DisplayModule

DM-TFT35-387

3.5" IPS 320x240 High Brightness TFT Display Panel –RGB

Contents

1 Revision History

Date	Changes
2019-05-16	First release
2019-07-18	Second release

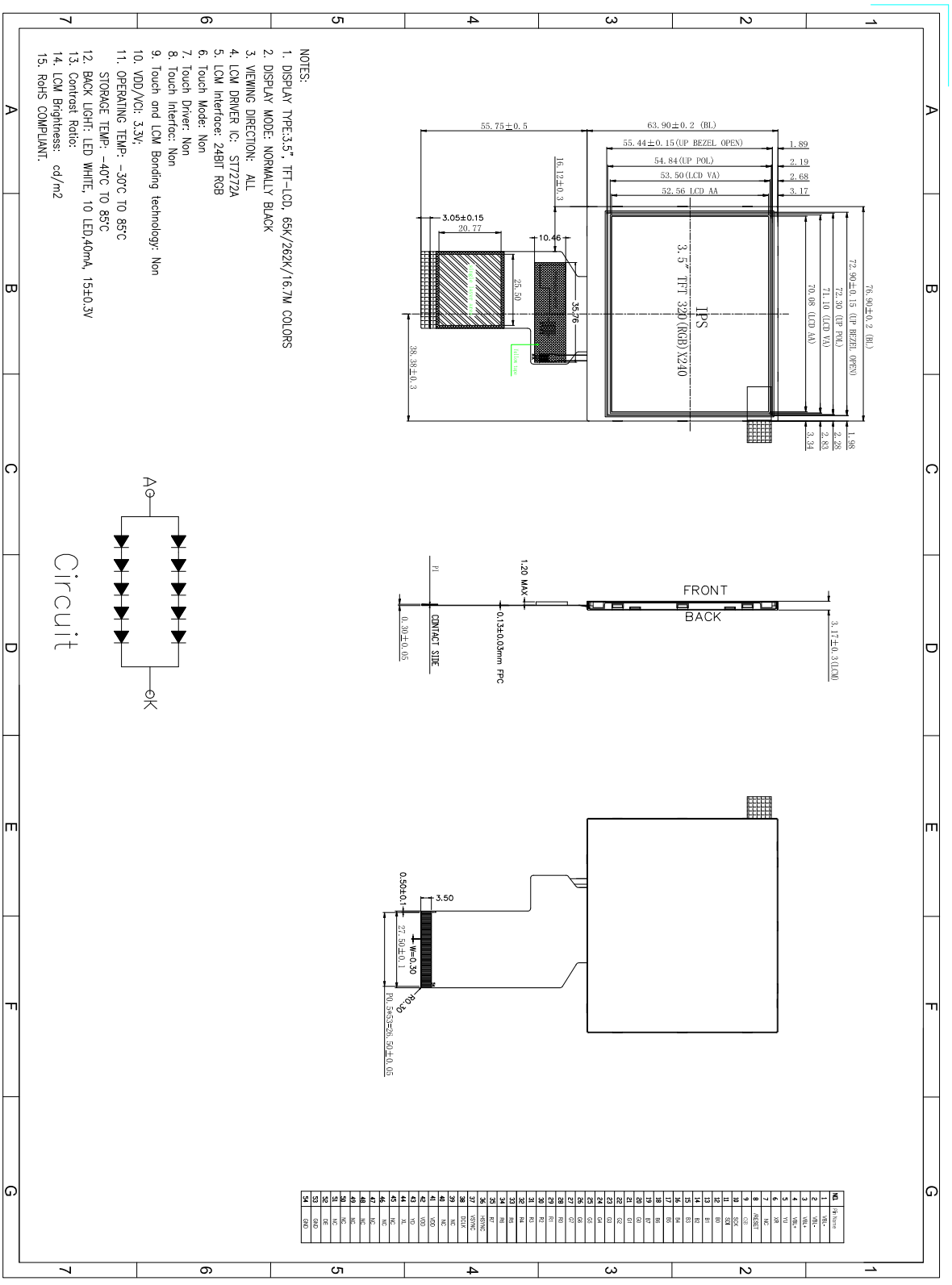
2 Main Features

Item	Specification	Unit
Size	3.5	Inch
Resolution	320(RGB) x240	pixel
Module Dimension	76.9 x 63.9 x 3.17	mm
Display area	70.08 x 52.56	mm
Pixel pitch	0.219 x 0.218	mm
TFT Controller IC	ST7272A	-
Interface	24bit RGB	-
Display Color	65K/262K/16.7M	colors
View Direction	ALL	O'clock
Display mode	Transmissive / Normally Black	-
Weight	27	g

3 Pin Description

No.	Symbol	Description
1	VBL-	Cathode pin of backlight.
2	VBL-	Cathode pin of backlight.
3	VBL+	Anode pin of backlight.
4	VBL+	Anode pin of backlight.
5	YU(NC)	Touch panel Top Film Terminal
6	XR(NC)	Touch panel Right Glass Terminal
7	NC	--
8	/RESET	Global reset pin. When GRB is “L”, internal initialization procedure is executed.
9	CSB	Serial communication chip selection.
10	SCK	Serial communication clock input.
11	SDI	Serial communication data input and output.
12-19	B0-B7	8 bit data bus display blue data. B[7:0] are not used in 8-bit RGB interface and should be connected to “L”
20-27	G0-G7	8 bit data bus display green data. DG[7:0] are used in 8-bit RGB interface.
28-35	R0-R7	8 bit data bus display red data. DR[7:0] are not used in 8-bit RGB interface and should be connected to “L”
36	HSYNC	Horizontal sync signal, default is negative polarity.
37	VSYNC	Vertical sync signal, default is negative polarity.
38	DCLK	Pixel clock input pin
39	NC	--
40	NC	--
41	VDD	Supply voltage(3.3V).
42	VDD	Supply voltage(3.3V).
43	YD(NC)	Touch panel Bottom Film Terminal
44	XL(NC)	Touch panel LEFT Glass Terminal
45	NC	--
46	NC	--
47	NC	--
48	NC	--
49	NC	--
50	NC	--
51	NC	--
52	DE	“Data input enable. Display access is enabled when DE is “H”
53	GND	Ground.
54	GND	Ground.

4 Mechanical Drawing



5 Optical & Electrical Characteristics

5.1 Optics Characteristics

Item	Symbol	Min	Typ	Max	Unit	Remark
View Angles TOP	ΘU	70	80	-	deg	CR ≥ 10
View Angles Bottom	ΘD	70	80	-	deg	
View Angles Right	ΘR	70	80	-	deg	
View Angles Left	ΘL	70	80	-	deg	
C.I.E(Red)	(x) (y)	0.580 0.314	0.620 0.354	0.660 0.394	-	Θ=0 Normal viewing angle
C.I.E(Green)	(x) (y)	0.317 0.563	0.357 0.603	0.397 0.643	-	
C.I.E(Blue)	(x) (y)	0.110 0.041	0.150 0.081	0.190 0.121	-	
C.I.E(White)	(x) (y)	0.287 0.330	0.327 0.370	0.367 0.410	-	
Uniformity	S(%)	55	60	-	%	C-light
Response Time	$T_R + T_F$	-	30	40	ms	-
Contrast Ratio	CR	640	800	-	-	-

- Measuring surrounding：dark room
- Ambient temperature：25±2°C
- 15min. warm-up time

5.2 Absolute Maximum Ratings

Item	Symbol	Min	Max	Unit	Remark
Digital Supply Voltage	VDD	-0.3	4.0	V	Note
Operating Temperature	TOP	-30	+85	℃	
Storage Temperature	TST	-40	+85	℃	

Note: If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily,the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the range of the absolute maximum ratings.

5.3 DC Characteristics

Item	Symbol	Min	Typ	Max	Unit
Digital Supply Voltage	VDD	3.0	3.3	3.6	V
Normal mode Current	IDD	-	31	-	mA
Low Level Input Voltage	V_{IL}	GND	-	0.3 x VDD	V
High Level Input Voltage	V_{IH}	0.7 x VDD	-	VDD	V
Low Level Output Voltage	V_{OL}	GND	-	GND+0.4	V
High Level Output Voltage	V_{OH}	VDD-0.4	-	VDD	V

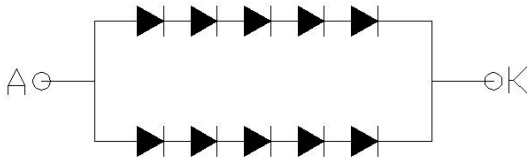
5.4 LED Backlight Characteristics

Item	Symbol	Min	Typ	Max	Unit	Remark
Forward Current	I_F	-	40	-	mA	
Forward Voltage	V_F	-	15	-	V	
LCM Luminance (I_F =20mA)	LV	800	920	-	cd/m^2	Note3
LED life time	Hr	-	50000	-	Hour	Note1,2
Uniformity	Avg	80	-	-	%	Note3

The back-light system is edge-lighting type with 10 chips LED.

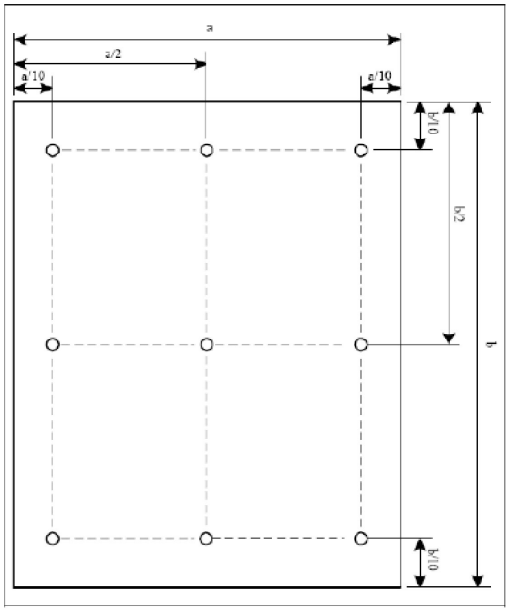
Note1:LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±3℃, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note2:The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and IL=40mA. The LED lifetime could be decreased if operating IL is larger than 40mA. The constant current driving method is suggested.



Circuit

Note3:Luminance Uniformity of these 9 points is defined as below:

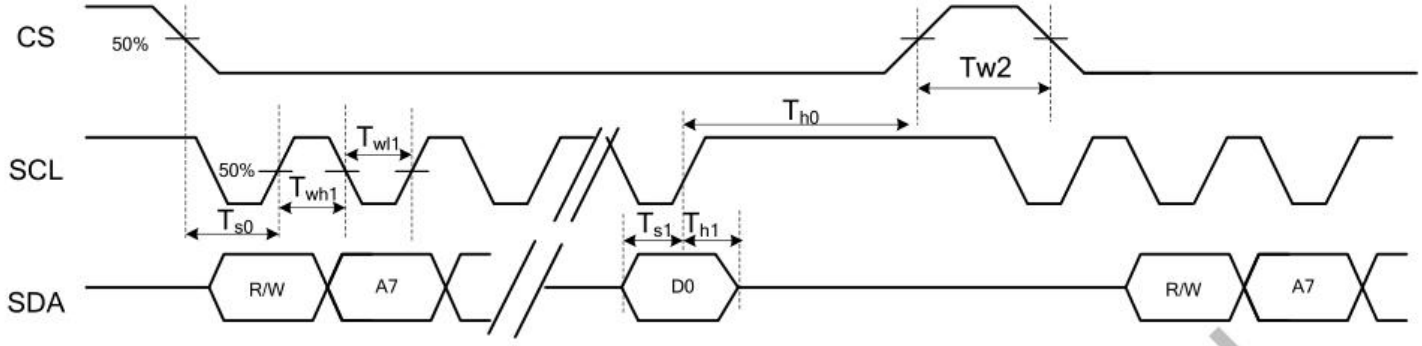


$$\text{Uniformity} = \frac{\text{minimun luminance in 9 point(1 - 9)}}{\text{maximun luminance in 9 point(1 - 9)}}$$

$$\text{Luminance} = \frac{\text{Total Luminance of 9 points}}{9}$$

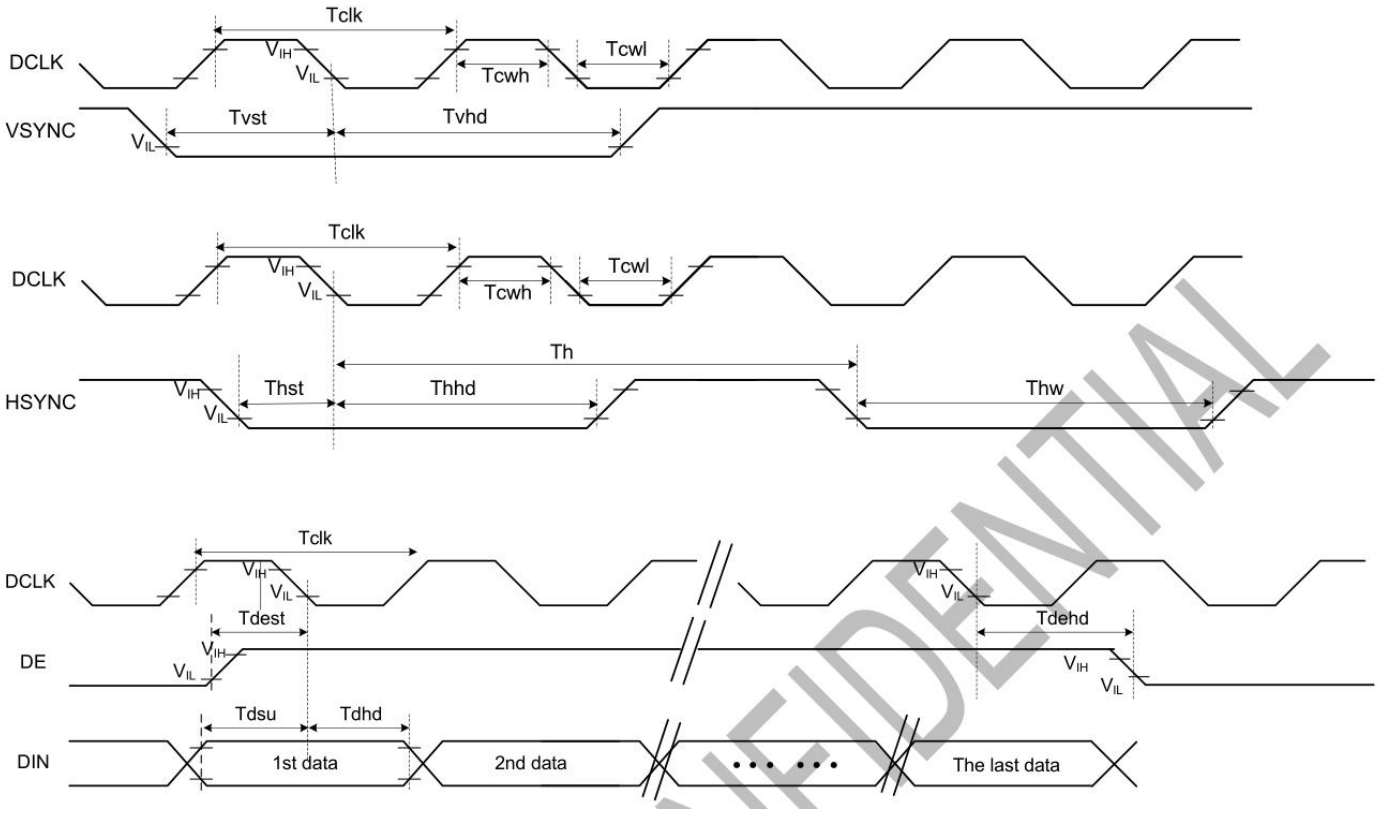
5.5 AC Characteristics

5.5.1 System Bus Timing for 3-Wire SPI Interface



Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
CS Input Setup Time	Ts0	50	-	-	ns	
Serial Data Input Setup Time	Ts1	50	-	-	ns	
CS Input Hold Time	Th0	50	-	-	ns	
Serial Data Input Hold Time	Th1	50	-	-	ns	
SCL Write Pulse High Width	Twh1	50	-	-	ns	
SCL Write Pulse Low Width	Twl1	50	-	-	ns	
SCL Read Pulse High Width	Trh1	300			ns	
SCL Read Pulse Low Width	Trl1	300			ns	
CS Pulse High Width	Tw2	400	-	-	ns	

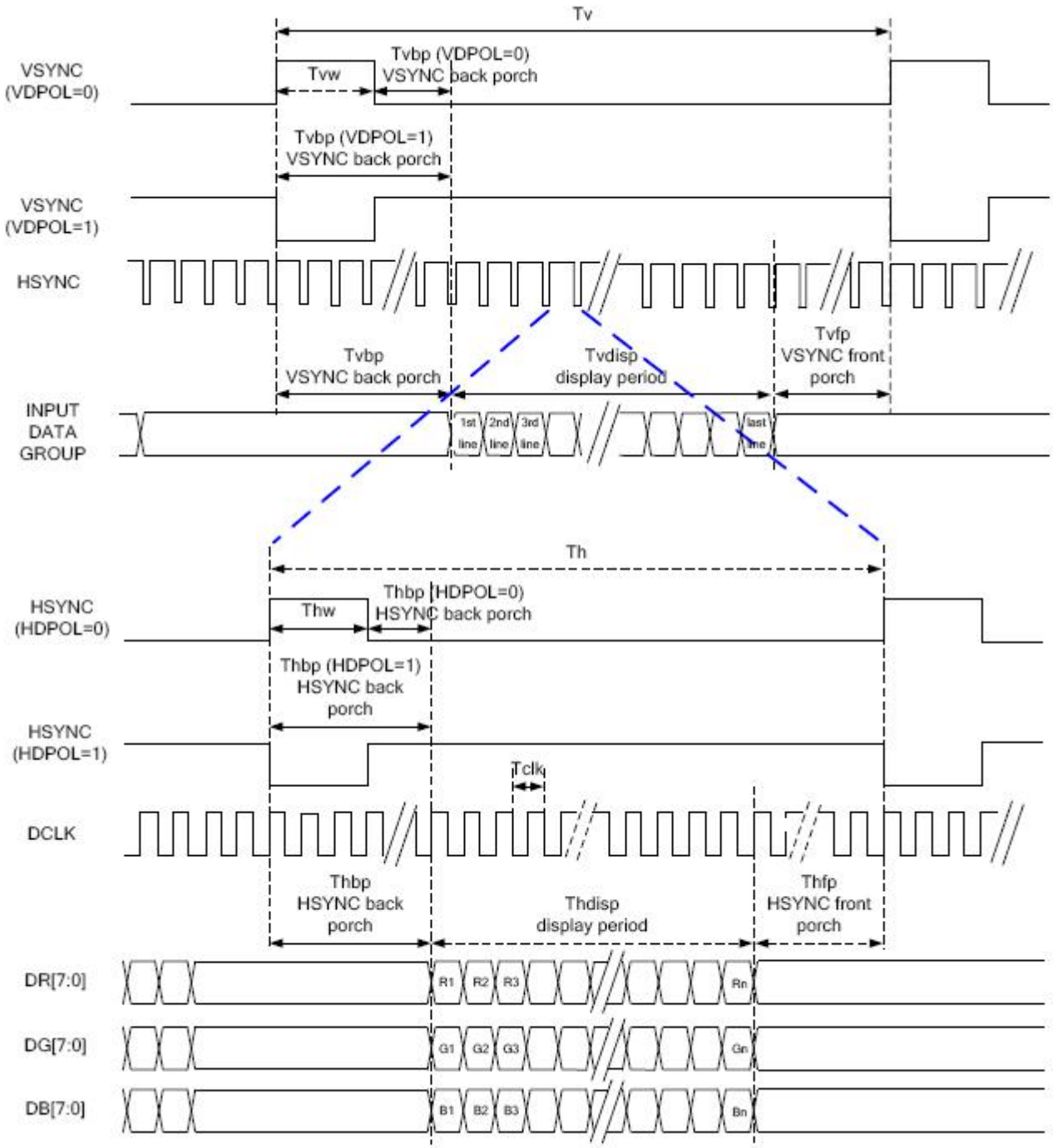
5.5.2 System bus timing for RGB interface



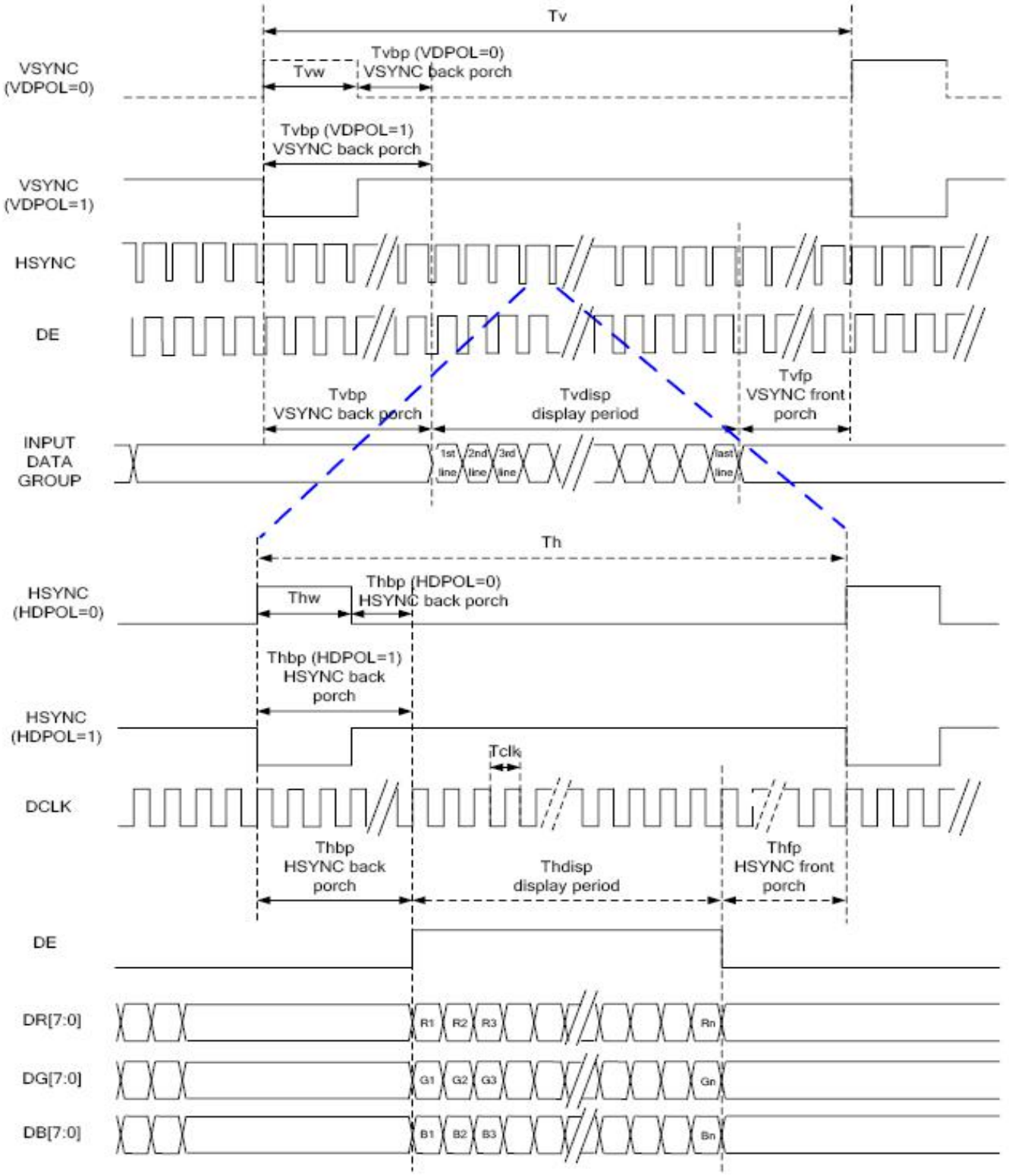
Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK Pulse Duty	Tclk	40	50	60	%	
HSYNC Width	Thw	2	-	-	DCLK	
HSYNC Period	Th	55	60	65	us	
VSYNC Setup Time	Tvst	12	-	-	ns	
VSYNC Hold Time	Tvhd	12	-	-	ns	
HSYNC Setup Time	Thst	12	-	-	ns	
HSYNC Hold Time	Thhd	12	-	-	ns	
Data Setup Time	Tdsu	12	-	-	ns	
Data Hold Time	Tdhd	12	-	-	ns	
DE Setup Time	Tdest	12	-	-	ns	
DE Hold Time	Tdehd	12	-	-	ns	

5.5.3 RGB interface

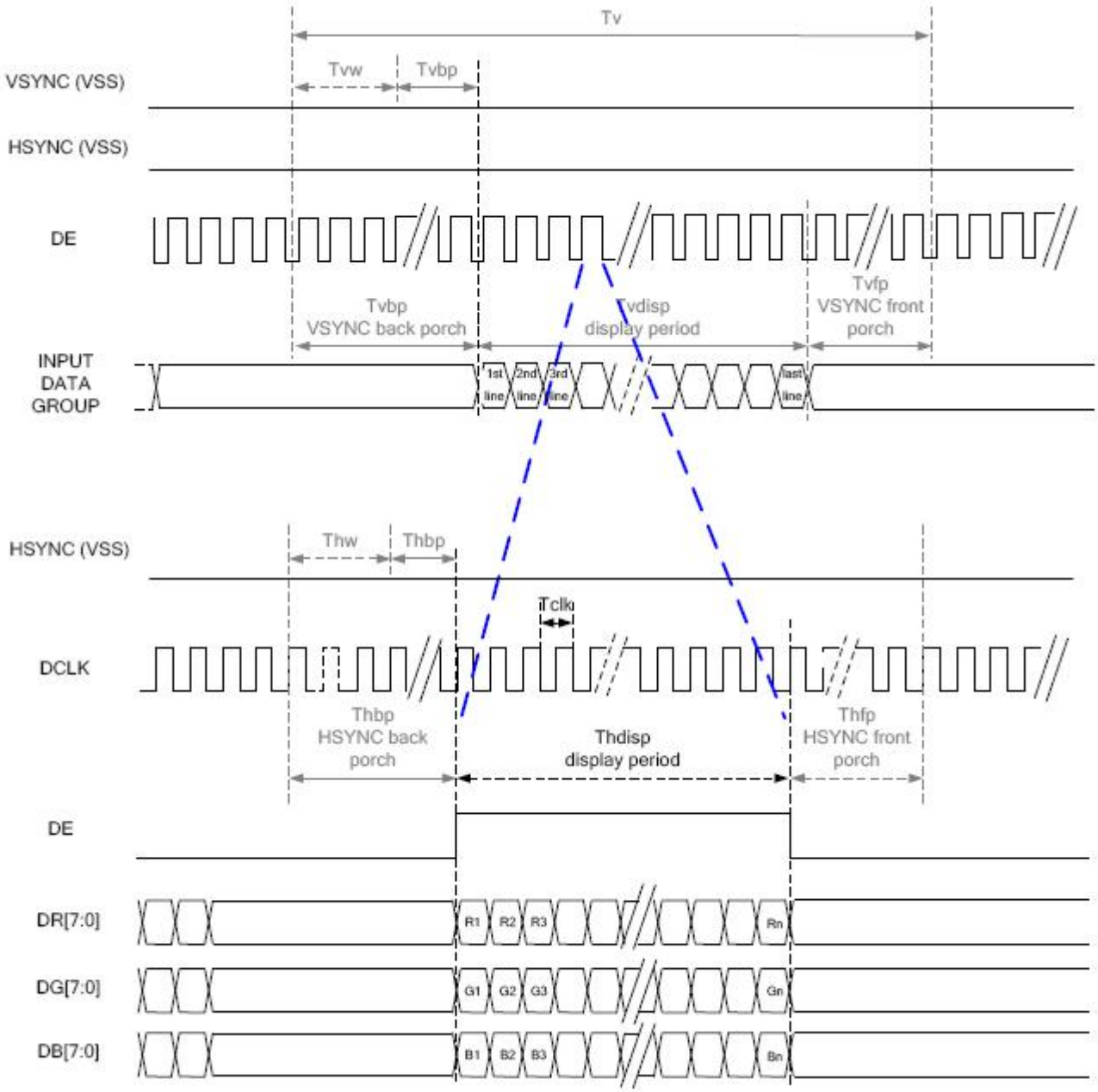
SYNC Mode



SYNC-DE Mode


Tv
Tvbp (VDPOL=0)
VSYNC back porch
Tvw
VSYNC
(VDPOL=0)
Tvbp (VDPOL=1)
VSYNC back porch
VSYNC
(VDPOL=1)
HSYNC
DE
Tvbp
VSYNC back porch
Tvdisp
display period
Tvfp
VSYNC front
porch
INPUT
DATA
GROUP
1st line
2nd line
3rd line
last line
Th
Thbp (HDPOL=0)
HSYNC back porch
Thw
HSYNC
(HDPOL=0)
Thbp (HDPOL=1)
HSYNC back
porch
HSYNC
(HDPOL=1)
Tclk
DCLK
Thbp
HSYNC back
porch
Thdisp
display period
Thfp
HSYNC front
porch
DE
DR[7:0]
R1
R2
R3
Rn
DG[7:0]
G1
G2
G3
Gn
DB[7:0]
B1
B2
B3
Bn

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.

Parallel 24-bit RGB Input 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	By H_BLANKING setting
	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	By V_BLANKING setting
	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.

6 Reliability

Test Item	Content of Test	Test Condition	Note
High Temperature Storage	Endurance test applying the high storage temperature for a long time.	85℃ 200hrs	2
Low Temperature Storage	Endurance test applying the high storage temperature for a long time.	-40℃ 200hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	85℃ 200hrs	-
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-30℃ 200hrs	1
High Temperature/ Humidity Operation	The module should be allowed to stand at 60℃,90%RH max, for 96hrs under no-load condition excluding the polarizer. Then taking it out and drying it at normal temperature.	60℃,90%RH 96hrs	1,2
Thermal Shock Resistance	The sample should be allowed stand the following 10 cycles of operation.	-40℃/85℃ 10 cycles	-
Vibration Test	Endurance test applying the vibration during transportation and using.	Total fixed amplitude: 15mm; Vibration: 10~55Hz; One cycle 60 seconds to 3 directions of X, Y, Z, for each 16 minutes.	3
Static Electricity Test	Endurance test apply the electric stress to the terminal.	VS=800V, RS=1.5kΩ, CS=100pF, 1 time.	-

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 rest chamber.

Note3: Test performed on product itself, not inside a container

7 Warranty and Conditions

http://www.displaymodule.com/pages/faq