

Features and Benefits

- Epitaxial Planar Die Construction
- Two Pre-Biased Transistors and Two Switching Diodes, Internally Connected in One Package
- Ideally Suited for Automated Assembly Processes
- **Lead Free By Design/RoHS Compliant (Note 1)**
- **"Green" Device (Note 2)**
- **Qualified to AEC-Q101 standards for High Reliability**

| |
|---------------------------|
| R1 = R3 = 2.2kΩ (nominal) |
|---------------------------|

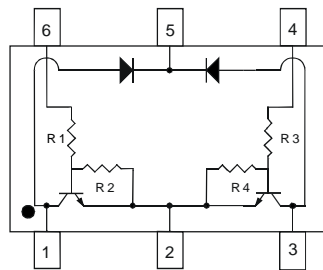
| |
|--------------------------|
| R2 = R4 = 47kΩ (nominal) |
|--------------------------|

Mechanical Data

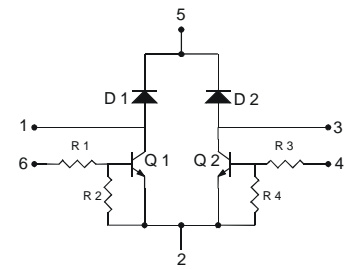
- Case: SOT-363
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish - Matte Tin annealed over Alloy 42 leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.0062 grams (approximate)



Top View



Top View



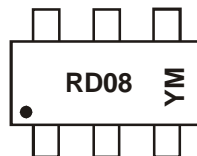
Device Circuit

Ordering Information (Note 3)

| Device | Packaging | Shipping |
|------------|-----------|------------------|
| DRDNB21D-7 | SOT-363 | 3000/Tape & Reel |

- Notes:
1. No purposefully added lead.
 2. Diodes Inc.'s "Green" Policy can be found on our website at <http://www.diodes.com>
 3. For packaging details, visit our website at <http://www.diodes.com>.

Marking Information



RD08 = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (e.g. T = 2006)
 M = Month (e.g. 1 = January)

Date Code Key

| Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|-------|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | S | T | U | V | W | X | Y | Z | A | B | C | D |
| 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 |

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

| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 4) | P _D | 200 | mW |
| Thermal Resistance, Junction to Ambient Air (Note 4) | R _{θJA} | 625 | °C/W |
| Operating and Storage Junction Temperature Range | T _J , T _{STG} | -55 to +150 | °C |

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

| Characteristic | Symbol | Value | Unit |
|---------------------------|-----------------|-----------|------|
| Collector-Emitter Voltage | V _{CC} | 50 | V |
| Base-Emitter Voltage | V _{in} | -5 to +12 | V |
| Output Current | I _O | 100 | mA |
| Peak Collector Current | I _{CM} | 100 | mA |

Maximum Ratings, Switching Diode @T_A = 25°C unless otherwise specified

| Characteristic | Symbol | Value | Unit |
|---|---------------------|-------|------|
| Non-Repetitive Peak Reverse Voltage | V _{RM} | 100 | V |
| Peak Repetitive Reverse Voltage | V _{RPM} | 75 | V |
| Working Peak Reverse Voltage | V _{RWM} | | |
| DC Blocking Voltage | V _R | | |
| RMS Reverse Voltage | V _{R(RMS)} | 53 | V |
| Forward Continuous Current (Note 4) | I _{FM} | 500 | mA |
| Average Rectified Output Current (Note 4) | I _O | 250 | mA |
| Non-Repetitive Peak Forward Surge Current @ t = 1.0μs | I _{FSM} | 4.0 | A |
| @ t = 1.0s | | 1.0 | |

Electrical Characteristics, Pre-Biased NPN Transistor @T_A = 25°C unless otherwise specified

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|----------------------------|---------------------|-----|-----|-----|------|---|
| Input Voltage | V _{I(off)} | 0.5 | — | — | V | V _{CC} = 5V, I _O = 100μA |
| | V _{I(on)} | — | — | 1.1 | V | V _O = 0.3V, I _O = 5mA |
| Output Voltage | V _{O(on)} | — | — | 0.3 | V | I _O /I _I = 50mA/0.25mA |
| Input Current | I _I | — | — | 3.6 | mA | V _I = 5V |
| Output Current | I _{O(off)} | — | — | 0.5 | μA | V _{CC} = 50V, V _I = 0V |
| DC Current Gain | G _I | 80 | — | — | — | V _O = 5V, I _O = 10mA |
| Input Resistor Tolerance | ΔR1 | -30 | — | +30 | % | - |
| Resistance Ratio Tolerance | ΔR2/R1 | -20 | — | +20 | % | - |
| Gain-Bandwidth Product* | f _T | — | 250 | — | MHz | V _{CE} = 10V, I _E = 5mA, f = 100MHz |

* Transistor - For Reference Only

Electrical Characteristics, Switching Diode @T_A = 25°C unless otherwise specified

| Characteristic | Symbol | Min | Max | Unit | Test Condition |
|------------------------------------|--------------------|------|-------|------|--|
| Reverse Breakdown Voltage (Note 5) | V _{(BR)R} | 75 | — | V | I _R = 10μA |
| Forward Voltage | V _F | 0.62 | 0.72 | V | I _F = 5.0mA |
| | | — | 0.855 | | I _F = 10mA |
| | | — | 1.0 | | I _F = 100mA |
| | | — | 1.25 | | I _F = 150mA |
| Reverse Current (Note 5) | I _R | — | 2.5 | μA | V _R = 75V |
| | | | 50 | μA | V _R = 75V, T _J = 150°C |
| | | | 30 | μA | V _R = 25V, T _J = 150°C |
| | | | 25 | nA | V _R = 20V |
| Total Capacitance | C _T | — | 4.0 | pF | V _R = 0, f = 1.0MHz |
| Reverse Recovery Time | t _{rr} | — | 4.0 | ns | I _F = I _R = 10mA, I _{rr} = 0.1 x I _R , R _L = 100Ω |

Notes: 4. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch; pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com>
5. Short duration pulse test used to minimize self-heating effect.

Device Characteristics

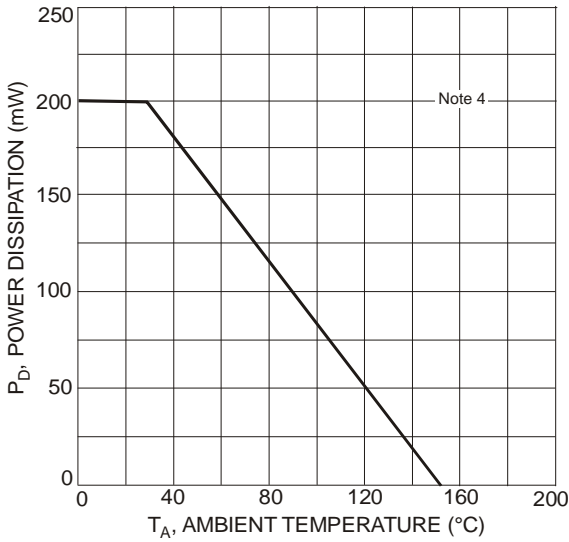


Fig. 1 Power Derating Curve (Total Device)

Pre-Biased NPN Transistor Elements

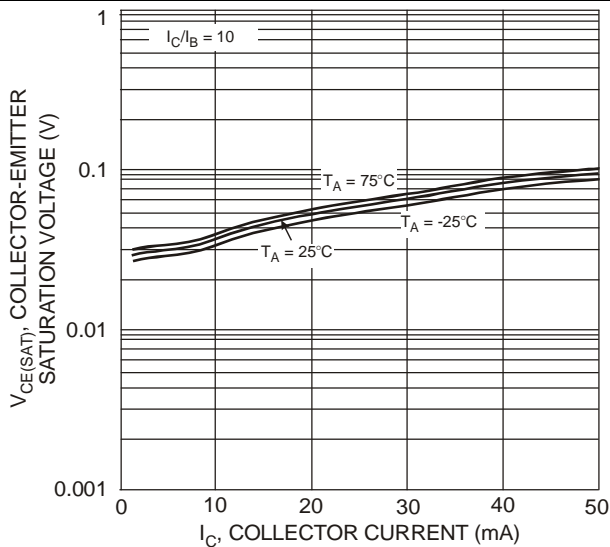


Fig. 2 Typical $V_{CE(SAT)}$ vs. I_C

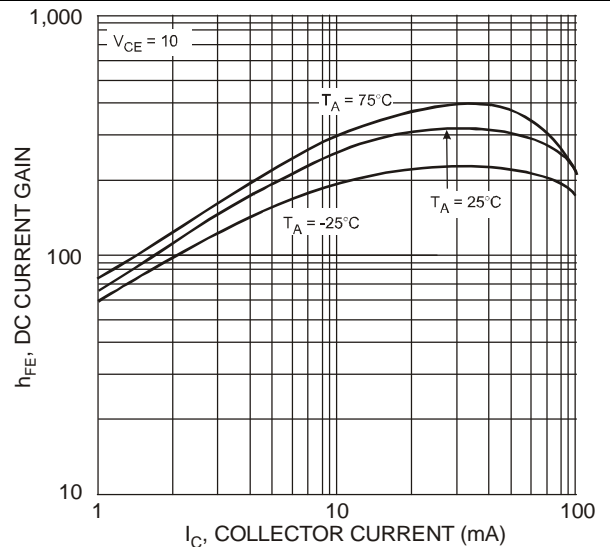


Fig. 3 Typical DC Current Gain

Pre-Biased NPN Transistor Elements - continued

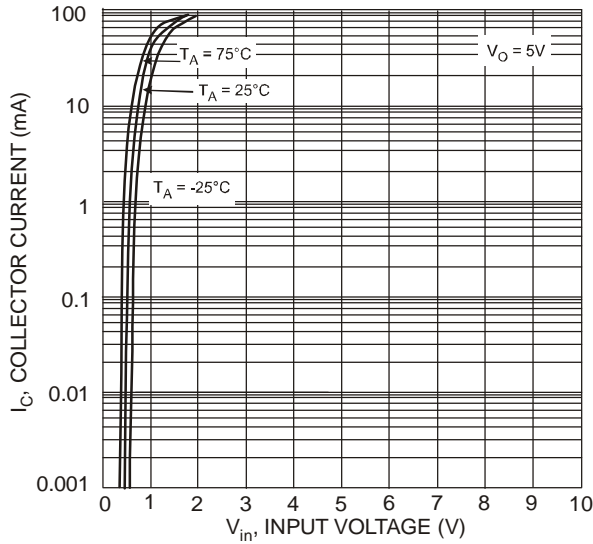


Fig. 4 Typical Collector Current vs. Input Voltage

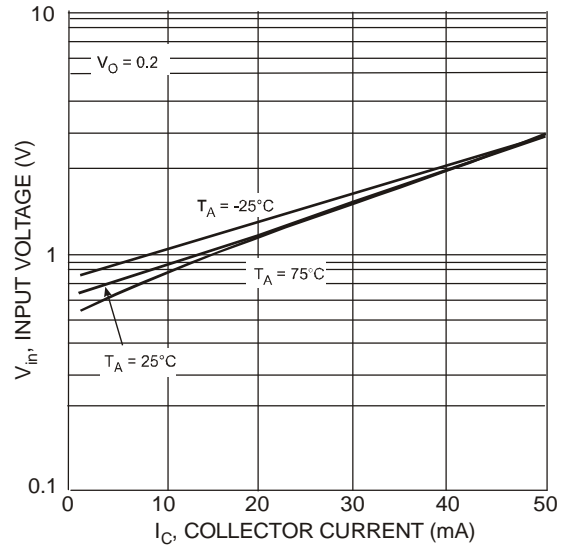


Fig. 5 Typical Input Voltage vs. Collector Current

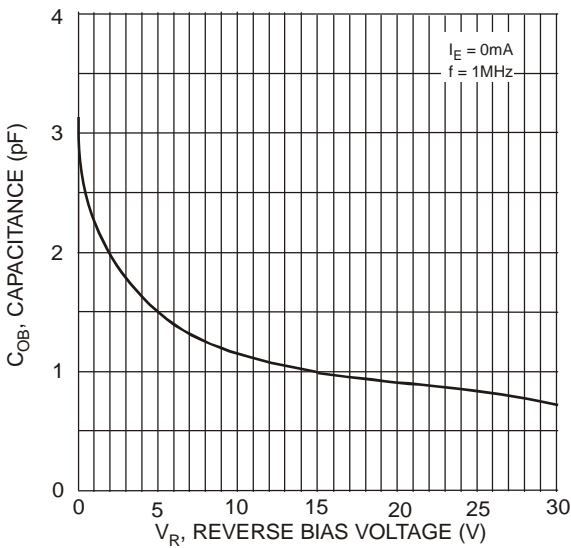


Fig. 6 Typical Output Capacitance

Switching Diode Elements

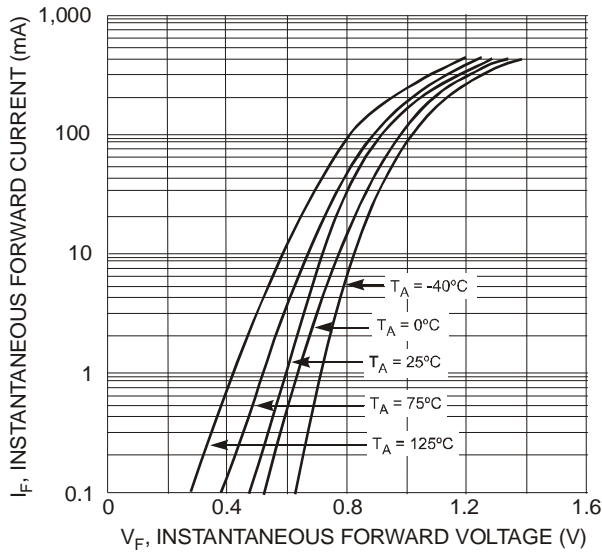


Fig. 7 Typical Forward Characteristics

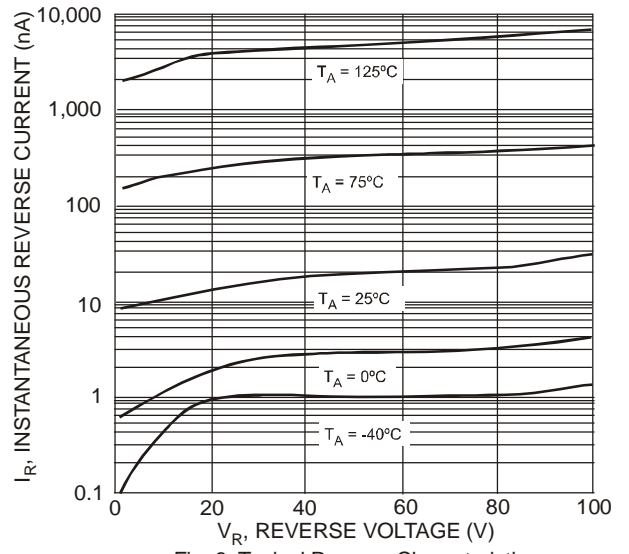


Fig. 8 Typical Reverse Characteristics

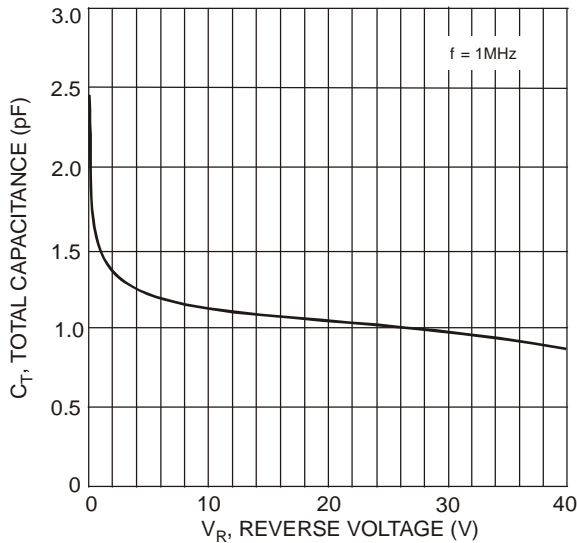
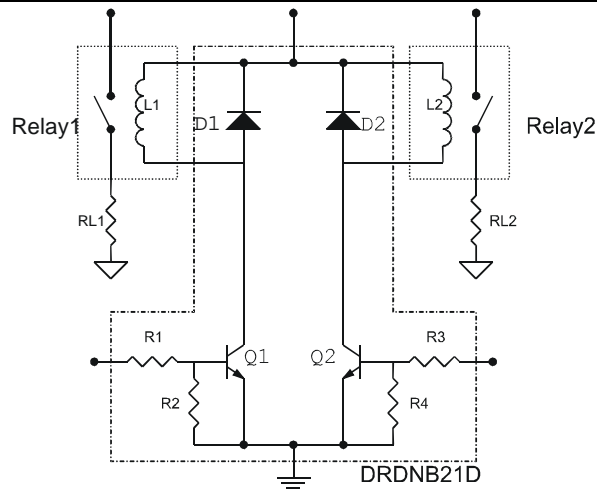


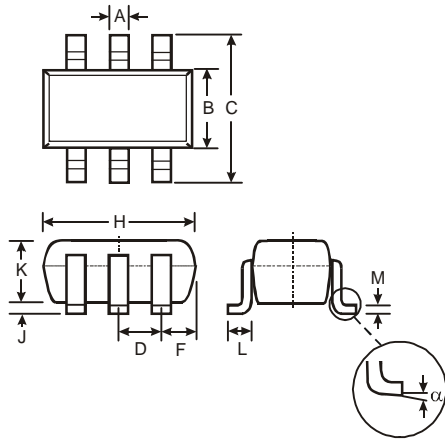
Fig. 9 Typical Capacitance vs. Reverse Voltage

Typical Application Circuit



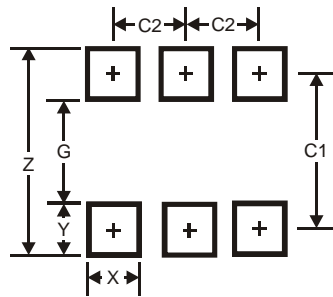
Typical Application Circuit DRDNB21D with two independent relays.

Package Outline Dimensions



| SOT-363 | | |
|----------------------|----------|------|
| Dim | Min | Max |
| A | 0.10 | 0.30 |
| B | 1.15 | 1.35 |
| C | 2.00 | 2.20 |
| D | 0.65 Typ | |
| F | 0.40 | 0.45 |
| H | 1.80 | 2.20 |
| J | 0 | 0.10 |
| K | 0.90 | 1.00 |
| L | 0.25 | 0.40 |
| M | 0.10 | 0.22 |
| α | 0° | 8° |
| All Dimensions in mm | | |

Suggested Pad Layout



| Dimensions | Value (in mm) |
|------------|---------------|
| Z | 2.5 |
| G | 1.3 |
| X | 0.42 |
| Y | 0.6 |
| C1 | 1.9 |
| C2 | 0.65 |

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