

# TFT-DISPLAY DATASHEET

ONation  
Model: OT043AWDDDT-04

## BRIEF SPEC.:

Main Feature	LandscapeType
Active Screen Area	95.04 x 53.85 (mm)
Diagonal   Format	4.3 "   16:9
Resolution	480 X 272
Colors	[8 Bit]
Backlight	LED
Brightness	450 cd/m <sup>2</sup>
LED Life Time	
Interface	TTL
Viewing Angle	65/65 L/R 50/60
Touchscreen	No
Power Supply	3.3 V [Typ.]
Module Outline	105.6 x 67.3 x 5.05 (mm)
Operation Temperature	-20... +70 °C
Storage Temperature	-30... +80 °C
Surface Treatment	



# ONation Corporation

## TFT COLOR LCD MODULE

**MODEL: OT043AWDDDT-04**  
(Complied with RoHS)

**WQVGA**  
**TTL interface**

**Version: P0.2**

<b>Customer :</b> _____
<b>Approved By :</b> _____
<b>Date:</b> _____

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

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

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### 1.RECORD OF REVISION

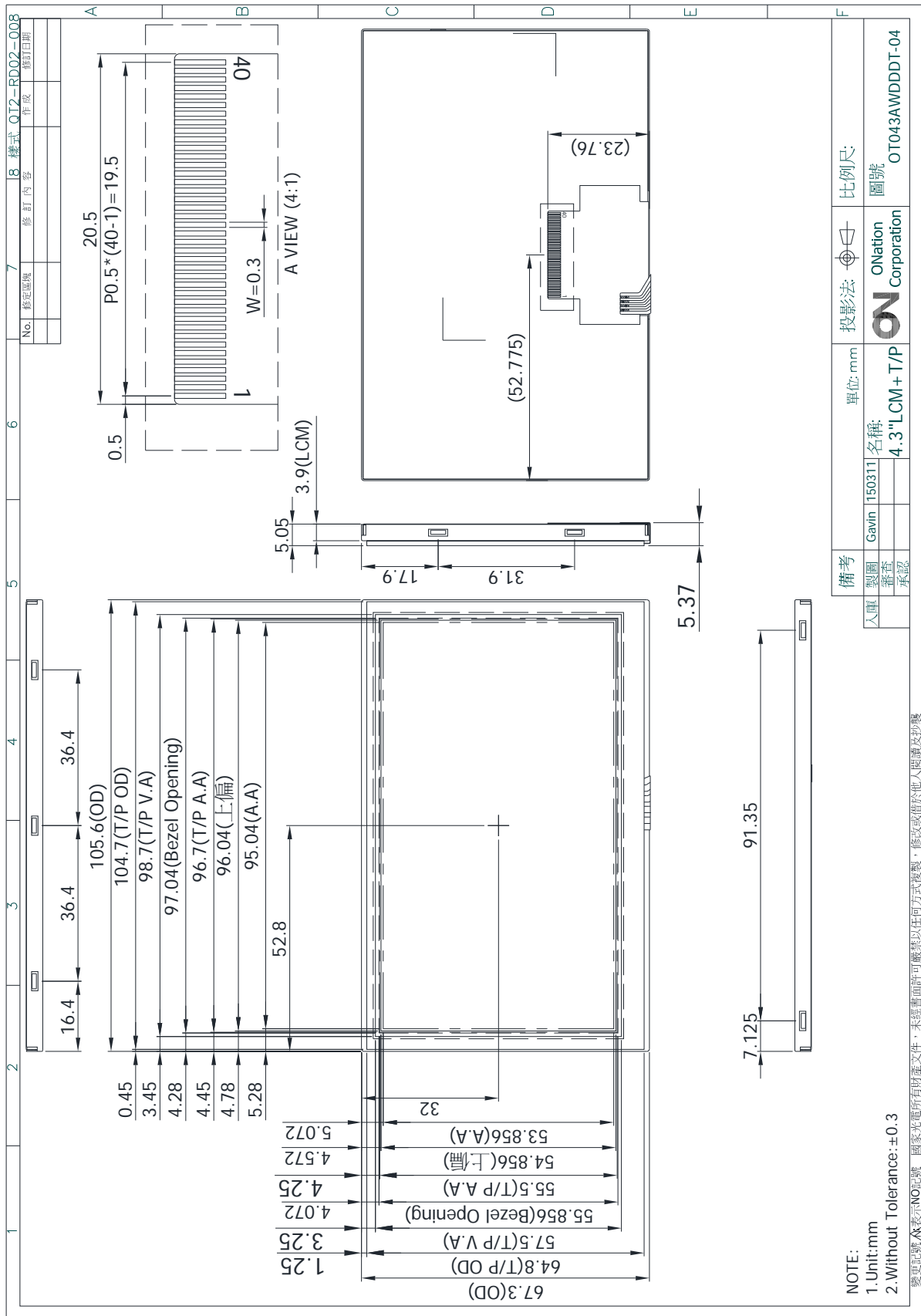
REV	DATE	PAGE	SUMMARY		
0.1	2015.06.04	ALL	Preliminary specification was first issued.		
0.2	2016.12.20	1	(7) <sup>o</sup>	Viewing Direction <sup>o</sup>	6 O'clock <sup>o</sup> Horizontal : Right side 65°(typ.), Left side 65°(typ.)- Vertical : Up side 50°(typ.), Down side 60°(typ.) <sup>o</sup>
			(8) <sup>o</sup>	Gray Scale Inversion Direction <sup>o</sup>	12 O'clock <sup>o</sup> →
			(7) <sup>o</sup>	Viewing Direction <sup>o</sup>	12 O'clock <sup>o</sup> Horizontal : Right side 65°(typ.), Left side 65°(typ.) <sup>o</sup> Vertical : Up side 50°(typ.), Down side 60°(typ.) <sup>o</sup>
			(8) <sup>o</sup>	Gray Scale Inversion Direction <sup>o</sup>	6 O'clock <sup>o</sup>

## 2.MECHANICAL SPECIFICATIONS

(1)	Number Of Dots (Dots)	480(R.G.B) X 272
(2)	Module Size(mm)	105.6(H) X 67.3(V) X5.05(D) (**)
(3)	Active Area(mm)	95.04(H) X 53.856(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	12 O'clock Horizontal : Right side 65°(typ.), Left side 65°(typ.) Vertical : Up side 50°(typ.), Down side 60°(typ.)
(8)	Gray Scale Inversion Direction	6 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	X+	Touch panel output	
2	Y-	Touch panel output	
3	X-	Touch panel output	
4	Y+	Touch panel output	
5	NC	No connection	
6	LEDK	Backlight Unit(-)	
7	LEDA	Backlight Unit(+)	
8	GND	Ground	
9	VDD	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	

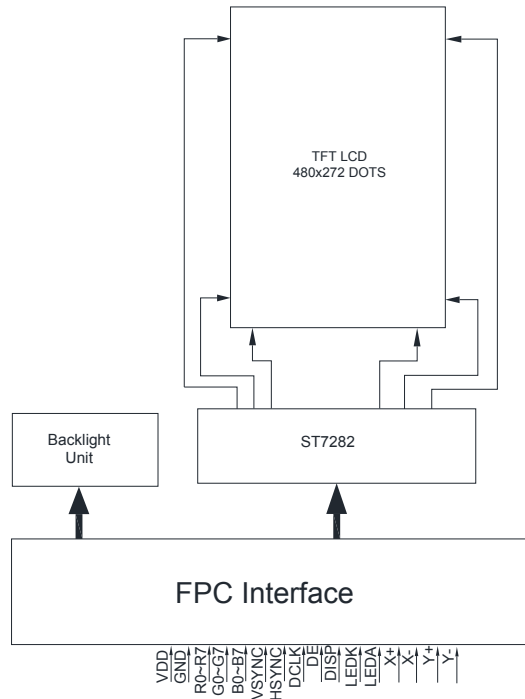
## Note1:

DISP="Low", Standby.

DISP="High", Normal display.



## 5. BLOCK DIAGRAM



## 6. ABSOLUTE MAXIMUM RATINGS

### 6.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
Supply Voltage	VDD	-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=60°C & RH=90% ≤ 120Hrs.

## 7. ELECTRICAL CHARACTERISTICS

### 7.1 ELECTRICAL CHARACTERISTICS OF LCD

Ta=25°C

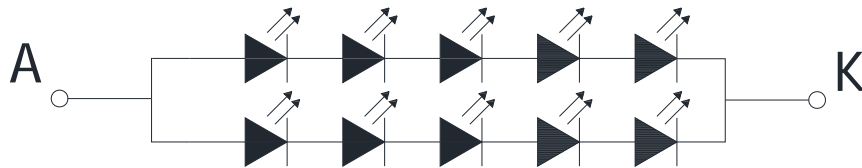
ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Power Voltage For LCD	VDD	3.0	3.3	3.6	V	
	IDD	-	TBD	TBD	mA	Note 1
High Level Input Voltage	VIH	0.7VDD	-	VDD	V	VDD=3.3V
Low Level Input Voltage	VIL	GND	-	0.3VDD	V	VDD=3.3V

Note 1 : Test condition : VDD =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



### 8. OPTICAL CHARACTERISTICS

Ta=25°C

ITEM	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT	REMARK
Contrast Ratio	CR		(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	-	
	Red	Rx	TBD	TBD	TBD	-	
		Ry	TBD	TBD	TBD	-	
	Green	Gx	TBD	TBD	TBD	-	
		Gy	TBD	TBD	TBD	-	
	Blue	Bx	TBD	TBD	TBD	-	
		By	TBD	TBD	TBD	-	
Viewing Angle	Hor.	$\theta_{x+}$	55	65	-	Deg.	Note 3
		$\theta_{x-}$	55	65	-		
	Ver.	$\theta_{y+}$	40	50	-		
		$\theta_{y-}$	50	60	-		
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.

$$\text{Contrast Ratio (CR)} = L_{63}/L_0$$

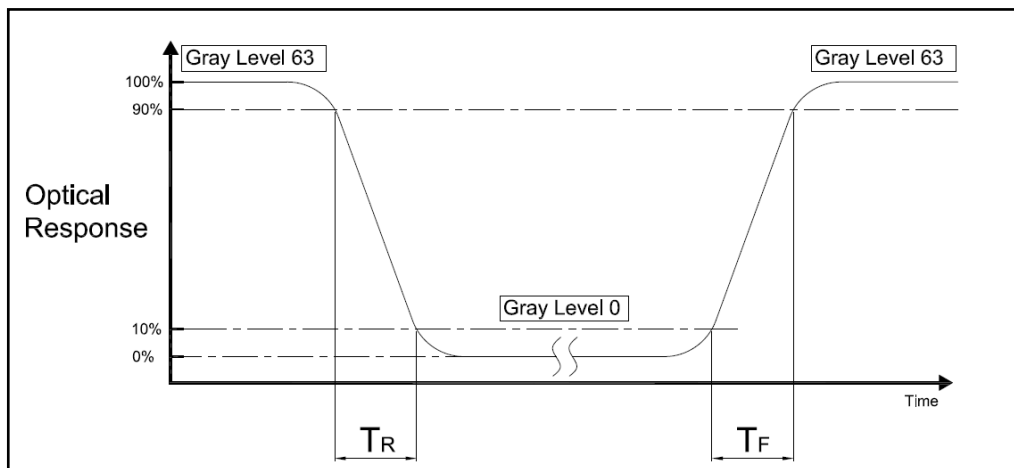
L63 : Luminance of gray level 63

L0 : Luminance of gray level 0

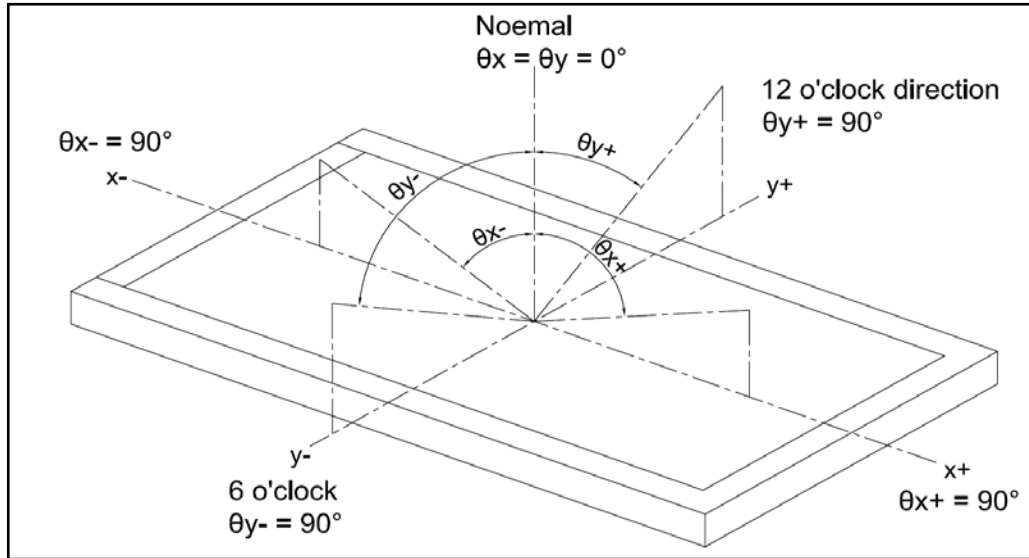
$$CR = CR(5)$$

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)

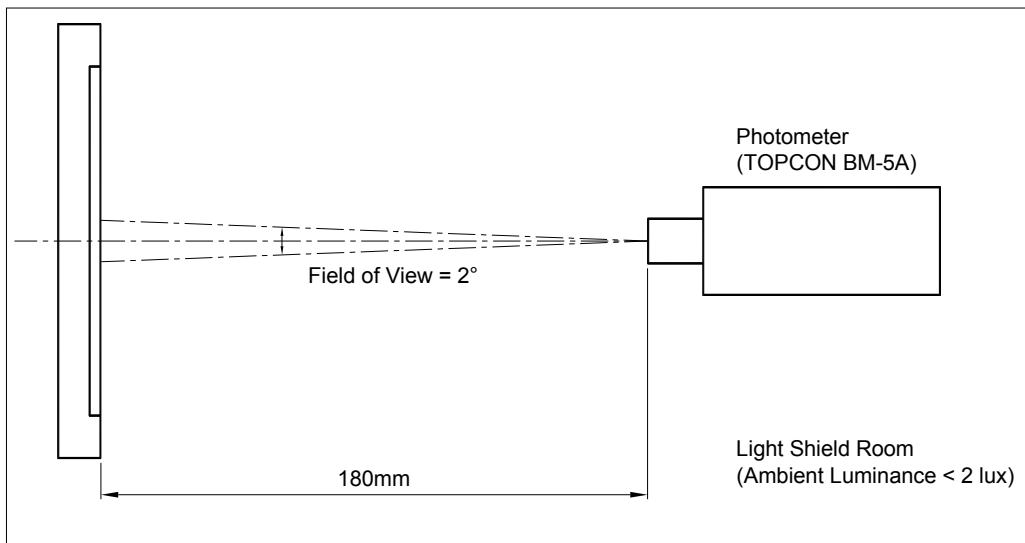


Note 3 :

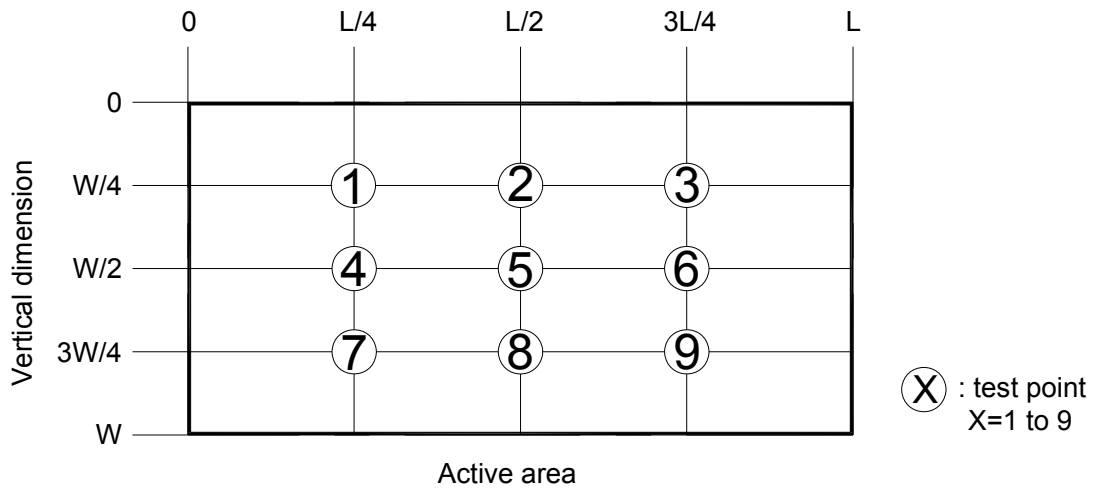


Note 4 : Measurement Set-Up:

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

ITEM	SPECIFICATIONS	REMARK
Working Voltage	$\leq$ DC 10V.	
Resistance	X axis:400 $\Omega$ ~1050 $\Omega$	
Resistance	Y axis:100 $\Omega$ ~500 $\Omega$	
Linearity	$\leq$ 1.5%	
Response	$\leq$ 15ms	
Operation force	20g~80g	

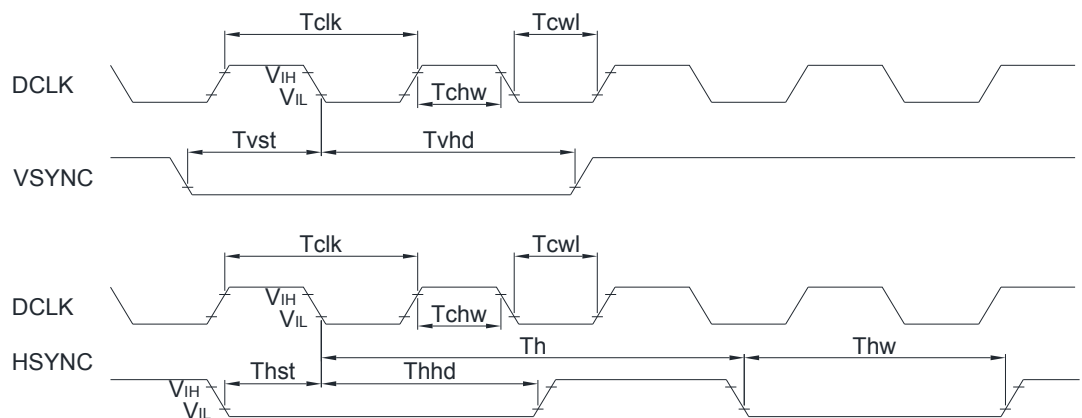
## 10. TIMING SPECIFICATIONS

### 10.1 AC CHARACTERISTICS

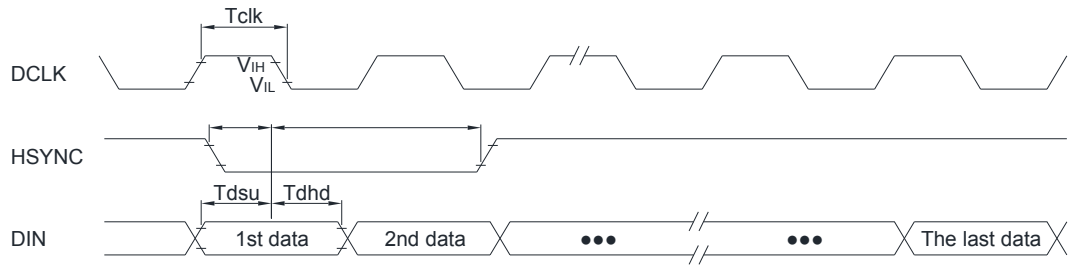
ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
VDD power source slew time	TPOR	-	-	20	ms	From 0V to 99% VDD
GRB pulse width	tRSTW	10	50	-	us	R=10Kohm, C=1uF
CLK pulse duty	Tcw	40	50	60	%	
Hsync width	Thw	1	-	-	ns	
Hsync period	Th	55	60	65	us	
Vsync setup time	Tvst	12	-	-	ns	
Vsync hold time	Tvhhd	12	-	-	ns	
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

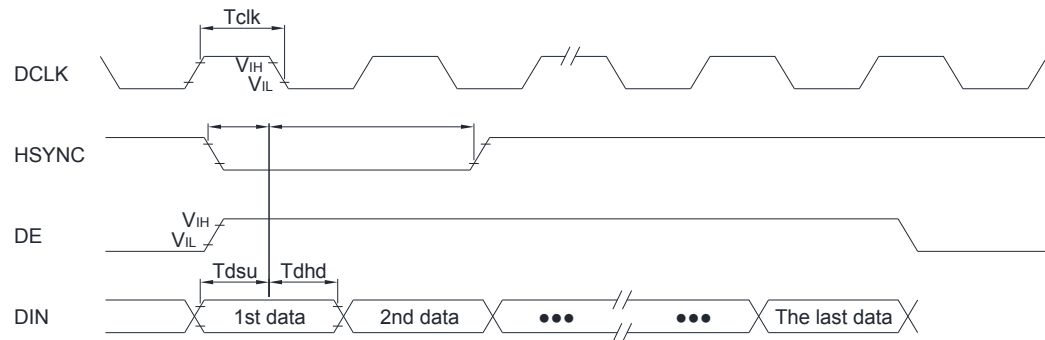
#### 10.2.1 CLOCK AND DATA INPUT TIMING DIAGRAM



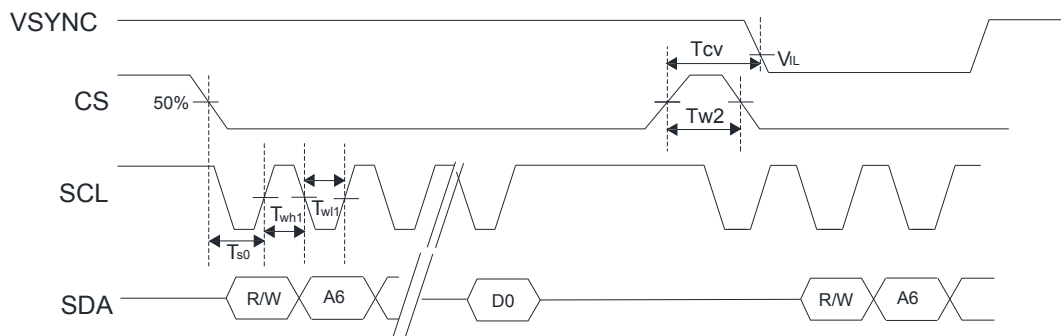
10.2.2 SYNC MODE



10.2.3 SYNC-DE MODE



10.2.4 3-WIRE COMMUNICATION TIMING DIAGRAM





### 10.3 RGB INPUT TIMING TABLE

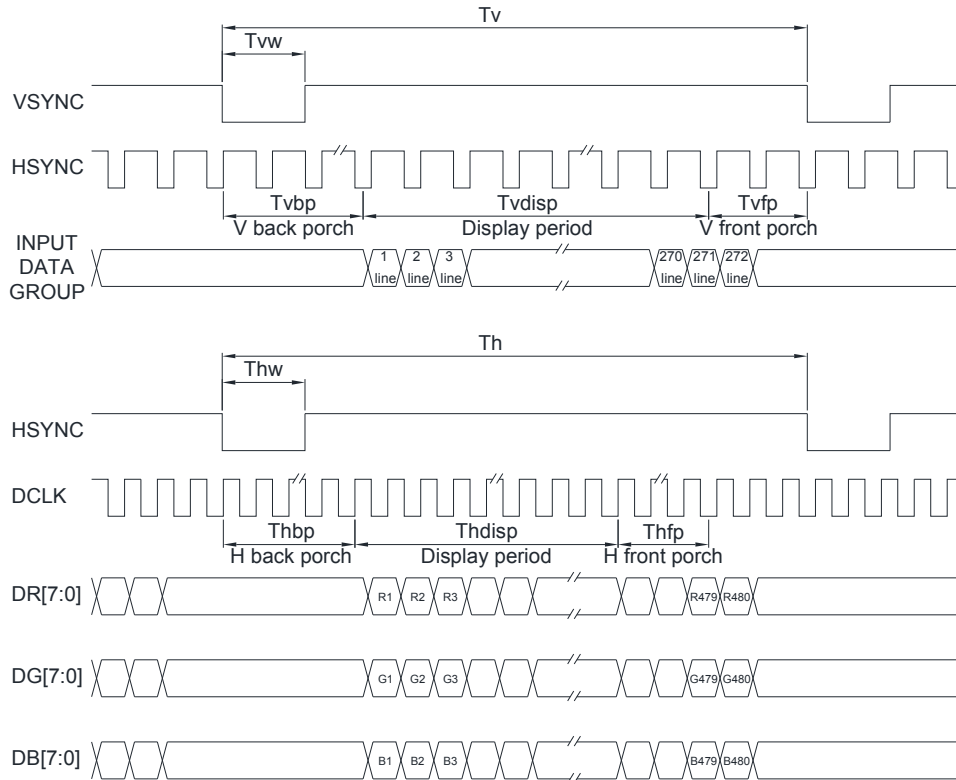
#### 10.3.1 PARALLEL 24-BIT RGB TIMING TABLE

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	

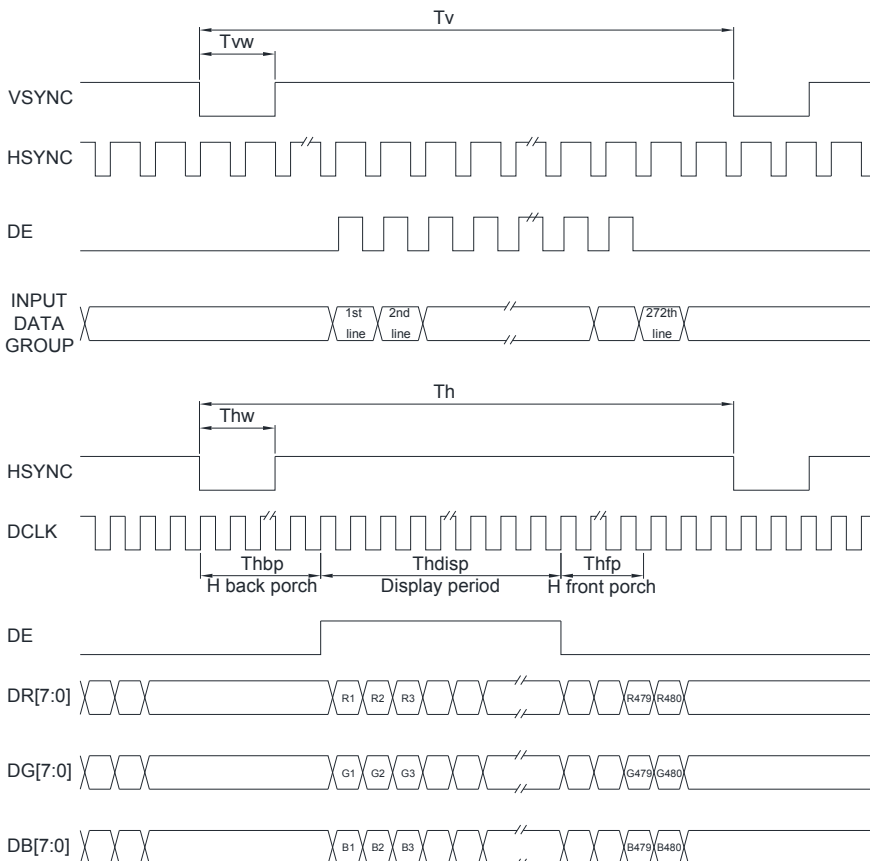
#### 10.3.2 SERIES 8-BIT RGB TIMING TABLE

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

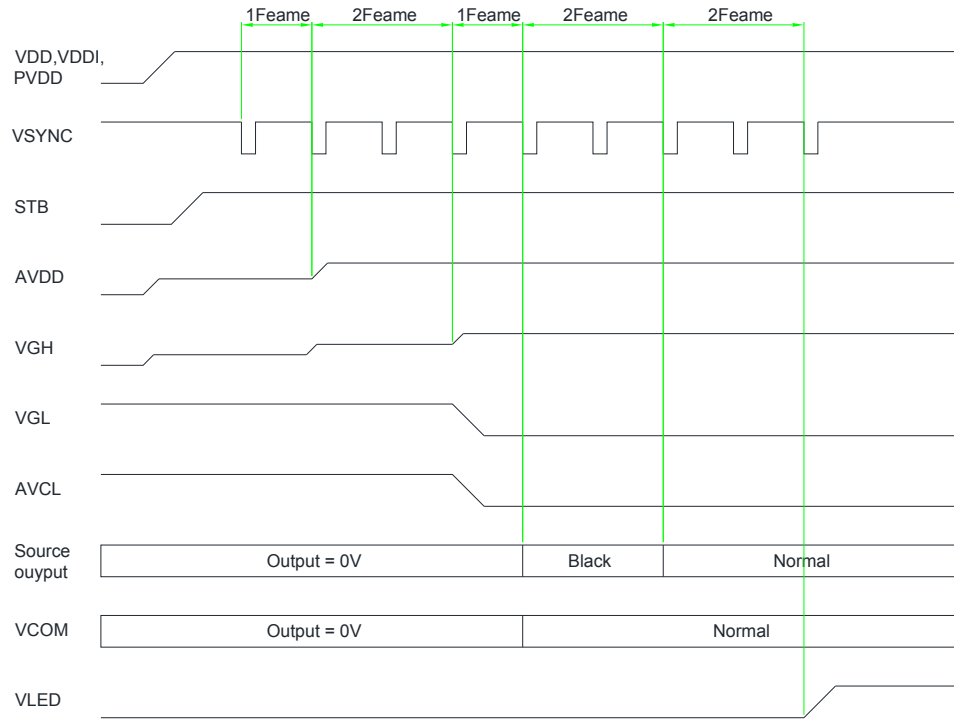


### 10.5 SYNC-DE MODE TIMING DIAGRAM

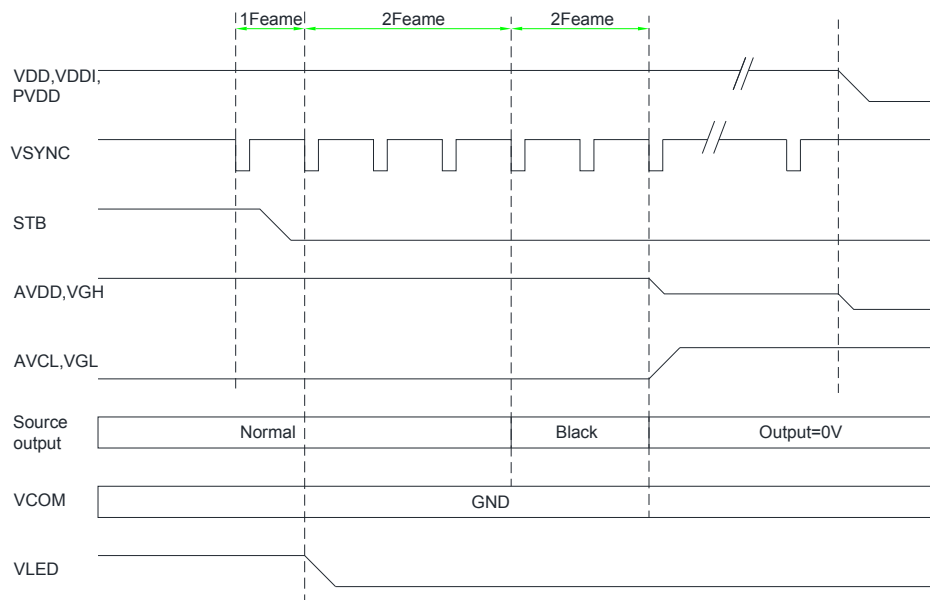


## 10.6 POWER ON/OFF SEQUENCE

### 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	TBD	TBD	
2	Low Temperature Storage	TBD	TBD	
3	High Temperature Operation	TBD	TBD	
4	Low Temperature Operation	TBD	TBD	
5	Temperature Cycle	TBD	TBD	
6	High Temperature Humidity Storage	TBD	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.

## 11.1 VIBRATION TEST :

### 11.1.1 STATE LABORATORY ENVIRONMENT :

Room temperature :  $25\pm 3^{\circ}\text{C}$   
Relative humidity :  $55\pm 20\% \text{RH}$

### 11.1.2 TEST METHOD / SPECIFICATION :

Sample Status : Non-packaged single state  
Waveform : Sine  
Frequency : 10~55~10Hz  
Full amplitude : 1.5mm  
Vibration direction : X,Y,Z Axis (3 Axial)  
Test time : Each 2Hour / X,Y,Z Axis , Altogether 6 Hour

## 11.2 MECHANICAL SHOCK TEST :

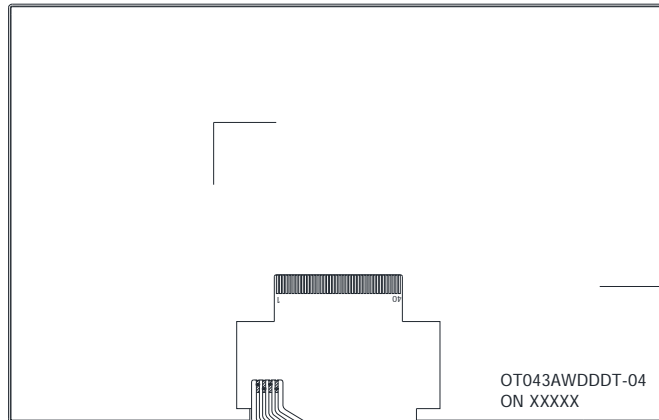
### 11.2.1 STATE LABORATORY ENVIRONMENT :

Room temperature :  $25\pm 3^{\circ}\text{C}$   
Relative humidity :  $55\pm 20\% \text{RH}$

### 11.2.2 TEST METHOD / SPECIFICATION :

Sample Status : Non-packaged single state  
Waveform : Half-sine  
Acceleration : 1G  
Shock Time : 6ms  
Impact direction : 6 Directions ( $\pm X, \pm Y, \pm Z$  axes)  
Number of shocks : Each direction 3 Secondary , Altogether 18 Secondary

## 12.MODEL NUMBER SYSTEM



- (a) MODEL NAME : OT043AWDDDT-04
- (b) LOT NO : ON XX XX X

CODE	MEANING	DESCRIPTION
<u>XX</u>	Year	2013=13, 2014=14, 2015=15, ....
<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 : QT3-QC-A-I001

### 14. PACKAGE INFORMATION

LCM MODEL	LCM QTY. IN THE BOX	INNER BOX SIZE(mm)	WEIGHT	REMARK
OT043AWDDDT-04	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.