

The Do's and Don'ts When Substituting SOIC-8 Voltage References

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When Substituting SOIC-8 Voltage References

DO

- When V_{OUT} conforms
- When parameter differences are acceptable
- When add-on features are not used

DON'T

- When TEMP, TRIM, or \overline{SLEEP} pin is used
- Substitute directly when applications require current sink/source capability

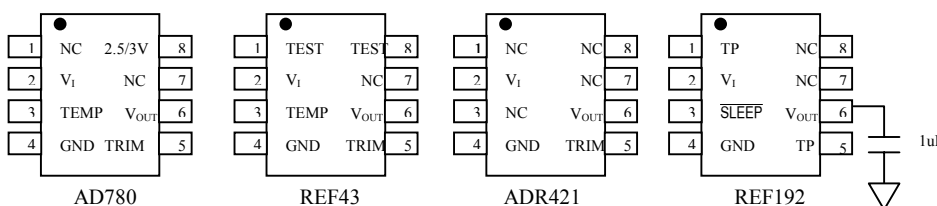


Figure 1. Various 2.5V SO-8 Voltage References

INTRODUCTION

Like operational amplifiers, SOIC-8 voltage references employ standard pinouts especially pins 2, 4, and 6 are assigned with V_{IN} , GND, and V_{OUT} respectively. Since most users are interested in second source options, quite often the question is asked "Can similar references be substituted with one and another?" Parts such as AD780, REF43, REF192, and ADR421 are good examples; they are 2.5V SOIC-8 voltage references, Figure 1.

In general, other than technologies and in some cases add-on feature differences, various SOIC-8 voltage references are interchangeable. This occurs when the output voltages conform, other performances differences are acceptable, and most importantly the add-on features are not used.

Confusion also arises with the labels NC, TEST, and TP on the various references. TEST and TP are essentially the same as NC. Although NC stands for No Connect, to be technically correct, it means "Do Not Connect". It is because most of these pins have actual connections within the devices and they are reserved specifically for factory testing purposes. As a result, users should not connect anything on TEST, TP, and NC pins other than dummy PCB pads or else parts may not function properly.

Other than the standard V_{IN} , V_{OUT} , and GND pins, some references feature TEMP and TRIM pins. TEMP pin provides temperature information based on a scale factor, but it must be buffered in order to avoid loading down the device. Similarly, the TRIM pin provides system fine trimming flexibility. Both TEMP and TRIM pins can be left floating if they are not used.

On the other hand, REF19x family has a \overline{SLEEP} pin which provides an active-low shutdown feature. It is recommended to tie the \overline{SLEEP} pin high if it is not used. Quite often, letting such pin float in a well-controlled PCB, does not cause problem. For this reason, it may not be suitable to substitute the REF19x with similar references for applications requiring absolute reliability in large volume production. In addition, REF19x requires a 1uF output capacitor to function properly whereas it is optional for others voltage references.

Finally, references like AD780 and REF43 have both sink and source current capability. Such capability may be required as voltage references for certain A/D and D/A converters.

As can be seen, similar voltage references can be substituted interchangeably in most applications. However, one should understand all the application requirements before making such a replacement.

Parameters	AD780	REF43	ADR421	REF192
V_O (V)	2.5/3.0	2.5	2.5	2.5
Accuracy (mV)	± 1	± 1.5	± 1	± 2
Tempco (ppm/ $^{\circ}$ C)	3	10	3	5
I_{SUPPLY} (μ A)	1000	450	500	45
I_{LOAD} (mA)	5	20	10	30
Noise (μ Vp-p)	4	10	1.75	20

Table 1. Various 2.5V SO-8 Voltage References Parameters Comparison