



2. Electrical spec

**LC2041**

**20 Characters X 4 Lines**  
**1/16 DUTY 5x8 Font**

**ELECTRICAL CHARACTERISTICS**

$T_a = 25^{\circ}\text{C}$   $V_{DD} = 5.0 \pm 0.25 \text{ v}$

Input "High" Voltage ( $V_{IH}$ ) 2.2 V min

Input "Low " Voltage ( $V_{IL}$ ) 0.6 V max

**APPLICABLE FOR -LOP**

	<u>TN</u>		<u>STN</u>	
	<u>TEMPERATURE</u>		<u>TEMPERATURE</u>	
	<u>NORMAL</u>	<u>WIDE</u>	<u>NORMAL</u>	<u>WIDE</u>
Supply Current, ( $I_{DD}$ )Typ., mA	3	3	3	3
Recommend LCD drive Voltage:				
( $V_{DD}-V_O$ )at $T_a = -20^{\circ}\text{C}$ ,Volts	N/A	9.8	N/A	8.0
$T_a = 0^{\circ}\text{C}$	5.0	9.3	4.1	7.4
$T_a = 25^{\circ}\text{C}$	4.8	9.0	3.8	7.0
$T_a = 50^{\circ}\text{C}$	4.6	8.2	3.6	6.7
$T_a = 70^{\circ}\text{C}$	N/A	7.6	N/A	6.4

**ABSOLUTE MAXIMUM RATINGS**

	<u>NORMAL</u>		<u>WIDE</u>	
	<u>TEMPERATURE</u>		<u>TEMPERATURE</u>	
	<u>MIN</u>	<u>MAX</u>	<u>MIN</u>	<u>MAX</u>
Input Voltage ( $V_I$ ) V	0	$V_{DD}$	0	$V_{DD}$
Supply for Logic ( $V_{DD}-V_{SS}$ ) V	0	7	0	7
Supply for LCD ( $V_{DD}-V_O$ ) V	0	10	0	10
Operating Temperature $T_{OP}$ , $^{\circ}\text{C}$	0	+50	-20	+70
Storage Temperature $T_{ST}$ , $^{\circ}\text{C}$	-20	+70	-30	+80

**OPTION**

**BACKLIGHT**

- BEXX -- EL
- BLEXX -- LED EDGE
- BLEWH -- LED EDGE(WHIT)
- BLEBU -- LED EDGE(BLUE)
- BLSXX -- LED SMT

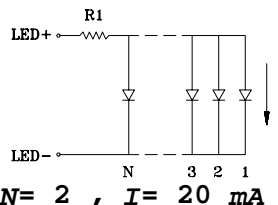
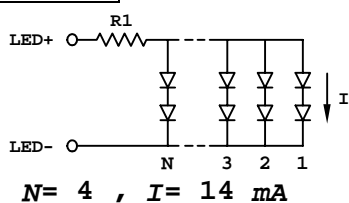
**INPUT VOLTAGE & CURRENT**

- 100  $V_{RMS}$  (400-800) Hz; 3.5mA
- + 5V DC; 56 mA R1= 13 Ohm 1/4 W
- + 5V DC; 40 mA R1= 41 Ohm 1/4 W
- + 5V DC; 40 mA R1= 41 Ohm 1/4 W
- + 5V DC; 280 mA R2= 3.3 Ohm 1/2 W

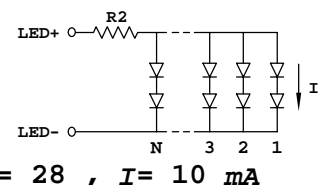
\*R1: Built-in BL current limit resistor On LCDM

\*R2: Suggest BL current limit resistor on customer board

**EDGE**



**SMT LED**



----- **Single +5V for wide temperature operation** -----

**SINGLE +5V OPERATION** *only*

-- not available --

**TEMPERATURE COMPENSATION**

-- not available --

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**ELECTRICAL CHARACTERISTICS**

$T_a = 25^{\circ}\text{C}$   $V_{DD} = 5.0 \pm 0.25 \text{ v}$

Input "High" Voltage ( $V_{IH}$ ) 2.2 V min

Input "Low " Voltage ( $V_{IL}$ ) 0.6 V max

**APPLICABLE FOR -LNY**

	<u>TN</u>		<u>STN</u>	
	<u>TEMPERATURE</u>		<u>TEMPERATURE</u>	
	<u>NORMAL</u>	<u>WIDE</u>	<u>NORMAL</u>	<u>WIDE</u>
Supply Current, ( $I_{DD}$ )Typ., mA	N/A	N/A	3	3
Recommend LCD drive Voltage: ( $V_{DD}-V_O$ ) at $T_a = -20^{\circ}\text{C}$ , Volts	N/A	N/A	N/A	7.0
$T_a = 0^{\circ}\text{C}$	N/A	N/A	4.6	6.8
$T_a = 25^{\circ}\text{C}$	N/A	N/A	4.2	6.5
$T_a = 50^{\circ}\text{C}$	N/A	N/A	4.0	6.3
$T_a = 70^{\circ}\text{C}$	N/A	N/A	N/A	6.1

**ABSOLUTE MAXIMUM RATINGS**

	<u>NORMAL</u>		<u>WIDE</u>	
	<u>TEMPERATURE</u>		<u>TEMPERATURE</u>	
	<u>MIN</u>	<u>MAX</u>	<u>MIN</u>	<u>MAX</u>
Input Voltage ( $V_I$ ) V	0	$V_{DD}$	0	$V_{DD}$
Supply for Logic ( $V_{DD}-V_{SS}$ ) V	0	7	0	7
Supply for LCD ( $V_{DD}-V_O$ ) V	0	10	0	10
Operating Temperature $T_{OP}$ , $^{\circ}\text{C}$	0	+50	-20	+70
Storage Temperature $T_{ST}$ , $^{\circ}\text{C}$	-20	+70	-30	+80

**OPTION**

**BACKLIGHT**

- BEXX -- EL
- BLEXX -- LED EDGE
- BLEWH -- LED EDGE(WHIT
- BLEBU -- LED EDGE(BLUE
- BLSXX -- LED SMT

**INPUT VOLTAGE & CURRENT**

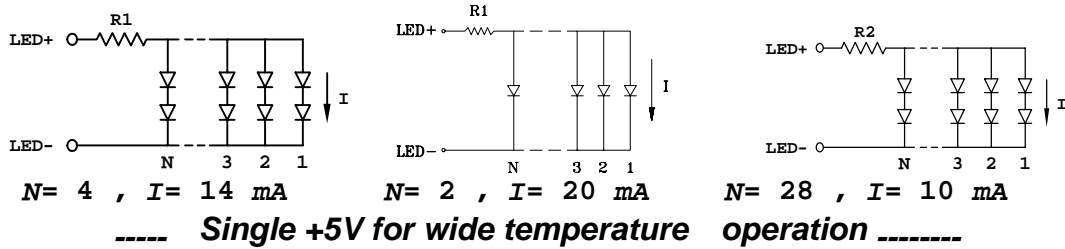
100  $V_{RMS}$  (400-800) Hz; 3.5mA  
 + 5V DC; 56 mA R1= 13 Ohm 1/4 W  
 + 5V DC; 40 mA R1= 41 Ohm 1/4 W  
 + 5V DC; 40 mA R1= 41 Ohm 1/4 W  
 + 5V DC; 280 mA R2= 3.3 Ohm 1/2 W

\*R1: Built-in BL current limit resistor On LCDM

\*R2: Suggest BL current limit resistor on customer board

**EDGE**

**SMT LED**



**SINGLE +5V OPERATION** *only*

-- not available --

**TEMPERATURE COMPENSATION**

-- not available --

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**20 Characters X 4 Lines**  
**1/16 DUTY 5x8 Font**

**ELECTRICAL CHARACTERISTICS**

$T_a = 25^{\circ}\text{C}$   $V_{DD} = 5.0 \pm 0.25 \text{ v}$

Input "High" Voltage ( $V_{IH}$ ) 2.2 V min

Input "Low" Voltage ( $V_{IL}$ ) 0.6 V max

**APPLICABLE FOR -LEP**

	<u>TN</u>		<u>STN</u>	
	<u>TEMPERATURE</u>		<u>TEMPERATURE</u>	
	<u>NORMAL</u>	<u>WIDE</u>	<u>NORMAL</u>	<u>WIDE</u>
Supply Current, ( $I_{DD}$ ) Typ., mA	N/A	N/A	3	3
Recommend LCD drive Voltage: ( $V_{DD} - V_O$ ) at $T_a = -20^{\circ}\text{C}$ , Volts	N/A	N/A	N/A	7.4
$T_a = 0^{\circ}\text{C}$	N/A	N/A	4.4	7.1
$T_a = 25^{\circ}\text{C}$	N/A	N/A	4.1	6.8
$T_a = 50^{\circ}\text{C}$	N/A	N/A	3.8	6.4
$T_a = 70^{\circ}\text{C}$	N/A	N/A	N/A	6.1

**ABSOLUTE MAXIMUM RATINGS**

	<u>NORMAL</u>		<u>WIDE</u>	
	<u>TEMPERATURE</u>		<u>TEMPERATURE</u>	
	<u>MIN</u>	<u>MAX</u>	<u>MIN</u>	<u>MAX</u>
Input Voltage ( $V_I$ ) V	0	$V_{DD}$	0	$V_{DD}$
Supply for Logic ( $V_{DD} - V_{SS}$ ) V	0	7	0	7
Supply for LCD ( $V_{DD} - V_O$ ) V	0	10	0	10
Operating Temperature $T_{OP}$ , $^{\circ}\text{C}$	0	+50	-20	+70
Storage Temperature $T_{ST}$ , $^{\circ}\text{C}$	-20	+70	-30	+80

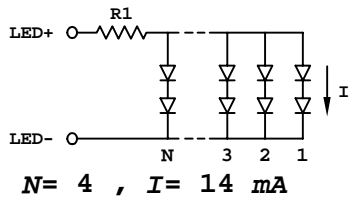
**OPTION**

<b>BACKLIGHT</b>	<b>INPUT VOLTAGE &amp; CURRENT</b>
-BEXX -- EL	100 $V_{RMS}$ (400-800) Hz; 3.5mA
-BLEXX -- LED EDGE	+ 5V DC; 56 mA R1= 13 Ohm 1/4 W
-BLEWH -- LED EDGE (WHIT)	+ 5V DC; 40 mA R1= 41 Ohm 1/4 W
-BLEBU -- LED EDGE (BLUE)	+ 5V DC; 40 mA R1= 41 Ohm 1/4 W
-BLSXX -- LED SMT	+ 5V DC; 280 mA R2= 3.3 Ohm 1/2 W

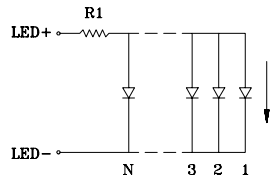
\*R1: Built-in BL current limit resistor On LCDM

\*R2: Suggest BL current limit resistor on customer board

**EDGE**

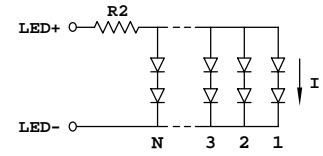


N= 4 , I= 14 mA



N= 2 , I= 20 mA

**SMT LED**



N= 28 , I= 10 mA

----- **Single +5V for wide temperature operation** -----

**SINGLE +5V OPERATION** *only*

-- not available --

**TEMPERATURE COMPENSATION**

-- not available --

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**ELECTRICAL CHARACTERISTICS**

T<sub>a</sub> = 25°C V<sub>DD</sub> = 5.0 ± 0.25 v

Input "High" Voltage (V<sub>IH</sub>) 2.2 V min

Input "Low " Voltage (V<sub>IL</sub>) 0.6 V max

**APPLICABLE FOR -LSE**

	<u>TN</u>		<u>STN</u>	
	<u>TEMPERATURE</u>		<u>TEMPERATURE</u>	
	<u>NORMAL</u>	<u>WIDE</u>	<u>NORMAL</u>	<u>WIDE</u>
Supply Current, (I <sub>DD</sub> ) Typ., mA	N/A	N/A	3	N/A
Recommend LCD drive Voltage: (V <sub>DD</sub> -V <sub>O</sub> ) at T <sub>a</sub> = -20°C, Volts	N/A	N/A	N/A	N/A
T <sub>a</sub> = 0°C	N/A	N/A	4.9	N/A
T <sub>a</sub> = 25°C	N/A	N/A	4.7	N/A
T <sub>a</sub> = 50°C	N/A	N/A	4.5	N/A
T <sub>a</sub> = 70°C	N/A	N/A	N/A	N/A

**ABSOLUTE MAXIMUM RATINGS**

	<u>NORMAL</u>		<u>WIDE</u>	
	<u>TEMPERATURE</u>		<u>TEMPERATURE</u>	
	<u>MIN</u>	<u>MAX</u>	<u>MIN</u>	<u>MAX</u>
Input Voltage (V <sub>I</sub> ) V	0	V <sub>DD</sub>	0	V <sub>DD</sub>
Supply for Logic (V <sub>DD</sub> -V <sub>SS</sub> ) V	0	7	0	7
Supply for LCD (V <sub>DD</sub> -V <sub>O</sub> ) V	0	10	0	10
Operating Temperature T <sub>OP</sub> , °C	0	+50	-20	+70
Storage Temperature T <sub>ST</sub> , °C	-20	+70	-30	+80

**OPTION**

**BACKLIGHT**

-BEXX -- EL

**INPUT VOLTAGE & CURRENT**

100 V<sub>RMS</sub> (400-800) Hz; 3.5mA

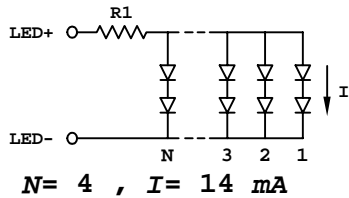
-BLEXX -- LED EDGE  
 -BLEWH -- LED EDGE(WHIT  
 -BLEBU -- LED EDGE(BLUE  
 -BLSXX -- LED SMT

+ 5V DC;56 mA R1= 13 Ohm 1/4 W  
 + 5V DC;40 mA R1= 41 Ohm 1/4 W  
 + 5V DC;40 mA R1= 41 Ohm 1/4 W  
 + 5V DC;280 mA R2= 3.3 Ohm 1/2 W

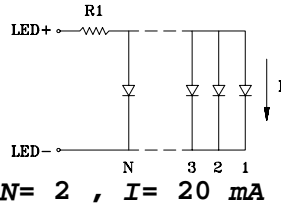
\*R1:Built-in BL current limit resistor On LCDM

\*R2:Suggest BL current limit resistor on customer board

**EDGE**

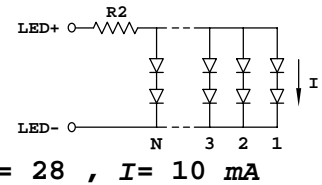


N= 4 , I= 14 mA



N= 2 , I= 20 mA

**SMT LED**



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-- not available --

**TEMPERATURE COMPENSATION**

-- not available --

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**ELECTRICAL CHARACTERISTICS**

T<sub>a</sub>= 25°C V<sub>DD</sub>=5.0±0.25 v

Input "High" Voltage (V<sub>IH</sub>)

2.2 V min

Input "Low " Voltage (V<sub>IL</sub>)

0.6 V max

**APPLICABLE FOR -LNA**

Supply Current, (I<sub>DD</sub>)Typ., mA

	<u>TN</u>		<u>STN</u>	
	<u>TEMPERATURE</u>		<u>TEMPERATURE</u>	
	<u>NORMAL</u>	<u>WIDE</u>	<u>NORMAL</u>	<u>WIDE</u>
Supply Current, (I <sub>DD</sub> )Typ., mA	N/A	N/A	3	N/A

Recommend LCD drive Voltage:

(V<sub>DD</sub>-V<sub>O</sub>)at T<sub>a</sub> = -20°C,Volts

N/A N/A N/A N/A

T<sub>a</sub> = 0°C

N/A N/A 3.8 N/A

T<sub>a</sub> = 25°C

N/A N/A 3.8 N/A

T<sub>a</sub> = 50°C

N/A N/A 3.8 N/A

T<sub>a</sub> = 70°C

N/A N/A N/A N/A

**ABSOLUTE MAXIMUM RATINGS**

Input Voltage (V<sub>I</sub>) V

	<u>NORMAL</u>		<u>WIDE</u>	
	<u>TEMPERATURE</u>		<u>TEMPERATURE</u>	
	<u>MIN</u>	<u>MAX</u>	<u>MIN</u>	<u>MAX</u>
Input Voltage (V <sub>I</sub> ) V	0	V <sub>DD</sub>	0	V <sub>DD</sub>

Supply for Logic (V<sub>DD</sub>-V<sub>SS</sub>) V

0 7 0 7

Supply for LCD (V<sub>DD</sub>-V<sub>O</sub>) V

0 10 0 10

Operating Temperature T<sub>OP</sub>, °C

0 +50 -20 +70

Storage Temperature T<sub>ST</sub>, °C

-20 +70 -30 +80

**OPTION**

**BACKLIGHT**

-BEXX -- EL

**INPUT VOLTAGE & CURRENT**

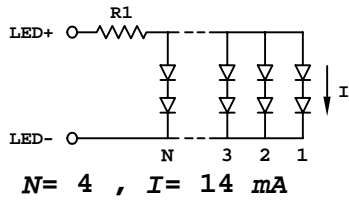
100 V<sub>RMS</sub> (400-800) Hz; 3.5mA

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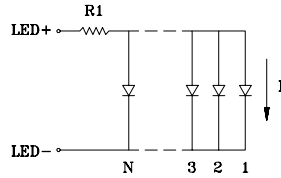
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\*R2:Suggest BL current limit resistor on customer board

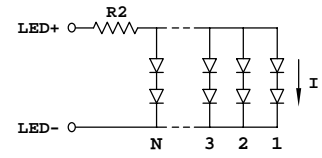
**EDGE**



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**TEMPERATURE COMPENSATION**

**-- not available --**