

PRODUCT SPECIFICATION

**SPEC
PECIFICATION
CS1802
V 1.0**

CUSTOMER			LCM		
APPROVED	CHECKED	CHECKED	APPROVED	CHECKED	PREPARED
					Henry 2007.5.8

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1.0 COMPOSITION

Display type: [128(RGB) ×160 Dots, 1.77 inch TFT-LCD Module]

Input data: 8 bit parallel interface by 80 MPU

View Direction: [12 O'clock]

Backlight: [LED B/L White]

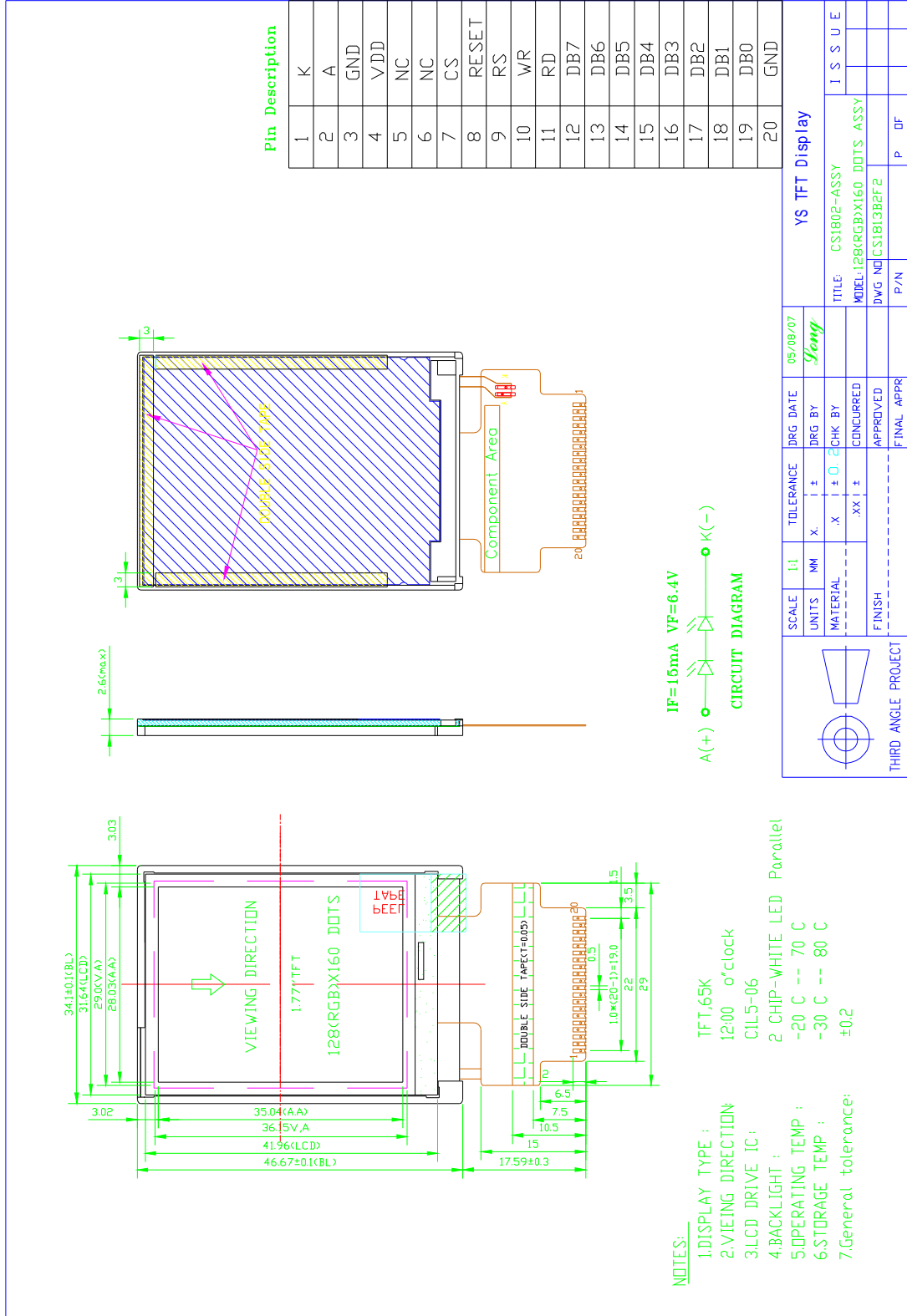
Driver IC: C1L5-06

2.0 MECHANICAL SPECIFICATIONS

ITEM	STANDARD VALUES	UNITS
LCD type	TFT	
Pixel arrangement	128(RGB) ×160	pixels
Module size	34.1 ×46.67 ×2.6	mm
View area	29. ×36.15	mm
Active area	28.03 ×35.04	mm
Pixel Pitch	0.209×0.209	mm
Viewing direction	12 O'clock	

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3.0 DIMENSIONAL DIAGRAM

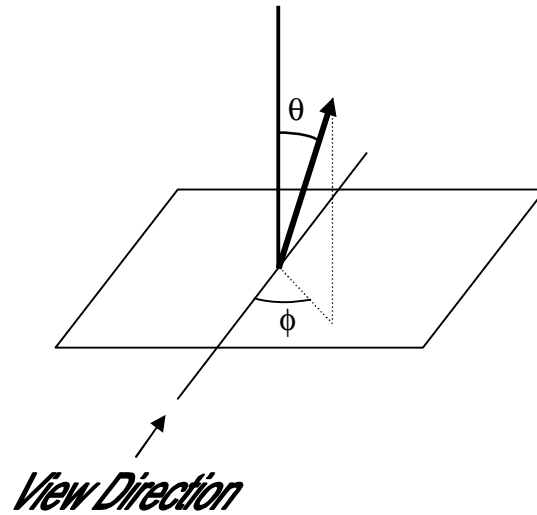


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4.0 OPTICAL CHARACTERISTICS

ITEM		SYMBOL		CONDITIONS	MIN	TYP	MAX	UNITS
Viewing Angle		Ho	θL	C/R \geq 10 B/L On	-	40	-	Deg
		r.	θR		-	40	-	
		He	ϕH		-	40	-	
		r.	ϕL		-	15	-	
Luminance Of White(Center Point)		Y _L			100	150	-	cd/m ²
Contrast Ratio		C/R			100	150	-	-
Response Time	Rising: T _R	T _R + T _F			-	20	40	ms
	Falling: T _F							
Color Chromaticity		White		$\phi = 0$ $\theta = 0^\circ$ Normal Viewing Angle B/L On	0.226	0.322	0.426	—
					0.255	0.345	0.455	
		Red			0.390	0.568	0.580	
					0.280	0.356	0.396	
		Green			0.241	0.346	0.365	
					0.420	0.526	0.590	
		Blue			0.045	0.149	0.245	
					0.069	0.159	0.269	
Reflectance		Rf		B/L Off	0.5	1.0	-	%

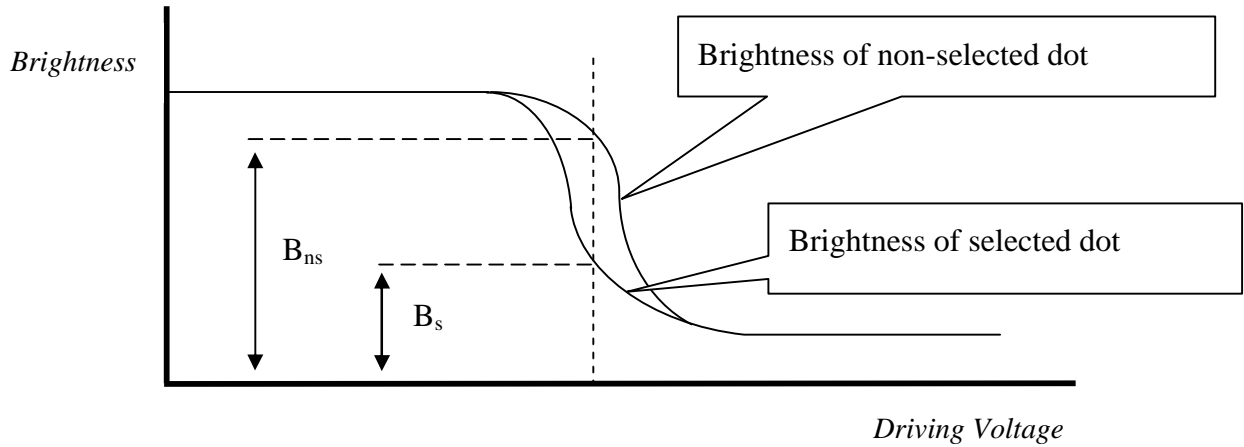
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4.1 q and f 

- The contrast of the display is optimal when viewed in the “View Direction” ($f = 0^\circ$).
- $0^\circ \leq q < 90^\circ, 0^\circ \leq f < 360^\circ$

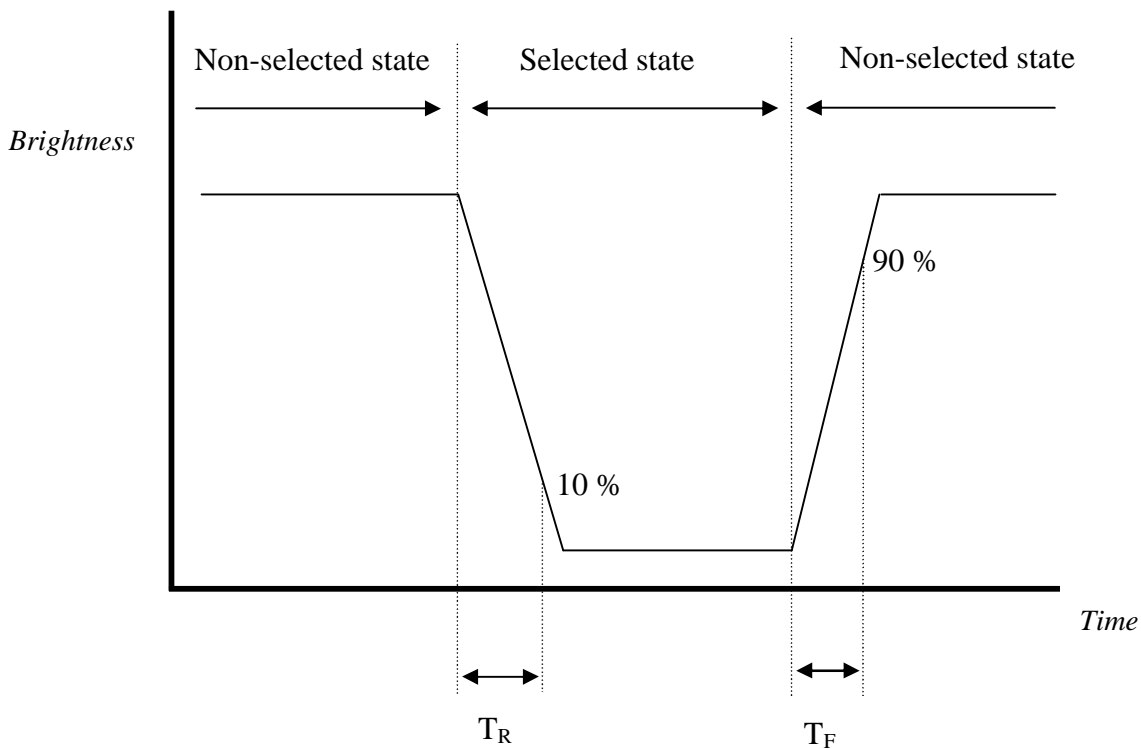
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4.2 Contrast ratio Cr



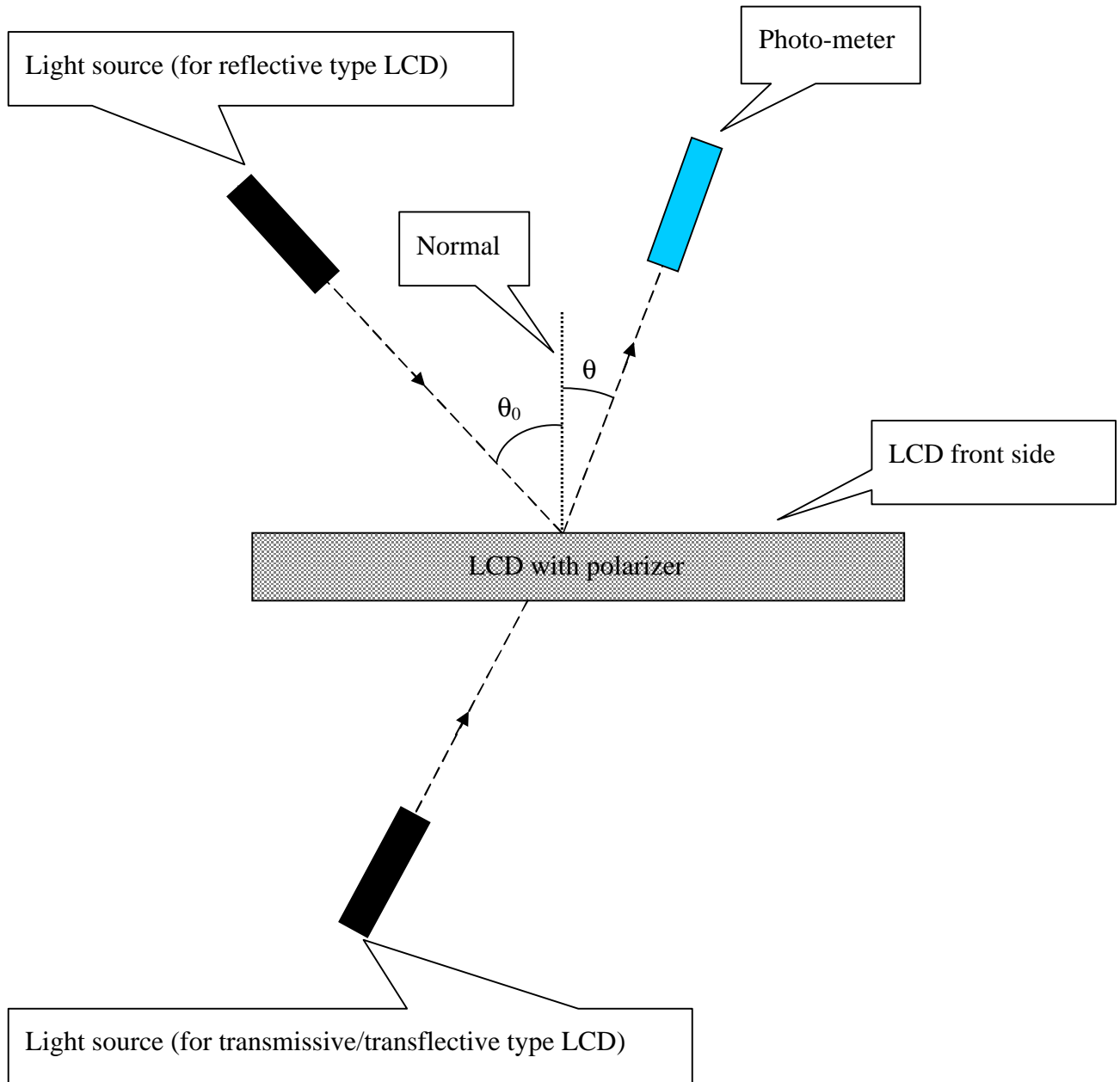
Contrast Ratio: $C_r = B_{ns} / B_s$

4.3 Response times T_R and T_F



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4.4 Optical measurement system



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5.0 ELECTRICAL SPECIFICATIONS

5.1 TFT-LCD Module Characteristics

ITEM	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Power-supply Voltage	V_{DD}	$T_a = 25\text{ }^\circ\text{C}$	2.70	3.0	3.30	V
DC/DC Super Voltage	V_{CI}	$T_a = 25\text{ }^\circ\text{C}$	2.70	3.0	3.30	
Input Voltage	V_{IH}	H level	$0.8 \times V_{DD}$	—	V_{DD}	
	V_{IL}	L level	V_{SS}	—	$0.2 \times V_{DD}$	
Supply Current For Logic	I_{DD}	$V_{DD} = 3.0\text{V}$	—	3.0	—	mA
LCD Frame Frequency	FLM		—	60	—	Hz
LED Module Forward voltage	V_{led}	-	6.3	6.4	6.5	V
LED Module Forward current	I_{led}	-	-	20	-	mA

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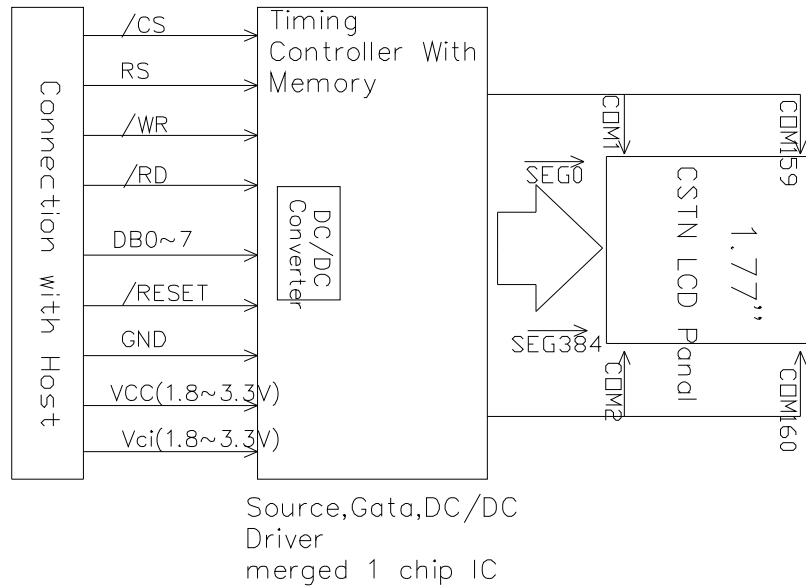
6.0 TERMINAL FUNCTIONS

Pin No	Symbol	Function
1	K	Cathode of Back Light
2	A	Anode of Back Light
3	GND	Ground
4	VDD	POWER SUPPLY
5	NC	NC
6	NC	NC
7	CS	Chip Select
8	RESET	LCD Reset
9	RS	Register Select
10	WR	Data Write
11	RD	Data Read
12	DB7	Data7
13	DB6	Data6
14	DB5	Data5
15	DB4	Data4
16	DB3	Data3
17	DB2	Data2
18	DB1	Data1
19	DB0	Data0
20	GND	Ground

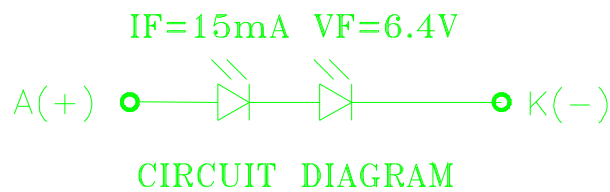
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7.0 BLOCK DIAGRAM

7.1 TFT-LCD Module (Interface Structure)

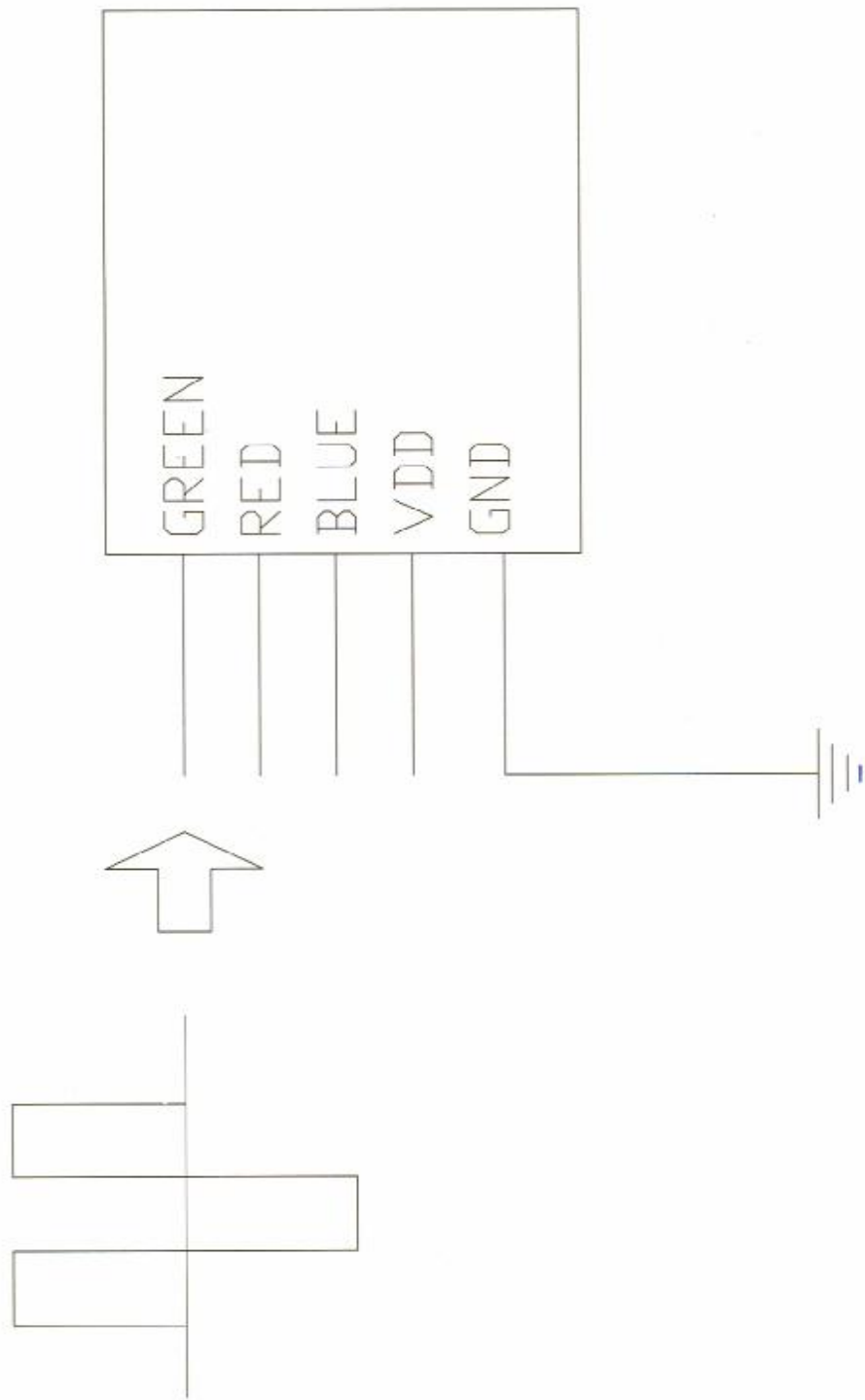


7.2 Back-light Unit



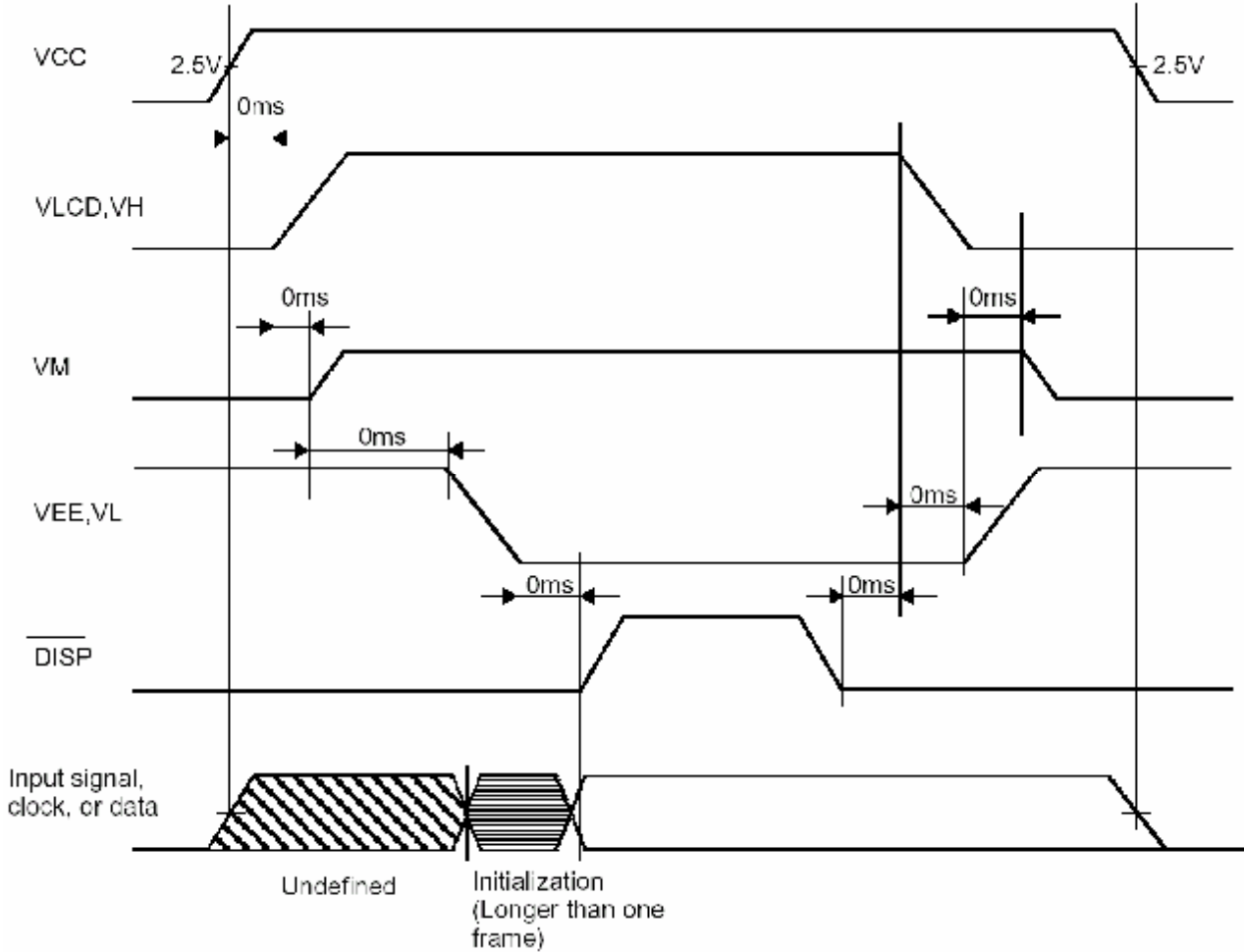
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8.0 POWER SUPPLY CIRCUIT



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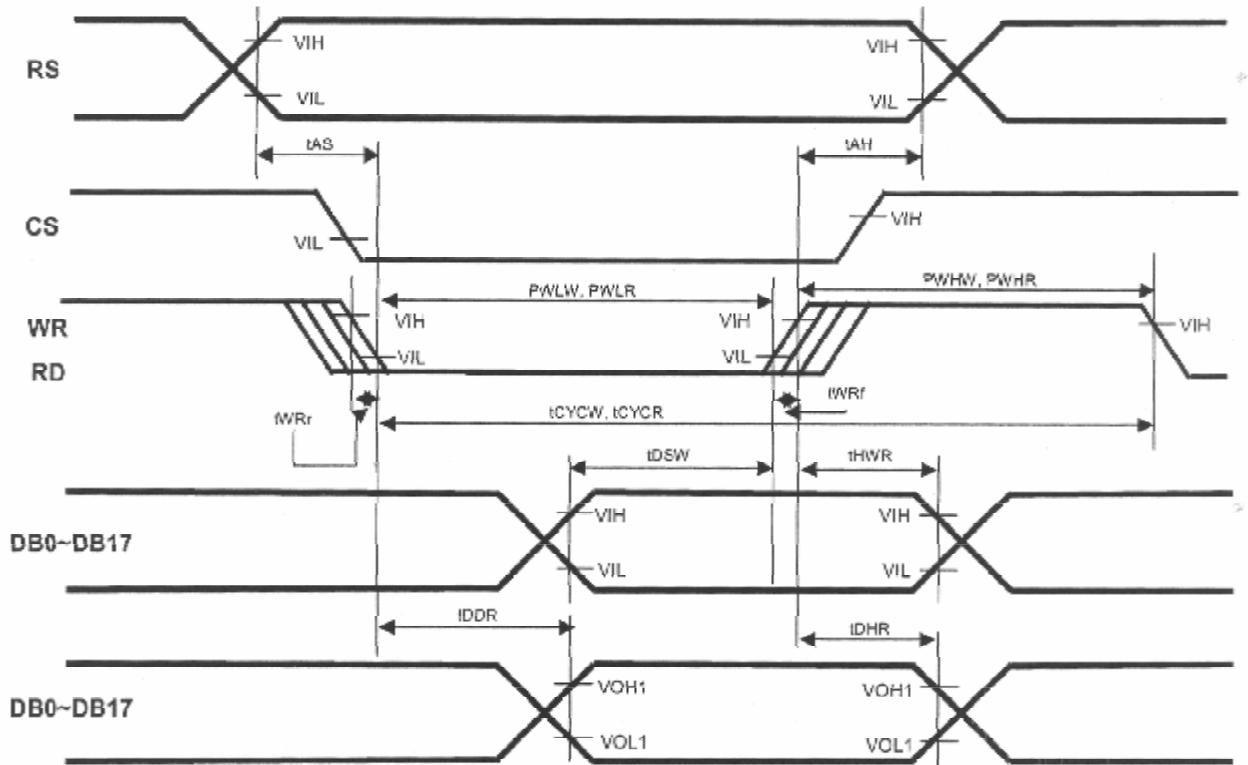
9.0 Power ON/OFF Sequence



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10.0 AC CHARACTERISTICS

10.1 Read/Write Characteristics(80 series)



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11.0 MAXIMUM ABSOLUTE VALUES

ITEM	SYMBOL	STANDARD	UNITS
Supply Voltage for Logic	V_{DD}	1.8to 3.3	V
DC/DC Converter Power	V_{CI}	2.5to 3.3	V
LCD Power Supply Voltage	V_{LCD}	0.3 to +25	
Operating temperature	T_{OP}	-20 to +60	°C
Storage temperature	T_{ST}	-30 to +70	

11.1 RELIABILITY

ITEM	CONDITIONS	CRITERIA
High temperature operation	60 °C for 200 hours	<ul style="list-style-type: none"> ◆ No defect in cosmetic and operational functions. ◆ Total current consumption below double of initial value.
Low temperature operation	-20 °C for 200 hours	
High humidity storage	40 °C, 90 % RH for 240 hours	
High temperature storage	70 °C for 200 hours	
Low temperature storage	-30 °C for 200 hours	
Temperature cycling	-30 °C (30 min) ↓↑ 25 °C (5 min) ↓↑ 70 °C (30 min) CYCLES: 10	
Vibration	Random Wave: 40~500 Hz Acceleration: 5g Each Direction (x, y, z): 50 sec	

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12.0 PRECAUTIONS

12.1 Static charge

Since this LCD module contains CMOS LSIs that are sensitive to static charge, care must be taken when handling it.

12.2 Power on sequence

1. Input signals should not be applied to the LCD module before the logic system voltage has reached the specified voltage. If the above sequence is not kept the LCD module might be permanently damaged.
2. When connecting the power supply, connect the LCD bias voltage after connecting the logic system voltage.
3. When disconnecting the power supply, disconnect the logic system voltage after the LCD bias voltage.
4. It is recommended to connect a serial resistor or fuse to the LCD bias power supply of the system, as a current limiter. The value of the resistor depends on the kind of LCD used, but is typically 50 ~ 100 Ω .

12.3 Operation

1. It is essential to drive the LCD within the specified voltage limits, since a higher driving voltage than allowed causes a shorter LCD lifetime. Under these circumstances, electrochemical reactions will result in undesirable deterioration of the LCD.
2. The response time of the LC fluid is considerably longer at low temperatures than in the normal operating temperature range. On the other hand, the LCD will show a dark blue color at high temperatures. Those phenomena do not indicate a malfunction or defect of the LCD. Back at normal temperatures, the LCD will return to its original behavior.
3. If the display area is pressed hard during operation, some abnormal display patterns might appear. However, the display will resume normal operation after turning the module off and on.
4. Moisture on the terminals could cause an electrochemical reaction resulting in an open terminal connection. If the environmental temperature is higher than 40 $^{\circ}\text{C}$, it is required that the relative humidity is 50% or less.

12.4 Packaging

1. Do not leave the product in a place of high humidity for a long period. For storage in a location where the temperature is 35 $^{\circ}\text{C}$ or higher, special care to protect the product from high humidity is required. A combination of high temperature and high humidity may cause polarization degradation and damage as well. Please keep the temperature and humidity

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within the specified range for storing.

2. Since LCD panels tend to be easily damaged, they should be handled with full care. Avoid any contact with materials that have a hardness of more than 2H.
3. Adhesives used for adhering upper/lower polarizers and aluminum plates are made of organic substances that will deteriorate by chemical reactions with for example chemicals such as acetone, toluene, ethanol, and isopropylalcohol. Please prevent the use of these chemicals and contact us when it is necessary for you to use other chemicals.
4. Immediately wipe off saliva or water drops from the display area with an absorbent cotton cloth, without scrubbing it. If adhered for a long period, such particles might cause deformation or faded color.
5. Moisture deposited on the display surface and contact terminals due to low temperatures will be a cause for polarizer damage, stains, and dirt. Before use, such panels should be slowly warmed up to a temperature that is higher than room temperature.
6. Touching the display area and contact terminals with bare hands is harmful to polarizer and may lead to poor insulation at the terminals.
7. The glass is fragile and can be cracked or chipped easily by handling, in particular on near its edge. Please prevent sudden shocks or exposing the glass to other sorts of stress.

12.5 Long-term storage

For long-term storage the following methods are highly recommended:

1. Store the product in a polyethylene bag with a sealed opening to prevent fresh air entering from the outside. Placing it with a desiccant is not necessary.
2. Store the product in a dark place, with the temperature in the range from 0 °C to 35 °C.
3. Keep the sensitive polarizer surface of the LCD panels clear of any contact. We recommend using the container that was used by DISPLAY to deliver the products.

12.6 Cleaning of the product

To clean the product make sure to use absorbent cotton cloth or other soft material like chamois. Make sure to rub it gently, and do not use chemicals when cleaning.

13.0 FINAL REMARKS

1. The above specifications are the binding criteria for DISPLAY Technology 's outgoing quality inspection.
2. The customer is kindly requested to inform DISPLAY Technology as soon as possible on any questions, remarks, and disagreements regarding these specifications.
3. DISPLAY is not responsible for damage to its products due to neglect of the precautions as described in the previous chapter.

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APPENDIX—

REVISION RECORD

REV	REVISION ITEM	DATE
A	New release	2007/5/08
B		
C		
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