# AMP DISPLAY

## SPECIFICATIONS

# WDMG10768K104_01W

10.4" ,   1024×768 , H600 Kernel , 16.7M Color TFT HMI

| | |
|---|---|
| CUSTOMER: | |
| CUSTOMER PART NO. | |
| AMP DISPLAY PART NO. | **WDMG10768K104_01W** |
| APPROVED BY: | |
| DATE: | |

☐　　APPROVED FOR SPECIFICATIONS

☐　　APPROVED FOR SPECIFICATION AND PROTOTYPES

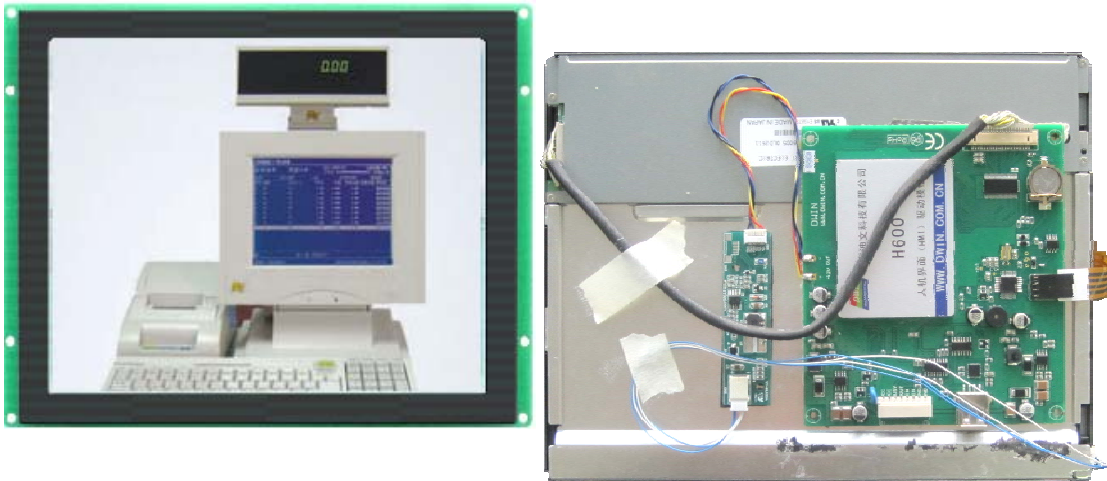## AMP DISPLAY INC

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TEL: 909-980-13410　　FAX: 909-980-1419
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**WDMG10768K104_01WT:**



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# DMG10768K104_01W

## Intelligent Display Terminal

## Data Sheet

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Size: <u>10.4 inch</u>

Resolution: <u>1024×768</u>

| 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 assembly dimensions chart | 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

**Perfect reliable HMI technology—**
**Boost you updating true-color era!**

# AMP DISPLAY

## Technical Specification

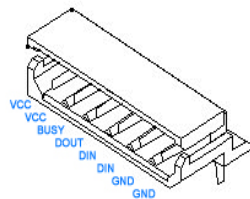| Terminal Characteristics | |
|---|---|
| Terminal Type | DMG10768K104_01W |
| Driver | H600 |
| Category | Advanced Type |
| TFT-ID | 0x04 |
| Display COLORS | 16.7M color TFT HMI |
| Size （inch） | 10.4 " |
| Resolution (wxRGBxh，pixel) | 1024xRGBx768 [1] |
| Backlight | LED |
| Brightness | WN Typical Brightness 220nit； WT Typical Brightness 180nit； Brightness of the screen can be adjusted to 64 levels with software. |
| Contrast Ratio | 600 |
| Reaction Time（ms) | 12 |
| Viewing Angle（L/R/U/D） | 80/80/65/65 |
| 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– 26 | |
|---|---|---|
| Electric Current（mA, Typical value）（input [2]：VCC=12V） | Backlight on | Backlight off |
| | 800 | 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; Socket type: 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 （DMG10768K104_01WN） Support 4line resistance touch panel（DMG10768K104_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 | 282MB（up to 118 pictures） , 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 | 210.4 (w)×157.8 (h) mm |
|---|---|
| Dimensions | 257.4(W)×180.2 (H)×37.6（N）/37.6（T）mm |
| Net Weight | 690g  (DMG10768K104_01WN)<br>800g  (DMG10768K104_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 | DMG10768K104_01WN    support RTC<br>DMG10768K104_01WT    support touch panel, RTC |
|---|---|

Pb RoHs CE

# 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 | | 8X8 lattice ASCII character | √ |
| | 0x54 | | 16×16lattice GBK | √ |
| | 0x55 | X+Y+String | 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 | | More points setting in the background color.(delete point) | √ |
| | 0x51 | （x,y）$_0$+（x,y）$_1$+……+（x,y）$_n$ | 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$_e$,y$_e$)$_0$+(x$_s$,y$_z$,x$_e$,y$_e$)$_1$+……+(x$_s$,y$_z$,x$_e$,y$_e$)$_n$ | 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$_e$,y$_e$)$_0$+(x$_s$,y$_z$,x$_e$,y$_e$)$_1$+……+(x$_s$,y$_z$,x$_e$,y$_e$)$_n$ | Areas deleting | √ |
| | 0x5B | | Fill in more than one appointed areas. | √ |
| | 0x5C | | Areas color changing | √ |
| | 0x60 | (x$_s$,y$_z$,x$_e$,y$_e$,n)$_0$+(x$_s$,y$_z$,x$_e$,y$_e$,n)$_1$+……+(x$_s$,y$_z$,x$_e$,y$_e$,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 | Keyboard 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-storage | -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.)<br>2. Waveform: half sine, 2ms<br>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<br>2. Stoke: 1.5mm<br>3.Vibration: half-wave, vertical axis ( X , Y , Z axis : 2 hours )<br>4.Scan: 10G, 55-400 Hz<br>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.

**Dimension**

_____

Technical Requirements:
1.Display center is datum reference
2.Unmarked tolerance:GB/T1804-m
3.all through Hole: Φ3.5

| Model | DMG10768K104_01W |
|---|---|
| Unit | mm |
| Design | DWIN |
| Version | V 2.0 |
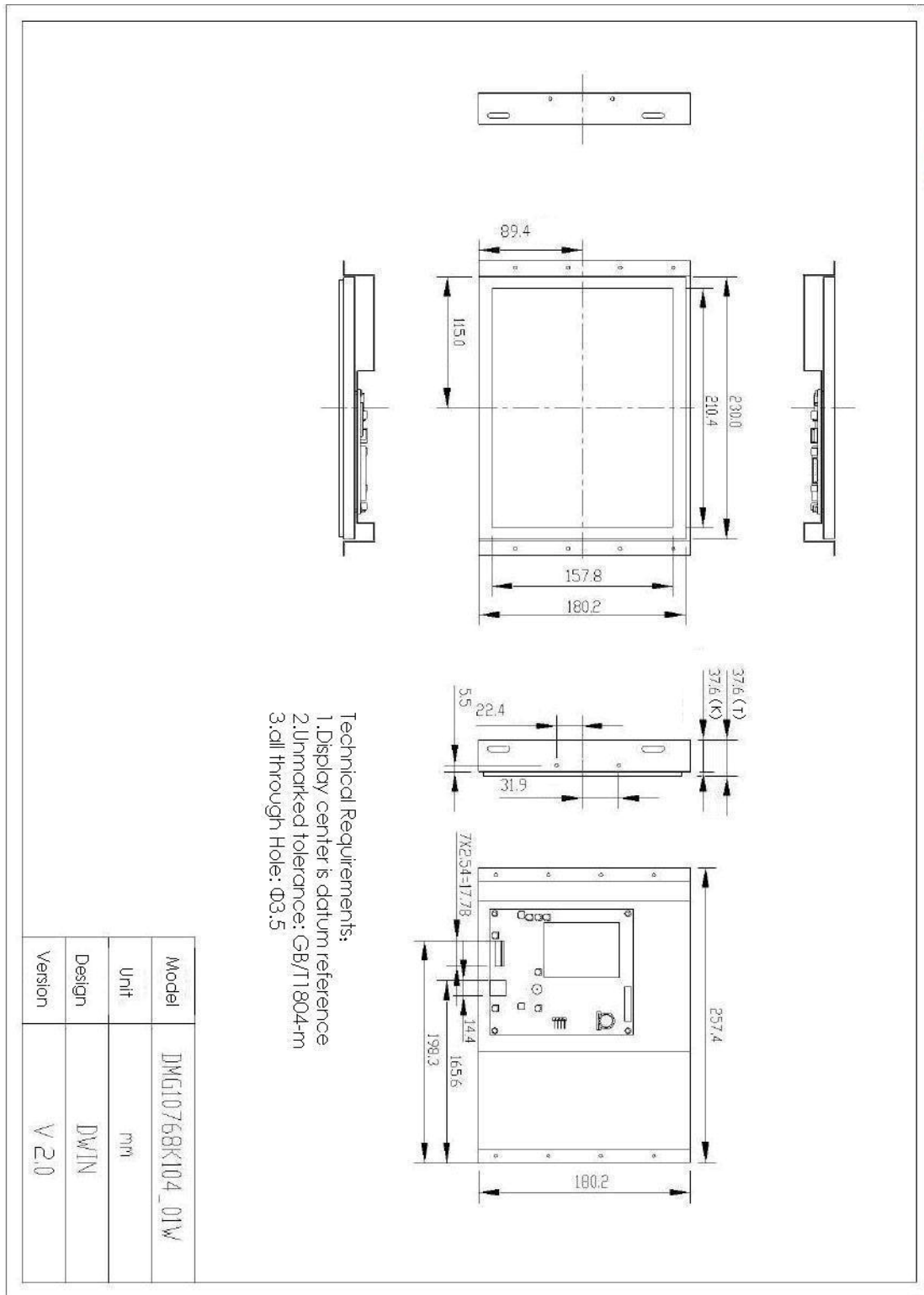
## Appendix 1　Naming Rules

## Naming Rules
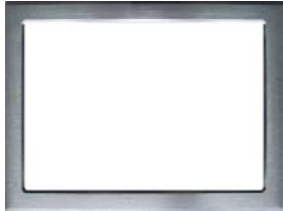
| illustration | e.g. DMT48270K043_01WN | |
|---|---|---|
| | DM | DWIN　HMI |
| | T | T=65K color HMI　　G=16.7M color　D=256 color |
| | 48 | 48: resolution in width. 48=480, 64=640 |
| | 270 | 270: resolution in height |
| | K | K=advanced type, T=basic type, S=standard type [1] |
| | 043 | dimension,056=5.6 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)

# AMP DISPLAY

## Appendix 2 Accessories

### Accessories

| Configuration Method | Name | Model | Illumination | Picture |
|---|---|---|---|---|
| Optional | Aluminum Alloy Panel | DS104001 | |  |
| Notes: More information about the accessories please check the DWIN Accessory Book. | | | | |

## Assembly Sketch Map

Aluminum alloy Front panel

Shell

HMI（UART LCM）

Circuit wafer bracket

Screw

DMG10768k104-01W

## Panel Dimensions Chart

| Model | DS104001 |
|---|---|
| Unit | mm |
| Design | DWIN |
| Version | 2.0 |

Technical Requirements
the material is Ordinary Hard aluminum alloy
Unmarked tolerance: GB/T1804-m
processing Surface should be smooth, uniform texture,
drawbench for outside surface
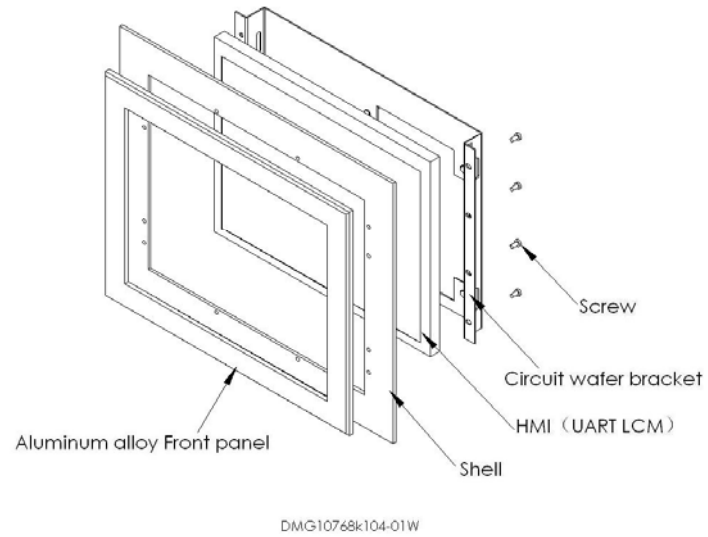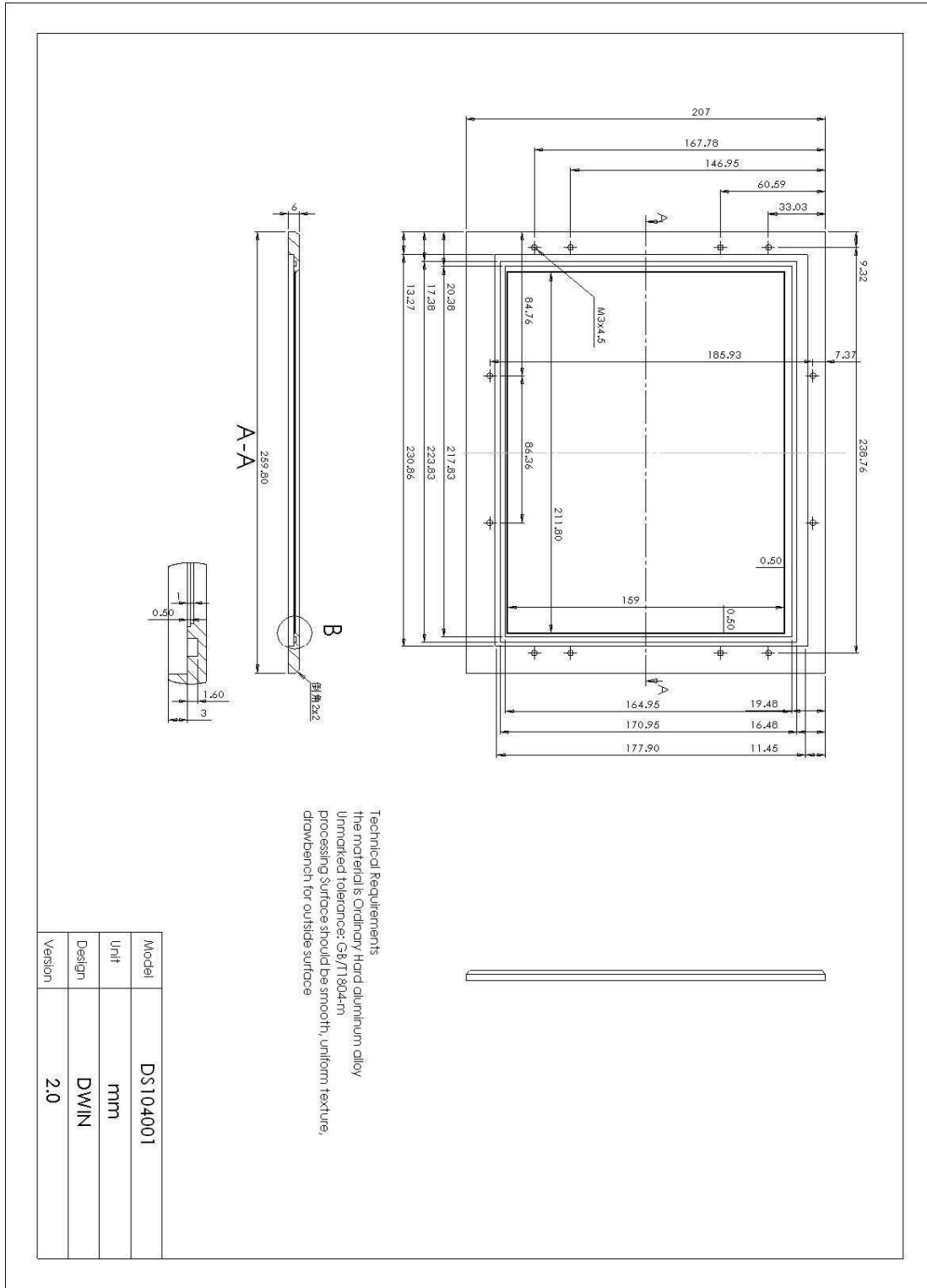
## Appendix 3 Testing Summary:

# AMP DISPLAY

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 command 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 systern 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
//--------
```

# AMP DISPLAY

## 2，Typical Application Schematic