

Version: 0.1

TECHNICAL SPECIFICATION

MODEL NO. : ET017QC4

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

PM	FAE	Front Light	Panel Design	Electronic Design	Mechanical Design	Product Verification	Prepared By
鄧如夏	賴宜賢	張極棟 2015.8.18	陳均 2015.8.18	陳均 2015.8.18	洪嘉興 2015.8.18	傅淑貞 2015.8.18	李慧珊 2015.8.18

Revision History

Rev.	Issued Date	Revised	Contents
0.1	Aug 18,2015	New	

TECHNICAL SPECIFICATION

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1. General Description

ET017QC4 is a reflective electrophoretic E Ink[®] technology display module based on active matrix TFT. It has 1.73" active area with 240 x 320 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.

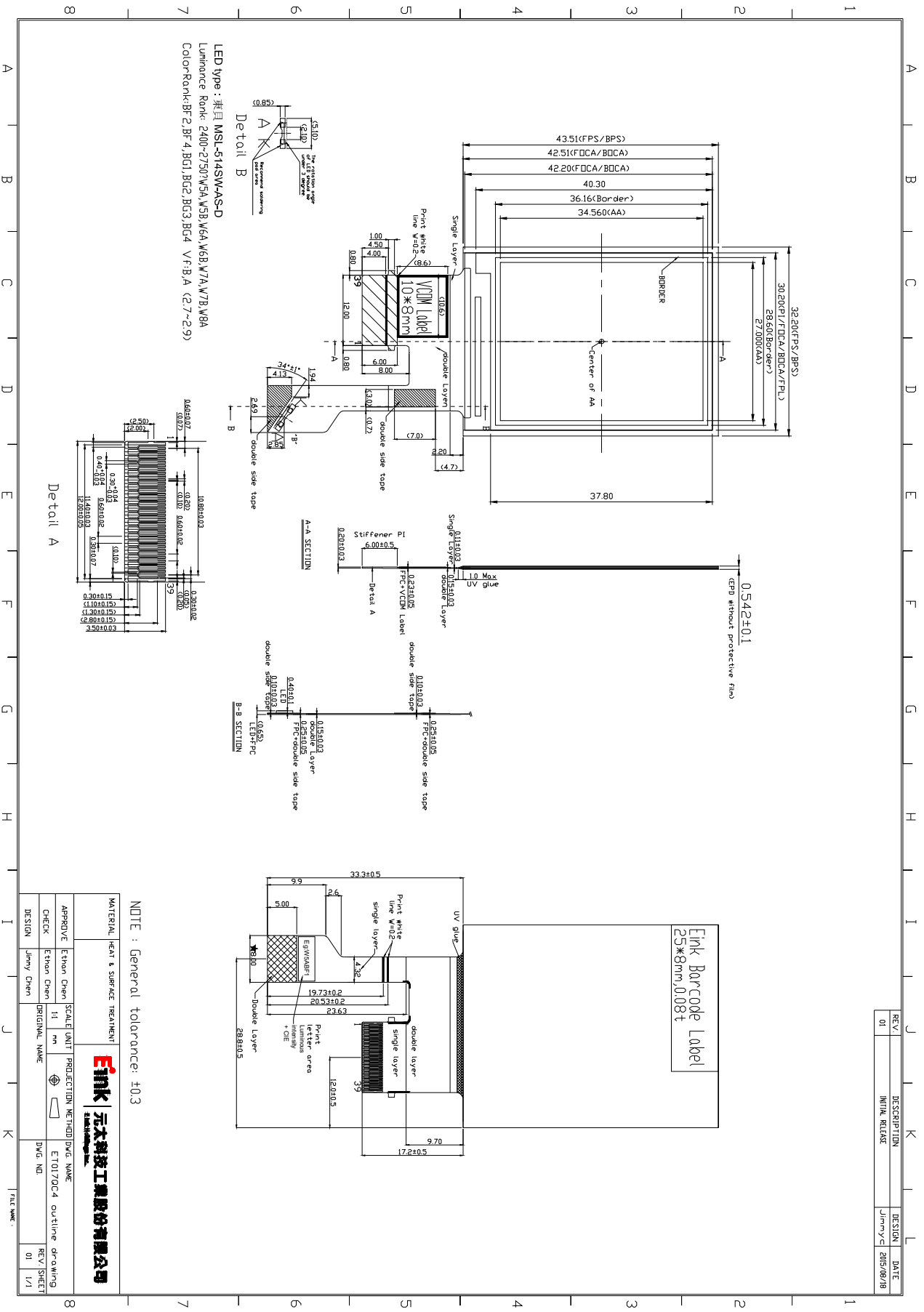
2. Features

- High contrast reflective/electrophoretic technology
- 240*320 display
- No glass, No broken risk
- High reflectance
- Ultra wide viewing angle
- Ultra low power consumption
- Pure reflective mode
- Bi-stable
- Commercial temperature range
- Landscape, portrait mode
- hard-coated front-surface

3. Mechanical Specifications

Parameter	Specifications	Unit	Remark
Screen Size	1.73	Inch	
Display Resolution	240 (H) × 320 (V)	Dot	
Active Area	27.00 (H) × 34.56 (V)	mm	
Pixel Pitch	0.1125(H) × 0.108(V)	mm	
Pixel Configuration	Rectangle		
Outline Dimension	32.2(H) × 43.51(V) × 0.542(D)	mm	
Module Weight	1.12 ± 0.2	g	

4. Mechanical Drawing of EPD Module



REV	DESCRIPTION	DESIGN	DATE
01	INITIAL RELEASE	Jimmy Chen	2015/08/18

NOTE : General tolerance: ±0.3

MATERIAL		SCALE		PROJECTION METHOD		DRAWING	
HEAT & SURFACE TREATMENT		1:1	mm	1st	ASME Y14.5	ET017QC4	Outline drawing
APPROVE	E Ink Chen	SCALE	UNIT	PROJECTION	METHOD	DWG. NAME	REV. SHEET
CHECK	E Ink Chen	1:1	mm	1st	ASME Y14.5	ET017QC4	Outline drawing
DESIGN	Jimmy Chen	ORIGINAL NAME				DWG. NO.	REV. SHEET
							01 / 1

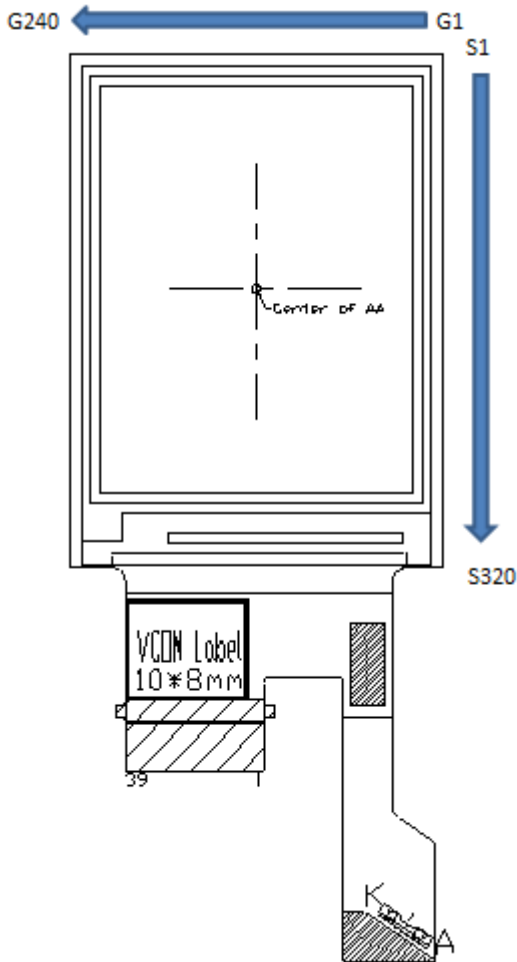
5. Input/Output Terminals

5-1) Connector type: 39FXL-RSM1-S-H-TB(LF)

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	XCL	Clock source driver
6	XLE	Latch enable source driver
7	XOE	Output enable source driver
8	NC	NO Connection
9	NC	NO Connection
10	NC	NO Connection
11	XSTL	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 voltage
23	VGH	Positive power supply gate driver
24	VGL	Negative power supply gate driver
25	NC	NO Connection
26	NC	NO Connection
27	MODE1	Output mode selection gate driver
28	MODE1	Output mode selection gate driver
29	NC	NO Connection
30	NC	NO Connection
31	NC	NO Connection
32	SPV	Start pulse 1st gate driver
33	CKV	Clock 1st gate driver
34	BORDER	Border connection
35	NC	NO Connection
36	NC	NO Connection
37	LED+	LED Positive power supply
38	NC	NO Connection
39	LED-	LED Negative power supply

5-2) Scan direction drawing



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	VGH	-0.3 to +45	V
Supply Voltage	VGL	-25.0 to +0.3	V
Supply Range	VGH-VGL	-0.3 to +45	V
Operating Temp. Range	TOTR	0 to +50	°C
Storage Temperature	TSTG	-25 to +70	°C

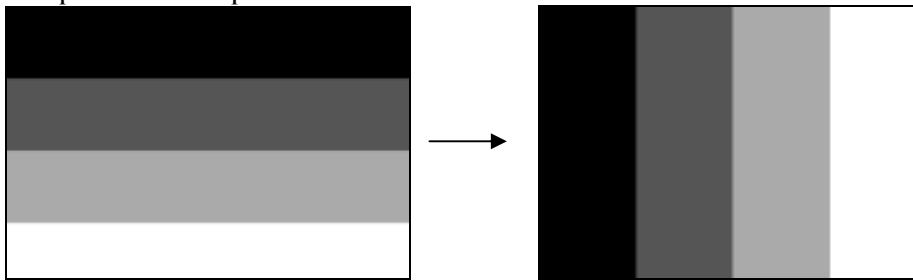
6-2) Panel DC characteristics

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}	$V_{DD}=3.3V$	-	0.13	0.22	mA
Gate Negative supply	V_{GL}		-21	-20	-19	V
	I_{GL}	$V_{GL} = -20V$	-	0.15	0.31	mA
Gate Positive supply	V_{GH}		21	22	23	V
	I_{GH}	$V_{GH} = 22V$	-	0.09	0.19	mA
Source Negative supply	V_{NEG}		-15.4	-15	-14.6	V
	I_{NEG}	$V_{NEG} = -15V$	-	2.11	5.15	mA
Source Positive supply	V_{POS}		14.6	15	15.4	V
	I_{POS}	$V_{POS} = 15V$	-	2.15	5.3	mA
Border supply	V_{COM}		-3.34	Adjusted	-2.44	V
Asymmetry source	V_{Asvm}	$V_{POS}+V_{NEG}$	-800	0	800	mV
Common voltage	V_{COM}		-3.34	Adjusted	-2.44	V
	I_{COM}		-	0.3	-	mA
Standby power panel	P_{STBY}		-	-	0.2	mW
Power panel	P		-	70	168	mW
Operating temperature			0	-	50	°C
Storage temperature			-25	-	70	°C
Maximum image update time at 25°C			-	1000	-	ms

- The 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 E Ink.
- Vcom is recommended to be set in the range of assigned value $\pm 0.1V$.
- The maximum I_{COM} inrush current is about 35.3 mA.

Note 6-1

The power consumption



6-3) Refresh Rate

The module ET017QC4 is applied at a maximum screen refresh rate of 85Hz.

	Min	Max
Refresh Rate	-	85Hz

6-4) Recommended driving condition for Front light

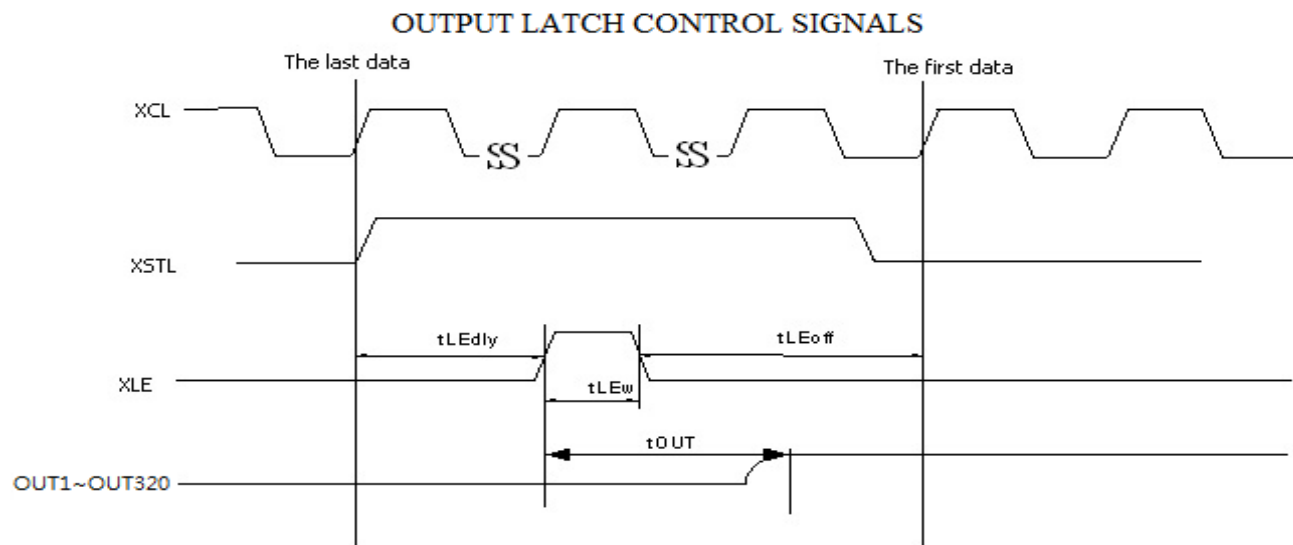
GND = 0 V , Ta = 25°C

Parameter	Symbol	Min	TYP	MAX	Unit	Remark
Supply voltage of LED Front light	V_{LED}	2.7	-	3	V	
Supply current of LED Front light	I_{LED}	-	5	-	mA	
Front light Power Consumption	P_{LED}	13.5	-	15	mW	

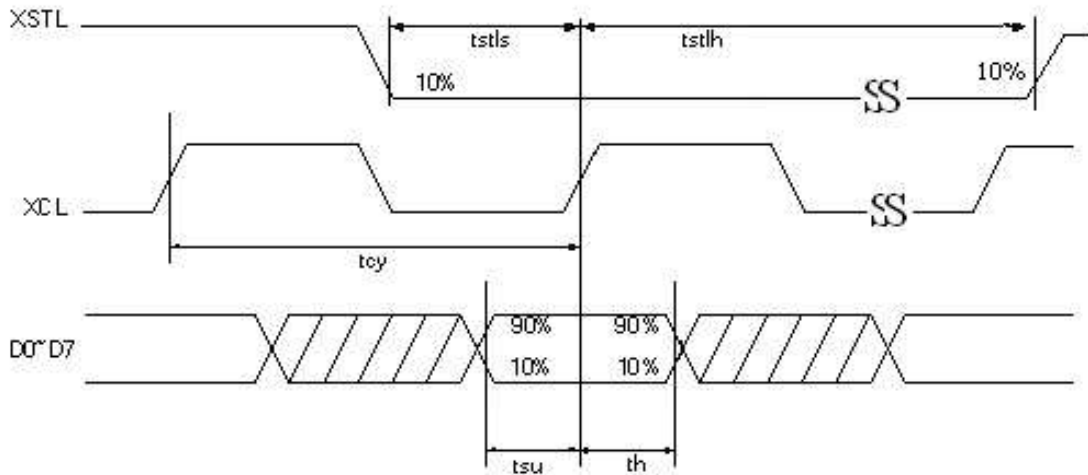
6-5)Panel AC characteristics

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

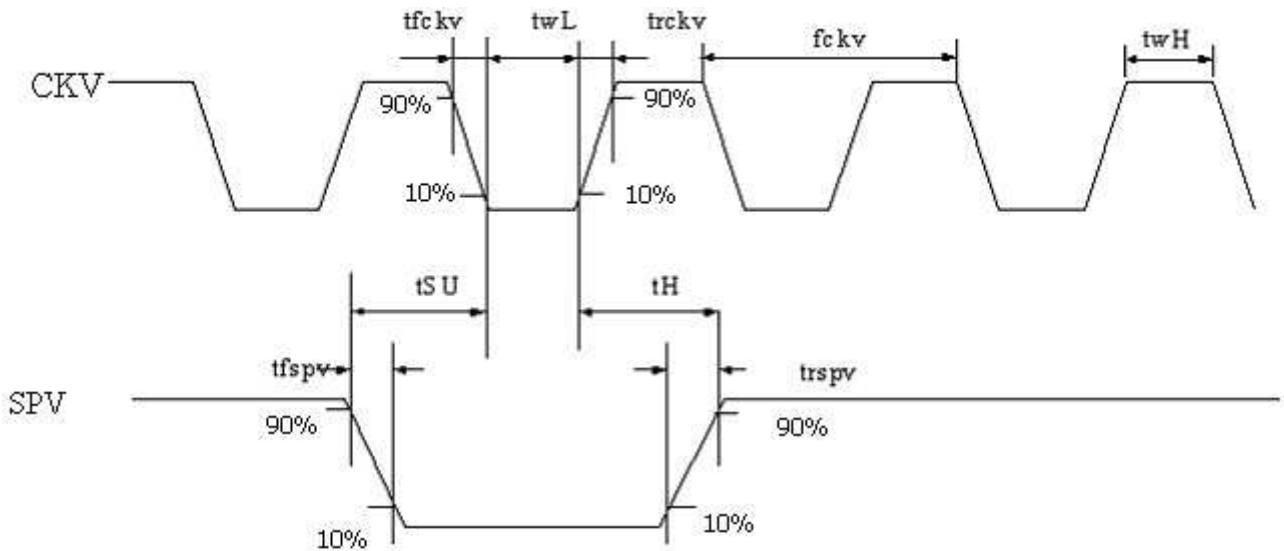
Parameter	Symbol	Min.	Typ.	Max.	Unit
Clock frequency	fckv	-	-	200	kHz
Minimum “L” clock pulse width	twL	0.5	-	-	us
Minimum “H” clock pulse width	twH	0.5	-	-	us
Clock rise time	trckv	-	-	100	ns
Clock fall time	tfckv	-	-	100	ns
SPV setup time	tSU	100	-	twH-100	ns
SPV hold time	tH	100	-	twH-100	ns
Pulse rise time	trspv	-	-	100	ns
Pulse fall time	tfspv	-	-	100	ns
Clock XCL cycle time	tcy	25	-	-	ns
D0 .. D7 setup time	tsu	12	-	-	ns
D0 .. D7 hold time	th	12	-	-	ns
XSTL setup time	tstls	12	-	-	ns
XSTL hold time	tstlh	12	-	-	ns
XLE on delay time	tLEdly	40	-	-	ns
XLE high-level pulse width (When VCC=3.0V to 3.6V)	tLEw	250	-	-	ns
XLE off delay time	tLEoff	200	-	-	ns
Output setting time to +/- 30mV(C _{load} =200pF)	tout	-	-	12	us



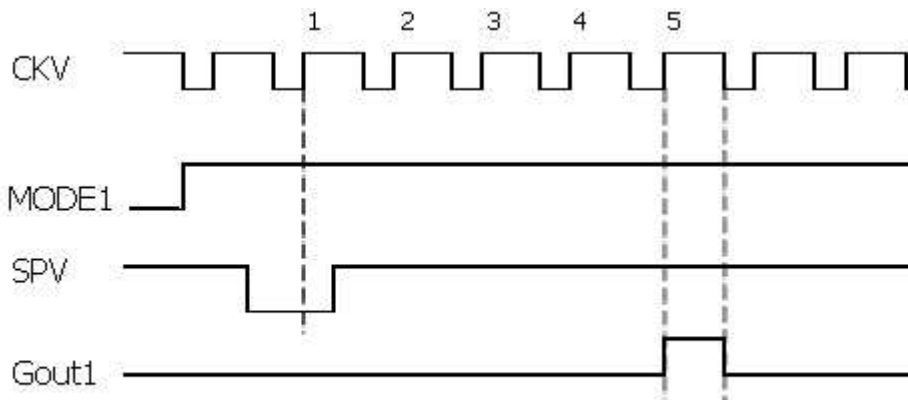
CLOCK & DATA TIMING



CKV & SPV TIMING



GATE OUTPUT TIMING



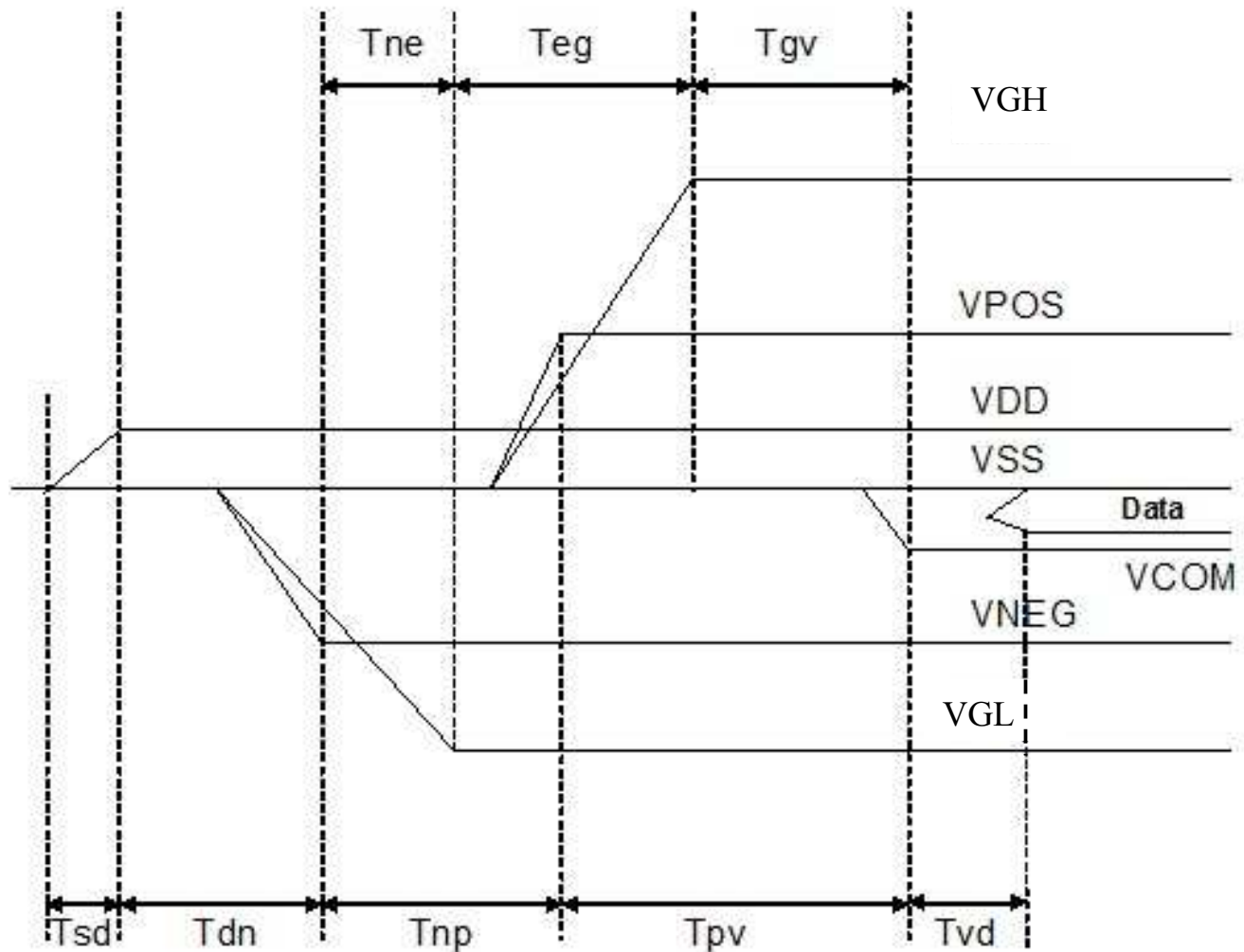
Note : First gate line on timing
After 5CKV , gate line is on .

7. Power Sequence

Power Rails must be sequenced in the following order :

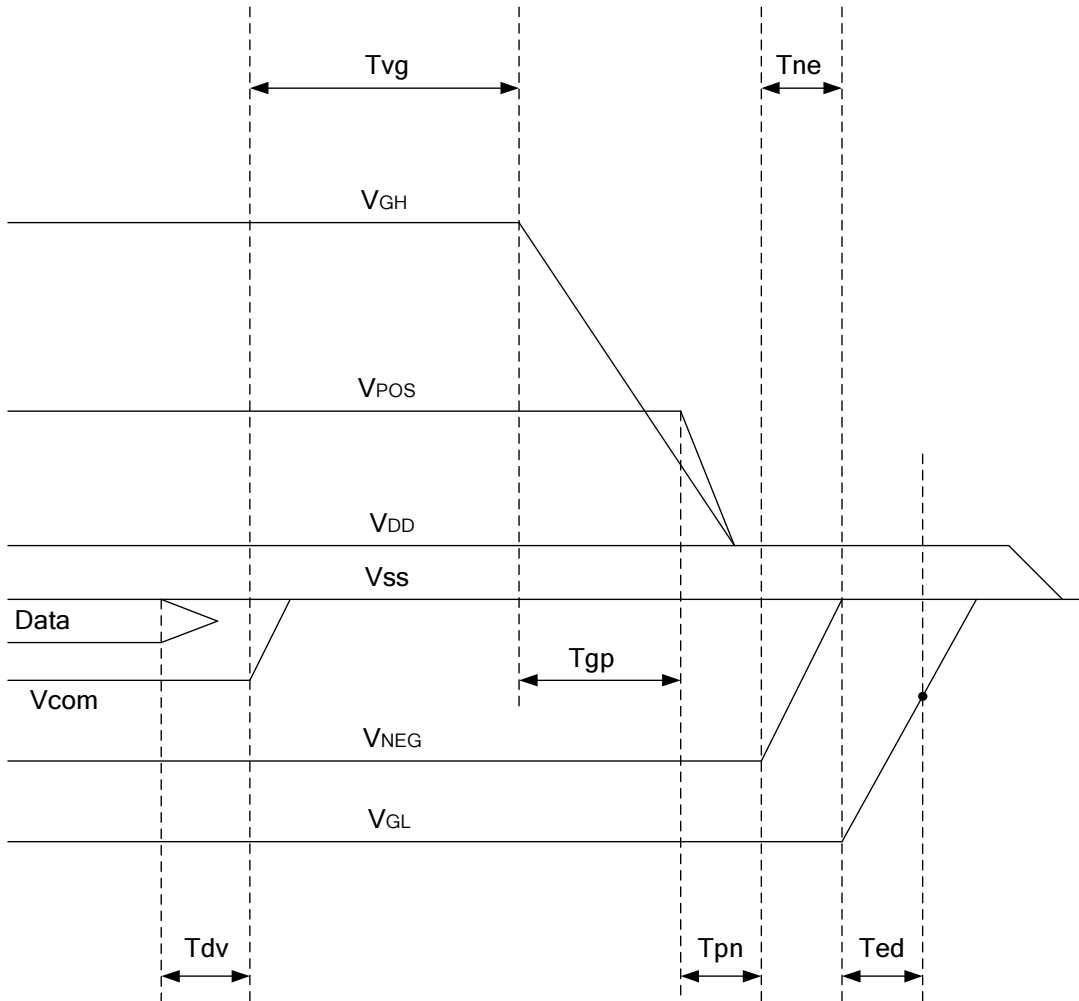
1. VSS → VDD → VNEG → VPOS (Source driver) → VCOM
2. VSS → VDD → VGL → VGH (Gate driver)

POWER ON



	Min	Max
Tsd	30us	-
Tdn	100us	-
Tnp	1000us	-
Tpv	100us	-
Tvd	100us	-
Tne	0us	-
Teg	1000us	-
Tgv	100us	-

POWER DOWN



	Min	Max
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 VSS state.

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

8. Optical characteristics

8-1) Specifications

Measurements are made 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°C

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP.	MAX	UNIT	Note
R	Reflectance	White	30	35	-	%	Note 8-1
Gn	N _{th} Grey Level	-	-	DS+(WS-DS)×n/(m-1)	-	L*	-
CR	Contrast Ratio	-	10	12	-		-
T _{update}	Update time	2~4-bit mode 1-bit mode		780 260	-	ms ms	-

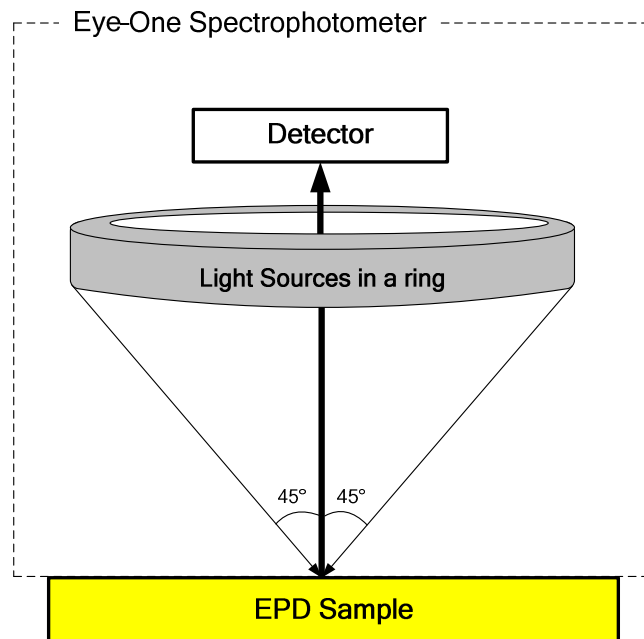
WS: White state , DS: Dark state, Gray state from Dark to White :DS、G1、G2...、Gn...、Gm-2、WS
m:4、8、16 when 2、3、4 bits mode

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:

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

L_{center} is the luminance measured at center in a white area (R=G=B=1). L_{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.

9.HANDLING, SAFETY, ENVIROMENTAL REQUIREMENTS AND REMARK

WARNING
The display module should be kept flat or fixed to a rigid, curved support with limited bending along the long axis. It should not be used for continual flexing and bending. Handle with care. Should the display break do not touch any material that leaks out. In case of contact with the leaked material then wash with water and soap. Contact E Ink for advice on mounting the display in a curved shape.
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.

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 panel can be deformed 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 Preliminary 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 120 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 120 hrs	IEC 60 068-2-3CA	
6	High Temperature, High- Humidity Storage	T = +60°C, RH=80% for 120hrs 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	Package Vibration	1.04G, Frequency: 10~500Hz Direction: X,Y,Z Duration: 1 hours in each direction	Full packed for shipment	
9	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	
10	Electrostatic Effect (non-operating)	(Machine model)+/- 250V 0Ω, 200pF	IEC 62179, 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. Bar Code definition

EHA 00 6 01 1 N 7 4 00361 A T
 1 2 3 4 2 5 6 2 7 2 8

1 : EPD model code:

ET017QC4 : EHA

2 : Internal control codes :Do not care

3 : Pearl FPL reversion code : C:6,E:8

4 : FPL batch code:

01~99	001~099	G0~G9	160~169	Q0~Q9	230~239	X0~X9	300~309
A0~A9	100~109	H0~H9	170~179	R0~R9	240~249	Y0~Y9	310~319
B0~B9	110~119	J0~J9	180~189	S0~S9	250~259	Z0~Z9	320~329
C0~C9	120~129	K0~K9	190~199	T0~T9	260~269		
D0~D9	130~139	L0~L9	200~209	U0~U9	270~279		
E0~E9	140~149	M0~M9	210~219	V0~V9	280~289		
F0~F9	150~159	N0~N9	220~229	W0~W9	290~299		

5 : Year:

N: 2013 / P: 2014 / Q: 2015 / R: 2016 /... / Z: 2024

6 : Month:

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

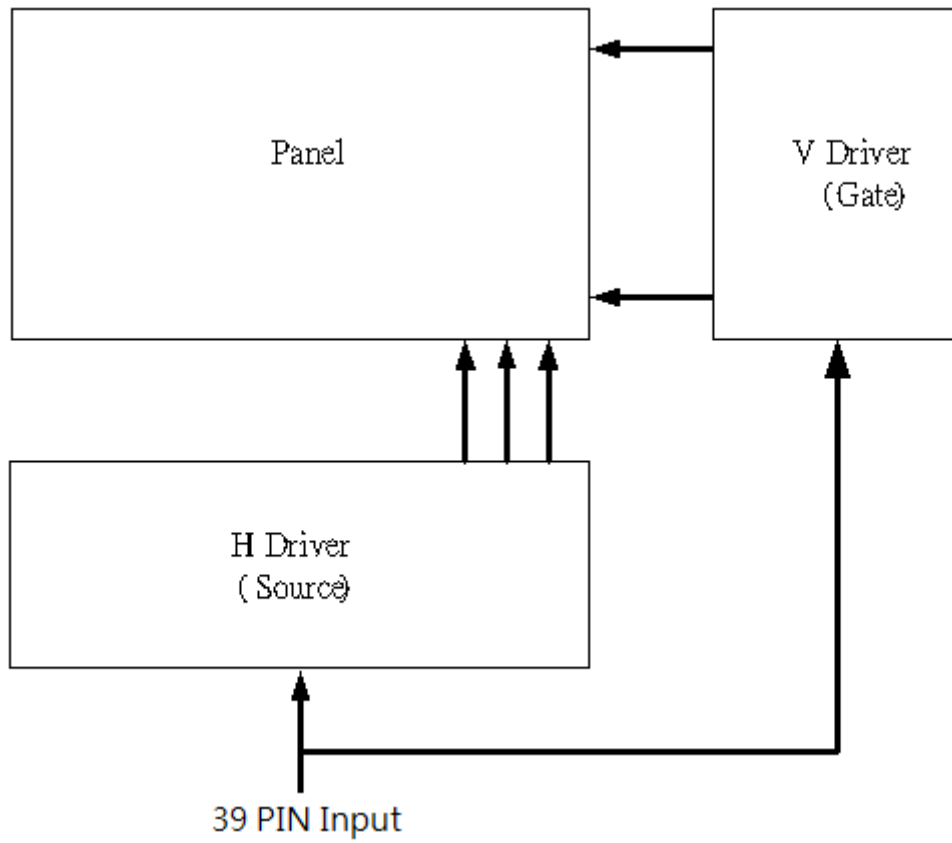
7 : Serial number

00000-99999

8 : MFG code:

E Ink Yanzhou : FAB1: K, FAB2 : Y, FAB3 : T, FAB4 : L, FAB5 : G,
 E Ink Hsinchu : P

12. Block Diagram



13. Packing

REV	DESCRIPTION	DESIGN	DATE
01	INITIAL RELEASE	Jimmyc	2015.08.18

NOTE:

- One layer include:
24pcs panel & 1 piece of tray.
- QTY: 288 pcs panel/carton.
- Dimension: 455*375*190mm
- Weight: 3.7 KG
- Make sure tray stacked with 180° rotation.
We can check this by lateral side view.

8	30g加厚複合紙袋(雙面噴塗)73*95mm(規格JK0030)	2	
7	防鏽劑(保護容積25L)	3	
6	CARTON INTERNAL	1	
5	摺口袋450*380*590mm	1	抗靜電
4	EPD 1.73" Panel	288	
2	PS TRAY	13	抗靜電
1	EPE FOAM	2	
ITEM	DESCRIPTION	QTY	REMARK

MTLSPEC.	UNSPECIFIED TOL'S	REMARK
	ANGLB ROUGHNESS	

元太科技工業股份有限公司
E Ink Holdings Inc.

APPROVE	Ethan Chen	SCALE	1:1	UNIT	mm	SHEET	1 OF 1	DWG.TITLE	ET017QC4 PACKING DRAW		
CHECK	Ethan Chen	MTL.NO.		DWG.NO.		REV.	01	A4 SIZE			
DESIGN	Jimmy Chen										