

NAN YA PLASTICS CORP.
ELEC. MATERIALS DIV.
LCD DEPARTMENT

SPECIFICATION

SPEC. NO. : LT279-0
DATE : Feb,23, 1999
SHEET NO. : 1/18

U.S. MARKETING ARM:

MARK PRODUCTS CORPORATION
800 N. EDGEWOOD AVENUE
WOOD DALE, IL 60191
TEL: 630-787-9089
FAX: 630-787-9015

SPECIFICATION OF
128x64 COG LCD MODULE
PRODUCT NO.: LTA75_279__

SPEC. NO.: LT279-0-~~0~~[△]

CUSTOMER
APPROVED BY
DATE:

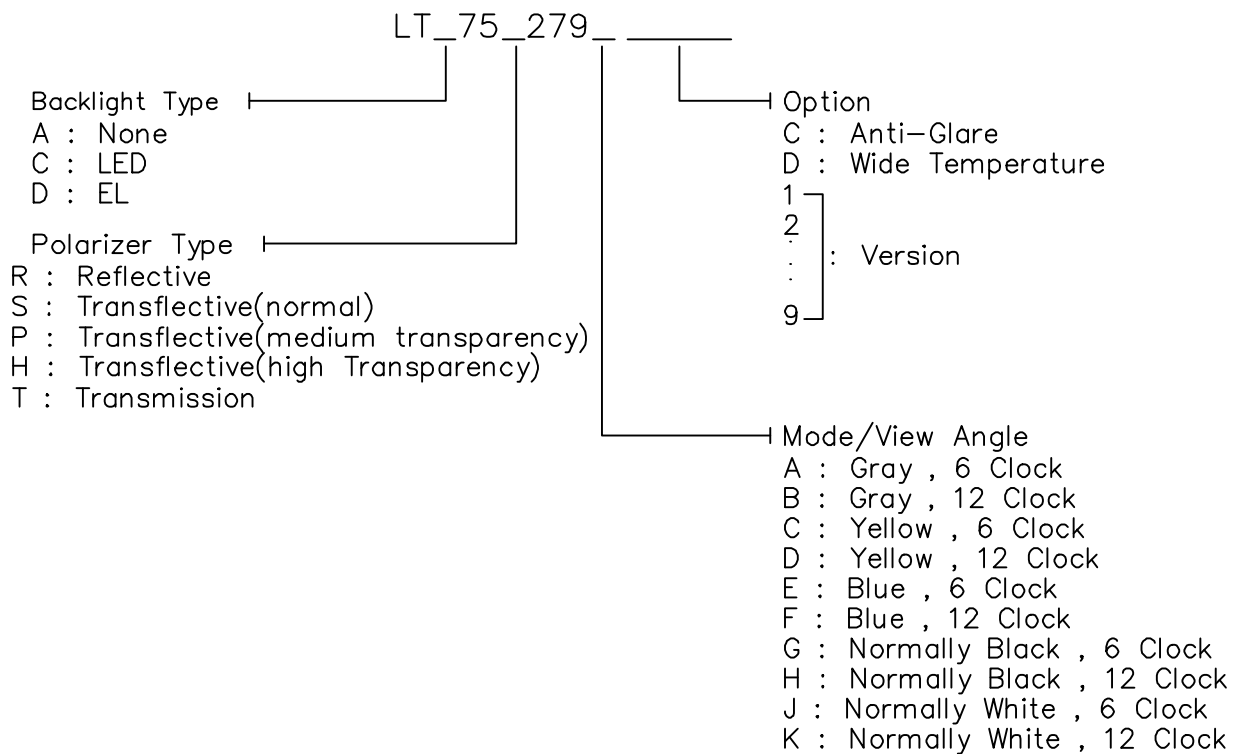
SALE MANAGER	TECHNICAL APPROVE	DESIGN MANAGER	DESIGN CHECK	DESIGNER

REV/DATE	RO/ 2.23.99'					APP	CHK	BY
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1. MECHANICAL DATA

- (1) Product No. LTA75_279_
- (2) Module Size 77.5 (W)mm x 51.3 (H)mm x MAX2.8 (D)mm
(W/O B.L.)
- (3) Dot Size 0.48 (W)mm x 0.48 (H)mm
- (4) Dot Pitch 0.52 (W)mm x 0.52 (H)mm
- (5) Number of Characters 128 (W) x 64 (H)
- (6) Duty 1/64
- (9) LCD Display Mode STN: Gray Mode Yellow Mode Blue Mode
FSTN: Black and White(Normal White/Positive Image)
 Black and White(Normal Black/Negative Image)
Rear Polarizer: Reflective
- (10) Viewing Direction 6 O'clock 12 O'clock ___O'clock
- (11) Backlight W/O
- (12) Weight 23.0 g (approx)
- (13) Controller (COG) SED1565

Note :



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2. ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

VSS=0V

	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD-VSS	-0.3	5.5	V	
Input Voltage	VI	-0.3	VDD	V	
Static Electricity	-	-	-	-	Note 1

Note 1 LCM should be grounded during handling LCM.

(2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	NORMAL TEMP.				WIDE TEMP.			
	OPERATING		STORAGE		OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	0	50	-20	70	-20	70	-30	80
Humidity (Without Condensation)	Note 2,4		Note 3,4		Note 4,5		Note 4,6	

Note 2 $T_a \leq 50^\circ\text{C}$: 85%RH max
 $T_a > 50^\circ\text{C}$: Absolute humidity must be lower
 than the humidity of 85%RH at 50°C

Note 3 T_a at -20°C will be < 48hrs, at 70°C will be < 120hrs

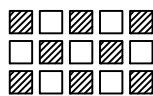
Note 4 Background color will change slightly depending on ambient temperature.
 at phenomenon is reversible.

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

3. ELECTRICAL CHARACTERISTICS

(VDD= 5V ± 10%)

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	
Input Voltage	VIH	H level	0.8VDD	—	VDD	V	
	VIL	L level	0	—	0.2VDD	V	
Recommended LCD Driving Voltage (WIDE TEMP. LCM)	VDD-V5 (VLCD)	DUTY= 1/64 Bias= 1/9	-20°C	10.6	11.0	11.4	V
			0°C	9.1	9.5	9.9	
			25°C	8.8	9.2	9.6	
			50°C	8.5	8.9	9.3	
			70°C	8.4	8.8	9.2	
Power Supply Current	IDD	VDD = 5.0V 	—	0.7	—	mA	

4.0. OPTICAL CHARACTERISTICS

(FOR NORMAL TEMPERATURE MODE LCM)

AT V_{OP}

MODE	ITEM	Cr(Contrast Ratio)		θ (Viewing Angle)		ϕ (Viewing Angle)	
		25℃		25℃		25℃	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
R	A	—	3.0	—	43	—	41
	C	—	—	—	—	—	—
	J	—	—	—	—	—	—
S	A	—	—	—	—	—	—
	C	—	—	—	—	—	—
	J	—	—	—	—	—	—
T	E	—	—	—	—	—	—
	G	—	—	—	—	—	—
NOTE		NOTE6		NOTE5			

NOTE :

R: REFLECTIVE
S: TRANSFLECTIVE
T: TRANSMISSIVE
A/B: GRAY

C/D: YELLOW
E/F: BLUE
G/H: NORMALLY BLACK
J/K: NORMALLY WHITE

AT $\phi=0^\circ$ $\theta=0^\circ$

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0℃	—	—	—	ms	NOTE 2
		25℃	—	—	—		
		50℃	—	—	—		
Response Time (fall)	Tf	0℃	—	—	—	ms	NOTE 2
		25℃	—	—	—		
		50℃	—	—	—		

4.1. OPTICAL CHARACTERISTICS

(FOR WIDE TEMPERATURE MODE LCM)

AT Vop

MODE	ITEM	Cr(Contrast Ratio)		θ (Viewing Angle)		ϕ (Viewing Angle)	
		25℃		25℃		25℃	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
R	A	-	3.5	-	43	-	49
	C	-	6.0	-	67	-	66
	J	-	5.5	-	70	-	65
S	A	-	-	-	-	-	-
	C	-	-	-	-	-	-
	J	-	6.0	-	63	-	69
T	E	-	-	-	-	-	-
	G	-	-	-	-	-	-
NOTE		NOTE6		NOTE5			

NOTE :

R: REFLECTIVE
S: TRANSFLECTIVE
T: TRANSMISSIVE
A/B: GRAY

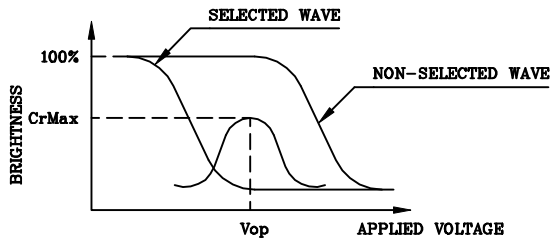
C/D: YELLOW
E/F: BLUE
G/H: NORMALLY BLACK
J/K: NORMALLY WHITE

AT $\phi=0^\circ$ $\theta=0^\circ$

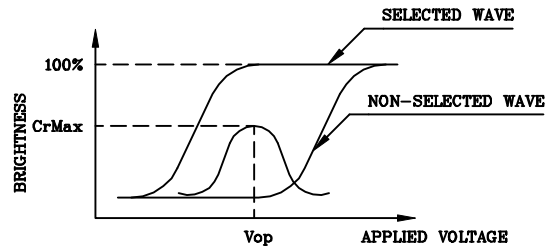
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20℃	-	10000	15000	ms	NOTE 2
		0℃	-	1400	2100		
		25℃	-	2750	550		
		50℃	-	160	240		
		70℃	-	80	120		
Response Time (fall)	Tf	-20℃	-	6000	9000	ms	NOTE 2
		0℃	-	700	1100		
		25℃	-	180	270		
		50℃	-	80	120		
		70℃	-	60	90		

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



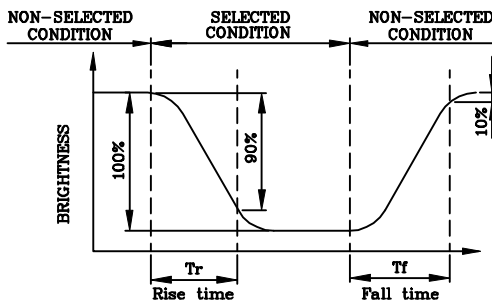
(negative type)

*Conditions

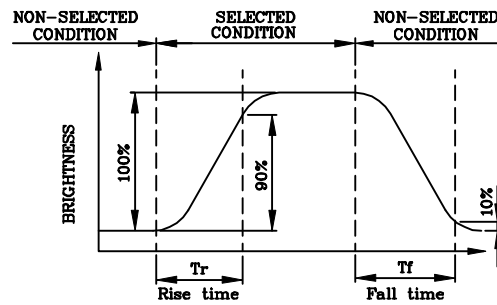
Viewing Angle : 0
Frame Frequency : 70Hz
Applied Waveform : 1/N duty, 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



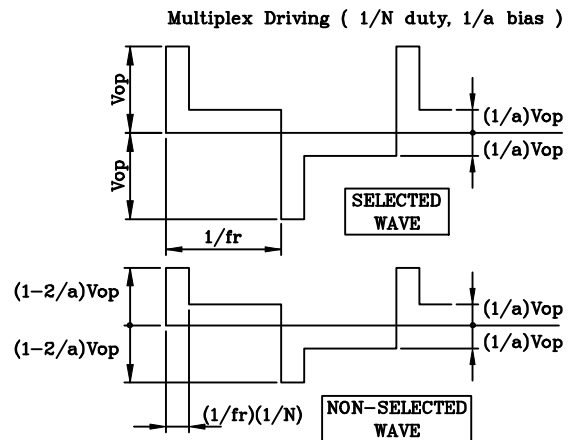
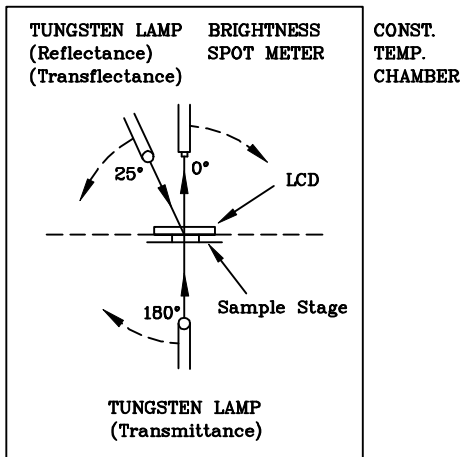
(negative type)

*Conditions

Operating Voltage : Vop
Viewing Angle (θ,θ) : (0,0)
Frame Frequency : 70Hz
Applied Waveform : 1/N duty, 1/a bias

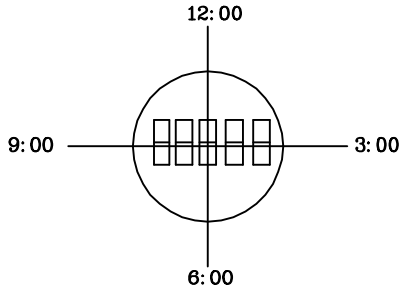
(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



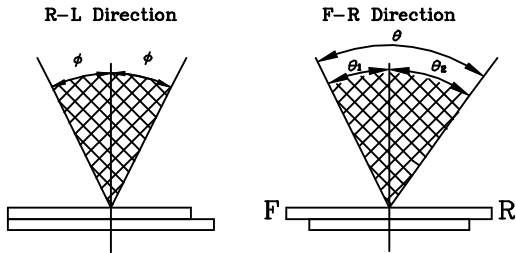
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



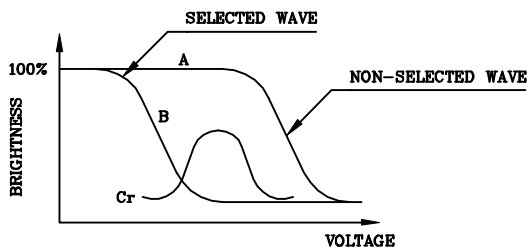
$$\theta = \theta_1 + \theta_2$$

*Conditions

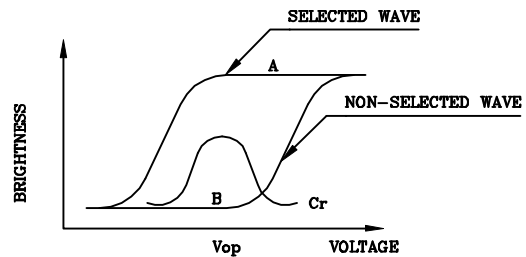
- Operating Voltage : V_{op}
- Frame Frequency : 70Hz
- Applied Waveform : 1/N duty, 1/a bias
- Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



(negative type)

$$\text{Contrast Ratio : } Cr = A/B$$

*Conditions

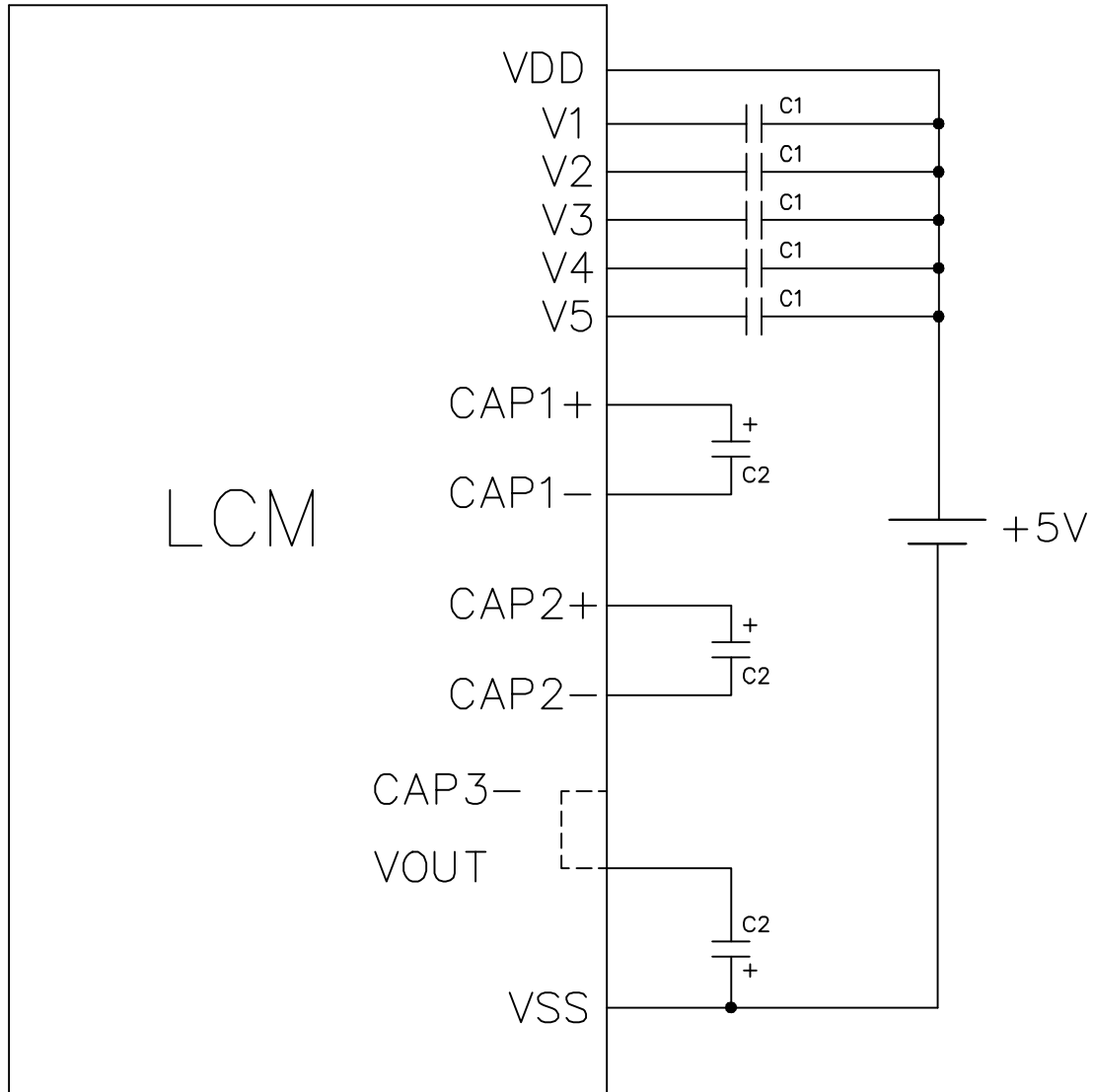
- Viewing Angle : 0
- Frame Frequency : 70Hz
- Applied Waveform : 1/N duty, 1/a bias

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5. INTERNAL PIN CONNECTION

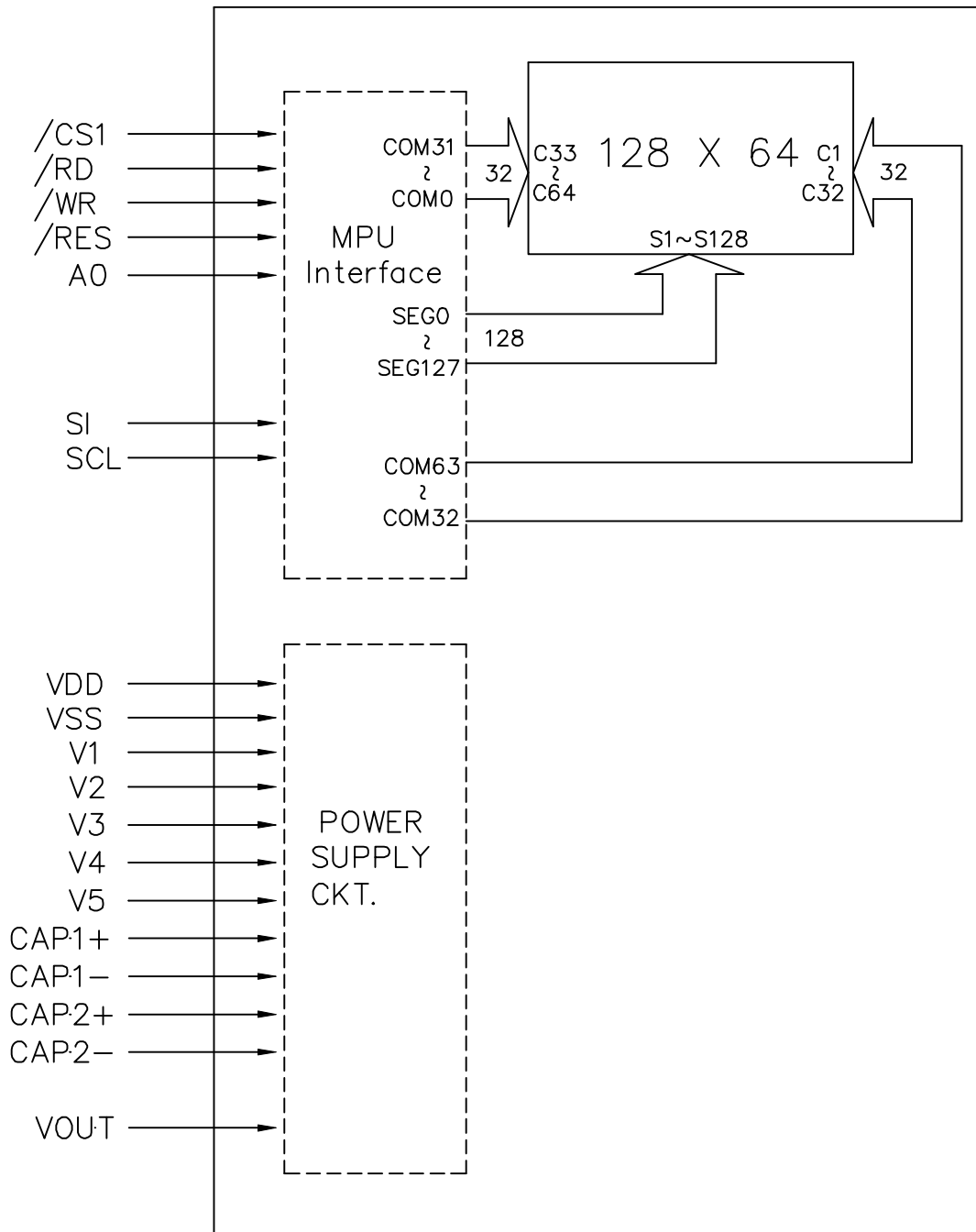
PinNo.	Symbol	Function
1	V5	This is a multi-level power supply for the liquid crystal drive. $VDD(=V0) \geq V1 \geq V2 \geq V3 \geq V4 \geq V5$
2	V4	
3	V3	
4	V2	
5	V1	
6	N.C	N.C
7	CAP2+	Connect a capacitor between this terminal and the CAP2- terminal.
8	CAP2-	Connect a capacitor between this terminal and the CAP2+ terminal.
9	CAP1-	Connect a capacitor between this terminal and the CAP1+ terminal.
10	CAP1+	Connect a capacitor between this terminal and the CAP1- terminal.
11	VOUT	Connect a capacitor between this terminal and the VSS
12	VSS	0V(GND)
13	VDD	+5.0V(Logic voltage)
14	D7(SI)	Serial data input
15	D6(SCL)	Serial clock input
16	/RD	Tie either "H" or "L"
17	/WR	Tie either "H" or "L"
18	A0	"H"=Display data , "L"=Control data
19	/RES	Reset signal
20	/CS1	Chip select signal

6. POWER SUPPLY/BOOSTER CAPACITANCE



C1: 2.2~4.7 μ F
C2: 2.2~4.7 μ F

7. MPU INTERFACE/BLOCK DIAGRAM



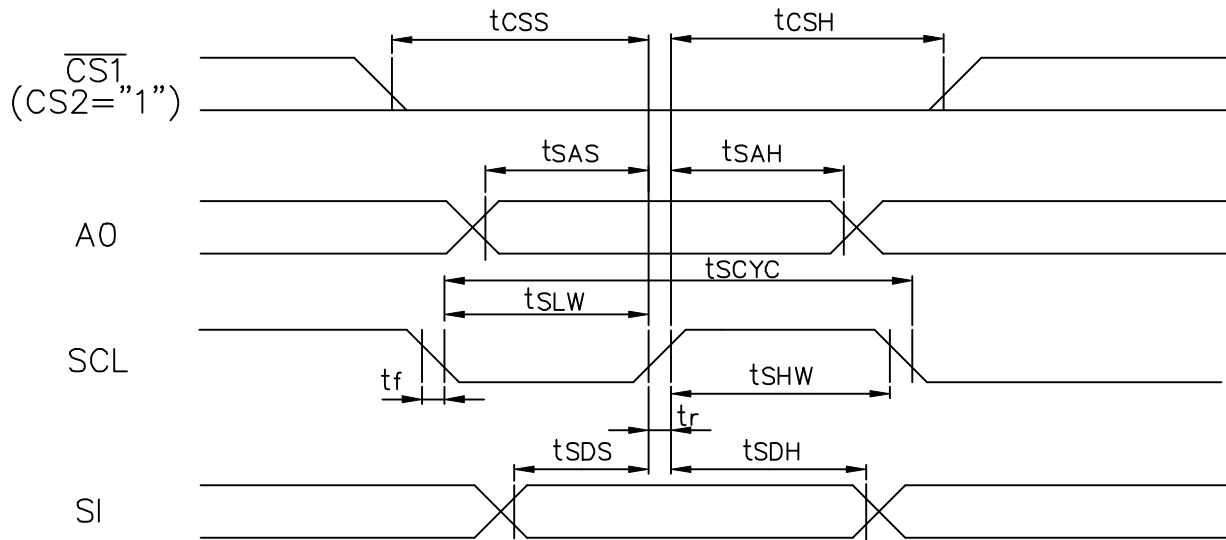
8. SED1565 Commands (Serial Interface)

Command	Command Code									Function	
	A0	D7	D6	D5	D4	D3	D2	D1	D0		
(1)Display ON/OFF	0	1	0	1	0	1	1	1	0	1	LCD display ON/OFF 0: OFF,1: ON
(2)Display start line set	0	0	1	Display start address							Sets the display RAM display start line address
(3)Page address set	0	1	0	1	1	Page address				Sets the display RAM page address	
(4)Column address set upper bit	0	0	0	0	1	Most significant column address				Sets the most significant 4 bits of the display RAM column address	
Column address set lower bit	0	0	0	0	0	Least significant column address				Sets the least significant 4 bits of the display RAM column address	
(5)Status read											Not applicable for serial interface
(6)Display data write	1	Write data								Writes to the display RAM	
(7)Display data read											Not applicable for serial interface
(8)ADC select	0	1	0	1	0	0	0	0	0	1	Sets the display RAM address SEG output correspondence 0: normal,1: reverse
(9)Display normal/reverse	0	1	0	1	0	0	1	1	0	1	Sets the LCD display normal/reverse 0: normal,1: reverse
(10)Display all points ON/OFF	0	1	0	1	0	0	1	0	0	1	Display all points 0: normal display,1: all point ON
(11)LCD bias set	0	1	0	1	0	0	0	1	0		Sets the LCD drive voltage bias ratio (1/9)
(12)Read/modify/write	0	1	1	1	0	0	0	0	0		Column address increment At write: +1, At read: 0
(13)End	0	1	1	1	0	1	1	1	0		Clears read/modify/write
(14)Reset	0	1	1	1	0	0	0	1	0		Internal reset
(15)Common output mode select	0	1	1	0	0	0	*	*	*	1	Select COM output scan direction 0: normal direction,1: reverse direction
(16)Power control set	0	0	0	1	0	1	1	1	1		Select internal power supply operating mode
(17)V5 voltage regulator internal resistor ratio set	0	0	0	1	0	0	Resistor ratio				Select internal resistor ratio (Rb/Ra) mode Default: 100
(18)Electronic volume mode set	0	1	0	0	0	0	0	0	0	1	Set the V5 output voltage electronic volume register Default: 100110
Electronic volume register set	0	*	*	Electronic volume value							
(19)Static indicator ON/OFF	0	1	0	1	0	1	1	0	0	1	0: OFF,1: ON
Static indicator register set	0	*	*	*	*	*	*	*	*	mode	Set the flashing mode
(20)Power saver											Display OFF and display all points ON compound command
(21)NOP	0	1	1	1	0	0	0	1	1		Command for non-operation
(22)Test	0	1	1	1	1	*	*	*	*		Command for IC test. Do not use this command
(23)Test mode reset	0	1	1	1	1	0	0	0	0		Enter during the refresh sequence.

(Note)*: disabled data

9.0. TIMING CHARACTERISTICS

(For Serial Interface)



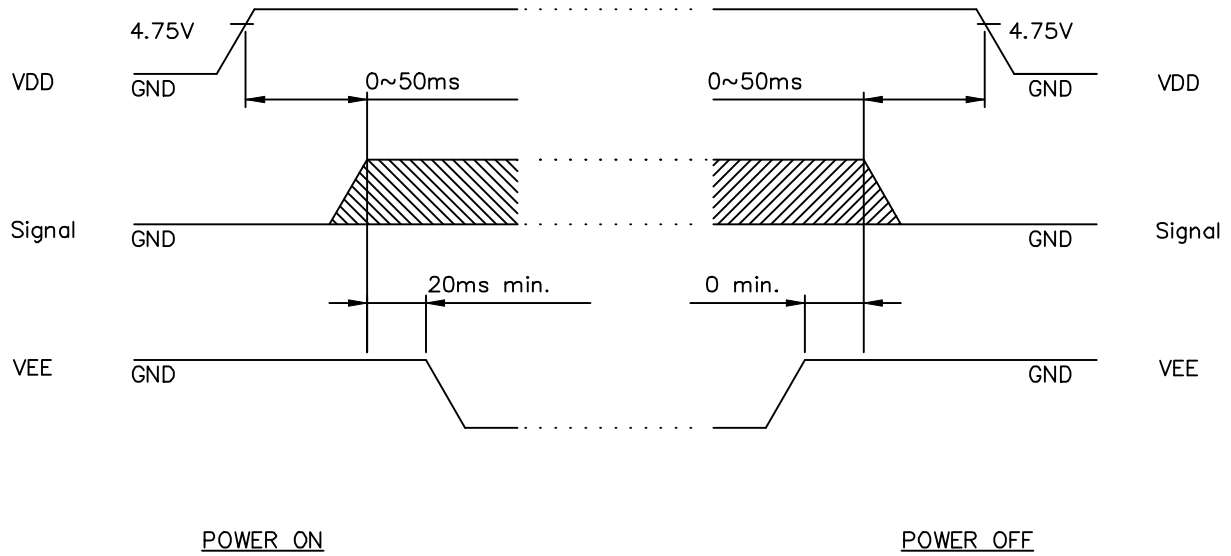
$V_{DD}=4.5\sim 5.5V, T_a=-40\sim 85^\circ C$

Item	Signal	Symbol	Condition	Rating		Unites
				Min	Max	
Serial Clock Period	SCL	t_{SCYC}		200	—	ns
SCL "H" pulse width		t_{SHW}		75	—	ns
SCL "L" pulse width		t_{SLW}		75	—	ns
Address setup time	A0	t_{SAS}		50	—	ns
Address hold time		t_{SAH}		100	—	ns
Data setup time	SI	t_{SDS}		50	—	ns
Data hold time		t_{SDH}		50	—	ns
CS-SCL time	CS	t_{CSS}		100	—	ns
		t_{CSH}		100	—	ns

$V_{DD}=2.7\sim 4.5V, T_a=-40\sim 85^\circ C$

Item	Signal	Symbol	Condition	Rating		Unites
				Min	Max	
Serial Clock Period	SCL	t_{SCYC}		250	—	ns
SCL "H" pulse width		t_{SHW}		100	—	ns
SCL "L" pulse width		t_{SLW}		100	—	ns
Address setup time	A0	t_{SAS}		150	—	ns
Address hold time		t_{SAH}		150	—	ns
Data setup time	SI	t_{SDS}		100	—	ns
Data hold time		t_{SDH}		100	—	ns
CS-SCL time	CS	t_{CSS}		150	—	ns
		t_{CSH}		150	—	ns

9.1. POWER ON/OFF TIMING



The missing pixels may occur when the LCM is driven beyond above power interface timing sequence.

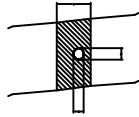
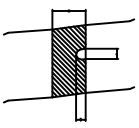
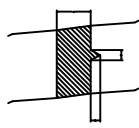
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10.RELIABILITY TEST

NO	ITEM	CONDITION			STANDARD	NOTE
1	High Temp. Storage	70°C	120HR		Appearance without defect	
2	Low Temp. Storage	-20°C	120HR		Appearance without defect	
3	High Temp. & High Humidity Storage	40°C 90%RH	120HR		Appearance without defect	
4	Thermal Shock	-20°C,30min → 25°C,5min → 60°C,30min → 25°C,5min (= 1 cycle)			Appearance without defect	5 cycles

11.LCD PRODUCT QUALITY STANDARD

(1) DISPLAY APPEARANCE

NO	ITEM	C R I T E R I A													
1.	INCLUSIONS (BLACK SPOT , WHITE SPOT , DUST)	(1) ROUND TYPE													
		<table border="1"> <thead> <tr> <th>DIAMETER mm (a*)</th> <th>NO. OF DEFECT*</th> </tr> </thead> <tbody> <tr> <td>$a \leq 0.20$</td> <td>NEGLECT</td> </tr> <tr> <td>$0.20 < a \leq 0.35$</td> <td>5 MAX</td> </tr> <tr> <td>$0.35 < a$</td> <td>NONE</td> </tr> </tbody> </table>	DIAMETER mm (a*)	NO. OF DEFECT*	$a \leq 0.20$	NEGLECT	$0.20 < a \leq 0.35$	5 MAX	$0.35 < a$	NONE					
DIAMETER mm (a*)	NO. OF DEFECT*														
$a \leq 0.20$	NEGLECT														
$0.20 < a \leq 0.35$	5 MAX														
$0.35 < a$	NONE														
		(2) LINEAR TYPE													
		<table border="1"> <thead> <tr> <th>LENGTH mm(L)</th> <th>WIDTH mm(W)</th> <th>NO. OF DEFECT</th> </tr> </thead> <tbody> <tr> <td>N A</td> <td>$W \leq 0.03$</td> <td>NEGLECT</td> </tr> <tr> <td>$L \leq 3$</td> <td>$0.03 < W \leq 0.08$</td> <td>6</td> </tr> <tr> <td>$3 < L$</td> <td>$0.08 < W$</td> <td>NONE</td> </tr> </tbody> </table>	LENGTH mm(L)	WIDTH mm(W)	NO. OF DEFECT	N A	$W \leq 0.03$	NEGLECT	$L \leq 3$	$0.03 < W \leq 0.08$	6	$3 < L$	$0.08 < W$	NONE	
LENGTH mm(L)	WIDTH mm(W)	NO. OF DEFECT													
N A	$W \leq 0.03$	NEGLECT													
$L \leq 3$	$0.03 < W \leq 0.08$	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													
		<table border="1"> <thead> <tr> <th>DIAMETER mm (a*)</th> <th>NO. OF DEFECT*</th> </tr> </thead> <tbody> <tr> <td>$a \leq 0.15$</td> <td>NEGLECT</td> </tr> <tr> <td>$0.15 < a \leq 0.20$</td> <td>2 MAX</td> </tr> <tr> <td>$0.20 < a$</td> <td>NONE</td> </tr> </tbody> </table>	DIAMETER mm (a*)	NO. OF DEFECT*	$a \leq 0.15$	NEGLECT	$0.15 < a \leq 0.20$	2 MAX	$0.20 < a$	NONE					
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 BY 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	$(a+b)/2 \leq 0.15$ mm MAXIMUM NUMBER:IGNORED $0.15 < (a+b)/2 \leq 0.20$ MAXIMUM NUMBER:10													
6.	DOT DEFECT	$(a+b)/2 \leq 0.20$ mm MAXIMUM NUMBER:IGNORED $0.20 < (a+b)/2 \leq 0.30$ MAXIMUM NUMBER:5 x = WIDTH	 												
7.	CONTRAST IRREGULARITY (SPOT)	DIAMETER SPEC. $a \leq 0.50$ mm $0.50 < a \leq 0.75$ $0.75 < a \leq 1.00$ $1.00 < a$	NO. OF DEFECT* NEGLECT 5 3 NONE												
8.	DOT WIDTH	DESIGN WIDTH±15%													
9.	COLOR TONE AND UNIFORMITY	OBVIOUS UNEVEN COLOR IS NOT PERMITTED													

(2) NOTE:

• SAFETY

- 1.If the LCD panel breaks, be careful not to allow the liquid crystal to touch your skin.
- 2.If the liquid crystal touches your skin or clothes, please wash it off immediately by using soap and water.

• HANDLING

- 1.Prevent all contact with static electricity, which can damage the CMOS ICs. The module is packaged in a static-shielding bag to prevent damage during shipment, warehousing and removal from the shipping carton.
- 2.Do not remove the panel or frame from the module.
- 3.The polarizing plate on the front surface of the display is very fragile and easily scratched. The module is shipped with a protective liner which must be removed from the polarizing plate prior to assembly.
- 4.Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of polarizing plate.
- 5.Do not use ketonics solvent or aromatic solvent on the polarizing plate. Use a soft cloth soaked with plastic-lens cleaning solution.

• STORAGE

- 1.Store the panel or module in a dark place where the temperature is $25^{\circ}\text{C}\pm 5^{\circ}\text{C}$ and the humidity is below 65% RH.
- 2.Do not place the module near organics solvents or corrosive gases.
- 3.Do not crush, shake, or jolt the module.

• TERMS OF WARRANTY

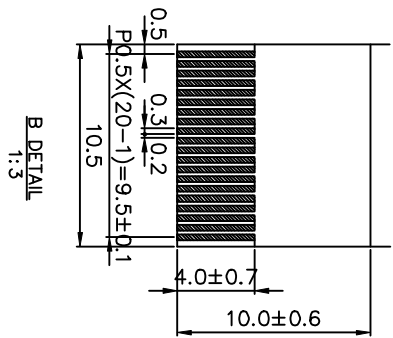
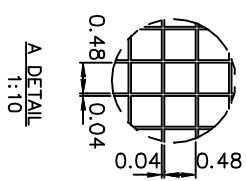
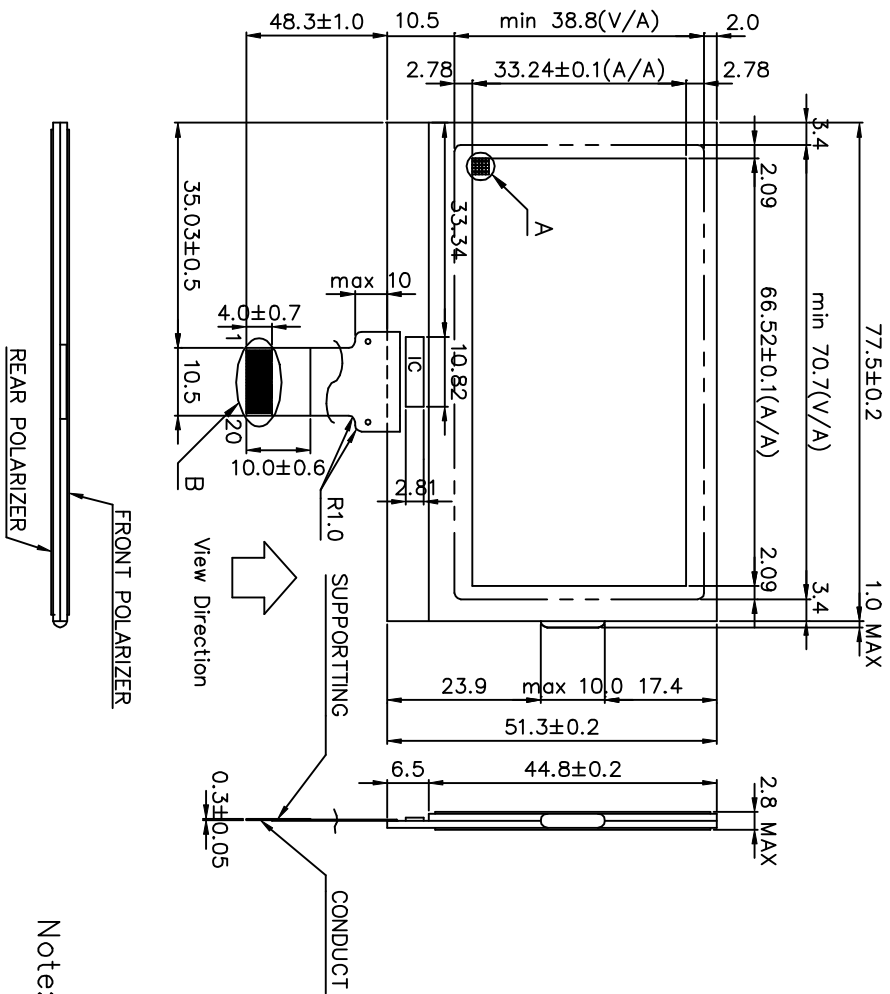
- 1.Acceptance inspection period
The inspection period is within one month after the arrival of the contracted goods at the buyer's factory site.
- 2.Applicable warranty period
The warranty period is within twelve months from the date of invoice under normal usage and storage conditions.

• TYPICAL OPERATING LIFETIME OF BACKLIGHT

- LED : 50,000HR
EL : 5,000HR
CCFT : 10,000HR

REV/DATE	RO/ 2.23.99'					APP	CHK	BY
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NO	SYMBOL
1	V5
2	V4
3	V3
4	V2
5	V1
6	N/C
7	CAP2+
8	CAP2-
9	CAP1-
10	CAP1+
11	VOUT
12	VSS
13	VDI
14	D7(S)
15	D6(SCL)
16	/RD
17	/MR
18	A0
19	/RES
20	/CST



Note:
 1.RESOLUTION : 128X64
 2.COG IC : SED1565
 3.GLASS THICKNESS : 1.1 mm
 4.GENERAL TOLERANCE: ±0.3mm

產品編號	LT1A75_279_	南亞塑膠工業股份有限公司
NAME		NAN YA PLASTICS CORPORATION
DATE		
TITLE	製圖圖	
APPROVE		
CHECK		
DESIGN		
DRAW	KIKI	88.02.23
DWG-NO	TAAX279X	Rev.0
UNIT	mm	
SCALE		
THIRD ANGLE PROJECT		