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INSTALLATION MANUAL

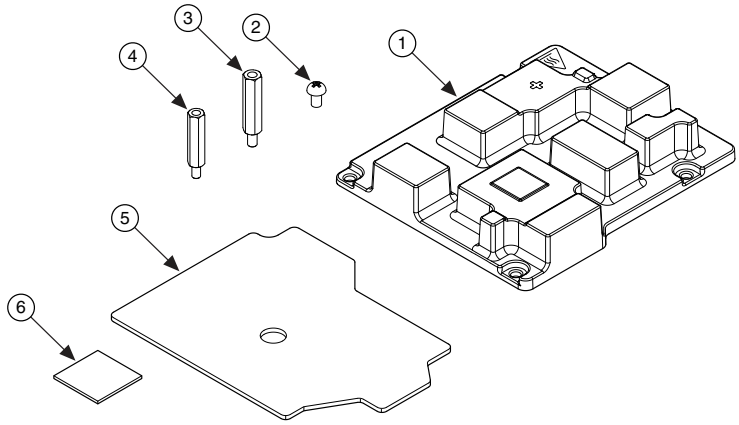
Thermal Kit for CompactRIO Single Board Controller with DAQmx

The Thermal Kit for CompactRIO Single Board Controller with DAQmx is a heat spreader accessory used to improve the thermal performance of your sbRIO system by removing heat from the components that may limit the maximum operating temperature of the device.

Table 1. Thermal Kit Compatability

Digital I/O Models	Multifunction I/O Models
sbRIO-9603	sbRIO-9628
sbRIO-9608	sbRIO-9629
sbRIO-9609	sbRIO-9638

Figure 1. Thermal Kit Contents



1. Heat spreader (x1)
2. M3x8 mm pan head screw (x7)
3. M3x18 mm standoff, 4.5 mm hex (x2)
4. M3x16 mm standoff, 4.5 mm hex (x5)
5. Main thermal pad (x1)
6. Supplemental FPGA thermal pad

NATIONAL INSTRUMENTS

Mounting Guidelines

Determine the mounting configuration based on the cooling requirements for your sbRIO system.

Thermal Conduction Path	Mount the system with the flat face against a base mounting surface.
Thermal Convection Path	Mount the system with the flat face exposed to air. Add a heat sink for increased convection.

Consider the following factors when designing a thermal solution for your sbRIO system:

- Base mounting material
- System enclosure material
- Interactions with other heat sources in the system
- Size constraints
- Air flow availability

Note For information and examples on environmental and design factors that can impact the thermal performance of an NI sbRIO system, go to *ni.com/r/sbriocooling*.

Physical Characteristics

Weight	207.2 g (7.31 oz)

Placing the Main Thermal Pad on the sbRIO Model

What to Use

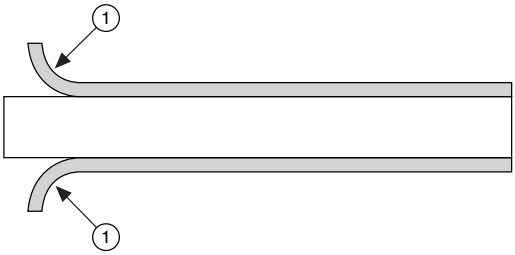
- Main thermal pad, included in kit
- sbRIO model

What to Do

The thermal pad included in this kit provides a thermal interface material between the heat spreader and the sbRIO device components.

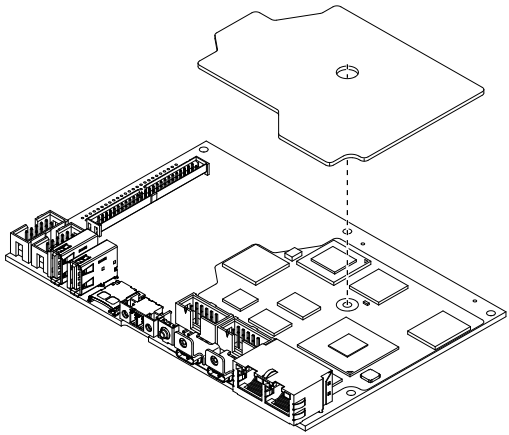
Note You must apply the thermal pad to the sbRIO model before you assemble the heat spreader.

Figure 2. Side View and Layers of Thermal Pad



1. Peel off clear, plastic liner

Figure 3. Thermal Pad Placement on the Board Surface



1. Remove the liners from the thermal pad.
2. Apply the main thermal pad to the board surface. Use the silkscreen outline on the board to align the main thermal pad.

Placing the Supplemental FPGA Thermal Pad on the Heat Spreader

Notice The 75T and 100T FPGAs are shorter in height than the 200T FPGA. NI provides a supplemental FPGA thermal pad for use with 75T and 100T FPGAs to accommodate the difference in component height. Only use the supplemental FPGA pad if your sbRIO model has a 75T or 100T FPGA. Do not use the supplemental pad with a 200T FPGA, as it will result in high strain on the board components.

Table 2. Supplemental FPGA Thermal Pad Compatability

Digital I/O Model	Multifunction I/O Models
sbRIO-9603	sbRIO-9628
	sbRIO-9638

What to Use

- Supplemental FPGA thermal pad, included in kit
- Heat spreader

What to Do

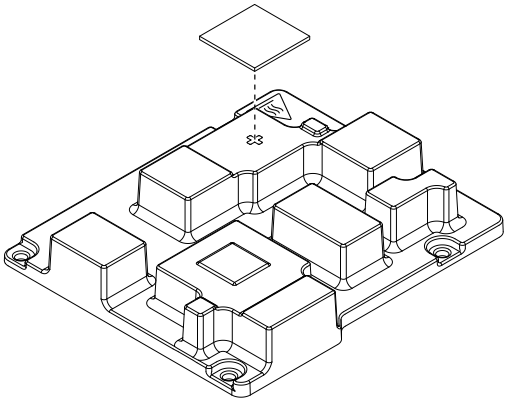
The thermal pad included in this kit provides a thermal interface material between the heat spreader and the sbRIO model components.

Note You must apply the thermal pad to the heat spreader before you assemble the sbRIO system.

Figure 4. Side View and Layers of Thermal Pad

1. Peel off clear, plastic liner

Figure 5. Thermal Pad Placement on the Heat Spreader



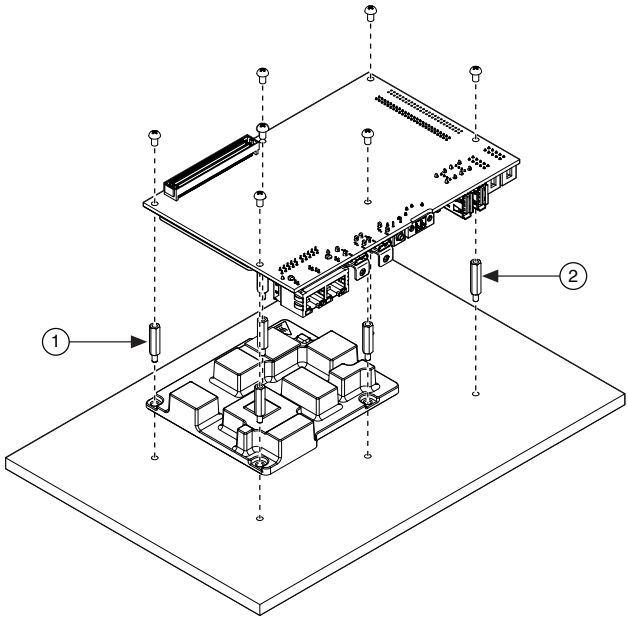
1. Remove the liners from the thermal pad.
2. Apply the thermal pad to the FPGA pedestal of the heat spreader, marked with a + symbol.

Mounting the sbRIO Model with a Thermal Conduction Path

What to Use

- Socket driver, 4.5 mm
- Screwdriver, Phillips #1

Figure 6. Thermal Conduction Mounting Configuration



1. Standoff, 16.00 mm (0.63 in.)
2. Standoff, 18.00 mm (0.71 in.)

1. Fasten the heat spreader to the mounting surface with the provided 16 mm standoffs and tighten completely.

   Note (Optional) You can use thermal interface material between the heat spreader and mounting surface. Note that thermal interface material may affect system stack height and levelness.

2. When mounting the NI sbRIO-9628/9629/9638, fasten the provided 18 mm standoffs to the mounting surface in the sbRIO footprint holes not used to fasten the heat spreader. Tighten completely.
3. Align the sbRIO model with the standoff holes and fasten using provided screws.

   Note Tighten the screws to 0.56 N · m (5.0 lb · in) of torque.

   Notice Use caution when aligning the sbRIO model. Once it has been fastened, separating the heat spreader and sbRIO device will be difficult and could potentially damage components.

   Notice The thermal pad is a viscoelastic material and compressing it too quickly places a large amount of stress on board components. NI recommends fastening the screws by hand. If you must use an automatic screwdriver, fasten

the screws at a rate less than 4.23 mm/s (10 in./min.) to prevent damage during assembly.

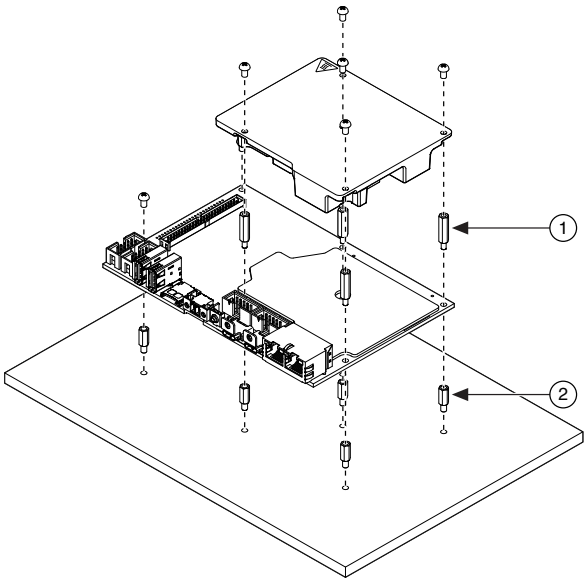
Mounting the sbRIO Model with a Thermal Convection Path

What to Use

- Socket driver, 4.5 mm
- Screwdriver, Phillips #1

What to Do

Figure 7. Thermal Conduction Mounting Configuration



1. Standoff, 16.00 mm (0.63 in.)
2. Standoff (not provided)

1. Fasten the standoffs (not provided) to the mounting surface and tighten completely.
2. Align the sbRIO model on standoffs and fasten using provided 16 mm standoffs.
3. When mounting the NI sbRIO-9628/9629/9638, fasten the last two holes with provided screws.

Note Tighten the screws to 0.56 N · m (5.0 lb · in) of torque.

4. Align the heat spreader with the standoff holes and fasten using provided screws.

Note Tighten the screws to 0.56 N · m (5.0 lb · in) of torque.

Notice Use caution when aligning the heat spreader. Once it has been fastened, separating the heat spreader and sbRIO device will be difficult and could potentially damage components.

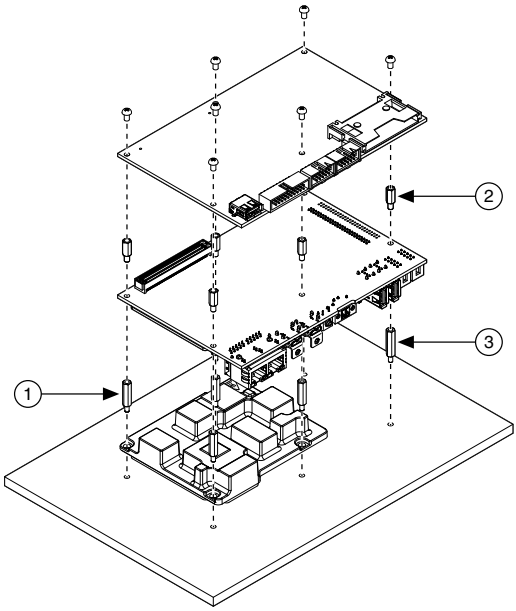
Notice The thermal pad is a viscoelastic material and compressing it too quickly places a large amount of stress on board components. NI recommends fastening the screws by hand. If you must use an automatic screwdriver, fasten the screws at a rate less than 4.23 mm/s (10 in./min.) to prevent damage during assembly.

Mounting the sbRIO Model with a RIO Mezzanine Card (RMC)

What to Use

- Socket driver, 4.5 mm
- Screwdriver, Phillips #1

Figure 8. RMC Mounting Configuration



1. Standoffs, 16.00 mm (0.63 in.)
2. Standoffs (not provided)
3. Standoffs, 18.00 mm (0.71 in.)

Note You can use an RMC with the heat spreader in either mounting orientation. However, the standoffs used to separate the sbRIO and the RMC are not provided in this kit.

1. Fasten the heat spreader to the mounting surface with the provided 16 mm standoffs and tighten completely.

   Note (Optional) You can use thermal interface material between the heat spreader and mounting surface. Note that thermal interface material may affect system stack height and levelness.

2. When mounting the NI sbRIO-9628/9629/9638, fasten the provided 18 mm standoffs to mounting surface in the sbRIO footprint holes not used to fasten the heat spreader. Tighten completely.
3. Align the sbRIO model to standoff holes and fasten using standoffs of the appropriate height.

   Notice Use caution when aligning the sbRIO model. Once it has been fastened, separating the heat spreader and sbRIO device will be difficult and could potentially damage components.

Notice The thermal pad is a viscoelastic material and compressing it too quickly places a large amount of stress on board components. If you must use an automatic screwdriver, fasten these screws at a rate less than 4.23 mm/s (10 in./min.) to prevent damage during assembly.

4. Align the RMC to the standoff holes and mate the RMC connectors. Fasten using the provided screws.

Note Tighten the screws to 0.56 N · m (5.0 lb · in) of torque.

Environmental Guidelines

Systems that use the heat spreader included in this kit must validate the sbRIO model before deployment. Refer to the Hardware Installation Manual on *ni.com/manuals* for more information about validating your system.

Verify that the CPU/FPGA, primary, and secondary reported onboard temperature sensors do not exceed the maximum temperature in the device specifications on *ni.com/manuals*.

Note For information and examples on environmental and design factors that can impact the thermal performance of an NI sbRIO system, go to *ni.com/r/sbriocooling*.

Environmental Management

NI is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to NI customers.

For additional environmental information, refer to the *Commitment to the Environment* web page at *ni.com/environment*. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

Waste Electrical and Electronic Equipment (WEEE)

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