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S1D13705 Embedded Memory LCD Controller

13705CFG Configuration Program

Document Number: X27A-B-001-03

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13705CFG

13705CFG is an interactive Windows® program that calculates register values for a user-defined S1D13705 configuration. The configuration information can be used to directly alter the operating characteristics of the S1D13705 utilities or any program built with the Hardware Abstraction Layer (HAL) library. Alternatively, the configuration information can be saved in a variety of text file formats for use in other applications.

Note

This program is a Windows desktop application suitable for configuring software for a given implementation of an Epson LCD controller. However, it is not a display driver for any Windows desktop operating system. Epson does not provide display drivers for any of the Windows desktop operating systems.

S1D13705 Supported Evaluation Platforms

13705CFG runs on PC system running Windows 9x/ME/XP/NT/2000 and can modify Win32 .exe files.

Installation

Create a directory for **13705cfg.exe** and the S1D13705 utilities. Copy the files **13705cfg.exe** and **panels.def** to that directory. **Panels.def** contains configuration information for a number of panels and must reside in the same directory as **13705cfg.exe**.

Usage

To start 13705CFG from the Windows desktop, double-click on the My Computer icon and run the program **13705cfg.exe** from the installed directory.

To start 13705CFG from a Windows command prompt, change to the directory **13705cfg.exe** was installed to and type the command **13705cfg**.

The basic procedure for using 13705CFG is:

1. Start 13705CFG as described above.
2. Open an existing file to serve as a starting reference point (this step is optional).
3. Modify the configuration. For specific information on editing the configuration, see “13705CFG Configuration Tabs” on page 7.
4. Save the new configuration. The configuration information can be saved in two ways; as an ASCII text file or by modifying an executable image on disk.

   Several ASCII text file formats are supported. Most are formatted C header files used to build display drivers or standalone applications.

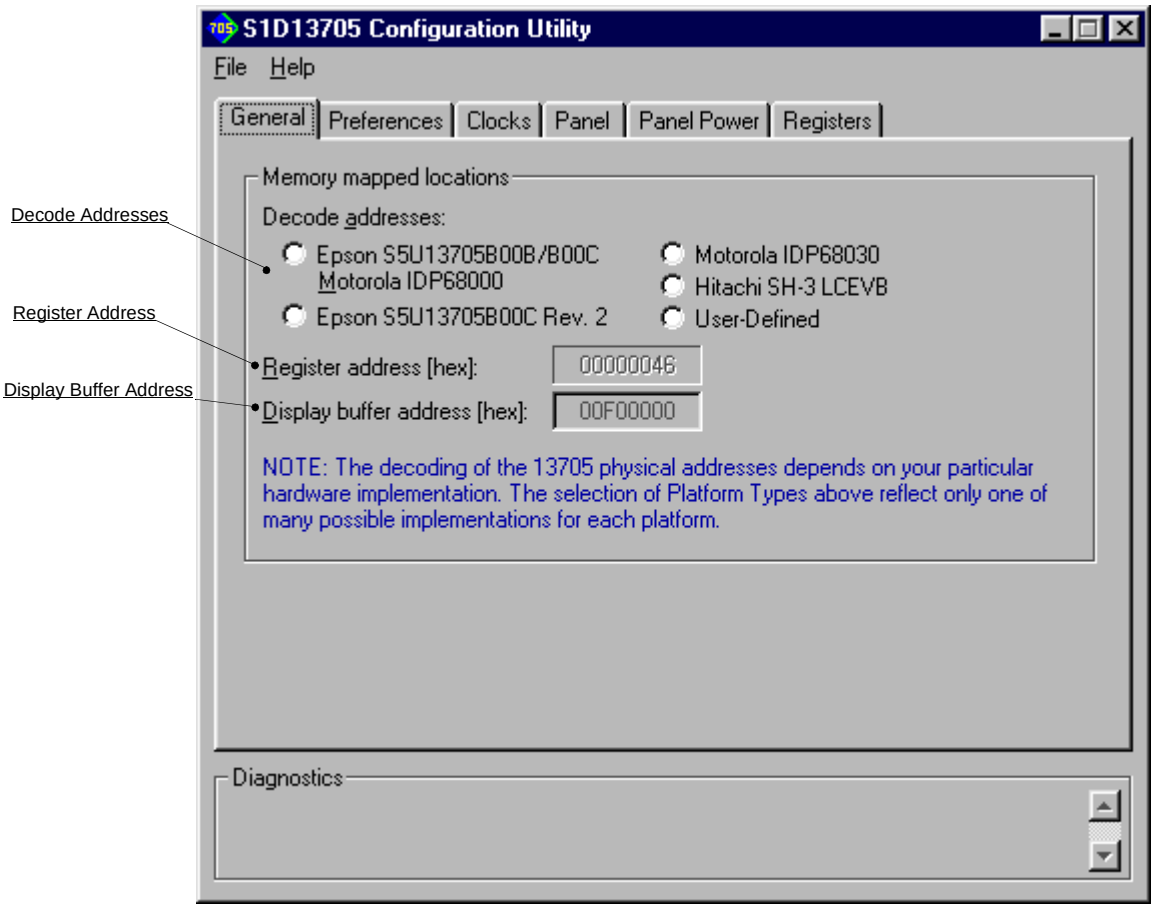
   Utility files based on the Hardware Abstraction Layer (HAL) can be modified directly by 13705CFG.

13705CFG Configuration Tabs

13705CFG provides a series of tabs which can be selected at the top of the main window. Each tab allows the configuration of a specific aspect of S1D13705 operation.

The tabs are labeled “General”, “Preference”, “Clocks”, “Panel”, “Panel Power”, and “Registers”. The following sections describe the purpose and use of each of the tabs.

General Tab



The General tab contains S1D13705 evaluation board specific information. The values presented are used for configuring HAL based executable utilities. The settings on this tab specify where in CPU address space the registers and display buffer are located.

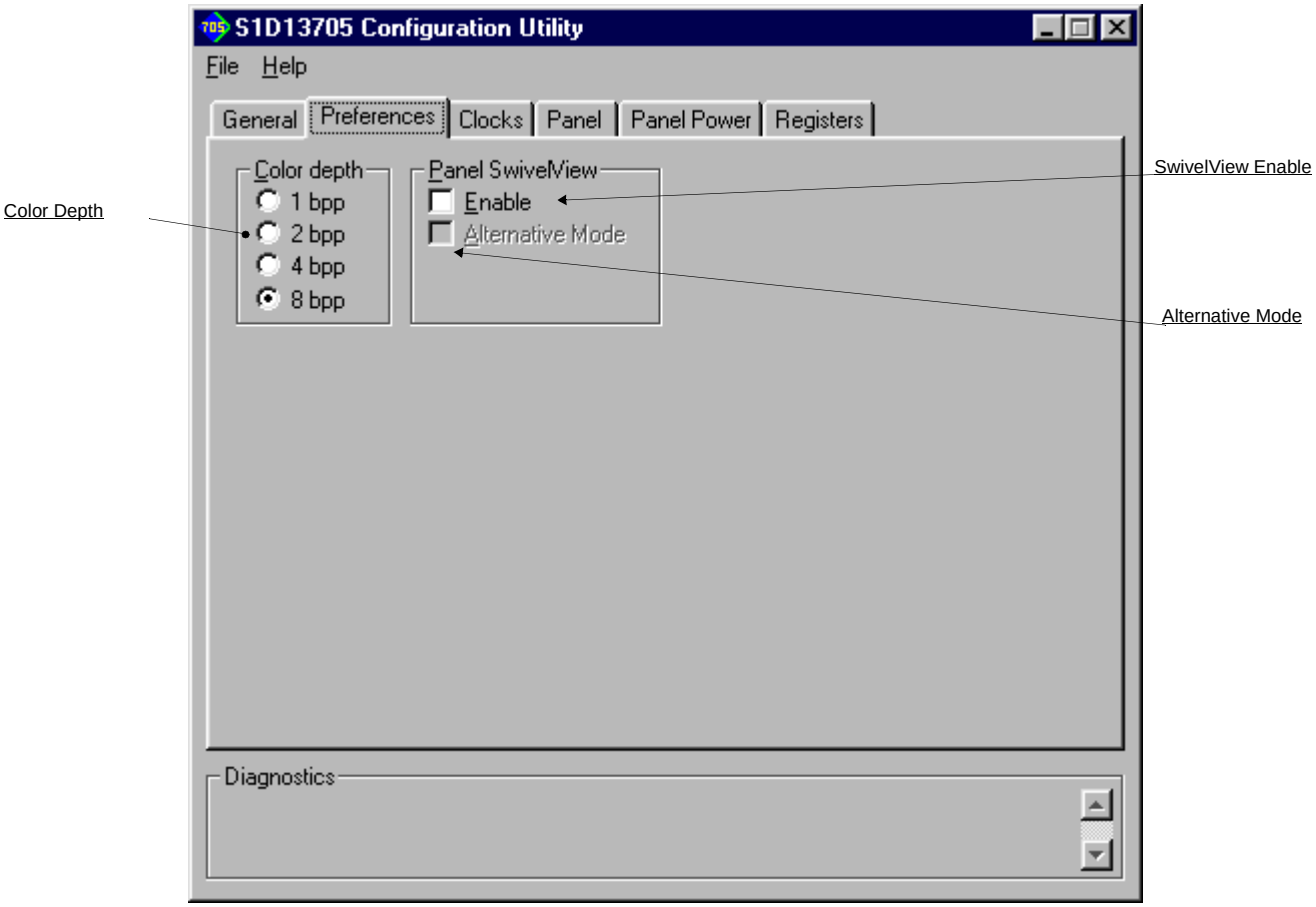
Decode Addresses	Selecting one of the listed evaluation platforms changes the values for the “Register address” and “Display buffer address” fields. The values used for each evaluation platform are examples of possible implementations as used by the Epson S1D13705 evaluation board. If your hardware implementation differs from the addresses used, select the User-Defined option and enter the correct addresses for “Register address” and “Display buffer address”.
Register Address	The physical address of the start of register decode space (in hexadecimal). This field is automatically set according to the Decode Address unless the “User-Defined” decode address is selected.
Display Buffer Address	The physical address of the start of display buffer decode space (in hexadecimal). This field is automatically set according to the Decode Address unless the “User-Defined” decode address is selected.

Note

When “Epson S5U13705B00C Rev. 2 Evaluation Board” is selected, the register and display buffer addresses are blanked because the evaluation board uses the PCI interface and the decode addresses are determined by the system BIOS during boot-up.

If using the S1D13705 Evaluation Board on a PCI based platform, both Windows and the S1D13XXX device driver must be installed. For further information on the S1D13XXX device driver, see the *S1D13XXX Windows 32-bit Windows Device Driver Installation Guide*, document number X00A-E-003-xx.

Preferences Tab



The Preference tab contains settings pertaining to the initial display state. During runtime these settings may be changed.

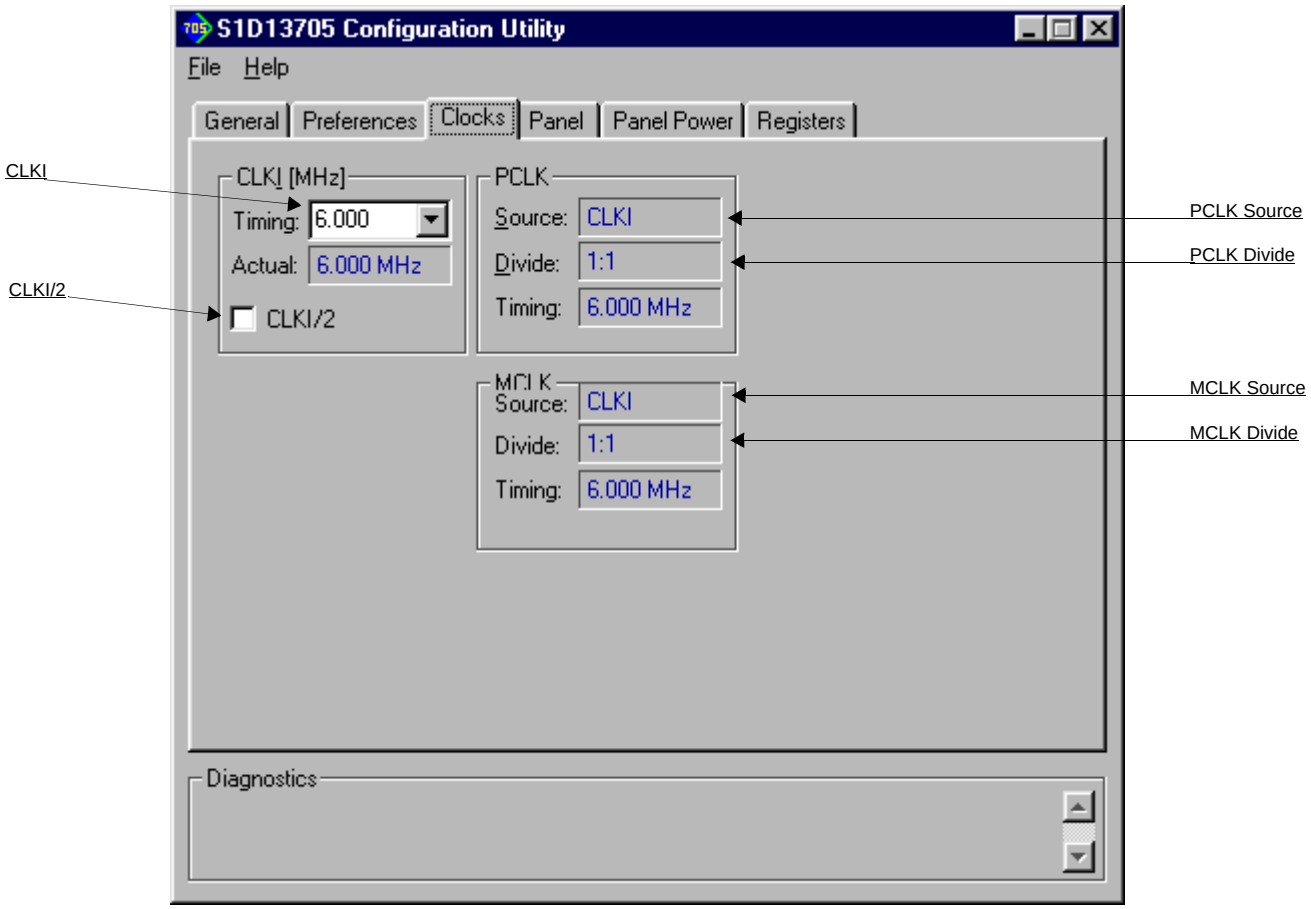
Color Depth	Sets the initial color depth on the LCD panel.
Panel SwivelView	The S1D13705 SwivelView feature is capable of rotating the image displayed on an LCD panel 90° in a counter-clockwise direction. This sets the initial orientation of the panel. The SwivelView feature can be run in two different modes. Default mode requires a virtual display which requires more memory but uses less power.
Enable	When this box is checked SwivelView is enabled and the LCD display is rotated 90° in a counter-clockwise direction.

Alternative Mode

When alternate mode is selected, SwivelView requires no virtual display but consumes more power.

For details see the *S1D13705 Hardware Functional Specification*, document number X27A-A-001-xx.

Clocks Tab



The Clocks tab is intended to simplify the selection of input clock frequencies and the source of internal clocking signals. For further information regarding clocking and clock sources, refer to the *S1D13705 Hardware Functional Specification*, document number X27A-A-001-xx.

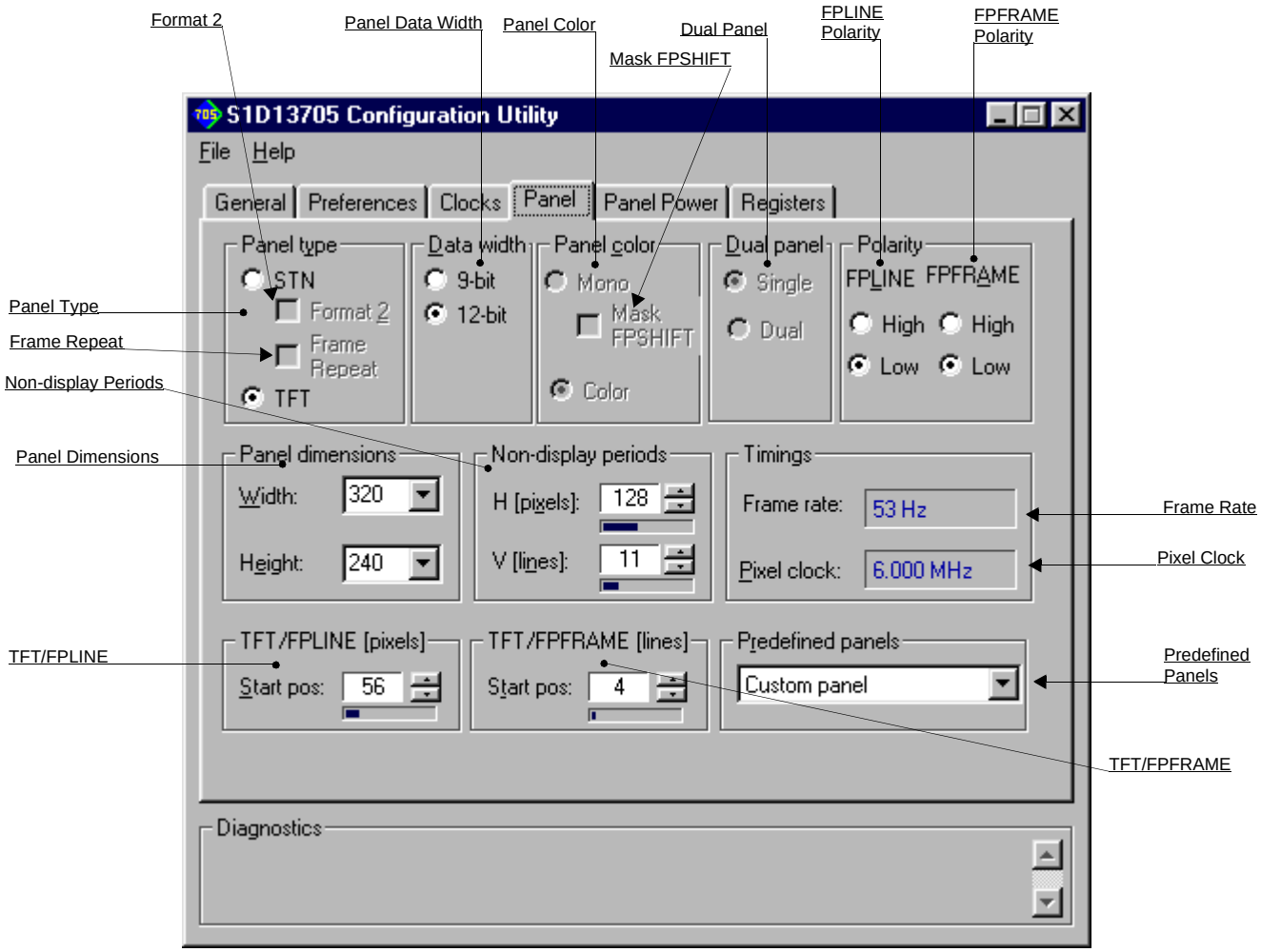
Note

Options for LCD frame rates are limited to ranges determined by the clock values. Changing clock values may modify or invalidate Panel settings. Confirm all settings on the Panel tab after modifying any clock settings.

The S1D13705 uses one clock input known as CLKI. The pixel clock (PCLK) and the memory clock (MCLK) are both derived from CLKI.

CLKI	This setting determines the frequency of CLKI. CLKI is the source for both PCLK and MCLK. The CLKI frequency must be selected from the drop down list or by entering the desired frequency in MHz. The actual CLKI frequency used for configuration is displayed in blue in the Actual section.
CLKI/2	Selecting this box divides the input clock, CLKI, in half for internal S1D13705 operations.
PCLK	These settings confirm the signal source and input clock divisor for the pixel clock (PCLK).
Source	The PCLK source is CLKI.
Divide	The divide ratio for the clock source signal is 1:1.
Timing	This field shows the actual PCLK used by the configuration process.
MCLK	These settings confirm the signal source and input clock divisor for the memory clock (MCLK).
Source	The MCLK source is CLKI.
Divide	The divide ratio for the clock source signal is 1:1.
Timing	This field shows the actual MCLK frequency used by the configuration process.

Panel Tab



The S1D13705 supports many panel types. This tab allows configuration of most panel settings such as panel dimensions, type and timings.

Panel Type

Selects between passive (STN) and active (TFT/D-TFD) panel types. The Epson D-TFD panels are supported only in TFT compatible mode.

Several options may change or become unavailable when the STN/TFT setting is switched. Therefore, confirm all settings on this tab after the Panel Type is changed.

Format 2	Selects color STN panel format 2. This option is specifically for configuring 8-bit color STN panels. See the *S1D13705 Hardware Functional Specification*, document number X27A-A-001-xx, for description of format 1 / format 2 data formats. Most new panels use the format 2 data format.
Frame Repeat	Selects Frame Repeat feature for use with EL panels. See the *S1D13705 Hardware Functional Specification*, document number X27A-A-001-xx, for description of Frame Repeat.
Data Width	Selects the panel data width. Panel data width is the number of bits of data transferred to the LCD panel on each clock cycle and shouldn't be confused with color depth which determines the number of displayed colors. When the panel type is STN, the available options are 4 and 8 bit. When an active panel type is selected the available options are 9 and 12 bit.
Panel Color	Selects between a monochrome or color panel.
Mask FPSHIFT	When selected causes the signal FPSHIFT to be masked. When color or TFT panel is selected this option is disabled.
Dual Panel	Selects between single or dual panel. When the panel type is TFT, "Single" is automatically selected and the "Dual" option is greyed out.
Polarity	These settings define the polarity of the FPLINE and FPFRAME pulses.
FPLINE Polarity	Selects the polarity of the FPLINE pulse. Refer to the panel specification for the correct polarity of the FPLINE pulse.
FPFRAME Polarity	Selects the polarity of the FPFRAME pulse. Refer to the panel specification for the correct polarity of the FPFRAME pulse.

Panel Dimensions

These fields specify the panel width and height. A number of common widths and height are available in the selection boxes. If the width/height of your panel is not listed, enter the actual panel dimensions into the edit field.

Manually entered pixel widths must be multiples of 8. If a value is entered that does not match these requirements, a notification box appears and 13705CFG rounds up the value to the next allowable width.

Non-Display Periods

It is recommended that these automatically generated non-display values be used without adjustment. However, manual adjustment may be useful in fine tuning the non-display width and non-display height.

Timings

These settings show the Frame Rate and Pixel Clock timings.

Frame Rate

This field displays the effective frame rate of the LCD panel. Panel dimensions are fixed therefore frame rate can only be adjusted by changing either PCLK or non-display period values. Higher frame rates correspond to smaller horizontal and vertical non-display values, or higher PCLK frequencies.

Pixel Clock

The pixel clock used for the LCD panel is displayed in this field. The pixel clock is dependent on the CLKI frequency.

TFT/FPLINE

Start Pos

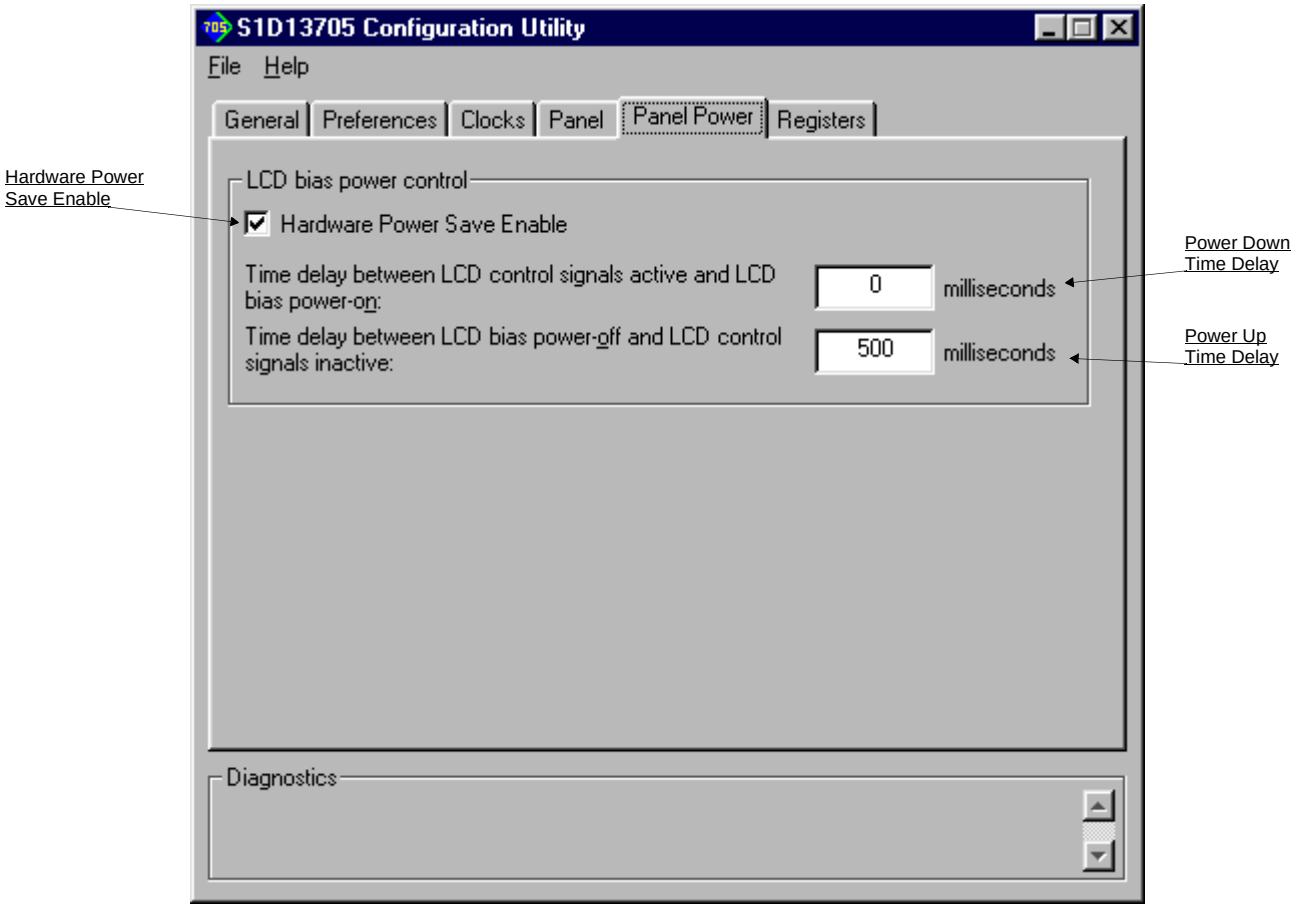
Specifies the delay (in pixels) from the start of the horizontal non-display period to the leading edge of the FPLINE pulse. This setting is only available when the selected panel type is TFT.

Refer to *S1D13705 Hardware Functional Specification*, document number X27A-A-001-xx for a complete description of the FPLINE pulse settings.

TFT/FPFRAME

Start Pos	Specifies the delay (in lines) from the start of the vertical non-display period to the leading edge of the FPFRAME pulse. This settings is only available when the selected panel type is TFT. Refer to *S1D13705 Hardware Functional Specification*, document number X27A-A-001-xx, for a complete description of the FPFRAME pulse settings.
Predefined Panels	13705CFG uses a file (**panels.def**) which lists various panel manufacturers recommended settings. If the file **panels.def** is present in the same directory as **13705cfg.exe**, the settings for a number of predefined panels are available in the drop-down list. If a panel is selected from the list, 13705CFG loads the predefined settings contained in the file.

Panel Power Tab



The S5U13705B00C evaluation board is designed to use the GPIO0 signal to control the LCD bias power. The following settings allow configuration of the necessary delays.

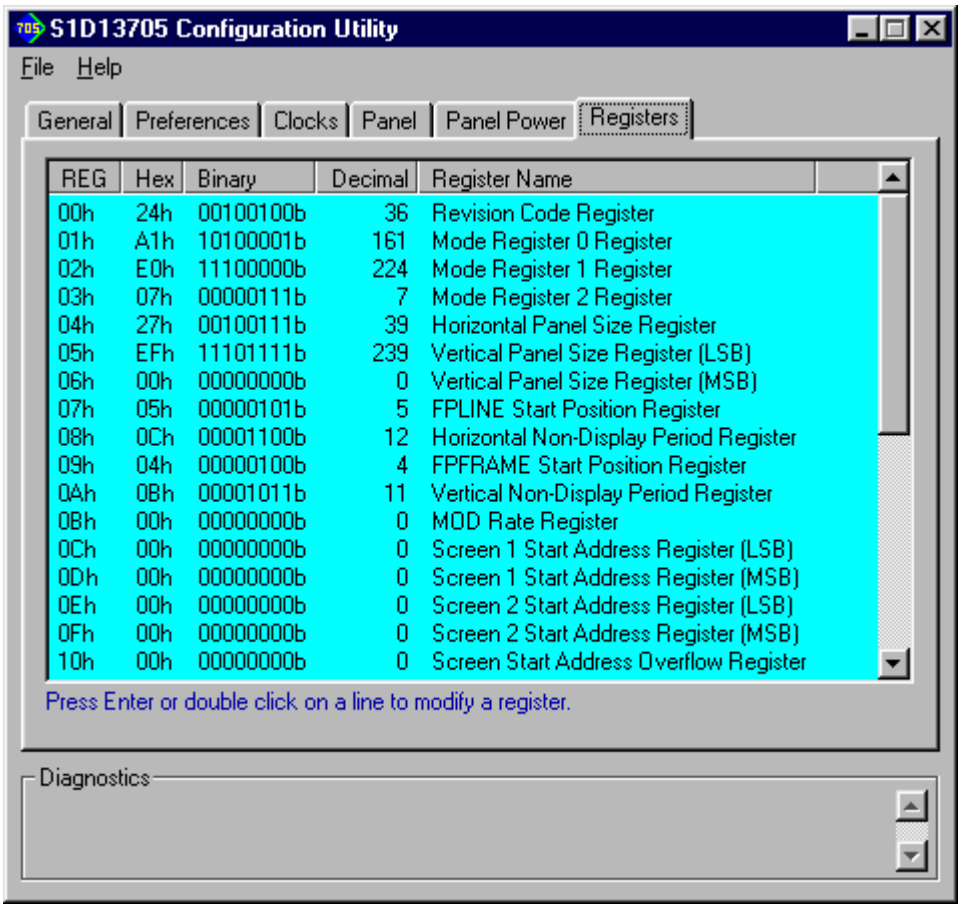
Hardware Power Save Enable	When this box is checked, Hardware Power Save using GPIO0 is enabled. When this box is unchecked, the Hardware Power Save function is not available.
Power Down Time Delay	This setting controls the time delay between when the LCD panel is powered-off and when the S1D13705 control signals are turned off. This setting must be configured according to the specification for the panel being used. This value is only used by Epson evaluation software designed for the S5U13705B00C evaluation board.

Power Up Time Delay

This setting controls the time delay between when the S1D13705 control signals are turned on and the LCD panel is powered-on. This setting must be configured according to the specification for the panel being used.

This value is only used by Epson evaluation software designed for the S5U13705B00C evaluation board.

Registers Tab



REG	Hex	Binary	Decimal	Register Name
00h	24h	00100100b	36	Revision Code Register
01h	A1h	10100001b	161	Mode Register 0 Register
02h	E0h	11100000b	224	Mode Register 1 Register
03h	07h	00000111b	7	Mode Register 2 Register
04h	27h	00100111b	39	Horizontal Panel Size Register
05h	EFh	11101111b	239	Vertical Panel Size Register (LSB)
06h	00h	00000000b	0	Vertical Panel Size Register (MSB)
07h	05h	00000101b	5	FPLINE Start Position Register
08h	0Ch	00001100b	12	Horizontal Non-Display Period Register
09h	04h	00000100b	4	FPFRAME Start Position Register
0Ah	0Bh	00001011b	11	Vertical Non-Display Period Register
0Bh	00h	00000000b	0	MOD Rate Register
0Ch	00h	00000000b	0	Screen 1 Start Address Register (LSB)
0Dh	00h	00000000b	0	Screen 1 Start Address Register (MSB)
0Eh	00h	00000000b	0	Screen 2 Start Address Register (LSB)
0Fh	00h	00000000b	0	Screen 2 Start Address Register (MSB)
10h	00h	00000000b	0	Screen Start Address Overflow Register

The Registers tab allows viewing and direct editing the S1D13705 register values.

Scroll up and down the list of registers and view their configured values based on the settings in the previous tabs. Individual register settings may be changed by double-clicking on the register in the listing. **Manual changes to the registers are not checked for errors, so caution is warranted when directly editing these values.** It is strongly recommended that the *S1D13705 Hardware Functional Specification*, document number X27A-A-001-xx be referred to before making a manual register settings.

Manually entered values may be changed by 13705CFG if further configuration changes are made on the other tabs. In this case, the user is notified.

Note

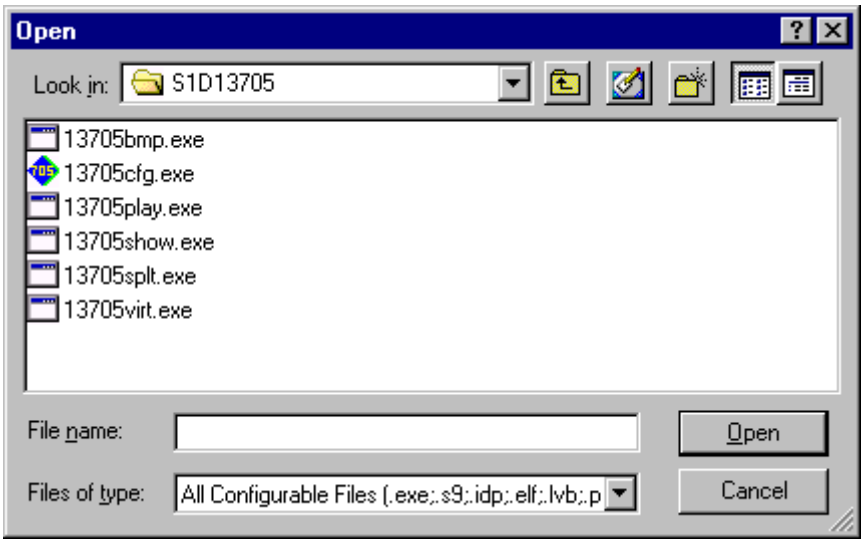
Manual changes to the registers may have unpredictable results if incorrect values are entered.

13705CFG Menus

The following sections describe each of the options in the File and Help menus.

Open...

From the Menu Bar, select “File”, then “Open...” to display the Open File Dialog Box.



The Open option allows 13705CFG to open files containing HAL configuration information. When 13705CFG opens a file it scans the file for an identification string, and if found, reads the configuration information. This may be used to quickly arrive at a starting point for register configuration. The only requirement is that the file being opened must contain a valid S1D13705 HAL library information block.

13705CFG supports a variety of executable file formats. Select the file type(s) 13705CFG should display in the Files of Type drop-down list and then select the filename from the list and click on the Open button.

Note

13705CFG is designed to work with utilities programmed using a given version of the HAL. If the configuration structure contained in the executable file differs from the version 13705CFG expects the Open will fail and an error message is displayed. This may happen if the version of 13705CFG is substantially older, or newer, than the file being opened.

Save

From the Menu Bar, select “File”, then “Save” to initiate the save action. The Save menu option allows a fast save of the configuration information to a file that was opened with the Open menu option.

Note

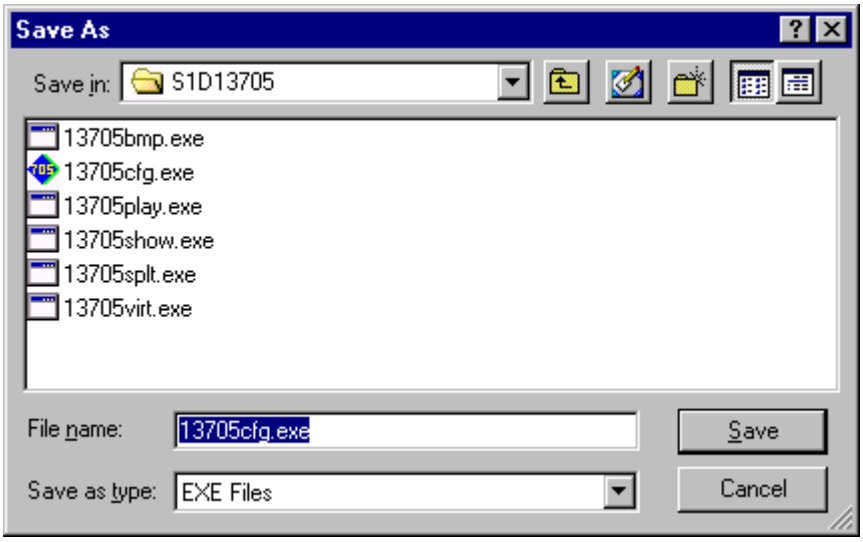
This option is only available once a file has been opened.

Note

13705cfg.exe can be configured by making a copy of the file 13705cfg.exe and configuring the copy. It is not possible to configure the original while it is running.

Save As...

From the Menu Bar, select “File”, then “Save As...” to display the Save As Dialog Box.



“Save as” is very similar to Save except a dialog box is displayed allowing the user to name the file before saving.

Using this technique a tester can configure a number of files differing only in configuration information and name (e.g. BMP60Hz.EXE, BMP72Hz.EXE, BMP75Hz.EXE where only the frame rate changes in each of these files).

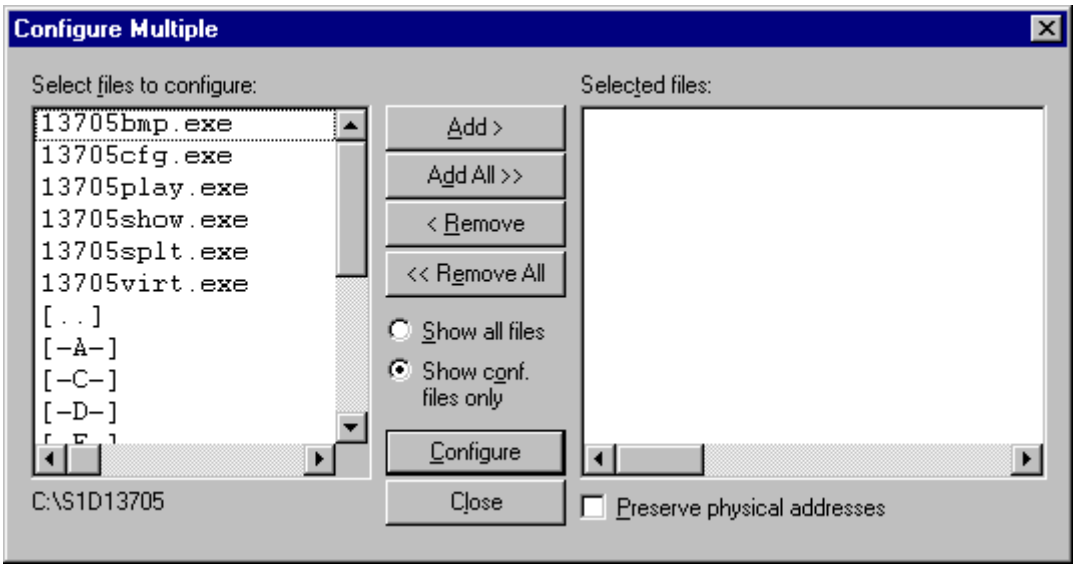
Note

When “Save As” is selected then an exact duplicate of the file as opened by the “Open” option is created containing the new configuration information.

Configure Multiple

After determining the desired configuration, “Configure Multiple” allows the information to be saved into one or more executable files built with the HAL library.

From the Menu Bar, select “File”, then “Configure Multiple” to display the Configure Multiple Dialog Box.This dialog box is also displayed when a file(s) is dragged onto the 13705CFG window.



The left pane lists files available for configuration; the right pane lists files that have been selected for configuration. Files can be selected by clicking the “Add” or “Add All” buttons, double clicking any file in the left pane, or by dragging the file(s) from Windows Explorer.

Selecting “Show all files” displays all files in the selected directory, whereas selecting “Show conf. files only” will display only files that can be configured using 13705CFG.

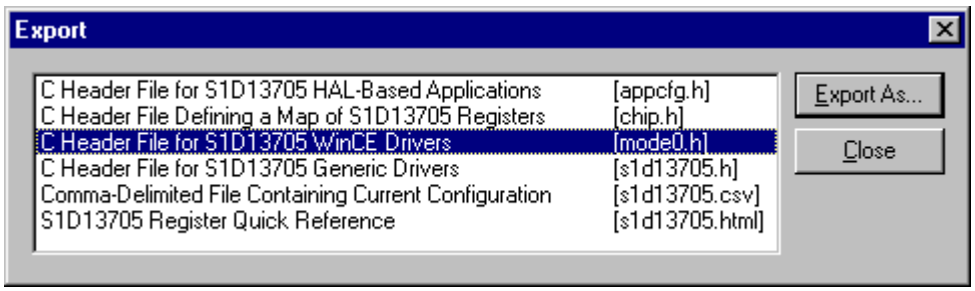
The configuration values can be saved only to specific files. The file must have been compiled using the 13705 HAL library.

Checking “Preserve Physical Addresses” instructs 13705CFG to use the register and display buffer address values the files were previously configured with. Addresses specified in the General Tab are discarded. This is useful when configuring several programs for various hardware platforms at the same time. For example, if configuring PCI, MPC and IDP based programs at the same time for a new panel type, the physical addresses for each are retained. This feature is primarily intended for the test lab where multiple hardware configurations exist and are being tested.

Export

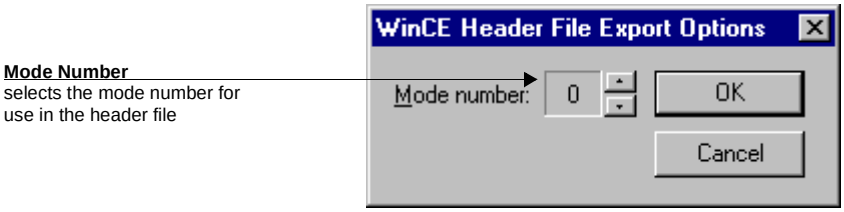
After determining the desired configuration, “Export” permits the user to save the register information as a variety of ASCII text file formats. The following is a list and description of the currently supported output formats:

- a C header file for use in writing HAL library based applications.
- a C header file which lists each register and the value it should be set to.
- a C header file for use in developing Window CE display drivers.
- a C header file for use in developing display drivers for other operating systems such as Linux, QNX, and VxWorks UGL or WindML.
- a comma delimited text file containing an offset, a value, and a description for each S1D13705 register.



After selecting the file format, click the “Export As...” button to display the file dialog box which allows the user to enter a filename before saving. Before saving the configuration file, clicking the “Preview” button starts Notepad with a copy of the configuration file about to be saved.

When the **C Header File for S1D13705 WinCE Drivers** option is selected as the export type, additional options are available and can be selected by clicking on the Options button. The options dialog appears as:



Enable Tooltips

Tooltips provide useful information about many of the items on the configuration tabs. Placing the mouse pointer over nearly any item on any tab generates a popup window containing helpful advice and hints.

To enable/disable tooltips check/uncheck the “Tooltips” option form the “Help” menu.

Note

Tooltips are enabled by default.

ERD on the Web

This “Help” menu item is actually a hotlink to the Epson Research and Development website. Selecting “Help” then “ERD on the Web” starts the default web browser and points it to the ERD product web site.

The latest software, drivers, and documentation for the S1D13705 is available at this website.

About 13705CFG

Selecting the “About 13705CFG” option from the “Help” menu displays the about dialog box for 13705CFG. The about dialog box contains version information and the copyright notice for 13705CFG.

Comments

- On any tab particular options may be grayed out if selecting them would violate the operational specification of the S1D13705 (i.e. Selecting TFT or STN on the Panel tab enables/disables options specific to the panel type).
- The file **panels.def** is a text file containing operational specifications for several supported, and tested, panels. This file can be edited with any text editor.
- 13705CFG allows manually altering register values. The manual changes may violate memory and LCD timings as specified in the *S1D13705 Hardware Functional Specification*, document number X27A-A-001-xx. If this is done, unpredictable results may occur. Epson Research and Development, Inc. does not assume liability for any damage done to the display device as a result of configuration errors.