



Typical DESIGN easy to be modified

Liquid Crystal Display Design  
I-SFT 100i.12SV-M



## Industrial Solutions Flatpanel Technology

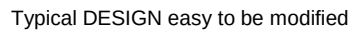
### DESIGN FOR TFT COLOR LCD MODULE

|               |                          |
|---------------|--------------------------|
| Model         | <b>I-SFT 100i.12SV-M</b> |
| Design No.    | D-sh091-m                |
| Revision      | Rev. 1.0                 |
| Type          | 12,1" 800 x 600          |
| Specification |                          |
| Version       | Internal Revision 1.1    |
| Date          | 07/06/2013               |
| Preliminary   | <b>ý</b>                 |
| Final         | "                        |
| Approved      |                          |

This typical design can be used to manufacture dedicated products at i-sft according to the mentioned specification with partional NRE cost.

Please send us a RFQ for this design and stating the number of displays to be build. We will send a formal quote including a final specification. With your formal order please also send a written approval of the final specification.

No further activities will start before formal order is processed and written approval of final specification is in!



|             |            |      |
|-------------|------------|------|
| Version 1.1 | 07.06.2013 | 2/21 |
|-------------|------------|------|



Liquid Crystal Display Design  
I-SFT 100i.12SV-M



Typical DESIGN easy to be modified

|           |                                                |           |
|-----------|------------------------------------------------|-----------|
| <b>1</b>  | <b>DESCRIPTION .....</b>                       | <b>4</b>  |
| <b>2</b>  | <b>FEATURES.....</b>                           | <b>4</b>  |
| <b>3</b>  | <b>APPLICATIONS .....</b>                      | <b>4</b>  |
| <b>4</b>  | <b>STRUCTURE AND FUNCTIONS.....</b>            | <b>5</b>  |
| <b>5</b>  | <b>OUTLINE OF CHARACTERISTICS .....</b>        | <b>6</b>  |
| <b>6</b>  | <b>BLOCK DIAGRAMM .....</b>                    | <b>7</b>  |
| <b>7</b>  | <b>SPECIFICATIONS.....</b>                     | <b>8</b>  |
| 7-1       | GENERAL SPECIFICATIONS.....                    | 8         |
| 7-2       | ABSOLUTE MAXIMUM RATINGS .....                 | 8         |
| 7-3       | ELECTRICAL CHARACTERISTICS.....                | 9         |
| 7-4       | INTERFACE PIN CONNECTION .....                 | 10        |
| 7-5       | DISPLAY COLORS vs. INPUT DATA SIGNALS .....    | 11        |
| 7-6       | INPUT SIGNAL TIMING .....                      | 12        |
| 7-7       | DISPLAY POSITION at HRV: L and VRV: L.....     | 14        |
| 7-8       | OPTICAL CHARACTERISTICS .....                  | 15        |
| 7-9       | OUTLINE DIMENSIONS .....                       | 17        |
| 7-10      | e <sup>3</sup> CONTROLLER SPECIFICATIONS ..... | 18        |
| <b>8.</b> | <b>GENERAL PRECAUTIONS.....</b>                | <b>20</b> |
| 8.1       | MOUNTING .....                                 | 20        |
| 8.2       | HANDLING .....                                 | 20        |
| 8.3       | STORAGE .....                                  | 21        |
| 8.4       | OPERATION.....                                 | 21        |
| 8.5       | OTHERS.....                                    | 21        |



## 1 DESCRIPTION

**I-SFT 100i.12SV** (H091) is a custom specific development based module and is not available on the open market.

**I-SFT 100i.12SV** (H091) is a TFT (thin film transistor) active matrix colour liquid crystal display (LCD) comprising amorphous silicon TFT attached to each signal electrode, a driving circuit.

**I-SFT 100i.12SV** (H091) is a **i-sft** GmbH specific design consisting out of a **i-sft** GmbH specific third party manufactured LCD-Glass-Matrix with backlight (which is NOT available in retail), a specific backlight to drive the panel to surface 1000 nit and an integrated e<sup>3</sup> controller.

The 12.1 inch diagonal display area contains 800×600 pixels and can display 262,144 colours simultaneously.

## 2 FEATURES

12.1" SVGA for High bright Applications

High efficiency

Long life e<sup>3</sup> system

Colour temperature 9000K

## 3 APPLICATIONS

Industrial applications only



Typical DESIGN easy to be modified

## Liquid Crystal Display Design I-SFT 100i.12SV-M



# 4 STRUCTURE AND FUNCTIONS

A TFT color LCD module comprises a TFT LCD panel, LSIs for driving liquid crystal. The TFT LCD panel is composed of a TFT array glass substrate superimposed on a color filter glass substrate with liquid crystal filled in the narrow gap between two substrates.

RGB (Red, Green, Blue) data signals are sent to LCD panel drivers after modulation into suitable forms for active matrix addressing through signal processor.

Each of the liquid crystal cells acts as an electro-optical switch that controls the incident light transmission by a signal applied to a signal electrode through the TFT switch.



Typical DESIGN easy to be modified

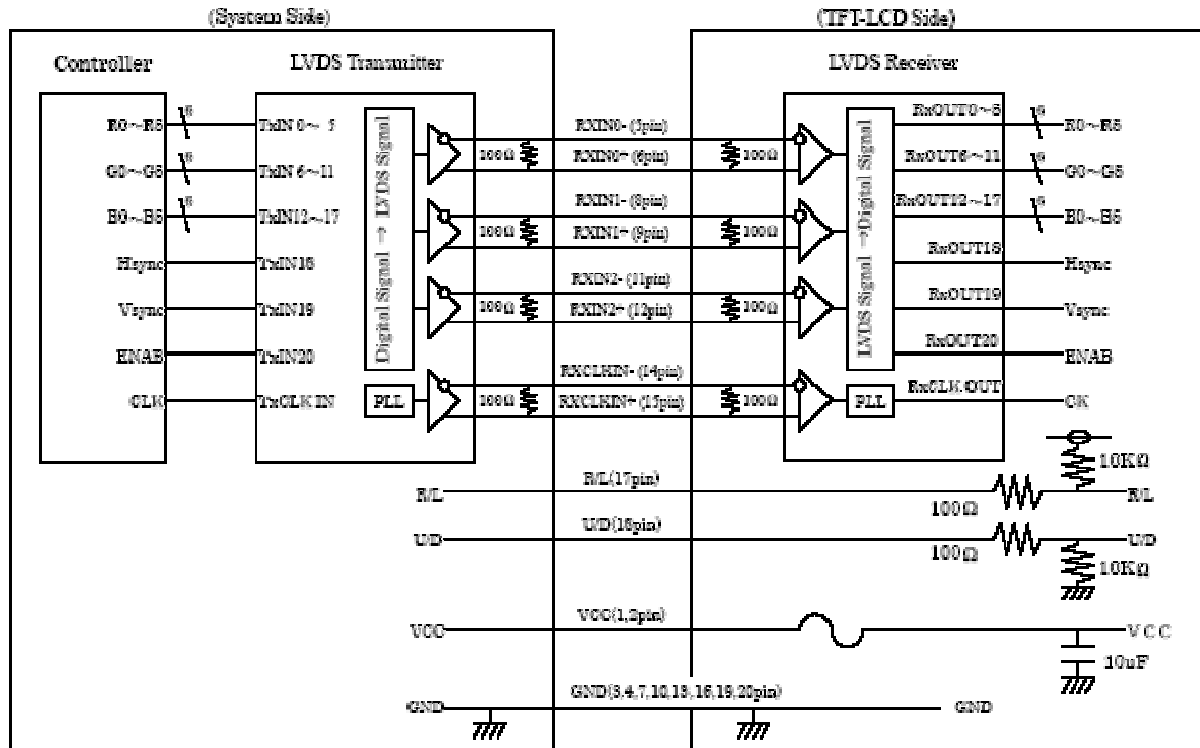
## Liquid Crystal Display Design I-SFT 100i.12SV-M



### 5 OUTLINE OF CHARACTERISTICS

| ITEM                | SPECIFICATION                              | UNIT              | NOTE |
|---------------------|--------------------------------------------|-------------------|------|
| Active display area | 246.0 (H) x 184.5 (V) (12.1 inch diagonal) | mm                |      |
| Driver element      | a – Si TFT active matrix                   |                   |      |
| Display colours     | 256k                                       |                   |      |
| Number of pixels    | 800 x 600                                  | pixel             |      |
| Luminance (typ.)    | 1000                                       | cd/m <sup>2</sup> |      |
| Dimming ratio       | 1 : 1000                                   |                   |      |
| Pixel arrangement   | RGB vertical stripe                        |                   |      |
| Pixel pitch         | 0.3075 (H) x 0.3075 (W)                    | mm                |      |
| Display mode        | Normally White                             |                   |      |
| Surface treatment   | Haze 25, Anti-glare & hard-coating (3H)    |                   |      |

## 6 BLOCK DIAGRAMM





Typical DESIGN easy to be modified

Liquid Crystal Display Design  
I-SFT 100i.12SV-M



## 7 SPECIFICATIONS

### 7-1 GENERAL SPECIFICATIONS

| ITEM        |                | TYP.  | UNIT |
|-------------|----------------|-------|------|
| Module size | Horizontal (H) | 283.8 | mm   |
|             | Vertical (V)   | 211.7 | mm   |
|             | Depth (D)      | 22.15 | mm   |
| Weight      |                | 1560  | g    |

### 7-2 ABSOLUTE MAXIMUM RATINGS

| ITEM                  | SYMBOL    | MIN. | MAX. | UNIT | NOTE |
|-----------------------|-----------|------|------|------|------|
| Storage temperature   | $T_{nop}$ | -25  | 70   | °C   | (1)  |
| Operating temperature | $T_{op}$  | -10  | 65   | °C   | (1)  |
| Shock (operating)     | $S_{op}$  | -    | tbd  | g    |      |
| Vibration (operating) | $V_{op}$  | -    | tbd  | g    |      |

Note

(1) measured at center of display area (front side); no condensation



# Liquid Crystal Display Design

## I-SFT 100i.12SV-M



Typical DESIGN easy to be modified

### 7-3 ELECTRICAL CHARACTERISTICS

(1) Logic, LCD driving

Ta = 25°C

| Parameter               | Symbol          | Min.          | Typ.         | Max.          | Unit | Remarks                                          |
|-------------------------|-----------------|---------------|--------------|---------------|------|--------------------------------------------------|
| Supply voltage          | V <sub>CC</sub> | 4.75<br>(3.0) | 5<br>(3.3)   | 5.25<br>(3.6) | V    | -                                                |
| Supply current          | I <sub>CC</sub> | -             | 230<br>(380) | 280<br>(480)  | mA   | V <sub>CC</sub> =5.0V<br>(V <sub>CC</sub> =3.3V) |
| Logic input "L" voltage | V <sub>IL</sub> | -             | -            | 0.8           | V    | CMOS level<br>note                               |
| Logic input "H" voltage | V <sub>IH</sub> | 2.1           | -            | -             | V    |                                                  |

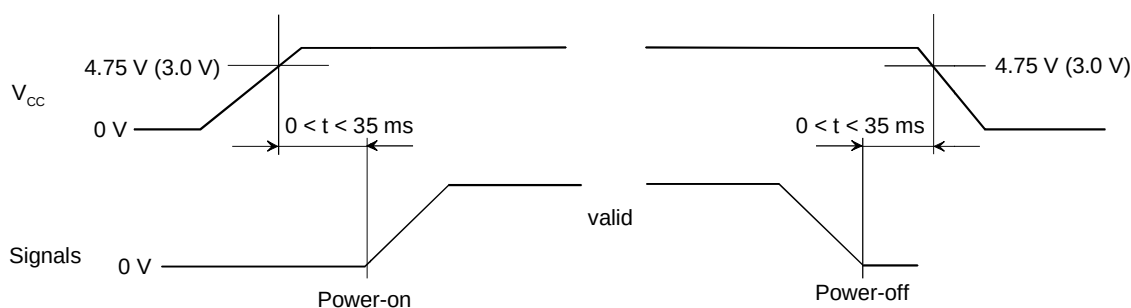
Note: V<sub>CCi</sub> = 3.3V : is given by DC/DC converter in the LCD module

(2) Backlight, e<sup>3</sup> controller driving

Ta = 25°C

| Parameter         | Symbol           | Min. | Typ. | Max. | Unit | Remarks |
|-------------------|------------------|------|------|------|------|---------|
| Supply voltage    | V <sub>inv</sub> | -    | 24   | -    | V    |         |
| Power consumption | P <sub>inv</sub> | -    | 20   | -    | W    |         |

### SUPPLY VOLTAGE SEQUENCE



note 1: The supply voltage for input signals should be the same as V<sub>CC</sub>.

note 2: Turn on the backlight within the LCD operation period. When the backlight turns on before LCD operation or the LCD operation turns off before the backlight turns off, the display becomes momentarily white.

note 3: When the power is off, please keep whole signals (Hsync, Vsync, CLK, DE, MODE and DATA) low level or high impedance.



#### 7-4 INTERFACE PIN CONNECTION

(1) Interface signals, power supply

Module side connector

Mating connector

CN30 : DF13-30DP-1.25 (HIROSE)

DF13-30DS (HIROSE)

| Pin NO. | Symbol          | Function                                |
|---------|-----------------|-----------------------------------------|
| 1       | V <sub>DD</sub> | Power supply +3.3 V                     |
| 2       | V <sub>DD</sub> | Power supply +3.3 V                     |
| 3       | NC              | Not Connected                           |
| 4       | GND             | Ground                                  |
| 5       | GND             | Ground                                  |
| 6       | GND             | Ground                                  |
| 7       | GND             | Ground                                  |
| 8       | IN0+            | LVDS Channel 0 Positive data signal (+) |
| 9       | IN0-            | LVDS Channel 0 Negative data signal (-) |
| 10      | GND             | Ground                                  |
| 11      | IN1+            | LVDS Channel 1 Positive data signal (+) |
| 12      | IN1-            | LVDS Channel 1 Negative data signal (-) |
| 13      | IN2+            | LVDS Channel 2 Positive data signal (+) |
| 14      | IN2-            | LVDS Channel 2 Negative data signal (-) |
| 15      | CLK+            | LVDS Positive clock signal (+)          |
| 16      | CLK-            | LVDS Negative clock signal (-)          |
| 17      | R/L             | Horizontal display mode select          |
| 18      | U/D             | Vertical display mode select            |
| 19-23   | NC              | Not Connected                           |
| 24      | GND             | Ground                                  |
| 25-30   | NC              | Not Connected                           |

(1) for best connection use pin 1 and 2 parallel and pin 4 – 7, 10 and 24 in parallel



# Liquid Crystal Display Design I-SFT 100i.12SV-M

Typical DESIGN easy to be modified



## 7-5 DISPLAY COLORS vs. INPUT DATA SIGNALS

| Display colors  |         | Data signal(0: Low level, 1: High level) |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----------------|---------|------------------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
|                 |         | R5                                       | R4 | R3 | R2 | R1 | R0 | G5 | G4 | G3 | G2 | G1 | G0 | B5 | B4 | B3 | B2 | B1 | B0 |
| Basic colors    | Black   | 0                                        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                 | Blue    | 0                                        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  |
|                 | Red     | 1                                        | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                 | Magenta | 1                                        | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  |
|                 | Green   | 0                                        | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  |
|                 | Cyan    | 0                                        | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
|                 | Yellow  | 1                                        | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  |
|                 | White   | 1                                        | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Red grayscale   | Black   | 0                                        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                 | dark    | 0                                        | 0  | 0  | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                 | ↑       |                                          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|                 | ↓       |                                          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|                 | bright  | 1                                        | 1  | 1  | 1  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                 | Red     | 1                                        | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Green grayscale | Black   | 0                                        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                 | dark    | 0                                        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                 | ↑       |                                          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|                 | ↓       |                                          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|                 | bright  | 0                                        | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 0  |
|                 | Green   | 0                                        | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Blue grayscale  | Black   | 0                                        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                 | dark    | 0                                        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 0  |
|                 | ↑       |                                          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|                 | ↓       |                                          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|                 | bright  | 0                                        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 0  | 1  |
|                 | Blue    | 0                                        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  |

note: colors are developed in combination with 6 bit signals (64 steps in grayscale)  
of each primary red, green, and blue color.

This process can result in up to 262,144 (64×64×64) colors.



# Liquid Crystal Display Design

## I-SFT 100i.12SV-M



Typical DESIGN easy to be modified

### 7-6 INPUT SIGNAL TIMING

#### (1) INPUT SIGNAL SPECIFICATION

| Parameter                       |                 | Symbol | MIN. | TYP.  | MAX. | Unit | Remarks |
|---------------------------------|-----------------|--------|------|-------|------|------|---------|
| CLK                             | Frequency       | 1/Tc   | 35   | 40    | 42   | MHz  | -       |
| Hsync                           | Period          | Th     | 20.8 | 26.4  | 39.9 | μs   | -       |
|                                 | Display period  | Thd    | 832  | 1056  | 1395 | CLK  |         |
|                                 | Front-porch     | Thf    | -    | -     | -    | μs   |         |
|                                 |                 |        | 800  | 800   | 800  | CLK  |         |
|                                 | Pulse width     | Thp*)  | -    | -     | -    | μs   |         |
|                                 |                 |        | 0    | 40    | -    | CLK  |         |
|                                 | Back-porch      | Thb *) | -    | -     | -    | μs   |         |
|                                 |                 |        | 2    | 128   | 200  | CLK  |         |
| Vsync                           | Period          | Tv     | -    | 17.6  | -    | ms   |         |
|                                 |                 |        | 628  | 666   | 798  | H    |         |
|                                 | Display period  | Tvd    | -    | 17.6  | -    | ms   |         |
|                                 |                 |        | -    | 480   | -    | H    |         |
|                                 | Front-porch     | Tvf    | -    | 0.381 | -    | ms   |         |
|                                 |                 |        | 1    | 12    | -    | H    |         |
|                                 | Pulse width     | Tvp *) | -    | 0.063 | -    | ms   |         |
|                                 |                 |        | 2    | 2     | -    | H    |         |
|                                 | Back-porch      | Tvb *) | -    | 0.985 | -    | ms   |         |
|                                 |                 |        | 4    | 31    | -    | H    |         |
|                                 | *) Tvp+Tvb      | 6      | 33   | -     | H    |      |         |
|                                 |                 |        | 33   | -     | H    |      |         |
|                                 | Rise, Fall      | Tvrf   | -    | -     | 10   | ns   |         |
| DATA<br>R0-R5<br>G0-G5<br>B0-B5 | CLK-DATA timing | Tds    | -    | -     | 10   | ns   |         |
|                                 |                 |        | 8    | -     | -    | ns   |         |
|                                 | DATA-CLK timing |        | Tdh  | 12    | -    | -    | ns      |
|                                 | Rise, Fall      | Tdrf   | -    | -     | 10   | ns   |         |
| DE                              | DE-CLK timing   | Tes    | 8    | -     | -    | ns   |         |
|                                 | CLK-DE timing   | Teh    | 12   | -     | -    | ns   |         |
|                                 | Rise, Fall      | Terf   | -    | -     | 10   | ns   |         |

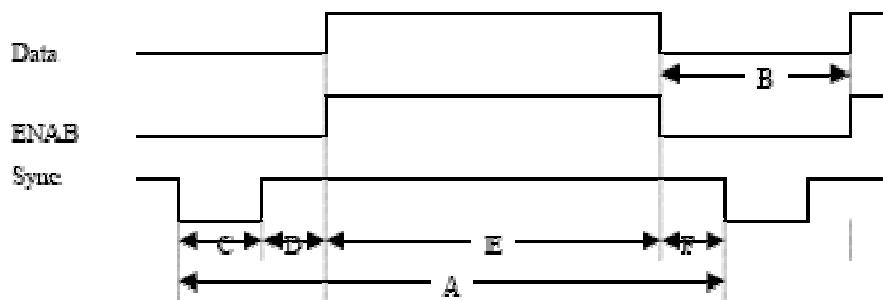
#### (2) DEFINITION OF INPUT SIGNAL TIMING



Liquid Crystal Display Design  
I-SFT 100i.12SV-M



Typical DESIGN easy to be modified





# Liquid Crystal Display Design

## I-SFT 100i.12SV-M



Typical DESIGN easy to be modified

### 7-7 DISPLAY POSITION at HRV: L and VRV: L

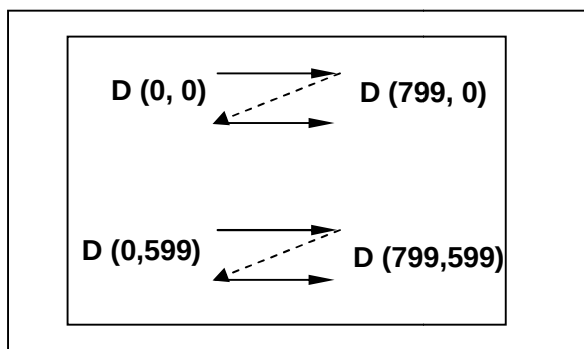
Normal scan: DPS = "L" (factory set)

|          |          |  |          |  |            |            |
|----------|----------|--|----------|--|------------|------------|
| D(0,0)   | D(1,0)   |  | D(X,0)   |  | D(798,0)   | D(799,0)   |
| D(0,1)   | D(1,1)   |  | D(X,1)   |  | D(638,1)   | D(639,1)   |
|          |          |  |          |  |            |            |
| D(0,Y)   | D(1,Y)   |  | D(X,Y)   |  | D(638,Y)   | D(639,Y)   |
|          |          |  |          |  |            |            |
| D(0,598) | D(1,598) |  | D(X,598) |  | D(798,598) | D(799,598) |
| D(0,599) | D(1,599) |  | D(X,599) |  | D(798,599) | D(799,599) |

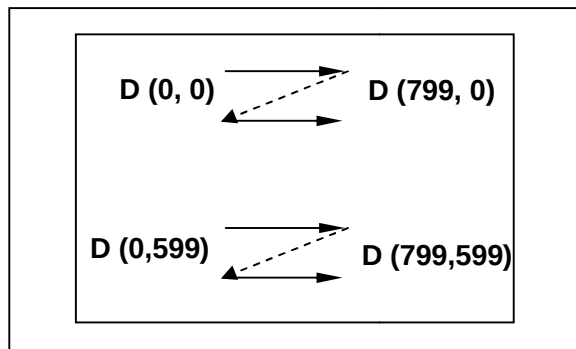
Note. Below drawings show relations between the scan direction and the viewing direction.

Front

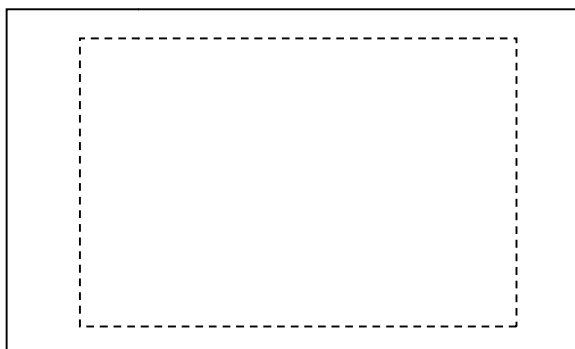
Normal scan (factory set)



Reverse scan (DPS = "H", external signal)



Back



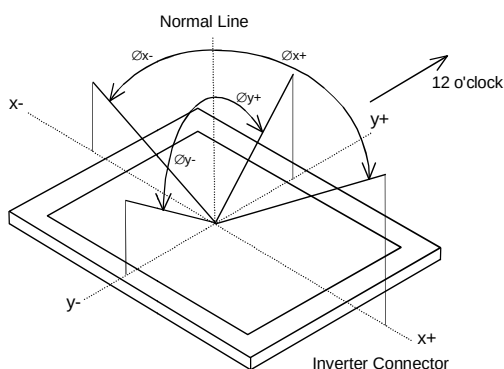


## 7-8 OPTICAL CHARACTERISTICS

Ta = 25°C ± 5°C

| Parameter                       |            | Symbol           | Condition                                             | Min.   | Typ.     | Max.   | Unit              | Remark |
|---------------------------------|------------|------------------|-------------------------------------------------------|--------|----------|--------|-------------------|--------|
| Viewing angle range             | Horizontal | $\varnothing x+$ | CR>10, $\varnothing y = \pm 0^\circ$                  | -      | 65       | -      | deg.              | note 1 |
|                                 |            | $\varnothing x-$ | CR>10, $\varnothing y = \pm 0^\circ$                  | -      | 65       | -      | deg.              | note 1 |
|                                 | Vertical   | $\varnothing y+$ | CR>10, $\varnothing x = \pm 0^\circ$                  | -      | 55       | -      | deg.              | note 1 |
|                                 |            | $\varnothing y-$ | CR>10, $\varnothing x = \pm 0^\circ$                  | -      | 65       | -      | deg.              | note 1 |
| Contrast ratio                  |            | CR               | $\varnothing y=0^\circ$ , $\varnothing x=\pm 0^\circ$ | -      | 550:1    | -      | -                 | note 2 |
| Response time                   |            | tpd              | white to black<br>black to white                      | -<br>- | 15<br>30 | -<br>- | ms                | note 3 |
| Luminance<br>(center of screen) |            | Lw               | at center                                             | Vabs   | -        | 1000   | cd/m <sup>2</sup> | note 4 |
|                                 |            |                  | at center                                             | V(λ)   | -        | 850    |                   | note 5 |
| Dimming range                   |            | DR               |                                                       |        | 1000:1   |        |                   |        |

Note 1: Definitions of viewing angle are as follows. (Matrix facing up, connector on the right side)



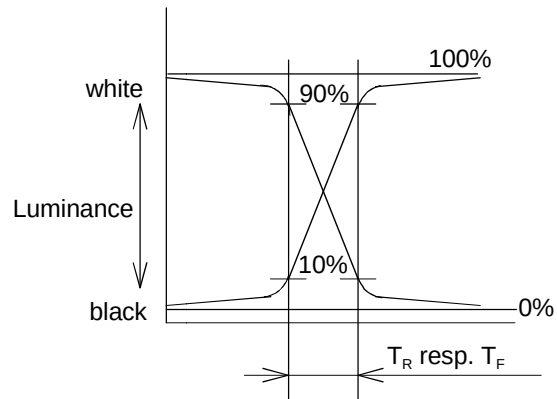
Note 2: The contrast ratio is calculated by using the following formula:

$$\text{Contrast ratio} = \frac{\text{Brightness (Luminance) with all pixels in "White"}}{\text{Brightness (Luminance) with all pixels in "Black"}}$$

The brightness is measured in a darkroom.

Note 3: Definition of response time is as follows.

Photo detector output signal is measured when the brightness changes "white" to "black". Response time is the time between 10% and 90% of the photo detector output amplitude.



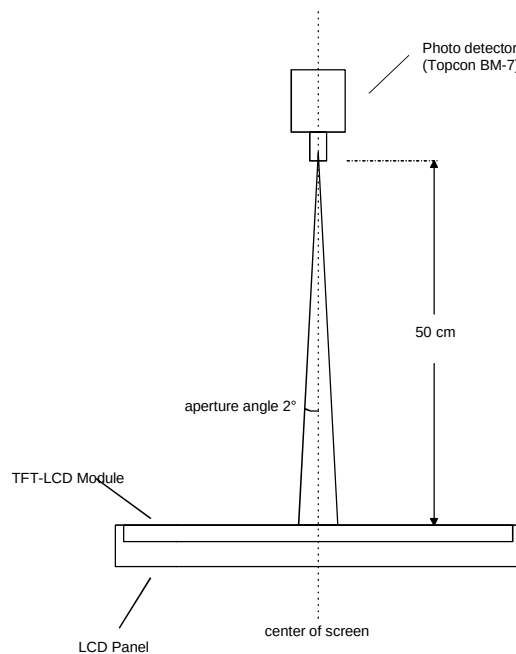
Note 4: Brightness measurements setup.

Measurement should be executed in a dark room 30 minutes

after lighting the backlight. Matrix: on state.

The brightness is measured at the centre of the screen surface.

Environmental conditions: Temperature should be  $25 \pm 2$  °C. Ensure there is sufficient heat flow / air circulation is given





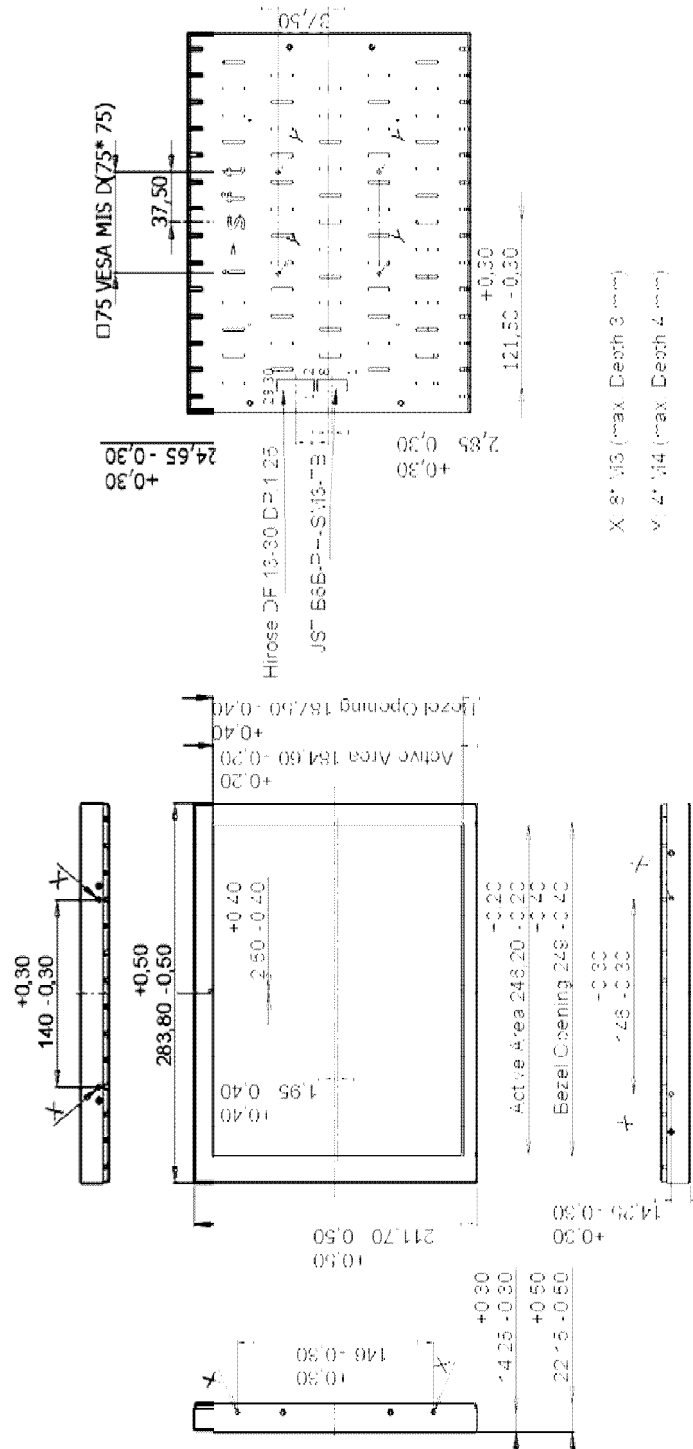
# Liquid Crystal Display Design

I-SFT 100i.12SV-M

Typical DESIGN easy to be modified



## 7-9 OUTLINE DIMENSIONS



tolerances in DIN ISO 2768 T1 class m



## 7-10 e<sup>3</sup> CONTROLLER SPECIFICATIONS

### a. PIN CONNECTION

Connector (Series): JST S8B-PH-SM3-TBc

Corresponding connector: housing JST PHR-8, contacts JST SPH-002T-P0.5S

| Pin # | Description                                                                           | value                                            |
|-------|---------------------------------------------------------------------------------------|--------------------------------------------------|
| 1     | Supply voltage for e <sup>3</sup> controller                                          | typ. 24 VDC *1                                   |
| 2     | Supply voltage for e <sup>3</sup> controller                                          | typ. 24 VDC *1                                   |
| 3     | N.C.                                                                                  |                                                  |
| 4     | Remote ON/OFF                                                                         | +5VDC = ON<br>GND = OFF                          |
| 5     | Reference voltage output                                                              | +5 VDC *3                                        |
| 6     | Dimming input with variable resistor<br>Analog dimming input<br>Digital dimming input | 1K $\Omega$ *3<br>0-5 VDC *3<br>PWM, TTL – Level |
| 7     | Ground                                                                                | GND *1                                           |
| 8     | Ground                                                                                | GND *1                                           |

Attention: depending on source and temperature, when switching on, the e<sup>3</sup> controller current can be much higher (see separate application note)

\*1 for connection use both pin 1 and 2 parallel and pin 7 and 8 parallel

\*2 n.c.: no connection (leave pin open)

\*3 If no dimming is required, you have to short pin 6 and pin 5 for maximum brightness, 0 VDC= dark, 5 VDC= bright

Note: e<sup>3</sup> controller included soft start after power on 1minute.



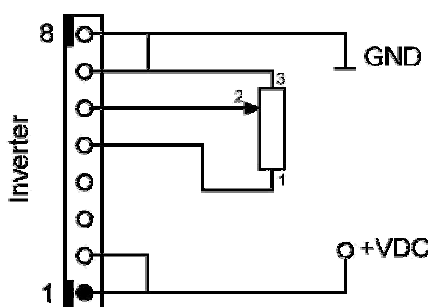
Typical DESIGN easy to be modified

## Liquid Crystal Display Design I-SFT 100i.12SV-M

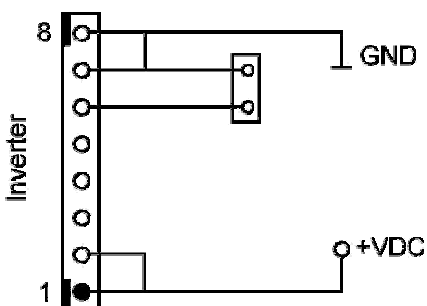


### b. e<sup>3</sup> CONTROLLER CONNECTIONS

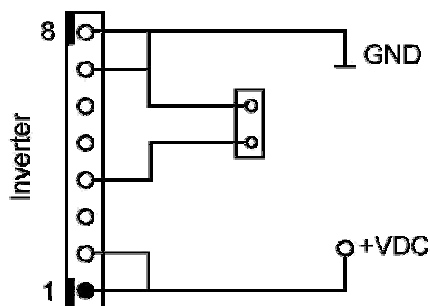
1. Dimming with variable Resistor (pin 7: 0 V)



2. Dimming with variable analog DC voltage. Variable voltage 0 to 5 VDC (pin 7: 0 V)



3. Digital Dimming with PWM control 0 to 100% PWM, PWM 200-1000 Hz; TTL-Level (pin 7: 0 V), recommended frequency 200Hz,





Typical DESIGN easy to be modified

## Liquid Crystal Display Design I-SFT 100i.12SV-M



# 8. GENERAL PRECAUTIONS

## 8.1 MOUNTING

- (a) The module should be attached firmly to the system using every mounting hole. Be careful not to twist and bend the modules during mounting and operation.
- (b) To avoid the local build-up of heat, there must be a sufficient heat flow / air circulation on the rear side of the display. We recommend a minimum gap of 6 to 15 mm between the rear side of the display module and the application - depending on display size and orientation of mounting. As higher the display as wider the gap.
- (c) The length of fixation screws for the housing must not exceed 4 mm on the top, the bottom and on the sides. Length of fixation screws on the back plate must not exceed 6 mm
- (d) Refrain from strong mechanical shock and / or any force to the module, this may cause improper operation or damage to the module and e<sup>3</sup> backlight.

## 8.2 HANDLING

- (a) Note that polarizer's are very fragile and could be easily damaged. Do not press or scratch the surface harder than a HB pencil lead.
- (b) Wipe off water droplets or oil immediately. If you leave the droplets for a long time, staining and discoloration may occur.
- (c) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.
- (d) The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might produce a permanent damage to the polarizer due to chemical reaction.
- (e) If the liquid crystal material leaks from the panel (i.e. when broken ), it should be kept away from the eyes or mouth. In case of contact with hands, legs or clothes, it must be washed away thoroughly with soap.
- (f) Protect the module from static electricity, it may cause damage to the C-MOS Gate Array IC`s.
- (g) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
- (h) Do not disassemble the module.
- (i) Pins of I/F connector must not be touched directly with bare hands.



Typical DESIGN easy to be modified

## Liquid Crystal Display Design

### I-SFT 100i.12SV-M



#### **8.3 STORAGE**

- (a) The module shall be stored in a dark place. It is prohibited to apply sunlight or fluorescent light during the store.

#### **8.4 OPERATION**

- (a) Do not connect, or disconnect the module in the "Power On" mode.
- (b) Power supply should always be turned on/off by following item 7.3 " SUPPLY VOLTAGE SEQUENCE ".(see specification of your model)
- (c) Module has high frequency circuits. Sufficient suppression of electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.

#### **8.5 OTHERS**

- (a) Ultra-violet ray filter is necessary for outdoor operation.
- (b) Avoid condensation. It may result in improper operation or permanent damage.
- (c) Do not exceed the absolute maximum rating values (e.g. the supply voltage variation, input voltage variation, variation in part contents and environmental temperature and so on). Otherwise the module may be damaged.
- (d) If the module displays the same pattern continuously for a long period of time, image "sticking" can be seen on the screen. For proper operations avoid such conditions.
- (e) This module has its circuitry PCB's on the rear side. Please handle carefully in order to avoid any kind of stress.