

MDT032000	240x320	MCU Interface	TFT Module
Specification			
Version: 1		Date: 09/12/2023	
Revision			
1	07/12/2023	First issue	

Display Features			
Display Size	3.2"		
Resolution	240x320		
Orientation	Portrait		
Appearance	RGB		
Logic Voltage	2.75V		
Interface	MCU		
Brightness	600 cd/m ²		
Touchscreen	---		
Module Size	55.04 x 77.7 x 2.55 mm		
Operating Temperature	-20°C ~ +70°C	Created By	Checked By
Pinout	40 way FFC	CL	TSB
Pitch	0.50 mm	Box Quantity	Weight / Display
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* - For full design functionality, please use this specification in conjunction with the ST7789Z3 display driver specification.(Provided Separately)

Display Accessories	
Part Number	Description
MBID-40FP	40 Way FFC to cable and wires. Driven by any driver board that can be wired to a 1mm pitch SHDR-40V-S-B receptacle.
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



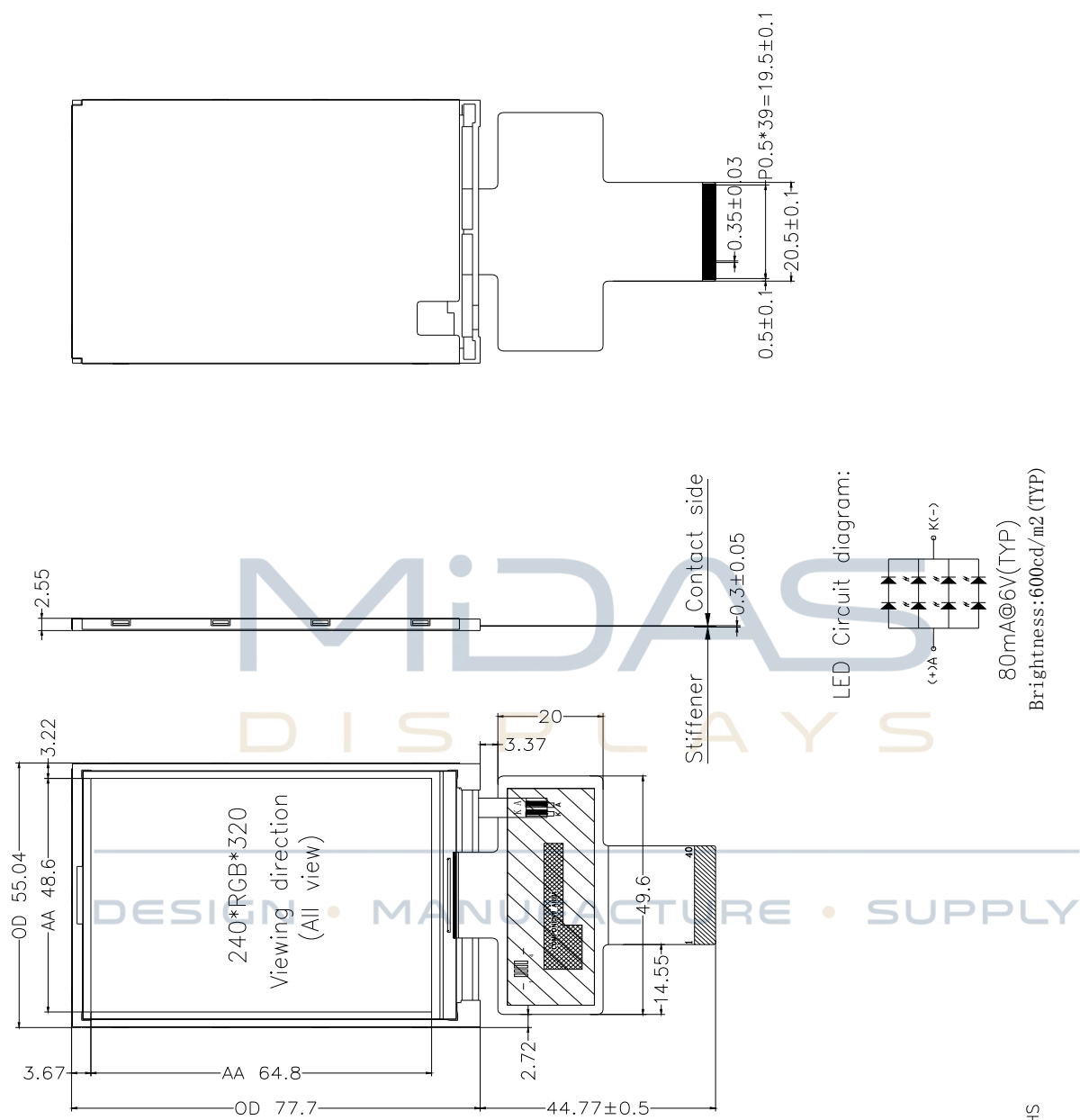
1. GENERAL SPECIFICATIONS

Item	Contents	Unit
LCD TYPE	TFT	
MODULE SIZE(W*H*T)	55.04*77.7*2.55	mm
ACTIVE SIZE(W*H)	48.6 (H) x 64.8 (V)	mm
Pixel Size	0.0675 (H) x 0.2025 (V)	mm
NUMBER OF DOTS	240 x RGB x 320	
DRIVER IC	ST7789Z3	
INTERFACE TYPE	MCU	
RECOMMEND VIEWING DIRECTION	ALL	O'CLOCK
GRAY SCALE INVERSION DIRECTION	-	O'CLOCK
COLORS	262K	
BACKLIGHT TYPE	8-DIES WHITE LED	
TOUCH PANEL TYPE	WITHOUT	

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2. EXTERNAL DIMENSIONS



Remark:
1. Unmarked tolerance is ±0.3
2. All materials comply with RoHS
3. ...:critical dimension.

3.BLOCK DIAGRAM



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4. PIN ASSIGNMENT

PIN NO.	SYMBOL	DESCRIPTION
1	GND	Power ground
2	YU	Not connection
3	XL	Not connection
4	YD	Not connection
5	XR	Not connection
6	GND	Power ground
7	VDD	Power Supply for Analog, Digital System and Booster Circuit.
8	VDDI	Power Supply for I/O System.
9	NC	Not connection
10	CS	-Chip selection pin Low enable. High disable.
11	RS	-Display data/command selection pin in parallel interface. DCX='1': display data or parameter. DCX='0': command data.
12	WR	-Write enable in MCU parallel interface.
13	RD	-Read enable in 8080 MCU parallel interface.
14	DB0	-DB [8:0] are used as MCU parallel interface data bus.
15	DB1	
16	DB2	
17	DB3	
18	DB4	
19	DB5	
20	DB6	
21	DB7	
22	DB8	
23~29	NC	Not connection
30	RESET	-This signal will reset the device and it must be applied to properly initialize the chip. -Signal is active low.
31	IM1	0: 80-8bit parallel I/F DB[7:0] 1: 80-9bit parallel I/F DB[8:0]
32	GND	Power ground
33	K	Backlight LED Ground
34	A	Backlight LED Power
35~38	NC	Not connection
39	GND	Power ground
40	GND	Power ground

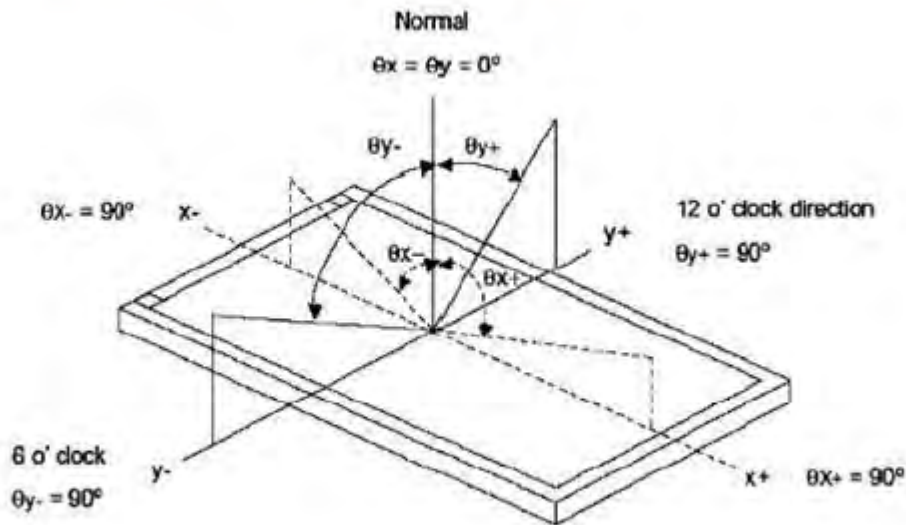


5. OPTICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
				MIN	TYP.	MAX		
Luminance		L			600		Cd/m ²	
Contrast ratio		CR	$\theta = 0^\circ$	800	1000			
Response time		T _{ON}			25	35	ms	
		T _{OFF}						
CIE COLOUR COORDINATE	RED	RX	VIEWING NORMAL ANGLE	0.636	0.646	0.656		
		RY		0.330	0.340	0.350		
	GREEN	GX		0.280	0.290	0.300		
		GY		0.548	0.558	0.568		
	BLUE	BX		0.125	0.135	0.145		
		BY		0.114	0.124	0.134		
	WHITE	WX		0.295	0.305	0.315		
		WY		0.318	0.328	0.338		
VIEWING ANGLE	Hor.	θ_{x+}	CR $\geq$ 10	80	89		Degree	
		θ_{x-}		80	89			
	Ver.	θ_{y+}		80	89			
		θ_{y-}		80	89			



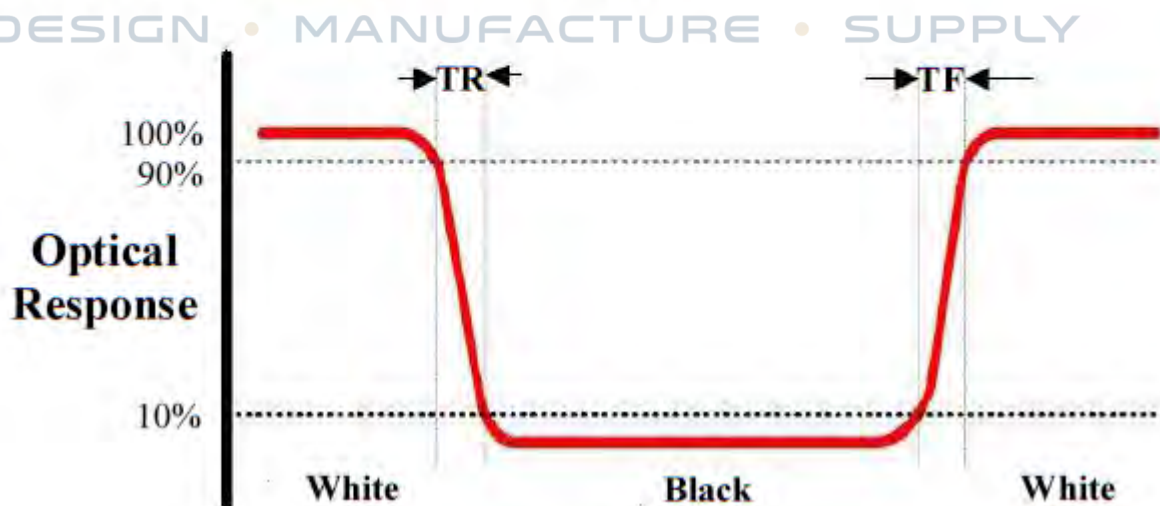
Note 1: Definition of Viewing Angle θ_x and θ_y :



Note 2: Definition of contrast ratio CR:

$$CR = \frac{\text{Luminance of white state}}{\text{Luminance of black state}}$$

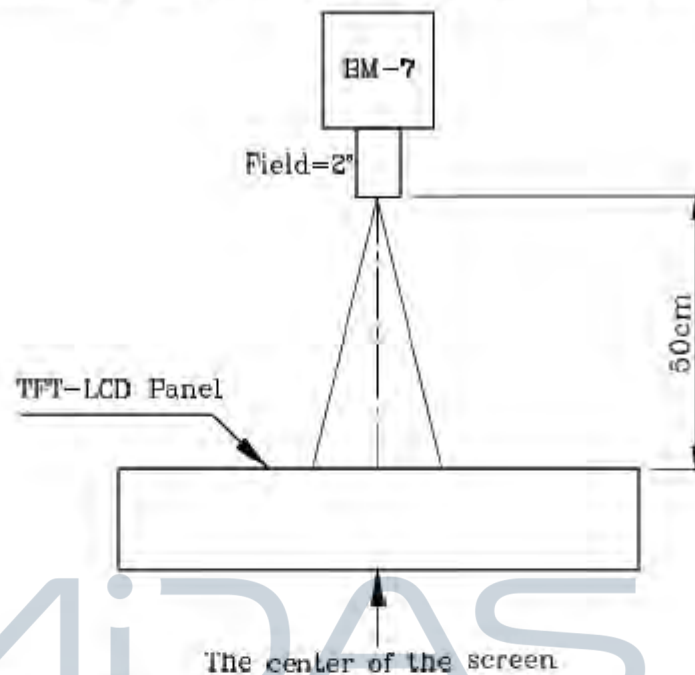
Note 3: Definition of Response Time (T_r, T_f)



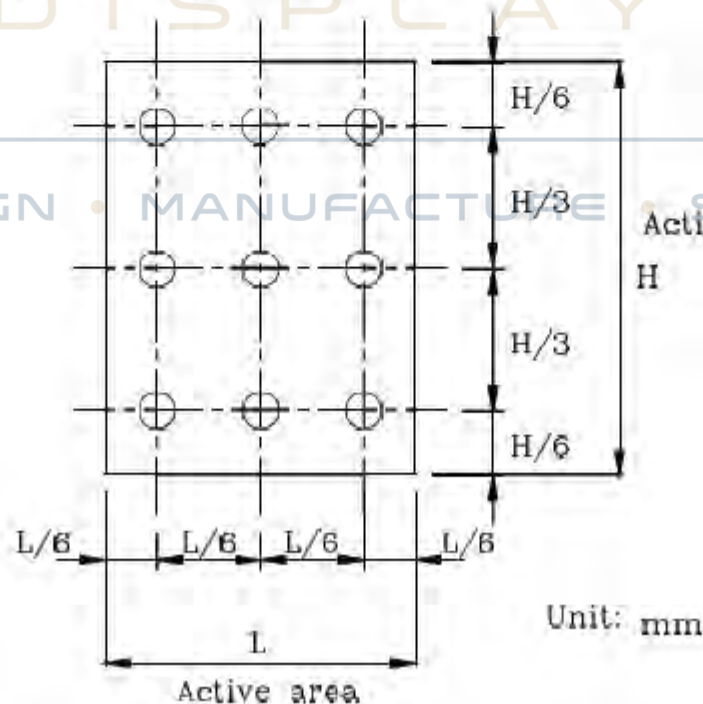
Note 4: Definition of Luminance

① The Brightness Test Equipment Setup

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



② The Brightness Test Point Setup



6. ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT
Power Supply Voltage	VDD	-0.3	4.6	V
Supply voltage for logic	VDDI	-0.3	4.0	V
Supply current (One LED)	I _{LED}		30	mA
Operating temperature	Top	-20	+70	°C
Storage temperature	Tst	-30	+80	°C

MIDAS
DISPLAYS

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7. ELECTRICAL CHARACTERISTICS

7.1 ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Power supply	VDD	Ta=25°C	2.4	2.75	3.3	V	
Power supply	VDDI	Ta=25°C	1.65	1.8	3.3	V	
Input voltage	VIH	Ta=25°C	0.7VDDI	-	VDDI	V	
	VIL	Ta=25°C	GND	-	0.3VDDI	V	

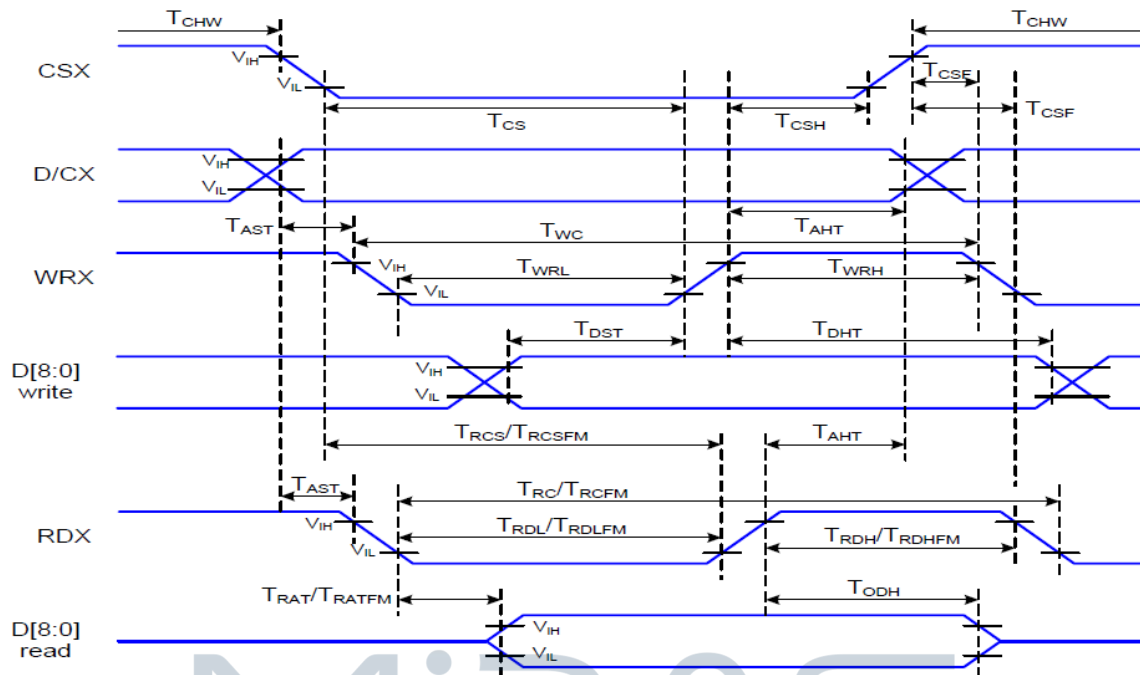
7.2 BACKLIGHT CHARACTERISTICS

Item	Symbol	Condition	Min	Typ.	Max	Unit	Note
Supply voltage	Vr	-		6.0		V	
Supply current	If	-		80		mA	
Power consumption	P			0.48		W	
LED life time	-	-	30,000	-	-	Hr	

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8.TIMING CHARACTERISTICS



8080 Series MCU Parallel Interface Characteristics: 9/8-bit Bus

Signal	Symbol	Parameter	Min	Max	Unit	Description
D/CX	T _{AST}	Address setup time	0	-	ns	-
	T _{AHT}	Address hold time (Write/Read)	10	-	ns	
CSX	T _{CHW}	Chip select "H" pulse width	0	-	ns	-
	T _{CS}	Chip select setup time (Write)	15	-	ns	
	T _{RCS}	Chip select setup time (Read ID)	45	-	ns	
	T _{RCSFM}	Chip select setup time (Read FM)	355	-	ns	
	T _{CSF}	Chip select wait time (Write/Read)	10	-	ns	
	T _{CSH}	Chip select hold time	10	-	ns	
WRX	T _{WC}	Write cycle	66	-	ns	-
	T _{WRH}	Control pulse "H" duration	15	-	ns	
	T _{WRL}	Control pulse "L" duration	15	-	ns	
RDX (ID)	T _{RC}	Read cycle (ID)	160	-	ns	When read ID data
	T _{RDH}	Control pulse "H" duration (ID)	90	-	ns	
	T _{RDL}	Control pulse "L" duration (ID)	45	-	ns	
RDX (FM)	T _{RCFM}	Read cycle (FM)	450	-	ns	When read from frame memory
	T _{RDHFM}	Control pulse "H" duration (FM)	90	-	ns	
	T _{RDLFM}	Control pulse "L" duration (FM)	355	-	ns	
D[8:0]	T _{DST}	Data setup time	10	-	ns	For CL=30pF



9.RELIABILITY TEST ITEMS AND CRITERIA

NO.	TEST ITEM	CONDITIONS	
1	HIGH TEMPERATURE STORAGE	TA=+80℃	240H
2	LOW TEMPERATURE STORAGE	TA=-30℃	240H
3	HIGH TEMPERATURE OPERATION	TA=+70℃	240H
4	LOW TEMPERATURE OPERATION	TA=-20℃	240H
5	HIGH TEMPERATURE AND HIGH HUMIDITY OPERATION	+60℃, 90%RH	240H



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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°C). Whenever possible, the LCD modules should be stored in the same conditions in which they were shipped from our company.

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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.

