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MDT0320ASHH-MULTI	240 x 320	MULTI Interface	TFT Module
Specification			
Version: 1		Date: 11/02/2021	
Revision			
1	09/02/2021	First issue	

Display Features	
Display Size	3.20”
Resolution	240 x 320
Orientation	Portrait
Appearance	RGB
Logic Voltage	2.8V
Interface	Parallel / SPI
Brightness	1000 cd/m^2
Touchscreen	---
Module Size	55.04 x 77.60 x 2.55mm
Operating Temperature	-20°C ~ +70°C
Pinout	40 way FFC
Pitch	0.5mm

Box Quantity	Weight / Display
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* - For full design functionality, please use this specification in conjunction with the ILI9341 specification.(Provided Separately)

Display Accessories	
Part Number	**Description**

Optional Variants	
Appearances	**Voltage**

Summary

TFT 3.2”is a TN transmissive type color active matrix TFT liquid crystal display that use amorphous silicon TFT as switching devices. This module is a composed of a TFT_LCD module, It is usually designed for industrial application and this module follows RoHs,

General Specifications

- Size: 3.2 inch
- Dot Matrix: 240x RGBx 320(TFT) dots
- Module dimension: 55.04 (W) x 77.6 (H) x 2.55(D) mm
- Active area: 48.6 x 64.8 mm
- Pixel pitch: 0.2025 x 0.2025 mm
- LCD type: TFT, Normally White, Transmissive
- View Direction: 6 o’clock
- Gray Scale Inversion Direction: 12 o’clock
- Aspect Ratio: Portrait
- Driver IC: ILI9341 or Equivalent
- Interface: 80 MCU 8bit /9bit/16bit/18bit/SPI(3 Wire/4 Wire)
- Backlight Type: LED,Normally White
- With /Without TP: Without TP
- Surface: Anti-Glare

*Color tone slight changed by temperature and driving voltage.

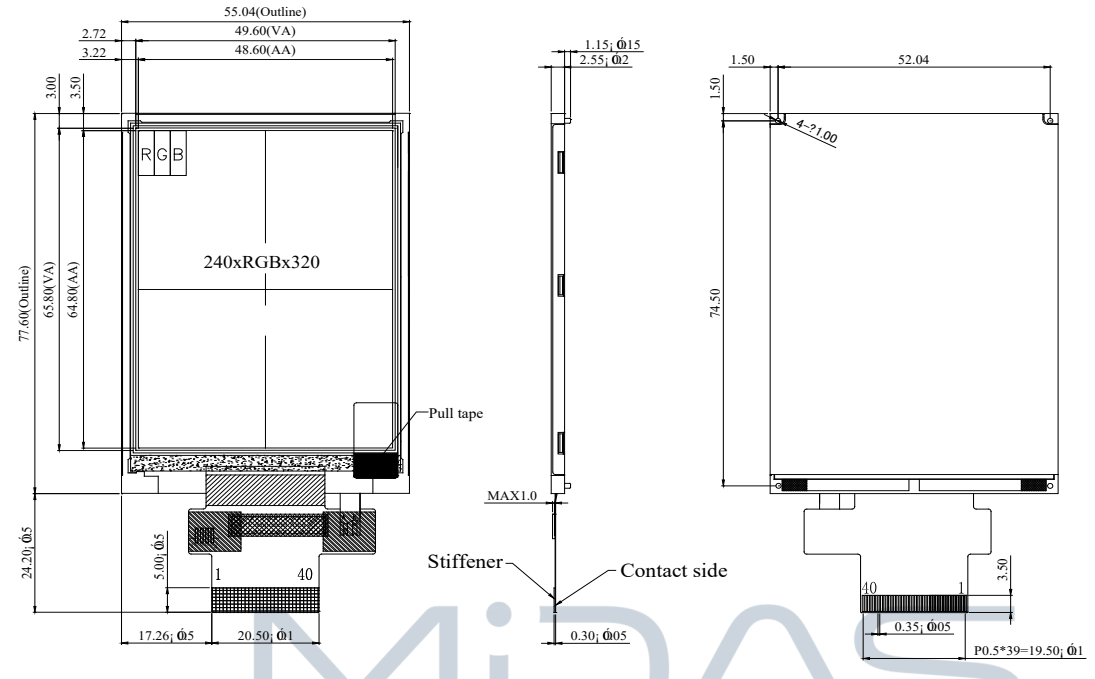
Interface

LCM PIN Definition

NO	Symbol	Function	I/O
1	NC	No connection	—
2	NC	No connection	—
3	NC	No connection	—
4	NC	No connection	—
5	VCI	Power supply(TYP: 2.8V).	P
6	IOVCC	Power supply(TYP:1.8V/2.8V).	P
7	R5	18-bit parallel bi-directional data bus for MCU system and RGB interface mode Fix to VSS level when not in use	I/O
8	R4		
9	R3		
10	R2		
11	R1		
12	R0		
13	G5		
14	G4		
15	G3		
16	G2		
17	G1		
18	G0		
19	B5		
20	B4		
21	B3		
22	B2		
23	B1		
24	B0		
25	SDA	Serial data input/output	I/O
26	DOTCLK	Data enable signal in RGB interface.	I
27	DE	A data ENABLE signal in RGB I/F mode	I
28	HSYNC	Horizontal synchronizing signal in RGB interface	I
29	VSYNC	Vertical synchronizing signal in RGB interface	I
30	NRD	Read enable pin I80 parallel bus system interface	I
31	NWR_DNC	NWR Write enable pin I80 parallel bus system interface	I

<table>
<tr><td></td><td></td><td>DNC Command/parameter or display data selection pin in serial bus system interface</td><td></td></tr>
<tr><td>32</td><td>DNC_SCL</td><td>DNC Command/parameter or display data selection pin in parallel interface
SCL Serial data clock in serial bus system Interface</td><td>I</td></tr>
<tr><td>33</td><td>NCS</td><td>Chip select signal</td><td>I</td></tr>
<tr><td>34</td><td>NRESET</td><td>System Reset</td><td>I</td></tr>
<tr><td>35</td><td>IM0</td><td rowspan="3">System interface select:
<table>
<tr><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/Content</th><th>GRAM</th></tr>
<tr><td>0</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>0</td><td>1</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>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>80 MCU 18-bit bus interface I</td><td>D[7:0]</td><td>D[17:0]</td></tr>
<tr><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>0</td><td>4-wire 8-bit data serial interface I</td><td colspan="2">SDA: In/OUT</td></tr>
</table></td><td rowspan="3">I</td></tr>
<tr><td>36</td><td>IM1</td></tr>
<tr><td>37</td><td>IM2</td></tr>
<tr><td>38</td><td>GND</td><td>Ground</td><td>P</td></tr>
<tr><td>39</td><td>VLED+</td><td>Anode of LED backlight.</td><td>P</td></tr>
<tr><td>40</td><td>VLED-</td><td>Cathode of LED backlight.</td><td>P</td></tr>
</table>

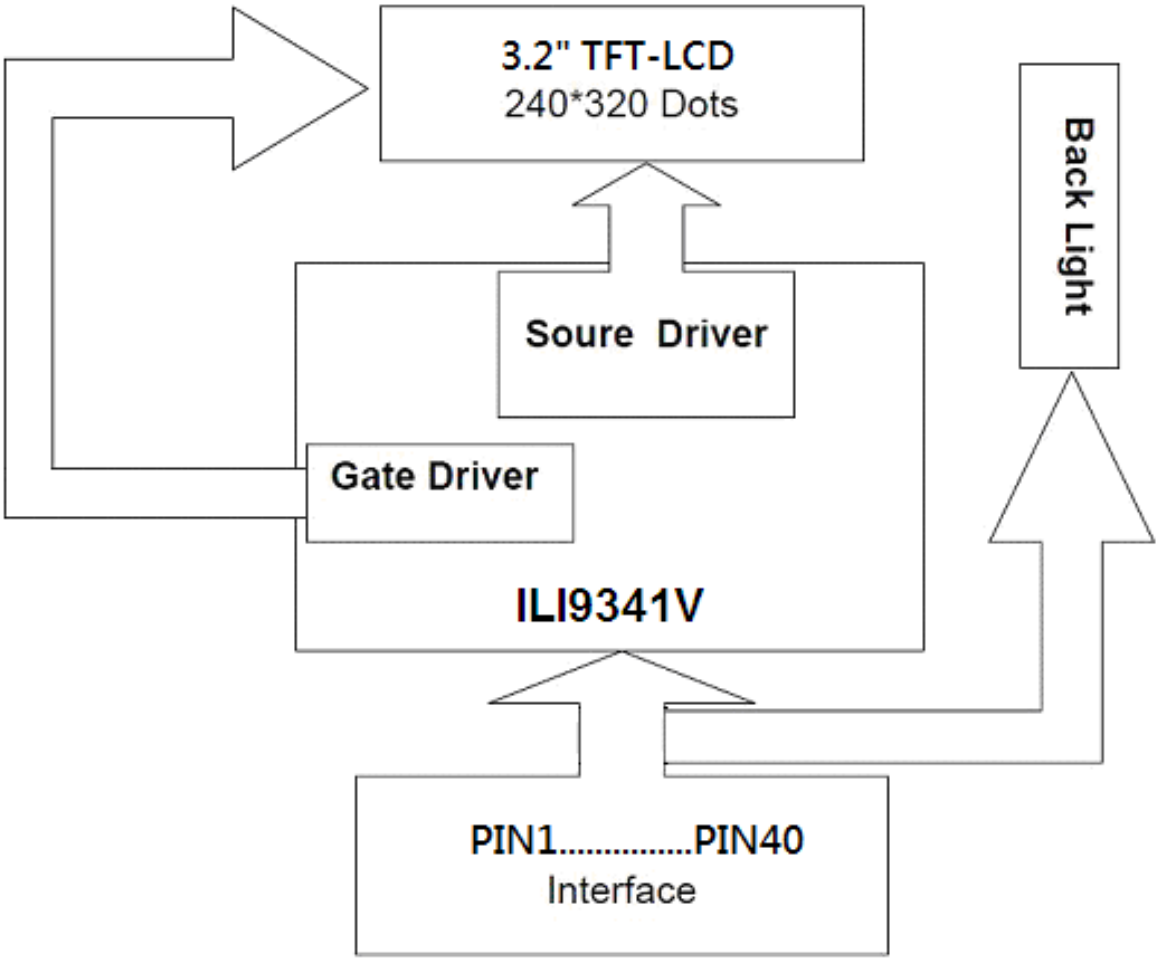
Contour Drawing



NO.	SYMBOL
1	NC
2	NC
3	NC
4	NC
5	VCI
6	IOVCC
7	R5
8	R4
9	R3
10	R2
11	R1
12	R0
13	G5
14	G4
15	G3
16	G2
17	G1
18	G0
19	B5
20	B4
21	B3
22	B2
23	B1
24	B0
25	SDA
26	DOTCLK
27	DE
28	HSYNC
29	VSYNC
30	NRD
31	NWR_DNC
32	DNC_SCL
33	NCS
34	NRESET
35	IM0
36	IM1
37	IM2
38	GND
39	VLED+
40	VLED-

The non-specified tolerance of dimension is ±0.3mm.

Block Diagram



Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	TOP	-20	—	+70	℃
Storage Temperature	TST	-30	—	+80	℃

Note: Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above

1. Temp. ≦60℃, 90% RH MAX. Temp.＞60℃, Absolute humidity shall be less than 90% RH at 60℃

Electrical Characteristics

1. Operating conditions:

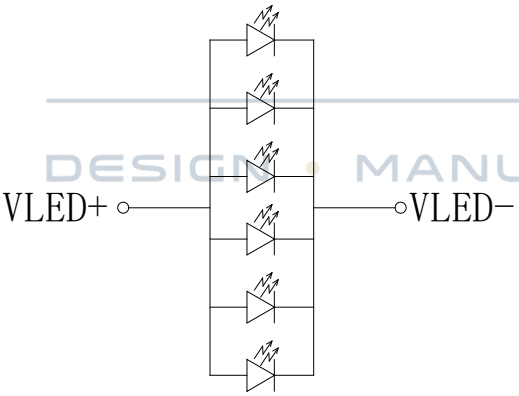
Item	Symbol	Condition	Min	Type	Max	Unit
Power supply voltage	VCI		2.5	2.8	3.3	V
Power supply voltage	IOVCC		1.65	2.8	3.3	V
Input high voltage	Vih		0.7IOVCC	-	IOVCC	V
Input low voltage	Vil		GND	-	0.3IOVCC	V
Output high voltage	Voh	IOL=-1.0mA	0.8 IOVCC	-	IOVCC	V
Output low voltage	Vol	IOL =1.0mA	GND	-	0.2 IOVCC	V
Current consumption	I_{VCI}	-	-	5.5	8.25	mA

This value is test for VDD=3.3V , Ta=25 ℃ only

2. LED driving conditions

Parameter	Symbol	Min	Typ	Max	Unit	Remark
LED current	—	—	120	—	mA	—
LED voltage	VLED+	5.5	6.0	6.5	V	Note 1
LED Life Time	—	—	50000	—	Hr	Note 2,3

Note 1 : There are 1 Groups LED
Note 2 : Ta = 25°C



CIRCUIT DIAGRAM

Note 3 : Brightness to be decreased to 50% of the initial value

Optical Characteristics

Item		Symbol	Condition.	Min	Typ.	Max.	Unit	Remark
Response time		Tr	θ=0°、Φ=0°	-	4	8	.ms	Note 3
		Tf		-	12	24	.ms	
Contrast ratio		CR	At optimized viewing angle	400	500	-	-	Note 4
Color Chromaticity	White	Wx	θ=0°、Φ=0	0.26	0.31	0.36		Note 2,6,7
		Wy		0.28	0.33	0.38		
Viewing angle (Gray Scale Inversion Direction)	Hor.	ΘR	CR≧10	35	45	-	Deg.	Note 1
		ΘL		35	45	-		
	Ver.	ΦT		35	45	-		
		ΦB		10	20	-		
Brightness		-	-	900	1000	-	cd/m^2	Center of display
Uniformity		(U)	-	75	-	-	%	Note 5

Ta=25±2℃

Note 1: Definition of viewing angle range

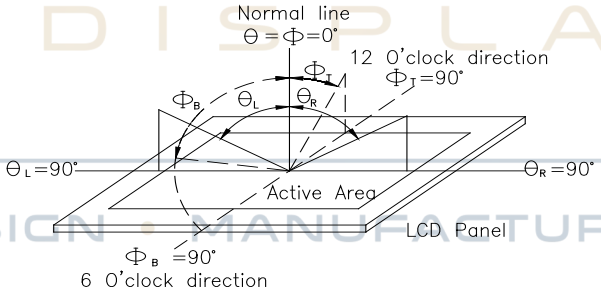


Fig 9.1. Definition of viewing angle

Note 2: Test equipment setup:

After stabilizing and leaving the panel alone at a driven temperature for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7orBM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

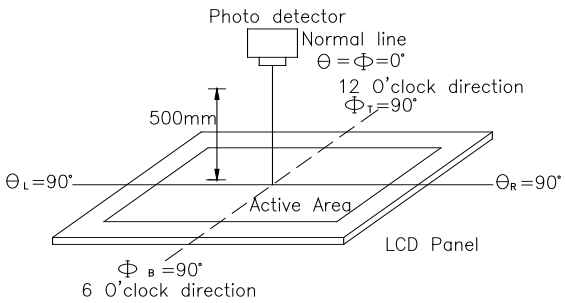
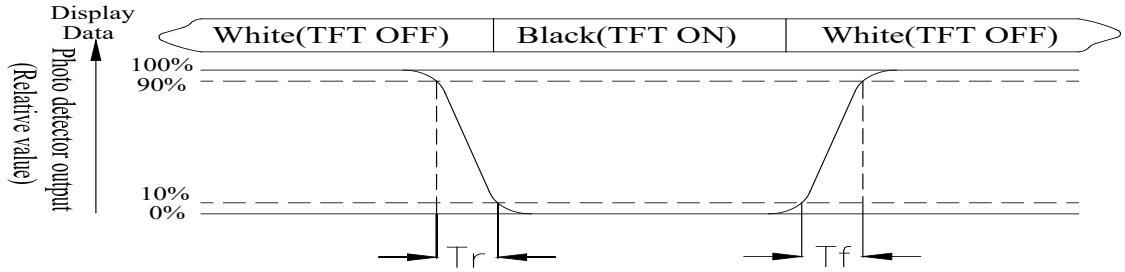


Fig 9.2. Optical measurement system setup

Note 3: Definition of Response time:
The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time, Tr, is the time between photo detector output intensity changed from 90%to 10%. And fall time, Tf, is the time between photo detector output intensity changed from 10%to 90%



Note 4: Definition of contrast ratio:
The contrast ratio is defined as the following expression.

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5: Definition of Luminance Uniformity
Active area is divided into 9 measuring areas (reference the picture in below). Every measuring point is placed at the center of each measuring area.
Luminance Uniformity (U) = Lmin/Lmax x100%
L = Active area length
W = Active area width

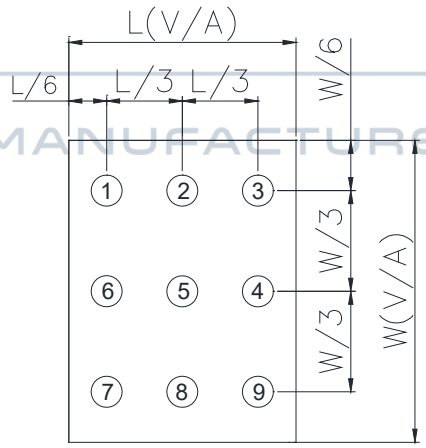


Fig 9.3. Definition of uniformity

Note 6: Definition of color chromaticity (CIE 1931)
Color coordinates measured at the center point of LCD

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

Reliability

Content of Reliability Test (Wide temperature, -20℃~70℃)

Environmental Test			
Test Item	**Content of Test**	**Test Condition**	**Note**
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80℃ 96hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30℃ 96hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70℃ 96hrs	——
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20℃ 96hrs	1
High Temperature/ Humidity Operation	The module should be allowed to stand at 40 ℃,90%RH max	40℃,90%RH 96hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation -20℃ 25℃ 70℃ 30min 5min 30min 1 cycle	-20℃/70℃ 10 cycles	——
Vibration test	Endurance test applying the vibration during transportation and using.	Total fixed amplitude : 1.5mm Vibration Frequency : 10~55Hz One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes	3
Static electricity test	Endurance test applying the electric stress to the terminal.	VS=±600V(contact) ,±800v(air), RS=330Ω CS=150pF 10 times	——

Note1: No dew condensation to be observed.

Note2: The function test shall be conducted after 4 hours storage at the normal Temperature and humidity after remove from the test chamber.

Note3: The packing have to including into the vibration testing.