MODEL NO. : _	TM101XDH01
ISSUED DATE:	2009-07-17
VERSION : _	Ver 1.0

Preliminary Specification Final Product Specification

Customer :_____

Approved by	Notes

SHANGHAI TIANMA Confirmed :

Prepared by	Checked by	Approved by

This technical specification is subjected to change without notice

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Record of Revision

Rev	Issued Date	Description	Editor
1.0	2009-07-17	Preliminary Specification Release	Xing Nie

1 General Specifications

	Feature	Spec		
	Size	10.1 inch		
	Resolution	1024 (RGB) × 576		
	Interface	LVDS		
	Color Depth	262K		
	Technology Type	a-Si TFT		
Display Spec.	Pixel Pitch (mm)	0.2175×0.2175		
	Pixel Configuration	R.G.B. Vertical Stripe		
	Display Mode	TM with Normally White		
	Surface Treatment(Up Polarizer)	Anti-Glare		
	Viewing Direction	6 o'clock		
	Gray Scale Inversion Direction	12'clock		
	LCM (W x H x D) (mm)	235×143×5.2		
	Active Area(mm)	222.72×125.28		
Mechanical Characteristics	With /Without TSP	Without TSP		
	Weight (g)	TBD		
	LED Numbers	24 LEDs		
	Source Driver IC	NT39415		
Electronic	Gate Driver IC	NT39211		
	Timing Controller IC	MTD004-LF-00		

- Note 1: Viewing direction for best image quality is different from TFT definition. There is a 180 degree shift.
- Note 2: Requirements on Environmental Protection: RoHS
- Note 3: LCM weight tolerance: +/- 5%

2 Input/Output Terminals

2.1 Connector Name / Designation

Manufacturer	JAE (or equivalent)
Type / Part Number	IPEX 20455-040E-12
Mating Receptacle/Part Number	IPEX 20453-040T

2.2 TFT-LCD Panel Driving

Pin #	Pin # Signal Name Description		Remarks	
1	NC	Not connected(Reserve)	-	
2	VDD	Power supply 3.3V(typical)	-	
3	VDD	Power supply 3.3V(typical)	-	
4	VDD_EDID	Power supply for EDID	-	
5	NC	Not connected(Reserve)	-	
6	SCL	EDID clock	-	
7	SDA	EDID data	-	
8	RX_0-	LVDS differential data input	-	
9	RX_0+	LVDS differential data input	-	
10	GND	Ground	-	
11	RX_1-	LVDS differential data input	-	
12	RX_1+	LVDS differential data input	-	
13	GND	Ground	-	
14	RX_2-	LVDS differential data input	-	
15	RX_2+	LVDS differential data input	-	
16	GND	Ground	-	
17	RX_CLK-	LVDS differential clock input	-	
18	RX_CLK+	LVDS differential clock input	-	
19	GND	Ground	-	
20	NC	Not connected(Reserve)	-	
21	NC	Not connected(Reserve)	-	
22	GND	GND	-	
23	NC	Not connected(Reserve)	-	
24	NC	Not connected(Reserve)	-	
25	GND	GND	-	
26	NC	Not connected(Reserve)	-	
27	NC	Not connected(Reserve)	-	
28	GND	GND	-	
29	NC	Not connected(Reserve)	-	
30	NC	Not connected(Reserve)	-	
31	GND_LED	LED Ground	-	
32	GND_LED	LED Ground	-	
33	GND_LED	LED Ground	-	
34	NC	Not connected(Reserve)	-	
35	PWM_LED	System PWM Signal Input	-	

36	EN_LED	LED enable pin	-
37	NC	Not connected(Reserve)	-
38	V_LED	LED Power Supply 5V	-
39	V_LED	LED Power Supply 5V	-
40	V_LED	LED Power Supply 5V	-

Note: All input signals shall be low or Hi-Z state when VDD is off.

2.3 LVDS Receiver

Signal Electrical Characteristics for LVDS Receiver

The built-in LVDS receiver is compatible with (ANSI/TIA/TIA-644) standard.

Parameter	Symbol	Min.	Тур.	Max.	Unit	Conditions
Differential Input High Threshold	Vth	-	-	+100	mV	Vcm=+1.2V
Differential Input Low Threshold	Vtl	-100	-	-	mV	Vcm=+1.2V
Magnitude Differential Input Voltage	Vid	100	-	600	mV	-
Common Mode Voltage	Vcm	Vid /2+0.6	1.2	1.8- Vid /2	V	-
Common Mode Voltage Offset	∆Vcm	-	-	50	mV	Vcm=+1.2V

Note:

A. Input signals shall be low or Hi-Z state when VDD is off.

B. All electrical characteristics for LVDS signal are defined and shall be measured at the interface connector of LCD.

Data mapping

RXin C									
RXin O		0 G 0	0R5	OR4	0R3	0R2	OR1	ORO	
RXin 1		0B1	0B0	0G5	0G4	0G3	0 G2	0G1	
RXin 2		DE	VS	HS	0B5	OB4	OB3	0B2	
			С	urrent cya	le				

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3 Absolute Maximum Ratings

ltem	Symbol	MIN	MAX	Unit	Remark
Supply Voltage	VDD	-0.5	4.0	V	-
Input Signal Voltage	-	-0.5	2.6	V	LVDS signals
Operating Temperature	TOP	0	50	°C	
Storage Temperature	TST	-20	60	°C	



4 Electrical Characteristics

4.1 LCD module

		GND=0V,Ta=25℃				
Item	Symbol	MIN	TYP	MAX	Unit	Remark
Power Supply Voltage	VCC	2.3	3.3	3.6	V	Power Supply Voltage
Power Consumption	Black Mode (60Hz)	-	210	-	mA	Power Consumption

4. 2 Recommended Driving Condition for Backlight

Symbol	Parameter	Min.	Тур.	Max.	Units	Remark	
VL	LED Light bar Driving (Row output)		9.0	-	10.5	V	Ta=25℃
ΙL	LED Current			160		mA	Ta=25℃
V_LED	LED input		4.5	5.0	5.5		Ta=25 ℃
	PWM	High	2.0	3.3	3.6	V	
V_PVIVI	Signal Voltag	Low	0	-	0.5	V	_
FPWM	Output PWM frequency		-	200	1K	Hz	-
	LED	High	2.6	3.3	3.6		
	enable	Low	0	-	0.5	V	-
PWM	PWM Duty ra	atio	20	-	100	%	-

Note: The value is for design stage only.

Note 1: The figure below shows the connection of backlight LED.



Note 2: One LED : I_F =20mA, V_F =3.2V. Note 3: The Minimum Life of LED : 20,000 hours.

4.3 Block Diagram





5 Timing Chart

5.1 Timing Characteristics

Interface Timings

Parameter	Symbol	Unit	Min.	Тур.	Max.
LVDS Clock Frequency(single)	ICK	MHz	34.0	49.5	72.0
H Total Time	TH-total	clocks	1066	1344	1424
H Active Time	TH-Data	clocks	1024	1024	1024
V Total Time	Tv-total	lines	586	614	946
V Active Time	TV-Data	lines	576	576	576
Frame Rate	Vsync	Hz	55	60	65

Timing Characteristics





5.2 Scan Mode

SHIFT	Left +Down	Left +Up	Right +Down	Right + Up
SHL	L	L	Н	Н
U_D	L	Н	L	Н

Note: 1,The scan direction can be determined by Pin SHL and Pin U_D.

2, Pin SHL and Pin U_D had been fixed to H and L on the PCB.

VDD power on/off sequence 5.3

VDD power on/off sequence is as follows. Interface signals are also shown in the chart.

Signals from any system shall be Hi-Z state or low level when VDD is off.



Power Sequencing Requirements

Parameter	Symbol	Unit	min	ty	max
VDD Rise Time	T1	ms	0.5	-	10
VDD Good to Signal Valid	T2	ms	0	-	50
Signal Valid to Backlight On	Т3	ms	200	-	-
Backlight Off to Signal Disable	T4	ms	200	-	-
Signal Disable to Power Down	Т5	ms	0	-	50
VDD Fall Time	Т6	ms	0	-	10
Power Off	Τ7	ms	400	-	-

5.4 Timing Controller Power on and Reset Timing sequence When Power (VDDI) turns on and RESET=High, the timing sequence is listed below,

Power on and Reset Timing

₩ SH4	ANGHAI TIANMA MICRO-ELECTRONICS	5	TM101)	(DH01 V1.0)
VDDI					
RESET					
DE(LVDS)					
Ouput Data	(Free R	un) (F	ree Run)	Normal	Normal
STV	1st Fra	me 2n	d Frame	3rd Frame	4th Frame
OE					
CPV					
STH					

Note: The power on sequence listed here is default setting.

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6 Optical Characteristics

								Ta=25 ℃
ltem		Symbol	Condition	Min	Тур	Max	Unit	Remark
				10	15	-		
View Angles		θΒ		30	35	-	Degree	Niete 2, 2
view Angles		θL	GR210	40	45	-	Degree	NOIEZ,3
		θR		40	45	-		
Contrast Ratio		CR	θ=0°	400	500	-		Note 3
Doopopoo Tim	^	T _{ON}	25℃		10	16	ms	Note 4
Response min	đ	T _{OFF}	23 C	-	12	10		
	White	x	Backlight is	0.263	0.313	0.363		Note 1,5
		у		0.279	0.329	0.379		
	Pod	x		0.548	0.598	0.648		Note 1,5
Chromaticity	Reu	у		0.316	0.366	0.416		
Childhalichy	Groop	х	on	0.305	0.355	0.405		Noto 1 5
	Gleen	у		0.526	0.576	0.626		NOLE 1,5
	Pluo	х		0.110	0.160	0.210		Noto 1 5
	Diue	у		0.077	0.127	0.177		
Uniformity		U			80	-	%	Note 6
NTSC				-	45	-	%	Note 5
Luminance		L		170	200	-	cd/m ²	Note 7

Test Conditions:

- 1. The ambient temperature is 25° C.
- 2. The test systems refer to Note 1 and Note 2.



Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



The center of the screen

Note 2: Definition of viewing angle range and measurement system.

viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80).



Note 3: Definition of contrast ratio

 $Contrast ratio (CR) = \frac{Luminance measured when LCD is on the "White" state}{Luminance measured when LCD is on the "Black" state}$ "White state ": The state is that the LCD should drive by Vwhite.

"Black state": The state is that the LCD should drive by Vblack.

Vwhite: To be determined Vblack: To be determined.



The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.



Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity (U) = Lmin/ Lmax

L-----Active area length W----- Active area width



Lmax: The measured Maximum luminance of all measurement position.

Lmin: The measured Minimum luminance of all measurement position.

Note 7: Definition of Luminance:

Measure the luminance of white state at center point.

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7 Environmental / Reliability Test

No	Test Item	Condition	Remark
1	High Temperature Operation	Ts=+50℃, 240hrs	Note1 IEC60068-2-2,GB2423.2—89
2	Low Temperature Operation	Ta=0℃, 240hrs	IEC60068-2-1 GB2423.1—89
3	High Temperature Storage (non-operation)	Ta=+60℃, 240hrs	IEC60068-2-2, GB2423.2—89
4	Low Temperature Storage (non-operation)	Ta=-20℃, 240hrs	IEC60068-2-1 GB2423.1—89
5	High Temperature & High Humidity Operation	Ta = +60℃,90% RH max,240 hours	Note2 IEC60068-2-3, GB/T2423.3—2006
6	Thermal Shock (non-operation)	-30℃ 30 min~+80℃ 30 min, Change time:5min, 100 Cycle	Start with cold temperature, end with high temperature IEC60068-2-14,GB2423.22—87
7	Electro Static Discharge (operation)	\pm 2KV,Human Body Mode, 100pF/1500 Ω	IEC61000-4-2 GB/T17626.2—1998
8	Vibration (non-operation)	Sine Wave Frequency range:10~55Hz, Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z.(6 hours for total)	IEC60068-2-6 GB/T2423.10—1995
9	Shock (non-operation)	100G 6ms, ±X,±Y,±Z 3times for each direction	IEC60068-2-27 GB/T2423.5—1995
10	Package Drop Test	Height:80 cm,1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/2423.8—1995
11	Package Vibration Test	Random Vibration: 0.015G*G/Hz for 5-200Hz, -6dB/Octave from 200-500Hz 2 hours for each direction of X,Y,Z (6 hours for total)	IEC60068-2-34

- Note1: Ts is the temperature of panel's surface.
- Note2: Ta is the ambient temperature of samples.



9 Packing Drawing

No	Item	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM module	TM101XDH01-00	235×143×5.2	TBD	25	
2	TIANMA LOGO	Paper	9×9	TBD	25	
3	Desiccant	Desiccant	45×35	0.0035	4	
4	Crepe Paper Tape	Paper	30×10	TBD	25	
5	Carton	Corrugated Paper	530×350×250	1.12	1	
6	Anti-Static Bag	PE	247×256×0.05	0.04	25	
7	Partition_1	Corrugated Paper	513×333×217	1.96	1	
8	Partition_2	Corrugated Paper	505×332	0.1	2	
9	Corrugated Bar	Corrugated Paper	513×308	TBD	2	
10	Dust-Proof Bag	PE	700×530	0.06	1	
11	Total weight		TBD			





- a) Handling Precautions
- i. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
- ii. If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.
- iii. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- iv. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.
- v. If the display surface is contaMinated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:
 - Isopropyl alcohol
 - Ethyl alcohol
- vi. Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:
 - Water
 - Ketone
 - Aromatic solvents
- vii. Do not attempt to disassemble the LCD Module.
- viii. If the logic circuit power is off, do not apply the input signals.
- ix. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
 - b) Be sure to ground the body when handling the LCD Modules.
 - c) Tools required for assembly, such as soldering irons, must be properly ground.
 - d) To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
 - e) The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.
 - f) Storage precautions
 - i. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.
 - ii. The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:
 - g) Temperature : 0° C $\sim 40^{\circ}$ C Relatively humidity: $\leq 80^{\circ}$
 - i. The LCD modules should be stored in the room without acid, alkali and harmful gas.
 - ii. Transportation Precautions
 - h) The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.