

L1634

■ Features of L1634 Series

- 16 characters × 4 lines
- STN LCD is used
- 5 × 7 dot matrix + cursor
- 1/16 duty
- 5V single power supply

■ Specification

A. Mechanical Characteristics

Item	Specifications	Unit
Module size (H × V × T) (Reflective/built-in EL backlight type)	87.0 × 60.0 × 11.6	mm
Module size (H × V × T) (Built-in LED backlight type)	87.0 × 60.0 × 15.8	mm
Viewing area (H × V)	61.8 × 25.2	mm
Character size (5 × 7 dot, H × V)	2.95 × 4.15	mm
Dot size (H × V)	0.55 × 0.55	mm
Dot space	0.05	mm
Center to center dimension of mounting holes (H × V)	82.0 × 55.0	mm
Weight (Reflective type)	50	g
Weight (Built-in LED backlight type)	65	g
Weight (Built-in EL backlight type)	55	g

H : Horizontal, V : Vertical, T : Thickness (max.)

B. Absolute Maximum Ratings

$V_{SS} = 0V$

Item	Symbol	Conditions	Min.	Max.	Unit
Power supply voltage	V_{DD}		-0.3	6.0	V
	V_{LC}		$V_{DD}-12.0$	V_{DD}	V
Input voltage	V_{IN}		-0.3	$V_{DD}+0.3$	V
Operating temp.	T_{opr}		0	+50	°C
Storage temp.	T_{stg}		-20	+60	°C
Storage humidity		≤48hrs	+20	+85	%RH
		≤1000hrs	+20	+65	%RH

C. Electrical Characteristics

$V_{DD} = 5V \pm 5\%$, $V_{SS} = 0V$, $T_a = 0^\circ C$ to $50^\circ C$

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Power supply voltage	V_{DD}		4.75	5.00	5.25	V
	$V_{DD}-V_{LC}$		4.0	—	11.0	V
Input* voltage	High	V_{IH1}	2.2	—	V_{DD}	V
	Low	V_{IL1}	0	—	0.6	V
Output** voltage	High	V_{OH1}	$-I_{OH} = 0.205mA$	2.4	—	V
	Low	V_{OL1}	$I_{OL} = 1.2mA$	—	—	0.4
Current consumption	I_{DD}	$T_a = 25^\circ C$ $V_{DD} = 5V$	—	2.7	4.0	mA
	I_{LC}	$V_{LC} = 0.25V$	—	1.1	2.0	mA
Clock oscillation frequency	f_{osc}	Resistance oscillation	140	220	300	kHz

* Applied to DB₀ ~ DB₇, E, R/W, RS

** Applied to DB₀ ~ DB₇

D. Optical Characteristics (STN gray type)

D-1 Reflective type

Viewing angle : 6 o'clock ($\theta = 0^\circ$), $T_a = 25^\circ C$, $V_{opr} = 4.75V$

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Viewing angle	θ_1	$C \geq 2.0$ $\theta = 0^\circ$	—	—	-15	deg.
	θ_2		55	—	—	
	$\theta_2 - \theta_1$		70	—	—	
Contrast	C	$\theta = 25^\circ$, $\theta = 0^\circ$	2	4	—	—
Response time (rise)	t_{on}	$\theta = 0^\circ$	—	270	400	ms
Response time (fall)	t_{off}	$\theta = 0^\circ$	—	60	100	
Response time (rise)	t_{on}	$\theta = 0^\circ$, $\theta = 0^\circ$ $T_a = 0^\circ C$ $V_{opr} = 5.0V$	—	720	1100	ms
Response time (fall)	t_{off}		—	170	350	

D-2 Transflective type

Viewing angle : 6 o'clock ($\theta = 0^\circ$), $T_a = 25^\circ C$, $V_{opr} = 4.75V$, Backlight OFF

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Viewing angle	θ_1	$C \geq 2.0$ $\theta = 0^\circ$	—	—	-10	deg.
	θ_2		50	—	—	
	$\theta_2 - \theta_1$		60	—	—	
Contrast	C	$\theta = 25^\circ$, $\theta = 0^\circ$	2	4	—	—
Response time (rise)	t_{on}	$\theta = 0^\circ$	—	270	400	ms
Response time (fall)	t_{off}	$\theta = 0^\circ$	—	60	100	
Response time (rise)	t_{on}	$\theta = 0^\circ$, $\theta = 0^\circ$ $T_a = 0^\circ C$ $V_{opr} = 5.0V$	—	720	1100	ms
Response time (fall)	t_{off}		—	170	350	

E. Recommended Operating Voltage (STN gray type)

The recommended value of (V_{opr}) for an ambient temperature is as follows.

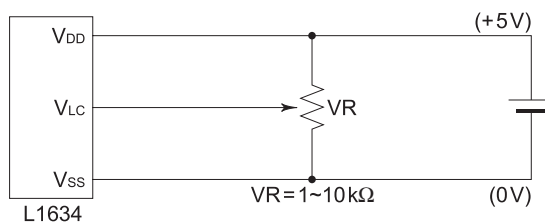
$V_{opr} = V_{DD}-V_{LC}$

Temperature (°C)	0	25	50
V_{opr} (V)	5.00	4.75	4.50

■ **STN Reflective type**

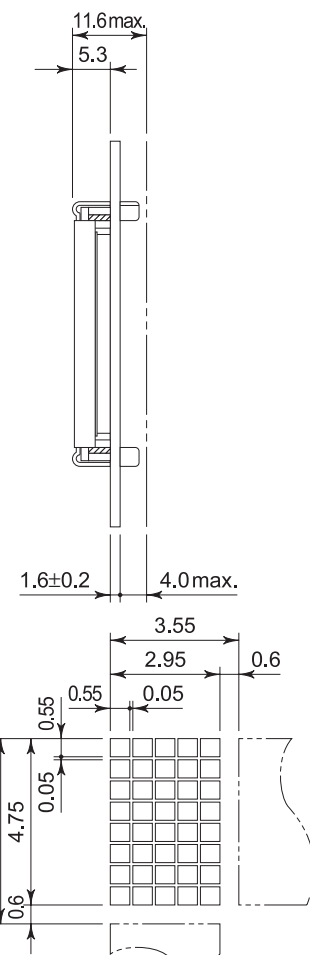
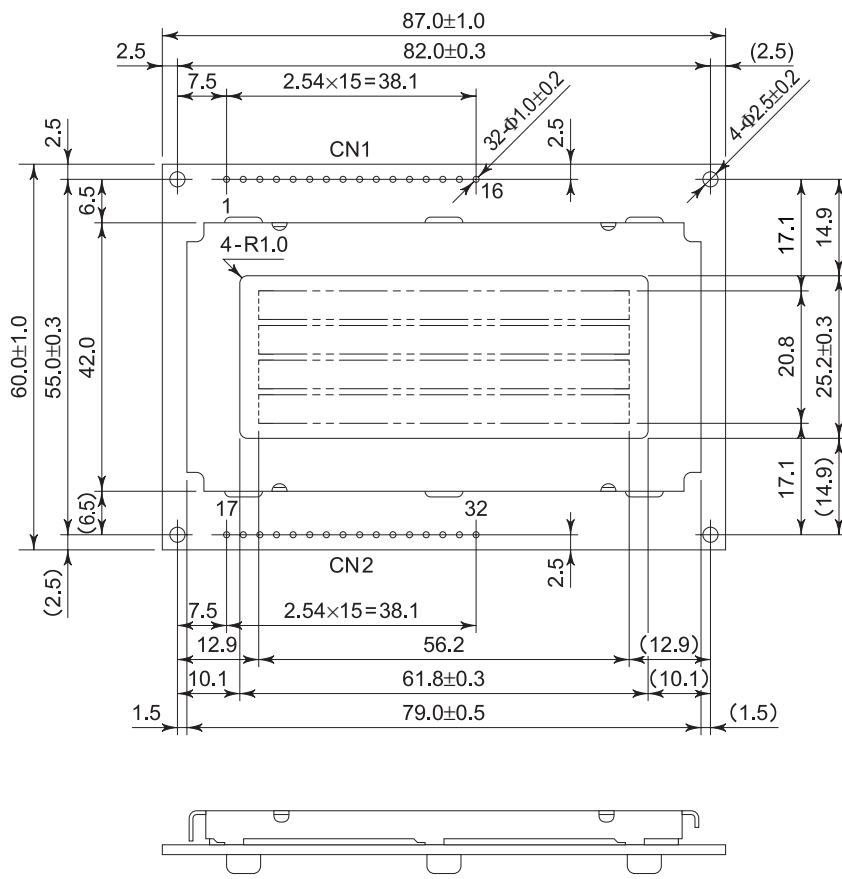
Item	L163400J000
Mechanical Characteristics	A
Absolute Maximum Ratings	B
Electrical Characteristics	C
Optical Characteristics	D-1
Recommended Operating Voltage	E

F-1 Power Supply



F-2 Dimensions

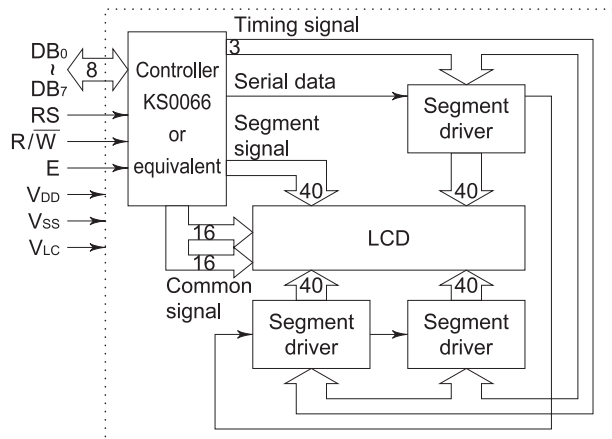
Unit : mm
General tolerance : ±0.5



F-3 Pin Functions

No.	No.	Name	Function
1	17	V _{SS}	GND
2	18	V _{DD}	Power supply voltage +5V
3	19	V _{LC}	Liquid crystal driving voltage
4	20	RS	L : Instruction code input H : Data input
5	21	R/W	L : Data write (LCM←MPU) H : Data read (LCM→MPU)
6	22	E	Enable
7	23	DB ₀	Data bus line
8	24	DB ₁	Data bus line
9	25	DB ₂	Data bus line
10	26	DB ₃	Data bus line
11	27	DB ₄	Data bus line
12	28	DB ₅	Data bus line
13	29	DB ₆	Data bus line
14	30	DB ₇	Data bus line
15	31	NC	—
16	32	NC	—

F-4 Block Diagram

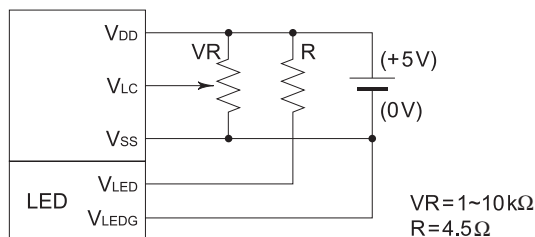


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■ STN Transflective, Built-in LED Backlight type

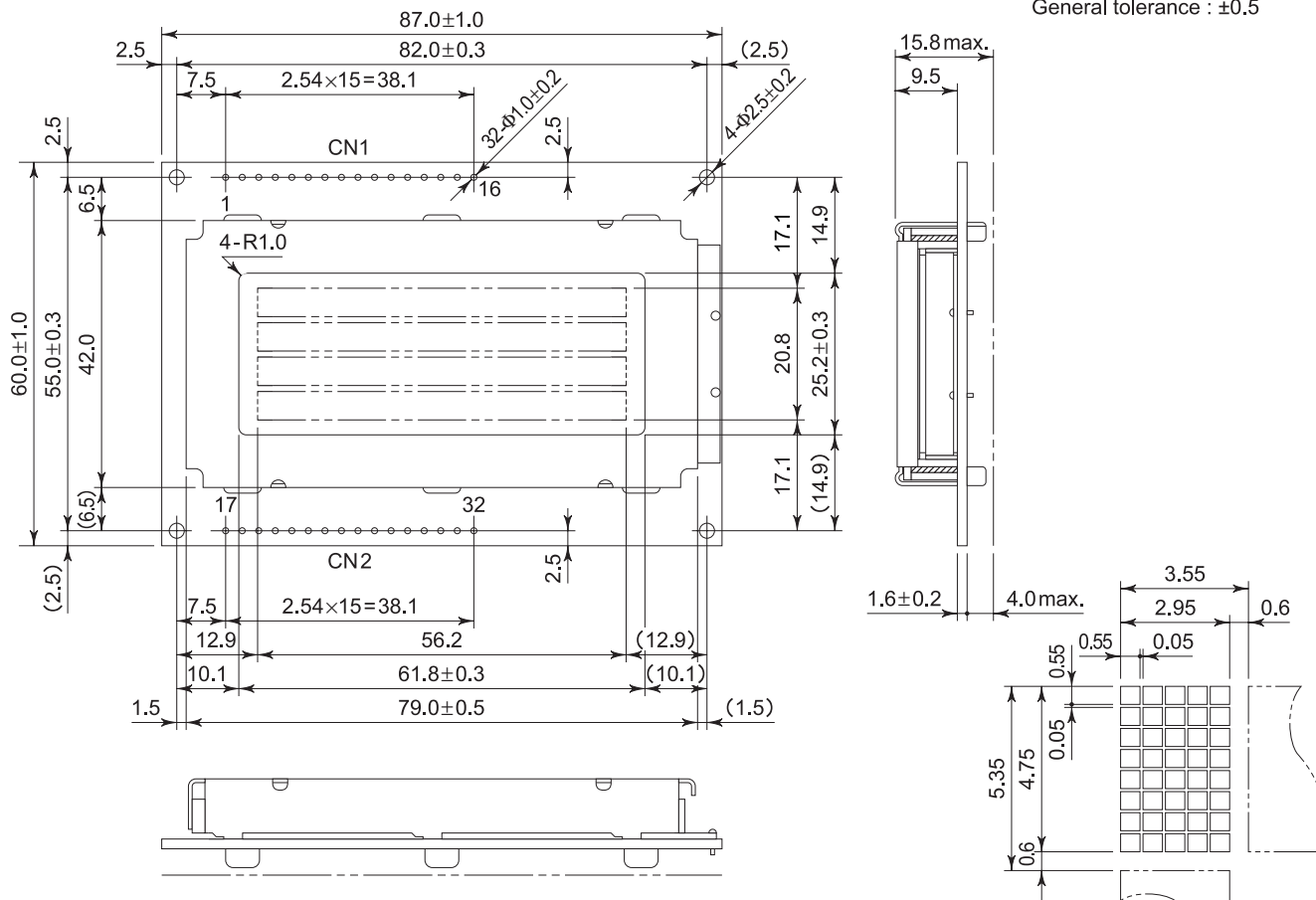
Item	L1634B1J000
Mechanical Characteristics	A
Absolute Maximum Ratings	B
Electrical Characteristics	C
Optical Characteristics	D-2
Recommended Operating Voltage	E

G-1 Power Supply



G-2 Dimensions

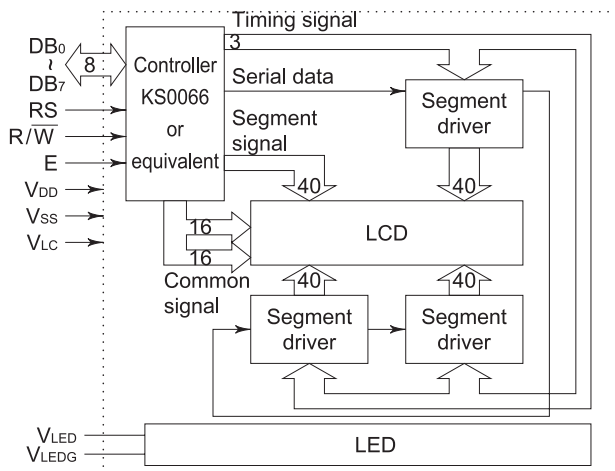
Unit : mm
General tolerance : ±0.5



G-3 Pin Functions

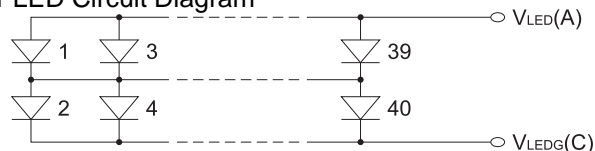
No.	No.	Name	Function
1	17	VSS	GND
2	18	VDD	Power supply voltage +5V
3	19	VLC	Liquid crystal driving voltage
4	20	RS	L : Instruction code input H : Data input
5	21	R/W	L : Data write (LCM←MPU) H : Data read (LCM→MPU)
6	22	E	Enable
7	23	DB0	Data bus line
8	24	DB1	Data bus line
9	25	DB2	Data bus line
10	26	DB3	Data bus line
11	27	DB4	Data bus line
12	28	DB5	Data bus line
13	29	DB6	Data bus line
14	30	DB7	Data bus line
15	31	VLED	Anode
16	32	VLEDG	Cathode

G-4 Block Diagram



G-5 LED Backlight

G-5-1 LED Circuit Diagram

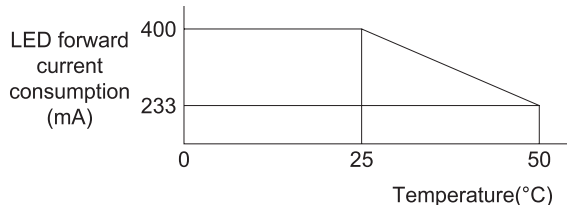


G-5-2 Absolute Maximum Ratings

Ta = 25°C

Item	Symbol	Specifications	Unit
LED forward current consumption*	IF	400	mA
LED reverse voltage	VR	8	V
LED allowable dissipation	PD	1.7	W

* LED forward current consumption and operating temperature characteristics are as follows.



G-5-3 Electrical Characteristics

Ta = 25°C

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
LED forward input voltage	VF	IF = 200mA	3.8	4.1	4.4	V
LED reverse current	IR	VR = 8V	—	—	2.0	mA

G-5-4 Optical Characteristics

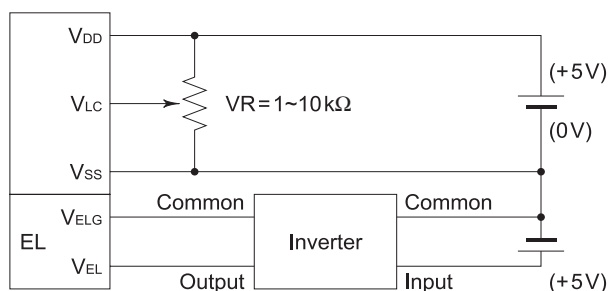
Ta = 25°C

Item	Symbol	Conditions	Specifications	Unit
Surface brightness (panel upper side)	Bp	IF = 200mA Vopr = 0V	4.5 min. 5 typ.	cd/m ²
LED brightness	L	IF = 200mA	40 min. 50 typ.	cd/m ²
LED service life			50,000 typ.	h
LED color			Yellowgreen	

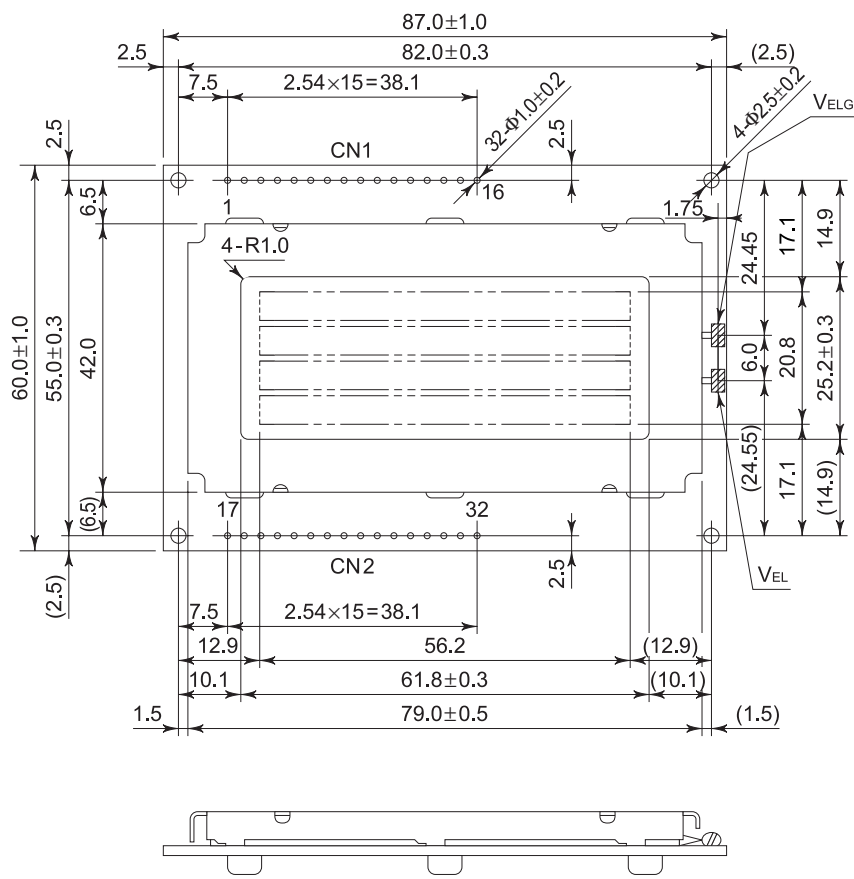
■ STN Transflective, Built-in EL Backlight type

Item	L163421J000
Mechanical Characteristics	A
Absolute Maximum Ratings	B
Electrical Characteristics	C
Optical Characteristics	D-2
Recommended Operating Voltage	E

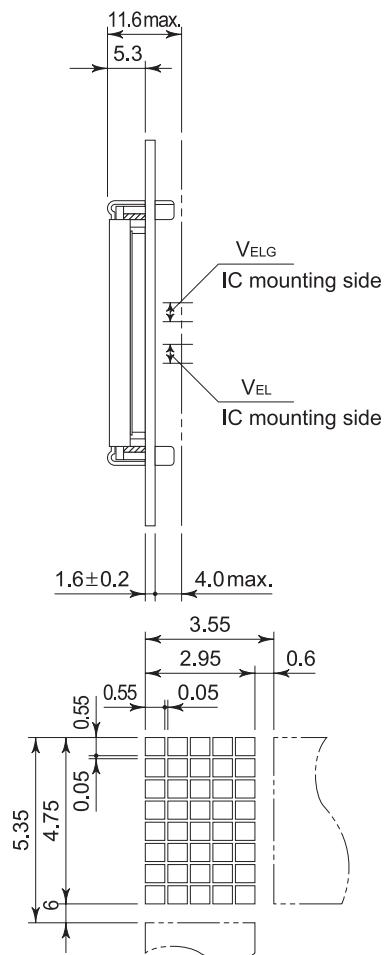
H-1 Power Supply



H-2 Dimensions



Unit : mm
General tolerance : ±0.5

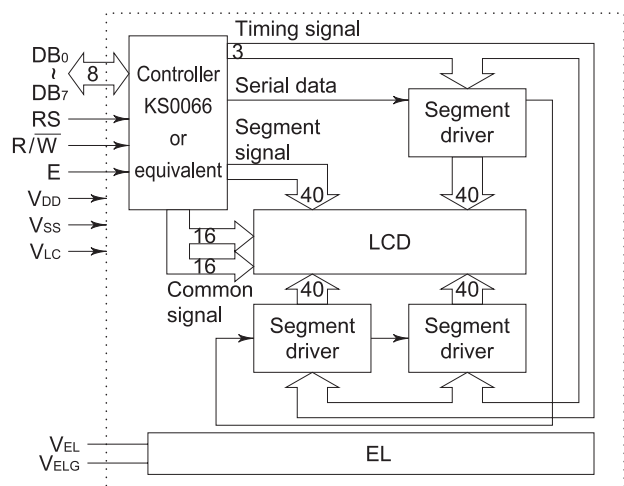


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H-3 Pin Functions

No.	No.	Name	Function
1	17	V _{SS}	GND
2	18	V _{DD}	Power supply voltage +5V
3	19	V _{LC}	Liquid crystal driving voltage
4	20	RS	L : Instruction code input H : Data input
5	21	R/W	L : Data write (LCM←MPU) H : Data read (LCM→MPU)
6	22	E	Enable
7	23	DB ₀	Data bus line
8	24	DB ₁	Data bus line
9	25	DB ₂	Data bus line
10	26	DB ₃	Data bus line
11	27	DB ₄	Data bus line
12	28	DB ₅	Data bus line
13	29	DB ₆	Data bus line
14	30	DB ₇	Data bus line
15	31	NC	—
16	32	NC	—

H-4 Block Diagram



H-5 EL Lamp (white)

H-5-1 Environmental Characteristics

Item	Symbol	Conditions	Specifications
Operating temperature range	T _{opr}		-20°C to +50°C
Storage temperature range	T _{stg}		-20°C to +60°C
Soldering heat-resistance		270°C ± 5°C, 3 s max.	No terminal abnormality
Thermal shock		-20°C 30 min. ↔ +60°C 30 min. 5 cycles	No defect on appearance

H-5-2 Electrical Characteristics

Item	Symbol	Conditions	Spec.	Unit
Electrostatic capacity	C _{EL}	f = 1 kHz (in darkroom) 2 VAC	5.5 typ.	nF
Current	I _{EL}	When applying rated voltage, 20°C, 70%RH	3.0 max. 2.2 typ.	mA
Maximum rated voltage	V _{EL1}	Sine wave, 1 kHz	150	V _{rms}
Rated voltage	V _{EL2}	Sine wave, 400 Hz	100	V _{rms}
Isolation voltage		Between lead and film Sine wave, 50 Hz, 1 min.	1500	V _{rms}

H-5-3 Emission Characteristics

Item	Conditions	Specifications	Unit
Initial brightness (B)	When applying rated voltage 20°C, 70%RH (in darkroom)	30 min. 35 typ.	cd/m ²
Service life when applying rated voltage	Used continuously down to half of initial brightness 20°C, 70%RH	1500	h
Service life when used with an inverter	Used continuously down to half of initial brightness 20°C, 70%RH	4000	h
Color of light		White	—
Chromaticity coordinates	When applying rated voltage 20°C, 70%RH (in darkroom)	x = 0.315 typ. y = 0.375 typ. x = 0.285 min. y = 0.345 min. x = 0.355 max. y = 0.415 max.	—

H-6 Suitable Inverter 5A

H-6-1 Electrical Characteristics (when combined with EL lamp)

Item	Symbol	Conditions	Specifications	Unit
Oscillating frequency	f _{INV}	T _a = 25°C, V _{IN} = 5 VDC	350 typ.	Hz
Output voltage	V _{OUT}	T _a = 25°C, V _{IN} = 5 VDC	95 typ.	V
Output current	I _{OUT}	T _a = 25°C, V _{IN} = 5 VDC	1.5 typ.	mA
Input current	I _{IN}	T _a = 25°C, V _{IN} = 5 VDC	45 typ.	mA
Input voltage	V _{IN}		5 typ.	V DC
Initial brightness	B	T _a = 25°C, V _{IN} = 5 VDC	35 typ.	cd/m ²
Surface brightness (panel upper side)	B _p	T _a = 25°C, V _{IN} = 5 VDC V _{opr} = 0V	3.5 typ.	cd/m ²

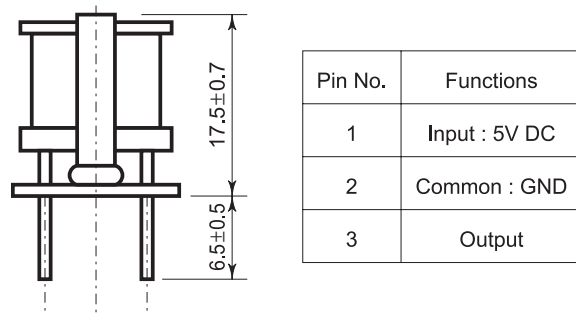
H-6-2 Tolerance (inverter only)

Item	Specifications	Unit
Input voltage	3.0 to 6.0	V
Load range	5 to 20	cm ²

H-6-3 Maximum ratings (inverter only)

Item	Specifications	Unit
Input voltage	7.0	V
Load range	25	cm ²
Operating temperature range	-10 to +60	°C
Storage temperature range	-20 to +70	°C

H-6-4 Dimensions (Unit : mm)



Wide Temperature Range STN LCD Module

■ Specification

J. Absolute Maximum Ratings

V_{SS} = 0V

Item	Symbol	Conditions	Min.	Max.	Unit
Power supply voltage	V _{DD}		-0.3	6.0	V
	V _{LC}		V _{DD} -12.0	V _{DD}	V
Input voltage	V _{IN}		-0.3	V _{DD} +0.3	V
Operating temp.	T _{opr}		-20	+70	°C
Storage temp.	T _{stg}		-30	+80	°C
Storage humidity		≤48hrs	+20	+85	%RH
		≤1000hrs	+20	+65	%RH

K. Electrical Characteristics

V_{DD} = 5V ± 5%, V_{SS} = 0V, T_a = -20°C to +70°C

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Power supply voltage	V _{DD}		4.75	5.00	5.25	V
	V _{DD} -V _{LC}		4.0	—	11.0	V
Input voltage *	High	V _{IH1}	2.2	—	V _{DD}	V
	Low	V _{IL1}	0	—	0.6	V
Output voltage **	High	V _{OH1}	-I _{OH} = 0.205mA	2.4	—	V
	Low	V _{OL1}	I _{OL} = 1.2mA	—	—	0.4
Current consumption	I _{DD}	T _a = 25°C V _{DD} = 5V V _{LC} = 0.2V	—	2.7	4.0	mA
	I _{LC}		—	1.1	2.0	mA
Clock oscillation frequency	f _{osc}	Resistance oscillation	140	220	300	kHz

* Applied to DB₀ ~ DB₇, E, R/W, RS** Applied to DB₀ ~ DB₇

L. Optical Characteristics

The background color is affected by ambient temperature, and the response characteristics deteriorates at low temperature.

• Reflective/transflective type

Viewing angle : 6o'clock(∅ = 0°), T_a = 25°C, V_{opr} = 4.8V, Backlight OFF

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Viewing angle	∅ ₁	C ≥ 2.0 ∅ = 0°	—	—	0	deg.
	∅ ₂		50	—	—	
	∅ ₂ - ∅ ₁		50	—	—	
Contrast	C	∅ = 20°, ∅ = 0°	2	3	—	—
Response time (rise)	t _{on}	∅ = 0°	—	50	80	ms
Response time (fall)	t _{off}	∅ = 0°	—	100	160	
Response time (rise)	t _{on}	∅ = 0°, ∅ = 0° T _a = 0°C V _{opr} = 4.9V	—	200	320	ms
Response time (fall)	t _{off}		—	450	720	
Response time (rise)	t _{on}	∅ = 0°, ∅ = 0° T _a = -20°C V _{opr} = 5.0V	—	1500	2400	ms
Response time (fall)	t _{off}		—	1500	2400	

M. Recommended Operating Voltage

The recommended value of (V_{opr}) for an ambient temperature is as follows.

V_{opr} = V_{DD}-V_{LC}

Temperature (°C)	-20	0	25	70
V _{opr} (V)	5.0	4.9	4.8	4.2

■ Reflective type

Item	L163400P000
Mechanical Characteristics	A
Absolute Maximum Ratings	J
Electrical Characteristics	K
Optical Characteristics	L
Recommended Operating Voltage	M
Reflective type	
Power Supply	F-1
Dimensions	F-2
Pin Functions	F-3
Block Diagram	F-4

■ Built-in LED Backlight type

Item	L1634B1P000
Mechanical Characteristics	A
Absolute Maximum Ratings	J
Electrical Characteristics	K
Optical Characteristics	L
Recommended Operating Voltage	M
Transflective Built-in LED Backlight type	
Dimensions	G-2
Pin Functions	G-3
Block Diagram	G-4
LED Circuit Diagram	G-5-1
Electrical Characteristics (LED)	G-5-3

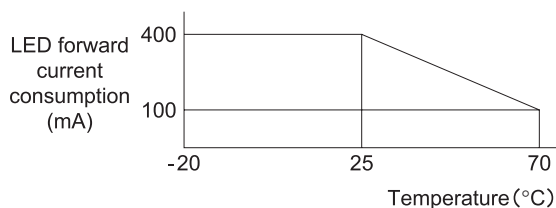
P. LED Backlight

P-1 Absolute Maximum Ratings

T_a = 25°C

Item	Symbol	Specifications	Unit
LED forward current consumption*	I _F	400	mA
LED reverse voltage	V _R	8	V
LED allowable dissipation	P _D	1.7	W

* LED forward current consumption and operating temperature characteristics are as follows.



P-2 Optical Characteristics

T_a = 25°C

Item	Symbol	Conditions	Specifications	Unit
Surface brightness (panel upper side)	B _p	I _F = 200mA* V _{opr} = 0V	4.5 min. 5 typ.	cd/m ²
LED brightness	L	I _F = 200mA*	40 min. 50 typ.	cd/m ²
LED service life			50,000 typ.	h
LED color			Yellowgreen	

* The forward current depends upon the temperature. Especially, it must be decreased at high temperature. For temperature dependence, refer to forward current reduction characteristics.