

Features

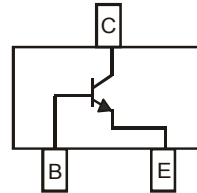
- Epitaxial Planar Die Construction
- Low Collector-Emitter Saturation Voltage, $V_{CE(SAT)}$
- Complementary PNP Type Available (DSS5160U)
- Ultra-Small Surface Mount Package
- **Lead Free By Design/RoHS Compliant (Note 1)**
- **"Green Device" (Note 2)**



Top View

Mechanical Data

- Case: SOT-323
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminals: Finish — Matte Tin annealed over Copper Plated Alloy 42 leadframe. Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Marking Information: See Page 4
- Ordering Information: See Page 4
- Weight: 0.006 grams (approximate)



Device Schematic

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

| Characteristic | Symbol | Value | Unit |
|--------------------------------|-----------|-------|------|
| Collector-Base Voltage | V_{CBO} | 80 | V |
| Collector-Emitter Voltage | V_{CEO} | 60 | V |
| Emitter-Base Voltage | V_{EBO} | 5 | V |
| Collector Current - Continuous | I_C | 1 | A |
| Peak Pulse Collector Current | I_{CM} | 2 | A |
| Base Current (DC) | I_B | 300 | mA |
| Peak Base Current | I_{BM} | 1 | A |

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|---|-----------------|-------------|---------------------------|
| Power Dissipation (Note 3) @ $T_A = 25^\circ\text{C}$ | P_D | 400 | mW |
| Thermal Resistance, Junction to Ambient (Note 3) @ $T_A = 25^\circ\text{C}$ | $R_{\theta JA}$ | 313 | $^\circ\text{C}/\text{W}$ |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55 to +150 | $^\circ\text{C}$ |

- Notes:
1. No purposefully added lead.
 2. Diode's Inc.'s "Green" policy can be found on our website at http://www.diodes.com/products/lead_free/index.php.
 3. Device mounted on FR-4 PCB with minimum recommended pad layout.

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|---------------|-------------------|-------------|-------------------|---------------------|---|
| OFF CHARACTERISTICS | | | | | | |
| Collector-Base Breakdown Voltage | $V_{(BR)CBO}$ | 80 | — | — | V | $I_C = 100\mu\text{A}, I_E = 0$ |
| Collector-Emitter Breakdown Voltage (Note 4) | $V_{(BR)CEO}$ | 60 | — | — | V | $I_C = 10\text{mA}, I_B = 0$ |
| Emitter-Base Breakdown Voltage | $V_{(BR)EBO}$ | 5 | — | — | V | $I_E = 100\mu\text{A}, I_C = 0$ |
| Collector Cutoff Current | I_{CBO} | — | — | 100 50 | nA μA | $V_{CB} = 60\text{V}, I_E = 0$ $V_{CB} = 60\text{V}, I_E = 0, T_A = 150^\circ\text{C}$ |
| Collector Cutoff Current | I_{CES} | — | — | 100 | nA | $V_{CE} = 60\text{V}, V_{BE} = 0$ |
| Emitter Cutoff Current | I_{EBO} | — | — | 100 | nA | $V_{EB} = 5\text{V}, I_C = 0$ |
| ON CHARACTERISTICS (Note 4) | | | | | | |
| DC Current Gain | h_{FE} | 250 200 100 | — — — | — — — | — | $V_{CE} = 5\text{V}, I_C = 1\text{mA}$ $V_{CE} = 5\text{V}, I_C = 500\text{mA}$ $V_{CE} = 5\text{V}, I_C = 1\text{A}$ |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT)}$ | — — — | — — — | 115 150 280 | mV | $I_C = 100\text{mA}, I_B = 1\text{mA}$ $I_C = 500\text{mA}, I_B = 50\text{mA}$ $I_C = 1\text{A}, I_B = 100\text{mA}$ |
| Collector-Emitter Saturation Resistance | $R_{CE(SAT)}$ | — | — | 280 | m Ω | $I_C = 1\text{A}, I_B = 100\text{mA}$ |
| Base-Emitter Saturation Voltage | $V_{BE(SAT)}$ | — | — | 1.1 | V | $I_C = 1\text{A}, I_B = 50\text{mA}$ |
| Base-Emitter Turn On Voltage | $V_{BE(ON)}$ | — | — | 0.9 | V | $V_{CE} = 5\text{V}, I_C = 1\text{A}$ |
| SMALL SIGNAL CHARACTERISTICS | | | | | | |
| Output Capacitance | C_{obo} | — | — | 10 | pF | $V_{CB} = 10\text{V}, f = 1.0\text{MHz}$ |
| Current Gain-Bandwidth Product | f_T | 150 | — | — | MHz | $V_{CE} = 10\text{V}, I_C = 50\text{mA}, f = 100\text{MHz}$ |
| SWITCHING CHARACTERISTICS | | | | | | |
| Turn-On Time | t_{on} | — | 63 | — | ns | $V_{CC} = 10\text{V}$ $I_C = 0.5\text{A}, I_{B1} = I_{B2} = 25\text{mA}$ |
| Delay Time | t_d | — | 33 | — | ns | |
| Rise Time | t_r | — | 30 | — | ns | |
| Turn-Off Time | t_{off} | — | 420 | — | ns | |
| Storage Time | t_s | — | 380 | — | ns | |
| Fall Time | t_f | — | 40 | — | ns | |

Notes: 4. Measured under pulsed conditions. Pulse width = 300 μs . Duty cycle $\leq 2\%$.

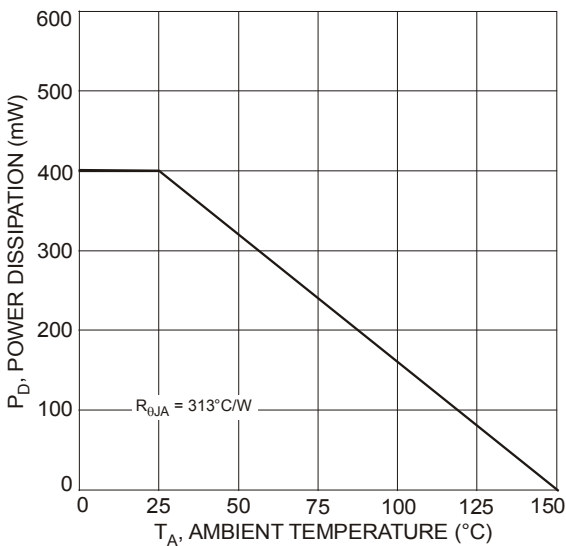


Fig. 1 Power Dissipation vs. Ambient Temperature (Note 3)

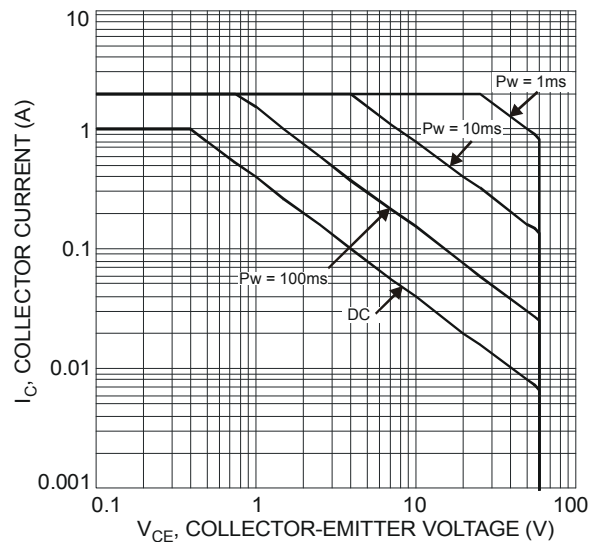


Fig. 2 Typical Collector Current vs. Collector-Emitter Voltage (Note 3)

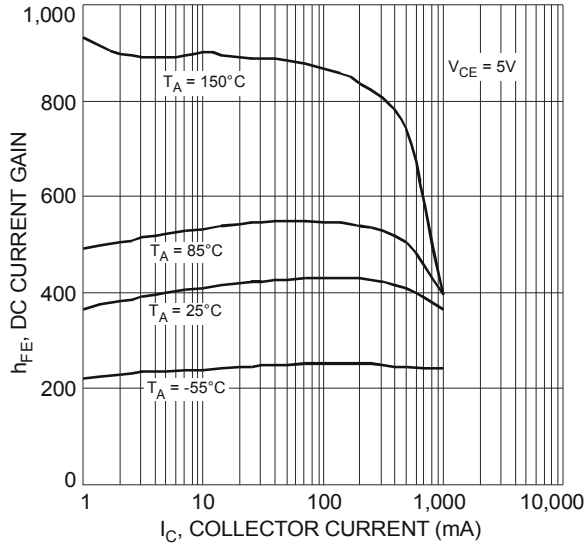


Fig. 3 Typical DC Current Gain vs. Collector Current

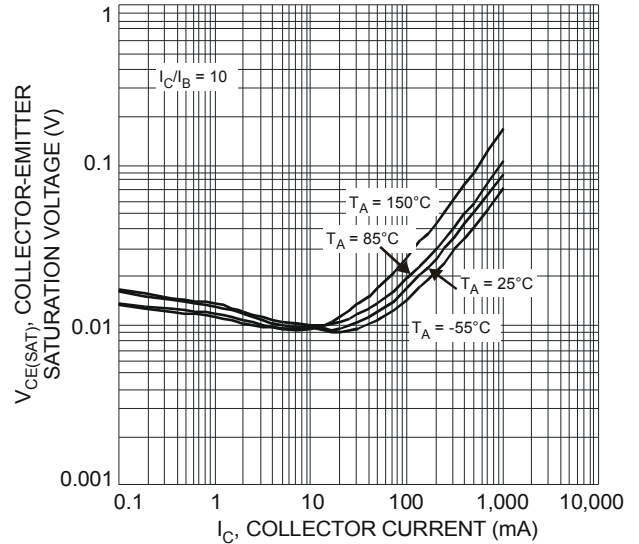


Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

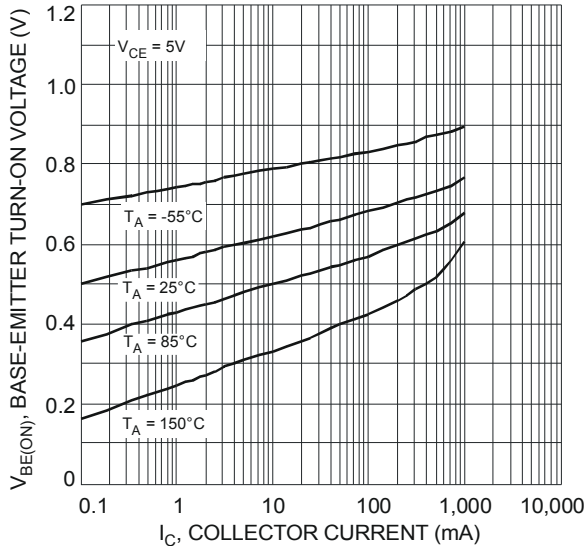


Fig. 5 Typical Base-Emitter Turn-On Voltage vs. Collector Current

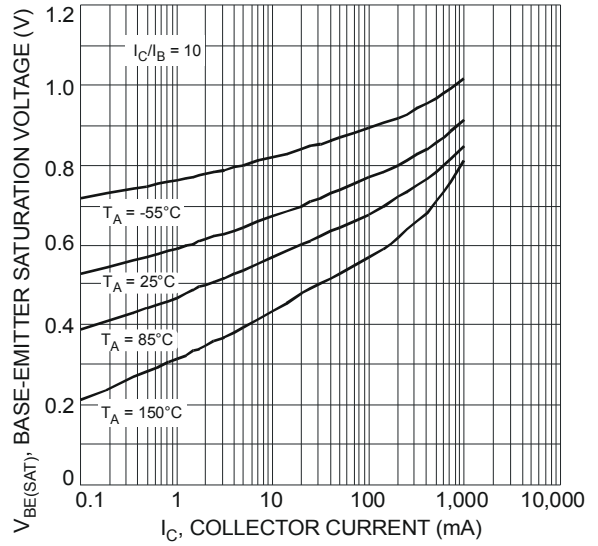


Fig. 6 Typical Base-Emitter Saturation Voltage vs. Collector Current

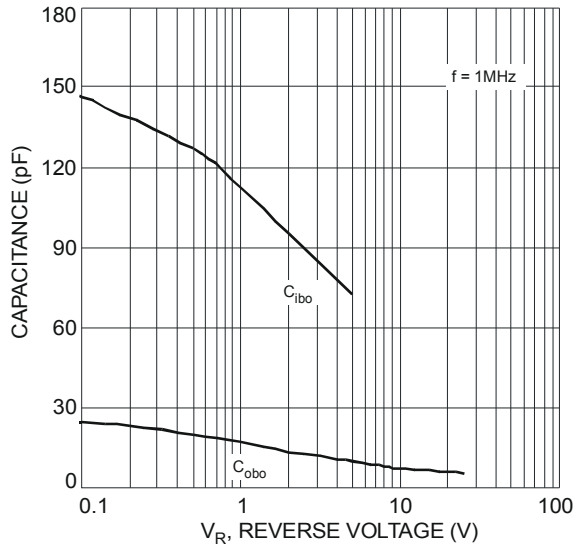


Fig. 7 Typical Capacitance Characteristics

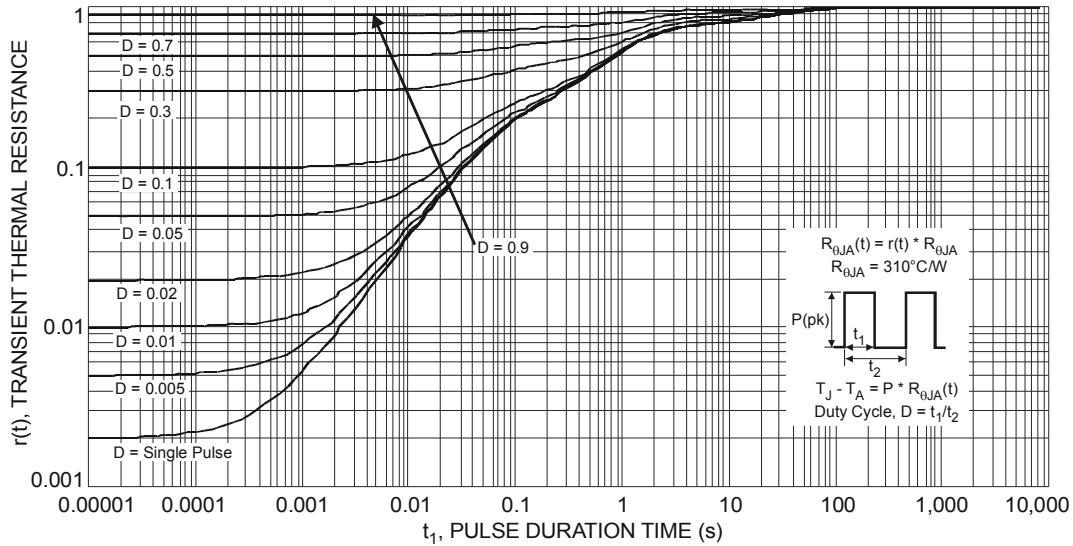


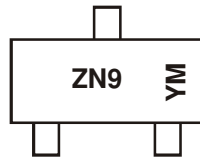
Fig. 8 Transient Thermal Response (Note 3)

Ordering Information (Note 5)

| Part Number | Case | Packaging |
|-------------|---------|------------------|
| DSS4160U-7 | SOT-323 | 3000/Tape & Reel |

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

Marking Information



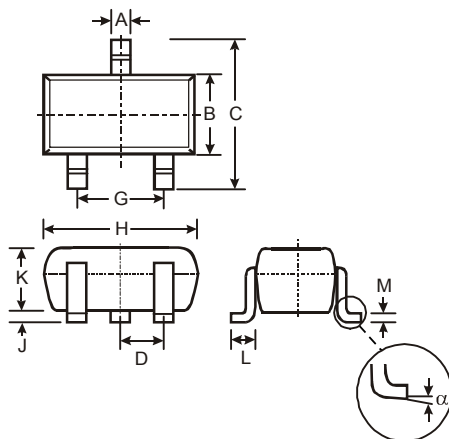
ZN9 = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: V = 2008)
 M = Month (ex: 9 = September)

Date Code Key

| Year | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|------|------|------|------|------|------|------|------|------|
| Code | V | W | X | Y | Z | A | B | C |

| 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 |

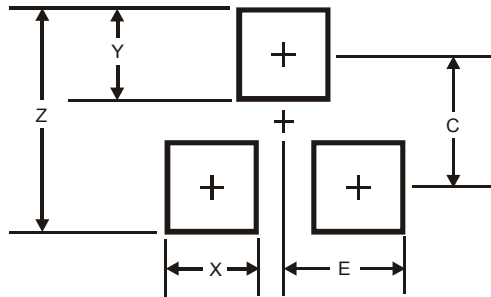
Package Outline Dimensions



| SOT-323 | | | |
|---------|------|------|------|
| Dim | Min | Max | Typ |
| A | 0.25 | 0.40 | 0.30 |
| B | 1.15 | 1.35 | 1.30 |
| C | 2.00 | 2.20 | 2.10 |
| D | - | - | 0.65 |
| G | 1.20 | 1.40 | 1.30 |
| H | 1.80 | 2.20 | 2.15 |
| J | 0.0 | 0.10 | 0.05 |
| K | 0.90 | 1.00 | 1.00 |
| L | 0.25 | 0.40 | 0.30 |
| M | 0.10 | 0.18 | 0.11 |
| α | 0° | 8° | - |

All Dimensions in mm

Suggested Pad Layout



| Dimensions | Value (in mm) |
|------------|---------------|
| Z | 2.8 |
| X | 0.7 |
| Y | 0.9 |
| C | 1.9 |
| E | 1.0 |

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