

SPECIFICATION



YMFG-G160160A-1 P-1DPEGSN

September 27, 2007

Version 1.01



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Specification For

Liquid Crystal Display Module

MODEL NO. : YM 160160G-T01

View Direction	<input checked="" type="checkbox"/> 6 O'clock		<input type="checkbox"/> 12 O'clock		
LCD Type	<input checked="" type="checkbox"/> FSTN Positive		<input type="checkbox"/> FSTN Negative		
	<input type="checkbox"/> STN Gray	<input type="checkbox"/> STN Yellow Green		<input type="checkbox"/> STN Blue	
Rear Polarizer	<input type="checkbox"/> Reflective		<input checked="" type="checkbox"/> Transflective		<input type="checkbox"/> Transmissive
Backlight Type	<input type="checkbox"/> LED	<input type="checkbox"/> Internal Power		<input checked="" type="checkbox"/> EL	
		<input type="checkbox"/> External Power		<input type="checkbox"/> CCFL	
Backlight Color	<input type="checkbox"/> White		<input type="checkbox"/> Amber		<input type="checkbox"/> Blue
	<input type="checkbox"/> Yellow		<input checked="" type="checkbox"/> Other		
Temperature Range	<input checked="" type="checkbox"/> Normal		<input type="checkbox"/> Wide		<input type="checkbox"/> Super Wide
EL Driver IC	<input checked="" type="checkbox"/> Build-in		<input type="checkbox"/> Not Build-in		
DC-to-DC	<input type="checkbox"/> With		<input checked="" type="checkbox"/> Without		

To Be Very Careful !

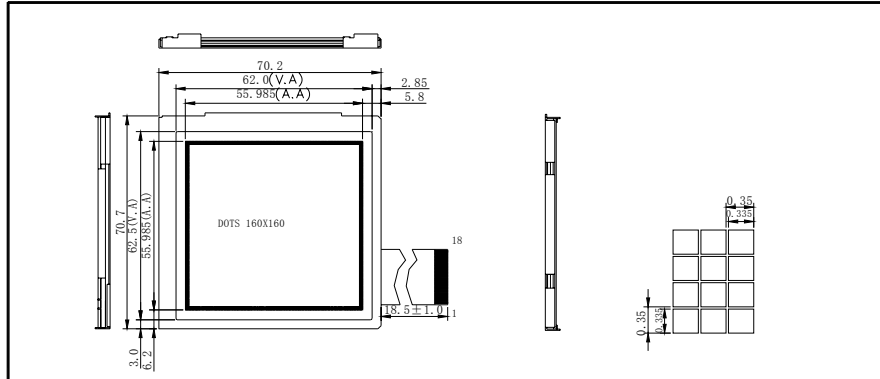
The LCD driver ICs are made by CMOS process, which are very easy to be damaged by static charge, make sure the user is grounded when handling the LCM.



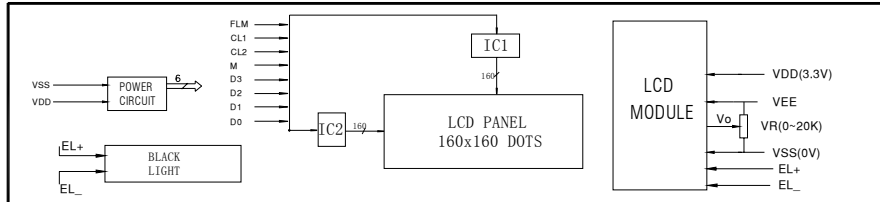
LCM Module Drawing

QiuTian, ShiJia **YM-160160G-T01** 160 x 160 GRAPHIC
1/160DUTY, 1/13BIAS

1.0 DIMENSIONAL DRAWING



2.0 BLOCK DIAGRAM & POWER SUPPLY



3.0 MECHANICAL SPECIFICATIONS & FEATURE

Item	Nominal Dimensions(mm)	FEATURE	
Module Size (W*H*T)	70.2X70.7X4.8MAX	LCD Type	FSTN
View Area (W*H)	62X62.5	LCD Colour	Gray
Dot xDots(W*H)	160x160	View Angle	6 O'clock
Dot Pitch (W*H)	0.35x0.35	Display Type	Positive Type
Dot Size (W*H)	0.335x0.335	Rear polarizer	Transflective
---	---	Operating Temperature	-10° C ~ 60° C
---	---	Storage Temperature	-20° C ~ 70° C
---	---	Backlight	EL(Green)

4.0 ELECTRICAL CHARACTERISTICS

Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Operating Voltage	Vdd	Ta=25° C	---	3.3	---	V
Operating Voltage for LCD	Vlcd	Ta=25° C	---	18.6V	---	V
Supply Current	Idd	Ta=25° C, Vdd=3.3V	---	1.0	---	mA
Supply Current for Backlight	If	Ta=25° C, VEE=18.6V	---	2.5	---	mA

5.0 INTERFACE PIN CONNECTIONS

Pin No	Symbol	Level	Description
1	VSS	I	GND (0V)
2	FLM	H/L	Frame start signal
3	CL1	H → L	Data latch pulse
4	CL2	H → L	Data shift clock pulse
5	M	H/L	Alternate signal for LCD driving waveform
6	Vdd	I	Power supply for logic(+3.3V)
7	EL-ON	I	EL control signal
8	VEE	I	LCD driving voltage(+v)
9-12	D3-D0	H/L	Display data
13	TP-L	I	Touch panel signal
14	TP-U	I	
15	TP-R	I	
16	TP-D	I	
17-18	VSS	I	Signal ground(GND)



General Specification

Item	Content
Display Resolution	160 (W)×160(H)
Dimensional Outline(mm)	70.2(W)X70.7(H)X4.8(D)(MAX)mm
Display mode	Transflective Type/Positive
Circuit	Common-Driver IC, Segment-driver IC with build-in SRAM
Interface	VSS,FLM,CL1,CL2,M,VDD,EL-ON,VEE,D3-D0,TP-L,TP-U,TP-R,TP-D,VSS.

Absolute Maximum Rating

(1) Electrical Absolute Ratings

Item	Symbol	Min.	Max.	Unit	Note
Power Supply for Logic	$V_{DD}-V_{SS}$	-0.3	5.5	Volt	
Power Supply for LCD	$V_{EE}-V_{SS}$	0	35.0	Volt	
Input Voltage	V_I	-0.3	V_{DD}	Volt	
Static Electricity	-	-	100	Volt	Note 1
Power Supply For EL	VOLTAGE	$V_{EL1}-V_{EL2}$	----	AC120	Vrms
	FREQUENCY	f_{EL}	----	1.0	KHz

Note 1 : TEST METHOD AND CONDITIONS

AFTER CHARGING UP 200PF CAPACITOR BY STATED VOLTAGE,THE CAPACITOR IS CONNECTED WITH INTERFACE PINS OF THE MODULE.

(2) Environmental Absolute Maximum Ratings

Item	Normal Temperature				Wide Temperature			
	Operating		Storage		Operating		Storage	
	Min,	. Max,	Min,	. Max,	Min,	. Max,	Min,	. Max,
Ambient Temperature	-10°C	+60°C	-20°C	+70°C	-20°C	+70°C	-30°C	+80°C
Humidity(without condensation)	85%RH		85%RH		Note 4,5		Note 4,6	

Note 2 Ta AT -20°C :48HRRH max
70°C :168HR MAX.

Ta>50°C : Absolute humidity must be lower than the humidity of 85%RH at 50°C

Note 3 Ta at -20°C will be<48hrs at 70°C will be <120hrs when humidity is higher than 70%.

Note 4 Background color changes slightly depending on ambient temperature. This phenomenon



is reversible.

Note 5 $T_a \leq 70^\circ\text{C}$: 75RH max

$T_a > 70^\circ\text{C}$: absolute humidity must be lower than the humidity of 75%RH at 70°C

Note 6 T_a at -30°C will be <48hrs, at 80°C will be <120hrs when humidity is higher than 70%.

Electrical Characteristics

Item	Symbol	Condition	Min.	Typ	Max.	Unit	note
Power Supply for Logic	$V_{DD}-V_{SS}$	-	2.4	3.3	5.5	Volt	
LCD Driver circuit power supply voltage	$V_{EE}-V_{SS}$	-	15.0	-	32.0	Volt	
Input Voltage	V_{IL}	L level	-	-	$0.2 V_{DD}$	Volt	
	V_{IH}	H level	$0.8 V_{DD}$	-	-	Volt	
Output Voltage	V_{OH}	$I_{OH}=-0.4\text{mA}$	$V_{DD}-0.4$	-	-	Volt	
	V_{OL}	$I_{OL}=+0.4\text{mA}$	-	-	0.4	Volt	
LCM Recommend LCD Module Driving Voltage	$V_{lcd} = V_{DD} - V_O$	$T_a = -20^\circ\text{C}$	-	-	-	Volt	
		$T_a = 0^\circ\text{C}$	-	-	-		
		$T_a = 25^\circ\text{C}$	18.1	18.6	19.1		
		$T_a = 50^\circ\text{C}$	-	-	-		
Power Supply for EL Driving	EL_1-EL_2	V_{EL}	-	50	-	Vrms	
Power Supply Current for LCM	$I_{DD}(\text{EL B/L OFF})$	$V_{DD} - V_{SS} = 3.3\text{V}$	-	1.0	-	mA	
	$I_{EE}(\text{EL B/L ON})$	$V_{EE} - V_{SS} = 18.6\text{V}$ FLM=75Hz $V_{EE} = 18.6\text{V}$	-	2.5	-		

NOTE(1): Append To Terminals D0~D3,FLM,CL1,CL2,M

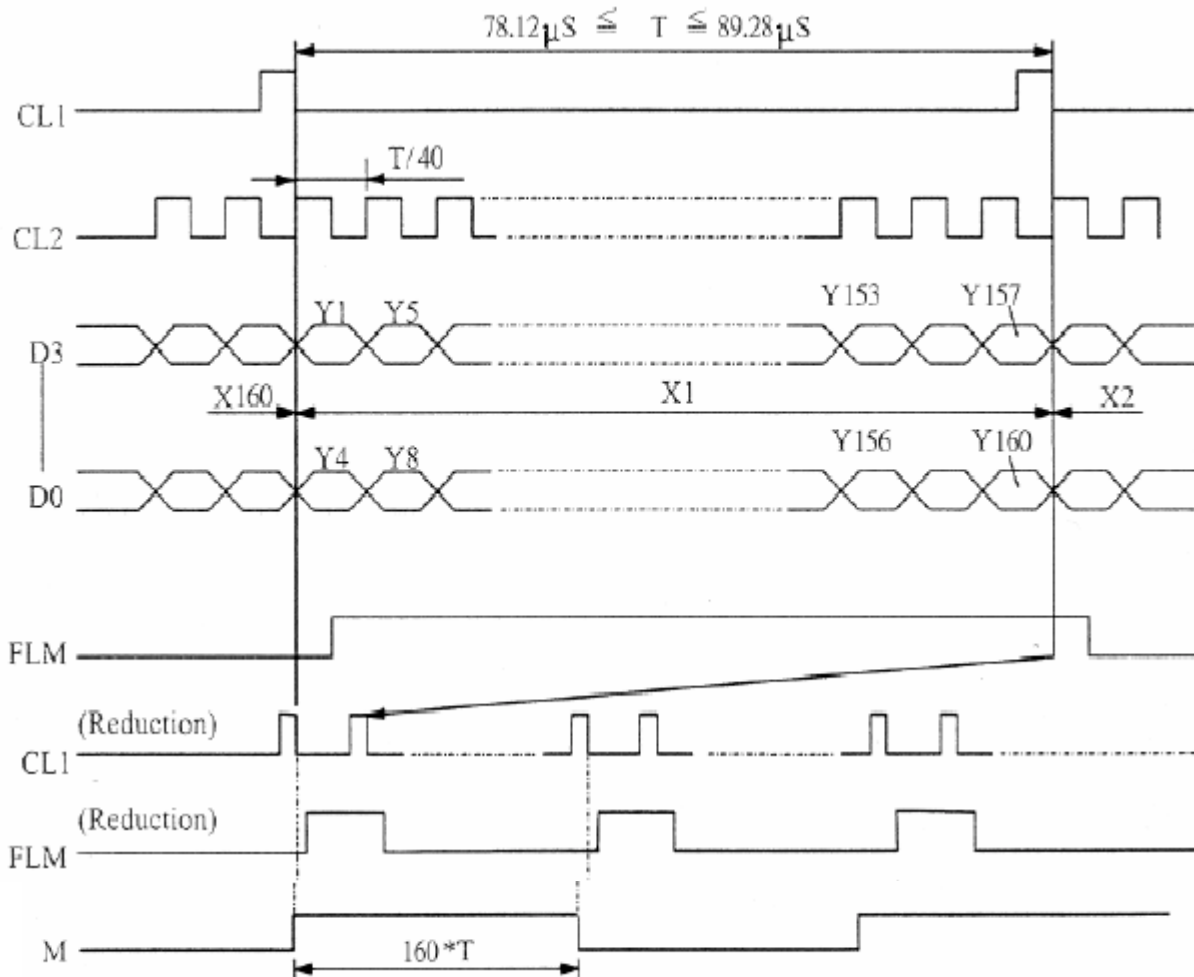
NOTE(2): The Display Pattern Is All "Q"

NOTE(3): Recommended LCD Driving Voltage May Fluctuate About $\pm 0.5\text{V}$ By Each Module.



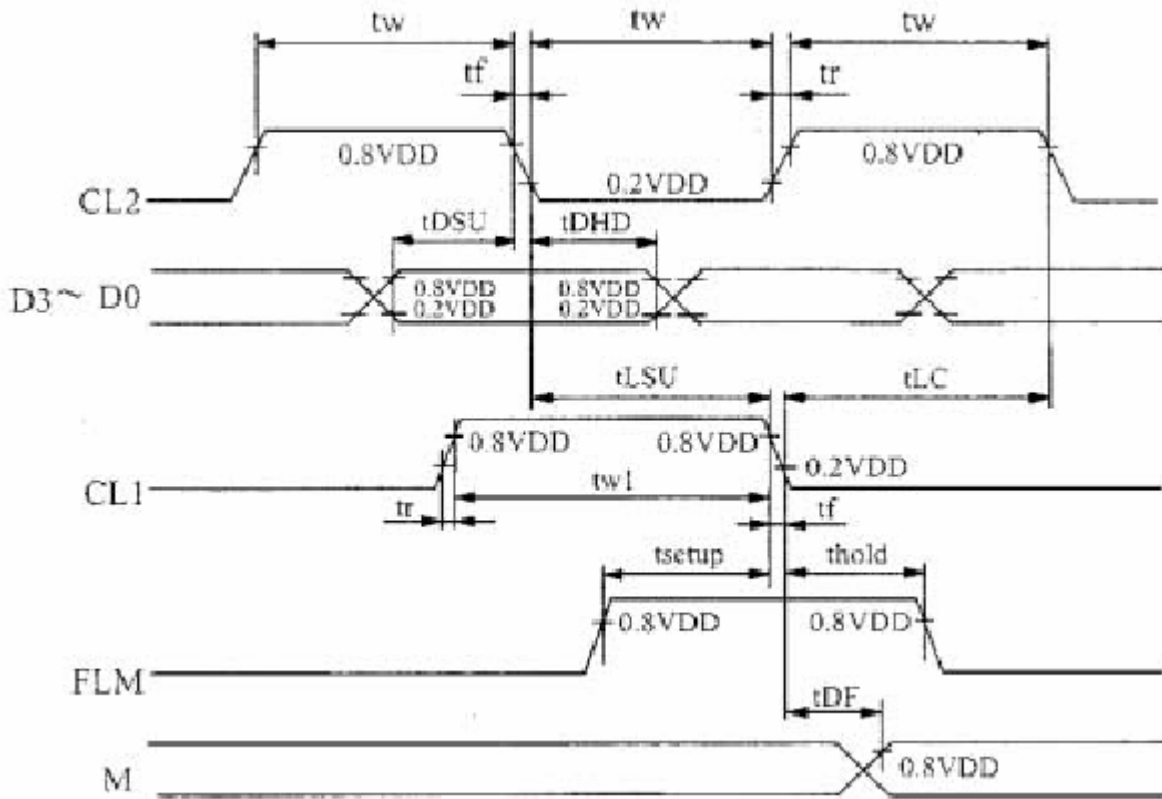
TIMING CHARACTERISTICS

1. Interface Timing



2 SWITCHING CHARACTERISTICS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
CL1 PULSE WIDTH	tw1	51	—	—	ns
CL2 PULSE	tw	51	—	—	ns
RISE,FALL TIME	tr,tf	—	—	50	ns
DATA SETUP TIME	tDSU	30	—	—	ns
DATA HOLD TIME	tDHD	40	—	—	ns
CL1 SETUP TIME	tLSU	51	—	—	ns
CL1 TO CL2 TIME	tLC	51	—	—	ns
FLM SETUP TIME	tsetup	30	—	—	ns
FLM HOLD TIME	thold	50	—	—	ns
OUTPUT DELAY TIME	tDF	—	—	200	ns



Optical Characteristics

Item	Symbol	Condition	Min.	Typ	Max.	Unit	note
Viewing angle range	Φf (12 o'clock)	When $Cr, \geq 2$	-	20	-	Degree	1
	Φb (6 o'clock)		-	40	-		
	Φl (9 o'clock)		-	30	-		
	Φr (3 o'clock)		-	30	-		
Rise Time	T_r	$V_{DD}-V_O = 5.0V$ $T_a=25^\circ C$		310		mS	1
Fall Time	T_f			150			
Frame frequency	F_{rm}		-	75	-	Hz	
Contrast	Cr		-	4.0	-		7



Mechanical Specification

Product No.		YM-160160G-T01
Module Size		70.2(W)×70.7(H)×4.8max(D)
Dot Size		0.335(W)mm×0.335(H)mm
Dot Pitch		0.35(W)mm×0.35(H)mm
Resolution		160(W)×160(H) Dots Matrix
Duty Ratio		1/160 Duty
LCD Display Mode	STN	<input type="checkbox"/> Gray Mode <input type="checkbox"/> Yellow Mode <input type="checkbox"/> Blue Mode
	FSTN	<input checked="" type="checkbox"/> Black & White(Normally White/Positive Image) <input type="checkbox"/> Black & White(Normally White/Negative Image)
		Rear Polarizer:
Viewing Direction		<input checked="" type="checkbox"/> 6 O'clock <input type="checkbox"/> 12 O'clock <input type="checkbox"/> 3 O'clock <input type="checkbox"/> 9 O'clock
Backlight		<input type="checkbox"/> W/O <input type="checkbox"/> CCFL <input checked="" type="checkbox"/> EL <input type="checkbox"/> LED
Controller		S6B0794
DC/DC Converter		Without
EL Driver		With

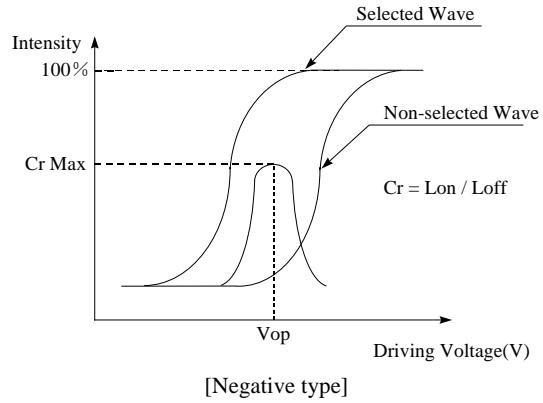
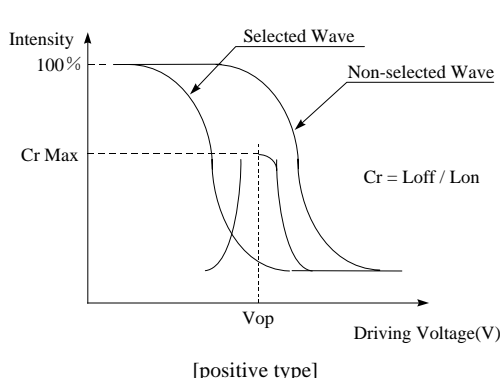


Interface Pin Assignment

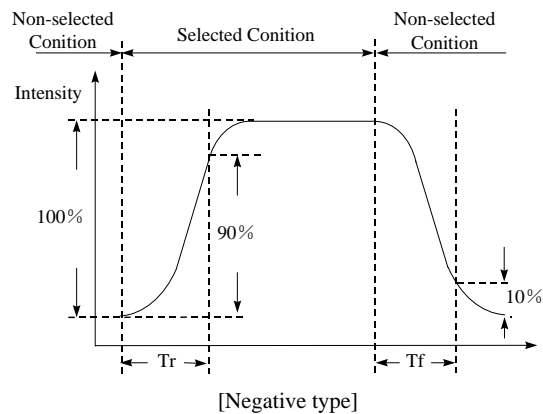
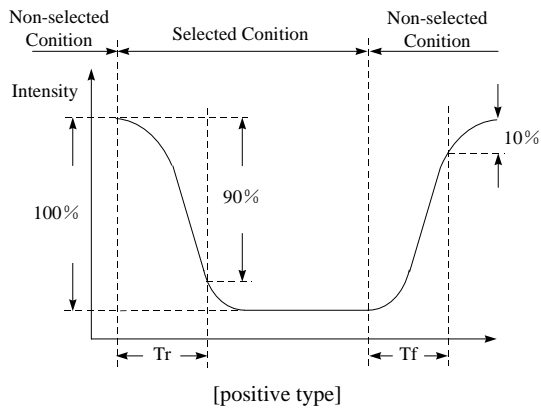
Pin No.	Pin Out	Description
1	VSS	GND
2	FLM	Frame start signal
3	CL1	Data latch pulse
4	CL2	Data shift clock pulse
5	M	Alternate signal for LCD driving waveform
6	VDD	Power supply for logic
7	EL-ON	EL control signal
8	V _{EE}	LCD driving voltage(+v)
9-12	D3-D0	Display data
13	TP-L	Touch panel signal
14	TP-U	
15	TP-R	
16	TP-D	
17-18	VSS	GND (0V)



[Note 7] Definition of Operation Voltage (Vop)



[Note 8] Definition of Response Time (Tr, Tf)



Conditions:

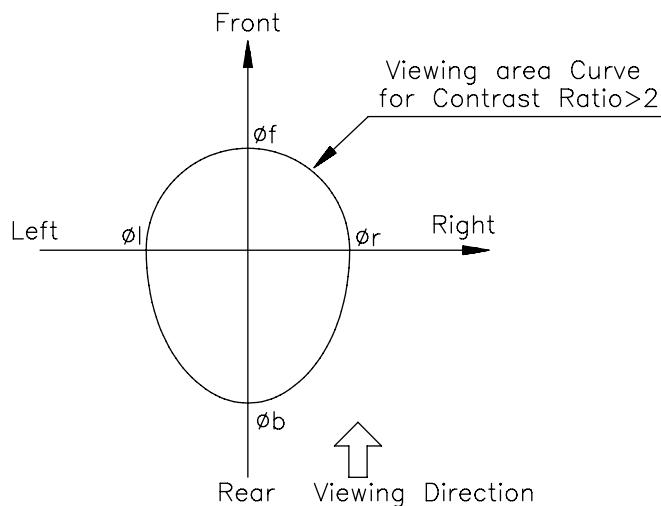
Operating Voltage : Vop

Frame Frequency : 64 Hz

Viewing Angle (θ, φ): $0^\circ, 0^\circ$

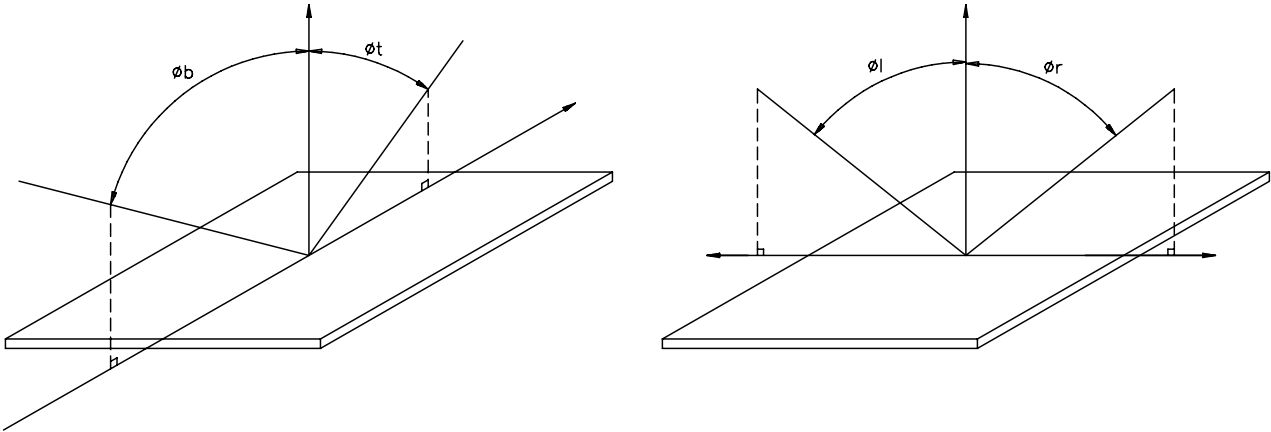
Driving Wave form : 1/N duty, 1/a bias

[Note 9] Definition of Viewing Direction

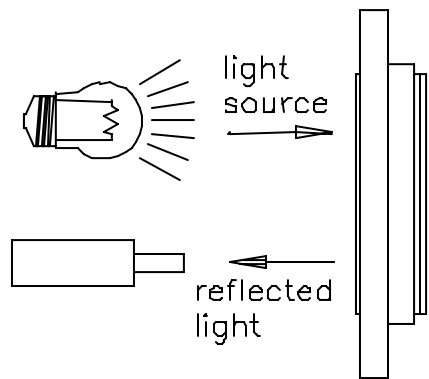




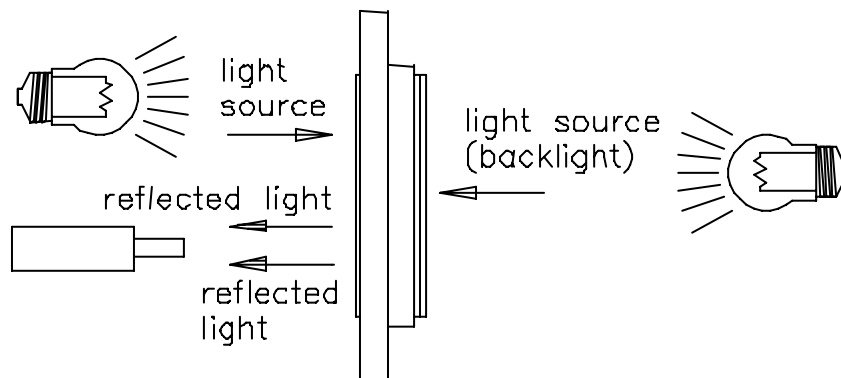
[Note 10] Definition of viewing angle



[Note 11] Description of Measuring Equipment



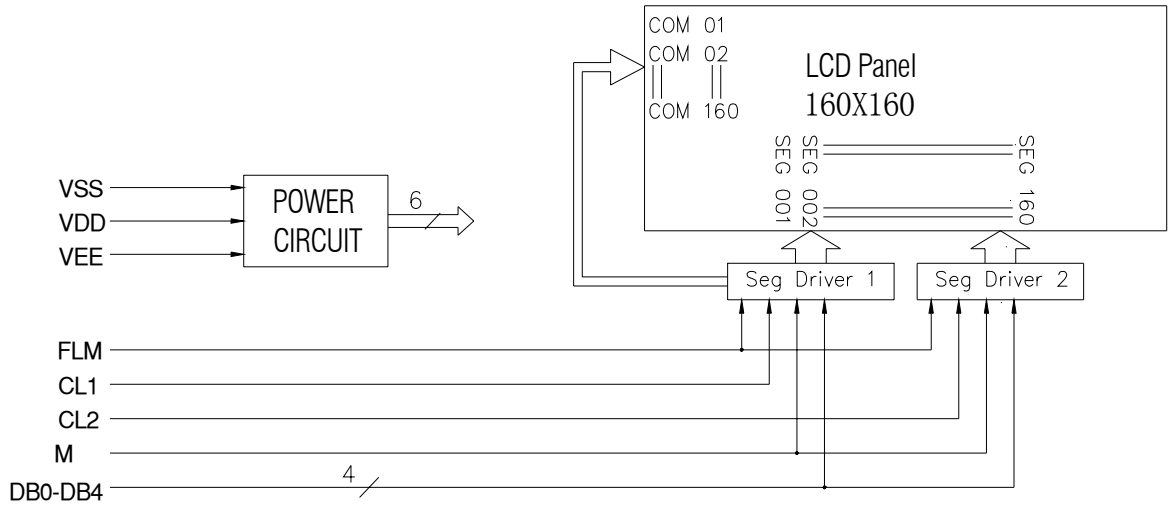
Reflective type



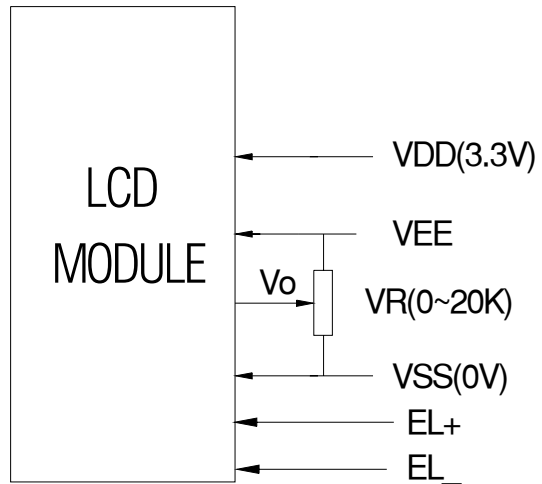
Transflective type



Block Diagram



Power Supply



The Transflective of VR is 0K~20K Ohm



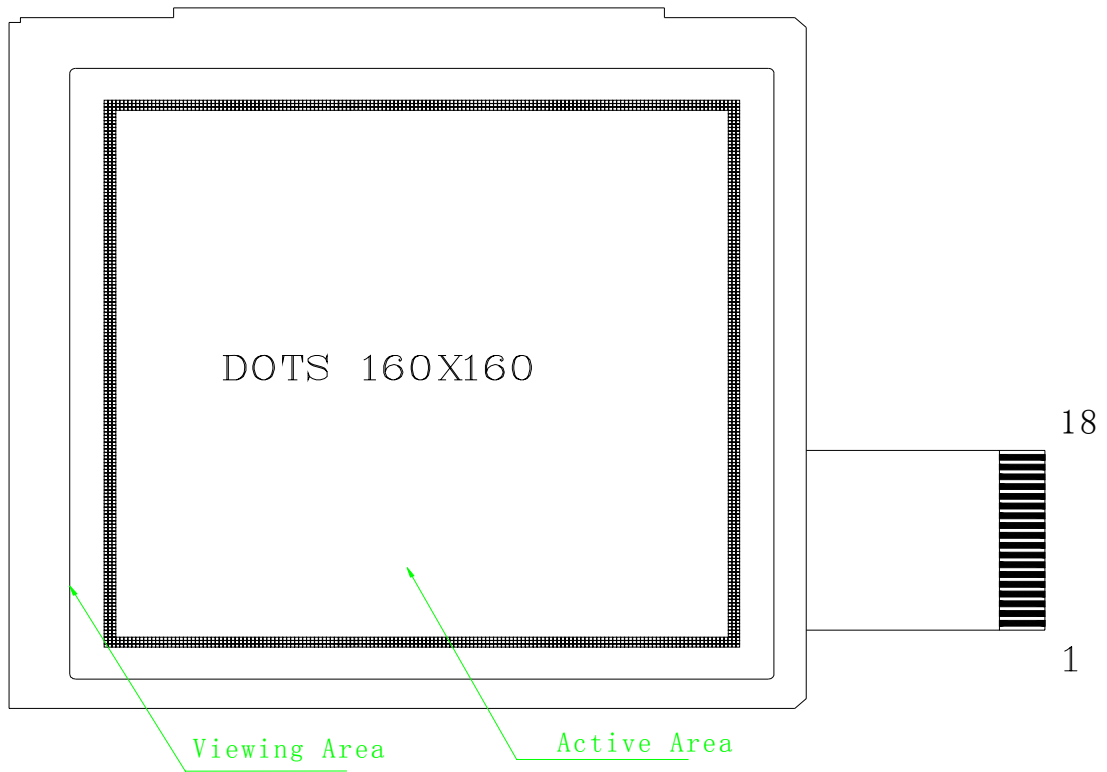
Reliability Test

No	Item	Conditions		Note
1	High Temp. Operation	70°C	120HR	
2	High Temp. Storage	80°C	120HR	
3	Low Temp. Operation	-20°C	120HR	
4	Low Temp. Storage	-30°C	120HR	
5	High Temp./Humid Storage	60°C 90%RH	120HR	
6	Thermal Shock	-20°C ,30min +60°C ,30min	10 cycle	
7	Vibration Test (IEC-68-2-6)	Frequency : 10~55 Hz Duration : 20 times, 6 min/time Amplitude : 0.75 mm	-	
8	Shock (IEC 68-2-27)	Duration : 11 mS Acceleration : 100g	-	X, Y, Z direction

Appearance Check

CONDIITON OF APPEARANCE CHECK:

- (1)Specimen shall be checked by eyes in distance of 30cm under 40w-fluorescence lamp.
- (2)Checking direction shall be in 45 degree from perpendicular line op specimen surface.





Handling Precautions

- (1) Treat polarizer very carefully since it is easy to be damaged.
- (2) When cleaning the display surface, use soft cloth (e.g. gauss) with a solvent (recommended below) and wipe lightly.
 - ◆ ethyl alcohol
 - ◆ iso-procolol

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvents:

- ◆ water
- ◆ ketone
- ◆ aromatics

- (3) Direct current causes electro-chemical reaction with remarkable degradation of the display quality. Give careful consideration to prevent direct current at ON/OFF timing and during operation.
- (4) Avoid strong shock and drop from the height.
- (5) To prevent LCD panels from degradation, do not operate or store them exposed directly to sunshine or high temperature/humidity.
- (6) Give careful consideration to avoid electrical static discharge with causes uneven contrast.
- (7) Even a small condensation on the contact pads (terminals) causes electro-chemical reaction which makes missing row and column. Give careful attention to avoid condensation. When assembling with zebra connector, clean the surface of the pads with alcohol and keep the air very clean.



Lcd Product Quality Standard
DISPLAY APPEARANCE

No	Item	Criteria
1	inclusions (black spot, white spot, dust)	(1)round type diameter mm(a*) no of defect* $a \leq 0.20$ neglect $0.20 < a \leq 0.35$ 5max $0.35 < a$ none (2)linear type length mm(l) width mm(W) no. of defect na $W \leq 0.03$ neglect $1 \leq 3$ $0.03 < W \leq 0.08$ 6 $3 < l$ $0.08 < W$ none
2	scratch	1.scratch on protective film is permitted. 2.scratch on polarizer shall be as follow: (1)round type diameter mm(a*) no of defect $a \leq 0.15$ neglect $0.15 < a \leq 0.20$ 2 max $0.20 < a$ none (2)linear type be judged bye 1.-(2) linear type
3	dent	diameter < 1.5mm
4	bubble	not exceeding 0.5mm average diameter is acceptable between glass and polarizing film
5	pin hole	$(a+b)/2 \leq 0.15\text{mm}$ maximum number: ignored $0.15 < (a+b)/2 \leq 0.20\text{mm}$ maximum number:10
6	dot defect	$(a+b)/2 \leq 0.20\text{mm}$ maximum number: ignored $0.20 < (a+b)/2 \leq 0.30\text{mm}$ maximum number:5 x=width
7	contrast irregularity(spot)	diameter spec no of defect $a \leq 0.50\text{mm}$ neglect $0.50 < a \leq 0.75$ 5 $0.75 < a \leq 1.00$ 3 $1.00 < a$ none
8	dot width	design width $\pm 15\%$
9	color tone and uniformity	obvious uneven color is not permitted