

MDT035000R	320x240	24 BIT-RGB + SPI Interface	TFT Module
Specification			
Version: 1		Date: 19/09/2020	
Revision			
1	17/09/2020	First issue	

Display Features			
Display Size	3.5"		
Resolution	320x240		
Orientation	Landscape		
Appearance	RGB		
Logic Voltage	3.3V		
Interface	24 BIT-RGB + SPI		
Brightness	440 cd/m ²		
Touchscreen	RTP		
Module Size	76.90 x 63.90 x 4.59 mm		
Operating Temperature	-20°C ~ +70°C	Created By	Checked By
Pinout	54 way FFC	CL	TSB
Pitch	0.50mm	Box Quantity	Weight / Display
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* - For full design functionality, please use this specification in conjunction with the ST7272A display driver specification.(Provided Separately)

Display Accessories	
Part Number	Description
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	3.5	INCH
LCD TYPE	TFT/IPS/NORMALLY BLACK/TRANSMISSIVE	
MODULE SIZE	76.90*63.90*4.59	MM
ACTIVE AREA	70.08*52.56	MM
PIXEL PITCH	0.219*0.219	MM
NUMBER OF PIXELS	320 *240	
DRIVER IC	ST7272A	
INTERFACE TYPE	24 BIT-RGB + SPI	
TOP POLARIZER TYPE	Anti-glare	
VIEWING DIRECTION	ALL	O'CLOCK
GRAY SCALE INVERSION DIRECTION	-	O'CLOCK
BACKLIGHT TYPE	6-DIES WHITE LED	
TOUCH PANEL	RTP	

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Touch Panel Features

Type:	4-Wire Analogy Resistive Touch Panel
Input Mode:	Stylus or Finger
ITO Film:	0.188 mm (T)
ITO Glass:	1.1 mm (T)
Connector:	FPC

TOUCH PANEL MECHANICAL CHARACTERISTICS

Surface Hardness: 3H or more (according to JIS-K5400).

TOUCH PANEL OPTICAL CHARACTERISTICS

Transmittance: 80% Typical.

TOUCH PANEL RATING

1. Maximum Voltage

Less than DC 7 volts.

2. Operating Temperature Range

- 20°C to 70°C (Humidity: 20% RH to 70% RH, No condensation of dew).

3. Storage Temperature Range

- 30°C to 80°C (Humidity: 20% RH to 80% RH, No condensation of dew).

TOUCH PANEL ELECTRICAL CHARACTERISTICS

1. Resistance between Terminals

Direction "Y": 190~430Ω

Direction "X": 320~710Ω

2. Linearity

X axis: $\leq \pm 1.5\%$

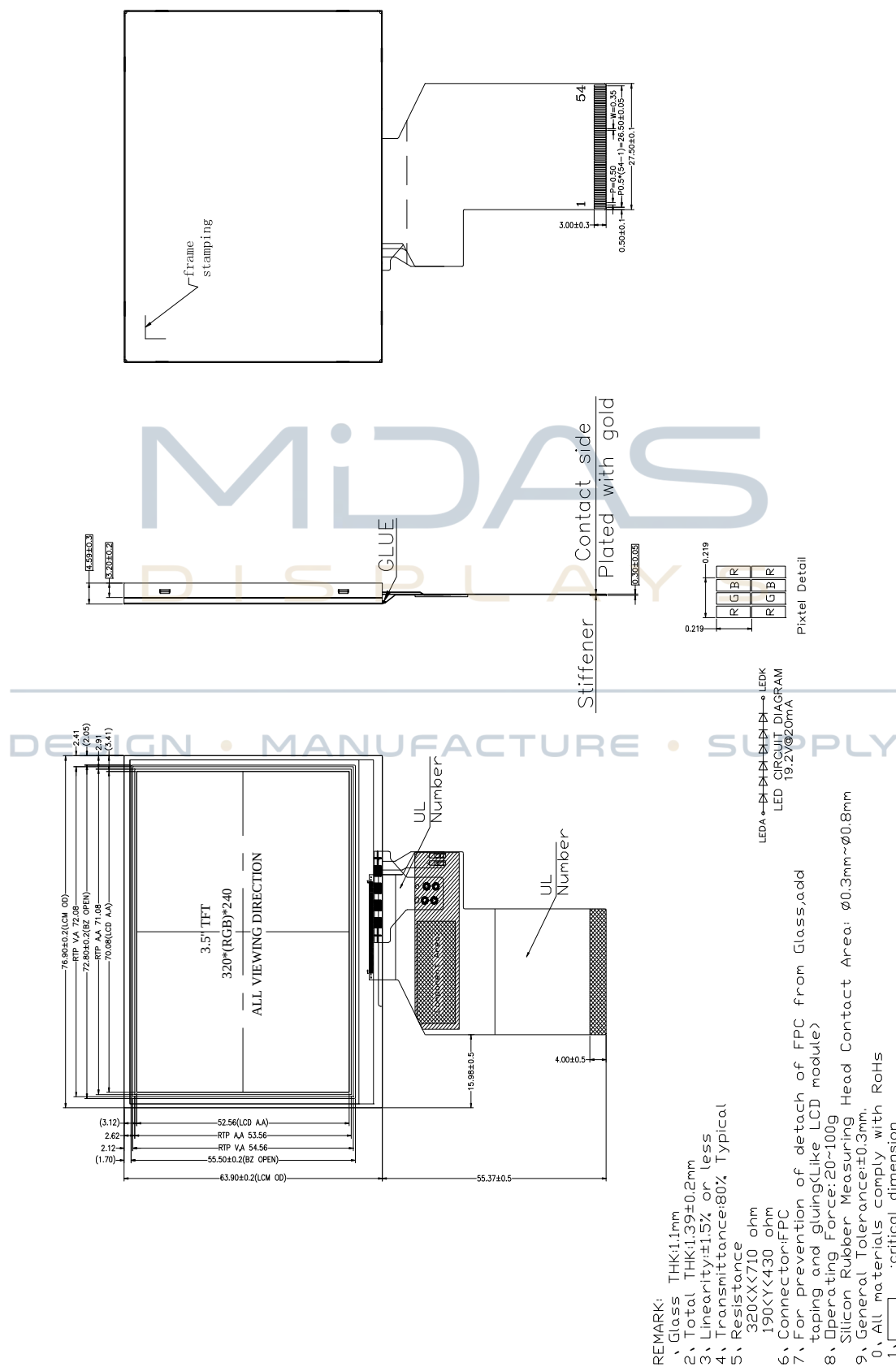
Y axis: $\leq \pm 1.5\%$

3. Insulation Resistance: 20MΩ or more at DC 25 V.

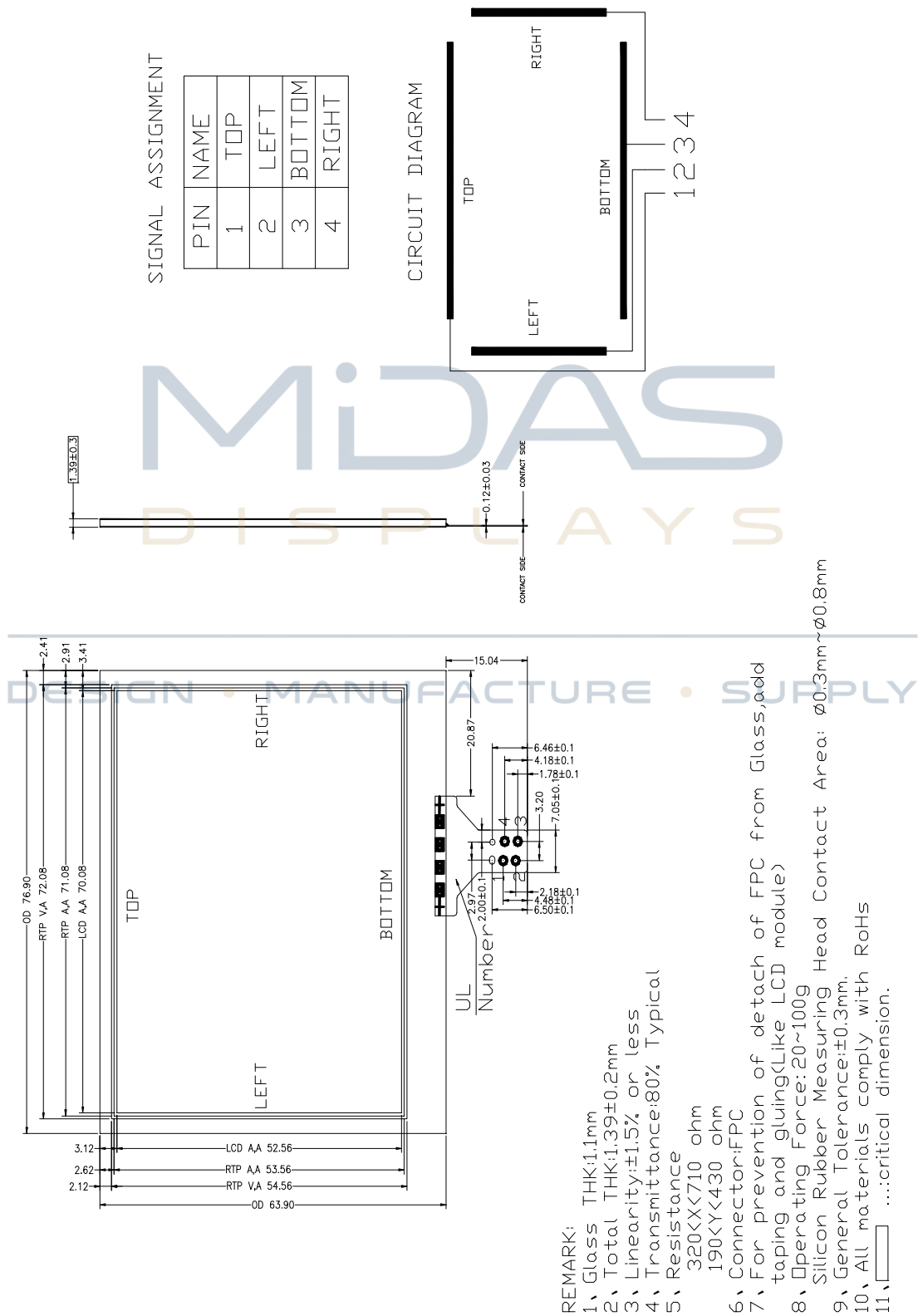
4. Chattering Time: 10 msec or less at 100kΩ Pull-up.

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2. EXTERNAL DIMENSIONS

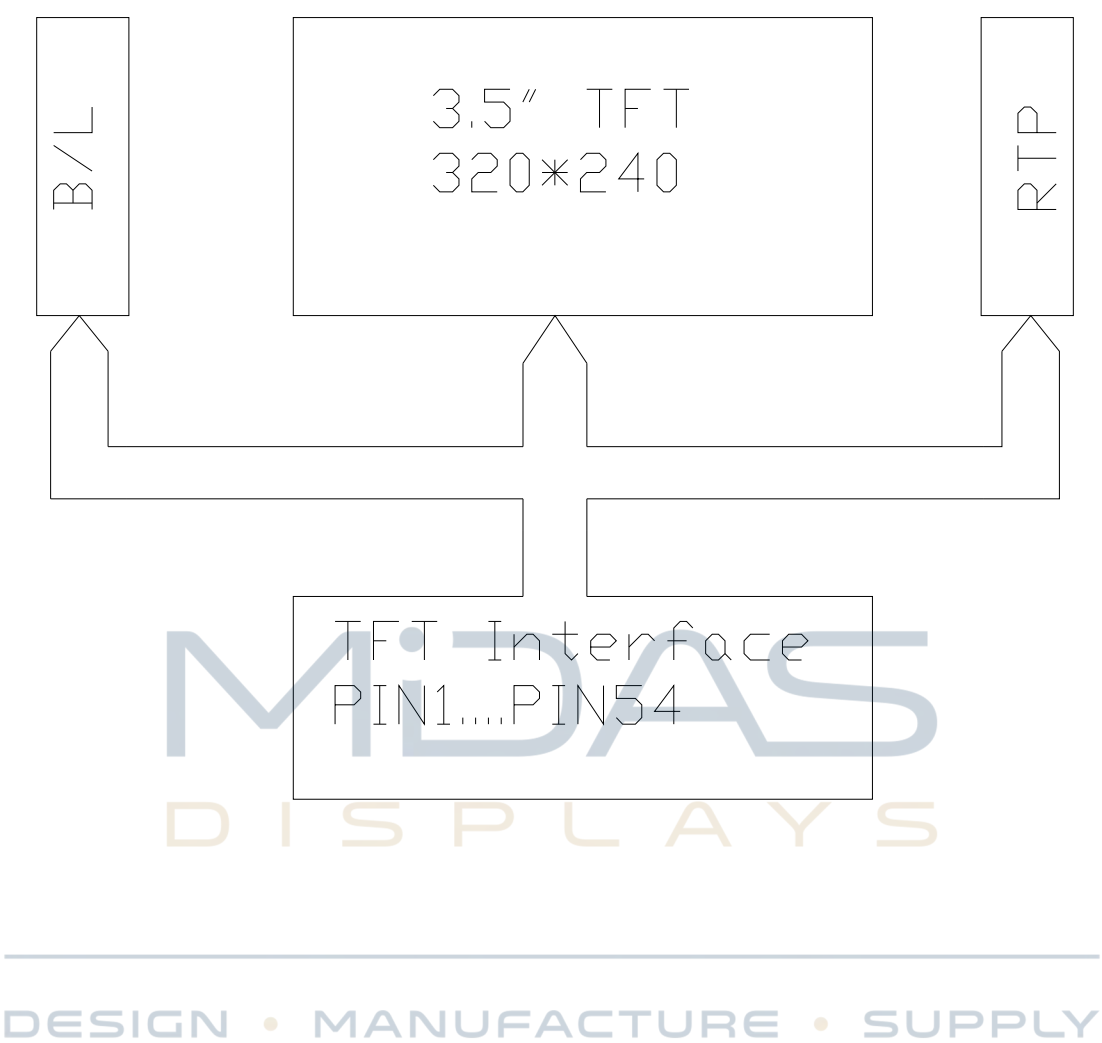


Touch Panel:



RTP03504

3. BLOCK DIAGRAM



4. PIN ASSIGNMENT

Pin No.	Symbol	Description
1	LEDK	Cathode of LED
2	LEDK	Cathode of LED
3	LEDA	Anode of LED
4	LEDA	Anode of LED
5	XR	Touch panel control
6	YD	Touch panel control
7	NC	No connect
8	RESET	Reset pin
8	SPENA	Chip select of serial interface
10	SPCLk	Clock pin of serial interface
11	SPDAT	Data input pin of serial interface
12~19	B0~B7	Blue data bus
20~27	G0~G7	Green data bus
28~35	R0~R7	Red data bus
36	HSYNC	Horizontal sync signal, negative polarity
37	VSYNC	Vertical sync signal, negative polarity
38	DCLK	Clock signal ,latching data at the falling edge
39	NC	No connect
40	NC	No connect
41	VDD	Power supply
42	VDD	Power supply
43	XL	Touch panel control
44	YU	Touch panel control
45~56	NC	No connect
52	DEN	Display enable pin from controller
53	GND	Power ground
54	GND	Power ground

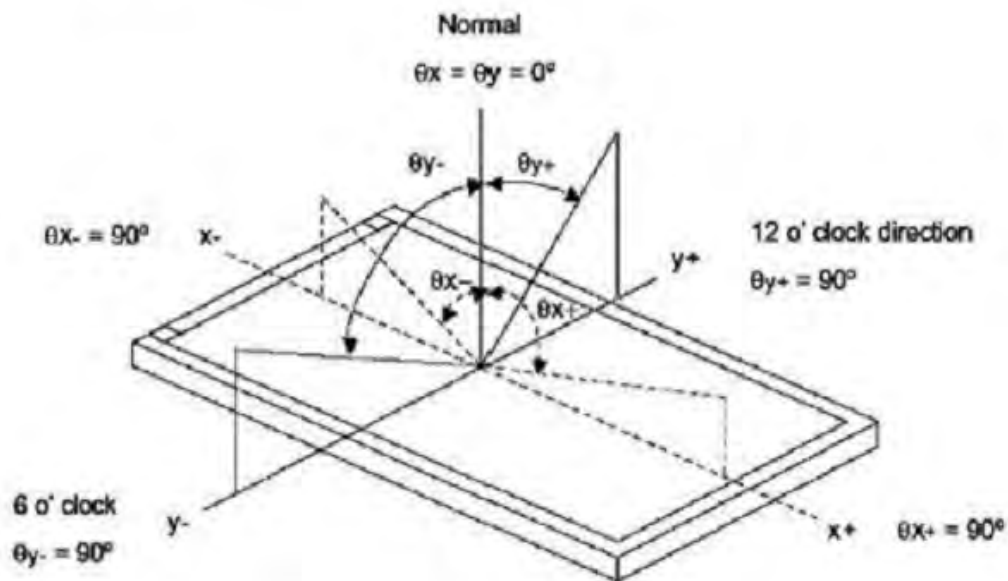


5. OPTICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
				MIN	TYP.	MAX		
Luminance		L	$I_L=20\text{mA}$	352	440	528	Cd/m^2	
Contrast ratio		CR	$\theta =0^\circ$	640	800			
Response time		T_R+T_F			30	40	msec	
CIE COLOUR COORDINATE	RED	RX	VIEWING NORMAL ANGLE	0.626	0.646	0.666		
		RY		0.312	0.332	0.352		
	GREEN	GX		0.303	0.323	0.343		
		GY		0.547	0.567	0.587		
	BLUE	BX		0.114	0.134	0.154		
		BY		0.101	0.121	0.141		
	WHITE	WX		0.297	0.317	0.337		
		WY		0.319	0.339	0.359		
VIEWING ANGLE	Hor.	θ_{x+}	$CR\geq 10$	70	80		Degree	
		θ_{x-}		70	80			
	Ver.	θ_{y+}		70	80			
		θ_{y-}		70	80			
Uniformity	Un			80			%	



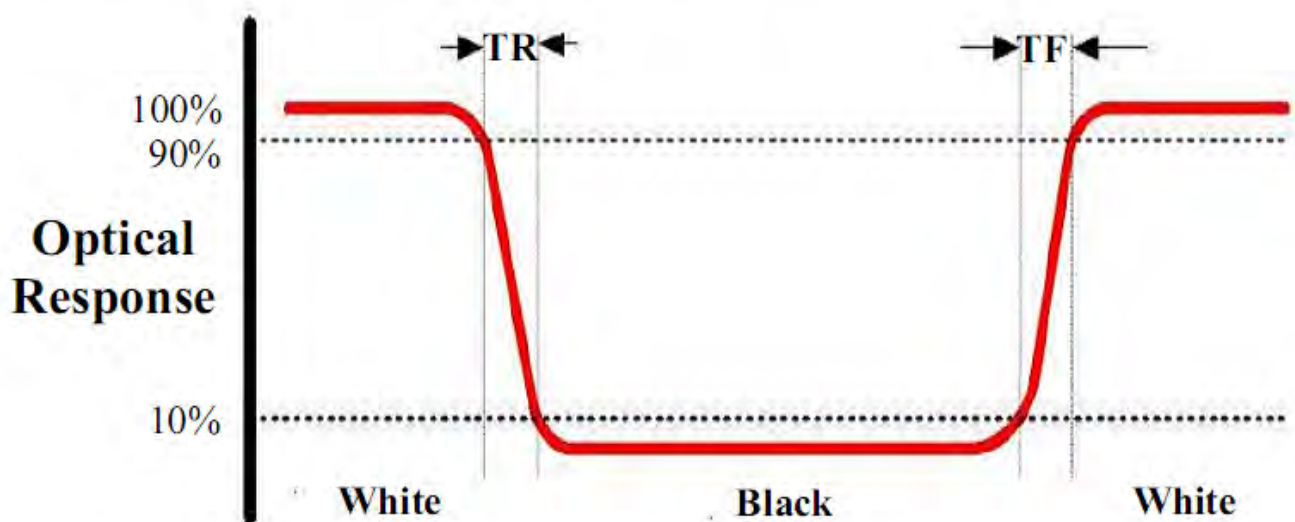
Note 1: Definition of Viewing Angle θ_x and θ_y :



Note 2: Definition of contrast ratio CR:

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

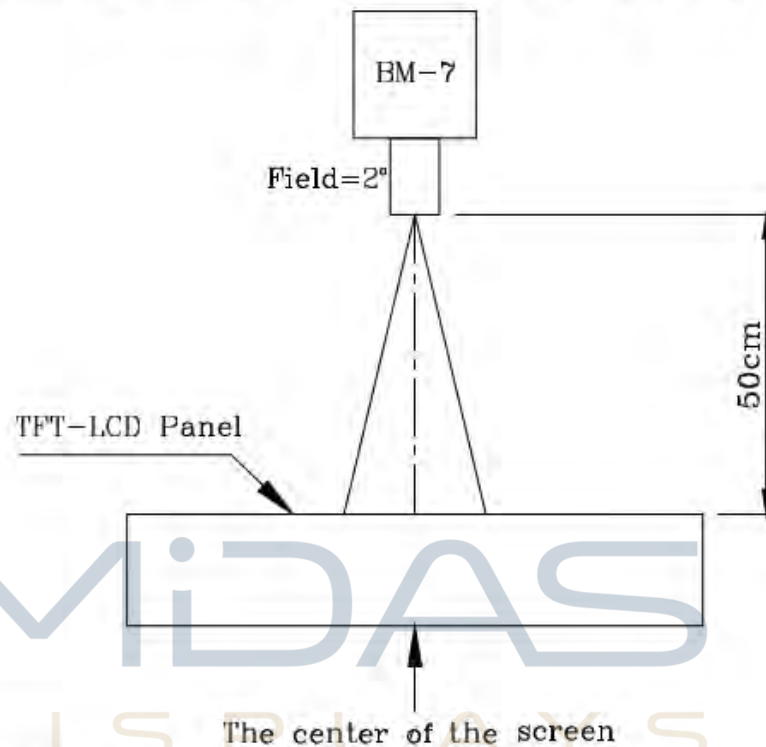
Note 3: Definition of Response Time (T_r, T_f)



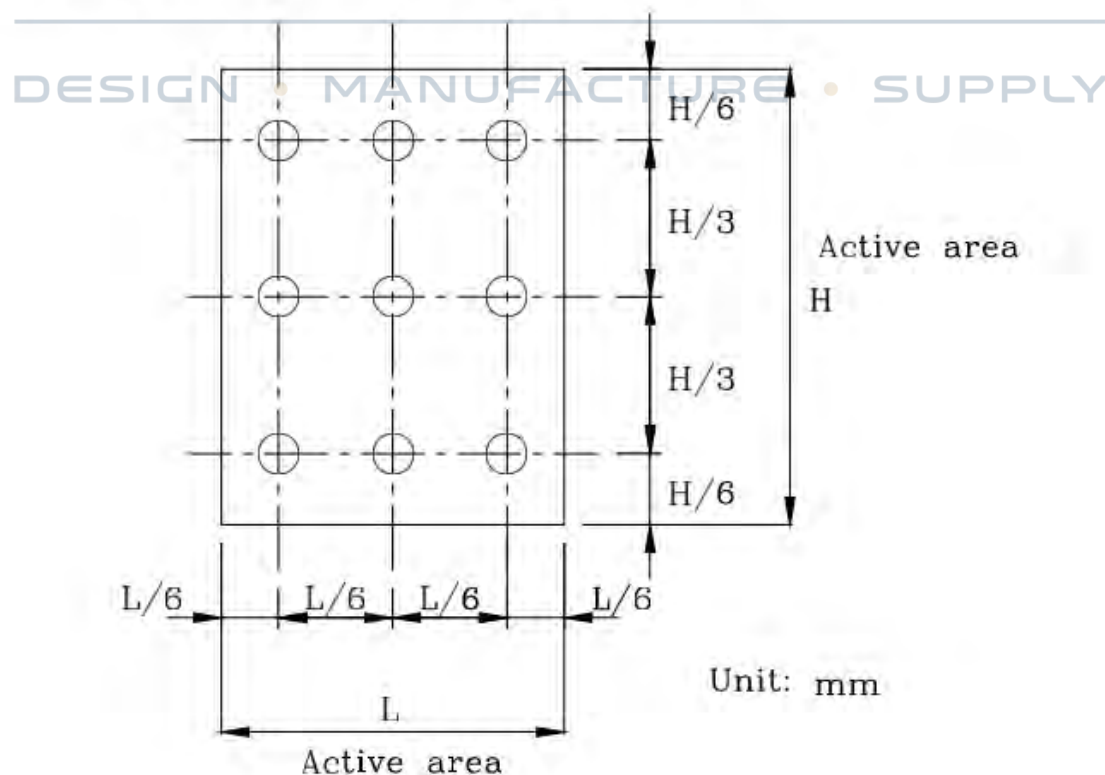
Note 4: Definition of Luminance

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
Power Supply Voltage	VDD	-0.3	4.5	V
Supply voltage for logic	VDD	-0.3	4.5	V
Supply current (One LED)	I _{LED}		30	mA
Operating temperature	Top	-20	+70	°C
Storage temperature	Tst	-30	+80	°C

7. ELECTRICAL CHARACTERISTICS

7.1 Input power

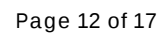
ITEM	SYMBOL	Min	TYP	MAX	UNIT
Supply voltage for analog	VDD	3.0	3.3	3.6	V
Supply voltage for logic	VDD	3.0	3.3	3.6	V
Input voltage	V _{IL}	GND	-	0.3VDD	
	V _{IH}	0.7VDD	-	VDD	
Input leakage current	I _{LKG}	-1		1	μA

7.2 Backlight Driving Conditions

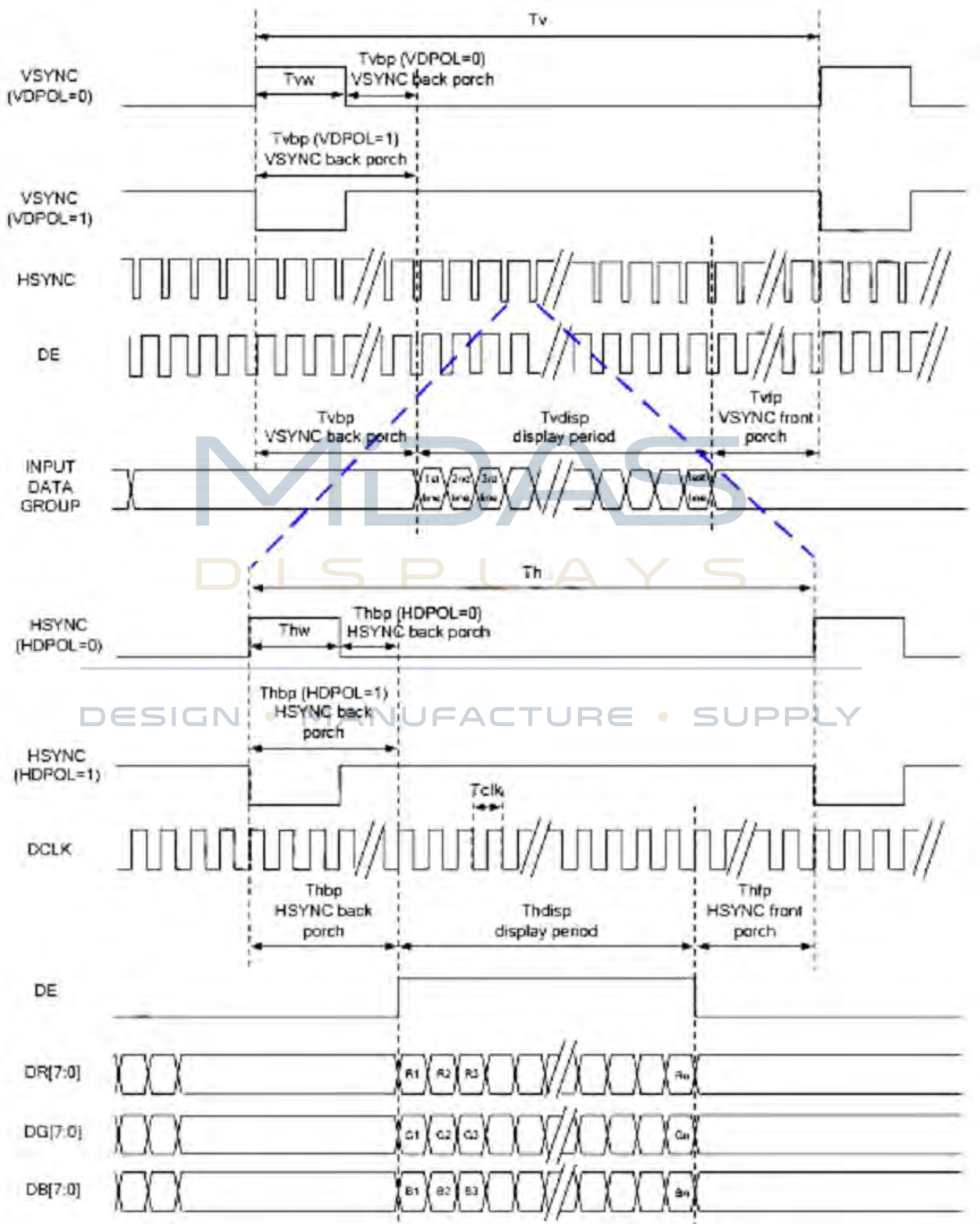
ITEM	SYMBOL	SPECIFICATIONS			UNIT	Remark
		MIN	TYP.	MAX		
Voltage for LED backlight	V _f	16.8	18.6	20.4	V	IL=20mA
Current for LED backlight	I _L		20		mA	
Power consumption	P		0.375		W	
LED life time		30000	50000		H _r	



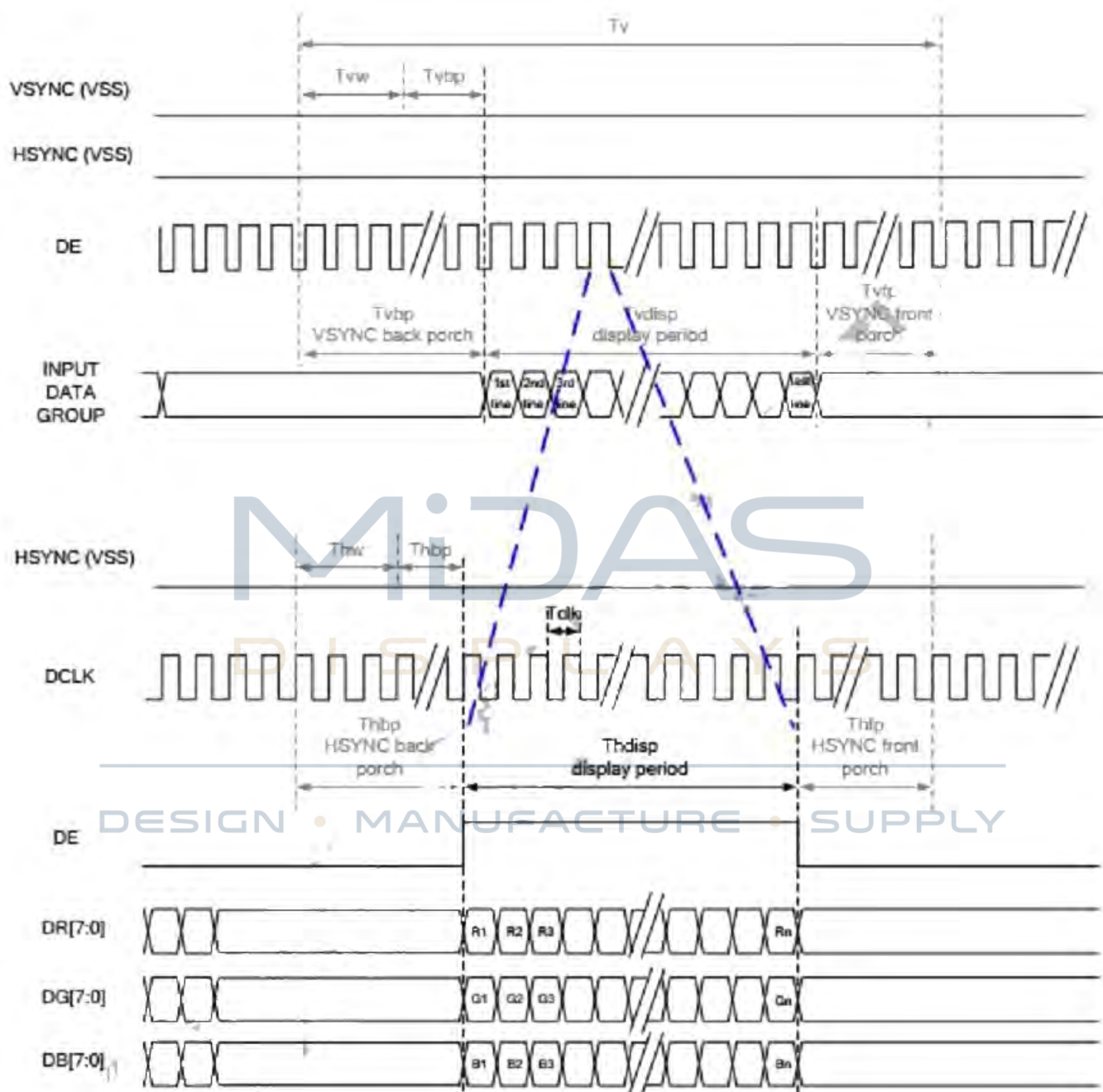
7.3.1 SYNC MODE



7.3.2 SYNC DE-MODE



7.3.3 DE MODE



RGB Mode Selection Table	DCLK	HSYNC	VSYNC	DE
SYNC - DE Mode	Input	Input	Input	Input
SYNC Mode	Input	Input	Input	GND
DE Mode	Input	GND	GND	Input

Note: "Input" means these signals are driven by host side.

7.3.4 Parallel 24 bit RGB Timing Table

Parallel 24-bit RGB Input Timing (PVDD=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C)

Parallel 24-bit RGB Input Timing Table						
Item	Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency	Fclk	5	6	8	MHz	
DCLK Period	Tclk	125	167	200	ns	
HSYNC	Period Time	Th	325	371	438	DCLK
	Display Period	Thdisp		320		DCLK
	Back Porch	Thbp	3	43	43	DCLK
	Front Porch	Thfp	2	8	75	DCLK
	Pulse Width	Thw	2	4	43	DCLK
VSYNC	Period Time	Tv	244	260	289	HSYNC
	Display Period	Tvdisp		240		HSYNC
	Back Porch	Tvbp	2	12	12	HSYNC
	Front Porch	Tvfp	2	8	37	HSYNC
	Pulse Width	Tvw	2	4	12	HSYNC

Note: It is necessary to keep Tvbp =12 and Thbp =43 in sync mode. DE mode is unnecessary to keep it.

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8. RELIABILITY TEXT

8.1standard Specification for Reliability of LCDModule

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 HUNMIDITY(OPERATING)	+60℃ , 90%RH,	240H



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9. 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 polarizer 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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10. 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.

