

MagnaMouse™ Description

The principal of the MagnaMouse™ is shown in its most basic form in figure 1. This sketch shows a magnetically attracted, metal, electrically conductive armature attached to a magnet in the reset position, and separated from a substrate by a lower spacer. It is shown in the reset position in 1A and in the actuated position in figure 1B.

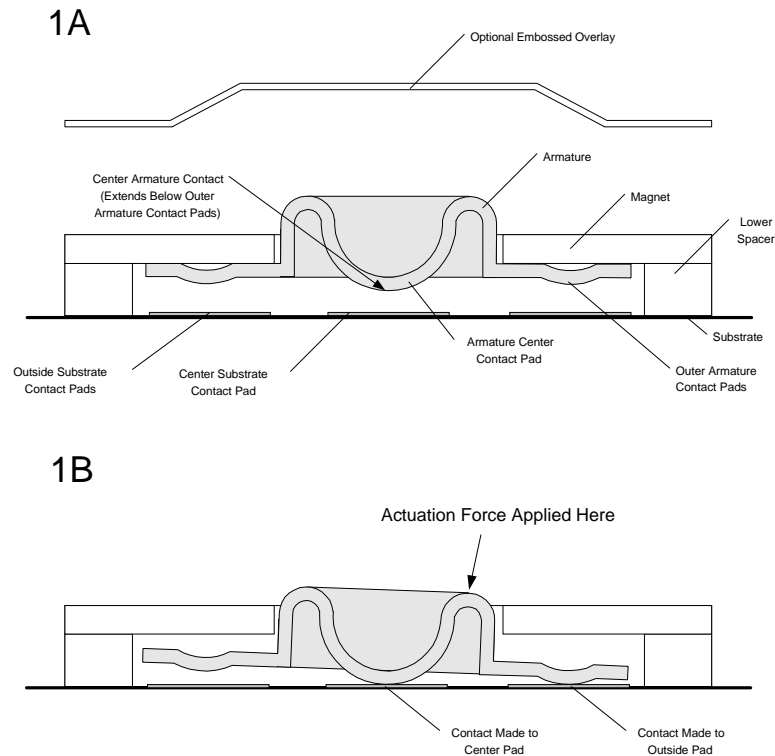
The armature, including the inner contact pad as well as the outer contact pads and the actuating button, is stamped as a single piece part. Note that the inner contact extends below the outer contact pads. The actuating button is formed as a continuous ring and, depending on the application, the outer contact pads are formed either as discrete contact pads or as a continuous ridge extending around the perimeter of the armature.

The magnet is polarized in a series of parallel linear north/south poles extending into the page. This configuration is very similar to a common refrigerator magnet.

A substrate containing electrical contacts on its upper surface is shown at the base of the mouse assembly. These contacts are arranged in various configurations about the top surface of the substrate. The actual array depends on the desired mouse function and ranges from individual discrete contact pads, arranged in a circular array, to a continuous analog variable resistor or voltage divider.

With individual discrete contact pads, the cursor direction is defined directly by the individual contact pads, and with the analog resistor, the direction is determined by a comparative circuit and an analog to digital converter in the microprocessor. The latter provides an unlimited directional capability.

Actuation is achieved by depressing the armature at any desired position on top of the actuating button. When the armature is depressed, as shown in figure 1B, the armature pads contact both the center and outer substrate pads. The outside contact pad on the



substrate determines the direction that the cursor will travel. Since the cursor will normally travel at a constant speed, an accelerator function can be added by designing the center contact pad as a pressure sensitive resistor and adding a resistance sensitive accelerator function in the microprocessor. With the latter arrangement, the operator merely has to press harder to accelerate the movement of the cursor.

An exploded view of the MagnaMouse™ is shown in figure 2, and it is shown assembled in figures 3 and 4 as top and bottom views respectively. Overall height of the assembled package is approximately 0.080" or 2 mm and the width and length can be designed as a custom package. Today, the minimums for width and length are limited to ½" or approximately 12 mm.

The description of the MagnaMouse™ presented herein is limited to the basic cursor control type product. This next-generation technology can replace current products used in computer cursor controls, game controls, automotive mirror and seat operation, temperature settings, radio or television selection controls, and any other electronic device that uses a multi-directional switch. The MagnaMouse™ technology can also fit space requirements for smaller electronic devices such as cell phones and PDAs.

Figure 2 Exploded View

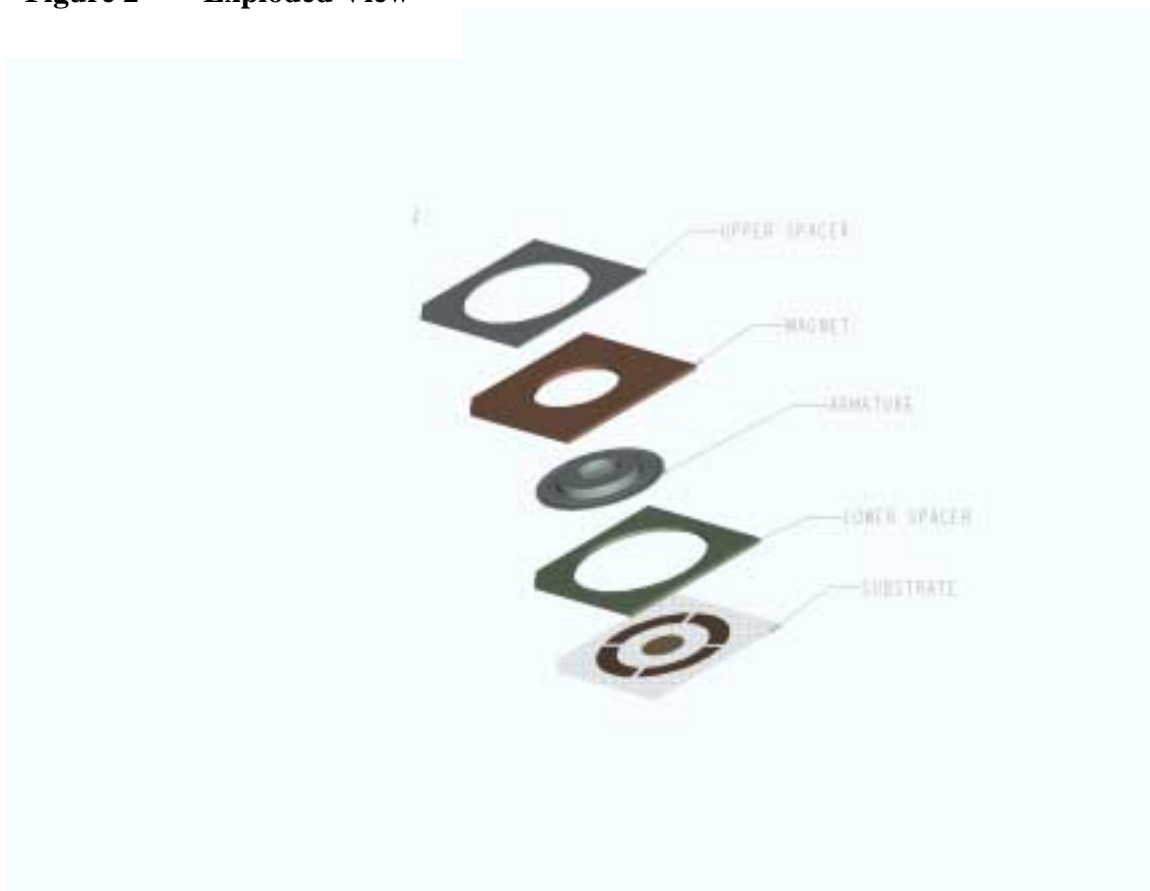


Figure 3 Top View

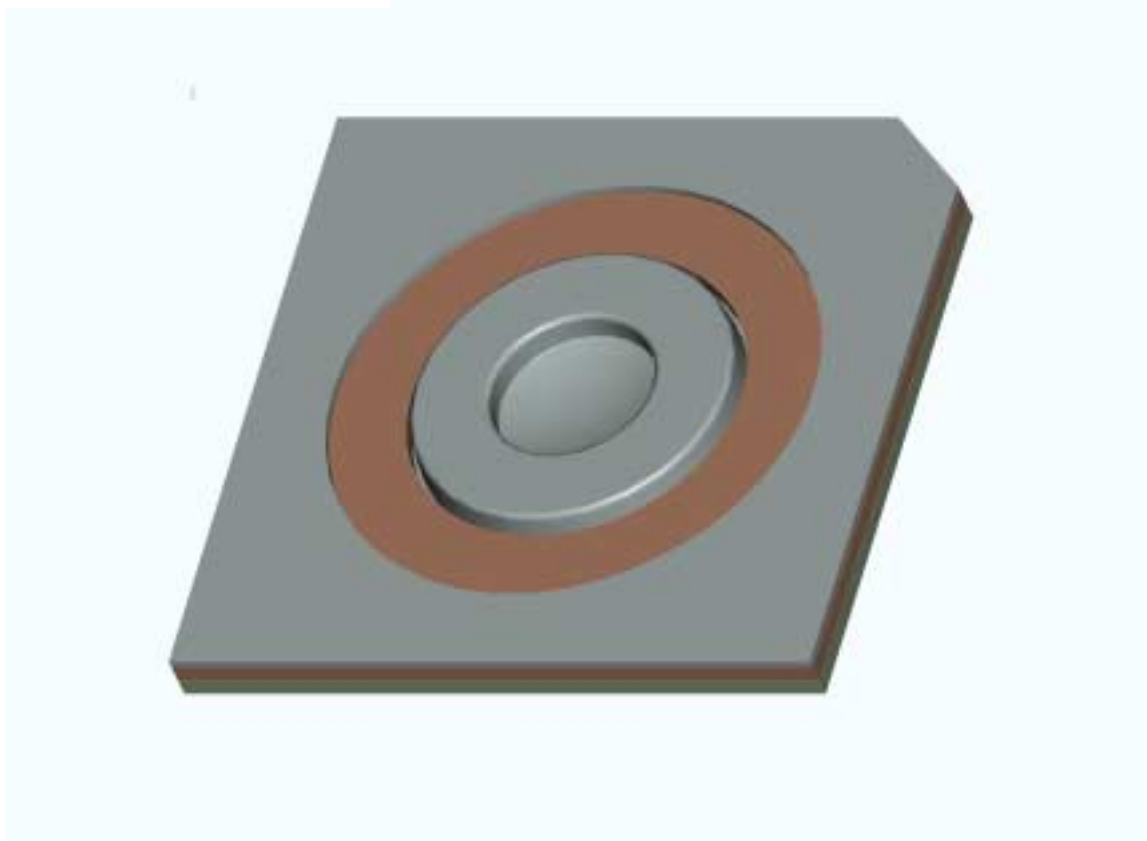
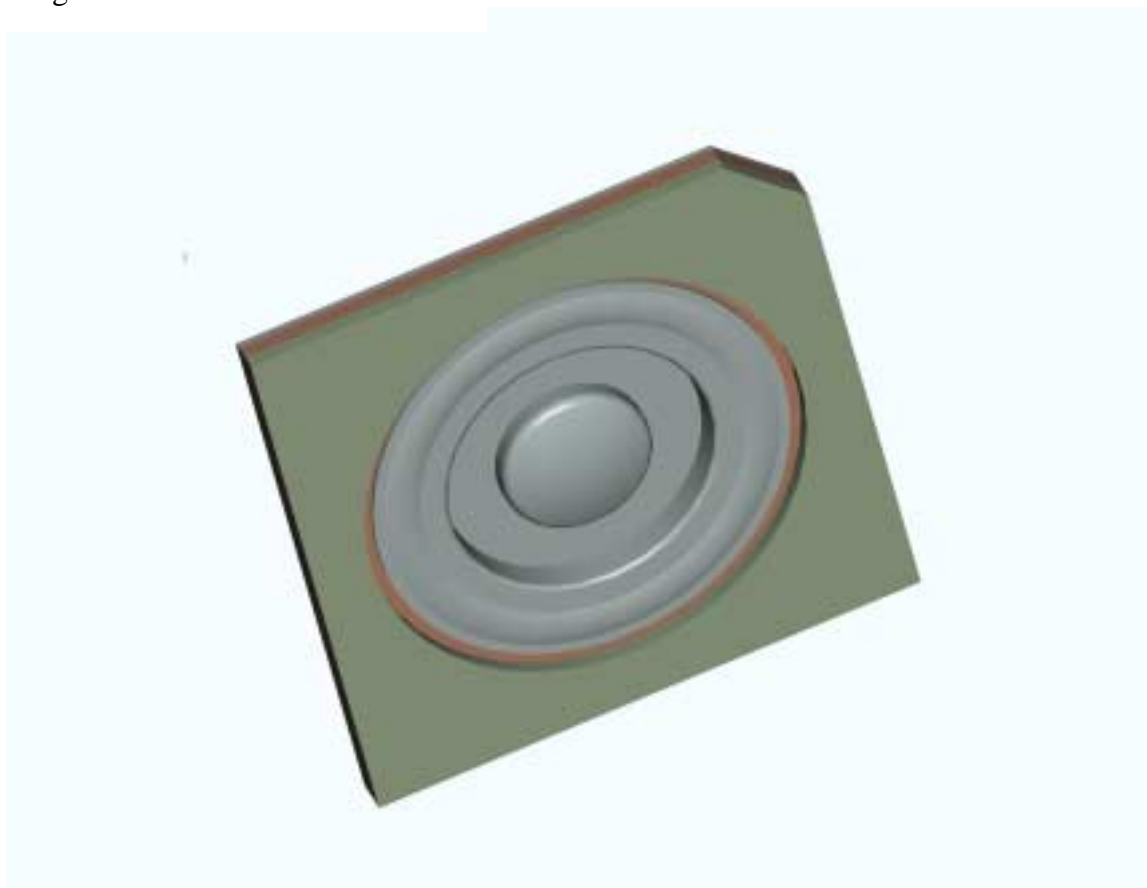
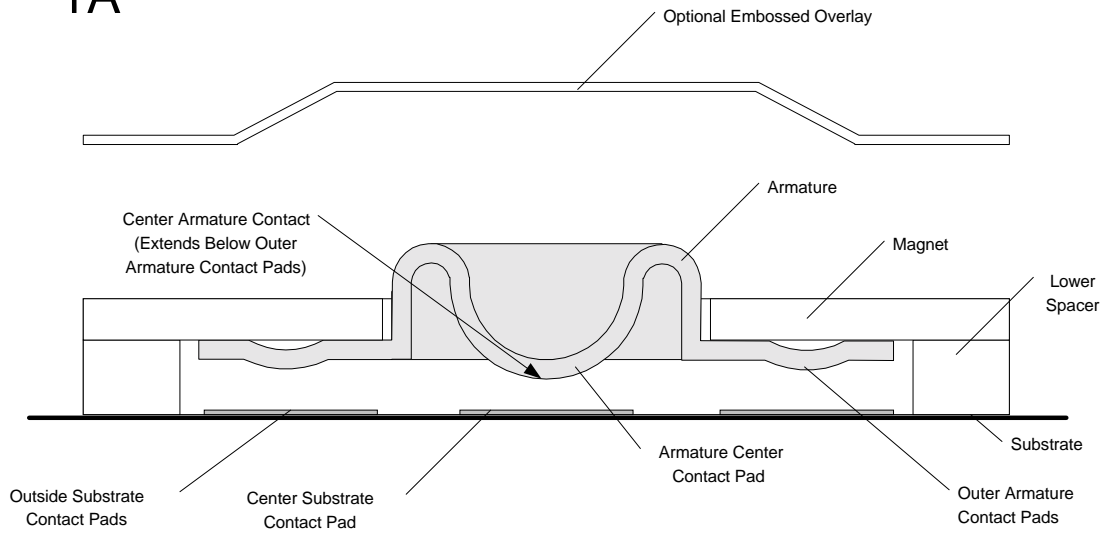


Figure 4 Bottom View



1A



1B

