LCM Specification

☑Preliminary specification

☐Final Specification

Project No. 项目编号	TFT-H101W8WXIWZ1C40
Customer 客户名称	
Module No. 客户型号	
Product type 产品内容	TFT LCD Module 800 x 3RGB x 1280 Dots 10.1”TFT LCD
Signature by customer: 客户确认签章： ☐Trial production ☐Mass production	

编　　制	电子审核	结构审核	批　　准
Y.L			

深圳市鑫洪泰电子科技有限公司

Shenzhen Hot Display Technology Co.,Ltd

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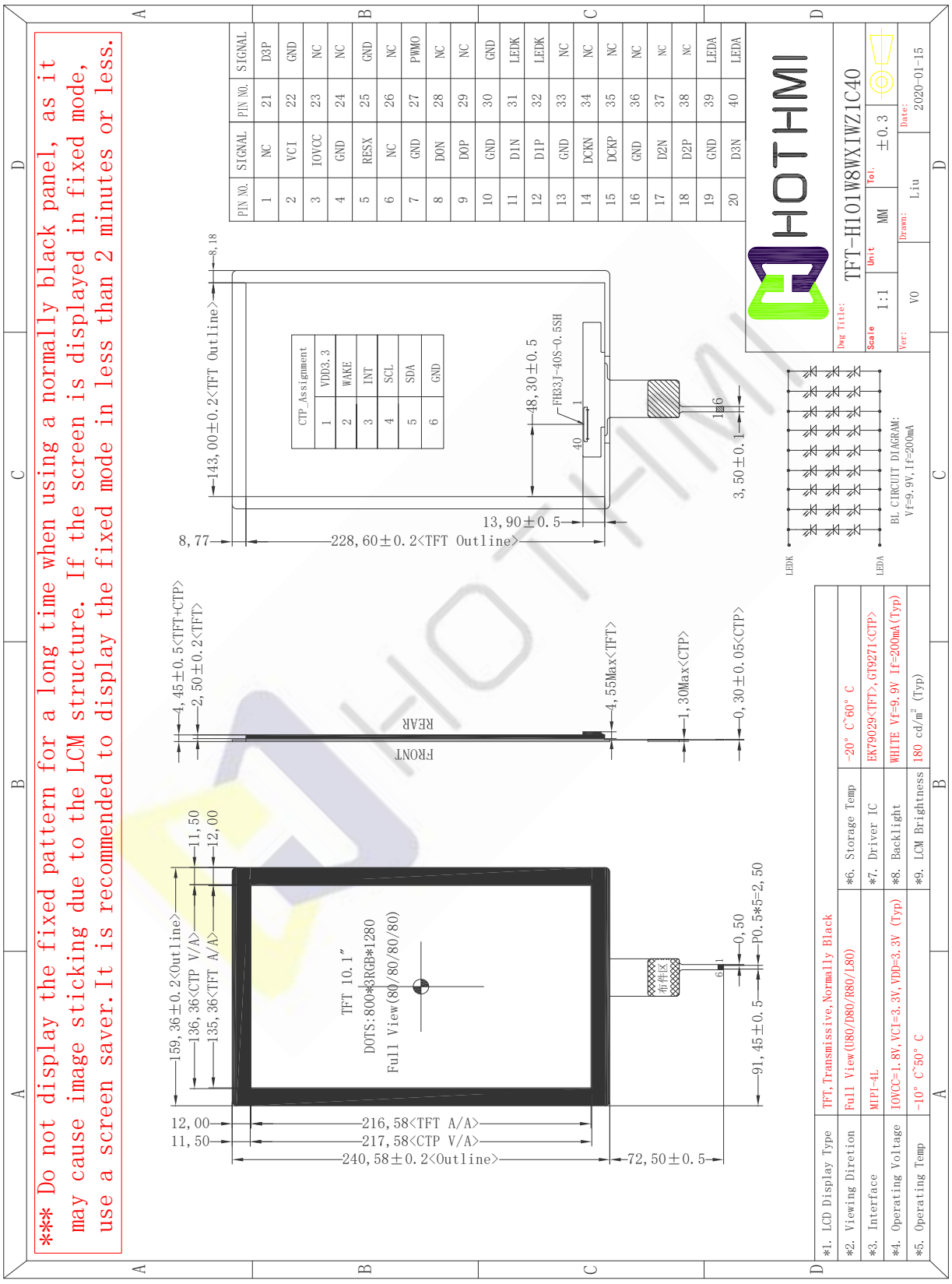
1 Document revision history :

DOCUMENT REVISION	DATE	DESCRIPTION	PREPARED BY	APPROVED BY
0	2020-02-20	First Release.	Y.L	

1. General Feature:

Item	Standard Value	Unit
Display Size	10.1”	--
Number of Pixels	800(H)x3(RGB)*1280(V)	--
Active Area	135.36(H) *216.58(V)	mm
Outline Dimension	143.00(H) ×228.60× 2.50(V) <TFT> 159.36(H) ×240.58× 4.45(V) <TFT+CTP>	mm
Viewing Direction	Full O’Clock	-
Interface	MIPI-4L interface	-
Driver IC	EK79029	-
Driver Condition	VCI=3.3V	V
Backlight	White LED	-
Touch Panel	Cap Touch Panel	-
CTP Driver IC	GT9271	
CTP Driver Condition	VDD=3.3V	
Operation Temperature	-10~50	℃
Storage Temperature	-20~60	℃

2.Outline Dimensions



PIN NO.	SIGNAL	PIN NO.	SIGNAL
1	NC	21	D3P
2	VCI	22	GND
3	IOVCC	23	NC
4	GND	24	NC
5	RESX	25	GND
6	NC	26	NC
7	GND	27	PWMO
8	DON	28	NC
9	DOP	29	NC
10	GND	30	GND
11	D1N	31	LEDK
12	D1P	32	LEDK
13	GND	33	NC
14	DCKN	34	NC
15	DCKP	35	NC
16	GND	36	NC
17	D2N	37	NC
18	D2P	38	NC
19	GND	39	LEDA
20	D3N	40	LEDA

CTP_Assignment	
1	VDD3.3
2	WAKE
3	INT
4	SCL
5	SDA
6	GND

3. Pin Description

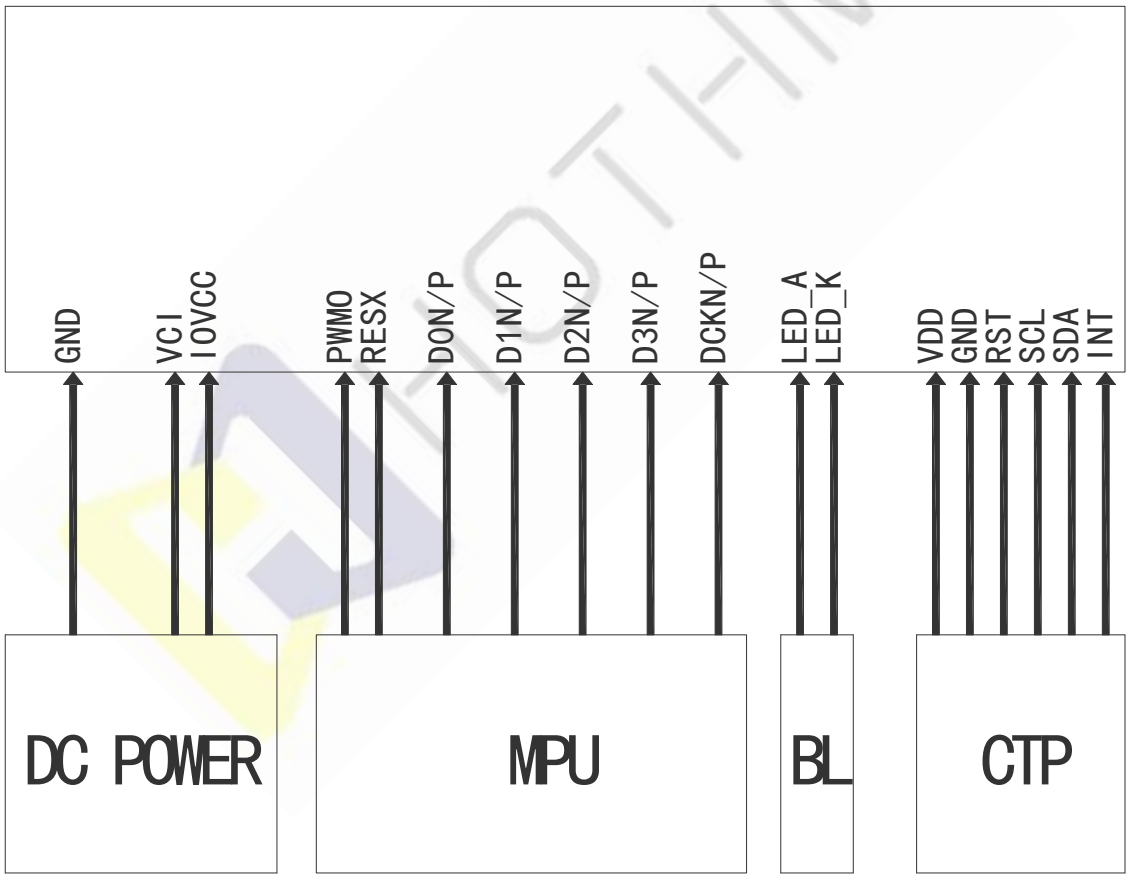
3.1 Pin Description

3.2

Pin NO.	Symbol	Description
1	NC	No Connector
2	VCI	Analog Power(3.0 ~ 3.6 V,3.3V)
3	IOVCC	Analog Power(1.75 ~ 3.6 V,3.3V)
4	NC	No Connector
5	RESX	Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability. Normally pull high. (R=10KΩ， C=0.1μF)
6	NC	No Connector
7	GND	Ground
8	D0N	Negative MIPI differential data inputs
9	D0P	Positive MIPI differential data inputs
10	GND	Ground
11	D1N	Negative MIPI differential data inputs
12	D1P	Positive MIPI differential data inputs
13	GND	Ground
14	DCKN	Negative MIPI differential clock inputs
15	DCKP	Positive MIPI differential clock inputs
16	GND	Ground
17	D2N	Negative MIPI differential data inputs
18	D2P	Positive MIPI differential data inputs
19	GND	Ground
20	D3N	Negative MIPI differential data inputs
21	D3P	Positive MIPI differential data inputs
22	GND	Ground
23,24	NC	No Connector
25	GND	Ground
26	NC	No Connector
27	PWMO	PWM control signal for LED driver(CABC)
28,29	NC	No Connector
30	GND	Ground
31,32	LED_K	LED Cathode
33-38	NC	No Connector
39,40	LED_A	LED Anode
---END---		

CTP Pin Description		
1	VDD	Power supply input for CTP
2	RST	Cap Touch panel Reset
3	INT	Cap Touch panel Interrupt
4	SCL	Cap Touch panel SCL Data
5	SDA	Cap Touch panel SDA Data
6	GND	Ground
---END---		

3.2 Wiring Diagram



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4. Electrical Characteristics

4-1 TFT LCD Module Operating Conditions

Item	Symbol	Condition	Min	Type	Max	Uint
Interface logic circuits	IOVCC	-	1.75	3.3	3.6	V
Analog Power supply	VCI	-	3.0	3.3	3.6	V
TFT Gate on voltage	VGH	-	10.0	-	16.0	V
TFT Gate off voltage	VGL	-	-16.0	-	-10.0	V

4-2 LED back light specification (pera chip)

Item	Symbol	Condition	Min	Type	Max	Uint
Forward voltage	Vt	If=20mA	9.0	9.9	10.8	V
Forward current	Ipn	/1-chip	-	200	-	mA
Luminance(With LCD)	Lv	If=180mA	-	180	-	cd/㎡
Luminous color	White					

4-3 CTP Operating Conditions

Item	Symbol	Condition	Min	Type	Max	Uint
Power Supply Voltages	VDD	-	2.8	3.30	3.60	V
I/O Digital Voltage	IOVDD	-	2.8	3.30	3.60	V

5. OPTICAL SPECIFICATION

5.1 Overview

The test of Optical specifications shall be measured in a dark room (ambient luminance 1lux and temperature = 25 2℃) with the equipment of Luminance meter system (Goniometer system and TOPCON BM-5) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0 . The center of the measuring spot on the Display surface shall stay fixed. The backlight should be operating for 30 minutes prior to measurement.

5.2 Optical Specifications

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle Range	Horizontal	Θ L	CR>10	-	80	-	Deg.	Note 1
		Θ R		-	80	-	Deg.	
	Vertical	Θ U		-	80	-	Deg.	
		Θ D		-	80	-	Deg.	
Contrast ratio		CR	Θ = 0°	600	800	-		Note2
Color Gamut		CG		-	-	-	%	
White Chromaticity		Wx	Θ = 0°	-	0.302	-		
		Wy		-	0.321	-		
Reproduction of color	Red	Rx		-	-	-		Note4 (Based on C Light)
		Ry		-	-	-		
	Green	Gx		-	-	-		
		Gy		-	-	-		
	Blue	Bx		-	-	-		
		By		-	-	-		
Response Time (Rising + Falling)		Tr+Tf	Θ = 0° Ta= 25℃	-	20	30	ms	Note5
Transmittance(with Polarizer)		Tr		-	-	-	%	Note3

Note:

1.Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o’ clock direction and the vertical or 6, 12 o’ clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1).

2.Contrast measurements shall be made at viewing angle of Θ = 0 and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black)

state . (see FIGUR 1) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3.Transmittance is the Value without APF and without CG.

4.The color chromaticity coordinates specified in the above table shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

5.The electro-optical response time measurements shall be made as FIGURE 2 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Tf.

Figure1 Measurement Set Up

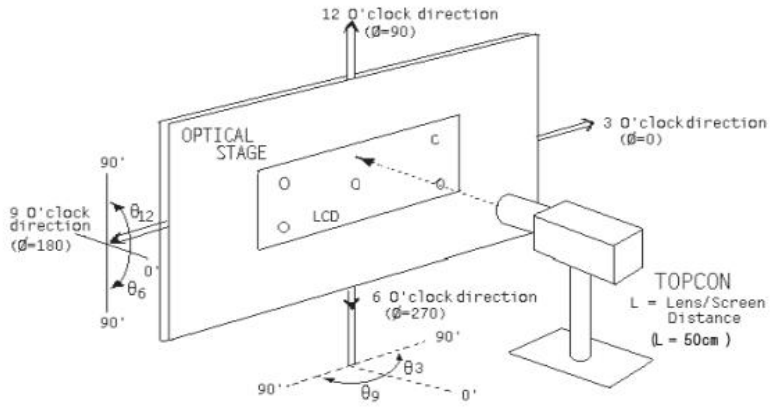
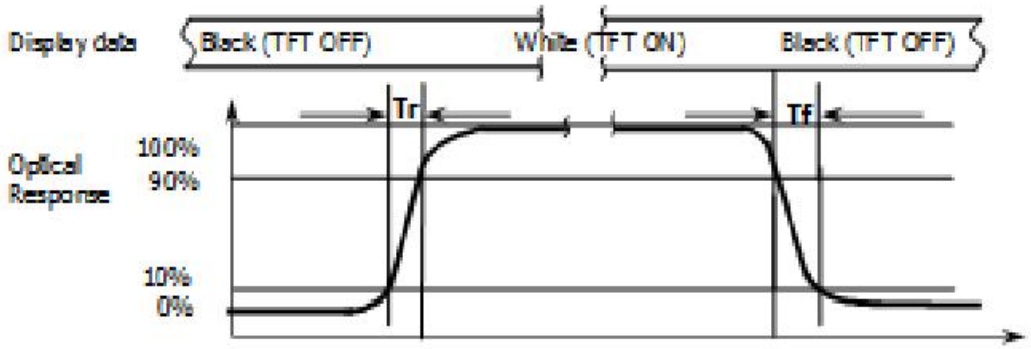


Figure2 Response Time Testing



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6.Timing Characteristics

6-1 MIPI data-clock timing specification

Parameter	Descript	Spec.			Unit
		Min.	Typ.	Max.	
T_{REOT}	30%-85% rise time and fall time	-	-	35	ns
$T_{CLK-MISS}$	Timeout for receiver to detect absence of Clock transitions and disable the Clock Lane HS-RX.	-	-	60	ns
$T_{CLK-POST}$*1	Time that the transmitter continues to send HS clock after the last associated Data Lane has transitioned to LP Mode. Interval is defined as the period from the end of $T_{HS-TRAIL}$ to the beginning of $T_{CLK-TRAIL}$.	60 ns + 52*UI (For DCS)	-		ns
$T_{CLK-PRE}$	Time that the HS clock shall be driven by the transmitter prior to any associated Data Lane beginning the transition from LP to HS mode.	8	-		ns
$T_{CLK-SETTLE}$	Time interval during which the HS receiver shall ignore any Clock Lane HS transitions, starting from the beginning of $T_{CLK-PRE}$.	95	-	300	ns
$T_{CLK-TERM-EN}$	Time for the Clock Lane receiver to enable the HS line termination, starting from the time point when Dn crosses $V_{IL,MAX}$.	Time for Dn to reach VTERM-EN	-	38	ns
$T_{HS-SETTLE}$	Time interval during which the HS receiver shall ignore any Data Lane HS transitions, starting from the beginning of $T_{HSPREPARE}$.	85 ns + 6*UI	-	145 ns + 10*UI	ns
T_{EOT}	Time from start of $T_{HS-TRAIL}$ or $T_{CLK-TRAIL}$ period to start of LP-11 state	-	-	105ns+48*UI	-
$T_{HS-EXIT}$ (1)	time to drive LP-11 after HS burst	100	-	-	ns
$T_{HS-PREPARE}$	Time to drive LP-00 to prepare for HS transmission	40ns + 4*UI	-	85ns+6*UI	ns
$T_{HS-PREPARE}$ + $T_{HS-ZERO}$	$T_{HS-PREPARE}$ + Time to drive HS-0 before the Sync sequence	145ns + 10*UI	-	-	ns
$T_{HS-SKIP}$	Time-out at RX to ignore transition period of EoT	40	-	55ns+4*UI	ns
$T_{HS-TRAIL}$	Time to drive flipped differential state after last payload data bit of a HS transmission burst	60 + 4*UI	-	-	ns
T_{LPX}	Length of any Low-Power state period	50	-	-	ns
Ratio T_{LPX}	Ratio of $T_{LPX(MASTER)}/T_{LPS(SLAVE)}$ between Master and Slave side	2/3	-	3/2	-
T_{TA-GET}	Time to drive LP-00 by new TX	$5*T_{LPX}$			ns
T_{TA-GO}	Time to drive LP-00 after Turnaround Request	$4*T_{LPX}$			ns
$T_{TA-SURE}$	Time-out before new TX side starts driving	T_{LPX}	-	$2*T_{LPX}$	ns

Note: (1) For image transmission:
$T_{CLK-POST}$ min value =164 when MIPI max frequency per lane = 0.53Gbps.
$T_{CLK-POST}$ min value =112 when MIPI max frequency per lane = 1Gbps

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6-2 MIPI Input Timing Table

For 800RGBx1280

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
MIPI (4 Lane) @Frame rate=60Hz			432		Mbps
MIPI (3 Lane) @Frame rate=60Hz			576		Mbps
DCLK frequency @Frame rate=60Hz	F_{DCLK}		71.9		MHz
HSYNC period time	T_H		920		DCLK
Horizontal display area	T_{HD}		800		DCLK
HSYNC pulse width	T_{HPW}		24	-	DCLK
HSYNC back porch	T_{HBP}		24	-	DCLK
HSYNC front porch	T_{FBP}		72	-	DCLK
VSYNC period time	T_V		1304		H
Vertical display area	T_{VD}		1280		H
VSYNC pulse width	T_{VPW}		2	-	H
VSYNC back porch	T_{VBP}		10	-	H
VSYNC front porch	T_{VFP}		12	-	H

6-3 MIPI AC characteristics

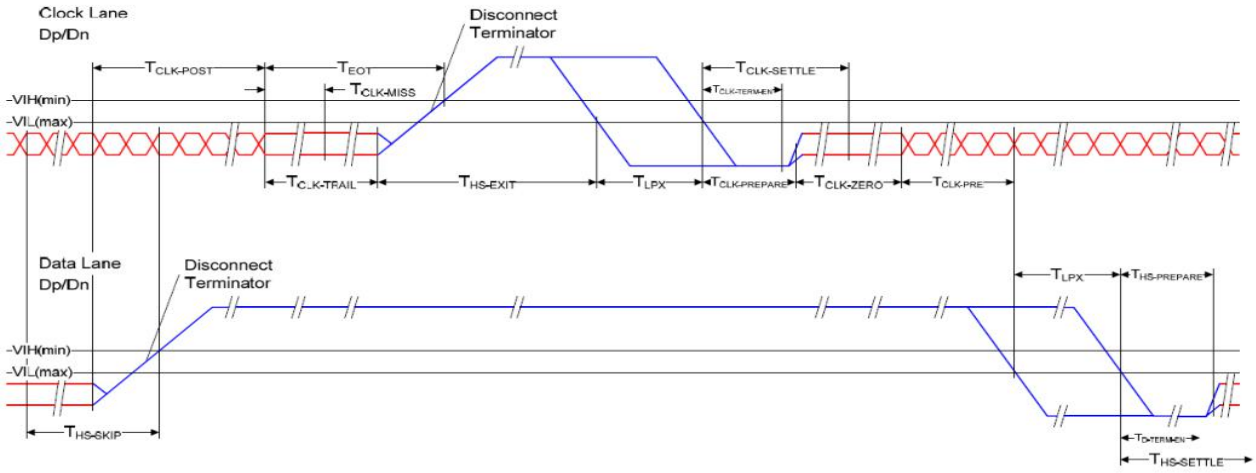

Figure 13.1: Switching the clock lane between clock transmission and low-power mode

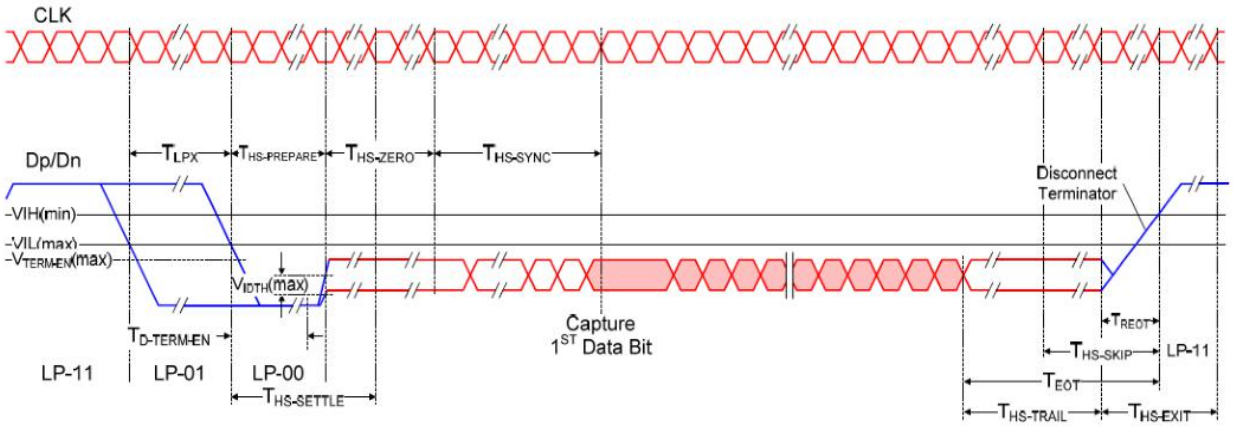

Figure 13.2: Timing of high-speed data transmission in bursts

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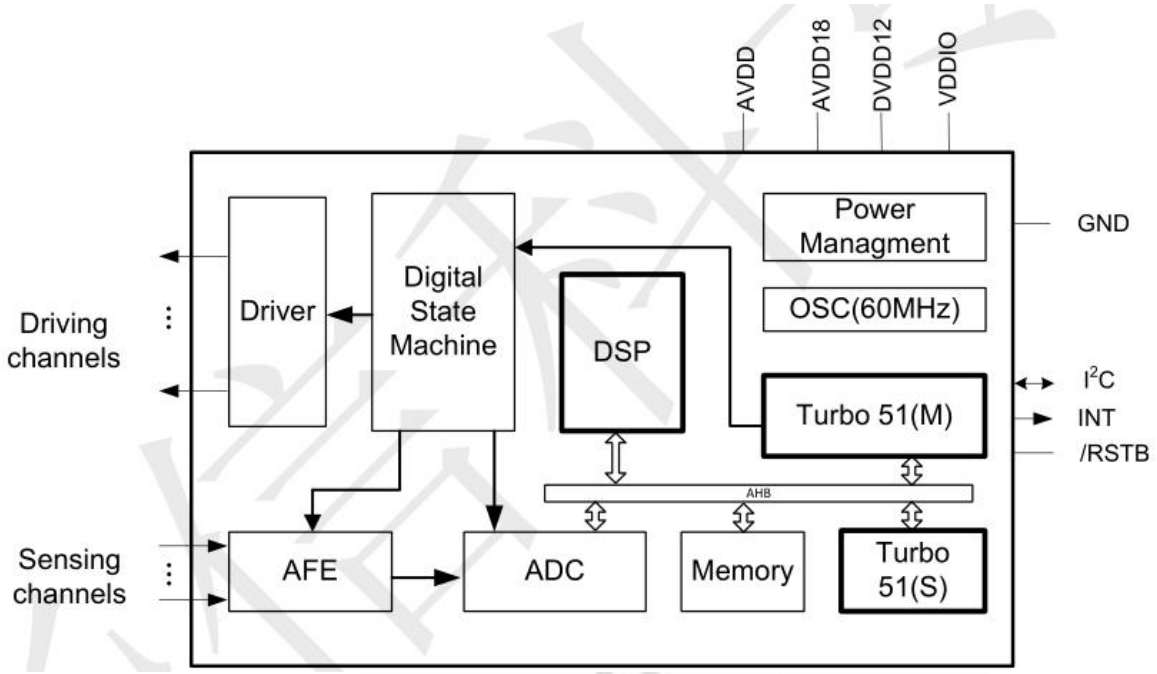
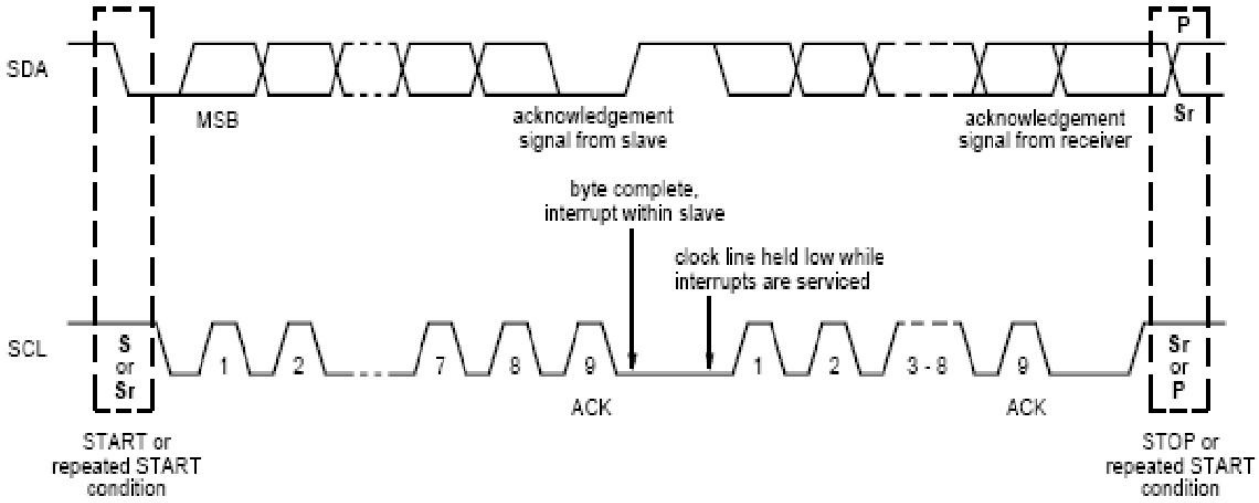
6-6 CTP Timing Characteristics

6-6-1 Chip schematic



6-6-2 I2C Serial Data Transfer Format



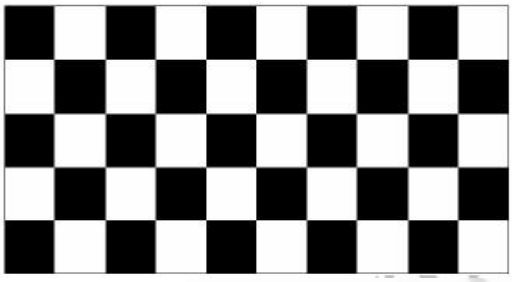
7. RELIABILITY TEST

7-1 Temperature and Humidity

TEST ITEMS	CONDITIONS	NOTE
High Temperature Storage	Ta=+60 o C, 240hrs	
Low Temperature Storage	Ta=-20 o C, 240hrs	
High Temperature Operation	Ta=+50 o C, 240hrs	
Low Temperature Operation	Ta=-10 o C, 240hrs	
High Temperature and High Humidity (Operating)	Ta=+50 o C, 90%RH, 240hrs	

Note: (1) All tests above are practiced at module type.

(2) There is no display function NG issue occurred, all the cosmetic specification is judged before the reliability stress.



(a) Test Pattern (chess board Pattern)

(b) Gray Pattern

7-2 Shock and Vibration

ITEMS	CONDITIONS
Packing Shock (Non-Operation)	● Shock level:980m/s^2 ● Waveform:1/2 Sine wave,6msec ● ±X, ±Y ±Z,each axis 1 times
Packing Vibration (Non-Operation)	● Frequency range:8-33.3HZ ● Stoke:1.0mm ● Sweep: 10Hz-50Hz ● x,y,z 2 hours for each direction

7-3 Electrostatic Discharge

TEST ITEM	CONDITIONS
ESD (Non-operation)	150pF,330Ω， Contact±4KV,Air :±8KV.Note 1
	200pF,0Ω， ±200V Contact test.Note 2

Note:Measure Point:

1.LCD glass and metal bezel

2.IF connector pins

8.HANDDLING & CAUTIONS

8-1 Caution For Operation

♦Since the LCM is made of glass, do not apply strong mechanical impact or static load onto it.Handling with care since shock, vibration, and careless handling may seriously affect the product.If it falls from a high place or receives a strong shock, the glass maybe broken.

♦It is indispensable to drive the LCM within the specified voltage limit since the higher voltage than the limit causes LCM's life shorter. An electro-chemical reaction due to DC causes undesirable deterioration of the LCM so that the use of DC drive should avoid.

♦Do not connect or disconnect the LCM to or from the system when power is on.

♦Never use the LCM under abnormal conditions of high temperature and high humidity.

♦When expose to drastic fluctuation of temperature(hot to cold or cold to hot), the LCM may be affected; specifically, drastic temperature fluctuation from cold to hot, produces dew on the LCM's surface which may affect the operation of the polarizer on the LCM.

♦Response time will be extremely delay at lower temperature than the operating temperature range and on the other hand LCM may turn black at temperature above its operational range. However those phenomenon do not mean malfunction or out of order with the LCM. The LCM will revert to normal operation once the temperature returns to the recommended temperature range for normal operation.

♦ Do not display the fixed pattern for a long time when using a normally black panel, as it may cause image sticking due to the LCM structure. If the screen is displayed in fixed mode, use a screen saver.It is recommended to display the fixed mode in less than 2 minutes or less.

♦Do not disassemble and/or re-assemble LCM module

7-2 Caution Against Static Charge

♦The LCM use C-MOS LSI drivers, so customers are recommended that any unused input terminal would be connected to Vdd or Vss, do not input any signals before power is turn on, and ground you body, work/assembly area, assembly equipments to protect against static electricity.

♦Remove the protective film slowly, keeping the removing direction approximate 30-degree not vertical from panel surface, if possible, under ESD control device like ion blower, and the humidity of working room should be kept over 50%RH to reduce the risk of static charge.

♦Avoid the use work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.

♦In handling the LCM, wear non-charged material gloves. And the conducting wrist to the earth and the conducting shoes to the earth are necessary

--END--