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## PRODUCT SPECIFICATION

MODULE NO	VC2041-series
VERSION	
CUSTOMER	
APPROVE	

Sale by	Check by	Made by

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**MODIFY RECORD**

NO.	VER.	DATE	MODIFY REASON	MODIFY CONTENTS
1	A	2007/01/30	New issued	

## **1. Precaution in use of LCD Module**

- (1) Avoid applying excessive shocks to the module or making any alterations or modifications to it.
- (2) Don't make extra holes on the printed circuit board, modify its shape or change the components of LCD module.
- (3) Don't disassemble the LCM.
- (4) Don't operate it above the absolute maximum rating.
- (5) Don't drop, bend or twist LCM.
- (6) Soldering: only to the I/O terminals.
- (7) Storage: please storage in anti-static electricity container and clean environment.
- (8) Don't touch the elastomer connector, especially insert a backlight panel (EL or CCFL)

## **2. General Specification**

### 2.1 Mechanical Data

Item	Dimension	Unit
Number of Characters	20 characters x 4 Lines	—
Module dimension ( L x W x H )	98.0 x 60.0 x 13.6 (Max)- LED B/L	mm
View area	77.0 x 25.2	mm
Active area	70.4 x 20.8	mm
Character size ( L x W )	2.95 x 4.75	mm
Character pitch ( L x W )	3.55 x 5.35	mm
LCD TYPE	-	
Viewing Direction	-	
Backlight	-	
Controller IC	KS0066 (or Equivalent)	

### 3. Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Voltage For Logic	Vdd-Vss	—	4.75	5.0	5.25	V
Supply Voltage For LCD *Wide Temp、Type	Vdd-Vo	—				-20℃
				4.5		25℃
						70℃
Input High Vol.	V <sub>IH</sub>	—	2.2	—	Vdd	V
Input Low Vol.	V <sub>IL</sub>	—	-0.3	—	0.6	V
Output High Vol.	V <sub>OH</sub>	—	2.4	—	—	V
Output Low Vol.	V <sub>OL</sub>	—	—	—	0.4	V
Supply Current(Logic)	I <sub>dd</sub>	Vdd=5V	—	1.5	—	mA

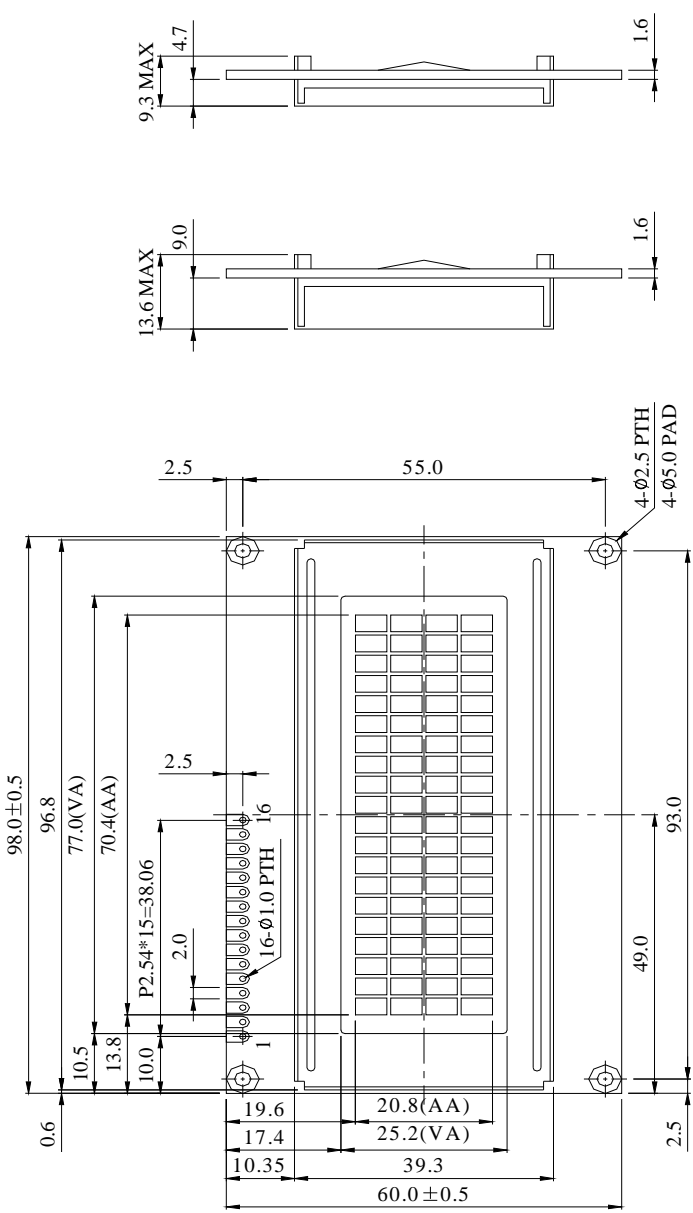
#### 3.1 Electrical Absolute Maximum Ratings

(V<sub>ss</sub>=0V, Ta=25℃)

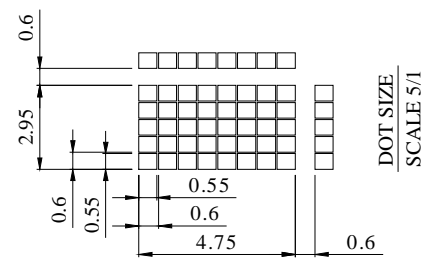
Item	Symbol	Min	Max	Unit	
Supply Voltage (Logic)	Vdd- Vss	-0.3	7.0	V	
Supply Voltage(LCD driver)	Vdd-Vo	-0.3	10.0	V	
Input Voltage	V <sub>I</sub>	V <sub>ss</sub>	V <sub>dd</sub>	V	
Normal Temp. Type	Operation Temp.	T <sub>OP</sub>	0	50	℃
	Storage Temp.	T <sub>STG</sub>	-10	60	℃
Wide Temp. Type	Operation Temp.	T <sub>OP</sub>	-20	70	℃
	Storage Temp.	T <sub>STG</sub>	-30	80	℃

# 4. Dimensional Outlines

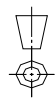
PIN NO.	SYMBOL
1	V <sub>ss</sub>
2	V <sub>dd</sub>
3	V <sub>o</sub>
4	RS
5	R/W
6	E
7	DB0
8	DB1
9	DB2
10	DB3
11	DB4
12	DB5
13	DB6
14	DB7
15	A
16	K



LED B/L  
EL or NO B/L



The tolerance of non-specified dimension is ±0.3mm.

APPROVE	UNIT:	mm	
	SCALE:		
CHECK	MODEL	C2041	REV : 0
	TITLE	LCM DRAWING	
DRAW	DWG NO.	2006/11/22	LCM06-1204-A0
	DATE	2006/11/22	

## 5. Interface Pin Function

Pin No.	Symbol	Level	Description
1	Vss	0V	Supply Voltage for logic Ground
2	Vdd	5.0V	Supply Voltage for logic and LED backlight
3	Vo	(Variable)	Operating voltage for LCD
4	RS	H/L	H:DATA, L: Instruction code
5	R/W	H/L	H: Read(MPU→Module) ; L: Write(MPU→Module)
6	E	H,H→L	Chip enable signal
7	DB0	H/L	Data bit 0
8	DB1	H/L	Data bit 1
9	DB2	H/L	Data bit 2
10	DB3	H/L	Data bit 3
11	DB4	H/L	Data bit 4
12	DB5	H/L	Data bit 5
13	DB6	H/L	Data bit 6
14	DB7	H/L	Data bit 7
15	A/VEE		Power supply for backlight V+/VEE
16	K		Power supply for backlight V-

## 6. Backlight Information

### 6.1 Specification

- LED array yellow-green

Parameter	Symbol	Min	Typical	Max	Unit	Test Condition
Supply Current	I <sub>LED</sub>	—	280	—	mA	V <sub>LED</sub> =4.2V
Supply Voltage	V	4.0	4.2	4.3	V	—
Reverse Voltage	V <sub>R</sub>	—	—	8	V	—
Luminous Intensity	I <sub>V</sub>	100	—	—	cd/m <sup>2</sup>	I <sub>LED</sub> =280mA
Wave Length	λ <sub>p</sub>	—	575	—	nm	I <sub>LED</sub> =280mA
Life Time	—	—	50,000	—	Hr.	V ≤ 4.2V
Color	Yellow green					

- LED edge white

Parameter	Symbol	Min	Typical	Max	Unit	Test Condition
Supply Current	I <sub>LED</sub>	—	45	—	mA	V <sub>LED</sub> =3.1V
Supply Voltage	V		3.1	3.2	V	—
Reverse Voltage	V <sub>R</sub>	—	—	5	V	—
Luminous Intensity	I <sub>V</sub>	60	—	—	cd/m <sup>2</sup>	I <sub>LED</sub> =45mA
Chromaticity	X	—	0.30	—		I <sub>LED</sub> =45mA
	Y		0.31			
Life Time	—	—	20,000	—	Hr.	V ≤ 3.1V
Color	white					

### 6.2 Backlight driving methods

LED B/L drive from PIN15 (LED+) , PIN16 (LED-) OR PIN A(LED+) , PIN K(LED-)



## 7. Controller data

### 7.1 Function description

The LCD display Module is built in a LSI controller, the controller has two 8-bit registers, an instruction register (IR) and a data register (DR).

The IR stores instruction codes, such as display clear and cursor shift, and address information for display data RAM (DDRAM) and character generator (CGRAM). The IR can only be written from the MPU.

The DR temporarily stores data to be written or read from DDRAM or CGRAM. When address information is written into the IR, then data is stored into the DR from DDRAM or CGRAM. By the register selector (RS) signal, these two registers can be selected.

RS	R/W	Operation
0	0	IR write as an internal operation (display clear, etc.)
0	1	Read busy flag (DB7) and address counter (DB0 to DB7)
1	0	Write data to DDRAM or CGRAM (DR to DDRAM or CGRAM)
1	1	Read data from DDRAM or CGRAM (DDRAM or CGRAM to DR)

#### Busy Flag (BF)

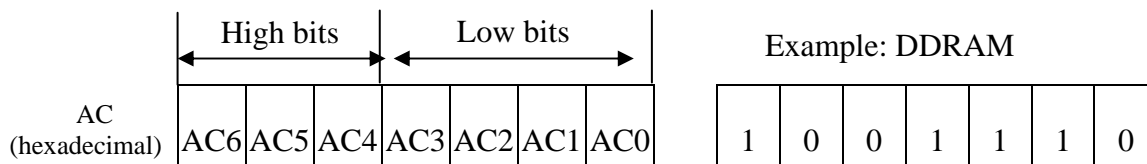
When the busy flag is 1, the controller LSI is in the internal operation mode and the next instruction will not be accepted. When RS=0 and R/W=1, the busy flag is output to DB7. The next instruction must be written after ensuring that the busy flag is 0.

#### Address Counter (AC)

The address counter (AC) assigns addresses to both DDRAM and CGRAM

#### Display Data RAM (DDRAM)

This DDRAM is used to store the display data represented in 8-bit character codes. Its extended capacity is 80x8 bits or 80 characters. Below figure is the relationship between DDRAM addresses and positions on the liquid crystal display.



DDRAM Address

Display position DDRAM address

1	2	3	4	5	6										16
00	01	02	03	04	05										0F
40	41	42	43	44	45										4F

Example: 2-Line by 16-Character Display

Character Generator ROM (CGROM)

The CGROM generate 5x8 dot or 5x10 dot character patterns from 8-bit character codes. See Table 2.

7.2 Character Generator RAM (CGRAM)

In CGRAM, the user can rewrite character by program. For 5x8 dots, eight character patterns can be written, and for 5x10 dots, four character patterns can be written.

Write into DDRAM the character code at the addresses shown as the left column of table 1. To show the character patterns stored in CGRAM.

Relationship between CGRAM Addresses, Character Codes (DDRAM) and Character Patterns (CGRAM Data)

**Relationship between CGRAM Addresses, Character Codes (DDRAM) and Character Patterns (CGRAM Data)**

For 5 \* 8 dot character patterns

Character Codes ( DDRAM data )		CGRAM Address		Character Patterns ( CGRAM data )		
7 6 5 4 3 2 1 0		5 4 3 2 1 0		7 6 5 4 3 2 1 0		
High Low		High Low		High Low		
0 0 0 0 * 0 0 0		0 0 0	0 0 0	* * *		Character pattern( 1 )
			0 0 1	* * *		
			0 1 0	* * *		
			0 1 1	* * *		
			1 0 0	* * *		
			1 0 1	* * *		
			1 1 0	* * *		
			1 1 1	* * *		
			0 0 0	* * *		
			0 0 1	* * *		
0 0 0 0 * 0 0 1		0 0 1	0 1 0	* * *		Character pattern( 2 )
			0 1 1	* * *		
			1 0 0	* * *		
			1 0 1	* * *		
			1 1 0	* * *		Cursor pattern
			1 1 1	* * *		
			0 0 0	* * *		
			0 0 1	* * *		
			1 1 1	* * *		
			1 1 1	* * *		

For 5 \* 10 dot character patterns

Character Codes ( DDRAM data )		CGRAM Address		Character Patterns ( CGRAM data )		
7 6 5 4 3 2 1 0		5 4 3 2 1 0		7 6 5 4 3 2 1 0		
High Low		High Low		High Low		
0 0 0 0 * 0 0 0		0 0	0 0 0 0	* * *		Character pattern
			0 0 0 1	* * *		
			0 0 1 0	* * *		
			0 0 1 1	* * *		
			0 1 0 0	* * *		
			0 1 0 1	* * *		
			0 1 1 0	* * *		
			0 1 1 1	* * *		
			1 0 0 0	* * *		
			1 0 0 1	* * *		
			1 0 1 0	* * *		Cursor pattern
			1 0 1 1	* * *		
			1 1 1 1	* * *	* * * * *	

■ : " High "

7.3 C.G ROM table (table 2)

Code RC: English –European Font

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

Upper 4 bit Lower 4 bit	LLLL	LLLH	LLHL	LLHH	LHLL	LHLH	LHHL	LHHH	HLLL	HLLH	HLHL	HLHH	HHLL	HHLH	HHHL	HHHH
LLLL	CG RAM (1)			0	1	2	3	4				5	6	7	8	9
LLLH	(2)		!	1	2	3	4				5	6	7	8	9	:
LLHL	(3)		"	2	3	4	5	6			7	8	9	:	;	;
LLHH	(4)		#	3	4	5	6	7			8	9	:	;	;	;
LHLL	(5)		\$	4	5	6	7	8			9	:	;	;	;	;
LHLH	(6)		%	5	6	7	8	9			:	;	;	;	;	;
LHHL	(7)		&	6	7	8	9	:			;	;	;	;	;	;
LHHH	(8)		'	7	8	9	:	;			;	;	;	;	;	;
HLLL	(1)		(	8	9	:	;	;			;	;	;	;	;	;
HLLH	(2)		)	9	:	;	;	;			;	;	;	;	;	;
HLHL	(3)		*	:	;	;	;	;			;	;	;	;	;	;
HLHH	(4)		+	;	;	;	;	;			;	;	;	;	;	;
HHLL	(5)		,	;	;	;	;	;			;	;	;	;	;	;
HHLH	(6)		-	;	;	;	;	;			;	;	;	;	;	;
HHHL	(7)		.	;	;	;	;	;			;	;	;	;	;	;
HHHH	(8)		/	;	;	;	;	;			;	;	;	;	;	;

Upper 4 bit Lower 4 bit	LLLL	LLLH	LLHL	LLHH	LHLL	LHLH	LHHL	LHHH	HLLL	HLLH	HLHL	HLHH	HHLL	HHLH	HHHL	HHHH
LLLL	CG RAM (1)			0	1	2	3	4			5	6	7	8	9	0
LLLH	CG RAM (2)	.	!	1	2	3	4	5			6	7	8	9	0	1
LLHL	CG RAM (3)	!	2	3	4	5	6	7			8	9	0	1	2	3
LLHH	CG RAM (4)	+	3	4	5	6	7	8			9	0	1	2	3	4
LHLL	CG RAM (5)	+	4	5	6	7	8	9			0	1	2	3	4	5
LHLH	CG RAM (6)	+	5	6	7	8	9	0			1	2	3	4	5	6
LHHL	CG RAM (7)	+	6	7	8	9	0	1			2	3	4	5	6	7
LHHH	CG RAM (8)	+	7	8	9	0	1	2			3	4	5	6	7	8
HLLL	CG RAM (1)	.	8	9	0	1	2	3			4	5	6	7	8	9
HLLH	CG RAM (2)	.	9	0	1	2	3	4			5	6	7	8	9	0
HLHL	CG RAM (3)	+	0	1	2	3	4	5			6	7	8	9	0	1
HLHH	CG RAM (4)	+	1	2	3	4	5	6			7	8	9	0	1	2
HHLL	CG RAM (5)	.	2	3	4	5	6	7			8	9	0	1	2	3
HHLH	CG RAM (6)	.	3	4	5	6	7	8			9	0	1	2	3	4
HHHL	CG RAM (7)	.	4	5	6	7	8	9			0	1	2	3	4	5
HHHH	CG RAM (8)	.	5	6	7	8	9	0			1	2	3	4	5	6

Code EC : English –European Font

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

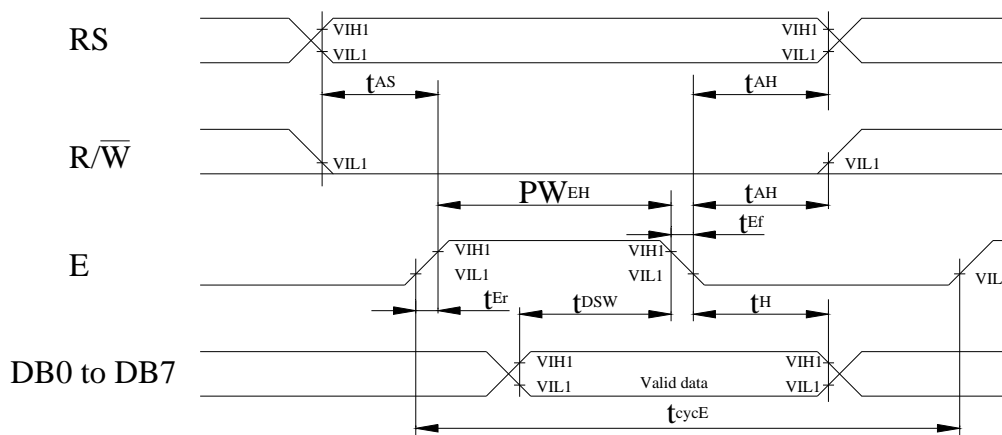
7.4 Instruction table

Instruction	Instruction Code										Description	Execution time (fosc=270Khz)	
	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0			
Clear Display	0	0	0	0	0	0	0	0	0	1	Write "00H" to DDRAM and set DDRAM address to "00H" from AC	1.53ms	
Return Home	0	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	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	0	1	D	C	B	Set display (D), cursor (C), and blinking of cursor (B) on/off control bit.	39 μs
Cursor or Display Shift	0	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.	39 μs
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:5×11 dots/5×8 dots)	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



7.5 Timing characteristics

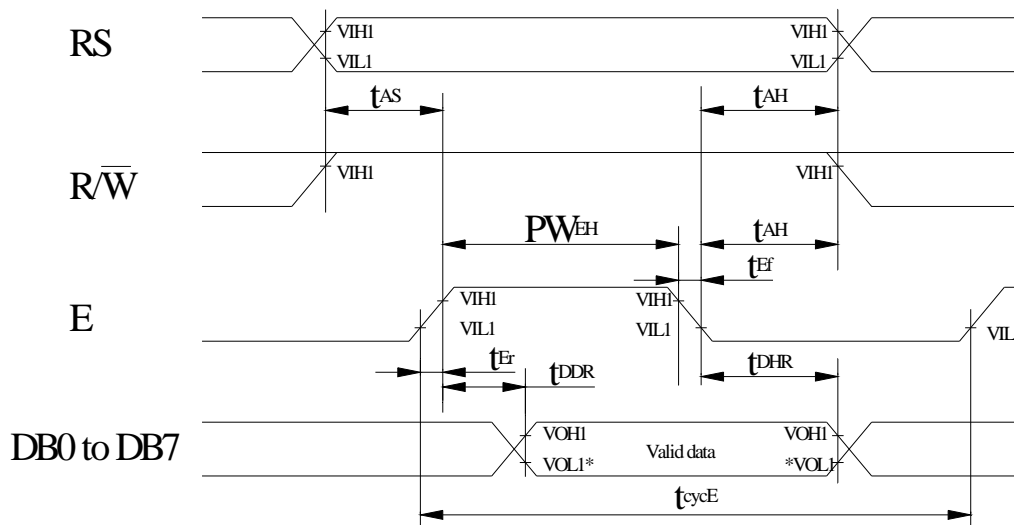
Write Operation



Ta= 25°C, Vdd=5.0±0.5V

Item	Symbol	Min	Typ	Max	Unit
Enable cycle time	t <sub>cycE</sub>	500	—	—	ns
Enable pulse width (high level)	PW <sub>EH</sub>	230	—	—	ns
Enable rise/fall time	t <sub>Er</sub> , t <sub>Ef</sub>	—	—	20	ns
Address set-up time (RS, R/W to E)	t <sub>AS</sub>	40	—	—	ns
Address hold time	t <sub>AH</sub>	10	—	—	ns
Data set-up time	t <sub>Dsw</sub>	80	—	—	ns
Data hold time	t <sub>H</sub>	10	—	—	ns

Read Operation



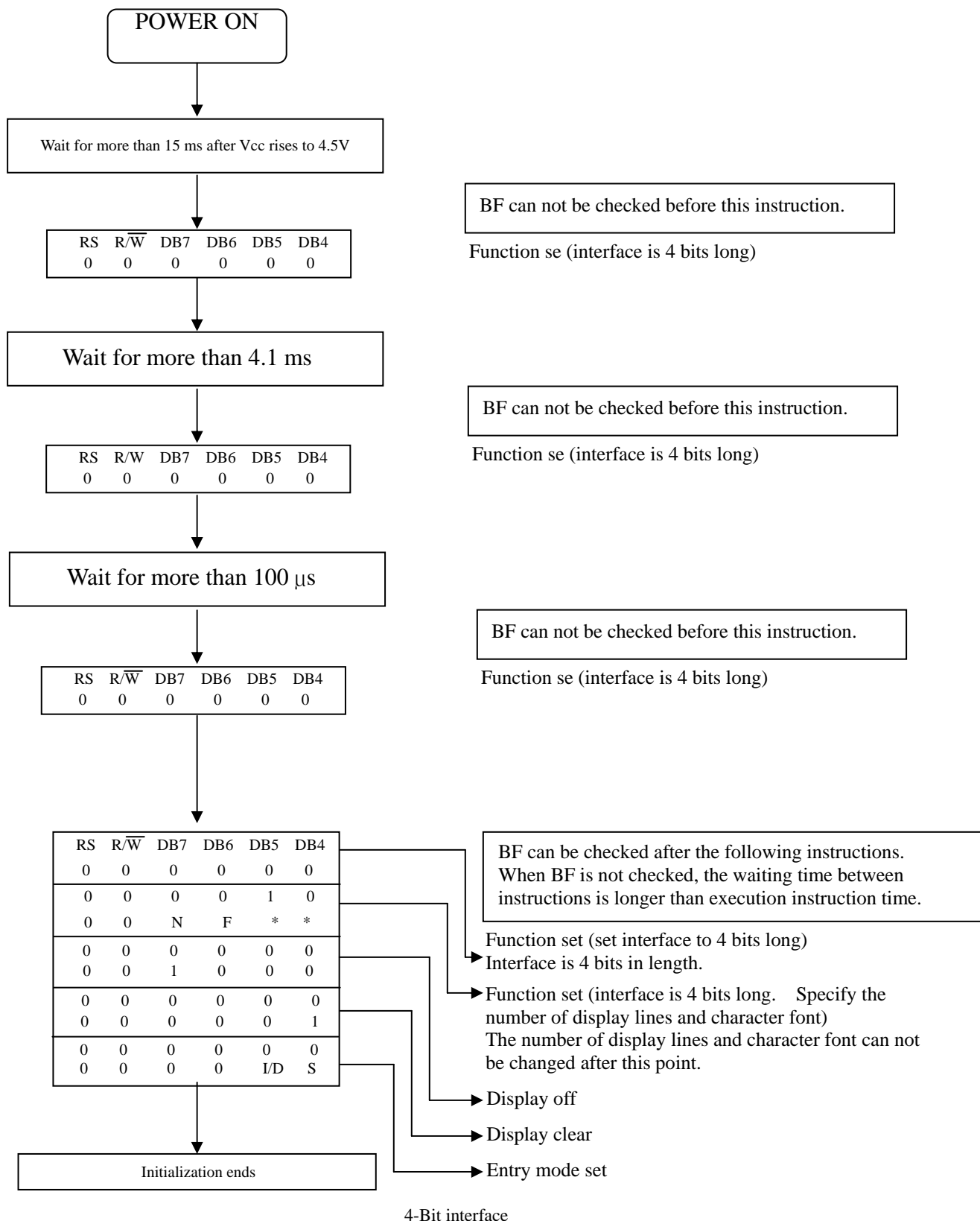
NOTE: \*VOL1 is assumed to be 0.8V at 2 MHz operation.

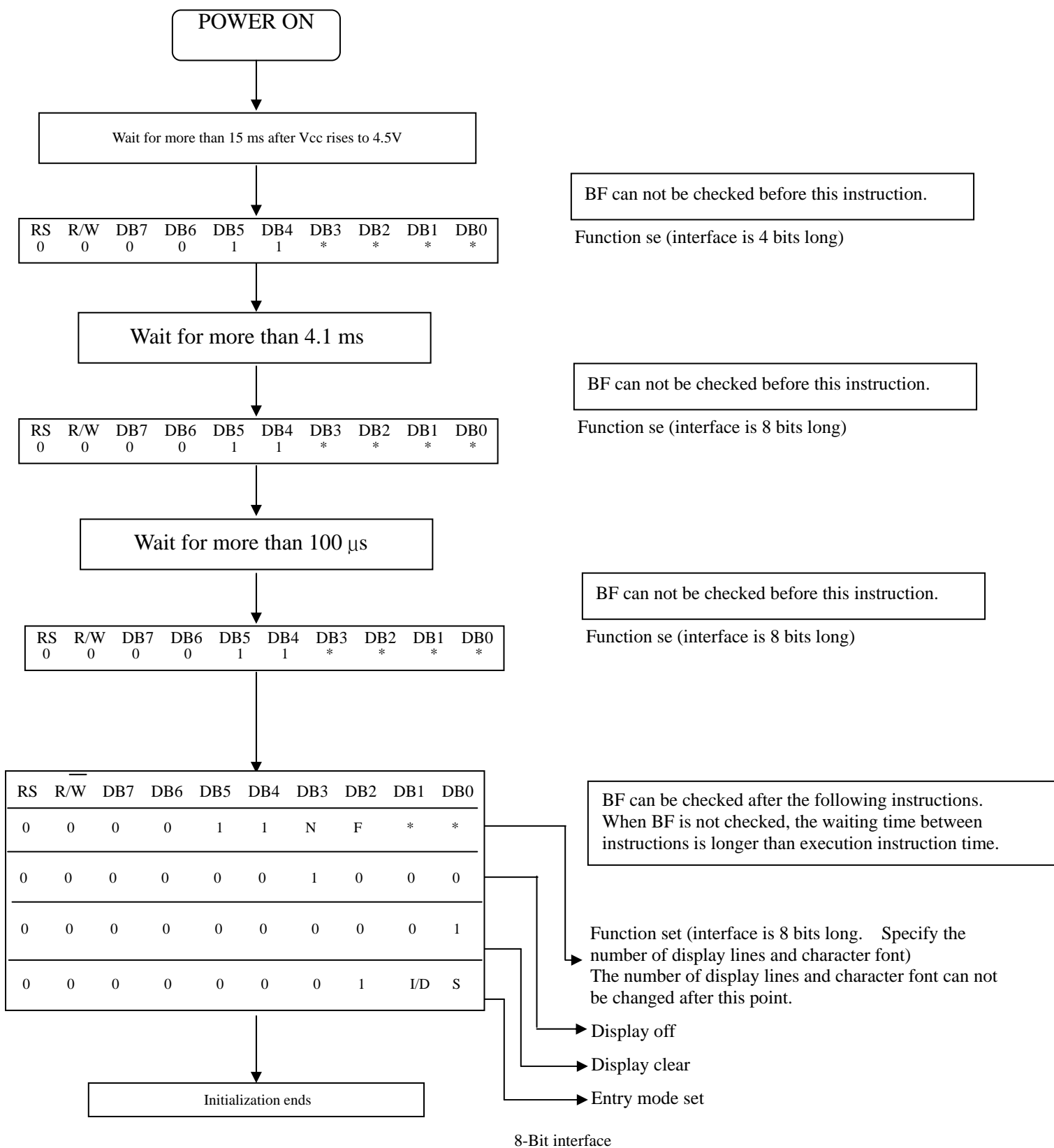
Ta=25°C, Vdd=5.0±0.5V

Item	Symbol	Min	Typ	Max	Unit
Enable cycle time	t <sub>cycE</sub>	500	—	—	ns
Enable pulse width (high level)	PW <sub>EH</sub>	230	—	—	ns
Enable rise/fall time	t <sub>Er</sub> , t <sub>Ef</sub>	—	—	20	ns
Address set-up time (RS, R/W to E)	t <sub>AS</sub>	40	—	—	ns
Address hold time	t <sub>AH</sub>	10	—	—	ns
Data delay time	t <sub>DDR</sub>	—	—	100	ns
Data hold time	t <sub>DHR</sub>	5	—	—	ns

## 7.6 Initializing soft ware of LCM

### 4-bit interface





## 8. Optical Characteristics

### 8.1 OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
View Angle	(V) $\theta$	$CR \geq 2$	10		45	deg
	(H) $\varphi$	$CR \geq 2$	-30		30	deg
Contrast Ratio	CR	—		3		—
Response Time 25°C	T rise	—		150	250	ms
	T fall	—		180	250	ms

#### Conditions :

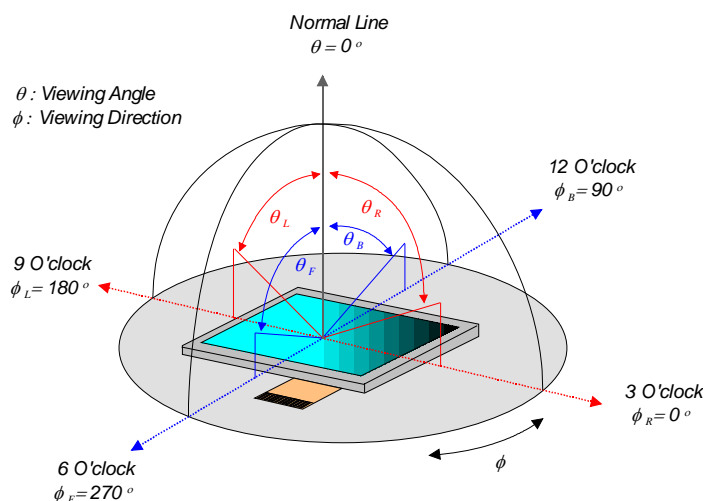
Operating Voltage :  $V_{op}$

Viewing Angle( $\theta$  ,  $\varphi$ ) :  $0^\circ$  ,  $0^\circ$

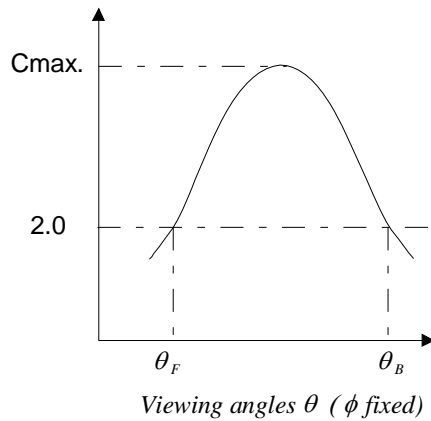
Frame Frequency : 64 HZ

Driving Waveform : 1/N duty , 1/a bias

### 8.2 Definition of Viewing Angle and Optimum Viewing Area



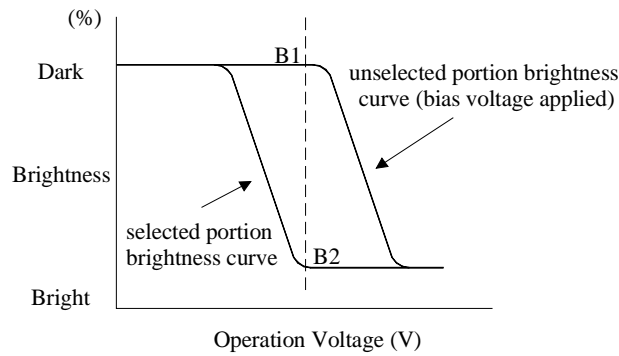
### 8.3 Definition of Viewing Angle $\theta_F$ and $\theta_B$



Optimum viewing angle with the naked eye and viewing angle  $\theta$  at  $C_{max}$ .  
Above are not always the same.

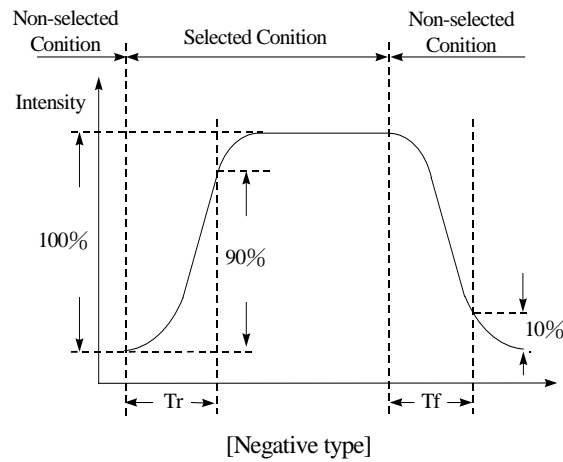
### 8.4 Definition of Contrast CR

$$CR = \text{Brightness of selected dot (B1)} / \text{Brightness of unselected dot (B2)}$$

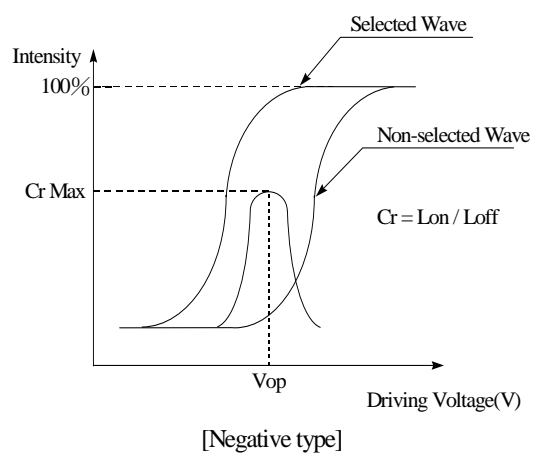


### 8.5 Definition of Response Time

(  $T_r$  ,  $T_f$  )



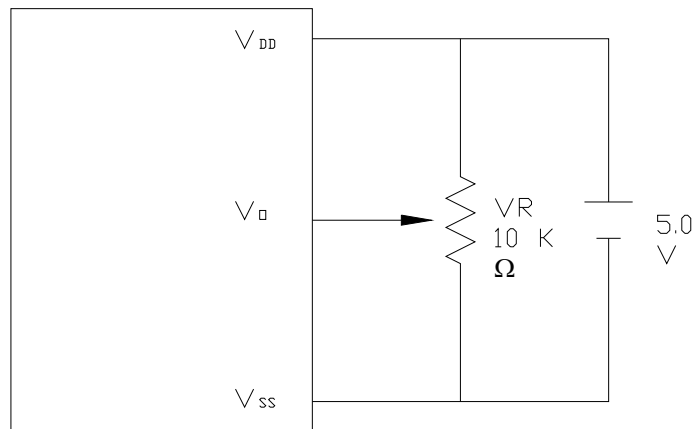
### 8.6 Definition of Operation Voltage (Vop)



## 9. Power Supply for LCD Module and LCD Operating Voltage

### Adjustment

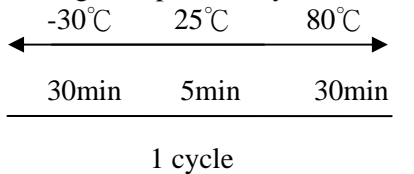
LCD Module block diagram





## 10. Reliability

### 10.1 Content of Reliability Test

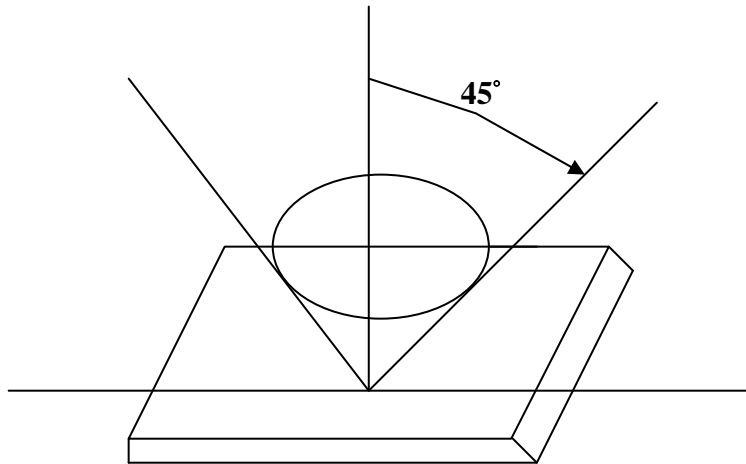
Environmental Test				
No.	Test Item	Content of Test	Test Condition	Applicable Standard
1	High Temperature storage	Endurance test applying the high storage temperature for a long time.	80°C / 96hrs	—
2	Low Temperature storage	Endurance test applying the high storage temperature for a long time.	-30°C 96hrs	—
3	High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70°C 96hrs	—
4	Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20°C 96hrs	—
5	High Temperature/Humidity Storage	Endurance test applying the high temperature and high humidity storage for a long time.	60°C,90%RH 96hrs	—
6	High Temperature/Humidity Operation	Endurance test applying the electric stress (Voltage & Current) and temperature / humidity stress to the element for a long time.	40°C,90%RH 96hrs	—
7	Temperature Cycle	Endurance test applying the low and high temperature cycle. 	-30°C/80°C 5 cycles	—
Mechanical Test				
8	Vibration test	Endurance test applying the vibration during transportation and using.	Total fixed amplitude : 1.5mm Vibration Frequency :10~55Hz One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes	—
Others				
9	Static electricity test	Endurance test applying the electric stress to the terminal.	VS=800V,RS=1.5kΩ CS=100pF 1 time	—

\*\*\*Supply voltage for logic system=5V. Supply voltage for LCD system =Operating voltage at 25°C

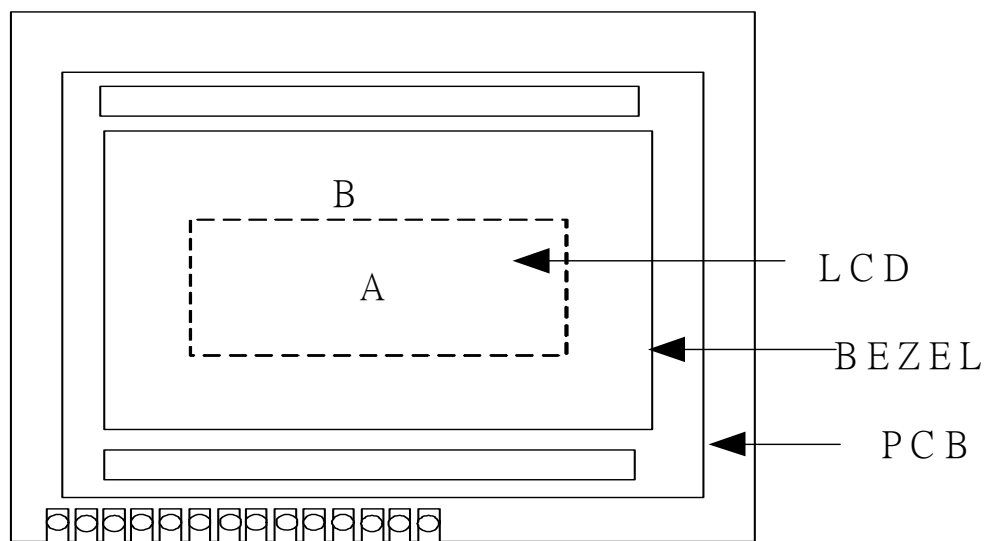
## 11. Quality Assurance

### 11.1 Inspection conditions

The LCD shall be inspected under 40W white fluorescent light. The distance between the eyes and the sample shall be more than 30cm. All directions for inspecting the sample should be within 45° against perpendicular line.



Definition of applicable Zones

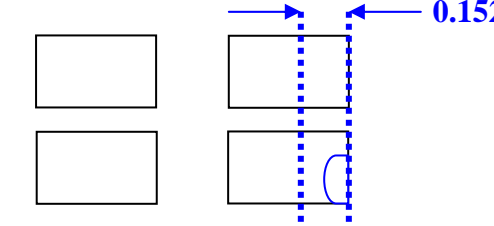
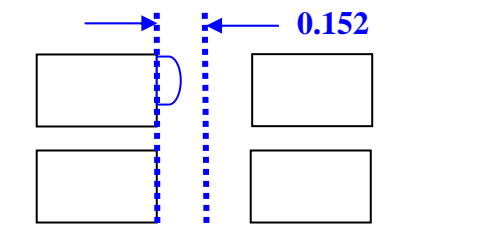
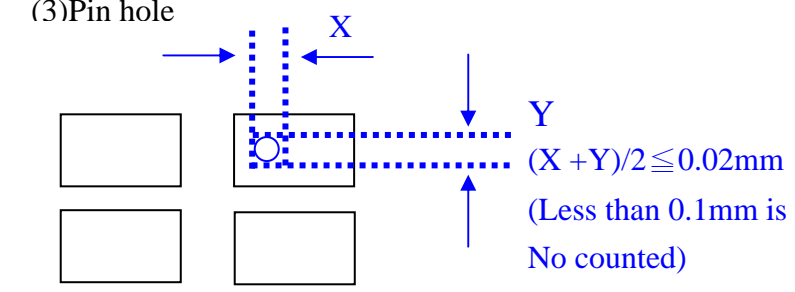
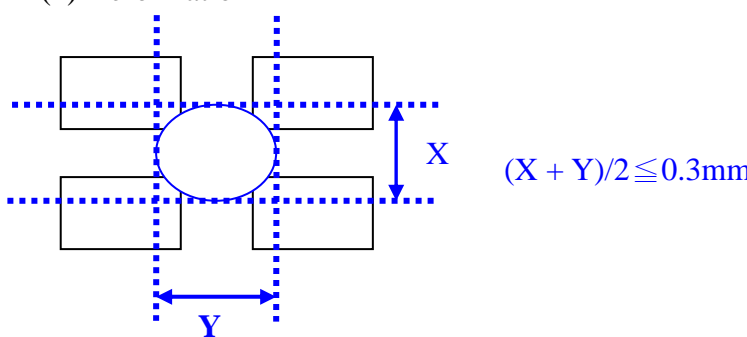


A : Display Area

B : Non-Display Area

11.2 Inspection Parameters

NO.	Parameter	Criteria																												
1	Black or White spots	<table border="1"> <thead> <tr> <th rowspan="2">Zone Dimension</th> <th colspan="2">Acceptable Number</th> <th rowspan="2">Class Of Defects</th> <th rowspan="2">Acceptable Level</th> </tr> <tr> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td><math>D &lt; 0.15</math></td> <td>*</td> <td>*</td> <td rowspan="4">Minor</td> <td rowspan="4">2.5</td> </tr> <tr> <td><math>0.15 \leq D \leq 0.2</math></td> <td>4</td> <td>4</td> </tr> <tr> <td><math>0.2 \leq D \leq 0.25</math></td> <td>2</td> <td>2</td> </tr> <tr> <td><math>D \leq 0.3</math></td> <td>0</td> <td>1</td> </tr> </tbody> </table> <p><math>D = (\text{Long} + \text{Short})/2</math>      *: Disregard</p>	Zone Dimension	Acceptable Number		Class Of Defects	Acceptable Level	A	B	$D < 0.15$	*	*	Minor	2.5	$0.15 \leq D \leq 0.2$	4	4	$0.2 \leq D \leq 0.25$	2	2	$D \leq 0.3$	0	1							
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2	Scratch, Substances	<table border="1"> <thead> <tr> <th colspan="2">Zone X(mm) Y(mm)</th> <th colspan="2">Acceptable Number</th> <th rowspan="2">Class Of Defects</th> <th rowspan="2">Acceptable Level</th> </tr> <tr> <th>A</th> <th>B</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>*</td> <td><math>0.04 \geq W</math></td> <td>*</td> <td>*</td> <td rowspan="4">Minor</td> <td rowspan="4">2.5</td> </tr> <tr> <td><math>3.0 \geq L</math></td> <td><math>0.06 \geq W</math></td> <td>4</td> <td>4</td> </tr> <tr> <td><math>2.0 \geq L</math></td> <td><math>0.08 \geq W</math></td> <td>2</td> <td>3</td> </tr> <tr> <td>—</td> <td><math>0.1 &lt; W</math></td> <td>0</td> <td>1</td> </tr> </tbody> </table> <p>X: Length    Y: Width    *: Disregard Total defects should not exceed 4/module</p>	Zone X(mm) Y(mm)		Acceptable Number		Class Of Defects	Acceptable Level	A	B	A	B	*	$0.04 \geq W$	*	*	Minor	2.5	$3.0 \geq L$	$0.06 \geq W$	4	4	$2.0 \geq L$	$0.08 \geq W$	2	3	—	$0.1 < W$	0	1
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$2.0 \geq L$	$0.08 \geq W$	2	3																											
—	$0.1 < W$	0	1																											
3	Air Bubbles ( between glass & polarizer)	<table border="1"> <thead> <tr> <th rowspan="2">Zone Dimension</th> <th colspan="2">Acceptable Number</th> <th rowspan="2">Class Of Defects</th> <th rowspan="2">Acceptable Level</th> </tr> <tr> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td><math>D \leq 0.15</math></td> <td>*</td> <td>*</td> <td rowspan="3">Minor</td> <td rowspan="3">2.5</td> </tr> <tr> <td><math>0.15 &lt; D \leq 0.25</math></td> <td>2</td> <td>*</td> </tr> <tr> <td><math>0.25 &lt; D</math></td> <td>0</td> <td>1</td> </tr> </tbody> </table> <p>*: Disregard Total defects shall not excess 3/module.</p>	Zone Dimension	Acceptable Number		Class Of Defects	Acceptable Level	A	B	$D \leq 0.15$	*	*	Minor	2.5	$0.15 < D \leq 0.25$	2	*	$0.25 < D$	0	1										
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$0.25 < D$	0	1																												

4.	Uniformity	<p>(1)Pixel shape (with Dent )</p>  <p>(2)Pixel shape (with Projection)</p>  <p>(3)Pin hole</p>  <p><math>(X + Y)/2 \leq 0.02\text{mm}</math> (Less than 0.1mm is No counted)</p> <p>(4) Deformation</p>  <p><math>(X + Y)/2 \leq 0.3\text{mm}</math></p> <p>Total acceptable number: 1/pixel ;.5/cell</p>
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## 12. Numbering system

V C 204 1 - G Y Y - JC  
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

### 1. Brand Name

V	Vitek Display co., LTD
---	------------------------

### 2. Display Type

C	Character Type
G	Graphic Type
O	COG
S	Segment Type
T	TFT Type

### 3. Number of Pixels

Character Module	Characters per line × Lines
Graphic Module	Row Dots × Column Dots

### 4. Series number

1-9	Series Number
-----	---------------

### 5 LCD Polarize

	Normal Temperature		Wide Temperature	
	6:00	12:00	6:00	12:00
Reflective	A	B	C	D
Transflective	E	F	G	H
Transmissive	I	J	K	L

### 6 LCD Mode:

	TN	STN		FSTN	DFSTN
Positive	P	G	Gray	F	
		Y	Yellow/Green		
Negative	N	B	Blue	W	D

7. Backlight

None	N	None
EL	I	White
	U	Blue Green
LED	A	Amber
	B	Blue
	E	Yellow/Green, edge
	G	Green
	R	Red
	W	White
	Y	Yellow/Green
CCFL	C	White

8. IC font Character

Cyrillic/English	CC
Japanese/English	JC
European/English	RC , EC

8. Graphic

X	Without Negative Voltage
V	Negative Voltage
T	Temperature Compensation
B	Chinese BIG 5
G	Chinese GB
S	Chinese BIG 5 , Chinese GB , Japanese code
O	Other

9. Special code

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