

DISPLAY Elektronik GmbH

DATA SHEET

LCD MODULE

DEM 640480F TMH-PW-N

5,7" TFT

Product Specification

Version: 1

12.06.2018

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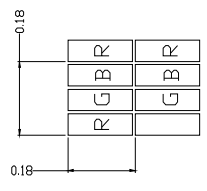
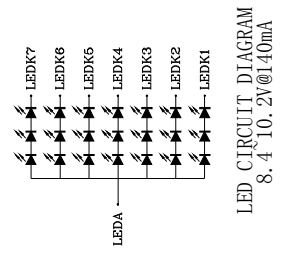
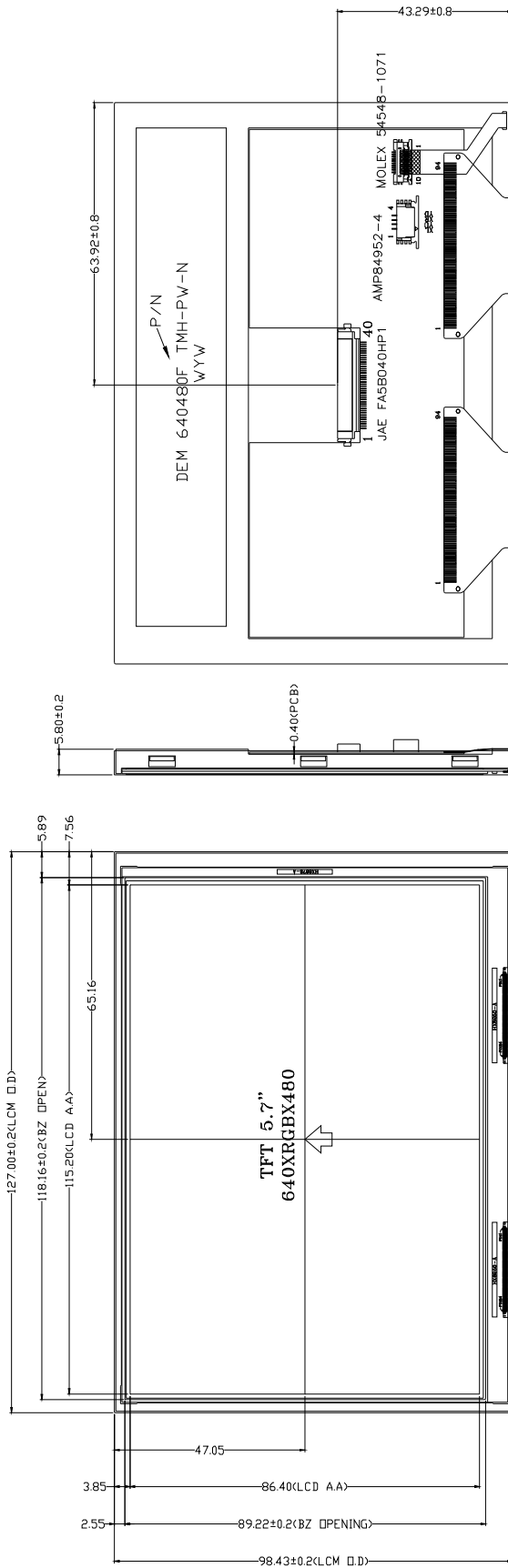
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1. GENERAL SPECIFICATIONS

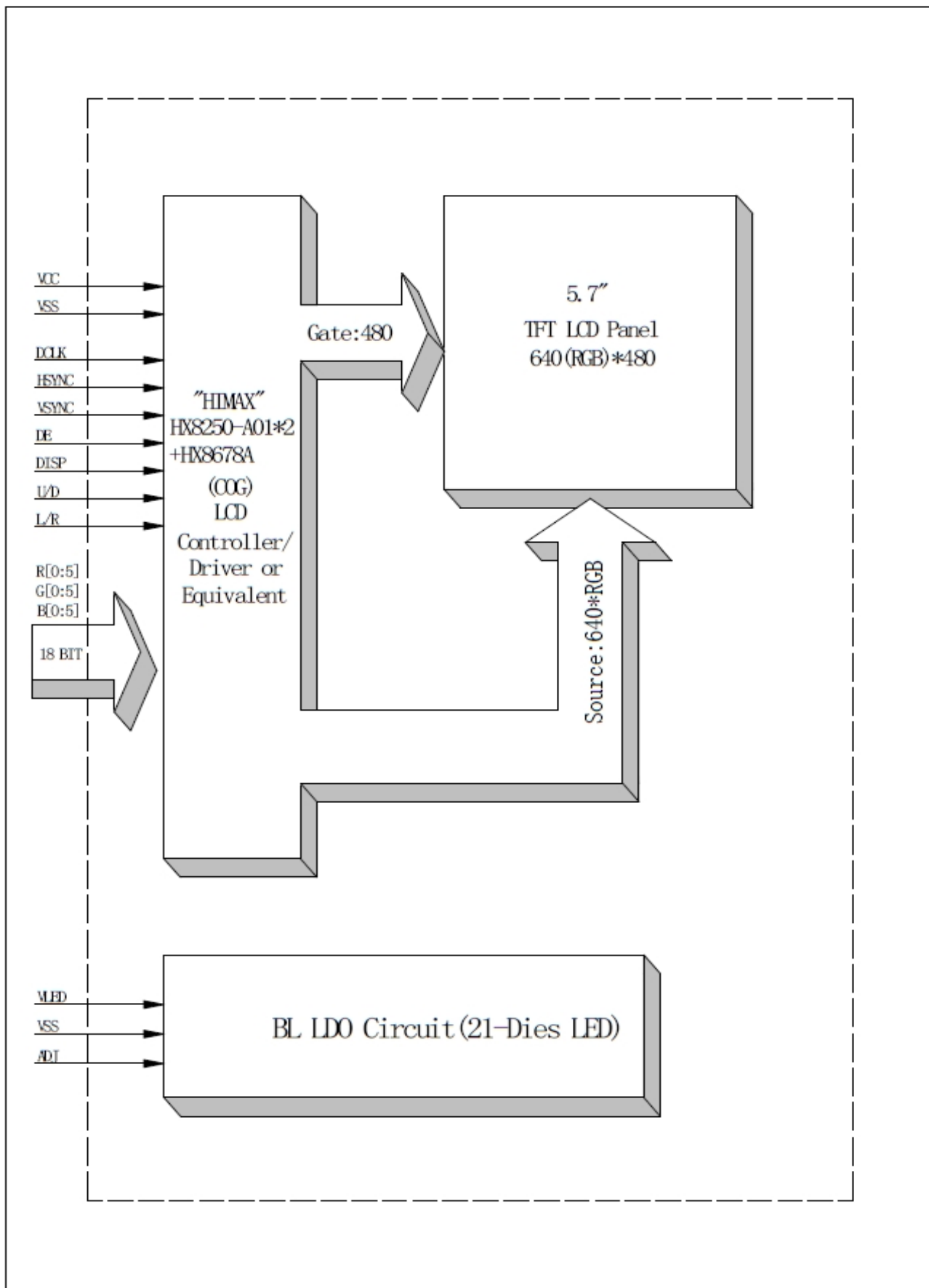
Item	Contents	Unit
LCD TYPE	TFT/TRANSMISSIVE	
MODULE SIZE (W*H*T)	127.00*98.43*5.80	MM
ACTIVE SIZE (W*H)	115.20*86.40	MM
PIXEL PITCH (W*H)	0.18*0.18	MM
NUMBER OF DOTS	640*480	
DRIVER IC	HX8250-A+HX8678-B	
INTERFACE TYPE	18-BIT RGB	
TOP POLARIZER TYPE	GLARE	
RECOMMEND VIEWING DIRECTION	6	O'CLOCK
GRAY SCALE INVERSION DIRECTION	12	O'CLOCK
BACKLIGHT TYPE	21-DIES WHITE LED	
TOUCH PANEL TYPE	WITHOUT	

2. EXTERNAL DIMENSIONS



Remark:
 1. Unmarked tolerance is ±0.3
 2. All materials comply with RoHS
 3. [] : critical dimension
 4. WYW: Product date code printing
 Format: Y:year ,WW:week

3. BLOCK DIAGRAM



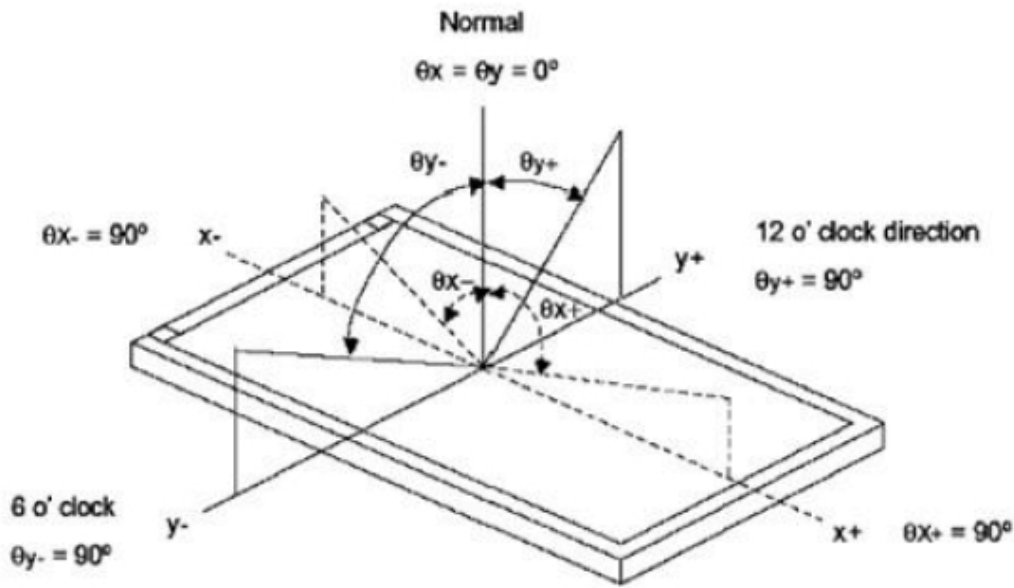
4. PIN ASSIGNMENT

Pin No.	Symbol	Description
1	U/D	Up/down scan setting. When U/D=H, reverse scan. When U/D=L, normal scan.
2	NC	No connection.
3	HSYNC	Horizontal sync input in digital RGB and CCIR601 mode. (Short to GND if not used)
4~6	VLED	Power supply for BLU LDO circuit.
7	VCC	Power supply.
8	VSYNC	Vertical sync input in digital RGB and CCIR601 mode. (Short to GND if not used)
9	DE	Input data enable control. When DE mode, active High to enable data input. Default pull low.
10	NC(X2)	No connection.(Touch panel control PIN: X2)
11	NC(Y1)	No connection.(Touch panel control PIN: Y1)
12	ADJ	Chip Enable (Active High).
13~15	B5~B3	Blue data input.
16	VSS	Power ground.
17~19	B2~B0	Blue data input.
20	VSS	Power ground.
21~23	G5~G3	Green data input.
24	VSS	Power ground.
25~27	G2~G0	Green data input.
28	VSS	Power ground.
29~31	R5~R3	Red data input.
32	VSS	Power ground.
33~35	R2~R0	Red data input.
36	NC(X1)	No connection.(Touch panel control PIN: X1)
37	NC(Y2)	No connection.(Touch panel control PIN: Y2)
38	DCLK	Clock signal. Latching data at the rising edge.
39	VSS	Power ground.
40	L/R	The shift direction of device internal shift register is controlled by this pin as shown below: L/R=H: STH->SO1->•••->SO960->STHO L/R=L: STH->SO960->•••->SO1->STHO

5. OPTICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
			MIN	TYP.	MAX		
Luminance	L		600	750	900	Cd/m ²	
Contrast Ratio	CR	$\theta=0^\circ$		TBD			
Response Time	T _{ON}	25 °C		TBD		ms	
	T _{OFF}						
CIE Color Coordinate	Red	X _R					
		Y _R					
	Green	X _G					
		Y _G					
	Blue	X _B					
		Y _B					
	White	X _W	0.268	0.288	0.308		
		Y _W	0.301	0.321	0.341		
Viewing Angle	Hor.	θ_{x+}		70		Degree	
		θ_{x-}		70			
	Ver.	θ_{+}		60			
		θ_{-}		40			
Uniformity	Un		75	80		%	

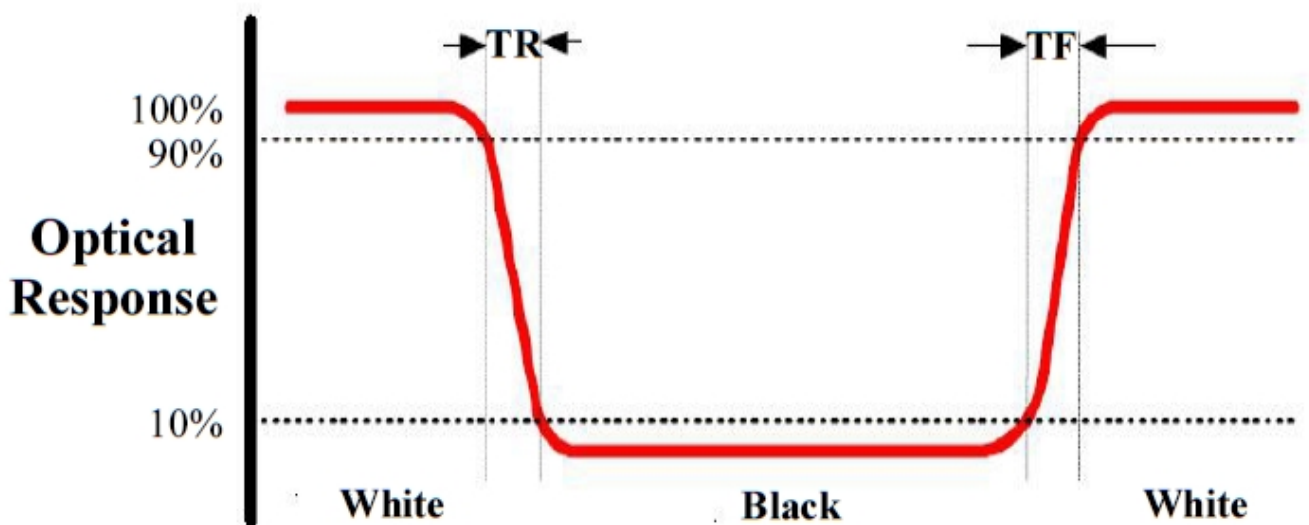
Note 1: Definition of Viewing Angle θ_x and θ_y :



Note 2: Definition of contrast ratio CR:

$$CR = \frac{\text{Luminance of white state}}{\text{Luminance of black state}}$$

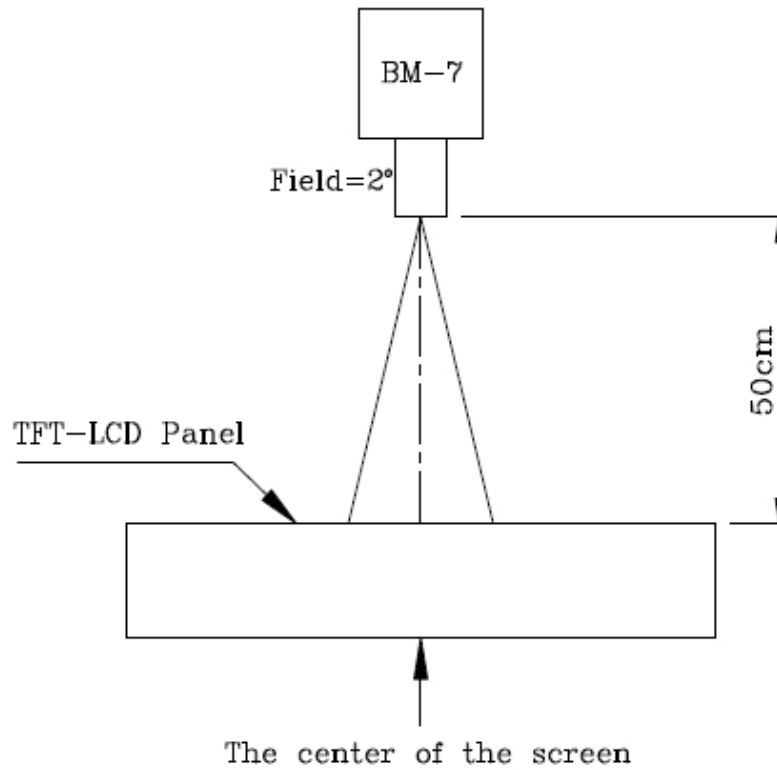
Note 3: Definition of Response Time (T_r, T_f)



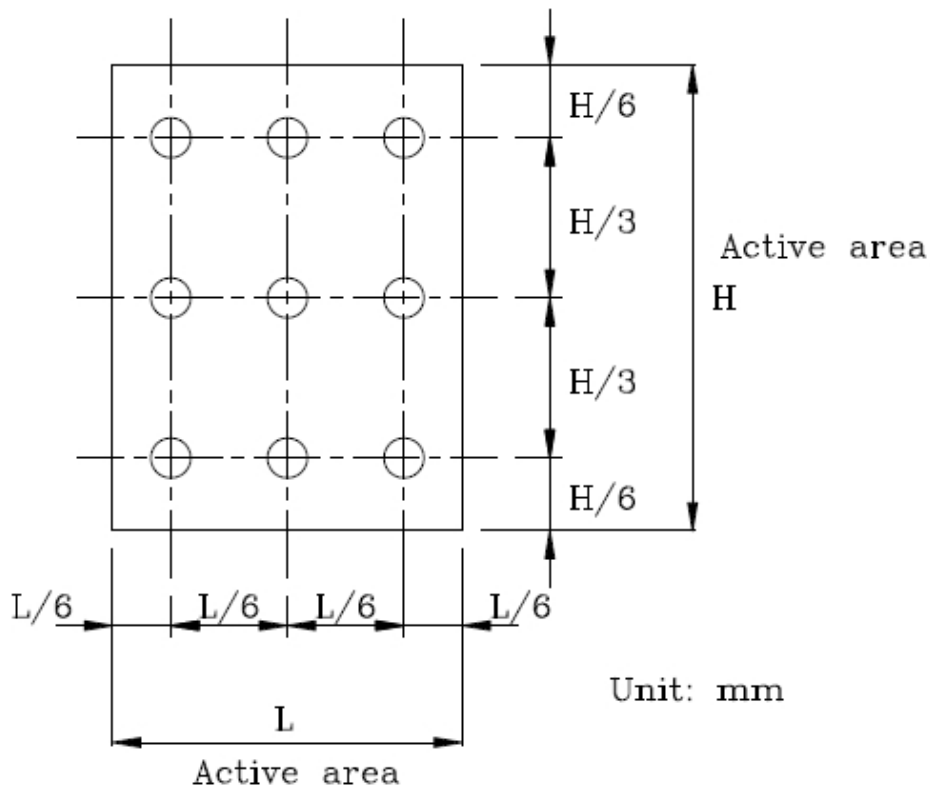
Note 4: Definition of Luminance

① The Brightness Test Equipment Setup

Field=2° (As measuring “black” image, field=2° is the best testing condition)



② The Brightness Test Point Setup



Unit: mm

6. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Supply voltage for analog	VCC	-0.5	5.0	V
Supply voltage for logic	VCC	-0.5	5.0	V
Supply current (One LED)	I _{LED}		40	mA
Operating temperature	T _{OP}	-20	+70	°C
Storage temperature	T _{ST}	-30	+80	°C

Note : The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

7. ELECTRICAL CHARACTERISTICS

Item	Symbol	Min	Typ.	Max	Unit	Applicable terminal
Supply Voltage for Analog	VCC	2.7	3.3	3.6	V	
Supply Voltage for Logic	VCC	2.7	3.3	3.6	V	
Input Voltage	V _{IL}	-0.3	-	0.2VCC	V	
	V _{IH}	0.8 VCC	-	VCC		
Input leakage Current	I _{LKG}	-1		1	μA	

Item	Symbol	Value			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V _F	8.4	9.6	10.2	V	I _L =140mA
Current for LED Backlight	I _L		140		mA	
Power Consumption	P		1.344		W	
LED Life Time		30,000	50,000		Hr	Note
Power supply for LED	VLED	4.5	5.0	5.5	V	
ADJ frequency		19K	20K	21K	Hz	
ADJ input voltage	V _{IH}	3.0		3.3	V	
ADJ input voltage	V _{IL}	0		0.3	V	

Note: Brightness to be decreased to 50% of the initial value at ambient temperature TA=25°C

8. TIMING CHARACTERISTICS

8.1 AC Electrical Characteristics

PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
HS setup time	T_{hst}	10	-	-	ns
HS hold time	T_{hhd}	10	-	-	ns
VS setup time	T_{vst}	10	-	-	ns
VS hold time	T_{vhd}	10	-	-	ns
Data setup time	T_{dsu}	10	-	-	ns
Data hold time	T_{dhd}	10	-	-	ns
DEN setup time	T_{esu}	10	-	-	ns
VS falling to HS falling time on odd field @ RGB mode	T_{HV_O}	-4	0	+4	T_{CPH}
VS falling to HS falling time on even field @ RGB mode	T_{HV_E}	0.4	0.5	0.6	T_H
Source output settling time	T_{ST}	-	12	20	μs
Source output loading R	R_{SL}	-	2	-	K ohm
Source output loading C	C_{SL}	-	60	-	pF
POL output delay time	T_{DP}	-	-	40	ns

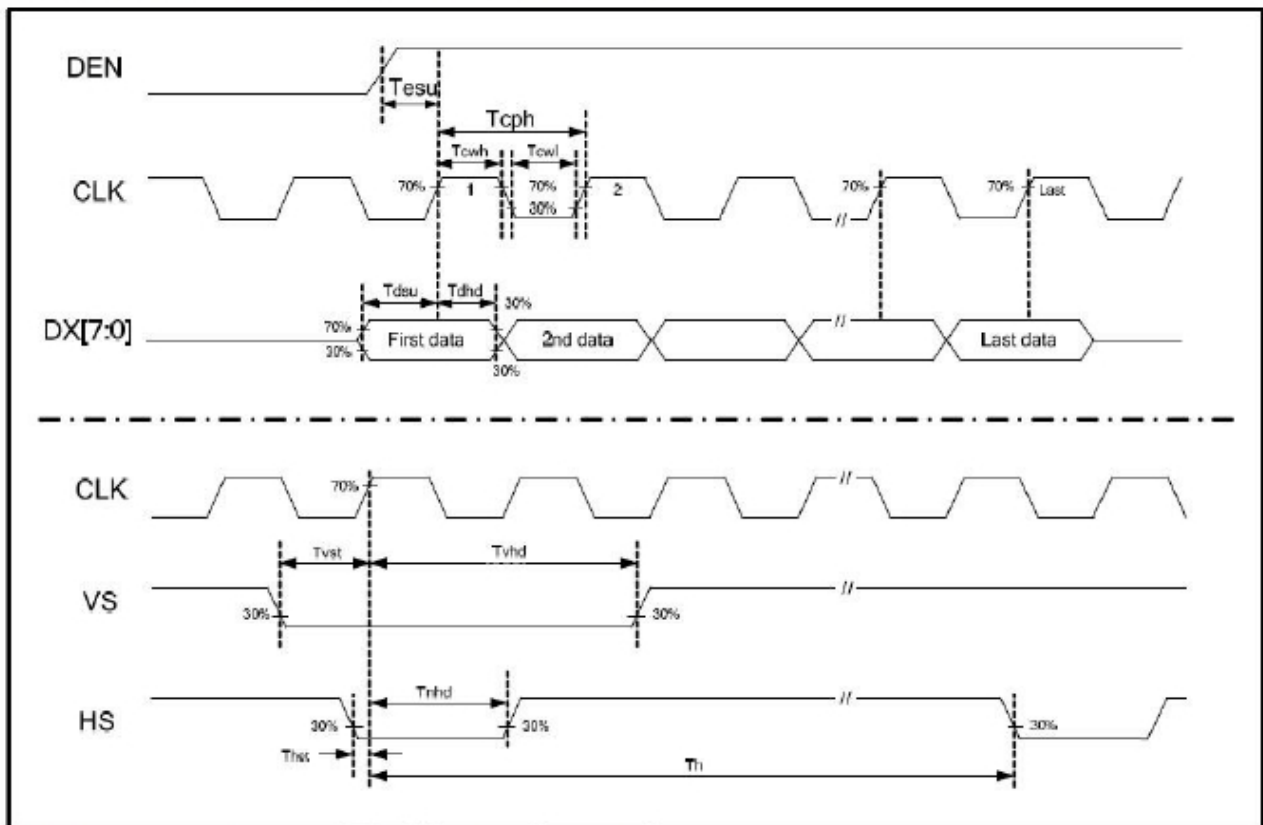
8.2 Digital Parallel RGB interface

PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
CLK frequency	F_{CPH}	-	25.175	-	MHZ
CLK period	T_{CPH}	-	39.7	-	ns
CLK pulse duty	T_{CWH}	40	50	60	%
HS period	T_H	-	800	-	T_{CPH}
HS pulse width	T_{WH}	5	30	-	T_{CPH}
HS-first horizontal data time	T_{HS}	112	144	175	T_{CPH}
DEN pulse width	T_{EP}	-	640	-	T_{CPH}
VS pulse width	T_{WV}	1	3	5	T_H
VS-DEN time	T_{STV}	-	35	-	T_H
VS period	T_V	-	525	-	T_H

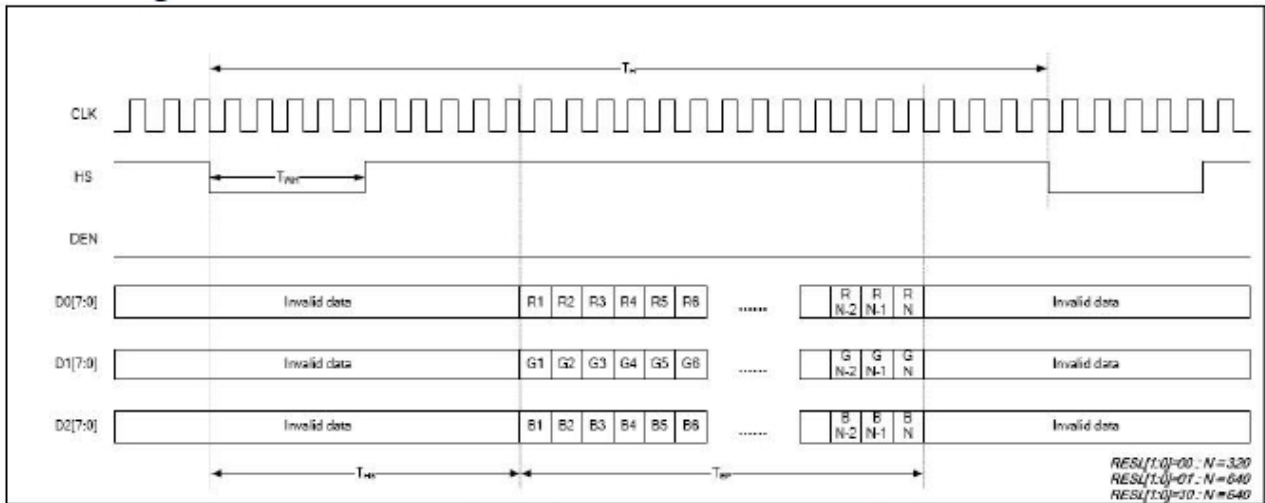
Note: When SYNC mode is used, 1st data start from 144th CLK after HS falling (when $STHD[5:0]=00000$)

PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
OEV pulse width	T_{OEV}	-	100	-	T_{CPH}
CKV pulse width	T_{CKV}	-	96	-	T_{CPH}
HS-CKV time	T_1	-	52	-	T_{CPH}
HS-OEV time	T_2	-	8	-	T_{CPH}
HS-POL time	T_3	-	72	-	T_{CPH}
STV setup time	T_{SUV}	-	46	-	T_{CPH}
STV pulse width	T_{WSTV}	-	1	-	T_H

8.3 Clock and Data input waveforms

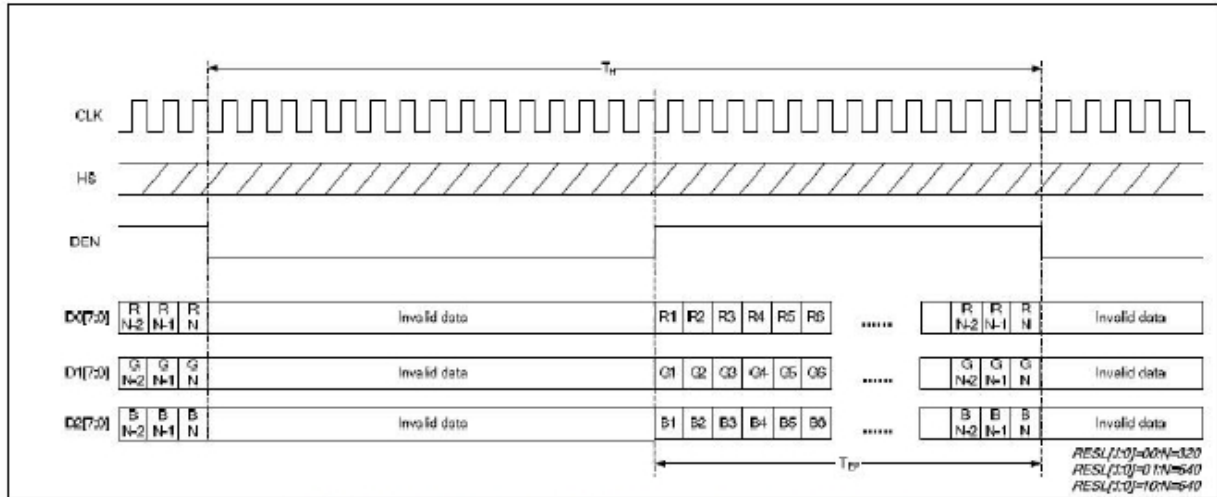


8.4 Data input format for RGB mode



Parallel RGB SYNC Mode Horizontal Data Format

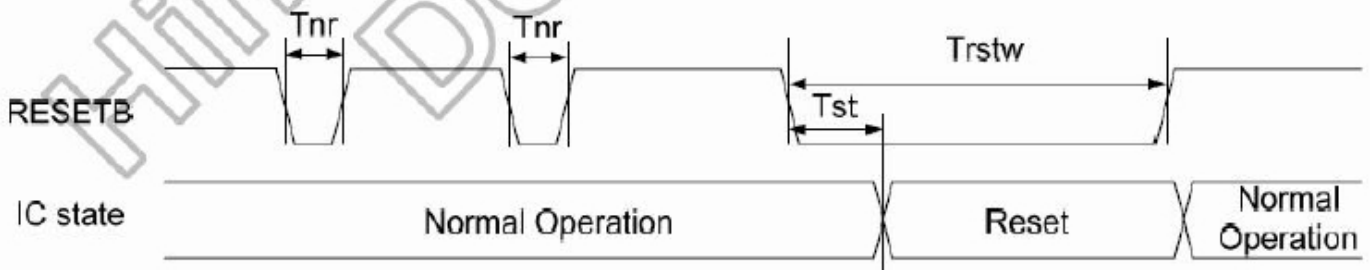
RES[1:0]=00 : N = 320
 RES[1:0]=01 : N = 640
 RES[1:0]=10 : N = 640



Parallel RGB DE Mode Horizontal Data Format

8.5 Hardware reset timing

PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
RESETB low pulse width	T_{rstw}	10	-	-	μs
Negative noise pulse width	T_{nr}		-	2	μs
Reset start time	T_{st}	2	-		μs



9. RELIABILITY TEST

No.	Item	Description	Remarks
01	High temperature operation	The sample should be allowed to stand at 70℃ for 240 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.	Note 1 IEC60068-2-2, GB2423.2-89
02	Low temperature operation	The sample should be allowed to stand at -20℃ for 240 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.	Note2 IEC60068-2-1 GB2423.1-89
03	High temperature storage	The sample should be allowed to stand at 80℃ for 240 hours under no-load condition, and then returning it to normal temperature condition, and allowing it stand for 2 hours.	IEC60068-2-2 GB2423.2-89
04	Low temperature storage	The sample should be allowed to stand at -30℃ for 240 hours under no-load condition, then returning it to normal temperature condition, and allowing it stand for 2 hours.	IEC60068-2-1 GB/T2423.1-89
05	Moisture storage	The sample should be allowed to stand at 60℃,90%RH MAX for 240hours under no-load condition, then taking it out and drying it at normal temperature for 2 hours.	IEC60068-2-1 GB/T2423.3-2006
06	Thermal shock storage	The sample should be allowed to stand the following 10 cycles : -20℃ for 30 minutes → normal temperature for 5 minutes → +60℃ for 30 minutes → normal temperature for 5 minutes, as one cycle.	Start with cold temperature,end with high temperature IEC60068-2-14, GB2423.22-87
07	Packing vibration	Frequency range : 10Hz ~ 55Hz Amplitude of vibration : 1.5mm Sweep time: 12 min X,Y,Z 2 hours for each direction.	IEC61000-2-6 GB/T2423.5-1995
08	Packing drop test	According to ASTM-D-5327.	IEC60068-2-32 GB/T2423.8-1995
09	Electrical Static Discharge	Air: ±8KV 150pF/330Ω 5 times	IEC61000-4-2 GB/T17626.2-1998
		Contact: ±4KV 150pF/330Ω 5 times	

Note:1.Ts is the temperature of panel's surface.

2.Ta is the ambient temperature of sample.

3.Sample size for each test item is 3~5pcs.

10. LCD MODULES HANDLING PRECAUTIONS

- The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
- If the display panel is damaged and the liquid crystal substance inside it leaks out, do not get any in your mouth. If
- The substance come into contact with your skin or clothes promptly wash it off using soap and water.
- Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarize carefully.
- To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
 - Be sure to ground the body when handling the LCD module.
 - Tools required for assembly, such as soldering irons, must be properly grounded.
 - To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
 - The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.
- Storage precautions
When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps. Keep the modules in bags designed to prevent static electricity charging under low temperature / normal humidity conditions (avoid high temperature / high humidity and low temperatures below 0°C). Whenever possible, the LCD modules should be stored in the same conditions in which they were shipped from our company.

11. OTHERS

- Liquid crystals solidify at low temperature (below the storage temperature range) leading to defective orientation of liquid crystal or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subjected to a strong shock at a low temperature.
- If the LCD modules have been operating for a long time showing the same display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. Abnormal operating status can be resumed to be normal condition by suspending use for some time. It should be noted that this phenomena does not adversely affect performance reliability.
- To minimize the performance degradation of the LCD modules resulting from caused by static electricity, etc. exercise care to avoid holding the following sections when handling the modules:
 - Exposed area of the printed circuit board
 - Terminal electrode sections.