



SPEC. NO	QE-개발-01-272
ISSUED DATE	2001. 10. 6

CUSTOMER : 에스원  
 MODEL : OGM-128GN12B-C-AE2H3  
 DESCRIPTION : LCD MODULE

THIS SPECIFICATION IS APPLIED FOR LCD MODULE DELIVERED TO YOUR COMPANY BY ORION DISPLAY TECHNOLOGY CO., LTD

◆ CUSTOMER APPROVAL


	CHECKED	CHECKED	APPROVAL
APPROVAL			
REMARK			

◆ SUPPLIER APPROVAL

PREPARED	CHECKED		APPROVAL

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ORION DISPLAY TECHNOLOGY CO.,LTD.

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### 1. 내용

- 1) 제품규격 : 첨부 규격에 따른다.
- 2) 검사규격 : 출하검사규격에 따른다.
- 3) 포장규격 : 제품포장규격에 따른다.

### 2. 작성, 검토 및 승인


관리 분 : \_\_\_\_\_       접수부서 :

비관리분 : \_\_\_\_\_       접 수 자 :

본 품질지침서(EI)는 다음 책임자에 의해 작성(개정), 검토 및 승인이 되어야 효력이 있다.

구 분	작성부서		합의부서		합의부서	
	서명	일자	서명	일자	서명	일자
작성(개정)		2001. 10. 13				
검 토		2001. 10. 13				
검 토		2001. 10. 13				
승 인	CW RYU	2001. 10. 13				




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## 1. FEATURES

- Number of dots ----- 128 dots X 64 dots
- Display mode ----- STN-YELLOW
- Display type ----- Positive, Transflective
- Viewing direction ----- 6 o'clock
- Operating temperature ----- Outdoor
- Driving method ----- 1/64 duty, 1/9 bias ( 1.3K/6.8K )
- Structure ----- COB ( Chip On Board )
- Numer of data line ----- 8-bit parallel
- Applied IC
  - Common driver ----- KS0107BPCC or equivalent
  - Segment driver ----- KS0108BPCC or equivalent
- Instruction functions
  - \* Display data read/write
  - \* Set address
  - \* Read status
  - \* Display ON/OFF
  - \* Set display start line
- Built-in DC/DC converter circuit -- NJU7660
  - \* Vo is supplied by the external
- Backlighting
  - EL ----- Soft
  - Emitting color ----- White
  - Driving condition ----- AC100V, 400Hz
- Color of metal bezel ----- Black

## 2. MECHANICAL DATA

ITEM	WIDTH	HEIGHT	THICKNESS	UNIT
Module size	93,0	70,0	10,0	mm
Viewing area	70,7	38,8	-	mm
Graphic	Construction	128 x 64		dots
	Active area	66,52	33,24	mm
Dot	Size	0,48	0,48	mm
	Pitch	0,52	0,52	mm
Weight	About 70			g

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### 3. ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	CONDITION	STANDARD VALUE		UNIT
			MIN.	MAX.	
Power supply for logic	$V_{DD}$	$T_a=25^\circ\text{C}$	0	7.0	V
Power supply for LCD	$V_{LCD}$	$T_a=25^\circ\text{C}$	0	9.7	V
Input voltage	$V_{IN}$	$T_a=25^\circ\text{C}$	0	19.0	V
Operating temperature	$T_{OP}$	-	-10	50	$^\circ\text{C}$
Storage temperature	$T_{STG}$	-	-30	85	$^\circ\text{C}$

### 4. ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Power supply for logic	$V_{DD}$	$T_a = 25^\circ\text{C}$	4.8	5	5.2	V
Input high voltage	$V_{IH}$	-	$0.7V_{DD}$	-	$V_{DD}$	V
Input low voltage	$V_{IL}$	-	$V_{SS}$	-	$0.3V_{DD}$	V
Output high voltage	$V_{OH}$	$I_{OH} = -0.4 \text{ mA}$	$V_{DD}-0.4$	-	-	V
Output low voltage	$V_{OL}$	$I_{OL} = 0.4 \text{ mA}$	-	-	0.4	V
Power supply current	$I_{DD}$	$V_{DD}=5.0\text{V}, V_{LCD}=-9.1\text{V}$	-	5.0	10.0	mA
Power supply for LCD = $V_{LCD}$ ( Note 1 )	$V_{DD}-V_O$	$T_a = -10^\circ\text{C}$	9.1	9.3	9.5	V
		$T_a = 25^\circ\text{C}$	8.9	9.1	9.3	V
		$T_a = 50^\circ\text{C}$	8.7	8.9	9.1	V

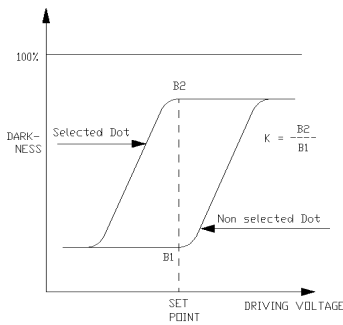
Note 1 : Power supply for LCD is available with external  $R_L$  in accordance with contrast.

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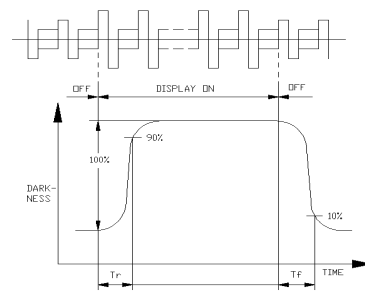
5. ELECTRO-OPTICAL CHARACTERISTICS ( STN ) ( Ta = 25 ℃ )

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Contrast ratio	K	—	4.5	—	—	1
Response time ( rise )	$T_r$	—	160	500	ms	2
Response time ( fall )	$T_f$	—	160	500	ms	2
Viewing angle	$\phi$	-40 ~ +40			deg.	3,4
	$\theta$	-40 ~ +40				

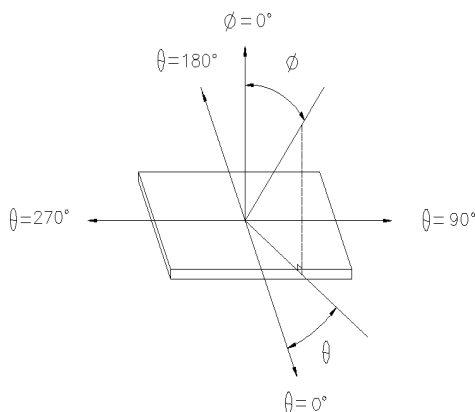
NOTE1. Definition of contrast K



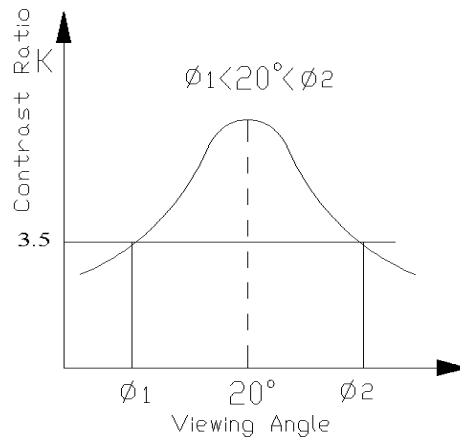
NOTE2. Definition of optical response




NOTE3. Definition of angle  $\theta$  and  $\phi$



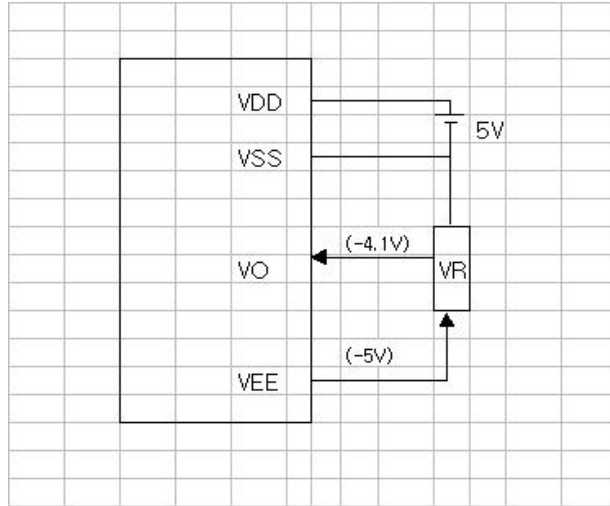
NOTE4. Definition of viewing angle  $\phi_1$  and  $\phi_2$



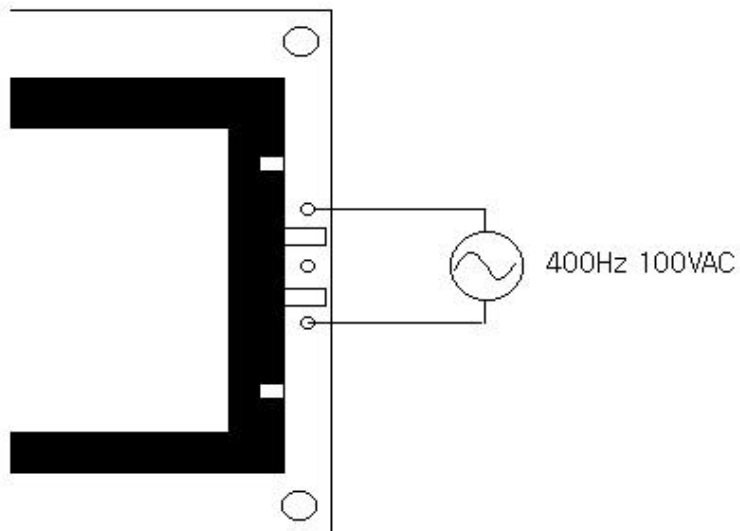
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## 6. POWER SUPPLY


### 6-1 LCD POWER SUPPLY FOR LCD DRIVING



### 6-2 POWER SUPPLY FOR E/L BACKLIGHT





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## 7. QUALITY SPECIFICATION

### 7.1 Acceptable Quality Level

INSPECTION ITEM	SAMPLING PROCEDURES	A.Q.L
MAJOR	MIL-STD-105E Inspection Level II Normal Inspection Single sample inspection	1.0
MINOR	MIL-STD-105E Inspection Level II Normal Inspection Single sample inspection	2.5

Major defect :

A major defect is a defect that could result in failure or materially reduce that the usability of the unit of product for its intended purpose.

Minor defect :

A minor defect is one that does not materially reduce the usability of the product for its intended purpose or is a departure from established standards giving no significant bearing on the effective use or operation of the unit.

### 7.2 Inspection Conditions

7.2.1 The environmental conditions for inspection shall be as follows

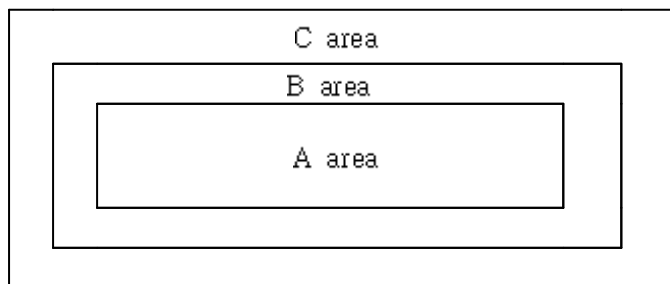
-Room Temperature :  $25 \pm 3^{\circ}\text{C}$

-Humidity Temperature :  $65 \pm 20\%RH$

7.2.2 The external visual inspection

-The inspection shall be performed by using 40Watts fluorescent lamp for illumination and the distance between LCD and eyes of the inspector shall be 30cm or more.


### 7.3 Definition of the Area



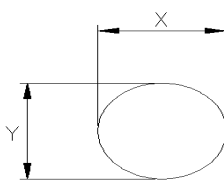
A area: Active Area

B area: Viewing Area

C area: Out of Viewing Area

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6.4 Inspection Standards

Class of defects	Inspection Item	Criteria of defects		Remarks
MAJOR	Display on inspection	1) No Display 2) Abnormal Operation 3) Short Circuit 4) Pattern Open 5) Off Viewing angle		
	Missing	Component missing		
MINOR	Spot/Dent	Size	Defect size	Acceptable Number
		A Size	$\phi \leq 0.2$ mm	Ignore
			$0.2 < \phi \leq 0.3$ mm	3
			$0.3 < \phi \leq 0.4$ mm	1
			$\phi > 0.4$ mm	0
		B Size	$\phi \leq 0.2$ mm	Ignore
			$0.2 < \phi \leq 0.3$ mm	3
			$0.3 < \phi \leq 0.4$ mm	1
			$\phi > 0.4$ mm	0
		Cell Size (Viewing Area Criteria) ※ A size $< 2500\text{mm}^2$ Spot size = $(X+Y)/2$ B size $\geq 2500\text{mm}^2$		
Scratch	POSITIVE		NEGATIVE	
	Width X Length	Acceptable Number	Width X Length	Acceptable Number
	0.1 X 1.5 mm	3	0.1 X 1.5 mm	3
	0.08 X 3.0 mm	2	0.08 X 3.0 mm	2
	0.05 X 5.0 mm	1	0.05 X 5.0 mm	1
	※ Scratches should be separated more than 10mm each other			
Bubble	1) Round bubble should be treated as spot(positive) 2) Line bubble should be treated as scratch(positive)			




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Class of defects	Inspection Item	Criteria of defects	Remarks
MINOR	Pattern Misalignment	<p>Voids in segment</p>	
	Stain	Stains which cannot be removed even when wiped slightly with a soft cloth.	
	Rainbow	More than 2 colors are noticeable in the viewing direction.	
MINOR	PCB damage	Damage on gold or copper foil	
	Parts alignment	<ol style="list-style-type: none"> <li>1) IC lead width is more than 50% beyond land pattern</li> <li>2) Chip component is off center and more than 50% of the leads is off the pad out line.</li> </ol>	
	Conductive foreignmatter (solderball, soldersplash)	Conductive foreign matter is not allowed	
	Bezel claw	Bezel claw missing or not bent	

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## 8. RELIABILITY

- Operating life time : Longer than 50,000 hours ( EL life time : 1300 hours )  
( at room temperature without direct irradiation of sunlight )
- Reliability characteristics shall meet following requirements.

ITEM	TEST	CRITERION
High temp.	85°C / 240 Hrs	* Total current consumption should be below double of initial value
Low temp.	-30°C / 240 Hrs	
High humidity	40°C X 90%RH / 200 Hrs	
Thermal shock	-20°C → 25°C → 70°C → 25°C / 5 Cycles (30min) (5min) (30min) (5min)	* Contrast ratio should be within initial value ±50%
Vibration	1.Operating time : Thirty minutes exposure in each direction( x,y,z ) 2.Sweep frequency (1min) : 10Hz →55Hz →10Hz 3.Amplitude : 0.75mm double amplitude	* No defect in cosmetic and operational function is allowable

\* Remarks : Samples subjected to the tests shall be " Not operating " condition .

## 9. PIN CONNECTIONS

PIN NO.	SYMBOL	FUNCTION
1.	VSS	Ground
2.	VDD	+5 VDC
3	V <sub>0</sub>	Input voltage for LCD driving ( -4.1V )
4.	D/I	"H" : Data Input "L" : Instruction code input
5.	R/W	R/W = "L" ( "H" : Command write "L" : data write ) R/W = "H"   "H" : State read "L" : data read )
6.	E	Enable signal
7.	DB0	Data bus line
:	:	
14.	DB7	
15	CS1	H: Chip select for IC1
16	CS2	H: Chip select for IC2
17	RESET	Reset signal : Active low power - up reset
18	V <sub>EE</sub>	Output voltage for LCD power supply (-5V)
19	N/C	-
20.	N/C	-



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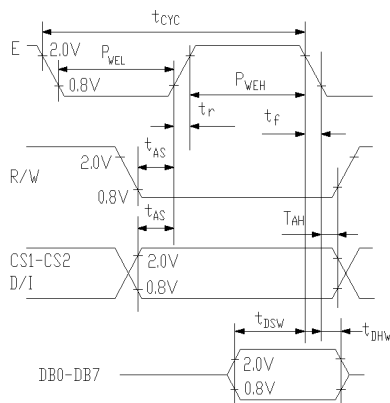
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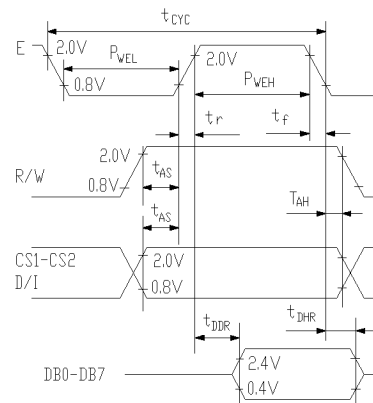
## 10. TIMING DIAGRAM


Item	Symbol	Min.	Typ.	Max.	Unit
Enable cycle time	$t_{CYC}$	1000	-	-	nS
Enable high level width	$P_{VEH}$	450	-	-	nS
Enable low level width	$P_{VEL}$	450	-	-	nS
Enable rise time	$t_r$	-	-	25	nS
Enable fall time	$t_f$	-	-	25	nS
Address setup time	$t_{AS}$	140	-	-	nS
Address hold time	$t_{AH}$	10	-	-	nS
Data setup time	$t_{DSW}$	200	-	-	nS
Data delay time	$t_{DDR}$	-	-	320	nS
Data hold time ( Write )	$t_{DHW}$	10	-	-	nS
Data hold time ( Read )	$t_{DHR}$	20	-	-	nS

11-1. At MPU write



11-2. At MPU read



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## 11. PRECAUTION FOR USING

### ■ HANDLING

- \* Refrain from storing mechanical shock and from applying any force to LCD MODULE. It may cause mis\_operation or damage of LCD.
- \* Do not touch, press or rub the display panel with a hard, stiff tool or object as the polarizers in the panel are easily scratched.
- \* If LCD is broken and liquid crystal material flow out, ingestion, inhalation, or contact with skin should be avoided. If liquid crystal material contact with skin, wash immediately with alcohol and rinse thoroughly with water.
- \* Never use organic solvents to clear the display panel as these solvent may adversely affect the polarizer. To clean the display panel dampen a bit of absorbent cotton with petroleum benzene and gently wipe the panel, or contaminations by using a scotch tape.
- \* Refrain from discharge of high electro-static voltage, it will damage C-MOS LSI in the MODULE.
- \* Do not leave the MODULE in high temperature, especially in high humidity for a long time. It is recommended to store the MODULE where the temperature is in the range of 0°C to 35°C and the humidity is lower than 70%.
- \* Store the MODULE without exposure to direct sunlight or fluorescent lamp.
- \* Ultra violet cut filter is necessary for outdoor operation.
- \* Avoid condensation of water, it may cause misoperation or disconnection of electrode.

### ■ OPERATION

- \* Never connect or disconnect the LCD MODULE from the main system while power is being supplied.
- \* When supplying the M signal from the external unit to a GRAPHIC MODULE, set the duty to 50% ± 1%.  
If the duty deviates too greatly from the value, a DC voltage will be applied to the liquid crystal, which could induce an electrochemical reaction and reduce the life of the MODULE.
- \* Do not exceed the maximum rating values under the worst conditions taking account of the supply voltage variation, input voltage variation, and environmental temperature, etc. Otherwise LCD module may be damaged.



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12. EXTERNAL DIMENSION

