NLX Rail Design Suggestions

Version 1.0

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1. Objective

The NLX motherboard specification does not require any specific method of mounting the motherboard to the chassis. The preferred method is to use a rail system. This paper describes design considerations for developing rails used to mount the motherboard to the chassis in an NLX slide-mount system.

Implementation examples show use of an injection-molded plastic rail, lever-latch, and embedded metal ground clips for the rails.

2. Rail Requirements and Functions

Two rails are required for mounting a motherboard. The rails generally perform the following functions:

- Mount the motherboard to the chassis.
- Provide mechanical support for motherboard insertion/extraction.
- Provide features for EMI/RFI ground clips.

3. Rail Mechanical Specification

This section describes the mechanical specifications for an NLX motherboard rail.

3.1 Rail Height, Mounting Thread Size, and Locations

The NLX motherboard specification defines the height of the motherboard from the chassis bottom to be .331 inch/ 7.95 mm. An NLX motherboard uses four mounting holes to attach it to the mounting system, requiring two rails. Each rail has two mounting bosses at 3.400 inch/ 86.36 mm centers. The overall rail height at the mounting bosses should be .331 inch/7.95 mm.

There are various methods for attaching the rails to the motherboard. This paper considers only a screw-mounted rail. The screws are used to secure the rail to the motherboard. The thread size for screws should be #6-32. In case of plastic rails, an additional rib should be provided to help support the motherboard. The rib height should match .313 inch/7.95 mm so that the rib makes contact with the motherboard and absorbs some of the shock during shipping. See Figure 1 for details.

3.2 Component Height Clearance

The NLX motherboard specification requires that there be a .140 inch/3.56 mm clearance between the bottom of the board to the top of the entire length of rail except at mounting bosses and support rib.

3.3 EMI/RFI Ground Clip

It is suggested that EMI/RFI grounding contacts be used in the rails. These metal contacts are used to provide grounding from the motherboard mounting holes to the chassis through clips attached to the rails. In this design example, there are features provided in the rail for snap-on EMI/RFI ground clips.

4. Molded Plastic Rail Design

Figure 1 shows an example of a plastic injection molded rail. The overall length of the rail is 8.00 inch/203.20mm. The rail has a tapered shape in the front to act as a lead-in for the guides and a hook feature at the rear for the lever-latch to interact with the rail during insertion and extraction of the motherboard. The lever-latch mechanism assists with easy insertion and extraction of the motherboard. The center-to-center distance between mounting bosses is 3.400 inch/86.36 mm as required in the NLX motherboard specification. The rail height at the bosses is .305 inch/7.75 mm, which leaves .008 inch/0.20 mm for the clip thickness. The clearance between the motherboard and the rail is .140 inch/3.56 mm except at bosses and support rib. The rib height is .313 inch/ 7.95mm. The rail has molded-in features so that EMI/RFI ground clips can be snapped onto it.

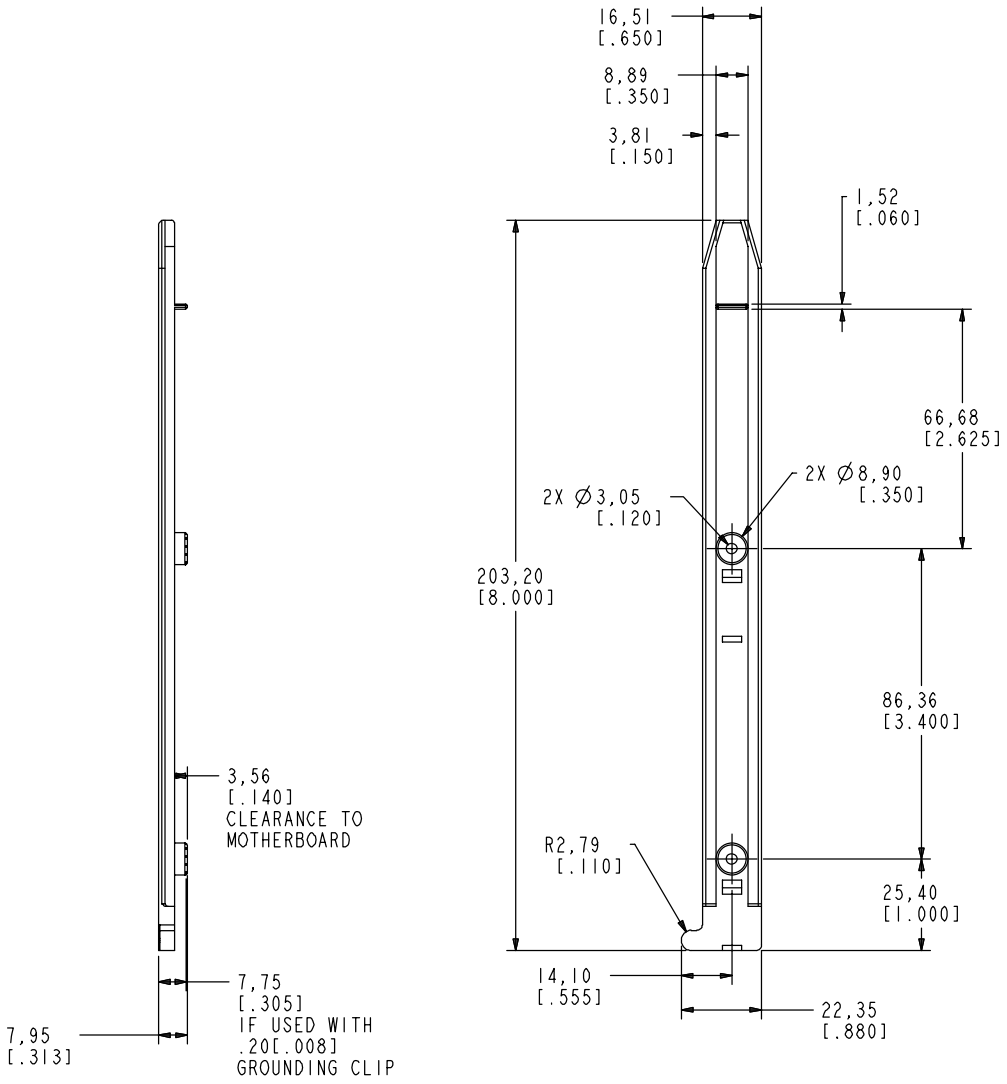

Figure 1: Molded Plastic Rail Example

5. Rail Ground EMI/RFI Clip

Figure 2 shows an example of the EMI/RFI ground clips used in the rails. The clip is snapped on the rail before the rail is attached to the motherboard. In general, the material used for the clip should provide an electrical path to ground, and it should be made of a resilient material such as stainless steel to ensure good contact. The clip can be made of .008 inch/0.20 mm, half-hard 301 stainless steel material. The 0.158 inch diameter hole provides clearance for a #6-32 screw. The radius portion of the clip assembly provides a sufficient contact surface for EMI/RFI grounding of the motherboard. There are four contact surfaces per assembly in this design method.

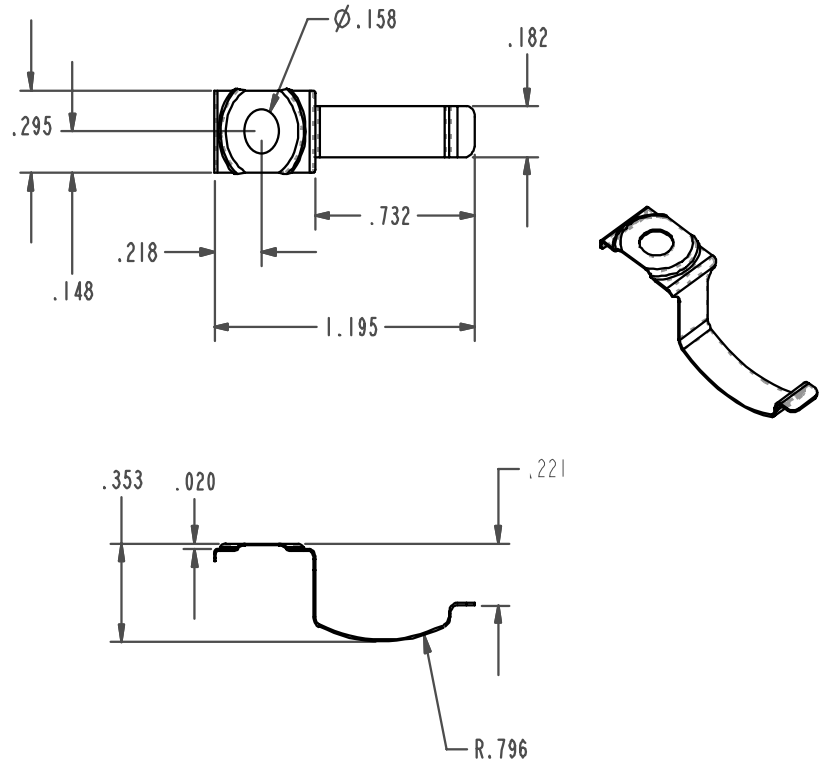

Figure 2: Rail Ground Clip Example

Note: Measurements are in inches.

6. Assembly Rail-Ground Clips

Figure 3 shows an example of two ground clips snapped into the motherboard rail.

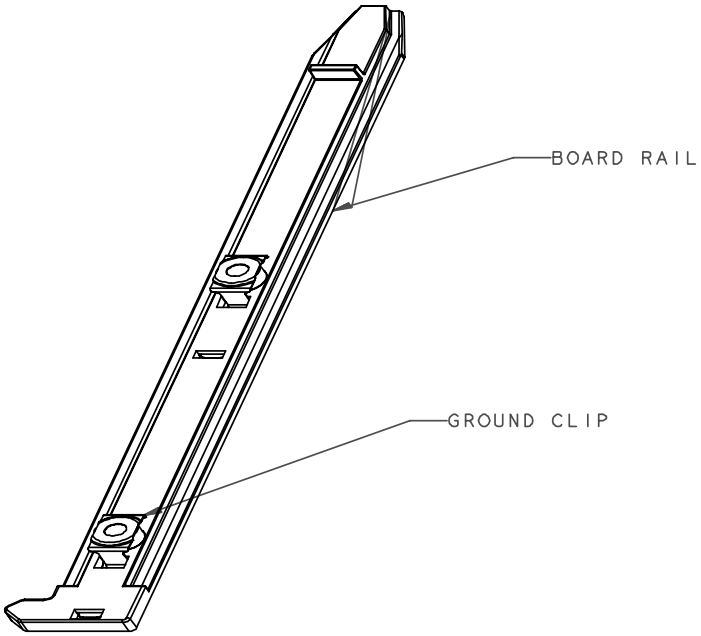

Figure 3: Rail and Clip Assembly

7. Assembly Cross Section

Figure 4 shows the cross section through the motherboard, rail, ground clip, and chassis assembly.

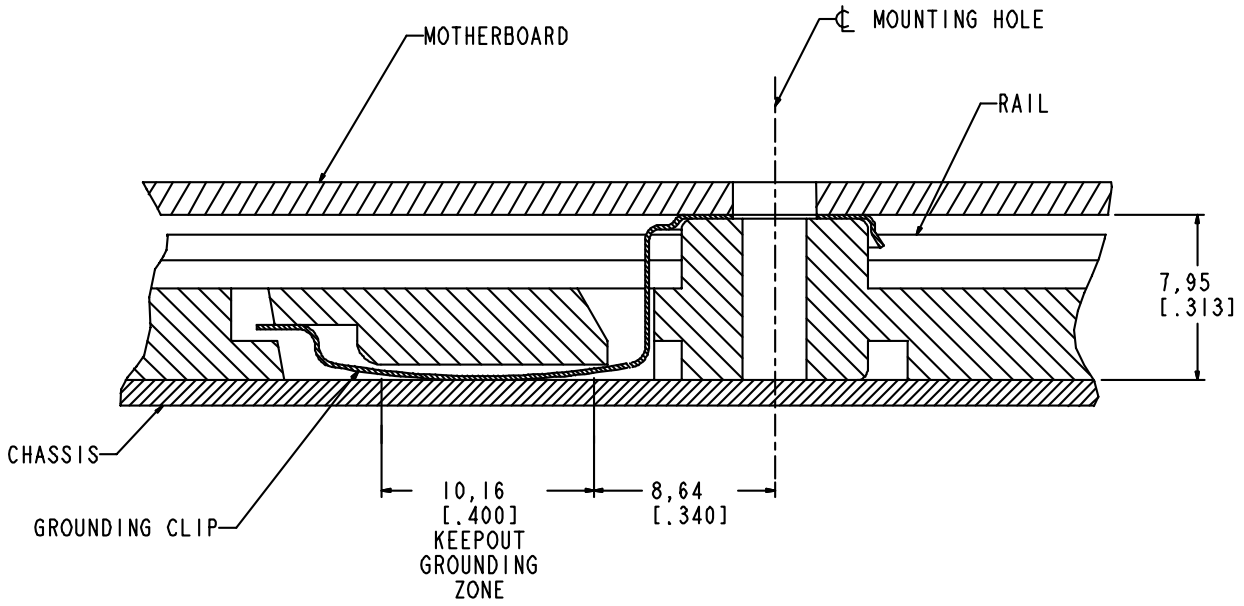

Figure 4: Cross Section Through Rail Assembly

8. Molded Plastic Lever-latch

Figure 5 shows an example of an injection molded lever-latch. The lever-latch is used to give a mechanical advantage over the connector during insertion and extraction of the motherboard as well as latch the motherboard in during normal operation.

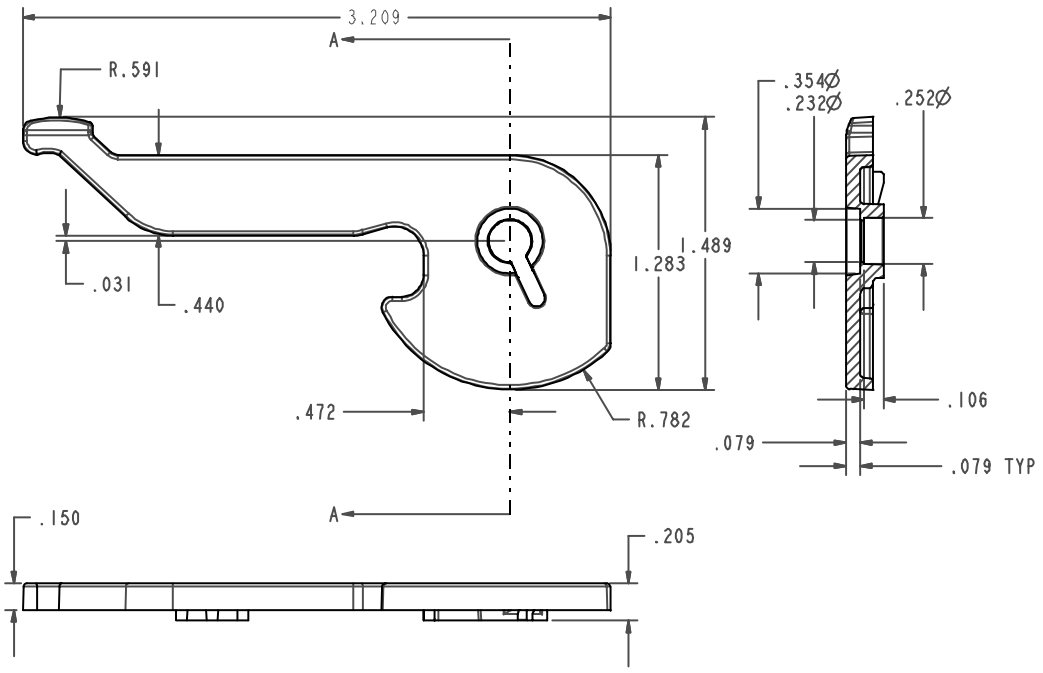

Figure 5: Molded Lever-latch Example

Note: Measurements are in inches.

9. Assembly Lever-latch

Figure 6 shows an example of a lever-latch assembly. The lever-latch is mounted in the chassis and hooks to the rail. The mounting point acts as a pivot for the lever-latch.

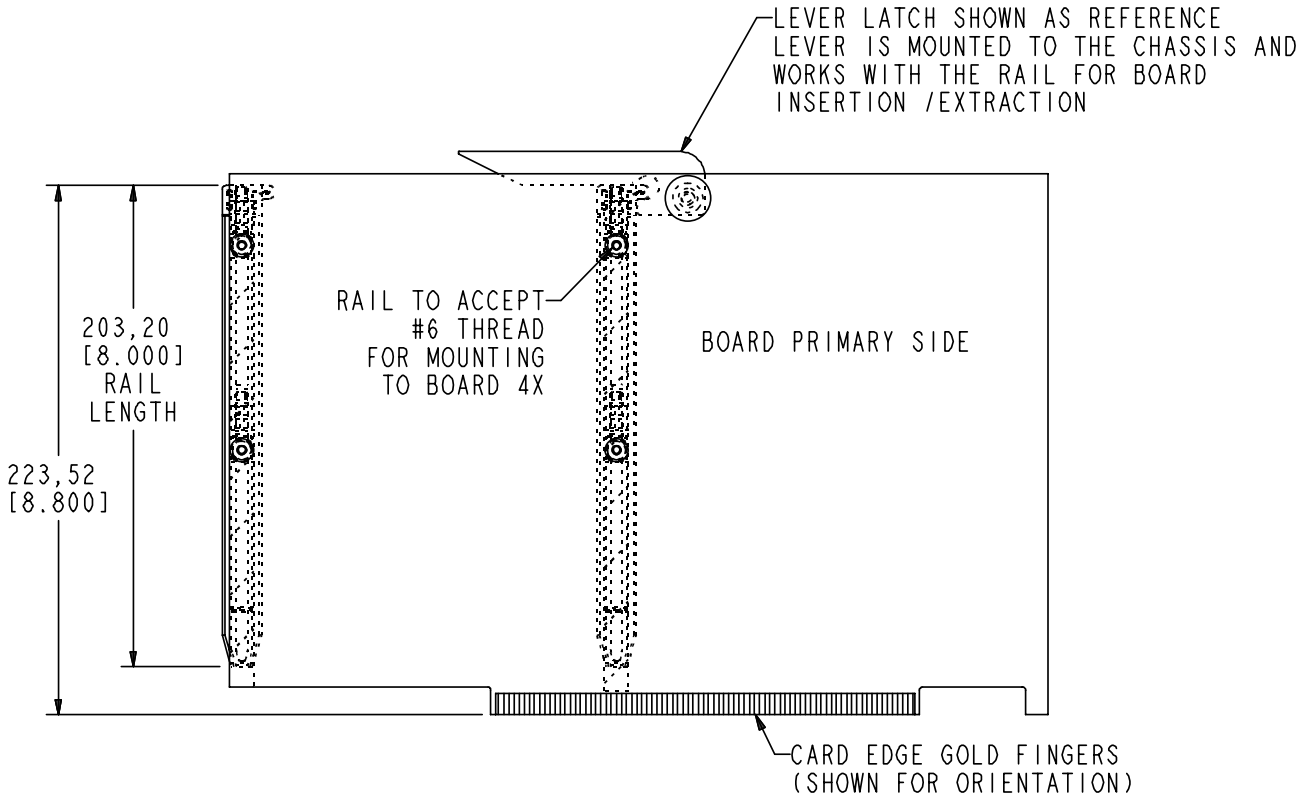

Figure 6: Lever-Latch Assembly