Application Note

Create custom panel timings for SP-1920 Series
P/N 4176000XX-3

Revision History

Date	Rev No.	Page	Summary
20 Dec 2017	1.00	All	First issued

Content:

DIGITAL **VIEW**®

Version: 1.00   **Date:** 20 Dec 2017
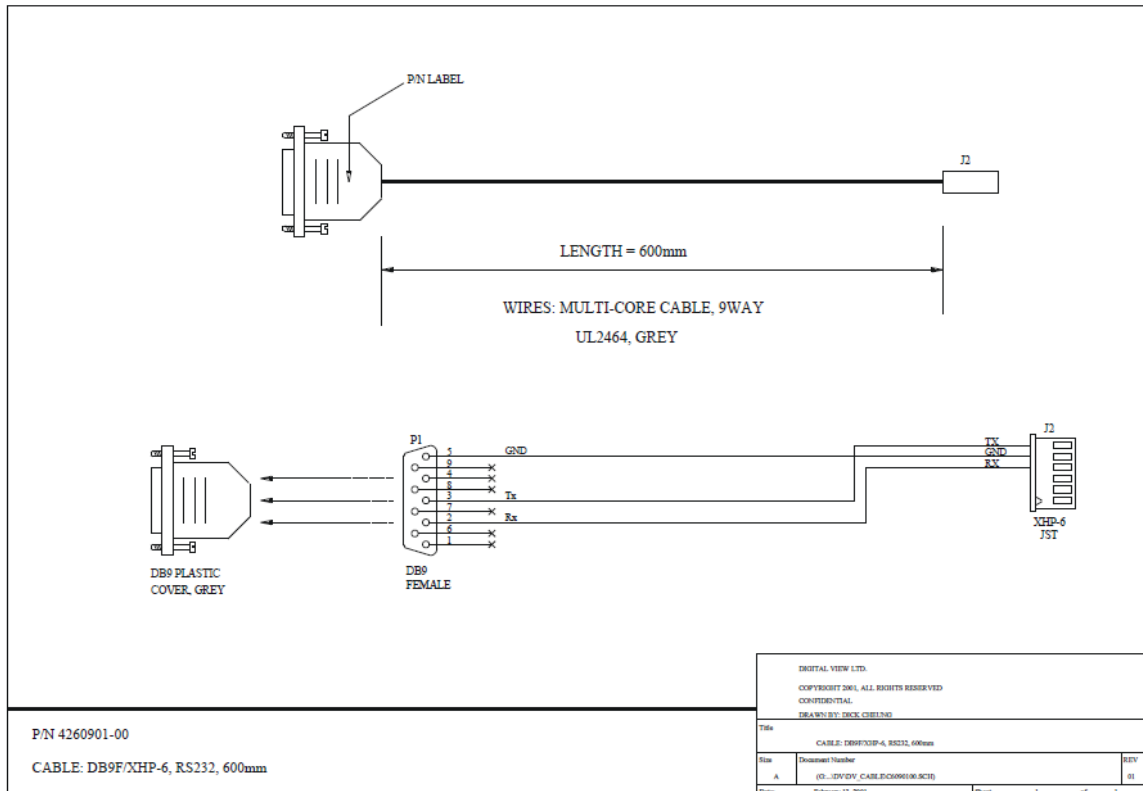
(1) Setup:

This application note shows how to create a custom panel timing on the Digital View SP-1920 LCD controller board.

Please make sure you have the following materials before starting the work:

1) Target panel specification
2) The target controller:
   - Use firmware version V1.06.00.00 or up for SP-1920.
3) Controller Utility V1.27 program
4) PC with RS-232 port
5) PC with Microsoft Windows XP or later.
6) RS-232 programming cable (e.g P/N 426090100-3)

Use RS-232 programming cable (we suggest using P/N 426090100-3 for SP-1920). DB9 connector connect to serial port, and Molex 51021-0600 / JST XHP-6 or compatible connect to CN8 on the controller board.

For SP-1920 RS-232 cable drawing P/N 426171800-3 :

(2) Install the Controller Utility Program

Step 1: Open the Controller Utility program (Version 1.27 or later). (Please uninstall any earlier versions before installing the latest version)

Note: This software tool requires the Microsoft .NET Framework to execute. If your computer does not have the Microsoft .NET Framework installed please go to http://www.microsoft.com to download and install the latest .NET Framework.

Step 2: Choose the communication port and select corresponding "Baud Rate" (2400) matching with the controller. Then Click **Connect**.
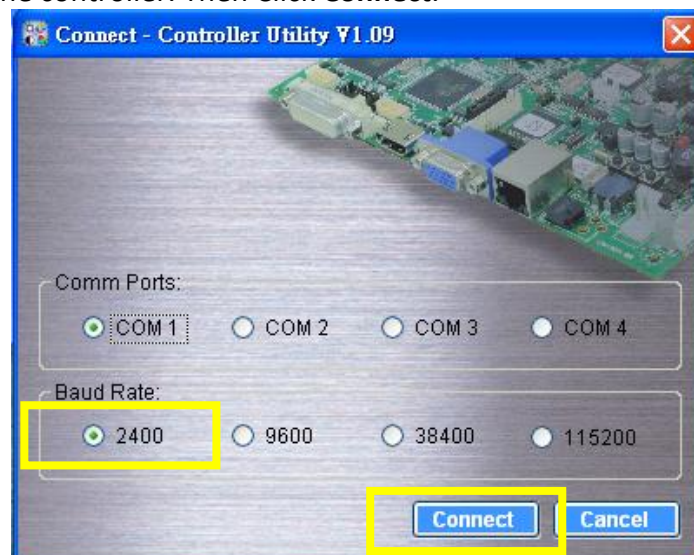
Step 3: Choose "Panel Timing" function in the main window of the Controller Utility Program.

Step 4: Custom panel timing parameter entry page will be shown for entering the panel timing data.
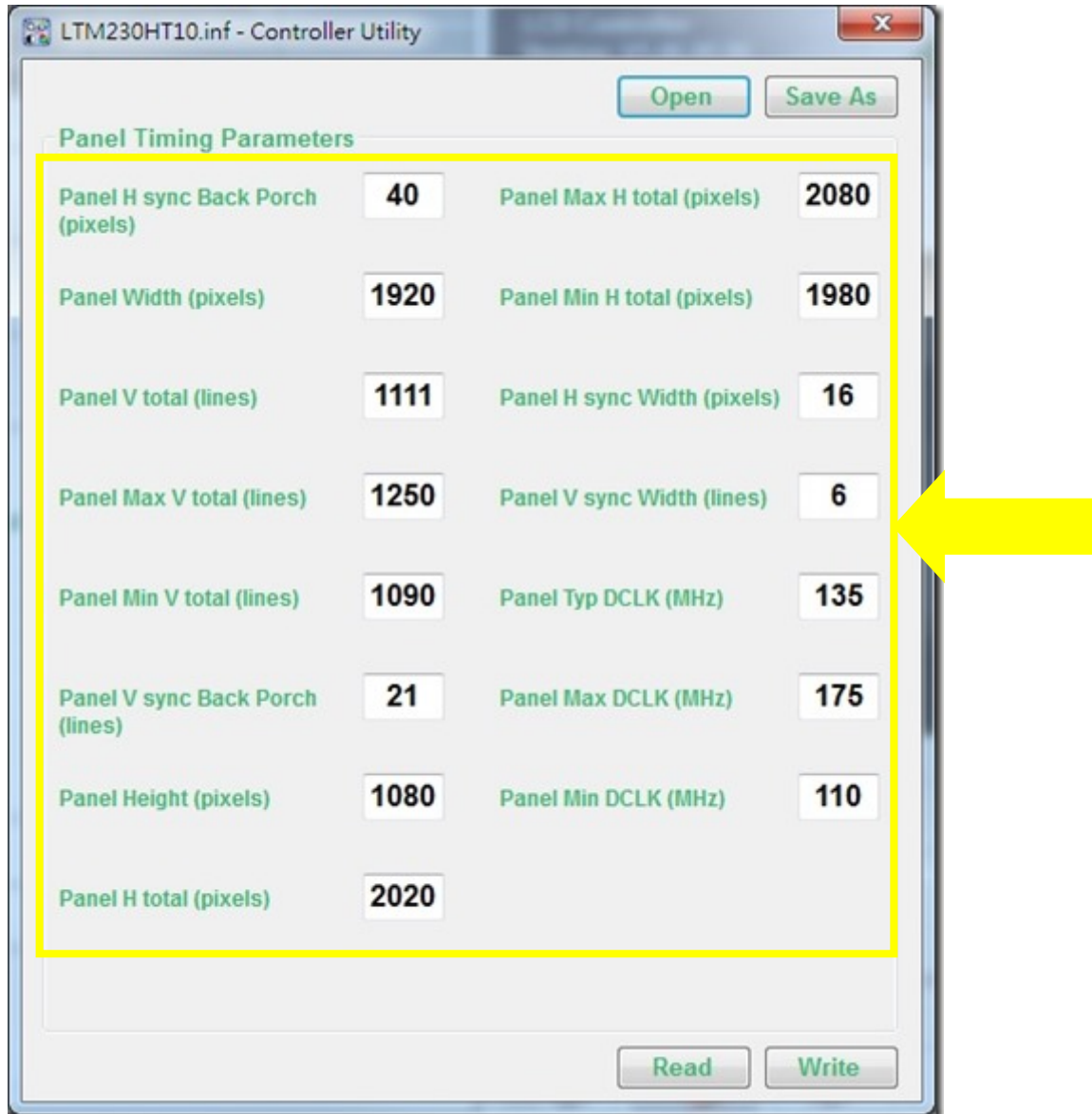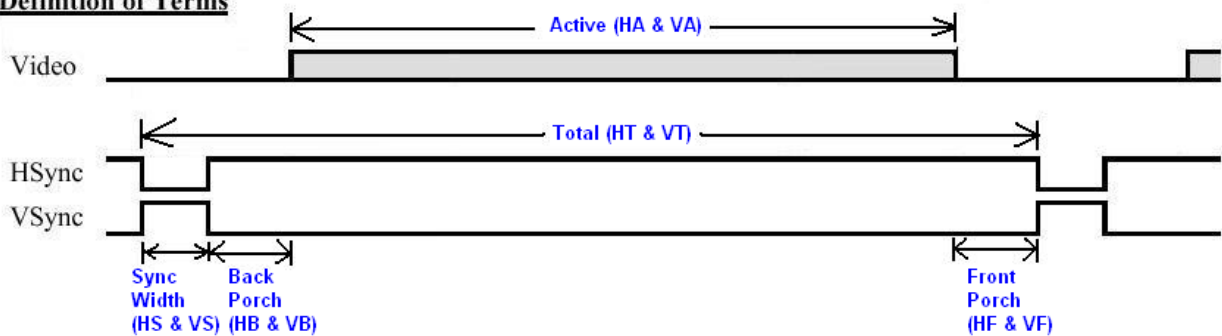
(3) Custom panel timings input

The panel timing consists of two five parameter groups in Horizontal and Vertical. These five parameters are:

a) Active: The portion that has the valid display content (HA and VA)

b) Sync width: (HS and VS)

c) Front Porch: Duration between the end of valid display and the beginning of Sync (HF and VF) - Not necessary to input.

d) Back Porch: Duration between end of Sync and beginning of valid display (HB and VB)

e) Total: equal a) + b) + c) + d) (HT and VT)

Definition of Terms

Video	Active (HA & VA)
HSync	Total (HT & VT)
VSync	
	Sync Width (HS & VS) Back Porch (HB & VB) Front Porch (HF & VF)

The panel timings parameters

The .inf file has total 13 parameters. 6 parameters specify the horizontal (HT, HTmax, HTmin, HA, HS, HB) and 7 parameters specify the vertical (Vsync, VT, VTmax, VTmin, VA, VS & VB)

You need to observe two rules here:

HT > HA + HS + HB ...... rule 1
VT > VA + VS + VB ...... rule 2

You can always find HT, HTmax, HTmin, HA, VSync, VT, VTmax, VTmin and VA in thepanel specification. You can find HS and VS in most panel specification as well. HB and VB is less common.

In case you cannot find all these parameters, the rule of thumb is:

HS=HB and VS=VB ...... **rule 3**
HS= 1/4 x (HT-HA) and VS = 1/4 x (VT-VA) ...... **rule 4**

round to the closest integer number

(4) Examples

Below lists some examples how you can find the timing information from the panel specification:

4.1) LG LP101WX1-SLN1 (resolution 1280x800)

ITEM	Symbol		Min	Typ	Max	Unit	Note
DCLK	Frequency	f_{CLK}	67.5	71.0	74.5	MHz	
Hsync	Period	T_{hp}	1366	1440	1488		
	Width	t_{WH}	16	32	48	tCLK	
	Width-Active	t_{WHA}	1280	1280	1280		
Vsync	Period	t_{VP}	811	823	847		
	Width	t_{WV}	3	6	9	tHP	
	Width-Active	t_{WVA}	800	800	800		
Data Enable	Horizontal back porch	t_{HBP}	54	80	98	tCLK	
	Horizontal front porch	t_{HFP}	16	48	62		
	Vertical back porch	t_{VBP}	7	15	35	tHP	
	Vertical front porch	t_{VFP}	1	2	3		

Panel V Sync Freq (Hz) = Vsync = 1 / [(1 / 71M) x HT x VT)] = 1/[(1/71M) x 1440 x 823] = **60Hz**

Panel H sync Back Porch (pixels) = HB = **80**

Panel Width (pixels) = HA = **1280**

Panel V total (lines) = VT = **823**

Panel Max V total (lines) = VTmax = **847**

Panel Min V total (lines) = VTmin = **811**

Panel V sync Back Porch (lines) = VB = **15**

Panel Height (pixels) = VA = **800**

Panel H total (pixels) = HT = **1440**

Panel Max H total (pixels) = HTmax = **1488**

Panel Min H total (pixels) = HTmin = **1366**

Panel H sync Width (pixels) = HS = **32**

Panel V sync Width (lines) = VS = **6**

Panel Typ DCLK (MHz) = Typ DCLK = **71**

Panel Max DCLK (MHz) = Max DCLK = **74**

Panel Min DCLK (MHz) = Min DCLK = **67**

Rule 1 & 2 are observed here.

4.2) AUO B101EW05 V0 (resolution 1280x800)

Parameter		Symbol	Min.	Typ.	Max.	Unit
Frame Rate		---	---	60	---	Hz
Clock frequency		$1/T_{Clock}$	64	68.93	85	MHz
Vertical Section	Period	T_V	808	816	1023	T_{Line}
	Active	T_{VD}		800		
	Blanking	T_{VB}	8	16	223	
Horizontal Section	Period	T_H	1310	1408	2047	T_{Clock}
	Active	T_{HD}		1280		
	Blanking	T_{HB}	40	168	767	

Panel V Sync Freq (Hz) = Vsync = **60**
Panel H sync Back Porch (pixels) = HB = 1/4(HT-HA)* = **32**
Panel Width (pixels) = HA = **1280**
Panel V total (lines) = VT = **816**
Panel Max V total (lines) = VTmax = **1023**
Panel Min V total (lines) = VTmin = **808**
Panel V sync Back Porch (lines) = VB = 1/4(VT-VA)* = **4**
Panel Height (pixels) = VA = **800**
Panel H total (pixels) = HT = **1408**
Panel Max H total (pixels) = HTmax = **2047**
Panel Min H total (pixels) = HTmin = **1310**
Panel H sync Width (pixels) = HS = 1/4 x (HT-HA)* = **32**
Panel V sync Width (lines) = VS = 1/4 x (VT-VA)* = **4**
Panel Typ DCLK (MHz) = Typ DCLK = **68**
Panel Max DCLK (MHz) = Max DCLK = **85**
Panel Min DCLK (MHz) = Min DCLK = **64**

* Rule 3 & 4 are observed here.

4.3) Kyocera T-55787GD104J-LW-ALN (resolution 800x600)

Item		Symbol	Min.	Typ.	Max	Unit	Note
Clock (CK)	Frequency	1/Tc	30	40	48	MHz	
Enable signal (DE)	Horizontal Period	Th	860	1056	1395	Tc	
			24.0	26.4	-	μ s	1)
	Horizontal display period	Thd		800		Tc	
	Vertical Period	Tv	610	628	1024	Th	
	Vertical display period	Tvd		600		Th	
Refresh rate		fv	50	60	70	Hz	2)

Panel V Sync Freq (Hz) = Vsync = **60**
Panel H sync Back Porch (pixels) = HB = 1/4(HT-HA)* = **64**
Panel Width (pixels) = HA = **800**
Panel V total (lines) = VT = **628**
Panel Max V total (lines) = VTmax = **1024**
Panel Min V total (lines) = VTmin = **610**
Panel V sync Back Porch (lines) = VB = 1/4(VT-VA)* = **7**
Panel Height (pixels) = VA = **600**
Panel H total (pixels) = HT = **1056**
Panel Max H total (pixels) = HTmax = **1395**
Panel Min H total (pixels) = HTmin = **860**
Panel H sync Width (pixels) = HS = 1/4 x (HT-HA)* = **64**
Panel V sync Width (lines) = VS = 1/4 x (VT-VA)* = **7**
Panel Typ DCLK (MHz) = Typ DCLK = **40**
Panel Max DCLK (MHz) = Max DCLK = **48**
Panel Min DCLK (MHz) = Min DCLK = **30**

* Use Rule 3 & 4 are observed here.
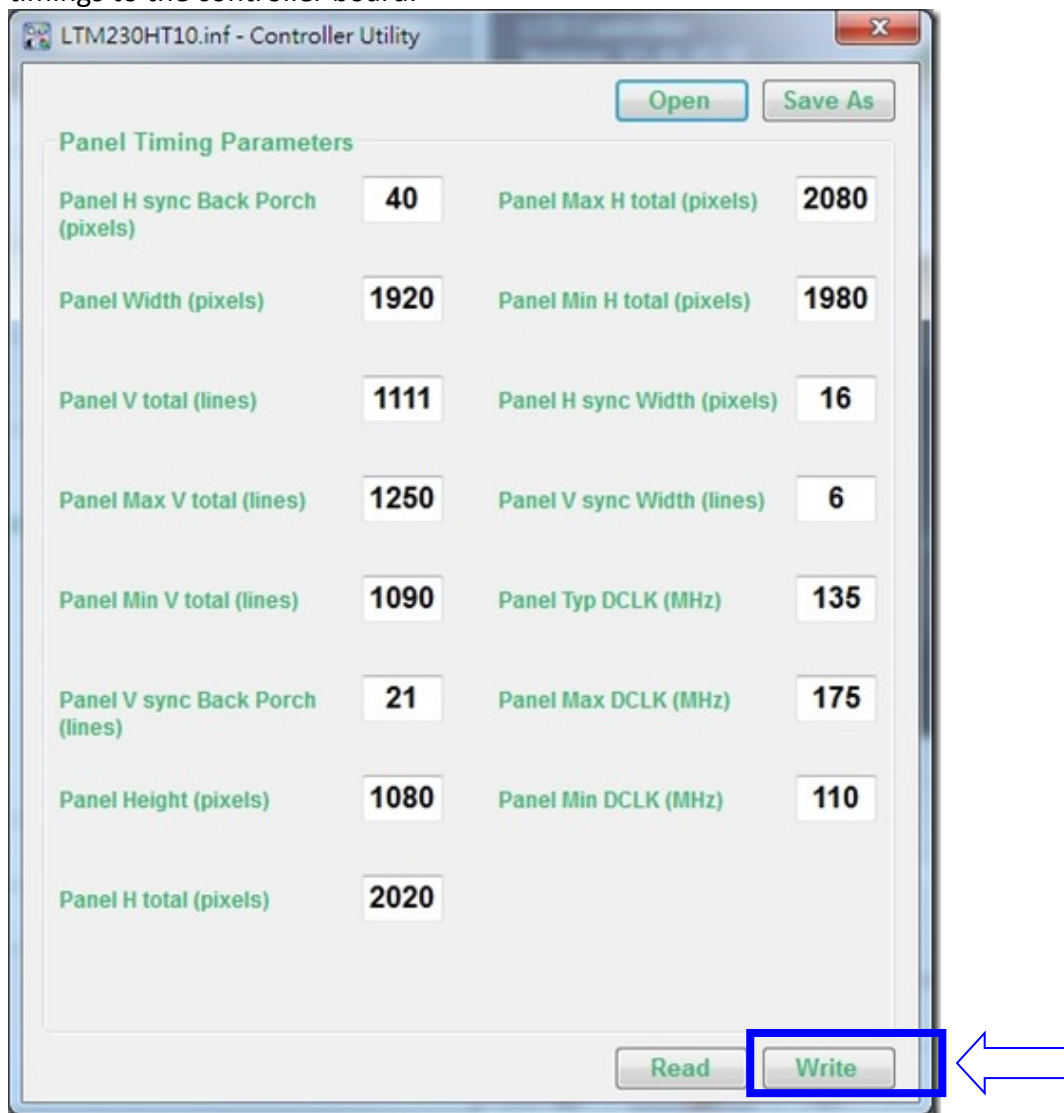
5) Download the new panel timings to the controller board

Step 1: Set SW1 position 1 – 8 to ON on the controller using the custom panel timings.

Step 2: Once you entered the custom panel timings data in the panel timings page and then power on the controller, press the "WRITE" function to download the new panel timings to the controller board.
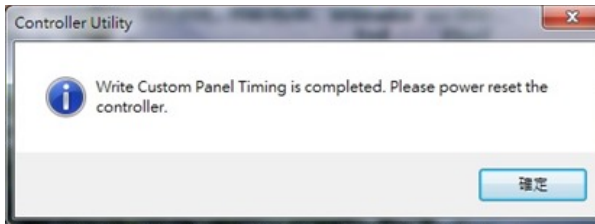
LTM230HT10.inf - Controller Utility

	Open	Save As

Panel Timing Parameters

Panel H sync Back Porch (pixels)	40	Panel Max H total (pixels)	2080
Panel Width (pixels)	1920	Panel Min H total (pixels)	1980
Panel V total (lines)	1111	Panel H sync Width (pixels)	16
Panel Max V total (lines)	1250	Panel V sync Width (lines)	6
Panel Min V total (lines)	1090	Panel Typ DCLK (MHz)	135
Panel V sync Back Porch (lines)	21	Panel Max DCLK (MHz)	175
Panel Height (pixels)	1080	Panel Min DCLK (MHz)	110
Panel H total (pixels)	2020		

Read	Write

**Step 3:** It will show the success message (see below) when completed.

Step 4: Power off and then on the controller.
6) Save and Open the panel timing file:

The Controller Utility program is allowed to Save the panel timings to a ".inf" file to record the panel timings data and it can be used by Digital View to add this specific panel to the production firmware.

The Controller Utility program is also allowed to Open the saved '.inf' file to load the custom panel timing data on the custom panel timing page.
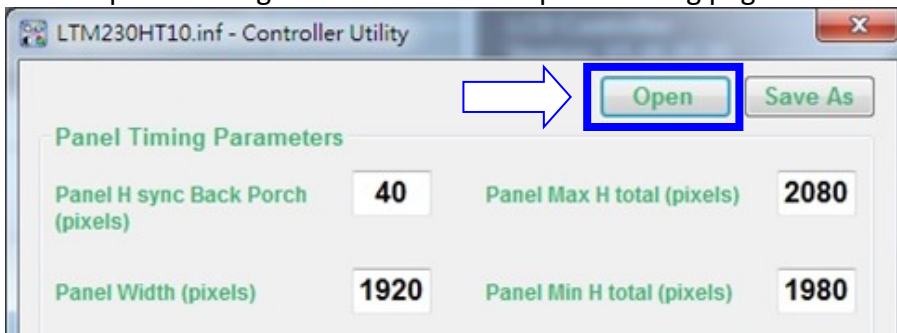
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