DisplayModule

DM-TFTR34-478

3.4" 800 X 800 Round 16.7M All View TFT - MIPI

Table of Contents

1 General Specifications

No.	Item	Specification	Remark
1	LCD Size	3.4 inch (Diagonal)	
2	Driver Element	a-Si TFT active matrix	
3	Resolution	800 (RGB) ×800	
4	Display Mode	Normally Black	
5	Pixel Pitch(mm)	0.0365 (H) × 0.1095 (V)	
6	Display Colors	16.7M	
7	Surface Treatment	--	
8	Color Arrangement	RGB-Stripe	
9	Interface	MIPI	
10	Viewing Direction	ALL	
11	Gray Scale Inversion Direction	--	Note 1
12	Outline Dimension (mm)	94.9(W) × 96.95 (H) × 2.3 (T)	
13	Active Area (mm)	87.6 (W) × 87.6 (H)	
14	Touch Screen	--	
15	Display Driver IC	SC7705	
16	Touch Driver IC	--	

Note 1: Viewing direction for best image quality is different from TFT definition. There is a 180°shift.

Note 2: RoHS compliant.

2 Pin Assignment

2.1 LCD Pin assignment

Match connector: XF2M-3015-1A（OMRON）or equivalent.

N	Symbol	I/O	Description	Remark
1	LEDA	p	LED Anode	
2	LEDK1	p	LED Cathode1	
3	LEDK2	p	LED Cathode2	
4	VCI	P	Power Supply 2.8V	
5	IOVCC	P	LCD I/O power supply(1.8V)	
6	RESET	I	Reset pin	
7	NC	-	No connection.	
8	NC	-	No connection.	
9	GND	P	Ground	
10	D0P	I/O	MIPI DSI differential data pair (Data lane 0)	
11	D0N	I/O	MIPI DSI differential data pair (Data lane 0)	
12	GND	P	Ground	
13	D1P	I	MIPI DSI differential data pair (Data lane 1)	
14	D1N	I	MIPI DSI differential data pair (Data lane 1)	
15	GND	P	Ground	
16	CLKP	I	MIPI DSI differential clock pair	
17	CLKN	I	MIPI DSI differential clock pair	
18	GND	P	Ground	
19	D2P	I	MIPI DSI differential data pair (Data lane 2)	
20	D2N	I	MIPI DSI differential data pair (Data lane 2)	
21	GND	P	Ground	
22	D3P	I	MIPI DSI differential data pair (Data lane 3)	
23	D3N	I	MIPI DSI differential data pair (Data lane 3)	
24	GND	P	Ground	
25	TP_INT	-	Touch Interrupt,No connection	
26	TP_SDA	-	Touch IIC Data signal,No connection	
27	TP_SCL	-	Touch IIC Clock signal,No connection	
28	TP_RESET	-	Touch Reset Signal,No connection	
29	TP_VCI	-	Touch Power supply,No connection	
30	NC	-	No connection.	

I---Input, O---Output, P--- Power/Ground

3 Absolute Maximum Ratings

Ta = 25℃

Item	Symbol	Min.	Max.	Unit	Remark
Power Voltage	VCI	-0.30	+5.6	V	
	IOVCC	-0.30	+4.5	V	
	TP_VCI	-	-	V	
	TP_IOVCC	-	-	V	
Operating Temperature	Top	-20.0	70.0	℃	
Storage Temperature	T_{st}	-30.0	80.0	℃	
Operating and Storage Humidity	H_{stg}	10%	90%	%(RH)	

4. Electrical Characteristics

4.1 Recommended Operating Condition

VCI=3.3V， GND=0V， Ta = 25℃

Item		Symbol	Min.	Typ.	Max.	Unit	Remark
Digital supply Voltage		IOVCC	1.65	1.8	3.3	V	
Analog supply Voltage		VCI	2.8	3.0	3.3	V	
TP Power		TP_VCI	-	-	-	V	
Input Signal Voltage	Low Level	V_{IL}	0	-	0.3 x IOVCC	V	
	High Level	V_{IH}	0.7 x IOVCC	-	IOVCC	V	
Current of digital supply voltage		I_{IOVCC}	-	16	30	mA	VCI=3.3V, color bar pattern
Current of analog supply voltage		I_{VCI}	-	27	50	mA	

4.2 Backlight Unit Driving Condition

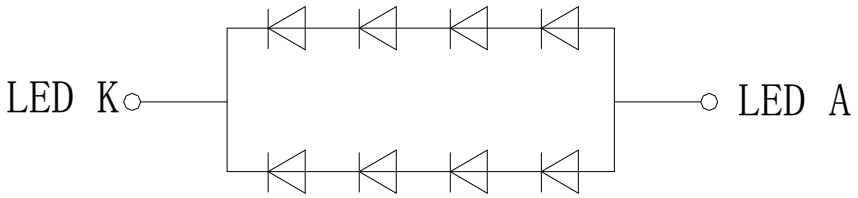
Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Forward Current	I_F	-	40	50	mA	8LEDs (4 LED Serial, 2LED Parallel)
Forward Current Voltage	V_F	-	12.0	13.2	V	
Backlight Power Consumption	W_{BL}	-	480	660	mW	
Operating Life Time	--	20000	--	--	hrs	Note 2, Note 3

Note1: The LED driving condition is defined for each module (4 LED Serial, 2 LED Parallel).

Note2: When LCM is operated, the stable forward current should be inputted. And forward voltage is for reference only.

Note3: Optical performance should be evaluated at Ta=25℃ When LED is driven at high current, high ambient temperature & humidity condition. The life time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.

Note4: The LED driving condition is defined for each LED module.



5 Timing Chart

5.1 DSI Interface Timing Characteristics

High Speed Mode

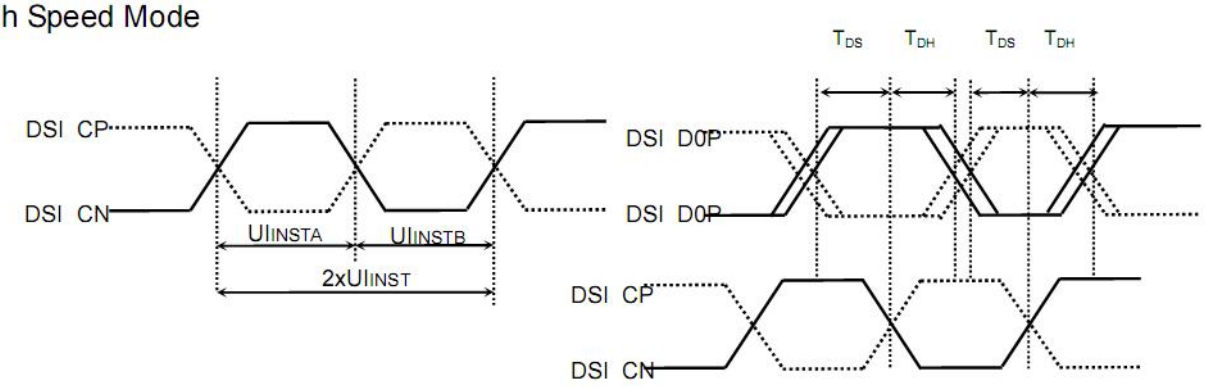


Figure 7.4: DSI clock timing Characteristics

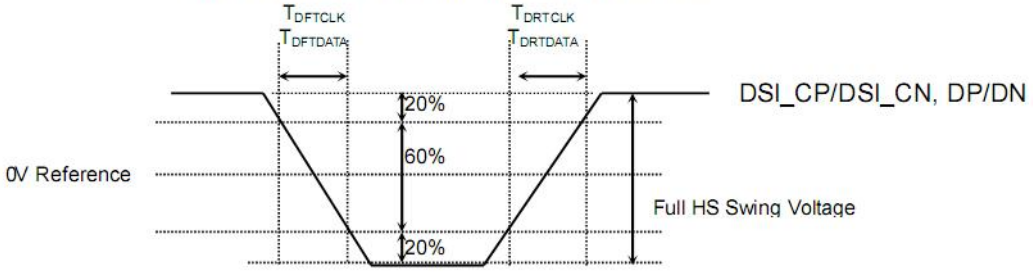


Figure: Rising and falling time on clock and data channel

(VSSA=0V, IOVCC=1.65V to 3.3V, VCI=2.5V to 3.3V, T_A = -30 to 70°C)

Signal	Item	Symbol	Spec.			Unit
			Min.	Typ.	Max.	
DSI_CP/ DSI_CN	Double UI instantaneous	$2xU_{INST}$	TBD	-	25	ns
	UI instantaneous	U_{INSTA} U_{INSTB}	TBD	-	12.5	ns
DP/DN	Data to clock setup time	T_{DS}	0.15xUI	-	-	ps
	Data to clock hold time	T_{DH}	0.15xUI	-	-	ps
DSI_CP/ DSI_CN	Differential rise time for clock	T_{DRTCLK}	150	-	0.3UI	ps
	Differential fall time for clock	T_{DFTCLK}	150	-	0.3UI	ps
DP/DN	Differential rise time for data	$T_{DRTDATA}$	150	-	0.3UI	ps
	Differential fall time for data	$T_{DFTDATA}$	150	-	0.3UI	ps

Table: DSI High Speed Mode characteristics

Low Power Mode

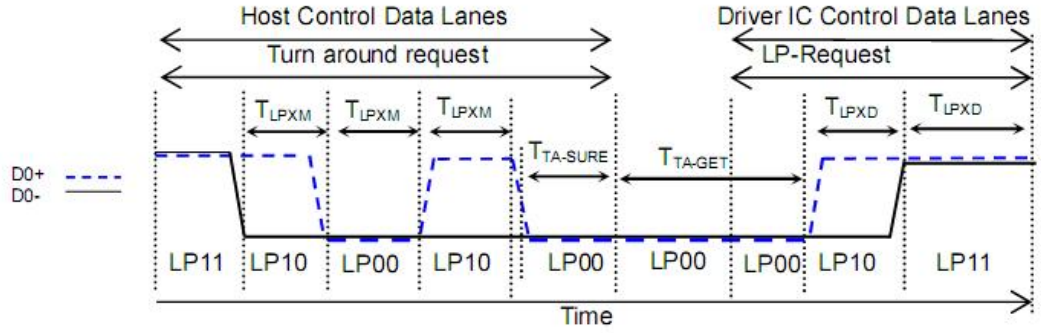


Figure 7.6: BTA from HOST to Display module Timing

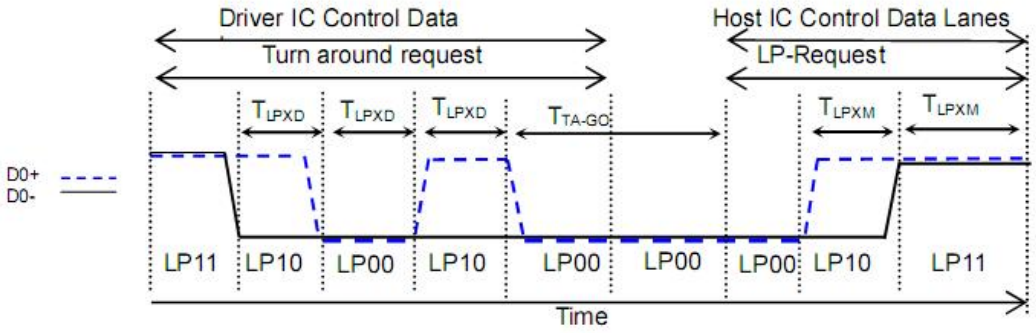


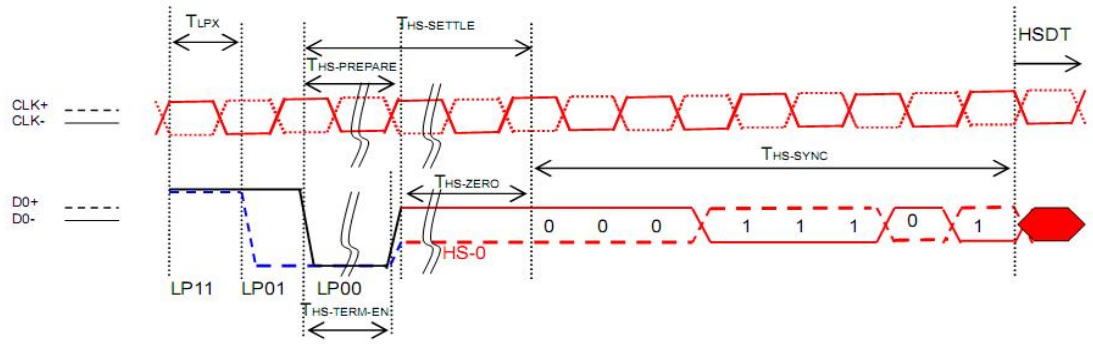
Figure: BTA from Display module Timing to HOST

(VSSA=0V, IOVCC=1.65V to 3.3V, VCI=2.3V to 3.3V, T_A = -30 to 70°C)

Signal	Item	Symbol	Spec.			Unit
			Min.	Typ.	Max.	
DSI_D0P/ DSI_D0P	Length of LP-00/LP01/LP10/LP11 Host→ Display module	T_{LPXM}	50	-	-	ns
	Length of LP-00/LP01/LP10/LP11 Display module →Host	T_{LPXD}	50	-	-	ns
	Time-out before the MPU start driver	$T_{TA-SURE}$	T_{LPXD}	-	2xT_{LPXD}	ns
	Time to drive LP-00 by display module	T_{TA-GET}	5xT_{LPXD}	-	-	ns
	Time to drive LP-00 after turnaround request Host	T_{TAGO}	4xT_{LPXD}	-	-	ns

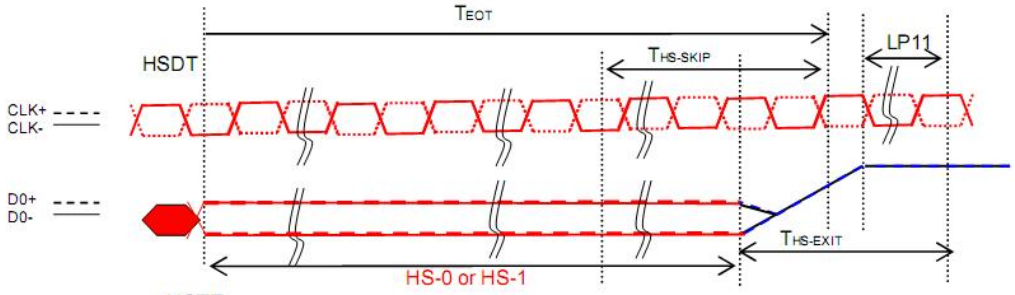
Table: DSI Low Power Mode characteristics

DSI BURSTS



Signal	Item	Symbol	Spec.			Unit
			Min.	Typ.	Max.	
DSI_D0P/ DSI_D0P	Length of LP-00/LP01/LP10/LP11	T_{LPX}	50	-	-	ns
	Time to Driver LP-00 to prepare for HS transmission	$T_{HS-PREPARE}$	40+4UI	-	85+6UI	ns
	Time to enable data receiver line termination	$T_{HS-TERM-EN}$	-	-	35+4xUI	ns
	Time to drive LP-00 by display module	T_{TA-GET}	5xT_{LPXD}	-	-	ns
	Time to drive LP-00 after turnaround request Host	T_{TAGO}	4xT_{LPXD}	-	-	ns

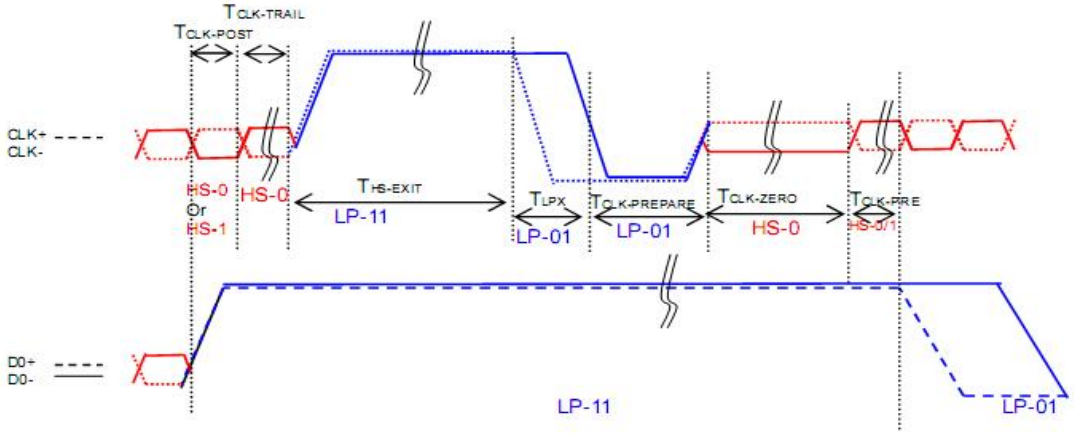
Table: DSI Low Power Mode to High Speed Mode Timing



NOTE:
If the last bit is HS-0, the transmitter changes from HS-0 to HS-1
If the last bit is HS-0, the transmitter changes from HS-1 to HS-0

Signal	Item	Symbol	Spec.			Unit
			Min.	Typ.	Max.	
DSI_D0P/ DSI_D0P	Time-Out at Display Module to Ignore Transition Period of EoT	$T_{HS-SKIP}$	40	-	55+4xUI	ns
	Time to Driver LP-11 after HS Burst	$T_{HS-EXIT}$	100	-	-	ns

Table: DSI Low Power Mode to High Speed Mode Timing



Signal	Item	Symbol	Spec.			Unit
			Min.	Typ.	Max.	
DSI_CP/ DSI_CN	Time that the MCU shall continue sending HS clock after the last associated Data Lane has transitioned to LP mode	$T_{CLK-POST}$	60+52xUI	-	-	ns
	Time to drive HS differential state after last payload clock bit of a HS transmission burst	$T_{CLK-TRAIL}$	60	-	-	ns
	Time to drive LP-11 after HS burst	$T_{HS-EXIT}$	100	-	-	ns
	Time to drive LP-00 to prepare for HS transmission	$T_{CLK-PREPARE}$	38	-	95	ns
	Time-out at Clock Lane Display Module to enable HS Termination	$T_{CLK-TERM-EN}$	-	-	38	ns
	Minimum lead HS-0 drive period before starting Clock	$T_{CLK-PREPARE}$ + $T_{CLK-ZERO}$	300	-	-	ns
	Time that the HS clock shall be driven prior to any associated data Lane beginning the transition from LP to HS mode	$T_{CLK-PRE}$	8xUI			

Table: Clock Lanes High Speed Mode to/from Low Power Mode Timings

5.2 Recommended Timing Setting of TCON

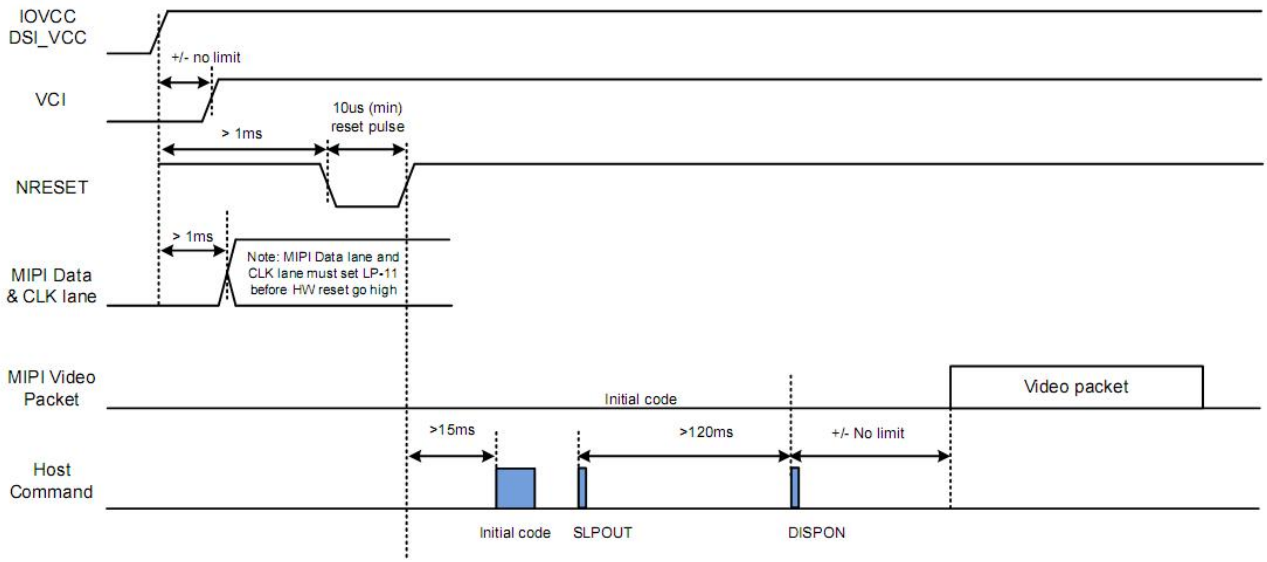
TCON (Embedded in Source IC) Input Timing (DCLK, HS, VS, DE)

VCI=3.3V, GND=0V, Ta=25℃

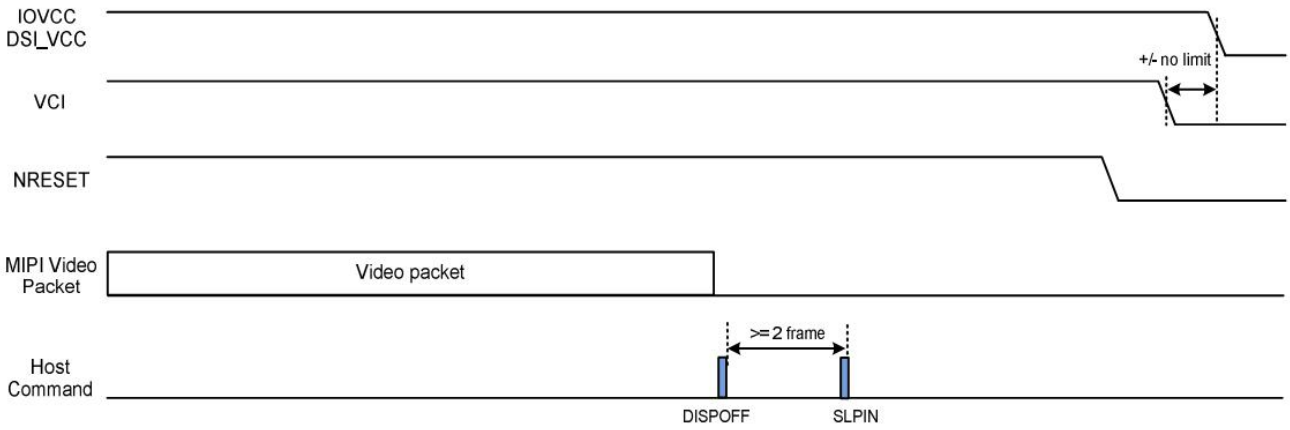
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK	Fclk	-	48	-	MHz	
	tclk	-	20.8	-	ns	
HSD	thd	-	800	-	tclk	
	thpw	-	30	-	tclk	
	thb	-	60	-	tclk	
	thfp	-	60	-	tclk	
VSD	tvd	-	800	-	th	
	tvpw	-	4	-	th	
	tvb	-	11	-	th	
	tvfp	-	16	-	th	

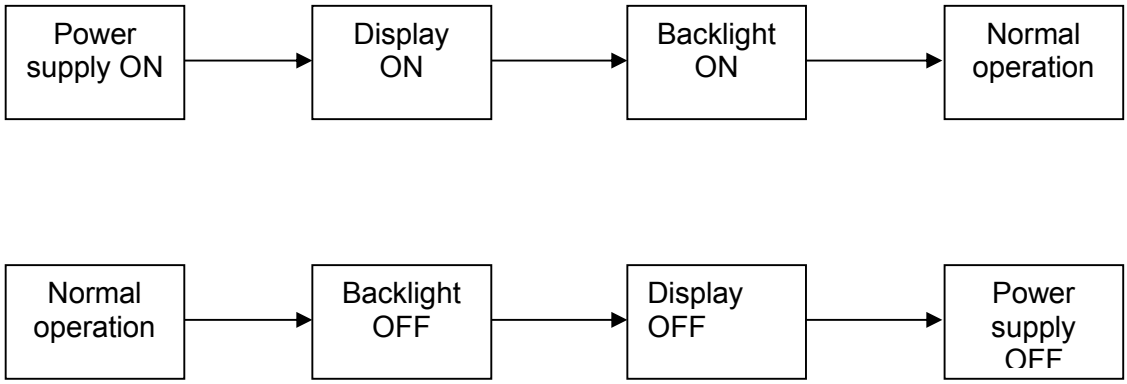
Note: For reference only, it needs to be adjusted according to the actual display effect.

5.3 POWER ON SEQUENCE :



5.4 POWER OFF SEQUENCE :





5.5 Reset timing

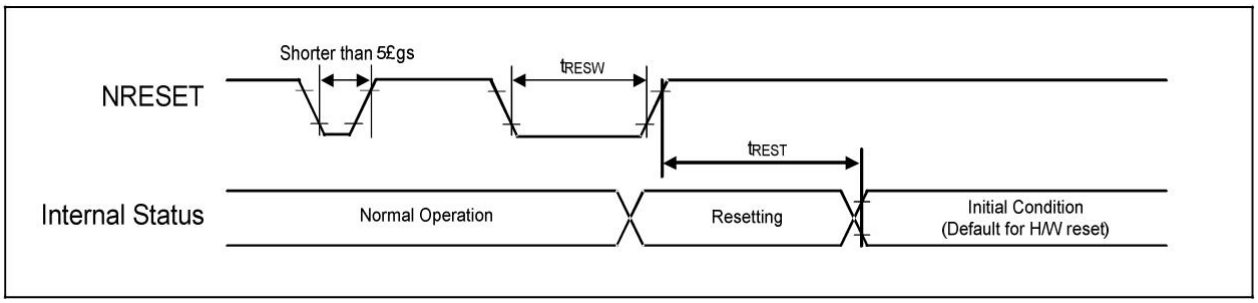


Figure: Reset input timing

Symbol	Parameter	Related Pins	Spec.			Note	Unit
			Min.	Typ.	Max.		
tRESW	Reset low pulse width(1)	NRESET	10	-	-	-	µs
tREST	Reset complete time(2)	-	5	-	-	When reset applied during SLPIN mode	ms
		-	120	-	-	When reset applied during SLPOUT mode	ms

Table: Reset input timing

6 Optical Characteristics

Ta=25℃

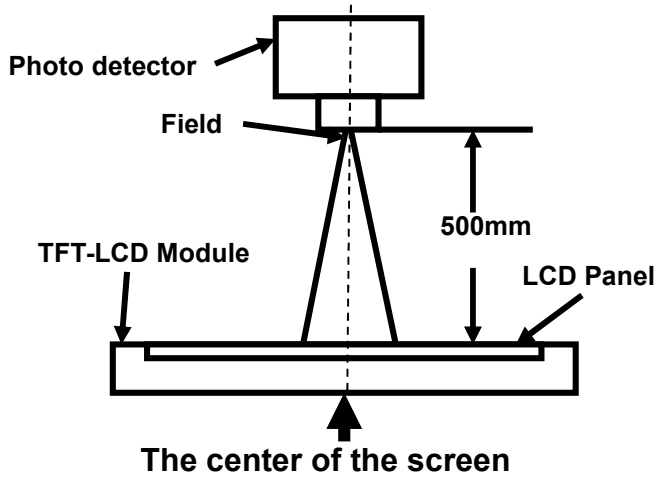
Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
View Angles		θT	CR≧10	80	85	-	Degree	Note 2
		θB		80	85	-		
		θL		80	85	-		
		θR		80	85	-		
Contrast Ratio		CR	θ=0°	1000	1200	-		Note1 Note3
Response Time		T_{ON}	25℃	-	30	35	ms	Note1 Note4
		T_{OFF}						
Chromaticity	White	x	Backlight is on	0.262	0.292	0.322		Note1 Note5
		y		0.303	0.333	0.363		
	Red	x		0.637	0.667	0.697		
		y		0.293	0.323	0.353		
	Green	x		0.241	0.271	0.301		
		y		0.561	0.591	0.621		
	Blue	x		0.104	0.134	0.164		
		y		0.091	0.121	0.151		
Uniformity		U		75	80	-	%	Note1 Note6
NTSC				65	70	-	%	Note 5
Luminance		L		300	350	-	cd/m^2	Note1 Note7

Test Conditions:

1. I_F= 40 mA, V_F=12.8V and the ambient temperature is 25±2℃.humidity is 65±7%
2. The test systems refer to Note 1 and Note 2.

Note 1: Definition of optical measurement system.

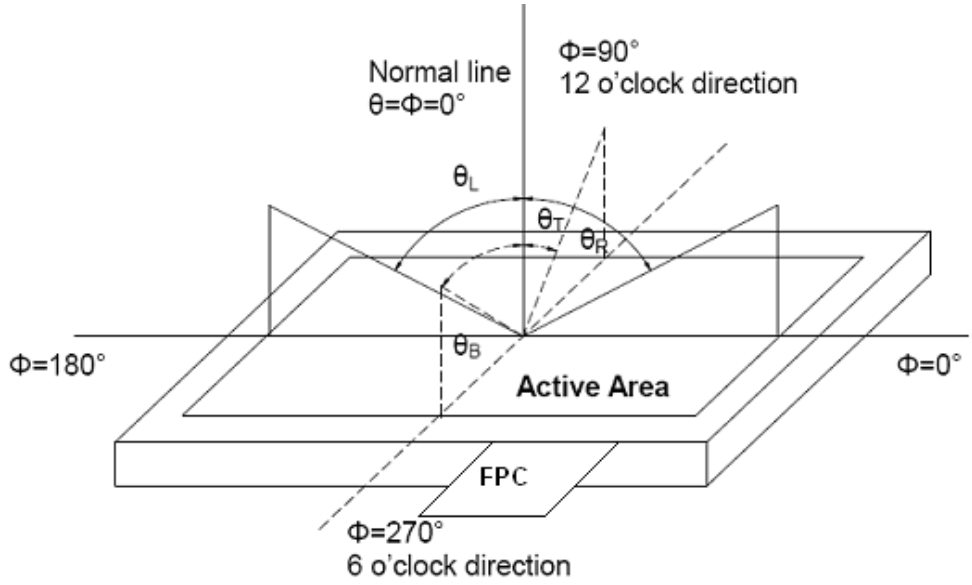
Properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



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)。



Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

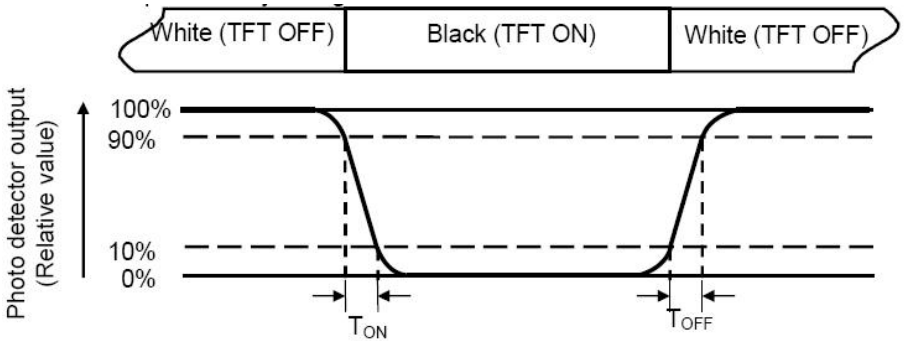
“White state “: The state is that the LCD should drive by Vwhite.

“Black state”: The state is that the LCD should drive by Vblack.

Vwhite: To be determined Vblack: To be determined.

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 (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.



Note 5: Definition of color chromaticity (CIE1931)

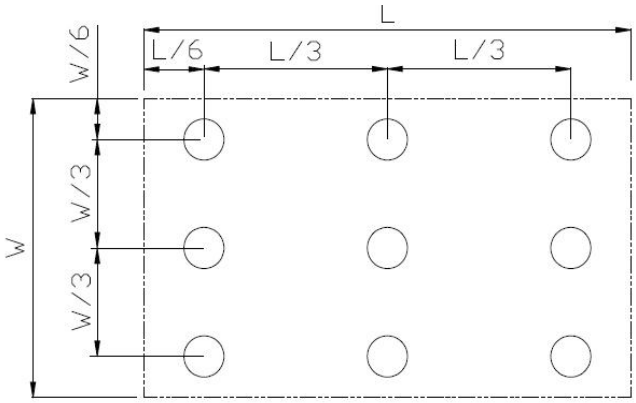
Color coordinates measured at center point of LCD.

Note 6: Definition of luminance uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity (U) = Lmin/ Lmax

L-------Active area length W----- Active area width



Lmax: The measured Maximum luminance of all measurement position.

Lmin: The measured Minimum luminance of all measurement position.

Note 7: Definition of luminance:

Measure the luminance of white state at center point.

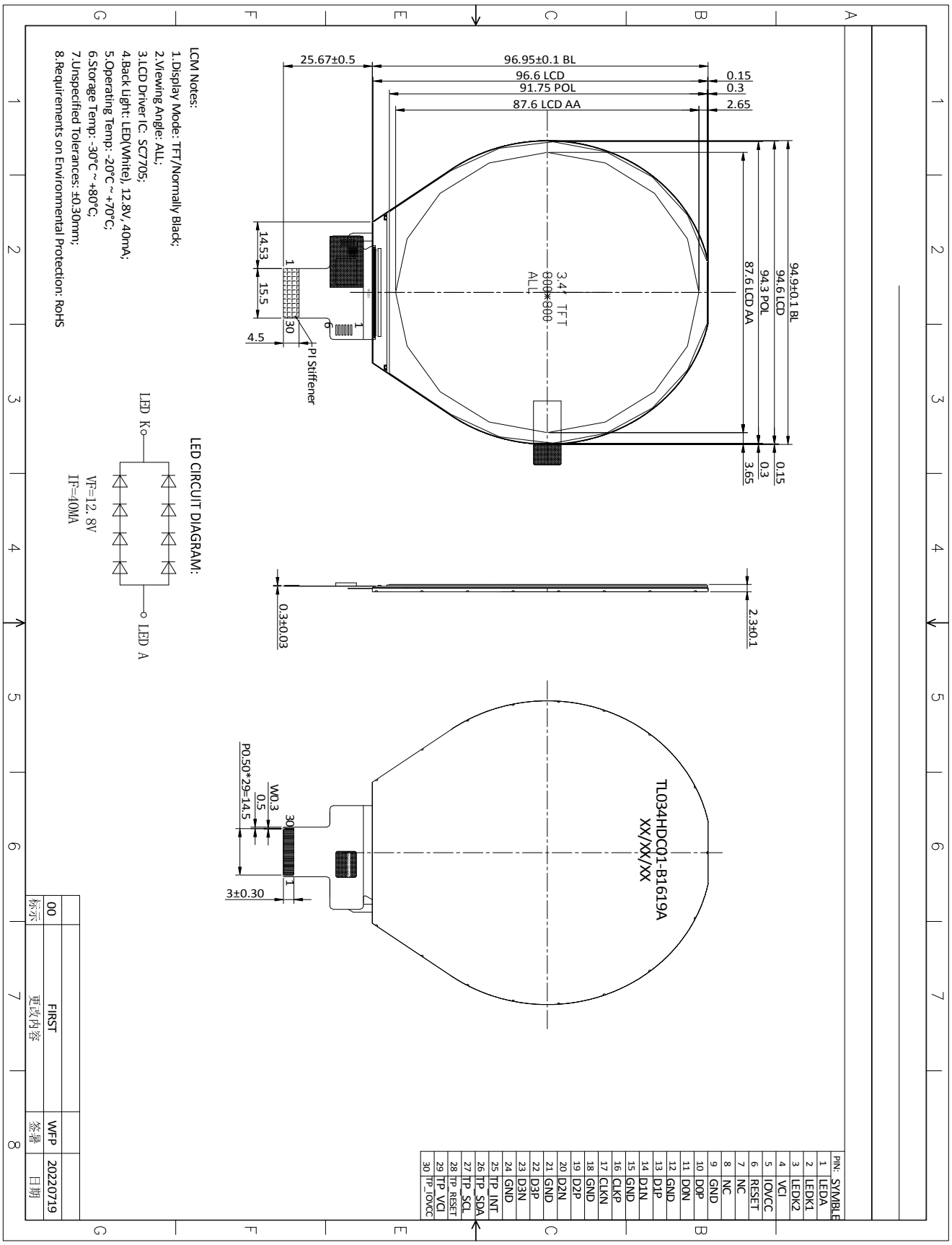
7 Environmental / Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts = +70℃, 240 hours	No abnormalities in functions
2	Low Temperature Operation	Ta = -20℃, 240 hours	No abnormalities in functions
3	High Temperature Storage	Ta = +80℃, 240 hours	No abnormalities in functions
4	Low Temperature Storage	Ta = -30℃, 240 hours	No abnormalities in functions
5	Storage at High Temperature and Humidity	Ta = +60℃, 90% RH max,240hours	No abnormalities in functions
6	Thermal Shock (non-operating)	-30℃ 30 min~ +70℃ 30 min, Change time: 0.5 hour □ 5 min □ 0.5 hour.10 Cycle	Start with cold temperature, End with high temperature,
7	ESD	C=150pF, R=330Ω,5point/panel Air: ±8Kv, 5times; Contact:±4Kv,5times (Environment:15℃~35℃, 30%~60%.86Kpa~106Kpa)	No abnormalities in functions

Note1: Ts is the temperature of panel's surface.

Note2: Ta is the ambient temperature of samples.

8 Mechanical Drawing



9 Precautions for Use of LCD Modules

Handling Precautions

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

9.1.2 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.

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

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

9.1.5 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
- Ketone
- Aromatic solvents

9.1.6 Do not attempt to disassemble the LCD Module.

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

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

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

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

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

9.1.8.4 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.

Storage Precautions

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

9.2.2 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%

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

Transportation Precautions

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