Voltage Reference Overview

Shunt and Series References for Any Application

Tempco
0.05 to 20 ppm/°C

Tempco
30 to 50 ppm/°C

Tempco
100 to 150 ppm/°C

Tempco
50 to 100 ppm/°C

Accuracy Requirements
For common applications

Highest Accuracy

Medium Accuracy

Standard Grade

ti.com/vref
With more than 40 years of supply history, Texas Instruments is the premier volume supplier of voltage references. TI’s broad portfolio features low temperature coefficient, precise initial accuracy, low noise, and excellent long term stability performance. Series and shunt references support a wide variety of applications, including high-precision references for data converters up to 20-bit precision accuracy and low-noise references for sensor conditioning. Voltage references are also commonly used as voltage monitors, current limiters, and programmable current sources.

Voltage Reference Selection Guide

| Temp Drift ppm/°C | Initial Accuracy | Part Number | Adjustable | 1.2 | 2.0 | 2.5 | 3.0 | 3.3 | 4.0 | 5.0 | 8.2 | 10 |  | Package Option |
|-------------------|------------------|-------------|------------|-----|-----|-----|-----|-----|-----|-----|----|----|----------------|
| 10                | 0.05             | LM4030 A    | •          | •   |     |     |     |     |     |     |     |    | 3SOT-23,      |
|                   |                  | LM4030 A/B  | •          | •   |     |     |     |     |     |     |     |    | 5SOT-23       |
| 30                | 0.15             | LM4030 C    | •          | •   |     |     |     |     |     |     |     |    |               |
| 20                | 0.05 1.0         | LM2/385/B*  | •          |     |     |     |     |     |     |     |     |    | C/I TSSOP, SOP |
| 30                | 0.05 1.0         | LM1/2/385 BX* | Up to 5.3V | •   | •   |     |     |     |     |     |     |    | I/C/M SDIC-8, |
| 50                | 0.05 1.0         | LM1/2/385 BY* | Up to 5.3V | •   | •   |     |     |     |     |     |     |    | I/C/M TO-92   |
| 50/50             | 0.2 0.1          | REF1112     | •          |     |     |     |     |     |     |     |     |    | 3SOT-23       |
| 50                | 0.1 0.2 0.5      | LM4050/1 A/B/C | • • • • |     |     |     |     |     |     |     |     |    | I/Q 3/5SOT-23** |
| 50                | 0.1 0.2 0.5      | TL4050/1 A/B/C | Up to 10V | •   | •   | •   | •   | •   |     |     |     |    | I/Q 3SOT-23** |
| 50                | 0.4 1.0 2.2      | LM431 C/B/A  | Up to 36V  | •   |     |     |     |     |     |     |     |    | I/Q 3SOT-23   |
| 50                | 0.5 1.0 2.0      | TL431 A/B    | Up to 36V  | •   |     |     |     |     |     |     |     |    | C/I 3SOT-23** |
| 100               | 0.1 0.2          | LM4040 A/B*  | • • • • • • • • • • |     |     |     |     |     |     |     |    | 3SOT-23       |
| 100               | 0.2 0.5          | LM4040 C*    | • • • • • • • • • • |     |     |     |     |     |     |     |    | 5SOT-23, SC-70 |
| 100               | 0.1 0.2          | LM4041 A/B   | Up to 15V  | •   |     |     |     |     |     |     |     |    | TO-92         |
| 100               | 0.5              | LM4041 C*    | • • • • • • • • • • |     |     |     |     |     |     |     |    |                  |
| 129               | 0.5 1.0          | LM431B       | Up to 30V  | •   |     |     |     |     |     |     |     |    | 3/5SOT-23      |
| 129               | 1.5              | LMV431       | Up to 30V  | •   |     |     |     |     |     |     |     |    |                  |
| 150               | 1.0 2.0          | LM1/2/385 B* | Up to 5.3V | •   | •   |     |     |     |     |     |     |    |                  |
| 150               | 1.0 2.0          | LM4040 D/E*  | • • • • • • • • • • |     |     |     |     |     |     |     |    |                  |
| 150               | 1.0 2.0          | LM4041 D/E*  | Up to 15V  | •   |     |     |     |     |     |     |     |    |                  |
| 150               | 0.5              | TLV431B      | Up to 6V   | •   |     |     |     |     |     |     |     |    |                  |
| 150               | 1.0              | TLV431A      | Up to 6V   | •   |     |     |     |     |     |     |     |    |                  |
| 150               | 1.5              | TLV431       | Up to 6V   | •   |     |     |     |     |     |     |     |    |                  |

V<sub>REF</sub> Orderable Part Number Decoder

LM4040 Q A I M3 X – 2.5 / NOPB

- **Main Part number**: LM4040
- **Automotive Grade Q**: AEC-Q100
- **No letter: commercial grade**
- **Initial Accuracy**: A, B, C, D, E (Typically A is highest)
- **Temperature Range**
  - Consumer: 0 - 70°C
  - Industrial: -40 - 85°C
  - Extended: -40 - 125°C
  - Military: -55 - 155°C
- **Output Voltage adj:** adjustable value in voltage
- **Package**
  - M3: SOT23
  - M7: SC70
  - Z: TO92
- **Tape and Reel size**
  - X: 3000 units
  - Non letter: 1000 units
- **NOPB Lead free**
## Voltage Reference Selection Guide

<table>
<thead>
<tr>
<th>Output Voltage</th>
<th>1.0</th>
<th>1.2</th>
<th>1.8</th>
<th>2.0</th>
<th>2.5</th>
<th>3.0</th>
<th>3.3</th>
<th>4.1</th>
<th>4.5</th>
<th>5.0</th>
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### Temperature Ranges

- **Consumer**: 0 – 70°C
- **Industrial**: -40 – 85°C
- **Extended**: -40 – 125°C
- **Military**: -55 – 125°C

### AECQ Grades

- **Q1**: -40 – 125°C
- **Q3**: -40 – 85°C
- **Q4**: 0 – 70°C

### V<sub>REF</sub> Orderable Part Number Decoder

<table>
<thead>
<tr>
<th>Main Part number</th>
<th>TL4050</th>
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<tbody>
<tr>
<td>Shunt references</td>
<td>REF29/30/31/32/33/50</td>
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</table>

### Notes

- See ti.com for additional versions of this part.
- **Additional package options available.**

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NOTES: Not all positions in the part number have to filled. Always check the datasheet for precise product identification and specifications.
Voltage Reference Overview

Typical Application Diagrams

Feedback Loop in Isolated AC/DC Power Supply

Portable Medical System

Design Resources and Reference

See TI's complete voltage reference portfolio and easy selection tool at ti.com/vref

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ti.com/power forum

Find answers to your power management questions
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