



BOOKBINDING AREA

DOC.

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 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.

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.



RoHS COMPLIANCE

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.



PROTECTION CIRCUIT

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



LONG LIFE VERSION

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"

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STANDARD DOC.	REVISION RECORD	PAGE	1/20				

	NO.	DATE	DESCRIPTION	ITEM	PAGE	APPROVED
Added further information of LED backlight 4 4/20	1	2005.05	INITIAL ISSUED	ALL	ALL	
	2	2007.04	Added further information of LED backlight	4	4/20	Sty &
	2	2007.04				



Midas LCD Part Number System

MC 1	COG 2	13203 3	3 A 4	* 5	6 6	W 7	* 8	* 9	-	S 10	N 11	T 12	L 13	W 14	* 15	* 16
1	=		ч as Compo		U	,	0	5		10	11	12	13	14	13	10
2	=		OB (chip		rd) CO	G: chip	on glas	s								
3	=	No of do	ts	(e.g. 2	40064	= 240 x	64 dot	s)	(e.g. 216	05 = 2	x 16 5m	m C.H.)		
4	=	Series														
5	=	Series Va	ariant:	A to Z	Z – see a	addendı	ım									
6	=	3: 3 o'clo	ock	6: 6 0 ³	clock	9): 9 o'cl	ock	1	2 : 12 o'	clock					
7	=	S: Norm	al (0 to +	50 deg	C) W :	Wide to	emp. (-	20 to +	70 de	eg C) Xa	Exten	ded tem	p (-30 -	+ 80 De	gC)	
8	=	Characte	er Set													
		C: Chine: CB: Chin H: Hebr K: Europ L: Englis M: Europ R: Cyrill W: Euro	pean (std) sh/Japano pean (Eng	fied (Gr (Graph) (Engli ese (spec glish/Sc glish/G	aphic I iic Disp sh/Gerr cial) candina re <mark>ek</mark>)	Displays olays on man/Fro vian)	ly) ench/G									
9	=	Bezel He	eight (whe	ere appl	icable /	' availal	ble)									
		Blank 2 3 4 5 6 7 8 9 A B D E F G	Top of c 9.5mm / applical 8.9 mm 7.8 mm 7.8 mm 7.8 mm 7.8 mm 7.8 mm 6.4 mm 5.5 mm 6.4 mm 5.5 mm 6.0 mm 4.7 mm 3.7 mm	of PCB / not ble	o Top	(via an Com Sep Com Sep Com Sep Com Sep Sep Sep Com	amon pins 1 d 2) amon arate amon arate amon arate amon arate arate arate arate arate arate arate arate	Arn or E L Arn Arn Arn Arn Arn Arn Ed Ed Ed Ed Ed Ed Ed	dge it ray ray ray ray ray ge ge ge ge ge ge		5					
10	=	T: TN S	: STN B:	STN B	lue G:	STN G	rey F:	FSTN	F2: F	FSTN						
11	=	P: Positi	ve N: Ne	gative												
12	=	R: Refle	ctive M:	Transm	issive	T: Tran	sflectiv	ve								
13	=	Backligh	ıt: Blank:	Reflec	tive L	LED										
14	=	Backligh	t Colour:	Y: Ye	llow-G	reen W	: White	e B: Bl	ue R:	Red A	: Ambe	er 0: Or	ange G :	Green	RGB: 1	R.G.B.
15	=	Driver C	hip:	Blank	: Stand	lard I	: I ² C	T: Tosh	iba T	C6963C	A: Av	ant SA	P1024B	R: R	aio RA	6963

16 = Voltage Variant: e.g. 3 = 3v

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1. GENERAL SPECIFICATIONS

ITEM	NOMINAL DIMENSIONS / AVAILABLE OPTIONS
DISPLAY FORMAT	122 X 32 DOT MATRIX
LCD PANEL OPTIONS	STN (Yellow-Green color)
POLARIZER OPTIONS	Positive, Transflective
BACKLIGHT OPTIONS	Array type LED backlight (Yellow-Green color)
VIEWING ANGLE OPTIONS	6:00 (Bottom)
TEMPERATURE RANGE OPTIONS	Wide temperature range (- 20 \degree C ~ 70 \degree C)
CONTROLLER IC	AVANT
DISPLAY DUTY	1/32
DRIVING BIAS	1/7

2. MECHANICAL SPECIFICATIONS

OVERALL SIZE	LED backlight v	LED backlight version : 84.0 x 44.0 x max 15.0						
VIEWING AREA	64.0W x 17.9H	mm	HOLE-HOLE	76.0W x 36.0H	mm			
DOT SIZE	0.40W x 0.45H	mm	DOT PITCH	0.04W x 0.04H	mm			
WEIGHT (EL BKL)	86.0	g	WEIGHT (LED BKL)	105.0	g			

3. ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	CONDITION	MIN	MAX	UNIT
POWER SUPPLY (LOGIC)	Vdd	25°C	-0.3	7.0	V
POWER SUPPLY (LCD)	V0	25°C	Vdd -13.5	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	SYMBOL	CONDITION	S1	ANDAI	RD	UNIT
	STMBUL	CONDITION	MIN	ТҮР	MAX	UNII
Input voltage	Vdd	+5V	4.7	5.0	5.5	V
Supply current	ldd	Vdd=5V		0.9		mA
		-20 [°] C	4.10		4.50	
Recommended LCD driving		O°C	4.20		4.50	
voltage for normal temp.	Vdd - V0	25 [°] C	4.20	4.40	4.50	v
Version module		50°C	4.10		4.45	
		70°C	3.90		4.40	
LED forward voltage	Vf	25 [°] C	4.0	4.2	4.4	V
LED forward current	lf	25 [°] C		120		mA
LED reverse Current	lr	25°C			600	μA
LED Peak wave length	λρ	25°C lf = 120mA	568		575	nm
LED illuminance (Without LCD)	Lv	25°C lf = 120mA	158	198		cd/m ²
LED life time		25 [°] C If = 120mA	9K**			Hours

* The above data are for reference only.

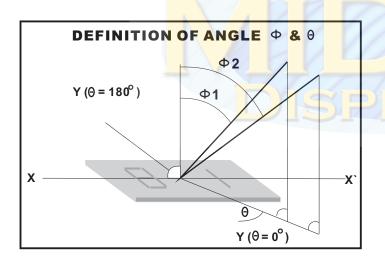
** If you wanted to drive the LED BKL uninterruptedly exceed 12hours/day, you are not suggested this version

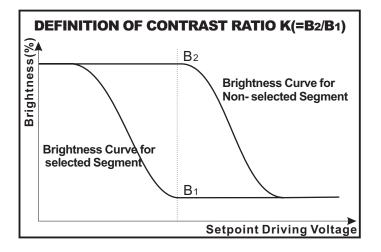
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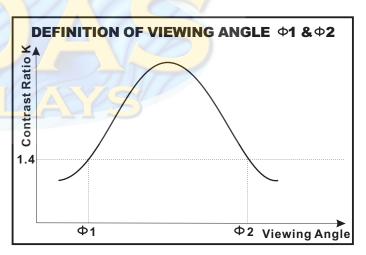
5. OPTICAL CHARACTERISTICS

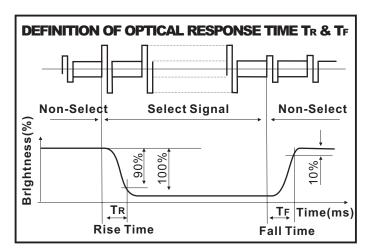
FOR TN TYPE LCD MODULE (TA=25°C, Vdd=5.0V ± 0.25V)										
ITEM	SYMBOL	CONDITION	MIN	ТҮР	MAX	UNIT				
	Φ2–Φ 1		30			dog				
VIEWING ANGLE	Θ	K=4	25			deg				
CONTRAST RATIO	К			2						
RESPONSE TIME(RISE)	TR			120	150	ms				
RESPONSE TIME(FALL)	TF			120	150	ms				

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 – A	40			deg				
VIEWING ANGLE	Θ	K=4	60			ueg				
CONTRAST RATIO	К			6						
RESPONSE TIME(RISE)	TR			150	250	ms				
RESPONSE TIME(FALL)	TF			150	250	ms				









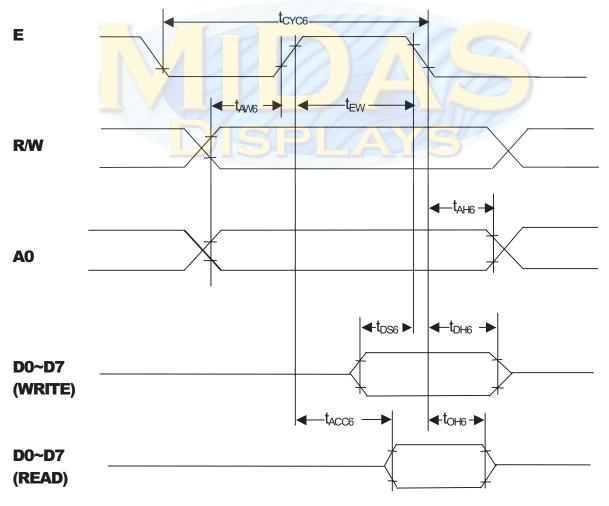
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6. AC CHARACTERISTIC

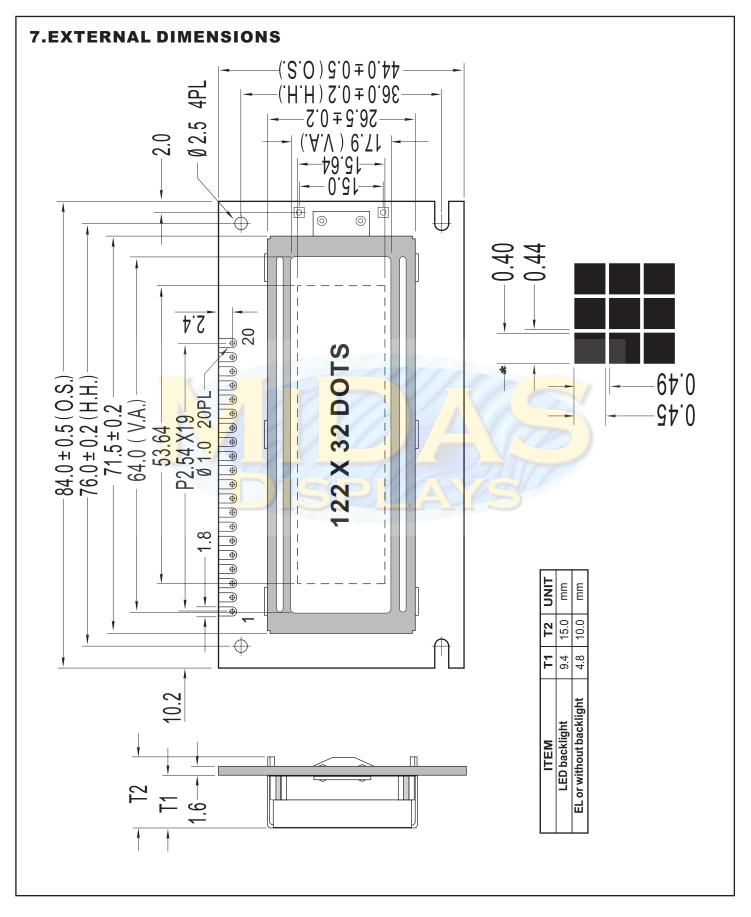
			(С
10%,V _{SS} =0\	/	00	. 76	\sim
		- /II ~	+/5	(.

Parame	eter	Symbol	Min	Max	Condition	Unit
Address set up	time	t _{AV6}	20	—		ns
Address hold time		t _{AH6}	10			ns
System cycle time		t _{CYC6}	1000			ns
E pulse width	Read	+	100	—		ns
	Write	t _{EW}	80			ns
Data set up time	;	t _{DS6}	80			ns
Data hold time		t _{DH6}	10	—		ns
Access time		t _{ACC6}		90	C _L =100pF	ns
Output disable ti	me	t _{OH6}	10	60		ns

*Input signal rise time and fall time are less than 15ns.



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PRODUCT SPEC.

UCT MODE NO.

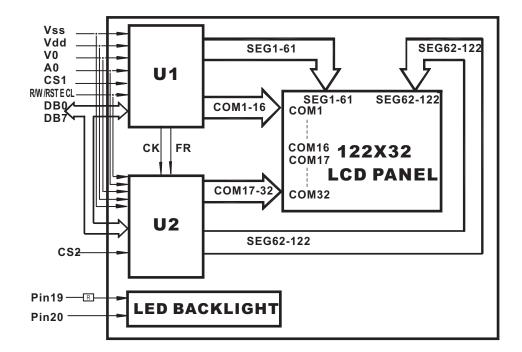
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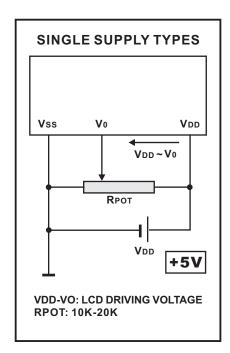
8. PIN ASSIGNMENT

PIN NO.	SYMBOL	FUN	FUNCTION				
1	Vss		0V				
2	Vdd	Power Supply	+5V				
3	V0		Contrast Adjust				
4	A0	H/L H: Data; L:	Instruction code				
5	CS1	Chip 1 E	nable signal				
6	CS2	Chip 2 E	nable signal				
7	CL	Clock In	put (2K Hz)				
8	E	Enat	Enable Signal				
9	R/W	Read	Read / Write				
10	DB0	Dat	a Bit 0				
11	DB1	Dat	a Bit 1				
12	DB2	Dat	a Bit 2				
13	DB3	Dat	a Bit 3				
14	DB4	Data	a Bit 4				
15	DB5	Data	a Bit 5				
16	DB6	Dat	a Bit 6				
17	DB7	Dat	a Bit 7				
18	RST	Rese	t Signal				
19	LED+	Anode of	of LED Unit	+5V			
20	LED-	Cathode	of LED Unit	0V			

9.1 . BLOCK DIAGRAM

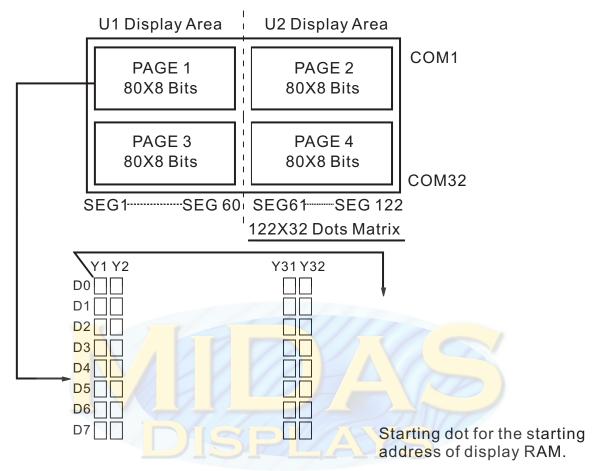


9.2. POWER SUPPLY

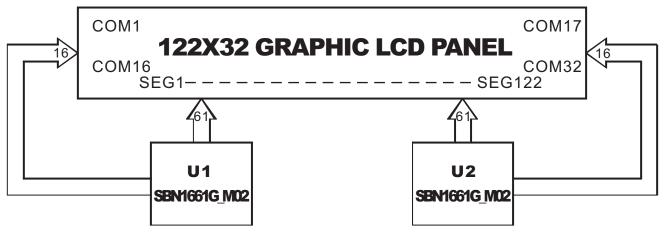


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10. RELATION BETWEEN DISPLAY PATTERN AND DRIVERS



Each segment driver has 4 pages RAM, and each page has 80x8 bits RAM. D0~D7 are 8 bits transmitted data, where D0 is LSB and D7 is MSB.



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11. INSTRUCTIONCODE

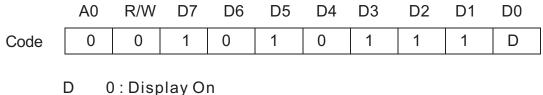
Instruction	A0	R/W	D7	D6	D5	D4	D3	D2	D1	D0	Desc	cription
Display on/off	0	0	1	0	1	0	1	1	1	0/1	Whole dia 1: on 0:	•
Display Start line	0	0	1	1	0	DISPL	AY STA	RT AD	DRESS	5 (1-31)	Determine th correspond to	•
Page address set	0	0	1	0	1	1	1	0		age -3)	Set the page of	disp data RAM
Column address set	0	0	0	С	olur	nn ac	dres	ss(0-	79)		Set the column data RAM	address of disp
Status read	0	1	B U S Y	A D C	0 Z ~ 0 F F	R E S E T	0	0	0	0	BUSY 0: ready 1: working ADC 0: counter clockwise 1; clockwise output ON/OFF 0: disp on 1: disp RESET 0; normal 1: rese	
Write display data	1	0				Write	data	1	1		Write data to disp RAM Read data from disp RAM	
Read display data	1	1				Read	l data	a				
ADC select	0	0		0	3	0	0	0	0	0/1	Determine the of the disp RA 0: clockwise o 1: counter cloc	utput
Static drive on/off	0	0	1	0	1	0	0	1	0	0/1	Select the dyr driving 1: stati	amic or static
Duty ratio select	0	0	1	0	1	0	1	0	0	0/1	Select the 0: 1/16	duty ratio 1: 1/32
Read Modify write	0	0	1	1	1	0	0	0	0	0	Increment the column address register when writing but no change when reading	
END	0	0	1	1	1	0	1	1	1	0	Release from the Read Modify Write mode	
Reset	0	0	1	1	1	0	0	0	1	0	Set the display register to 1st register to 3.	
Power save (dual command)	0 0	0 0	1 1	0 0	1 1	0 0	1 0	1 1	1 0	0 1	Set the power selecting disp driving on.	save mode by off and static

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12. INSTRUCTION DESCRIPTION

A. Display On / Off

This is instruction executes whole display On/Off no relation with the data in the Display Data RAM and internal conditions.



1: Display Off

When the static driving mode is selected (static drive On) in display Off status, the internal circuits put on the power save mode.

B. Display Start Line

This instruction set the line address. The selected line in the Display Data RAM correspond to the COM0 which display at the top of LCD panel

The display area is set automatically from the selected line to the line which increased the one or page switching are available by this instruction.

		R/W								
Code	0	0	1	1	0	A 4	A 3	A 2	A 1	A 0

A4	A3	A2	A1	A0	Line Address
0	0	0	0	0	0
				1	1
1	1	1	1	0	1E
1	1	1	1	1	1F

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C. Page Address Set

When MPU access the display Data RAM, the page address corresponded to the row address must be selected.

The access in the display Data RAM is available by setting the page and column address. The display is no change when the page address is changed.

		R/W								
Code	0	0	1	0	1	1	1	0	A1	A0

A1	A0	Page
0	0	0
0	1	1
1	0	2
1	1	3

D. Column Address Set

A0

0

R/W

0

D7

0

This instruction set the column address in the Display Data RAM. When the MPU access the Display Data RAM continuously, the column address increase 1 automatically, therefore, the MPU can access the data only without address setting. The increment of the column address is stopped by the address of 50H automatically, but the page address is no change even if the column address increase to 50H and stop.

<u> </u>	
Code	

D6	D5	D4	D3	D2	D1	D0
A6	A5	A4	A3	A2	A1	A0

A6	A5	A4	A3	A2	A1	A0	ColumnAdd.
0	0	0	0	0	0	0	0
0	0	0	0	0	0	1	1
1	0	0	1	1	1	0	4E
1	0	0	1	1	1	1	4F

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E. Status Read

This instruction read out the internal status.

	A0	R/W	/ D7	D6	D5	D4	D3	D2	D1	D0
Code	0	1	BUSY	ADC	ON/OF	RESET	0	0	0	0

BUSY: BUSY=1 indicate the operating or the Reset cycle The instruction can be input after the BUSY status change to 0.

- ADC: Indicate the output correspondence of column (segment) address and segment driver.
 - 0: Counter clockwise Output (Inverse) Column Address 79 - n ------ Segment Driver n
 - 1: Clockwise Output (Normal) Column Address n ----- Segment Driver n

ON/OF: Indicate the whole display On / Off status.

- 0 : Whole Display On
- 1: Whole Display Off
- (Note) The data 0 = On and 1 = Off of Display On/ Off status read out is inverted with the Display On/Off instruction data of 1 = On and 0 = Off
- RESET: Indicate the initialization period by reset instruction.

0: _____ 1:Initialization Period

F. Write Display Data

This instruction write the 8-bit data on the data bus into the Display RAM. The column (segment) address increase 1 automatically when writing, therefore, the MPU can write the 8-bit data into the Display Data RAM without address setting.

	A0	R/W	D7	D6	D5	D4	D3	D2	D1	D0
61SEG	1	0				Write	Data			

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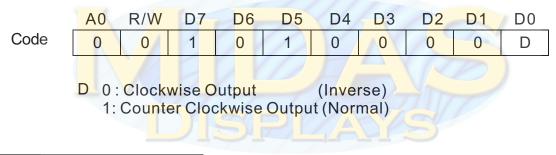
G. Read Display Data

This instruction read out the 8-bit data from Display Data RAM which addressed by the column and page address. In case of the Read Modify Write Mode is Off, the column address increase 1 automatically after each read out, therefore, the MPU can read out the 8-bit data from the Display Data RAM continuously without address setting.

	A0	R/W	D7	D6	D5	D4	D3	D2	D1	D0
Code	1	1				Read	l Data			

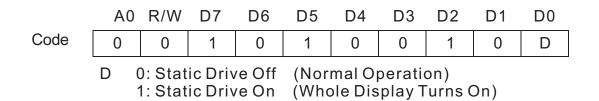
H. ADC Select

This instruction set the correspondence of column address in the Display Data RAM and segment driver out. Therefore, the order fo segment output can be changed by the software, and no restriction of the LSI placement against the LCD panel.



I. Static Drive On/ Off

This instruction executes the all common output terms on and whole display on obligatory

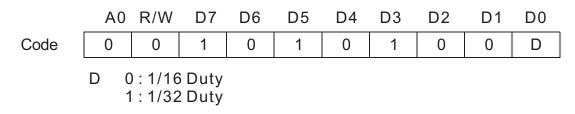


When the Display Off mode is selected (Display Off) in Static Driver On status, the internal circuits put on the power save mode.

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J. Duty ratio Select

This instruction set the LCD driving duty ratio.



K. Read Modify Write

After this instruction is executed, the column address increase 1 automatically when Display Data Write Instruction execution, but the address is not changed when the Display Data Read Instruction execution.

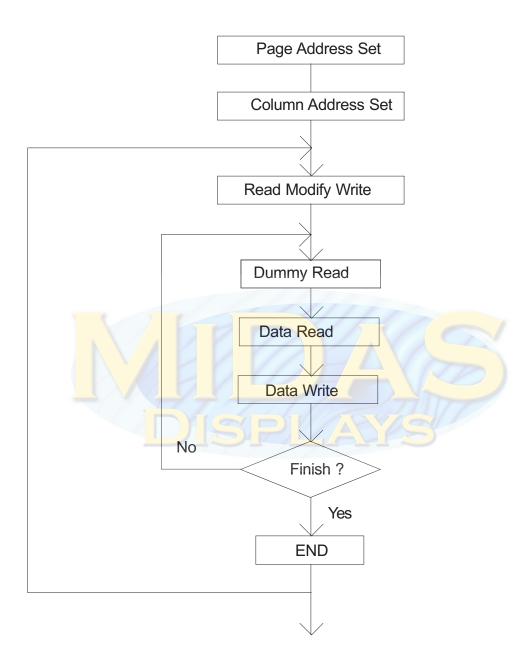
This status continues during End instruction execution. When the End instruction is entered the column address back to the address where Read Modify Write instruction entering. By this function, the load of MPU for example cyclic data writing operation like as cursor blink etc., can be reduced.

	A 0	R/W	D7	D6	D5	D4	D3	D2	D1	D0
Code	0	0	1		517	0	0	0	0	0
				\mathbb{Z}		46	YP.			

(Note) During the Read Modify Write mode, any instruction except Column Address Set can be executed.

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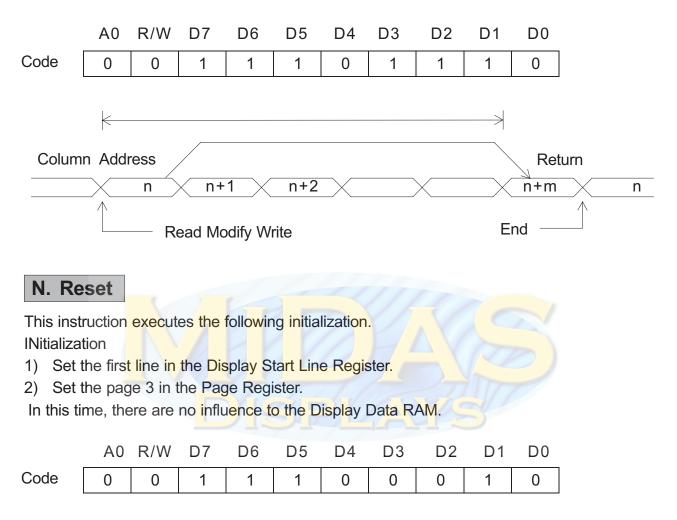
L. Sequence of cursor display



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M. End

This instruction release the Read Modify Write mode and the column address back to the address where the Read Modify Write mode setting.



(Note) The initialization when the power terms on can not be executed by Reset instruction

O. Power Save (Dual Command)

When both of Display Off and Static Drive On are executed, the internal put on the power save mode and the current consumption is reduced as same as stand by current. The internal status in this mode are as following:

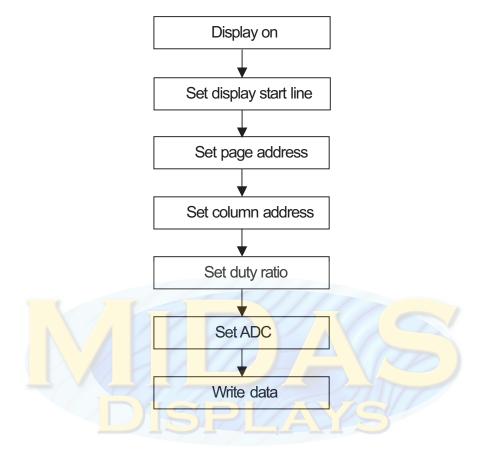
- 1) Stop the LCD driving. Segment and Common drivers output Vdd level
- 2) Stop the oscillation or inhibit the external clock input
- 3) Keeping the display data and operating mode.

The power save mode is released by Display on or static drive off instruction.

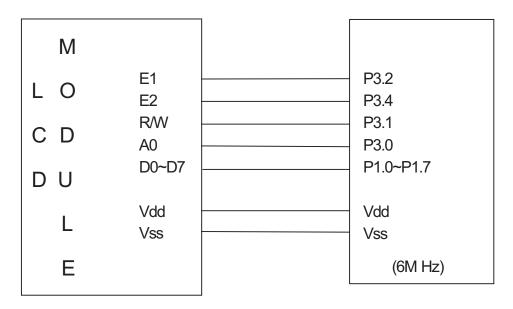
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13. APPLICATION EXAMPLE

Application Flowchart

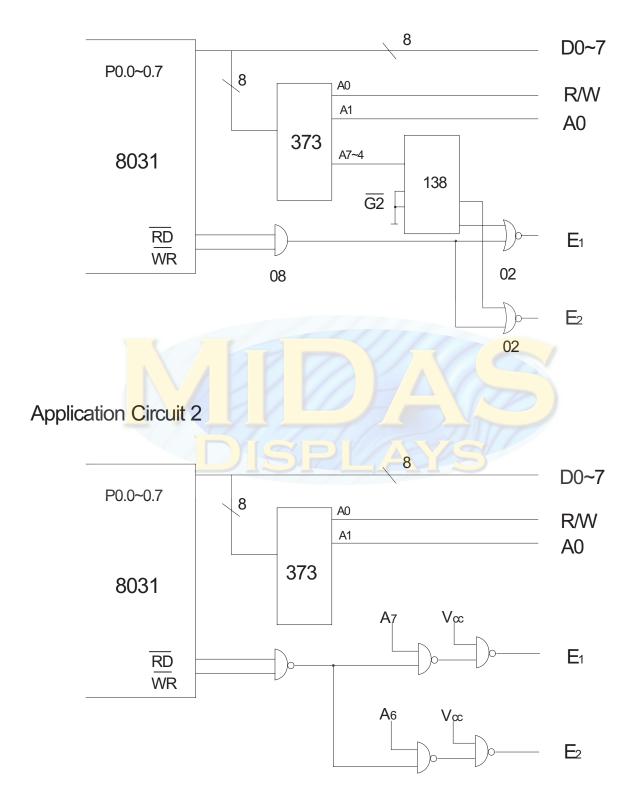


Application Circuit



BOOKBINDING AREA						
	PRODUCT SPEC.	MODE NO.	PAGE	19/20		

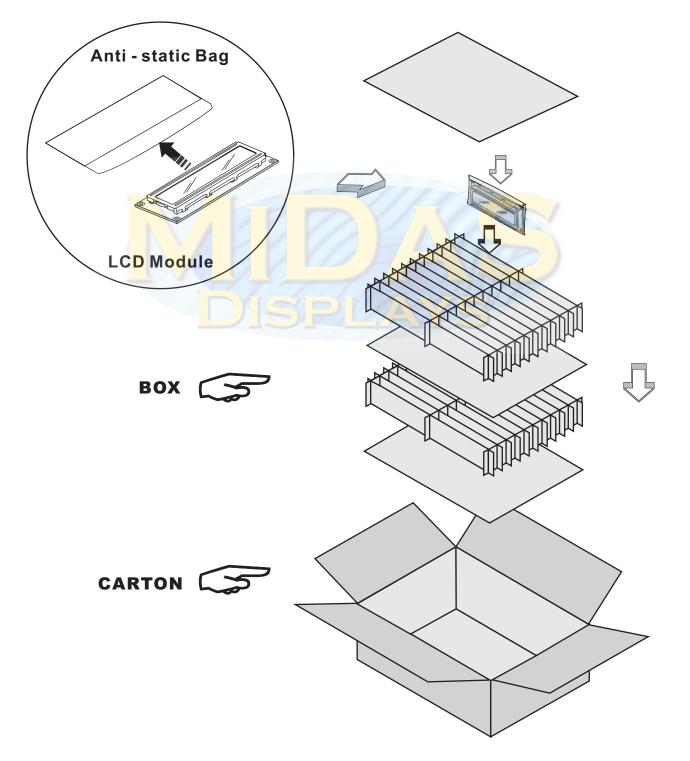
Application Circuit 1



BOOKBINDING AREA					
	PRODUCT SPEC.	MODE NO.	PAGE	20/20	

14. PACKING DETAIL

WITH LED BKL	WITHOUT LED BKL	NOTE
45 PCS/BOX	45 PCS/BOX	1. The weight is estimated for reference only.
10 BOXES/CARTON	10 BOXES/CARTON	2. Packing detail may be changed without notice.
450 PCS/CARTON	450 PCS/CARTON	
20.00 KGS/CTN(G.W.)	18.00 KGS/CTN(G.W.)	
0.07 M ³ /CARTON	0.07 M ³ /CARTON	



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