Specification for Approval

Customer:_____

Model Name:_____

Supplier Approval			Customer approval
R&D Designed	R&D Approved	QC Approved	
Peter	Peng Jun		

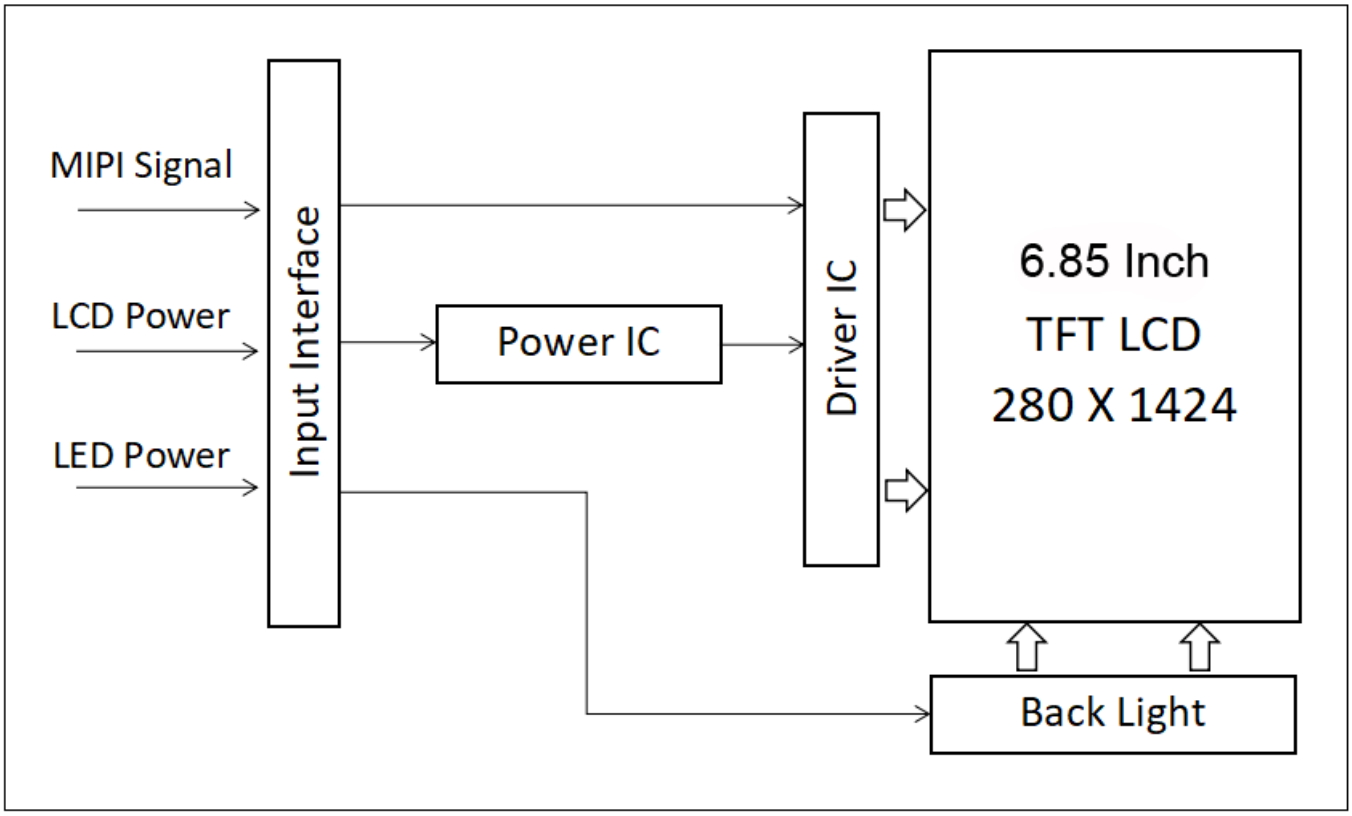
Revision Record

REV NO.	REV DATE	CONTENTS	Note
V0	2024-10-22	NEW ISSUE	

Table of Contents

1. General Description

The LCM 6.85_MIPI is a 280 x 3RGB x1424 dots matrix 6.85” TFT LCD module.

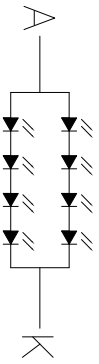


2. Mechanical Specifications

No.	Item	Specification
1	LCD Type	6.85 inch
2	Resolution	280(RGB)X1424
3	Display mode	Normally Black
4	Outline size	38.20 (H)X181.47(V)X3.45(T)mm
5	Active area	33.60(H)X170.88 (V) mm
5	Pixel pitch	40(H) X RGB X 120(V) um
6	Viewing direction	ALL
7	Display Color	16.7M
8	Surface Treatment	AG
9	Interface	MIPI
10	Brightness	650 cd/㎡(typ)
11	Driver IC	ST7703I

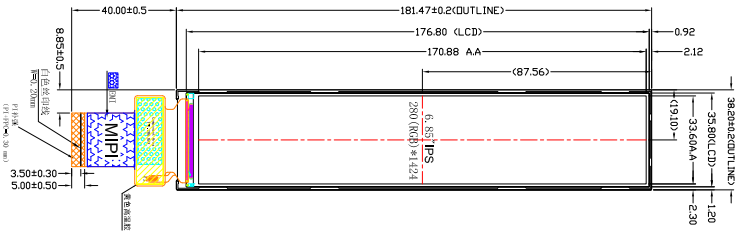
3. External Dimensions

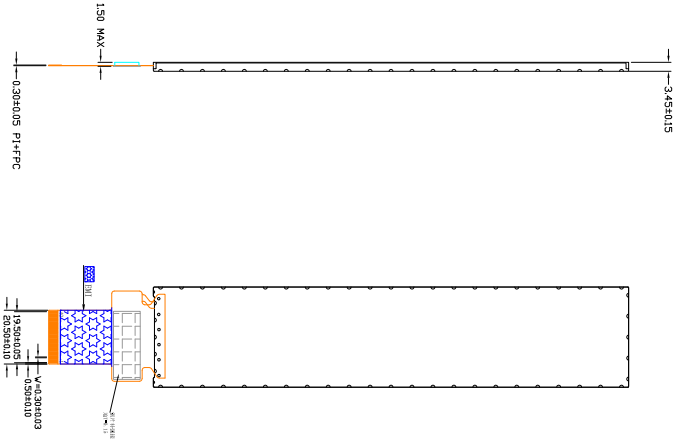
PIN	SYMBOL
1	GND
2	NC
3	LEDA
4	LEDA
5	NC
6	LEDK
7	LEDK
8	NC
9	GND
10	NC
11	NC
12	NC
13	NC
14	NC
15	NC
16	NC
17	GND
18	NC
19	GND
20	GND
21	RESET
22	VDD
23	STBYB
24	NC
25	GND
26	D0P
27	D0N
28	GND
29	D1P
30	D1N
31	GND
32	CLKP
33	CLKN
34	GND
35	D2P
36	D2N
37	GND
38	D3P
39	D3N
40	GND



Backlight 4*2=8LED
Vf=12V, If=80mA

Notes:
1. DISPLAY TYPE: 6.85", TFT LCD
2. DISPLAY MODE: Transmissive, Normally Black
3. VIEWING DIRECTION: 80/80/80/80(TYP)
4. DRIVER IC:ST7703I
5. BACK LIGHT: 8 chip white LEDs
6. luminance 650 cd/m2(Typ).
7. OPERATING TEMP: -20° C TO +70° C;
   STORAGE TEMP: -30° C TO +80° C;
8. 带*编号为重点尺寸，未注公差为±0.20;
9. 所有材料需符合RoSH要求





ROHS

SMY.	DESCRIPTION OF REVISION	REASON	REVISED BY	DATE
/0	first issue	A	XG. SU	2024/09/13

Amson

于都上晴電子有限公司
YU DU AMSON ELECTRONICS Co., Ltd.

TITLE: OUTLINE DIMENSION		D/N:AM-2801424-068E-MIPI	
DRAWN BY:			
CHECKED BY:		Rev:V0	UNIT: mm
APPROVED BY:		SCALE: 1 : 1	SHEET NO: 1 OF 1

4. Interface Description

Pin No.	Symbol	Description	Remark
1	GND	Ground	
2	NC	No connection	
3	LEDA	LED anode	
4	LEDA	LED anode	
5	NC	No connection	
6	LEDK	LED cathode	
7	LEDK	LED cathode	
8	NC	No connection	
9	GND	Ground	
10	NC	No connection	
11	NC	No connection	
12	NC	No connection	
13	NC	No connection	
14	NC	No connection	
15	NC	No connection	
16	NC	No connection	
17	GND	Ground	
18	NC	No connection	
19	GND	Ground	
20	GND	Ground	
21	RESET	Global reset pin.	
22	VDD	Power for Digital Circuit	
23	STBYB	STBYB mode control	
24	NC	No connection	
25	GND	Ground	
26	D0P	MIPI Differential Data Input+	
27	D0N	MIPI Differential Data Input+	
28	GND	Ground	
29	D1P	MIPI Differential Data Input+	
30	D1N	MIPI Differential Data Input+	
31	GND	Ground	
32	CLKP	MIPI Differential Clock Input+	
33	CLKN	MIPI Differential Clock Input-	
34	GND	Ground	
35	D2P	MIPI Differential Data Input+	
36	D2N	MIPI Differential Data Input+	
37	GND	Ground	
38	D3P	MIPI Differential Data Input+	
39	D3N	MIPI Differential Data Input+	
40	GND	Ground	

5. Operation Specifications

5.1 Absolute Max. Rating

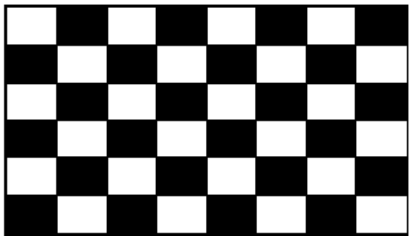
Item	Symbol	Values		Unit
		Min.	Max.	
Power Voltage	VDD	-0.3	3.6	V
Input Signal Voltage	V_I	-0.3	VDD	V
Operation Temperature	T_{OP}	-20	70	℃
Storage Temperature	T_{ST}	-30	80	℃

5.2 Typical Operation Conditions

Item	Symbol	Values			Unit
		Min.	Typ.	Max.	
Power Voltage	VDD	3.0	3.3	3.6	V
Current Consumption	I_{VDD}	-	-	-	mA
Power Consumption	P_{VDD}	-	-	-	W
Power Consumption	P_{LED}	-	0.96	-	W

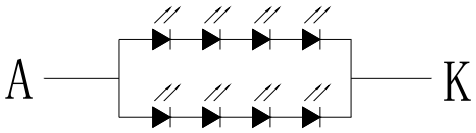
Note :1. The measuring position is the connector of LCM and the test conditions are under 25℃, Frame Rate=60Hz

2. The specified current and power consumption are under the VDD = 3.3V , 25℃, Frame Rate=60Hz condition and Mosaic pattern，The LED driving condition is ILED=80mA.



5.3 LED Back Light Specification

Item	Symbol	Condition	Min	Typ.	Max	Unit
Forward Voltage	Vf	If=80mA	-	12	-	V
Luminance for LCM	Yu	If=80mA	-	650	-	cd/m^2



Backlight 4*2=8LED
Vf=12V, If=80mA

5.4 Power On/Off Sequence

To prevent the device damage from latch up, the power on/off sequence shown below must be followed.

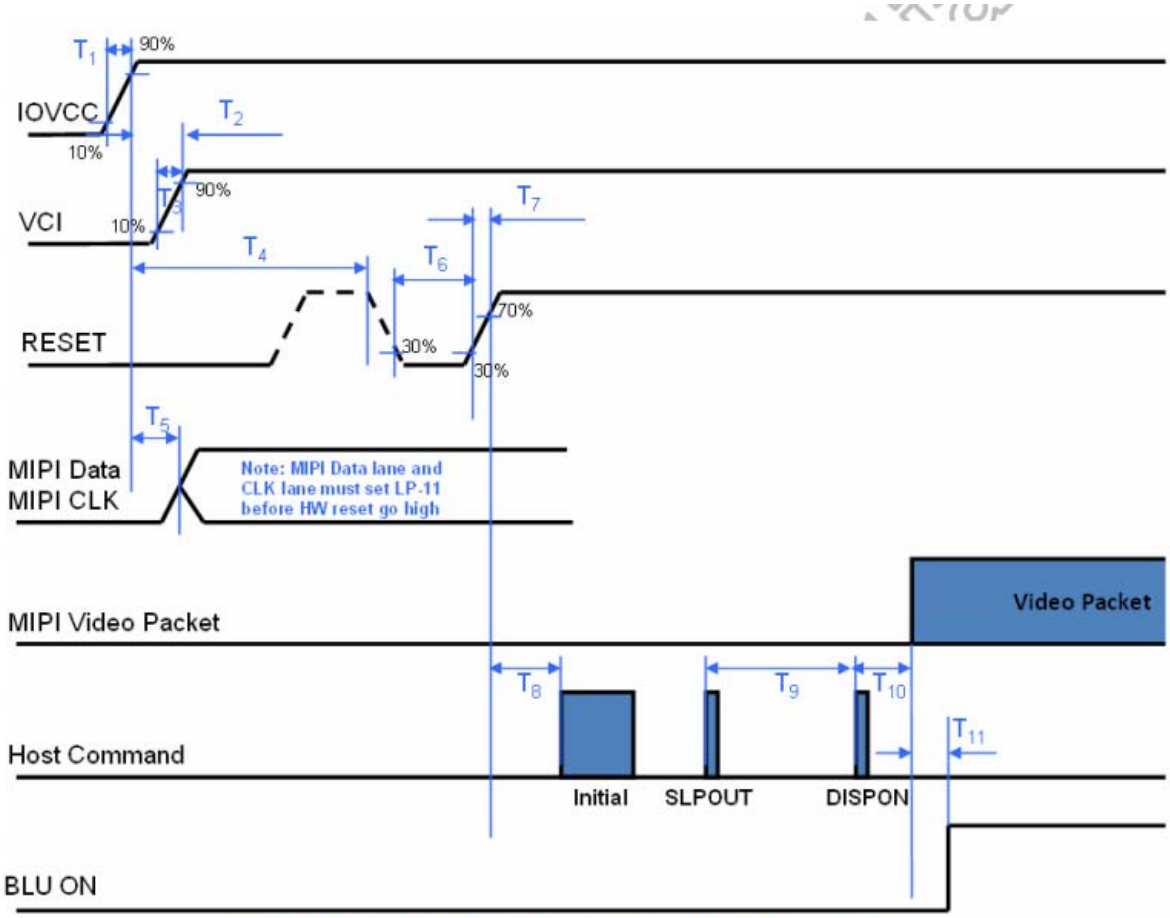


Figure 8-6: DSI Power On Sequence of Power IC Mode

	Min.	Typ.	Max.	Unit
T1	0.01	-	10	ms
T2		No Limit		ms
T3	0.01	-	10	ms
T4	1	-	-	ms
T5	1	-	-	ms
T6	10	-	-	us
T7		No Limit		ns
T8	15	-	-	ms
T9	120	-	-	ms
T10		No Limit		ms
T11	100	150	-	ms

Table 8-1: DSI Power On Timing of Power IC Mode

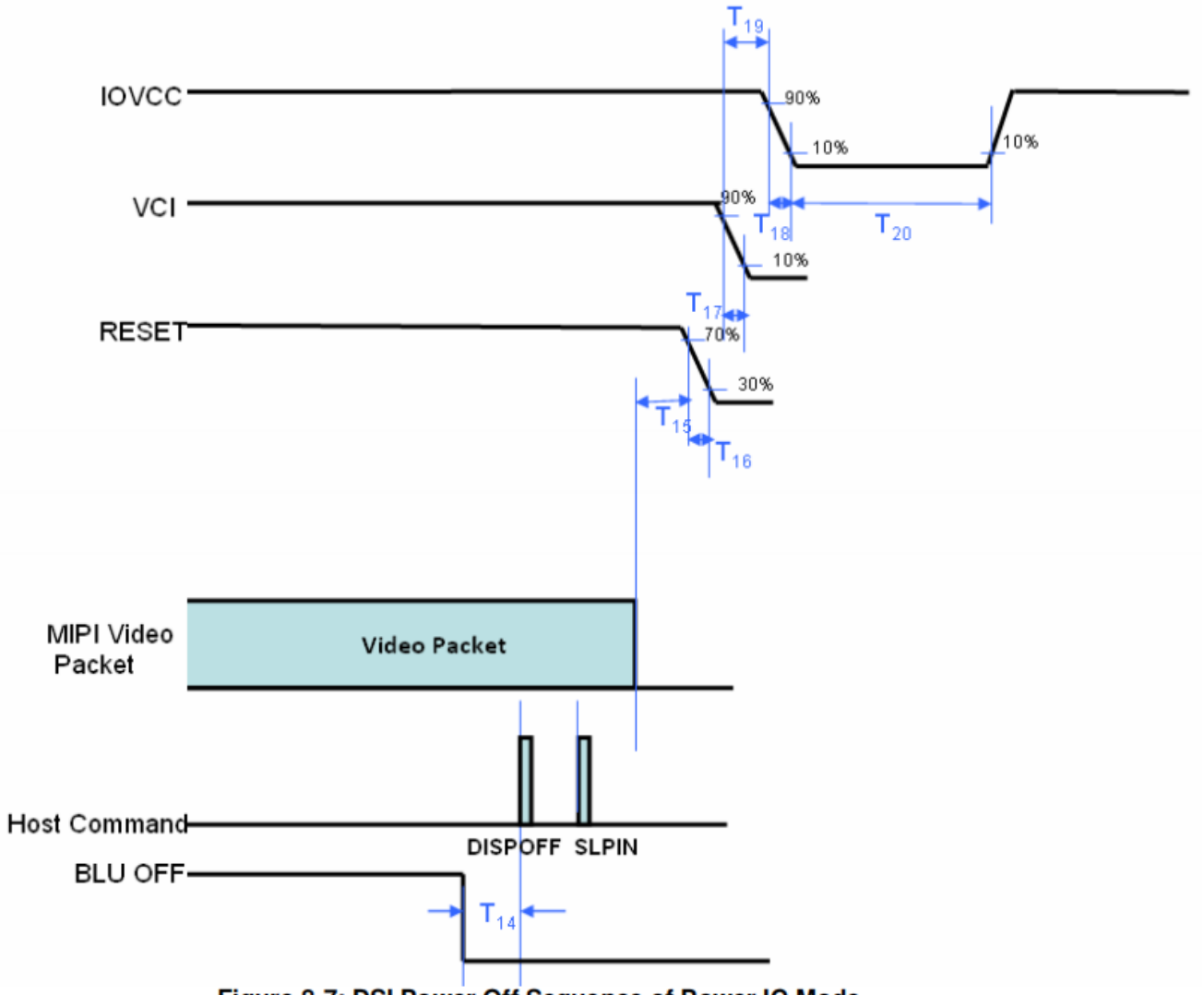


Figure 8-7: DSI Power Off Sequence of Power IC Mode

	Min.	Typ.	Max.	Unit
T14	40	100	-	ms
T15	10	-	-	ms
T16	No Limit			ms
T17	No Limit			ms
T18	No Limit			ms
T19	No Limit			ms
T20	500			ms

Table 8-2: DSI Power Off Timing of Power IC Mode

6. Signal Timing Characteristics

6.1 DC electrical Characteristics

Parameter	Symbol	Conditions	Spec.			Unit
			Min.	Typ.	Max.	
Power & Operating Voltages						
Logic Operating voltage	IOVCC	I/O supply voltage	1.65	1.8	2.0	V
Analog Operating voltage	VCI	Operation voltage	2.5	-	6.2	
Input / Output						
Logic High level input voltage	VIH	-	0.7IOVCC	-	IOVCC	V
Logic Low level input voltage	VIL	-	VSSD	-	0.3IOVCC	
Logic High level output voltage	VOH	IOH = -1.0mA	0.8IOVCC	-	IOVCC	
Logic Low level output voltage	VOL	IOL = +1.0mA	VSSD	-	0.2IOVCC	
Input leakage current	IIL	-	-1	-	1	μA
DC/DC Converter Operation						
VSP booster voltage	VSP	IVSP=1mA	4.5		6.2	V
VSN booster voltage	VSN	IVSN=-1mA	-6.2		-4.5	
VGH booster voltage	VGH	Ivgh=1mA	10		20	
VGL booster voltage	VGL	Ivgl=-1mA	-15		-7.5	
VGH and VGL difference	|VGH-VGL|	-	-	-	32	
Oscillator tolerance	OSC	25℃	-3		3	%
Source Driver						
Gamma reference voltage	VSPR	-	3.3		5.6	V
	VSNR	-	-5.6		-3.3	
Output voltage deviation	DVOS	VSSD+1.0 ~ VSPROUT-1.0	-	-	+/- 20	mV
		VSSD+0.1V ~ VSSD+1.0 VSPR-1.0 ~ VSPR-0.1V	-	-	+/- 50	mV
Output offset voltage	Voff	-		-	+/-50	mV

LP Mode

Parameter	Symbol	Conditions	Spec.			Unit
			Min.	Typ.	Max.	
Logic high level input voltage	V_{IHLPCD}	LP-CD	450	-	1350	mV
Logic low level input voltage	V_{ILLPCD}	LP-CD	0	-	200	mV
Logic high level input voltage	V_{IHLPRX}	LP-RX(CLK, D0)	880	-	1350	mV
Logic low level input voltage	V_{ILLPRX}	LP-RX(CLK, D0)	0	-	550	mV
Logic low level input voltage	$V_{ILLPRXULP}$	LP-RX(CLK ULP mode)	0	-	300	mV
Logic high level output voltage	V_{OHLPTX}	LP-TX(D0)	1.1	-	1.3	V
Logic low level output voltage	V_{OLLPTX}	LP-TX(D0)	-50	-	50	mV
Logic high level input current	V_{IH}	LP-CD, LP-RX	-	-	10	uA
Logic low level input current	V_{IL}	LP-CD, LP-RX	-10	-	-	uA
Input pulse rejection	SGD	DSI-CLK+/-, DSI-D0+/1	-	-	300	Vps

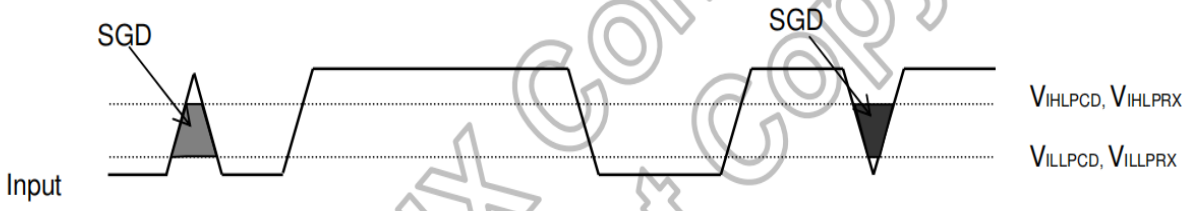


Figure 7.1: Input glitch rejections of low-power receivers

High Speed Mode

Parameter	Symbol	Conditions	Spec.			Unit
			Min.	Typ.	Max.	
Input common mode	V_{CMCLK} V_{CMDATA}	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	70	-	330	mV
Input common mode variation <450 MHZ	$V_{CMRCLKL}$ $V_{CMRDATAL}$	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	-50	-	50	mV
Input common mode variation >450 MHZ	$V_{CMRCLKM}$ $V_{CMRDATAM}$	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	-	-	100	mV
Low-level differential Input threshold	V_{THLCLK} $V_{THLDATA}$	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	-70	-	-	mV
High-level differential Input threshold	V_{THHCLK} $V_{THHDATA}$	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	-	-	70	mV
Single ended input low voltage	V_{ILHS}	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	-40	-	-	mV
Single ended input high voltage	V_{IHHS}	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	-	-	460	mV
Differential input termination resistor	R_{TERM}	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	80	100	125	Ω
Single-ended threshold voltage for termination enable	V_{TERMEN}	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	-	-	450	mV
Termination capacitor	C_{TERM}	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	-	-	-	pF

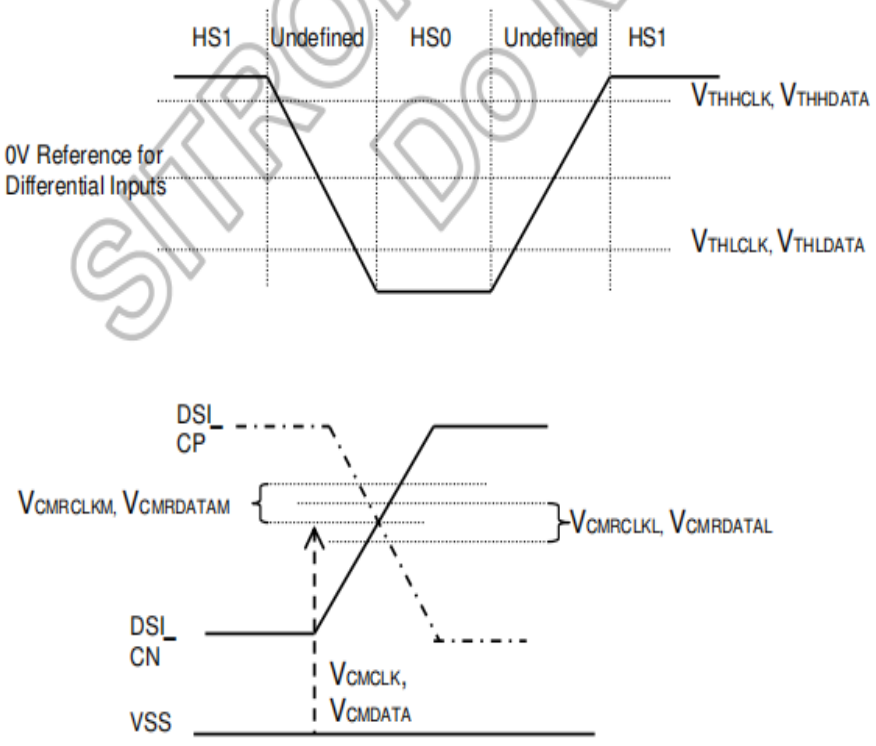


Figure 7.2: Differential voltage range and Command mode voltage

6.2 AC electrical Characteristics

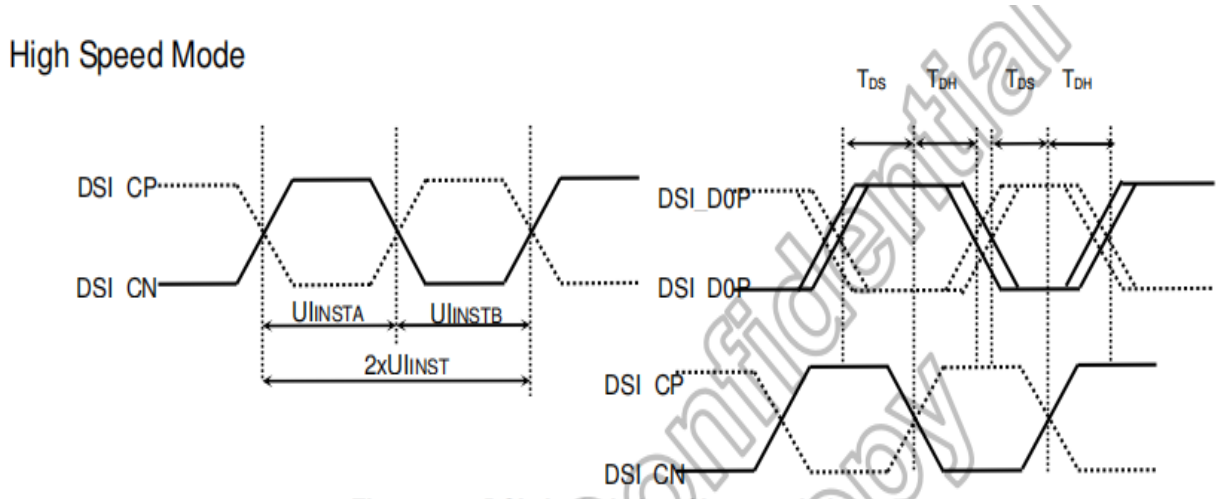


Figure 7.4: DSI clock timing Characteristics

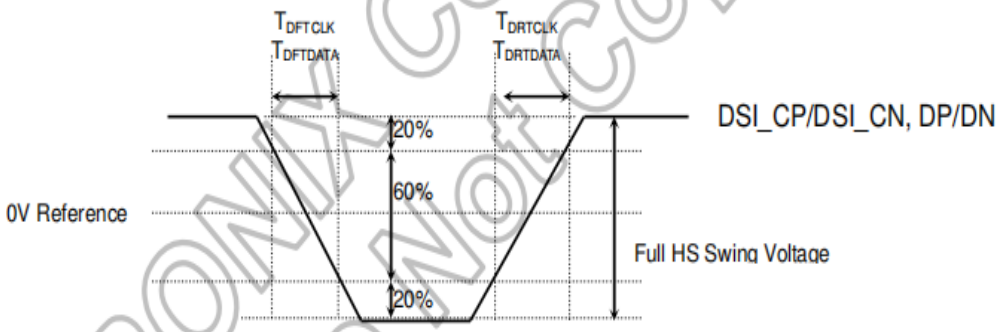


Figure 7.5: Rising and falling time on clock and data channel

(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 7.3: DSI High Speed Mode Characteristics

Low Power Mode

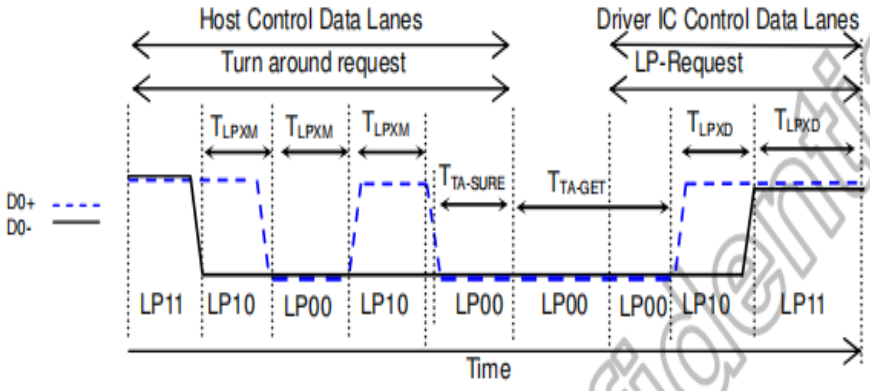


Figure 7.6: BTA from HOST to Display Module Timing

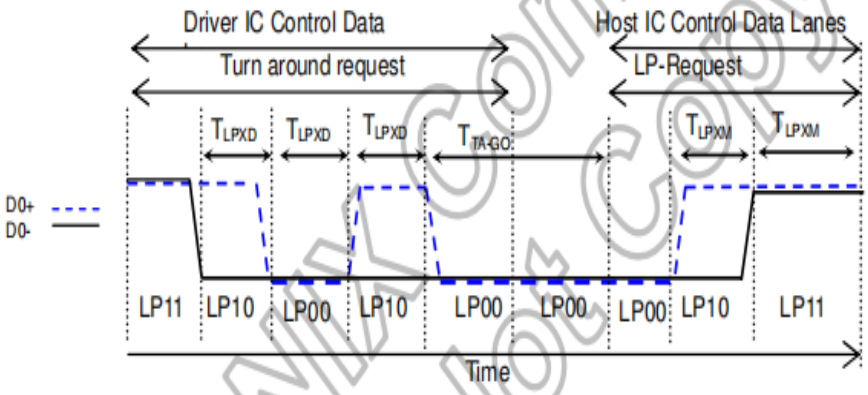


Figure 7.7: BTA from Display Module Timing to HOST

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

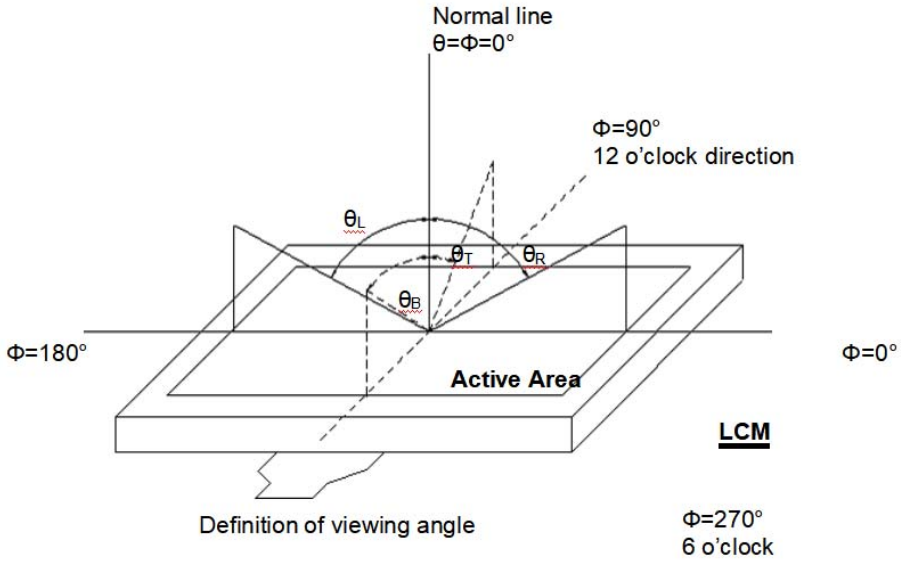
Signal	Item	Symbol	Spec.			Unit
			Min.	Typ.	Max.	
DSI_D0P/ DSI_D0P	Length of LP-00/LP01/LP10/LP11 Host→ Display module	T_{LPXM}	50	-	-	ns
	Length of LP-00/LP01/LP10/LP11 Display module →Host	T_{LPXD}	50	-	-	ns
	Time-out before the MPU start driver	$T_{TA\text{-}SURE}$	T_{LPXD}	-	2xT_{LPXD}	ns
	Time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

Table 7.4: DSI Low Power Mode Characteristics

7. Optical specifications

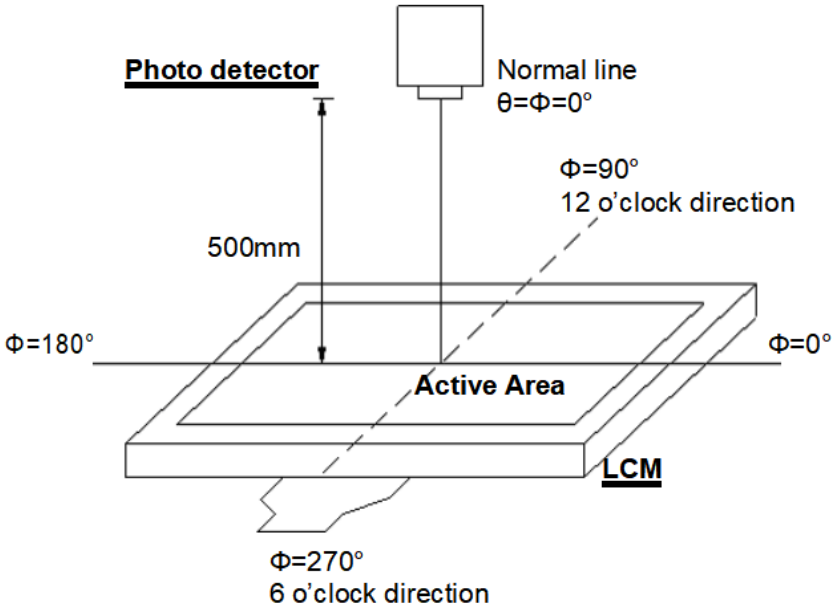
Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR≥ 10)	θ_L	Φ=180° (9 o'clock)	-	85	-	degree	Note 1
	θ_R	Φ=0° (3 o'clock)	-	85	-		
	θ_T	Φ=90° (12 o'clock)	-	85	-		
	θ_B	Φ=270° (6 o'clock)	-	85	-		
Response time Rise + Fall	T_{RT}	Normal θ=Φ=0°	-	-	35	msec	Note 3
Contrast ratio	CR		-	900	-	-	Note 4
Color chromaticity	W_X		-	0.301	-	-	Note 2 Note 5 Note 6
	W_Y		-	0.329	-	-	
NTSC	Ratio		-	65	-	%	
Luminance	L		-	650	-	cd/㎡	Note 6

Note 1: Definition of viewing angle range



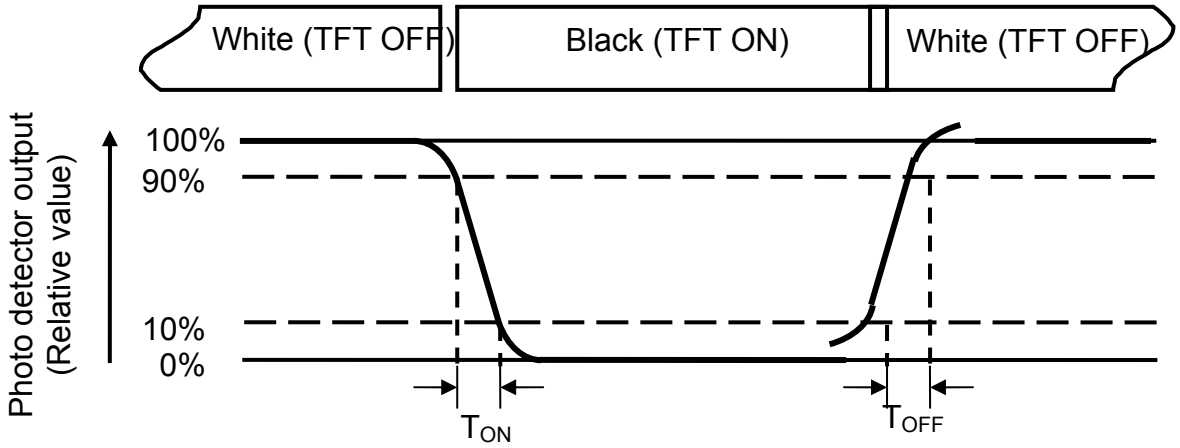
Note 2: Definition of optical measurement system.

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. (Viewing angle is measured by ELDIM-EZ contrast/Height: 1.2mm, Response time is measured by Photo detector TOPCON BM-7A, other items are measured by BM-7A/Field of view: 1° /Height: 500mm.)



Note 3: 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%.



Definition of response time

Note 4: Definition of contrast ratio

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

Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: All input terminals LCD panel must be ground while measuring the center area of the panel.

8. Reliability Test Conditions And Methods

Item	Test Conditions	Remark
High Temperature Storage	Ta = 80℃ 96 hrs	
Low Temperature Storage	Ta = -30℃ 96 hrs	
High Temperature Operation	Ts = 70℃ 96 hrs	
Low Temperature Operation	Ta = -20℃ 96 hrs	
Operate at High Temperature and Humidity	50℃, 90%RH max. 96 hrs	Operation
Thermal Shock	-20℃~+60℃ 10cycles 1 Hrs/cycle	Non-operation
Electrostatic Discharge	Contact=±4KV, class B Air=±8KV, class B	

Note1: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

Note2: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

9. Package Drawing

TBD