Interfacing Timing Devices to Switchtec™ Devices

Introduction
The PM85xx family of Switchtec™ PCIe switch devices require a number of PCIe reference clocks to operate. This application note shows the biasing and termination networks needed to connect various families of Microsemi timing products to the PM85xx devices. It also shows methods for power supply sequencing that will satisfy the requirements of the Switchtec devices and the timing devices.

ZL30251 Clock Multiplier and Frequency Synthesizer Family
The ZL30251 is a 3-output clock multiplier and frequency synthesizer device which can be used to provide 100 MHz reference clocks to the PM85xx devices. This section shows how the device should be connected to the PM85xx device reference clock input, and shows the power supply sequencing options for the devices.

The following devices have the same output drivers as the ZL30251, and can be connected to the PM85xx reference inputs in the same way as the ZL30251 outputs: ZL30151, ZL3025x, ZL30169, ZL30244, ZL30245, ZL30255, ZL30182, ZL3062x, ZL3072x

Interconnection
The ZL30251 output drivers can be configured as CML or HSTL.
When configured for CML, the drivers have 50Ω internal pull-ups to VDD. The driver should be set to 800mV. Since the Voh voltage of the CML driver is greater than the maximum voltage allowed by the PM85xx receiver, the interface must be AC coupled. The differential signal should be terminated in a 100Ω resistor as shown in Figure 1. Because of the double termination (50Ω in the ZL30251 and 100Ω at the end of the transmission line), the signal swing at the receiver will be attenuated by half. If the driver is set to 800mV, the swing at the receiver will be 400mV, meeting the Vid_min of the receiver with margin.

Figure 1 AC-Coupled Termination for ZL30251 with CML Drivers
If DC coupling is required, the ZL30251 output should be configured for HSTL. In this mode, the VDDO for the driver should be connected to 1.8V, so that the swing of the reference clock is below the 2.0V maximum of the receiver.

![Diagram of DC-Coupled Termination for ZL30251 with HSTL Drivers](image)

**Figure 2 DC-Coupled Termination for ZL30251 with HSTL Drivers**

It is also possible to connect VDDO to 1.5V, use 30Ω series resistors, and set OCxCR2.DRIVE to 4x.

**Power Sequencing for the ZL30251 Family**

Note that the ZL30251 requires that the 3.3V rail be powered on before or at the same time as the 1.8V rail. The PM85xx requires the opposite sequence. Please see section Power Sequencing Suggestions for Devices Requiring Opposite Sequence for suggestions on managing the sequencing requirements.
ZL30267 10-Output Clock Multiplier and Frequency Synthesizer Family

The ZL30267 is a 10-output clock multiplier and frequency synthesizer device which can be used to provide 100 MHz reference clocks to the PM85xx devices. This section shows how the device should be connected to the PM85xx device reference clock input, and shows the power supply sequencing options for the devices.

The following devices have the same output drivers as the ZL30267, and can be connected to the PM85xx reference inputs in the same way as the ZL30267 outputs: ZL3026x and ZL40250, ZL40251, ZL40252, ZL40253.

Interconnection

![Figure 3 DC-coupled Termination for ZL30267 with HCSL outputs](image-url)
Interfacing Timing Devices to Switchtec Devices

Figure 4 AC-coupled Termination for ZL30267 with LVDS or Programmable Diff outputs

Note that if Programmable Diff outputs are selected, \( V_{OD} \) should be set to 400 mV. The setting for \( V_{CM} \) doesn't matter since the circuit is AC coupled.

Figure 5 DC-coupled Termination for ZL30267 with LVDS or Programmable Diff Outputs

Note that if Programmable Diff outputs are selected, \( V_{CM} \) should be set to 1.2V, and \( V_{OD} \) should be set to 400 mV.

Power Sequencing for the ZL30267 Family

Note that the ZL30267 requires that the 3.3V rail be powered on before or at the same time as the 1.8V rail. The PM85xx requires the opposite sequence. Please see section Power Sequencing Suggestions for Devices Requiring Opposite Sequence for suggestions on managing the sequencing requirements

ZL40230 10-output Clock Buffer Family

The ZL40230 is a 10-output clock buffer device which can be used to provide 100 MHz reference clocks to the PM85xx devices. This section shows how the device should be connected to the PM85xx device reference clock input, and shows the power supply sequencing options for the devices.

The following devices have the same output drivers as the ZL40230, and can be connected to the PM85xx reference inputs in the same way as the ZL40230 outputs: ZL40231, ZL40234, and ZL40235.
There are several options for interconnection, as shown in the following section.

**Interconnection**

Figure 6 **DC-coupled Termination for ZL4023x with HCSL outputs**

---

Figure 7 **DC-coupled Termination for ZL4023x with LVDS outputs**
Power Sequencing for the ZL40230 Family.

The ZL40230 family of devices does not have a requirement on power supply sequencing, so no special provisions are required. The PM855x power sequencing should be followed – 1.8V should be provided before 3.3V.

Power Sequencing Suggestions for Devices Requiring Opposite Sequence

The ZL30251 family and the ZL30267 family required the 3.3V supply to be applied before or at the same time as the 1.8V supply. The PM85xx family requires the opposite sequence – that is 1.8V should be applied before 3.3V. This can cause difficulties in designing a power circuit that satisfies all the device families.

One way to meet this objective is to power the 3.3V rail for the ZL30xxx devices from the same regulator that powers the 3.3V rail of the PM85xx. Then the 1.8V rail for the ZL30xxx can be supplied from a dedicated 1.8V regulator powered from the 3.3V rail. The 1.8V rail for the PM855x must be supplied by some other means, and it must be provided prior to the 3.3V rail being supplied.
Microsemi Corporation (Nasdaq: MSCC) offers a comprehensive portfolio of semiconductor and system solutions for aerospace & defense, communications, data center and industrial markets. Products include high-performance and radiation-hardened analog mixed-signal integrated circuits, FPGAs, SoCs and ASICs; power management products; timing and synchronization devices and precise time solutions, setting the world's standard for time; voice processing devices; RF solutions; discrete components; enterprise storage and communication solutions, security technologies and scalable anti-tamper products; Ethernet solutions; Power–over-Ethernet ICs and midspans; as well as custom design capabilities and services. Microsemi is headquartered in Aliso Viejo, Calif., and has approximately 4,800 employees globally. Learn more at www.microsemi.com.

Microsemi makes no warranty, representation, or guarantee regarding the information contained herein or the suitability of its products and services for any particular purpose, nor does Microsemi assume any liability whatsoever arising out of the application or use of any product or circuit. The products sold hereunder and any other products sold by Microsemi have been subject to limited testing and should not be used in conjunction with mission-critical equipment or applications. Any performance specifications are believed to be reliable but are not verified, and Buyer must conduct and complete all performance and other testing of the products, alone and together with, or installed in, any end-products. Buyer shall not rely on any data and performance specifications or parameters provided by Microsemi. It is the Buyer’s responsibility to independently determine suitability of any products and to test and verify the same. The information provided by Microsemi hereunder is provided “as is, where is” and with all faults, and the entire risk associated with such information is entirely with the Buyer. Microsemi does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other IP rights, whether with regard to such information itself or anything described by such information. Information provided in this document is proprietary to Microsemi, and Microsemi reserves the right to make any changes to the information in this document or to any products and services at any time without notice.