

DISPLAY Elektronik GmbH

DATA SHEET

LCD MODULE

DEM 40492 SYH-PY

Product Specification

Version: 3.1.2

28.09.2023

GENERAL SPECIFICATION

MODULE NO. :

DEM 40492 SYH-PY

CUSTOMER P/N

Version No.	Change Description	Date
0	Original Version	22.05.2008
1	Change Module Type	04.06.2008
2	Modify Backlight Current, Block Diagram, Pin Description, Backlight Characteristics, Add Font Characteristics, Modify Test Criteria	06.10.2008
3	Change IC	31.10.2018
3.1.0	Change Production Line and Components	20.07.2023
3.1.1	Correct the LED Backlight Drawing	03.08.2023
3.1.2	Correct the LED Backlight Drawing	28.09.2023

PREPARED BY: CC

DATE: 28.09.2023

APPROVED BY: MH

DATE: 28.09.2023

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1. FUNCTIONS & FEATURES

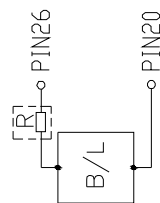
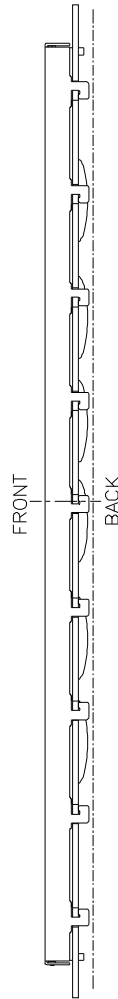
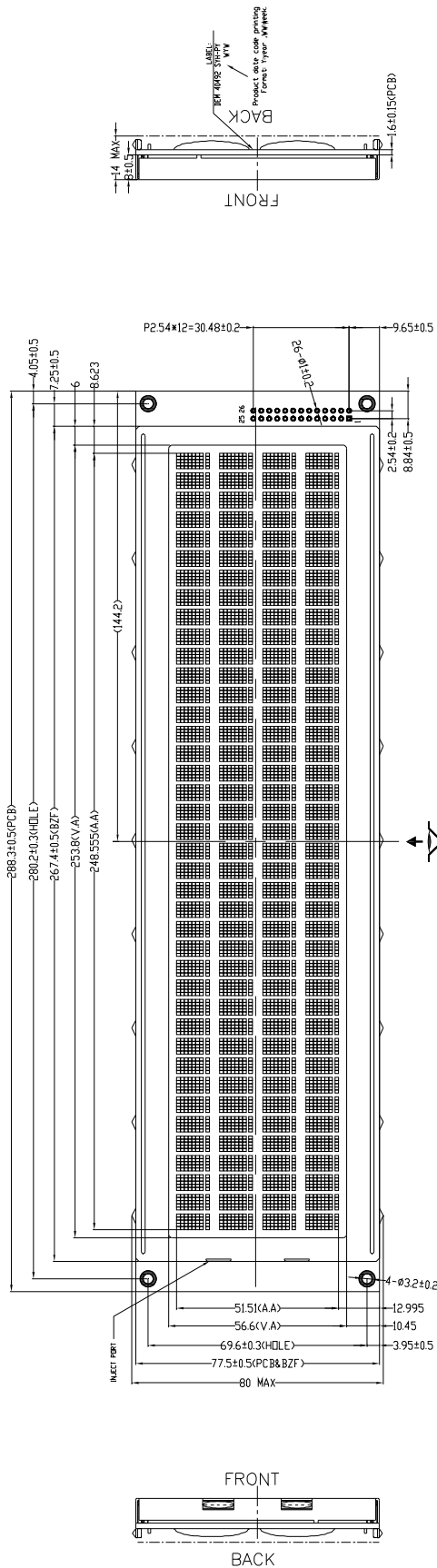
MODULE NAME	LCD TYPE	Remark
DEM 40492 SYH-PY	STN Yellow-Green Transflective Positive Mode	-

- Format : 40 x 4 Characters
- Viewing Direction : 6 o'clock
- Driving Scheme : 1/16 Duty, 1/5 Bias
- Power Supply Voltage (VDD) : 5.0 Volt (typ.)
- LCD Operating Voltage : 8.5 Volt (typ.)
- Operation Temperature : -20°C to +70°C
- Storage Temperature : -30°C to +80°C
- Backlight Color : LED, Lightguide, Yellow-Green

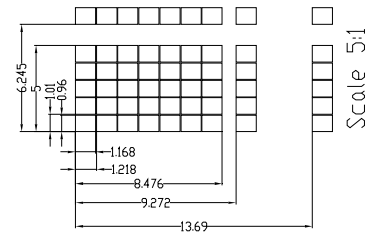
2. MECHANICAL SPECIFICATIONS

- Modules Size : 288.30 x 77.50 x 14.00 mm
- Viewing area : 253.80 x 56.60 mm
- Character Pitch : 6.25 x 13.69 mm
- Character Size : 5.00 x 10.44 mm
- Dot Pitch : 1.01 x 1.22 mm
- Dot Size : 0.96 x 1.17 mm
- Weight : 330 g

3. EXTERNAL DIMENSIONS (⌀ unit: mm)

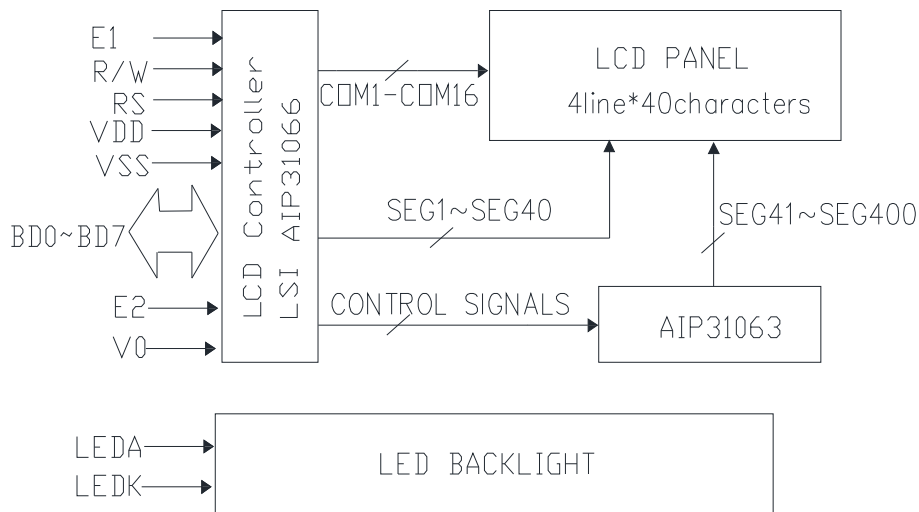


CONSTANT CURRENT: 200mA, 5.0V(REF.)
BACKLIGHT DRIVER CIRCUIT DIAGRAM



1. Unmarked tolerance is ±0.3
2. All materials comply with RoHS
3. □ ...:critical dimension.

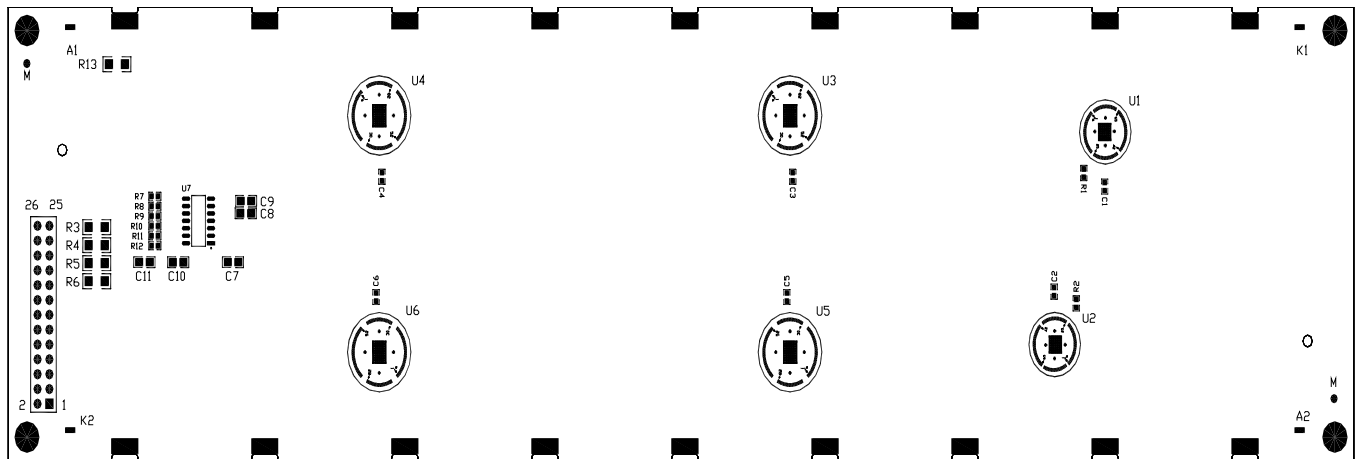
4. BLOCK DIAGRAM



5. PIN ASSIGNMENT

No.	Symbol	Function
1	NC	No Connection
2	V0	Power Supply for LCD Drive (Reference Voltage: -3.5V)
3	E2	Enable Signal for Half-Down Screen Chip
4	NC	No Connection
5	R/W	Read/Write Selection (H: Read, L: Write)
6	NC	No Connection
7	RS	Register Selection (H: Data register, L: Instruction register)
8	VSS	GND (0V)
9	E1	Enable Signal for Half-Up Screen Chip
10	VSS	GND (0V)
12		
14		
16		
18		
11 13 15 17 19 21 23 25	DB0~DB7	Data Bus Line
20	LEDK	Power Supply for Backlight (Reference Voltage: 0V)
22 24	VDD	Power Supply for Logic(+5V)
26	LEDA	Power Supply for Backlight (Constant Current: 200mA, Reference Voltage: 5.0V, using Internal Resistor Values of R3 = R4 = R5 = 130Ohm to limit the current.)

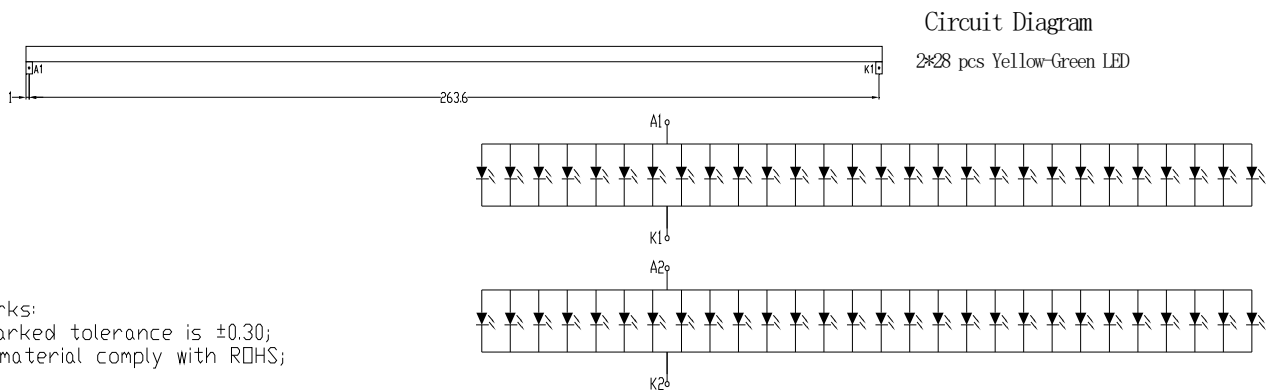
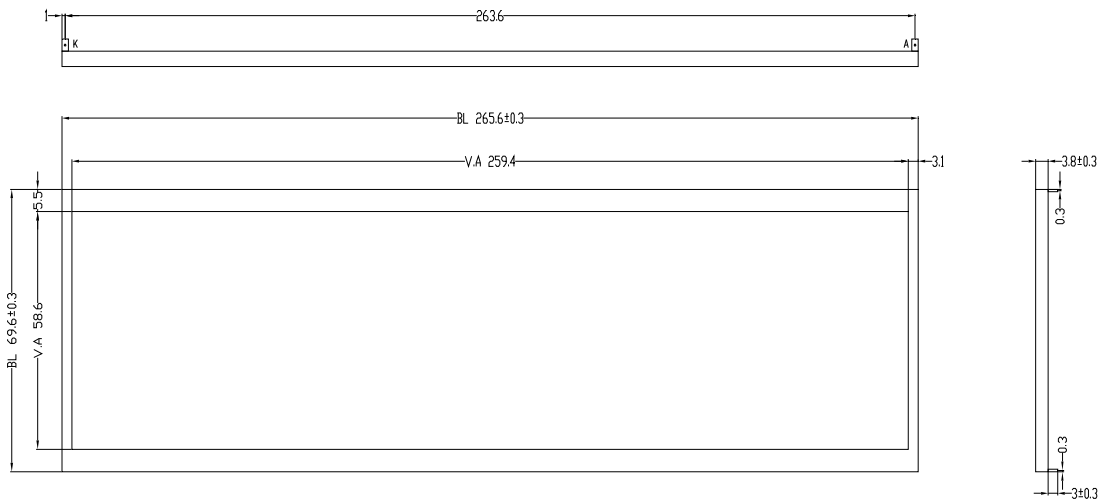
6. PCB Top Layout and Top Overlay



7. BACKLIGHT ELECTRICAL/OPTICAL SPECIFICATIONS

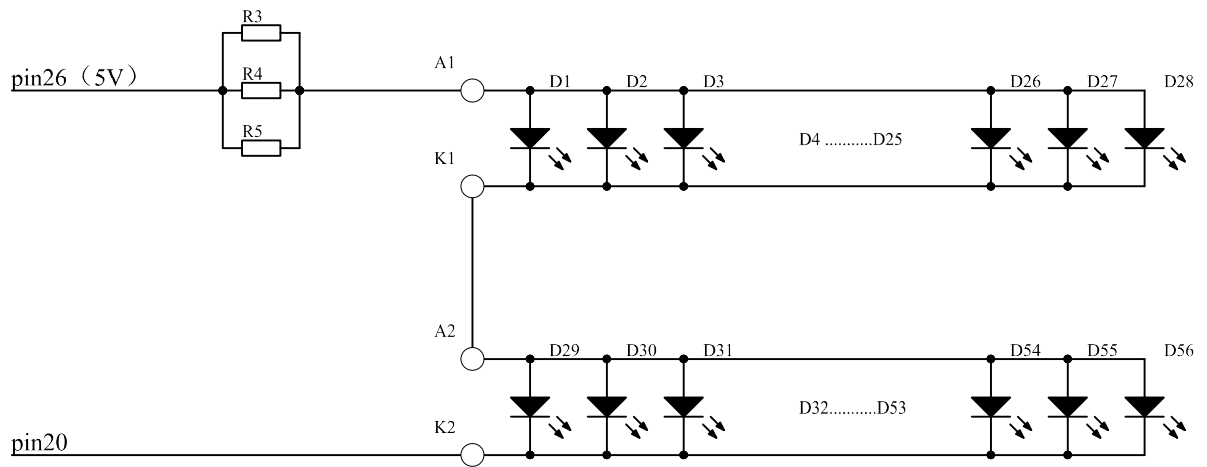
7.1 Backlight Component:

Item	Symbol	min.	typ.	max.	Unit	Condition
Forward Voltage	Vf	1.7	2.0	2.3	v	If=2*280mA
Power Dissipation	Pd	-	-	644	mW	If=2*280mA
Luminous Uniformity	ΔL_v	70			%	MIN/MAX*100%
Luminance	Lv		35	-	cd/m ²	If=2*280mA T=25°C
Dominant Wave Length	λ_D	569	-	576	nm	



Remarks:
 1.Unmarked tolerance is ±0.30;
 2.All material comply with RQHS;

7.2 MODULE BACKLIGHT CONFIGURATION



8. MAXIMUM ABSOLUTE POWER RATINGS

Item	Symbol	MIN	MAX	Unit
Supply Voltage for Logic	V _{DD}	-0.3	7.0	V
Supply Voltage for LCD	V ₀	VDD-12.0	VDD+0.3	V
Input Voltage	V _{in}	-0.3	VDD+0.3	V
Supply Current (without B/L)	I _{DD} (Ta = 25°C)	---	5	mA
Supply Current for Backlight	I _F (Ta = 25°C)	---	560x2	mA
Reverse Voltage for Backlight	V _R (Ta = 25°C)	---	5	V
Operating Temperature	Top	-20	70	°C
Storage Temperature	Tst	-30	80	°C

9. ELECTRICAL CHARACTERISTICS

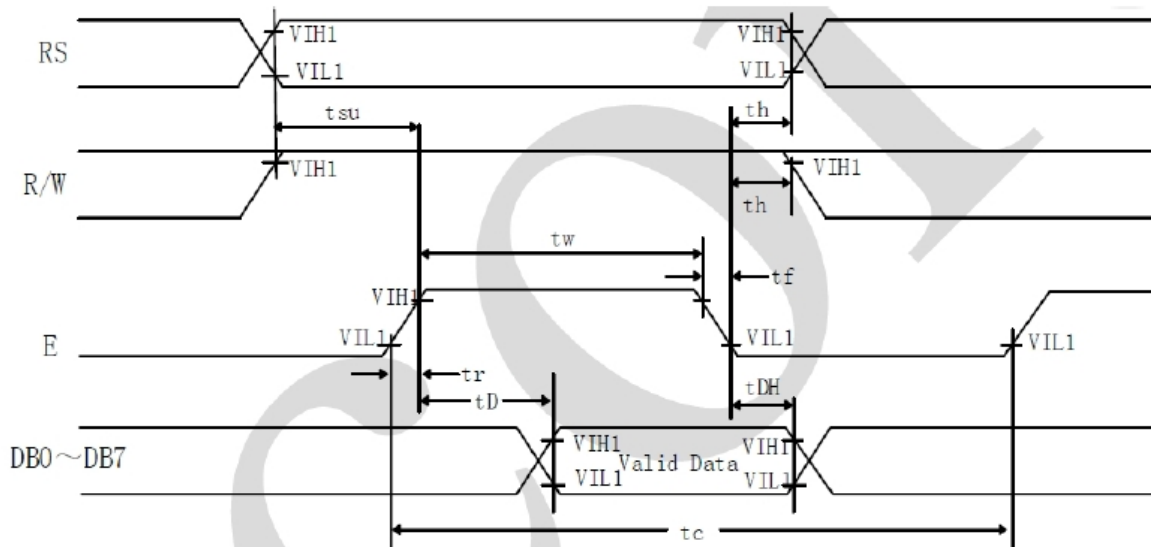
9.1 DC Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V _{DD}	Supply voltage	-	4.7	5.0	5.3	V
V _{LCD}	LCD supply voltage	-	8.2	8.5	8.8	V
I _{DD}	Supply current 1	-	-	TBD	-	mA
I _{LCD}	Supply current 2	-	-	TBD	-	mA

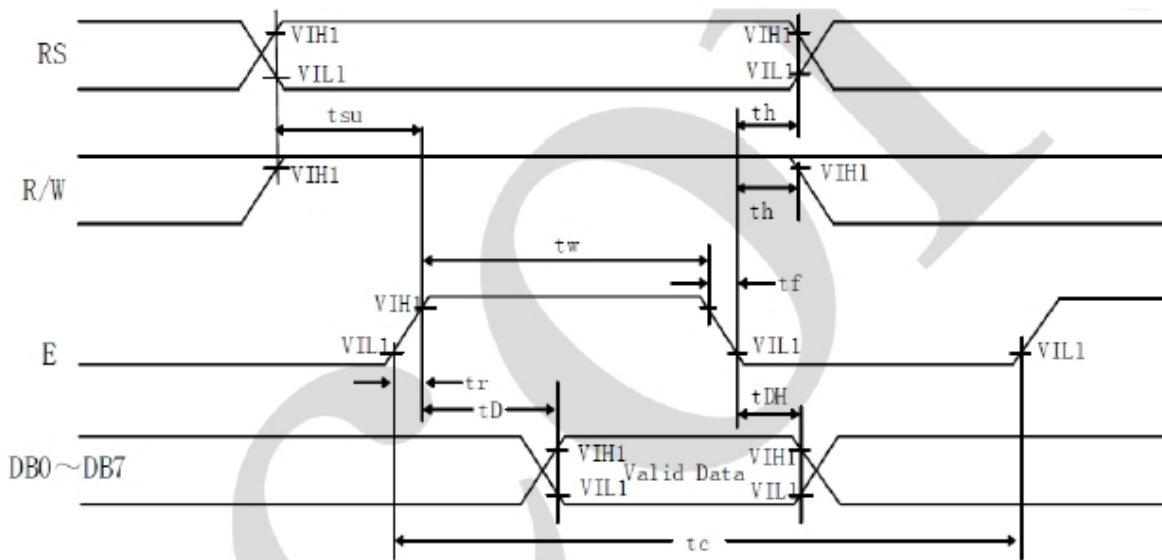
9.2 AC Characteristics

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
E Cycle Time	t _c	Write Mode	500	-	-	ns
E Rise / Fall Time	t _R , t _F		-	-	20	
E Pulse Width (High, Low)	t _w		230	-	-	
R/W and RS Setup Time	t _{su1}		40	-	-	
R/W and RS Hold Time	t _{H1}		10	-	-	
Data Setup Time	t _{su2}		80	-	-	
Data Hold Time	t _{H2}		10	-	-	
E Cycle Time	t _c	Read Mode	500	-	-	ns
E Rise / Fall Time	t _R , t _F		-	-	20	
E Pulse Width (High, Low)	t _w		230	-	-	
R/W and RS Setup Time	t _{su}		40	-	-	
R/W and RS Hold Time	t _H		10	-	-	
Data Output Delay Time	t _D		-	-	120	
Data Hold Time	t _{DH}		5	-	-	

Read Mode (Reading Data from AIP31066L to MPU)



Read Mode (Reading Data from AIP31066L to MPU)



10. CHARACTER GENERATOR ROM

Upper 4 bit Lower 4 bit	LLLL	LLH	LLHL	LLHH	LHLL	LHLH	LHHL	LHHH	HLLL	HLLH	HLHL	HLHH	HHLL	HHLH	HHHL	HHHH
LLLL				0	1	2	3	4				一	夕	三	四	五
LLH			!	1	A	Q	a	q			。	ア	チ	△	△	△
LLHL			"	2	B	R	b	r			「	イ	ウ	×	×	×
LLHH			#	3	C	S	c	s			」	ウ	テ	毛	毛	毛
LHLL			キ	4	D	T	d	t			√	エ	ト	カ	ハ	ハ
LHLH			キ	5	E	U	e	u			・	オ	カ	工	工	工
LHHL			キ	6	F	V	f	v			ヲ	カ	ニ	ヨ	ヨ	ヨ
LHHH			キ	7	G	W	g	w			ヲ	キ	又	ラ	ラ	ラ
HLLL			0	8	H	X	h	x			イ	夕	卒	リ	リ	リ
HLLH			イ	9	I	Y	i	y			ウ	テ	ル	ル	ル	ル
HLHL			キ	キ	J	Z	j	z			エ	コ	ル	ル	ル	ル
HLHH			キ	キ	K	K	ク	ク			オ	オ	口	口	口	口
HHLL			キ	キ	ル	ル	リ	リ			カ	コ	ワ	ワ	ワ	ワ
HHLH			キ	キ	M	N	m	n			ユ	又	△	△	△	△
HHHL			キ	キ	N	N	キ	キ			ヨ	セ	市	市	市	市
HHHH			キ	キ	0	0	キ	キ			ウ	ウ	又	又	又	又

11. INSTRUCTION TABLE

Instruction	Instruction Code										Description	Execution time (fosc=270 kHz)
	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0		
Clear Display	0	0	0	0	0	0	0	0	0	1	Write "20H" to DDRAM and set DDRAM address to '00H' from AC	1.53 ms
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.	1.53 ms
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	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	1	S/C	R/L	-	-	Set cursor moving and display shift control bit, and the direction, without changing of DDRAM data.	39 μs
											Set interface data length (DL: 8-bit/4-bit) numbers of display line	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

* "-": dont care

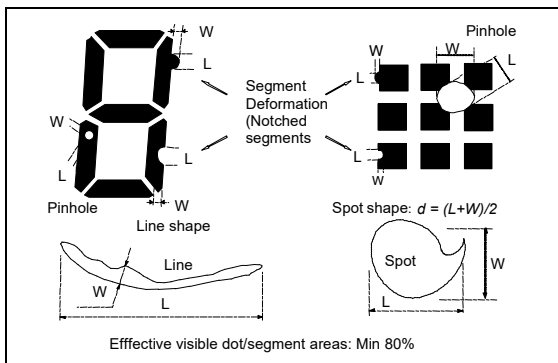
Note: When an MPU program with checking the Busy Flag(DB7) is made, it must be necessary 1/2Fosc is necessary for executing the next instruction by the falling edge of the 'E' signal after the Busy Flag (DB7) goes to "Low".

12. QUALITY DESCRIPTION

DEFECT SPECIFICATION:

Specific type-related items are covered in this sheet.

- a: Table for Cosmetic defects
(Note: nc = not counted).
Sizes and number of defects
(Max. Qty)

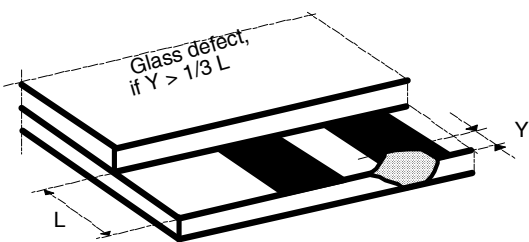


Example

s/

Shapes

- b: Glass defects
- b1: Glass defects at contact ledge
- b2: Glass chipping in other areas shall not be in conflict



with the product's function.

Defect Type	Max. defect size [μm]d or L W	Max. Quantity.
Black or White Spots	$d \leq 150$	nc
	$150 < d \leq 300$	5
Black or White Lines	--	nc
	$W \leq 10$	
	$L \leq 5000$	3
	$W \leq 30$	
	$L \leq 2000$	2
	$W \leq 50$	
Pinhole	$d \leq 150$	nc
	$150 < d \leq 300$	1/segment
(Total defects)		(5)
Segment Deformation	$W \leq 100$	nc
Bubble (e.g. under pola)	$d \leq 150$	nc
	$200 < d \leq 400$	3
	$400 < d \leq 600$	1

13. MODULE ACCEPT QUALITY LEVEL (AQL)

Inspection Standard: ANSI Z-1.4 Table Normal Inspection Single Sampling Level II.

14. RELIABILITY TEST

Operating life time: 50,000 hours (at room temperature without direct irradiation of sunlight)

Reliability characteristics shall meet following requirements.

Tests Item	Condition
High Temperature Storage	+80°C x 96h
Low Temperature Storage	-30°C x 96h
High Temperature Operation	+70°C x 96h
Low Temperature Operation	-20°C x 96h
High Temperature, High Humidity	+60°C x 90%RH x 96h
Thermal Shock	-20°C x 30min → +25°C x 10s → +70°C x 30 min x 5 cycles
Vibration Test	Frequency x Swing x Time 40Hz x 4mm x 4h
Drop Test	Height x no. of drop 1.0m x 6 drops

15. LCD MODULES HANDLING PRECAUTIONS

- Please remove the protection foil of polarizer before using.
- The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
- If the display panel is damaged and the liquid crystal substance inside it leaks out, do not get any in your mouth. If the substance come into contact with your skin or clothes promptly wash it off using soap and water.
- Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarize carefully.
- To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
 - Be sure to ground the body when handling the LCD module.
 - Tools required for assembly, such as soldering irons, must be properly grounded.
 - To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
 - The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.
- Storage precautions
When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps. Keep the modules in bags designed to prevent static electricity charging under low temperature / normal humidity conditions (avoid high temperature / high humidity and low temperatures below 0°C). Whenever possible, the LCD modules should be stored in the same conditions in which they were shipped from our company.

16. OTHERS

- Liquid crystals solidify at low temperature (below the storage temperature range) leading to defective orientation of liquid crystal or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subjected to a strong shock at a low temperature.
- If the LCD modules have been operating for a long time showing the same display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. Abnormal operating status can be resumed to be normal condition by suspending use for some time. It should be noted that this phenomena does not adversely affect performance reliability.
- To minimize the performance degradation of the LCD modules resulting from caused by static electricity, etc. exercise care to avoid holding the following sections when handling the modules:
 - Exposed area of the printed circuit board
 - Terminal electrode sections