

## **CDCE(L)9xx Performance Evaluation Module**

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This user's guide explains how to use the CDCE(L)9xx Performance Evaluation Module (EVM), which is a generic PCB that can handle all the CDCE(L)9xx devices. The CDCE9xx is soldered on the PCB for best performance; therefore, it is necessary to specify the desired device when ordering the EVM. The assembly of the EVM is slightly different for each member of the family. However, the basic functionality remains the same.

The following EVMs will be available within summer 2007:

- CDCE949EVM
- CDCE925EVM
- CDCE913EVM

CDCEL9xx versions will follow later.

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## 1 Block Diagram

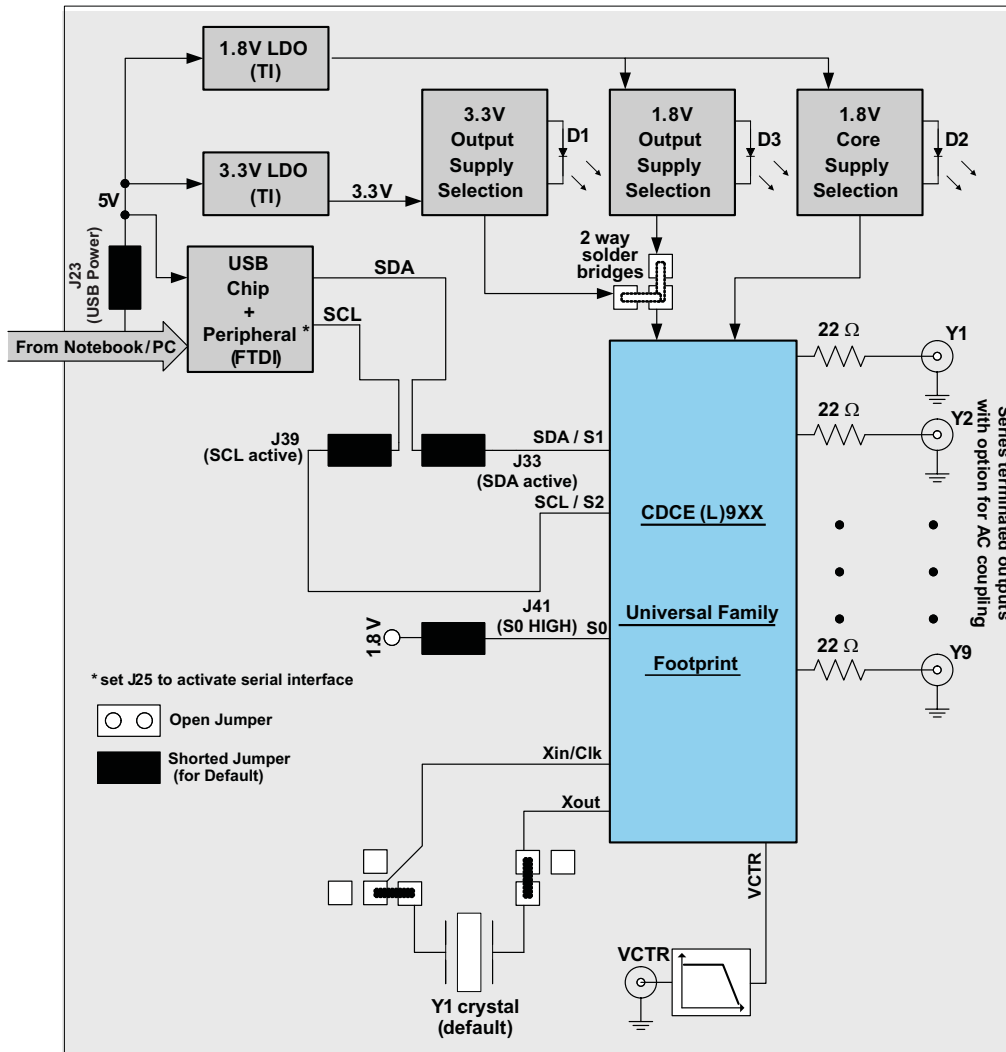
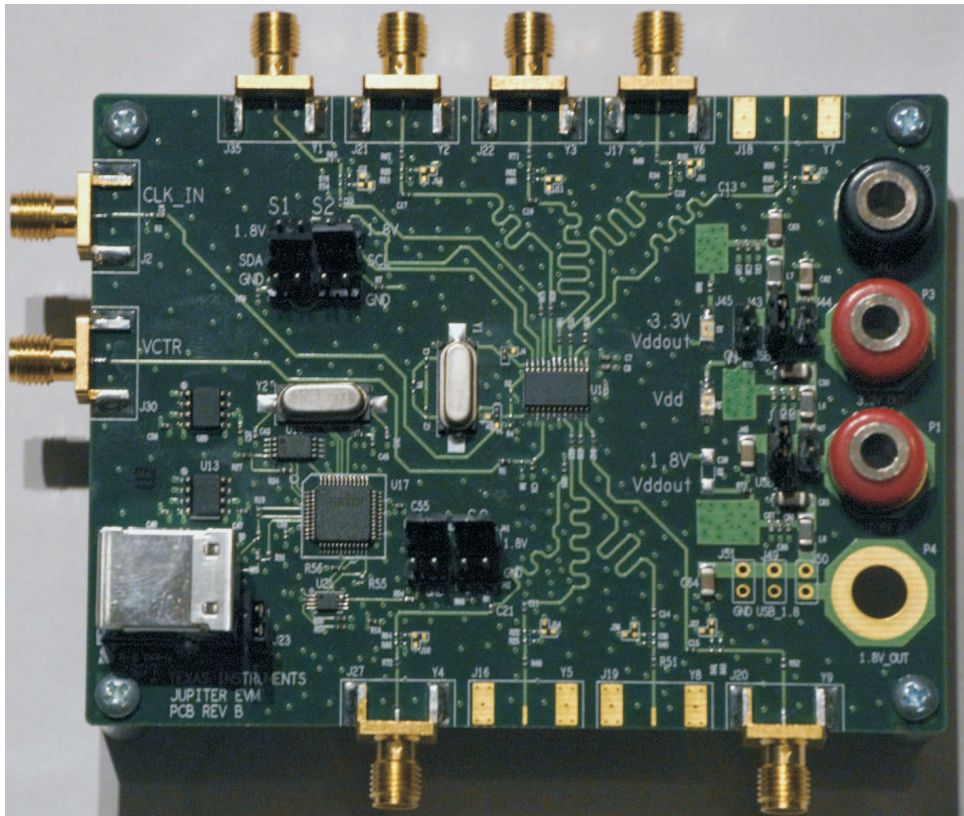


Figure 1. CDCE(L)9xx Simplified Block Diagram (Default Setup)

### 1.1 Features

- Easy-to-use evaluation module for fast prototyping and application evaluation, supporting the entire clock family.
- Easy and fast device programming through TI Pro-Clock™ software
- Evaluation of multiple crystals and reference clocks due to flexible input structure
- EVM completely USB powered in factory default
- Option for USB power and external power supply
- No need for programming or notebook/PC connection



**Figure 2. CDCE(L)9xx Printed-Circuit Board**

### 1.2 Related Documentation From Texas Instruments

- *CDCE949, CDCE(L)949, Programmable, 4-PLL VCXO Clock Synthesizer With 1.8-V and 3.3-V Input/Outputs* data sheet ([SCAS844](#))
- CDCE(L)937 data sheet (Unpublished)
- CDCE(L)925 data sheet (Unpublished)
- CDCE(L)913 data sheet (Unpublished)
- *VCXO Application Guidelines for CDCE(L)9xx Family* application report ([SCAA085](#))

### 1.3 If You Need Assistance

If you need assistance with this device, send an e-mail to [clocks\\_apps@list.ti.com](mailto:clocks_apps@list.ti.com).

## 2 About the CDCE(L)9xx Clock-Generator Family

The CDCE9xx and CDCEL9xx are a family of modular PLL-based, low-cost, high-performance, programmable clock synthesizers, multipliers, and dividers. They generate from 3 (1-PLL) up to 9 (4-PLL) output clocks from a single input frequency. A crystal or LVCMOS clock signal is possible as the reference clock. VCXO functionality is built into every member of the CDCE9xx device family, which allows synchronizing the output frequency to an external control signal, e.g., a PWM signal.

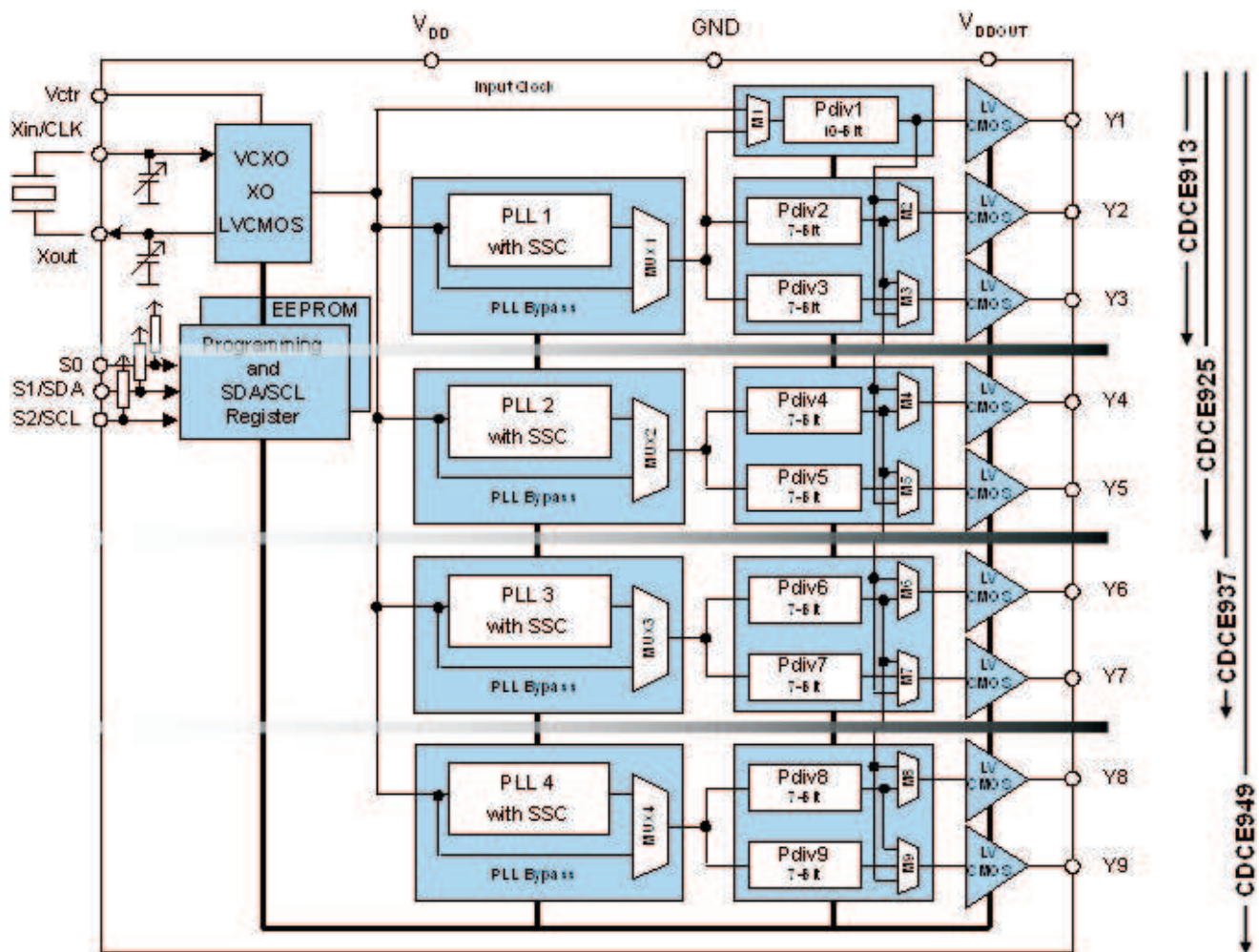
A deep M/N divider ratio allows the generation of zero ppm audio/video, networking (WLAN, Bluetooth™, Ethernet™, GPS), or interface (USB, IEEE1394, Memory Stick™) clocks from a 27-MHz reference input frequency, for example.

An inbuilt EEPROM cuts off the need for reprogramming the CDCE(L)9xx 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. 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 following is an overview of the devices of the CDCE(L)9xx family:

- 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



**Figure 3. Functional Block Diagram of the CDCE(L)9xx**

### 3 QUICK START (USB PLUG 'N' PLAY)

The following steps allow the user to get started quickly with 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. Verify it by checking any of the

outputs available at the SMA connectors.

4. Programming the device is also possible using the TI Pro-Clock™ dedicated software (see section 4.2).

## 4 EVM Hardware

### 4.1 Hardware Configuration

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, solder-bridges, and communication interface (I<sup>2</sup>C/SMBus) is also provided, allowing the user to change the setup and play around according to his needs and wishes.

#### 4.1.1 Power Supply

Power for the EVM can be supplied fully not only via the USB but also through a stabilized external power supply. The following paragraphs describe how to set the board jumpers for both cases. Depending on the device the user is dealing with (CDCE9xx or CDCEL9xx), a guideline of the jumper's setup for the output stage is given.

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**NOTE:** All EVMs are delivered with USB power supply as default.

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##### 4.1.1.1 External Power Supply

In order for the board to be supplied with an external power supply generator, follow the instructions regarding the jumpers' setup for both the device core and the output stage. The latter depends on the type of device (CDCE9xx or CDCEL9xx).

###### Core Supply Voltage

- Insert jumper J47 (leave jumper J46 open).
- Connect the positive pole of the external power supply to P1 and the negative pole to P2 (ground). Voltage ranges between 1.7 V and 1.9 V (nominal 1.8 V).
- Insert jumpers J23 and J25 and plug in the USB cable (use a 2.0 USB male B termination). Even though externally supplied, the board needs this connection to allow the programming of the device.

###### Output Stage Supply Voltage (Either 3.3 V or 1.8 V)

a) CDCE9XX → VDDOUT = 3.3 V

- Insert jumper J44 (leave J43 and J45 open).
- Connect the positive pole of the external power supply to P3 and the negative pole to P2 (ground). Voltage ranges between 3 V and 3.6 V (nominal 3.3 V).

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**NOTE:** J45 → use this jumper to ground Vddout. In this way, the default functionality for the SDA/S1 and SCL/S2 pins is recalled, and the device can be reprogrammed even though these pins were set to control pins (S1 and S2). Besides, the device default address is also recalled. Set J39 and J33 for SDA and SCL to reprogram the device (leave J32, J34, J38, and J40 open).

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b) CDCEL9XX → VDDOUT=1.8 V

- Insert jumper J50 (leave jumpers J49 and J51 open).
- Connect the positive pole of the external power supply to P4 and the negative pole to P2 (ground). Voltage ranges between 1.7 V and 1.9 V (nominal 1.8 V).

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**NOTE:** J51 → use this jumper to ground V<sub>ddout</sub>. In this way, the default functionality for the SDA/S1 and SCL/S2 pins is recalled, and the device can be reprogrammed even though these pins were set to control pins (S1 and S2). Besides, the device default address is also recalled. Set J39 and J33 for SDA and SCL to reprogram the device (leave J32, J34, J38, and J40 open).

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#### 4.1.1.2 USB Power Supply

In order for the board to be fully supplied via USB, follow the instructions regarding the jumpers' setup for both the device core and the output stage. The latter depends on the type of device (CDCE9xx or CDCEL9xx).

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**NOTE:** All EVMs are delivered with the USB power supply as default.

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##### Core Supply Voltage

- Insert jumper J46 (leave jumper J47 open).
- Insert jumper J23 and J25, and plug in the USB cable (use a 2.0 USB male B termination).

##### Output Stage Supply Voltage (Either 3.3 V or 1.8 V)

a) CDCE9XX → V<sub>DDOUT</sub> = 3.3 V

- Insert jumper J43 (leave J44 and J45 open).

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**NOTE:** J45 → use this jumper to ground V<sub>ddout</sub>. In this way, the default functionality for the SDA/S1 and SCL/S2 pins is recalled and the device can be reprogrammed even though these pins were set to control pins (S1 and S2). Besides, the device default address is also recalled. Set J39 and J33 for SDA and SCL to reprogram the device (leave J32, J34, J38, and J40 open).

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b) CDCEL9XX → V<sub>DDOUT</sub> = 1.8 V

- Insert jumper J49 (leave jumper J50 and J51 open).

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**NOTE:** J51 → use this jumper to ground V<sub>ddout</sub>. In this way, the default functionality for the SDA/S1 and SCL/S2 pins is recalled and the device can be reprogrammed even though these pins were set to control pins (S1 and S2). Besides, the device default address is also recalled. Set J39 and J33 for SDA and SCL to reprogram the device (leave J32, J34, J38, and J40 open).

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#### 4.1.2 Programming Interfaces

The device supports nonvolatile EEPROM programming for easy customized applications. Although preset to a factory default configuration (see the relevant data sheet), it can be reprogrammed to a different application configuration. All device settings are programmable through the SDA/SCL bus, a 2-wire serial interface that works according to the I<sup>2</sup>C standard specification.

Three, free programmable control inputs, S0, S1, and S2, can be used to select different frequencies, or change the SSC setting for lowering EMI, or other control features like, outputs disable to low, outputs 3-state, power down, PLL bypass, etc.

The device can be programmed externally in two ways:

1. Via the USB cable connected to the PC and to the EVM (in this mode, J39 and J33 are set). TI Pro-Clock™ software (see section 4) supports the device programming.
2. By an external pattern generator connected to J39 (clock) and J33 (data).

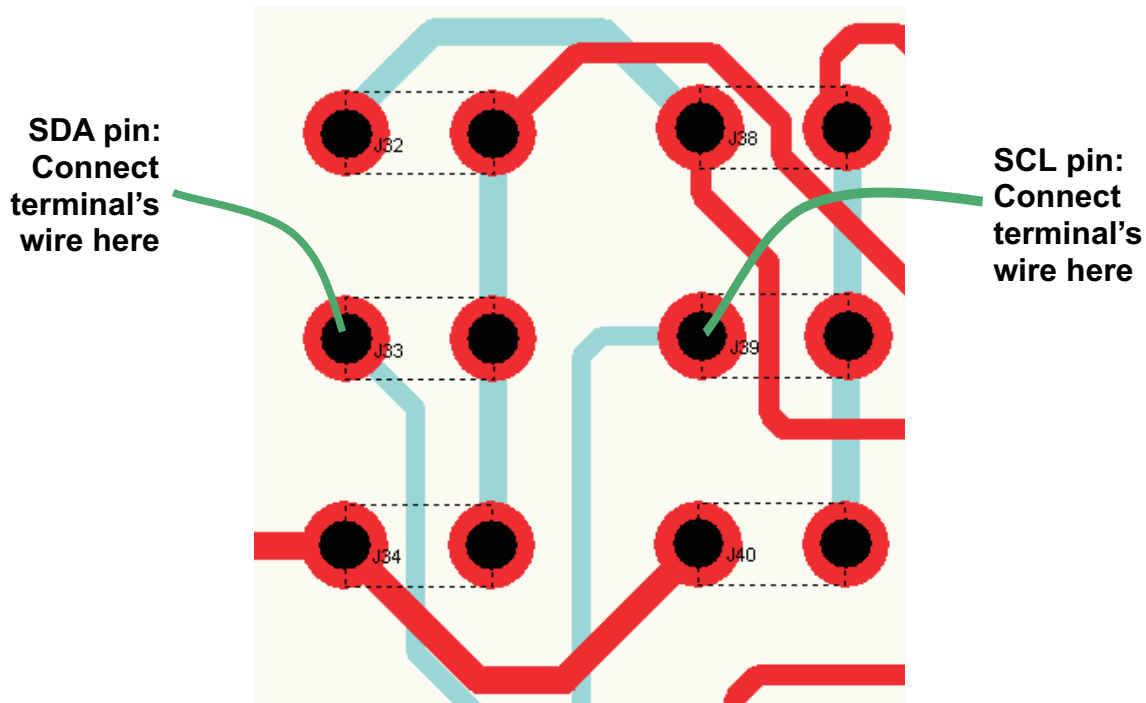
The EVM also offers the opportunity to change the configuration setting of the device by switching the set of S0, S1, and S2 (see the relevant device data sheet). This can be done by simply inserting and removing the jumpers by the following description:

- S0: Insert J41 to set it HIGH; insert J42 to set it LOW.
- S1: Insert J32 to set it HIGH; insert J34 to set it LOW (always leave J33 open).
- S2: Insert J38 to set it HIGH; insert J40 to set it LOW (always leave J39 open).

#### 4.1.3 Pass Programming Through

This option allows the device to be programmed on your own board, through the CDCE(L)9xx EVM, by simply connecting the SDA/SCL available pins to your programming interface.

- Insert jumper J23 and J25 and plug in the USB cable (use a 2.0 USB male B termination).
- Connect the SDA wire and the SCL wire as shown in [Figure 4](#). This is a zoomed view of the EVM region where the jumpers 32, 33, 34, 38, 39, and 40 are placed.



**Figure 4. EVM Region Showing SDA Pin and SCL Pin Locations**

- Connect the other SDA and SCL wire terminals to your programming interface.
- The setup is ready; communication with the customer onboard device is now possible.

#### 4.1.4 Input

The CDCE(L)9xx can be driven either from a crystal or from an LVCMOS input signal. If a crystal is connected, the CDCE(L)9xx can act as a crystal oscillator or as a VCXO with integrated PLLs. Two crystal footprints allow connecting a smaller 4-pin crystal and a larger 2-pin crystal. This eases the evaluation of different crystals with different footprint and size. The 2-pin crystal (Y1) on the EVM top side is used as default.

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**NOTE:** The EVM default is a crystal oscillator with 2-pin crystal (Y1). (See [Figure 1](#))

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##### 4.1.4.1 Crystal or VCXO

The following steps are necessary to use the EVM with a crystal or VCXO as reference:

###### 1. General 2-pin crystal or VCXO setup

The 2-pin crystal footprint allows evaluating crystals with a larger size. Larger size crystals usually offer a wider tuning range for the VCXO functionality.

- (a) Short pin 1 and 2 of J52.
  - (b) Short pin 3 and 2 of J4.
  - (c) Ensure that R2 and R4 are not installed.
  - (d) Ensure that C1 and C2 are not installed.
2. General 4-pin crystal or VCXO setup
- The 4-pin crystal footprint is a universal footprint that allows evaluating different smaller 2- and 4-pin crystals. Smaller crystals are beneficial, if a simple crystal oscillator without VCXO functionality is needed. Smaller crystals are usually cheaper and need less board space.
- (a) Short pin 2 and 4 of J52.
  - (b) Short pin 1 and 2 of J4.
  - (c) Ensure that R2 and R4 are not installed.
  - (d) Ensure that C1 and C 2 are not installed.
3. VCXO setup
- Because the device has an integrated VCXO, it is possible to verify its functionality (pull-ability) using the VCTR connector (J30). Install an appropriate resistor R6 to adjust the voltage level according to the need (R5, R6 work together as a voltage divider).
- (a) Assemble R5 and C31 (low pass for VCXO) as needed.
  - (b) R6 and R5 can be used to create a voltage divider for shifting down the control voltage.
  - (c) Connect the control voltage to J30.

#### 4.1.4.2 LVCMOS

CLK\_IN is available via jumper J2 for driving the CDCE(L)9xx with an LVCMOS input. In this case, R2 and R4 can be installed on the EVM. Assembling R2 and R4 with 100  $\Omega$  each matches the 50- $\Omega$  termination of a signal generator. C4 permits AC coupling to the external signal source. Ensure that the jumper J52 is shorted between pin 3 and pin 2, which connects J2 (CLK\_IN) with pin 1 (CLK) of the device.

#### 4.1.5 LVCMOS Output

The CDCE(L)9xx can drive from three LVCMOS outputs (CDCE(L)913) up to nine LVCMOS outputs (CDCE(L)949). Most of them are accessible via SMA connectors. All outputs are series terminated with a 22- $\Omega$  resistor in series to the output.

For each output routed on the EVM, it is possible to AC-couple it (i.e., Y1). Depending on the application requirements, install the resistors for adjusting the DC level (for Y1  $\rightarrow$  R74 and R76). Power this voltage divider with the wanted voltage supply (either 1.8 V or 3.3 V) by using the dedicated jumper (for Y1  $\rightarrow$  J12), and install a capacitor (for Y1  $\rightarrow$  C23) with a value between 10 nF and 100 nF.

#### 4.1.5.1 Y4 Output

The pin 7 corresponds to the output Y4, and this is valid for the device CDCE(L)925, CDCE(L)937, and CDCE(L)949. For the CDCE(L)913, this pin serves as VDDOUT. J6, J7, and C28 are set accordingly.

## 5 TI ClockPro™ Programming Software

The TI ClockPro™ design tool is the evaluation software for the CDCE(L)949, CDCE(L)937, CDCE(L)925, and CDCE(L)913 clocking family.

The software runs under Windows™ 98, NT, 2000, XP, and Vista. A quick installation is required prior to use.

After the loading screen, the start window is shown (Figure 5). This initial window called TI ClockPro™ Wizard recommends devices based on the frequencies and conditions required by the user. It is also possible to skip this window, going directly to the Devices Search Window (Figure 6). The Devices Search Window allows the user to select the EVM to work with or go to local mode. After pressing OK, the user is directed to the Main View Window (Figure 8), that offers the capabilities of communicating with the device, creating new setups, and loading setups in the device. Under the Tools menu option, other views [Direct register view (Figure 9), the bits View (Figure 10)] and utilities [Pulling Range Tool (Figure 11) and Checksum Calculator (Figure 12)] can be accessed.



## 5.1 Loading and Saving a Setup

Saving and loading the setup of the CDCE(L)9xx software can be done in several different ways.

Click *File*, and select one of the following options to save or load the current setup.

1. Load Setup/Save Setup — loads/saves the setup from/to an encrypted file
2. Load \*.txt/Save \*.txt — loads/saves the setup from/to a text file. Use this format to view the setup later with a text editor.
3. Load \*.csv/Save \*.csv — loads/saves the setup from/to a comma-delimited file. Use this format to view the setup later with Microsoft™ Excel™.
4. Load Intel™ Hex\*.hex/Save Intel Hex\*.hex — loads/saves the setup from/to hexadecimal object file format. Usually, programmers can directly read-in this file format.
5. Configuration Code Release Sheet — use this option to order factory-programmed EEPROM specials of the CDCE(L)9xx. Contact your regional TI marketing or sales representative for further information.

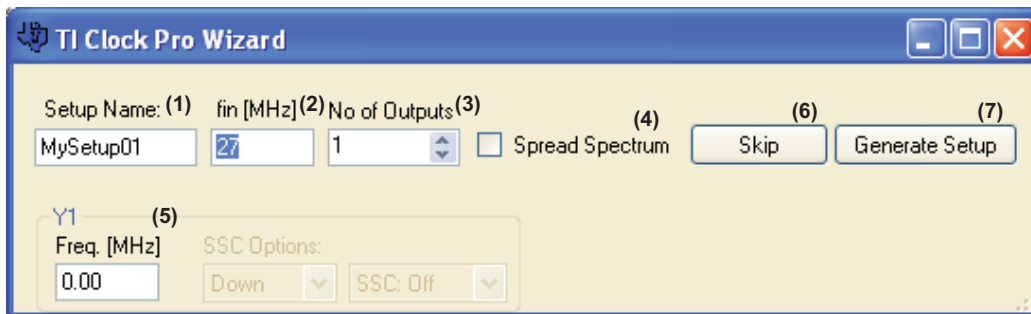


Figure 5. TI ClockPro™ Start Window

1. **Setup Name.** Customized level that refers to the set of solutions that the wizard can generate
2. **fin(MHz).** User's input frequency in MHz
3. **No of Outputs.** Number of outputs to generate out of the input frequency introduced in (2)
4. **Spread Spectrum.** If the outputs require spread spectrum, checking this option allows the customer to introduce the SSC settings per output.
5. **Output conditions.** This group of controls allows the user to introduce output frequency in MHz and if required SSC Conditions (offset and percentage)
6. **Skip** button directs the user to device selection window (Figure 6)
7. **Generate Setup** button recommends devices that generate out of fin the four conditions introduced by the user. The solutions are listed in the window (Figure 7)

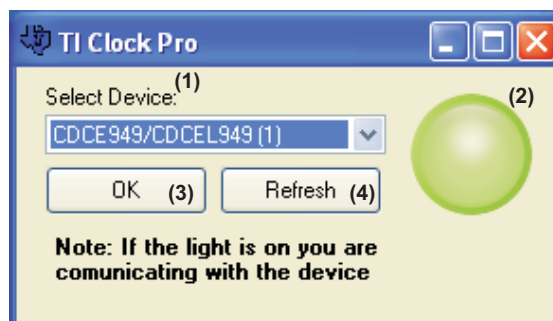
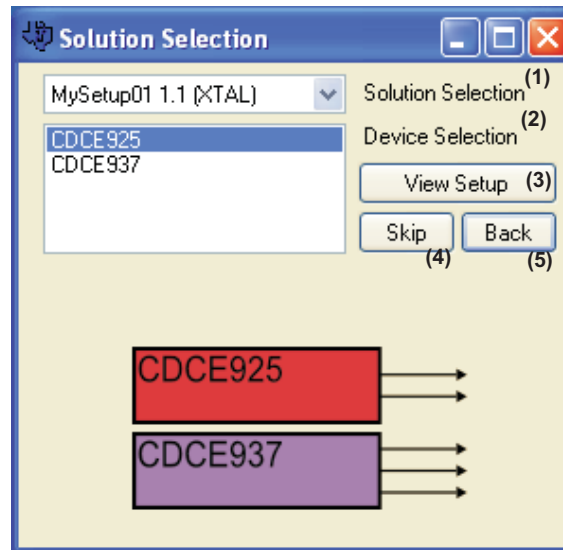


Figure 6. TI ClockPro™ Devices Search Window

1. **Select Device** chooses the device to work with. When an EVM is connected, it appears as a first option. Nonconnected options (local mode) are also available.
2. It is green when an EVM is connected. It is black when working in local mode (no data is transferred to the EVM).
3. **OK** button directs to the Main View (Figure 8), or if Generation Setup button was pressed on the

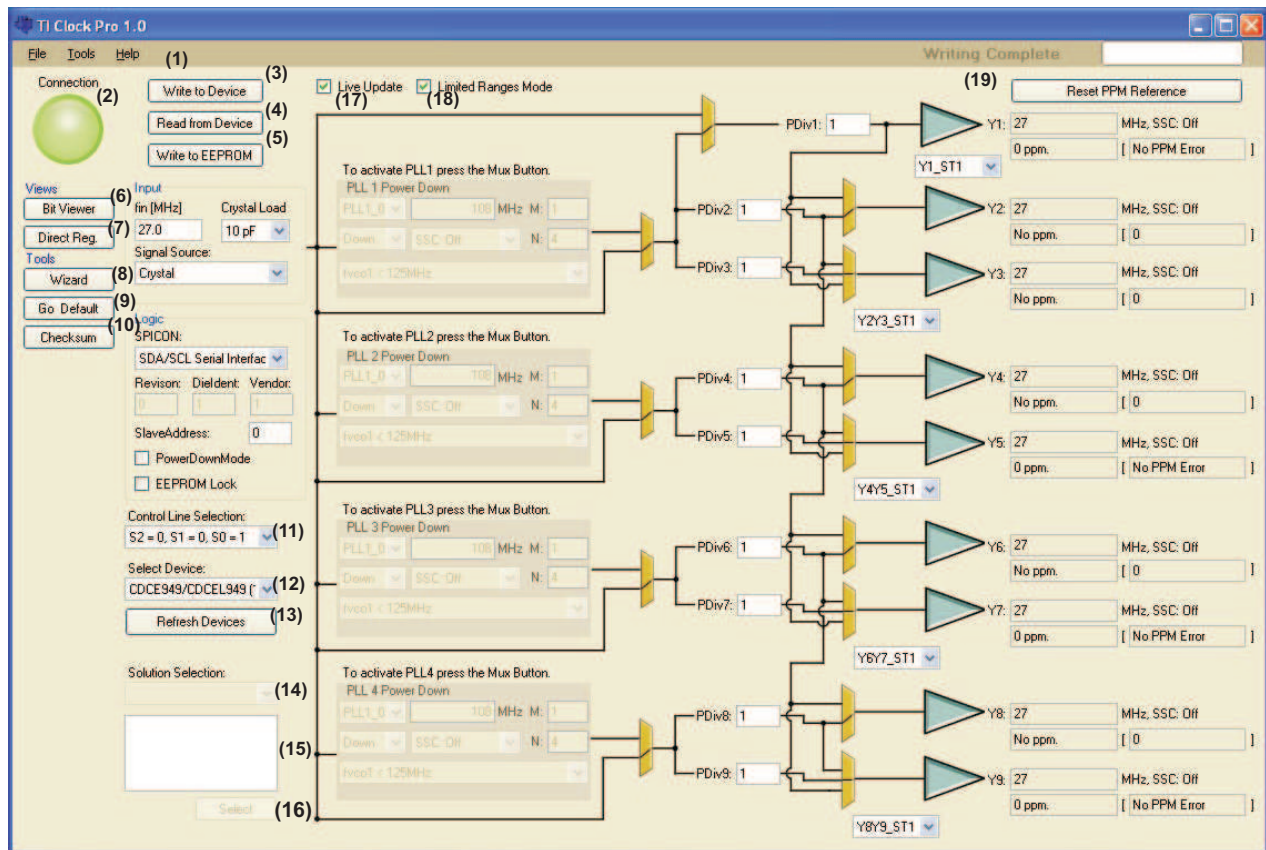
Wizard Window, it directs to the Solution Selection Window (Figure 7).

4. Refresh updates the choices in (1).



**Figure 7. TI ClockPro™ Solution Selection Window**

1. **Solution Selection** selects the solution to view when pressing the button View Setup (3). Many different solutions can be generated by different combinations of the devices and the input stage.
2. **Device Selection** chooses the initial setup to load in the Main View (Figure 8).
3. **View Setup** loads the selected device for the selected solution in the Main View (Figure 8).
4. **Skip** button skips loading a solution showing the Main View (Figure 8).
5. **Back** button goes back to the Wizard View (Figure 5).



**Figure 8. TI Clock Pro Main View**

1. Main Menu bar with three menu options. File menu option supports loading and saving of files (.isf, .csv, .txt, .hex, .configuration code release sheet) and exiting the program. With the Through the Tools menu, the following tools can be accessed: Bit Viewer, Pulling Range Tool, Check sum calculator, Direct Register View, and Wizard View. Also via the Tools menu, the device can be reset to default (menu option: Go Default) and the current setup can be written to EEPROM (menu option: Write to EEPROM). The Help menu has a link to the About window that contains information about the version number of the current software.
2. The Connection indicator is Green when the device selected in (12) is a device in a performance EVM. When it is black, the device selected in (12) is working in local mode.
3. If connected, the Write to Device button writes all the displayed contents in the Main View (Figure 8) and the Direct Register View (Figure 9) in the device's control register.
4. If connected, the Read from Device button reads all the contents of the device's control register in the Main View (Figure 8) and in the Direct Register View (Figure 9).
5. If connected, the Write to EEPROM button writes all the displayed contents in the Main View (Figure 8) and in the Direct Register View (Figure 9) in the device's EEPROM.
6. Bit Viewer button. When it is pressed, it shows the Bits Viewer Tool (Figure 10).
7. Direct Reg. button. When it is pressed, it shows the Direct Register View (Figure 9).
8. Wizard button. When it is pressed, it shows the Wizard View (Figure 5).
9. Go default button. When it is pressed, it loads the default setup as per device selected in (12).
10. Checksum button. When it is pressed, it shows the Checksum Calculator Tool (Figure 12).
11. Control Line Selection. This displays the control pins settings linked to the active setup. This control does not change the control pins voltages in the performance EVM. In order to ensure that the active setup in the performance EVM is the same as the setup displayed in this view, ensure that (11) and the jumpers in the EVM are set to the same values.

The use of S1 and S2 depends on SPICON, which decides if S1 and S2 are used as control pins or as

serial interface pins.

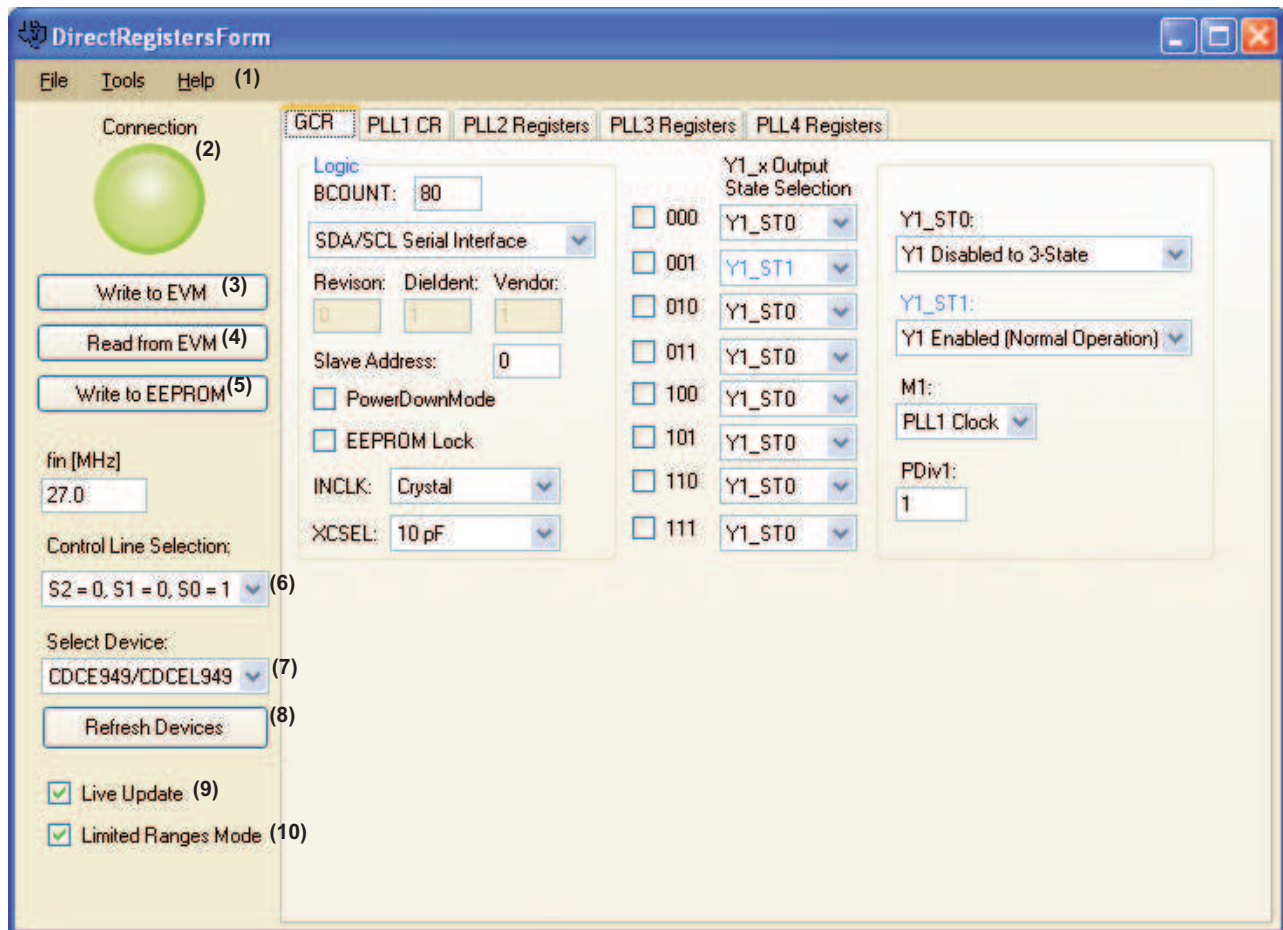
If SPICON is logic 0, the serial control interface is enabled. In this case, S1 is used as SDA, and S2 is used as SCL. For the internal logic, S1 and S2 are considered to be "0". This means that either control pin selection "000" or "001" is active, depending on the logic level at S0.

If SPICON is logic 1, S1 and S2 are used as control pins, and the serial interface is disabled. The internal logic S1 and S2 are considered to be 0 or 1, according to the logic level that is connected to these pins. In this case, up to eight different device setups can be selected through S2, S1, and S0.

The SPICON configuration is possible in the generic control register (GCR). For the EVM default configuration, SPICON is logic 0. This results in S0 = 1, S1 = 0, S2 = 0, according to the default jumper setting on the EVM.

If Vdd is connected and Vddout is forced to GND, S1, and S2 act as serial interface pins – even if SPICON is logic 1. This allows reprogramming the device, if the control pin functionality is enabled. For more information, see the CDCE(L)9xx data sheet.

12. Select Device chooses the device where all the actions are performed.
13. Refresh devices button. When pressed, it looks for the EVMs connected.
14. Solution selection shows the solution generated by the Wizard View ([Figure 5](#)).
15. List of devices shows those devices that are part of the solution selected in (14).
16. Select button. When it is pressed, the selected device in (15) are loaded in the program.
17. Life update. When checked and the device selected, all changes in the setup (Wizard View ([Figure 8](#)) or Direct Register View ([Figure 9](#)) are automatically written to the control register.
18. Limited Ranges Mode. When checked when a setup is loaded or a change is performed in the setup, the change is ensured to be within the specifications. If not checked, the verification of settings within specifications is skipped.
19. Reset PPM Reference. The ppm is calculated with respect to the requested output frequency in the Wizard View. After this button is pressed, the ppm is calculated with respect to the output frequency when that occurred.
20. Current status



**Figure 9. TI ClockPro™ Direct Register View**

1. Main Menu bar with three menu options as per Main View Menu Bar (Figure 8)
2. The Connection indicator is green when the device selected in (7) is a device in a performance EVM. When black, the device selected in (7) is working in local mode.
3. If connected, the Write to Device button writes all the displayed contents in the Main View (Figure 8) and in the Direct Register View (Figure 9) in the device's control register.
4. If connected, the Read from Device button reads all the contents of the device's control register in the Main View (Figure 8) and in the Direct Register View (Figure 9).
5. If connected, the Write to EEPROM button writes all the displayed contents in the Main View (Figure 8) and in the Direct Register View (Figure 9) in the device's EEPROM.
6. Control Line Selection. This shows the control pins settings linked to the active setup. This control does not change the control pins voltages in the performance EVM. In order to ensure that the active setup in the performance EVM is the same as the setup displayed in this view, ensure that (6) and the jumpers in the EVM are set to the same values.
7. Select Device chooses the device where all the actions are performed.
8. Refresh devices button. When pressed, it looks for EVMs connected.
9. Live update. When checked and the device is selected, all changes in the setup (Wizard View, Figure 8, or Direct Register View, Figure 9, are automatically written to the control register.
10. Limited Ranges Mode. When checked and a setup is loaded or a change is performed in the setup, the change is ensured to be within the specifications. If not checked, the verification of settings within specifications is skipped.

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 16	SSC1_7 [2:0]			SSC1_6 [2:0]			SSC1_5 [2:1]	
	0	1	1	0	0	0	0	0
Byte 17	SSC1_5 [0]		SSC1_4 [2:0]		SSC1_3 [2:0]		SSC1_2 [2]	
	0	0	0	0	0	0	0	0
Byte 18	SSC1_2 [2:1]		SSC1_1 [2:0]		SSC1_0 [2:0]			
	0	0	0	0	0	0	0	0
Byte 19	FS1_7	FS1_6	FS1_5	FS1_4	FS1_3	FS1_2	FS1_1	FS1_0
	0	0	0	0	0	0	0	0
Byte 20	MUX1	M2	M3		Y2Y3STATE 1		Y2Y3STATE 0	
	1	1	1	0	1	1	0	0
Byte 21	Y2Y3_7	Y2Y3_6	Y2Y3_5	Y2Y3_4	Y2Y3_3	Y2Y3_2	Y2Y3_1	Y2Y3_0
	0	0	0	0	0	0	0	0
Byte 22	SSC1DC			PDivider 2				
	1	0	0	0	0	1	1	1
Byte 23	Reserved 6			PDivider 3				
	0	0	0	0	1	0	0	1
Byte 24	PLL 1_ON [11:4]							
	0	0	0	0	0	0	0	0
Byte 25	PLL 1_ON [3:0]				PLL 1_OR [8:5]			
	1	0	0	1	0	0	0	0
Byte 26	PLL 1_OR [4:0]				PLL 1_OQ [5:3]			
	0	0	0	0	0	0	0	1
Byte 27	PLL 1_OQ [2:0]		PLL 1_OP [2:0]		VCO1_0 RANGE			
	0	1	0	0	1	0	1	1
Byte 28	PLL 1_IN [11:4]							
	0	0	0	0	0	0	0	0
Byte 29	PLL 1_IN [3:0]				PLL 1_1R [8:5]			
	0	0	0	1	0	0	0	0
Byte 30	PLL 1_1R [4:0]				PLL 1_1Q [5:3]			
	0	0	0	0	0	0	1	0
Byte 31	PLL 1_1Q [2:0]		PLL 1_1P [2:0]		VCO1_1 RANGE			
	0	0	0	1	0	0	1	1

Figure 10. TI ClockPro™ Bits Viewer – Bit Contents of the Control Register

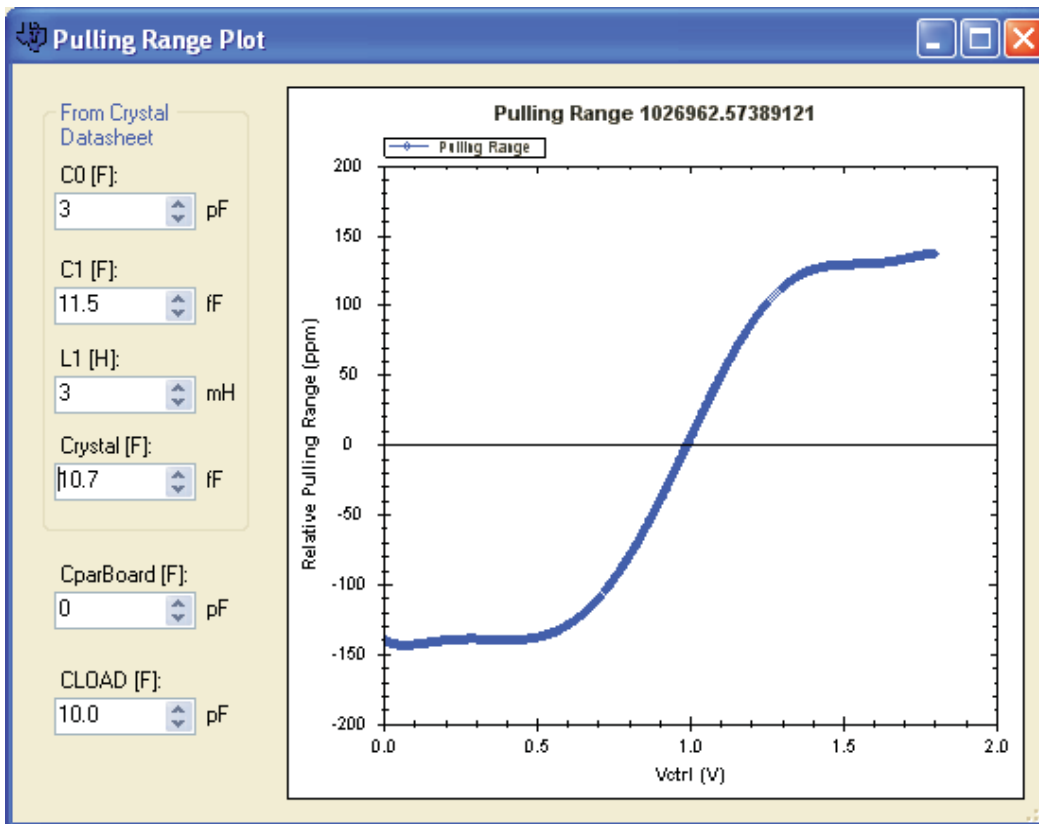


Figure 11. TI ClockPro™ Pulling Range Calculator

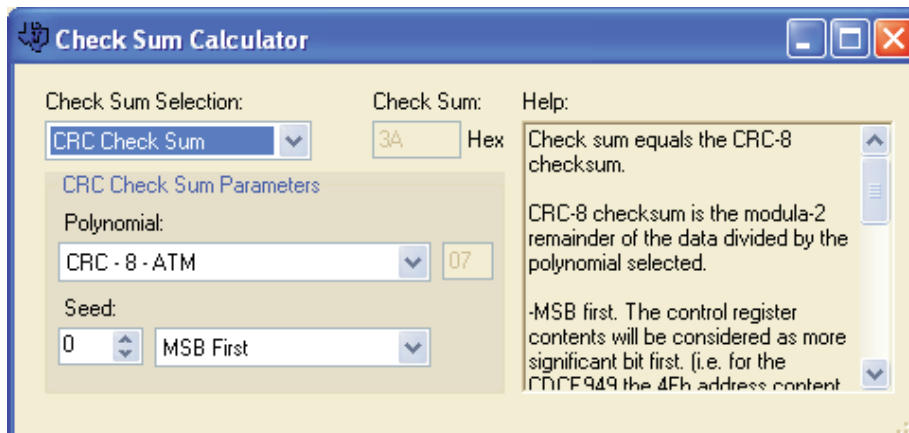


Figure 12. TI ClockPro™ Checksum Calculator

## 5.2 Software Installation

Use the following steps to install the CDCE(L)9xx evaluation software:

1. Insert CDCE(L)9xx EVM compact disc.
2. Click on setup.exe to install *TI Pro Clock* software.  
→ Folder: TI-Pro-Clock
3. Reboot your computer
4. Run software from desktop Ti ProClock™ icon.

or

Start → Programs → Texas Instruments → TI Pro Clock

Three different drivers are available.

1. Windows 98 and Windows ME in folder *w-98-ME*
2. Windows XP, Windows Vista, Windows Server 2003, Windows 2000 in folder *w-xp-vista-server-2000*  
Windows XP x64,
3. Windows Vista x64 and Windows Sever 2003 x64 in folder *w-xp-vista-server-64*



## 6 Bill of Materials and Schematic

### 6.1 Bill of Materials

**Table 1. Bill of Materials**

Item	Qty	RefDes	Value	Manufacturer	Part Number
1	0	C1, C2	10 pF		NU
2	0	C3, C9	NU		NU
3	9	C11-C15, C17, C19, C21, C23	0 Ω	Panasonic - ECG	ERJ-2GE0R00X
4	8	C4, C5, C7, C26, C37, C41, C53, C67	10 nF	Panasonic - ECG	ECJ-0EB1E103K
5	3	C6, C8, C61	1 nF	Panasonic - ECG	ECJ-0EB1E102K
6	8	C16, C20, C39, C50, C62-C65	4.7 μF	Panasonic - ECG	ECJ-3YB1C475M
7	5	C18, C24, C51, C60, C66	1 μF	Panasonic - ECG	ECJ-0EB1A105M
8	0	C28	10 nF	Panasonic - ECG	ECJ-0EB1E103K
9	18	C29, C31-C33, C36, C40, C44-C48, C54-C59, C68	0.1 μF	Panasonic - ECG	ECJ-0EB1A104K
10	1	C35	10 μF	Panasonic - ECG	ECJ-3YB1A106M
11	1	C38	47 pF	AVX Corporation	04025A470JAT2A
12	2	C42, C43	27 pF	AVX Corporation	04025A270JAT2A
13	2	C49, C52	33 nF	AVX Corporation	0402YD333KAT2A
14	1	C70	220 pF	Panasonic	ECJ-0EB1E221K
15	2	D1, D2	Red	Lumex Opto/Components Inc	SML-LX1206SR-TR
16	0	D3	Red		NU
17	1	J1	Conn USB Typ B Fem	Mill-Max	897-30-004-90-000
18	2	J2, J30	SMA	Johnson Comp	142-0701-851
19	3	J4, J24, J29	SMD3P_BRI DGE	Panasonic - ECG	ERJ-2GE0R00X
20	3	J6-J8	SMD3P_BRI DGE	Panasonic - ECG	ERJ-2GE0R00X
21	0	J10-J15, J31, J36, J37	SMD3P_BRI DGE	Panasonic - ECG	ERJ-2GE0R00X
22	0	J16	Y5		NU
23	1	J17	Y6	Johnson Comp	142-0701-851
24	0	J18	Y7		NU
25	0	J19	Y8		NU
26	1	J20	Y9	Johnson Comp	142-0701-851
27	1	J21	Y2	Johnson Comp	142-0701-851
28	1	J22	Y3	Johnson Comp	142-0701-851
29	16	J23, J25, J26, J32-J34, J38-J47	Jumper		Header 2 pos, 0.100 ctr
30	0	J49-J51	Jumper		NU
31	1	J27	Y4	Johnson Comp	142-0701-851
32	1	J35	Y1	Johnson Comp	142-0701-851
33	1	J52	SMD4P_BRI DGE	Panasonic - ECG	ERJ-2GE0R00X

**Table 1. Bill of Materials (continued)**

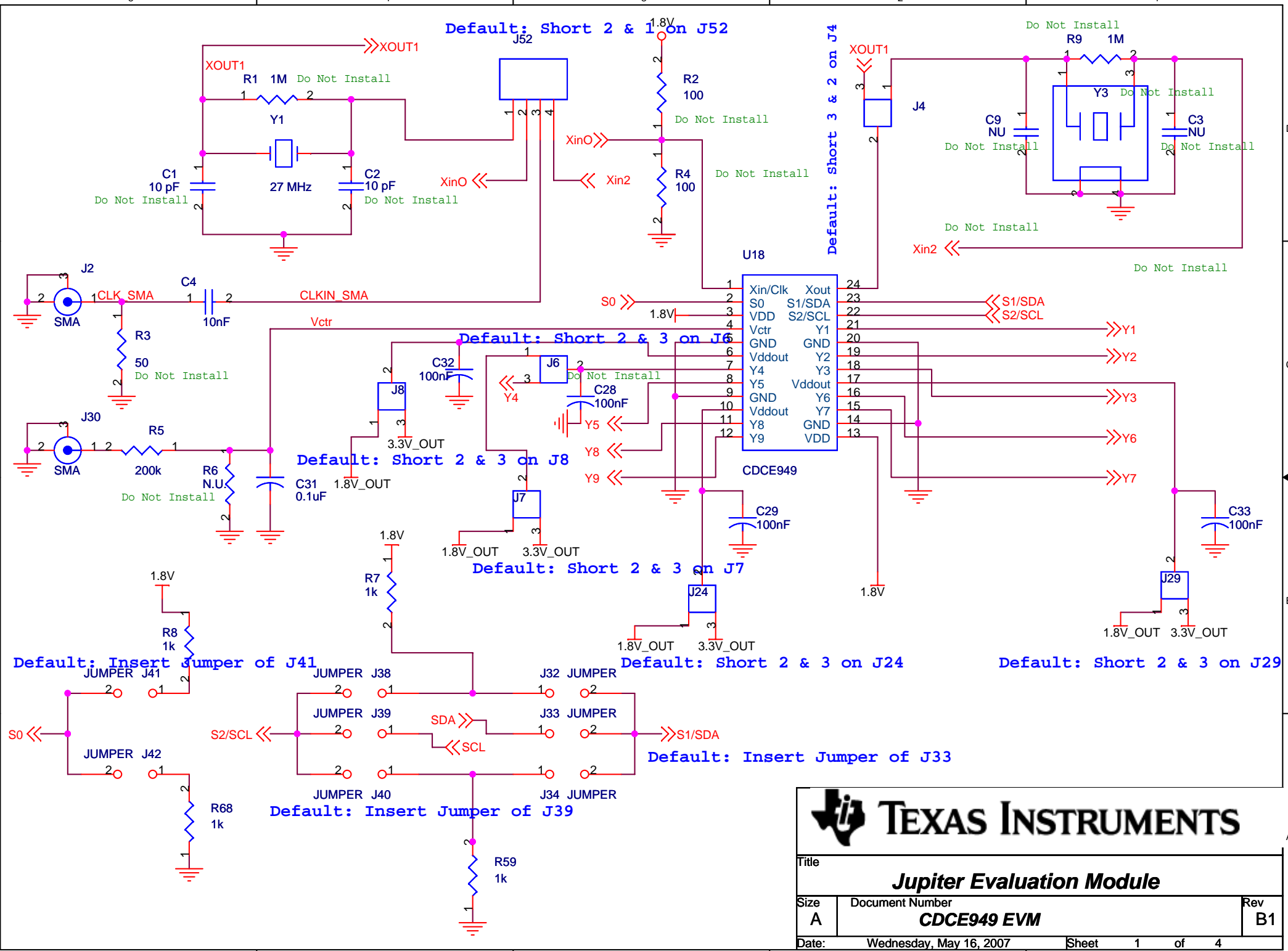
Item	Qty	RefDes	Value	Manufacturer	Part Number
34	2	L4, L5	1k @ 100 MHz	Murata Electronics	BLM21AG102SN1D
35	3	L6-L8	50 Ω @ 100 MHz	Murata Electronics	BLM31PG500SN1L
36	1	P1	1.8 V	SPC Technologies	845R
37	1	P2	GND	SPC Technologies	845R
38	1	P3	3.3V_OUT	SPC Technologies	845R
39	0	P4			NU
40	0	R1	1M	Panasonic - ECG	ERJ-2RKF1004X
41	0	R2, R4		Panasonic - ECG	ERJ-2GEJ101X
42	0	R3			NU
43	2	R5, R54	200k	Panasonic - ECG	ERJ-2GEJ204X
44	0	R6	NU		NU
45	5	R7, R8, R26, R59, R68	1k	Panasonic - ECG	ERJ-2GEJ102X
46	0	R9	1M	Panasonic - ECG	ERJ-2RKF1004X
47	1	R16	470	Yageo Corporation	RC0402FR-07470RL
48	1	R19	1.5k	Panasonic - ECG	ERJ-2GEJ152X
49	0	R22, R25, R28, R32, R34, R35, R37, R38, R40, R41, R43, R53, R60, R62, R64, R66, R74, R76		Panasonic - ECG	ERJ-2RKF1000X
50	9	R23, R29, R33, R36, R39, R42, R61, R65, R75	22 Ω	Panasonic - ECG	ERJ-2GEJ220X
51	1	R24	2.2k	Panasonic - ECG	ERJ-2GEJ222X
52	1	R27	10k	Panasonic - ECG	ERJ-2GEJ103X
53	2	R30, R31	26.7	Panasonic - ECG	ERJ-2RKF26R7X
54	9	R48-R52, R63, R67, R71, R72	0 Ω	Panasonic - ECG	ERJ-2GE0R00X
55	2	R55, R56	5.6k	Panasonic - ECG	ERJ-2GEJ562X
56	2	R57, R58	10k	Panasonic - ECG	ERJ-2GEJ103X
57	1	R69	160	Yageo Corporation	9C04021A1600JLHF3
58	2	R70, R73	10	Panasonic - ECG	ERJ-2RKF10R0X
59	1	U13	TPS77533D	TI	TPS77533D
60	1	U16	93C66B/TSS OP	MicroChip	93C66B
61	1	U17	FT2232	FTDI	FT2232L
62	1	U18	CDCE949	TI	CDCE949PW
63	1	U20	TPS77518D	TI	TPS77518D
64	1	U21	PCA9306	TI	PCA9306DCU
65	1	Y1	Crystal 27 MHz, 10-pF Load	KDS	SMD-49 (PN ZD02580)
66	1	Y2	6 MHz	ECS Inc	ECS-60-32-5PDN-TR
67	0	Y3	Variable Crystal		Variable
68	4	Screw	H781-ND	Building Fasteners	PMS 440 0038 PH
69	4	Standoff	3481K-ND	Keystone Electronics	3481

**Table 1. Bill of Materials (continued)**

<b>Item</b>	<b>Qty</b>	<b>RefDes</b>	<b>Value</b>	<b>Manufacturer</b>	<b>Part Number</b>
70	6	2-Pin Jumper/Short for J23, J25, J39, J41, J43, J46	AMP Novo Shunt	Tyco Electronics	0-0881545-1

## 6.2 Schematic

The CDCE9xx EVM schematic is appended to this page.

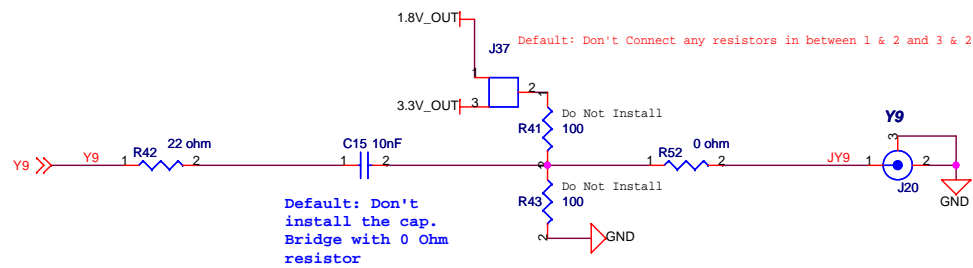
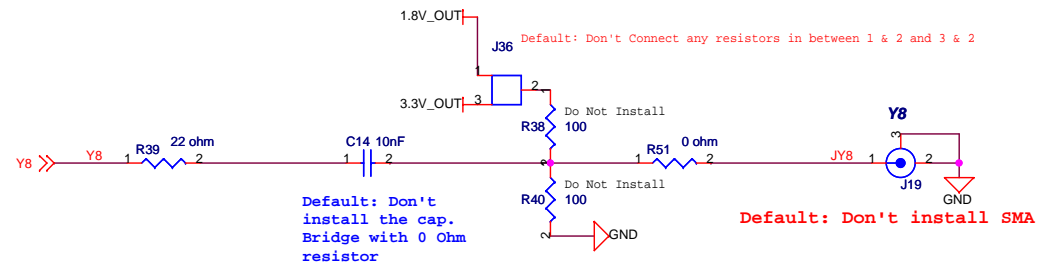
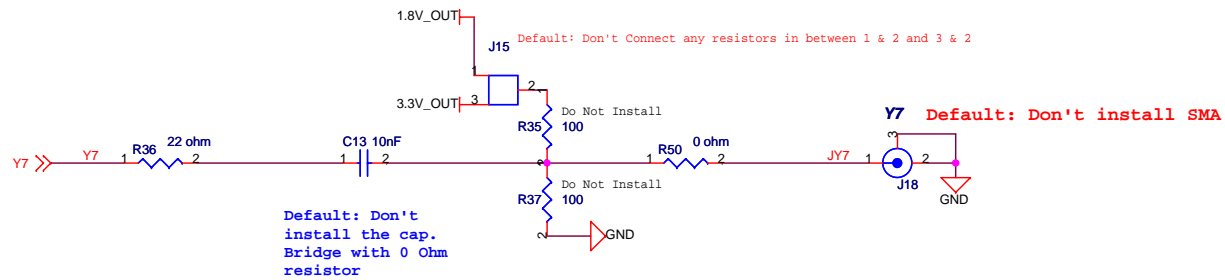
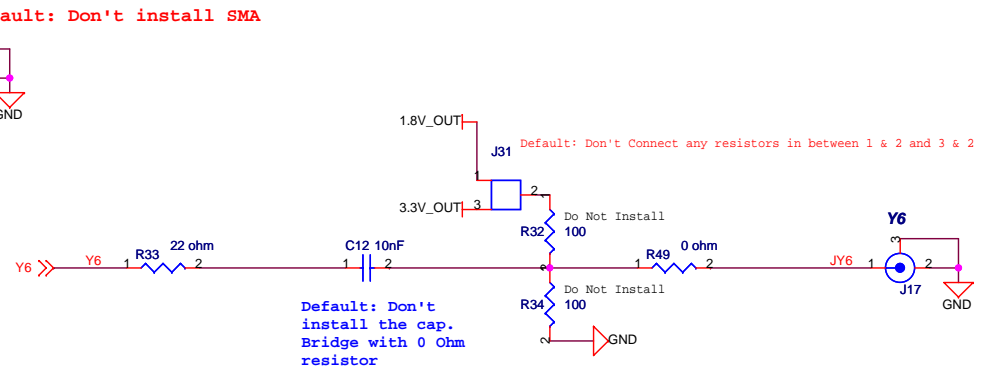
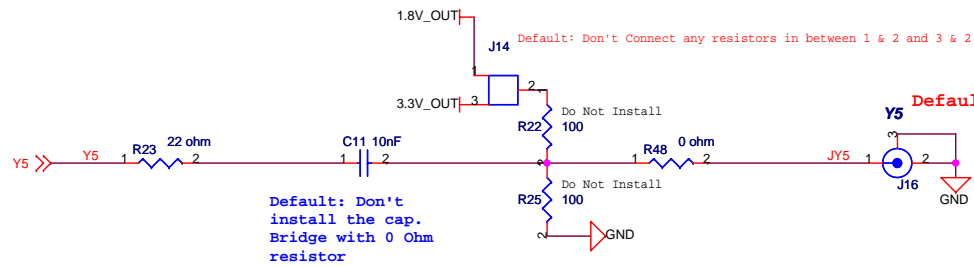



# TEXAS INSTRUMENTS

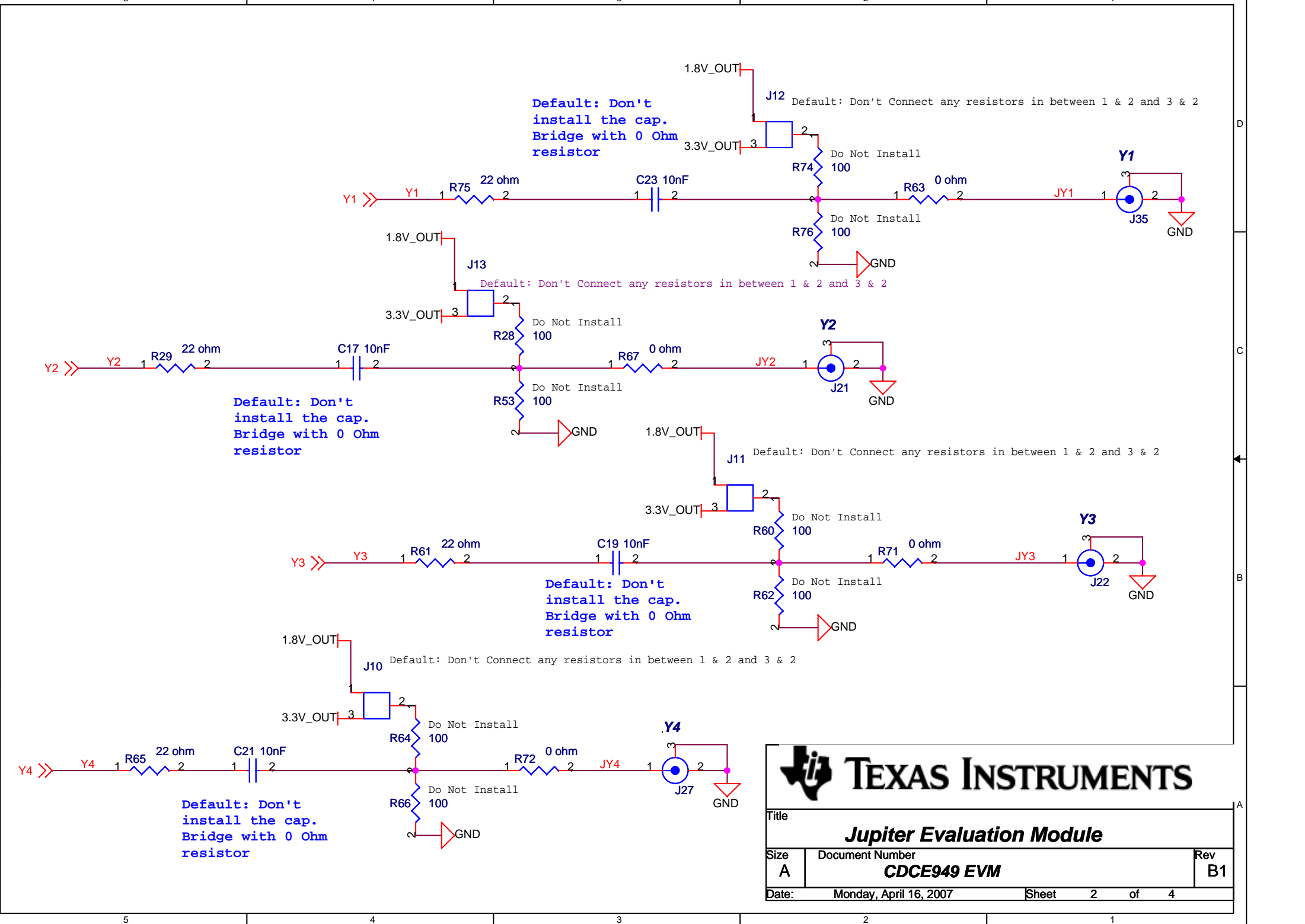
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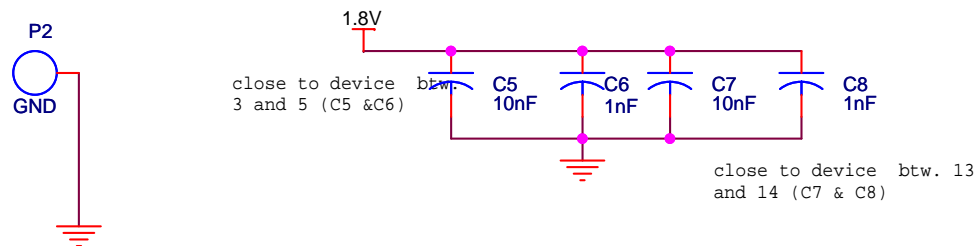
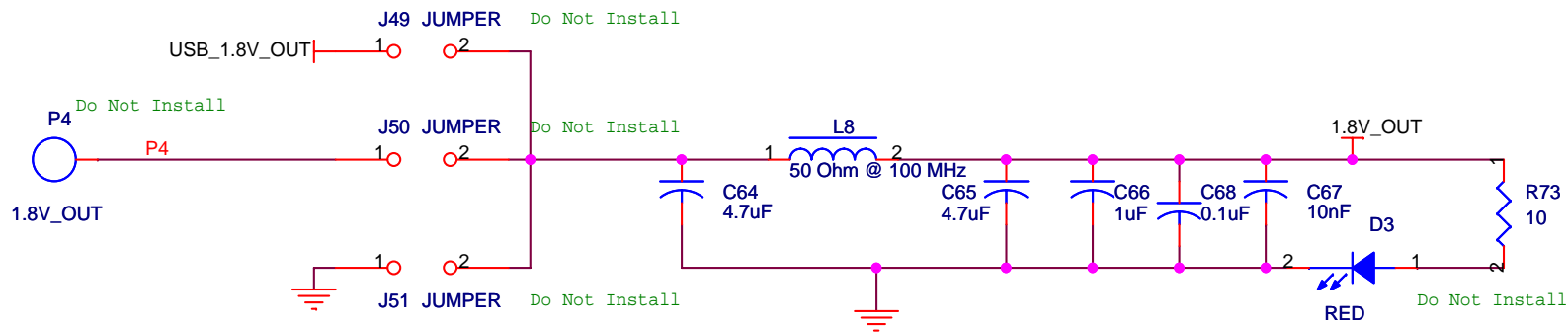
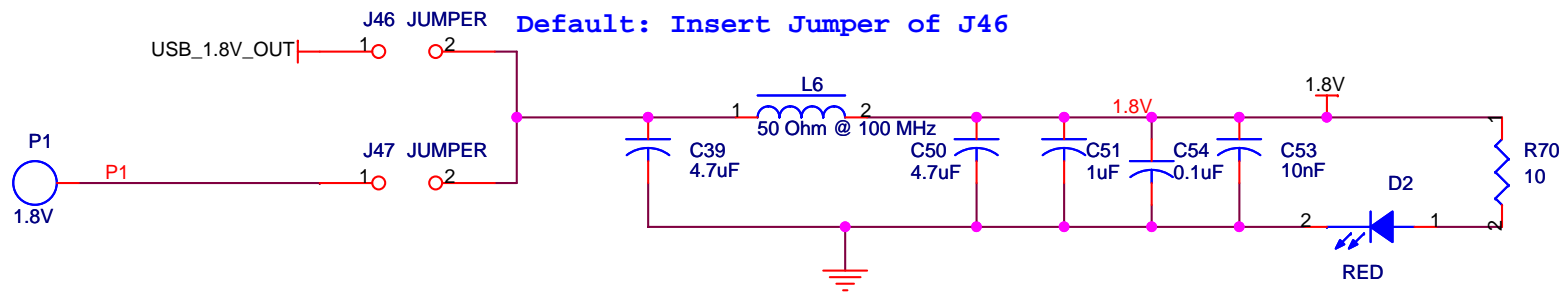
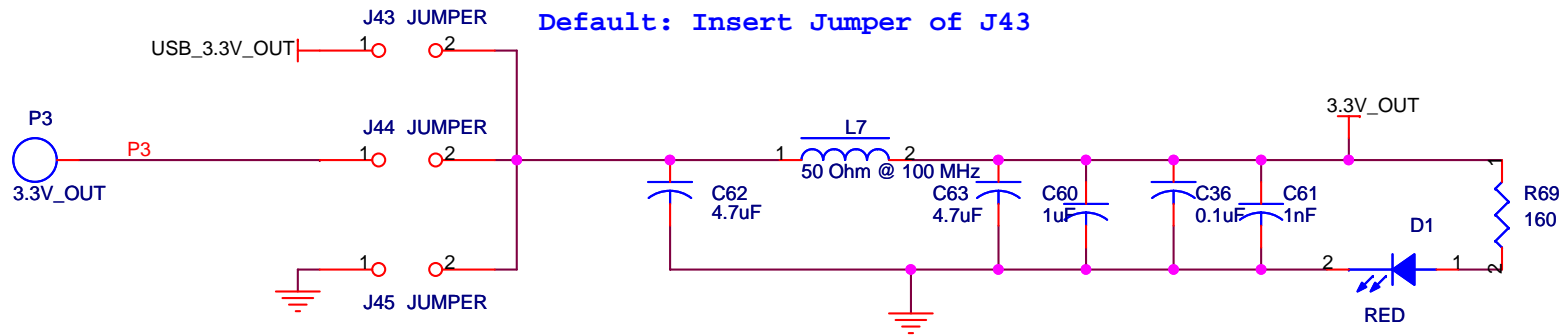
Date: Wednesday, May 16, 2007      Sheet 1 of 4



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Size	Document Number	Rev
B	<b>CDCE949 EVM</b>	B1
Date:	Monday, April 16, 2007	Sheet 2 of 4



Title		
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Size	Document Number	Rev
A	<b>CDCE949 EVM</b>	B1
Date:	Monday, April 16, 2007	Sheet 2 of 4



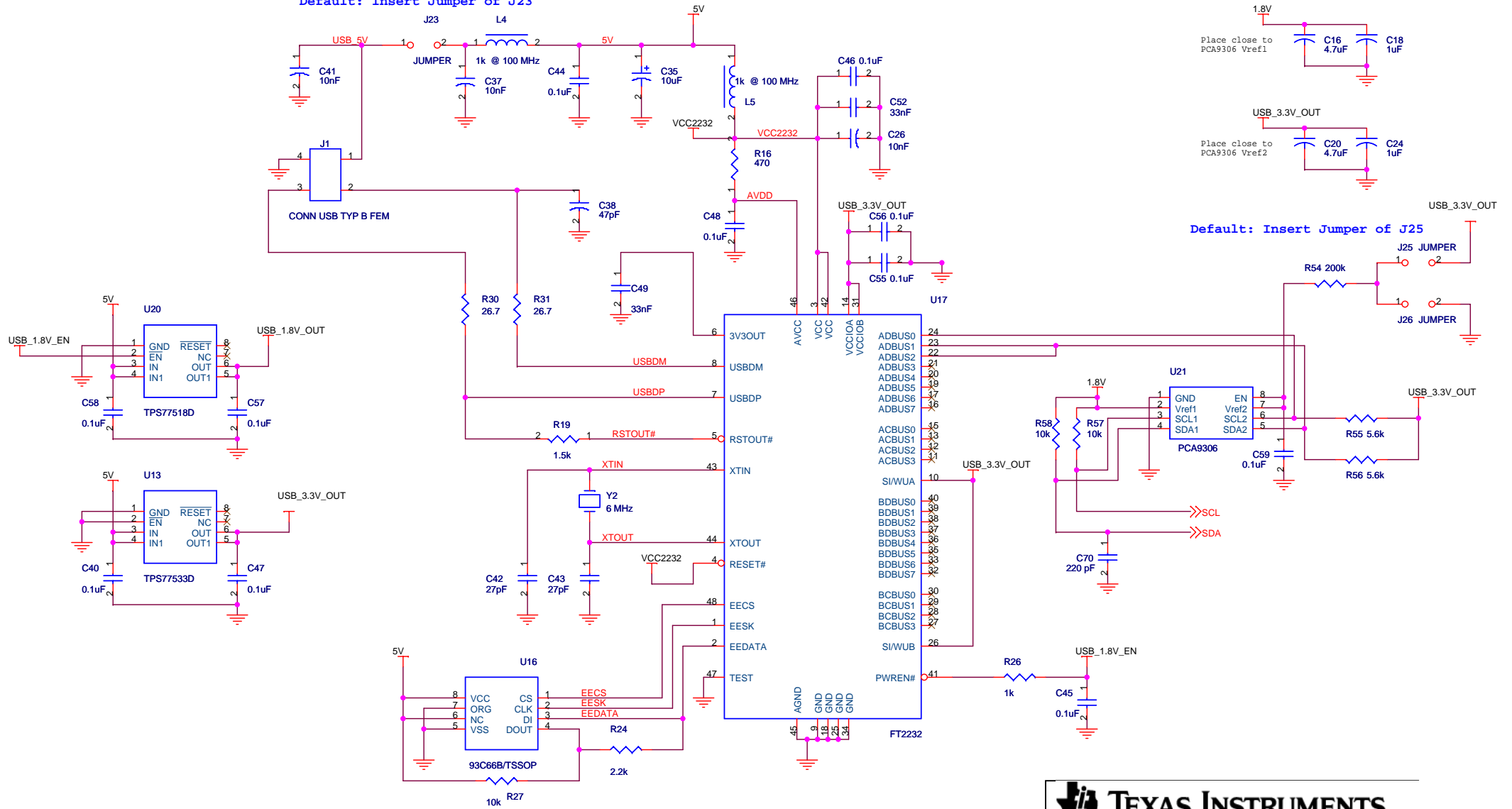
# TEXAS INSTRUMENTS

Title

## Jupiter Evaluation Module

Size	Document Number	Rev
A	CDCE949 EVM	B1
Date:	Monday, June 18, 2007	Sheet 3 of 3

Default: Insert Jumper of J23



Default: Insert Jumper of J25



Title		
<b>Jupiter Evaluation Module</b>		
Size	Document Number	Rev
B	<b>CDCE949 EVM</b>	B1
Date:	Thursday, March 29, 2007	Sheet 3 of 3



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Data Converters	<a href="http://dataconverter.ti.com">dataconverter.ti.com</a>	Automotive	<a href="http://www.ti.com/automotive">www.ti.com/automotive</a>
DLP® Products	<a href="http://www.dlp.com">www.dlp.com</a>	Communications and Telecom	<a href="http://www.ti.com/communications">www.ti.com/communications</a>
DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>	Computers and Peripherals	<a href="http://www.ti.com/computers">www.ti.com/computers</a>
Clocks and Timers	<a href="http://www.ti.com/clocks">www.ti.com/clocks</a>	Consumer Electronics	<a href="http://www.ti.com/consumer-apps">www.ti.com/consumer-apps</a>
Interface	<a href="http://interface.ti.com">interface.ti.com</a>	Energy	<a href="http://www.ti.com/energy">www.ti.com/energy</a>
Logic	<a href="http://logic.ti.com">logic.ti.com</a>	Industrial	<a href="http://www.ti.com/industrial">www.ti.com/industrial</a>
Power Mgmt	<a href="http://power.ti.com">power.ti.com</a>	Medical	<a href="http://www.ti.com/medical">www.ti.com/medical</a>
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RF/IF and ZigBee® Solutions	<a href="http://www.ti.com/lprf">www.ti.com/lprf</a>	Video and Imaging	<a href="http://www.ti.com/video">www.ti.com/video</a>
		Wireless	<a href="http://www.ti.com/wireless-apps">www.ti.com/wireless-apps</a>

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