
SPECIFICATION

规格书

Product Type: 6.8 inch TFT LCM (Tianma/IPS)

LCD Nunmber: _____

Customer NO: _____

CUSTOMER	PREPARE BY	CHECK BY	APPROVED BY
APPROVED			
SUPPLIER	PREPARE BY	CHECK BY	APPROVED BY
APPROVED			

变更记录表				
变更序号 Change No.	日期 Date	内容及理由 Subject And Reason	版本号 Version No.	负责人 Response
1	2016. 12. 05	首版发布	A0	KevinLiu
2	2017. 2. 15	增加 ESD 测试项	A1	KevinLiu

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一. 适用

本规格承认书适用[6.86英寸液晶显示屏](#) 电子产品，显示人机互动信息。

二. 产品指定

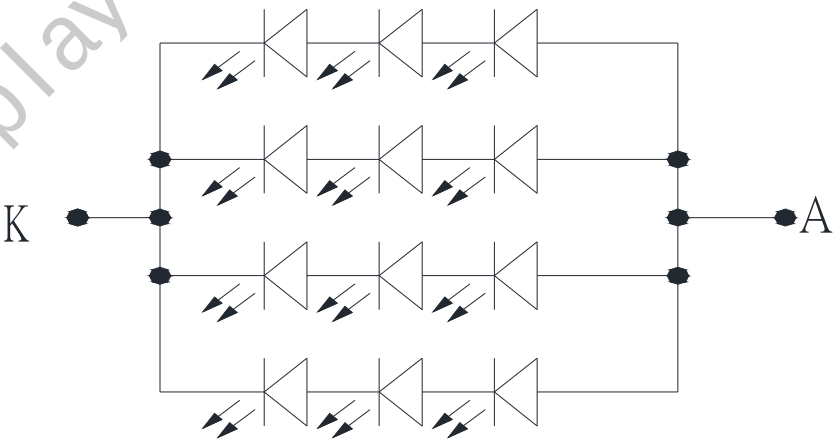
客户产品名称: [6.8 inch 后视镜 TFT LCM](#) 模块
客户产品料号:
产品型号: TM686T40

三. 产品组成

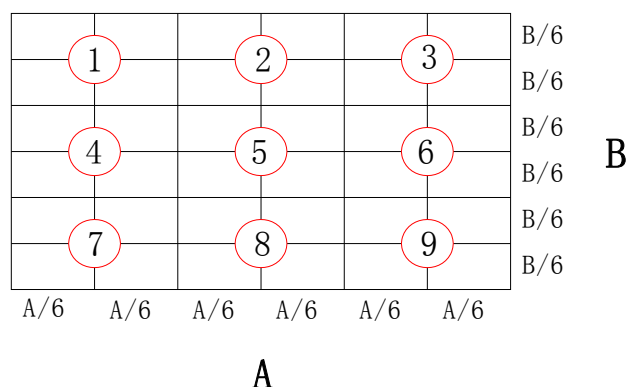
模组主要零部件组成

模组	序号	名称	物料料号	数量	备注
	1	TFT液晶显示屏	参考BOM	1PCS	客供
	2	6.8 Inch背光源	参考BOM	1PCS	
	3				
	4				
	5				
	6				
	7				

四. 测试电路图 Test Circuit Diagram: TYP:10.4V/120mA

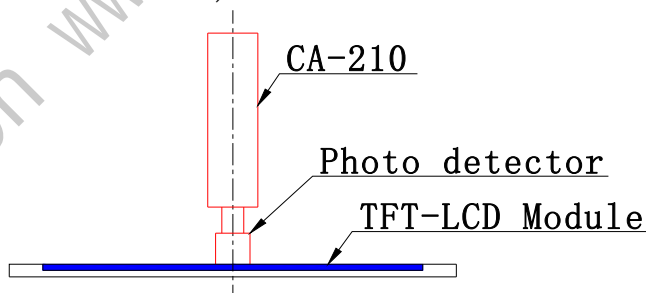


五. 测试点位置图 Test Point Space Diagram:



六. 测试条件如下 Test Condition as follow:

1. 环境温度: $25 \pm 2^{\circ}\text{C}$
2. 环境湿度: $55\% \pm 10\%$ 。
3. 使用限流电源测试: **120mA** (单颗 LED 灯 60mA)
4. 测量仪器:
 - 1) 恒压恒流电源: 茂迪 LPS305C-TC
 - 2) 显示器色彩分析仪: CA-210 (Konica Minolta)
5. 测定距离 $L = 30\text{mm}$
6. 测量方式: (如右图)



七. 极限参数 Absolute Maximum Rating:

项 目 Item	符 号 Symbol	条 件 Conditions	值 Rating	单 位 Unit
1 极限直流正向电流 Absolutemaximumforward current	Ifm	---	4x90	mA
2 脉冲驱动时极限正向电流 Peak forward current	Ifp	1 msec 脉冲, 1/10 占空比 1 msec Plus 10% Duty Cycle	4x240	mA
3 极限功耗 Power dissipation	Pd	---	12x297	mW
4 工作温度 Operating Temperature Range	Topr	---	$-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$	$^{\circ}\text{C}$
5 贮存温度 Storage Temperature Range	Tstg	---	$-30^{\circ}\text{C} \sim +80^{\circ}\text{C}$	$^{\circ}\text{C}$

当工作温度高于 25°C 时, Ifm, Ifp 和 Pd 必须降低; 电流降低率是 $-0.36\text{mA}/^{\circ}\text{C}$ (直流驱动), 或 $-0.86\text{mA}/^{\circ}\text{C}$ (脉冲驱动), 功耗降低率是 $-0.75\text{mW}/^{\circ}\text{C}$ 产品的工作电流不能大于对应工作温度条件 Ifm 或 Ifp 的 60%。

For operation above 25°C , The Ifm Ifp & Pd must be derated, the Current derating is $-0.36\text{mA}/^{\circ}\text{C}$ for DC

drive and $-0.86\text{mA}/^{\circ}\text{C}$ for Pulse drive, the Power dissipation is $-0.75\text{mW}/^{\circ}\text{C}$. The product working current must not more than the 60% of the I_{fm} or I_{fp} according to the working temperature.

八. 电光特性 Electric Light Characteristic:

(除非特别说明, 环境温度 $T_a=25^{\circ}\text{C}$, Unless specified, The Ambient temperature $T_a=25^{\circ}\text{C}$)

项目 Item	符号 Symbol	最小值 Min.	典型值 Typ	最大值 Max.	单位 Unit	测试条件 Condition
1. 正向电压 Forward Voltage	V_f	9.0	—	10.4	V	$I_F=120\text{mA}$
2. 色坐标 Chromaticity Coordinate	X	0.27	0.31	0.33	---	$I_F=120\text{mA}$
	Y	0.27	0.31	0.33	---	$I_F=120\text{mA}$
3. 亮度 Luminance	L_v	500	550	600	cd/m^2	$I_F=120\text{mA}$
4. 均匀性 Uniformity	ΔL_v	80	—	—	%	$I_F=120\text{mA}$

备注: 因白色 LED 无波长特性, 供货时无法做到整批颜色一致, 包装时将分色包装.

Note: There is no wavelength feature for white led, and there will be a few difference of that color when producing, we will package them according to the difference.

九. 模组外观检验规格 Backlight Visual Inspection Spec:

1. 点亮外观:

检验项目	条件	规格	备 注
亮点、黑点、污点	动作试验	0.3<D: 不可有 0.25<D≤0.3: 1EA OK 0.2≤D≤0.25: 2EA OK; D<0.2: 不计	1. 点距 20mm 2. 盖上 LCD 仍能明显看见判 NG
亮线、刮伤、异物	动作试验	0.03<W: 不可有 ; 3.0<L: 不可有 L≤2.0 0.02<W≤0.03: 2EA OK L ≤3.0 0.01<W≤0.02: 3EA OK W ≤0.01: 不计	---
MURA	动作试验	点灯时发光面上不可有亮线等明暗现象, 如果出现时, 盖上 LCD 不可看见	---
牛顿环	动作试验	盖上 LCD 不可看见	---

2. 非点亮外观: 项目重缺点轻缺点判定基准

- | | |
|---------|------------------------|
| 2.1 包装箱 | 2.1.1 不可有破裂 |
| | 2.1.2 若有特殊记号必须检附相关证明文档 |
| 2.2 塑料框 | 2.2.1 不可有龟裂 |

- 2.2.2 灌口残料不得高于胶框表面
- 2.2.3 不可有缺角破损脏污现象
- 2.2.4 毛边不可影响 LCD 模块组装作业
- 2.2.5 不可附着有黏性的异物
- 2.3 产品标签与喷码
- 2.3.1 内容必须正确
- 2.3.2 字体清晰
- 2.3.3 贴附位置必须正确
- 2.3.4 不可短缺或误配
- 2.3.5 不可重迭
- 2.4 膜片
- 2.4.1 逆翘不可有, 正翘程度不可超过 0.5mm
- 2.4.2 不可有龟裂, 缺角, 破损现象
- 2.4.3 不可有变形, 毛边等现象
- 2.3.4 必须平整, 不可造成 LCD 之 Pooling 现象
- 2.5 线材
- 2.5.1. 不可有裸线或断线
- 2.5.2. 长度、线径、颜色必须正确, 不可刺伤、压伤或破损
- 2.5.3. 热缩套管不可破损
- 2.5.4. 不可有组装不良现象
- 2.5.5. A.K 不可反接, (A 为正极, K 为负极)

十. 信赖性、ESD 测试 Reliability or ESD Test :

项目	试验方法	判定基准
高温高湿动作试验	温度 $60 \pm 2^{\circ}\text{C}$ 、湿度 80% RH, 96Hr 动作后、常温放置 2Hr	A, B, C, D, E
低温动作试验	温度 $-20 \pm 2^{\circ}\text{C}$ 、常湿, 96Hr 动作后、常温放置 2Hr	A, B, C, D, E
高温高湿保存试验	温度 $85 \pm 2^{\circ}\text{C}$ 、湿度 80% RH, 96Hr 放置后、常温放置 2Hr	A, B, C, D, E
低温保存试验	温度 $-30 \pm 2^{\circ}\text{C}$ 、常湿 96Hr 放置后、常温放置 2Hr	A, B, C, D, E
冷热冲击试验	-20°C (0.5h) $\rightarrow$ 60°C (0.5h) 为 1 次 温度循环、50 次温度循环后常温放置 2Hr	A, B, C, D, E
振动试验 (非动作)	X、Y、Z 每个方向, 频率: 10~50Hz; 2G; 1 小时	A, B, C, D, E
ESD 接触放电	环境温度: $23 \pm 3^{\circ}\text{C}$, 环境湿度: $60 \pm 5\%\text{RH}$, 尖形放电探头接触产品, 单部位 $\pm 6\text{KV}/20$ 次 (10 次正极, 10 次负极), 放电间隔 1 秒	B 级
ESD 空气放电	环境温度: $23 \pm 3^{\circ}\text{C}$, 环境湿度: $60 \pm 5\%\text{RH}$, 尖形放电探头相垂直产品 2mm 以产生电弧, 单部位 $\pm 10\text{KV}/20$ 次 (10 次正极, 10 次负极), 放电间隔 1 秒	B 级

性赖性项判定标准:

A: 点亮无问题

B: 辉度维持 80%以上

C: 外观无异常变化(损坏、伤痕、锈蚀、严重变形等情形)

D: 均匀变化在 30%以内
E: 色度变化在 0.02 以内
ESD 项判定标准:

- A 级: 实验中, 产品功能不受任何影响。
B 级: 实验中, 产品功能暂时丧失或降低, 停止试验后, 能自动恢复。
C 级: 实验中, 产品功能暂时丧失或降低, 停止试验后由试验人员干预或系统复位才能恢复。
D 级: 因试验造成产品功能或其他软件失效, 不能恢复的功能丧失或性能降低。

十一. 产品寿命 Product Life:

周围温度 $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 、($I_f=25\text{mA/Each LED}$)之推荐使用条件下, 模组之寿命为:

辉度减半平均寿命 30,000 小时以上

辉度减半保证寿命 20,000 小时以上

注: 辉度减半平均寿命指背光源平均辉度衰减到初期平均辉度 50%所需时间。

十二. 包装、标示、注意事项:

- 1: 产品标签(喷码)统一位于下铝(铁)框的固定位置, 包括有客户品名、产品型号、序列号、日期等, 以便追索新产品的信息。
- 2: 产品外包装箱为中性包装, 运输条件适用广东省内, 每箱产品装箱总数为96Pcs, 分上、下层内盒, 每盒48Pcs。(注: 国内长途跨省及国际航空、海运等特别运输, 需特殊加强包装, 费用另行沟通)
- 3: 保存注意事项: 注意保存。保存条件不好时, 会降低反射膜(扩散膜)与导光板(反射腔)的粘附力。
- 4: 长时间(3个月以上)保存, 温度必须在 $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ 以下, 湿度必须在 $50\% \pm 10\%$ 以下。
- 5: 运输过程中严禁超高堆放挤压, 倒放, 整车装卸。
- 6: 背光模组在装配时不要扭曲和用猛力挤压等。
- 7: 避免在有灰尘或油雾环境下装配。
- 8: 必须满足背光模组的使用环境要求, 尽可能避免温度的剧烈变化。
- 9: 必须按正确的接线方式连接电源, 否则将会导致损坏。
- 10: 拿取产品时必须带上手指套, 否则会有手指印和铁框生锈的现象。

十三. 外箱标示 Outer Carton Labeling:

1. 纸箱上的出货标签表示以下项目:
2. 品名、数量、出货年月日。

十四. 欧盟 RoHS 标准 European Union RoHS Standard:

有害物 质名称	铅 (Pb)	镉 (Cd)	汞 (Hg)	六价铬 (Cr ⁶⁺)	多溴联苯 (PBBs)	多溴联苯醚 (PBDEs)	包装材料 (Pb+Cd+Hg+Cr ⁶⁺)
限 定 标 准 (ppm)	1000	100	1000	1000	1000	1000	100

注：以上有害物质限定标准只针对背光源产品材料，不含 FOG 及客供物料。

十五. 其它 Others:

本承认书如有疑问, 双方协议解决.

十六. 模组成品图 Finished Module Drawing

见下附页

[illegible]

十七. FOG 参数

Specification

6.86 WXGA LCD Module

(1). General Feature

Item	Specification	Unit
Substrate Thickness	4.5	mm
Module Outline Dimension	66.6 x 181	mm
Active Screen Size(diagonal)	6.8	Inch
Active Area	60.2208x160.5888	mm
Resolution	480* RGB*1280	pixel
Pixel Pitch	41.82 X 125.46	um
Pixel Arrangement	R,G,B Vertical Stripe	/
Pixel Driving Element	a-Si	/
Cell Gap	/	um
Viewing Direction	ALL	o'clock
Gray Scale Inversion Direction	-	o'clock
Weight (gram)	/	g
Suggested Driver IC	EK79030	/

(2). Absolute Maximum Ratings

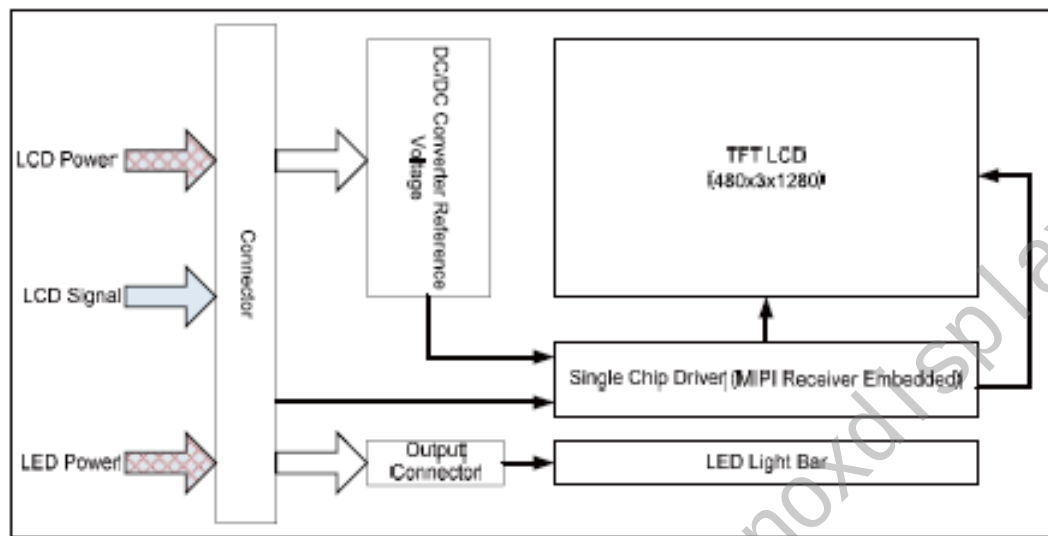
Item	Symbol	Min.	Max.	Unit	Conditions
Logic Supply Voltage	VDD	-0.3	4	V	TA=25℃
Backlight input voltage	LED_VCC	8.6	10	V	
Operating Temperature	TOP	-20	60	℃	
Operating Humidity	HOP	-	90	%RH	
Storage Temperature	TST	-20	65	℃	
Storage Humidity	HST	-	90	%RH	

Note: The module may be destroyed and not be recovered while the absolute maximum rating values of this product have been exceeded

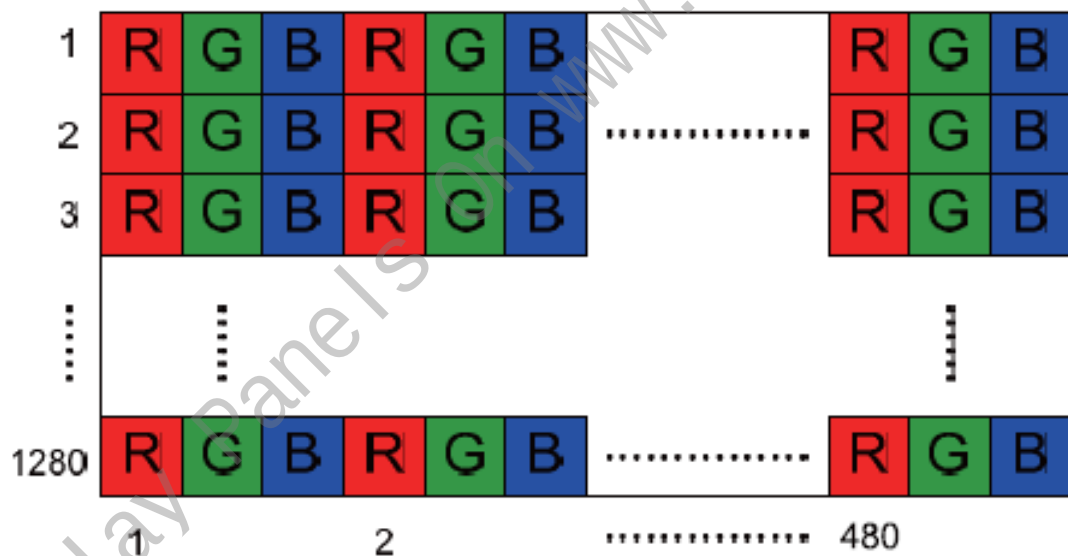
(3). Pin Assignment

Pin No.	Symbol	Description	Remarks
1	GND	Ground	
2	D0P	MIPI differential data input	
3	D0N	MIPI differential data input	
4	GND	Ground	
5	D1P	MIPI differential data input	
6	D1N	MIPI differential data input	
7	GND	Ground	
8	DCLKP	MIPI differential clock input	
9	DCLKN	MIPI differential clock input	
10	GND	Ground	
11	D2P	MIPI differential data input	
12	D2N	MIPI differential data input	
13	GND	Ground	
14	D3P	MIPI differential data input	
15	D3N	MIPI differential data input	
16	GND	Ground	
17	GND	Ground	
18	IOVCC	Power supply 1.8V	
19	IOVCC	Power supply 1.8V	
20	NC	Not connect	
21	NC	Not connect	
22	NC	Not connect	
23	NC	Not connect	
24	RESET	Global reset pin, Active high.	
25	STBYB	Default pull high (IOVCC).	
26	NC	Not connect	
27	GND	Ground	
28	LEDK	LED CATHODE	
29	LEDK	LED CATHODE	
30	GND	Ground	
31	NC	Not connect	
32	GND	Ground	
33	GND	Ground	
34	NC	Not connect	
35	LEDA	LED ANODE	
36	LEDA	LED ANODE	
37	GND	Ground	
38	VCI	Power supply 3.3V	
39	VCI	Power supply 3.3V	
40	NC	Not connect	

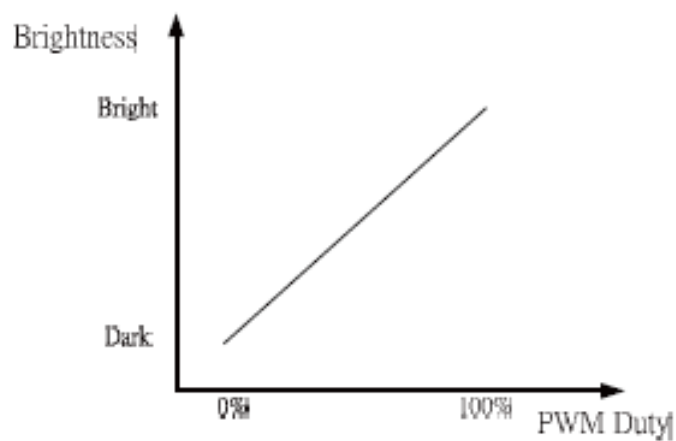
(4). Function Block Diagram



Pixel Format



Note:



(5). Operation Specification

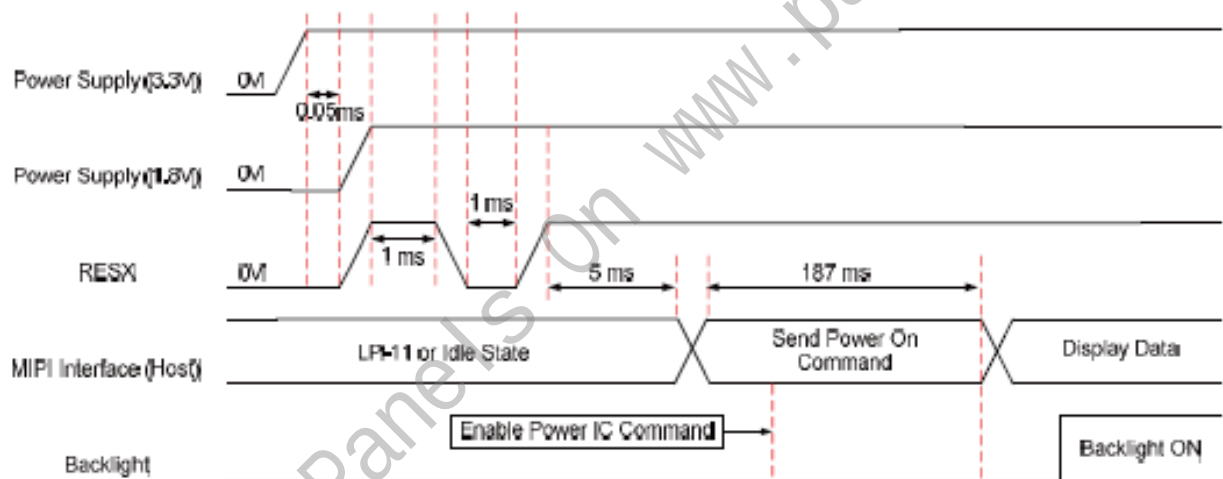
5.1 General Input Condition

(T_A=25°C)

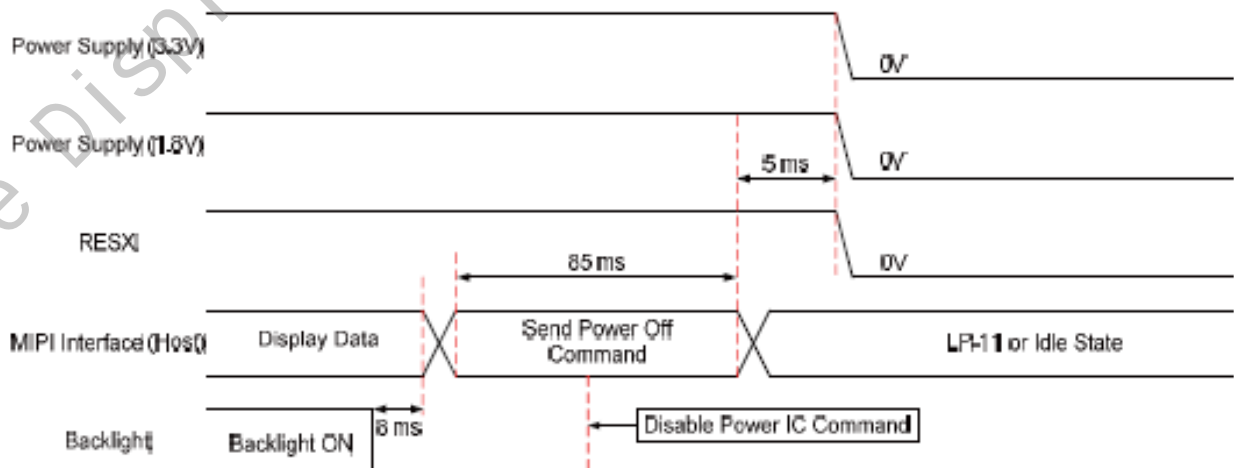
Item	Symbol	Values				Conditions
		Min.	Typ.	Max.	Unit	
Power supply voltage	IOVCC	-	1.8	-	V	GND=0V
Power supply voltage	VCI	3.0	3.3	3.6	V	
Power supply current	IOVCC	-	80	-	mA	/
Power supply current	VCI	-	200	-	mA	

5.2 Power Sequence

*Power on:



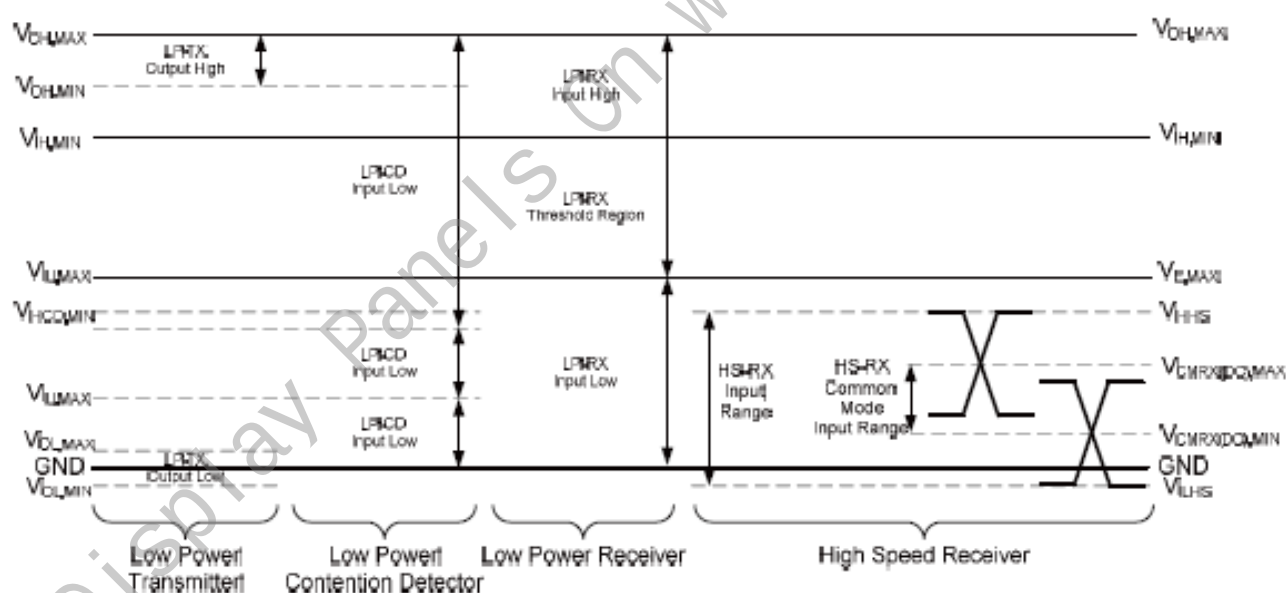
*Power off:



5.3 Input Data Characteristics

*Electrical Characteristics(DC)

MIPI Receiver Differential Input (DC Characteristics)						
Symbol	Parameter		Min	Typ	Max	Unit
	Input data bit rate	BR_{MIPI}	200	-	1000	Mbps
High Speed RX	Differential input impedance	Z_{ID}	80	100	125	Ω
	Common-mode voltage	V_{CMRX}	70	-	330	mV
	Differential input high threshold	V_{IDTH}	-	-	70	mV
	Differential input low threshold	V_{IDTL}	-70	-	-	mV
	Differential input voltage range	$ V_{IDM} $	70	-	500	mV
	Single-end input high voltage	V_{IHHS}	-	-	460	mV
	Single-end input low voltage	V_{ILHS}	-40	-	-	mV
Low Power RX	Logic 1 input voltage	V_{IH}	880	-	-	mV
	Logic 1 input voltage	V_{IL}	-	-	550	mV
Low Power TX	Output high level	V_{OH}	1.1	1.2	1.3	V
	Output low level	V_{OL}	-50	-	50	mV

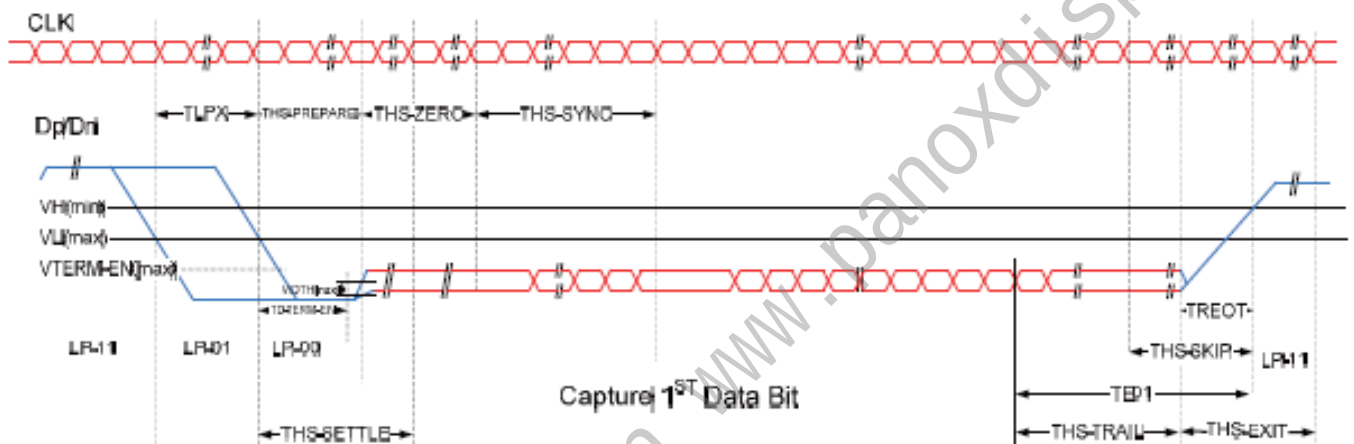


*Electrical Characteristics(AC)

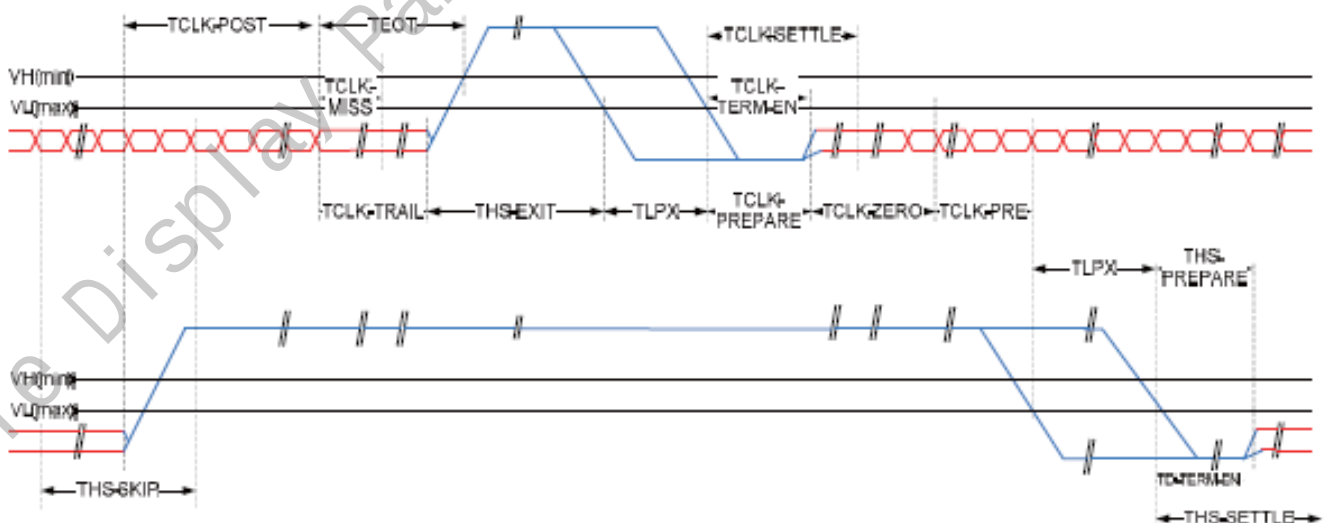
Description	Parameter	Min	Typ	Max	Unit
Timeout for receiver to detect absence of clock transitions and disable the Clock Lane HS-RX	$T_{CLKMISS}$	-	-	60	ns
Time that the transmitter continues to send HS clock after the last associated Data Lane has transitioned to LP Mode. Interval is defined as the period from the end of THS-TRAIL to the beginning of TCLK-TRAIL	$T_{CLKPOST}$	$60\text{ ns} + 52 \cdot UI$	-	-	ns
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.	T_{CLKPRE}	8	-	-	UI
Time that the transmitter drives the Clock Lane LP-00 Line state immediately before the HS-0 Line state starting the HS transmission.	$T_{CLKPREPARE}$	38	-	95	ns
Time interval during which the HS receiver shall ignore any Clock Lane HS transitions, starting from the beginning of TCLK-PREPARE.	$T_{CLKSETTLE}$	95	-	300	ns
Time for Clock Lane receiver to enable the HS line termination, starting from the time point when Dn crosses VIL MAX.	$T_{CLKTERMEN}$	Time for Dn reach V_{TERMEN}	-	38	ns
Time that the transmitter drives the HS-0 state after the last payload clock bit of a HS transmission burst.	$T_{CLKTRAIL}$	60	-	-	ns
TCLK-PREPARE + time that the transmitter drives the HS-0 state prior to starting the Clock.	$T_{CLKPREPARE} + T_{CLKZERO}$	300	-	-	ns
Time for the Data Lane receiver to enable the HS line termination, starting from the time point when Dn crosses VIL,MAX.	$T_{DTERMEN}$	Time for Dn reach V_{TERMEN}	-	$35\text{ ns} + 4 \cdot UI$	ns
Transmitted time interval from the start of THS-TRAIL or TCLK-TRAIL, to the start of the LP-11 state following a HS burst.	T_{EOT}	-	-	$105\text{ ns} + 12 \cdot UI$	ns
Time that the transmitter drives LP-11 following a HS burst.	T_{HSEXIT}	100	-	-	ns
Time That the transmitter drives the Data Lane LP-00 Line state immediately before the HS-0 Line state starting the HS transmission.	$T_{HSPREPARE}$	$40\text{ ns} + 4 \cdot UI$	-	$85\text{ ns} + 6 \cdot UI$	ns
THS-PREPARE + time that the transmitter drives the HS-0 state prior to transmitting the Sync sequence.	$T_{HSPREPARE} + T_{HSZERO}$	$145\text{ ns} + 10 \cdot UI$	-	-	ns
Time Interval during which the HS receiver shall ignore any Data Lane HS transitions, Starting from the beginning of THS-PREPARE	$T_{HSSETTLE}$	$85\text{ ns} + 10 \cdot UI$	-	$145\text{ ns} + 10 \cdot UI$	ns
Time interval during which the HS-RX should ignore any transitions on the Data Lane, following a HS burst. The end point of the interval is defined as the beginning of the LP-11 state following the HS burst.	T_{HSSKIP}	40	-	$55\text{ ns} + 4 \cdot UI$	ns
Time that the transmitter drives the flipped differential state after last after last payload data bit of a HS transmission burst.	$T_{HS-TRAIL}$	$\text{Max}(n \cdot 8 \cdot UI, 60\text{ ns} + n \cdot 4 \cdot UI)$	-	-	ns
Transmitted length of any Low-Power state period.	T_{LPX}	50	-	-	ns
Ratio of TLPX (MASTER) / TLPX (SLAVE) between Master and Slave side.	Ratio T_{LPX}	2/3	-	3/2	ns
Time that the new transmitter drives the Bridge state (LP-00) after accepting control during a	T_{TA-GET}	$5 \cdot T_{LPX}$			ns

link Turnaround.					
Time that the transmitter drives the Bridge state (LP-00) before releasing control during a link Turnaround.	T_{TA-GO}	4*TLPX			ns
Time that the new transmitter waits after the LP-10 state before transmitting the Bridge state (LP-00) during a Link Turnaround.	$T_{TA-SURE}$	TLPX	-	2*TLPX	ns
Time that a transmitter drives a Mark-1 state prior to a Stop state in order to initiate an exit from ULPS.	T_{WAKEUP}	1	-	-	

High-Speed Data Transmission in Bursts:



Switching the Clock Lane between Clock Transmission and Low-Power Mode :



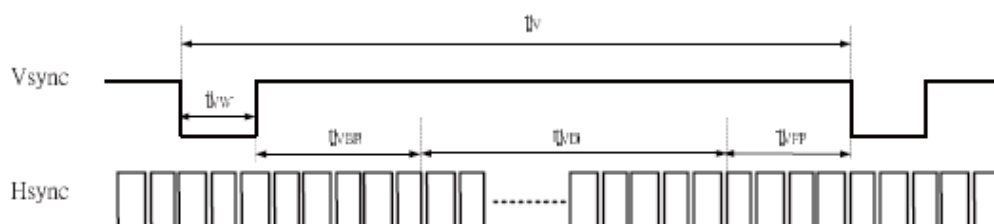
*Data Mapping

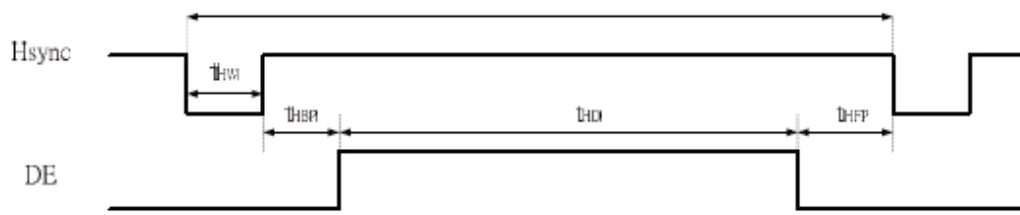
	INPUT DATA	R7 MSB	R6	R5	R4	R3	R2	R1	R0 LSB	G7 MSB	G6	G5	G4	G3	G2	G1	G0 LSB	B7 MSB	B6	B5	B4	B3	B2	B1	B0 LSB
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	CYAN	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	MAGENTA	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
WHITE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
RED	RED(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	GREEN(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
BLUE	BLUE(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	BLUE(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	BLUE(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	

5.5 Input Signal Timing

Item	Symbol	Values	Unit	Conditions
Frame Rate	Fr	45.0	Hz	
Clock Frequency	1/T _c	44.40	MHz	
Hor. Display Period	t _{HD}	480	clk (pixel)	
HS Period	t _H	824	clk (pixel)	
HS Width + Back Porch + Front Porch	t _{HW} +t _{HBP} +t _{HFP}	344	clk (pixel)	24+160+160
Vertical Display Period	t _{VD}	1280	line	
VS Period	t _V	1304	line	
VS Width + Back Porch + Front Porch	t _{VW} +t _{VBP} +t _{VFP}	24	line	2+10+12

Note: One frame length = 16.67ms, One line length = 12.78us.





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