

**Application Note: Create custom panel timings
on SP-1920**



Version: 1.00

Date: 20 Dec 2017

Application Note

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

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Revision History

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

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(1) Setup :

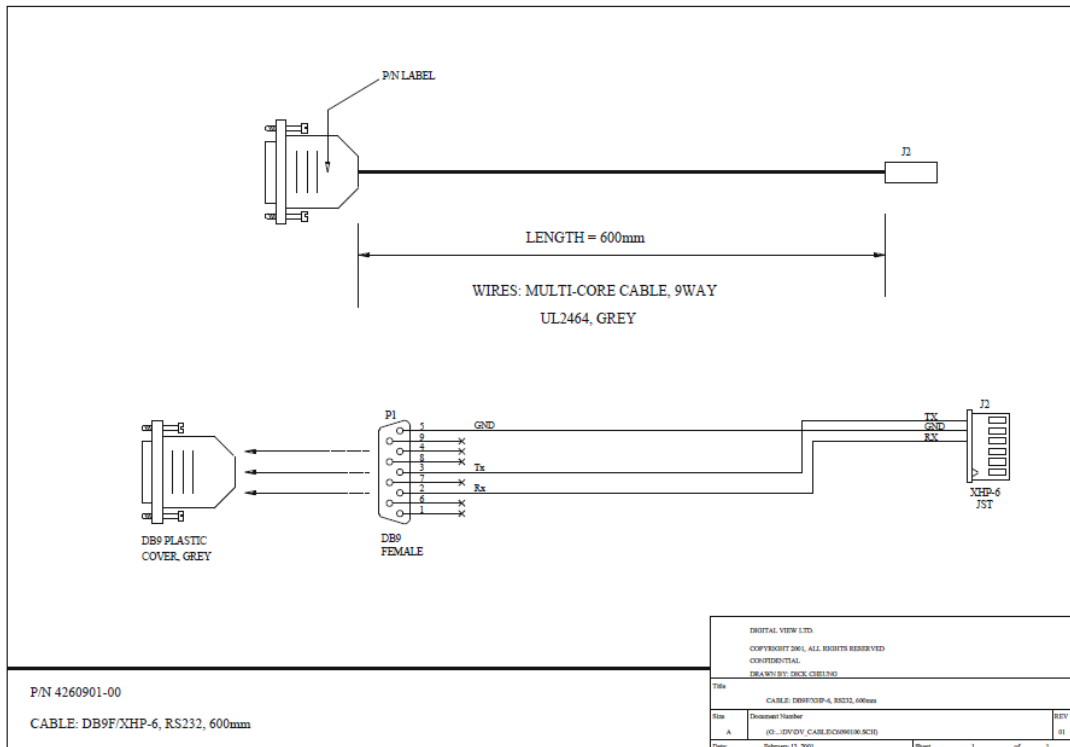
This application note will show how to create a custom panel timing on SP-1920 controller.

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 (suggest to use 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 :



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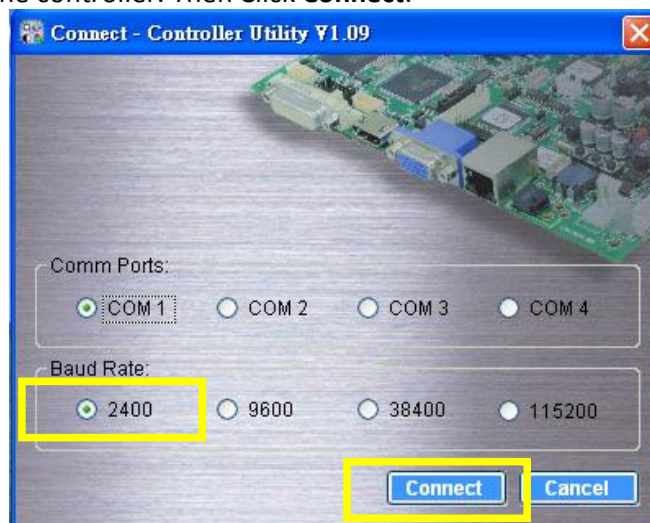
(2) Install the Controller Utility Program

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

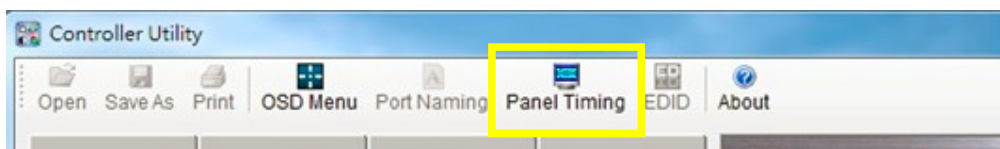


Note: This software tool requires the Microsoft .NET Framework to execute. If your computer does not have the Microsoft .NET Framework installed please go to <http://www.microsoft.com> to download and install the latest .NET Framework.

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.



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Step 4 : Custom panel timings entry page will be shown for entering the panel timing data.

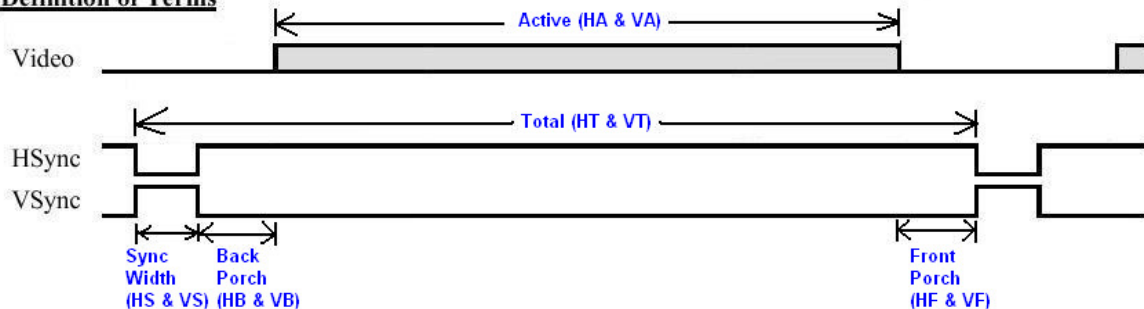


(3) Custom panel timings input

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 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



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 panel specification. You can find HS and VS in most panel specification as well. HB and VB is less common.

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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

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(4) Examples

Below list some example how you could find the timing information from 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	tCLK
	Width	t_{WH}	16	32	48	tCLK
	Width-Active	t_{WHA}	1280	1280	1280	tHP
Vsync	Period	t_{VP}	811	823	847	tHP
	Width	t_{WV}	3	6	9	tHP
	Width-Active	t_{WVA}	800	800	800	tHP
Data Enable	Horizontal back porch	t_{HBP}	54	80	98	tCLK
	Horizontal front porch	t_{HFP}	16	48	62	tCLK
	Vertical back porch	t_{VBP}	7	15	35	tHP
	Vertical front porch	t_{VFP}	1	2	3	tHP

$$\text{Panel V Sync Freq (Hz)} = \text{Vsync} = 1 / [(1 / 71M) \times \text{HT} \times \text{VT}] = 1 / [(1/71M) \times 1440 \times 823] = \mathbf{60\text{Hz}}$$

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.

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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	816	1023	T _{Line}
	Active	T _{VD}	800		
	Blanking	T _{VB}	8	223	
Horizontal Section	Period	T _H	1408	2047	T _{clock}
	Active	T _{HD}	1280		
	Blanking	T _{HB}	40	767	

- Panel V Sync Freq (Hz) = $V_{sync} = 60$
- 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) = $VT_{max} = 1023$
- Panel Min V total (lines) = $VT_{min} = 808$
- 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) = $HT_{max} = 2047$
- Panel Min H total (pixels) = $HT_{min} = 1310$
- Panel H sync Width (pixels) = $HS = 1/4 \times (HT-HA)^* = 32$
- Panel V sync Width (lines) = $VS = 1/4 \times (VT-VA)^* = 4$
- 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.

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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	
	Horizontal display period	Thd	24.0	26.4	-	μ s	1)
	Vertical Period	Tv	610	628	1024	Tc	
	Vertical display period	Tvd	-	600	-	Th	
Refresh rate	fv	50	60	70	Hz	2)	

- Panel V Sync Freq (Hz) = $V_{sync} = 60$
- 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) = $VT_{max} = 1024$
- Panel Min V total (lines) = $VT_{min} = 610$
- 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) = $HT_{max} = 1395$
- Panel Min H total (pixels) = $HT_{min} = 860$
- Panel H sync Width (pixels) = $HS = 1/4 \times (HT-HA)^* = 64$
- Panel V sync Width (lines) = $VS = 1/4 \times (VT-VA)^* = 7$
- 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.

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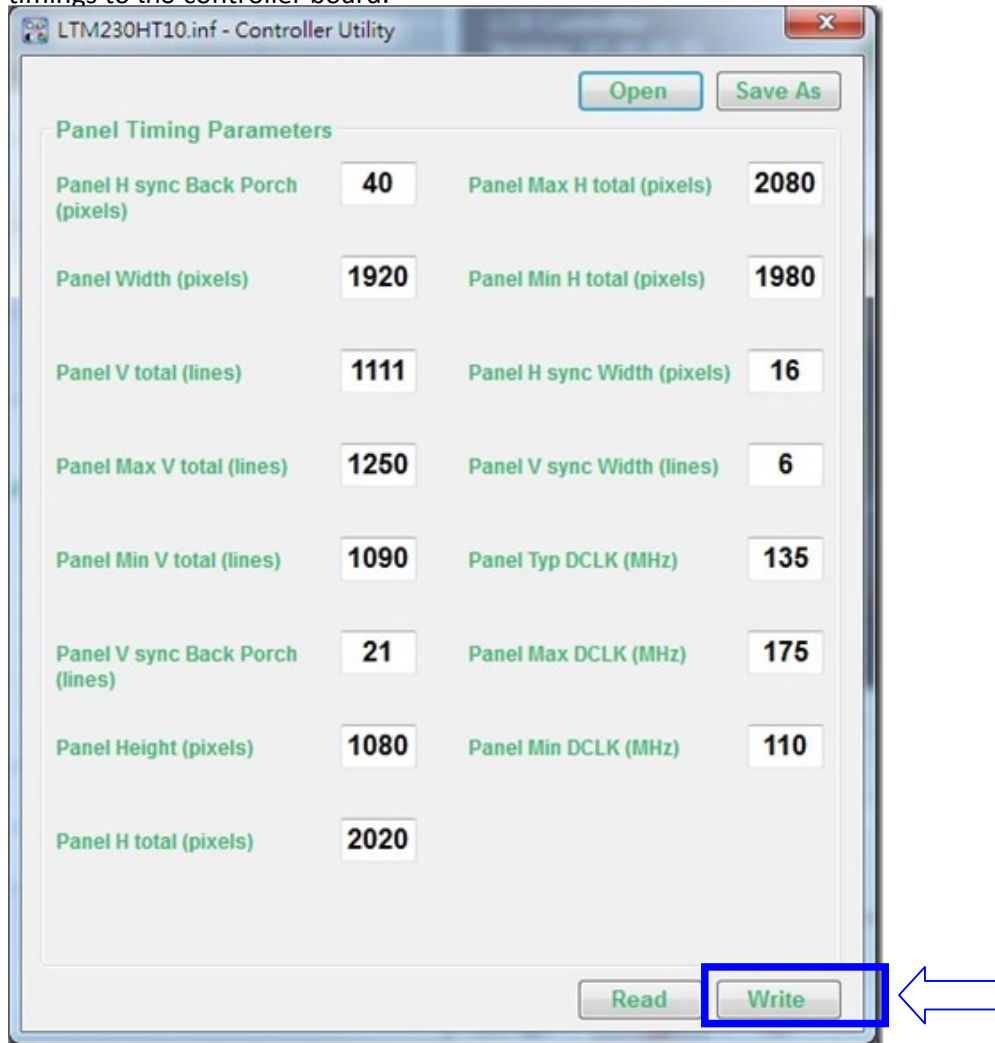
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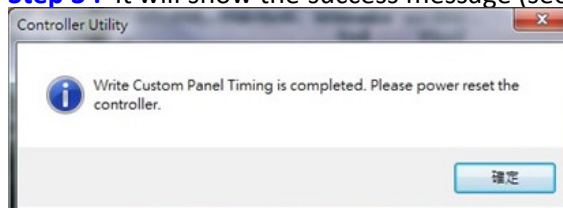
5) Download the new panel timings to controller board

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

Step 2 : Once you have entered the custom panel timing data in the panel timings page and then powered on the controller, press "WRITE" function to download the new panel timings to the controller board.



Step 3 : It will show the success message (see below) after completion.



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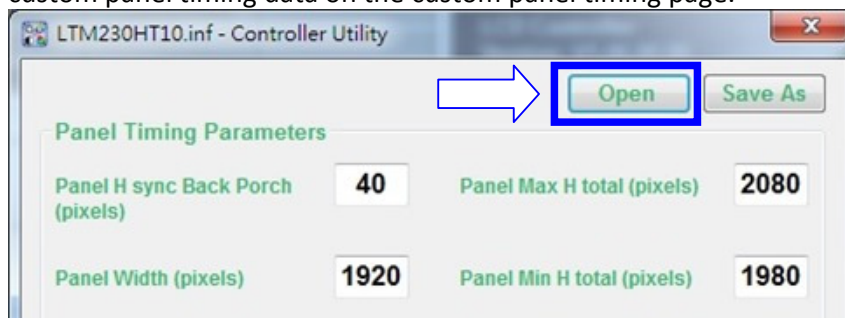
Step 4: Power off and then on the controller.

6) Save and Open the panel timing file :

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



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



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7) CONTACT DETAILS

- USA:** Digital View Inc.
18440 Technology Drive
Building 130
Morgan Hill, CA 95037
Tel: (1) 408-782 7773 Fax: (1) 408-782 7883
Sales: ussales@digitalview.com
- EUROPE:** Digital View Ltd.
The Lakehouse, Knebworth Park,
Herts, SG3 6PY
UK
Tel: (44) (0)20 7631 2150 Fax : (44) (0)20 7631 2156
Sales : uksales@digitalview.com
- ASIA:** Digital View Ltd.
Unit 705-708, 7/F Texwood Plaza
6 How Ming Street
Kwun Tong
Hong Kong.
Tel: (852) 2861 3615 Fax: (852) 2520 2987
Sales: hksales@digitalview.com

Specifications subject to change without notice

apnote - create custom panel timings for SP-1920 (Dec 2017)

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