Display Elektronik GmbH

DATA SHEET

LCD MODULE

DEM 128064D FGH-EG

Product specification **Version : 2**

21/09/2011

SPECIFICATION FOR
LCM MODULE

DEM 128064D FGH-EG

Customer Approval:

	SIGNATURE	DATE
PREPARED BY (RD ENGINEER)	MHO	21.09.2011
CHECKED BY	MH	21.09.2011
APPROVED BY	MHO	21.09.2011

DOCUMENT REVISION HISTORY

Version	DATE	DESCRIPTION	CHANGED BY
0	08.03.2007	First issue	
1	18.01.2008	Change IC	
2	21.09.2011	Update Block diagram/ Dimensional Outline and Pin description	

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1. FUNCTIONS & FEATURES

Format	: 128x64dots
LCD mode	: FSTN/Positive/Transflective
Viewing direction	: 6 o'clock
Driving scheme	: 1/64 Duty cycle, 1/9 Bias
Power supply voltage (V_{DD})	: 5.0 Volt
LCD driving voltage	: 8.5 Volt (typ.)
Driver IC	: SBN0064G (Avant) or equivalent
Operation temp	:-20°C to 70°C
Storage temp	: -30°C to 80°C
Backlight color	: Blue-Green, EL
EL-Driving	: EL-Inverter on Board
RoHS	: Compliant

2. MECHANICAL SPECIFICATIONS

Module size	: 54.00x 50.00 x 7.00 mm
Viewing area	: 44.50 x 30.0 mm
Dot pitch	: 0.32 x 0.39 mm
Dot size	: 0.28 x 0.35 mm

3. BLOCK DIAGRAM

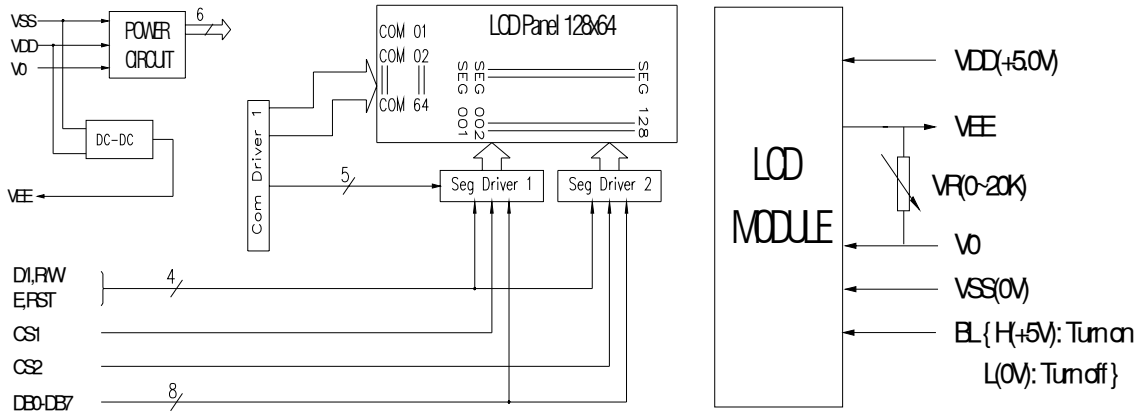
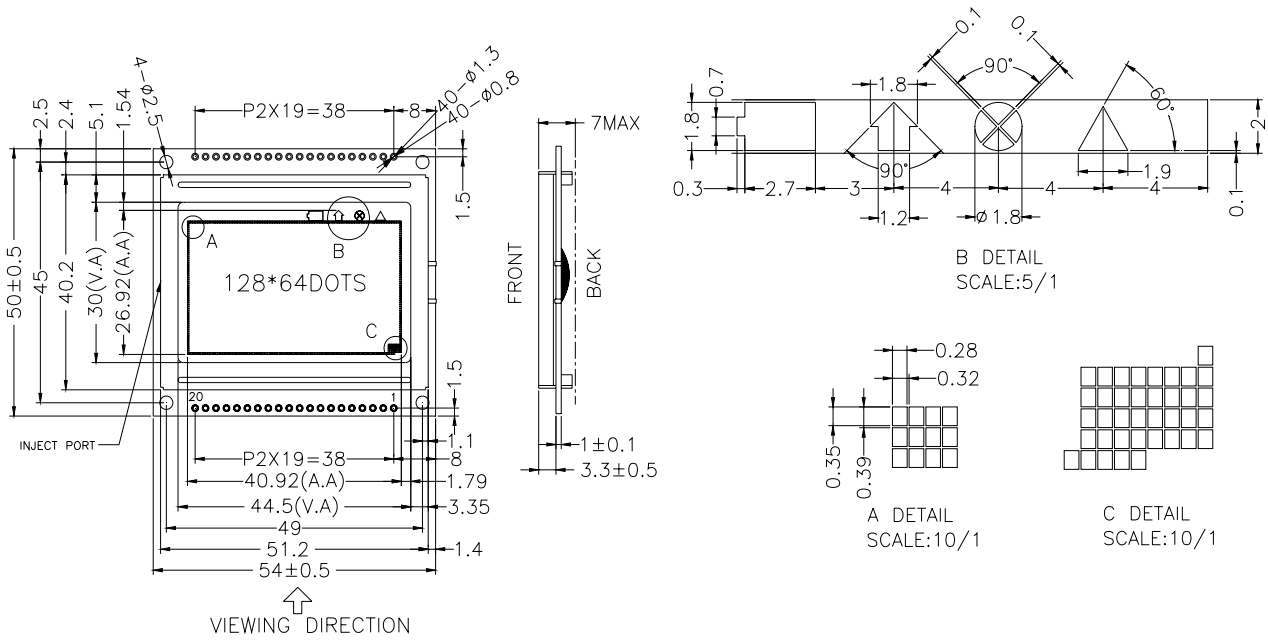


Figure 1. Block diagram

4. DIMENSIONAL OUTLINE



5. PIN DESCRIPTION

No.	Symbol	Function
1	VSS	GND(0V)
2	VDD	Power supply for Logic(+5.0V)
3	V0	Power supply for the LCD drive
4	D/I	Register selection. (H: Data register L: Instruction register)
5	R/W	Read /write selection. (H: Read L: write)
6	E	Enable signal for chip
7-14	DB0~DB7	Data bus line
15	CS1	Chip select signal for left half of the screen(High select)
16	CS2	Chip select signal for right half of the screen(High select)
17	RST	Reset signal
18	VEE	Output of supply negative voltage by the DC-DC converter on the module
19	EL	Switch signal for EL lamp{ H(+5V): Turn on; L(0V): Turn of f}
20	NC	No connection

6. MAXIMUM ABSOUTE LIMIT

Item	Symbol	MIN	MAX	Unit
Supply Voltage for Logic	V_{DD}	-0.3	7.0	V
Supply Voltage for LCD	V0	V_{DD}-19.0	V_{DD}+0.3	V
Input Voltage	Vin	-0.3	V_{DD}+0.3	V
Operating Temperature	Top	-20	70	°C
Storage Temperature	Tst	-30	80	°C

7. ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage for Logic	V_{DD}-V_{SS}	Ta = 25°C	4.75	5.0	5.25	V
Input High Voltage	V_{IH}	Ta = 25°C	0.7V_{DD}	---	V_{DD}	V
Input Low Voltage	V_{IL}	Ta = 25°C	0	---	0.3V_{DD}	V
Output High Voltage	V_{OH}	Ta = 25°C	2.4	---	---	V
Output Low Voltage	V_{OL}	Ta = 25°C	---	---	0.4	V
Supply Current	I_{DD}	Ta = 25°C	---	12.5	18	mA

8. BACKLIGHT CHARACTERISTICS

LCD Module with Blue-green EL Backlight

ELECTRICAL RATINGS

Ta = 25°C

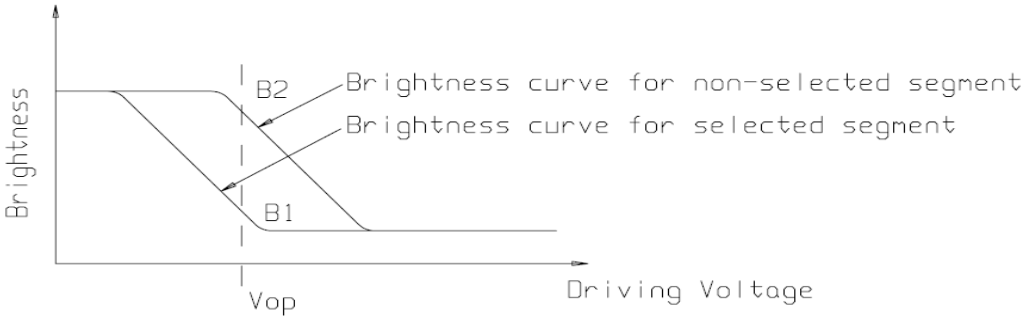
Item	Symbol	Condition	Min	Typ	Max	Unit
Current	I	50V/220HZ	---	0.1	---	mA/cm^2
Luminous Intensity (Without LCD)	IV		7	---	---	CD/m^2
Chromatics (Without LCD)	x		---	0.176	---	
	y		---	0.320	---	
Color	Blue-green					

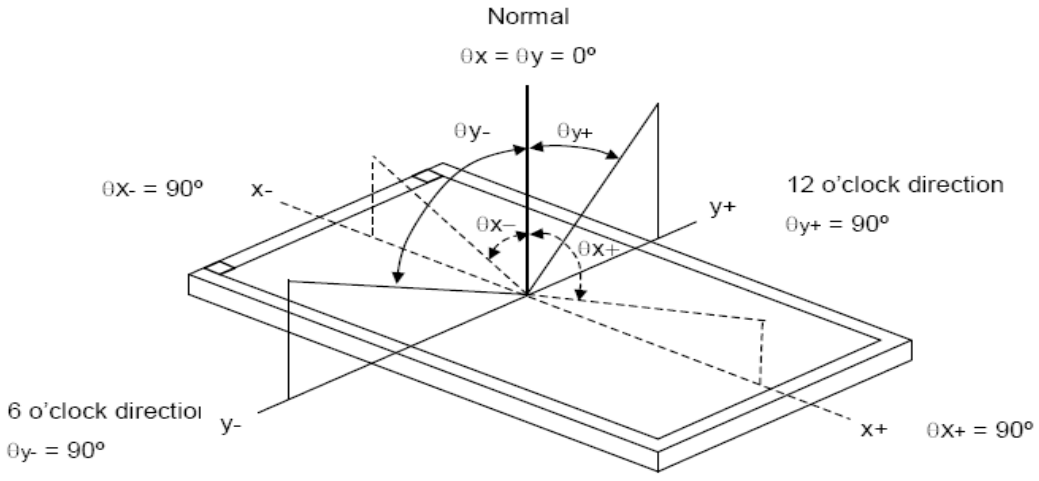
9. ELECTRO-OPTICAL CHARACTERISTICS

(Ta = 25°C)

Item	Symbol	Condition	Min	Typ	Max	Unit
Operating Voltage for LCD	Vlcd	Ta = -20°C	8.6	8.9	9.2	V
		Ta = 25°C	8.2	8.5	8.8	
		Ta = 70°C	7.8	8.1	8.4	
Response time	Tr	Ta = 25°C	---	185	---	ms
	Tf		---	200	---	ms
Contrast	Cr	Ta = 25°C	---	4	---	---
Viewing angle range	θ	Cr≥ 2	-40	---	+40	deg
	Φ		-45	---	+40	deg

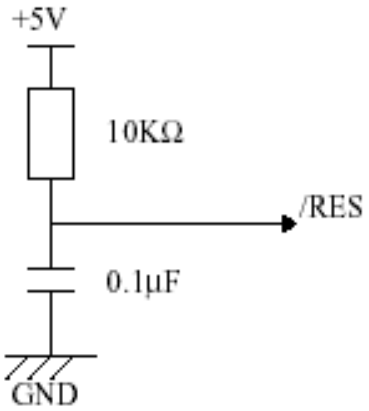
$$Cr = \frac{\text{Brightness of non-selected segment(B2)}}{\text{Brightness of selected segment(B1)}}$$





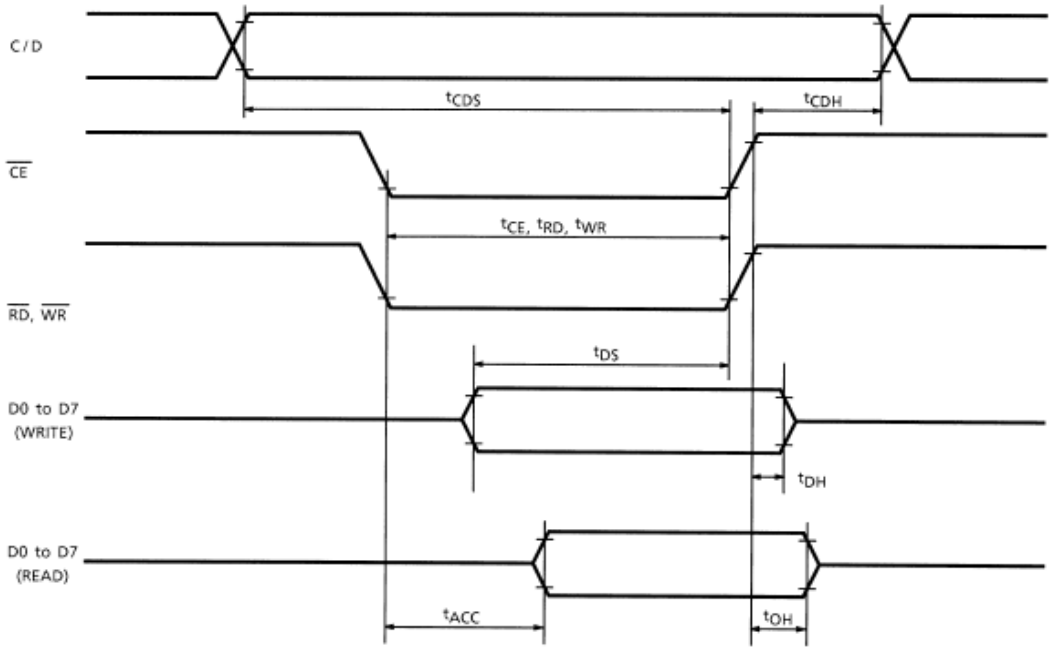
10. The /RES (RESET) Terminal

The T6A39C may be reset by an external active low TTL signal from a MPU or other logic device or it may be reset using the following circuit



11. TIMING CHARACTERISTICS

Bus Timing



Test Conditions (Unless Otherwise Noted, V_{DD} = 5.0 V ± 10%, V_{SS} = 0 V, Ta = −20 to 75°C)

Item	Symbol	Test Conditions	Min	Max	Unit
C / D Set−up Time	t_{CDS}	—	100	—	ns
C / D Hold Time	t_{CDH}	—	10	—	ns
$\overline{CE}$, $\overline{RD}$, $\overline{WR}$ Pulse Width	t_{CE}, t_{RD}, t_{WR}	—	80	—	ns
Data Set−up 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. CONTROL AND DISPLAY INSTRUCTION

Command	Code	D1	D2	Function
REGISTERS SETTING	00100001 00100010 00100100	X address Data Low address	Y address 00H High address	Set Cursor Pointer Set Offset Register Set Address Pointer
SET CONTROL WORD	01000000 01000001 01000010 01000011	Low address Columns Low address Columns	High address 00H High address 00H	Set Text Home Address Set Text Area Set Graphic Home Address Set Graphic Area
MODE SET	1000X000 1000X001 1000X011 1000X100 10000XXX 10001XXX	— — — — — —	— — — — — —	OR mode EXOR mode AND mode Text Attribute mode Internal CG ROM mode External CG RAM mode
DISPLAY MODE	10010000 1001XX10 1001XX11 100101XX 100110XX 100111XX	— — — — — —	— — — — — —	Display off Cursor on, blink off Cursor on, blink on Text on, graphic off Text off, graphic on Text on, graphic on
CURSOR PATTERN SELECT	10100000 10100001 10100010 10100011 10100100 10100101 10100110 10100111	— — — — — — — —	— — — — — — — —	1–line cursor 2–line cursor 3–line cursor 4–line cursor 5–line cursor 6–line cursor 7–line cursor 8–line cursor
DATA AUTO READ / WRITE	10110000 10110001 10110010	— — —	— — —	Set Data Auto Write Set Data Auto Read Auto Reset
DATA READ / WRITE	11000000 11000001 11000010 11000011 11000100 11000101	Data — Data — Data —	— — — — — —	Data Write and Increment ADP Data Read and Increment ADP Data Write and Decrement ADP Data Read and Decrement ADP Data Write and Nonvariable ADP Data Read and Nonvariable ADP
SCREEN PEEK	11100000	—	—	Screen Peek
SCREEN COPY	11101000			Screen Copy

X: invalid

13. PRECAUTION FOR USING LCD/LCM

LCD/LCM is assembled and adjusted with a high degree of precision. Do not attempt to make any alteration or modification. The followings should be noted.

General Precautions:

1. LCD panel is made of glass. Avoid excessive mechanical shock or applying strong pressure onto the surface of display area.
2. The polarizer used on the display surface is easily scratched and damaged. Extreme care should be taken when handling. To clean dust or dirt off the display surface, wipe gently with cotton, or other soft material soaked with isoproply alcohol, ethyl alcohol or trichlorotriflorothane, do not use water, ketone or aromatics and never scrub hard.
3. Do not tamper in any way with the tabs on the metal frame.
4. Do not made any modification on the PCB without consulting DISPLAY.
5. When mounting a LCM, make sure that the PCB is not under any stress such as bending or twisting. Elastomer contacts are very delicate and missing pixels could result from slight dislocation of any of the elements.
6. Avoid pressing on the metal bezel, otherwise the elastomer connector could be deformed and lose contact, resulting in missing pixels and also cause rainbow on the display.
7. Be careful not to touch or swallow liquid crystal that might leak from a damaged cell. Any liquid crystal adheres to skin or clothes, wash it off immediately with soap and water.

Static Electricity Precautions:

1. CMOS-LSI is used for the module circuit; therefore operators should be grounded whenever he/she comes into contact with the module.
2. Do not touch any of the conductive parts such as the LSI pads; the copper leads on the PCB and the interface terminals with any parts of the human body.
3. Do not touch the connection terminals of the display with bare hand; it will cause disconnection or defective insulation of terminals.
4. The modules should be kept in anti-static bags or other containers resistant to static for storage.
5. Only properly grounded soldering irons should be used.
6. If an electric screwdriver is used, it should be grounded and shielded to prevent sparks.
7. The normal static prevention measures should be observed for work clothes and working benches.
8. Since dry air is inductive to static, a relative humidity of 50-60% is recommended.

Soldering Precautions:

1. Soldering should be performed only on the I/O terminals.
2. Use soldering irons with proper grounding and no leakage.
3. Soldering temperature:350°C±10°C
4. Soldering time: 3 to 4 second.
5. Use eutectic solder with resin flux filling.
6. If flux is used, the LCD surface should be protected to avoid spattering flux.
7. Flux residue should be removed.

Operation Precautions:

1. The viewing angle can be adjusted by varying the LCD driving voltage Vo.
2. Since applied DC voltage causes electro-chemical reactions, which deteriorate the display, the applied pulse waveform should be a symmetric waveform such that no DC component remains. Be sure to use the specified operating voltage.
3. Driving voltage should be kept within specified range; excess voltage will shorten display life.
4. Response time increases with decrease in temperature.
5. Display color may be affected at temperatures above its operational range.
6. Keep the temperature within the specified range usage and storage. Excessive temperature and humidity could cause polarization degradation, polarizer peel-off or generate bubbles.
7. For long-term storage over 40°C is required, the relative humidity should be kept below 60%, and avoid direct sunlight.

Limited Warranty

DISPLAY LCDs and modules are not consumer products, but may be incorporated by DISPLAY's customers into consumer products or components thereof, DISPLAY does not warrant that its LCDs and components are fit for any such particular purpose.

1. The liability of DISPLAY is limited to repair or replacement on the terms set forth below. DISPLAY will not be responsible for any subsequent or consequential events or injury or damage to any personnel or user including third party personnel and/or user. Unless otherwise agreed in writing between DISPLAY and the customer, DISPLAY will only replace or repair any of its LCD which is found defective electrically or visually when inspected in accordance with DISPLAY general LCD inspection standard . (Copies available on request)
2. No warranty can be granted if any of the precautions state in handling liquid crystal display above has been disregarded. Broken glass, scratches on polarizer mechanical damages as well as defects that are caused accelerated environment tests are excluded from warranty.
3. In returning the LCD/LCM, they must be properly packaged; there should be detailed description of the failures or defect.