

# L1672

## ■ Features of L1672 Series

- 16 characters × 2 lines
- 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 type)	85.0 × 30.0 × 10.1	mm
Module size (H × V × T) (Built-in LED backlight type)	85.0 × 30.0 × 15.8	mm
Module size (H × V × T) (Built-in EL backlight type)	85.0 × 30.0 × 11.3	mm
Viewing area (H × V)	62.0 × 16.0	mm
Character size (5 × 7 dot, H × V)	2.78 × 4.27	mm
Dot size (H × V)	0.50 × 0.55	mm
Dot space	0.07	mm
Center to center dimension of mounting holes (H × V)	82.0 × 24.0	mm
Weight (Reflective type)	25	g
Weight (Built-in LED backlight type)	40	g
Weight (Built-in EL backlight type)	30	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	7.0	V
	$V_{LC}$		$V_{DD}-13.5$	$V_{DD}+0.3$	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
	$V_{DD}-V_{LC}$		1.5	—	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	$I_{DD}$	$T_a = 25^\circ C$ $V_{DD} = 5V$ $V_{LC} = 0.25V$	—	2.0	3.0	mA
	$I_{LC}$		—	0.2	1.0	mA
Clock oscillation frequency	$f_{osc}$	Resistance oscillation	190	270	350	kHz

\* Applied to DB<sub>0</sub> ~ DB<sub>7</sub>, E, R/W, RS

\*\* Applied to DB<sub>0</sub> ~ DB<sub>7</sub>

## D. Optical Characteristics

### D-1 TN LCD module (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	$\theta_1$	$C \geq 2.0$ $\theta = 0^\circ$	—	—	5	deg.
	$\theta_2$		40	—	—	
	$\theta_2 - \theta_1$		35	—	—	
Contrast	C	$\theta = 30^\circ$ , $\theta = 0^\circ$	5	8	—	—
Response time (rise)	$t_{on}$	$\theta = 0^\circ$	—	60	70	ms
Response time (fall)	$t_{off}$	$\theta = 0^\circ$	—	150	170	
Response time (rise)	$t_{on}$	$\theta = 0^\circ$ , $\theta = 0^\circ$ $T_a = 0^\circ C$ $V_{opr} = 5.0V$	—	210	300	ms
Response time (fall)	$t_{off}$		—	480	550	

### D-2 STN LCD module (gray)

#### D-2-1 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	$\theta_1$	$C \geq 2.0$ $\theta = 0^\circ$	—	—	-15	deg.
	$\theta_2$		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-2-2 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	$\theta_1$	$C \geq 2.0$ $\theta = 0^\circ$	—	—	-10	deg.
	$\theta_2$		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

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

### E-1 TN LCD module

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

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

### E-2 STN LCD module (gray)

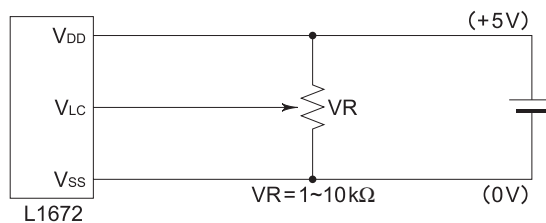
$V_{opr} = V_{DD}-V_{LC}$

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

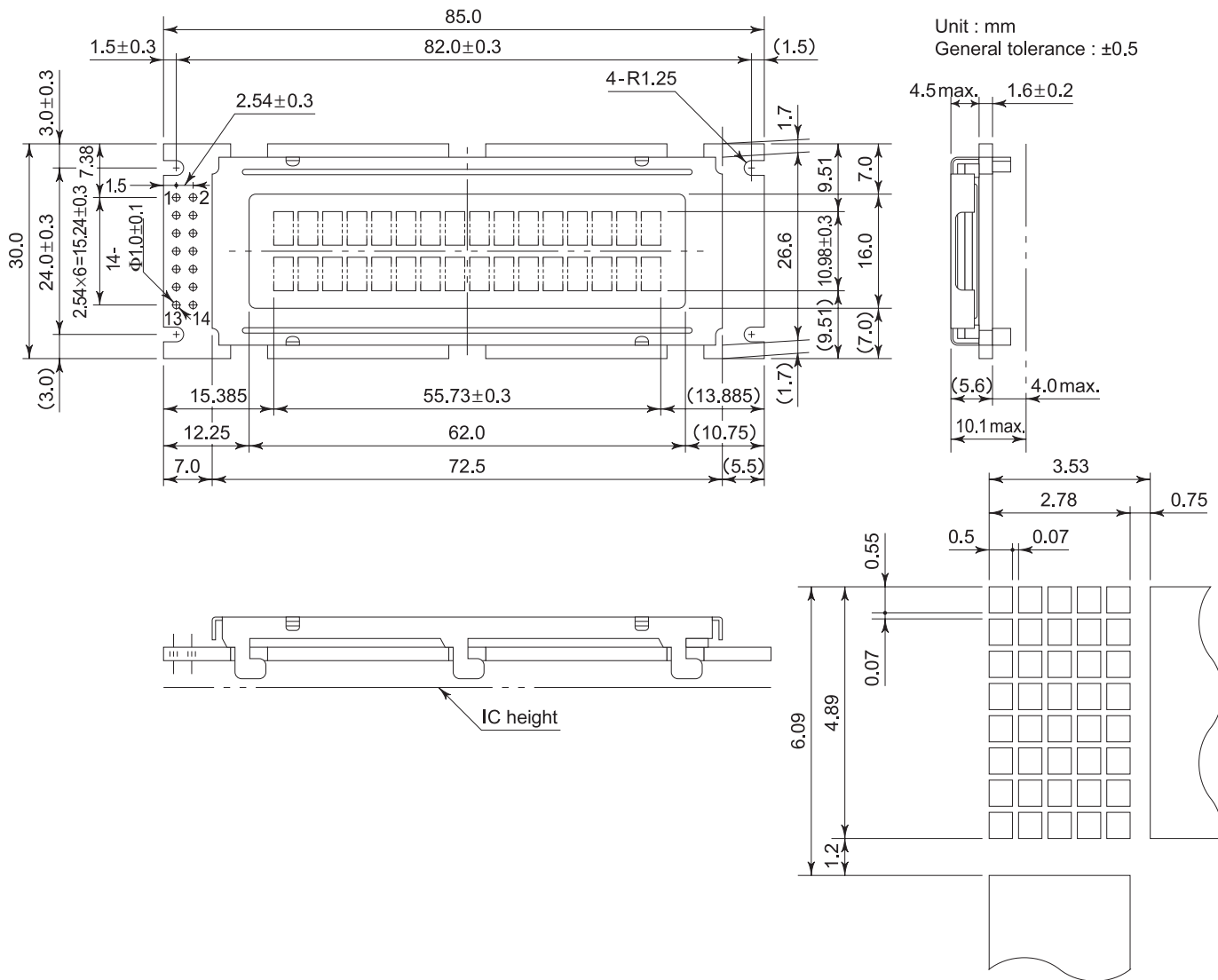
■ TN/STN Reflective type

Item	L1672000000	L167200J000
Mechanical Characteristics	A	A
Absolute Maximum Ratings	B	B
Electrical Characteristics	C	C
Optical Characteristics	D-1	D-2-1
Recommended Operating Voltage	E-1	E-2

F-1 Power Supply



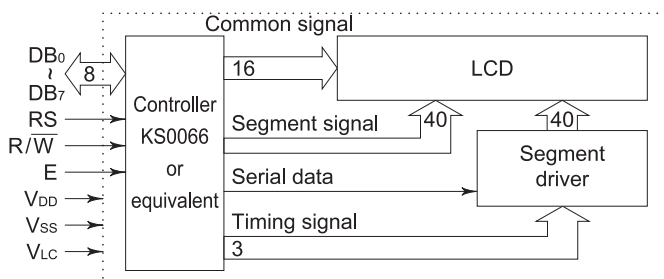
F-2 Dimensions



F-3 Pin Functions

No.	Name	Function
1	DB <sub>7</sub>	Data bus line
2	DB <sub>6</sub>	Data bus line
3	DB <sub>5</sub>	Data bus line
4	DB <sub>4</sub>	Data bus line
5	DB <sub>3</sub>	Data bus line
6	DB <sub>2</sub>	Data bus line
7	DB <sub>1</sub>	Data bus line
8	DB <sub>0</sub>	Data bus line
9	E	Enable
10	R/W	L : Data write (LCM←MPU), H : Data read (LCM→MPU)
11	RS	L : Instruction code input, H : Data input
12	VL <sub>c</sub>	Liquid crystal driving voltage
13	V <sub>SS</sub>	GND
14	V <sub>DD</sub>	Power supply voltage +5V

F-4 Block Diagram

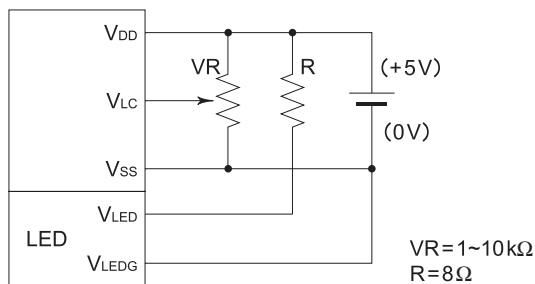


# L1672

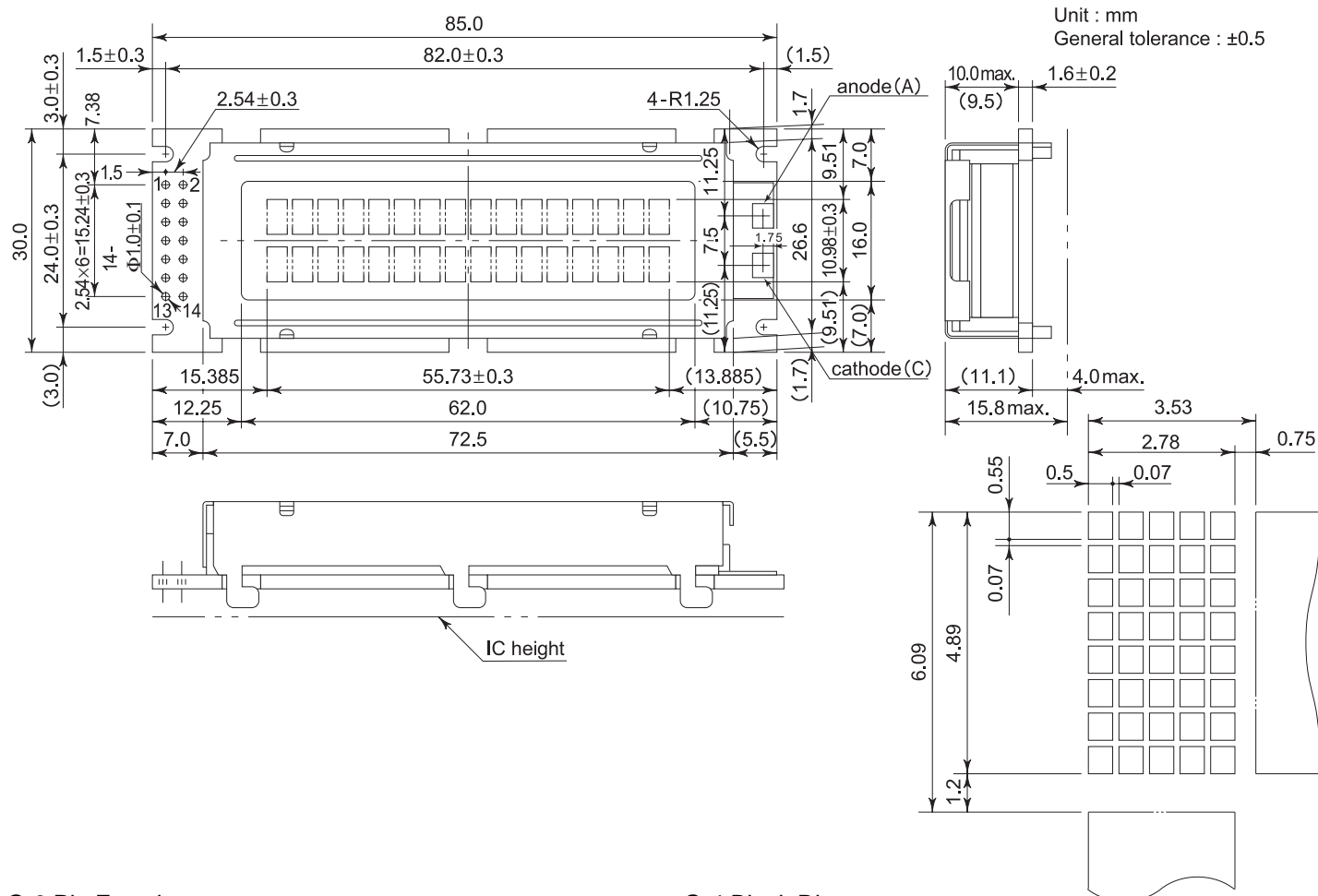
## ■ STN Transflective, Built-in LED Backlight type

Item	L1672B1J000
Mechanical Characteristics	A
Absolute Maximum Ratings	B
Electrical Characteristics	C
Optical Characteristics	D-2-2
Recommended Operating Voltage	E-2

### G-1 Power Supply



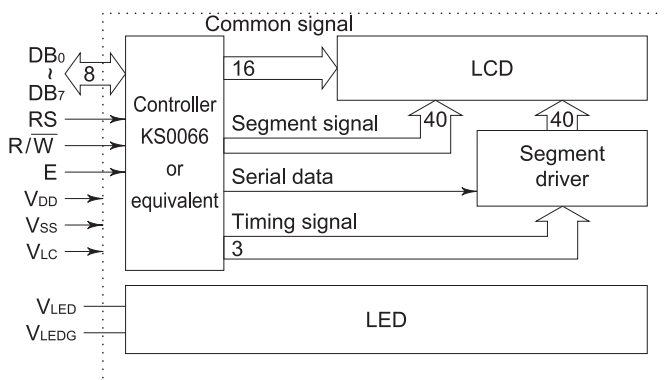
### G-2 Dimensions



### G-3 Pin Functions

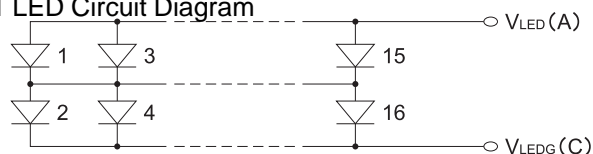
No.	Name	Function
1	DB <sub>7</sub>	Data bus line
2	DB <sub>6</sub>	Data bus line
3	DB <sub>5</sub>	Data bus line
4	DB <sub>4</sub>	Data bus line
5	DB <sub>3</sub>	Data bus line
6	DB <sub>2</sub>	Data bus line
7	DB <sub>1</sub>	Data bus line
8	DB <sub>0</sub>	Data bus line
9	E	Enable
10	R/W	L : Data write (LCM←MPU), H : Data read (LCM→MPU)
11	RS	L : Instruction code input, H : Data input
12	VL <sub>C</sub>	Liquid crystal driving voltage
13	V <sub>SS</sub>	GND
14	V <sub>DD</sub>	Power supply voltage +5V

### G-4 Block Diagram



### G-5 LED Backlight

#### G-5-1 LED Circuit Diagram

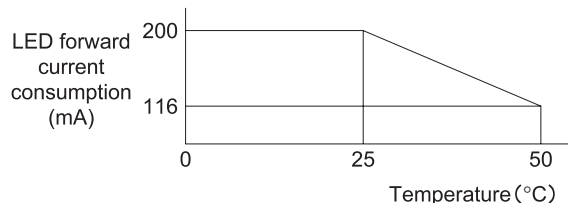


**G-5-2 Absolute Maximum Ratings**

Ta = 25°C

Item	Symbol	Specifications	Unit
LED forward current consumption*	IF	200	mA
LED reverse voltage	VR	8	V
LED allowable dissipation	PD	0.92	W

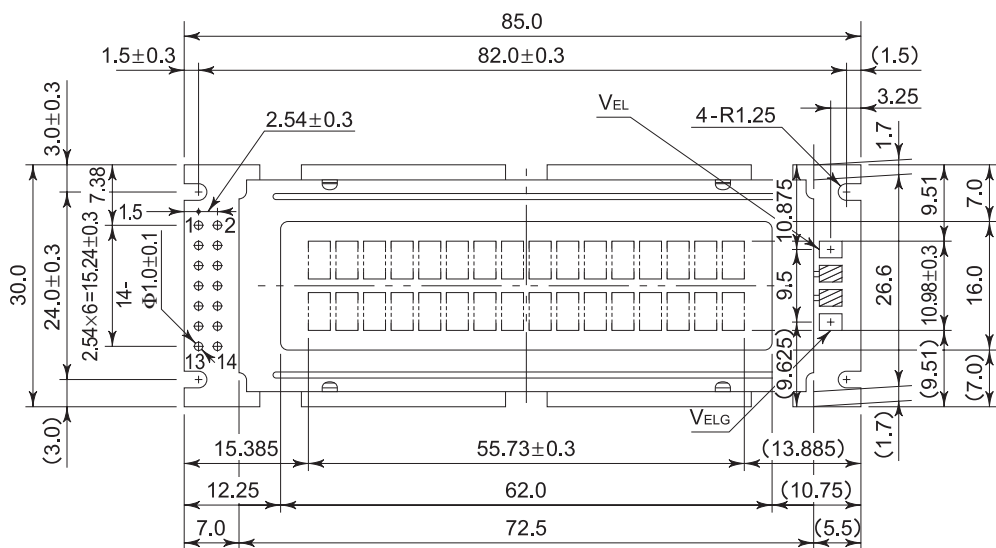
\* LED forward current consumption and operating temperature characteristics are as follows.



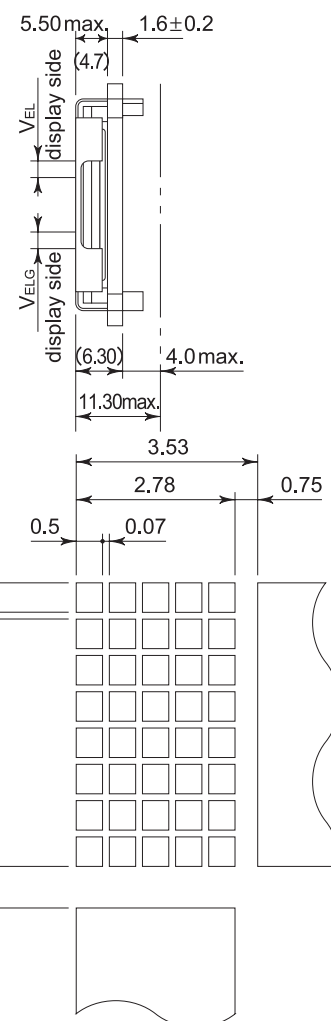
**■ STN Transflective, Built-in EL Backlight type**

Item	L167221J000
Mechanical Characteristics	A
Absolute Maximum Ratings	B
Electrical Characteristics	C
Optical Characteristics	D-2-2
Recommended Operating Voltage	E-2

**H-2 Dimensions**



Unit : mm  
General tolerance : ±0.5



**G-5-3 Electrical Characteristics**

Ta = 25°C

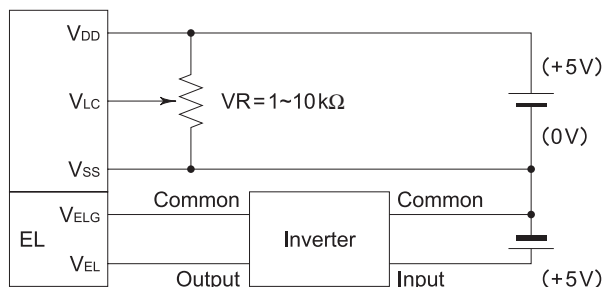
Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
LED forward input voltage	VF	IF = 112mA	3.8	4.1	4.4	V
LED reverse current	IR	VR = 8V	—	—	0.16	mA

**G-5-4 Optical Characteristics**

Ta = 25°C

Item	Symbol	Conditions	Specifications	Unit
Surface brightness (panel upper side)	Bp	IF = 112mA Vopr = 0V	8 min. 10 typ.	cd/m <sup>2</sup>
LED brightness	L	IF = 112mA	40 min. 50 typ.	cd/m <sup>2</sup>
LED service life			50,000 typ.	h
LED color			Yellowgreen	

**H-1 Power Supply**





## Wide Temperature Range STN LCD Module

## ■ Specification

## J. Absolute Maximum Ratings

V<sub>SS</sub> = 0V

Item	Symbol	Conditions	Min.	Max.	Unit
Power supply voltage	V <sub>DD</sub>		-0.3	7.0	V
	V <sub>LC</sub>		V <sub>DD</sub> -13.5	V <sub>DD</sub> +0.3	V
Input voltage	V <sub>IN</sub>		-0.3	V <sub>DD</sub> +0.3	V
Operating temp.	T <sub>opr</sub>		-20	+70	°C
Storage temp.	T <sub>stg</sub>		-30	+80	°C
Storage humidity		≤48hrs	+20	+85	%RH
		≤1000hrs	+20	+65	%RH

## K. Electrical Characteristics

V<sub>DD</sub> = 5V ± 5%, V<sub>SS</sub> = 0V, Ta = -20°C to +70°C

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Power supply voltage	V <sub>DD</sub>		4.75	5.00	5.25	V
	V <sub>DD</sub> -V <sub>LC</sub>		1.5	—	11.0	V
Input voltage *	High	V <sub>IH1</sub>	2.2	—	V <sub>DD</sub>	V
	Low	V <sub>IL1</sub>	0	—	0.6	V
Output voltage **	High	V <sub>OH1</sub>	-I <sub>OH</sub> = 0.205mA	2.4	—	V
	Low	V <sub>OL1</sub>	I <sub>OL</sub> = 1.2mA	—	—	0.4
Current consumption	I <sub>DD</sub>	Ta = 25°C V <sub>DD</sub> = 5V V <sub>LC</sub> = 0.2V	—	2.0	3.0	mA
	I <sub>LC</sub>		—	0.2	1.0	mA
Clock oscillation frequency	f <sub>osc</sub>	Resistance oscillation	190	270	350	kHz

\* Applied to DB<sub>0</sub> ~ DB<sub>7</sub>, E, R/W, RS\*\* Applied to DB<sub>0</sub> ~ DB<sub>7</sub>

## 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°), Ta = 25°C, V<sub>opr</sub> = 4.8V, Backlight OFF

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

## M. Recommended Operating Voltage

The recommended value of (V<sub>opr</sub>) for an ambient temperature is as follows.

V<sub>opr</sub> = V<sub>DD</sub>-V<sub>LC</sub>

Temperature (°C)	-20	0	25	70
V <sub>opr</sub> (V)	5.0	4.9	4.8	4.2

## ■ Reflective type

Item	L167200P000
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	L1672B1P000
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

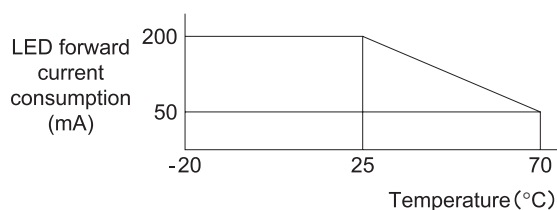
## P. LED Backlight

## P-1 Absolute Maximum Ratings

Ta = 25°C

Item	Symbol	Specifications	Unit
LED forward current consumption*	I <sub>F</sub>	200	mA
LED reverse voltage	V <sub>R</sub>	8	V
LED allowable dissipation	P <sub>D</sub>	0.92	W

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



## P-2 Optical Characteristics

Ta = 25°C

Item	Symbol	Conditions	Specifications	Unit
Surface brightness (panel upper side)	B <sub>p</sub>	I <sub>F</sub> = 112mA* V <sub>opr</sub> = 0V	4 min. 5 typ.	cd/m <sup>2</sup>
LED brightness	L	I <sub>F</sub> = 112mA*	40 min. 50 typ.	cd/m <sup>2</sup>
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.