

Record of Version

Version	Modifications	Date
1.0	Generation first version	2008-3-22

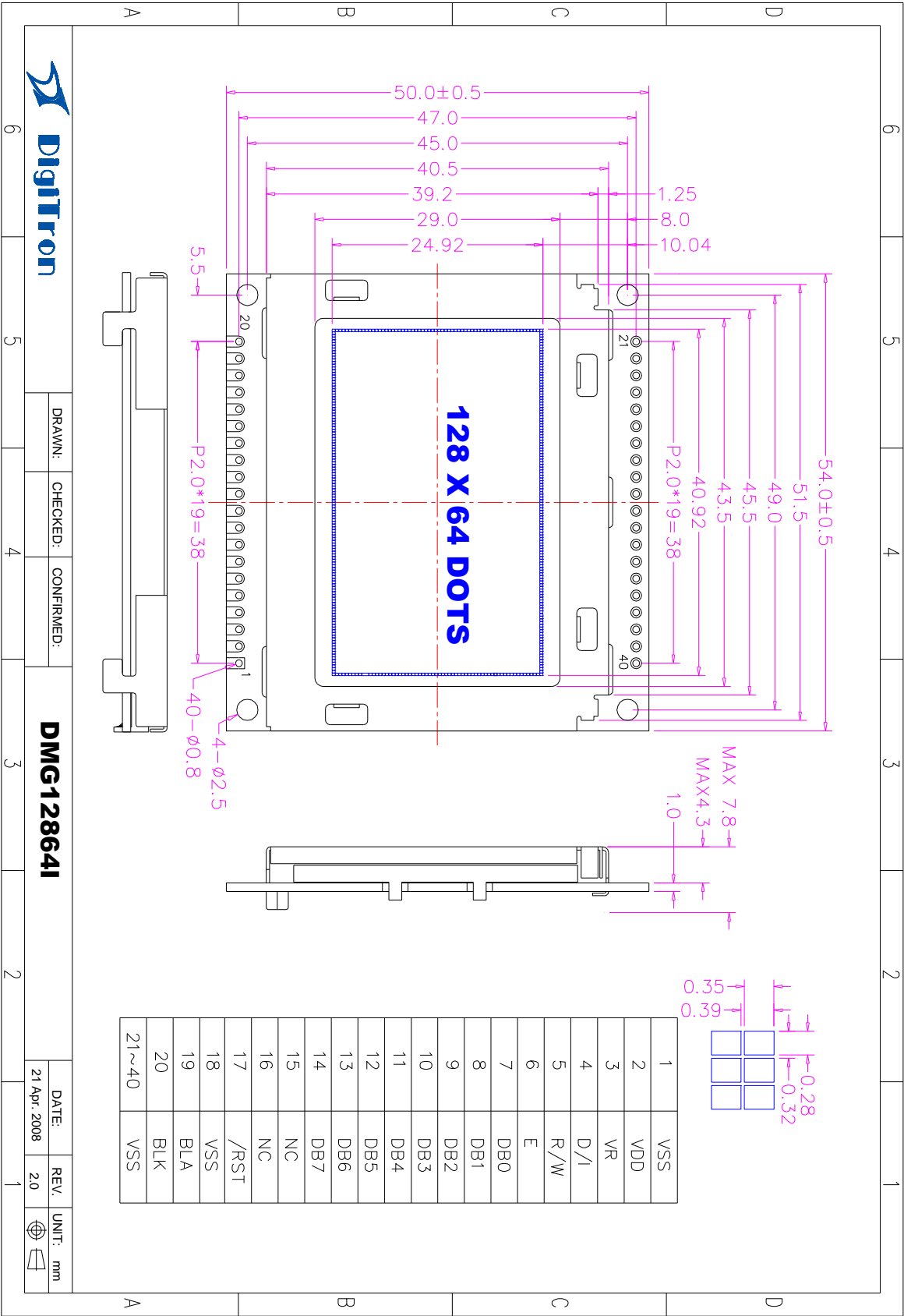
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1. General Specifications

Dot Pixels:	128 (W) × 64 (H)
Module Size:	54.0 (W)× 50.0 (H)× 7.8 (D)
Viewing Area:	65.5 (W)× 38.0 (H)
Active Area:	60.775 (W)× 32.935 (H)
Dot Size:	0.45 (W)× 0.49 (H)
Dot Pith:	0.475 (W)× 0.515 (H)
LCD display type:	FSTN
Drive method:	1/65 Duty 1/9 Bias
Viewing direction:	6 o'clock
Operating Temperature:	-0~+50°C
Storage temperature:	-10~+60°C
Backlight:	White (LED)
Controller/driver:	ST7565R
Approx. weight:	60g

2. External dimensions



3. Maximum absolute limit

Characteristics Symbol		MIN.	MAX.	UNIT
Power Supply for Logic	VDD-Vss	3.6 V		
Power Supply for LCD	V0		14.0	V
Input Voltage	Vin	0	VDD V	

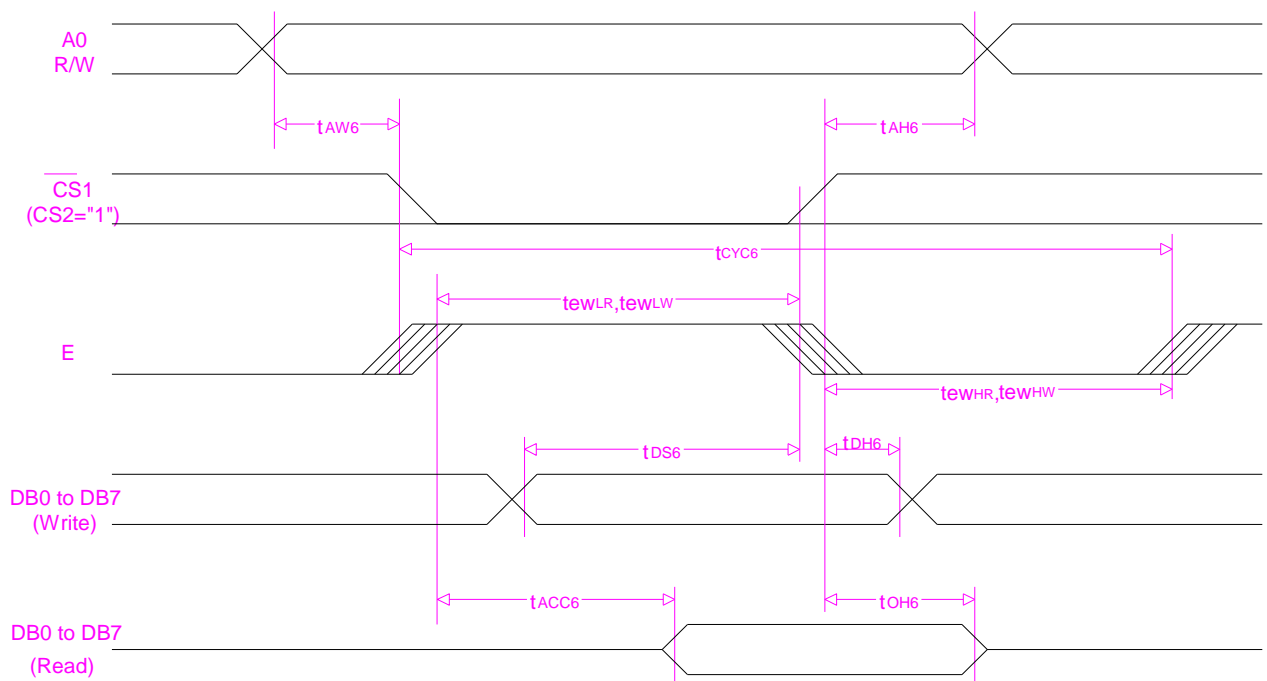
Note: Stresses beyond those given in the Absolute Maximum Rating table may cause operational errors or damage to the device.

4. Electrical characteristics

4.1) DC characteristics (ta = 25°C, VDD = 3.0 V)

Parameter	Sym.	Min.	Typ.	Max.	Unit	Condition
Operating Voltage	VDD	3.0 V				
Input high voltage	VIH	0.8 VDD	-	VDD	V	
Input low voltage	VIL	Vss	-	0.2 VDD	V	
Output high voltage	VOH	0.8 VDD	-	VDD	V	
Output low voltage	VOL	Vss	-	0.2 VDD	V	
Supply current for logic	IDD	0.5 mA				VDD =3.0V
Supply current for Backlight	ILED	45 mA				LED+=3.0V

4.2) AC characteristics (TA = 25°C, VDD = 3 V)

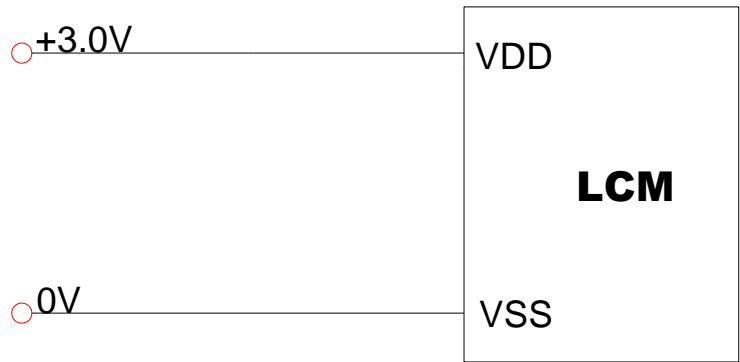


Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
t _{AH6}	Address hold time	0	-	-	ns	A0, R/W
t _{AS6}	Address setup time	0	-	-	ns	
t _{CYC6}	System cycle time	240	-	-	ns	
t _{EWHW}	Control low pulse width (write)	120	-	-	ns	E
t _{EWHR}	Control low pulse width (read)	120	-	-	ns	E
t _{EWLW}	Control high pulse width (write)	100	-	-	ns	E
t _{EWLR}	Control high pulse width (read)	100	-	-	ns	E
t _{DS6}	Data setup time	40	-	-	ns	DB0~DB7
t _{DH6}	Data hold time	10	-	-	ns	
t _{ACC6}	/RD access time	-	-	140	ns	DB0~DB7
t _{OH6}	Output disable time	5	-	50	ns	CL=100pF

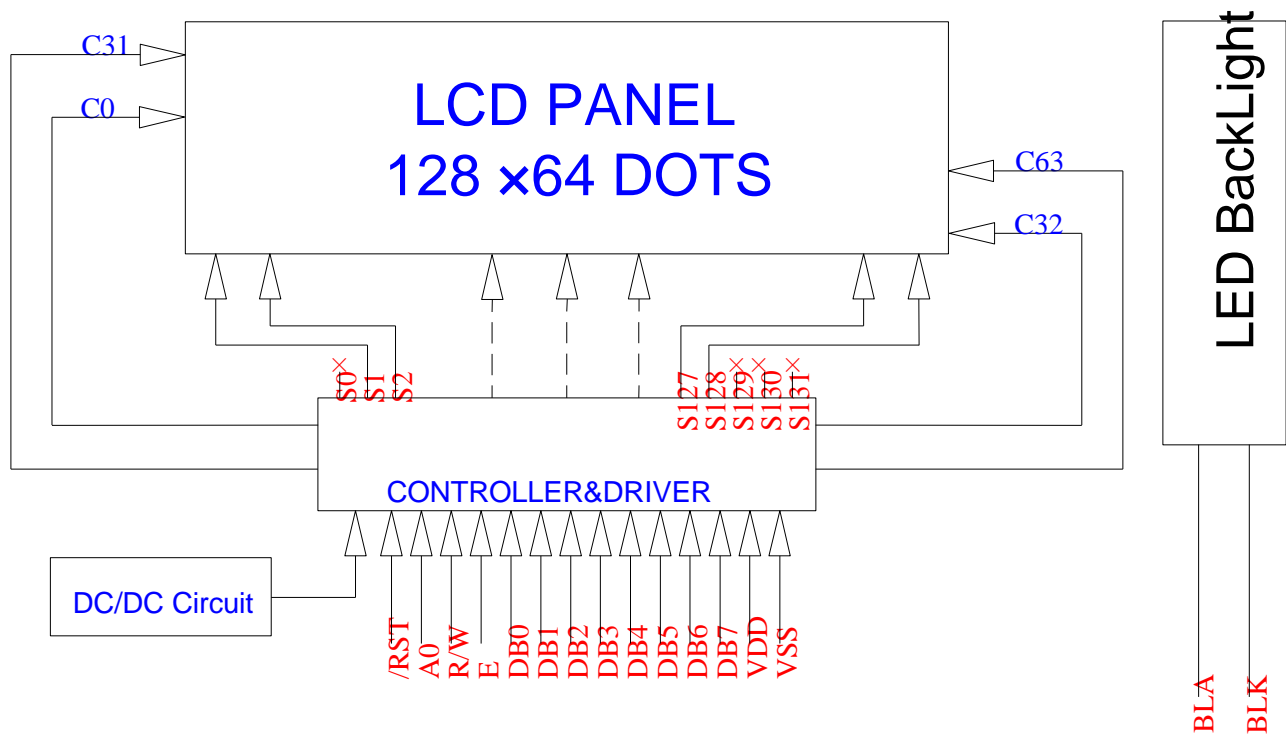
5. Operating Principles

Pin NO.	Symbol	LEVEL	Function
1	VSS 0V GND		
2	VDD	3.0V	Supply Power for logic
3	VR	-	VLCD voltage adjustment pin
4	D/I	H/L	Data or Instruction select.
5	R/W	H/L	Read or Write
6 E		H→ L	Read /Write enable signal.
7 DB0		H/L	DATABUS
8 DB1		H/L	DATABUS
9 DB2		H/L	DATABUS
10 DB3		H/L	DATABUS
11 DB4		H/L	DATABUS
12 DB5		H/L	DATABUS
13 DB6		H/L	DATABUS
14 DB7		H/L	DATABUS
15 NC		H/L	Non-Connection
16 NC		H/L	Non-Connection
17	/RST	-	Reset signal. "L" active
18 VSS		-	GND
19	BLA	3.0V	Supply Power for LED light
20	BLK	0V	Supply Power for LED light

5.2) Power supply for LCD Module



5.3) Block Diagram



6. Instruction Description

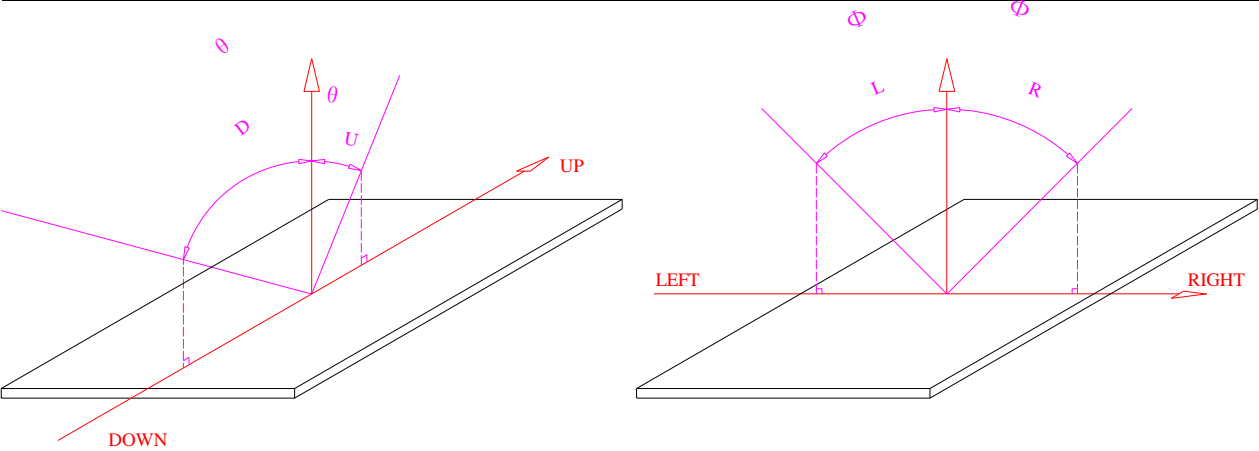
Instruction	RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description
Read display data	1	1	Read Data								Read data from DDRAM
Write display data	1	0	Write Data								Write data into DDRAM
Display ON/OFF 0		0	1	0	1	0	1	1	1	D O N	Display on/off LCD panel DON = 0 : display OFF DON = 1 : display ON
Initial display line	0	0	0	1	ST5	ST4	ST3	ST2	ST1	ST0	Specify DDRAM line for COM0
Set reference Voltage mode	0	0	1	0	0	0	0	0	0	1	Set reference voltage mode
Set reference Voltage register	0	0	X	X	SV5	SV4	SV3	SV2	SV1	SV0	Set reference voltage register
Set page address	0	0	1	0	1	1	P3	P2	P1	P0	Set page address
Set column address MSB	0	0	0	0	0	1	Y7	Y6	Y5	Y4	Set column address MSB
Set column address LSB	0	0	0	0	0	0	Y3	Y2	Y1	Y0	Set column address LSB
ADC Setting	0	0	1	0	1	0	0	0	0	A D C	Set SEG output direction ADC=0: S0→S131 ADC=1: S131→S0
Reverse display ON/OFF	0	0	1	0	1	0	0	1	1	R E V	Normal Reverse display REV=0 : normal display REV=1 : reverse display
Entire display ON/OFF	0	0	1	0	1	0	0	1	0	E O N	normal/entire display ON EON=0 : normal display EON=1: entire display ON
LCD bias setting	0	0	1	0	1	0	0	0	1	Bias	Set LCD Bias
Set modify-read	0	0	1	1	1	0	0	0	0	0	Set modify-read mode
Reset modify-read	0	0	1	1	0	1	1	0	0	0	Release
Reset	0	0	1	1	0	0	0	1	0	0	Initialize
SHL Setting	0	0	1	1	0	0	S H L	X X X			Set COM output direction SHL=0: C0- C63 SHL=1 C63- C0
Power control	0	0	0	0	1	0	1	VC	VR	VF	Set control power circuit function
Regulator resistor select	0	0	0	0	1	0	0	R2	R1	R0	Select internal resistance ratio of the regulator resistor
Set static indicator register	0	0	x	x	x	x	x	x	S1	S0	Set static indicator register

NOTE: Refer to the SPEC of ST7565R

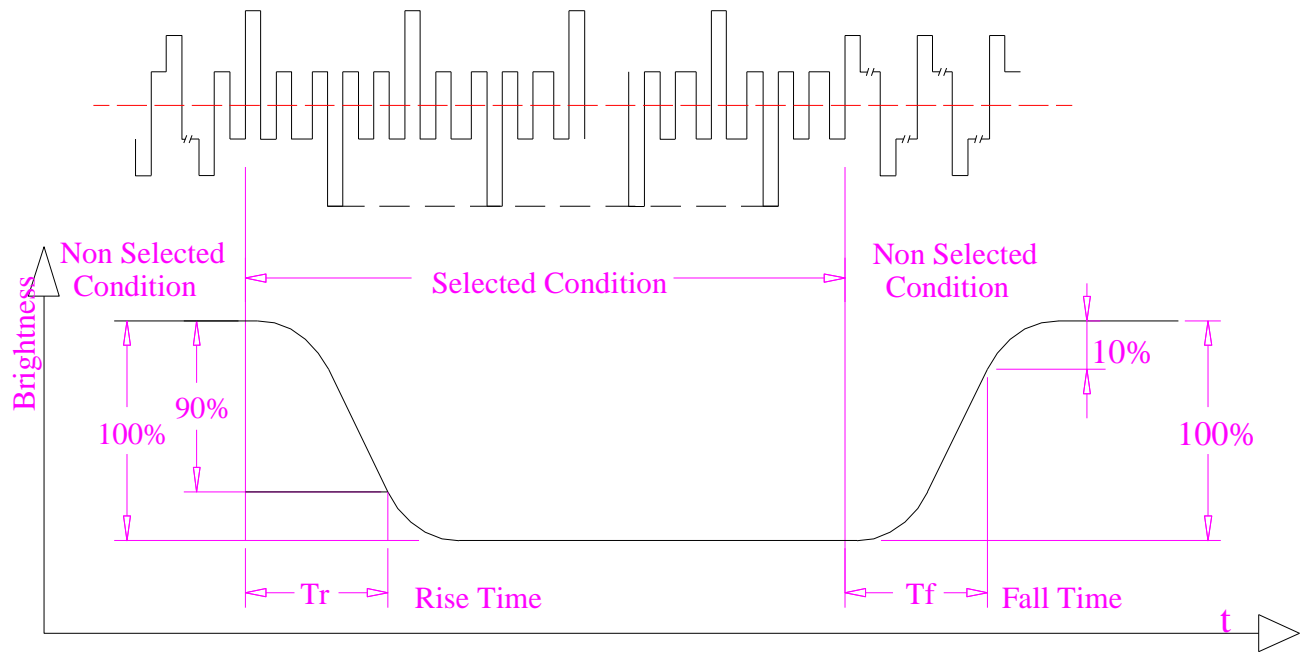
7. Electro-optical Units

Electro-optical Characteristics

Item Symbol		Test Condition	Standard Value			Unit
			Min.	Typ.	Max.	
Viewing Angle	θ U	CR=2	10			degree
	θ D		40			degree
	Φ L		30			degree
	Φ R		30			degree
Contrast	CR	Ta=25°C	7			
Response Time (rise)	Tr	Ta=25°C	-		300	ms
Response Time (fall)	Tf	Ta=25°C	-		300	ms



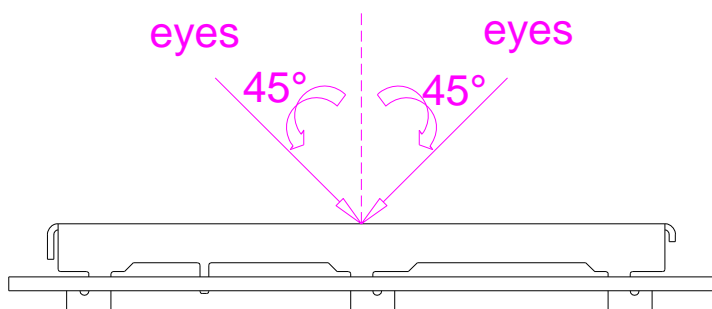
Viewing Angle



$$CR = \frac{\text{Brightness of Non-selected Segment}}{\text{Brightness of Selected Segment}}$$

8. Inspection criteria

8.1. Inspection conditions

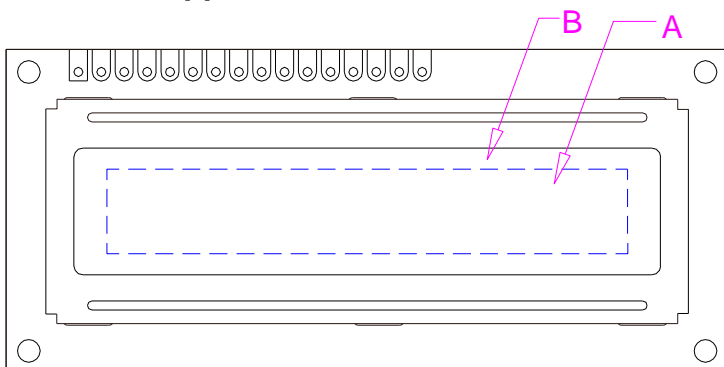


The LCD shall be inspected under 40W white fluorescent light.

The distance between the eyes and the sample shall be more than 30cm.

The test direction is base on about around 45 degree of vertical line

Definition of applicable Zones



A: Active display area

B: Area from outside of "A Zone" to validity viewing area

A + B = Validity viewing area

b). Sampling procedures for each item's acceptance level table

Defect type	Sampling procedures	AQL
Major defect	M1L-STD-105D inspection level I Normal inspection single sample inspection	1,0
Minor defect	M1L-STD-105D Inspection level I Normal inspection single sample inspection	2.5

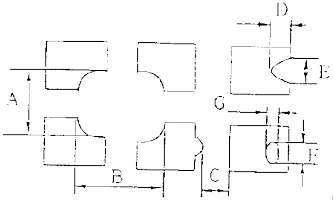
c) ①. Major defect

A major defect refers to a defect which is not. considered to substantially degrade usability for product applications.

②. Minor defect

A minor defect refer, 10 a defect which is not considered 10 substantially degrade product application, or a defect which deviates from existing Standards almost unrelated to the effective use of the product or it's operation.

d). Incoming Inspection standards

ITEM	Criterion for defects	Defect type
1.Display on inspection	(1) Non display (2) Vertical Line is deficient (3) Horizontal line is deficient (4) Cross line is deficient	Minor
2.Black/White spot	Size ϕ (mm) Acceptable number $\phi \leq 0.25$ Ignore (note) $0.25 < \phi \leq 0.35$ 3 $0.35 < \phi$ 0 Note: NG is four or more spot crowd together	Minor
3.Black/White line	Length (mm) width (mm) : Acceptable number $L < 10$ $w < 0.05$ Ignore $L < 10$ $0.05 < w < 0.10$ 1 $L < 10$ $0.10 \leq w$ 0 $L > 10$ $w < 0.05$ 0 Defects separate at interval if 30mm each other	Minor
4.Display on inspection	 ≤ 0.3 ≤ 0.15 ≤ 0.15 NOTE: 1) Up to 5 damages acceptable 2) NG if there're two or more pinholes	Minor
5) Spot-like contrast irregularity	Size ϕ (mm) Acceptable number $\phi \leq 0.2$ Ignore (note) $0.2 < \phi \leq 0.4$ 3 $0.4 < \phi \leq 0.6$ 2 $0.6 < \phi$ 0 NOTE: 1) conformed to limit samples 2) Defects separate at intervals of 50mm each other	Minor
6) Bubble in polarizer	Size ϕ (mm) Acceptable number $\phi \leq 0.2$ Ignore (note) $0.2 < \phi \leq 0.4$ 3 $0.4 < \phi \leq 0.6$ 2 $0.6 < \phi$ 0	Minor
7) Scratches and dent on the polarizer	Scratches and dent on the polarizer shall be in the accordance with "2).Black/White spot 3).Black/White line"	Minor
8.) Stains on LCD panel surface	Stains which cannot be removed even when wiped lightly with a soft cloth or similar cleaning too.	Minor
9) Rainbow color	No rainbow color is allowed in the optimum contrast on Stale within the active area	Minor
10) Threshold	Non-uniform brightness at optimum contrast is not allowed and the criterion abides by standard samples	Minor
11) Viewing area encroachment	Polarizer edge or line is visible in the opening viewing area due to polarizer shortness or sealing line.	Minor
12) Bezel appearance	Rust and deep damage which are visible in the bezel is reject able	Minor
13) Defect of land surface contact (Poor soldering)	Evident crevices which is visible are reject able	Minor

ITEM	Criterion for defects	Defect type
14) Parts mounting	(1) Failure to mount parts (2) Parts not in the specifications are mounted (3) Polarity, for example, is reversed	Major
15) Parts alignment	(1) LSI. IC lead width is more than 50% beyond pad outline. (2) Chip component is off center and more than 50% of the leads s off the pad outline	Minor Minor
16) Conductive foreign matter	(1) $0.45 < \varnothing, N \geq 1$ (2) $0.30 < \varnothing \leq 0.45, N \geq 1$ \varnothing : Average diameter of solder ball (unit: mm) (3) $0.50 < L, N \geq 1$ L: Average length of solder chip (unit: mm)	Major Minor Minor
17) PWB pattern damage	(1) Deep damage is found on copper foil and the pattern is nearly broken (2) Damage on copper foil other than (1) above	Major Minor
18) Faulty PWB correction	(1) Due to PWB copper foil pattern burnout, the pattern is connected, using a jumper wire for repair; 2 or more places are corrected per PWB. (2) Short circuited part is cut, and no resist coating has been performed.	Minor Minor
19) Bezel claw	Bezel claw missing or not bent	Minor
20) Indication of name plate (sampling indication label)	(1) Failure to stamp or label error, or not legible, (all acceptable if legible) (2) The separation is more than 1/3 for indication discoloration, In which the characters can be checked	Minor

9. Precautions for using LCD modules

a) Handling of LCM

- (1) The LCD screen is made of glass. Don't give excessive external shock, or drop from a high place.
- (2) If the LCD screen is damaged and the liquid crystal leaks out, do not lick and swallow. When the liquid is attach to your hand, skin, cloth etc, wash it off by using soap and water thoroughly and immediately.
- (3) Don't apply excessive force on the surface of the LCM.
- (4) If the surface is contaminated ,clean it with soft cloth. If the LCM is severely contaminated , use Isopropyl alcohol/Ethyl alcohol to clean. Other solvents may damage the polarizer . The following solvents is especially prohibited: water , ketone Aromatic solvents etc.
- (5) Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.
- (6) Install the LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.
- (7) Don't disassemble the LCM.
- (8) 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 modules.
 - Tools required for assembling, such as soldering irons, must be properly grounded.
 - To reduce the amount of static electricity generated, do not conduct assembling 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.
- (9) Do not alter, modify or change the the shape of the tab on the metal frame.
- (10) Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.
- (11) Do not damage or modify the pattern writing on the printed circuit board.
- (12) Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector
- (13) Except for soldering the interface, do not make any alterations or modifications with a soldering iron.
- (14) Do not drop, bend or twist LCM.

b) Storage

- (1) Store in an ambient temperature of 5 to 45 °C, and in a relative humidity of 40% to 60%. Don't expose to sunlight or fluorescent light.
- (2) Storage in a clean environment, free from dust, active gas, and solvent.
- (3) Store in antistatic container.