

TFT-DISPLAY DATASHEET

ONation
Model: OT043AWDDDT-03

BRIEF SPEC.:

Main Feature

Landscape Type

White LED Backlight

Active Screen Area	95.04 x 53.86 (mm)
Diagonal Format	4,3 " 16:9
Resolution	480 x 272
Colors	16,7M (8-bit)
Backlight	LED
Brightness	450 cd/m ²
LED Life Time	N/A
Interface	TTL
Viewing Angle	-55~65(H), -50~60(V)
Touchscreen	no
Power Supply	3,3V (Typ.)
Module Outline	1 13,5 x 73 x 6,5 Typ (mm)
Operation Temperature	-20... +70 °C
Storage Temperature	-30... +80 °C
Surface Treatment	Clear



ONation Corporation

TFT COLOR LCD MODULE

MODEL: OT043AWDDDT-03
(Complied with RoHS)

WQVGA
TTL interface

Version: P0.3

Customer : _____
Approved By : _____
Date: _____

ONATION		
APPROVAL	CHECKER	PREPARE
<i>Ian</i>	<i>Ian</i>	<i>Josh</i>

[All information is subject to change without notice.](#)
[Please confirm the sales representative before starting to design your system](#)

CONTENTS

NO.	ITEM	PAGE
1	RECORD OF REVISION	0-1
2	MECHANICAL SPECIFICATIONS	1
3	OUTLINE DIMENSIONS	2
4	INTERFACE PIN CONNECTION	3~4
5	BLOCK DIAGRAM	5
6	ABSOLUTE MAXIMUM RATINGS	5
7	ELECTRICAL CHARACTERISTICS	6
8	OPTICAL CHARACTERISTICS	7~9
9	TOUCH PANEL SPECIFICATIONS	10~17
10	TIMING SPECIFICATIONS	18~22
11	RELIABILITY TEST	23
12	MODEL NUMBER SYSTEM	24
13	LCM INSPECTION STANDARD	25
14	PACKAGE INFORMATION	25
15	PRECAUTIONS FOR USE	26

1.RECORD OF REVISION

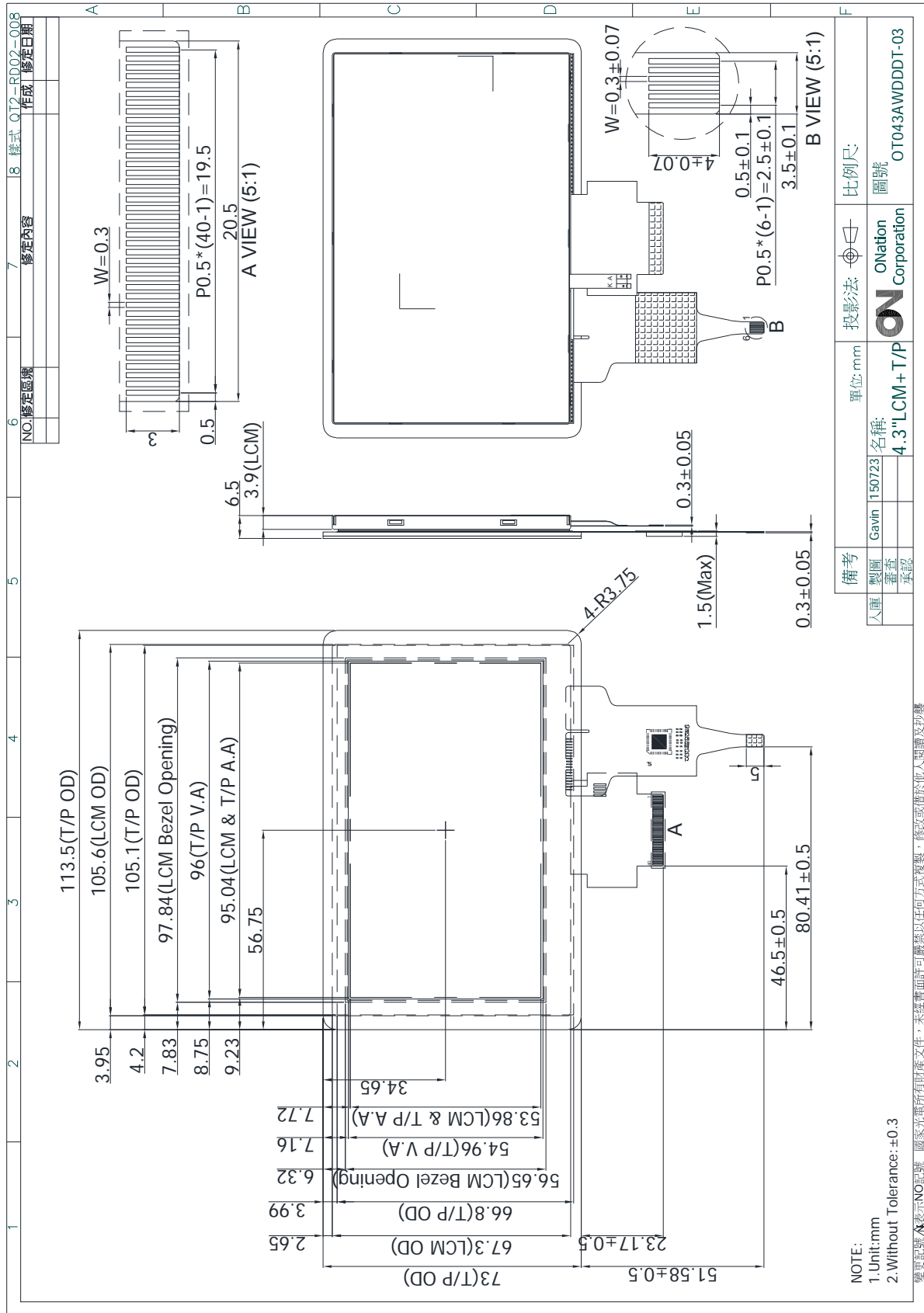
REV	DATE	PAGE	SUMMARY
0.1	2015.06.05	ALL	Preliminary specification was first issued.
0.2	2015.06.24	6	ADD LED life time
0.3	2015.07.24	2	Modify: 3. OUTLINE DIMENSIONS
		6	ADD :7.3 CTP ELECTRICAL CHARACTERISTICS
		10	ADD : 9. TOUCH PANEL SPECIFICATIONS

2.MECHANICAL SPECIFICATIONS

(1)	Number Of Dots (Dots)	480(R.G.B) X 272
(2)	Module Size(mm)	113.5(H) X 73(V) X65(D) (**)
(3)	Active Area(mm)	95.04(H) X 53.86(V)
(4)	Pixel Pitch(mm)	0.198 (H) X 0.198(V)
(5)	LCD / Polarizer Model	TFT , Transmissive, Normally/White
(6)	Backlight Color	White, LED
(7)	Viewing Direction	6 O'clock Horizontal : Right side 65°(typ.), Left side 65°(typ.) Vertical : Up side 60°(typ.), Down side 50°(typ.)
(8)	Gray Scale Inversion Direction	12 O'clock
(9)	Electrical Interface	TTL Interface
(10)	Color Configuration	R.G.B Stripe
(11)	Module Weight(g)	TBD

(**)Module include FPC and component.

3. OUTLINE DIMENSIONS



4. INTERFACE PIN CONNECTION

4.1 LCM PANEL DRIVING SECTION

FPC PITCH=0.5mm,40PIN

PIN NO.	SIGNAL	FUNCTION	REMARK
1	NC	No connection	
2	NC	No connection	
3	NC	No connection	
4	NC	No connection	
5	NC	No connection	
6	LEDK	Backlight Unit(-)	
7	LEDA	Backlight Unit(+)	
8	GND	Ground	
9	VCC	Power Supply	
10	NC	No connection	
11	VSYNC	Vertical Sync Signal; Negative Polarity	
12	HSYNC	Horizontal Sync Signal; Negative Polarity	
13	DCLK	Clock Signal	
14	DE	Data Input Enable	
15	DISP	Display Control	Note1
16	R7	Red Data Signal	
17	R6	Red Data Signal	
18	R5	Red Data Signal	
19	R4	Red Data Signal	
20	R3	Red Data Signal	
21	R2	Red Data Signal	
22	R1	Red Data Signal	
23	R0	Red Data Signal	
24	G7	Green Data Signal	
25	G6	Green Data Signal	
26	G5	Green Data Signal	
27	G4	Green Data Signal	
28	G3	Green Data Signal	
29	G2	Green Data Signal	
30	G1	Green Data Signal	
31	G0	Green Data Signal	
32	B7	Blue Data Signal	
33	B6	Blue Data Signal	
34	B5	Blue Data Signal	
35	B4	Blue Data Signal	
36	B3	Blue Data Signal	

37	B2	Blue Data Signal	
38	B1	Blue Data Signal	
39	B0	Blue Data Signal	
40	GND	Ground	

Note1:

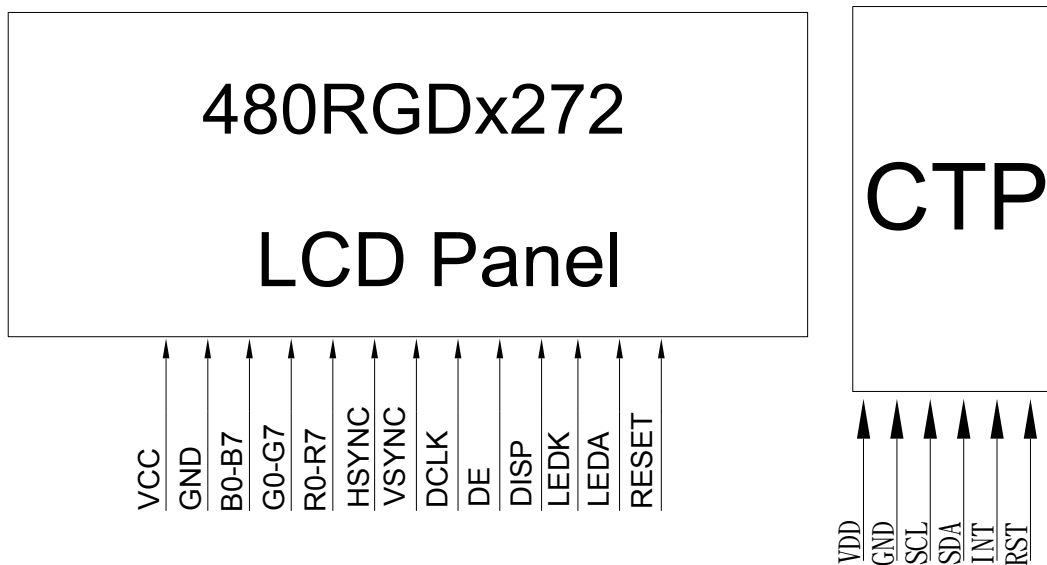
DISP="Low", Standby.
DISP="High", Normal display.

4.2 TOUCH PANEL PIN ASSIGNMENT

FPC PITCH=0.5mm,6PIN

PIN NO.	SIGNAL	FUNCTION	REMARK
1	RESET	External Reset , Low is Active	
2	VDD	Power Supply For Digital Circuit	
3	GND	Ground	
4	INT	External Interrupt to the Host	
5	SDA	I2C Data Input and Output	
6	SCL	I2C Clock Input	

5. BLOCK DIAGRAM



6. ABSOLUTE MAXIMUM RATINGS

6.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
Supply Voltage	VCC	-0.3	+4.6	V	
	VLED	-	20	V	

Note: The absolute maximum rating values of this product not allowed to be exceeded at any times. Should be module be used with any of absolute maximum ratings exceeded. The characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

6.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE		REMARK
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature(°C)	-20	70	-30	80	Note 1,2
Humidity(% RH)	Note 3		Note 3		Without condensation

Note 1 : The response time will become lower when operated at low temperature.

Note 2 : Background color changes slightly depending on ambient temperature.

Note 3 : Storage Ta=50°C & RH=90% ≤ TBDHrs.

7. ELECTRICAL CHARACTERISTICS

7.1 ELECTRICAL CHARACTERISTICS OF LCD

Ta=25°C

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Power Voltage For LCD	VCC	3.0	3.3	3.6	V	
	ICC	-	TBD	TBD	mA	Note 1
High Level Input Voltage	VIH	0.7VCC	-	VCC	V	VCC=3.3V
Low Level Input Voltage	VIL	GND	-	0.3VCC	V	VCC=3.3V

Note 1 : Test condition : VCC =3.3V ; Test Pattern : Black.

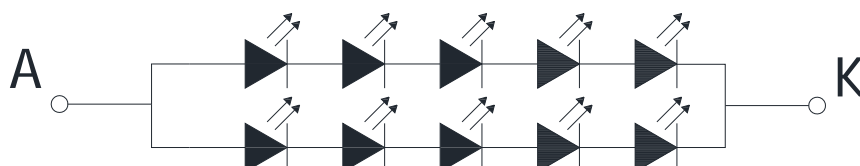
7.2 BACKLIGHT UNITS

Ta=25°C

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
LED Driving Voltage	VLED	-	16	18	V	
	ILED	-	40	-	mA	VLED=16V
LED life time		-	10	-	kHrs	Ta =70°C

Note 1: The LED of B/L is drive by current only, drive voltage is for reference only. drive voltage can make driving current under safety area(current between minimum and maximum). 10,000 hours is only an estimate for reference.

Note 2: The lifetime of LED is defined as the time when it continues to operate under the conditions at Ta= 70 °C and IL = 40mADC (LED forward current) until the brightness becomes $\leq 50\%$ of its original value.



7.3 CTP ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Power Voltage For CTP	VDD	2.8		3.3	V	
Power Current For CTP	IDD1		6.2		mA	Active Current
Power Current For CTP	IDD2	70		120	uA	Sleep Current

8. OPTICAL CHARACTERISTICS

Ta=25°C

ITEM	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT	REMARK
Contrast Ratio	CR	Viewing Normal Angle $\Theta_x = \Theta_y = 0^\circ$	(250)	(350)	-	-	Note 1
Response Time	TR+TF		-	30	45	ms	Note 2
Chromaticity	White	Wx	TBD	TBD	TBD	-	Note 4
		Wy	TBD	TBD	TBD	-	
Viewing Angle	Hor.	θ_{x+}	55	65	-	Deg.	Note 3
		θ_{x-}	55	65	-		
	Ver.	θ_{y+}	50	60	-		
		θ_{y-}	40	50	-		
Luminance	L	ILED=40mA	(350)	(450)	-	cd/m2	
Luminance Uniformity	YU	ILED=40mA	70	-	-	%	Note 5

Note 1 : Definition of Contrast Ratio (CR) :

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L63/L0$$

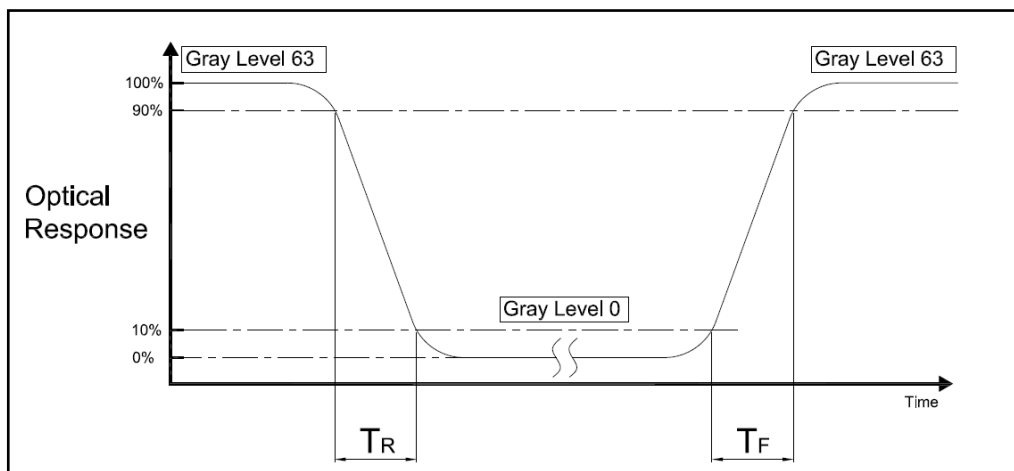
L63 : Luminance of gray level 63

L0 : Luminance of gray level 0

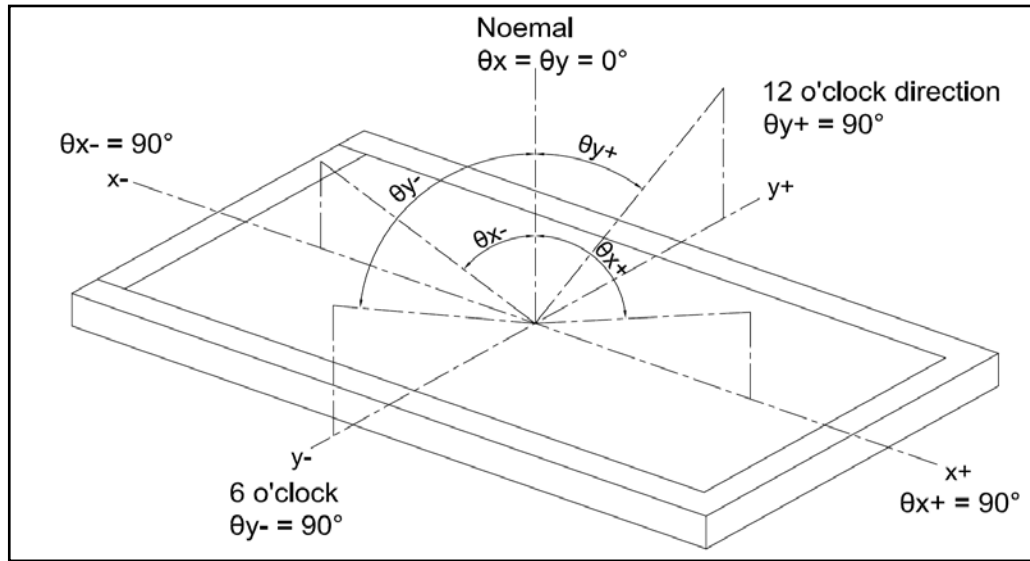
$$CR = CR(5)$$

CR(X) is corresponding to the Contrast Ratio of the point X at Figure in Note 5

Note 2 : Definition of Response Time (TR.TF)

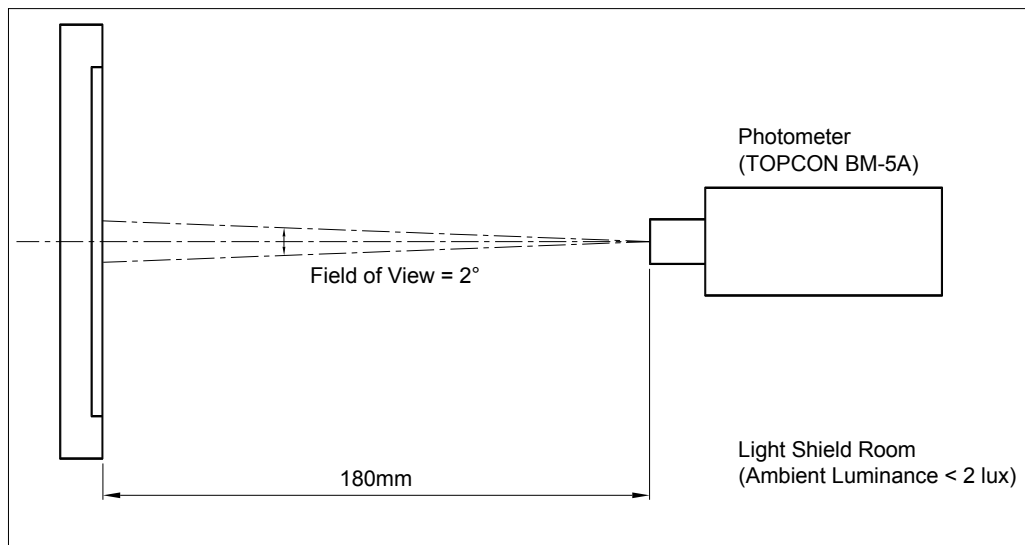


Note 3 : Definition of Viewing Angle

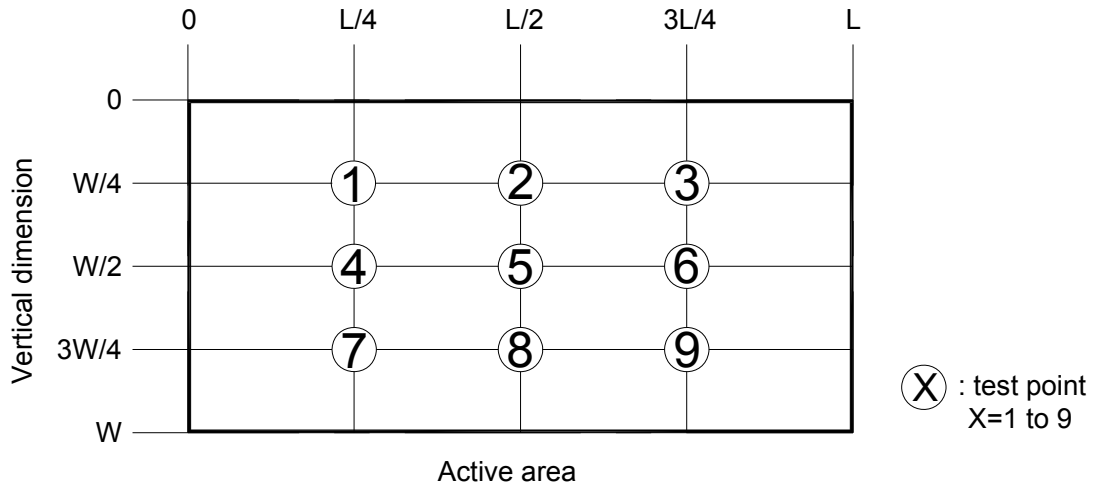


Note 4 : Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



Note 5 :

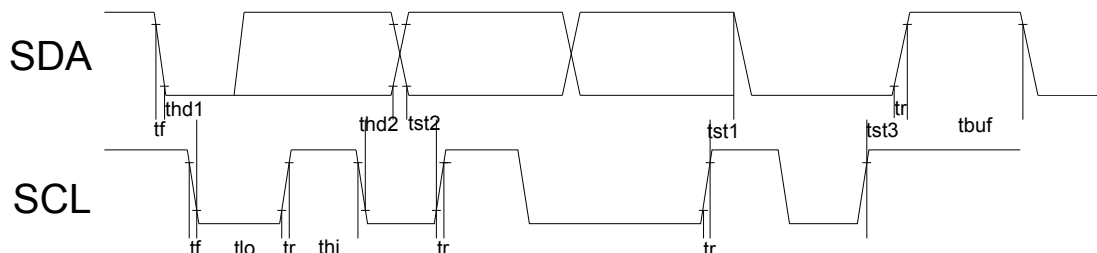


$$\left(1 - \frac{\text{MAX Luminance} - \text{Average Luminance}}{\text{Average Luminance}} \right) \times 100\% \geq 70\%$$

9. TOUCH PANEL SPECIFICATIONS

9.1 I2C Communication

GT911 provides standard I2C interface for communication. In the system, GT911 always works in slave mode, all communications are initiated by master, and the baud rate can be up to 400K bps. The definition of I2C timing is as following:



Test condition1: 1.8V communication interface, 400Kbps, pull up resistor is 2K ohm

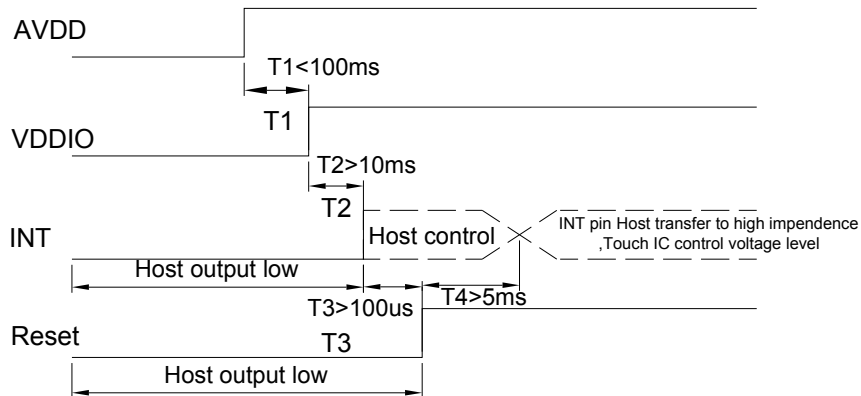
ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
SCL low period	tlo	0.9	-	us	
SCL high period	thi	0.8	-	us	
SCL setup time for START condition	tst1	0.4	-	us	
SCL setup time for STOP condition	tst3	0.4	-	us	
SCL hold time for START condition	thd1	0.3	-	us	
SDA setup time	tst2	0.4	-	us	
SDA hold time	thd2	0.4	-	us	

Test condition2: 3.3V communication interface, 400Kbps, pull up resistor is 2K ohm

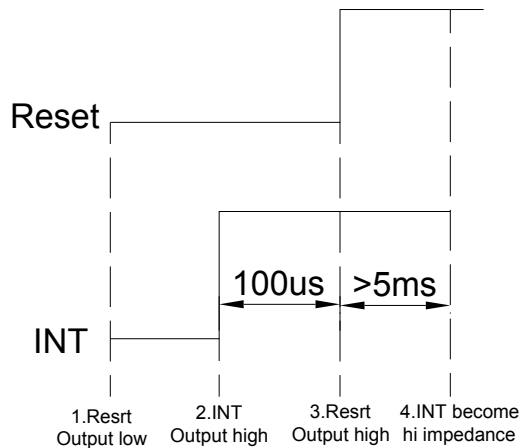
ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
SCL low period	tlo	0.9	-	us	
SCL high period	thi	0.8	-	us	
SCL setup time for START condition	tst1	0.4	-	us	
SCL setup time for STOP condition	tst3	0.4	-	us	
SCL hold time for START condition	thd1	0.3	-	us	
SDA setup time	tst2	0.4	-	us	
SDA hold time	thd2	0.4	-	us	

GT911 has 2 sets of slave address 0xBA/0xBB & 0x28/29. Master can control Reset & INT pin to configure the slave address in power on initial state like following:

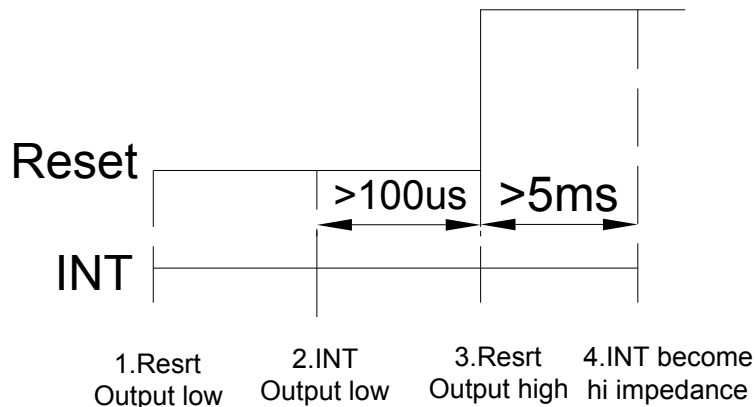
Power on diagram:



Timing of setting slave address to 0x28/0x29:



Timing of setting slave address to 0xBA/0xBB:



a) Data Transmission

(ex: slave address is 0xBA/0xBB)

Communication is always initiated by master, A high-to-low transition of SDA with SCL high is a start condition.

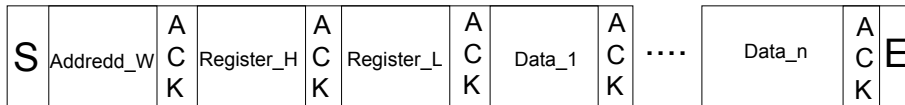
All addressing signal are serially transmitted to and from on bus in 8-bit word. GT911 sends a "0" to acknowledge when the addressing word is 0xBA/BB (or 0x28/0x29). This happens during the ninth clock cycle. If the slave address is not matched, GT911 will stay in idle state.

The data words are serially transmitted to and from in 9-bit formation: 8-bit data + 1-bit ACK or NACK sent by GT911. Data changes during SCL low periods & keeps valid during SCL high.

A low-to-high transition of SDA with SCL high is a stop condition

b) Write Data to GT911

(ex: slave address is 0xBA/0xBB)



Write operations

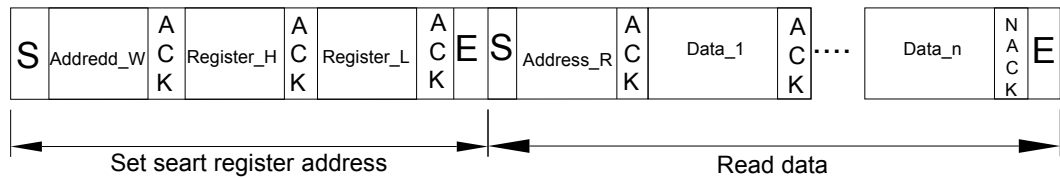
Please check the above figure, master start the communication first, and then sends device address 0xBA preparing for a write operation.

After receiving ACK from GT911, master sends out 16-bit register address, and then the data word in 8-bit, which is going to be wrote into GT911.

The address pointer of GT911 will automatically increase one after one byte writing, so master can sequentially write in one operation. When operation finished, master stop the communication.

c) Read Data from GT911

(ex: slave address is 0xBA/0xBB)



Read operations

Please check the above figure, master start the communication first, and then sends device address 0xBA for a write operation.

After receiving ACK from GT911, master sends out 16-bit register address, to set the address pointer of GT911. After receiving ACK, master produce start signal once again & send device address 0xBB , then read data word from GT911 in 8-bit.

GT911 also supports sequential read operation, and the default setting is sequential read mode.

Master shall send out ACK after every byte reading successfully but NACK after the last one. Then sends stop signal to finish the communication.

9.2 Register Information of GT911

a) Real Time Order

(Write Only)

Addr	Name	Bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0x8040	Command	0: read coordinate 1: read diff data or raw data 2: software reset3:baseline update 4: baseline calibration 5: screen off 3&4 are still internal test							

b) Configuration Information

(R/W)

Addr	Name	Bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0x8047	Config_Version	Version of the configuration							
0x8048	X Output Max (Low Byts)	Resolution of X axis							
0x8049	X Output Max (High Byts)								
0x804A	Y Output Max (Low Byts)	Resolution of Y axis							
0x804B	Y Output Max (High Byts)								
0x804C	Touch Number	Reserved				Touch number:1~5			
0x804D	Module_Switch1	Reserved	Stretch_rank		X2Y	Reserved	INT trigger method 00: rising edge trigger 01: falling edge trigger 02 low level enquiry 03 high level enquiry		
0x804E	Module_switch2	Reserved							
0x804F	Shake_Count	Reserved				Finger shake count			
0x8050	Filter	First_Filter	Normal_Filter (filtering value of original coordinate window, coefficient is 1)						
0x8051	Large_Touch	Number of touch in large area							
0x8052	Noise_Reduction	Reserved				Value of noise elimination (coefficient is 1, 0~15)			
0x8053	Screen_Touch_Level	Threshold of touch grow out of nothing							
0x8054	Screen_Touch_Level	Threshold of touch grow out of nothing							
0x8055	Low_Power_Control	Reserved				Time to low power consumption(0~15s)			
0x8056	Refresh_Rate	Reserved				Coordinate report rate (Cycle: 5+N ms)			
0x8057	x_threshold	Reserved							
0x8058	y_threshold								
0x8059	X_Speed_Limit	Reserved							
0x805A	Y_Speed_Limit								
0x805B	Space	Blank area of boarder-top (coefficient is 32)				Blank area of Boarder-bottom (coefficient is 32)			
0x805C		Blank area of boarder-left (coefficient is 32)				Blank area of Boarder-right (coefficient is 32)			

0x805D	Stretch_Rate	Reserved		Level of weak stretch (Stretch X/16 Pitch) (beta version is valid, published version is not)	
0x805E	Stretch_R0	Interval 1 coefficient			
0x805F	Stretch_R1	Interval 2 coefficient			
0x8060	Stretch_R2	Interval 3 coefficient			
0x8061	Stretch_RM	All intervals base number			
0x8062	Drv_GroupA_Num	All_Driving	Reserved	Driver_Group_A_number	
0x8063	Drv_GroupB_Num	Reserved		Driver_Group_B_number	
0x8064	Sensor_Num	Sensor_Group_B_Number		Sensor_Group_A_Number	
0x8065	FreqA_factor	Driver frequency double frequency coefficient of Driver group A GroupA_Frequency = Multiplier factor * baseband			
0x8066	FreqB_factor	Driver frequency double frequency coefficient of Driver group B GroupB_Frequency = Multiplier factor * baseband			
0x8067	Pannel_BitFreqL	Baseband of Driver group A\B(1526HZ<baseband<14600Hz)			
0x8068	Pannel_BitFreqH				
0x8069	Pannel_Sensor_TimeL	Time interval of the neighbouring two driving signal (Unit: us), Reserved.			
0x806A	Pannel_Sensor_TimeH				
0x806B	Pannel_Tx_Gain	Reserved		Pannel_Drv_output_R 4 gears	Pannel_DAC_Gain 0:Gain maximum 7: Gain minimum
0x806C	Pannel_Rx_Gain	Pannel_PGAC	Pannel_PGAR	Pannel_Rx_Vcmi(4gears)	Pannel_PGA_Gain (8 gears)
0x806D	Pannel_Dump_Shift	Reserved		Magnification coefficient of original value (The Nth power of 2)	
0x806E	Drv_Frame_Control	Reserved	SubFrame_DrvNum		Repeat_Num
0x806F	NC	Reserved			
0x8070	NC	Reserved			
0x8071	NC	Reserved			
0x8072	Stylus_Tx_Gain	Undefined (invalid when stylus_priority=0)			
0x8073	Stylus_Rx_Gain	Undefined (invalid when stylus_priority=0)			
0x8074	Stylus_Dump_Shift	Magnification coefficient of original value (The Nth power of 2), Reserved			
0x8075	Stylus_Driver_Touch_Level	Stylus effective threshold (driving), Reserved			
0x8076	Stylus_Sensor_Touch_Level	Stylus effective threshold (driving), Reserved			
0x8077	Stylus_Control	Pen mode escape time out period (Unit: Sec)			
0x8078	Base_reduce	S-Style improve quantity		Reserved	
0x8079	NC	Reserved			
0x807A	Freq_Hopping_Start	Frequency hopping start frequency (Unit: 2KHz, 50 means 100KHz)			
0x807B	Freq_Hopping_End	Frequency hopping stop frequency (Unit: 2KHz, 150 means 300KHz)			
0x807C	Noise_Detect_Times	Detect_Station_Times	Detect_Confirm_Times		
0x807D	Hopping_Flag	Hopping_End	Reserved	Detect_Time_Out	

Addr	Name	Bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0	
0x807E	Hopping_Threshold	Large_Noise_Threshold			Hopping_Hit_Threshold					
0x807F	Noise_Threshold	Threshold of noise level								
0x8080	NC	Reserved								
0x8081	NC	Reserved								
0x8082	Hopping_seg1_BitFreqL	Frequency hopping segment band 1 central frequency (for driver A/B)								
0x8083	Hopping_seg1_BitFreqH									
0x8084	Hopping_seg1_Factor	Frequency hopping segment 1 central frequency coefficient								
0x8085	Hopping_seg2_BitFreqL	Frequency hopping segment band 2 central frequency (for driver A/B)								
0x8086	Hopping_seg2_BitFreqH									
0x8087	Hopping_seg2_Factor	Frequency hopping segment 2 central frequency coefficient								
0x8088	Hopping_seg3_BitFreqL	Frequency hopping segment band 3 central frequency (for driver A/B)								
0x8089	Hopping_seg3_BitFreqH									
0x808A	Hopping_seg3_Factor	Frequency hopping segment 3 central frequency coefficient								
0x808B	Hopping_seg4_BitFreqL	Frequency hopping segment band 4 central frequency (for driver A/B)								
0x808C	Hopping_seg4_BitFreqH									
0x808D	Hopping_seg4_Factor	Frequency hopping segment 4 central frequency coefficient								
0x808E	Hopping_seg5_BitFreqL	Frequency hopping segment band 5 central frequency (for driver A/B)								
0x808F	Hopping_seg5_BitFreqH									
0x8090	Hopping_seg5_Factor	Frequency hopping segment 5 central frequency coefficient								
0x8091	NC	Reserved								
0x8092	NC	Reserved								
0x8093	Key 1	Key 1 Position: 0-255 valid (0 means no touch, it means independent touch key when 4 of the keys are 8 multiples)								
0x8094	Key 2	Key 2 position								
0x8095	Key 3	Key 3 position								
0x8096	Key 4	Key 4 position								
0x8097	Key_Area	Time limit for long press(1~16 s)				Touch valid interval setting: 0-15 valid				
0x8098	Key_Touch_Level	Key threshold of touch key								
0x8099	Key_Leave_Level	Key threshold of touch key								
0x809A	Key_Sens	KeySens_1(sensitivity coefficient of key 1, same below)				KeySens_2				
0x809B	Key_Sens	KeySens_3				KeySens_4				
0x809C	Key_Restrain	Finger from screen left after inhibition of key time(Unit:100ms,0 means 600ms)				The independent button pro key inhibition parameters				
0x809D	NC	Reserved								
0x809E	NC	Reserved								
0x809F	NC	Reserved								
0x80A0	NC	Reserved								
0x80A1	NC	Reserved								
0x80A2	Proximity_Drv_Select	Drv_Start_Ch (start channel of driving direction)				Drv_End_Ch (End channel)				

Addr	Name	Bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0	
0x80A3	Proximity_Sens_Select	Sens_Start_Ch (start channel of sensing direction)					Sens_End_Ch (End channel)			
0x80A4	Proximity_Touch_Level	Proximity effective threshold value								
0x80A5	Proximity_Leave_Level	Proximity ineffective threshold value								
0x80A6	Proximity_Sample_Ad d_Times	Frequency multification of proximity sensing channel.								
0x80A7	Proximity_Sample_Dec_ValL	Sample value minus this value (16 bit), and accumulate, low byte.								
0x80A8	Proximity_Sample_Dec_ValH	Sample value minus this value (16 bit), and accumulate, high byte.								
0x80A9	Proximity_Leave_Shake_Count	exit proximity jitter count								
0x80AA	Self_Cap_Tx_gain	self-capacitance sends gains								
0x80AB	Self_Cap_Rx_gain	self-capacitance receive gains								
0x80AC	Self_Cap_Dump_Shift	Magnification coefficient of original value of self-capacitance (The Nth power of 2)								
0x80AD	SCap_Diff_Up_Level_Drv	Self capacitance suppress floating rising threshold (driving direction)								
0x80AE	Scap_Merge_Touch_Level_Drv	Self-capacitance Touch Level (driving direction)								
0x80AF	SCap_Pulse_TimeL	Self-capacitance sampling time (low byte)								
0x80B0	SCap_Pulse_TimeH	Self-capacitance sampling time (high byte)								
0x80B1	SCap_Diff_Up_Level_Sen	Self capacitance suppress floating rising threshold (sensing direction)								
0x80B2	Scap_Merge_Touch_Level_Sen	Self-capacitance Touch Level (sensing direction)								
0x80B3	NC	Reserved								
0x80B4	NC	Reserved								
0x80B5	NC	Reserved								
0x80B6	NC	Reserved								
0x80B7 ~ 0x80C4	Sensor_CH0~ Sensor_CH13	ITO Sensor corresponding chip channel number								
0x80C5 ~ 0x80D4	NC	Reserved								
0x80D5 ~ 0x80EE	Driver_CH0~ Driver_CH25	ITO Driver corresponding chip channel number								
0x80EF ~ 0x80FE	NC	Reserved								
0x80FF	Config_Chksum	configuration information verify (the complement number of total byte from 0x8047 to 0x80FE)								
0x8100	Config_Fresh	signal of updated configuration (the host writes)								

c) Coordinates Information

Addr	Access	Bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0	
0x8140	R	Product ID (first byte, ASCII)								
0x8141	R	Product ID (second byte, ASCII)								
0x8142	R	Product ID (third byte, ASCII)								
0x8143	R	Product ID (forth byte, ASCII)								

Addr	Access	Bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0x8144	R	Firmware version (HEX.low byte)							
0x8145	R	Firmware version (HEX.high byte)							
0x8146	R	x coordinate resolution (low byte)							
0x8147	R	x coordinate resolution (high byte)							
0x8148	R	y coordinate resolution (low byte)							
0x8149	R	y coordinate resolution (high byte)							
0x814A	R	Vendor_id (current module option information)							
0x814B	R	Reserved							
0x814C	R	Reserved							
0x814D	R	Reserved							
0x814E	R/W	buffer status	large detect	Reserved			number of touch points		
0x814F	R	track id							
0x8150	R	point 1 x coordinate (low byte)							
0x8151	R	point 1 x coordinate (high byte)							
0x8152	R	point 1 y coordinate (low byte)							
0x8153	R	point 1 y coordinate (high byte)							
0x8154	R	Point 1 size (low byte)							
0x8155	R	point 1 size (high byte)							
0x8156	R	Reserved							
0x8157	R	track id							
0x8158	R	point 2 x coordinate (low byte)							
0x8159	R	point 2 x coordinate (high byte)							
0x815A	R	point 2 y coordinate (low byte)							
0x815B	R	point 2 y coordinate (high byte)							
0x815C	R	point 2 size (low byte)							
0x815D	R	point 2 size (high byte)							
0x815E	R	Reserved							
0x815F	R	track id							
0x8160	R	point 3 x coordinate (low byte)							
0x8161	R	point 3 x coordinate (high byte)							
0x8162	R	point 3 y coordinate (low byte)							
0x8163	R	point 3 y coordinate (high byte)							
0x8164	R	point 3 size (low byte)							
0x8165	R	point 3 size (high byte)							
0x8166	R	Reserved							
0x8167	R	track id							
0x8168	R	point 4 x coordinate (low byte)							
0x8169	R	point 4 x coordinate (high byte)							
0x816A	R	point 4 y coordinate (low byte)							
0x816B	R	point 4 y coordinate (high byte)							
0x816C	R	point 4 size (low byte)							
0x816D	R	point 4 size (high byte)							
0x816E	R	Reserved							
0x816F	R	track id							
0x8170	R	point 5 x coordinate (low byte)							
0x8171	R	point 5 x coordinate (high byte)							
0x8172	R	point 5 y coordinate (low byte)							
0x8173	R	point 5 y coordinate							
0x8174	R	point 5 size (low byte)							
0x8175	R	point 5 size (high byte)							
0x8176	R	Reserved							
0x8177	R	Reserved							

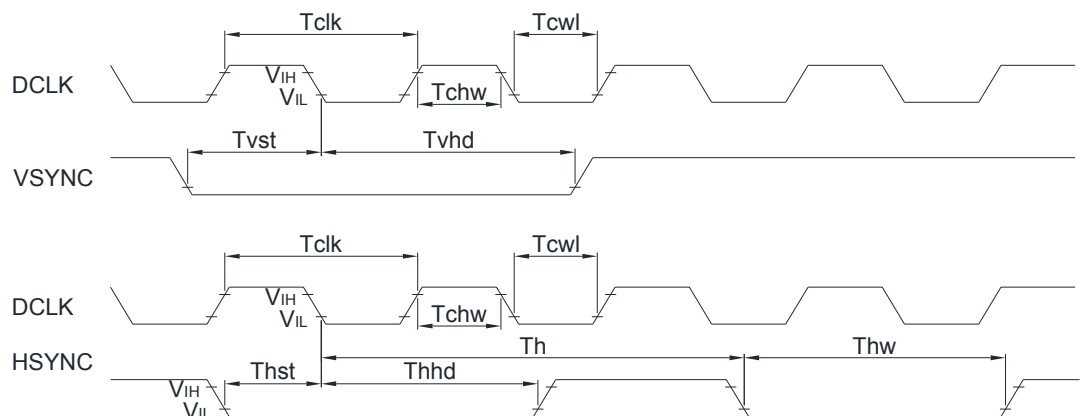
10. TIMING SPECIFICATIONS

10.1 AC CHARACTERISTICS

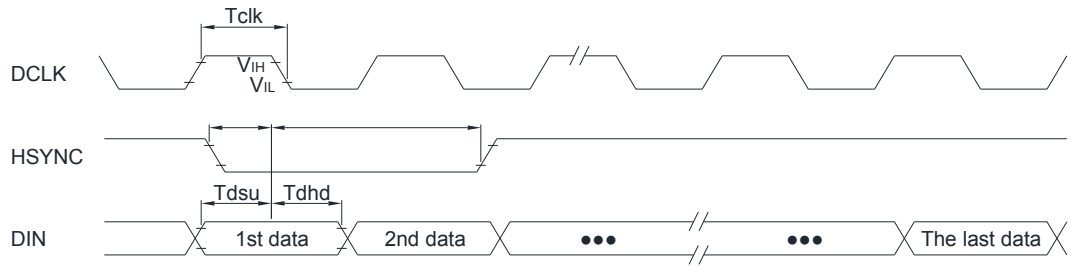
ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
VCC power source slew time	TPOR	-	-	20	ms	From 0V to 99% VCC
GRB pulse width	tRSTW	10	50	-	us	R=10Kohm, C=1uF
CLK pulse duty	Tcw	40	50	60	%	
Hsync width	Thw	1	-	-	ns	
Hsync period	Th	55	60	65	us	
Vsync setup time	Tvst	12	-	-	ns	
Vsync hold time	Tvhd	12	-	-	ns	
Hsync setup time	Thst	12	-	-	ns	
Hsync hold time	Thhd	12	-	-	ns	
Data setup time	Tdsu	12	-	-	ns	
Data hold time	Tdhd	12	-	-	ns	
SD output stable time	Tst	-	-	12	us	Output settled within +20mV Loading=6.8k+28.2pF
GD output rise and fall time	Tgst	-	-	6	us	Output settled (5%~95%), Loading=4.7k+29.8pF

10.2 AC TIMING DIAGRAM

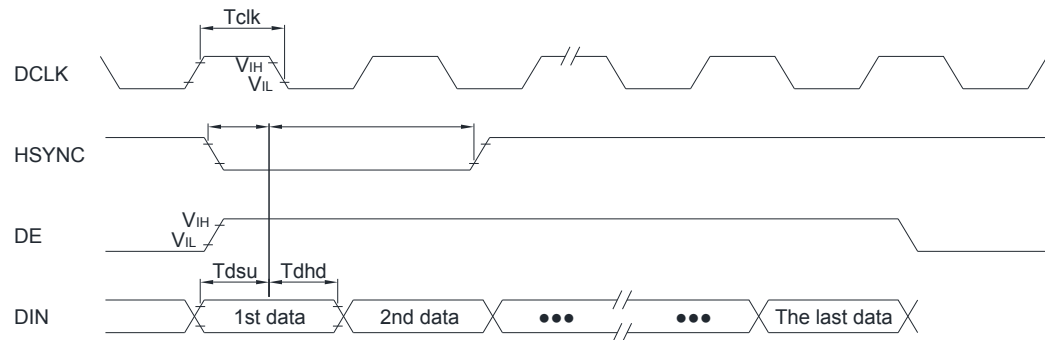
10.2.1 CLOCK AND DATA INPUT TIMING DIAGRAM



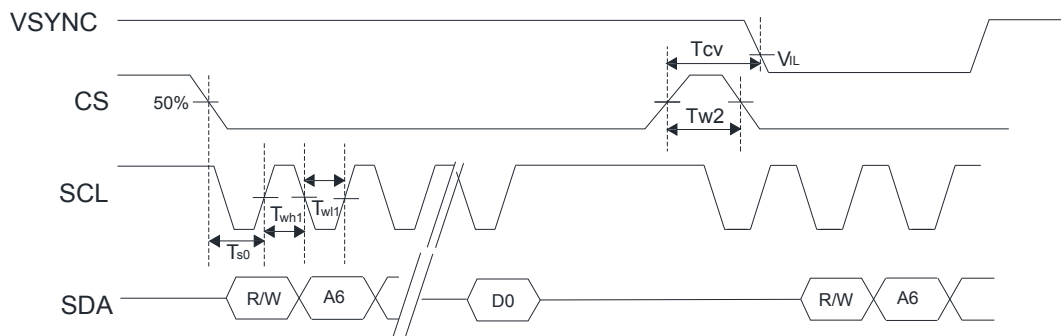
10.2.2 SYNC MODE



10.2.3 SYNC-DE MODE



10.2.4 3-WIRE COMMUNICATION TIMING DIAGRAM



10.3 RGB INPUT TIMING TABLE

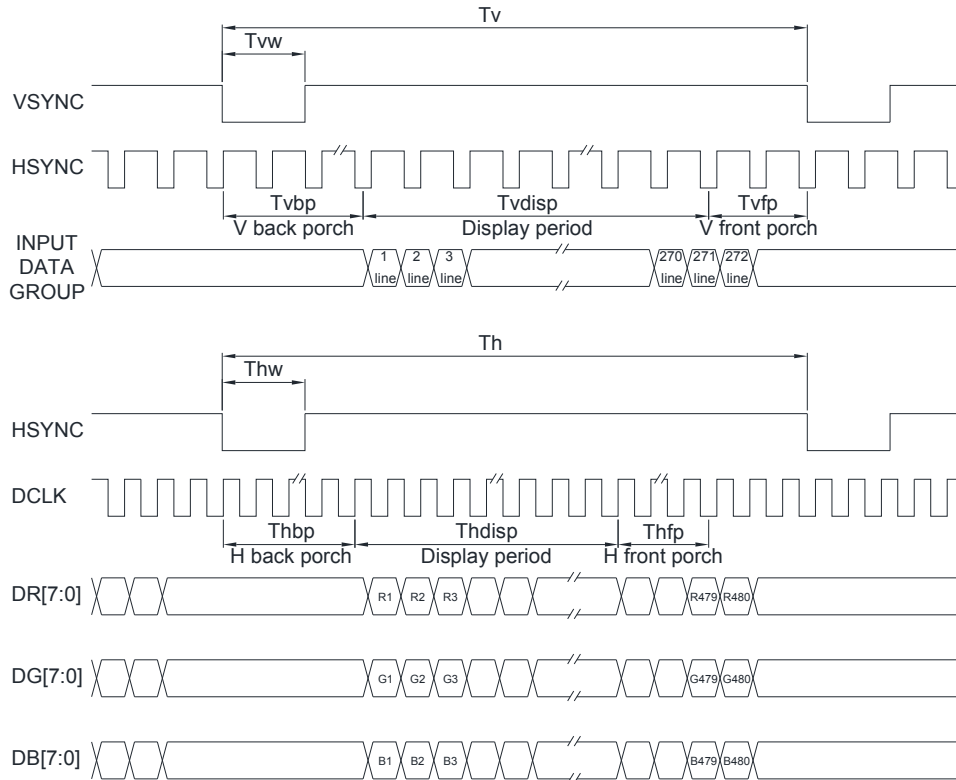
10.3.1 PARALLEL 24-BIT RGB TIMING TABLE

ITEM		SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
DCLK frequency		Fclk	9	12	15	MHz	
DCLK period		Tclk	67	83	111	ns	
HSYNC	Period Timing	Th	486	526	533	DCLK	
	Display period	Thdisp	-	480	-	DCLK	
	Back porch	Thbp	3	43	50	DCLK	By H_Blanking setting
	Front porch	Thfp	2	2	2	DCLK	
	Pulse width	Thw	1	1	1	DCLK	
VSYNC	Period time	Tv	276	286	304	H	
	Display period	Tvdisp	-	272	-	H	
	Back porch	Tvbp	2	12	30	H	By V_Blanking setting
	Front porch	Tvfp	1	1	1	H	
	Pulse width	Tvw	1	1	1	H	

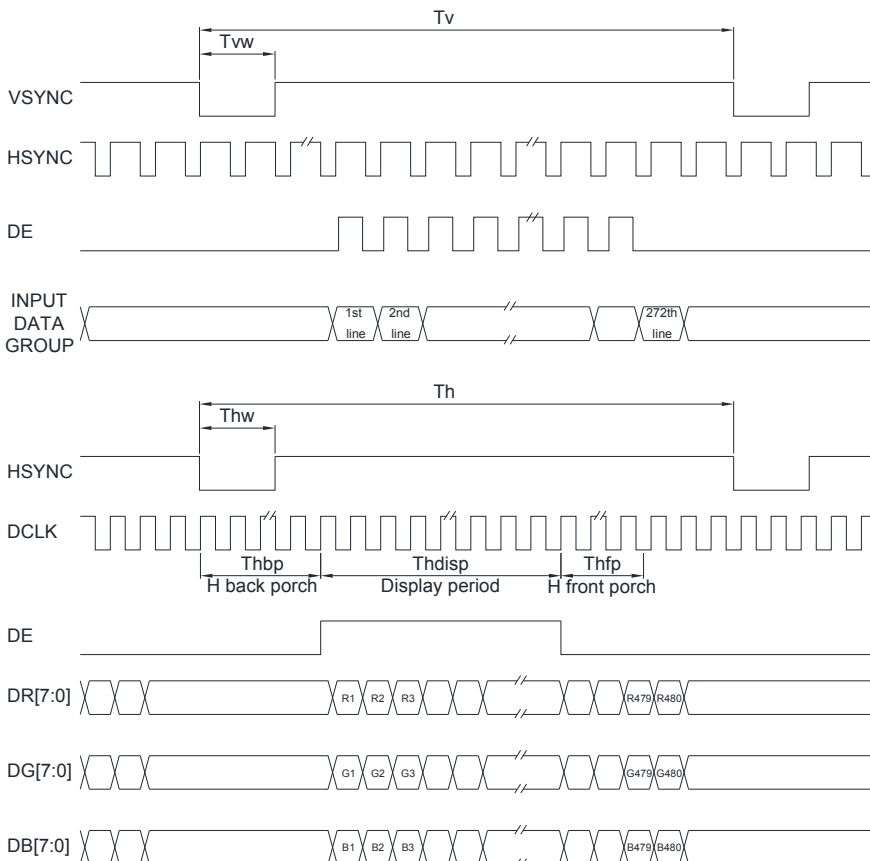
10.3.2 SERIES 8-BIT RGB TIMING TABLE

ITEM		SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
DCLK frequency		Fclk	24	27	30	MHz	
DCLK period		Tclk	33	37	42	ns	
HSYNC	Period Timing	Th	1560	1716	1900	DCLK	
	Display period	Thdisp	-	1440	-	DCLK	
	Back porch	Thbp	108	129	255	DCLK	By H_Blanking setting
	Front porch	Thfp	12	147	205	DCLK	
	Pulse width	Thw	1	1	50	DCLK	
VSYNC	Period time	Tv	274	288	335	H	
	Display period	Tvdisp	-	272	-	H	
	Back porch	Tvbp	1	12	32	H	By V_Blanking setting
	Front porch	Tvfp	1	4	31	H	
	Pulse width	Tvw	1	10	30	H	

10.4 SYNC MODE TIMING DIAGRAM

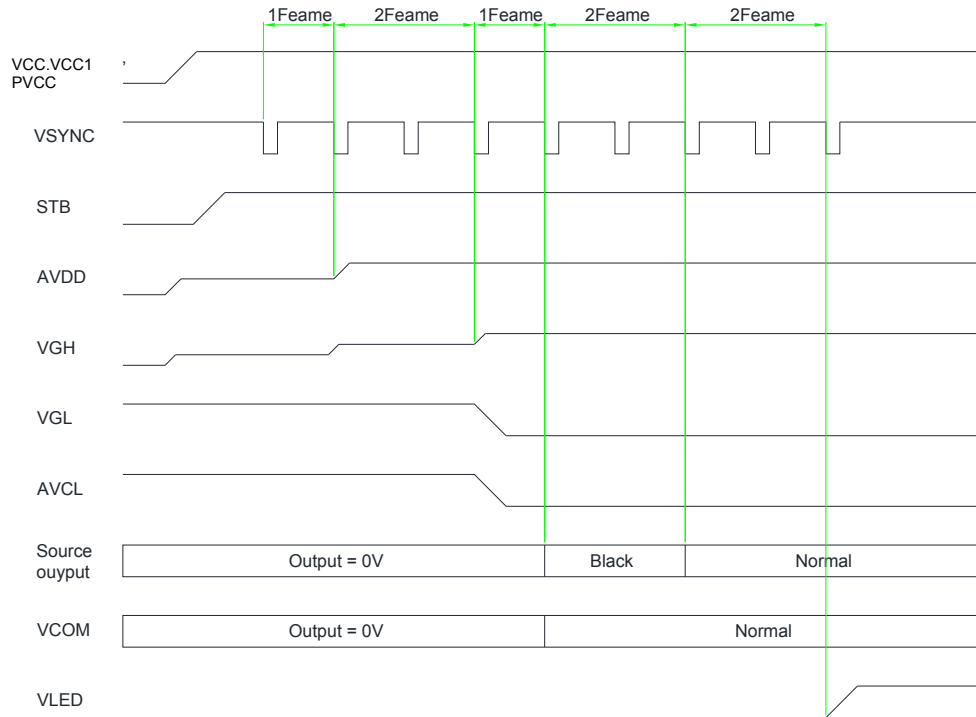


10.5 SYNC-DE MODE TIMING DIAGRAM

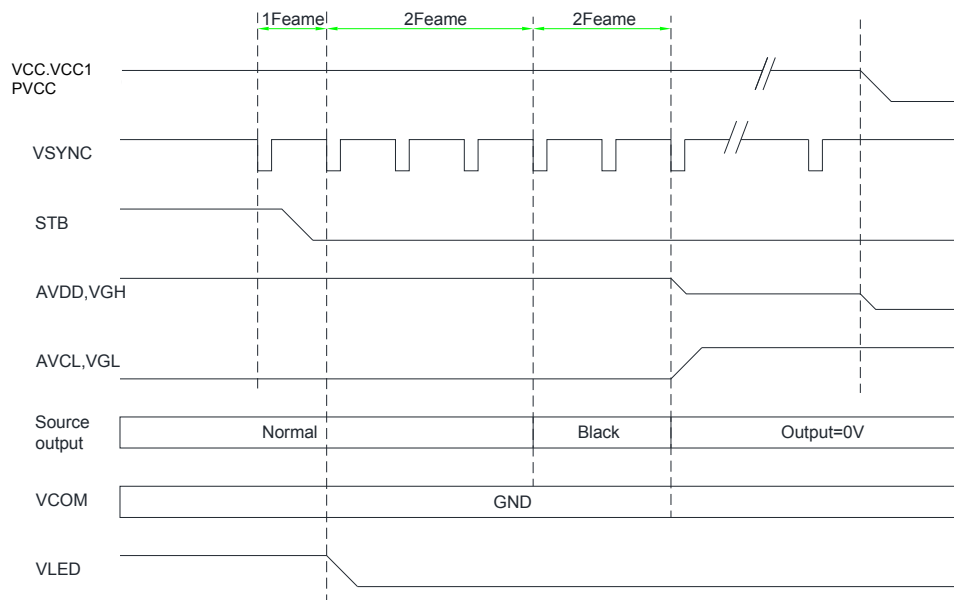


10.6 POWER ON/OFF SEQUENCE

10.6.1 POWER ON SEQUENCE



10.6.2 POWER OFF SEQUENCE



Note: Please refer to ST7789V data sheet for more details.

11. RELIABILITY TEST

ENVIRONMENTAL TEST				
NO.	ITEM	CONDITIONS	TIME PERIOD	REMARK
1	High Temperature Storage	80°C	TBD	
2	Low Temperature Storage	-30°C	TBD	
3	High Temperature Operation	70°C	TBD	
4	Low Temperature Operation	-20°C	TBD	
5	Temperature Cycle	-20°C~70°C (15min)(15min)	TBD	
6	High Temperature Humidity Storage	50°C 90%R	TBD	

Note 1: a. The module should work properly.

b. Before and after function test, The difference of consumptive current. Should be within 10%

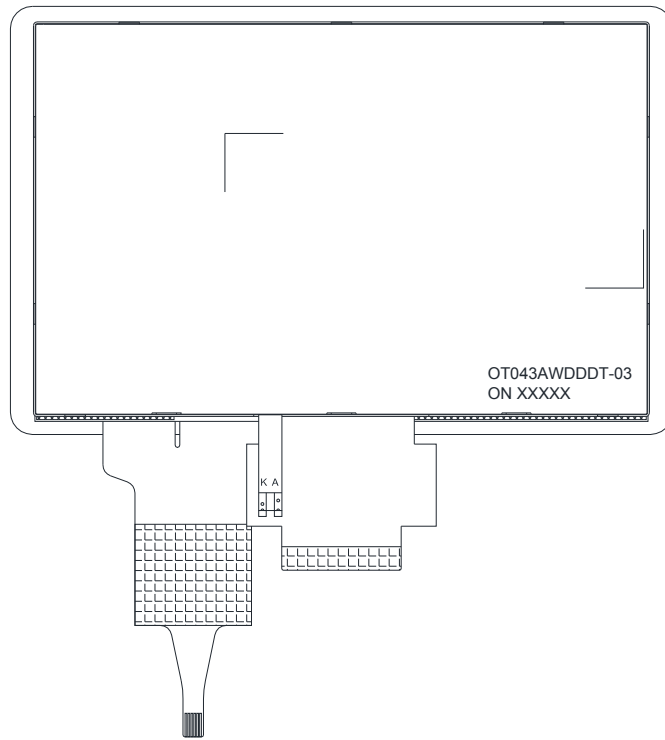
Note 2: a. The module should work properly.

b. The modlue won't be deformative, Color changeable or broken.

c. The modules can't be apart.

Note 3: a. Before cosmetic and function test, The product must have enough recovery time, At least 2 hours at room temperature.

12.MODEL NUMBER SYSTEM



(a) MODEL NAME : OT043AWDDDT-03

(b) LOT NO : ON XX XX X

CODE	MEANING	DESCRIPTION
<u>XX</u>	Year	2015=15, 2016=16,
<u>XX</u>	Month	01,02,03,04,05,06,07,08,09,10,11,12
<u>X</u>	Week	1,2,3,4,5,6

13. LCM INSPECTION STANDARD

Inspection specifications refer ONation Corporation LCM INSPECTION STANDARD Document.
Document Number : TBD

14. PACKAGE INFORMATION

LCM MODEL	LCM QTY. IN THE BOX	INNER BOX SIZE(mm)	WEIGHT	REMARK
OT043AWDDDT-03	TBD	TBD	TBD	

15.PRECAUTIONS FOR USE

15.1 SAFETY

- (1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
- (2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
- (3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

15.2 STORAGE CONDITIONS

- (1) Store the panel or module in a dark place where the temperature is $23\pm 5^{\circ}\text{C}$ and the humidity is below $50\pm 20\%\text{RH}$.
- (2) Store in anti-static electricity container.
- (3) Store in clean environment, free from dust, active gas, and solvent.
- (4) Do not place the module near organics solvents or corrosive gases.
- (5) Do not crush, shake, or jolt the module.

15.3 HANDLING PRECAUTIONS

- (1) Avoid static electricity which can damage the CMOS LSI.
- (2) The polarizing plate of the display is very fragile. So, please handle it very carefully.
- (3) Do not give external shock.
- (4) Do not apply excessive force on the surface.
- (5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the Surface of plate.
- (6) Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
- (7) Do not operate it above the absolute maximum rating.
- (8) Do not remove the panel or frame from the module.
- (9) When the module is assembled, it should be attached to the system firmly, Be careful not to twist and bend the module.
- (10) Wipe off water droplets or oil immediately . If you leave the droplets for a long time, staining and discoloration may occur.
- (11) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs or clothes, it must be washed away thoroughly with soap.

15.4 WARRANTY

- (1) Acceptance inspection period
The period is within one month after the arrival of contracted commodity at the buyer's factory site.
- (2) Applicable warrant period
The period is within 12 months since the date of shipping out under normal using and storage conditions.