

**DISPLAY Elektronik GmbH**

**DATA SHEET**

**LCD MODULE**

**DEM 128128B SBH-PW-N**

*Product Specification*

*Version : 7.1.1*

10.06.2008

# GENERAL SPECIFICATION

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MODULE NO. :

# DEM 128128B SBH-PW-N

CUSTOMER P/N

VERSION NO.	CHANGE DESCRIPTION	DATE
0	ORIGINAL VERSION	15.04.2005
1	CHANGED SERIES	09.05.2005
2	CHANGED MODEL DRAWING	04.07.2005
3	CHANGED SERIES DRAWING	17.08.2005
4	CHANGED MODEL AND PCB DRAWING	01.09.2005
5	CHANGED BACKLIGHT	17.03.2006
6	CHANGED PCB DESCRIPTION	12.06.2006
7	REVISED LED-RESISTORS	27.04.2007
7.1.1	CHANGE IC	10.06.2008

PREPARED BY: XYP

DATE: 10.06.2008

APPROVED BY: MH

DATE: 10.06.2008

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**1. FUNCTIONS & FEATURES**

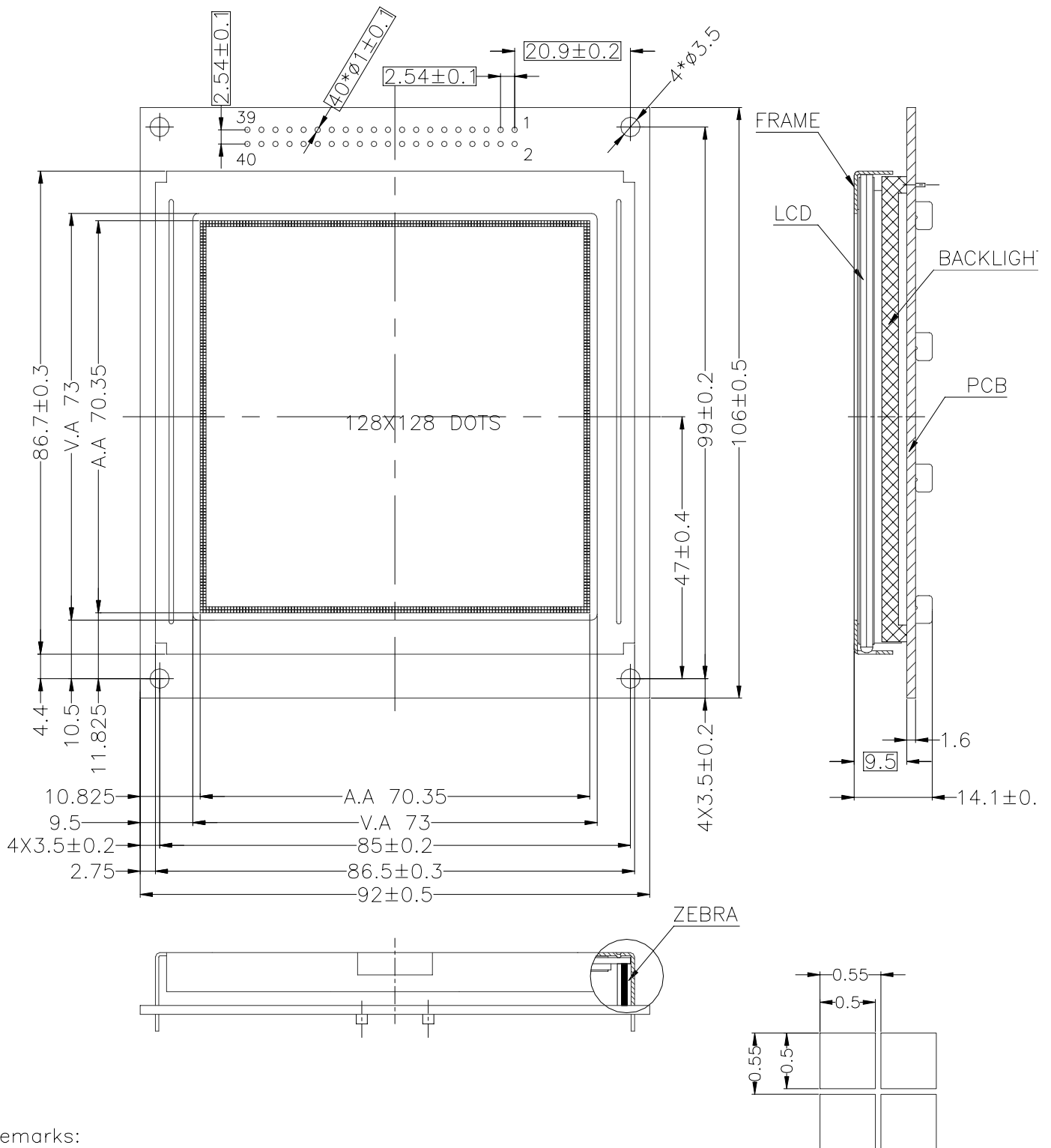
MODULE NAME	LCD Type
DEM 128128B SBH-PW-N	STN-BLUE Transmissive Negative Mode

- Glass Thickness : 1.1mm
- Viewing Direction : 6 O'clock
- Driving Scheme : 1/128Duty, 1/12 Bias
- Power Supply for logic : 5.0 Volt (typ.)
- Backlight Color : LED, Lightguide, White
- Display Content : 128 x 128 Dots
- $V_{LCD}$  : 18.5V (typ.)
- Operation Temperature : -20 to +70°C
- Storage temperature : -25 to +75°C
- Controller IC : T6963C (Toshiba)

**2. MODULE ARTWORK**

- Module Size : 106.00 x 92.00 x 14.10 mm
- Viewing Area : 73.00 mm x 73.00 mm
- Active Area : 70.35 mm x 70.35 mm
- Dot Pitch : 0.55 mm x 0.55 mm
- Dot Size : 0.50 mm x 0.50 mm
- Dot Gap : 0.05 mm

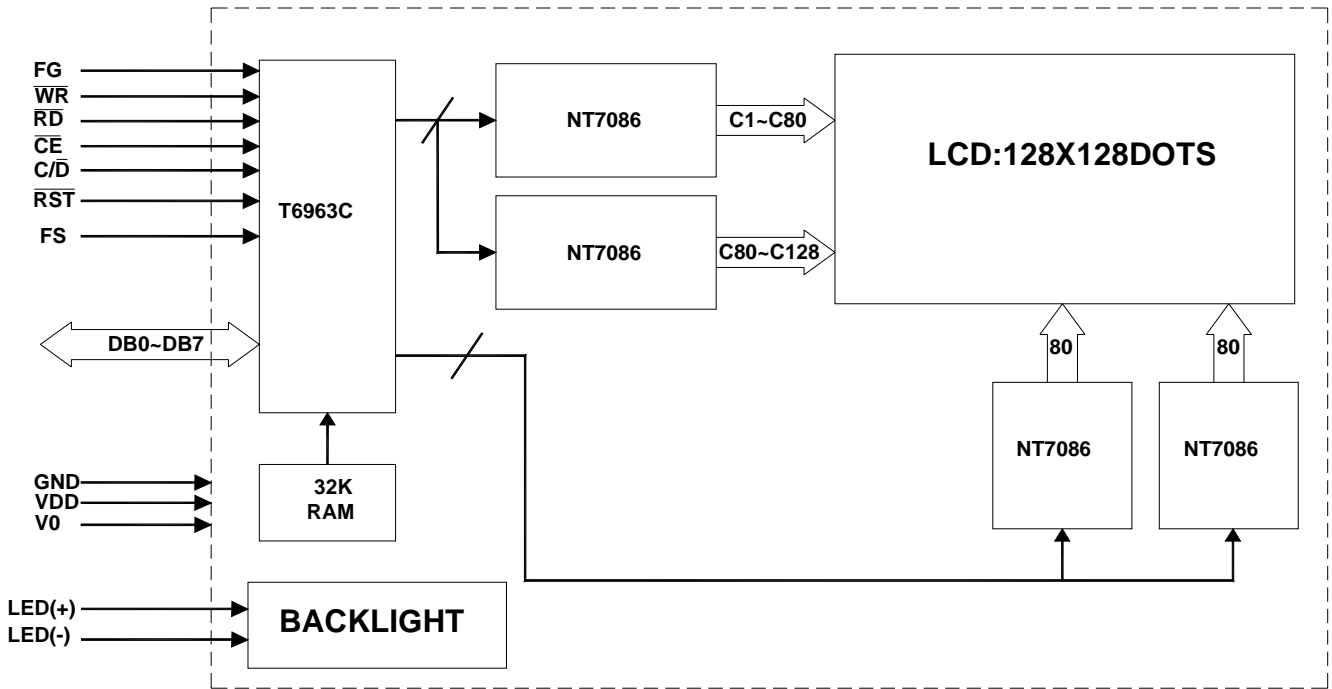
**3. EXTERNAL DIMENSIONS**



Remarks:  
 1, Unmarked tolerance is  $\pm 0.3$ ,  
 2, All materials comply with RoHs.

LCD DOT 20:1

**4. BLOCK DIAGRAM**

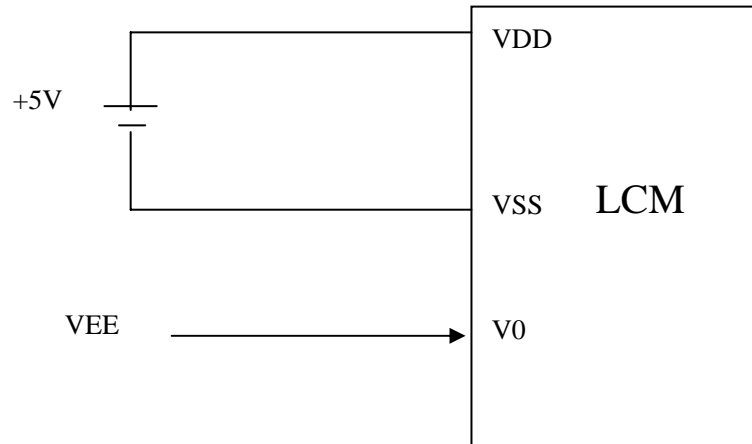


**5. PIN ASSIGNMENT**

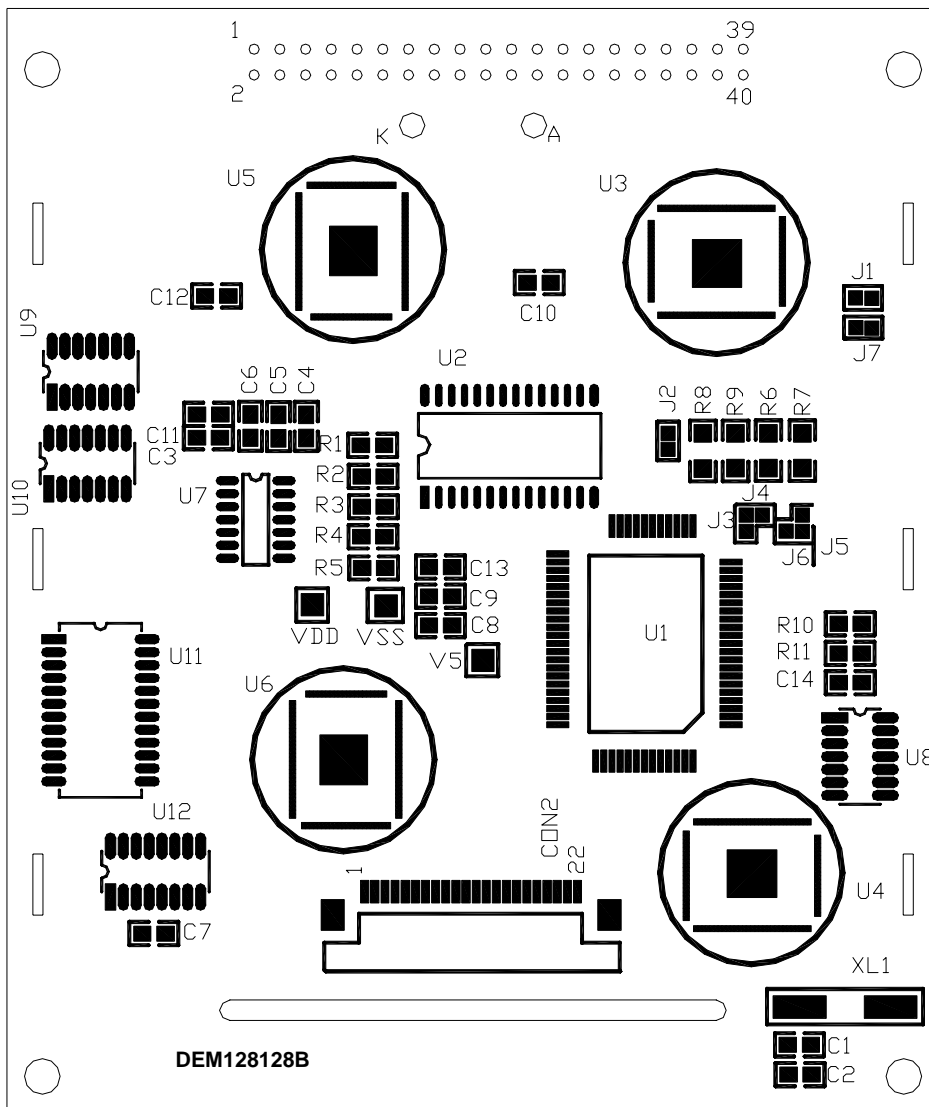
NO.	SYMBOL	FUNCTION
1	FG	Frame ground (see note 1)
3	VSS	Ground (0V)
5	VDD	Power Supply(+5V)
7	V0	Power Supply for LCD Drive(-13.5V)
9	/WR	Data write. Write data to controller T6963C when “L”
11	/RD	Data read. Read data from controller T6963C when “L”
13	/CE	Chip enable of controller when “L”
15	C/ D	Command/Data read/write. “H” for command read/write and “L” for data read/write
17	/RST	Controller reset when “L”
19	DB0	Data input/output(LSB)
21	DB1	Data input/output
23	DB2	Data input/output
25	DB3	Data input/output
27	DB4	Data input/output
29	DB5	Data input/output
31	DB6	Data input/output
33	DB7	Data input/output(MSB)
35	FS	Font select. “H” for 6x8 font & “L” for 8x8 font
37	LED+(A)	Anode of LED backlight
39	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**



**7. PCB DRAWING AND DESCRIPTION**



Note: It is only a draft drawing to show the components on the PCB.

**7.1 DESCRIPTION:**

**7-1-1. The polarity of the pin 37 and the pin 39:**

J3,J5	J6, J4	LED Polarity	
		37 Pin	39 Pin
Each closed	Each open	Anode	Cathode
Each open	Each closed	Cathode	Anode

Note: In application module, J3=J5 =closed, J4=J6=J2= open.

**7-1-2. The J1 is metal-bezel GND to module GND and J7 is mounting holes GND to module GND.**

Note: In application module, J1=closed, J7=closed

**7-1-3.The LED resistor should be bridged when J2 is closed**

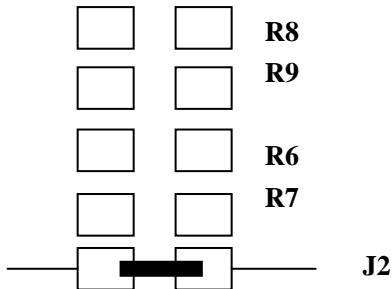
Note: In application module, J2= open

**7-1-4.The R6 and the R7, R8, R9 are the LED resistor.**

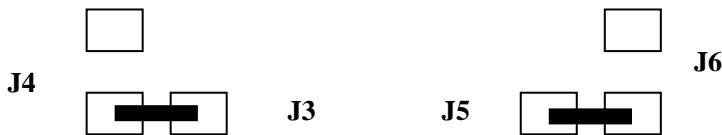
Note: In application module, R6= 47 Ohm, R7=68 Ohm, R8=82 Ohm, R9=open.

**7.2 EXAMPLE APPLICATION**

**7-2-1. The LED resistor should be bridged as following.**



**7-2-2. The 37 pin is the anode and the 39 pin is the cathode as following.**



**7-2-3.The 37 pin is the cathode and the 39 pin is the anode as following.**



**7-2-4. The metal-bezel is on ground as following.**



**7-2-5.The holes is on ground as following**





**8. ABSOLUTE MAXIMUM RATINGS (V<sub>ss</sub>=0V, Ta=25°C)**

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage (Logic)	V <sub>DD</sub>	-0.3 to 7.0	V
Input voltage	V <sub>IN</sub>	-0.3 to V <sub>DD</sub> +0.3	V
Operating Temperature	T <sub>opr</sub>	-20 to +70	°C
Storage Temperature	T <sub>stg</sub>	-25 to +75	°C

**9. COMMAND DEFINITIONS**

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

Command	Code	D1	D2	Function
BIT SET / RESET	11110XXX	-	-	Bit Reset
	11111XXX	-	-	Bit Set
	1111X000	-	-	Bit 0 (LSB)
	1111X001	-	-	Bit 1
	1111X010	-	-	Bit 2
	1111X011	-	-	Bit 3
	1111X100	-	-	Bit 4
	1111X101	-	-	Bit 5
	1111X110	-	-	Bit 6
	1111X111	-	-	Bit 7 (MSB)

### 10. ELECTRICAL CHARACTERISTICS

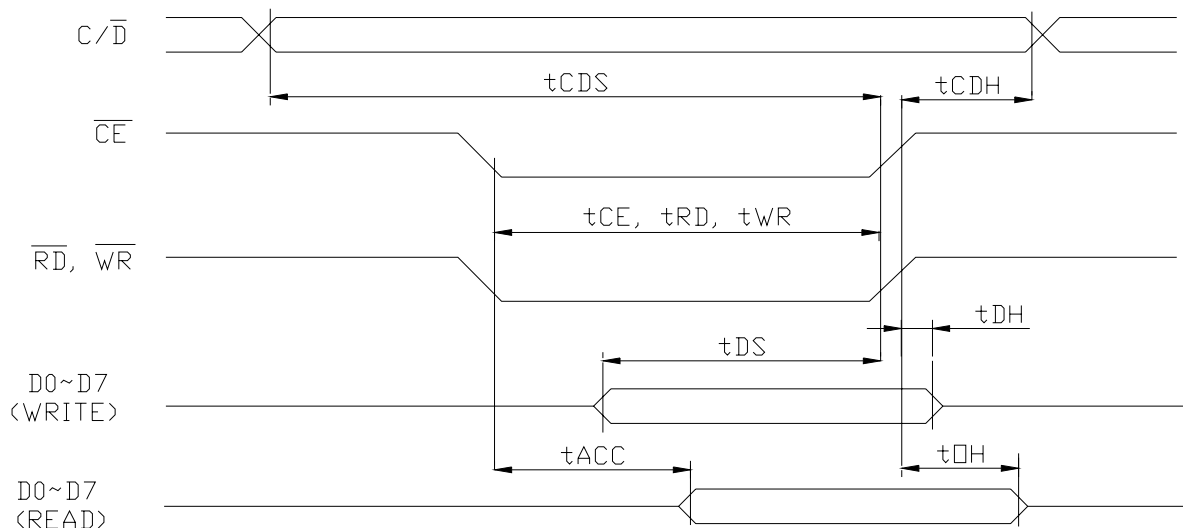
#### 10.1 DC Characteristics

Ta=25°C, VSS=0V

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Supply Voltage (Logic)	V <sub>DD</sub> -V <sub>SS</sub>	-	4.5	5.0	5.5	V
High Level Input Voltage	V <sub>IH</sub>	V <sub>DD</sub> =5.0V±10%	V <sub>DD</sub> -2.2	-	V <sub>DD</sub>	V
Low Level Input Voltage	V <sub>IL</sub>	V <sub>DD</sub> =5.0V±10%	0	-	0.8	V
High Level Output Voltage	V <sub>OH</sub>	I <sub>OH</sub> =0.75mA	V <sub>DD</sub> -0.3	-	V <sub>DD</sub>	V
Low Level Output Voltage	V <sub>OL</sub>	I <sub>OL</sub> =0.75mA	0	-	0.3	V
Current Consumption(Operating)	I <sub>DD(1)</sub>	V <sub>DD</sub> =5.0V f <sub>OSC</sub> = 3.0 MHz	-	3.3	6.0	mA
Current Consumption(Halt)	I <sub>DD(2)</sub>	V <sub>DD</sub> =5.0V			3	uA

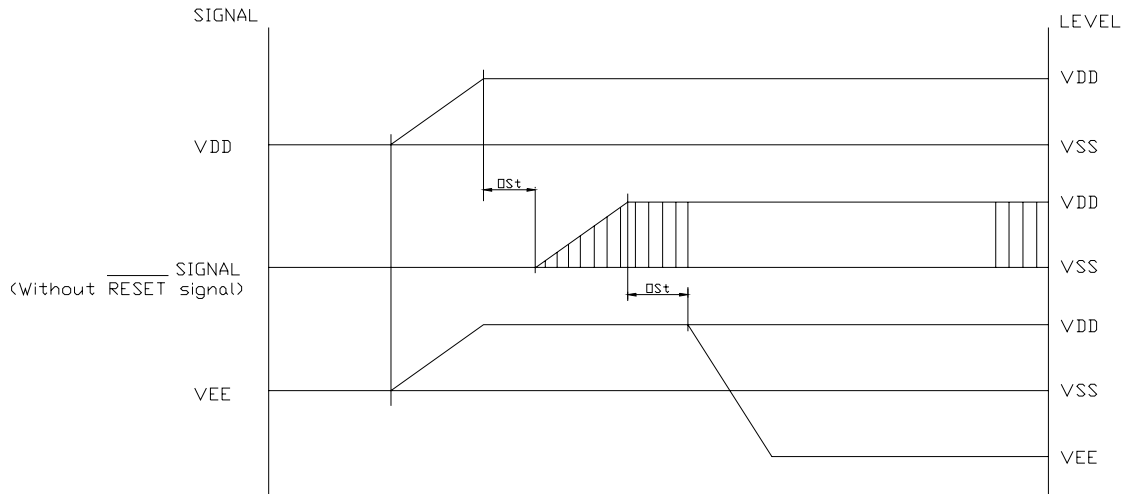
#### 10.2 AC Characteristics

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

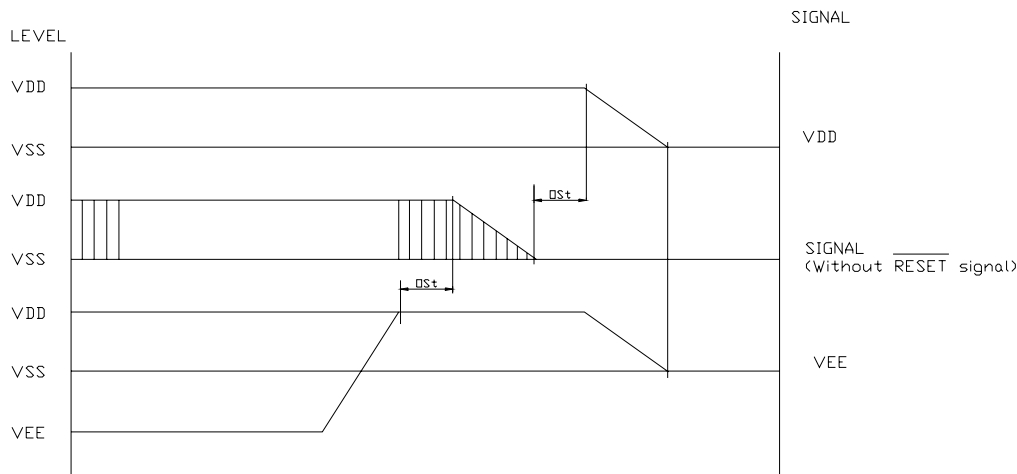


**10.3 Power Supply ON/OFF Sequence**

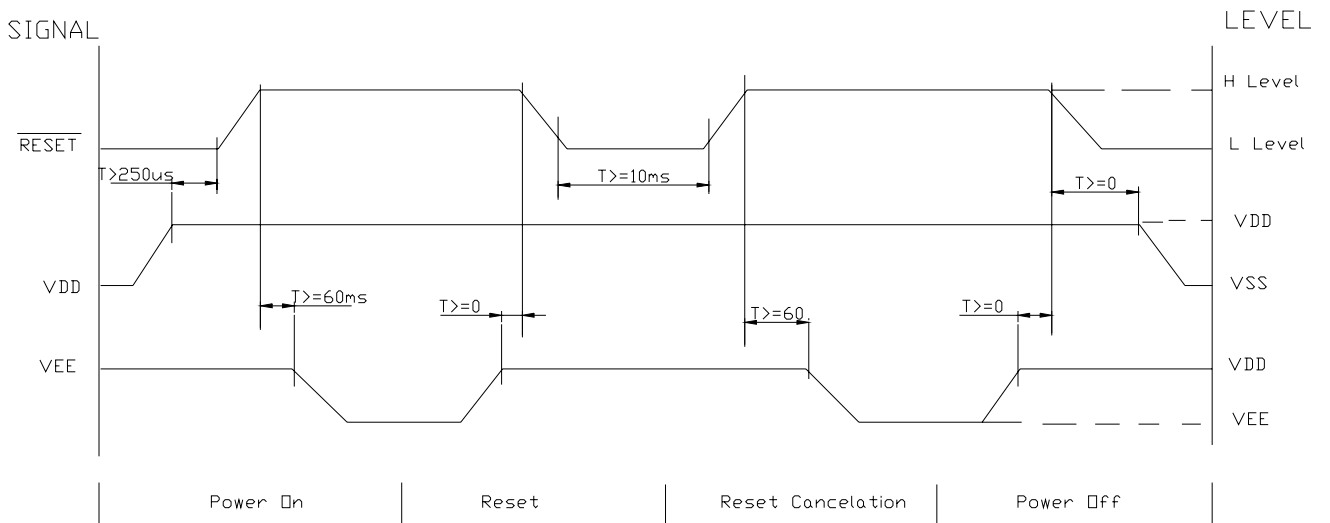
**ON Sequence**



**OFF Sequence**



**Reset Sequence**



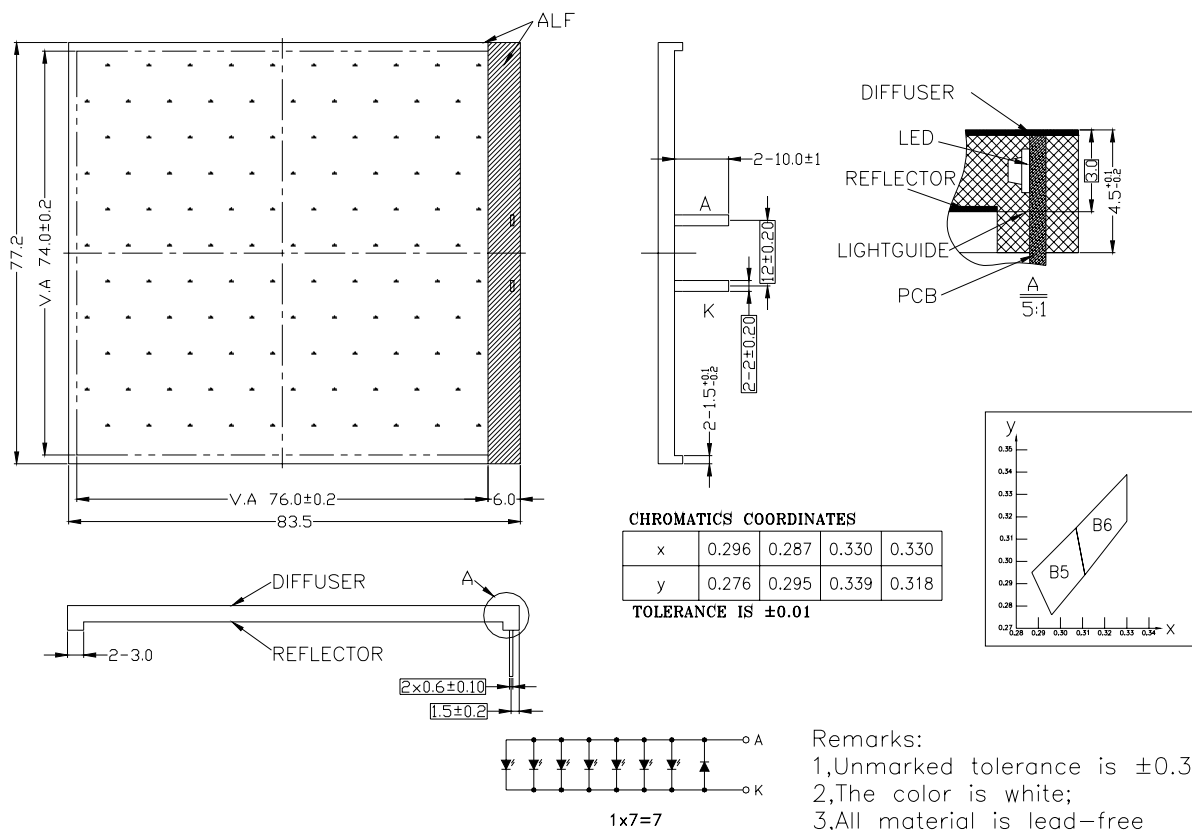
Please maintain the above sequence when turning on and off the power supply of the module.

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. BACKLIGHT ELECTRICAL/OPTICAL SPECIFICATIONS**

ELECTRICAL–OPTICAL CHARACTERISTICS

Item	Symbol	min.	typ.	max.	Unit	Condition
Forward Voltage	Vf	2.9	3.2	3.5	V	If= 105 mA
Reverse Current	Ir		30		$\mu A$	Vr= 0.8 V
Chromaticity Uniformity		65	75			
Spectral Line Half width	$\Delta\lambda$				nm	If= mA
Luminance	Lv	175	250		cd/m <sup>2</sup>	If= 105 mA
Operating Temperature Range	Topr				-30~+70	°C
Storage Temperature Range	Tstg				-40~+80	°C



Remarks:  
 1, Unmarked tolerance is ±0.3;  
 2, The color is white;  
 3, All material is lead-free

**Backlight drawing**

**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 comes 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 polarizer 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