Texas Instruments

CDCL6010 Evaluation Board

User's Guide

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CDCL6010 Evaluation Board

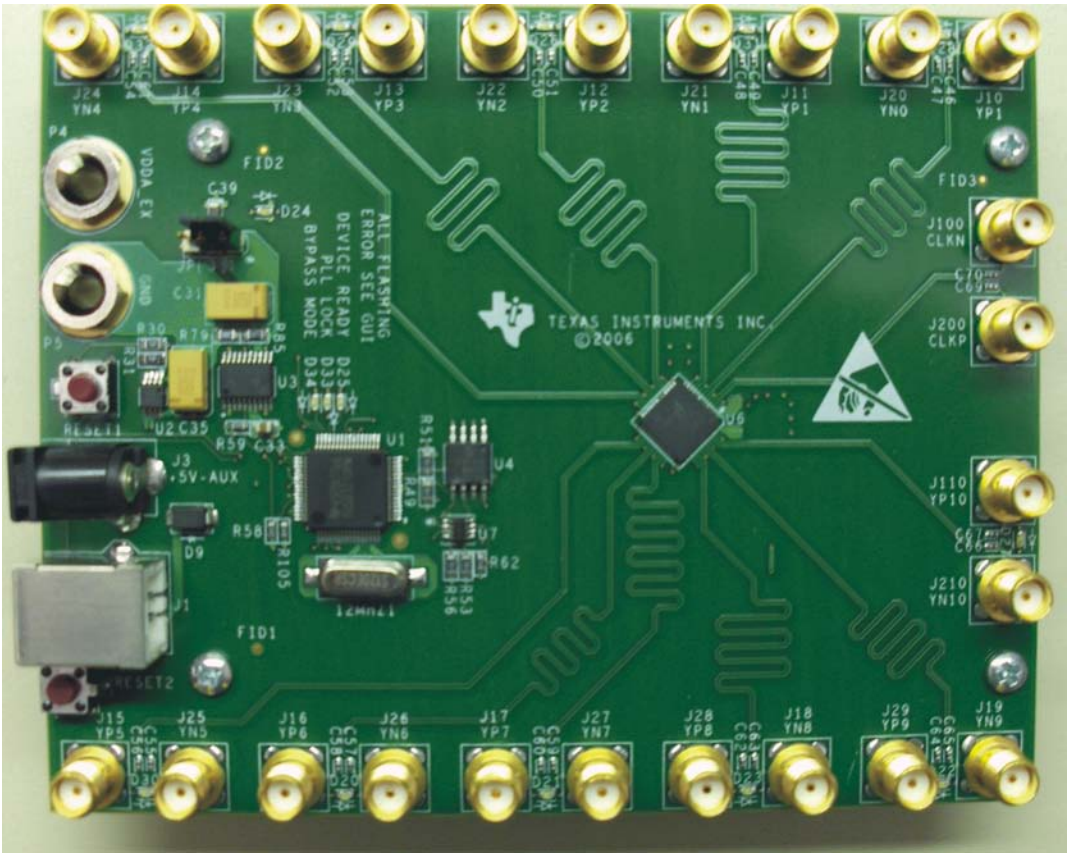


Figure 1. CDCL6010 Evaluation Board

Features:

- Easy-to-use evaluation board designed for rapid prototype and application evaluation
- Simple device programming via host-powered USB port
- Fast configuration through provided software GUI
- Total board power provided either through USB port or separate 1.8V and ground connections
- Single LVDS input reference
- 11 CML outputs (two banks of five outputs and one bypass)

1 General Description

The CDCL6010 is a high-performance, low phase noise clock multiplier, distributor, jitter cleaner and low skew buffer. It has a fully-integrated, low-noise, liquid crystal (LC)-based voltage-controlled oscillator (VCO) that operates in the 1.200GHz–1.275GHz range.

The CDCL6010 evaluation module (EVM) is designed to demonstrate the electrical performance of the device. This fully assembled and factory-tested evaluation board allows complete validation of all device functions. Throughout this document, the acronym *EVM* and the phrases *evaluation module* and *evaluation board* are synonymous with the CDCL6010EVM. Figure 1 illustrates the CDCL6010EVM.

For optimum performance, the board is equipped with 50Ω SMA connectors and well-controlled 50Ω impedance microstrip transmission lines.

2 Signal Path and Control Circuitry

The CDCL6010 can accept a 30MHz—325MHz frequency LVDS signaling input. The default configuration assumes a 30.72MHz input and 61.44MHz on all outputs (0 to 9). The LVDS reference can be input through the Edge SMA input connector (Ref Input) which is ac-coupled onto the board.

The EVM supports five easy-to-configure loop filter bandwidth selections: 400kHz, 250kHz, 175kHz, 125kHz and 50kHz. Other bandwidth settings are available but not supported by the DIP switch selector. If other bandwidth settings are needed, external components must be assembled. Refer to Table 1 for an overview on setting the bandwidth on the CDCL6010EVM; the PLL bandwidth setting is located on the back of the board. Figure 2 illustrates the EVM controls and connectors.

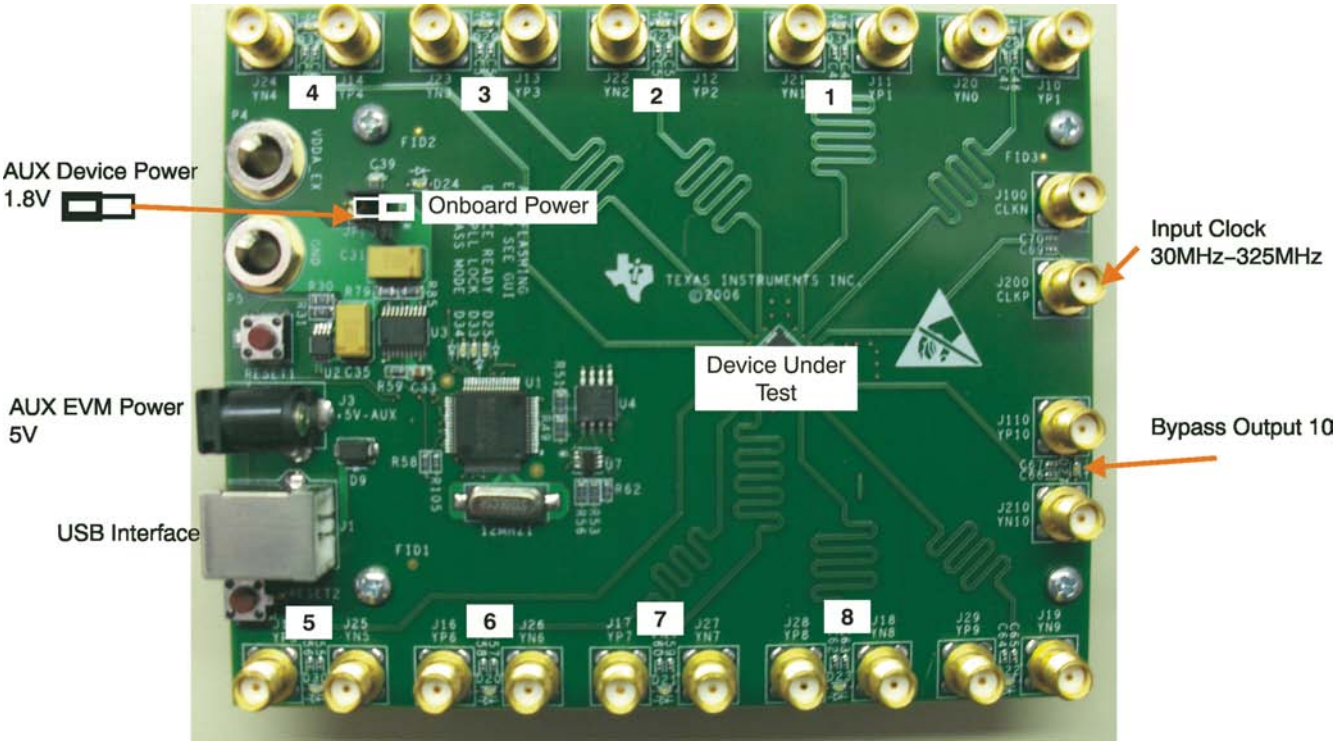


Figure 2. CDCL6010EVM Controls and Connectors

Table 1. PLL Bandwidth Setting

PLL Bandwidth (kHz)[1]	SEL BW				C_1 (nF)	R (Ω)	C_2 (nF)	On-Chip Loop Filter	Bandwidth Quick-Set Switch Position[2]
	[3]	[2]	[1]	[0]					
400	0	0	0	0	–	–	–	On	All switches off
350	0	0	1	0	2.2	8660	0	Off	***Not supported by Quick Set.***
300	0	0	1	1	3.3	7500	0	Off	***Not supported by Quick Set.***
250	0	1	0	0	4.7	6200	0	Off	Switch #1 is On; the rest are off.
200	0	1	1	0	8.2	4990	0	Off	***Not supported by Quick Set.***
175	1	0	0	0	10	4300	0	Off	Switch #2 is On; the rest are off.
150	1	0	1	0	15	3740	0	Off	***Not supported by Quick Set.***
125	1	1	1	1	22	3090	0	Off	Switch #3 is On; the rest are off.
100	1	1	1	1	33	2490	0.24	Off	***Not supported by Quick Set.***
75	1	1	1	1	56	1870	0.82	Off	***Not supported by Quick Set.***
50	1	1	1	1	150	1210	2.70	Off	Switch #4 is On; the rest are off.
20	1	1	1	1	680	470	18	Off	***Not supported by Quick Set.***
10	1	1	1	1	3300	220	68	Off	***Not supported by Quick Set.***
To test 350kHz, 300kHz, 200kHz, 150kHz, 100kHz, 75kHz, 20kHz and 10kHz:					C83	R94	C77	Off	Install component for desired PLL bandwidth.

(1) If a bandwidth different from those shown in this table needs to be tested, set all switches to off and install C83, R94 and C77 if needed.
(2) For external bandwidth component selection.

3 Software-Selectable Options

The provided EVM software is controlled through a graphical user interface (GUI). The software allows users to easily send commands to the CDCL6010 through the host-powered USB interface. The EVM includes a slave USB controller that transmits the commands to the 1.8V SDA/SCL programming interface of the CDCL6010. DC power for the USB controller can be provided either from the 5V power pin in the USB cable or by using an external 5V dc connector (available on the EVM).

If the USB cable must be removed while the CDCL6010 is running, a 5V dc adapter can be plugged into the EVM before the USB cable is removed to ensure continued board operation.

In addition to controlling the device from the GUI, the EVM has an onboard EEPROM that can manage separate configuration of the CDCL6010. If the EVM does not detect an available USB interface, the microcontroller boots and loads the device under test as programmed in Default Configuration 1 (this configuration is saved using the GUI). Switch RESET 2 toggles between Default Configuration 1 and Configuration 2.

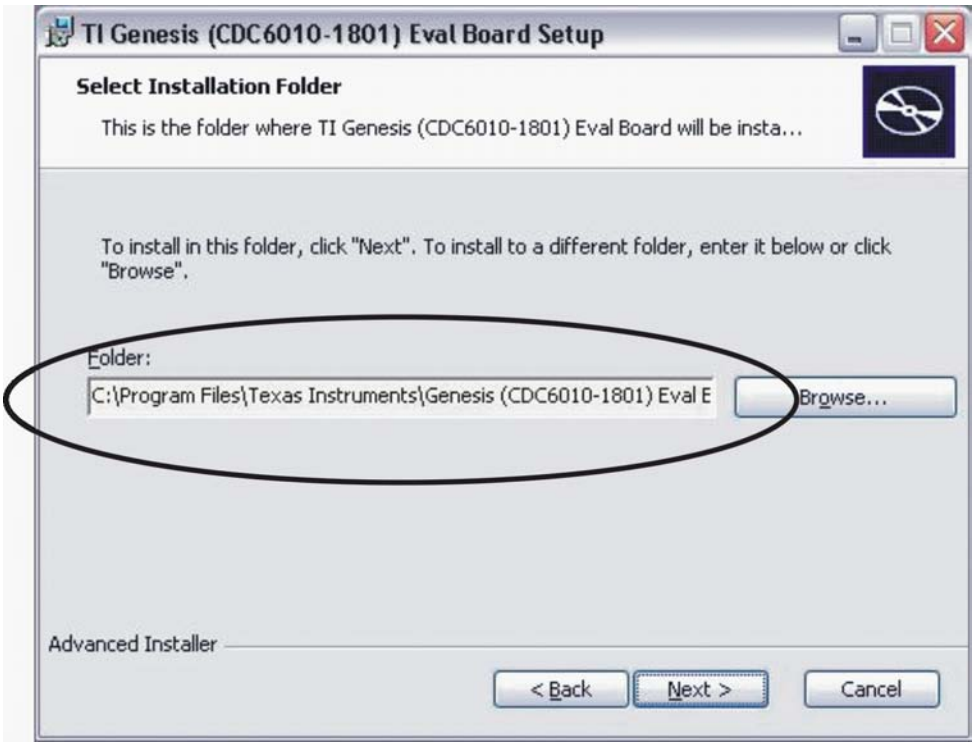
4 Installing the Software GUI and USB Driver

The CDCL6010EVM software can be installed on a PC running the Microsoft Windows® 2000 operating system or higher (including Windows XP®).

To start software installation, run the setup wizard *Genesis_Setup_xx.msi* file (available on the CD shipped with the EVM). Figure 3 appears.

Figure 3. Software Installation Screen

Be sure to note the program installation folder; the USB driver must be installed from the same folder after setup completes and the USB cable is connected to the EVM. See Figure 4



Note the program file location; the USB controller driver is in the same location.

Figure 4. Installation Prompt

After the setup wizard completes, start the GUI interface from the **Start** menu [Start→Texas Instruments→TI Genesis (CDC6010-1810 Eval Board)→TIGenesisGUI.exe].

Connect the USB cable to the EVM. If Microsoft Windows prompts you for an appropriate driver, do ***not*** use the automatic search option. Select *Install from a list or specific location*, as shown in Figure 5. When prompted for the driver location, browse to the Genesis GUI program folder that was created during installation.

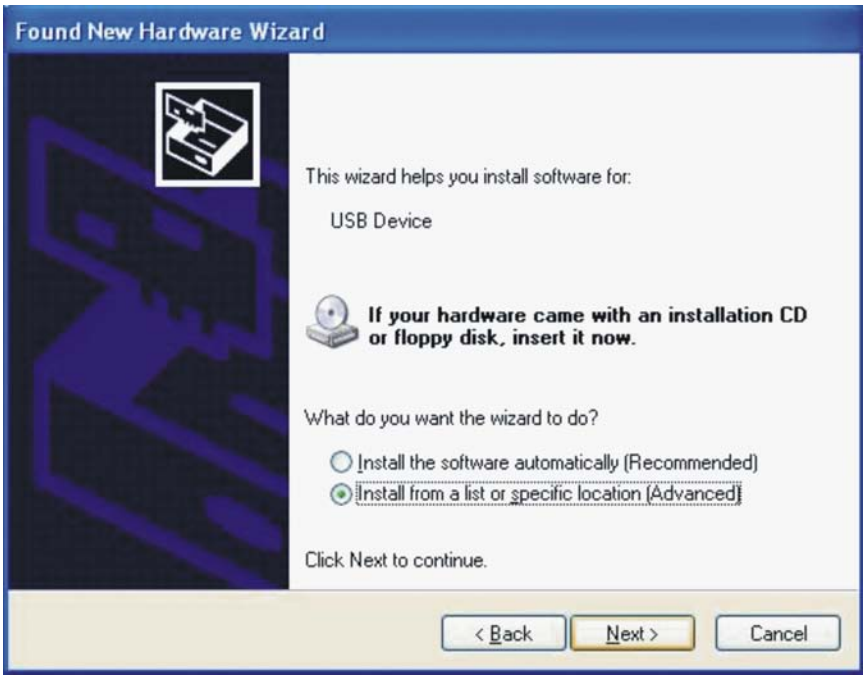


Figure 5. USB Driver Installation Screen

When prompted with a warning about the hardware installation, select *Continue Anyway*, as shown in Figure 6.

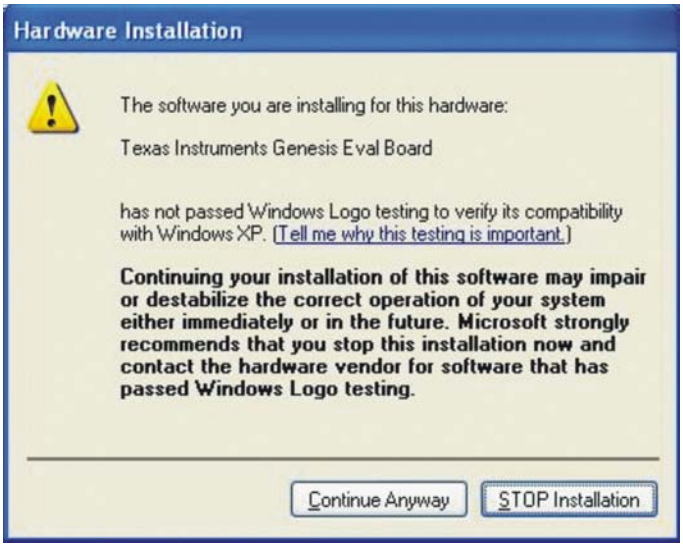


Figure 6. Hardware Installation Prompt

Once the USB driver installation completes, the GUI software should connect properly and be ready for use.

5 Genesis GUI

Figure 7 shows the Genesis GUI for navigating the EVM software.

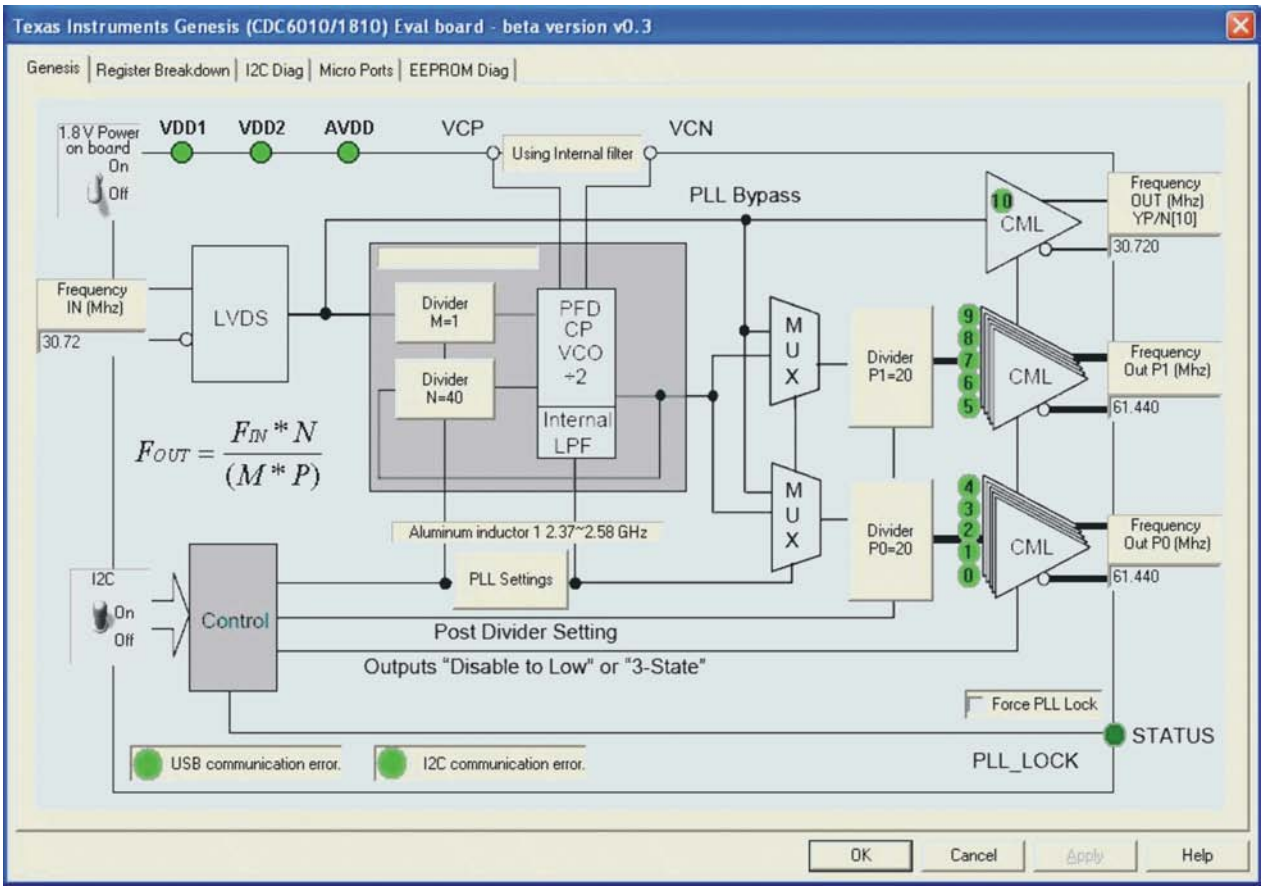


Figure 7. TI Genesis Software GUI

The CDCL6010 GUI represents the block diagram of the device described in the product data sheet. When connecting to the EVM via the USB, cable make sure that the USB communication indicator and I²C™ indicator are green. These indicators show that the PC is communicating with the EVM and the microcontroller on the EVM is communicating with the CDCL6010 device. In addition, the VDD1, VDD2 and VDDA indicators should also be green. If using the onboard regulator, the onboard 1.8V power should be on the specified jumper as shown in Figure 2. Divider M, Divider N, PLL Setting, and the Output Dividers are accessible from the main *(Genesis)* tab of the GUI screen. The GUI calculates the output frequency of the outputs.

The Register Breakdown tab provides access to all the registers. It allows users to control the individual output enables and configuration writes and reads.

Note: The CDCL6010 product data sheet is required to configure the device using this GUI. The data sheet may be downloaded from the TI web site at www.ti.com.

6 Schematics and Layout

Figure 8 and Figure 9 show the printed circuit board (PCB) schematics.

Note: Board layouts are not to scale. These figures are intended to show how the board is laid out; they are not intended to be used for manufacturing CDCL6010EVM PCBs.

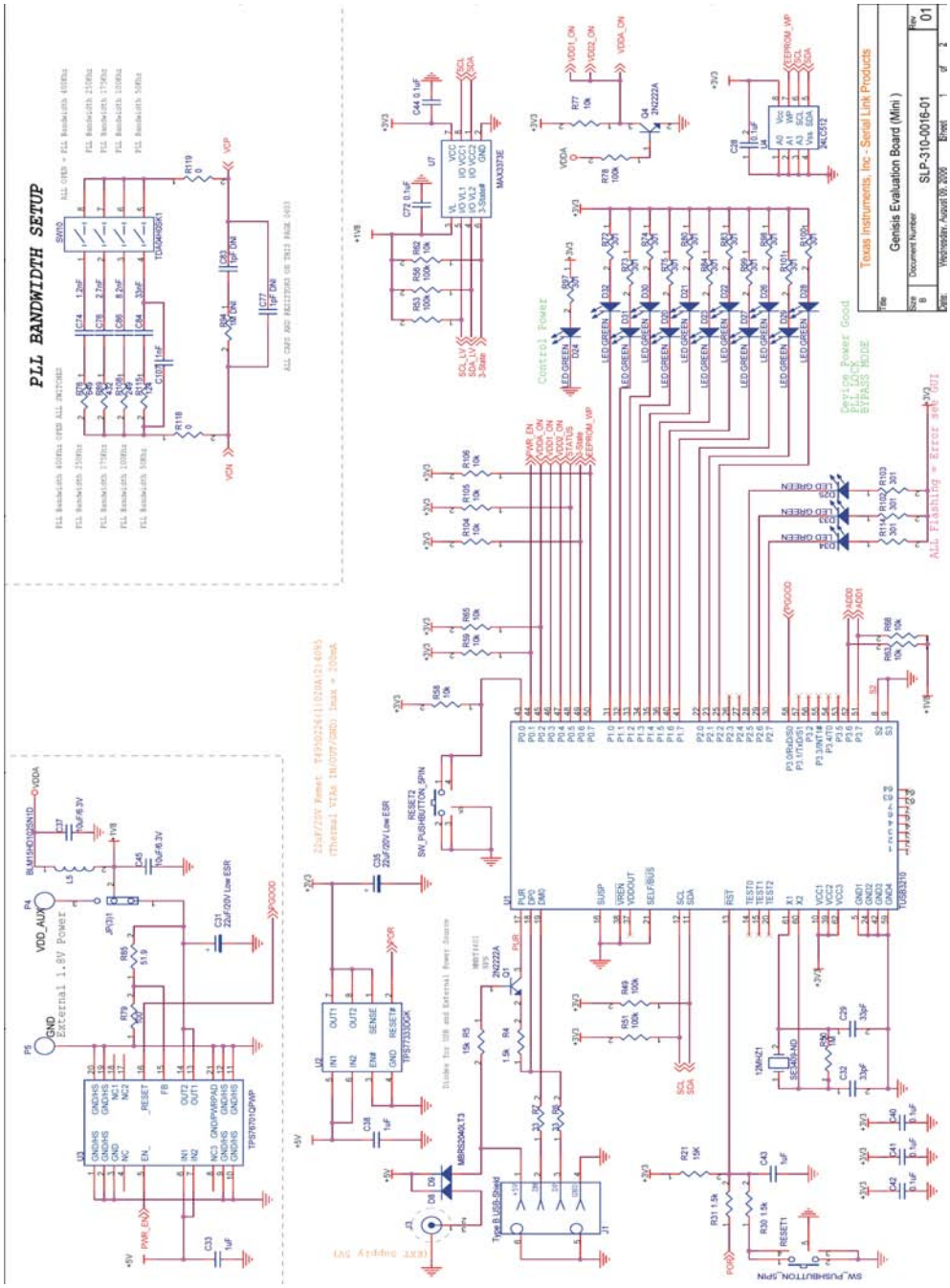


Figure 8. CDCL6010EVM—Schematic

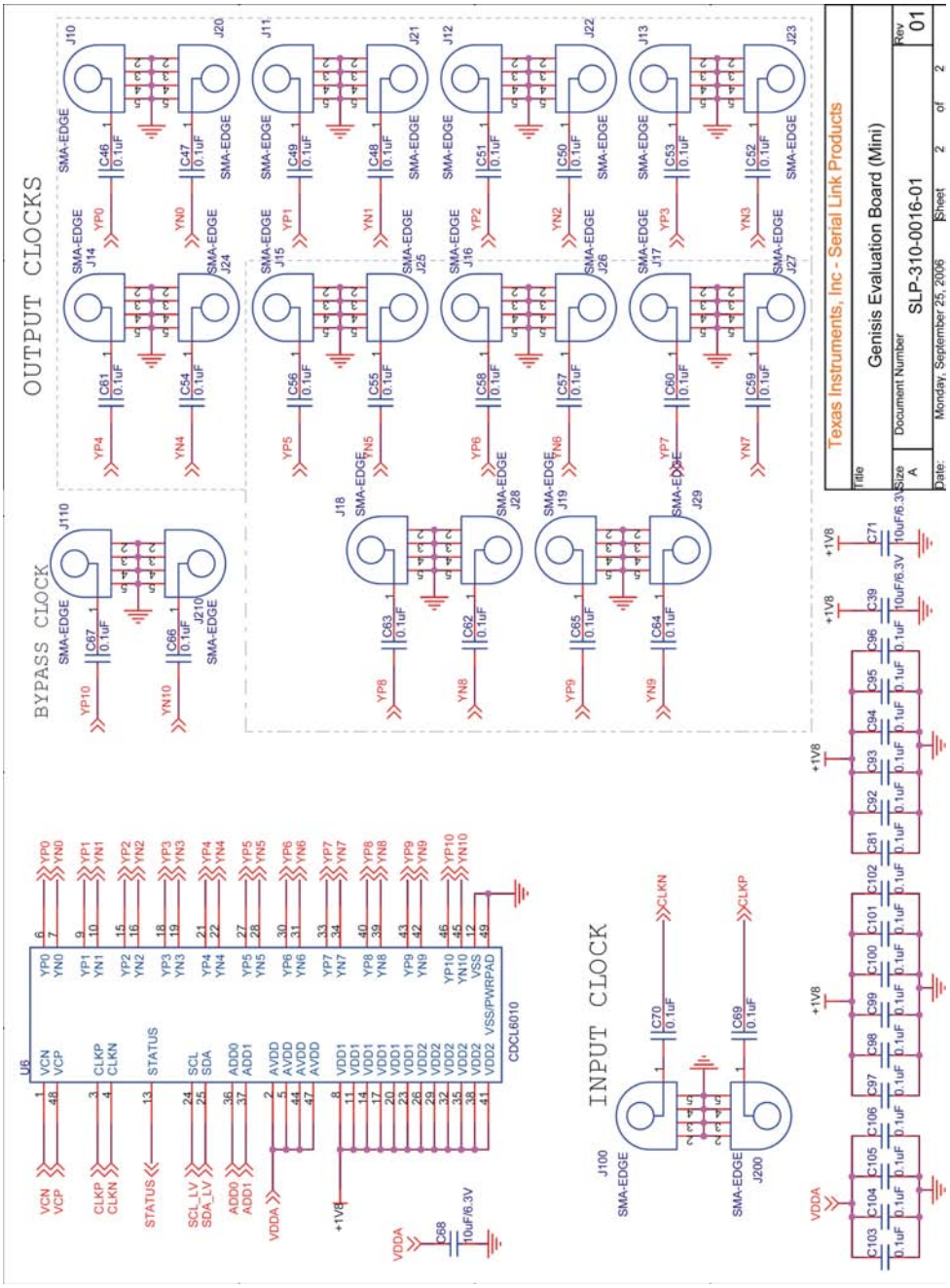


Figure 9. CDCL6010EVM—Schematic

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EVM WARNINGS AND RESTRICTIONS

It is important to operate this EVM within the input voltage range of –0.3V to +4.0V and the output voltage range of 0V to 1.8V.

Exceeding the specified input range may cause unexpected operation and/or irreversible damage to the EVM. If there are questions concerning the input range, please contact a TI field representative prior to connecting the input power.

Applying loads outside of the specified output range may result in unintended operation and/or possible permanent damage to the EVM. Please consult the EVM User's Guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative.

During normal operation, some circuit components may have case temperatures greater than +105°C. The EVM is designed to operate properly with certain components above +85°C as long as the input and output ranges are maintained. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors. These types of devices can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during operation, please be aware that these devices may be very warm to the touch.

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