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This technical specification is subjected to change without notice

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Table of Contents

Cov	/ersheet	. 1
Tab	le of Contents	. 2
Red	cord of Revision	. 3
1	General Specifications	. 4
2	Input/Output Terminals	. 5
3	Absolute Maximum Ratings	. 6
4	Electrical Characteristics	6
5	Timing Chart	6
6	Optical Characteristics	6
7	Environmental / Reliability Test	. 6
8	Mechanical Drawing	. 6
9	Packing Drawing	6
10	Precautions For Use of LCD Modules	. 6



Record of Revision

Rev	Issued Date	Description	Editor
1.0	2009-05-22	Preliminary Specification Release	ZhenYing Zhang
2.0	2009-07-30	Final Specification Release	ZhenYing Zhang
2.1	2009-09-29	Modify the main FPC	Ming Gao
2.2	2010-01-20	Update Life Time Definition in P7	ZhenYing Zhang
		Update RA standard in P19	ZhenYing Zhang
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1 General Specifications

	Spec	
	Size	1.77 inch
	Resolution	128(RGB) x 160
	Interface	CPU 8bits
	Color Depth	65/262K
	Technology Type	a-Si
Display Spec.	Pixel Pitch (mm)	0.219x0.219
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	TM with Normally White
	Surface Treatment(Up Polarizer)	Clear Type(3H)
	Viewing Direction	6 o'clock
	Gray Scale Inversion Direction	12 o'clock
	LCM (W x H x D) (mm)	34.7x47.0x2.6
Machaniaal	Active Area(mm)	28.032x35.04
Mechanical Characteristics	With/Without TSP	Without TSP
onaracteristics	Weight (g)	6.7
	LED Numbers	2 LEDs
Electronic	Driver IC	HX8353-C

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: Q/S0002

Note 3 : LCM weight tolerance : +/- 5%

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2 Input/Output Terminals

2.1 TFT LCD Panel

Num	Symbol	I/O	Description	Remarks
1	GND	Р	Ground	
2	XR(X+)	Р	Touch panel XR position	
3	YU(Y+)	Р	Touch panel YU position	
4	XL(X-)	Р	Touch panel XL position	
5	YD(Y-)	Р	Touch panel YD position	
6	GND	Р	Ground	
7	VDD	Р	Power supply	
8	/CS	I	Chip select signal , low: chip can be accessed	
0	ПС	1	Command/Data select signal,	
9	КЭ	I	low: instruction; high: data	
10	/WS	I	Write signal	
11	RD	I	Read signal	
12	D0	I	Data input	
13	D1	I	Data input	
14	D2	I	Data input	
15	D3	I	Data input	
16	D4	I	Data input	
17	D5	I	Data input	
18	D6	I	Data input	
19	D7	l	Data input	
20	/LCD_ RESET	I	Reset signal	
21	GND	Р	Ground	
22	LED1+	Р	Back light cathode LED1+	
23	LED2+	Р	Back light cathode LED2+	
24	LED3+	Р	No connection	
25	LED-	Р	Back light anode	

Note2-1: I/O definition:

I-----Input O---Output P----Power/Ground



3 Absolute Maximum Ratings

3.1 Driving TFT LCD Panel

GND=0V,Ta = 25℃

Item	Symbol	Min	Max	Unit	Remark
Logic Supply Voltage	VDD	2.3	3.3	V	
Analog Supply Voltage	VDD	2.3	3.3	V	
Input Voltage	D7~D0,/CS,RS,/WS, RD /LCD_RESET	-0.3	VDD+0.3	۷	
Back Light Forward Current	I _{LED}		20	mΑ	For each LED
Operating Temperature	T _{OPR}	-20	70	°C	
Storage Temperature	T _{STG}	-30	80	°C	

4 Electrical Characteristics

4.1 Driving TFT LCD Panel

GND=0V, Ta=25℃

ltem		Symbol	Min	Тур	Max	Unit	Remark
Logic Supply V	/oltage	VDD	2.3	2.8	3.3	V	
Analog Supply	Voltage	VDD	2.3	2.8	3.3	V	
Input Signal	Low Level	VIL	-0.3	l	0.2xVDD	V	D7~D0,/CS,RS,/WS, RD
Voltage	High Level	VIH	0.8xVDD	-	VDD	V	/LCD_RESET
Output Signal	Low Level	Vol	1	-	0.2xVDD	V	
Voltage	High Level	Vон	0.8xVDD	-	VDD	V	
(Panel+ LSI)		Black Mode (60Hz)	-	TBD		-	
Power Consumption		Standby Mode		TBD			
		Sleeping Mode		TBD			



4.2 Driving Backlight

Ta=25℃

ltem	Symbol	Min	Тур	Мах	Unit	Remark
Forward Current	l _F		15		mA	
Forward Current Voltage	V _F		3.2		V	
Backlight Power	W_{BL}		96		mW	
Consumption						
Operating Life Time		10000	(20000)		Hrs	

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



Note 2: One LED : I_F =15 mA, V_F =3.2V

Note 3: IF is defined for one channel LED.

Optical performance should be evaluated at Ta=25 $^\circ\!\!\! C$ only.

If LED is driven by high current, high ambient temperature & humidity condition. The life time of LED will be reduced.

Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.



4.3 Block Diagram





5 Timing Chart

5.1 Timing Parameter

Signal	Symbol Parameter		Min.	Max.	Unit	Description	
De	t AST	Address setup time	0	-	ne		
RO	t AHT	Address hold time (Write/Read)	10	-	115	-	
	tснw	Chip select "H" pulse width	0	-			
	tcs	Chip select setup time (Write)	15	-			
/cs	trcs	Chip select setup time (Read ID)	45	-	ns	-	
,	trosfm	Chip select setup time (Read FM)	355	-			
	tosr	Chip select wait time (Write/Read)	10	-			
	twc	Write cycle	66	-			
/ws	twen	Control pulse "H" duration	15	-	ns	-	
	twe	Control pulse "L" duration	15	-			
	trc	Read cycle (ID)	160	-			
RD	t RDH	Control pulse "H" duration (ID)	90	-	ns	When read ID data	
	TRDL	Control pulse "L" duration (ID)	45	-			
	t RCFM	Read cycle (FM)	450	-		When read from frame	
RD (FM)	t RDHFM	Control pulse "H" duration (FM)	90	-	ns	momony	
	TROLFM	Control pulse "L" duration (FM)	355	-		memory	
	tost	Data setup time	10	-			
	t DHT	Data hold time	10	-		For maximum Cr=20nE	
D7 to D0	TRAT	Read access time (ID)	-	40	ns	For maximum CL=30pF	
	TRATEM	Read access time (FM)	-	340		For minimum CL=opF	
	topн	Output disable time	20	80			





Note5-1: CMD: command code ;

PA: parameter;

b. System Bus Interface Register Read Timing







5.3 GRAM Write/Read Data Format

Figure 5.3.2 8-bit Data Bus GRAM Write/Read Data Format (65K)



5.4 GRAM Write/Read Timing





Reset Input Timing

Symbol	Parameter	Related Pins	Spec.			Note	Unit
Symbol	ranameter	Related Fills	Min.	Тур.	Max.	Note	onin
tresw	Reset low pulse width ⁽¹⁾	NRESET	10	-	-	-	μs
t	Depet complete time ⁽²⁾	-	-	-	5	When reset applied during Sleep In mode	ms
TREST	Reset complete time	-		-	120	When reset applied during Sleep Out mode	ms

Figure 5.5.1 Reset Timing



5.6 Power On/Off sequence 5.6.1 Power on Sequence



5.6.2 Power off Sequence





6 Optical Characteristics

								Ta=25 ℃
ltem	ı	Symbol	Condition	Min	Тур	Max	Unit	Remark
		θΤ		45	50	-		
		θΒ	CD > 10	15	20	-	Degree	Noto 2
view Angles		θL	GR≦ 10	40	45	-	Degree	Note 2
		θR		40	45	-		
Contrast Ratio)	CR	θ=0°	200	350	-		Note1 Note3
Posponso Tim		T _{ON}	25℃		30	40	mc	Note1
Response mi	le	T _{OFF}	2 5 C	-	30	40	ms	Note4
	W/bito	x		0.238	0.288	0.338		
	vvnite	у		0.258	0.308	0.358		
	Red	х	Backlight is on	0.554	0.604	0.654		
Chromaticity		у		0.295	0.345	0.395		Note5
Ghi omaticity	Croop	х		0.284	0.334	0.384		Note1
	Green	у		0.450	0.500	0.550		
	Pluo	x		0.095	0.144	0.194		
	Diue	у		0.061	0.111	0.161		
Uniformity		U	$\overline{\ }$	70	80	-	%	Note1 Note6
NTSC			-	-	40	-	%	Note 5
Luminance		L		200	250	-	cd/m ²	Note1 Note7

Test Conditions:

1. V_F =3.2V, I_F =15mA(One LED current), 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.



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 driven by Vwhite.

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

Vwhite: To be determined Vblack: To be determined.

Note 4: Definition of Response time

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



Fig. 2 Definition of uniformity

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.



7 Environmental / Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts=+70℃, 240hrs	Note1 IEC60068-2-1,GB2423.2
2	Low Temperature Operation	Ta=-20℃, 240hrs	IEC60068-2-1 GB2423.1
3	High Temperature Storage	Ta=+80℃, 240hrs	IEC60068-2-1 GB2423.2
4	Low Temperature Storage	Ta=-30℃, 240hrs	IEC60068-2-1 GB2423.1
5	High Temperature & High Humidity Storage	Ta=+60℃, 90% RH 240 hours	Note2 IEC60068-2-78 GB/T2423.3
6	Thermal Shock (Non-operation)	-30℃ 30 min~+70℃ 30 min, Change time:5min, 20 Cycles	Start with cold temperature, End with high temperature, IEC60068-2-14,GB2423.22
7	Electro Static Discharge (Operation)	C=150pF, R=330Ω → 5points/panel Air:±8KV, 5times; Contact:±4KV, 5 times; (Environment: 15℃~35℃, 30%~60%, 86Kpa~106Kpa)	IEC61000-4-2 GB/T17626.2
8	Vibration (Non-operation)	Frequency range:10~55Hz, Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z. (6 hours for total)(Package condition)	IEC60068-2-6 GB/T2423.10
9	Shock (Non-operation)	60G 6ms, ±X,±Y,±Z 3times, for each direction	IEC60068-2-27 GB/T2423.5
10	Package Drop Test	Height:80 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/T2423.8
11	Package Vibration Test	Random Vibration: 0.015GxG/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 GB/T2423.11

Note1: Ts is the temperature of panel's surface.

Note2: Ta is the ambient temperature of sample.

8 Mechanical Drawing





9 Packing Drawing

No	ltem	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM module	TM017FDH03	34.7x47x2.6	0.0067	792	
2	Tray	PET(Transmit)	315×247×10.8	0.0845	42	Anti-static
3	EPE	EPE	315×247×5	0.009	12	
4	Anti-static bag	PE	327×440	0.021	6	
5	BOX	Corrugated Paper	345×260×70	0.227	6	
6	Desiccant	Desiccant	45x50	0.0035	12	
7	Carton	Corrugated Paper	544×365×250	1.01	1	
8	Total weight(Kg)		11.10			
Put 6 tz	Use empty tray LCM + LCM + to m + LCM + to m + LCM + - - - - - - - - - - - - -	Rotate tray of stack.Che	Detail A Tray5 Tray4 Tray3 Tray1 180 degrees and place on top ck the tray using Fig.A.	2*3 per floor * 5 floor The tape to seal carton		
∢ * 1	EPE EPE Box 32 LCMs per Box		6 Box	Put into carton		



10 Precautions For Use of LCD Modules

- 10.1 Handling Precautions
- 10.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
- 10.1.2 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.
- 10.1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- 10.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.
- 10.1.5 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

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
- Ketone
- Aromatic solvents
- 10.1.6 Do not attempt to disassemble the LCD Module.
- 10.1.7 If the logic circuit power is off, do not apply the input signals.
- 10.1.8 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
 - 10.1.8.1 Be sure to ground the body when handling the LCD Modules.
 - 10.1.8.2 Tools required for assembly, such as soldering irons, must be properly ground.
 - 10.1.8.3 To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
 - 10.1.8.4 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.
 - 10.2 Storage precautions
- 10.2.1 When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.
- 10.2.2 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:

Temperature : 0° C $\sim 40^{\circ}$ C Relatively humidity: $\leq 80\%$

- 10.2.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.
 - 10.3 Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.

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