Voltage Level Translator

$$V_{REF} = 1.4V \text{ for TTL input}$$

$$V_{REF} = \frac{V+}{2} \text{ for CMOS input}$$

Output V_{OUT} swings from rail-to-rail
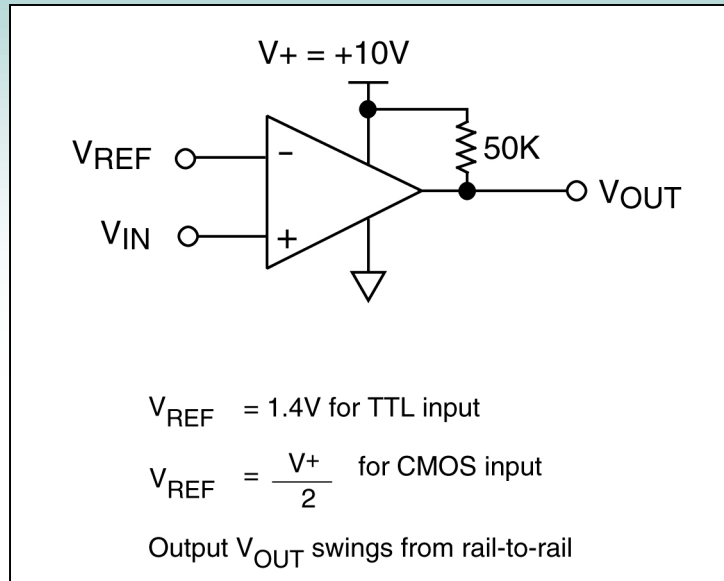
Description

Basic voltage level translator utilizes a voltage comparator to translate an input voltage range into an output voltage range. First step is to determine the input voltage range, which involves an input low voltage level V_{IN}(low) and an input high voltage level, V_{IN}(high). Next step is to figure out the proper reference voltage level, at V_{REF}. In many cases V_{REF} can be simply midpoint between V_{IN}(low) and V_{IN}(high). In other cases, one may want to skew the V_{REF} voltage level towards either V_{IN}(low) or V_{IN}(high). In this example, the output voltage range is simple ground and V+, which also represent output voltage that range from rail to rail. For logic circuit type of voltage level translator, V_{REF} could be set to 1.4V for TTL logic voltages, and V+/2 for CMOS logic voltages. Note that this circuit utilizes an open drain voltage comparator, which requires a pull-up resistor to V+. This pull-up resistor can be readily replaced by diode(s), zener diode, or a combination of resistors and diodes or zener diode to change the V_{OUT}(high) voltage level. Similarly, these components can also be employed to set V_{OUT}(low) voltage levels. Hence by using an open drain voltage comparator it is simpler and easier to modify both V_{OUT}(low) and V_{OUT}(high) voltage levels.

Recommended Components

½ ALD2301, ½ ALD2303
Precision applications: ½ ALD2321

Other Related Circuit Ideas

Schematic no. LT_23001.0 Voltage Level Translator