

PRODUCT SPECIFICATION

PART NUMBER: QX-101WSVGATLT00D
DESCRIPTION: TFT 10.1"wide 1024*600 TN TTL 300CD

Rev:1.6

- () Preliminary Specification
- (V) Approved Specification

Customer Name:	
Signature:	Date:

QiteX Advanced Display Solution		
PREPARED BY	REVIEWED BY	SIGNATURE DATE
<i>Natalie Lin</i>	<i>Joy Tseng</i>	<i>2018/05/28</i>

CONTENTS

NO	Item	Page
	COVER	
	Content	
	RECORD OF REVISIONS	
1	PRECAUTIONS and WARRANTY	4
1.1	Precautions	4
1.2	Warranty	4
2	GENERAL DECRIPITION	5
2.1	General Specifications	5
3	ABSOLUTE MAXIMUM RATINGS	6
3.1	Absolute Ratings of Environment	6
3.2	Electrical Absolute Ratings	6
3.2.1	TFT LCD Module	6
3.2.2	Backlight Unit	7
4	BLOCK DIAGRAM	8
5	PIN CONNECTIONS	9
6	OPTICAL CHARATERISTICS	11
6.1	Optical Characteristics	14
7	SIGNAL CHARACTERISTICS	15
7.1	Parallel RGB input timing table	15
7.2	Output timing table	16
7.3	Input clock and data timing diagram	16
7.4	Source output timing diagram(Cascade)	17
7.5	Vertical timing diagram HV(Cascade)	17
7.6	Vertical timing diagram DE(Cascade)	17
7.7	Gate output timing diagram(Cascade)	18
7.8	Vertical timing diagram HV (Dual gate)	18
7.9	Vertical timing diagram DE (Dual gate)	18
7.10	Gate output timing diagram (Dual gate)	19
8	REALIABILITY SPECIFICATION	20
9	OUTLINE DRAWING	21

RECORD OF REVISIONS

Revision	Date	Description	Page
Preliminary	2017/8/23	1st Edition	
Preliminary	2017/09/12	REVISED BLOCK DIAGRAM	8
Preliminary	2017/09/26	ADD OUTLINE DRAWING	20
Rev 1.0	2017/11/21	REVISED DISPLAY MODE in GENERAL SPECIFICATIONS	5
		REVISED NOTE4: DEFINITION OF RESPONSE TIME	13
Rev 1.1	2017/11/24	REVISED ININTERFACE TO RGB	5
Rev 1.2	2017/11/27	REVISED PIXEL SIZE	5
		OUTLINE DRAWING	21
Rev 1.3	2018/04/10	COMPLETE LED INFO	7
Rev 1.4	2018/05/28	Modify Backlight Voltage	7
Rev 1.5	2018/07/06	Modify BLOCK DIAGRAM	8
Rev 1.6	2018/11/01	Modify Color Chromaticity	11
		Modify Backlight Forward Voltage	7

1. Precautions and Warranty

1.1 Precaution

- 1.1.1 Do not apply rough force such as bending or twisting to the module during assembly.
- 1.1.2 To assemble or install module into user's system can be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- 1.1.3 Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
- 1.1.4 It's not permitted to have pressure or impulse on the module because the LCD panel and Backlight will be damaged.
- 1.1.5 Always follow the correct power sequence when LCD module is connecting and operating. This can prevent damage to the CMOS LSI chips during latch-up.
- 1.1.6 Do not pull the I/F connector in or out while the module is operating.
- 1.1.7 Do not disassemble the module, or insert anything into the Backlight unit
- 1.1.8 It is dangerous that moisture come into or contacted the LCD module, because moisture may damage LCD module when it is operating.
- 1.1.9 High temperature or humidity may reduce the performance of module. Please store LCD module
- 1.1.10 within the specified storage conditions.
- 1.1.11 The response time will become slowly below lower temperature.
- 1.1.12 Do not keep same pattern in a long period of time. It may cause image sticking on LCD.
- 1.1.13 Display may change color with different temperature.
- 1.1.14 The Module should be kept into anti-static bag or other containers resistant to static for storage.
- 1.1.15 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, skin or clothes, it has to be washed away thoroughly with soap.
- 1.1.16 After the module's end of life, it is not harmful in case of normal operation and storage.

1.2 Warranty

- 1.2.1 Our warranty liability is limited to repair and/or replacement. We will not be responsible for any consequential loss.
- 1.2.2 If possible, we suggest customer to use up all modules in six months. If the module storage time over twelve months, we suggest that recheck it before the module be used.

2. GENERAL DESCRIPTION

The specification is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This product is composed of a TFT-LCD panel, driver ICs and a backlight unit.

2.1 General Specifications

Features	Details	Unit
Display Size(Diagonal)	10.1"	
LCD type	TN TFT	
Display Mode	Transmissive/ white	
Resolution	1024 RGB x 600	Pixels
View Direction	12 O'CLOCK	Best Image
Gray Scale Inversion Direction	6 O'CLOCK	
Module Outline	235(H) x 143(V) x4.9(T) (Note1)	mm
Active Area	222.72(H) x125.28(V)	mm
Pixel Size	0.2175(H) x 0.2088(V)	mm
Pixel Arrangement	RGB Vertical Stripe	
Polarizer Surface Treatment	Anti-glare	
Display Colors	16.7M	
Interface	24 bits-RGB interface	
With or Without Touch Panel	Without	
Operating Temperature	-20~70	°C
Storage Temperature	-30~80	°C
Weight	266	g

Note: Exclusive posts, FFC/FPC tail etc.

3. Absolute Maximum Ratings

3.1 Absolute Ratings of Environment

$V_{SS}=0V, T_a=25^{\circ}C$

Item	Symbol	Min.	Max.	Unit
Supply Voltage	DVDD	-0.5	+3.96	V
	AVDD	-0.5	+14.85	V
	VGH	-0.3	+42.0	V
	VGL	VGH-42	+0.3	V
Storage temperature	T_{stg}	-30	+80	$^{\circ}C$
Operating temperature	T_{op}	-20	+70	$^{\circ}C$

Note 1: If T_a below $50^{\circ}C$, the maximal humidity is 90%RH, if T_a over $50^{\circ}C$, absolute humidity should be less than 60%RH.

Note 2: The response time will be extremely slow when the operating temperature is around $-10^{\circ}C$, and the back ground will become darker at high temperature operating.

3.2 Electrical Absolute Ratings

3.2.1 TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	
Supply Voltage	DVDD	3.0	-	3.6	V	
	AVDD	6.5	10.8	13.5	V	
	VGH	(16)	21	(26)	V	
	VGL	(-13)	-8	(-3)	V	
Input signal voltage	VCOM	-	3.7	-	V	
Logic Low input voltage	V_{IL}	0	-	$0.3 * DVDD$	V	
Logic High input voltage	V_{IH}	$0.7 * DVDD$	-	DVDD	V	
Logic Low output voltage	V_{OL}	-	-	GND+0.4		
Logic High output voltage	V_{OH}	$DVDD-0.4$	-	-		
Current Consumption All Black	Logic	$I_{CC+} I_{IN}$	-	TBD	-	mA
	Analog					

*Note 1: All of the voltage listed above are with respective to GND = 0v

*Note 2: Device is subject to be damaged permanently if stresses beyond those absolute maximum rating listed above.

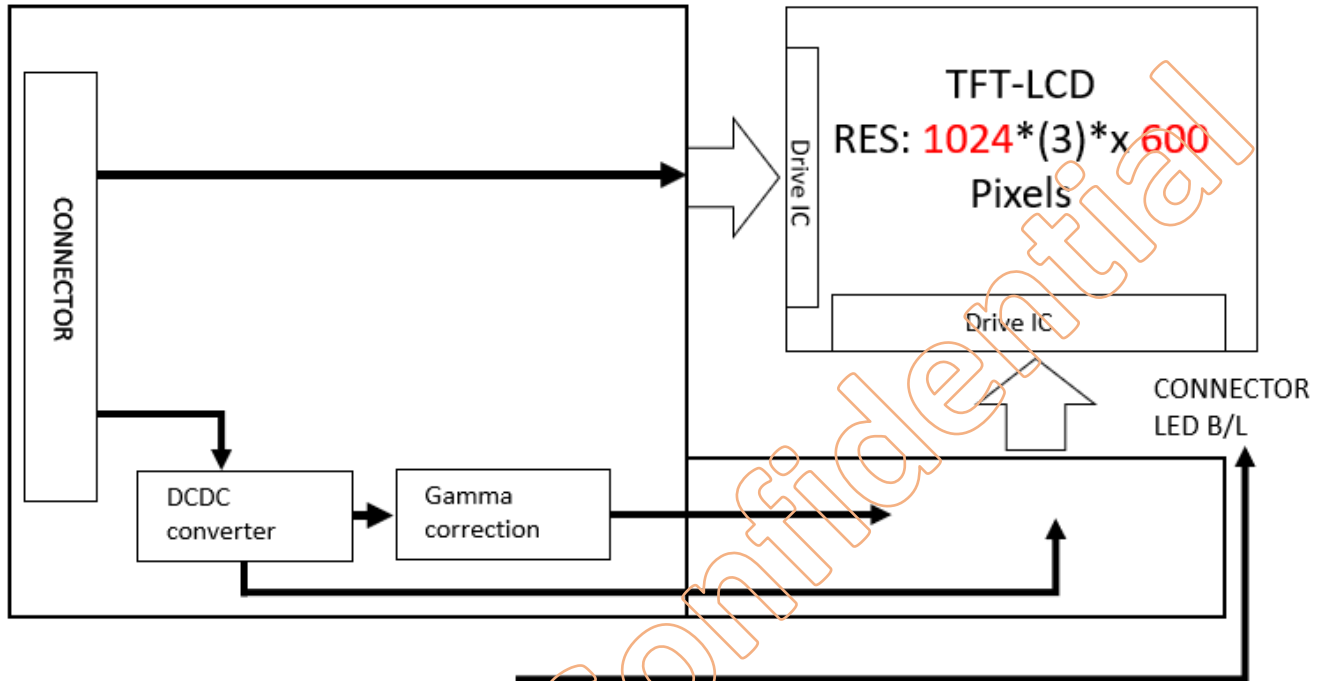
3.2.2 Backlight Unit

Item	Symbol	Condition	Min.	Typ.	Max	Unit
Forward Voltage	V _F	T _a =25 °C, I _F =20mA/LED	8.4	9.4	10.2	V
Forward Current	I _F	T _a =25 °C, V _F =3.1V/LED	-	180	-	mA
Power dissipation	P _D	-	-	1692	-	mW
Uniformity	Avg	-	-	-	-	%
LED working life(25°C)	-	-	-	40000	-	Hrs
Drive method	Constant current					
LED Configuration	27 White LEDs (3 LEDs in one string and 9 groups in parallel)					

* Note1 : Led life time defined as follows: The final brightness is at 50% of original brightness.

The environmental conducted under ambient air flow, at T_a=25±2 °C, 60%RH±5%, Typical operating life time is estimated data, led power dissipation is evaluated by led supplier

4. BLOCK DIAGRAM



QiteX

5. PIN CONNECTIONS

No.	Symbol	Function
1	VLED+	NC
2	VLED+	NC
3	VLED-	NC
4	VLED-	NC
5	GND	Ground
6	VCOM	Comman voltage
7	DVDD	Power Voltage for digital circuit
8	MODE	DE/SYNC Mode selection. Normally pull high When Mode=H,DE Mode When Mode=L,SYNC Mode
9	DE	Data input enable for TTL mode
10	VS	Vertical sync. Signal in RGB I/F mode
11	HS	Horizontal sync. Signal in RGB I/F mode
12	B7	Blue data
13	B6	Blue data
14	B5	Blue data
15	B4	Blue data
16	B3	Blue data
17	B2	Blue data
18	B1	Blue data
19	B0	Blue data
20	G7	Green data
21	G6	Green data
22	G5	Green data
23	G4	Green data
24	G3	Green data
25	G2	Green data
26	G1	Green data
27	G0	Green data
28	R7	Red data
29	R6	Red data
30	R5	Red data
31	R4	Red data

32	R3	Red data
33	R2	Red data
34	R1	Red data
35	R0	Red data
36	GND	Ground
37	DCLK	In TTL Mode ,DLCK for clock input
38	GND	Ground
39	L/R	Lift/Right scan control
40	U/D	Up/Down scan control
41	VGH	Gate On Voltage
42	VGL	Gate OFF Voltage
43	AVDD	Power for Analog circuit
44	RESET	Reset signal
45	NC	No connection
46	VCOM	Comman voltage
47	DITHB	Dither function enable control. Normally pull Low When DITHB=H,Enable internally Dithering function. When DITHB=L,Disable internally Dithering function.
48	GND	Ground
49	NC	No connection
50	NC	No connection

*Note:

Symbol	Color	Function
Red+	Red	LED Anode
White-	Green	LED Cathode

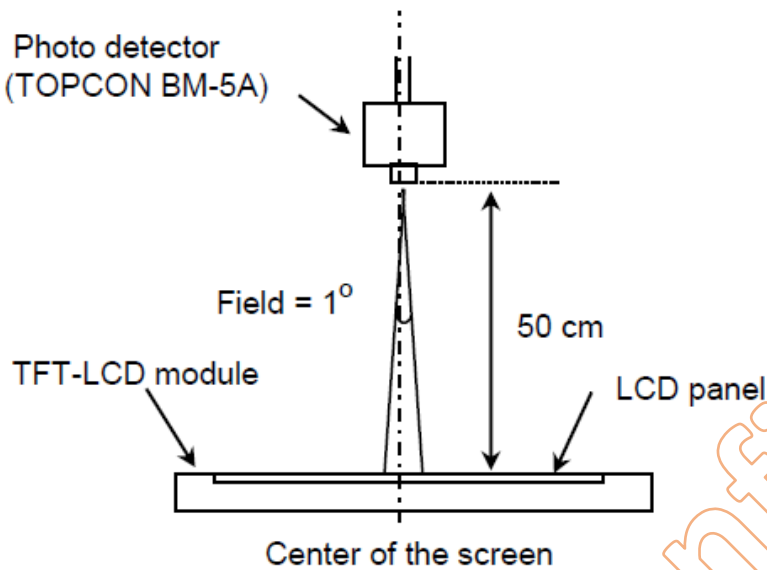
6. OPTICAL CHARACTERISTIC

6.1 Optical Characteristics

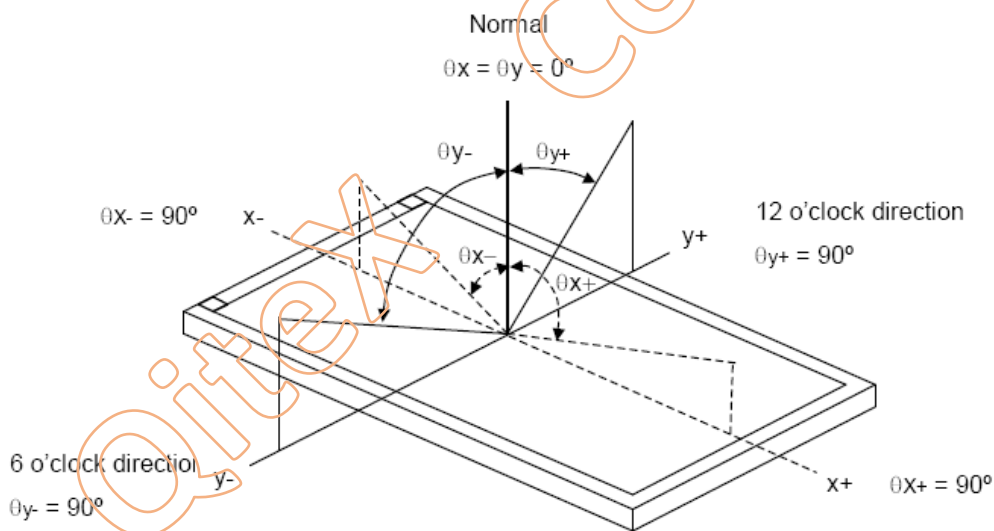
Ta=25°C, DVDD=3.3V, TN LC+ Polarizer

Item		Symbol	Condition	Specification			Unit	Note
				Min.	Typ.	Max.		
Viewing Angle	Horizontal	θ_{X+}	Center CR \geq 10	60	70	-	Deg.	Note 2
		θ_{X-}		60	70	-		
	Vertical	ϕ_{Y+}		50	60	-		
		ϕ_{Y-}		60	70	-		
NTSC Ratio(Gamut)				-	52	-	%	
Contrast ratio		CR		400	450	-		Note 3
Luminance on TFT($I_f=20\text{mA/LED}$)		Lv	Normally viewing angle $\theta_X = \phi_Y = 0^\circ$	224	300	-	cd/m ²	
Response time		TR+TF			-	8	-	ms
Color Chromaticity	Red	XR		0.550	0.600	0.650	-	
		YR		0.311	0.361	0.411		
	Green	XG		0.289	0.339	0.389		
		YG		0.561	0.611	0.661		
	Blue	XB		0.101	0.151	0.201		
		YB		0.097	0.147	0.197		
	White	XW		0.273	0.323	0.373		
		YW		0.321	0.371	0.421		

* Note 1: The method of optical measurement:



* Note 2: Definition of Viewing Angles:



* Note 3: Definition of Contrast ratio

Contrast is measured perpendicular to display surface in reflective and transmissive mode.

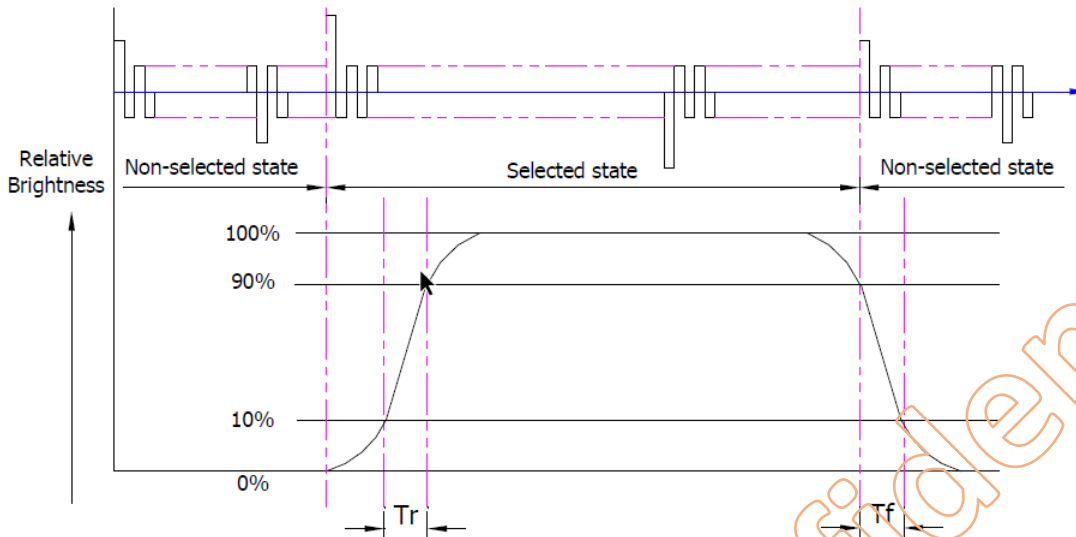
The measurement condition is:

Measuring Equipment	Eldim or Equivalent
Measuring Point Diameter	3mm//1mm
Measuring Point Location	Active Area centre point
Test pattern	A: All Pixels white
	B: All Pixel black
Contrast setting	Maximum

Definitions: CR (Contrast) = Luminance of White Pixel / Luminance of Black Pixel

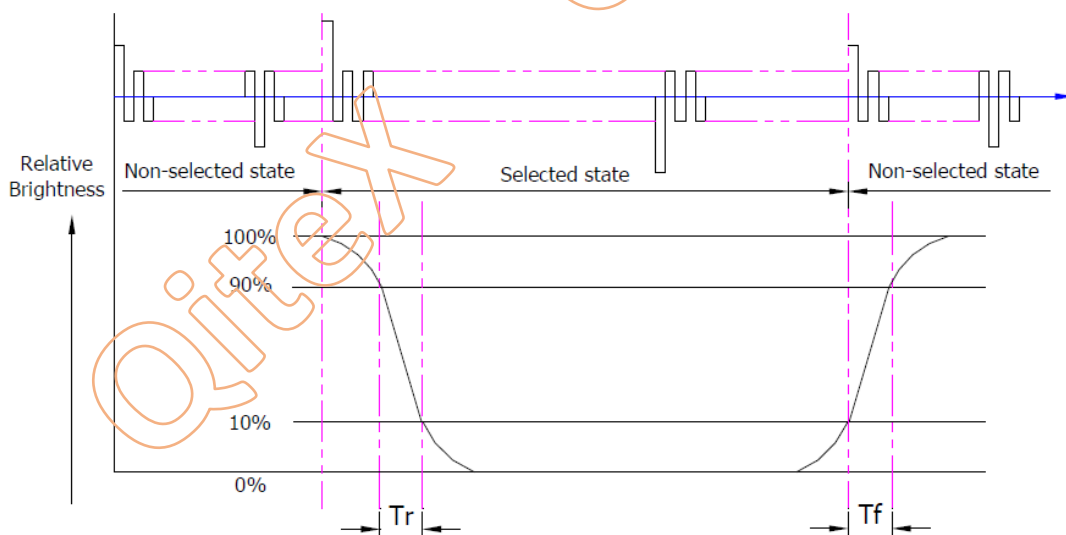
*** Note 4: Definition of Response Time:**

Normally Black Type (Negative)



- (1) T_r is the time it takes to change from non-selected stage with relative luminance 10% to selected state with relative luminance 90%.
- (2) T_f is the time it takes to change from selected state with relative luminance 90% to non-selected state with relative luminance 10%.

Normally White Type (Positive)



- (1) T_r is the time it takes to change from non-selected stage with relative luminance 90% to selected state with relative luminance 10%.
- (2) T_f is the time it takes to change from selected state with relative luminance 10% to non-selected state with relative luminance 90%;

* Measuring machine: LCD-5100 or EQUI

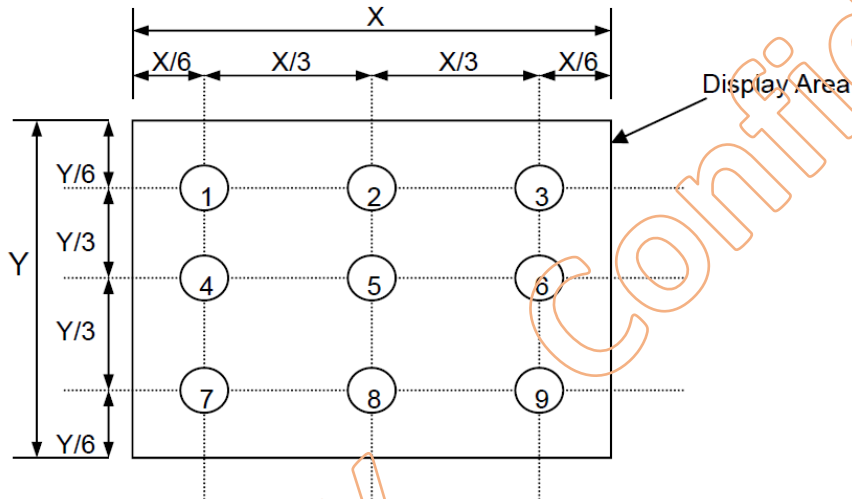
* Note 5: Definition of Surface Luminance, Uniformity and Transmittance

Using the transmissive mode measurement approach, measure the white screen luminance of the display panel and backlight.

5.5.1. Surface Luminance: $LV = \text{average (LP1:LP9)}$

5.5.2. Uniformity = $\text{Minimal (LP1:LP9) / Maximal (LP1:LP9) * 100\%}$

5.5.3. Transmittance = $LV \text{ on LCD} / LV \text{ on Backlight} * 100\%$



7. SIGNAL CHARACTERISTICS

7.1 Parallel RGB input timing table

7.1.1 DE Mode

Parameter	Symbol	Values			Unit
		Min.	Typ	Max.	
DCLK Frequency	fclk	40.8	51.2	67.2	MHz
Horizontal Display Area	thd	1024			DCLK
HSD Period	th	1114	1344	1400	DCLK
HSD Blanking	thb=thfp	90	320	376	DCLK
Vertical Display Area	tvd	600			T _H
VSD Period	tv	610	635	800	T _H
VSD Blanking	Tvbp+tvfp	10	35	200	T _H

7.1.2 HV mode

Horizontal Timing

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	44.9	51.2	63	MHz
Horizontal Display Area	thd	1024			DCLK
HSD Period	Th	1200	1344	1400	DCLK
HSD Pulse Width	thpw	1	-	140	DCLK
HSD Back Porch	thbp	160			DCLK
HSD Front Porch	thfp	16	160	216	DCLK

Vertical Timing

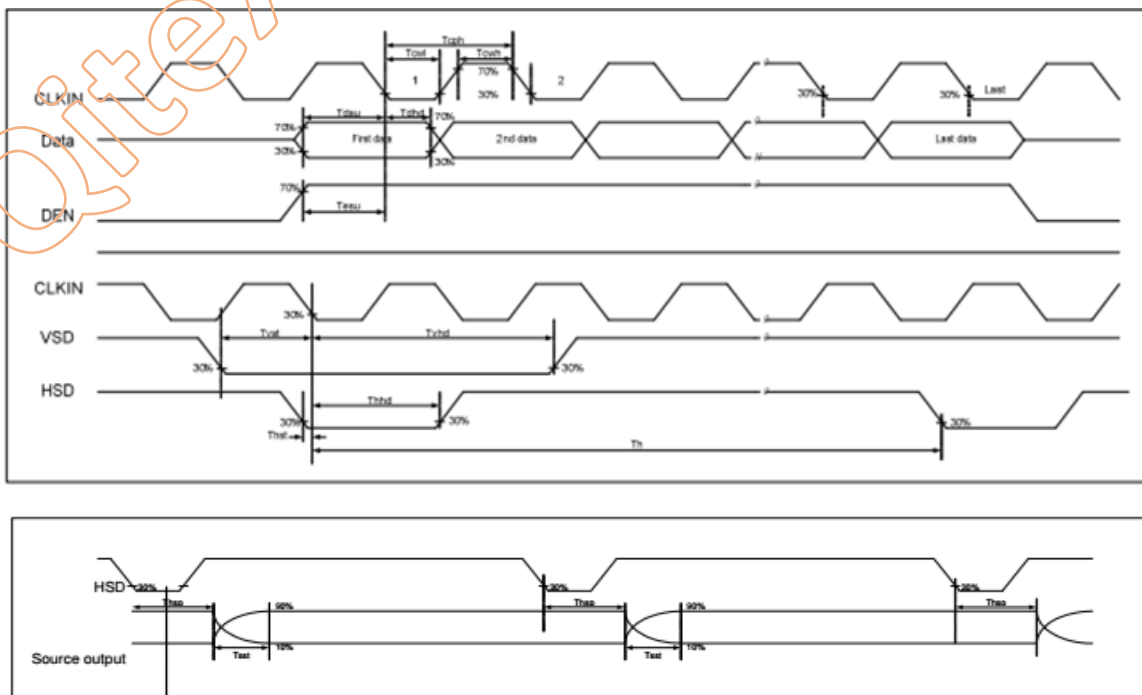
Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Vertical Display Area	thd	600			T _H
VSD Period	Tv	624	635	750	T _H
VSD Pulse Width	tvpw	1	-	20	T _H
VSD Back Porch	tvbp	23			T _H
VSD Front Porch	tvfp	16	12	127	T _H

7.2 Output timing table

Parallel 24-bit RGB mode

Parameter	Symbol	Spec.			Unit	Remark
		Min.	Typ.	Max.		
CLKIN Frequency	Fclk	-	65	71	MHz	VDD=3.0V~3.6V
CLKIN Cycle Time	Tclk	14.1	15.4	-	ns	-
CLKIN Pulse Duty	Tcwh	40	50	60	%	Tclk
Time from HSD to Source Output	Thso		64		CLKIN	-
Time from HSD to LD	Thld		64		CLKIN	-
Time from HSD to STV	Thstv		2		CLKIN	-
Time from HSD to CKV	Thckv		20		CLKIN	-
Time from HSD to OEV	Thoev		4		CLKIN	-
LD Pulse Width	Twld		10		CLKIN	-
CKV Pulse Width	Twckv		66		CLKIN	-
OEV Pulse Width	Twoev		74		CLKIN	-

7.3 Input clock and data timing diagram



7.4 Source output timing diagram(Cascade)

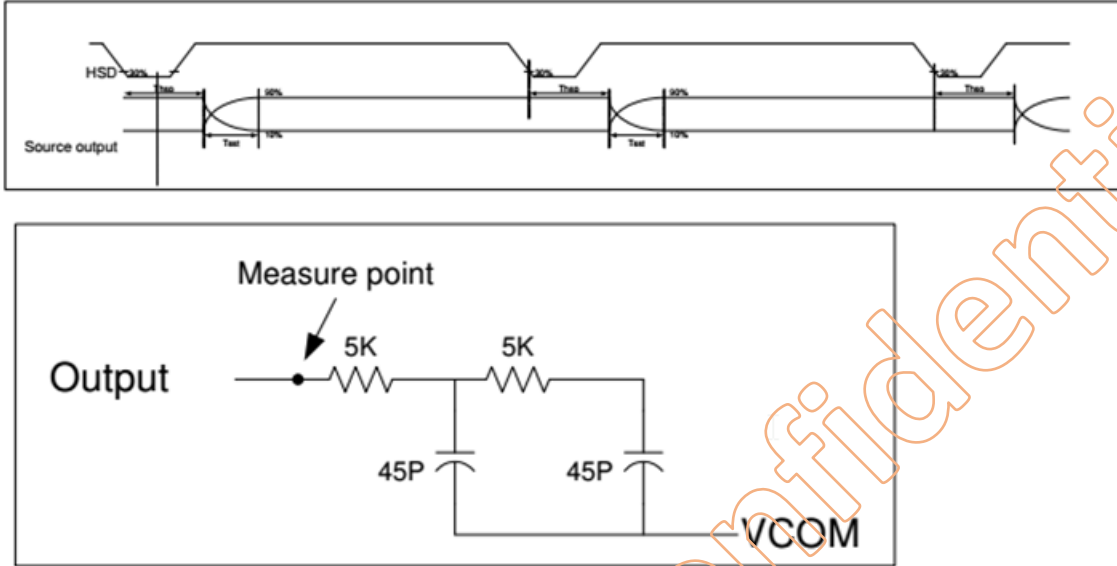
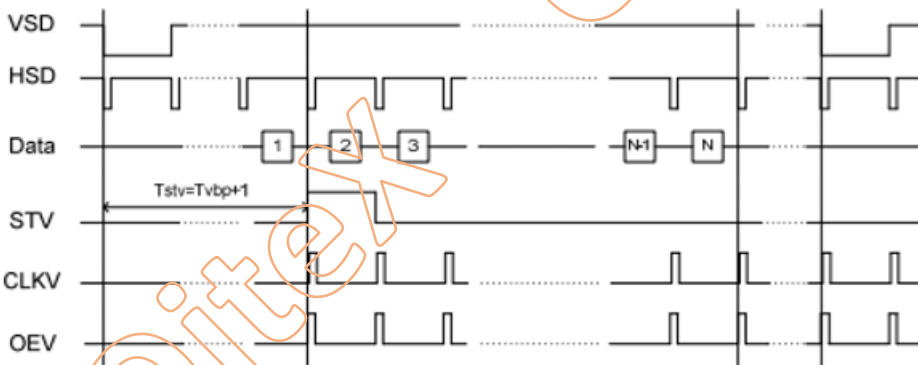
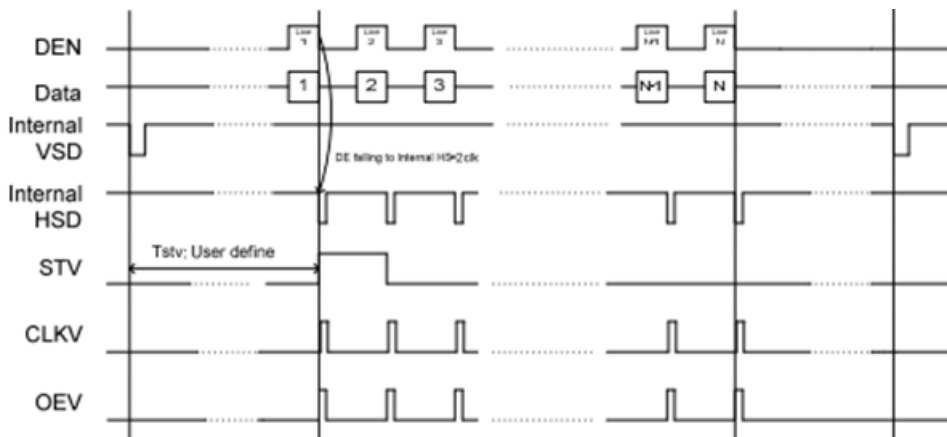


Figure 11.3: Output load condition

7.5 Vertical timing diagram HV(Cascade)



7.6 Vertical timing diagram DE(Cascade)



7.7 Gate output timing diagram(Cascade)

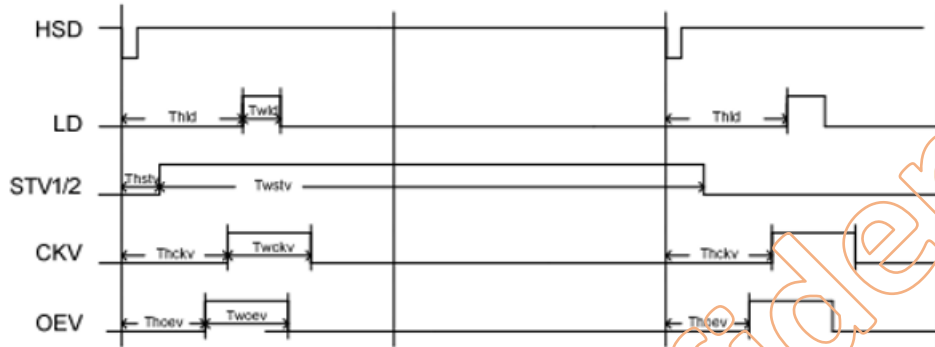
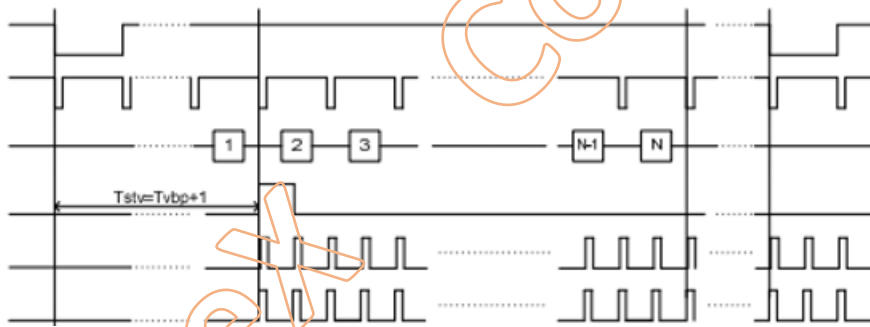
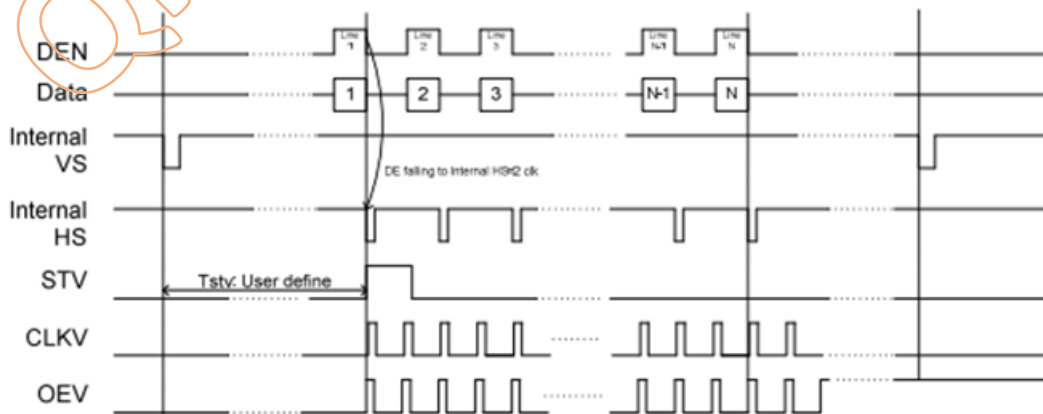


Figure 11.6: Gate output timing diagram (Cascade)

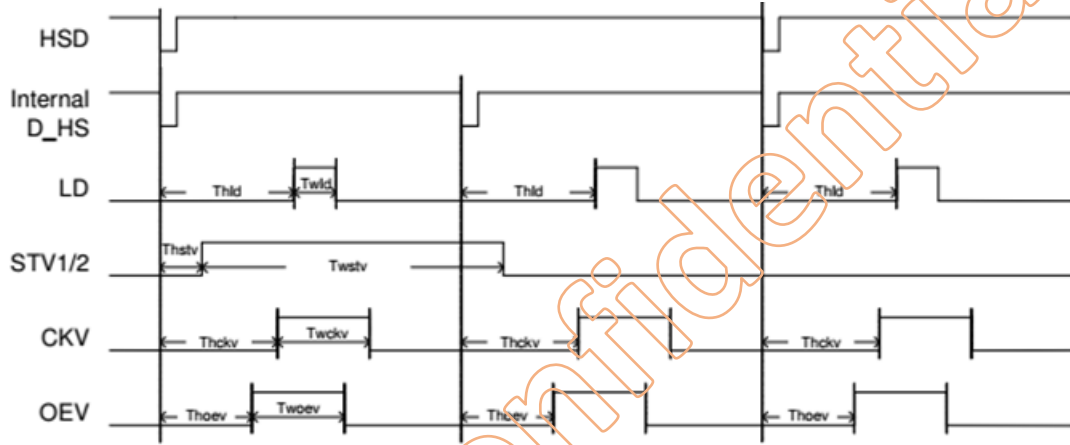
7.8 Vertical timing diagram HV(Dual gate)



7.9 Vertical timing diagram HV(Dual gate)



7.10 Gate output timing diagram(Dual gate)



QiteX

8. RELIABILITY SPECIFICATION

No	Item	Condition	Quantity	Criteria
1	High Temperature Operating	70°C, 96Hrs	2	GB/T2423.2 -2008
2	Low Temperature Operating	-20°C, 96Hrs	2	GB/T2423.1 -2008
3	High Humidity	50°C, 90%RH, 96Hrs	2	GB/T2423.3 -2006
4	High Temperature Storage	80°C, 96Hrs	2	GB/T2423.2 -2008
5	Low Temperature Storage	-30°C, 96Hrs	2	GB/T2423.1 -2008
6	Thermal Cycling Test	20°C, 60min~70°C, 60min, 20 cycles.	2	GB/T2423.22 -2012
7	Packing vibration	Frequency range:10Hz~50Hz Acceleration of gravity: 5G X,Y,Z 30 min for each direction.	2	GB/T5170.14 -2009
8	Electrical Static Discharge	Air: ± 8KV 150pF/330 Ω 5 times Contact: ± 4KV 150pF/330 Ω 5 times	2	GB/T17626.2 -2006
9	Drop Test (Packaged)	Height:80 cm,1 corner, 3 edges, 6 surfaces.	2	GB/T2423.8 -1995

QiteX

9. OUTLINE DRAWING

