

---

**2.85 TO 12 VOLT FIXED POSITIVE  
LOCAL VOLTAGE REGULATOR**

---

**DEVICE 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 circuit design allows creation of any custom voltage in the range 2.85 to 12 volts. The devices are available in a small outline surface mount package, ideal for applications where space saving is important, as well as through hole TO92 style packaging. 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**

- Small outline SO8 and SOT223 package
- TO92 package
- 2.85 to 12 Volt
- Output current up to 200mA
- Tight initial tolerance
- Low quiescent current
- -55 to 125°C temperature range
- No external components
- Internal thermal shutdown
- Internal short circuit current limit

**VOLTAGE RANGE**

|         |       |
|---------|-------|
| ZSR285  | 2.85V |
| ZSR300  | 3.0V  |
| ZSR330  | 3.3V  |
| ZSR400  | 4.0V  |
| ZSR485  | 4.85V |
| ZSR500  | 5.0V  |
| ZSR520  | 5.2V  |
| ZSR570  | 5.7V  |
| ZSR600  | 6.0V  |
| ZSR700  | 7.0V  |
| ZSR800  | 8.0V  |
| ZSR850  | 8.5V  |
| ZSR900  | 9.0V  |
| ZSR1000 | 10.0V |
| ZSR1200 | 12.0V |

# ZSR SERIES

## ABSOLUTE MAXIMUM RATING

|                         |                              |                                                                    |               |
|-------------------------|------------------------------|--------------------------------------------------------------------|---------------|
| Input voltage           | 20V                          | <b>Power Dissipation (<math>T_{amb}=25^{\circ}\text{C}</math>)</b> |               |
| Output Current( $I_o$ ) | 200mA                        | SOT223                                                             | 2W(Note 3)    |
| Operating Temperature   | -55 to $125^{\circ}\text{C}$ | TO92                                                               | 600mW         |
| Storage Temperature     | -65 to $150^{\circ}\text{C}$ | S08                                                                | 780mW(Note 3) |

## ELECTRICAL CHARACTERISTICS

### Notes:

1. 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  $25^{\circ}\text{C}$  and must be linearly derated to zero at  $T_{amb}=125^{\circ}\text{C}$ .
2. 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.
3. Maximum power dissipation, for the SOT223 and S08 packages, is calculated assuming that the device is mounted on a PCB measuring 2 inches square.
4. 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.

### ZSR285 TEST CONDITIONS (Unless otherwise stated): $T_j=25^{\circ}\text{C}$ , $I_o=100\text{mA}$ , $V_{in}=6.85\text{V}$

| SYMBOL                     | PARAMETER                                     | CONDITIONS                                      | MIN.  | TYP.   | MAX.       | UNITS                          |
|----------------------------|-----------------------------------------------|-------------------------------------------------|-------|--------|------------|--------------------------------|
| $V_o$                      | Output Voltage                                |                                                 | 2.78  | 2.85   | 2.92       | V                              |
|                            |                                               | $I_o=1$ to 200mA $\tau$                         | 2.736 |        | 2.964      | V                              |
|                            |                                               | $V_{in}=4.85$ to 20V<br>$I_o=1$ to 100mA $\tau$ | 2.736 |        | 2.964      | V                              |
| $\Delta V_o$               | Line Regulation                               | $V_{in}=4.85$ to 20V                            |       | 10     | 40         | mV                             |
| $\Delta V_o$               | Load Regulation                               | $I_o=1$ to 200mA<br>$I_o=1$ to 100mA            |       | 5<br>2 | 25         | mV<br>mV                       |
| $I_q$                      | Quiescent Current                             | $\tau$                                          |       | 350    | 600        | $\mu\text{A}$                  |
| $\Delta I_q$               | Quiescent Current Change                      | $I_o=1$ to 200mA<br>$V_{in}=4.85$ to 20V        |       |        | 100<br>100 | $\mu\text{A}$<br>$\mu\text{A}$ |
| $V_n$                      | Output Noise Voltage                          | $f=10\text{Hz}$ to 10kHz                        |       | 75     |            | $\mu\text{V rms}$              |
| $\Delta V_{in}/\Delta V_o$ | Ripple Rejection                              | $V_{in}=5.85$ to 18V<br>$f=120\text{Hz}$        | 48    | 62     |            | dB                             |
| $V_{in}$                   | Input Voltage Required To Maintain Regulation |                                                 | 4.85  | 4.55   |            | V                              |
| $\Delta V_o/\Delta T$      | Average Temperature Coefficient of $V_o$      | $I_o=5.0\text{mA}$ $\tau$                       |       | 0.1    |            | mV/ $^{\circ}\text{C}$         |

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

## ZSR SERIES

### 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 200mA $\tau$                      | 2.88 |        | 3.12       | V                              |
|                            |                                               | $V_{in}=5$ to 20V<br>$I_O=1$ to 100mA $\tau$ | 2.88 |        | 3.12       | V                              |
| $\Delta V_O$               | Line Regulation                               | $V_{in}=5$ to 20V                            |      | 10     | 40         | mV                             |
| $\Delta V_O$               | Load Regulation                               | $I_O=1$ to 200mA<br>$I_O=1$ to 100mA         |      | 5<br>2 | 25         | mV<br>mV                       |
| $I_q$                      | Quiescent Current                             | $\tau$                                       |      | 350    | 600        | $\mu\text{A}$                  |
| $\Delta I_q$               | Quiescent Current Change                      | $I_O=1$ to 200mA<br>$V_{in}=5$ to 20V        |      |        | 100<br>100 | $\mu\text{A}$<br>$\mu\text{A}$ |
| $V_n$                      | Output Noise Voltage                          | $f=10\text{Hz}$ to 10kHz                     |      | 75     |            | $\mu\text{V rms}$              |
| $\Delta V_{in}/\Delta V_O$ | Ripple Rejection                              | $V_{in}=6$ to 18V<br>$f=120\text{Hz}$        | 48   | 62     |            | dB                             |
| $V_{in}$                   | Input Voltage Required To Maintain Regulation |                                              | 5    | 4.7    |            | V                              |
| $\Delta V_O/\Delta T$      | Average Temperature Coefficient of $V_O$      | $I_O=5.0\text{mA}$ $\tau$                    |      | 0.1    |            | 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 200mA $\tau$                        | 3.168 |        | 3.432      | V                              |
|                            |                                               | $V_{in}=5.3$ to 20V<br>$I_O=1$ to 100mA $\tau$ | 3.168 |        | 3.432      | V                              |
| $\Delta V_O$               | Line Regulation                               | $V_{in}=5.3$ to 20V                            |       | 7.5    | 30         | mV                             |
| $\Delta V_O$               | Load Regulation                               | $I_O=1$ to 200mA<br>$I_O=1$ to 100mA           |       | 5<br>2 | 25         | mV<br>mV                       |
| $I_q$                      | Quiescent Current                             | $\tau$                                         |       | 350    | 600        | $\mu\text{A}$                  |
| $\Delta I_q$               | Quiescent Current Change                      | $I_O=1$ to 200mA<br>$V_{in}=5.3$ to 20V        |       |        | 100<br>100 | $\mu\text{A}$<br>$\mu\text{A}$ |
| $V_n$                      | Output Noise Voltage                          | $f=10\text{Hz}$ to 10kHz                       |       | 50     |            | $\mu\text{V rms}$              |
| $\Delta V_{in}/\Delta V_O$ | Ripple Rejection                              | $V_{in}=6.3$ to 18V<br>$f=120\text{Hz}$        | 50    | 64     |            | dB                             |
| $V_{in}$                   | Input Voltage Required To Maintain Regulation |                                                | 5.3   | 5      |            | V                              |
| $\Delta V_O/\Delta T$      | Average Temperature Coefficient of $V_O$      | $I_O=5.0\text{mA}$ $\tau$                      |       | 0.1    |            | mV/ $^{\circ}\text{C}$         |

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

## ZSR SERIES

### 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 $200\text{mA}$ $\tau$                               | 3.84 |        | 4.16       | V                              |
|                            |                                               | $V_{in}=6$ to $20\text{V}$<br>$I_O=1$ to $100\text{mA}$ $\tau$ | 3.84 |        | 4.16       | V                              |
| $\Delta V_O$               | Line Regulation                               | $V_{in}=6$ to $20\text{V}$                                     |      | 10     | 40         | mV                             |
| $\Delta V_O$               | Load Regulation                               | $I_O=1$ to $200\text{mA}$<br>$I_O^0=1$ to $100\text{mA}$       |      | 5<br>2 | 25         | mV<br>mV                       |
| $I_q$                      | Quiescent Current                             | $\tau$                                                         |      | 350    | 600        | $\mu\text{A}$                  |
| $\Delta I_q$               | Quiescent Current Change                      | $I_O=1$ to $200\text{mA}$<br>$V_{in}=6$ to $20\text{V}$        |      |        | 100<br>100 | $\mu\text{A}$<br>$\mu\text{A}$ |
| $V_n$                      | Output Noise Voltage                          | $f=10\text{Hz}$ to $10\text{kHz}$                              |      | 75     |            | $\mu\text{V rms}$              |
| $\Delta V_{in}/\Delta V_O$ | Ripple Rejection                              | $V_{in}=7$ to $18\text{V}$<br>$f=120\text{Hz}$                 | 48   | 62     |            | dB                             |
| $V_{in}$                   | Input Voltage Required To Maintain Regulation |                                                                | 6    | 5.3    |            | V                              |

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

| SYMBOL                     | PARAMETER                                     | CONDITIONS                                                       | MIN.  | TYP.   | MAX.       | UNITS                          |
|----------------------------|-----------------------------------------------|------------------------------------------------------------------|-------|--------|------------|--------------------------------|
| $V_O$                      | Output Voltage                                |                                                                  | 4.729 | 4.85   | 4.971      | V                              |
|                            |                                               | $I_O=1$ to $200\text{mA}$ $\tau$                                 | 4.656 |        | 5.044      | V                              |
|                            |                                               | $V_{in}=6.8$ to $20\text{V}$<br>$I_O=1$ to $100\text{mA}$ $\tau$ | 4.656 |        | 5.044      | V                              |
| $\Delta V_O$               | Line Regulation                               | $V_{in}=6.85$ to $20\text{V}$                                    |       | 10     | 40         | mV                             |
| $\Delta V_O$               | Load Regulation                               | $I_O=1$ to $200\text{mA}$<br>$I_O^0=1$ to $100\text{mA}$         |       | 5<br>2 | 25         | mV<br>mV                       |
| $I_q$                      | Quiescent Current                             | $\tau$                                                           |       | 350    | 600        | $\mu\text{A}$                  |
| $\Delta I_q$               | Quiescent Current Change                      | $I_O=1$ to $200\text{mA}$<br>$V_{in}=6.85$ to $20\text{V}$       |       |        | 100<br>100 | $\mu\text{A}$<br>$\mu\text{A}$ |
| $V_n$                      | Output Noise Voltage                          | $f=10\text{Hz}$ to $10\text{kHz}$                                |       | 50     |            | $\mu\text{V rms}$              |
| $\Delta V_{in}/\Delta V_O$ | 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                              |
| $\Delta V_O/\Delta T$      | Average Temperature Coefficient of $V_O$      | $I_O=5.0\text{mA}$ $\tau$                                        |       | 0.1    |            | mV/ $^{\circ}\text{C}$         |

$\tau = T_j = -55$  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 $200\text{mA}$<br>$I_O=1$ to $100\text{mA}$          |      | 9<br>3 | 30         | mV<br>mV                       |
| $I_q$                      | Quiescent Current                             | $\tau$                                                          |      | 350    | 600        | $\mu\text{A}$                  |
| $\Delta I_q$               | Quiescent Current Change                      | $I_O=1$ to $200\text{mA}$<br>$V_{in}=12$ to $20\text{V}$        |      |        | 100<br>100 | $\mu\text{A}$<br>$\mu\text{A}$ |
| $V_n$                      | Output Noise Voltage                          | $f=10\text{Hz}$ to $10\text{kHz}$                               |      | 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 |                                                                 | 12   | 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): $T_j=25^{\circ}\text{C}$ , $I_O=100\text{mA}$ , $V_{in}=16\text{V}$

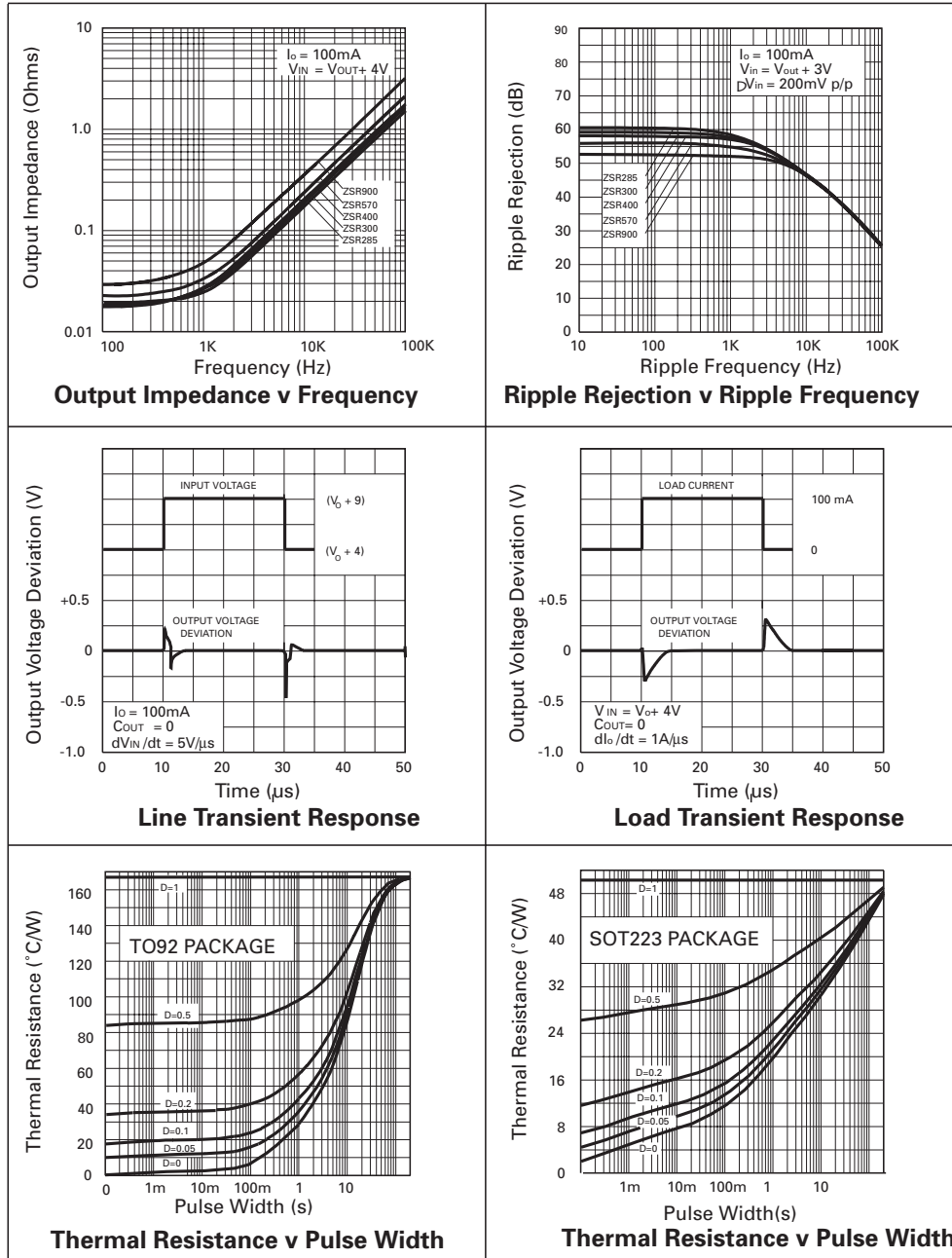
| SYMBOL                     | PARAMETER                                     | CONDITIONS                                                      | MIN.  | TYP.   | MAX.       | UNITS                          |
|----------------------------|-----------------------------------------------|-----------------------------------------------------------------|-------|--------|------------|--------------------------------|
| $V_O$                      | 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 $200\text{mA}$<br>$I_O=1$ to $100\text{mA}$          |       | 9<br>3 | 30         | mV<br>mV                       |
| $I_q$                      | Quiescent Current                             | $\tau$                                                          |       | 350    | 600        | $\mu\text{A}$                  |
| $\Delta I_q$               | Quiescent Current Change                      | $I_O=1$ to $200\text{mA}$<br>$V_{in}=14$ to $20\text{V}$        |       |        | 100<br>100 | $\mu\text{A}$<br>$\mu\text{A}$ |
| $V_n$                      | Output Noise Voltage                          | $f=10\text{Hz}$ to $10\text{kHz}$                               |       | 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 |                                                                 | 14    | 13.7   |            | V                              |
| $\Delta V_O/\Delta T$      | Average Temperature Coefficient of $V_O$      | $I_O=5.0\text{mA}$ $\tau$                                       |       | 0.25   |            | $\text{mV}/^{\circ}\text{C}$   |

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

# ZSR SERIES

# ZSR285 ZSR300 ZSR400 ZSR570 ZSR900

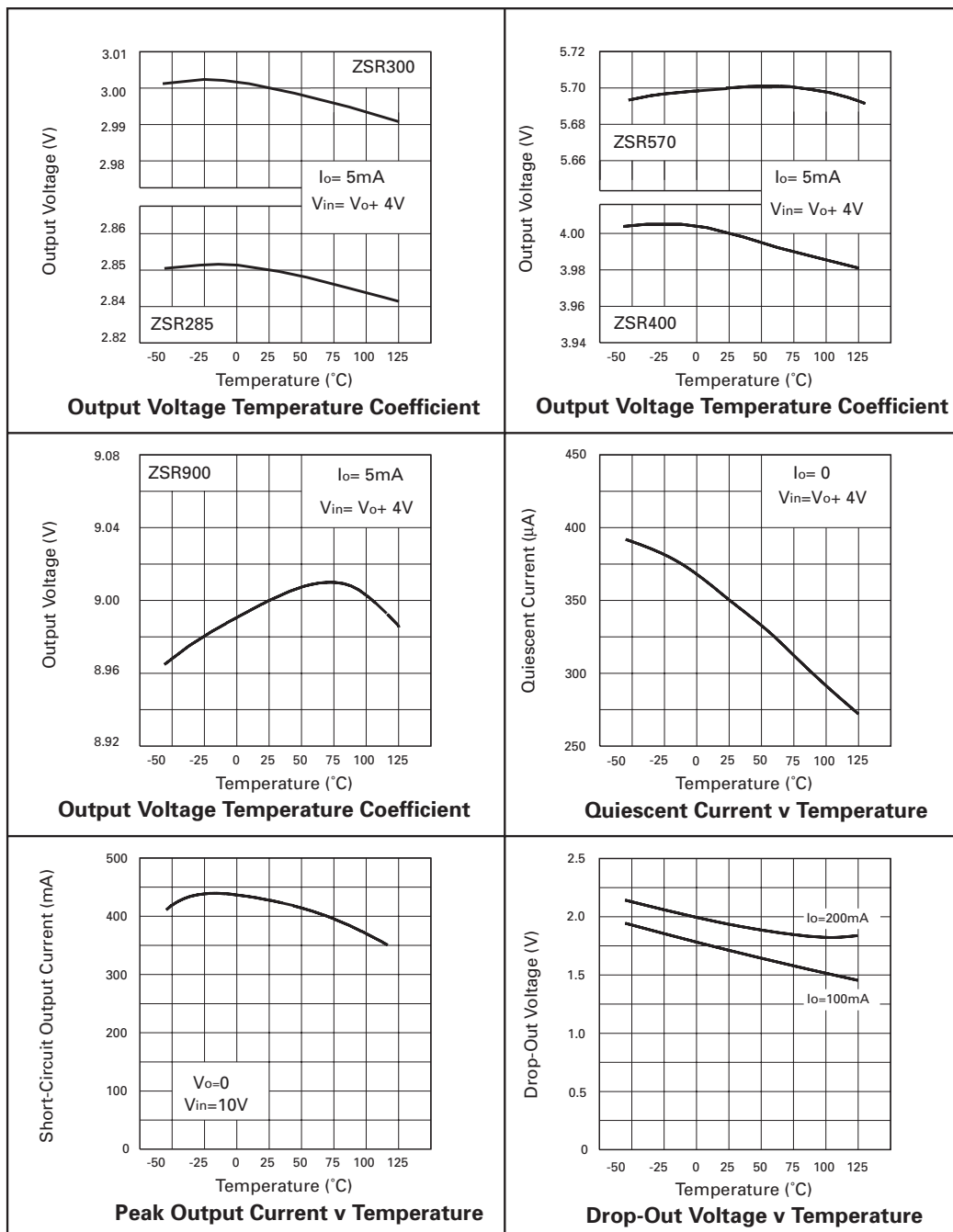
## TYPICAL CHARACTERISTICS



# ZSR285 ZSR300 ZSR400 ZSR570 ZSR900

# ZSR SERIES

## TYPICAL CHARACTERISTICS



## ZSR SERIES

### ZSR570 TEST CONDITIONS (Unless otherwise stated): $T_j=25^{\circ}\text{C}$ , $I_O=100\text{mA}$ , $V_{in}=9.7\text{V}$

| SYMBOL                     | PARAMETER                                     | CONDITIONS                                     | MIN.  | Typ.     | MAX.       | UNITS                          |
|----------------------------|-----------------------------------------------|------------------------------------------------|-------|----------|------------|--------------------------------|
| $V_O$                      | Output Voltage                                |                                                | 5.557 | 5.7      | 5.843      | V                              |
|                            |                                               | $I_O=1$ to 200mA $\tau$                        | 5.47  |          | 5.93       | V                              |
|                            |                                               | $V_{in}=7.7$ to 20V<br>$I_O=1$ to 100mA $\tau$ | 5.47  |          | 5.93       | V                              |
| $\Delta V_O$               | Line Regulation                               | $V_{in}=7.7$ to 20V                            |       | 10       | 40         | mV                             |
| $\Delta V_O$               | Load Regulation                               | $I_O=1$ to 200mA<br>$I_O=1$ to 100mA           |       | 7<br>2.5 | 30         | mV<br>mV                       |
| $I_q$                      | Quiescent Current                             | $\tau$                                         |       | 350      | 600        | $\mu\text{A}$                  |
| $\Delta I_q$               | Quiescent Current Change                      | $I_O=1$ to 200mA<br>$V_{in}=7.7$ to 20V        |       |          | 100<br>100 | $\mu\text{A}$<br>$\mu\text{A}$ |
| $V_n$                      | Output Noise Voltage                          | $f=10\text{Hz}$ to 10kHz                       |       | 90       |            | $\mu\text{V rms}$              |
| $\Delta V_{in}/\Delta V_O$ | Ripple Rejection                              | $V_{in}=8.7$ to 18V<br>$f=120\text{Hz}$        | 48    | 62       |            | dB                             |
| $V_{in}$                   | Input Voltage Required To Maintain Regulation |                                                | 7.7   | 7.4      |            | V                              |
| $\Delta V_O/\Delta T$      | Average Temperature Coefficient of $V_O$      | $I_O=5.0\text{mA}$ $\tau$                      |       | 0.15     |            | mV/ $^{\circ}\text{C}$         |

### 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 200mA $\tau$                      | 5.76 |          | 6.24       | V                              |
|                            |                                               | $V_{in}=8$ to 20V<br>$I_O=1$ to 100mA $\tau$ | 5.76 |          | 6.24       | V                              |
| $\Delta V_O$               | Line Regulation                               | $V_{in}=8$ to 20V                            |      | 10       | 40         | mV                             |
| $\Delta V_O$               | Load Regulation                               | $I_O=1$ to 200mA<br>$I_O=1$ to 100mA         |      | 7<br>2.5 | 30         | mV<br>mV                       |
| $I_q$                      | Quiescent Current                             | $\tau$                                       |      | 350      | 600        | $\mu\text{A}$                  |
| $\Delta I_q$               | Quiescent Current Change                      | $I_O=1$ to 200mA<br>$V_{in}=8$ to 20V        |      |          | 100<br>100 | $\mu\text{A}$<br>$\mu\text{A}$ |
| $V_n$                      | Output Noise Voltage                          | $f=10\text{Hz}$ to 10kHz                     |      | 90       |            | $\mu\text{V rms}$              |
| $\Delta V_{in}/\Delta V_O$ | Ripple Rejection                              | $V_{in}=9$ to 18V<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     |            | mV/ $^{\circ}\text{C}$         |

$\tau = T_j = -55$  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      | 5.125      | V                              |
|                            |                                               | $I_O=1$ to 200mA $\tau$                      | 4.8   |        | 5.2        | V                              |
|                            |                                               | $V_{in}=7$ to 20V<br>$I_O=1$ to 100mA $\tau$ | 4.8   |        | 5.2        | V                              |
| $\Delta V_O$               | Line Regulation                               | $V_{in}=7$ to 20V                            |       | 10     | 40         | mV                             |
| $\Delta V_O$               | Load Regulation                               | $I_O=1$ to 200mA<br>$I_O=1$ to 100mA         |       | 5<br>2 | 25         | mV<br>mV                       |
| $I_q$                      | Quiescent Current                             | $\tau$                                       |       | 350    | 600        | $\mu\text{A}$                  |
| $\Delta I_q$               | Quiescent Current Change                      | $I_O=1$ to 200mA<br>$V_{in}=7$ to 20V        |       |        | 100<br>100 | $\mu\text{A}$<br>$\mu\text{A}$ |
| $V_n$                      | Output Noise Voltage                          | $f=10\text{Hz}$ to 10kHz                     |       | 75     |            | $\mu\text{V rms}$              |
| $\Delta V_{in}/\Delta V_O$ | Ripple Rejection                              | $V_{in}=8$ to 18V<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    |            | mV/ $^{\circ}\text{C}$         |

### ZSR520 TEST CONDITIONS (Unless otherwise stated): $T_j=25^{\circ}\text{C}$ , $I_O=100\text{mA}$ , $V_{in}=9.2\text{V}$

| SYMBOL                     | PARAMETER                                     | CONDITIONS                                     | MIN.  | TYP.   | MAX.       | UNITS                          |
|----------------------------|-----------------------------------------------|------------------------------------------------|-------|--------|------------|--------------------------------|
| $V_O$                      | Output Voltage                                |                                                | 5.070 | 5.2    | 5.330      | V                              |
|                            |                                               | $I_O=1$ to 200mA $\tau$                        | 4.99  |        | 5.41       | V                              |
|                            |                                               | $V_{in}=7.2$ to 20V<br>$I_O=1$ to 100mA $\tau$ | 4.99  |        | 5.41       | V                              |
| $\Delta V_O$               | Line Regulation                               | $V_{in}=7.2$ to 20V                            |       | 10     | 40         | mV                             |
| $\Delta V_O$               | Load Regulation                               | $I_O=1$ to 200mA<br>$I_O=1$ to 100mA           |       | 5<br>2 | 25         | mV<br>mV                       |
| $I_q$                      | Quiescent Current                             | $\tau$                                         |       | 350    | 600        | $\mu\text{A}$                  |
| $\Delta I_q$               | Quiescent Current Change                      | $I_O=1$ to 200mA<br>$V_{in}=7.2$ to 20V        |       |        | 100<br>100 | $\mu\text{A}$<br>$\mu\text{A}$ |
| $V_n$                      | Output Noise Voltage                          | $f=10\text{Hz}$ to 10kHz                       |       | 75     |            | $\mu\text{V rms}$              |
| $\Delta V_{in}/\Delta V_O$ | Ripple Rejection                              | $V_{in}=8.2$ to 18V<br>$f=120\text{Hz}$        | 48    | 62     |            | dB                             |
| $V_{in}$                   | Input Voltage Required To Maintain Regulation |                                                | 7.2   | 6.9    |            | V                              |
| $\Delta V_O/\Delta T$      | Average Temperature Coefficient of $V_O$      | $I_O=5.0\text{mA}$ $\tau$                      |       | 0.1    |            | mV/ $^{\circ}\text{C}$         |

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

## ZSR SERIES

### ZSR850 TEST CONDITIONS (Unless otherwise stated): $T_j=25^{\circ}\text{C}$ , $I_O=100\text{mA}$ , $V_{in}=12.5\text{V}$

| SYMBOL                     | PARAMETER                                     | CONDITIONS                                    | MIN.  | TYP.   | MAX.       | UNITS                          |
|----------------------------|-----------------------------------------------|-----------------------------------------------|-------|--------|------------|--------------------------------|
| $V_O$                      | Output Voltage                                |                                               | 8.288 | 8.5    | 8.712      | V                              |
|                            |                                               | $I_O=1$ to 200mA $\tau$                       | 8.16  |        | 8.84       | V                              |
|                            |                                               | $V_{in}=10$ to 20V<br>$I_O=1$ to 100mA $\tau$ | 8.16  |        | 8.84       | V                              |
| $\Delta V_O$               | Line Regulation                               | $V_{in}=10.5$ to 20V                          |       | 11     | 40         | mV                             |
| $\Delta V_O$               | Load Regulation                               | $I_O=1$ to 200mA<br>$I_O=1$ to 100mA          |       | 8<br>3 | 30         | mV<br>mV                       |
| $I_q$                      | Quiescent Current                             | $\tau$                                        |       | 350    | 600        | $\mu\text{A}$                  |
| $\Delta I_q$               | Quiescent Current Change                      | $I_O=1$ to 200mA<br>$V_{in}=10.5$ to 20V      |       |        | 100<br>100 | $\mu\text{A}$<br>$\mu\text{A}$ |
| $V_n$                      | Output Noise Voltage                          | $f=10\text{Hz}$ to 10kHz                      |       | 115    |            | $\mu\text{V rms}$              |
| $\Delta V_{in}/\Delta V_O$ | Ripple Rejection                              | $V_{in}=11.5$ to 18V<br>$f=120\text{Hz}$      | 44    | 60     |            | dB                             |
| $V_{in}$                   | Input Voltage Required To Maintain Regulation |                                               | 10.5  | 10.2   |            | V                              |
| $\Delta V_O/\Delta T$      | Average Temperature Coefficient of $V_O$      | $I_O=5.0\text{mA}$ $\tau$                     |       | 0.25   |            | $\text{mV}/^{\circ}\text{C}$   |

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

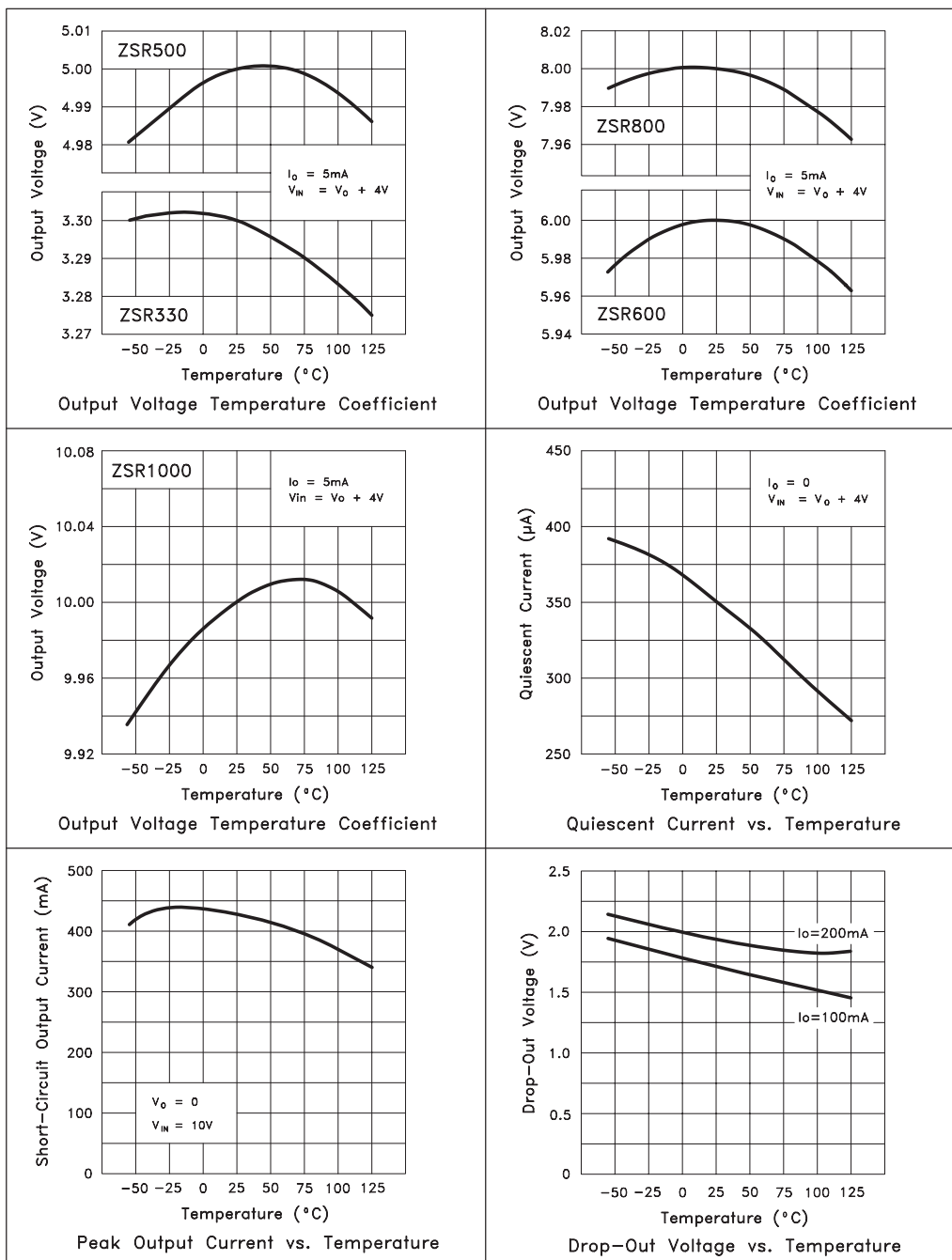
| SYMBOL                     | PARAMETER                                     | CONDITIONS                                    | MIN.  | TYP.   | MAX.       | UNITS                          |
|----------------------------|-----------------------------------------------|-----------------------------------------------|-------|--------|------------|--------------------------------|
| $V_O$                      | Output Voltage                                |                                               | 8.775 | 9.0    | 9.225      | V                              |
|                            |                                               | $I_O=1$ to 200mA $\tau$                       | 8.64  |        | 9.36       | V                              |
|                            |                                               | $V_{in}=11$ to 20V<br>$I_O=1$ to 100mA $\tau$ | 8.64  |        | 9.36       | V                              |
| $\Delta V_O$               | Line Regulation                               | $V_{in}=11$ to 20V                            |       | 12     | 40         | mV                             |
| $\Delta V_O$               | Load Regulation                               | $I_O=1$ to 200mA<br>$I_O=1$ to 100mA          |       | 9<br>3 | 30         | mV<br>mV                       |
| $I_q$                      | Quiescent Current                             | $\tau$                                        |       | 350    | 600        | $\mu\text{A}$                  |
| $\Delta I_q$               | Quiescent Current Change                      | $I_O=1$ to 200mA<br>$V_{in}=11$ to 20V        |       |        | 100<br>100 | $\mu\text{A}$<br>$\mu\text{A}$ |
| $V_n$                      | Output Noise Voltage                          | $f=10\text{Hz}$ to 10kHz                      |       | 150    |            | $\mu\text{V rms}$              |
| $\Delta V_{in}/\Delta V_O$ | Ripple Rejection                              | $V_{in}=12$ to 18V<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   |            | $\text{mV}/^{\circ}\text{C}$   |

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

# ZSR330 ZSR500 ZSR600 ZSR800 ZSR1000

# ZSR SERIES

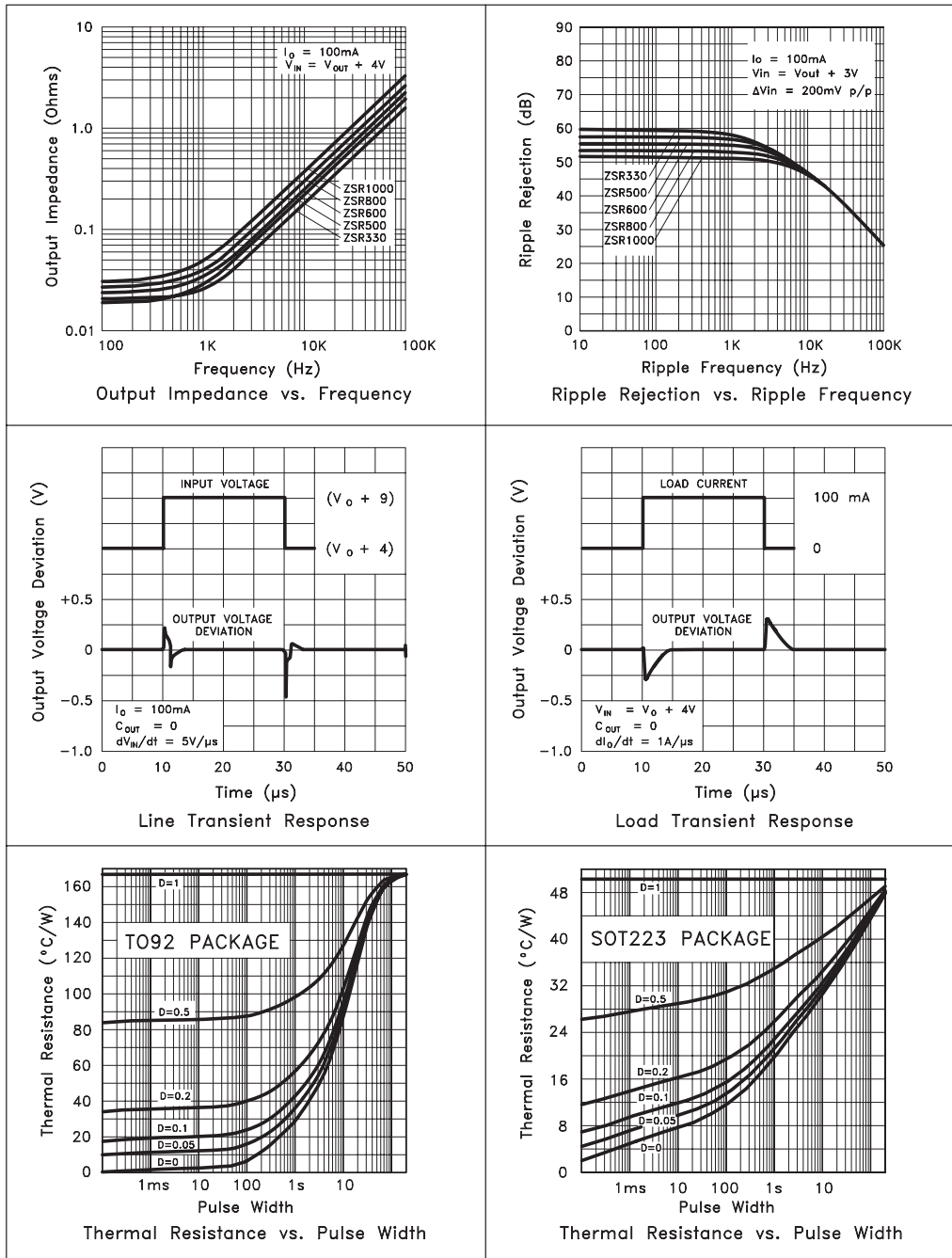
## TYPICAL CHARACTERISTICS



# ZSR SERIES

# ZSR330 ZSR500 ZSR600 ZSR800 ZSR1000

## TYPICAL CHARACTERISTICS



## ZSR SERIES

### ZSR700 TEST CONDITIONS (Unless otherwise stated): $T_j=25^{\circ}\text{C}$ , $I_O=100\text{mA}$ , $V_{in}=11\text{V}$

| SYMBOL                     | PARAMETER                                     | CONDITIONS                                                     | MIN.  | TYP. | MAX.       | UNITS                          |
|----------------------------|-----------------------------------------------|----------------------------------------------------------------|-------|------|------------|--------------------------------|
| $V_O$                      | Output Voltage                                |                                                                | 6.825 | 7    | 7.175      | V                              |
|                            |                                               | $I_O=1$ to $200\text{mA}$ $\tau$                               | 6.72  |      | 7.28       | V                              |
|                            |                                               | $V_{in}=9$ to $20\text{V}$<br>$I_O=1$ to $100\text{mA}$ $\tau$ | 6.72  |      | 7.28       | V                              |
| $\Delta V_O$               | Line Regulation                               | $V_{in}=9$ 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                             |
| $I_q$                      | Quiescent Current                             | $\tau$                                                         |       | 350  | 600        | $\mu\text{A}$                  |
| $\Delta I_q$               | Quiescent Current Change                      | $I_O=1$ to $200\text{mA}$<br>$V_{in}=9$ to $20\text{V}$        |       |      | 100<br>100 | $\mu\text{A}$<br>$\mu\text{A}$ |
| $V_n$                      | Output Noise Voltage                          | $f=10\text{Hz}$ to $10\text{kHz}$                              |       | 75   |            | $\mu\text{V rms}$              |
| $\Delta V_{in}/\Delta V_O$ | Ripple Rejection                              | $V_{in}=10$ to $18\text{V}$<br>$f=120\text{Hz}$                | 48    | 62   |            | dB                             |
| $V_{in}$                   | Input Voltage Required To Maintain Regulation |                                                                | 9     | 8.7  |            | 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): $T_j=25^{\circ}\text{C}$ , $I_O=100\text{mA}$ , $V_{in}=12\text{V}$

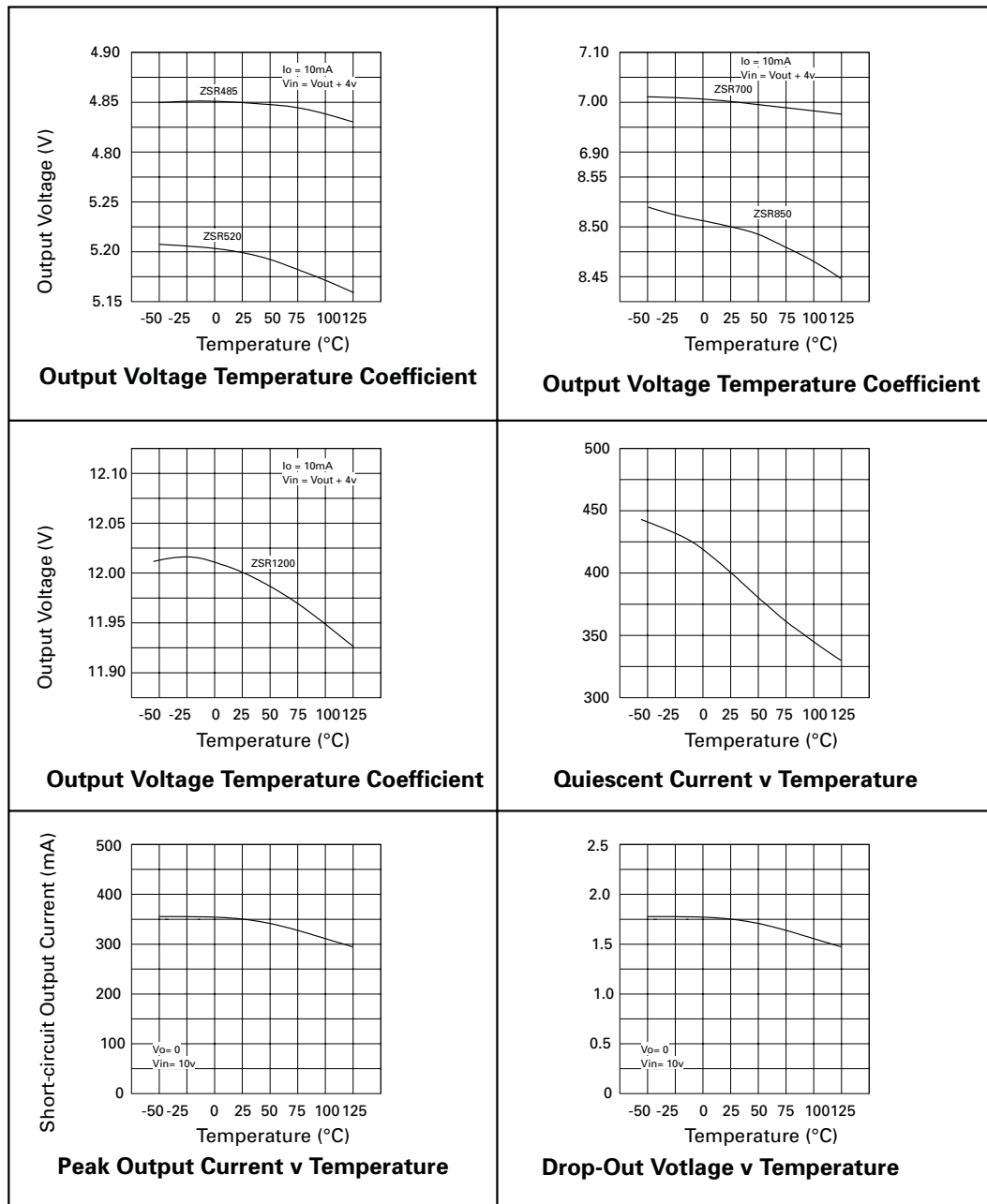
| SYMBOL                     | PARAMETER                                     | CONDITIONS                                                      | MIN. | TYP. | MAX.       | UNITS                          |
|----------------------------|-----------------------------------------------|-----------------------------------------------------------------|------|------|------------|--------------------------------|
| $V_O$                      | Output Voltage                                |                                                                 | 7.8  | 8    | 8.2        | 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                             |
| $I_q$                      | Quiescent Current                             | $\tau$                                                          |      | 350  | 600        | $\mu\text{A}$                  |
| $\Delta I_q$               | Quiescent Current Change                      | $I_O=1$ to $200\text{mA}$<br>$V_{in}=10$ to $20\text{V}$        |      |      | 100<br>100 | $\mu\text{A}$<br>$\mu\text{A}$ |
| $V_n$                      | Output Noise Voltage                          | $f=10\text{Hz}$ to $10\text{kHz}$                               |      | 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 |                                                                 | 10   | 9.7  |            | V                              |
| $\Delta V_O/\Delta T$      | Average Temperature Coefficient of $V_O$      | $I_O=5.0\text{mA}$ $\tau$                                       |      | 0.25 |            | $\text{mV}/^{\circ}\text{C}$   |

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

# ZSR SERIES

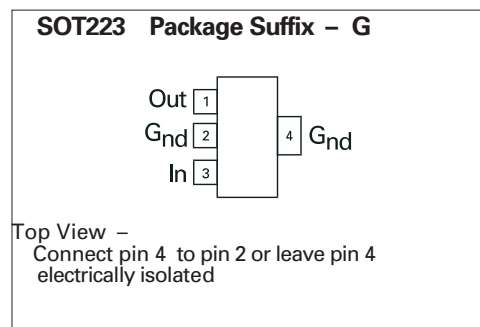
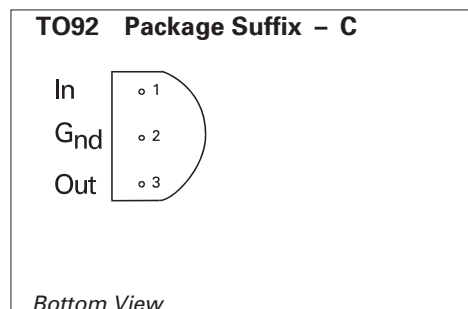
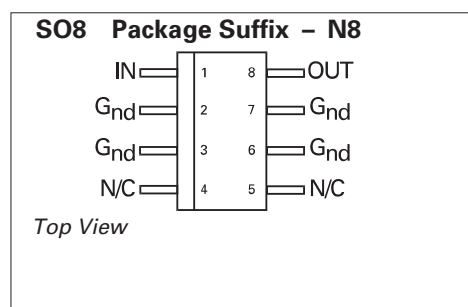
ZSR485 ZSR520 ZSR700  
ZSR850 ZSR1200

## TYPICAL CHARACTERISTICS



# ZSR SERIES

## CONNECTION DIAGRAMS



## OPTIONS

| Voltage | Voltage Option ▲ | TO92 | SOT223 | SO8 |
|---------|------------------|------|--------|-----|
| 2.85V   | 285              | 3    | 3      | 3   |
| 3.0V    | 300              | 3    | 3      | 3   |
| 3.3V    | 330              | 3    | 3      | 3   |
| 4.0V    | 400              | 3    | 3      | 3   |
| 4.85V   | 485              | 3    | 3      | 3   |
| 5.0V    | 500              | 3    | 3      | 3   |
| 5.2V    | 520              | 3    | 3      | 3   |
| 5.7V    | 570              | 3    | 3      | 3   |
| 6.0V    | 600              | 3    | 3      | 3   |
| 7.0V    | 700              | 3    | 3      | 3   |
| 8.0V    | 800              | 3    | 3      | 3   |
| 8.5V    | 850              | 3    | 3      | 3   |
| 9.0V    | 900              | 3    | 3      | 3   |
| 10.0V   | 1000             | 3    | 3      | 3   |
| 12.0V   | 1200             | 3    | 3      | 3   |

\* NOTE: Exception. ZSR1000 part mark is ZSR100 for all package options

## ORDERING INFORMATION

| Part No  | Package | Partmark |
|----------|---------|----------|
| ZSR ▲ C  | TO92    | ZSR ▲    |
| ZSR ▲ G  | SOT223  | ZSR ▲    |
| ZSR ▲ N8 | SO8     | ZSR ▲    |

### ▲ Voltage Option

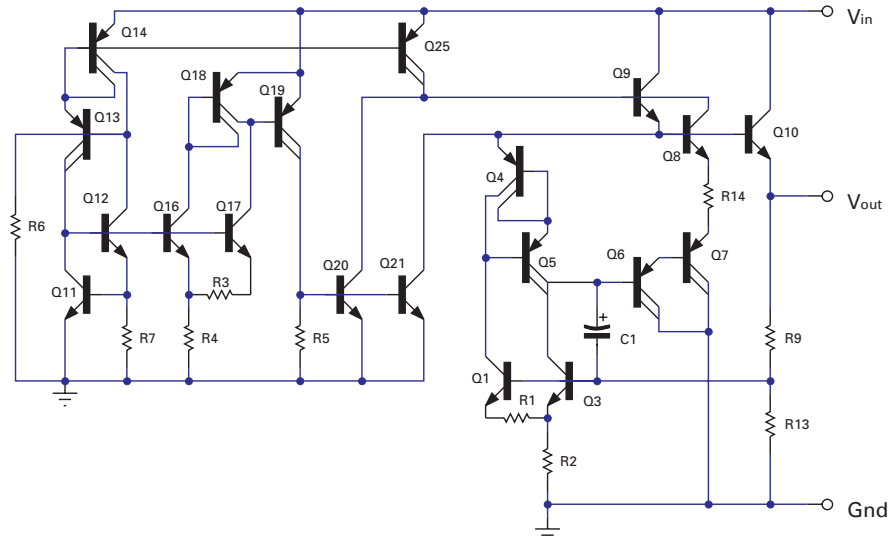
eg 3V device in TO92 package  
part number ZSR300C  
part marked ZSR300 \*

eg 12V device in SOT223 package  
part number ZSR1200G  
part marked ZSR1200 \*

eg 5V device in SO8 package  
part number ZSR500N8  
part marked ZSR500 \*

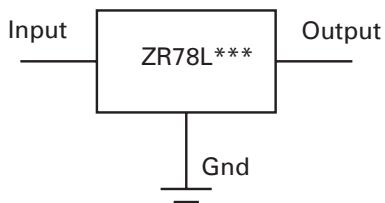
# ZSR SERIES

## SCHEMATIC DIAGRAM

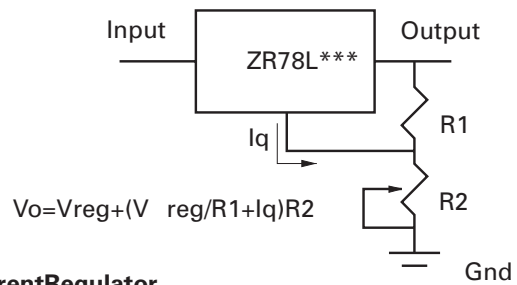


## APPLICATIONS

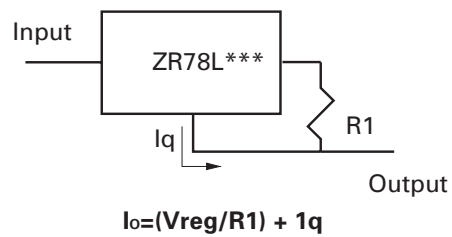
### FixedOutputRegulator



### AdjustableOutputRegulator



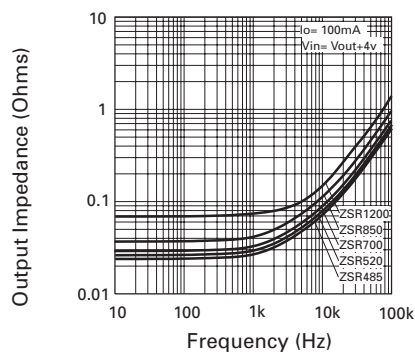
### CurrentRegulator



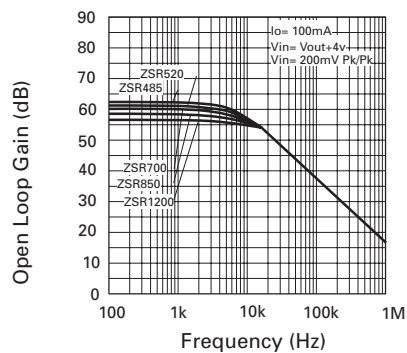
# ZSR485 ZSR520 ZSR700 ZSR850 ZSR1200

# ZSR SERIES

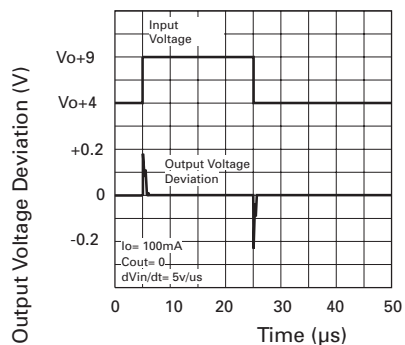
## TYPICAL CHARACTERISTICS



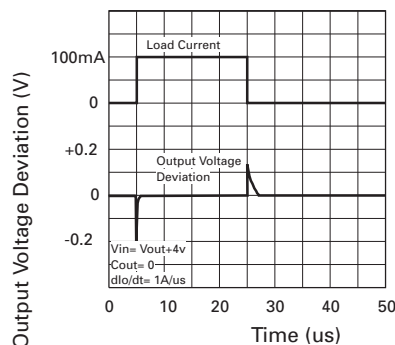
Output Impedance v Frequency



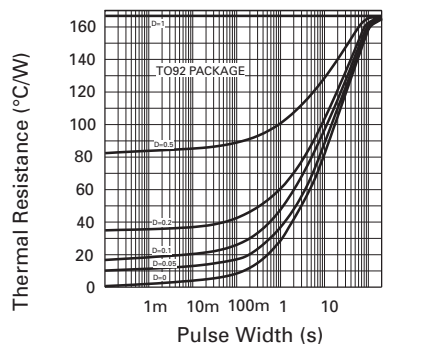
Ripple Rejection v Ripple Frequency



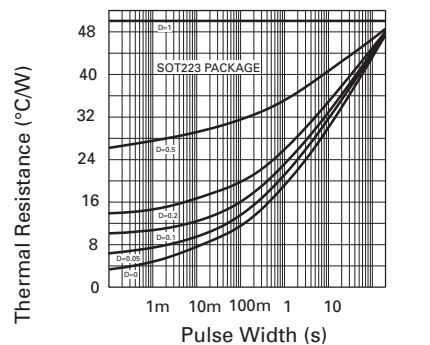
Line Transient Response



Load Transient Response



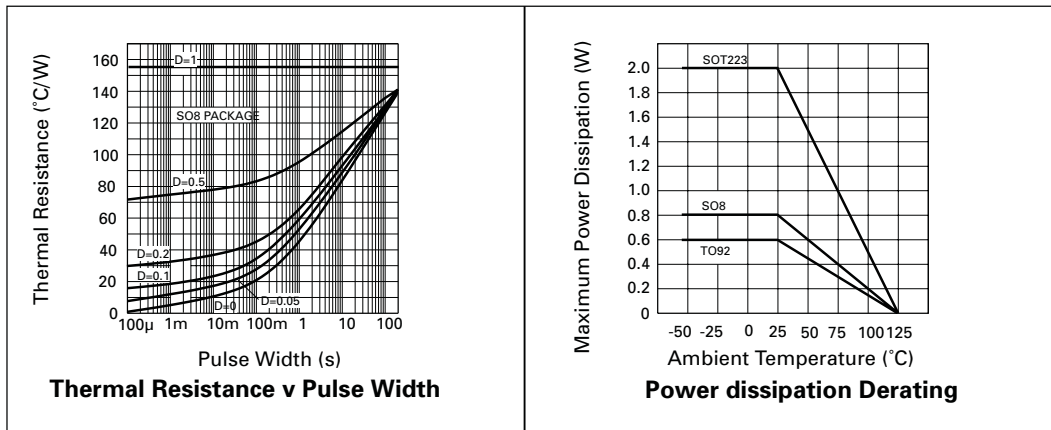
Thermal Resistance v Pulse Width



Thermal Resistance v Pulse Width

# ZSR SERIES

## TYPICAL CHARACTERISTICS



© Zetex plc 2001

Zetex plc  
Fields New Road  
Chadderton  
Oldham, OL9 8NP  
United Kingdom  
Telephone (44) 161 622 4422  
Fax: (44) 161 622 4420

Zetex GmbH  
Streitfeldstraße 19  
D-81673 München  
Germany  
Telefon: (49) 89 45 49 49 0  
Fax: (49) 89 45 49 49 49

Zetex Inc  
Suite 315  
700 Veterans Memorial Highway  
Hauppauge NY11788  
USA  
Telephone: (631) 360 2222  
Fax: (631) 360 8222

Zetex (Asia) Ltd  
3701-04 Metroplaza, Tower 1  
Hing Fong Road  
Kwai Fong, Hong Kong  
China  
Telephone: (852) 26100 611  
Fax: (852) 24250 494

These offices are supported by agents and distributors in major countries world-wide.

This publication is issued to provide outline information only which (unless agreed by the Company in writing) may not be used, applied or reproduced for any purpose or form part of any order or contract or be regarded as a representation relating to the products or services concerned. The Company reserves the right to alter without notice the specification, design, price or conditions of supply of any product or service.

For the latest product information, log on to [www.zetex.com](http://www.zetex.com)



ISSUE 3 - SEPTEMBER 2001