

Video character generator OM9024

Hardware Version: V1.1

File Version: V2.1



Application areas:

- Safety monitoring system
- Security monitoring cameras
- Industrial applications
- Room entertainment system
- Consumer electronics
- Toll Station information display
- Elevator floor information display
- Building intercom information Publishing

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Contents

| | |
|--|----|
| Video character generator OM9024 | 1 |
| 1. Product introduction | 3 |
| 1.1 Introduction | 3 |
| 1.2 Features | 3 |
| 1.3 OM9024 range of applications | 5 |
| 1.4 Successful case | 5 |
| 1.5 Shape and size information..... | 6 |
| 1.6 Performance parameters | 6 |
| 1.7 Order model | 7 |
| 1.8 Item List | 7 |
| 2. Definition about connection | 8 |
| 3. Fast hardware connection | 9 |
| 3.1 Power Connector | 9 |
| 3.2 Composite video signal | 9 |
| 3.3 Data signal superimposed..... | 9 |
| 3.3.1 Serial communication | 9 |
| 4. Communication protocol and the command | 11 |
| 4.1 Communication data packet format..... | 11 |
| 4.2 Data Return..... | 11 |
| 4.3 Command List..... | 11 |
| 4.4 Command application examples | 16 |
| 5. 16 hex communication protocol and command | 17 |
| 5.1 Communication data packet format..... | 17 |
| 5.2 Data Return..... | 17 |
| 5.3 Command List..... | 18 |
| 5.4 16 hex command application example | 22 |
| 6. Test and demo program | 25 |
| 7. Application update | 26 |
| 8. Update History | 27 |

1. Product introduction

1.1 Introduction

OM9024 Video character generator is a dedicated equipment for video overlay, Can operate in the Internal Mode (Itself to produce video signal, can have a colored background and colored text, also can have a colored background of characters) and external mode (white text and gray background of characters, external video overlay), Communication interface with RS232 or RS485, Onboard real-time clock, date and time can be independently set and can set whether to display, position, color size, etc. The product can output three-way video signal (including one loop through) that is superimposed.

Products include GB2312 fonts, 7445 characters were included in Simplified, Can choose the traditional BIG5 font, included common words and 5872 characters of commonly used characters.

Users do not need to know the knowledge of the video overlay, you can use this product.

1.2 Features

- One video input port and one video output port
- One power inputs terminal
- Careful hardware design, the display is stable and reliable and the image is clear
- Design is based on strong characters superimposed MB90092 chip, can be superimposed text, images, animations
- GB2312 character, 7445 character,wider range of applications
- Can choose traditional fonts BIG5 for the user to use traditional chinese
- Can display up to 12 rows,24 characters per row
- You can use RS232(TTL and CMOS level can be selected), RS485 (requires special

instructions), the default is use the RS232

- Onboard real-time clock, date and time can be independently set and can set whether to display, position, color size, etc.
- Can choose the internal mode or external mode, the video can be produced without the input video
- You can define a static overlay mode, it is not lost when power-on
- Users do not need initialization and the OM9024 can be used directly when power-on.
- Free source code for the host computer (VB) secondary development, free RS232 test code for the lower machine
- Two command format, a character can support direct communications, easy to use, no parity; the other is 16 hex communications, it have the communications check function to ensure stability
- Font online update feature
- Program update function, it can easily provide customized services for users

1.3 OM9024 range of applications

All text or images can be added to the video application that using the system.

1. Video Surveillance
2. Security Industry
3. Elevator floor display
4. Road and bridge toll stations monitoring
5. Bank counting monitoring, queuing system
6. Large electronic display screen
7. Time, temperature and humidity overlay on the video
8. Industrial field control
9. GPS information overlay
10. Mobile video ads, etc.

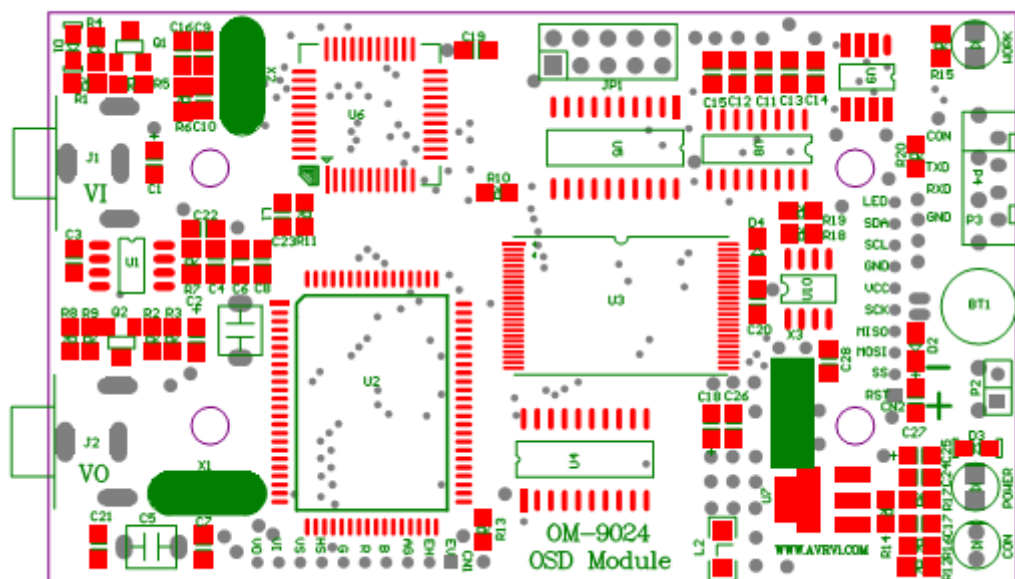
1.4 Successful case

1. Zhejiang Province, a high-speed toll road monitoring system
2. Beijing GPS signal superimposed system unit
3. A building intercom Wireless information Publishing system
4. A large production plant process control
5. Display information system of a bank money counter

1.5 Shape and size information

Dimensions: 90mm * 53mm, Positioning hole diameter is 4mm, length of positioning holes spaced is 60mm, width is 24mm. One input AV terminal and one output terminal, six wiring terminals, one power seat and two indicators lights.

Layout as shown:



1.6 Performance parameters

1. Input voltage: DC 7.5 ~ 9V, can choose DC 5V.
2. Communication Interface: RS232, RS485
3. The level for serial communication: CMOS/TTL/485
4. Video Impedance: 75 ohms
5. Operating temperature: -40°C ~ +85°C

Accepted customization, including custom splash screen, create the power-on image, increase the special functions.

1.7 Order model

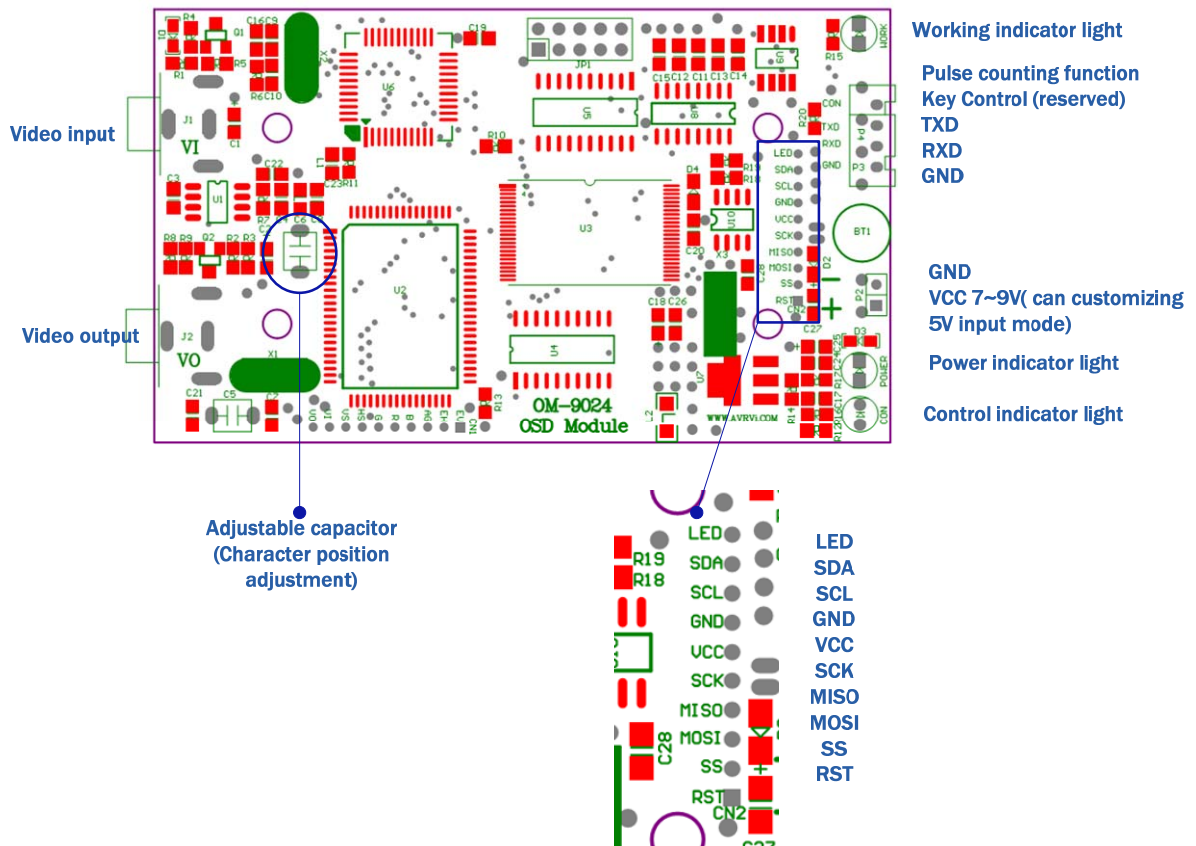
| Product type | The level for serial communication |
|--------------|------------------------------------|
| NEOM9024-2 | RS232 |
| NEOM9024-4 | RS485 |
| NEOM9024-T | TTL |

1.8 Item List

1. OM9024
2. A serial cable
3. DC 9V power supply
4. CD-ROM

2. Definition about connection

Interface definition as shown:



| Label name | Function |
|--------------|--------------------------|
| Video Input | Video signal input port |
| Video output | Video signal output port |
| Con | Pulse counting function |
| TXD | UART Data out |
| RXD | UART Data in |
| GND | Signal Ground |
| GND | Power Ground |
| VCC | Power input port |

3. Fast hardware connection

3.1 Power Connector

OM9024 working voltage is DC5V \pm 5%, the supply voltage range is DC7.5 ~ 9V, we also can Provide DC5V mode for users.

3.2 Composite video signal

OM9024 accept the P / N standard composite video, the default is PAL format (N format need to customize), Composite video input should meet 75 Ω 1V (Vp-p). The PAL composite video signal is connected to the video input port, the superposed composite video signal output using the three output ports.

3.3 Data signal superimposed

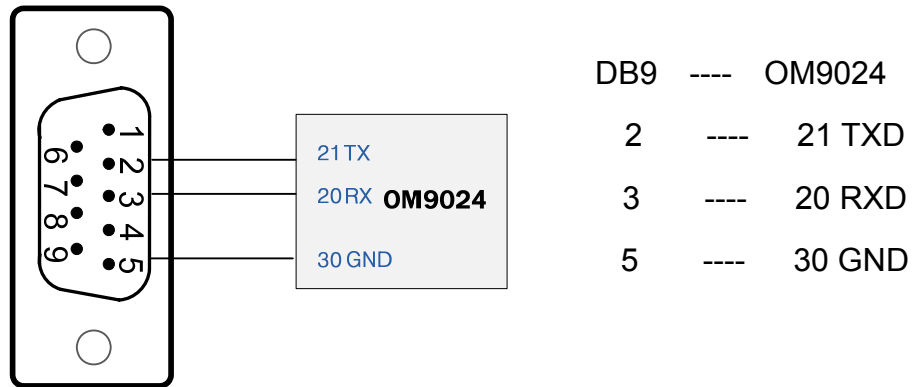
OM9024 according to the user customization, support RS232, RS485 mode, and the factory default mode is RS232 standard, can with the computer or other data sources directly connected.

3.3.1 Serial communication

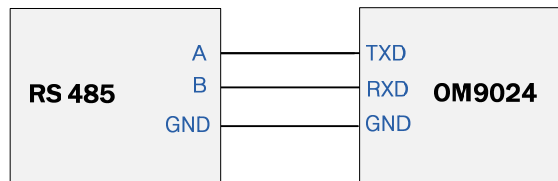
The OM9024's RXD is the RS232 level data receiver, TXD is the RS232 level data sender. Respectively connecting with the computer or other data source TXD and RXD, Also note that common ground connection.

Communication baud rate: 9600, 8, N, 1

Standard DB9 serial connection as follows:



Note: If you use NEOM9024-4, using RS485 communication, and communication interfaces are approximate.



4. Communication protocol and the command

4.1 Communication data packet format

The communication data can be passed to the product through the RS232 mode, the data packet format need to follow the table below.

Header (two bytes), command (one byte or multiple bytes), the parameter (optional)

4.2 Data Return

OM9024 receive and process the packet, it will return the response.

- ✧ If performed correctly, return K
- ✧ If the command or parameter error, return E

4.3 Command List

The following table describes the command and data parameters, in practice, need to add a header (here is the <!).

| Command | Parameter | Function | Explanation |
|---------|--------------|---------------------|---|
| \$ | NO | Communications test | If the communication is correct, return OSD_OK! The correct COM port, baud rate is 9600, send <! @ |
| > | X,Y,String,# | Content display | X range: 0 to 11 using the A ~ L to express Y range: 0 to 23 using the A ~ X to express String: To display the content, word, digit, etc. |

| | | | |
|-----|------------|-------------------------------------|---|
| | | | Note: This command must use half-width '#' to end |
| ? | line | Clear line | Line is the S, clear full-screen Line is A ~ L, clear the corresponding row |
| * | 0 | Off scrolling display | Close scrolling display and clear display |
| * | X,String,# | Scrolling Display | X range: 0 to 11 using the A ~ L to express String: To scroll the words Note: This command must use half-width '#' to end; This command will clear the other display; In the rolling state, does not accept static content display. |
| @ | 0 or 1 | Internal or external mode switching | 0: internal mode,does not display the input video,the text and character background can be colored 1: external mode, display the input video, text color is white Note: This is the Ascii code of 0 and 1, that is 0x30 and 0x31 |
| @CC | Color | Character color | Character color settings, Color in the range of A ~ H, it is valid only when the mode is internal mode, external mode is displayed as white |
| @CS | Size | Character size | Size range is A ~ D, in the following will description it's specific meaning |

| | | | |
|-----|-----------|--------------------------------------|--|
| | | | Take effect at the next show, note that the character size change will affect the words number of lines display in the screen, you need to make the appropriate settings for the following several parameters according the needs. |
| @CB | BackColor | Character background color | Set character background color BackColor range is A to H, it is valid only when the mode is internal mode. The instruction was controlled by the special display switch command. |
| @A | Texian | Special display switch | Special display switch, control the character's background display 0:Off 1:On Note: This is the Ascii code of 0 and 1, that is 0x30 and 0x31 |
| @S | BackColor | Screen background color | Set screen background color. This backColor range is A to H and it is valid only when the mode is internal mode. Display the input video signal when the work mode is external mode. |
| @E | Num | The number of words per line display | Num range: 0 to 23 Using the A ~ X to express This command and the following command are very useful for automatic change line and automatic back the screen start position. |
| @T | Total | The total number of rows displayed | Total range: 0 to 11 Using the A ~ L to express |
| @L | LineSpace | Line spacing | range: A~Q The maximum is 15 pixels |

| | | | |
|-----|----------|--|---|
| @H | Hspace | The left margin of the horizontal screen | Hspace range: 0 to 63, You can usually keep the default |
| @V | Vspace | The top margins of the vertical screen | Vspace range: 0 to 63, You can usually keep the default |
| XR | X | Row Set | Set the display row position |
| XD | X,Y | Row and column Set | Set the display row and column position |
| I | String,[| Command storage | Commands stored in the EEPROM, and it can be executed when the power is on, you can store the power-on image and some initial parameters , example: <! !@0[Means that it will switch to the internal mode when power is on. This command must use half-width '[' to end. |
| CI | NO | Clear Memory | Clear the storage contents of the above command |
| S | String | Storage configuration | The 32 bytes of configuration parameters stored in EEPROM, and execute when power is on. |
| CS | NO | Clear all configuration | Clear all configuration, Back to factory settings |
| D | String | Time calibration | Time string, 14 bytes for seconds, minutes, hours, days, weeks, months and years |
| DDD | X,Y,Size | Date display settings | Set the date shown position and character size, the parameter and the character display |

| | | | |
|-----|------------|---|--|
| | | | command is match |
| DDT | X,Y,Size | Time display settings | Set the time shown position and character size, the parameter and the character display command is match |
| UD | NO | Close date display | Close date display |
| UT | NO | Close time display | Close time display |
| T | ID | TWI slave address setting | TWI slave address setting |
| A | X,Y,Adress | Display the contents of the character's address | In the specified location (X rows Y column)display the contents of the character's address |
| FF | NO | Upgrade font | Upgrade font |

Some explanations about the commands:

1. Font size and font color settings command, take effect at the next show, external mode is displayed as white

2. The meaning of each parameter:

Size (Font) there are four values, 0 / A representative of normal size, that is the minimum;1/B representative double-wide;2/C representative the double font size, length and width were multiplied by 2; 3/D representative the four times font size, length and width were multiplied by 4. Our most popular is the 2 / C, double font size.

Background color (BC)and color value (CC) ,they represent the meaning as following table, Note that the color settings only valid when the image is not superimposed, superimposed images,

the characters were all white, and only when the screen background color is black, can clear view the change of the background color.

| Value | Color |
|-------|-----------|
| 0/A | Black |
| 1/B | Blue |
| 2/C | Red |
| 3/D | Magenta |
| 4/E | Green |
| 5/F | Turquoise |
| 6/G | Yellow |
| 7/H | White |

4.4 Command application examples

| Command | Details | Explanation |
|---------|---------------|--|
| \$ | <!\$ | Communications test, return OSD_OK! |
| > | <!>BAcontent# | In the X = 1, Y = 0 position began to show "content " |
| ? | <!?S | Clear the screen, Note: the time will continue to show. |
| @ | <!@1 | Switch to internal mode |
| DDD | <!DDDAAB | Set the date display position is X = 0, Y = 0, the character size is B |
| UD | <!UD | Close date display |

5. 16 hex communication protocol and command

5.1 Communication data packet format

- ✧ header is two bytes:0x55 0xAA
- ✧ Data length: NUM one byte, the length of the command plus parameters.
- ✧ Command type: CMD one byte
- ✧ Command parameters: N bits, $N = \text{NUM} - 1$
- ✧ Parity bit: CRC8 computing (packet length + command type + parameters)

| Header | Data length | Command | parameters | Parity bit |
|-----------|---------------------------|-------------------|---------------------------|------------|
| 0x55 0xAA | NUM | Command type | Parameter length is Num-1 | CRC8 |
| | | NUM contains byte | | |
| | CRC8 computational domain | | | |

5.2 Data Return

OM9024 receive and process the packet, it will return the response.

- ✧ If performed correctly, return K Express ACK
- ✧ If the command or parameter error, return E Express Error
- ✧ If receive an unknown command, return U Express Unknown command
- ✧ Packet checksum errors, sends R, Resend request, and follow the correct CRC8 checksum value in the R behind, which is very useful when debugging.

5.3 Command List

The following table describes the command and data parameters, in practice, need to add a header (here is the 0x55 and 0xAA) and a length bit and one parity bit.

| Command | Parameter | Function | Explanation |
|---------|--------------|--------------------------------------|--|
| 0x01 | NO | Communications test | If the communication is correct, return OSD_OK! |
| 0x02 | NO | Clear the screen | Clear the screen |
| 0x03 | 0X00 or 0X01 | Internal and external mode switching | 0X00: internal mode, does not display the input video, text and the character background can be colored 0X01: external mode, display the input video, text color is white |
| 0x04 | 0X00-0X07 | Screen background color | Set Screen background color BackColor range is 0X00-0X07, it is valid only when the mode is internal mode. Display the input video signal when the work mode is external mode. |
| 0x05 | X,Y,String | Content display | X range: 0x00 to 0x0B Y range: 0X00 to 0X17 |

| | | | |
|------|-----------|----------------------------|--|
| | | | String: To display the content, word , digit, etc. |
| 0x06 | X | Clear line | Clear the corresponding row |
| 0x07 | X,String | Scrolling Display | X range: 0x00 to 0x0B String: To scroll the words |
| 0x08 | X | Close scrolling display | Close scrolling display and clear screen |
| 0x09 | X | Row Set | Set the display row position |
| 0x0A | X,Y | Row and column Set | Set the display row and column position |
| 0x0B | Size | Character size | Set display character size, take effect at the next show |
| 0x0C | Color | Character color | Character color settings, it is valid only when the mode is internal mode, external mode is displayed as white |
| 0x0D | BackColor | Character background color | Set character background color BackColor, it is valid only when the mode is internal mode. The instruction was controlled by special command and |

| | | | |
|------|-----------|--|---|
| | | | function switch. |
| 0x0E | Num | The number of words per line display | range: 0x00-0x17 This command and the following command is very useful for automatic change line and automatic back screen start position. |
| 0x0F | Total | The total number of rows displayed | range: 0x00-0x0B The total number of rows displayed |
| 0x10 | LineSpace | Line spacing | range: 0x00-0x0F The maximum is 15 pixels |
| 0x11 | Hspace | The left margin of the horizontal screen | Hspace range: 0X00 to 0X3F, You can usually keep the default |
| 0x12 | Vspace | On the margins of the vertical screen | Vspace range: 0X00 to 0X3F, You can usually keep the default |
| 0x13 | Texian | Special display switch | Special display switch, control the character's background display 0X00:Off 0X01:On |
| 0x14 | String | Storage configuration | The 15 bytes of configuration parameters |

| | | | |
|------|----------|-------------------------|--|
| | | | stored in EEPROM, and execute when power is on |
| 0x15 | NO | Clear all configuration | Clear all configuration, Back to factory settings |
| 0x16 | String | Command storage | Commands stored in the EEPROM, and it can be executed when the power is on, you can store the power-on image and some initial parameters |
| 0x17 | NO | Clear Memory | Clear the storage contents of the above command |
| 0x18 | String | Time calibration | Time string, 7 bytes for seconds, minutes, hours, days, weeks, months and years |
| 0x19 | X,Y,Size | Date display settings | Set the date shown position and character size, the parameter and the character display command is match |
| 0X1A | X,Y,Size | Time display settings | Set the time shown position and character size, the parameter and the character display |

| | | | |
|------|--------|---|--|
| | | | command is match |
| 0X1B | NO | Close date display | Close date display |
| 0X1C | NO | Close time display | Close time display |
| 0X1D | Id | TWI slave address setting | TWI slave address setting |
| 0X1E | Adress | Display the contents of the address character | In the specified position (X rows Y column)display the contents of the character's address |
| 0x1F | NO | Update font | Update font |

Note: The command refer to section IV shows some applications of the command, not repeated in this

5.4 16 hex command application example

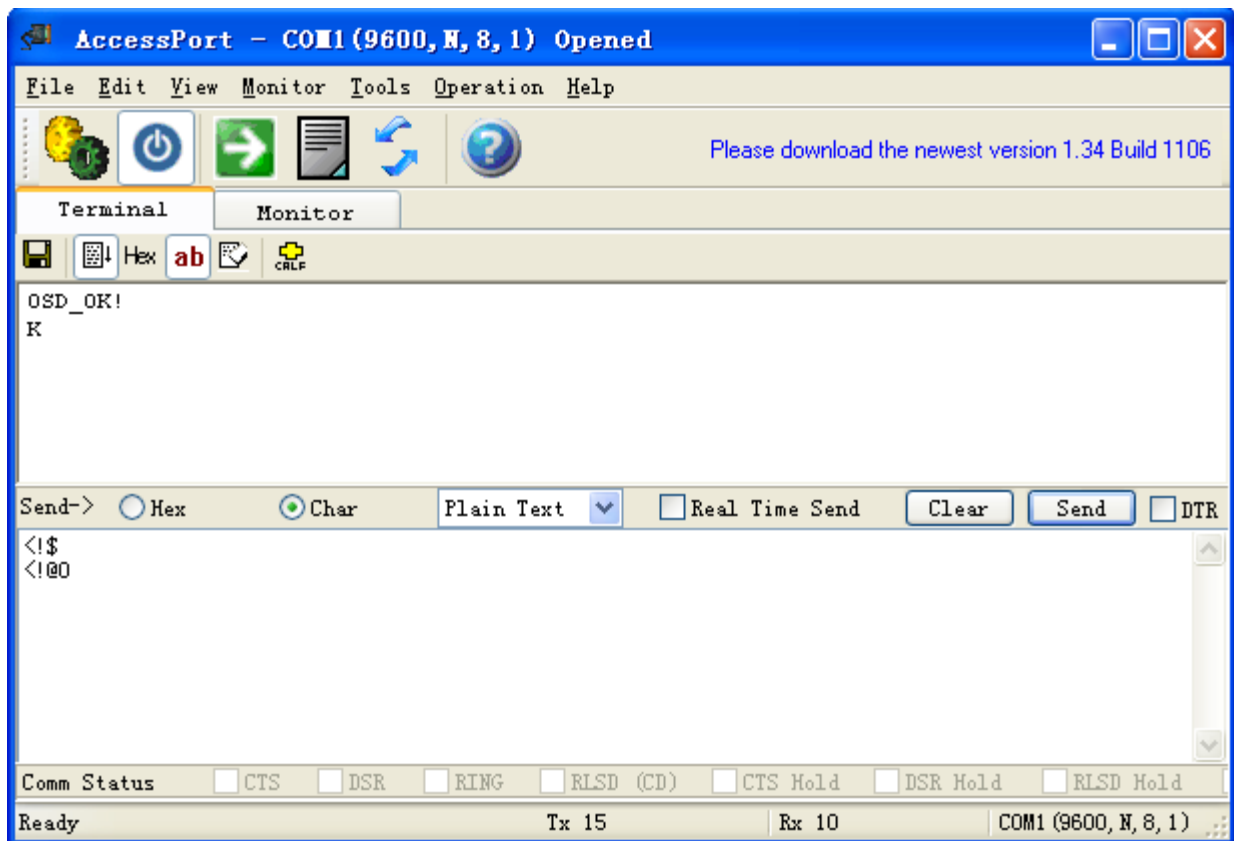
| Command | Specific code (16 hex) | Explanation |
|---------|---|---------------------|
| | Header Length Type Parameters Calibration | |
| 0x01 | 0x55 0xAA 0x01 0x01 0x9A | Communications test |
| 0x02 | 0x55 0xAA 0x01 0x02 0x78 | Clear the screen |
| 0x03 | (1) 0x55 0xAA 0x02 0x03 0x00 0x1A | (1) Internal mode |
| | (2) 0x55 0xAA 0x02 0x03 0x01 | (2) External mode |

| | | |
|------|--|--|
| | 0x44 | |
| 0x04 | 0x55 0xAA 0x02 0x04 0x00 0x74 | Set the background color is black screen when the work mode is internal mode |
| 0x05 | 0x55 0xAA 0x04 0x05 0x05 0x00 0x43 0x0F | Display character C in column 0, line 5. |
| 0x06 | 0x55 0xAA 0x02 0x06 0x05 0xDA | Clear display on line 5 |
| 0x07 | 0x55 0xAA 0x08 0x07 0x05 0x43 0x43 0x43 0x43 0x43 0x43 0x18 | Display the scroll string (six 'C') in the fifth row |
| 0x08 | 0x55 0xAA 0x02 0x08 0x05 0x53 | Clear the scroll information displayed in the fifth line |
| 0x09 | 0x55 0xAA 0x02 0x09 0x05 0XC2 | Set cursor position to line 5 |
| 0x0A | 0x55 0xAA 0x03 0x0A 0x05 0x05 0X22 | Set cursor position to line 5, column 5 |
| 0x0B | 0x55 0xAA 0x02 0x0B 0x03 0X8E | Set character size to three |
| 0x0C | 0x55 0xAA 0x02 0x0C 0x07 0x81 | Set character color to 0X07 |
| 0x0D | 0x55 0xAA 0x02 0x0D 0x00 0xD9 | Set the character's background color to 0X00 |
| 0x0E | 0x55 0xAA 0x02 0x0E 0x0A 0xED | Set the number of words per line to 0X0A |
| 0x0F | 0x55 0xAA 0x02 0x0F 0x06 0x8A | Set the total number of rows displayed to 0X06 |
| 0x10 | 0x55 0xAA 0x02 0x10 0x00 0XA3 | Set line spacing to 0X00 |

| | | |
|------|--|--|
| 0x11 | 0x55 0xAA 0x02 0x11 0x14 0x9B | Set level start position to 0X14 |
| 0x12 | 0x55 0xAA 0x02 0x12 0x10 0xAF | Set vertical start position to 0X10 |
| 0x13 | (1)0x55 0xAA 0x02 0x13 0x00 0Xf6 (2)0x55 0xAA 0x02 0x13 0x01 0xA8 | (1) Close special display (2) Open special display |
| 0x14 | 0x55 0xAA 0x10 0x14 0x14 0x08 0x00 0x01 0x01 0x01 0x01 0x01 0x00 0x00 0x00 0x0A 0x08 0x0F 0x1F 0x25 | Reconfigure the power-on parameters |
| 0x15 | 0x55 0xAA 0x01 0x15 0x66 | Clear the power-on configuration parameters |
| 0x16 | 0x55 0xAA 0x09 0x16 0x55 0xAA 0x04 0x05 0x05 0x00 0x43 0x0F 0x19 | Display character C in column 0 and line 5 when power-on |
| 0x17 | 0x55 0xAA 0x01 0x17 0xDA | Clear power-on image |
| 0x18 | 0x55 0xAA 0x08 0x18 0x40 0x59 0x23 0x29 0x05 0x02 0x08 0x6F | Set time: 2008.03.01 23:59:40 |
| 0x19 | 0x55 0xAA 0x04 0x19 0x00 0x05 0x02 0XF7 | Display date at row 0 column 5, the character size is NO.2 |
| 0x1A | 0x55 0xAA 0x04 0x1A 0x01 0x05 0x02 0XD4 | Display time at row 1 column 5, the character size is NO.2 |
| 0x1B | 0x55 0xAA 0x01 0x1B 0x79 | Does not display date |
| 0x1C | 0x55 0xAA 0x01 0x1C 0xFA | Does not display time |

| | | |
|------|---|---|
| 0x1D | 0x55 0xAA 0x02 0x1D 0x23 0xEB | TWI slave address set to 0X23 |
| 0x1E | 0x55 0xAA 0x05 0x1E 0x03 0x02 0x1D 0XBD 0x58 | Display the 0X1DBD content of the character's address at the second column, third row |
| 0x1F | 0x55 0xAA 0x01 0x1F 0x18 | Upgrade Font |

6. Test and demo program



First extract the "AccessPort" of the CD-ROM and open "AccessPort.exe"

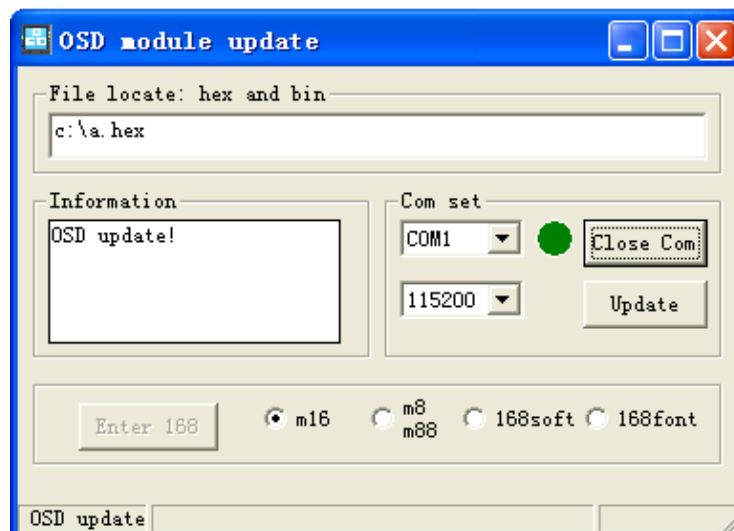
Before use, please set communication port number is currently using port number and the baud rate is set to 9600bps, using the 'options' of the 'tools' menu.

Havn't much explains, please users to experience it in the use process.

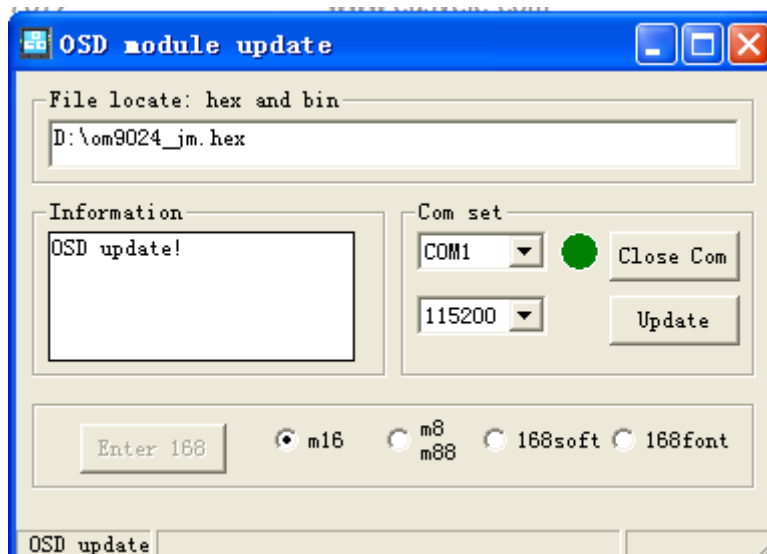
7. Application update

In order to facilitate user customization and system kernel update, we also provide software update, if the product has Problem or user need some special features, you can contact to us.

- a) Hardware connection, please reference RS232 connect with the computer of the OM9024's manual
- b) Open the OSDupdatev1.01.exe procedures, as shown in Figure



- c) Please select the update file that we provide, as shown, click on the update.



- d) OM9024 re-power, auto start the update
- e) The update is complete.

8. Contact

Company: EasyElectronic Technology Co., Ltd. Jinan, Shandong, China

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TEL: 0086-531-62327572

Fax: 0086-531-80879869

AVRVi Website: www.easyele.com

8. Update History

2010-07-15: V1.0 has been created

2010-05-17: V1.1 Increase the description on the design font process and increase the upgrade instructions.

2010-06-20: V1.2 Increase the order example and increase the checksum function example

2010-12-09: V1.3 Increase some command and increase the command example