Sauls Wharf House
Crittens Road
Great Yarmouth
Norfolk
NR31 0AG

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

MDT021000	480x480	MIPI Interface	TFT Module
Specification			
Version: 1		Date: 08/04/2023	
Revision			
1	06/04/2023	First issue	

Display Features			
Display Size	2.10"	RoHS compliant	
Resolution	480x480		
Orientation	Round		
Appearance	RGB		
Logic Voltage	2.8V		
Interface	MIPI		
Brightness	200 cd/m^2		
Touchscreen	---		
Module Size	56.18 x 59.71 x 2.26 mm	Created By	Checked By
Operating Temperature	-20°C ~ +70°C	CL	TSB
Pinout	30 way FFC	Box Quantity	Weight / Display
Pitch	0.50 mm	---	---

* - For full design functionality, please use this specification in conjunction with the ST7701S display driver specification.(Provided Separately)

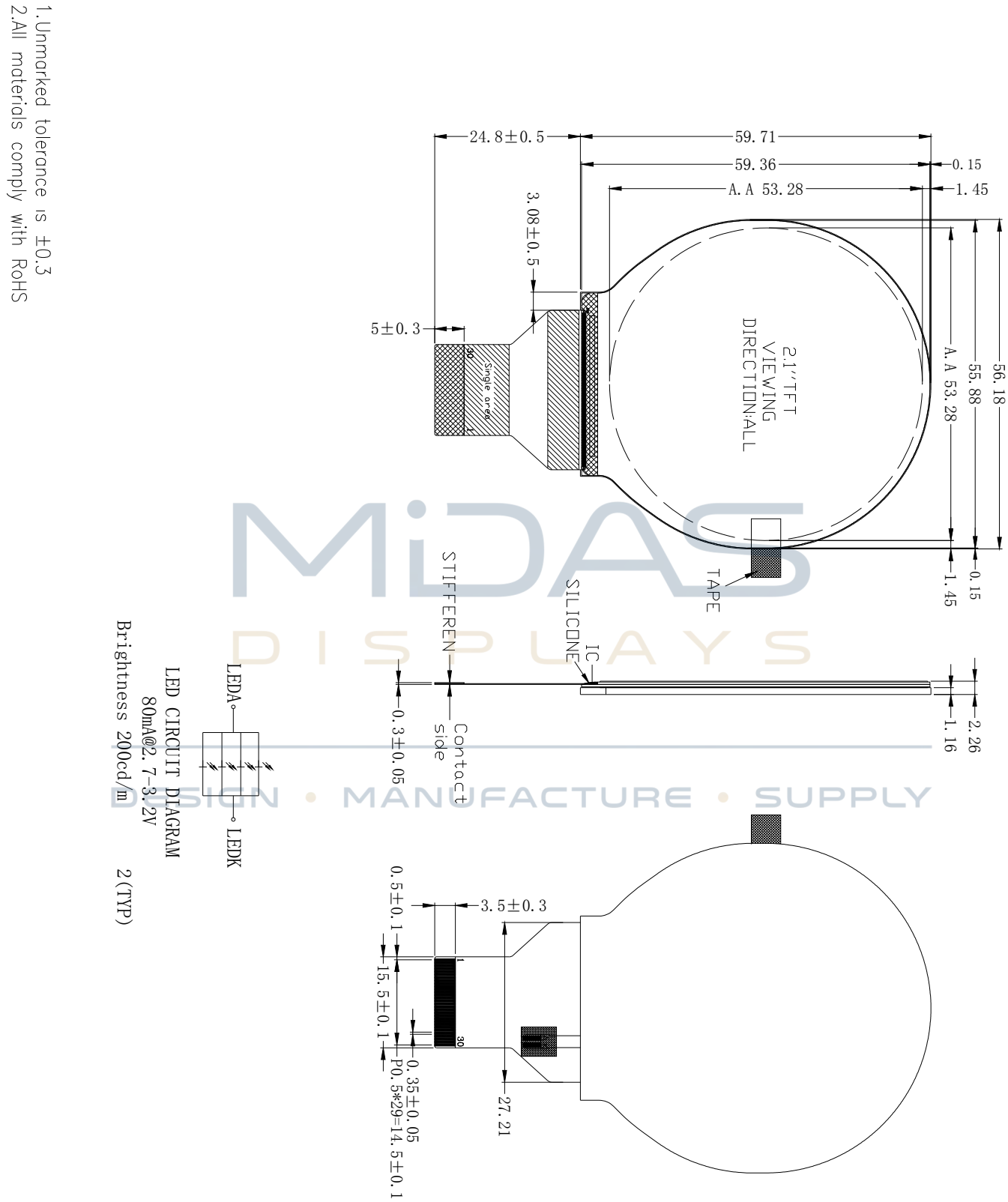
Display Accessories	
Part Number	**Description**
MDIB-30FP	30 way FFC/FPC 0.5mm to 30 way JST 1mm crimp header
MDIB-CC1	Interconnect board for standard pitch pinouts to fine pitch wires. Providing pinouts for 2.54 pinout. 1.27, 1, 0.845, 0.8, 0.7, 0.65, 0.62, 0.6, 0.5 & 0.3 pads.

Optional Variants	
Appearances	**Voltage**

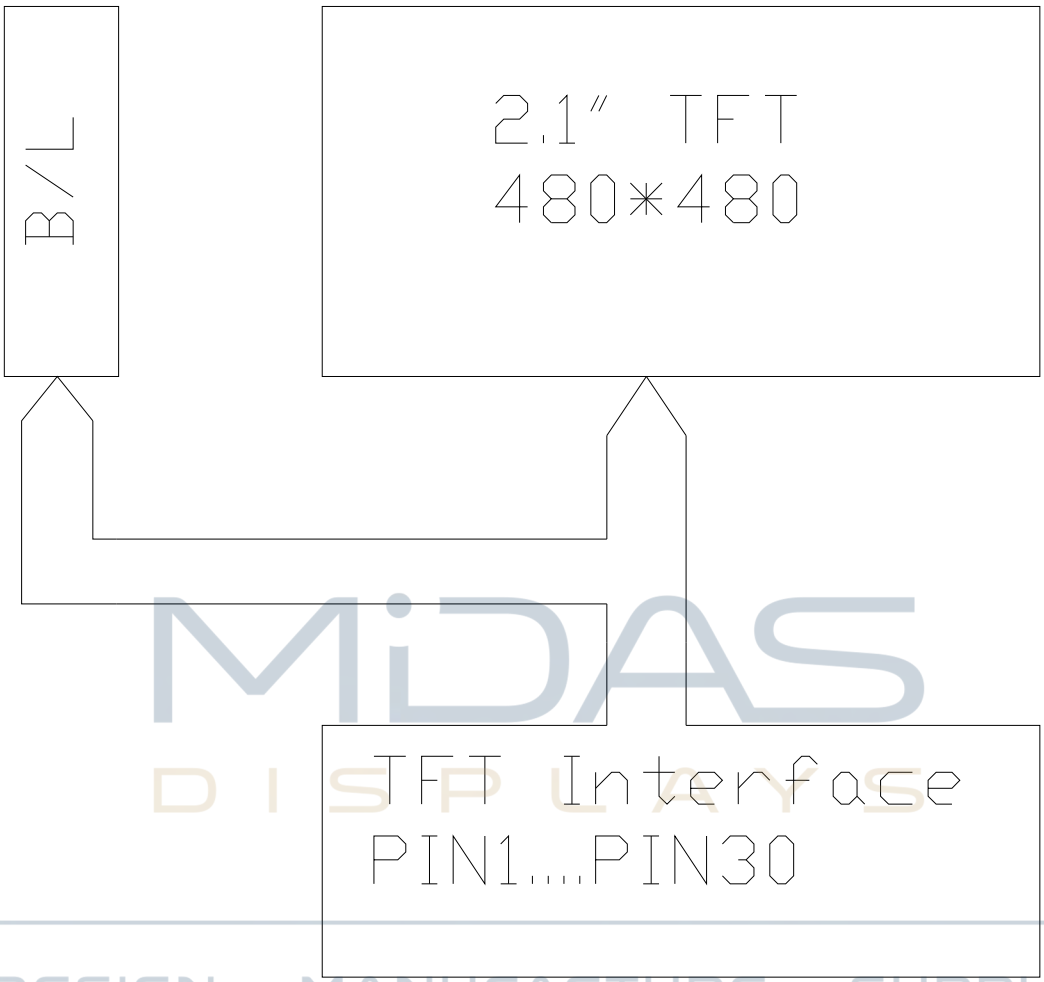
1. GENERAL SPECIFICATIONS

ITEM	STANDARD VALUE	UNIT
LCD SIZE	2.1	inch
LCD TYPE	TFT/IPS/ NORMALLY BLACK/TRANSMISSIVE	
MODULE SIZE	56.18*59.71*2.26	mm
ACTIVE AREA	53.28*53.28	mm
PIXEL PITCH (W*H)	111*111	um
NUMBER OF PIXELS	480*480	
DRIVER IC	ST7701S	
INTERFACE TYPE	MIPI	
RECOMMEND VIEWING DIRECTION	ALL	O'clock
GRAY SCALE INVERSION DIRECTION	-	O'clock
COLORS	16.7 M	
BACKLIGHT TYPE	4-DIES WHITE LED	

2. EXTERNAL DIMENSIONS



3. BLOCK DIAGRAM



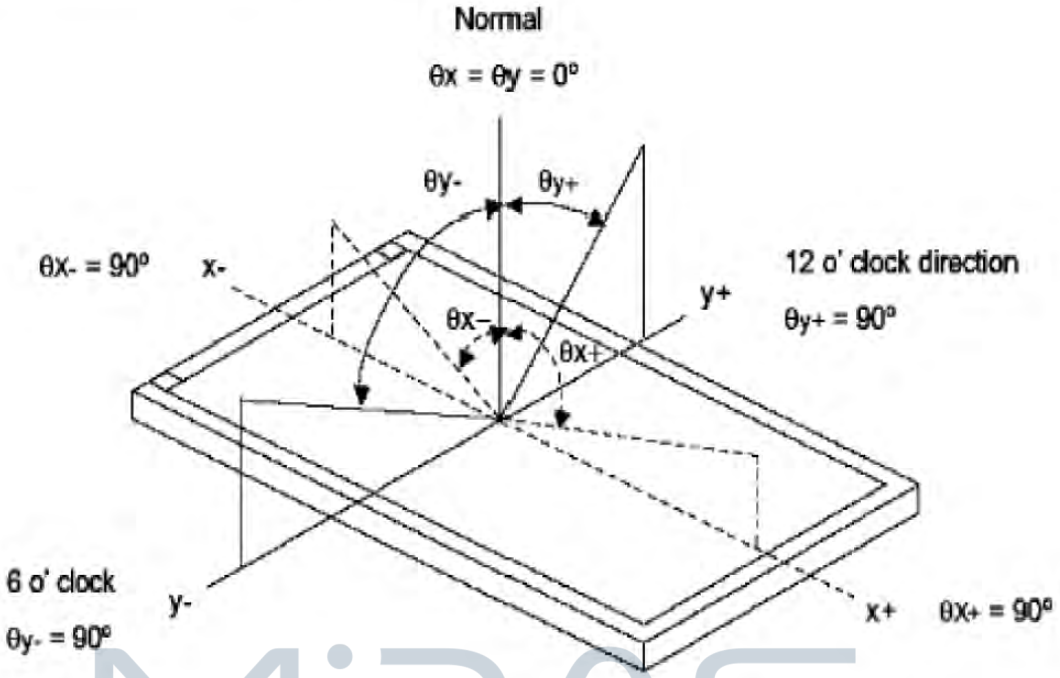
4. PIN ASSIGNMENT

Pin No.	Symbol	Description
1	LEDA	Anode of LED
2	LEDK	Cathode of LED
3	NC	Not connection
4	VCI	Power supply for analog
5	IOVCC	Power supply for I/O system
6	RESET	Reset pin
7	NC	Not connection
8	NC	Not connection
9	GND	Power ground
10	DP0	MIPI Data lane0 input (positive)
11	DN0	MIPI Data lane0 input (negative)
12	GND	Power ground
13	DP1	MIPI Data lane1 input (positive)
14	DN1	MIPI Data lane1 input (negative)
15	GND	Power ground
16	CKP	MIPI CLK input(positive)
17	CKN	MIPI CLK input(negative)
18	GND	Power ground
19	NC	Not connection
20	NC	Not connection
21	GND	Power ground
22	NC	Not connection
23	NC	Not connection
24	GND	Power ground
25	NC	Not connection
26	NC	Not connection
27	NC	Not connection
28	NC	Not connection
29	NC	Not connection
30	NC	Not connection

5. OPTICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
				MIN	TYP.	MAX		
Luminance		L	If=80mA		200	-	Cd/㎡	
Contrast ratio		CR	θ =0°	800	1000			
Response time	Rising	$T_R + T_F$			30	35	ms	
	Falling							
CIE COLOUR COORDINATE	RED	XR	VIEWING NORMAL ANGLE	0.640	0..655	0.670		
		YR		0.312	0.327	0.342		
	GREEN	XG		0.269	0.284	0.299		
		YG		0.579	0.594	0.609		
	BLUE	XB		0.123	0.138	0.153		
		YB		0.096	0.111	0.126		
	WHITE	XW		0.285	0.300	0.315		
		YW		0.311	0.326	0.341		
VIEWING ANGLE	Hor.	θ x+	CR≥10	80	85		Degree	
		θ x−		80	85			
	Ver.	θ y+		80	85			
		θ y−		80	85			

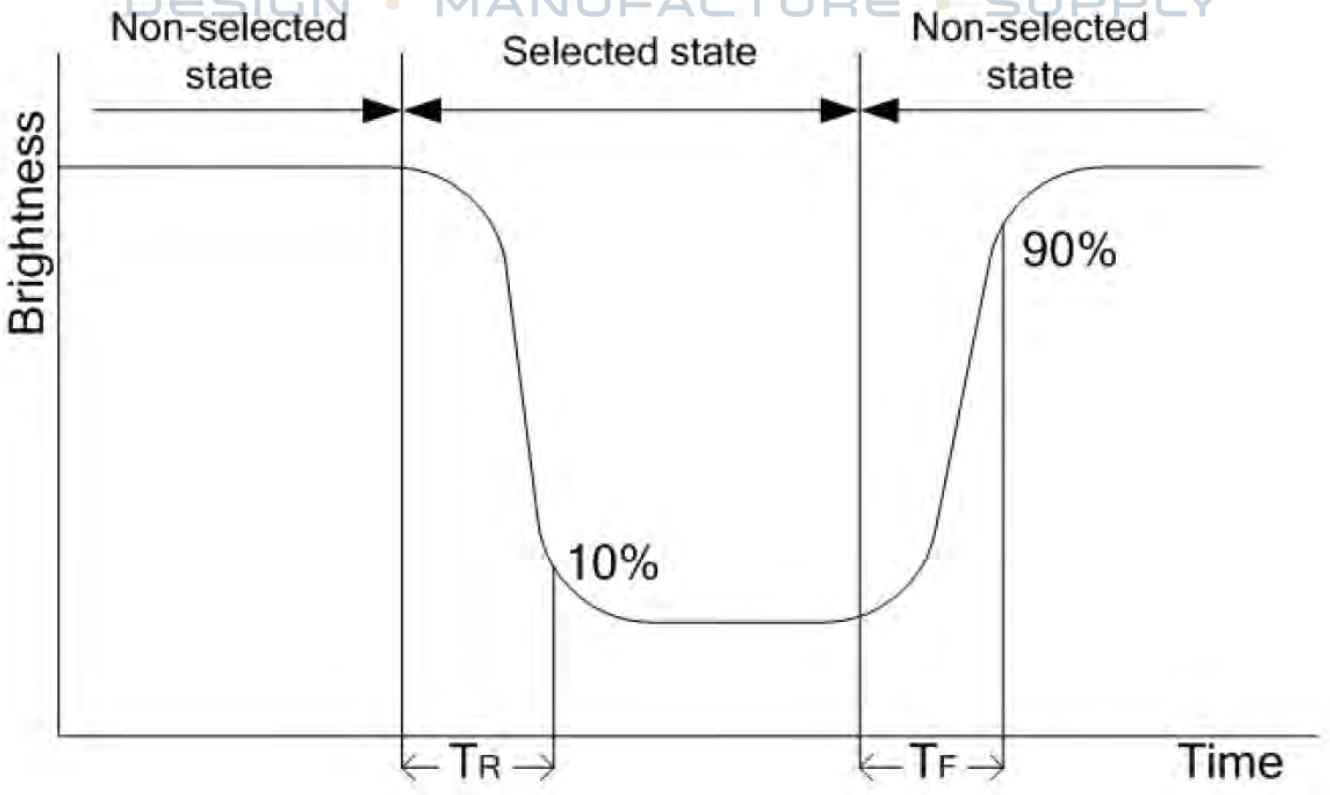
Note 1 : Definition of Viewing Angle θ_x and θ_y :



Note 2: Definition of contrast ratio CR:

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

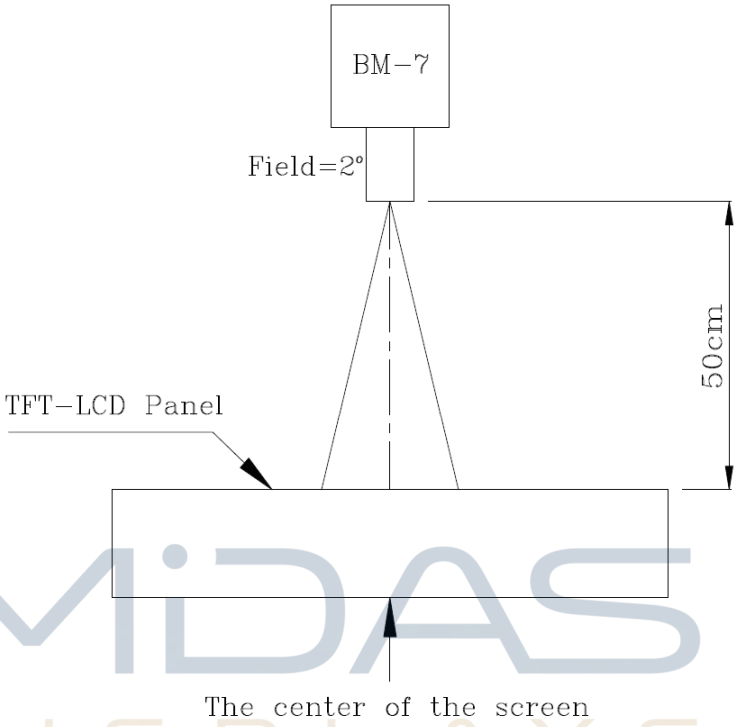
Note 3: Definition of response time (T_R, T_F)



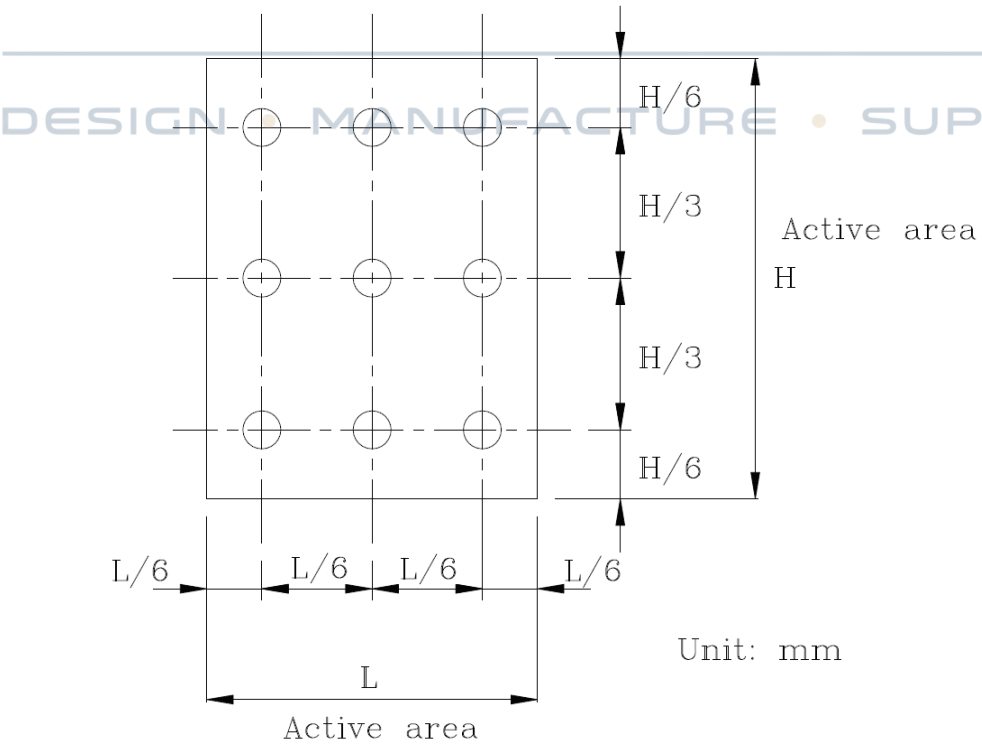
Note 4: Definition of Luminance

①The Brightness Test Equipment Setup

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



②The Brightness Test Point Setup



6. ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT
Supply Voltage	VCI	-0.3	4.6	V
Supply Voltage (Logic)	IOVCC	-0.3	4.6	V
Operating temperature	Top	-20	+70	℃
Storage temperature	Tst	-30	+85	℃

7. ELECTRICAL CHARACTERISTICS

7.1 BLACKLIGHT DRIVING CONDITIONS

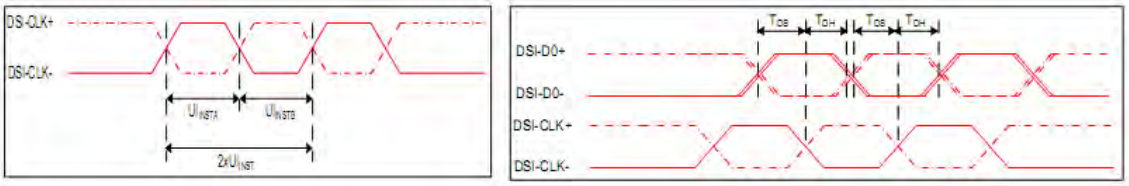
ITEM	SYMBOL	SPECIFICATIONS			UNIT	REMARK
		MIN	TYP.	MAX		
Supply Voltage	Vf	2.7	3.0	3.2	V	
Supply Current	IL		80		mA	
Power consumption	P		0.12		W	
LED lifetime			50,000		H_r	

7.2 ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	MIN	TYP.	MAX	UNIT
Supply voltage for analog	VCI	2.5	2.8	3.6	V
Interface Operation Voltage	IOVCC	1.65	1.8	3.3	V
Current for Driver(Black)	IVCI		25		mA
Input voltage	Vil	GND		0.3IOVCC	V
	Vih	0.7IOVCC		IOVCC	V

8. TIMING CHARACTERISTICS

8.1 High Speed Mode



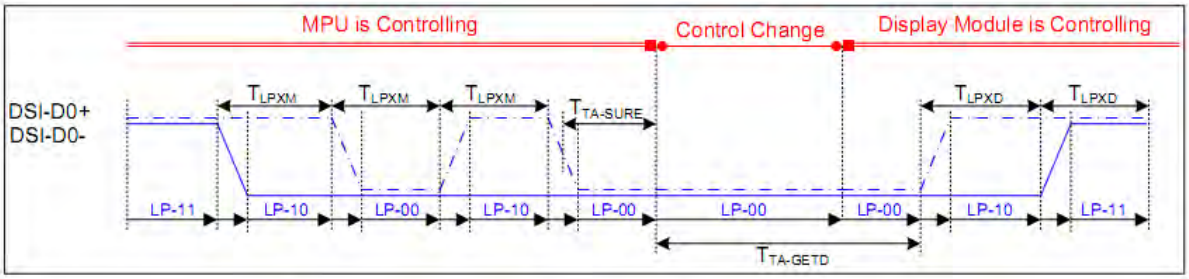
DSI clock channel timing

VDDI=1.8,VDD=2.8, AGND=DGND=0V, Ta=25 °C

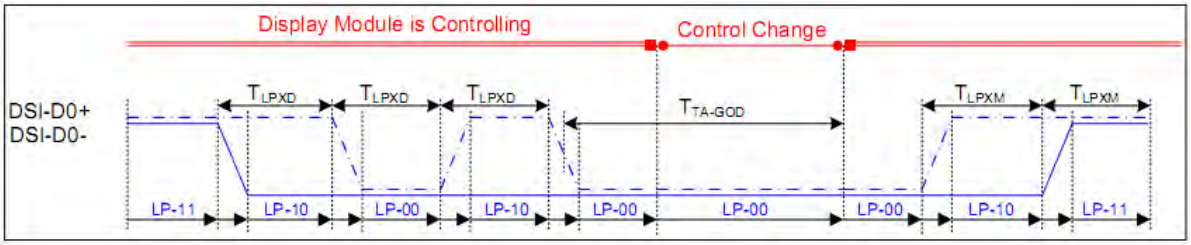
Signal	Symbol	Parameter	MIN	MAX	Unit	Description
DSI-CLK+/-	$2xUI_{INSTA}$	Double UI instantaneous	2.5	25	ns	
DSI-CLK+/-	UI_{INSTA} UI_{INSTB}	UI instantaneous halfs	1.25	12.5	ns	$UI = UI_{INSTA} = UI_{INSTB}$
DSI-Dn+/-	tDS	Data to clock setup time	0.15	-	UI	
DSI-Dn+/-	tDH	Data to clock hold time	0.15	-	UI	

Mipi Interface- High Speed Mode Timing Characteristics

8.2 Low Power Mode



Bus Turnaround (BTA) from display module to MPU Timing



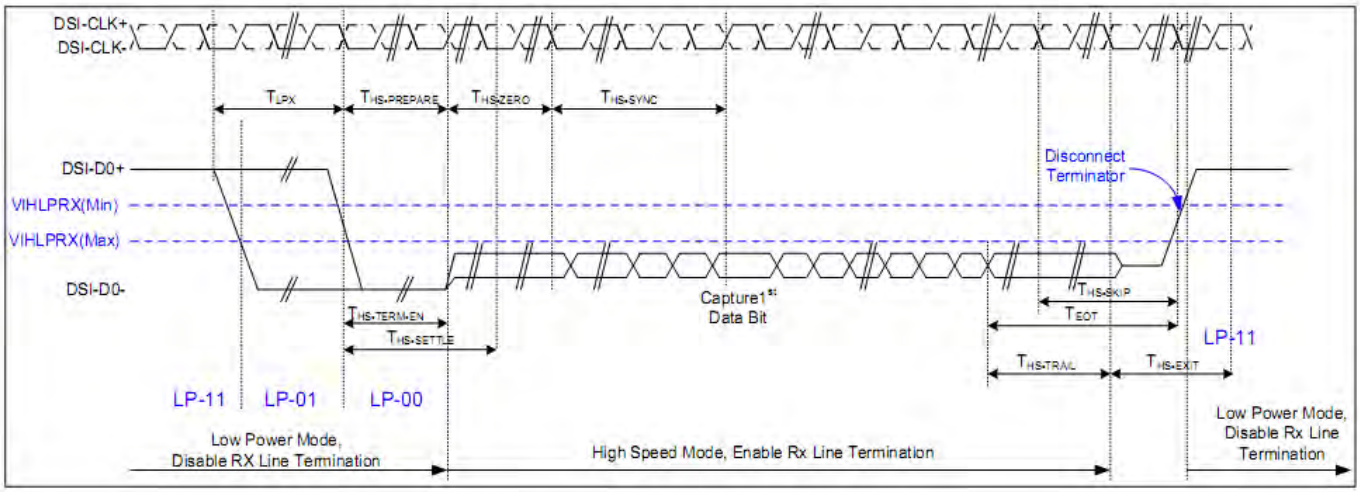
Bus Turnaround (BTA) from MPU to display module Timing

VDDI=1.8,VDD=2.8, AGND=DGND=0V, Ta=25 °C

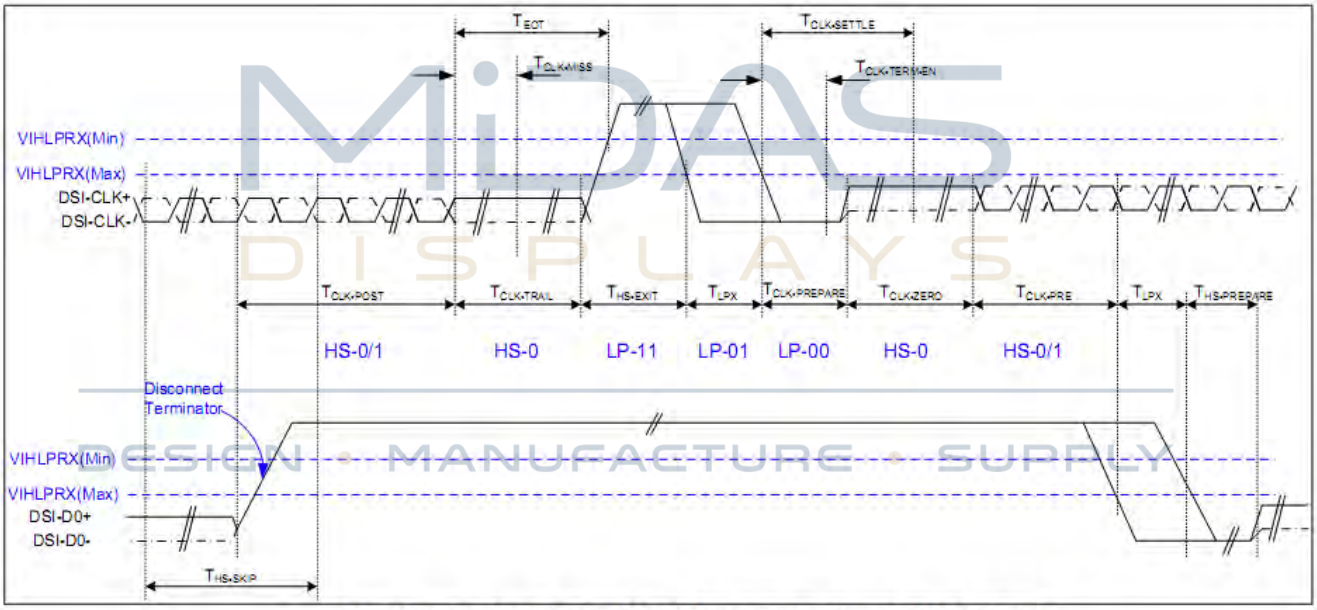
Signal	Symbol	Parameter	MIN	MAX	Unit	Description
DSI-D0+/-	TLPXM	Length of LP-00,LP-01, LP-10 or LP-11 periods MPU→Display Module	50	75	ns	Input
DSI-D0+/-	TLPXD	Length of LP-00,LP-01, LP-10 or LP-11 periods MPU→Display Module	50	75	ns	Output
DSI-D0+/-	TTA-SURED	Time-out before the MPU start driving	T_{LPXD}	$2xT_{LPXD}$	ns	Output
DSI-D0+/-	TTA-GETD	Time to drive LP-00 by display module	$5xT_{LPXD}$		ns	Input
DSI-D0+/-	TTA-GOD	Time to drive LP-00 after turnaround request-MPU	$4xT_{LPXD}$		ns	Output

Mipi Interface Low Power Mode Timing Characteristics

8.3 DSI Bursts Mode



Data lanes-Low Power Mode to/from High Speed Mode Timing



Clock lanes- High Speed Mode to/from Low Power Mode Timing

VDDI=1.8,VDD=2.8, AGND=DGND=0V, Ta=25 ℃

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
Low Power Mode to High Speed Mode Timing						
DSI-Dn+/-	TLPX	Length of any low power state period	50	-	ns	Input
DSI-Dn+/-	THS-PREPARE	Time to drive LP-00 to prepare for HS transmission	40+4 UI	85+6 UI	ns	Input
DSI-Dn+/-	THS-TERM-EN	Time to enable data receiver line termination measured from when Dn crosses VILMAX	-	35+4 UI	ns	Input
DSI-Dn+/-	THS-PREPARE + THS-ZERO	THS-PREPARE + time to drive HS-0 before the sync sequence	140+ 10UI	-	ns	Input
High Speed Mode to Low Power Mode Timing						
DSI-Dn+/-	THS-SKIP	Time-out at display module to ignore transition period of EoT	40	55+4 UI	ns	Input
DSI-Dn+/-	THS-EXIT	Time to drive LP-11 after HS burst	100	-	ns	Input
DSI-Dn+/-	THS-TRAIL	Time to drive flipped differential state after last payload data bit of a HS transmission burst	60+4 UI	-	ns	Input
High Speed Mode to/from Low Power Mode Timing						
DSI-CLK+/-	TCLK-POS	Time that the MPU shall continue sending HS clock after the last associated data lane has transition to LP mode	60+5 2UI	-	ns	Input
DSI-CLK+/-	TCLK-TRAIL	Time to drive HS differential state after last payload clock bit of a HS transmission burst	60	-	ns	Input
DSI-CLK+/-	THS-EXIT	Time to drive LP-11 after HS burst	100	-	ns	Input
DSI-CLK+/-	TCLK-PREPARE	Time to drive LP-00 to prepare for HS transmission	38	95	ns	Input
DSI-CLK+/-	TCLK-TERM-EN	Time-out at clock lan display module to enable HS transmission	--	38	ns	Input
DSI-CLK+/-	TCLK-PREPARE + TCLK-ZERO	Minimum lead HS-0 drive period before starting clock	300	-	ns	Input
DSI-CLK+/-	TCLK-PRE	Time that the HS clock shall be driven prior to any associated data lane beginning the transition from LP to HS mode	8UI	-	ns	Input
DSI-CLK+/-	TEOT	Time form start of TCLK-TRAIL period to start of LP-11 state	-	105n s+12 UI	ns	Input

9. RELIABILITY TEST

NO.	TEST ITEM	CONDITIONS
1	HIGH TEMPERATURE STORAGE	TA=70℃ 240H
2	LOW TEMPERATURE STORAGE	TA=-20℃ 240H
3	HIGH TEMPERATURE OPERATION	TA=85℃ 240H
4	LOW TEMPERATURE OPERATION	TA=-30℃ 240H
5	HIGH TEMPERATURE AND HIGH HUMIDITY OPERATION	+60℃, 90%RH 240H
6	THERMAL SHOCK	-20℃→+70℃, 0.5H;100CYCLES;1H/ CYCLES

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 substance 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.

11. 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.