

FEATURES

- ◆ Blue on Grey STN Type
- ◆ Transflective Mode

- ◆ Low Power EL Backlight
- ◆ 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	160	g

OPTICAL DATA

Item	Symbol	Condition	Min	Typ	Max	Unit
Contrast Ratio	K	Ø=10°, Q=0°, Note 1	-	(3.0)	-	-
Brightness	-	-	-	10	-	cd/m ²
Viewing Direction	-	-	-	6	-	o'clock
Viewing Angle	Ø2 - Ø1	K=1.4, Note 1	-	40	-	degree
Response Time (Rise)	t _R	Ø=10°, Q=0°, Note 1	-	250	400	ms
Response Time (Fall)	t _F	Ø=10°, Q=0°, Note 1	-	300	450	ms

ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Condition	Min	Max	Unit
Supply Voltage (Logic)	V _{DD} - V _{SS}	-	0	7	V
Supply Voltage (LC Drive)	V _{DD} - V _{EE}	-	0	22	V
Input Voltage	V _I	-	V _{SS}	V _{DD}	V
Operating Temperature	T _{OP}	Note 4,5	0	50	°C
Storage Temperature	T _{ST}	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	Not CS	-	Chip select
A16	Not RES	-	Reset
A17	VEE (15.0V)	-	Power supply for LCD drive
A18-A20	NC	-	No connection
E1-E2	VEL	-	Power supply for EL driving

ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage (Logic)	V _{DD} - V _{SS}	-	4.75	5.0	5.25	V
Supply Voltage (LC Drive)	V _{EE} - V _{SS}	-	-14.5	-15.0	-15.5	V
Supply Current	I _{DD}	Note 2	-	6.0	-	mA
	I _{EE}	Note 2	-	4.0	-	mA
Input Voltage (High Level)	V _{IH}	High Level	0.8* V _{DD}	-	V _{DD}	V
Input Voltage (Low Level)	V _{IL}	Low Level	0	-	0.2* V _{DD}	V
Frame Frequency	f _{FLM}	-	-	75	-	Hz
Duty Ratio	-	-	-	1/128	-	-
Recommended LC Drive Voltage	V _{DD} - V _O	Duty=1/128 T=0°C, Ø=10°, Note 3	-	16.9	-	V
		Duty=1/128 T=25°C, Ø=10°, Note 3	-	15.8	-	V
		Duty=1/128 T=40°C, Ø=10°, Note 3	-	15.4	-	V
Backlight Tile Voltage	V _{EL}	f _{EL} =400Hz	-	100	-	Vrms
Backlight Lamp Frequency	f _{EL}	-	-	400	-	Hz
Backlight Tile Current	I _{EL}	V _{EL} =100Vrms, f _{EL} =400Hz	-	-	160	mA

TIMING CHARACTERISTICS

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

CONNECTORS

Connector	
No special connector required	

- Note1: Definition of optical data, see page 84
- Note 2: f_{FLM}=75Hz, V_{DD}-V₀=15.8V, D=GND(VSS)
- 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 display remains readable.
- Note 5: Storage at -20°C < 48 hr.

MECHANICAL DIMENSIONS

This technical drawing provides the mechanical dimensions for a rectangular panel. The overall width is 159.4, and the overall height is 1019.4. The drawing includes multiple concentric rectangular frames, with the innermost frame labeled 'EL SEALING AREA'. Various mounting points are indicated by circles with crosses, labeled A1, A20, B1, and B10. Dimensions are given in millimeters, with some values including tolerances (e.g., ± 0.3 , ± 0.1 , ± 0.5). A calculation $0.50 \times 239 + 0.47 = 119.97 \pm 0.1$ is shown for a specific width dimension. Other dimensions include 152.4 ± 0.3 , 142.4, 126.0 ± 0.3 , 126.0 ± 0.3 , 12.0, 48.26 ± 0.3 , 2.54, 2.5, (3.5), 22.86 ± 0.3 , 12.0 ± 0.5 , 1.2 ± 0.2 , 9.5 MAX., 4.9, 1.5 MAX., 1.5 MAX., 3.5, 8.5, 3.5, 3.1, (3.5), (3.0), 0.50 $\times$ 127 $\pm$ 0.127 $\pm$ 63.97 $\pm$ 0.1, 1019.4 $\pm$ 0.7, 3.0, 1.5, 4- $\varnothing$ 9.0, and 4- $\varnothing$ 9.0.

BLOCK DIAGRAM

The block diagram illustrates the internal architecture of the LCD module. Key components and their connections include:

- Controller:** Receives control signals (CS, RES, RS, R/W, E, DB0, DB7) and manages the system. It is connected to RAM (13), IC1, IC2, IC3, IC4, IC5, and the LCD.
- RAM:** Provides 13 words of memory, connected to the Controller and IC1.
- IC1 and IC2:** 64-bit data path components connected to the Controller and the LCD.
- IC3, IC4, and IC5:** 80-bit data path components connected to the Controller and the LCD.
- LCD:** A 240x128 pixel display receiving data from the ICs.
- Power Circuit:** Provides power (VDD, VSS, VO, VEE) to the module.
- Timing:** Generates timing signals for the module.

POWER SUPPLY

VR: 10~20K Ω

INTERFACE TIMING DIAGRAM

POWER UP TIMING DIAGRAM

The diagram illustrates the timing requirements for power up and power off. It shows three signals: VDD, VEE, and SIGNAL. VDD rises from 0V to 4.75V. VEE is at 5V. SIGNAL is valid during the power up transition. The power up transition is labeled 'POWER ON' and the power off transition is labeled 'POWER OFF'. Timing constraints include 0~50 ms for VDD rise time and 0 ms min. for VEE fall time.

HITACHI