

Special Designed N-type Current Mirror and P-type Current Mirror

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Mechatronix has been working on a special designed n-type current mirror. The goal has been to build a current mirror that has accuracy of $\pm 0.5\%$ for mirror currents less than 100nA as well as currents greater than 2mA. Here are the conclusion results. The **Red** lines in all figures are set at $\pm 0.2\%$. The specs were chosen so that they would exceed the dynamic current range of the best IC OTAs that were/are available.

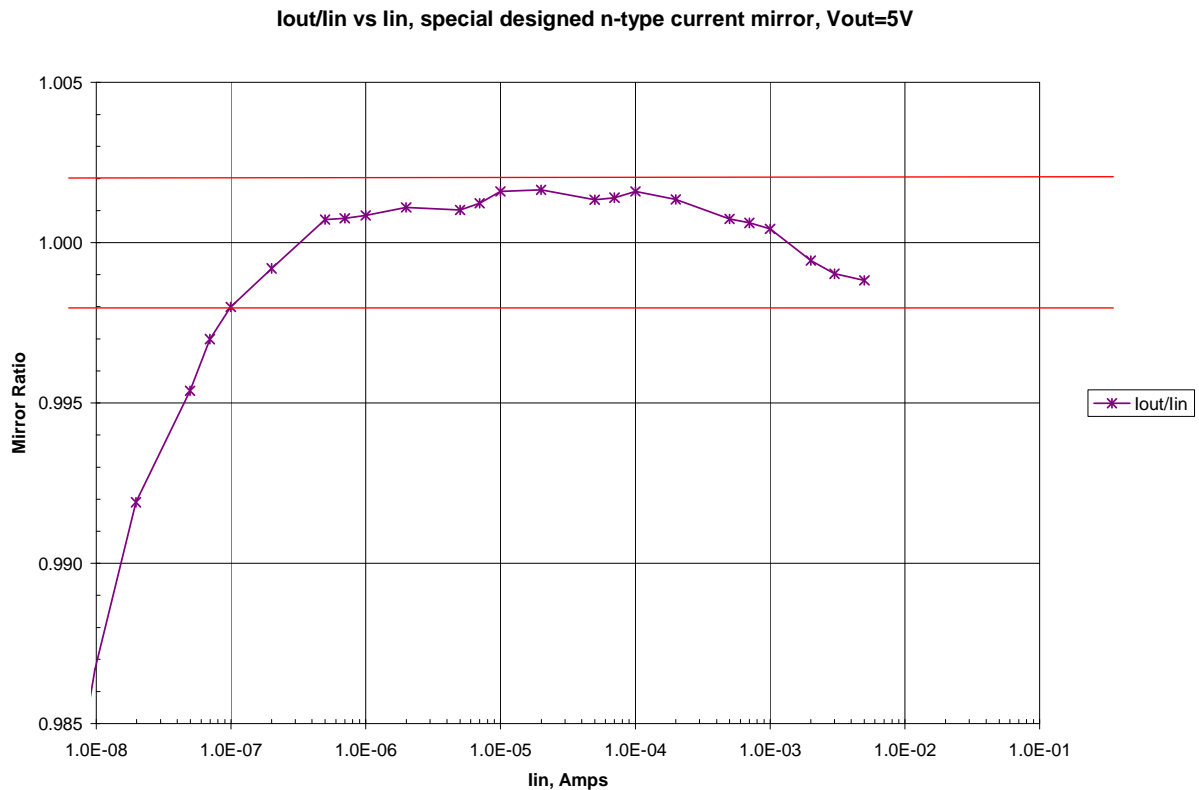


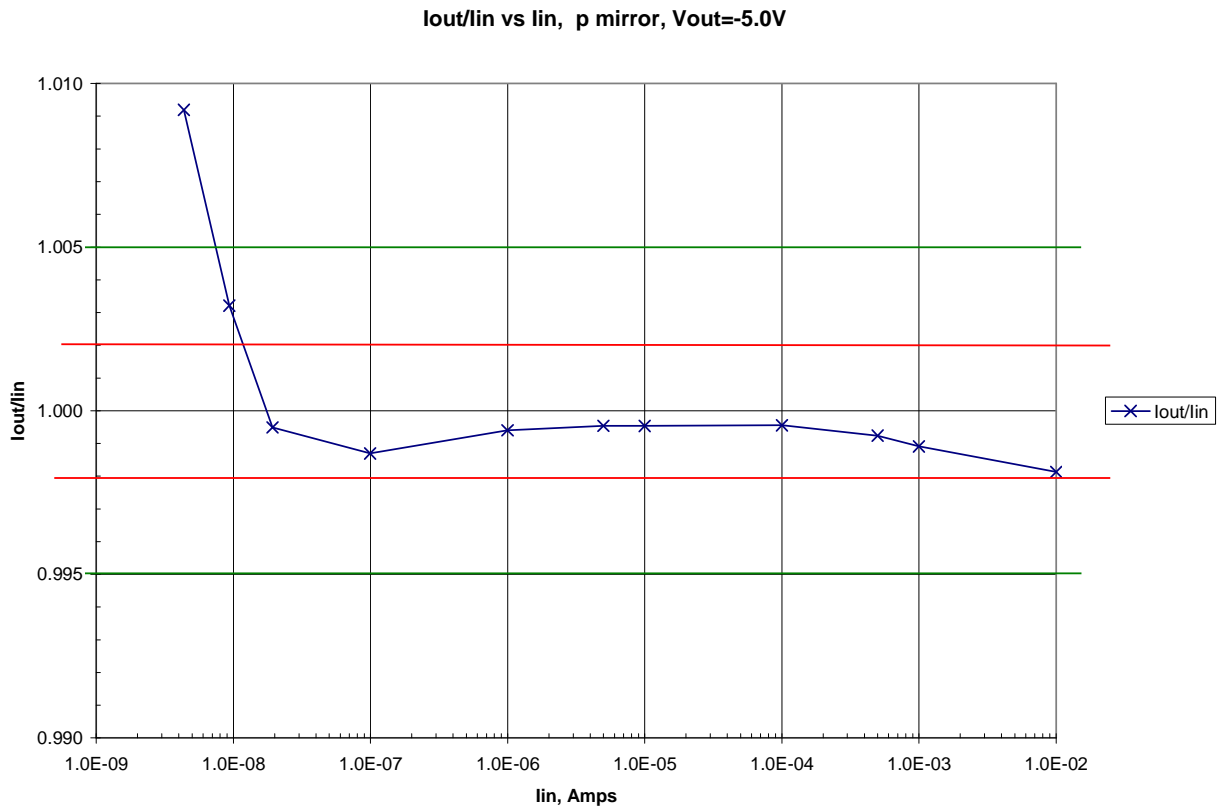
Figure 1: Highly accurate and wide operating range n-type current mirror.

Regarding output resistance of this mirror type: For 100uA current at the output, the output current only changes by 40nA over a 12V output range. That is 0.04% over the 12V output voltage range.

The goal is to build both a n-mirror and p-mirror with this type of performance, then go back to the discrete OTA and use these mirrors within it. An overall goal is to build an

OTA that has better performance than the CA3280 at all operating points as well as extending the operating range beyond that of what that IC could handle.

Mechatronix has also been working on a p-type current mirror. In Figure 2, the Red lines are at $\pm 0.2\%$ and the Green lines are at $\pm 0.5\%$. The p-type current mirror was tested to 10mA.



**Figure 2: Highly accurate and wide operating range p-type current mirror.
Mirror error is $< \pm 0.2\%$ down to $< 20\text{nA}$!**

Another advantage of these mirror types is that they would cost much less than any mirror using the high end pairs such as the MAT01, MAT02, MAT03, or MAT04 from Analog Devices.

These current mirrors can also be used in a discrete OTA design. These current mirrors have better electrical performance than the current mirrors in the IC OTAs such as the CA3280, CA3080 and LM13700. We know this from the electrical measurements we have taken on them.