NI-9695 sbRIO Thermal Solution

The National Instruments NI-9695 thermal kit is a heat spreader accessory used to improve the thermal performance of the sbRIO-9605/9606/9623/9626/9633/9636.

Note A 4.5 mm socket driver and a #1 Phillips screwdriver are required to install the NI-9695.

The NI-9695 contains the following components.

1	Heat Spreader (1X)	4	M3 Pan Head Screw (6X)
2	M3x16 mm Standoff, 4.5mm Hex (4X)	5	Pre-Cut Gap Pad (1X)
3	M3x18 mm Standoff, 4.5mm Hex (2X)		
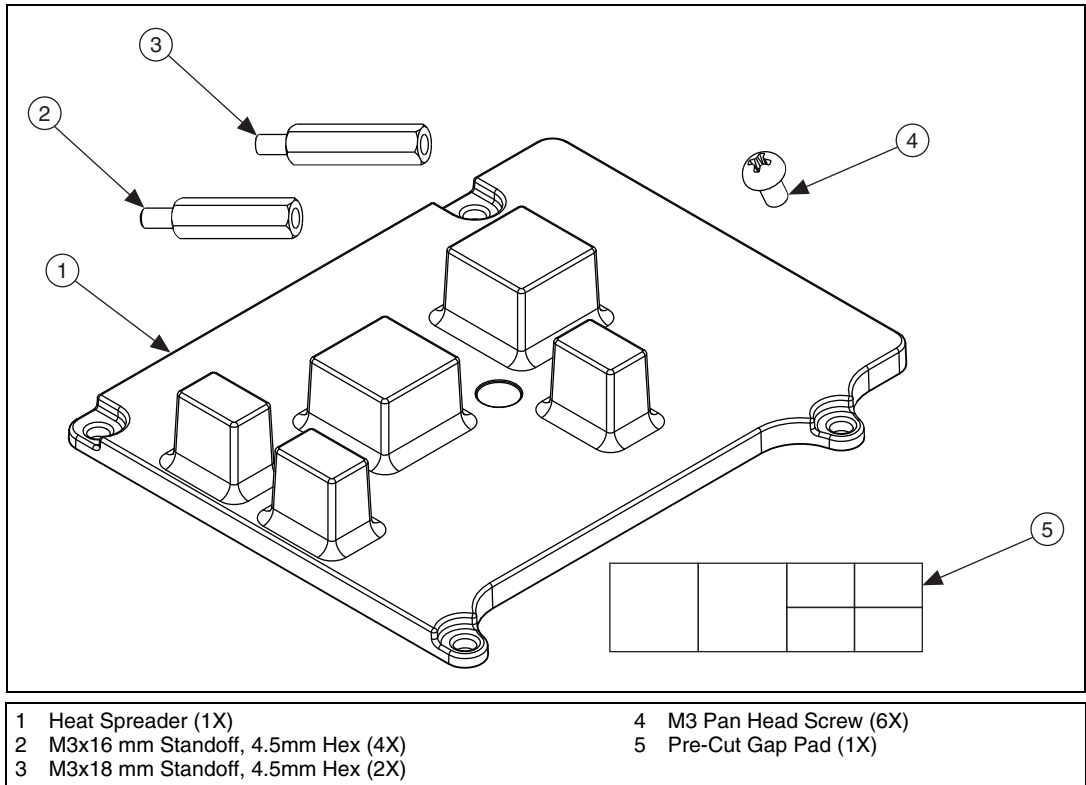
Figure 1. NI-9695 Part Locator Diagram

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Mounting and Environmental Considerations

The heat spreader provided in NI-9695 is intended to improve the thermal performance of sbRIO by removing heat from the components that may limit the device's maximum operating temperature. The mounting configuration of the heat spreader can also influence the device's maximum operating temperature. The spreader can either be mounted with its flat face against a base mounting surface (ideally a thermally conductive surface) or with the flat face exposed to air. When the heat spreader's flat face is exposed to air, a heat sink can potentially be added to the face in order increase the heat spreader's ability to convect heat to the surrounding environment. The best orientation will vary by application depending on factors like the base mounting material, system enclosure material, interactions with other heat sources in the system, size restraints, and air flow availability.

For information and examples on environmental and design factors that can impact the thermal performance of an NI sbRIO system, go to ni.com/info and enter the Info Code sbriocooling.
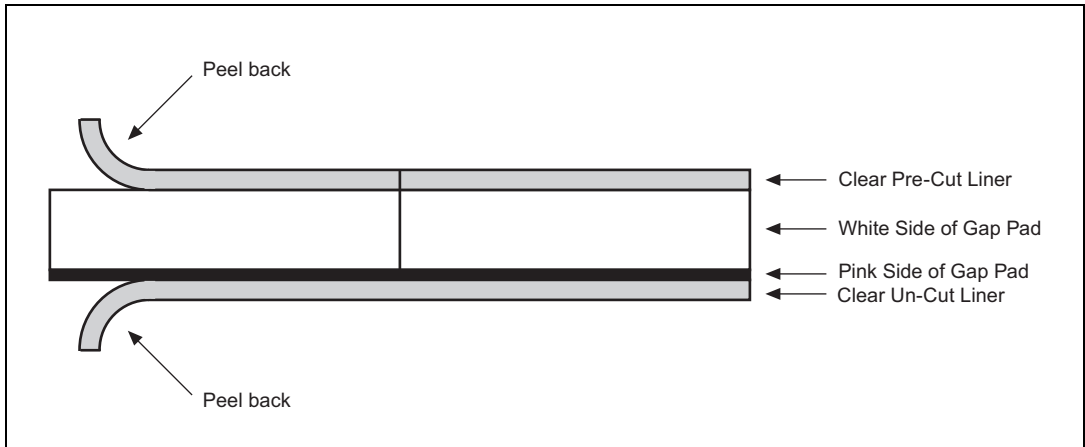
Gap Pad

Pre-cut gap pad pieces are provided to act as the thermal interface material between the heat spreader and sbRIO components. Installing the heat spreader will require two large gap pad pieces and three small pieces, making one of the provided small pieces a spare.
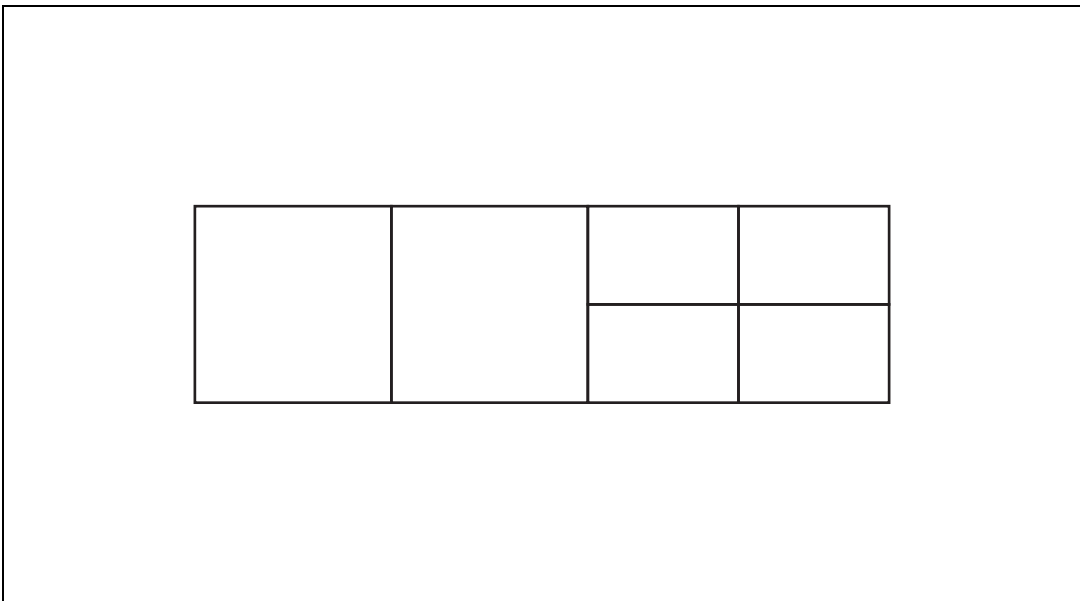
Figure 2. Perforated Sections Mark Individual Pieces of Gap Pad

The gap pad has clear liners on both sides that must be removed. The individual pieces of gap pad should be removed from the liners and applied to the heat spreader prior to assembling the heat spreader to sbRIO. When applying the gap pad pieces to the heat spreader, the pink side of the gap pad is to be placed on the heat spreader's raised protrusions, which will align with sbRIO's components when fully assembled.

Figure 3. Side View and Layers of Gap Pad
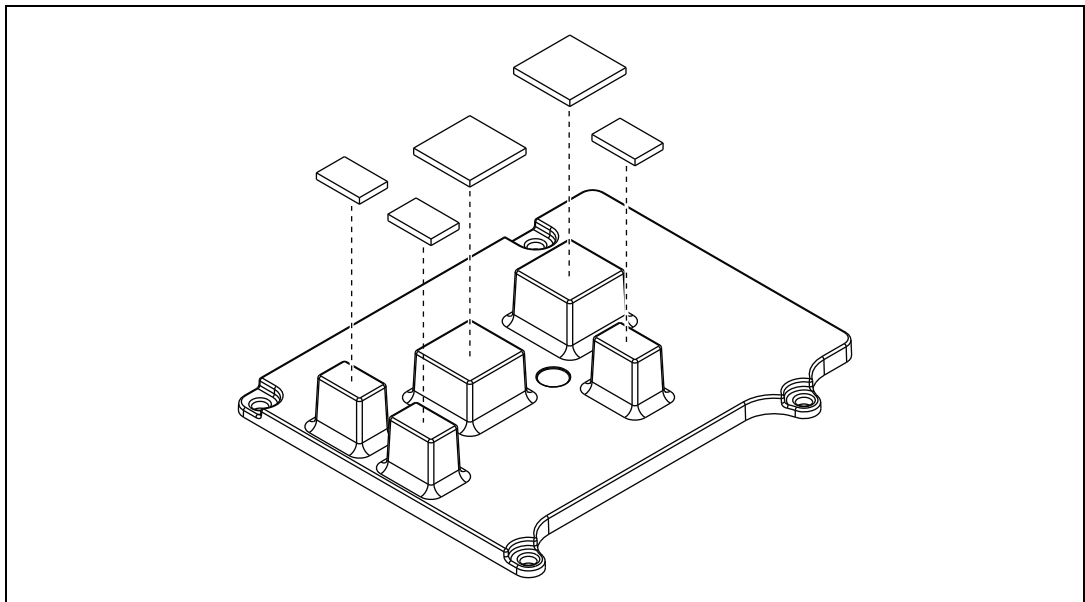
Figure 4. Gap Pad Placement on Heat Spreader

Installing the NI 9695

The section provides installation procedures for the following example configurations.

- Installing the flat face of the heat spreader to the base mounting surface
- Installing with the flat face of the heat spreader exposed to air
- Installing with an RMC

Installing the Flat Face of the Heat Spreader to the Base Mounting Surface

| 1 | 16 mm standoff | 2 | 18 mm standoff |
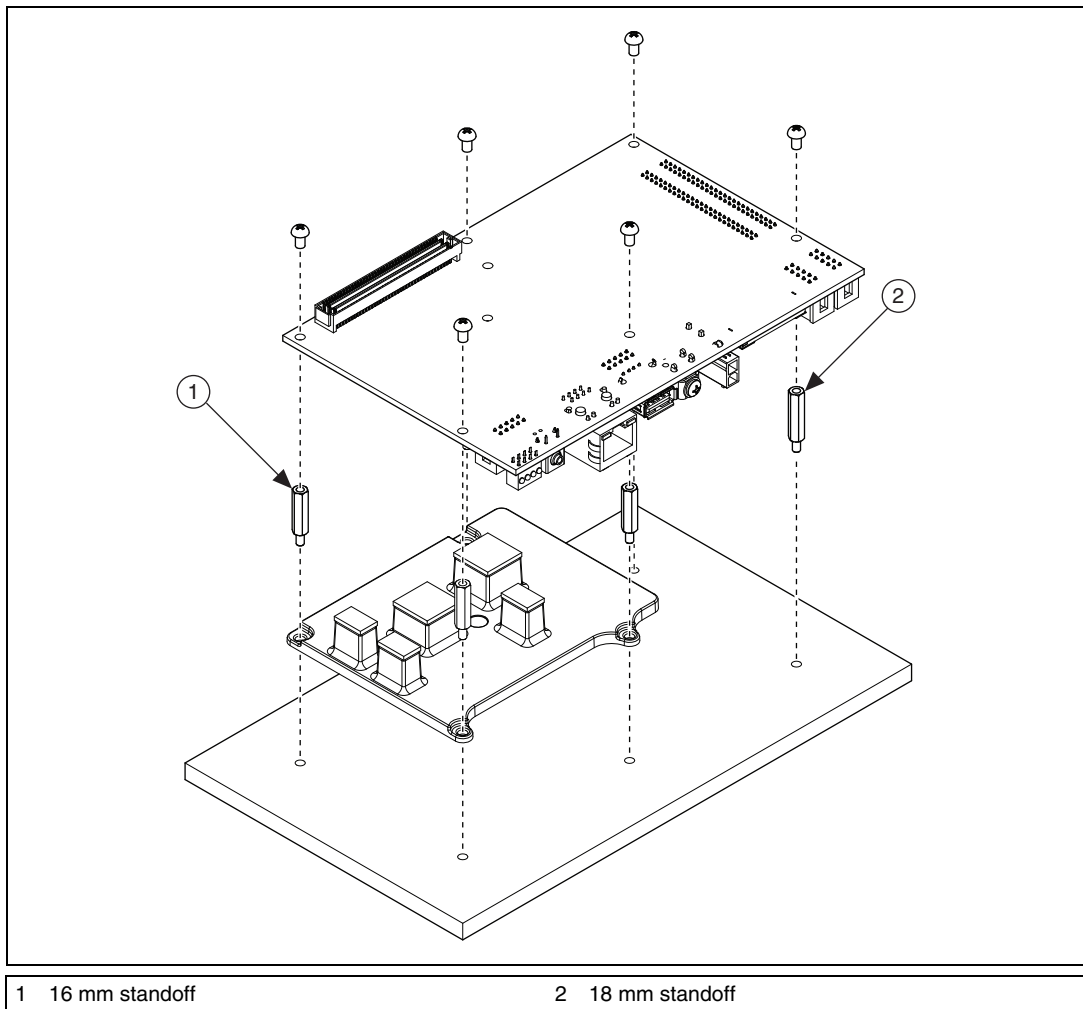
Figure 5. Heat Spreader to sbRIO: Flat Face Mated to Base Mounting Surface

1. Remove gap pad pieces from both liners and apply pink side to heat raised protrusions.

2. Fasten heat spreader to mounting surface using provided 16 mm standoffs. Tighten completely.

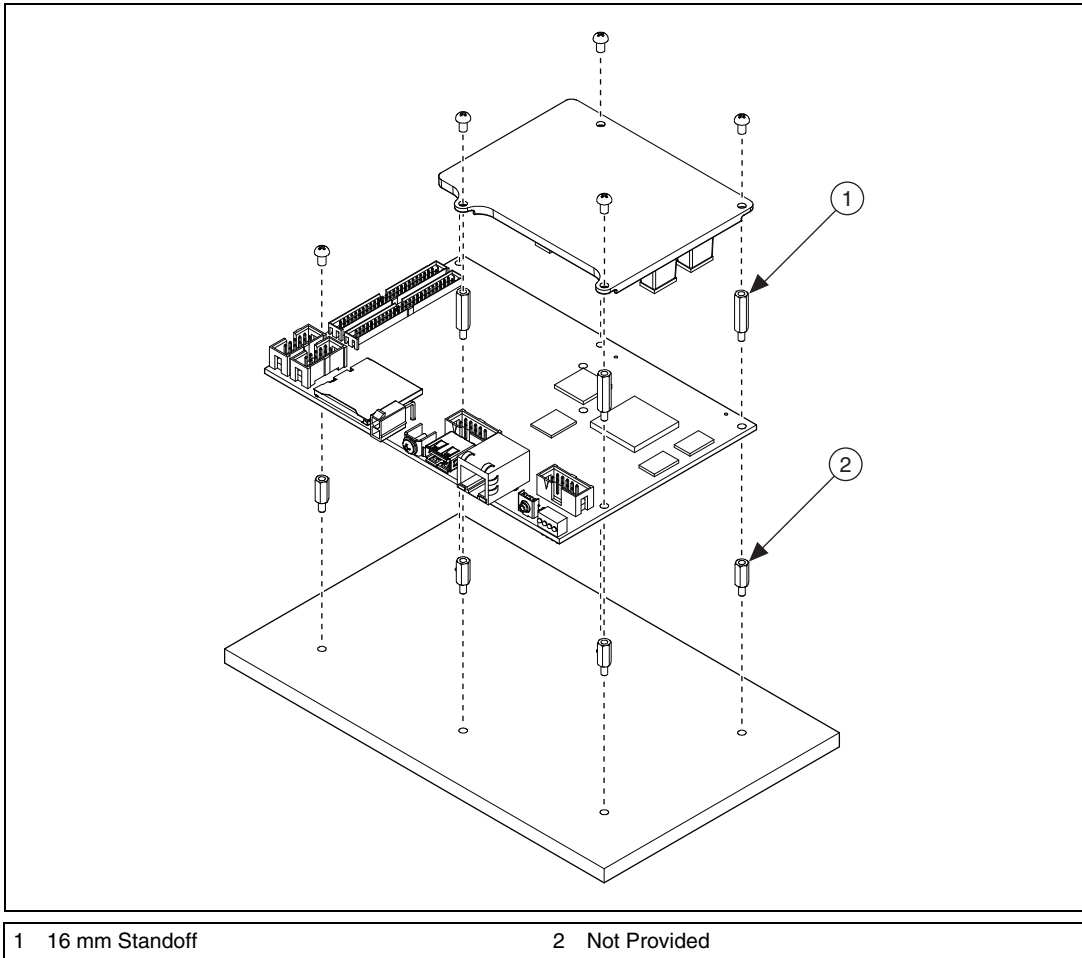**Note** Thermal interface material can optionally be used between heat spreader and mounting surface. Note that thermal interface material may affect system stack height and levelness.

3. When mounting the sbRIO-9623/9626/9633/9636, fasten provided 18 mm standoffs to mounting surface in sbRIO footprint holes not used to fasten the heat spreader. Tighten completely.

4. Align sbRIO device to standoff holes and fasten using provided screws. Use caution when aligning the sbRIO device. Once it has been placed separating the heat spreader and sbRIO device will be difficult and could potentially damage components.

Caution *Do not* fasten screws using an automatic screwdriver. Gap pad is a viscoelastic material and compressing it too fast will potentially break components by placing a large amount of stress on them. It is recommended to fasten these screws at a rate below 10 in/min.

Installing With the Flat Face of the Heat Spreader Exposed to Air

1	16 mm Standoff	2	Not Provided

Figure 6. Heat Spreader to sbRIO: Flat Face Exposed to Air

1. Remove gap pad pieces from both liners and apply pink side to heat spreader pads.

2. Fasten standoffs (not provided) to mounting surface.

3. Align sbRIO on standoffs and fasten using provided 16 mm standoffs. When mounting sbRIO-9623/9626/9633/9636, fasten last two holes with provided screws. Tighten completely.

4. Align heat spreader to standoff holes and fasten using provided screws. Use caution when aligning the heat spreader. Once it has been placed it should not be considered reworkable.

⚠ **Caution** *Do not* fasten screws using an automatic screwdriver. Gap pad is a viscoelastic material and compressing it too fast will potentially break components by placing a large amount of stress on them. It is recommended to fasten these screws at a rate below 10 in/min.

Installing With an RMC

📝 **Note** An RMC can be used with the heat spreader in either mounting orientation. However, the standoffs used to separate sbRIO and the RMC are not provided in this kit. Figure 7 shows one example of an RMC being installed to a sbRIO-9626 with the flat face of the heat spreader mated to the base mounting surface.

| 1 | 16 mm Standoff | 2 | Not Provided | 3 | 18 mm Standoff |
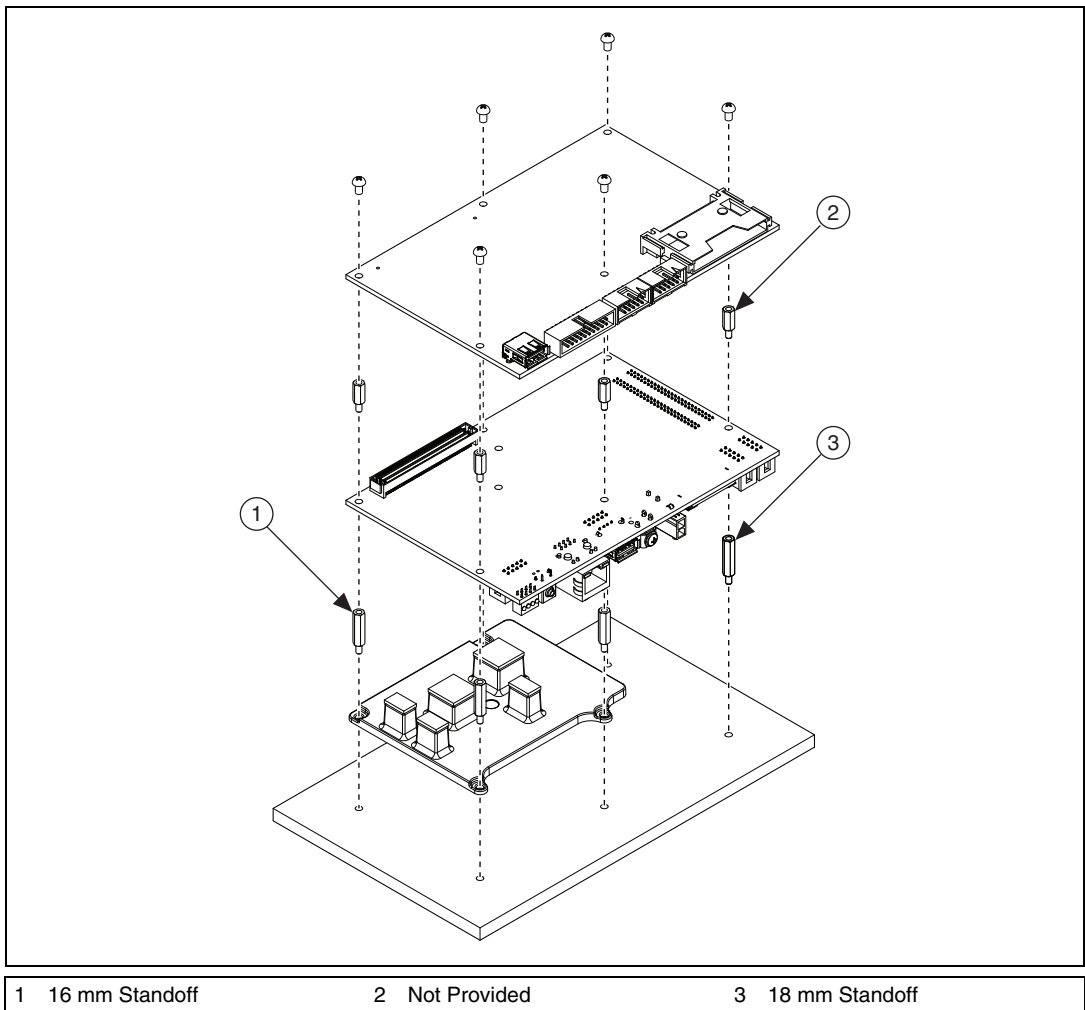
Figure 7. Heat Spreader to sbRIO: With RMC

1. Remove gap pad pieces from both liners and apply pink side to heat spreader pads.

2. Fasten heat spreader to mounting surface using provided 16 mm standoffs. Tighten completely.

Note Thermal interface material can optionally be used between heat spreader and mounting surface. Note that thermal interface material may affect system stack height and levelness.

3. When mounting sbRIO-9623/9626, fasten provided 18 mm standoffs to mounting surface in sbRIO footprint holes not used to fasten the heat spreader. Tighten completely.

4. Align sbRIO device to standoff holes and fasten using standoffs of the proper height (not provided). See sbRIO manual for information on selecting the proper standoff height. Use caution when aligning the sbRIO device. Once it has been placed separating the heat spreader and sbRIO device will be difficult and could potentially damage components.

Caution *Do not* fasten screws using an automatic screwdriver. Gap pad is a viscoelastic material and compressing it too fast will potentially break components by placing a large amount of stress on them. It is recommended to fasten these screws at a rate below 10 in/min.

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

Specifications

Physical Characteristics

Torque for screws ....0.56 N · m
(5 lb · in.)

Weight ....118 g (4.16 oz)

Environmental

Note Systems that use the heat spreader provided in NI 9695 are still required to validate an sbRIO device per the specifications provided in the sbRIO device manual. Measure the local ambient temperature by placing thermocouples on both sides of the PCB, 0.2 in. (5 mm) from the board surface. In addition, the component temperatures should not exceed their recommended maximum case temperatures. Systems that use the heat spreader provided in NI-9695 have the option of only measuring the heat spreader temperature in

place of measuring the component case temperatures. The heat spreader temperature should not exceed 85 °C when measured in the designated center depression, which is shown in Figure 8.

1 Heat Spreader	2 Center Depression

Figure 8. Heat Spreader Temperature Measurement Location

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/info and enter the Info Code 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 *NI and 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)

EU Customers At the end of the product life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers, National Instruments WEEE initiatives, and compliance with WEEE Directive 2002/96/EC on Waste and Electronic Equipment, visit `ni.com/environment/weee`.

电子信息产品污染控制管理办法 （中国 RoHS）

中国客户 National Instruments 符合中国电子信息产品中限制使用某些有害物质指令 (RoHS)。关于 National Instruments 中国 RoHS 合规性信息，请登录 `ni.com/environment/rohs_china`。(For information about China RoHS compliance, go to `ni.com/environment/rohs_china`.)

Where to Go for Support

The National Instruments Web site is your complete resource for technical support. At `ni.com/support` you have access to everything from troubleshooting and application development self-help resources to email and phone assistance from NI Application Engineers.

National Instruments corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. National Instruments also has offices located around the world to help address your support needs. For telephone support in the United States, create your service request at `ni.com/support` and follow the calling instructions or dial 512 795 8248. For telephone support outside the United States, visit the Worldwide Offices section of `ni.com/niglobal` to access the branch office Web sites, which provide up-to-date contact information, support phone numbers, email addresses, and current events.