

Version: 2.0

TECHNICAL SPECIFICATION**MODEL NO. : ED097OC1**

The content of this information is subject to be changed without notice.

Please contact PVI or its agent for further information

☐ Customer's Confirmation

Customer _____

Date _____

By _____

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Confirmed By _____



Prepared By _____



Revision History

Rev.	Issued Date	Revised Contents
1.0	Set.10.2008	New
2.0	November.7.2008	Add Page 7 6-2) Absolute maximum rating Page 12 Note 8-1 Modify Page 4 3. Mechanical Specifications Page 10 7. Power on Sequence Page 12 8-1)Specifications Add Contrast ratio Typ= 7 Update time 1000/540 change to 780/260 (2-4 bits/1bits) Page 19 14. Packing

TECHNICAL SPECIFICATION

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1. Application

The display is a TFT active matrix electrophoretic display, with associated interface and control logic, and a reference system design.

The 9.7" active area contains 1200x825 pixels, and has full 1~4 bit display capabilities

An integrated circuit containing interface, timing and control logic is supplied with each panel.

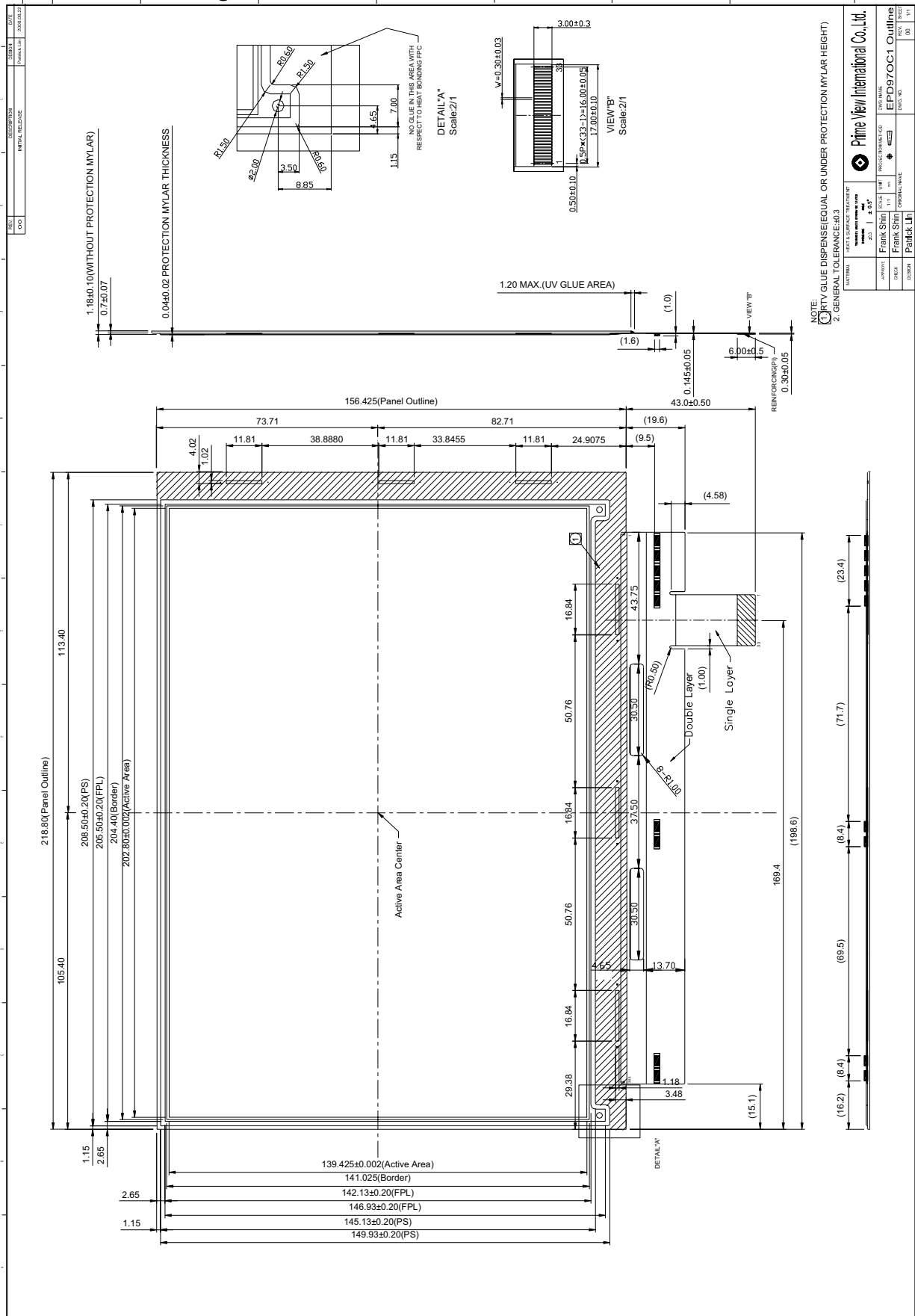
2. Features

- High contrast TFT electrophoretic
- 1200x825 display
- High reflectance
- Ultra wide viewing angle
- Ultra low power consumption
- Pure reflective mode
- Bi-stable
- Commercial temperature range
- Landscape, portrait mode
- Antiglare hard-coated front-surface

3. Mechanical Specifications

Parameter	Specifications	Unit	Remark
Screen Size	9.7	Inch	
Display Resolution	1200 (H) ×825(V)	Pixel	
Active Area	202.8 (H)×139.425 (V)	mm	
Pixel Pitch	0.169(H)×0.169(V)	mm	
Pixel Configuration	Rectangle		
Outline Dimension	218.8(H)×156.425(V)×1.18(D)	mm	
Module Weight	80±5	g	

4. Mechanical Drawing of EPD Module



5.Input/Ouput Terminals

5-1)Pinout List

Pin #	Signal	Description
1	VNEG	Negative power supply source driver
2	NC	NO Connection
3	VPOS	Positive power supply source driver
4	NC	NO Connection
5	VSS	Ground
6	NC	NO Connection
7	VDD	Digital power supply drivers
8	XCL	Clock source driver
9	XLE	Latch enable source driver
10	XOE	Output enable source driver
11	XSHR	Shift direction source driver
12	XSTL2	Start pulse source driver
13	D0	Data signal source driver
14	D1	Data signal source driver
15	D2	Data signal source driver
16	D3	Data signal source driver
17	D4	Data signal source driver
18	D5	Data signal source driver
19	D6	Data signal source driver
20	D7	Data signal source driver
21	NC	NO Connection
22	VCOM	Common connection
23	NC	NO Connection
24	VGG	Positive power supply gate driver
25	NC	NO Connection
26	VEE	Negative power supply gate driver
27	NC	NO Connection
28	MODE2	Output mode selection gate driver
29	MODE1	Output mode selection gate driver
30	XRL	Shift direction gate driver
31	SPV	Start pulse gate driver
32	CKV	Clock gate driver
33	BORDER	Border connection

6. Electrical Characteristics

6-1) Panel interface description

This panel is intended to be driven by EPD display controller ASIC.

6-2) Absolute maximum rating

Parameter	Symbol	Rating	Unit
Logic Supply Voltage	VDD	-0.3 to +7	V
Positive Supply Voltage	V _{POS}	-0.3 to +18	V
Negative Supply Voltage	V _{NEG}	+0.3 to -18	V
Max .Drive Voltage Range	V _{POS} - V _{NEG}	36	V
Supply Voltage	VGG	-0.3 to +45	V
Supply Voltage	VEE	-25.0 to +0.3	V
Supply Range	VGG-VEE	-0.3 to +45	V
Operating Temp. Range	TOTR	0 to +50	°C
Storage Temperature	TSTG	-25 to +70	°C

6-3) Panel DC characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Signal ground	V _{SS}		-	0	-	V
Logic Voltage supply	V _{DD}		3.0	3.3	3.6	V
	I _{VDD}	V _{DD} =3.3V	-	0.75	1.5	mA
Gate Negative supply	V _{EE}		-21	-20	-19	V
	I _{EE}	GV _{EE} = -20V	-	3.9	11.7	mA
Gate Positive supply	V _{GG}		21	22	23	V
	I _{GG}	GV _{DD} = 22V	-	3.3	9.9	mA
Source Negative supply	V _{NEG}		-15.4	-15	-14.6	V
	I _{NEG}	V _{NEG} = -15V	-	44.9	89.8	mA
Source Positive supply	V _{POS}		14.6	15	15.4	V
	I _{POS}	V _{POS} = 15V	-	44.1	88.3	mA
Border supply	V _{Border}	V _{POS} = 15V	14.6	15	15.4	V
		V _{NEG} = -15V	-15.4	-15	-14.6	V
Asymmetry source	V _{Asym}	V _{POS} +V _{NEG}	-800	0	800	mV
Common voltage	V _{COM}		-2	Adjusted	-0.3	V
	I _{COM}		-	0.59	-	mA
Maximum power panel	P _{MAX}		-	-	3200	mW
Standby power panel	P _{STBY}		-	-	0.6	mW
Typical power panel	P _{TYP}		-	1500	-	mW
Operating temperature			0	-	50	°C
Storage temperature			-25	-	70	°C
Maximum image update time at 25°C			-	1000	-	ms

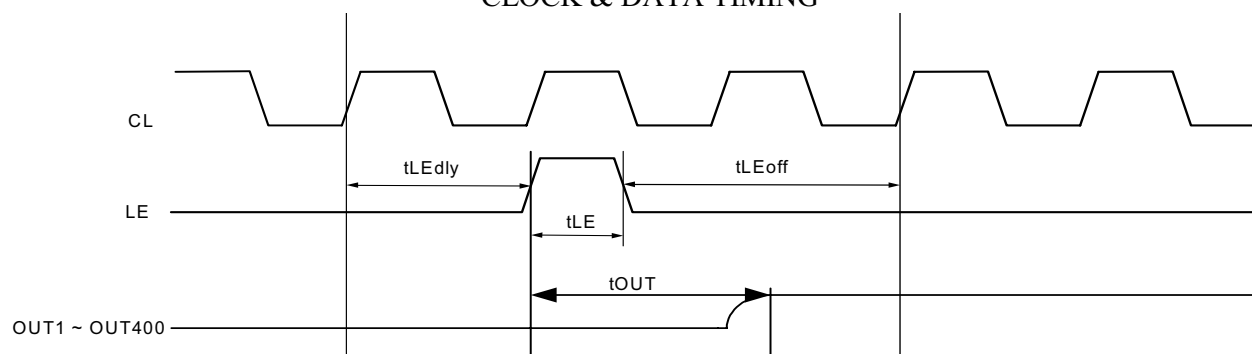
- The maximum power and maximum currents are specified for the worse case power consumption.
This occurs when 2 horizontal inverted stripped images are displayed
- The typical power is the consumed power when “typical images” are displayed.
- The standby power is the consumed power when the panel controller is in standby mode.
- The listed electrical/optical characteristics are only guaranteed under the controller & waveform provided by PVI
- Vcom is recommended to be set in the range of assigned value $\pm 0.1V$

6-4)Panel AC characteristics

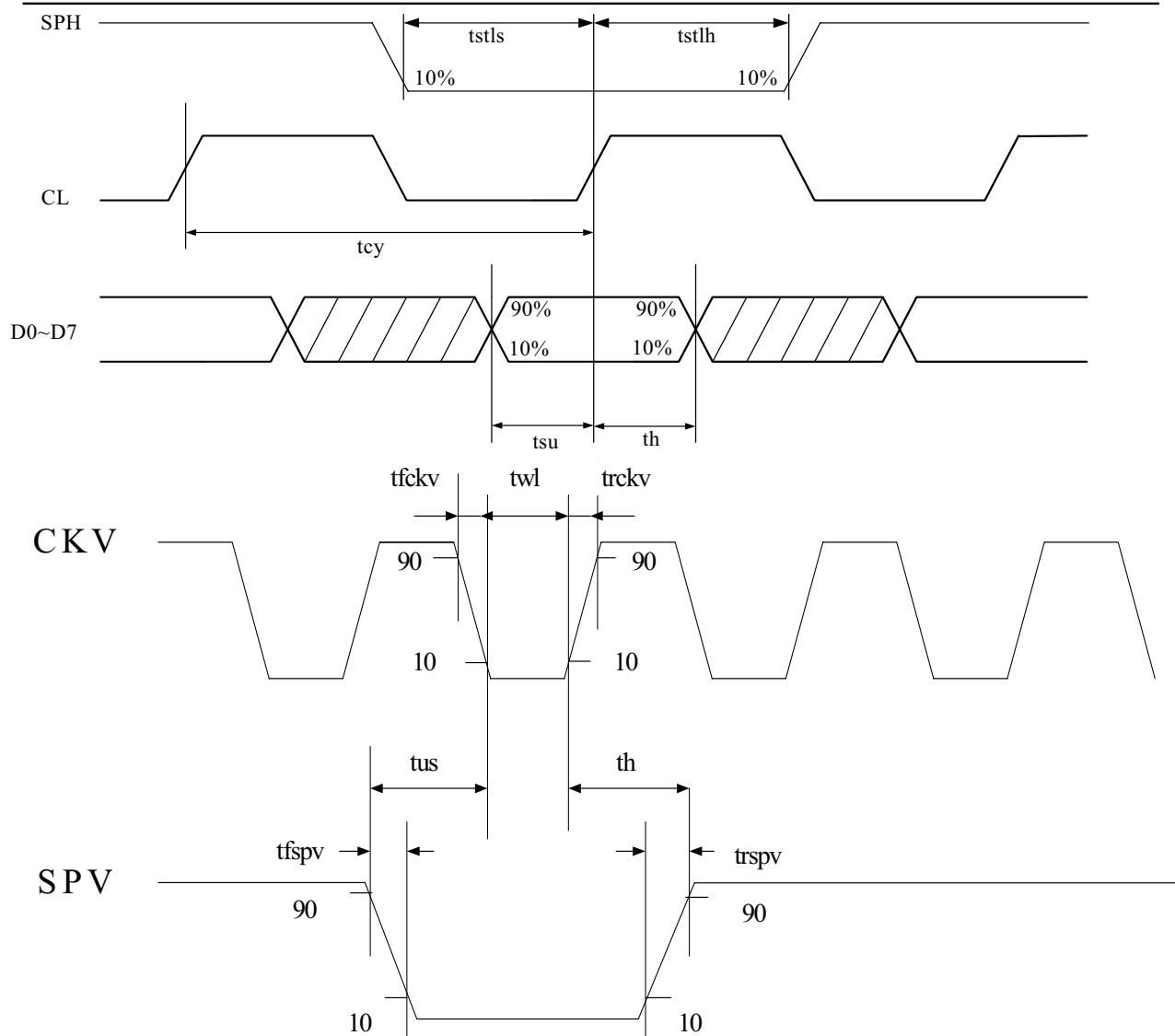
VDD=3.0V to 3.6V, unless otherwise specified.

Parameter	Symbol	Min.	Typ.	Max.	Unit	App Pin
Clock frequency	fckv	-	-	200	kHz	CKV
Minimum “L” clock pulse width	twL	0.5	-	-	us	
Clock rise time	trckv	-	-	100	ns	
Clock fall time	tfckv	-	-	100	ns	
Data setup time	tSU	100	-	-	ns	CKV, SPV
Data hold time	tH	100	-	-	ns	
Pulse rise time	trspv	-	-	100	ns	SPV
Pulse fall time	tfspv	-	-	100	ns	
Clock CL cycle time	tcy	50	-	DC	ns	Below table
D0 .. D7, SPH setup time	tsu	8	-	-	ns	
D0 .. D7, SPH hold time	th	1	-	-	ns	
LE on delay time	tLEdly	40	-	-	ns	
LE high-level pulse width	tLEw	40	-	-	ns	
LE off delay time	tLEoff	40	-	-	ns	

CLOCK & DATA TIMING



OUTPUT LATCH CONTROL SIGNALS

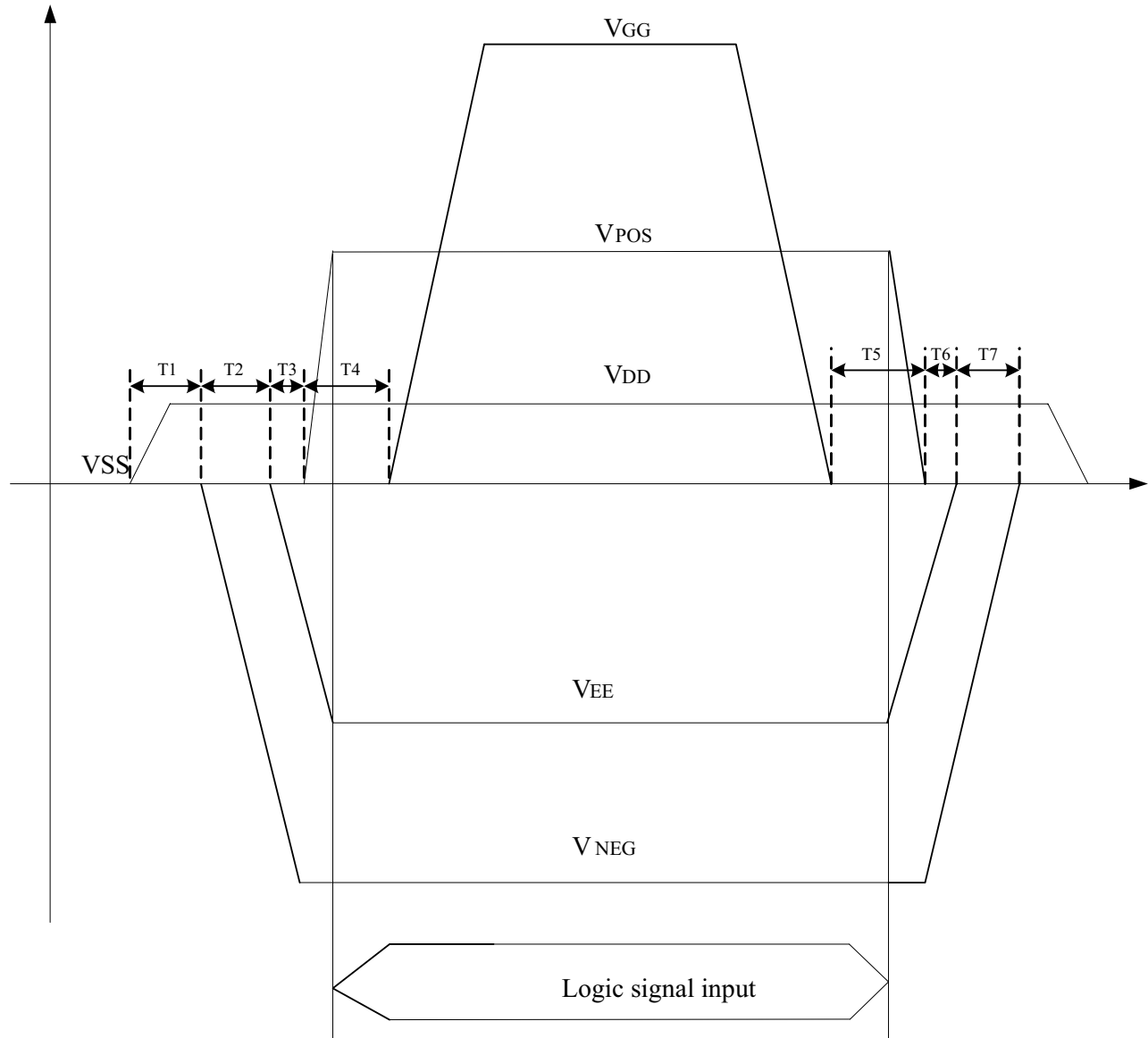


6-5) Power Consumption

Parameter	Symbol	Conditions	TYP	Max	Unit	Remark
Maximum panel power consumption during update.	-	-	-	3200	mW	
Power consumption in standby mode	-	-	-	0.6	mW	
Typical panel power	-	-	1500	-	mW	

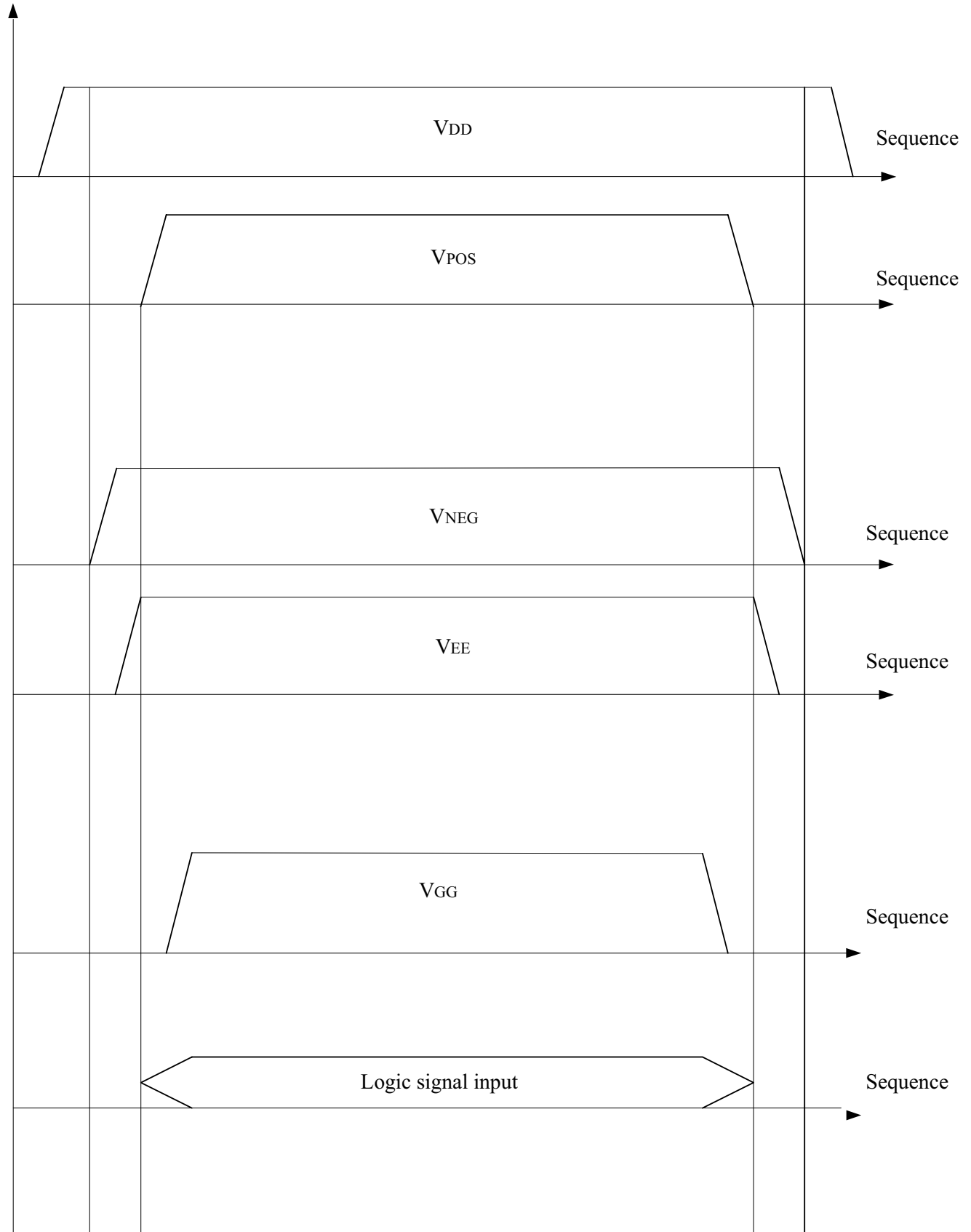
7.Power on Sequence

1. VSS $\rightarrow$ VDD $\rightarrow$ VNEG $\rightarrow$ VPOS (Source driver)
2. VEE $\rightarrow$ VGG(Gate driver)



T1: 100 μ s(min)
 T2: 0 μ s(min)
 T3: 1000 μ s(min)
 T4: 0 μ s(min)
 T5: 0 μ s(min)
 T6: 0 μ s(min)
 T7: 0 μ s(min)

* It is expanded as blew.



8. Optical characteristics

8-1) Specifications

Measurements are made with that the illumination is under an angle of 30 degrees, the detection is perpendicular unless otherwise specified.

T = 25°C

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP.	MAX	UNIT	Note
R	Reflectance	White	30	35	-	%	Note 8-1
Gn	N _{th} Grey Level	-	-	$DS + (WS - DS) \times n / (m - 1)$	-	L*	-
CR	Contrast Ratio	-	6	7	-		-
T _{update}	Update time	2~4-bit mode 1-bit mode		780 260	-	ms ms	-

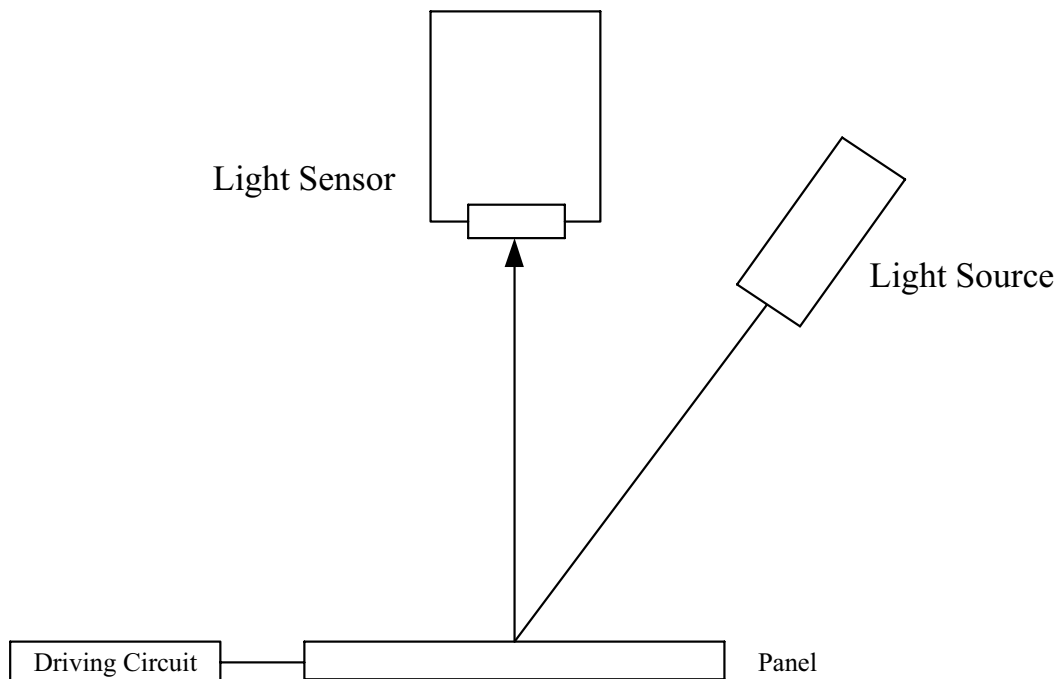
WS: White state , DS: Dark state, Gray state from Dark to White :DS 、 G1 、 G2... 、 Gn... 、 Gm-2 、 WS
m:4 、 8 、 16 when 2 、 3 、 4 bits mode

Note 8-1: Luminance meter :Eye – One Pro Spectrophotometer

8-2) Definition of contrast ratio

The contrast ratio (CR) is the ratio between the reflectance in a full white area (Rl) and the reflectance in a dark area (Rd):

$$CR = Rl/Rd$$

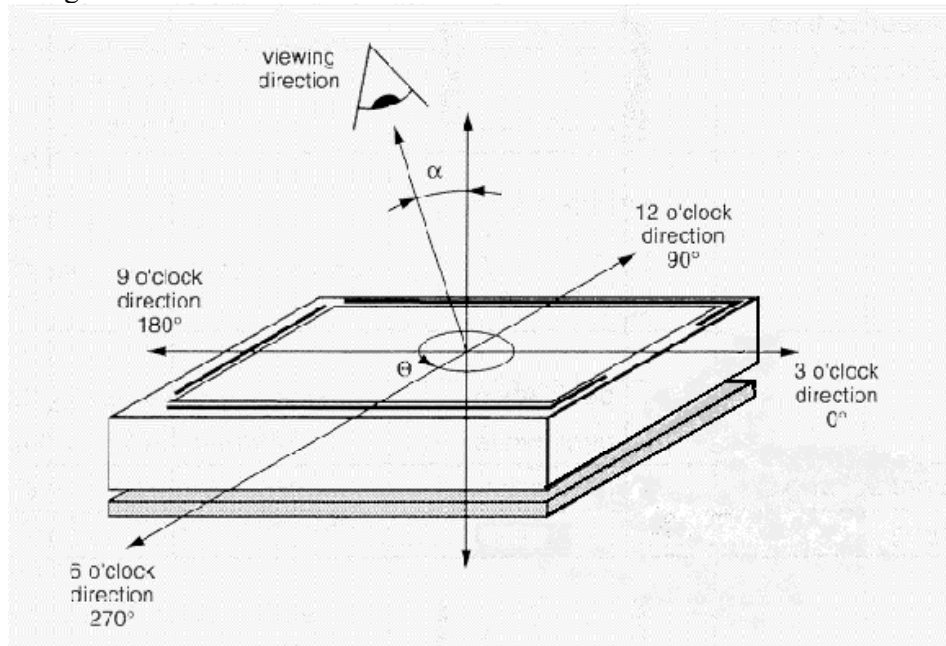


8-3)Reflection Ratio

The reflection ratio is expressed as:

$$R = \text{Reflectance Factor}_{\text{white board}} \times (L_{\text{center}} / L_{\text{white board}})$$

L_{center} is the luminance measured at center in a white area ($R=G=B=1$). $L_{\text{white board}}$ is the luminance of a standard white board. Both are measured with equivalent illumination source. The viewing angle shall be no more than 2 degrees.



9.HANDLING, SAFETY AND ENVIROMENTAL REQUIREMENTS**WARNING**

The display glass may break when it is dropped or bumped on a hard surface. Handle with care. Should the display break, do not touch the electrophoretic material. In case of contact with electrophoretic material, wash with water and soap.

CAUTION

The display module should not be exposed to harmful gases, such as acid and alkali gases, which corrode electronic components.

Disassembling the display module can cause permanent damage and invalidate the warranty agreements.

Observe general precautions that are common to handling delicate electronic components. The glass can break and front surfaces can easily be damaged. Moreover the display is sensitive to static electricity and other rough environmental conditions.

Data sheet status

Product specification	This data sheet contains final product specifications.
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Limiting values

Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

Application information

Where application information is given, it is advisory and does not form part of the specification.

10. Reliability test

	TEST	CONDITION	METHOD	REMARK
1	High-Temperature Operation	T = +50°C, RH = 30% for 240 hrs	IEC 60 068-2-2Bp	At the end of the test, electric, mechanical, and optical specifications shall be satisfied.
2	Low-Temperature Operation	T = 0°C for 240 hrs	IEC 60 068-2-2Ab	At the end of the test, electric, mechanical, and optical specifications shall be satisfied.
3	High-Temperature Storage	T = +70°C, RH=23% for 240 hrs	IEC 60 068-2-2Bp	At the end of the test, electric, mechanical, and optical specifications shall be satisfied.
4	Low-Temperature Storage	T = -25°C for 240 hrs	IEC 60 068-2-1Ab	At the end of the test, electric, mechanical, and optical specifications shall be satisfied.
5	High-Temperature, High-Humidity Operation	T = +40°C, RH = 90% for 168 hrs	IEC 60 068-2-3CA	At the end of the test, electric, mechanical, specifications shall be satisfied.
6	High Temperature, High- Humidity Storage	T = +60°C, RH=80% for 240hrs	IEC 60 068-2-3CA	At the end of the test, electric, mechanical, specifications shall be satisfied.
7	Temperature Cycle	-25°C → +70°C, 100 Cycles 30min 30min	IEC 60 068-2-14	At the end of the test, electric, mechanical, specifications shall be satisfied.
8	UV exposure Resistance	765 W/m ² for 168hrs, 40°C	IEC60 068-2-5Sa	Optical characteristics shall be satisfied.
9	Package Vibration	1.04G, Frequency: 10~500Hz Direction: X,Y,Z Duration: 1 hours in each direction	Full packed for shipment	At the end of the test, electric, mechanical, and optical specifications shall be satisfied.
10	Package Drop Impact	Drop from height of 122 cm on concrete surface. Drop sequence: 1 corner, 3 edges, 6 faces One drop for each.	full packed for shipment	At the end of the test, electric, mechanical, and optical specifications shall be satisfied.
11	Electrostatic Effect (non-operating)	(Machine model)+/- 250V 0Ω, 200pF	IEC 62179, IEC 62180	At the end of the test, electric, mechanical, specifications shall be satisfied.
12	Altitude test Operation	700hPa (= 3000m) 48Hr		At the end of the test, electric, mechanical, specifications shall be satisfied.
13	Altitude test Storage	260hPa (= 10000m) 48Hr		At the end of the test, electric, mechanical, specifications shall be satisfied.
14	Stylus Tapping	POLYACETAL Pen: Top R:0.8mm Load: 300gf Speed: 2 times/sec Total 13,500times,		Pass criteria – no glass breakage or damage to microcapsules.

Actual EMC level to be measured on customer application

11. Bar Code definition

E0D	00	4	01	1	I	7	4	00361	A	T
1	2	3	4	2	5	6	2	7	2	8

1 : EPD model code:

ED097OC1:E0D

2 : Internal control codes:

3 : FPL reversion code

V100:3,V110:4

4 : FPL batch code:

(BL/P/B...)001~009:01~99, 100~109:A0~A9, 110~119:B0~B9... 320~329:Z0~Z9

5 : Year:

F:2005 / G:2006 / H:2007 / I:2008 /... / Z:2025

6 : Month:

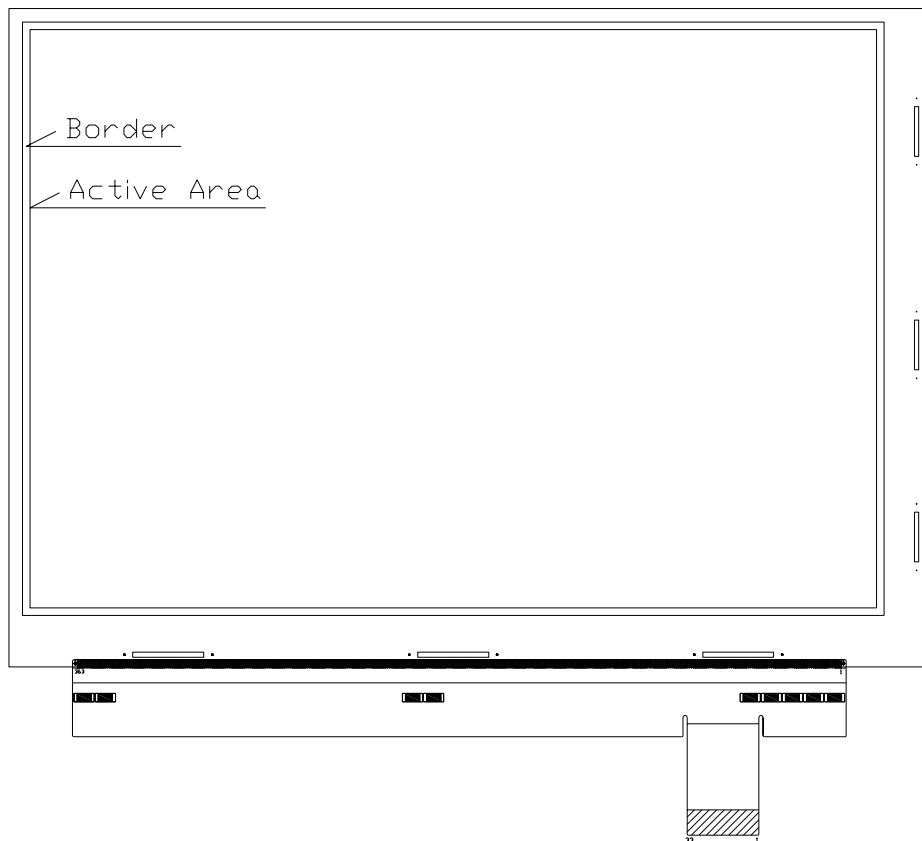
1:Jan. 2:Feb. ... 9:Sep. A:Oct. B:Nov. C:Dec.

7 : Serial number

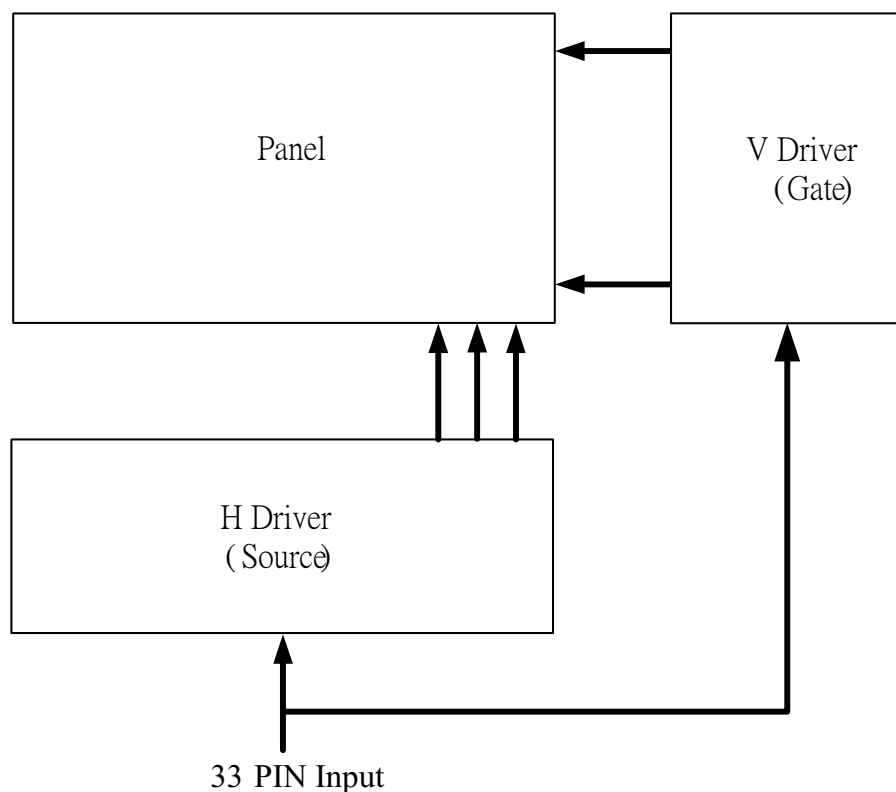
8 : MFG code:

TOC:T, PVI:P

12. Border definition

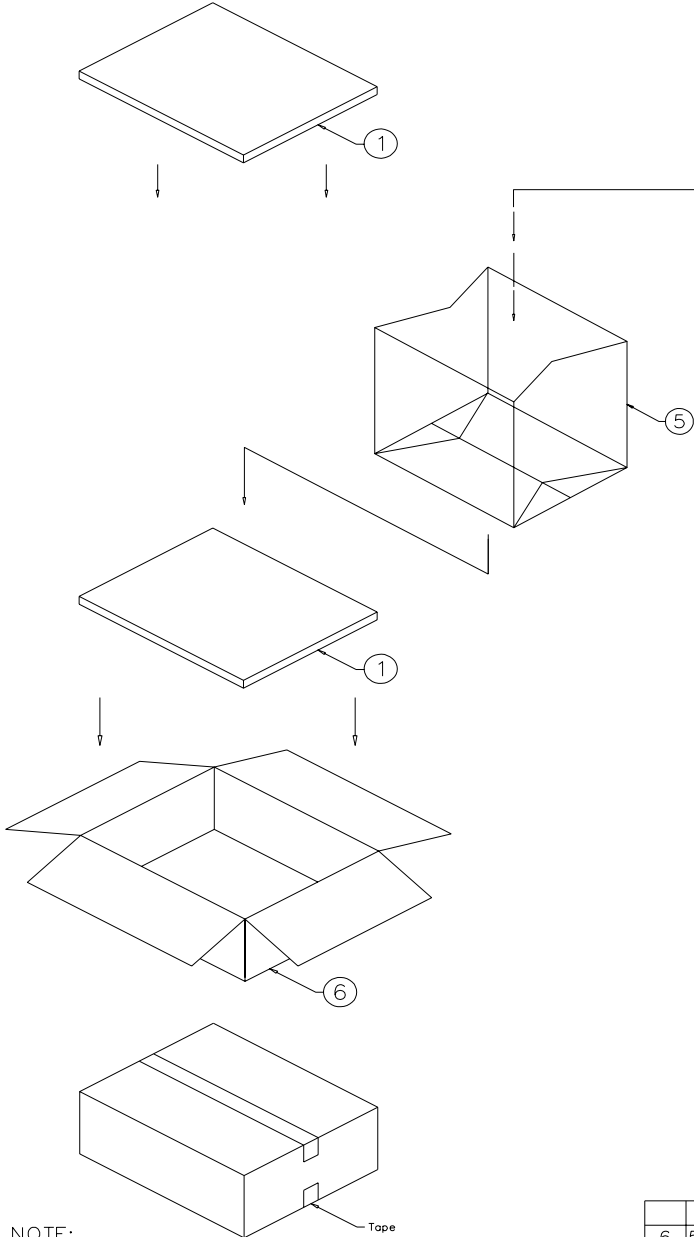


13. Block Diagram



14.Packing

REV	DESCRIPTION	DESIGN	DATE
01	INITIAL RELEASE	Jimmyc	'08.09.11
	Translate Chinese to English of Note: 5	Patrickl	'08.11.06



①

②

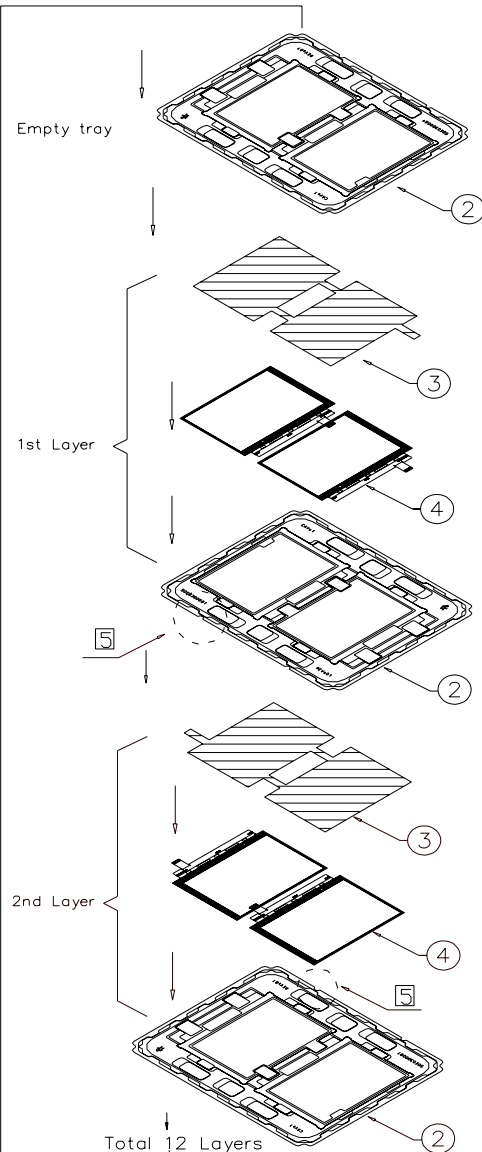
③

④

⑤

⑥

Tape



Empty tray

②

③

④

⑤

②

③

④

⑤

②

1st Layer

2nd Layer

Total 12 Layers

NOTE:

1. One layer include: 2 pcs panel, 1 pc epe cushion sheet & 1 pc tray

2. Q'TY: 24 pcs panel/carton.

3. Dimension: 455*375*190mm

4. Weight: 4.7 KG

⑤ Make sure tray stacked with 180° rotation. We can check this by lateral side view.

6	50-0100091	CARTON INTERNAL	1	
5	50-0500041	开口袋450*380*700mm	1	防静电
4		ED0970C1 Panel	24	
3	50E0200041	EPE CUSHION SHEET	12	防静电
2	50E0300081	PS TRAY	13	防静电
1	50-0300491	EPE FOAM	2	

MTL.SPEC.		UNSPECIFIED TOL'S		REMARK	
		ANGLE	ROUGHNESS		
APPROVE	Frank Shin	SCALE	UNIT	SHEET	DWG.TITLE ED0970C1 PACKING DRAW
CHECK	Frank Shin	1:1	mm	1 OF 1	
DESIGN	Jimmyc	MTL.NO.		DWG.NO.	
				REV. 01	A4 SIZE


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