Recommended Terminations for Differential Inputs of CDCE706/CDCE906

Firoj Kabir *Clock Drivers*

ABSTRACT

This application report describes how differential signals (LVDS, LVPECL, and HSTL) can be connected to CDCE706/CDCE906 differential inputs directly. The wide common-mode voltage and smaller swing required make the devices so versatile that they can receive any differential signal without any complicated coupling and biasing circuits.

1 Introduction

CDCE706/CDCE906 is a three-PLL-based, programmable synthesizer/multiplier/divider with different input clocking options. The CDCE706/906 can accept XTAL input or single-ended or differential input signals. This device can be used as a differential to a single-ended translator with multiplication and division (PLL-based driver) or with division (buffer). The default input selection is XTAL input. The differential inputs can be selected either using SMBus programming or EEPROM. The device has two dedicated supply pins for two banks of the outputs. The output supply voltage can be either 3.3 V or 2.5 V. The outputs also can be inverted. So, different combinations of output buffers are achievable.

1.1 Specifications for Input Clocks

		MIN	NOM	MAX	UNIT
V_{CC}	Device supply voltage	3	3.3	3.6	V
V_{CCOUT1}	Output Y0, Y1 supply voltage	2.3		3.6	V
V_{CCOUT2}	Output Y2, Y3, Y4, Y5 supply voltage	2.3		3.6	V
V_{IL}	Low-level input voltage LVCMOS			0.3 V_{CC}	V
V_{IH}	High-level input voltage LVCMOS	0.7 V_{CC}			V
$V_{I(thresh)}$	Input voltage threshold LVCMOS		0.5 V_{CC}		V
V_I	Input voltage rang LVCMOS	0		3.6	V
$\|V_{ID}\|$	Differential input voltage	0.1			V
V_{IC}	Common-mode for differential input voltage	0.2		V_{CC}– 0.6	V
I_{OH}/I_{OL}	Output current (3.3 V)			±6	mA
	Output current (2.5 V)			±4	mA
C_L	Output load LVCMOS			25	pF

2 Recommended Differential Input Terminations

The differential input clocks can be connected to CDCE706/906 directly (DC-coupled) with standard termination or with AC-coupling with proper termination and biasing.

2.1 CDCE706/906 With LVDS Clock Driver

Usually, LVDS clock outputs require 100-Ω termination at the receiver end. An LVDS driver provides a minimum 245-mV swing with 1.2-V offset. Both 3.3-V and 2.5-V LVDS drivers can be connected to CDCE706/906 differential input directly.

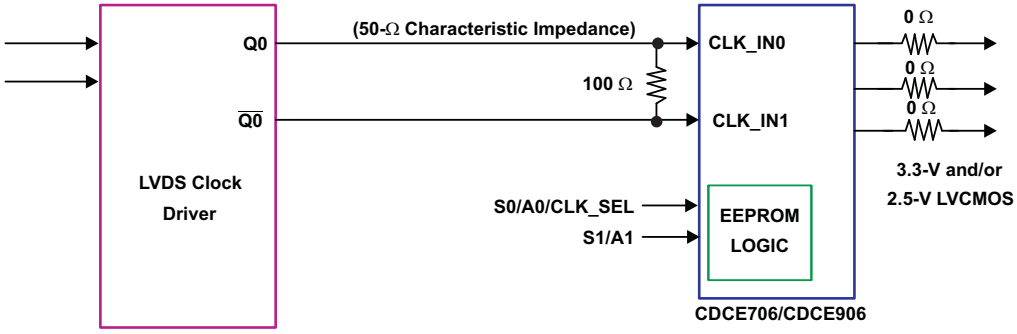

Figure 1. DC-Coupling Between LVDS Driver and CDCE706/906

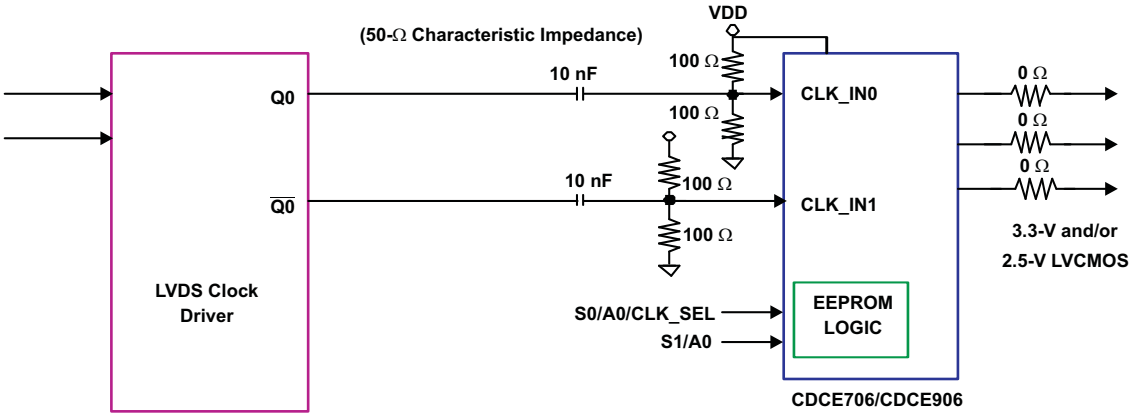

Figure 2. AC-coupling Between LVDS Driver and CDCE706/906

2.2 CDCE706/906 With LVPECL Clock Driver

LVPECL output has open-emitter structure. So, for switching it requires a DC path. The common termination for LVPECL output is 50 Ω to VCC-2 V. Usually, an LVPECL driver provides a minimum 500-mV swing with VCC-1.3-V offset. Both 3.3-V and 2-5 V LVPECL drivers can be connected to CDCE706/CDCE906 directly with DC termination. AC termination is also possible.

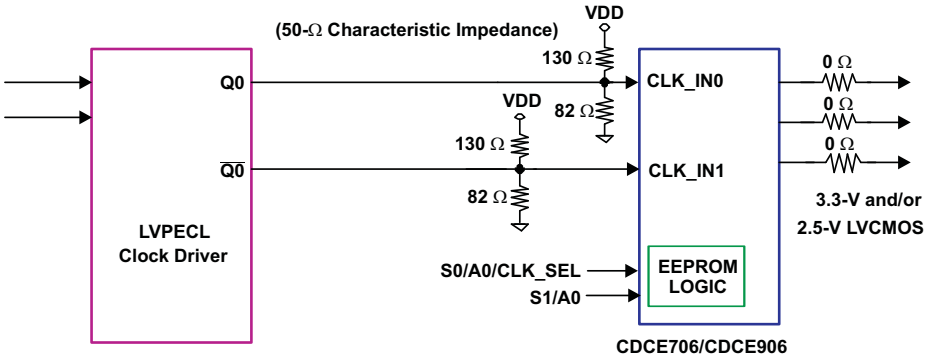

Figure 3. DC-Coupling Between LVPECL Driver and CDCE706/906

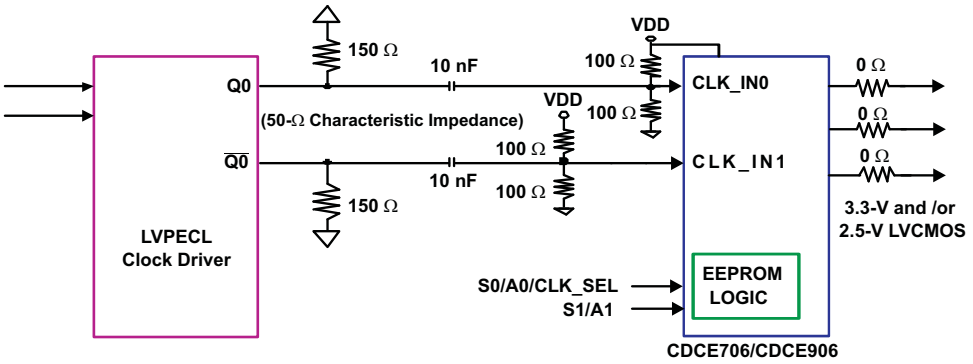

Figure 4. AC-Coupling Between LVPECL Driver and CDCE706/906

2.3 CDCE706/906 With HSTLClock Driver

An HSTL driver provides a minimum 400-mV swing with 0.75-V offset. So, HSTL outputs can be connected to CDCE706/CDCE906 inputs directly.

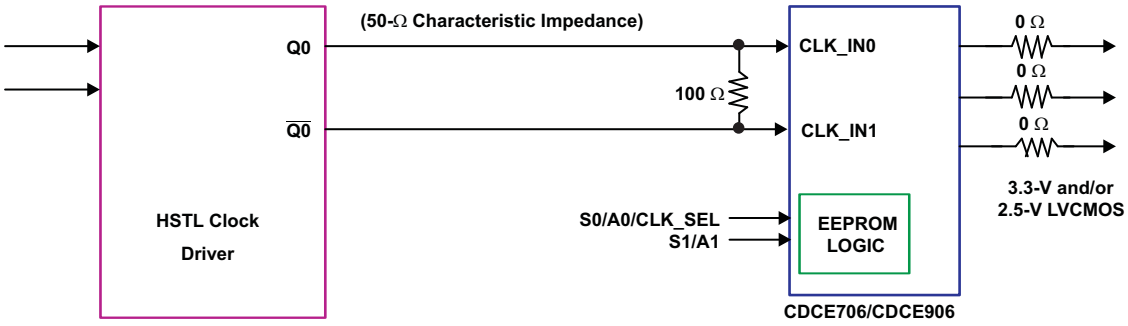

Figure 5. DC Coupling Between HSTL Driver and CDCE706/906

3 Output Jitter Impact With Differential Clock Inputs

The output jitter of CDCE/CDCE906 is low. The typical period jitter is 60 ps. The jitter performance remains same with differential clock inputs as well as single ended input (assuming both differential and single ended inputs have same jitter characteristics)

4 Inverted Outputs From CDCE706/CDCE906

Each of the six outputs can be individually inverted. So, three pseudo-differential pairs can be generated out of six outputs. As there is a slight mismatch between the rise and fall times, the cross-point does not occur at the middle.

5 Conclusion

As CDCE706/CDCE906 accepts a wide range of common-mode voltages (0.2 V – 2.6 V) and differential inputs can work with only a 100-mV swing, these devices can be an excellent differential to single-ended translators with or without using the PLLs.

5.1 References

1. *CDCE706, Programmable 3-PLL Clock Synthesizer/ Multiplier/ Divider* data sheet (SCAS815)
2. *CDCE906, Programmable 3-PLL Clock Synthesizer/ Multiplier/ Divider* data sheet (SCAS814)

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products		**Applications**	
Amplifiers	amplifier.ti.com	Audio	www.ti.com/audio
Data Converters	dataconverter.ti.com	Automotive	www.ti.com/automotive
DSP	dsp.ti.com	Broadband	www.ti.com/broadband
Interface	interface.ti.com	Digital Control	www.ti.com/digitalcontrol
Logic	logic.ti.com	Military	www.ti.com/military
Power Mgmt	power.ti.com	Optical Networking	www.ti.com/opticalnetwork
Microcontrollers	microcontroller.ti.com	Security	www.ti.com/security
Low Power Wireless	www.ti.com/lpw	Telephony	www.ti.com/telephony
		Video & Imaging	www.ti.com/video
		Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments
Post Office Box 655303 Dallas, Texas 75265