Version: 1.0

TECHNICAL SPECIFICATION
【Luvia】
Tcon Board: L-T1000

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☐Customer's Confirmation

Customer _____

Date _____

By _____

☐E Ink's Confirmation

Approve By _____

Confirmed By _____

Prepared By _____

Revision History

Rev.	Issued Date	Revised Contents
1.0	2020/12/01	First draft

TECHNICAL SPECIFICATION

CONTENTS

1. General Description

L-T1000 board is a controller which designed for mini-LVDS interface driving and allows E Ink clients to access the hardware and software for below ePaper display module for further evaluation.

- E Ink's 28" Monochrome ePaper display
- E Ink's 25.3" Monochrome ePaper display
- E Ink's 25.3" ACeP display

2. Features

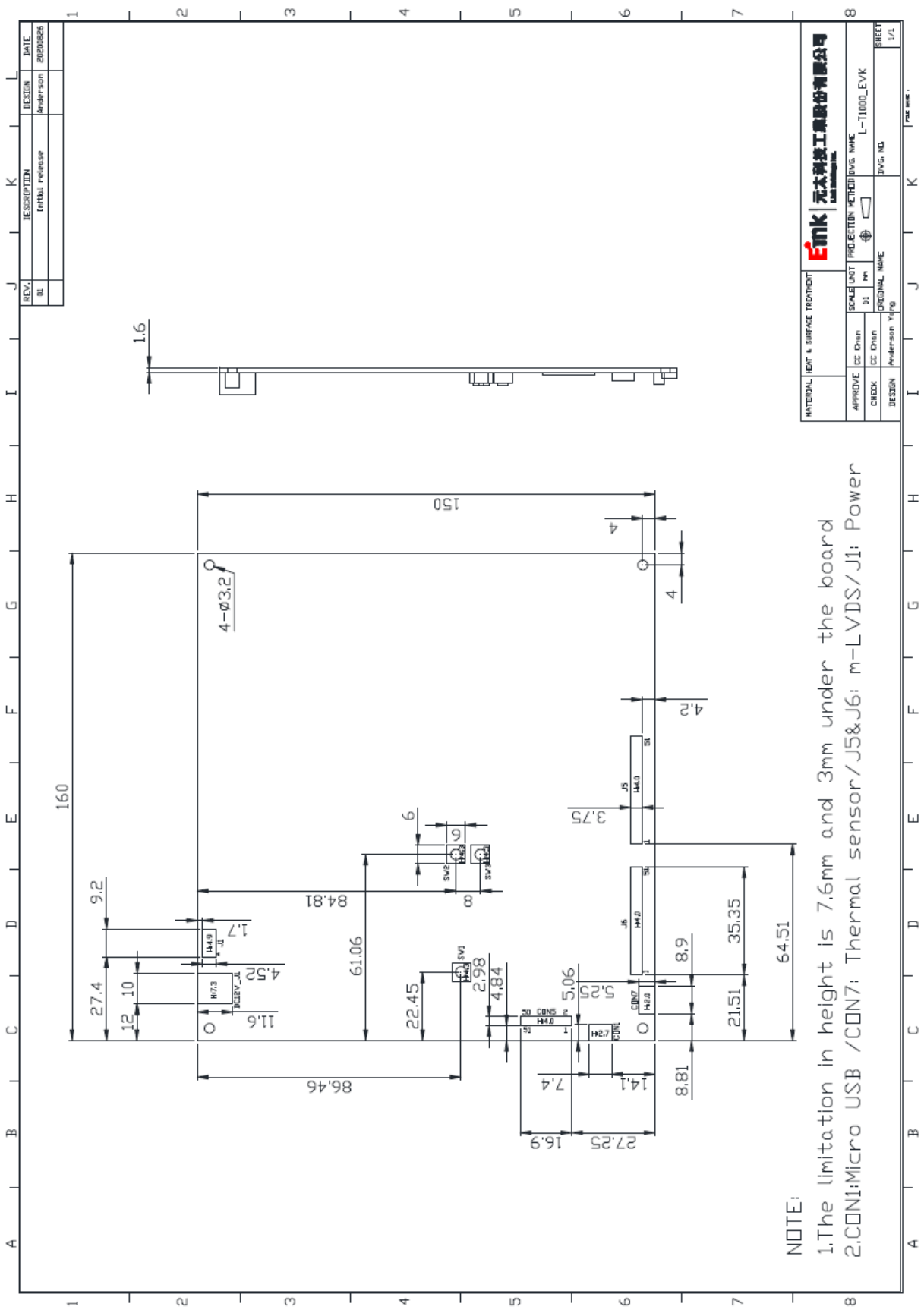
- Drive 25.3" full color display (Operating temperature: 15 ~ 35 ºC)
- Drive 28" & 25.3" monochrome display (Operating temperature: -15 ~ 65 ºC)
- Tcon Storage Temperature: -25~ 70 ºC
- 6-layer PCB, double-side SMT

3. Tcon Board Specifications

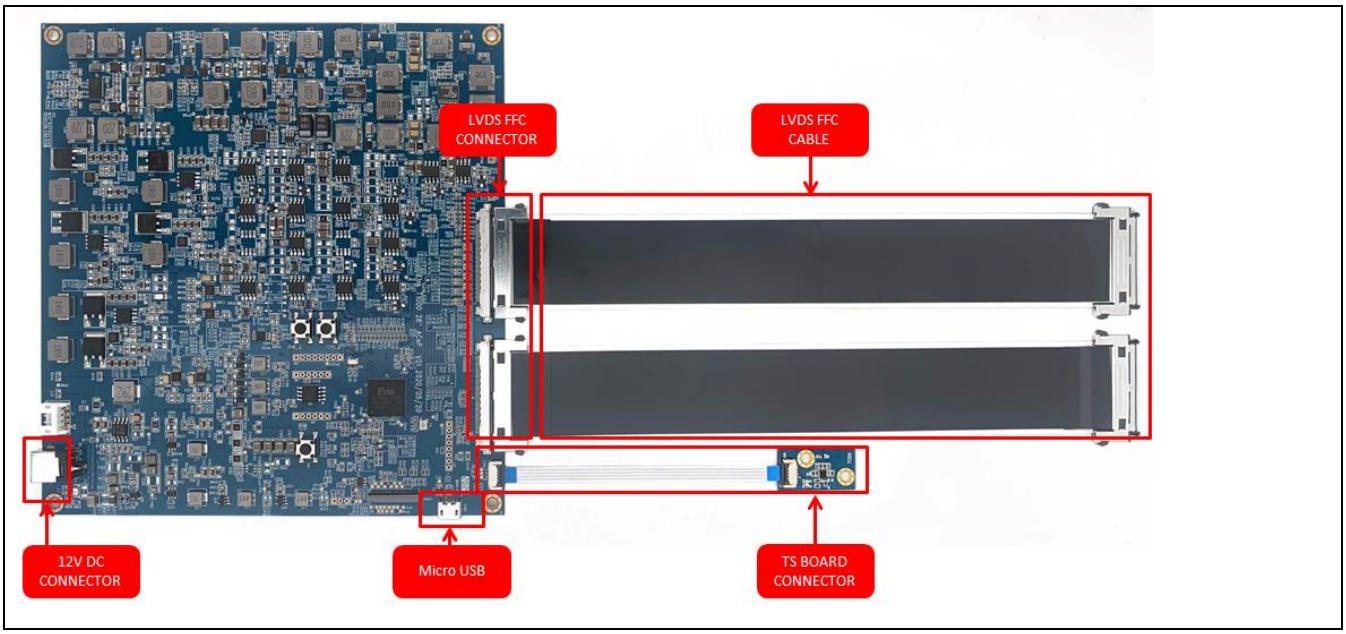
TCON	E Ink L-T1000
RAM	Embedded 64MB
Flash Memory	External 16MB
Display Interface	Mini -LVDS/FPC Connector
Debug Interface	UART J8
Host Interface	USB Port (Micro USB)
Power Adapter	DC +12V/6A
Dimension	Tcon board: 160mm x150mm TS board: 27mmx14.4mm FFC: 10cm
Weight	0.14kg
Environment	Operation Temperature: -15 ~ 65˚C Storage Temperature: -25~ 70˚C 5 ~ 50% Relative Humidity, non-condensing

4. Mechanical Drawing

4-1) Mechanical Dimension



4-2) Real Photographs



L-T1000 TCON Board with Mini-LVDS cables

5. Input/ Output Interface

5-1) Pin Assignment

Connector J5 to EPD

Pin #	Signal	I/O	Description	Remark
1	VSS	P	Ground	
2	LV0P_D0	I	Data signal source driver	
3	LV0N_D1	I	Data signal source driver	
4	VSS	P	Ground	
5	LV1P_D2	I	Data signal source driver	
6	LV1N_D3	I	Data signal source driver	
7	VSS	P	Ground	
8	LV2P_D4	I	Data signal source driver	
9	LV2N_D5	I	Data signal source driver	
10	VSS	P	Ground	
11	LV3P_D6	I	Data signal source driver	
12	LV3N_D7	I	Data signal source driver	
13	VSS	P	Ground	
14	LV4P_D8	I	Data signal source driver	
15	LV4N_D9	I	Data signal source driver	
16	VSS	P	Ground	
17	LV5P_D10	I	Data signal source driver	
18	LV5N_D11	I	Data signal source driver	
19	VSS	P	Ground	
20	CLKP_CKH	I	Data signal source driver	
21	CLKN_GLOSTL	I	Data signal source driver	
22	VSS	P	Ground	
23	LV6P_D12	I	Data signal source driver	
24	LV6N_D13	I	Data signal source driver	
25	VSS	P	Ground	
26	LV7P_D14	I	Data signal source driver	
27	LV7N_D15	I	Data signal source driver	
28	VSS	P	Ground	
29	LV8P	I	Data signal source driver	
30	LV8N	I	Data signal source driver	
31	VSS	P	Ground	
32	LV9P	I	Data signal source driver	
33	LV9N	I	Data signal source driver	
34	VSS	P	Ground	
35	LV10P	I	Data signal source driver	
36	LV10N	I	Data signal source driver	
37	VSS	P	Ground	
38	LV11P	I	Data signal source driver	
39	LV11N	I	Data signal source driver	
40	VSS	P	Ground	
41	CKV	I	Clock gate driver	
42	VSS	P	Ground	
43	SPH1	I/O	Start pulse source driver SHR: H → Start pulse input: SPH2 → Start pulse output: SPH1 SHR: L → Start pulse input: SPH1 → Start pulse output: SPH2	
44	SPH2	I/O	Start pulse source driver SHR: H → Start pulse input: SPH2 → Start pulse output: SPH1 SHR: L → Start pulse input: SPH1 → Start pulse output: SPH2	

45	SPV1	I/O	Start pulse gate driver UD: H → Start pulse input: SPV1 → Start pulse output: SPV2 UD: L → Start pulse input: SPV2 → Start pulse output: SPV1	
46	SPV2	I/O	Start pulse gate driver UD: H → Start pulse input: SPV1 → Start pulse output: SPV2 UD: L → Start pulse input: SPV2 → Start pulse output: SPV1	
47	SHR	I	Shift direction control pin source driver SHR =H: Data inputs read sequentially from S800 to S1. SHR =L: Data inputs read sequentially from S1 to S800.	
48	UD	I	Shift direction control pin gate driver UD = H: Data shift direction from G1 to G800. UD = L: Data shift direction from G800 to G1.	
49	OEH	I	Outputs enabled when OE is logic “H”, Outputs forced to GND when OE is logic “L”.	
50	LEH	I	Latch enable source driver	
51	DSEL	I	Data Input select	

Note: **P** in I/O: Power pin

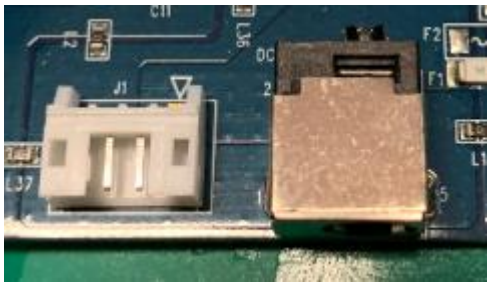
Connector J6 to EPD

Pin #	Signal	I/O	Description	Remark
1	MODE	I	Output enable gate driver	
2	XON	I	XON signal gate driver	
3	STBYB	I	mini-LVDS enable.	
4	NC	-	NO Connection	
5	NC	-	NO Connection	
6	NC	-	NO Connection	
7	NC	-	NO Connection	
8	VGL	P	Negative power supply gate driver.	
9	VGL	P	Negative power supply gate driver.	
10	NC	-	NO Connection	
11	VN3	P	Negative power supply source driver.	
12	VN3	P	Negative power supply source driver.	
13	VN3	P	Negative power supply source driver.	
14	NC	-	NO Connection	
15	VN2	P	Negative power supply source driver.	
16	VN2	P	Negative power supply source driver.	
17	VN2	P	Negative power supply source driver.	
18	NC	-	NO Connection	
19	VN1	P	Negative power supply source driver.	
20	VN1	P	Negative power supply source driver.	
21	VN1	P	Negative power supply source driver.	
22	NC	-	NO Connection	
23	VSS	P	Ground	
24	VSS	P	Ground	
25	NC	-	NO Connection	
26	VDD	P	Logic power.	
27	VDD	P	Logic power.	
28	NC	-	NO Connection	
29	VP1	P	Positive power supply source driver.	
30	VP1	P	Positive power supply source driver.	
31	VP1	P	Positive power supply source driver.	
32	NC	-	NO Connection	

33	VP2	P	Positive power supply source driver.	
34	VP2	P	Positive power supply source driver.	
35	VP2	P	Positive power supply source driver.	
36	NC	-	NO Connection	
37	VP3	P	Positive power supply source driver.	
38	VP3	P	Positive power supply source driver.	
39	VP3	P	Positive power supply source driver.	
40	NC	-	NO Connection	
41	VGH	P	Positive power supply gate driver.	
42	VGH	P	Positive power supply gate driver.	
43	NC	-	NO Connection	
44	BORDER	P	Border connection	
45	NC	-	NO Connection	
46	VCOM	P	Common Voltage.	
47	VCOM	P	Common Voltage.	
48	NC	-	NO Connection	
49	VCOM	P	Common Voltage.	
50	VCOM	P	Common Voltage.	
51	VCOM	P	Common Voltage.	

Note: **P** in I/O: Power pin

Connector 2 – Power Pin (12V)



Pin	Signal	Description	Remark
1	+12	Input power	
2	+12	Input power	
3	G	Ground	
4	G	Ground	

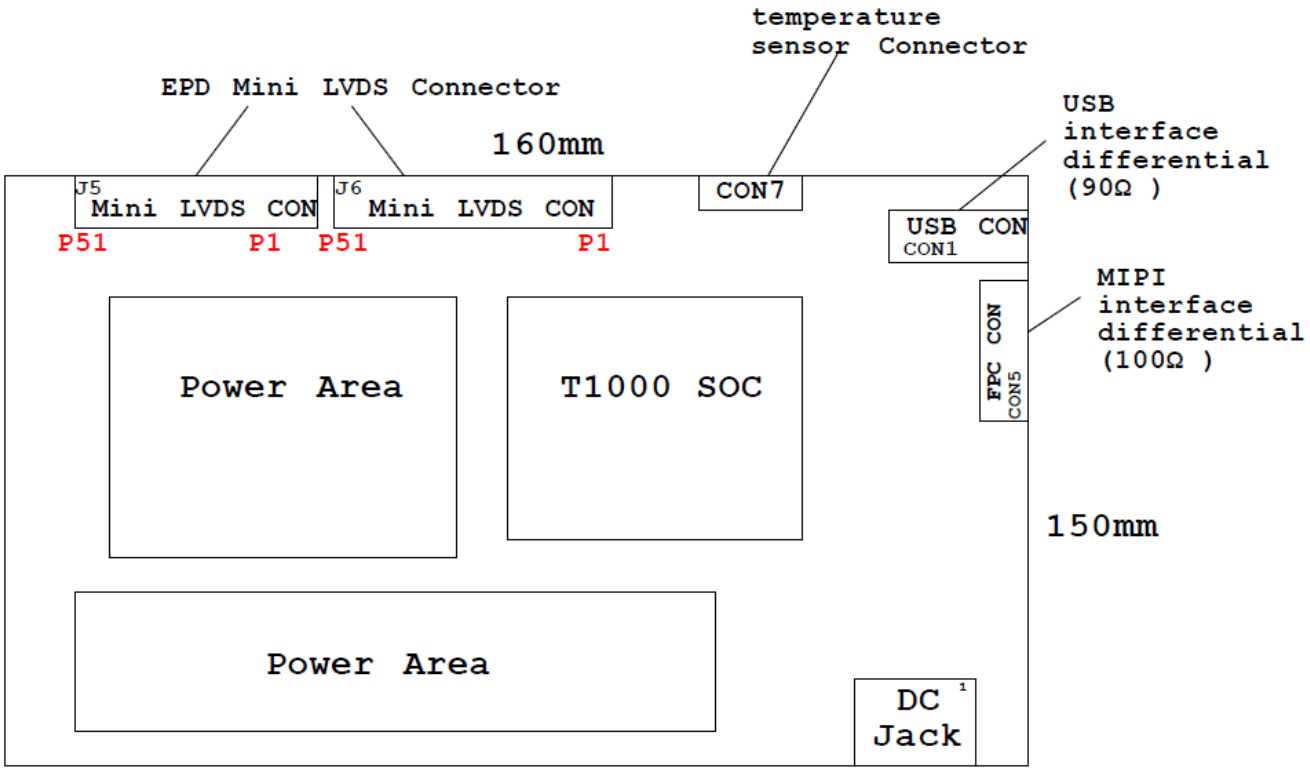
Connector 3 – micro USB (Omitted)

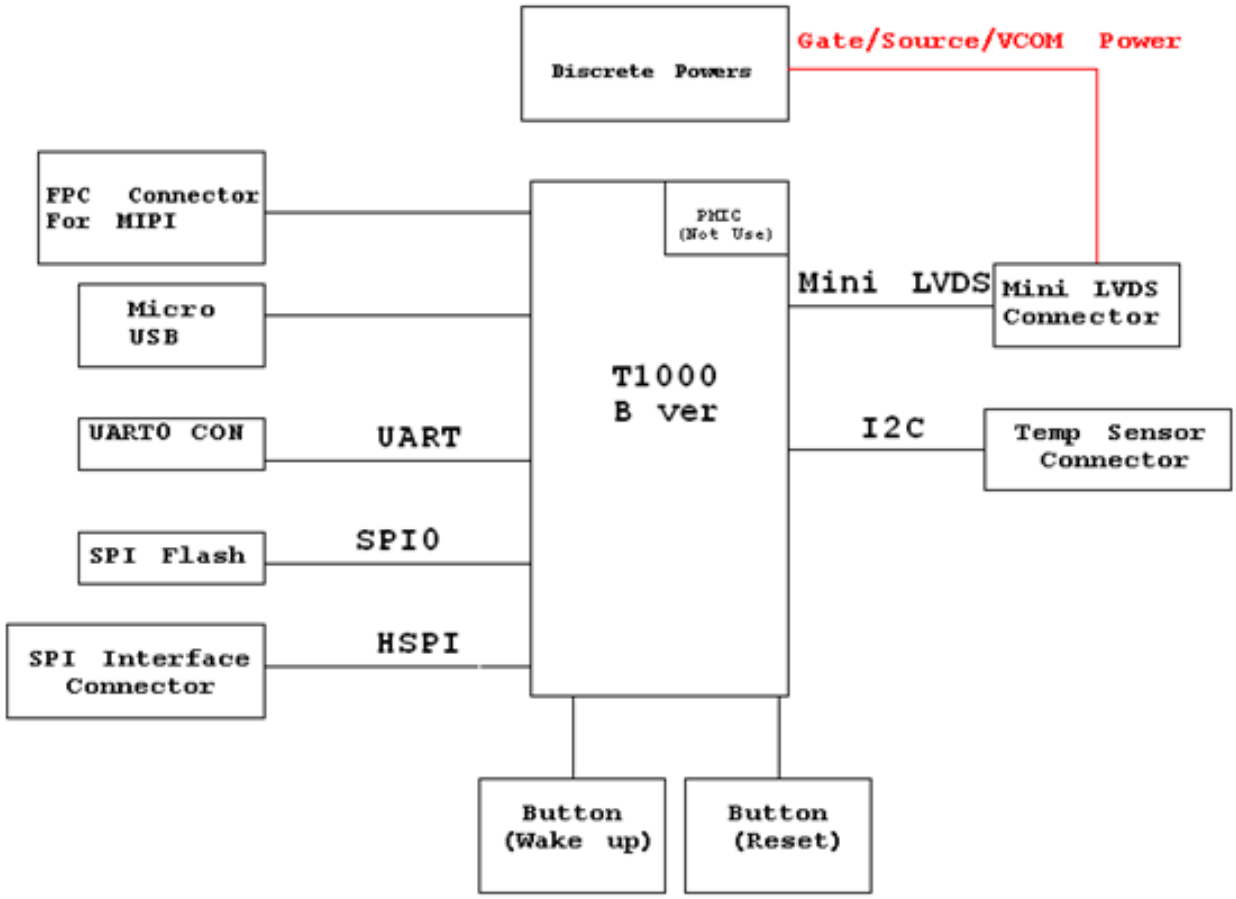
Connector 4 – to Thermal Sensor (Omitted)

5-2) Tcon Electrical Connection

SERVICE	SYMBOL	CONNECTOR	TYPE NUMBER	NUMBER OF PINS	MATING CONNECTOR
To EPD	J5、J6	JAE	FI-RE51S-HF-R1500	51	0.5mm pitch
Power Input (DC Jack)	J1	Qi Speed	KDCD-044D-25	5	
Power Input (Wafer, option)	J1	STM	M24264R	4	
To Host	CON1	Micro USB Port			

5-3) Function Block Diagram





6. Tcon Electrical Characteristics

- Power Supply: 12V DC,6A

- EPD Controller

1. 32-Bit RISC Microcontroller
2. Open RISC basic instruction set (ORBIS32)
3. 8KB instruction cache

- RAM

1. Built-in 128Mb/512Mb DDR2-SDRAM
2. Embedded 64MB RAM
3. External 16MB flash memory

- External Interfaces

1. Micro USB for control and data
2. UART debug interface
3. Mini LVDS EPD panel interface
4. 12V connector

- Internal Interfaces

1. I2C for programming of on-board devices (temp sensor)
2. SPI interfaces

- Source / Gate Driver Interface

1. Supports up to 8192x8192 resolution (limited frame rate)
2. Supports 8/16-bit source driver data bus
3. Mini LVDS interface for driver

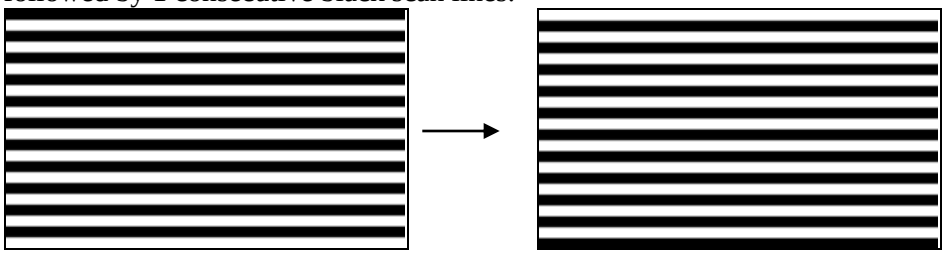
- Display Engine

1. Supports partial-region display
2. Supports up to 63 pipelines

- LUT support: Supports LUT up to 4096 frames

7. Power Consumption

The power consumption is measured 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.



ePaper display module	Condition	RMS	Max	Peak Current
28” monochrome display 3840x1080, 75Hz	Tcon board only	2W	22W	<2A
	Tcon + EPD	12W	33W	<3A
25.3” monochrome display 3200x1800, 75Hz	Tcon board only	2.5W	22W	<2A
	Tcon + EPD	12W	31W	<3A
25.3” full color display 3200x1800, 65Hz	Tcon board only	4W	28W	<3A
	Tcon + EPD	10W	38W	<4A

Note: Power data is based on 12V voltage input.

8. Appendix (Tcon Light-on Inspection)

Signal Parameter

Parameter	Symbol	Min	Typ	Max	Unit	Remark
Gate negative supply	VGL	-22	-20	-19	V	
Gate positive supply	VGH	26	27	28	V	
Source negative supply	VN1	-16	Adjusted	-9	V	Voltage controlled by WFM setting.
Source negative supply	VN2	-16	Adjusted	-9	V	
Source negative supply	VN3	-16	Adjusted	-9	V	
Source positive supply	VP1	6	Adjusted	17	V	
Source positive supply	VP2	6	Adjusted	17	V	
Source positive supply	VP3	6	Adjusted	17	V	
Common voltage	VCOM	-20	Adjusted	20	V	