

DISPLAY Elektronik GmbH

DATA SHEET

LCD MODULE

DEM 240064C FGH-PW

Product specification

Version: 1

21/May/2007

GENERAL SPECIFICATION

MODULE NO. :

DEM 240064C FGH-PW

CUSTOMER P/N

VERSION NO.	CHANGE DESCRIPTION	DATE
0	ORIGINAL VERSION	01/03/2007
1	MODIFY DESCRIPTION	21/05/2007

PREPARED BY: WJN

DATE: 21/05/2007

APPROVED BY: MH

DATE: 23/05/2007

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1. FUNCTIONS & FEATURES

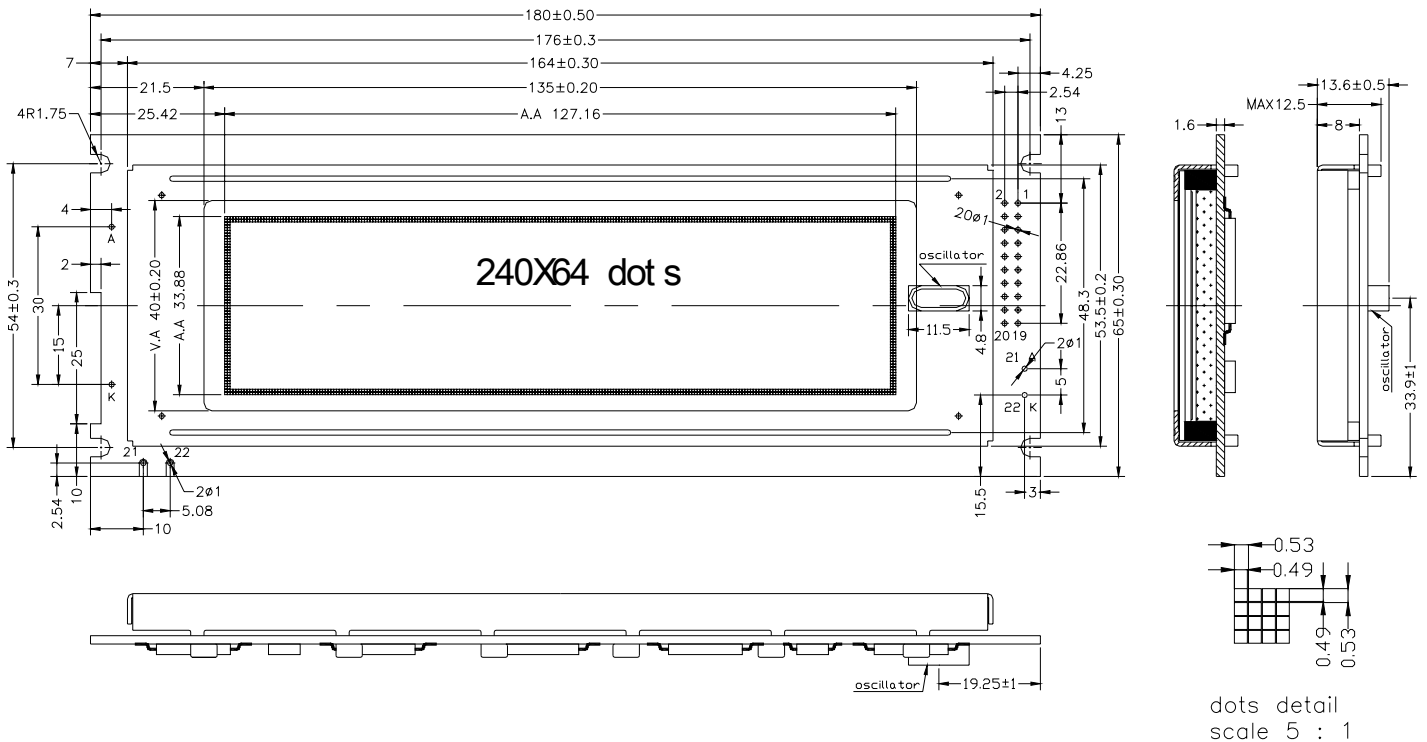
Module Model	LCD Type
DEM 240064C FGH-PW	FSTN Transflective Positive Mode

- Viewing Direction : 6 O'clock
- Driving Scheme : 1/64 Duty, 1/9 Bias
- Power Supply for logic : 5.0 Volt
- Display Format : 240 x 64 Dots
- Backlight : LED, White, Lightguide, 8-LEDs
- V_{LCD} : 12.6 Volt (typ. @ 25°C)
- Operating Temperature : -20°C to +70°C
- Storage Temperature : -30°C to +80°C

2. MODULE ARTWORK

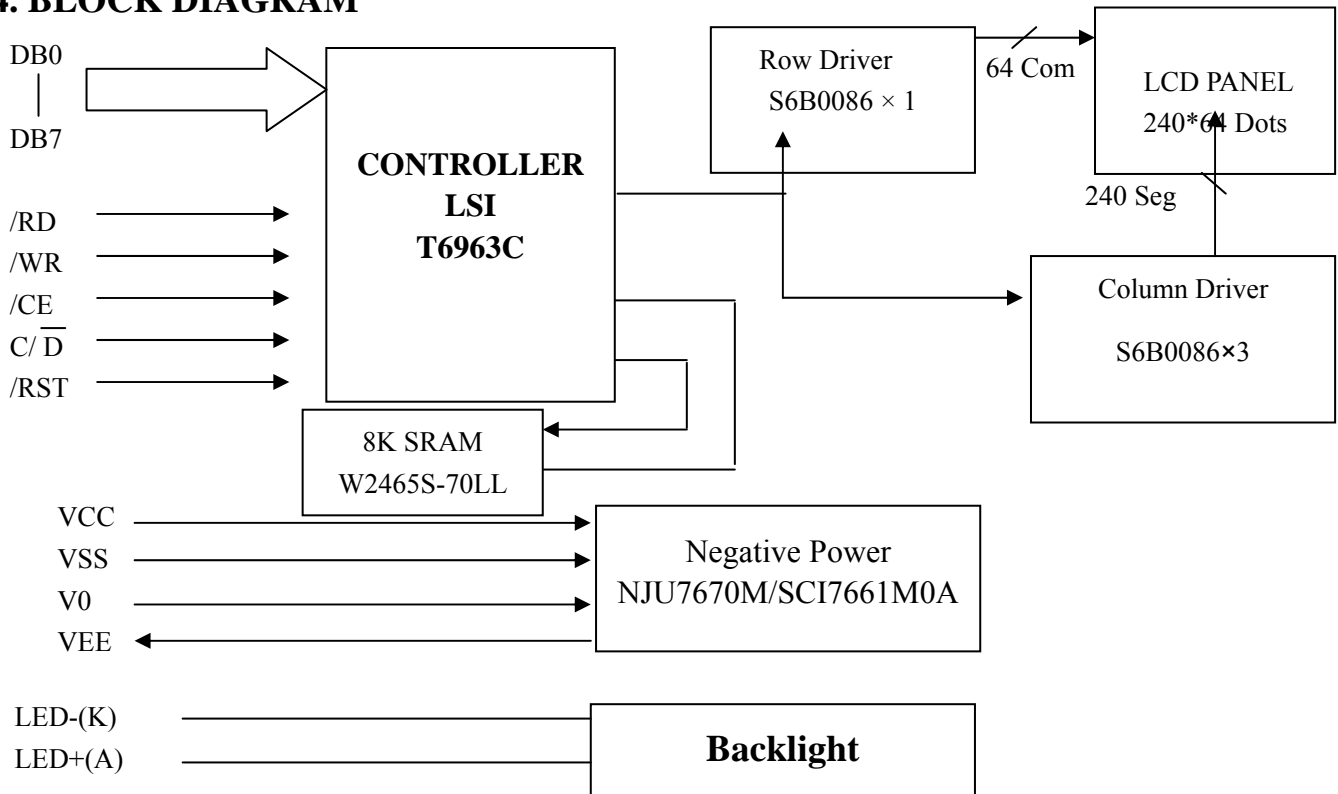
- Module Size : 180.00 x 65.00 x 13,6 mm (max.)
- Dot Size : 0.49 x 0.49 mm
- Dot Gap : 0.04 mm

3. EXTERNAL DIMENSIONS



NOTES:
 UNMARKED TOLERANCE IS ±0.4mm.
 ALL MATERIALS COMPLY WITH ROHS.

4. BLOCK DIAGRAM



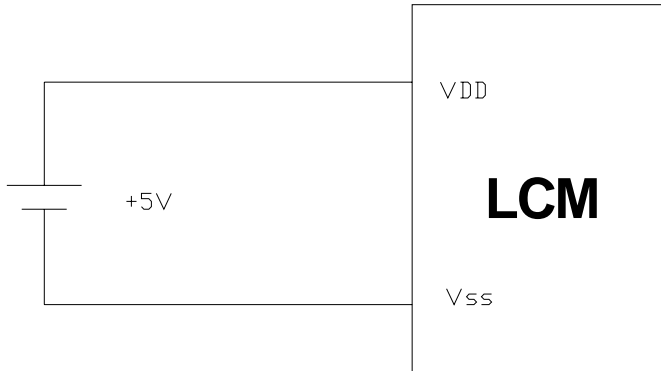
5. PIN ASSIGNMENT

NO.	SYMBOL	FUNCTION
1	FG	Frame ground (see mote 1)
2	VSS	Ground (0Volt)
3	VDD	Power Supply (+5Volt)
4	V0	Power Supply for LCD Drive
5	/WR	Data write. Write data to controller T6963C when “L”
6	/RD	Data read. Read data from controller T6963C when “L”
7	CE	Chip enable of controller when “L”
8	C/ /D	Command/Data read/write. “H” for command read/write and “L” for data read/write
9	VEE	The negative power supply for LCD
10	/RST	Controller reset when “L”
11	DB0	Data input/output(LSB)
12	DB1	Data input/output
13	DB2	Data input/output
14	DB3	Data input/output
15	DB4	Data input/output
16	DB5	Data input/output
17	DB6	Data input/output
18	DB7	Data input/output(MSB)
19	FS	Font select. “H” for 6x8 font & “L” for 8x8 font
20	N.C	No Connection
21	LED+(A)	Anode of LED backlight
22	LED-(K)	Cathode of LED backlight

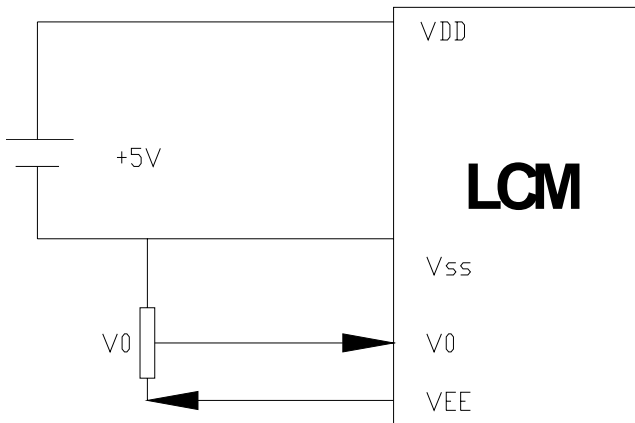
Note: This pin is electrically connected to the metal bezel (frame),but, is otherwise not connected. User can choose to connect this pin to ground or leave it open.

6. POWER SUPPLY

Mode (Internal contrast regulation) - J7 is closed.

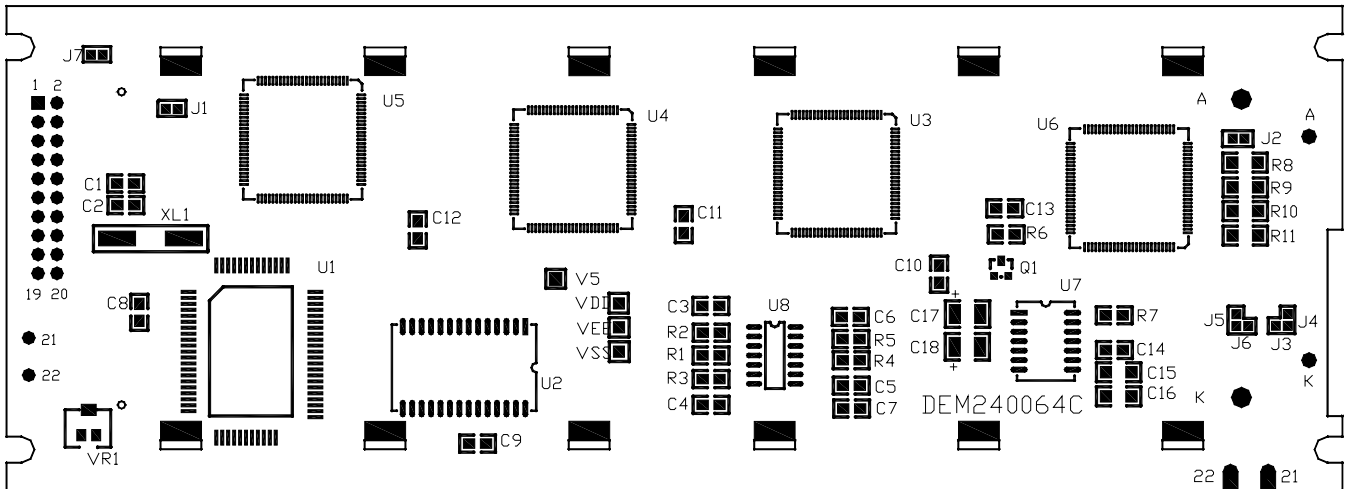


Mode (external contrast regulation) - J7 is open.



7. PCB DRAWING AND DESCRIPTION

7.1 PCB DRAWING



7.2 DESCRIPTION:

7-2-1. The polarity of the pin 21 and the pin 22:

symbol	symbol state	J3, J5	J4, J6	LED Polarity	
				21 Pin	22 Pin
J4, J6	Each solder-bridge	Each open	Each closed	Anode	Cathode
J3, J5	Each solder-bridge	Each closed	Each open	Cathode	Anode

Note: In application module, J3=J5= open, J4=J6=0 Ohm

7-2-2. The metal-bezel is set on ground when the J1 is closed.

Note: In application module, J1=0 Ohm

7-2-3. The LED resistor can be bridged when the J2 is closed

Note: In application for module, J2=open

7-2-4. The R8,R9,R10 and the R11 are the LED resistor.

Note: In application module, R8=8.2Ohm, R9=R10= R11=open

7-2-5. The module use internal contrast regulation when J7 is closed.

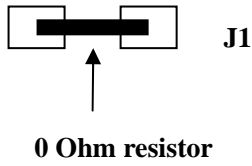
Note: In application module, J7 is open.

7-2-6 The VR1 use internal contrast regulation.

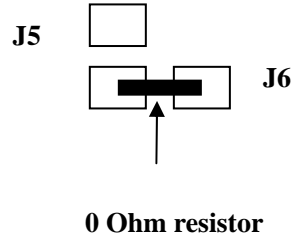
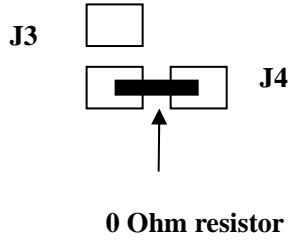
Note: In application module ,VR1=10k Ohm.

7.3 Example application

7-3-1.The metal-bezel is on ground as following.



7-3-2.The 21 pin is the anode and the 22 pin is the cathode as following.

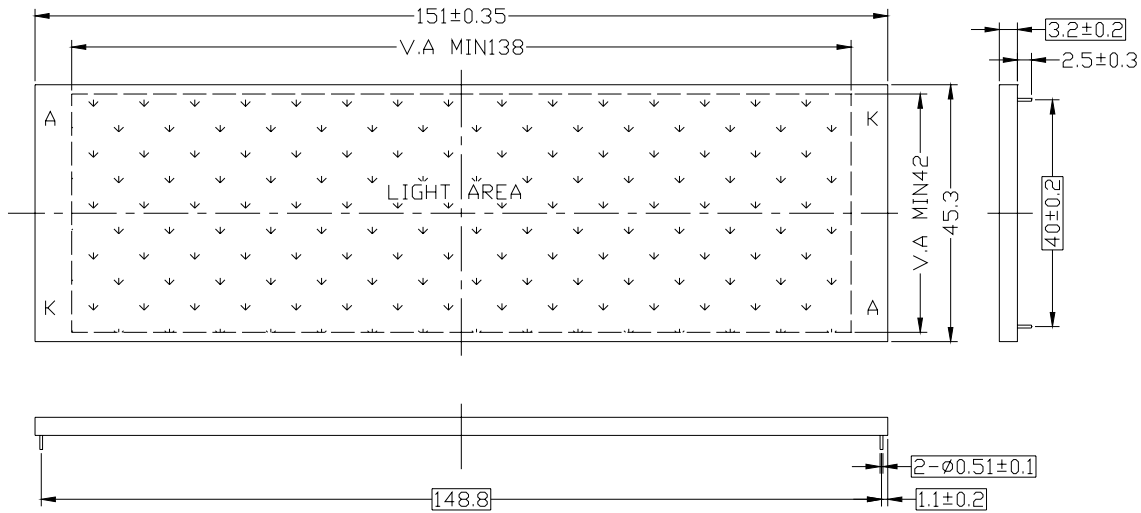


7-3-3. The module internal contrast regulation is disabled when J7 is open. Then customer needs to use external regulation

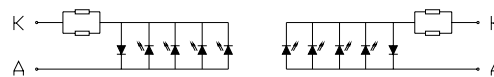


8. BACKLIGHT ELECTRICAL/OPTICAL SPECIFICATION

Item	Symbol	MIN.	TYP.	MAX.	Unit	Conditions
Forward Voltage	V_f	3.9	4.1	4.3	V	$I_f=60 \times 2 \text{mA}$
Forward Current	I_f			240	mA	
Power Dissipation	P_d		0.24		W	
Reverse Voltage	V_R		1.0		V	
Reverse Current	I_R		30		mA	$V_R=0.8 \text{V}$
Luminous Intensity	L_V	300	400		cd/m^2	$I_f=60 \times 2 \text{mA}$



CIRCUIT DIAGRAM (2X (1X4) =8 dies)



9. ABSOLUTE MAXIMUM RATINGS

9.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

(V_{SS}=0V, Ta=25°C)

PARAMETER	SYMBOL	Min.	Max.	UNIT
Supply Voltage (Logic)	V _{DD} -V _{SS}	0	7	V
Supply Voltage (LCD Driver)	V _{DD} -V _{EE}	0	19	V
Input voltage range	V _{IN}	V _{SS}	V _{DD}	V
Operating temperature	T _{opr}	-20	70	°C
Storage temperature	T _{stg}	-30	80	°C

9.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

Item	Operating		Storage		Comment
	(Min.)	(Max.)	(Min.)	(Max.)	
Ambient Temp	-20	70	-25	75	Note(1)
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) Ta=0°C: 50Hr Max.

Note (2) Ta ≤ 40°C: 90% RH Max.

Ta ≥ 40°C: Absolute humidity must be lower than the humidity of 90% RH at 40°C.

10. ELECTRICAL CHARACTERISTICS

1). DC Characteristics

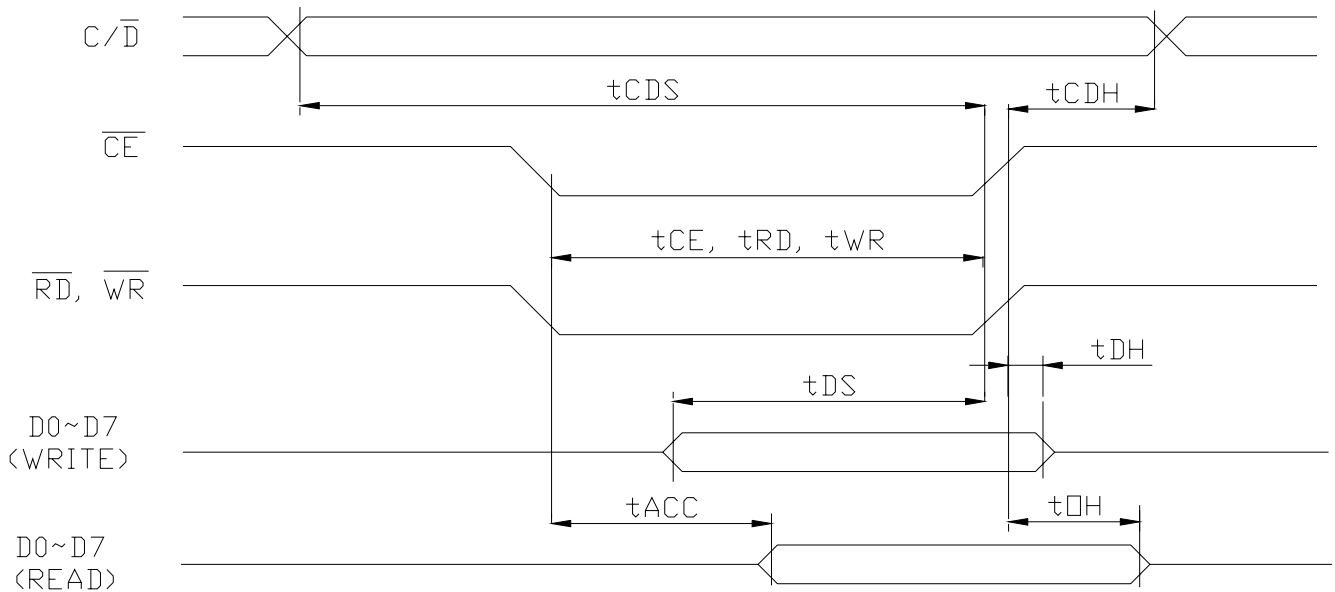
(V_{SS}=0V)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Supply Voltage (Logic)	V _{DD} -V _{SS}	-	4.5	5.0	5.5	V
Supply Current	I _{DD}	V _{DD} -V _{SS} =5.0V	-	8.2	13.0	mA
	I _{EE}	V _{DD} -V _{EE} =12.9V	-	2.8	5.0	mA

2). AC Characteristics

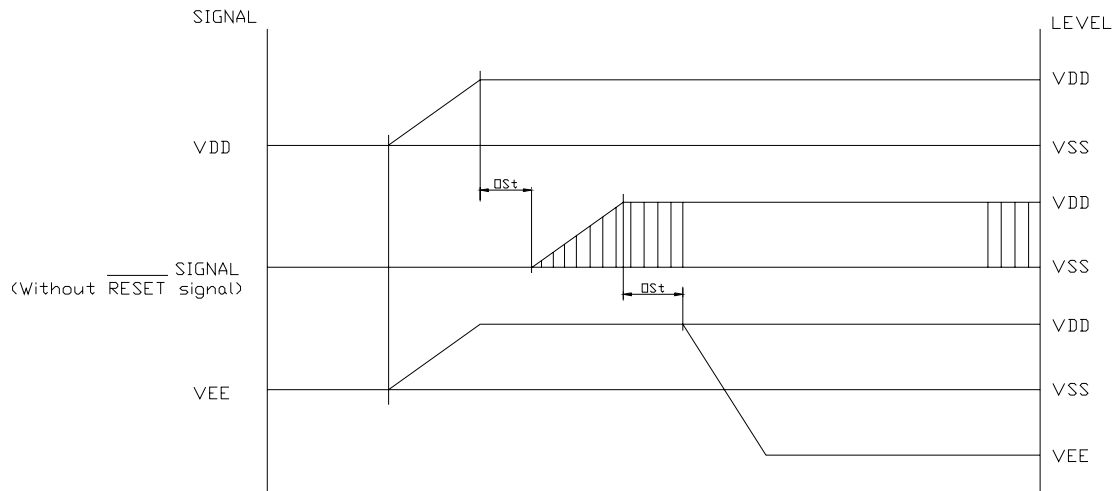
(V_{SS}=0V)

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

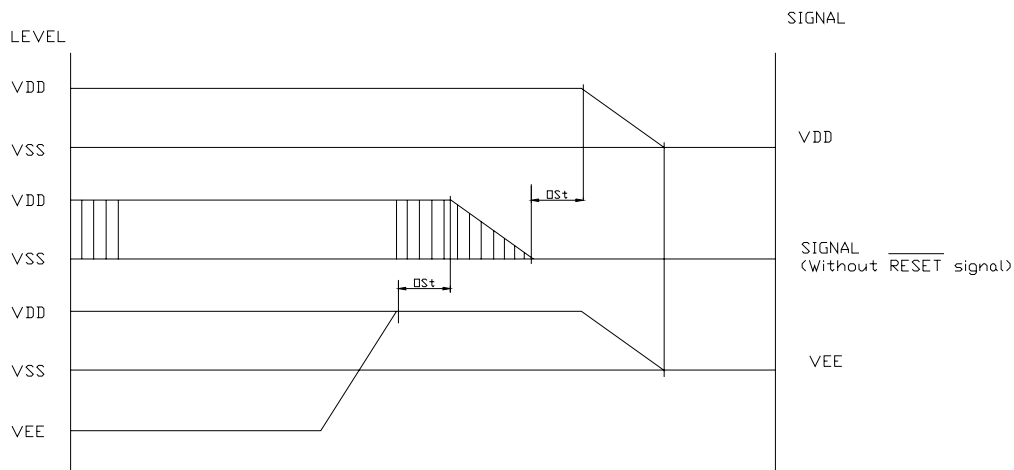


3). Power Supply ON/OFF Sequence

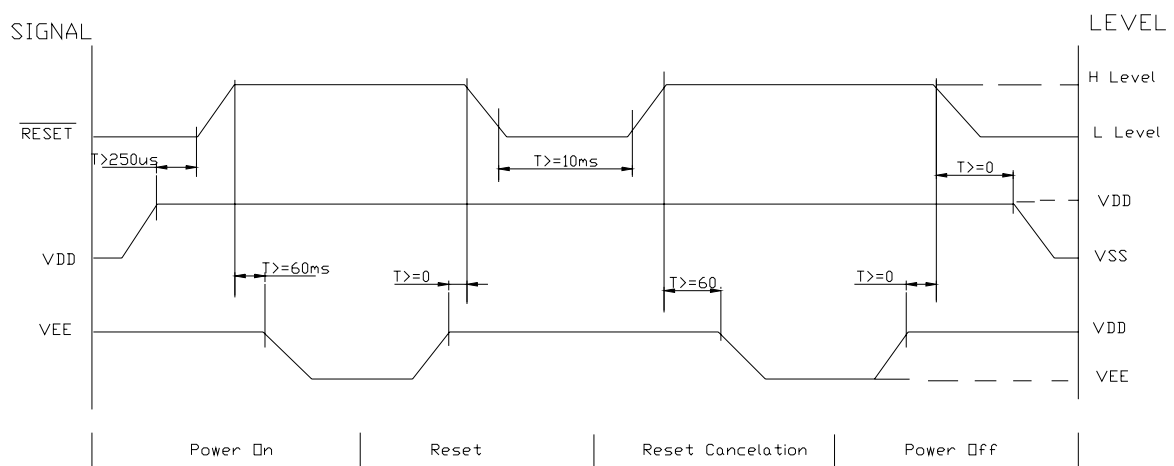
● **ON Sequence**



● **OFF Sequence**



● **Reset Sequence**



Please maintain the above sequence when turning on and off the power supply of the module.

If VEE is supplied to the module while internal alternate signal for LCD driving (M) is unstable or RESET is active, DC component will be supplied to the LCD panel. This may cause damage to the LCD module.

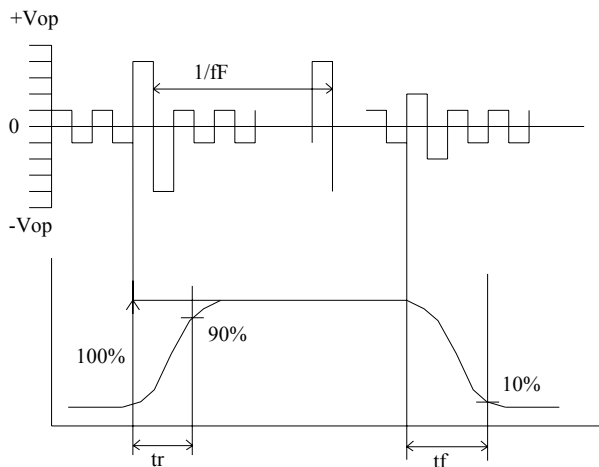
11. ELECTRO-OPTICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REF.
Rise Time	Tr	0°C	---	450	560	ms	Note(1)
		25°C		140	210		
Fall Time	Tf	0°C	----	680	800	ms	
		25°C		220	330		
Contrast	CR	25°C	---	2.7	---		Note(3)
View Angle	$\theta 1 \cdot \theta 2$	25°C & CR ≥ 1.5	--	--	80		Note(2)
	$\phi 1 \cdot \phi 2$		-35	--	35		
Frame Frequency	Ff	25°C	--	64	--	Hz	

Note (1) Response time is measured as the shortest period of time possible

Between the change is state of an LCD segment as demonstrated below:

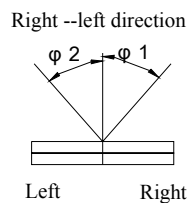
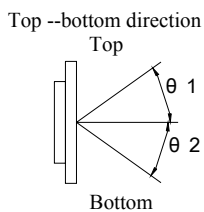
entire range.



Condition:

- (a) .Temperature-----25°C
- (b).Frame frequency-----64Hz
- (c). View Angle----- $\theta = 0^\circ$, $\phi = 0^\circ$
- (d). Operating voltage-----12V

Note(2) definition of View Angle



Note(3) : Contrast ratio is defined under the following condition: $CR = \frac{\text{Brightness of selected condition}}{\text{Brightness of non-selected condition}}$

- (a). Temperature -----25°C
- (b). Frame frequency -----64Hz
- (c). Viewing angle ----- $\theta = 0^\circ$, $\phi = 0^\circ$
- (d). Operating voltage-----12V

12. 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.

13. 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