# LCD Controller Manual

# MCT6448K-104 Version 2.00

2

1. MCT6448K-104                     ,

2. MCT6448K-104     Connector

3.

4. MCT6448K-104        Image Overwrite

[        1.] MCT6448K-104                              Special Font

1. MCT6448K- 104                    ,


♦ MCT6448K- 104


   ♦ LCD Resolution  : 8bit(256) Color TFT 640*480 dots

                16bit Color TFT 640*480 dots

   ♦                   :

                 KS5601

   ♦ LCD Back Light _____

   ♦ LCD Back Light  : Inverter      _On/Off

   ♦        Font      :        16*16 dots

                  16*16 dots

                  8*16 dots

                  8*16 dots

                16*16

   ♦ Image File Memory_____

     8bit(256) Color/640*480        =>        47 [Page]      .

     16bit Color/640*480        =>        23 [Page]      .


       Font_____/      ,_____,_____

_____,_____.



♦ MCT6448K- 104


   ♦ CPU              : ARM920T 200[MHz]

   ♦ Display Type     : 256 Color/16Bit Color TFT 640*480 dots

   ♦                  : + 12[VDC].

   ♦ LCD Backlight    Inverter

   ♦                  : RS- 232C       => 9600, 19200, 57600, 115200 [bps]

               8 Bit Parallel

## 2. MCT6448K-104    Connector

2        MCT6448K-104    Dimensions    Connector                .

### MCT6448K-104    Dimensions
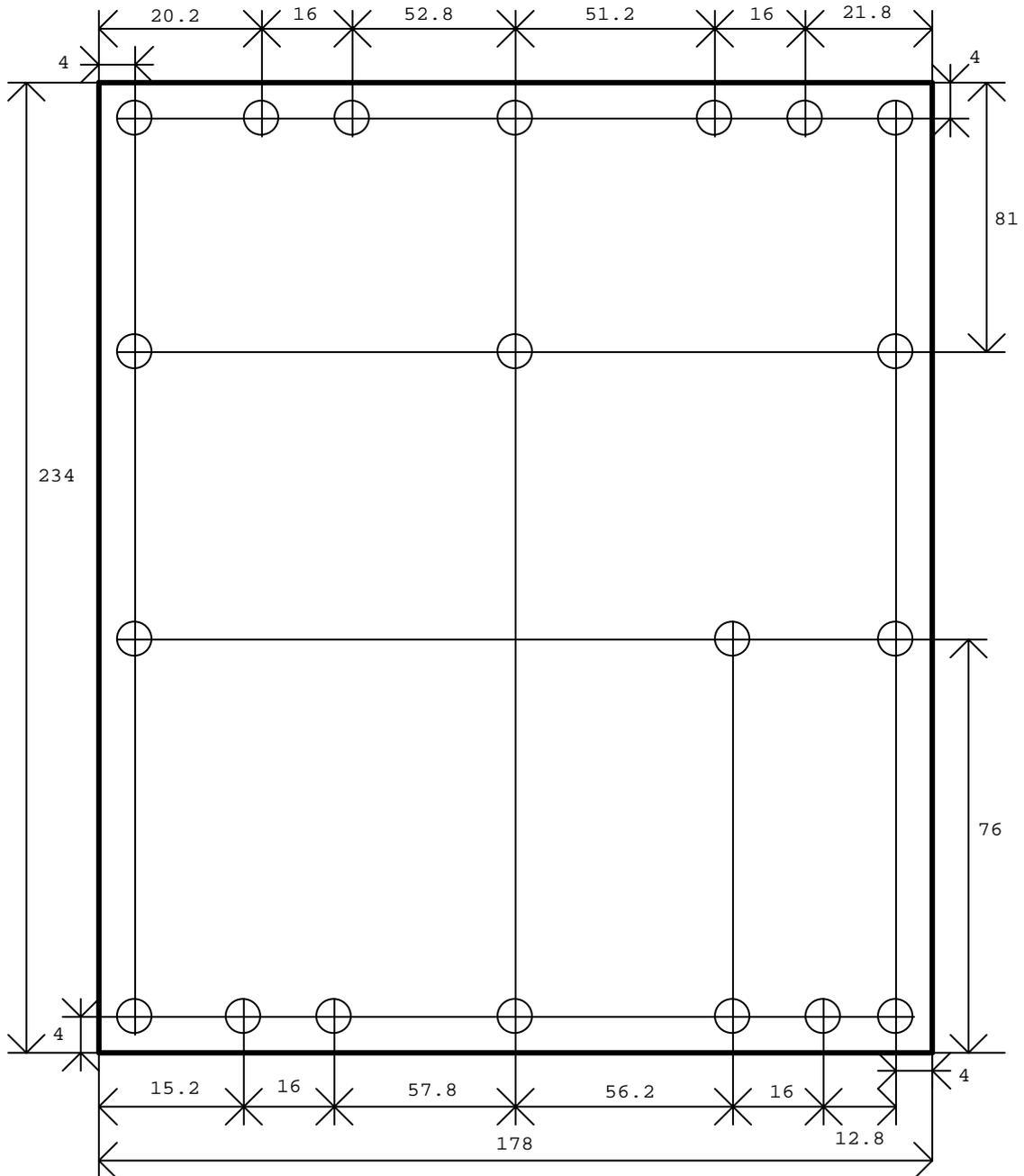
## MCT6448K- 104 Connector
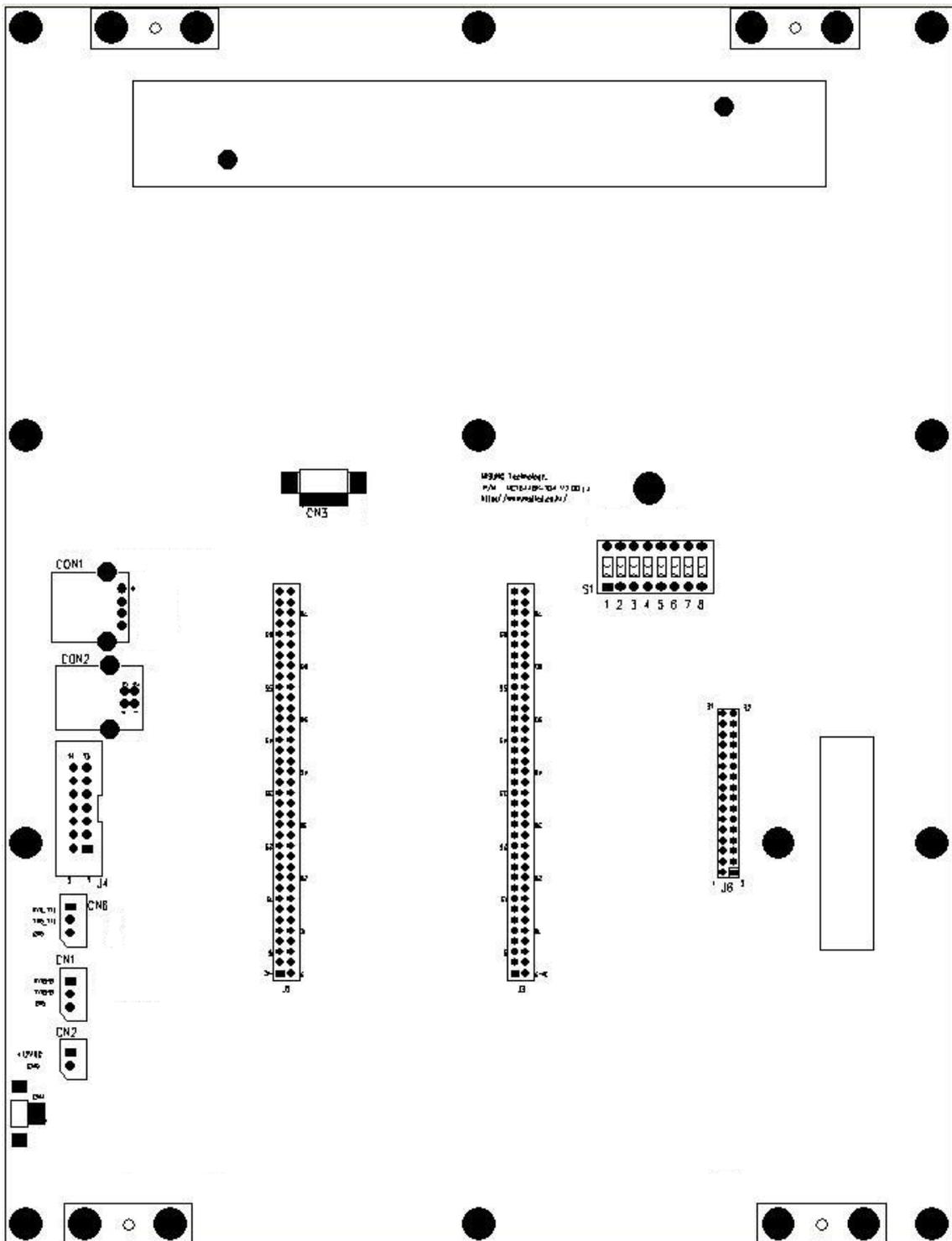
## 2- 1. LCD Module Interface Connector : J6

| Pin Number | Symbol | Description |
|---|---|---|
| 1 | VCC33 | + 3.3[VDC] |
| 2 | VCC33 | + 3.3[VDC] |
| 3 | GND | DC Groud |
| 4 | DCLK | Data Input Clock |
| 5 | DEN | Data Enable Signal |
| 6 | GND | DC Groud |
| 7 | B0 | Brue 0 |
| 8 | B1 | Brue 1 |
| 9 | B2 | Brue 2 |
| 10 | B3 | Brue 3 |
| 11 | B4 | Brue 4 |
| 12 | B5 | Brue 5 |
| 13 | GND | DC Groud |
| 14 | GND | DC Groud |
| 15 | G0 | Green 0 |
| 16 | G1 | Green 1 |
| 17 | G2 | Green 2 |
| 18 | G3 | Green 3 |
| 19 | G4 | Green 4 |
| 20 | G5 | Green 5 |
| 21 | GND | DC Groud |
| 22 | GND | DC Groud |
| 23 | R0 | Red 0 |
| 24 | R1 | Red 1 |
| 25 | R2 | Red 2 |
| 26 | R3 | Red 3 |
| 27 | R4 | Red 4 |
| 28 | R5 | Red 5 |
| 29 | GND | DC Groud |
| 30 | GND | DC Groud |
| 31 | VSYNC | Vertical Sync Signal |
| 32 | HSYNC | Horizontal Sync Signal |

## 2-2. Parallel Connector: J4

| Pin Number | Symbol | Description |
|---|---|---|
| 1 | BUSY | Busy Output(Active Low) |
| 2 | RESERVED | Reserved |
| 3 | RESERVED | Reserved |
| 4 | RESERVED | Reserved |
| 5 | GND | Ground |
| 6 | /CS | Chip Select(Falling Edge Active) |
| 7 | D7 | Data 7 |
| 8 | D6 | Data 6 |
| 9 | D5 | Data 5 |
| 10 | D4 | Data 4 |
| 11 | D3 | Data 3 |
| 12 | D2 | Data 2 |
| 13 | D1 | Data 1 |
| 14 | D0 | Data 0 |

## Parallel Timing .
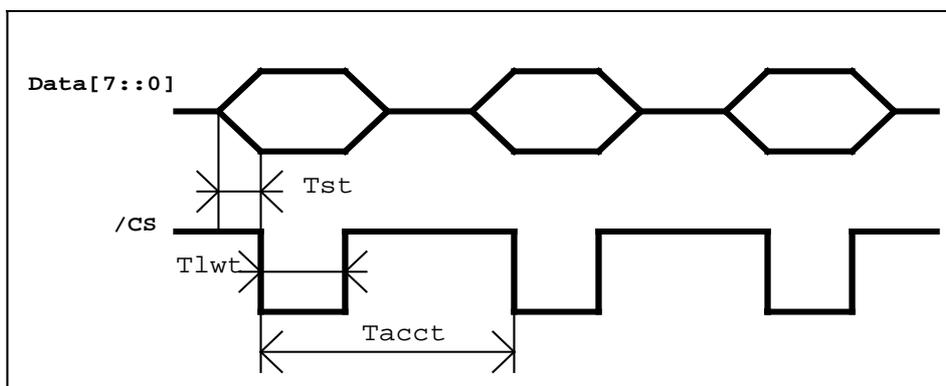


Tst : Setup Time : 1[us] < Tst.

Tlwt : Low Width Time : 1[us] < Tlwt.

Tacct : Access Time : 100[us] < Tacct.

## 2-3. Backlight Power Connector : CN3

| Pin Number | Symbol | Description |
|---|---|---|
| 1 | GND | DC Ground |
| 2 | REF | Vref |
| 3 | ON_OFF | On/OFF |
| 4 | GND | DC Ground |
| 5 | GND | DC Ground |
| 6 | VCC12 | +12[VDC] |
| 7 | VCC12 | +12[VDC] |

## 2-4. TTL RS232C Connector : CN7

| Pin Number | Symbol | Description |
|---|---|---|
| 1 | RXD_TTL | Receive Data_5VDC |
| 2 | TXD_TTL | Transmit Data_5VDC |
| 3 | GND | DC Ground |

## 2-5. RS232C Connector : CN1

| Pin Number | Symbol | Description |
|---|---|---|
| 1 | RXD232 | Receive Data |
| 2 | TXD232 | Transmit Data |
| 3 | GND | DC Ground |

## 2-6. Power Connector : CN2

| Pin Number | Symbol | Description |
|---|---|---|
| 1 | VCC12 | +12[VDC] |
| 2 | GND | DC Ground |

## 2-7. USB Device Connector : CON2

## 2-8. USB Host Connector: CON1 => Reserved

## 2-9. Touch       : CN4

## 2- 10. Switch    : S1

| Pin Number | Symbol | Description |
|---|---|---|
| 1 |  | BaudRate |
| 2 |  |  |
| 3 |  | 8/16bit color |
| 4 |  | Reserved |
| 5 |  | USB download |
| 6 |  | Logo image display |
| 7 |  | Parallel on/off |
| 8 |  | TTL/RS232C |

** BaudRate                    S1- 1,2    Switch    on/off                    .

| S1- 1 | S1- 2 | BaudRate [bps] |
|---|---|---|
| ON | ON | 9,600 |
| ON | OFF | 19,200 |
| OFF | ON | 57,600 |
| OFF | OFF | 115,200 |

** 8/16bit Color    : S1- 3    Switch    on/off             .

| S1- 3 | Symbol | Description |
|---|---|---|
| OFF | 8Bit(256) Color | 8Bit(256) Color |
| ON | 16Bit Color | 16Bit Color |

** USB download : S1- 5    Switch    on/off             .

| S1- 5 | Symbol | Description |
|---|---|---|
| ON |  | USB        image download |
| OFF |  | . |

** Logo image display : S1- 6    Switch    on/off             .

| S1- 6 | Symbol | Description |
|---|---|---|
| ON |  | Logo image display |
| OFF |  | . |

** Parallel interface : S1- 7    Switch    on/off             .

| S1- 7 | Symbol | Description |
|---|---|---|
| ON |  | Parallel interface |
| OFF |  | . |

** TTL/RS232C      : S1-8   Switch   on/off          .

| S1-8 | Symbol | Description |
|---|---|---|
| ON | | TTL |
| OFF | | RS232C |

3.

'Esc' =  0x1b [hex]

| | | | Parameter | |
|---|---|---|---|---|
| 'Esc' | 'K' | '0x01' | | |
| | | '0x02' | | KS5601 |
| | | '0x03' | | (default) |
| | | '0x04' | | |
| 'Esc' | 'E' | '0x01' | | |
| | | '0x02' | | |
| | | '0x03' | | (default) |
| | | '0x04' | | |
| 'Esc' | 'P' | '0x01' | | Reserved |
| | | '0x02' | | Reserved |
| | | '0x03' | | Reserved |
| | | '0x04' | | Reserved |
| | | '0x05' | | Reserved |
| | | '0x06' | | Reserved |
| | | '0x07' | | Font          ON |
| | | '0x08' | | Font          ON |
| | | '0x09' | | Font          ON |
| | | '0x0a' | | Font          OFF |
| | | '0x0b' | | Reserved |
| | | '0x0c' | | Reserved |
| | | '0x0d' | | Reserved |
| | | '0x0e' | | Reserved |
| | | '0x0f' | | Reserved |
| | | '0x10' | | Reserved |
| | | '0x11' | | Reserved |
| | | '0x12' | | Reserved |
| | | '0x13' | | Reserved |
| | | '0x14' | | Font     3 ,     2 |
| | | '0x15' | | Font     2 ,     3 |
| | | '0x16' | | Font     3 ,     3 |
| 'Esc' | 'D' | '0x01' | | clear |
| | | '0x02' | (X1,Y1,X2,Y2) | Text     Clear (X1, Y1, X2, Y2   hex X1,X2:0x00 ~ 0x4f,  Y1,Y2:0x00 ~ 0x1e) |

| | | | Parameter | |
|---|---|---|---|---|
| MST | | '0x03' | | Reserved |
| | | '0x04' | (X1,Y1,X2,Y2) | Graphic      clear<br>(X1, Y1, X2, Y2   hex<br>X1,X2:0x0000 ~ 0x027f,   Y1,Y2:0x0000 ~ 0x01df) |
| 'Esc' | 'C' | '0x01' | (X,Y) | Text X,Y     cursor     .<br>(X,Y   hex<br>    :0x00 ~ 0x4f    :0x00 ~ 0x1d) |
| | | '0x02' | | Reserved |
| | | '0x03' | | Reserved |
| | | '0x04' | | Reserved |
| | | '0x05' | | Reserved |
| | | '0x06' | (X,Y) | Graphic X,Y     cursor     .<br>    (X, Y)<br>X:0x0000 ~ 0x027f, Y:0x0000 ~ 0x01df |
| 'Esc' | 'L' | '0x01' | | LCD Back Light OFF |
| | | '0x02' | | LCD Back Light ON |
| 'Esc' | 'V' | '0x01' | | LCD Back Light      UP |
| | | '0x02' | | LCD Back Light      DOWN |
| 'Esc' | 'G' | '0x01' | (X,Y) | Graphic             <br>X:0x0000 ~ 0x027f, Y:0x0000 ~ 0x01df |
| | | '0x02' | (X,Y) | Graphic             <br>X:0x0000 ~ 0x027f, Y:0x0000 ~ 0x01df |
| | | '0x03' | (X1,Y1,X2,Y2) | Graphic       **Line**<br>X1,X2:0x0000 ~ 0x027f Y1,Y2:0x0000 ~ 0x01df |
| | | '0x04' | (X1,Y1,X2,Y2) | Graphic       **Line**<br>X1,X2:0x0000 ~ 0x027f Y1,Y2:0x0000 ~ 0x01df |
| | | '0x05' | (X1,Y1,X2,Y2) | Graphic         **Rectangle**<br>X1,X2:0x0000 ~ 0x027f Y1,Y2:0x0000 ~ 0x01df |
| | | '0x06' | (X1,Y1,X2,Y2) | Graphic         **Rectangle**<br>X1,X2:0x0000 ~ 0x027f Y1,Y2:0x0000 ~ 0x01df |
| | | '0x07' | (X1,Y1,X2,Y2) | Graphic       **Rectangle**<br>X1,X2:0x0000 ~ 0x027f Y1,Y2:0x0000 ~ 0x01df |
| | | '0x08' | (X1,Y1,X2,Y2) | Graphic       **Rectangle**<br>X1,X2:0x0000 ~ 0x027f Y1,Y2:0x0000 ~ 0x01df |
| | | '0x09' | (X,Y,radius) | Graphic               <br>X    Y<br>X:0x0000 ~ 0x027f, Y:0x0000 ~ 0x01df<br>Radius     :0x00 ~ 0xf0 |
| | | '0x0a' | (X,Y,radius) | Graphic             <br>X    Y<br>X:0x0000 ~ 0x027f, Y:0x0000 ~ 0x01df<br>Radius     :0x00 ~ 0xf0 |
| | | '0x0b' | (X,Y,radius) | Graphic           <br>X    Y<br>X:0x0000 ~ 0x027f, Y:0x0000 ~ 0x01df<br>Radius     :0x00 ~ 0xf0 |

| | | | Parameter | |
|---|---|---|---|---|
| MST | | '0x0c' | (X,Y,radius) | Graphic _____<br>X Y<br>X:0x0000 ~ 0x027f, Y:0x0000 ~ 0x01df<br>Radius :0x00 ~ 0xf0 |
| | | '0x0d' | (X,Y,a,b) | Graphic _____<br>X Y<br>X:0x0000 ~ 0x027f, Y:0x0000 ~ 0x01df<br>a :640/2 b :480/2 |
| | | '0x0e' | (X,Y,a,b) | Graphic _____<br>X Y<br>X:0x0000 ~ 0x027f, Y:0x0000 ~ 0x01df<br>a :640/2 b :480/2 |
| | | '0x0f' | (X,Y,a,b) | Graphic _____<br>X Y<br>X:0x0000 ~ 0x027f, Y:0x0000 ~ 0x01df<br>a :640/2 b :480/2 |
| | | '0x10' | (X,Y,a,b) | Graphic _____<br>X Y<br>X:0x0000 ~ 0x027f, Y:0x0000 ~ 0x01df<br>a :640/2 b :480/2 |
| 'Esc' | 'A' | '0x01' | | Reset (MCT6448K-104 Rebooting) |
| | | '0x02' | | LCD Back Light . |
| | | '0x03' | | Echo '0x06' Send |
| | | '0x04' | | User font display 16Byte Send<br>Image data 16Byte dummy<br>data 16Byte . |
| | | '0x05' | (I) | Text color<br>256 Color Mode I:0x00~0xff<br>16Bit Color mode I:R.G.B [Bytes].<br>R.G.B =>R:0x00~0xff; G:0x00~0xff; B:0x00~0xff; |
| | | '0x06' | (I) | Text background color<br>256 Color Mode I:0x00~0xff<br>16Bit Color mode I:R.G.B [Bytes].<br>R.G.B =>R:0x00~0xff; G:0x00~0xff; B:0x00~0xff; |
| | | '0x07' | | Reserved |
| | | '0x08' | (I) | Text overlay on |
| | | '0x09' | (I) | Text overlay off |
| | | '0x0a' | (I) | Image overlay on |
| | | '0x0b' | (I) | Image overlay off |
| | | '0x0c' | (I) | Image overlay background color setting |
| 'Esc' | 'I' | '0x01' | (I) | Image One page draw<br>(I 0x00~0x2f : 256color, 0x00~0x17 :16bit) |
| | | '0x02' | | Reserved |
| | | '0x03' | | Reserved |
| | | '0x04' | (X,Y) | Image .<br>X:0x0000 ~ 0x027f, Y:0x0000 ~ 0x01df<br>- > "0x05" image draw |

| | | | Parameter | |
|---|---|---|---|---|
| 'MST' | | '0x05' | (I,J) | I: Page Number, J: Image Number<br>I:0x00 ~ 0x2f, J:0x0000 ~ 0x012c |
| | | '0x06' | (I,X1,Y1,X2,Y2) | I: Page Number,<br>X1,Y1(start point), X2,Y2(end point)<br>       2byte       . |
| | | '0x07' | (I,X1,Y1,X2,Y2) | I: Page Number,<br>X1,Y1 - image start point<br>X2,Y2 - image size |
| 'Esc' | 'T' | '0x01' | | Reserved |
| | | '0x02' | | Reserved |
| | | '0x03' | | Touch Enable |
| | | '0x04' | | Touch end |
| | | '0x05' | | Touch start -> touch panel down -><br>320,240 (ASCII 7byte) serial |
| | | '0x06' | | Touch panel down -> 320,240 (ASCII 7byte) serial<br>   -> touch panel up -> 0xff    serial |
| 'Esc' | 'Z' | '0x01' | | Viewport move left top |
| | | '0x02' | | Viewport move right top |
| | | '0x03' | | Viewport move right bottom |
| | | '0x04' | | Viewport move right bottom |

## 4. MCT6448K- 104 　 Image Overwrite 　

### Image Overwrite Application Program



　　　　　　　　　 Overwrite 　　 Application Program
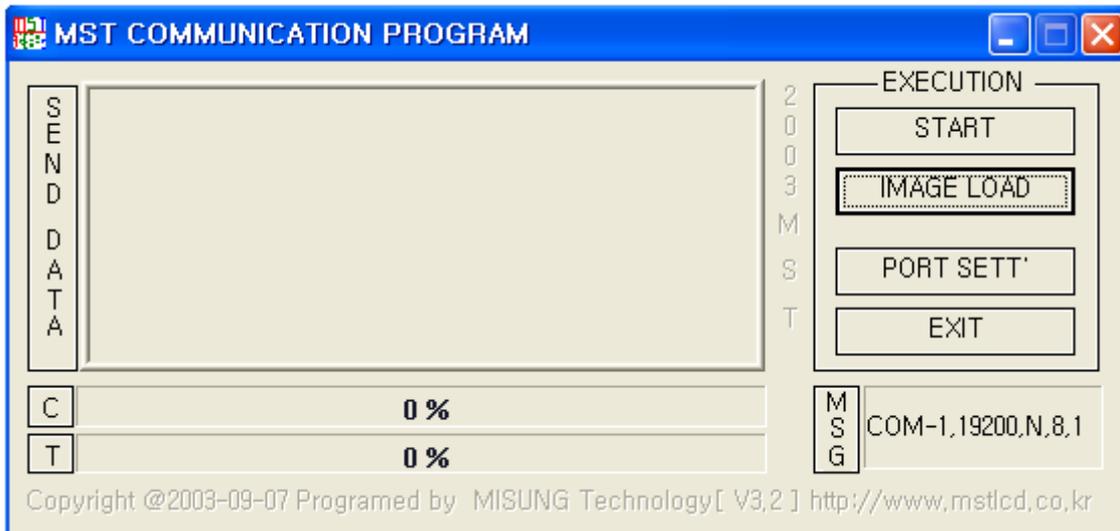
MCT6448K- 104 　　　　 Image 　 display 　　　　　　　　　　　 ,

Image 　 page 　　 Overwrite 　　　　　　　 .

　　　　　　　 , <u>MCT6448K- 104 　 PC 　 Serial Cable 　　　　　　　</u>

ㅡ 　 .
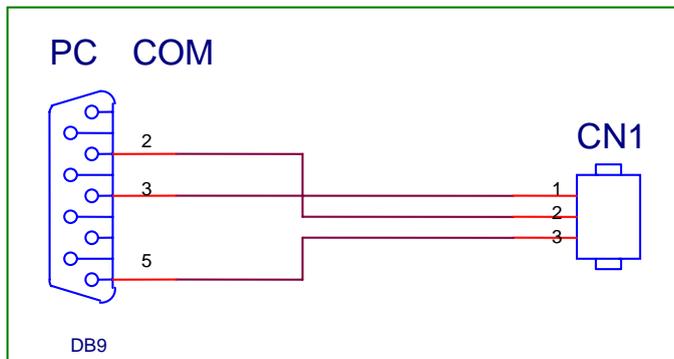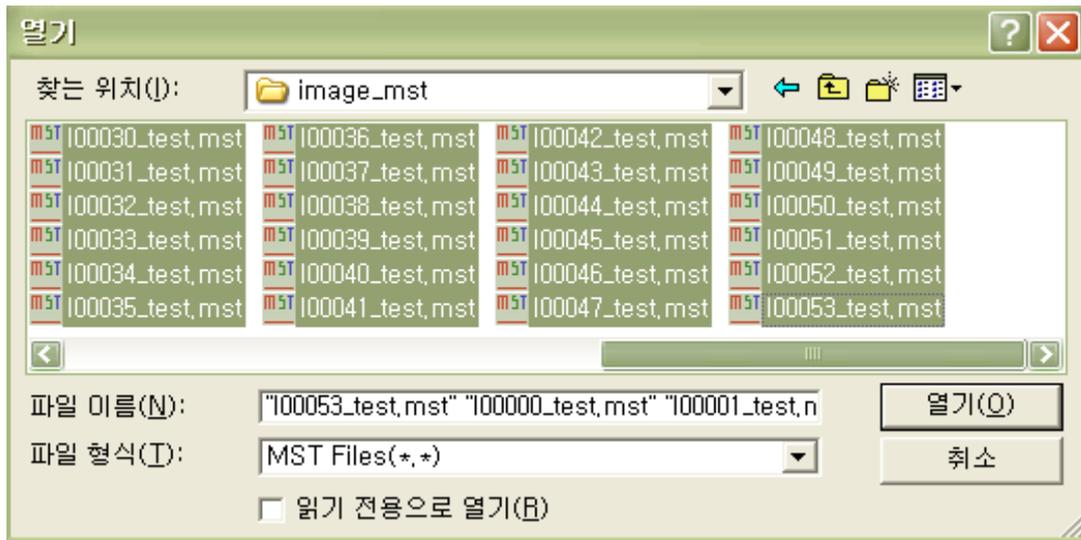


　　　　　　　 , 　　　　　　 'IMAGE LOAD'

image 　　　　 , 　　　 .

, **'START'** MCT6448K- 104 Overwrite
.
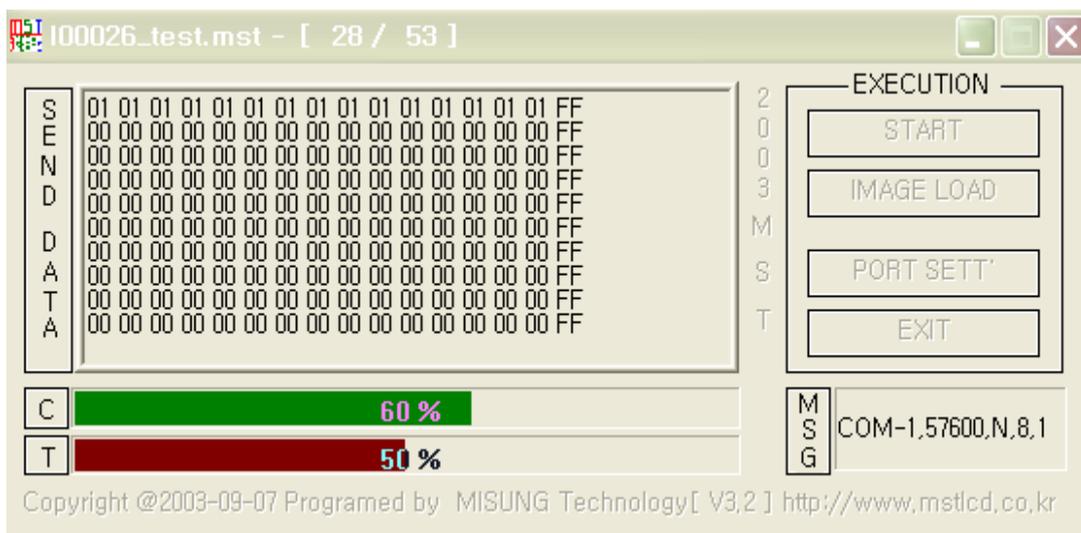


Bar Bar Download
, Bar
. Bar '100%' Image Overwrite .

'IMAGE LOAD'                     Image

    .

I 00000_test.mst

        Image                    →  Serial number : Overwrite    page number

(Serial number    1                              4      '0'                    .)
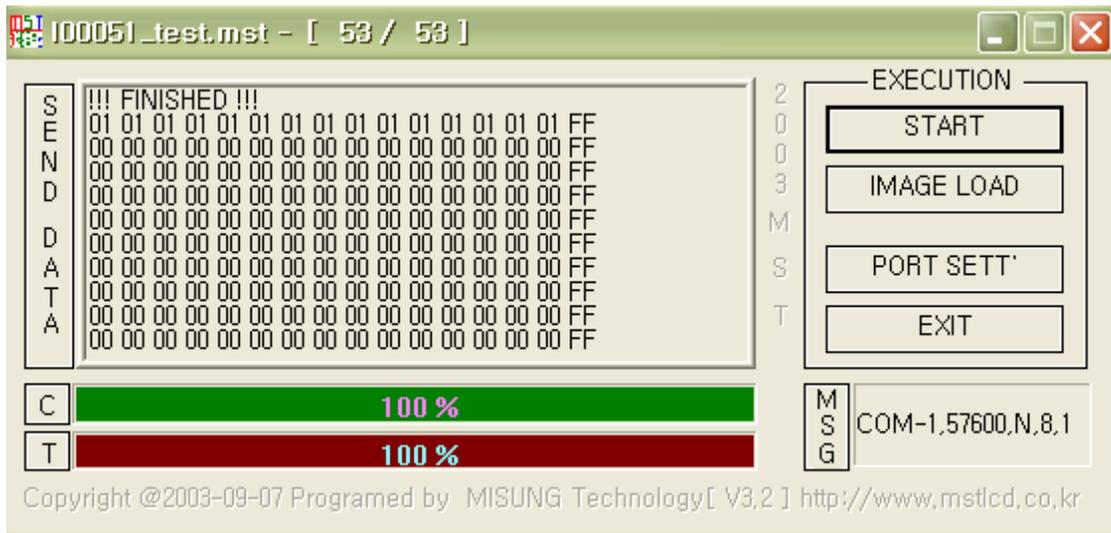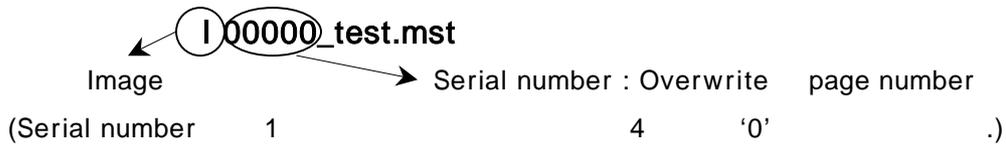

Ex) 1    page    Overwrite    file    I00001_test.mst

**[     1.] MCT6448K-104                          Special Font**

<            1- 1 > MCT6448K-104                          (Special Font)           .
Special                    <        1- 1 >                          .



<              1 - 1 >