

1. SUMMARY

LW500AC9001 is a transmissive type color active matrix liquid crystal display (LCD) which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of a TFT LCD panel, driver ICs, FPC and a backlight unit. The following table described the features of LW500AC9001.

2. FEATURES

High Resolution: 1152,000 Dots (800 RGB x 480).

Application: Portable Navigation

PMP (Personal Multimedia Player), MP4 application product

DVB-S

GAMING

3. GENERAL SPECIFICATIONS

Parameter	Specifications	Unit
Screen Size	5.0(Diagonal)	inch
Display Format	800 RGB x 480	Dot
Active Area	108(H) x64.8(V)	mm
Pixel Pitch	0.135(H) x 0.135(V)	mm
Surface Treatment	Anti-glare	
Pixel Configuration	RGB-Stripe	
Outline Dimension	118.5(H) x 77.55 (V) x 3.4(T)	mm
Weight	65.92	g
View Angle Direction	6 o'clock	
Temperature Range	Operation	-20~70 °C
	Storage	-30~80 °C

4. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Values		Unit	Condition
		Min.	Max.		
Power Voltage	VCC	-0.3	+7.0	V	

Note: Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above.

5. ELECTRICAL CHARACTERISTICS

5.1. Operating conditions:

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power Supply	VCC	2.7	3.3	3.6	V	
Operating Current	IDD	-	110	-	mA	
Frame frequency	fFrame	-	60	-	Hz	
Dot Data Clock	DCLK	-	33.26	-	MHz	
Power Consumption	PLCD	-	363	-	mW	

5.2 LED driving conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power Consumption	PLED	-	924	-	mW	
LED Current	If	-	40	-	mA	
Backlight Voltage	Vb	-	23.1	-	V	

Note 1 : Ta = 25°C

Note 2 : Brightness to be decreased to 50% of the initial value

6. DC CHARACTERISTICS

Parameter	Symbol	Rating			Unit	Condition
		Min.	Typ.	Max.		
Low level input voltage	V _{IL}	0	-	0.3* VCC	V	
High level input voltage	V _{IH}	0.7* VCC	-	VCC	V	

7. AC CHARACTERISTICS

7.1 AC Timing Characteristics

.Sync mode

Signal	Item	Symbol	Min	Typ	Max	Unit	Note
CLK	Frequency	F _{CPH}	-	33.26	-	MHZ	
	Period	T _{CPH}	-	30.06	-	ns	
	Pulse duty	T _{CWH}	40	50	60	%	
HS	Period	T _H	-	1056	-	T _{CPH}	
	Pulse width	T _{WH}	1	128	-	T _{CPH}	
	First horizontal data time	T _{HS}	STHD[7:0]+88			T _{CPH}	1
	Active Time	T _{HA}	-	800	-	T _{CPH}	
VS	Period	T _V	-	525	-	T _H	
	Pulse Width	T _{WV}	1	2	-	T _H	
	DEN time	T _{VS}	STVD[7:0]+8			T _H	2
	Active Time	T _{VA}	-	480	-	T _H	
---	VS falling to HS falling time	T _{HV}	-4	-	4	T _{CPH}	Fig7.1

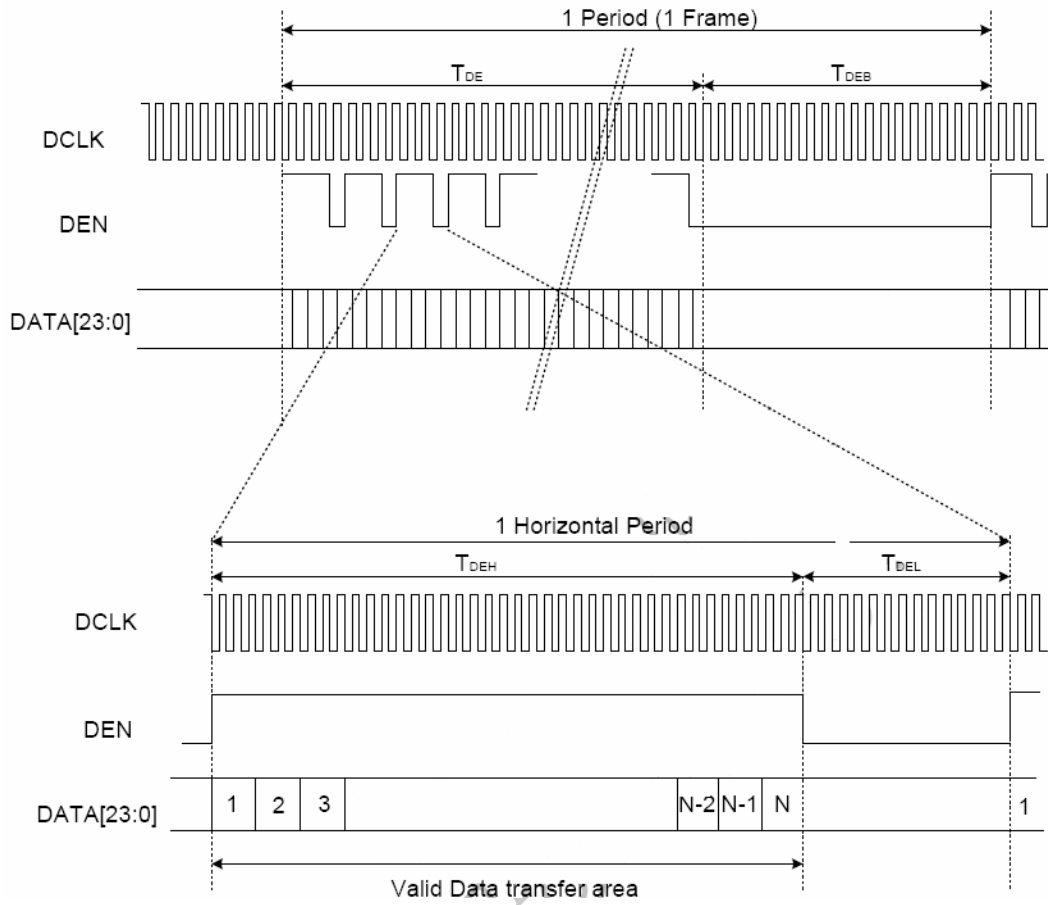
Note1: T_{HS}+ T_{HA}< T_H,STHD[7:0] Default = 128.

Note2: STVD[7:0] Default = 27.

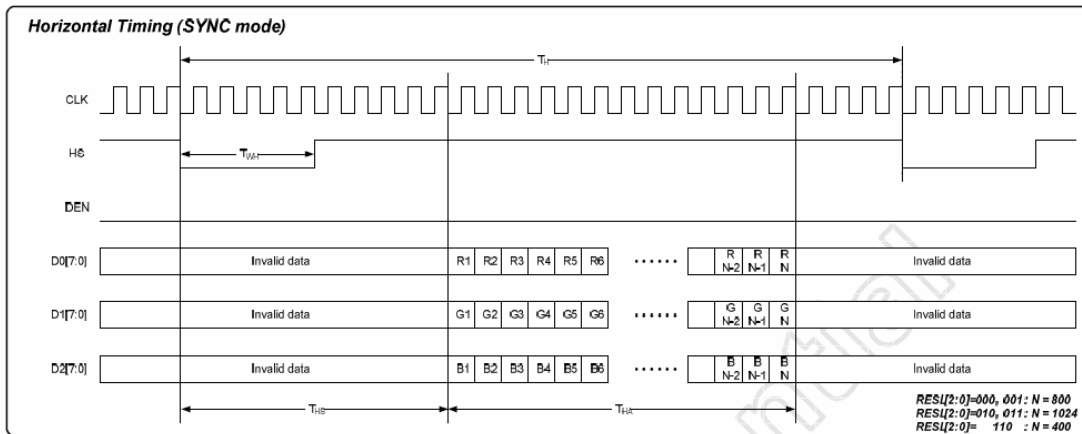
.DEN mode

Signal	Item	Symbol	Min	Typ	Max	Unit	Note
CLK	Frequency	F _{CPH}	-	33.26	-	MHZ	
	Period	T _{CPH}	-	30.06	-	ns	
	Pulse duty	T _{CWH}	40	50	60	%	
DE	Period	T _{DEH} +T _{DEL}	1000	1056	1200	T _{CPH}	
	Pulse width	T _{DH}	-	800	-	T _{CPH}	
	Frame blanking	T _{HS}	10	45	110	T _{DEH} +T _{DEL}	
	Frame width	T _{EP}	-	480	-	T _{DEH} +T _{DEL}	

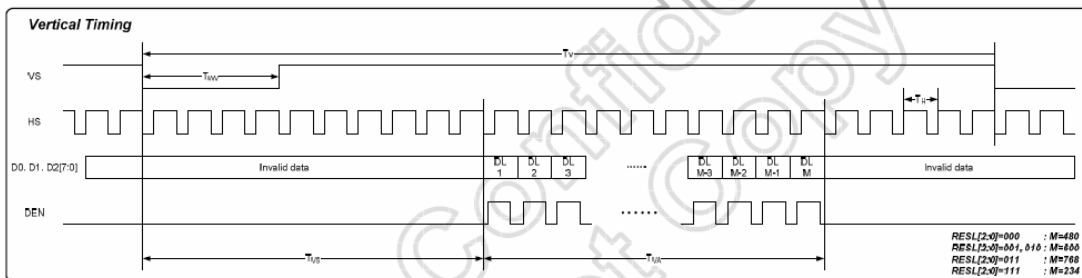
7.2 AC Timing Diagrams .DEN mode



.Sync mode



SYNC Mode Horizontal Data Format



SYNC Mode Vertical Data Format

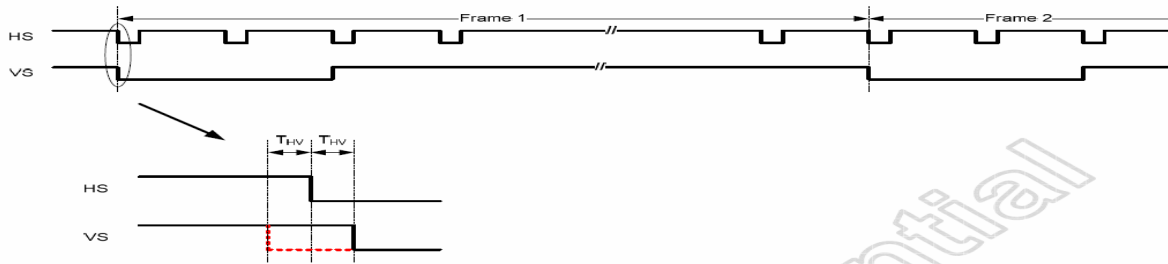
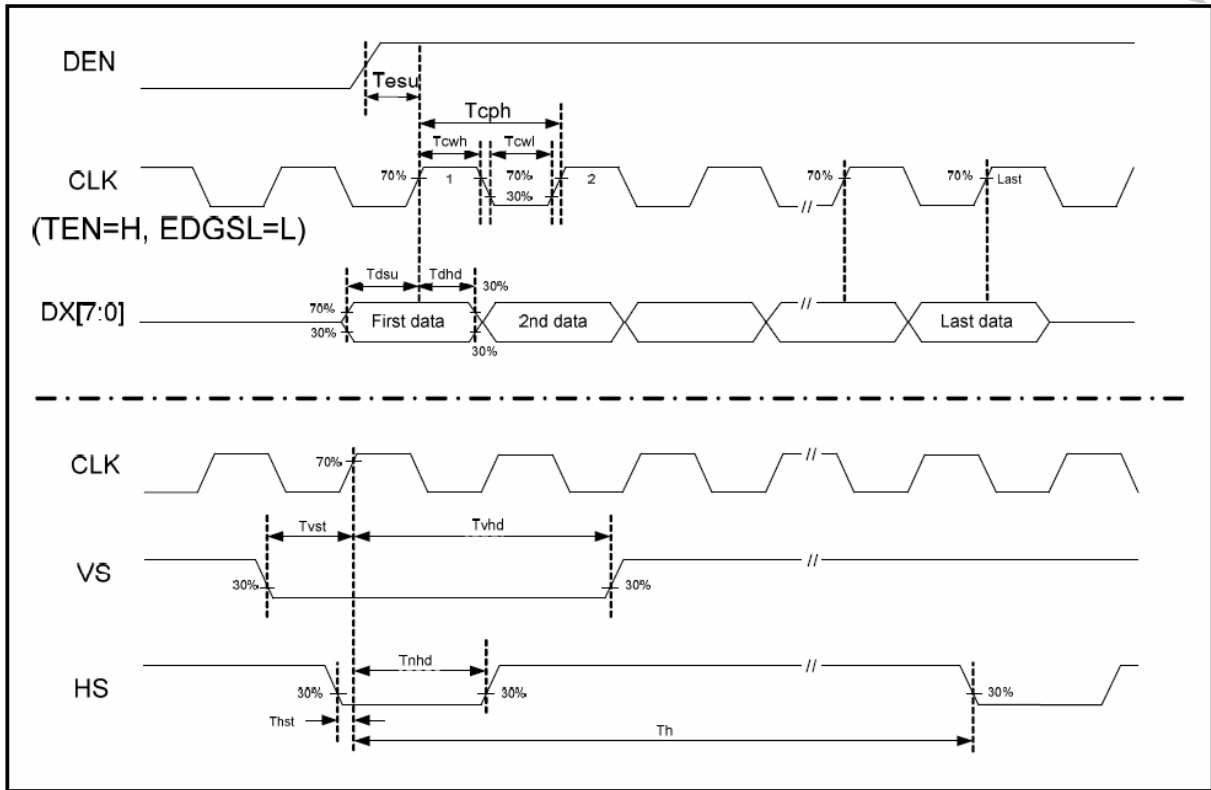
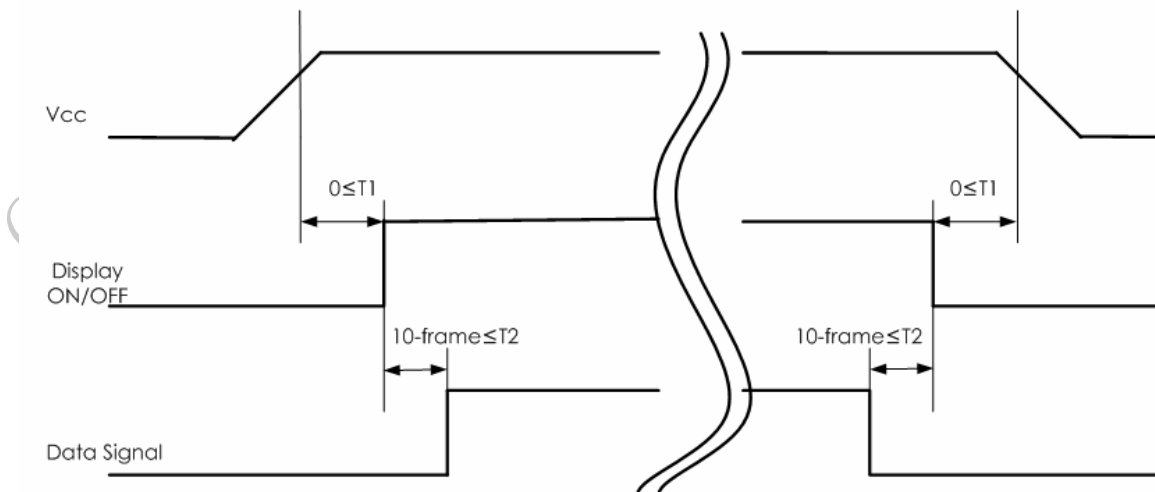


Fig. 7-1 Definition of VS falling to HS falling time



7.3 Power Sequence

The LCD panel power ON/OFF sequence is as below.



8. OPTICAL CHARACTERISTIC

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Brightness			300	350	-	cd/m ²	
Response time	TR	$\Theta=0$	-	15	-	ms	(2)
	TF		-	35	-	ms	
Contrast ratio	CR	At optimized viewing angle	350	400	-	-	(3)
Color Chromaticity	White	Wx	(0.26)	(0.31)	(0.36)	-	(4)
		Wy	(0.28)	(0.33)	(0.38)		
Viewing Angle	Hor.	Θ_R	-	(70)	-	Degree	(5)
		Θ_L	-	(70)	-		
	Ver.	ϕ_H	-	(60)	-		
		ϕ_L	-	(70)	-		

Ta=25±2°C, ILED=20mA

Note 1: Definition of viewing angle range

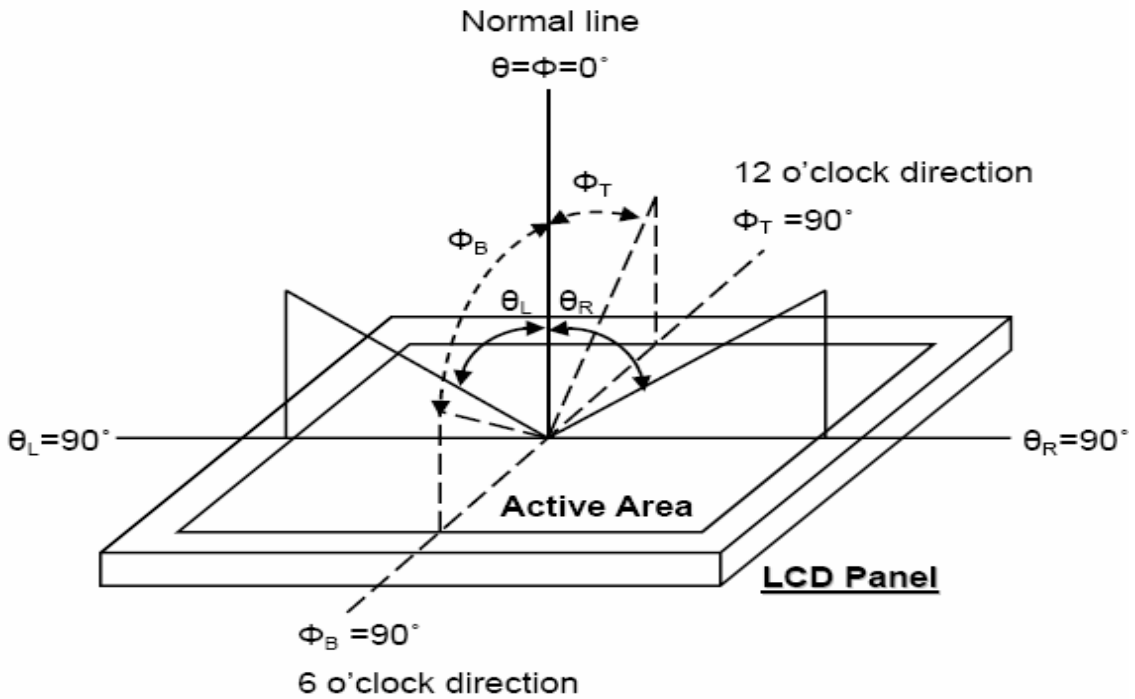


Fig. 8-1 Definition of viewing angle

Note 2: Test equipment setup:

After stabilizing and leaving the panel alone at a driven temperature for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

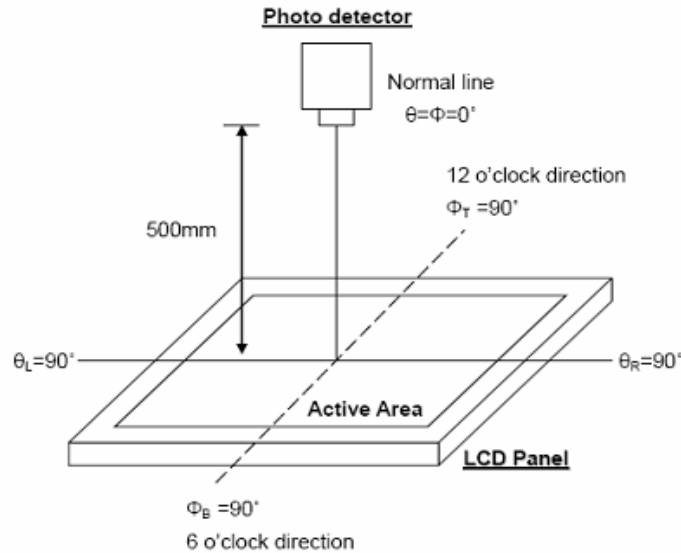


Fig. 8-2 Optical measurement system setup

Note 3: Definition of Response time:

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time, T_r , is the time between photo detector output intensity changed from 90% to 10%. And fall time, T_f , is the time between photo detector output intensity changed from 10% to 90%.

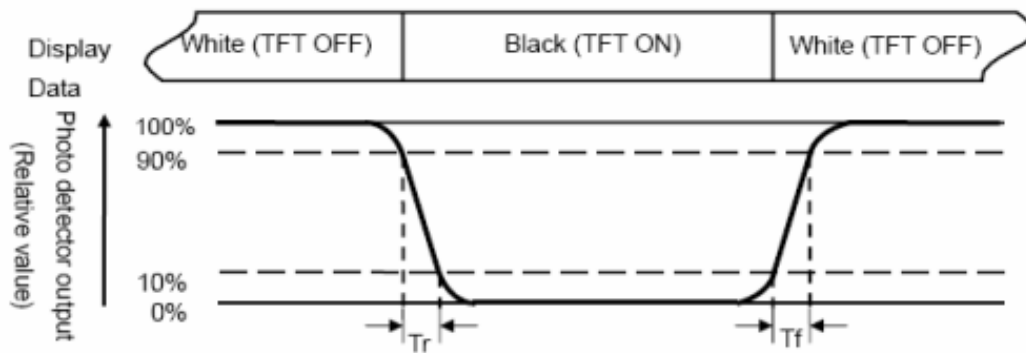


Fig. 3-3 Definition of response time

Note 4: Definition of contrast ratio:

The contrast ratio is defined as the following expression.

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5: White $V_i = V_{i50} \pm 1.5V$

Black $V_i = V_{i50} \pm 2.0V$

“±” means that the analog input signal swings in phase with VCOM signal.

“±” means that the analog input signal swings out of phase with VCOM signal.

The 100% transmission is defined as the transmission of LCD panel when all the input terminals

of module are electrically opened.

Note 6: Definition of color chromaticity (CIE 1931)

Color coordinates measured at the center point of LCD

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

Note 8 : Uniformity (U) = $\frac{\text{Brightness (min)}}{\text{Brightness (max)}} \times 100\%$

9. INTERFACE

9.1. LCM PIN Definition

Pin	Symbol	I/O	Function	Remark
1	VLED-	I	LED Ground	
2	VLED+	I	LED Power	
3	DGND	I	Digital Ground	
4	VCC	I	Power Supply (+3.3 V)	
5	R0	I	Red Data Bit0	
6	R1	I	Red Data Bit1	
7	R2	I	Red Data Bit2	
8	R3	I	Red Data Bit3	
9	R4	I	Red Data Bit4	
10	R5	I	Red Data Bit5	
11	R6	I	Red Data Bit6	
12	R7	I	Red Data Bit7	
13	G0	I	Green Data Bit0	
14	G1	I	Green Data Bit1	
15	G2	I	Green Data Bit2	
16	G3	I	Green Data Bit3	
17	G4	I	Green Data Bit4	
18	G5	I	Green Data Bit5	
19	G6	I	Green Data Bit6	
20	G7	I	Green Data Bit7	
21	B0	I	Blue Data Bit0	
22	B1	I	Blue Data Bit1	
23	B2	I	Blue Data Bit2	
24	B3	I	Blue Data Bit3	
25	B4	I	Blue Data Bit4	
26	B5	I	Blue Data Bit5	
27	B6	I	Blue Data Bit6	
28	B7	I	Blue Data Bit7	
29	DGND	I	Digital Ground	
30	DCLK	I	Dot Data Clock	
31	DISP	I	Display On/Off	Note2
32	Hsync	I	Horizontal Sync Input	
33	Vsync	I	Vertical Sync Input	
34	DE	I	Data Enable Control	Note 1
35	N.C		N.C	

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36	DGND	I	Digital Ground	
37	NC	I	No connection	
38	NC	I	No connection	
39	NC	I	No connection	
40	NC	I	No connection	

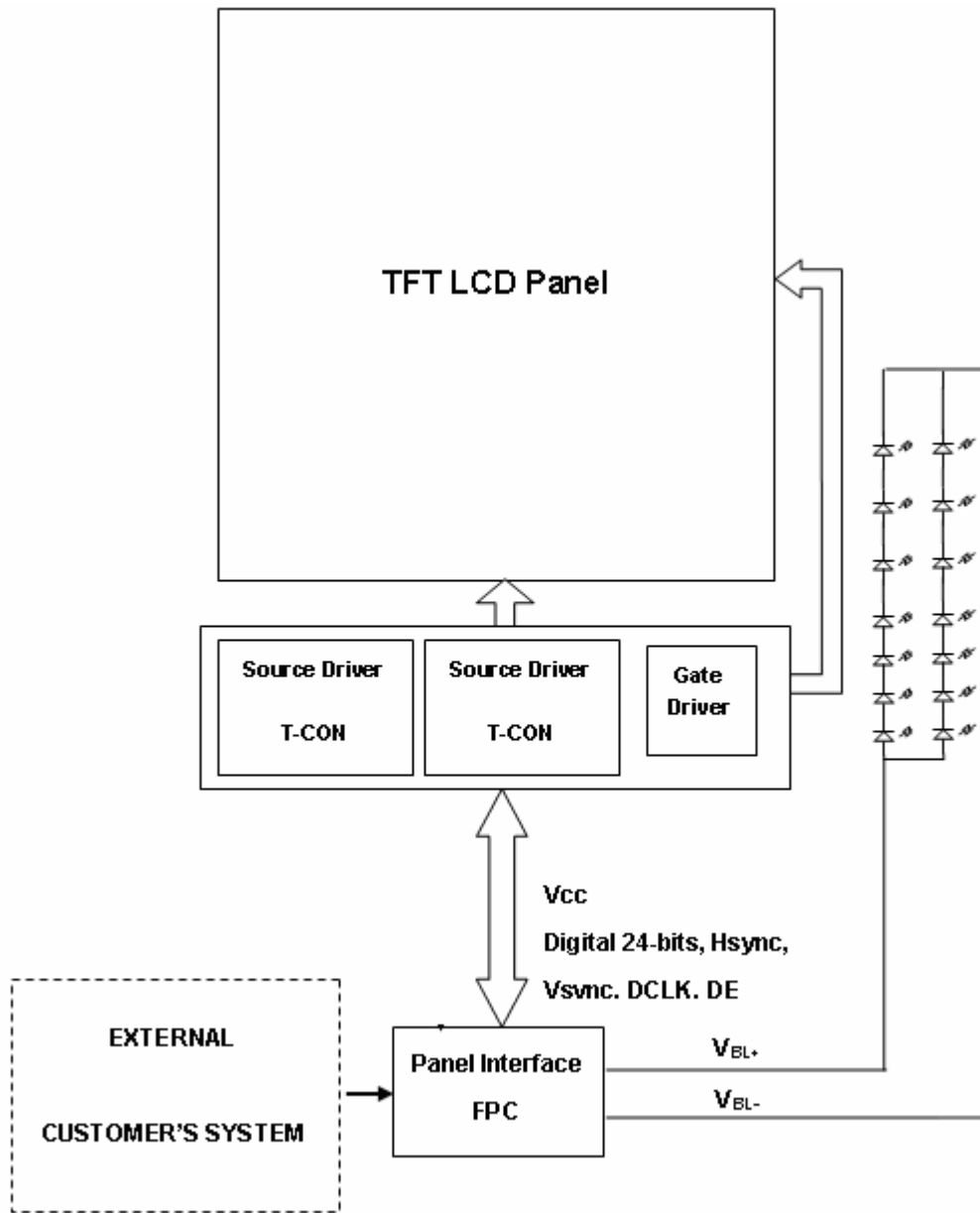
Note1: DE=" H ": data can be access, DE=" L ": data cannot be access

Note2: Usually pull high. High: Display On / Low: Display Off

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10. BLOCK DIAGRAM



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11. QUALITY ASSURANCE

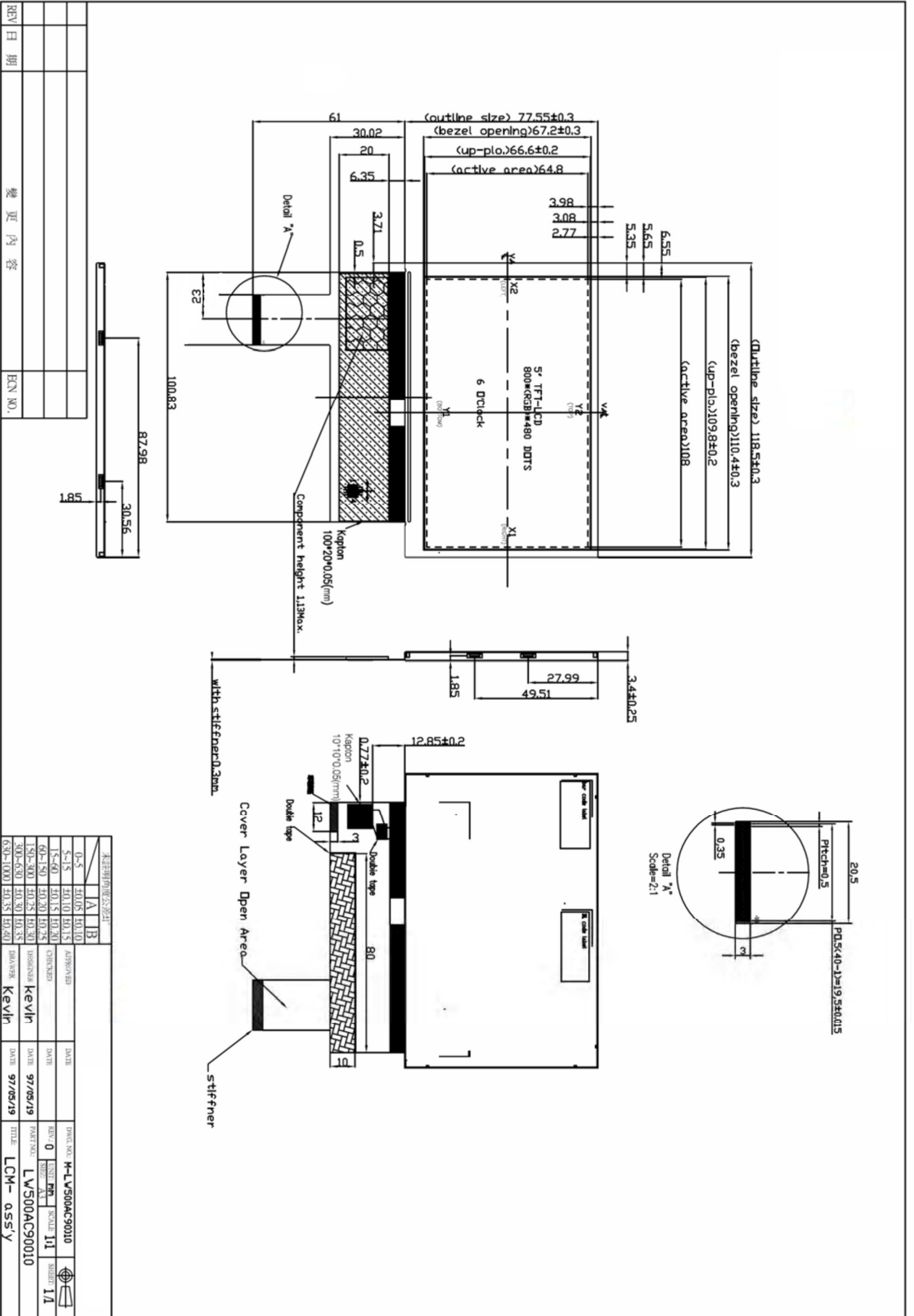
No.	Test Items	Test Condition	REMARK
1	High Temperature Storage Test	Ta=80°C Dry 240h	
2	Low Temperature Storage Test	Ta=-30°C Dry 240h	
3	High Temperature Operation Test	Ta=70°C Dry 240h	
4	Low Temperature Operation Test	Ta=-20°C Dry 240h	
5	High Temperature and High Humidity Operation Test	Ta=60°C 90%RH 240h	
6	Electro Static Discharge Test	Panel surface / top case Contact / Air : ±6KV / ±8KV , 150pF , 330Ω	Non-operating
7	Shock Test (non-operating)	Shock Level : 100G Waveform : Half Sinusoidal Wave Shock Time : 6ms Number of Shocks : 3 times for each ±X, ±Y, ±Z direction	
8	Vibration Test (non-operating)	Frequency Range: 10~55Hz. Amplitude:1.5 mm. Sweep Time: 11min. Test Period : 6 cycles for each direction of X,Y,Z	
9	Thermal Shock Test	-30°C(0.5Hr) ~ +80°C(0.5Hr) for 100 cycles	

Note1: The test samples have recovery time for 2 hours at room temperature before the function check. In the standard conditions, there is no display function NG issue occurred.

Note2: All the cosmetic specifications are judged before the reliability stress.

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12. OUTLINE DRAWING