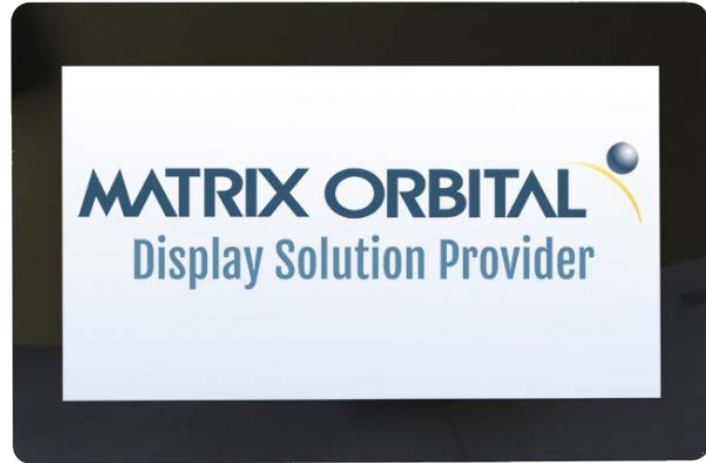


MOP-TFT1024600W-101A/G -IPS

Hardware Manual

Revision 1.0



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1 Contact



On Shore and In-House Design

In-House Manufacturing

In-House Sales

In-House Support

In Calgary, Canada

Sales

Phone: (403) 229-2737

Email: sales@matrixorbital.ca

Support

Phone: (403) 229-2737

Email: support@matrixorbital.ca

Online

Purchasing: www.matrixorbital.com

Support: www.matrixorbital.com

Free support forums

<https://www.lcdforums.com/forums>

Example Code on GitHub

<https://github.com/MatrixOrbital>

2 Customization

Need a custom solution? No problem! Since we manufacture our products in-house, we are highly flexible, have low MOQ's and provide you what you need. From custom headers to custom cables to entire custom displays, we can make what you need.



3 General Information

The MOP-TFT1024768W-121 is a 12.1" IPS TFT.

Item	Contents	Unit
Display Size (Diagonal)	10.1"	inch
Display type	IPS TFT	
Resolution	1024x600	Pixels
Display Mode	Transmissive, Normally Black	
Backlight	LED, 1100 cd/m ² , 50,000 hours	
View Direction	Free	
Gray Scale Inversion Direction	None	
Module Outline	235.0 (W) x 143.0 (H)	mm
Active Area	222.7 (W) x 125.3 (H)	mm
Pixel Pitch	0.2175 (W) x 0.2088 (H)	mm
Polarizer Surface Treatment	Anti-glare Glare	
Display Colors	16.7M	
Interface	LVDS	
Display Driver IC	EK79001HN + EK73215BCGA	
Capacitive Touch IC	IL2511 or Equivalent	
Operating Temperature	-20 to 70	°C
Storage Temperature	-30 to 80	°C

Part Numbering

MOP	TFT	1024	600	W	101	A	IPS	BLH	TPN
1	2	3	4	5	6	7	8	9	10

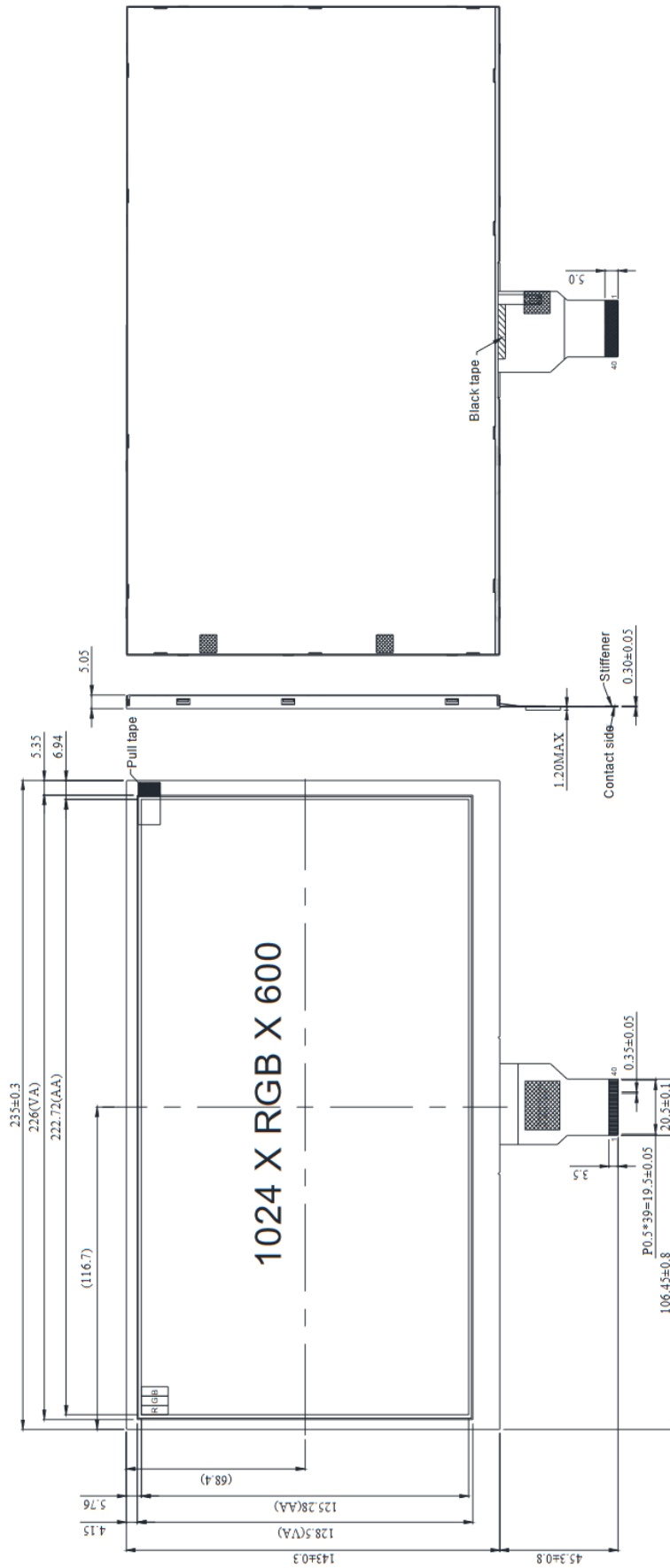
#	Designator	Options
1	Product Line	MOP: Matrix Orbital Parallel Display
2	Screen Type	TFT: Graphic TFT
3	Display Columns	1024
4	Display Rows	600
5	Model	W
6	Display Size	39: 3.9" 43: 4.3" 50: 5.0" 70: 7.0" 101: 10.1"
7	Display Form Factor	A: Standard TFT G: Extended Bezel capacitive touch panel
8	IPS Display	-IPS
9	Brightness Level	-BLM: 300 - 600 Nit -BLH: 600 - 1000 Nit -BLD: 1000+ Nit
10	Touch Panel Type	TPN: None TPR: Resistive TPC: Capacitive

Options

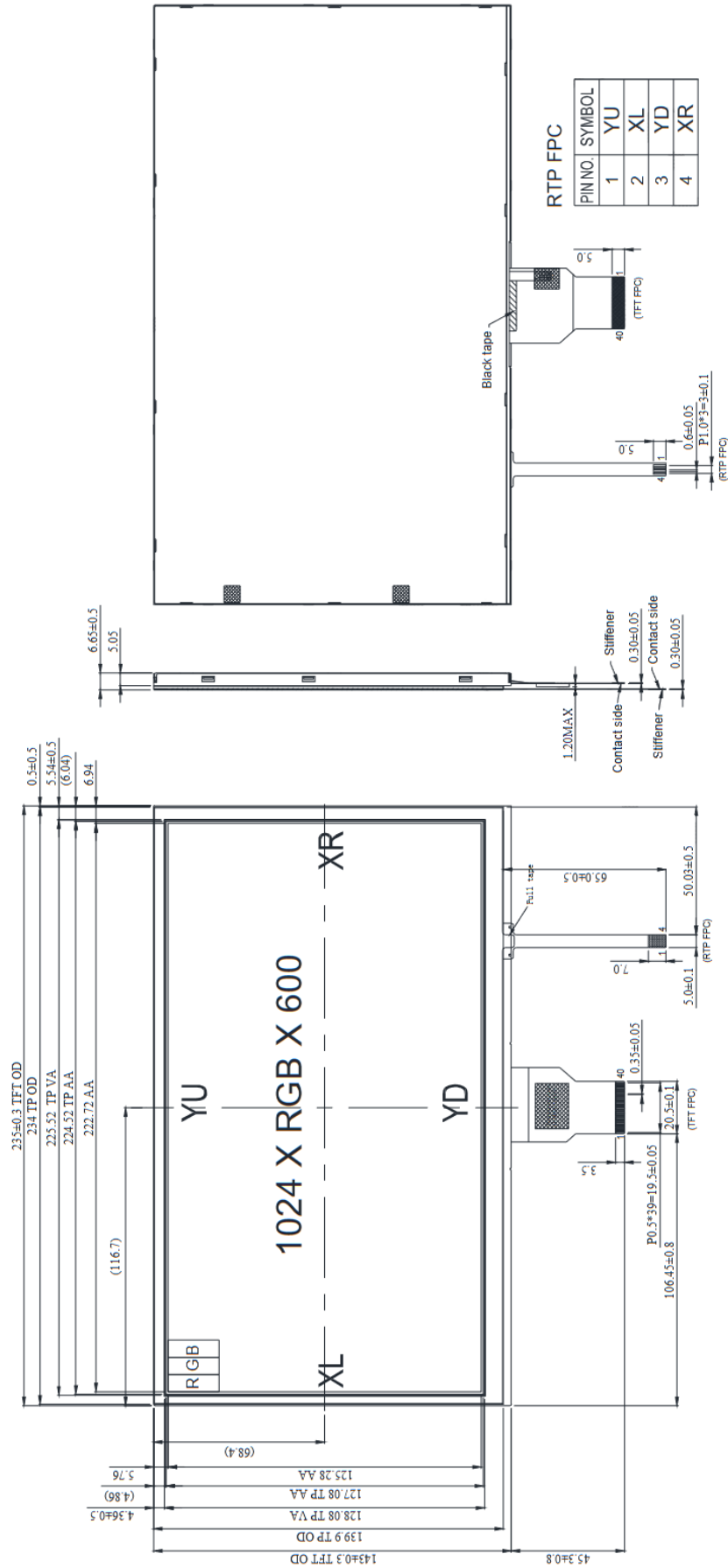
	Designator	Addons
	Bonding	-OPT Optical Bonding
	Gorilla Glass	-GG Gorilla Glass Gen 3
	Water/Glove	-WG Water/Glove Capable

4 Dimensions

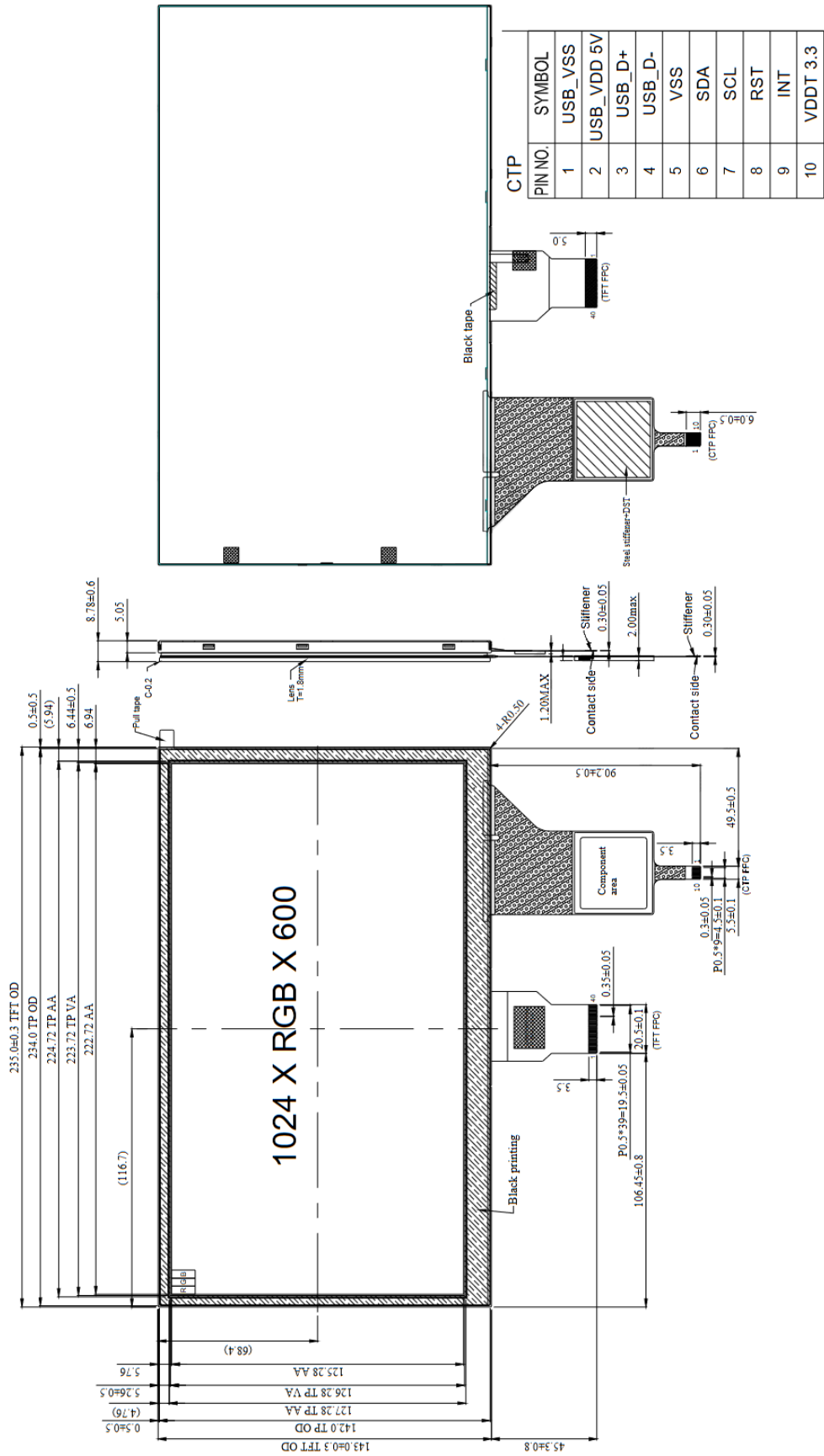
4.1 MOP-TFT1024600W-101A TPN



4.2 MOP-TFT1024600W-101A TPR



4.3 MOP-TFT1024600W-101A TPC



5 Electrical Characteristics

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Digital Power Supply Voltage For LCD	VDD	3	3.3	3.6	V	Note1
Analog Power Supply Voltage	AVDD	9.89	10.2	10.5	V	-
Gate On Power Supply Voltage	VGH	19.4	20.0	20.6	V	-
Gate Off Power Supply Voltage	VGL	-10.3	-10.0	-9.7	V	-
Common Power Supply Voltage	VCOM	4.0	4.3	4.6	V	Note2
Input logic high voltage	VIH	0.7 VDD	-	VDD	V	Note3
Input logic low voltage	VIL	0	-	0.3 VDD	V	
Supply CTP	USB_VDD 5V	4.4	5.0	5.5	V	USB type
	I_VDD 5V	—	97.8	120	mA	

Note 1: VDD setting should match the signals output voltage (refer to Note 3) of customer's system board.

Note 2: Please adjust VCOM to make the flicker level be minimum.

Note 3: RESET,STBYB,U/D,L/R,SELB

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Current for Driver	IGH	-	0.48	1.0	mA	VGH =20.0V
	IGL	-	1.57	2.5	mA	VGL = -10.0V
	IVDD	-	24	36	mA	VDD =3.3V
	IAVDD	-	13.7	25	mA	AVDD =10.2V

6 Optical Characteristics

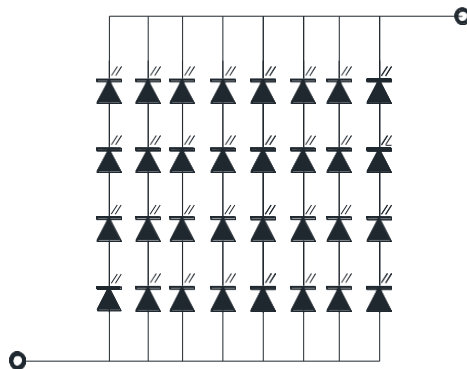
Item		Symbol	Condition.	Min	Typ.	Max.	Unit
Response time		Tr	$\theta=0^\circ$ 、 $\Phi=0^\circ$	-	13	18	ms
		Tf		-	12	17	ms
Contrast ratio		CR	At optimized viewing angle	700	1000	-	-
Color Chromaticity	White	Wx	$\theta=0^\circ$ 、 $\Phi=0$	0.263	0.313	0.363	
		Wy		0.279	0.329	0.379	
Viewing angle	Hor.	ΘR	$CR \geq 10$	85	89	-	Deg.
		ΘL		85	89	-	
	Ver.	ΦT		85	89	-	
		ΦB		85	89	-	
Uniformity		(U)		70	80	-	%

	TPN	TPR	TPC	
Brightness	1100	800	900	cd/m2

Values at 25°C, 60% RH, at 50k hours backlight will be at 50% brightness

7 Backlight Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage of white LED backlight	VL	10.8	12.4	14.0	V
Current for LED backlight	IL	-	480	-	mA
LED life time	-	50,000	-	-	Hr



8 Touch Panel Characteristics

Coordinate Origin: top left corner

Parameter	-TPR (resistive)	-TPC (capacitive)
Touch Points	1	5
Hardness	3H	6H

8.1 Resistive Touch

Item		Typ.
Operation Force	60 – 100	grams
Resistance	X: 300 - 1000 Y: 100 - 450	Ohm

***Note:** Do not operate it with a thing except a polyacetal pen (tip R0.8mm or less) or a finger, especially those with hard or sharp tips such as a ball point pen or a mechanical pencil.

8.2 Capacitive Touch

For increased sensitivity through acrylic or glass please contact us.

Item	101A / 101G	101A -WG / 101G -WG
IC	GT911	ILI2511
I2C Slave Address	0xBA/0xBB or 0x28/0x29 configurable	0xBA/0xBB
Speed	400Kbps	400Kbps
Durability	64g steel ball at 100cm	64g steel ball at 100cm

9 Interface Description

9.1 40 pin LVDS

Pin No.	Symbol	Description
1	VCOM	Common voltage
2	VDD	Digital power
3	VDD	Digital power
4	NC	Not connect
5	Reset	Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability. Normally pull high. (R=10KΩ, C=1μF)
6	STBYB	Standby mode, normally pull high STBYB="1", normal operation STBYB="0", timing control, source driver will turn off, all output are high-Z
7	GND	Digital ground
8	RXIN0-	Negative LVDS differential data inputs
9	RXIN0+	Positive LVDS differential data inputs
10	GND	Digital ground
11	RXIN1-	Negative LVDS differential data inputs
12	RXIN1+	Positive LVDS differential data inputs
13	GND	Digital ground
14	RXIN2-	Negative LVDS differential data inputs
15	RXIN2+	Positive LVDS differential data inputs
16	GND	Digital ground
17	RXCLKN-	Negative LVDS differential clock inputs
18	RXCLKN+	Positive LVDS differential clock inputs
19	GND	Digital ground
20	RXIN3-	Negative LVDS differential data inputs
21	RXIN3+	Positive LVDS differential data inputs
22	GND	Digital ground
23	NC	Not connect
24	NC	Not connect
25	GND	Digital ground
26	NC	Not connect
27	NC	Not connect
28	SELB	6-bit/8-bit input select SELB = L , 8-bit ; SELB = H , 6-bit

29	AVDD	Analog power
30	GND	Digital ground
31	LED-	LED Cathode
32	LED-	LED Cathode
33	L/R	Left or right display control
34	U/D	Up / down display control
35	VGL	Negative power for TFT
36	NC	Not connect
37	NC	Not connect
38	VGH	Positive power for TFT
39	LED+	LED Anode
40	LED+	LED Anode

When L/R="0",set right to left scan direction. When L/R="1",set left to right scan direction. When U/D="0",set top to bottom scan direction. When U/D="1",set bottom to top scan direction.

9.2 Capacitive Touch

MOP-TFT1024600W-101A TPC

Suggested mating FFC connector, 10 position, 0.5mm pitch, Bottom contact.

FFC Header	Part Number
Matrix Orbital	
Molex	

Pin	Name	Description
1	USB GND	Ground
2	USB VCC	5.0V
3	USB D+	USB Data +
4	USB D-	USB Data -
5	GND	Ground
6	SDA	I2C Data
7	SCL	I2C Clock
8	/RST	External Reset, Low is active
9	/INT	Interrupt
10	VCC	3.3V

*Note: Pull up resistors of 10K ohms to VDD are recommended for RST and INT

**Note: Pull up resistors of 1k-10k ohms to VDD are required for SCL and SDA

MOP-TFT1024600W-101G TPC

Suggested mating FFC connector, 6 position, 1.0mm pitch, Top contact.

FFC Header	Part Number
------------	-------------

Matrix Orbital	
Molex	

Pin	Name	Description
1	SDA	I2C Data
2	SCL	I2C Clock
3	VCC	Power
4	/RST	External Reset, Low is active
5	/INT	Interrupt
6	GND	Ground

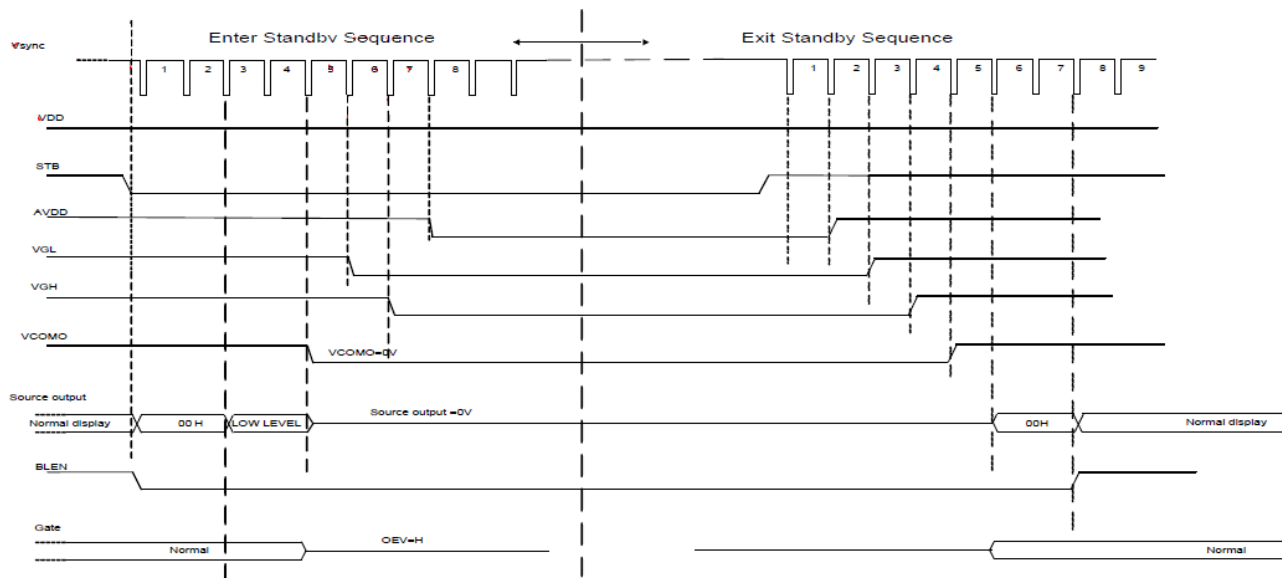
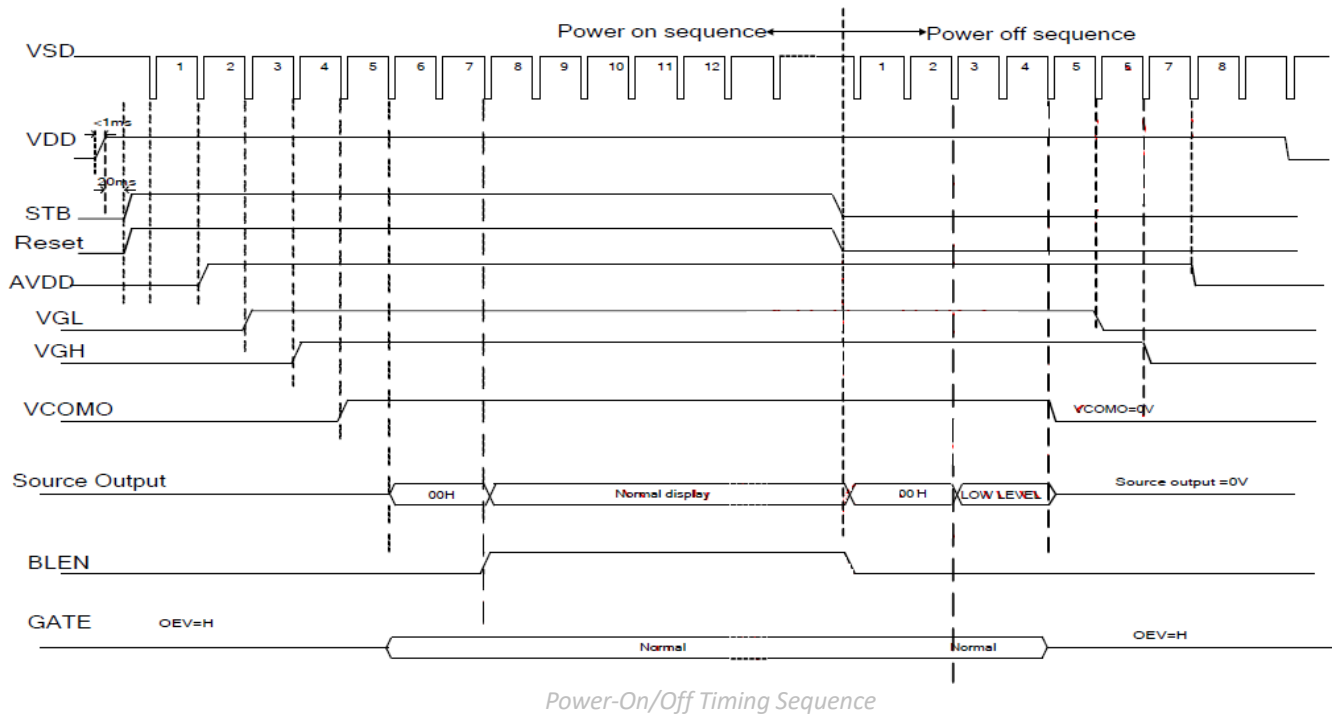
*Note: Pull up resistors of 10K ohms to VDD are recommended for RST and INT

**Note: Pull up resistors of 1k-10k ohms to VDD are required for SCL and SDA

10 Interface Pixel Timing

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK	Frequency	Fc	40.8	51.2	67.2	MHZ	
	Vertical Active Display Term						
	Total	Tv	610	635	800	Th	Tv=Tvd+Tvb
	Display	Tvd	-	600	-	Th	-
	Blank	Tvb	10	35	200	Th	-
Horizontal Active Display Term	Total	Th	1114	1344	1400	Tc	Th=Thd+Thb
	Display	Thd	-	1024	-	Tc	-
	Blank	Thb	90	320	376	Tc	-

11 Power Sequence



12 Timing Characteristics

Parameter	Symbol	condition	Min.	Typ.	Max.	Unit
Clock frequency	RxFCLK		20	-	71	MHz
Input data skew margin	T _{RSKM}	VID =400mV RxVCM=1.2V RxFCLK=71MHz	500	-	-	ps
Clock high time	T _{LVCH}		-	4/(7* RxFCLK)	-	ns
Clock low time	T _{LVCL}		-	3/(7* RxFCLK)	-	ns
PLL wake-up-time	T _{enPLL}				150	us

13 Environmental

Item	Min	Max	Unit
Operation Temperature	-20	70	°C
Storage Temperature	-30	80	°C
Humidity		90%*	RH

*noncondensing

14 Inspection Criterion

Description

This specification is made to be used as the standard acceptance/rejection criteria.

Sample plan

Sampling plan:

1999 and ANSI/ASQC Z1.4-1993

Single sampling, normal inspection

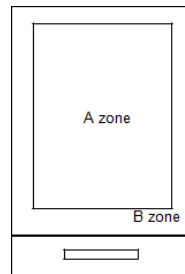
Visual inspection: AQL 1.5%

Electrical functional: AQL 0.65%

Inspection condition

- Viewing distance for cosmetic inspection is about 30 ± 2 cm with bare eyes, and under a 1000~1500lux environment for visual inspection. All directions for inspecting the sample should be within 45° against perpendicular line. (Normal temperature $18 \sim 28^\circ\text{C}$ and normal humidity $60 \pm 15\% \text{RH}$).
- During testing, the LCD is driven using the voltage level (Within $\pm 0.5\text{V}$ of the typical value at 25°C .) that provides the most optical contrast

Definition of inspection zone in LCD



Zone A: Active Area

Zone B: Viewing Area

Function Defect

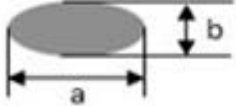
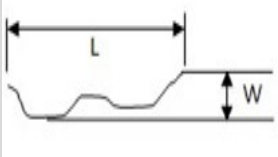

Items to be inspected	Inspection criterion	Classification of defects
All functional defects	1) No display 2) Display abnormally 3) Missing vertical, horizontal segment 4) Short circuit 5) Back-light no lighting, flickering and abnormal lighting. 6) obvious striation 7) Current beyond specification value	MA
Missing	Missing component	
Outline dimension	Overall outline dimension exceeds the drawing is not allowed.	

LCD pixel defect (bad dot) (defect type: MI)

Checking item	Judgment criterion	Total
Bright dot	0	0
Dark dot	$N \leq 2$	$N \leq 2$
Total dot	$N \leq 2$	$N \leq 2$
Mura	Not visible through 5% ND filters	

***Note:** Bright dot caused by scratch and foreign object accords to item 1.

Dot and line defect (defect type: MI)

Checking item	Judgment criterion		Figure	
	Diameter(mm)\LCD Size	S ≤5.0 Inch		
Dot defect	D≤0.10	Allowed	 $D=(a+b)/2$	
	0.10<D≤0.15	2		
	0.15<D≤0.25	1		
	0.25<D	0		
	Total	2		
	Distance between 2 defects should be more than 3mm apart.			
Line defect	Length(mm)	Width(mm)	Judgment criterion	
	---	W≤0.03	allowed	
	L≤2.5	0.03<W≤0.05	3	
	L≤2.5	0.05<W≤0.10	2	
	---	0.1<W	0	
	Total		3	
Distance between 2 defects should more than 3mm apart. Scratches not viewable through the back of the display are acceptable				
Concave point and air bubble for polarizer	Size(mm)	Judgment criterion	 $D=(a+b)/2$	
	D≤0.20	allowed		
	0.20<D≤0.30	4		
	0.30<D≤0.50	1		
	D>0.50	None		

15 Handling Precautions

Mounting method

Do not make extra holes in the display or modify its shape. When mounting the display, ensure that the display does not flex, bend or twist. Extreme care should be used when handling the LCD modules.

LCD Handling and Cleaning Precaution

To clean the display surface, it is recommended to wipe lightly using a soft cloth with either Isopropyl alcohol or Ethyl alcohol. Do not wipe the display surface with dry or hard materials as it may damage the polarizer surface.

Do not use Water or Aromatics to clean the display.

Do not wipe ITO pad area with dry or hard materials that will damage the ITO patterns

Do not use Soldering flux, Chlorine (Cl), and Sulfur(S) on the pad or prevent it from being contaminated.

If the display is sent without applying a silicon coat on the pad, the ITO patterns could be damaged due to corrosion as time goes on.

If ITO corrosion occurs due to customer miss-handling, or if the customer applies materials such as Chlorine (Cl), Sulfur (S) to the display, the responsibility is placed the customer.

Static Charge Precaution

The LCD module uses CMOS LSI drivers, so we recommend that you:

- Connect any unused input terminal to VDD or VSS
- Do not input any signals before power is turned on
- Ground your body, work/assembly areas, and assembly equipment to protect against static electricity.

Packing

The module employs LCD elements and must be treated as such.

- Avoid intense shock and falls from a height.
- To prevent modules from degradation, do not operate or store them exposed direct to sunshine or high temperature/humidity

Precautions during Operation

- It is an indispensable condition to drive the LCD module within the specified voltage limits. Applying voltage higher than the limit will reduce the life span of the LCD.
- Using direct drive current should be avoided, as it will induce an electrochemical reaction causing undesirable deterioration.
- The LCD's response time will be delayed when operating at a temperature lower than the suggested operating range. When operating at a temperature higher than the suggested range, the LCD will be noticeably darker. The display will return to normal when it is brought back to the specified operation temperature.
- If the display area is pushed hard during operation, some font may be abnormally drawn but the LCD will return to normal after it is reset.
- Slight dew depositing on terminals can cause an electro-chemical reaction, damaging traces and resulting in an open circuit.

Usage under the maximum operating temperature, 50%Rh or less is required

Storage Recommendations

When storing the LCD for a prolonged period of time, the following recommendations will help prevent damage or deterioration

- Store the display in an ambient temperature range between 10°C to 30°C, and in a relative humidity of 45% to 75%.
- Do not leave the display exposed to sunlight or fluorescent light.
- Place the display in a polyethylene bag with the opening sealed.
- Ensure that nothing is making contact with the polarizer surface.
- It is recommended to store them in the same packaging that was provided upon purchase

Safety Precautions

In the case that the LCD glass has shattered, it is recommended to remove any glass pieces, wash off the liquid crystal using either acetone or ethanol, and proceed to burn any remaining display pieces.

If any liquid leaked out of a damaged glass cell, and comes in contact with your hands, please wash it off well with soap and water

16 Revision History

Revision	Date	Description	Author
1.0	May 23, 2024	Initial Release	Henry