


TFT LCD Approval Specification

MODEL NO.:M156B1-C01

Customer : _____

Approved by : _____

Note :

核准時間	部門	審核	角色	投票
2009-08-11 17:49:41	MTR 產品管理處		Director	Accept

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REVISION HISTORY

Version	Date	Section	Description
Ver. 2.0	Jul, 16 '09	-	M156B1-C01 approval specifications was first issued.

1. GENERAL DESCRIPTION

1.1 OVERVIEW

The M156B1-C01 is a 15.6-inch wide LCD cell with thin film transistors as active elements and contains 1366x768 pixels. Each pixel is divided into red, green and blue dot, which are arranged in vertical stripe. The cell is normally white mode, and can be applied to the transmission type display. Backlight unit (BLU) and circuit board for the cell are not built in.

1.2 FEATURES

- Response time 8ms
- WXGA (1366 x 768 pixels) resolution

1.3 APPLICATION

- TFT LCD Monitor
- TFT LCD TV

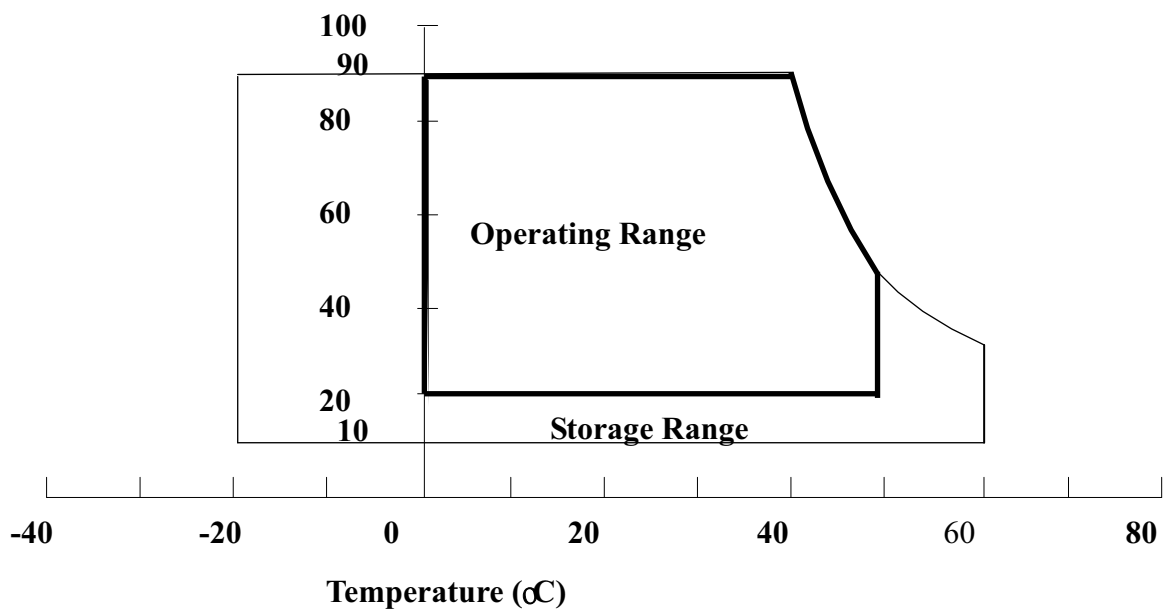
1.4 GENERAL SPECIFICATIONS

Item		Specification	Unit
Max Panel Dimension (TFT)		353.632 X 203.086	mm
Glass thickness(TFT/ CF)		0.7/0.7	mm
Active Area		344.232 (H) x 193.536 (V) (15.6" diagonal)	mm
Driver Element		a-si TFT active matrix	-
Pixel Number		1366X R.G.B X 768	pixel
Pixel Pitch		0.252 (H) X 0.252 (V)	mm
Pixel Arrangement		RGB vertical stripe	-
Transmissive Mode		Normally white	-
Surface Treatment		Hard coating (3H), AG (Haze 25%)	-
Polarizer Type		TAC	-
Polarizer Dimension	TFT	350.43 X 199.44	mm
	CF	350.43 X 199.44	mm
Polarizer Thickness	TFT	0.215	mm
	CF	0.215	mm
Weight		297(typ.)	g

2. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T _{ST}	-20	+60	°C	(1)
Operating Ambient Temperature	T _{OP}	0	+50	°C	(1), (2)
LCD Cell Life Time	L _{CELL}	50,000	-	Hrs	MTBF based

Relative Humidity (%RH)



Note (1) Temperature and relative humidity range is shown in the figure below.

- (a) 90% RH Max. ($T_a \leq 40\text{ }^\circ\text{C}$).
- (b) Wet-bulb temperature should be 39 °C Max. ($T_a > 40\text{ }^\circ\text{C}$).
- (c) No condensation.

Note (2) The temperature of panel surface should be 0 °C Min. and 60 °C Max

3. Suggestive Driving Condition

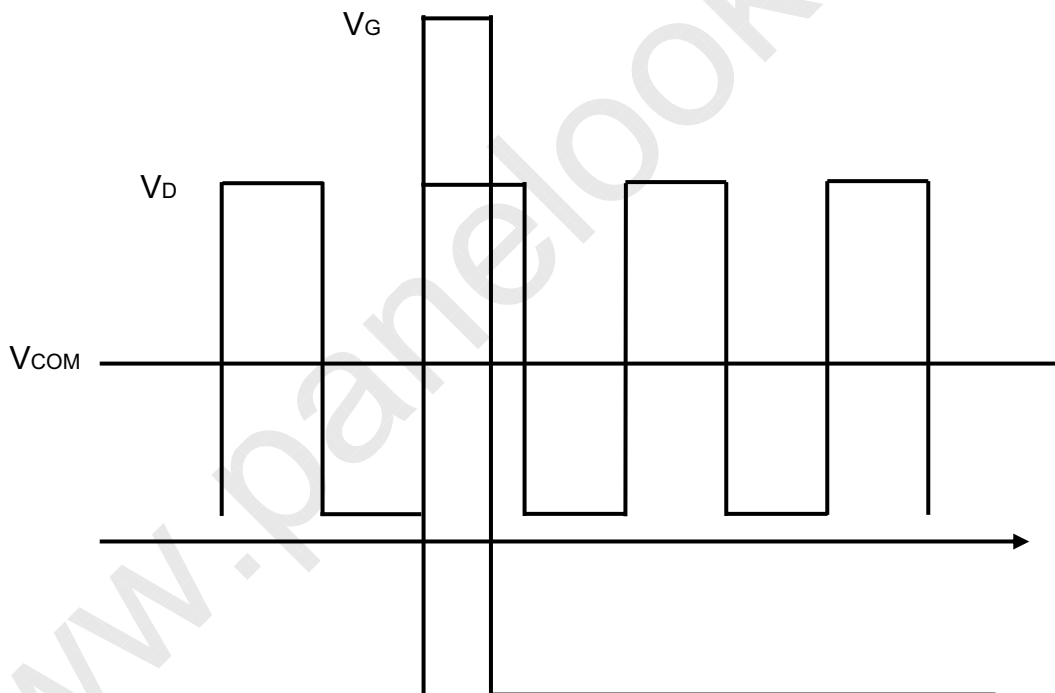
Item		Min.	Typ.	Max.	Unit		
Driving Voltage	V_G	On	20.13	20.83	21.53	V	
		Off	-7.46	-6.86	-6.26	V	
	V_D	B	Gam1	10.275	10.475	10.675	V
			Gam14	-0.1	0.1	0.3	V
		W	Gam7	5.717	5.917	6.117	V
			Gam8	5.185	5.385	5.585	V
	V_{COM}	Center	4.0	4.5	5.0	V	
	$G \downarrow$ -D offset	2	-	-	us		
	Charging time	15	-	-	us		

B: Black pattern

W: White pattern

Gamma Voltage : Gam1 > Gam2 > Gam3 > ... > Gam10 $G \downarrow$: gate pulse falling edge

DRIVING TIMING DIAGRAM



4. PANEL PIN DEFINITION

4.1 DATA PIN DEFINE

Pin number	TAB1	TAB2~5	TAB6
1	dummy	dummy	dummy
2	dummy	dummy	dummy
3	dummy	dummy	dummy
4	dummy	dummy	dummy
5	dummy	dummy	dummy
6	dummy	dummy	dummy
7	dummy	dummy	dummy
8	LR	dummy	dummy
9	XAO	dummy	dummy
10	OE	dummy	dummy
11	CPV	dummy	dummy
12	STV1	dummy	dummy
13	STV2	dummy	dummy
14	VSS	dummy	dummy
15	VSS	dummy	dummy
16	VDD	dummy	dummy
17	VDD	dummy	dummy
18	Vee	dummy	dummy
19	Vgl	dummy	dummy
20	Vgl	dummy	dummy
21	Vgl	dummy	dummy
22	dummy	dummy	dummy
23	Vgh	dummy	dummy
24	Vgh	dummy	dummy
25	Vgh	dummy	dummy
26	Vcom	Vcom	Vcom
27	Vst	dummy	dummy
28	Vst	dummy	dummy
29	Vcom	Vcom	Vcom
30	dummy	dummy	dummy
31	OUT_1	OUT_1	OUT_1
32	OUT_2	OUT_2	OUT_2
33	OUT_3	OUT_3	OUT_3
34	OUT_4	OUT_4	OUT_4
35	OUT_5	OUT_5	OUT_5
36	OUT_6	OUT_6	OUT_6
37	OUT_7	OUT_7	OUT_7
38	OUT_8	OUT_8	OUT_8
39	OUT_9	OUT_9	OUT_9
....			
372	OUT_342	OUT_342	OUT_342
373	dummy	dummy	dummy
....	dummy	dummy	dummy
408	dummy	dummy	dummy
409	OUT_343	OUT_343	OUT_343
....			
729	OUT_663	OUT_663	OUT_663
730	OUT_664	OUT_664	OUT_664

731	OUT_665	OUT_665	OUT_665
732	OUT_666	OUT_666	OUT_666
733	OUT_667	OUT_667	OUT_667
734	OUT_668	OUT_668	OUT_668
735	OUT_669	OUT_669	OUT_669
736	OUT_670	OUT_670	OUT_670
737	OUT_671	OUT_671	OUT_671
738	OUT_672	OUT_672	OUT_672
739	OUT_673	OUT_673	OUT_673
740	OUT_674	OUT_674	OUT_674
741	OUT_675	OUT_675	OUT_675
742	OUT_676	OUT_676	OUT_676
743	OUT_677	OUT_677	OUT_677
744	OUT_678	OUT_678	OUT_678
745	OUT_679	OUT_679	dummy
746	OUT_680	OUT_680	dummy
747	OUT_681	OUT_681	dummy
748	OUT_682	OUT_682	dummy
749	OUT_683	OUT_683	dummy
750	OUT_684	OUT_684	dummy
751	dummy	dummy	dummy
752	dummy	dummy	dummy
753	Vcom	Vcom	Vcom
754	dummy	dummy	Vst
755	dummy	dummy	Vst
756	dummy	dummy	G_gate(Vgl)
757	dummy	dummy	G1-Vcom
758	dummy	dummy	G2-Vcom
759	dummy	dummy	dummy
760	dummy	dummy	dummy
761	Vcom	Vcom	Vcom
762	Vcom	Vcom	Vcom
763	dummy	dummy	dummy
764	dummy	dummy	dummy
765	dummy	dummy	dummy
766	dummy	dummy	dummy
767	dummy	dummy	dummy

Note: 1. Test pin is recommend for floating

2. LR default value is Vss (ground)



4.2 SCAN PIN DEFINE

Scan1~3	DUMMY	OE	CPV	PASS2	STV2	VSS	MODE2	VDD	VEE	VEE			
	155	156	157	157	159	160	161	162	163	164			
XAO	154								165	166	VEE		
VDD	153								167	168	VEE		
LR	152								169	170	VGH		
TEST	151								171	172	VGH		
									173	174	PASS1		
										175	Dummy PAD		
DUMMY	150									176	OUT264		
.										177	OUT263	G(1,1)	
.											.		
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.											.		
.											.		
DUMMY	15										439	OUT1	G(1,256)
											440	OUT0	
											441	Dummy PAD	
PASS3	14								442	443	PASS1		
LR	13								444	445	VGH		
VSS	12								446	447	VGH		
XAO	11								448	449	VEE		
									450	451	VEE		
	10	9	8	7	6	5	4	3	2	1			
	DUMMY	OE	CPV	PASS2	STV1	VSS	MODE1	VDD	VEE	VEE			

5. OPTICAL CHARACTERISTICS

5.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Gamma voltage	-	Refer to Item 3 driving condition	V
Vcom	-	most suitable Vcom	V

5.2 OPTICAL SPECIFICATION

ITEM		Symbol	Condition	MIN.	TYP.	MAX.	UNIT	NOTE
Contrast Ratio		CR	$\theta_x=0^\circ, \theta_y=0^\circ$ CS-1000T, CMO BLU	350	500	-	%	4,1,8
Response Time (Black/White)		Tr	$\theta_x=\theta_y=0^\circ$	-	2	4	ms	5,1,8
		Tf	$\theta_x=\theta_y=0^\circ$	-	6	12	ms	
Center point Transmittance		T%	$\theta_x=0^\circ, \theta_y=0^\circ$ CS-1000T, CMO BLU	10.5	11	-	%	7,1,8
Transmittance uniformity (13pts)		δ T%	$\theta_x=\theta_y=0^\circ$	-	1.4	1.5	-	6,1
Viewing Angle	Horizontal θ_x ($\theta_y=0^\circ$)	Right	CR≥10 USB2000	40	45	-	Deg	2,3,1,8
		Left		40	45	-	Deg	
	Vertical θ_y ($\theta_x=0^\circ$)	Up		15	20	-	Deg	
		Down		40	45	-	Deg	
Color Coordinate at center point	Red	Rcx	$\theta_x=0^\circ, \theta_y=0^\circ$ CS-1000T Standard light source "C"	Typ -0.03	0.641	Typ +0.03	-	2,0
		Rcy			0.329		-	
	Green	Gcx			0.274		-	
		Gcy			0.585		-	
	Blue	Bcx			0.150		-	
		Bcy			0.106		-	
	White	Wcx			0.308		-	
		Wcy			0.346		-	

Note (0)

Light source is the standard light source "C" which is defined by CIE and driving voltages are based on suitable gamma voltages. The calculating method is as following :

1. Measure Module's and BLU's spectrums. White is without signal input and R, G, B are with signal input.

BLU is supplied by CMO. **Light source is the BLU with DBEF-D2.**

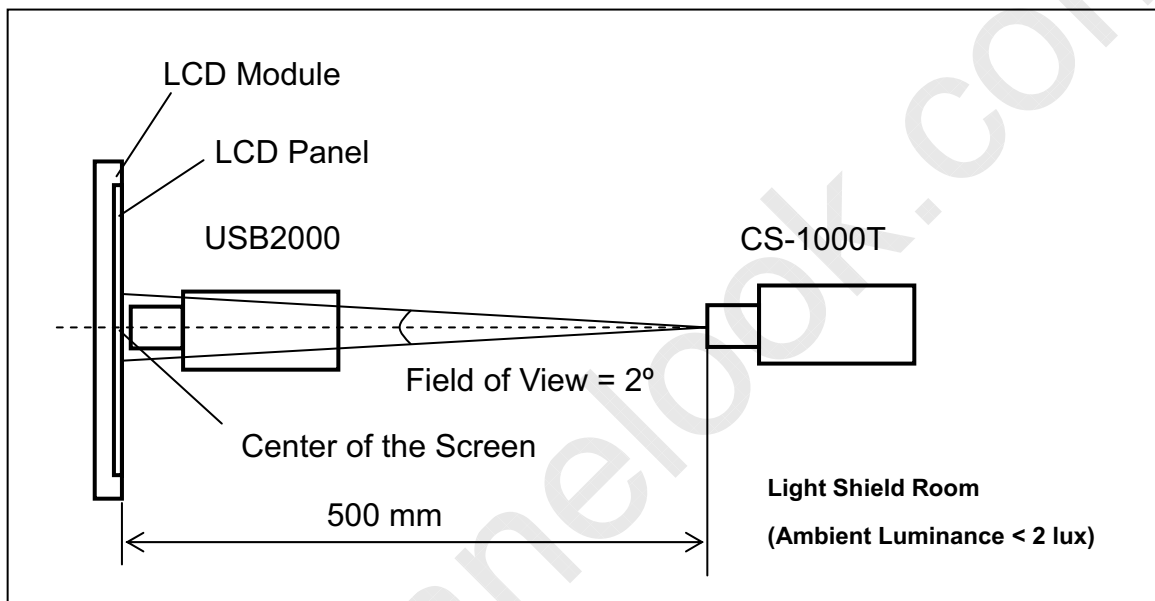
2. Calculate cell's spectrum.
3. Calculate cell's chromaticity by using the spectrum of standard light source "C"

Note (1)

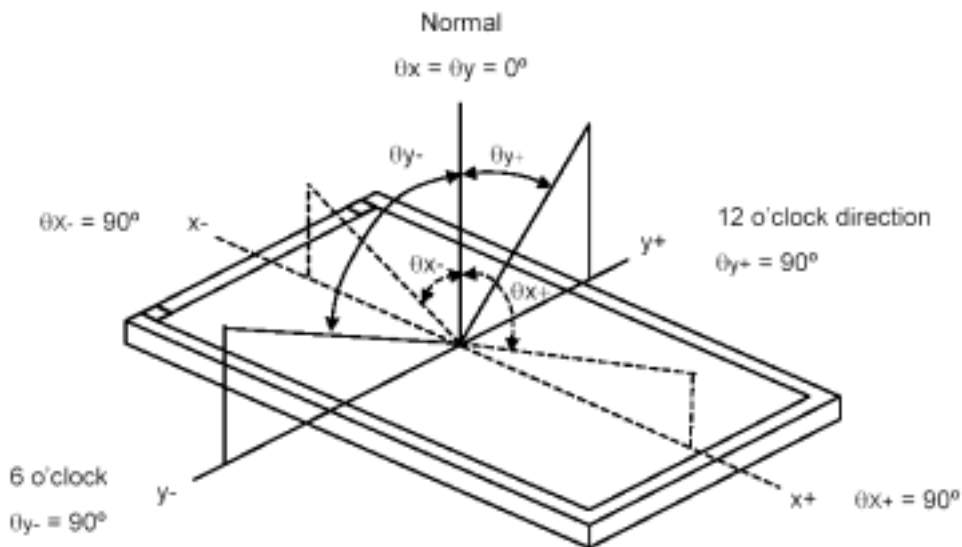
Light source is the BLU, which is supplied by CMO, and driving voltages are based on suitable gamma voltages. White is without signal input and R, G, B are with signal input. SPEC is judged by CMO's golden sample.

Note (2): Measurement setup:

The LCD module should be stabilized at given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 20 minutes in a windless room.



Note (3): Definition of viewing angle (θ_x, θ_y):

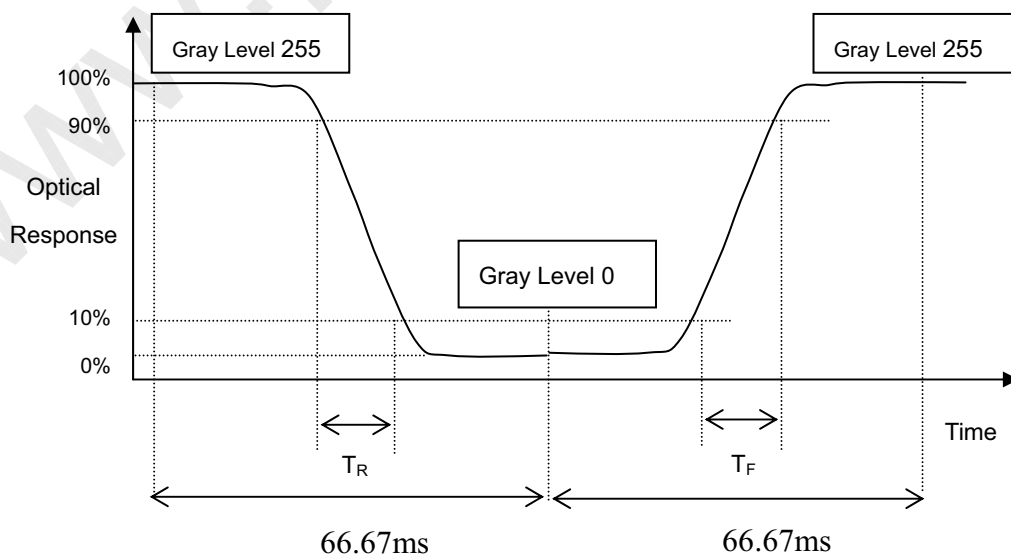


Note (4): Definition of Contrast Ratio (CR):

Ratio of gray max (G_{max}), gray min (G_{min}), at the center point of panel.

$$CR = \frac{\text{Luminance with all pixel white } (G_{max})}{\text{Luminance with all pixel Black } (G_{min})}$$

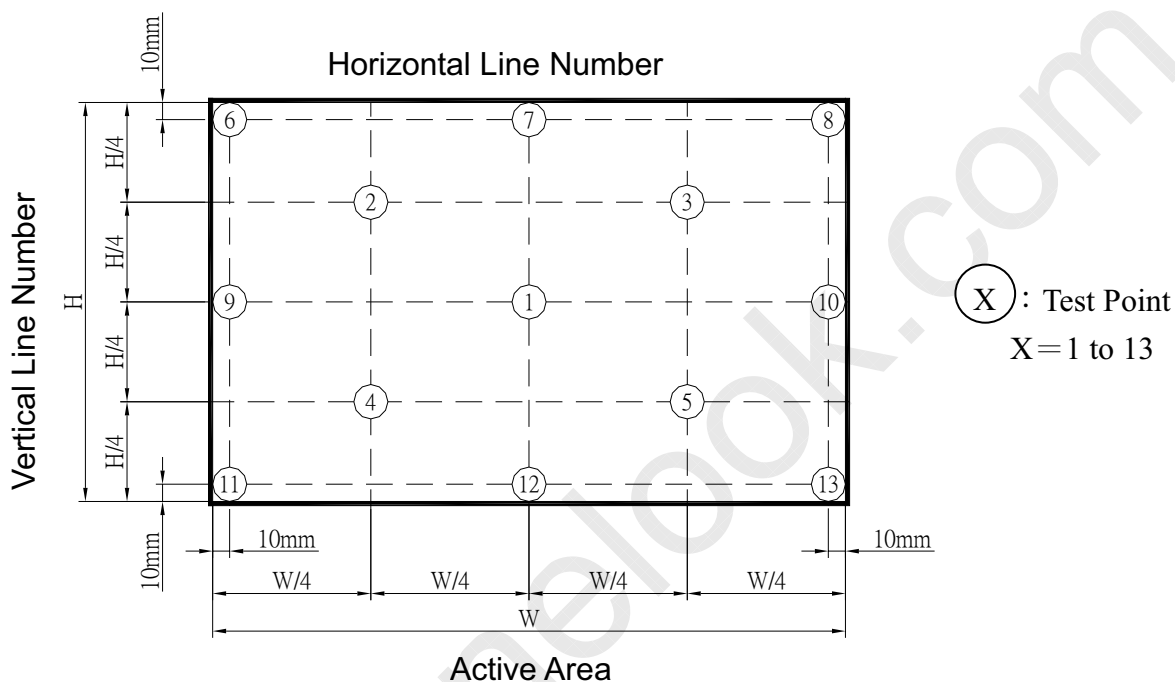
Note (5): Definition of Response Time (T_R, T_F):



Note (6): Definition of Transmittance Variation ($\delta T\%$):

Measure the transmittance at 13 points

$$\delta T\% = \frac{\text{Maximum } [T\%(1), T\%(2), \dots T\%(13)]}{\text{Minimum } [T\%(1), T\%(2), \dots T\%(13)]}$$



Note (7) : Definition of Transmittance(T%):

Module is without signal input.

BLU is supplied by CMO .

$$\text{Transmittance} = \frac{\text{Luminance of LCD module}}{\text{Luminance of backlight}} * 100\%$$

Note (8): Under suggestive driving condition (see Section 3).

6. PACKAGING

6.1. PACKING SPECIFICATION

1. 22 pcs LCD panel / 1 Dense Pack Box
2. Dense Box Dimensions: 462 (L) X 273.5 (W) X 119.5(H) mm
3. Weight: Approximately 15.5Kg (44 cells per bag)

6.2 PACKING METHOD

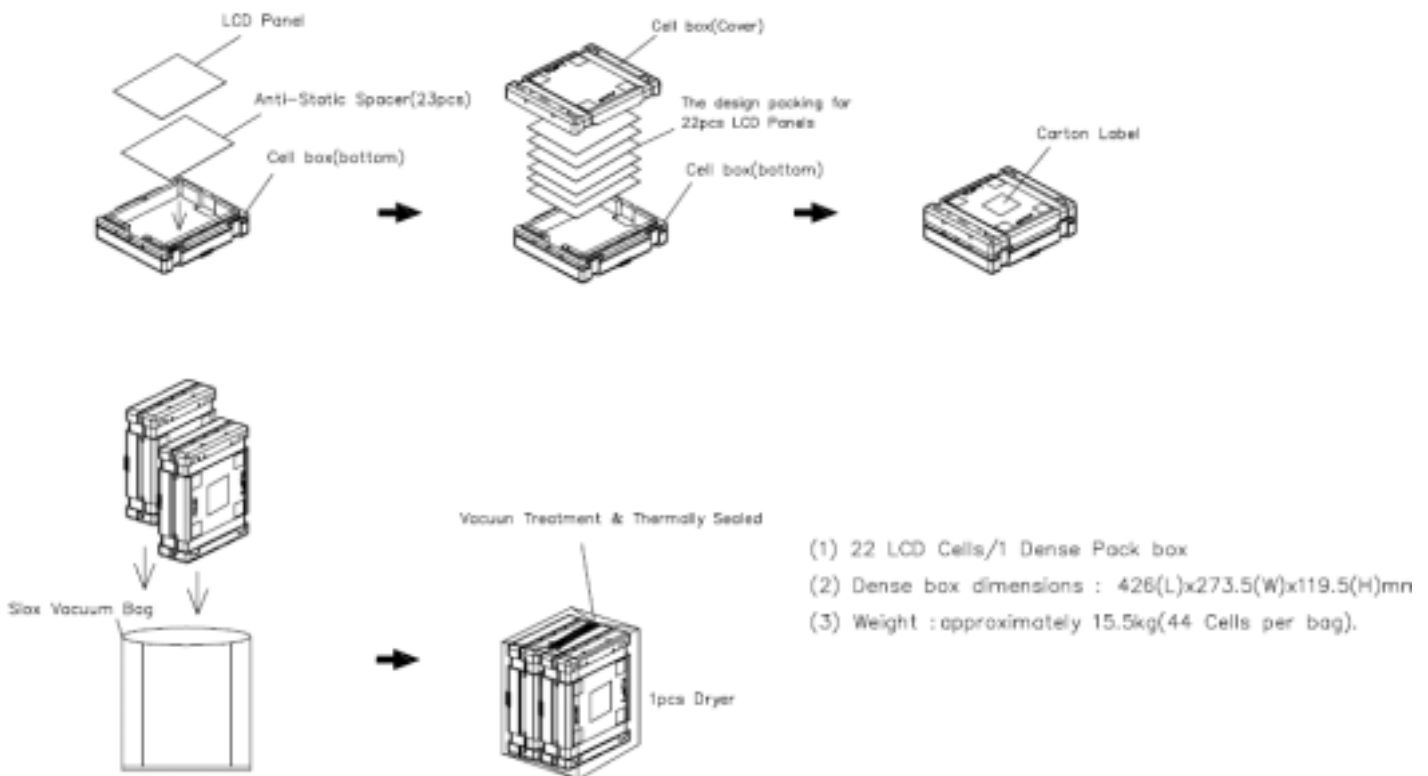


Figure. 6-1 Packing method

Pallet Stack:L1100*W970*H1423mm

Weight: 750kg

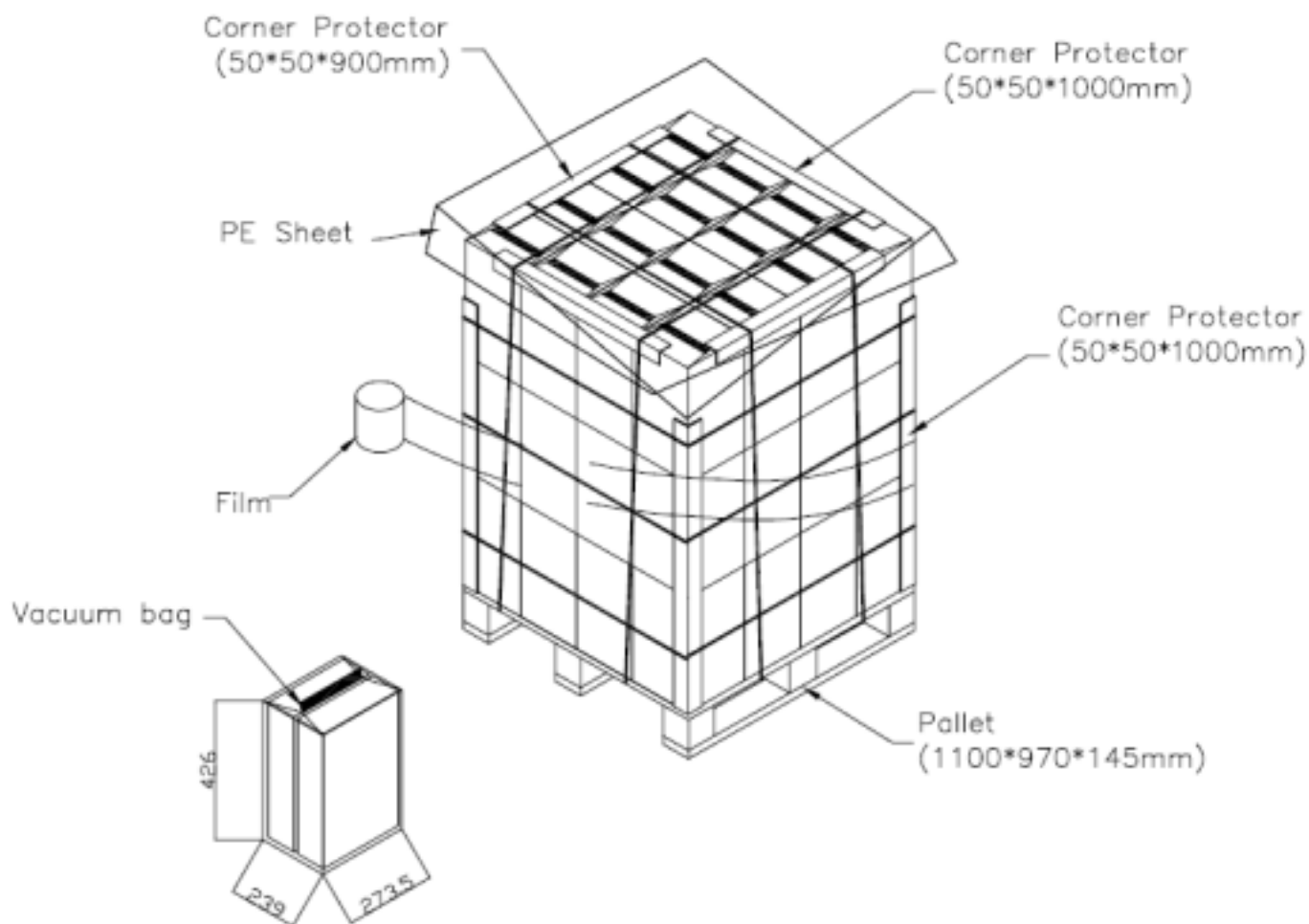


Figure. 6-2 Packing method

7. DEFINITION OF LABEL

1. Model Name: M156B1- C01
2. Panel Type: version control
3. Quantity: 22pcs / PP box
4. Case ID: serial number.
5. Note: Notification, if necessary.
6. Barcode: Case ID in code39 format



Figure. 7-1 Carton Label

8. PRECAUTIONS

8.1 ASSEMBLY AND HANDLING PRECAUTIONS

1. Do not apply rough force such as bending or twisting to the cell during assembly.
2. To assemble or install cell into customer's module can be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
3. It is not permitted to have pressure or impulse on the module because the LCD panel and Backlight will be damaged.
4. Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
5. It is dangerous that moisture come into or contacted the LCD panel, because moisture may damage TFT circuit.
6. High temperature or humidity may reduce the performance of cell. Please store LCD cell within the specified storage conditions.

8.2 SAFETY PRECAUTIONS

1. If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.

9. RELIABILITY TEST

Environment test conditions are listed as following table.

Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta= 50°C , 80%RH, 240hours	(1)
High Temperature Operation (HTO)	Ta= 50°C , 50%RH , 240hours	
Low Temperature Operation (LTO)	Ta= 0°C , 240hours	
High Temperature Storage (HTS)	Ta= 60°C , 240hours	
Low Temperature Storage (LTS)	Ta= -20°C , 240hours	
Packing Vibration	1.14Grms Random, Frequency Range: 1 – 200 Hz Top & Bottom: 30 minutes (+Z), 10 min (-Z) Right & Left: 10 minutes (X) Back & Forth 10 minutes (Y)	(2)
Thermal Shock Test (TST)	-20°C/30min , 60°C / 30min , 100 cycles	(1)

Note (1) The tests are done with CMO LCD modules (M156B1-L01).

Note (2) The test is done with a package shown in Section 6.

