



YES OPTOELECTRONICS CO.,LTD

SPECIFICATIONS

MODEL NO.: YMS480800-043AAAMFGN

DATE: MAR.07.2016

Approved	Checked	Department

CUSTOMER:

MODEL NO.:

DATE:

Approved	Checked	Department

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REVISION HISTORY

Rev	Date	Item	Page	Remark
1.0	MAR.07.2016	New Creation	ALL	

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1. Over View

YMS480480-043AAAMFGN is a reflective electrophoretic E Ink® technology display module based on active matrix TFT substrate. It has 4.3” active area with 480 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 it used.

2.Features

- High contrast reflective/electrophoretic technology
- 480 x 800 display
- Ultra wide viewing angle
- Ultra low power consumption
- Pure reflective mode
- Bi-stable
- Commercial temperature range
- Landscape, portrait mode

3. Mechanical Specifications

Parameter	Specifications	Unit	Remark
Screen Size	4.3	Inch	
Display Resolution	480 (H)×800(V)	Pixel	
Active Area	56.16 (H)×93.6 (V)	mm	
Pixel Pitch	0.117 (H)×0.117 (V)	mm	
Pixel Configuration	Rectangle		
Outline Dimension	62.4(W)×106.4(H)×1.18(D)	mm	
Module Weight	16	g	
Number of Gray	16 Gray Level (monochrome)		
Display operating mode	Reflective mode		

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5. Input / Output Terminals

5-1)Pin Assignment

Pin #	Signal	Description
1	VNEG	Negative power supply source driver
2	VPOS	Positive power supply source driver
3	GND	Ground
4	VDD	Digital power supply drivers
5	XCL	Digital power supply drivers
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 connection
23	VGG	Positive power supply gate driver
24	VEE	Negative power supply gate driver
25	NC	No Connection
26	NC	No Connection
27	NC	No Connection
28	MODE1	Output mode selection gate driver
29	NC	No Connection
30	NC	No Connection
31	NC	No Connection
32	SPV	Start pulse gate driver
33	CKV	Clock gate driver
34	BORDER	Border connection
35	NC	No Connection
36	NC	No Connection
37	NC	No Connection
38	NC	No Connection
39	GND	Ground

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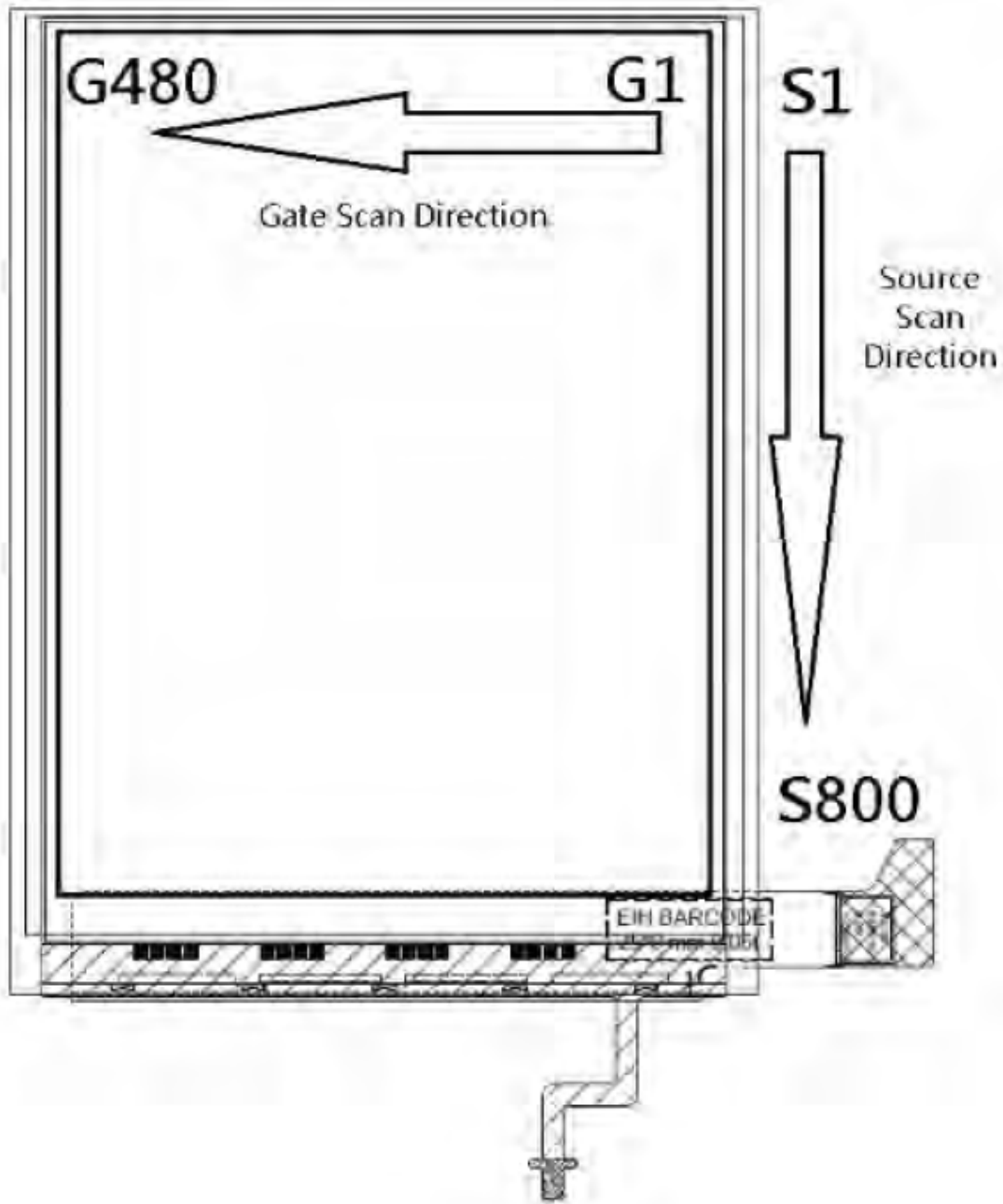
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5-2) Panel Scan direction



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6. Electrical Characteristics

6-1) Absolute maximum rating

Parameter	Symbol	Rating	Unit	Remark
Logic Supply Voltage	V _{DD}	-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	V _{GG}	-0.3 to +45	V	--
Supply Voltage	V _{EE}	-25.0 to +0.3	V	--
Supply Range	V _{GG} -V _{EE}	-0.3 to +45	V	--
Operating Temp. Range	TOTR	0 to +50	°C	--
Storage Temperature	TSTG	-25 to +70	°C	--

Note 1: SPI Flash IC Power Supply

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	-	0.902	1.76	mA
Gate Negative supply	V _{EE}		-21	-20	-19	V
	I _{EE}	V _{EE} = -20V	-	0.704	1.98	mA
Gate Positive supply	V _{GG}		21	22	23	V
	I _{GG}	V _{GG} = 22V	-	0.55	1.21	mA
Source Negative supply	V _{NEG}		-15.4	-15	-14.6	V
	I _{NEG}	V _{NEG} = -15V	-	2.75	7.7	mA
Source Positive supply	V _{POS}		14.6	15	15.4	V
	I _{POS}	V _{POS} = 15V	-	2.75	8.47	mA
Border supply	V _{COM}		-3.5	Adjusted	-1.1	V
Asymmetry source	V _{Asym}	V _{POS} +V _{NEG}	-800	0	800	mV
Common voltage	V _{COM}		-3.5	Adjusted	-1.1	V
	I _{COM}		-	0.11	-	mA
Panel Power	P		-	112.2	314.6	mW
Standby power panel	P _{STBY}		-	-	0.4	mW
Operating temperature			0	-	50	°C
Storage temperature			-25	-	70	°C

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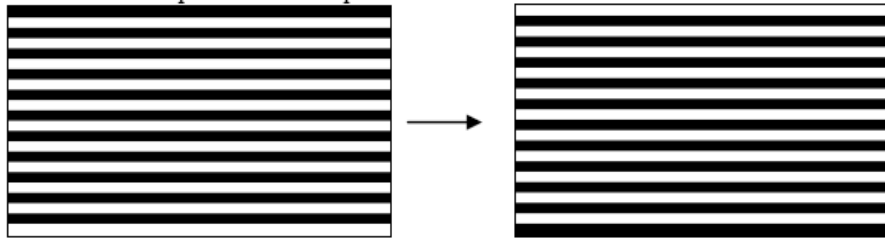
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- The maximum power consumption is measured using 85Hz waveform with following pattern transition: from pattern of repeated 1 consecutive black scan lines followed by 1 consecutive white scan line to that of repeated 1 consecutive white scan lines 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 $\pm 0.1V$.
- The maximum I_{COM} inrush current is about 182 mA

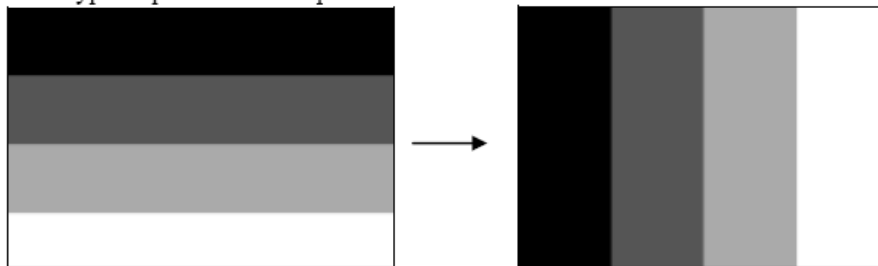
Note 6-1

The maximum power consumption



Note6-2

The Typical power consumption



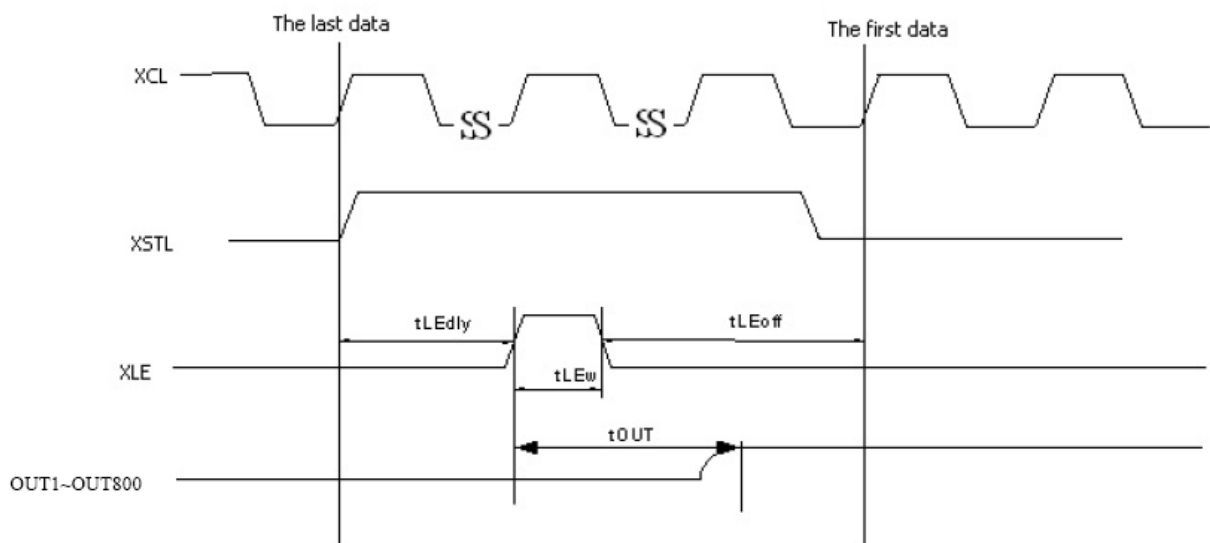
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6-3) Panel AC Characteristics

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

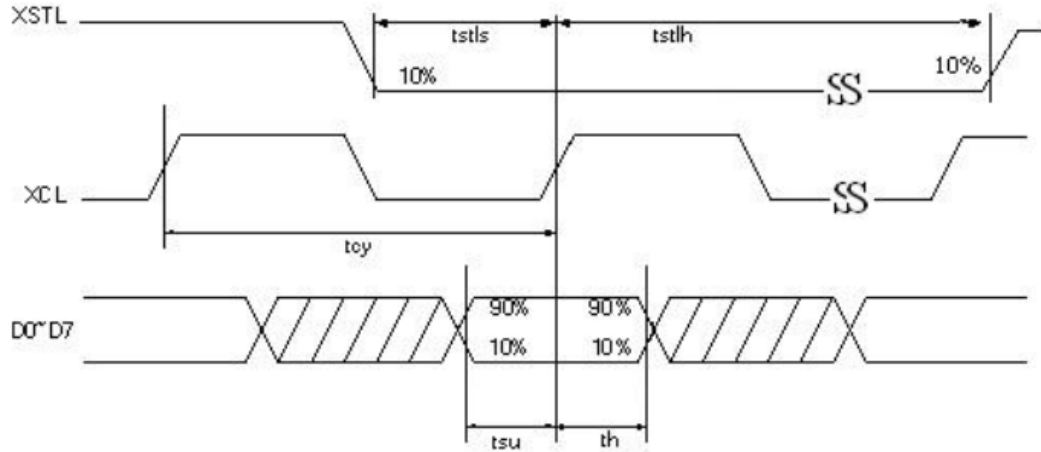
Parameter	Symbol	Min.	Typ.	Max.	Unit
Clock frequency	fckv	-	-	200	kHz
Minimum "L" clock pulse width	twL	0.5	-	-	us
Minimum "H" clock pulse width	twH	0.5	-	-	us
Clock rise time	trckv	-	-	100	ns
Clock fall time	tfckv	-	-	100	ns
SPV setup time	tSU	100	-	twH-100	ns
SPV hold time	tH	100	-	twH-100	ns
Pulse 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	150	-	-	ns
XLE off delay time	tLEoff	200	-	-	ns
Output setting time to +/- 30mV(C _{load} =200pF)	tout	-	-	12	us

OUTPUT LATCH CONTROL SIGNALS

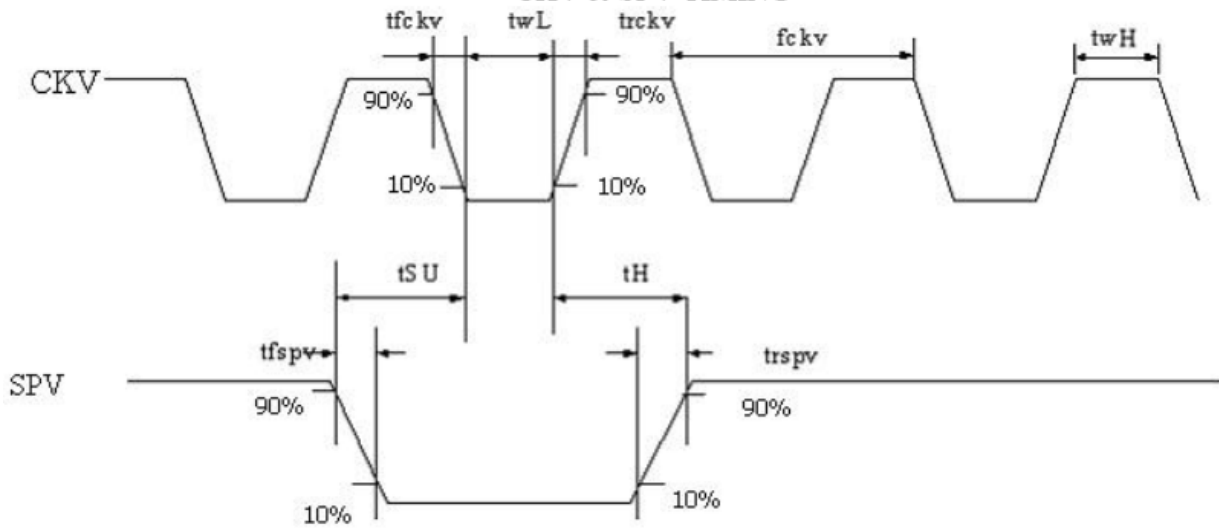


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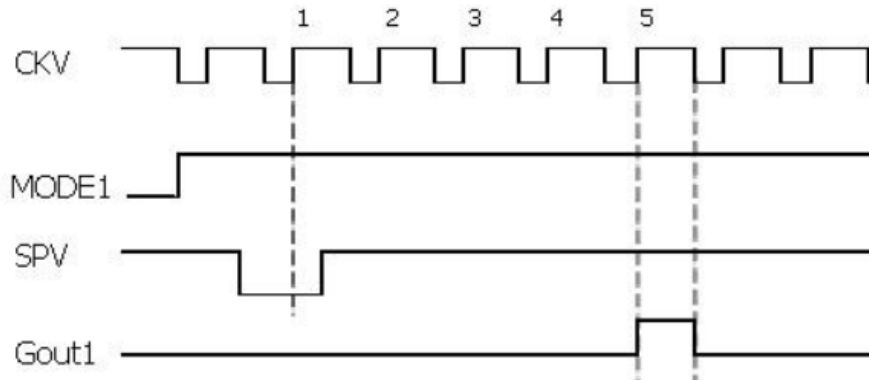
CLOCK & DATA TIMING



CKV & SPV TIMING



GATE OUTPUT TIMING



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

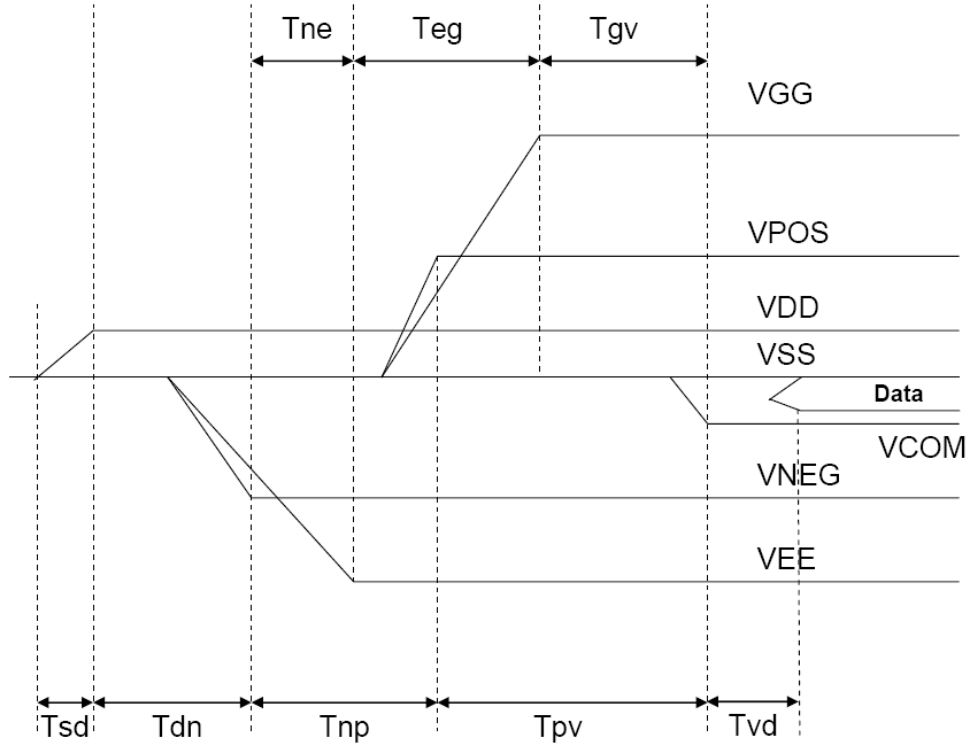
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7. Power on Sequence

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

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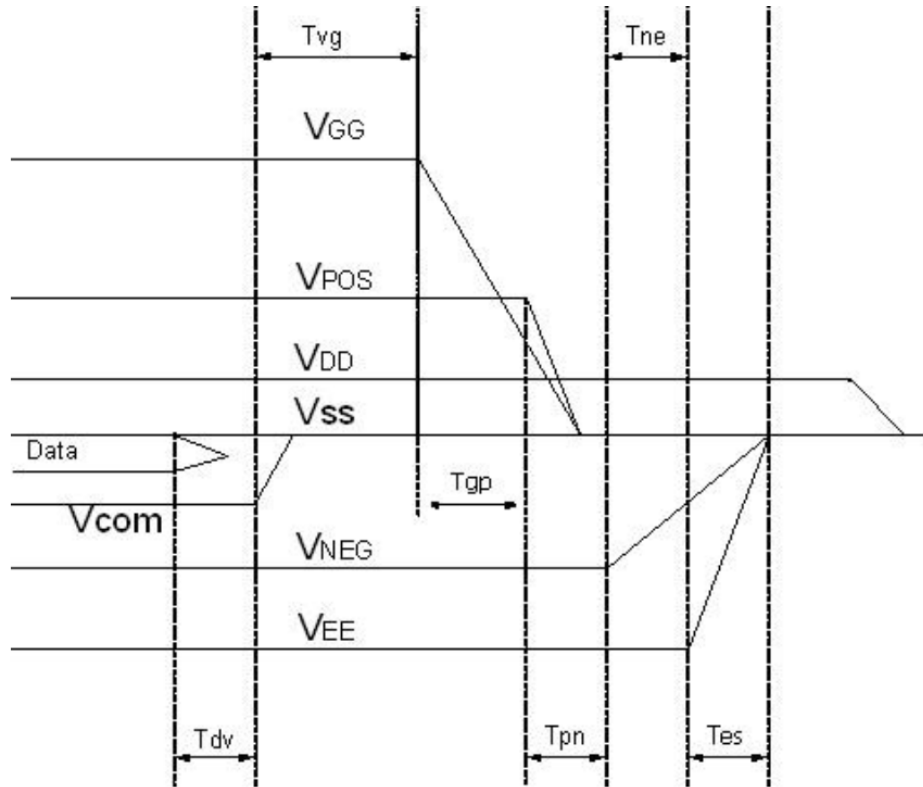
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POWER DOWN



	Min	Max
Tdv	100μs	-
Tvg	0μs	-
Tgp	0μs	-
Tpn	0μs	-
Tne	0μs	-
Tes	0s	-

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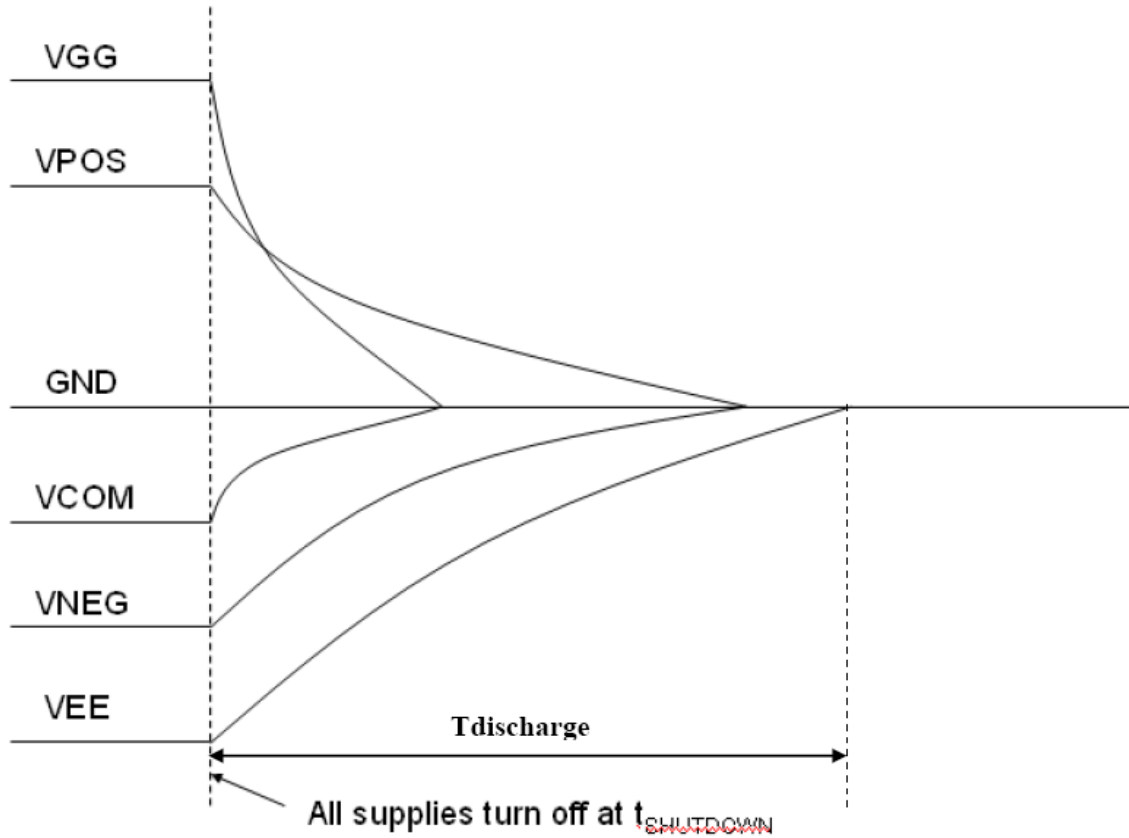
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8. Discharge time Sequence



Note8-1 : Supply voltages decay through pulldown resistors.

Note8-2 : VEE must remain negative of Vcom during decay period.

8-1) Refresh Rate

The module ED043WC1 is applied at a maximum screen refresh rate of 85Hz.

	Min	Max
Refresh Rate	-	85Hz

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9. Optical characteristics

9-1) Specifications

Measurements are made with that the illumination is at an angle of 45 degrees from the perpendicular at the center of sample surface, the detector is perpendicular unless otherwise specified.

T = 25°C

Symbol	Parameter	Conditions	Min	Typ.	Max	Unit	Note
R	Reflectance	White	30	35	-	%	Note 9-1
Gn	N th Grey Level	-	-	$DS+(WS-DS) \times n/(m-1)$	-	L*	-
CR	Contrast Ratio	-	10	12	-		-

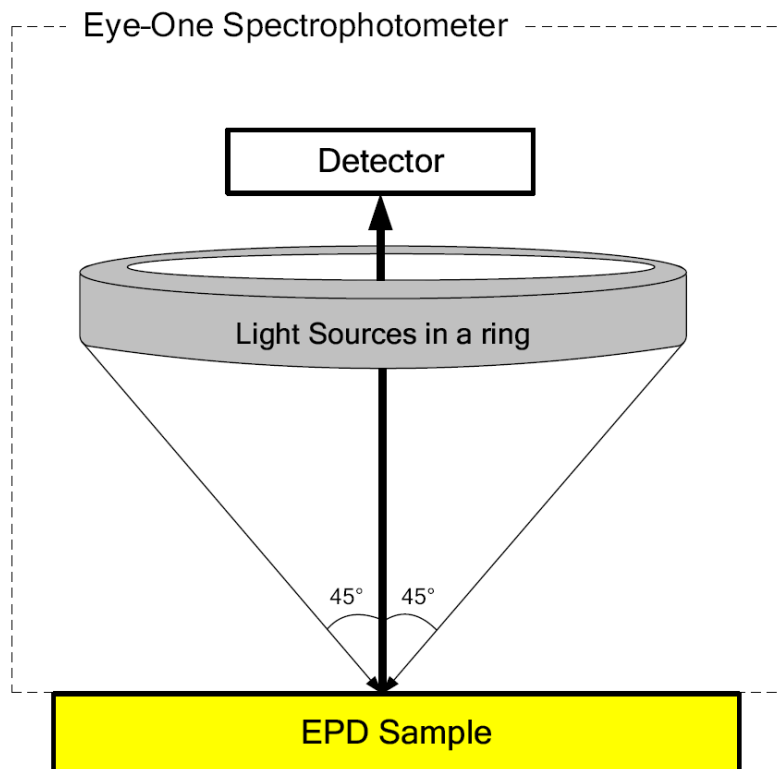
WS: White state , DS: Dark state, Gray state from Dark to White :DS、G1、G2...、Gn...、Gm-2、WS
 m:4、8、16 when 2、3、4 bits mode

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):

$$CR = Rl/Rd$$



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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.

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10. HANDLING, SAFETY AND ENVIRONMENTAL 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.

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.

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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.

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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=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	Solar radiation test	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,		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 >

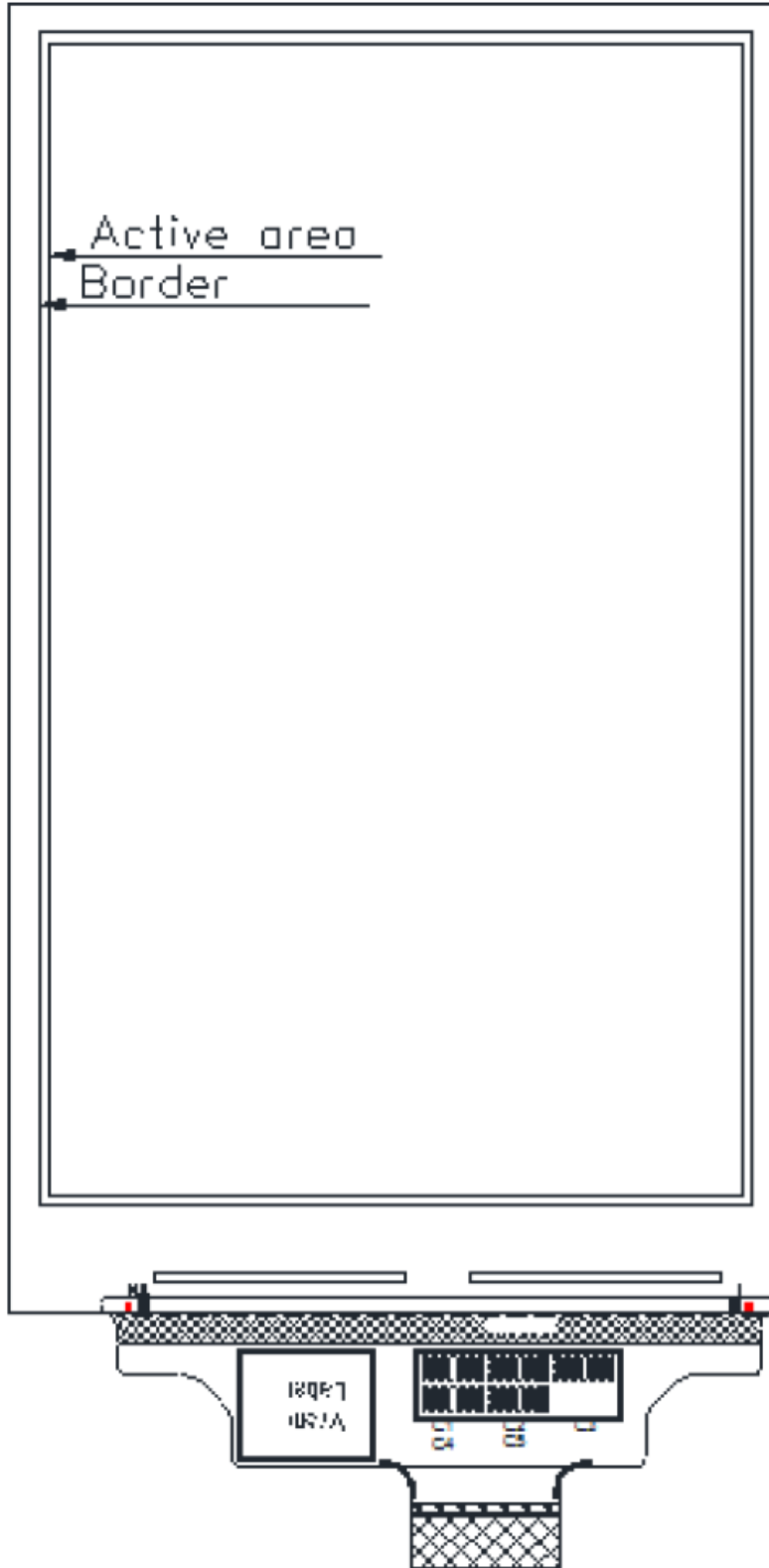
In the standard conditions, there is not display function NG issue occurred.
(Including : line defect, no image) All the cosmetic specification is judged before the reliability stress.

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12. Bar Code definition

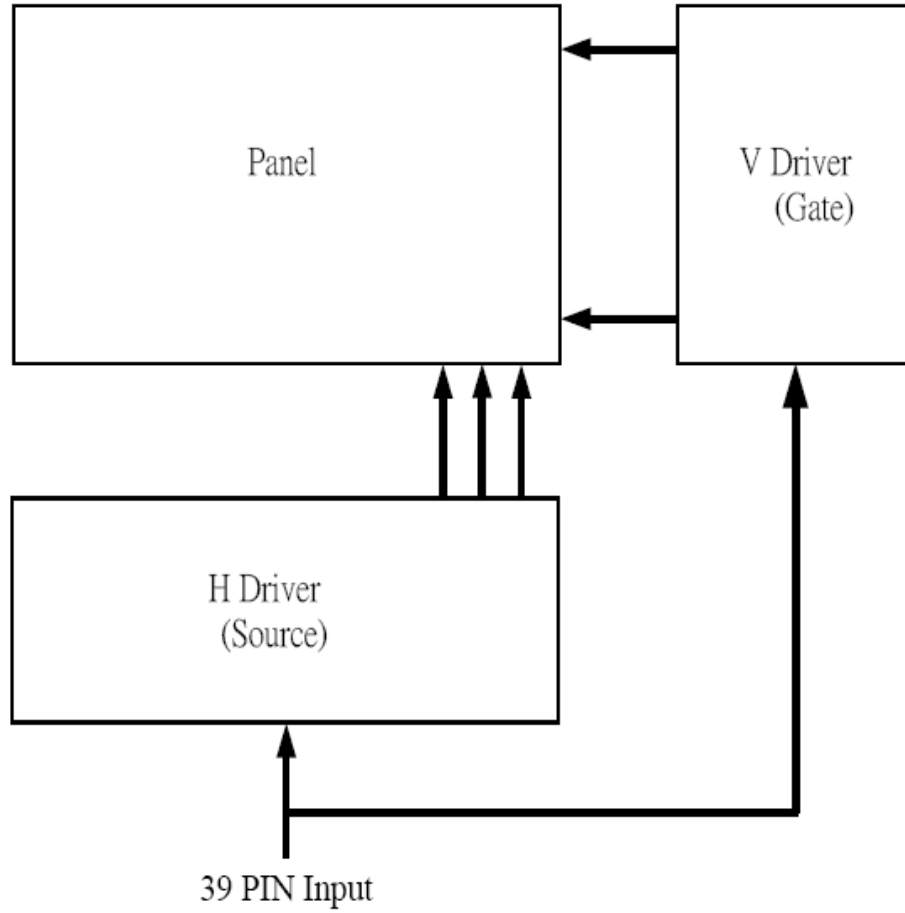
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13. Border definition



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14. Block Diagram



15. Packing
TBD

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