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Crestron SIMPL+ Module Help

MODULE NAME: ViewSonic CDE30 Series RS-232 Control v1.0
VERSION: 1.0

GENERAL DESCRIPTION

This module provides comprehensive RS-232 control for ViewSonic CDE30 series commercial displays. It allows for the management of various display functions, including:

- **Power:** On and Off control.
- **Input Source Selection:** HDMI 1/2/3, Android, and USB Type-C.
- **Audio:** Volume, Bass, and Treble level control (set, up, down), and Mute.
- **Picture & Display:** Adjustments for Brightness, Contrast, Sharpness, Color, and Tint. Controls for Freeze, Zoom Mode, and Color Mode.
- **System & OSD:** Panel lock controls (Power, Button, Menu), keypad emulation, and factory reset.
- **Status Polling:** A robust, configurable polling engine provides continuous feedback on the display's current state, including power, input, audio levels, and more.

The module handles sending commands in the required ViewSonic format and parsing responses to provide reliable feedback. It features a power transition lock to prevent command conflicts, configurable polling rates, and detailed debug messaging for troubleshooting.

COMPATIBILITY

This module is specifically designed and tested for the **ViewSonic CDE30 series** displays.

- **Verified Models:** CDE9830, CDE6530
- **Expected Compatibility:** CDE4330, CDE5530, CDE7530, CDE8630

While other ViewSonic models may share parts of the RS-232 command set, full functionality is not guaranteed and should be verified through testing.

FEATURES

- Direct RS-232 control of compatible ViewSonic displays.
- Discrete power commands with reliable feedback.
- Power transition lock with timeouts to prevent the module from getting stuck during warm-up or cool-down.
- Multiple input source selection with direct feedback.
- Analog and incremental control for Volume, Bass, Treble, Brightness, Contrast, Sharpness, Color, and Tint.
- Discrete controls for Mute, Freeze, and various lock modes with feedback.
- Ability to query display information such as Firmware Version, Serial Number, Device Name, IP, and MAC Address.
- **Intelligent Polling:** Configurable status polling queries essential statuses (Power, Input, Volume) at a set interval, ensuring feedback remains synchronized with the display's actual state.
- **Manual Query:** A trigger is available to manually poll all supported statuses at once.
- Initialization sequence to query the display's status on startup.
- Detailed debug output for monitoring communication and troubleshooting.

INPUTS

Power Control

Signal Name	Type	Description
Power_On_trig	DIGITAL	Momentary high pulse sends the "Power On" command to the display.
Power_Off_trig	DIGITAL	Momentary high pulse sends the "Power Off" command to the display.

Input Selection

Signal Name	Type	Description
Input_Select_HDMI1_trig	DIGITAL	Momentary high pulse selects HDMI1 as the active input source.
Input_Select_HDMI2_trig	DIGITAL	Momentary high pulse selects HDMI2 as the active input source.

Input_Select_HDMI3_trig	DIGITAL	Momentary high pulse selects HDMI3 as the active input source.
Input_Select_Android_trig	DIGITAL	Momentary high pulse selects the built-in Android system as the active source.
Input_Select_TypeC_trig	DIGITAL	Momentary high pulse selects USB Type-C as the active input source.

Audio Control

Signal Name	Type	Description
Volume_Up_trig	DIGITAL	Momentary high pulse increases the volume level by one step.
Volume_Down_trig	DIGITAL	Momentary high pulse decreases the volume level by one step.
Mute_On_trig	DIGITAL	Momentary high pulse mutes the display's audio.
Mute_Off_trig	DIGITAL	Momentary high pulse un-mutes the display's audio.
Bass_Up_trig	DIGITAL	Momentary high pulse increases the bass level by five steps.
Bass_Down_trig	DIGITAL	Momentary high pulse decreases the bass level by five steps.
Treble_Up_trig	DIGITAL	Momentary high pulse increases the treble level by five steps.
Treble_Down_trig	DIGITAL	Momentary high pulse decreases the treble level by five steps.
Volume_Level_ain	ANALOG	Sets the desired volume level (0-100).
Bass_Level_ain	ANALOG	Sets the desired bass level (0-100).
Treble_Level_ain	ANALOG	Sets the desired treble level (0-100).

Picture & Display Control

Signal Name	Type	Description
Brightness_Up_trig	DIGITAL	Momentary high pulse increases the brightness level by one step.
Brightness_Down_trig	DIGITAL	Momentary high pulse decreases the brightness level by one step.
Contrast_Up_trig	DIGITAL	Momentary high pulse increases the contrast level by five steps.
Contrast_Down_trig	DIGITAL	Momentary high pulse decreases the contrast level by five steps.
Sharpness_Up_trig	DIGITAL	Momentary high pulse increases the sharpness level by five steps.
Sharpness_Down_trig	DIGITAL	Momentary high pulse decreases the sharpness level by five steps.
Color_Up_trig	DIGITAL	Momentary high pulse increases the color level by five steps.
Color_Down_trig	DIGITAL	Momentary high pulse decreases the color level by five steps.
Tint_Up_trig	DIGITAL	Momentary high pulse increases the tint level by five steps.
Tint_Down_trig	DIGITAL	Momentary high pulse decreases the tint level by five steps.
Freeze_On_trig	DIGITAL	Momentary high pulse freezes the current video image on the display.
Freeze_Off_trig	DIGITAL	Momentary high pulse un-freezes the video image.
Zoom_Mode_Full_trig	DIGITAL	Momentary high pulse sets the zoom mode to "Full".

Zoom_Mode_Normal_trig	DIGITAL	Momentary high pulse sets the zoom mode to "Normal".
Zoom_Mode_Real_trig	DIGITAL	Momentary high pulse sets the zoom mode to "Real".
Color_Mode_Normal_trig	DIGITAL	Momentary high pulse sets the color temperature to "Normal".
Color_Mode_Warm_trig	DIGITAL	Momentary high pulse sets the color temperature to "Warm".
Color_Mode_Cold_trig	DIGITAL	Momentary high pulse sets the color temperature to "Cold".
Brightness_Level_ain	ANALOG	Sets the desired brightness level (0-100).
Contrast_Level_ain	ANALOG	Sets the desired contrast level (0-100).
Sharpness_Level_ain	ANALOG	Sets the desired sharpness level (0-100).
Color_Level_ain	ANALOG	Sets the desired color level (0-100).
Tint_Level_ain	ANALOG	Sets the desired tint level (0-100).

System & OSD Control

Signal Name	Type	Description
Power_Lock_On_trig	DIGITAL	Momentary high pulse enables the power button lock.
Power_Lock_Off_trig	DIGITAL	Momentary high pulse disables the power button lock.
Button_Lock_On_trig	DIGITAL	Momentary high pulse enables the keypad/button lock.
Button_Lock_Off_trig	DIGITAL	Momentary high pulse disables the keypad/button lock.
Menu_Lock_On_trig	DIGITAL	Momentary high pulse enables the OSD menu lock.
Menu_Lock_Off_trig	DIGITAL	Momentary high pulse disables the OSD menu lock.
Keypad_Up_trig	DIGITAL	Emulates pressing the "Up" arrow on the keypad.
Keypad_Down_trig	DIGITAL	Emulates pressing the "Down" arrow on the keypad.

Keypad_Left_trig	DIGITAL	Emulates pressing the "Left" arrow on the keypad.
Keypad_Right_trig	DIGITAL	Emulates pressing the "Right" arrow on the keypad.
Keypad_Enter_trig	DIGITAL	Emulates pressing the "Enter" key on the keypad.
Keypad_Menu_trig	DIGITAL	Emulates pressing the "Menu" key on the keypad.
Keypad_Exit_trig	DIGITAL	Emulates pressing the "Exit" key on the keypad.
Restore_Defaults_trig	DIGITAL	Momentary high pulse restores the display to factory default settings.

Polling and Communication

Signal Name	**Type**	**Description**
Enable_Polling_trig	DIGITAL	When HIGH, enables periodic polling of display status. When LOW, disables polling.
Query_All_Status_trig	DIGITAL	Momentary high pulse manually queries all supported display statuses once.
Poll_Rate_seconds_ain	ANALOG	Sets the interval for status polling in whole seconds (e.g., 30 = 30 seconds). Default: 30s. Min: 5s. Max: 300s. If 0 is input, the default rate is used.
Display_ID_ain	ANALOG	Sets the Display ID for RS-232 communication (1-98). If 0 or out of range, defaults to 1.
From_Display_rx$	BUFFER	Connect to the RX$ input of a serial communication symbol. Receives data from the display.

OUTPUTS

Power Feedback

Signal Name	Type	Description
Power_Is_On_fb	DIGITAL	HIGH when the display is confirmed to be ON. LOW otherwise.
Power_Is_Off_fb	DIGITAL	HIGH when the display is confirmed to be OFF. LOW otherwise.

Input Selection Feedback

Signal Name	Type	Description
Is_HDMI1_fb	DIGITAL	HIGH when HDMI1 is the confirmed active input source.
Is_HDMI2_fb	DIGITAL	HIGH when HDMI2 is the confirmed active input source.
Is_HDMI3_fb	DIGITAL	HIGH when HDMI3 is the confirmed active input source.
Is_Android_fb	DIGITAL	HIGH when the built-in Android system is the confirmed active source.
Is_TypeC_fb	DIGITAL	HIGH when USB Type-C is the confirmed active input source.

Audio & Picture Feedback

Signal Name	Type	Description
Is_Muted_fb	DIGITAL	HIGH when the display's audio is confirmed to be muted.
Is_Frozen_fb	DIGITAL	HIGH when the display's video image is confirmed to be frozen.
Volume_Level_fb	ANALOG	Reflects the current volume level of the display (0-100).
Bass_Level_fb	ANALOG	Reflects the current bass level of the display (0-100).
Treble_Level_fb	ANALOG	Reflects the current treble level of the display (0-100).

Brightness_Level_fb	ANALOG	Reflects the current brightness level of the display (0-100).
Contrast_Level_fb	ANALOG	Reflects the current contrast level of the display (0-100).
Sharpness_Level_fb	ANALOG	Reflects the current sharpness level of the display (0-100).
Color_Level_fb	ANALOG	Reflects the current color level of the display (0-100).
Tint_Level_fb	ANALOG	Reflects the current tint level of the display (0-100).

Lock & Mode Feedback

Signal Name	Type	Description
Is_Power_Locked_fb	DIGITAL	HIGH when the power button lock is confirmed to be active.
Is_Button_Locked_fb	DIGITAL	HIGH when the keypad/button lock is confirmed to be active.
Is_Menu_Locked_fb	DIGITAL	HIGH when the OSD menu lock is confirmed to be active.
Is_Zoom_Mode_Full_fb	DIGITAL	HIGH when the zoom mode is confirmed to be "Full".
Is_Zoom_Mode_Normal_fb	DIGITAL	HIGH when the zoom mode is confirmed to be "Normal".
Is_Zoom_Mode_Real_fb	DIGITAL	HIGH when the zoom mode is confirmed to be "Real".
Is_Color_Mode_Normal_fb	DIGITAL	HIGH when the color temperature is confirmed to be "Normal".
Is_Color_Mode_Warm_fb	DIGITAL	HIGH when the color temperature is confirmed to be "Warm".
Is_Color_Mode_Cold_fb	DIGITAL	HIGH when the color temperature is confirmed to be "Cold".

Information & Communication Feedback

Signal Name	Type	Description
Polling_Is_Active_fb	DIGITAL	HIGH when status polling is currently active.

Is_Communicating_fb	DIGITAL	Goes HIGH on a valid response from the display. Goes LOW on a timeout or NACK.
FW_Version_fb$	STRING	Reports the firmware version of the display.
Serial_Number_fb$	STRING	Reports the serial number of the display.
Device_Name_fb$	STRING	Reports the device name of the display.
IP_Address_fb$	STRING	Reports the IP address of the display.
MAC_Address_fb$	STRING	Reports the MAC address of the display.
Debug_fb$	STRING	Provides status messages, commands sent, responses received, and error information for troubleshooting.
To_Display_tx$	STRING	Connect to the TX$ output of a serial communication symbol. Transmits commands to the display.

OPERATIONS

Initialization

Upon program start, the module waits 90 seconds for the control system and display to stabilize. It then performs an initial full query of all available statuses to synchronize feedback with the display's actual state.

Command Sending

Commands are sent by pulsing the corresponding digital trigger (e.g., Power_On_trig) or by changing an analog input (e.g., Volume_Level_ain). The module formats these actions into the correct ViewSonic RS-232 protocol, including the Display ID, command length, and terminator.

Response Handling

The module listens for responses on the From_Display_rx$ input.

- **ACK (+)**: When a set command is acknowledged, the module provides "emulated" feedback instantly for a responsive user experience. This emulated state is then verified or corrected by the next polling cycle.
- **NACK (-)**: Indicates a command was rejected. The Is_Communicating_fb signal will go low.
- **Get Responses (r...)**: Responses to query commands update the relevant feedback signals and internal state variables.

Polling

If Enable_Polling_trig is high, the module will query the Power, Input, and Volume status at the interval defined by Poll_Rate_seconds_ain. This ensures feedback remains current. Polling is automatically managed and will not interfere with manually sent commands. A full status query can be initiated at any time by pulsing Query_All_Status_trig.

TROUBLESHOOTING & NOTES

- **Communication Settings:** Ensure the serial port connected to the display is configured for **9600 baud, 8 data bits, no parity, and 1 stop bit**. These parameters must be set on the COM port symbol in the Crestron program.
- **Wiring:** Verify RS-232 wiring (TX, RX, GND) is correct. A straight-through serial cable is typically required. The included RS-232 adapter may be necessary.
- **Display ID:** The Display_ID_ain input must match the "Monitor ID" setting in the display's OSD menu (Advanced > Monitor ID). The default is 1.
- **Debug_fb$ Output:** This string output is the most critical tool for troubleshooting. Connect it to a "Serial/ASCII Send" symbol or view it in SIMPL Debugger to see:
    - Module initialization and status.
    - Formatted commands being sent (TX).
    - Processed responses received (RX).
    - Polling activity and status.
    - Timeout errors.
- **Response Timeouts:** If the Is_Communicating_fb signal frequently goes low or commands seem unresponsive, check physical connections, COM port settings, and ensure the correct Display ID is set.
- **Command Terminator:** All commands are terminated with a Carriage Return (\x0D). The module parses responses terminated by a CR and cleans any non-printable characters.