7.33inchE-paper Display Series

GDEP0733T01

GooDisplay

Product Specifications

Customer	Standard
Description	7.33" E-PAPER DISPLAY
Model Name	GDEP0733T01
Date	2024/03/12
Revision	1.0

	Design Engineering		
	Approval	Check	Design

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CONTENTS

1. General Description

GDEP0733T01 is a reflective electrophoretic technology display module based on plastic active matrix TFT substrate. The plastic substrate is protected by an outer covering, which is a part of the display. It has 7.33" active area with 200 x 750 pixels, the display is capable to display images at 2-8 gray levels (1-3 bits) depending on the display controller and the associated waveform file it used.

2. Features

➢ Carta high contrast reflective/electrophoretic technology
➢ 200 x 750 display
➢ High reflectance
➢ Ultra wide viewing angle
➢ Ultra low power consumption
➢ Pure reflective mode
➢ Bi-stable
➢ Commercial temperature range
➢ Portrait mode
➢ With Cover Lens

3. Mechanical Specifications

Parameter	Specifications	Unit	Remark
Screen Size	7.33	Inch	
Display Resolution	200 (H) × 750 (V)	Pixel	
Active Area	48 (H) × 180 (V)	mm	
Pixel Pitch	0.24 (H) x 0.24 (V)	mm	
Pixel Configuration	Square		
Outline Dimension	54.8 (W)×203.5 (H)×2.926 (D)	mm	
Module Weight	62±5	g	
Number of Gray	8 Gray Level (monochrome)		
Display operating mode	Reflective mode		

4. Mechanical Drawing of EPD Module

Detail A Scale 4 : 1

NOTES
1.GENERAL TOLERANCE:±0.3
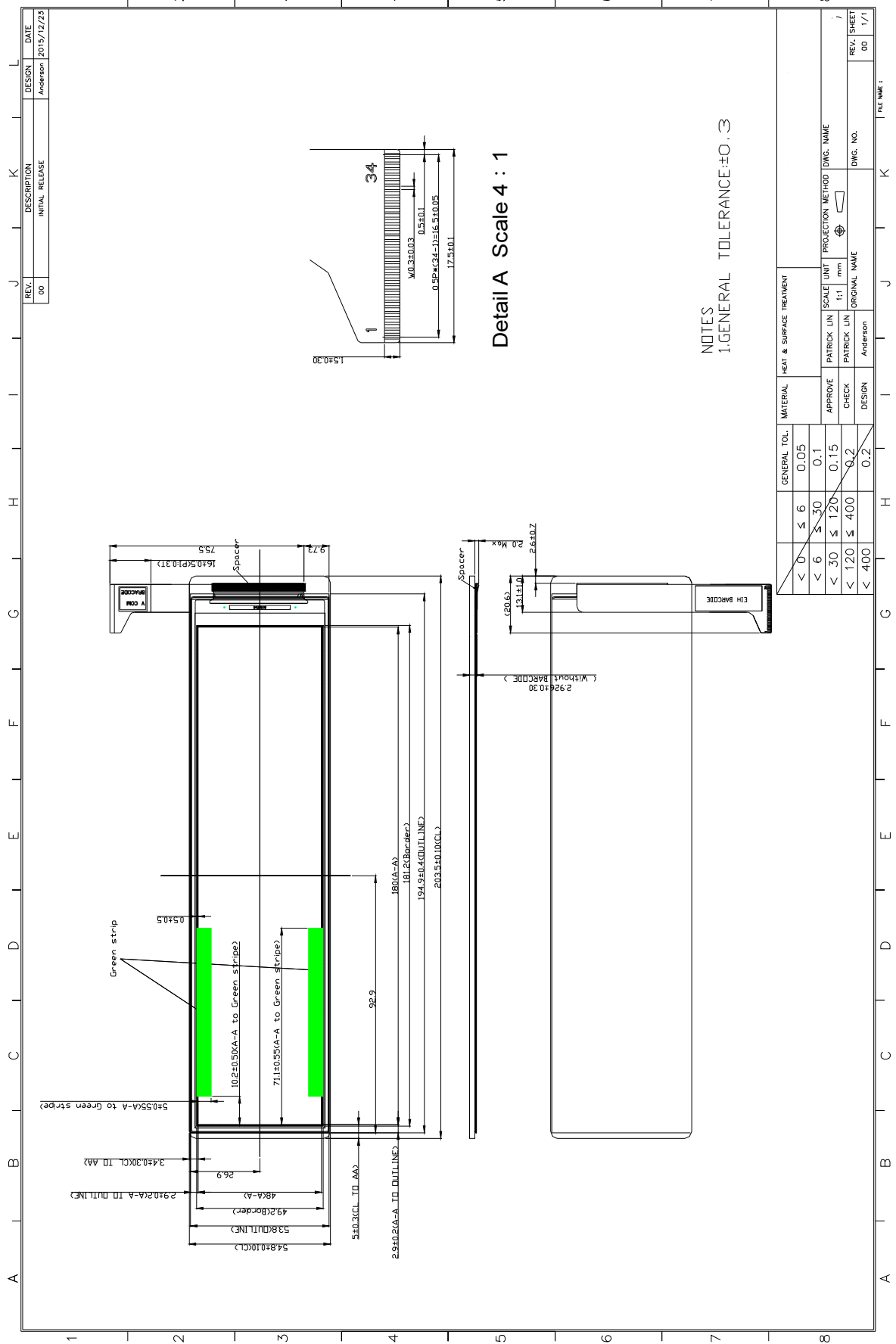
5. Input/Ouput Terminals

5-1) Connector type: FH34S-34S-0.5SH(50)-Hirose

Pin Assignment

Pin #	Signal	Description	Remark
1	VNEG	Negative power supply source driver	
2	VGL	Negative power supply gate driver	
3	VSS	Ground	
4	NC	NC	Not to use
5	NC	NC	Not to use
6	VDD	Digital power supply drivers (3.3V)	
7	VSS	Ground	
8	XCL	Clock source driver	
9	VSS	Ground	
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	NC	NC	Not to use
23	NC	NC	Not to use
24	NC	NC	Not to use
25	NC	NC	Not to use
26	VSS	Ground	
27	MODE 1	Output mode selection gate driver	
28	CKV	Clock gate driver	
29	SPV	Start pulse gate driver	
30	NC	NC	Not to use
31	BORDER	Border connection	
32	VSS	Ground	
33	VPOS	Positive power supply source driver	
34	VGH	Positive power supply gate driver	

5-2) Panel Scan Direction
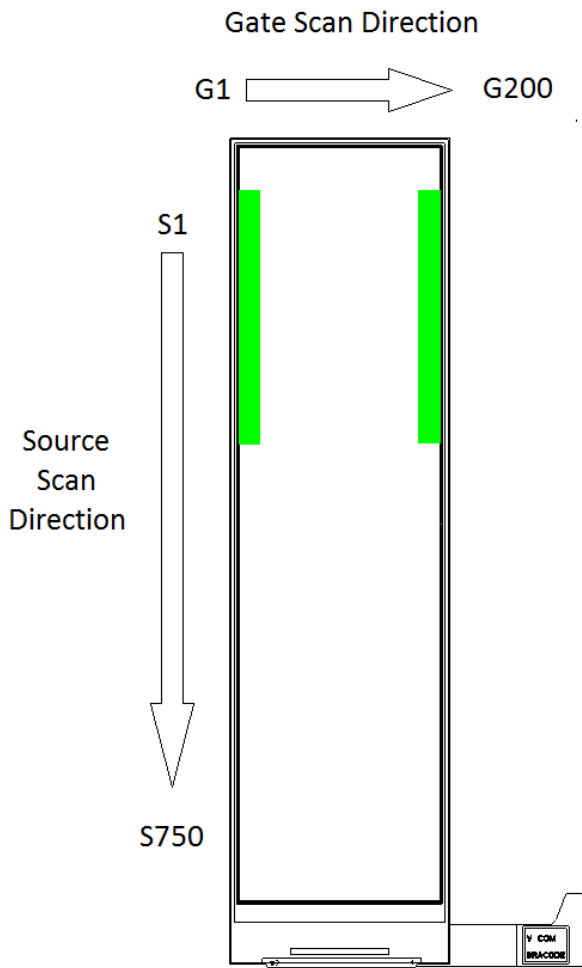
6. Electrical Characteristics

6-1) Absolute maximum rating

Parameter	Symbol	Rating	Unit
Logic Supply Voltage	VDD	-0.3 to +5	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	VGH	-0.3 to +46	V
Supply Voltage	VGL	-25.0 to +0.3	V
Supply Range	VGH-VGL	-0.3 to +46	V
Operating Temp. Range	TOTR	0 to +50	℃
Storage Temp. Range	TSTG	-25 to +70	℃

6-2) Panel DC characteristics

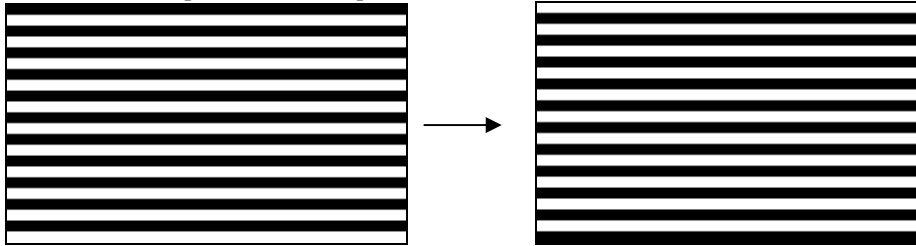| Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Signal ground	V_{SS}		-	0	-	V
Logic Voltage supply	V_{DD}		3.0	3.3	3.6	V
	I_{VDD}	V_{DD}=3.3V	-	0.57	0.93	mA
Gate Negative supply	VGL		-21	-20	-19	V
	I_{GL}	VGL =-20V	-	1.14	1.75	mA
Gate Positive supply	VGH		21	22	23	V
	I_{GH}	VGH = 22V	-	0.24	1.5	mA
Source Negative supply	V_{NEG}		-15.4	-15	-14.6	V
	I_{NEG}	V_{NEG} = -15V	-	0.51	5.85	mA
Source Positive supply	V_{POS}		14.6	15	15.4	V
	I_{POS}	V_{POS} = 15V	-	1.02	6.98	mA
Border supply	V_{COM}		-4	Adjusted	0.3	V
Asymmetry source	V_{Asym}	V_{POS}+V_{NEG}	-800	0	800	mV
Common voltage	V_{COM}		-4	Adjusted	-0.3	V
	I_{COM}		-	0.16	-	mA
Maximum power panel	P_{MAX}		-	-	262.12	mW
Standby power panel	P_{STBY}		-	-	1.47	mW
Typical power panel	P_{TYP}		-	48.31	-	mW

- The maximum power consumption is measured using 85Hz 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 85Hz 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 ± 0.1V.
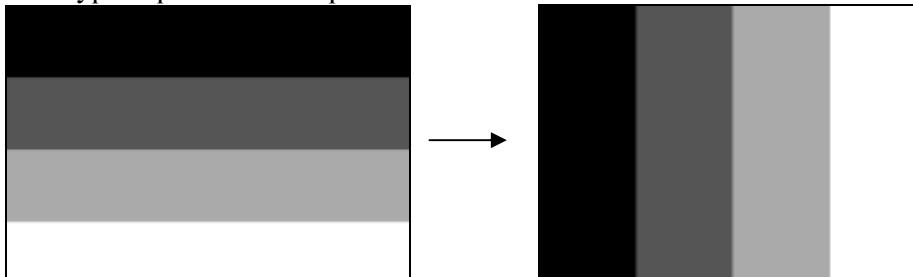- The maximum I_{COM} inrush current is about 200 mA

Note 6-1

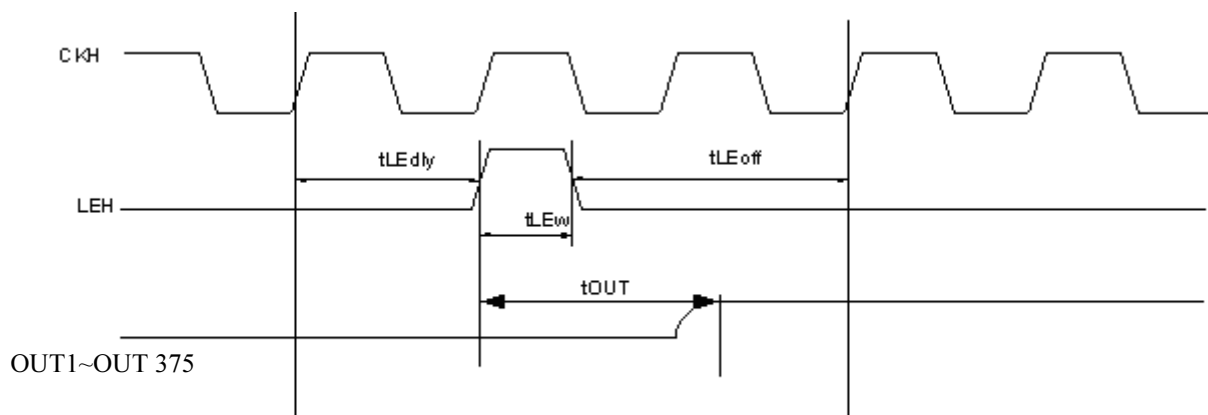The maximum power consumption

Note 6-2

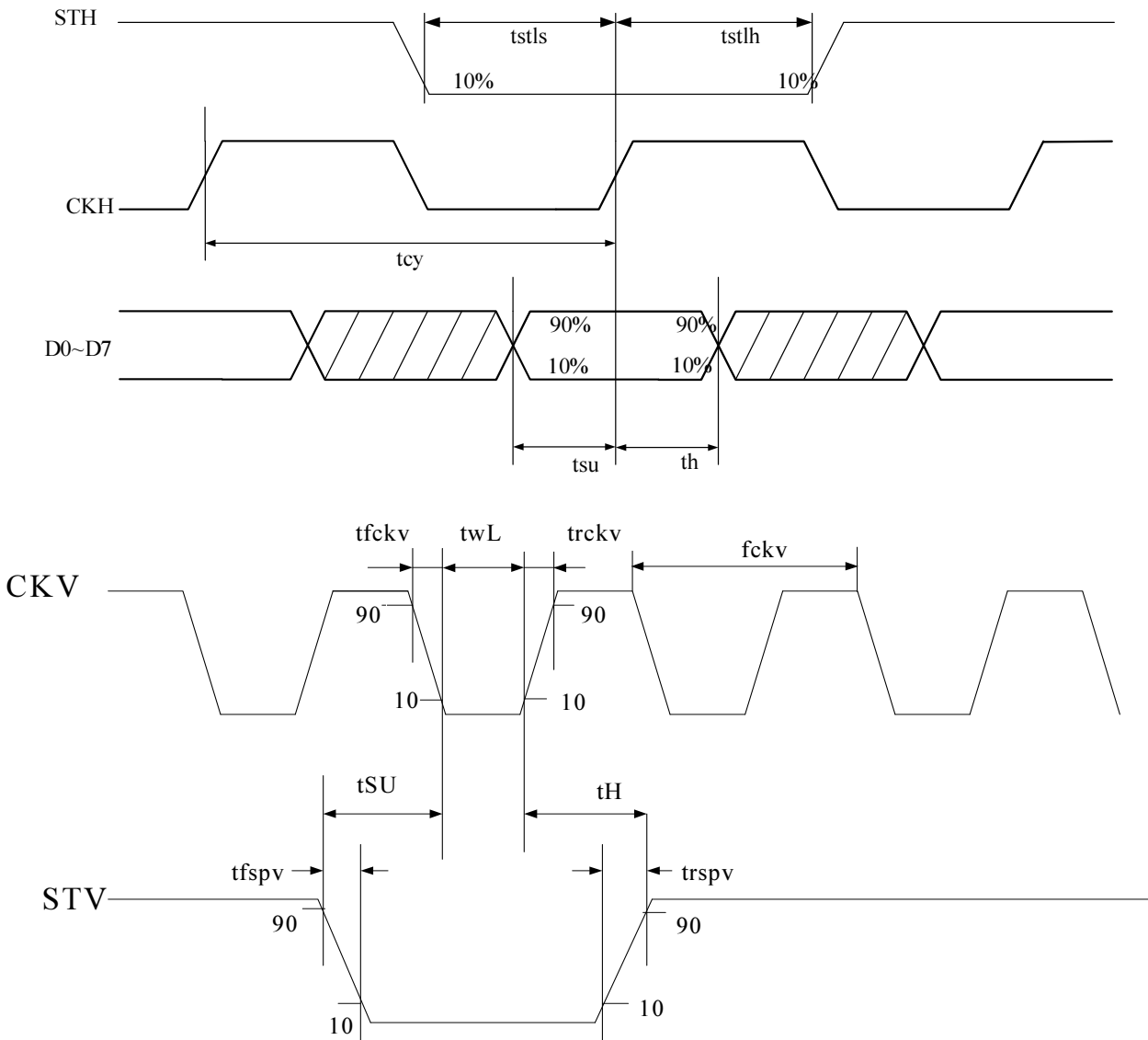The Typical power consumption

6-3) Panel AC characteristics

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

Parameter	Symbol	Min.	Typ.	Max.	Unit
Clock frequency	fckv	-	-	200	kHz
Minimum "L" clock pulse width	twL	500	-	-	ns
Minimum "H" clock pulse width	twH	500	-	-	ns
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 XCL cycle time	tcy	16.67	-	-	ns
D0 .. D7 setup time	tsu	8	-	-	ns
D0 .. D7 hold time	th	8	-	-	ns
XSTL setup time	tstls	0.5* tcy	-	0.8* tcy	ns
XSTL hold time	tstlh	0.5* tcy	-	160*tcy-tstls	ns
XLE on delay time	tLEdly	3.5* tcy	-	-	ns
XLE high-level pulse width (When VDD=3.0V to 3.6V)	tLEw	300	-	-	ns
XLE off delay time	tLEoff	200	-	-	ns
Output setting time to +/- 30mV(C_{load}=200pF)	tout	-	-	20	us

OUTPUT LATCH CONTROL SIGNALS

CLOCK & DATA TIMING

STH

tstls   tstlh

10%   10%

CKH

tcy

D0~D7

90%   90%
10%   10%

tsu   th

tfckv   twL   trckv   fckv

CKV

90   90

10   10

tSU   tH

tfspv   trspv

STV

90   90

10   10

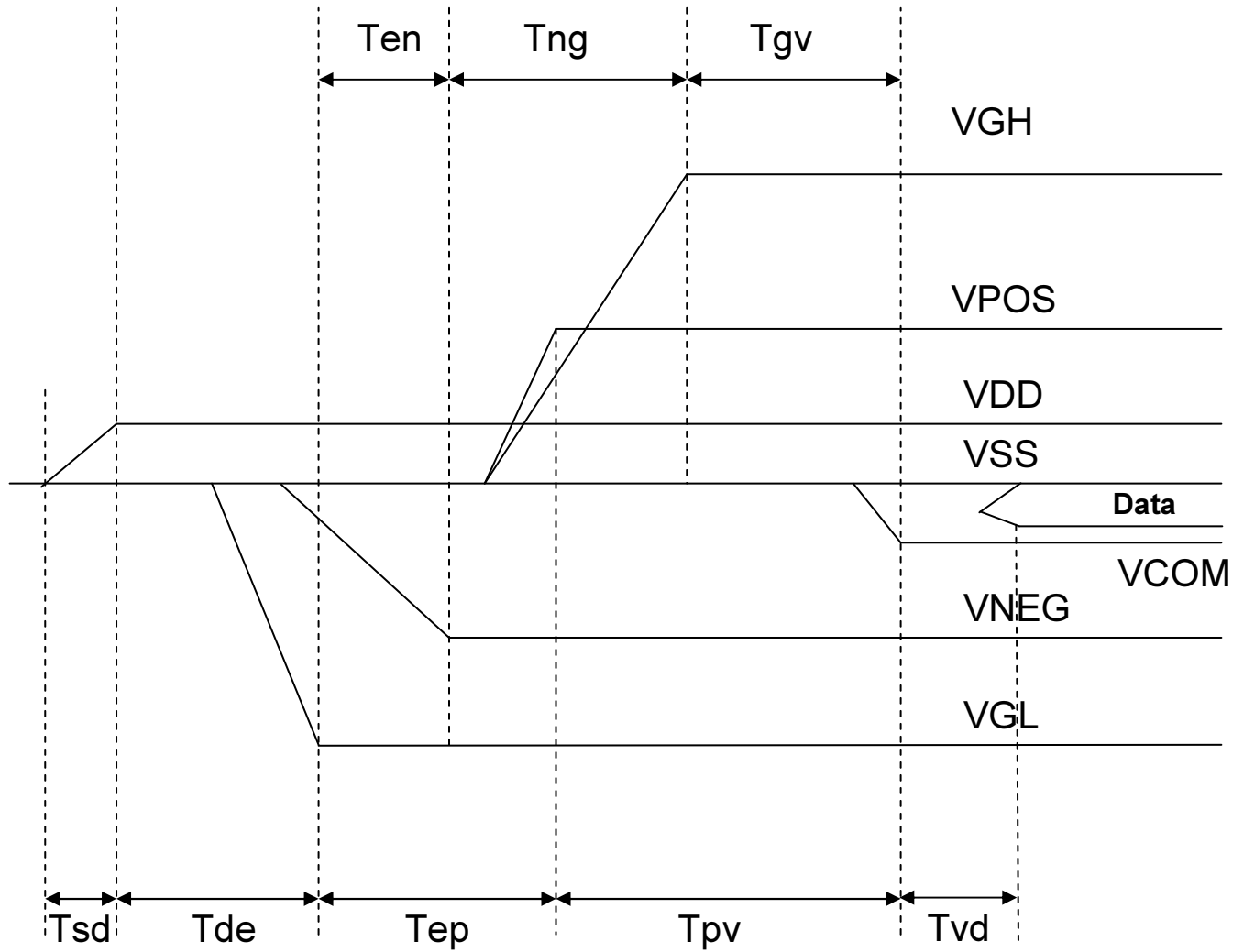## GATE OUTPUT TIMING

1   2   3   4   5

CKV

MODE1

SPV

Gout1
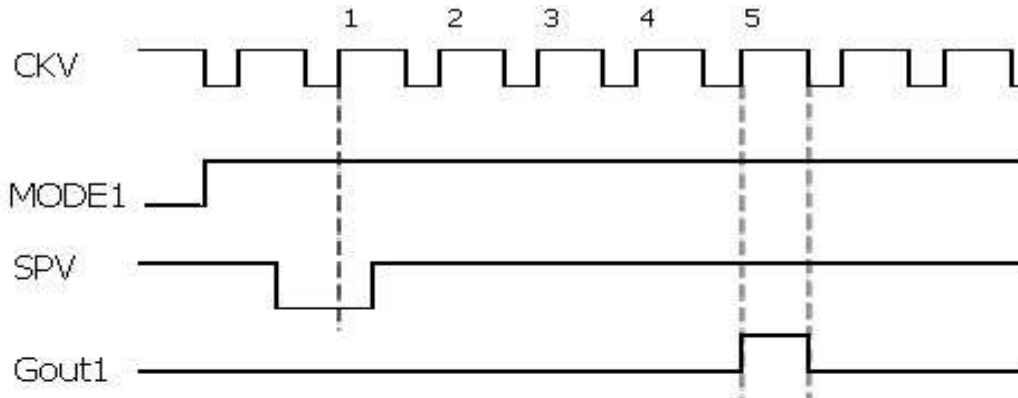
Note：First gate line on timing

After 5CKV，gate line is on .

7. Power on Sequence

Power Rails must be sequenced in the following order：

1. VSS → VDD → VNEG → VPOS (Source driver) → VCOM
2. VSS → VDD → VGL → VGH (Gate driver)

POWER ON

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

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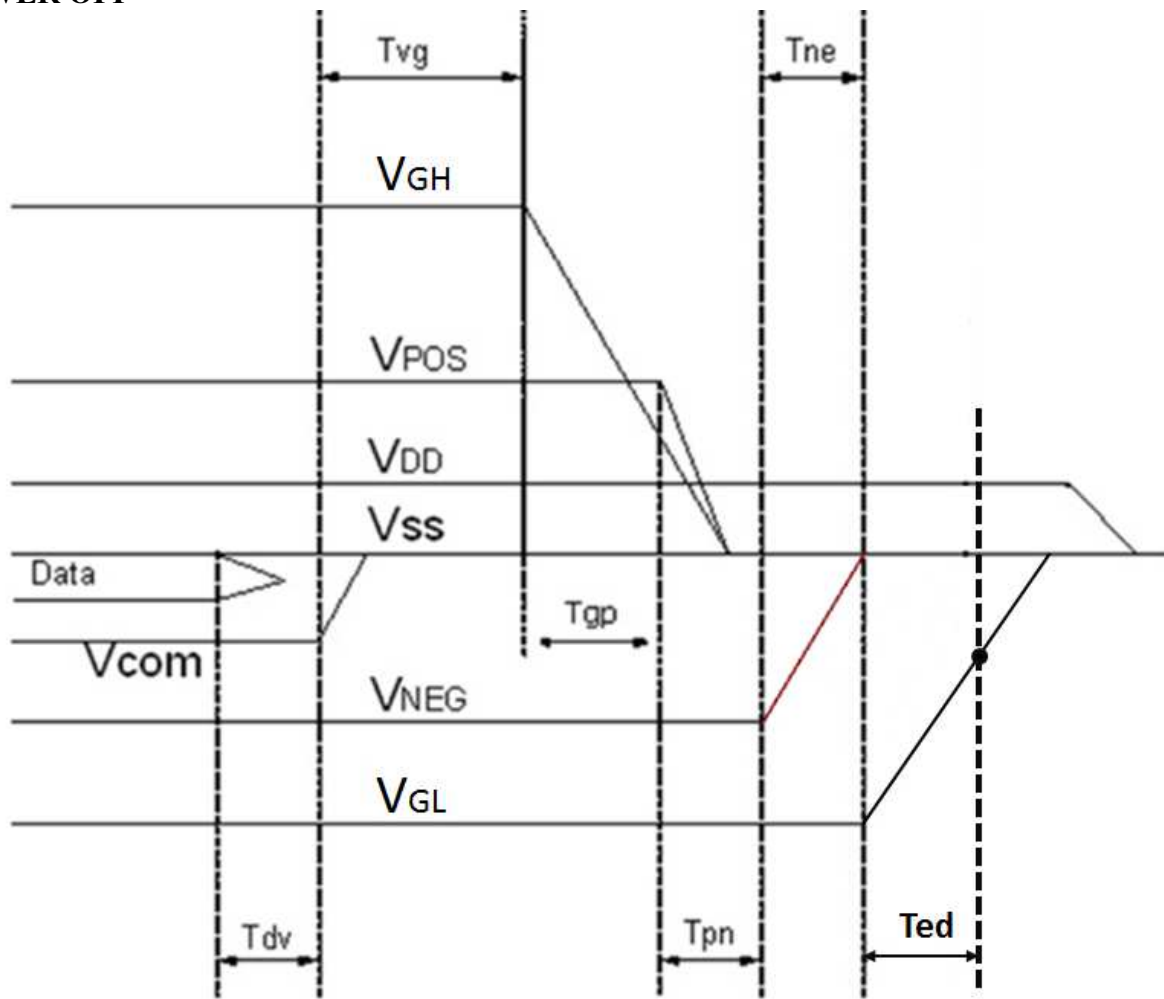
	Min	Max	Remark
Tdv	100μs	-	-
Tvg	0μs	-	-
Tgp	0μs	-	-
Tpn	0μs	-	-
Tne	0μs	-	-
Ted	0.5s	-	Discharged point @ -7.4 Volt

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

Note 7-2 : Begin to turn off VGL power after VNEG and VPOS are completely or almost discharged to GND state.

Note 7-3：VGL must remain negative of Vcom during decay period

7-1) Refresh Rate

The module ET073TC1 is applied at a maximum screen refresh rate of 85Hz.

	Min	Max
Refresh Rate	-	85Hz

8. Driving Method

In order to use current IC, the design for the 750*200 display area is different from normal array design. The same row of pixels could have different gate line. The array is actually displaying a 375*400 image. Therefore, the input image should be re-arranged to 375*400 to display a 750*200 image

8-1) Data Arrangement

A simplified example is shown below, with an input image of 8*2. Each number represents a single pixel. After data re-arrangement, the image has a dimension of 4*4.

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16

1	3	5	7
2	4	6	8
9	11	13	15
10	12	14	16
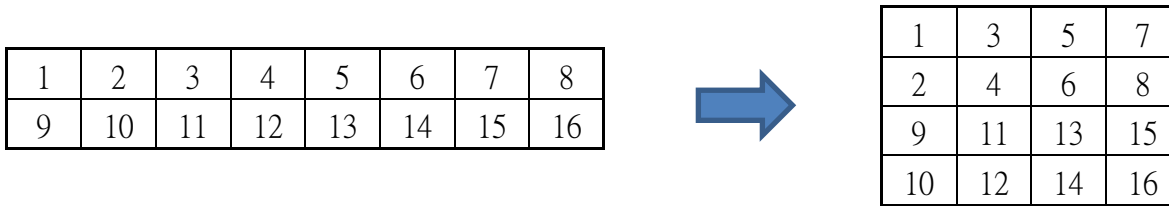
A practical application is shown below. On the left is the original picture with dimension of 750*200, which user wants to input. Due to the array design, the input picture should be first translated into 375*400, as shown on the right. The "S" stands for source line and the "G" stands for gate line in the array.

Original image	G1	G2	……….	G199	G200
S1	D1_1	D2_1		D199_1	D200_1
S2	D1_2	D2_2		D199_2	D200_2
S3	D1_3	D2_3		D199_3	D200_3
:					
:					
S375					
S749	D1_749	D2_749		D199_749	D200_749
S750	D1_750	D2_750		D199_750	D200_750
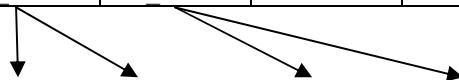
Converted image	G1	G2	G3	G4	……….		G399	G400
S1	D1_1	D1_2	D2_1	D2_2			D200_1	D200_2
S2	D1_3	D1_4	D2_3	D2_4			D200_3	D200_4
S3	D1_5	D1_6	D2_5	D2_6			D200_5	D200_6
:								
:								
S374	D1_747	D1_748	D2_747	D2_748			D200_747	D200_748
S375	D1_749	D1_750	D2_749	D2_750			D200_749	D200_750

9. Optical characteristics

9-1) Specifications

Measurements are made by PR655 with MS-75 or equivalent SepctaScan Colorimeter with that the illumination is at an angle 45° from the perpendicular at the center of sample surface, and the detector is perpendicular unless otherwise specified

$T = 25^{o}C$

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP.	MAX	UNIT	Note
R	Reflectance	White	30	40	-	%	Note 9-1
Gn	N_{th} Grey Level	-	-	DS+(WS-DS)× n/(m-1)	-	L*	-
CR	Contrast Ratio	-	9	12	-		-

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

9-2) Definition of contrast ratio for Front light off mode

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
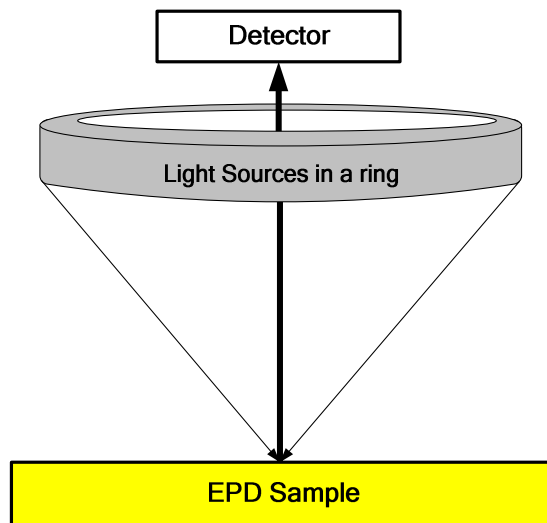
9-3) Reflection Ratio

The reflection ratio is expressed as:

$R = Reflectance\ Factor_{white\ board}$ 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.

10. HANDLING, SAFETY AND ENVIRONMENTAL 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.

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 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.	
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-assembly operation.	

11. Reliability test

|	TEST	CONDITION	METHOD	REMARK
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=40% 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	Solar Radiation Test	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	Stylus Tapping	POLYACETAL Pen: Top R:0.8mm Load: 300gf Speed: 2 times/sec Total 13,500times,		Test with bezel and device to simulate full product test.

Actual EMC level to be measured on customer application

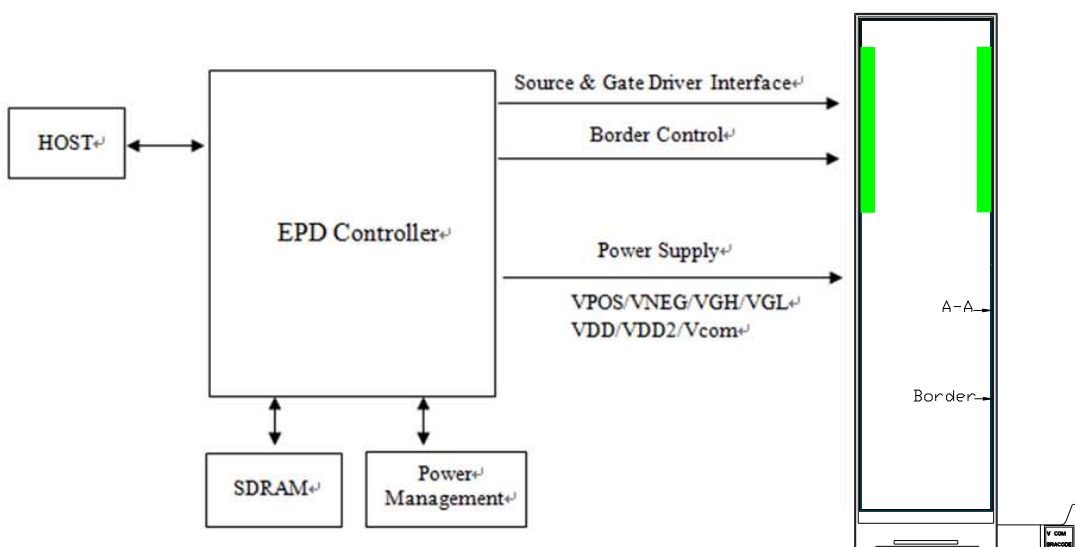Note: The protective film must be removed before temperature test.

< 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.
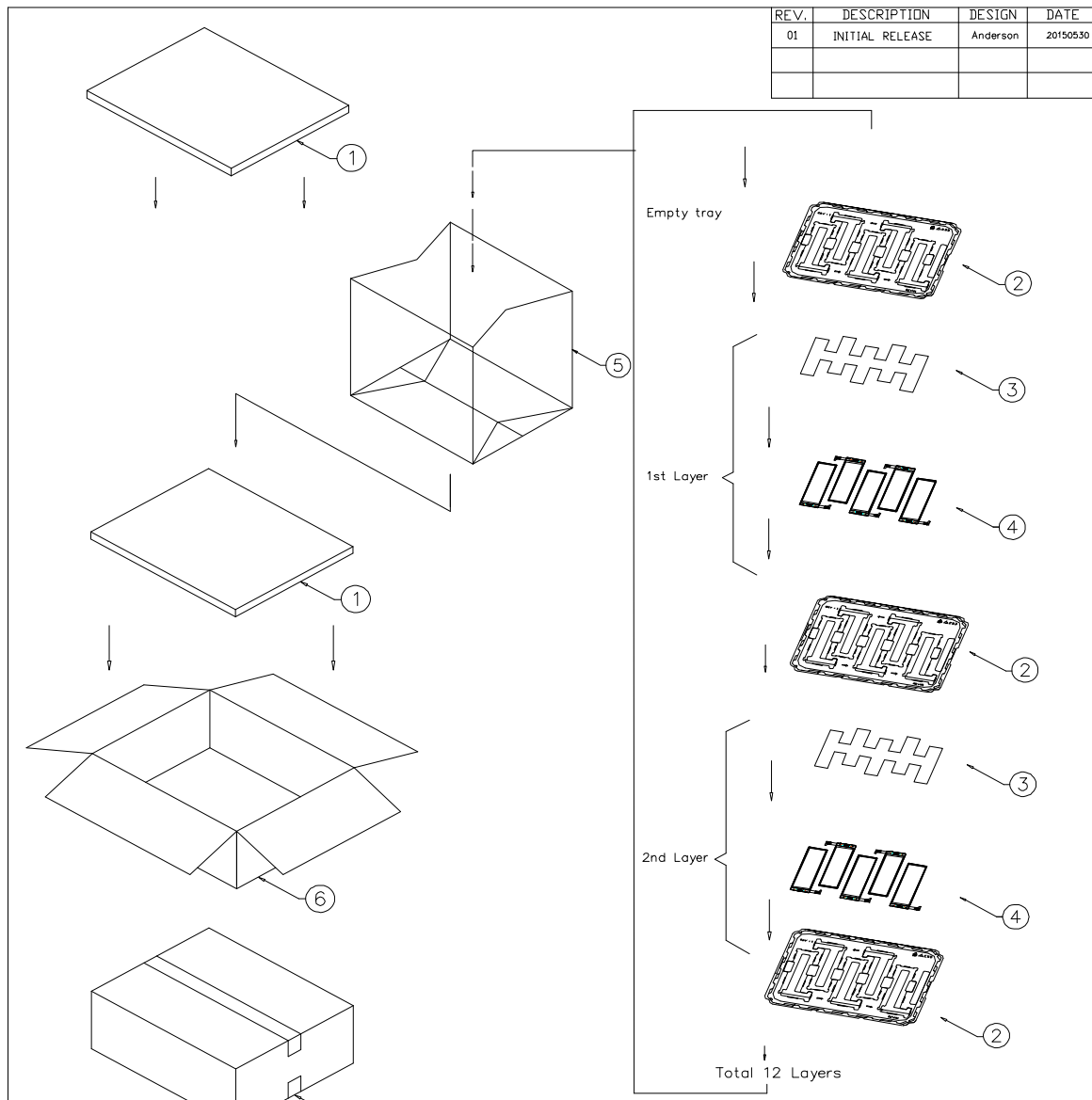
12. Border definition
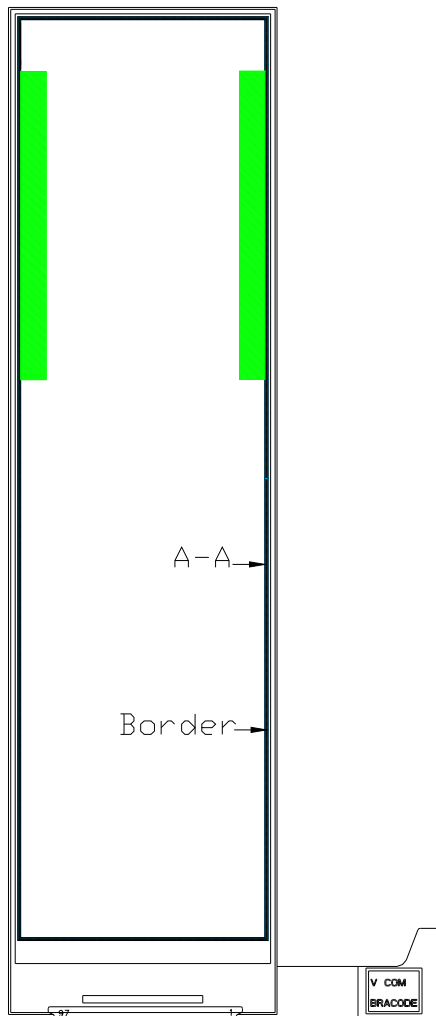
13. Block Diagram

14. Packing

REV.	DESCRIPTION	DESIGN	DATE
01	INITIAL RELEASE	Anderson	20150530

Empty tray

1st Layer

2nd Layer

Total 12 Layers

NOTE:
1.One layer include:1 piece of cushion sheet, 5pcs panel & 1 piece of tray.
2.Q'TY:60 pcs panel/carton.
3.Dimension: 455*365*170mm
4.Weight: 6.41KG

6		CARTON	1	
5		FOLDED BAG	1	
4		ET073TC1 Panel	60	
3		EPE CUSHION SHEET	12	
2		PET TRAY	13	
1		CUSHION PLATE	2	
ITEM	PART NO.	DESCRIPTION	QTY	REMARK

MTL.SPEC.	UNSPECIFIED TOL'S	REMARK	GooDisplay		
	ANGLE				
	ROUGHNESS				
APPROVE Patrick 20150530	SCALE 1:1	UNIT mm	SHEET 1 OF 1	DWG.TITLE	
CHECK Patrick 20150530	MTL.NO.		DWG.NO.		REV. 01 / A4 SIZE
DESIGN Anderson 20150530					