DATA MODUL

SPECIFICATION

ED057TC2

5.65”, 600x448

Version: 1.0
Date: 30.07.2017

Note: This specification is subject to change without prior notice

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Version: 1.0

TECHNICAL SPECIFICATION

MODEL: ED057TC2

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

☐Customer's Confirmation

Customer _____

Date _____

By _____

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Revision History

Rev.	Issued Date	Revised Contents
0.1	2016.12.23	Preliminary
0.2	2017.01.05	Update Section 5 Input/Output Terminals
0.3	2017.01.23	Update Section 1 General Description Update Section 4 Mechanical Drawing of EPD module
0.4	2017.05.25	Update Section 3 Mechanical Specifications Update Section 4 Mechanical Drawing of EPD module Update Section 6 Command Table Update Section 7 Electrical Characteristics Combine Section 8 Power on Sequence into Section 7 Combine Section 9 Discharge time sequence into Section 7 Update Section 10 Reliability test Update Section 11 Block Diagram
1.0	2017.07.30	Update Section 5-1) Pin Assignment Section 7-2) Panel DC characteristics Section 8-1) Specification

TECHNICAL SPECIFICATION

CONTENTS

1. General Description

ED057TC2 is a reflective electrophoretic E Ink® technology display module on an active matrix TFT substrate. The diagonal length of the active area is 5.65” and contains 600 x 448 pixels. The panel is capable of displaying 1-bit black/white images depending on the associated lookup table used. The circuitry on the panel includes an integrated gate and source driver, timing controller, oscillator, DC-DC boost circuit, and memory to store the frame buffer and lookup tables, and additional circuitry to control VCOM and BORDER settings.

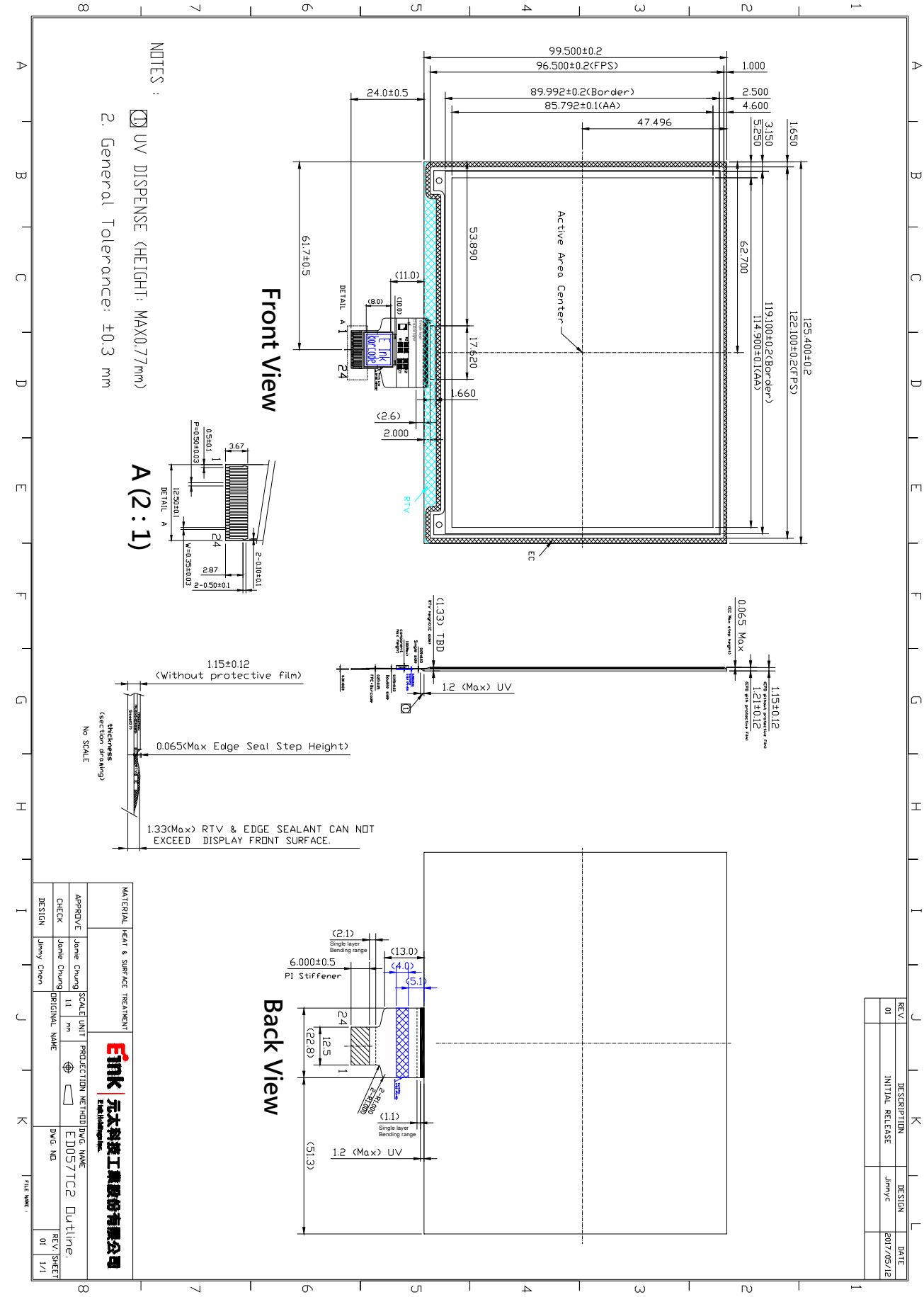
2. Features

- High contrast TFT electrophoretic
- 600 x 448 display
- High reflectance
- Ultra wide viewing angle
- Ultra low power consumption
- Pure reflective mode
- Bi-stable
- Commercial temperature range
- Low current sleep mode
- On chip display RAM
- Serial Peripheral Interface available
- External SPI flash/eeprom for waveform
- On-chip oscillator
- On-chip booster and regulator control for generating Vcom, Gate and Source driving voltage
- I2C Signal Master Interface to read external temperature sensor

3. Mechanical Specifications

Parameter	Specifications	Unit	Remark
Screen Size	5.65”	Inch	-
Display Resolution	600 (H) × 448 (V)	Pixel	132 dpi
Active Area	114.9 (H)× 85.8 (V)	mm	-
Pixel Pitch	191.5 (H) × 191.5 (V)	um	-
Pixel Configuration	Square		-
Outline Dimension	125.4 (H) × 99.5 (V) × 1.15 (D)	mm	Without protective film
Weight	28±2.8	g	-
Number of Gray	Black and White		
Display operating mode	Reflective mode		

4. Mechanical Drawing of EPD module



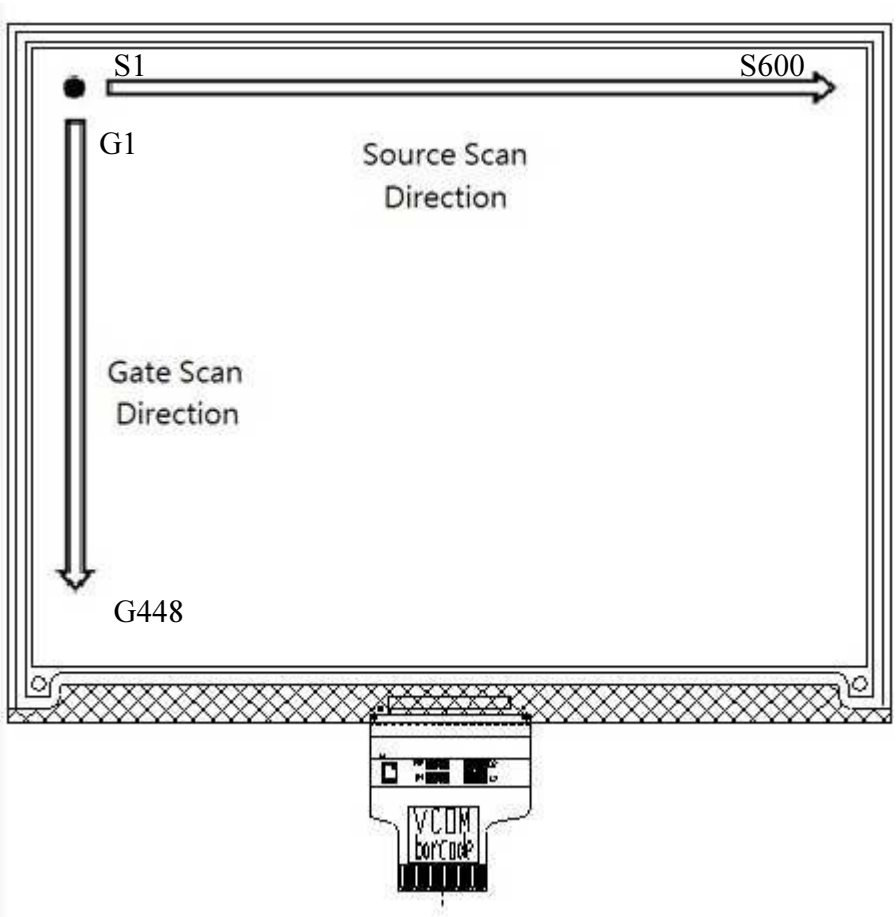
5. Input/Output Terminals

5-1) Connector type: AYF532435

Pin Assignment

Pin #	Type	Single	Description	Remark
1	I	MFCSB	MCU to flash/EEprom chip select	
2	O	GDR	N-Channel MOSFET Gate Drive Control	
3	O	RESE	Current Sense Input for the Control Loop	
4	P	VSL_LV	Negative source driver voltage (low voltage)	
5	P	VSH_LV	Positive source driver voltage (low voltage)	
6	O	TSCL	I2C Interface to digital temperature sensor Clock pin	
7	I/O	TSDA	I2C Interface to digital temperature sensor Data pin	
8	I	BS1	Bus selection pin; L: 4-wire IF. H: 3-wire IF. (Default)	
9	O	BUSY	Busy state output pin	
10	I	RES#	Reset	
11	I	D/C #	Data /Command control pin	
12	I	CS #	Chip Select input pin	
13	O	SCL	Serial clock pin (SPI)	
14	I/O	SDA	Serial data pin (SPI)	
15	P	VDDIO	Power for interface logic pins	
16	P	VCI	Power Supply pin for the chip	
17	P	VSS	Ground	
18	P	VDD	Core logic power pin	
19	O	FMSDO	Flash/EEprom to MCU data output	
20	P	VSH	Positive Source driving voltage	
21	P	VGH	Power Supply pin for VGH and VSH	
22	P	VSL	Negative Source driving voltage	
23	P	VGL	Power Supply pin for VCOM, VGL and VSL	
24	P	VCOM	VCOM driving voltage	

5-2) Panel Scan direction



6. Command Table

6-1) Register Definition

6-1-1) R00H (PSR): Panel setting Register

Action	W/R	C/D	D7	D6	D5	D4	D3	D2	D1	D0
Setting the panel	0	0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	0	1	1	1	-	-	UD	SHL	SHD_N	RST_N
	0	1	0	0	0	0	1	0	0	0

NOTE: "-" Don't care, can be set to VDD or GND level

UD: 0: Scan down. First line to Last line: Gn-1 → Gn-2 → Gn-3 → … → G0

1: Scan up. (Default) First line to Last line: G0 → G1 → G2 → … … . → Gn-1

SHL: 0: Shift left. First data to Last data: Sn-1 → Sn-2 → Sn-3 → … → S0

1: Shift right. (Default) First data to Last data: S0 → S1 → S2 → … … . → Sn-1

SHD_N: 0: DC-DC converter will be turned OFF

1: DC-DC converter will be turned ON (Default)

When SHD_N become LOW, charge pump will be turned OFF, register and SRAM data will keep until VDD OFF, and SD output and VCOM will remain previous condition. SHD_N may have two conditions: 0v or floating.

RST_N: 0: The controller is reset. Reset all registers to default value.

1: No effect (Default)

When RST_N become LOW, the driver will be reset, all registers will be reset to their default value. All driver functions will be disabled. SD output and VCOM will base on previous condition. It may have two conditions: 0v or floating.

This command can be active only when BUSY_N = "1".

6-1-2) R01H (PWR): Power setting Register

Action	W/R	C/D	D7	D6	D5	D4	D3	D2	D1	D0
Selecting Internal/External Power	0	0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
	0	1	-	-	0	0-	0	1	VDS_EN	VDG_EN
	0	1	-	-	-	-	-	-	0	0
	0	1	-	-	-	-	-	-	-	-
	0	1	-	-	-	-	-	-	-	-

NOTE: "-" Don't care, can be set to VDD or GND level

VDS_EN: Source power selection

0 : External source power from VDH/VDL pins

1 : Internal DC/DC function for generating VDH/VDL

VDG_EN: Gate power selection

0 : External gate power from VGH/VGL pins

1 : Internal DC/DC function for generating VGH/VGL

6-1-3) R02H (POF): Power OFF Command

Action	W/R	C/D	D7	D6	D5	D4	D3	D2	D1	D0
Turning OFF the power	0	0	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**

After the Power Off command, driver will power off based on the Power Off Sequence, BUSY_N will become "0". This command will turn off charge pump, T-con, source driver, gate driver, VCOM, and temperature sensor, but register data will be kept until VDD becomes OFF.

SD output and Vcom will base on previous condition. It may have 2 conditions: 0V or floating.

This command can be active only when BUSY_N = "1".

6-1-4) R03H (PFS): Power off sequence setting Register

Action	W/R	C/D	D7	D6	D5	D4	D3	D2	D1	D0
Setting Power OFF sequence	0	0	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**
	0	1	-	-	T_VDS_OFF[1:0]		-		-	

NOTE: "-" Don't care, can be set to VDD or GND level

T_VDS_OFF[1:0]: Power OFF Sequence of VDPS and VDNS.

00b: 1 frame (Default) 01b: 2 frames 10b: 3 frames 11b: 4 frame

This command can be active only when BUSY_N = "1".

6-1-5) R04H (PON): Power ON Command

Action	W/R	C/D	D7	D6	D5	D4	D3	D2	D1	D0
Turning ON the power	0	0	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**

After the Power ON command, the driver will be powered ON following the Power ON Sequence. After the Power ON command and all power sequence are ready, the BUSY_N signal will become "1". Refer to the Power ON Sequence section.

6-1-6) R06h (BTST): Booster Soft Start

Action	W/R	C/D	D7	D6	D5	D4	D3	D2	D1	D0
Starting data transmission	0	0	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**
	0	1	BTPHA7	BTPHA6	BTPHA5	BTPHA4	BTPHA3	BTPHA2	BTPHA1	BTPHA0
	0	1	BTPHB7	BTPHB6	BTPHB5	BTPHB4	BTPHB3	BTPHB2	BTPHB1	BTPHB0
	0	1	-	-	BTPHA5	BTPHC4	BTPHC3	BTPHC2	BTPHC1	BTPHC0

NOTE: "-" Don't care, can be set to VDD or GND level

BTPHA[7:6]: Soft start period of phase A.

00b: 10mS 01b: 20mS 10b: 30mS 11b: 40mS

BTPHA[5:3] : Driving strength of phase A

000b: strength 1 001b: strength 2 010b: strength 3 011b: strength 4

10b: strength 1 101b: strength 2 110b: strength 3 111b: strength 4 (strongest)

BTPHA[2:0] : Minimum OFF time setting of GDR in phase B

000b: 0.26uS 001b: 0.31uS 010b: 0.36uS 011b: 0.52uS

100b: 0.77uS 101b: 1.61uS 110b: 3.43uS **111b: 6.77uS**

BTPHB[7:6] : Soft start period of phase B.

00b: 10mS 01b: 20mS 10b: 30mS 11b: 40mS

BTPHB[5:3] : Driving strength of phase B

	000b: strength 1	001b: strength 2	010b: strength 3	011b: strength 4
	10b: strength 1	101b: strength 2	110b: strength 3	111b: strength 4 (strongest)

BTPHB[2:0] : Minimum OFF time setting of GDR in phase B

000b: 0.26uS	001b: 0.31uS	010b: 0.36uS	011b: 0.52uS
100b: 0.77uS	101b: 1.61uS	110b: 3.43uS	**111b: 6.77uS**

BTPHC[5:3] : Driving strength of phase C

000b: strength 1	001b: strength 2	010b: strength 3	011b: strength 4
10b: strength 1	101b: strength 2	110b: strength 3	111b: strength 4 (strongest)

BTPHC[2:0] : Minimum OFF time setting of GDR in phase C

000b: 0.26uS	001b: 0.31uS	010b: 0.36uS	011b: 0.52uS
100b: 0.77uS	101b: 1.61uS	110b: 3.43uS	**111b: 6.77uS**

6-1-7) R07H (DSLP): Deep sleep

Action	W/R	C/D	D7	D6	D5	D4	D3	D2	D1	D0
Deep sleep	0	0	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**
	0	1	1	0	1	0	0	1	0	1

NOTE: "-" Don't care, can be set to VDD or GND level

This command makes the chip enter the deep-sleep mode. The deep sleep mode could return to stand-by mode by hardware reset assertion.

The only one parameter is a check code, the command would be executed if check code is A5h.

6-1-8) R10H (DTM1): Data Start Transmission 1

Action	W/R	C/D	D7	D6	D5	D4	D3	D2	D1	D0
Starting data transmission	0	0	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**
	0	1	-	KPixel2[2:0]			-	KPixel2[2:0]		
	0	1	…		…		…		…	
	0	1	-	KPixel(2M-1)[2:0]			-	KPixel(2M)[2:0]		

NOTE: "-" Don't care, can be set to VDD or GND level

This command indicates that user starts to transmit data. Then write to SRAM. While complete data transmission, user must send a DataStop command (R11H). Then the chip will start to send data/VCOM for panel..

KPixel[1~2M][2:0]:

	Source Driver Output	
	DDX=1(Default)	DDX=0
KPixel[2:0]	LUT	LUT
000	Black	White
001	Gray1	Gray2
010	Gray2	Gray1
011	White	Black
100	Red0	Red3
101	Red1	Red2
110	Red2	Red1
111	Red3	Red0

6-1-9) R11H (DSP): Data Stop

Action	W/R	C/D	D7	D6	D5	D4	D3	D2	D1	D0
Stopping data transmission	0	0	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**
	1	1	data_flag	-	-	-	-	-	-	-

NOTE: "-" Don't care, can be set to VDD or GND level

To stop data transmission, this command must be issued to check the data_flag.

Data_flag: Data flag of receiving user data.

0: Driver didn't receive all the data.

1: Driver has already received all the one-frame data (DTM1).

This command can be active only when BUSY_N = "1".

After "Data Start" (10h) or "Data Stop" (11h) commands, BUSY_N signal will become "0" until display update is finish.

6-1-10) R12H (DRF): Display Refresh

Action	W/R	C/D	D7	D6	D5	D4	D3	D2	D1	D0
Refreshing the display	0	0	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**

After this command is issued, driver will refresh display (data/VCOM) according to SRAM data and LUT.

After Display Refresh command, BUSY_N signal will become “0” until display update id finished.

6-1-11) R13H (IPC): Image Process Command

Action	W/R	C/D	D7	D6	D5	D4	D3	D2	D1	D0
Image Process Setting	0	0	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**1**
	0	1	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

6-1-12) R30H (PLL): PLL Control

Action	W/R	C/D	D7	D6	D5	D4	D3	D2	D1	D0
Controlling PLL	0	0	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**
	0	1	**0**	**0**	**M[2:0]**			**N[2:0]**		

The command controls the PLL clock frequency. The PLL structure supports the following frame rates:

(FR: Frame Rate, Unit: Hz)

M	N	FR	M	N	FR	M	N	FR	M	N	FR	M	N	FR	M	N	FR	M	N	FR
1	1	29	2	1	57	3	1	86	4	1	114	5	1	143	6	1	171	7	1	200
	2	14		2	29		2	43		2	59		2	71		2	86		2	100
	3	10		3	19		3	29		3	38		3	48		3	57		3	67
	4	5		4	14		4	21		4	29		4	36		4	43		4	50
	5	7		5	11		5	17		5	23		5	29		5	34		5	40
	6	6		6	10		6	14		6	19		6	24		6	29		6	33
	7	5		7	8		7	12		7	16		7	20		7	24		7	29

6-1-13) R40H (TSC) Temperature Sensor Calibration

Action	W/R	C/D	D7	D6	D5	D4	D3	D2	D1	D0
Sensing Temperature	0	0	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**
	1	1	D10	D9/ TS7	D8/ TS6	D7/ TS5	D6 / TS4	D5 / TS3	D4 / TS2	D3 / TS1
	1	1	D2/TS0	D1	D0	-	-	-	-	-

This command reads the temperature sensed by the temperature sensor.

TS[3:0]: When TSE (R41h) is set to 0, this command reads internal temperature sensor value.

D[10:0]: When TSE (R41h) is set to 1, this command reads external LM75 temperature sensor value.

TS[7:0]	Temperature(℃)
1100 1110b	-25
1100 1111b	-24.5
1101 0000b	-24.5
:	:
1111 1110b	-1
1111 1111b	-0.5
0000 0000b	0
0000 0001b	0.5
0000 0010b	1
:	:
0101 1010b	45
:	:
0110 0011b	49.5
0110 0100b	50

6-1-14) R41H (TSE) Temperature Sensor Enable

Action	W/R	C/D	D7	D6	D5	D4	D3	D2	D1	D0
Calibrate Temperature Sensor	0	0	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**
	0	1	TSE	-	-	-	TO[3:0]			

This command selects Internal or External temperature sensor.

TSE: Internal temperature sensor switch

0: Enable (default) 1: Disable; using external sensor.

TO[3:0]: Temperature Offset

TO[3:0]	Temperature Offset	TO[3:0]	Temperature Offset
0000	+0(Default)	1000	-4.0
0001	+0.5	1001	-3.5
0010	+1.0	1010	-3.0
0011	+1.5	1011	-2.5
0100	+2.0	1100	-2.0
0101	+2.5	1101	-1.5
0110	+3.0	1110	-1.0
0111	+3.5	1111	-0.5

6-1-15) R24H (TSW) Temperature Sensor Write

Action	W/R	C/D	D7	D6	D5	D4	D3	D2	D1	D0
Calibrate Temperature Sensor	0	0	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**0**
	0	1	WATTR[7:0]							
	0	1	WMSB[7:0]							
	0	1	WLSB[7:0]							

This command reads the temperature sensed by the temperature sensor.

WATTR: **D[7:6]:** I^2C Write Byte Number

00 : 1 byte (head byte only)

01 : 2 bytes (head byte + pointer)

10 : 3 bytes (head byte + pointer + 1st parameter)

11 : 4 bytes (head byte + pointer + 1st parameter + 2nd parameter)

D[5:3]: User-defined address bits (A2, A1, A0)

D[2:0]: Pointer setting

WMSB[7:0]: MSByte of write-data to external temperature sensor

WLSB[7:0]: LSByte of write-data to external temperature sensor

6-1-16) R43H (TSR) Temperature Sensor Read

Action	W/R	C/D	D7	D6	D5	D4	D3	D2	D1	D0
Calibrate Temperature Sensor	0	0	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**1**
	1	1	RMSB[7:0]							
	1	1	RLSB[7:0]							

This command reads the temperature sensed by the temperature sensor.

RMSB[7:0]: MSByte read data from external temperature sensor

RLSB[7:0]: LSByte read data from external temperature sensor

6-1-17) R50H (CDI) VCOM and Data interval setting

Action	W/R	C/D	D7	D6	D5	D4	D3	D2	D1	D0
Set Interval between VCOM and data	0	0	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**0**
	1	1	VBD[2:0]			DDX	CDI[3:0]			

This command indicates the interval of Vcom and data output. When setting the vertical back porch, the total blanking will be kept
(20 Hsync).

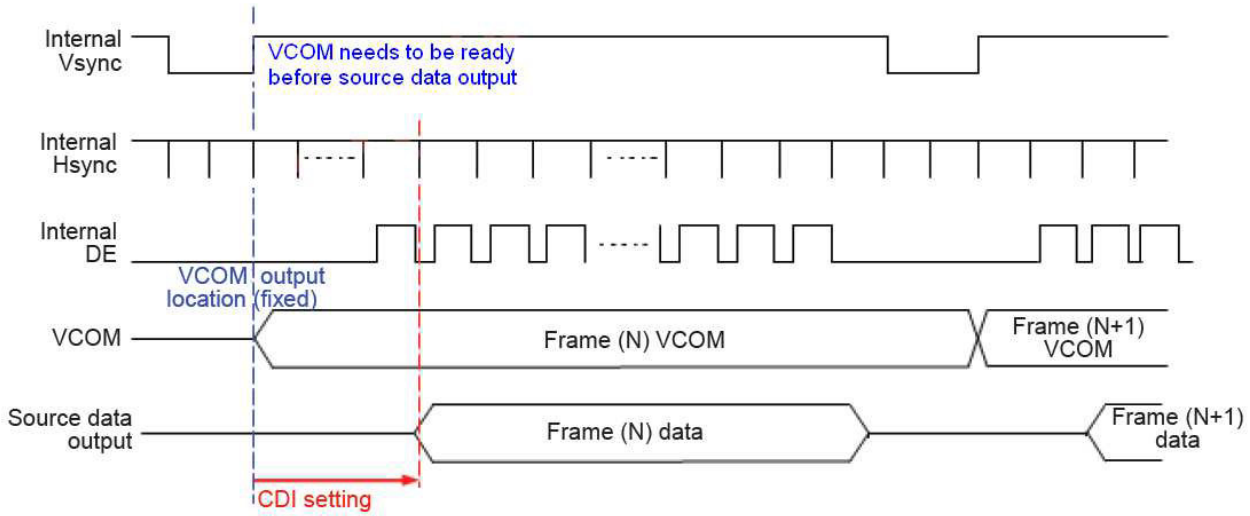
VBD[2:0]: Border output selection

DDX: Data polarity.

	Border Output	
	DDX=1(Default)	DDX=0
VBD[2:0]	LUT	LUT
000	Black	White
001	Gray1	Gray2
010	Gray2	Gray1
011	White	Black
100	Red0	Floating
101	Red1	Red2
110	Red2	Red1
111	Floating	Red0

CDI[3:0]: Vcom and data interval

CDI[2:0]	VCOM and Data interval	CDI[2:0]	VCOM and Data interval
0000b	17 hsyne	1000b	9
0001	16	1001	8
0010	15	1010	7
0011	14	1011	6
0100	13	1100	5
0101	12	1101	4
0110	11	1110	3
0111	10(Default)	1111	2



6-1-18) R51H (LPD) Low Power Detection

Action	W/R	C/D	D7	D6	D5	D4	D3	D2	D1	D0
Detect Low Power	0	0	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**1**
	1	1	-	-	-	-	-	-	-	LPD

This command indicates the input power condition. Host can read this flag to learn the battery condition.

LPD: Internal temperature sensor switch

0: Low power input (V_{DD}<2.5V) **1: Normal status (default)**

6-1-19) R61H (TRES) Resolution Setting

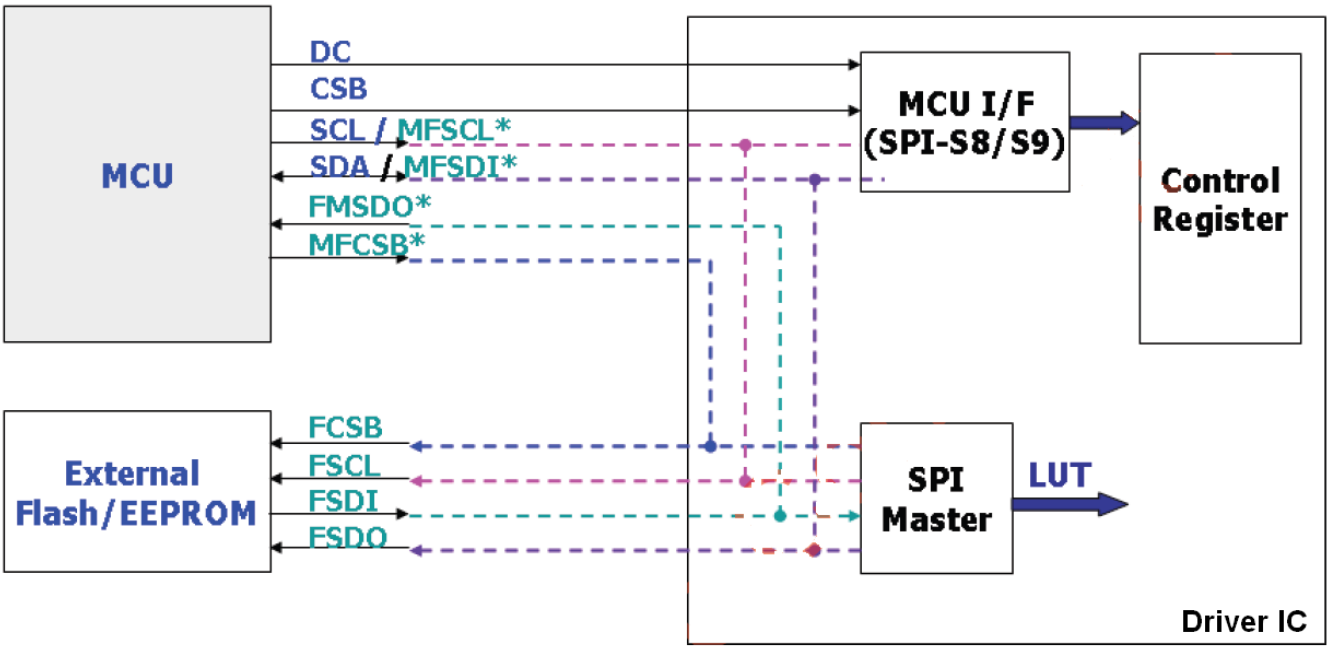
Action	W/R	C/D	D7	D6	D5	D4	D3	D2	D1	D0
Set Display Resolution	0	0	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**1**
	0	1	0	0	0	0	0	0	1	0
	0	1	0	1	0	1	1-	0	0	0
	0	1	0	0	0	0	0	0	0	1
	0	1	1	1	0	0	0	0	0	0

6-1-20) R65H (DAM) SPI Flash control

Action	W/R	C/D	D7	D6	D5	D4	D3	D2	D1	D0
Control SPI Flash	0	0	**0**	**1**	**1**	**0**	**0**	**1**	**0**	**1**
	0	1	-	-	-	-	-	-	-	DAM

This command defines how MCU host directly access external flash/EEPROM mode.
DAM: 0: Disable (Default)

1: Enable. Bypass MFSCL*, MFSDI*, FMSDO*, and MFCSB* to external flash.



6-1-21) R71H (FLG) Get Status

Action	W/R	C/D	D7	D6	D5	D4	D3	D2	D1	D0
Read Flags	0	0	**0**	**1**	**1**	**1**	**0**	**0**	**0**	**1**
	1	1	-	-	I^2C_ERR	I^2C_ BUSYN	data_ flag	PON	POF	BUSY_ N

This command reads the IC status.

I^2C_ERR: I^2C master error status

I^2C_BUSYN: I^2C master busy status (low active)

data_flag: Driver has already received all the one frame data

PON: Power ON status

POF: Power OFF status

BUSY_N: Driver busy status (low active)

6-1-22) R81H (VV) VCOM value

Action	W/R	C/D	D7	D6	D5	D4	D3	D2	D1	D0
Automatically measure Vcom	0	0	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
	1	1	-	VV[6:0]						

This command gets the Vcom value.

VV[6:0]: Vcom Value Output

VV[6:0]	VCOM Value
000 0000b	0V
000 0001b	-0.05V
000 0010b	-0.10V
000 0011b	-0.15V
000 0100b	-0.20V
:	:
101 0000b	-4.0V
(others)	-4.0V

6-1-23) R82H (VDCS) VCM_DC Setting

Action	W/R	C/D	D7	D6	D5	D4	D3	D2	D1	D0
Set VCM_DC	0	0	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0**
	0	1	**-**	VDCS[6:0]						

This command sets VCOM_DC value

VDCS[6:0]: Vcom_DC setting

VDCS[6:0]	VCOM_DC value
000 0000b	(Reserved)
000 0001b	(Reserved)
000 0010b	-0.10 V
000 0010b	-0.15V
000 1100b	-0.20V
:	:
101 0000b	-4.0V
(others)	-4.0V

7. Electrical Characteristics

7-1) Absolute Maximum Ratings

Item	Symbol	Min	Max	Unit
Logic Supply Voltage	VCI	-0.3	+6.0	V
Tst	Storage Temperature	-25	70	℃
Tot	Operating Temperature	0	50	℃

Note: Maximum ratings are those values beyond which damages to the device may occur.
Functional operation should be restricted to the limits in the Electrical Characteristics chapter.

Note: The recommended operating temperature should be kept below 40℃

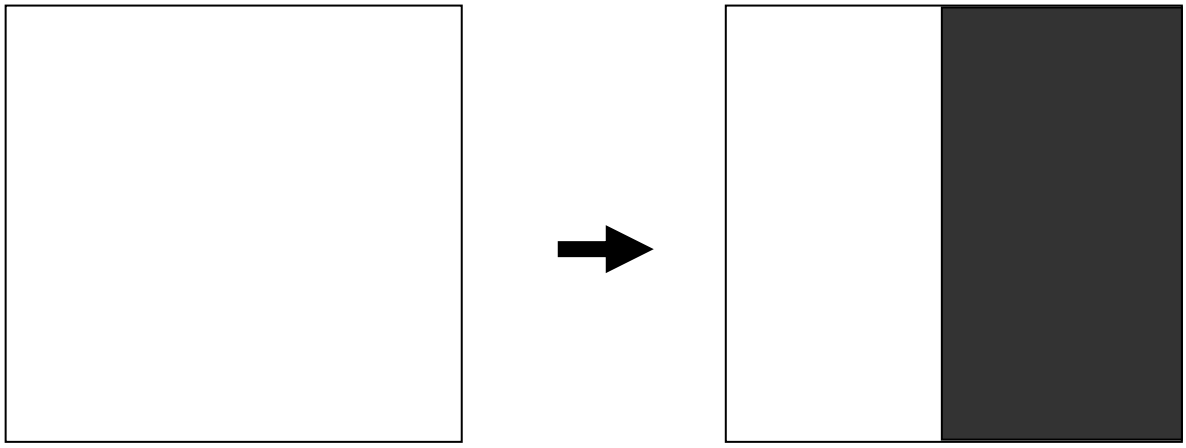
7-2) Panel DC characteristics

DIGITAL DC CHARACTERISTICS						
Symbol	**Parameter**	**Conditions**	**MIN.**	**TYP.**	**MAX.**	**Unit**
VCI	Logic supply voltage		2.5	3.3	3.6	V
V_{IL}	Low level input voltage	Digital input pins	0	--	0.3xVCI	V
V_{IH}	High level input voltage	Digital input pins	0.7xVCI	--	VCI	V
V_{OH}	High level output voltage	Digital input pins, I_{OH}=400 uA	VCI-0.4	--	--	V
V_{OL}	Low level output voltage	Digital input pins, I_{OL}=-400 uA	0	--	0.4	V
R_{IN}	Pull-up/down impedance			200		KΩ
I_{MSTB}	Module stand-by current	Stand-by mode	--	0.2		mA
I_{MDS}	Module deep sleep & Flash power down current	Deep sleep mode & Flash power down mode		1.0		uA
I_{MOPR}	Module operating current			20	150	mA
P	Operation Power Dissipation	VCI=3.3V without DC-DC		1.6		mW
		VCI=3.3V with DC-DC		66	540	mW
P_{STBY}	Standby Power Dissipation	VCI=3.3V		0.66		mW

- The Typical power consumption is measured using associated 25C waveform with following pattern transition: from full white pattern to black, white stripe pattern. (Note 7-1)
- The Max power consumption is measured using associated 25C waveform with following pattern transition: from full white pattern to pattern of repeated 1 consecutive black scan lines followed by 1 consecutive white scan line. (Note 7-2)
- The standby power is the consumed power when panel controller is in standby mode.
- The listed electrical/optical characteristics are only guaranteed under the controller & waveform provided by E INK.

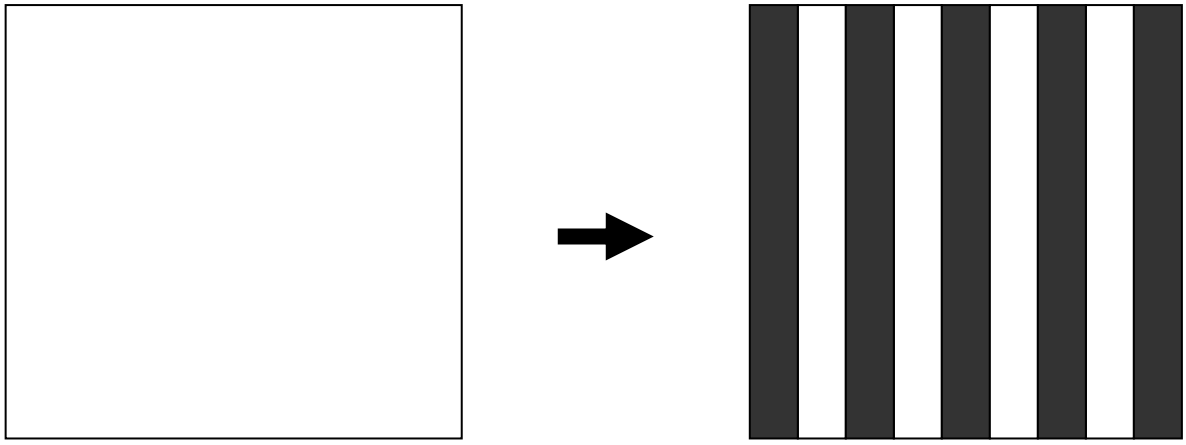
Note 7-1

The Typical power consumption



Note 7-2

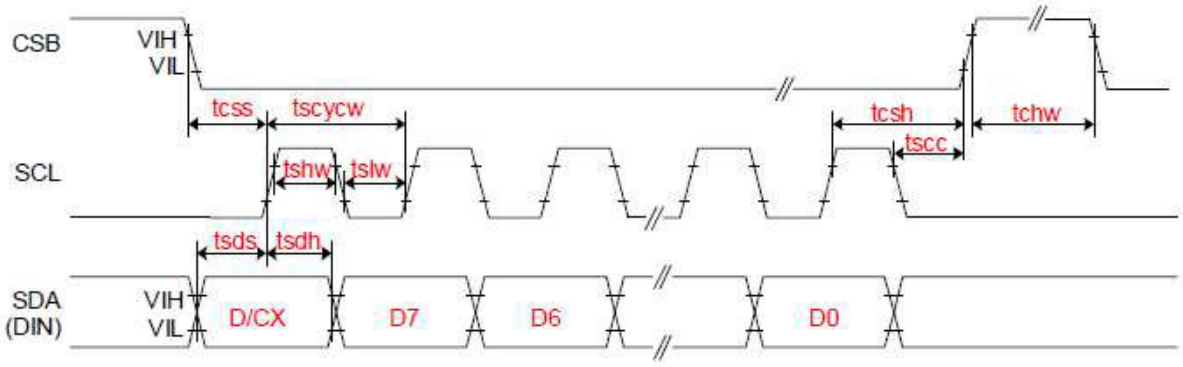
The Maximum power consumption



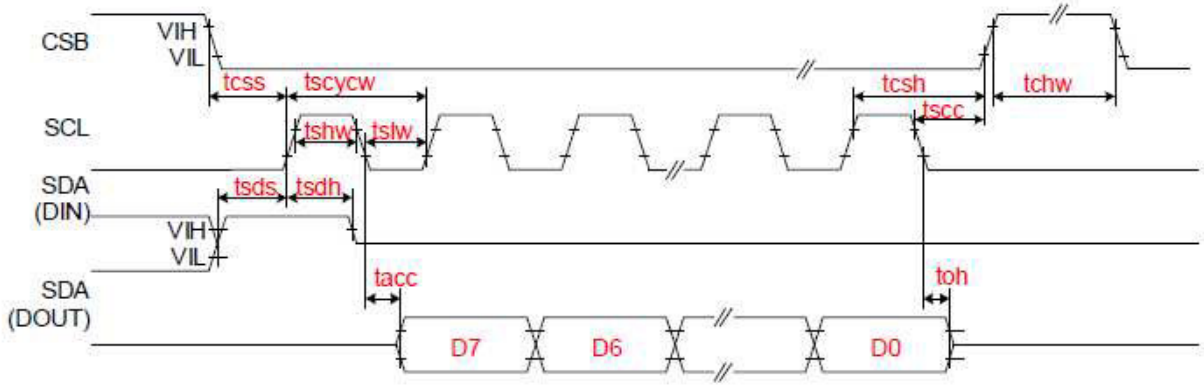
7-3) Panel AC characteristics

VDD=2.5V to 3.6V, unless otherwise specified.

SYMBOL	SIGNAL			MIN.	TYP.	MAX.	UNIT
SERIAL COMMUNICATION							
tCSS	CSB	Chip select setup time		60			Ns
tCSH		Chip select hold time		65			Ns
tSCC		Chip select setup time		20			Ns
tCHW		Chip select setup time		40			Ns
tSCYCW	SCL	Serial clock cycle (Write)		100			Ns
tSHW		SCL “H” pulse width (Write)		35			Ns
tSLW		SCL “L” pulse width (Write)		35			Ns
tSCYCR		Serial clock cycle (Read)		150			Ns
tSHR		SCL “H” pulse width (Read)		60			Ns
tSLR		SCL “L” pulse width (Read)		60			Ns
tSDS	SDA (DIN) (DOUT)	Data setup time		30			Ns
tSDH		Data hold time		30			Ns
tACC		Access time				10	Ns
tOH		Output disable time		15			Ns
DRIVER							
trS		Source driver rise time	99% final value		5		Us
tFS		Source driver fall time			5		Us
trG		Gate driver rise time	99% final value		5		Us
tFG		Gate driver fall time			5		Us
trCOM		VCOM rise time	99% final value		1		Ms
tFCOM		VCOM fall time			1		Ms



3-wire Serial Interface – Write



7-3-1) MCU Serial Interface

3-WIRE SPI

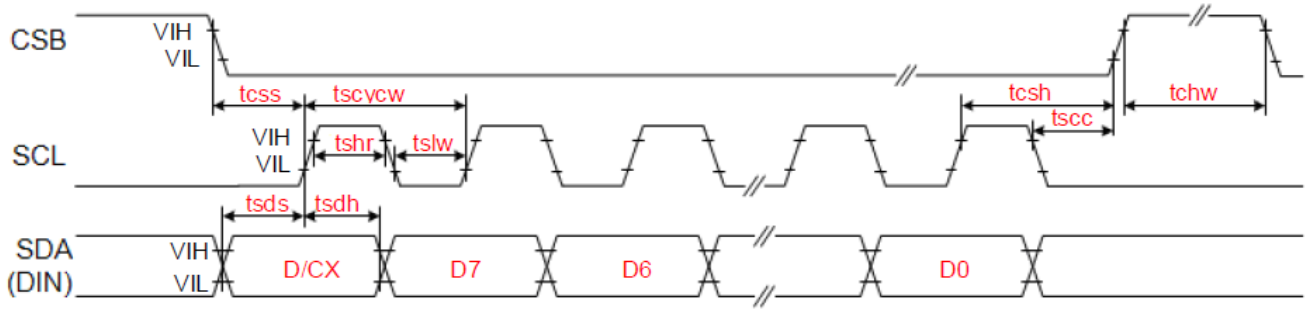


Figure : 3-wire Serial Interface – Write

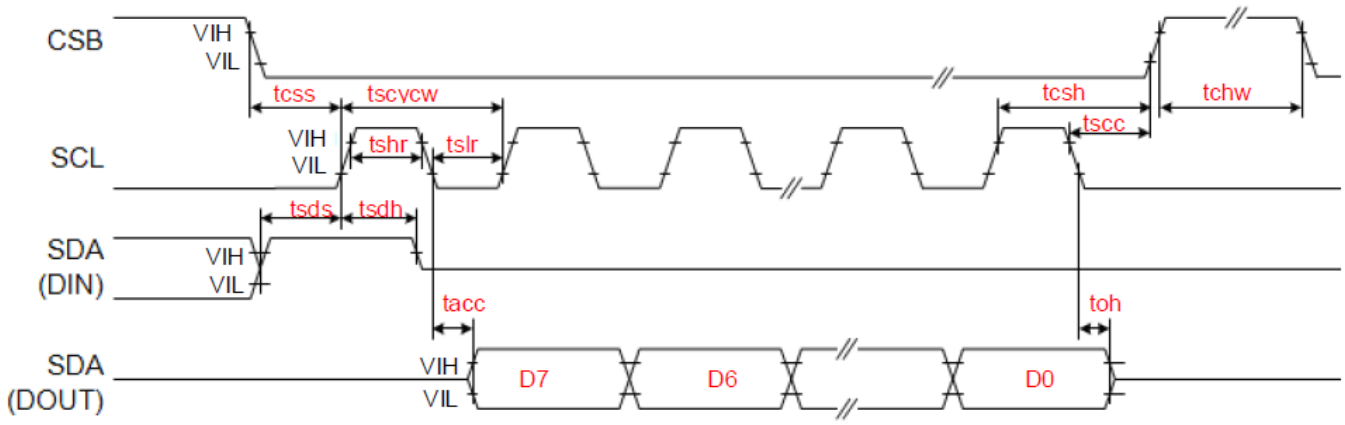
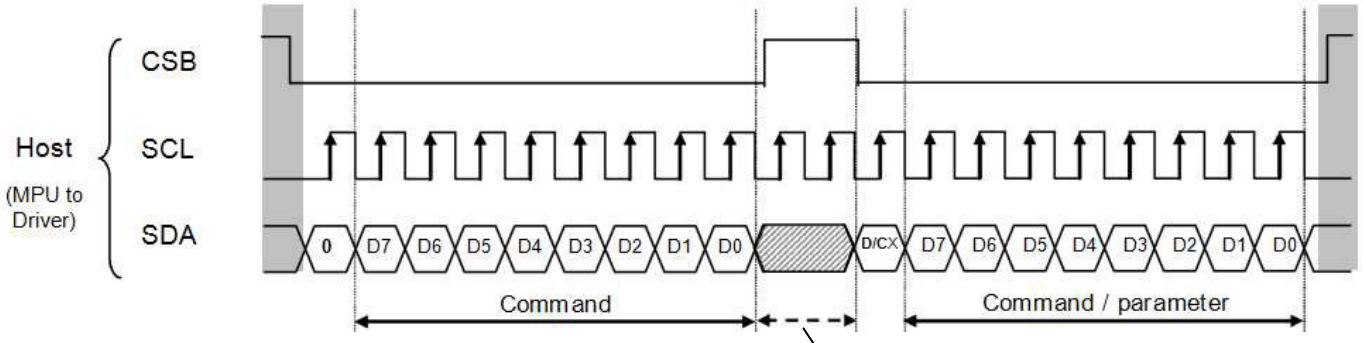


Figure : 3-wire Serial Interface – Read



CSB can be “H” between parameter-command and command-parameter SCL and SDA during CSB=”H” is invalid.

4-WIRE SPI

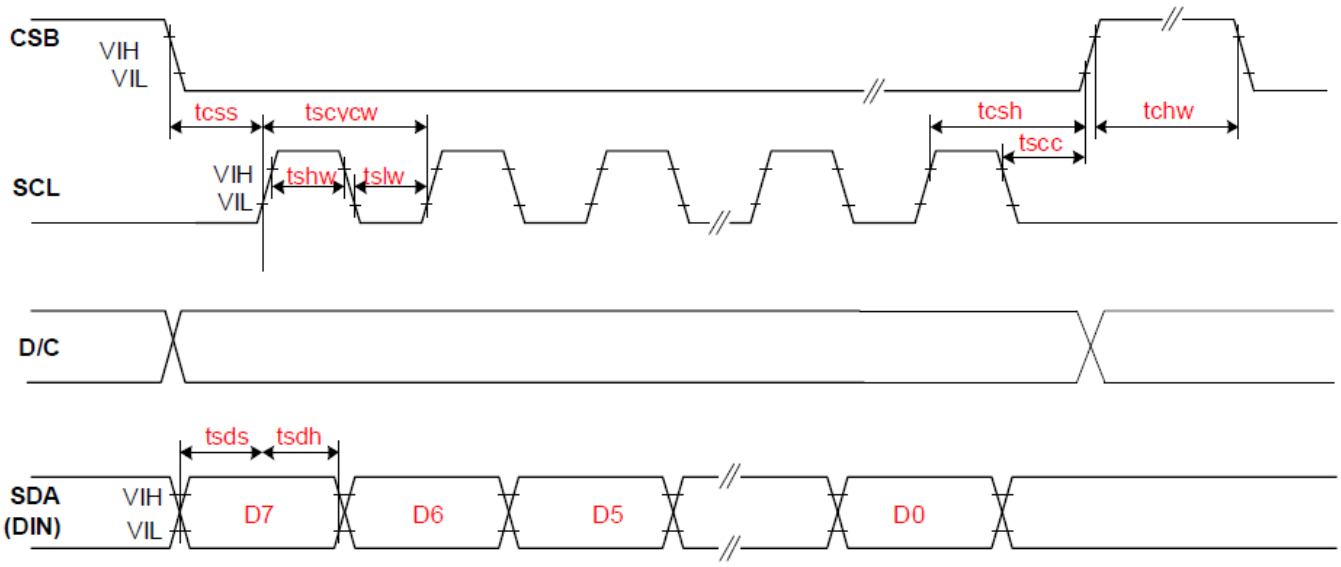
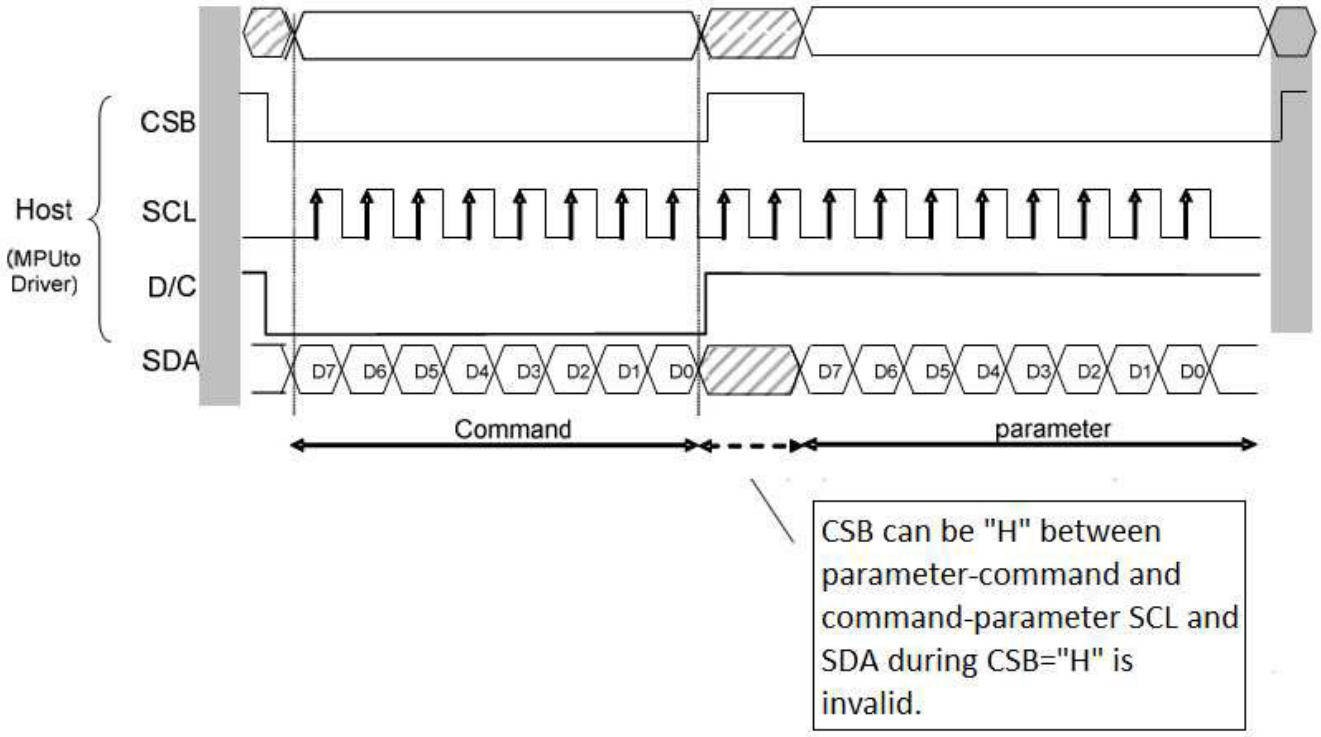
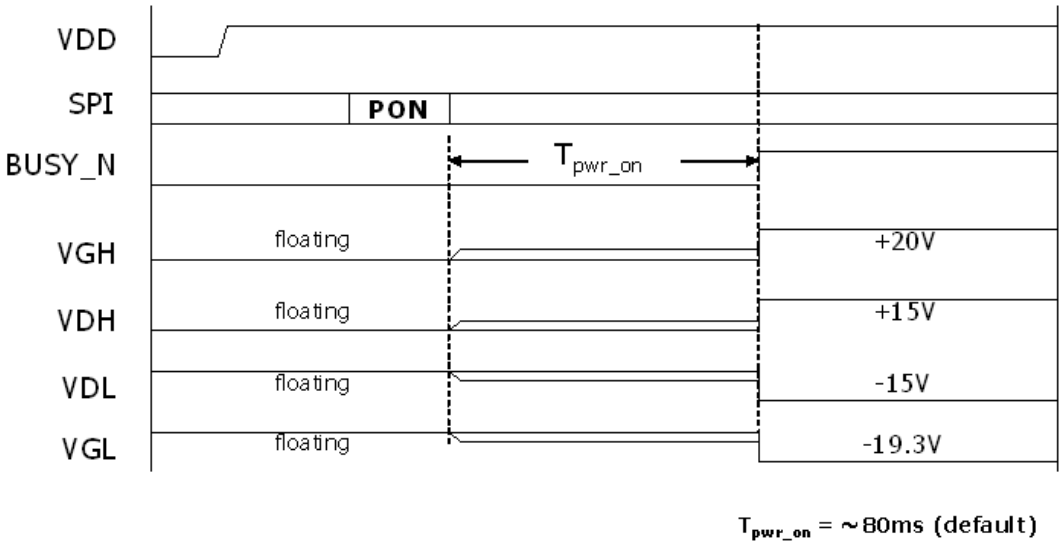


Figure : 4-wire Serial Interface – Read



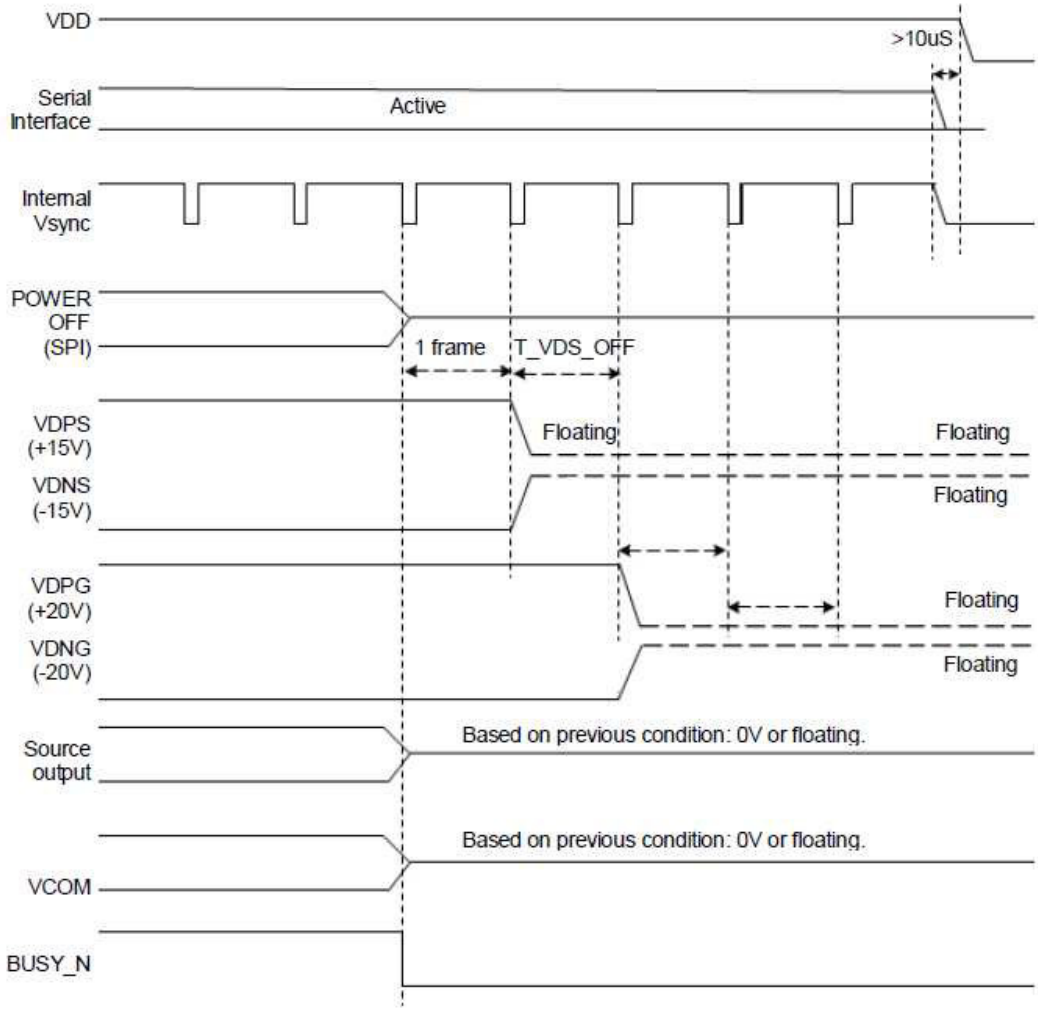
7-3-2) Power On/Off Characteristics

Power ON Sequence

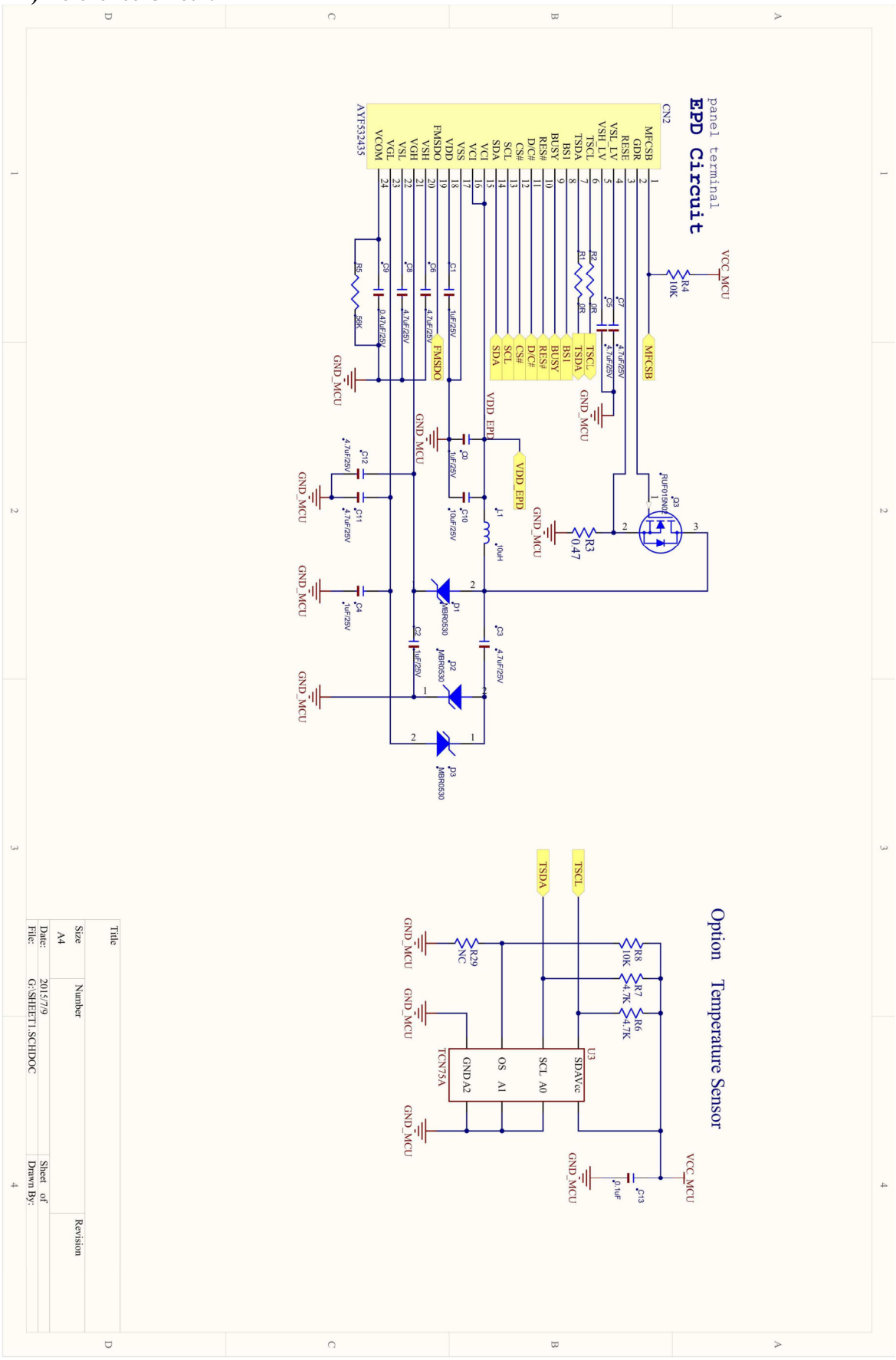


T_{pwr_on} = ~80ms (default)

Power OFF Sequence



7-4) Reference Circuit



8. Optical characteristics

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	30	35	-	%	Note 10-1
CR	Contrast Ratio	-	9	12	-		-
T_{update}	Update time	Black/White		2.2		sec	

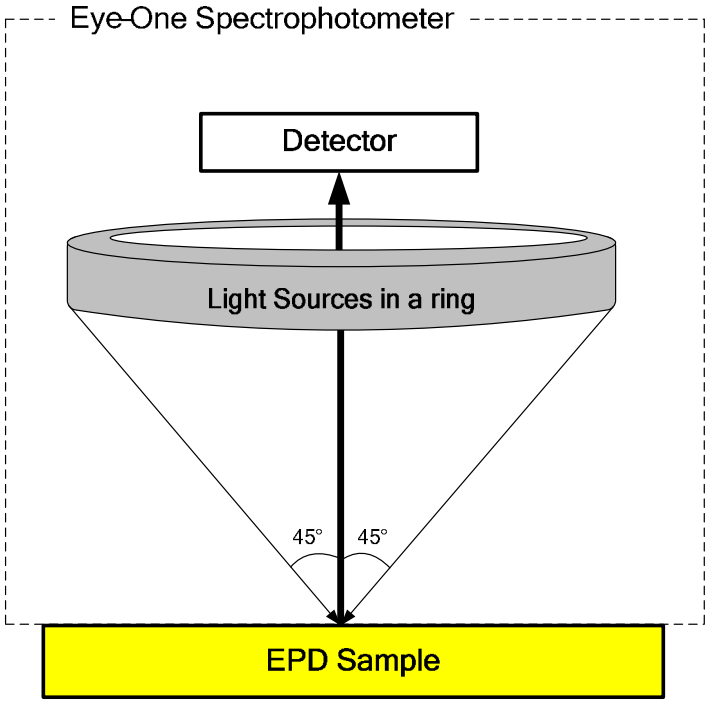
WS: White state, DS: Dark state

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 x

CR = Rl/Rd



8-3) Reflection Ratio

The reflection ratio is expressed as：

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

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.

9. HANDLING, SAFETY AND ENVIROMENTAL 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-assembled operation.

10. Reliability test

	TEST	CONDITION	REMARK
1	High-Temperature Operation	T = +50°C, RH = 30% for 240Hrs	
2	Low-Temperature Operation	T = 0°C for 240Hrs	
3	Low-Temperature Storage	T = -25°C for 240Hrs	(Test in White pattern)
4	High-Temperature, High-Humidity Operation	T = +40°C, RH = 90% for 168Hrs	
5	High-Temperature Storage	T = +70°C, RH = 40% for 240Hrs	(Test in White pattern)
6	High-Temperature, High-Humidity Storage	T = +50°C, RH = 80% for 240Hrs	(Test in White pattern)
7	Temperature Cycle	-25°C(30 min) ~60°C(30 min), 50 cycle, 1Hr/cycle	(Test in White pattern)
8	Electrostatic Effect (non-operating)	(Machine model)+/- 200V 0Ω, 200pF	Non-operation

Actual EMC level to be measured on customer application.

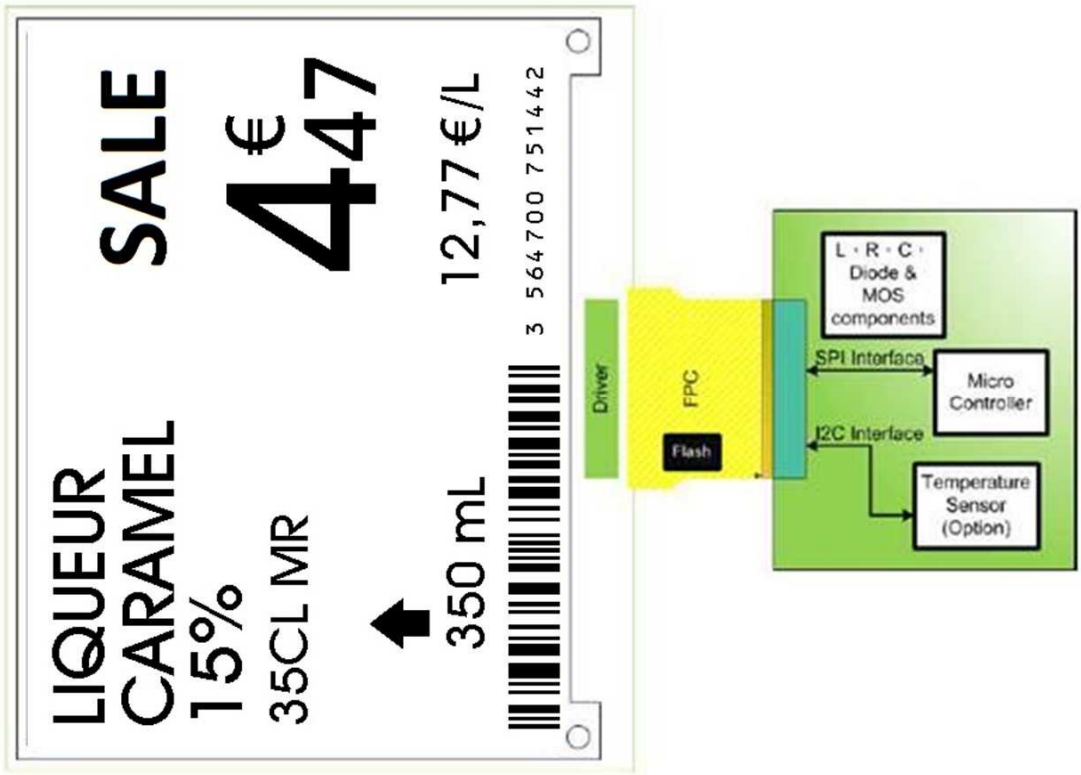
Note：The protective film must be removed before temperature test.

< Criteria >

In the standard conditions, there is not display function NG issue occurred.

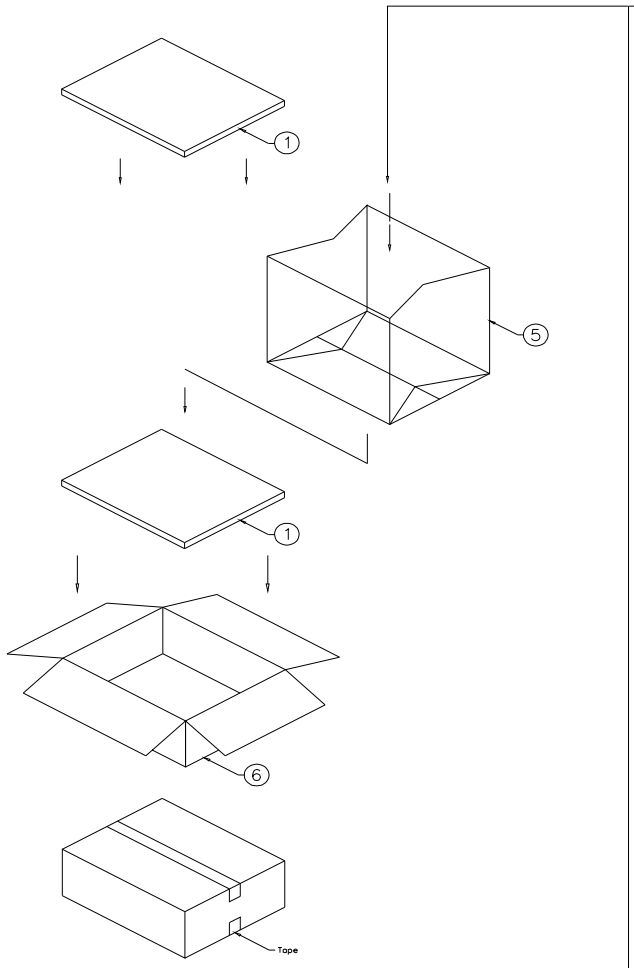
All the cosmetic specification is judged before the reliability stress.

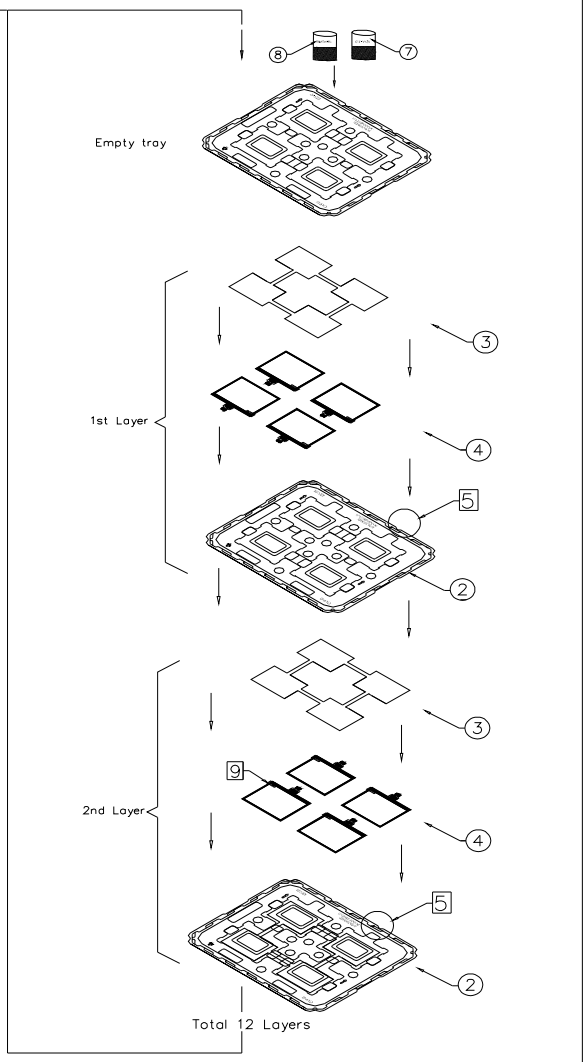
12. Block Diagram



13. Packing

REV	DESCRIPTION	DESIGN	DATE
01	INITIAL RELEASE	Jimmyc	'16.06.02





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: 4.1 KG
5. Make sure tray stacked with 0° rotation. We can check this by lateral side view.
6. The thickness of raw material of tray before froming is t=0.8mm.

ITEM	PART NO. DESCRIPTION	QTY	REMARK
9	EASY TAPE (For Remove Protect Sheet)	48	
8	30g乾燥劑	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 5.65"	48	
3	EPE CUSHION SHEET	12	抗靜電
2	PET TRAY	13	抗靜電
1	EPE FOAM	2	

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

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

APPROVE	Ethan Chen	'16.06.02	SCALE 1:1	UNIT mm	SHEET 1 OF 1
CHECK	Ethan Chen	'16.06.02	DWG.TITLE ED057TC2 PACKING Draw		
DESIGN	Jimmy Chen	'16.06.02	MTL.NO.	DWG.NO.	REV. 01

A4 SIZE

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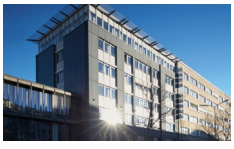

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