Version: 2.0

Technical Specification

MODEL NO: VB3300-EHB
(ED058TC8)

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

☐Customer's Confirmation

Customer _____

Date _____

By _____

☐E Ink's Confirmation

Approval by 林建明

Confirmed by 陳家弘

Prepared by 魏漢寧

Revision History

Rev.	Issued Date	Revised / Contents
1.0	March ,3 , 2021	Initial
2.0	Jun ,7 , 2021	Remove Mylar, Modify ME drawing page 5

TECHNICAL SPECIFICATION

CONTENTS

1. General Description

VB3300-EHB is a reflective electrophoretic E Ink® technology display module based on active matrix TFT substrate. It has 5.84" active area with 720 x 1440 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 it used.

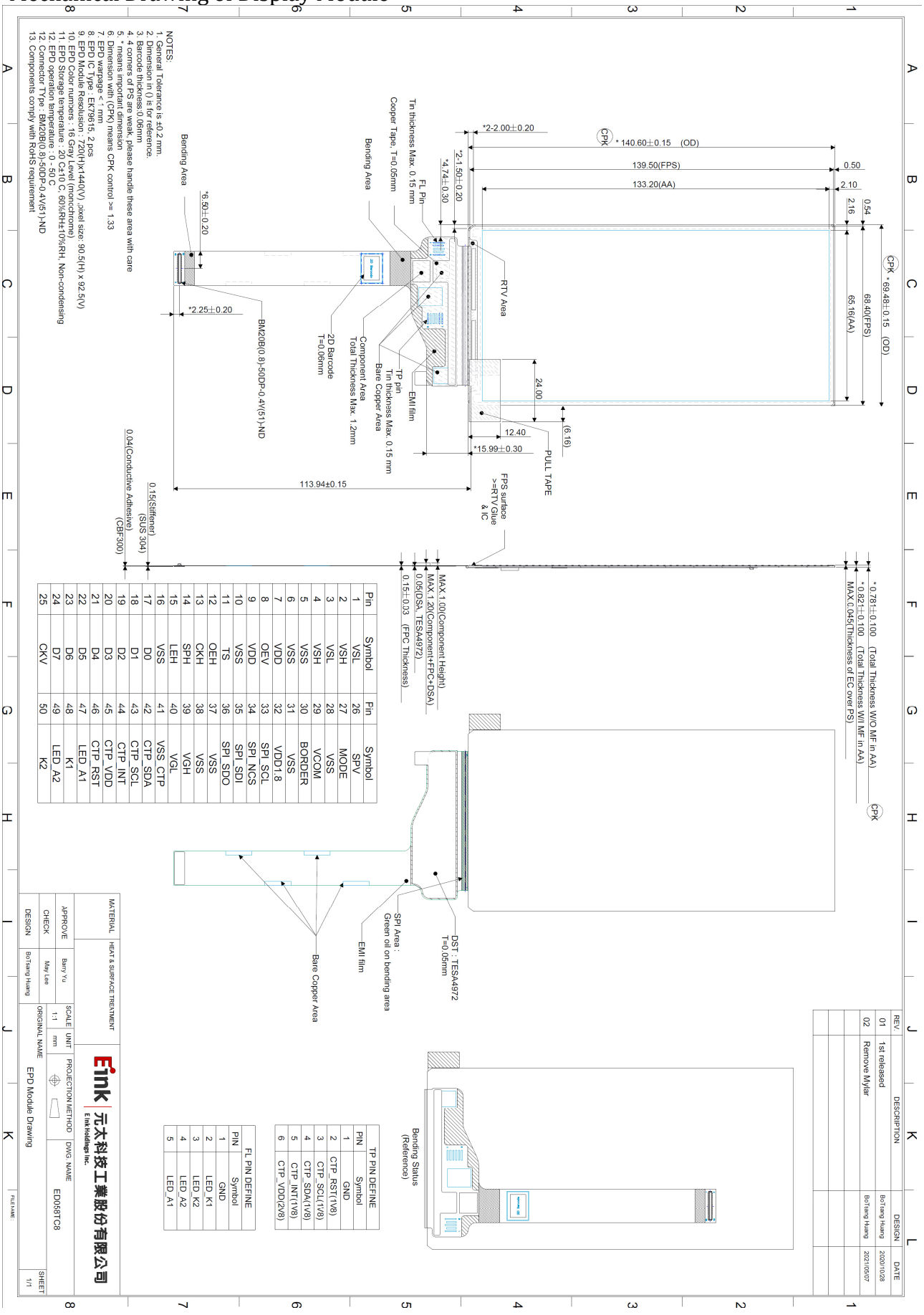
2. Features

- Carta High contrast reflective/electrophoretic technology
- 720 x 1440 display
- High reflectance
- Ultra wide viewing angle
- Ultra low power consumption
- Pure reflective mode
- Bi-stable
- Commercial temperature range
- Portrait mode

3. Mechanical Specifications

Parameter	Specifications	Unit	Remark
Screen Size	5.84	Inch	
Display Resolution	720 (H)×1440(V)	Pixel	
Active Area	65.16 (H)×133.2 (V)	mm	
Pixel Pitch	90.5 (H) × 92.5 (V)	μm	
Pixel Configuration	Rectangle		
Outline Dimension	69.48 (W) × 140.60 (H) × 0.78 (D)	mm	w/o PF
Module Weight	17.0+/-1.7	g	
Number of Gray	16 Gray Level (monochrome)		
Display operating mode	Reflective mode		

4. Mechanical Drawing of Display Module



5. Input/output Interface

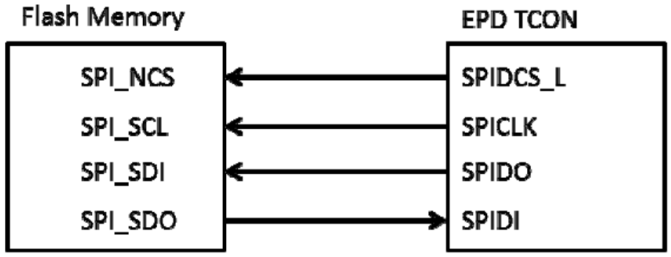
5-1) Connector type: BM20B(0.8)-50DP-0.4V(51)-ND

5-2) Pin Assignment

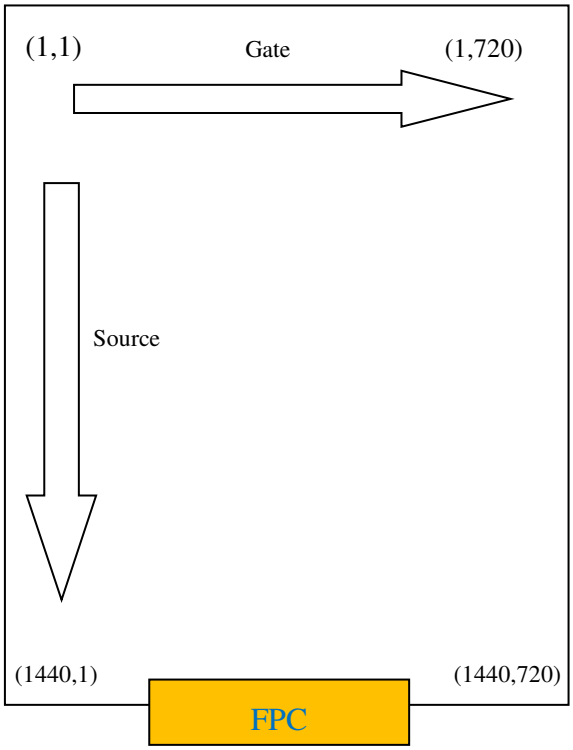
Pin #	Signal	I/O	Description	Remark
1	V_{SH}	P	Negative power supply source	
2	V_{SH}	P	Positive power supply source driver	
3	V_{SL}	P	Negative power supply source	
4	V_{SH}	P	Positive power supply source driver	
5	V_{SS}	P	Ground	
6	V_{SS}	P	Ground	
7	V_{DD}	P	Digital power supply drivers (3.3V)	
8	OEV	I	Output enable of gate driver	
9	V_{DD}	P	Digital power supply drivers (3.3V)	
10	V_{SS}	P	Ground	
11	TS	-	Thermistor sensor	NCP15XH103F03RC
12	OEH	I	Output enable source driver	
13	CKH	I	Clock of source driver	
14	SPH	I	Start pulse of source driver	
15	LEH	I	Latch enable of source driver	
16	V_{SS}	P	Ground	
17	D0	I	Data signal source driver	
18	D1	I	Data signal source driver	
19	D2	I	Data signal source driver	
20	D3	I	Data signal source driver	
21	D4	I	Data signal source driver	
22	D5	I	Data signal source driver	
23	D6	I	Data signal source driver	
24	D7	I	Data signal source driver	
25	CKV	I	Clock of gate driver	
26	SPV	I	Start pulse of gate driver	
27	MODE	I	Output mode selection gate driver	
28	V_{SS}	P	Ground	
29	V_{COM}	P	Common connection	
30	Border	P	Border connection	
31	V_{SS}	P	Ground	
32	$V_{DD1.8}$	P	SPI flash power supply (1.8V)	
33	SPI_SCL	I	Serial Data Clock for Flash memory	
34	SPI_NCS	I	Chip Select for Flash memory	
35	SPI_SDI	I	Serial Data Input for Flash memory	
36	SPI_SDO	I	Serial Data Output for Flash	
37	V_{SS}	P	Ground	
38	V_{SS}	P	Ground	

39	V_{GH}	P	Positive power supply gate	
40	V_{GL}	P	Negative power supply gate	
41	V_{SS_CTP}	P	CTP Ground	
42	CTP_SDA	I	Touch signal	
43	CTP_SCL	I	Touch signal	
44	CTP_INT	I	Touch signal	
45	CTP_VDD	I	Touch signal	
46	CTP_RST	I	Touch signal	
47	NC	-	NO Connection	
48	K1	-	Front light signal	
49	A	-	Front light signal	
50	K2	-	Front light signal	

Note 5-1



5-3) Panel Scan Direction



6. Electrical Characteristics

6-1) Absolute Maximum Ratings:

Parameter	Symbol	Rating	Unit	Remark
Logic Supply Voltage	VDD_3V3	-0.3 to 5.0	V	--
Positive Supply Voltage	V_{SH}	-0.3 to +18	V	--
Negative Supply Voltage	V_{SL}	-18 to +0.3	V	--
Max .Drive Voltage Range	$V_{SH} - V_{SL}$	36	V	--
Supply Voltage	VGH	-0.3 to 46	V	--
Supply Voltage	VGL	-25 to +0.3	V	--
Supply Range	VGH-VGL	-0.3 to +46	V	--
Operating Temp. Range	TOTR	0 to +50	℃	--
Storage Temperature	TSTG	-25 to 75	℃	--

6-2) Panel DC Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Signal ground	V_{SS}		-	0	-	V
Logic Voltage supply	V_{DD_3V3}		3.0	3.3	3.6	V
	I_{VDD_3V3}	V_{DD}=3.3V	-	7.9	8.4	mA
SPI Voltage supply	V_{DD_1V8}		1.65	1.8	1.95	V
	I_{VDD_1V8}	V_{DD_1V8}=1.8V	-		1.5	mA
Gate Negative supply	V_{GL}		-22	-21	-20	V
	I_{GL}	V_{GL} =-20V	-	5.6	25	mA
Gate Positive supply	V_{GH}		21	22	23	V
	I_{GH}	V_{GH} =22V	-	3.2	4.2	mA
Source Negative supply	V_{SL}		-15.4	-15	-14.6	V
	I_{SL}	V_{SL} =-15V	-	7.9	92	mA
Source Positive supply	V_{SH}		14.6	15	15.4	V
	I_{SH}	V_{SH} =15V	-	6.4	107	mA
Border supply	V_{COM}		-	Adjusted	-	V
Asymmetry source	V_{Asym}	$V_{SH} + V_{SL}$	-800	0	800	mV
Common voltage	V_{COM}		-4	Adjusted	-0.5	V
	I_{COM}		-	4.4	5.2	mA
Total Power	P		-	422	3625	mW
Standby power	P_{STBY}		-	-	0.4	mW

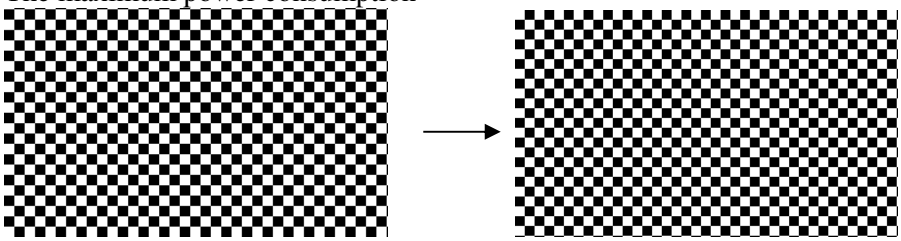
- The maximum power consumption is measured using 85 Hz waveform with following pattern transition: from pattern of repeated 1 consecutive black scan lines followed by 1 consecutive white scan line to that of repeated 1 consecutive white scan lines followed by 1 consecutive black scan lines. (Note 6-1)
- The Typical power consumption is measured using 85 Hz waveform with following pattern transition:

from horizontal 4 gray scale pattern to vertical 4 gray scale pattern. (Note 6-2)

- 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 E Ink.
- Vcom is recommended to be set in the range of assigned value ± 0.1 V
- The maximum I_{COM} inrush current is about 600 mA

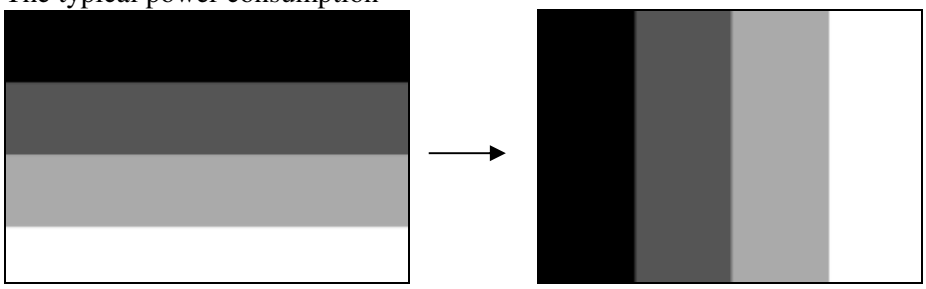
Note6-1

The maximum power consumption



Note 6-2

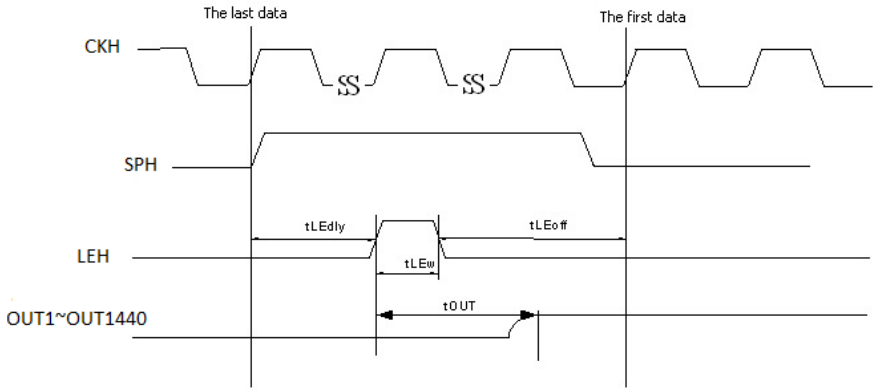
The typical power consumption



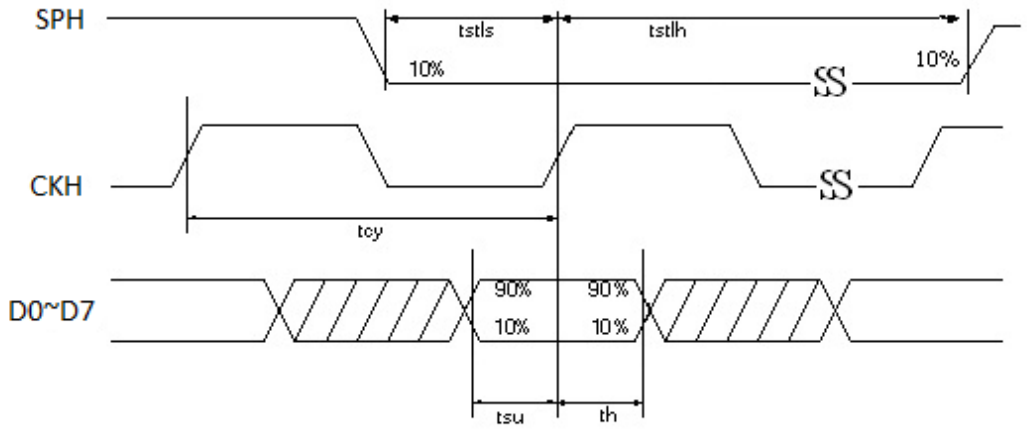
6-4) Panel AC characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Clock frequency	fckv			200	kHz
Minimum “L” clock pulse width	twL	0.5			us
Minimum “H” clock pulse width	twH	0.5			us
Clock rise time	trckv			100	ns
Clock fall time	tfckv			100	ns
SPV setup time	tSU	100		twH-100	ns
SPV hold time	tH	100		twH-100	ns
Pulse rise time	trspv			100	ns
Pulse fall time	tfspv			100	ns
Clock CKH cycle time	tcy	16.67	50		ns
D0 .. D7 setup time	tsu	8			ns
D0 .. D7 hold time	th	8			ns
SPH setup time	tstls	0.5*tcy		0.8*tcy	ns
SPH hold time	tstlh	0.5*tcy		240*tcy-tstls	ns
LEH on delay time	tLEdly	3.5*tcy			ns
LEH high-level pulse width (When VDD=1.7V to 2.1V)	tLEw	300			ns
LEH off delay time	tLEoff	200			ns
Output setting time to +/-30mV(C_{load}=200pF)	tout			20	us

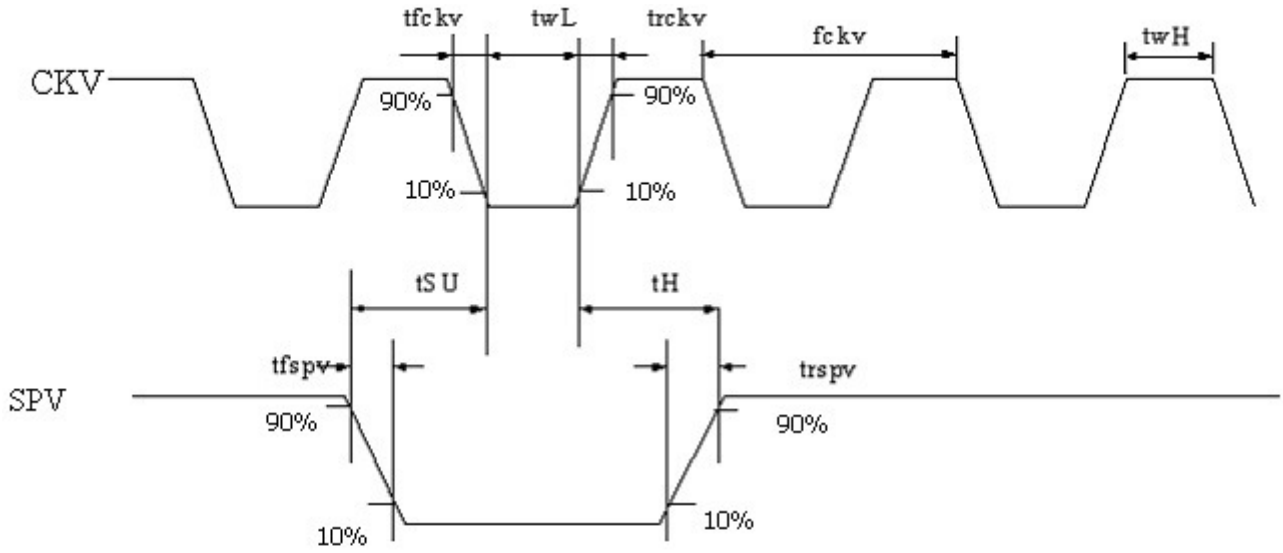
OUTPUT LATCH CONTROL SIGNALS



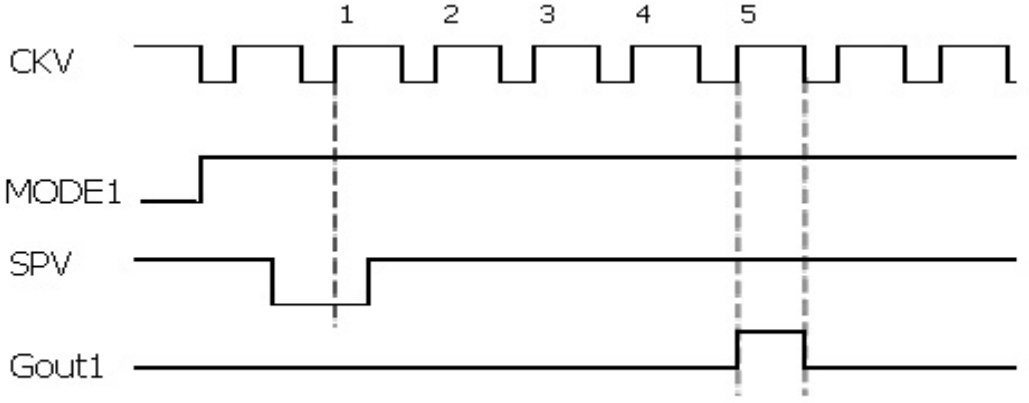
CLOCK & DATA TIMING



CKV & SPV TIMING



GATE OUTPUT TIMING



Note：First gate line on timing after 5CKV gate line is on

6-5) Refresh Rate

The module is applied at a maximum refresh rate of 85 Hz.

	Min	Max
Refresh Rate	-	85 Hz

7-6) Controller Timing

This timing mode is depicted on Figure 1 and Figure 2 and it refers to timing of Source Driver Output Enable (OEH) and Gate Driver Clock (CKV). Note, that in this mode LGON follows CKV timing.

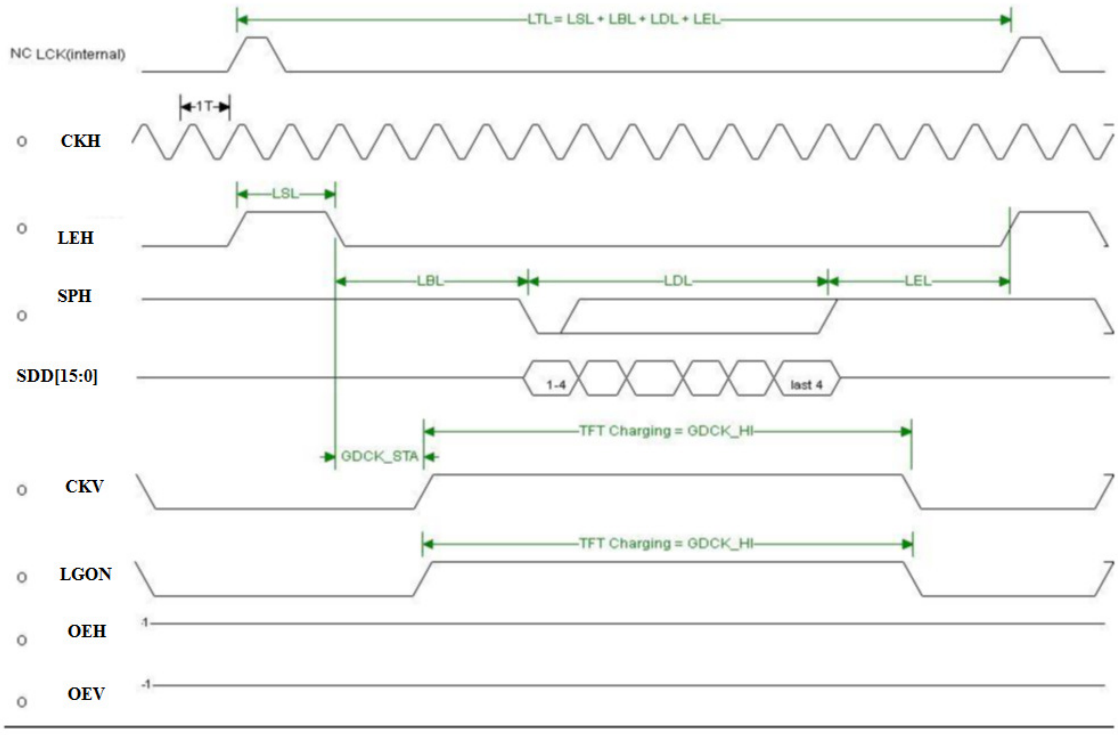


Figure 1. Line Timing in Mode 3

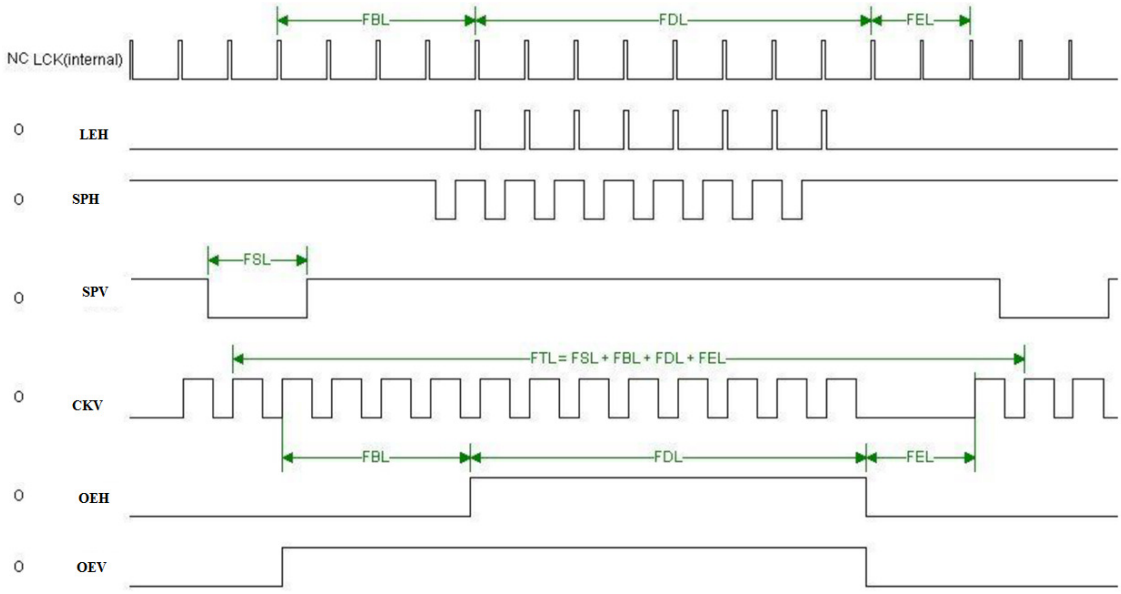


Figure 2 Frame Timing in Mode 3

Timing Parameters Table

Mode	3	**Resolution 1440 x 720**				
CKH [MHz]	24					
Pixels Per CKH	4					
Line	**LSL**	**LBL**	**LDL**	**LEL**	**CKV_STA**	**LGONL**
Parameters[CKH]	10	6	360	6	4	354
Line	-	-	-	-	-	-
Parameters[us]	0.42	0.25	15.00	0.25	0.17	14.75
Frame	**FSL**	**FBL**	**FDL**	**FEL**	**-**	**FR [Hz]**
Parameters [lines]	1	4	720	14	-	85.02
Frame	-	-	-	-	-	-
Parameters [us]	15.92	63.67	11460.00	222.83	-	-

Note 1: For parameters definition, see Section 7. Active Matrix Electronic Paper Display Timings

Note 2: For Isis Controller CKV_STA and LGONL are not settable parameters; CKV_STA = LBL, LGONL = LDL+0.5

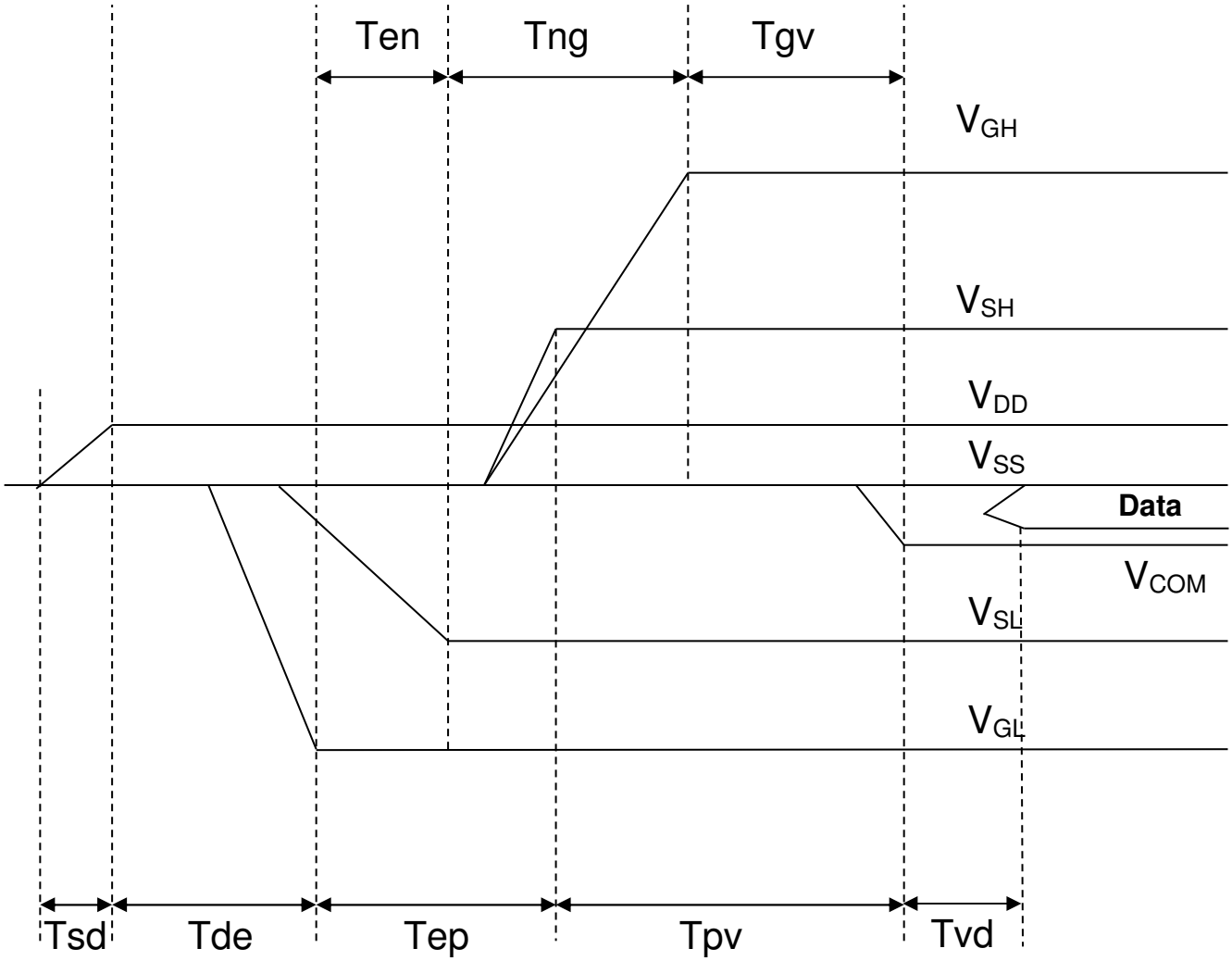
Note 3: For Freescale SoC OEV Low pulse represent FSL and SPV pulses with the first period of FBL

7. Power Sequence

Power Rails must be sequenced in the following order：

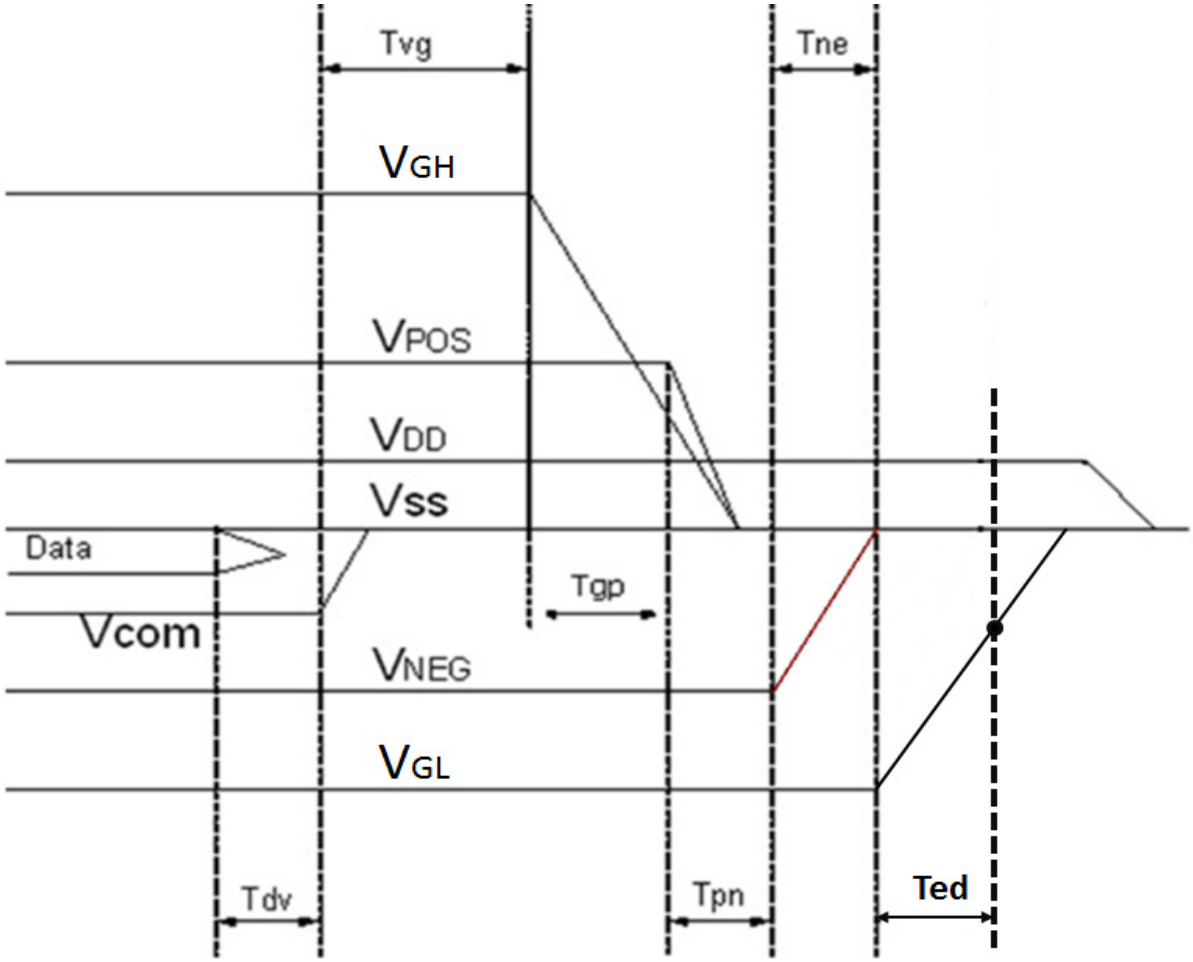
1. V_{SS} → V_{DD} → V_{SL} → V_{SH} (Source Driver) → V_{COM}
2. V_{SS} → V_{DD} → V_{GL} → V_{GH} (Gate Driver)

POWER ON



	Min	Max
Tsd	30us	-
Tde	100us	-
Tep	1000us	-
Tpv	100us	-
Tvd	100us	-
Ten	0us	-
Tng	1000us	-
Tgv	100us	-

POWER OFF



	Min	Max	Remark
Tdv	100µs	-	-
Tvg	0µs	-	-
Tgp	0µs	-	-
Tpn	0µs	-	-
Tne	0µs	-	-
Ted	0.5s	-	Discharged point @ -7.4 Volt

Note 7-1：Supply voltages decay through pull-down resistors.

Note 7-2 : Begin to turn off V_{GL} power after V_{SL} and V_{SH} are completely or almost discharged to GND state.

Note 7-3：V_{GL} must remain negative of Vcom during decay period

8. Optical characteristic

8-1) Specification

Measurements are made with that the illumination is under an angle of 45 degrees, the detector is perpendicular unless otherwise specified.

T = 25°C

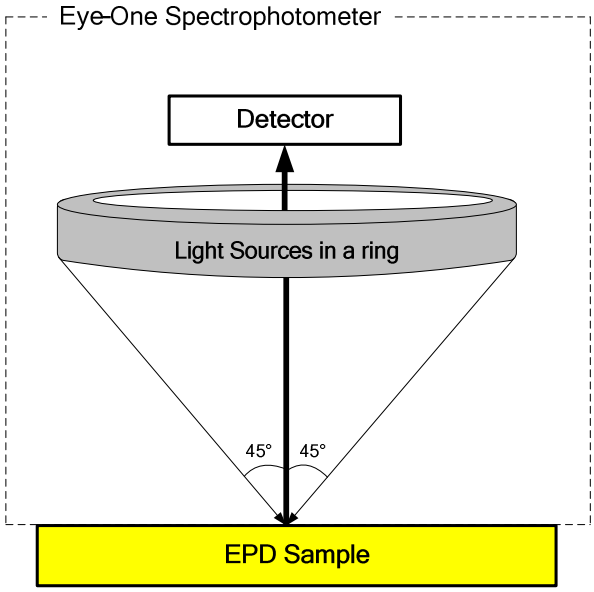
Symbol	Parameter	Conditions	Min	Typ.	Max	Unit	Note
R	Reflectance	White	35	45	-	%	Note 8-1
Gn	N_{th} Grey Level	-	-	DS+(WS-DS) ×n/(m-1)	-	L*	-
CR	Contrast Ratio	-	10	16	-		-

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 = 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.

9. Handing, Safety and Environment Requirements and Remark

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.

REMARK
All The specifications listed in this document are guaranteed for module only. Post-assembled operation or component(s) may impact module performance or cause unexpected effect or damage and therefore listed specifications is not warranted after any Post-assembled operation.

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.
IPA solvent can only be applied on active area and the back of a glass. For the rest part, it is not allowed.

Mounting Precautions
(1) It`s recommended that you consider the mounting structure so that uneven force (ex. Twisted stress) is not applied to the module.
(2) It`s recommended that you attach a transparent protective plate to the surface in order to protect the EPD. Transparent protective plate should have sufficient strength in order to resist external force.
(3) You should adopt radiation structure to satisfy the temperature specification.
(4) Acetic acid type and chlorine type materials for the cover case are not desirable because the former generates corrosive gas of attacking the PS at high temperature and the latter causes circuit break by electro-chemical reaction.
(5) Do not touch, push or rub the exposed PS with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment. Do not touch the surface of PS for bare hand or greasy cloth. (Some cosmetics deteriorate the PS)
(6) When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzene. Normal-hexane is recommended for cleaning the adhesives used to attach the PS. Do not use acetone, toluene and alcohol because they cause chemical damage to the PS.

(7) Wipe off saliva or water drops as soon as possible. Their long time contact with PS causes deformations and color fading.

Data sheet status	
Product specification	This data sheet contains formal 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

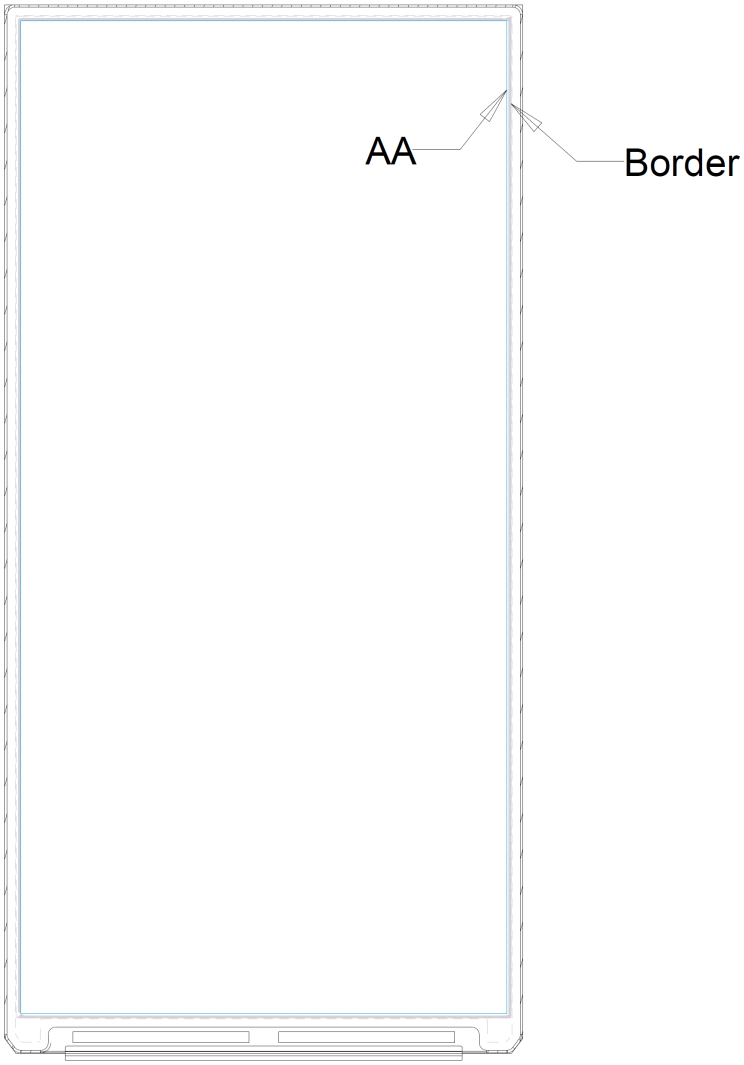
	TEST	CONDITION	METHOD	REMARK
1	High-Temperature Operation	T = +50°C, RH = 30% for 240 hrs	IEC 60 068-2-2Be	
2	Low-Temperature Operation	T = 0°C for 240 hrs	IEC 60 068-2-1Ae	
3	Low-Temperature Storage	T = -25°C for 240 hrs Test in white pattern	IEC 60 068-2-1Ab	
4	High-Temperature, High-Humidity Operation	T = +40°C, RH = 90% for 168 hrs	IEC 60 068-2-78	
5	High Temperature Storage	T = +60℃, RH=26% for 240 hrs Test in white pattern	IEC 60 068-2-78	
6	Temperature Cycle	-25℃→+70℃, 100 Cycles 30min 30min Test in white pattern	IEC 68-2-14 Nb	
7	Solar radiation test	765 W/m^2 for 168hrs,40℃ Test in white pattern	IEC60 068-2-5Sa	
8	Electrostatic Effect (non-operating)	(Machine model)+/- 250V 0Ω, 200pF	IEC 62180	

Actual EMC level to be measured on customer application
Note: The protective film must be removed before temperature test.

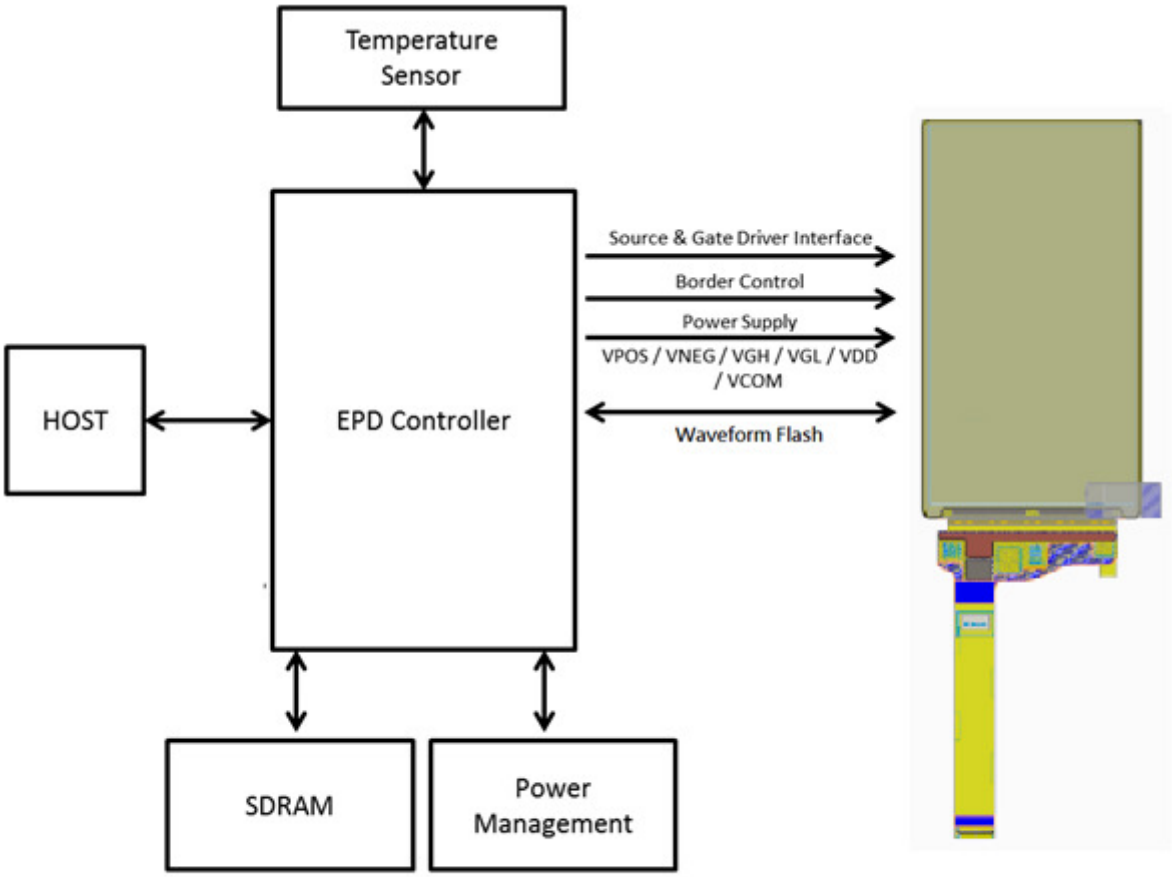
< Criteria >

In the standard conditions, there is not display function NG issue occurred. (Including: line defect, no image). All the cosmetic specification is judged before the reliability stress.

11. Border definition

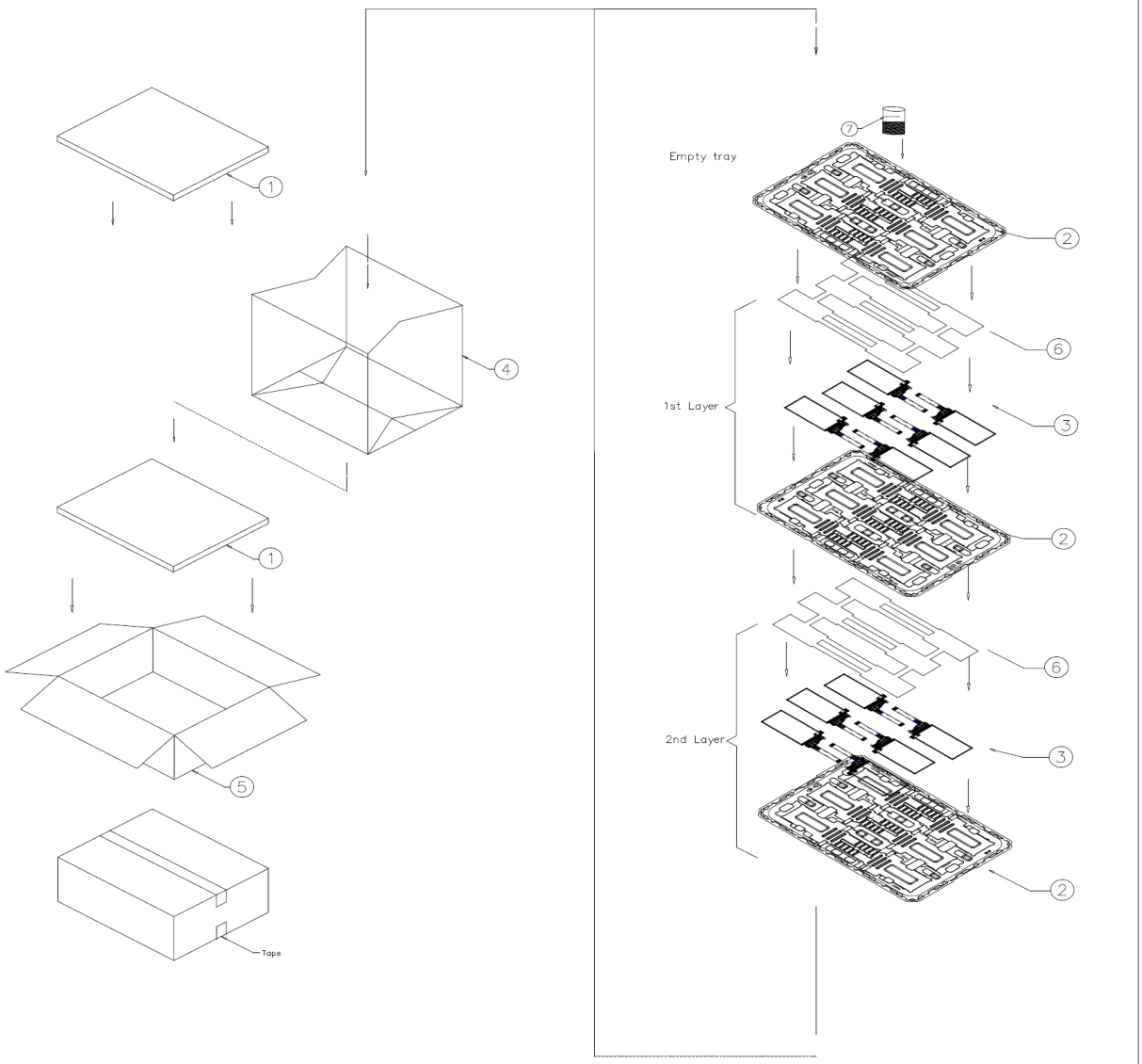


12. Block Diagram



13. Packing

REV	DESCRIPTION	DESIGN	DATE
01	INITIAL RELEASE	Botsang Huang	2020/11/27
02	Remove Mylar	Botsang Huang	2021/06/11



NOTE:
1. One layer include:
   6 pcs module & 1pcs tray & 1pcs EPE sheet
2. Q'TY: 72 pcs panel/carton.
3. Dimension: 558*370*170mm

ITEM	DESCRIPTION	Q'TY	REMARK
7	30g加厚複合紙活礦乾燥劑73*95mm	2	
6	EPE SHEET	12	
5	CARTON INTERNAL	1	
4	摺口袋562*393*593mm	1	抗靜電
3	ED058TC8	72	
2	TRAY	13	抗靜電
1	EPE FOAM	2	

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

E Ink 元太科技工業股份有限公司 E Ink Holdings Inc.

APPROVE	Barry Yu	2021/06/11	SCALE 1:1	UNIT mm	SHEET 1 OF 1	DWG.TITLE ED058TC8 PACKING
CHECK	May Lee	2021/06/11				
DESIGN	Botsang Huang	2021/06/11	MTL.NO.		DWG.NO.	A4 SIZE