Introduction

The evaluation board is designed to help the customer evaluate the 5P35021, the latest addition to the family of programmable devices in IDT's Timing portfolio. When the board is connected to a PC running IDT Timing Commander™ Software through USB, the device can be configured and programmed to generate different combinations of frequencies.

Board Overview

Use Figure 1 and Table 1 to identify: power supply jacks, USB connector, input and output frequency SMA connectors.

Figure 1. 5P35021 Evaluation Board Overview

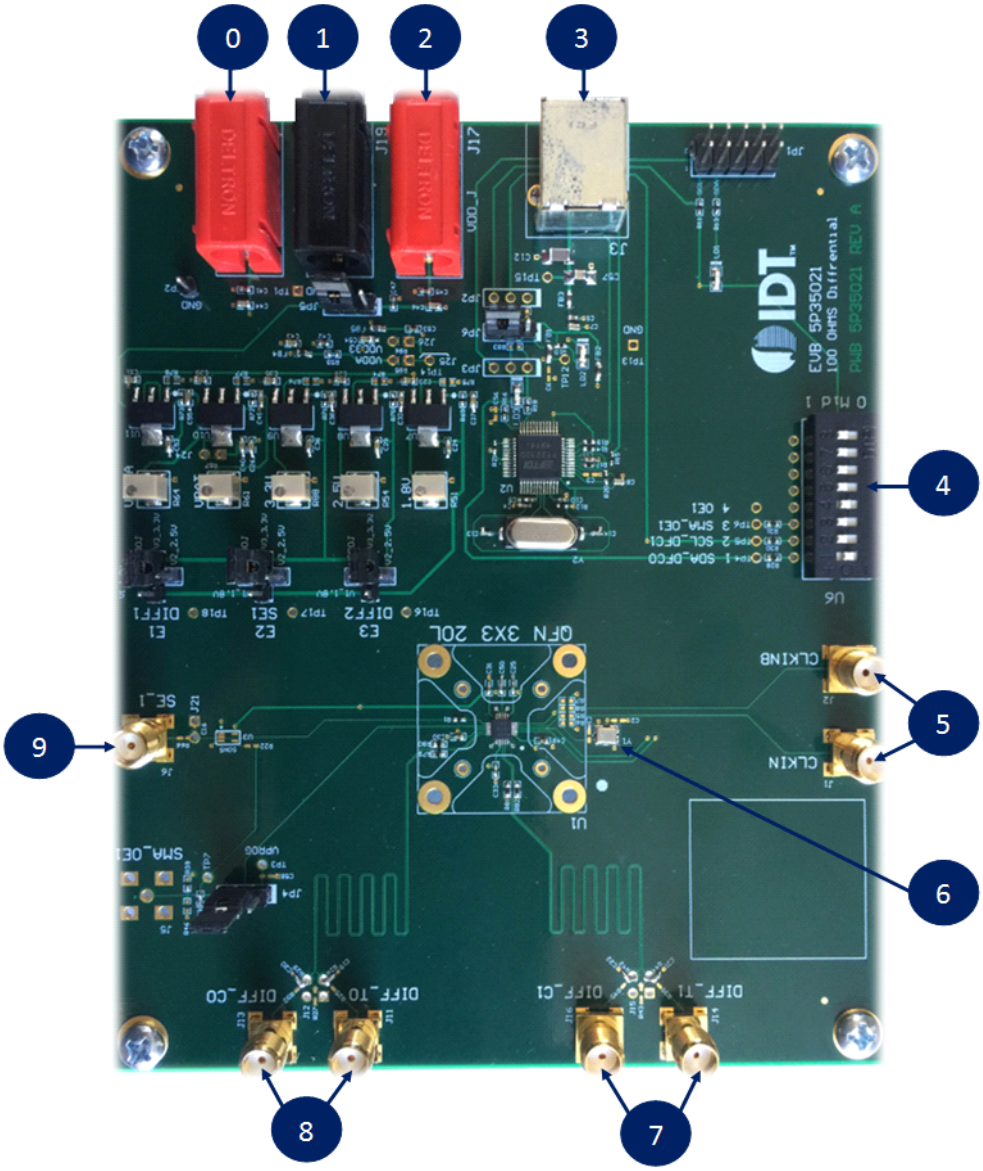


Table 1: Evaluation Board Pins and Functions

Item	Name	On-Board Connector Label	Function
0	Power supply jack	J18	Connect to 1.8V, 2.5V, or 3.3V for the output voltage of the device
1	Ground jack	J19	If J18 & J17are used for power supply, this is the return power
2	Output voltage jack	J17	Connect to 3.3V core voltage of the device
3	USB connector	J3	Connect this USB to your PC to run IDT Timing Commander
4	DIP switch	U6	This is used to configure the device in different modes
5	Differential clock input	CLKIN/CLKINB	A differential clock can be connected as source for the device
5 (cont.)	Single-ended clock input	CLKINB	A Single-ended clock can be connected as source for the device using CLKINB only
6	Crystal, 25 MHz	Y1	This crystal is used as a reference source for the clock signal
7	Differential output	DIFF_C1/T1	This can be a differential pair, or two single-ended outputs. By default, it’s a LPHCSL differential output.
8	Differential output	DIFF_C0/T0	This can be a differential pair, or two single-ended outputs. By default, it’s a LPHCSL differential output.
9	Single-ended output	SE_1	This is the single-ended output. By default it’s an LVCMOS single-ended output

Board Power Supply

Power Supply Options

The core voltage includes a digital voltage VDD33 and an analog voltage VDDA. Both core voltages can be powered by an external bench power supply or by USB.

- **Bench Power Supply** – To supply VDD33 with a bench power supply, connect power to J17. To supply VDDA with a bench power supply, connect power to J18. At the same time, place the jumpers as shown in Figure 2B.
- **USB Power Supply** – When the board is connected to a PC through a USB cable, on-board voltage regulators will generate a 3.3V for the device. In this case, place the jumper as shown in Figure 2A. See JP5 jumper position for the on-board voltage regulators in the following figure. USB power source is recommended because it's readily available right from your laptop.

Figure 2. Jumping to the Pin configuration as shown (Figure 2A.) will select power source from on-board voltage regulators powered by USB; Jumping to the Pin configuration as shown (Figure 2B.) will select the bench power supply

Figure 2A. (JP5: Pin 1 - 2 to Voltage Regulators)

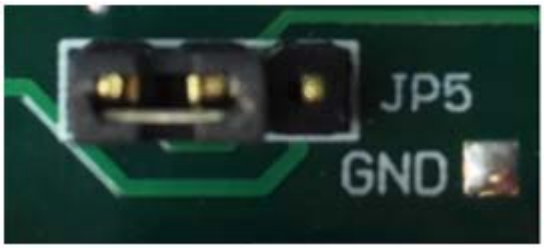


Figure 2B. (JP5: Pin 2 - 3 to Banana Jack)

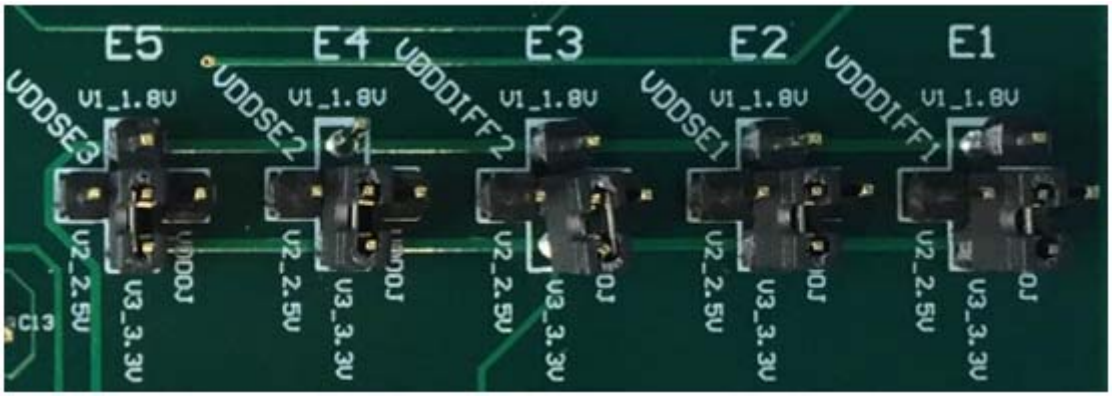
Output Clock Voltages

Like VDDA and VDD33 having two sources, each output voltage is also provided with two sources to choose from: bench power supply or powered from USB. The selection is made by a 4-way header as shown in Figure 3 below.

The jumper can be used to select a voltage for E1, E2, E3, E4, and E5 respectively. The on-board voltage regulators powered by USB are 1.8V, 2.5V and 3.3V; VDDOJ is from bench power supply connecting to JP17 and JP18. Each output voltage can be individually selected. Use the label on the evaluation board: E1 for VDDDIFF1, E2 for VDDSE1, E3 for VDDDIFF2, E4 for VDDSE2 and E5 for VDDSE3. The JP6 on the EVB needs to be in the default position as supplied by the manufacturer.

Note: Connect the USB to the board when using external power supply

Figure 3. Jumper Configuration for On-board Voltage Regulators



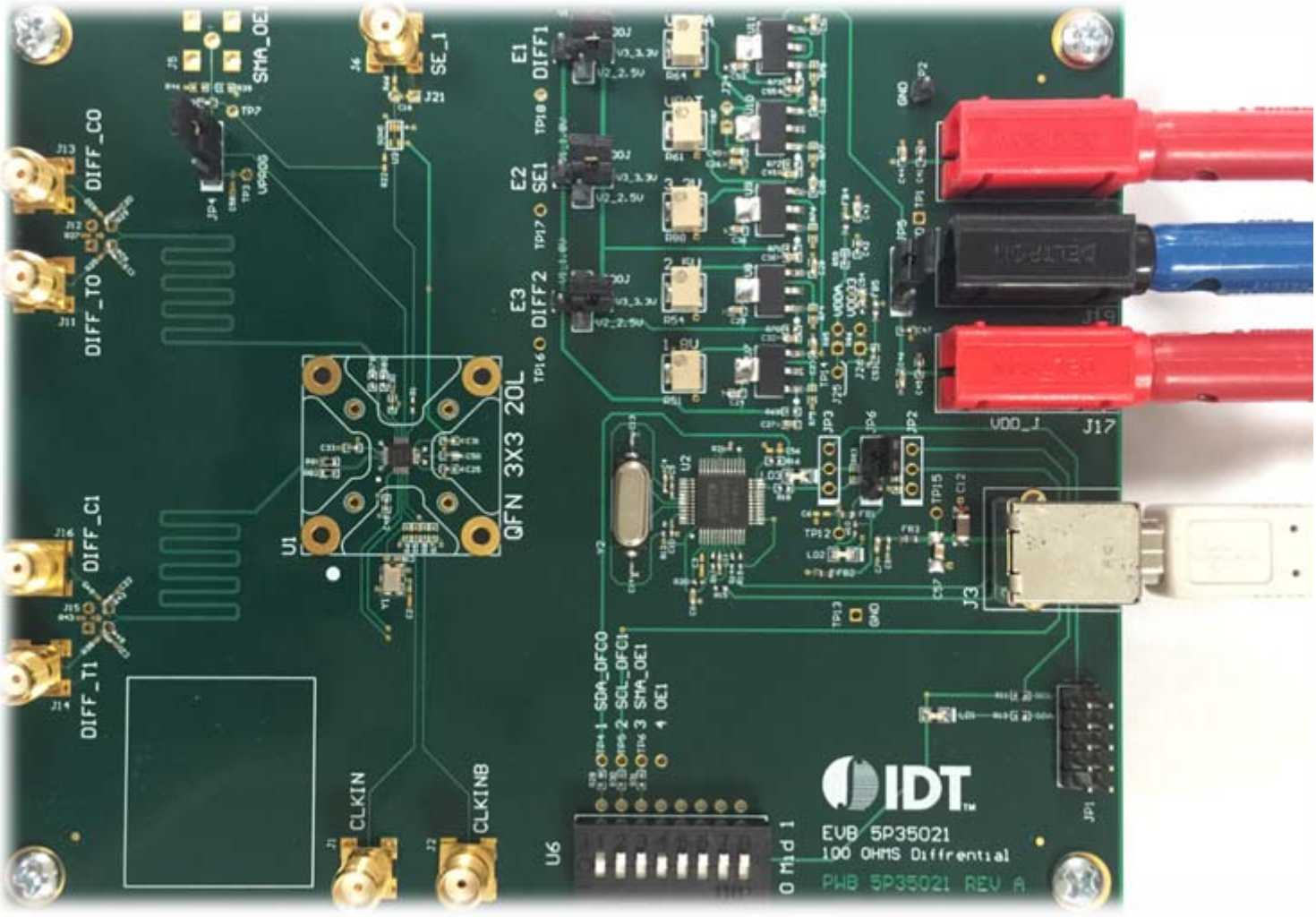
Connecting the Board

The board is connected to a PC through a USB connector for configuring and programming the device, as shown in Figure 4 below. The USB interface will also provide +5V power supply to the board, from which on-board voltage regulators generate various voltages for the core as well as for each output.

The board can also be powered by a bench power supply by connecting two banana jacks J17, J18 for output and core voltages, respectively. Please see board power supply section for details.

Note: The USB port only supports USB 2.0; USB 3.0 is not supported at this time.

Figure 4. Connecting the Board with USB Port for Communications with Timing Commander Software



On-Board Crystal

A 25MHz crystal is installed on the board. It is used as a source for reference frequency.

Board Default Frequency Output

Table 2: Board Default Frequency Output

Serial	Output	Output Frequency
1	SE_1 (Single-ended)	–
2	DIFF_CO/TO (Differential Output)	100 MHz
3	DIFF_C1/T1 (Differential Output)	100 MHz

DIP Switch (U6)

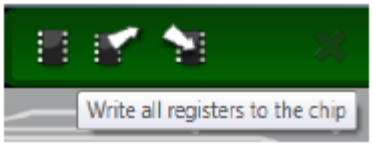
Table 3: DIP Switch (U6)

Serial	DIP Switch Pin Number	DIP Switch Pin Name	State	Mode
A	1	SDA_DFCO	Floating/Tristate	–
B	2	SCL_DFC1	High or 1	I2C
C	3, 5, 7	SMA_OE1, SMA_OE2, SMA_OE3	High or 1	–
D	4, 6, 8	OE1, OE2, OE3	High or 1	–

Configuration and Setup

Table 4: Configuration and Setup from I2C Port

Step No.	Steps	Comments
1	Set SCL_OFC1 Pin (DIP Switch PIN 2)	High or 1
2	Launch 5P35021 Timing Commander Software	Refer to 5P35021 Timing Commander User Guide Timing Commander Software
3	Follow the “Getting Started Steps” – in Timing Commander Software	–
4	Using the Timing Commander GUI, start a new settings file, or open a pre-optimized file.	Configure the Timing Commander Software for the required sets of Outputs
5	Connect J3 to a USB Port using the supplied I2C cable	An I2C connection is established between GUI software and VC3S device
6	Connect to the EVB by clicking on the microchip icon located at the right of the timing commander	

Step No.	Steps	Comments
7	Once configured, new options will be available on a green background indicating that the EVB has successfully connected with the board.	–
8	Write the setting to the device by clicking on the write all registers to the chip option	
9	All intended outputs should be available for measurement.	–

Board Schematics

Evaluation board schematics are shown on the following pages.

Figure 5. Evaluation Board Schematic (I)

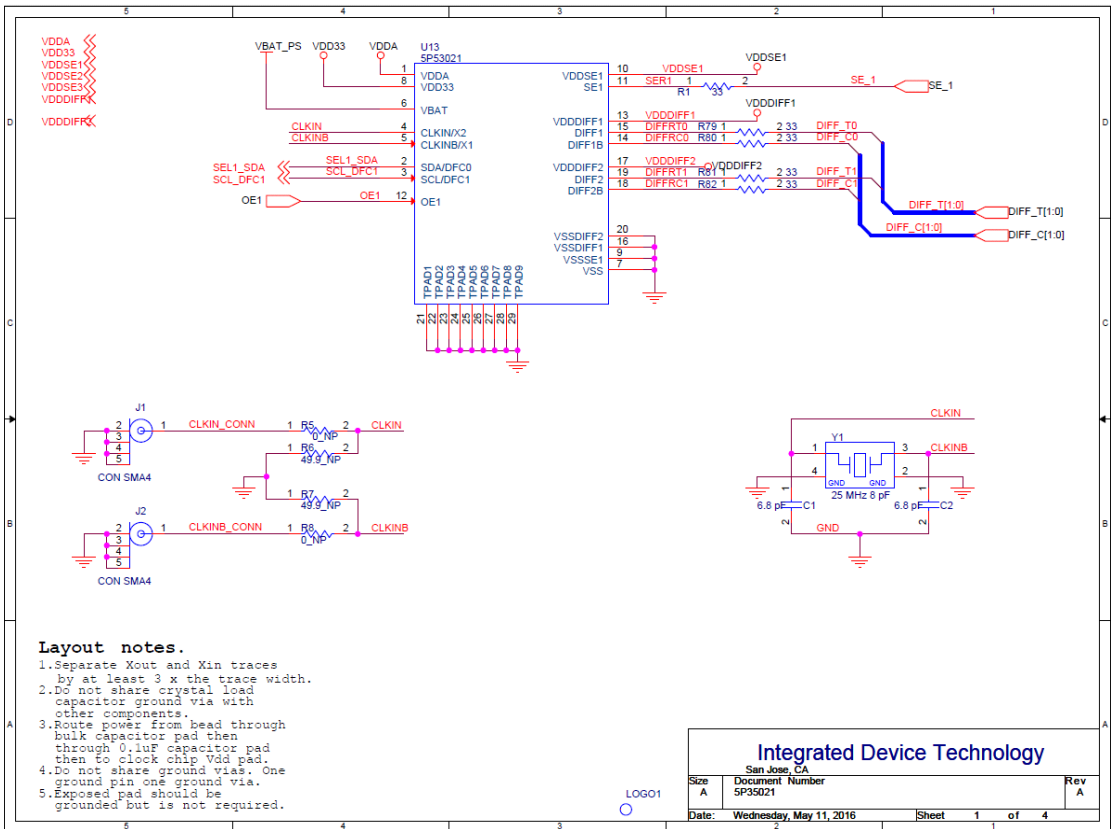


Figure 6. Evaluation Board Schematic (II)

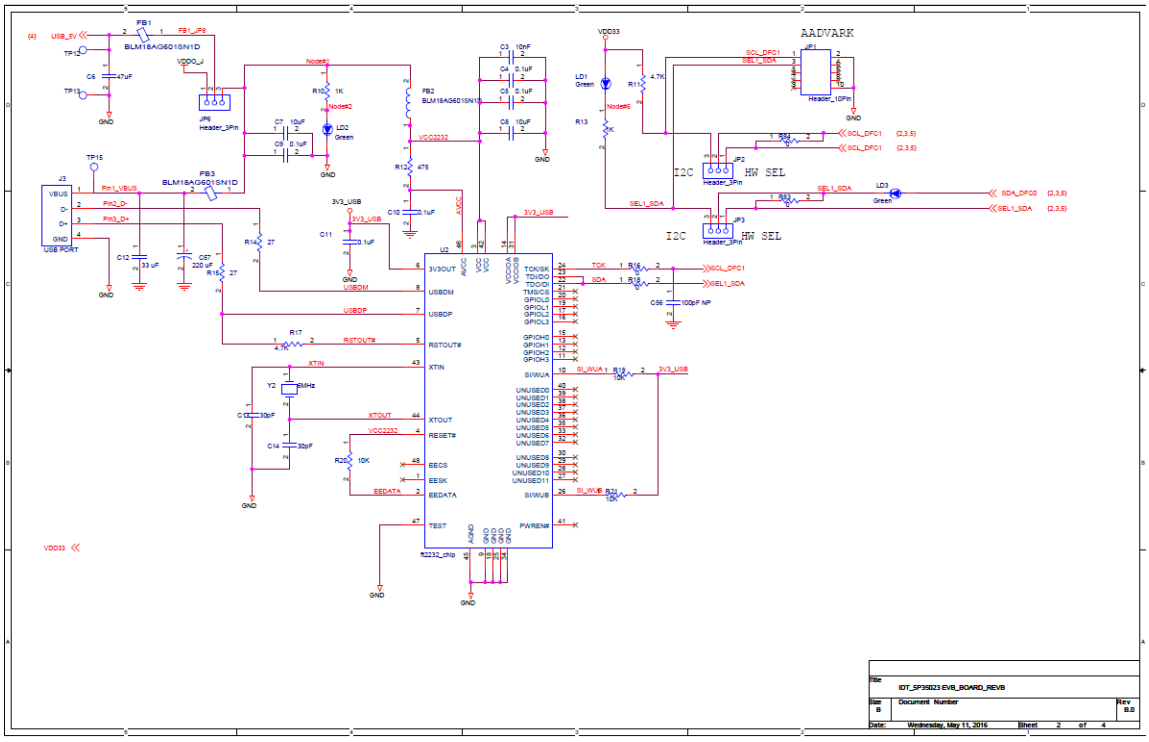


Figure 7. Evaluation Board Schematic (III)

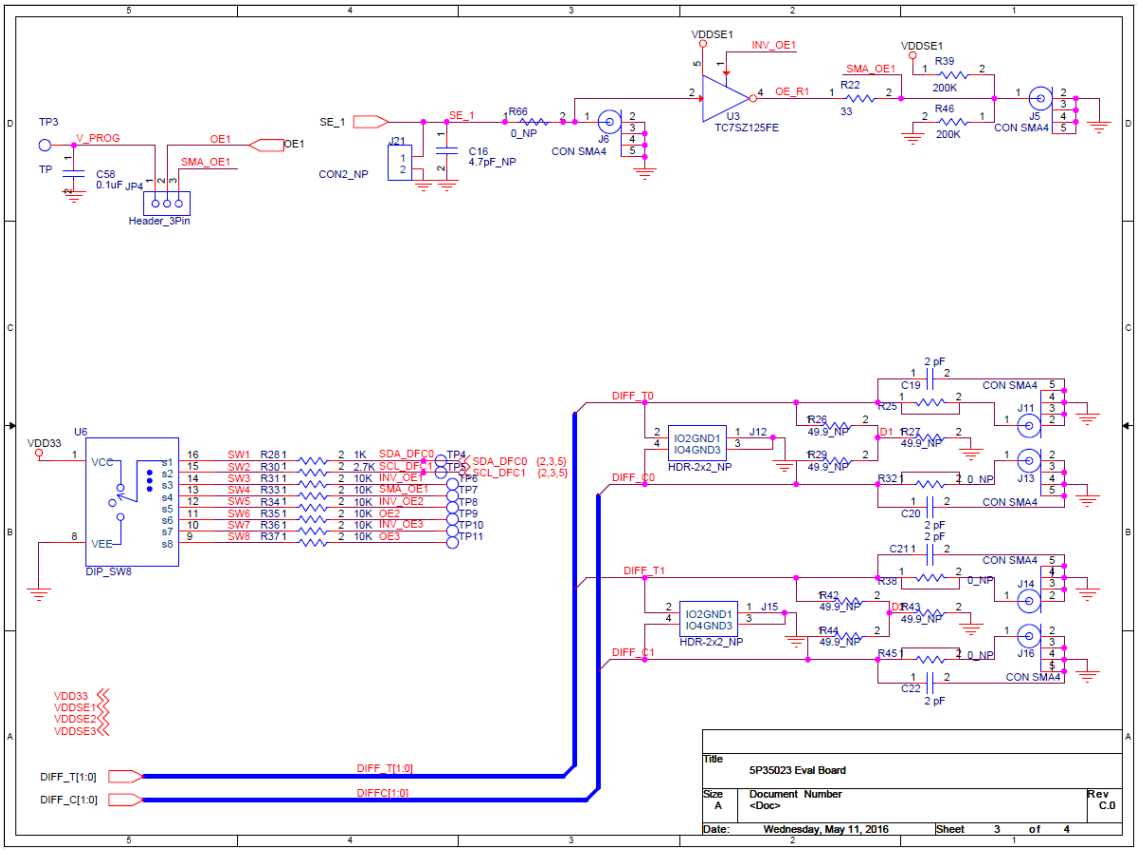
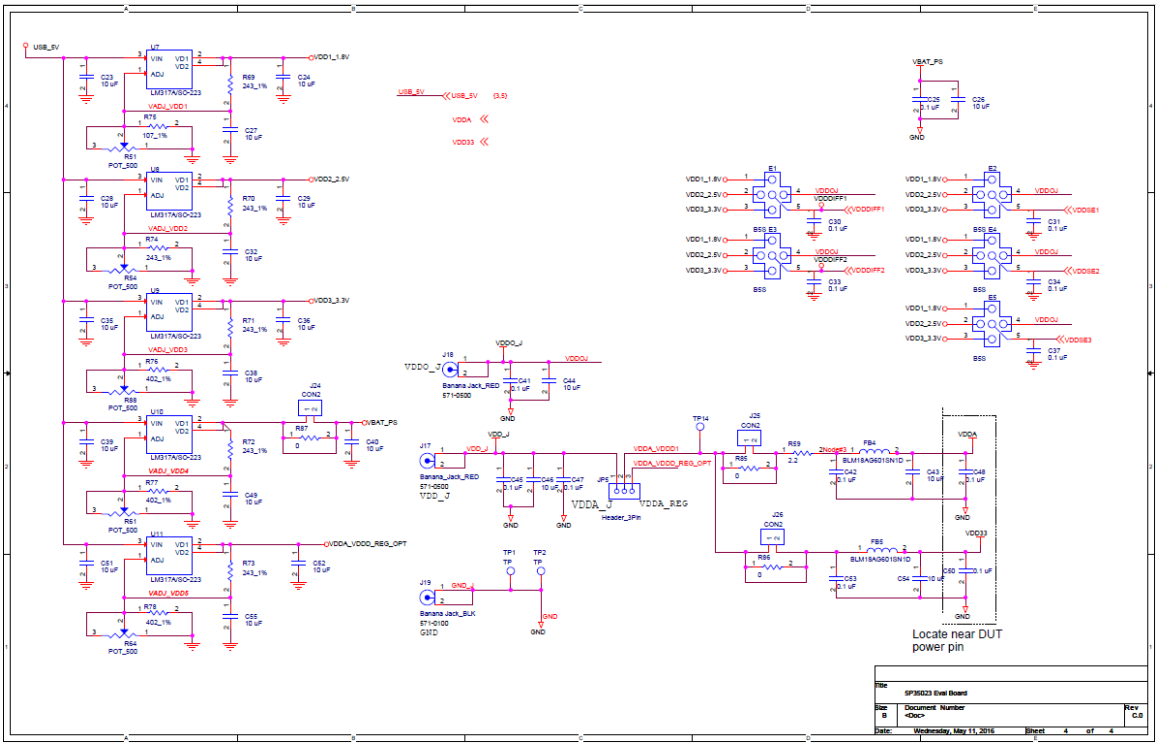


Figure 8. Evaluation Board Schematic (IV)



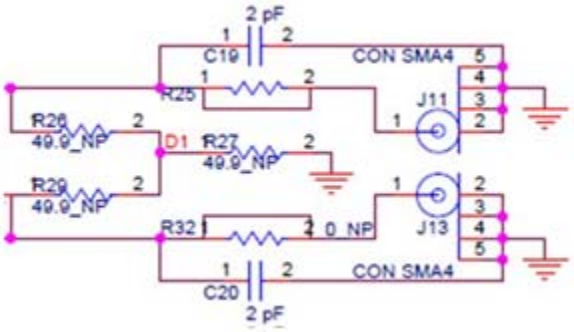
Signal Termination Options

Termination options for Differential Output 1 - 2 in the evaluation board are displayed in Figure 9. The termination circuits are designed to optionally terminate the output clocks in LVPECL, LVDS, LVCMOS and HCSL signal types by populating (or not-populating) some resistors. DC or AC coupling of these outputs are also supported.

Table 5 and Table 6, below, tabulates component installations to support LVPECL, HCSL, LVCMOS and LVDS signal types for OUTPUT1 - 2, respectively. Please note that by doing so, the output signals will be measured and terminated by an oscilloscope with a 50Ω internal termination.

Figure 9. Output Termination Options

DIFF_CO/TO



DIFF_C1/T1

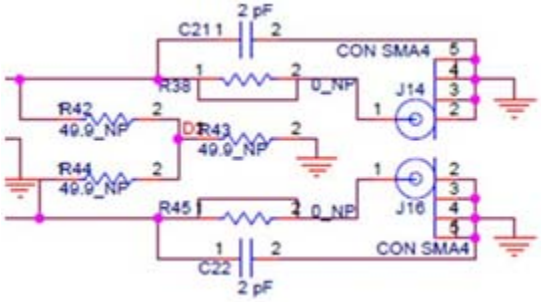


Table 5: Termination Options for Differential Output 1 (DIFF_CO/TO)

Signal Type	Series Resistors: R79, R80	Series Capacitors: C19, C20	Resistor Network: R25, R26, R27, R29, R32
**LPHCSL	33Ω	2pF	Not installed

Table 6: Termination Options for Differential Output 2 (DIFF_C1/T1)

Signal Type	Series Resistors: R81, R82	Series Capacitors: C21, C22	Resistor Network: R38, R42, R43, R44, R45
**LPHCSL	33Ω	2pF	Not installed

As noted, 4-resistor network is not installed in Table 5 and Table 6 because oscilloscope with internal 50Ω termination is utilized for signal termination and measurement. If an AC-coupled, stand-alone LVPECL output is needed (without oscilloscope connections), the 4-resistor network needs to be installed accordingly.

Table 7: Termination for Single-ended Output 1 (SE_1)

Signal Type	Series Resistors: R1	Series Capacitors: C16
*LVCMOS	33Ω	Not installed

Table 8: Termination for Differential and Single-ended Input)

Signal Type	Series Resistor: R8	Series Resistor: R5
Differential Clock Input	Not installed	Not installed
Single-ended Clock Input	Not installed	Not installed

Note: ** The differential output is applicable to LPHCSL which is the default configuration of the board.

* The single-ended output is applicable to LVCMOS which is the default configuration of the board.

Contact IDT if user wants to change termination configuration to support other output signal types.

Orderable Part Numbers

The following evaluation board part numbers are available for order.

Table 9: Orderable Part Numbers

Part Number	Description
EVK5P35021	Evaluation board with all differential outputs terminated as LPHCSL, Single-ended terminated as LVCMOS

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