

Industrial Solutions Flatpanel Technology

DESIGN FOR TFT COLOR LCD MODULE

Design No.	doh115_150
Revision	i-sft ↔ Rev. 0.2
Type	15" 1024 x 768
	SPECIFICATIONS
Version	Internal Revision 0.2
Date	02.03.2005
Preliminary <input checked="" type="checkbox"/>	
Final <input type="checkbox"/>	

This typical design can be used to manufacture dedicated products at i-sft according to the mentioned specification. 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!

Records of Revisions

Revision	Date	Description
0.1	02. Jul. 2003	First Draft
0.2	01.Mrz.2005	New Firmware

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1 DESCRIPTION

I-SFT doh115_150 is a TFT(thin film transistor) active matrix color liquid crystal display (LCD) comprising amorphous silicon TFT attached to each signal electrode, a driving circuit.

I-SFT doh115_150 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 1600 nit and an integrated inverter.

The 15 inch diagonal display area contains 1024x768 pixels and can display 16.777.216 colors. 6 o'clock direction is the optimum viewing angle.

Inside fans are temperature controlled.

2 FEATURES

15" XGA for Highbright Applications

DVI interface system

Long life lamp system

Color temperature 9000K

3 APPLICATIONS

Industrial application

POI / POS

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.

5 OUTLINE OF CHARACTERISTICS

Display area	304.128 mm(H) × 228.096 mm(V)
Drive system	a-Si TFT active matrix
Display colors	16.777.216 colors
Number of pixels	1024 × 768
Pixel arrangement	RGB, vertical stripe
Pixel pitch	0.297 mm(H) × 0.297 mm(V)
Module size	353.7 mm(H) × 264.0 mm(V) × 46.80 mm(D)
Weight	2850 g (typ.)
Luminance	1600 cd/m ² (typ.)
Dimming range	1 : 1000
Contrast ratio	850 :1 (typ.)
Response time	45 ms (typ.), "white" to "black"
Signal system	DVI - I
Supply voltage	24 VDC for integrated Inverter & controller
Scanning direction	Vertical scanning is normal Horizontal scanning is normal
Optional	Lightsensor

6 RESOLUTION

Resolution	Hz	
640 x 480	60	
640 x 480	67	
640 x 480	72	
640 x 480	75	
720 x 400	70	
720 x 400	88	
800 x 600	56	phys. resolution
800 x 600	60	phys. resolution
800 x 600	72	phys. resolution
800 x 600	75	phys. resolution
1024 x 768	60	
1024 x 768	70	
1024 x 768	75	
1024 x 768	75	

The integrated DVI controller has a DDC module for the recognition of the automatic Plug+Play function.

For other resolutions the display has auto-scaling.

7 SPECIFICATIONS

7-1 GENERAL SPECIFICATIONS

Item	Specifications	Unit
Module size	213.2 (H) × 308 (V) × 61 (D)	mm
Display area	247.2 (H) × 185.6 (V)	mm
Number of pixels	800×3 (H) × 600 (V)	pixel
Dot pitch	03075. (H) × 0.1025 (V)	mm
Pixel pitch	0.3075 (H) × 0.3075 (V)	mm
Pixel arrangement	RGB (Red, Green, Blue) vertical stripe	-
Display colors	16.7 mio	color
Weight	1850 (typ.)	g
Powerconnector	Molex 39-29-1027	

7-2 ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Ratings	Unit	Remarks
Supply voltage	V _{inv}	typ. 24 VDC	V	T _a = 25°C
Storage temp.	T _{st}	-20 to 60	°C	
Operation temp.	T _{op}	-10 to 60 *1	°C	

*1: measured at center display area (Front side)

7-3 ELECTRICAL CHARACTERISTICS

(1) Logic, LCD driving

Ta = 25°C

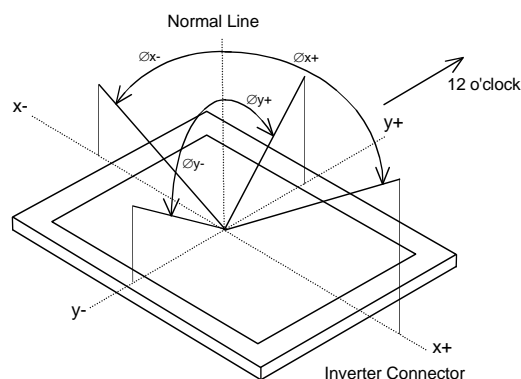
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
Supply voltage	Vin	22.8	24	25.2	V	at full brightness with fans
Supply current	Iin	-	2.7	-	A	

7-4 OPTICAL CHARACTERISTICS

Ta = 25°C ± 5°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	
Viewing angle range	Horizontal	$\varnothing x+$	CR>10, $\varnothing y = \pm 0^\circ$	-	80	-	deg.	note 1
		$\varnothing x-$	CR>10, $\varnothing y = \pm 0^\circ$	-	80	-	deg.	note 1
	Vertical	$\varnothing y+$	CR>10, $\varnothing x = \pm 0^\circ$	-	60	-	deg.	note 1
		$\varnothing y-$	CR>10, $\varnothing x = \pm 0^\circ$	-	60	-	deg.	note 1
Contrast ratio	CR	$\varnothing y=0^\circ, \varnothing x=\pm 0^\circ$	-	850	-	-	note 2	
Response time	tpd	white to black	-	50	-	ms	note 3	
		black to white	-	50	-			
Luminance (center of screen)	Lw	at center		1600		cd/m ²	note 4	
Dimming range Opt. Dimsens.	DR			1000 : 1 4 : 1				

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



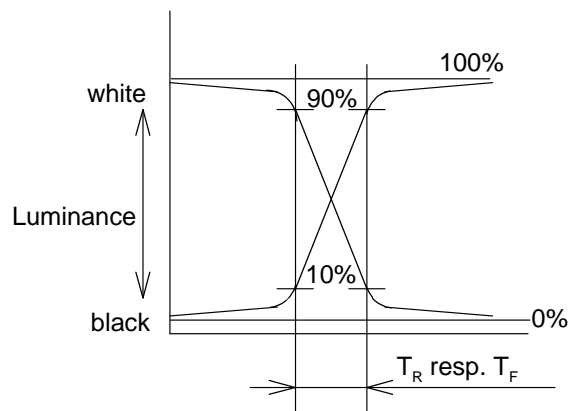
note 2: The contrast ratio is calculated by using the following formula:

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

the brightness is measured in darkroom.

note 3: Definition of response time is as follows.

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



Reference data

Ta = 0°C white to black tpd = 15 ms typ.

black to white tpd = 35 ms typ.

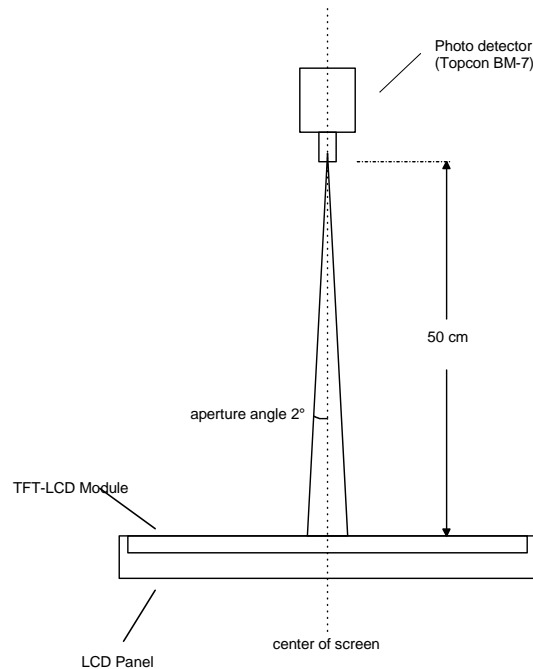
note 4: Brightness measurements setup.

measurement should be executed in a dark room 30 min.

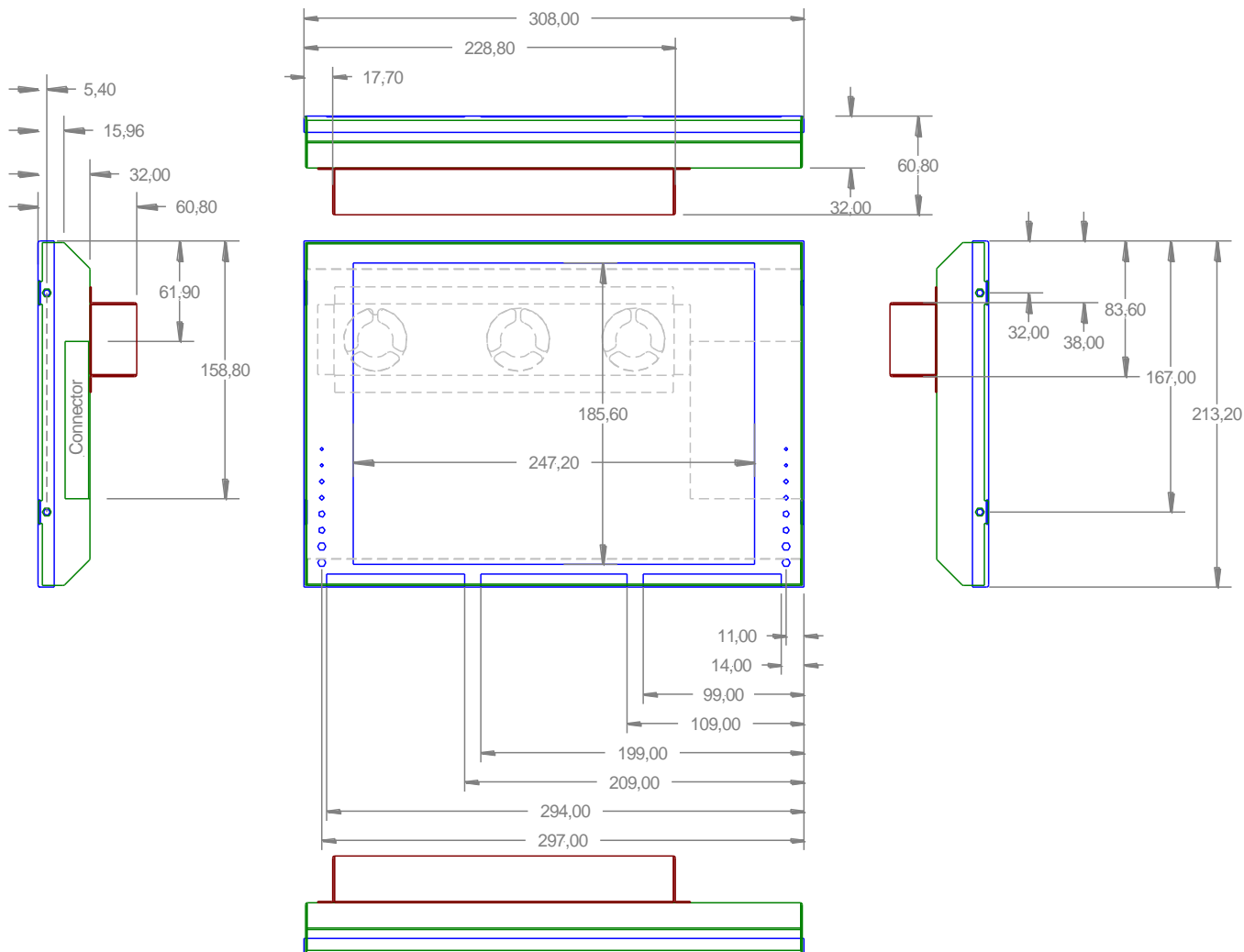
after lightning the backlight. Matrix: off state.

The brightness is measured in the center of the screen.

Environment condition: $T = 25 \pm 2 \text{ }^\circ\text{C}$, it has to be assured that a sufficient heat flow / air circulation is given



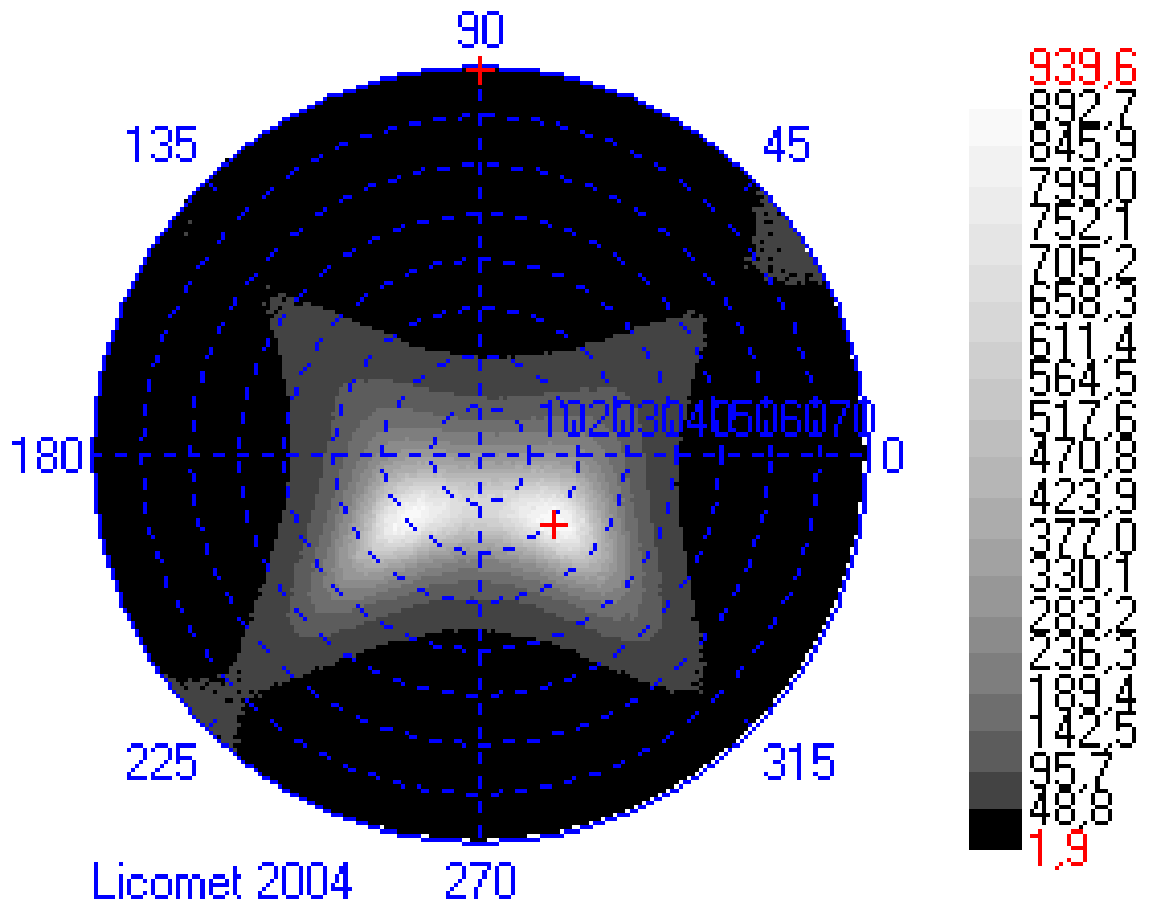
7-5 OUTLINE DIMENSIONS



tolerances in DIN ISO 2768 T1 class m

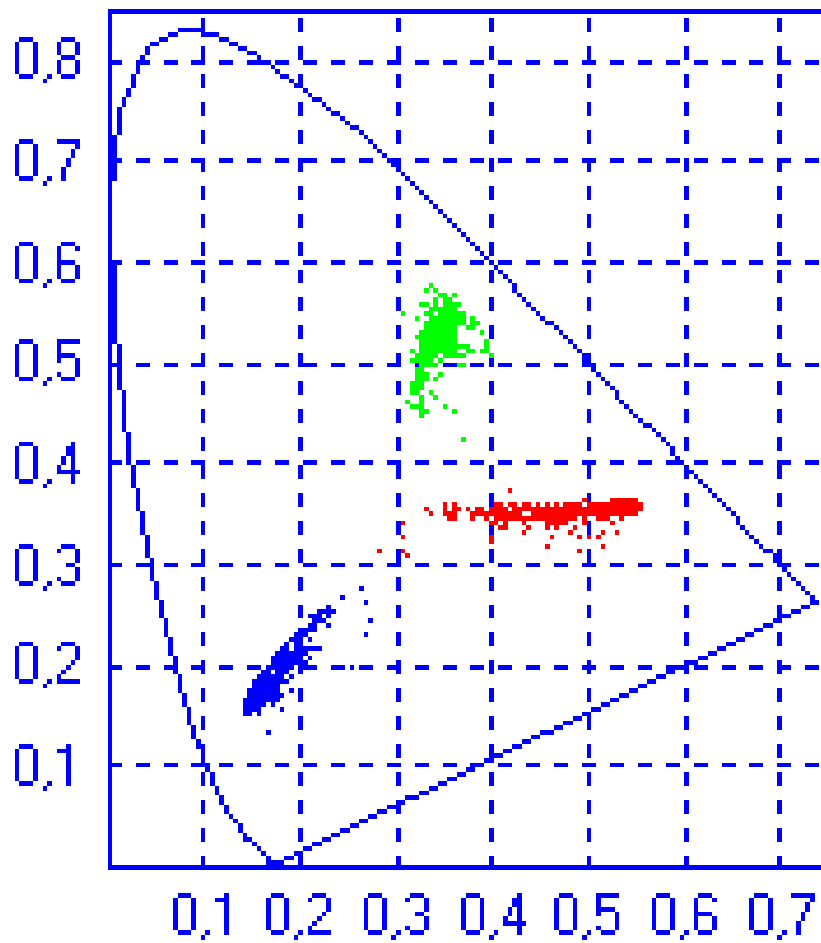
7-6 MEASUREMENTS

7-6-1 CONTRAST



7-6-2 COLOR DISPERSION

xy COLOR DISPERSION (1931 System)



7-7 DEFECT SPECIFICATIONS

a) Inspection conditions

Distance : the distance between the inspector's eye and the LCD panel is 20cm.

Luminance : the distance between a 20-W fluorescent lamp and the LCD panel is 25-30 cm.

Temperature: Room temperature is $25\text{C}^{\circ} \pm 5\text{C}^{\circ}$.

Viewing angle:

Display specifications : $-20^{\circ} \leq \theta x \leq +20^{\circ}$, $0^{\circ} \leq \theta y \leq +20^{\circ}$

Appearance specifications: $-45^{\circ} \leq \theta x \leq +45^{\circ}$, $-45^{\circ} \leq \theta y \leq +45^{\circ}$

Measuring light conditions: for Cold Cathode Fluorescent Lamp

Chromaticity coordinates ($x = 0.320$, $y = 0.325$) typ.

Luminance of backlight surface for inspection: 1200 cd/m^2

b) Display specifications

Item	Specifications			
Line defect	Not allowed			
Luminous dots *1	Color	Brightness	Distance between same color dots	Quantity
	Red, Green	F + H	-	$R + G \leq 6$
		F	-	$R \leq 6$, $G \leq 3$
	Blue	F + H	-	≤ 6
		F	-	≤ 6
	Red, Green, Blue	F	$\leq 6.5 \text{ mm}$ *4	$R, G, B \leq 0$
Linked two or *3 more dots			$R, G, B \leq 0$	
Dark dots *2	Color	Distance between dark dots		Quantity
	Black	-		$R + G + B \leq 16$ $R, G, B \leq 7$
		Linked two dots	*3	$\leq 1 \text{ pair}$
		Linked three or more dots	*3	≤ 0
		$\leq 6.5 \text{ mm}$	*4	≤ 0

*1 F: Full luminous dots (Bright point independent of viewing angle)

H: Half luminous dots (Bright point dependent on viewing angle)

Luminous dots are measured while the screen is black.

*2 Dark dots are measured while the screen is illuminated with Red, Green, or Blue.

*3 Linkage means linked two or more dots.

■ (: Luminous or Dark dot)

To be counted

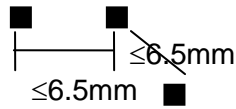


To be uncounted



*4 $\leq 6.5 \text{ mm}$ is considered with:

■ (: Luminous or Dark dot)



	To be counted	To be uncouncted
Luminous dots	Same color	Different color
Dark dots	Same screen	Different screen

*5 The dot-amounts of linkage and ≤ 6.5 mm are counted when the dots are only full luminous.

c) Appearance specifications

Item	Specifications		
	Measurement criteria	Quantity	
Other objects Stains Dust (dot shape)	Average diameter(\varnothing) mm		
	$\varnothing \leq 0.2$	all allowed	
	$0.2 < \varnothing < 0.3$	≤ 10 points	
	$0.3 < \varnothing \leq 0.5$	≤ 3 points	
	$0.5 < \varnothing$	0 point	
Other objects Stains Dust (line shape)	Linked other objects		
	Width(W) mm	Length(L) mm	
	$W \leq 0.05$	-	
	$0.05 \leq W \leq 0.1$	$L < 0.7$	≤ 4 points
		$0.7 \leq L \leq 1.0$	
$0.1 < W$	-	0 point	
Polarizer Bubbles	Average diameter(\varnothing) mm		
Wrinkles Dent	$\varnothing \leq 0.5$		
Panel dent	$\varnothing \leq 0.5$		
Polarizer scratch	Remarkable scratches		
Form	Specified labels and parts are put		

The relevant data for the values above are only valid under the conditions described in 7-9 "a".