j>0;j--) {;}
             }
}

//-------------------------------------------------------------------------
// SysInit
//-------------------------------------------------------------------------

void SysInit(void)
{
            PCON |=0x80;
            SCON=0x50;
            TMOD=0x21;
            TH1=255;
            TL1=255;
            TR1=1;
            ES=0;
            TH0=0xB8;
            TL0=0x00;
            TR0=1;
            ET0=1;
}
```

```
//-------------------------------------------------------------------
// TextChange
//-------------------------------------------------------------------
void WenbenChange1(void)
{
uchar wenben1[30]={0xAA,0x55,0x00,0x00,0x00,0x00,0xB1,0xB1,0xBE,0xA9,
                   0xB5,0xCF,0xCE,0xC4,0xBF,0xC6,0xBC,0xBC,0xD3,0xD0,
                   0xCF,0xDE,0xB9,0xAB,0xCB,0xBE,0xCC,0x33,0xC3,0x3C};  //display the text as: 北京迪文科技公司

    send_str(wenben1,30);
    delay_ms(100);
}

//-------------------------------------------------------------------
// main() Routine
//-------------------------------------------------------------------

int main (void)                                                       //main function
{
            EA=0;                                                     //CLEAR EA
            SysInit();
            EA=1;                                                     //EA=1

            delay_ms(40);                                             //delay 400ms

            while (1)
            {    delay_ms(100);

                 WenbenChange1();                                     //send text
            }
            return 0;
}

//-------------------------------------------------------------------
// End Of File
//--------
```

2 ，Typical Application Schematic