

CDCE6214 Programming

Write to EEPROM from Registers

Using TICSPRO

Connect to Device

- Power on device and Scan I2C as shown to the right
- The default I2C address is 0x67

1.4 Scan I2C Bus

1. Click the **Scan I2C Bus** tab in the small toolbar.
2. Look for the "Device found at 0x67. Address will be updated." text in the message window.

The screenshot shows the TICS Pro software interface for configuring a CDCE6214-Q1 device. The 'Scan I2C Bus' tab is selected in the toolbar. The main configuration area shows various PLL and output settings. At the bottom, a message window displays 'Device found at 0x67. Address will be updated.'

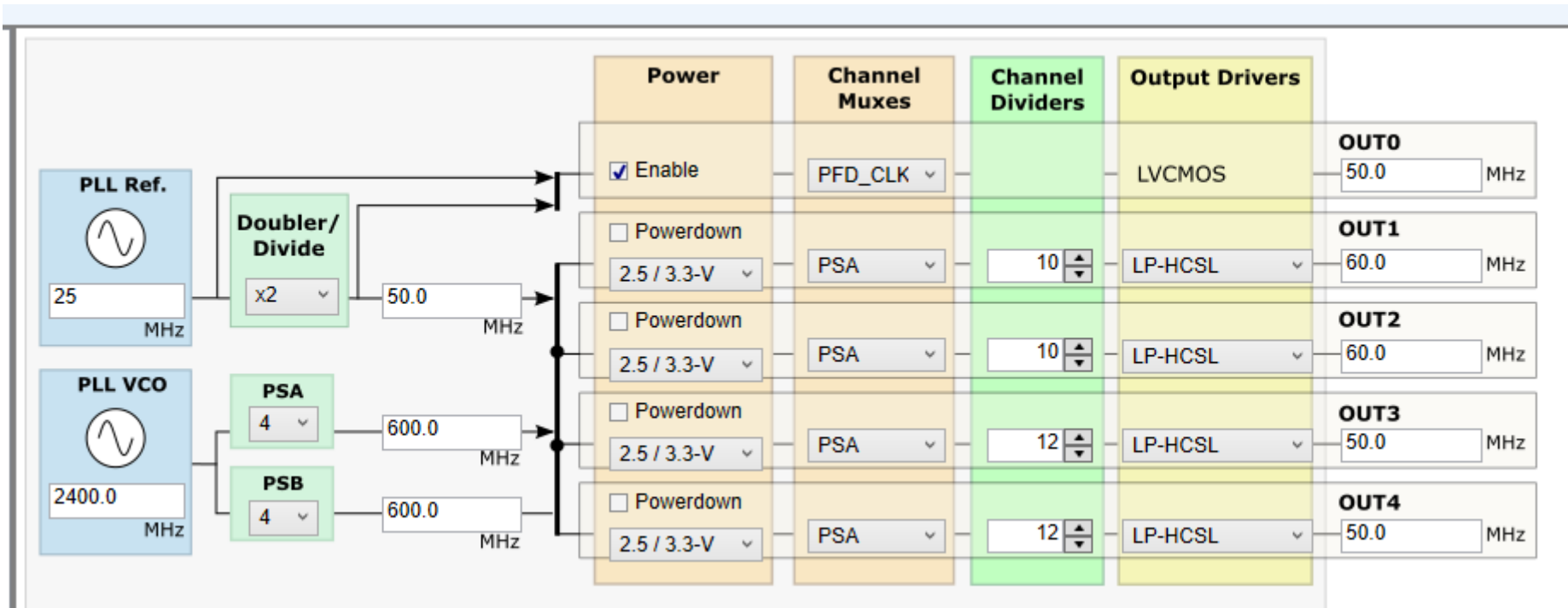
Key configuration sections visible include:

- Reference Frequency (MHz):** 25
- Doubler/Divide:** x2
- PLL:** PFD Freq (MHz) 50.0, CP Gain 2000uA, Lock Window 1.38 ns
- Loop Filter:** Rp 1.5 kOhm, Cp 12.63 pF, Cz 008.7 pF, R3 0 kOhm, C3 1.2 pF
- VCO:** 2.335 ~ 2.625 GHz, 2400.0 MHz
- Fractional N Divider:** Integer 48, Num 0, Den 0
- SSC:** Enable SSC, Down-spread, Spread Type 25MHz PFD, 0.5%
- DCO Mode:** Disabled, DCO Numerator Delta 81
- Outputs:** PSA 4, PSB 4, both at 600.0 MHz

Message window: Completed loading Device CDCE6214-Q1. Version = 2019-05-17, v0.0.12. Scanning for I2C address. Device found at 0x67. Address will be updated.

Verify Config

- Create or Load the desired config using the TICSPRO GUI
- Write All Registers and verify part is outputting as expected
- Read All Registers and confirm desired config is properly displayed

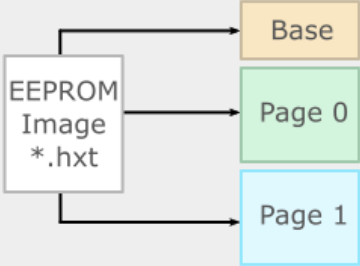


Select EEPROM Page

- Using the drop down menu under Register Content Transfer, select which EEPROM page you want the current config to be written to
- Select *update_crc* in the bottom corner

EEPROM / NVM

Direct EEPROM Access



EEPROM Image *.hxt

Base

Page 0

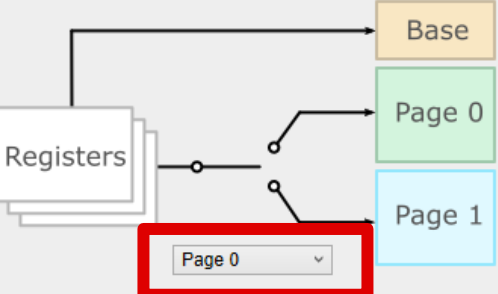
Page 1

Read EEPROM to File

Write File to EEPROM

This flow reads or writes an EEPROM image directly to the EEPROM. This is independent from the current device configuration.

Register Content Transfer



Registers

Base

Page 0

Page 1

Page 0

Register to EEPROM

This flow transfers the current device configuration from the device registers into the selected EEPROM page and always to the base page, which contains common settings to both pages. The device shall be in the targeted application state (PLL locked).

update_crc

40312

Program EEPROM

- Click *Register to EEPROM*

The screenshot shows the 'EEPROM / NVM' configuration interface. It is divided into two main panels:

- Direct EEPROM Access:** This panel shows a diagram where an 'EEPROM Image *.hxt' file is mapped to 'Base', 'Page 0', and 'Page 1'. Below the diagram are two buttons: 'Read EEPROM to File' and 'Write File to EEPROM'. A note states: 'This flow reads or writes an EEPROM image directly to the EEPROM. This is independent from the current device configuration.'
- Register Content Transfer:** This panel shows a diagram where 'Registers' are mapped to 'Base', 'Page 0', and 'Page 1'. A dropdown menu is set to 'Page 0'. A button labeled 'Register to EEPROM' is highlighted with a red box. Below the diagram, a note states: 'This flow transfers the current device configuration from the device registers into the selected EEPROM page and always to the base page, which contains common settings to both pages. The device shall be in the targeted application state (PLL locked)'. At the bottom, there is a checkbox for 'update_crc' (checked) and the value '40312'.

After EEPROM write is complete, you will see the following in the Status Box:

```
Wrote Register R14 (0xE) as 0x000E 53D4
Wrote Register R3 (0x3) as 0x0003 4000
EEPROM written, CRC of FILE / DEVICE / CRCERR 0x53d4 / 0x53d4 / 0x0000
```

CRC of FILE and DEVICE values may be different than above, but they should be equal each other. CRCERR should be 0x0000

After EEPROM write is complete, **power cycle** the device.

For More Info

- More info can be found in the EVM User's Guide
- <https://www.ti.com/lit/ug/snau244a/snau244a.pdf>

Without TICSPPro

EEPROM Access

9.5.2.3 EEPROM Access

NOTE

The EEPROM word write access time is typically 8 ms.

There are two methods to write into the internal EEPROM

1. Register Commit method.
2. EEPROM Direct Access Method

Use the following steps to bring the device into a good known configuration.

1. Power down all the supplies.
2. Apply PDN = LOW.
3. REFSEL and HW_SW_CTRL pins can be High, Low or High-Z. For factory programmed device, I²C interface is not available when HW_SW_CTRL is LOW.
4. Apply power supplies to all VDD pins. When device operation is not required, apply power supply to VDDREF.
5. Apply PDN = HIGH.
6. Use the I²C interface to configure the device.

Writing EEPROM Data from Registers

9.5.2.3.1 Register Commit Flow

In the Register Commit flow, all bits from the device registers are copied into the EEPROM. The recommended flow is:

1. Pre-configure the device as desired, except the serial interface using mode.
2. Write 1 to RECAL to calibrate the VCO in this operation mode.
3. Select the EEPROM page, to copy the register settings into, using REGCOMMIT_PAGE.
4. Unlock the EEPROM for write access with EE_LOCK = x5.
5. Start the register commit operation by writing 1 to REGCOMMIT.
6. Force a CRC update by writing a 1 to UPDATE_CRC.
7. Read back the calculated CRC in NVMLCRC.
8. Store the read CRC value in the EEPROM by writing 0x3F to NVM_WR_ADDR and then the CRC value to NVM_WR_DATA.

Power cycle the device after the EEPROM has finished being written to.

For More Info

- More info can be found in the Programming section of the Datasheet
- <https://www.ti.com/lit/ds/symlink/cdce6214.pdf>

Write to EEPROM from File

Using TICSPRO

Connect to Device

- Power on device and Scan I2C as shown to the right
- The default I2C address is 0x67

1.4 Scan I2C Bus

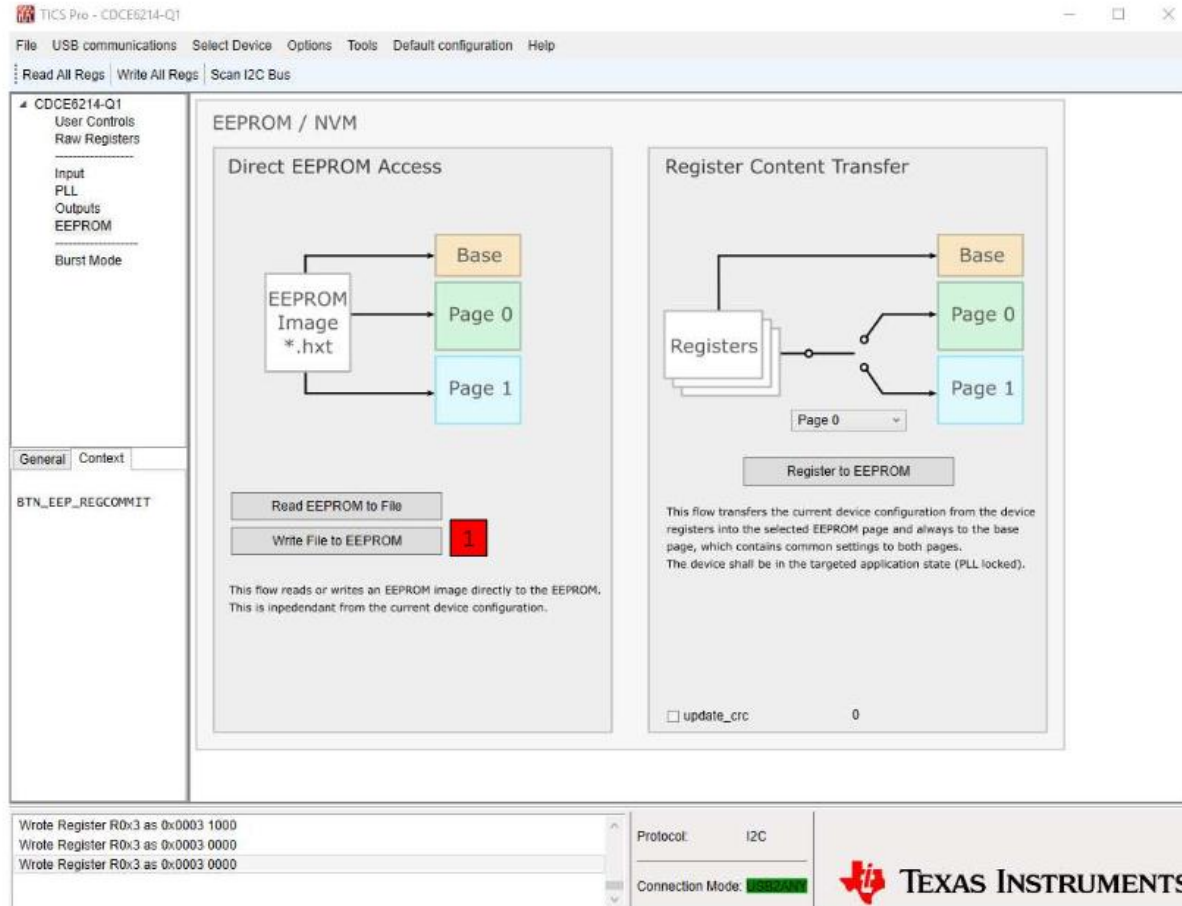
1. Click the **Scan I2C Bus** tab in the small toolbar.
2. Look for the "Device found at 0x67. Address will be updated." text in the message window.

The screenshot shows the TICS Pro software interface for configuring the CDCE6214-Q1 device. The 'Scan I2C Bus' tab is active in the toolbar. The main configuration area is divided into several sections: Reference Frequency (25 MHz), Doubler/Divide (x2), PLL (50.0 MHz PFD Freq, 2000uA CP Gain, 1.36 ns Lock Window), Loop Filter (Rp 1.5 kOhm, Cp 12.63 pF, Cx 608.7 pF, R3 0 kOhm, C3 1.2 pF), VCO (2.335 ~ 2.625 GHz, 2400.0 MHz), Fractional N Divider (Integer 48, Num 0, Den 0), and SSC (Down-spread, Spread Type 25MHz PFD, 0.5%). The bottom status bar displays the message: "Device found at 0x67. Address will be updated." The Texas Instruments logo is visible in the bottom right corner.

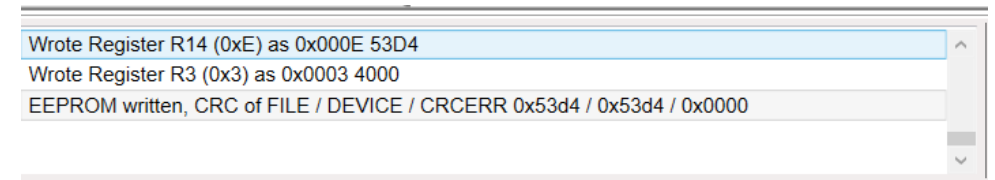
Program EEPROM

2.5.1 Direct Access

1. Under **Direct EEPROM Access**, click the **Write File to EEPROM** button
2. Select the .hxt EEPROM file.



After EEPROM write is complete, you will see the following in the Status Box:



CRC of FILE and DEVICE values may be different than above, but they should be equal each other. CRCERR should be 0x0000

After EEPROM write is complete, **power cycle** the device.

Verify Config

- Power on device
- Connect to Device by Scanning for I2C
- Read All Registers and verify config displayed is correct

For More Info

- More info can be found in the EVM User's Guide
- <https://www.ti.com/lit/ug/snau244a/snau244a.pdf>

Without TICSPPro

EEPROM Access

9.5.2.3 EEPROM Access

NOTE

The EEPROM word write access time is typically 8 ms.

There are two methods to write into the internal EEPROM

1. Register Commit method.
2. EEPROM Direct Access Method

Use the following steps to bring the device into a good known configuration.

1. Power down all the supplies.
2. Apply PDN = LOW.
3. REFSEL and HW_SW_CTRL pins can be High, Low or High-Z. For factory programmed device, I²C interface is not available when HW_SW_CTRL is LOW.
4. Apply power supplies to all VDD pins. When device operation is not required, apply power supply to VDDREF.
5. Apply PDN = HIGH.
6. Use the I²C interface to configure the device.

Writing EEPROM Data from File

9.5.2.3.2 Direct Access Flow

In the EEPROM direct access flow, the EEPROM words are directly accessed using the address and the data bit-fields. The recommended flow is:

1. Prepare an EEPROM image consisting of 64 words of 16 bits each.
2. Unlock the EEPROM for write access with `EE_LOCK = 0x5`.
3. Write the initial address offset to the address bit-field. Write a `0x00` to `NVM_WR_ADDR`.
4. Loop through the EEPROM image from address 0 to 63 by writing each word from the image to `NVM_WR_DATA`. The EEPROM word address is automatically incremented by every write access to `NVM_WR_DATA`.

Power cycle the device after the EEPROM has finished being written to.

For More Info

- More info can be found in the Programming section of the Datasheet
- <https://www.ti.com/lit/ds/symlink/cdce6214.pdf>

Reading EEPROM to File

Using TICSPPro

Connect to Device

- Power on device and Scan I2C as shown to the right
- The default I2C address is 0x67

1.4 Scan I2C Bus

1. Click the **Scan I2C Bus** tab in the small toolbar.
2. Look for the "Device found at 0x67. Address will be updated." text in the message window.

The screenshot displays the TICS Pro software interface for the CDCE6214-Q1 device. The main window shows the PLL configuration page, which includes various control blocks and parameters:

- Reference Frequency (MHz):** 25
- Doubler/Divide:** x2
- PLL:** PFD Freq (MHz) 50.0, CP Gain 2000uA, Lock Window 1.36 ns.
- Loop Filter:** Rp 1.5 kOhm, Cp 12.63 pF, Cx 608.7 pF, R3 0 kOhm, C3 1.2 pF.
- VCO:** 2.335 ~ 2.625 GHz, 2400.0 MHz.
- Fractional N Divider:** Integer 48, Num 0, Den 0. Actual denominator for den = 0 is 2^24 = 16777216.
- SSC:** Enable SSC checkbox, Down-spread Spread Type 25MHz PFD, 0.5%.
- DCO Mode:** Enable DCO Mode checkbox, DCO Numerator Delta 81.
- Outputs:** PSA 600.0 MHz, PSB 600.0 MHz.

The message window at the bottom of the interface shows the following text:

```
Completed loading Device CDCE6214-Q1 Version = 2019-05-17, v0.0.12
Scanning for I2C address...
Device found at 0x67. Address will be updated.
```

Read EEPROM Content

2.5.3 Read EEPROM Content

To read EEPROM to .hxt file, click the **Read EEPROM to file** button under **Direct EEPROM Access**.

The screenshot displays the 'EEPROM / NVM' configuration window, divided into two main sections: 'Direct EEPROM Access' and 'Register Content Transfer'.

Direct EEPROM Access: This section shows a diagram where an 'EEPROM Image *.hxt' file is mapped to 'Base', 'Page 0', and 'Page 1'. Below the diagram are two buttons: 'Read EEPROM to File' (highlighted with a red box) and 'Write File to EEPROM'. A descriptive text states: 'This flow reads or writes an EEPROM image directly to the EEPROM. This is independent from the current device configuration.'

Register Content Transfer: This section shows a diagram where 'Registers' are transferred to 'Base', 'Page 0', and 'Page 1'. A dropdown menu is set to 'Page 0', and a 'Register to EEPROM' button is present. A descriptive text states: 'This flow transfers the current device configuration from the device registers into the selected EEPROM page and always to the base page, which contains common settings to both pages. The device shall be in the targeted application state (PLL locked).'

At the bottom left, there is a checkbox for 'update_crc' which is checked, and the number '40312' is displayed at the bottom right.

Adjust EEPROM File if needed

- After the .hxt file has been exported, it may need to be adjusted
- *nvmlcrc* and *nvmscrc* MUST be the same value. If they are different, change *nvmscrc* to match *nvmlcrc*
- Byte 63 must also match *nvmlcrc* in both hex and decimal form
- *nvmcrcerr* must be 0x0000

```
----- CDCE6214-Q1 EEPROM HEX TEXT FILE -----  
Header Info Wed Apr 10 10:14:11 2024  
nvmbusy      0x0000  
nvmcrcerr    0x0000  
nvm_wr_error 0x0000  
nvm_rd_error 0x0000  
nvmlcrc      0xd848  
nvmscrc      0xd848  
nvm_rd_addr  0x0000  
nvm_rd_data  0x0000  
nvm_wr_addr  0x0000  
nvm_wr_data  0x0000
```

```
59      0x0008      8  
60      0x0000      0  
61      0x0000      0  
62      0x0000      0  
63      0xd848     55368  
----- END EEPROM HEX TEXT FILE -----
```