



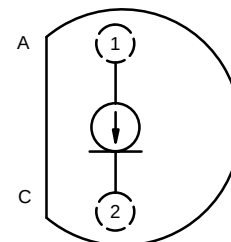
## Current Regulator Diodes

|             |             |             |             |
|-------------|-------------|-------------|-------------|
| <b>J500</b> | <b>J503</b> | <b>J506</b> | <b>J509</b> |
| <b>J501</b> | <b>J504</b> | <b>J507</b> | <b>J510</b> |
| <b>J502</b> | <b>J505</b> | <b>J508</b> | <b>J511</b> |

### PRODUCT SUMMARY

| Part Number | Typ $I_F$ (mA) | $P_{OV}$ (V) | Part Number | Typ $I_F$ (mA) | $P_{OV}$ (V) |
|-------------|----------------|--------------|-------------|----------------|--------------|
| J500        | 0.24           | 50           | J506        | 1.40           | 50           |
| J501        | 0.33           | 50           | J507        | 1.80           | 50           |
| J502        | 0.43           | 50           | J508        | 2.40           | 50           |
| J503        | 0.56           | 50           | J509        | 3.00           | 50           |
| J504        | 0.75           | 50           | J510        | 3.60           | 50           |
| J505        | 1.00           | 50           | J511        | 4.70           | 50           |

TO-226AA  
(TO-92)  
Modified



Top View

### FEATURES

- Two-Lead Plastic Package
- Guaranteed  $\pm 20\%$  Tolerance
- Operation from 1 V (J500–J503) to 50 V
- Excellent Temperature Stability

### BENEFITS

- Simple Series Circuitry, No Separate Voltage Source
- Tight Guaranteed Circuit Performance
- Excellent Performance in Low-Voltage/Battery Circuits and High-Voltage Spike Protection
- High Circuit Stability vs. Temperature

### APPLICATIONS

- Constant-Current Supply
- Current-Limiting
- Timing Circuits

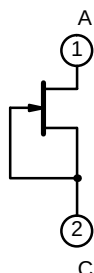
### DESCRIPTION

The J500 series is a family of  $\pm 20\%$  range current regulators designed for demanding applications in test equipment and instrumentation. These devices utilize the JFET techniques to produce a single two-leaded device which is extremely simple to operate.

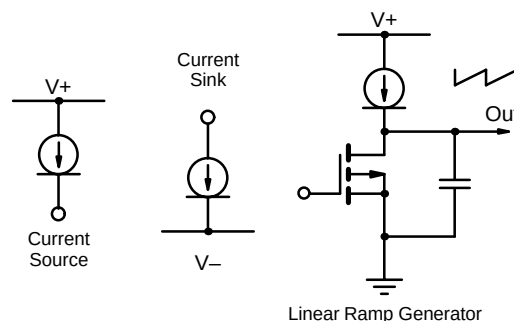
With nominal current ranges from 0.24 mA to 4.7 mA, the J500 series will meet a wide array of design requirements.

The low-cost TO-226A package ensures a cost-effective design solution.

### SCHEMATIC DIAGRAM



### APPLICATIONS



For applications information see AN103.

### ABSOLUTE MAXIMUM RATINGS

Peak Operating Voltage ..... 50 V  
 Reverse Current ..... 50 mA  
 Storage Temperature ..... -55 to 150°C

Power Dissipation<sup>a</sup> ..... 350 mW

Notes:

a. Derate 2.8 mW/°C above 25°C

### SPECIFICATIONS (T<sub>A</sub> = 25°C UNLESS OTHERWISE NOTED)

| Parameter                           | Symbol          | Test Conditions                          | Limits |                  |     | Unit |
|-------------------------------------|-----------------|------------------------------------------|--------|------------------|-----|------|
|                                     |                 |                                          | Min    | Typ <sup>a</sup> | Max |      |
| Peak Operating Voltage <sup>b</sup> | P <sub>OV</sub> | I <sub>F</sub> = 1.1 I <sub>F(max)</sub> | 50     | 95               |     | V    |
| Reverse Voltage                     | V <sub>R</sub>  | I <sub>R</sub> = 1 mA                    |        | 0.8              |     |      |
| Capacitance                         | C <sub>F</sub>  | V <sub>F</sub> = 25 V, f = 1 MHz         |        | 2.2              |     | pF   |

|             | Regulator Current <sup>c</sup><br>(I <sub>F</sub> ) |      |       | Dynamic Impedance <sup>d</sup><br>(Z <sub>d</sub> ) |                  | Knee Impedance<br>(Z <sub>k</sub> ) | Limiting Voltage <sup>e</sup> (V <sub>L</sub> ) |                  | Temperature Coefficient<br>(θ <sub>1</sub> )          |
|-------------|-----------------------------------------------------|------|-------|-----------------------------------------------------|------------------|-------------------------------------|-------------------------------------------------|------------------|-------------------------------------------------------|
|             | V <sub>F</sub> = 25 V                               |      |       | V <sub>F</sub> = 25 V                               |                  | V <sub>F</sub> = 6 V                | I <sub>F</sub> = 0.8 I <sub>F(min)</sub>        |                  | V <sub>F</sub> = 25 V<br>0°C ≤ T <sub>A</sub> ≤ 100°C |
| Part Number | mA                                                  |      |       | MΩ                                                  |                  | MΩ                                  | V                                               |                  | %/°C                                                  |
|             | Min                                                 | Nom  | Max   | Min                                                 | Typ <sup>a</sup> | Typ <sup>a</sup>                    | Max                                             | Typ <sup>a</sup> | Typ <sup>a</sup>                                      |
| J500        | 0.192                                               | 0.24 | 0.288 | 4.00                                                | 15               | 2.50                                | 1.2                                             | 0.4              | 0.95                                                  |
| J501        | 0.264                                               | 0.33 | 0.396 | 2.20                                                | 10               | 1.60                                | 1.3                                             | 0.5              | 0.81                                                  |
| J502        | 0.344                                               | 0.43 | 0.516 | 1.50                                                | 7                | 1.10                                | 1.5                                             | 0.6              | 0.70                                                  |
| J503        | 0.448                                               | 0.56 | 0.672 | 1.20                                                | 5                | 0.80                                | 1.7                                             | 0.7              | 0.58                                                  |
| J504        | 0.600                                               | 0.75 | 0.900 | 0.80                                                | 3.5              | 0.55                                | 1.9                                             | 0.8              | 0.46                                                  |
| J505        | 0.800                                               | 1.00 | 1.200 | 0.50                                                | 2                | 0.40                                | 2.1                                             | 0.9              | 0.33                                                  |
| J506        | 1.120                                               | 1.40 | 1.680 | 0.33                                                | 1.5              | 0.25                                | 2.5                                             | 1.1              | 0.19                                                  |
| J507        | 1.440                                               | 1.80 | 2.160 | 0.20                                                | 1                | 0.19                                | 2.8                                             | 1.3              | 0.08                                                  |
| J508        | 1.900                                               | 2.40 | 2.900 | 0.20                                                | 0.7              | 0.13                                | 3.1                                             | 1.5              | -0.05                                                 |
| J509        | 2.400                                               | 3.00 | 3.600 | 0.15                                                | 0.5              | 0.09                                | 3.5                                             | 1.7              | -0.14                                                 |
| J510        | 2.900                                               | 3.60 | 4.300 | 0.15                                                | 0.4              | 0.07                                | 3.9                                             | 1.9              | -0.22                                                 |
| J511        | 3.800                                               | 4.70 | 5.600 | 0.12                                                | 0.3              | 0.05                                | 4.2                                             | 2.1              | -0.34                                                 |

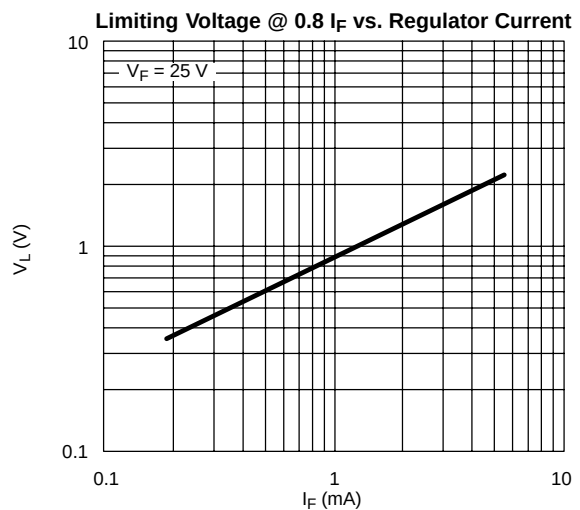
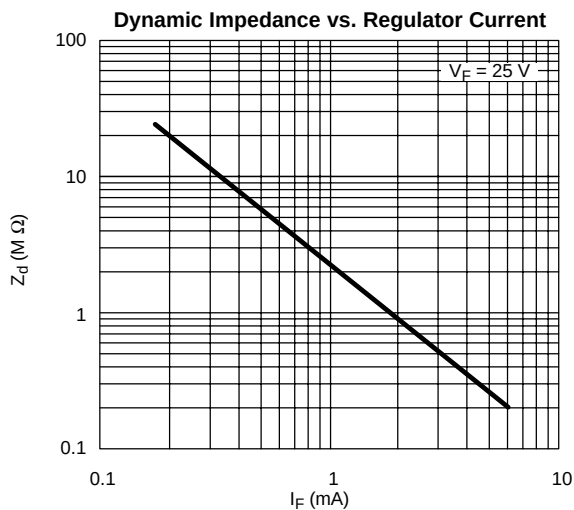
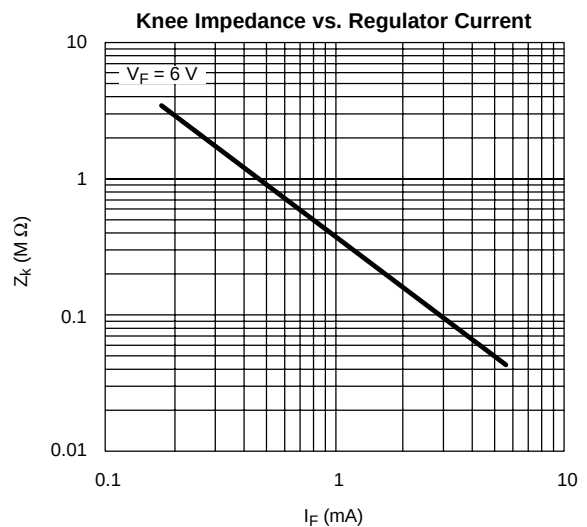
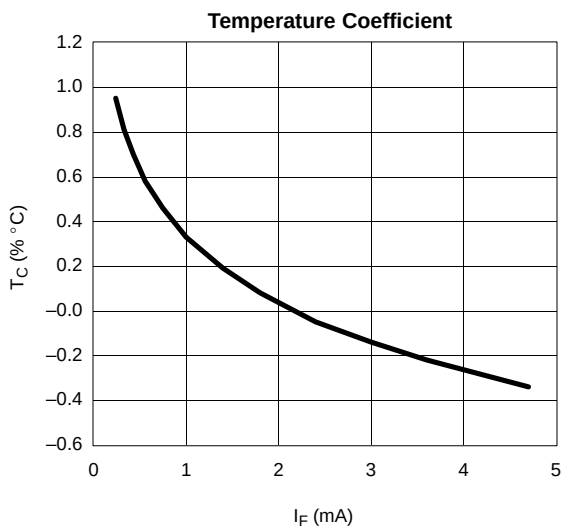
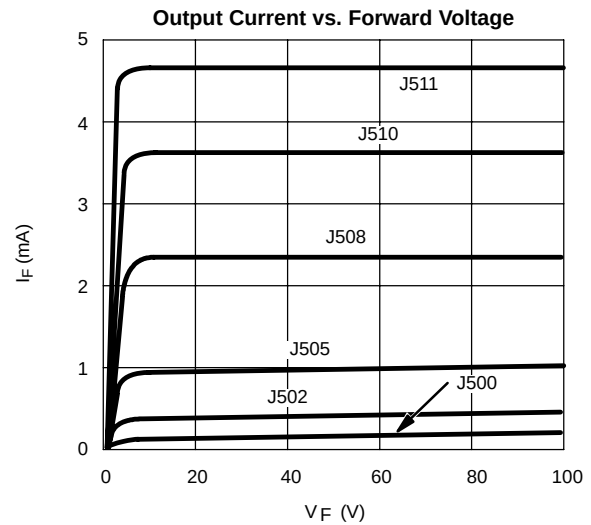
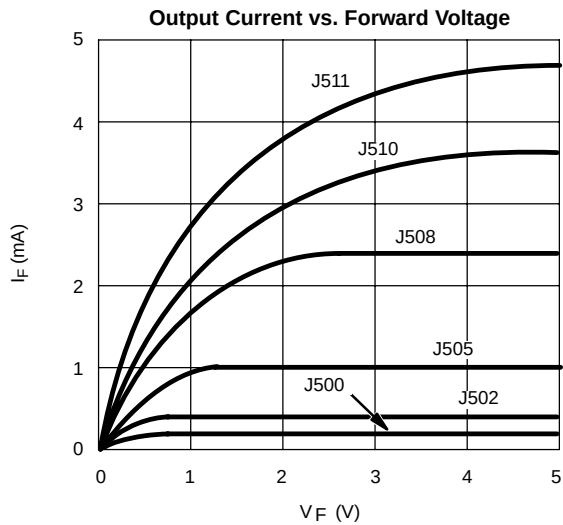
Notes:

- Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
- Max V<sub>F</sub> where I<sub>F</sub> = 1.1 I<sub>F(max)</sub> is guaranteed.
- Pulse test—steady state currents may vary.
- Pulse test—steady state impedances may vary.
- Min V<sub>F</sub> required to insure I<sub>F</sub> = 0.8 I<sub>F(min)</sub>.

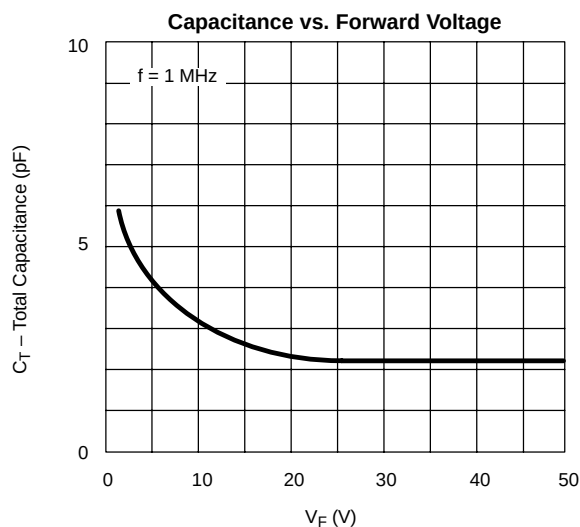
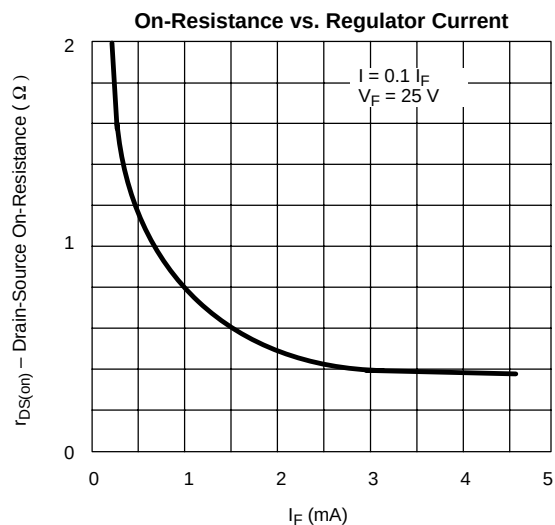
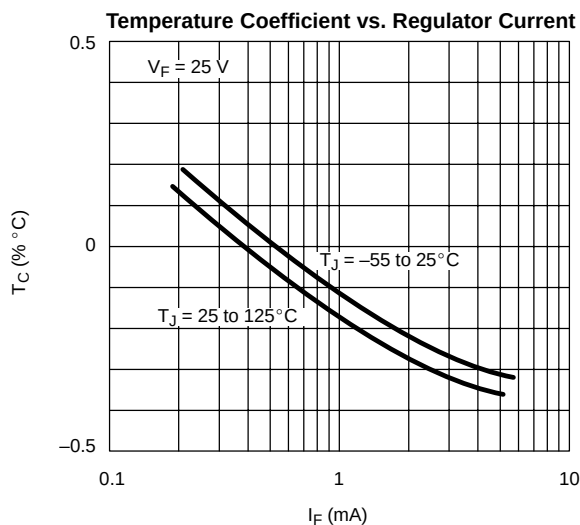
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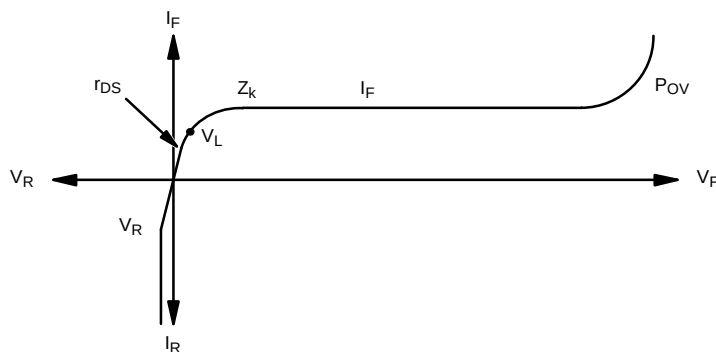
**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)**



**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)**



**CURRENT REGULATOR DIODE V-1 CHARACTERISTIC**





### Disclaimer

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