



**THE DATASHEET OF
DRDNB21D-7**



Features and Benefits

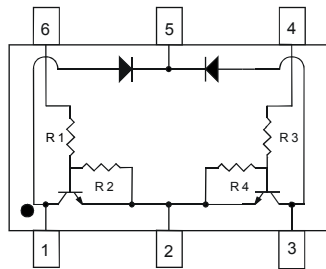
- Epitaxial Planar Die Construction
- Two Pre-Biased Transistors and Two Switching Diodes, Internally Connected in One Package
- Ideally Suited for Automated Assembly Processes
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen- and Antimony-Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e.: parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at <https://www.diodes.com/products/automotive/automotive-products/>.**
- This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability. <https://www.diodes.com/quality/product-definitions/>

Mechanical Data

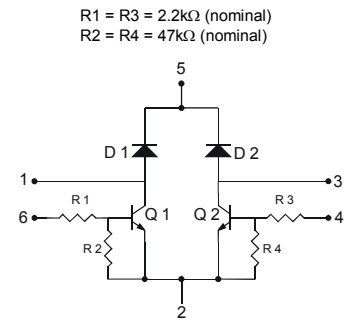
- Case: SOT-363
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish - Matte Tin annealed over Alloy 42 lead-frame. Solderable per MIL-STD-202, Method 208 @3
- Weight: 0.0062 grams (approximate)



Top View



Top View



Device Circuit

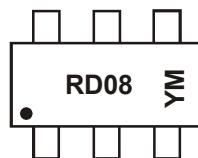
R1 = R3 = 2.2kΩ (nominal)
R2 = R4 = 47kΩ (nominal)

Ordering Information (Note 4)

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

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



RD08 = Product Type Marking Code
YM = Date Code Marking
Y = Year (e.g. 1 = 2021)
M = Month (e.g. 1 = January)

Date Code Key

| Year | 2005 | 2006 | | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
|------|------|------|-------|------|------|------|------|------|------|------|------|------|
| Code | S | T | | F | G | H | I | J | K | L | M | N |

| 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 5) | P _D | 200 | mW |
| Thermal Resistance, Junction to Ambient Air (Note 5) | 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 |

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 _{R(RM)} | 75 | V |
| Working Peak Reverse Voltage | V _{R(WM)} | | |
| DC Blocking Voltage | V _R | | |
| RMS Reverse Voltage | V _{R(RMS)} | 53 | V |
| Average Rectified Output Current (Note 5) | I _O | 250 | mA |
| Non-Repetitive Peak Forward Surge Current @ t = 1.0μs | I _{FSM} | 4.0 | A |
| @ t = 1.0ms | | 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 (Note 6) | ΔR1 | -30 | — | +30 | % | — |
| Resistance Ratio Tolerance (Note 6) | ΔR2/R1 | -20 | — | +20 | % | — |
| Gain-Bandwidth Product (Note 6) | f _T | — | 250 | — | MHz | V _{CE} = 10V, I _E = 5mA, f = 100MHz |

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

| Characteristic | Symbol | Min | Max | Unit | Test Condition |
|------------------------------------|--------------------|------|-------|------|--|
| Reverse Breakdown Voltage (Note 7) | 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 7) | 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:
- Device mounted on FR-4 PCB, 2oz 1inch squared copper pad PC board.
 - Transistor: for reference only.
 - Short duration pulse test used to minimize self-heating effect.

Device Characteristics

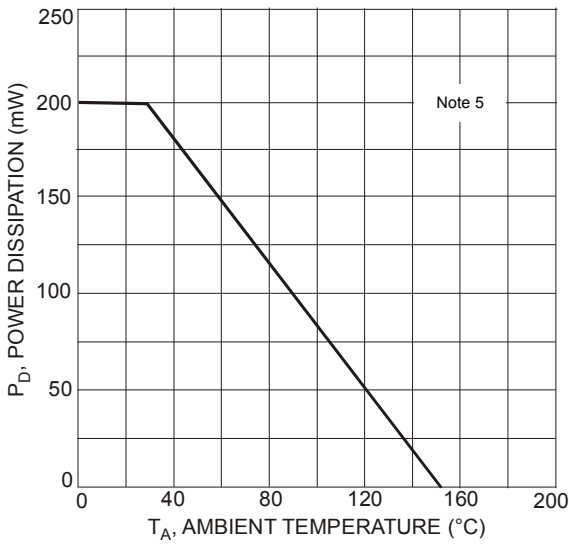


Fig. 1 Power Derating Curve (Total Device)

Pre-Biased NPN Transistor Elements

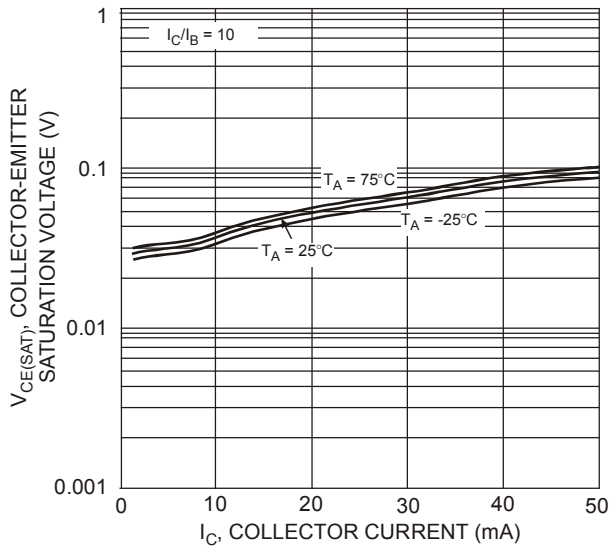


Fig. 2 Typical $V_{CE(SAT)}$ vs. I_C

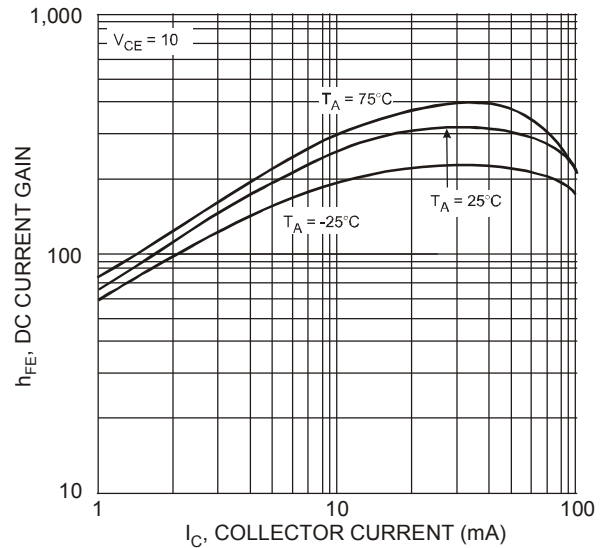


Fig. 3 Typical DC Current Gain

Pre-Biased NPN Transistor Elements (continued)

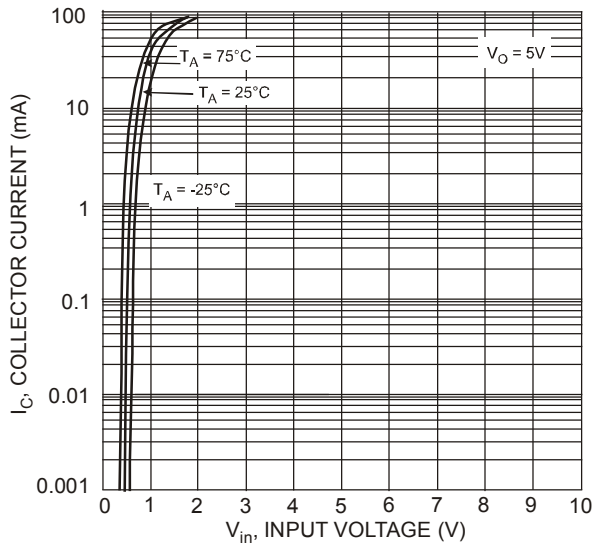


Fig. 4 Typical Collector Current vs. Input Voltage

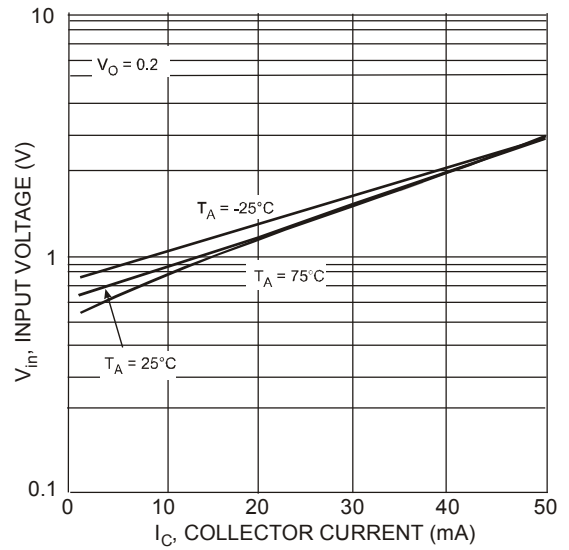


Fig. 5 Typical Input Voltage vs. Collector Current

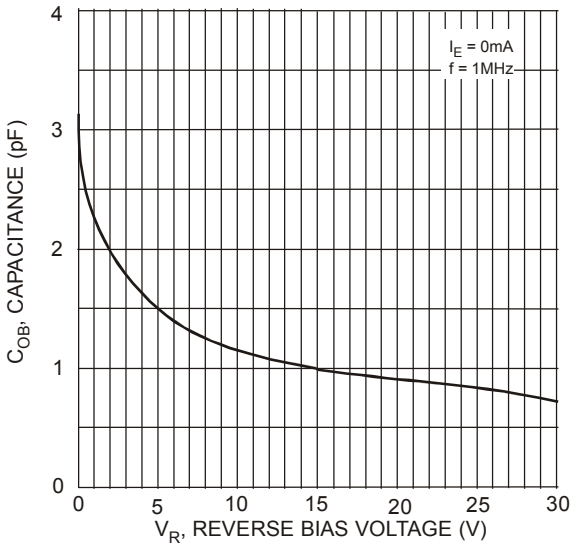


Fig. 6 Typical Output Capacitance

Switching Diode Elements

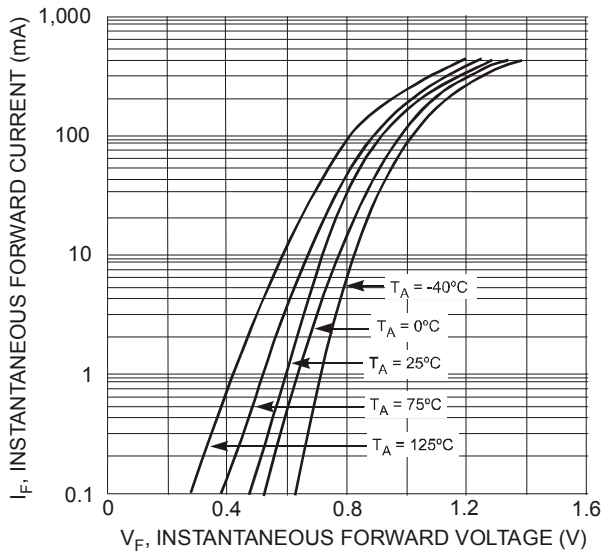


Fig. 7 Typical Forward Characteristics

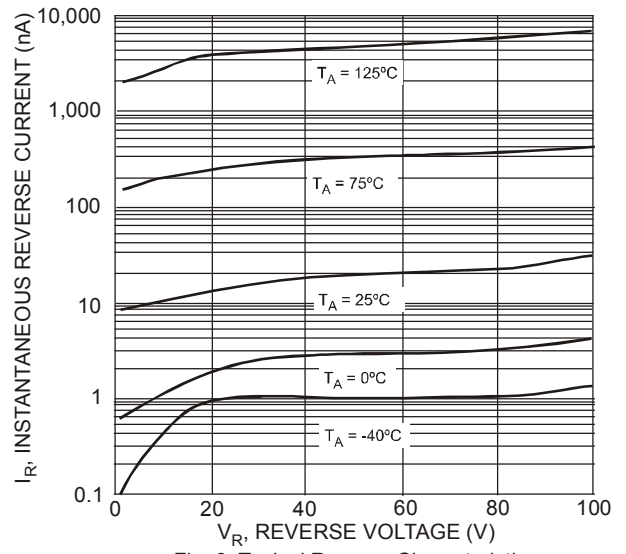


Fig. 8 Typical Reverse Characteristics

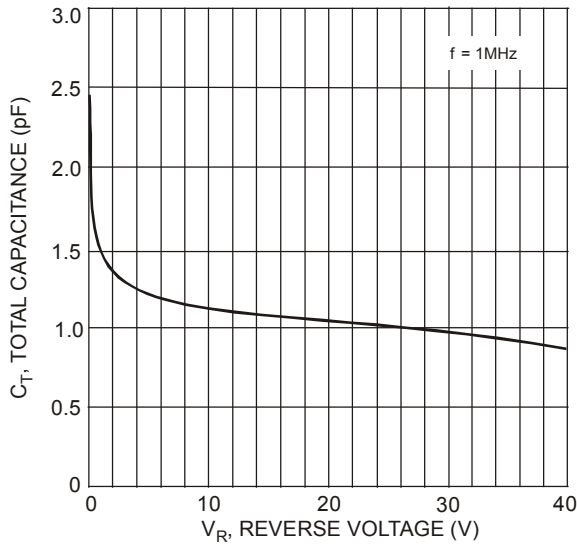
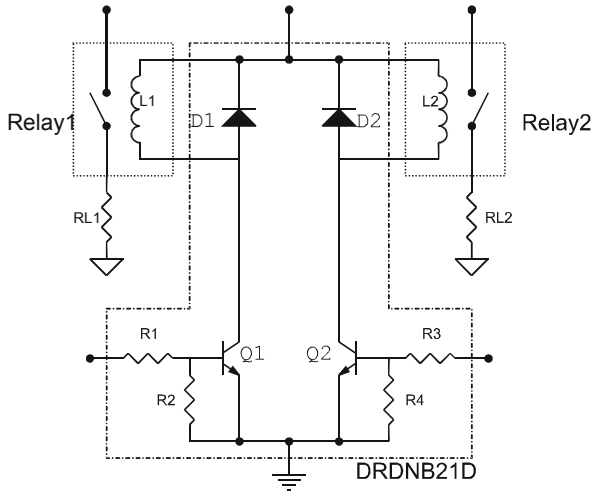


Fig. 9 Typical Capacitance vs. Reverse Voltage

Typical Application Circuit

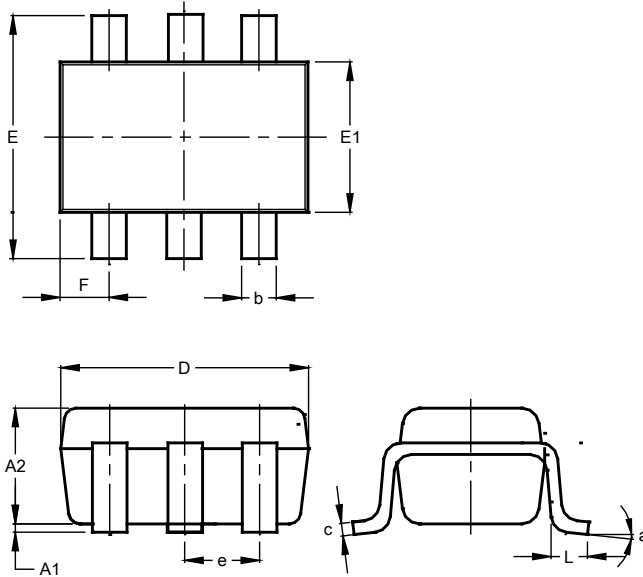


Typical Application Circuit DRDNB21D with two independent relays.

Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT363

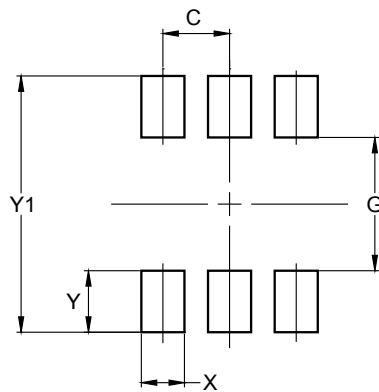


| SOT363 | | | |
|-----------------------------|-----------|------|-------|
| Dim | Min | Max | Typ |
| A1 | 0.00 | 0.10 | 0.05 |
| A2 | 0.90 | 1.00 | 0.95 |
| b | 0.10 | 0.30 | 0.25 |
| c | 0.10 | 0.22 | 0.11 |
| D | 1.80 | 2.20 | 2.15 |
| E | 2.00 | 2.20 | 2.10 |
| E1 | 1.15 | 1.35 | 1.30 |
| e | 0.650 BSC | | |
| F | 0.40 | 0.45 | 0.425 |
| L | 0.25 | 0.40 | 0.30 |
| a | 0° | 8° | -- |
| All Dimensions in mm | | | |

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT363



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 0.650 |
| G | 1.300 |
| X | 0.420 |
| Y | 0.600 |
| Y1 | 2.500 |

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