Electra House, 32 Southtown Road
Great Yarmouth, Norfolk
NR31 0DU, England

Telephone +44 (0)1493 602602
Fax +44 (0)1493 665111
Email:sales@midasdisplays.com
www.midasdisplays.com

MDT0240A7IS-SPI	240 x 320	SPI Interface	TFT Module

Specification

Version: 1	Date: 16/07/2017

Revision

1	14/07/2017	First issue

Display Features	
Display Size	2.4”
Resolution	240 x 320
Orientation	Portrait
Appearance	RGB
Logic Voltage	2.8V
Interface	SPI
Brightness	300 cd/m^2
Touchscreen	---
Module Size	39.40 x 54.85 x 2.95mm
Operating Temperature	-20°C ~ +70°C
Pinout	12 Way FFC
Pitch	0.5mm

RoHS compliant

Box Quantity	Weight / Display
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* - For full design functionality, please use this specification in conjunction with the ILI9341V specification.(Provided Separately)

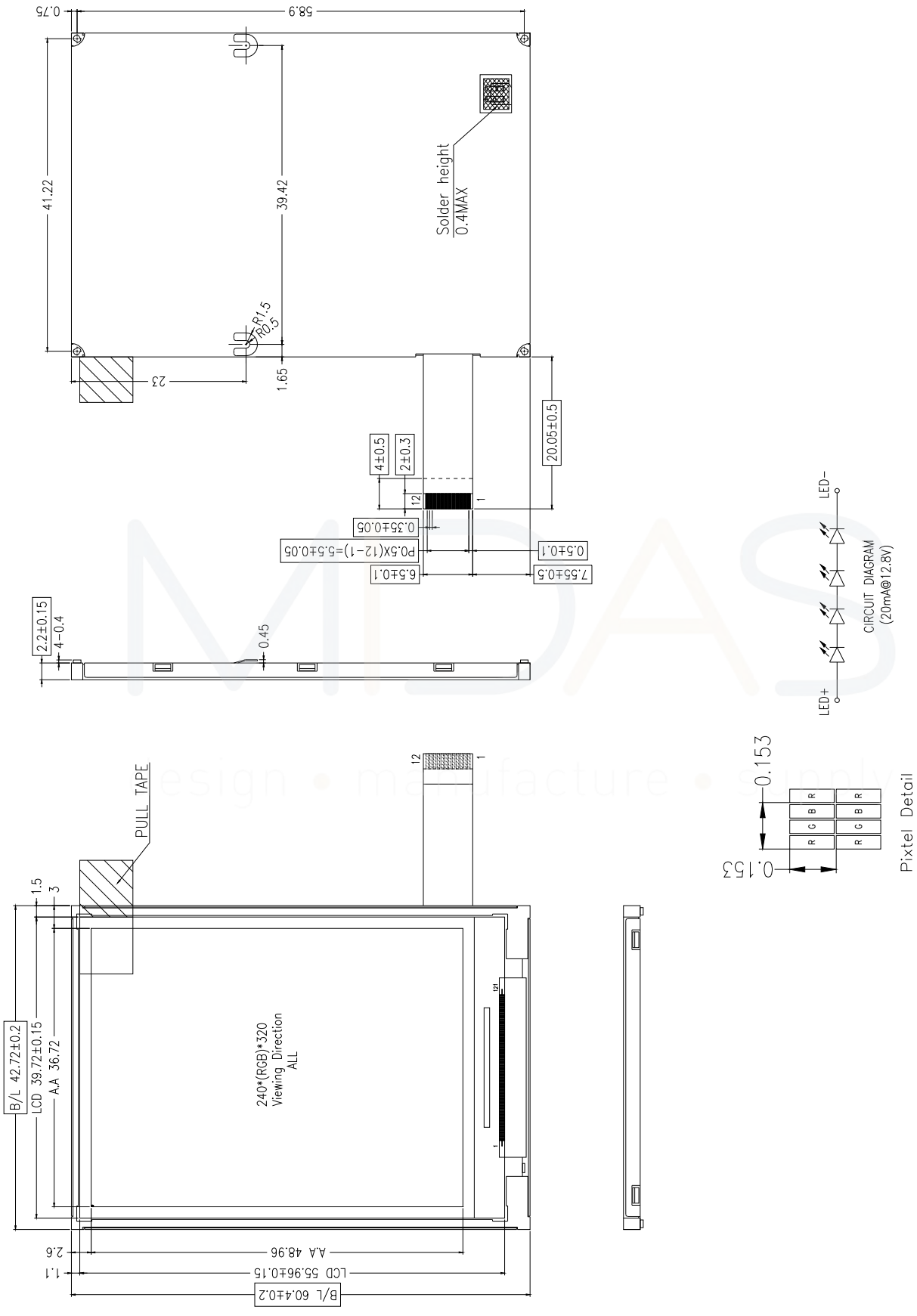
Display Accessories	
Part Number	**Description**

Optional Variants	
Appearances	**Voltage**

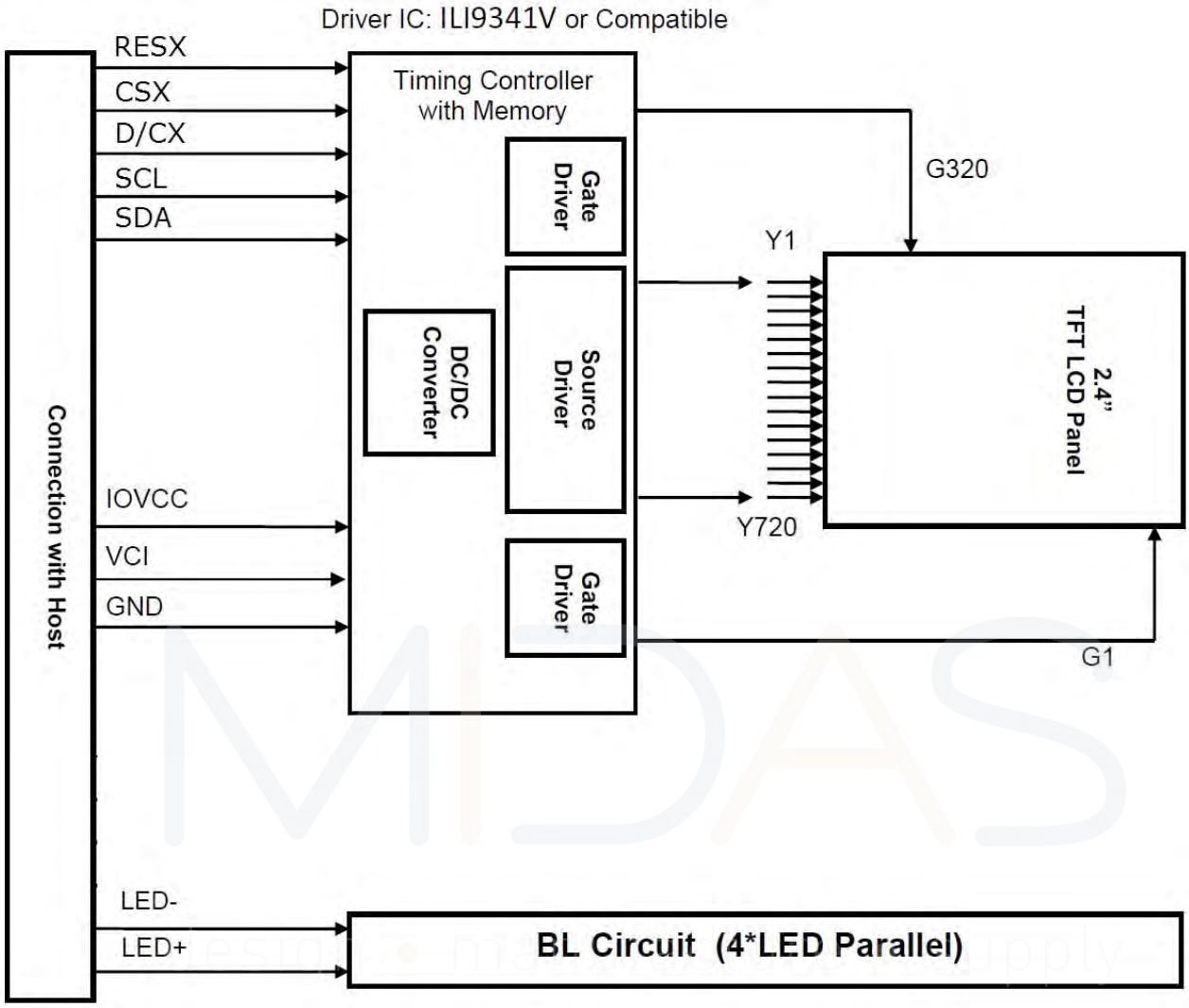
GENERAL SPECIFICATIONS

ITEM	Standard value	UNIT
LCD Type	TFT Transmissive	---
Driver element	a-Si TFT Active matrix	
Number of Dots	240*(RGB)*320	Dots
Pixel Arrangement	RGB Vertical Stripe	
Active Area	33.84 *45.12	mm
Viewing Direction	ALL view	
Driver IC	ILI9341V	
Module Size(W*H*T)	39.40x54.85x2.95	mm
Approx. Weight	TBD	g
Back Light	White LED	
System interface	SPI interface	

EXTERNAL DIMENSIONS



BLOCK DIAGRAM



PIN ASSIGNMENT

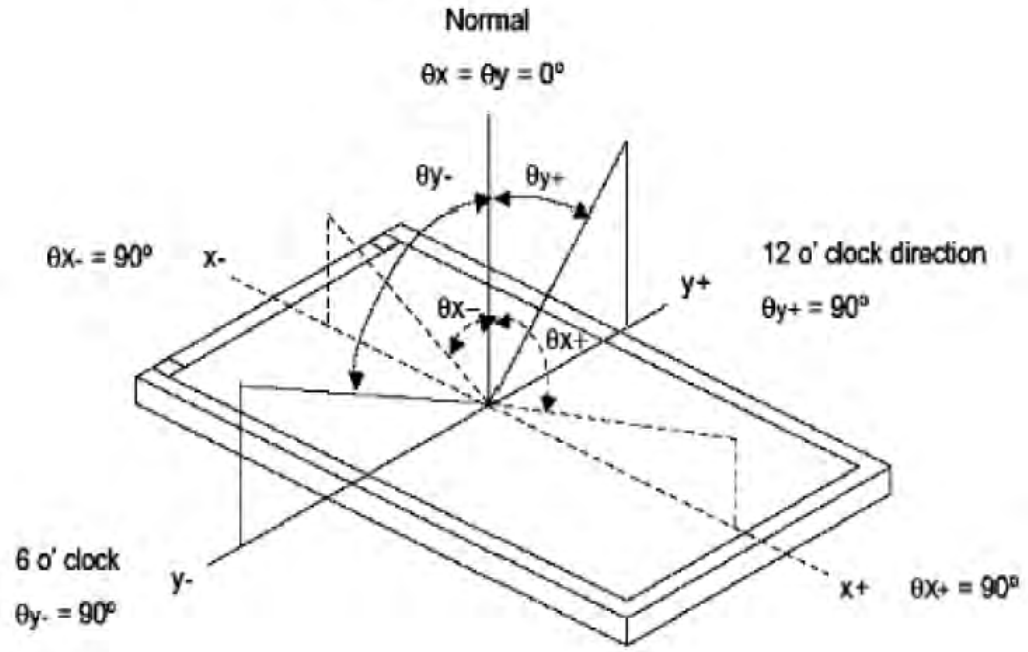
NO.	SYMBOL	DESCRIPTION	I/O
1	GND	Power ground	P
2	IOVCC	Power supply for I/O port,1.8V/2.8V	P
3	RESX	Reset signal pin	I
4	CSX	Chip select	I
5	D/CX	Display data/command selection	I
6	SCL	Serial clock	I
7	SDA	Serial data	I
8	VCI	Power supply for I/O port,2.8V	P
9	GND	Power ground	P
10	LEDA	Power for led backlight(anode)	P
11	LEDK	Power for led backlight(cathode)	P
12	GND	Power ground	P

I: Input, O: Output, P: Power

OPTICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
				MIN.	TYP.	MAX		
Brightness		B	Viewing normal angle	300			Cd/m^2	All left side data are based on product reference only
Contrast Ratio		CR		640	800	--	--	
Response Time		Tr+Tf		--	35	--	ms	
CIE Color coordinate	Red	X_R		--				
		Y_R						
	Green	X_G		--				
		Y_G						
	Blue	X_B		--				
		Y_B						
	White	X_W		--				
		Y_W		-				
Viewing Angle	Hor.	$\Theta x+$	Center CR>=10	-	80	--	Deg.	
		$\Theta x-$		-	80	--		
	Ver.	$\Theta y+$		-	80	--		
		$\Theta y-$		-	80	--		
Uniformity	Un			-	80		%	

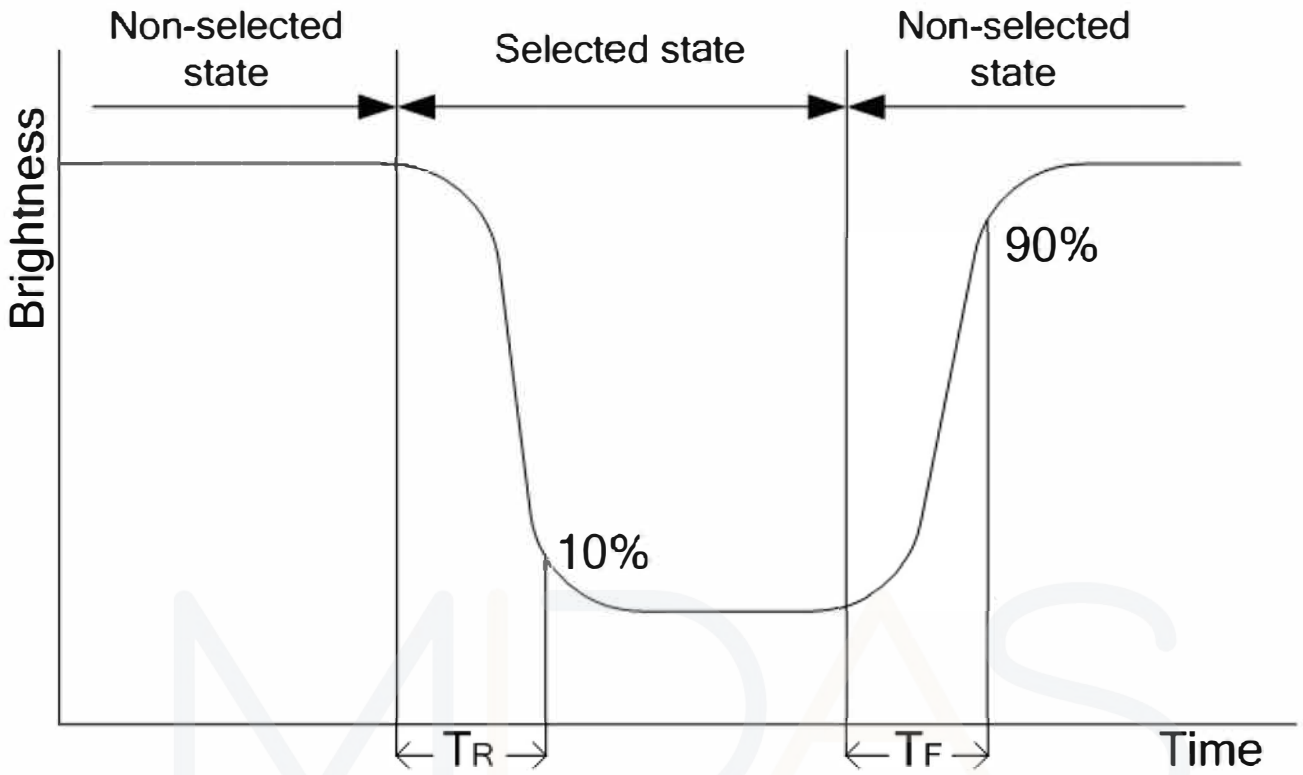
Note 1 : Definition of Viewing Angle θ_x and θ_y :



Note 2: Definition of contrast ratio CR:

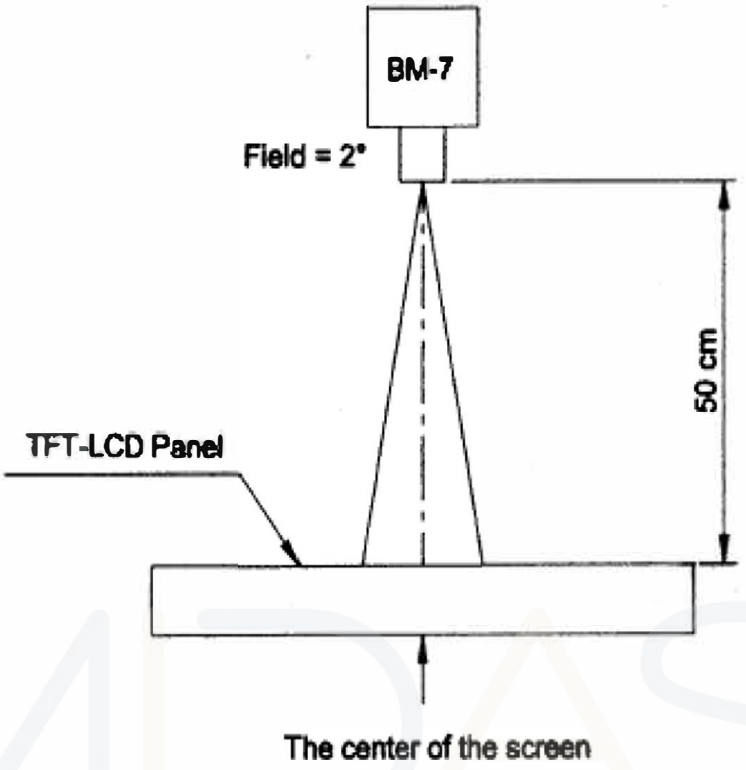
$$CR = \frac{\text{Brightness of non-selected dots (white)}}{\text{Brightness of selected dots (black)}}$$

Note 3: Definition of response time (T_R, T_F)

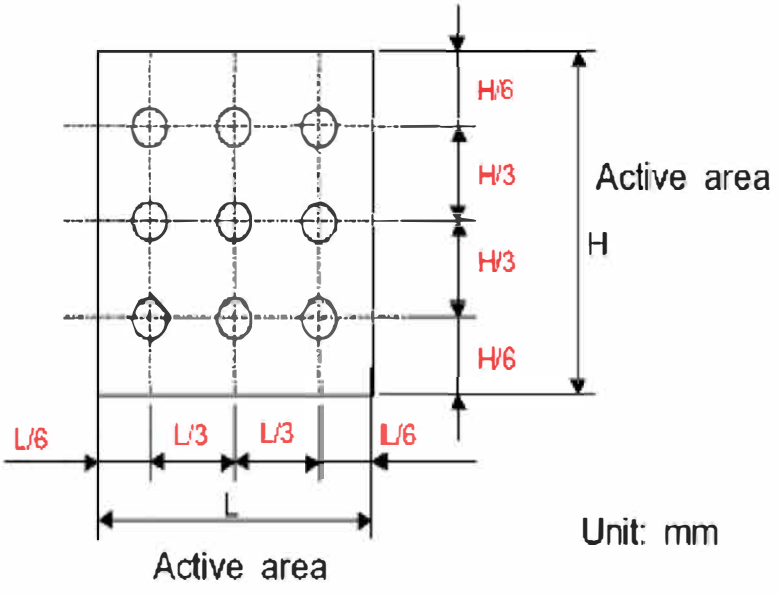


: The brightness test equipment setup

20mA Field=2° (As measuring "black" image, field=2° is the best testing condition)



Note 4 :



ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Supply voltage for logic	IOVCC	-0.3	4.6	V
Input voltage for analog	VCI	-0.3	4.6	V
Supply current (One LED)	I_{LED}		30	mA
Operating temperature	T_{OP}	-20	+70	℃
Storage temperature	T_{ST}	-30	+80	℃

Note: If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily, the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the range of the absolute maximum ratings.

ELECTRICAL CHARACTERISTICS

INPUT POWER

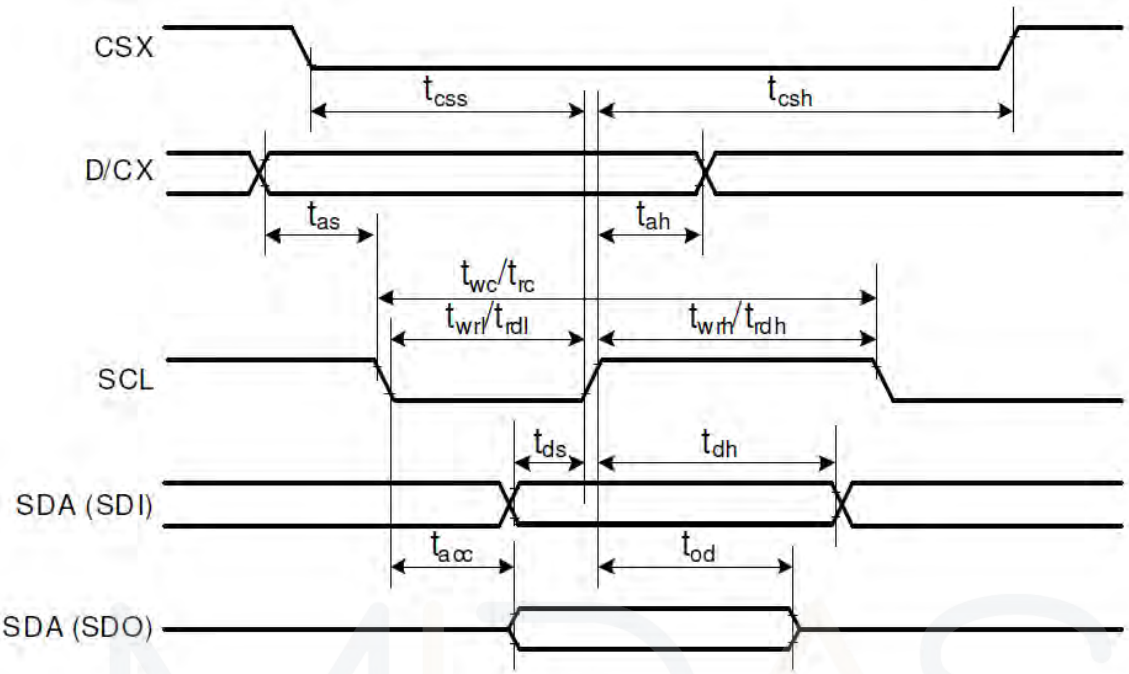
Item	Symbol	Min	Typ	Max	Unit	Applicable terminal
Supply voltage for logic	IOVCC	1.65	2.8	3.3	V	V_{DD}
Input voltage for analog	VCI	2.5	2.8	3.3	v	
Input voltage	V_{IL}	-0.3	-	0.3 IOVcc	V	
	V_{IH}	0.7 IOV_{cc}	-	IOV_{cc}	V	
Input leakage current	I_{LKG}				μA	
LED Forward voltage	V_f	3.0	3.2	3.4	V	With One LED
Input backlight current	I_{LED}	-	20	-	mA	With One LED

BLACKLIGHT DRIVING CONDITIONS

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	V_L	-	12.8	-	V	
Current for LED backlight	I_L	--	20	--	mA	
LED life time	-	30,000	-	-	Hr	Note

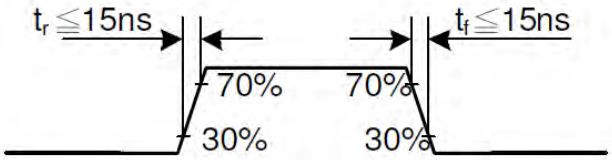
TIMING CHARACTERISTICS

DISPLAY SERIAL INTERFACE TIMING CHARACTERISTICS(4-LINE SPI SYSTEM)



Signal	Symbol	Parameter	min	max	Unit	Description
CSX	tcss	Chip select time (Write)	40	-	ns	
	tcsh	Chip select hold time (Read)	40	-	ns	
SCL	twc	Serial clock cycle (Write)	100	-	ns	
	twrh	SCL “H” pulse width (Write)	40	-	ns	
	twrl	SCL “L” pulse width (Write)	40	-	ns	
	trc	Serial clock cycle (Read)	150	-	ns	
	trdh	SCL “H” pulse width (Read)	60	-	ns	
	trdl	SCL “L” pulse width (Read)	60	-	ns	
D/CX	tas	D/CX setup time	10	-		
	tah	D/CX hold time (Write / Read)	10	-		
SDA / SDI (Input)	tds	Data setup time (Write)	30	-	ns	
	tdh	Data hold time (Write)	30	-	ns	
SDA / SDO (Output)	tacc	Access time (Read)	10	-	ns	For maximum CL=30pF
	tod	Output disable time (Read)	10	50	ns	For minimum CL=8pF

Note: Ta = 25 ℃, VDDI=1.65V to 3.3V, VCI=2.5V to 3.3V, AGND=VSS=0V



RELIABILITY TEST

NO	ITEM	CONDTTION	STANDARD
1	High Temp. Storage	80℃, 240 hours	1. Functional test is OK. Missing Segment, short, unclear segment, non-display, display abnormally and liquid crystal leak are un-allowed. 2. No low temperature bubbles, end seal loose and fall, frame rainbow.
2	Low Temp. Storage	-30℃, 240 hours	
3	High Temp. Operation	70℃, 240 hours, power on	
4	Low Temp. Operation	-20℃, 240 hours, power on	
5	High temperature and high Humidity storage	45℃, 95%RH , 72 hours, power on	
6	Thermal and cold shock	-40℃/85℃, soak 1hour 24cycles, 48hours, power off	
7	Vibration test	Packaging, Frequency : 10-55Hz Amplitude : 1.0mm, Each direction on X, Y axe 0.5 houre, circle 2 hours	1. Function test is OK. 2. No glass crack, chipped glass, end seal loose and fall.
8	Temp. Cycling	+70℃(4hr)~(2hr)~30℃(4) 9cycles, Power on , 72hr	
9	Dropping test	Pack products into the carton box. Drop it from 120cm height to ground. Once for each side of the carton	

10. LCD MODULES HANDLING PRECAUTIONS

- 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 substances come 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 polarize 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℃).Whenever possible, the LCD modules should be stored in the same conditions in which they were shipped from our company.

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.