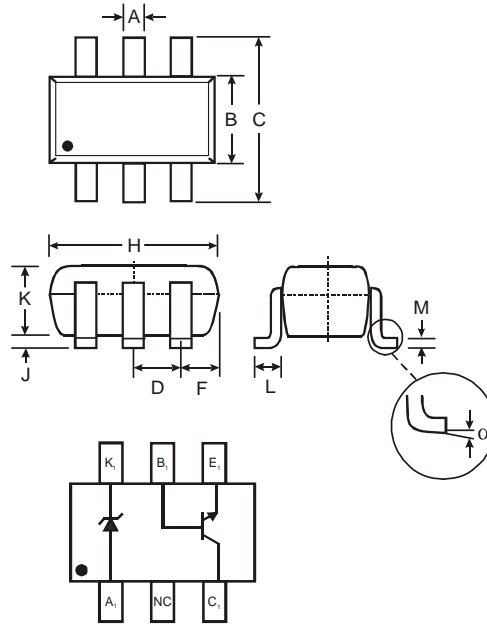


Features

- Epitaxial Planar Die Construction
- Selectively Paired NPN Transistors & Zener Diodes for Series Pass Voltage Regulator Circuits
- Ideally Suited for Automated Assembly Processes
- **Lead Free By Design/RoHS Compliant (Note 1)**
- **"Green" Device (Note 2)**

Mechanical Data

- Case: SOT-363
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminals: Finish – Matte Tin annealed over Alloy 42 leadframe. Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Marking & Type Code Information: See Page 5
- Ordering Information: See Page 5
- Weight: 0.008 grams (approximate)



| SOT-363 | | |
|----------------------|--------------|------|
| Dim | Min | Max |
| A | 0.10 | 0.30 |
| B | 1.15 | 1.35 |
| C | 2.00 | 2.20 |
| D | 0.65 Nominal | |
| F | 0.30 | 0.40 |
| H | 1.80 | 2.20 |
| J | — | 0.10 |
| K | 0.90 | 1.00 |
| L | 0.25 | 0.40 |
| M | 0.10 | 0.25 |
| α | 8° | |
| All Dimensions in mm | | |

Maximum Ratings, Total Device @T_A = 25°C unless otherwise specified

| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 3) | P _d | 200 | mW |
| Thermal Resistance, Junction to Ambient (Note 3) | R _{θJA} | 625 | °C/W |
| Operating and Storage and Temperature Range | T _j , T _{STG} | -55 to +150 | °C |

Maximum Ratings, NPN Transistor @T_A = 25°C unless otherwise specified

| Characteristic | Symbol | Value | Unit |
|---|------------------|-------|------|
| Collector-Base Voltage | V _{CB0} | 45 | V |
| Collector-Emitter Voltage | V _{CEO} | 18 | V |
| Emitter-Base Voltage | V _{EBO} | 5 | V |
| Collector Current - Continuous (Note 3) | I _C | 1 | A |

Maximum Ratings, Zener Element @T_A = 25°C unless otherwise specified

| Characteristic | Symbol | Value | Unit |
|---|----------------|-------|------|
| Forward Voltage @ I _F = 10mA | V _F | 0.9 | V |

- Notes:
1. No purposefully added lead.
 2. Diodes Inc's "Green" policy can be found on our website at http://www.diodes.com/products/lead_free/index.php.
 3. Part mounted on FR-4 board with recommended pad layout, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.

Electrical Characteristics, NPN Transistor @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic | Symbol | Min | Max | Unit | Test Condition |
|--------------------------------------|---------------|-----|-----|---------------|---|
| OFF CHARACTERISTICS (Note 4) | | | | | |
| Collector-Base Breakdown Voltage | $V_{(BR)CBO}$ | 45 | — | V | $I_C = 100\mu\text{A}, I_E = 0$ |
| Collector-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | 18 | — | V | $I_C = 1\text{mA}, I_B = 0$ |
| Emitter-Base Breakdown Voltage | $V_{(BR)EBO}$ | 5 | — | V | $I_E = 100\mu\text{A}, I_C = 0$ |
| Collector Cutoff Current | I_{CBO} | — | 1 | μA | $V_{CB} = 40\text{V}, I_E = 0$ |
| Emitter Cutoff Current | I_{EBO} | — | 1 | μA | $V_{EB} = 4\text{V}, I_C = 0$ |
| ON CHARACTERISTICS (Note 4) | | | | | |
| DC Current Gain | h_{FE} | 150 | 800 | — | $I_C = 100\text{mA}, V_{CE} = 1\text{V}$ |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT)}$ | — | 0.5 | V | $I_C = 300\text{mA}, I_B = 30\text{mA}$ |
| SMALL SIGNAL CHARACTERISTICS | | | | | |
| Output Capacitance | C_{obo} | — | 8 | pF | $V_{CB} = 10\text{V}, f = 1.0\text{MHz}, I_E = 0$ |
| Current Gain-Bandwidth Product | f_T | 100 | — | MHz | $V_{CB} = 10\text{V}, I_E = 50\text{mA}, f = 100\text{MHz}$ |

Electrical Characteristics, Zener Element @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Type Number | Zener Voltage Range (Note 5) | | | | Maximum Reverse Leakage Current | |
|-------------|------------------------------|---------|---------|----------|---------------------------------|---|
| | $V_Z @ I_{ZT}$ | | | I_{ZT} | $I_R @ V_R$ | |
| | Nom (V) | Min (V) | Max (V) | mA | μA | V |
| DVR1V8W | 3.3 | 3.1 | 3.5 | 5 | 5 | 1 |
| DVR2V5W | 3.9 | 3.7 | 4.1 | 5 | 3 | 1 |
| DVR3V3W | 4.7 | 4.4 | 5.0 | 5 | 3 | 2 |
| DVR5V0W | 5.1 | 4.85 | 5.36 | 0.05 | 5 | 3 |

- Notes:
- Short duration test pulse used to minimize self-heating effect.
 - Nominal Zener voltage is measured with the device junction in thermal equilibrium at $T_J = 30^\circ\text{C} \pm 1^\circ\text{C}$.

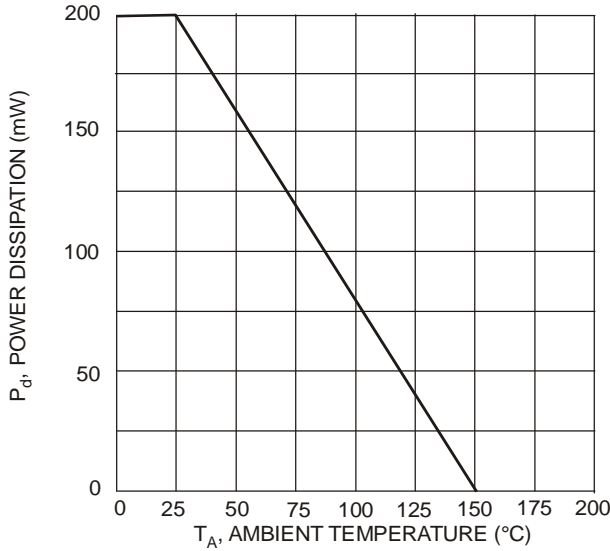


Fig. 1 Max Power Dissipation vs. Ambient Temperature (Total Device)

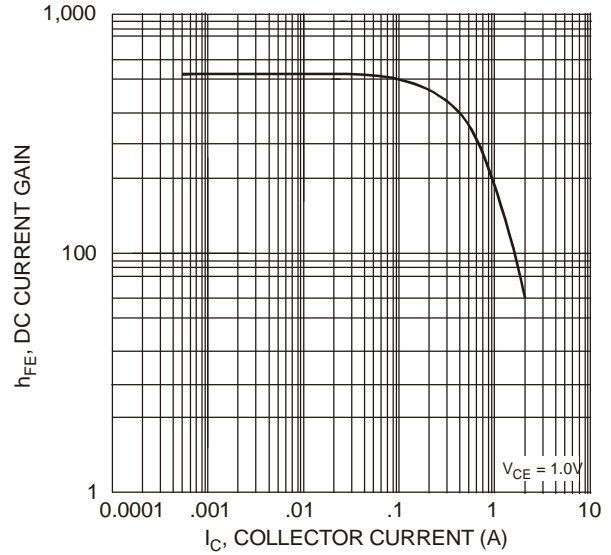


Fig. 2 Typical DC Current Gain vs. Collector Current (NPN Transistor)

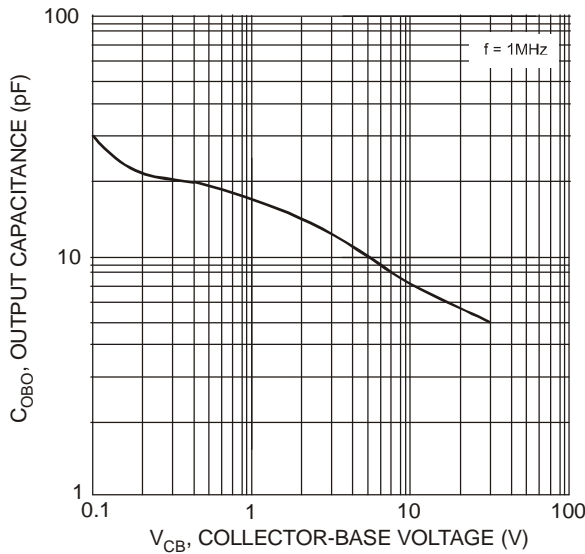


Fig. 3 Output Capacitance vs. Collector-Base Voltage (NPN Transistor)

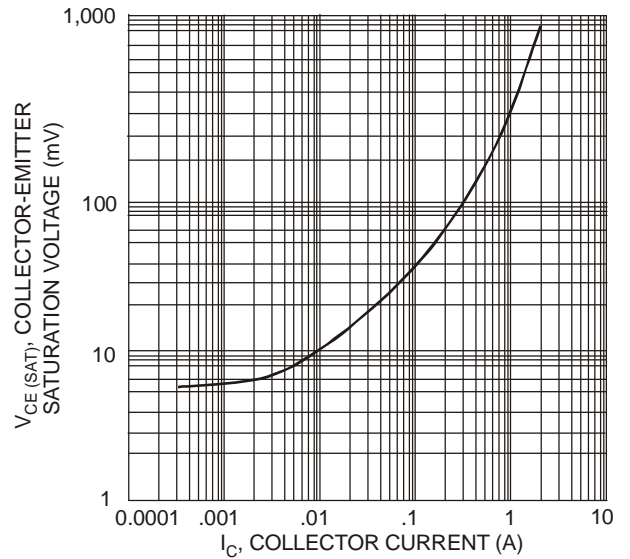


Fig. 4 Collector Saturation Voltage vs. Collector Current (NPN Transistor)

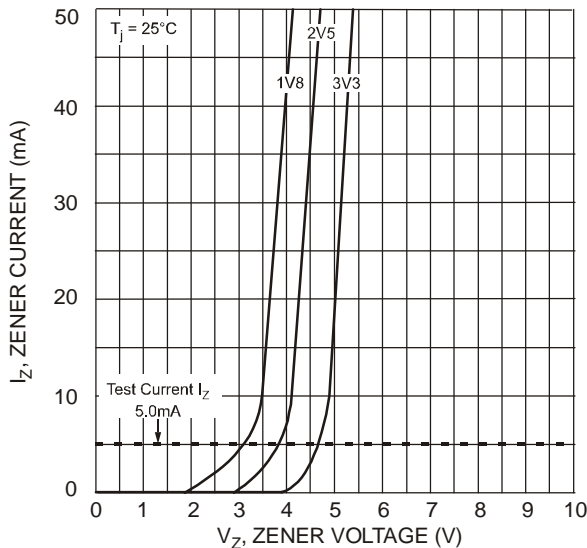


Fig. 5 Zener Breakdown Characteristics (DVR1V8W - DVR3V3W)

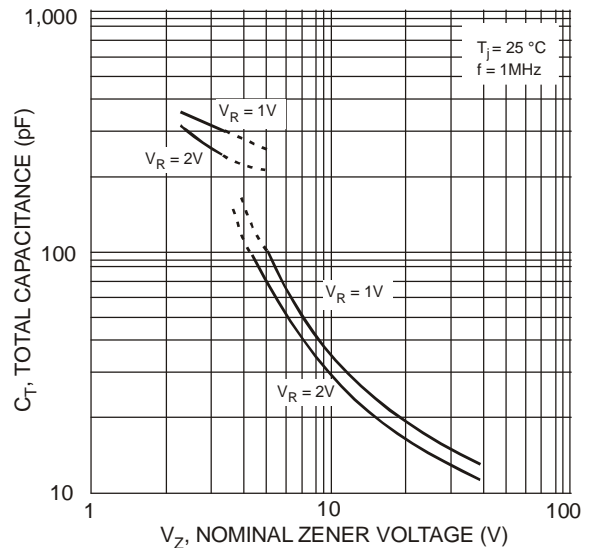


Fig. 6 Total Capacitance vs. Nominal Zener Voltage (DVR1V8W - DVR3V3W)

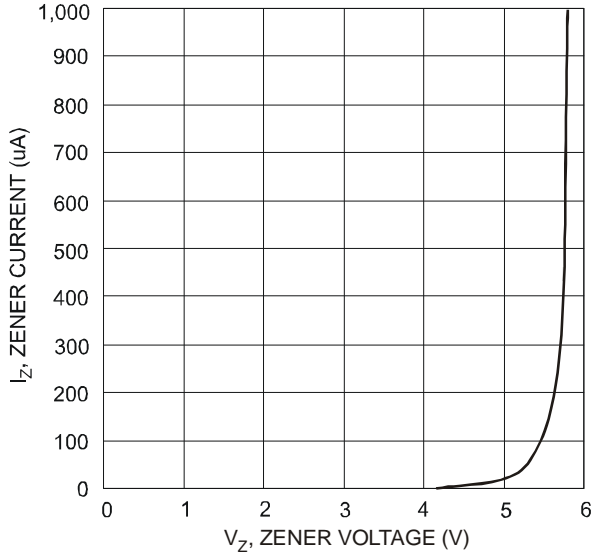


Fig. 7 Zener Breakdown Characteristics (DVR5V0W)

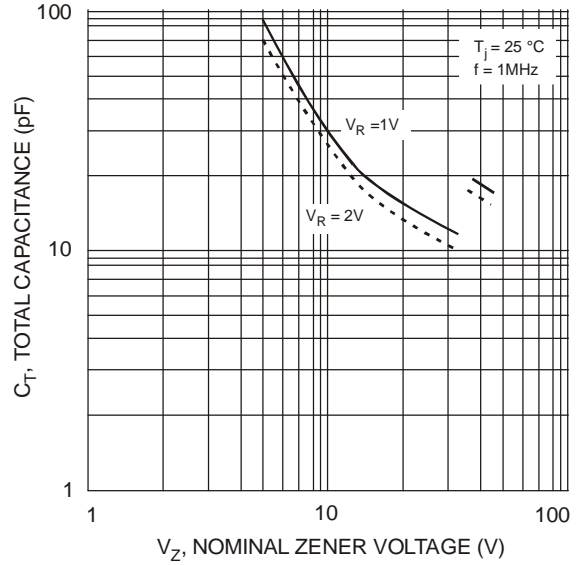


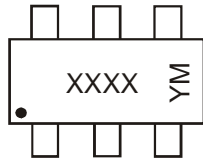
Fig. 8 Total Capacitance vs. Nominal Zener Voltage (DVR5V0W)

Ordering Information (Note 6)

| Device | Packaging | Shipping |
|-----------|-----------|------------------|
| DVR1V8W-7 | SOT-363 | 3000/Tape & Reel |
| DVR2V5W-7 | SOT-363 | 3000/Tape & Reel |
| DVR3V3W-7 | SOT-363 | 3000/Tape & Reel |
| DVR5V0W-7 | SOT-363 | 3000/Tape & Reel |

Notes: 6. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

Marking Information



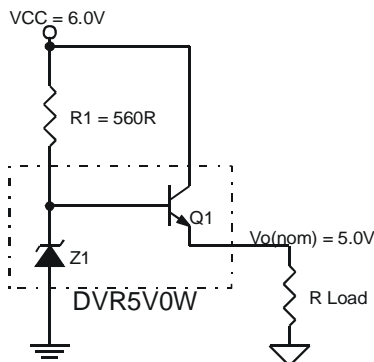
XXXX = Product Type Marking Code,
See Table Above, e.g., VR01 = DVR1V8W
YM = Date Code Marking
Y = Year ex: R = 2004
M = Month ex: 9 = September

Date Code Key

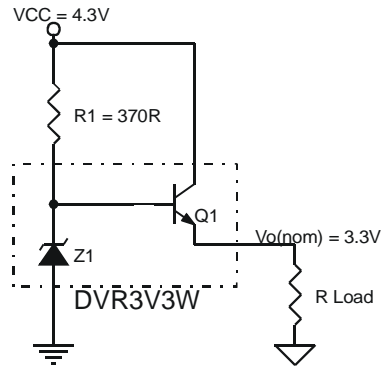
| Year | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|------|------|------|------|------|------|------|------|------|------|
| Code | R | S | T | U | V | W | X | Y | Z |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D |

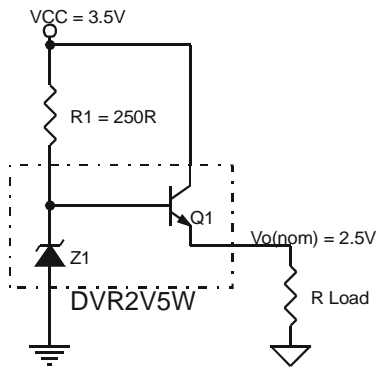
Sample Applications



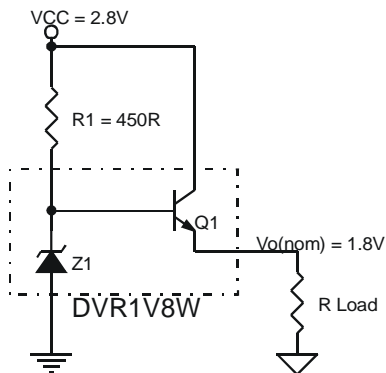
Sample Application for DVR5V0W:
 $VCC^9 = 6.0V$ $R1^7 = 560\Omega$
 $Vo(nom) = 5.0V$ $I_o = 100mA$
 $I_q(\text{typical}^8) = 0.5mA @ I_o = 0mA$
 $\text{Typical}^6 V_{reg}(\text{load}) = 0.2V \text{ from } I_o = 100mA \text{ to } 0mA$



Sample Application for DVR3V3W:
 $VCC^9 = 4.3V$ $R1^7 = 3700\Omega$
 $Vo(nom) = 3.3V$ $Io = 100mA$
 $Iq(\text{typical}^8) = 0.7mA @ Io = 0mA$
 Typical⁸ $Vreg(\text{load}) = 0.21V$ from $Io = 100mA$ to $0mA$



Sample Application for DVR2V5W:
 $VCC^9 = 3.5V$ $R1^7 = 250\Omega$
 $Vo(nom) = 2.5V$ $Io = 100mA$
 $Iq(\text{typical}^8) = 0.91mA @ Io = 0mA$
 Typical⁸ $Vreg(\text{load}) = 0.13V$ from $Io = 100mA$ to $0mA$



Sample Application for DVR1V8W:
 $VCC^9 = 2.8V$ $R1^7 = 450\Omega$
 $Vo(nom) = 1.8V$ $Io = 100mA$
 $Iq(\text{typical}^8) = 0.55mA @ Io = 0mA$
 Typical⁸ $Vreg(\text{load}) = 0.25V$ from $Io = 100mA$ to $0mA$

- Notes:
7. Resistor R1 not included.
 8. Typical performance shown is under setup and operating conditions specified in the sample applications.
 9. Recommended $VCC(\text{min}) \sim Vo(\text{nom}) + 1V$.

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