

**Display Elektronik GmbH**

# DATA SHEET

**TFT MODULE**

**DEE 600800A – W**

**6,0“  
E-PAPER DISPLAY**

**Product Specification**

**Ver.: 1**

**06.09.2013**

DOCUMENT REVISION	DATE	DESCRIPTION	CHANGED BY	CHECKED BY
0	08.06.2013	First Release.	LY	MH
1	06.09.2013	Items 1 to 2 were updated. (Page 6) The module specification was updated. (Page 10)The table 5 was updated.	LY	MH

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**1. General Description**

DEE600800A-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 600×800(SVGA), and the active area is 6 inch diagonal.

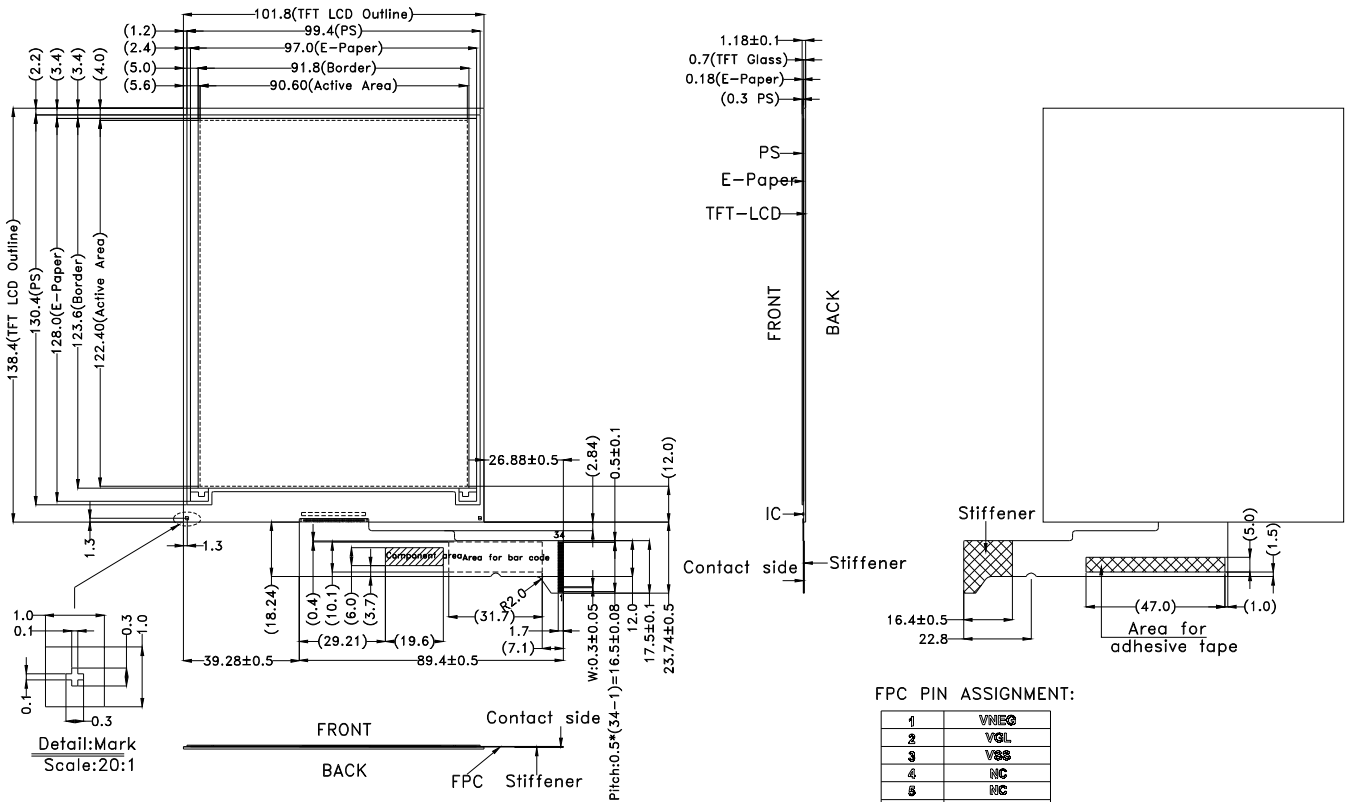
- 600×800 display
- White Reflectance above 40%
- Contrast Ratio above 8:1
- 3:4 aspect ratio
- Wide viewing angle
- Ultra low power consumption
- Reflective mode
- Bi -stable display
- Commercial temperature range
- Landscape, portrait modes
- Hard-coat antiglare display surface
- E-book reader.

**2. Mechanical Specifications**

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

<b>Parameter</b>	<b>Specifications</b>	<b>Unit</b>	<b>Remark</b>
Screen Size	6 (3:4)	Inch	-
Display Resolution	600 x 800 (or 800 x 600)	Pixel	-
Active Area	90.60 x 122.40 (or 122.40 x 90.60)	mm	-
Pixel Pitch	0.151 x 0.153	mm	-
Pixel Configuration	Rectangle	-	-
Outline Dimension	101.80 x 138.40 x 1.18 (or 138.40 x 101.80 x 1.18)	mm	-

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



Display Type	E-Paper+TFT LCD
Display Resolution	DOTS:600x800
Viewing Angle	Wide viewing angle
Max.Ratio and Bias Level	/
Controller/Driver	/
Logic Voltage	3.0V~3.6V
Driving Voltage	/
Operation Temperature	0°C~+50°C
Storage Temperature	-20°C~+70°C
Backlight Speciality	No backlight
Remark	/

FPC PIN ASSIGNMENT:

1	VNEG
2	VGL
3	VSS
4	NC
5	NC
6	VDD
7	VSS
8	CLK
9	VSS
10	LE
11	OE
12	SPH
13	D0
14	D1
15	D2
16	D3
17	D4
18	D5
19	D6
20	D7
21	VCOM
22	NC
23	NC
24	NC
25	NC
26	VSS
27	NC
28	CPV
29	STV
30	NC
31	VBORNER
32	VSS
33	VPOS
34	VGH

Figure 1: Module Specification

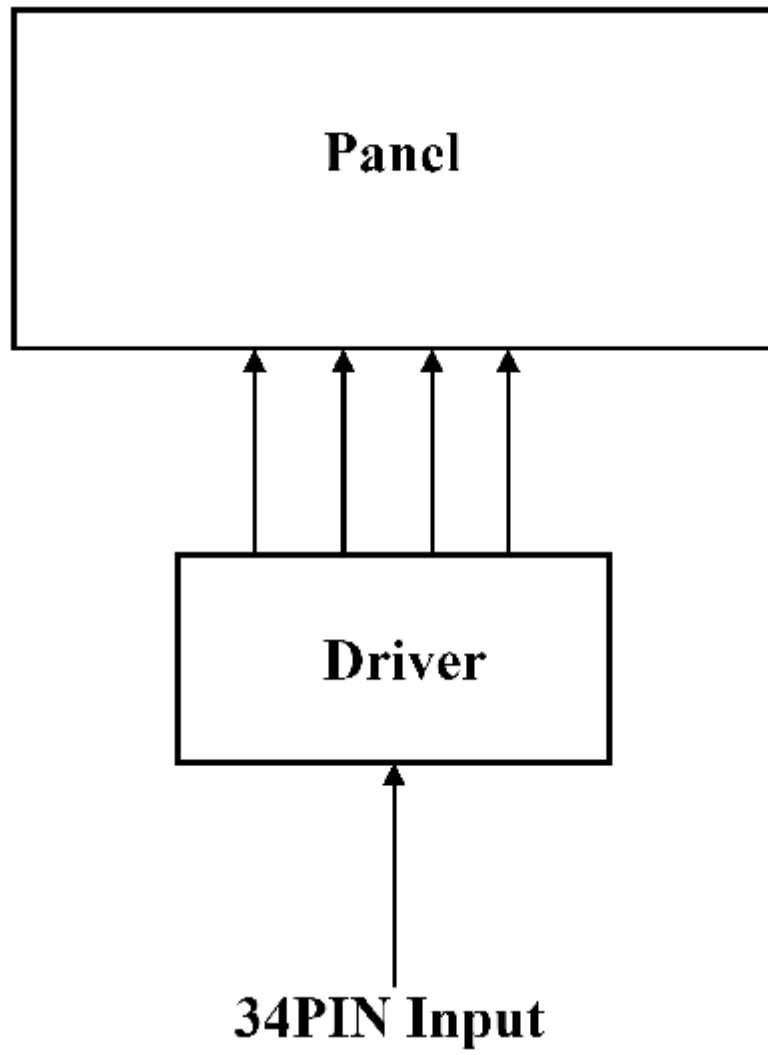


Figure 2: Block Diagram

## 3. Interface signals

Pin No.	Symbol	Description
1	VNEG	Negative power supply source driver
2	VGL	Positive power supply source driver
3	VSS	Ground.
4	NC	No connection.
5	NC	No connection.
6	VDD	Digital power supply drivers
7	VSS	Ground
8	CLK	Clock source driver
9	VSS	Ground
10	LE	Latch enable source driver
11	OE	Output enable source driver
12	SPH	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	No connection
23	NC	No connection
24	NC	No connection
25	NC	No connection
26	VSS	Ground.
27	NC	No connection
28	CPV	Shift clock input
29	STV	Start pulse gate driver
30	NC	No connection
31	VBORDER	Border connection
32	VSS	Ground
33	VPOS	Positive power supply source driver
34	VGH	Positive power supply gate driver

## 4. Electrical Specifications

### 4.1 Electrical Maximum Ratings

Parameter	Symbol	Rating	Unit
Logic Supply Voltage	VDD	-0.3 to +7	V
Positive Supply Voltage	VPOS	+18	V
Negative Supply Voltage	VNEG	-18	V
Supply Voltage for logic	VPOS- VNEG	36	V
Supply Voltage	VGG	-0.3 to +45	V
Supply Voltage	VEE	-25.0 to +0.3	V
Supply Voltage	VGG-VEE	-0.3 to +45	V
Operating Temp. range	TOTR	0 to +50	□
Storage Temp. range	TSTG	-25 to +70	□

### 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	-	uA
Gate Positive supply	VGH		21	22	23	V
	IVGH			0.35		uA
Gate Negative supply	VGL		-21	-20	-19	V
	IVGL			-3.0		uA
Source Positive supply	VPOS		14.6	15	15.4	V
	INEG	VPOS=-15V	-	20	-	mA
Source Negative supply	VNEG		-15.4	-15	-14.6	V
	IPOS	VNEG=15V		-20		mA
Asymmetry source	VASYM	VPOS+VNEG	-80	0	80	mV
Common voltage	VCOM		-2.5	Adjusted	-1.5	V
	ICOM		-	1.5	-	mA
Standby power module	PSTBY			-	0.4	mW
Typical power module	PTYP		-	600	1100	mW
Operating temperature			0		50	□
Storage temperature			-20	-	70	□
Maximum image update time at 25 □				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 supplier.

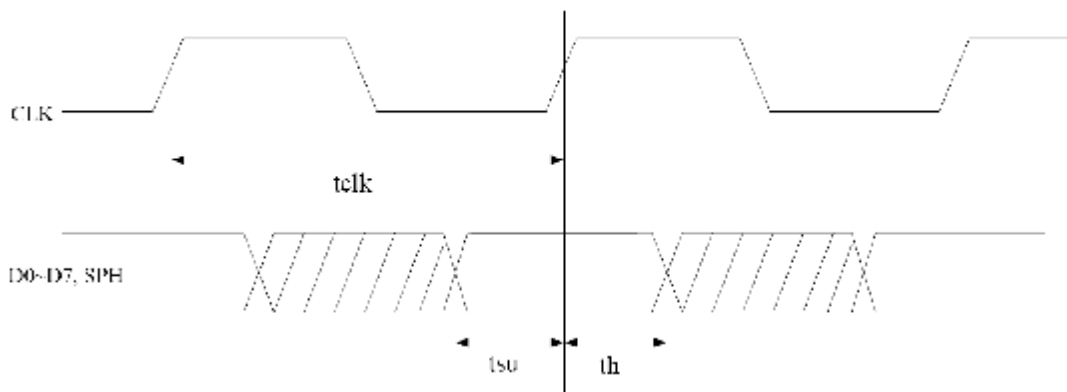


4.3 Module AC characteristics

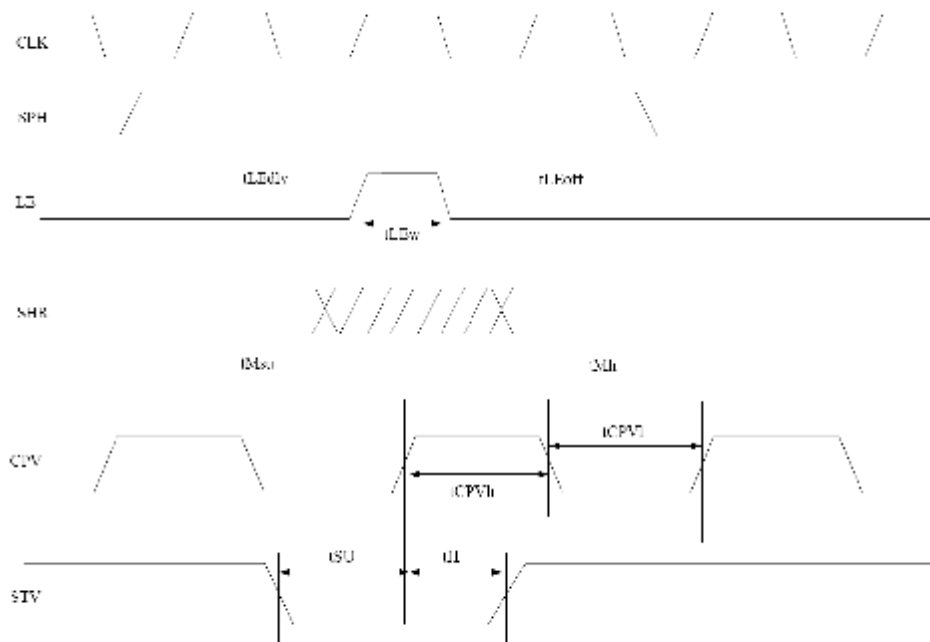
Note: VDD=3.0V to 3.6V, unless otherwise specified

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 STV
Data hold time	tH	300	-	-	ns	
Clock CLK cycle time	tclk	40	-	DC	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



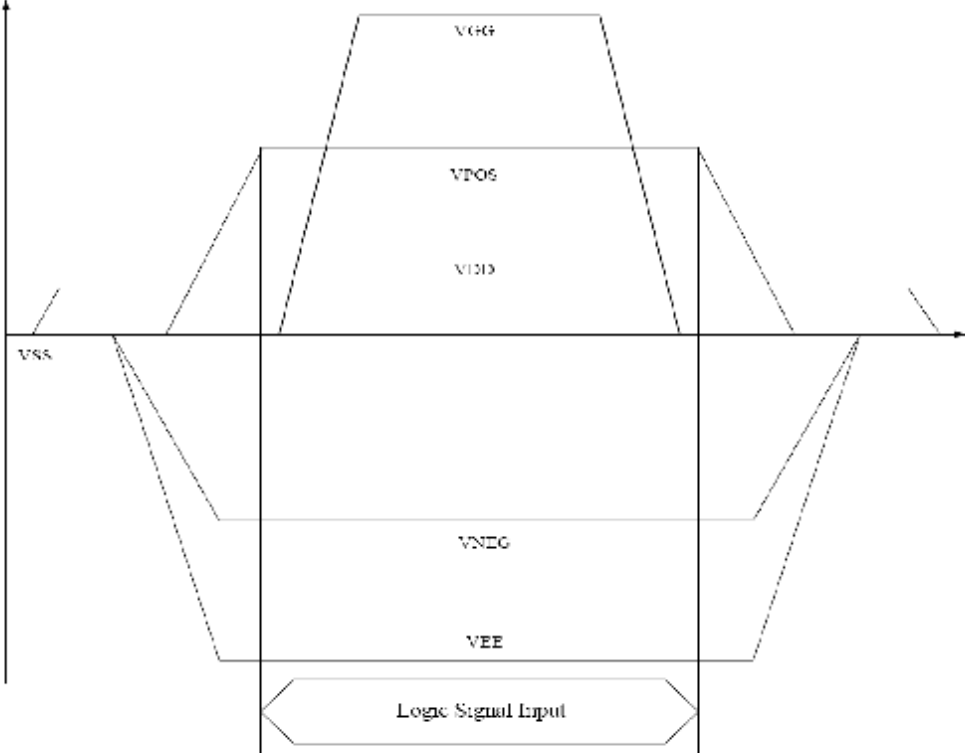
Output Latch/Control Signals



5. Power On Sequence

VDD -> VNEG -> VPOS (Source Driver)

VEE -> VGG (Gate Driver)



6. Optical Specification

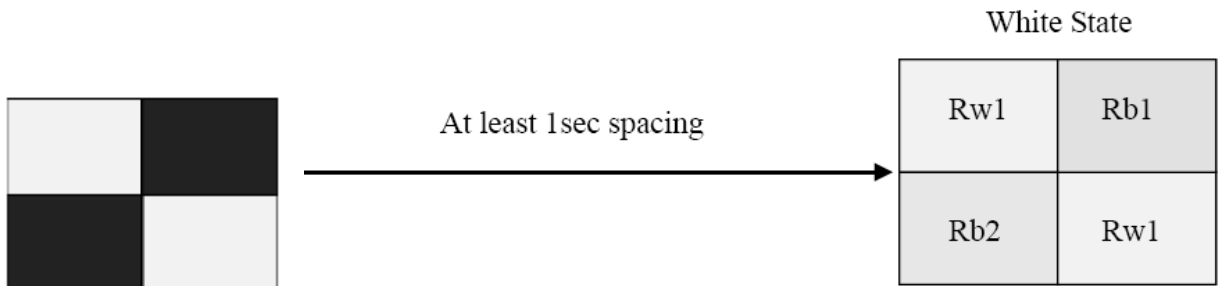
6.1 Optical characteristics

Parameter	Conditions	Values			Units	Notes
		Min.	Typ.	Max		
White Reflectivity	White	35	40		%	
Contrast Ratio (CR)		8:1	10:1			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		
Image Sticking(Ghosting)		-2.0	1.0	2.0		2

(Tamb=25°C, fv=50Hz, Vepd=+/-15V; 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	UV exposure Resistance	765 W/m <sup>2</sup> for 168hrs,40°C	IEC60 068-2-5Sa	At the end of the test, electrical, mechanical, and optical specifications shall be satisfied.
9	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.
10	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.
11	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.