

# NLX Ground Clip Design Suggestions

Version 1.0

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Release 1.0, May 1997

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## 1. Objective

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Within the NLX specification, several methods are suggested for electromagnetic interference (EMI) grounding of the motherboard. This paper describes one of these methods—the mechanical design aspects of motherboard grounding clips. For more suggestions about EMI concerns, consult either the NLX EMC Design Suggestions or the NLX Chassis Design Suggestions.

## 2. Different Grounding Schemes

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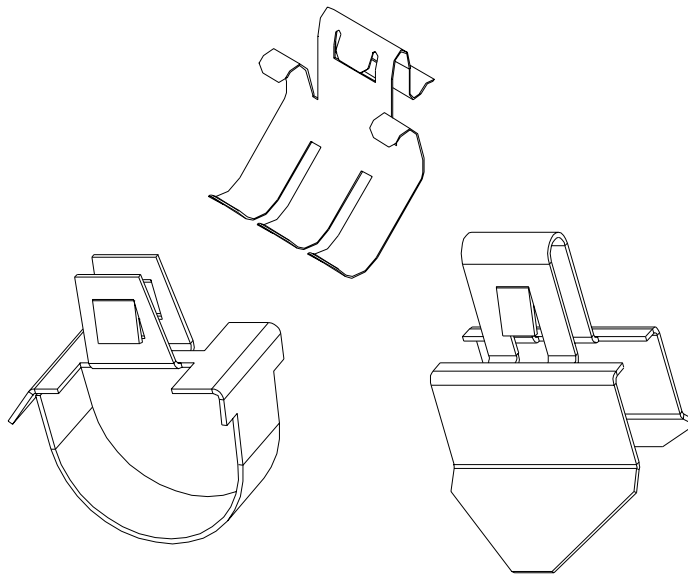
Three possible methods are used to ground the motherboard for EMI:

- Per the NLX specification, grounding to the chassis using the rear I/O shield
- Grounding using metal clips attached to the rails
- Grounding using EMI clips attached to the motherboard

## 3. Motherboard Grounding Clips

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The EMI clips are snapped into slots on the secondary side of the motherboard. When the motherboard is assembled in the system, the clips provide an electrical ground contact between motherboard and chassis. The clips can be snap-fit or soldered to the motherboard (soldered is preferred). See Figure 1 for examples of three types of motherboard grounding clips. Motherboard vendors should supply EMI clips with the motherboard where needed.

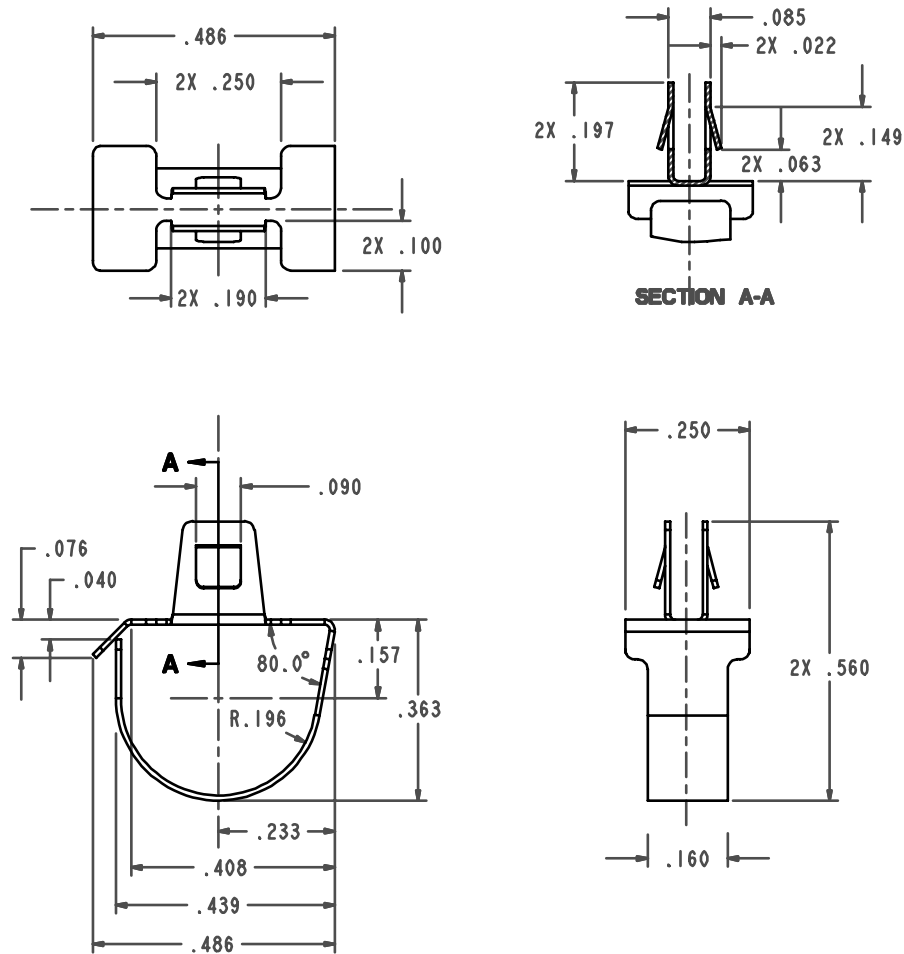


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**Figure 1: Motherboard EMI Clip Examples**

## 4. Design Example and Material Recommendation

Figure 2 gives a design example with typical dimensions. A typical material used for this type of application is .010"/0.25MM half hard 301 stainless steel. For good EMI grounding, the DC resistance between clip contact points should be less than  $2.5 \text{ m}\Omega$  (MIL-B-5087B). This material should provide sufficient spring tension to ensure contact with the chassis floor and be reasonably compliant to allow easy insertion and extraction of the motherboard.



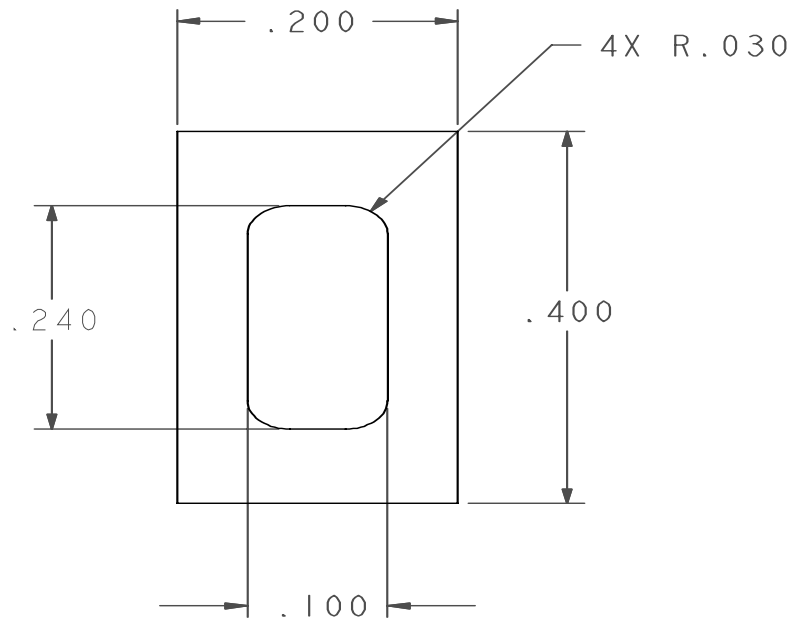
**Figure 2: Typical Ground Clip Design Example**

Note: Measurements are in inches.

## 5. Motherboard Keep-out Area for EMI Clips

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The motherboard should provide clearance for EMI clips around the attachment holes. The footprint in Figure 3 shows an example of the keep-out dimensions required for these clips on both sides of the motherboard.



**Figure 3: Motherboard Keep-out Area for Clip**

Note: Measurements are in inches.

## 6. Chassis Clearance

Three locations placed along the depth of the chassis running across the length of the board are suggested for grounding. Figure 4 shows these locations. NLX allows for chassis-specific mounting systems, but consideration needs to be made in the areas shown in Figure 4 for the motherboard-to-chassis surface distance. Because the distance between the lower surface of the motherboard and the chassis bottom is critical to the function of the EMI clips, it is imperative that this be .313"/7.95mm in the areas shown. The chassis surface in these areas should be clean and free of paint or other nonconductive materials.

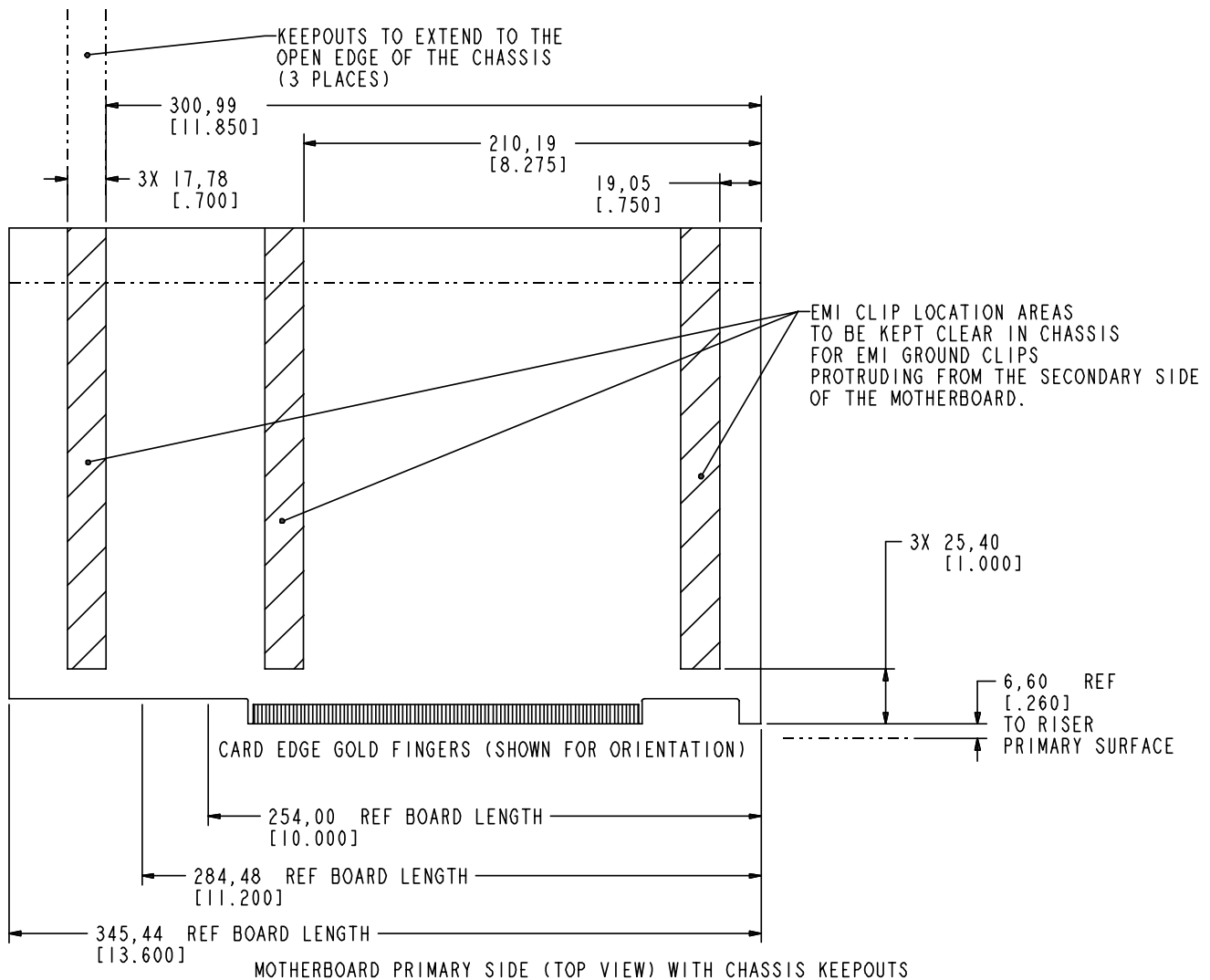


Figure 4: Chassis Keep-out Area for Clips