Model : LTD121LA3SG-201

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Please contact Soft View International Technology. before designing your product based on this module specification. 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.

Record of Revisions

Date	Rev.	Item	Old	New	Reason

- Contents -

SCOPE

This specification is applicable to Toshiba's 31.0cm diagonal size TFT-LCD module "LTD121LA1SG-201" designed for AV/TV.

FEATURES

(1) 12.1"XGA(1024x768 pixels) display size for AV/TV
(2) SPWG-B dimension
(3) LVDS interface system(H-Sync, V-Sync)
(4) P-Si TFT-LCD Module

Applications

Multimedia player
New media equipment
OA equipment
Display terminals

{ 希望加註說明:
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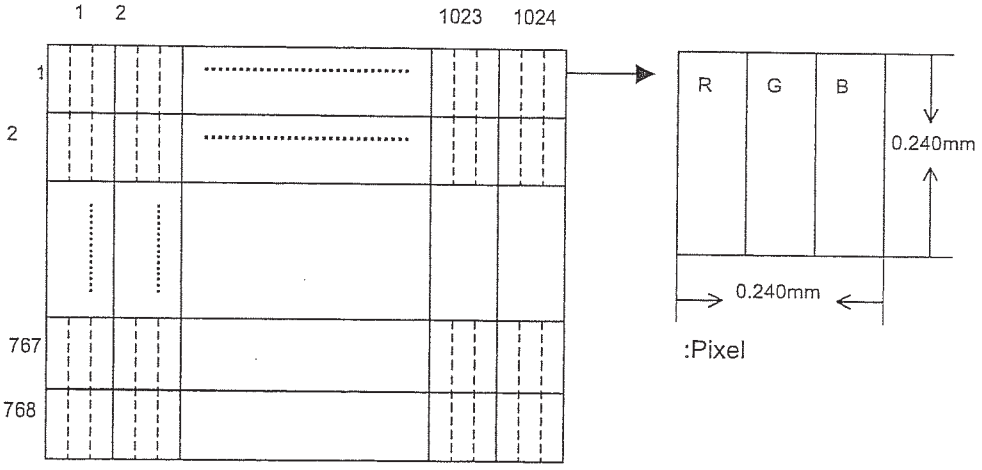
General information

Item	Specifications
Display Mode	TN color (64gray scales, 262,144 color)
Viewing Direction	6 o'clock(in direction of maximum contrast)
Driving Method	TFT active matrix
Input Signals	LVDS interface
Active Area	245.76(*W*) x 184.32(*H*) mm
Bezel Opening	250.4(*W*) x 188.9(*H*) mm
Nomber of Pixels	1024(*W*) x 768(*H*)
Pixel$ Pitch	0.240(*W*) x 0.240 (*H*) mm
Pixels Arrangement	R G B vertical stripes
Surface Treatment	Anti-Reflection and hard coat 3H on LCD surface
Backlight	1 CCFL

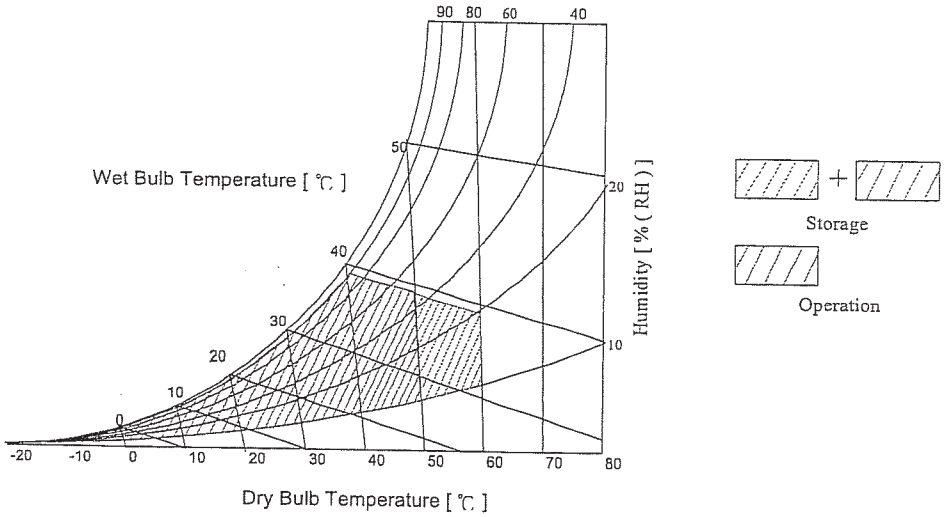


Absolute Maximum Rating

Absolute Rating of Environment

Item	Symbol	Min	Max	Unit	Checked Terminal 4)
Supply Voltage	V_{DD}	-0.3	4.0	V	V_{DD} - GND
Input Signal Voltage	V_{IN}	-0.3	V_{DD} +0.3	V	LVDS Interface
Operating Ambient Humidity 2)	H_{OP}	10	90	%(RH)	
Storage Temperature 2)	T_{STG}	-20	60	℃	
Storage Humidity 2)	H_{STG}	10	90	%(RH)	
Operating Ambient Temperature 2)	T_{OP}	0	50	℃	
Operating Temperature of Panel 3)	--	0	60	℃	

Note 1) Do not exceed the maximum rating values under the worst probable conditions taking into account the suppy voltage variation, input voltage variation, variation in part constants, and ambient temperature and so on. Otherwise the module may be damaged.
Note 2) Wet bulb temperature should be 39℃ Max, and no condensation of water. See figure below.
Note 3) The surface temperature caused by self heat radiation of cell itself is specified on this item.

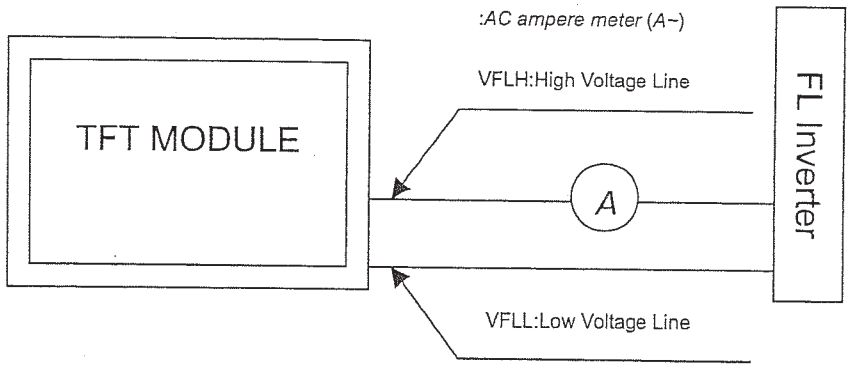


Electrical Characteristics

Item	Symbol	Min	Typ	Max	Unit	Remarks
Supply Voltage 4)	V_{DD}	3.0	3.3	3.6	V	
Differential Input Voltage 2)4)	V_{ID}	0.1	--	0.6	V	
Common Mode Input Voltage 5)	V_{CM}	1.0	--	2.4-1/2xV_{ID}	V	
Current Consumption	I_{DD}	--	235	--	mA	*1
FL Input Current 6)7)8)	I_{FL}	2.0	6.0	6.5	mA(rms)	*2
FL Driving Voltage 6)	V_{FL}	--	546	--	V(rms)	I_{FL}=6.0mA(rms)
FL Driving Frequency 6)10)	f_{FL}		32.3	--	kHz	
FL Starting Voltage 6)9)	V_{SFL}	--	740	770	V(rms)	24.5℃
*1 *2 Power Consumption		--		--	W	I_{FL}=6.0mA(rms)

Refer to THC63LVDF84A Specification by Thine Electronics,Inc.
*1 : 8 color bars pattern. *2 : Excepting the efficiency FL inverter

Note 1) The module should be always operated within these ranges. The "Typ" shows the recommendable value.
Note 2) Recommended LVDS transmitter: THC63LVDM83A (made by Thine Electronic,Inc.)
LVDS receiver included in this module is THC63LVDM83A (made by Thine Electronic,Inc.)
Refer to LVDS specifications.
Note 3) Checked pin Terminal: V_{DD}, GND (0V)
Note 4) Checked pin Terminal: IN0+/-, IN1+/-, IN2+/-, CLK+/-, GND(0V)
Measure: $|V_{IN0+} - V_{IN0-}|$, $|V_{IN1+} - V_{IN1-}|$, $|V_{IN2+} - V_{IN2-}|$, $|V_{CLK+} - V_{CLK-}|$
Note 5) Checked pin Terminal: IN0+/-, IN1+/-, IN2+/-, CLK+/-, GND(0V)
Measure: $1/2x(V_{IN0+} - V_{IN0-})$, $1/2x(V_{IN0+} - V_{IN0-})$, $1/2x(V_{IN0+} - V_{IN0-})$, $1/2x(V_{CLK+} - V_{CLK-})$
Note 6) Checked pin Terminal: $V_{FLH} - V_{FLL}$
Note 7) If FL input current (I_{FL}) is higher than typical value (6.0mA(rms)), thenFL lifetime becomes shorter.
Note 8) Measuring Method of I_{FL} .
Note 9) Input FL starting voltage (V_{SFL}) should not be less than one second.
If it were less than one second, it may cause unstable operation of FL.
Note10) Please adjuse LCD operating signal timing and FL driving frequency ,to optimize the display quality. There is a possibility that flicker is observed by the interference of LCD operating signal timing and FL driving condition (especially driving frequency), even if the condition satisfies above recommended operating conditions and timing specification shown in **6.**



Block Diagram

憶聲電子股份有限公司

呈: 李協理 2004 年 07 月 06 日

CC：會計處 ACV 廠務處

門素惠 發行者

件 名：LCD-104Q 試作品拆機回收 PANEL 轉售事由

一、 說明： 1.LCD-104Q 成品倉庫存 3 台爲試作品,今 LCD-104Q 已不再接單生產,而 RADIOSHACK 售服需求 10"PANEL,廠內 10"PANEL 已無庫存

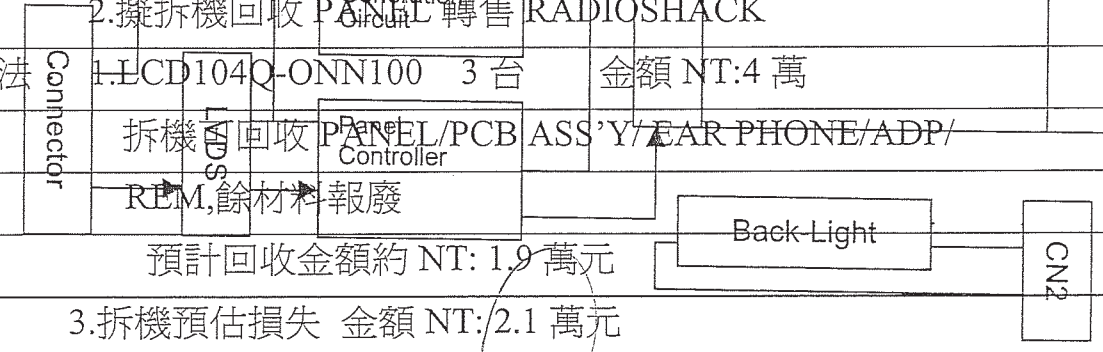
2.擬拆機回收 PANEL 轉售 RADIOSHACK

二、 辦法 1.LCD104Q-ONN100 3 台 金額 NT:4 萬

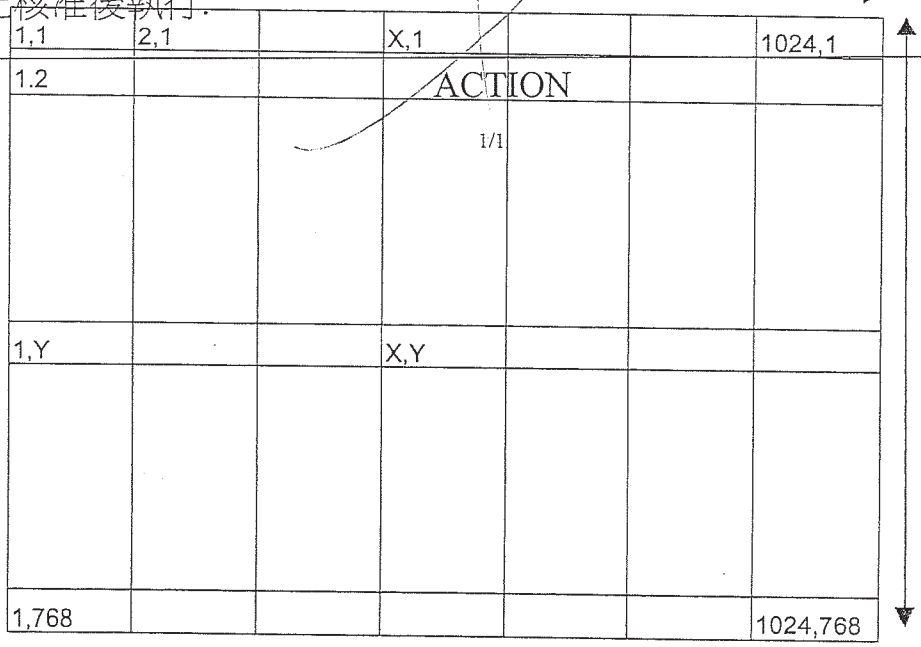
拆機回收 PANEL/PCB ASS'Y/EAR PHONE/ADP/REM,餘材料報廢

預計回收金額約 NT: 1.9 萬元

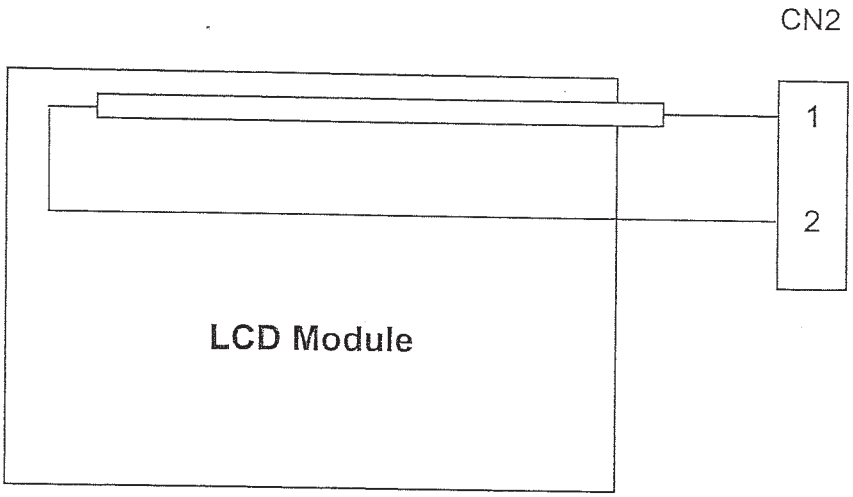
3.拆機預估損失 金額 NT: 2.1 萬元



三、以上核准後執行.



Back-Light Unit



Connector 2:

1. $V_{FL}1$
2. $G_{FL}1$

Lamp Lifetime

Ambient Temperature : 25±2℃
Lamp Current : 6.0mA

Lamp Lifetime	>10000hr
ON/OFF Lifetime	>10000 times (30sec ON – OFF)

Lamp Maximum Specification

Item	Symbol	Min.	Max	Unit
Lamp voltage	V_{FL}	-	750	V
Lamp current	I_{FL}	-	7	mA
Lamp frequency	f_{FL}	47.0	100.0	KHz

Permanent damage may occur to the LCD module if beyond this specification. Functional operation should be restricted to the conditions described under normally operating conditions.

Connector Pin Assignment For Interface

CN1 Input Signal

Connector :DF19L-20P-1H / HIROSE

Mating Connector :DF19G-20S-1C(Cable Type)DF19G-20S-1F(FPC Type) / HIROSE

Terminal No.	Symbol	Function
1	V_{DD}	POWER SUPPLY :+3.3V
2	V_{DD}	POWER SUPPLY :+3.3V
3	GND	GND
4	GND	GND
5	RxIN0-	Negative LVDS differential data input,[R0-R5, G0]
6	RxIN0+	Positive LVDS differential data input,[R0-R5, G0]
7	GND	GND
8	RxIN1-	Negative LVDS differential data input,[G1-G5, B0-B1]
9	RxIN1+	Positive LVDS differential data input,[G1-G5, B0-B1]
10	GND	GND
11	RxIN2-	Negative LVDS differential data input,[B2-B5, HS, VS, DE]
12	RxIN2+	Positive LVDS differential data input,[B2-B5, HS, VS, DE]
13	GND	GND
14	CLK-	Color signal( )
15	CLK2	Color signal(+)
16	GND	GND
17	NC	
18	NC	
19	GND	GND
20	GND	GND

Note 1) Please connect NC pin to nothing. Don't connect it to grand nor to other signal input.
Please connect GND to ground. Don't use it as no-connent nor connection with high impedance.
Note 2) 262,144 colors are displayed by the combinations of 18 bits data. (See next page)

CN2 CCFL Power Source

Connector:

Mating Connector:

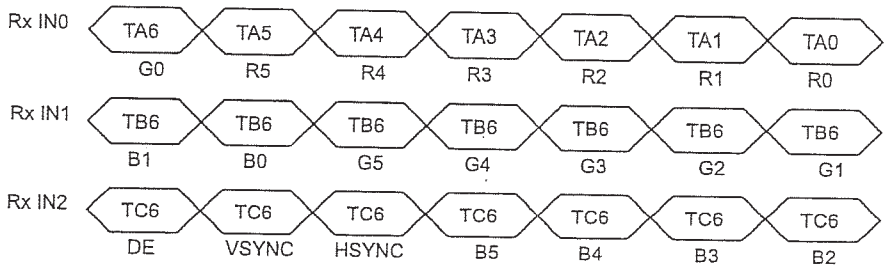
Terminal No.	Symbol	Function
1	V_{FL1}	CCFL Power Suppiy (high voltage)
2	V_{FL2}	CCFL Power Suppiy (high voltage)
3	G_{FL1}	CCFL Power Suppiy (low voltage)

Recommended Transmittre To LTD121LA3SG-201 Interface Assignment

Case 1: 6bit Transmitter

THC63LVDF63A, THC63LVDM63A, THC63LVDM63A-85					LTD121LA3SG-201 Interface (CN)	
Input Terminal No.		Input Signal (Graphics controller output signal)		Output Signal Symbol		
Symbol	Terminal	Symbol	Function		Terminal	Symbol
TA0	44	R0	Red Pixels Display Data(LSB)	TA- TA+	No.5 No.6	RxIN0- RxIN0+
TA1	45	R1	Red Pixels Display Data			
TA2	47	R2	Red Pixels Display Data			
TA3	48	R3	Red Pixels Display Data			
TA4	1	R4	Red Pixels Display Data			
TA5	3	R5	Red Pixels Display Data(MSB)			
TA6	4	G0	Green Pixels Display Data(LSB)			
TB0	6	G1	Green Pixels Display Data	TB- TB+	No.8 No.9	RxIN1- RxIN1+
TB1	7	G2	Green Pixels Display Data			
TB2	9	G3	Green Pixels Display Data			
TB3	10	G4	Green Pixels Display Data			
TB4	12	G5	Green Pixels Display Data(MSB)			
TB5	13	B0	Blue Pixels Display Data(LSB)			
TB6	15	B1	Blue Pixels Display Data			
TC0	16	B2	Blue Pixels Display Data	TC- TC+	No.11 No.12	RxIN2- RxIN2+
TC1	18	B3	Blue Pixels Display Data			
TC2	19	B4	Blue Pixels Display Data			
TC3	20	B5	Blue Pixels Display Data(MSB)			
TC4	22	HSYNC	Horizontal Synchronized Signal			
TC5	23	VSYNC	Vertical Synchronized Signal			
TC6	25	DE	Compound Synchroization Signal			
CLK IN	26	NCLK	Data Sampling Clock	TCLK- TCLK+	No.14 No.15	CLK- CLK+

Note 1) please refer to LVDS transmitter (THC63LVDF63A, THC63LVDM63A, THC63LVDM63A-85) specification by Thine

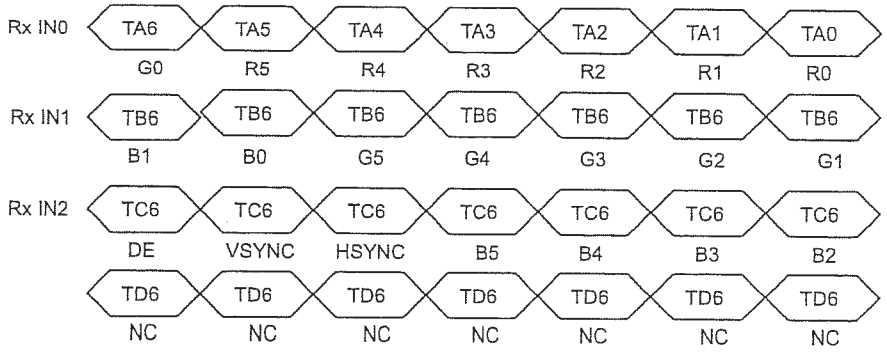


Recommended Transmittre Interface Assignment

Case 2: 8bit Transmitter

THC63LVDF83A, THC63LVDM83A, THC63LVDM83A-85					LTD121LA3SG-201 Interface (CN1)	
Input Terminal No.		Input Signal (Graphics controller output signal)		Output Signal Symbol		
Symbol	Terminal	Symbol	Function		Terminal	Symbol
TA0	51	R0	Red Pixels Display Data(LSB)	TA- TA+	No.5 No.6	RxIN0- RxIN0+
TA1	52	R1	Red Pixels Display Data			
TA2	54	R2	Red Pixels Display Data			
TA3	55	R3	Red Pixels Display Data			
TA4	56	R4	Red Pixels Display Data			
TA5	3	R5	Red Pixels Display Data(MSB)			
TA6	4	G0	Green Pixels Display Data(LSB)			
TB0	6	G1	Green Pixels Display Data	TB- TB+	No.8 No.9	RxIN1- RxIN1+
TB1	7	G2	Green Pixels Display Data			
TB2	11	G3	Green Pixels Display Data			
TB3	12	G4	Green Pixels Display Data			
TB4	14	G5	Green Pixels Display Data(MSB)			
TB5	15	B0	Blue Pixels Display Data(LSB)			
TB6	19	B1	Blue Pixels Display Data			
TC0	20	B2	Blue Pixels Display Data	TC- TC+	No.11 No.12	RxIN2- RxIN2+
TC1	22	B3	Blue Pixels Display Data			
TC2	23	B4	Blue Pixels Display Data			
TC3	24	B5	Blue Pixels Display Data(MSB)			
TC4	27	HSYNC	Horizontal Synchronized Signal			
TC5	28	VSYNC	Vertical Synchronized Signal			
TC6	30	DE	Compound Synchroization Signal			
TD0	50	NC	Non Connection (open)	TD- TD+	-----	----
TD1	2	NC	Non Connection (open)			
TD2	8	NC	Non Connection (open)			
TD3	10	NC	Non Connection (open)			
TD4	16	NC	Non Connection (open)			
TD5	18	NC	Non Connection (open)			
TD6	25	NC	Non Connection (open)			
CLK IN	31	NCLK	Data Sampling Clock	TCLK- TCLK+	No.14 No.15	CLK- CLK+

Note 1) Please connect NC pin to nothing. Don't connect it to ground nor to other signal input.
Note 2) Please refer to LVDS transmitter (THC63LVDF83A, THC63LVDM83A, THC63LVDM83A-85) specifications by Thine Electronics, Inc.

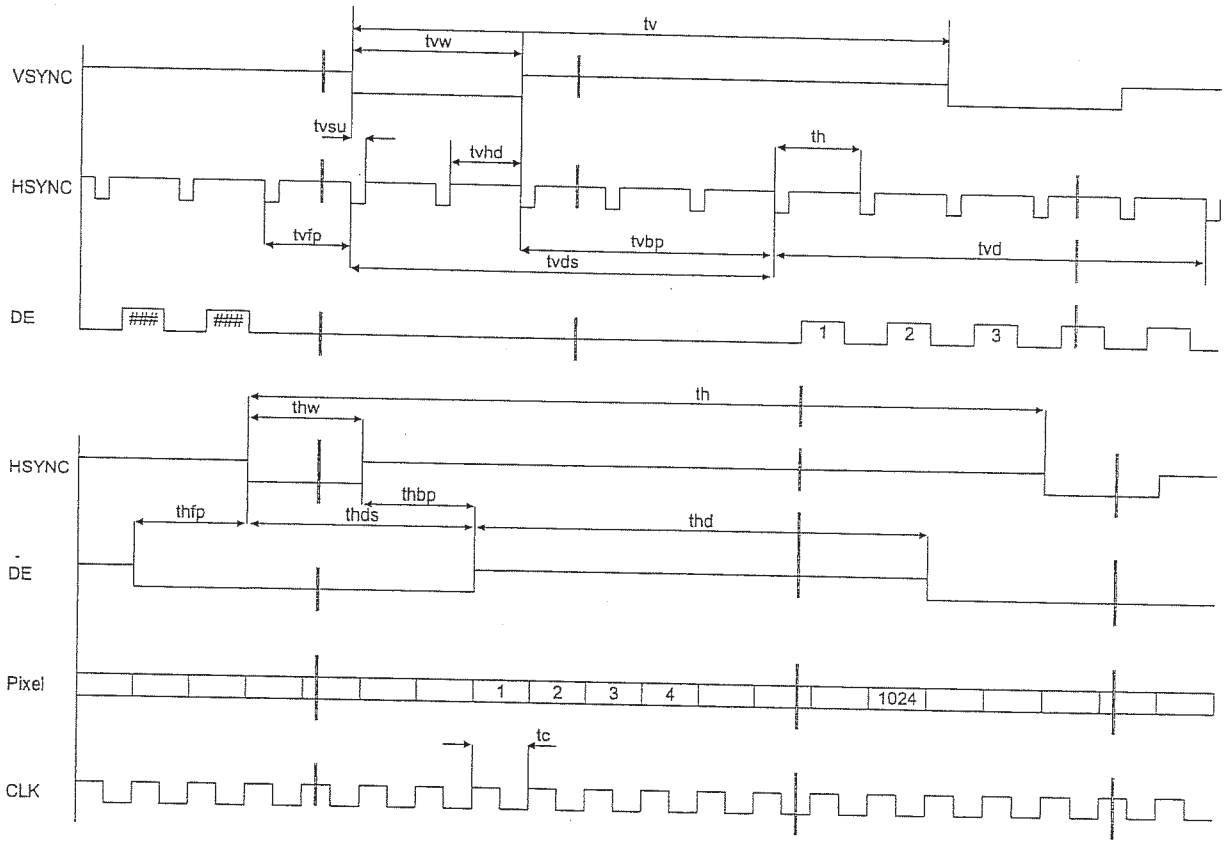


Colors Combination Table (262,144 color)

	Display	R5 R4 R3 R2 R1 R0	G5 G4 G3 G2 G1 G0	B5 B4 B3 B2 B1 B0	Gray Scale Level
Basic Color	Black	L L L L L L	L L L L L L	L L L L L L	
	Blue	L L L L L L	L L L L L L	H H H H H H	
	Green	L L L L L L	H H H H H H	L L L L L L	
	Light Blue	L L L L L L	H H H H H H	H H H H H H	
	Red	H H H H H H	L L L L L L	L L L L L L	
	Purple	H H H H H H	L L L L L L	H H H H H H	
	Yellow	H H H H H H	H H H H H H	L L L L L L	
	White	H H H H H H	H H H H H H	H H H H H H	
Gray Scale of Red	Black	L L L L L L	L L L L L L	L L L L L L	L0
	Dark	L L L L L H	L L L L L L	L L L L L L	L1
		L L L L H L	L L L L L L	L L L L L L	L2
	Light				L3.....L60
		H H H H L H	L L L L L L	L L L L L L	L61
		H H H H H L	L L L L L L	L L L L L L	L62
	Red	H H H H H H	L L L L L L	L L L L L L	Red L63
Gray Scale of Green	Black	L L L L L L	L L L L L L	L L L L L L	L0
	Dark	L L L L L L	L L L L L H	L L L L L L	L1
		L L L L L L	L L L L H L	L L L L L L	L2
	Light				L3.....L60
		L L L L L L	H H H H L H	L L L L L L	L61
		L L L L L L	H H H H H L	L L L L L L	L62
	Green	L L L L L L	H H H H H H	L L L L L L	Green L63
Gray Scale of Blue	Black	L L L L L L	L L L L L L	L L L L L L	L0
	Dark	L L L L L L	L L L L L L	L L L L L H	L1
		L L L L L L	L L L L L L	L L L L H L	L2
	Light				L3.....L60
		L L L L L L	L L L L L L	H H H H L H	L61
		L L L L L L	L L L L L L	H H H H H L	L62
	Blue	L L L L L L	L L L L L L	H H H H H H	Blue L63
Gray Scale of White & Black	Black	L L L L L L	L L L L L L	L L L L L L	L0
	Dark	L L L L L H	L L L L L H	L L L L L L	L1
		L L L L H L	L L L L H L	L L L L L L	L2
	Light				L3.....L60
		H H H H L H	H H H H L H	H H H H L H	L61
		H H H H H L	H H H H H L	H H H H H L	L62
	White	H H H H H H	H H H H H H	H H H H H H	White L63

Interface timing

Timing Chart



Timing Specification

Item	Symble	Min	Typ	Max	Unit
Horizontal Scanning Term	*th*	1334x*tc*	1344x*tc*	--	clock
H-sync Pulse Width	*thw*	4x*tc*	136x*tc*	--	clock
Horizontal Front Porch	*thfp*	4x*tc*	24x*tc*	--	clock
Horizontal Back Porch	thbp	24x*tc*	160x*tc*	--	clock
Horizontal Data Sync Period	*thds*	32x*tc*	296x*tc*	--	clock
Horizontal Display Term	*thd*	1024x*tc*	1024x*tc*	1024x*tc*	clock
Frame Period	*tv*	--	806x*th*	--	line
Frame Frequency	1/tv	60	60	60	Hz
V-sync Pulse Width	*tvw*	2x*th*	6x*th*	--	line
V-sync Set Up Time(to H-sync)	*tvsu*	8x*th*	--	--	clock
V-sync Hold Time	*tvhd*	(thbp+16)x*th*	--	--	clock
Vertical Front Porch	*tvfp*	1x*th*	3x*th*	--	line
Vertical Back Porch	*tvbp*	2x*th*	29x*th*	--	line
Vertical Data Sync Period	*tvds*	8x*th*	35x*th*	--	line
Vertical Display Term	*tvd*	768x*th*	768x*th*	768x*th*	line
Clock Period	*tc*	15.0	15.38	--	ns

Note 1) Refer to "Timing Chart" and LVDS (THC63LVDF84A-85) specifications by Thine Electronics,Inc.

Note 2) If NCLK is fixed to "H" or "L" level for certain penod while V_{DD} is supplied, the panel may be damaged.

Note 3) Please adjuse LCD operating signal timing and FL driving frequency, to optimize the display quality.
There is a possibility that flicker is observed by the interferenoe of LCD operating signal timing and FL driving conditio(especially driving frequency), even if the condition satisfies above timing specifications.

Note 4) Do not make *tv*, *tvhd* and *tvds* fluctuate. If *tv*, *tvhd*, and *tvds* are fluctuate, the panel display black.

Note 5) In case of using the long frame period, the detenoration of display quality,noise etc. may be occurred.

Note 6) NCLK count of each Horizontal Scanning Time should be always the same.
V-Blanking period should be "*n*" x "Horizontal Scanning Time".(*n*: integer)
Frame period should be always the same.

Optical characteristics

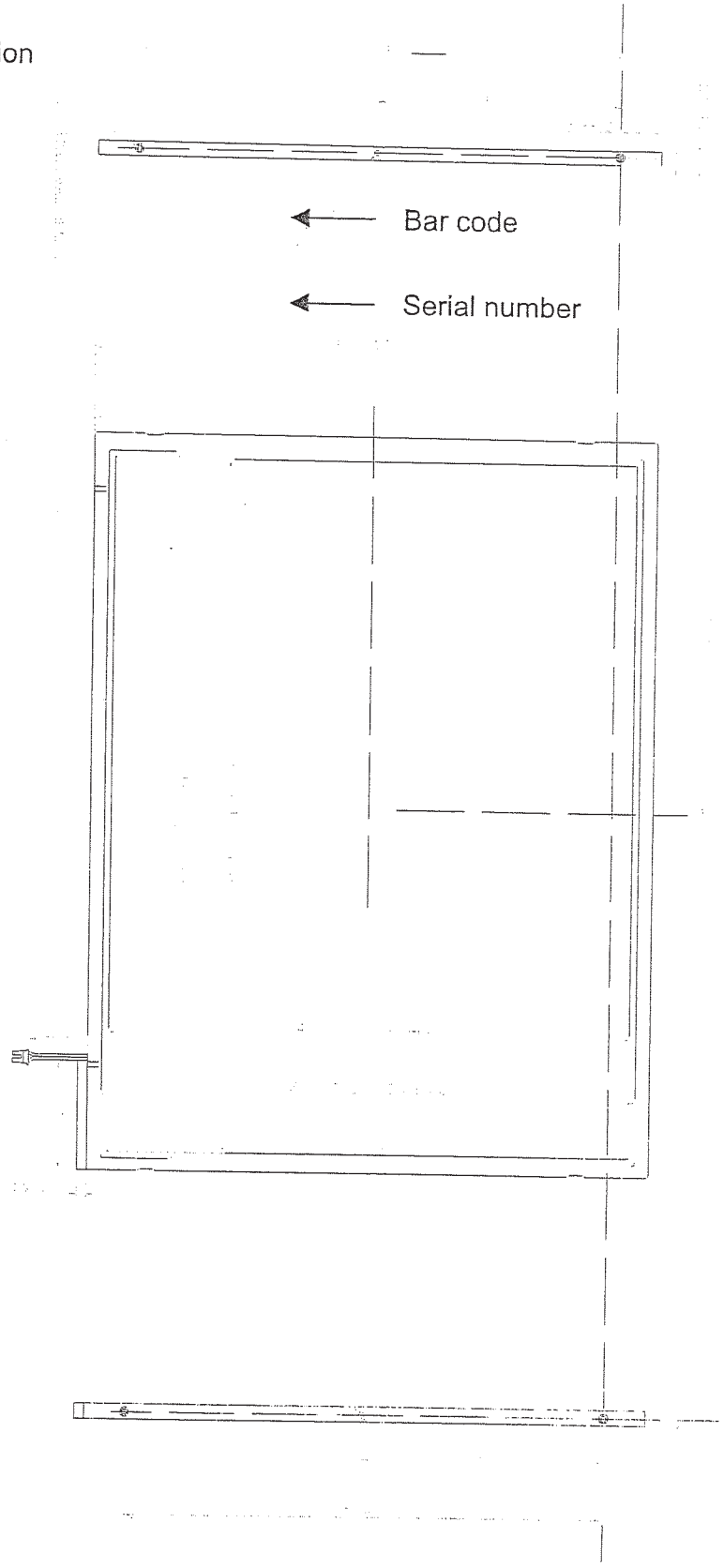
Item		Symble	Conditions		Specification Min	Typ	Max	Unit	Remark
Viewing Angle		θ	CR>=10	φ=180°	10	-	-	/	
				φ=0°	30	-	-	/	
				φ=90°	30	-	-	/	
				φ=-90°	30	-	-	/	
Contrast Ratio		CR	θ=0°, φ=0°		-	200	-	/	
Response Time		t ON	θ=0°, φ=0°		-	-	50	ms	
		t OFF			-	-	50	ms	
Luminance		L	θ=0°, φ=0°X=0.2890, Y=0.2880		160	200	-	cd/㎡	/FL=6.0mA(rms)
Chromaticity	Red	XR	Gray Scale Level:L63 θ=0°, φ=0°		0.56	0.60	0.64		
		YR			0.28	0.32	0.36		
	Green	XG	Ditto		0.28	0.32	0.36		
		yG			0.48	0.52	0.56		
	Blue	XB	Ditto		0.11	0.15	0.19		
		yB			0.08	0.12	0.16		
	White	Xw	Ditto		0.30	0.34	0.38		
		yw			0.30	0.34	0.38		

Note 1) Refer to "11.Measuring Method".

Note 2) The above test limit must be applied for initial use. Characteristics will be shifted by iong period operation, but it is not irregular phenomena. Theoretically brightness characteristics will be decreased due to CCFL degradation and color shift due to optical components change.

Outline dimension

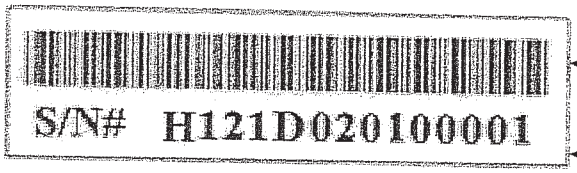
Mechanical Information



Unit : mm

Lot mark

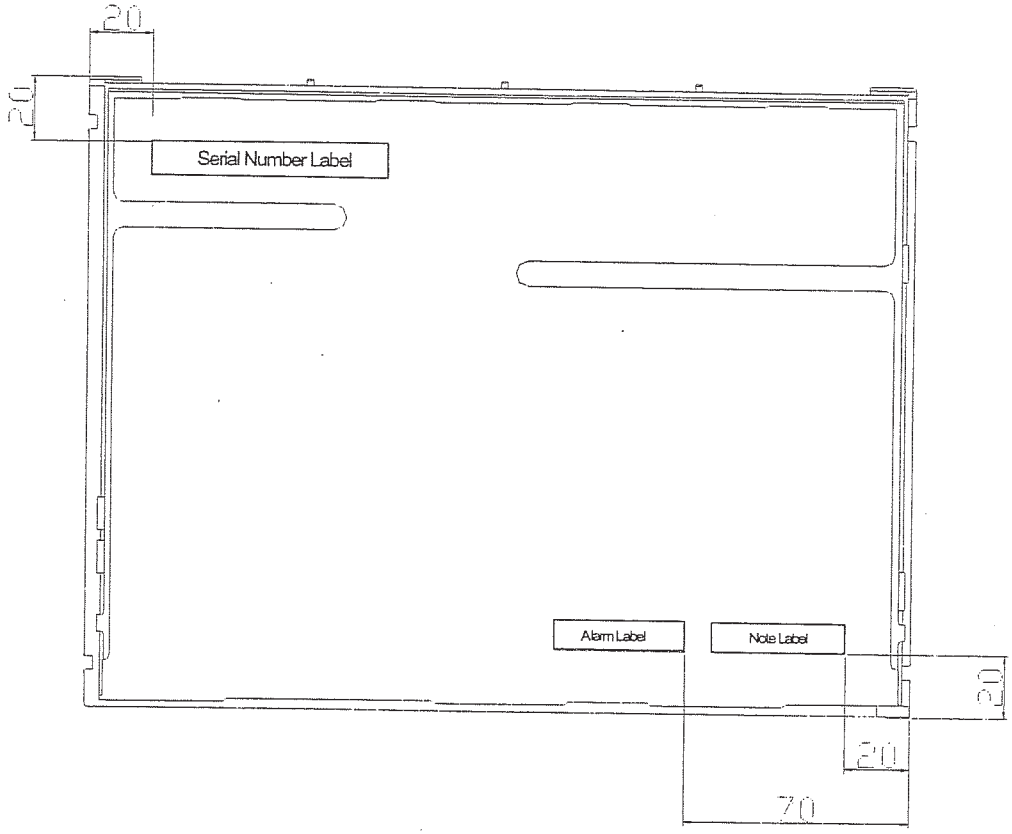
Product Label



Label indications

Bar code size : H 50 mm * L 15 mm
Meaning : Serial number

Label Locations



Quality

Inspection AQL

Total of Major Defects : AQL 0.65%

Sampling Method : MIL-STD-105EG II

Test Conditions

Ambient Temperature : 25±2℃

Ambient Humidity : 65±10%(RH)

Inverter : Harison HIU-766(52K)

Note : Inverter Specifications

Item	Symbol	conditions	Specifications			Unit
			Min	TYP	Max	
Lamp Current	I_L	T=25℃		6	7	MArms
Lamp Voltage	V_L	T=25℃		610		Vrms
Lamp Start-Voltage	V_{st}	T=25℃			750	Vrms
		T=0℃			1030	Vrms
Lamp Frequency	f_L	T=25℃, I_L =6mA	47	52	80	KHz

Reliability Test

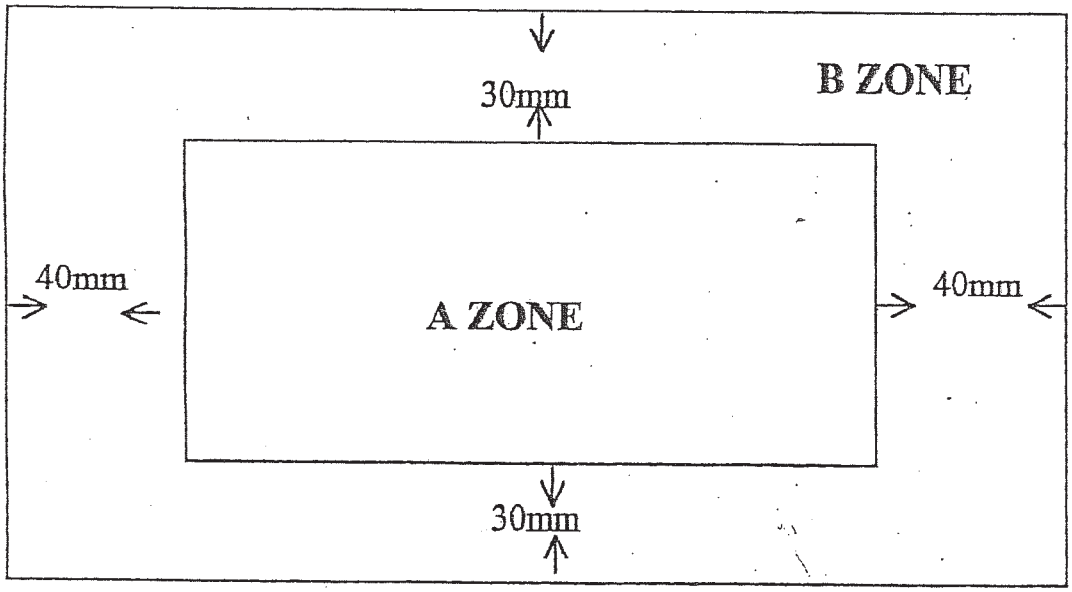
Test Item		Test Conditions	PCS	Result
Operating	High Temperature and High Humidity Operation	50℃, 90%RH 240hr	3	OK
	Low Temperature Operation	0℃, 240hr	3	OK
	High Temperature Operation	50℃, 240hr	3	OK
	Continuous Operation	30sec ON / 30sec OFF 10000hr	3	OK
	Lifetime Test	25±2℃, 10000hr	3	OK
Storage	High Temperature and High Humidity Operation	60℃, 90%RH 48hr	3	OK
	Low Temperature Operation	-20℃, 240hr	3	Ok
	High Temperature Operation	60℃, 240hr	3	OK
	Temperature Shock	60℃, 1hr / -20℃, 1hr 50cycles	3	Ok

92. 1. 16 品管處

ACTION ELECTRONICS CO., LTD

10″ ~12″ COLOR TFT-LCD MODULE INSPECTION STANDAED

DATE：2003-01-16
REV：1



ITEM	A ZONE	B ZONE	TOTAL
BLACK	2	3	5
BLUE			
RED			
WHITE、GRE			
TOTAL	2	3	

REMARK：

1. VIEWING DISTANCE 35cm± 5cm
2. VIEWING ANGLE 90 deg
3. SPOTS DISTACE ≧2cm ?
4. DIAMETER OF SPOT＜0.1mm NOT ACCOUNT
5. STRAIGHT LINE OF SCRATCH WIDE≦0.2mm NOT ACCOUNT
6. 點的直徑≦0.3mm

ITEM	SPEC. LIMIT
DIFFUSER SCRATCH	L≦5、N≦A-1/B-2
FOREING OR EXTERNAL SPOT	FOREING：L≦3，N≦2 ：D≦0.3，N≦2

N：QTY D：AVG.DIAMETER(mm) L：LENGTH(mm)

（附件一）

Appearance Test

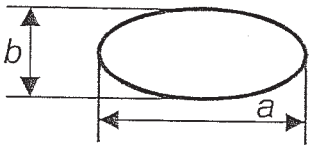
Specifications

Item	Description	Class
PCB Appearance	Pattern peeling snapping, electrically short	Major
	Repair portion on PCB is not covered by epoxy resign	Minor
Soldering	Cold solder joint, lead move when pulled	Major
Connectors	Distinct stain, rust or scratch	Minor
Black and White Spots/Lines*1, 2	<table><tr><th>Line Width (MM)</th><th>Length (MM)</th><th>Acceptable count</th></tr><tr><td>W<=0.10</td><td>-</td><td>neglect</td></tr><tr><td>0.10<W<=0.15</td><td>L<=10</td><td>n<=8</td></tr><tr><td>0.15<W<=0.20</td><td></td><td>n<=2</td></tr><tr><td>0.20<W</td><td>-</td><td>-</td></tr></table><table><tr><th>Average diameter (mm)</th><th>Acceptable count/side</th></tr><tr><td>D<=0.20</td><td>neglect</td></tr><tr><td>0.20<D<=0.50</td><td>n<=5</td></tr><tr><td>0.50<D<=1.50</td><td>n<=2</td></tr><tr><td>1.50<D</td><td>0</td></tr></table>	Minor
Break and Crack of Panel Outside Edge	Break: less than 2MM inward from cell outside. Worsening fine crack: reject	Minor

*1, Inspection area should be within active area.

*2,Dusts which are bigger not less than 0.20mm (0.20<W) shall be judged by "Average Diameter".

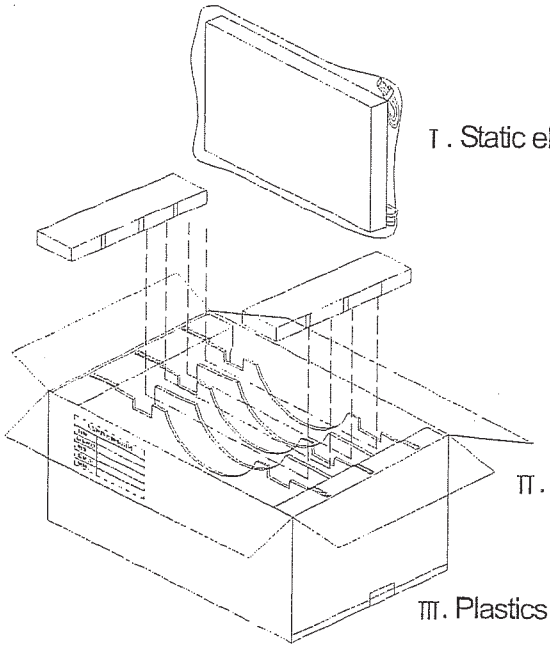
Average Diameter $D = (a+b)/2$ (mm)



Packaging

- Packaging From Corrugated Cardboard Box.

Packaging Method



Ⅰ. Static electric protective bag

Ⅱ. Corrugated Cardboard Box

Ⅲ. Plastics Adhesive Tape

Number	Quantity	Description
Ⅰ	10 pcs	Static electric protective bag
Ⅱ	1 set	Corrugated Cardboard Box
Ⅲ	H-type*	Plastics Adhesive Tape