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BOOKBINDING AREA

DOC.

DATASHEET STATEMENT

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 4.1: providing quick reference when you are judging whether or not the product meets your requirements.
 4.2: listing out definitely the tolerance.

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- 5. The sequence of the icons is random and doesn't indicate the importance grade.
- 6. Icons explanation

Midas 2006 version logo.Midas is an integrated manufacturer of flat panel display (FPD). Midas supplies TN, HTN, STN, FSTN monochrome LCD panel; COB, COG, TAB LCD module; and all kinds of LED backlight.



FAST RESPONSE TIME

This icon on the cover indicates the product is with high response speed; Otherwise not.

	C	
	$\mathbf{\Sigma}$	

HIGH CONTRAST

This icon on the cover indicates the product is with high contrast; Otherwise not.



WIDE VIEWING SCOPE

This icon on the cover indicates the product is with wide viewing scope; Otherwise not.



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This icon on the cover indicates the product meets ROHS requirements; Otherwise not.



3TIMEs 100% QC EXAMINATION This icon on the cover indicates the product

has passed Midas thrice 100% QC. Otherwise not.



VIcm = 3.0V

This icon on the cover indicates the product can work at 3.0V exactly; otherwise not.



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This icon on the cover indicates the product is with protection circuit; Otherwise not.



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This icon on the cover indicates the product is long life version (over 9K hours guaranteed); Otherwise not.



Anti UV VERSION

This icon on the cover indicates the product is against UV line. Otherwise not.



OPERATION TEMPERATURE RANGE

This icon on the cover indicates the operating temperature range (X-Y).



TWICE SELECTION OF LED MATERIALS

This icon on the cover indicates the LED had passed Midas twice strict selection which promises the product's identical color and brightness; Otherwise not.



N SERIES TECHNOLOGY (2008 developed) New structure, new craft, new technology and new materials inside both LCD module and LCD panel to improve the "RainBow"

Midas LCD Part Number System

MC	COG	132033	Α	*	6	W	*	*	-	S	Ν	Т	L	W	*	*
1	2	3	4	5	6	7	8	9	-	10	11	12	13	14	15	16
1	=	MC: Midas (Compo	nents												
2	=	Blank: COB	(chip	on boar	d) CO	G: chip	on glass	3								
3	=	No of dots		(e.g. 24	40064	= 240 x	64 dots	s)	(e	.g. 2160	05 = 2	x 16 5m	m C.H.)		
4	=	Series														
5	=	Series Varia	nt:	A to Z												
6	=	3: 3 o'clock		6: 6 o'd	clock	9): 9 o'clo	ock	12	2 : 12 o'o	clock					
7	=	S: Normal (0 to +	50 deg (C) W:	Wide te	emp. (-2	20 to +	70 deş	g C) X:	Exten	led tem	p (-30 -	⊦ 80 De	g C)	
8	=	Character Se	et													
		Blank: Stan C: Chinese S CB: Chinese H: Hebrew K: Europea L: English/J M: Europea R: Cyrillic	Simplif Big 5 n (std) lapane	ied (Gra (Graphi (Englis ese (spec	iphic I ic Disp h/Ger vial)	Displays olays on man/Fre	ly)	:eek)								
		W <mark>:</mark> Europea U: Europea				vian/Ice	elandic)									
9	=	Be <mark>zel</mark> Heigh	t (whe	re <mark>appl</mark> i	cabl <mark>e</mark> /	availal	ole)									
		Т		Bezel to f PCB	Тор	(via	nmon pins 1 d 2)	Arı or E L	dge							

	of PCB	(P	<u>-</u>
	011 CD	and 2)	Lit
Blank	9.5mm / not applicable	Common	Array
2	8.9 mm	Common	Array
3	$7.8 \mathrm{mm}$	Separate	Array
4	$7.8 \mathrm{mm}$	Common	Array
5	9.5 mm	Separate	Array
6	7 mm	Common	Array
7	7 mm	Separate	Array
8	6.4 mm	Common	Edge
9	6.4 mm	Separate	Edge
Α	$5.5 \mathrm{mm}$	Common	Edge
В	5.5 mm	Separate	Edge

10 = T: TN S: STN B: STN Blue G: STN Grey F: FSTN F2: FFSTN

- 11 = **P:** Positive N: Negative
- 12 = R: Reflective M: Transmissive T: Transflective
- 13 = Backlight: Blank: Reflective L: LED
- 14 = Backlight Colour: Y: Yellow-Green W: White B: Blue R: Red A: Amber O: Orange G: Green RGB: R.G.B.
- 15 = Driver Chip: Blank: Standard I: I²C
- 16 = Voltage Variant: e.g. 3 = 3v

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NO.	DATE	DE	SCRIPTION	ITEM	PAGE	APPROVED
1	2011.02	IN	ITIAL ISSUED	ALL	ALL	Sty R

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	PRODUCT SPEC.	MODE NO.	PAGE	3/16
	SFEC.	MC128064B6W-FPTLW		

1. GENERAL SPECIFICATIONS

ITEM	NOMINAL DIMENSIONS / AVAILABLE OPTIONS
DISPLAY FORMAT	128 X 64 DOT MATRIX
LCD PANEL OPTIONS	FSTN (Silver-gray color)
POLARIZER OPTIONS	Positive, Transflective
BACKLIGHT OPTIONS	Edge type LED backlight (White color)
VIEWING ANGLE OPTIONS	6:00 (Bottom)
TEMPERATURE RANGE OPTIONS	Wide temp. range (-20° C ~ 70° C)
CONTROLLER IC	NT7107C+NT7108C
NEGATIVE IC	Built in
DISPLAY DUTY	1/64
DRIVING BIAS	1/9

2. MECHANICAL SPECIFICATIONS

OVERALL SIZE	LED backlight	LED backlight version : 78.0 x 70.0 x max 15.0			mm
VIEWING AREA	62.0W x 44.0H	mm	HOLE-HOLE	68.0W x 65.0H	mm
DOT SIZE	0.40W x 0.56H	mm	DOT PITCH	0.04W x 0.04H	mm
WEIGHT (W/ <mark>O BK</mark> L)	55.0	g	WEIGHT (LED BKL)	<mark>7</mark> 8.0	g

3. ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	CONDITION	MIN	MAX	UNIT
POWER SUPPL <mark>Y (</mark> LOGIC)	Vdd	25°C	-0.3	7.0	V
POWER SUPPLY (LCD)	V0	25°C	Vdd -19.0	Vdd +0.3	V
INPUT VOLTAGE	Vin	25°C	-0.3	Vdd +0.3	V
OPERATING TEMPERATURE	Vopr		-20	70	°C
STORAGE TEMPERATURE	Vstg		-30	80	°C

4. ELECTRONICAL CHARACTERISTIC*

ITEM	EVMDOL	CONDITION	S1	FANDA	RD	UNIT
ITEM	SYMBOL	CONDITION	MIN	ТҮР	MAX	UNII
Input voltage	Vdd	+5V	2.7	5.0	5.5	V
Supply current	ldd	Vdd=5V		2.1		mA
		-20 [°] C	8.40		8.90	
Recommended LCD driving		0°C	8.10		8.55	
voltage for normal temp. Version module	Vdd - V0	25 [°] C	8.00	8.20	8.40	V
		50°C	7.90		8.30	
		70 [°] C	7.75		8.10	
LED forward voltage	Vf	25 [°] C	2.9		3.4	V
LED forward current	lf	25 [°] C		30	40	mA
LED reverse Current	Ir	25 [°] C		20		μA
LED color range	X coordinate	25 [°] C If = 30mA	0.25		0.28	
	Y coordinate	25 [°] C If = 30mA	0.26		0.29	
LED illuminance (Without LCD)	Lv	25 [°] C If = 30mA	200		260	cd/m ²
LED life time		25 [°] C If = 30mA	9K**			Hours

* The above data are for reference only.

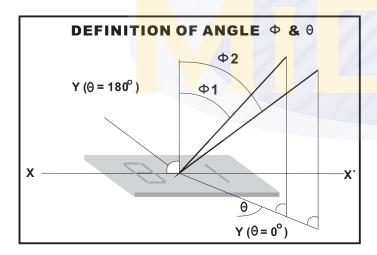
** The warranty period of FORDATA LCD module is 1YEAR counted from the date shown on the label of products. ** If you wanted to drive the LED BKL uninterruptedly exceed 12hours/day, you are not suggested this version

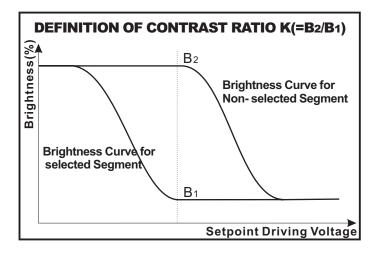
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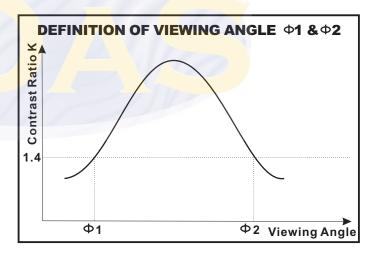
5. OPTICAL CHARACTERISTIC

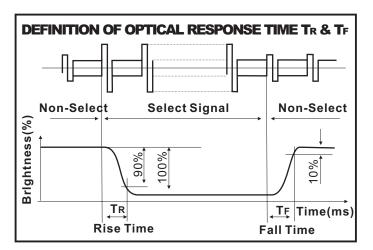
FOR TN TYPE LCD MODULE (TA=25 °C, Vdd=5.0V ± 0.25V)									
ITEM	SYMBOL	CONDITION	MIN	ТҮР	MAX	UNIT			
	Ф 2 –Ф 1	K=4	30			dog			
VIEWING ANGLE	Θ		25			deg			
CONTRAST RATIO	К			2					
RESPONSE TIME(RISE)	TR			120	150	ms			
RESPONSE TIME(FALL)	TF			120	150	ms			

FOR STN TYPE LCD MODULE (TA=25 °C, Vdd=5.0V \pm 0.25V)									
ITEM	SYMBOL	CONDITION	MIN	ТҮР	MAX	UNIT			
	Φ2–Φ 1	K=4	40			dog			
VIEWING ANGLE	Θ		60			deg			
CONTRAST RATIO	К			6					
RESPONSE TIME(RISE)	TR			150	250	ms			
RESPONSE TIME(FALL)	TF			150	250	ms			









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6. DC CHARACTERISTIC

(Unless otherwise stated, VDD= +5V \pm 10%, VSS=0V, Ta=25 °C)

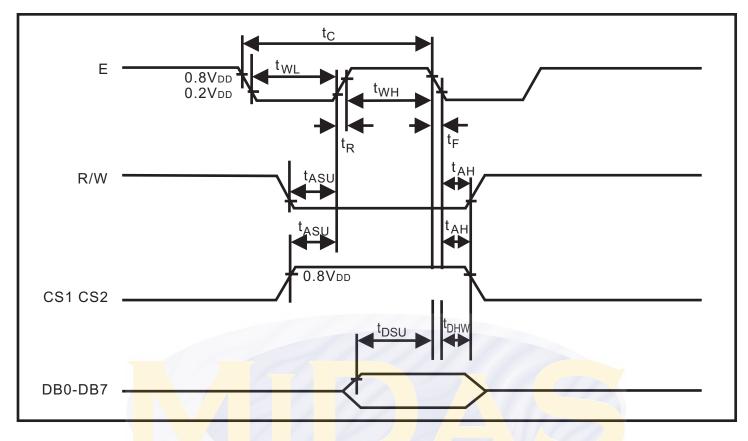
Parameter	Symbol	Condition	Min.	Тур.	Max.	Unit
High Level Input Voltage	VIH1		0.7VDD		VDD	V
	VIH2		0.7VDD		VDD	V
Low Level Input Voltage	VIL1		0		0.3VDD	V
	VIL2		0		0.8	V
High Level Output Voltage	VOH	ΙΟΗ = - 200 μ Α	2.4			V
Low Level Output Voltage	VOL	IOL = 1.6 mA			0.4	V
Input Leakage Current	ILKG	VIN = VDD to VSS	-1.0		1.0	μ Α
Three-State (OFF) Input Current	ITSL	VIN = VDD to VSS	-5.0		5.0	μ
	IDD1	During Display			100	μ
Operating Current	IDD2	During Access, Access Cycle = 1MHz			500	μ

7. AC CHARACTERISTIC

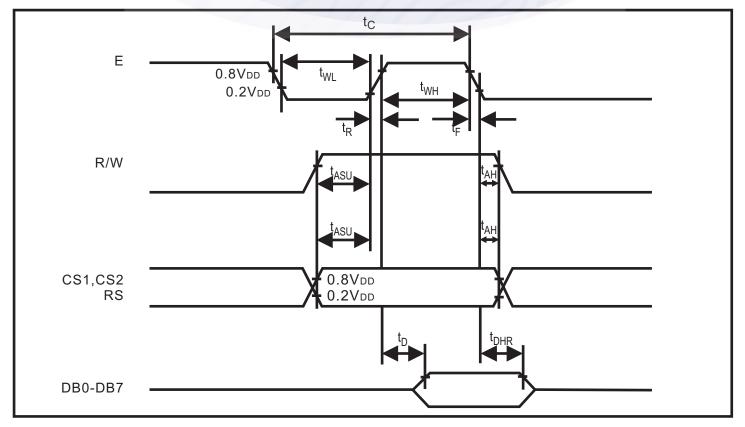
Characteristic	Symbol	Min	Тур	Max	Unit
E Cycle	tc	1000	_	_	ns
E High Level Width	twн	450	_	_	ns
E Low Level Width	t w∟	450	_	_	ns
E Rise Time	t _R	_	_	25	ns
E Fall Time	tr	_	_	25	ns
Address Setup Time	t asu	140	_	_	ns
Address Hold Time	t ah	10	_	—	ns
Data Setup Time	t dsu	200	—	—	ns
Data Delay Time	tD	_	_	320	ns
Data Hold Time (Write)	t dhw	10	_	_	ns
Data Hold Time (Read)	t _{DHR}	20	_		ns

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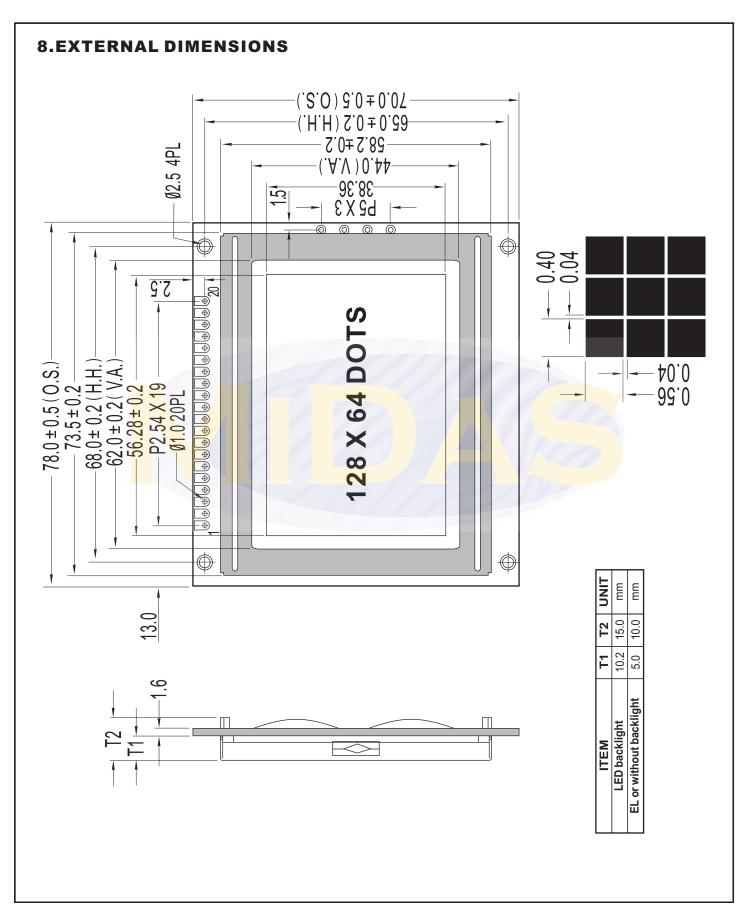
7.1 WRITE MODE TIMING DIAGRAM



7.2 READ MODE TIMING DIAGRAM



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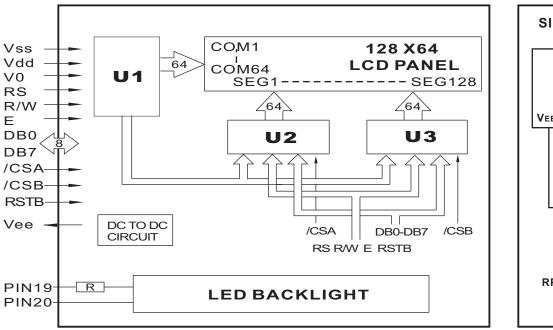


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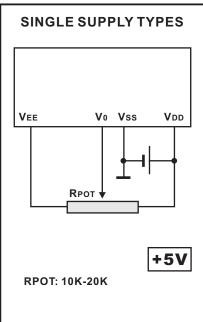
9. PIN ASSIGNMENT

PIN NO.	SYMBOL	FUNCTION		REMARK
1	/CSA	When /CSA=L,/CSB=H, select U2		
2	/CSB	When /CSB=L,	/CSA=H, select U3	
3	Vss		0V	
4	Vdd	Power Supply	+5V	
5	V0		Contrast Adjust	
6	RS	Register	select signal	
7	R/W	Read	I / Write	
8	E	Chip Enable signal		
9	DB0	Data Bit 0		
10	DB1	Data Bit 1		
11	DB2	Data	a Bit 2	
12	DB3	Data	a Bit 3	
13	DB4	Data	a Bit 4	
14	DB5	Data	a Bit 5	
15	DB6	Data	a Bit 6	
16	DB7	Data	a Bit 7	To
17	RSTB	Res <mark>et</mark> signal		
18	Vee	Negative v	oltage output	
19	LED+	Anode o	f LED Unit	5.0V
20	LED-	Cathode	of LED Unit	0V

10. BLOCK DIAGRAM



11. POWER SUPPLY



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12. FUNCTIONAL DESCRIPTION

12.1 RESET

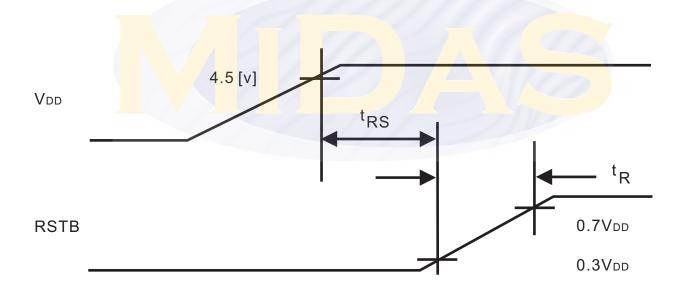
The system can be initialized by setting the RSTB to LOW when turning the power ON or by instruction from the MPU. When the RSTB is set to LOW, the following condition occurs:

- 1. The Display is turned OFF.
- 2. The Display Start Line register is set to 0 (Z-Address 0).

No instructions except the status read can be executed when the RSTB is LOW. This means that in order to execute other instructions, the RSTB must be cleared by setting DB4 to 0 and the DB7 set to 0 by status read instruction.

The table below shows the power supply initial conditions.

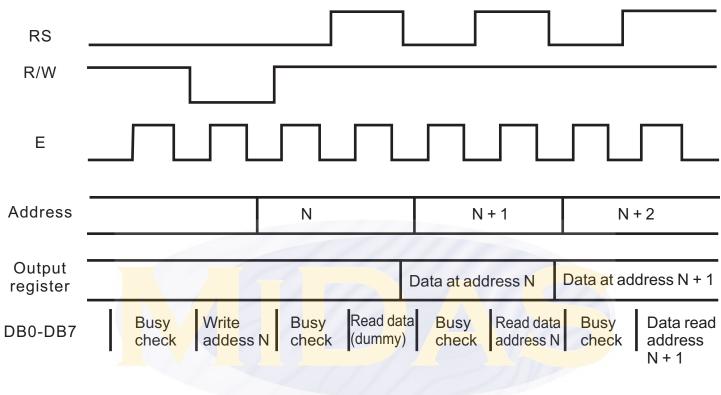
Parameter	Symbol	Min.	Тур.	Max.	Unit
Reset Time	tRS	1.0	-	-	uS
Rise Time	tR	-	-	200	nS



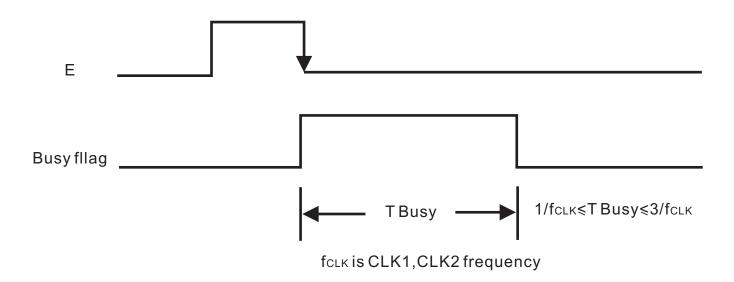
BOOKBINDING AREA									
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12.2 BUSY FLAG

The busy flag (DB7) is used to determine whether Nt7108 is operating or not. When the busy flag is HIGH, internal operation is taking place. When the busy flag is LOW, Nt7108 can accept data or instructions. The busy check diagram is shown below.

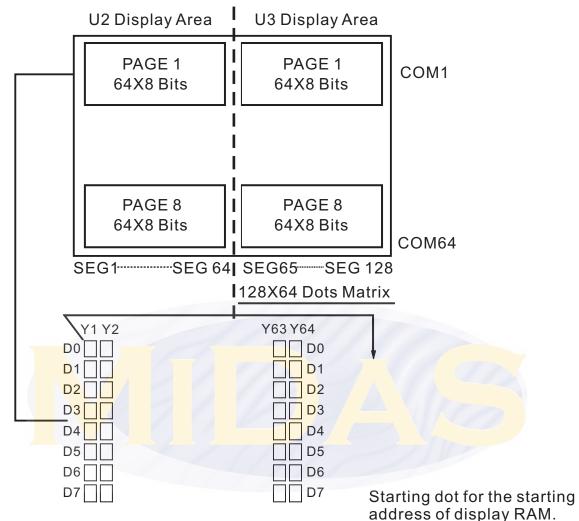


The busy flag diagram is shown below.



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12.3 RELATION BETWEEN DISPLAY PATTERN AND DRIVERS



Each segment driver has 8 pages RAM, and each page has 64x8 bits RAM. D0~D7 are 8 bits transmitted data, where D0 is LSB and D7 is MSB.

12.4 DISPLAY DATA RAM

The Display Data RAM is used to store the display data for the liquid crystal display. Write data 1 is indicates an ON State of the LCDs dot matrix while the OFF State is written as 0. ADC Signal can control the Display Data RAM and the segment output. Please refer to the table below.

ADC *	Display Data
Н	Y-Address 0:S1 to Y-Address 63:S64

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13. INSTRUCTION

Instruction	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Function
Display ON/OFF	L	L	L	L	н н н н ци					Controls the display on or off. Internal status and display RAM data is not affected. L:OFF H:ON	
Set address (Y address)	L	L	L	Н		Υa	addres		Sets the Y address in the Y address counter.		
Set Page (X address)	L	L	Н	L	Н	-7)	Sets the X address at the X address register.				
Display Start Line (Z address)	L	L	Н	Н	20	Disp	lay sta		Indicates the display data RAM displayed at the top of the screen.		
Status Read	L	T	B U S Y		ON / OF F	R E S E T	L	L	L	L	BUSY L:Ready H:In operation ON/OFF L:Display ON H:Display OFF RESET L:Normal H:Reset
Write Display Data	Н	L				Writes data (DB0:7) into display data RAM,After writing instruction,Y address is increased by 1 automatically.					
Read Display Data	Н	Н					Reads data (DB0:7) from display data RAM to the data bus.				

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14. DESCRIPTION OF COMMAND

Display On/Off

RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	0	1	1	1	1	1	D

The display data appears when D is 1 and disappears when D is 0.

Though the data is not on the screen with D=0, it remains in the display data RAM. Therefore, you can make it appear by changing D=0 into D=1.

Set Address(Y Address)

RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	1	AC5	AC4	AC3	AC2	AC1	AC0

Y address (AC0-AC5) of the display data RAM is set in the Y address counter. An address is set by instruction and increased by 1 automatically by read or write operations of display data.

Set Page(X Address)

RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	0	1	1	1	AC2	AC1	AC0

X address (AC0-AC2) of the display data RAM is set in the X address register. Writing or reading to or from MPU is executed in this specified page until the next page is set.

Display Start Line(Z Address)

 RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	1	AC5	AC4	AC3	AC2	AC1	AC0

Z address (AC0-AC5) of the display data RAM is set in the display start line register and displayed at the top of the screen.

When the display duty cycle is 1/64 or others(1/32-1/64), the data of total line number of LCD screen, from the line specified by display start line instruction , is displayed.

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Status Read

RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	Db1	DB0
0	1	BUSY	0	ON/OFF	RESET	0	0	0	0

BUSY

When BUSY is 1,the Chip is executing internal operation and no instructions are accepted. When BUSY is 0,the Chip is ready to accept any instructions.

• ON/OFF

When ON/OFFis 1,the display is off.When ON/OFFis 0,the display is on.

RESET

When RESET is 1, the system is being initialized.

In this condition, no instructions except status read can be accepted. When RESET is 0,initializing has finished and the system is in the usual operation condition.

Write Display Data

RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
1	0	D7	D6	D5	D4	D3	D2	D1	D0

Writes data (D0-D7) into the display data RAM.

After writing instruction, Y address is increased by 1 automatically.

Read Display Data

 RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
1	1	D7	D6	D5	D4	D3	D2	D1	D0

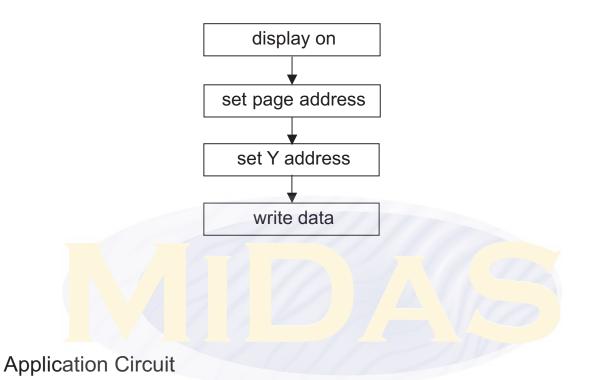
Reads data (D0-D7) from the display data RAM.

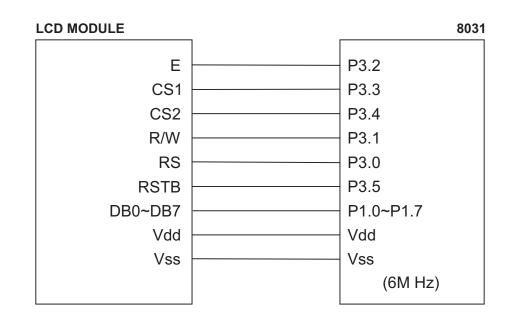
After reading instruction, Y address is increased by 1 automatically.

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15. APPLICATION EXAMPLE

Application Flowchart

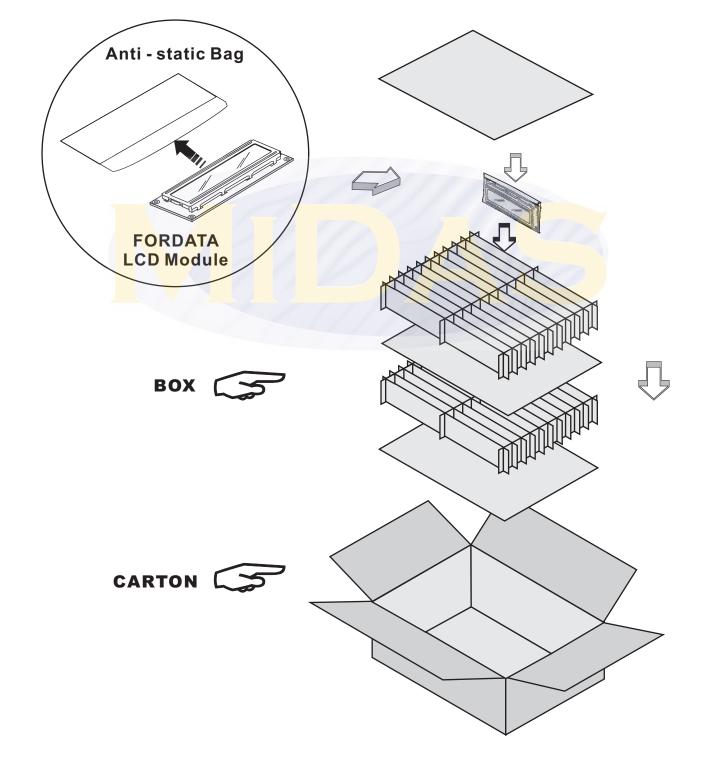




BOOKBINDING AREA						
	PRODUCT	MODE NO.	PAGE	46/46		
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16. PACKING DETAIL

WITH LED BKL	WITHOUT LED BKL	NOTE
30 PCS/BOX	30 PCS/BOX	1. The weight is estimated for reference only.
8 BOXES/CARTON	8 BOXES/CARTON	2. Packing detail may be changed without notice.
240 PCS/CARTON	240 PCS/CARTON	
19.00 KGS/CTN(G.W.)	17.00 KGS/CTN(G.W.)	
0.07 M ³ /CARTON	0.07 M ³ /CARTON	



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