

To our customers,

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

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# ZENER DIODES

## RD2.0FM to RD120FM

### ZENER DIODES

#### 1 W PLANAR TYPE 2 PIN POWER MINI MOLD

#### DESCRIPTION

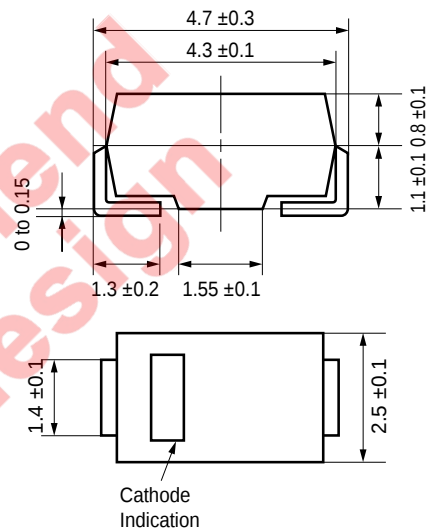
These products are zener diodes with an allowable power dissipation of 1 W and a planar type 2 pin power mini mold package.

#### <R> FEATURES

- Suitable for high-density mounting because the mounting area is reduced to about 65% compared with that of the 3-pin power mini mold RD\*\*P, which has been conventionally used until now.
- Achieves flat-surface mounting with a two-pin structure, while having the same Zener voltage classification as that for RD\*\*Ps.

#### PACKAGE DIMENSION

(Unit: mm)



#### APPLICATIONS

- Zener voltage and constant-current circuit
- Waveform clipper circuit and limiter circuit
- Surge absorption circuit

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

| Parameter            | Symbol           | Ratings     | Unit | Remarks            |
|----------------------|------------------|-------------|------|--------------------|
| Power dissipation    | P                | 1.0         | W    | Refer to Figure 1. |
| Forward current      | I <sub>F</sub>   | 200         | mA   |                    |
| Surge reverse power  | P <sub>RSM</sub> | 400         | W    | t = 10 μs          |
| Junction temperature | T <sub>J</sub>   | 150         | °C   |                    |
| Storage temperature  | T <sub>stg</sub> | -55 to +150 | °C   |                    |

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ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 ±2°C)

(1/2)

| Type Number | Class | Zener Voltage<br>V <sub>Z</sub> (V) <sup>Note1</sup> |      |                     | Dynamic Impedance<br>Z <sub>Z</sub> (Ω) <sup>Note2</sup> |                     | Reverse Current<br>I <sub>R</sub> (μA) |                    |
|-------------|-------|------------------------------------------------------|------|---------------------|----------------------------------------------------------|---------------------|----------------------------------------|--------------------|
|             |       | MIN.                                                 | MAX. | I <sub>Z</sub> (mA) | MAX.                                                     | I <sub>Z</sub> (mA) | MAX.                                   | V <sub>R</sub> (V) |
| RD2.0FM     | B     | 1.9                                                  | 2.2  | 5                   | 140                                                      | 5                   | 200                                    | 0.5                |
| RD2.2FM     | B     | 2.1                                                  | 2.4  | 5                   | 140                                                      | 5                   | 200                                    | 0.7                |
| RD2.4FM     | B     | 2.3                                                  | 2.6  | 5                   | 140                                                      | 5                   | 200                                    | 1.0                |
| RD2.7FM     | B     | 2.5                                                  | 2.9  | 5                   | 140                                                      | 5                   | 150                                    | 1.0                |
| RD3.0FM     | B     | 2.8                                                  | 3.2  | 5                   | 140                                                      | 5                   | 100                                    | 1.0                |
| RD3.3FM     | B     | 3.1                                                  | 3.5  | 5                   | 140                                                      | 5                   | 80                                     | 1.0                |
| RD3.6FM     | B     | 3.4                                                  | 3.8  | 5                   | 140                                                      | 5                   | 60                                     | 1.0                |
| RD3.9FM     | B     | 3.7                                                  | 4.1  | 5                   | 140                                                      | 5                   | 40                                     | 1.0                |
| RD4.3FM     | B     | 4.0                                                  | 4.5  | 5                   | 140                                                      | 5                   | 20                                     | 1.0                |
| RD4.7FM     | B     | 4.4                                                  | 4.9  | 5                   | 100                                                      | 5                   | 20                                     | 1.0                |
| RD5.1FM     | B     | 4.8                                                  | 5.4  | 5                   | 100                                                      | 5                   | 20                                     | 1.0                |
| RD5.6FM     | B     | 5.3                                                  | 6.0  | 5                   | 70                                                       | 5                   | 20                                     | 1.5                |
| RD6.2FM     | B     | 5.8                                                  | 6.6  | 5                   | 40                                                       | 5                   | 20                                     | 3.0                |
| RD6.8FM     | B     | 6.4                                                  | 7.2  | 5                   | 25                                                       | 5                   | 20                                     | 3.5                |
| RD7.5FM     | B     | 7.0                                                  | 7.9  | 5                   | 25                                                       | 5                   | 20                                     | 4.0                |
| RD8.2FM     | B     | 7.7                                                  | 8.7  | 5                   | 25                                                       | 5                   | 20                                     | 5.0                |
| RD9.1FM     | B     | 8.5                                                  | 9.6  | 5                   | 25                                                       | 5                   | 20                                     | 6.0                |
| RD10FM      | B     | 9.4                                                  | 10.6 | 5                   | 20                                                       | 5                   | 10                                     | 7.0                |
| RD11FM      | B     | 10.4                                                 | 11.6 | 5                   | 20                                                       | 5                   | 10                                     | 8.0                |
| RD12FM      | B     | 11.4                                                 | 12.6 | 5                   | 25                                                       | 5                   | 10                                     | 9.0                |
| RD13FM      | B     | 12.4                                                 | 14.1 | 5                   | 30                                                       | 5                   | 10                                     | 10                 |
| RD15FM      | B     | 13.8                                                 | 15.6 | 5                   | 30                                                       | 5                   | 10                                     | 11                 |
| RD16FM      | B     | 15.3                                                 | 17.1 | 5                   | 40                                                       | 5                   | 10                                     | 12                 |
| RD18FM      | B     | 16.8                                                 | 19.1 | 5                   | 45                                                       | 5                   | 10                                     | 13                 |
| RD20FM      | B     | 18.8                                                 | 21.2 | 5                   | 55                                                       | 5                   | 10                                     | 15                 |
| RD22FM      | B     | 20.8                                                 | 23.3 | 5                   | 55                                                       | 5                   | 10                                     | 17                 |
| RD24FM      | B     | 22.8                                                 | 25.6 | 5                   | 70                                                       | 5                   | 10                                     | 19                 |
| RD27FM      | B     | 25.1                                                 | 28.9 | 2                   | 80                                                       | 2                   | 10                                     | 21                 |
| RD30FM      | B     | 28.0                                                 | 32.0 | 2                   | 80                                                       | 2                   | 10                                     | 23                 |
| RD33FM      | B     | 31.0                                                 | 35.0 | 2                   | 80                                                       | 2                   | 10                                     | 25                 |
| RD36FM      | B     | 34.0                                                 | 38.0 | 2                   | 90                                                       | 2                   | 10                                     | 27                 |
| RD39FM      | B     | 37.0                                                 | 41.0 | 2                   | 130                                                      | 2                   | 10                                     | 30                 |
| RD43FM      | B     | 40.0                                                 | 45.0 | 2                   | 150                                                      | 2                   | 5                                      | 33                 |
| RD47FM      | B     | 44.0                                                 | 49.0 | 2                   | 170                                                      | 2                   | 5                                      | 36                 |
| RD51FM      | B     | 48.0                                                 | 54.0 | 2                   | 220                                                      | 2                   | 5                                      | 39                 |
| RD56FM      | B     | 53.0                                                 | 60.0 | 2                   | 220                                                      | 2                   | 5                                      | 43                 |
| RD62FM      | B     | 58.0                                                 | 66.0 | 2                   | 220                                                      | 2                   | 5                                      | 47                 |
| RD68FM      | B     | 64.0                                                 | 72.0 | 2                   | 230                                                      | 2                   | 5                                      | 52                 |

**Note 1.** V<sub>Z</sub> is tested with pulsed (40 ms).

**2.** Z<sub>Z</sub> is measured at I<sub>Z</sub> by given a very small A.C. signal.

ELECTRICAL CHARACTERISTICS ( $T_A = 25 \pm 2^\circ\text{C}$ )

(2/2)

| 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) |
| RD75FM      | B     | 70.0                                        | 79.0  | 2          | 250                                                      | 2          | 5                                          | 57        |
| RD82FM      | B     | 77.0                                        | 87.0  | 2          | 270                                                      | 2          | 5                                          | 63        |
| RD91FM      | B     | 85.0                                        | 96.0  | 2          | 340                                                      | 2          | 5                                          | 69        |
| RD100FM     | B     | 94.0                                        | 106.0 | 2          | 430                                                      | 2          | 5                                          | 76        |
| RD110FM     | B     | 104.0                                       | 116.0 | 2          | 530                                                      | 2          | 5                                          | 84        |
| RD120FM     | B     | 114.0                                       | 126.0 | 2          | 620                                                      | 2          | 5                                          | 91        |

**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. signal.

Not recommend  
for new design

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

Fig.1 P -  $T_A$  RATING

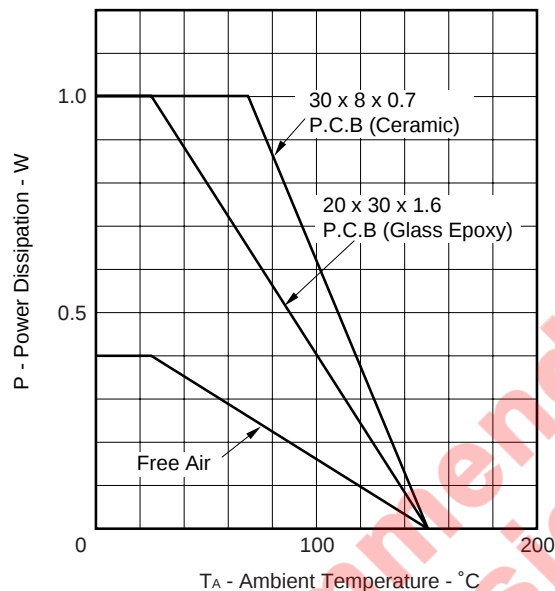
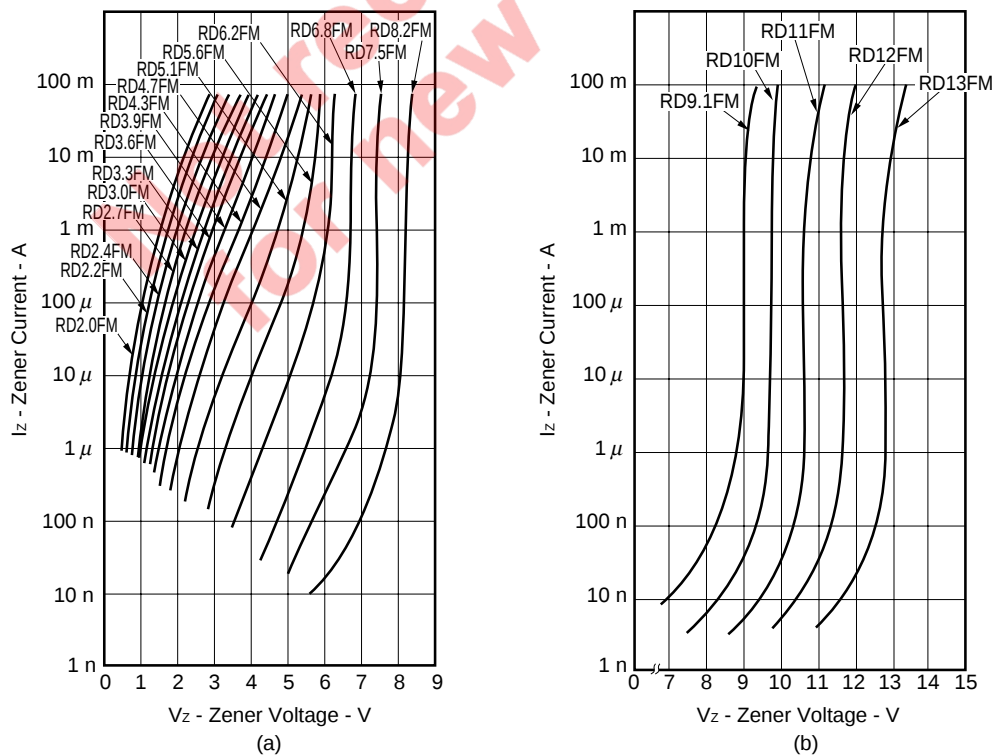
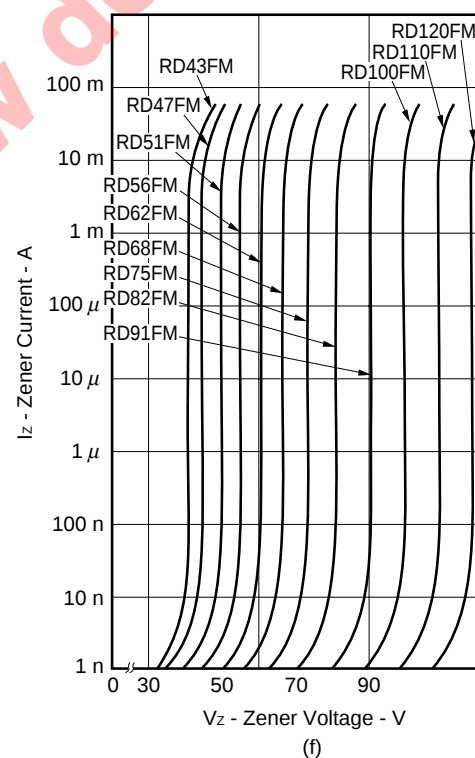
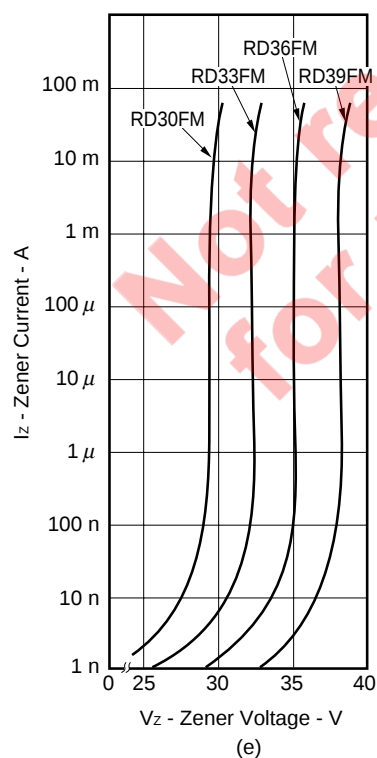
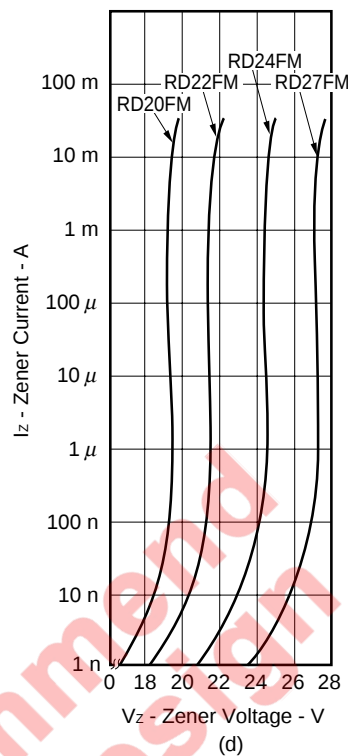
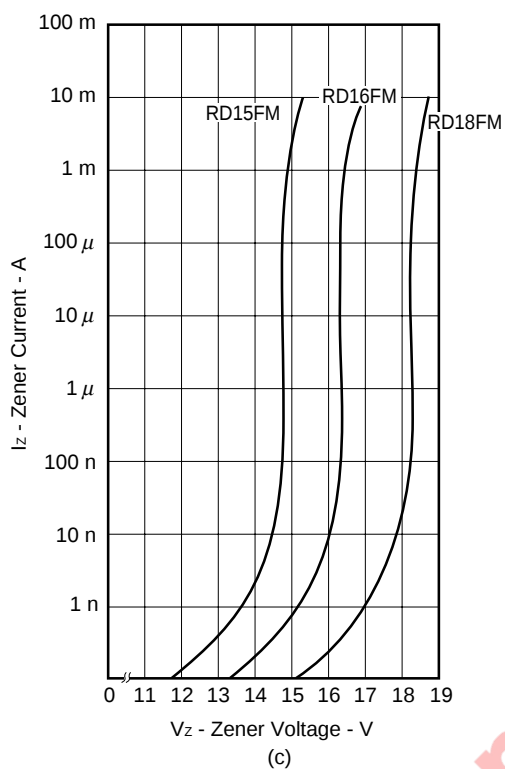


Fig.2  $I_Z$  -  $V_Z$  CHARACTERISTICS (a to f)





<R> Fig.3  $\gamma_z$  -  $V_z$  CHARACTERISTICS

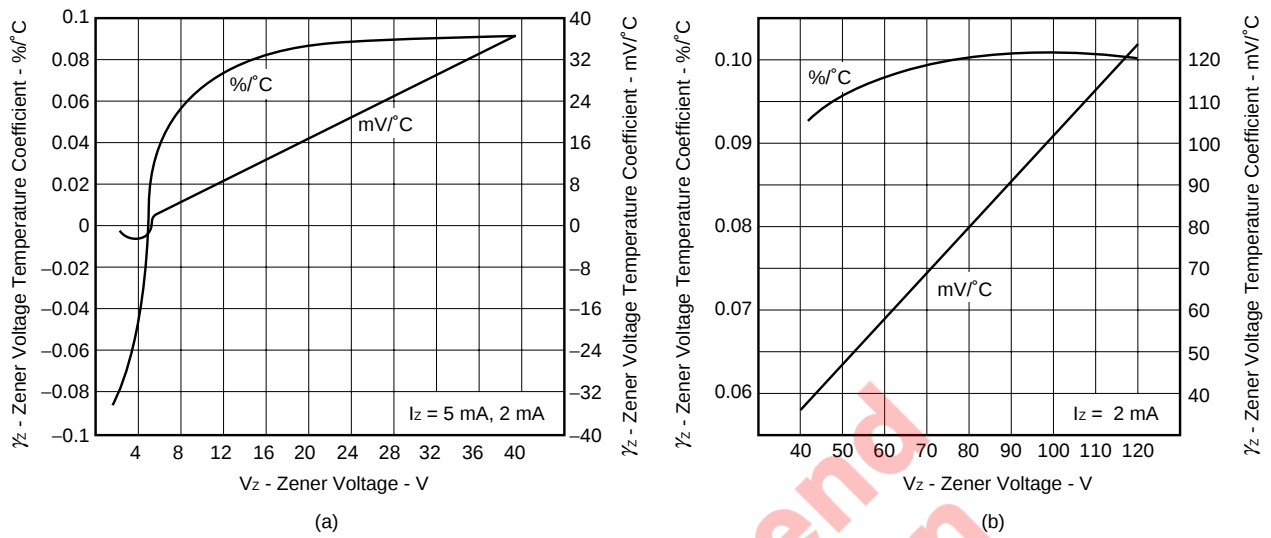


Fig.4  $Z_z$  -  $I_z$  CHARACTERISTICS

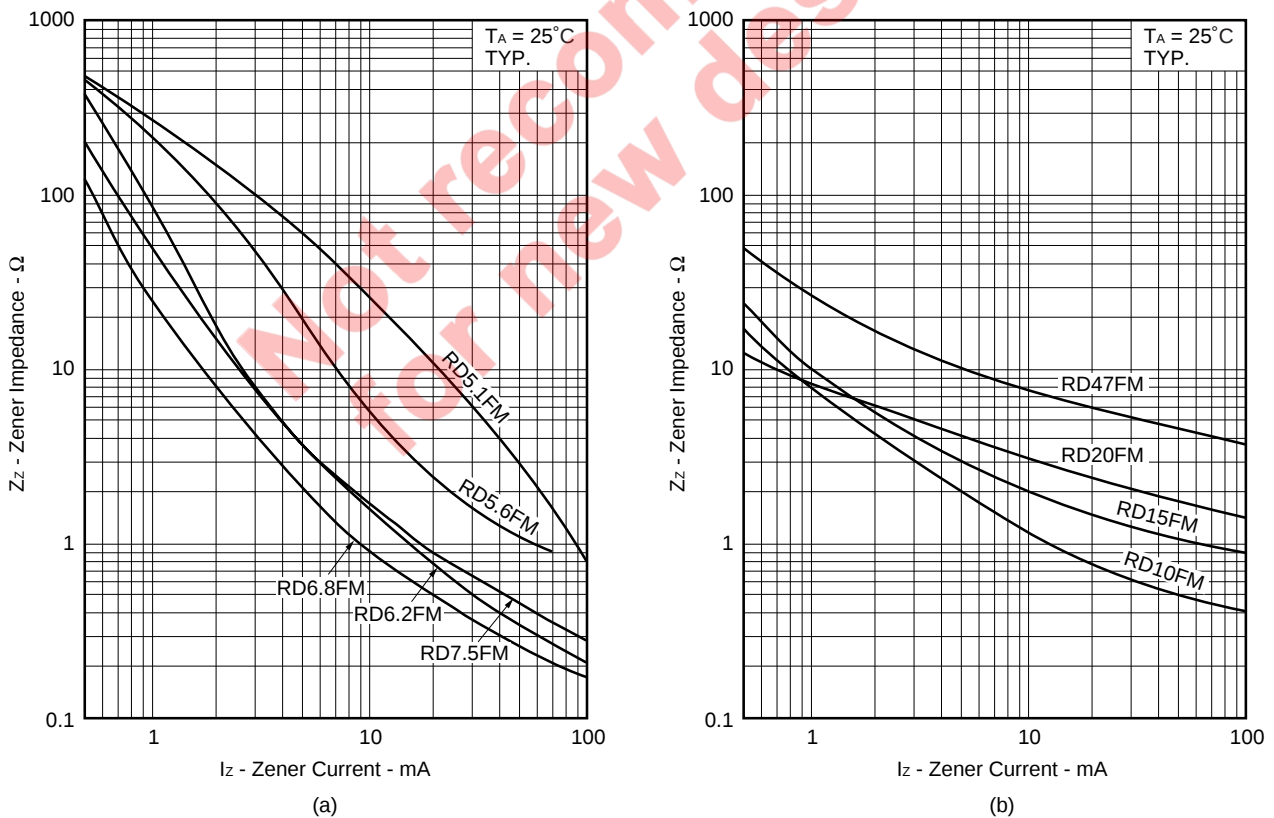


Fig.5 TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS

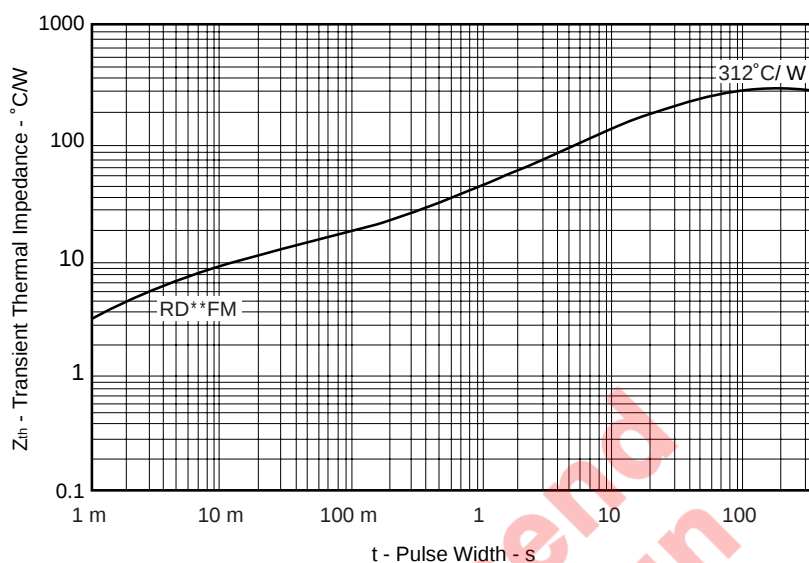
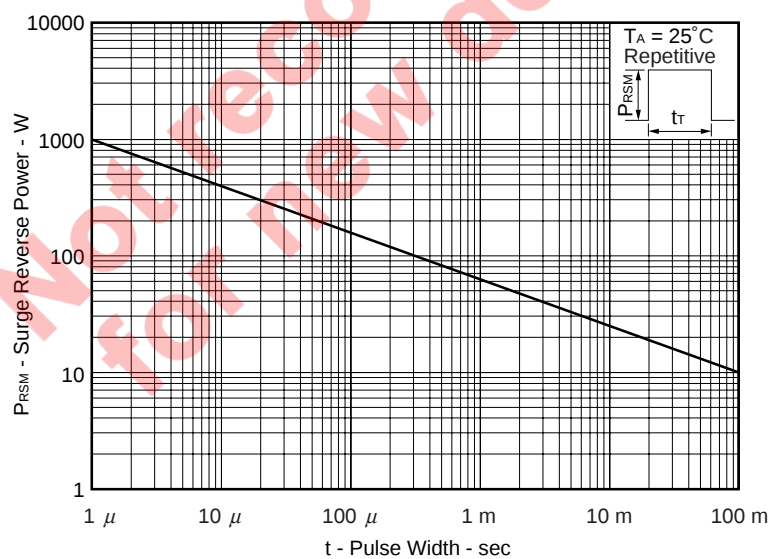


Fig.6 SURGE REVERSE POWER RATINGS



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