

To our customers,

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## Old Company Name in Catalogs and Other Documents

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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# RD2.0S to RD150S

## ZENER DIODES 200 mW 2-PIN SUPER MINI MOLD

### DESCRIPTION

Type RD2.0S to RD150S series are 2 pin super mini mold package zener diodes possessing an allowable power dissipation of 200 mW.

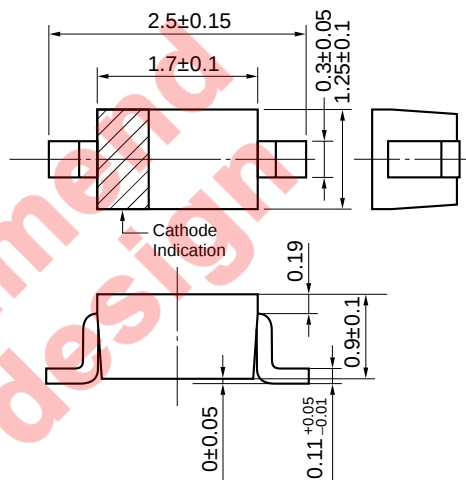
### FEATURES

- Sharp breakdown characteristic
- Vz: Applied E24 standard

### APPLICATIONS

Circuit for constant voltage, constant current, wave form clipper, surge absorber, etc.

### PACKAGE DRAWING (Unit: mm)



### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C)

|                      |                  |             |    |                                     |
|----------------------|------------------|-------------|----|-------------------------------------|
| Power Dissipation    | P                | 200         | mW |                                     |
| Forward Current      | I <sub>F</sub>   | 100         | mA |                                     |
| Reverse Surge Power  | P <sub>RSM</sub> | 85          | W  | (at t = 10 μs/ 1 pulse) Show Fig.12 |
| Junction Temperature | T <sub>j</sub>   | 150         | °C |                                     |
| Storage Temperature  | T <sub>stg</sub> | -55 to +150 | °C |                                     |

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<R> ELECTRICAL CHARACTERISTICS ( $T_A = 25 \pm 2^\circ\text{C}$ ) (1/4)

| Type Number | Class | Zener Voltage<br>$V_Z$ (V) <sup>Note1</sup> |      |            | Dynamic Impedance<br>$Z_Z$ ( $\Omega$ ) <sup>Note2</sup> |            | Reverse Current<br>$I_R$ ( $\mu\text{A}$ ) |           |
|-------------|-------|---------------------------------------------|------|------------|----------------------------------------------------------|------------|--------------------------------------------|-----------|
|             |       | MIN.                                        | MAX. | $I_Z$ (mA) | MAX.                                                     | $I_Z$ (mA) | MAX.                                       | $V_R$ (V) |
| RD2.0S      | B     | 1.90                                        | 2.20 | 5          | 100                                                      | 5          | 120                                        | 0.5       |
| RD2.2S      | B     | 2.10                                        | 2.40 | 5          | 100                                                      | 5          | 120                                        | 0.7       |
| RD2.4S      | B     | 2.30                                        | 2.60 | 5          | 100                                                      | 5          | 120                                        | 1.0       |
| RD2.7S      | B     | 2.50                                        | 2.90 | 5          | 110                                                      | 5          | 120                                        | 1.0       |
|             | B1    | 2.50                                        | 2.75 |            |                                                          |            |                                            |           |
|             | B2    | 2.65                                        | 2.90 |            |                                                          |            |                                            |           |
| RD3.0S      | B     | 2.80                                        | 3.20 | 5          | 120                                                      | 5          | 50                                         | 1.0       |
|             | B1    | 2.80                                        | 3.05 |            |                                                          |            |                                            |           |
|             | B2    | 2.95                                        | 3.20 |            |                                                          |            |                                            |           |
| RD3.3S      | B     | 3.10                                        | 3.50 | 5          | 130                                                      | 5          | 20                                         | 1.0       |
|             | B1    | 3.10                                        | 3.35 |            |                                                          |            |                                            |           |
|             | B2    | 3.25                                        | 3.50 |            |                                                          |            |                                            |           |
| RD3.6S      | B     | 3.40                                        | 3.80 | 5          | 130                                                      | 5          | 10                                         | 1.0       |
|             | B1    | 3.40                                        | 3.65 |            |                                                          |            |                                            |           |
|             | B2    | 3.55                                        | 3.80 |            |                                                          |            |                                            |           |
| RD3.9S      | B     | 3.70                                        | 4.10 | 5          | 130                                                      | 5          | 10                                         | 1.0       |
|             | B1    | 3.70                                        | 3.97 |            |                                                          |            |                                            |           |
|             | B2    | 3.87                                        | 4.10 |            |                                                          |            |                                            |           |
| RD4.3S      | B     | 4.00                                        | 4.49 | 5          | 130                                                      | 5          | 10                                         | 1.0       |
|             | B1    | 4.00                                        | 4.22 |            |                                                          |            |                                            |           |
|             | B2    | 4.14                                        | 4.35 |            |                                                          |            |                                            |           |
|             | B3    | 4.27                                        | 4.49 |            |                                                          |            |                                            |           |
|             | BX    | 4.00                                        | 4.35 |            |                                                          |            |                                            |           |
|             | BY    | 4.14                                        | 4.49 |            |                                                          |            |                                            |           |
| RD4.7S      | B     | 4.40                                        | 4.92 | 5          | 130                                                      | 5          | 10                                         | 1.0       |
|             | B1    | 4.40                                        | 4.63 |            |                                                          |            |                                            |           |
|             | B2    | 4.53                                        | 4.77 |            |                                                          |            |                                            |           |
|             | B3    | 4.67                                        | 4.92 |            |                                                          |            |                                            |           |
|             | BX    | 4.40                                        | 4.77 |            |                                                          |            |                                            |           |
|             | BY    | 4.53                                        | 4.92 |            |                                                          |            |                                            |           |
| RD5.1S      | B     | 4.82                                        | 5.39 | 5          | 130                                                      | 5          | 5                                          | 1.5       |
|             | B1    | 4.82                                        | 5.06 |            |                                                          |            |                                            |           |
|             | B2    | 4.96                                        | 5.22 |            |                                                          |            |                                            |           |
|             | B3    | 5.12                                        | 5.39 |            |                                                          |            |                                            |           |
|             | BX    | 4.82                                        | 5.22 |            |                                                          |            |                                            |           |
|             | BY    | 4.96                                        | 5.39 |            |                                                          |            |                                            |           |

**Note 1.**  $V_Z$  is tested with pulsed (40 ms).

**2.**  $Z_Z$  is measured at  $I_Z$  by given a very small A.C. current signal.

**Remark** Suffix B is suffix B1, B2 or suffix B3.

(2/4)

| Type Number | Class | Zener Voltage<br>$V_Z$ (V) <sup>Note1</sup> |      |            | Dynamic Impedance<br>$Z_Z$ ( $\Omega$ ) <sup>Note2</sup> |            | Reverse Current<br>$I_R$ ( $\mu A$ ) |           |
|-------------|-------|---------------------------------------------|------|------------|----------------------------------------------------------|------------|--------------------------------------|-----------|
|             |       | MIN.                                        | MAX. | $I_Z$ (mA) | MAX.                                                     | $I_Z$ (mA) | MAX.                                 | $V_R$ (V) |
| RD5.6S      | B     | 5.29                                        | 5.94 | 5          | 80                                                       | 5          | 5                                    | 2.5       |
|             | B1    | 5.29                                        | 5.57 |            |                                                          |            |                                      |           |
|             | B2    | 5.47                                        | 5.75 |            |                                                          |            |                                      |           |
|             | B3    | 5.65                                        | 5.94 |            |                                                          |            |                                      |           |
|             | BX    | 5.29                                        | 5.57 |            |                                                          |            |                                      |           |
|             | BY    | 5.47                                        | 5.94 |            |                                                          |            |                                      |           |
| RD6.2S      | B     | 5.84                                        | 6.55 | 5          | 50                                                       | 5          | 2                                    | 3.0       |
|             | B1    | 5.84                                        | 6.14 |            |                                                          |            |                                      |           |
|             | B2    | 6.04                                        | 6.35 |            |                                                          |            |                                      |           |
|             | B3    | 6.24                                        | 6.55 |            |                                                          |            |                                      |           |
|             | BX    | 5.84                                        | 6.35 |            |                                                          |            |                                      |           |
|             | BY    | 6.04                                        | 6.55 |            |                                                          |            |                                      |           |
| RD6.8S      | B     | 6.44                                        | 7.17 | 5          | 30                                                       | 5          | 2                                    | 3.5       |
|             | B1    | 6.44                                        | 6.76 |            |                                                          |            |                                      |           |
|             | B2    | 6.62                                        | 6.96 |            |                                                          |            |                                      |           |
|             | B3    | 6.83                                        | 7.17 |            |                                                          |            |                                      |           |
|             | BX    | 6.44                                        | 6.96 |            |                                                          |            |                                      |           |
|             | BY    | 6.62                                        | 7.17 |            |                                                          |            |                                      |           |
| RD7.5S      | B     | 7.03                                        | 7.87 | 5          | 30                                                       | 5          | 2                                    | 4.0       |
|             | B1    | 7.03                                        | 7.39 |            |                                                          |            |                                      |           |
|             | B2    | 7.25                                        | 7.63 |            |                                                          |            |                                      |           |
|             | B3    | 7.49                                        | 7.87 |            |                                                          |            |                                      |           |
|             | BX    | 7.03                                        | 7.63 |            |                                                          |            |                                      |           |
|             | BY    | 7.25                                        | 7.87 |            |                                                          |            |                                      |           |
| RD8.2S      | B     | 7.73                                        | 8.67 | 5          | 30                                                       | 5          | 2                                    | 5.0       |
|             | B1    | 7.73                                        | 8.13 |            |                                                          |            |                                      |           |
|             | B2    | 7.98                                        | 8.39 |            |                                                          |            |                                      |           |
|             | B3    | 8.25                                        | 8.67 |            |                                                          |            |                                      |           |
|             | BX    | 7.73                                        | 8.39 |            |                                                          |            |                                      |           |
|             | BY    | 7.98                                        | 8.67 |            |                                                          |            |                                      |           |
| RD9.1S      | B     | 8.53                                        | 9.58 | 5          | 30                                                       | 5          | 2                                    | 6.0       |
|             | B1    | 8.53                                        | 8.96 |            |                                                          |            |                                      |           |
|             | B2    | 8.81                                        | 9.26 |            |                                                          |            |                                      |           |
|             | B3    | 9.12                                        | 9.58 |            |                                                          |            |                                      |           |
|             | BX    | 8.53                                        | 9.26 |            |                                                          |            |                                      |           |
|             | BY    | 8.81                                        | 9.58 |            |                                                          |            |                                      |           |

**Note 1.**  $V_Z$  is tested with pulsed (40 ms).

**2.**  $Z_Z$  is measured at  $I_Z$  by given a very small A.C. current signal.

**Remark** Suffix B is suffix B1, B2 or suffix B3.

(3/4)

| Type Number | Class | Zener Voltage<br>$V_Z$ (V) <sup>Note1</sup> |       |            | Dynamic Impedance<br>$Z_Z$ ( $\Omega$ ) <sup>Note2</sup> |            | Reverse Current<br>$I_R$ ( $\mu A$ ) |           |
|-------------|-------|---------------------------------------------|-------|------------|----------------------------------------------------------|------------|--------------------------------------|-----------|
|             |       | MIN.                                        | MAX.  | $I_Z$ (mA) | MAX.                                                     | $I_Z$ (mA) | MAX.                                 | $V_R$ (V) |
| RD10S       | B     | 9.42                                        | 10.58 | 5          | 30                                                       | 5          | 2                                    | 7.0       |
|             | B1    | 9.42                                        | 9.90  |            |                                                          |            |                                      |           |
|             | B2    | 9.74                                        | 10.24 |            |                                                          |            |                                      |           |
|             | B3    | 10.08                                       | 10.58 |            |                                                          |            |                                      |           |
|             | BX    | 9.42                                        | 10.24 |            |                                                          |            |                                      |           |
|             | BY    | 9.74                                        | 10.58 |            |                                                          |            |                                      |           |
| RD11S       | B     | 10.40                                       | 11.60 | 5          | 30                                                       | 5          | 2                                    | 8.0       |
|             | B1    | 10.40                                       | 10.92 |            |                                                          |            |                                      |           |
|             | B2    | 10.72                                       | 11.26 |            |                                                          |            |                                      |           |
|             | B3    | 11.06                                       | 11.60 |            |                                                          |            |                                      |           |
|             | BX    | 10.40                                       | 11.26 |            |                                                          |            |                                      |           |
|             | BY    | 10.72                                       | 11.60 |            |                                                          |            |                                      |           |
| RD12S       | B     | 11.38                                       | 12.64 | 5          | 35                                                       | 5          | 2                                    | 9.0       |
|             | B1    | 11.38                                       | 11.94 |            |                                                          |            |                                      |           |
|             | B2    | 11.69                                       | 12.28 |            |                                                          |            |                                      |           |
|             | B3    | 12.04                                       | 12.64 |            |                                                          |            |                                      |           |
|             | BX    | 11.38                                       | 12.28 |            |                                                          |            |                                      |           |
|             | BY    | 11.69                                       | 12.64 |            |                                                          |            |                                      |           |
| RD13S       | B     | 12.43                                       | 14.00 | 5          | 35                                                       | 5          | 2                                    | 10        |
|             | B1    | 12.43                                       | 13.07 |            |                                                          |            |                                      |           |
|             | B2    | 12.87                                       | 13.53 |            |                                                          |            |                                      |           |
|             | B3    | 13.33                                       | 14.00 |            |                                                          |            |                                      |           |
| RD15S       | B     | 13.80                                       | 15.56 | 5          | 40                                                       | 5          | 2                                    | 11        |
|             | B1    | 13.80                                       | 14.50 |            |                                                          |            |                                      |           |
|             | B2    | 14.30                                       | 15.02 |            |                                                          |            |                                      |           |
|             | B3    | 14.81                                       | 15.56 |            |                                                          |            |                                      |           |
| RD16S       | B     | 15.31                                       | 17.14 | 5          | 40                                                       | 5          | 2                                    | 12        |
|             | B1    | 15.31                                       | 16.07 |            |                                                          |            |                                      |           |
|             | B2    | 15.78                                       | 16.58 |            |                                                          |            |                                      |           |
|             | B3    | 16.30                                       | 17.14 |            |                                                          |            |                                      |           |
| RD18S       | B     | 16.89                                       | 19.08 | 5          | 45                                                       | 5          | 2                                    | 13        |
|             | B1    | 16.89                                       | 17.75 |            |                                                          |            |                                      |           |
|             | B2    | 17.51                                       | 18.40 |            |                                                          |            |                                      |           |
|             | B3    | 18.16                                       | 19.08 |            |                                                          |            |                                      |           |

**Note 1.**  $V_Z$  is tested with pulsed (40 ms).

**2.**  $Z_Z$  is measured at  $I_Z$  by given a very small A.C. current signal.

**Remark** Suffix B is suffix B1, B2 or suffix B3.

(4/4)

| Type Number | Class | Zener Voltage<br>$V_Z$ (V) <sup>Note1</sup> |        |            | Dynamic Impedance<br>$Z_Z$ ( $\Omega$ ) <sup>Note2</sup> |            | Reverse Current<br>$I_R$ ( $\mu A$ ) |           |
|-------------|-------|---------------------------------------------|--------|------------|----------------------------------------------------------|------------|--------------------------------------|-----------|
|             |       | MIN.                                        | MAX.   | $I_Z$ (mA) | MAX.                                                     | $I_Z$ (mA) | MAX.                                 | $V_R$ (V) |
| RD20S       | B     | 18.80                                       | 21.14  | 5          | 50                                                       | 5          | 2                                    | 15        |
|             | B1    | 18.80                                       | 19.76  |            |                                                          |            |                                      |           |
|             | B2    | 19.46                                       | 20.45  |            |                                                          |            |                                      |           |
|             | B3    | 20.15                                       | 21.14  |            |                                                          |            |                                      |           |
| RD22S       | B     | 20.81                                       | 23.25  | 5          | 55                                                       | 5          | 2                                    | 17        |
|             | B1    | 20.81                                       | 21.84  |            |                                                          |            |                                      |           |
|             | B2    | 21.46                                       | 22.55  |            |                                                          |            |                                      |           |
|             | B3    | 22.15                                       | 23.25  |            |                                                          |            |                                      |           |
| RD24S       | B     | 22.86                                       | 25.66  | 5          | 60                                                       | 5          | 2                                    | 19        |
|             | B1    | 22.86                                       | 24.03  |            |                                                          |            |                                      |           |
|             | B2    | 23.65                                       | 24.85  |            |                                                          |            |                                      |           |
|             | B3    | 24.45                                       | 25.66  |            |                                                          |            |                                      |           |
| RD27S       | B     | 25.10                                       | 28.90  | 2          | 70                                                       | 2          | 2                                    | 21        |
| RD30S       | B     | 28.00                                       | 32.00  | 2          | 80                                                       | 2          | 2                                    | 23        |
| RD33S       | B     | 31.00                                       | 35.00  | 2          | 80                                                       | 2          | 2                                    | 25        |
| RD36S       | B     | 34.00                                       | 38.00  | 2          | 90                                                       | 2          | 2                                    | 27        |
| RD39S       | B     | 37.00                                       | 41.00  | 2          | 100                                                      | 2          | 2                                    | 30        |
| RD43S       | B     | 40.00                                       | 45.00  | 2          | 130                                                      | 2          | 2                                    | 33        |
| RD47S       | B     | 44.00                                       | 49.00  | 2          | 150                                                      | 2          | 2                                    | 36        |
| RD51S       | B     | 48.00                                       | 54.00  | 2          | 180                                                      | 2          | 1                                    | 39        |
| RD56S       | B     | 53.00                                       | 60.00  | 2          | 180                                                      | 2          | 1                                    | 43        |
| RD62S       | B     | 58.00                                       | 66.00  | 2          | 200                                                      | 2          | 0.2                                  | 47        |
| RD68S       | B     | 64.00                                       | 72.00  | 2          | 250                                                      | 2          | 0.2                                  | 52        |
| RD75S       | B     | 70.00                                       | 79.00  | 2          | 300                                                      | 2          | 0.2                                  | 57        |
| RD82S       | B     | 77.00                                       | 87.00  | 2          | 300                                                      | 2          | 0.2                                  | 63        |
| RD91S       | B     | 85.00                                       | 96.00  | 1          | 700                                                      | 1          | 0.2                                  | 69        |
| RD100S      | B     | 94.00                                       | 106.0  | 1          | 700                                                      | 1          | 0.2                                  | 76        |
| RD110S      | B     | 104.00                                      | 116.00 | 1          | 800                                                      | 1          | 0.2                                  | 84        |
| RD120S      | B     | 114.00                                      | 126.00 | 1          | 900                                                      | 1          | 0.2                                  | 91        |
| RD150S      | B     | 140.00                                      | 160.00 | 1          | 1500                                                     | 1          | 0.2                                  | 120       |

**Note 1.**  $V_Z$  is tested with pulsed (40 ms).

**2.**  $Z_Z$  is measured at  $I_Z$  by given a very small A.C. current signal.

**Remark** Suffix B is suffix B1, B2 or suffix B3.

TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )

Fig.1 POWER DISSIPATION vs. AMBIENT TEMPERATURE

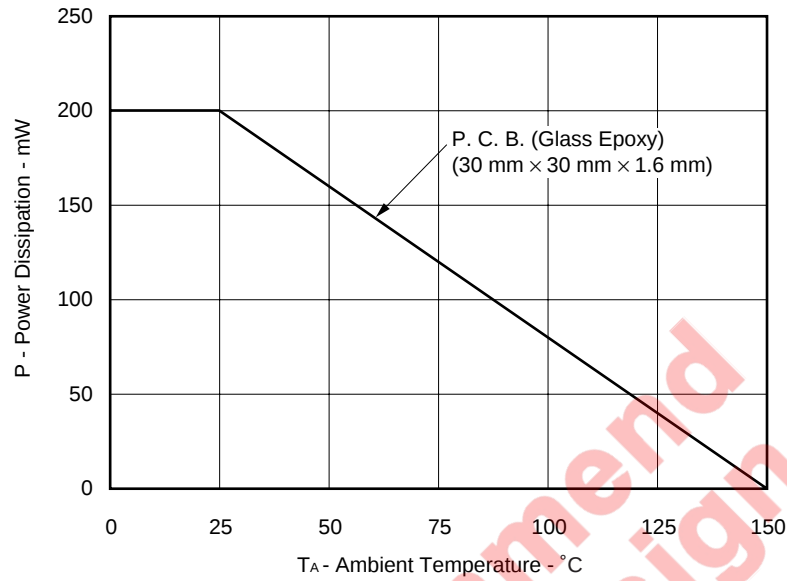


Fig.2 ZENER CURRENT vs. ZENER VOLTAGE

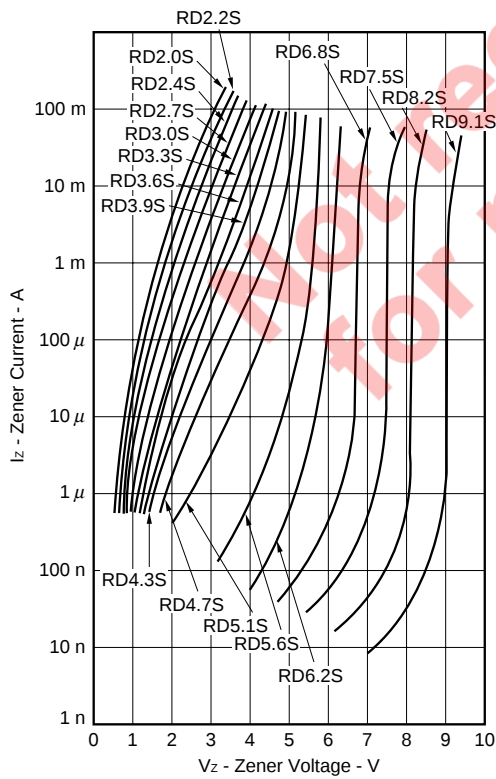


Fig.3 ZENER CURRENT vs. ZENER VOLTAGE

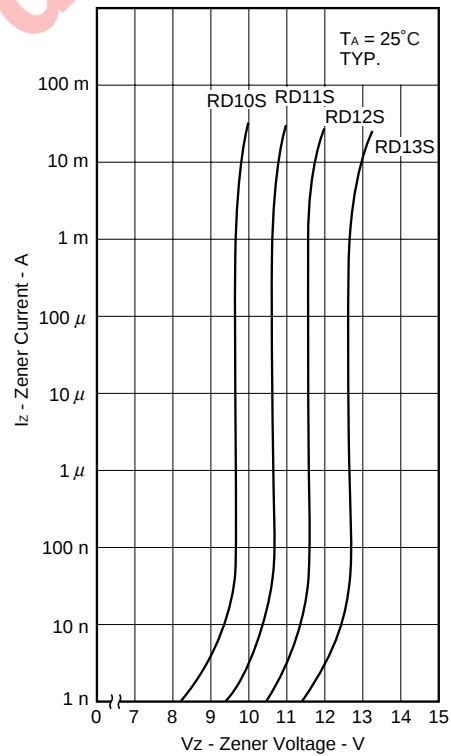


Fig.4 ZENER CURRENT vs. ZENER VOLTAGE

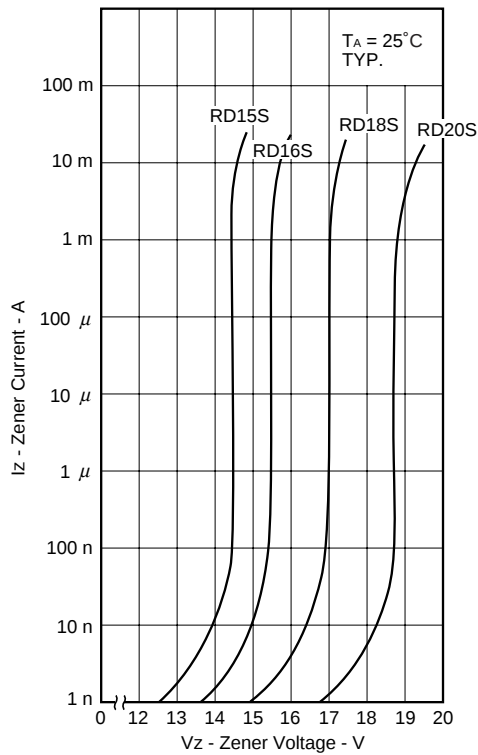


Fig.5 ZENER CURRENT vs. ZENER VOLTAGE

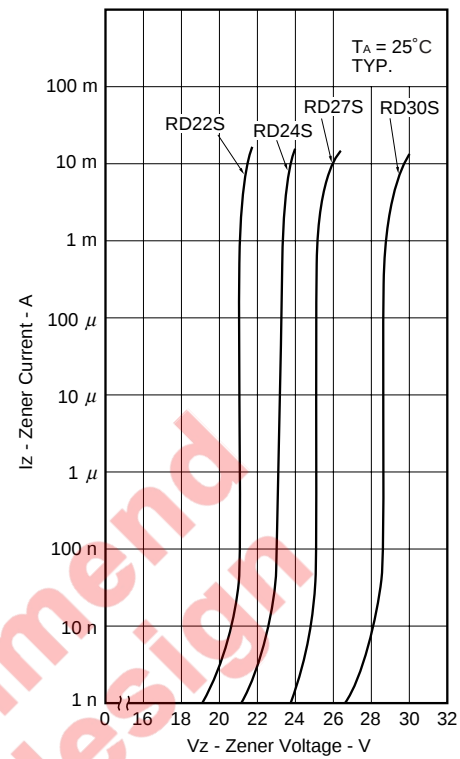


Fig.6 ZENER CURRENT vs. ZENER VOLTAGE

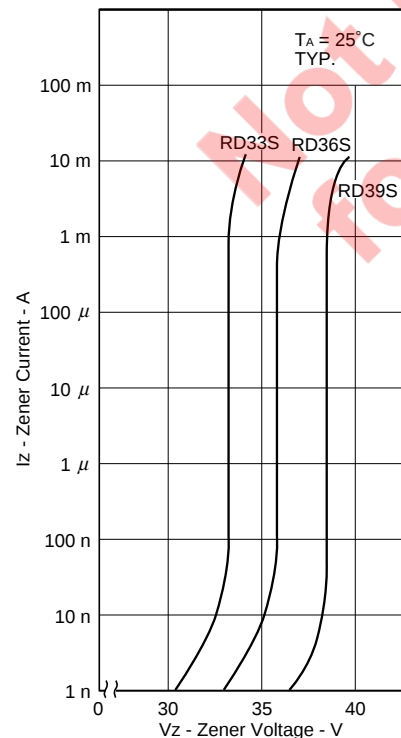


Fig.7 ZENER CURRENT vs. ZENER VOLTAGE

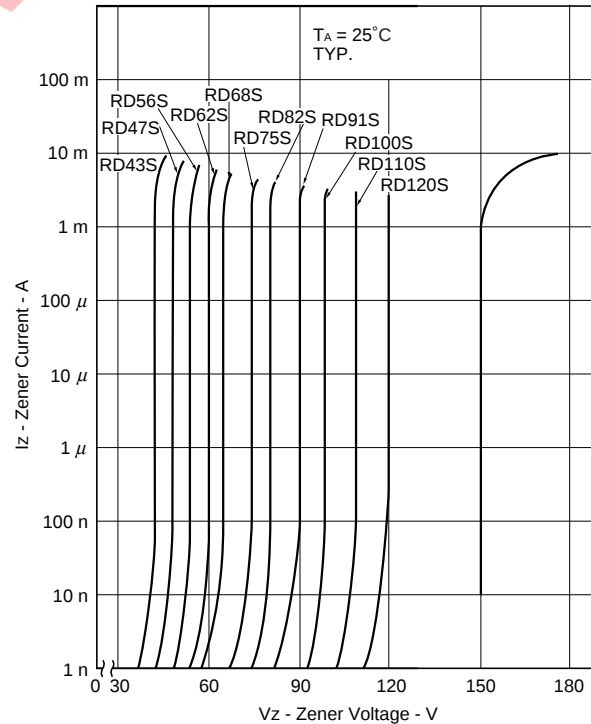


Fig.8 DYNAMIC IMPEDANCE vs. ZENER CURRENT

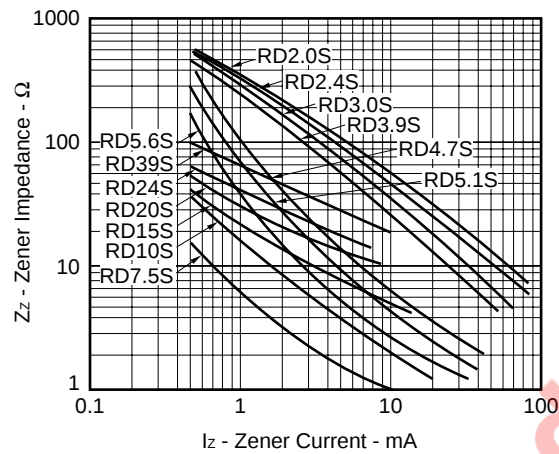


Fig.9 ZENER VOLTAGE TEMPERATURE COEFFICIENT vs. ZENER VOLTAGE

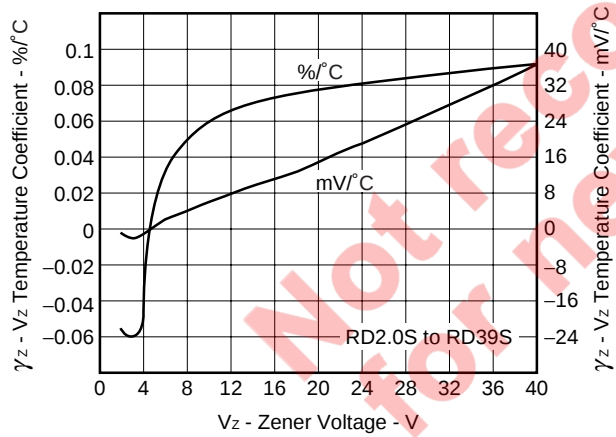


Fig.10 ZENER VOLTAGE TEMPERATURE COEFFICIENT vs. ZENER VOLTAGE

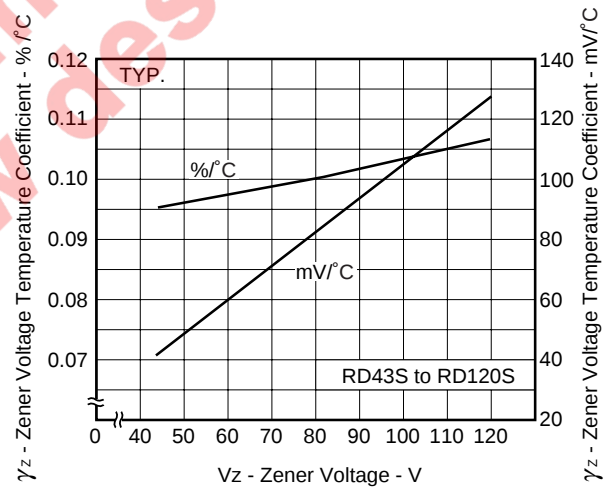


Fig.11 TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS

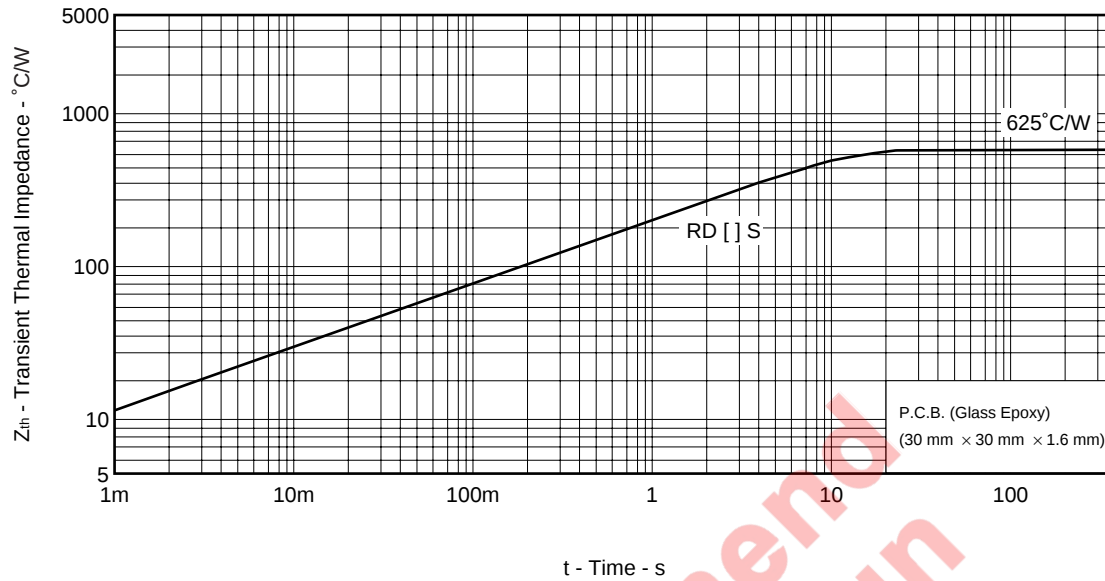
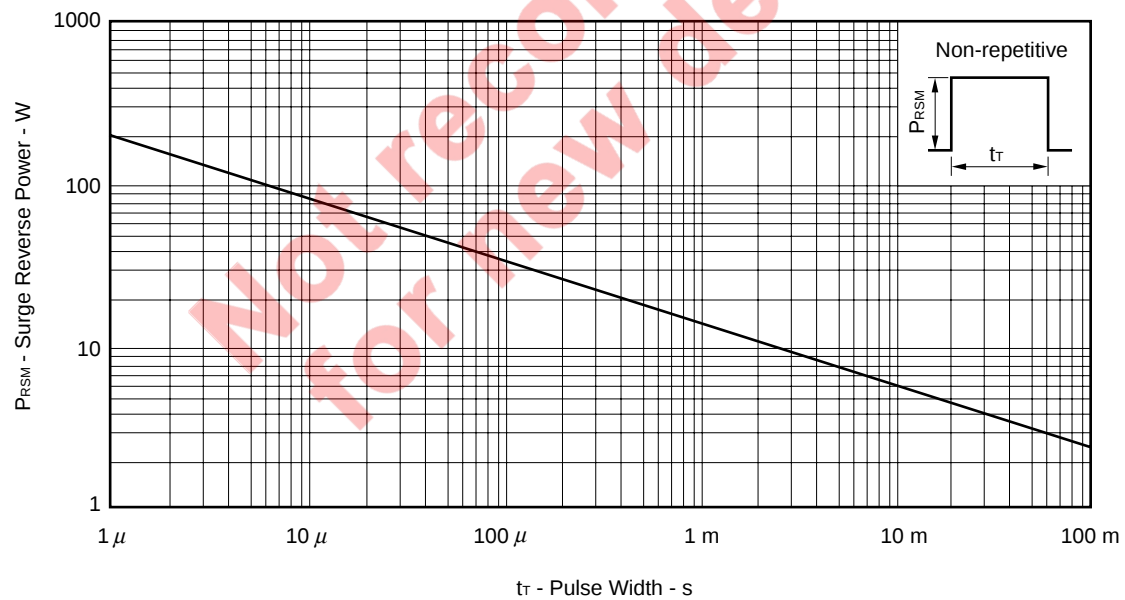


Fig.12 SURGE REVERSE POWER RATINGS



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