PRODUCT SPECIFICATION

CDTECH Model: **S070QWS145EP-FC152-AF-2**

CUSTOMER Model: -

Description: **7.0 ” TFT-LCD Module with CTP**

Version: **1.0**

CDTECH	PREPARED BY	CHECKED BY	APPROVED BY
SIGNATURE	罗洪飞	洪晓仪	罗洪飞
DATE	2023.12.15	2023.12.15	2023.12.15

	SIGNATURE	DATE
CUSTOMER APPROVAL		

Record of Revisions

Version	Revise Date	Description	Page
1.0	2023-8-30	First Release	-
	2023-9-21	Update CTP-IO voltage to 3.3V	-
	2023-9-26	Update the backlight driving current to 350mA	-
	2023-10-24	1.Update the backlight drive current to 280MA 2.Remove the cover plate with AG treatment 3.Update LED	-

Contents

1. General Specifications

1.1 LCM General Information

Item	Specification	Unit
LCD Size	7.0	inch
Number of Pixels	1024 (H) RGB x 600 (V)	pixels
Display Mode	Normally Black	-
Viewing Direction	Free	o' clock
Interface	MIPI	-
Display Colors	16.7M	colors
Outline Dimension	180.90 (H) x 116.00 (V) x 9.26 (D)	mm
Active Area	154.21 (H) x 85.92 (V)	mm
Pixel Pitch	0.1505 (H) x 0.1432 (V)	mm
Driver IC	EK79007+EK73217	-
Operation Temperature	-30~85	℃
Storage Temperature	-30~85	℃

1.2 Touch Panel Information

Item	Specification
Touch Structure	G+G
Bonding Type with LCM	OCA Optical Bonding
Driver IC	MXT640T
Interface	I²C
Touch Count Max	5 Points
Surface treatment	AF
Surface hardness	6H
I2C slave address	0x4A
Origin of coordinate	Top Left Corner

Note1:Requirements on environmental protection RoHS compliant.

2. Absolute Maximum Ratings

Item	Symbol	MIN.	MAX.	Unit	Note
Analog Supply voltage	VCC	-0.3	5.0	V	Note 1
Digital supply voltage	IOVCC	-0.3	3.6	V	Note 1

Note 1:Permanent damage may occur to the LCD module if beyond this specification.
Functional operation should be restricted to the conditions described under normal operating conditions.

3. Elecrical Characteristics

3.1 Recommended Operating Condition for TFT LCD

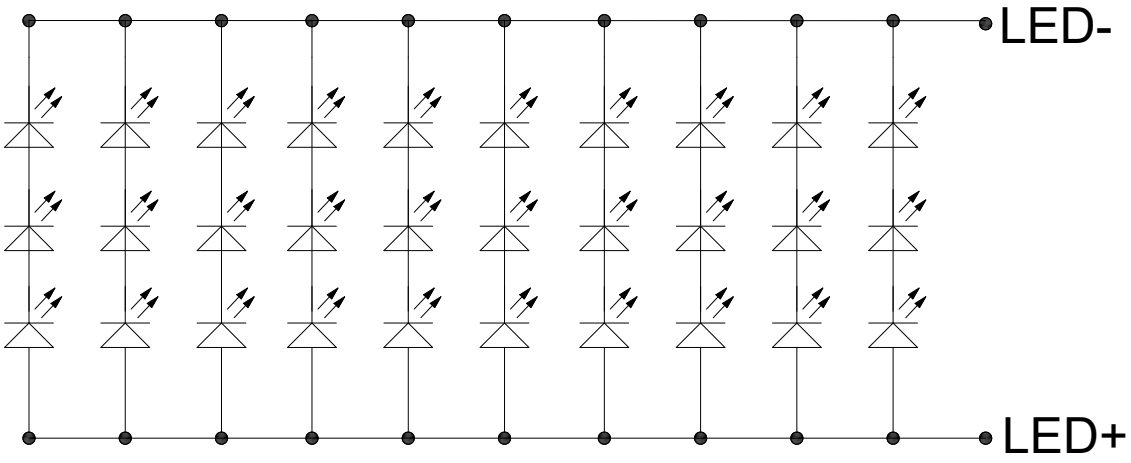
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Analog Supply voltage	VCC	3.0	3.3	3.6	V	
Analog supply current	I_{VCC}	-	TBD	-	mA	VCC=3.3V
Logic supply voltage	IOVCC	1.65	1.8	3.3	V	
Logic supply current	I_{IOVCC}	-	TBD	-	mA	IOVCC=1.8V
Logic input voltage	VIH	0.7*IOVCC	-	IOVCC	V	
	VIL	GND	-	0.3*IOVCC	V	

3.2 Recommended Driving Condition for Backlight

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Driving Current	I_F	-	280	-	mA	
Driving Voltage	V_F	8.1	-	10.2	V	
Power consumption	W_{BL}	2.268	-	2.856	W	
LED Life-Time	N/A	-	50,000	-	Hours	Ta=25℃ Note 1

Note 1:LED lifetime is defined as the module brightness decay 50% of original brightness at Ta=25 degree, typical current.

Note 2:LED circuit :



3.3 Touch Panel

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply voltage	VDD	-	3.3	-	V	
Analog supply current	I_{VDD}	-	TBD	-	mA	VDD=3.3V
Input high-level voltage	VIH	0.7*VDD	-	VDD	V	
Input low -level voltage	VIL	GND	-	0.3*VDD	V	

4. Interface Pin Assignment

4.1 LCM Pin Assignment

No.	Symbol	Description
1-2	VCC3.3V	Power supply (3.3V)
3	IOVCC1.8V	Power supply (1.8V)
4	RESET	Global reset pin
5	GND	Ground
6	DON	MIPI Negative data signal(-)
7	DOP	MIPI Positive data signal(+)
8	GND	Ground
9	D1N	MIPI Negative data signal(-)
10	D1P	MIPI Positive data signal(+)
11	GND	Ground
12	CLKN	MIPI Negative clock signal(-)
13	CLKP	MIPI Positive clock signal(+)
14	GND	Ground
15	D2N	MIPI Negative data signal(-)
16	D2P	MIPI Positive data signal(+)
17	GND	Ground
18	D3N	MIPI Negative data signal(-)
19	D3P	MIPI Positive data signal(+)
20	GND	Ground
21	NC	No connection
22-23	GND	Ground
24	NC	No connection
25	GND	Ground
26-27	LEDK	Power for LED backlight (Cathode)
28	NC	No connection
29-30	LEDA	Power for LED backlight (Anode)

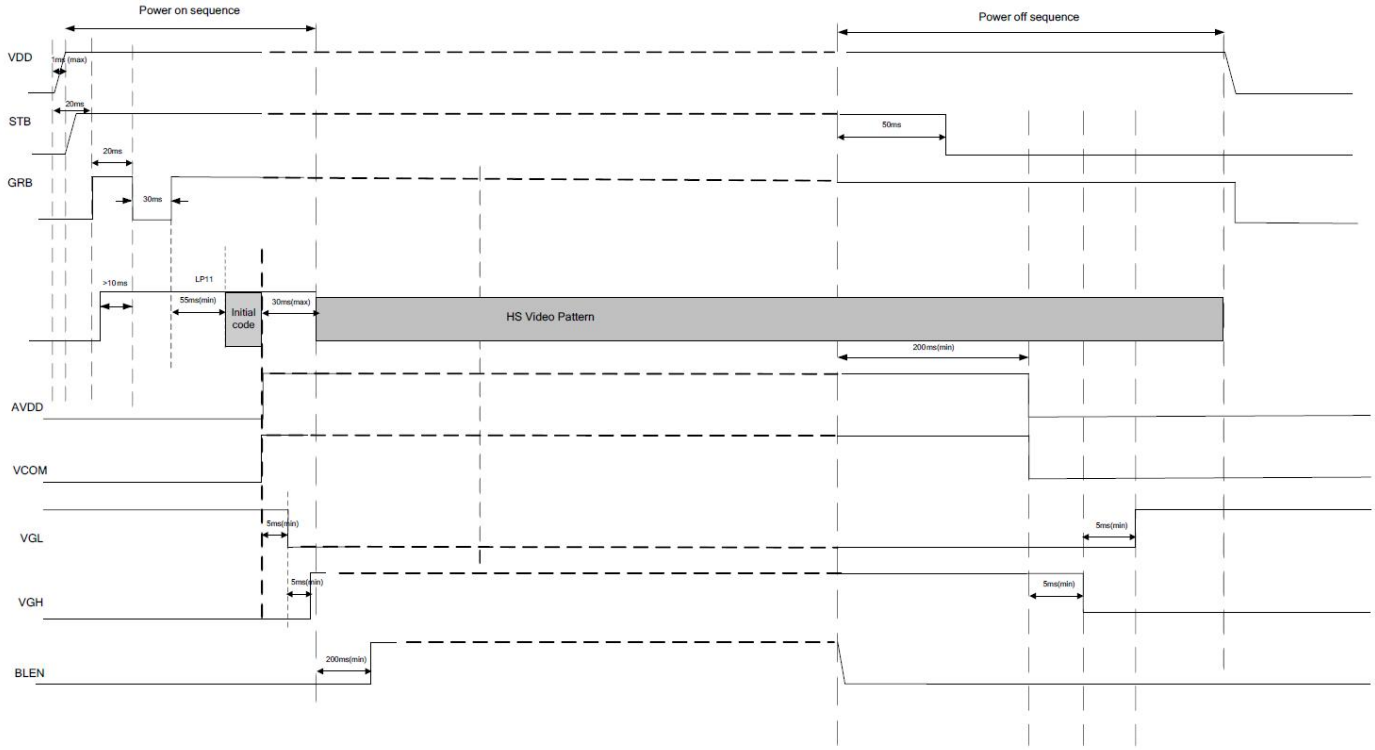
4.2 Touch FPC Pin Assignment

No.	Symbol	Description
1	RST	Global reset pin
2	VDD	Power supply for CTP
3	GND	Ground
4	INT	Interrupt signal for CTP
5	SDA	I2C data input and output for CTP
6	SCL	I2C clock input for CTP

5. Interface Characteristics

5.1 Power On/Off Sequence

In order to prevent IC from power on reset fail, the rising time (TPOR) of the digital power supply VDD should be maintained within the given specifications. Refer to “AC Characteristics” for more detail on timing.



Note: CLK and Data Lanes should keep in LP11(stop state) before GRB

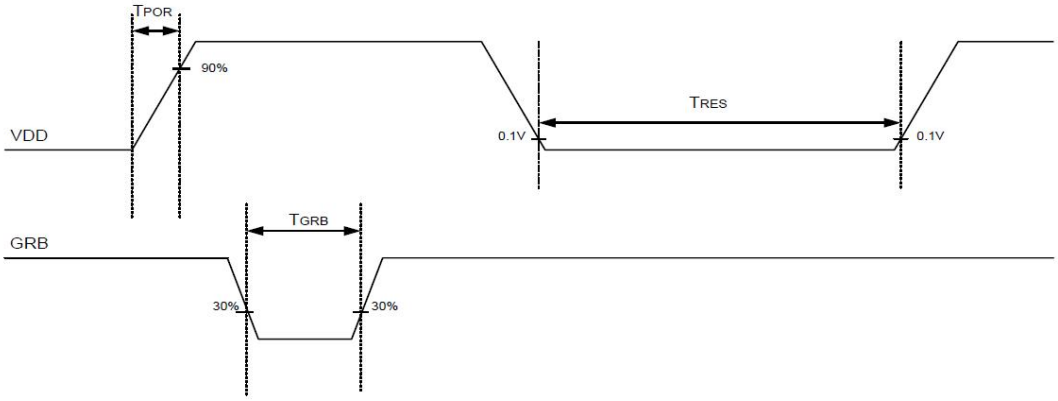
5.2 AC ELECTRICAL CHARACTERISTIC

5.2.1 Basic AC Characteristic

(VDD=VDD_IF=1.8V, AVDD=8 to 13.5V, GND=AGND=GND_IF=0V,TA=-20 to +85℃)

VDD/GRB AC characteristic

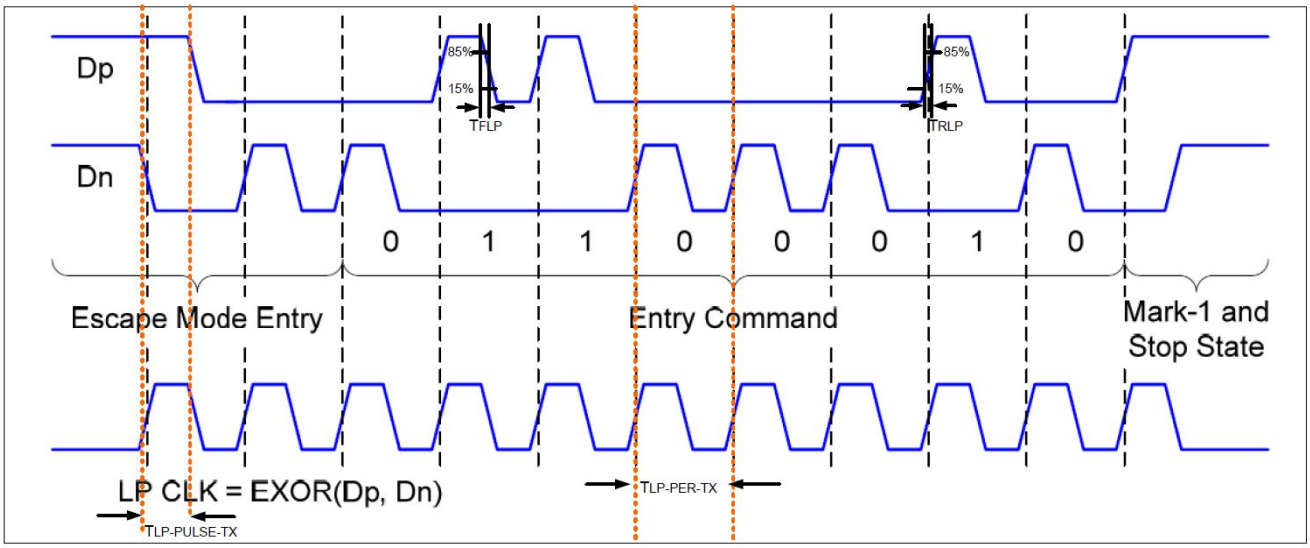
Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
VDD power slew rate	T_{POR}	-	-	20	ms	From 0 to 90% VDD
GRB active pulse width	T_{GRB}	1	-	-	ms	VDD=VDD_IF= 1.8V
VDD resettle time	T_{RES}	1	-	-	s	



5.2.2 MIPI AC Characteristic

5.2.2.1 LP Transmitter AC Specification

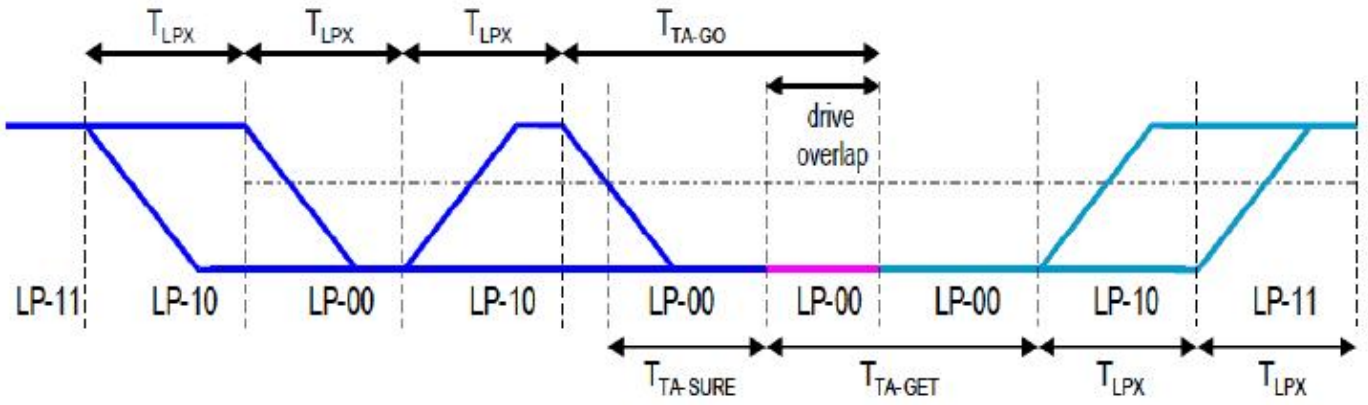
Parameter		Symbol	Min	Typ	Max	Units	Notes
15%~85% rising time and falling time		T_{RLP} /T_{FLP}	-	-	25	ns	-
30%~85% rising time and falling time		T_{REOT}	-	-	35	ns	-
Pulse width of LP exclusive-OR clock	First LP EXOR clock pulse after STOP state or Last pulse before stop state	$T_{LP-PULSE-TX}$	40	-	-	ns	-
	All other pulses		20	-	-	ns	-
Period of the LP EXOR clock		$T_{LP-PER-TX}$	90	-	-	mV/ns	-
Slew Rate @C_{LOAD} =0pF		δ V/δ t_{SR}	30	-	500	mV/ns	-
Slew Rate @C_{LOAD} =5pF			30	-	200	mV/ns	-
Slew Rate @C_{LOAD} =20pF			30	-	150	mV/ns	-
Slew Rate @C_{LOAD} =70pF			30	-	100	mV/ns	-
Load Capacitance		T_{RLP}	-	-	70	pF	-



5.2.2.3 Turnaround Procedure

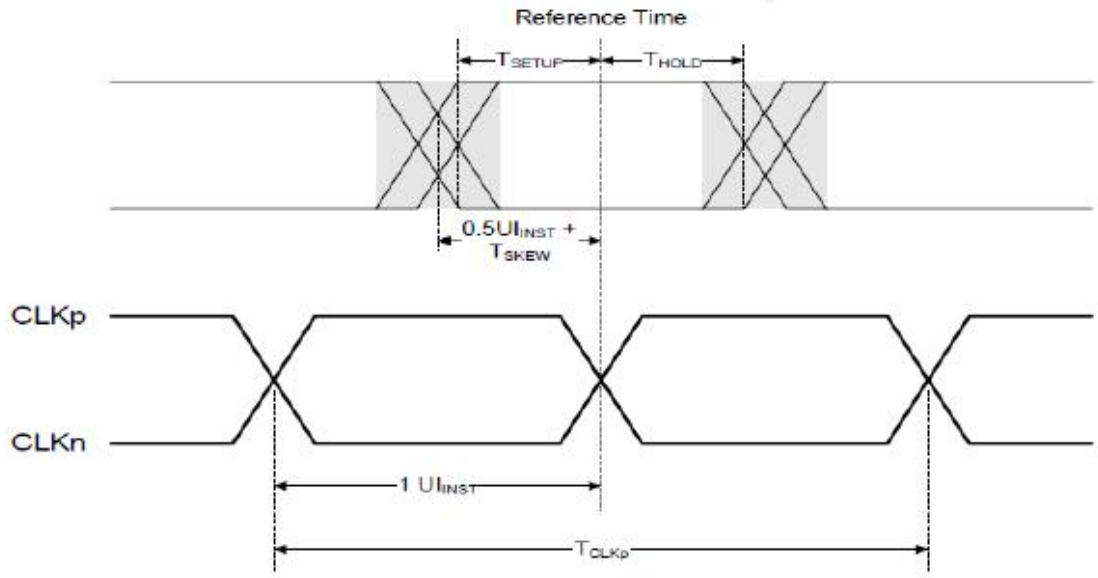
Turnaround Procedure Operation Timing Parameters

Parameter	Symbol	Min	Typ	Max	Units
Length of any Low-Power state period: Master side	T_{LPX}	50	-	75	ns
Length of any Low-Power state period: Slave side	T_{LPX}	50	55.56	58.34	ns
Ratio of T_{LPX}(Master)/ T_{LPX} (Slave) between Master and Slave side	Ratio T_{LPX}	2/3	-	3/2	
Time-out before new TX side start driving	$T_{TA-Sure}$	T_{LPX}	-	$2T_{LPX}$	ns
Time to drive LP-00 by new TX	T_{TA-GET}	-	$5T_{LPX}$	-	ns
Time to drive LP-00 after Turnaround Request	T_{TA-GO}	-	$4T_{LPX}$	-	ns



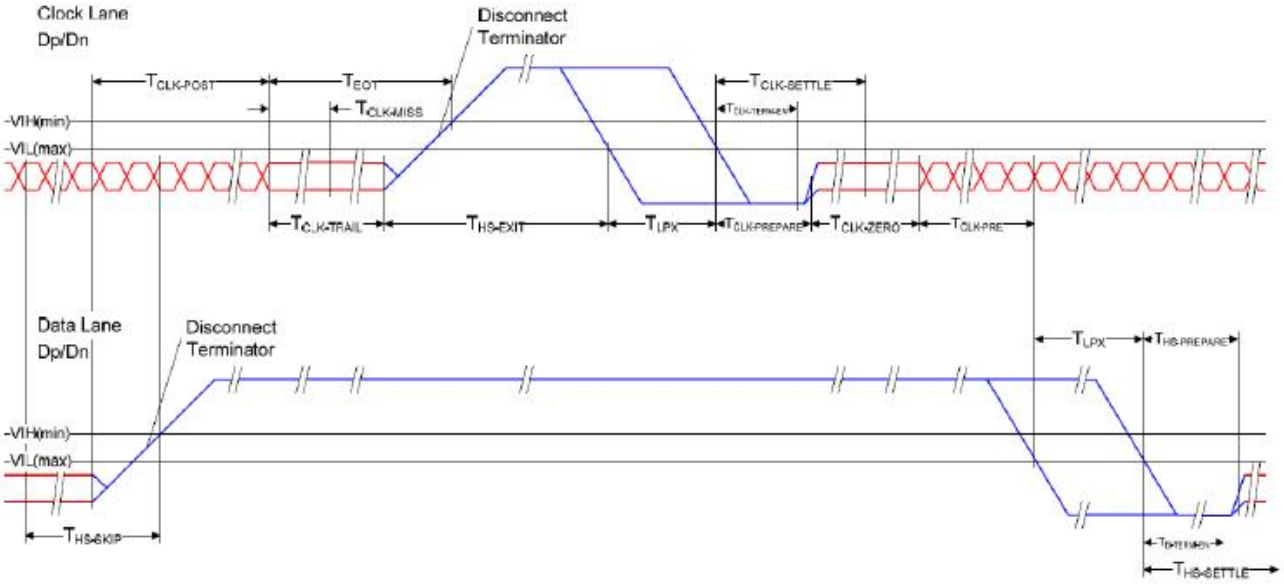
5.2.2.4 High speed transmission

Parameter	Symbol	Min	Typ	Max	Units
UI instantaneous	UI_{INST}	2	-	12.5	ns
Data to Clock Skew(measured at transmitter)	$T_{SKEW(TX)}$	-0.15	-	0.15	UI_{INST}
Data to Clock Setup time(measured at receiver)	$T_{SETUP(RX)}$	0.15	-	-	UI_{INST}
Data to Clock Hold time(measured at receiver)	$T_{HOLD(RX)}$	0.15	-	-	UI_{INST}
20%~80% rise time and fall time	T_R, T_F	150	-	-	ps
		-	-	0.3	UI_{INST}

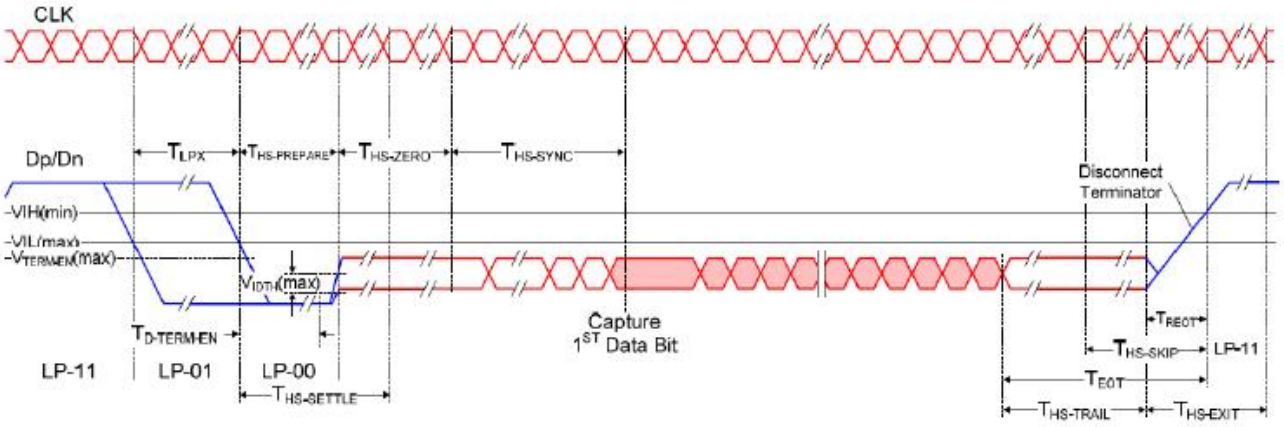


5.2.2.5 High Speed Clock Transmission

Parameter	Symbol	Min	Typ	Max	Units
Time that the transmitter shall continue sending HS clock after the last associated Data Lane has transitioned to LP mode	TCLK-POST	60+52UI	-	-	ns
Detection time that the clock has stopped toggling	TCLK-MISS	-	-	60	ns
Time to drive LP-00 to prepare for HS clock transmission	TCLK-PREPARE	38	-	95	ns
Minimum lead HS-0 drive period before starting clock	TCLK-PREPARE + TCLK-ZERO	300	-	-	ns
Time to enable Clock Lane receiver line termination measured from when Dn cross VIL,MAX	THS-TERM-EN	-	-	38	ns
Minimum time that the HS clock must be prior to any associated data lane beginning the transmission from LP to HS mode	TCLK-PRE	8	-	-	UI
Time to drive HS differential state after last payload clock bit of a HS transmission burst	TCLK-TRAIL	60	-	-	ns



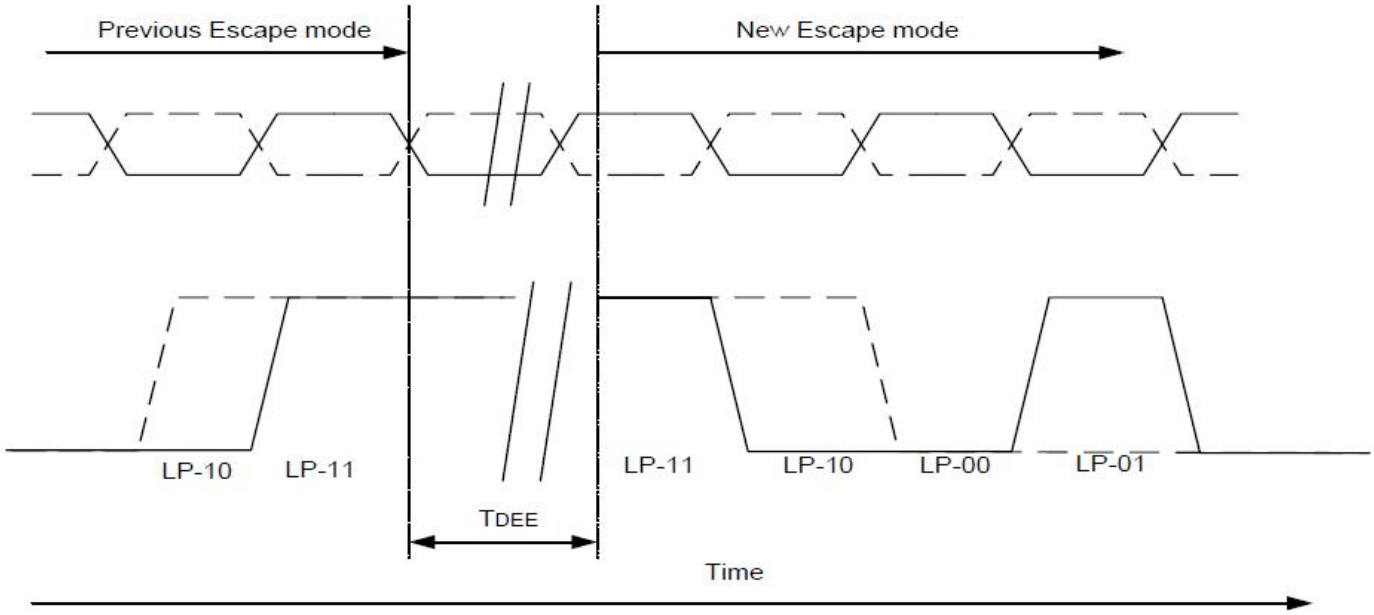
5.2.2.6 High Speed Data Transmission in Bursts



5.2.2.7 LP11 timing request between data transformation

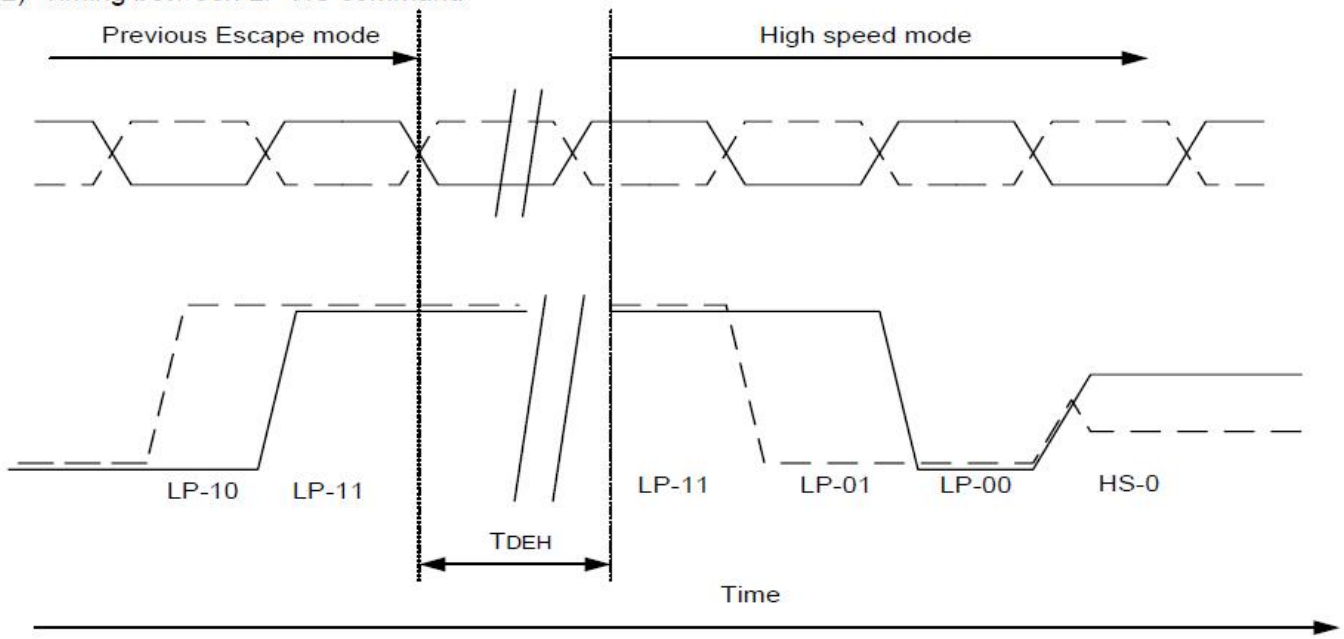
When Clock lane of DSI TX chip always keeps High speed mode, then Clock lane never go back to Low power mode. If Date lane of TX chip needs to transmit the next new data transmission or sequence, after the end of Low power mode or High speed mode or BTA. Then TX chip needs to keep LP-11 stop state before the next new data transmission, no matter in Low power mode or High speed mode or BTA. The LP-11 minimum timing is required for RX chip in the following 9 conditions, include of LP–LP, LP–HS, HS–LP, HS–HS, BTA– BTA, LP– BTA, BTA– LP, HS– BTA, and BTA– HS.This rule is suitable for short or long packet between TX and RX data transmission.

(1) Timing between LP-LP command



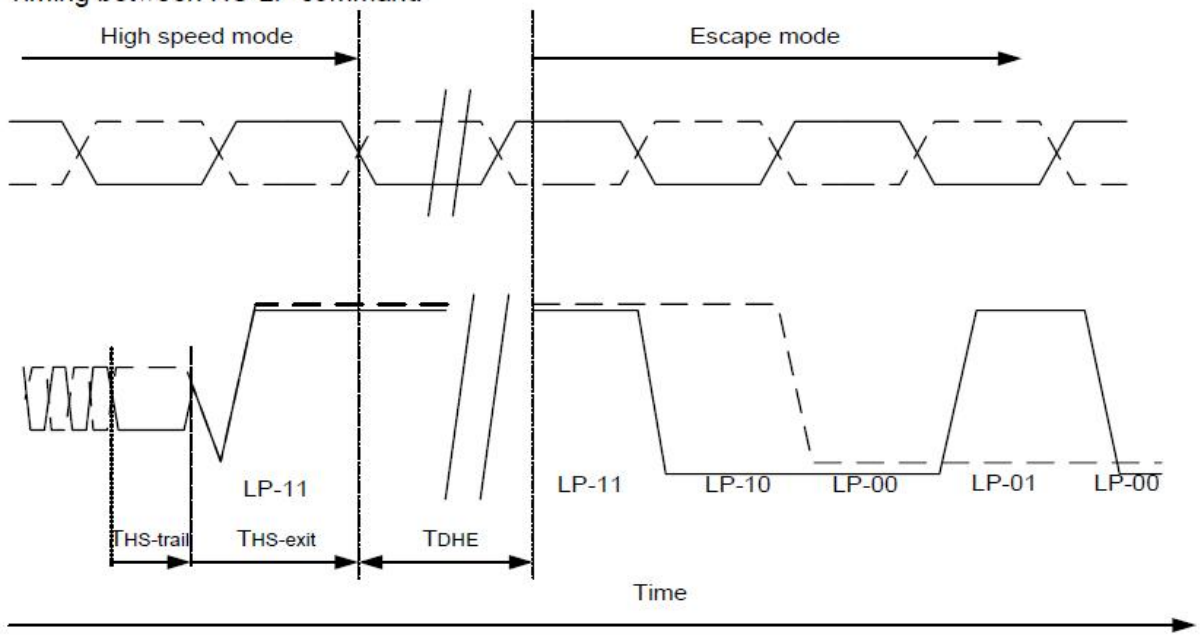
Parameter	Symbol	Min	Typ	Max	Unit
LP-11 delay to start of the new Escape Mode Entry	TDEE	150	-	-	ns

(2) Timing between LP-HS command



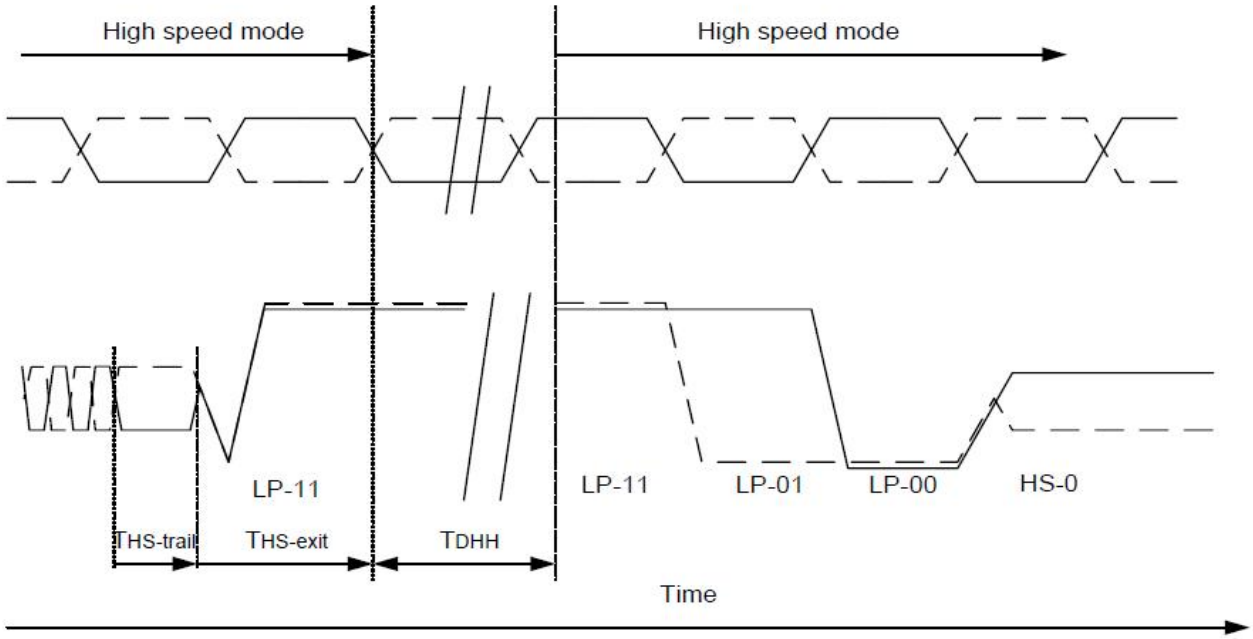
Parameter	Symbol	Min	Typ	Max	Unit
LP-11 delay to start of the Entering High Speed Mode	TDEH	Max(150,32UI)	-	-	ns

(3) Timing between HS-LP command



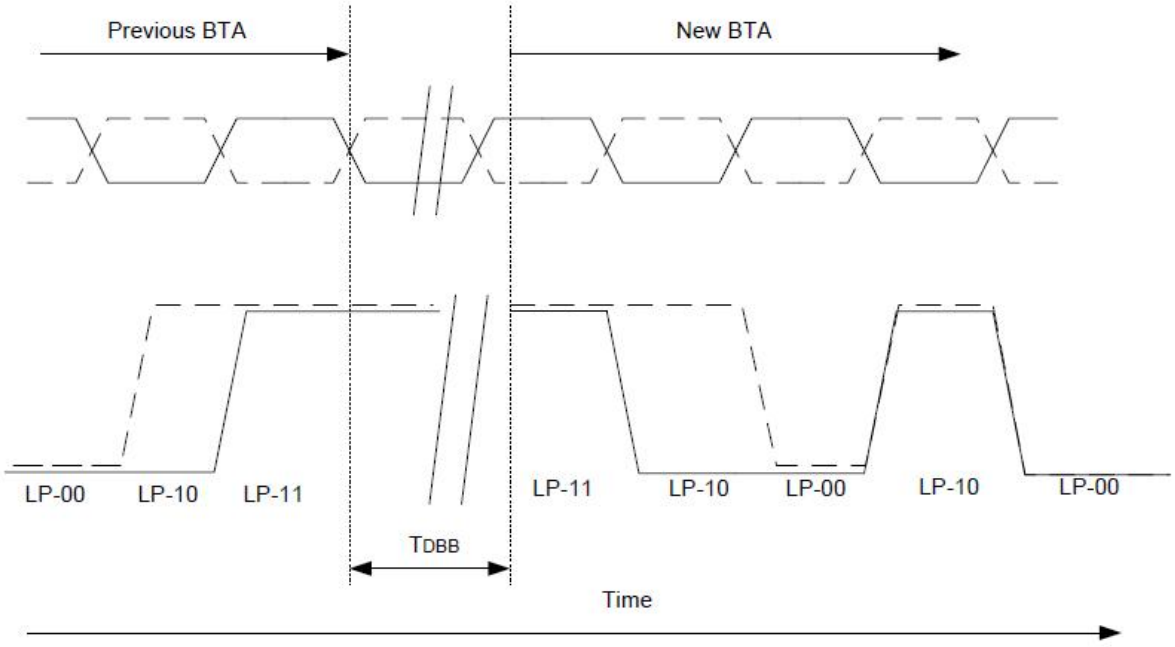
Parameter	Symbol	Min	Typ	Max	Unit
LP-11 delay to start of the Escape Mode Entry	TDHE	Max(150,32UI)	-	-	ns

(4) Timing between HS-HS command



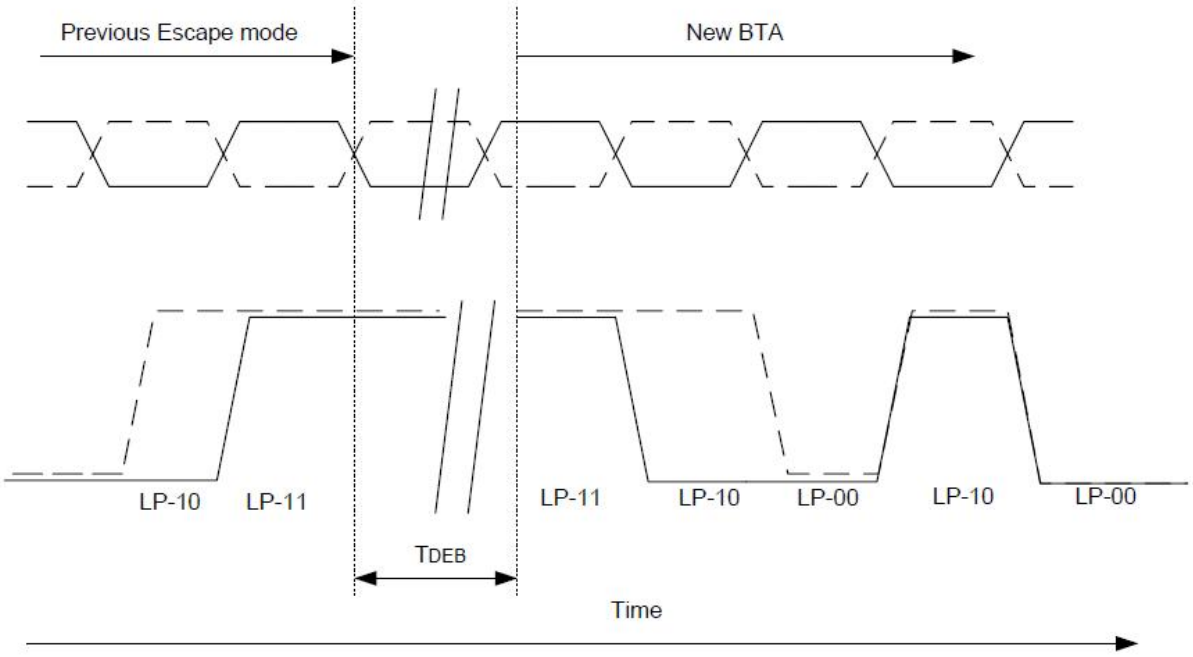
Parameter	Symbol	Min	Typ	Max	Unit
LP-11 delay to start of the Entering High Speed Mode	TDHH	Max(150,32UI)	-	-	ns

(5) Timing between BTA-BTA command



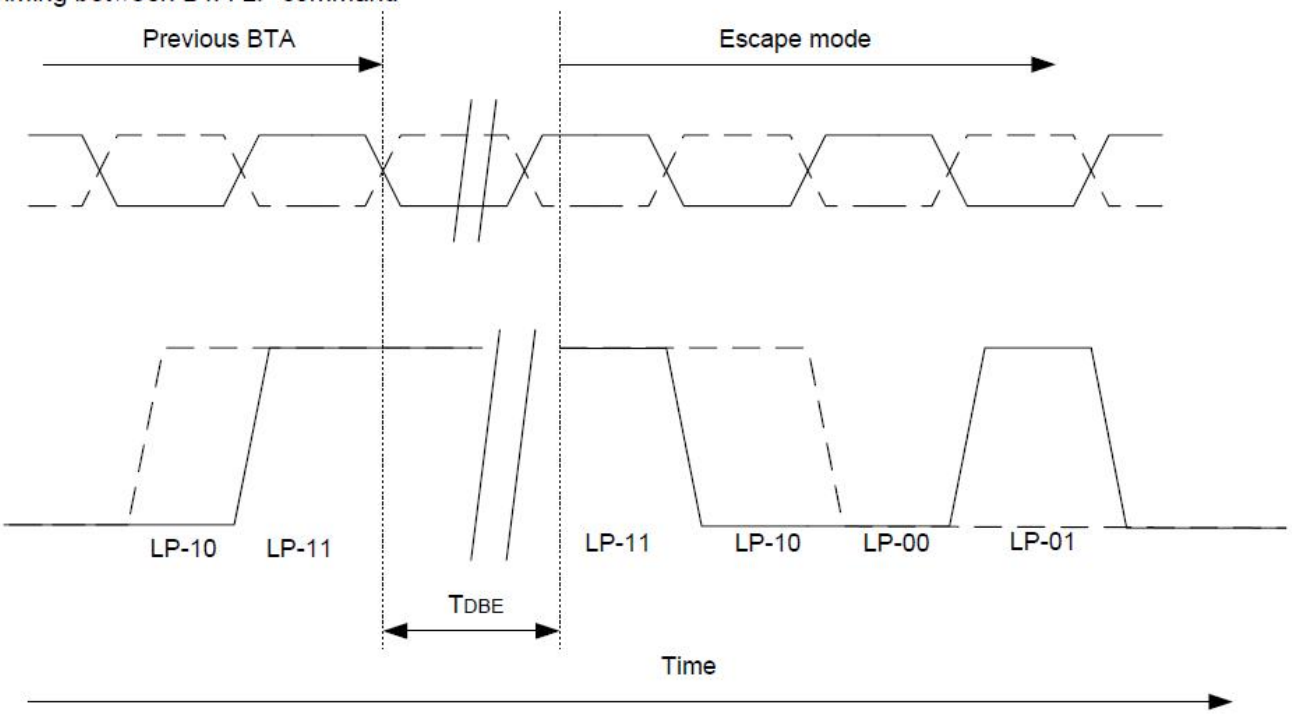
Parameter	Symbol	Min	Typ	Max	Unit
LP-11 delay to start of the new BTA	TDBB	150	-	-	ns

(6) Timing between LP-BTA command



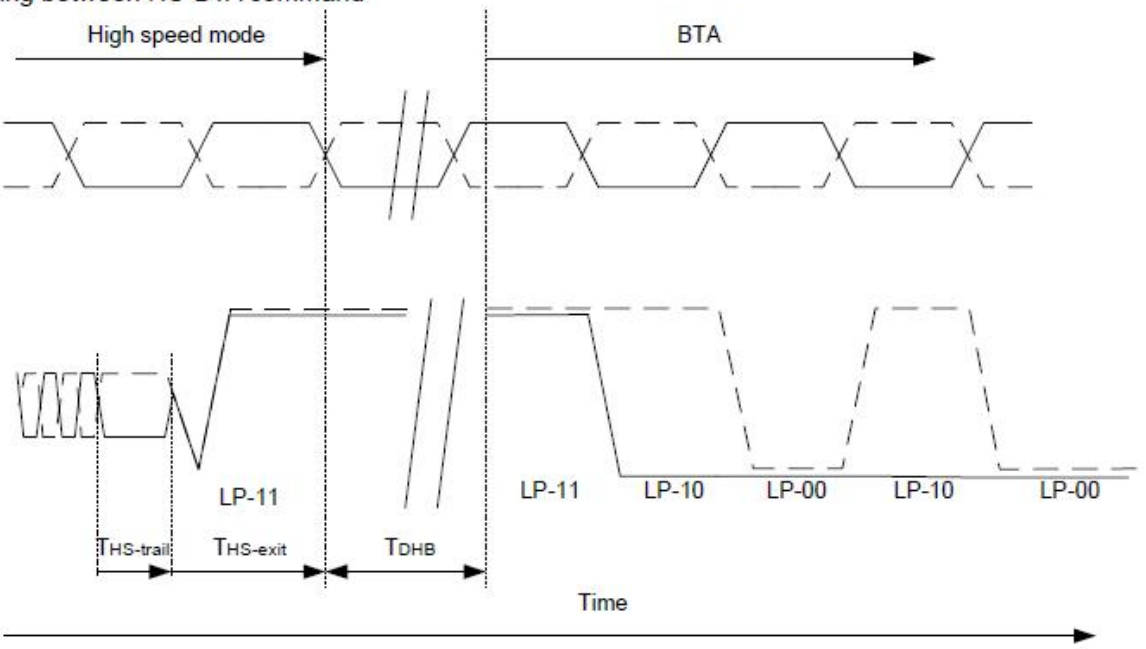
Parameter	Symbol	Min	Typ	Max	Unit
LP-11 delay to start of the new BTA	TDEB	150	-	-	ns

(7) Timing between BTA-LP command



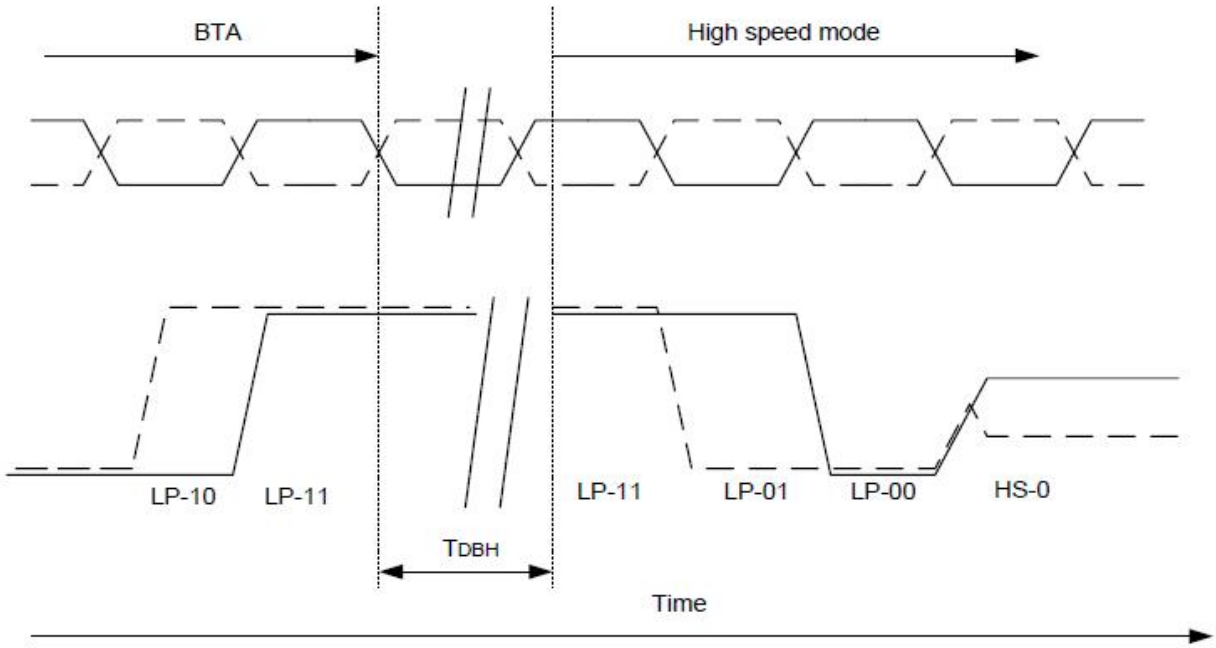
Parameter	Symbol	Min	Typ	Max	Unit
LP-11 delay to start of the Escape Mode Entry	TDBE	150	-	-	ns

(8) Timing between HS-BTA command



Parameter	Symbol	Min	Typ	Max	Unit
LP-11 delay to start of the BTA	TDHB	Max(150,32UI)	-	-	ns

(9) Timing between BTA-HP command



Parameter	Symbol	Min	Typ	Max	Unit
LP-11 delay to start of the Entering High Speed Mode	TDBH	Max(150,32UI)	-	-	ns

5.3 Output Timing Table

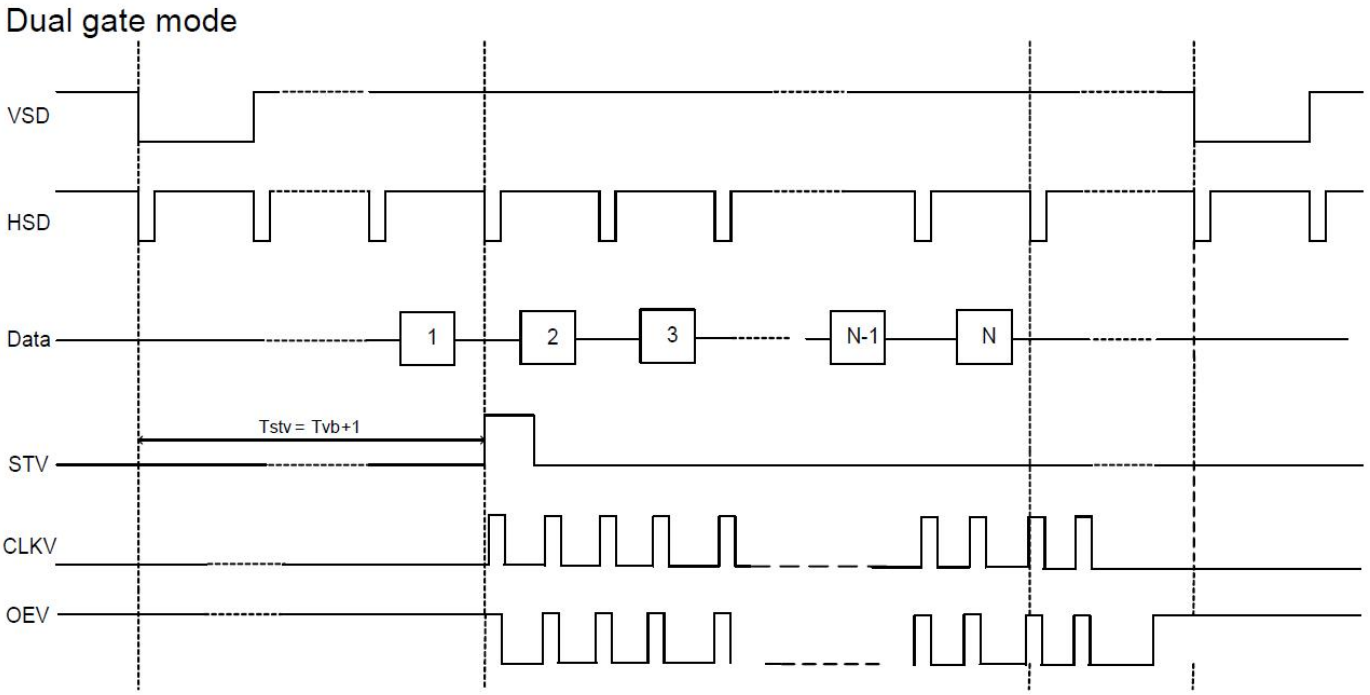


Fig. 11. Vertical output timing

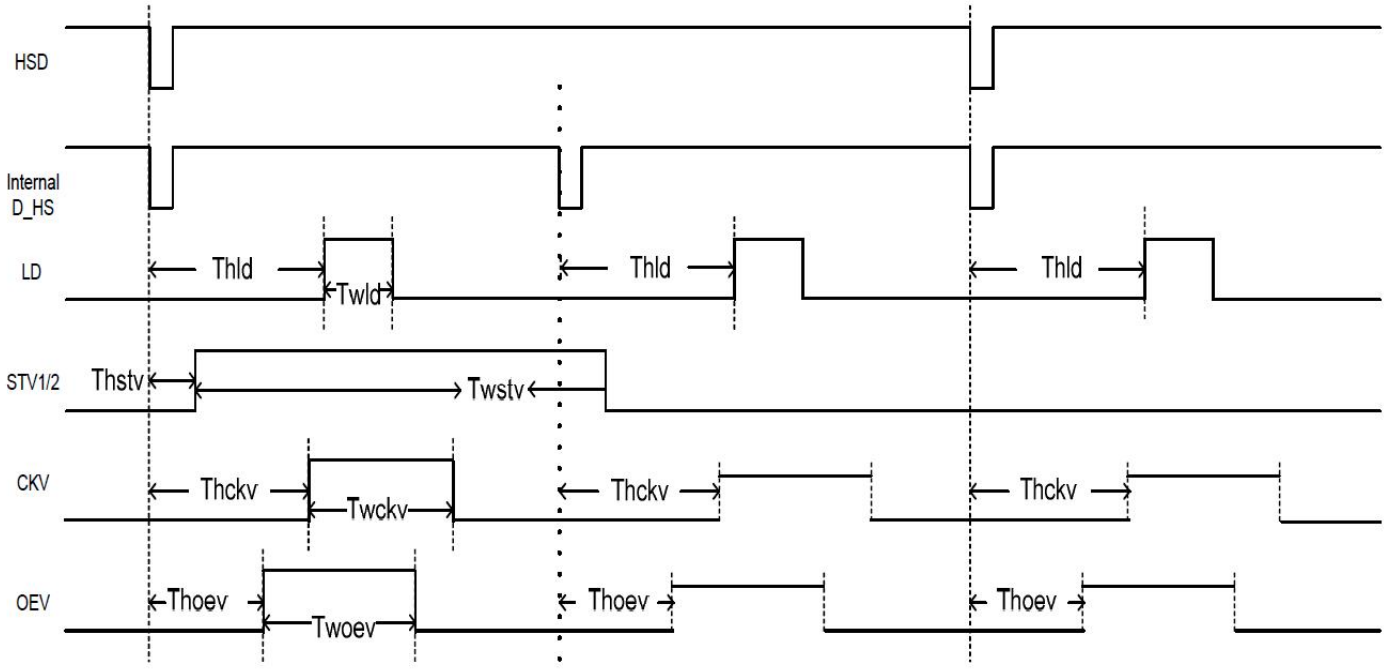
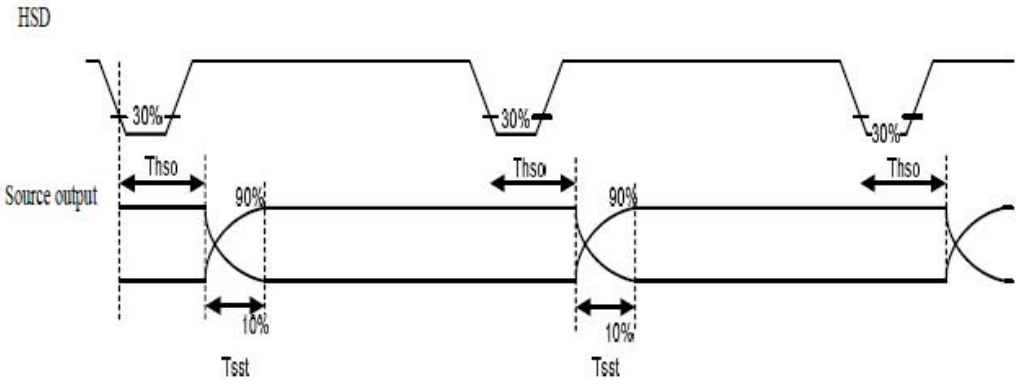
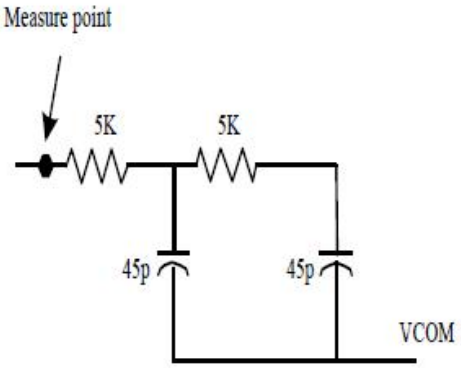


Fig. 11. Gate output timing

Analog output AC characteristic

Parameter	Symbol	Min.	Typ.	Max	Unit
Source Driver output stable time	Tsst	-	3	-	μ s



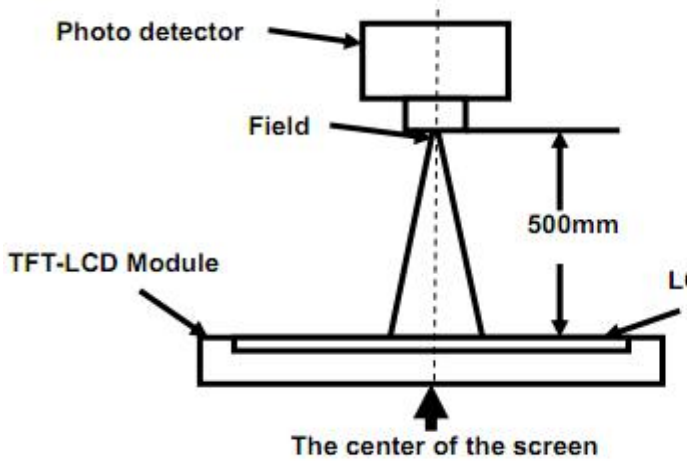


6. Optical Specifications

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR≥10) B/L ON	θ_T	Φ=90°(12 o'clock)	-	85	-	deg	Note2
	θ_B	Φ=270°(6 o'clock)	-	85	-	deg	Note2
	θ_L	Φ=180°(9 o'clock)	-	85	-	deg	Note2
	θ_R	Φ=0°(3 o'clock)	-	85	-	deg	Note2
Response Time	T_{ON}	Normal θ=Φ=0°	-	15	20	msec	Note4
	T_{OFF}		-	15	20	msec	Note4
Contrast Ratio	CR		800	1000	-	-	Note1 Note3
Color Chromaticity	W_X		0.269	0.299	0.329	-	Note1 Note5
	W_Y		0.293	0.323	0.353	-	Note1 Note5
Luminance	L		800	1000	-	cd/m²	Note1 Note7
Luminance Uniformity	Y_U		75	80	-	%	Note1 Note6
NTSC	-		-	50	-	%	-

Note 1:Definition of optical measurement system

The optical characteristics should be measured in dark room. After 5 minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Item	Photo detector	Field
Contrast Ratio	SR-3A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	BM-7A	2°

Note 2:Definition of viewing angle range and measurement system
Viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80).

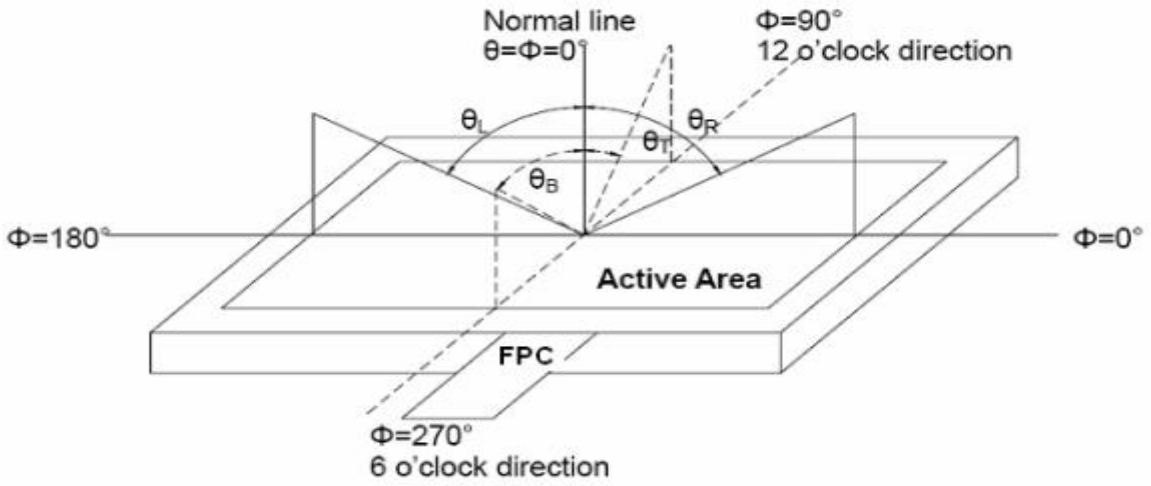


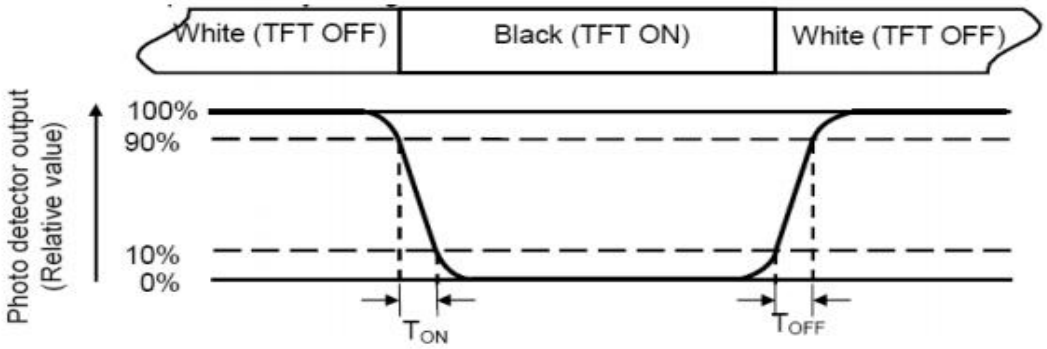
Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black”state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.



Note 5:Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6:Definition of Luminance Uniformity

The luminance uniformity in surface luminance is determined by measuring luminance at each test position 1 through n, and then dividing the maximum luminance of n points luminance by minimum luminance of n points luminance. For more information see FIG.2.

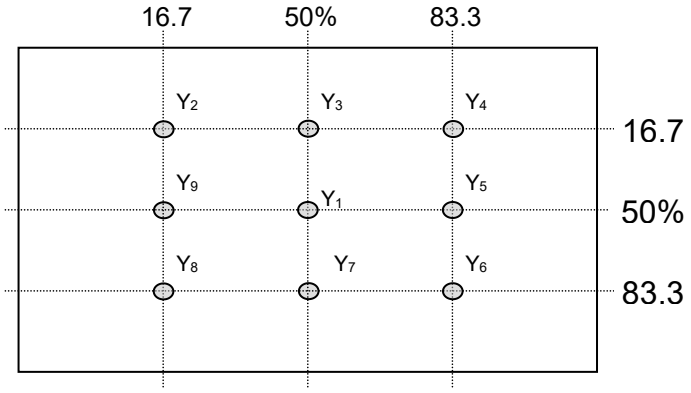


Fig. 2 Definition of points

Note 7:Definition of Luminance (Refer Fig. 2)

Surface luminance is the luminance with all pixels displaying white.

Lv = Average Surface Luminance with all white pixels(P1,P2,P3, ...,Pn).

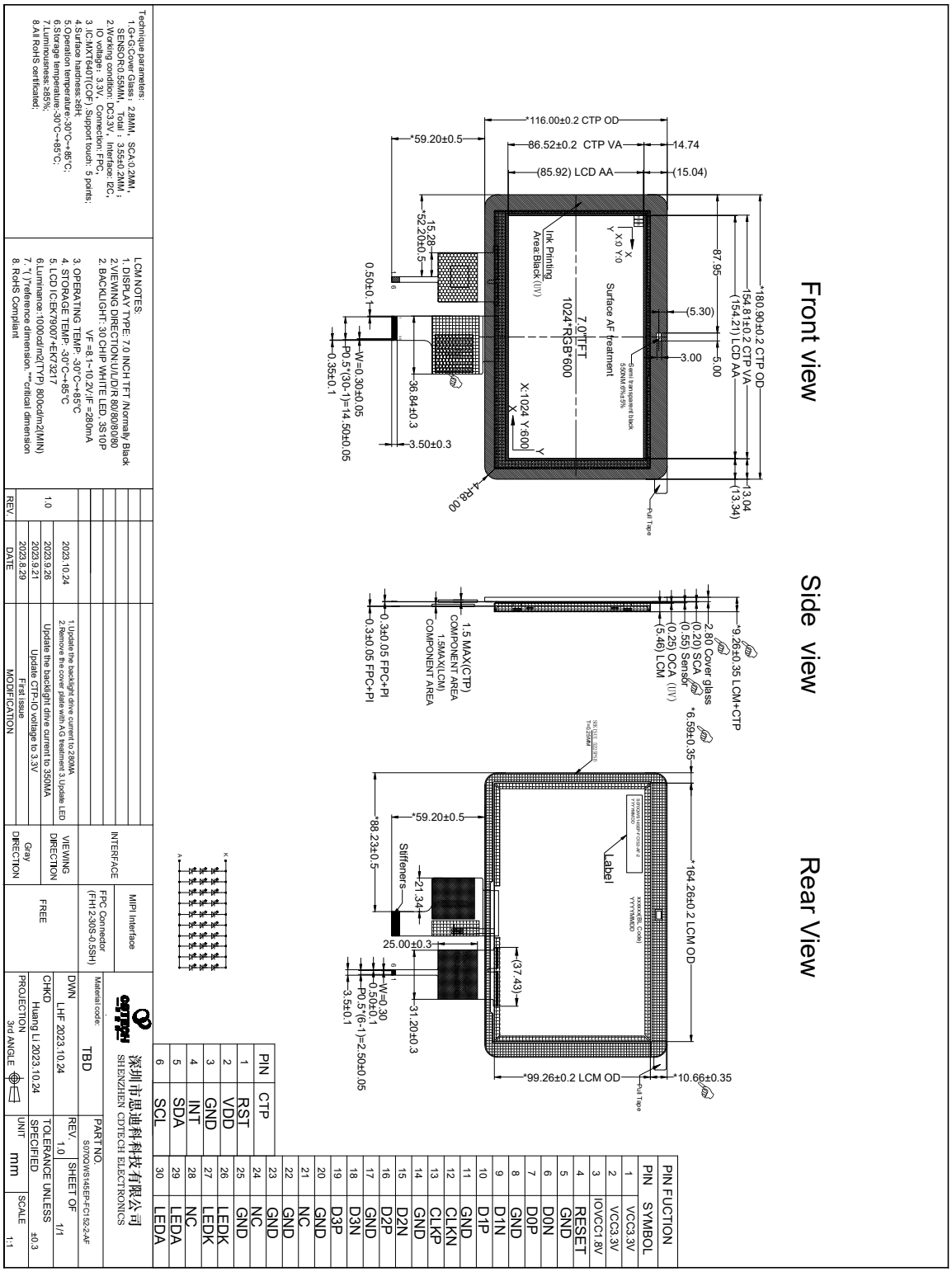
7. Reliability Test Items

Test Item	Test Conditions	
High Temperature Storage	Ta= +85℃	240hrs
Low Temperature Storage	Ta= -30℃	240hrs
High Temperature Operation	Ta= +85℃	240hrs
Low Temperature Operation	Ta= -30℃	240hrs
High Temperature and Humidity Storage	Ta= +60℃, 90% RH	240hrs
Thermal Shock (Non-operation)	-30℃/30 min ~ +85℃/30 min for 20 cycles Start with cold temperature end with high temperature	
Electro Static Discharge	Contact = ± 4 kV, class B Air = ± 8 kV, class B R=330Ω,C=150pF	
Vibration	Sweep: 10Hz~55Hz~10Hz Stroke: 1.5mm 2 hrs for each direction of X .Y. Z.	
Mechanical Shock	60G 6ms,±X,±Y,±Z 3 times for each direction	
Package Drop Test	Height: 60 cm 1 corner, 3 edges, 6 surfaces	

Notes: The test result shall be evaluated after the sample has been left at room temperature and humidity for 2 hours without load. No condensation shall be accepted. The sample will not be accepted if appear these defects:

1). Air bubble in the LCD
2). Seal leak or Glass crack
3). Non display or abnormal display
4). Brightness reduction >50%

8. Mechanical Drawing



Technique parameters:
1.G+G:Cover Glass：2.8MM，SCA:0.2MM，SENSOR:0.55MM，Total：3.55±0.2MM；
2.Working condition: DC3.3V，interface: I2C，IO voltage：3.3V，Connection: FPC，
3. IC:MXT640T(COF)，Support touch: 5 points;
4. Surface hardness: ≥6H;
5. Operation temperature: -30°C~+85°C;
6. Storage temperature: -30°C~+85°C;
7. Luminouness:≥85%;
8.All RoHS certificated;

LCM NOTES:
1. DISPLAY TYPE: 7.0 INCH TFT /Normally Black
2.VIEWING DIRECTION:U/L/D/R 80/80/80/80
2. BACKLIGHT: 30 CHIP WHITE LED; 3510P
3. OPERATING TEMP: -30°C~+85°C
4. STORAGE TEMP: -30°C~+85°C
5. LCD IC:ER79007+ER73217
6.Luminance: 1000cd/m2(TYP) 800cd/m2(MIN)
7. *():reference dimension, **:critical dimension
8. RoHS Compliant

REV.	DATE	MODIFICATION
1.0	2023.10.24	First issue
	2023.8.29	Update CTP-IO voltage to 3.3V
	2023.9.21	Update the backlight drive current to 350MA
	2023.9.26	Update the backlight drive current to 280MA 2.Remove the cover plate with AG treatment 3.Update LED

INTERFACE	MIPI Interface
	FPC Connector (FH12-30S-0.5SH)
VIEWING DIRECTION	FREE
Gray DIRECTION	

PIN	CTP
1	RST
2	VDD
3	GND
4	INT
5	SDA
6	SCL

PIN	SYMBOL	PIN	SYMBOL
1	VCC3.3V	16	D2P
2	VCC3.3V	17	GND
3	IOVCC1.8V	18	D3N
4	RESET	19	D3P
5	GND	20	GND
6	D0N	21	NC
7	D0P	22	GND
8	GND	23	GND
9	D1N	24	NC
10	D1P	25	GND
11	GND	26	LEDK
12	CLKN	27	LEDK
13	CLKP	28	NC
14	GND	29	LEDA
15	D2N	30	LEDA

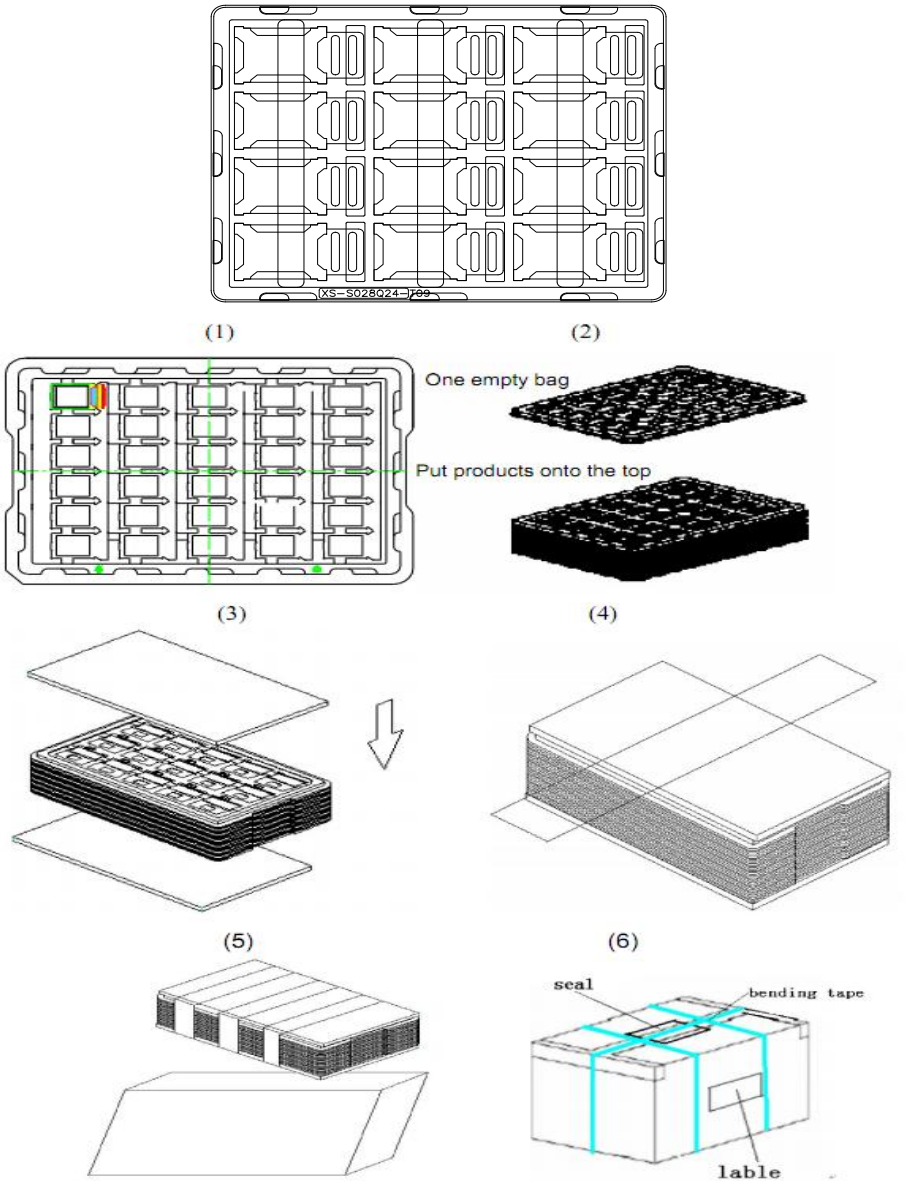
PIN FUCTION

深圳市思迪科科技有限公司
SHENZHEN CDTECH ELECTRONICS

Material code:	TBD
DWN	LHF 2023.10.24
CHKD	Huang Li 2023.10.24
PROJECTION	3rd ANGLE
UNIT	mm
SCALE	1:1
PART NO.	S070QWS145EP-FC1-52-2-AF
REV.	1.0
SHEET OF	1/1
TOLERANCE UNLESS SPECIFIED	±0.3

9. Packing

Packing Method



Steps:

1. Put module into tray cavity
2. Tray stacking
3. Put 1 cardboard under the tray stack and 1 cardboard above
4. Fix the cardboard to the tray stack with adhesive tape
5. Put the tray stack into carton
6. Carton sealing with adhesive tape

10. Precautions for Use of LCD modules

10.1 Handling Precautions

10.1.1. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

10.1.2. If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

10.1.3. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

10.1.4. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

10.1.5. If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
- Ketene
- Aromatic solvents

10.1.6. Do not attempt to disassemble the LCD Module.

10.1.7. If the logic circuit power is off, do not apply the input signals.

10.1.8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

10.1.8.1. Be sure to ground the body when handling the LCD Modules.

10.1.8.2. Tools required for assembly, such as soldering irons, must be properly ground.

10.1.8.3. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

10.1.8.4. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

10.2 Storage Precautions

10.2.1.When storing the LCD modules,avoid exposure to direct sunlight or to the light of fluorescent lamps.

10.2.2.The LCD modules should be stored under the storage temperature range if the LCD modules will be stored for a long time,the recommend condition is :

Temperature : 0℃ ~40℃ Relatively humidity: ≤80%

10.2.3.The LCD modules should be stored in the room without acid, alkali and harmful gas.

10.3 Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.