

**Display Elektronik GmbH**

# DATA SHEET

**TFT MODULE**

**DEE 800480A3 – W**

3,5“

**E-PAPER DISPLAY**

**Product Specification**

**Ver.: 0**

**19.06.2013**

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## 1. General Description

DEE800480A3-W is an Active Matrix Electrophoretic Display (AM EPD), High-Resolution AM TFT Black/White display module can be used in portable electronic devices, such as E-book Reader.

The module is a TFT-array driving electrophoretic display, with integrated circuits including source and gate drivers.

The resolution of the module is 800x480 and the active area is 3.5 inch diagonal.

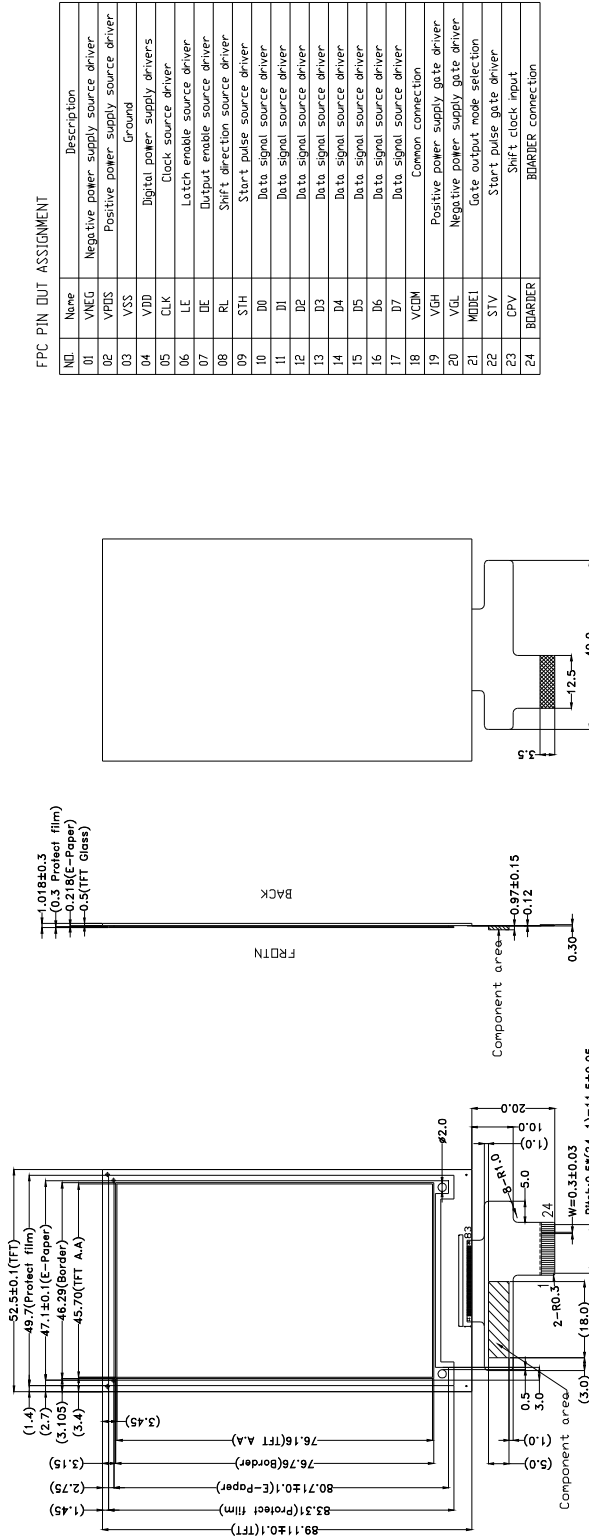
- 800×480 display with cover lens
- White Reflectance above 35%
- Contrast Ratio above 8:1(t=2minutes)
- 5:3 aspect ratio
- Wide viewing angle
- Ultra low power consumption
- Reflective mode
- Bi -stable display
- Commercial temperature range
- Landscape, portrait modes

## 2. Mechanical Specifications

The mechanical detail is shown in Fig. 1 and summarized in Table 1 below.

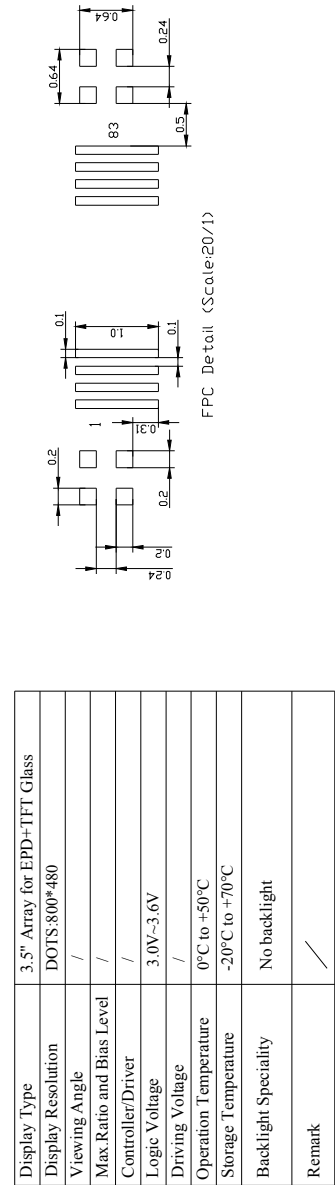
<b>Parameter</b>	<b>Specifications</b>	<b>Unit</b>	<b>Remark</b>
Screen Size	3.5 (5:3)	Inch	-
Display Resolution	800 x 480 (or 480 x 800)	Pixel	-
Active Area	45.70 x 76.16 (or 76.16 x 45.70)	mm	-
Pixel Pitch	0.0952 x 0.0952	mm	-
Pixel Configuration	Rectangle		-
Outline Dimension	52.50 x 89.55 x 1.018 (or 89.55 x 52.50 x 1.018)	mm	-

Kind suggestion: VA of customer's application should be 0.5mm smaller than LCD VA in each side.



FPC PIN OUT ASSIGNMENT

NO.	Name	Description
01	VNEG	Negative power supply source driver
02	VPDS	Positive power supply source driver
03	VSS	Ground
04	VDD	Digital power supply drivers
05	CLK	Clock source driver
06	LE	Latch enable source driver
07	OE	Output enable source driver
08	RL	Shift direction source driver
09	STH	Start pulse source driver
10	D0	Data signal source driver
11	D1	Data signal source driver
12	D2	Data signal source driver
13	D3	Data signal source driver
14	D4	Data signal source driver
15	D5	Data signal source driver
16	D6	Data signal source driver
17	D7	Data signal source driver
18	VCOM	Common Connection
19	VGH	Positive power supply gate driver
20	VGL	Negative power supply gate driver
21	MODEL	Gate output mode selection
22	STV	Start pulse gate driver
23	CPV	Shift clock input
24	BOARDER	BOARDER connection



Display Type	3.5" Array for EPD+TFT Glass
Display Resolution	DOTS:800*480
Viewing Angle	/
Max.Ratio and Bias Level	/
Controller/Driver	/
Logic Voltage	3.0V~3.6V
Driving Voltage	/
Operation Temperature	0°C to +50°C
Storage Temperature	-20°C to +70°C
Backlight Speciality	No backlight
Remark	/

Figure 1: Module Specification

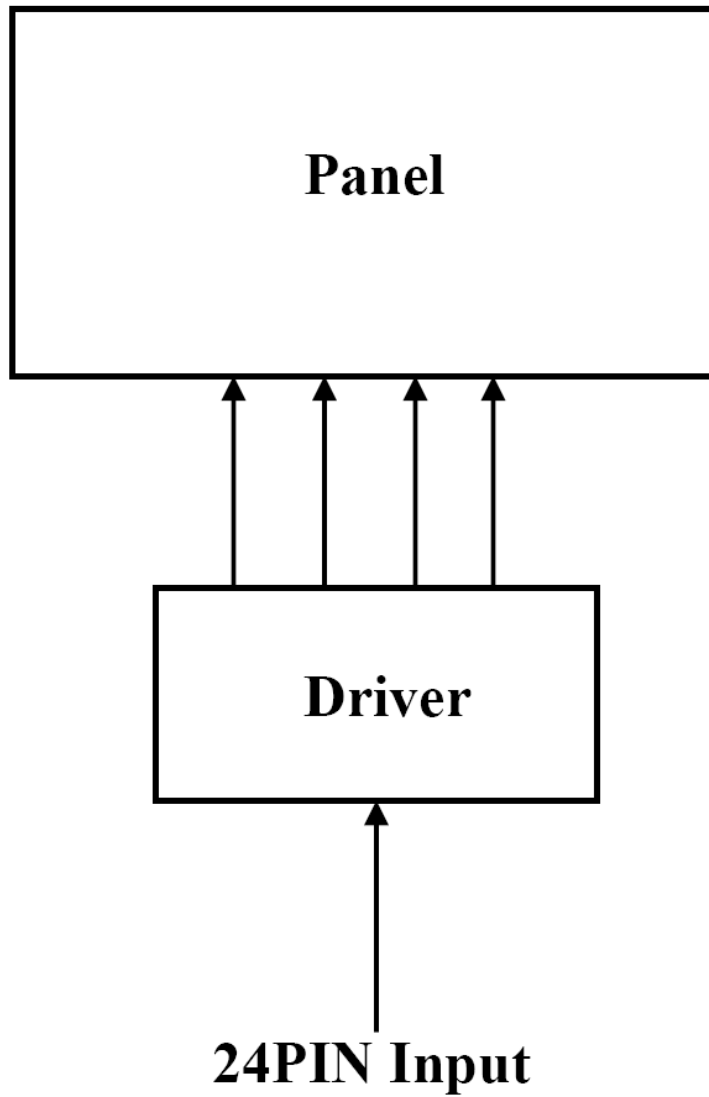


Figure 2: Block Diagram

### 3. Interface signals

No.	PIN	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	CLK	Clock source driver
6	LE	Latch enable source driver
7	OE	Output enable source driver
8	SHR	Shift direction source driver
9	SPH	Start pulse source driver
10	D0	Data signal source driver
11	D1	Data signal source driver
12	D2	Data signal source driver
13	D3	Data signal source driver
14	D4	Data signal source driver
15	D5	Data signal source driver
16	D6	Data signal source driver
17	D7	Data signal source driver
18	VCOM	Common connection
19	VGH	Positive power supply gate driver
20	VGL	Negative power supply gate driver
21	MODE1	Output mode selection gate driver (H)
22	STV	Start pulse gate driver
23	CPV	Shift clock input
24	VBORDER	Border connection

#### 4. Electrical Specifications

##### 4.2 Module DC characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Signal ground	VSS		-	0	-	V
Logic Voltage supply	VDD		3.0	3.3	3.6	V
	IVDD	VDD=3.3V		3.0		mA
Gate Positive supply	VGH		21	-	23	V
	IVGH			0.18		mA
Gate Negative supply	VGL		-21	-	-19	V
	IVGL			-2		mA
Source Positive supply	VPOS		14.6	15	15.4	V
	IPOS	VPOS=15V	-	12	-	mA
Source Negative supply	VNEG		-15.4	-15	-14.6	V
	INEG	VNEG=-15V		-12		mA
Asymmetry source	VASYM	VPOS+VNEG	-80	0	80	mV
Common voltage	VCOM		-2.5	Adjusted	-1.0	V
	ICOM		-	-1.0	-	mA
Standby power module	PSTBY			-	0.4	mW
Typical power module	PTYP		-	400	700	mW
Operating temperature			0		50	°C
Storage temperature			-20	-	70	°C
Maximum image update time at 25°C				960	1200	ms

Notes:

1. The maximum power and maximum current are specified for the worst case power consumption.
2. The typical power is measured when “typical images” are displayed.
3. The standby power is the consumed power when the module controller is in standby mode.
4. The listed electrical/optical characteristics are only guaranteed under the controller & waveform provided by manufacturer.

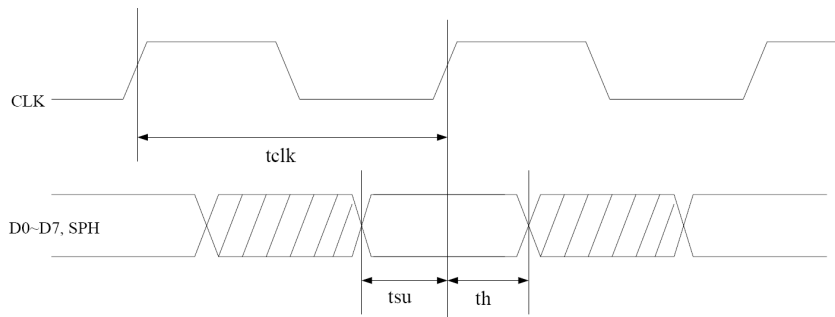


4.3 Module AC characteristics

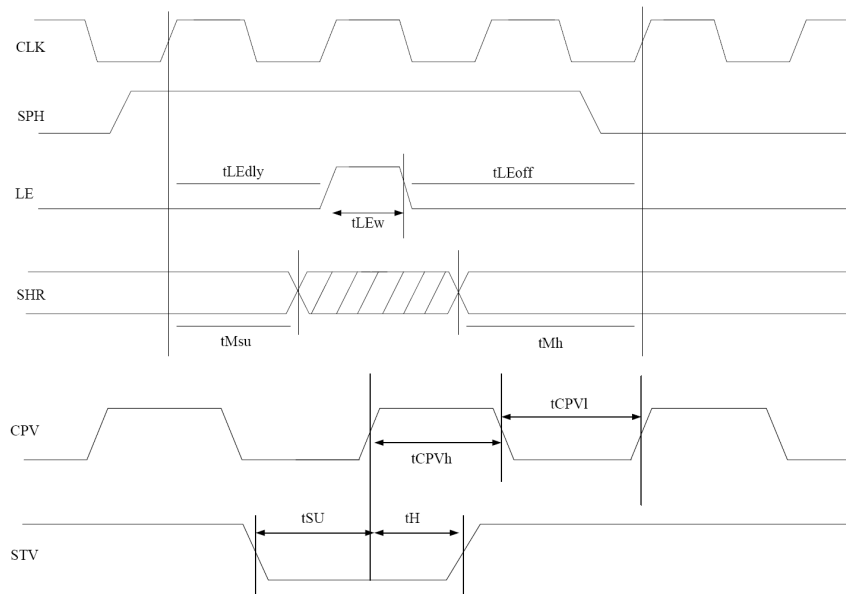
Note: VDD=3.0V to 3.6V, unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	App Pin
Clock frequency	fcpv			200	kHz	CPV
Clock CPV high time	tCPVh	0.5	-	-	us	
Clock CPV low time	tCPVl	0.5	-	-	us	
Data setup time	tSU	100	-	-	ns	CPV
Data hold time	tH	300	-	-	ns	STV
Clock CLK cycle time	tclk	40	-	-	ns	Below table
D0 ... D7, SPH setup time	tsu	8	-	-	ns	
D0 ... D7, SPH hold time	th	8	-	-	ns	
LE on delay time	tLEdly	40	-	-	ns	
LE high-level pulse width	tLEw	40	-	-	ns	
LE off delay time	tLEoff	40	-	-	ns	
SHR setup time	tMsu	100	-	-	ns	
SHR hold time	tMh	10	-	-	ns	

Clock & Data Timing



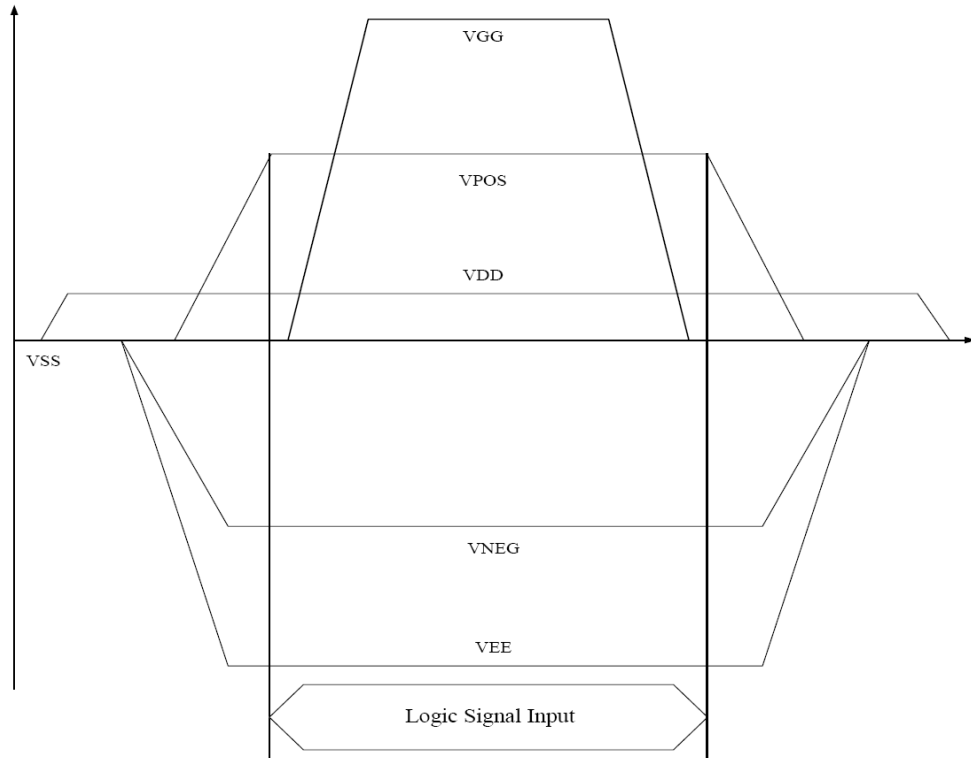
Output Latch/Control Signals



### 5. Power On Sequence

VDD -> VNEG -> VPOS (Source Driver)

VEE -> VGG (Gate Driver)



6. Optical Specification

6.1 Optical characteristics

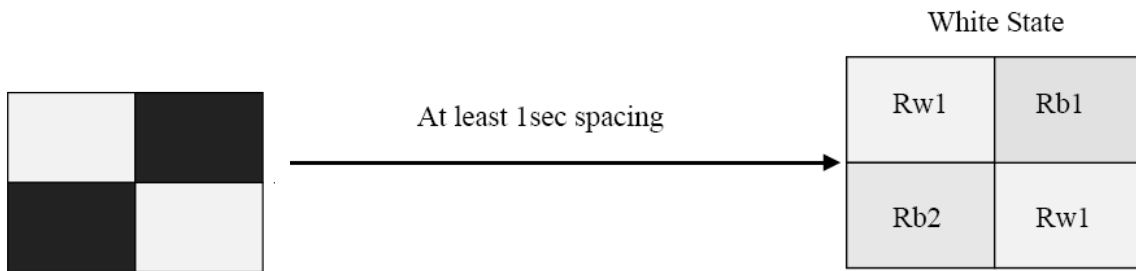
Parameter	Conditions	Values			Units	Notes
		Min.	Typ.	Max		
White Reflectivity	White	35			%	
Contrast Ratio (CR)		8:1				1
Image Update Time:	GC16(T=0°C)		1500	1600	ms	
	GC16(T=25°C)		960	1200		
	GC16(T≥35°C)		760	960		
	DU (T=0°C)		500	540		
	DU(T≥20°C)		300	360		

(Tamb=25°C, fv=50Hz; supply voltage module is 3.3VDC.

Measurements are made with Eye-One Pro Spectrophotometer.)

Notes:

1. CR=Surface Reflectance with all white pixel/Surface Reflectance with all black pixels;
2. Ghosting Testing:
  - 2.1 Testing Pattern



2.2 Refresh process: Init----GC White----4 checkerboard PatternGC) ----GC White.

2.3 Measuring the reflectance of all 4 checkerboard areas when final white state by Eye-one device.

2.4 Rw: reflectance of area transited from white state; Rb: reflectance of area transited from dark (black) state.

2.5 Calculating averages of WS-to-WS and DS-to-WS transitions:

$$Rw(ave)=(Rw1+Rw2)/2, Rb(ave)=(Rb1+Rb2)/2, G=Rw(ave)-Rb(ave).$$

**7. Handling, Safety, and Environment 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.

**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 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 glass can break and front surfaces can easily be damaged. Moreover the display is sensitive to static electricality and other rough environmental conditions.

## 8. Reliability Test

No.	TEST	CONDITION	METHOD	REMARK
1	High-Temperature Operation	T = +50°C, RH = 30% for 240 hrs	IEC 60 068-2-2Bp	At the end of the test, electrical, mechanical, and optical specifications shall be satisfied.
2	Low-Temperature Operation	T = 0°C for 240 hrs	IEC 60 068-2-2Ab	At the end of the test, electrical, mechanical, and optical specifications shall be satisfied.
3	High-Temperature Storage	T = +70°C, RH=23% for 240 hrs	IEC 60 068-2-2Bp	At the end of the test, electrical, mechanical, and optical specifications shall be satisfied.
4	Low-Temperature Storage	T = -25°C for 240 hrs	IEC 60 068-2-1Ab	At the end of the test, electrical, mechanical, and optical specifications shall be satisfied.
5	High-Temperature, High-Humidity Operation	T = +40°C, RH = 90% for 168 hrs	IEC 60 068-2-3CA	At the end of the test, electrical, mechanical, and optical specifications shall be satisfied.
6	High Temperature, High- Humidity Storage	T = +60°C, RH=80% for 240hrs	IEC 60 068-2-3CA	At the end of the test, electrical, mechanical, and optical specifications shall be satisfied.
7	Thermal Shock	1 cycle: [-25°C 30min] → [+70°C 30 min] : 100 cycles	IEC 60 068-2-14	At the end of the test, electrical, mechanical, and optical specifications shall be satisfied.
8	Package Vibration	1.04G, Frequency: 10~500Hz Direction: X,Y,Z Duration: 1 hours in each direction	Full packed for shipment	At the end of the test, electrical, mechanical, and optical specifications shall be satisfied.
9	Package Drop Impact	Drop from height of 122 cm on concrete surface. Drop sequence: 1 corner, 3edges, 6 faces One drop for each	full packed for shipment	At the end of the test, electrical, mechanical, and optical specifications shall be satisfied.
10	Electrostatic Effect (non-operating)	Machine model +/- 250V, 0Ω, 200pF	IEC 62179, IEC 62180	At the end of the test, electrical, mechanical, and optical specifications shall be satisfied.