

## FEATURES

- ◆ Black on Grey Film STN Type
- ◆ Reflective Mode

- ◆ Built-in LCD Controller HD61830B

## MECHANICAL DATA

Item	Value	Unit
Module Dimensions	159.4*101*9.5	mm
Viewing Area	126*71	mm
Resolution	240*128	dots
Dot Size	0.47*0.47	mm
Dot Pitch	0.5*0.5	mm
Weight	150	g

## OPTICAL DATA

Item	Symbol	Condition	Min	Typ	Max	Unit
Contrast Ratio	K	$\varnothing=10^\circ$ , $\theta=0^\circ$ , Note 1	-	3.0	-	-
Brightness	-	-	-	-	-	cd/m <sup>2</sup>
Viewing Direction	-	-	6			o'clock
Viewing Angle	$\varnothing2 - \varnothing1$	K=1.4, Note 1	-	40	-	degree
Response Time (Rise)	t <sub>R</sub>	$\varnothing=10^\circ$ , $\theta=0^\circ$ , Note 1	-	250	400	ms
Response Time (Fall)	t <sub>F</sub>	$\varnothing=10^\circ$ , $\theta=0^\circ$ , Note 1	-	300	450	ms

## ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Condition	Min	Max	Unit
Supply Voltage (Logic)	V <sub>DD</sub> - V <sub>SS</sub>	-	0	7	V
Supply Voltage (LC Drive)	V <sub>DD</sub> - V <sub>EE</sub>	-	0	22	V
Input Voltage	V <sub>I</sub>	-	V <sub>SS</sub>	V <sub>DD</sub>	V
Operating Temperature	T <sub>OP</sub>	Note 4,5	0	50	°C
Storage Temperature	T <sub>ST</sub>	Note 4,5	-20	60	°C

## DATA INTERFACE PIN ASSIGNMENT

Pin No	Symbol	Level	Function
A1	VSS (0V)	-	Ground
A2	VDD (+5V)	-	Power supply for logic
A3	V0	-	Power supply for LCD drive
A4	RS	-	Register select
A5	R/W	-	Read / Write
A6	E	-	Enable
A7-A14	DB0 - DB7	-	Data bus
A15	CS	-	Chip select
A16	RES	-	Reset
A17	VEE (15.0V)	-	Power supply for LCD drive
A18-A20	NC	-	No connection

## ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage (Logic)	V <sub>DD</sub> - V <sub>SS</sub>	-	4.75	5.0	5.25	V
Supply Voltage (LC Drive)	V <sub>EE</sub> - V <sub>SS</sub>	-	-14.5	-15.0	-15.5	V
Supply Current	I <sub>DD</sub>	Note 2	-	6.0	-	mA
	I <sub>EE</sub>	Note 2	-	4.0	-	mA
Input Voltage (High Level)	V <sub>IH</sub>	High Level	0.8* V <sub>DD</sub>	-	V <sub>DD</sub>	V
Input Voltage (Low Level)	V <sub>IL</sub>	Low Level	0	-	0.2* V <sub>DD</sub>	V
Frame Frequency	f <sub>FLM</sub>	-	-	75	-	Hz
Duty Ratio	-	-	-	1/128	-	-
Recommended LC Drive Voltage	V <sub>DD</sub> - V <sub>O</sub>	Duty=1/128 T=0°C, $\varnothing=10^\circ$ , Note 3	-	16.9	-	V
		Duty=1/128 T=25°C, $\varnothing=10^\circ$ , Note 3	-	15.8	-	V
		Duty=1/128 T=40°C, $\varnothing=10^\circ$ , Note 3	-	15.4	-	V

## TIMING CHARACTERISTICS

Item	Symbol	Min	Typ	Max	Unit
Enable cycle time	t <sub>CYC</sub>	1000	-	-	ns
Enable pulse width (High level)	t <sub>WEH</sub>	450	-	-	ns
Enable pulse width (Low level)	t <sub>WEL</sub>	450	-	-	ns
Enable rise time	t <sub>Er</sub>	-	-	25	ns
Enable fall time	t <sub>Ef</sub>	-	-	25	ns
Set up time of CS, R/W, RS	t <sub>AS</sub>	140	-	-	ns
Set up time of Input Data	t <sub>DIS</sub>	225	-	-	ns
Data delay time	t <sub>DD</sub>	-	-	225	ns
Hold time of Data	t <sub>H</sub>	10	-	-	ns
Hold time of CS, R/W, RS	t <sub>AH</sub>	10	-	-	ns
Data hold time	t <sub>DH</sub>	20	-	-	ns

## CONNECTORS

Connector
No special connector required

Note1: Definition of optical data, see page XXX

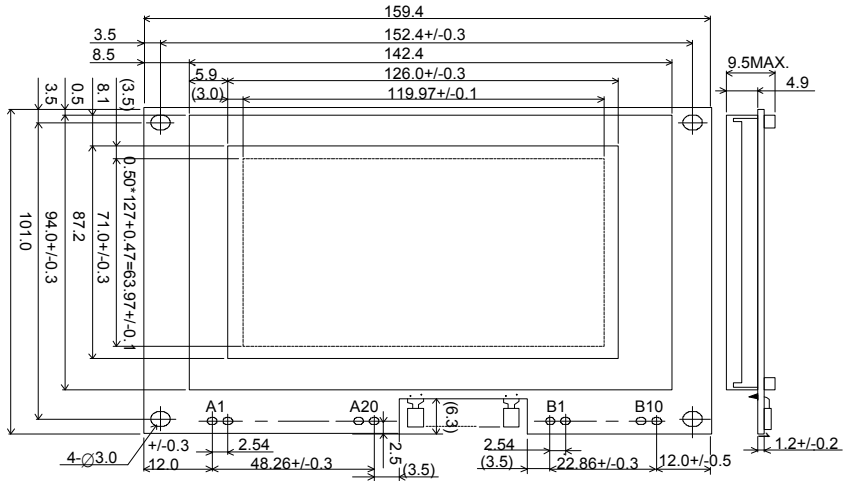
Note 2: f<sub>FLM</sub>=75Hz, V<sub>DD</sub>-V<sub>0</sub>=15.8V, D=GND(V<sub>SS</sub>)

Note 3: Recommended LC driving voltage may fluctuate about +/- 0.5V by each module

Note 4: Background colour of the LCD changes depending on temperature. Between 40-50°C optical characteristics of the LCD like contrast and viewing angle change but the LCD remains readable.

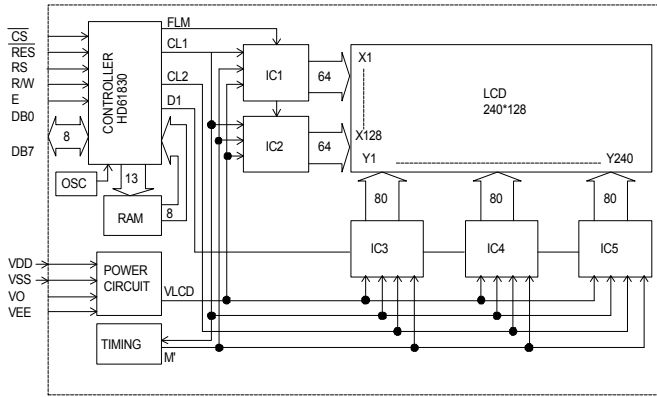
Note 5: Storage at -20°C < 48 hr.

**MECHANICAL DIMENSIONS**

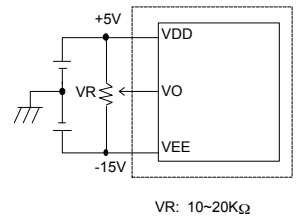


NOTE: PIN B1 - B10 SHOULD NOT BE USED  
USE PIN A1 - A20 FOR INTERFACE

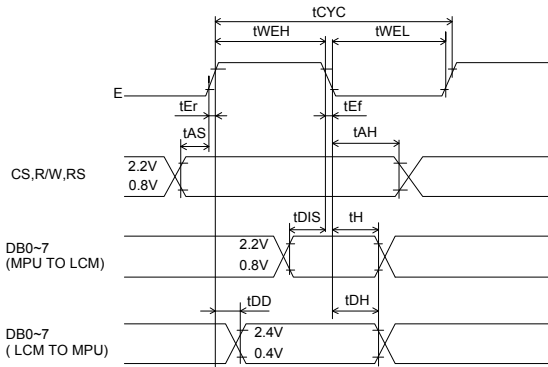
**BLOCK DIAGRAM**



**POWER SUPPLY**



**INTERFACE TIMING DIAGRAM**



**POWER UP TIMING DIAGRAM**

