cadence®

MPT TA

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Contents

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Getting Started with the MPT Toolbar

The Multiple Patterning (MPT) toolbar acts as a central access point for commands that you can use to color shapes in the layout.

The following sections provide details on how you can use the icons on the MPT toolbar to perform various tasks related to coloring shapes in a design:

What are the icons available on the MPT toolbar?

What are the available MPT flows?

How do I work with a fully colored flow?

How do I work with a partially colored flow?

How do I work with a lockless flow?

How do I work with a fully colored flow?

To work with a fully colored flow, you need to understand the following tasks:

How do I set up a fully colored flow?

How do I color a fully colored flow?

How do I lock a fully colored flow?

How do I verify a fully colored flow?

How do I set up a fully colored flow?

You can use the following SKILL functions to set up, check, and report the settings of a fully colored MPT flow:

- **mptSetFlow**: To set up a fully colored MPT flow. Use the function as follows:
  mptSetFlow("FullyColoredAndLocked")
- **mptCheckFlow**: To check if the fully colored flow has been set up. Use the function as follows:
  mptCheckFlow("FullyColoredAndLocked")
  INFO: Flow 'FullyColoredAndLocked' is properly set.
  t
- **mptReportCurrentSettings**: To display a report of the MPT flow settings. Use the function as follows:
  mptReportCurrentSettings(geGetEditCellView())
  This function displays the settings of the MPT flow in a **.rpt* file.

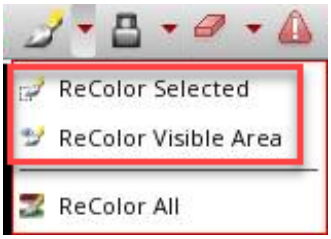
Related Topics

- How do I color a fully colored flow?
- How do I lock a fully colored flow?
- How do I verify a fully colored flow?

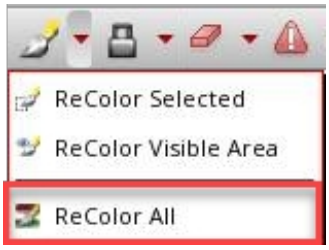
How do I color a fully colored flow?

You can color a design by using one of the following use models:

- To color automatically during edits, select the *Dynamic Coloring* option on the MPT toolbar.
  

- To color a part of the design or on the selected shapes, select the on-demand coloring options, *ReColor Selected* and *ReColor Visible Area*, on the MPT toolbar.
  

- To recolor the entire design at the current level or within the hierarchy, select the *Recolor All* option on the MPT toolbar.



- To color manually:
  a. Use the Palette assistant to select the colors in *Compact* or *Full* mode.
  b. Use the *MPT Coloring* options in the Property Editor.
  c. Use the *Shift Color* icon () on the MPT toolbar.

Related Topics

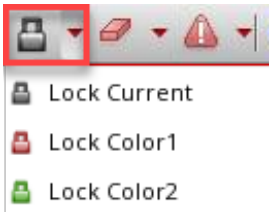
- How do I set up a fully colored flow?
- How do I lock a fully colored flow?
- How do I verify a fully colored flow?

How do I lock a fully colored flow?

Locking color is an important step in the fully colored MPT flow. This step ensures that the color will not change. This means that the color cannot be modified automatically by any application or it cannot be overridden at a higher level.

You can lock shapes in the following ways:

- **By using the Lock Color options**: Use the *Lock Color* options on the MPT toolbar to lock colors manually.



You can select the shapes to lock before or after clicking the lock options on the MPT toolbar. If you select the *Lock Current* option after selecting an instance, all colored shapes are locked using a hierarchical color lock.

- **By automatic propagation**: After a lock or an edit when the *Propagate locks to connected shapes* and *Propagate locks when editing* options are selected in the Multiple Patterning Options form.
- **By using the batch commands**, **Propagate Lock and Lock All**: The *Propagate Lock* command locks the connected shapes of an already locked shape and the *Lock All* command locks all the shapes in the design.

Related Topics

- How do I set up a fully colored flow?
- How do I color a fully colored flow?
- How do I verify a fully colored flow?

How do I verify a fully colored flow?

In a fully colored flow, it is important to flag color shorts, uncolored shapes, unlocked shapes, and hierarchical color locks.

You can verify the fully colored flow using the options in the *Checks* drop-down list () on the MPT toolbar. See the following topics for details about these checks:

- How do I verify hierarchical color locking?
- How do I check for color violations?
- How do I use the Methodology Compliance checker?

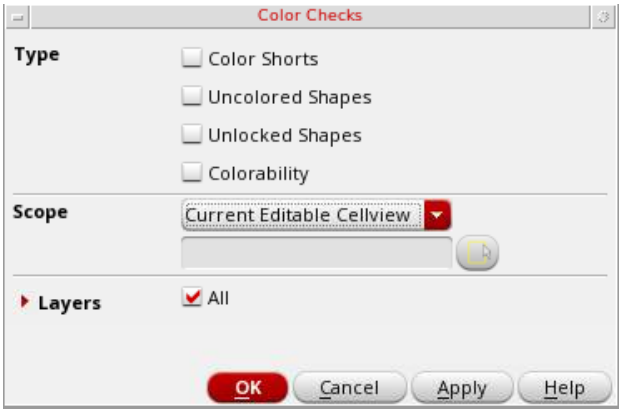
Related Topics

- How do I set up a fully colored flow?
- How do I color a fully colored flow?
- How do I lock a fully colored flow?

How do I check for color violations?

To check for color violations:

1. Click the *Checks* icon or select *Violation Checks* from the *Checks* option.
2. In the Color Checks form, in the *Type* section select the types of color checks that you need to perform.



3. Select the Scope: *Current Editable Cellview*, *Current Visible Area*, or *Area*.
4. In the *Layers* section, select specific layers or the *All* check box.

The Verify Process Rules Summary is displayed in the CIW.

The table below lists the coloring checks applicable to the three MPT flows.

MPT Flow	Color Checks Applicable
Fully Colored	Color Shorts, Uncolored Shapes, Unlocked Shapes, and Colorability
Partially Colored	Color Shorts and Colorability
Lockless	Color Shorts, Uncolored Shapes, and Colorability

Related Topics

- How do I verify hierarchical color locking?
- How do I use the Methodology Compliance checker?

How do I use the Methodology Compliance checker?

The Methodology Compliance checker lets you verify that your design matches the desired coloring flow. It flags discrepancies between the design data and the MPT flow set up.

To run the checker:

→ Click *Methodology Compliance* in the *Checks* list.

The checker flags discrepancies and reports them as follows:

- In the CIW, a short summary of the discrepancies is reported.

```
Compliance checker summary: 11 violations found (7 on current cellView, 4 in the hierarchy)
          See the Annotation Browser for more details about errors at current edited level
          See the file "MPTComplianceChecker.log" for more details about all errors
```

- In a log file, as a report with details about each error at the current hierarchy level and inside the hierarchy.
- In the *Annotation Browser*, as a marker for each current level error.

Related Topics

- How do I verify hierarchical color locking?
- How do I perform violation checks?

How do I verify hierarchical color locking?

To verify hierarchical color locking in fully colored and partially colored flows:

1. Choose *Hierarchical Color Locking Check* from the *Checks* drop-down list.
   The number of conflicting coloring locks is reported in the CIW. Annotation markers appear in the canvas where the conflicts are found.
2. Choose *Window – Assistants – Annotation Browser* to open the Annotation Browser and inspect the conflicts listed on the *Misc* tab in the MPT grouping.

   Potential conflicts include:

   - HCL in hierarchy over HCL in hierarchy
     There are hierarchical color locks of different or same colors at different levels of the hierarchy for a shape.
   - HCL over dbLock shape in hierarchy
     There is a hierarchical color lock on a shape that is also locked in the cell master.
   - HCL over shape in locked via
     There is a hierarchical color lock on a shape that is part of a locked or partially locked via.
3. Resolve the conflicts by removing color from shapes, by using one of the following methods:

   - Click the *Delete Colors* () icon on the Multiple Patterning toolbar. Choose one of

the following options:

- Delete Color
- Delete All Colors

- Right-click in the Annotation Browser and select *Fix*.

Related Topics

- How do I check for color violations?
- How do I use the Methodology Compliance checker?

How do I work with a lockless flow?

To work with a lockless flow, you need to understand the following tasks:

How do I set up a lockless flow?

How do I color a lockless flow?

How do I verify a lockless flow?

How do I set up a lockless flow?

You can use the following SKILL functions to set up, check, and report the settings of a lockless MPT flow:

- **mptSetFlow**: To set up a lockless MPT flow. Use the function as follows:
  mptSetFlow("Lockless")
- **mptCheckFlow**: To check if the lockless MPT flow has been set up. Use the function as follows:
  mptCheckFlow("Lockless")
  INFO: Flow 'Lockless' is properly set.
  t
- **mptReportCurrentSettings**: To display a report of the MPT flow settings. Use the function as follows:
  mptReportCurrentSettings(geGetEditCellView())
  This function displays the settings of the MPT flow in a **.rpt* file.

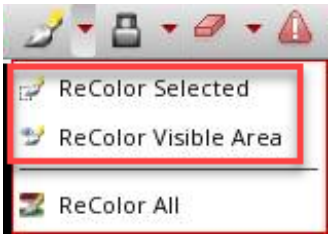
Related Topics

How do I color a lockless flow?

You can color a design using one of the following use models:

- To color automatically during edits, select the *Dynamic Coloring* option on the MPT toolbar.

- To color a part of the design or on the selected shapes, select the on-demand coloring options, *ReColor Selected* and *ReColor Visible Area*, on the MPT toolbar.



- To recolor the entire design at the current level or within the hierarchy, select the *Recolor All* option on the MPT toolbar.

- To color manually:
    a. Use the Palette assistant to select the colors in *Compact* or *Full* mode.
    b. Use the *MPT Coloring* options in the Property Editor.

c. Use the *Shift Color* icon () on the MPT toolbar.

Related Topics

- How do I set up a lockless flow?
- How do I verify a lockless flow?

How do I verify a lockless flow?

In a lockless flow, it is important to flag color shorts, uncolored shapes, and color ability.

You can verify the fully colored flow using the options in the *Checks* drop-down list ()on the MPT toolbar. See the following topics for details about these checks:

- How do I check for color violations?
- How do I use the Methodology Compliance checker?

Related Topics

- How do I set up a lockless flow?
- How do I color a lockless flow?

How do I work with a partially colored flow?

To work with a partially colored flow, you need to understand the following tasks:

How do I set up a partially colored flow?

How do I color a partially colored flow?

How do I lock a partially colored flow?

How do I verify a partially colored flow?

How do I set up a partially colored flow?

You can use the following SKILL functions to set up, check, and report the settings of a partially colored MPT flow:

- **mptSetFlow**: To set up a partially colored MPT flow. Use the function as follows:

mptSetFlow("PartiallyColored")

- **mptCheckFlow**: To check if the partially colored MPT flow has been set up. Use the function as follows:
  mptCheckFlow("PartiallyColored")
  INFO: Flow 'PartiallyColored' is properly set.
  t
- **mptReportCurrentSettings**: To display a report of the MPT flow settings. Use the function as follows:
  mptReportCurrentSettings(geGetEditCellView())
  This function displays the settings of the MPT flow in a **.rpt* file.

Related Topics

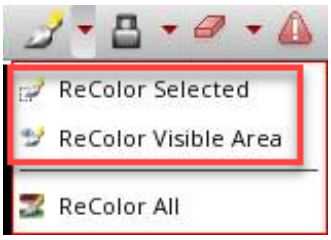
- How do I color a partially colored flow?
- How do I lock a partially colored flow?
- How do I verify a partially colored flow?

How do I color a partially colored flow?

You can color a design using one of the following use models:

- To color automatically during edits, select the *Dynamic Coloring* option on the MPT toolbar.

- To color a part of the design or on the selected shapes, select the on-demand coloring options, *ReColor Selected* and *ReColor Visible Area*, on the MPT toolbar.



- To recolor the entire design at the current level or within the hierarchy, select the *Recolor All* option on the MPT toolbar.

- To color manually:
    a. Use the Palette assistant to select the colors in *Compact* or *Full* mode.
    b. Use the *MPT Coloring* options in the Property Editor.
    c. Use the *Shift Color* icon () on the MPT toolbar.

Related Topics

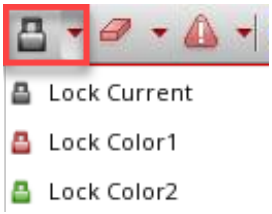
- How do I set up a partially colored flow?
- How do I lock a partially colored flow?
- How do I verify a partially colored flow?

How do I lock a partially colored flow?

Locking color is an important step in the partially colored flow. This step ensures that the color will not change. This means that the color cannot be modified automatically by any application or it cannot be overridden at a higher level.

You can lock shapes in the following ways:

- **By using the Lock Color options**: Use the Lock Color options on the MPT toolbar to lock colors manually.



  You can select the shapes to lock before or after clicking the lock options on the MPT toolbar. If you select the *Lock Current* option after selecting an instance, all colored shapes are locked using a hierarchical color lock.

- **By automatic propagation**: After a lock or an edit when the *Propagate locks to connected shapes* and *Propagate locks when editing* options are selected on the Multiple Patterning Options form.
- **By using the batch command**, **Propagate Lock**: The *Propagate Lock* command locks the connected shapes of an already locked shape. This applies to the entire design.

Related Topics

- How do I set up a partially colored flow?
- How do I color a partially colored flow?
- How do I verify a partially colored flow?

How do I verify a partially colored flow?

In a partially colored flow, it is important to flag hierarchical color locks, color shorts, and color ability.

You can verify the partially colored flow using the options in the *Checks* drop-down list () on the MPT toolbar. See the following topics for details about these checks:

- How do I verify hierarchical color locking?
- How do I check for color violations?
- How do I use the Methodology Compliance checker?

Related Topics

- How do I set up a partially colored flow?

- How do I color a partially colored flow?
- How do I lock a partially colored flow?

What are the available MPT flows?

There are three MPT flows, which are differentiated based on foundry requirements.

- **Fully Colored Flow**: The layout should have only colored and locked shapes. The layout team is responsible for meeting this requirement.
- **Partially Colored Flow**: Only critical nets and shapes should be colored and locked to ensure electrical performance and predictability. The remaining shapes can be unlocked or gray as the foundry is responsible for the final coloring of shapes.
- **Lockless Flow**: Like the fully colored flow, all shapes should be colored but the foundry does not require all shapes to be locked.

The SKILL functions related to the MPT flows are mptCheckFlow(), mptDefineFlow(), mptGetFlowNames(), mptGetFlowSettings(), and mptSetFlow().

Related Topics

- How do I work with a fully colored flow?
- How do I work with a partially colored flow?
- How do I work with a lockless flow?

What are the icons available on the MPT toolbar?

The icons from left to right on the MPT toolbar are described as follows:

	Dynamic coloring
	Showing or hiding color
	Shifting color

	Recoloring
	Locking color
	Deleting color
	Checking color
	Viewing the last operation status and color query

Related Topics

- What are the available MPT flows?