

### FEATURES

- TFT-Active Matrix-LCD Drive System
- 240 (V) x 720 (H) (Total 172,800) Dots (Delta Configuration)
- Slim, Lightweight and Compact;
  - Active Area/Outline Area: 57%
  - Thickness: 23 mm
  - Weight: 320 g
- Built-in Video Interface Circuit (including chroma demodulator, picture tone, video ACG circuit) and Control Circuit Responsive to Composite Video Signal
- Also Responsive to Standard Analog RGB Video Signals
- Further RGB Signals can be Superimposed on Composite Video Signal (in this case, RGB signals shall be digital input signal for eight colors display)
- High-Quality, Full-Color Rendition With Backlight Source Incorporated
- Viewing Angle:
  - 6 O'Clock Direction: LQ6NC01
  - 12 O'Clock Direction LQ6NC02

### DESCRIPTION

The SHARP LQ6NC01/LQ6NC02 Color TFT-LCD module is an active matrix LCD (Liquid Crystai Display) produced by making the most of Sharp's expertise in liquid-crystal and semiconductor technologies. The active device is amorphous silicon TFT (Thin Film Transistor). The module accepts full-color video signals (composite video and analog RGB) conforming to the NTSC (M) system standard.

When additionally provided with the backlight-driving DC/AC inverter, it is applicable to pocket TVs and various display monitors.

The module consists of a TFT-LCD panel, driver ICs, control PWB mounted with electronic circuits, flourescent tube, reflector, frame, front and rear shielding cases.

*NOTE:* Backlight-driving DC/AC inverter is not built into the module.

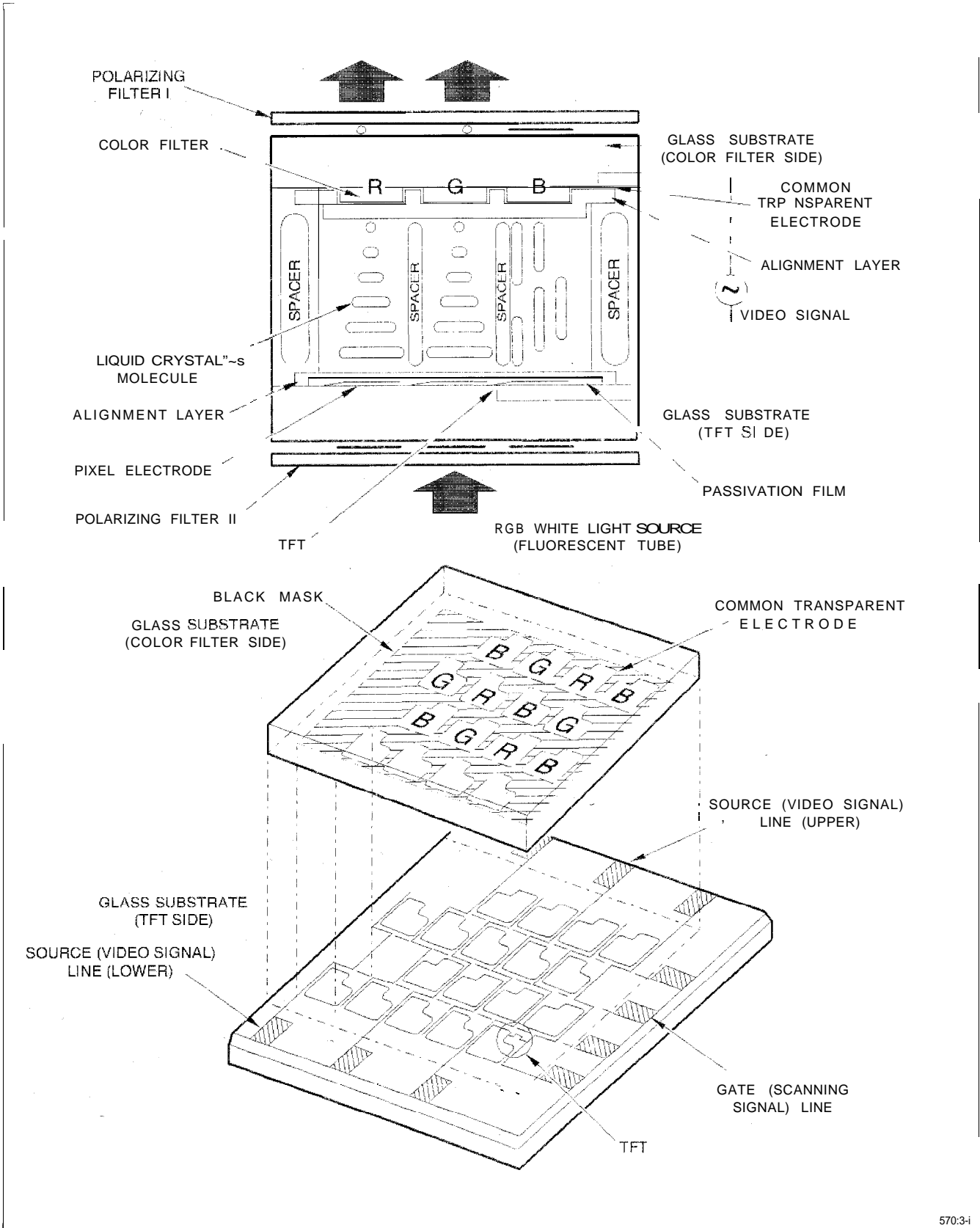
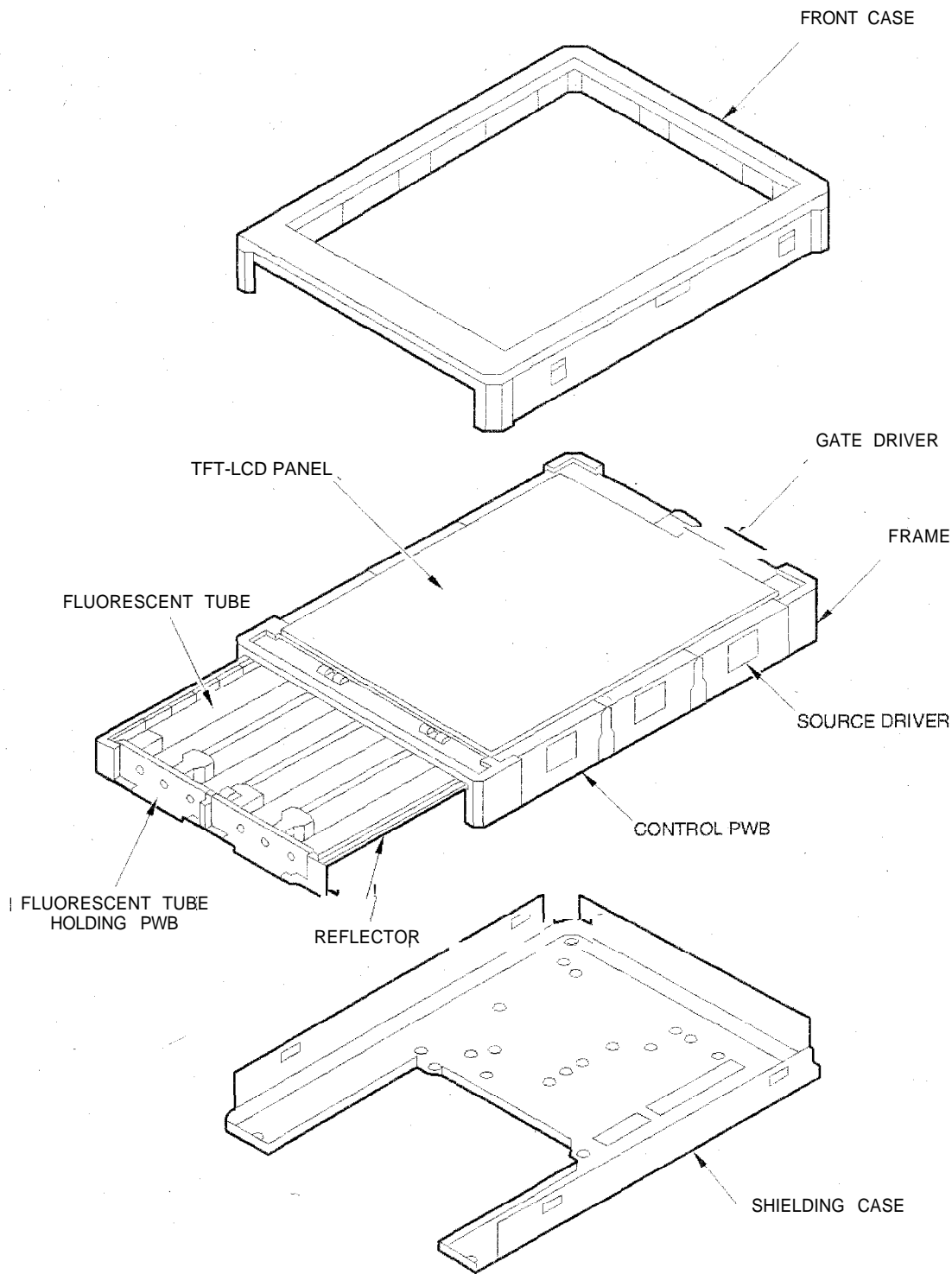


Figure 1. LQ6NC01/LQ6NC02 TFT-LCD Panel

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Figure 2, LQ6NC01/LQ6NC02 TFT-LCD Module Construction

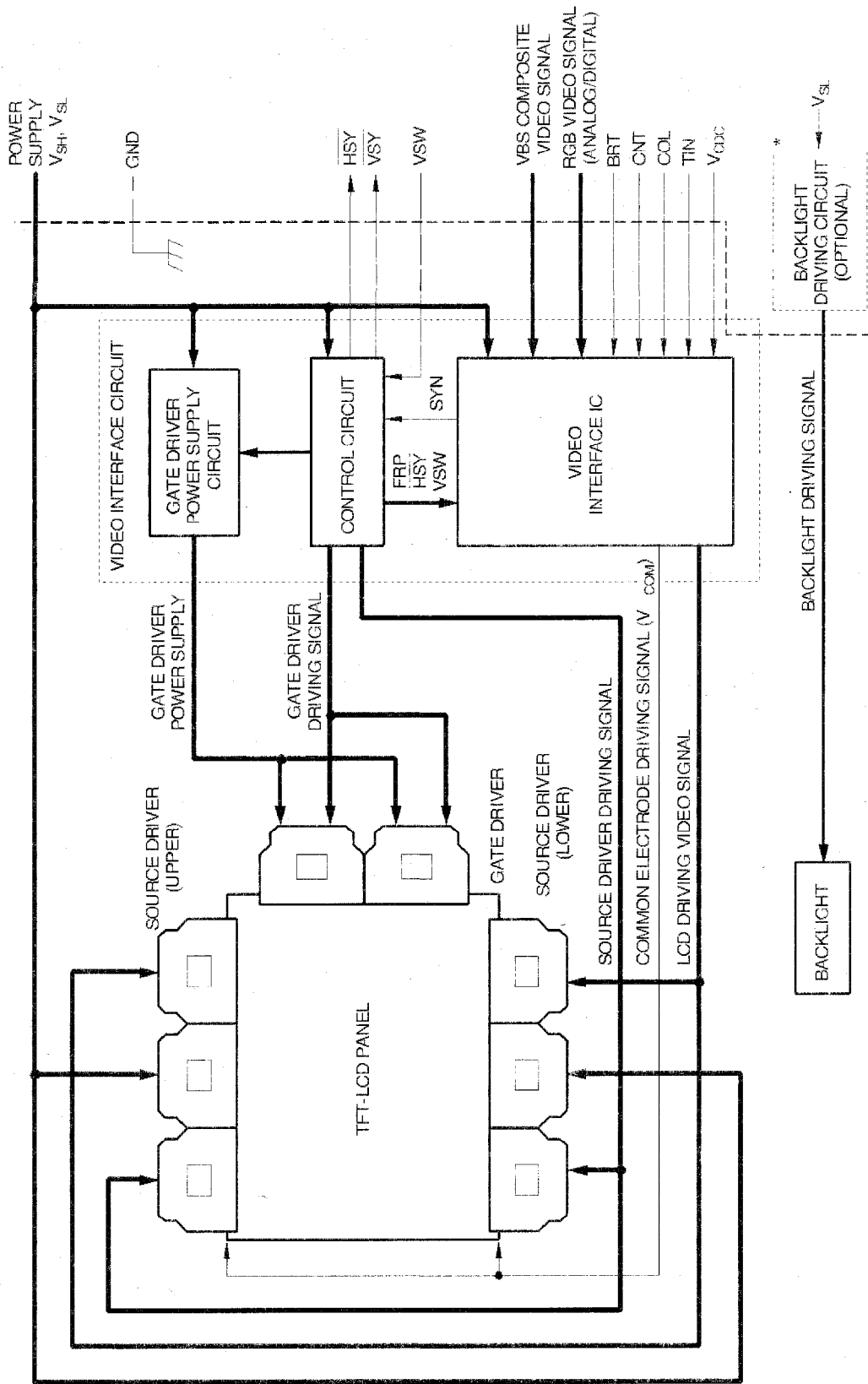


Figure 3. LQ6NC01/LQ6NC02 TFT-LCD Module Block Diagram

NOTE: \* = Not included in the module.

## MECHANICAL SPECIFICATIONS

PARAMETER	SPECIFICATIONS	UNIT	NOTE
Display Format	720 (W) × 240 (H)	dots	—
Active Area	113.8 (W) × 87.6 (H)	mm	—
Screen Size	5.7 (Diagonal)	inch	—
Dot Pitch	0.158 (W) × 0.365 (H)	mm	—
Dot Configuration	RGB Delta Configuration	—	—
Outline Dimension	149.4 (W) × 117 (H) × 23 (D)	mm	1
Weight	320 ±10	g	—

NOTE:

1 Excludes protrusions.

ABSOLUTE MAXIMUM RATINGS (GNB = 0 V, t<sub>A</sub> = 25°C)

SYMBOL	PARAMETER	MIN.	MAX.	UNIT	NOTE
V <sub>SH</sub>	Positive Power Supply Voltage	-0.3	+6.0	V	—
V <sub>SL</sub>	Negative Power Supply Voltage	-9.0	+0.3	V	—
V <sub>i1</sub>	Video Input Signal 1	—	2.0	V <sub>P-P</sub>	1
V <sub>i2</sub>	Video Input Signal 2	—	V <sub>SH</sub> -0.3	V <sub>P-P</sub>	2
V <sub>I</sub>	Digital Input/Output Signals	-0.3	V <sub>SH</sub> +0.3	V	3
V <sub>CDC</sub>	DC Bias Voltage of Common Electrode Driving Signal	V <sub>SL</sub> -0.3	-1.5	V	—
V <sub>PIC</sub>	Picture Adjusting Terminal Voltage	-0.3	V <sub>SH</sub> -0.3	V	4
T <sub>STG</sub>	Storage Temperature	-25	60	degrees	5
T <sub>OPP</sub>	Operating Temperature – Panel	0	60	degrees	
T <sub>OPA</sub>	Operating Temperature – Ambient	0	40	degrees	

NOTES:

1. VBS terminal (composite video signal)
2. VRI, VGI, VBI terminals (RGB signals)
3. HSY, VSY, VSW terminals.
4. BRT, CNT, COL, TIN terminals
5. Maximum wet-bulb temperature 38°C or less No dew condensation

## INPUT/OUTPUT TERMINALS – TFT-LCD PANEL DRIVING SECTION

PIN NUMBER	SYMBOL	I/O	DESCRIPTION	NOTE
1	HSY	O	Internal Horizontal Sync Signal (In phase with VBS)	–
2	VSX	O	Internal Vertical Sync Signal (In phase with VBS)	–
3	TST	–	This is Electrically Opened During Operation	–
4	NC	–		
5	TST	–		
6	GND	I	Ground	–
7	VSW	I	Selection Signal of Two Sets of Video Signals	1
8	GND	I	Ground	–
9	V <sub>CDC</sub>	I	DC Bias Voltage Adjusting Terminal of Common Electrode Driving Signal	2
10	V <sub>SH</sub>	I	Positive Power Supply Voltage	–
11	VBS	I	Composite Video Signal	3
12	BRT	I	Brightness Adjusting Terminal	4
13	CNT	I	Contrast Adjusting Terminal	
14	COL	I	Color Gain Adjusting Terminal	
15	TIN	I	Tint Adjusting Terminal	5
16	V <sub>SL</sub>	I	Negative Power Supply Voltage	
17	VRI	I	Color Video Signal – Red	
18	VGI	I	Color Video Signal – Green	5
19	VBI	I	Color Video Signal – Blue	
20	GND	I	Ground	–

## NOTES:

In the following descriptions, 'High' means 'V<sub>SH</sub>' and 'Low' means 'GND.'

- Selects input signals, composite or RGB:
  - When VSW is 'High' or open, composite video signal (Pin Number 13) is selected.
  - When VSW is 'Low,' RGB signal set (Pin Numbers 17 through 19) is selected.
- Common electrode driving signal (V<sub>COM</sub>) generated in the module is observed on the pin. This should be opened during operation, since the DC component of V<sub>COM</sub>(V<sub>CDC</sub>) is adjusted before shipping to the optimum value with V<sub>SH</sub> and V<sub>SL</sub> being the typical value. If the optimum value changes (for example, lowering of the power source), it should be re-adjusted with the built-in variable resistor (V<sub>CDC</sub>) or external circuit shown in Figure 5. Refer to 'Adjusting Method of Optimum Common Electrode DC Bias Voltage' for readjusting.
- Similarly, in case of RGB input, apply composite video signal or composite sync signal (with negative polarity) for sync separator.
- Brightness, Contrast, Color Gain and Tint are adjusted by the DC voltage supplied to each pin. (Contrast, color gain, and tint are not available for RGB signal input). They are adjusted to the optimum value on shipping but they can be re-adjusted with the built-in variable resistor (BRT, CNT, COL, TIN) or external circuit shown in Figure 5. (However, since the contrast is adjusted to maximize display characteristics, it is recommended not to readjust it and to keep outer adjustment terminals open)
- Responsive to 0 V<sub>P-P</sub> to 0.7 V<sub>P-P</sub> analog RGB signal when VSW is fixed to 'Low.'
  - In case of superimposing on composite video signal as on screen display (refer to Note 1). RGB signals shall be digital signal (Low: 0 V<sub>P-P</sub> High: >2 V<sub>P-P</sub> available for eight colors display).

## INPUT/OUTPUT TERMINALS -- BACKLIGHT DRIVING SECTION

PIN NUMBER	SYMBOL	I/O	DESCRIPTION	NOTE
L1	VL1	I	Power Supply For Fluorescent Tube (1) (GND)	1
L2	NC	—	No Connection	—
L3	VL2	I	Power Supply For Fluorescent Tube 1 (High)	—
L4	VL3	I	Power Supply For Fluorescent Tube 2 (High)	—
L5	NC	—	No Connection	—
L6	VL4	I	Power Supply For Fluorescent Tube (2) (GND)	1

**NOTE:**

1 Should be grounded by the backlight driving DC/AC inverter, as the L1 and L6 terminals are connected with the shielding film in the module. These terminals will be grounded by the optional DC/AC inverter. For internal electrical connection of backlight unit, see Figure 4.

**CAUTION:** Shielding case is separated from GND terminal and electrically open.

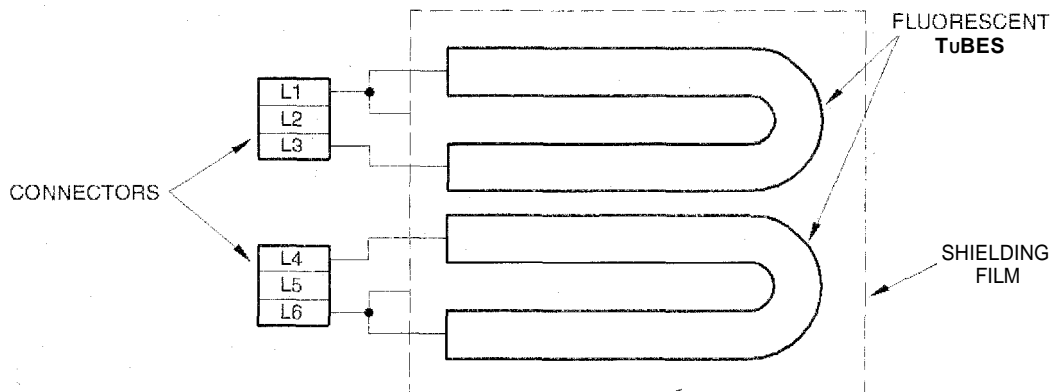


Figure 4. Wiring Diagram of Backlight Unit

**RECOMMENDED OPERATING CONDITIONS – TFT-LCD Panel Section (GND = 0 V,  $t_A = 25^\circ\text{C}$ )**

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT	NOTE
$V_{SH}$	Positive Power Supply Voltage	+4.8	+5.0	+5.2	V	–
$V_{SL}$	Negative Power Supply Voltage	-7.6	-8.0	-8.4	V	–
VBS	Video Input Signal Amplitude (Peak Level)	0.7	1.0	1.3	$V_{P-P}$	1
$V_{RGB} (1)$		–	0.7	–	$V_{P-P}$	2
$V_{RGB} (2)$		2.0	–	4.0	$V_{P-P}$	3
$V_{IOC}$	Video Input Signal DC Component	-1.0	0	+1.0	V	4
$V_{IN}$	Digital Input Voltage – High Level	+3.5	–	$V_{SH}$	V	5
$V_{IL}$	Digital Input Voltage – Low Level	0	–	+1.5	V	–
$V_{OH}$	Digital Output Voltage – High Level	+3.5	–	$V_{SH}$	V	6
$V_{OL}$	Digital Output Voltage – Low Level	0	–	+1.5	V	–
$V_{CDC}$	DC Bias Voltage of Common Electrode Driving Signal	-4.5	-3.5	-2.5	V	7

## NOTES:

- VBS (composite video signal):  
Input impedance:  $75\ \Omega$ .  
Amplitude of sync signal:  $>0.2\ V_{p.p.}$
- VRI VGI, VBI terminals (RGB signals for analog display).  
Input impedance:  $>10\ k\Omega$ .
- VRI VGI VB! terminals (RGB signals for superimposing).  
Input impedance:  $>10\ k\Omega$ .
- VBS, VRI, VGI, VBI terminals.
- VSW terminal.  
Input impedance:  $>50\ k\Omega$ .
- HSY,  $\overline{VS\overline{Y}}$  terminals (internal sync signals).  
Load resistance:  $>20\ k\Omega$ .
- Adjusted for each module so as to attain maximum contrast ratio.  
Refer to 'Adjusting Method of Optimum Common Electrode DC Bias Voltage' for adjusting.

**RECOMMENDED OPERATING CONDITIONS – BACKLIGHT DRIVING SECTION ( $t_A = 25^\circ\text{C}$ )**

SYMBOL	PARAMETER	CONDITION	MIN.	TYP.	MAX.	UNIT
$V_L$	Lamp Voltage	Just for reference	290	330	370	V RMS
$I_L$	Lamp Current		6.0	7.0	8.0	mA RMS
$f_L$	Frequency	–	20	–	50	kHz
$V_S$	Kick-Off Voltage	–	800	–	–	V RMS

## NOTE:

DC/AC inverter for driving cold cathode fluorescent tube (CCFT) is not built in the module  
DC/AC inverter for external connection (Model Number LQ0J04) is optionally available



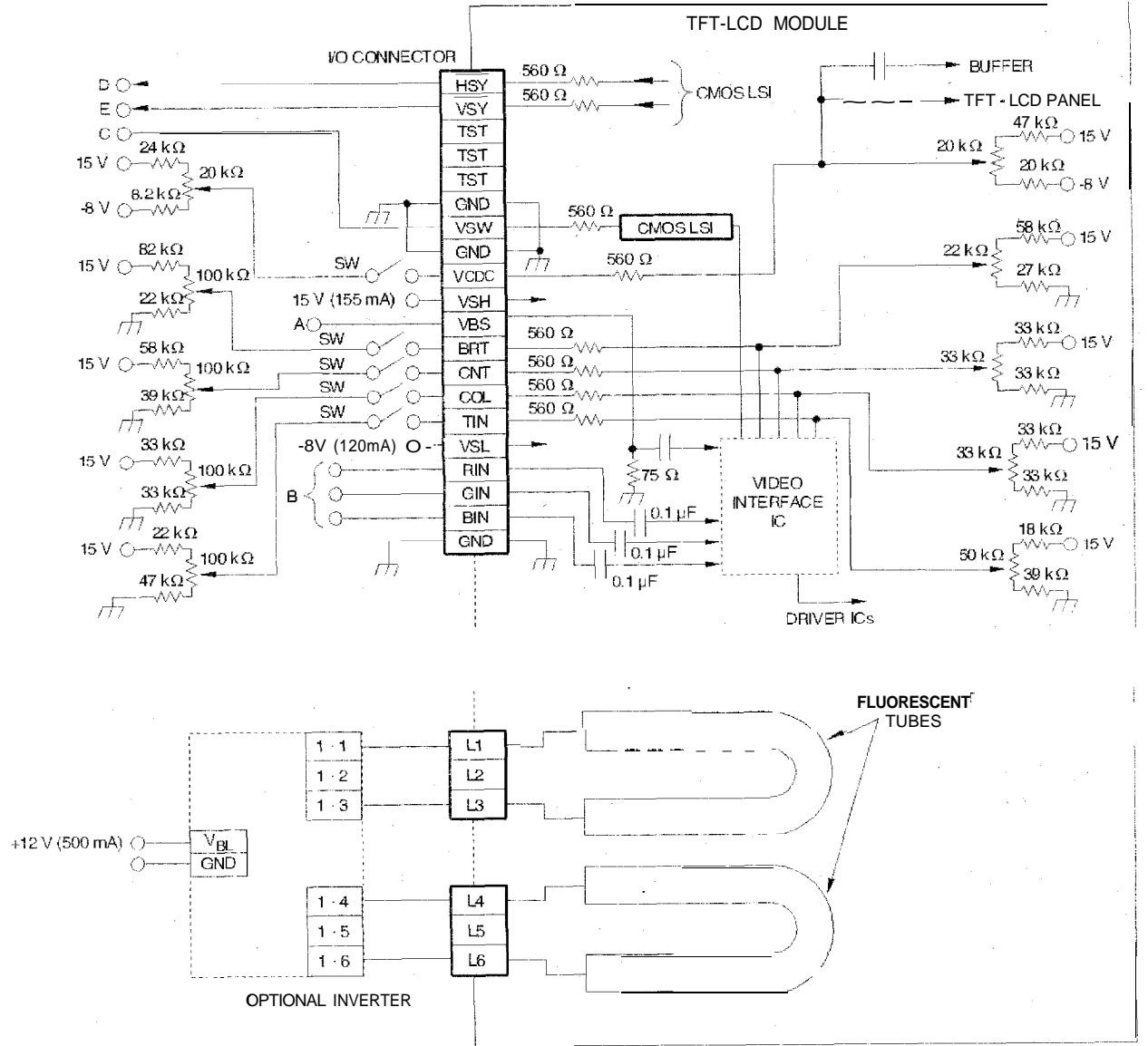
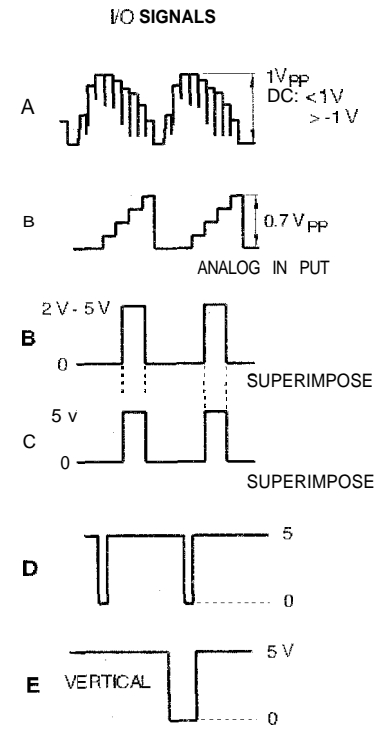
POWER CONSUMPTION ( $t_A = 25^\circ\text{C}$ )

SYMBOL	PARAMETER	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
$I_{SH}$	Power Consumption by the Panel Section – Positive Supply Current	$V_{SH} = +5.0\text{ V}$ $V_{SL} = -8.0\text{ V}$	–	+120	+155	mA	–
$I_{SL}$	Power Consumption by the Panel Section – Negative Supply Current		–	–90	–120	mA	–
$W_S$	Power Consumption by the Panel Section -Total		–	1.32	1.73	W	1
$W_L$	Power Consumption by the Fluorescent Tube Section	On rated lighting	–	4.6	6.0	W	2

## NOTES:

1. Excludes power consumption by the backlight
2. Calculated reference value ( $I \times V$ ).

Figure 5. TFT-LCD Module Recommended Circuit



NOTES:  
 Input impedance of A: 75 Ω  
 Input impedance of B: >10 kΩ  
 Input impedance of C: >100 kΩ