



SmarterGlass

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<p>TECHNICAL SPECIFICATION</p> <p>MODEL NO: ED060SC7</p>

The content of this information is subject to be changed without notice.
Please contact EIH or its agent for further information.

Customer's Confirmation

Customer _____

Date _____

By _____

EIH's Confirmation

Confirmed By 申峰坤

Prepared By 李穎銘



Revision History

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



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 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

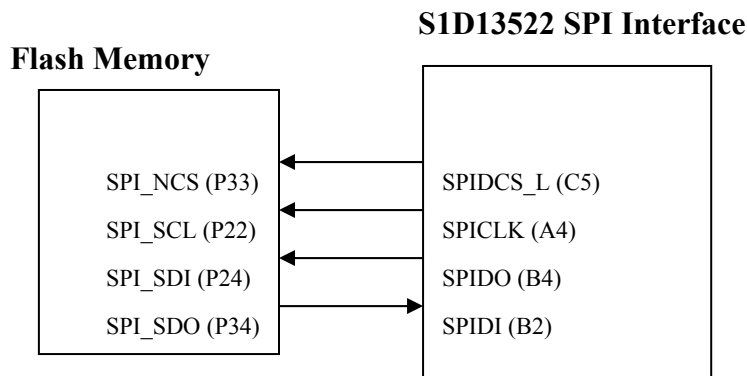
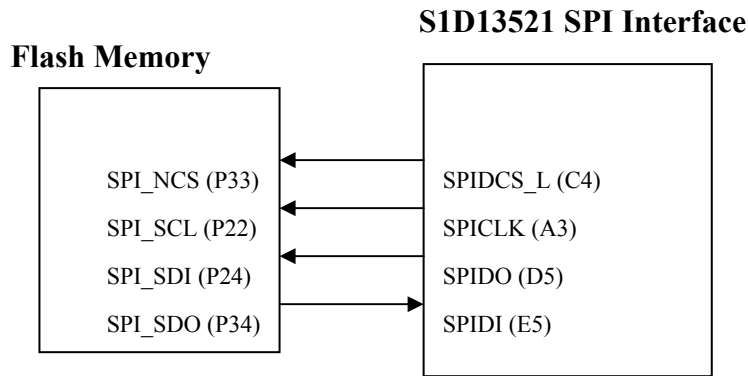
- High contrast TFT electrophoretic
- 600 x 800 display
- High reflectance
- Ultra wide viewing angle
- Ultra low power consumption
- Pure reflective mode
- Bi-stable
- Commercial temperature range
- Landscape, portrait mode
- Antiglare hard-coated front-surface

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	

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


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	°C
Storage Temperature	TSTG	-25 to +70	°C

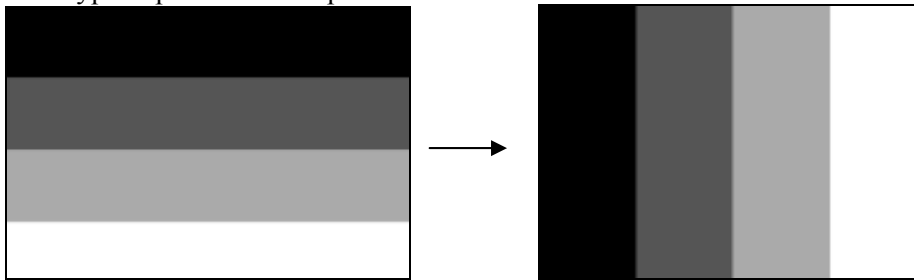
6-2) Panel DC characteristics

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	°C
Storage temperature			-25	-	70	°C

- 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

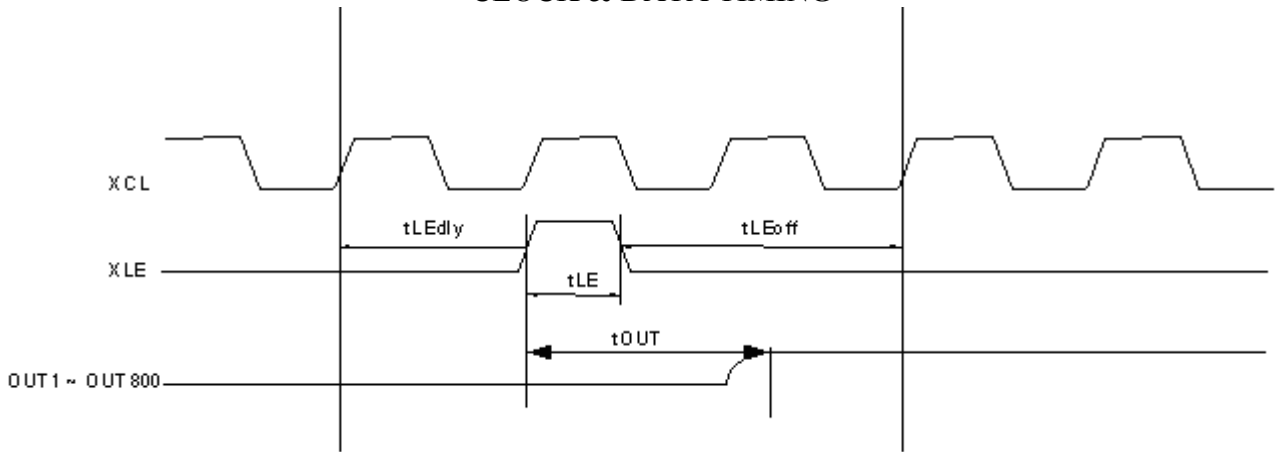
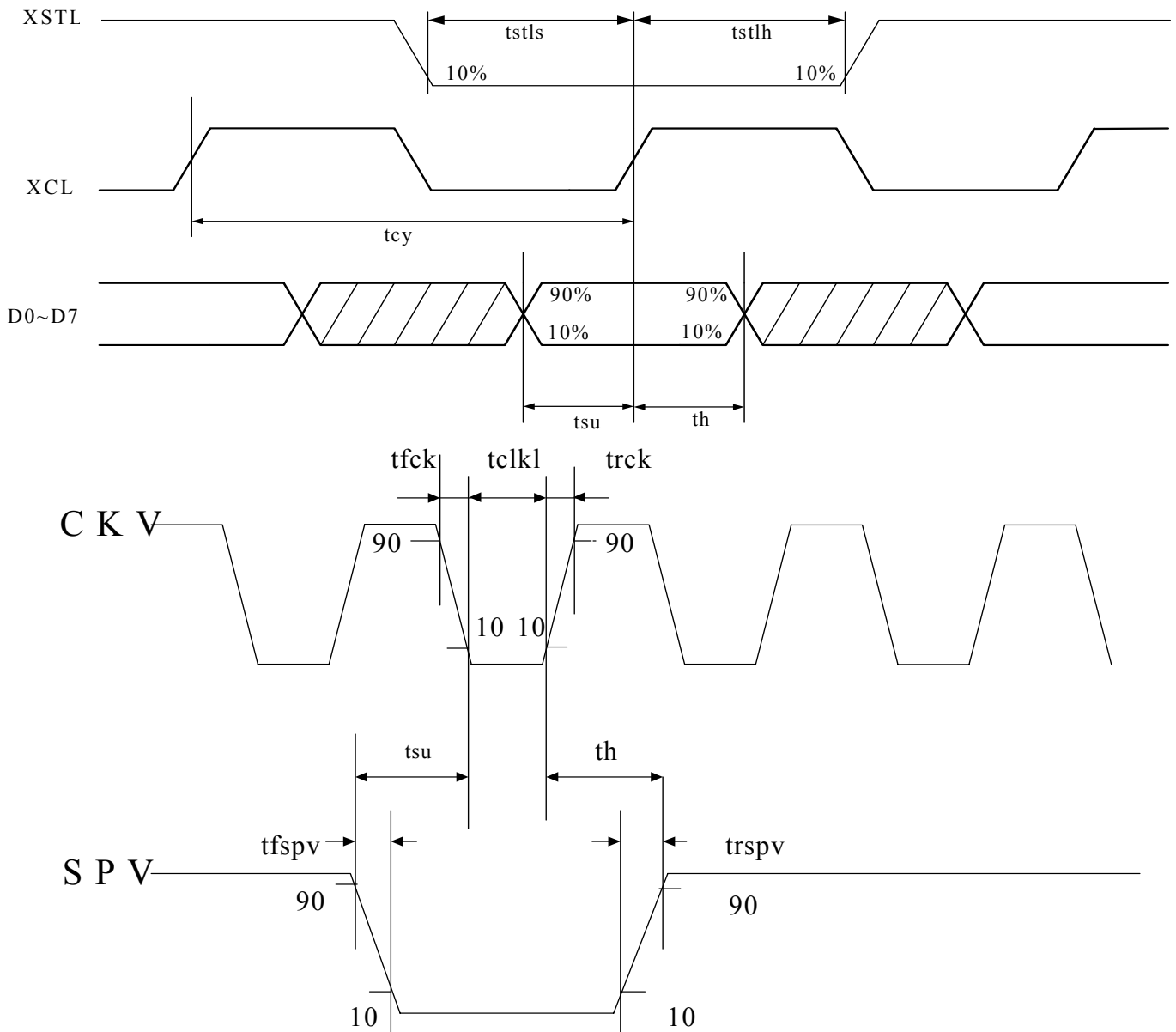
The Typical power consumption



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

OUTPUT LATCH CONTROL SIGNALS


6-4) Power Consumption

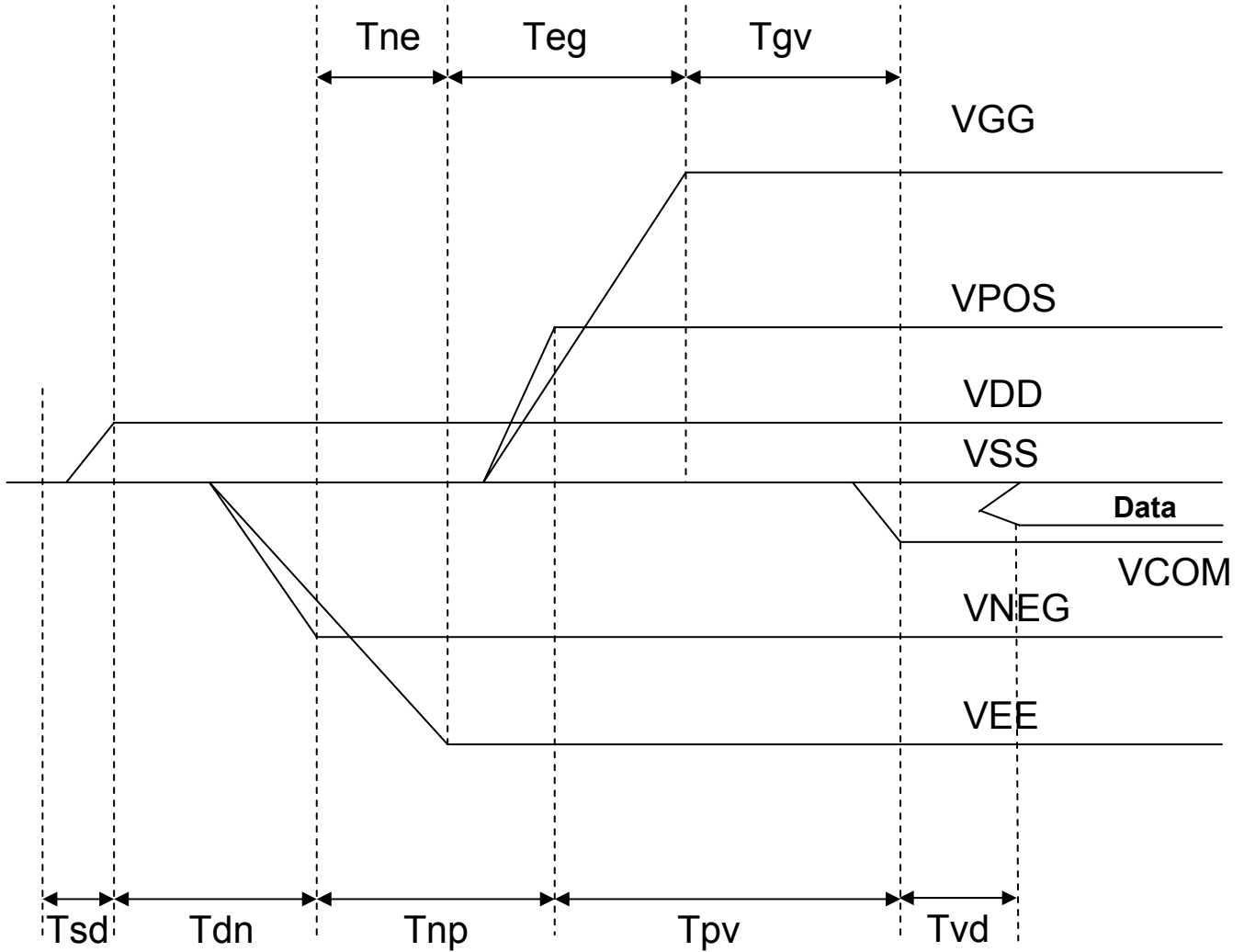
Parameter	Symbol	Conditions	TYP	Max	Unit	Remark
Panel power consumption during update.	-	-	547	1131	mW	
Power consumption in standby mode	-	-	-	0.4	mW	

7. Power on Sequence

Power Rails must be sequenced in the following order :

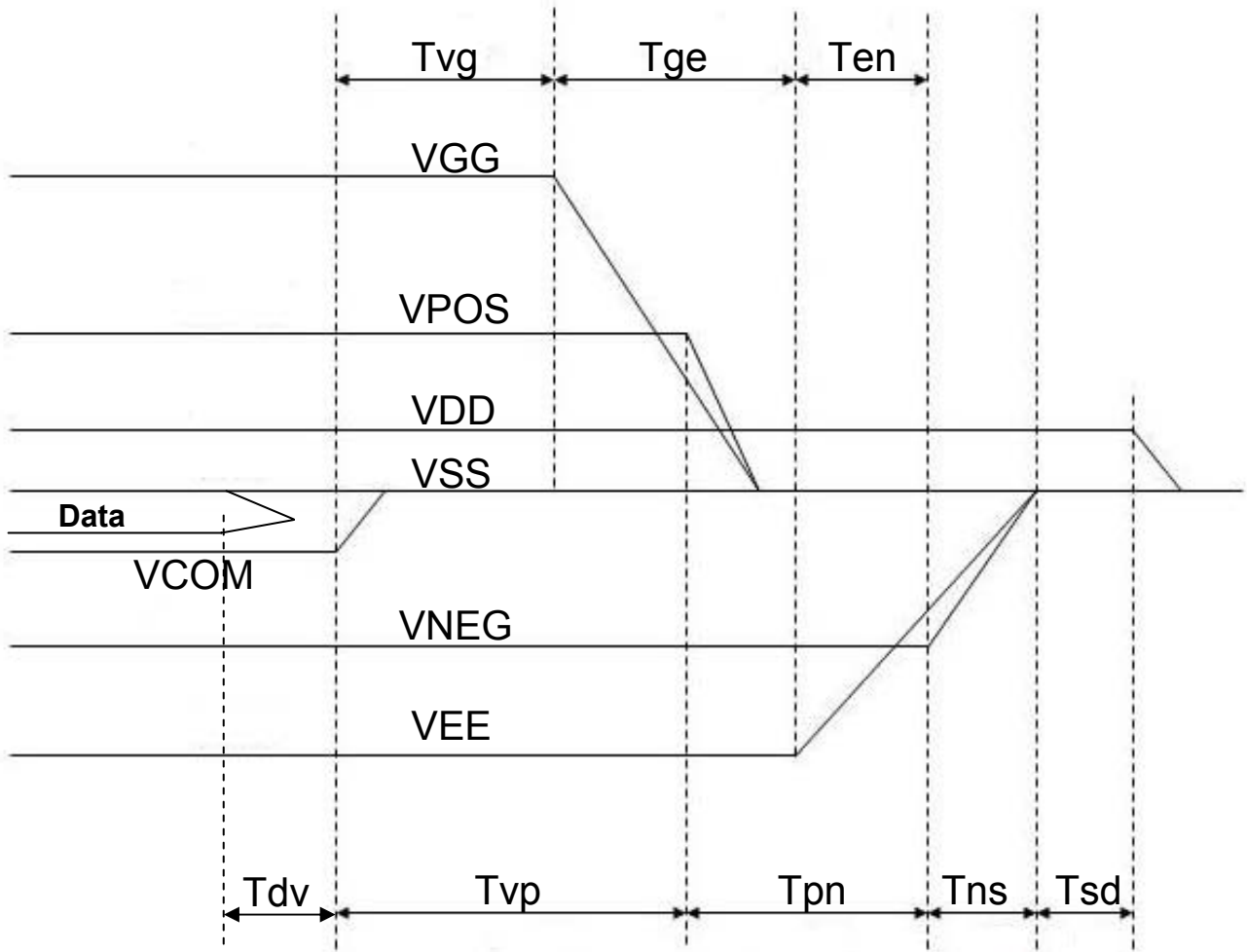
1. VSS → VDD → VNEG → VPOS (Source driver) → VCOM
2. VSS → VDD → VEE → VGG (Gate driver)

POWER ON



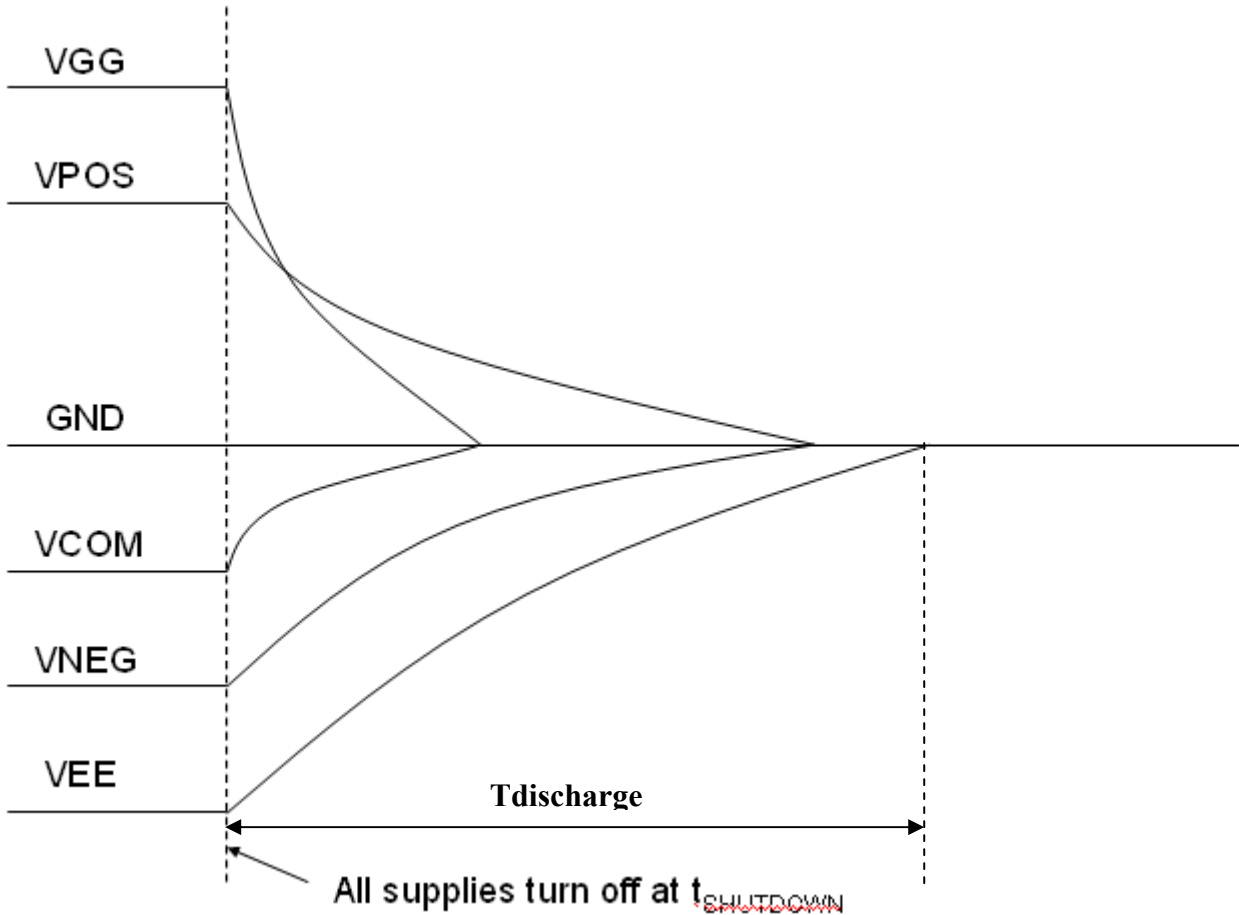
	Min	Max
Tsd	100us	-
Tdn	100us	-
Tnp	1000us	-
Tpv	100us	-
Tvd	100us	-
Tne	0us	-
Teg	1000us	-
Tgv	100us	-

POWER DOWN



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

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

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°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) xn/(m-1)	-	L*	-
CR	Contrast Ratio	-	10	12	-		-

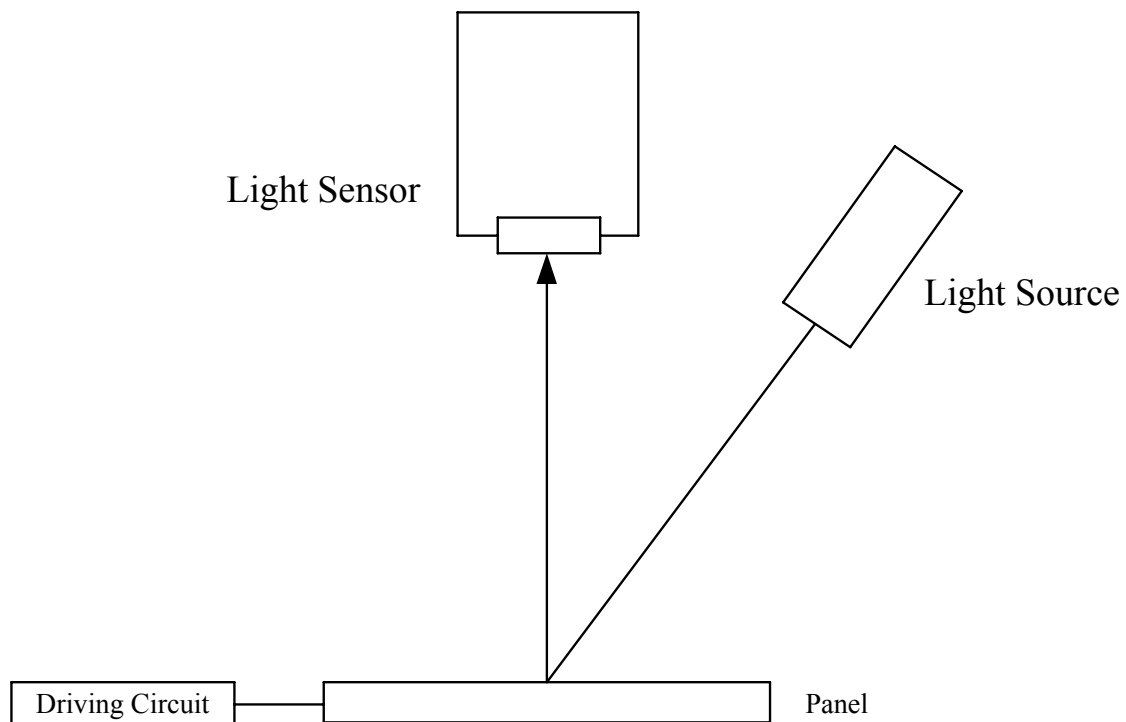
WS: White state , DS: Dark state, Gray state from Dark to White :DS 、 G1 、 G2... 、 Gn... 、 Gm-2 、 WS
m:4 、 8 、 16 when 2 、 3 、 4 bits mode

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):

$$CR = Rl/Rd$$

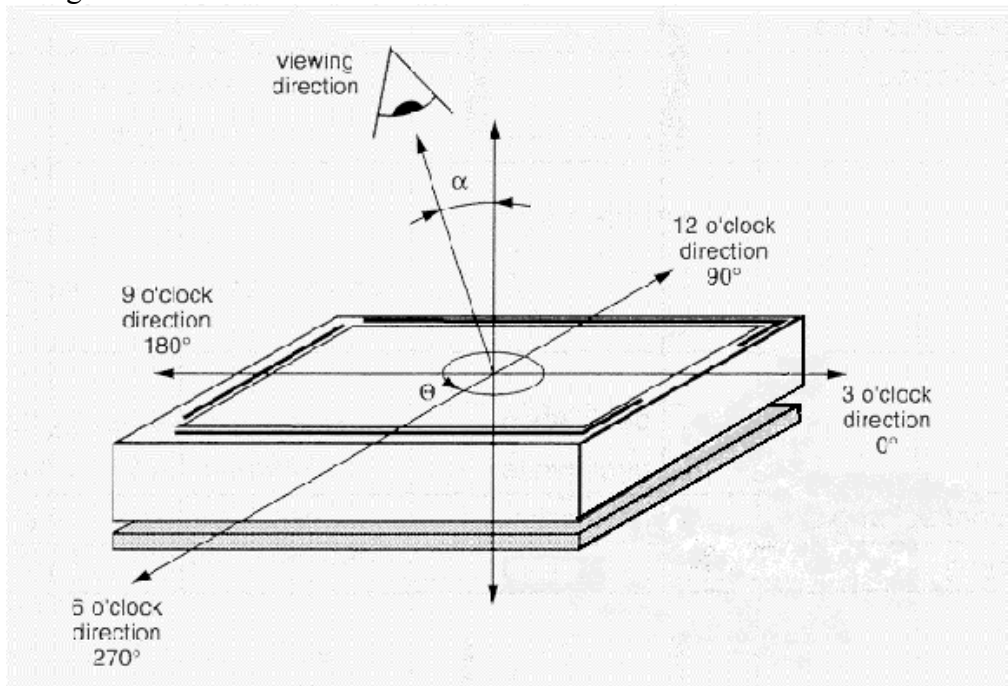


9-3) Reflection Ratio

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.



$\alpha = \text{declination}$ / $\theta = \text{azimuth}$

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 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.

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°C, RH=80% for 240hrs Test in white pattern	IEC 60 068-2-3CA
7	Temperature Cycle	-25°C → +70°C, 100 Cycles 30min 30min Test in white pattern	IEC 60 068-2-14
8	UV exposure Resistance	765 W/m ² for 168hrs, 40°C 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:

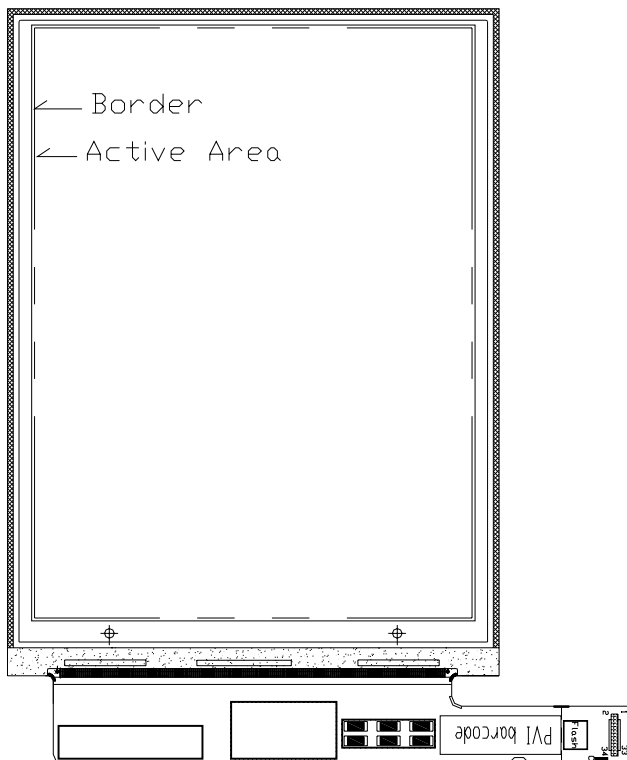
1:Jan. 2:Feb. ... 9:Sep. A:Oct. B:Nov. C:Dec.

[7] : Serial number

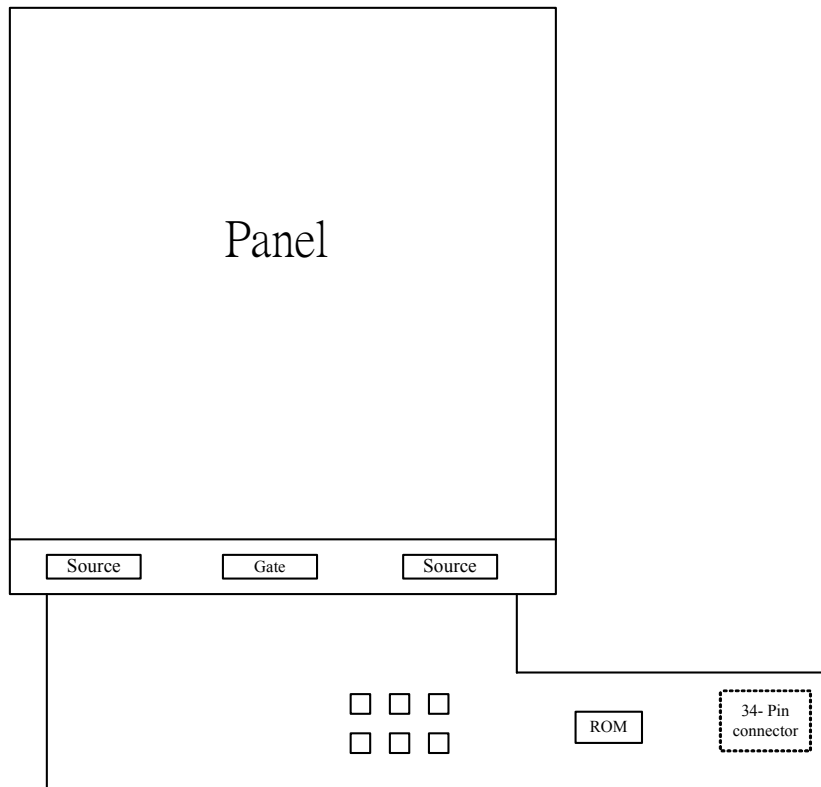
00000-99999

[8] : MFG code:

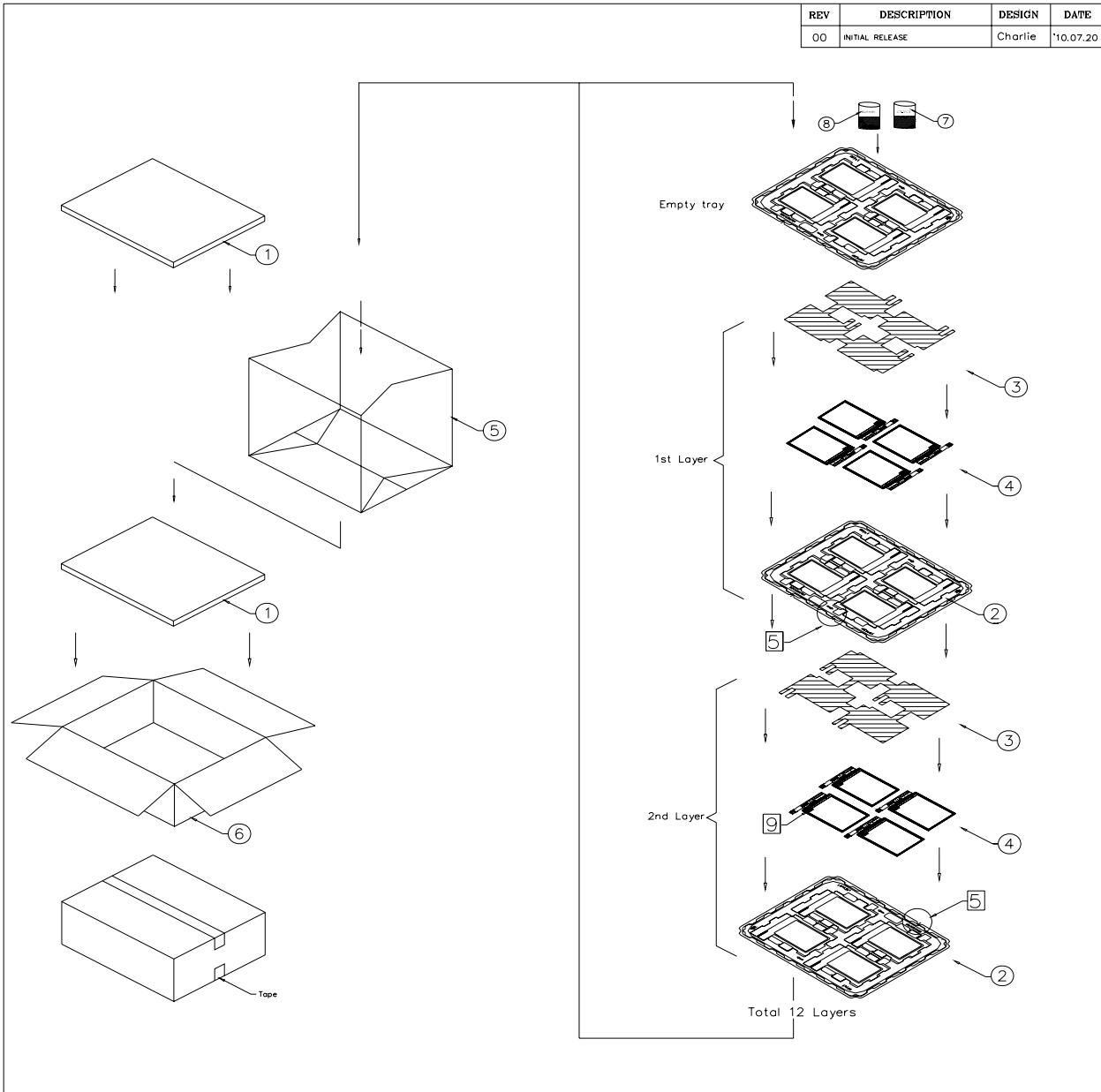
TOC:M, EIH:N

13. Border definition

14. Block Diagram




15.Packing



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.

9	99-1310114	EASY TAPE	48	For Remove Protect Sheet
8	99-3100075	30g 加厚复合纸(防静电)规格7.3*95mm(料号JK0030)	2	
7	50-0700021	防静电(保静容积25L)	3	
6	50-0100096	CARTON INTERNAL	1	
5	50-0510041	褶皱袋450*380*700mm	1	防静电
4		ED060SC7	48	
3	50E0210111	EPE CUSHION SHEET	12	防静电
2	50E0310161	TRAY	13	防静电
1	50-0300491	EPE FOAM	2	
ITEM	PART NO.	DESCRIPTION	QTY	REMARK

MTL.SPEC.		UNSPECIFIED TOL'S ±5.0mm		REMARK	
		ANGLE			
		ROUGHNESS			
APPROVE	Patrick Lin	'10.07.20	SCALE	UNIT	SHEET
CHECK	Patrick Lin	'10.07.20	1:1	mm	1 OF 1
DESIGN	CharlieYang	'10.07.20	MTL.NO.		DWG.NO.
 元太科技股份有限公司 E Ink Holdings Inc.					
DWG.TITLE ED060SC7 PACKING Dim					
					REV. 01
					A4 SIZE