

DISPLAY Elektronik GmbH

DATA SHEET

LCD MODULE

DEM 128128A1 SYH-LY

Product Specification

Version : 0

25.08.2017

GENERAL SPECIFICATION

MODULE NO. :

DEM 128128A1 SYH-LY

CUSTOMER P/N

VERSION NO.	CHANGE DESCRIPTION	DATE
0	ORIGINAL VERSION	25.08.2017

PREPARED BY: HZ

DATE: 25.08.2017

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DATE: 25.08.2017

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1. FUNCTIONS & FEATURES

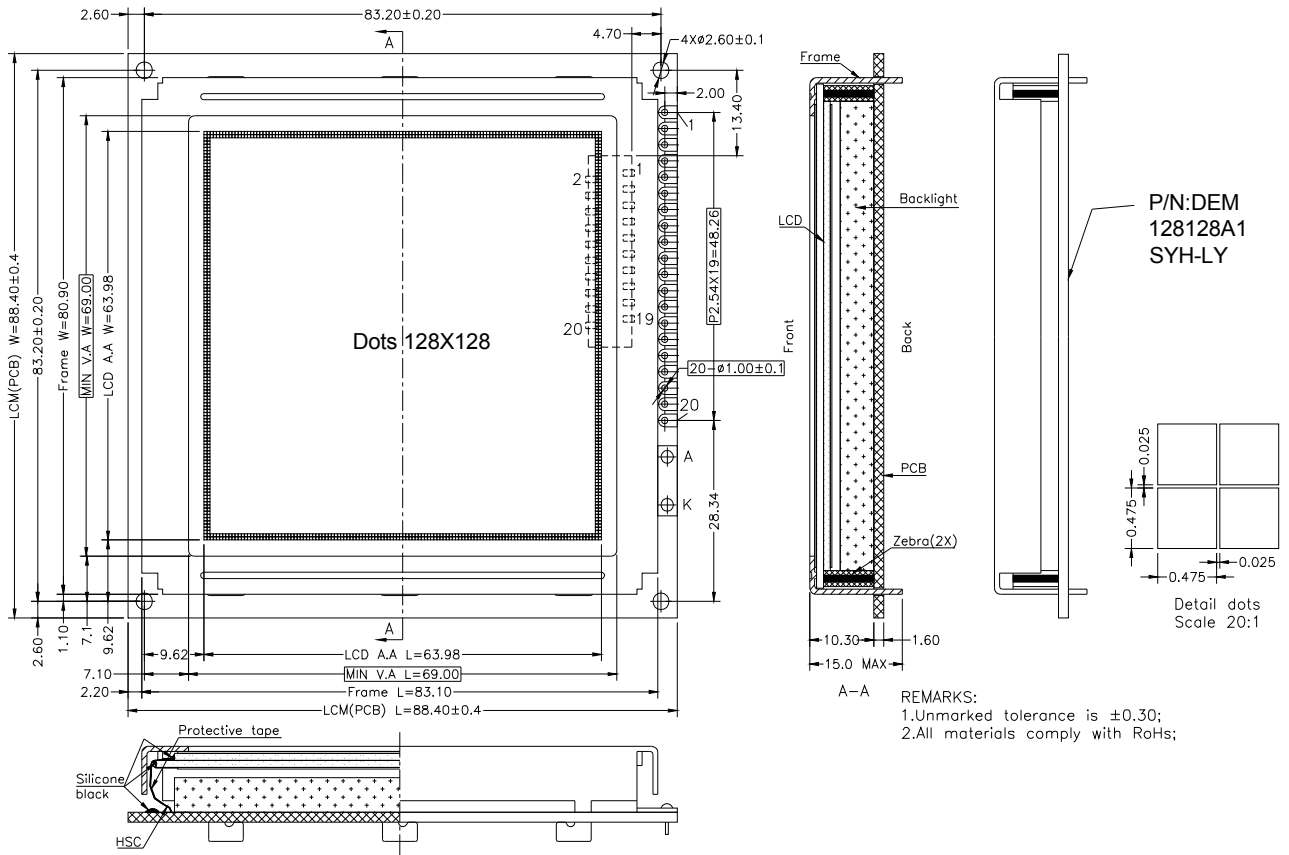
MODULE NAME	LCD Type	Remark
DEM 128128A1 SYH-LY	STN Yellow Green Transflective Positive Mode	DC/DC Converter Is AIC1652

- Viewing Direction : 6 O'clock
- Driving Scheme : 1/128 Duty, 1/12 Bias
- Power Supply for logic : 5.0 Volt (typ.)
- Backlight Color : LED, Lightbox, Yellow-Green
- Display Format : 128 x 128 Dots
- V_{LCD} : 15.5 Volt (typ.)

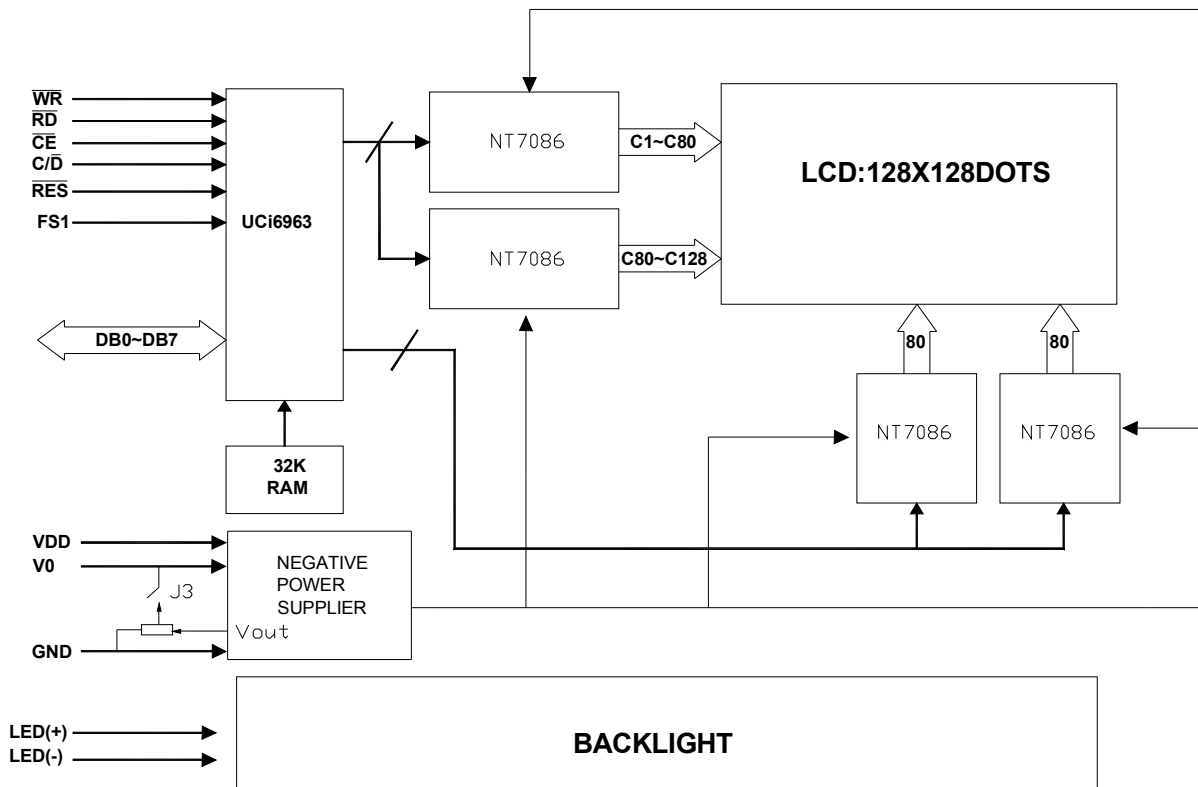
2. MECHANICAL SPECIFICATIONS

- Module Size : 88.40 x 88.40 x 15.00 mm
- Viewing Area : 69.00 x 69.00 mm
- Dot Size : 0.475 x 0.475 mm
- Dot Gap : 0.025 x 0.025 mm

3. EXTERNAL DIMENSIONS



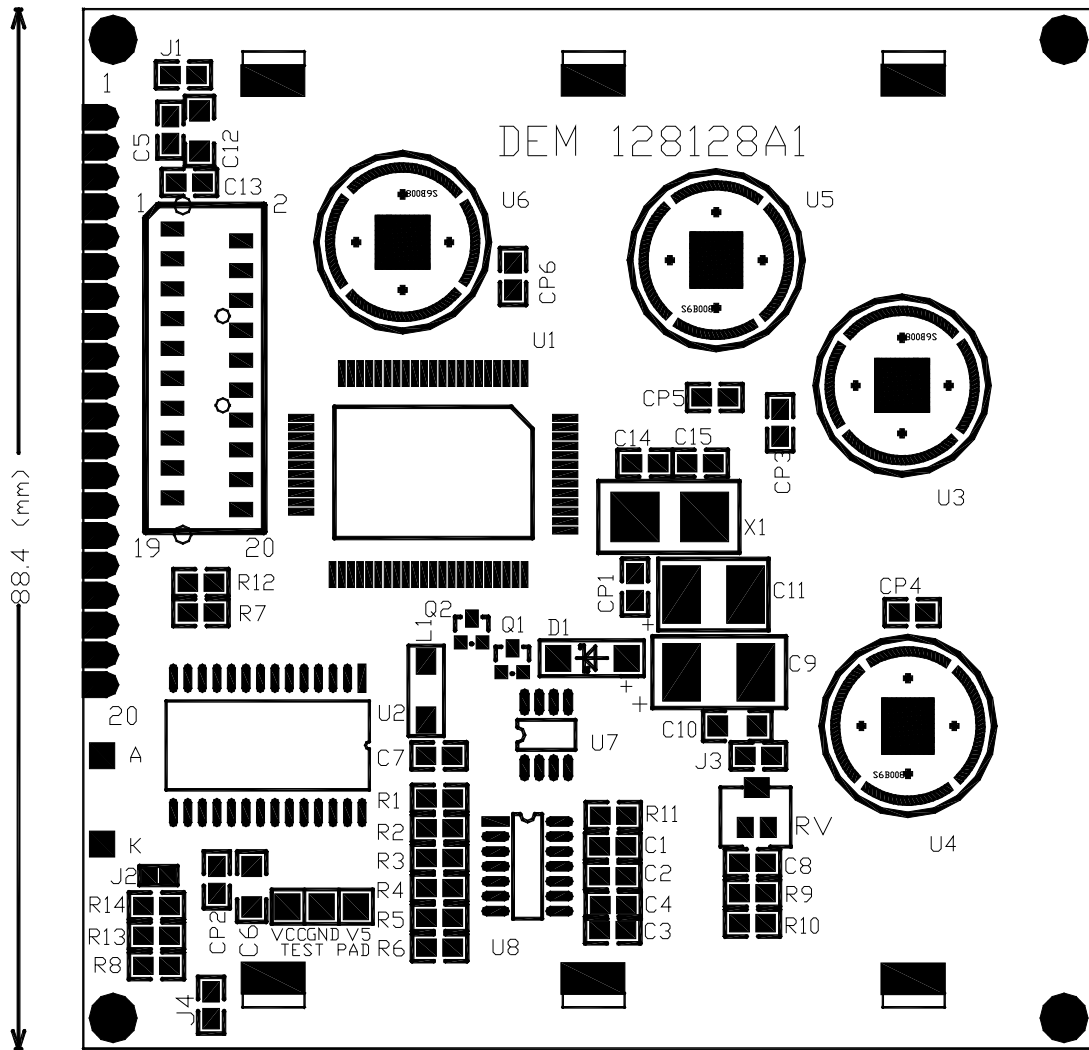
4. BLOCK DIAGRAM



5. PIN ASSIGNMENT

NO.	SYMBOL	FUNCTION
1	FGND	Frame GND
2	VSS	Ground (0V)
3	VDD	Power Supply(+5V)
4	V0	Voltage level for LCD control adjustment Volt. If J3 is opened, V0 (-8.5 ~ -14V) is supplied by external. If J3 is closed; it is supplied by DC/DC converter, left this Interface open.
5	/WR	Data write. Write data to controller UCi6963 when “L”
6	/RD	Data read. Read data from controller UCi6963 when “L”
7	/CE	Chip enable of controller when “L”
8	C/ D	Write mode H: Command write L: Data write
9	/RES	Controller reset when “L”
10	DB0	Data input/output(LSB)
11	DB1	Data input/output
12	DB2	Data input/output
13	DB3	Data input/output
14	DB4	Data input/output
15	DB5	Data input/output
16	DB6	Data input/output
17	DB7	Data input/output(MSB)
18	FS1	Font select. “H” for 6x8 font & “L” for 8x8 font
19	LED+(A)	Anode of LED backlight(+5.0V)
20	LED-(K)	Cathode of LED backlight(0V)

6. PCB DRAWING AND DESCRIPTION



7. PCB DESCRIPTION

7-1. The J1 is metal-bezel GND to module GND.

Note: In application module, J1=0 Ω .

7-2. The LED resistors are effective when J2 is open.

Note: In application module, J2=open.

7-3. The R8 and the R13, R14 are the LED resistor.

Note: In application module, R8=R13=R14=12 Ω

7-4. The mounting holes is set on ground when the J4 is closed.

Note: In application module, J4=0 Ω

7-5. The module use internal contrast regulation when J3 is closed.

Note: In application module, J3 is open.

8. STANDARD CHARACTER PATTERN

MSB \ LSB	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0		!	"	#	\$	%	&	'	()	*	+	,	-	.	/
1	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
2	a	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
3	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
4	'	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
5	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
6	Q	ü	é	á	ä	à	ç	ê	ë	è	í	ì	ï	ä	å	
7	É	æ	ŀ	ö	ó	ô	ù	û	ü	ö	ü	ø	ø	ø	ø	

9. COMMAND DEFINITIONS

No.	Command	C/D	W/R	D7	D6	D5	D4	D3	D2	D1	D0	Action	Value
1.	Set Cursor Pointer	1	0	0	0	1	0	0	0	0	1		21h
		0	0	#	#	#	#	#	#	#	#	Set X address	
		0	0	#	#	#	#	#	#	#	#	Set Y address	
2.	Set Offset Register	1	0	0	0	1	0	0	0	1	0		22h
		0	0	#	#	#	#	#	#	#	#	Data	
		0	0	0	0	0	0	0	0	0	0		00h
3.	Set Address Pointer	1	0	0	0	1	0	0	1	0	0		24h
		0	0	#	#	#	#	#	#	#	#	Low address	
		0	0	#	#	#	#	#	#	#	#	High address	
4.	Set Text Home Addr.	1	0	0	1	0	0	0	0	0	0		40h
		0	0	#	#	#	#	#	#	#	#	Low address	
		0	0	#	#	#	#	#	#	#	#	High address	
5.	Set Text Area	1	0	0	1	0	0	0	0	0	1		41h
		0	0	#	#	#	#	#	#	#	#	Columns	
		0	0	0	0	0	0	0	0	0	0		
6.	Set Graphic Home Addr.	1	0	0	1	0	0	0	0	1	0		42h
		0	0	#	#	#	#	#	#	#	#	Low address	
		0	0	#	#	#	#	#	#	#	#	High address	
7.	Set Graphic Area	1	0	0	1	0	0	0	0	1	1		43h
		0	0	#	#	#	#	#	#	#	#	Columns	
		0	0	0	0	0	0	0	0	0	0		
8.	OR mode	1	0	1	0	0	0	-	0	0	0		8xh
9.	EXOR mode	1	0	1	0	0	0	-	0	0	1		
10.	AND mode	1	0	1	0	0	0	-	0	1	1		
11.	Text Attribute mode	1	0	1	0	0	0	-	1	0	0		
		0	0	-	-	-	-	#	#	#	#		
12.	Internal CG ROM mode	1	0	1	0	0	0	0	-	-	-		
13.	External CG RAM mode	1	0	1	0	0	0	1	-	-	-		
14.	Display Mode	1	0	1	0	0	1	#	#	#	#	Switch Graphic/Text/Cursor/Blink ON/OFF	9xh
15.	Cursor Pattern Select	1	0	1	0	1	0	0	#	#	#	Set cursor: 1~8-line	Axh
16.	Data-write and Increase ADP	1	0	1	1	0	0	0	0	0	0		C0h
		0	0	#	#	#	#	#	#	#	#	Data	
17.	Data-read and Increase ADP	1	1	1	1	0	0	0	0	0	1		C1h
18.	Data-write and Decrease ADP	1	0	1	1	0	0	0	0	1	0		C2h
		0	0	#	#	#	#	#	#	#	#	Data	
19.	Data-read and Decrease ADP	1	1	1	1	0	0	0	0	1	1		C3h
20.	Data-write and Non-variable ADP	1	0	1	1	0	0	0	1	0	0		C4h
		0	0	#	#	#	#	#	#	#	#	Data	
21.	Data-read and Non-variable ADP	1	1	1	1	0	0	0	1	0	1		C5h
22.	Set Data Auto Write	1	0	1	0	1	1	0	0	0	0		B0h
23.	Set Data Auto Read	1	0	1	0	1	1	0	0	0	1		B1h
24.	Auto Reset	1	0	1	0	1	1	0	0	1	0		B2h
25.	Screen Peek	1	0	1	1	1	0	0	0	0	0		E0h
26.	Screen Copy	1	0	1	1	1	0	1	0	0	0		E8h
27.	Bit Set/Reset	1	0	1	1	1	1	#	#	#	#	Set/Reset Bit 0~7	Fxh
28.	Whole Screen Reverse (Triple-byte command)	1	0	1	1	0	1	0	0	0	0		D0h
		0	0	-	-	-	-	-	-	-	#	0: Normal 1: Reverse	
		0	0	-	-	-	-	-	-	-	-	(Don't Care)	

No.	Command	C/D	W/R	D7	D6	D5	D4	D3	D2	D1	D0	Action	Value
29.	Blink Time (Triple-byte command)	1	0	0	1	0	1	0	0	0	0		50h
		0	0	-	-	-	-	-	#	#	#	000b: 0.066s 100b: 1s 001b: 0.25s 101b: 1.25s 010b: 0.5s 110b: 1.5s 011b: 1.75s 111b: 2s	010b
		0	0	-	-	-	-	-	-	-	-	(Don't Care)	
30.	Cursor Auto Moving (Triple-byte command)	1	0	0	1	1	0	0	0	0	0		60h
		0	0	-	-	-	-	-	-	-	#	0: disable 1: enable	
		0	0	-	-	-	-	-	-	-	-	(Don't Care)	
31.	CGROM Font Select (Triple-byte command)	1	0	0	1	1	1	0	0	0	0		70h
		0	0	-	-	-	-	-	-	#	#	00b: Don't care 01b: Don't care 10b: CGROM Font-01 11b: CGROM Font-02	
		0	0	-	-	-	-	-	-	-	-	(Don't Care)	

10. MAXIMUM ABSOLUTE POWER RATINGS

Item	Symbol	Standard value	Unit
Power Supply Voltage	V _{DD}	-0.3 ~ +7.0	V
Input Voltage	V _{IN}	-0.3 to V _{DD} +0.3	V
Operating Temperature	T _{OPR}	-20 ~ +70	°C
Storage Temperature	T _{STR}	-30 ~ +80	°C

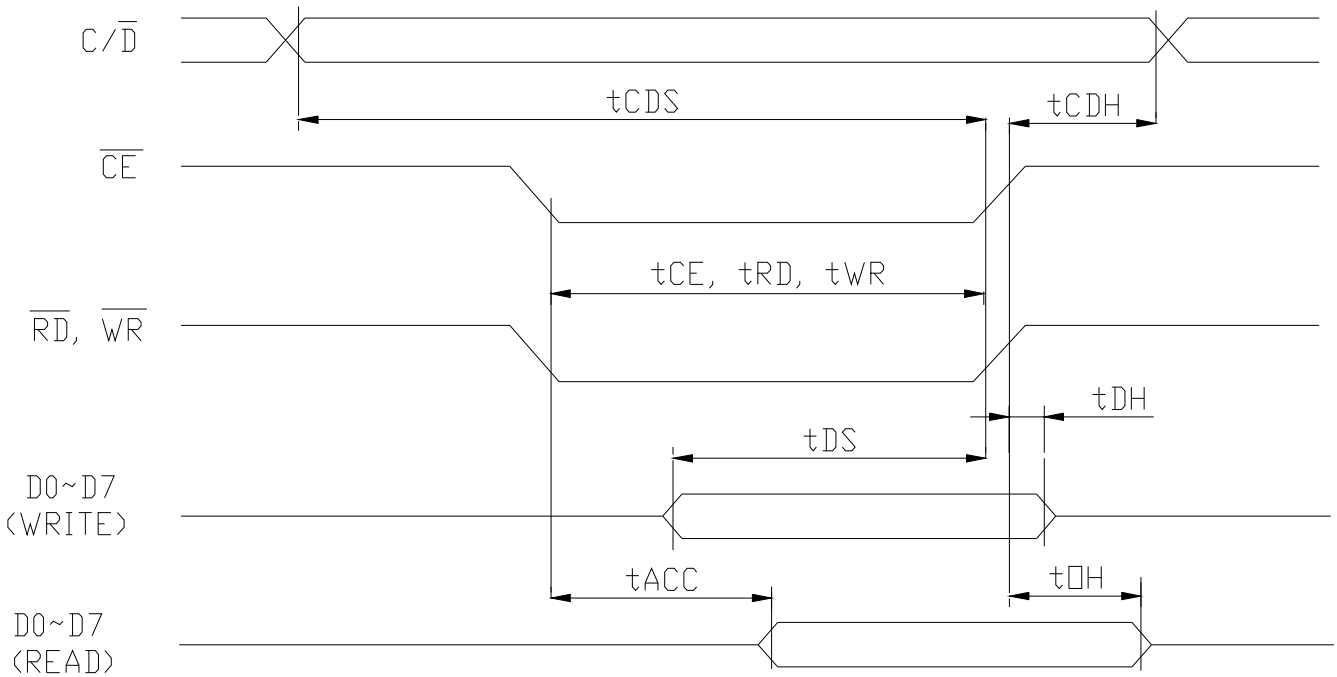
11. ELECTRICAL CHARACTERISTICS

11.1 DC Characteristics

Item	Symbol	Standard Value			Test Condition	Unit
		MIN	TYP	MAX		
Operating Voltage	V_{DD}	4.7	5.0	5.3	-----	V
LCD Voltage	V_{LCD}	15.0	15.5	16.0	$V_{DD} - V_5$	V
Supply Current	I_{DD}	---	TBD	TBD	$V_{DD}=5V, f_{osc}=3MHz$	mA

11.2 AC Characteristics

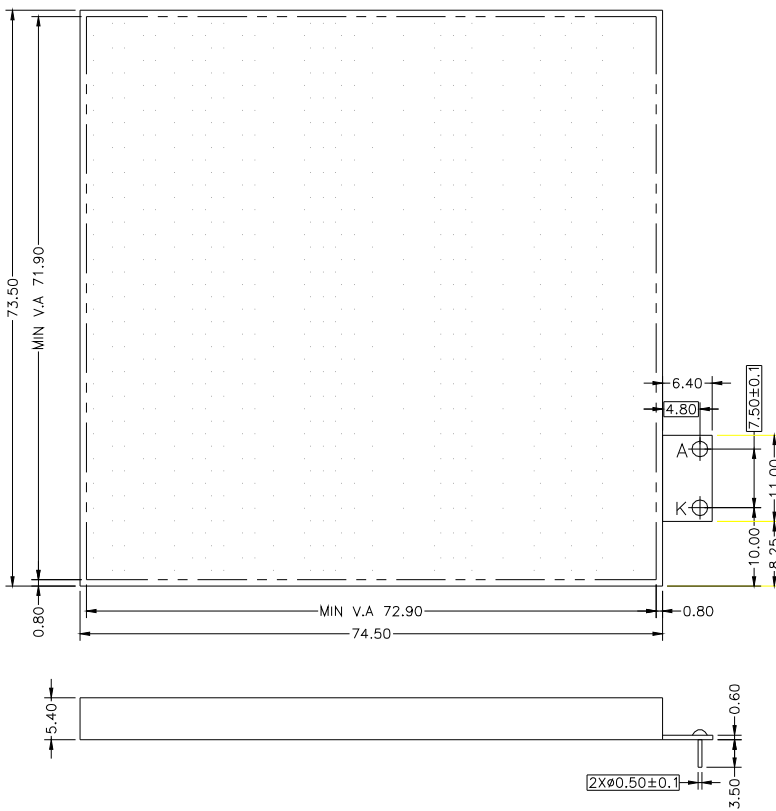
Parameter	Symbol	Min.	Max.	Units
C/D Setup Time	t_{CDS}	100	-	ns
C/D Hold Time	t_{CDH}	10	-	ns
CE, RD, WR Pulse Width	t_{CE}, t_{RD}, t_{WR}	80	-	ns
Data Setup Time	t_{DS}	80	-	ns
Data Hold Time	t_{DH}	40	-	ns
Access Time	t_{ACC}	-	150	ns
Output Hold Time	t_{OH}	10	50	ns



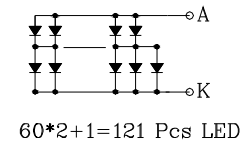
12. BACKLIGHT ELECTRICAL/OPTICAL SPECIFICATIONS

Electronics/Optical Specifications:

	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
Forward Voltage	V _f	3.8	4.1	4.4	V	I _f =600mA
Forward Current	I _f		600		mA	
Power Dissipation	P _d			2.64	W	I _f =600mA
Reverse Voltage	V _R			10	V	
Reverse Current	I _R			6	mA	
Luminous Intensity	I _v	120	180		cd/m ²	I _f =600mA
Luminous Uniformity	ΔIV	70			%	I _f =600mA
Emission Wavelength	λ _p	569		575	nm	I _f =20mA T _a =25°C Each chip



Electrical Circuit



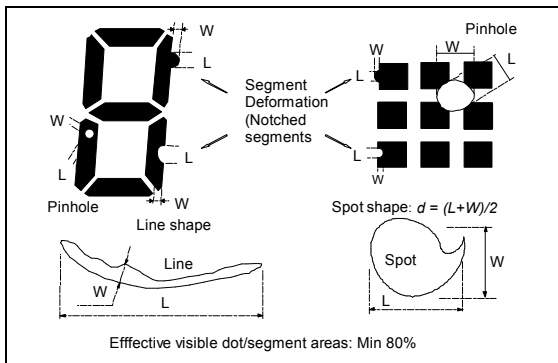
- REMARKS:
- 1.Unmarked tolerance is ±0.30;
 - 2.All materials comply with RoHs;
 - 3.The color is yellow green.

13. 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)

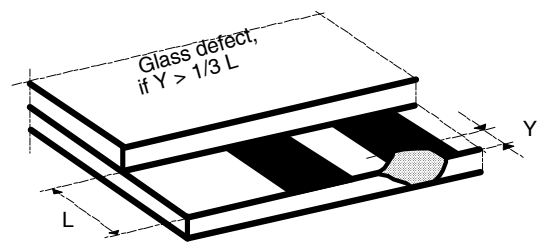


Examples/ Shapes

- 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	$d \leq 100$	nc
	$100 < d \leq 200$	5
Black or White Lines	--	nc
	$W \leq 10$	
	$L \leq 5000$ $W \leq 30$	3
	$L \leq 2000$ $W \leq 50$	2
Pinhole	$d \leq 100$	nc
	$100 < d \leq 200$	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



14. MODULE ACCEPT QUALITY LEVEL (AQL)

14.1 AQL Standard Value: Fatal Defect =0.1, Major Defect=0.65; Minor Defect =2.5.

14.2 Curtailed Inspection Scheme

Type	Batch Qty	inspection Qty	AQL value	pass	Reject
module product	350PCS < 1000PCS	125pcs	0.1	0	1
			0.65	2	3
			2.5	7	8
	200PCS < 350PCS	80pcs	0.1	0	1
			0.65	1	2
			2.5	5	6
	<200PCS	32pcs	0.1	0	1
			0.65	0	1
			2.5	4	5
Module sample	<200PCS	All inspected	/	/	The sample will be reject when the fatal defect >2pcs or main defect >5pcs.
	>200PCS	125pcs			

- Notes:**
- 1). Batch QTY is the production amount that Production department ship to QA department.
 - 2). All of product will be inspected if the batch QTY less than inspected QTY.
 - 3). Each batch fixed to be 500pcs.

15. RELIABILITY TEST

Operating life time: Longer than 50000 hours (at room temperature without direct irradiation of sunlight)

Reliability characteristics shall meet following requirements.

TEMPERATURE TESTS	NORMAL GRADE
High Temperature Storage	+80□ *96hrs (Without Polarizer)
Low Temperature Storage	-30□ * 4hrs
High Temperature Operation	+70□ *96hrs
Low Temperature Operation	-20□ *4hrs
High Temperature, High Humidity	+70□ * 95%RH *96hrs (Without Polarizer)
Thermal Shock	-20□ *30min. ← 10s ↓ 5Cycles +70□ *30min. —
Vibration Test	Frequency *Swing * Time 40Hz * 4mm * 4hrs
Drop Test	Drop height*Times 1.0m * 6times

16. 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.

17. 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