Version : 2.0

TECHNICAL SPECIFICATION

MODEL NO : ED060SC4

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Please contact PVI or its agent for further information.

☐Customer's Confirmation

Customer

Date

By

☐PVI's Confirmation

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Revision History

Rev.	Issued Date	Revised Contents
1.0	May,13,2008	New
2.0	Nov.21.2008	Add Page 8 6-1)Absolute maximum rating Page 8 6-3) Panel DC characteristics Border supply Page 16 10. Reliability test Stylus Tapping add Test should be done with a bezel Page 17 11. Bar Code definition Page 18 12. Border definition Modify Page 4 3. Mechanical Specifications Page 11 7.Power on sequence Page 8 6-3) Panel DC characteristics Page 19 14.Packing Del Page 14 Note 8-1

TECHNICAL SPECIFICATION

CONTENTS

1. Application

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

The 6” active area contains 800x600 pixels, and has full 1~4 bit display capabilities.

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

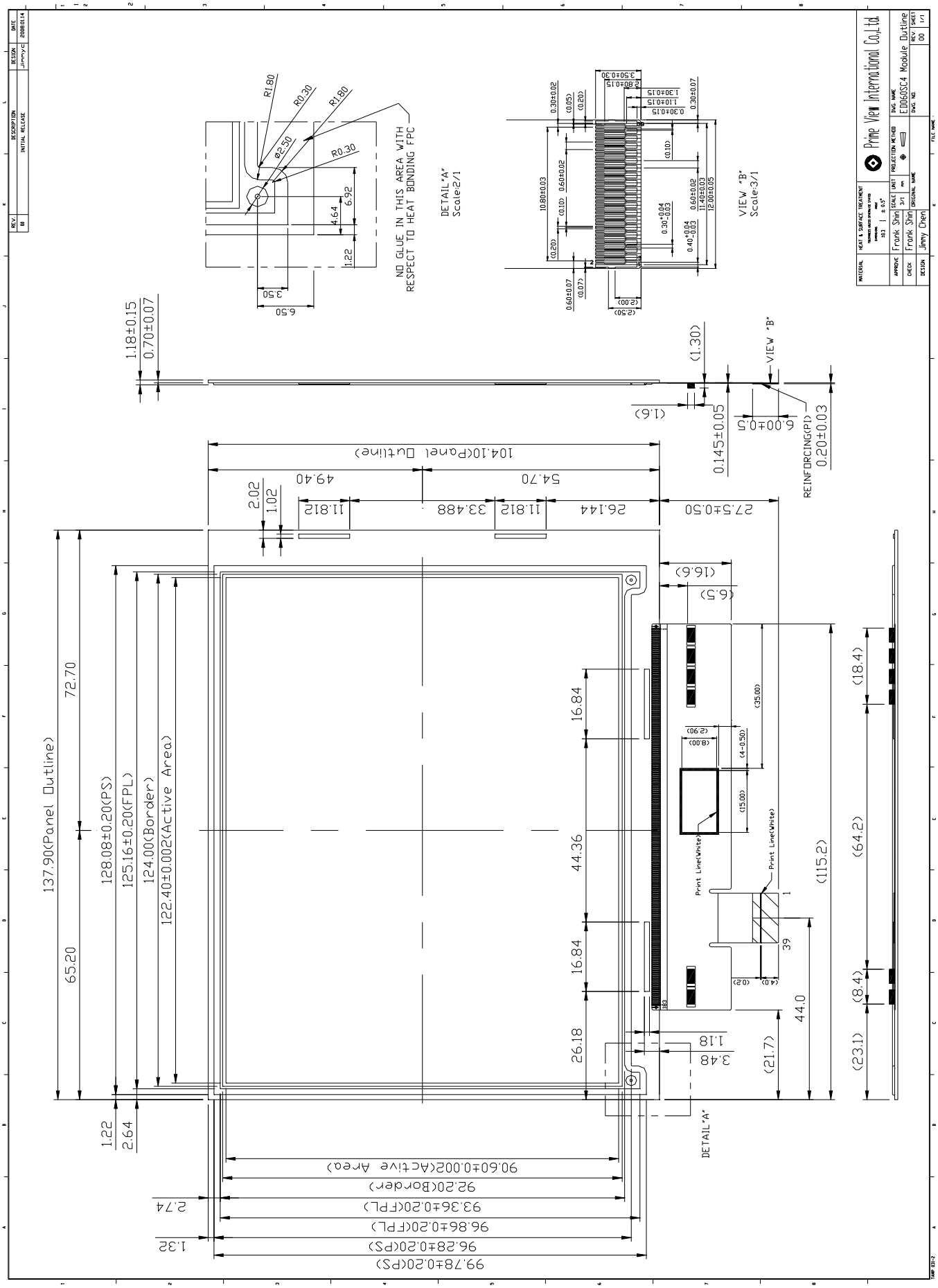
2. Features

- High contrast TFT electrophoretic
- 800x600 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	6.0 (4:3 diagonal)	Inch	
Display Resolution	800 (H) ×600(V)	Pixel	
Active Area	122.4 (H)×90.6 (V)	mm	
Pixel Pitch	0.153 (H)×0.151 (V)	mm	
Pixel Configuration	Rectangle		
Outline Dimension	137.90(W)×104.10(H)×1.18(D) (panel area height) 137.90(W)×104.10(H)×2.0 (D) (FPC area height with capacitor)	mm	Panel height is measured without released film
Module Weight	35±5	g	

4. Mechanical Drawing of EPD Module



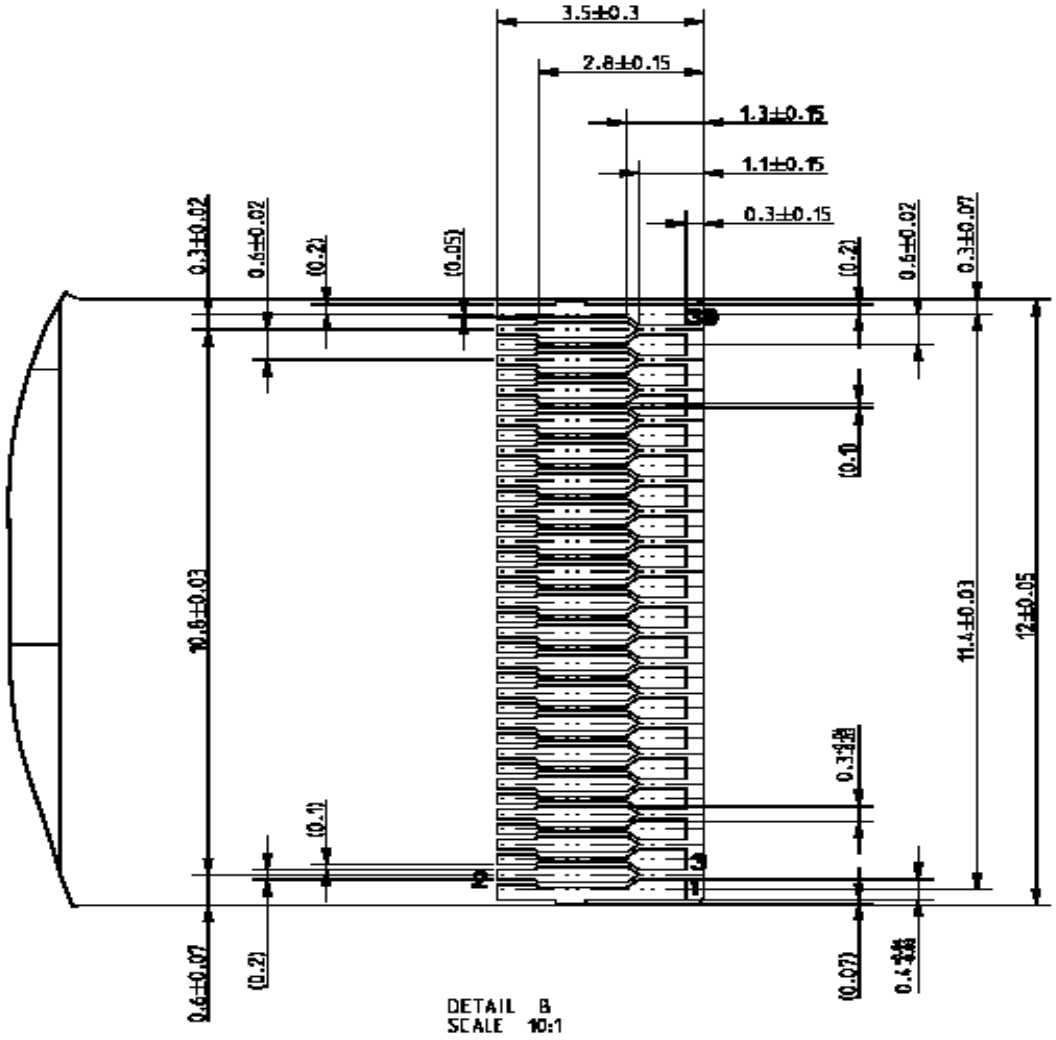
5.Input/Ouput Interface

5-1)Pin Assignment

Pin #	Signal	Description
1	VNEG	Negative power supply source driver
2	VPOS	Positive power supply source driver
3	VSS	Ground
4	VDD	Digital power supply drivers
5	CL	Clock source driver
6	LE	Latch enable source driver
7	OE	Output enable source driver
8	SHR	Shift direction source driver
9	NC	NO Connection
10	NC	NO Connection
11	SPH	Start pulse source driver
12	D0	Data signal source driver
13	D1	Data signal source driver
14	D2	Data signal source driver
15	D3	Data signal source driver
16	D4	Data signal source driver
17	D5	Data signal source driver
18	D6	Data signal source driver
19	D7	Data signal source driver
20	NC	NO Connection
21	NC	NO Connection
22	VCOM	Common connection
23	GVDD	Positive power supply gate driver
24	GVEE	Negative power supply gate driver
25	NC	NO Connection
26	NC	NO Connection
27	GMODE2	Output mode selection gate driver
28	GMODE1	Output mode selection gate driver
29	RL	Shift direction gate driver
30	U1CE2	Cascade sequence 1st gate driver
31	U1CE1	Cascade sequence 1st gate driver
32	U1SPV	Start pulse 1st gate driver
33	U1CKV	Clock 1st gate driver
34	VBORDER	Border connection
35	U2CE2	Cascade sequence 2nd gate driver
36	U2CE1	Cascade sequence 2nd gate driver
37	U2SPV	Start pulse 2nd gate driver
38	U2CKV	Clock 2nd gate driver
39	NC	NO Connection

5-2)Panel Electrical Connection

SERVICE	CONNECTOR	TYPE NUMBER	NUMBER OF PINS	MATING CONNECTOR
Interface	JST	39FXL-RSM1-S-H-TB	39	Copper foil 0.3mm pitch



6.Electrical Characteristics

6-1) Panel interface description

This panel is driven by ASIC PVI-6001A or "Apollo" display controller ASIC. See control product specification for details.

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	℃
Storage Temperature	TSTG	-25 to +70	℃

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	-	0.55	1.1	mA
Gate Negative supply	GV_{EE}		-21	-20	-19	V
	GI_{EE}	GV_{EE} =-20V	-	1.3	3.9	mA
Gate Positive supply	GV_{DD}		21	22	23	V
	GI_{DD}	GV_{DD} = 22V	-	0.6	1.8	mA
Source Negative supply	V_{NEG}		-15.4	-15	-14.6	V
	I_{NEG}	V_{NEG} = -15V	-	18	36	mA
Source Positive supply	V_{POS}		14.6	15	15.4	V
	I_{POS}	V_{POS} = 15V	-	18	36	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}		-2.5	Adjusted	-1.0	V
	I_{COM}		-	0.2	-	mA
Maximum power panel	P_{MAX}		-	-	1250	mW
Standby power panel	P_{STBY}		-	-	0.4	mW
Typical power panel	P_{TYP}		-	600	-	mW
Operating temperature			0	-	50	℃
Storage temperature			-25	-	70	℃
Maximum image update time at 25℃			-	1000	-	ms

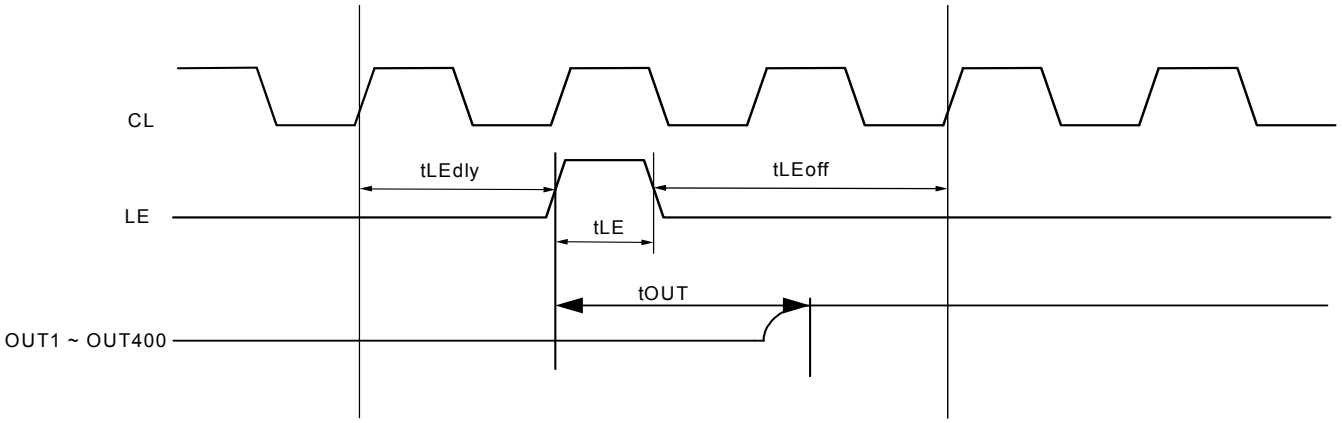
- The maximum power and maximum currents are specified for the worst case power consumption.
- The typical power is measured when "typical images" are displayed
- The standby power is the consumed power when the panel controller is in standby mode.
- The listed electrical/optical characteristics are only guaranteed under the controller & waveform provided by PVI.
- Vcom is recommended to be set in the range of assigned value ± 0.1V

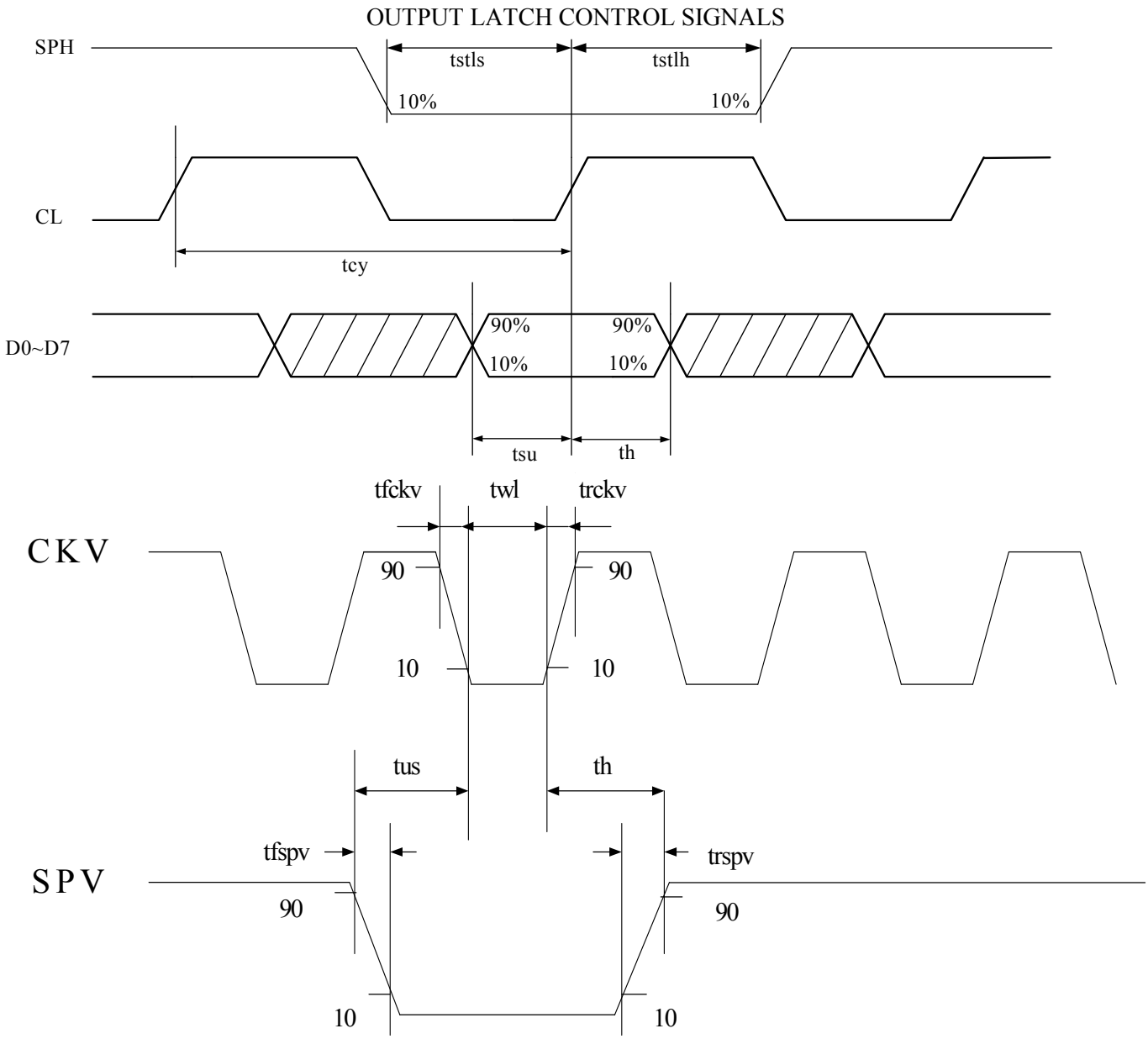
6-4)Panel AC characteristics

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





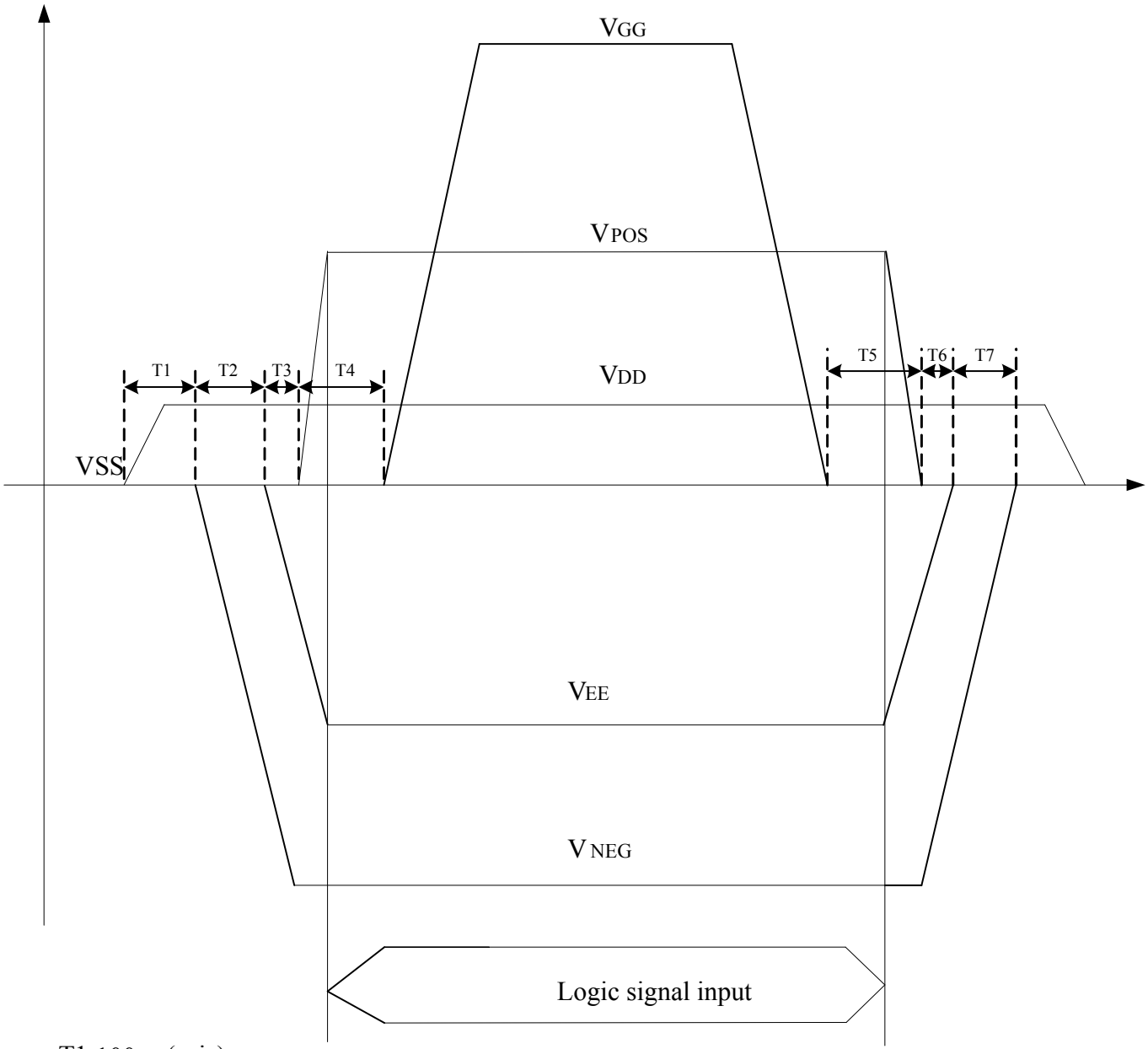
6-5) Power Consumption

Parameter	Symbol	Conditions	TYP	Max	Unit	Remark
Maximum panel power consumption during update.	-	-	-	1250	mW	
Power consumption in standby mode	-	-	-	0.4	mW	
Typical panel power	-	-	600	-	mW	

7.Power on Sequence

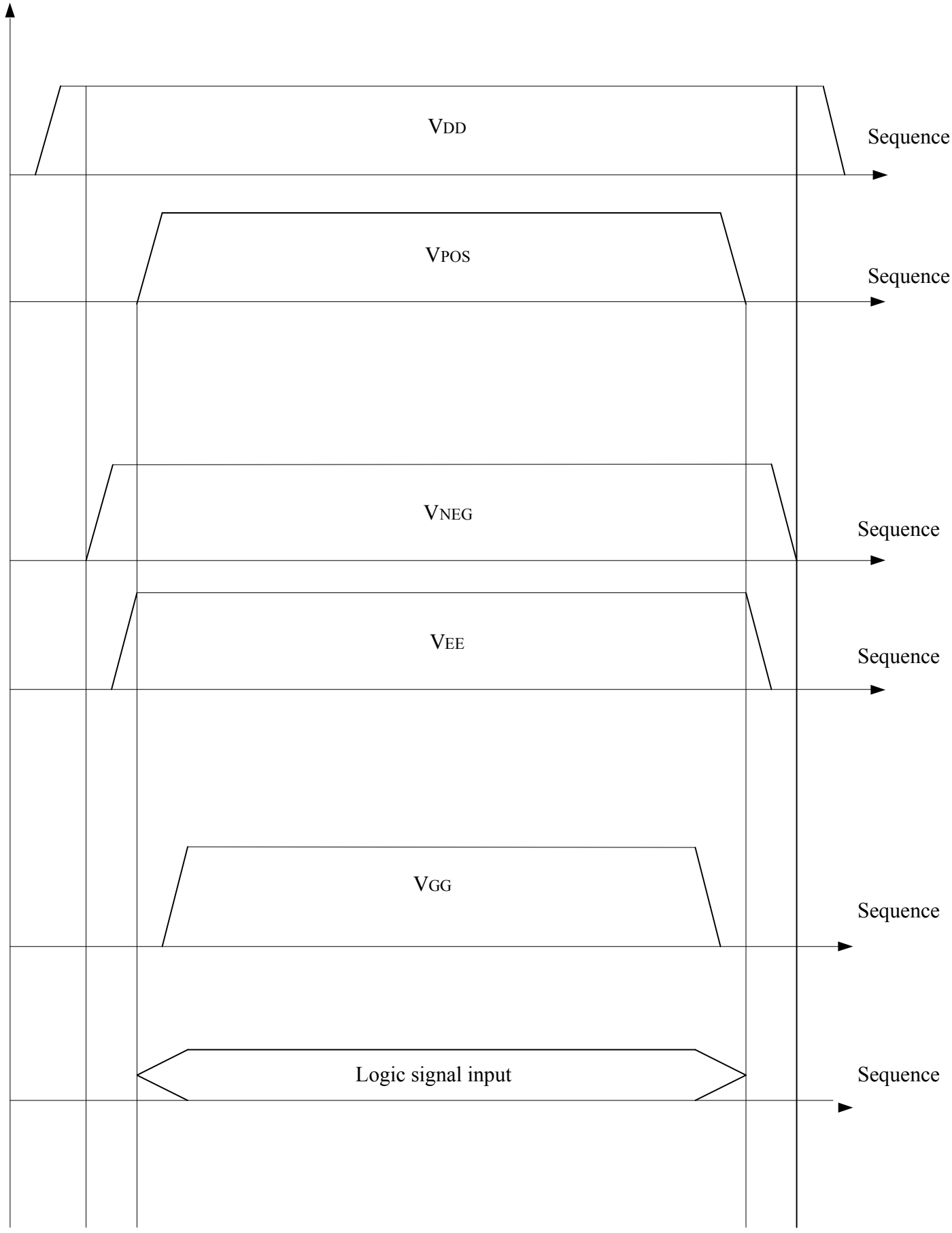
1. VSS → VDD → VNEG → VPOS (Source driver)

2. VEE → VGG(Gate driver)



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

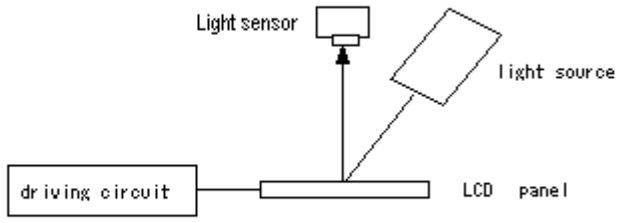
SYMBOL	PARAMETER	CONDITIONS	MIN	TYP.	MAX	UNIT	Note
R	Reflectance	White	30	35	-	%	-
Gn	N_{th} Grey Level	-	-	DS+(WS-DS)×n/(m-1)	-	L*	-
CR	Contrast Ratio	-	6	-	-		-
T_{update}	Update time	2~4-bit mode 1-bit mode		1000 540	-	ms ms	-

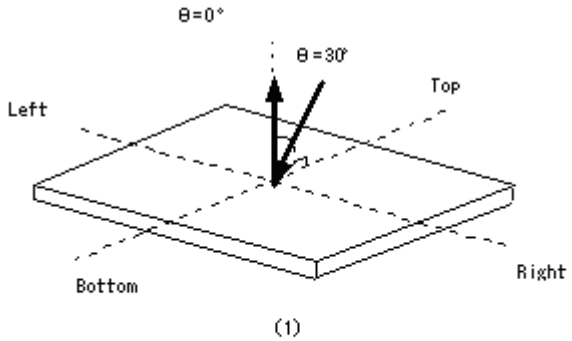
WS: White state , DS: Dark state, Gray state from Dark to White :DS、G1、G2…、Gn…、Gm-2、WS
m:4、8、16 when 2、3、4 bits mode

8-2)Definition of contrast ratio

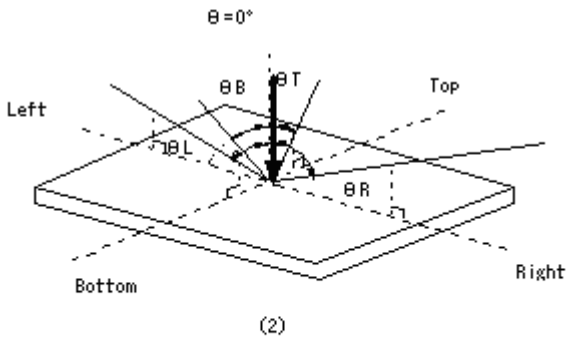
The contrast ratio (CR) is the ratio between the reflectance in a full white area (Rl) and the reflectance in a dark area (Rd):

CR = Rl/Rd





(1)



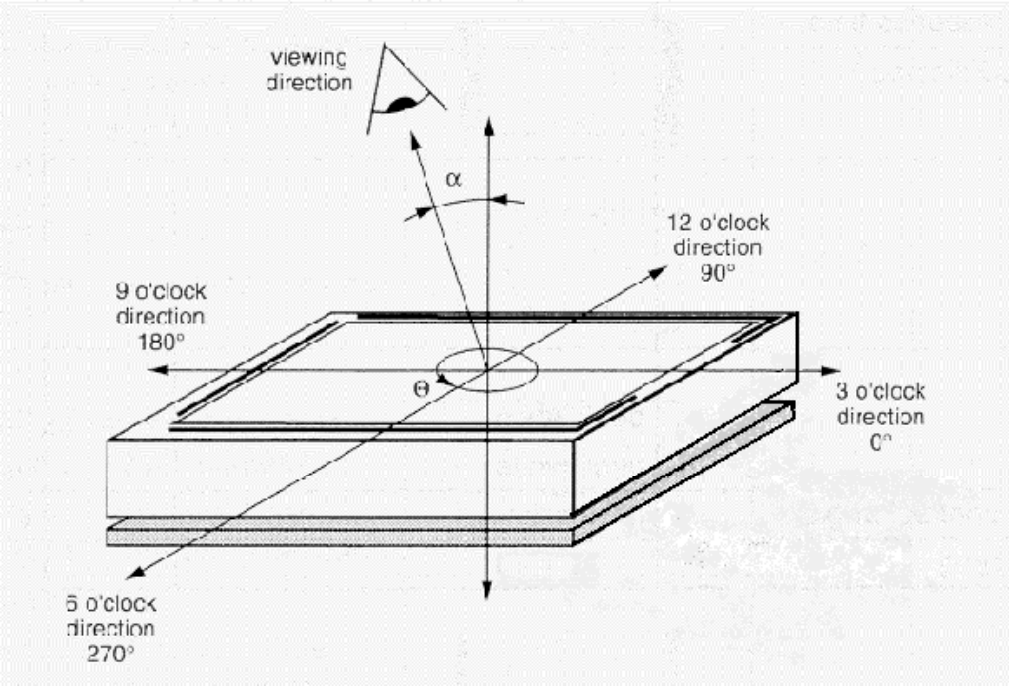
(2)

8-3)Reflection Ratio

The reflection ratio is expressed as:

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

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.



α = declination / θ = azimuth

8-4)Waveform

- Wave Form file should be available before panel delivery to customer.
- Wave Form file size should be 64Kb
- Ghosting quality is measured by the reflectance difference between specific area and surface.
  In MU and GU mode, within 3L*
  In GC mode, within 2L*

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 electronics components.
Disassembling the display module can cause permanent damage and invalidates 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.
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 Functional	T = +60°C, RH=26% for 240 hrs	IEC 60 068-2-2Bp	At the end of the test, electric, mechanical, specifications shall be satisfied.
4	Low-Temperature Functional	T = -10°C for 240 hrs	IEC 60 068-2-2Ab	At the end of the test, electric, mechanical, specifications shall be satisfied.
5	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.
6	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.
7	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.
8	High Temperature, High- Humidity Storage	T = +60℃, RH=80% for 240hrs	IEC 60 068-2-3CA	At the end of the test, electric, mechanical, specifications shall be satisfied.
9	Temperature Cycle	1 cycle:[-25℃ 30min]→[+70 ℃ 30 min] : 100 cycles	IEC 60 068-2-14	At the end of the test, electric, mechanical, specifications shall be satisfied.
10	UV exposure Resistance	765 W/m^2 for 168hrs,40℃	IEC60 068-2-5Sa	Optical characteristics shall be satisfied.
11	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.
12	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.
13	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.
14	Altitude test Operation	700hPa (= 3000m) 48Hr		At the end of the test, electric, mechanical, specifications shall be satisfied.

15	Altitude test Storage	260hPa (= 10000m) 48Hr		At the end of the test, electric, mechanical, specifications shall be satisfied.
16	Stylus Tapping	POLYACETAL Pen: Top R:0.4mm Load: 300gf Speed: 5times/sec Total 13,500times,	Test should be done with a bezel	Pass criteria – no glass breakage or damage to microcapsules.

Actual EMC level to be measured on customer application

11. Bar Code definition

E0R 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:

ED060SC4:E0R

2 : Internal control codes:

3 : FPL reversion code

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:

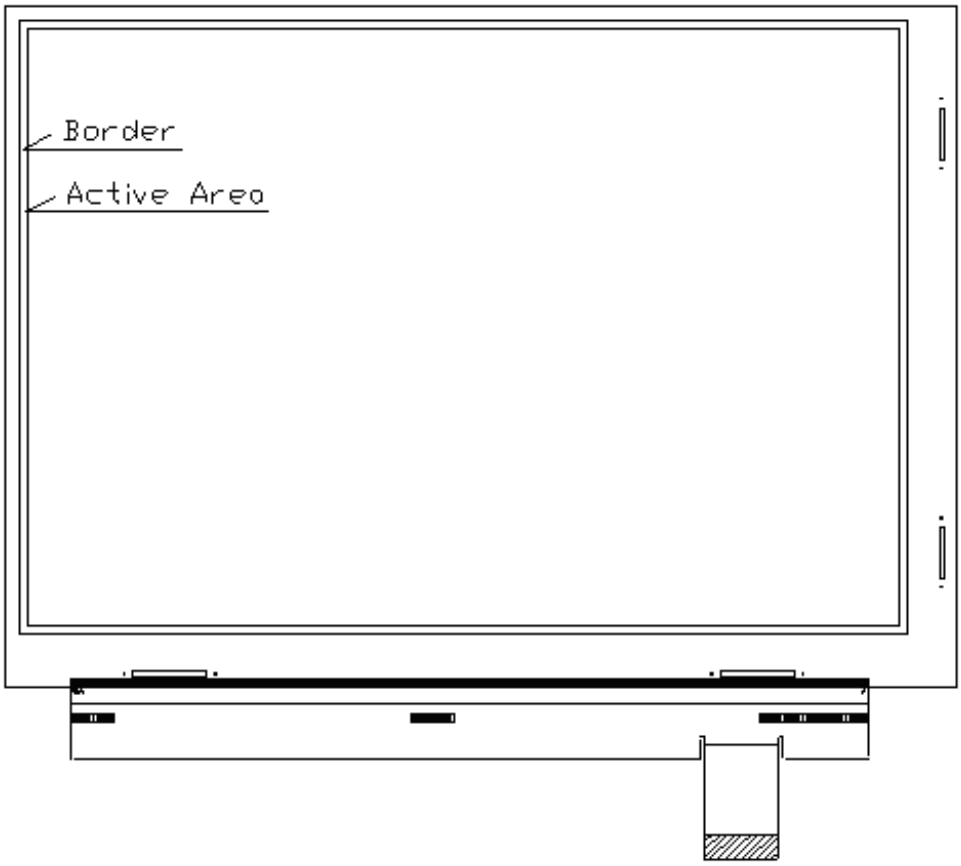
1:Jan. 2:Feb. ... 9:Sep. A:Oct. B:Nov. C:Dec.

7 : Serial number

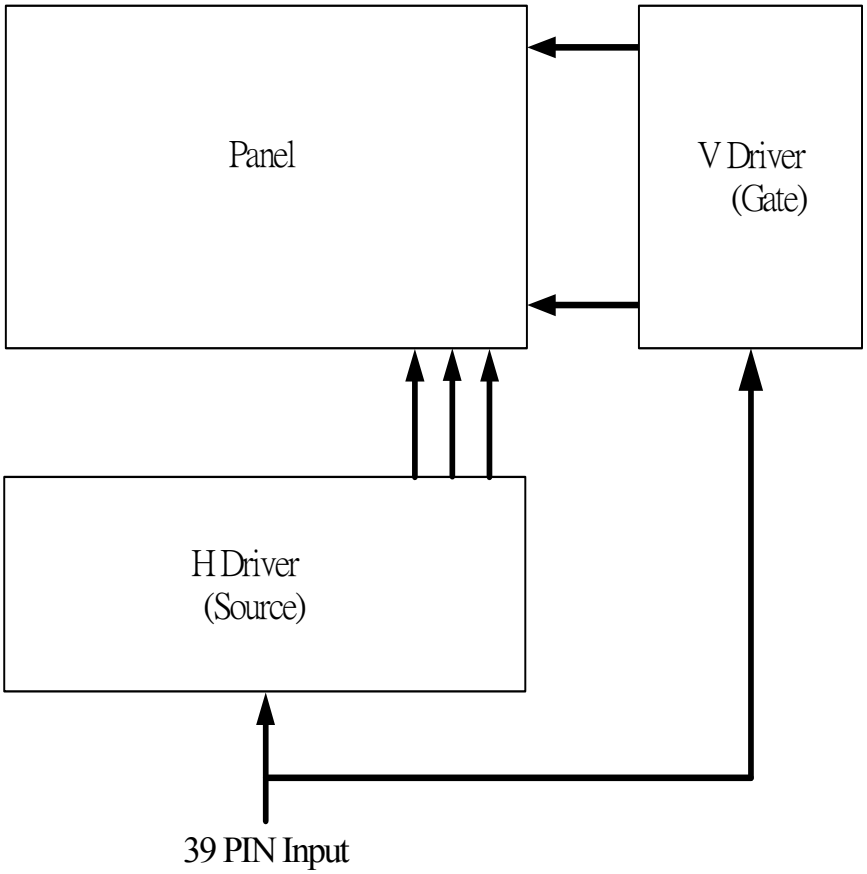
8 : MFG code:

TOC:T, PVI:P

12. Border definition

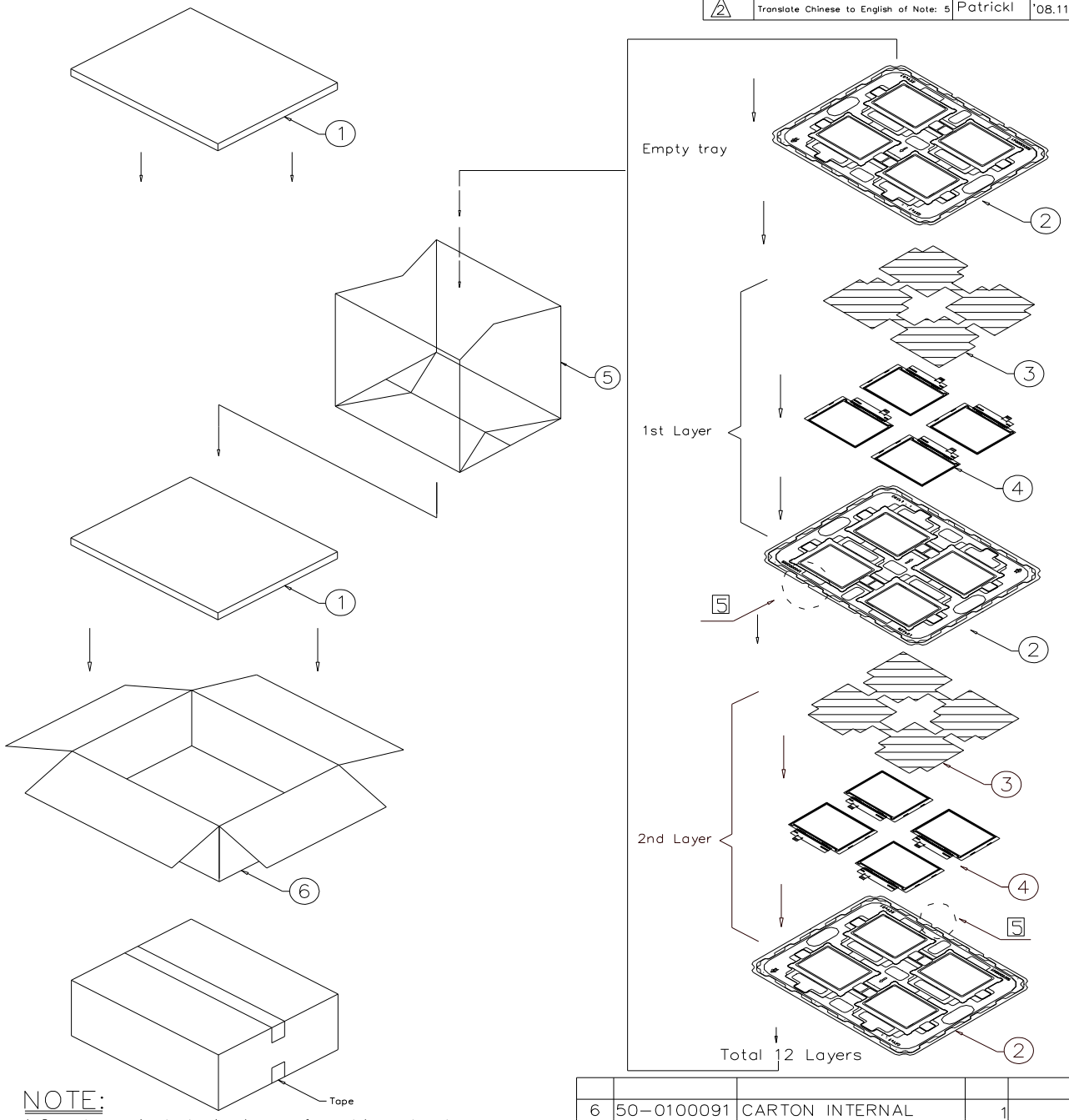


13.Block Diagram



14.Packing

REV	DESCRIPTION	DESIGN	DATE
01	INITIAL RELEASE	Jimmyc	'08.06.18
2	Translate Chinese to English of Note: 5	Patrickl	'08.11.06



NOTE:
1. One layer include: 1 piece of cushion sheet, 4pcs panel & 1 piece of tray.
2. Q'TY: 48 pcs panel/carton.
3. Dimension: 455*375*190mm
4. Weight: 4.7 KG
2 5 Make sure tray stacked with 180° rotation. We can check this by lateral side view.

ITEM	PART NO.	DESCRIPTION	QTY	REMARK
6	50-0100091	CARTON INTERNAL	1	
5	50-0500041	摺口袋450*380*700mm	1	抗靜電
4		ED060SC4 Panel	48	
3	50E0200021	EPE CUSHION SHEET	12	抗靜電
2	50E0300041	PS TRAY	13	抗靜電
1	50-0300491	EPE FOAM	2	

MTL.SPEC.	UNSPECIFIED TOL'S	REMARK
	ANGLE	
	ROUGHNESS	

元太科技股份有限公司
Prime View Internation Co.,ltd.

APPROVE	Frank Shin	SCALE	UNIT	SHEET	DWG.TITLE
CHECK	Frank Shin	1:1	mm	1 OF 1	ED060SC4 PACKING DRAW
DESIGN	Jimmyc	MTL.NO.	DWG.NO.	REV. 02	A4 SIZE