

DISPLAY Elektronik GmbH

DATA SHEET

LCD MODULE

DEM 1024600M4 VMH-PW-N (A-TOUCH)

Product Specification

Version: 1

13.05.2020

GENERAL SPECIFICATION

MODULE NO. :

DEM 1024600M4 VMH-PW-N
(A-TOUCH)

CUSTOMER

VERSION NO.	CHANGE DESCRIPTION	DATE
0	ORIGINAL VERSION	12.05.2020
1	CHANGE THE DRAWINGS	13.05.2020

PREPARED BY: YK

DATE: 13.05.2020

APPROVED BY: MHI

DATE: 13.05.2020

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1. GENERAL SPECIFICATIONS

ITEM	STANDARD VALUE	UNIT
LCD TYPE	TFT/IPS/ NORMALLY BLACK/TRANSMISSIVE	
MODULE SIZE	164.80 x 99.80 x 7.00	mm
ACTIVE AREA	154.21 x 85.92	mm
PIXEL PITCH (W*H)	0.1506 x 0.1432	
NUMBER OF PIXELS	1024 x 3(RGB) x 600	
DIVER IC	EK73215 + EK79001H	
INTERFACE TYPE	RGB	
RECOMMEND VIEWING DIRECTION	ALL	O'CLOCK
GRAY SCALE INVERSION DIRECTION	-	O'CLOCK
COLORS	16.7 MILLION	
BACKLIGHT TYPE	30-DIES WHITE LED	
TOUCH PANEL TYPE	RTP	

Touch Panel Features:

Type:	4-Wire Analogy Resistive Touch Panel
Input Mode:	Stylus or Finger
ITO Film:	0.2 mm (T)
ITO Glass:	1.1 mm (T)
Connector:	FPC

Touch Panel Mechanical Characteristics

Surface Hardness: 3H or more (according to JIS-K5400).

Touch Panel Optical Characteristics

Transmittance: 80% Typical.

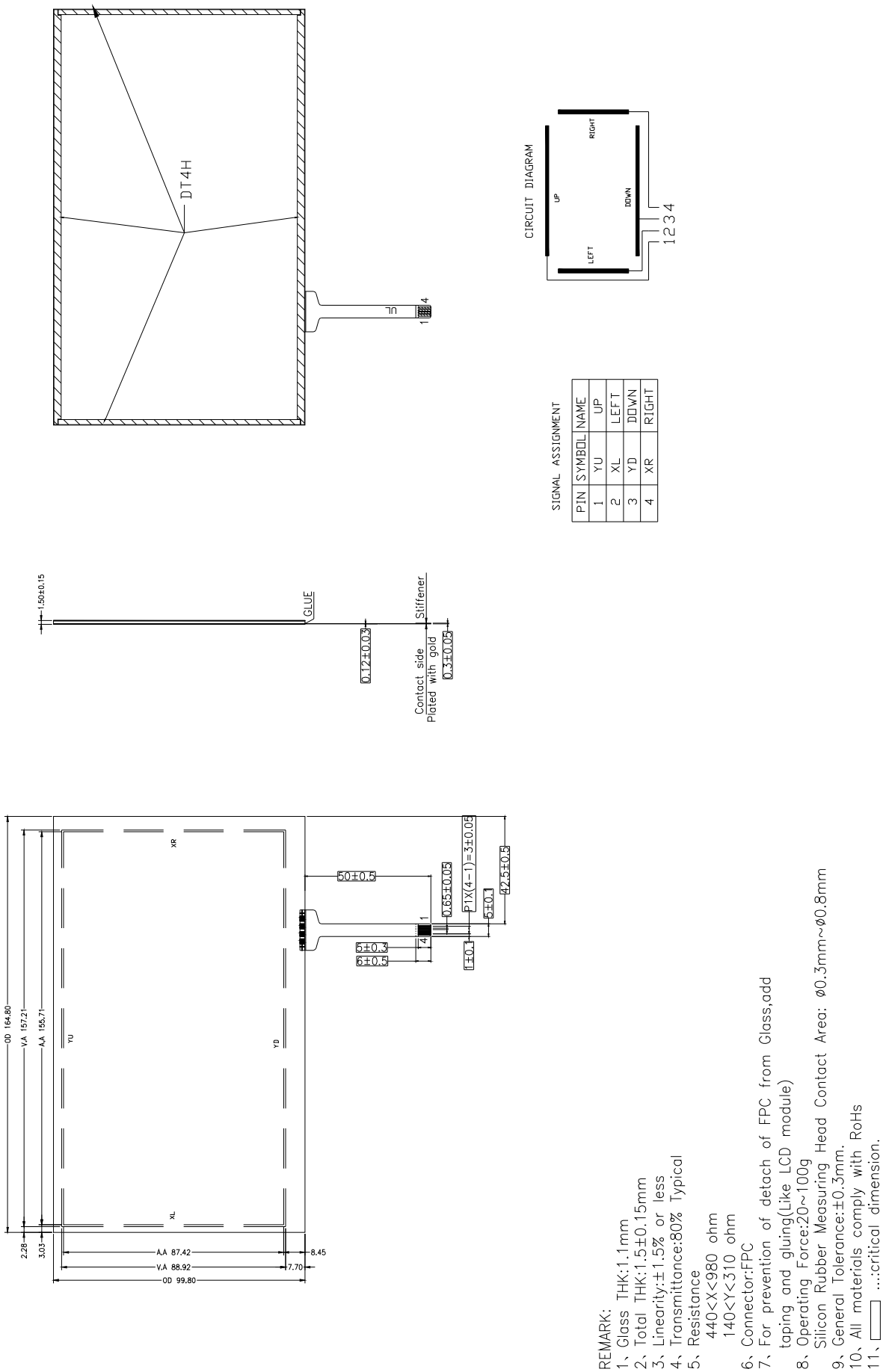
Touch Panel Rating

1. Maximum Voltage
Less than DC 7 volts.
2. Operating Temperature Range
- 20°C to 70°C (Humidity: 20% RH to 70% RH, No condensation of dew).
3. Storage Temperature Range
- 30°C to 80°C (Humidity: 20% RH to 80% RH, No condensation of dew).

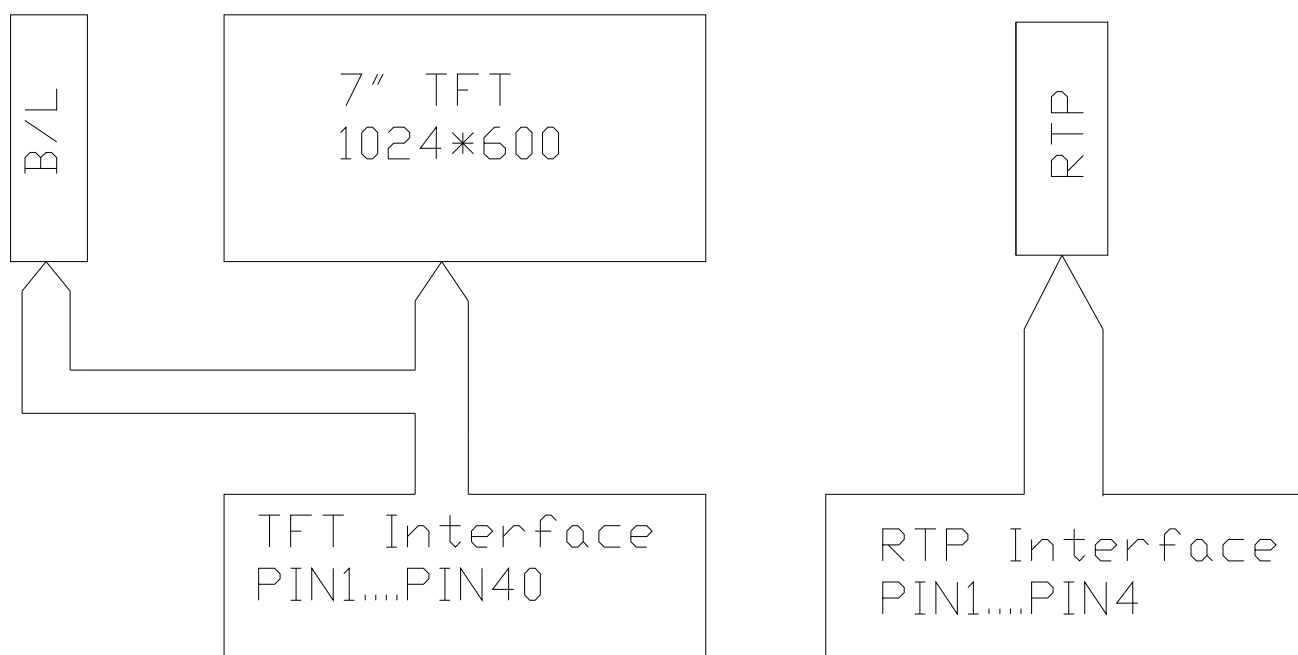
Electrical Characteristics

1. Resistance between Terminals
Direction "X": 440~980Ω
Direction "Y": 140~310Ω
2. Linearity
X axis: $\leq \pm 1.5\%$
Y axis: $\leq \pm 1.5\%$
3. Insulation Resistance: 20MΩ or more at DC 25 V.
4. Chattering Time: 10 msec or less at 100kΩ Pull-up.

Touch Panel:



3. BLOCK DIAGRAM



4. PIN ASSIGNMENT

PIN NO.	SYMBOL	DESCRIPTION
1	K	LED Cathode
2	A	LED Anode
3	GND	Power Ground
4	VDD	Power Supply
5	R0	Red Data
6	R1	Red Data
7	R2	Red Data
8	R3	Red Data
9	R4	Red Data
10	R5	Red Data
11	R6	Red Data
12	R7	Red Data
13	G0	Power Ground
14	G1	Green Data
15	G2	Green Data
16	G3	Green Data
17	G4	Green Data
18	G5	Green Data
19	G6	Green Data
20	G7	Green Data
21	B0	Blue Data
22	B1	Blue Data
23	B2	Blue Data
24	B3	Blue Data
25	B4	Blue Data
26	B5	Blue Data
27	B6	Blue Data
28	B7	Blue Data
29	GND	Power Ground
30	CLK	Clock Signal
31	STBYB	Standby mode, normally pulled high. STBYB = "1", normal operation STBYB = "0", timing controller, source driver will turn off, all output are High-Z

32	HS	Horizontal Sync Signal; Negative Polarity
33	VS	Vertical Sync Signal; Negative Polarity
34	DEN	Data Input Enable
35	AVDD	Power for Analog Circuit
36	GND	Power Ground
37	VGH	Gate ON Voltage
38	VGL	Gate OFF Voltage
39	VCOM	Common Voltage
40	NC	Not Connection

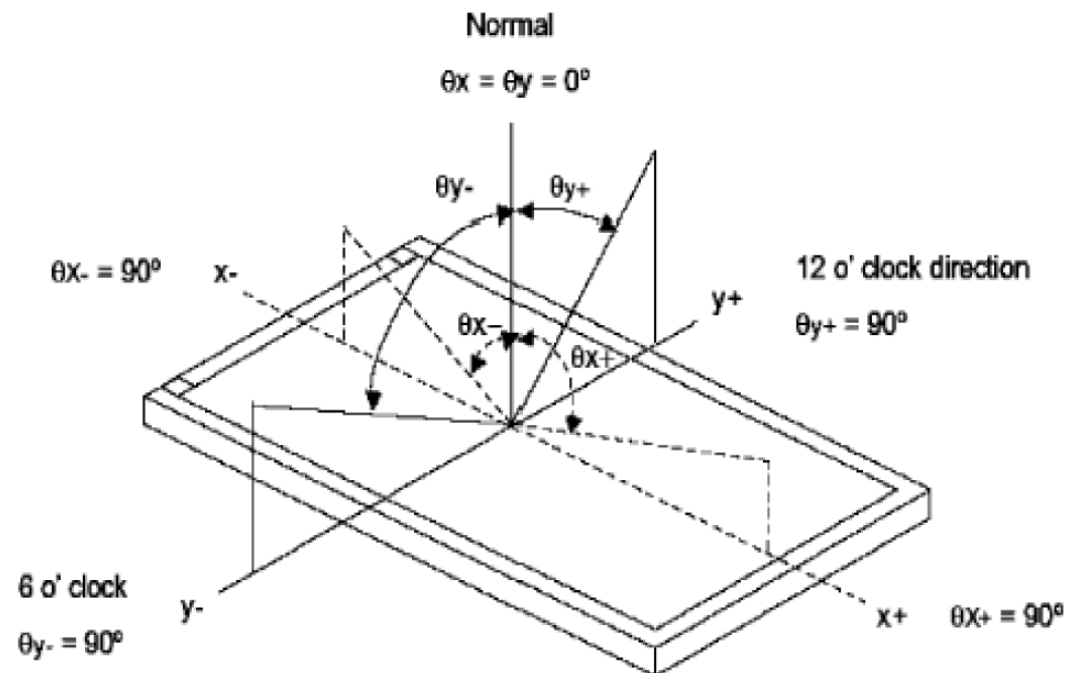
Touch Panel:

PIN NO.	SYMBOL	DESCRIPTION
1	YU	Touch Panel Pin UP
2	XL	Touch Panel Pin LEFT
3	YD	Touch Panel Pin DOWN
4	XR	Touch Panel Pin RIGHT

5. OPTICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
				MIN	TYP.	MAX		
Luminance		L		640	800	-	Cd/m ²	
Contrast Ratio		CR	$\theta = 0^\circ$	640	800			
Response Time	Rising	T _R	25°C		4	8	ms	
	Falling	T _F			12	24		
CIE COLOUR COORDINATE	RED	XR	VIEWING NORMAL ANGLE					
		YR						
	GREEN	XG						
		YG						
	BLUE	XB						
		YB						
	WHITE	XW						
		YW						
VIEWING ANGLE	Hor.	θ_{x+}	CR $\geq$ 10	80	85		Degree	
		θ_{x-}		80	85			
	Ver.	θ_{y+}		80	85			
		θ_{y-}		80	85			

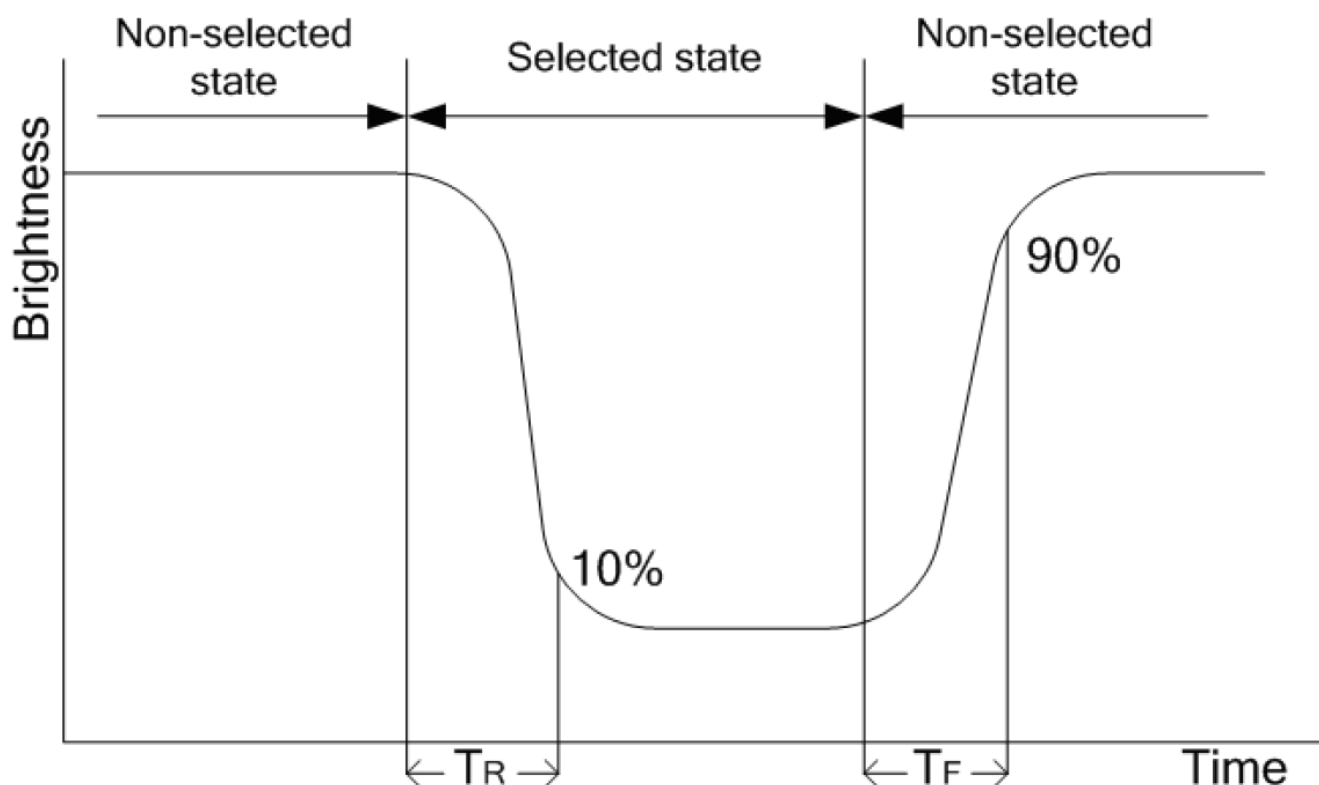
Note 1 : Definition of Viewing Angle θ_x and θ_y :



Note 2: Definition of contrast ratio CR:

$$CR = \frac{\text{Brightness of non-selected dots (white)}}{\text{Brightness of selected dots (black)}}$$

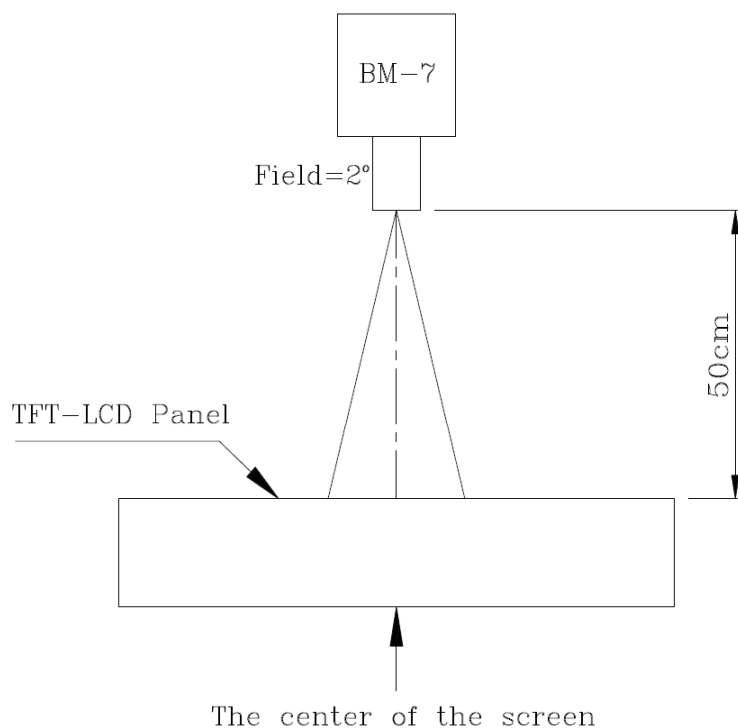
Note 3: Definition of response time (T_R , T_F)



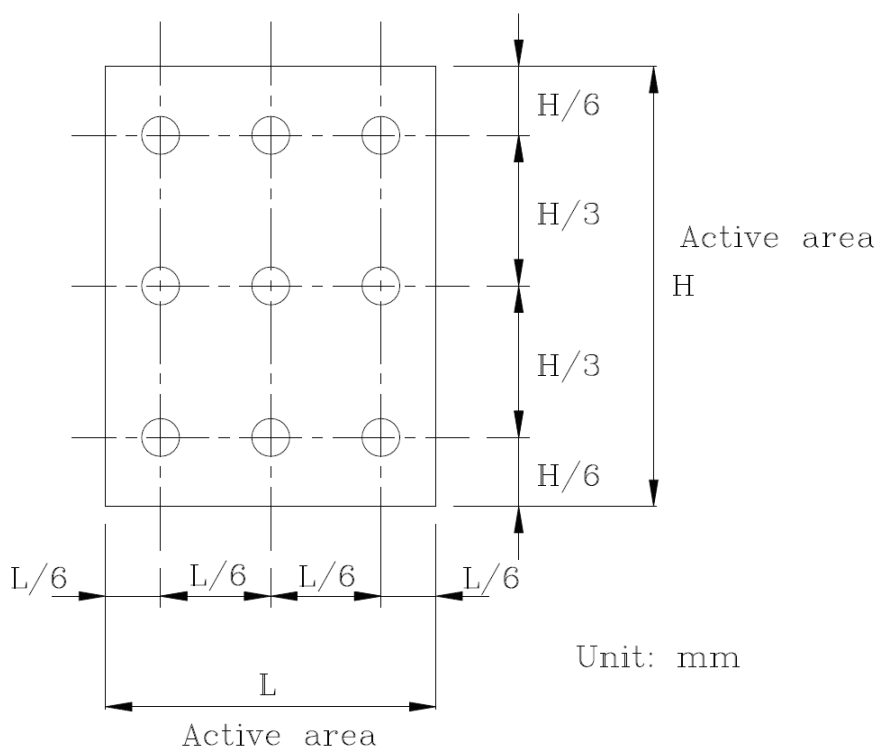
Note 4: Definition of Luminance

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
Power Supply Voltage	VDD	-0.5	5.0	V
Operating Temperature	Top	-20	+70	°C
Storage Temperature	Tst	-30	+80	°C

7. ELECTRICAL CHARACTERISTICS**7.1 BLACKLIGHT DRIVING CONDITIONS**

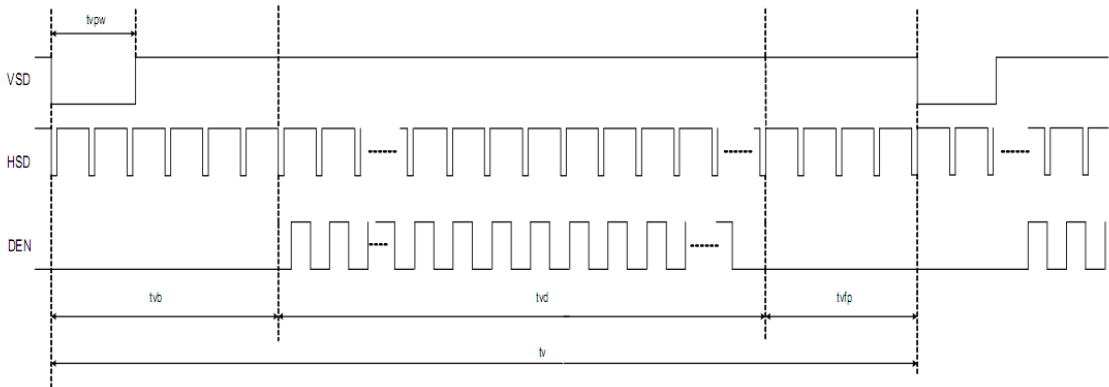
ITEM	SYMBOL	SPECIFICATIONS			UNIT	REMARK
		MIN	TYP.	MAX		
Supply Voltage	Vf		18		V	
Supply Current	IL		300		mA	
Power Consumption	P		5.4		W	
LED Lifetime			50,000		Hr	

7.2 ELECTRICAL CHARACTERISTICS

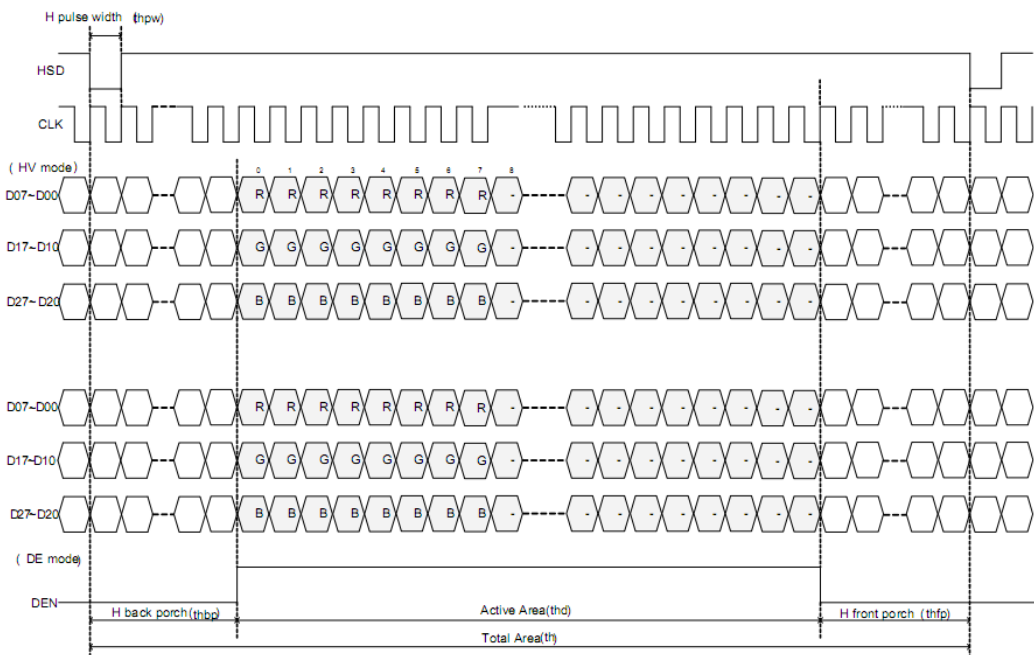
ITEM	SYMBOL	MIN	TYP.	MAX	UNIT
Power Supply	VDD	3.0	3.3	3.6	V
	AVDD	8.9	9.0	9.1	V
	VGH	17	18	19	V
	VGL	-6.5	-6.0	-5.5	V
	VCOM	3.0	3.15	3.3	V
Input Voltage	Vil	GND	-	0.3VDD	V
	Vih	0.7VDD	-	VDD	V

7.3 TIMING CHARACTERISTICS

7.3.1 Vertical input timing



7.3.2 Horizontal input timing



DE mode

DE mode					
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency @Frame rate=60hz	fclk	40.8	51.2	67.2	Mhz
Horizontal display area	thd	1024			DCLK
HSYNC period time	th	1114	1344	1400	DCLK
HSYNC blanking	thb+thfp	90	320	376	DCLK
Vertical display area	tvd	600			H
VSYNC period time	tv	610	635	800	H
VSYNC blanking	tvb+tvfp	10	35	200	H

HV mode(1)

HV mode

Horizontal input timing

Parameter		Symbol	Value			Unit
Horizontal display area		thd	1024			DCLK
DCLK frequency@ Frame rate=60hz		fclk	Min.	Typ.	Max.	Mhz
			44.9	51.2	63	
1 Horizontal Line		th	1200	1344	1400	DCLK
HSYNC pulse width	Min.	thpw	1			
	Typ.		—			
	Max.		140			
HSYNC back porch		thbp	160	160	160	
HSYNC front porch		thfp	16	160	216	

HV mode(2)

Vertical input timing					
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Vertical display area	tvd	600			H
VSYNC period time	tv	624	635	750	H
VSYNC pulse width	tpw	1	—	20	H
VSYNC back porch	tvb	23	23	23	H
VSYNC front porch	tvfp	1	12	127	H

8. RELIABILITY TEST

NO.	TEST ITEM	CONDITIONS	
1	HIGH TEMPERATURE STORAGE	TA=80°C	96H
2	LOW TEMPERATURE STORAGE	TA=-30°C	96H
3	HIGH TEMPERATURE OPERATION	TA=70°C	96H
4	LOW TEMPERATURE OPERATION	TA=-20°C	96H
5	HIGH TEMPERATURE AND HIGH HUMIDITY OPERATION	+60°C, 90%RH	96H
6	THERMAL SHOCK	-30°C → +80°C,	0.5H:5CYCLES

9. LCD MODULES HANDLING PRECAUTIONS

- n** The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
- n** 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.
- n** Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- n** The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.
- n** 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.
- n** 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

- n** 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.
- n** 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.
- n** 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.