

# SPECIFICATION CHARACTER TYPE DOT MATRIX LCD MODULE



ITEM NUMBER: FDCC4002B-FLYGBW-51XE

ESTABLISHED DATE: 1999.06 INITIAL ISSUED DATE: 2005.05

CHECKED BY: WU WEIJIA

APPROVED BY: LU BOO



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		•	2000.00				MITIAL 1000LD ALL ALL	MITIAL 1000LD ALL ALL LOS



NUMBER SYSTEM

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
FD	С	С	08	01	A	F	L	Y	Y	В	W	5	2	Х	E

No.	REMARKS	DESCRIPTION					
1	COMPANYABBRAVIATED	FD = FORDATA					
2	IC packing	C = Chip On Board G = Chip On Glass T = TAB N = NO IC					
3	LCM type	C = Character G = Graphic					
4	Chyaracter	08, 10, 12, 16, 20, 24, 40, = Character number Per line					
4	Graphic	80, 100, 120, 122, 128, 160 = Row Dots Quantity					
_	Character	01, 02, 04, = Character Lines					
5	Graphic	32, 64, 80, 128, 160 =Column Dots Quantity					
6	Serial Number	A~Z					
7	Polarizer type	R = Positive Reflective F = Positive Transflective M = Positive Transmissive N = Negative Transmissive E = Negative, Transflective					
8	Backlight type	N = No Backlight L = Array Type LED Backlight E = EL backlight without Invertor C = CCFL backlight without Invertor T = CCFL backlight with Invertor					
9	Backlight color	N = No BacklightY = Yellow-GreenW = WhiteR = RedA = AmberC = Blue-GreenB = BlueG = Green					
10	LCD panel type	T = TN H = HTN Y = Yellow-Green STN G = Gray STN B = Blue STN F = FSTN					
11	Viewing angle	B = Bottom 6:00 T = Top 12:00 R = Right 3:00 L = Left 9:00					
12	Operation temperature range	$S = 0^{\circ}C \sim 50^{\circ}C$ (Single Supply Voltage) $D = 0^{\circ}C \sim 50^{\circ}C$ (Dual Supply Voltage) $W = -20^{\circ}C \sim 70^{\circ}C$ (Single Supply Voltage) $H = -20^{\circ}C \sim 70^{\circ}C$ (Dual Supply Voltage) $E = -30^{\circ}C \sim 80^{\circ}C$ (Single Supply Voltage)					
13	Driving Voltage	1: VIcm = 3.0V, No / EL / CCFL Backlight or VIcm = 3.0V, VIed = LED voltage, (Via AK) 2: VIcm = 3.6V, VIed = 5.0V (Not via AK) 3: VIcm = 3.6V, VIed = LED voltage, (Not via AK) 4: VIcm = 5.0V, VIed = LED voltage, (Not via AK) 5: VIcm = 5.0V, VIed = 5.0V (Not via AK) 6: VIcm = 5.0V, No / EL / CCFL Backlight or VIcm = 5.0V, VIed = LED voltage, (Via AK) 7: VIcm = 3.6V, No / EL / CCFL Backlight or VIcm = 3.6V, VIed = LED voltage, (Via AK) 8: VIcm = 3.0V, VIed = 5.0V 9: VIcm = 3.0V, VIed = LED voltage, (Not via AK)					
14	Backlight Connect Method	0 = PIN1 LED-, PIN2 LED+ 1 = PIN15(17/19) LED+, PIN16(18/20) LED- 2 = PIN15(17/19) LED-, PIN16(18/20) LED+ 3 = PIN15(17/19) LED+, PIN16(18/20) NC 4 = PIN15(17/19) NC, PIN16(18/20) LED+ 5 = PINA LED+, PINK LED- 6 = No / EL / CCFL Backlight					
15	IC Manufacturer	X = SAMSUNG L = SUNPLUS S = SITRONIX T = TOSHIBA E = EPSON H = HOLTEK Q = ASLIC N = CIMTEK P = PRINCETON					
16	Font Set	R = English - Russia E = English - Japanese U = English - Europe H = English - Hebrew K = English - Europe N = NO FONT SET					

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## 1. GENERAL SPECIFICATIONS

ITEM	NOMINAL DIMENSIONS / AVAILABLE OPTIONS
DISPLAY FORMAT	40 Characters by 2 Lines
LCD PANEL OPTIONS	STN (Gray color)
POLARIZER OPTIONS	Positive, Transflective
BACKLIGHT OPTIONS	Array type LED backlight (Yellow-green color)
VIEWING ANGLE OPTIONS	6:00 ( Bottom )
TEMPERATURE RANGE OPTIONS	Wide temp. range ( -20°C ~ 70°C )
CONTROLLERIC	SAMSUNG
DISPLAY DUTY	1/16
DRIVING BIAS	1/5

# 2. MECHANICAL SPECIFICATIONS

OVERALL SIZE	LED backlight ve	LED backlight version: 182.0 x 33.5 x max 14.0							
VIEWING AREA	152.5W x 16.5H	152.5W x 16.5H mm <b>HOLE-HOLE</b> 175.0W x 26.5H r							
CHARACTER SIZE	3.20W x 5.55H	mm	CHARACTER PITCH	0.50W x 0.40H	mm				
DOT SIZE	0.60W x 0.65H	mm	DOT PITCH	0.05W x 0.05H	mm				

## 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	S	UNIT				
ITEN	STWIBUL	CONDITION	MIN	TYP	MAX			
Input voltage	Vdd	+5V	4.7	5.0	5.5	V		
Supply current	ldd	Vdd=5V		2.0	4.0	mA		
Recommended LCD driving		0°C	4.7	5.0	5.5			
voltage for normal temp.	Vdd - V0	25°C	4.3	4.5	4.7	V		
Version module		50°C	4.1	4.3	4.5			
LED forward voltage	VF	25°C		4.2	4.6	٧		
LED forward current	IF	25°C		300		mA		



SPEC.

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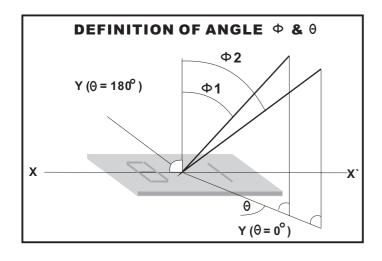
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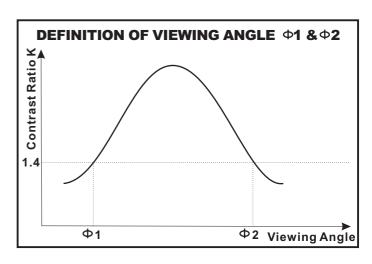
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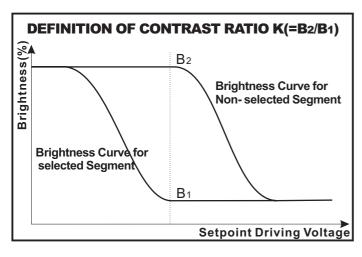
## 5. OPTICAL CHARACTERISTIC

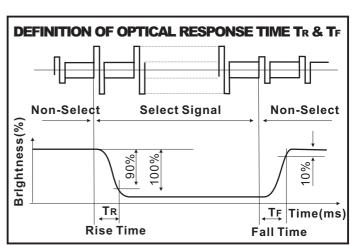
FOR TN TYPE LCD MODULE (Ta=25°C, Vdd=5.0V ± 0.25V)									
ITEM SYMBOL CONDITION MIN TYP MAX UNIT									
VIEWING ANGLE	Ф2 – Ф1	K=4	30			deg			
VIEWING ANGLE	Θ	- <b>N=4</b>	25			ueg			
CONTRAST RATIO	K			2					
RESPONSE TIME(RISE)	<b>T</b> R			120	150	ms			
RESPONSE TIME(FALL)	<b>T</b> F			120	150	ms			

FOR STN TYPE LCD MODULE (TA=25 °C, Vdd=5.0V ± 0.25V)										
ITEM SYMBOL CONDITION MIN TYP MAX UNIT										
VIEWING ANGLE	Ф2 – Ф1	K=4	40			deg				
VIEWING ANGLE	Θ	K=4	60			ueg				
CONTRAST RATIO	K			6						
RESPONSE TIME(RISE)	<b>T</b> R			150	250	ms				
RESPONSE TIME(FALL)	TF			150	250	ms				











# 6. ELECTRICAL SPECIFICATIONS

# 6.1 DC CHARACTERISTICS ( VDD = 4.5V to 5.5V, TA = 25 $^{\circ}$ C )

CHARACTERISTICS	CVMPOL		LIMIT		UNIT	TEST CONDITION	
CHARACTERISTICS	STWIBUL	MIN.	TYP.	MAX.	UNII	TEST CONDITION	
INPUT HIGH VOLTAGE	VIH1	2.2		Vdd	V	Pins ( E. RS. R/W. DB0 - DB7 )	
INPUT LOW VOLTAGE	VIL1	-0.3		0.6	V	FIIIS ( E. N.S. N/W. DBU - DB1 )	
INPUT HIGH CURRENT	Іін	-1.0		1.0	μΑ	Pins ( RS. R/W. DB0 - DB7 )	
INPUT LOW CURRENT	liL	-50	-125	-250	μΑ	Vdd = 5.0V	
OUTPUT HIGH VOLTAGE (TTL)	Vон1	2.4			V	Iон = - 0.1mA Pins: DB0 - DB7	
OUTPUT LOW VOLTAGE (TTL)	Vol1			0.4	V	IoL = 0.1mA Pins: DB0 - DB7	

# 6.2 AC CHARACTERISTICS ( VDD = 4.5V to 5.5V, TA = 25 °C )

## Write mode

CHARACTERISTICS	SYMBOL		LIMIT		LINUT	TEST CONDITION	
CHARACTERISTICS	STWIBUL	MIN.	TYP.	MAX.	UNIT	1EST CONDITION	
ENABLE CYCLE TIME	tc	500			ns	Pin E	
ENABLE PULSE WIDTH	tpw	230			ns	Pin E	
ENABLE RISE/ FALL TIME	tr, tr			20	ns	Pin E	
ADDRESS SETUP TIME	tsp1	40			ns	Pins RS, R/W, E	
ADDRESS HOLD TIME	tHD1	10			ns	Pins RS, R/W, E	
DATA SETUP TIME	tsp2	80			ns	Pins: DB0 - DB7	
DATA HOLD TIME	tHD2	10			ns	Pins: DB0 - DB7	

## Read mode

CHARACTERISTICS	CVMDOL		LIMIT		LINIT	TEST CONDITION
CHARACTERISTICS	STWIDUL	MIN.	TYP.	MAX.	UNIT	1E31 CONDITION
ENABLE CYCLE TIME	tc	500			ns	Pin E
ENABLE PULSE WIDTH	tpw	230			ns	Pin E
ENABLE RISE/ FALL TIME	tr, tr			20	ns	Pin E
ADDRESS SETUP TIME	tsp1	40			ns	Pins RS, R/W, E
ADDRESS HOLD TIME	tHD1	10			ns	Pins RS, R/W, E
DATA OUTPUT DELAY TIME	to			120	ns	Pins: DB0 - DB7
DATA HOLD TIME	tHD2	5			ns	Pins: DB0 - DB7

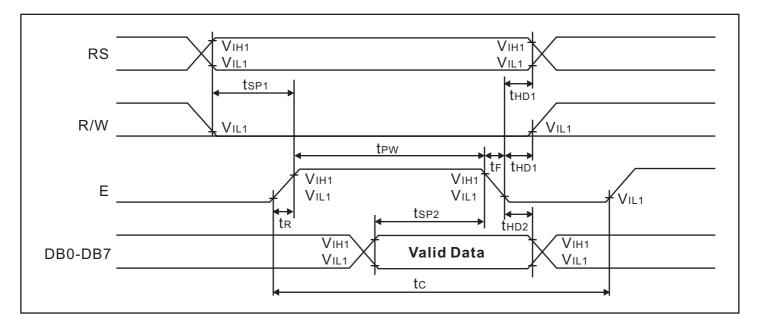


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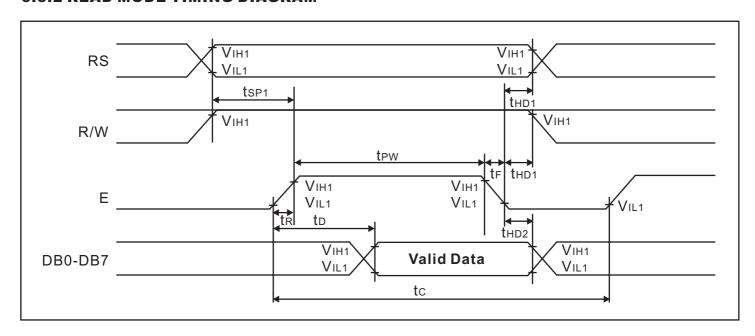
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## **6.3.1 WRITE MODE TIMING DIAGRAM**



## **6.3.2 READ MODE TIMING DIAGRAM**



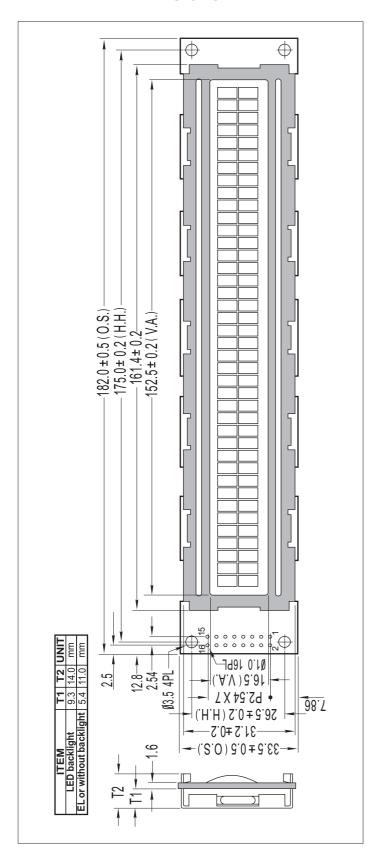


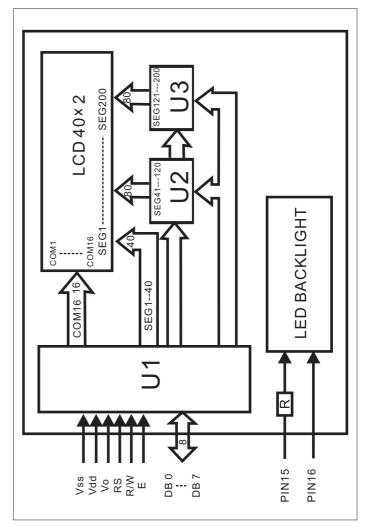
MODE NO. FDCC4002B-FLYGBW-51XE

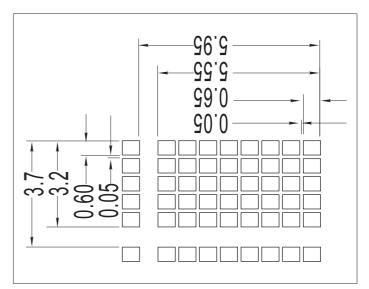
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## 7. EXTERNAL DIMENSIONS









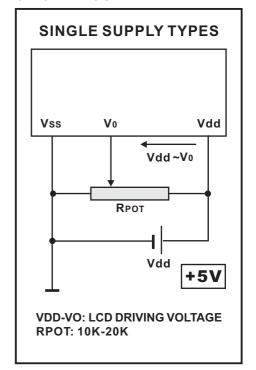
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## **8.PIN ASSIGNMENT**

PIN	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	Power supply for LCM (+5.0V)
3	V0	Contrast Adjust
4	RS	Register Select Signal
5	R/W	Data Read / Write
6	E	Enable Signal
7-14	DB0 - DB7	Data bus line
15	LED+	Power supply for BKL (+5.0V)
16	LED-	Power supply for BKL (0V)

## **9.POWER SUPPLY**



## 10. REFLECTOR OF SCREEN AND DDRAM ADDRESS

Display position	1-1	1-2	1-3	1-4	1-5	1-6	1-7	1-8	1-9	1-10
DDRAM address	00	01	02	03	04	05	06	07	08	09
Display position	1-11	1-12	1-13	1-14	1-15	1-16	1-17	1-18	1-19	1-20
DDRAM address	0A	0B	0C	0D	0E	0F	10	11	12	13
Display position	1-21	1-22	1-23	1-24	1-25	1-26	1-27	1-28	1-29	1-30
DDRAM address	14	15	16	17	18	19	1A	1B	1C	1D
Display position	1-31	1-32	1-33	1-34	1-35	1-36	1-37	1-38	1-39	1-40
DDRAM address	1E	1F	20	21	22	23	24	25	26	27
Display position	2-1	2-2	2-3	2-4	2-5	2-6	2-7	2-8	2-9	2-10
DDRAM address	40	41	42	43	44	45	46	47	48	49
Display position	2-11	2-12	2-13	2-14	2-15	2-16	2-17	2-18	2-19	2-20
DDRAM address	4A	4B	4C	4D	4E	4F	50	51	52	53
Display position	2-21	2-22	2-23	2-24	2-25	2-26	2-27	2-28	2-29	2-30
DDRAM address	54	55	56	57	58	59	5A	5B	5C	5D
Display position	2-31	2-32	2-33	2-34	2-35	2-36	2-37	2-38	2-39	2-40
DDRAM address	5E	5F	60	61	62	63	64	65	66	67

<sup>1-1</sup> means first character of line 1 on screen



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# 11. INSTRUCTION TABLE

				Inst	ructio	on Co	de					Execution
Instruction	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description	Time(fosc= 270kHz)
Clear Display	0	0	0	0	0	0	0	0	0	1	Write 20H to DDRAM set DDRAM address to 00H from AC	1.53ms
Return Home	0	0	0	0	0	0	0	0	1	-	Set DDRAM address to 00H from AC and return cursor to its original position if shifted. The contents of DDRAM are not changed.	1.53ms
Entry Mode Set	0	0	0	0	0	0	0	1	I/D	SH	Assign cursor moving direction and enable the shift of entire display	39 µs
Display ON/OFF Control	0	0	0	0	0	0	1	D	С	В	Set display(D) cursor(C) and blinking of cursor(B) on/off	39 µs
Cursor or Display Shift	0	0	0	0	0	1	S/C	R/L	-	-	Set cursor moving and display shift control bit, and the direction, without changing DDRAM data	39 µs
Function Set	0	0	0	0	1	DL	N	F	-	1	Set interface data length(DL:8bit/4bit), number of display line (N:2line/1line) and,display font type F:5X11dots / 5X8dots	39 µs
Set CGRAM Address	0	0	0	1	AC5	AC4	AC3	AC2	AC1	AC0	Set CGRAM address in address counter	39 µs
Set DDRAM Address	0	0	1	AC6	AC5	AC4	AC3	AC2	AC1	AC0	Set DDRAM address in address counter	39 µs
Read Busy Flag and Address	0	1	BF	AC6	AC5	AC4	AC3	AC2	AC1	AC0	Whether during internal operation or not can be known by reading BF The contents of address counter can also be read	0 µs
Write Data to RAM	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Write data into internal RAM (DDRAM/CGRAM)	43 µs
Read data from RAM	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Read data from internal RAM (DDRAM/CGRAM)	43 µs



#### 12. INSTRUCTION DESCRIPTION

# A. Clear Display

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

Clear all the display data by writing 20H (space code) to all DDRAM address, and set DDRAM address to 00H into AC (address counter).

Return cursor to the original status, namely, bring the cursor to the left edge on the first line of the display.

Make the entry mode increment (I/D = HIGH)

# **B.** Return Home

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

Set DDRAM address to 00H into the address counter.

Return cursor to its original site and return display to its original status,if shifted. Contents of DDRAM does not change.

# C. Entry Mode Set

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

Set the moving direction of cursor and display.

# I/D:Increment /decrement of DDRAM address(cursor or blink)

I/D=High,cursor/blink moves to right and DDRAM address is increased by 1.

I/D=low,cursor/blink moves to left and DDRAM address is decreased by 1.

\*CGRAM operates the same way as DDRAM, when reading from or writing to CGRAM.

## SH:Shift of entire display

When DDRAM read (CGRAM read/write) operation or SH=Low,shifting of entire display is not performed.if SH=High, and DDRAM write operation,shift of entire display is performed according to I/D value(I/D=High,shift left, I/D=Low, shift right).



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# D. Display ON/OFF Control

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

# D:Display ON/OFF control bit

When D=High, entire display is turned on.

When D=Low, display is turned off, but display data remains in DDRAM.

## C:Cursor ON/OFF control bit

When C=High, cursor is turned on.

When C=Low, cursor is disappeared in current display, but I/D register preserves its data.

## **B:Cursor Blink ON/OFF control bit**

When B=High, cursor blink is on, which performs alternately between all the High data and display characters at the cursor position.

When B=Low ,blink is off.

# E. Cursor or Display Shift

RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	0	0	1	S/C	R/L	•	-

Shifting of right/left cursor position or display without writing or reading of display data.

This instruction is used to correct or search display data.

During 2-line mode display, cursor moves to the 2<sup>nd</sup> line after the 40<sup>th</sup> digit of the 1<sup>st</sup> line.

Note that display shift is performed simultaneously in all the lines.

When displayed data is shifted repeatedly, each line is shifted individually.

When display shift is performed, the contents of the address counter are not changed.

S/C	R/L	Operation
0	0	Shift cursor to the left, AC is decreased by 1
0	1	Shift cursor to the right, AC is increased by 1
1	0	Shift all the display to the left, cursor moves according to the display
1	1	Shift all the display to the right, cursor moves according to the display



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# F. Function set

RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	0	1	DL	N	F	-	-

# DL:Interface data length control bit

When DL=High, it means 8-bit bus mode with MPU.

When DL=Low, it means 4-bit bus mode with MPU.

When 4-bit bus mode, it needs to transfer 4-bit data twice.

# N:Display line number control bit

When N=Low, 1-line display mode is set.

When N=High, 2-line display mode is set.

## F:Display font type control bit

When F=Low, 5x8 dots format display mode is set.

When F=High, 5x11 dots format display mode.

# G. Set CGRAM Address

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

Set CGRAM address to AC.

This instruction makes CGRAM data available from MPU.

# H. Set DDRAM Address

RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	AC6	AC5	AC4	AC3	AC2	AC1	AC0

Set DDRAM address to AC.

This instruction makes DDRAM data available from MPU.

When 1-line display mode (N=Low), DDRAM address is from 00H to 4FH In 2-line display mode(N=High), DDRAM address in the 1st line is from 00H to 27H and DDRAM address in the 2<sup>nd</sup> line is from 40H to 67H



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# Read Busy Flag & Address

RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	1	BF	AC6	AC5	AC4	AC3	AC2	AC1	AC0

This instruction shows whether IC is in internal operation or not.

If BF is High, internal operation is in progress and shall wait until BF is to be Low, which by then the next instruction can be performed. In this instruction you and also read the value of the address counter.

# Write data to RAM

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

Write binary 8-bit data to DDRAM/CGRAM.

The selection of RAM from DDRAM, and CGRAM, is set by the previous address set instruction(DDRAM address set, CGRAM address set).

RAM set instruction can also determine the AC direction to RAM.

After write operation, the address is automatically increased /decreased by 1,according the entry mode.

# K. Read data from RAM

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

Read binary 8-bit data from DDRAM/CGRAM.

The selection of RAM is set by the previous address set instruction. If the address set instruction of RAM is not performed before this instruction, the data that has been read first is invalid, as the direction of AC is not yet determined. If RAM data is read several times without RAM address instructions set before read operation, the correct RAM data can be obtained from the second. But the first data would be incorrect, as there is no time margin to transfer RAM data.



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In case of DDRAM read operation, cursor shift instruction plays the same role as DDRAM address set instruction, it also transfers RAM data to output data register.

After read operation, address counter is automatically increased/decreased by 1 according to the entry mode.

After CGRAM read operation, display shift may not be executed correctly.

Note:In case of RAM write operation,AC is increased/decreased by 1 as in read operation.

At this time, AC indicates the next address position, but only the previous data can be read by the read instruction.

### 13. RELATIONSHIP BETWEEN CHARACTER CODE AND CGRAM

	Character code 7 D6 D5 D4 D3 D2 D1 D0					C	GR	AM	Ad	dre	SS			CG	RAI	M D	ata			Pattern		
D7	D6	D5	D4	D3	D2	2 D1	D0	A5	A4	А3	A2	A1	Α0	P7	P6	P5	P4	P3	P2	P1	P0	number
0	0	0	0	Х	0	0	0	0	0	0	0	0	0	Х	Χ	Χ	0	1	1	1	0	pattern 1
											0	0	1	Х	Χ	Х	1	0	0	0	1	
									:		0	1	0	Х	Χ	Х	1	0	0	0	1	
											0	1	1	Х	Χ	Х	1	1	1	1	1	
											1	0	0	Х	Χ	Х	1	0	0	0	1	
											1	0	1	Х	Χ	Х	1	0	0	0	1	
											1	1	0	Х	Χ	Х	1	0	0	0	1	
											1	1	1	Х	Χ	Χ	0	0	0	0	0	
0	0	0	0	Х	1	1	1	0	0	0	0	0	0	Х	Х	Х	1	0	0	0	1	pattern8
											0	0	1	Х	Χ	Х	1	0	0	0	1	
											0	1	0	Х	Χ	Х	1	0	0	0	1	
											0	1	1	Х	Χ	Х	1	1	1	1	1	
											1	0	0	Х	Χ	Х	1	0	0	0	1	
											1	0	1	Х	Χ	Х	1	0	0	0	1	
											1	1	0	Х	Χ	Х	1	0	0	0	1	
											1	1	1	Х	X	X	0	0	0	0	0	

## 14. DISPLAY DATA RAM(DDRAM)

DDRAM stores display data of maximum 80x8 bits(80 characters). DDRAM address is set in the address counter(AC) as a hexadecimal number

MSB						LSB
AC6	AC5	AC4	AC3	AC2	AC1	AC0

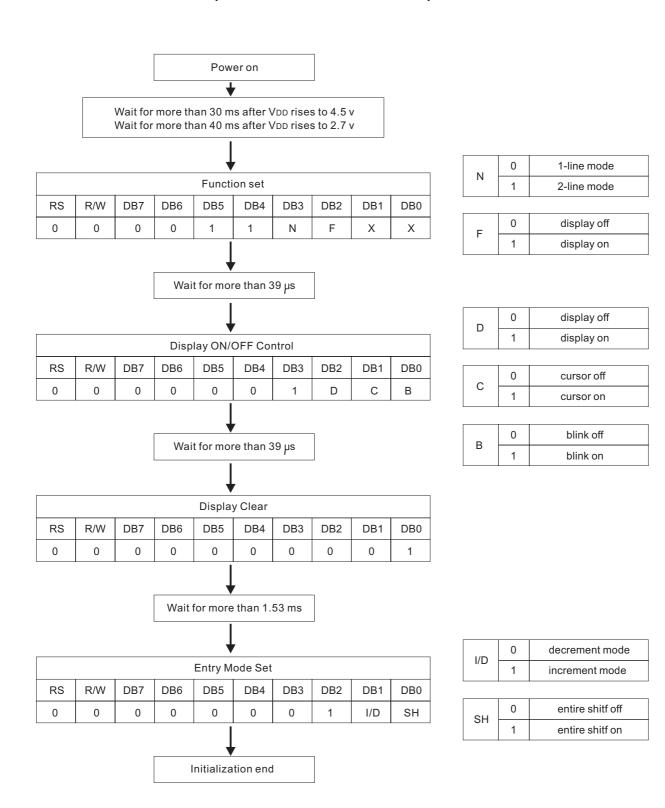


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#### 15. INITIALIZATION

## 15.1 8-bit interface mode (Condition: fosc = 270KHZ)



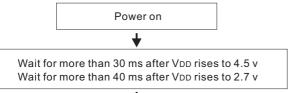


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# 15.2 4-bit interface mode (Condition: fosc = 270KHZ)



Function set (4-bit mode change)									
RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	0	1	DL	Х	Х	Х	Х
			•	1	7				

Wait for more than 39 µs

Function set (display mode set)									
0	0	0	0	1	0	Х	Х	Х	Х
0	0	N	F	Х	Х	Х	Х	Х	Х

Wait for more than 39 µs

	Display ON/OFF Control								
RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	0	0	0	Х	Х	Х	Х
0	0	1	D	С	В	Х	Х	Х	Х

Wait for more than 39  $\mu s$ 

Display Clear									
RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	0	0	0	Х	Х	Х	Х
0	0	0	0	0	1	Х	Х	Х	Х

Wait for more than 1.53 ms

	Entry Mode Set								
RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	0	0	0	X	Х	Х	Х
0	0	0	1	1/D	SH	Х	Х	Х	Х

Initialization end

DI	0	4-bit mode
DL	1	8-bit mode

N	0	1-line mode					
	1	2-line mode					

F	0	display off					
	1	display on					

D	0	display off				
	1	display on				

С	0	cursor off				
	1	cursor on				

В	0	blink off					
	1	blink on					

I/D	0	decrement mode						
	1	increment mode						

SH	0	entire shitf off					
	1	entire shitf on					

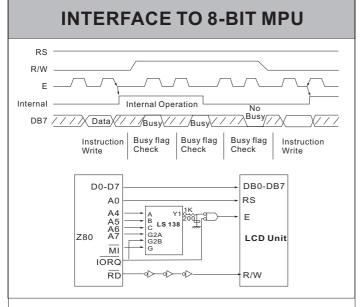


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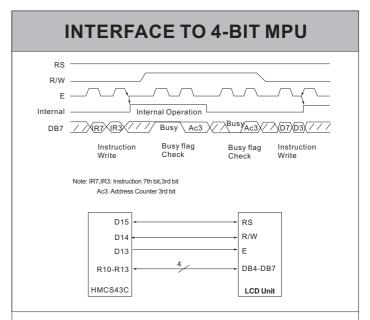
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#### **16.INTERFACE TO MPU**





Data transfer is made through all 8 bus lines from DB0 to DB7



#### If Interface Data Is 4-bit Long

Data transfer is accomplished through 4 bus lines from DB4 to DB7. (while the rest of 4 bus lines from DB0 toDB3 are not used.)

Data transfer is completed when 4-bits of data is transferred twice.(upper 4-bits of data, then lower 4-bits of data.)

## **Features**

- 1. Interface to an 8-bit or 4-bit MPU is available.
- 2. 192 types of alphanumeric, symbols and special characters can be displayed with the built - in character generator (ROM).
- 3. Other preferred characters can be displayed by character generator (RAM).
- 4. Various instructions may be programmed.
  - Clear display
  - Cursor at home
  - On/Off cursor
  - Blink character
  - Shift display
  - Shift cursor
  - Read/Write display data .etc.
- 5. Compact and light weight design which can easily be integrated into end products.
- 6. Single power supply +5V drive (except for extended temperature type).
- 7. Low power consumption.



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## **17. STANDARD FONT MAP**

Linnari										I	I	I		I	I	
Upper 4bit Lower 4bit	LLLL	LLLH	LLHL	LLHH	LHLL	LHLH	LHHL	LHHH	HLLL	HLLH	HLHL	HLHH	HHLL	ннцн	HHHL	
LLLL	CG RAM (1)															
LLLH	(2)															
LLHL	(3)															
LLHH	(4)															
LHLL	(5)															
LHLH	(6)															
LHHL	(7)															
LHHH	(8)															
HLLL	(1)															
HLLH	(2)															
HLHL	(3)															
HLHH	(4)															
HHLL	(5)															
HHLH	(6)															
HHHL	(7)															
нннн	(8)															



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#### **18. PACKING DETAIL**

#### WITH LED BKL

15 PCS/BOX

10 BOXES/CARTON

150 PCS/CARTON

18.00 KGS/CTN(G.W.)

0.07 M³/CARTON

## WITHOUT LED BKL

15 PCS/BOX

10 BOXES/CARTON

200 PCS/CARTON

17.00 KGS/CTN(G.W.)

0.07 M³/CARTON

#### **NOTE**

- 1. The weight is estimated for reference only.
- 2. Packing detail may be changed without notice.
- 3. FORDATA prefer 200PCS order quantity to 250PCS for full packing cause.

