Version: 2.0

<div style="border:1px solid">

TECHNICAL SPECIFICATION

MODEL NO: ED060SC7

</div>

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Please contact EIH or its agent for further information.

☐Customer's Confirmation

Customer _____

Date _____

By _____

☐EIH's Confirmation

Confirmed By _____

Prepared By _____

Revision History

Rev.	Issued Date	Revised Contents
1.0	September, 14,2010	New
2.0	Nov 15 , 2010	**Modify** Page 5 4. Mechanical Drawing of EPD module Outline drawing delete VCOM LABEL Page 14 7. Power on Sequence **Add** Page 16 8. Discharge time Sequence

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 600 x 800 pixels, the display is capable to display images at 2-16 gray levels (1-4 bits) depending on the display controller and the associated waveform file used.
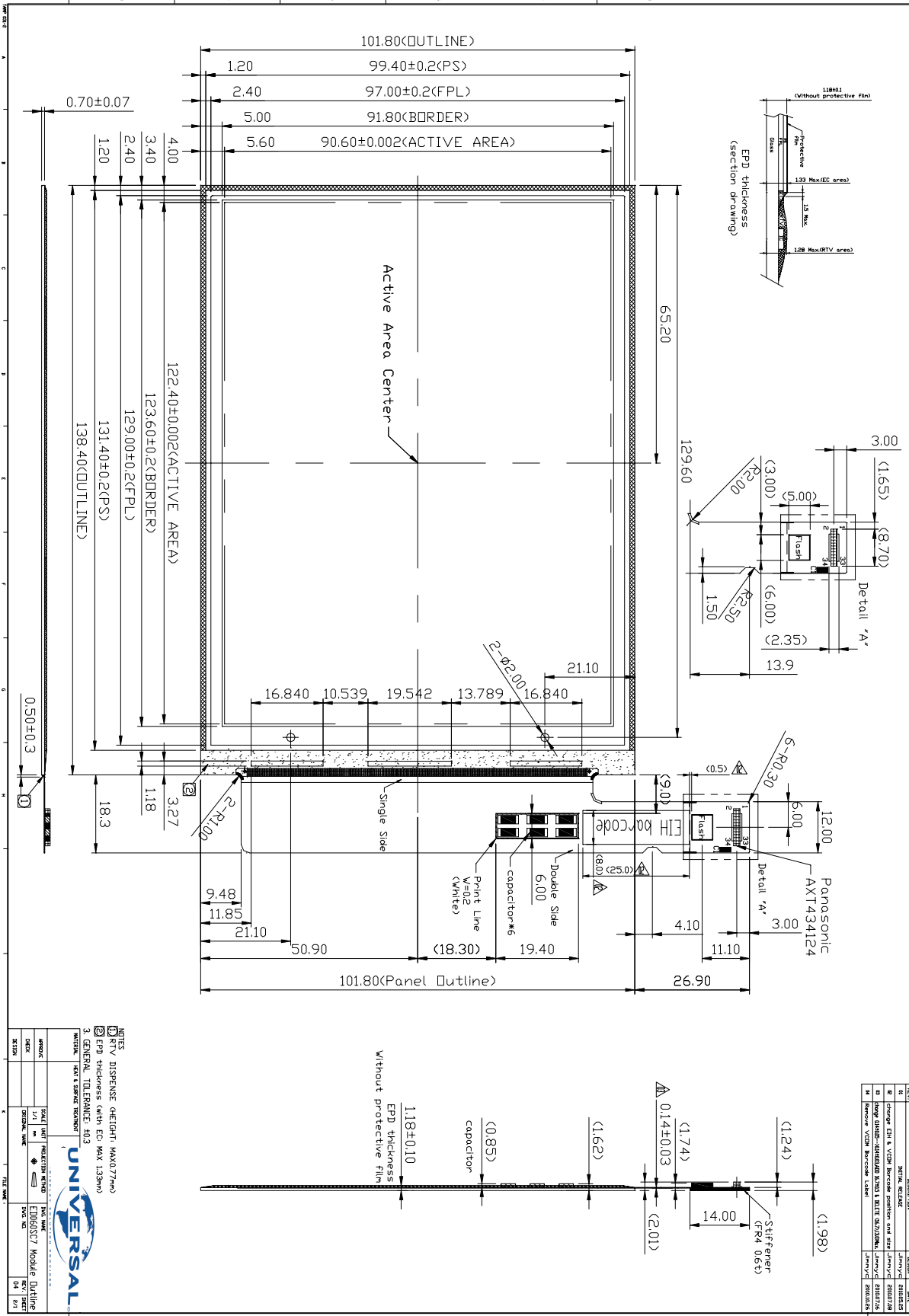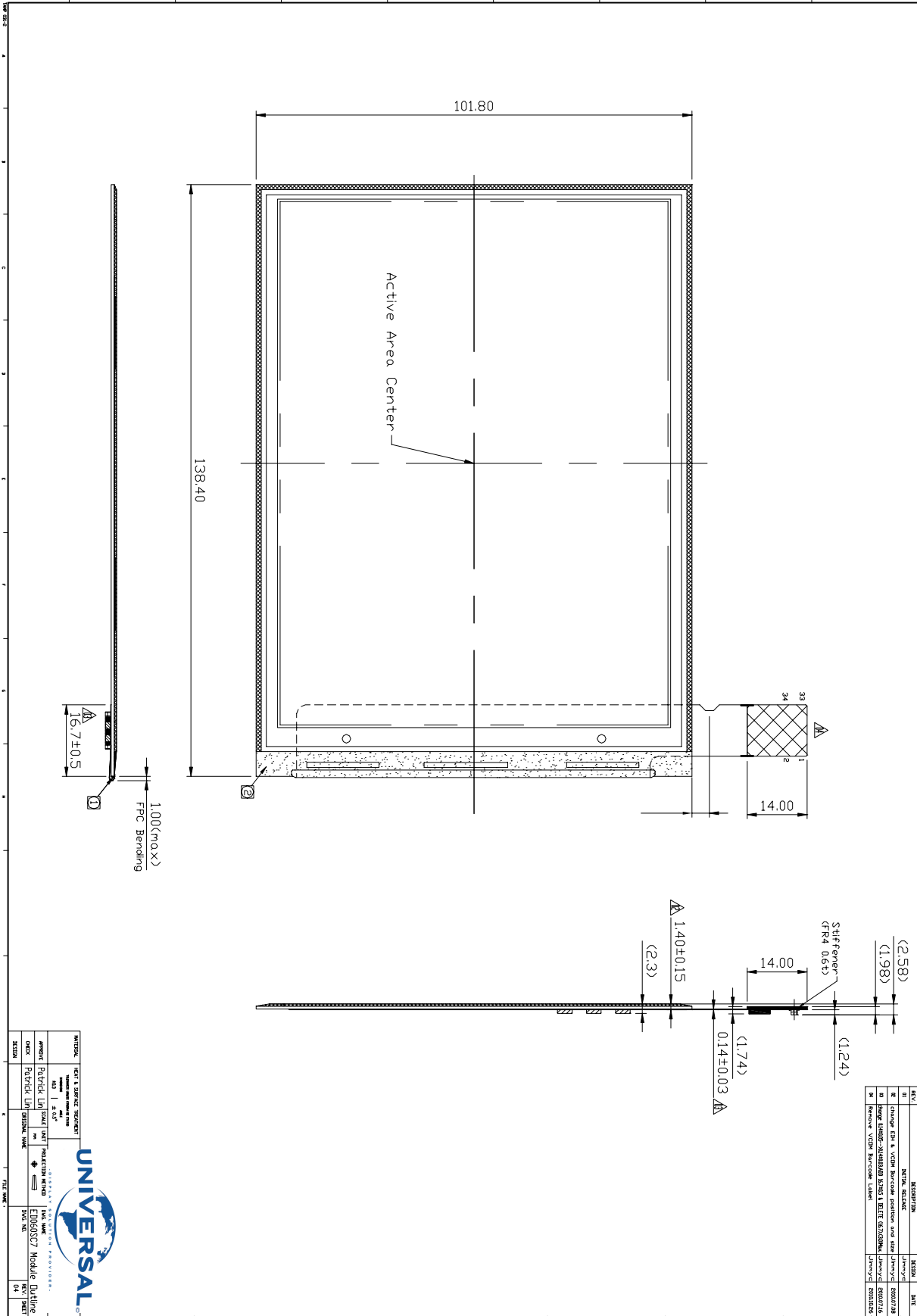
2. Features

- ➢ High contrast TFT electrophoretic
- ➢ 600 x 800 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

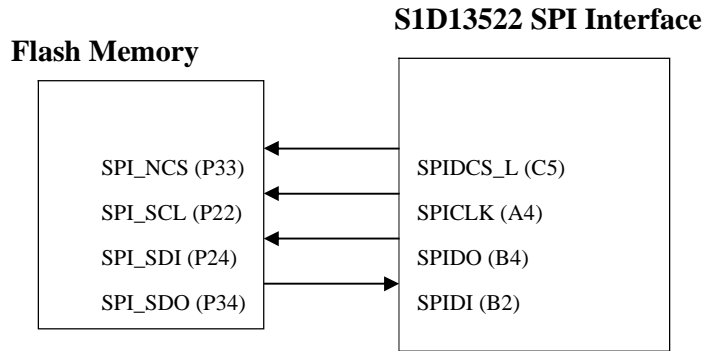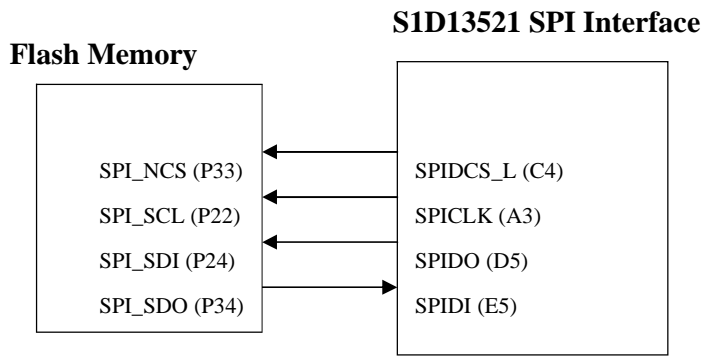| Parameter	Specifications	Unit	Remark
Screen Size	6.0 (3:4 diagonal)	Inch	
Display Resolution	600 (H)×800(V)	Pixel	
Active Area	90.6 (H)×122.4 (V)	mm	
Pixel Pitch	0.151 (H)×0.153 (V)	mm	
Pixel Configuration	Rectangle		
Outline Dimension	101.8(W)×138.4(H)×1.18(D) (panel area height)	mm	
Module Weight	34±3.4	g	

4. Mechanical Drawing of EPD Module

101.80

138.40

Active Area Center

16.7±0.5

1.00(max)
FPC Bending

33
34
2
1

14.00

1.40±0.15

(2.3)

0.14±0.03

(1.74)

14.00

Stiffener
(FR4 0.6t)

(1.24)

(2.58)

(1.98)

5. Input/Output Interface
5-1) Connector type: AXT434124
Pin Assignment

Pin #	Signal	Description	Remark
1	VNEG	Negative power supply source driver	
2	VPOS	Positive power supply source driver	
3	VNEG	Negative power supply source driver	
4	VPOS	Positive power supply source driver	
5	VDD	Digital power supply drivers	
6	VSS	Ground	
7	VDD	Digital power supply drivers	
8	VSS	Ground	
9	XCL	Clock source driver	
10	XLE	Latch enable source driver	
11	XOE	Output enable source driver	
12	XSTL	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	VCOM	Common connection	
22	SPI_SCL	Serial Data Clock for Flash memory	Note5-1
23	VCOM	Common connection	
24	SPI_SDI	Serial Data Input for Flash memory	Note5-1
25	VGG	Positive power supply gate driver	
26	MODE1	Output mode selection gate driver	
27	VEE	Negative power supply gate driver	
28	CKV	Clock gate driver	
29	VEE	Negative power supply gate driver	
30	SPV	Start pulse gate driver	
31	VSS	Ground	
32	BORDER	Border connection	
33	SPI_NCS	Chip Select for Flash memory	Note5-1
34	SPI_SDO	Serial Data Output for Flash memory	Note5-1

Note 5-1

S1D13521 SPI Interface

Flash Memory

Flash Memory	S1D13521 SPI Interface
SPI_NCS (P33)	SPIDCS_L (C4)
SPI_SCL (P22)	SPICLK (A3)
SPI_SDI (P24)	SPIDO (D5)
SPI_SDO (P34)	SPIDI (E5)

S1D13522 SPI Interface

Flash Memory

Flash Memory	S1D13522 SPI Interface
SPI_NCS (P33)	SPIDCS_L (C5)
SPI_SCL (P22)	SPICLK (A4)
SPI_SDI (P24)	SPIDO (B4)
SPI_SDO (P34)	SPIDI (B2)

6.Electrical Characteristics

6-1) 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	℃

6-2) 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	-	1.05	3.15	mA
Gate Negative supply	V_{EE}		-21	-20	-19	V
	I_{EE}	V_{EE} =-20V	-	0.8	2.4	mA
Gate Positive supply	V_{GG}		21	22	23	V
	I_{GG}	V_{GG} = 22V	-	0.8	2.4	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	-	16	32	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	-0.3	V
	I_{COM}		-	0.25	-	mA
Maximum power panel	P_{MAX}		-	-	1131	mW
Standby power panel	P_{STBY}		-	-	0.4	mW
Typical power panel	P_{TYP}		-	547	-	mW
Operating temperature			0	-	50	℃
Storage temperature			-25	-	70	℃

- The Typical power consumption is measured with following pattern transition: from horizontal 4 gray scale pattern to vertical 4 gray scale pattern. (Note 6-1)

- 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 EIH

- Vcom is recommended to be set in the range of assigned value $\pm$ 0.1V

- The maximum I_{COM} inrush current is about 800 mA

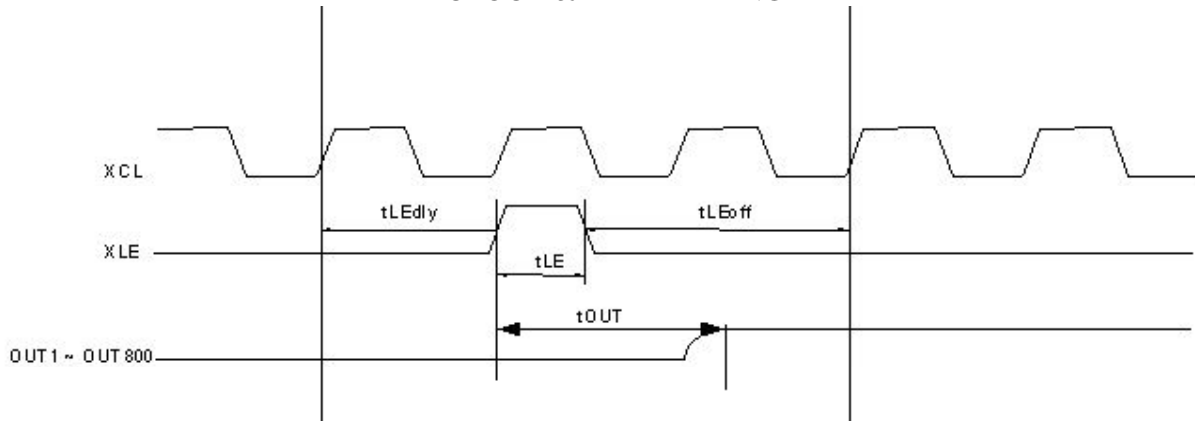Note 6-1

The Typical power consumption
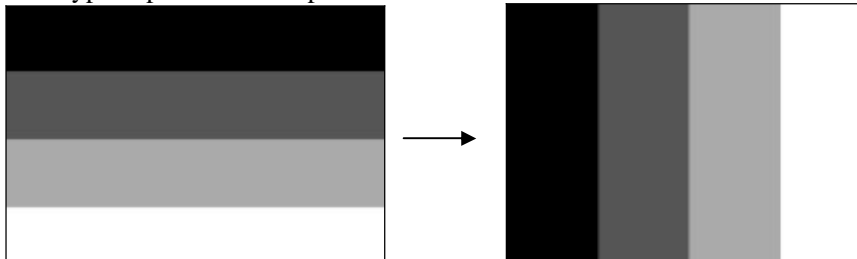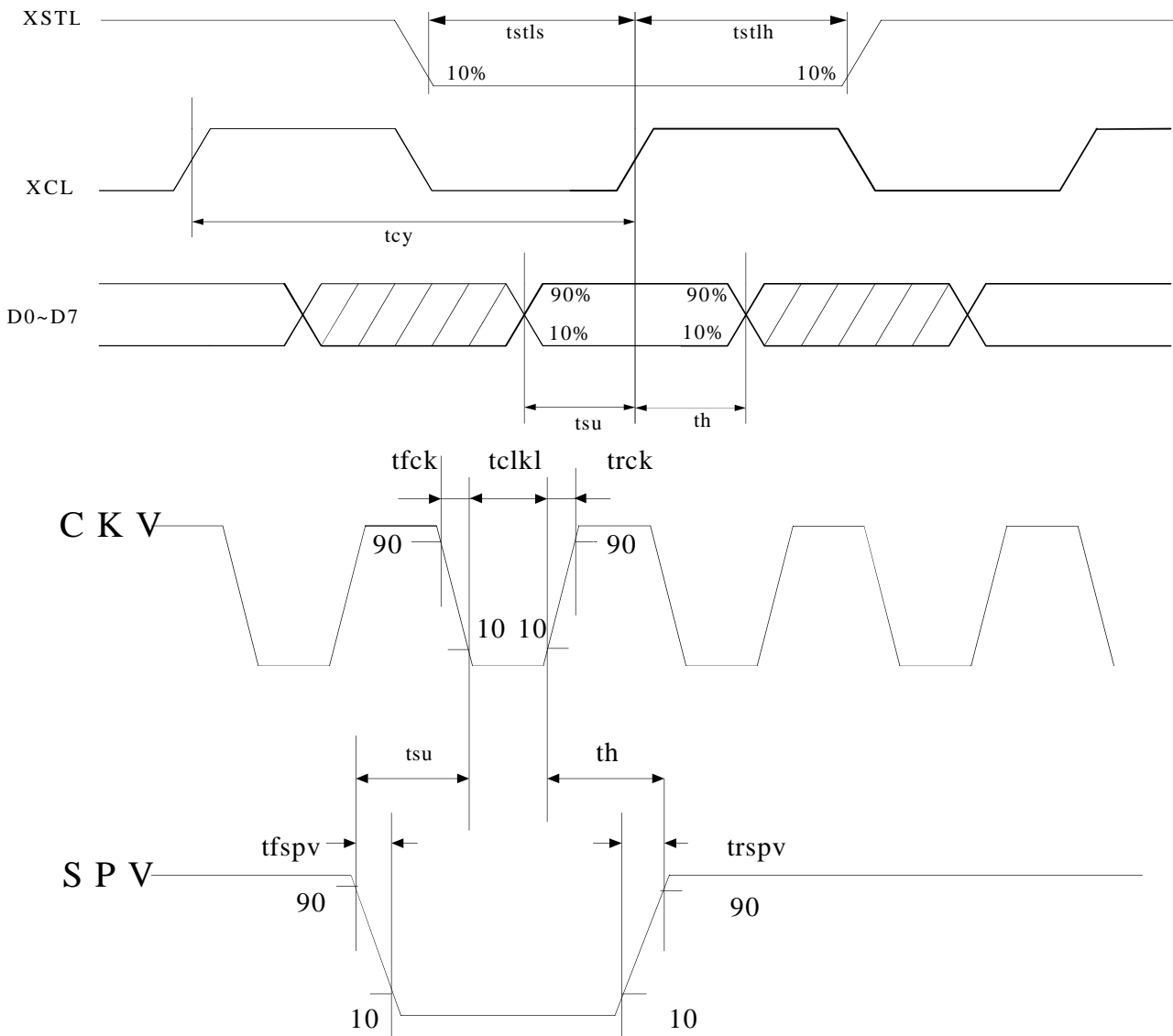
6-3) Panel AC characteristics

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 XCL cycle time	tcy	50	-	DC	ns	Below table
D0 ..D7 setup time	tsu	8	-	-	ns	
D0 .. D7 hold time	th	1	-	-	ns	
XLE on delay time	tLEdly	40	-	-	ns	
XLE high-level pulse width	tLEw	40	-	-	ns	
XLE off delay time	tLEoff	200	-	-	ns	
Output setting time to +/- 30mV(C_{load}=200pF)	tout	-	-	12	us	

CLOCK & DATA TIMING

XCL

tLEdly   tLEoff

XLE

tLE

tOUT

OUT1 ~ OUT 800

OUTPUT LATCH CONTROL SIGNALS

XSTL

tstls   tstlh

10%   10%

XCL

tcy

D0~D7

90%   90%

10%   10%

tsu   th

tfck   tclkl   trck

C K V

90   90

10 10

tsu   th

tfspv   trspv

S P V

90   90

10   10

6-4) Power Consumption

Parameter	Symbol	Conditions	TYP	Max	Unit	Remark
Panel power consumption during update.	-	-	547	1131	mW	
Power consumption in standby mode	-	-	-	0.4	mW	

7.Power on Sequence

Power Rails must be sequenced in the following order：

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

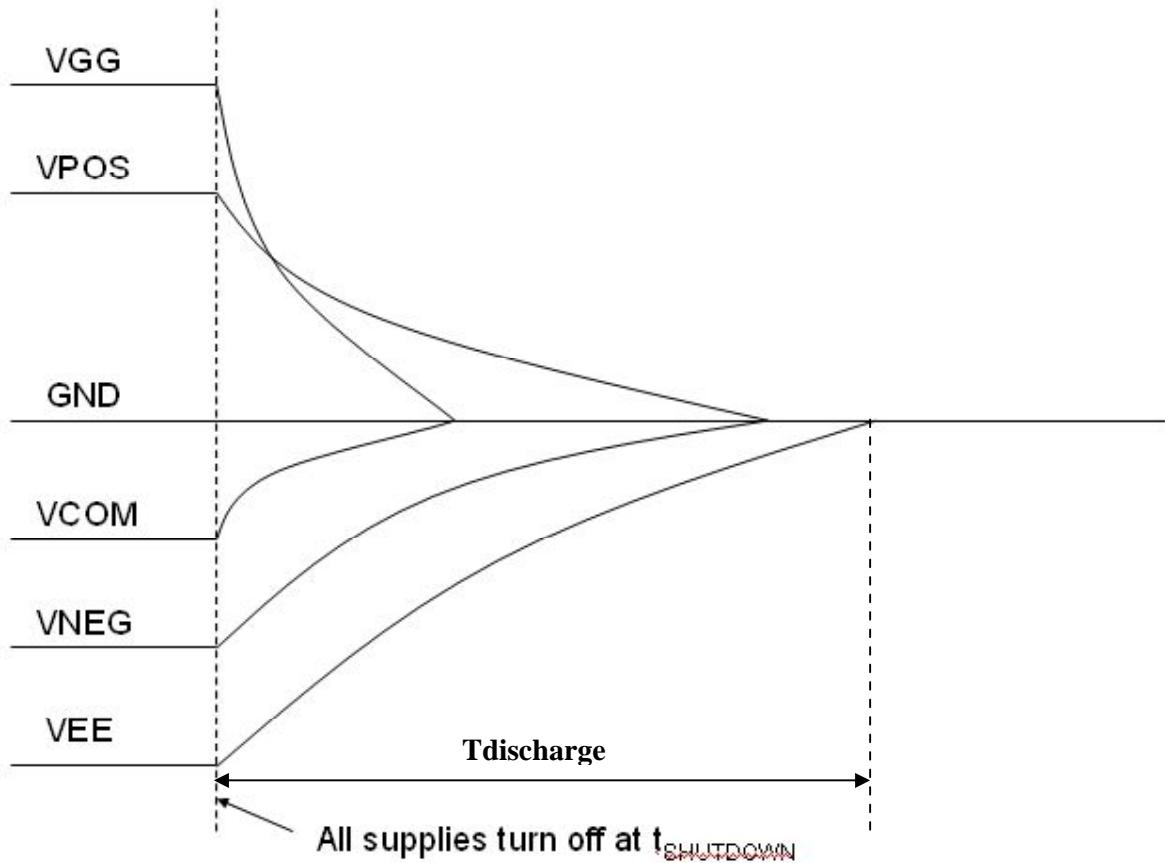2. VSS → VDD → VEE → VGG (Gate driver)

POWER ON
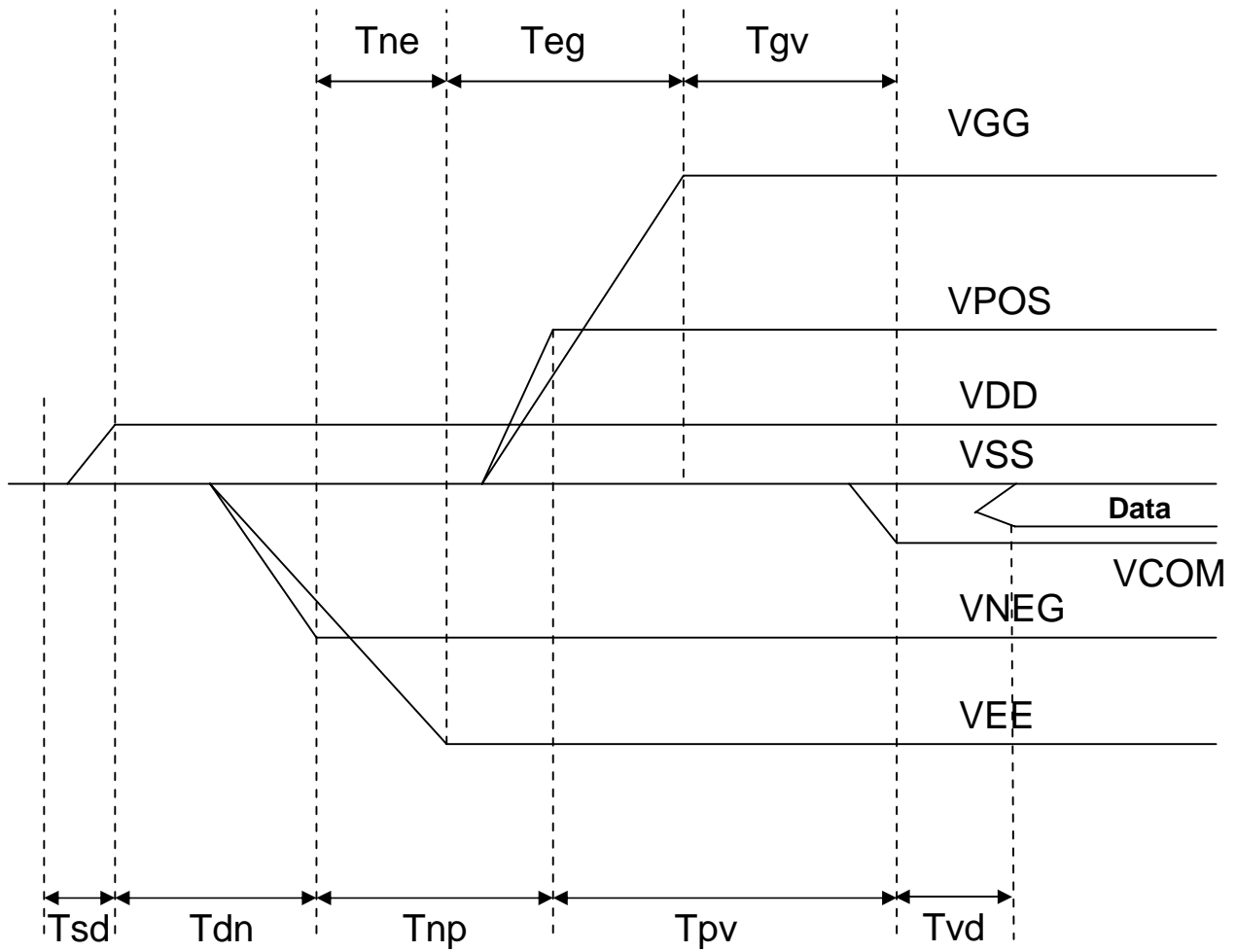
	Min	Max
Tsd	100us	-
Tdn	100us	-
Tnp	1000us	-
Tpv	100us	-
Tvd	100us	-
Tne	0us	-
Teg	1000us	-
Tgv	100us	-

POWER DOWN

Tvg   Tge   Ten

VGG

VPOS

VDD

VSS

Data

VCOM

VNEG

VEE

Tdv   Tvp   Tpn   Tns   Tsd
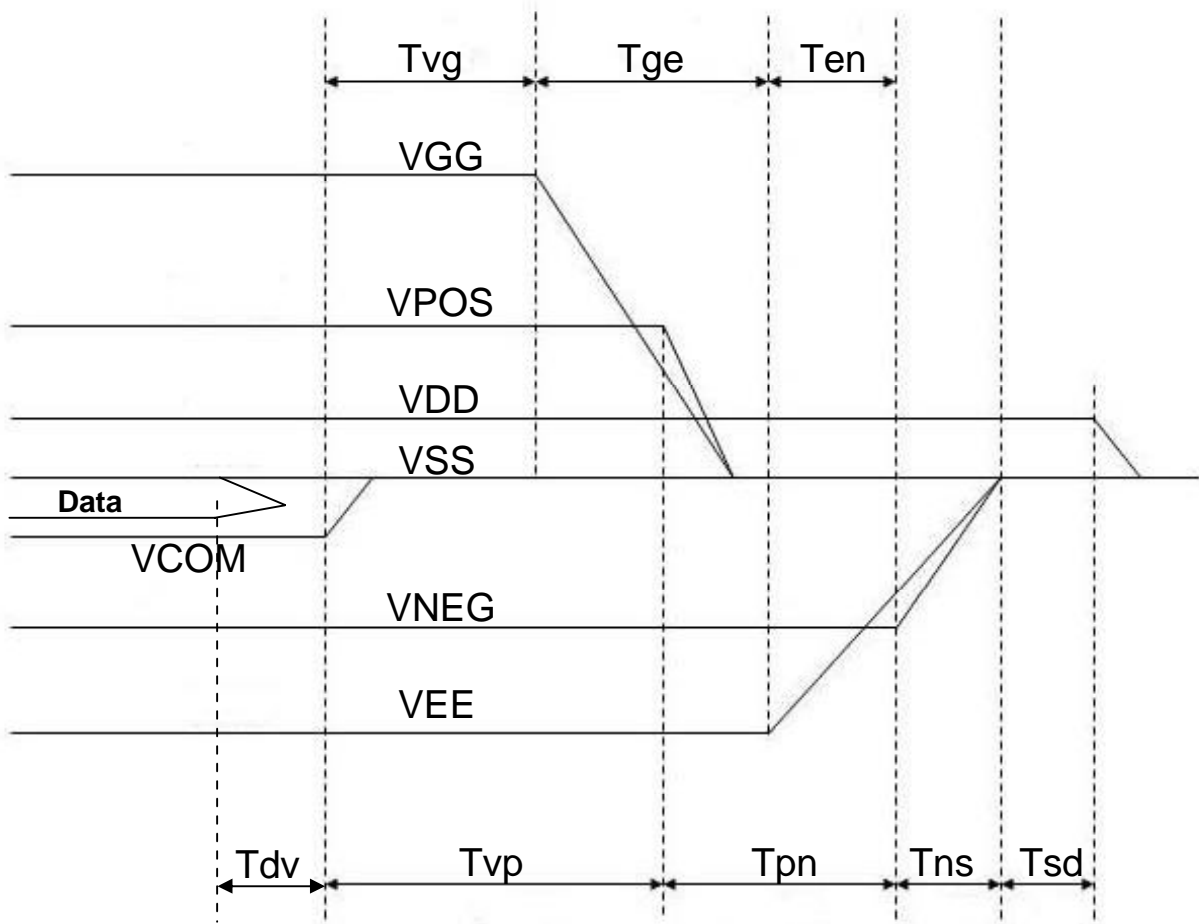
	Min	Max
Tdv	100 μs	-
Tvp	0 μs	-
Tpn	0 μs	-
Tns	-	1000ms
Tsd	100 μs	-
Tvg	0 μs	-
Tge	0 μs	-
Ten	0 μs	-

8. Discharge time Sequence

Note8-1：Supply voltages decay through pulldown resistors.
Note8-2：VEE must remain negative of all other supplies during decay period.

8-1) Refresh Rate
The module ED60SC7 is applied at a maximum screen refresh rate of 85Hz.

	Min	Max
Refresh Rate	-	85Hz

ED060SC7

9. Optical characteristics

9-1) Specifications

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

$T = 25^{\circ}C$

| Symbol	Parameter	Conditions	Min	Typ.	Max	Unit	Note
R	Reflectance	White	30	40	-	%	Note 9-1
Gn	N_{th} Grey Level	-	-	DS+(WS-DS) $\times n/(m-1)$	-	L*	-
CR	Contrast Ratio	-	10	12	-		-

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 9-1: Luminance meter: Eye – One Pro Spectrophotometer

9-2) 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):
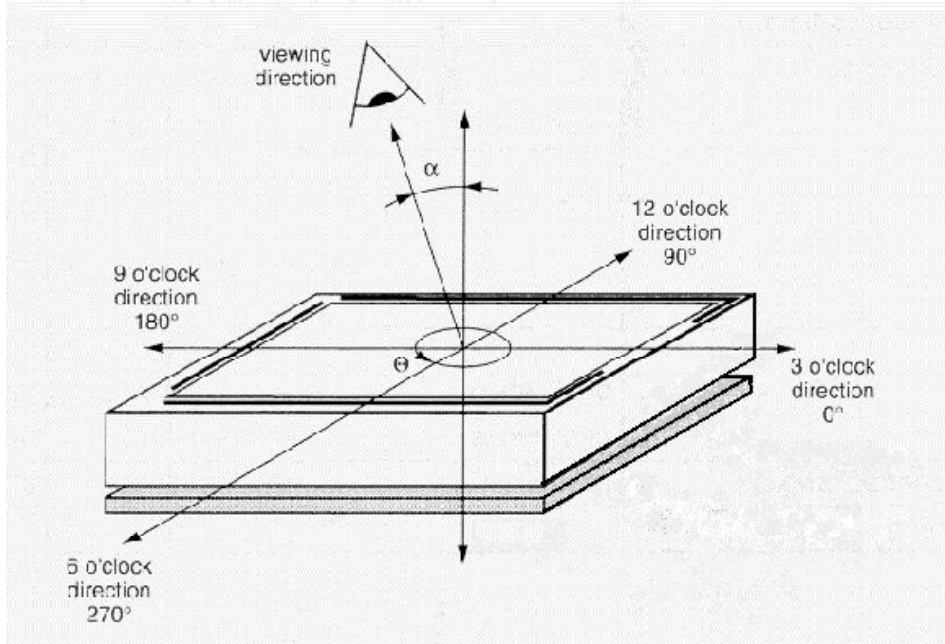
CR = Rl/Rd

Light Sensor

Light Source

Driving Circuit   Panel
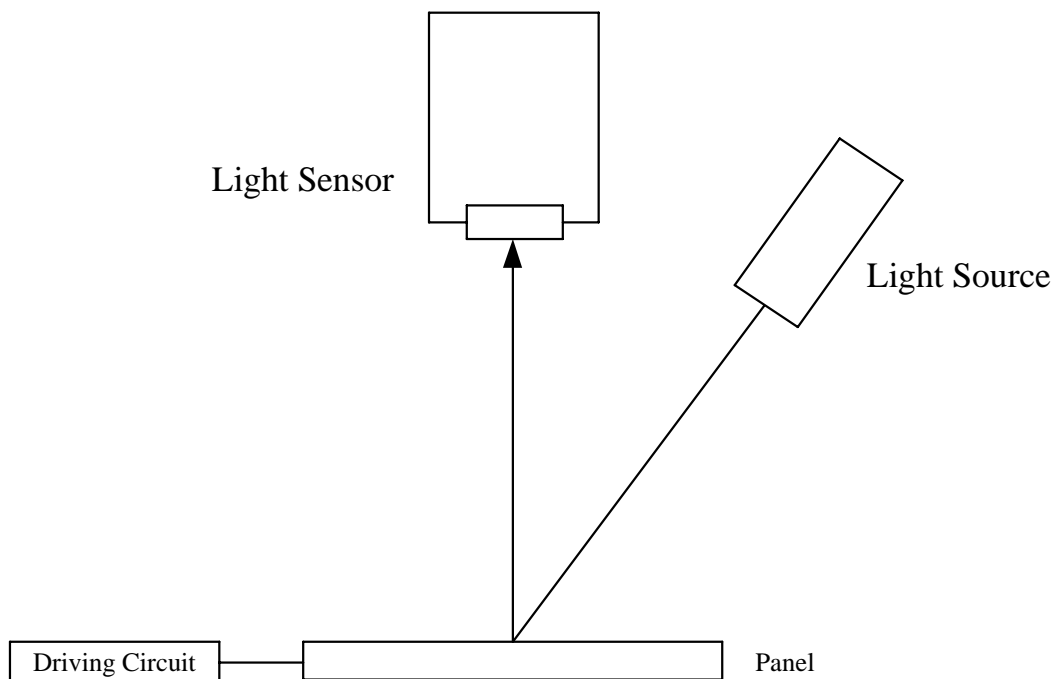
9-3) Reflection Ratio

The reflection ratio is expressed as:

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

L$_{center}$ is the luminance measured at center in a white area (R=G=B=1). L$_{white\ board}$ 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

10.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 specificatio n	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.	

11. Reliability test

	TEST	CONDITION	METHOD
1	High-Temperature Operation	T = +50°C, RH = 30% for 240 hrs	IEC 60 068-2-2Bp
2	Low-Temperature Operation	T = 0°C for 240 hrs	IEC 60 068-2-2Ab
3	High-Temperature Storage	T = +70°C, RH=23% for 240 hrs Test in white pattern	IEC 60 068-2-2Bp
4	Low-Temperature Storage	T = -25°C for 240 hrs Test in white pattern	IEC 60 068-2-1Ab
5	High-Temperature, High-Humidity Operation	T = +40°C, RH = 90% for 168 hrs	IEC 60 068-2-3CA
6	High Temperature, High- Humidity Storage	T = +60℃, RH=80% for 240hrs Test in white pattern	IEC 60 068-2-3CA
7	Temperature Cycle	-25℃→+70℃, 100 Cycles 30min 30min Test in white pattern	IEC 60 068-2-14
8	UV exposure Resistance	765 W/m^2 for 168hrs,40℃ Test in white pattern	IEC60 068-2-5Sa
9	Package Vibration	1.04G, Frequency: 10~500Hz Direction: X,Y,Z Duration: 1 hours in each direction	Full packed for shipment
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
11	Electrostatic Effect (non-operating)	(Machine model)+/− 250V 0Ω, 200pF	IEC 62179, IEC 62180
12	Altitude test Operation	700hPa (= 3000m),48Hr	
13	Altitude test Storage	260hPa (= 10000m),48Hr Test in white pattern	
14	Stylus Tapping	POLYACETAL Pen: Top R:0.8mm Load: 300gf Speed: 2 times/sec Total 13,500times,	

Actual EMC level to be measured on customer application

Note : The protective film must be removed before temperature test.

12.Bar Code definition

E01	00	4	01	1	I	7	4	00361	A	N
1	2	3	4	2	5	6	2	7	2	8

1 ：EPD model code:

   ED060SC7: E2N/E32/E31/E30

2 ：Internal control codes:

3 ：FPL reversion code

   V110:4 V110A:5 V220:6 V250:7 V220E:8

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

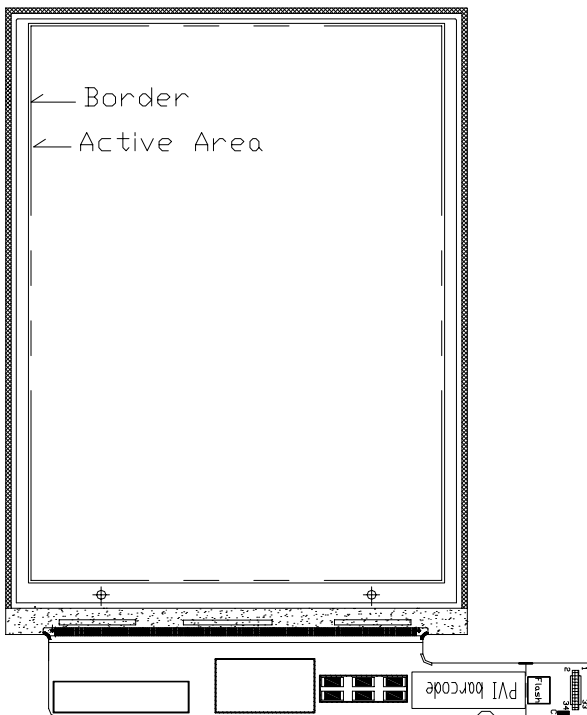6 ：Month:

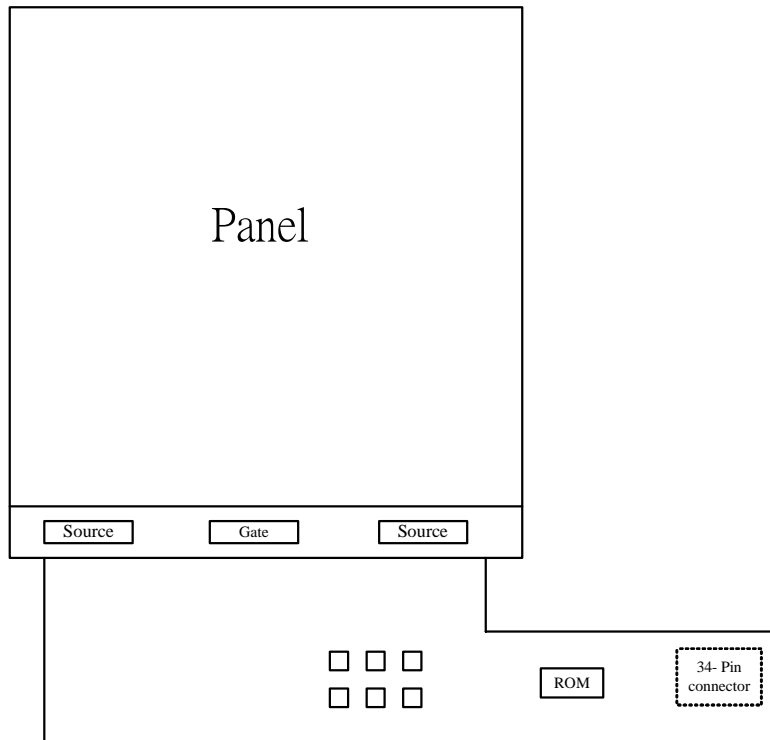   1:Jan.　2:Feb. ... 9:Sep. A:Oct. B:Nov. C:Dec.

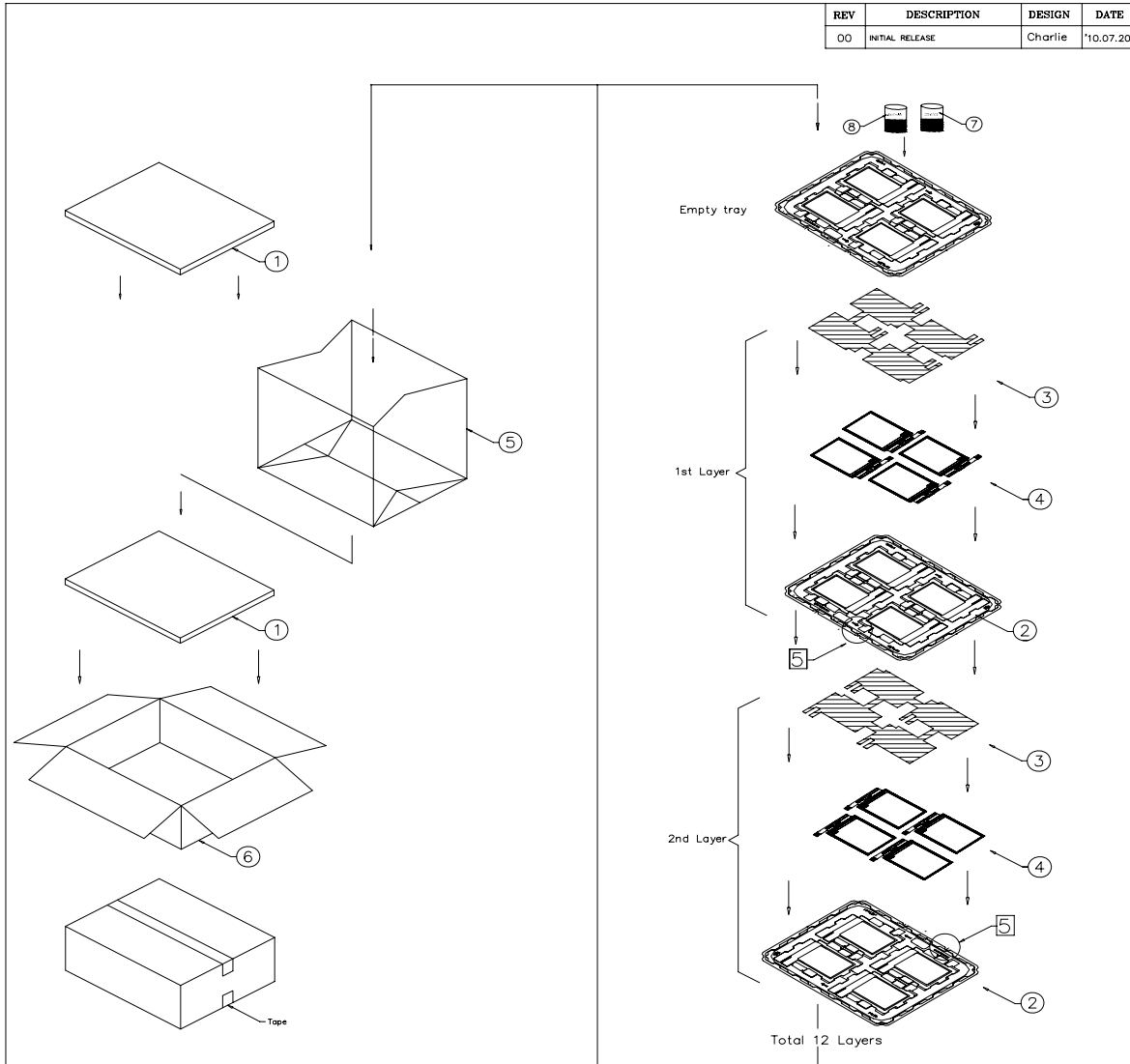7 ：Serial number

   00000-99999

8 ：MFG code:

   TOC:M, EIH:N

13. Border definition

Border

Active Area

PVI barcode

14.Block Diagram

15.Packing

REV	DESCRIPTION	DESIGN	DATE
00	INITIAL RELEASE	Charlie	'10.07.20

⑧ ⑦

Empty tray

1st Layer

③

④

⑤

②

2nd Layer

③

④

⑤

②

Total 12 Layers

NOTE:
1. One layer include: 1 piece of cushion sheet, 4 pcs module & 1 piece of tray.
2. Q'TY: 48 pcs panel/carton.
3. Dimension: 455*375*190mm
4. Weight: 4.8 KG
5. Make sure tray stacked with 180° rotation. We can check this by lateral side view.

Universal Display LTD

ITEM	PART NO.	DESCRIPTION	QTY	REMARK
8	99-3100075	30g加琴琼合紙防硬乾燥剤73*95mm(高科JK0030)	2	
7	50-0700021	防錆剤(保。	3	
6	50-0100096	CARTON INTERNAL	1	
5	50-0510041	摺口袋450*380*700mm	1	抗靜電
4		ED060SC7	48	
3	50E0210111	EPE CUSHION SHEF	12	抗靜電
2	50E0310161	TRAY	13	抗靜電
1	50-0300491	EPE FOAM	2	

MTL.SPEC.	UNSPECIFIED TOL'S ±5.0mm		REMARK		
	ANGLE				
	ROUGHNESS				

APPROVE	Patrick Lin	'10.07.20	SCALE	UNIT	SHEET	DWG.TITLE
CHECK	Patrick Lin		1:1	mm	1 OF 1	ED060SC7 PACKING Dim
DESIGN	CharlieYang	'10.07.20	MTL.NO.			DWG.NO.	REV. 01	A4 SIZE