DISPLAY Elektronik GmbH

DATA SHEET

LCD MODULE

DEM 128128B SBH-PW-N (D-TOUCH)

Product   specification   *Version : 8*

27/Apr/2007

GENERAL SPECIFICATION

MODULE NO. :

DEM 128128B SBH-PW-N

(D-TOUCH)

CUSTOMER   P/N

VERSION NO.	CHANGE DESCRIPTION	DATE
0	ORIGINAL VERSION	15/04/2005
1	CHANGED SERIES DRAWING	17/08/2005
2	CHANGED SERIES	01/09/2005
3	CHANGED MODEL DRAWING	09/01/2006
4	CHANGED BACKLIGHT	17/03/2006
5	ADDED VERSION	06/07/2006
6	CHANGED MODULE DRAWING	19/10/2006
7	CHANGED TOUCH PANEL TIMING DIAGRAM	03/04/2007
8	MODIFY SECTION 7.1	27/04/2007

PREPARED BY: WJN   DATE: 27/04/2007

APPROVED BY: MH   DATE: 15/05/2007

CONTENTS

DEM 128128B SBH-PW-N (D-TOUCH)   Product Specification

1. FUNCTIONS & FEATURES

- LCD TYPE:

MODULE NAME	LCD TYPE	Remark
DEM 128128B SBH-PW-N (D-TOUCH)	STN-BLUE Transmissive Negative Mode	DIGITAL TOUCH

- Viewing Direction : 6 o'clock
- Driving Scheme : 1/128 Duty, 1/12 Bias
- Power Supply for logic : 5.0 Volt (typ.)
- Backlight Color : White, Lightguide
- Display Format : 128 x 128 Dots
- V_{LCD} : 18.5 Volt (typ. at 25°C)
- Touch Panel : Digital Touch, Anti-Glare-Type, 6 x 16 Areas
- Operating Temperature : -20°C to +70°C
- Storage Temperature : -25°C to +75°C

2. MODULE ARTWORK

- Module Size : 92.00 x 106.00 x 16.9 mm
- Viewing Area : 73.00 x 73.00 mm (LCD or Touch Panel)
- Active Area : 70.35 x 70.35 mm (LCD)
- Active Area : 70.10 x 69.00 mm (Touch Panel)
- Dot Pitch : 0.55 x 0.55 mm (LCD)
- Dot Pitch : 4.40 x 11.55 mm (Touch Panel)
- Dot Size : 0.50 x 0.50 mm (LCD)
- Dot Size : 4.10 x 11.25 mm (Touch Panel)
- Dot Gap : 0.05 mm (LCD)
- Dot Gap : 0.30 mm (Touch Panel)

3. EXTERNAL DIMENSIONS

3.1 Module Drawing

TOUCH PANEL
6 ROWS X 16 COLUMNS

LCD DOT 20:1
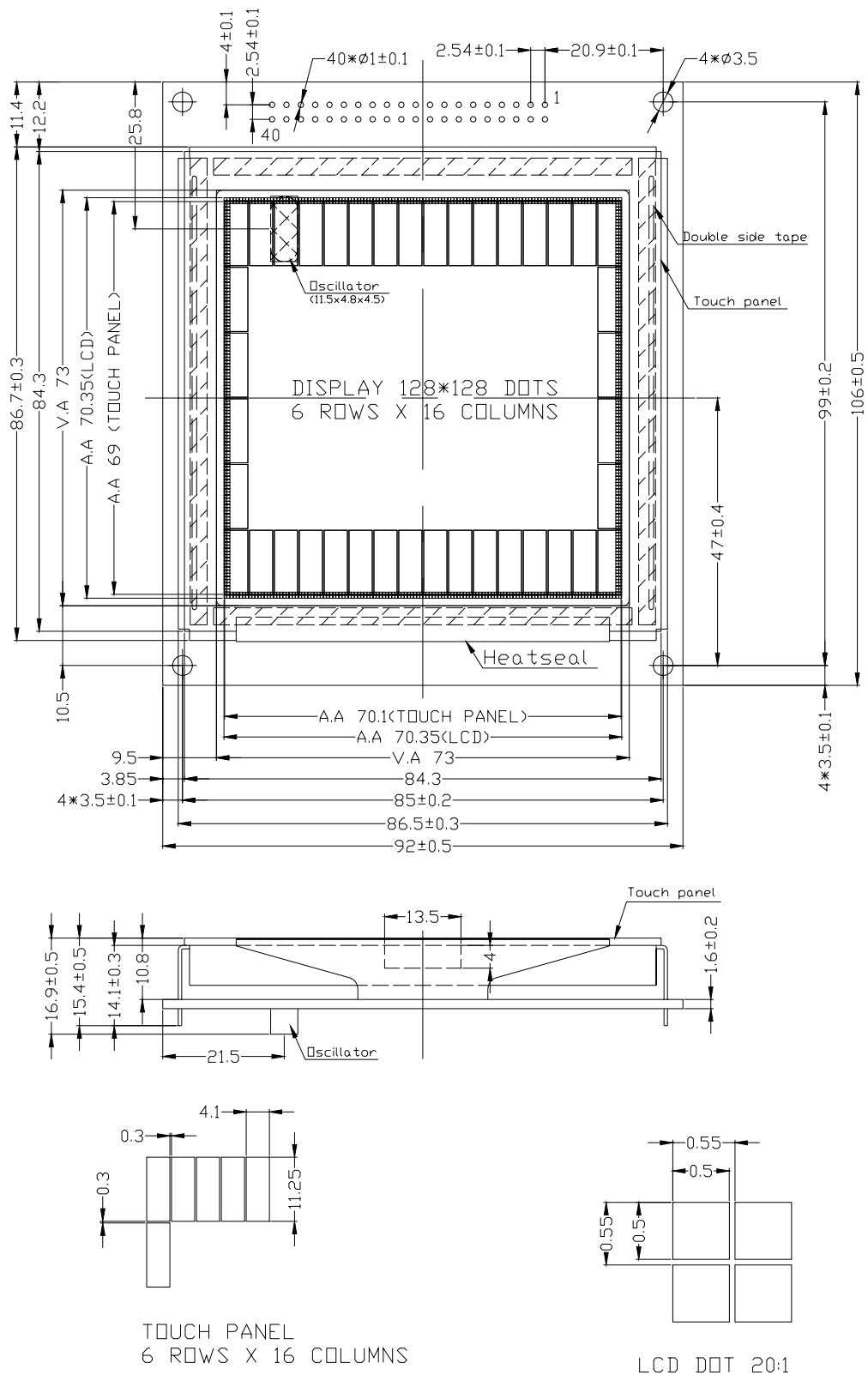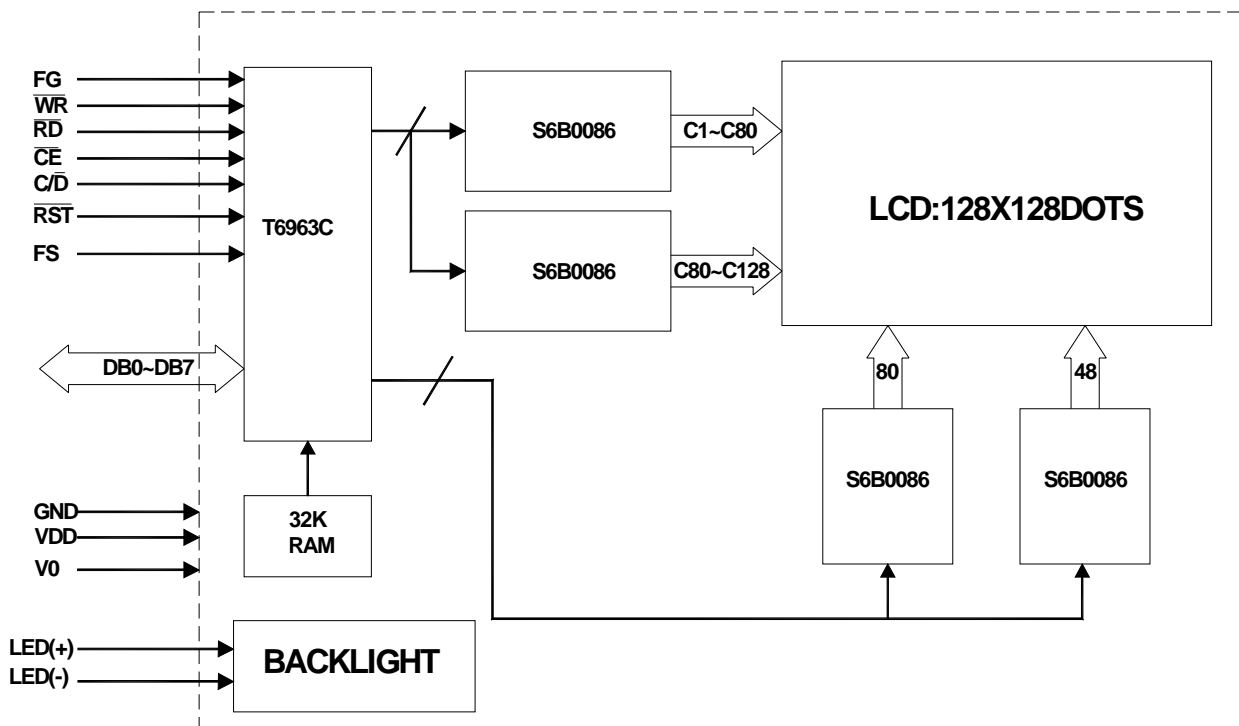
Remarks:
1,Unmarked tolerance is ±0.3,
2,All materials comply with RoHs.

3.2 Touch Panel Drawing
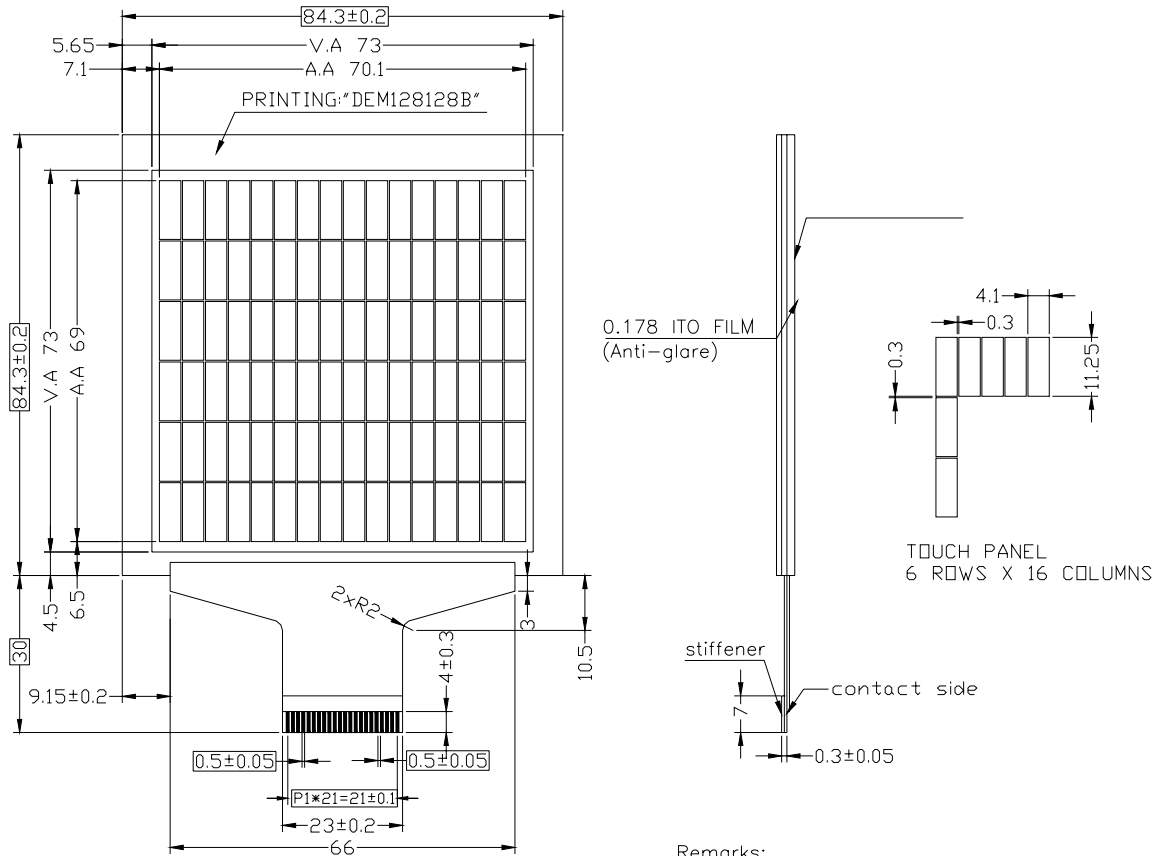
Remarks:
1,The thickness is 0.2mm,
2,Unmarked tolerance is ±0.3,
3,The material is lead-free.

TOUCH PANEL
6 ROWS X 16 COLUMNS

0.178 ITO FILM (Anti-glare)

stiffener

contact side

PRINTING:"DEM128128B"

4. BLOCK DIAGRAM

4.1 Block Diagram Of LCD Module

4.2 Digital Touch Screen Auto-Scanning Block Diagram
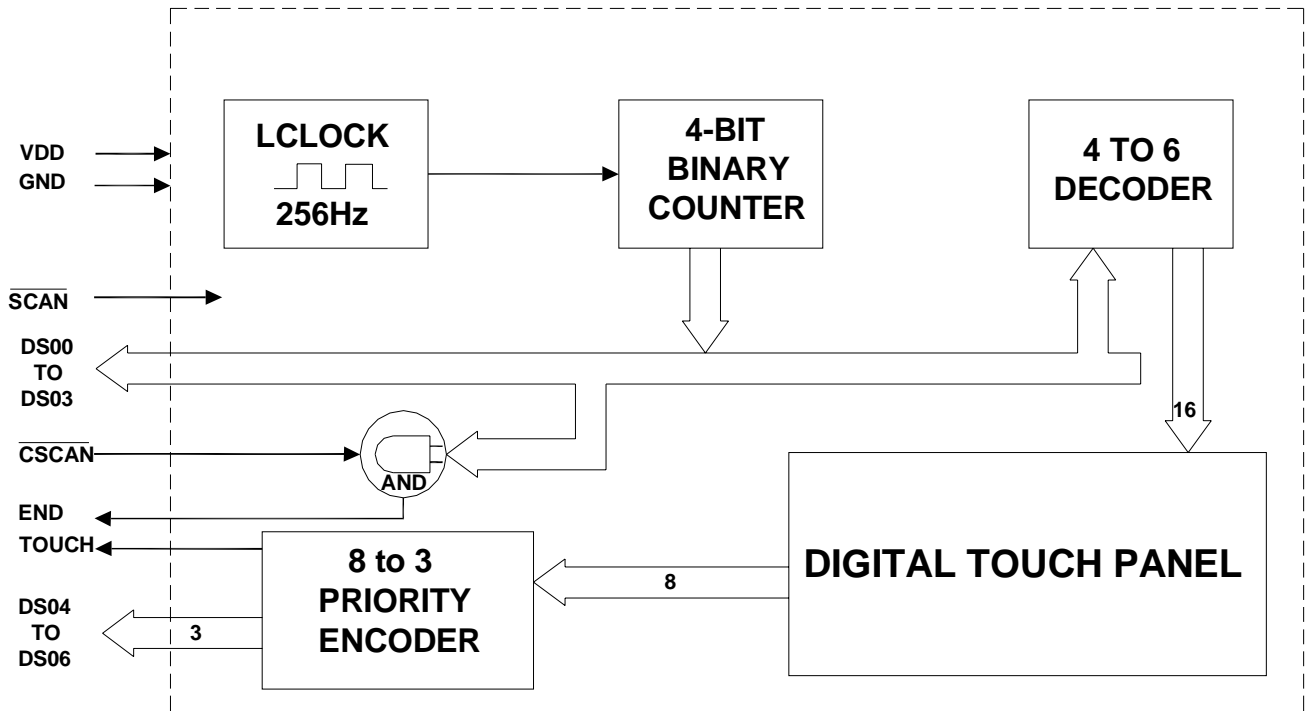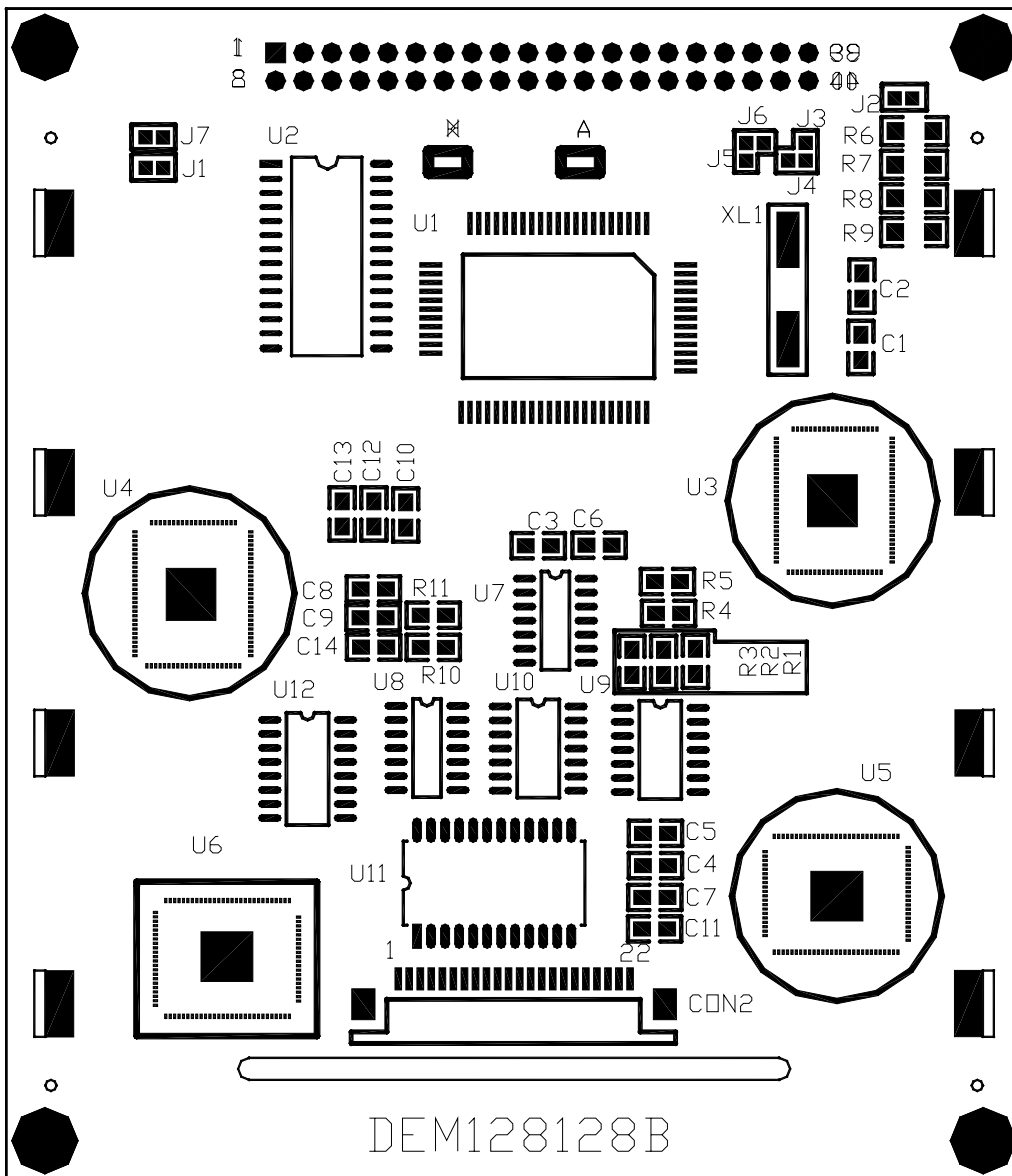
5. PIN ASSIGNMENT

NO.	SYMBOL	FUNCTION
1	FG	Frame ground (see note 1)
2	/CSCAN	Active LOW: Force column scan counter to run continuously in order to obtain a complete cycle
3	VSS	Ground(0V)
4,6,8,10	DS00~DS03	4 bits to indicate the column being scanned: range0 to 15 corresponding to COL1 to COL16, with DS00 as LSB. Output is latched at the most recently touched position. When read while "TOUCH" is positive, the touched column is identified.*
5	VDD	Power supply for logic(+5V)
7	V0	Power supply for LCD drive(-13.5V)
9	/WR	Write Command or data to module when "L"
11	/RD	Read Command or data from module when "L"
12,14,16	DS04~DS06	3bits to indicate the row being scanned: range 0 to 7 corresponding to ROW1 to ROW8, with DS4 as LSB & DS6 as MSB. Output is latched at the most recently touched position. When read while "TOUCH" is positive, the touched column is identified.*
13	/CE	Enable LCD controller when "L"
15	C//D	Command/data select. "H" for command read/write. "L" for data read/write
17	/RST	LCD Controller reset. Controller initialize and DB00-DB7 are set to be high impedance when/RST is "L"
18	/SCAN	Active LOW: Standby to scan. Scanning will begin when a touch is identified at any of the sensing position, and will continue until touch is removed.
19,21,23,25, 27,29,31,33	DB0~DB7	LCD data input/output. DB0(pin11) is LSB and DB7(pin18) is MSB.
20	END	A 4ms positive pulse generated at the end of a complete scan cycle (Max cycle time: 64ms)
22	TOUCH	A 2ms negative pulse when scanning reaches an identified touch position. It can be used as an interrupt.
24,26,28,30,3 2,34,36,38,40	N.C.	No Connection
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

* If DS00 to DS06 is read at the "END, then the last touched position will be identified.

6. POWER SUPPLY
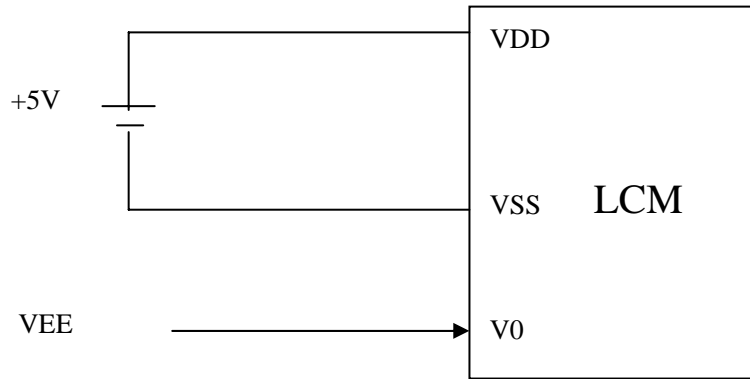
7. PCB DRAWING AND DESCRIPTION

7.1 DESCRIPTION:

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

symbol	symbol state	J3,J5	J6, J4	LED Polarity	
				37 Pin	39 Pin
J6,J4	Each solder-bridge	Each closed	Each open	Anode	Cathode
J3,J5	Each solder-bridge	Each open	Each closed	Cathode	Anode

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

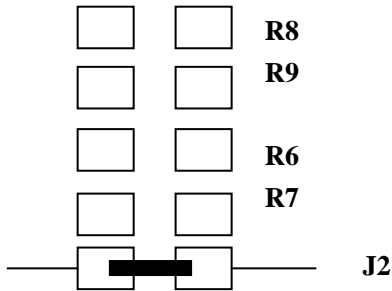### 7-1-3.The LED resistor should be bridged when J2 is closed

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 are on ground as following

8. ABSOLUTE MAXIMUM RATINGS (Vss=0V, Ta=25°C)

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage (Logic)	V_{DD}	-0.3 to 7.0	V
Input voltage	V_{IN}	-0.3 to V_{DD} +0.3	V
Operating Temperature	Topr	-20 to +70	°C
Storage Temperature	Tstg	-25 to +75	°C

9. ELECTRICAL CHARACTERISTICS

1). DC Characteristics

Ta=25°C, VSS=0V

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

2). AC Characteristics

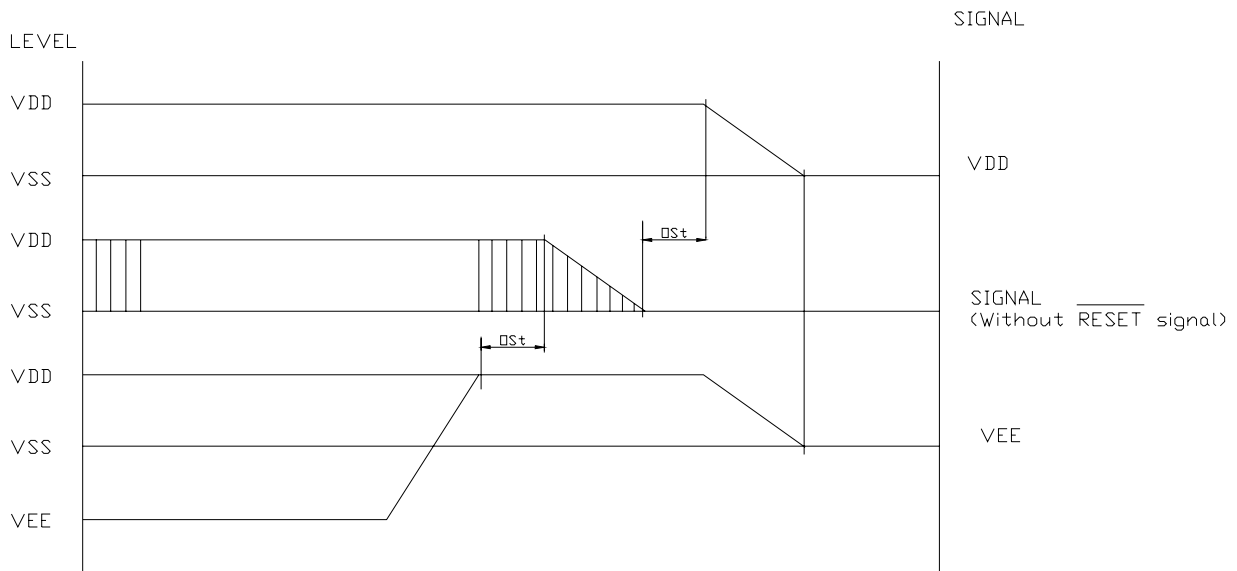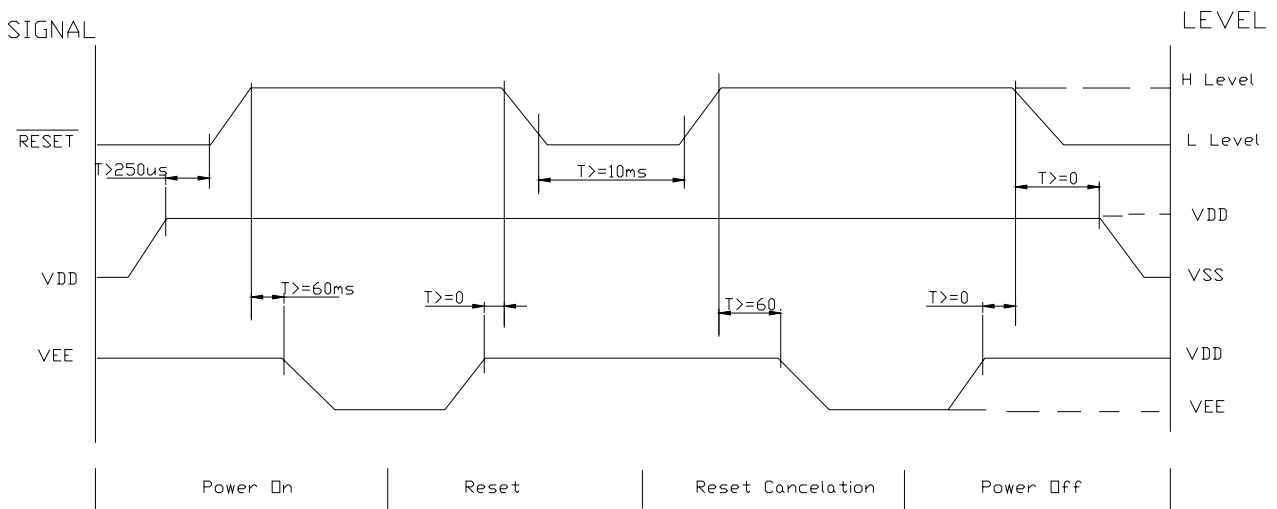| Parameter	Symbol	Min.	Max.	Units
C/D Setup Time	t_{CDS}	100	-	ns
C/D Hold Time	t_{CDH}	10	-	ns
CE, RD, WR Pulse Width	t_{CE}, t_{RD}, t_{WR}	80	-	ns
Data Setup Time	t_{DS}	80	-	ns
Data Hold Time	t_{DH}	40	-	ns
Access Time	t_{ACC}	-	150	ns
Output Hold Time	t_{OH}	10	50	ns
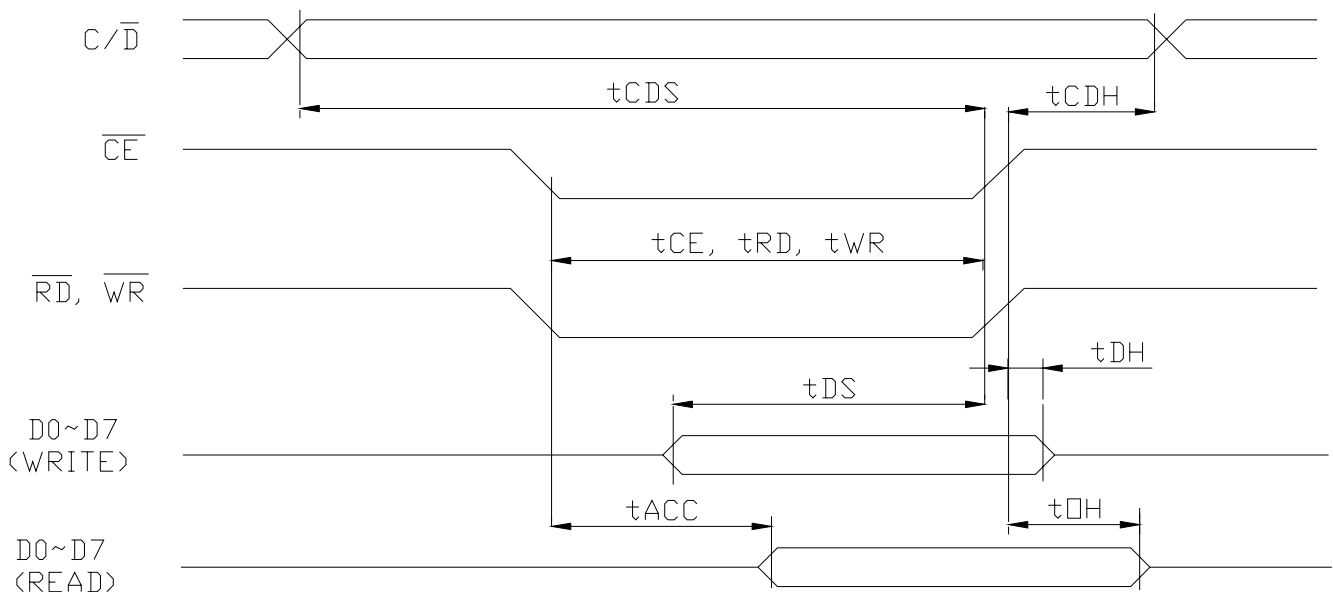
3). Power Supply ON/OFF Sequence

● **ON Sequence**
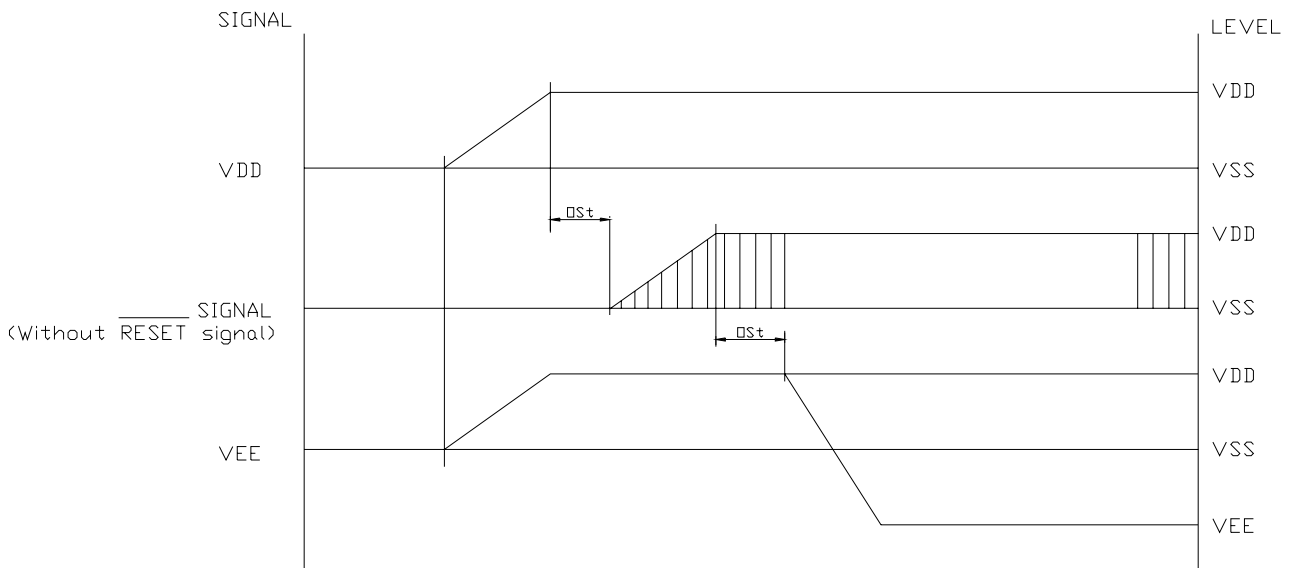
● **OFF Sequence**

● **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.
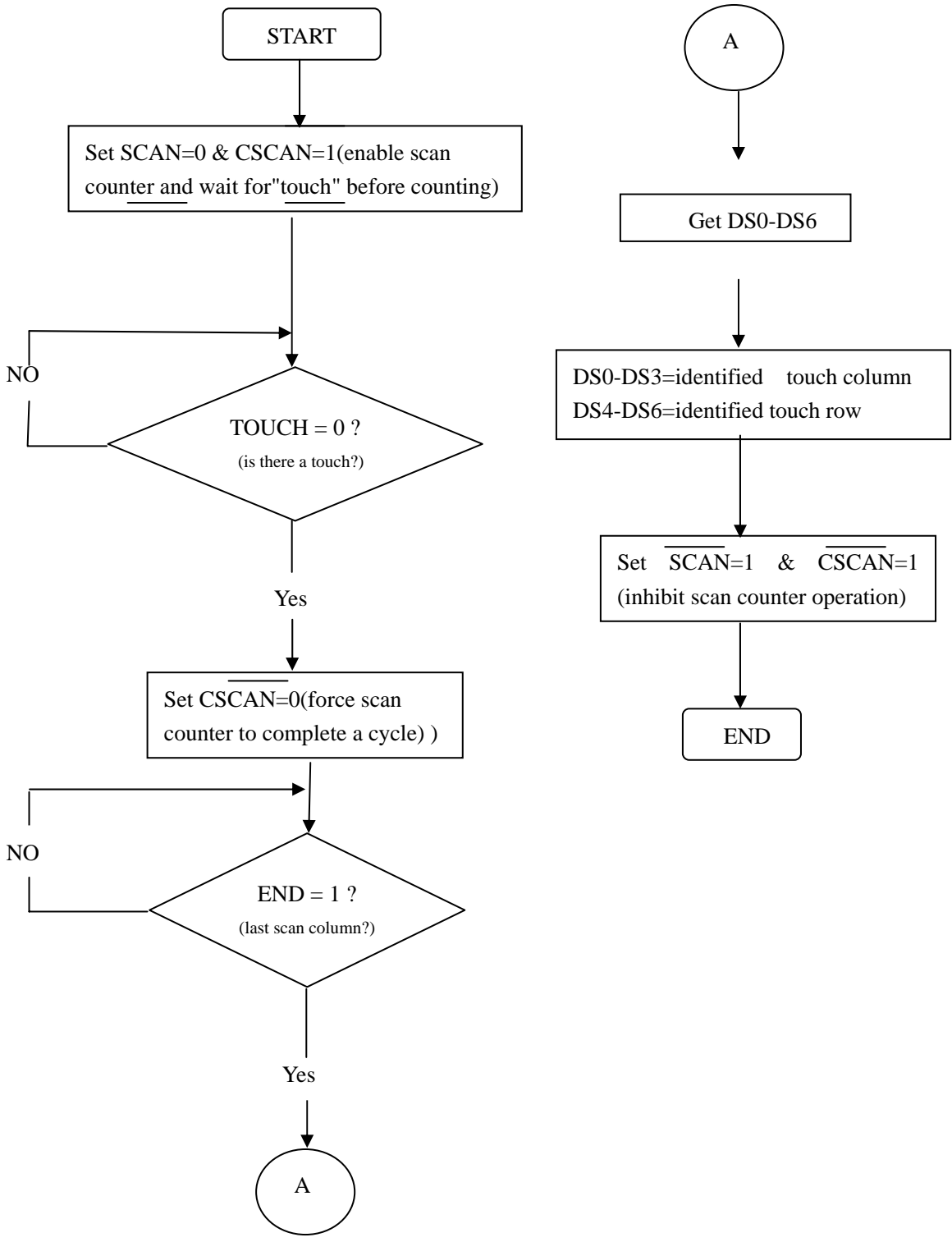
10. TOUCH PANEL SPECIFICATIONS

10.1 Electrical Characteristics of Digital Touch Panel

1). Max rating: DC. 10V, 1mA

2). Insulating resistance: More than 100meg-ohms at DC. 25 volts.

3). Contact resistance: 20K Ohms or less.

4). Contact bounce: Less than 15 msec (*Input by finger).

50. Withstand voltage: Withstanding an applied voltage of AC. 25 volts (50Hz, 0.5mA) each terminal for one minutes. Shall not be any mechanical or electrical failures.

10.2 Mechanical Characteristics of Digital Touch Panel

1). Activation force: 10~35 gf (Diagonal cross point except dot spacer).

2). Using by the silicon finger, hardness test with=60^0 of R=10mm

3). Surface hardness: 2H (based on pencil hardness test with JIS K5400).

4). Total light transparency: 70% or more.

5). Transmission Haze: 6.0% (typical value).

10.3 Flow Chart of Touch Panel Programming

``

START

A

Set SCAN=0 & CSCAN=1(enable scan counter and wait for"touch" before counting)

Get DS0-DS6

NO

TOUCH = 0 ?

(is there a touch?)

DS0-DS3=identified   touch column
DS4-DS6=identified touch row

Yes

Set $\overline{SCAN}$=1   & $\overline{CSCAN}$=1
(inhibit scan counter operation)

Set $\overline{CSCAN}$=0(force scan counter to complete a cycle))
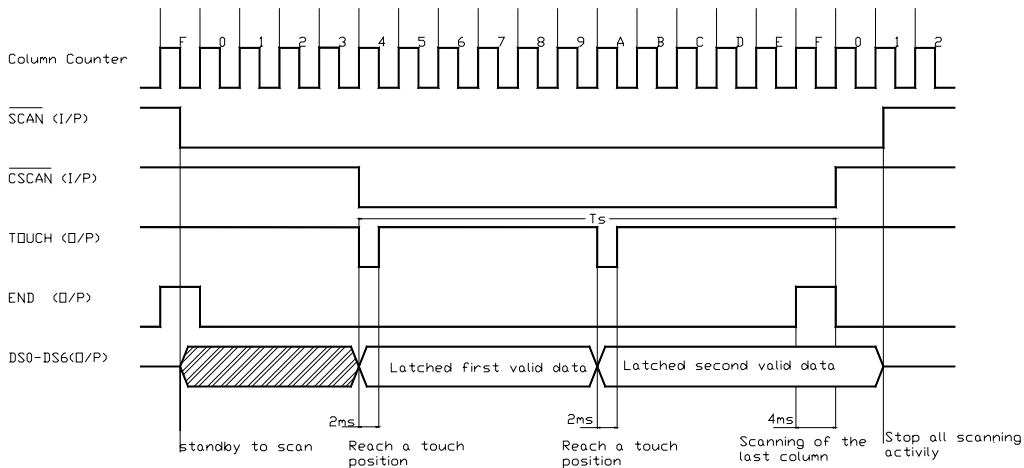
END

NO

END = 1 ?

(last scan column?)

Yes

A

10.4 Timing Diagrams for Digital Touch Panel Auto-Scanning Mode

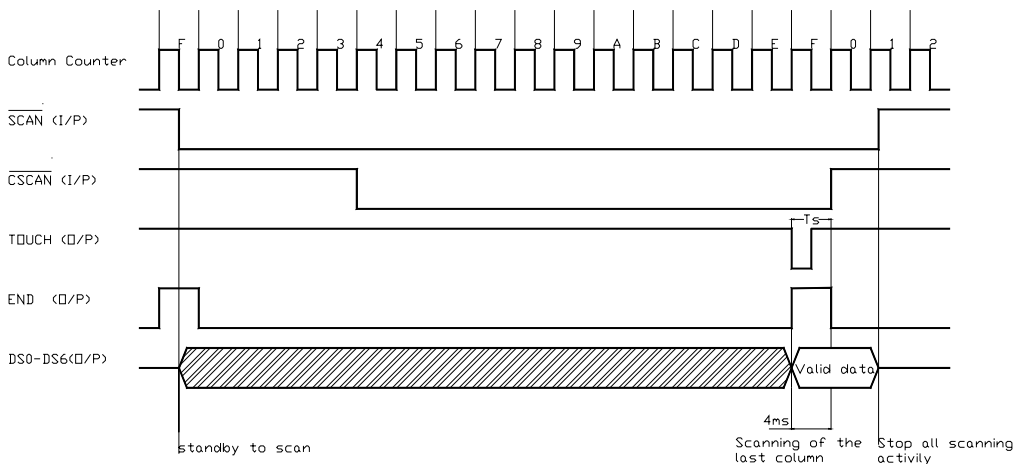CASE1: Single key is pressed (column11-row4 is pressed)
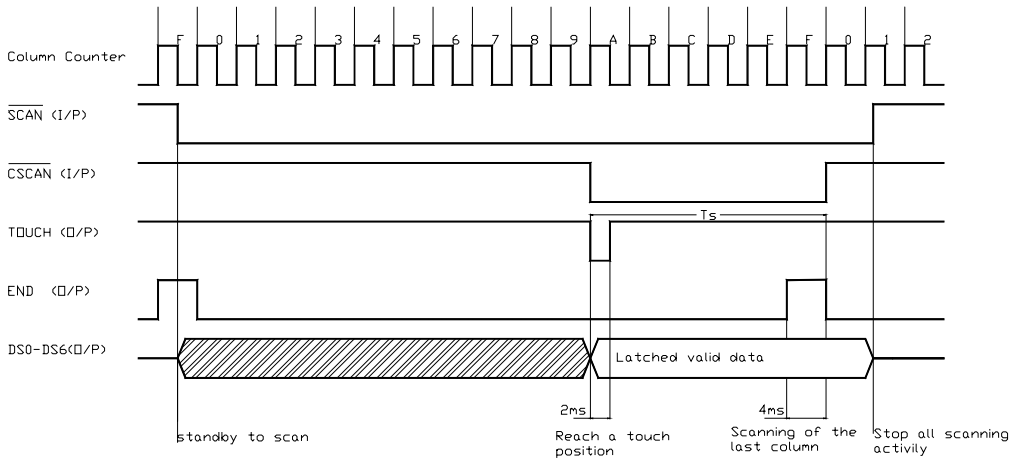
Remark: 1. Max. Ts=64ms (dependent on which key is pressed)

2. Number of TOUCH pulse = Number of key pressed at one time

CASE2: Double keys are pressed (column5-rows4 and column11-rows4 are pressed)

Remark: 1. Max. Ts= 64ms (dependent on which key is pressed.

2. Number of TOUCH pulse = Number of key pressed at one time.

CASE3: Last column key pressed (column 5-rows4 are pressed)

Remark: 1. Max. Ts= 64ms (dependent on which key is pressed.

2. Number of TOUCH pulse = Number of key pressed at one time.

10.5 Multiple Touch Situation
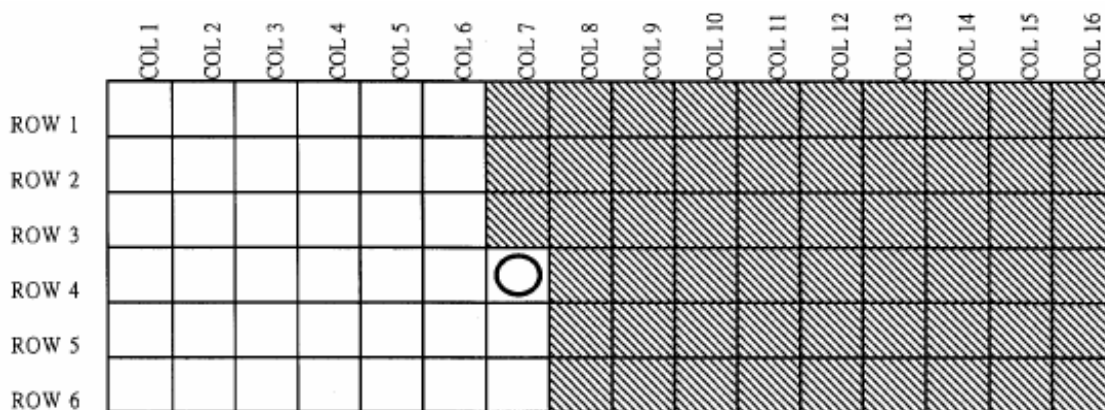
Column on the Right have higher priority than column on the Left.
Row on the Upper have higher priority than row on the Lower.
Column have higher priority than Row.
The above demonstration is when you press column 7 - row 4 with another key at the same times, the keys insides gray area have higher priority than column 7 - row 4. However, when you press column 7 - row 4 with the key insides white area, column 7 - row 4 have higher priority.
For example, if you press column 7 - row 4 with column 11 - row 2, the hardware will output column 11 - row 2. Another example, if you press column 7 - row 4 with column 3 - row 1, the hardware will output column 7 - row 4.
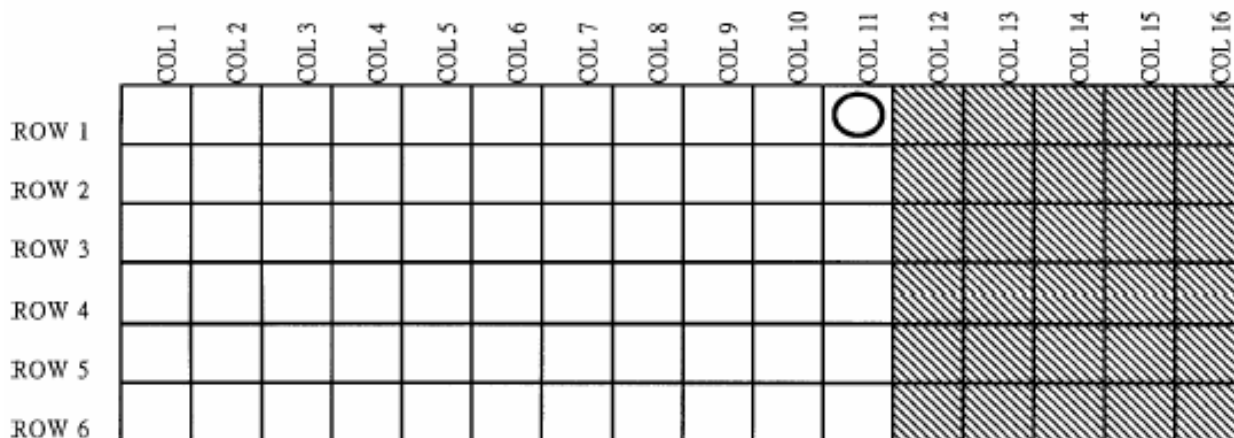

This is another example. When user press on column 11 - row 1 with another key at the same time. Gray area means have higher priority than column 11 - row 1.

11. BACKLIGHT ELECTRICAL/OPTICAL SPECIFICATIONS

Unless specified,The Ambient temperature Ta=25°C

Item	Symbol	min.	typ.	max.	Unit	Condition
Forward Voltage	Vf	2.9	3.2	3.5	V	If= 105 mA
Reverse Current	Ir		30		μA	Vr= 0.8 V
Peak wave length	λp				nm	If= mA
Spectral Line Half width	$\triangle\lambda$				nm	If= mA
Luminance	Lv		TBD		cd/m²	If= 105 mA

Backlight drawing
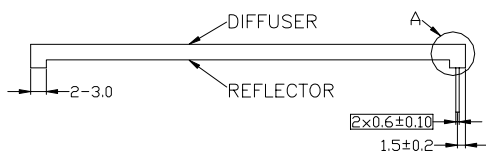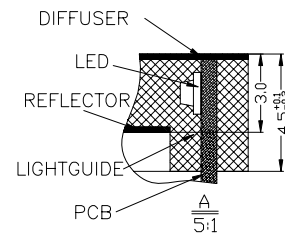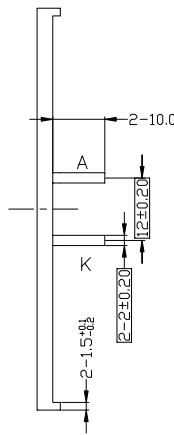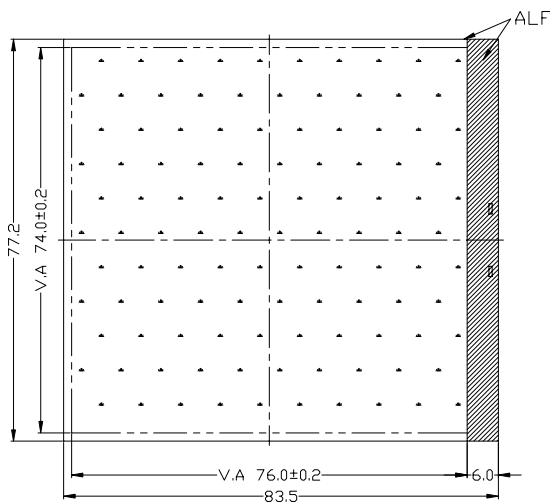
	Rank B1 Limiting Region				Rank B2 Limiting Region			
X	0.287	0.283	0.330	0.330	0.296	0.287	0.330	0.330
Y	0.295	0.305	0.360	0.339	0.276	0.295	0.339	0.318
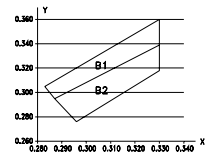
Chromaticity Coordinate

Remarks:
1,Unmarked tolerance is ±0.3;
2,The color is white;
3,All material is lead-free
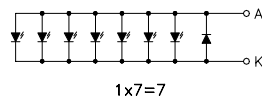
12. PRECAUTION FOR USING LCM

12.1 LIQUID CRYSTAL DISPLAY (LCD)

LCD is made up of glass, organic sealant, organic fluid, and polymer based polarizer. The following precautions should be taken when handing,

(1). Keep the temperature within range of use and storage. Excessive temperature and humidity could cause polarization degredation, polarizer peel off or bubble.

(2). Do not contact the exposed polarizer with anything harder than an HB pencil lead. To clean dust off the display surface, wipe gently with cotton, chamois or other soft material soaked in petroleum benzel.

(3). Wipe off saliva or water drops immediately. Contact with water over a long period of time may cause polarizer deformation or color fading, while an active LCD with water condensation on its surface will cause corrosion of ITO electrodes.

(4). Glass can be easily chipped or cracked from rough handling, especially at corners and edges.

(5). Do not drive LCD with DC voltage.

12.2 LIQUID CRYSTAL MODULES

Mechanical considerations

LCM are assembled and adjusted with a high degree of precision. Avoid excessive shocks and do not make any alterations or modifications. The following should be noted.

(1). Do not tamper in any way with the tabs on the metal frame

(2). Do not modify the PCB by drilling extra holes, changing its outline, moving its components or modifying its pattern.

(3). Do not touch the elastomer connector, especially insert an backlight panel (for example, EL).

(4). 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.

(5). Avoid pressing on the metal bezel, otherwise the elastomer connector could be deformed and lose contact, resulting in missing pixels.

Static Electricity

LCM contains CMOS LSI's and the same precaution for such devices should apply, namely

(1). The operator should be grounded whenever he/she comes into contact with the module. Never 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.

(2). The modules should be kept in antistatic bags or other containers resistant to static for storage.

(3). Only properly grounded soldering irons should be used.

(4). If an electric screwdriver is used, it should be well grounded and shielded from commutator sparks.

(5). The normal static prevention measures should be observed for work clothes and working benches; for the latter conductive (rubber) mat is recommended.

(6). Since dry air is inductive to static, a relative humidity of 50-60% is recommended.

DEM 128128B SBH-PW-N (D-TOUCH)   Product Specification

Soldering

    (1). Solder only to the I/O terminals.

    (2). use only soldering irons with proper grounding and no leakage

    (3). Soldering temperature: 280°C ± 10°C

    (4). Soldering time: 3 to sec.

    (5). Use eutectic solder with resin flux fill.

    (6). If flux is used, the LCD surface should be covered to avoid flux spatters. Flux residue should be removed after wards.

Operation

    (1). The viewing angle can be adjusted by varying the LCD driving voltage V0.

    (2). Driving voltage should be kept within specified range; excess voltage shortens display life.

    (3). Response time increases with decrease in temperature.

    (4). Display may turn black or dark blue at temperatures above its operational range; this is (however not pressing on the viewing area) may cause the segments to appear "fractured".

    (5). Mechanical disturbance during operation (such as pressing on the viewing area) may cause the segments to appear "fractured".

Storage

    If any fluid leaks out of a damaged glass cell, wash off any human part that comes into contact with soap and water. Never swallow the fluid. The toxicity is extremely low but caution should be exercised at all the time.

Limited Warranty

    Unless otherwise agreed between DISPLAY and customer, DISPLAY will replace or repair any of its LCD and LCM which is found to be defective electrically and visually when inspected in accordance with DISPLAY acceptance standards, for a period on one year from date of shipment. Confirmation of such date shall be based on freight documents. The warranty liability of DISPLAY is limited to repair and/or replacement on the terms set forth above. DISPLAY will not responsible for any subsequent or consequential events.