

## Features and Benefits

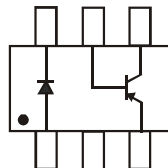
- Epitaxial Planar Die Construction
- One Transistor and One Switching Diode in One Package
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

## Mechanical Data

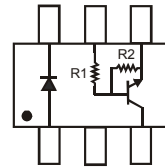
- Case: SOT-363
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish - Matte Tin annealed over Alloy 42 lead-frame. Solderable per MIL-STD-202, Method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



Top View



DRDP006W



DRDNB16W

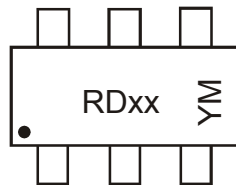
 R1 = 1K  $\Omega$   
 R2 = 10K  $\Omega$ 

## Ordering Information (Note 4)

Device	Compliance	Packaging	Shipping
DRDP006W-7	Commercial	SOT-363	3000/Tape & Reel
DRDNB16W-7	Commercial	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



RDxx = Product Type Marking Code:  
 RD02 = DRDP006W  
 RD03 = DRDNB16W  
 YM = Date Code Marking  
 Y = Year (ex: 1 = 2021)  
 M = Month (ex: 9 = September)

### Date Code Key

Year	2005	.....	2021	2022	2023	2024	2025	2026
Code	S	.....	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 @ $T_A = 25^\circ\text{C}$  unless otherwise specified**

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	$P_D$	200	mW
Thermal Resistance, Junction to Ambient Air (Note 5)	$R_{\theta JA}$	625	$^\circ\text{C/W}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

**Maximum Ratings, DRDP006W PNP Transistor @ $T_A = 25^\circ\text{C}$  unless otherwise specified**

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	$V_{CB0}$	-60	V
Collector-Emitter Voltage	$V_{CEO}$	-60	V
Emitter-Base Voltage	$V_{EBO}$	-5.0	V
Collector Current (Note 5)	$I_C$	-600	mA

**Maximum Ratings, DRDNB16W Pre-Biased NPN Transistor @ $T_A = 25^\circ\text{C}$  unless otherwise specified**

Characteristic	Symbol	Value	Unit
Supply Voltage	$V_{CC}$	50	V
Input Voltage	$V_{IN}$	-5 to +10	V
Output Current	$I_C$	600	mA

**Maximum Ratings, Switching Diode @ $T_A = 25^\circ\text{C}$  unless otherwise specified**

Characteristic	Symbol	Value	Unit	
Non-Repetitive Peak Reverse Voltage	$V_{RM}$	100	V	
Peak Repetitive Reverse Voltage	$V_{RRM}$	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 5)	$I_{FM}$	500	mA	
Average Rectified Output Current (Note 5)	$I_O$	250	mA	
Non-Repetitive Peak Forward Surge Current	$I_{FSM}$	@ $t = 1.0\mu\text{s}$	4.0	A
		@ $t = 1.0\text{s}$	1.0	

Note: 5. Device mounted on FR-4 PCB, 1 inch square 2oz copper pad area.

**Electrical Characteristics, DRDP006W PNP Transistor @ $T_A = 25^\circ\text{C}$  unless otherwise specified**

Characteristic (Note 6)	Symbol	Min	Typ	Max	Unit	Test Condition
DC Current Gain	$h_{FE}$	—	100	300	—	$I_C = -150\text{mA}$ , $V_{CE} = -10\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	—	-0.4	V	$I_C = -150\text{mA}$ , $I_B = -15\text{mA}$
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	-60	—	—	V	$I_C = -10\mu\text{A}$ , $I_E = 0$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	-60	—	—	V	$I_C = -10\text{mA}$ , $I_B = 0$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	-5	—	—	V	$I_E = -10\mu\text{A}$ , $I_C = 0$
Collector Cutoff Current	$I_{CBO}$	—	—	-10	nA	$V_{CB} = -50\text{V}$ , $I_E = 0$
Current Gain-Bandwidth Product	$f_T$	—	200	—	MHz	$V_{CE} = -20\text{V}$ , $I_C = -50\text{mA}$ , $f = 100\text{MHz}$
Capacitance	$C_{obo}$	—	—	8	pF	$V_{CB} = -10\text{V}$ , $I_E = 0$ , $f = 1\text{MHz}$

**Electrical Characteristics, DRDNB16W Pre-Biased NPN Transistor @ $T_A = 25^\circ\text{C}$  unless otherwise specified**

Characteristic (Note 6)	Symbol	Min	Typ	Max	Unit	Test Condition
Input Voltage	$V_{I(off)}$	0.3	—	—	V	$V_{CC} = 5\text{V}$ , $I_O = 100\mu\text{A}$
	$V_{I(on)}$	—	—	2.0	V	$V_O = 0.3\text{V}$ , $I_O = 20\text{mA}$
Output Voltage	$V_{O(on)}$	—	—	0.3	V	$I_O/I_I = 50\text{mA}/2.5\text{mA}$
Input Current	$I_I$	—	—	7.2	mA	$V_I = 5\text{V}$
Output Current	$I_{O(off)}$	—	—	0.5	$\mu\text{A}$	$V_{CC} = 50\text{V}$ , $V_I = 0\text{V}$
DC Current Gain	$G_I$	56	—	—	—	$V_O = 5\text{V}$ , $I_O = 50\text{mA}$
Gain-Bandwidth Product	$f_T$	—	200	—	MHz	$V_{CE} = 10\text{V}$ , $I_E = 5\text{mA}$ , $f = 100\text{MHz}$

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

Characteristic	Symbol	Min	Max	Unit	Test Condition
Reverse Breakdown Voltage (Note 6)	$V_{(BR)R}$	75	—	—	$I_R = 10\mu\text{A}$
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 6)	$I_R$	—	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	$I_F = I_R = 10\text{mA}$ , $t_{rr} = 0.1 \times I_R$ , $R_L = 100\Omega$

Note: 6. Short duration pulse test used to minimize self-heating effect.

**Device Characteristics**

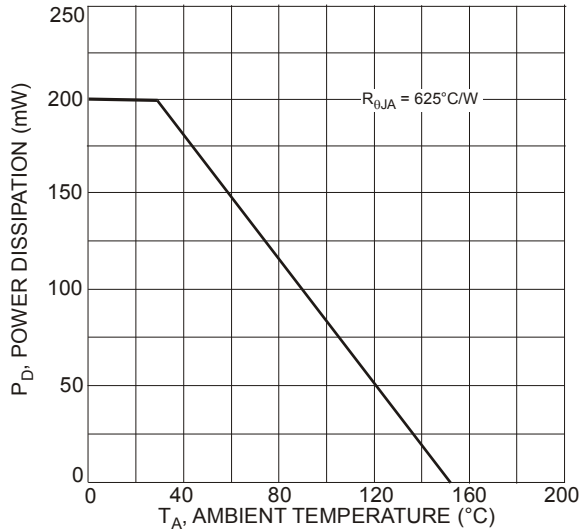


Fig. 1, Power Derating Curve (Total Device)

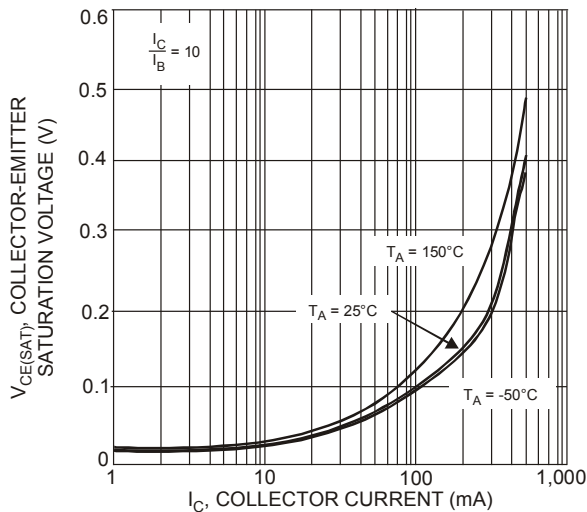


Fig. 2, Typical Collector-Emitter Saturation Voltage vs. Collector Current (DRDP006W)

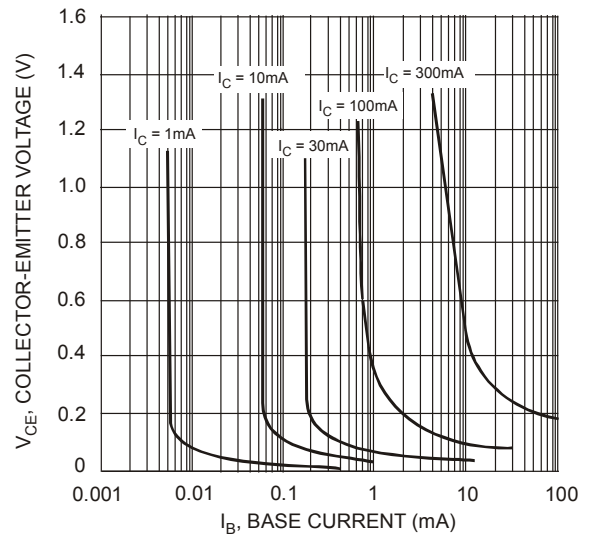


Fig. 3, Typical Collector Saturation Region (DRDP006W)

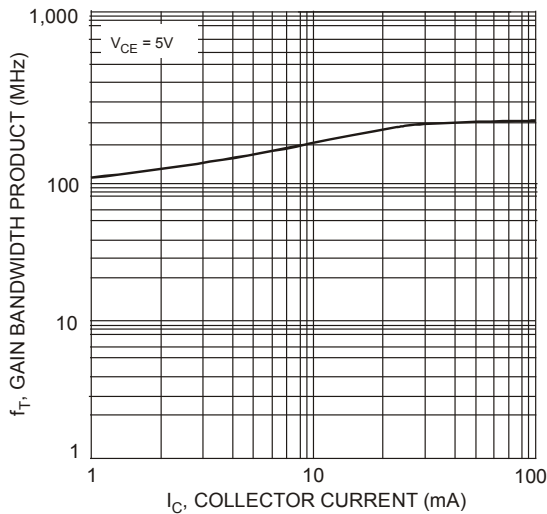


Fig. 4, Typical Gain Bandwidth Product vs. Collector Current (DRDP006W)

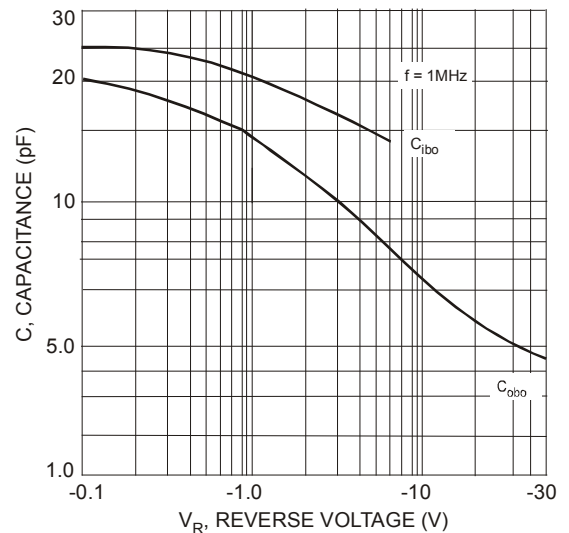


Fig. 5, Typical Capacitance (DRDP006W)

**Device Characteristics** (continued)

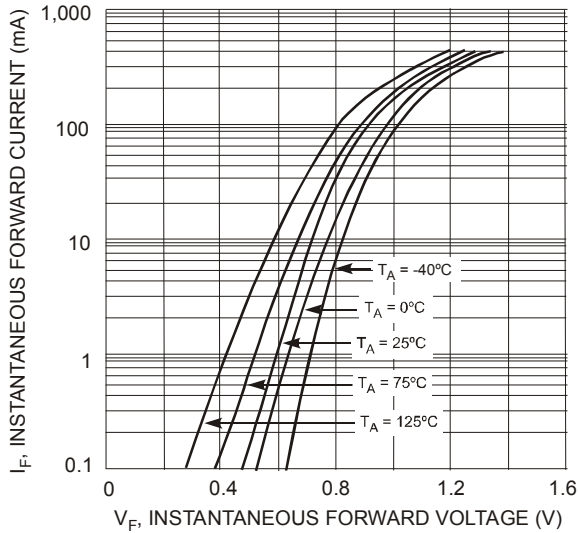


Fig. 6, Typical Forward Characteristics (Switching Diode)

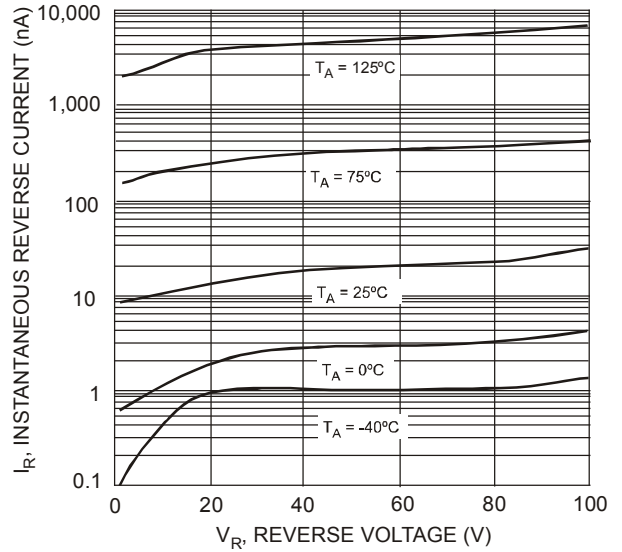


Fig. 7, Typical Reverse Characteristics (Switching Diode)

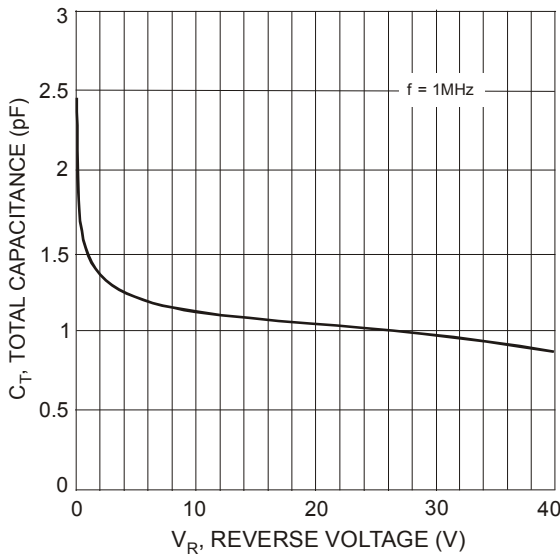
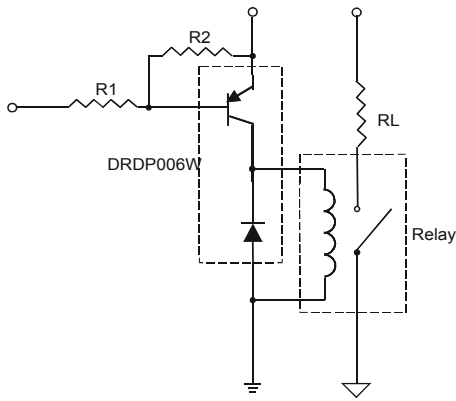
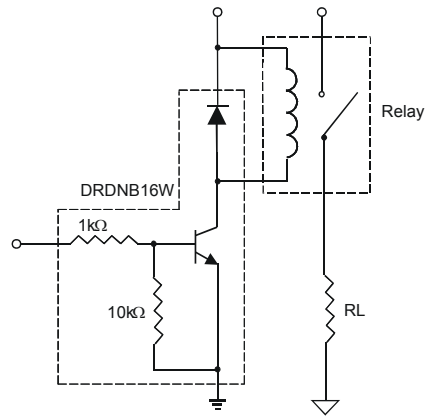


Fig. 8, Typical Capacitance vs. Reverse Voltage (Switching Diode)

**Sample Applications**



Application Example: DRDP006W current source configuration, bias resistors not included

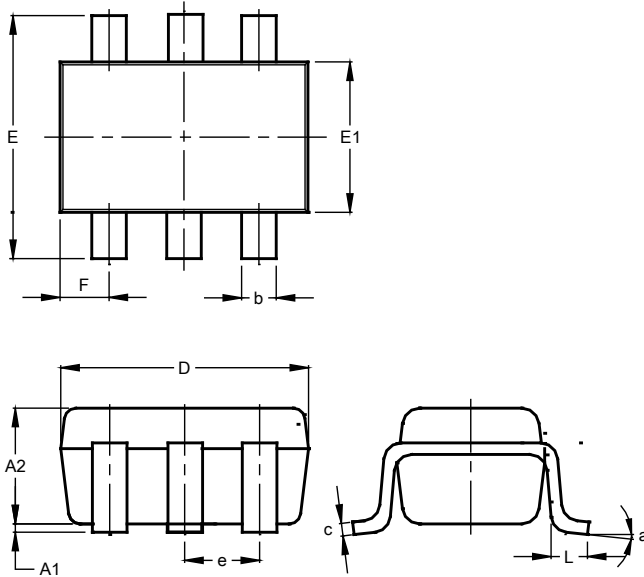


Application Example: DRDNB16W current sink configuration with built-in bias resistors

**Package Outline Dimensions**

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

**SOT363**

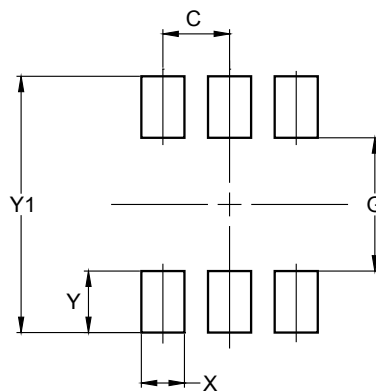


SOT363			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.90	1.00	0.95
b	0.10	0.30	0.25
c	0.10	0.22	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
F	0.40	0.45	0.425
L	0.25	0.40	0.30
a	0°	8°	--
All Dimensions in mm			

**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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