

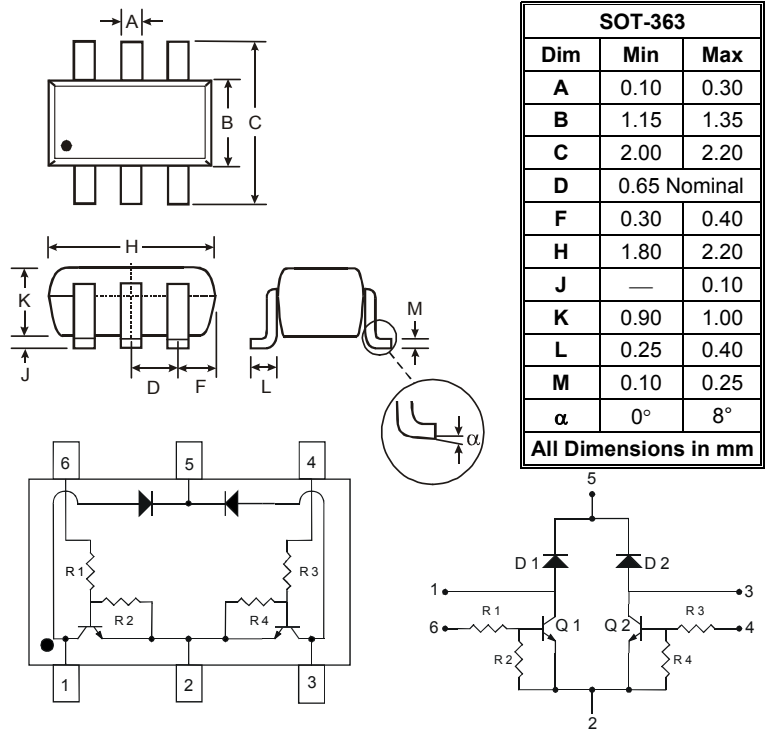
**Features**

- 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**

**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
- Terminal Connections: See Diagram
- Terminals: Finish - Matte Tin annealed over Alloy 42 leadframe. Solderable per MIL-STD-202, Method 208
- Marking & Type Code Information: See Page 5
- Ordering Information: See Page 5
- Weight: 0.0062 grams (approximate)

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



**Maximum Ratings, Total Device** @<sub>T<sub>A</sub></sub> = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 3)	P <sub>d</sub>	200	mW
Thermal Resistance, Junction to Ambient Air (Note 3)	R <sub>θJA</sub>	625	°C/W
Operating and Storage Junction Temperature Range	T <sub>j</sub> , T <sub>STG</sub>	-55 to +150	°C

**Maximum Ratings, Pre-Biased NPN Transistor** @<sub>T<sub>A</sub></sub> = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CC</sub>	50	V
Collector-Emitter Voltage	V <sub>in</sub>	-5 to +12	V
Output Current	I <sub>o</sub>	100	mA
Peak Collector Current	I <sub>CM</sub>	100	mA

**Maximum Ratings, Switching Diode** @<sub>T<sub>A</sub></sub> = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Non-Repetitive Peak Reverse Voltage	V <sub>RM</sub>	100	V
Peak Repetitive Reverse Voltage	V <sub>RPM</sub>	75	V
Working Peak Reverse Voltage	V <sub>RWM</sub>		
DC Blocking Voltage	V <sub>R</sub>		
RMS Reverse Voltage	V <sub>R(RMS)</sub>	53	V
Forward Continuous Current (Note 3)	I <sub>FM</sub>	500	mA
Average Rectified Output Current (Note 3)	I <sub>o</sub>	250	mA
Non-Repetitive Peak Forward Surge Current @ t = 1.0μs	I <sub>FSM</sub>	4.0	A
@ t = 1.0s		2.0	

- 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](http://www.diodes.com/products/lead_free/index.php).
  3. 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/datasheets/ap02001.pdf>.

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Input Voltage	$V_{I(\text{off})}$	0.5	—	—	V	$V_{CC} = 5\text{V}$ , $I_O = 100\mu\text{A}$
	$V_{I(\text{on})}$	—	—	1.1	V	$V_O = 0.3\text{V}$ , $I_O = 5\text{mA}$
Output Voltage	$V_{O(\text{on})}$	—	—	0.3	V	$I_O/I_I = 50\text{mA}/0.25\text{mA}$
Input Current	$I_I$	—	—	3.6	mA	$V_I = 5\text{V}$
Output Current	$I_{O(\text{off})}$	—	—	0.5	$\mu\text{A}$	$V_{CC} = 50\text{V}$ , $V_I = 0\text{V}$
DC Current Gain	$G_I$	80	—	—	—	$V_O = 5\text{V}$ , $I_O = 10\text{mA}$
Input Resistor Tolerance	$\Delta R_1$	-30	—	+30	%	
Resistance Ratio Tolerance	$\Delta R_2/R_1$	-20	—	+20	%	
Gain-Bandwidth Product*	$f_T$	—	250	—	MHz	$V_{CE} = 10\text{V}$ , $I_E = 5\text{mA}$ , $f = 100\text{MHz}$

\* Transistor - For Reference Only

## Electrical Characteristics, Switching Diode @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Min	Max	Unit	Test Condition
Reverse Breakdown Voltage (Note 4)	$V_{(BR)R}$	75	—	V	$I_R = 10\mu\text{A}$
Forward Voltage	$V_F$	0.62	0.72	V	$I_F = 5.0\text{mA}$
		—	0.855		$I_F = 10\text{mA}$
		—	1.0		$I_F = 100\text{mA}$
		—	1.25		$I_F = 150\text{mA}$
Reverse Current (Note 4)	$I_R$	—	2.5	$\mu\text{A}$	$V_R = 75\text{V}$
		—	50	$\mu\text{A}$	$V_R = 75\text{V}$ , $T_J = 150^\circ\text{C}$
		—	30	$\mu\text{A}$	$V_R = 25\text{V}$ , $T_J = 150^\circ\text{C}$
		—	25	nA	$V_R = 20\text{V}$
Total Capacitance	$C_T$	—	4.0	pF	$V_R = 0$ , $f = 1.0\text{MHz}$
Reverse Recovery Time	$t_{rr}$	—	4.0	ns	$I_F = I_R = 10\text{mA}$ , $I_{rr} = 0.1 \times I_R$ , $R_L = 100\Omega$

- Notes:
- 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/datasheets/ap02001.pdf>.
  - Short duration pulse test used to minimize self-heating effect.

## Device Characteristics

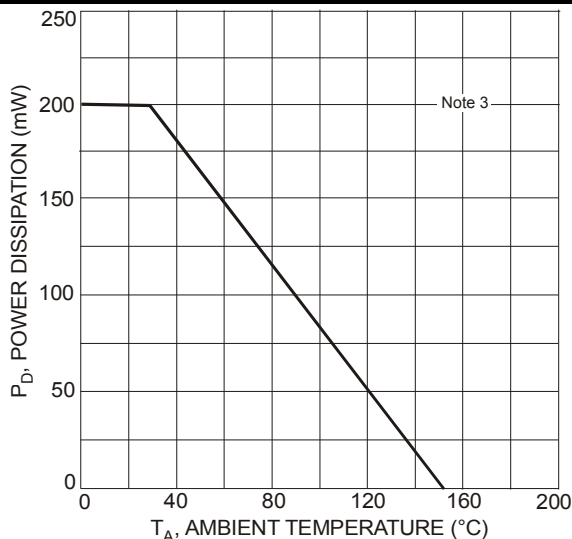


Fig. 1 Power Derating Curve (Total Device)

**Pre-Biased NPN Transistor Elements**

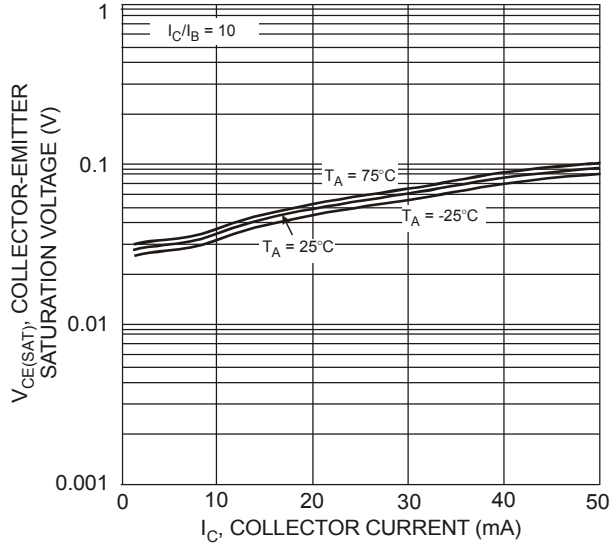


Fig. 2 Typical  $V_{CE(SAT)}$  vs.  $I_C$

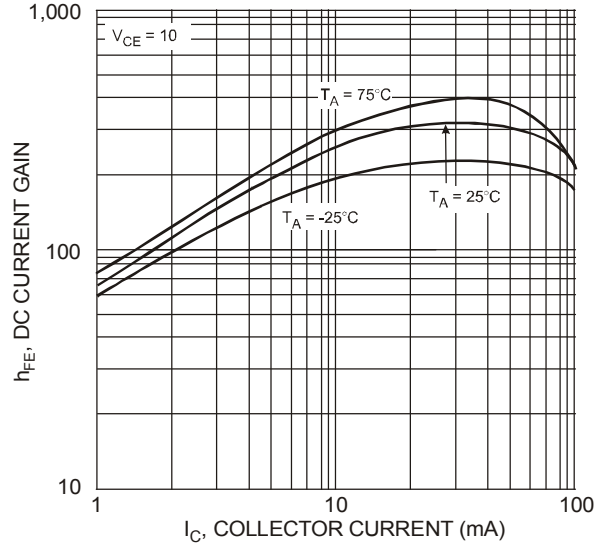


Fig. 3 Typical DC Current Gain

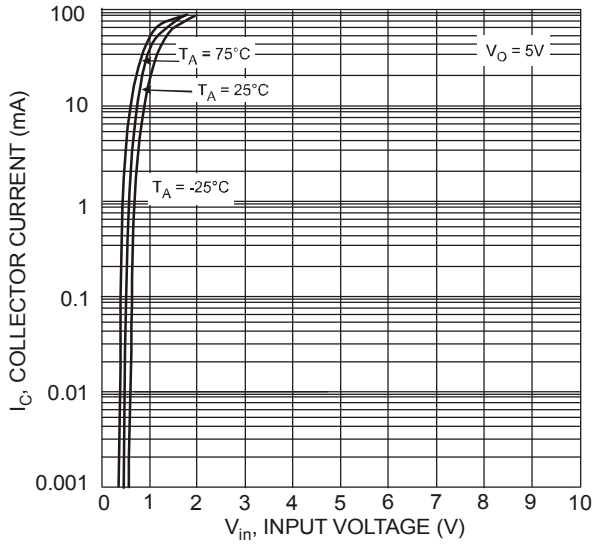


Fig. 4 Typical Collector Current vs. Input Voltage

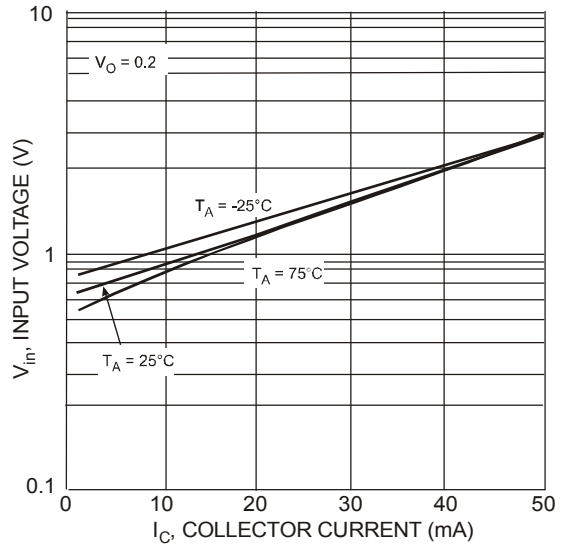


Fig. 5 Typical Input Voltage vs. Collector Current

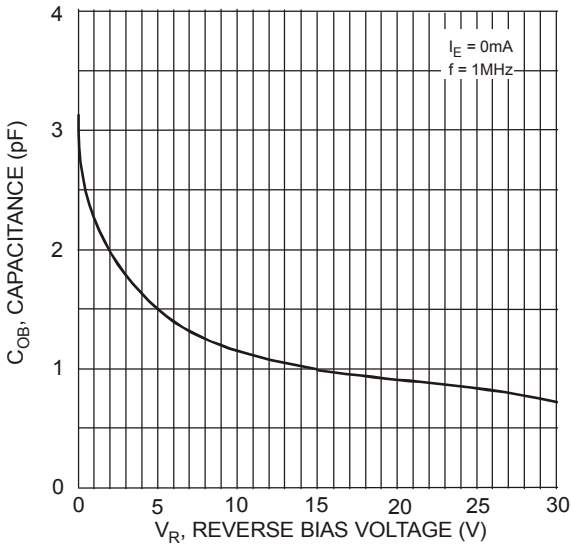


Fig. 6 Typical Output Capacitance

**Switching Diode Elements**

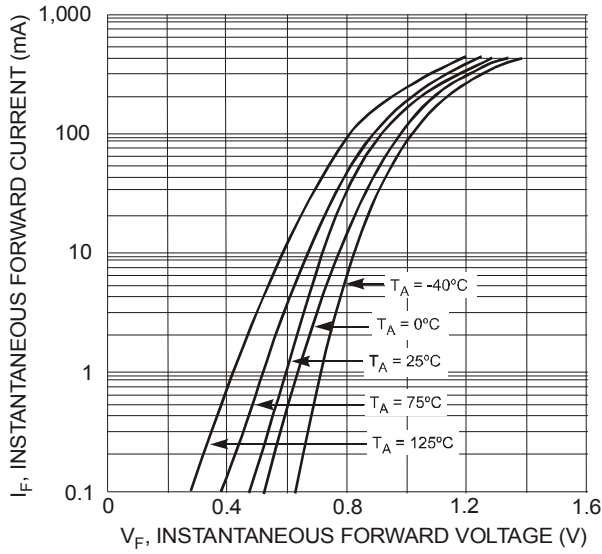


Fig. 7 Typical Forward Characteristics

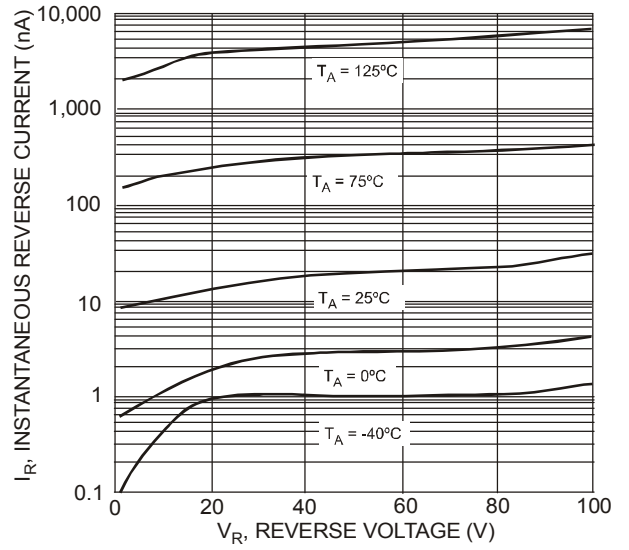


Fig. 8 Typical Reverse Characteristics

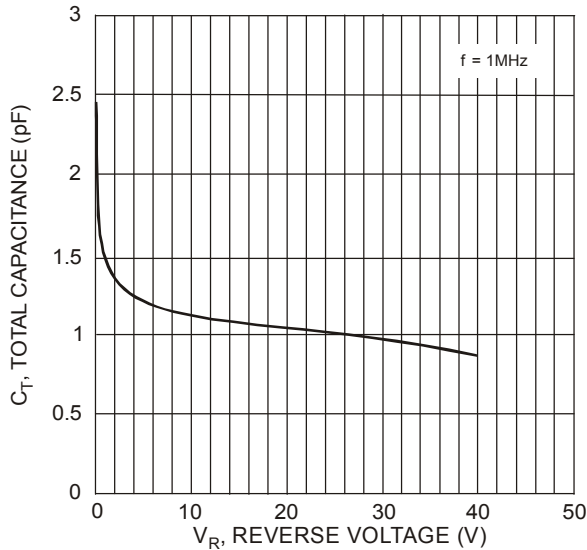
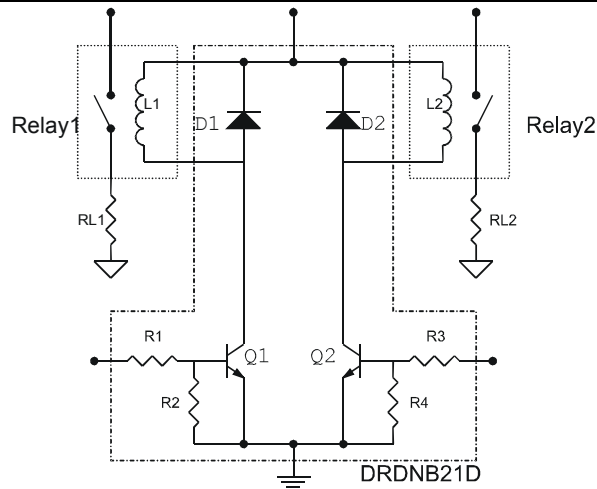


Fig. 9 Typical Capacitance vs. Reverse Voltage

**Typical Application Circuit**



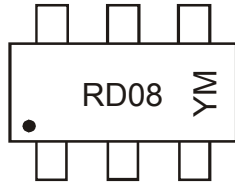
Typical Application Circuit DRDNB21D with two independent relays.

## Ordering Information (Note 5)

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

Notes: 5. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

## 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
Code	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

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