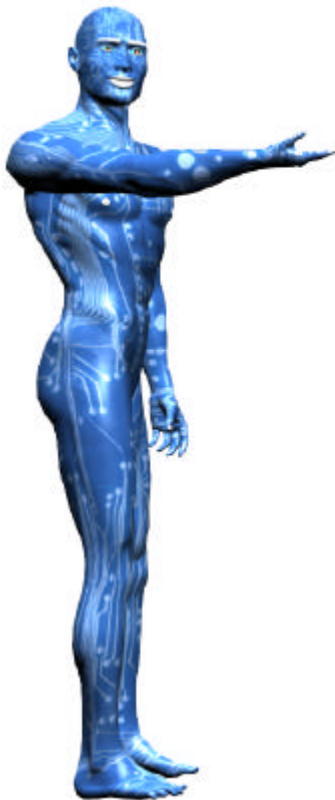


Spezifikation

Produkt: LCD - Modul
Artikelnr.: NLC-128x064-xxx13x



Specification No.: LM436-13A

Kontaktdaten:

Deutschland:
admatec GmbH ♦ Wendenstrasse 29 ♦ D - 20097 Hamburg
fon: +49(0)40-238533-0 ♦ fax: +49(0)40-238533-11
web: www.admatec.de ♦ e-mail: info@admatec.de

Schweiz:
admatec AG ♦ Schareggstrasse 3 ♦ CH – 5506 Mägenwil
fon: +41(0)62-8960048 ♦ fax: +41(0)62-8962580
web: www.admatec.ch ♦ e-mail: info@admatec.ch

2. ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

VSS=0V Standard

ITEM	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD-VSS	-0.3	7.0	V	
Input Voltage	VI	-0.3	VDD	V	
Static Electricity	-	-	-	-	Note 1

(2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	-20	70	-30	80
Humidity(Without Condensation)	Note 2,4		Note 3,4	

Note 1 LCM should be grounded during handling LCM.

Note 2 Ta ≤ 70°C : 75%RH max

Ta > 70°C : Absolute humidity must be lower

than the humidity of 75%RH at 70°C

Note 3 Ta at -30°C will be < 48hrs, at 80°C will be < 120hrs


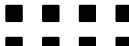
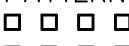
Note 4 Background color will change slightly depending on ambient temperature.

That phenomenon is reversible.

3. ELECTRICAL CHARACTERISTICS

3-1. ELECTRICAL CHARACTERISTICS OF LCM

(VDD = 5V±10%)

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	
Input Voltage	VIH	H level	0.7VDD	-	VDD	V	
	VIO	L level	0	-	0.3VDD	V	
Recommended LC Driving Voltage	VDD-V0	Duty= 1/64 Bias= 1/8	-20°C	9.5	9.8	10.0	V
			0°C	9.2	9.5	9.6	
			25°C	8.9	9.2	9.5	
			50°C	8.8	9.1	9.4	
			70°C	8.5	8.8	9.1	
Power Supply Current	IDD	FLM=79 Hz VDD=5.0 V VDD-V0=9.2 V PATTERN : 	-	1.9	2.9	mA	
LCM Surface Luminance	-	(Dots All On) PATTERN: 	-	4.2	-	cd/m ²	
		(Dots All Off) PATTERN: 	-	13.1	-		

3-2.ELECTRICAL CHARACTERISTICS OF BACKLIGHT

Used LED Rating

Temp.=25°C

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Peak forward current	I _P	-	-	540	mA	-
Maximum reverse voltage	V _R	-	-	8.0	V	-
Applied forward current	I _F	-	250	375	mA	at V _F = 4.2 V
Applied forward voltage	V _F	-	4.2	-	V	at I _F = 250 mA
LED power consumption	P _F	-	1.1	-	W	-
LED life time	L _L	-	40000	-	hrs	at I _F = 250 mA (*1)

(*1) LED life time is defined as follows : The final brightness is at 50% of original brightness .

4. OPTICAL CHARACTERISTICS

AT Vop

ITEM MODE	Cr(Contrast Ratio)										θ (Viewing Angle)		ϕ (Viewing Angle)	
	-20°C		0°C		25°C		50°C		70°C		25°C		25°C	
	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
H C	2.5	3.5	3.0	4.0	3.5	4.5	3.0	4.0	2.0	3.0	-	31-23	-	±25
Note	NOTE 6										NOTE 5			

Note:

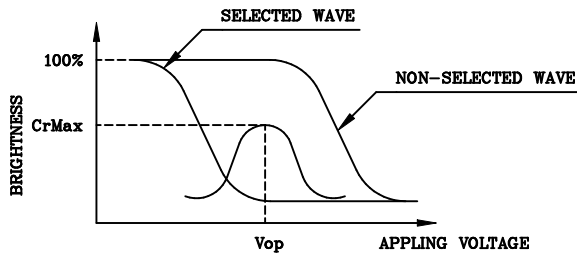
H: Transflective(High Transparency)
C: Yellow , 6 O'clock

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

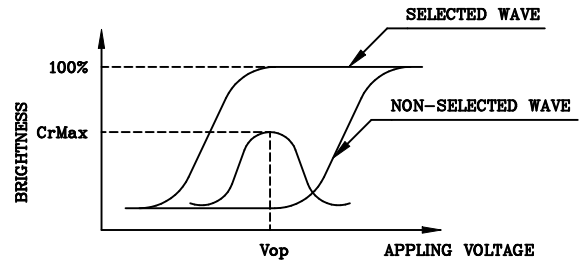
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20°C	2800	3500	5200	ms	Fig. 2
		0°C	680	850	1270		
		25°C	160	200	300		
		50°C	95	120	180		
		70°C	45	60	90		
Response Time (fall)	Tf	-20°C	1900	2400	3600	ms	Fig. 2
		0°C	400	500	600		
		25°C	95	120	180		
		50°C	40	50	75		
		70°C	30	40	60		

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



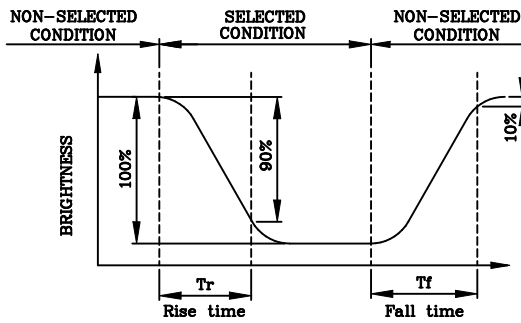
(negative type)

*Conditions

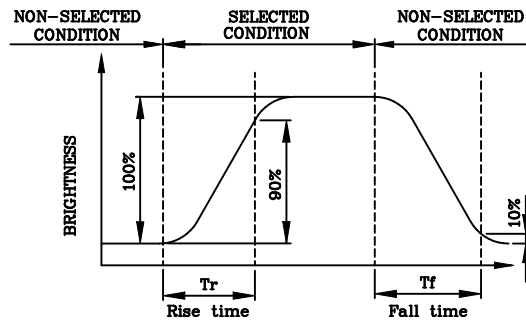
Viewing Angle : 0
 Frame Frequency : 70Hz
 Applying Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



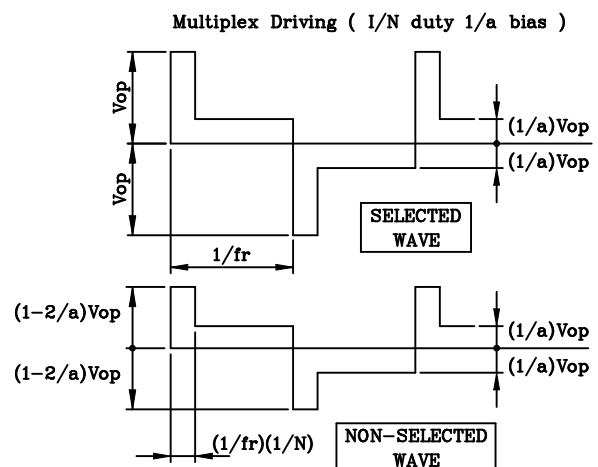
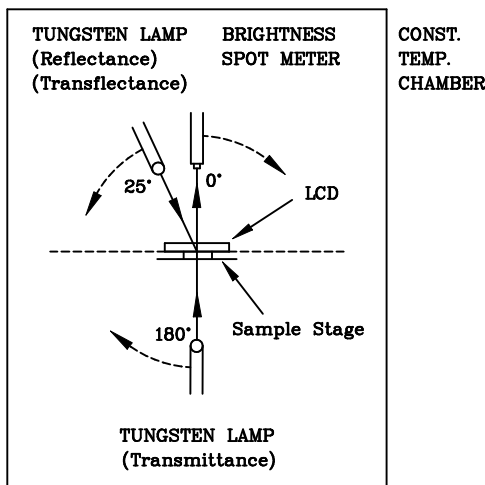
(negative type)

*Conditions

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

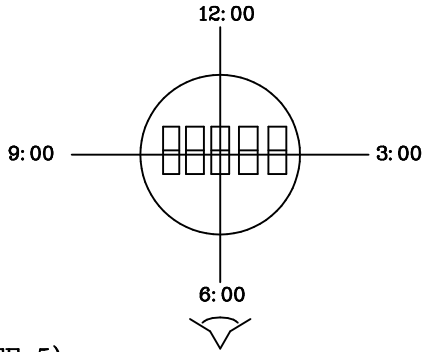
(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



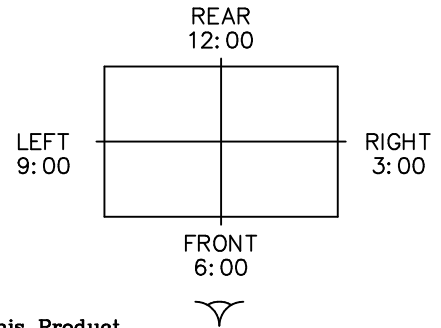
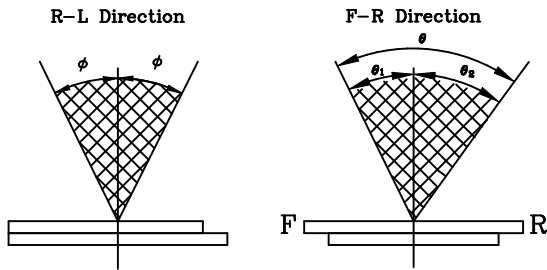
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



*For This Product
 The Viewing Direction Is 6 O'clock
 So $\theta_1 > \theta_2$

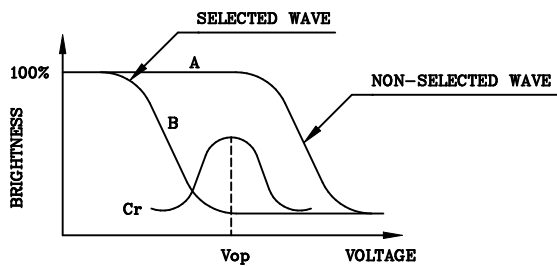
$$\theta = \theta_1 + \theta_2$$

*Conditions

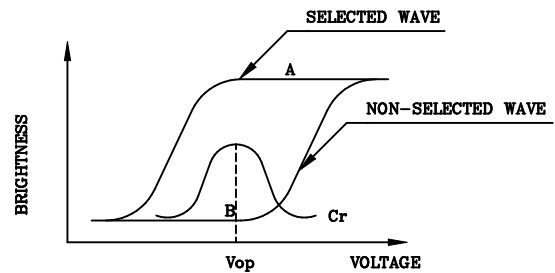
Operating Voltage : V_{op}
 Frame Frequency : 70Hz
 Applying Waveform : 1/N duty 1/a bias
 Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



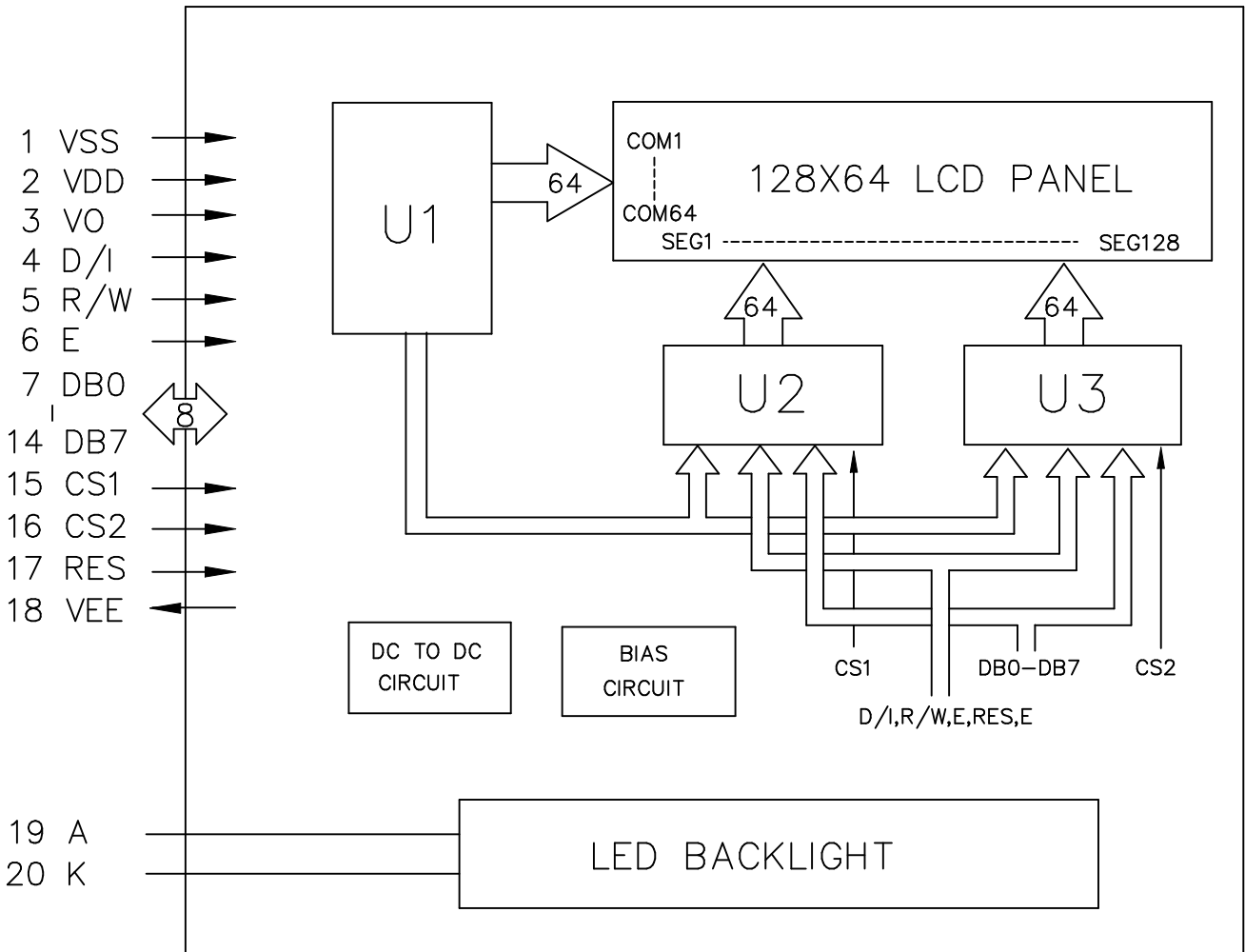
(negative type)

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

*Conditions

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

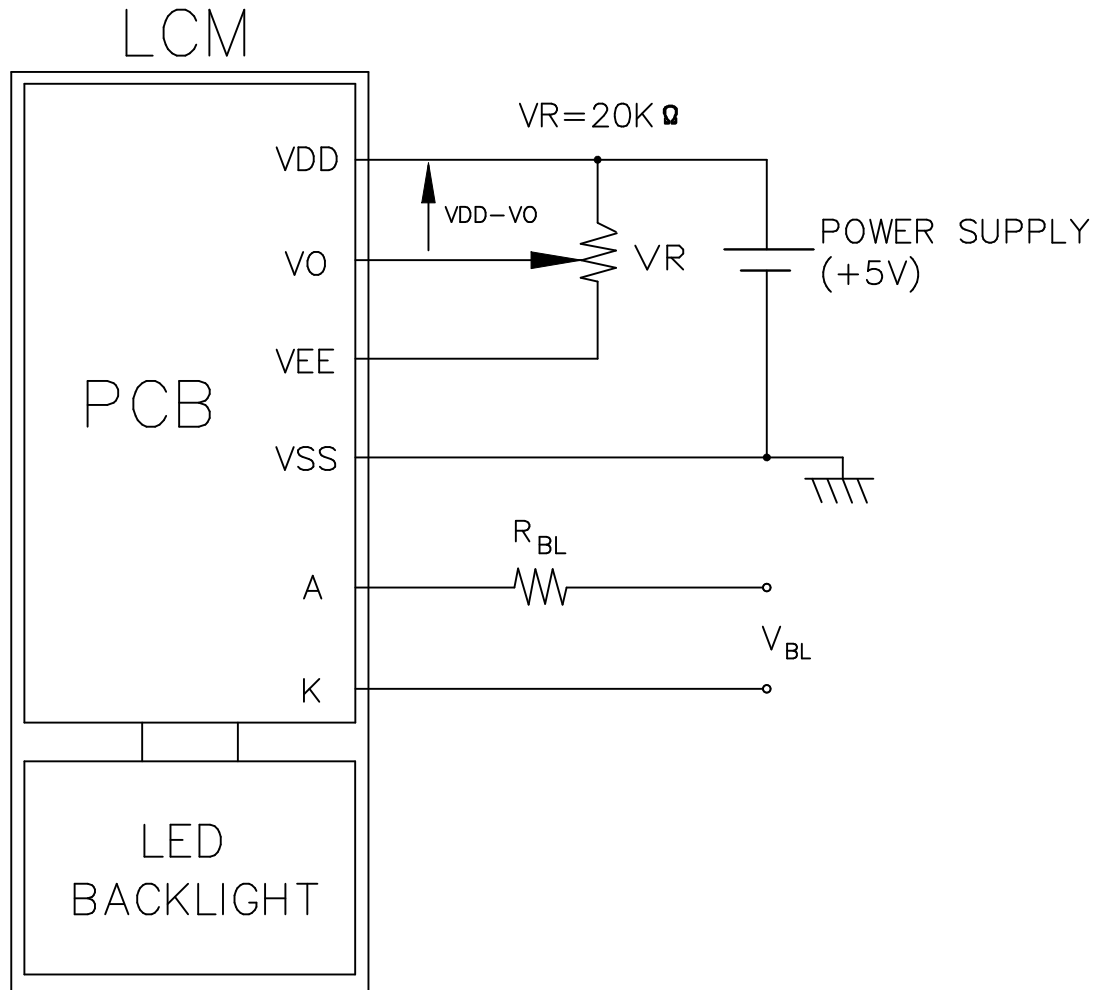
5. BLOCK DIAGRAM



6. INTERNAL PIN CONNECTION

Pin No.	Symbol	Level	Function	
1	V _{SS}	—	0V	Power Supply
2	V _{DD}	—	+5V	
3	V ₀	—	OPERATING VOLTAGE FOR LCD DRIVING	
4	D/I	H/L	H: DATA INPUT L: INSTRUCTION CODE INPUT	
5	R/W	H/L	H: DATA READ (LCM TO MPU) L: DATA WRITE (MPU TO LCM)	
6	E	H, H->L	ENABLE SIGNAL	
7	DB0	H/L	DATA BUS LINE	
8	DB1	H/L		
9	DB2	H/L		
10	DB3	H/L		
11	DB4	H/L		
12	DB5	H/L		
13	DB6	H/L		
14	DB7	H/L		
15	CS1	H	CHIP SELECT FOR IC1	
16	CS2	H	CHIP SELECT FOR IC2	
17	RES	L	RESET ACTIVE "L"	
18	VEE	—	NEGATIVE VOLTAGE OUTPUT	
19	A	—	FOR LED BACKLIGHT	
20	K	—	FOR LED BACKLIGHT	

7. POWER SUPPLY



Recommended Value for R_{BL} and V_{BL}

ITEM	R_{BL}	V_{BL}
Back Light	LED	LED
Interface	LED	LED
19,20 PIN	3.2Ω	5Vdc

8. TIMING CHARACTERISTICS

8-1 INTERFACE TIMING

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Enable cycle time	t_{eye}	Fig.a , Fig.b	1000	-	-	ns
E high level width	P_{WEH}	Fig.a , Fig.b	450	-	-	ns
E low level width	P_{WEL}	Fig.a , Fig.b	450	-	-	ns
E rise/fall time	t_r, t_f	Fig.a , Fig.b	-	-	25	ns
Address set up time	t_{AS}	Fig.a , Fig.b	140	-	-	ns
Address hold time	t_{AH}	Fig.a , Fig.b	10	-	-	ns
Data delay time	t_{DDR}	Fig.b	-	-	320	ns
Data set up time	t_{DSW}	Fig.a	200	-	-	ns
Data hold time (WR)	t_{DHW}	Fig.a	10	-	-	ns
Data hold time (RD)	t_{DHR}	Fig.b	20	-	-	ns

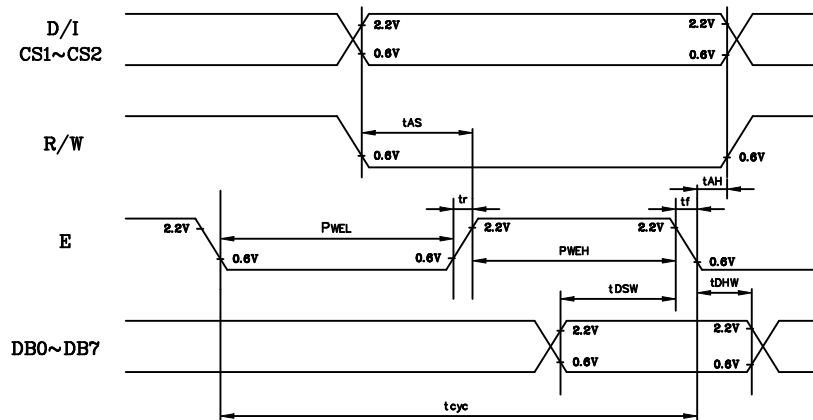


Fig . a Interface timing (data write)

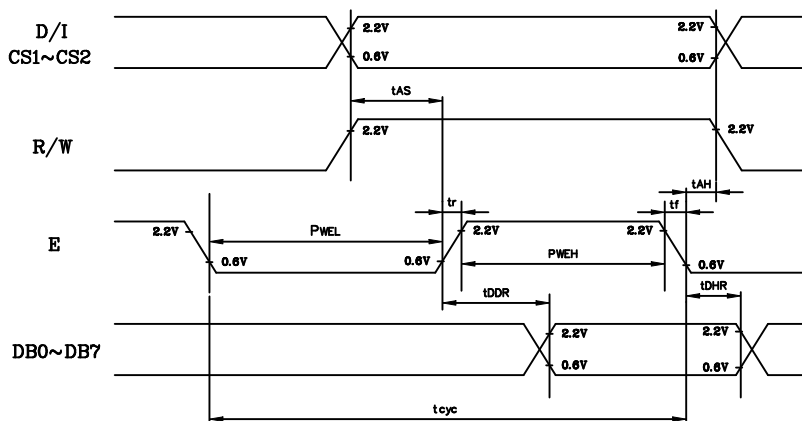
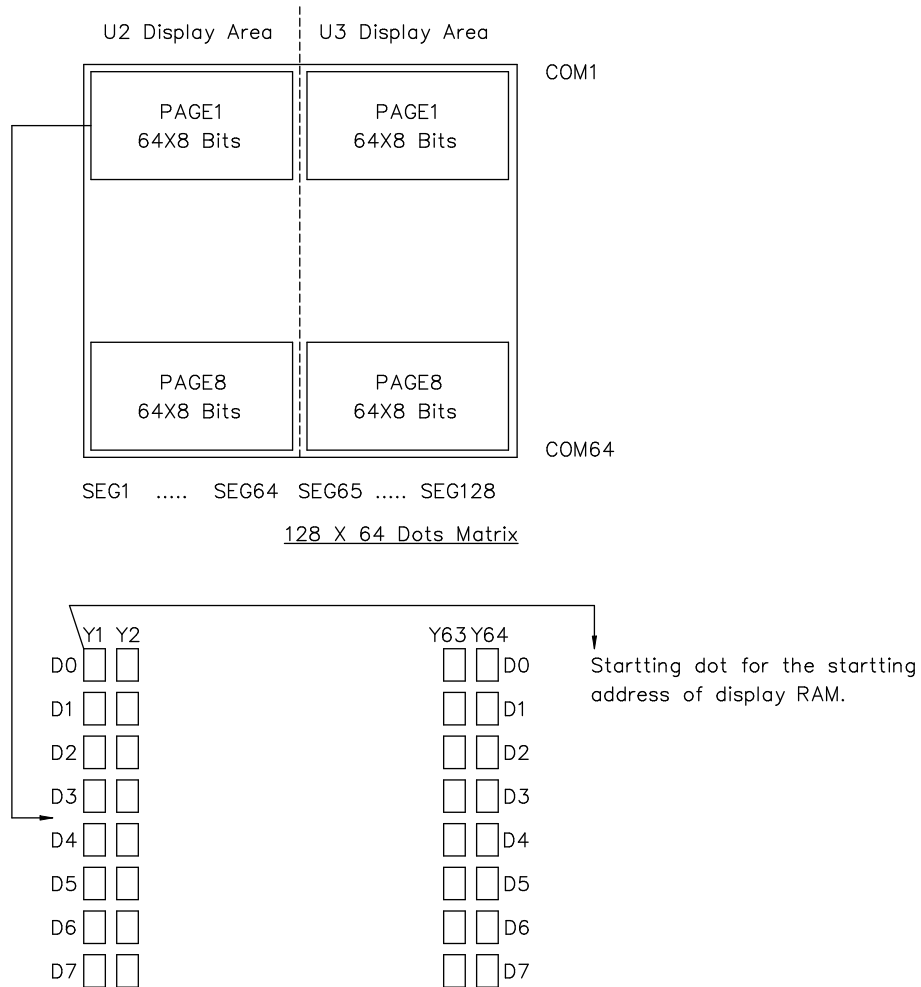


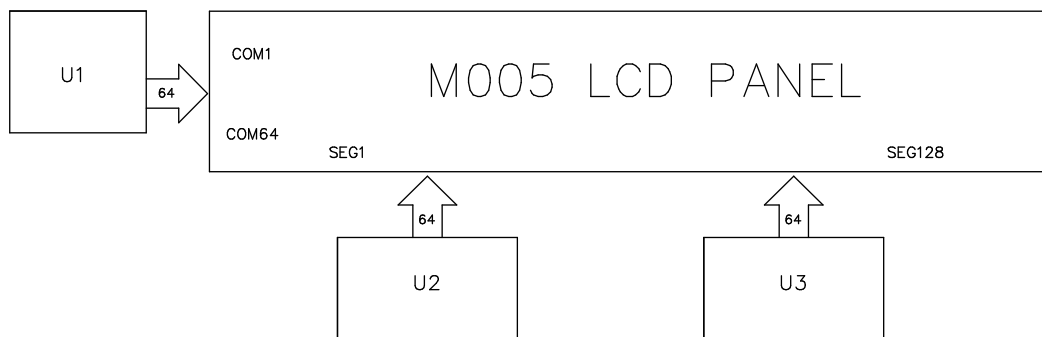
Fig . b Interface timing (data read)

Fig. b Interface timing (data read)

8-2 DISPLAY PATTERN



Each segment driver has 8 pages RAM , and each page has 64 x 8 bits RAM .
 D0~D7 are 8 bits transmitted data , where D0 is LSB and D7 is MSB .



8-3 DISPLAY CONTROL INSTRUCTION

The display control instructions control the internal state of the KS0108B. Instructions is received from MPU to KS0108B for the display control.

Instruction	D/I	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	FUNCTION
Display ON/OFF	0	0	0	0	1	1	1	1	1	0/1	Controls the display on or off. Internal status and display RAM data is not affected. 0: OFF , 1: ON
Set Address	0	0	0	1	Y address(0~63)					Sets the Y address in the Y address counter.	
Set Page (X address)	0	0	1	0	1	1	1	Page(0~7)			Sets the X address at the X address register.
Display Start Line	0	0	1	1	Display start line(0~63)					Indicates the display data RAM displayed at the top of the the screen.	
Status Read	0	1	BUSY	0	ON/OFF	RESET	0	0	0	0	Read status. BUSY 0: Ready 1: In operation ON/OFF 0: Display ON 1: Display OFF RESET 0: Normal 1: Reset
Write Display Data	1	0	Write Data								Writes data(DB0:7) into display data RAM. After writing instruction, Y address is increased by 1 automatically.
Read Display Data	1	1	Read Data								Reads data(DB0:7) from display data RAM to the data bus.

Inspection Provision

1.Purpose

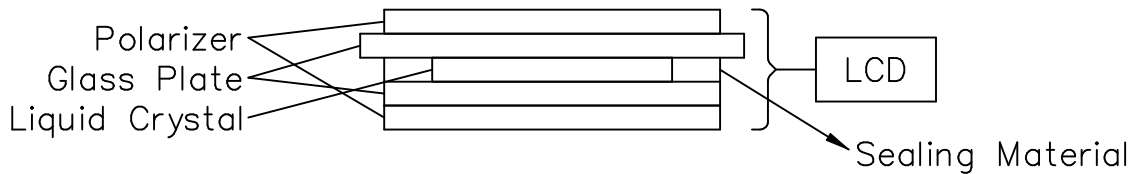
The NAN YA inspection provision provides outgoing inspection provision and its expected quality level based on our outgoing inspection of NAN YA LCD produces.

2.Applicable Scope

The NAN YA inspection provision is applicable to the arrangement in regard to outgoing inspection and quality assurance after outgoing.

3.Technical Terms

3-1 NAN YA Technical Terms



4.Outgoing Inspection Provision

Outgoing inspection is according to the product inspection manual.
 (Per 1-1, 1-2 & 1-3)

4-1 Inspection Method

MIL-STD-105D Level II Regular inspection

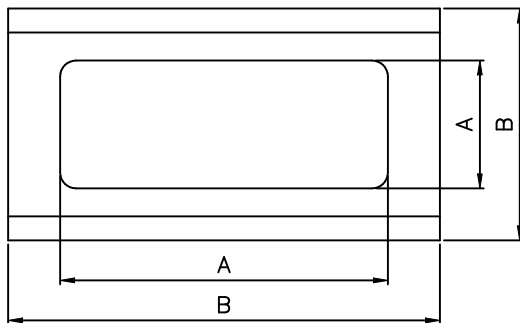
4-2 Inspection Standard

	Item		AQL(%)	Remarks
Major Defect	Dots	Opens Shorts Erroneous operation	0.4	faults which substantially lower the practicality and the initial purpose difficult to achieve.
	Solder appearance	Shorts Loose		
	Cracks	Display surface cracks		

	Dimensions	External from Dimensions	0.4	
Minor Defect	Inside the glass	Black spots	0.65	faults which appear to pose almost no obstacle to the practicality, effective use, and operation.
	Polarizing plate	Scratches, foreign Matter, air bubbles, and peeling		
	Dots	Pinhole, deformation		
	Color tone	Color unevenness		
	Solder appearance	Cold solder Solder projections		

4-3 Inspection Provisions
 *Viewing Area Definition

Fig. 1



A : Zone Viewing Area
 B : Zone Glass Plate Out Line

*Inspection place to be 500 to 1000 lux illuminance uniformly without glaring.
 The distance between luminous source(daylight fluorescent lamp and cool white fluorescent lamp) and a sample to be 30cm to 50cm.

*Test and measurement are performed under the following conditions, unless otherwise specified.

Temperature 20± 15°C
 Humidity 65± 20%R.H..
 Pressure 860~1060hPa(mmbar)

In case of doubtful judgment, it is performed under the following conditions.

Temperature 20± 2°C
 Humidity 65± 5%R.H..
 Pressure 860~1060hPa(mmbar)

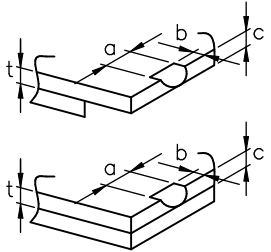
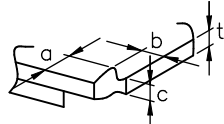
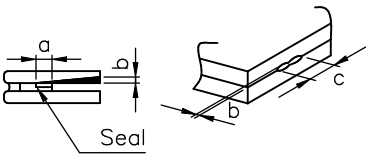
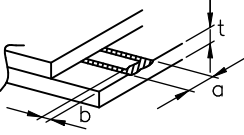
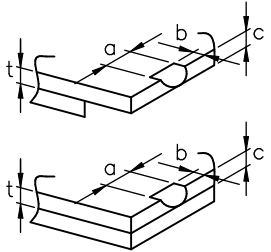
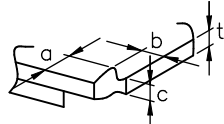
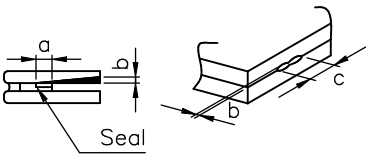
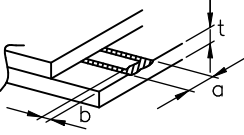
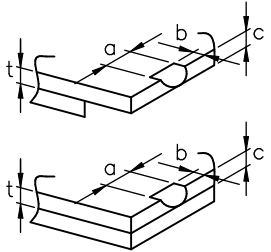
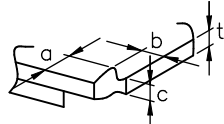
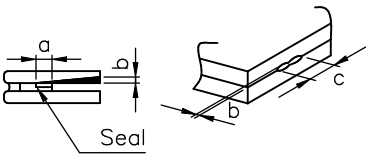
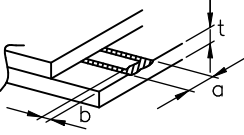
5.Specification for quality check

5-1 Electrical characteristics

NO.	Item	Criterion
1.	Non operational	Fail
2.	Miss operating	Fail
3.	Missing dot	Fail
4.	Contrast irregular	Not allowable
5.	Response time	Within Specified value
6.	LED backlight turn on/off	Within Specified value

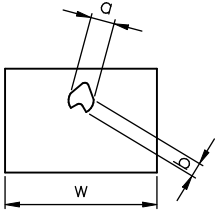
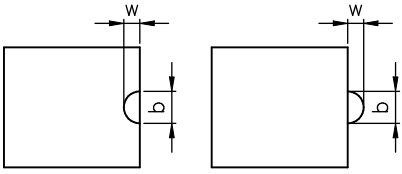
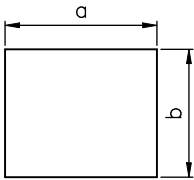
5-2 External Appearance Defect

NO.	Item	Criterion																		
1.	Black spots, foreign matter, and white spots (Including light leakage due to pinholes of polarizing plates, etc.)	<p>(1)-1-Spots(At non lighting condition)</p> <table border="1" data-bbox="730 477 1377 763"> <thead> <tr> <th>Average Diameter(mm):D</th> <th>Number of pieces permitted</th> </tr> </thead> <tbody> <tr> <td>$D \leq 0.1$</td> <td>Ignore</td> </tr> <tr> <td>$0.1 < D \leq 0.2$</td> <td>5</td> </tr> <tr> <td>$0.2 < D \leq 0.3$</td> <td>2</td> </tr> <tr> <td>$0.3 < D$</td> <td>0</td> </tr> </tbody> </table> <p>Number of total pieces is set to within 5 pieces.</p> <p>Note that when there are 2 pieces or more, they are not to be concentrated. Set as: Average diameter = (Long diameter + Short diameter)/2</p> <p>(1)-2-Spots(At lighting condition)</p> <table border="1" data-bbox="730 1189 1377 1429"> <thead> <tr> <th>Average Diameter(mm):D</th> <th>Number of pieces permitted</th> </tr> </thead> <tbody> <tr> <td>$D \leq 0.3$</td> <td>Ignore</td> </tr> <tr> <td>$0.3 < D \leq 0.75$</td> <td>5</td> </tr> <tr> <td>$0.75 < D$</td> <td>0</td> </tr> </tbody> </table> <p>Number of total pieces is set to within 5 pieces.</p> <p>Note that when there are 2 pieces or more, they are not to be concentrated. Set as: Average diameter = (Long diameter + Short diameter)/2</p>	Average Diameter(mm):D	Number of pieces permitted	$D \leq 0.1$	Ignore	$0.1 < D \leq 0.2$	5	$0.2 < D \leq 0.3$	2	$0.3 < D$	0	Average Diameter(mm):D	Number of pieces permitted	$D \leq 0.3$	Ignore	$0.3 < D \leq 0.75$	5	$0.75 < D$	0
Average Diameter(mm):D	Number of pieces permitted																			
$D \leq 0.1$	Ignore																			
$0.1 < D \leq 0.2$	5																			
$0.2 < D \leq 0.3$	2																			
$0.3 < D$	0																			
Average Diameter(mm):D	Number of pieces permitted																			
$D \leq 0.3$	Ignore																			
$0.3 < D \leq 0.75$	5																			
$0.75 < D$	0																			

<p>4. Air bubbles polarizing plates, and reflection plates</p>	<table border="1" data-bbox="730 383 1248 667"> <tr> <th data-bbox="730 383 991 524">Average Diameter (mm): D</th> <th data-bbox="991 383 1248 524">Number of pieces permitted</th> </tr> <tr> <td data-bbox="730 524 991 568">$D \leq 0.3$</td> <td data-bbox="991 524 1248 568">Ignore</td> </tr> <tr> <td data-bbox="730 568 991 667">$0.3 < D$</td> <td data-bbox="991 568 1248 667">0</td> </tr> </table> <p data-bbox="1248 383 1497 667">Average diameter = (Long diameter + Short diameter)/2</p> <p data-bbox="730 689 1497 779">Note that when there are 4 pieces or more, they are not to be concentrated.</p>		Average Diameter (mm): D	Number of pieces permitted	$D \leq 0.3$	Ignore	$0.3 < D$	0					
Average Diameter (mm): D	Number of pieces permitted												
$D \leq 0.3$	Ignore												
$0.3 < D$	0												
<p>5. Cracks</p>	<table border="1" data-bbox="683 779 1497 1964"> <tr> <td data-bbox="683 779 1086 1171"> <p>(1) General crack</p>  </td> <td data-bbox="1086 779 1497 1171"> <p>$a \leq 5$ $b \leq 2$ $c \leq t$</p> <p>Where, a and b are ignored when less than or equal 0.5. The numbers of pieces are set at up to 5 pieces.</p> </td> </tr> <tr> <td data-bbox="683 1171 1086 1361"> <p>(2) Corner crack</p>  </td> <td data-bbox="1086 1171 1497 1361"> <p>$a \leq 2.5$ $b \leq 2.5$ $c \leq t$ $a+b \leq 4$</p> </td> </tr> <tr> <td data-bbox="683 1361 1086 1641"> <p>(3) Seal portion crack</p>  </td> <td data-bbox="1086 1361 1497 1641"> <p>$a \leq \text{The seal width} \times 1/3$ $b \leq t \times 2/3$ $c \leq 5$</p> <p>The numbers of pieces are set at up to 5 pieces.</p> </td> </tr> <tr> <td data-bbox="683 1641 1086 1877"> <p>(4) ITO Pin crack</p>  </td> <td data-bbox="1086 1641 1497 1877"> <p>$a \leq 5$ $b \leq 1/3 \text{ pin length}$ $c \leq t$</p> </td> </tr> <tr> <td data-bbox="683 1877 1086 1964"> <p>(5) Progressive cracks</p> </td> <td colspan="2" data-bbox="1086 1877 1497 1964"> <p>All taken to be unacceptable.</p> </td> </tr> </table>		<p>(1) General crack</p> 	<p>$a \leq 5$ $b \leq 2$ $c \leq t$</p> <p>Where, a and b are ignored when less than or equal 0.5. The numbers of pieces are set at up to 5 pieces.</p>	<p>(2) Corner crack</p> 	<p>$a \leq 2.5$ $b \leq 2.5$ $c \leq t$ $a+b \leq 4$</p>	<p>(3) Seal portion crack</p> 	<p>$a \leq \text{The seal width} \times 1/3$ $b \leq t \times 2/3$ $c \leq 5$</p> <p>The numbers of pieces are set at up to 5 pieces.</p>	<p>(4) ITO Pin crack</p> 	<p>$a \leq 5$ $b \leq 1/3 \text{ pin length}$ $c \leq t$</p>	<p>(5) Progressive cracks</p>	<p>All taken to be unacceptable.</p>	
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<p>(5) Progressive cracks</p>	<p>All taken to be unacceptable.</p>												

6.	Outer dimensions	Should be with in the tolerance.
7.	Newton ring	Orbicular of interference fringes. To be non. In case of doubtful judgenemt, agreement shall be reachment.
8.	Soldering	Should be no defective soldering such as shorting, loose terminal cold solder, peeling of printed circuit board pattern, improper mouting position, etc.

5-3 Dot Appearance Defect

NO.	Item	Criteria
1.	Plinhole	 <p>Dot display a and b are each $\leq 0.2\text{mm}$ The overall total is taken be with in 10 units. Note that they are not to be concentrated.</p>
2.	Missing	 <p>Dot display a and b are each $\leq 0.2\text{mm}$ The overall total is taken to be with in 10 units.</p>
3.	Thick and thin display	 <p>Taken to be within $\pm 1.5\%$ of display character width(a) and height(b).</p>

NOTICE:

• SAFETY

- 1.If the LCD panel breaks, be careful not to get 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.Avoid static electricity which can damage the CMOS LSI.
- 2.Do not remove the panel or frame from the module.
- 3.The polarizing plate of the display is very fragile. So, please handle it very carefully.
- 4.Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
- 5.Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.

• STORAGE

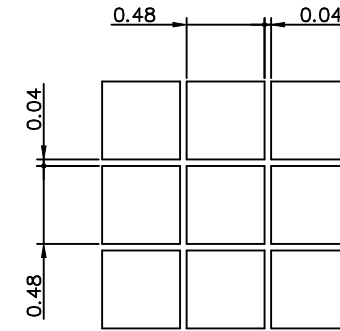
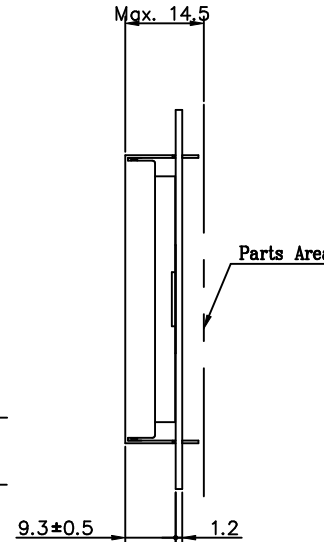
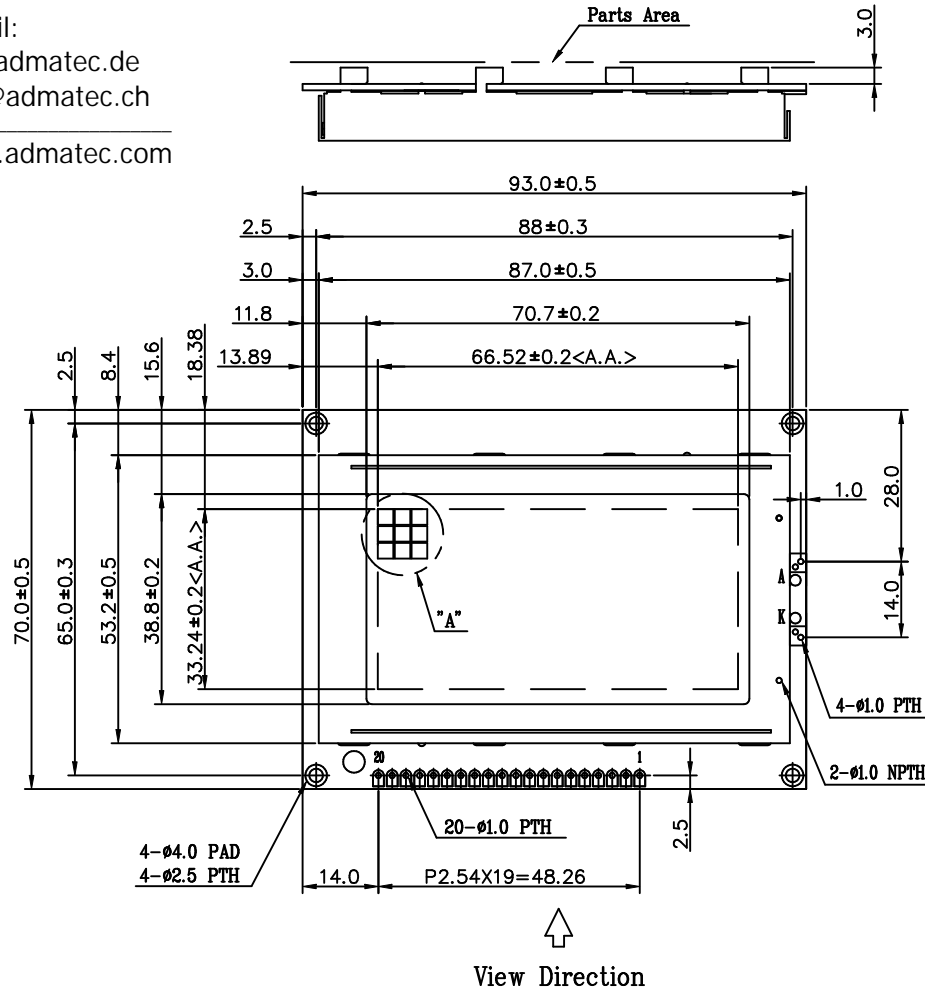
- 1.Store the panel or module in a dark place where the temperature is $25^{\circ}\text{C}\pm 5^{\circ}\text{C}$ and the humidity is below 65% RH.
- 2.Do not place the module near organics solvents or corrosive gases.
- 3.Do not crush, shake, or jolt the module.

• TERMS OF WARRANT

- 1.Acceptance inspection period
The period is within one month after the arrival of contracted commodity at the buyer's factory site.
- 2.Applicable warrant period
The period is within twelve months since the date of shipping out under normal using and storage conditions.

e-mail:
 lcd@admaterc.de
 info@admaterc.ch

web: www.admaterc.com



Detail "A"
 (Scale 30:1)

Notes :

1. Resolution : 128 × 64 Dots
2. Controller : Without
3. DC/DC Converter : Built In
4. Backlight : LED (Yellow-Green)
5. Frame : SPCC (0.5 t)

Pin No.	Symbol	Level	Function	Pin No.	Symbol	Level	Function		
1	VSS	-	0V	10	DB3	H/L	Data Bus Line		
2	VDD	-	+5V	11	DB4				
3	VO	-	Operating Voltage for LCD Driving	12	DB5				
4	D/I	H/L	H : Data Input L : Instruction Code Input	13	DB6				
5	R/W	H/L	H : Data Read (LCM to MPU) L : Data Write (MPU to LCM)	14	DB7	15	CS1	H	Chip Select for IC1
6	E	H,H→L	Enable Signal	16	CS2	H	Chip Select for IC2		
7	DB0	H/L	Data Bus Line	17	RES	L	Reset Active "L"		
8	DB1			18	VEE	-	Negative Voltage Output		
9	DB2			19	A	-	For LED Backlight (+)		
				20	K	-	For LED Backlight (-)		

GENERAL TOLERANCE LIST

DIMENSION	TOLERANCE
L ≤ 6	±0.25 (mm)
6 < L ≤ 18	±0.3 (mm)
18 < L ≤ 50	±0.4 (mm)
50 < L ≤ 125	±0.5 (mm)
125 < L	±0.6 (mm)
ANGLE	±1° (DEG)



NLC-128x064-xxx13x

REV. NO.	DESCRIPTION	DATE	DESIGN	CHECK	APPROVE	DWG NO.	SCALE	UNIT
						M436AD13A	1/1	mm