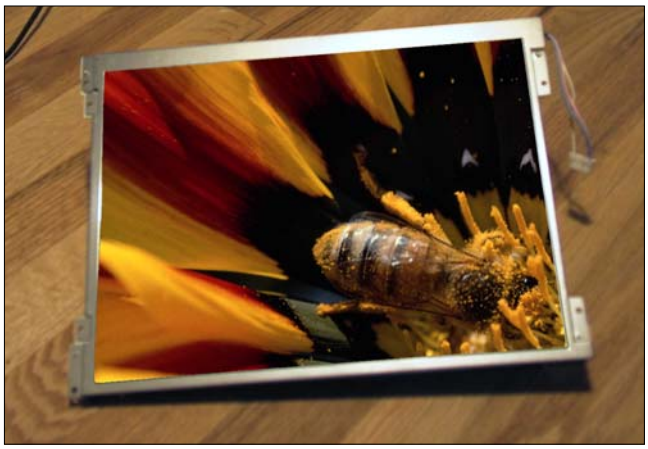
AND Displays

PRELIMINARY



ANDpSi121GAOS-HB

12.1" XGA Color p-Si TFT LCD Module

The ANDpS121GAOS-HB is 1024 x 768 Color TFT display that utilizes new poly-silicon (p-Si) technology to provide a brighter, thinner and lighter display with high-resolution. The p-Si TFT technology allows the row and column LCD drivers to be fabricated directly on the LCD glass. This eliminates the need for discrete TAB drivers and also reduces the thickness, weight and overall size of the display. The 12.1" XGA resolution expands applications in such areas as electronics books and personal digital-picture viewers.

Features

- High Luminance
- Built-in Long Life Lamps (MTTF: 50,000 h)
- Replaceable structure of lamp units
- Analog scaling board attachable to LCD backward
- Recommendable inverter attachable to LCD backward
- XGA (1024 x 768 pixels color display)
- Reverse Scan function
- Applications: electronic books and personal digital-picture viewers

Mechanical Characteristics

Item	Specification	Unit
Outline Dimensions	278.3 (W) x 209.0 (H) x 12.0 max (D)	mm
Number of Pixels	1024 (W) x 768 (H)	pixels
Active Area	245.8 (W) x 184.3 (H)	mm
Viewing Area	247.8 (W) x 186.3 (H)	
Pixel Pitch	0.24 (W) x 0.24 (H)	mm
Weight (approx.)	685	gram
Backlight	Twin CCFL, Sidelight type	–

Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Supply Voltage	V_{DD}	-0.3	4.0	V
	V_{FL}	0	2.0	kV(rms)
FL Driving Frequency	f_{FL}	(0)	(100)	kHz
Input Signal Voltage	V_{IN}	-0.3	V_{DD} + 0.3	V
Operating Ambient Temp.	T_{op}	0	50	°C
Operating Temp. for Panel		0	60	°C
Storage Temperature	T_{stg}	-20	60	°C
Storage Humidity (Max. Wet bulb temp = 39°C)	–	10	90	%(RH)

Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage I_{FL}=6.0mA(rms)	V_{DD}	3.0	3.3	3.6	V
	V_{FL}	TBD	(580)	TBD	V(rms)
FL Start Voltage (Ta = 0°C)	–	1400	–	–	V(rms)
Differential Input Voltage	V_{ID}	100	_	600	mV
Common Mode Input Voltage	V_{CM}	1.0	–	2.4-(V_{ID})/2	V
Current Consumption	I_{DD} *	–	(220)	TBD	mA
	I_{FL} **	3.0	–	6.0	mA(rms)
Pwr Consumption I_{FL}=6.0mA(rms)	P	–	(7.7)	–	W

*: 8 color bars pattern
**: Except the efficiency of FL inverter

Optical Characteristics (Ta = 25°C)

Item		Sym.	Min.	Typ.	Max.	Unit
Contrast Ratio		CR	100	250	–	–
Viewing Angle (CR ≥ 10)	(Upper+Lower)		TBD	100	–	°
	(Left+Right)		TBD	120	–	°
Response Time	(t_{ON})	t_{on}	–	–	50	ms
	(t_{OFF})	t_{off}	–	–	50	ms
Luminance I_{FL}=6.0mA(rms)		L	(280)	(350)	–	cd/m^2
Lamp Life Time (Notes 1,2)		MTBF	50,000			h

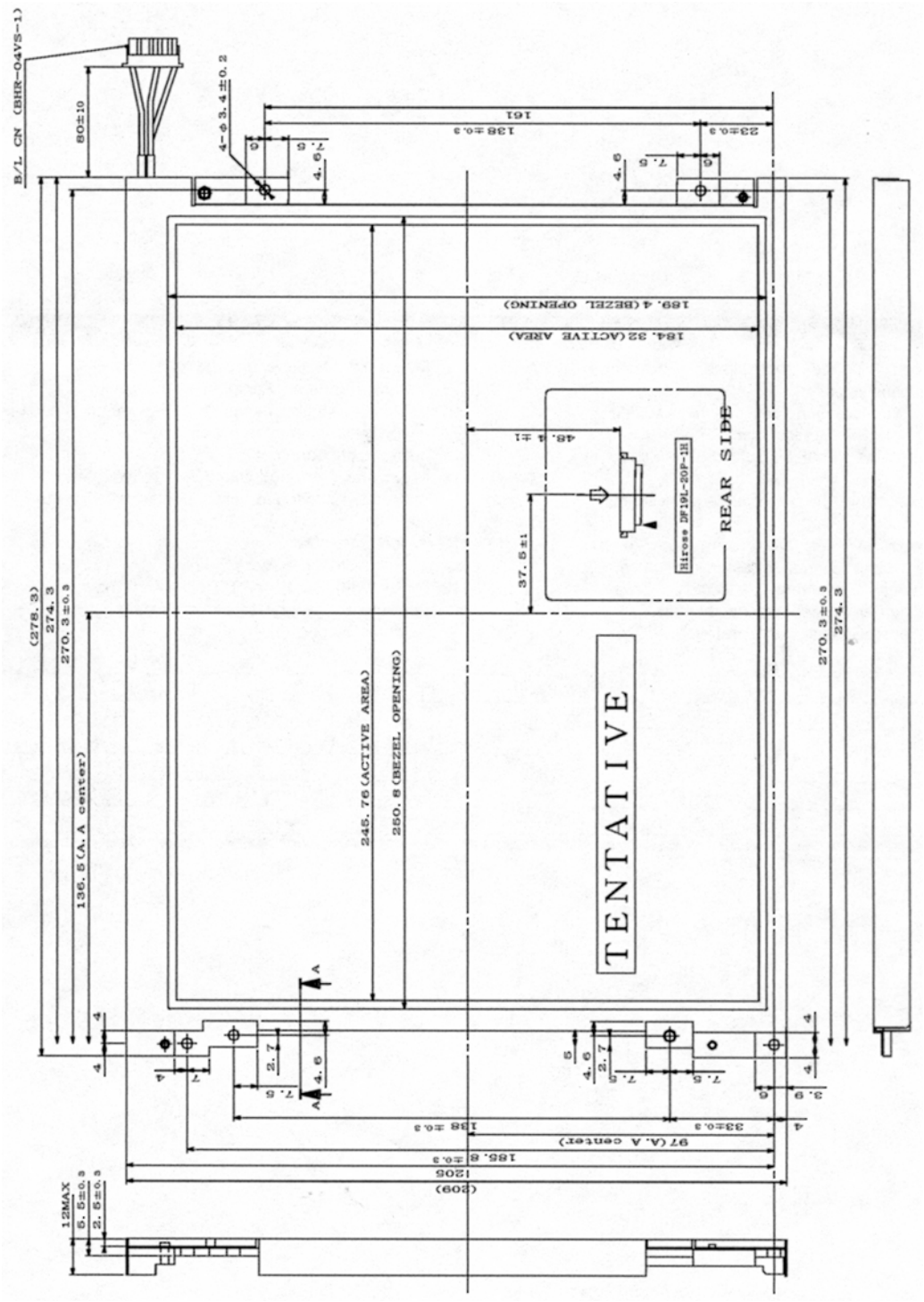
Note 1: Conditions: Ta = 25°C, I_{FL}=6.0mA(rms), continuous lighting
Note 2: Definitions of failure:
a) LCD luminance becomes half of the minimum value.
b) Lamp doesn't light normally.

Product specifications contained herein may be changed without prior notice. It is therefore advisable to contact Purdy Electronics before proceeding with the design of equipment incorporating this product.

Dimensional Outline

Front View

Unit: mm
Standard Tolerance: 0.5mm

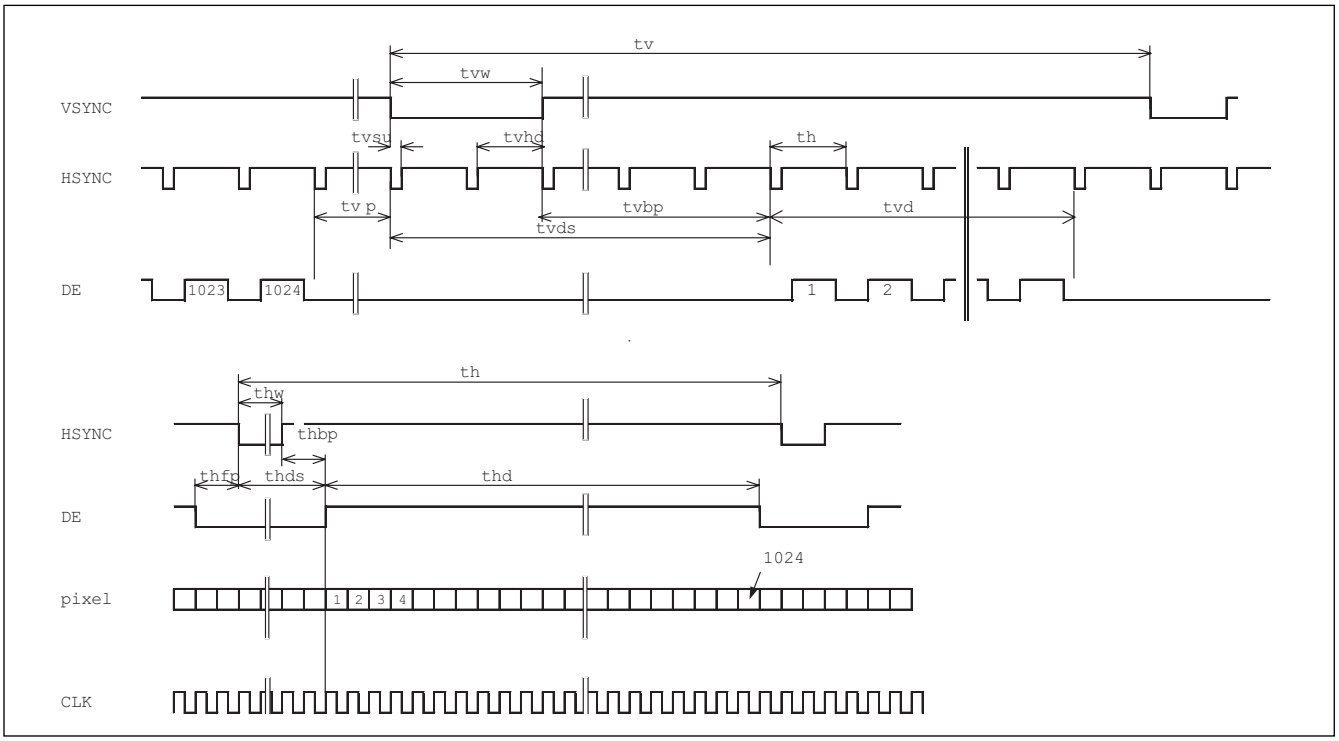


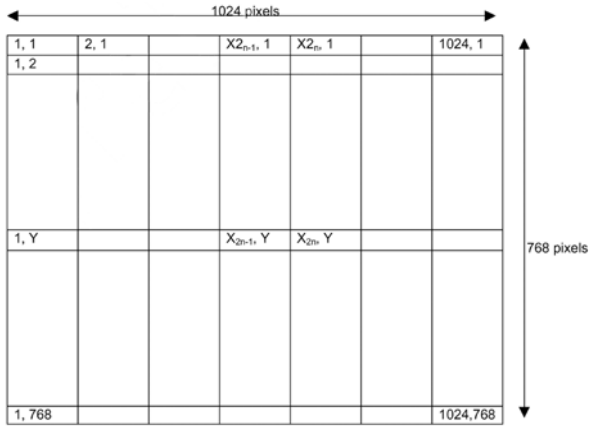
Timing Specifications *(see Notes below)*

Item	Symbol	Min	Typ	Max	Unit
Horizontal Scanning Term	*t*h	1334 x *t*c	1344 x *t*c	–	clock
H-sync Pulse Width	*t*hw	4 x *t*c	136 x *t*c	–	clock
Horizontal Front Porch	*t*hfp	4 x *t*c	24 x *t*c	–	clock
Horizontal Back Porch	*t*hbp	24 x *t*c	160 x *t*c	–	clock
Horizontal Data Sync Period	*t*hds	32 x *t*c	296 x *t*c	–	clock
Horizontal Display Term	*t*hd	1024 x *t*c	1024 x *t*c	1024 x *t*c	clock
Frame Period	*t*v	778 x *t*h	806 x *t*h	860 x *t*h	line
V-sync Pulse Width	*t*vw	2 x *t*h	6 x *t*h	–	line
V-sync Set up Time (to H-sync)	*t*vsu	8 x *t*c	–	–	clock
V-sync Hold Time	*t*vhd	(thbp+16) x *t*c	–	–	clock
Vertical Front Porch	*t*vfp	1 x *t*h	3 x *t*h	–	line
Vertical Back Porch	*t*vbp	2 x *t*h	29 x *t*h	–	line
Vertical Data Sync Period	*t*vds	8 x *t*h	35 x *t*h	–	line
Vertical Display Time	*t*vd	768 x *t*h	768 x *t*h	768 x *t*h	line
Clock Period	*t*c	15.0	15.38	–	ns

Notes:
Refer to "Timing Chart" below. If DE is fixed to "H" or "L" level for certain period while NCLK is supplied, the panel displays black w/some flicker. If NCLK is fixed to "H" or "L" level for certain period while DE is supplied, the panel may be damaged. Please adjust 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 timing specifications and recommended operating conditions. Do not make *tv, tv*hd and *tv*ds fluctuate. If *tv, tv*hd, and *tv*ds are fluctuate, the panel display black. In case of using the long frame period, the deterioration of display quality, noise, etc. may be occurred. 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.

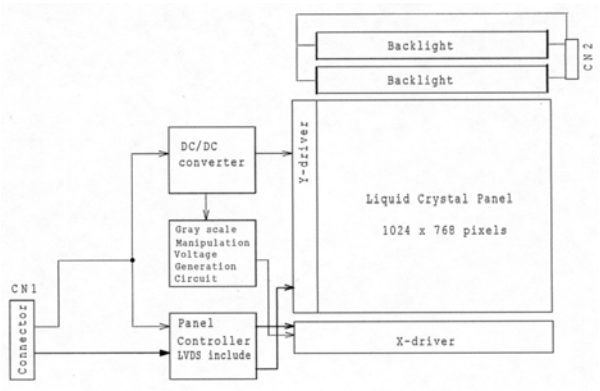
Timing Chart





Recommended Inverter:

Block Diagram



1) Drivers are fabricated on the LCD glass

2) Connectors

CN1: DF19L-20P-1H / Hirose Electric Co., Ltd.

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

CN2: BHR-04VS-1/Japan Solderless Terminal Mfg. Co., Ltd.

Mating Connector - SM04(4.0)B-BHS-1 / JST

Connector Pin Assignment for Interface

CN1 Input Signal (see Notes below)
DF19L-20P-1H / Hirose Electric Co., Ltd.

Terminal No.		Symbol	Function
1		V_{DD}	Power Supply: +3.3V
	2	V_{DD}	Power Supply: +3.3V
3		V_{SS}	Ground
	4	V_{SS}	Ground
5		RxIN0-	Neg. LVDS differential data input (R0-R5, G0)
	6	RxIN0+	Pos. LVDS differential data input (R0-R5, G0)
7		V_{SS}	Ground
	8	RxIN1-	Neg. LVDS differential data input (G1-G5, B0-B1)
9		RxIN1+	Pos. LVDS differential data input (G1-G5, B0-B1)
	10	V_{SS}	Ground
11		RxIN2-	Neg. LVDS differential data input (B1-B5,HS,VS,DE)
	12	RxIN2+	Pos. LVDS differential data input (B1-B5,HS,VS,DE)
13		V_{SS}	Ground
	14	CLK-	Clock Signal (-)
15		CLK+	Clock Signal (+)
	16	V_{SS}	Ground
17		U/D	Vert. Rev. (“L” level or Open; Normal, “H” level: Rev.)
	18	L/R	Horiz. Rev. (“L” level or Open; Normal, “H” level: Rev.)
19		V_{SS}	Ground
	20	V_{SS}	Ground

CN2 CCFL Power Source
BHR-04VS-1/Japan Solderless Terminal Mfg. Co., Ltd

Terminal No.	Symbol	Function
1	VFLH1	CCFL Power Supply (High Voltage)
2	VFLH2	CCFL Power Supply (Low Voltage)
3	NC	Non Connection (open)
4	VFLL	CCFL Power Supply (Low Voltage)

Notes:
Please connect GND pin to ground. Don’t use it as no-connect nor connection with high impedance. NC terminal should be open. Take away terminal No. 3 of the mating connector. If does not take away, it may cause smoke burn of electrical parts by high voltage.

Note (2): 256K colors are displayed by the combinations of 18 data bits.

	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	–
	Lt. 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		–
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
					:						:						:			L3~L60
					:						:						:			
		H	H	H	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L61
	Light	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
					:						:						:			L3~L60
					:						:						:			
		L	L	L	L	L	L	H	H	H	H	L	H	L	L	L	L	L	L	L61
	Light	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
					:						:						:			L3~L60
					:						:						:			
		L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	L	H	L61
	Light	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	H	L1
		L	L	L	L	H	L	L	L	L	L	H	L	L	L	L	L	H	L	L2
					:						:						:			L3~L60
					:						:						:			
		H	H	H	H	L	H	H	H	H	H	L	H	H	H	H	H	L	H	L61
	Light	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