# Communication Protocols of LCD Development Tools

2012.12.07

α 0.2

## Revision Record

| REV. | DESCRIPTION | DATE |
|---|---|---|
| α 0.1 | Document Created | 2012.10.10 |
| α 0.2 | Modify "3.4. Touch Screen Pressed Position Feedback C0H" | 2012.12.07 |
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# Contents

# 1.Command Set

## 1.1.Frame Format

| | | | | | | |
|---|---|---|---|---|---|---|
| 0xAA | Cmd | Data | 0xF8 | 0x8F | 0x88 | 0xFF |

Fields Description :

| Field | Length(Bytes) | Description |
|---|---|---|
| 0xAA | 1 | Frame start byte(Fixed) |
| Cmd | 1 | Control command |
| Data | N | Data to be transmitted |
| 0XF8 | 1 | Frame end bytes(Fixed) |
| 0X8F | 1 | |
| 0x88 | 1 | |
| 0XFF | 1 | |

Note : (1)The communication frame length is limited to a maximum of 1031 bytes and a minimum of 6 bytes; Data field Length N ranges: 0≤N≤1020.

(2)LCD factory default baud rate is 115200bps, 8 data bits, 1 stop bit, no parity.

Baud rate can be changed at any time by command "Baudrate Settings" (refer to Section 3.2.1 for details).

## 1.2.Color Format

$2^{16}$=65536 colors are supported(what is also called 65K color for short) , RGB bytes are allocated as follows:

| Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Color assignments | R | | | | | G | | | | | | B | | | | |

Example : Pure red=F800H , Pure green=07E0H , Pure blue=001FH.

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# 2.Commands List

| Command Name | Command Code | Command Parameters | Description |
|---|---|---|---|
| **HandShake** | 00H | None | Return the device information when LCD received "Handshake" command from HOST. |
| **Baudrate Settings** | 01H | <BR> | <BR> Baud rate code, 1 Byte. |
| **Sleep/Wake** | 02H | None | Switch LCD state between "Sleep" and "Wake". When received "Sleep/Wake" command, LCD will firstly check its current state and then switch to the opposite. For example, LCD is currently in a "Sleep" state and will turn to "Wake" state when receiving this command, and vice versa. |
| **Restart LCD** | 03H | None | Restart LCD device. |



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|---|---|---|---|
| **LCD Front/Background Color Settings** | 40H | Mode + Color | Mode(1Byte) : 00H-Set front color of LCD. Default value is **Green.**<br>01H- Set background color of LCD. Default value is **Blue.**<br>Color(2Byte) : A 16-bit color value(RGB:565) |
| **Set Front/Background Color with Specified Pixel** | 41H | Mode + X + Y | Mode(1Byte) : 00H- Set Front Color with pixel (X,Y) RGB value.<br>01H- Set background Color with pixel (X,Y) RGB value.<br>X(2 Bytes) : X coordinate in pixels, range [0 , Width-1] , big endian. Width-The width of screen resolution<br>Y(2 Bytes) : Y coordinate in pixels , range [0 , Height-1] , big endian. Height-The height of screen resolution. |
| **Text Display** | 50H | Lib_ID + MODE + X + Y +STRING | Lib_ID(1 Byte) : |

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| | | | |
|---|---|---|---|
| | | | 00H 12×12 GB2312 and 6×12 ASCII<br>01H 16×16 GB2312 and 8×16 ASCII<br>02H 24×24 GB2312 and 12×24 ASCII<br>03H 32×32 GB2312 and 16×32 ASCII<br>04H 12×12 BIG5 and 6×12 ASCII<br>05H 16×16 BIG5 and 8×16 ASCII<br>06H 24×24 BIG5 and 12×24 ASCII<br>07H 32×32 BIG5 and 16×32 ASCII<br>Mode(1 Byte) : 00H Both front and background color is displayed<br>01H Front color is displayed,but background color is not displayed<br>02H Front color is not displayed,but background color is displayed |



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| | | | |
|---|---|---|---|
| | | | X(2 Bytes) : X position of left-up point<br>Y(2 Bytes) : Y position of left-up point<br>Data(N Bytes) : Text to display , big-endian mode , max length is 1020 bytes |
| **Draw Point** | 60H | COLOR_MODE + $(X , Y)_0$ + $(X , Y)_1$ + ... + $(X , Y)_{N-1}$ | COLOR_MODE(1 Byte) : 00H Use front color to draw points<br>01H Use background color to draw points<br>X(2 Bytes) : X position of left-up point<br>Y(2 Bytes) : Y position of left-up point<br>0<N≤256 |
| **Clear Screen** | 70H | None | Clear the LCD with the background color. The default background color is blue |
| **Clear screen to a user-specified color** | 71H | Color | Color(2 Bytes) : A 16-bit color value(RGB:565) |
| **Fill area with the Front** | 72H | COLOR_MODE +$(X_S , Y_S)$+$(X_E , Y_E)$ | COLOR_MODE(1 Byte) : 00H With Front color |



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| | | | |
|---|---|---|---|
| **color or Background color** | | | 01H With Background color<br>$X_S$(2 Bytes) : X position of left-up point<br>$Y_S$(2 Bytes) : Y position of left-up point<br>$X_E$(2 Bytes) : X position of Right-Down point<br>$Y_E$(2 Bytes) : Y position of Right-Down point |
| **Fill area with a user-specified color** | 73H | Color +($X_S$ , $Y_S$)+($X_E$ , $Y_E$) | Color(2 Bytes) : A 16-bit color value(RGB:565)<br>$X_S$(2 Bytes) : X position of left-up point<br>$Y_S$(2 Bytes) : Y position of left-up point<br>$X_E$(2 Bytes) : X position of Right-Down point<br>$Y_E$(2 Bytes) : Y position of Right-Down point |
| **Show the full picture by specifying the PICNUM** | 80H | PICNUM | PICNUM(1 Byte) : No. of picture to be showed |
| **Pictur Cut** | 81H | PICNUM +($X_S$ , $Y_S$)+($X_E$ , $Y_E$)+(X , Y) | PICNUM(1 Byte) : No. of picture to be cut<br>$X_S$(2 Bytes) : X position of left-up point |



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| | | | |
|---|---|---|---|
| | | | $Y_S$(2 Bytes) : Y position of left-up point<br>$X_E$(2 Bytes) : X position of Right-Down point<br>$Y_E$(2 Bytes) : Y position of Right-Down point<br>X(2 Bytes) : X position of left-up point<br>Y(2 Bytes) : Y position of left-up point |
| **Reverse current picture** | 86H | Mode | Mode(1 Byte) : 00H Normal<br>01H Horizontally Reverse<br>02H Vertically Reverse<br>03H Both Horizontally and Vertically Reverse |
| **Backlight Adjust** | 90H | Light_Level | Light_Level (1 Byte) :Backlight level, 1 Byte ,range is[0 ,100]. 0 indicate that backlight turn OFF , 100 indicate that backlight brightest |
| **Touch Screen Pressed** | C0H | <$X_C$> + <$Y_C$> + <$X_P$> + <$Y_P$> | Feedback current pressed position of the touch screen. |



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| | | | |
|---|---|---|---|
| **Position Feedback** | | | There are two ways to identify this position , one is touch screen coordinates and the other is LCD screen coordinates. Coordinates used by C0H command is determined by factory settings. Three kinds of configuration are provided: (default setting is configuration 3) :<br>1、Containing touch screen coordinates only: <$X_C$> <$Y_C$><br>2、Containing LCD screen coordinates only: <$X_P$> <$Y_P$><br>3、Containing both touch and LCD screen coordinates: <$X_C$> <$Y_C$> <$X_P$> <$Y_P$><br>Parameter Descriptions are as follows:<br>$X_C$(2 Bytes) : Touch screen X-axis coordinate value that is pressed currently , range[0 , 1023] , big endian.<br>$Y_C$(2 Bytes) : Touch screen Y-axis coordinate value that is |



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| | | | |
|---|---|---|---|
| | | | pressed currently , range [0 , 1023] , big endian.<br>$X_P$(2 Bytes) : LCD screen X-axis coordinate value that is pressed currently , range [0 , Width-1] , big endian. Width-The width of screen resolution.<br>$Y_P$(2 Bytes) : LCD screen Y-axis coordinate value that is pressed currently , range [0 , Height-1] , big endian. Height-The height of screen resolution. |
| **Buzzer Settings** | A0H | TM | TM Beep time ,1 byte ,ranged from 00H to FFH(1~256). 00H represents the minimum time of 1 while FFH represents maximum 256. Time base is 10ms, and actual beep time is (<TM>+1)×10ms. |



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# 3. Command Descriptions

## 3.1.Connect Device 00H

### 3.1.1.Handshake

【Command】00H

【Function】Return the device information when LCD received "Handshake" command from HOST.

【Send Length】6 Bytes

【Receive Length】11 Bytes

【Send Format】AA 00 F8 8F 88 FF

【Receive Format】AA 00 <PIXBITS> <WIDTH> <HEIGHT> F8 8F 88 FF

【Parameter Description】<PIXBITS>Pixel bits，1Byte. Refer to the table below for details:

| Code | Pixel bits | Remark |
|---|---|---|
| **08H** | 8 bits | |
| **10H** | 16 bits | |
| **18H** | 24 bits | |

< WIDTH>Width，2 Bytes

< HEIGHT>Height，2 Bytes

【Example】 Send: AA 00 F8 8F 88 FF

Receive: AA 00 **10 01 E0 01 10** F8 8F 88 FF

【Example Description】Send "Handshake" command to LCD，and LCD return the device information as follows:

Pixel bits=16 bits**(10H)**

Width=480**(01E0H)**

Height=272**(0110H)**

# 3.2.LCD Settings 01H~03H，40H~41H

## 3.2.1.Baudrate Settings

【Command】01H

【Function】Set Serial Baud rate of LCD. Default factory setting is as follows: 115200bps, 8 data bits, 1 stop bit, no parity.

【Send Length】7 Bytes

【Receive Length】0 Byte

【Send Format】AA 01 <BR> F8 8F 88 FF

【Receive Format】None

【Parameter Description】<BR>Baud rate code, 1 Byte. Refer to the table below for details:

| Code | Value | Remark |
|---|---|---|
| **00H** | 115200 | (Default) |
| **01H** | 57600 | |
| **02H** | 38400 | |
| **03H** | 19200 | |
| **04H** | 9600 | |
| **05H** | 4800 | |
| **06H** | 2400 | |

【Example】Send: AA 01 **05** F8 8F 88 FF

【Example Description】Set LCD baud rate to 4800 bps**(05).**

## 3.2.2.Sleep/Wake

【Command】02H

【Function】Switch LCD state between "Sleep" and "Wake". When received "Sleep/Wake" command, LCD will firstly check its current state and then switch to the opposite. For example, LCD is currently in a "Sleep" state and will turn to "Wake" state when receiving this command, and vice versa.

【Send Length】6 Bytes

【Receive Length】0 Byte

【Send Format】AA 02 F8 8F 88 FF

【Receive Format】None

【Parameter Description】None

【Example】Send: AA 02 F8 8F 88 FF

【Example Description】 Switch LCD state to the opposite.

## 3.2.3.Restart LCD

【Command】03H

【Function】Restart LCD device.

【Send Length】6 Bytes

【Receive Length】0 byte

【Send Format】AA 03 F8 8F 88 FF

【Receive Format】None

【Parameter Description】None

【Example】Send: AA 03 F8 8F 88 FF

【Example Description】Restart LCD device.

## 3.2.4.LCD Front/Background Color Settings

【Command】40H

【Function】Set front/background color of LCD. Front color is used to specify the point, fixed area and text color while background color is used to clear screen, specify fixed area and text background color.

【Send Length】9 Bytes

【Receive Length】0 Byte

【Send Format】AA 40 <MODE> <COLOR> F8 8F 88 FF

【Receive Format】None

【Parameter Description】<MODE>Mode select. Refer to the table below for details:

| Code | Description | Remark |
|---|---|---|
| **00H** | Set front color of LCD | |
| **01H** | Set background color of LCD | |

<COLOR>Color information. Refer to the table below for details:

| Pixel bits | <COLOR>Length | Remark |
|---|---|---|
| **16 bits** | 2 Bytes | A 16-bit color value(RGB:565) |

【Example】Send: AA 40 **00 F8 00** F8 8F 88 FF

【Example Description】Set front color **(00H)**to **Red(F800H)**

## 3.2.5. Set Front/Background Color with Specified Pixel

【Command】41H

【Function】Set Front/Background Color with RGB value of specified screen pixel.

【Send Length】11 Bytes

【Receive Length】0 Byte

【Send Format】AA 41 <MODE> <X> <Y> F8 8F 88 FF

【Receive Format】None

【Parameter Description】<MODE>Mode select. Refer to the table below for details:

| Code | Description | Remark |
|---|---|---|
| **00H** | Set Front Color with pixel (X,Y) RGB value | |
| **01H** | Set background Color with pixel (X,Y) RGB value | |

<X> <Y>Pixel’ s coordinate. Refer to the table below for details:

| Coordinate | Length | Remark |
|---|---|---|
| **X** | 2 Bytes | X coordinate in pixels, range [0 , Width-1] , big endian. Width-The width of screen resolution. |
| **Y** | 2 Bytes | Y coordinate in pixels, range [0 , Height-1] , big endian. Height-The height of screen resolution |

【Example】Send: AA 41 **00 01 D6 01 09** F8 8F 88 FF

【Example Description】Set front color**(00H)** with pixel**(01D6H , 0109H)**RGB value (decimal**(470 , 265)**).

# 3.3.LCD Display 50H、60H、70H~73H、80H~81H、80H~81H、86H、90H

## 3.3.1. Text Display

【Command】50H

【Function】With the specified mode, display text at the specified position of the screen

【Send Length】11+N Bytes，N is length of text(0<N≤1020)

【Receive Length】0 Byte

【Send Format】AA 50 <Lib_ID><MODE> <X> <Y> <STRING> F8 8F 88 FF

【Receive Format】None

【Parameter Description】<Lib_ID> Font library ID. Refer to the table below for details:

| Code | Description | Remark |
|---|---|---|
| **00H** | 12×12 GB2312 and 6×12 ASCII | |
| **01H** | 16×16 GB2312 and 8×16 ASCII | |
| **02H** | 24×24 GB2312 and 12×24 ASCII | |
| **03H** | 32×32 GB2312 and 16×32 ASCII | |
| **04H** | 12×12 BIG5 and 6×12 ASCII | |
| **05H** | 16×16 BIG5 and 8×16 ASCII | |
| **06H** | 24×24 BIG5 and 12×24 ASCII | |
| **07H** | 32×32 BIG5 and 16×32 ASCII | |

<MODE>Display mode. Refer to the table below for details:

| Code | Description | Remark |
|---|---|---|

| | | |
|---|---|---|
| **00H** | Both front and background color is displayed | |
| **01H** | Front color is displayed,but background color is not displayed | |
| **02H** | Front color is not displayed,but background color is displayed | |

<X> <Y>Coordinate. Refer to the table below for details:

| Coordinate | Length | Remark |
|---|---|---|
| **X position** | 2 Bytes | Big-endian mode |
| **Y position** | 2 Bytes | Big-endian mode |

<STRING>Text to display , big-endian mode , max length is 1020 bytes , ASCII code and the other character coding can be written in the same string.

【Example】Send：AA 50 **01 00 00 F0 00 88 48 69 C4 E3 BA C3 A3 A1** F8 8F 88 FF

【Example Description】Display “Hi 你好 !”(code is **48 69 C4 E3 BA C3 A3 A1**) at**(00F0H ,0088H)**position with 16×16 GB2312**(01)**, both front and background color is displayed**(00H)**.

## 3.3.2.Draw Point

【Command】60H

【Function】Draw points at the specified position of the screen

【Send Length】7+N*4 Bytes，N is the number of points(0<N≤256)

【Receive Length】0 Byte

【Send Format】AA 60 <COLOR_MODE> <$X_0$> <$Y_0$> <$X_1$> <$Y_1$> … <$X_{N-1}$> <$Y_{N-1}$> F8 8F 88 FF

【Receive Format】None

【Parameter Description】< COLOR_MODE >Set the color mode. Refer to the table below for details:

| Code | Description | Remark |
|---|---|---|
| **00H** | Use front color to draw points | |
| **01H** | Use background color to draw points | |

$<X_0>$ $<Y_0>$ $<X_1>$ $<Y_1>$ … $<X_{N-1}>$ $<Y_{N-1}>$ Coordinate information. Refer to the table below for details:

| Position | Length | Remark |
|---|---|---|
| $X_0$ | 2 Bytes | X position of the first point |
| $Y_0$ | 2 Bytes | Y position of the first point |
| $X_1$ | 2 Bytes | X position of the second point |
| $Y_1$ | 2 Bytes | Y position of the second point |
| … | 2 Bytes | … |
| $X_{N-1}$ | 2 Bytes | X position of the N-th point |
| $Y_{N-1}$ | 2 Bytes | Y position of the N-thpoint |

【Example】Send：AA 60 **00 00 F0 00 88 01 40 01 04** F8 8F 88 FF

【Example Description】Use front color**(00H)** to draw two points , the Coordinate of two points is as follows:

First point：(**00F0H , 0088H**)(decimal**(240 , 136)**)

Second point：(**0140H , 0104H**)(decimal**(320 , 260)**)

## 3.3.3.Clear Screen

【Command】70H

【Function】Clear the LCD with the background color. The default background color is blue.

【Send Length】6 Bytes

【Receive Length】0 Byte

【Send Format】AA 70 F8 8F 88 FF

【Receive Format】None

【Parameter Description】 None

【Example】 Send：AA 70 F8 8F 88 FF

【Example Description】Clear the LCD with the background color.

## 3.3.4.Clear screen to a user-specified color

【Command】71H

【Function】Clear the LCD with a user-specified color.

【Send Length】8 Bytes

【Receive Length】0 Byte

【Send Format】AA 71 <COLOR> F8 8F 88 FF

【Receive Format】None

【Parameter Description】<COLOR> User-specified color. Refer to the table below for details:

| Pixel bits | <COLOR>Length | Remark |
|---|---|---|
| **16bits** | 2 Bytes | A 16-bit color value(RGB:565) |

【Example】 Send：AA 71 **F8 00** F8 8F 88 FF

【Example Description】 Clear the LCD with **red(F800H).**

## 3.3.5.Fill area with the Front color or Background color

【Command】72H

【Function】Fill area with the Front color or Background color.

【Send Length】15 Bytes

【Receive Length】0 Byte

【Send Format】AA 71 <COLOR_MODE> <$X_S$> <$Y_S$> <$X_E$> <$Y_E$> F8 8F 88 FF

【Receive Format】None

【Parameter Description】 <COLOR_MODE>Color mode. Refer to the table below for details:

| Code | Description | Remark |
|---|---|---|
| **00H** | With Front color | |
| **01H** | With Background color | |

<$X_S$> <$Y_S$> <$X_E$> <$Y_E$> Coordinate of the area to be filled. Refer to the table below for details:

| Position | Length | Remark |
|---|---|---|
| $X_S$ | 2 Bytes | X position of left-up point |
| $Y_S$ | 2 Bytes | Y position of left-up point |
| $X_E$ | 2 Bytes | X position of Right-Down point |
| $Y_E$ | 2 Bytes | Y position of Right-Down point |

【Example】 Send：AA 71 **01 00 F0 00 88 01 40 01 04** F8 8F 88 FF

【Example Description】Fill area with the Background color**(01H)**,and coordinate of the area is as follows:

Left-up point：(**00F0H，0088H**)(decimal**(240，136)**)

Right-Down point：(**0140H，0104H**)(decimal**(320，260)**)

## 3.3.6. Fill area with a user-specified color

【Command】73H

【Function】Fill area with a user-specified color.

【Send Length】16 Bytes

【Receive Length】0 Byte

【Send Format】AA 73 <COLOR> <$X_S$> <$Y_S$> <$X_E$> <$Y_E$> F8 8F 88 FF

【Receive Format】None

【Parameter Description】<COLOR> User-specified color. Refer to the table below for details:

| Pixel bits | <COLOR>Length | Remark |
|---|---|---|
| **16bits** | 2 Bytes | A 16-bit color value(RGB:565) |

<$X_S$> <$Y_S$> <$X_E$> <$Y_E$> Coordinate of the area to be filled. Refer to the table below for details:

| Position | Length | Remark |
|---|---|---|
| $X_S$ | 2 Bytes | X position of left-up point |
| $Y_S$ | 2 Bytes | Y position of left-up point |
| $X_E$ | 2 Bytes | X position of Right-Down point |
| $Y_E$ | 2 Bytes | Y position of Right-Down point |

【Example】Send：AA 73 **F8 00 00 F0 00 88 01 40 01 04** F8 8F 88 FF

【Example Description】Fill area with **red(F800H)**, and coordinate of the area is as follows:

Left-up point：**(00F0H，0088H)**(decimal**(240，136)**)

Right-Down point：**(0140H，0104H)**(decimal**(320，260)**)

## 3.3.7.Show the full picture by specifying the PICNUM

【Command】80H

【Function】Show the full picture by specifying the PICNUM.

【Send Length】7 Bytes

【Receive Length】0 Byte

【Send Format】AA 80 <PICNUM> F8 8F 88 FF

【Receive Format】None

【Parameter Description】 <PICNUM> No. of picture to be showed,1 Byte.

【Example】 Send：AA 80 **05** F8 8F 88 FF

【Example Description】Show the **sixth (05H )** picture.

## 3.3.8.Pictur Cut

【Command】81H

【Function】Cut Specified picture, and then put the shear zone at the specified position on the currently displayed page.

【Send Length】19 Bytes

【Receive Length】0 Byte

【Send Format】AA 81 <PICNUM> <$X_S$> <$Y_S$> <$X_E$> <$Y_E$> <X> <Y> F8 8F 88 FF

【Receive Format】None

【Parameter Description】 <PICNUM> No. of picture to be showed,1 Byte.

<$X_S$> <$Y_S$> <$X_E$> <$Y_E$> Coordinate of the area to be cut. Refer to the table below for details:

| Position | Length | Remark |
|---|---|---|

| | | |
|---|---|---|
| $X_S$ | 2 Bytes | X position of left-up point |
| $Y_S$ | 2 Bytes | Y position of left-up point |
| $X_E$ | 2 Bytes | X position of Right-Down point |
| $Y_E$ | 2 Bytes | Y position of Right-Down point |

<X> <Y> Left-up point of the specified position where put the shear zone. Refer to the table below for details:

| 坐标信息 | 长度 | 备注 |
|---|---|---|
| X | 2Bytes | X position of left-up point |
| Y | 2Bytes | Y position of left-up point |

【Example】 Send：AA 81 **05 00 F0 00 88 01 40 01 04** 00 30 00 5C F8 8F 88 FF

【Example Description】 Cut the **sixth (05 )** picture, the shear zone is as follows:

Left-up point：(**00F0H，0088H**)(decimal(**240，136**))

Right-Down point：(**0140H，0104H**)(decimal(**320，260**))

Then put the shear zone at **(0030H，005CH)** position of the currently displayed page.

## 3.3.9.Reverse current picture

【Command】86H

【Function】Reverse current picture.

【Send Length】7 Bytes

【Receive Length】0 Byte

【Send Format】AA 86 <MODE> F8 8F 88 FF

【Receive Format】None

【Parameter Description】<MODE> Reverse mode. Refer to the table below for details:

| Code | Description | Remark |
|---|---|---|
| **00H** | Normal | |
| **01H** | Horizontally Reverse | |
| **02H** | Vertically Reverse | |
| **03H** | Both Horizontally and Vertically Reverse | |

【Example】Send：AA 86 **01** F8 8F 88 FF

【Example Description】Reverse current picture horizontally**(01).**.

## 3.3.10.Backlight Adjust

【Command】90H

【Function】Adjust backlight. 0 indicate that backlight turn OFF，100 indicate that backlight brightest.

【Send Length】7 Bytes

【Receive Length】0 Byte

【Send Format】AA 90 <LIGHT_LEVEL> F8 8F 88 FF

【Receive Format】None

【Parameter Description】<LIGHT_LEVEL> Backlight level, 1 Byte，range is[0，100].

【Example】Send：AA 90 **28** F8 8F 88 FF

【Example Description】Set backlight to **(28H)** level(decimal **(40)**).

# 3.4. Touch Screen Pressed Position Feedback C0H

【Command】C0H

【Function】Feedback current pressed position of the touch screen. There are two ways to identify this position , one is touch screen coordinates and the other is LCD screen coordinates. Coordinates used by C0H command is determined by factory settings. Three kinds of configuration are provided: (default setting is configuration 3) :

2、Containing touch screen coordinates only.

2、Containing LCD screen coordinates only.

3、Containing both touch and LCD screen coordinates.

【Send Length】0 Byte

【Receive Length】Determined by the factory configuration. Three kinds of receive frame length are listed as follows:

1、Touch screen coordinates only : 10 Bytes

2、LCD screen coordinates only : 10 Bytes

3、Both touch and LCD screen coordinates : 14Bytes

【Send Format】None

【Receive Format】Determined by the factory configuration. Three kinds of receive frame are listed as follows:

1、Touch screen coordinates only : AA C0 <$X_C$> <$Y_C$> F8 8F 88 FF

2、LCD screen coordinates only : AA C0 <$X_P$> <$Y_P$> F8 8F 88 FF

3、Both touch and LCD screen coordinates : AA C0 <$X_C$> <$Y_C$> <$X_P$> <$Y_P$> F8 8F 88 FF

【Parameter Description】

<$X_C$> <$Y_C$>Touch screen coordinates， upper left (0,0)，lower right (1023,1023).

<$X_P$> <$Y_P$>LCD screen coordinates, upper left (0,0)，lower right (Width-1,Height-1).

Refer to the table below for details:

| Coordinate | Length | Remark |
|---|---|---|
| $X_C$ | 2 Bytes | Touch screen X-axis coordinate value that is pressed currently，range[0，1023]，big endian. |
| $Y_C$ | 2 Bytes | Touch screen Y-axis coordinate value that is pressed currently，range [0，1023]，big endian. |
| $X_P$ | 2 Bytes | LCD screen X-axis coordinate value that is pressed currently，range [0，Width-1]，big endian. Width-The width of screen resolution. |
| $Y_P$ | 2 Bytes | LCD screen Y-axis coordinate value that is pressed currently，range [0，Height-1]，big endian. Height-The height of screen resolution. |

【Example】 Receive frame containing both touch and LCD screen coordinates: AA C0 **03 FF 02 8E** **03 1F** **01 32** F8 8F 88 FF

【Example Description】Feedback screen pressed position coordinates:

Touch screen coordinate: **(03FFH,068EH)**, Decimal **(1023,654)**

LCD screen coordinate: **(031FH,0132H),** Decimal **(799,306)**

## 3.5.Buzzer Settings A0H

【Command】A0H

【Function】Control the buzzer beeps

【Send Length】7 Bytes

【Receive Length】0 Byte

【Send Format】AA A0 <TM> F8 8F 88 FF

【Receive Format】None

【Parameter Description】<TM>Beep time , 1 byte , ranged from 00H to FFH(1~256). 00H represents the minimum time of 1 while FFH represents maximum 256. Time base is 10ms, and actual beep time is (<TM>+1)×10ms

【Example】Send: AA A0 **03** F8 8F 88 FF

【Example Description】Control the buzzer beeps for 40ms.

# 4.Note

1、Time Interval between Continuous two commands should be more than 80ms, otherwise it may lead to command execution errors。

# 5. LCD Screen Coordinates Description

Take 480×272 LCD as a example，the screen coordinates are defined as follows:

Sample: (column, row)


# 6.Appendix

## 6.1.ASCII Code Table

The following table is ASCII code table ranged from 20H to 7FH. Characters before 20H are not listed because they are invisible.

| Dec | Hex | Char |
|---|---|---|
| 32 | 20 | |
| 33 | 21 | ! |
| 34 | 22 | " |
| 35 | 23 | # |
| 36 | 24 | $ |
| 37 | 25 | % |
| 38 | 26 | & |
| 39 | 27 | ' |
| 40 | 28 | ( |
| 41 | 29 | ) |
| 42 | 2A | * |
| 43 | 2B | + |
| 44 | 2C | , |
| 45 | 2D | - |
| 46 | 2E | . |
| 47 | 2F | / |
| 48 | 30 | 0 |
| 49 | 31 | 1 |
| 50 | 32 | 2 |
| 51 | 33 | 3 |
| 52 | 34 | 4 |
| 53 | 35 | 5 |
| 54 | 36 | 6 |
| 55 | 37 | 7 |
| 56 | 38 | 8 |
| 57 | 39 | 9 |
| 58 | 3A | : |
| 59 | 3B | ; |
| 60 | 3C | < |
| 61 | 3D | = |
| 62 | 3E | > |
| 63 | 3F | ? |

| Dec | Hex | Char |
|---|---|---|
| 64 | 40 | @ |
| 65 | 41 | A |
| 66 | 42 | B |
| 67 | 43 | C |
| 68 | 44 | D |
| 69 | 45 | E |
| 70 | 46 | F |
| 71 | 47 | G |
| 72 | 48 | H |
| 73 | 49 | I |
| 74 | 4A | J |
| 75 | 4B | K |
| 76 | 4C | L |
| 77 | 4D | M |
| 78 | 4E | N |
| 79 | 4F | O |
| 80 | 50 | P |
| 81 | 51 | Q |
| 82 | 52 | R |
| 83 | 53 | S |
| 84 | 54 | T |
| 85 | 55 | U |
| 86 | 56 | V |
| 87 | 57 | W |
| 88 | 58 | X |
| 89 | 59 | Y |
| 90 | 5A | Z |
| 91 | 5B | [ |
| 92 | 5C | \ |
| 93 | 5D | ] |
| 94 | 5E | ^ |
| 95 | 5F | _ |

| Dec | Hex | Char |
|---|---|---|
| 96 | 60 | ` |
| 97 | 61 | a |
| 98 | 62 | b |
| 99 | 63 | c |
| 100 | 64 | d |
| 101 | 65 | e |
| 102 | 66 | f |
| 103 | 67 | g |
| 104 | 68 | h |
| 105 | 69 | i |
| 106 | 6A | j |
| 107 | 6B | k |
| 108 | 6C | l |
| 109 | 6D | m |
| 110 | 6E | n |
| 111 | 6F | o |
| 112 | 70 | p |
| 113 | 71 | q |
| 114 | 72 | r |
| 115 | 73 | s |
| 116 | 74 | t |
| 117 | 75 | u |
| 118 | 76 | v |
| 119 | 77 | w |
| 120 | 78 | x |
| 121 | 79 | y |
| 122 | 7A | z |
| 123 | 7B | { |
| 124 | 7C | \| |
| 125 | 7D | } |
| 126 | 7E | ~ |
| 127 | 7F | ⌂* |

## 6.2.GB2312 Code table