

CUSTOMER	:	
MODEL	:	MOC-40216D-A-CBBAC
DESCRIPTION	:	LCD MODULE

◆ CUSTOMER APPROVAL

	CHECKED	CHECKED	APPROVAL
APPROVAL			
REMARK			

◆ SUPPLIER APPROVAL

PREPARED	CHECKED		APPROVAL

MYTECH CORPORATION

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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 elastmer connector, especially insert a backlight panel (EL or CCFL)

2. General Specification

(1) Mechanical Dimension

Item	Dimension	Unit
Number of Characters	40characters x2 Lines	-
Module dimension (L x W x H)	182.0 x 33.5 x 13.1 (Max)—LED B/L	mm
View area	154.4 x 16.5	mm
Active area	147.5 x 11.5	mm
Dot size	0.6 x 0.65	mm
Dot pitch	0.65 x 0.7	mm
Character size (L x W)	3.2 x 5.55	mm
Character pitch (L x W)	3.7 x 5.95	mm

(2) Controller IC: **KS0066 (or Equivalent) controller**

(3) Temperature Range

	Wide
Operating	-20 ~+70°C
Storage	-30 ~+80°C

3. Absolute Maximum Ratings

3.1 Electrical Absolute Maximum Ratings

(V_{ss}=0V, T_a=25°C)

Item	Symbol	Min	Max	Unit
Supply Voltage (Logic)	V _{dd} -V _{ss}	-0.3	7	V
Supply Voltage (LCD driver)	V _{dd} -V _o	-0.3	13	V
Input Voltage	V _I	V _{ss}	V _{dd}	V
Normal Type	TOP	0	+50	°C
	TSTG	-10	+60	°C
Wide Temperature Type	Top	-20	+70	°C
	Tstg	-30	+80	°C

3.2 Environmental Absolute Maximum Ratings

Item	Operating		Storage		Comment
	(Min.)	(Max.)	(Min.)	(Max.)	
Humidity	Note(2)		Note(2)		Without condensation
Vibration	-	4.9M/S ²	-	19.6M/S ²	XYZ Direction
Shock	-	29.4M/S ²	-	490M/S ²	XYZ Direction

Note (1) T_a = 0°C : 50Hr Max

Note (2) T_a ≤ 40°C : 90% RH MAX

T_a > 40°C : Absolute humidity must be lower than the humidity of 90% at 40°C

4. Electrical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage For Logic	V _{dd} -V _{ss}	-	4.5	-	5.5	V
Supply Voltage For LCD * Wide Temp · Type	V _{dd} -V _o	* T _a =-20°C	-	5.0	-	V
		T _a =0°C	-	-	-	V
		T _a =25°C	-	4.5	-	V
		T _a =50°C	-	-	-	V
		* T _a =+70°C	-	3.8	-	V
Input High Volt.	V _{IH}	-	2.2	-	V _{dd}	V
Input Low Volt.	V _{IL}	-	-	-	0.6	V
Output High Volt.	V _{OH}	-	2.4	-	-	V
Output Low Volt.	V _{OL}	-	-	-	0.4	V
Supply Current	I _{dd}	V _{dd} =5V	-	1.6	-	mA

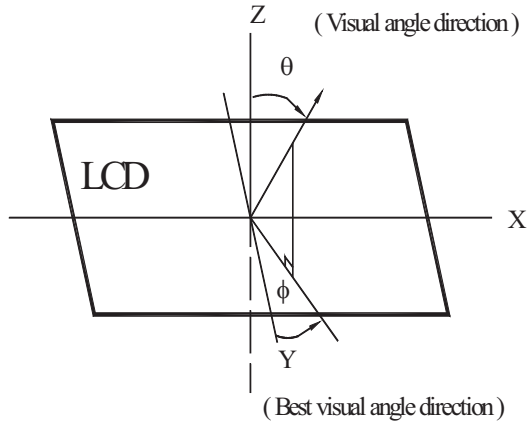
5. Optical Characteristics

a. STN

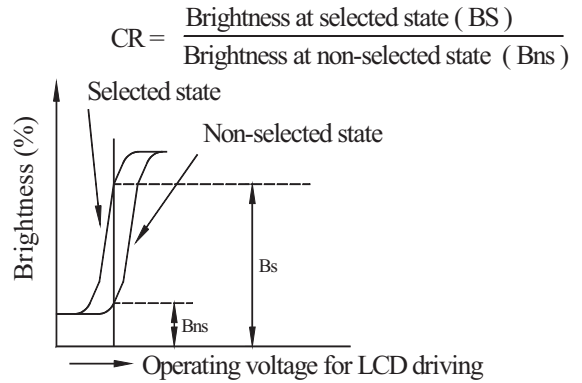
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
View Angle	(V) θ	$CR \geq 2$	10	-	45	deg
	(H) φ	$CR \geq 2$	-30	-	30	deg
Contrast Ratio	CR	-	-	3	-	-
Response Time 25°C	T rise	-	-	100	150	ms
	T fall	-	-	150	200	ms

5.1 Definitions

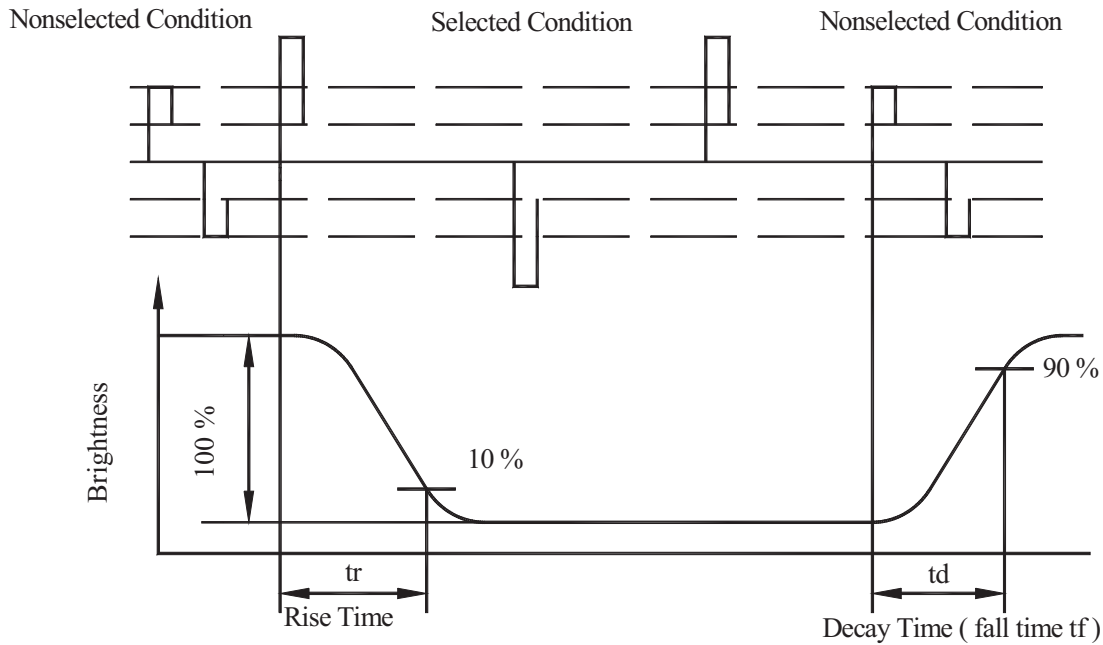
View Angles



Contrast Ratio



Response Time

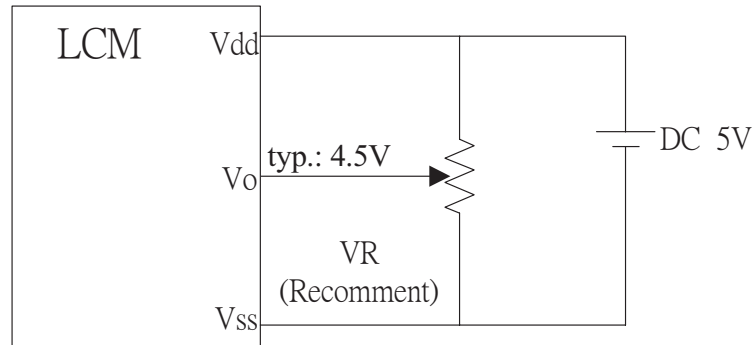


6. Interface Pin Function

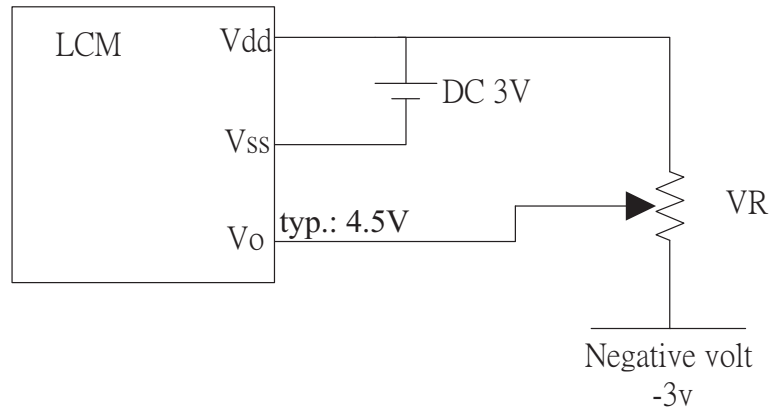
Pin No.	Symbol	Level	Description
1	Vss	0V	Ground
2	Vdd	5.0V	Supply Voltage for logic (+3V option)
3	Vo	(Variable)	Operating voltage for LCD
4	RS	H/L	H:DATA, L:Instruction code
5	R/W	H/L	H:Read(MPU→Module)L:Write(MPU→Module)
6	E	H,H→L	Chip enable signal
7	DB0	H/L	Data bit 0
8	DB1	H/L	Data bit 1
9	DB2	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	-	Power supply for LED backlight (+)
16	K	-	Power supply for LED backlight (GND)

7. Power Supply for LCD Module and LCD Operating Voltage a Adjustment

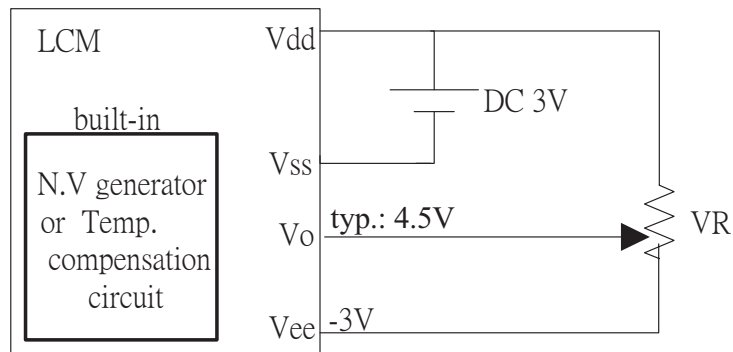
* Standart Type



* (Option) LCM operating on " DC 3V " input with external negative voltage



* (Option) LCM operating on " DC 3V " input with built-in negative voltage



8. Backlight Information

8.1 Specification

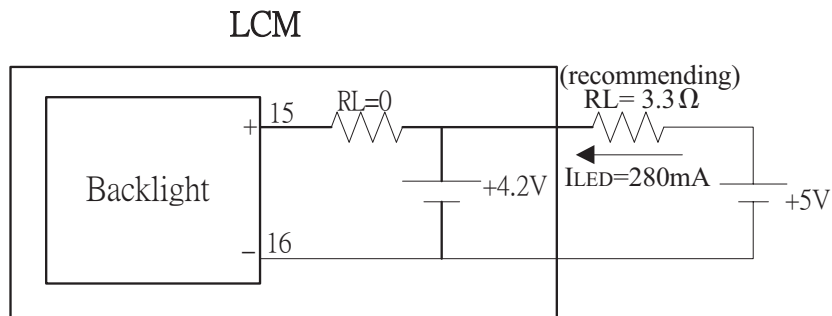
(1) LED array / yellow-green

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Supply Current	I _{LED}	-	280	-	mA	V=4.2V
Supply Voltage	V	-	4.2	4.3	V	-
Reverse Voltage	V _R	-	-	8	V	-
Luminous Intensity	I _V	60	-	-	cd / m ²	I _{LED} =280mA
Wave Length	λ _p	-	574	-	nm	I _{LED} =280mA
Life Time	-	-	100000	-	Hr.	V ≤ 4.2
Color	Yellow Green					

8.2 Backlight driving methods

a. LED B/L drive from pin15 (LED+) pin16 (LED-)

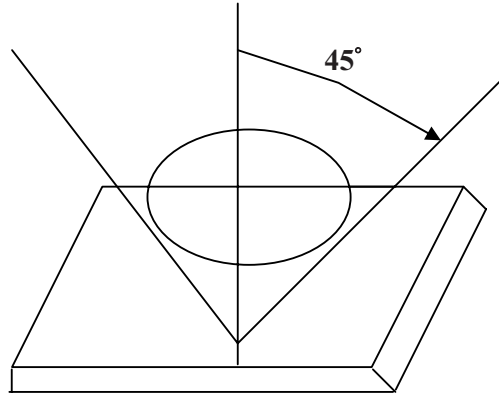
a.1 array / yellow-green



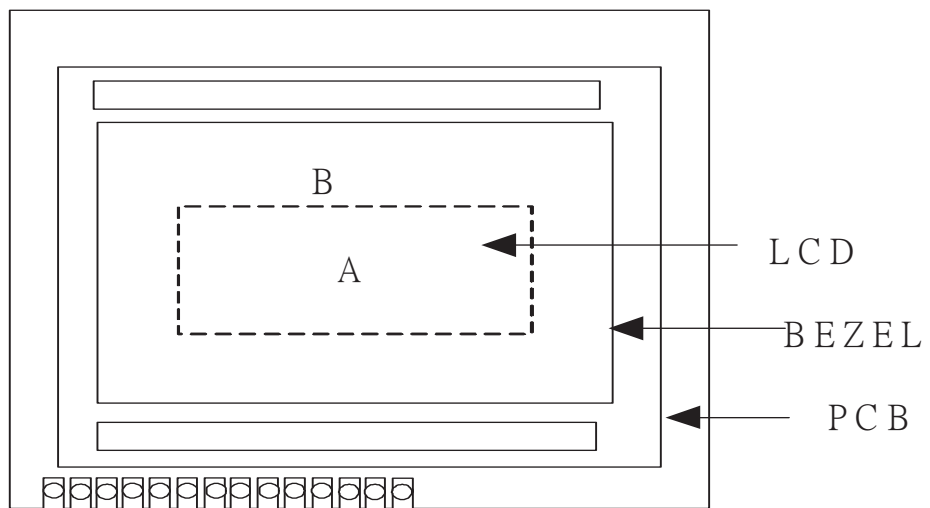
9. Quality Assurance

9.1 Inspection conditions

The LCD shall be inspected under 40W white fluorescent light.



Definition of applicable Zones

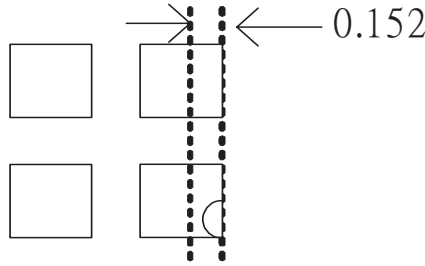
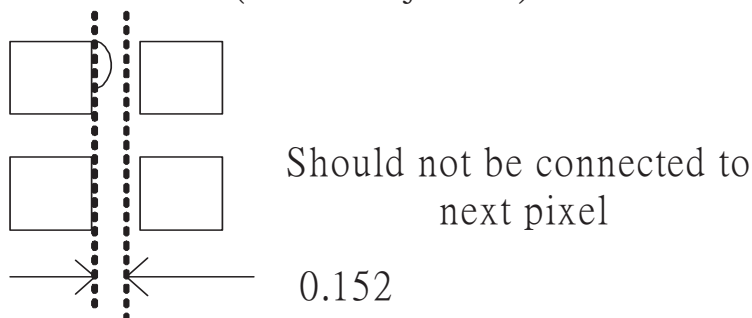
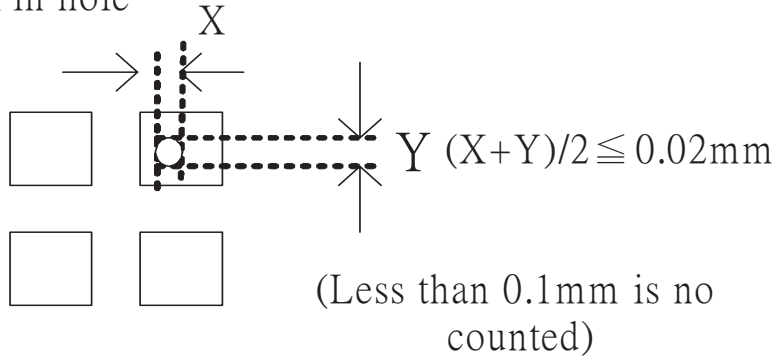
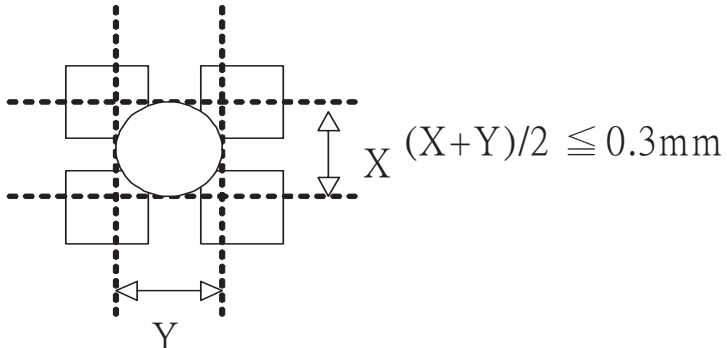


A : Display Area

B : Non-Display Area

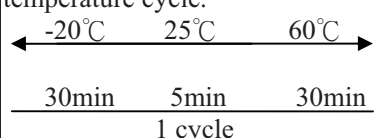
9.2 Inspection Parameters

NO.	Parameter	Criteria																												
1	Black or White spots	<table border="1"> <thead> <tr> <th colspan="2" data-bbox="565 489 824 558">Zone</th> <th colspan="2" data-bbox="824 489 1024 558">Acceptable Number</th> <th data-bbox="1024 489 1198 604" rowspan="2">Class Of Defects</th> <th data-bbox="1198 489 1390 558" rowspan="2">Acceptable Level</th> </tr> <tr> <th colspan="2" data-bbox="565 558 824 611">Dimension</th> <th data-bbox="824 558 924 611">A</th> <th data-bbox="924 558 1024 611">B</th> </tr> </thead> <tbody> <tr> <td colspan="2" data-bbox="565 611 824 657">D < 0.15</td> <td data-bbox="824 611 924 657">*</td> <td data-bbox="924 611 1024 657">*</td> <td data-bbox="1024 611 1198 814" rowspan="4">Minor</td> <td data-bbox="1198 611 1390 814" rowspan="4">2.5</td> </tr> <tr> <td colspan="2" data-bbox="565 657 824 703">0.15 ≤ D ≤ 0.2</td> <td data-bbox="824 657 924 703">4</td> <td data-bbox="924 657 1024 703">4</td> </tr> <tr> <td colspan="2" data-bbox="565 703 824 749">0.2 ≤ D ≤ 0.25</td> <td data-bbox="824 703 924 749">2</td> <td data-bbox="924 703 1024 749">2</td> </tr> <tr> <td colspan="2" data-bbox="565 749 824 814">D ≤ 0.3</td> <td data-bbox="824 749 924 814">0</td> <td data-bbox="924 749 1024 814">1</td> </tr> </tbody> </table> <p data-bbox="565 814 1024 850">D=(Long + Short)/2 *: Disregard</p>	Zone		Acceptable Number		Class Of Defects	Acceptable Level	Dimension		A	B	D < 0.15		*	*	Minor	2.5	0.15 ≤ D ≤ 0.2		4	4	0.2 ≤ D ≤ 0.25		2	2	D ≤ 0.3		0	1
Zone		Acceptable Number		Class Of Defects	Acceptable Level																									
Dimension		A	B																											
D < 0.15		*	*	Minor	2.5																									
0.15 ≤ D ≤ 0.2		4	4																											
0.2 ≤ D ≤ 0.25		2	2																											
D ≤ 0.3		0	1																											
2	Scratch, Substances	<table border="1"> <thead> <tr> <th colspan="2" data-bbox="565 957 867 1026">Zone</th> <th colspan="2" data-bbox="867 957 1066 1026">Acceptable Number</th> <th data-bbox="1066 957 1211 1073" rowspan="2">Class Of Defects</th> <th data-bbox="1211 957 1401 1026" rowspan="2">Acceptable Level</th> </tr> <tr> <th data-bbox="565 1026 703 1096">X(mm)</th> <th data-bbox="703 1026 867 1096">Y(mm)</th> <th data-bbox="867 1026 966 1096">A</th> <th data-bbox="966 1026 1066 1096">B</th> </tr> </thead> <tbody> <tr> <td data-bbox="565 1096 703 1142">*</td> <td data-bbox="703 1096 867 1142">0.04 ≥ W</td> <td data-bbox="867 1096 966 1142">*</td> <td data-bbox="966 1096 1066 1142">*</td> <td data-bbox="1066 1096 1211 1304" rowspan="4">Minor</td> <td data-bbox="1211 1096 1401 1304" rowspan="4">2.5</td> </tr> <tr> <td data-bbox="565 1142 703 1188">3.0 ≥ L</td> <td data-bbox="703 1142 867 1188">0.06 ≥ W</td> <td data-bbox="867 1142 966 1188">4</td> <td data-bbox="966 1142 1066 1188">4</td> </tr> <tr> <td data-bbox="565 1188 703 1234">2.0 ≥ L</td> <td data-bbox="703 1188 867 1234">0.08 ≥ W</td> <td data-bbox="867 1188 966 1234">2</td> <td data-bbox="966 1188 1066 1234">3</td> </tr> <tr> <td data-bbox="565 1234 703 1304">—</td> <td data-bbox="703 1234 867 1304">0.1 < W</td> <td data-bbox="867 1234 966 1304">0</td> <td data-bbox="966 1234 1066 1304">1</td> </tr> </tbody> </table> <p data-bbox="565 1304 1066 1371">X: Length Y: Width *: Disregard Total defects should not exceed 4/module</p>	Zone		Acceptable Number		Class Of Defects	Acceptable Level	X(mm)	Y(mm)	A	B	*	0.04 ≥ W	*	*	Minor	2.5	3.0 ≥ L	0.06 ≥ W	4	4	2.0 ≥ L	0.08 ≥ W	2	3	—	0.1 < W	0	1
Zone		Acceptable Number		Class Of Defects	Acceptable Level																									
X(mm)	Y(mm)	A	B																											
*	0.04 ≥ W	*	*	Minor	2.5																									
3.0 ≥ L	0.06 ≥ W	4	4																											
2.0 ≥ L	0.08 ≥ W	2	3																											
—	0.1 < W	0	1																											
3	Air Bubbles (between glass & polarizer)	<table border="1"> <thead> <tr> <th colspan="2" data-bbox="565 1507 824 1577">Zone</th> <th colspan="2" data-bbox="824 1507 1024 1577">Acceptable Number</th> <th data-bbox="1024 1507 1198 1623" rowspan="2">Class Of Defects</th> <th data-bbox="1198 1507 1390 1577" rowspan="2">Acceptable Level</th> </tr> <tr> <th colspan="2" data-bbox="565 1577 824 1629">Dimension</th> <th data-bbox="824 1577 924 1629">A</th> <th data-bbox="924 1577 1024 1629">B</th> </tr> </thead> <tbody> <tr> <td colspan="2" data-bbox="565 1629 824 1675">D ≤ 0.15</td> <td data-bbox="824 1629 924 1675">*</td> <td data-bbox="924 1629 1024 1675">*</td> <td data-bbox="1024 1629 1198 1772" rowspan="3">Minor</td> <td data-bbox="1198 1629 1390 1772" rowspan="3">2.5</td> </tr> <tr> <td colspan="2" data-bbox="565 1675 824 1728">0.15 < D ≤ 0.25</td> <td data-bbox="824 1675 924 1728">2</td> <td data-bbox="924 1675 1024 1728">*</td> </tr> <tr> <td colspan="2" data-bbox="565 1728 824 1772">0.25 < D</td> <td data-bbox="824 1728 924 1772">0</td> <td data-bbox="924 1728 1024 1772">1</td> </tr> </tbody> </table> <p data-bbox="565 1772 1040 1839">*: Disregard Total defects shall not excess 3/module.</p>	Zone		Acceptable Number		Class Of Defects	Acceptable Level	Dimension		A	B	D ≤ 0.15		*	*	Minor	2.5	0.15 < D ≤ 0.25		2	*	0.25 < D		0	1				
Zone		Acceptable Number		Class Of Defects	Acceptable Level																									
Dimension		A	B																											
D ≤ 0.15		*	*	Minor	2.5																									
0.15 < D ≤ 0.25		2	*																											
0.25 < D		0	1																											

<p>4</p>	<p>Uniformity</p>	<p>(1) Pixel shape (with Dent)</p>  <p>(2) Pixel shape (With Projection)</p>  <p>(3) Pin hole</p>  <p>(4) Deformation</p>  <p>Total acceptable number : 1/pixel,5/cell</p>
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10. Reliability

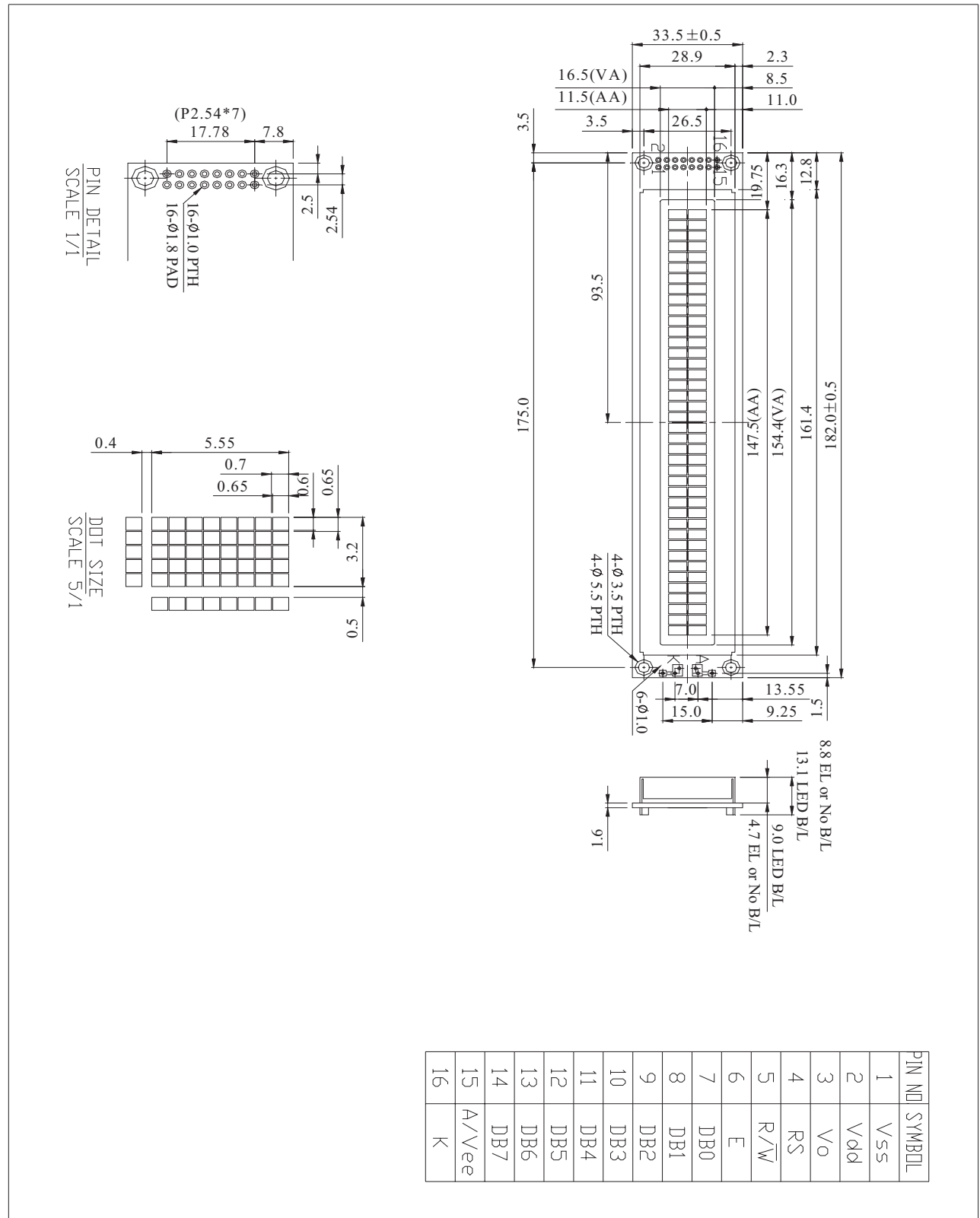
Content of Reliability Test

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.	60°C 200hrs	-
2	Low Temperature storage	Endurance test applying the high storage temperature for a long time.	-20°C 200hrs	-
3	High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	50°C 200hrs	-
4	Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	0°C 200hrs	-
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. 	-20°C/60°C 10 cycles	-
Mechanical Test				
8	Vibration test	Endurance test applying the vibration during transportation and using.	10~22Hz→1.5mmp-p 22~500Hz→1.5G Total 0.5hrs	-
9	Shock test	Constructional and mechanical endurance test applying the shock during transportation.	50G Half sign wave 11 msedc 3 times of each direction	-
10	Atmospheric pressure test	Endurance test applying the atmospheric pressure during transportation by air.	115mbar 40hrs	-
Others				
11	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. Appendix (Drawing , KS0066 controller data)

11-1 Drawing



11-2. KS0066 controller data

11-2.1 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)

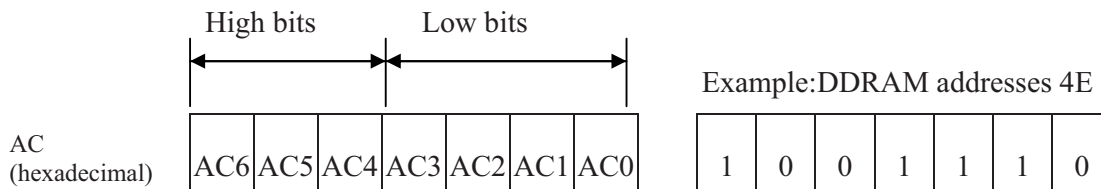
When the busy flag is 1, the controller LSI is in the internal operation mode, and the next instruction will not be accepted. When RS=0 and R/W=1, the busy flag is output to DB7. The next instruction must be written after ensuring that the busy flag is 0.

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 7 8 9 10 11 12 13 14 15 16

00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F

Example: 2-Line by 16-Character Display

Character Generator ROM (CGROM)

The CGROM generate 5×8 dot or 5×10 dot character patterns from 8-bit character codes. See Table 2.

Character Generator RAM (CGRAM)

In CGRAM, the user can rewrite character by program. For 5×8 dots, eight character patterns can be written, and for 5×10 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)

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		
High				Low				High			Low			High				Low							
0 0 0 0 * 0 0 0								0 0 0						0	0	0	* * *	█				0			
														0	0	1	* * *					0	0	0	
														0	1	1	* * *	0	0	0					
														1	0	0	* * *	0	0	0					
														1	0	1	* * *	0	0	0					
														1	1	0	* * *	0	0	0					
														1	1	1	* * *	0	0	0					
														0	0	0	* * *	0	0	0					
														0	0	1	* * *	0	0	0					
														0	1	0	* * *	0	0	0					
0 0 0 0 * 0 0 1								0 0 1						0	1	1	* * *	0	0	0					
														1	0	0	* * *	0	0	0					
														1	0	1	* * *	0	0	0					
														1	1	0	* * *	0	0	0					
0 0 0 0 * 1 1 1								1 1 1						1	0	0	* * *	█				0			
														1	0	1	* * *								
														1	1	0	* * *								
														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										
High					Low					High		Low			High					Low										
0 0 0 0 * 0 0 0										0 0					0	0	0	0	0	* * *	0					0	0	0	0	0
															0	0	0	1	* * *	0					0	0	0	0	0	
															0	0	1	0	* * *	█					0	0	0	0		
															0	0	1	1	* * *	█					0	0	0	0		
															0	1	0	0	* * *	█					0	0	0	0		
															0	1	0	1	* * *	█					0	0	0	0		
															0	1	1	0	* * *	█					0	0	0	0		
															0	1	1	1	* * *	█					0	0	0	0		
															1	0	0	0	* * *	█					0	0	0	0		
															1	0	0	1	* * *	█					0	0	0	0		
															1	0	1	0	* * *	█					0	0	0	0	0	
															1	0	1	0	* * *											
															1	1	1	1	* * *	█					* * *	* * *	* * *	* * *		

█ : " High "

11-2.2 C.G ROM table. table 2

Code C: English - Cyrillic 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)			0	1	2	3	4			5	6	7	8	9	.
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)		/	/	/	/	/	/			/	/	/	/	/	/

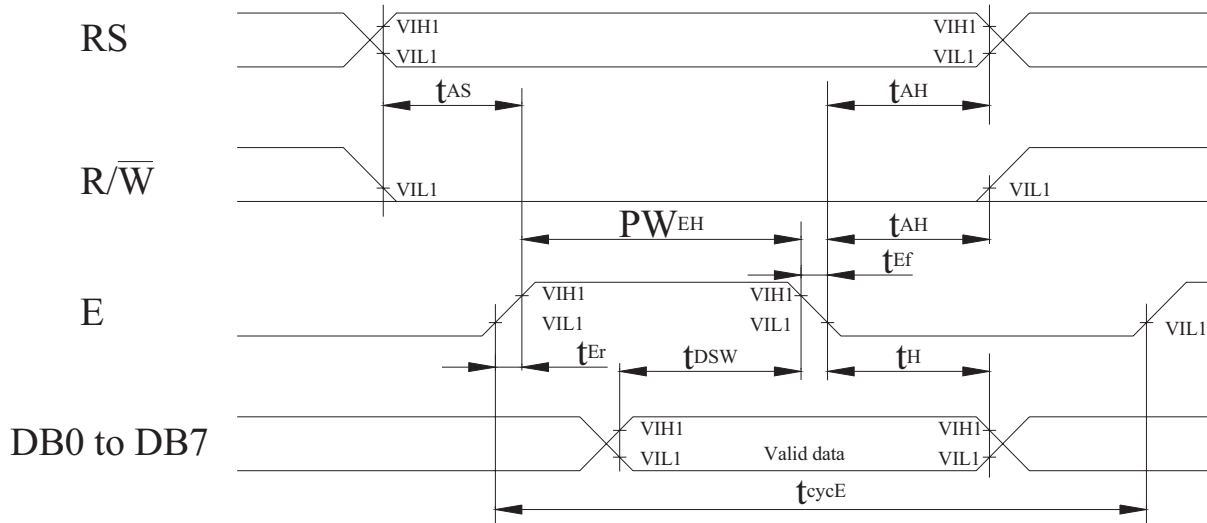
11-2.3 Instruction table

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	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	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

—” : don't care

11-2.4 Timing characteristics

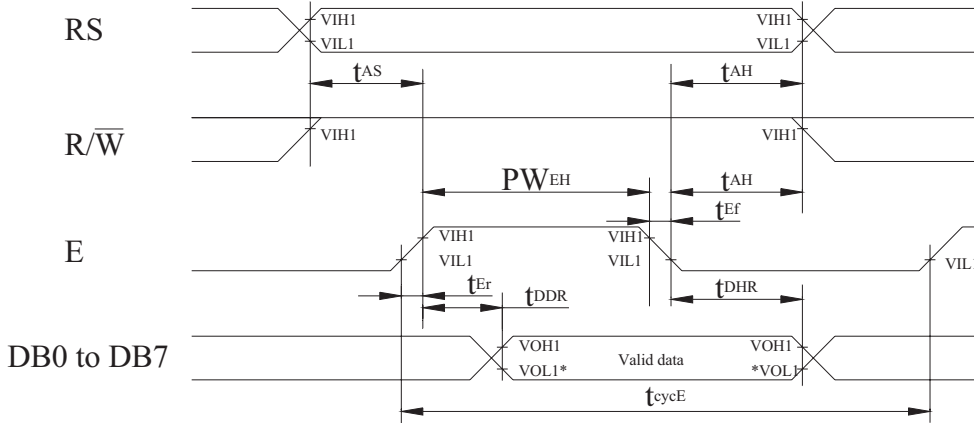
11-2.4.1 Write Operation



$T_a=25^{\circ}C, V_{dd}=5.0\pm 0.5V$

Item	Symbol	Min	Typ	Max	Unit
Enable cycle time	t_{cycE}	500	-	-	ns
Enable pulse width (high level)	PW_{EH}	230	-	-	ns
Enable rise/fall time	t_{Er}, t_{Efc}	-	-	20	ns
Address set-up time (RS, R/W to E)	t_{AS}	40	-	-	ns
Address hold time	t_{AH}	10	-	-	ns
Data set-up time	t_{DSW}	80	-	-	ns
Data hold time	t_H	10	-	-	ns

11-2.4.2 Read Operation



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

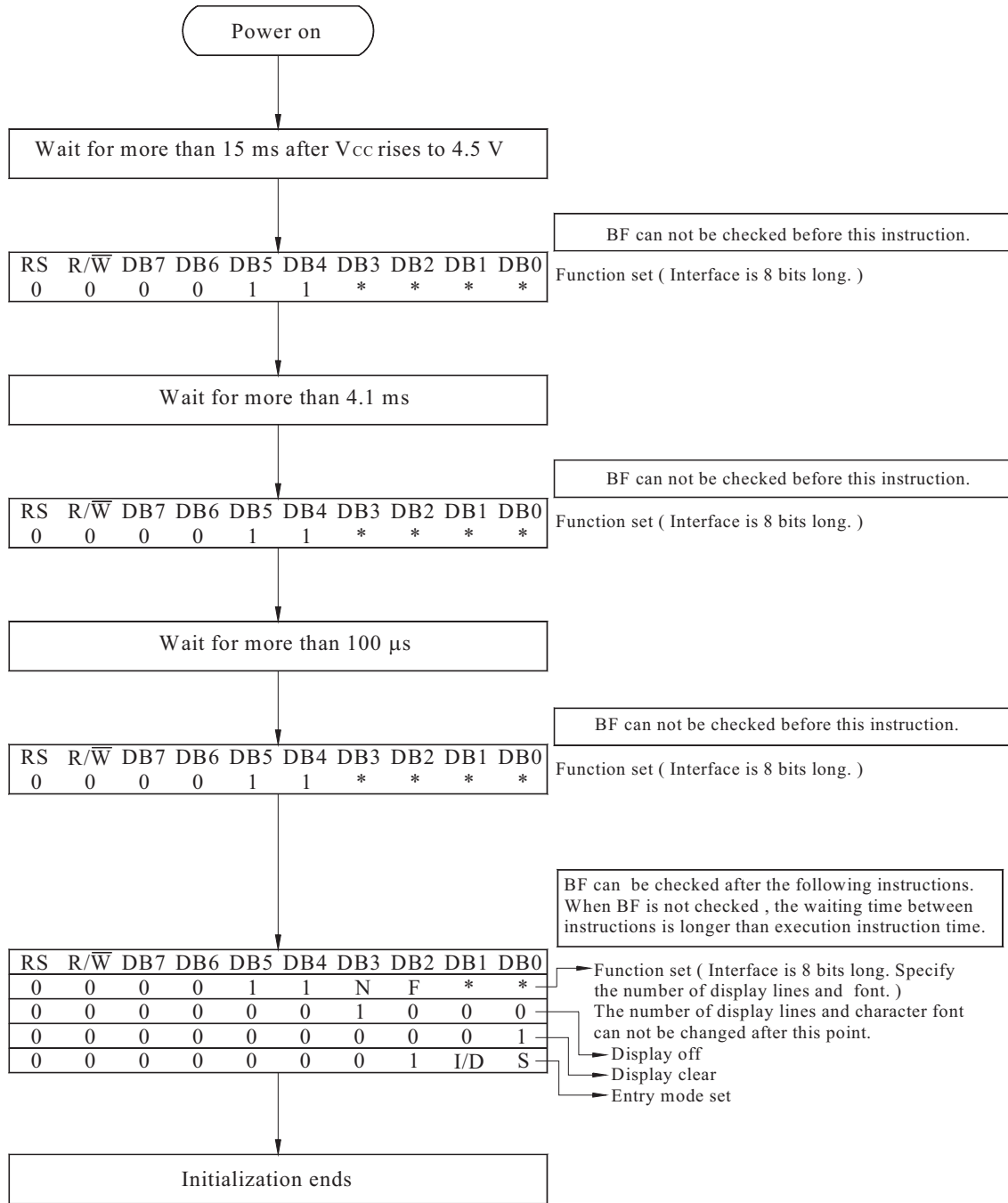
$T_a=25^{\circ}C, V_{dd}=5.0\pm 0.5V$

Item	Symbol	Min	Typ	Max	Unit
Enable cycle time	t_{cycE}	500	-	-	ns
Enable pulse width (high level)	PW_{EH}	230	-	-	ns
Enable rise/fall time	t_{Er}, t_{Ef}	-	-	20	ns
Address set-up time (RS, R/W to E)	t_{AS}	40	-	-	ns
Address hold time	t_{AH}	10	-	-	ns
Data delay time	t_{DDR}	-	-	160	ns
Data hold time	t_{DHR}	5	-	-	ns

11-2.5 Initializing soft ware of LCM

11-2.5.1 8-bit interface

11-2.5.2 4-bit interface



8-Bit Ineterface

