

The MegaWizard™ Plug-In Manager in the Quartus® II software creates or modifies design files that contain custom megafunction variations. These auto-generated files can then be instantiated in a design file. The MegaWizard Plug-In Manager allows you to specify options for the ALTGX\_RECONFIG megafunction.

Start the MegaWizard Plug-In Manager using one of the following methods:

- On the Tools menu, click **MegaWizard Plug-In Manager**.
- When working in the **Block Editor** (schematic symbol), open the Edit menu and click **Insert Symbol**. The **Symbol** dialog box appears. In the **Symbol** dialog box, click **MegaWizard Plug-In Manager**.
- Start the stand-alone version of the MegaWizard Plug-In Manager by typing the following command at the command prompt: `qmegawiz`.

## Dynamic Reconfiguration

This section describes the options available on the individual pages of the ALTGX\_RECONFIG MegaWizard Plug-In Manager.

 The MegaWizard Plug-In Manager provides a warning if any of the settings you choose are illegal.

Figure 3–1 shows the first page of the MegaWizard Plug-In Manager. To generate an ALTGX\_RECONFIG custom megafunction variation, select **Create a new custom megafunction variation**. Click **Next**.

**Figure 3–1. MegaWizard Plug-In Manager (Page 1)**

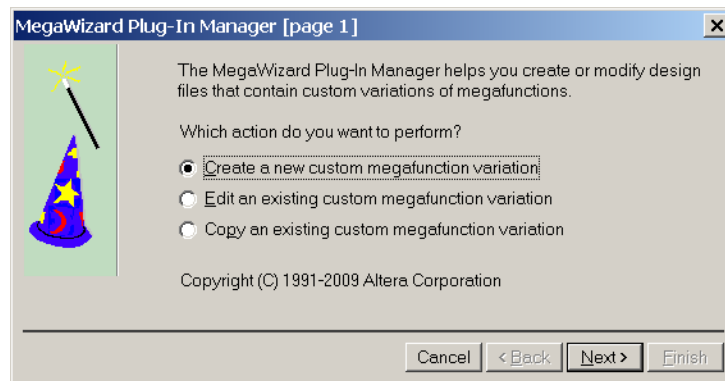



Figure 3-2 shows the second page of the MegaWizard Plug-In Manager. Select the following options (click **Next** when you are done):

1. In the list of megafunctions on the left, click the “+” icon beside **I/O**. From the options presented, select the **ALTGX\_RECONFIG** megafunction.
2. From the drop-down menu beside **Which device family will you be using?**, select **HardCopy IV**.
3. From the radio buttons under **Which type of output file do you want to create?**, select your output file format (**AHDL**, **VHDL**, or **Verilog HDL**).
4. In the box beneath **What name do you want for the output file?**, enter the file name or click the **Browse** button to search for it.

 For the design to compile successfully, always enable the dynamic reconfiguration controller for all the ALTGX instances in the design.

**Figure 3-2. MegaWizard Plug-In Manager—ALTGX\_RECONFIG (Page 2)**

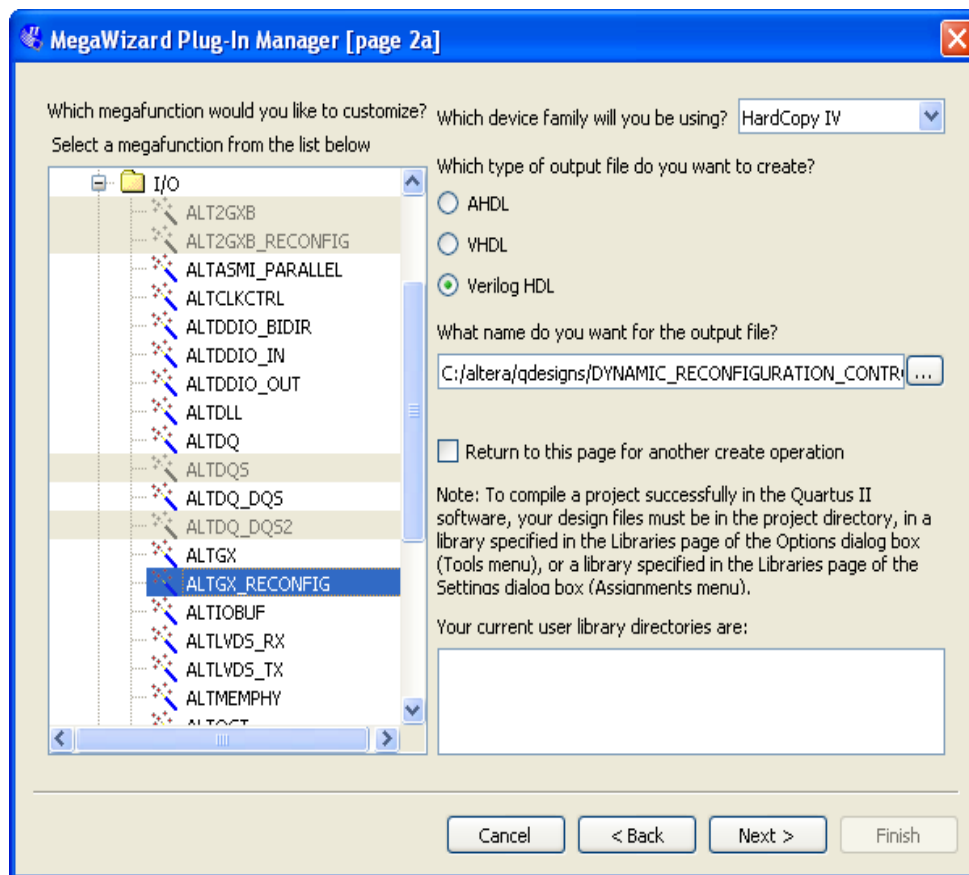


Figure 3-3 shows page 3 of the ALTGX\_RECONFIG MegaWizard Plug-In Manager. From the drop-down menu, select the number of channels controlled by the dynamic reconfiguration controller.

Figure 3-3. MegaWizard Plug-In Manager—ALTGX\_RECONFIG (Reconfiguration Settings) (Page 3)

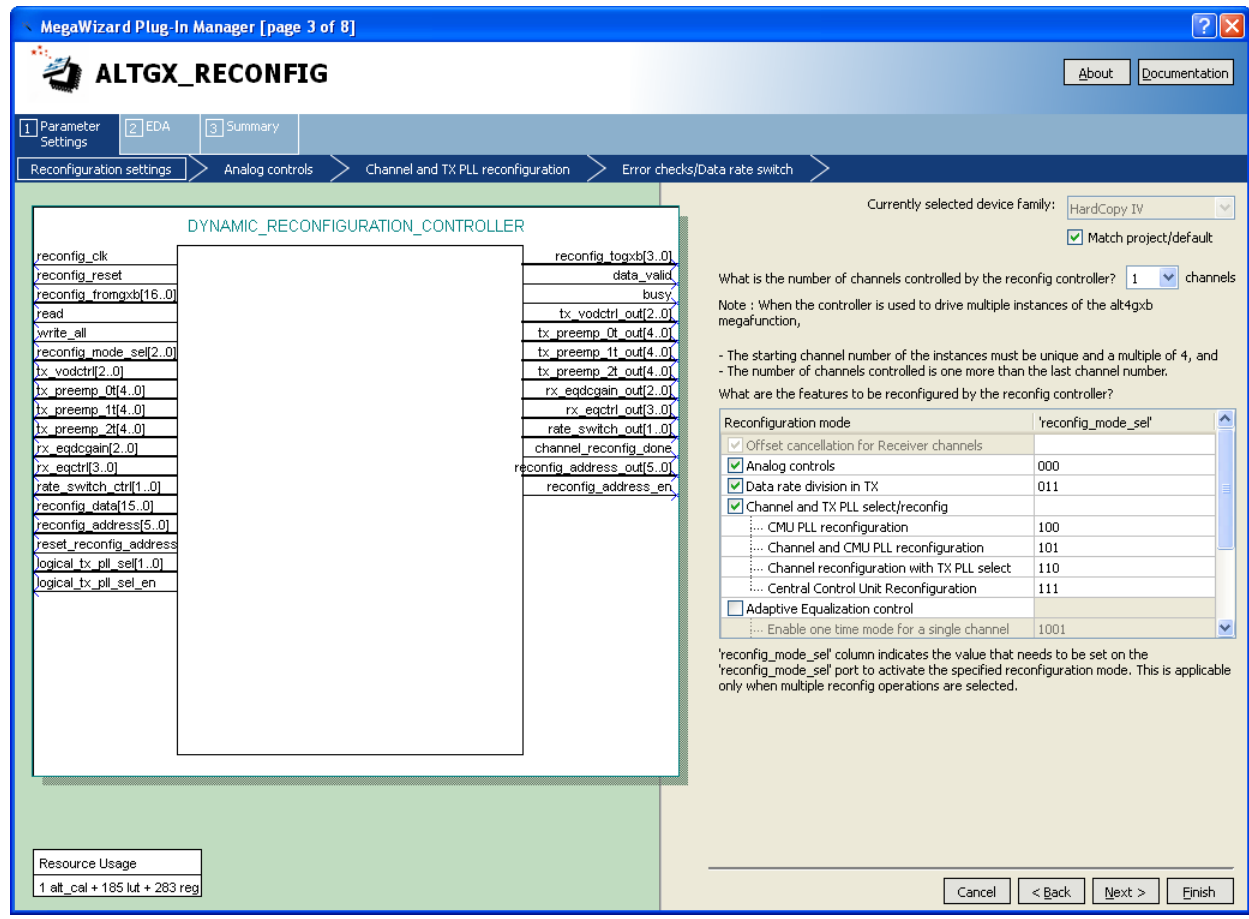


Table 3-1 describes the available options on page 3 of the MegaWizard Plug-In Manager for your ALTGX\_RECONFIG custom megafunction variation. Turn on **Match project/default** if you want to change the device family listed in the **Currently selected device family** option.

Make your selections on page 3, then click **Next**.

**Table 3-1. MegaWizard Plug-In Manager Options (Page 3)**

ALTGX_RECONFIG Setting	Description	Reference
<p>What is the number of channels controlled by the reconfig controller?</p>	<p>Determine the highest logical channel address among all the ALTGX instances connected to the ALTGX_RECONFIG instance. Round it up to the next multiple of four and set that number in this option.</p> <p>Depending on this setting, the ALTGX_RECONFIG MegaWizard Plug-in Manager generates the appropriate signal width for the interface signal (<code>reconfig_fromgxb</code>) between the ALTGX_RECONFIG and ALTGX instances. It also gives the necessary bus width for all the selected physical media attachment (PMA) signals.</p> <p>Depending on the number of channels set, the resource estimate changes because this is a soft implementation that uses fabric logic resources. The resource estimate is shown in the bottom left of Page 3 of the MegaWizard Plug-in Manager.</p>	<p>“Total Number of Channels Option in the ALTGX_RECONFIG Instance” section of the <i>HardCopy IV GX Dynamic Reconfiguration</i> chapter in volume 3 of the <i>HardCopy IV Device Handbook</i></p>
<p>What are the features to be reconfigured by the reconfig controller?</p>	<p>This feature is always enabled by default:</p> <ul style="list-style-type: none"> <li>■ <b>Offset cancellation for Receiver channels</b>—After the device powers up, the dynamic reconfiguration controller performs offset cancellation on the receiver portion of all the transceiver channels controlled by it.</li> </ul> <p>These features are available for selection:</p> <ul style="list-style-type: none"> <li>■ <b>Analog Controls</b>—Allows dynamic reconfiguration of PMA controls such as Equalization, Pre-emphasis, DC Gain, and VOD.</li> <li>■ <b>Data rate division in TX</b>—Allows dynamic reconfiguration of the transmitter local divider settings to 1, 2, or 4. The transmitter channel data rate is reconfigured based on the local divider settings.</li> <li>■ <b>Channel and TX PLL select/reconfig</b>—The following features are available under this option: <ul style="list-style-type: none"> <li>■ <b>CMU PLL Reconfiguration</b>—Allows the dynamic reconfiguration of the CMU PLL to a different data rate.</li> <li>■ <b>Channel and CMU PLL reconfiguration</b>—Allows the dynamic reconfiguration of the transceiver channel from one functional mode to another and also the reconfiguration of the CMU PLL.</li> <li>■ <b>Channel reconfiguration with TX PLL select</b>—Allows you to select another transmitter PLL for the transceiver channel and reconfigure the channel to another data rate.</li> </ul> </li> </ul>	<p>“Offset Cancellation Feature” section of the <i>HardCopy IV GX Dynamic Reconfiguration</i> chapter in volume 3 of the <i>HardCopy IV Device Handbook</i></p> <p>“PMA Controls Reconfiguration Mode Details” section of the <i>HardCopy IV GX Dynamic Reconfiguration</i> chapter in volume 3 of the <i>HardCopy IV Device Handbook</i></p> <p>“Channel and CMU PLL Reconfiguration Mode Details” section of the <i>HardCopy IV GX Dynamic Reconfiguration</i> chapter in volume 3 of the <i>HardCopy IV Device Handbook</i></p>

Figure 3-4 shows page 4 of the ALTGX\_RECONFIG MegaWizard Plug-In Manager.

Figure 3-4. MegaWizard Plug-In Manager—ALTGX\_RECONFIG (Analog Controls) (Page 4)

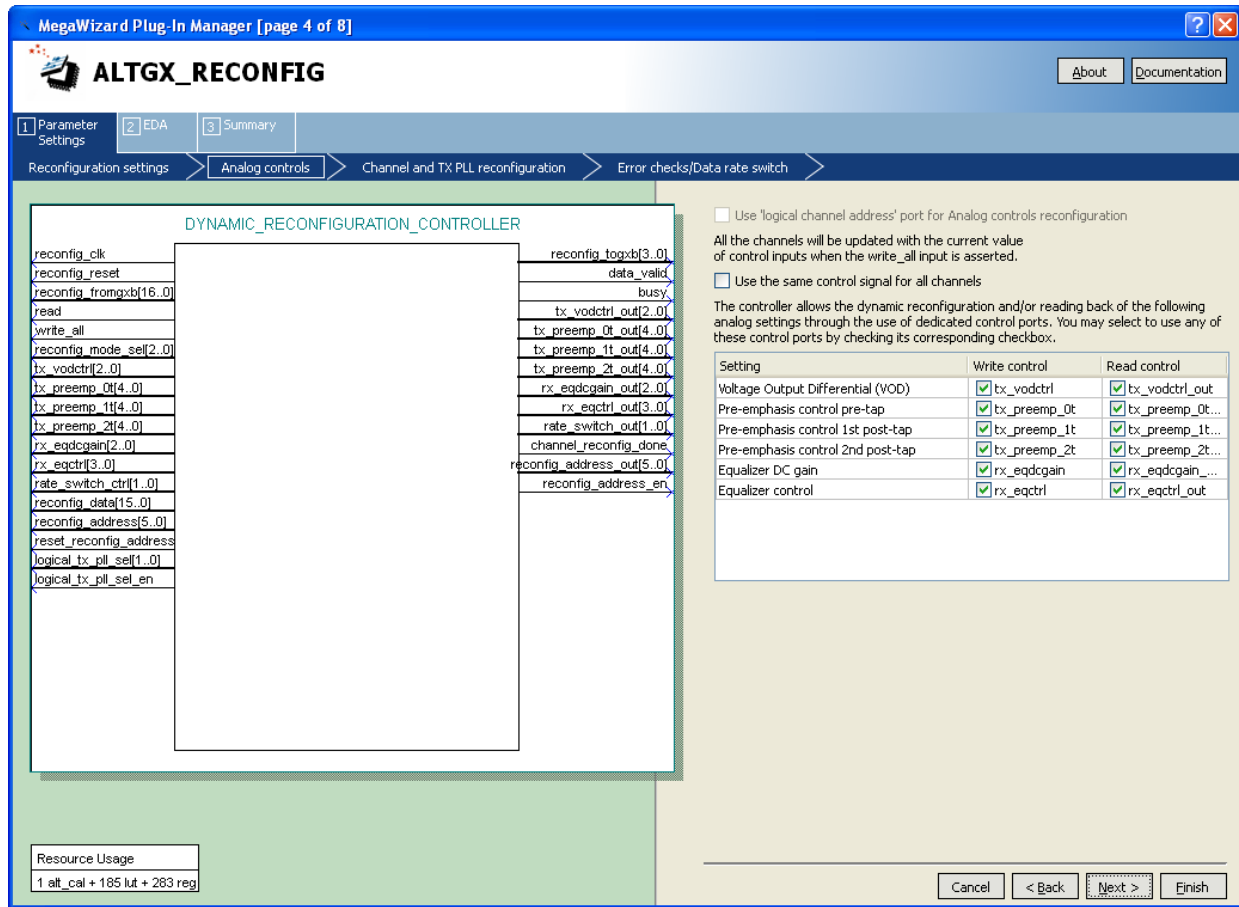


Table 3-2 describes the available options on page 4 of the MegaWizard Plug-In Manager for your ALTGX\_RECONFIG custom megafunction variation.

Make your selections on page 4, then click **Next**.

**Table 3-2. MegaWizard Plug-In Manager Options (Page 4) (Part 1 of 2)**

ALTGX_RECONFIG Setting	Description	Reference
Use 'logical_channel_address' port for Analog controls reconfiguration	This option is applicable only for Analog controls reconfiguration and is available for selection when the number of channels controlled by the ALTGX_RECONFIG instance is more than one. The dynamic reconfiguration controller reconfigures only the channel whose logical channel address is specified at the logical_channel_address port. The width of this port is selected by the ALTGX_RECONFIG MegaWizard Plug-In Manager depending on the number of channels controlled by the dynamic reconfiguration controller. The maximum width of the logical_channel_address port is 9 bits.	"PMA Controls Reconfiguration Mode Details" section of the <i>HardCopy IV GX Dynamic Reconfiguration</i> chapter in volume 3 of the <i>HardCopy IV Device Handbook</i>
Use the same control signal for all channels	This option is available for selection when the number of channels controlled by the ALTGX_RECONFIG instance is more than one. The dynamic reconfiguration controller writes the same control signals to all the channels connected to it when you enable this option.  This option is not available for selection when you enable the <b>Use 'logical_channel_address' port for Analog controls reconfiguration</b> option.	

**Table 3-2. MegaWizard Plug-In Manager Options (Page 4) (Part 2 of 2)**

ALTGX_RECONFIG Setting	Description	Reference
Write Control	<p>The PMA control ports available to write various analog settings to the transceiver channels controlled by the dynamic reconfiguration controller are as follows:</p> <ul style="list-style-type: none"> <li>■ tx_vodctrl—Voltage Output Differential (V<sub>OD</sub>) — 3 bits per channel</li> <li>■ tx_preemp_0t—Pre-emphasis control pre-tap — 5 bits per channel</li> <li>■ tx_preemp_1t—Pre-emphasis control 1st post-tap— 5 bits per channel</li> <li>■ tx_preemp_2t—Pre-emphasis control 2nd post-tap— 5 bits per channel</li> <li>■ rx_eqdcgain—Equalizer DC gain—3 bits per channel</li> <li>■ rx_eqctrl—Equalizer control—4 bits per channel</li> </ul> <p>These are optional signals. The signal widths are based on the setting you entered for the <b>What is the number of channels controlled by the reconfig controller?</b> option and whether you enable the <b>Use 'logical_channel_address' port for Analog controls reconfiguration</b> option. At least one of these PMA control ports must be enabled to configure and use the dynamic reconfiguration controller.</p>	
Read Control	<p>The PMA control ports available to read the existing values from the transceiver channels controlled by the dynamic reconfiguration controller are as follows:</p> <ul style="list-style-type: none"> <li>■ tx_vodctrl_out—Voltage Output Differential (V<sub>OD</sub>)—3 bits per channel</li> <li>■ tx_preemp_0t_out—Pre-emphasis control pre-tap— 5 bits per channel</li> <li>■ tx_preemp1t_out—Pre-emphasis control 1st post-tap—5 bits per channel</li> <li>■ tx_preemp_2t_out—Pre-emphasis control 2nd post-tap—5 bits per channel</li> <li>■ rx_eqdcgain_out—Equalizer DC gain—3 bits per channel</li> <li>■ rx_eqctrl_out—Equalizer control—4 bits per channel</li> </ul> <p>These are optional signals. The signal widths are based on the setting you entered for the <b>What is the number of channels controlled by the reconfig controller?</b> option and whether you enable the <b>Use 'logical_channel_address' port for Analog controls reconfiguration</b> option. The PMA controls are available for selection only if the corresponding write control is selected. Read and write transactions cannot be performed simultaneously.</p>	<p>“Dynamically Reconfiguring PMA Controls” section of the <i>HardCopy IV GX Dynamic Reconfiguration</i> chapter in volume 3 of the <i>HardCopy IV Device Handbook</i></p>

Figure 3-5 shows page 5 of the ALTGX\_RECONFIG MegaWizard Plug-In Manager.

Figure 3-5. MegaWizard Plug-In Manager—ALTGX\_RECONFIG (Channel and TX PLL Reconfiguration) (Page 5)

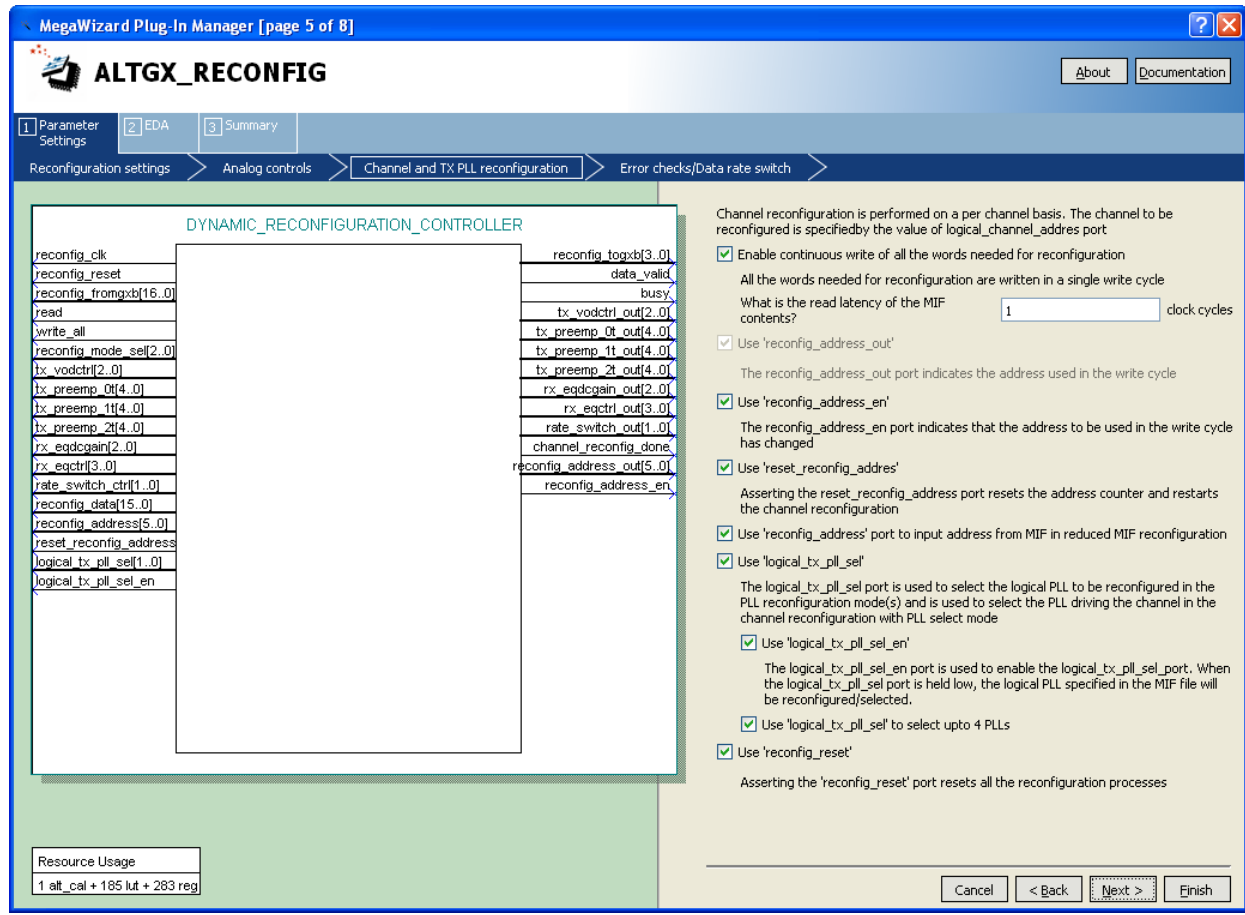


Table 3-3 describes the available options on page 5 of the MegaWizard Plug-In Manager for your ALTGX\_RECONFIG custom megafunction variation.

Table 3-3. MegaWizard Plug-In Manager Options (Page 5) (Part 1 of 3)

ALTGX_RECONFIG Setting	Description	Reference
Enable continuous write of all the words needed for reconfiguration	When this option is turned on, you only need to issue one pulse on the <code>write_all</code> port. The reconfig controller then writes all of the words in the <code>.mif</code> . If the option is not turned on, a separate pulse must be issued for each word in the <code>.mif</code> .	"Dynamic Reconfiguration Controller Port List" section in the <i>HardCopy IV GX Dynamic Reconfiguration</i> chapter in volume 3 of the <i>HardCopy IV Device Handbook</i>
Use 'reconfig_address_out'	This option is enabled by default when you select the <b>Channel and TX PLL select/reconfig</b> option. The value on <code>reconfig_address_out[5:0]</code> indicates the address associated with the words in the <code>.mif</code> , which contains the dynamic reconfiguration instructions. The dynamic reconfiguration controller automatically increments the address at the end of each <code>.mif</code> write transaction.	"Dynamic Reconfiguration Controller Port List" section in the <i>HardCopy IV GX Dynamic Reconfiguration</i> chapter in volume 3 of the <i>HardCopy IV Device Handbook</i>

**Table 3-3. MegaWizard Plug-In Manager Options (Page 5) (Part 2 of 3)**

ALTGX_RECONFIG Setting	Description	Reference
Use 'reconfig_address_en'	When high, this optional output status signal indicates that the address to be used in the .mif write transaction cycle has changed. This signal gets asserted when the .mif write transaction is completed (the busy signal is de-asserted).	"Dynamic Reconfiguration Controller Port List" section in the <i>HardCopy IV GX Dynamic Reconfiguration</i> chapter in volume 3 of the <i>HardCopy IV Device Handbook</i>
Use 'reset_reconfig_address'	When asserted, this optional control signal resets the reconfig_address_out (current reconfiguration address) to 0.	"Dynamic Reconfiguration Controller Port List" section in the <i>HardCopy IV GX Dynamic Reconfiguration</i> chapter in volume 3 of the <i>HardCopy IV Device Handbook</i>
Use 'reconfig_address' port to input address from MIF in reduced MIF reconfiguration	In .mif-based channel reconfiguration mode, this option can speed up reconfiguration when only a few words in the .mif have changed.	"Dynamic Reconfiguration Controller Port List" section in the <i>HardCopy IV GX Dynamic Reconfiguration</i> chapter in volume 3 of the <i>HardCopy IV Device Handbook</i>
Use 'logical_tx_pll_sel'	<p>This is an optional control signal. The logical_tx_pll_sel[1:0] signal refers to the logical reference index of the CMU PLL. The functionality of the signal depends on which of the following features is activated:</p> <ul style="list-style-type: none"> <li>■ <b>CMU PLL reconfiguration</b>—The corresponding CMU PLL is reconfigured based on the value at logical_tx_pll_sel[1:0].</li> <li>■ <b>Channel and CMU PLL reconfiguration</b>—The corresponding CMU PLL is reconfigured based on the value at this signal. The transceiver channel listens to the CMU PLL selected by logical_tx_pll_sel[1:0].</li> <li>■ <b>Channel reconfiguration with TX PLL select</b>—The transceiver channel listens to the TX PLL selected by logical_tx_pll_sel[1:0].</li> </ul>	"Guidelines for the logical_tx_pll_sel and logical_tx_pll_sel_en Ports" section in the <i>HardCopy IV GX Dynamic Reconfiguration</i> chapter in volume 3 of the <i>HardCopy IV Device Handbook</i>
Use 'logical_tx_pll_sel_en'	This is an optional control signal. When you enable this signal, the value set on the logical_tx_pll_sel[1:0] signal is valid only if logical_tx_pll_sel_en is set to 1.	"Guidelines for the logical_tx_pll_sel and logical_tx_pll_sel_en Ports" section in the <i>HardCopy IV GX Dynamic Reconfiguration</i> chapter in volume 3 of the <i>HardCopy IV Device Handbook</i>

**Table 3-3. MegaWizard Plug-In Manager Options (Page 5) (Part 3 of 3)**

ALTGX_RECONFIG Setting	Description	Reference
Use 'logical_tx_pll_sel' to select up to 4 PLLs	When this option is turned on, the width of the logical_tx_pll_sel port is increased to two bits, allowing you to indicate which of the four PLLs you want to reconfigure. If the option is not turned on, only two GMU PLLs are used.	"Guidelines for the logical_tx_pll_sel and logical_tx_pll_sel_en Ports" section in the <i>HardCopy IV GX Dynamic Reconfiguration</i> chapter in volume 3 of the <i>HardCopy IV Device Handbook</i>
Use 'reconfig_reset'	This is a global asynchronous reset signal. When asserted, the reconfiguration operation is halted and all registers in the reconfiguration block are reset to 0. If the signal is asserted before offset cancellation is complete, offset cancellation will restart after the reconfig_reset signal is deasserted. If the signal is asserted after offset cancellation is complete, offset cancellation will not restart.	—

Figure 3-6 shows page 6 of the ALTGX\_RECONFIG MegaWizard Plug-In Manager.

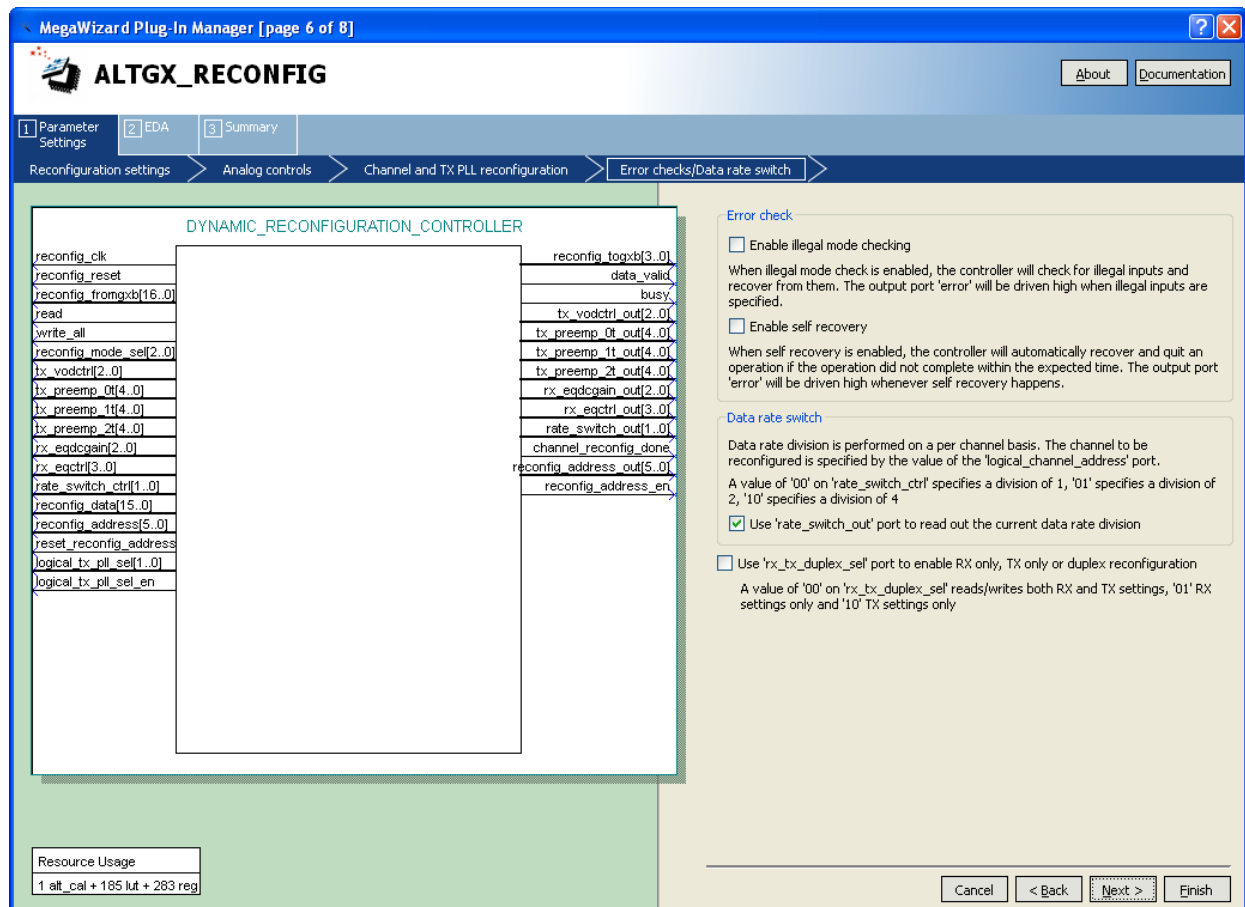
**Figure 3-6. MegaWizard Plug-In Manager—ALTGX\_RECONFIG (Error Checks/Data Rate Switch) (Page 6)**

Table 3-4 describes the available options on page 6 of the MegaWizard Plug-In Manager for your ALTGX\_RECONFIG custom megafunction variation.

Make your selections on page 6, then click **Next**.

**Table 3-4. MegaWizard Plug-In Manager Options (Page 6)**

ALTGX_RECONFIG Setting	Description	Reference
Enable illegal mode checking	When you select this option, the ALTGX_RECONFIG MegaWizard Plug-In Manager provides the <code>error</code> output port. The dynamic reconfiguration controller checks for specific unsupported options within two <code>reconfig_clk</code> cycles, de-asserts the <code>busy</code> signal and asserts the <code>error</code> output port for two <code>reconfig_clk</code> cycles. The dynamic reconfiguration controller does not execute the unsupported operation.	“Error Indication During Dynamic Reconfiguration” section of the <i>HardCopy IV GX Dynamic Reconfiguration</i> chapter in volume 3 of the <i>HardCopy IV Device Handbook</i>
Enable self recovery	When you select this option, the ALTGX_RECONFIG MegaWizard Plug-In Manager provides the <code>error</code> output port. The dynamic reconfiguration controller quits an operation if it did not complete within the expected number of clock cycles. After recovering from the illegal operation, the dynamic reconfiguration controller de-asserts the <code>busy</code> signal and asserts the <code>error</code> output port for two <code>reconfig_clk</code> cycles.	“Error Indication During Dynamic Reconfiguration” section of the <i>HardCopy IV GX Dynamic Reconfiguration</i> chapter in volume 3 of the <i>HardCopy IV Device Handbook</i>
Use ‘ <code>rate_switch_out</code> ’ port to read out the current data rate division	The <code>rate_switch_out[1:0]</code> signal is available when you select Data Rate Division in TX mode. You can read the existing local divider settings of a transmitter channel at this port. The decoding for this signal is as follows: 2'b00—Division of 1 2'b01—Division of 2 2'b10—Division of 4 2'b11—Not supported	“Data Rate Division in Transmitter Mode Details” section in the <i>HardCopy IV GX Dynamic Reconfiguration</i> chapter in volume 3 of the <i>HardCopy IV Device Handbook</i>
Use the ‘ <code>rx_tx_duplex_sel</code> ’ port to enable RX only, TX only or duplex configuration.	You can read or write the receiver and transmitter settings, or only the receiver settings, or only the transmitter settings, based on the value you set at the <code>rx_tx_duplex_sel[1:0]</code> port. <ul style="list-style-type: none"> <li>■ 2'b00—Duplex mode</li> <li>■ 2'b01—RX only mode</li> <li>■ 2'b10—TX only mode</li> <li>■ 2'b11—Unsupported value (do not use this value)</li> </ul> If you disable the <code>rx_tx_duplex_sel[1:0]</code> port, the dynamic reconfiguration controller will read or write both the receiver and transmitter settings.	“Dynamically Reconfiguring PMA Controls” section of the <i>HardCopy IV GX Dynamic Reconfiguration</i> chapter in volume 3 of the <i>HardCopy IV Device Handbook</i>

Figure 3-7 shows page 7 (the Simulation Libraries page) of the MegaWizard Plug-In Manager, which is used for dynamic reconfiguration selection.

Make your selections, then click Next.

**Figure 3-7. MegaWizard Plug-In Manager—ALTGX\_RECONFIG (Simulation Libraries) (Page 7)**

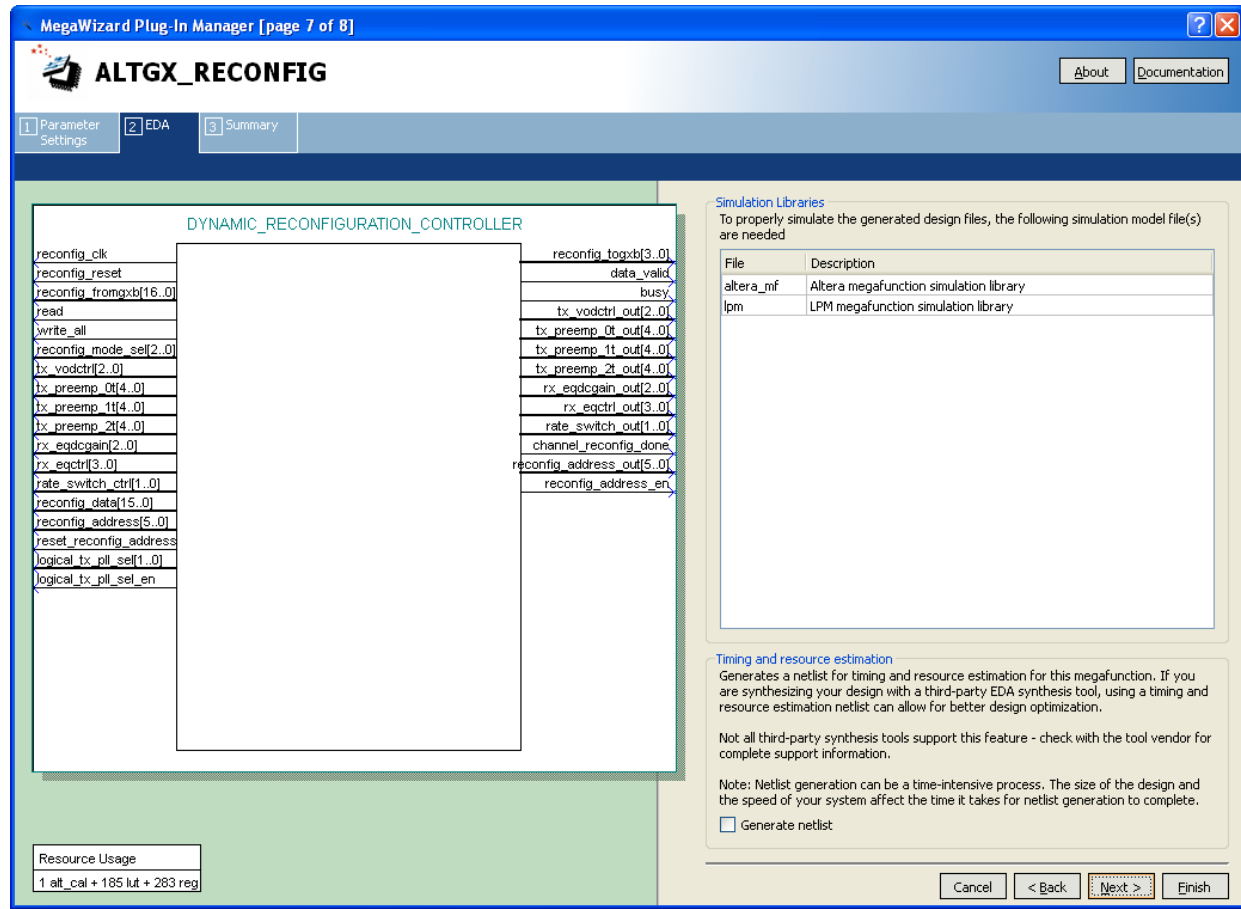


Table 3-5 describes the available option on page 7 of the MegaWizard Plug-In Manager for your ALTGX\_RECONFIG custom megafunction variation.

Make your selections on page 7, then click Next.

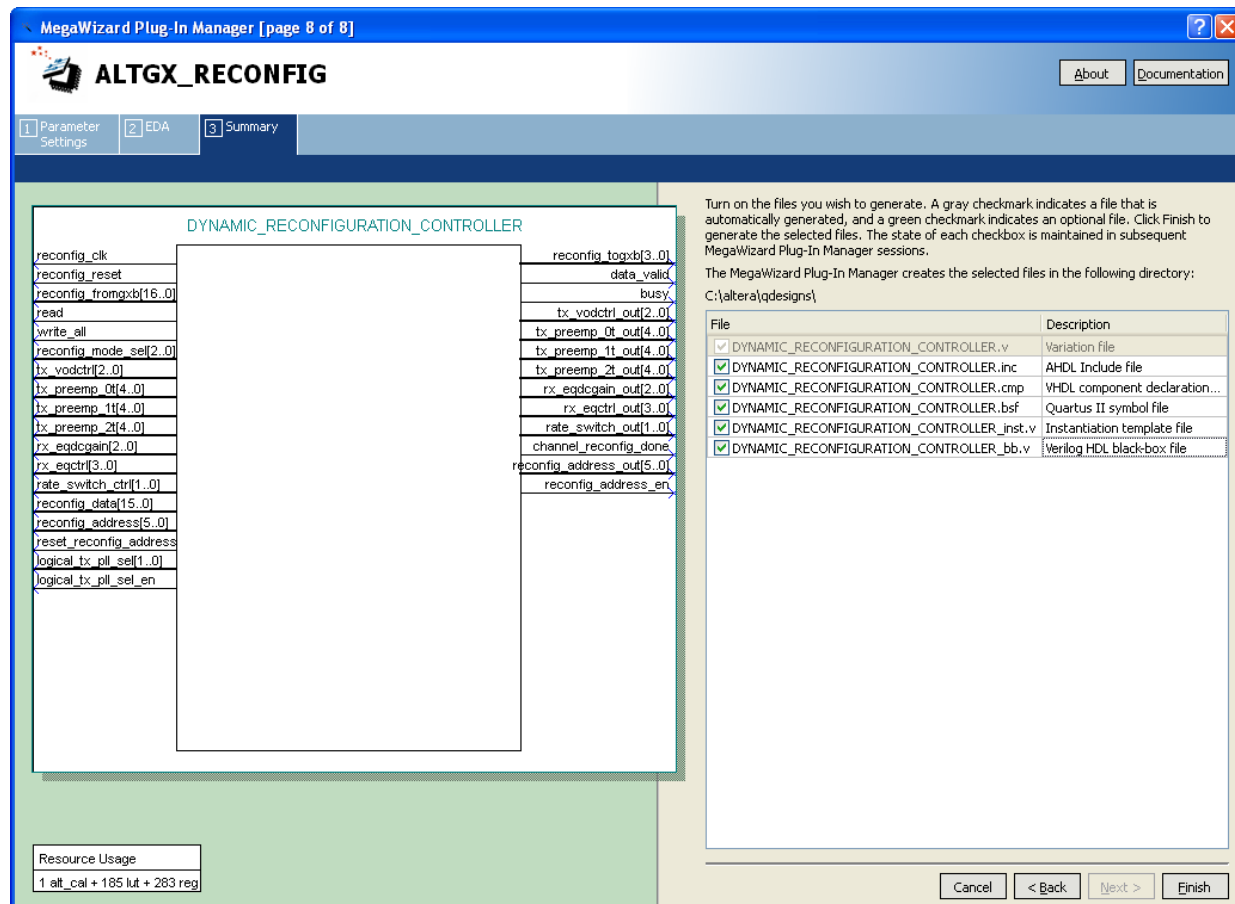
**Table 3-5. MegaWizard Plug-In Manager Options (Page 7)**

ALTGX_RECONFIG Setting	Description
Generate netlist	Selecting this option generates a netlist file that third-party synthesis tools use to estimate timing and resource usage

Figure 3-8 shows page 7 (the last page) of the MegaWizard Plug-In Manager for the dynamic reconfiguration protocol set up. You can select optional files on this page.

After you make your selections, click **Finish** to generate the files.

**Figure 3-8. MegaWizard Plug-In Manager—ALTGX\_RECONFIG (Summary) (Page 8)**



## Document Revision History

Table 3-6 shows the revision history for this document.

**Table 3-6. Document Revision History**

Date	Version	Changes
January 2011	1.1	Updated screenshots and links to other chapters. Added rows to Table 3-3.
March 2010	1.0	Updated metadata; no change to document.
June 2009	1.0	Initial release.

