

## ZSR SERIES

### 3.0 to 12 volt fixed positive local voltage regulator

#### Description

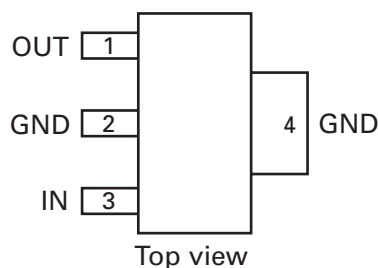
The ZSR Series three terminal fixed positive voltage regulators feature internal circuit current limit and thermal shutdown making the devices difficult to destroy. The devices are available in a high power surface mount package, ideal for applications where space saving is important. The devices are suited to local voltage regulation applications, where problems could be encountered with distributed single source regulation, as well as more general voltage regulation applications.

The ZSR Series show performance characteristics superior to other local voltage regulators. The initial output voltage is maintained to within 2.5% with a quiescent current of typically 350 $\mu$ A. Output voltage change, with input voltage and load current, is much lower than competitive devices. The ZSR devices are completely stable with no external components.

#### Features

- Output current up to 200mA
- Tight initial tolerance of 2.5%
- Low 600 $\mu$ A quiescent current
- -55 to 125°C temperature range
- No external components
- Internal thermal shutdown
- Internal short circuit current limit
- High power SOT223 package

#### SOT223 Package suffix - G



Top view –  
Connect pin 4 to pin 2 or leave pin 4 electrically isolated

#### SOT223 ordering information

| Order reference | Voltage | Part marking | Status | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-----------------|---------|--------------|--------|--------------------|-----------------|-------------------|
| ZSR300GTA       | 3.0V    | ZSR300       | Active | 7                  | 12              | 1000              |
| ZSR330GTA       | 3.3V    | ZSR330       | Active | 7                  | 12              | 1000              |
| ZSR500GTA       | 5.0V    | ZSR500       | Active | 7                  | 12              | 1000              |
| ZSR800GTA       | 8.0V    | ZSR800       | Active | 7                  | 12              | 1000              |
| ZSR1000GTA      | 10.0V   | ZSR100       | Active | 7                  | 12              | 1000              |
| ZSR1200GTA      | 12.0V   | ZSR1200      | Active | 7                  | 12              | 1000              |

# ZSR SERIES

## Absolute maximum rating

|                          |              |
|--------------------------|--------------|
| Input voltage            | 20V          |
| Output current ( $I_O$ ) | 200mA        |
| Operating temperature    | -55 to 125°C |
| Storage temperature      | -65 to 150°C |

## Power Dissipation ( $T_{amb}=25^{\circ}\text{C}$ )

|        |    |
|--------|----|
| SOT223 | 2W |
|--------|----|

Maximum power dissipation for the SOT223 is calculated assuming that the device is mounted on a PCB measuring 2 inches square.

## Recommended operating conditions

| Parameter              | Products | Min | Max | Units |
|------------------------|----------|-----|-----|-------|
| $V_{in}$ Input Voltage | ZSR300   | 5   | 20  | V     |
|                        | ZSR330   | 5.3 | 20  | V     |
|                        | ZSR500   | 7   | 20  | V     |
|                        | ZSR800   | 10  | 20  | V     |
|                        | ZSR1000  | 12  | 20  | V     |
|                        | ZSR1200  | 14  | 20  | V     |

## Notes:

- The maximum operating input voltage and output current of the device will be governed by the maximum power dissipation of the selected package. Maximum package power dissipation is specified at 25°C and must be linearly derated to zero at  $T_{amb}=125^{\circ}\text{C}$ .
- The following data represents pulse test conditions with junction temperatures as indicated at the initiation of the test. Continuous operation of the devices with the stated conditions might exceed the power dissipation limits of the chosen package.
- The shut down feature of the device operates if its temperature exceeds its design limit as might occur during external faults, short circuits etc. If the regulator is supplied from an inductive source then a large voltage transient, on the regulator input, can result should the shut down circuit operate. It is advised that a capacitor (1 $\mu\text{F}$  or greater) should be applied across the regulator input to ensure that the maximum voltage rating of the device is not exceeded under shutdown conditions.

# ZSR SERIES

## Electrical characteristics

**ZSR300 test conditions** (Unless otherwise stated):  $T_j=25^{\circ}\text{C}$ ,  $I_O=100\text{mA}$ ,  $V_{in}=7\text{V}$

| Symbol                     | Parameter                                     | Conditions                                                       | Min. | Typ. | Max. | Units                        |
|----------------------------|-----------------------------------------------|------------------------------------------------------------------|------|------|------|------------------------------|
| $V_O$                      | Output Voltage                                |                                                                  | 2.92 | 3.0  | 3.08 | V                            |
|                            |                                               | $I_O=1$ to $200\text{mA}^{(\tau)}$                               | 2.88 |      | 3.12 | V                            |
|                            |                                               | $V_{in}=5$ to $20\text{V}$<br>$I_O=1$ to $100\text{mA}^{(\tau)}$ | 2.88 |      | 3.12 | V                            |
| $\Delta V_O$               | Line regulation                               | $V_{in}=5$ to $20\text{V}$                                       |      | 10   | 40   | mV                           |
| $\Delta V_O$               | Load regulation                               | $I_O=1$ to $200\text{mA}$                                        |      | 5    | 25   | mV                           |
|                            |                                               | $I_O=1$ to $100\text{mA}$                                        |      | 2    |      | mV                           |
| $I_g$                      | Quiescent current                             | $(\tau)$                                                         |      | 350  | 600  | $\mu\text{A}$                |
| $\Delta I_g$               | Quiescent current change                      | $I_O=1$ to $200\text{mA}$                                        |      |      | 100  | $\mu\text{A}$                |
|                            |                                               | $V_{in}=1$ to $20\text{V}$                                       |      |      | 100  | $\mu\text{A}$                |
| $V_n$                      | Output noise voltage                          | $f=10\text{Hz}$ to $10\text{Hz}$                                 |      | 75   |      | $\mu\text{V rms}$            |
| $\Delta V_{in}/\Delta V_O$ | Ripple rejection                              | $V_{in}=1$ to $20\text{V}$<br>$f=120\text{Hz}$                   | 48   | 62   |      | dB                           |
| $V_{in}$                   | Input voltage required to maintain regulation |                                                                  |      | 4.7  |      | V                            |
| $\Delta V_O/\Delta T$      | Average temperature coefficient of $V_O$      | $I_O=5.0\text{mA}^{(\tau)}$                                      |      | 0.1  |      | $\text{mV}/^{\circ}\text{C}$ |

**ZSR330 test conditions** (Unless otherwise stated):  $T_j=25^{\circ}\text{C}$ ,  $I_O=100\text{mA}$ ,  $V_{in}=7.3\text{V}$

| Symbol                     | Parameter                                     | Conditions                                                         | Min.  | Typ. | Max.  | Units                        |
|----------------------------|-----------------------------------------------|--------------------------------------------------------------------|-------|------|-------|------------------------------|
| $V_O$                      | Output Voltage                                |                                                                    | 3.218 | 3.3  | 3.382 | V                            |
|                            |                                               | $I_O=1$ to $200\text{mA}^{(\tau)}$                                 | 3.168 |      | 3.432 | V                            |
|                            |                                               | $V_{in}=5.3$ to $20\text{V}$<br>$I_O=1$ to $100\text{mA}^{(\tau)}$ | 3.168 |      | 3.432 | V                            |
| $\Delta V_O$               | Line regulation                               | $V_{in}=5.3$ to $20\text{V}$                                       |       | 7.5  | 30    | mV                           |
| $\Delta V_O$               | Load regulation                               | $I_O=1$ to $200\text{mA}$                                          |       | 5    | 25    | mV                           |
|                            |                                               | $I_O=1$ to $100\text{mA}$                                          |       | 2    |       | mV                           |
| $I_g$                      | Quiescent current                             | $(\tau)$                                                           |       | 350  | 600   | $\mu\text{A}$                |
| $\Delta I_g$               | Quiescent current change                      | $I_O=1$ to $200\text{mA}$                                          |       |      | 100   | $\mu\text{A}$                |
|                            |                                               | $V_{in}=5.3$ to $20\text{V}$                                       |       |      | 100   | $\mu\text{A}$                |
| $V_n$                      | Output noise voltage                          | $f=10\text{Hz}$ to $10\text{Hz}$                                   |       | 50   |       | $\mu\text{V rms}$            |
| $\Delta V_{in}/\Delta V_O$ | Ripple rejection                              | $V_{in}=6.3$ to $18\text{V}$<br>$f=120\text{Hz}$                   | 50    | 64   |       | dB                           |
| $V_{in}$                   | Input voltage required to maintain regulation |                                                                    |       | 5    |       | V                            |
| $\Delta V_O/\Delta T$      | Average temperature coefficient of $V_O$      | $I_O=5.0\text{mA}^{(\tau)}$                                        |       | 0.1  |       | $\text{mV}/^{\circ}\text{C}$ |

### NOTES:

$(\tau)T_j=-55$  to  $125^{\circ}\text{C}$

## ZSR SERIES

**ZSR500 test conditions** (Unless otherwise stated):  $T_j=25^{\circ}\text{C}$ ,  $I_O=100\text{mA}$ ,  $V_{in}=9\text{V}$

| Symbol                     | Parameter                                     | Conditions                                                       | Min.  | Typ. | Max.  | Units                        |
|----------------------------|-----------------------------------------------|------------------------------------------------------------------|-------|------|-------|------------------------------|
| $V_O$                      | Output Voltage                                |                                                                  | 4.875 | 5    | 5.126 | V                            |
|                            |                                               | $I_O=1$ to $200\text{mA}^{(\tau)}$                               | 4.8   |      | 5.2   | V                            |
|                            |                                               | $V_{in}=7$ to $20\text{V}$<br>$I_O=1$ to $100\text{mA}^{(\tau)}$ | 4.8   |      | 5.2   | V                            |
| $\Delta V_O$               | Line regulation                               | $V_{in}=7$ to $20\text{V}$                                       |       | 10   | 40    | mV                           |
| $\Delta V_O$               | Load regulation                               | $I_O=1$ to $200\text{mA}$                                        |       | 5    | 25    | mV                           |
|                            |                                               | $I_O=1$ to $100\text{mA}$                                        |       | 2    |       | mV                           |
| $I_g$                      | Quiescent current                             | $(\tau)$                                                         |       | 350  | 600   | $\mu\text{A}$                |
| $\Delta I_g$               | Quiescent current change                      | $I_O=1$ to $200\text{mA}$                                        |       |      | 100   | $\mu\text{A}$                |
|                            |                                               | $V_{in}=7$ to $20\text{V}$                                       |       |      | 100   | $\mu\text{A}$                |
| $V_n$                      | Output noise voltage                          | $f=10\text{Hz}$ to $10\text{Hz}$                                 |       | 75   |       | $\mu\text{V rms}$            |
| $\Delta V_{in}/\Delta V_O$ | Ripple rejection                              | $V_{in}=8$ to $18\text{V}$<br>$f=120\text{Hz}$                   | 48    | 62   |       | dB                           |
| $V_{in}$                   | Input voltage required to maintain regulation |                                                                  | 7     | 6.7  |       | V                            |
| $\Delta V_O/\Delta T$      | Average temperature coefficient of $V_O$      | $I_O=5.0\text{mA}^{(\tau)}$                                      |       | 0.1  |       | $\text{mV}/^{\circ}\text{C}$ |

**ZSR800 test conditions** (Unless otherwise stated):  $T_j=25^{\circ}\text{C}$ ,  $I_O=100\text{mA}$ ,  $V_{in}=12\text{V}$

| Symbol                     | Parameter                                     | Conditions                                                        | Min. | Typ. | Max. | Units                        |
|----------------------------|-----------------------------------------------|-------------------------------------------------------------------|------|------|------|------------------------------|
| $V_O$                      | Output Voltage                                |                                                                   | 7.8  | 8    | 8.25 | V                            |
|                            |                                               | $I_O=1$ to $200\text{mA}^{(\tau)}$                                | 7.68 |      | 8.32 | V                            |
|                            |                                               | $V_{in}=10$ to $20\text{V}$<br>$I_O=1$ to $100\text{mA}^{(\tau)}$ | 7.68 |      | 8.32 | V                            |
| $\Delta V_O$               | Line regulation                               | $V_{in}=10$ to $20\text{V}$                                       |      | 11   | 40   | mV                           |
| $\Delta V_O$               | Load regulation                               | $I_O=1$ to $200\text{mA}$                                         |      | 8    | 30   | mV                           |
|                            |                                               | $I_O=1$ to $100\text{mA}$                                         |      | 3    |      | mV                           |
| $I_g$                      | Quiescent current                             | $(\tau)$                                                          |      | 350  | 600  | $\mu\text{A}$                |
| $\Delta I_g$               | Quiescent current change                      | $I_O=1$ to $200\text{mA}$                                         |      |      | 100  | $\mu\text{A}$                |
|                            |                                               | $V_{in}=10$ to $20\text{V}$                                       |      |      | 100  | $\mu\text{A}$                |
| $V_n$                      | Output noise voltage                          | $f=10\text{Hz}$ to $10\text{Hz}$                                  |      | 115  |      | $\mu\text{V rms}$            |
| $\Delta V_{in}/\Delta V_O$ | Ripple rejection                              | $V_{in}=11$ to $18\text{V}$<br>$f=120\text{Hz}$                   | 44   | 60   |      | dB                           |
| $V_{in}$                   | Input voltage required to maintain regulation |                                                                   |      | 9.7  |      | V                            |
| $\Delta V_O/\Delta T$      | Average temperature coefficient of $V_O$      | $I_O=5.0\text{mA}^{(\tau)}$                                       |      | 0.25 |      | $\text{mV}/^{\circ}\text{C}$ |

**NOTES:**

$(\tau) T_j=-55$  to  $125^{\circ}\text{C}$

# ZSR SERIES

**ZSR1000 test conditions** (Unless otherwise stated):  $T_j=25^{\circ}\text{C}$ ,  $I_O=100\text{mA}$ ,  $V_{in}=14\text{V}$

| Symbol                     | Parameter                                     | Conditions                                                        | Min. | Typ. | Max.  | Units                        |
|----------------------------|-----------------------------------------------|-------------------------------------------------------------------|------|------|-------|------------------------------|
| $V_O$                      | Output Voltage                                |                                                                   | 9.75 | 10   | 10.25 | V                            |
|                            |                                               | $I_O=1$ to $200\text{mA}^{(\tau)}$                                | 9.6  |      | 10.4  | V                            |
|                            |                                               | $V_{in}=12$ to $20\text{V}$<br>$I_O=1$ to $100\text{mA}^{(\tau)}$ | 9.6  |      | 10.4  | V                            |
| $\Delta V_O$               | Line regulation                               | $V_{in}=12$ to $20\text{V}$                                       |      | 12   | 40    | mV                           |
| $\Delta V_O$               | Load regulation                               | $I_O=1$ to $200\text{mA}$                                         |      | 9    | 30    | mV                           |
|                            |                                               | $I_O=1$ to $100\text{mA}$                                         |      | 3    |       | mV                           |
| $I_g$                      | Quiescent current                             | $(\tau)$                                                          |      | 350  | 600   | $\mu\text{A}$                |
| $\Delta I_g$               | Quiescent current change                      | $I_O=1$ to $200\text{mA}$                                         |      |      | 100   | $\mu\text{A}$                |
|                            |                                               | $V_{in}=12$ to $20\text{V}$                                       |      |      | 100   | $\mu\text{A}$                |
| $V_n$                      | Output noise voltage                          | $f=10\text{Hz}$ to $10\text{Hz}$                                  |      | 150  |       | $\mu\text{V rms}$            |
| $\Delta V_{in}/\Delta V_O$ | Ripple rejection                              | $V_{in}=13$ to $18\text{V}$<br>$f=120\text{Hz}$                   | 43   | 57   |       | dB                           |
| $V_{in}$                   | Input voltage required to maintain regulation |                                                                   |      | 11.7 |       | V                            |
| $\Delta V_O/\Delta T$      | Average temperature coefficient of $V_O$      | $I_O=5.0\text{mA}^{(\tau)}$                                       |      | 0.25 |       | $\text{mV}/^{\circ}\text{C}$ |

**ZSR1200 test conditions** (Unless otherwise stated):  $T_j=25^{\circ}\text{C}$ ,  $I_O=100\text{mA}$ ,  $V_{in}=16\text{V}$

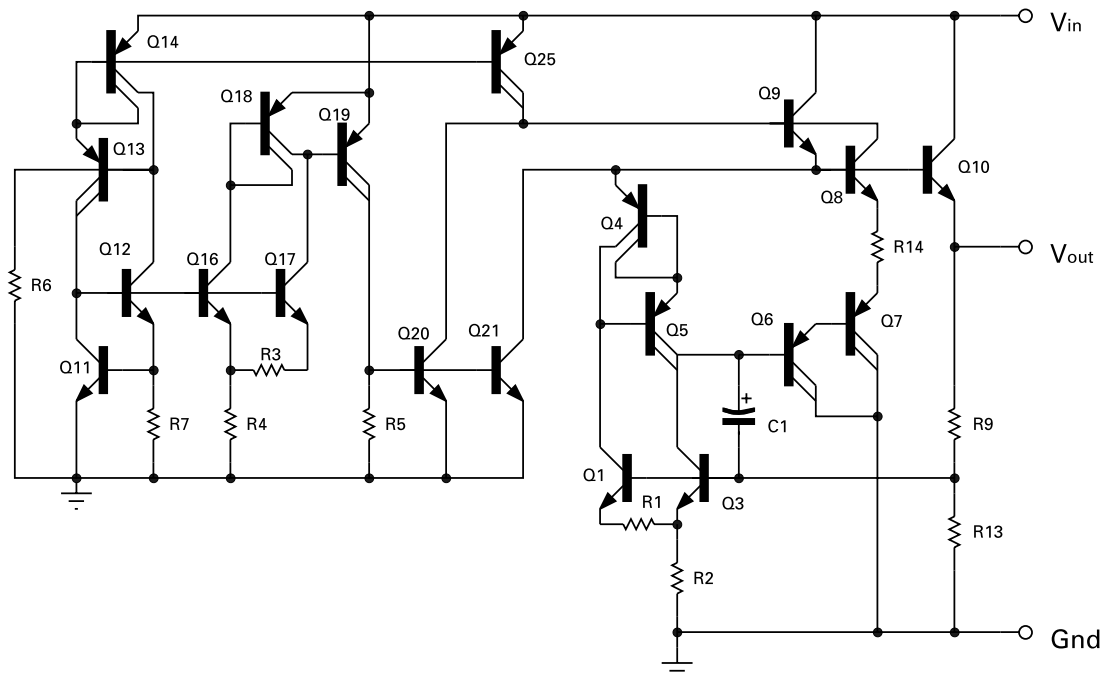
| Symbol                     | Parameter                                     | Conditions                                                        | Min.  | Typ. | Max.  | Units                        |
|----------------------------|-----------------------------------------------|-------------------------------------------------------------------|-------|------|-------|------------------------------|
| $V_O$                      | Output Voltage                                |                                                                   | 11.7  | 12   | 12.3  | V                            |
|                            |                                               | $I_O=1$ to $200\text{mA}^{(\tau)}$                                | 11.52 |      | 12.48 | V                            |
|                            |                                               | $V_{in}=14$ to $20\text{V}$<br>$I_O=1$ to $100\text{mA}^{(\tau)}$ | 11.52 |      | 12.48 | V                            |
| $\Delta V_O$               | Line regulation                               | $V_{in}=14$ to $20\text{V}$                                       |       | 12   | 40    | mV                           |
| $\Delta V_O$               | Load regulation                               | $I_O=1$ to $200\text{mA}$                                         |       | 9    | 30    | mV                           |
|                            |                                               | $I_O=1$ to $100\text{mA}$                                         |       | 3    |       | mV                           |
| $I_g$                      | Quiescent current                             | $(\tau)$                                                          |       | 350  | 600   | $\mu\text{A}$                |
| $\Delta I_g$               | Quiescent current change                      | $I_O=1$ to $200\text{mA}$                                         |       |      | 100   | $\mu\text{A}$                |
|                            |                                               | $V_{in}=14$ to $20\text{V}$                                       |       |      | 100   | $\mu\text{A}$                |
| $V_n$                      | Output noise voltage                          | $f=10\text{Hz}$ to $10\text{Hz}$                                  |       | 150  |       | $\mu\text{V rms}$            |
| $\Delta V_{in}/\Delta V_O$ | Ripple rejection                              | $V_{in}=15$ to $18\text{V}$<br>$f=120\text{Hz}$                   | 43    | 57   |       | dB                           |
| $V_{in}$                   | Input voltage required to maintain regulation |                                                                   |       | 13.7 |       | V                            |
| $\Delta V_O/\Delta T$      | Average temperature coefficient of $V_O$      | $I_O=5.0\text{mA}^{(\tau)}$                                       |       | 0.25 |       | $\text{mV}/^{\circ}\text{C}$ |

## NOTES:

$(\tau) T_j = -55$  to  $125^{\circ}\text{C}$

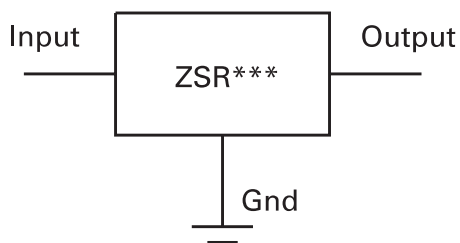
# ZSR SERIES

## Schematic diagram

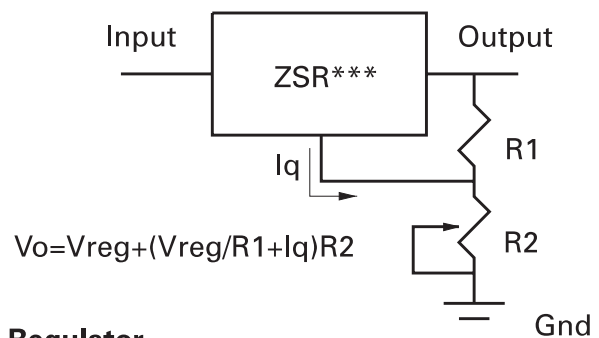


## Applications

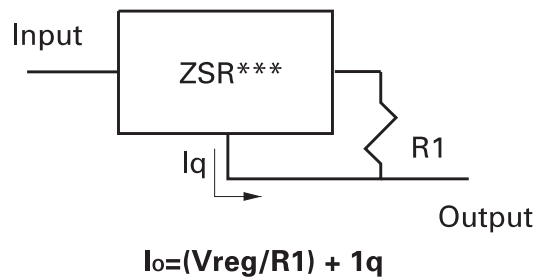
### Fixed Output Regulator



### Adjustable Output Regulator

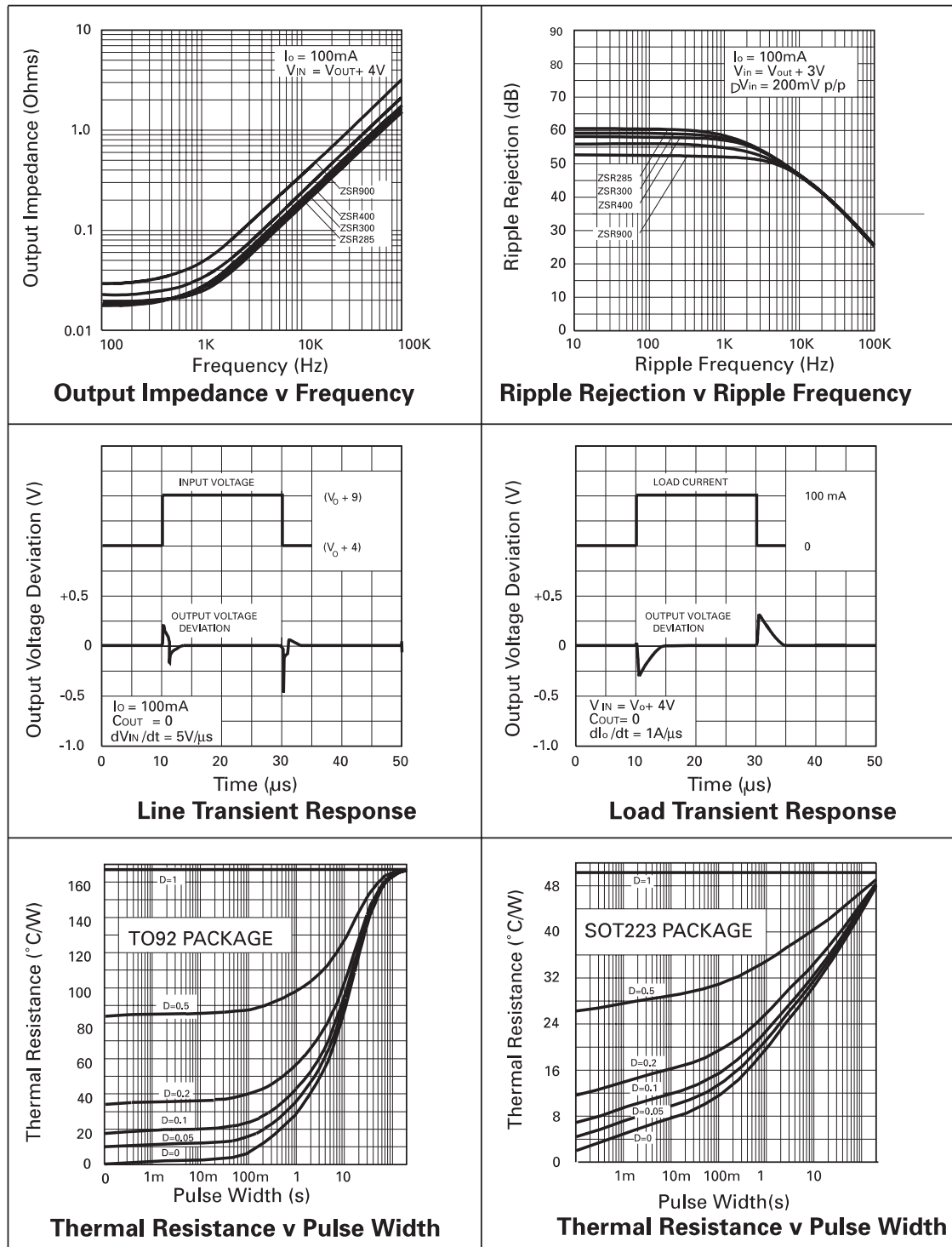


### Current Regulator



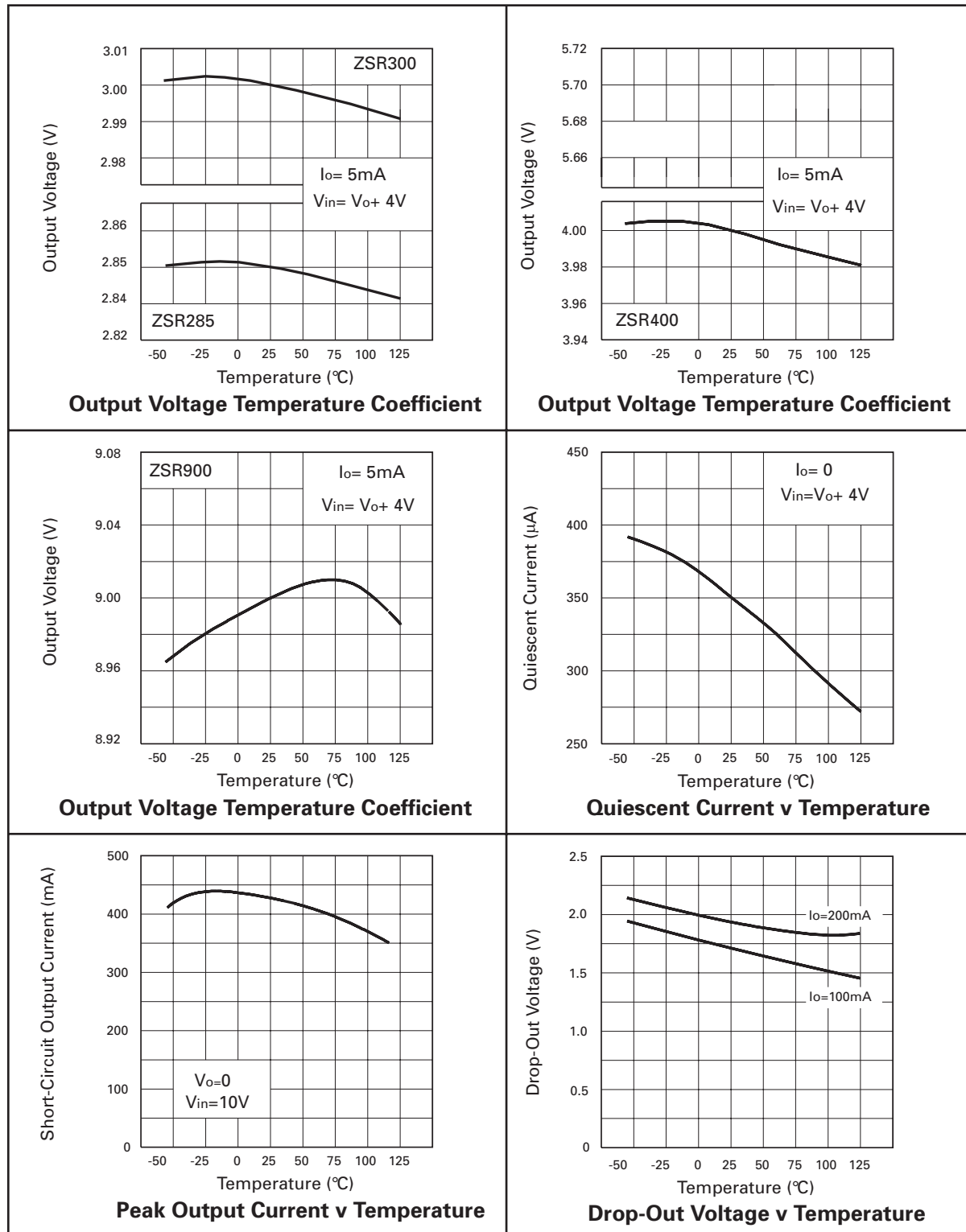
# ZSR SERIES

## Typical characteristics



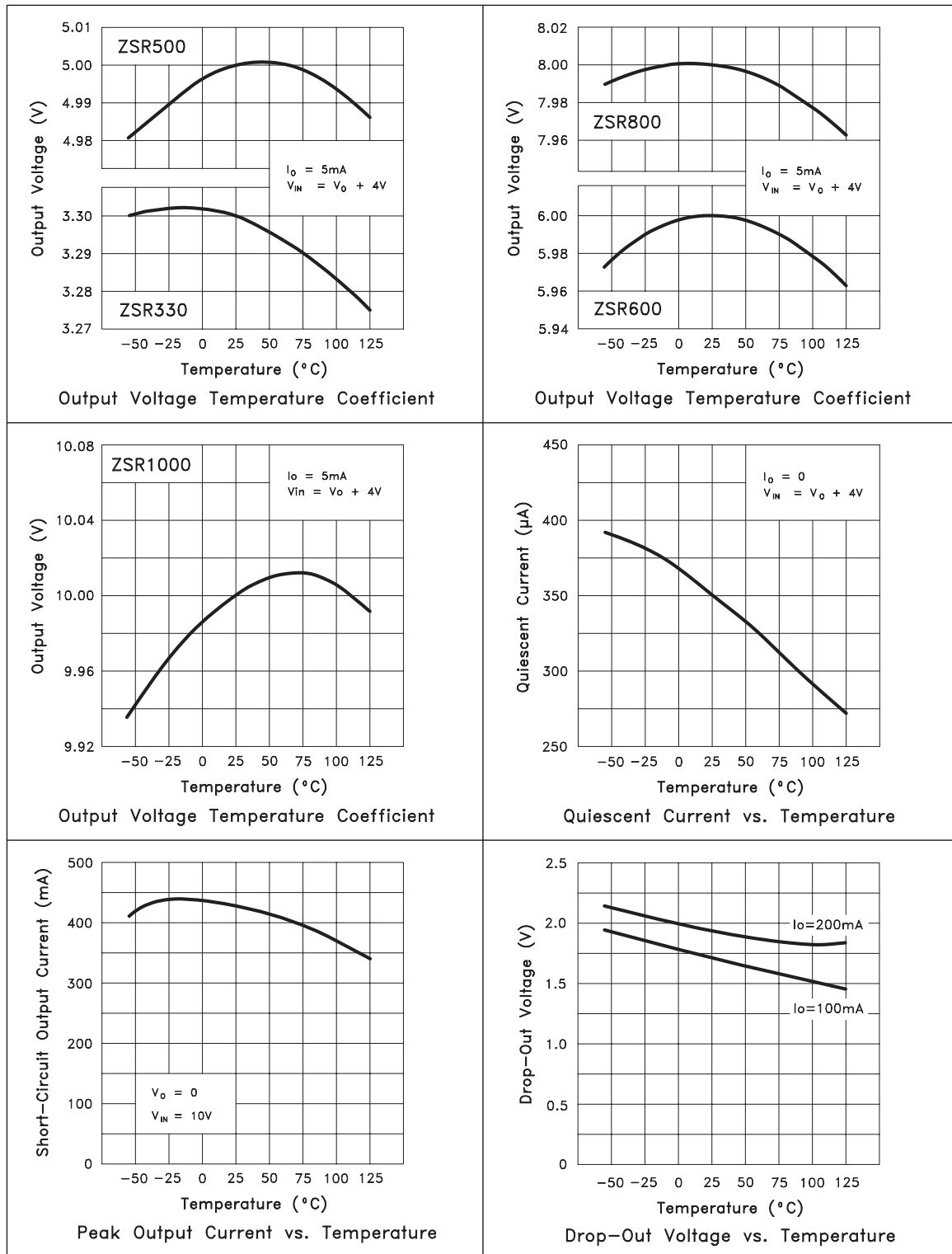
# ZSR SERIES

## Typical characteristics



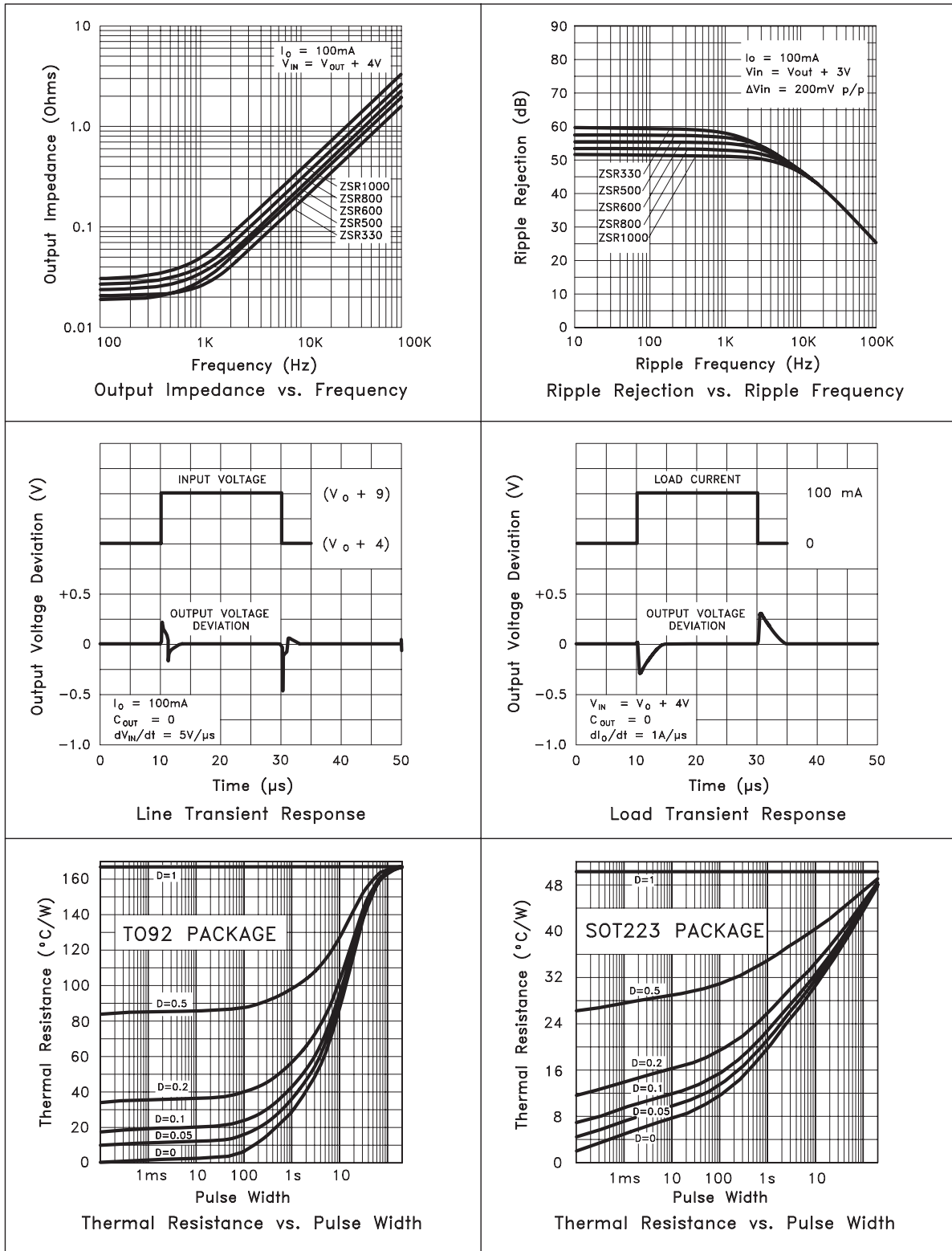
# ZSR SERIES

## Typical characteristics



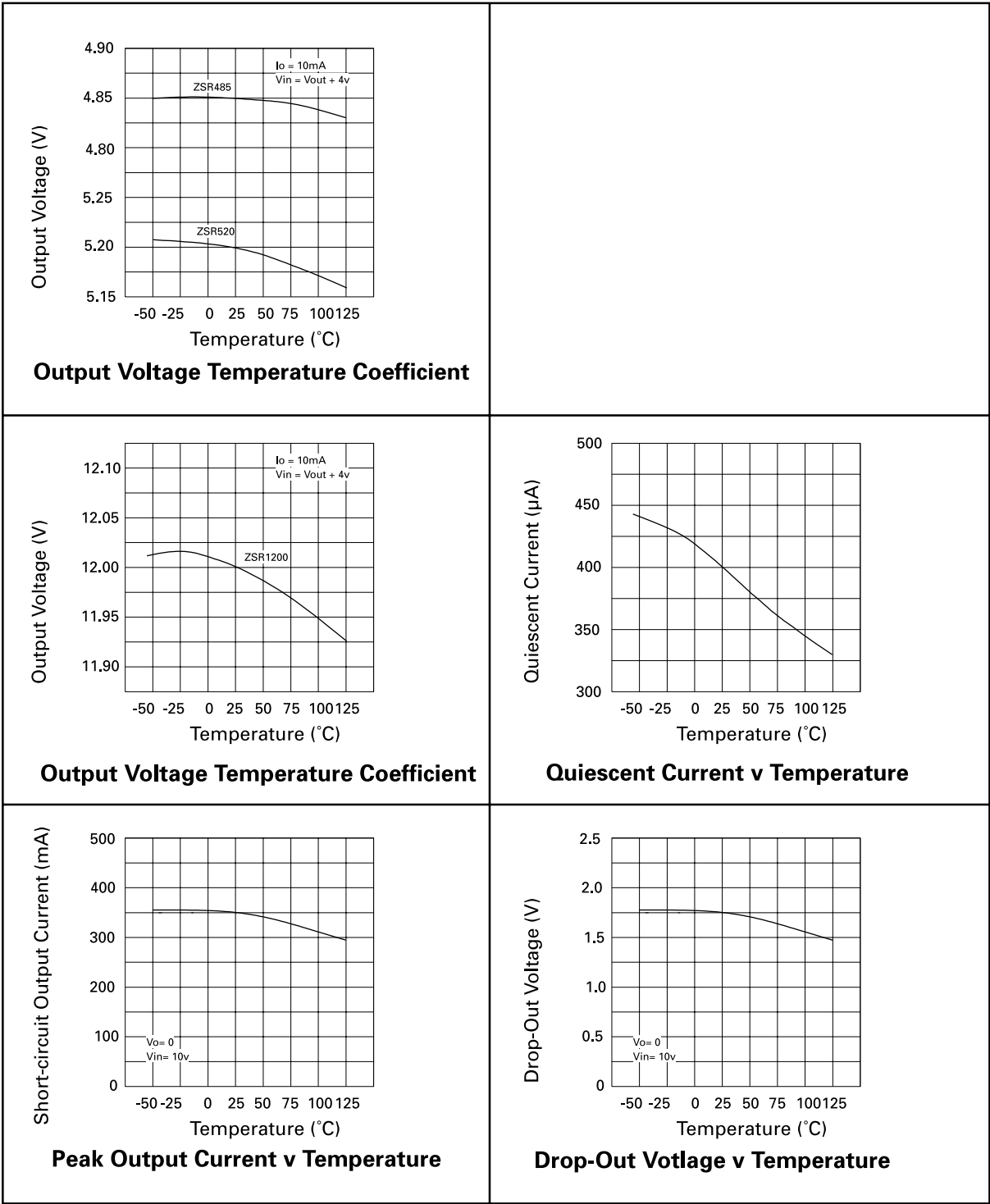
# ZSR SERIES

## Typical characteristics



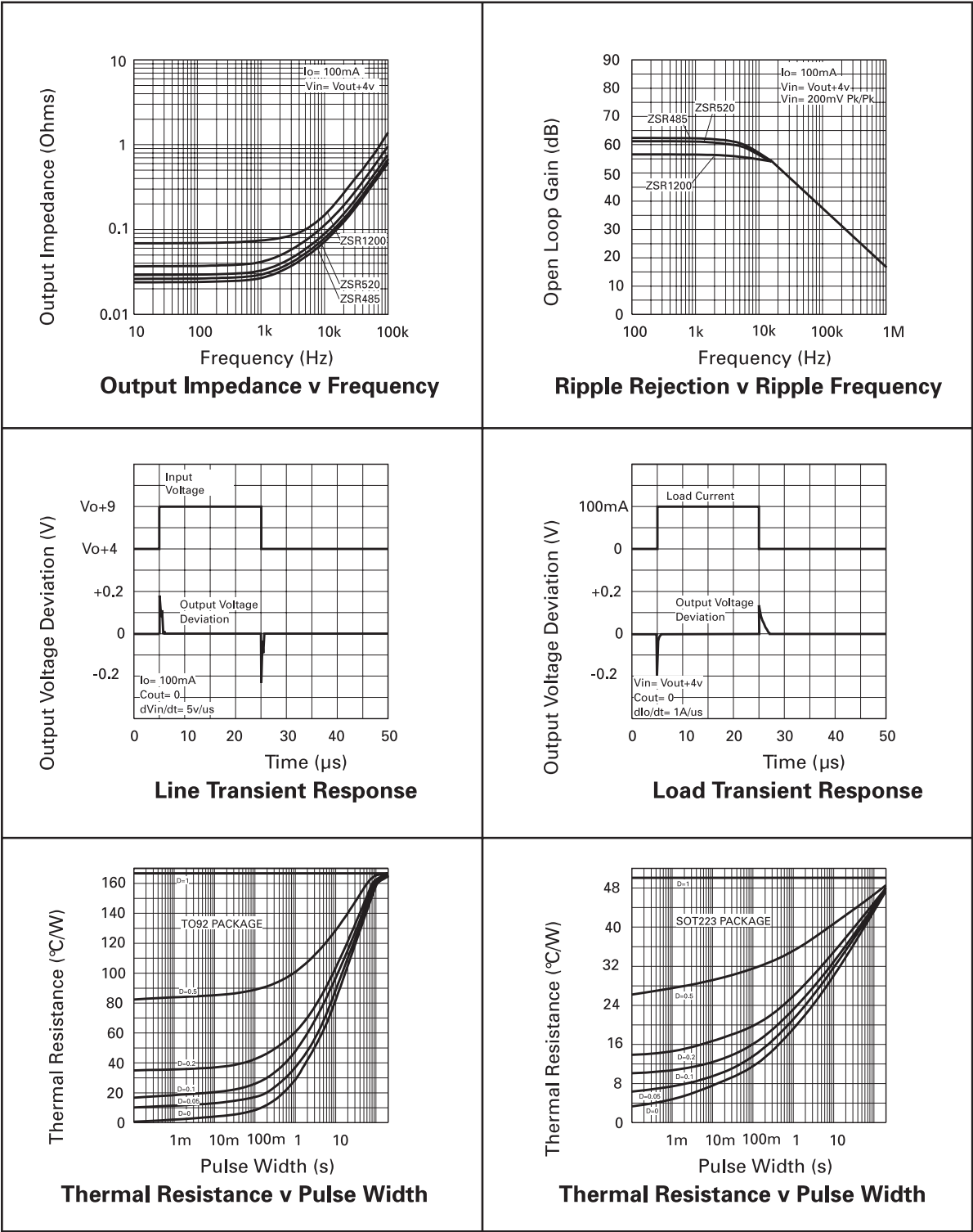
# ZSR SERIES

## Typical characteristics



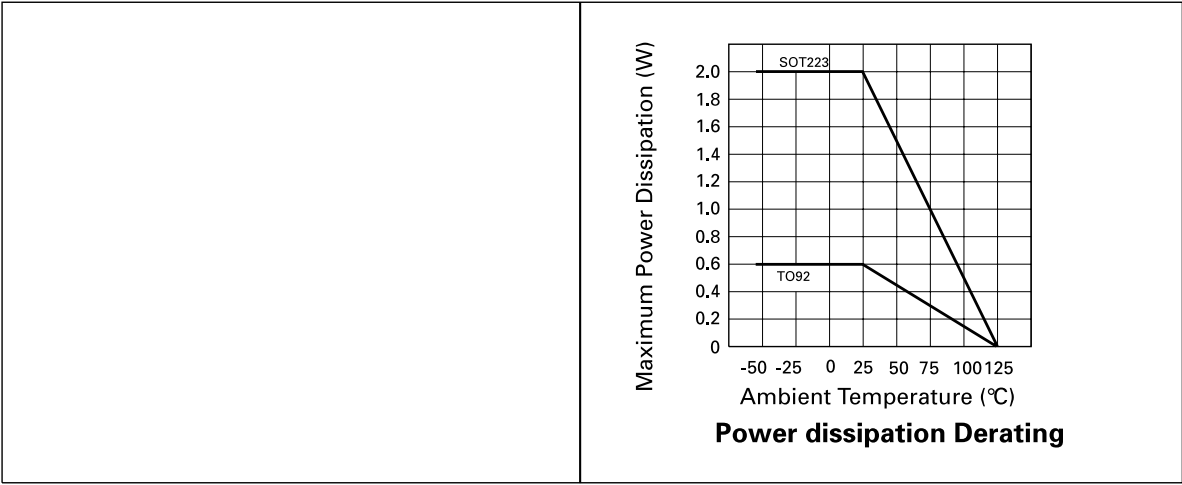
# ZSR SERIES

## Typical characteristics



# ZSR SERIES

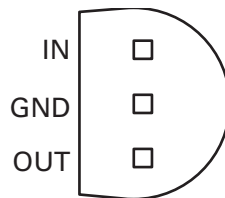
## Typical characteristics



# ZSR SERIES

## Obsolete Variants

### TO92 Package suffix - C



Underside view

### SOT223 Order information

| Orderable | Voltage | Part marking | Status   | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-----------|---------|--------------|----------|--------------------|-----------------|-------------------|
| ZSR285GTA | 2.85V   | ZSR285       | Obsolete | 7                  | 12              | 1000              |
| ZSR400GTA | 4.0V    | ZSR400       | Obsolete | 7                  | 12              | 1000              |
| ZSR485GTA | 4.85V   | ZSR485       | Obsolete | 7                  | 12              | 1000              |
| ZSR520GTA | 5.2V    | ZSR520       | Obsolete | 7                  | 12              | 1000              |
| ZSR600GTA | 6.0V    | ZSR600       | Obsolete | 7                  | 12              | 1000              |
| ZSR900GTA | 9.0V    | ZSR900       | Obsolete | 7                  | 12              | 1000              |

### TO92 Order information

| Part Number | Voltage | Part marking | Status   | Orderable |
|-------------|---------|--------------|----------|-----------|
| ZSR285      | 2.85V   | ZSR285       | Obsolete | ZSR285C*  |
| ZSR300      | 3.0V    | ZSR300       | Obsolete | ZSR300C*  |
| ZSR330      | 3.3V    | ZSR330       | Obsolete | ZSR330C*  |
| ZSR400      | 4.0V    | ZSR400       | Obsolete | ZSR400C*  |
| ZSR485      | 4.85V   | ZSR485       | Obsolete | ZSR485C*  |
| ZSR500      | 5.0V    | ZSR500       | Obsolete | ZSR500C*  |
| ZSR520      | 5.2V    | ZSR520       | Obsolete | ZSR520C*  |
| ZSR600      | 6.0V    | ZSR600       | Obsolete | ZSR600C*  |
| ZSR800      | 8.0V    | ZSR800       | Obsolete | ZSR800C*  |
| ZSR900      | 9.0V    | ZSR900       | Obsolete | ZSR900C*  |
| ZSR1000     | 10.0V   | ZSR100       | Obsolete | ZSR1000C* |
| ZSR1200     | 12.0V   | ZSR1200      | Obsolete | ZSR1200C* |

#### NOTES:

\* TO92 was supplied in the following reel options:

loose in boxes of 4000

suffix: L

taped and wound on a reel of 1500

suffix: STOB

taped and folded in concertina form of 1500

suffix: STZ

# ZSR SERIES

## ZSR285 test conditions

=6.85V

| Symbol       | Parameter                                     | Conditions                          | Min.  | Typ. | Max.  | Units |
|--------------|-----------------------------------------------|-------------------------------------|-------|------|-------|-------|
| $V_O$        | Output Voltage                                |                                     | 2.78  | 2.85 | 2.92  | V     |
|              |                                               | $I_O=1$ to 200mA <sup>( )</sup>     | 2.735 |      | 2.964 | V     |
|              |                                               | $V_{in}=4.85$ to 20V                | 2.736 |      | 2.964 | V     |
|              |                                               | $I_O=1$ to 100mA <sup>( )</sup>     |       |      |       |       |
| $V_O$        | Line regulation                               | $V_{in}=4.85$ to 20V                |       | 10   | 40    | mV    |
| $V_O$        | Load regulation                               | $I_O=1$ to 200mA                    |       | 5    | 25    | mV    |
|              |                                               | $I_O=1$ to 100mA                    |       | 2    |       | mV    |
| $I_g$        | Quiescent current                             | ( )                                 |       | 350  | 600   | A     |
| $I_g$        | Quiescent current change                      | $I_O=1$ to 200mA                    |       |      | 100   | A     |
|              |                                               | $V_{in}=4.85$ to 20V                |       |      | 100   | A     |
| $V_n$        | Output noise voltage                          | $f=10$ Hz to 10Hz                   |       | 75   |       | V rms |
| $V_{in}/V_O$ | Ripple rejection                              | $V_{in}=5.85$ to 218V<br>$f=120$ Hz | 48    | 62   |       | dB    |
| $V_{in}$     | Input voltage required to maintain regulation |                                     | 4.85  | 4.55 |       | V     |
| $V_O/T$      | Average temperature coefficient of $V_O$      | $I_O=5.0$ mA <sup>( )</sup>         |       | 0.1  |       | mV/°C |

## ZSR400 test conditions (Unless otherwise stated): $T_J=25^\circ\text{C}$ , $I_O=100\text{mA}$ , $V_{in}=8\text{V}$

| Symbol       | Parameter                                     | Conditions                       | Min. | Typ. | Max. | Units |
|--------------|-----------------------------------------------|----------------------------------|------|------|------|-------|
| $V_O$        | Output Voltage                                |                                  | 3.9  | 4.0  | 4.1  | V     |
|              |                                               | $I_O=1$ to 200mA <sup>( )</sup>  | 3.84 |      | 4.16 | V     |
|              |                                               | $V_{in}=6$ to 20V                | 3.84 |      | 4.16 | V     |
|              |                                               | $I_O=1$ to 100mA <sup>( )</sup>  |      |      |      |       |
| $V_O$        | Line regulation                               | $V_{in}=6$ to 20V                |      | 10   | 40   | mV    |
| $V_O$        | Load regulation                               | $I_O=1$ to 200mA                 |      | 5    | 25   | mV    |
|              |                                               | $I_O=1$ to 100mA                 |      | 2    |      | mV    |
| $I_g$        | Quiescent current                             | ( )                              |      | 350  | 600  | A     |
| $I_g$        | Quiescent current change                      | $I_O=1$ to 200mA                 |      |      | 100  | A     |
|              |                                               | $V_{in}=6$ to 20V                |      |      | 100  | A     |
| $V_n$        | Output noise voltage                          | $f=10$ Hz to 10Hz                |      | 75   |      | V rms |
| $V_{in}/V_O$ | Ripple rejection                              | $V_{in}=7$ to 218V<br>$f=120$ Hz | 48   | 62   |      | dB    |
| $V_{in}$     | Input voltage required to maintain regulation |                                  | 6    | 5.3  |      | V     |

### NOTES:

( )  $T_J=-55$  to  $125^\circ\text{C}$

## ZSR SERIES

**ZSR485 test conditions** (Unless otherwise stated):  $T_j=25^{\circ}\text{C}$ ,  $I_O=100\text{mA}$ ,  $V_{in}=8.85\text{V}$

|              |                                               |                                                                 |       |        |            |                        |
|--------------|-----------------------------------------------|-----------------------------------------------------------------|-------|--------|------------|------------------------|
| $V_O$        | Output Voltage                                |                                                                 | 4.792 | 4.85   | 4.971      | V                      |
|              |                                               | $I_O=1$ to $200\text{mA}^{( )}$                                 | 4.656 |        | 5.044      | V                      |
|              |                                               | $V_{in}=6.8$ to $20\text{V}$<br>$I_O=1$ to $100\text{mA}^{( )}$ | 4.656 |        | 5.044      | V                      |
| $V_O$        | Line regulation                               | $V_{in}=6.85$ to $20\text{V}$                                   |       | 10     | 40         | mV                     |
| $V_O$        | Load regulation                               | $I_O=1$ to $200\text{mA}$<br>$I_O=1$ to $100\text{mA}$          |       | 5<br>2 | 25         | mV<br>mV               |
| $I_g$        | Quiescent current                             | ( )                                                             |       | 350    | 600        | A                      |
| $I_g$        | Quiescent current change                      | $I_O=1$ to $200\text{mA}$<br>$V_{in}=6.85$ to $20\text{V}$      |       |        | 100<br>100 | A<br>A                 |
| $V_n$        | Output noise voltage                          | $f=10\text{Hz}$ to $10\text{Hz}$                                |       | 50     |            | V rms                  |
| $V_{in}/V_O$ | Ripple rejection                              | $V_{in}=7.85$ to $18\text{V}$<br>$f=120\text{Hz}$               | 50    | 64     |            | dB                     |
| $V_{in}$     | Input voltage required to maintain regulation |                                                                 | 6.85  | 6.55   |            | V                      |
| $V_O/T$      | Average temperature coefficient of $V_O$      | $I_O=5.0\text{mA}^{( )}$                                        |       | 0.1    |            | mV/ $^{\circ}\text{C}$ |

**ZSR520 test conditions** (Unless otherwise stated):  $T_j=25^{\circ}\text{C}$ ,  $I_O=100\text{mA}$ ,  $V_{in}=100\text{mV}$

|              |                                               |                                                                 |       |        |            |                        |
|--------------|-----------------------------------------------|-----------------------------------------------------------------|-------|--------|------------|------------------------|
| $V_O$        | Output Voltage                                |                                                                 | 5.070 | 5.2    | 5.330      | V                      |
|              |                                               | $I_O=1$ to $200\text{mA}^{( )}$                                 | 4.99  |        | 5.41       | V                      |
|              |                                               | $V_{in}=7.2$ to $20\text{V}$<br>$I_O=1$ to $100\text{mA}^{( )}$ | 4.99  |        | 5.41       | V                      |
| $V_O$        | Line regulation                               | $V_{in}=7.2$ to $20\text{V}$                                    |       | 10     | 40         | mV                     |
| $V_O$        | Load regulation                               | $I_O=1$ to $200\text{mA}$<br>$I_O=1$ to $100\text{mA}$          |       | 5<br>2 | 25         | mV<br>mV               |
| $I_g$        | Quiescent current                             | ( )                                                             |       | 350    | 600        | A                      |
| $I_g$        | Quiescent current change                      | $I_O=1$ to $200\text{mA}$<br>$V_{in}=7.2$ to $20\text{V}$       |       |        | 100<br>100 | A<br>A                 |
| $V_n$        | Output noise voltage                          | $f=10\text{Hz}$ to $10\text{Hz}$                                |       | 75     |            | V rms                  |
| $V_{in}/V_O$ | Ripple rejection                              | $V_{in}=8.2$ to $18\text{V}$<br>$f=120\text{Hz}$                | 48    | 62     |            | dB                     |
| $V_{in}$     | Input voltage required to maintain regulation |                                                                 | 7.2   | 6.9    |            | V                      |
| $V_O/T$      | Average temperature coefficient of $V_O$      | $I_O=5.0\text{mA}^{( )}$                                        |       | 0.1    |            | mV/ $^{\circ}\text{C}$ |

( )  $T_j=-55$  to  $125^{\circ}\text{C}$

## ZSR SERIES

**ZSR600 test conditions** (Unless otherwise stated):  $T_j=25^{\circ}\text{C}$ ,  $I_O=100\text{mA}$ ,  $V_{in}=10\text{V}$

| Symbol                     | Parameter                                     | Conditions                                                       | Min. | Typ. | Max. | Units                        |
|----------------------------|-----------------------------------------------|------------------------------------------------------------------|------|------|------|------------------------------|
| $V_O$                      | Output Voltage                                |                                                                  | 5.85 | 6    | 6.15 | V                            |
|                            |                                               | $I_O=1$ to $200\text{mA}^{(\tau)}$                               | 5.76 |      | 6.24 | V                            |
|                            |                                               | $V_{in}=8$ to $20\text{V}$<br>$I_O=1$ to $100\text{mA}^{(\tau)}$ | 5.76 |      | 6.24 | V                            |
| $\Delta V_O$               | Line regulation                               | $V_{in}=8$ to $20\text{V}$                                       |      | 10   | 40   | mV                           |
| $\Delta V_O$               | Load regulation                               | $I_O=1$ to $200\text{mA}$                                        |      | 7    | 30   | mV                           |
|                            |                                               | $I_O=1$ to $100\text{mA}$                                        |      | 2.5  |      | mV                           |
| $I_g$                      | Quiescent current                             | $(\tau)$                                                         |      | 350  | 600  | $\mu\text{A}$                |
| $\Delta I_g$               | Quiescent current change                      | $I_O=1$ to $200\text{mA}$                                        |      |      | 100  | $\mu\text{A}$                |
|                            |                                               | $V_{in}=8$ to $20\text{V}$                                       |      |      | 100  | $\mu\text{A}$                |
| $V_n$                      | Output noise voltage                          | $f=10\text{Hz}$ to $10\text{Hz}$                                 |      | 90   |      | $\mu\text{V rms}$            |
| $\Delta V_{in}/\Delta V_O$ | Ripple rejection                              | $V_{in}=9$ to $18\text{V}$<br>$f=120\text{Hz}$                   | 48   | 62   |      | dB                           |
| $V_{in}$                   | Input voltage required to maintain regulation |                                                                  | 8    | 7.7  |      | V                            |
| $\Delta V_O/\Delta T$      | Average temperature coefficient of $V_O$      | $I_O=5.0\text{mA}^{(\tau)}$                                      |      | 0.15 |      | $\text{mV}/^{\circ}\text{C}$ |

**ZSR900 test conditions** (Unless otherwise stated):  $T_j=25^{\circ}\text{C}$ ,  $I_O=100\text{mA}$ ,  $V_{in}=13\text{V}$

| Symbol                     | Parameter                                     | Conditions                                                        | Min.  | Typ. | Max.  | Units                        |
|----------------------------|-----------------------------------------------|-------------------------------------------------------------------|-------|------|-------|------------------------------|
| $V_O$                      | Output Voltage                                |                                                                   | 8.775 | 9.0  | 9.225 | V                            |
|                            |                                               | $I_O=1$ to $200\text{mA}^{(\tau)}$                                | 8.64  |      | 9.36  | V                            |
|                            |                                               | $V_{in}=11$ to $20\text{V}$<br>$I_O=1$ to $100\text{mA}^{(\tau)}$ | 8.64  |      | 9.36  | V                            |
| $\Delta V_O$               | Line regulation                               | $V_{in}=11$ to $20\text{V}$                                       |       | 12   | 40    | mV                           |
| $\Delta V_O$               | Load regulation                               | $I_O=1$ to $200\text{mA}$                                         |       | 9    | 30    | mV                           |
|                            |                                               | $I_O=1$ to $100\text{mA}$                                         |       | 3    |       | mV                           |
| $I_g$                      | Quiescent current                             | $(\tau)$                                                          |       | 350  | 600   | $\mu\text{A}$                |
| $\Delta I_g$               | Quiescent current change                      | $I_O=1$ to $200\text{mA}$                                         |       |      | 100   | $\mu\text{A}$                |
|                            |                                               | $V_{in}=11$ to $20\text{V}$                                       |       |      | 100   | $\mu\text{A}$                |
| $V_n$                      | Output noise voltage                          | $f=10\text{Hz}$ to $10\text{Hz}$                                  |       | 150  |       | $\mu\text{V rms}$            |
| $\Delta V_{in}/\Delta V_O$ | Ripple rejection                              | $V_{in}=12$ to $18\text{V}$<br>$f=120\text{Hz}$                   | 43    | 57   |       | dB                           |
| $V_{in}$                   | Input voltage required to maintain regulation |                                                                   | 11    | 10.7 |       | V                            |
| $\Delta V_O/\Delta T$      | Average temperature coefficient of $V_O$      | $I_O=5.0\text{mA}^{(\tau)}$                                       |       | 0.25 |       | $\text{mV}/^{\circ}\text{C}$ |

**NOTES:**

$(\tau) T_j=-55$  to  $125^{\circ}\text{C}$

# ZSR SERIES

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|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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