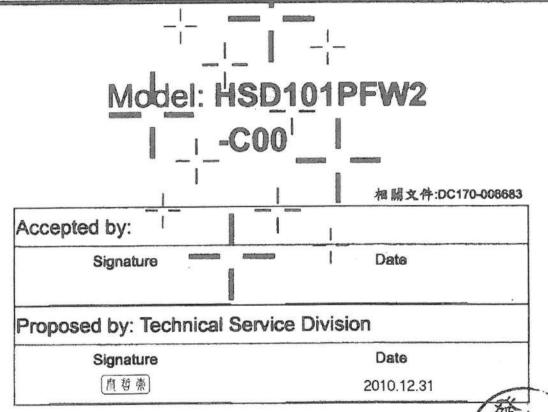
HannStar

Document Title			1/26	
Document No.	DC170-006682	Revision	1.0	

TO: Natec(Panasonic Project)

Date : Dec., 20, 2010

Customer Acceptance Specification



Note: (1) The information contained herein is tentative and may be changed without prior notices

(2) Please contact HannStar Display Corp. before designing your product based on this module specification.

(3) The information contained herein is presented merely to indicate the characteristics and performance of our products. No responsibility is assumed by HannStar for any intellectual property claims or other problems that may result from application based on the module described herein.

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Document Title	HSD101PFW2 Specification for Natec	Page No.	4/26
Document No.	DC170-006682	Revision	1.0

1.0 GENERAL DESCRIPTION

1.1 Introduction

HannStar Display model HSD101PFW2-C** is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driving circuit and a back light system. This TFT LCD has a 10.1 (16:9) inch diagonally measured active display area with WSVGA (1024 horizontal by 600 vertical pixel) resolution.

1.2 Features

- 10.1 (16:9 diagonal) inch configuration
- One channel LVDS interface
- 262K color by 6 bit R.G.B signal input
- RoHS Compliance
- Halogen Free

1.3 Applications

- Mobile NB
- Digital Photo frame
- Display terminal for AV application

1.4 General information

Item	Specification	Unit	
Outline Dimension	235 x 143 x 5.0 (Typ.)	mm	
Display area	222.72(H) x 125.28(V)	mm	
Number of Pixel	1024 RGB (H) x 600(V)	pixels	
Pixel pitch	0.2175(H) x 0.2088(V)	mm	
Pixel arrangement	RGB Vertical stripe		
Display mode	Normally white		
NTSC	50	%	
Surface treatment	Anti-Glare (3H)		
Weight	185 (Typ.)	g	
Back-light	White LED		
Power Consumption	0.7W (Max.)/Logic 2.8W (Max.)/BL	W	

Document Title	HSD101PFW2 Specification for Natec	Page No.	6/26	
Document No.	DC170-006682	Revision	1.0	

3.0 OPTICAL CHARACTERISTICS

3.1 Optical specification

Item		Symbol	Condition	Min.	Тур.	Max.	Unit	Note
Contrast		CR		400	500	_		(1)(2)(4)
Response time White luminance (5 point)		RT	RT		16	32	msec	(1)(3)
		YL		240	300	_	cd/m ²	(1)(4)(5) (I _L =18mA)
		R _x	⊖=0	(0.543)	(0.593)	(0.643)		
Red	Red	R _Y	Normal	(0.305)	(0.355)	(0.405)		
chromaticity	Green	G _x	viewing	(0.272)	(0.322)	(0.372)		
		G _Y	angle	(0.500)	(0.550)	(0.600)		
	Blue	B _x		(0.102)	(0.152)	(0.202)		
		B _Y		(0.046)	(0.096)	(0.146)		
	4.8.71	nite W _x		0.263	0.313	0.363		
	White			0.279	0.329	0.379		
		θL		60	70	_		
	Hor.	Θ_R	00.40	60	70	_		(4)(4)
Viewing angle	Ver.	θυ	CR>10	40	50	_		(1)(4)
		θр		50	60	_		
Brightness uniformity		B _{UNI}	⊖=0 (5point)	80	-	_	%	(5)
Brightness Uni	formity	B _{UNI}	⊖=0 (13 points)	70	_	-	%	(6)

3.2 Measuring Condition

■ Measuring surrounding: dark room ■ Ambient temperature: 25±2°C

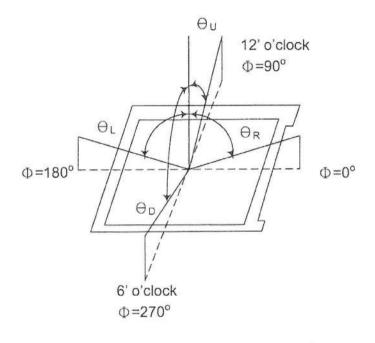
■ 15min. warm-up time.

Document Title	cument Title HSD101PFW2 Specification for Natec		7/26
Document No.	DC170-006682	Revision	1.0

3.3 Measuring Equipment

FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

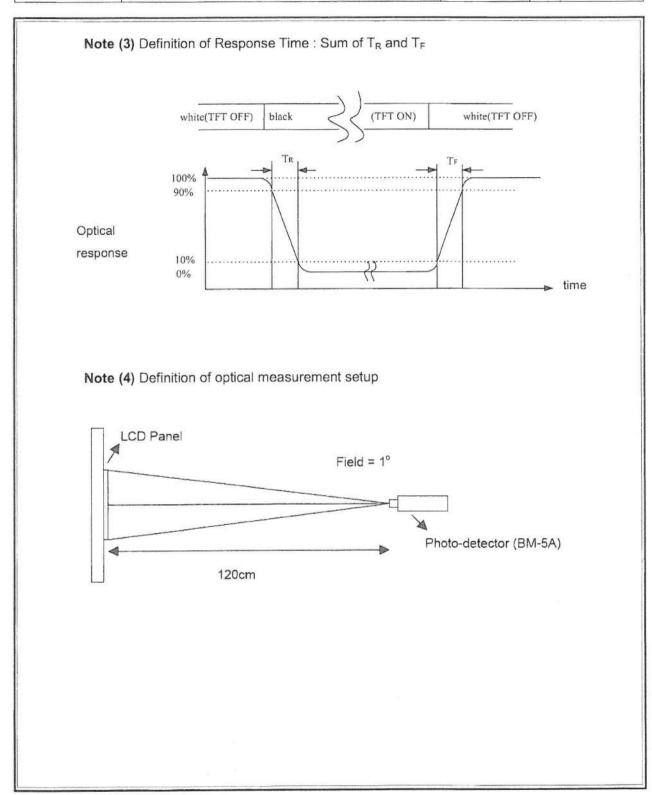
■ Measuring spot size: 20 ~ 21 mm Note (1) Definition of Viewing Angle:



Note (2) Definition of Contrast Ratio (CR): measured at the center point of panel

> Luminance with all pixels white CR = -Luminance with all pixels black

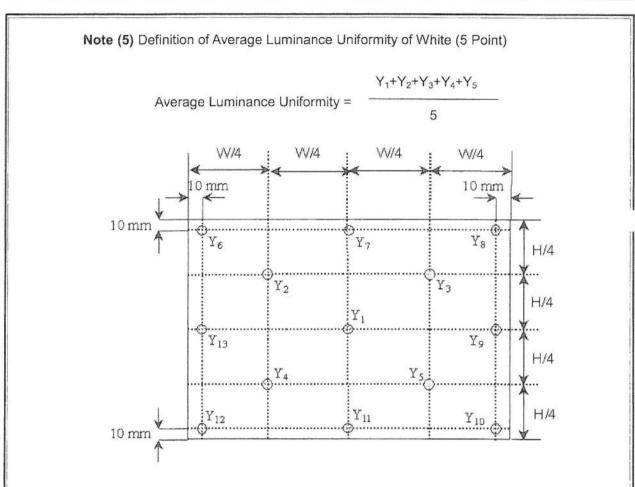
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Document Title	HSD101PFW2 Specification for Natec	Page No.	8/26	
Document No.	DC170-006682	Revision	1.0	1



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Document Title	HSD101PFW2 Specification for Natec	Page No.	9/26	
Document No.	DC170-006682	Revision	1.0	



Note (6) Definition of brightness uniformity

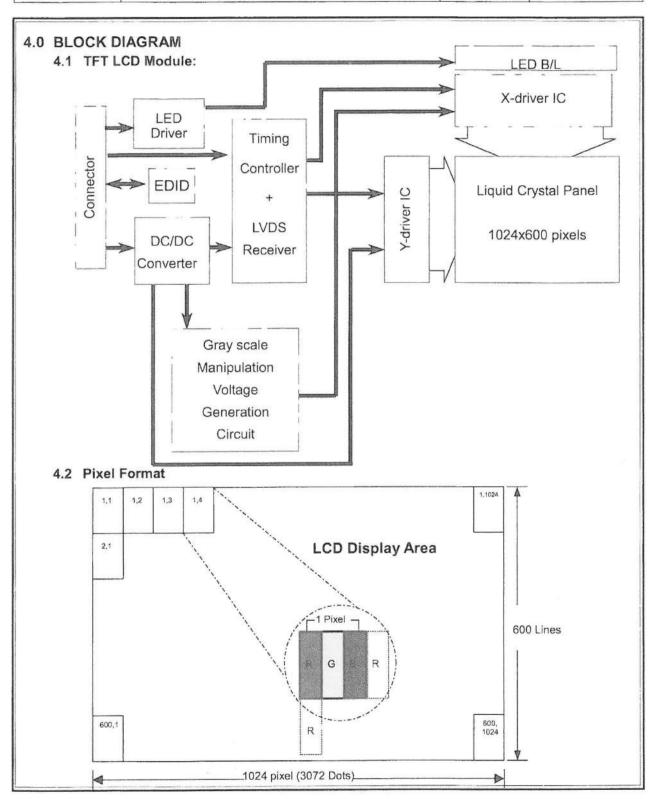
Luminance uniformity(5 points) =
$$\frac{\text{(Min Luminance of 5 points)}}{\text{(Max Luminance of 5 points)}} \times 100\%$$

$$Luminance uniformity(13points) = \frac{\text{(Min Luminance of 13 points)}}{\text{(Max Luminance of 13 points)}} \times 100\%$$

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Document Title HSD101PFW2 Specification for Natec Page No. 10/26

Document No. DC170-006682 Revision 1.0



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Document Title	HSD101PFW2 Specification for Natec	Page No.	12/26
Document No.	DC170-006682	Revision	1.0

5.0 INTERFACE PIN CONNECTION

5.1 TFT LCD Module: CN1 (Input signal): FI-XB30SL-HF10(JAE or equivalent)

Pin No.	Signal	Description
1	GND	Ground
2	VCC	(+)3.3V Power
3	VCC	(+)3.3V Power
4	V_EDID	3.3V Power for NB
5	ADJ	Adjust for LED brightness
6	CLK_EDID	EDID Clock for NB
7	DATA_EDID	EDID Data for NB
8	RXIN0-	LVDS Signal(-)channel 0
9	RXIN0+	LVDS Signal(+)channel 0
10	GND	Ground
11	RXIN1-	LVDS Signal(-)channel 1
12	RXIN1+	LVDS Signal(+)channel 1
13	GND	Ground
14	RXIN2-	LVDS Signal(-)channel 2
15	RXIN2+	LVDS Signal(+)channel 2
16	GND	Ground
17	RXCLKIN-	LVDS Clock Signal(-)
18	RXCLKIN+	LVDS Clock Signal(+)
19	GND	Ground
20	NC	NC
21	NC	NC
22	GND	Ground
23	GND	Ground
24	V_LED	Power Supply for LED(+)5V
25	V_LED	Power Supply for LED(+)5V
26	V_LED	Power Supply for LED(+)5V
27	NC	NC
28	NC	NC
29	NC	NC
30	NC	NC

Note: The brightness of LCD panel could be changed by adjusting ADJ

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Document Title	HSD101PFW2 Specification for Natec	Page No.	13/26	
Document No.	DC170-006682	Revision	1.0	

6.0 ELECTRICAL CHARACTERISTICS

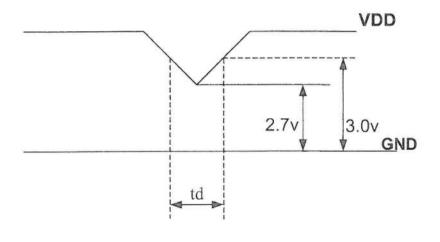
6.1 TFT LCD Module

Item	Symbol	Min.	Тур.	Max.	Unit	Note
Supply Voltage	V _{DD}	3.0	3.3	3.6	V	Note (1)
Current of power supply	IDD	0.182	0.190	0.198	А	V _{DD} =3.3V \ L0 pattern Ta=25°C fv=60Hz
Inrush current	I _{RUSH}	2	-	1.50	А	Note (2)

Note (1): V_{DD}.dip condition:

When VDD operating within 2.7V \leqq VDD<3.0V , td \leqq 10ms , the display may momentarily become abnormal.

VDD<2.7V , VDD dip condition should also follow the Power On/Off conditions for supply voltage.



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Document Title	HSD101PFW2 Specification for Natec	Page No.	16/26
Document No.	DC170-006682	Revision	1.0

Frame Rate 55 60 65 Hz Frame Period t1 612 625 680 line Vertical Display Time t2 600 600 600 line Vertical Blanking Time t3 12 25 80 line 1 Line Scanning Time t4 1160 1200 1510 clock Horizontal Display Time t5 1024 1024 1024 clock Horizontal Blanking Time t6 136 176 486 clock Clock Rate t7 39 45 61.6 MHz ming Diagram of Interface Signal (DE mode)	Frame Rate	Frame Rate 55 60 65 Frame Period t1 612 625 680 II Vertical Display Time t2 600 600 600 II Vertical Blanking Time t3 12 25 80 II 1 Line Scanning Time t4 1160 1200 1510 C Horizontal Display Time t5 1024 1024 1024 C Horizontal Blanking Time t6 136 176 486 C Clock Rate t7 39 45 61.6 M Iming Diagram of Interface Signal (DE mode) Ical In 14 14 15 15 15 15 15 15 15 15 15 15 15 15 15	Frame Rate	Unit
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Document Title	HSD101PFW2 Specification for Natec	Page No.	18/26
Document No.	DC170-006682	Revision	1.0

6.6 Backlight Unit

Parameter	Symbol	Min	Тур	Max	Units	Condition
LED Current	l _F		20	21	mA	Ta=25°C
LED Voltage	V _F	3.0	3.2	3.4	Volt	Ta=25°C
LED Power consumption	P _{LED}		2.12	2.36	Watt	Ta=25°C Note (1)
LED Life-Time	N/A	10,000			Hour	Ta=25°C I _{F=} 18mA Note (2)

Note (1): Calculator value for reference P=I_F x V_F x N (LED Qty')

Note (2): The LED lifetime defines as the estimated time to 50% degradation of final luminous.

6.7 LED Driver

6.7.1 Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit	Note
LED Power Supply voltage	V _{LED}	-0.3	6	Volt	
LED_EN, PWM pin Voltage	V _{EN} , V _{PWM}		5.5	Volt	72-1-1-1-1-1

6.7.2 DC Electrical Characteristics

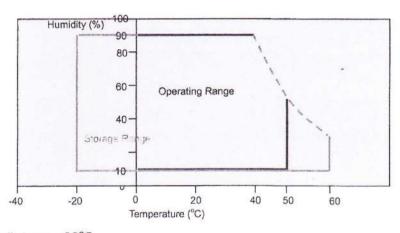
Parameter	Symbol	Min	Тур	Max	Units	Remark
LED Power Supply Voltage	V _{LED}	4.5		5.5	Volt	
PWM High Threshold	V _{PWMH}	3.0			Volt	
PWM Low Threshold	V _{PWML}			0.2	Volt	
PWM Frequency	F _{PWM}	18		50	KHz	
PWM Duty Cycle	T _D	15		-	%	Note(1)

Document Title	HSD101PFW2 Specification for Natec	Page No.	20/26
Document No.	DC170-006682	Revision	1.0

7.0 Reliability test in	items
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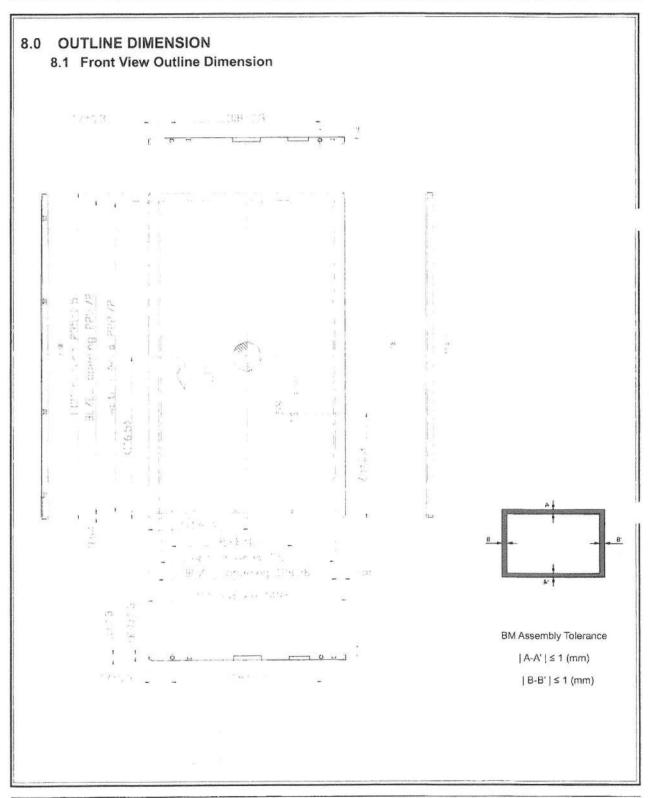
No.	Item	Conditions	Remark
1	High Temperature Storage	Ta=+60°C, 240hrs	
2	Low Temperature Storage	Ta=-20°C, 240hrs	
3	High Temperature Operation	Ta=+50°C, 500hrs	
4	Low Temperature Operation	Ta=0°C, 500hrs	
5	Thermal Cycling Test (non operation)	-20°C(30min)→+60°C(30min),100 cycles	
6	Vibration Sine Wave 1.5G, 5~500Hz, XYZ 30min/each direction		
7	Shock	Half-Sine, 200G, 2ms, ±XYZ, 1time	

Storage / Operating temperature



Note .Max wet bulb temp.=39°C

Document Title	HSD101PFW2 Specification for Natec	Page No.	21/26
Document No.	DC170-006682	Revision	1.0



Document Title	HSD101PFW2 Specification for Natec	Page No.	22/26
Document No.	DC170-006682	Revision	1.0

