

# RD2.0ES SERIES

**V<sub>Z</sub> : 2.0 - 37.5Volts**  
**P<sub>D</sub> : 400 mW**

### FEATURES :

- \* High reliability
- \* Low leakage current
- \* Suitable for 5mm - pitch high speed automatic insertion
- \* **Pb / RoHS Free**

### MECHANICAL DATA

**Case:** DO-34 Glass Case

**Weight:** approx. 0.093g

### ORDERING INFORMATION

RD2.0ES to RD39ES with suffix "AB1", "AB2", or "AB3" should be applied for orders for suffix "AB"

### MAXIMUM RATINGS

Rating at 25 °C ambient temperature unless otherwise specified

| Parameter                      | Symbol           | Value         | Unit |
|--------------------------------|------------------|---------------|------|
| Forward Rectifier Current      | I <sub>F</sub>   | 150           | mA   |
| Power Dissipation              | P <sub>D</sub>   | 400           | mW   |
| Surge Reverse Power (t = 10μs) | P <sub>RSM</sub> | 100           | W    |
| Junction Temperature           | T <sub>J</sub>   | 175           | °C   |
| Storage Temperature Range      | T <sub>stg</sub> | - 65 to + 175 | °C   |

# ZENER DIODES

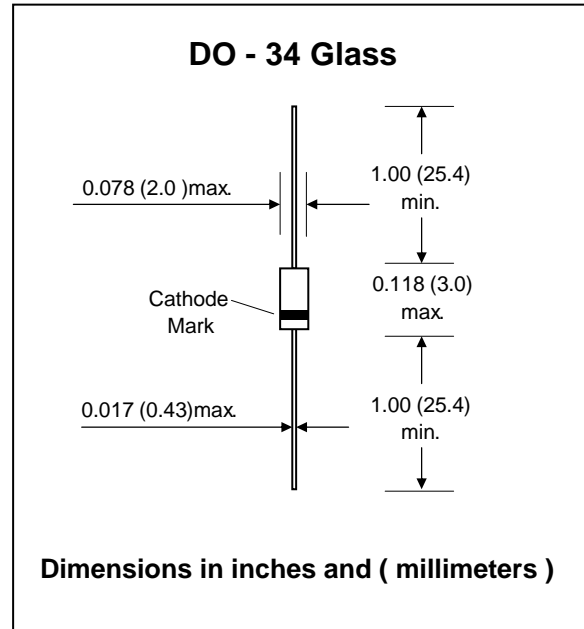
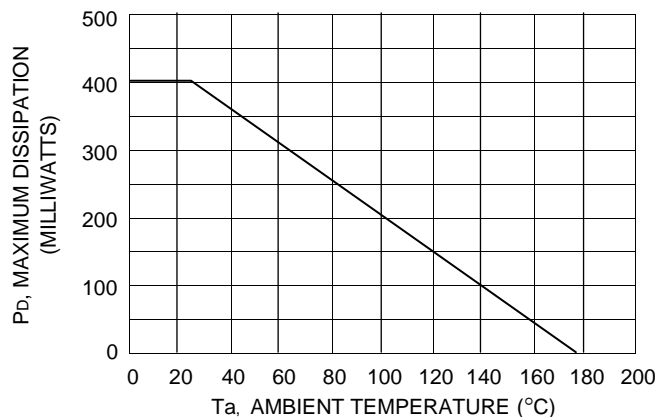


Fig. 1 POWER DISSIPATION vs. AMBIENT TEMPERATURE



## ELECTRICAL CHARACTERISTICS

Rating at 25 °C ambient temperature unless otherwise specified

| Type    | Suffix | Zener Voltage <sup>(1)</sup>          |      | Test Current<br>I <sub>ZT</sub><br>(mA) | Maximum Zener <sup>(2)</sup><br>Impedance |                                   |                 | Maximum<br>Reverse Current |                   |
|---------|--------|---------------------------------------|------|---|---|-----------------------------------|-----------------|----------------------------|-------------------|
|         |        | V <sub>Z</sub> (V) at I <sub>ZT</sub> |      |   | Z <sub>ZT</sub> @ I <sub>ZT</sub>         | Z <sub>ZK</sub> @ I <sub>ZK</sub> | I <sub>ZK</sub> | I <sub>R</sub>             | at V <sub>R</sub> |
|         |        | min.                                  | max. |   | (Ω)                                       | (Ω)                               | (mA)            | (μA)                       | (V)               |
| RD2.0ES | AB     | 1.88                                  | 2.20 | 5                                       | 100                                       | 1000                              | 0.5             | 120                        | 0.5               |
|         | AB1    | 1.88                                  | 2.10 |   |   |                                   |                 |                            |                   |
|         | AB2    | 2.02                                  | 2.20 |   |   |                                   |                 |                            |                   |
| RD2.2ES | AB     | 2.12                                  | 2.41 | 5                                       | 100                                       | 1000                              | 0.5             | 120                        | 0.7               |
|         | AB1    | 2.12                                  | 2.30 |   |   |                                   |                 |                            |                   |
|         | AB2    | 2.22                                  | 2.41 |   |   |                                   |                 |                            |                   |
| RD2.4ES | AB     | 2.33                                  | 2.63 | 5                                       | 100                                       | 1000                              | 0.5             | 120                        | 1.0               |
|         | AB1    | 2.33                                  | 2.52 |   |   |                                   |                 |                            |                   |
|         | AB2    | 2.43                                  | 2.63 |   |   |                                   |                 |                            |                   |
| RD2.7ES | AB     | 2.54                                  | 2.91 | 5                                       | 110                                       | 1000                              | 0.5             | 100                        | 1.0               |
|         | AB1    | 2.54                                  | 2.75 |   |   |                                   |                 |                            |                   |
|         | AB2    | 2.69                                  | 2.91 |   |   |                                   |                 |                            |                   |
| RD3.0ES | AB     | 2.85                                  | 3.22 | 5                                       | 120                                       | 1000                              | 0.5             | 50                         | 1.0               |
|         | AB1    | 2.85                                  | 3.07 |   |   |                                   |                 |                            |                   |
|         | AB2    | 3.01                                  | 3.22 |   |   |                                   |                 |                            |                   |
| RD3.3ES | AB     | 3.16                                  | 3.53 | 5                                       | 120                                       | 1000                              | 0.5             | 20                         | 1.0               |
|         | AB1    | 3.16                                  | 3.38 |   |   |                                   |                 |                            |                   |
|         | AB2    | 3.32                                  | 3.53 |   |   |                                   |                 |                            |                   |
| RD3.6ES | AB     | 3.47                                  | 3.83 | 5                                       | 120                                       | 1100                              | 0.5             | 10                         | 1.0               |
|         | AB1    | 3.47                                  | 3.68 |   |   |                                   |                 |                            |                   |
|         | AB2    | 3.62                                  | 3.83 |   |   |                                   |                 |                            |                   |
| RD3.9ES | AB     | 3.77                                  | 4.14 | 5                                       | 120                                       | 1200                              | 0.5             | 5                          | 1.0               |
|         | AB1    | 3.77                                  | 3.98 |   |   |                                   |                 |                            |                   |
|         | AB2    | 3.92                                  | 4.14 |   |   |                                   |                 |                            |                   |
| RD4.3ES | AB     | 4.05                                  | 4.53 | 5                                       | 120                                       | 1200                              | 0.5             | 5                          | 1.0               |
|         | AB1    | 4.05                                  | 4.26 |   |   |                                   |                 |                            |                   |
|         | AB2    | 4.20                                  | 4.40 |   |   |                                   |                 |                            |                   |
|         | AB3    | 4.34                                  | 4.53 |   |   |                                   |                 |                            |                   |
| RD4.7ES | AB     | 4.47                                  | 4.91 | 5                                       | 100                                       | 1200                              | 0.5             | 5                          | 1.0               |
|         | AB1    | 4.47                                  | 4.65 |   |   |                                   |                 |                            |                   |
|         | AB2    | 4.59                                  | 4.77 |   |   |                                   |                 |                            |                   |
|         | AB3    | 4.71                                  | 4.91 |   |   |                                   |                 |                            |                   |
| RD5.1ES | AB     | 4.85                                  | 5.35 | 5                                       | 70  | 1200                              | 0.5             | 5                          | 1.5               |
|         | AB1    | 4.85                                  | 5.03 |   |   |                                   |                 |                            |                   |
|         | AB2    | 4.97                                  | 5.18 |   |   |                                   |                 |                            |                   |
|         | AB3    | 5.12                                  | 5.35 |   |   |                                   |                 |                            |                   |
| RD5.6ES | AB     | 5.29                                  | 5.88 | 5                                       | 40  | 900                               | 0.5             | 5                          | 2.5               |
|         | AB1    | 5.29                                  | 5.52 |   |   |                                   |                 |                            |                   |
|         | AB2    | 5.46                                  | 5.70 |   |   |                                   |                 |                            |                   |
|         | AB3    | 5.64                                  | 5.88 |   |   |                                   |                 |                            |                   |
| RD6.2ES | AB     | 5.81                                  | 6.40 | 5                                       | 30  | 500                               | 0.5             | 5                          | 3.0               |
|         | AB1    | 5.81                                  | 6.06 |   |   |                                   |                 |                            |                   |
|         | AB2    | 5.99                                  | 6.24 |   |   |                                   |                 |                            |                   |
|         | AB3    | 6.16                                  | 6.40 |   |   |                                   |                 |                            |                   |
| RD6.8ES | AB     | 6.32                                  | 6.97 | 5                                       | 25  | 150                               | 0.5             | 2                          | 3.5               |
|         | AB1    | 6.32                                  | 6.59 |   |   |                                   |                 |                            |                   |
|         | AB2    | 6.52                                  | 6.79 |   |   |                                   |                 |                            |                   |
|         | AB3    | 6.70                                  | 6.97 |   |   |                                   |                 |                            |                   |

## ELECTRICAL CHARACTERISTICS

Rating at 25 °C ambient temperature unless otherwise specified

| Type    | Suffix | Zener Voltage <sup>(1)</sup>          |       | Test Current<br>I <sub>ZT</sub><br>(mA) | Maximum Zener <sup>(2)</sup><br>Impedance |                                   |                 | Maximum<br>Reverse Current |                   |
|---------|--------|---------------------------------------|-------|---|---|-----------------------------------|-----------------|----------------------------|-------------------|
|         |        | V <sub>Z</sub> (V) at I <sub>ZT</sub> |       |   | Z <sub>ZT</sub> @ I <sub>ZT</sub>         | Z <sub>ZK</sub> @ I <sub>ZK</sub> | I <sub>ZK</sub> | I <sub>R</sub>             | at V <sub>R</sub> |
|         |        | min.                                  | max.  |   | (Ω)                                       | (Ω)                               | (mA)            | (μA)                       | (V)               |
| RD7.5ES | AB     | 6.88                                  | 7.64  | 5                                       | 25  | 120                               | 0.5             | 0.5                        | 4.0               |
|         | AB1    | 6.88                                  | 7.19  |   |   |                                   |                 |                            |                   |
|         | AB2    | 7.11                                  | 7.41  |   |   |                                   |                 |                            |                   |
|         | AB3    | 7.33                                  | 7.64  |   |   |                                   |                 |                            |                   |
| RD8.2ES | AB     | 7.56                                  | 8.41  | 5                                       | 20  | 120                               | 0.5             | 0.5                        | 5.0               |
|         | AB1    | 7.56                                  | 7.90  |   |   |                                   |                 |                            |                   |
|         | AB2    | 7.82                                  | 8.15  |   |   |                                   |                 |                            |                   |
|         | AB3    | 8.07                                  | 8.41  |   |   |                                   |                 |                            |                   |
| RD9.1ES | AB     | 8.33                                  | 9.29  | 5                                       | 20  | 120                               | 0.5             | 0.5                        | 6.0               |
|         | AB1    | 8.33                                  | 8.70  |   |   |                                   |                 |                            |                   |
|         | AB2    | 8.61                                  | 8.99  |   |   |                                   |                 |                            |                   |
|         | AB3    | 8.89                                  | 9.29  |   |   |                                   |                 |                            |                   |
| RD10ES  | AB     | 9.19                                  | 10.30 | 5                                       | 20  | 120                               | 0.5             | 0.2                        | 7.0               |
|         | AB1    | 9.19                                  | 9.59  |   |   |                                   |                 |                            |                   |
|         | AB2    | 9.48                                  | 9.90  |   |   |                                   |                 |                            |                   |
|         | AB3    | 9.82                                  | 10.30 |   |   |                                   |                 |                            |                   |
| RD11ES  | AB     | 10.18                                 | 11.26 | 5                                       | 20  | 120                               | 0.5             | 0.2                        | 8.0               |
|         | AB1    | 10.18                                 | 10.63 |   |   |                                   |                 |                            |                   |
|         | AB2    | 10.50                                 | 10.95 |   |   |                                   |                 |                            |                   |
|         | AB3    | 10.82                                 | 11.26 |   |   |                                   |                 |                            |                   |
| RD12ES  | AB     | 11.13                                 | 12.30 | 5                                       | 25  | 110                               | 0.5             | 0.2                        | 9.0               |
|         | AB1    | 11.13                                 | 11.63 |   |   |                                   |                 |                            |                   |
|         | AB2    | 11.50                                 | 11.92 |   |   |                                   |                 |                            |                   |
|         | AB3    | 11.80                                 | 12.30 |   |   |                                   |                 |                            |                   |
| RD13ES  | AB     | 12.18                                 | 13.62 | 5                                       | 25  | 110                               | 0.5             | 0.2                        | 10                |
|         | AB1    | 12.18                                 | 12.71 |   |   |                                   |                 |                            |                   |
|         | AB2    | 12.59                                 | 13.16 |   |   |                                   |                 |                            |                   |
|         | AB3    | 13.03                                 | 13.62 |   |   |                                   |                 |                            |                   |
| RD15ES  | AB     | 13.48                                 | 15.02 | 5                                       | 25  | 110                               | 0.5             | 0.2                        | 11                |
|         | AB1    | 13.48                                 | 14.09 |   |   |                                   |                 |                            |                   |
|         | AB2    | 13.95                                 | 14.56 |   |   |                                   |                 |                            |                   |
|         | AB3    | 14.42                                 | 15.02 |   |   |                                   |                 |                            |                   |
| RD16ES  | AB     | 14.87                                 | 16.50 | 5                                       | 25  | 150                               | 0.5             | 0.2                        | 12                |
|         | AB1    | 14.87                                 | 15.50 |   |   |                                   |                 |                            |                   |
|         | AB2    | 15.33                                 | 15.96 |   |   |                                   |                 |                            |                   |
|         | AB3    | 15.79                                 | 16.50 |   |   |                                   |                 |                            |                   |
| RD18ES  | AB     | 16.34                                 | 18.30 | 5                                       | 30  | 150                               | 0.5             | 0.2                        | 13                |
|         | AB1    | 16.34                                 | 17.06 |   |   |                                   |                 |                            |                   |
|         | AB2    | 16.90                                 | 17.67 |   |   |                                   |                 |                            |                   |
|         | AB3    | 17.51                                 | 18.30 |   |   |                                   |                 |                            |                   |
| RD20ES  | AB     | 18.14                                 | 20.45 | 5                                       | 30  | 200                               | 0.5             | 0.2                        | 15                |
|         | AB1    | 18.14                                 | 18.96 |   |   |                                   |                 |                            |                   |
|         | AB2    | 18.80                                 | 19.68 |   |   |                                   |                 |                            |                   |
|         | AB3    | 19.52                                 | 20.45 |   |   |                                   |                 |                            |                   |

## ELECTRICAL CHARACTERISTICS

Rating at 25 °C ambient temperature unless otherwise specified

| Type   | Suffix | Zener Voltage <sup>(1)</sup>          |       | Test Current<br>I <sub>ZT</sub><br>(mA) | Maximum Zener <sup>(2)</sup><br>Impedance |                                   |                 | Maximum<br>Reverse Current |                   |
|--------|--------|---------------------------------------|-------|---|---|-----------------------------------|-----------------|----------------------------|-------------------|
|        |        | V <sub>Z</sub> (V) at I <sub>ZT</sub> |       |   | Z <sub>ZT</sub> @ I <sub>ZT</sub>         | Z <sub>ZK</sub> @ I <sub>ZK</sub> | I <sub>ZK</sub> | I <sub>R</sub>             | at V <sub>R</sub> |
|        |        | min.                                  | max.  |   | (Ω)                                       | (Ω)                               | (mA)            | (μA)                       | (V)               |
| RD22ES | AB     | 20.23                                 | 22.61 | 5                                       | 30  | 200                               | 0.5             | 0.2                        | 17                |
|        | AB1    | 20.23                                 | 21.08 |   |   |                                   |                 |                            |                   |
|        | AB2    | 20.76                                 | 21.65 |   |   |                                   |                 |                            |                   |
|        | AB3    | 21.22                                 | 22.09 |   |   |                                   |                 |                            |                   |
|        | AB4    | 21.68                                 | 22.61 |   |   |                                   |                 |                            |                   |
| RD24ES | AB     | 22.26                                 | 24.81 | 5                                       | 30  | 200                               | 0.5             | 0.2                        | 19                |
|        | AB1    | 22.26                                 | 23.12 |   |   |                                   |                 |                            |                   |
|        | AB2    | 22.75                                 | 23.73 |   |   |                                   |                 |                            |                   |
|        | AB3    | 23.29                                 | 24.27 |   |   |                                   |                 |                            |                   |
|        | AB4    | 23.81                                 | 24.81 |   |   |                                   |                 |                            |                   |
| RD27ES | AB     | 24.26                                 | 27.64 | 5                                       | 45  | 250                               | 0.5             | 0.2                        | 21                |
|        | AB1    | 24.26                                 | 25.52 |   |   |                                   |                 |                            |                   |
|        | AB2    | 24.97                                 | 26.26 |   |   |                                   |                 |                            |                   |
|        | AB3    | 25.63                                 | 26.95 |   |   |                                   |                 |                            |                   |
|        | AB4    | 26.29                                 | 27.64 |   |   |                                   |                 |                            |                   |
| RD30ES | AB     | 26.99                                 | 30.51 | 5                                       | 55  | 250                               | 0.5             | 0.2                        | 23                |
|        | AB1    | 26.99                                 | 28.39 |   |   |                                   |                 |                            |                   |
|        | AB2    | 27.70                                 | 29.13 |   |   |                                   |                 |                            |                   |
|        | AB3    | 28.36                                 | 29.82 |   |   |                                   |                 |                            |                   |
|        | AB4    | 29.02                                 | 30.51 |   |   |                                   |                 |                            |                   |
| RD33ES | AB     | 29.68                                 | 33.11 | 5                                       | 65  | 250                               | 0.5             | 0.2                        | 25                |
|        | AB1    | 29.68                                 | 31.22 |   |   |                                   |                 |                            |                   |
|        | AB2    | 30.32                                 | 31.88 |   |   |                                   |                 |                            |                   |
|        | AB3    | 30.90                                 | 32.50 |   |   |                                   |                 |                            |                   |
|        | AB4    | 31.49                                 | 33.11 |   |   |                                   |                 |                            |                   |
| RD36ES | AB     | 32.14                                 | 35.77 | 5                                       | 75  | 250                               | 0.5             | 0.2                        | 27                |
|        | AB1    | 32.14                                 | 33.79 |   |   |                                   |                 |                            |                   |
|        | AB2    | 32.79                                 | 34.49 |   |   |                                   |                 |                            |                   |
|        | AB3    | 33.40                                 | 35.13 |   |   |                                   |                 |                            |                   |
|        | AB4    | 34.01                                 | 35.77 |   |   |                                   |                 |                            |                   |
| RD39ES | AB     | 34.68                                 | 38.52 | 5                                       | 85  | 250                               | 0.5             | 0.2                        | 30                |
|        | AB1    | 34.68                                 | 36.47 |   |   |                                   |                 |                            |                   |
|        | AB2    | 35.36                                 | 37.19 |   |   |                                   |                 |                            |                   |
|        | AB3    | 36.00                                 | 37.85 |   |   |                                   |                 |                            |                   |
|        | AB4    | 36.63                                 | 38.52 |   |   |                                   |                 |                            |                   |

### Notes :

- (1) Tested with pulse (40 ms )
- (2) Z<sub>Z</sub> and Z<sub>ZK</sub> are measured at  $I_Z$  by given a very small AC. current signal.
- (3) Suffix AB is Suffix AB1, AB2, AB3, or AB4