NEW PRODUCT

# DVR1V8W - DVR5V0W

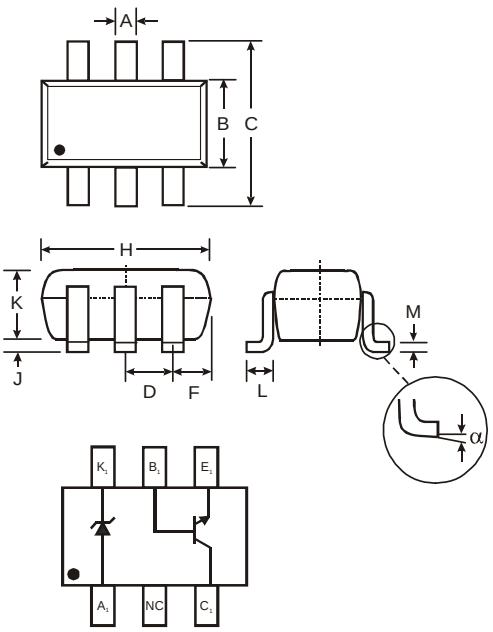
## COMPLEX ARRAY FOR VOLTAGE REGULATORS

## 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) | $R_{\theta JA}$ | 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 | | $V_{CBO}$ | 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.

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## Electrical Characteristics, NPN Transistor @$T_A$ = 25°C unless otherwise specified

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

## Electrical Characteristics, Zener Element @$T_A$ = 25°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: 4. Short duration test pulse used to minimize self-heating effect.
5. Nominal Zener voltage is measured with the device junction in thermal equilibrium at $T_T$ = 30°C ±1°C.

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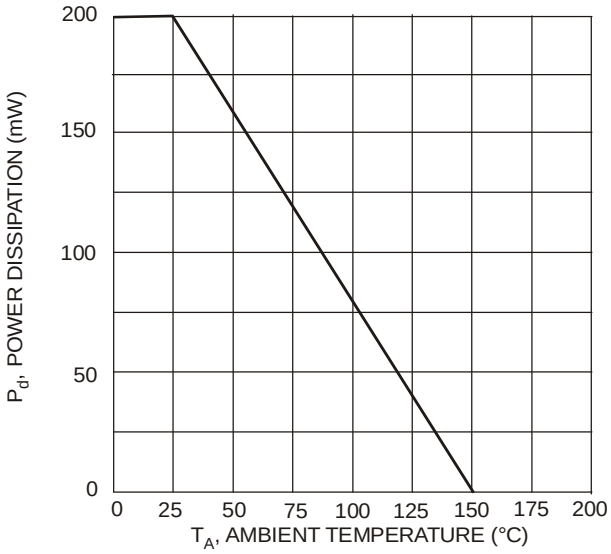



Fig. 1 Max Power Dissipation vs. Ambient Temperature (Total Device)

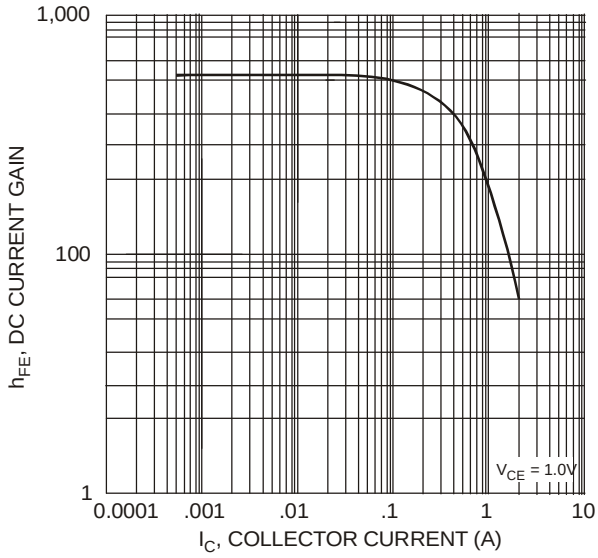



Fig. 2 Typical DC Current Gain vs. Collector Current (NPN Transistor)

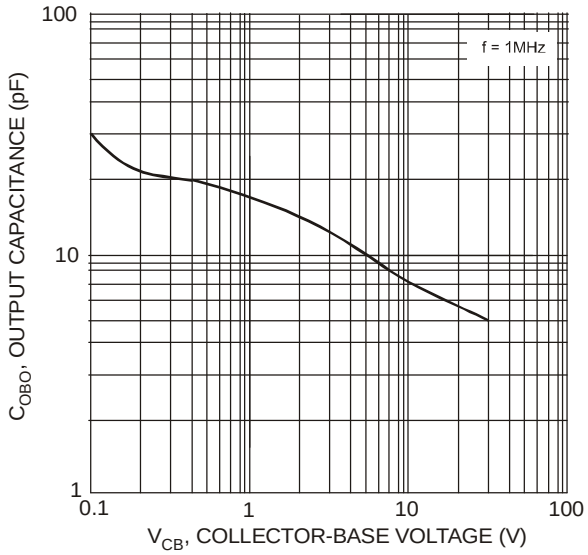



Fig. 3 Output Capacitance vs.
Collector-Base Voltage (NPN Transistor)

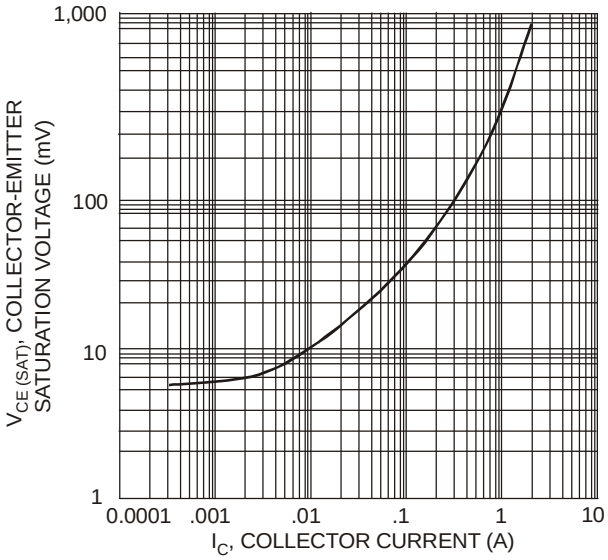



Fig. 4 Collector Saturation Voltage vs.
Collector Current (NPN Transistor)

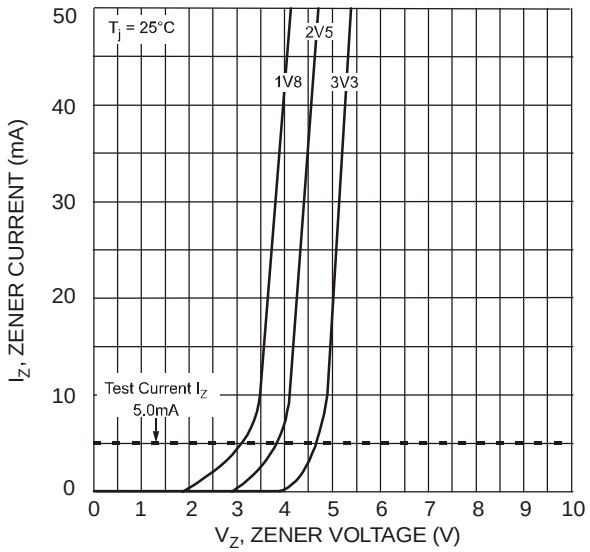



Fig. 5 Zener Breakdown Characteristics
(DVR1V8W - DVR3V3W)

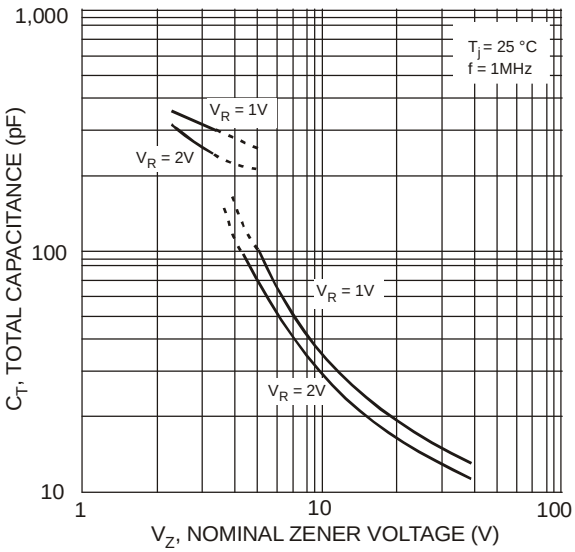



Fig. 6 Total Capacitance vs. Nominal Zener Voltage
(DVR1V8W - DVR3V3W)

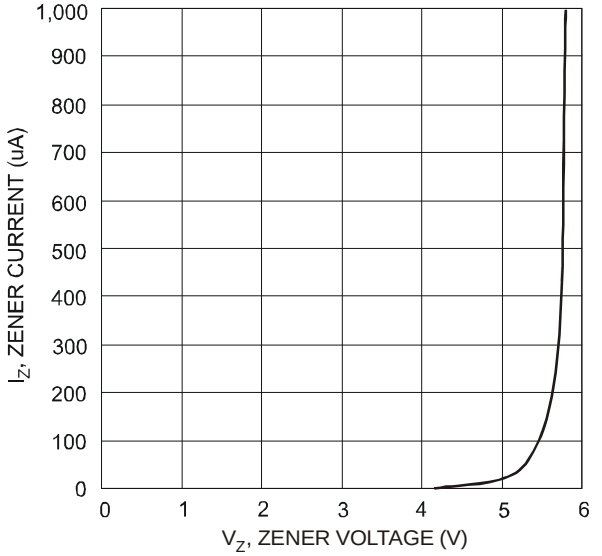



Fig. 7 Zener Breakdown Characteristics (DVR5V0W)

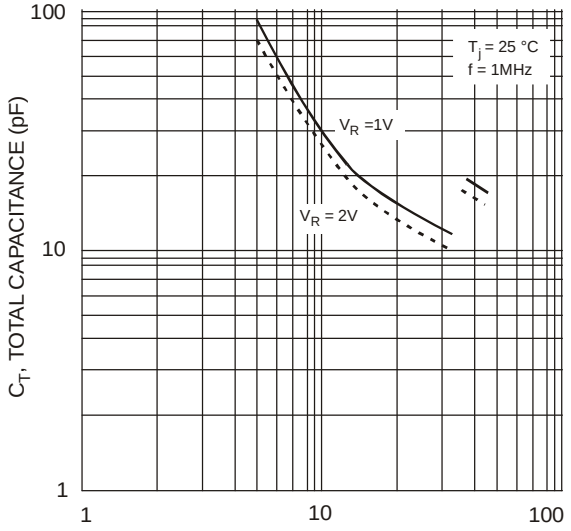


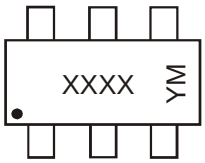

Fig. 8 Total Capacitance vs. Nominal Zener Voltage (DVR5V0W)

## 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



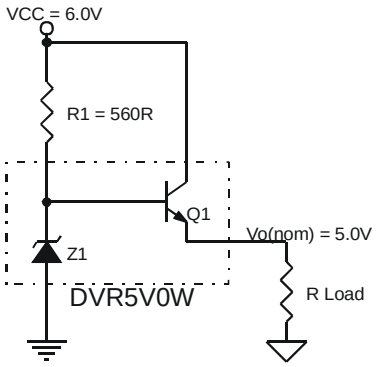

XXXX = Product Type Marking Code,
See Table Above, e.g., VR01 = DVR1V8W
YM = Date Code Marking
Y = Year ex: R = 2004
M = Month ex: 9 = September

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]= 560Ω
Vo(nom) = 5.0V Io = 100mA
Iq(typical[8]) = 0.5mA @ Io = 0mA
Typical[8] Vreg(load) = 0.2V from Io = 100mA to 0mA

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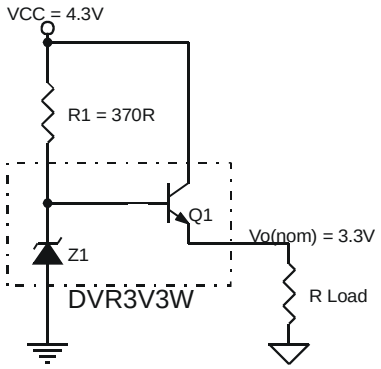
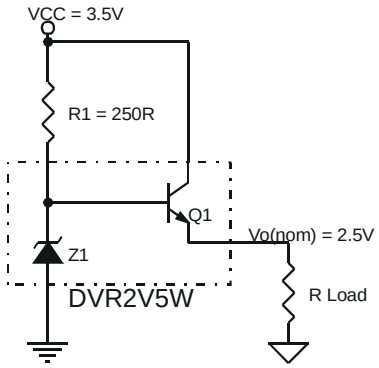
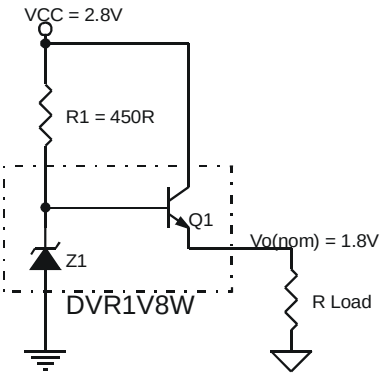



Sample Application for DVR3V3W:
VCC[9] = 4.3V R1[7]= 3700Ω
Vo(nom) = 3.3V Io = 100mA
Iq(typical[8]) = 0.7mA @ Io = 0mA
Typical[8] Vreg(load) = 0.21V from Io = 100mA to 0mA




Sample Application for DVR2V5W:
VCC[9] = 3.5V R1[7]= 250Ω
Vo(nom) = 2.5V Io = 100mA
Iq(typical[8]) = 0.91mA @ Io = 0mA
Typical[8] Vreg(load) = 0.13V from Io = 100mA to 0mA




Sample Application for DVR1V8W:
VCC[9] = 2.8V R17= 450Ω
Vo(nom) = 1.8V Io = 100mA
Iq(typical[8]) = 0.55mA @ Io = 0mA
Typical[8] Vreg(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(min) ~ Vo(nom) + 1V.