Keywords: ESD-Protected EPOT System has Pushbutton Interface

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APPLICATION NOTE 1802

ESD-Protected EPOT System has Pushbutton Interface

As systems grow smaller, it becomes increasingly attractive to replace mechanical potentiometers with smaller and less expensive silicon equivalents (EPOTs). A common interface for such EPOTs consists of a chip select, increment, and Active-Low up/down line. CS activates the device, and on a rising edge of Active-Low INC steps the wiper in a direction indicated by the Active-Low U/D pin. The simple circuit of **Figure 1** employs two pushbuttons (one for up and one for down) and a few tiny silicon devices to implement a debounced, ESD-protected EPOT system.

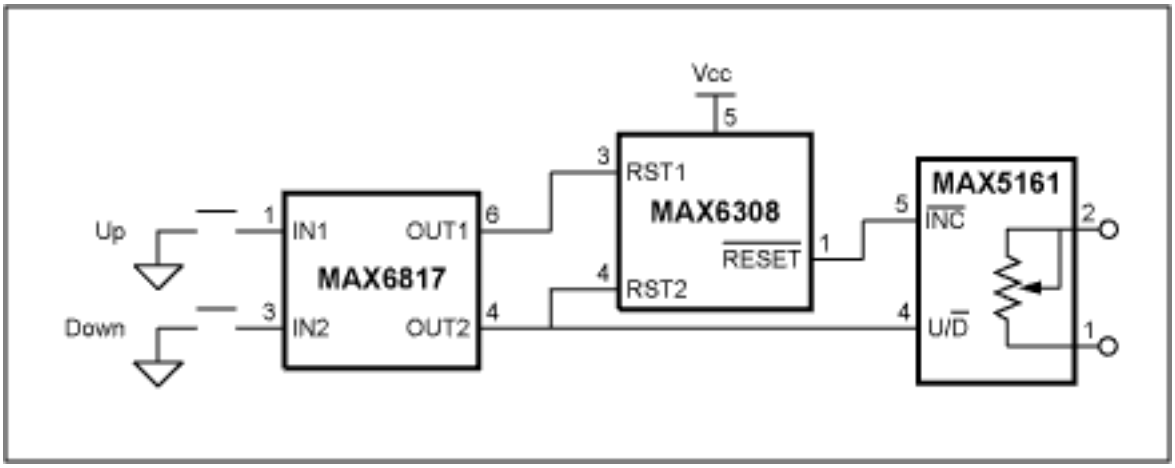

Figure 1. These three ICs form a solid-state potentiometer (EPOT).

The normally open pushbutton switches feed into an ESD-protected switch debouncer in a SOT23 package (MAX6817) which has internal pullup resistors on the inputs and buffered, non-inverting CMOS outputs. In the absence of a switch closure, the normally open switches hold the MAX6817 outputs high. In turn, that condition ensures a low state for the active-low, push-pull output of the MAX6308; an SC70 reset device with two reset inputs that are independent of the Vcc pin. The reset device must have extra reset inputs rather than a manual reset input, because the glitch-immunity protection of MR inputs is not sufficient to guarantee proper operation.

The MAX5161 is a 32-tap, linear-taper EPOT in a SOT23 package, with the standard (Active-Low INC)-Active-Low U/D interface. (The CS input is pulled high internally.) Its t_{setup} requirement is 50ns, meaning the Acitve-Low U/D signal must be stable for 50ns preceding a rising edge at the Active-Low INC pin. That requirement is met with the delay introduced by transient-filtering circuitry internal to the MAX6308. The delay (shown in **Figure 2** as t_f) is typically 10µsec to 30µsec. Active-Low INC goes high again only after the reset timeout interval expires. For the MAX6308, that interval (t_{reset}) is preset at the factory with a value as short as 1msec.

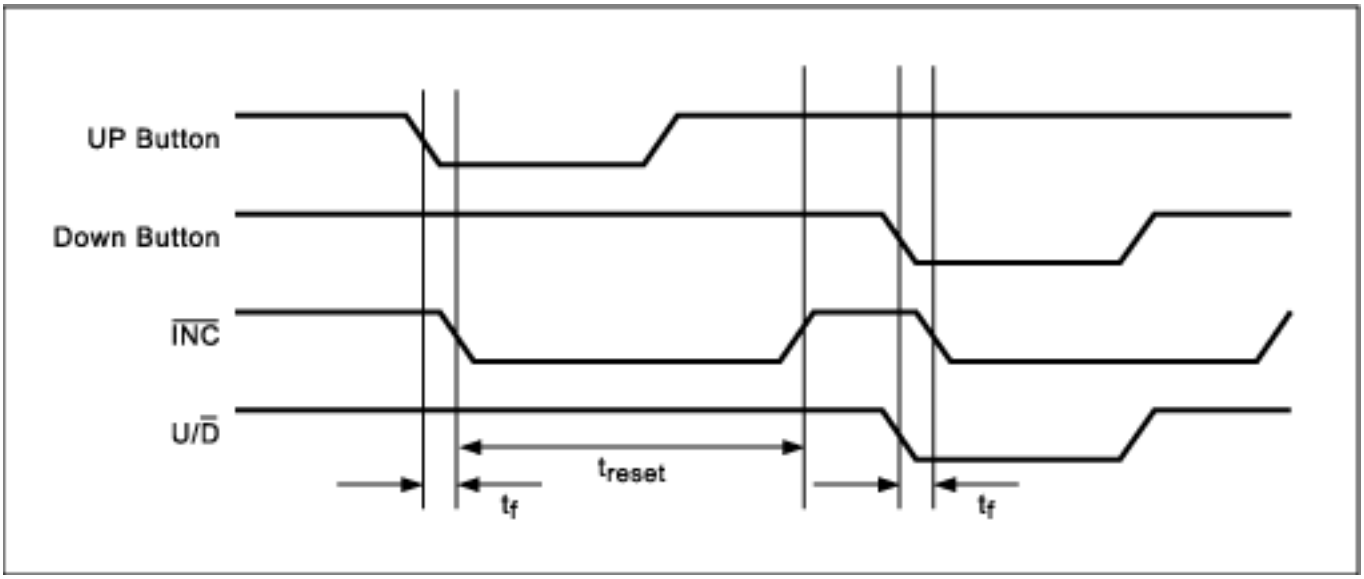

Figure 2. Closing either pushbutton in Figure 1 increments the potentiometer output in a direction indicated by the MAX5161's Active-Low U/D input.

A similar version of this article appeared in the September 26, 2002 issue of *EDN* magazine.

Application Note 1802: http://www.maxim-ic.com/an1802

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Related Parts

MAX5161: QuickView -- Full (PDF) Data Sheet -- Free Samples

MAX6308: QuickView -- Full (PDF) Data Sheet -- Free Samples

MAX6817: QuickView -- Full (PDF) Data Sheet -- Free Samples

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