

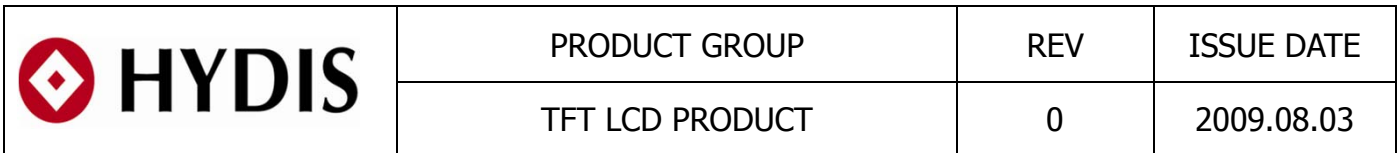
# **TITLE : HT121WX2-210**

## **Product Specification**

### **Rev. 0**

## **HYDIS Technologies**

SPEC. NUMBER	PRODUCT GROUP	REV.	ISSUE DATE	PAGE
S864-1395	TFT LCD	0	2009.08.03	1 OF 33



REV

TFT LCD PRODUCT

0

2009.08.03

REVISION HISTORY	
------------------	--

[illegible]

SPEC. NUMBER S864-1395	SPEC TITLE HT121WX2-210 Product Specification	PAGE 2 OF 33
---------------------------	--	-----------------

A4(210 X 297)

**HYDIS**

PRODUCT GROUP

REV

ISSUE DATE

TFT LCD PRODUCT

0

2009.08.03

## Contents

No	Item	Page
1.0	General Description	4
2.0	Absolute Maximum Ratings	6
3.0	Electrical Specifications	7
4.0	Optical Specifications	9
5.0	Interface Connections	14
6.0	Signal Timing Specifications	17
7.0	Signal Timing Waveforms	17
8.0	Input Signals, Basic Display Colors & Gray Scale of Colors	19
9.0	Power Sequence	20
10.0	Mechanical Characteristics	21
11.0	Mechanical Drawing	22
12.0	Reliability Test	25
13.0	Handling & Cautions	25
14.0	Labels	27
15.0	Packing Information	29

SPEC. NUMBER  
S864-1395SPEC TITLE  
HT121WX2-210 Product SpecificationPAGE  
3 OF 33

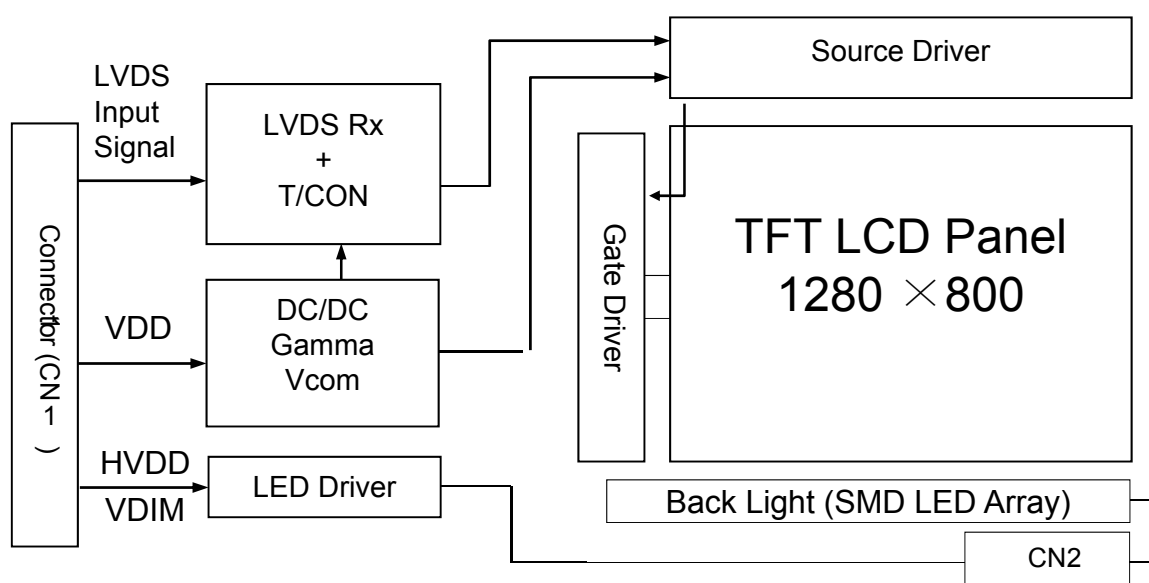
## 1.0 GENERAL DESCRIPTION

### 1.1 Introduction

12.1inch Wide TN Tablet is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices.

This module has a 12.1 inch diagonally measured active area with WXGA resolutions (1280 horizontal by 800 vertical pixel array).

Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical Stripe and this module can display 262,144 colors. The TFT-LCD panel used for this module is a low reflection and higher color type.



### 1.2 Features

- 3.3 V Logic Power Supply
- 12V Back-light Power Supply
- 1 Channel LVDS Interface
- SMD LED (48EA) Array (Bottom Side/Horizontal Direction)
- 262,144 Colors
- Data Enable Signal Mode
- Side Mounting Frame
- Green Product (RoHS)



# HYDIS

PRODUCT GROUP

REV

ISSUE DATE

TFT LCD PRODUCT

0

2009.08.03

### 1.3 Application

- Tablet PC (TN, Wide type)

### 1.4 General Specifications

Parameter	Specification	Unit	Remarks
Active area	261.12(H) × 163.20(V)	mm	
Number of pixels	1280(H) × 800(V)	pixels	
Pixel pitch	0.204(H) × 0.204(V)	mm	
Pixel arrangement	RGB Vertical Stripe		
Display colors	262,144	colors	
Display mode	Normally White		
Outline dimension	276.8±0.3(H) × 180.0±0.3(V) × 6.8(D:Max.)	mm	Note 1
Weight	270(Typ.) / 275(Max.)	g	Note 2
Back-light	SMD LED (48EA) Array		
Surface treatment	Glare (HCLR/2H)		

Note 1 : At PCB side (LED Side: 4.6mm Max.)

Note 2 : Without digitizer

SPEC. NUMBER  
S864-1395SPEC TITLE  
HT121WX2-210 Product SpecificationPAGE  
5 OF 33

## 2.0 ABSOLUTE MAXIMUM RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit.

$T_a = 25 \pm 2^\circ\text{C}$

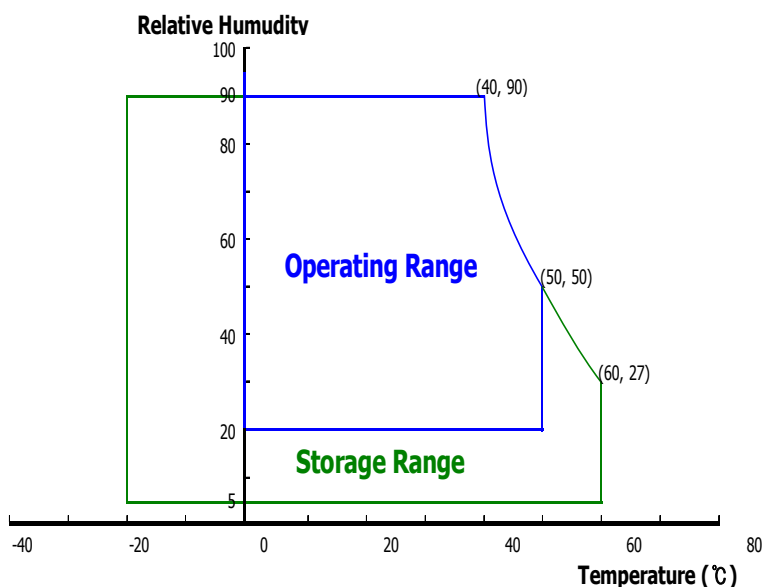
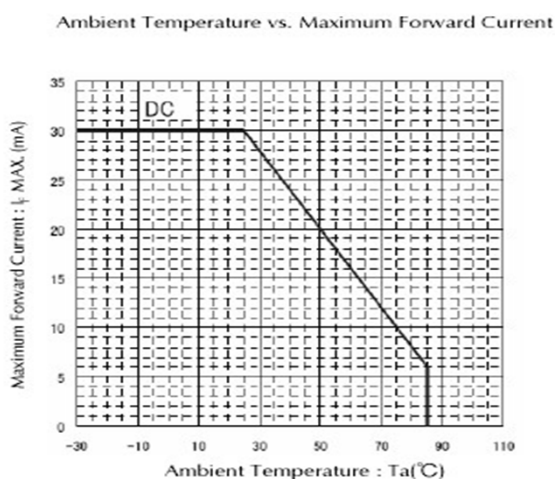
Parameter	Symbol	Min.	Max.	Unit	Remarks
Logic Power Supply Voltage	$V_{DD}$	-0.3	4.0	V	
Logic Power Supply Voltage	$V_{IN}$	-0.3	$V_{DD} + 0.3$	V	
Back-light Power Supply Voltage	$HV_{DD}$	-0.3	28	V	
Back-light LED Current	$I_{LED}$	-	27	mA	Note 1
Back-light LED Reverse Voltage	$V_R$	-	5	V	
Operating Temperature	$T_{OP}$	0	+50	$^\circ\text{C}$	Note 1, Note 2
Storage Temperature	$T_{SP}$	-20	+60	$^\circ\text{C}$	

Note 1. Ambient temperature vs allowable forward current are shown in the figure below.

Note 2. Temperature and relative humidity range are shown in the figure below.

90% RH Max. (  $40^\circ\text{C} \geq T_a$  )

Maximum wet - bulb temperature at  $39^\circ\text{C}$  or less. (  $> 40^\circ\text{C}$  ) No condensation.



### 3.0 ELECTRICAL SPECIFICATIONS

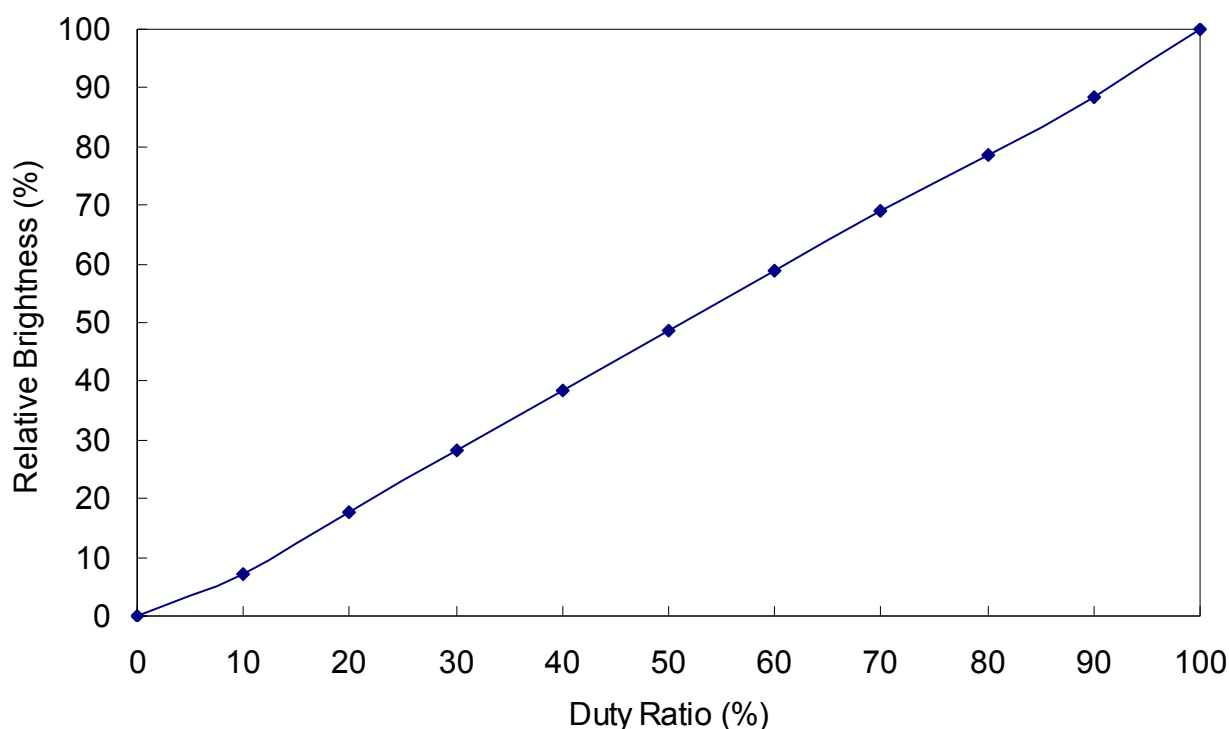
#### 3.1 Electrical Specifications

< Table 3. Electrical Specifications >

Parameter		Min.	Typ.	Max.	Unit	Remarks
Logic Power Supply Voltage	$V_{DD}$	3.0	3.3	3.6	V	Note 1
Logic Power Supply Current	$I_{DD}$	-	300	470	mA	Note 1
Back-light Power Supply Voltage	$HV_{DD}$	7.0	12.0	20	V	Note 2
Back-light Power Supply Current	$I_{HVDD}$	-	255	305	mA	Note 2, 3
Back-light Power Consumption	$P_{BL}$	-	3.06	3.66	W	Note 2, 3
LED Driver's Efficiency	$\eta$	-	82	-	%	Note 2, 3
Back-light PWM Frequency	$F_{PWM}$	200	320	350	Hz	
High Level PWM Signal Voltage	$V_{PWMH}$	2.1	3.3	5.0	V	
Low Level PWM Signal Voltage	$V_{PWML}$	-	0	0.6	V	
High Level Differential Input Signal Voltage	$V_{IH}$	-	-	+100	mV	$V_{CM} = 1.2V$
Low Level Differential Input Signal Voltage	$V_{IL}$	-100	-	-	mV	
Back-light LED Voltage / Back-light LED Total Voltage	$V_{LED} / V_{BL}$	-	3.2 / 38.4	3.4 / 40.8	V	Note 4
Back-light LED Current / Back-light LED Total Current	$I_{LED} / I_{BL}$	-	16.9 / 67.6	17.8 / 71.2	mA	Note 4
Life Time		12,000	-	-	Hrs	Note 6
Power Consumption	$P_D$	-	1.0	1.55	W	Note 1
	$P_{LED}$	-	2.60	2.90	W	Note 4
	$P_{total}$	-	3.60	4.45	W	Note 1, 4

- Notes :
1. The supply voltage is measured and specified at the interface connector of LCM.  
The current draw and power consumption specified is for 3.3V at 25°C.  
a) Typ : Window XP pattern,      b) Max : Vertical Sub line pattern
  2. The power supply voltage and current is measured and specified at the interface connector of LCM including LED Driver.
  3. Reference value, which is measured with LED Driver for 12V.
  4. Reference value, which is measured without LED Driver.
  5. Calculated value for reference ( $V_{LED} \times I_{LED} \times \# \text{ of LEDs (48EA) }$ ).
  6. End of Life shall be determined by the time when any of the following is satisfied under continuous lighting at 25°C and  $I_{LED} = 16.9\text{mA}$ .
    - Intensity drops to 50% of the Initial Value (Luminance Spec.)
    - Based on LED

### 3.2 PWM Duty Ratio vs Brightness



Notes :

In case of duty ratio 0%, LED can't illuminate itself so this state is LED off.

In case of duty ratio 100%, the brightness of LED is maximum and the state is LED on.



## 4.0 OPTICAL SPECIFICATIONS

### 4.1 Overview

The test of optical specifications shall be measured in a dark room (ambient luminance  $\leq 1$  lux and temperature =  $25 \pm 2^\circ\text{C}$ ) with the equipment of Luminance meter system (Goniometer system and TOPCON BM-5A) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of  $\theta$  and  $\Phi$  equal to  $0^\circ$ . We refer to  $\theta_{\Phi=0}$  ( $=\theta_3$ ) as the 3 o'clock direction (the "right"),  $\theta_{\Phi=90}$  ( $=\theta_{12}$ ) as the 12 o'clock direction ("upward"),  $\theta_{\Phi=180}$  ( $=\theta_9$ ) as the 9 o'clock direction ("left") and  $\theta_{\Phi=270}$  ( $=\theta_6$ ) as the 6 o'clock direction ("bottom"). While scanning  $\theta$  and/or  $\Phi$ , the center of the measuring spot on the Display surface shall stay fixed. The backlight should be operating for 30 minutes prior to measurement.  $V_{DD}$  shall be  $3.3 \pm 0.3\text{V}$  at  $25^\circ\text{C}$ . Optimum viewing angle direction is 6 o'clock.

### 4.2 Optical Specifications

<Table 4. Optical Specifications>

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remarks
Viewing Angle Range	Horizontal	$\Theta_3$	CR > 10	-	45	-	Deg.	Note 1
		$\Theta_9$		-	45	-	Deg.	
	Vertical	$\Theta_{12}$		-	20	-	Deg.	
		$\Theta_6$		-	40	-	Deg.	
Luminance Contrast Ratio		CR	$\Theta = 0^\circ$	400	600	-		Note 2
Luminance of White	1 Points	$Y_w$		170	200	-	cd/m <sup>2</sup>	
White Luminance Uniformity	5 Points	$\Delta Y_5$		80	-	-	%	Note 3
	13 Points	$\Delta Y_{13}$		65	-	-		
Color Chromaticity	White	$W_x$		0.273	313	0.353	Note 4	
		$W_y$		0.289	329	0.369		
	Red	$R_x$			0.575			
		$R_y$			0.370			
	Green	$G_x$			0.355			
		$G_y$			0.590			
	Blue	$B_x$			0.150			
		$B_y$			0.100			
Color Reproduction					48		%	
Response Time		Total ( $T_r + T_d$ )	Ta= 25° C $\Theta = 0^\circ$	-	25	-	ms	Note 5
Cross Talk		CT	$\Theta = 0^\circ$	-	-	2.0	%	Note 6



# HYDIS

PRODUCT GROUP

REV

ISSUE DATE

TFT LCD PRODUCT

0

2009.08.03

Note : 1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1 shown in page 11).

2. Contrast measurements shall be made at viewing angle of  $\Theta = 0^\circ$  and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state. (See FIGURE 1 shown in page 11)  
Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. The White luminance uniformity on LCD surface is then expressed.  
(See FIGURE 2~3 shown in page 12)

$$\text{Uniformity } \Delta Y = \frac{\text{Minimum Luminance of 5(or 13) points}}{\text{Maximum Luminance of 5(or 13) points}} \times 100 (\%)$$

4. The color chromaticity coordinates specified in Table 4 shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.
5. The electro-optical response time measurements shall be made as FIGURE 4 shown in page 13 by switching the "data" input signal OFF and ON. The times needed for the luminance to change from 10% to 90% is  $T_r$ , and 90% to 10% is  $T_d$ . (See FIGURE 4 shown in page 13)
6. Cross-Talk of one area of the LCD surface by another shall be measured by comparing the luminance (YA) of a 25mm diameter area, with all display pixels set to a gray level, to the luminance (YB) of that same area when any adjacent area is driven dark. (See FIGURE 5 shown in page 13)

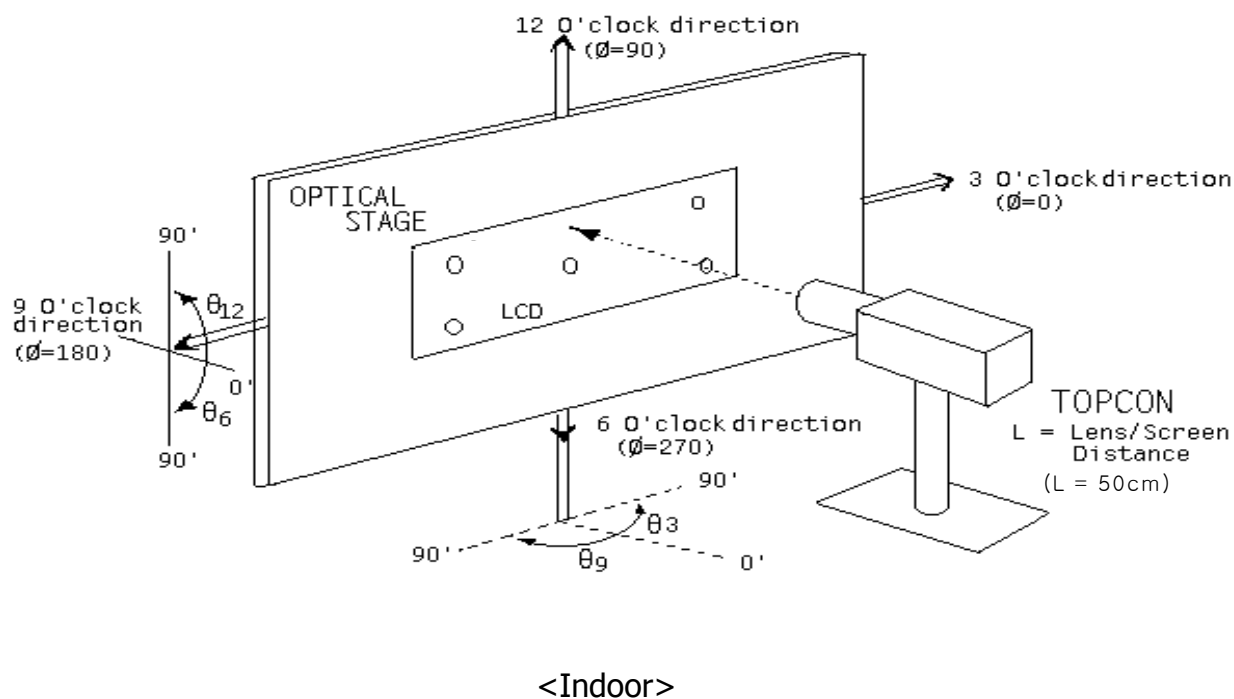
SPEC. NUMBER  
S864-1395

SPEC TITLE  
HT121WX2-210 Product Specification

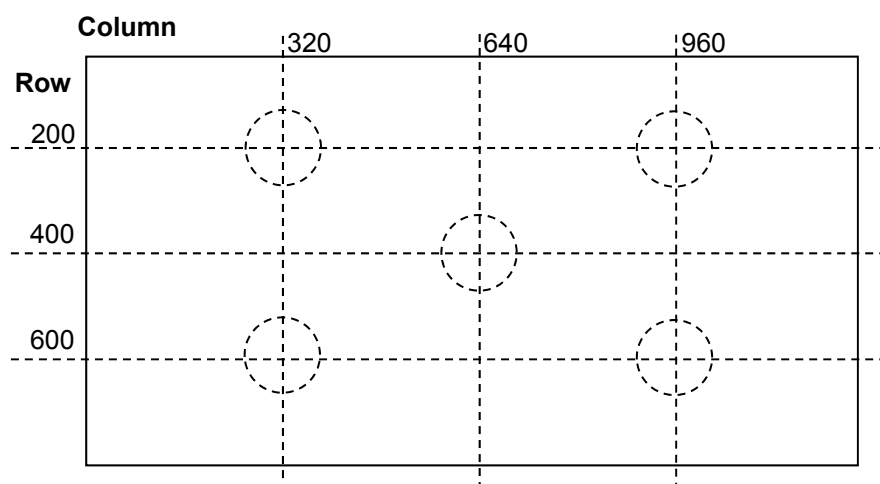
PAGE  
10 OF 33

### 4.3 Optical Measurements

**Figure 1. Measurement Set Up**



**Figure 2. White Luminance and Uniformity Measurement Locations (5 points)**

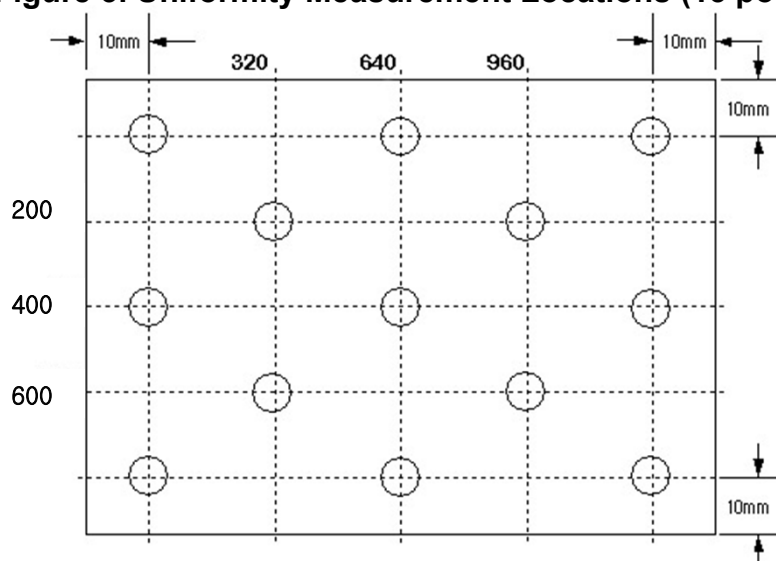


Note.

Luminance of white is defined as luminance values of 5 points across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in Figure 2 for a total of the measurements per display.

$$* Y_W = (\text{Sum of 5 Points Luminance} / 5)$$

**Figure 3. Uniformity Measurement Locations (13 points)**





# HYDIS

PRODUCT GROUP

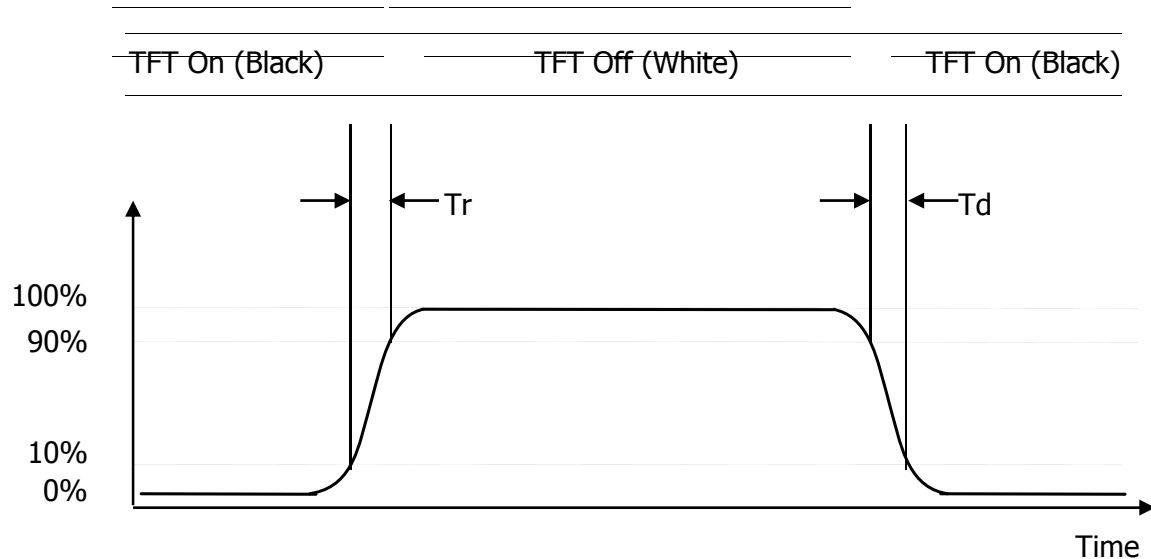
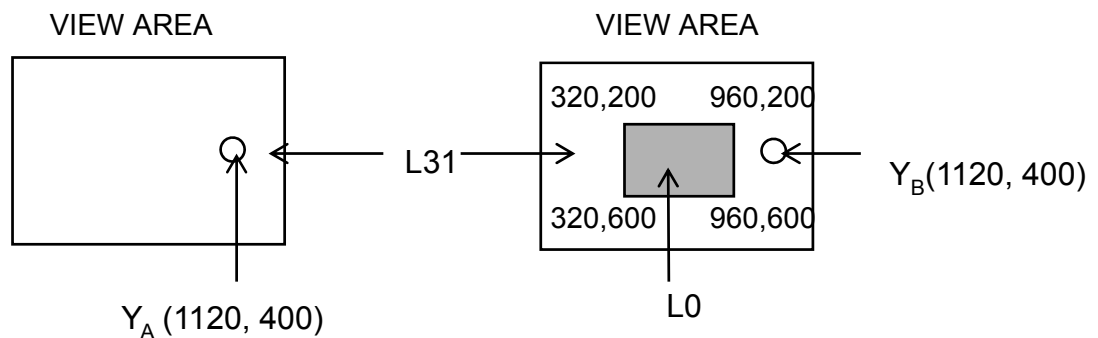
REV

ISSUE DATE

TFT LCD PRODUCT

0

2009.08.03

**Figure 4. Response Time Testing****Figure 5. Cross Modulation Test Description**

$$\text{Cross-Talk (\%)} = \left| \frac{Y_B - Y_A}{Y_B} \right| \times 100$$

Where:

 $Y_A$  = Initial luminance of measured area ( $\text{cd/m}^2$ ) $Y_B$  = Subsequent luminance of measured area ( $\text{cd/m}^2$ )

The location measured will be exactly the same in both patterns

SPEC. NUMBER  
S864-1395SPEC TITLE  
HT121WX2-210 Product SpecificationPAGE  
13 OF 33



# HYDIS

PRODUCT GROUP

REV

ISSUE DATE

TFT LCD PRODUCT

0

2009.08.03

## 5.0 INTERFACE CONNECTIONS

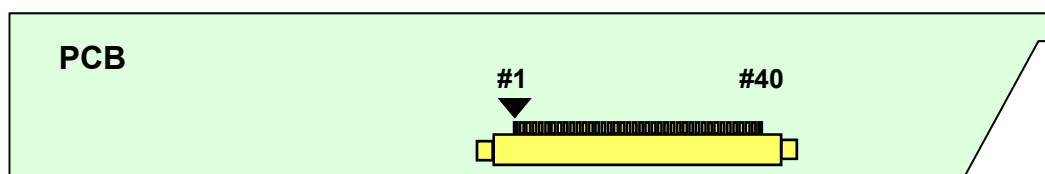
### 5.1 Electrical Interface Connection

#### CN1 Interface Connector (FI-JH40S-HF10, Manufactured by JAE)

Pin No.	Symbol	Function	Pin No.	Symbol	Function
1	GND1	GROUND	21	GND6	GROUND
2	CONNTST	Connector Test	22	RCLKIN-	LVDS Negative clock signal (-)
3	LVDD1	Logic Power Supply : +3.3V	23	RCLKIN+	LVDS Positive clock signal (+)
4	LVDD2	Logic Power Supply : +3.3V	24	GND7	GROUND
5	LVDD3	Logic Power Supply : +3.3V	25	VDIM	PWM Brightness Control
6	VDD_DEID	EDID Power Supply : +3.3V	26	BL ON	
7	TEST	NON-CONNECTION	27	Reserved	NON-CONNECTION
8	CLK_EDID	EDID Clock	28	HVGND1	GROUND
9	DATA_EDID	EDID Data	29	HVGND2	GROUND
10	GND2	GROUND	30	HVGND3	GROUND
11	GND3	GROUND	31	HVGND4	GROUND
12	NC	NON-CONNECTION	32	HVGND5	GROUND
13	RIN0-	LVDS Negative data signal (-)	33	NC	NON-CONNECTION
14	RIN0+	LVDS Positive data signal (+)	34	HVDD1	Back-light Power Supply: +12V
15	GND4	GROUND	35	HVDD2	Back-light Power Supply: +12V
16	RIN1-	LVDS Negative data signal (-)	36	HVDD3	Back-light Power Supply: +12V
17	RIN1+	LVDS Positive data signal (+)	37	HVDD4	Back-light Power Supply: +12V
18	GND5	GROUND	38	HVDD5	Back-light Power Supply: +12V
19	RIN2-	LVDS Negative data signal (-)	39	CONNTST	Connector Test
20	RIN2+	LVDS Positive data signal (+)	40	GND8	GROUND

Note 1. Connected with No. 2 & 39

Note 2. Start from left side



CN1 (FI-JH40S-HF10)

SPEC. NUMBER  
S864-1395

SPEC TITLE  
HT121WX2-210 Product Specification

PAGE  
14 OF 33

**HYDIS**

PRODUCT GROUP

REV

ISSUE DATE

TFT LCD PRODUCT

0

2009.08.03

**5.2 LVDS Interface****LVDS Transmitter : THC63LVDM83A**

Input signal	Transmitter		Interface		FI-JH40S-HF10	Remark
	Pin No	Pin No	System (Tx)	TFT-LCD (Rx)	Pin No.	
R0	51	48 47	OUT0- OUT0+	IN0- IN0+	13 14	
R1	52					
R2	54					
R3	55					
R4	56					
R5	3					
G0	4					
G1	6	46 45	OUT1- OUT1+	IN1- IN1+	16 17	
G2	7					
G3	11					
G4	12					
G5	14					
B0	15					
B1	19					
B2	20	42 41	OUT2- OUT2+	IN2- IN2+	19 20	
B3	22					
B4	23					
B5	24					
HSYNC	27					
VSYNC	28					
DE	30					
MCLK	31	40	CLKOUT-	CLKIN-	22	
		39	CLKOUT+	CLKIN+	23	

SPEC. NUMBER  
S864-1395SPEC TITLE  
HT121WX2-210 Product SpecificationPAGE  
15 OF 33



# HYDIS

PRODUCT GROUP

REV

ISSUE DATE

TFT LCD PRODUCT

0

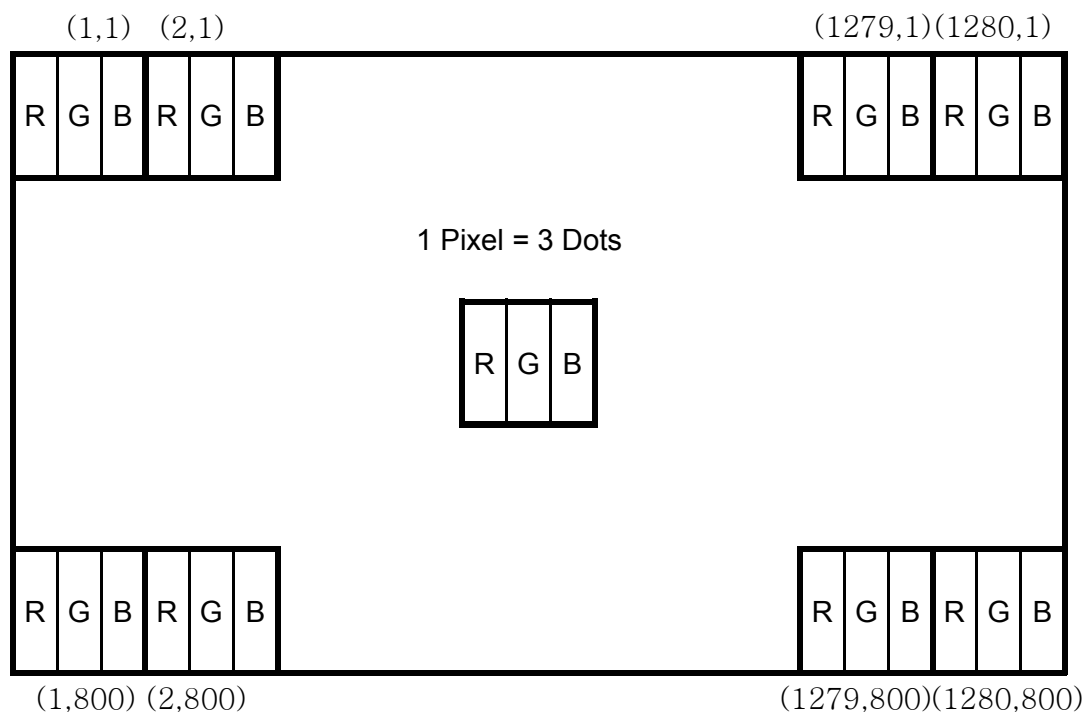
2009.08.03

## 5.3 Back-light Interface

### CN2 LED FPC Connector (04-6298-009, Manufactured by Kyocera)

Pin No.	Symbol	Function	Remark
1	Anode1	LED Anode Power Supply	LED Anode Power Supply (3.25V X 12EA = 39V)
2	Anode2	LED Anode Power Supply	
3	Anode3	LED Anode Power Supply	
4	Anode4	LED Anode Power Supply	
5	NC	Non-Connection	
6	Cathode1	LED Cathode Power Supply	LED Cathode Power Supply
7	Cathode2	LED Cathode Power Supply	
8	Cathode3	LED Cathode Power Supply	
9	Cathode4	LED Cathode Power Supply	

## 5.4 Data Input Format

SPEC. NUMBER  
S864-1395SPEC TITLE  
HT121WX2-210 Product SpecificationPAGE  
16 OF 33



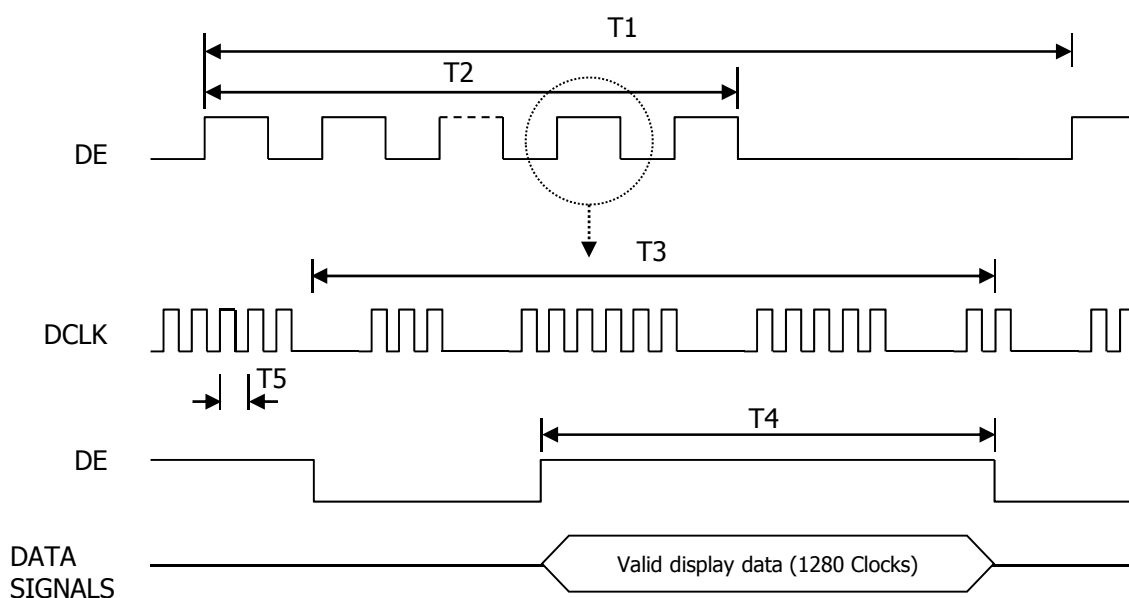
## 6.0. SIGNAL TIMING SPECIFICATIONS

6.1 The 12.1" WXGA LCM is operated by the only DE (Data enable) mode (LVDS Transmitter Input)

Item	Symbol	Min.	Typ.	Max.	Unit
Frame Period	T1	810	823	-	Lines
Vertical Display Period	T2	-	800	-	Lines
One line Scanning Period	T3	1350	1440	-	Clocks
Horizontal Display Period	T4	-	1280	-	Clocks
Clock Frequency	1/T5	-	71.1072	-	MHz

## 7.0 SIGNAL TIMING WAVEFORMS

### 7.1 Timing Waveforms of Interface Signal

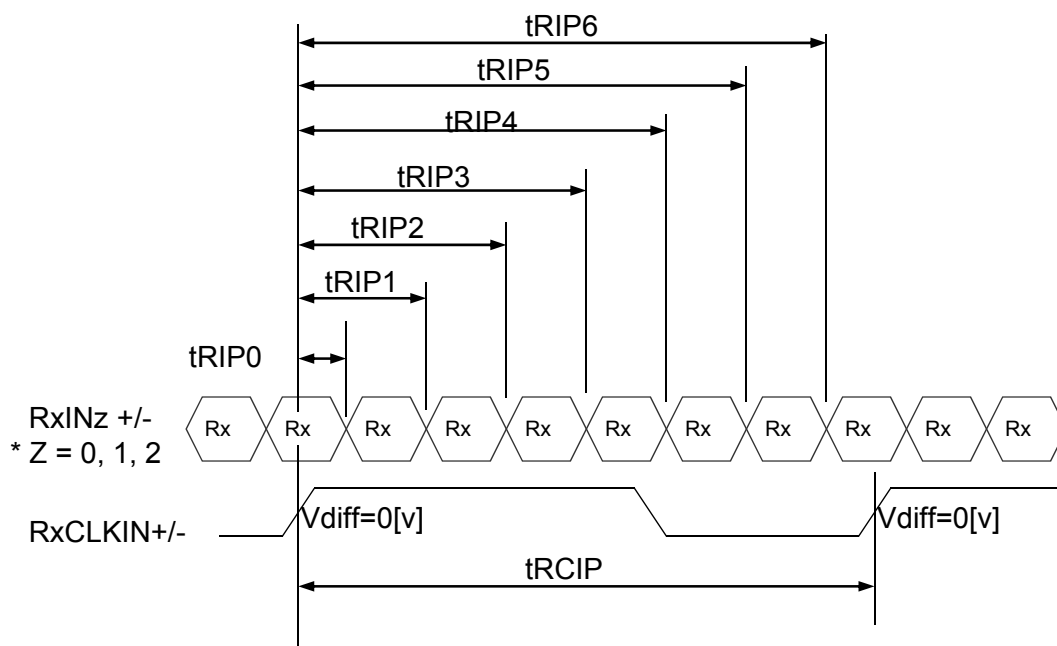


## 7.2 LVDS Rx Interface Timing Parameter

The specification of the LVDS Rx interface timing parameter

< LVDS Rx Interface Timing Specification >

Item	Symbol	Min.	Typ.	Max.	Unit	Remarks
CLKIN Period	tRCIP	12.50	14.06	25.00	nsec	
Input Data 0	tRIP0	-0.4	0.0	+0.4	nsec	
Input Data 1	tRIP1	tRCIP/7-0.4	tRCIP/7	tRCIP/7+0.4	nsec	
Input Data 2	tRIP2	2 × tRCIP/7-0.4	2 × tRCIP/7	2 × tRCIP/7+0.4	nsec	
Input Data 3	tRIP3	3 × tRCIP/7-0.4	3 × tRCIP/7	3 × tRCIP/7+0.4	nsec	
Input Data 4	tRIP4	4 × tRCIP/7-0.4	4 × tRCIP/7	4 × tRCIP/7+0.4	nsec	
Input Data 5	tRIP5	5 × tRCIP/7-0.4	5 × tRCIP/7	5 × tRCIP/7+0.4	nsec	
Input Data 6	tRIP6	6 × tRCIP/7-0.4	6 × tRCIP/7	6 × tRCIP/7+0.4	nsec	



**HYDIS**

PRODUCT GROUP

REV

ISSUE DATE

TFT LCD PRODUCT

0

2009.08.03

**8.0 INPUT SIGNALS, BASIC DISPLAY COLORS & GRAY SCALE OF COLORS**

Each color is displayed in sixty-four gray scales from a 6 bit data signal input. A total of 262,144 colors are derived from the resultant 18 bit data.

Colors & Gray Scale		Red Data						Green Data						Blue Data					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	↓						↓						↓					
	▽	↓						↓						↓					
	Brighter	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	▽	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	△	↓						↓						↓					
	▽	↓						↓						↓					
	Brighter	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	▽	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray Scale Of Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	△	↓						↓						↓					
	▽	↓						↓						↓					
	Brighter	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	▽	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
Gray Scale Of White & Black	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1
	Darker	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0
	△	↓						↓						↓					
	▽	↓						↓						↓					
	Brighter	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	0	1
	▽	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

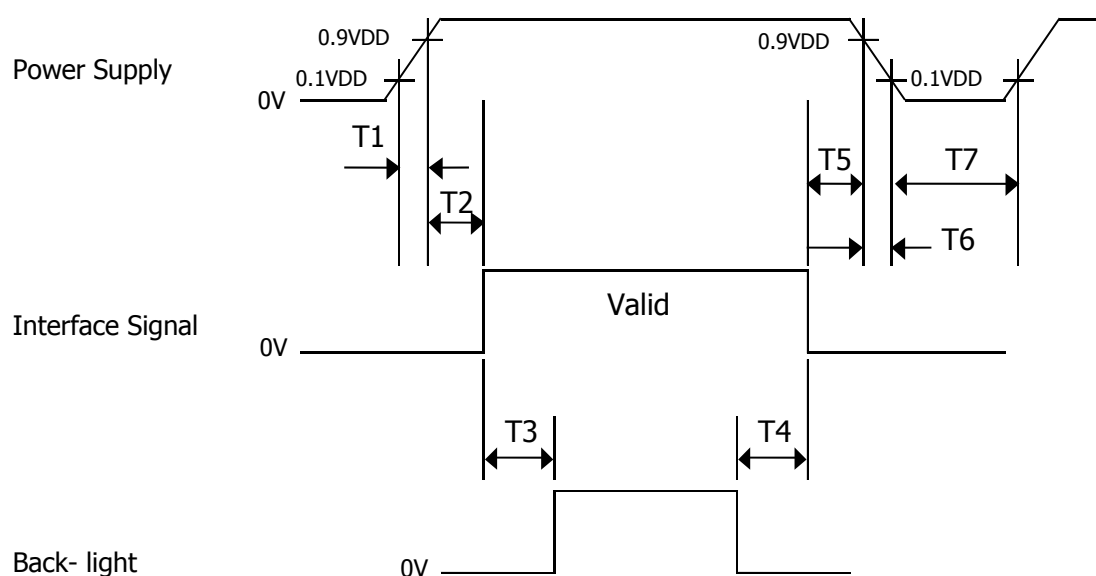
SPEC. NUMBER  
S864-1395SPEC TITLE  
HT121WX2-210 Product SpecificationPAGE  
19 OF 33

B2005-C001-C (3/3)

A4(210 X 297)

## 9.0 POWER SEQUENCE

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence shall be as shown in below



- $T1 \leq 10 \text{ ms}$
- $0 \leq T2 \leq 50 \text{ ms}$
- $200 \text{ ms} \leq T3$
- $200 \text{ ms} \leq T4$
- $0 \leq T5 \leq 50 \text{ ms}$
- $0 \leq T6 \leq 10 \text{ ms}$
- $500 \text{ ms} \leq T7$

- Notes :
1. When the power supply VDD is 0V, Keep the level of input signals on the low or keep high impedance.
  2. Do not keep the interface signal high impedance when power is on.
  3. Back Light must be turn on after power for logic and interface signal are valid.

## 10.0 MECHANICAL CHARACTERISTICS

### 10.1 Dimensional Requirements

Figure 6 & 7 (located in 11.0) shows mechanical outlines for the model

Parameter	Specification	Unit
Active Area	261.12(H) X 163.20(V)	mm
Number of pixels	1280(H) X 800(V) (1 pixel = R + G + B dots)	
Pixel pitch	0.204(H) X 0.204(V)	
Pixel arrangement	RGB Vertical stripe	
Display colors	262,144	
Display mode	Normally White	
Outline dimension	$276.8 \pm 0.3(H) \times 180.0(V) \pm 0.3 \times 6.8(D:Max.)$	mm
Weight	270(Typ.) / 275(Max.)	g
Back-light	SMD LED (48EA) Array	

### 10.2 Mounting

See Figure 6 & 7 & 8. (shown in 11.0)

Parameter	Specification	Unit
Torque of side mounting screw	2.5(Max.)	kgf
Torque of ground plate screw	1.5(Max.)	kgf
Torque of top side screw	2.5(Max.)	kgf

### 10.3 Glare-with LR Coating and Polarizer Hardness.

The surface of the LCD has a glare-with LR coating to minimize reflection and a coating to reduce scratching.

### 10.4 Light Leakage

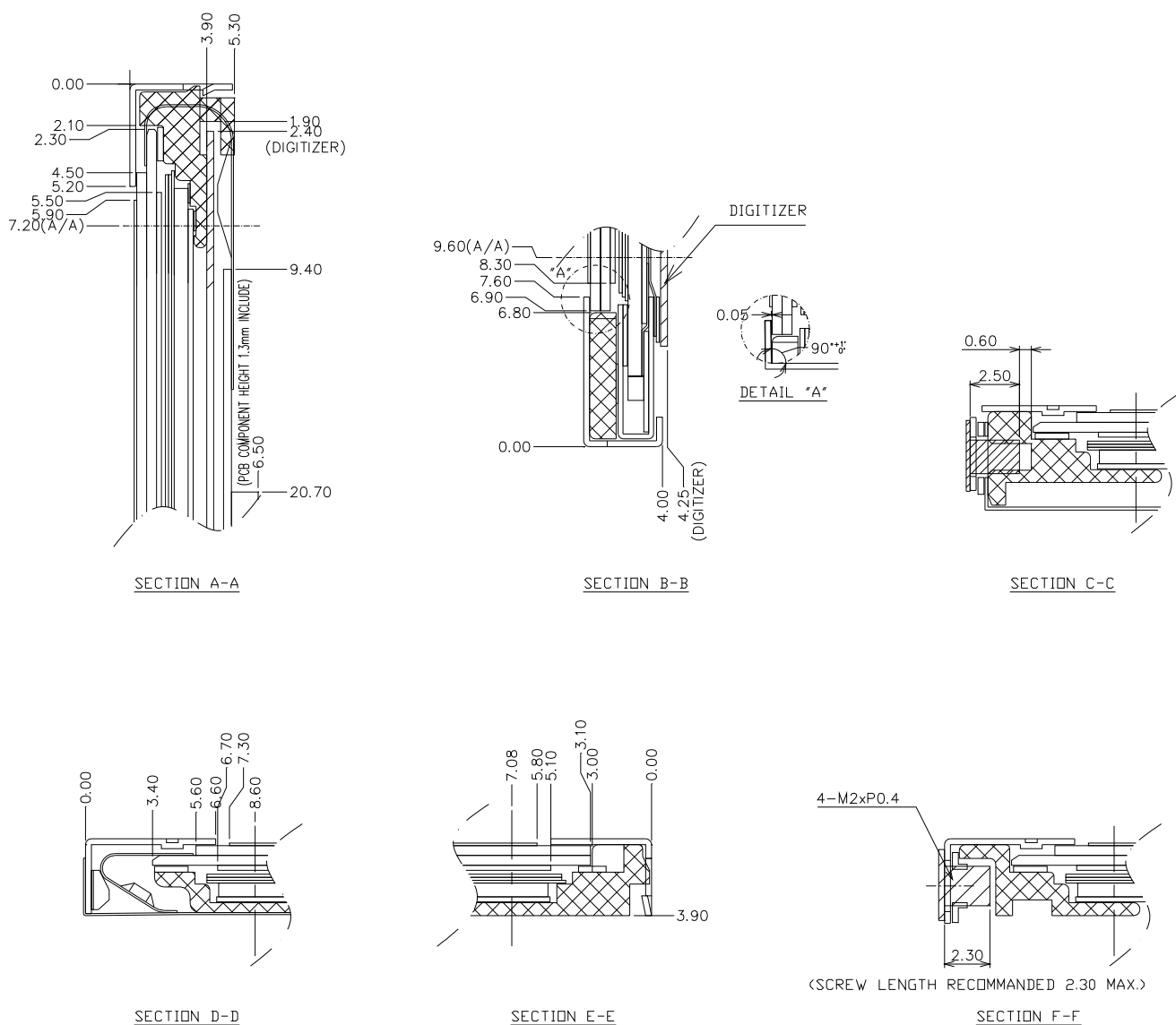
There shall not be visible light from the back-lighting system around the edges of the screen as seen from a distance 50cm from the screen with an overhead light level of 150lux. The manufacture shall furnish limit samples of the panel showing the light leakage acceptable.



[illegible]

1. LCN1 : FT-JH4QS-HF10CJAE\_40PIN)
2. C/N2 : 04-629B-009 (9PIN, KYOCERA)
3. BLU TYPE: LED BLU
4. GENERAL TOLERANCE :  $\pm 0.5$

**Figure 8. TFT-LCD Module Section for Main Position**





## 12.0 RELIABILITY TEST

The Reliability test items and its conditions are shown in below.

<Table 12. Reliability Test>

No	Test Item	Conditions
1	High temperature storage test	Ta = 60 °C, 240 hrs
2	Low temperature storage test	Ta = -20 °C, 240 hrs
3	High temperature & high humidity operation test	Ta = 50 °C, 80%RH, 240hrs
4	High temperature operation test	Ta = 50 °C, 240 hrs
5	Low temperature operation test	Ta = 0 °C, 240 hrs
6	Thermal shock	Ta = -20 °C ↔ 60 °C (30 min), 100 cycle
7	Vibration test (non-operating)	Frequency : 10~500Hz Gravity/AMP : 1.5G Period : X,Y,Z 30min
8	Shock test (non-operating)	Gravity : 220G Pulse width : 2ms, half sine wave ±X, ±Y, ±Z Once for each direction
9	Electro-static discharge test (non-operating)	Air : 150pF, 330ohm, 15KV Contact : 150pF, 330ohm, 8KV


## 13.0 HANDLING & CAUTIONS

### 13.1 Cautions when taking out the module

- Pick the pouch only, when taking out module from a shipping package.

### 13.2 Cautions for handling the module

- As the electrostatic discharges may break the LCD module, handle the LCD module with care. Peel a protection sheet off from the LCD panel surface as slowly as possible.
- As the LCD panel and back - light element are made from fragile glass (epoxy) material, impulse and pressure to the LCD module should be avoided.
- As the surface of the polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning.
- Do not pull the interface connector in or out while the LCD module is operating.
- Put the module display side down on a flat horizontal plane.
- Handle connectors and cables with care.

 <b>HYDIS</b>	PRODUCT GROUP	REV	ISSUE DATE
	TFT LCD PRODUCT	0	2009.08.03

### 13.3 Cautions for the operation

- When the module is operating, do not lose MCLK, DE signals. If any one of these signals were lost, the LCD panel would be damaged.
- Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.

### 13.4 Cautions for the atmosphere

- Dew drop atmosphere should be avoided.
- Do not store and/or operate the LCD module in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer packing pouch and under relatively low temperature atmosphere is recommended.

### 13.5 Cautions for the module characteristics

- Do not apply fixed pattern data signal to the LCD module at product aging.
- Applying fixed pattern for a long time may cause image sticking.


### 13.6 Cautions for the digitizer assembly

- When assembling FPC connector, do not flip connector past 90° due to possible damage to connector.
- When positioning digitizer underneath driver IC, do not lift driver IC past 90° due to possible damage to drive IC pattern.
- Please be warned that during assembly of digitizer, the opening or closing of FPC will result in possible electrostatic discharge damage to the LED

### 13.7 Other cautions

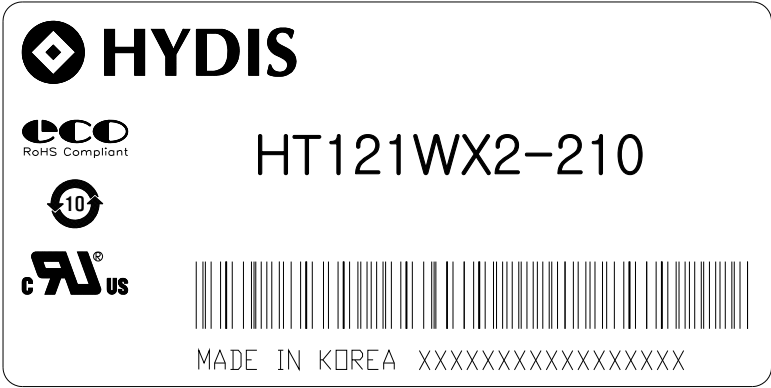
- Do not re-adjust variable resistor or switch etc.
- When returning the module for repair or etc., Please pack the module not to be broken. We recommend to use the original shipping packages.

SPEC. NUMBER S864-1395	SPEC TITLE HT121WX2-210 Product Specification	PAGE 26 OF 33
---------------------------	--	------------------

 <b>HYDIS</b>	PRODUCT GROUP	REV	ISSUE DATE
	TFT LCD PRODUCT	0	2009.08.03

# 14.0 LABELS

## 14.1 Product Label




### HYDIS Barcode

1	2	3	4	5	6	7
X X	X	X	X X	X	X X X X	X X X X X X

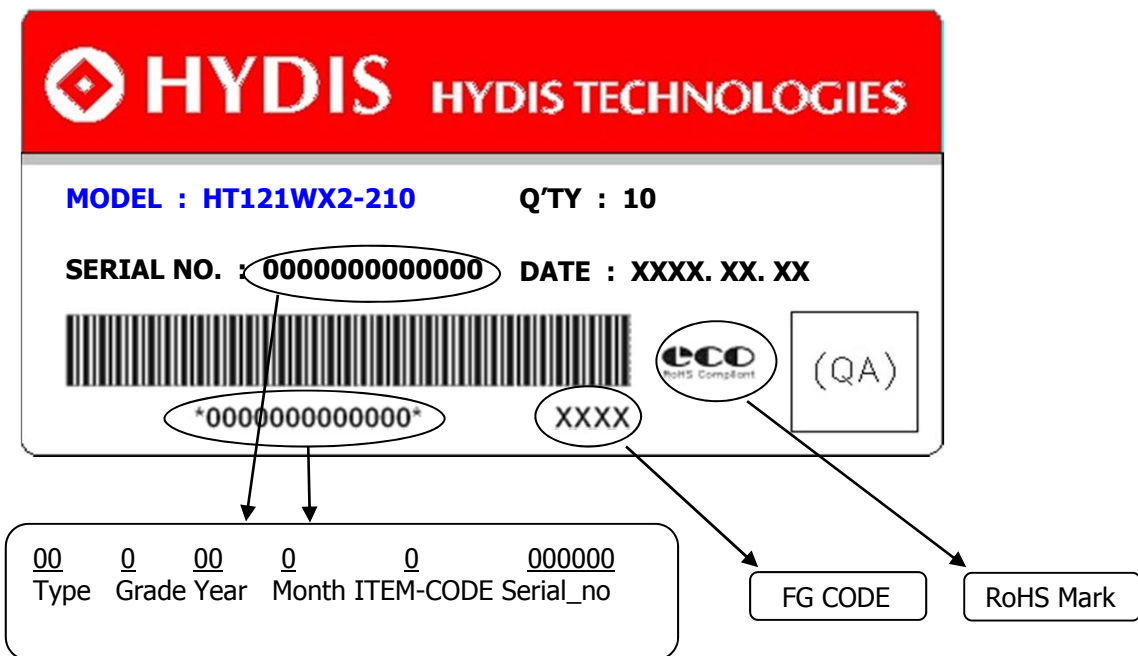
- No 1. Control Number
 No 5. Month (1, 2, 3,..., 9, X, Y, Z)
- No 2. Rank / Grade
 No 6. FG Code
- No 3. Line Classification  
 (HYDIS : H, LCM : L, BOE OT : A/B/C)
 No 7. Serial Number
- No 4. Year (8 : 2008, 9 : 2009, ...)

SPEC. NUMBER S864-1395	SPEC TITLE HT121WX2-210 Product Specification	PAGE 27 OF 33
---------------------------	--	------------------

 <b>HYDIS</b>	PRODUCT GROUP	REV	ISSUE DATE
	TFT LCD PRODUCT	0	2009.08.03

### 14.2 Packing Label

Label Size: 108 mm (L) × 56 mm (W)  
 Contents  
 Model: HT121WX2-210  
 Q'ty: Module Q'ty in one box  
 Serial No.: Box Serial No. See next figure for detail description.  
 Date: Packing Date  
 FG Code: FG Code of Product

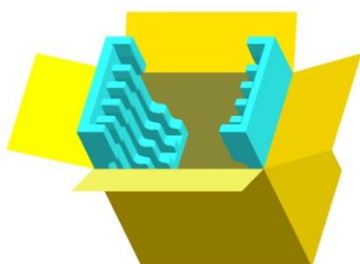


SPEC. NUMBER S864-1395	SPEC TITLE HT121WX2-210 Product Specification	PAGE 28 OF 33
---------------------------	--	------------------

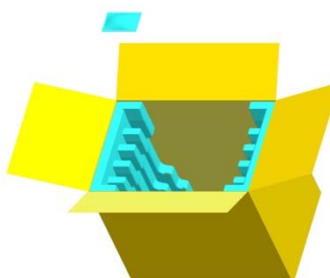
## 15.0 PACKING INFORMATION

### 15.1 Packing order

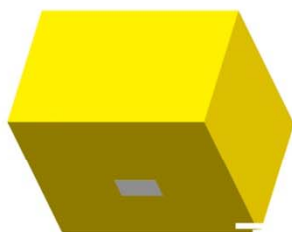
Put Pad into the box.



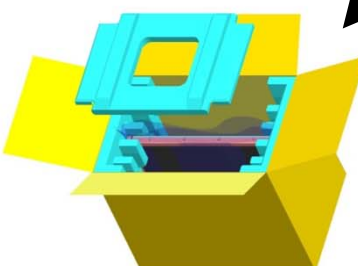
Put silica gels in the box.



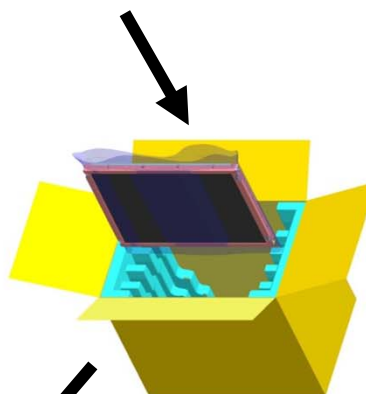
After sealing the box, attach Packing Label on the attach position sign area of the box.



Place a cover on the top of the box.



As shown in the figure, place the Modules bundled by shielding bag in the box.



### 15.2 Notes

- Box Dimension : 349.0mm(W) X 261.0mm(D) X 311.0mm(H)
- Package Quantity in one Box : 10pcs

**HYDIS**

PRODUCT GROUP

REV

ISSUE DATE

TFT LCD PRODUCT

0

2009.08.03

**16.0 EDID Table**

EDID chip is 24LC024 (Microchip) or equivalent .

Address (HEX)	Function	Hex	Dec	Input values.	Notes
00	Header	00	0	0	EDID Header
01		FF	255	255	
02		FF	255	255	
03		FF	255	255	
04		FF	255	255	
05		FF	255	255	
06		FF	255	255	
07		00	0	0	
08	ID Manufacturer Name	09	9	BOE	ID = BOE
09		E5	229		
0A	ID Product Code	9F	159	2207	ID = 2207
0B		08	8		
0C	32-bit serial No.	00	0		
0D		00	0		
0E		00	0		
0F		00	0		
10	Week of manufacture	0	0	0	
11	Year of Manufacture	13	19	2009	Manufactured in 2009
12	EDID Structure Ver.	01	1	1	EDID Ver 1.0
13	EDID revision #	03	3	3	EDID Rev. 0.3
14	Video input definition	80	128	-	
15	Max H image size	1A	26	26	26 cm (Approx)
16	Max V image size	10	16	16	16 cm (Approx)
17	Display Gamma	78	120	2.2	Gamma curve = 2.2
18	Feature support	0A	10		RGB display, Preferred Timing mode
19	Red/Green low bits	70	112	-	Red / Green Low Bits
1A	Blue/White low bits	A5	165	-	Blue / White Low Bits
1B	Red x high bits	93	147	0.575	Red (x) = 10010011 (0.575)
1C	Red y high bits	5E	94	0.370	Red (y) = 01011110 (0.37)
1D	Green x high bits	5B	91	0.355	Green (x) = 01011011 (0.355)
1E	Green y high bits	97	151	0.590	Green (y) = 10010111 (0.59)
1F	Blue x high bits	26	38	0.150	Blue (x) = 00100110 (0.15)
20	Blue y high bits	19	25	0.100	Blue (y) = 00011001 (0.1)
21	White x high bits	50	80	0.313	White (x) = 01010000 (0.313)
22	White y high bits	54	84	0.329	White (y) = 01010100 (0.329)

SPEC. NUMBER  
S864-1395SPEC TITLE  
HT121WX2-210 Product SpecificationPAGE  
30 OF 33

B2005-C001-C (3/3)

A4(210 X 297)

Address (HEX)	Function	Hex	Dec	Input values.	Notes
23	Established timing 1	00	0	-	
24	Established timing 2	00	0	-	
25	Established timing 3	00	0	-	
26	Standard timing #1	01	1		Not Used
27		01	1		
28	Standard timing #2	01	1		Not Used
29		01	1		
2A	Standard timing #3	01	1		Not Used
2B		01	1		
2C	Standard timing #4	01	1		Not Used
2D		01	1		
2E	Standard timing #5	01	1		Not Used
2F		01	1		
30	Standard timing #6	01	1		Not Used
31		01	1		
32	Standard timing #7	01	1		Not Used
33		01	1		
34	Standard timing #8	01	1		Not Used
35		01	1		
36	Detailed timing/monitor descriptor #1	C6	198	71.1072	71.1072MHz Main clock
37		1B	27		
38		00	0	1280	Hor Active = 1280
39		A0	160	160	Hor Blanking = 160
3A		50	80	-	4 bits of Hor. Active + 4 bits of Hor. Blanking
3B		20	32	800	Ver Active = 768
3C		17	23	23	Ver Blanking = 23
3D		30	48	-	4 bits of Ver. Active + 4 bits of Ver. Blanking
3E		30	48	48	Hor Sync Offset = 48
3F		20	32	32	H Sync Pulse Width = 32
40		36	54	3	V sync Offset = 3 line
41		00	0	6	V Sync Pulse width : 6 line
42		05	5	261	Horizontal Image Size = 261 mm (Low 8 bits)
43		A3	163	163	Vertical Image Size = 163 mm (Low 8 bits)
44		10	16	-	4 bits of Hor Image Size + 4 bits of Ver Image Size
45		00	0	0	Hor Border (pixels)
46		00	0	0	Vertical Border (Lines)
47		19	25		Refer to right table



PRODUCT GROUP

REV

ISSUE DATE

TFT LCD PRODUCT

0

2009.08.03

Address (HEX)	Function	Hex	Dec	Input values.	Notes
48	Detailed timing/monitor descriptor #2	00	0		
49		00	0		
4A		00	0		
4B		F9	249		
4C		00	0		
4D		0A	10		
4E		20	32		
4F		20	32		
50		20	32		
51		20	32		
52		20	32		
53		20	32		
54		20	32		
55		20	32		
56		20	32		
57		20	32		
58		20	32		
59		20	32		
5A	Detailed timing/monitor descriptor #3	00	0		
5B		00	0		
5C		00	0		
5D		FE	254		
5E		00	0		
5F		48	72	H	
60		59	89	Y	
61		44	68	D	
62		49	73	I	
63		53	83	S	
64		0A	10		
65		20	32		
66		20	32		
67		20	32		
68		20	32		
69		20	32		
6A		20	32		
6B		20	32		

SPEC. NUMBER  
S864-1395SPEC TITLE  
HT121WX2-210 Product SpecificationPAGE  
32 OF 33

B2005-C001-C (3/3)

A4(210 X 297)





PRODUCT GROUP

REV

ISSUE DATE

TFT LCD PRODUCT

0

2009.08.03

Address (HEX)	Function	Hex	Dec	Input values.	Notes
6C	Detailed timing/monitor descriptor #4	00	0		
6D		00	0		
6E		00	0		
6F		FE	254		
70		00	0		
71		48	72	H	
72		54	84	T	
73		31	49	1	
74		32	50	2	
75		31	49	1	
76		57	87	W	
77		58	88	X	
78		32	50	2	
79		2D	45	-	
7A		32	50	2	
7B		31	49	1	
7C		30	48	0	
7D		0A	10		
7E	Extension flag	00	0		
7F	Checksum	EF	239	-	

SPEC. NUMBER  
S864-1395SPEC TITLE  
HT121WX2-210 Product SpecificationPAGE  
33 OF 33

B2005-C001-C (3/3)

A4(210 X 297)