CDCE(L)9xx and CDCEx06 Programming Evaluation Module

This user's guide explains how to use the CDCE(L)9xx Programming EVM, which is a generic printed-circuit board. It is designed to program devices in the CDCE(L)9xx and CDCEx06 families. These families use different core voltages, requiring voltage adjustment. This document explains the settings in detail. The CDCE(L)9xx and the CDCEx06 programming is now available.

Contents

List of Figures

1 Introduction

WARNING

The CDCE9xx and CDCEx06 programming EVM has an errata in the silkscreen on jumper J5. Where it reads CDCE9xx, it should read CDCEx06 and vice versa.

1.1 Features

- Easy-to-use evaluation module for fast programming of prototyping units and low production
- Allows programming of all members of the TI's CDCE(L)9xx family and CDCEx06 family with the same board
- Easy and fast device programming through TI ClockPro software
- EVM completely USB powered

The CDCE(L)9xx programming EVM is designed to program all devices of both the CDCE(L)9xx and the CDCEx06 families.

These families are modular PLL-based, low-cost, high-performance, programmable clock synthesizers.

The CDCE(L)9xx family ranges from three (1-PLL) up to nine (4-PLL) output clocks from a single input frequency. A crystal or LVCMOS clock signal is possible as reference clock. VCXO functionality as well as SSC functionality is built in every device of the CDCE(L)9xx family, which allows synchronizing the output frequency to an external control signal, e.g., a PWM signal. Three free programmable control inputs, S0, S1, and S2, can be used to select different frequencies, or change SSC setting for lowering EMI, or other control features like, outputs disable to low, outputs 3-state, power down, PLL bypass, etc. The device has separate output supply pins, VDDOUT, which is 1.8 V for CDCEL9xx and to 2.5 V to 3.3 V for CDCE9xx.

The CDCEx06 are 3-PLL, 6-output devices with one PLL being SSC-capable. They accept crystals as well as single-ended or differential-ended signals as an input. Two programmable pins can be used either for addressing or be programmed as configuration pins. These devices can be used with a single 3.3-V supply voltage. However, the outputs can be separately supplied by two independent supply pins. Both can be used with 3.3 V or 2.5 V.

A deep M/N divider ratio allows both families the generation of zero ppm audio/video, networking (WLAN, BlueTooth, Ethernet, GPS) or interface (USB, IEEE1394, memory stick) clocks from a 27-MHz reference input frequency, for example.

An in-built EEPROM cuts off the need for reprogramming in a certain application, but reprogramming is still possible with a 2-wire serial interface. Based on the PLL frequency and the divider settings, the internal loop filter components are automatically adjusted to achieve high stability and optimized jitter transfer characteristic of each PLL.

An overview of the devices follows.

CDCE949/CDCEL949: 4-PLL, 9 outputs, f_{max}=230 MHz, industrial temperature range, 24 pins
CDCE937/CDCEL937: 3-PLL, 7 outputs, f_{max}=230 MHz, industrial temperature range, 20 pins
CDCE925/CDCEL925: 2-PLL, 5 outputs, f_{max}=230 MHz, industrial temperature range, 16 pins
CDCE913/CDCEL913: 1-PLL, 3 outputs, f_{max}=230 MHz, industrial temperature range,14 pins
CDCE906: 3-PLL, 6 outputs, f_{max}=167 MHz, industrial temperature range, 20 pins
CDCE706: 3-PLL, 6 outputs, f_{max}=300 MHz, industrial temperature range, 20 pins

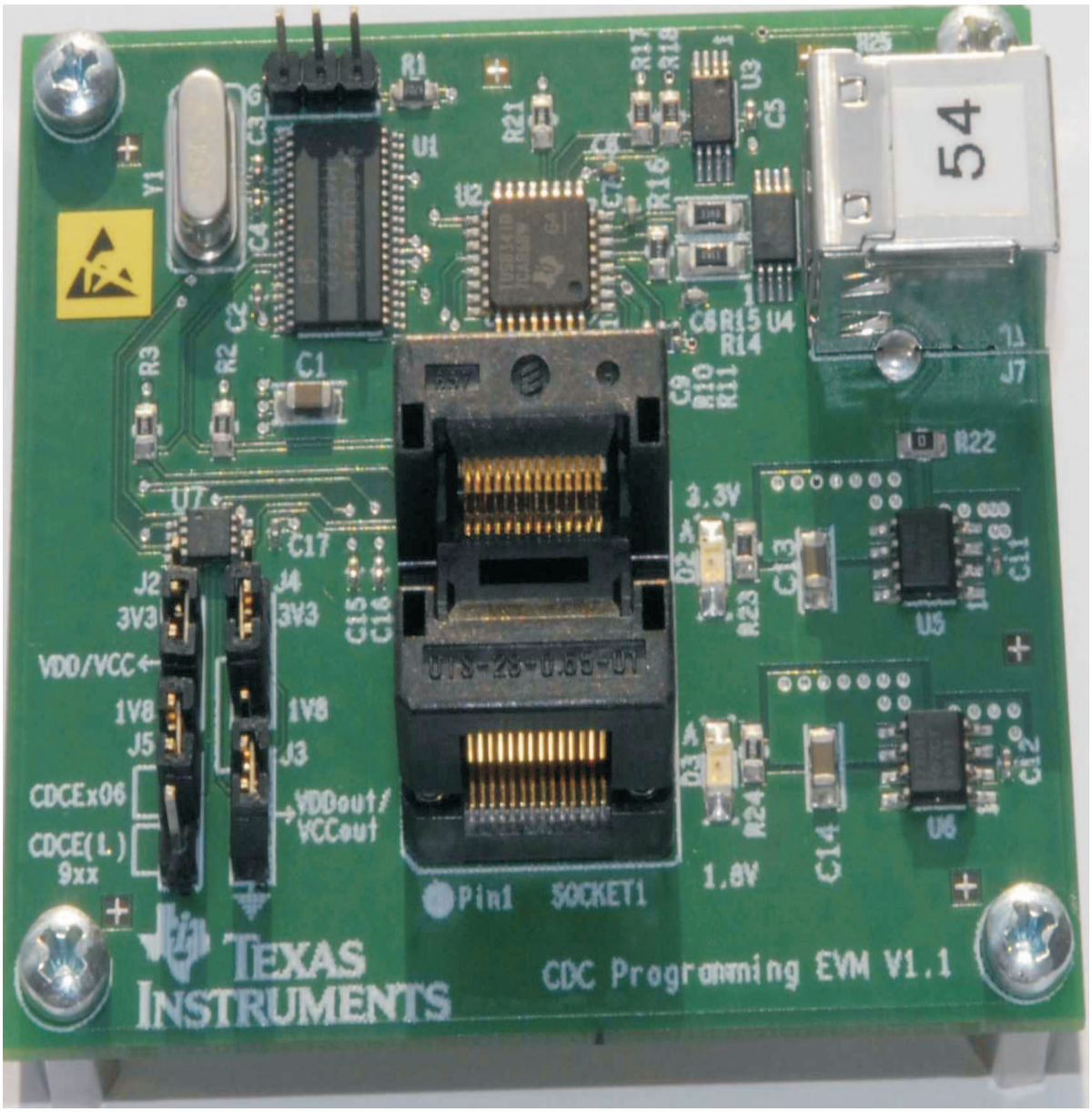


Figure 1. CDC Programming EVM

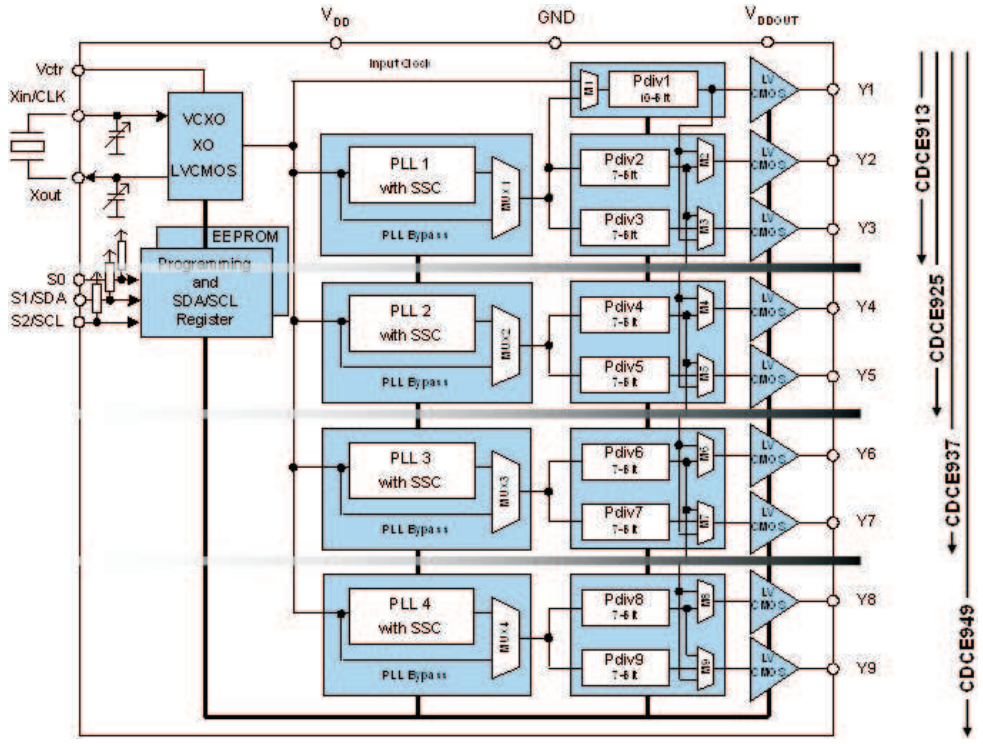


Figure 2. Functional Block Diagram of CDCE(L)9xx

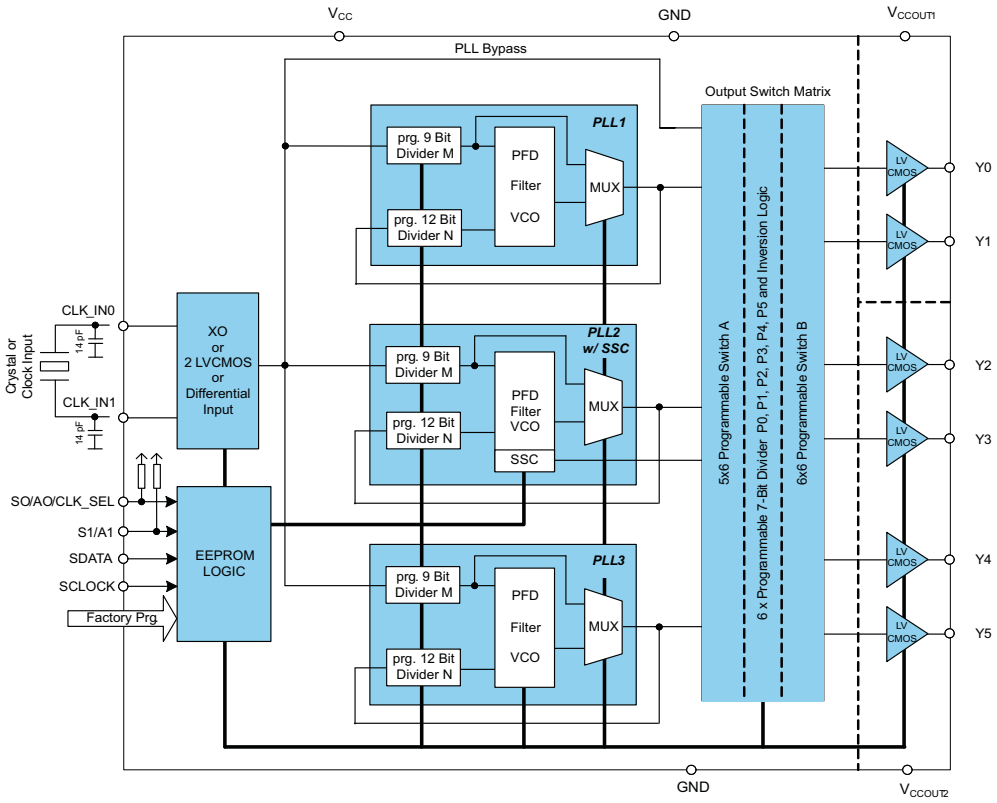


Figure 3. Functional Block Diagram of CDCEx06

2 Quick Start – USB Plug 'N' Play

Follow these steps to quickly start using the EVM.

1. Connect the EVM with the PC with a 2.0 USB cable.
2. Install the driver software using the provided CD-ROM.
3. The EVM is now running and completely powered through USB. The LED's D2 (3.3 V) and D3 (1.8 V) indicate the availability of the supply voltages.
4. Programming the device is also possible using the TI ClockPro dedicated software.

3 EVM Hardware

This section gives an extended description of the board hardware, providing the user with a comprehensive overview of its configuration; detailed information regarding onboard jumpers and communication interface (I^2C/SMBus) is also provided, allowing the user to change the setup.

The EVM is powered fully by the USB. Two onboard LDOs generate the needed 3.3-V and 1.8-V supply voltages for the board components and the device.

3.1 Jumper Settings

The CDCE(L)9xx programming EVM uses five jumpers to allow for a combination of different devices and voltages to be programmed.

J1: Jumper 1 is used to factory-program the components on the board. Do not use this jumper.

J2: Selects the voltage supply of the core. For CDCE(L)9xx, this jumper must be connected to 1.8 V. For CDCEx06, this jumper must be connected to 3.3 V.

J3: Applies the voltage to VDDOUT. It can either be the voltages selected in jumper J4 or ground.

J4: Selects the voltage to be applied to VDDOUT. For CDCEL9xx, the jumper must be connected to 1.8 V; for all other devices, it must be connected to 3.3 V.

J5: Selects the device to be programmed. Note that the silkscreen for this jumper is incorrect. Where it reads CDCE9xx, it should read CDCEx06 and vice versa. **WILL THIS BE CHANGED BEFORE RELEASE??**

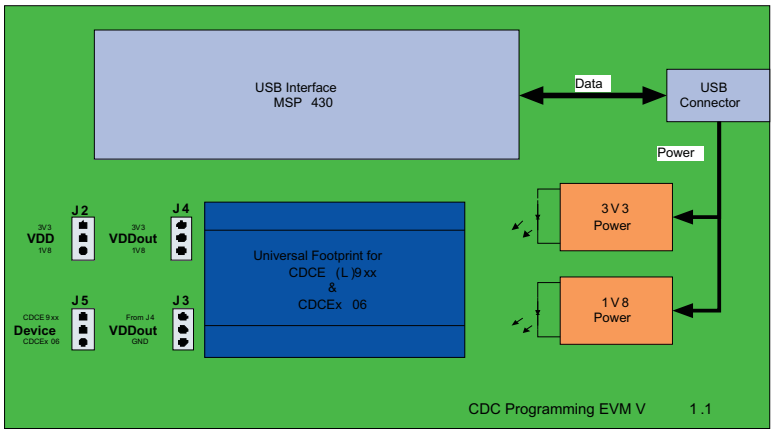


Figure 4. CDCE(L)9xx and CDCEx06 Programming EVM Block Diagram

WARNING

The CDCE9xx and CDCEx06 programming EVM has an errata in the silkscreen on jumper J5. Where it reads CDCE9xx, it should read CDCEx06 and vice versa.

3.2 Positioning of the Devices in the Socket

The socket is slightly bigger then the devices to be programmed. This allows for different devices to be programmed with only one EVM. Therefore, the positioning of the device on the socket is important.

3.2.1 Programming the CDCE(L)9xx

All devices of the CDCE(L)9xx family are programmed by positioning on the upper edge of the socket with pin 1 toward the pin 1 marking of the socket. (see Figure 5).

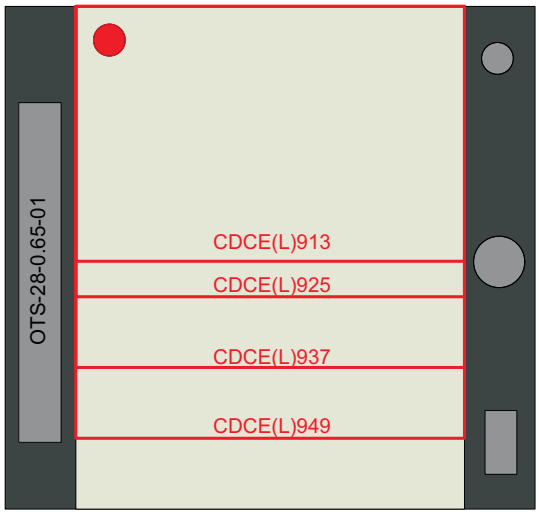


Figure 5. CDCE(L)9xx Device Location in Socket

3.2.2 Programming the CDCEx06

All devices of the CDCEx06 family are programmed by positioning on the lower edge of the socket with pin 1 toward the pin 1 marking of the socket. (see Figure 6).

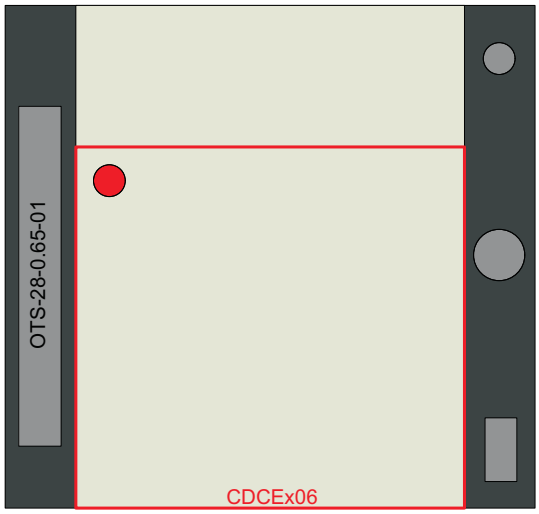
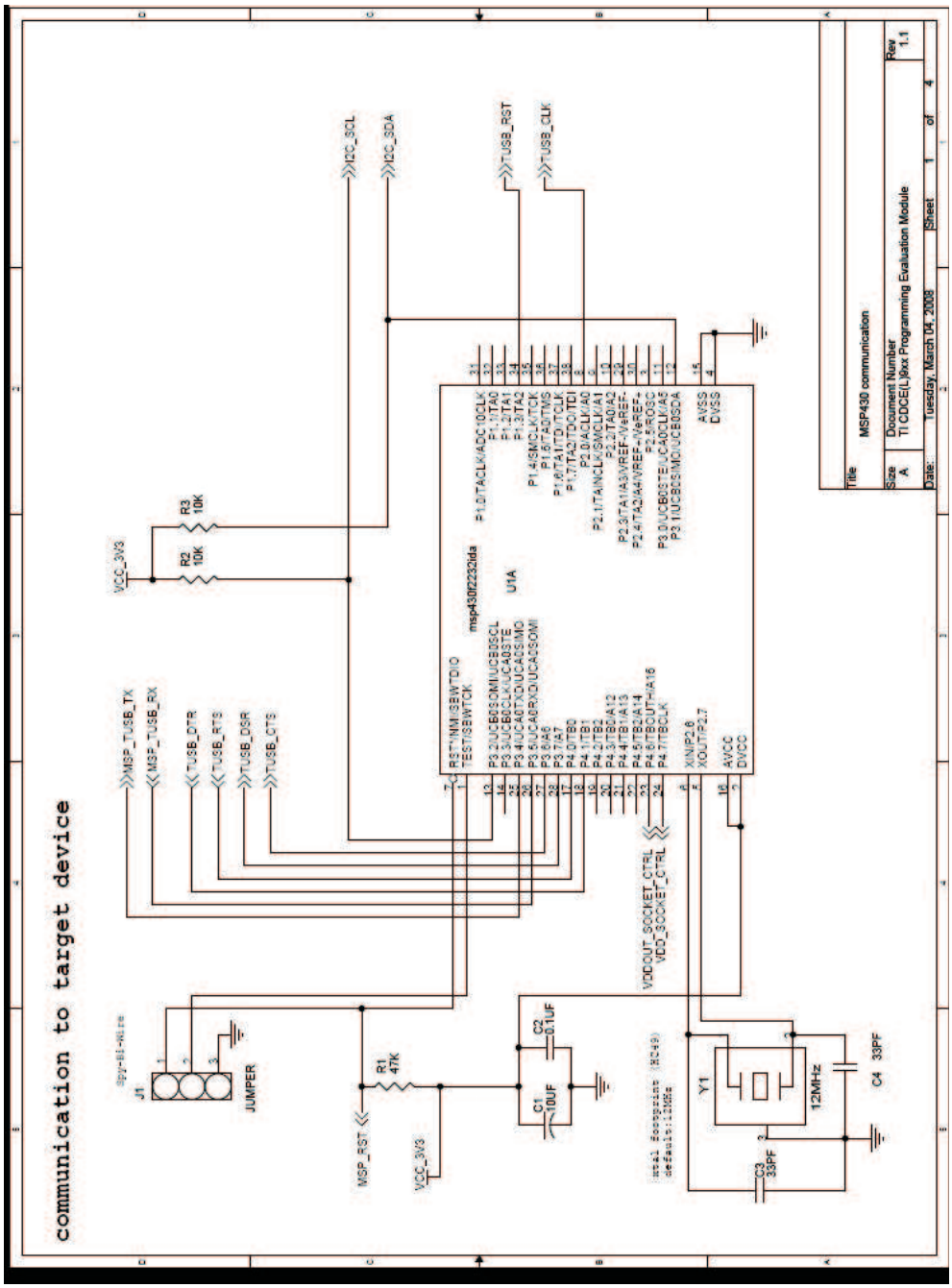
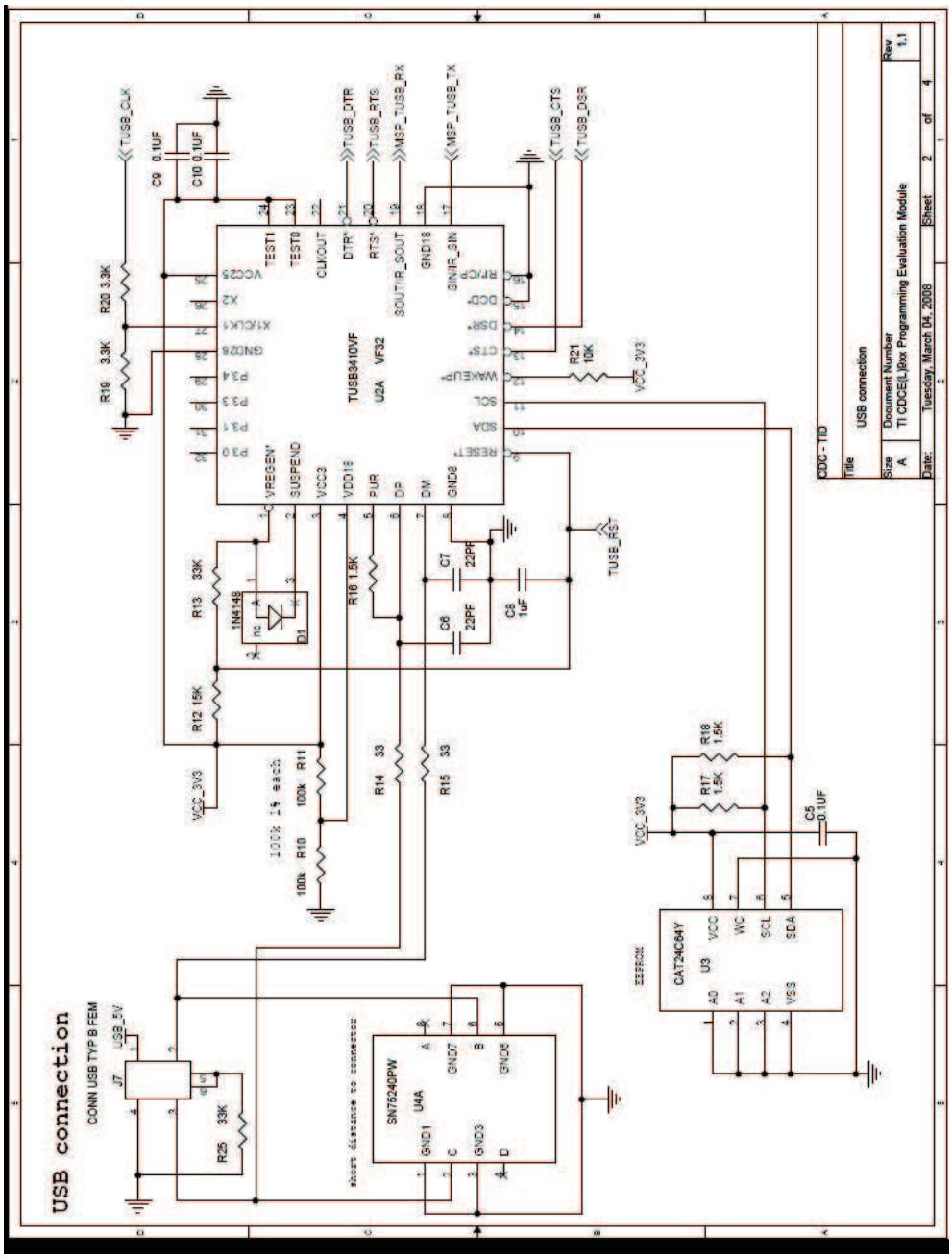
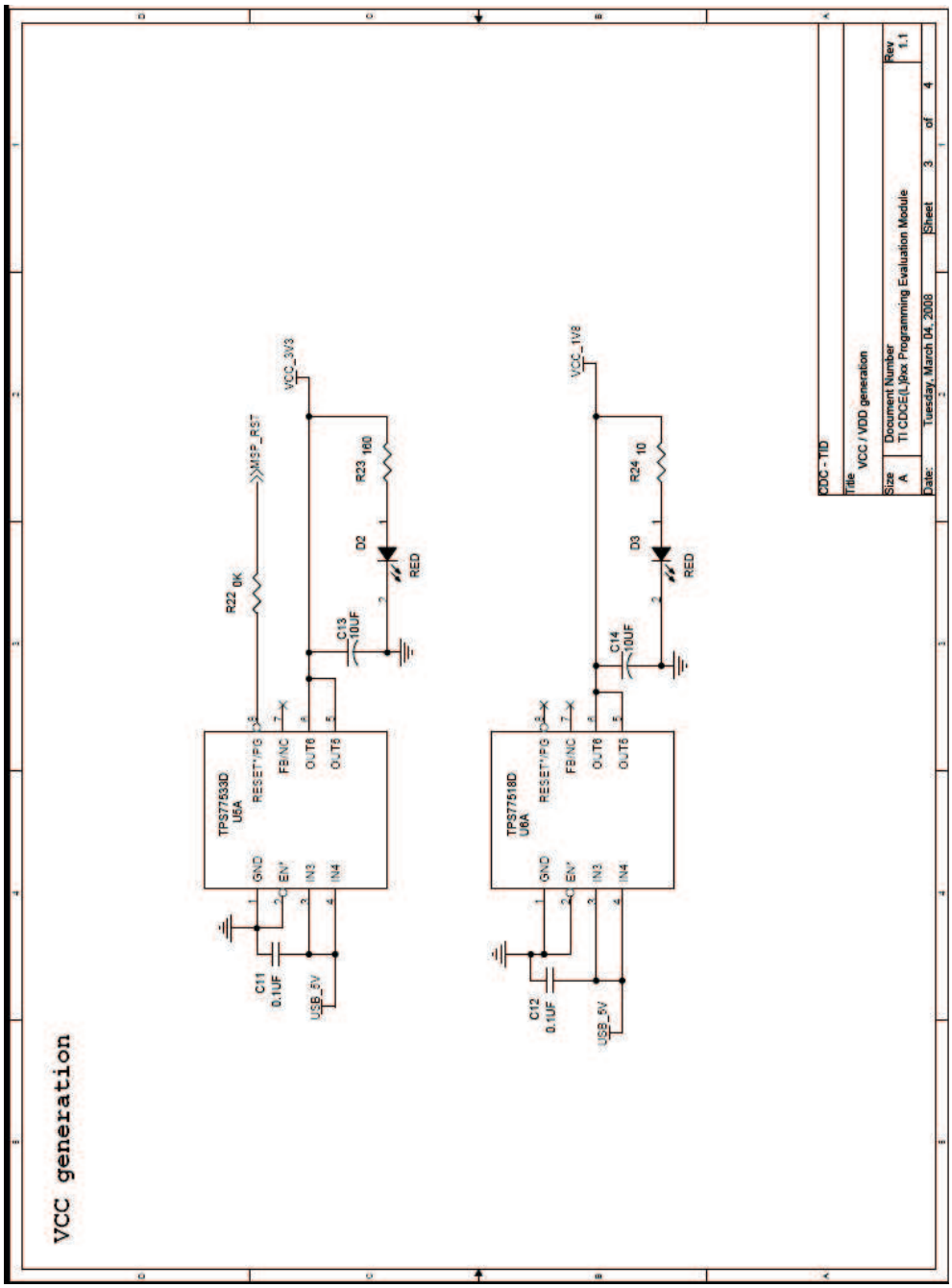


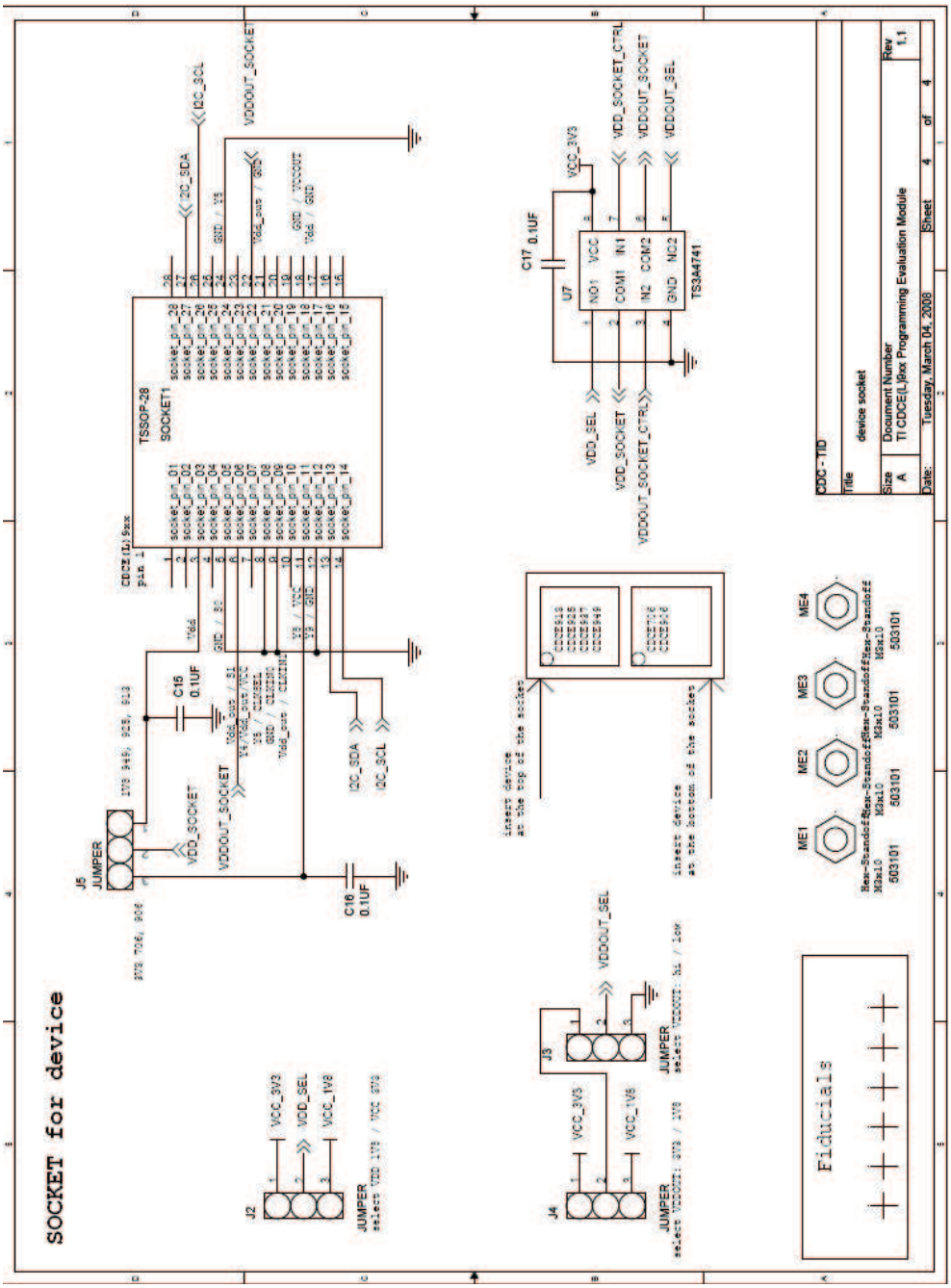
Figure 6. CDCEx06 Device Location in Socket

4 Schematics




USB connection
CONN USB TYP B FEM
TUSB3410VF
U2A VF32
SN75240PW
U4A
CAT24C64Y
U3
EEPROM
TUSB_CLK
TUSB_DTR
TUSB_RTS
MSP_TUSB_RX
MSP_TUSB_TX
TUSB_CTS
TUSB_DSR
TUSB_RST
VCC_3V3
CDC - TID
USB connection
Document Number
TI CDCE(L)9xx Programming Evaluation Module
Rev 1.1
Tuesday, March 04, 2008


VCC generation
VCC_3V3
VCC_1V8
MSP_RST
R22 0K
R23 180
R24 10
D2
D3
RED
C13 10UF
C14 10UF
C11 0.1UF
C12 0.1UF
USB_5V
TPS77533D U6A
TPS77518D U6A
RESET*/PG
FB/NC
OUT6
OUT5
GND
EN*
IN3
IN4
CDC - TID
Title: VCC / VDD generation
Size: A
Document Number: TI CDCE(L)9xx Programming Evaluation Module
Rev: 1.1
Date: Tuesday, March 04, 2008
Sheet 3 of 4


SOCKET for device
TSSOP-28
SOCKET1
C15 0.1UF
C16 0.1UF
C17 0.1UF
U7
TS3A4741
J5
JUMPER
J2
J3
J4
VDD_SOCKET
VDDOUT_SOCKET
VDD_SOCKET_CTRL
VDDOUT_SEL
I2C_SCL
I2C_SDA
VCC_3V3
VCC_1V8
Fiducials
ME1
ME2
ME3
ME4
CDC - TID
Title
device socket
Document Number
TI CDCE(L)9xx Programming Evaluation Module
Rev 1.1
Size A
Date: Tuesday, March 04, 2008
Sheet 4 of 4

5 Related Documentation From Texas Instruments

- *CDCE949, CDCEL949, Programmable 4-PLL VCXO Clock Synthesizer With 1.8V, 2.5V, and 3.3V LVCMOS Outputs* data sheet (SCAS844)
- *CDCE937, CDCEL937, Programmable 3-PLL VCXO Clock Synthesizer With 1.8V, 2.5V, and 3.3V LVCMOS Outputs* data sheet (SLAS564)
- *CDCE9252, CDCEL925, Programmable 2-PLL VCXO Clock Synthesizer With 1.8V, 2.5V, and 3.3V LVCMOS Outputs* data sheet (SCAS847)
- *CDCE913, CDCEL913, Programmable 1-PLL VCXO Clock Synthesizer With 1.8V, 2.5V, and 3.3V LVCMOS Outputs* data sheet (SCAS849)
- *VCXO Application Guideline for CDCE(L)9xx Familily* application report (SCAA085)
- *CDCE(L)9xx Performance Evaluation Module* user's guide (SCAU022)

EVALUATION BOARD/KIT IMPORTANT NOTICE

Texas Instruments (TI) provides the enclosed product(s) under the following conditions:

This evaluation board/kit is intended for use for **ENGINEERING DEVELOPMENT, DEMONSTRATION, OR EVALUATION PURPOSES ONLY** and is not considered by TI to be a finished end-product fit for general consumer use. Persons handling the product(s) must have electronics training and observe good engineering practice standards. As such, the goods being provided are not intended to be complete in terms of required design-, marketing-, and/or manufacturing-related protective considerations, including product safety and environmental measures typically found in end products that incorporate such semiconductor components or circuit boards. This evaluation board/kit does not fall within the scope of the European Union directives regarding electromagnetic compatibility, restricted substances (RoHS), recycling (WEEE), FCC, CE or UL, and therefore may not meet the technical requirements of these directives or other related directives.

Should this evaluation board/kit not meet the specifications indicated in the User's Guide, the board/kit may be returned within 30 days from the date of delivery for a full refund. THE FOREGOING WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user indemnifies TI from all claims arising from the handling or use of the goods. Due to the open construction of the product, it is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge.

EXCEPT TO THE EXTENT OF THE INDEMNITY SET FORTH ABOVE, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

TI currently deals with a variety of customers for products, and therefore our arrangement with the user **is not exclusive.**

TI assumes **no liability for applications assistance, customer product design, software performance, or infringement of patents or services described herein.**

Please read the User's Guide and, specifically, the Warnings and Restrictions notice in the User's Guide prior to handling the product. This notice contains important safety information about temperatures and voltages. For additional information on TI's environmental and/or safety programs, please contact the TI application engineer or visit www.ti.com/esh.

No license is granted under any patent right or other intellectual property right of TI covering or relating to any machine, process, or combination in which such TI products or services might be or are used.

FCC Warning

This evaluation board/kit is intended for use for **ENGINEERING DEVELOPMENT, DEMONSTRATION, OR EVALUATION PURPOSES ONLY** and is not considered by TI to be a finished end-product fit for general consumer use. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to part 15 of FCC rules, which are designed to provide reasonable protection against radio frequency interference. Operation of this equipment in other environments may cause interference with radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct this interference.

EVM WARNINGS AND RESTRICTIONS

It is important to operate this EVM within the input voltage range of 0 V to 5 V and the output voltage range of 0 V to 3.6 V.

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 85°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.

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

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 TI 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. Information of third parties may be subject to additional restrictions.

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.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

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
Clocks and Timers	www.ti.com/clocks	Digital Control	www.ti.com/digitalcontrol
Interface	interface.ti.com	Medical	www.ti.com/medical
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
RFID	www.ti-rfid.com	Telephony	www.ti.com/telephony
RF/IF and ZigBee® Solutions	www.ti.com/lprf	Video & Imaging	www.ti.com/video
		Wireless	www.ti.com/wireless

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