# 20V PNP SURFACE MOUNT TRANSISTOR

## Features

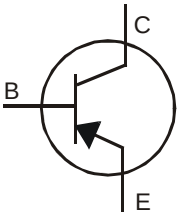
- Epitaxial Planar Die Construction
- Complementary NPN Type Available (DCP68)
- Ideally Suited for Automated Assembly Processes
- Ideal for Medium Power Switching or Amplification Applications
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

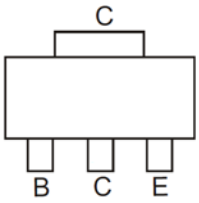
- Case: SOT223
- Case Material: Molded Plastic, "Green Molding" Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish—Matte Tin
- Solderable per MIL-STD -202, Method 208
- Weight: 0.112 grams (Approximate)

SOT223

Top View




Device Schematic



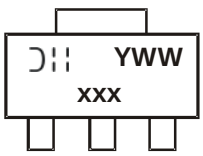

Top View
Pin Out Configuration

## Ordering Information (Note 4)

| Part Number | Marking | Reel Size (inches) | Tape Width (mm) | Quantity per Reel |
|---|---|---|---|---|
| DCP69-13 | P12 | 13 | 12 | 2500 |
| DCP69-16-13 | P12-16 | 13 | 12 | 2500 |
| DCP69-25-13 | P12-25 | 13 | 12 | 2500 |

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 http://www.diodes.com.

## Marking Information




xxx = Product Type Marking Code
P12 = DCP69
P12-16 = DCP69-16
P12-25 = DCP69-25
= Manufacturer's code marking
YWW = Date Code Marking
Y = Last digit of year (ex: 8 = 2018)
WW = Week code (01 – 53)

## Maximum Ratings @$T_A$ = 25°C unless otherwise specified

| Characteristic | Symbol | Value | Units |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | -25 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | -20 | V |
| Emitter-Base Voltage | $V_{EBO}$ | -5 | V |
| Collector Current | $I_C$ | -1 | A |
| Peak Pulse Current | $I_{CM}$ | -2 | A |

## Thermal Characteristics @$T_A$ = 25°C unless otherwise specified

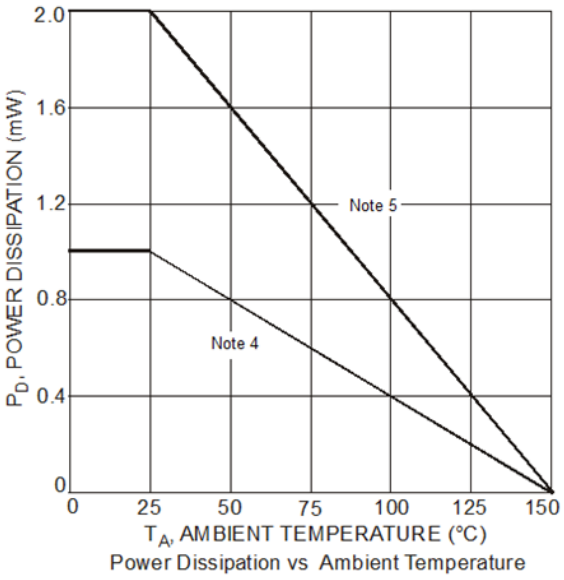
| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Power Dissipation (Note 5) | $P_D$ | 1 | W |
| Thermal Resistance, Junction to Ambient Air (Note 5) | $R_{\Theta JA}$ | 125 | °C/W |
| Power Dissipation (Note 6) | $P_D$ | 2 | W |
| Thermal Resistance, Junction to Ambient Air (Note 6) | $R_{\Theta JA}$ | 62.5 | °C/W |
| Operating and Storage Temperature Range | $T_J$, $T_{STG}$ | -55 to +150 | °C |

## ESD Ratings (Note 7)

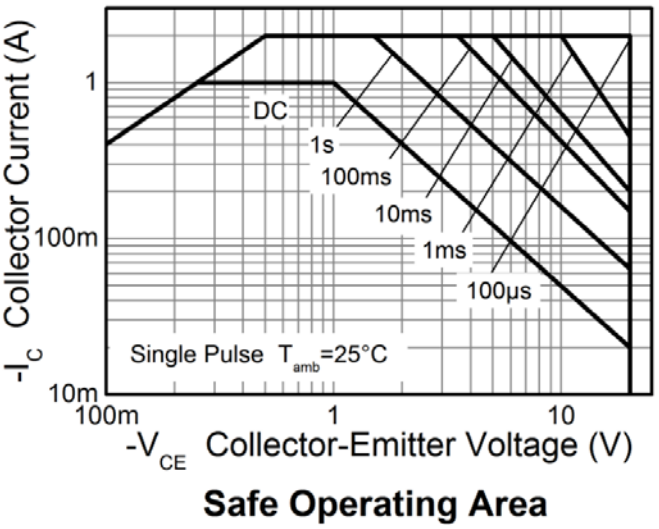
| Characteristic | Symbol | Value | Unit | JEDEC Class |
|---|---|---|---|---|
| Electrostatic Discharge—Human Body Model | ESD HBM | 4000 | V | 3A |
| Electrostatic Discharge—Machine Model | ESD MM | 400 | V | C |

Notes:
5. Device mounted on FR-4 PCB; pad layout as shown on in Diodes Inc. suggested pad layout document, which can be found on our website at http://www.diodes.com.
6. Device mounted on FR-4 PCB with 1$in^2$ copper pad layout
7. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

## Thermal Characteristics and Derating Information



Power Dissipation vs Ambient Temperature



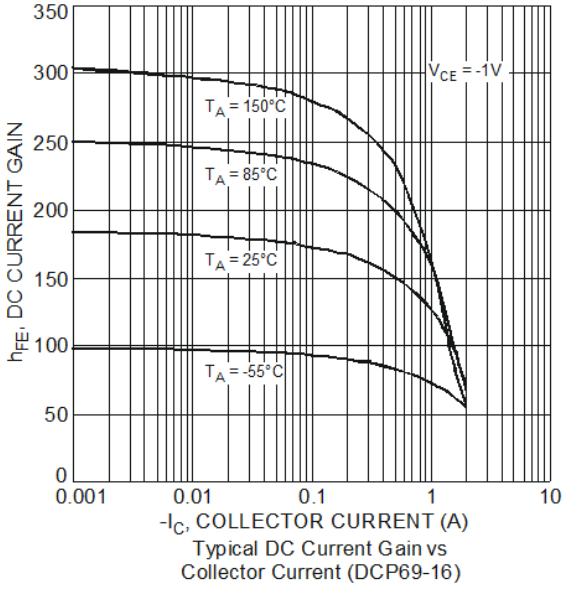
**Safe Operating Area**

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

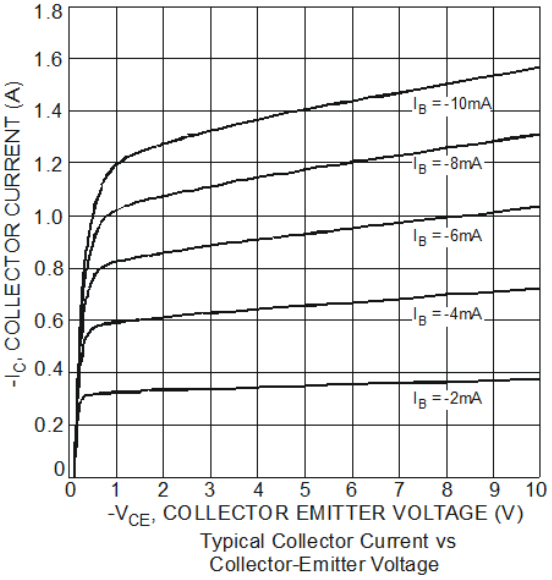
| Characteristic | | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | | |
| Collector-Base Breakdown Voltage | | $BV_{CBO}$ | -25 | — | — | V | $I_C$ = -100µA, $I_E$ = 0 |
| Collector-Emitter Breakdown Voltage (Note 8) | | $BV_{CEO}$ | -20 | — | — | V | $I_C$ = -10mA, $I_B$ = 0 |
| Emitter-Base Breakdown Voltage | | $BV_{EBO}$ | -5 | — | — | V | $I_E$ = -100µA, $I_C$ = 0 |
| Collector-Base Cutoff Current | | $I_{CBO}$ | — | — | -100<br>-10 | nA<br>µA | $V_{CB}$ = -25V, $I_E$ = 0<br>$V_{CB}$ = -25V, $I_E$ = 0, $T_A$ = 150°C |
| Emitter-Base Cutoff Current | | $I_{EBO}$ | — | — | -100 | nA | $V_{EB}$ = -5.0V, $I_C$ = 0 |
| **ON CHARACTERISTICS (Note 8)** | | | | | | | |
| DC Current Gain | DCP69, DCP69-16, DCP69-25 | $h_{FE}$ | 50<br>60 | —<br>— | —<br>— | — | $V_{CE}$ = -10V, $I_C$ = -5.0mA<br>$V_{CE}$ = -1V, $I_C$ = -1A |
| | DCP69 | | 85 | — | 375 | | $V_{CE}$ = -1V, $I_C$ = -500mA |
| | DCP69-16 | | 100 | — | 250 | | $V_{CE}$ = -1V, $I_C$ = -500mA |
| | DCP69-25 | | 160 | — | 375 | | $V_{CE}$ = -1V, $I_C$ = -500mA |
| Collector-Emitter Saturation Voltage | | $V_{CE(sat)}$ | — | — | -0.5 | V | $I_C$ = -1A, $I_B$ = -100mA |
| Base-Emitter Turn-On Voltage | | $V_{BE\ (on)}$ | — | — | -0.7<br>-1 | V | $V_{CE}$ = -10V, $I_C$ = -5.0mA<br>$V_{CE}$ = -1V, $I_C$ = -1A |
| **SMALL SIGNAL CHARACTERISTICS** | | | | | | | |
| Current Gain-Bandwidth Product | | $f_T$ | 40 | 200 | — | MHz | $V_{CE}$ = -5V, $I_C$ = -50mA, f = 100MHz |
| Output Capacitance | | $C_{obo}$ | — | 17 | — | pF | $V_{CB}$ = -10V, f = 1 MHz |

Notes: 8. Measured under pulsed conditions. Pulse width = 300µs. Duty cycle ≤ 2%.

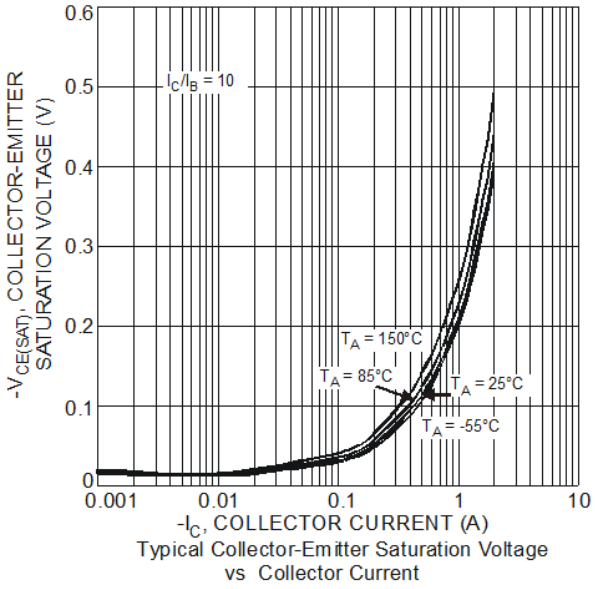
## Electrical Characteristics (@$T_A$ = +25°C, unless otherwise specified.)



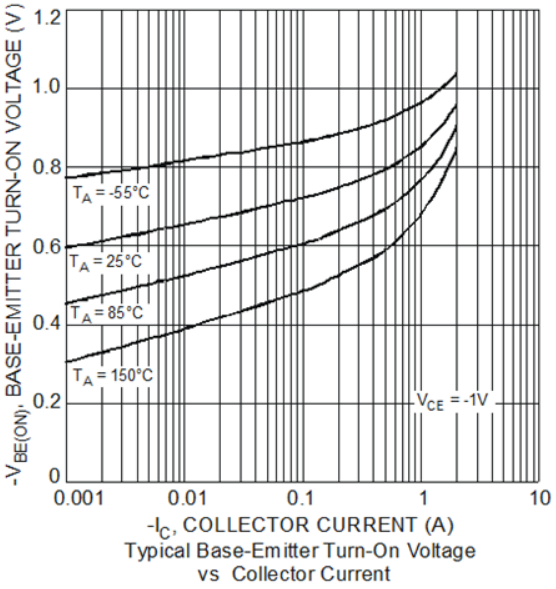
Typical DC Current Gain vs Collector Current (DCP69-16)



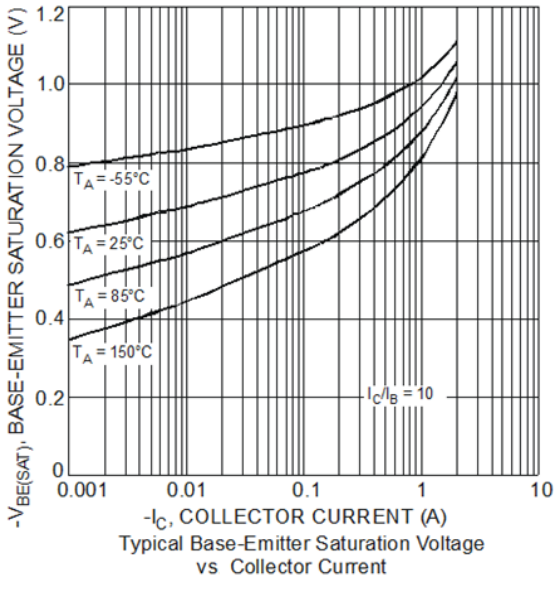
Typical Collector Current vs Collector-Emitter Voltage



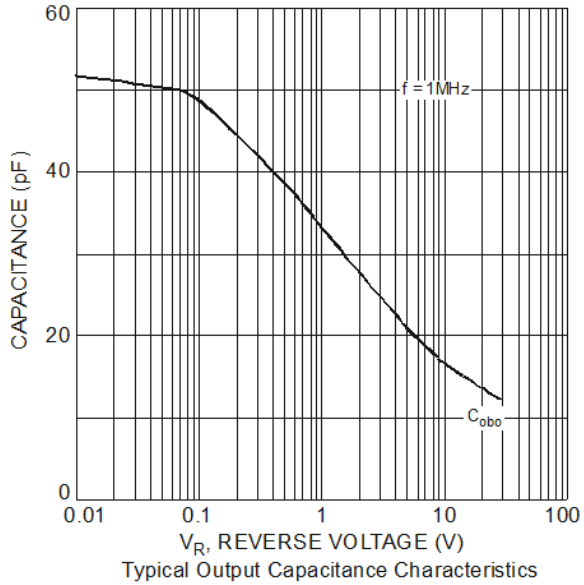
Typical Collector-Emitter Saturation Voltage vs Collector Current



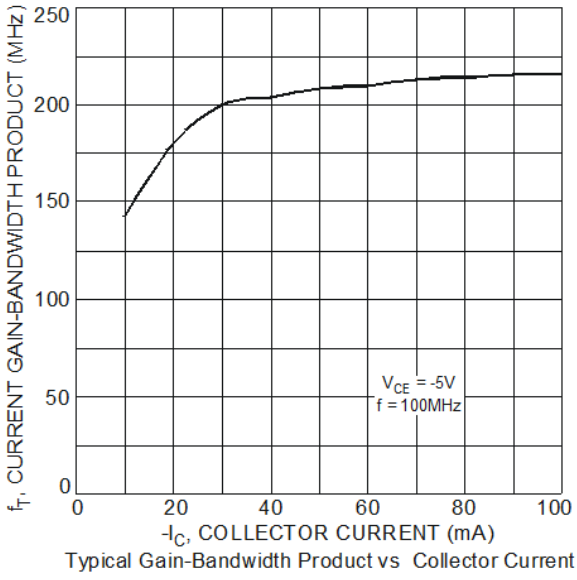
Typical Base-Emitter Turn-On Voltage vs Collector Current



Typical Base-Emitter Saturation Voltage vs Collector Current



Typical Output Capacitance Characteristics

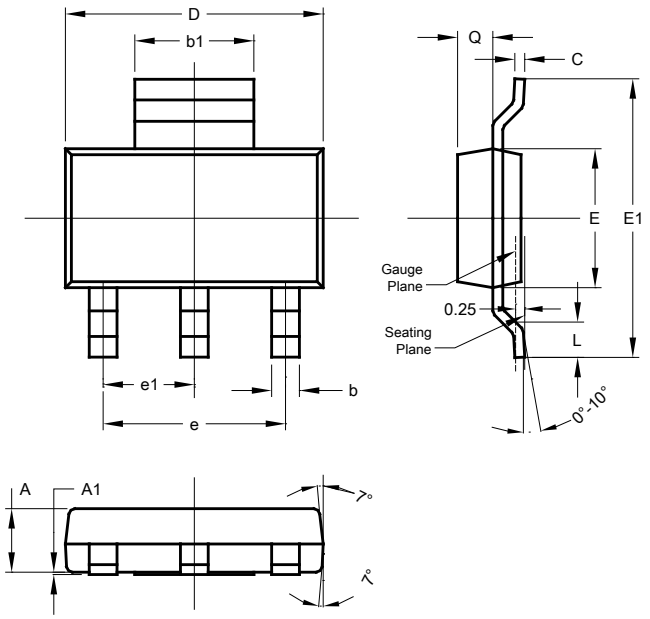


Typical Gain-Bandwidth Product vs Collector Current

## Package Outline Dimensions

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

**SOT223**

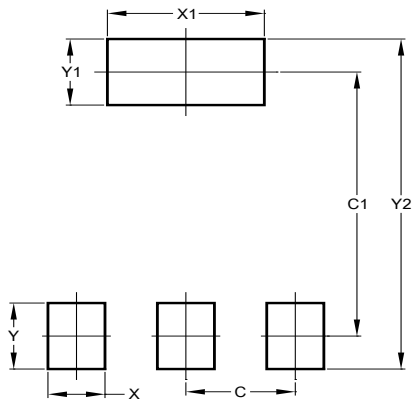



| SOT223 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 1.55 | 1.65 | 1.60 |
| **A1** | 0.010 | 0.15 | 0.05 |
| **b** | 0.60 | 0.80 | 0.70 |
| **b1** | 2.90 | 3.10 | 3.00 |
| **C** | 0.20 | 0.30 | 0.25 |
| **D** | 6.45 | 6.55 | 6.50 |
| **E** | 3.45 | 3.55 | 3.50 |
| **E1** | 6.90 | 7.10 | 7.00 |
| **e** | — | — | 4.60 |
| **e1** | — | — | 2.30 |
| **L** | 0.85 | 1.05 | 0.95 |
| **Q** | 0.84 | 0.94 | 0.89 |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

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

**SOT223**




| Dimensions | Value (in mm) |
|---|---|
| **C** | 2.30 |
| **C1** | 6.40 |
| **X** | 1.20 |
| **X1** | 3.30 |
| **Y** | 1.60 |
| **Y1** | 1.60 |
| **Y2** | 8.00 |

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