深圳市拓普微科技开发有限公司
SHENZHEN TOPWAY TECHNOLOGY CO., LTD.

LMT025ENPFWA

LCD Module User Manual

Prepared by:	Checked by:	Approved by:
Huchubin		
Date: 2020-09-25	Date:	Date:

Rev.	Descriptions	Release Date
0.1	Preliminary New release	2020-09-25

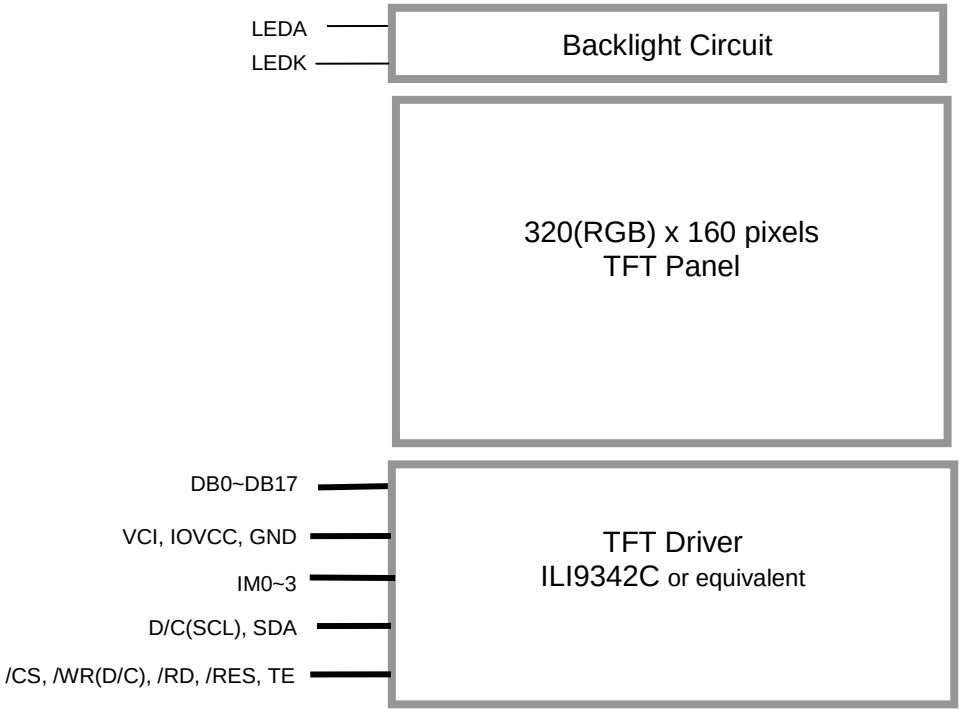
Table of Content

1. Basic Specifications

Screen Size(Diagonal) :	2.5”
Color Depth:	262k colors
Number of dots :	320 (RGB) x 160
Active Area :	56.6x28.3 mm
Dot Pitch :	0.14x0.14 mm
Display Technology :	a-Si TFT active matrix
Display Mode :	Transmissive with Normally black
Pixel Configuration :	RGB Vertical Stripe
Viewing Direction :	Full View
Backlight Type:	LEDs
Outline Dimension :	62.5 x 37.8 x 3.0 mm (exclude FPC) (see dwg for details)
Operating Temperature :	-20 ~ +70°C (No Condensation)
Storage Temperature :	-30 ~ +80°C (No Condensation)

Note:
1. Color tone may slightly change by temperature and driving condition.

1.1 Block Diagram



1.2 Terminal Functions

Pin No.	Pin Name	I/O	Descriptions
1	GND	P	Power Ground
2	DB0	I/O	18-bit parallel bi-directional data bus for MCU system and RGB interface mode Fix to GND level when not in use
…	…		
19	DB17		
20	GND	P	Power Ground
21	VCI	P	High voltage power supply for analog circuit blocks
22	IOVCC	P	Low voltage power supply for interface logic circuits
23	/CS	I	Chip select input pin (“Low” enable) This pin can be permanently fixed “Low” in MPU interface mode only If not used, this pin should be connected to IOVCC or GND
24	GND	P	Power Ground
25	D/C(SCL)	I	(D/C)This pin is used to select “Data or Command” in the parallel interface (SCL)This pin is used serial interface clock in 3-wire 9-bit/4-wire 8-bit serial data interface
26	/WR(D/C)	I	8080-Ⅰ/8080-Ⅱ system(/WR): Server as a write signal and writes data at the rising edge 4-line system (D/C): Serves as command or parameter select Fix to IOVCC or GND level when not in use
27	/RD	I	Server as a read signal and MCU read data the rising edge Fix to IOVCC or GND level when not in use
28	SDA	I/O	When IM[3]: High, Serial in/out signal The data is applied on the rising edge of the SCL signal Fix to IOVCC or GND level when not in use
29	/RES	I	This signed will reset the device and must be applied to properly initialize the chip Signal is active low
30	GND	P	Power Ground
31	TE	O	Tearing effect output pin to synchronize MPU to frame writing, activated by S/W command. When this pin is not activated, this pin is low If not use, open this pin
32	PWM	O	Output pin for PWM(Pulse Width Modulation) signal of LED driving If not use, open this pin
33	GND	P	Power Ground
34	IM0	I	Note1
35	IM1	I	
36	IM2	I	
37	IM3	I	
38	LEDA	P	BL anode signal
39	LEDK	P	BL cathode signal
40	GND	P	Power Ground

*Note1:

<table>
<tr><th colspan="4">Interface Logic Signals</th></tr>
<tr><th>Pin Name</th><th>I/O</th><th>Type</th><th>Descriptions</th></tr>
<tr><td>IM[3:0]</td><td>I</td><td>(IOVCC/GND)</td><td>
- Select the MCU interface mode
<table>
<tr><th rowspan="2">IM3</th><th rowspan="2">IM2</th><th rowspan="2">IM1</th><th rowspan="2">IM0</th><th rowspan="2">MCU-Interface Mode</th><th colspan="2">DB Pin in use</th></tr>
<tr><th>Register</th><th>GRAM</th></tr>
<tr><td>0</td><td>1</td><td>0</td><td>0</td><td>80 MCU 8-bit bus interface Ⅰ</td><td>D[7:0]</td><td>D[7:0]</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>0</td><td>80 MCU 16-bit bus interface Ⅰ</td><td>D[7:0]</td><td>D[15:0]</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>1</td><td>80 MCU 9-bit bus interface Ⅰ</td><td>D[7:0]</td><td>D[8:0]</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>1</td><td>80 MCU 18-bit bus interface Ⅰ</td><td>D[7:0]</td><td>D[17:0]</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>1</td><td>3-wire 9-bit data serial interface Ⅰ</td><td colspan="2">SDA: In/OUT</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>4-wire 8-bit data serial interface Ⅰ</td><td colspan="2">SDA: In/OUT</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>0</td><td>80 MCU 16-bit bus interface Ⅱ</td><td>D[8:1]</td><td>D[17:10] D[8:1]</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>80 MCU 8-bit bus interface Ⅱ</td><td>D[17:10]</td><td>D[17:10]</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>1</td><td>80 MCU 18-bit bus interface Ⅱ</td><td>D[8:1]</td><td>D[17:0]</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>80 MCU 9-bit bus interface Ⅱ</td><td>D[17:10]</td><td>D[17:9]</td></tr>
</table>
MPU parallel interface bus and serial interface select
If use RGB interface must select serial interface
*: Fix this pin at IOVCC or GND
</td></tr>
</table>

2. Absolute Maximum Ratings

Items	Symbol	Min.	Max.	Unit	Condition
Supply Voltage	VCC	-0.3	+4.2	V	GND = 0V
Logic Voltage	IOVCC	-0.3	+4.2	V	GND = 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 Characteristic

GND = 0V, T_{OP}=25°C

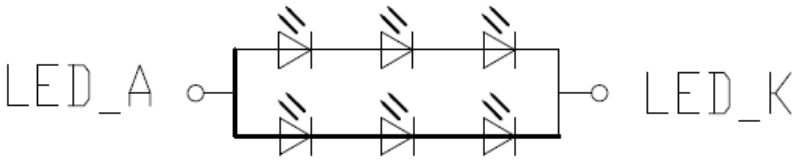
Items	Symbol	MIN.	TYP.	MAX.	Unit	Application Pin
Analog Operating Voltage	VCI	2.6	2.8	3.4	V	VCI
Logic Supply Voltage	IOVCC	1.65	1.8	3.4	V	IOVCC
Input High Voltage	V_{IH}	0.7 IOVCC	-	IOVCC	V	DB0~DB17, /WR, /RD, D/C, /CS, SDA, /RES, IM0~IM3,
Input Low Voltage	V_{IL}	GND	-	0.3 IOVCC	V	
Output High Voltage	V_{OH}	0.8 IOVCC	-	IOVCC	V	DB0~DB17, SDA, TE, PWM
Output Low Voltage	V_{OL}	GND	-	0.2 IOVCC	V	
Operating Current	I_{VCC}	-	TBD	-	mA	VCI

3.2 LED Backlight Circuit Characteristics

I_{LEDA} =40mA, T_{OP}=25°C

Items	Symbol	MIN.	TYP.	MAX.	Unit	Remark
Forward Voltage	Vf	2.8	3.0	3.2	V	One LED
Forward Current	If	-	20	-	mA	One LED
Backlight Power Consumption	WBL		360		mW	

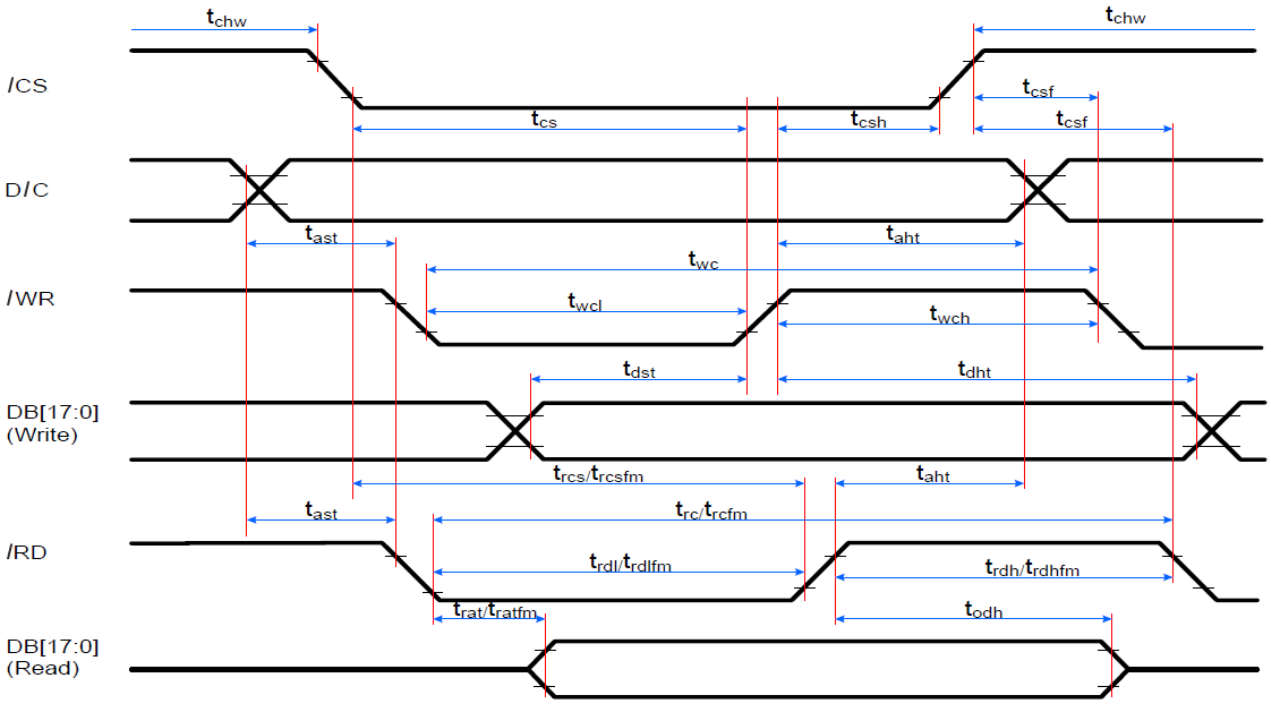
Cautions:
Exceeding the recommended driving current could cause substantial damage to the backlight and shorten its lifetime.



LED Circuit

3.3 AC Characteristics

3.3.1 Display Parallel 18bit Interface Timing Characteristics (8080-Ⅰ system)

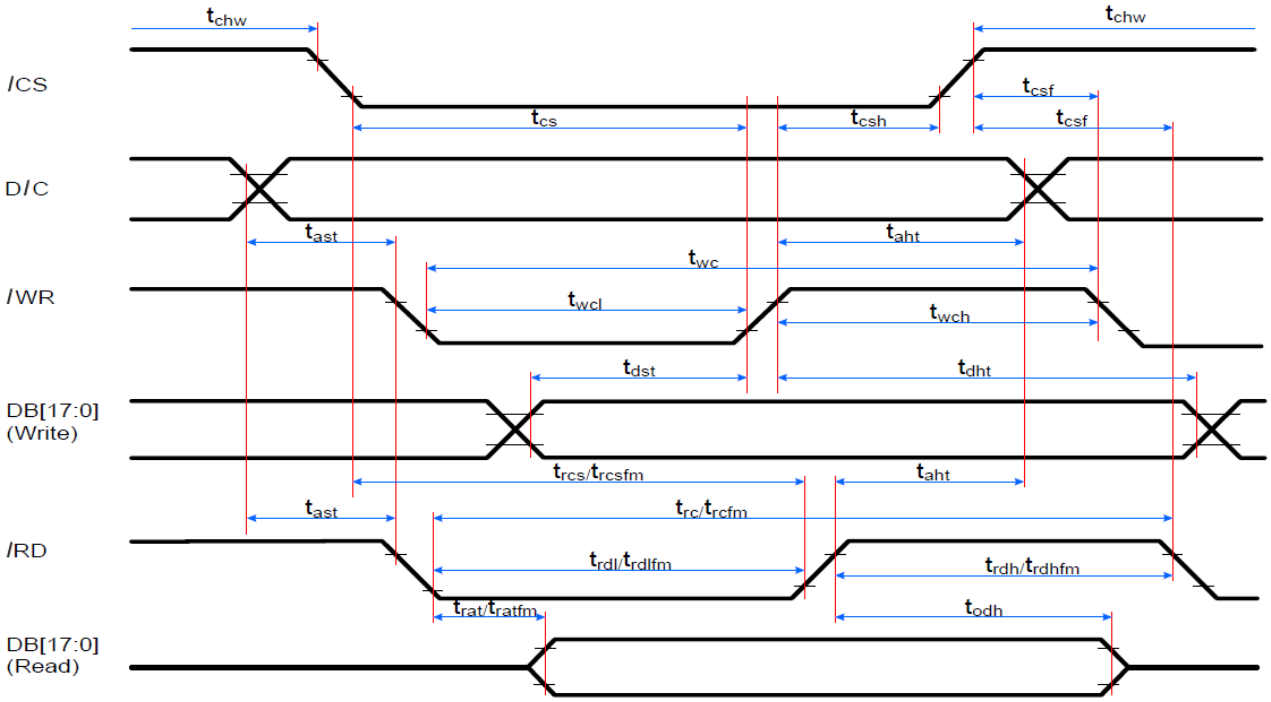


GND=0V, T_{OP}=25°C℃

Signal	Symbol	Parameter	Spec.		Unit	Description
			Min.	Max.		
D/C	T_{AST}	Address setup time	0	-	ns	-
	T_{AHT}	Address hole time(Write/Read)	10	-		
/CS	T_{CHW}	Chip select “H” pulse width	0	-	ns	-
	T_{CS}	Chip select setup time(Write)	15	-		
	T_{RCS}	Chip select setup time(Read ID)	45	-		
	T_{RCSFM}	Chip select setup time(Read FM)	355			
	T_{CSF}	Chip select wait time(Write/Read)	10			
/WR	T_{WC}	Write cycle	66	-	ns	-
	T_{WRH}	Control pulse “H” duration	15	-		
	T_{WRL}	Control pulse “L” duration	15	-		
D[17:0], D[15:0], D[8:0], D[7:0]	T_{DST}	Data setup time	10	-	ns	For maximum CL=30pF For minimum CL=8pF
	T_{DHT}	Data hold time	10	-		
	T_{RAT}	Read access time(ID)	-	40		
	T_{RATFM}	Read access time(FM)	-	340		
	T_{ODH}	Ouput disable time	20	80		
/RD(ID)	T_{RC}	Read cycle(ID)	160		ns	When read ID data
	T_{RDH}	Control pulse “H” duration(ID)	90			
	T_{RDL}	Control pulse “H” duration(ID)	45			
/RD(FM)	T_{RCFM}	Read cycle(FM)	450			When read from frame memory
	T_{RDHFM}	Control pulse “H” duration(FM)	90			
	T_{RDLFM}	Control pulse “H” duration(FM)	355			

Note:
*1. Input signal rise/fall time should be less than 15ns .
*2. Logic high and low levels are specified as 30% and 70% of IOVCC for Input signals
*3. Please refer to ILI9342C datasheet for details

3.3.2 Display Parallel 18/16/9/8bit Interface Timing Characteristics (8080-Ⅱ system)

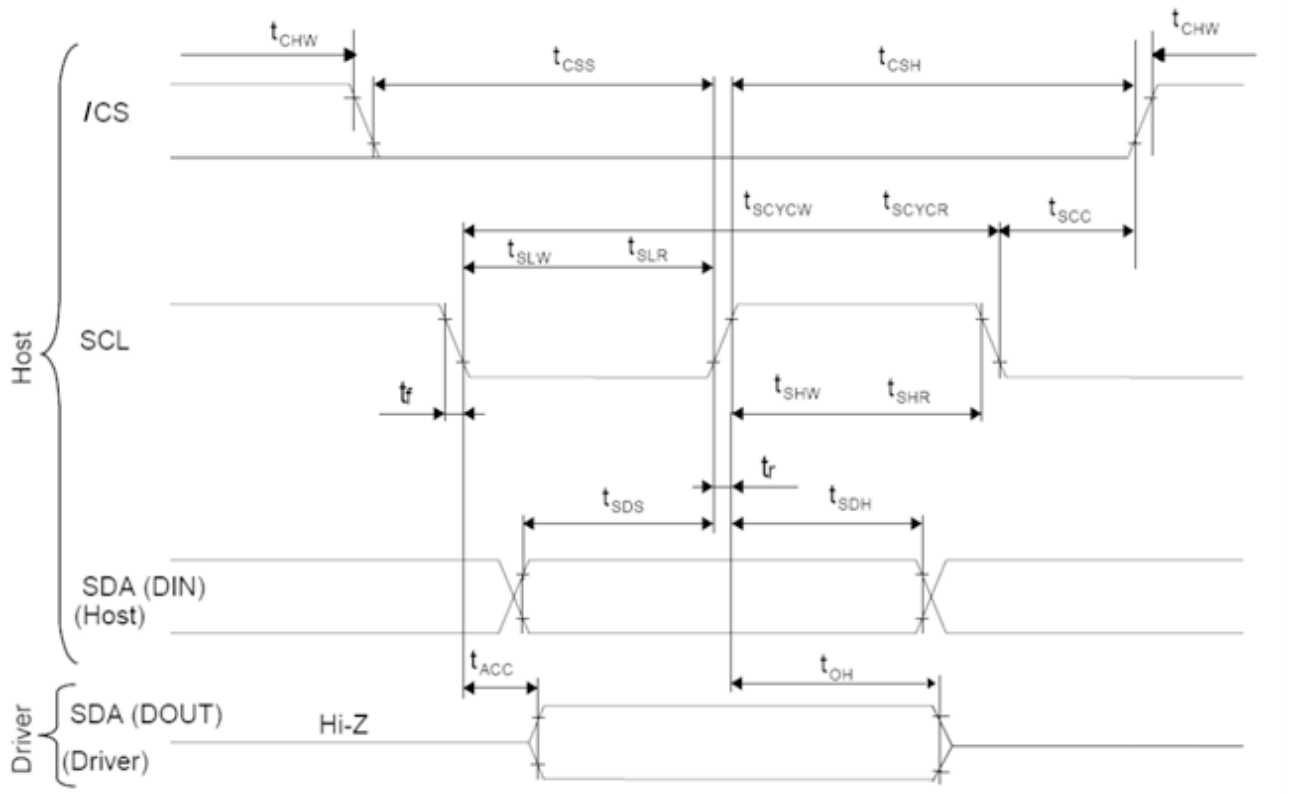


GND=0V, T_{OP}=25°C

Signal	Symbol	Parameter	Spec.		Unit	Description
			Min.	Max.		
D/C	T_{AST}	Address setup time	0	-	ns	-
	T_{AHT}	Address hole time(Write/Read)	10	-		
/CS	T_{CHW}	Chip select “H” pulse width	0	-	ns	-
	T_{CS}	Chip select setup time(Write)	15	-		
	T_{RCS}	Chip select setup time(Read ID)	45	-		
	T_{RCSFM}	Chip select setup time(Read FM)	355			
	T_{CSF}	Chip select wait time(Write/Read)	10			
/WR	T_{WC}	Write cycle	66	-	ns	-
	T_{WRH}	Control pulse “H” duration	15	-		
	T_{WRL}	Control pulse “L” duration	15	-		
D[17:0], D[17:10] &D[8:1], D[17:10], D[17:9]	T_{DST}	Data setup time	10	-	ns	For maximum CL=30pF For minimum CL=8pF
	T_{DHT}	Data hold time	10	-		
	T_{RAT}	Read access time(ID)	-	40		
	T_{RATFM}	Read access time(FM)	-	340		
	T_{ODH}	Ouput disable time	20	80		
/RD(ID)	T_{RC}	Read cycle(ID)	160		ns	When read ID data
	T_{RDH}	Control pulse “H” duration(ID)	90			
	T_{RDL}	Control pulse “H” duration(ID)	45			
/RD(FM)	T_{RCFM}	Read cycle(FM)	450			When read from frame memory
	T_{RDHFM}	Control pulse “H” duration(FM)	90			
	T_{RDLFM}	Control pulse “H” duration(FM)	355			

Note:
*1. Input signal rise/fall time should be less than 15ns .
*2. Logic high and low levels are specified as 30% and 70% of IOVCC for Input signals
*3. Please refer to ILI9342C datasheet for details

3.3.3 Display Serial Interface Timing Characteristics (3 line SPI Timing)

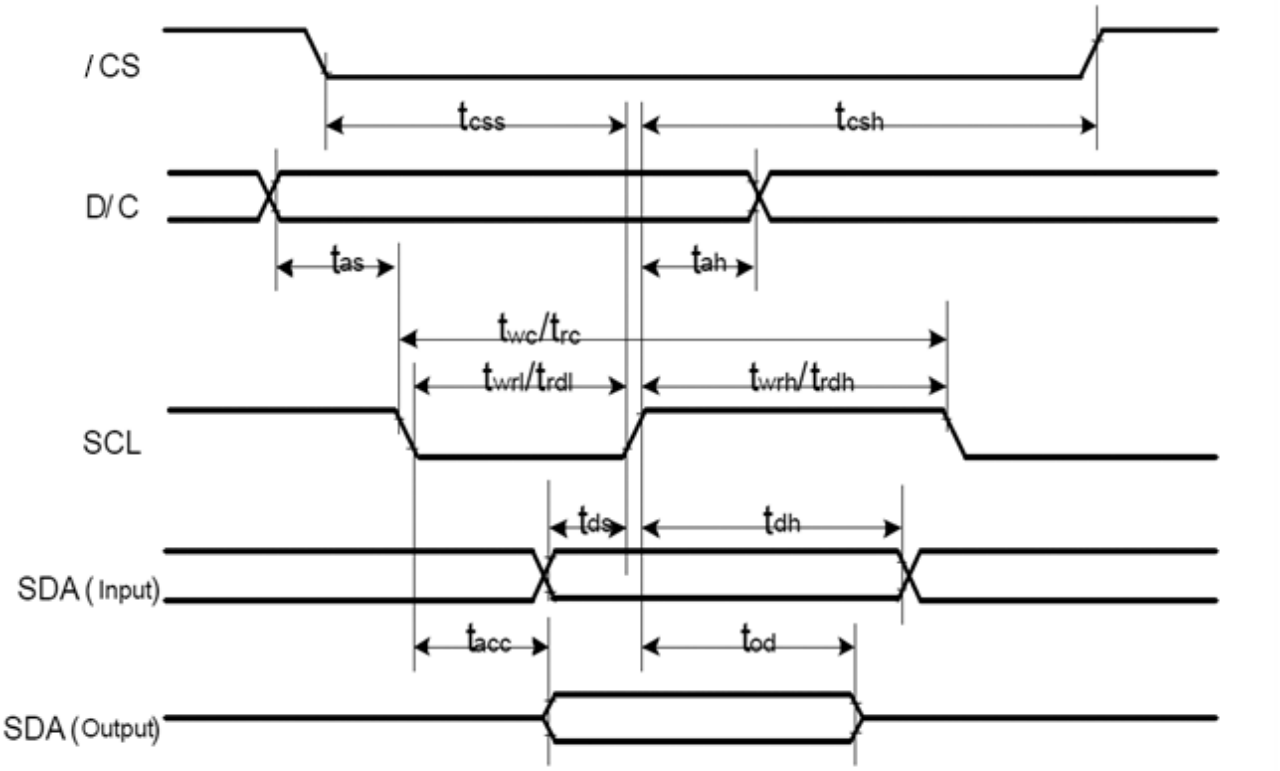


GND=0V, T_{OP}=25°C

Signal	Symbol	Parameter	Spec.		Unit	Description
			Min.	Max.		
/CS	T_{SCC}	SCL - /CS	20	-	ns	-
	T_{CHW}	/CS “H” Pulse Width	40			
	T_{CSS}	/CS – SCL Time(Write)	30			
	T_{CSH}		30	-		
SCL	T_{SCYCW}	Serial clock cycle(Write)	100	-	ns	-
	T_{SHW}	SCL “H” pulse width (Write)	35	-		
	T_{SLW}	SCL “L” pulse width (Write)	35	-		
	T_{SCYCR}	Serial clock cycle(Read)	150			
	T_{SHR}	SCL “H” pulse width (Read)	60			
	T_{SLR}	SCL “L” pulse width (Read)	60			
SDA (Input)	T_{SDS}	Data setup time(Write)	30		ns	For maximum CL=30pF For minimum CL=8pF
	T_{SDH}	Data hold time(Write)	30			
SDA (Output)	T_{ACC}	Access time(Read)	10	-		
	T_{OH}	Output disable time(Read)	15	50		

Note:
*1. Input signal rise/fall time should be less than 15ns .
*2. Logic high and low levels are specified as 30% and 70% of IOVCC for Input signals
*3. Please refer to ILI9342C datasheet for details

3.3.4 Display Serial Interface Timing Characteristics (4 line SPI Timing)

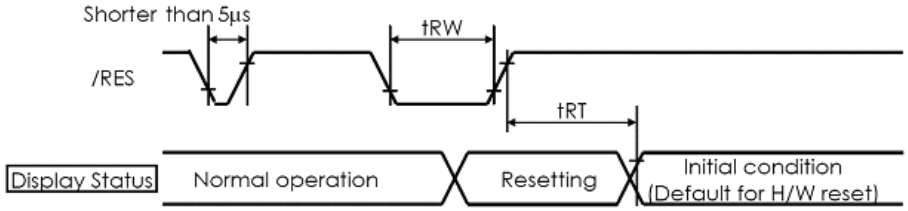


GND=0V, T_{OP}=25°C

Signal	Symbol	Parameter	Spec.		Unit	Description
			Min.	Max.		
/CS	T_{CSS}	Chip select time(Write)	30	-	ns	-
	T_{CSH}	Chip select hold time(Write)	30	-		
SCL	T_{WC}	Serial clock cycle(Write)	100	-	ns	-
	T_{WRH}	SCL “H” pulse width (Write)	35	-		
	T_{WRL}	SCL “L” pulse width (Write)	35	-		
	T_{RC}	Serial clock cycle(Read)	150			
	T_{RDH}	SCL “H” pulse width (Read)	60			
	T_{RDL}	SCL “L” pulse width (Read)	60			
D/C	T_{AS}	D/C setup time	10	-	ns	-
	T_{AH}	D/C hold time(Write/ Read)	10	-		
SDA (Input)	T_{DS}	Data setup time(Write)	30		ns	For maximum CL=30pF For minimum CL=8pF
	T_{DH}	Data hold time(Write)	30			
SDA (Output)	T_{ACC}	Access time(Read)	-	50		
	T_{OD}	Output disable time(Read)	15	50		

Note:
*1. Input signal rise/fall time should be less than 15ns .
*2. Logic high and low levels are specified as 30% and 70% of IOVCC for Input signals
*3. Please refer to ILI9342C datasheet for details

3.4 Reset Timing



GND=0V, T_{OP}=25°C

Item	Symbol	MIN.	TYP.	MAX.	Unit
Reset LOW pulse width	t_{RW}	10	-	-	us
Reset time	t_{RT}	-	-	120	ms

4. Functions

4.1 Display Commands

Regulative Command Set													
Command Function	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	Hex
No Operation	0	1	↑	XX	0	0	0	0	0	0	0	0	00h
Software Reset	0	1	↑	XX	0	0	0	0	0	0	0	1	01h
Read Display Identification Information	0	1	↑	XX	0	0	0	0	0	1	0	0	04h
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	ID1 [7:0]								E3
	1	↑	1	XX	ID2 [7:0]								00
	1	↑	1	XX	ID3 [7:0]								00
Read Display Status	0	1	↑	XX	0	0	0	0	1	0	0	1	09h
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	D [31:25]							X	00
	1	↑	1	XX	X	D [22:20]			D [19:16]				61
	1	↑	1	XX	X	X	X	X	X	D [10:8]			00
	1	↑	1	XX	D [7:5]			X	X	X	X	X	00
Read Display Power Mode	0	1	↑	XX	0	0	0	0	1	0	1	0	0Ah
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	D [7:2]						0	0	08
Read Display MADCTL	0	1	↑	XX	0	0	0	0	1	0	1	1	0Bh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	D [7:2]						0	0	00
Read Display Pixel Format	0	1	↑	XX	0	0	0	0	1	1	0	0	0Ch
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	X	DPI [2:0]			X	DBI [2:0]			06
Read Display Image Format	0	1	↑	XX	0	0	0	0	1	1	0	1	0Dh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	X	X	X	X	X	D [2:0]			00
Read Display Signal Mode	0	1	↑	XX	0	0	0	0	1	1	1	0	0Eh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	D [7:2]						0	0	00
Read Display Self-Diagnostic Result	0	1	↑	XX	0	0	0	0	1	1	1	1	0Fh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	D [7:6]		X	X	X	X	X	X	00
Enter Sleep Mode	0	1	↑	XX	0	0	0	1	0	0	0	0	10h
Sleep OUT	0	1	↑	XX	0	0	0	1	0	0	0	1	11h
Partial Mode ON	0	1	↑	XX	0	0	0	1	0	0	1	0	12h
Normal Display Mode ON	0	1	↑	XX	0	0	0	1	0	0	1	1	13h
Display Inversion OFF	0	1	↑	XX	0	0	1	0	0	0	0	0	20h
Display Inversion ON	0	1	↑	XX	0	0	1	0	0	0	0	1	21h
Gamma Set	0	1	↑	XX	0	0	1	0	0	1	1	0	26h
	1	1	↑	XX	GC [7:0]								01
Display OFF	0	1	↑	XX	0	0	1	0	1	0	0	0	28h
Display ON	0	1	↑	XX	0	0	1	0	1	0	0	1	29h
Column Address Set	0	1	↑	XX	0	0	1	0	1	0	1	0	2Ah
	1	1	↑	XX	SC [15:8]								XX
	1	1	↑	XX	SC [7:0]								XX
	1	1	↑	XX	EC [15:8]								XX
	1	1	↑	XX	EC [7:0]								XX
Page Address Set	0	1	↑	XX	0	0	1	0	1	0	1	1	2Bh
	1	1	↑	XX	SP [15:8]								XX
	1	1	↑	XX	SP [7:0]								XX
	1	1	↑	XX	EP [15:8]								XX
	1	1	↑	XX	EP [7:0]								XX

Memory Write	0	1	↑	XX	0	0	1	0	1	1	0	0	2Ch
	1	1	↑	D [17:0]									XX
Color SET	0	1	↑	XX	0	0	1	0	1	1	0	1	2Dh
	1	1	↑	XX	R00 [5:0]								XX
	1	1	↑	XX	Rnn [5:0]								XX
	1	1	↑	XX	R31 [5:0]								XX
	1	1	↑	XX	G00 [5:0]								XX
	1	1	↑	XX	Gnn [5:0]								XX
	1	1	↑	XX	G63 [5:0]								XX
	1	1	↑	XX	B00 [5:0]								XX
	1	1	↑	XX	Bnn [5:0]								XX
	1	1	↑	XX	B31 [5:0]								XX
Memory Read	0	1	↑	XX	0	0	1	0	1	1	1	0	2Eh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	D [17:0]									XX
Partial Area	0	1	↑	XX	0	0	1	1	0	0	0	0	30h
	1	1	↑	XX	SR [15:8]								00
	1	1	↑	XX	SR [7:0]								00
	1	1	↑	XX	ER [15:8]								00
	1	1	↑	XX	ER [7:0]								EF
Vertical Scrolling Definition	0	1	↑	XX	0	0	1	1	0	0	1	1	33h
	1	1	↑	XX	TFA [15:8]								00
	1	1	↑	XX	TFA [7:0]								00
	1	1	↑	XX	VSA [15:8]								00
	1	1	↑	XX	VSA [7:0]								F0
	1	1	↑	XX	BFA [15:8]								00
	1	1	↑	XX	BFA [7:0]								00
Tearing Effect Line OFF	0	1	↑	XX	0	0	1	1	0	1	0	0	34h
Tearing Effect Line ON	0	1	↑	XX	0	0	1	1	0	1	0	1	35h
	1	1	↑	XX	X	X	X	X	X	X	X	M	00
Memory Access Control	0	1	↑	XX	0	0	1	1	0	1	1	0	36h
	1	1	↑	XX	MY	MX	MV	ML	BGR	MH	X	X	00
Vertical Scrolling Start Address	0	1	↑	XX	0	0	1	1	0	1	1	1	37h
	1	1	↑	XX	VSP [15:8]								00
	1	1	↑	XX	VSP [7:0]								00
Idle Mode OFF	0	1	↑	XX	0	0	1	1	1	0	0	0	38h
Idle Mode ON	0	1	↑	XX	0	0	1	1	1	0	0	1	39h
Pixel Format Set	0	1	↑	XX	0	0	1	1	1	0	1	0	3Ah
	1	1	↑	XX	X	DPI [2:0]			X	DBI [2:0]			66
Set Tear Scanline	0	1	↑	XX	0	1	0	0	0	1	0	0	44h
	1	1	↑	XX	X	X	X	X	X	X	X	STS [8]	00
	1	1	↑	XX	STS [7:0]								00
Get Scanline	0	1	↑	XX	0	1	0	0	0	1	0	1	45h
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	X	X	X	X	X	X	GTS [9]	GTS [8]	00
	1	↑	1	XX	GTS [7:0]								00
Write Display Brightness	0	1	↑	XX	0	1	0	1	0	0	0	1	51h
	1	1	↑	XX	DBV [7:0]								00

Read Display Brightness	0	1	↑	XX	0	1	0	1	0	0	1	0	52h
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	DBV [7:0]								00
Write CTRL Display	0	1	↑	XX	0	1	0	1	0	0	1	1	53h
	1	1	↑	XX	X	X	BCTRL	X	DD	BL	X	X	00
Read CTRL Display	0	1	↑	XX	0	1	0	1	0	1	0	0	54h
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	X	X	BCTRL	X	DD	BL	X	X	00
Write Content Adaptive Brightness Control	0	1	↑	XX	0	1	0	1	0	1	0	1	55h
	1	1	↑	XX	X	X	X	X	X	X	C [1:0]		00
Read Content Adaptive Brightness Control	0	1	↑	XX	0	1	0	1	0	1	1	0	56h
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	X	X	X	X	X	X	C [1:0]		00
Write CABC Minimum Brightness	0	1	↑	XX	0	1	0	1	1	1	1	0	5Eh
	1	1	↑	XX	CMB [7:0]								00
Read CABC Minimum Brightness	0	1	↑	XX	0	1	0	1	1	1	1	1	5Fh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	CMB [7:0]								00
Read Automatic Brightness Control Self-Diagnostic Result	0	1	↑	XX	0	1	1	0	1	0	0	0	68H
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	D7	D6	X	X	X	X	X	X	00
Read ID1	0	1	↑	XX	1	1	0	1	1	0	1	0	DAh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	Module's Manufacture [7:0]								E3
Read ID2	0	1	↑	XX	1	1	0	1	1	0	1	1	DBh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	LCD Module / Driver Version [7:0]								XX
Read ID3	0	1	↑	XX	1	1	0	1	1	1	0	0	DCh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	LCD Module / Driver ID [7:0]								XX

Extended Command Set													
Command Function	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	Hex
RGB Interface Signal Control	0	1	↑	XX	1	0	1	1	0	0	0	0	B0h
	1	1	↑	XX	ByPass_MODE	RCM [1:0]		X	VSPL	HSPL	DPL	EPL	40
Frame Control (In Normal Mode)	0	1	↑	XX	1	0	1	1	0	0	0	1	B1h
	1	1	↑	XX	X	X	X	X	X	X	DIVA [1:0]		00
	1	1	↑	XX	X	X	X	RTNA [4:0]					1C
Frame Control (In Idle Mode)	0	1	↑	XX	1	0	1	1	0	0	1	0	B2h
	1	1	↑	XX	X	X	X	X	X	X	DIVB [1:0]		00
	1	1	↑	XX	X	X	X	RTNB [4:0]					1C
Frame Control (In Partial Mode)	0	1	↑	XX	1	0	1	1	0	0	1	1	B3h
	1	1	↑	XX	X	X	X	X	X	X	DIVC [1:0]		00
	1	1	↑	XX	X	X	X	RTNC [4:0]					1C
Display Inversion Control	0	1	↑	XX	1	0	1	1	0	1	0	0	B4h
	1	1	↑	XX	X	X	X	X	X	X	DINV[1:0]		00
Blanking Porch Control	0	1	↑	XX	1	0	1	1	0	1	0	1	B5h
	1	1	↑	XX	0	VFP [6:0]							02
	1	1	↑	XX	0	VBP [6:0]							02
	1	1	↑	XX	0	HFP [6:0]							0A
	1	1	↑	XX	HBP [7:0]								14

Display Function Control	0	1	↑	XX	1	0	1	1	0	1	1	0	B6h
	1	1	↑	XX	X	X	X	X	PTG [1:0]		PT [1:0]		0A
	1	1	↑	XX	REV	GS	SS	SM	ISC [3:0]				80
	1	1	↑	XX	X	X	NL [5:0]						1D
	1	1	↑	XX	X	X	PCDIV [5:0]						04
Entry Mode Set	0	1	↑	XX	1	0	1	1	0	1	1	1	B7h
	1	1	↑	XX	X	X	X	X	X	GON	DTE	GAS	07
Backlight Control 1	0	1	↑	XX	1	0	1	1	1	0	0	0	B8h
	1	1	↑	XX	X	X	X	X	X	X	X	X	XX
	1	1	↑	XX	X	X	X	X	TH_UI [3:0]				0B
Backlight Control 2	0	1	↑	XX	1	0	1	1	1	0	0	1	B9h
	1	1	↑	XX	X	X	X	X	X	X	X	X	XX
	1	1	↑	XX	TH_MV [3:0]				TH_ST [3:0]				BB
Backlight Control 3	0	1	↑	XX	1	0	1	1	1	0	1	0	BAh
	1	1	↑	XX	X	X	X	X	X	X	X	X	XX
	1	1	↑	XX	X	X	X	X	DTH_UI [3:0]				04
Backlight Control 4	0	1	↑	XX	1	0	1	1	1	0	1	1	BBh
	1	1	↑	XX	X	X	X	X	X	X	X	X	XX
	1	1	↑	XX	DTH_MV [3:0]				DTH_ST [3:0]				A8
Backlight Control 5	0	1	↑	XX	1	0	1	1	1	1	0	0	BCh
	1	1	↑	XX	X	X	X	X	X	X	X	X	XX
	1	1	↑	XX	DIM2 [3:0]				X	DIM1 [2:0]			43
Backlight Control 6	0	1	↑	XX	1	0	1	1	1	1	0	1	BDh
	1	1	↑	XX						LEDONR	LEDONPOL	LEDPWMOPL	00
Backlight Control 7	0	1	↑	XX	1	0	1	1	1	1	1	0	BEh
	1	1	↑	XX	PWM_DIV[7:0]								D0
Power Control 1	0	1	↑	XX	1	1	0	0	0	0	0	0	C0h
	1	1	↑	XX	X	X	X	VRH1 [4:0]					09
	1	1	↑	XX	X	X	X	VRH2 [4:0]					09
Power Control 2	0	1	↑	XX	1	1	0	0	0	0	0	1	C1h
	1	1	↑	XX	0	VC[2:0]			0	BT [2:0]			00
Power Control 3 (For Normal Mode)	0	1	↑	XX	1	1	0	0	0	0	1	0	C2h
	1	1	↑	XX	1	DCA1 [2:0]			0	DCA0 [2:0]			B2
Power Control 4 (For Idle Mode)	0	1	↑	XX	1	1	0	0	0	0	1	1	C3h
	1	1	↑	XX	1	DCB1 [2:0]			0	DCB0 [2:0]			B2
Power Control 5 (For Partial Mode)	0	1	↑	XX	1	1	0	0	0	1	0	0	C4h
	1	1	↑	XX	1	DCC1 [2:0]			0	DCC0 [2:0]			B2
VCOM Control 1	0	1	↑	XX	1	1	0	0	0	1	0	1	C5h
	1	1	↑	XX	nVM	VCM[6:0]							F2
Get GPIO0~7 Status	0	1	↑	XX	1	1	0	0	0	1	1	0	C6h
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	GPI [7:0]								00
Set GPIO0~7 Status	0	1	↑	XX	1	1	0	0	0	1	1	1	C7h
	1	1	↑	XX	GPO[7:0]								00
	1	1	↑	XX	X	X	X	X	X	X	IE	OEB	02
Set EXTC	0	1	↑	XX	1	1	0	0	1	0	0	0	C8h
	1	1	↑	XX	EXTC1[7:0]								FF
	1	1	↑	XX	EXTC2[7:0]								93
	1	1	↑	XX	EXTC3[7:0]								42
NV Memory Write	0	1	↑	XX	1	1	0	1	0	0	0	0	D0h
	1	1	↑	XX	X	X	X	X	PGM_ADR [3:0]				00
	1	1	↑	XX	PGM_DATA [7:0]								XX
NV Memory Protection Key	0	1	↑	XX	1	1	0	1	0	0	0	1	D1h
	1	1	↑	XX	KEY [23:16]								55
	1	1	↑	XX	KEY [15:8]								AA
	1	1	↑	XX	KEY [7:0]								66

NV Memory Status Read	0	↓	↑	XX	1	1	0	1	0	0	1	0		D2h
	1	↑	↓	XX	X	X	X	X	X	X	X	X		XX
	1	↑	↓	XX	MADCTL_CNT [1:0]		ID3_CNT [1:0]		ID2_CNT [1:0]		ID1_CNT [1:0]			XX
	1	↑	↓	XX	BUSY	X	X	X	X	VMF_CNT [2:0]				XX
Read ID4	0	↓	↑	XX	1	1	0	1	0	0	1	1		D3h
	1	↑	↓	XX	X	X	X	X	X	X	X	X		XX
	1	↑	↓	XX	0	0	0	0	0	0	0	0		00
	1	↑	↓	XX	1	0	0	1	0	0	1	1		93
	1	↑	↓	XX	0	1	0	0	0	0	1	0		42
Get External Register by SPI	0	1	↑	XX	1	1	0	1	1	0	0	1		D9h
	1	1	↑	XX	X	X	X	ENSPI	SPI_EXT_ORD [3:0]					00
Positive Gamma Correction	0	1	↑	XX	1	1	1	0	0	0	0	0		E0h
	1	1	↑	XX	X	X	X	X	VP0 [3:0]					00
	1	1	↑	XX	X	X	VP1 [5:0]							05
	1	1	↑	XX	X	X	VP2 [5:0]							08
	1	1	↑	XX	X	X	X	X	VP4 [3:0]					04
	1	1	↑	XX	X	X	X	VP6 [4:0]						13
	1	1	↑	XX	X	X	X	X	VP13 [3:0]					0A
	1	1	↑	XX	X	VP20 [6:0]								34
	1	1	↑	XX	VP36 [3:0]				VP27 [3:0]					8A
	1	1	↑	XX	X	VP43 [6:0]								46
	1	1	↑	XX	X	X	X	X	VP50 [3:0]					07
	1	1	↑	XX	X	X	X	VP57 [4:0]						0E
	1	1	↑	XX	X	X	X	X	VP59 [3:0]					0A
	1	1	↑	XX	X	X	VP61 [5:0]							1B
	1	1	↑	XX	X	X	VP62 [5:0]							1D
	1	1	↑	XX	X	X	X	X	VP63 [3:0]					0F
Negative Gamma CorrectionE	0	1	↑	XX	1	1	1	0	0	0	0	1		E1h
	1	1	↑	XX	X	X	X	X	VN0 [4:0]					00
	1	1	↑	XX	X	X	VN1 [5:0]							22
	1	1	↑	XX	X	X	VN2 [5:0]							25
	1	1	↑	XX	X	X	X	X	VN4 [3:0]					04
	1	1	↑	XX	X	X	X	VN6 [4:0]						0F
	1	1	↑	XX	X	X	X	X	VN13 [3:0]					06
	1	1	↑	XX	X	VN20 [6:0]								38
	1	1	↑	XX	VN36 [3:0]				VN27 [3:0]					56
	1	1	↑	XX	X	VN43 [6:0]								4B
	1	1	↑	XX	X	X	X	X	VN50 [3:0]					05
	1	1	↑	XX	X	X	X	VN57 [4:0]						0C
	1	1	↑	XX	X	X	X	X	VN59 [3:0]					0A
	1	1	↑	XX	X	X	VN61 [5:0]							37
	1	1	↑	XX	X	X	VN62 [5:0]							3A
	1	1	↑	XX	X	X	X	X	VN63 [4:0					0F
Digital Gamma Control 1	0	1	↑	XX	1	1	1	0	0	0	1	0		E2h
1st Parameter	1	1	↑	XX	RCA0 [3:0]				BCA0 [3:0]					XX
:	1	1	↑	XX	RCAx [3:0]				BCAx [3:0]					XX
16th Parameter	1	1	↑	XX	RCA15 [3:0]				BCA15 [3:0]					XX
Digital Gamma Control 2	0	1	↑	XX	1	1	1	0	0	0	1	1		E3h
1st Parameter	1	1	↑	XX	RFA0 [3:0]				BFA0 [3:0]					XX
:	1	1	↑	XX	RFAx [3:0]				BFAx [3:0]					XX
64th Parameter	1	1	↑	XX	RFA63 [3:0]				BFA63 [3:0]					XX
Interface Control	0	1	↑	XX	1	1	1	1	0	1	1	0		F6h
	1	1	↑	XX	MY_EOR	MX_EOR	MV_EOR	X	BGR_EOR	X	X	WEMODE		01
	1	1	↑	XX	X	X	EPF [1:0]		X	X	MDT [1:0]			00
	1	1	↑	XX	X	X	ENDIAN	X	DM [1:0]		RM	RIM		00

Note:
*1. Please refer to ILI9342C datasheet for details

4.2 Power off the LCD Module

IOVCC and VCI can applied any order.
VCI and IOVCC can be powered down in any order.
During power off, if LCD is in the Sleep Out mode, VCI and IOVCC must be powered down minimum 120msec after RESX has been released.
During power off, if LCD is in the Sleep In mode, IOVCC and VCI can be powered down minimum 0msec after RESX has been released.
CSX can be applied at any timing or can be permanently grounded. RESX has priority over CSX.
The backlight is turned on, after sending the signal, the backlight is turned off, before the signal is turned off.

4.3 Refreshing The LCD Module

It recommends that the operating modes and display contents be refreshed periodically to prevent the effect of unexpected noise.

5. Optical Characteristics

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	70	80	-	Degree	Note2,3
		θB		70	80	-		
		θL		70	80	-		
		θR		70	80	-		
Contrast Ratio		CR	θ= 0°	600	800	-		Note 3
Response Time		TON	25°C	-	30	40	ms	Note 4
		TOFF						
Chromaticity	**White**	x	Backlight is on	0.252	0.302	0.352		Note 1,5
		y		0.265	0.315	0.365		
	Red	x		0.575	0.625	0.675		
		y		0.271	0.321	0.371		
	Green	x		0.275	0.325	0.375		
		y		0.577	0.627	0.677		
	Blue	x		0.107	0.157	0.207		
		y		-0.005	0.045	0.095		
Uniformity		U		75	80	-	%	Note 6
NTSC			Θ= 0° Φ=0°	65	70	-	%	Note 5
Luminance		L		250	300	-	cd/㎡	Note 7

1. I_F = 40 mA, and the ambient temperature is 25°C

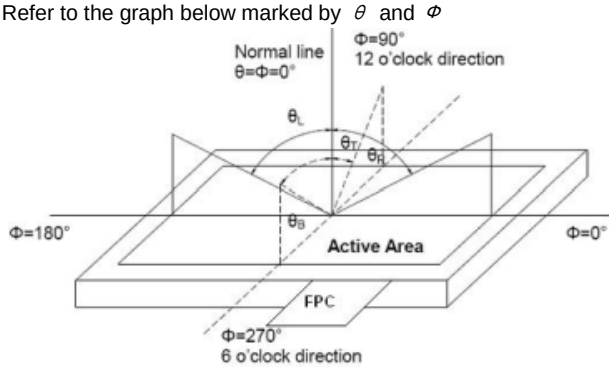
2. The test systems refer to Note 1 and Note 2.

Note 1: Definition of optical measurement system.
The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical
properties are measured at the center point of the LCD screen. All input terminals LCD panel must
be ground when measuring the center area of the panel.

Measuring surroundings: Dark room

Measuring temperature: Ta=25℃.

Note 2: Definition of viewing angle range and measurement system.
The definition of viewing angle:
Refer to the graph below marked by θ and Φ

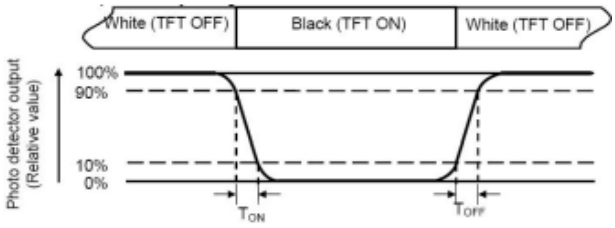


Note 3: Definition of contrast ratio
The definition of contrast ratio (Test LCM using SR-3A (1°)):

$$\text{Contrast Ratio(CR)} = \frac{\text{Luminance When LCD is at "White" state}}{\text{Luminance When LCD is at "Black" state}}$$

(Contrast Ratio is measured in optimum common electrode voltage)

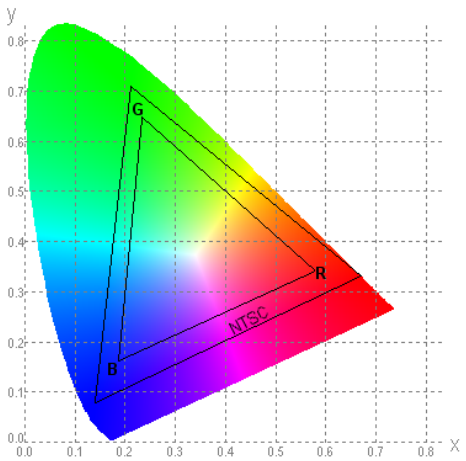
Note 4: Definition of Response time
Definition of Response time.
The response time is defined as the LCD optical switching time interval between "White" state and
"Black" state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90%
to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10%
to 90%.



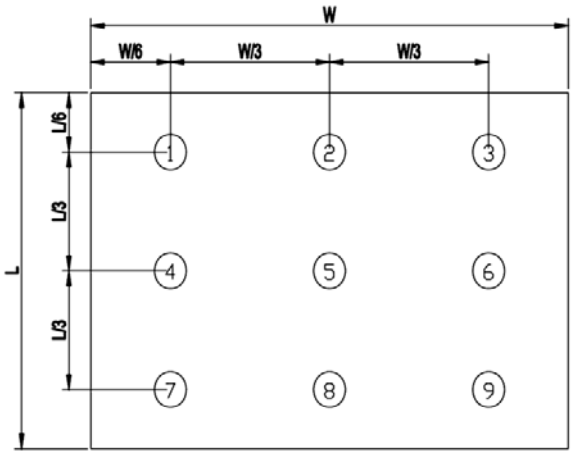
Note 5: Definition of color chromaticity (CIE1931)
Definition of Color of CIE1931 Coordinate and NTSC Ratio.

Color gamut:

$$S = \frac{\text{Area of RGB triangle}}{\text{Area of NTSC triangle}} \times 100\%$$



Note 6: Definition of Luminance Uniformity
Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the
center of each measuring area.
Luminance Uniformity (U) = Lmin/ Lmax
L-------Active area length W----- Active area width
Lmax: The measured Maximum luminance of all measurement position.
Lmin: The measured Minimum luminance of all measurement position.



Note 7: Definition of Luminance:
Measured the luminance of white state at center point

6. LCD Module Design and Handling Precautions

- Please ensure V0, VCOM is adjustable, to enable LCD module get the best contrast ratio under different temperatures, view angles and positions.
- Normally display quality should be judged under the best contrast ratio within viewable area. Unexpected display pattern may com out under abnormal contrast ratio.
- Never operate the LCD module exceed the absolute maximum ratings.
- Never apply signal to the LCD module without power supply.
- Keep signal line as short as possible to reduce external noise interference.
- IC chip (e.g. TAB or COG) is sensitive to light. Strong light might cause malfunction. Light sealing structure casing is recommended.
- Make sure there is enough space (with cushion) between case and LCD panel, to prevent external force passed on to the panel; otherwise that may cause damage to the LCD and degrade its display result.
- Avoid showing a display pattern on screen for a long time (continuous ON segment).
- LCD module reliability may be reduced by temperature shock.
- When storing and operating LCD module, avoids exposure to direct sunlight, high humidity, high or low temperature. They may damage or degrade the LCD module.
- Never leave LCD module in extreme condition (max./min storage/operate temperature) for more than 48hr.
- Recommend LCD module storage conditions is 0 C~40 C <80%RH.
- LCD module should be stored in the room without acid, alkali and harmful gas.
- Avoid dropping & violent shocking during transportation, and no excessive pressure press, moisture and sunlight.
- LCD module can be easily damaged by static electricity. Please maintain an optimum anti-static working environment to protect the LCD module. (eg. ground the soldering irons properly)
- Be sure to ground the body when handling LCD module.
- Only hold LCD module by its sides. Never hold LCD module by applying force on the heat seal or TAB.
- When soldering, control the temperature and duration avoid damaging the backlight guide or diffuser which might degrade the display result such as uneven display.
- Never let LCD module contact with corrosive liquids, which might cause damage to the backlight guide or the electric circuit of LCD module.
- Only clean LCD with a soft dry cloth, Isopropyl Alcohol or Ethyl Alcohol. Other solvents (e.g. water) may damage the LCD.
- Never add force to components of LCD module. It may cause invisible damage or degrade the module's reliability.
- When mounting LCD module, please make sure it is free from twisting, warping and bending.
- Do not add excessive force on surface of LCD, which may cause the display color change abnormally.
- LCD panel is made with glass. Any mechanical shock (e.g. dropping from high place) will damage the LCD module.
- Protective film is attached on LCD screen. Be careful when peeling off this protective film, since static electricity may be generated.
- Polarizer on LCD gets scratched easily. If possible, do not remove

6. 液晶显示模块设计和使用须知

- 请注意 V0, VCOM 的设定，以确保液晶显示模块在不同的使用温度下以及在不同的视角和位置观察模块显示，均能达到最佳对比度，请务必将应用电路上设置为对比度可调。
- 请注意液晶显示模块的显示品质判定是指在正常对比度下以及视窗(V.A)范围内进行的，非正常对比度下液晶可能会出现非预期的显示不良，应注意区分。
- 请勿在最大额定值以外使用液晶显示模块。
- 请勿在没有接通电源的条件下，给液晶显示模块输送信号。
- 请尽可能缩短信号线的连接，以避免对液晶显示模块的信号干扰。
- 集成电路因 IC 芯片(如 TAB 或 COG)对紫外线极为敏感，强光环境下可能会引起液晶显示模块功能失效，故应采用不透光的外壳。
- 请在液晶显示模块与外壳之间保留足够的空间(可使用衬垫)，以缓冲外力对液晶显示模块的损坏或因受力不均而产生的显示不匀等异常现象。
- 避免液晶显示屏在某一画面下长时间点亮，否则有出现残影的风险；请通过软件每隔一段时间改变一次画面。
- 液晶显示模块的可靠性可能因温度冲击而降低。
- 请勿在阳光直射、高湿、高温或低温下储存和使用液晶显示模块，这将造成液晶显示模块的损坏或失效。
- 请勿在极限环境(最大/最小存储/工作温度)下使用或放置液晶显示模块超过 48 小时以上。
- 液晶显示模块建议存储条件为：0 C~40 C <80%RH。
- 请勿让液晶显示模块存储于带有 酸性，碱性，有害气体环境之中。
- 在运输过程中，请勿让液晶显示模块跌落与猛烈震动，同时避免 异常挤压，高湿度，与阳光照射.
- 液晶显示模块极易受静电损坏，请务必保证液晶显示模块在防静电的工作环境中使用或保存。(如：烙铁正确接地,等)
- 拿取液晶显示模块时需注意操作人员的接地情况。
- 请手持液晶显示模块的边沿取放模块，防止热压纸或 TAB 部位受力。
- 焊接液晶模块时，请注意控制烙铁的温度、焊接时间，以免烫坏导光板或偏光片，导致显示不匀等不良现象发生。
- 请勿使用洗板水等腐蚀性液体接触液晶模块，以免腐蚀导光板或模块电路。
- 仅可使用柔软的干布，异丙醇或乙醇清洁液晶屏表面，其他任何溶剂(如:水)都有可能损坏液晶模块。
- 请勿挤压液晶显示模块上的元器件，以避免产生潜在的损坏或失效而影响产品可靠性。
- 装配液晶显示模块时，请务必注意避免液晶显示模块的扭曲或变形。
- 请勿挤压液晶显示屏表面，这将导致显示颜色的异常。
- 液晶屏由玻璃制作而成，任何机械碰撞(如从高处跌落)均有可能损坏液晶显示模块。
- 液晶屏表面带有保护膜，揭除保护膜时需要注意可能产生的静电。
- 因液晶显示屏表面的偏光片极易划伤，安装完成之前请

LCD protective film until the last step of installation.
- When peeling off protective film from LCD, static charge may cause abnormal display pattern. The symptom is normal, and it will turn back to normal in a short while.
- LCD panel has sharp edges, please handle with care.
- Never attempt to disassemble or rework LCD module.
- If display panel is damaged and liquid crystal substance leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes promptly wash it off using soap and water.

尽量不要揭下保护膜。
- 请缓慢揭除保护膜，在此过程中液晶显示屏上可能会产生静电线，此为正常情况，可在短时间内消失。
- 请注意避免被液晶显示屏的边缘割伤。
- 请不要试图拆卸或改造液晶显示模块。
- 当液晶显示屏出现破裂，内部液晶液体可能流出；相关液体不可吞吃，绝对不可接触嘴巴，如接触到皮肤或衣服，请使用肥皂与清水彻底清洗.

7. CTP Mounting Instructions

7.1 Bezel Mounting (Figure 1)
- The bezel window should be bigger than the CTP active area. It should be≥0.5mm each side.
- Gasket should be installed between the bezel and the CTP surface. The final gap should be about 0.5~1.0mm.
- It is recommended to provide an additional support bracket for backside support when necessary (e.g. slim type TFT module without mounding structure). They should only provide appropriate support and keep the module in place.
- The mounting structure should be strong enough to prevent external uneven force or twist act onto the module.

7. 电容触摸屏安装指导

7.1 面框安装（附图 1）
- 客户面框窗口应大于 CTP 动作区域，各边离动作区应≥0.5mm.
- 面框与 CTP 面板间应垫有胶垫，其最终间隙约为 0.5～1.0mm.
- 建议必要时在背面提供附加支架(例如无安装结构的薄型 TFT 模块)，应仅利用适当支撑以保持模块位置.
- 安装结构应具有足够的强度，以防止外部不均匀力或扭曲力作用到模块上.

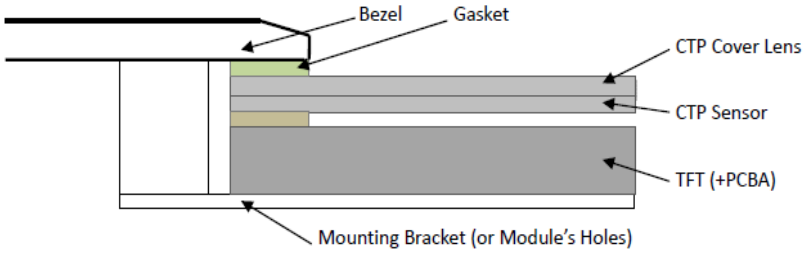


Figure 1

7.2 Surface Mounting (Figure 2)
- As the CTP assembling on the countersink area with double side adhesive.
  The countersink area should be flat and clean to ensure the double side adhesive installation result.
- The Bezel is recommend to keep a gap(≥0.3mm each side) around the cover lens for tolerance.
- It is recommended to provide an additional support bracket with gasket for backside support when necessary (e.g. TFT module without mounding structure). They should only provide appropriate support and keep the module in place.
- The mounting structure should be strong enough to prevent external uneven force or twist act onto the module

7.2 嵌入安装（附图 2）
- 客户面框应具有使用双面胶粘贴 CTP 的结构沉台面，其粘贴面要求平整且洁净无污以保证粘贴牢靠.
- 考虑到制作误差，建议面框与 CTP 盖板之间四周留有≥0.3mm 间隙.
- 建议必要时在背面提供垫有胶垫附加支架(例如无安装结构的 TFT 模块)，应仅利用适当支撑以保持模块位置.
- 安装结构应具有足够的强度，以防止外部不均匀力或扭曲力作用到模块上。

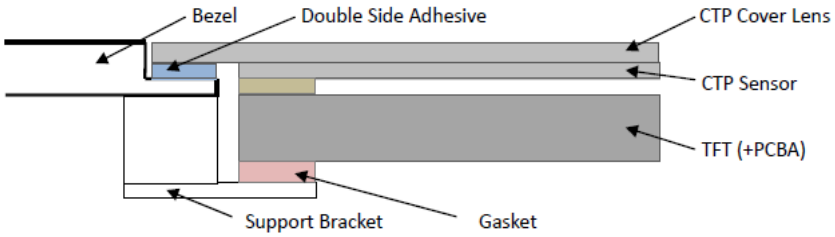


Figure 2

7.3 Additional Cover Lens Mounting (Figure 3)
- For the case of additional cover Lens mounting, it is necessary to recheck with the CTP specification about the material and thickness to

7.3 覆加盖板（附图 3）
- 需要覆加玻璃盖板的安装，为确保其功能，有必要查看产品规格书中有关盖板材料和厚度的说明.

ensure the functionality.

- It should keep a 0.2~0.3mm gap between the cover lens and the CTP surface..
- The cover lens window should be bigger than the active area of the CTP.It should be≥0.5mm each side.
- It is recommended to provide an additional support bracket for backside support when necessary (e.g. slim type TFT module without mounding structure). They should only provide appropriate support and keep the module in place.
- The mounting structure should be strong enough to prevent external uneven force or twist act onto the module.

- 玻璃盖板与 CTP 表面之间应留有 0.2～0.3mm 间隙.
- 玻璃盖板视窗应大于 CTP 动作区域，各边离动作区应≥0.5mm。
- 建议必要时在背面提供附加支架(例如无安装结构的薄型 TFT 模块)，应仅利用适当支撑以保持模块位置.
- 安装结构应具有足够的强度，以防止外部不均匀力或扭曲力作用到模块上.

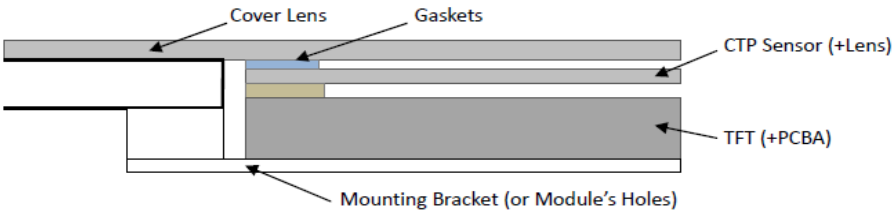


Figure 3

8. RTP Mounting Instructions

- It should bezel touching the RTP Active Area (A.A.) to prevent abnormal touch.It should left gab D=0.2~0.3mm in between. (Figure 4)
- Outer bezel design should take care about the area outside the A.A. Those areas contain circuit wires which is having different thickness. Touching those areas could de-form the ITO film. As a result bezel the ITO film be damaged and shorten its lifetime.
  It is suggested to protect those areas with gasket (between the bezel and RTP).The suggested figures are B≥0.50mm; C≥0.50mm. (Figure 4)
- The bezel side wall should keep space E= 0.2 ~ 0.3mm from the RTP. (Figure 4)

8. 电阻触摸屏安装指导

- 为避免面框直接压在动作区(A.A.)上造成误动作，面框与电阻触摸屏(RTP)之间应留有一定的空隙 D=0.2~0.3mm 之间.(附图 4)
- 设计面框时，要注意用面框保护触摸屏四周的非保证操作区域，因为布线区域在此处形成一台阶，在此区域附近操作时 ITO Film 变形较大，容易导致 ITO 损坏而降低寿命。为保护 RTP 和避免误操作，在 RTP 与面框之间垫缓冲物（Gasket），我们建议设计面框应覆盖动作区的边缘，面框边缘到 V.A.区的距离 B≥0.50mm; 垫圈内边缘到 V.A.区的距离 C≥0.50mm. (附图 4)
- 在设计面框与 RTP 组装时，应考虑到面框内侧与 RTP 外侧的间距 E≥0.2mm. (附图 4)

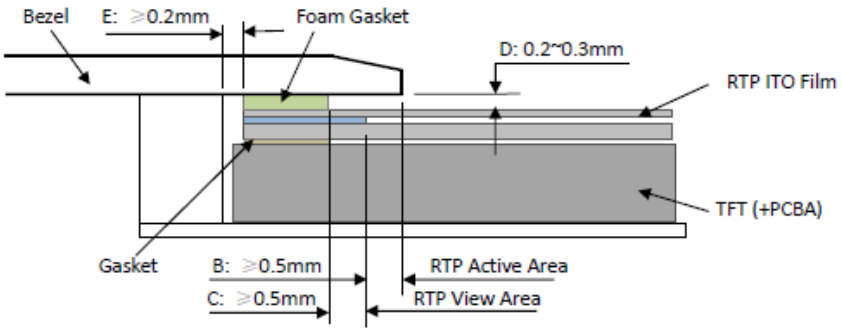


Figure 4

- In general design,
  RTP V.A. should be bigger than the TFT V.A.
  and RTP A.A. should be bigger than the TFT A.A.
  (Figure 5)

- 通常设计时：
  RTP 的可视区 V.A. 应不小于 TFT 的可视区 V.A.
  及 RTP 的动作区 A.A. 应不小于 TFT 的动作区 A.A.
  (附图 5)

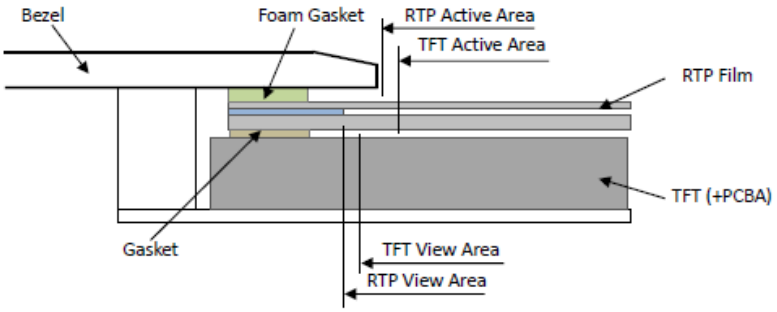
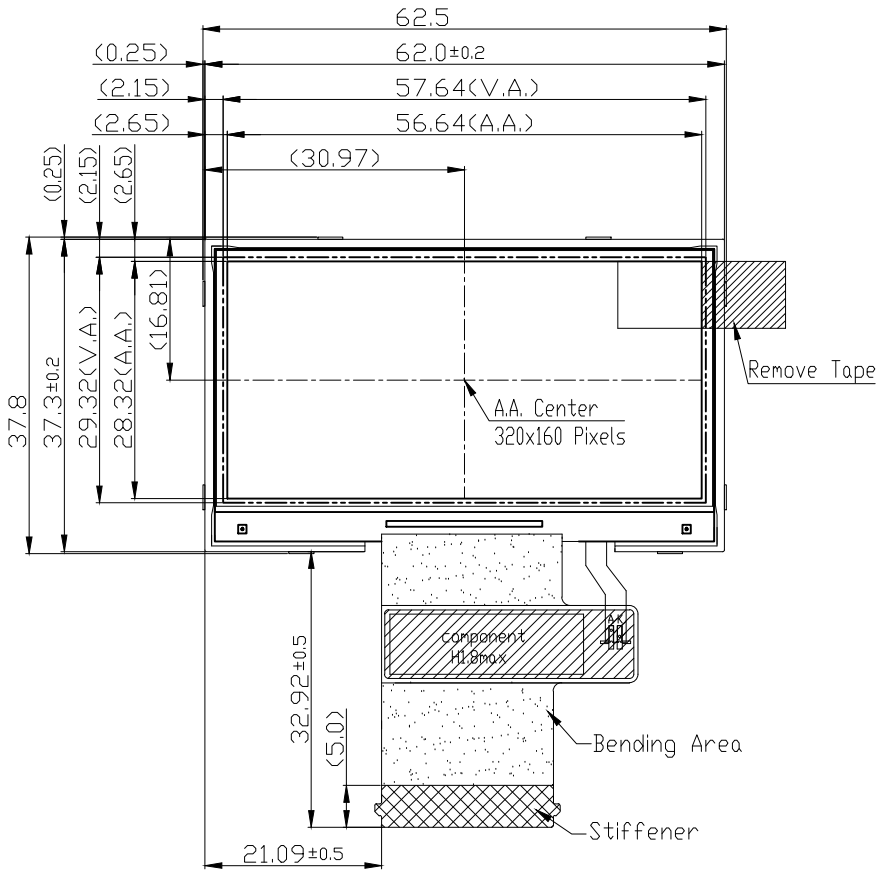


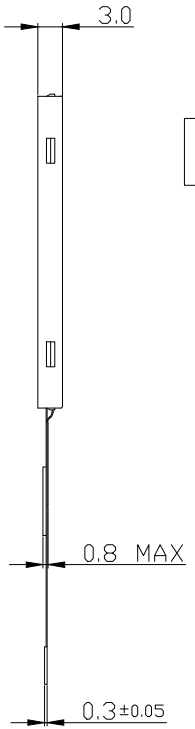
Figure 5

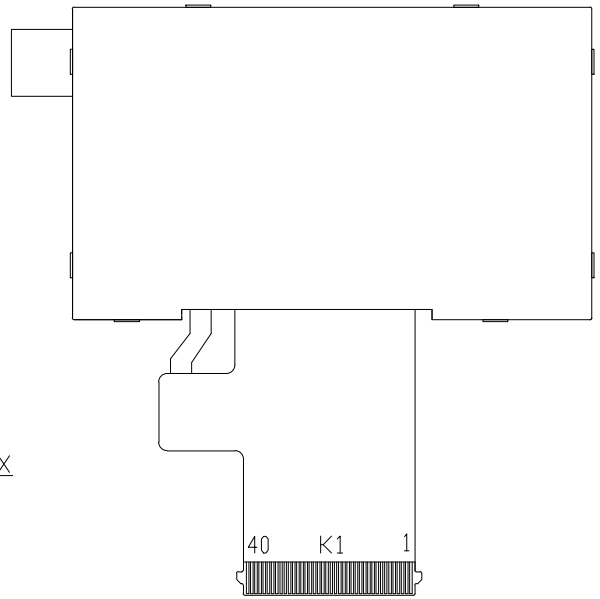
Warranty

This product has been manufactured to our company's specifications as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment, we cannot take responsibility if the product is used in medical devices, nuclear power control equipment, aerospace equipment, fire and security systems, or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required. If the product is to be used in any of the above applications, we will need to enter into a separate product liability agreement.

- We cannot accept responsibility for any defect, which may arise form additional manufacturing of the product (including disassembly and reassembly), after product delivery.
- We cannot accept responsibility for any defect, which may arise after the application of strong external force to the product.
- We cannot accept responsibility for any defect, which may arise due to the application of static electricity after the product has passed our company's acceptance inspection procedures.
- When the product is in CCFL models, CCFL service life and brightness will vary according to the performance of the inverter used, leaks, etc. We cannot accept responsibility for product performance, reliability, or defect, which may arise.
- We cannot accept responsibility for intellectual property of a third part, which may arise through the application of our product to our assembly with exception to those issues relating directly to the structure or method of manufacturing of our product.

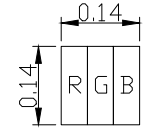




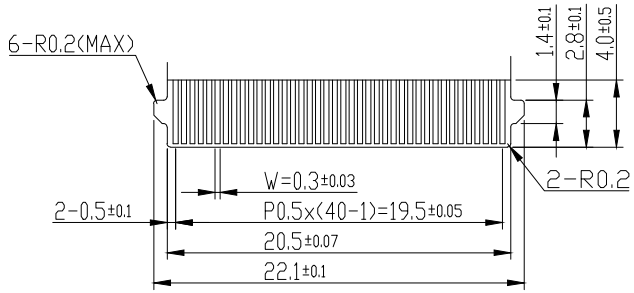


K1 Terminal	
NO.	PIN NAME
1	GND
2	DB0
3	DB1
4	DB2
5	DB3
6	DB4
7	DB5
8	DB6
9	DB7
10	DB8
11	DB9
12	DB10
13	DB11
14	DB12
15	DB13
16	DB14
17	DB15
18	DB16
19	DB17
20	GND

K1 Terminal	
NO.	PIN NAME
21	VCI
22	IOVCC
23	/CS
24	GND
25	D/C(SCL)
26	/WR(D/C)
27	/RD
28	SDA
29	/RES
30	GND
31	TE
32	PWM
33	GND
34	IM0
35	IM1
36	IM2
37	IM3
38	LEDA
39	LEDK
40	GND



Pixel Details
Scale=100/1



K1 Details
Scale=3/1

Note:
*1. LCD Display Type : TFT,Transmissive (Full View)
*2. Pixel Arrangment : RGB-STRIPE
*3. Color Depth : 262k Color
*4. Operating Voltage(VCI , IOVCC) : 2.8V
*5. Backlight : White LEDs
*6. Backlight Supply : 2x20mA (VF=9.0V, TYP)
*7. Recommended Connector K1: FH28-40S-0.5SH (HIROS)
*8. Operating Temperature : -20°C~70°C
*9. Storage Temperature : -30°C~80°C

Rev	Note	Date
C		
B		
A		

Dwg Title: LMT025ENPFWA Outline Dwg
Dwg No.: MK-007045-1-1
Date: 2020-09-17
Scale: 3/2 | Tol.: ±0.3 | Unit: mm | Paper Size: A3
Approved | Checked | Drawn: Qiu Shaoping

TOPWAY