深圳市拓普微科技开发有限公司
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TWM15002

LCD Module User Manual

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Date: 2017-07-26	Date:	Date:

Rev.	Descriptions	Release Date
0.1	Preliminary Release	2017-07-26

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1. Basic Specifications

1.1 Display Specifications

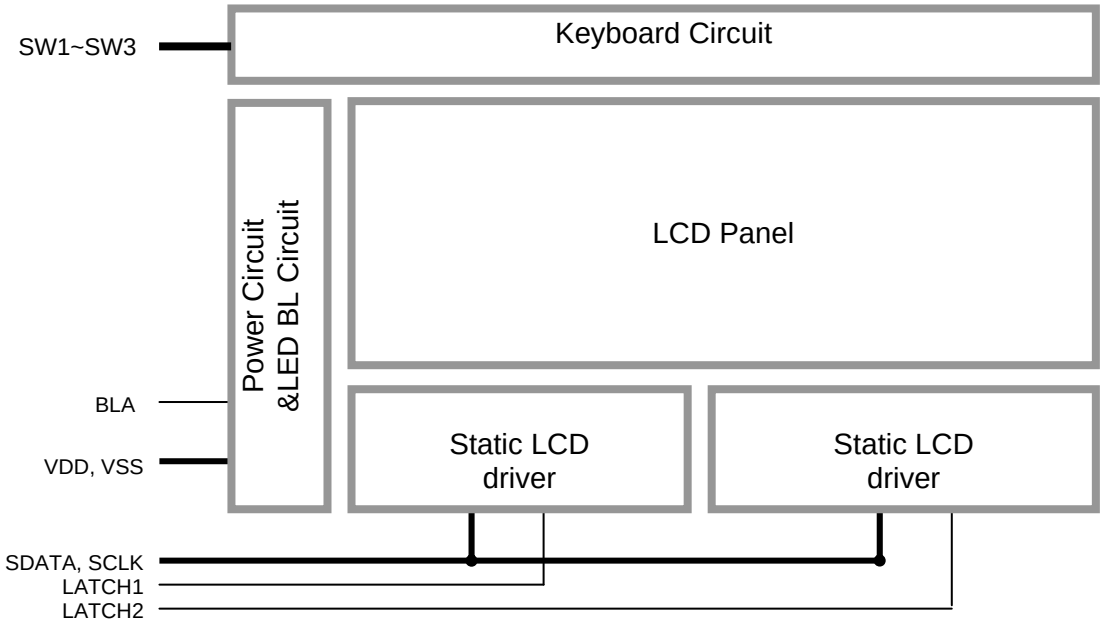
1) LCD Display Mode : TN, Positive, Transflective
2) Display Color : Display Data = “1” : Dark Gray (*1)
: Display Data = “0” : Light Gray (*2)
3) Viewing Angle : 6H
4) Driving Method : Static
5) Backlight : White LED backlight

Note:
*1. Color tone may slightly change by Temperature and Driving Condition.
*2. The Color is defined as the inactive / background color

1.2 Mechanical Specifications

1) Outline Dimension : 80.0x 60.0 x 15.6 MAX
see attached Outline Drawing for details

1.3 Block Diagram



1.4 Terminal Functions

Pin No.	Pin Name	I/O	Descriptions
1	VDD	Power	Positive Power Supply
2	VSS	Power	Positive Power Supply
3	SDATA	Input	Serial Data
4	SCLK	Input	Serial Data clock
5	LATCH1	Input	Latch Signal for sending the buffer data to display (chip1) Positive plus trigger
6	LATCH2	Input	Latch Signal for sending the buffer data to display (chip2) Positive plus trigger
7	SW1	-	Keyboard Circuit
8	SW2	-	
9	SW3	-	
10	BLA	Power	Positive power for LED backlight

2. Absolute Maximum Ratings

Items	Symbol	Min.	Max.	Unit	Condition
Supply Voltage	V_{DD}	-0.3	5.5	V	V_{SS} = 0V
Input Voltage	V_{IN}	V_{SS}-0.3	V_{DD}+0.3	V	V_{SS} = 0V
Operating Temperature	T_{OP}	-20	70	°C	No Condensation
Storage Temperature	T_{ST}	-30	80	°C	No Condensation

Cautions:
Any Stresses exceeding the Absolute Maximum Ratings may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

3. Electrical Characteristics

3.1 DC Characteristics

V_{SS}=0V, V_{DD} =3.3V, T_{OP} =25°C

Items	Symbol	MIN.	TYP.	MAX.	Unit	Applicable Pin
Operating Voltage (*1)	V_{DD}	3.0	3.3	3.6	V	VDD
Input High Voltage	V_{IN}	0.8xVDD	-	VDD	V	DATA, /RD, /WR, /CS
Input Low Voltage	V_{IN}	VSS	-	0.5	V	DATA, /RD, /WR, /CS
Operating Current (*2) (BL OFF)	I_{DD}	-	0.3	2.0	mA	VDD

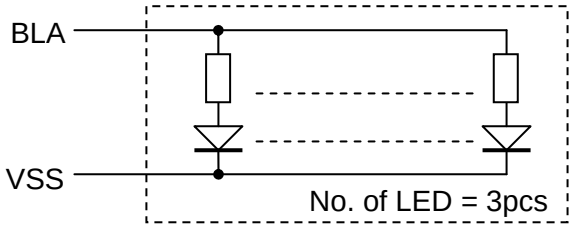
Note:
*1. The variation of Operating Voltage may affect the LCD display contrast.
*2. No Data transfer.

3.2 LED Backlight Circuit Characteristics

VSS=0V,BLA=3.3V, T_{OP} =25°C

Items	Symbol	MIN.	TYP.	MAX.	Unit	Applicable Pin
Forward Voltage	Vf_{BLA}	-	3.3	-	V	BLA
Forward Current	If_{BLA}	-	32	51	mA	BLA

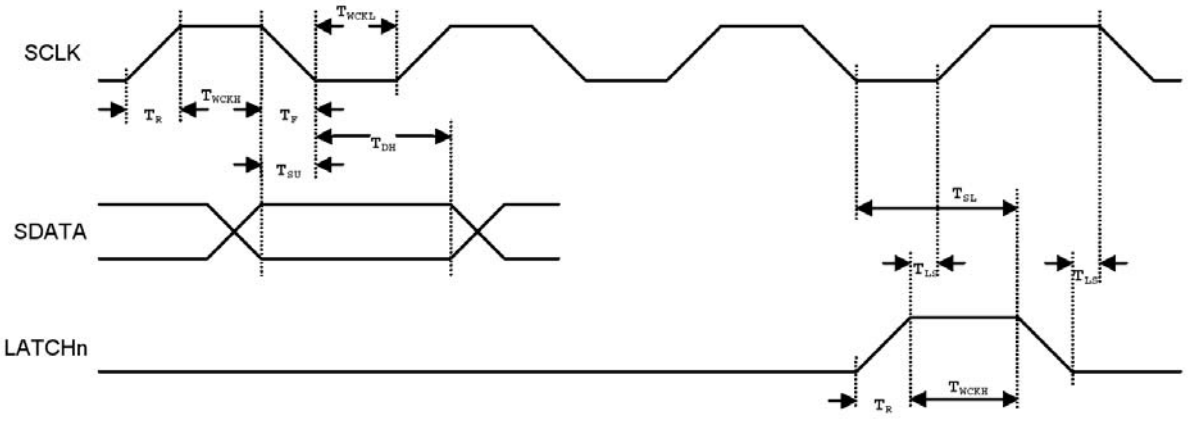
Cautions:
Exceeding the recommended driving current could cause substantial damage to the backlight and shorten its lifetime.



3.3 AC Characteristics

V_{SS}=0V, V_{DD} =3.3V, T_{OP} =25°C

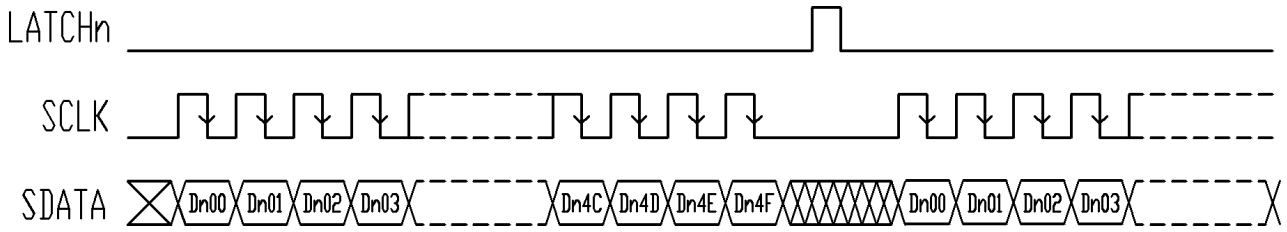
Symbol	MIN.	TYP.	MAX.	Unit	Descriptions
FCL	-	-	400	kHz	Data Shift Freq
TWCKH	1040	-	-	ns	Clcok High Level Width
TWCKL	1040	-	-	ns	Clock Low Level Width
TSL	650	-	-	ns	Clock Setup Time
TLS	650	-	-	ns	Latch Setup Time
TR/TF	-	-	140	ns	Signal Rise/Fall Time
TSU	390	-	-	ns	Data Setup Time
TDH	390	-	-	ns	Data Hold Time



4. Function Specifications

4.1 Data format and timing

The LCD module contains four serial to parallel buffers (80bit).
The four buffers share the same SCLK and SDATA as clock and data respectively.
After the input data shift into the buffer by SCLK falling edge,
The inputted data will be latched into to LCD driver n by the toggle on LATCHn.
Then the corresponding LCD segment will be display accordingly.
(please see the display mapping for details)



Timing Diagram of Write Data Mode

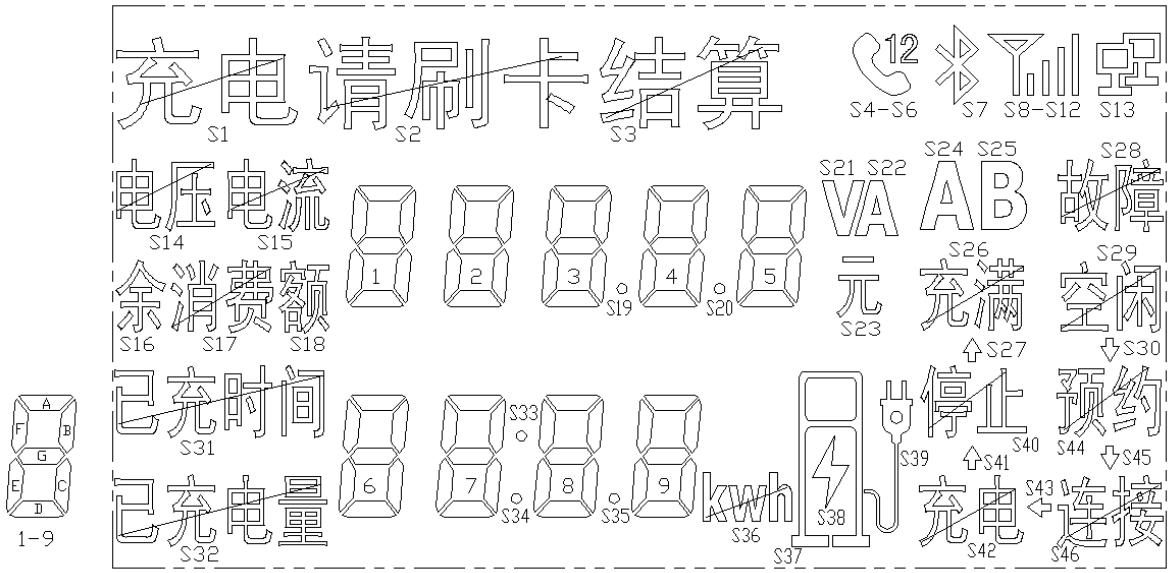
4.2 Display Maping

LCD driver 1, (accessed by Latch1)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
D10x	S15	S2	S3	S16	S17	S18	S31	S32	6C	6B	6A	6F	6G	6E	6D	-
D11x	7C	7B	7A	7F	7G	7E	7D	S33	8C	8B	8A	8F	8G	8E	8D	S34
D12x	9C	9B	9A	9F	9G	9E	9D	S35	S21	5C	5B	5A	5F	5G	5E	5D
D13x	S20	4C	4B	4A	4F	4G	4E	4D	S19	3C	3B	3A	3F	3G	3E	3D
D14x	S1	2C	2B	2A	2F	2G	2E	2D	S14	1C	1B	1A	1F	1G	1E	1D

LCD driver 2, (accessed by Latch2)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
D20x	--	--	--	--	--	--	--	--	--	--	S22	S23	S4	S5	S6	S7
D21x	S8	S9	S10	S11	S12	S13	S24	S25	S28	S26	S29	S27	S30	S40	S44	S41
D22x	S45	S46	S43	S42	S39	S38	S37	S36								



Segment Keys

5. Design and Handling Precaution

1. The LCD panel is made by glass. Any mechanical shock (eg. dropping form high place) will damage the LCD module.
2. Do not add excessive force on the surface of the display, which may cause the Display color change abnormally.
3. The polarizer on the LCD is easily get scratched. If possible, do not remove the LCD protective film until the last step of installation.
4. Never attempt to disassemble or rework the LCD module.
5. Only Clean the LCD with Isopropyl Alcohol or Ethyl Alcohol. Other solvents (eg. water) may damage the LCD.
6. When mounting the LCD module, make sure that it is free form twisting, warping and distortion.
7. Ensure to provide enough space (with cushion) between case and LCD panel to prevent external force adding on it, or it may cause damage to the LCD or degrade the display result.
8. Only hold the LCD module by its side. Never hold LCD module by add force on the heat seal or TAB.
9. Never add force to component of the LCD module. It may cause invisible damage or degrade of the reliability.
10. LCD module could be easily damaged by static electricity. Be careful to maintain an optimum anti-static work environment to protect the LCD module.
11. When peeling off the protective film from LCD, static charge may cause abnormal display pattern. It is normal and will resume to normal in a short while.
12. Take care and prevent get hurt by the LCD panel sharp edge.
13. Never operate the LCD module exceed the absolute maximum ratings.
14. Keep the signal line as short as possible to prevent noisy signal applying to LCD module.
15. Never apply signal to the LCD module without power supply.
16. IC chip (eg. TAB or COG) is sensitive to the light. Strong lighting environment could possibly cause malfunction. Light sealing structure casing is recommend.
17. LCD module reliability may be reduced by temperature shock.
18. When storing the LCD module, avoid exposure to the direct sunlight, high humidity, high temperature or low temperature. They may damage or degrade the LCD module