



# Crystalfontz America, Incorporated

## GRAPHIC LCD MODULE SPECIFICATIONS



Part Number	<b>CFAG128128B-TMI-VZ</b>
Data Sheet	<b>Release Date 2012-04-17, Preliminary</b>
Product Pages	<a href="http://www.crystalfontz.com/product/CFAG128128BTMIVZ.html">www.crystalfontz.com/product/CFAG128128BTMIVZ.html</a>

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<b>CFAG128128B-TMI-VZ DATA SHEET REVISION HISTORY</b>	
2012/04/17	Data Sheet version: Preliminary Release Date 2012-04-17 <ul style="list-style-type: none"> <li>• In section 1, corrected part number from "CFAG128128B-TMI-TN" to "CFAG128128B-TMI-VZ".</li> <li>• In section 8, fixed description of pin 18 in table to "No Connection".</li> </ul>
2007/02/14	Data Sheet version: not listed New preliminary Data Sheet.

Preliminary

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# 1. MODULE CLASSIFICATION INFORMATION

<u>C</u>	<u>F</u>	<u>A</u>	<u>G</u>	<u>128</u>	<u>128</u>	<u>B</u>	-	<u>T</u>	<u>M</u>	<u>I</u>	-	<u>VZ</u>
①	②	③	④	⑤		⑥		⑦	⑧			⑨

①	Brand	Crystalfontz America, Inc.
②	Display Type	G→Graphic
③	Number of Characters (Width)	128→ Pixels
④	Number of Lines (Height)	128→Pixels
⑤	Model Identifier	B
⑥	Backlight Type & Color:	T→LED, white
⑦	Fluid Type, Image (Positive or Negative), & LCD Glass Color	M→STN negative, blue
⑧	LCD Polarize Type, Temperature Range, View Direction	I→Transmissive, Wide Temperature, 6:00 o'clock
⑨	Special Codes	V→Negative voltage Z→Manufacturer code

# 2. PRECAUTIONS IN USE OF LCD MODULE

- Avoid applying excessive shocks to the module.
- Don't make extra holes on the printed circuit board, modify its shape, or change module components.
- Don't disassemble the LCD module.
- Don't operate the module above its absolute maximum rating.
- Don't drop, bend, or twist the LCD module.
- Solder only to the I/O terminals.
- Please store in an antistatic container in a clean environment.

# 3. GENERAL SPECIFICATIONS

RoHS compliant. Factories are ISO certified.

PHYSICAL CHARACTERISTICS	SPECIFICATION
Number of Pixels	128 pixels x 128 pixels
Pixel Size	0.32 (W) x 0.32 (H) mm
Pixel Pitch	0.35 (W) x 0.35 (H) mm
Viewing Area Width and Height	50.00 (W) x 49.00 (H) mm
Active Area Width and Height	44.77 (W) x 44.77 (H) mm
Overall Width, Height, and Depth	72.50 (W) x 69.90 (H) x 10.00 maximum (D) mm
Weight	

Preliminary

## 4. Absolute Maximum Ratings

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
Operating Temperature	$T_{OP}$	-20	□	+70	°C
Storage Temperature	$T_{ST}$	-30	□	+80	°C
Input Voltage	$V_I$	$V_{SS}$	□	$V_{DD}$	V
Supply Voltage For Logic	$V_{CC}-V_{SS}$	-0.3	□	+7	V
Supply Voltage For LCD	$V_{CC}-V_{EE}$	0	□	28	V

## 5. Electrical Characteristics

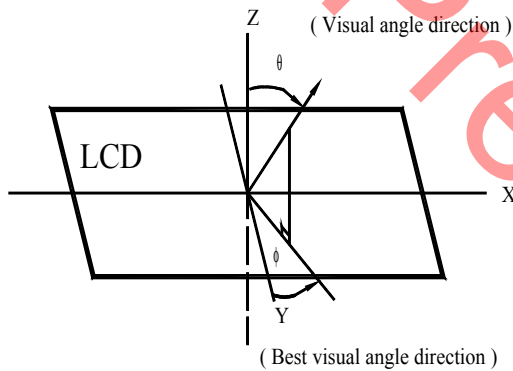
ITEM	SYMBOL	CONDITIO N	MIN.	TYP.	MAX.	UNIT
Supply Voltage For Logic	$V_{DD}-V_{SS}$	□	4.75	5.0	5.25	V
Supply Voltage For LCD	$V_{DD}-V_0$	$T_a=-20^{\circ}\text{C}$		□	18.2	V
		$T_a=25^{\circ}\text{C}$	□	16.3	□	V
		$T_a=70^{\circ}\text{C}$	14.9	□		V
Input High Volt.	$V_{IH}$	□	2.2	□	$V_{DD}$	V
Input Low Volt.	$V_{IL}$	□	0	□	0.8	V
Output High Volt.	$V_{OH}$	□	2.4	□	$V_{DD}$	V
Output Low Volt.	$V_{OL}$	□	0	□	0.4	V
Supply Current	$I_{DD}$	$V_{DD}=5\text{V}$	18	25	30	mA

## 6. Optical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
View Angle	(V) $\theta$	$CR \geq 2$	20	$\square$	40	deg
	(H) $\phi$	$CR \geq 2$	-30	$\square$	30	deg
Contrast Ratio	CR	$\square$	$\square$	3	$\square$	$\square$
Response Time	T rise	$\square$	$\square$	200	300	ms
	T fall	$\square$	$\square$	200	300	ms

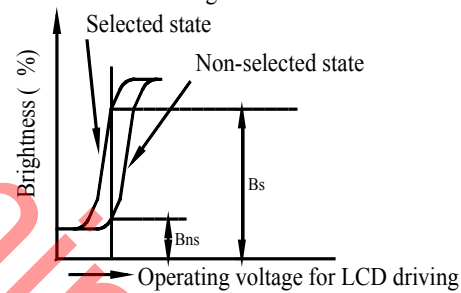
### 6.1 Definitions

#### ■ View Angles

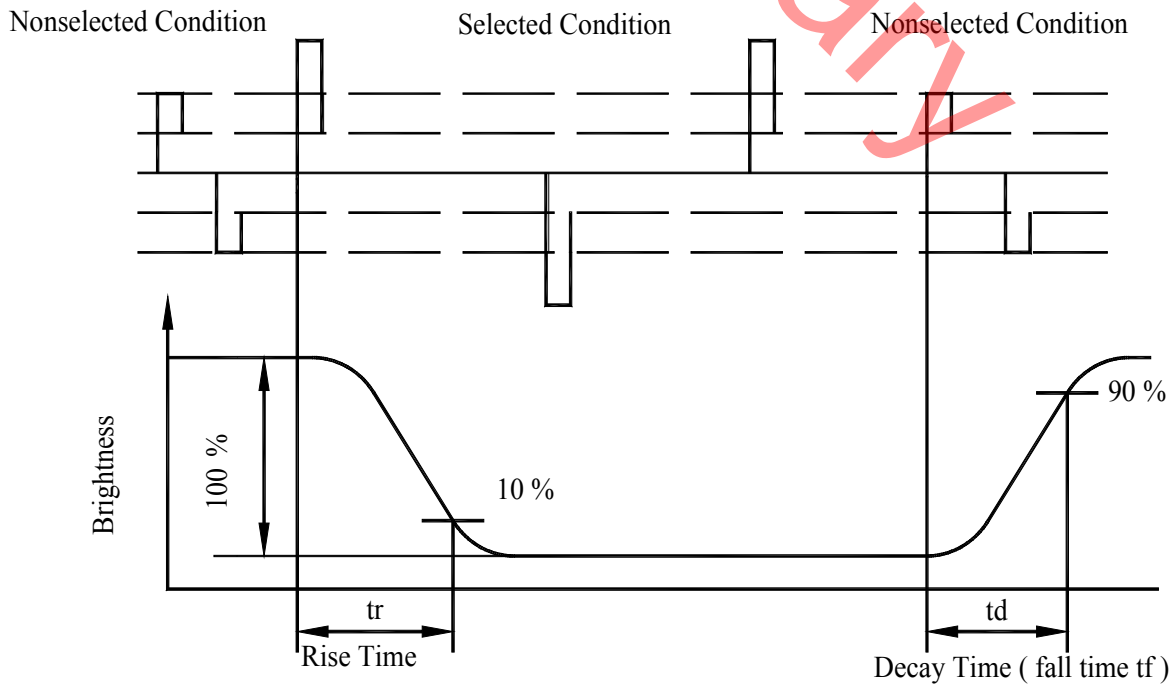


#### ■ Contrast Ratio

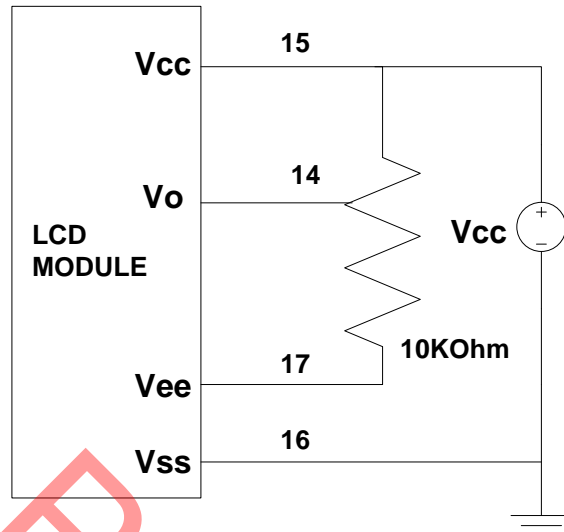
$$CR = \frac{\text{Brightness at selected state (BS)}}{\text{Brightness at non-selected state (Bns)}}$$



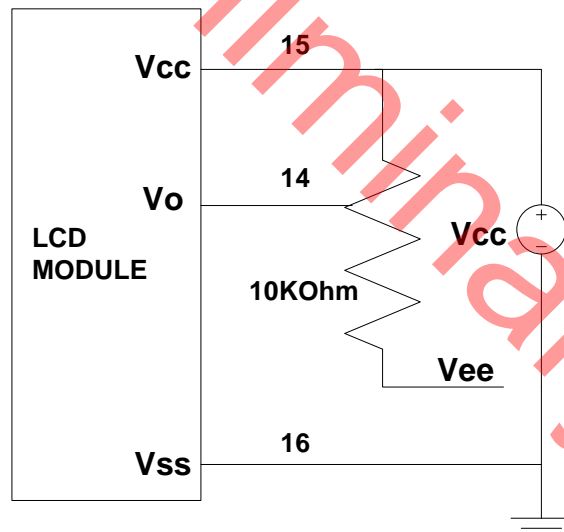
#### ■ Response Time



## 7. Power Supply for LCD Module and Contrast Adjust



Contrast adjust by using internal Negative (Positive) voltage generator

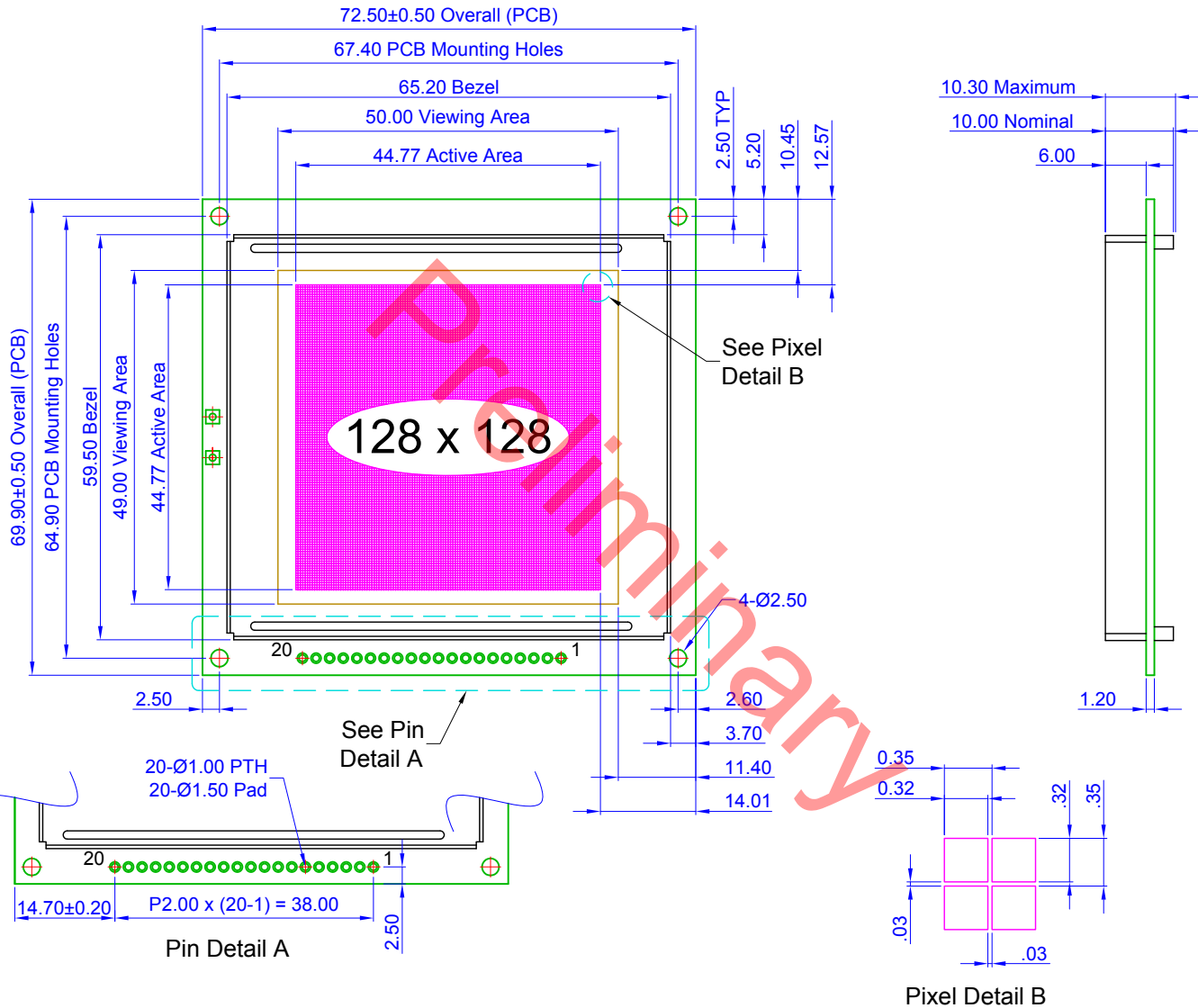


Contrast adjust by using external Negative (Positive) voltage generator



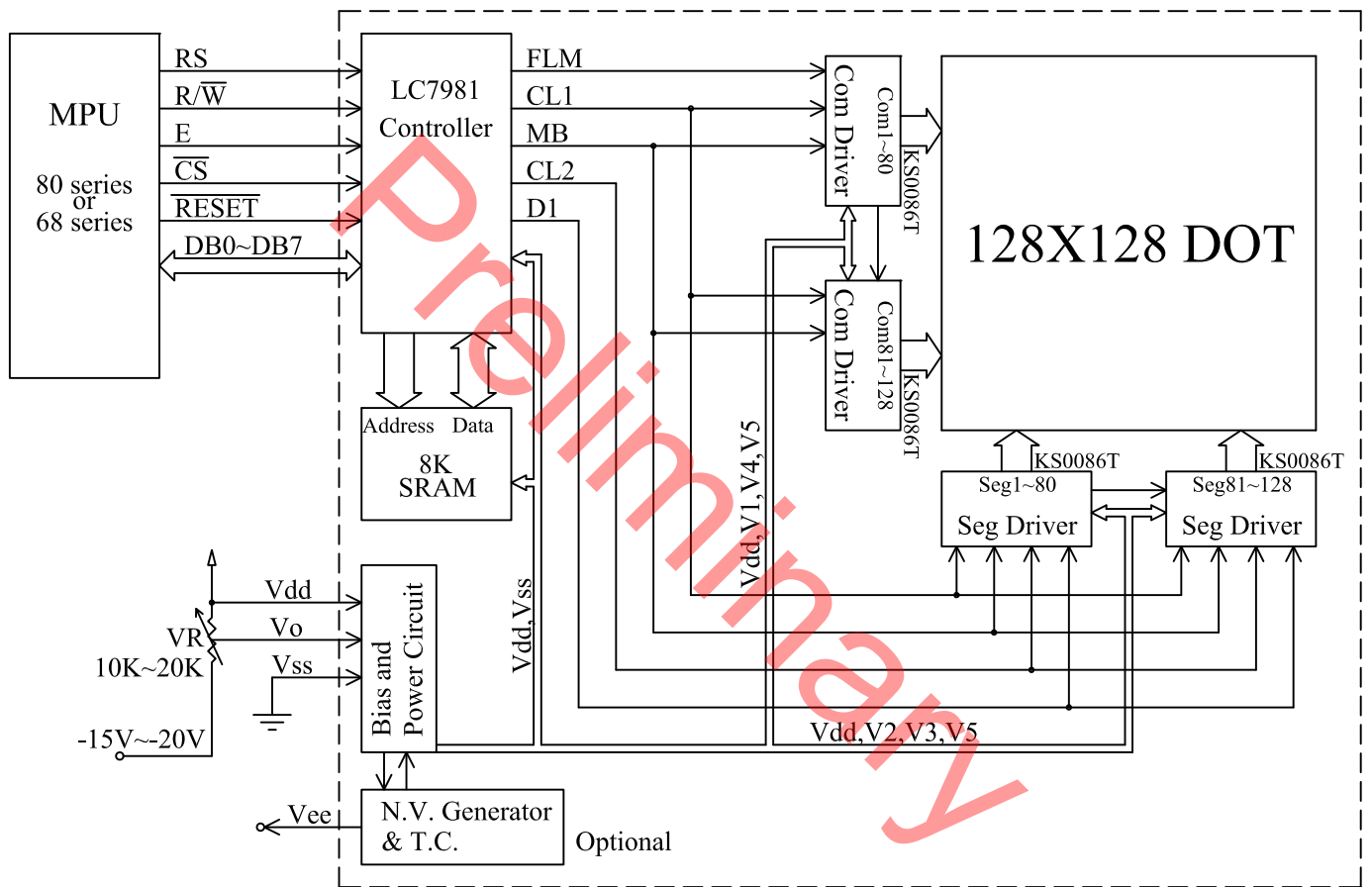
## 8. Interface Description

Pin	Symbol	Level	Description
1-8	DB0-DB7	H/L	Bidirectional databus connects to standard host databus.
9	RS	H/L	Register selection input. High: Data register (for read and write) Low: Instruction code (for write)
10	R/W	H/L	Host interface input. High: Read (Host→Module) Low: Write (Host←Module)
11	E	H/L	Enable
12	/CS	H,H→L	Chip select input. <i>Low:</i> Controller chip is selected. Communications with the host is possible. <i>High:</i> Controller chip is not selected. Host interface signals are ignored by the controller.
13	/RST	L	Reset signal input. <i>Low:</i> Display controller is reset. The RST pin should be pulsed low shortly after power is applied. <i>High:</i> The RST pin should be brought high for normal operation.
14	V <sub>O</sub>		Supply voltage for driving LCD.
15	V <sub>DD</sub>		Supply voltage for logic. Must be connected to an external source. Do NOT mix supply voltage and logic voltages.
16	V <sub>SS</sub>		Power Supply (GND). Must be connected to an external ground.
17	V <sub>EE</sub>		Negative voltage output.
18	NC		Make no connection
19	LED+		Supply voltage for LED. "A" (anode) or "+" of LED backlight
20	LED-		Supply voltage for LED. "K" (cathode or kathode for German and original Greek spelling) or "-" of LED backlight



Note: Tolerance is ±0.3 mm unless specified.





External contrast adjustment.

# 11. Built-in Character Generator

Upper 4 bit Lower 4 bit	LLLL	LLLH	LLHL	LLHH	LHLL	LHLH	LHHL	LHHH	HLLL	HLLH	HLHL	HLHH	HHLL	HHLH	HHHL	HHHH
LLLL			0	1	2	3	4	5	6			7	8	9	A	B
LLLH		.	!	@"	#	\$	%	&	'	(	)	*	+	,	-	.
LLHL		"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;
LLHH		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E
LHLL		@	A	B	C	D	E	F	G	H	I	J	K	L	M	N
LHLH		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E
LHHL		@	A	B	C	D	E	F	G	H	I	J	K	L	M	N
LHHH		7	8	9	A	B	C	D	E	F	G	H	I	J	K	L
HLLL		<	0	1	2	3	4	5	6	7	8	9	A	B	C	D
HLLH		>	9	8	7	6	5	4	3	2	1	0	A	B	C	D
HLHL		*	#	\$	%	&	'	(	)	*	+	,	-	.	:	;
HLHH		+	#	\$	%	&	'	(	)	*	+	,	-	.	:	;
HHLL		.	<	0	1	2	3	4	5	6	7	8	9	A	B	C
HHLH		-	=	0	1	2	3	4	5	6	7	8	9	A	B	C
HHHL		.	>	9	8	7	6	5	4	3	2	1	0	A	B	C
HHHH		/	?	0	1	2	3	4	5	6	7	8	9	A	B	C

# 12. Reliability

Content of Reliability Test (wide temperature, -20°C~70°C)

Environmental Test			
Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80°C 200hrs	2
Low Temperature storage	Endurance test applying the high storage temperature for a long time.	-30°C 200hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70°C 200hrs	—
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20°C 200hrs	1
High Temperature/ Humidity Operation	The module should be allowed to stand at 60°C,90%RH max For 96hrs under no-load condition excluding the polarizer, Then taking it out and drying it at normal temperature.	60°C,90%RH 96hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation -20°C 25°C 70°C  30min 5min 30min 1 cycle	-20°C/70°C 10 cycles	—
Vibration test	Endurance test applying the vibration during transportation and using.	Total fixed amplitude : 1.5mm Vibration Frequency : 10~55Hz  One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes	3
Static electricity test	Endurance test applying the electric stress to the terminal.	VS=800V,RS=1.5kΩ CS=100pF 1 time	—

Note1: No dew condensation to be observed.

Note2: The function test shall be conducted after 4 hours storage at the normal Temperature and humidity after remove from the test chamber.

Note3: Vibration test will be conducted to the product itself without putting it in a container.

# 13. Backlight Information

## Specification

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION
Supply Current	I <sub>LED</sub>	64	80	120	mA	V=3.2V
Supply Voltage	V	3.4	3.5	3.6	V	□
Reverse Voltage	V <sub>R</sub>	□	□	5	V	□
Luminous Intensity	I <sub>V</sub>	120	140	□	CD/M <sup>2</sup>	I <sub>LED</sub> =80mA
Wave Length	λ <sub>p</sub>	□	X=0.30 Y=0.31	□	nm	I <sub>LED</sub> =80mA
Life Time	□	□	10000	□	Hr.	I <sub>LED</sub> =80mA
Color	WHITE					

Note: The LED of B/L is drive by current only □ driving voltage is only for reference  
To make driving current in safety area (waste current between minimum and maximum).

### LED B\L Drive Method Drive from A , K

