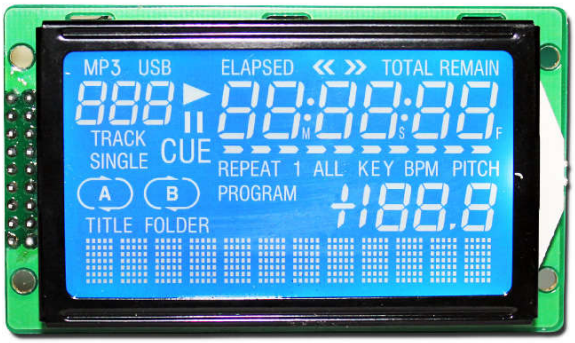
液晶显示模块使用手册

FM16220



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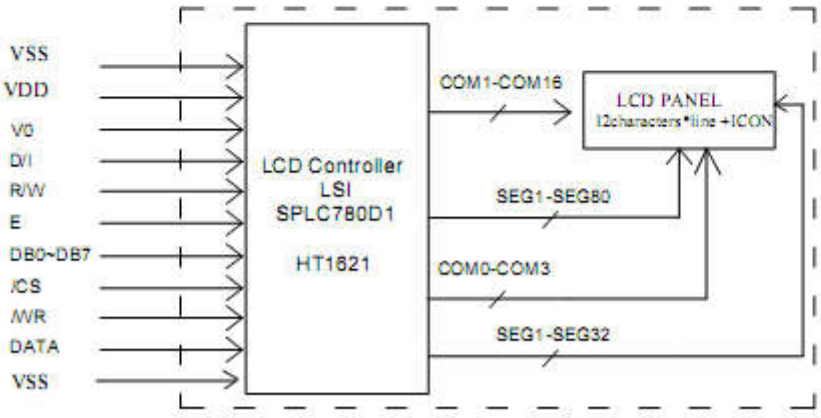
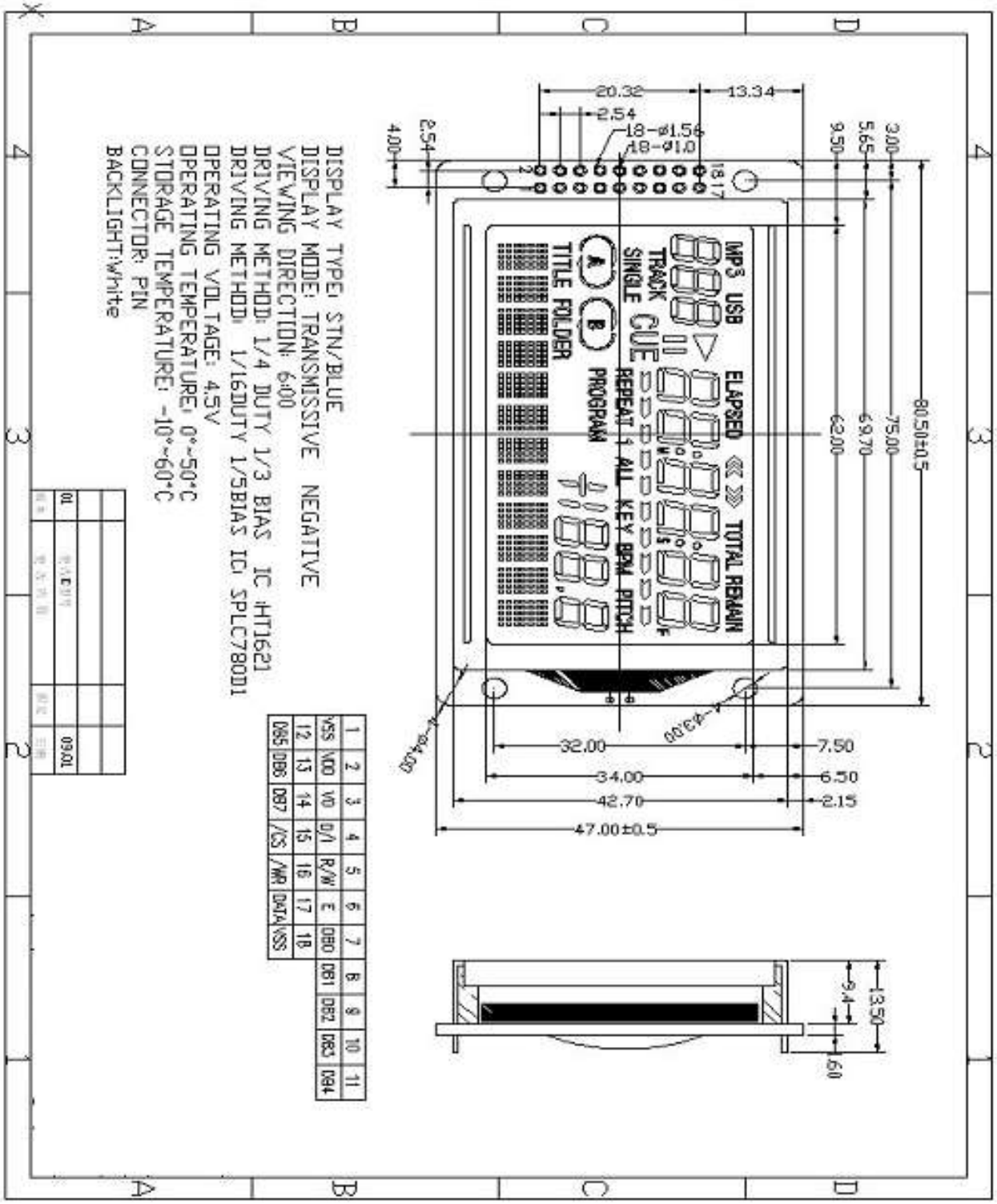
1.FUNCTION & FEATURES

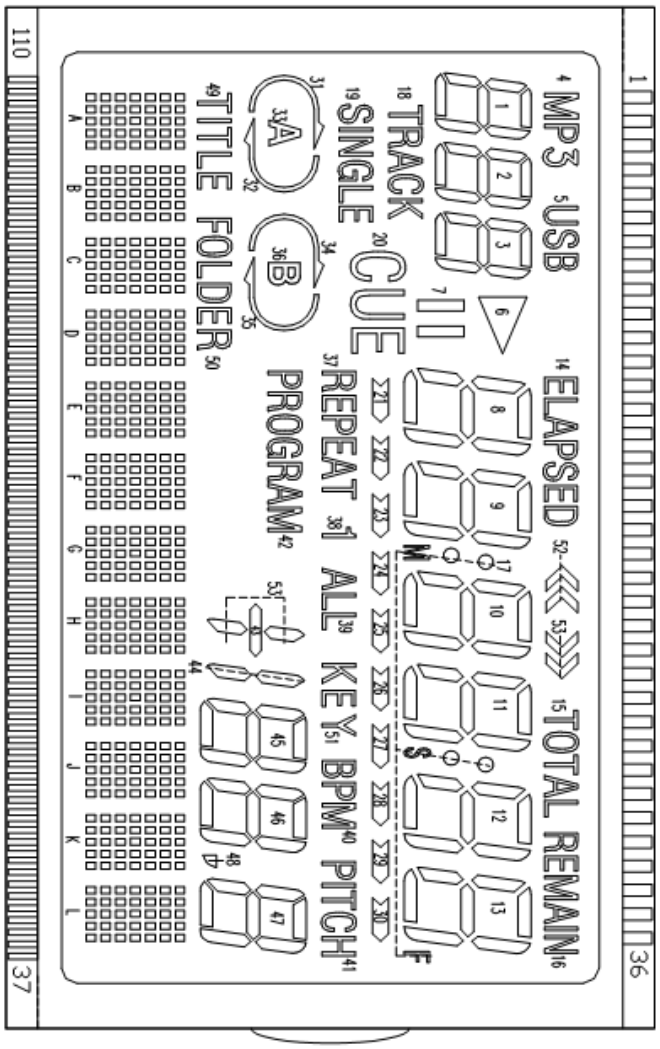
ITEM	Normal dimensions
Display Format	12characters*1 lines 5*7 dots +ICON
Module dimension	80.5(W)*47.0(H)*13.5（MAX）(T)
Viewing area	62.0(W)* 34.0(H)
Duty/bias	1/16Duty,1/5Bias AND 1/4DUTY,1/3BIAS
LCD mode	STN / Negative
Viewing direction	6 O'clock
Driver	HT1621 / SPLC780D1

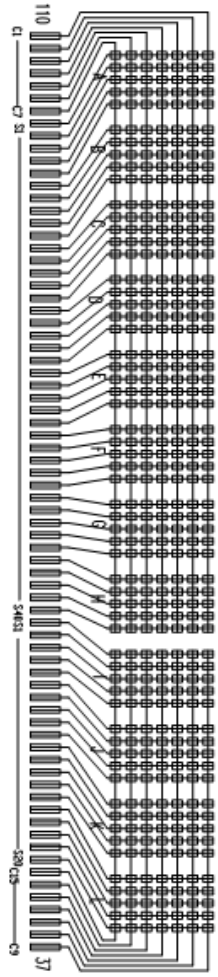
2.BLOCK DIAGRAM



3.DIMENSIONAL OUTLINE OR TABLE





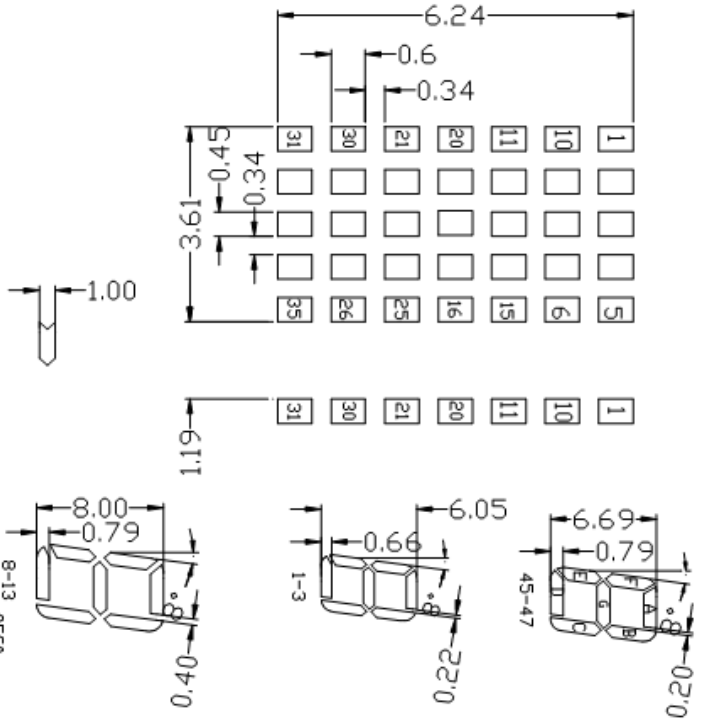


PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
COM1	COM1				50	49	18	1D	1C	2D	2C	3D	3C	8D	8C	9D	9C	10D	10C	11D	11C	12D	12C	13D	13C	48	27	21	17	47C	47D	46C	46D	45C	45D	44
COM2		COM2			51	35	19	1E	1G	2E	2G	3E	3G	8E	8G	9E	9G	10E	10G	11E	11G	12E	12G	13E	13G	28	26	22	37	47G	47E	46G	46E	45G	45E	53
COM3			COM3		33	36	20	1F	1B	2F	2B	3F	3B	8F	8B	9F	9B	10F	10B	11F	11B	12F	12B	13F	13B	29	25	23	38	47B	47F	46B	46F	45B	45F	43
COM4				COM4	32	34	7	1A	4	2A	5	3A	6	8A	14	9A	52	10A	53	11A	15	12A	16	13A		30	24	39	42	41	47A	40	46A	5I	45A	

COM1 COM4 SEG31

HT1621

SEG0



4.PIN DESCRIPTION

Pin no.	Symbol	Function
1	VSS	Ground
2	VDD	Power Supply +5V
3	V0	Contrast Adjustment
4	D/I	Register Selection Input 1 = Data Register 0 = Instruction Register (for WRITE) Busy flag address counter (for READ)
5	R/W	Read/Write signal input is used to select the read/write mode High = Read mode, Low = Write mode
6	E	Start enable signal to read or write the data
7~14	DB0~DB7	LCD Data Port. Used for data transfer between the MPU and the LCD module. DB7 can be used as a busy flag.
15	/CS	Chip select
16	/WR	Write clock input
17	DATA	Serial data input
18	VSS	Ground

5.MAXIMUM ABSOLUTE LIMIT (T=25℃)

Item	Symbol	Standard value			Unit
		Min.	typ.	max.	
Power supply voltage for logic	V_{DD}	-0.3	5.0	5.3	V
Driver supply voltage for LCD	V_{LCD}	-0.3	4.5	4.8	V
Operating temperature	Topr	0	-	+50	°C
Storage temperature	Tstg	-10	-	+60	°C

Note: Voltage greater than above may damage the module

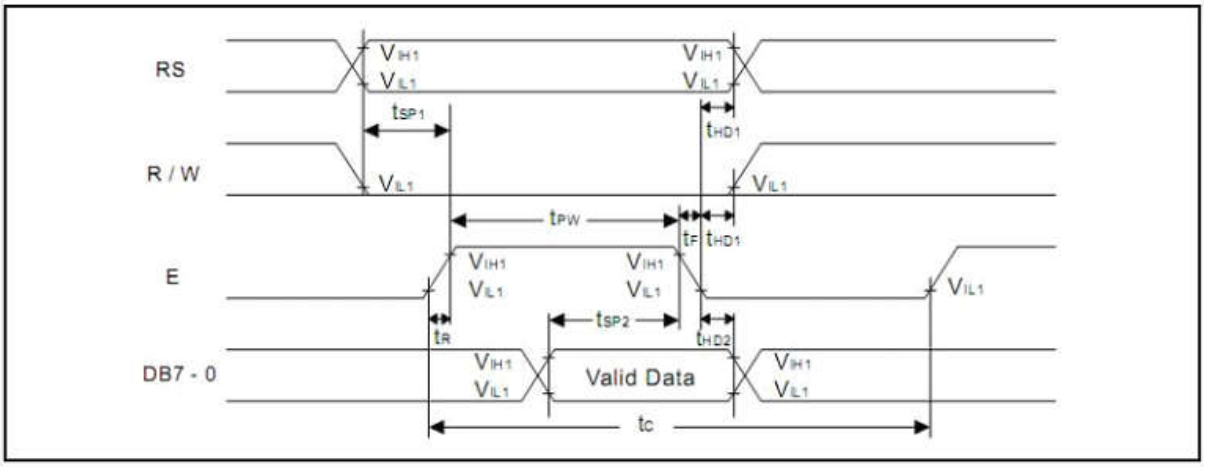
6.ELECTRICAL CHARACTERISTICS.

6-1DC Characteristics(T=25°C)

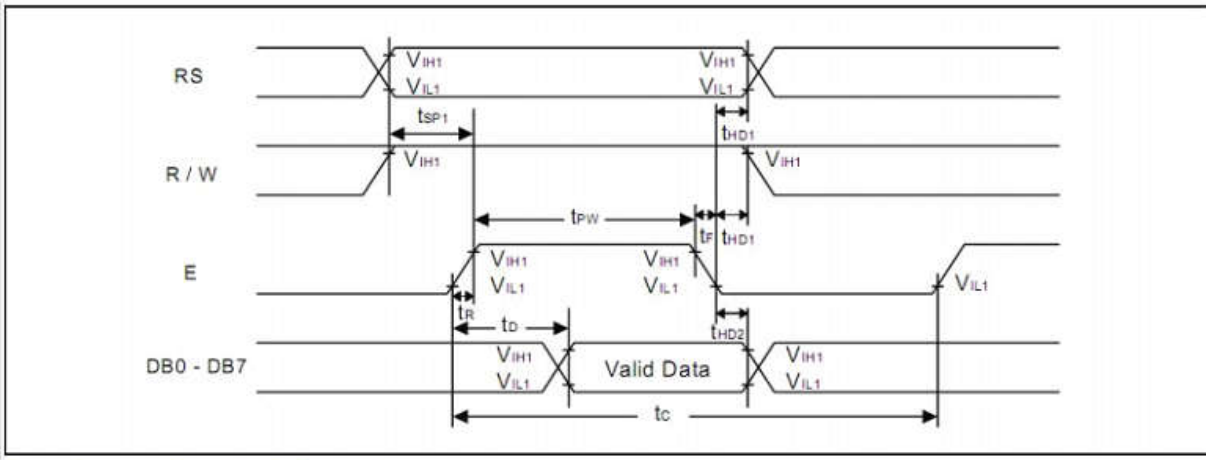
Item	Symbol	Min	Typ	Max	Unit	Test condition
Operating voltage	V_{DD}	-	5.0	-	V	-
Input high voltage	V_{IH1}	2.5	-	VDD	V	PINS(E,RS,R/W,DB0-DB7)
Input low voltage	V_{IL1}	-0.3	-	0.6	V	
Input high voltage	V_{IH2}	VDD-1	-	VDD	V	PIN OSC1
Input low voltage	V_{IL2}	-0.2	-	1.0	V	PIN OSC1
Output high voltage	V_{OH1}	2.4	-	VDD	V	I_{OH}=-0.1mA,PINS:DB0-DB7
Output low voltage	V_{OL1}	-	-	0.4	V	I_{OL}=0.1mA,PINS:DB0-DB7
Output high voltage	V_{OH2}	0.9VDD	-	VDD	V	I_{OH}=-40uA,PINS:CL1,CL2,M,D
Output low voltage	V_{OL2}	-	-	0.1VDD	V	I_{OL}=-40uA,PINS:CL1,CL2,M,D

6-2 AC Characteristics

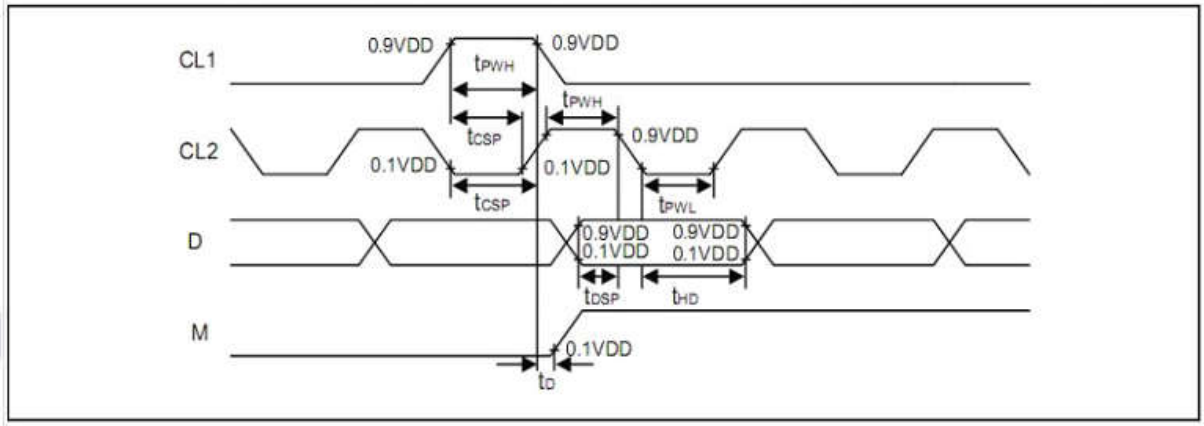
Write Mode



Read Mode



Interface mode with LCD Driver



6-3 AC Characteristics (VDD=5V)

Symbol	Characteristics	Test Condition	Min.	Typ.	Max.	Unit
Read/Write mode						
T_C	Enable Cycle Time	Pin E	500	–	–	ns
T_{PW}	Enable Pulse Width	Pin E	230	–	–	ns
T_W	Enable Pulse Width	Pin E	230	–	–	ns
T_R, T_F	Enable Rise/Fall	Pin E	–	–	20	ns
T_{SP1}	Address Setup Time	Pins: RS, RW, E	40	–	–	ns
T_{HD1}	Address Hold Time	Pins: RS, RW, E	10	–	–	ns
T_{SP2}	Data Setup Time	Pins: DB0 – DB7	80	–	–	ns
T_{HD2}	Data Hold Time	Pins: DB0 – DB7	10	–	–	ns
T_D	Data Outpt DelayTime	Pins: DB0 – DB7	–	–	120	ns
Interface Mode with LCD Driver						
T_{PWH}	Clock Pulse with high	Pins: CL1, CL2	800	–	–	ns
T_{PWL}	Clock Pulse with low	Pins: CL1, CL2	800	–	–	ns
T_{CSP}	Clock Setup Time	Pins: CL1, CL2	500	–	–	ns
T_{DSP}	Data Setup Time	Pin: D	300	–	–	ns
T_{HD}	Data Hold Time	Pin: D	300	–	–	ns
T_D	M Delay Time	Pin: M	–	–	1000	ns

7.Instruction Description

Instruction	Instruction Code										Description	Execution time (Temp = 25℃)		
	RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0		Fosc= 190KHz	Fosc= 270KHz	Fosc= 350KHz
Clear Display	0	0	0	0	0	0	0	0	0	1	Write "20H" to DDRAM and set DDRAM address to "00H" from AC	2.16ms	1.52ms	1.18ms
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.	2.16ms	1.52ms	1.18ms
Entry Mode Set	0	0	0	0	0	0	0	1	I/D	S	Assign cursor moving direction and enable the shift of entire display	53μs	38μs	29μs
Display ON/ OFF Control	0	0	0	0	0	0	1	D	C	B	Set display (D), cursor(C), and blinking of cursor(B) on/off control bit.	53μs	38μs	29μs
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 of DDRAM data.	53μs	38μs	29μs
Function Set	0	0	0	0	1	DL	N	F	-	-	Set interface data length (DL: 8-bit/4-bit), numbers of display line (N: 2-line/1-line) and, display font type (F:5x10 dots/5x8 dots)	53μs	38μs	29μs
Set CGRAM Address	0	0	0	1	AC5	AC4	AC3	AC2	AC1	AC0	Set CGRAM address in address counter.	53μs	38μs	29μs
Set DDRAM Address	0	0	1	AC6	AC5	AC4	AC3	AC2	AC1	AC0	Set DDRAM address in address counter	53μs	38μs	29μs
Read Busy Flag and Address Counter	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.			
Write Data to RAM	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Write data into internal RAM (DDRAM/CGRAM).	53μs	38μs	29μs
Read Data from RAM	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Read data from internal RAM (DDRAM/CGRAM).	53μs	38μs	29μs

Name	ID	Command Code	D/C	Function	Def.
READ	1 1 0	A5A4A3A2A1A0D0D1D2D3	D	Read data from the RAM	
WRITE	1 0 1	A5A4A3A2A1A0D0D1D2D3	D	Write data to the RAM	
READ-MODIFY-WRITE	1 0 1	A5A4A3A2A1A0D0D1D2D3	D	READ and WRITE to the RAM	
SYS DIS	1 0 0	0000-0000-X	C	Turn off both system oscillator and LCD bias generator	Yes
SYS EN	1 0 0	0000-0001-X	C	Turn on system oscillator	
LCD OFF	1 0 0	0000-0010-X	C	Turn off LCD bias generator	Yes
LCD ON	1 0 0	0000-0011-X	C	Turn on LCD bias generator	
TIMER DIS	1 0 0	0000-0100-X	C	Disable time base output	
WDT DIS	1 0 0	0000-0101-X	C	Disable WDT time-out flag output	
TIMER EN	1 0 0	0000-0110-X	C	Enable time base output	
WDT EN	1 0 0	0000-0111-X	C	Enable WDT time-out flag output	
TONE OFF	1 0 0	0000-1000-X	C	Turn off tone outputs	Yes
TONE ON	1 0 0	0000-1001-X	C	Turn on tone outputs	
CLR TIMER	1 0 0	0000-11XX-X	C	Clear the contents of time base generator	
CLR WDT	1 0 0	0000-111X-X	C	Clear the contents of WDT stage	
XTAL 32K	1 0 0	0001-01XX-X	C	System clock source, crystal oscillator	
RC 256K	1 0 0	0001-10XX-X	C	System clock source, on-chip RC oscillator	Yes
EXT 256K	1 0 0	0001-11XX-X	C	System clock source, external clock source	
BIAS 1/2	1 0 0	0010-abX0-X	C	LCD 1/2 bias option ab=00: 2 commons option ab=01: 3 commons option ab=10: 4 commons option	
BIAS 1/3	1 0 0	0010-abX1-X	C	LCD 1/3 bias option ab=00: 2 commons option ab=01: 3 commons option ab=10: 4 commons option	
TONE 4K	1 0 0	010X-XXXX-X	C	Tone frequency, 4kHz	
TONE 2K	1 0 0	011X-XXXX-X	C	Tone frequency, 2kHz	
$\overline{\text{IRQ}}$ DIS	1 0 0	100X-0XXX-X	C	Disable $\overline{\text{IRQ}}$ output	Yes

8.STANDARD CHARACTER PATTERN