

DISPLAY Elektronik GmbH

DATA SHEET

LCD MODULE

DEM 480272A2 TMH-PW-N

4,3" TFT

Product Specification

Version: 2

02.12.2016

GENERAL SPECIFICATION

MODULE NO. :

DEM 480272A2 TMH-PW-N

CUSTOMER

VERSION NO.	CHANGE DESCRIPTION	DATE
0	ORIGINAL VERSION	18.10.2016
1	CHANGE MODULE DRAWING	09.11.2016
2	CHANGE PART NUMBER AND LED LIFE TIME FROM 30000 TO 50000 HOURS	02.12.2016

PREPARED BY: ZX

DATE: 02.12.2016

APPROVED BY: MH

DATE: 02.12.2016

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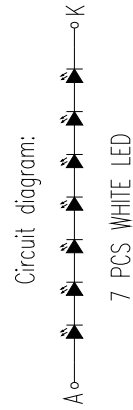
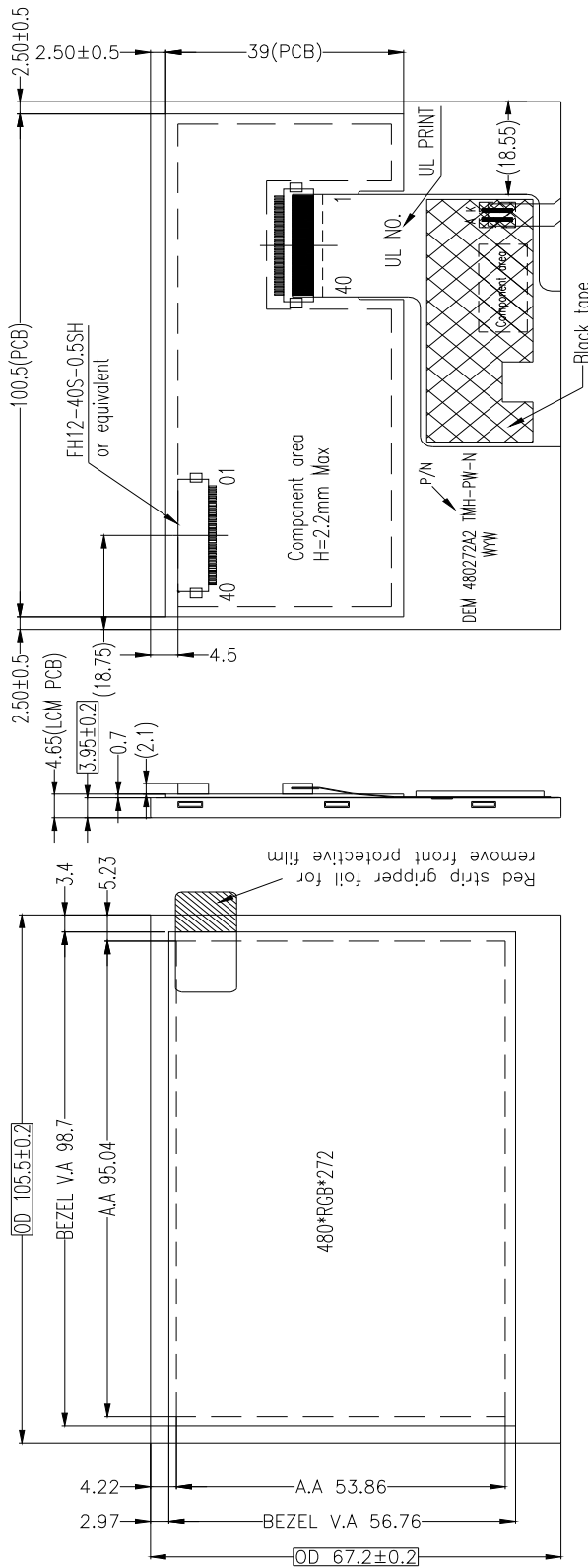
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1. GENERAL SPECIFICATIONS

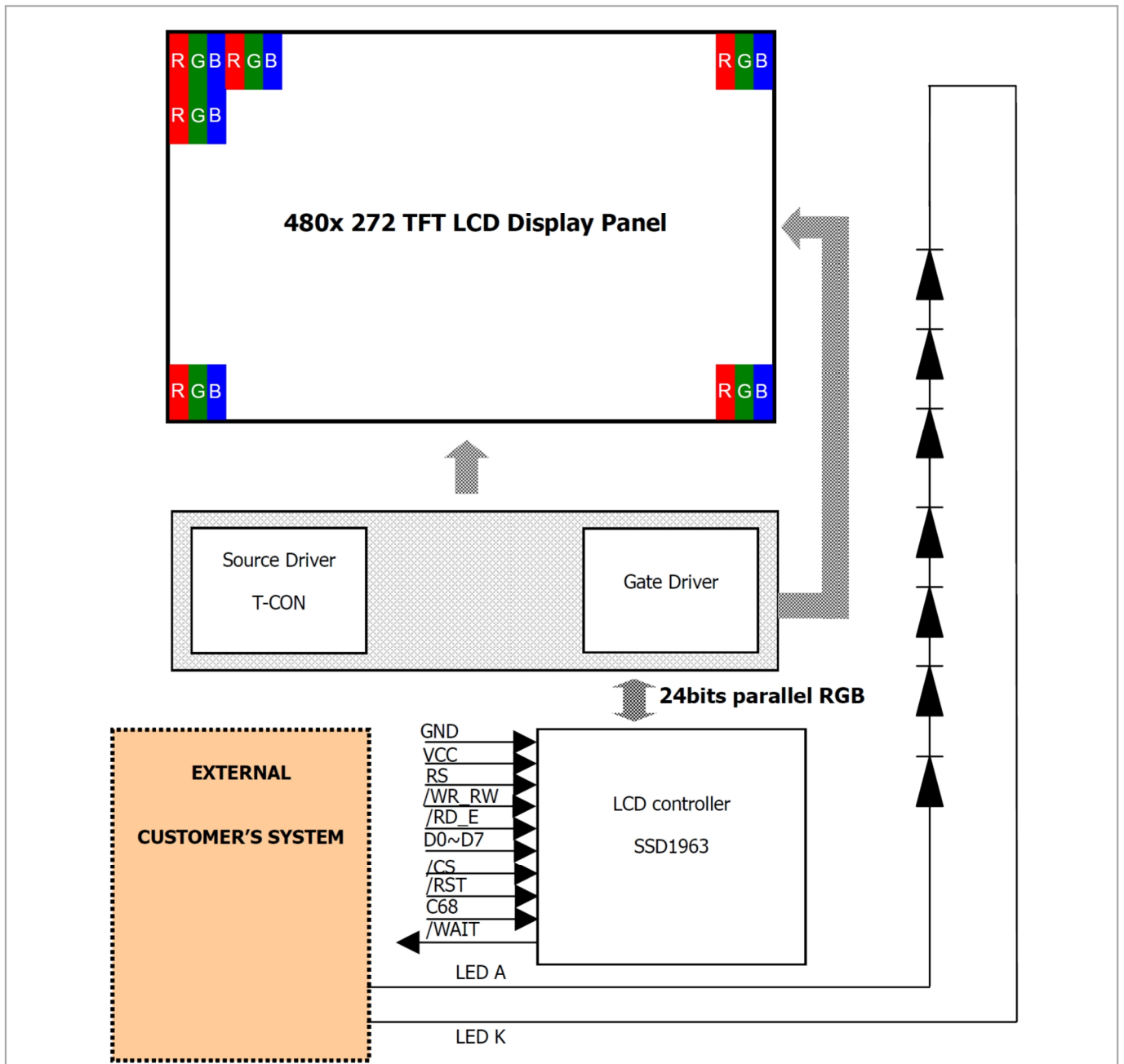
Item	Contents	Unit
LCD TYPE	TFT/TRANSMISSIVE	-
MODULE SIZE(W*H*T)	105.50 x 67.20 x 4.65	mm
ACTIVE SIZE(W*H)	95.04 x 53.86	mm
PIXEL PITCH(W*H)	0.198 x 0.198	mm
NUMBER OF DOTS	480 x RGB x 272	-
INTERFACE TYPE	8-Bit-Parallel 8080-MCU-Interface	-
TOP POLARIZER TYPE	ANTI-GLARE	-
RECOMMEND VIEWING DIRECTION	12:00	O'CLOCK
GRAY SCALE INVERSION DIRECTION	6:00	O'CLOCK
COLORS	16.7 Million	-
BACKLIGHT TYPE	7-DIES WHITE LED	-
TOUCH PANEL TYPE	WITHOUT	-
APPROX. WEIGHT	t.b.d.	g
LCD controller	SSD1963 (Solomon Systech)	-

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	I/O	Function	Remark
1	VCC	P	Power supply	
2	VCC	P	Power supply	
3	GND	P	GND	
4	GND	P	GND	
5	/RST	I	Reset Signal	
6	NC	-	No connect	
7	/WAIT	O	Tearing effect	
8	C68	I	MCU interface configuration I: 8080 Interface	
9	/CS	I	Chip select	
10	RS	I	Data/Command select	
11	/RD_E	I	8080 mode: RD#(read strobe signal)	
12	/WR_RW	I	8080 mode: WR#(write strobe signal)	
13	GND	P	GND	
14	DB0	IO	Data bus 0	(1)
15	DB1	IO	Data bus 1	(1)
16	DB2	IO	Data bus 2	(1)
17	DB3	IO	Data bus 3	(1)
18	DB4	IO	Data bus 4	(1)
19	DB5	IO	Data bus 5	(1)
20	DB6	IO	Data bus 6	(1)
21	DB7	IO	Data bus 7	(1)
22	NC	-	No connect	(1)
23	NC	-	No connect	(1)
24	NC	-	No connect	(1)
25	NC	-	No connect	(1)
26	NC	-	No connect	(1)
27	NC	-	No connect	(1)
28	NC	-	No connect	(1)
29	NC	-	No connect	(1)

30	GND	P	GND	
31	NC	-	No connect	
32	NC	-	No connect	
33	GND	P	GND	
34	GND	P	GND	
35	NC	-	No connect	
36	NC	-	No connect	
37	NC	-	No connect	
38	NC	-	No connect	
39	LED A	P	Backlight Anode	
40	LED K	P	Backlight Cathode	

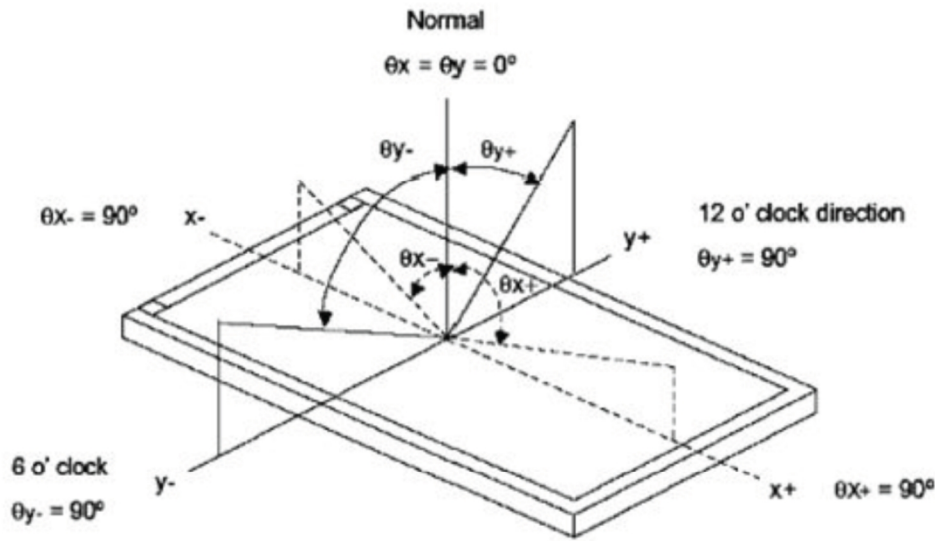
Note :

1. DATA Pins not used should be floating

5. OPTICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
			MIN	TYP.	MAX		
Luminance	L	$I_L=20\text{mA}$	400	500	-	cd/m ²	
Contrast Ratio	CR	$\theta =0^\circ$	400	500			
Response Time	T _{ON}	25°C		10	20	ms	
	T _{OFF}			15	30		
CIE Color Coordinate	Red	X _R	Viewing normal angle				
		Y _R					
	Green	X _G					
		Y _G					
	Blue	X _B					
		Y _B					
	White	X _W		0.27	0.31	0.35	
		Y _W		0.31	0.35	0.39	
Viewing Angle	Hor.	θ_{X+}	CR \geq 10		75	Degree	
		θ_{X-}			75		
	Ver.	θ_{Y+}			60		
		θ_{Y-}			75		
Uniformity	Un		80			%	

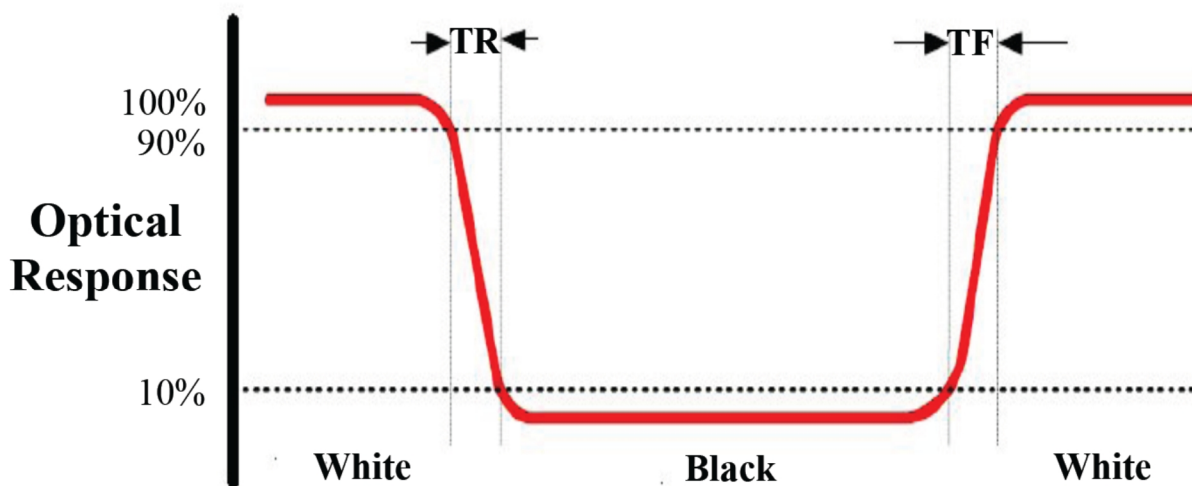
Note 1: Definition of Viewing Angle θ_x and θ_y :



Note 2: Definition of contrast ratio CR:

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

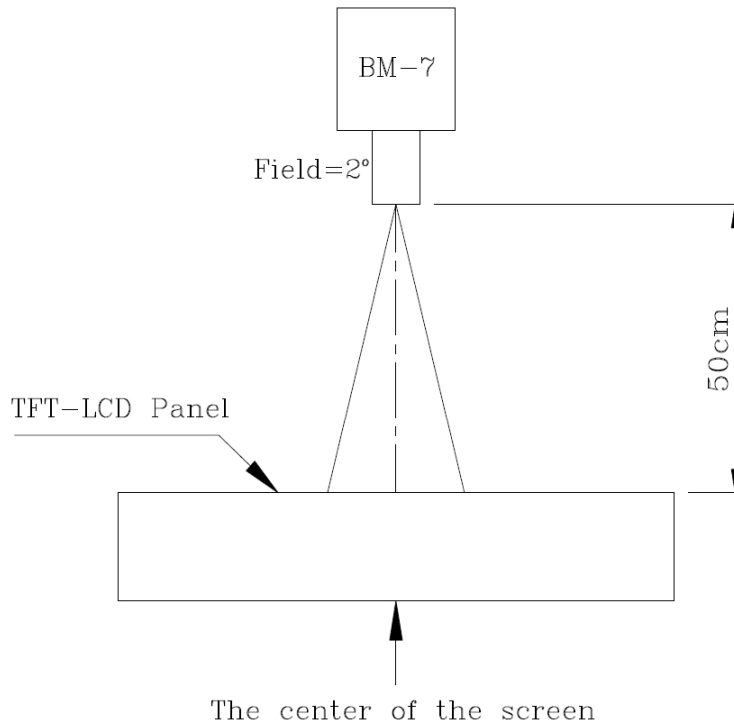
Note 3: Definition of Response Time (T_r, T_f)



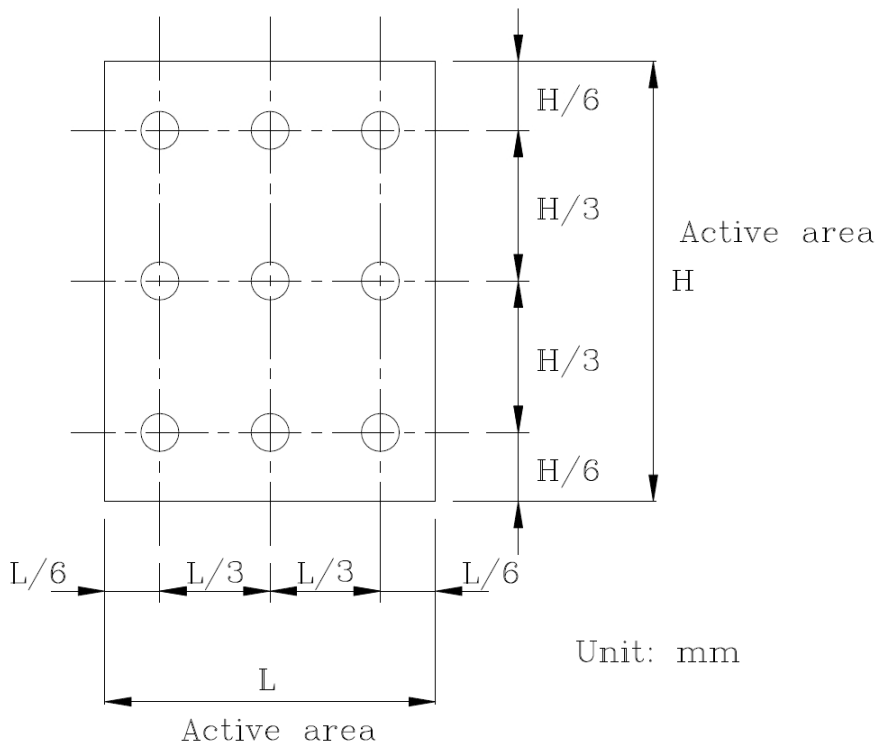
Note 4: Definition of Luminance

①The Brightness Test Equipment Setup

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



②The Brightness Test Point Setup



6. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Supply Voltage for Analog	VDD	-0.3	4.5	V
Supply Voltage for Logic	VDD	-0.3	4.5	V
Supply Current (One LED)	I _{LED}		30	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

7.1 INPUT POWER

Item	Symbol	Min	Typ.	Max	Unit	Applicable Terminal
Supply Voltage for Analog	VDD	3.0	3.3	3.6	V	
Supply Voltage for Logic	VDD	3.0	3.3	3.6	V	
Input Voltage	V _{IL}	GND	-	0.3VCC	V	
	V _{IH}	0.7VCC	-	VCC	V	
Input leakage Current	I _{IKG}	-1		1	μ A	

7.2 BLACKLIGHT DRIVING CONDITIONS

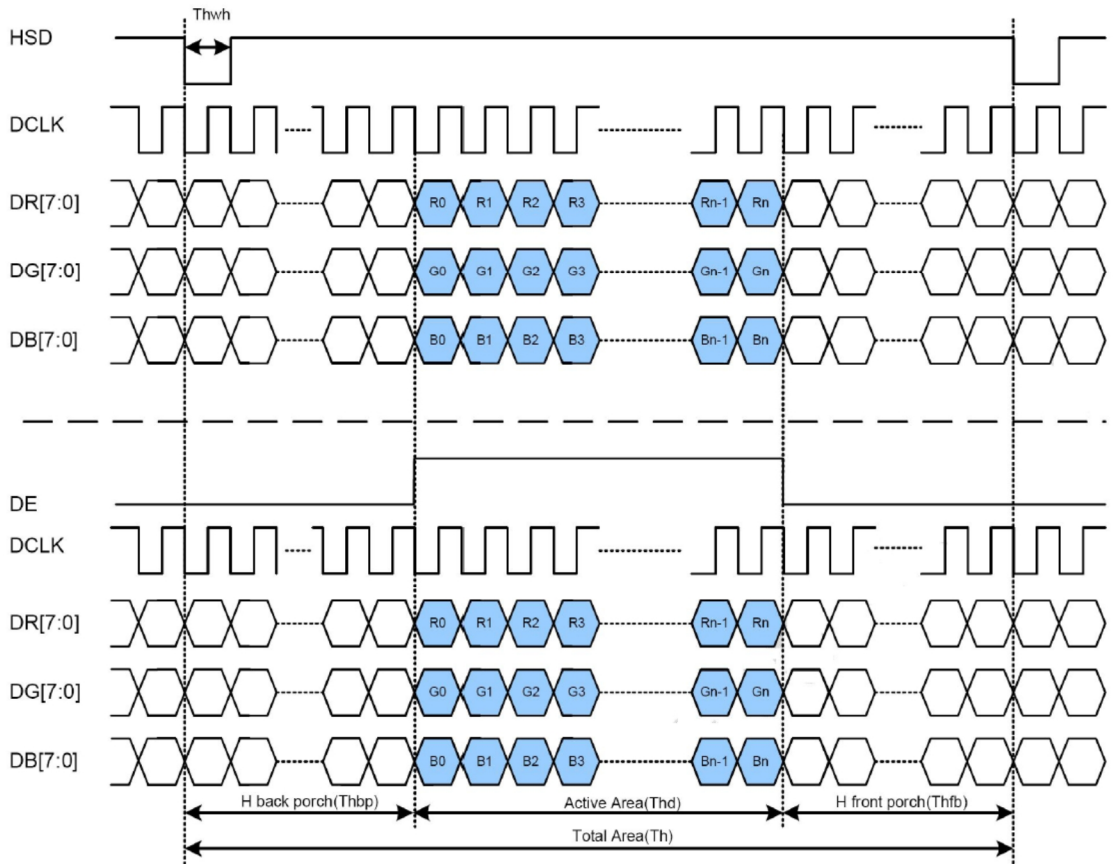
Item	Symbol	Value			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V _F	20.3	22.4	23.8	V	I _L =20mA
Current for LED Backlight	I _L	15	20	25	mA	
Power Consumption	P		0.448		W	
LED Life Time		50.000			Hr	Note

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

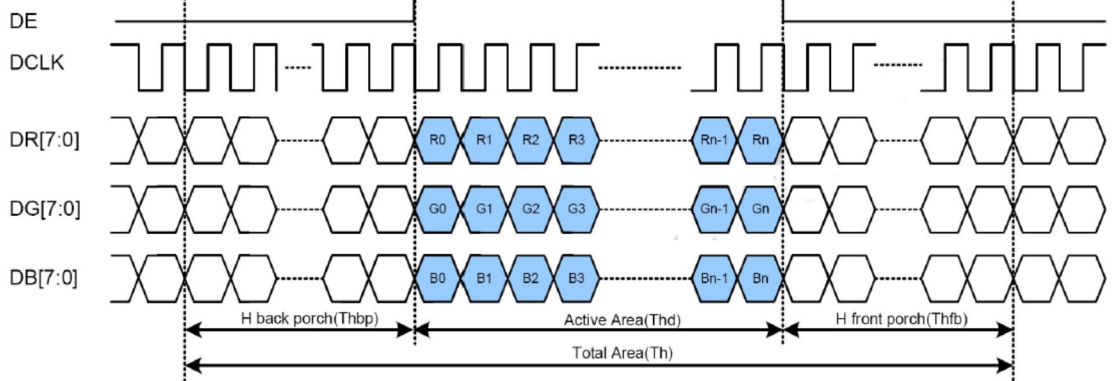
7.3 TIMING CHARACTERISTICS

7.3.1 PARALLEL RGB MODE TIMING DIAGRAM (not applicable)

(HV Mode)



(DE Mode)



7.3.2 PARALLEL RGB TIMING TABLE (not applicable)

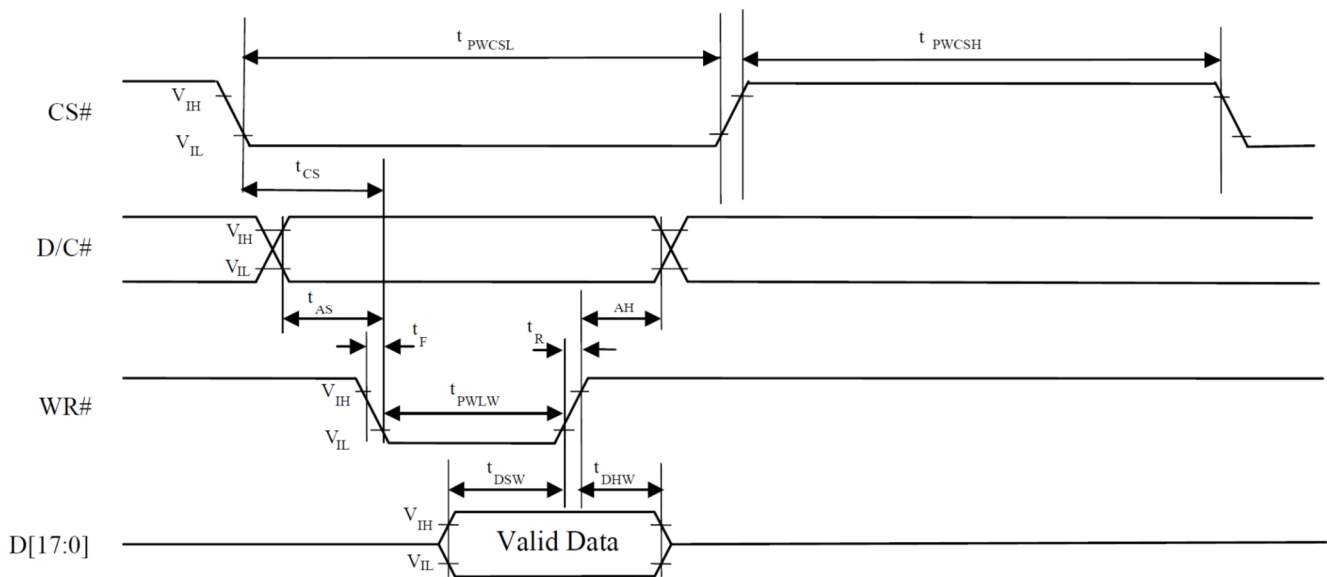
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	5	9	12	MHz
VSD period time	T_v	277	288	400	H
VSD display area	T_{vd}	272			H
VSD back porch	T_{vb}	3	8	31	H
VSD front porch	T_{vfp}	2	8	97	H
HSD period time	T_h	520	525	800	DCLK
HSD display area	T_{hd}	480			DCLK
HSD back porch	T_{hbp}	36	40	255	DCLK
HSD front porch	T_{hfp}	4	5	65	DCLK

7.3.3 Parallel 8080-Series Interface Timing Characteristics

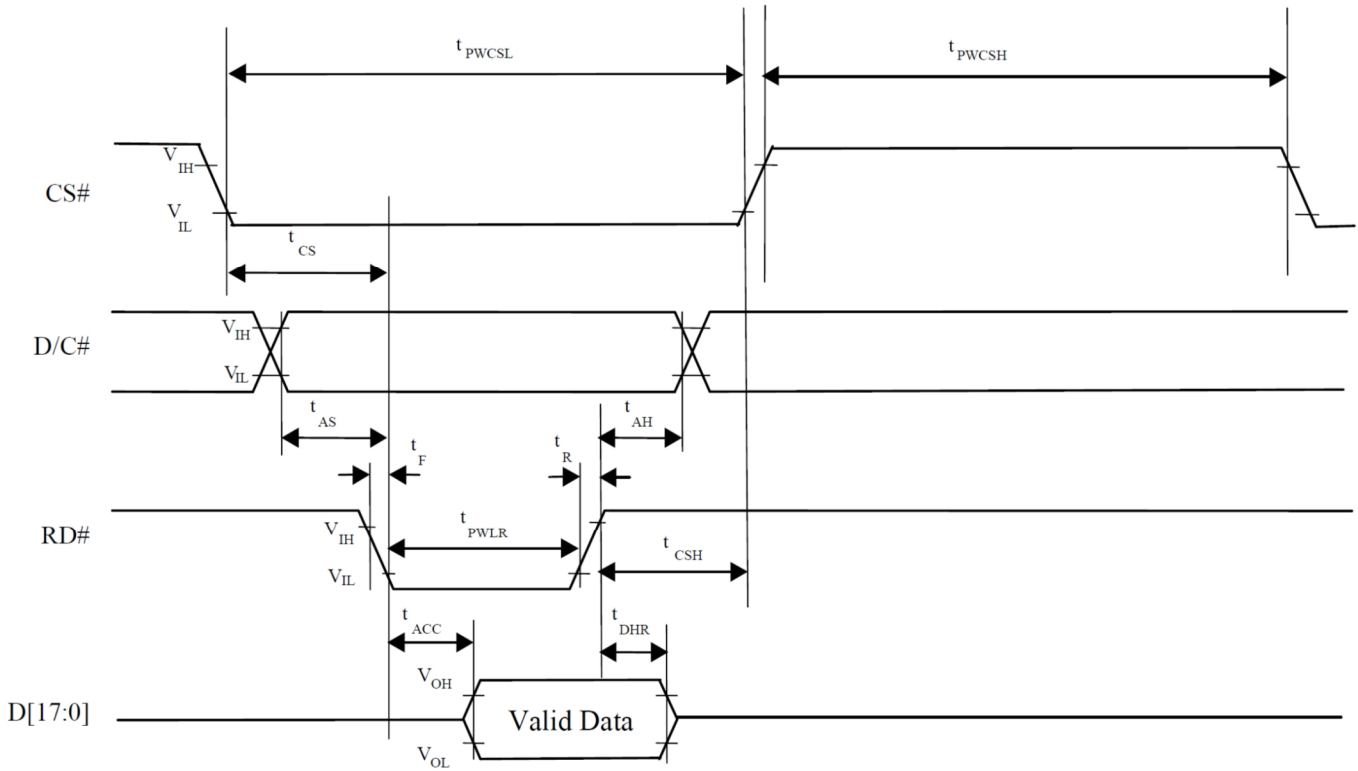
Symbol	Parameter	Min	Typ	Max	Unit
f_{MCLK}	System Clock Frequency *	1	-	110	MHz
t_{MCLK}	System Clock Period*	$1/f_{MCLK}$	-	-	ns
t_{PWCSL}	Control Pulse High Width	Write	13	$1.5 * t_{MCLK}$	ns
		Read	30	$3.5 * t_{MCLK}$	
t_{PWCSH}	Control Pulse Low Width	Write (next write cycle)	13	$1.5 * t_{MCLK}$	ns
		Write (next read cycle)	80	$9 * t_{MCLK}$	
		Read	80	$9 * t_{MCLK}$	
t_{AS}	Address Setup Time	1	-	-	ns
t_{AH}	Address Hold time	2	-	-	ns
t_{DSW}	Write Data Setup Time	4	-	-	ns
t_{DHW}	Write Data Hold Time	1	-	-	ns
t_{PWLW}	Write Low Time	12	-	-	ns
t_{DHR}	Read Data Hold Time	1	-	-	ns
t_{ACC}	Access Time	32	-	-	ns
t_{PWLr}	Read Low Time	36	-	-	ns
t_R	Rise Time	-	-	0.5	ns
t_F	Fall Time	-	-	0.5	ns
t_{CS}	Chip Select setup time	2	-	-	ns
t_{CSH}	Chip Select hold time to read signal	3	-	-	ns

*System Clock denotes external input clock (PLL-bypass) or internal generated clock (PLL-enabled)

7.3.4 Parallel 8080-series Interface Timing Diagram (Write Cycle)



7.3.5 Parallel 8080-series Interface Timing Diagram (Read Cycle)



7.3.6 Mapping for writing an Pixel Data

Interface	Cycle	D[23]	D[22]	D[21]	D[20]	D[19]	D[18]	D[17]	D[16]	D[15]	D[14]	D[13]	D[12]	D[11]	D[10]	D[9]	D[8]	D[7]	D[6]	D[5]	D[4]	D[3]	D[2]	D[1]	D[0]		
8 bits	1 st																		R7	R6	R5	R4	R3	R2	R1	R0	
	2 nd																			G7	G6	G5	G4	G3	G2	G1	G0
	3 rd																			B7	B6	B5	B4	B3	B2	B1	B0

8. RELIABILITY TEST

No.	Item	Description
01	High temperature operation	The sample should be allowed to stand at +70°C for 120 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.
02	Low temperature operation	The sample should be allowed to stand at -20°C for 120 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.
03	High temperature storage	The sample should be allowed to stand at +80°C for 240 hours under no-load condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.
04	Low temperature storage	The sample should be allowed to stand at -30°C for 240 hours under no-load condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.
05	Moisture storage	The sample should be allowed to stand at +60°C, 90%RH MAX for 240 hours under no-load condition , then taking it out and drying it at normal temperature for 2 hours.
06	Operate at high temperature and humidity	+60°C, 90%RH , 240 hours
07	Thermal shock storage	The sample should be allowed to stand the following 10 cycles: -30°C for 30 minutes->normal temperature for 5 minutes-> +80°C for 30 minutes -> normal temperature for 5 minutes, as one cycle.
08	Packing vibration	Frequency range:10HZ~55HZ Amplitude of vibration:1.5mm Sweep time:12min X,Y, Z 2 hours for each direction.
09	Packing drop test	According to ASTM-D-5327
10	Electrical static	Air: $\pm 4\text{kV}$ 150Pf/330 Ω 5 times

9. 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.

10. 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.