

Features

- Epitaxial Planar Die Construction
- Complementary PNP Type Available (DSS5140V)
- Low Collector-Emitter Saturation Voltage, $V_{CE(SAT)}$
- Surface Mount Package Suited for Automated Assembly
- Ultra-Small Surface Mount Package
- **Lead Free/RoHS Compliant (Note 1)**
- **"Green Device" (Note 2)**

Mechanical Data

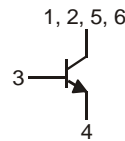
- Case: SOT-563
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminals: Finish — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Marking Information: See Page 4
- Ordering Information: See Page 4
- Weight: 0.003 grams (approximate)



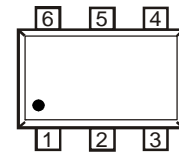
Top View



Bottom View



Device Schematic



Pin Out Configuration

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

| Characteristic | Symbol | Value | Unit |
|--|-----------|-------|------|
| Collector-Base Voltage | V_{CBO} | 40 | V |
| Collector-Emitter Voltage | V_{CEO} | 40 | V |
| Emitter-Base Voltage | V_{EBO} | 5 | V |
| Collector Current - Continuous | I_C | 1 | A |
| Repetitive Peak Collector Current (Note 3) | I_{CRP} | 2 | A |
| Peak Pulse Collector Current | I_{CM} | 3 | A |
| Base Current (DC) | I_B | 300 | mA |
| Peak Base Current | I_{BM} | 1 | A |

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|---|-----------------|-------------|---------------------------|
| Power Dissipation (Note 4) @ $T_A = 25^\circ\text{C}$ | P_D | 600 | mW |
| Thermal Resistance, Junction to Ambient (Note 4) @ $T_A = 25^\circ\text{C}$ | $R_{\theta JA}$ | 208 | $^\circ\text{C}/\text{W}$ |
| 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. Operated under pulsed conditions: Pulse width $\leq 30\text{ms}$; duty cycle ≤ 0.2 .
 4. 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 | $V_{(BR)CBO}$ | 40 | — | — | V | $I_C = 100\mu\text{A}, I_E = 0$ |
| Collector-Emitter Breakdown Voltage (Note 5) | $V_{(BR)CEO}$ | 40 | — | — | 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 | $V_{CB} = 40\text{V}, I_E = 0$ $V_{CB} = 40\text{V}, I_E = 0, T_A = 150^\circ\text{C}$ |
| Collector Cutoff Current | I_{CES} | — | — | 100 | nA | $V_{CE} = 40\text{V}, V_{BE} = 0$ |
| Emitter Cutoff Current | I_{EBO} | — | — | 100 | nA | $V_{EB} = 5\text{V}, I_C = 0$ |
| ON CHARACTERISTICS (Note 5) | | | | | | |
| DC Current Gain | h_{FE} | 300 300 200 75 | — — — — | — 900 — — | — | $V_{CE} = 5\text{V}, I_C = 1\text{mA}$ $V_{CE} = 5\text{V}, I_C = 500\text{mA}$ $V_{CE} = 5\text{V}, I_C = 1\text{A}$ $V_{CE} = 5\text{V}, I_C = 2\text{A}$ |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT)}$ | — — — — | — — — — | 80 110 190 440 | mV | $I_C = 100\text{mA}, I_B = 1\text{mA}$ $I_C = 500\text{mA}, I_B = 50\text{mA}$ $I_C = 1\text{A}, I_B = 100\text{mA}$ $I_C = 2\text{A}, I_B = 200\text{mA}$ |
| Collector-Emitter Saturation Resistance | $R_{CE(SAT)}$ | — | — | 190 | $\text{m}\Omega$ | $I_C = 1\text{A}, I_B = 100\text{mA}$ |
| Base-Emitter Saturation Voltage | $V_{BE(SAT)}$ | — | — | 1.2 | V | $I_C = 1\text{A}, I_B = 100\text{mA}$ |
| Base-Emitter Turn On Voltage | $V_{BE(ON)}$ | — | — | 1.1 | 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} | — | 58 | — | ns | $V_{CC} = 10\text{V}$ $I_C = 0.5\text{A}, I_{B1} = I_{B2} = 25\text{mA}$ |
| Delay Time | t_d | — | 30 | — | ns | |
| Rise Time | t_r | — | 28 | — | ns | |
| Turn-Off Time | t_{off} | — | 375 | — | ns | |
| Storage Time | t_s | — | 350 | — | ns | |
| Fall Time | t_f | — | 25 | — | ns | |

Notes: 5. Measured under pulsed conditions. Pulse width = $300\mu\text{s}$. Duty cycle $\leq 2\%$.

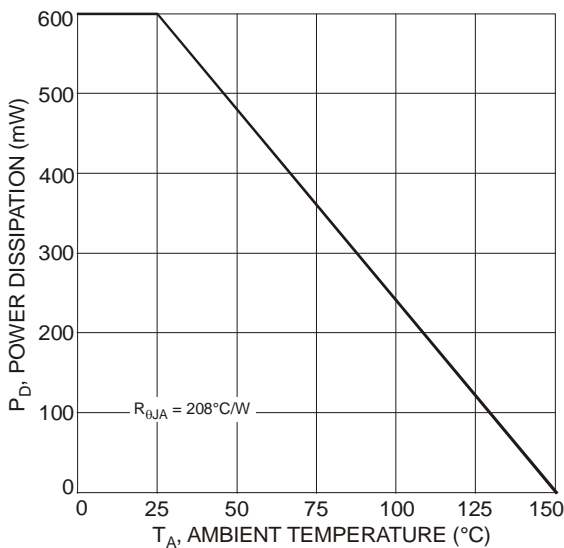


Fig. 1 Power Dissipation vs. Ambient Temperature (Note 4)

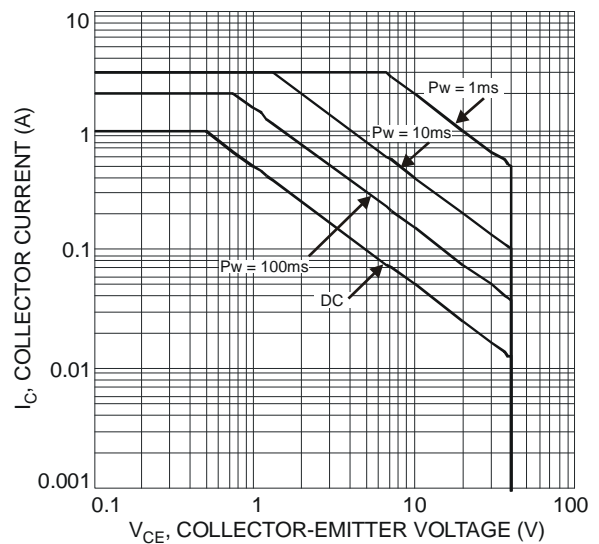


Fig. 2 Typical Collector Current vs. Collector-Emitter Voltage (Note 4)

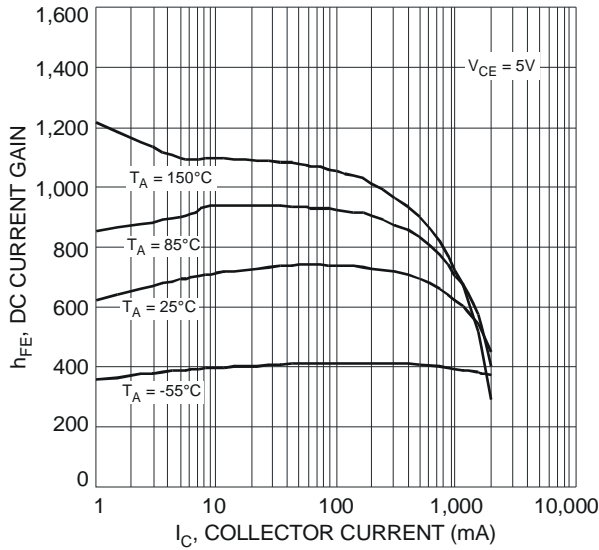


Fig. 3 Typical DC Current Gain vs. Collector Current

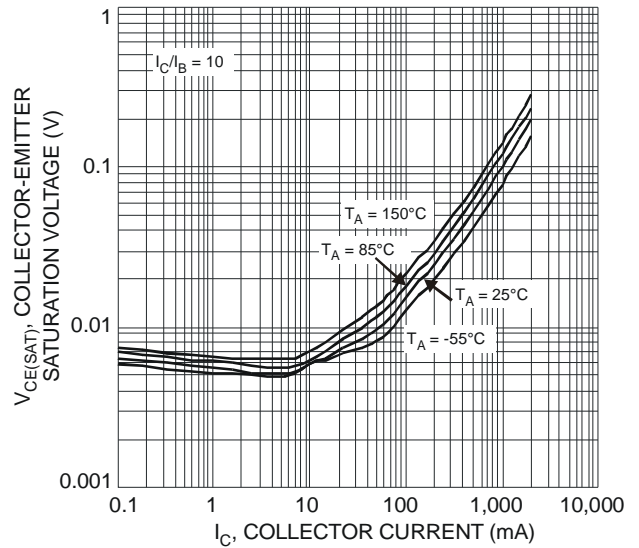


Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

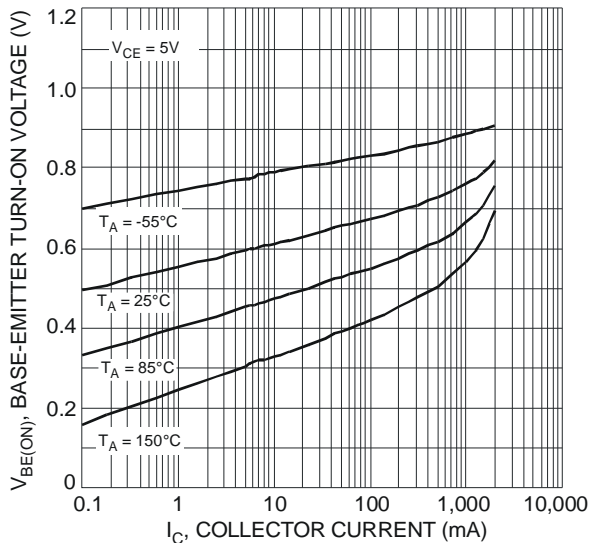


Fig. 5 Typical Base-Emitter Turn-On Voltage vs. Collector Current

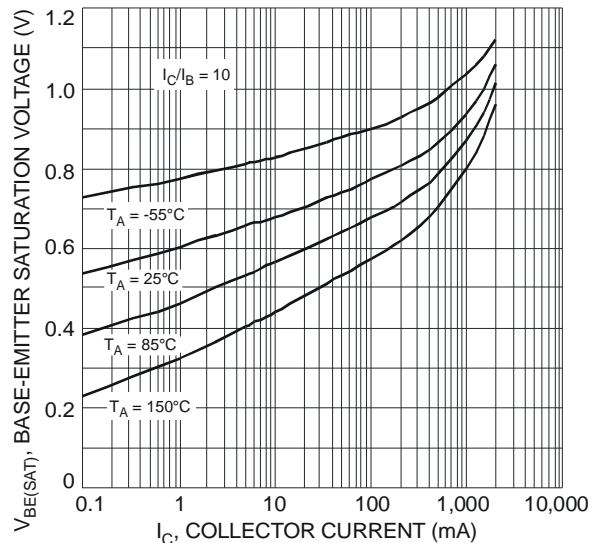


Fig. 6 Typical Base-Emitter Saturation Voltage vs. Collector Current

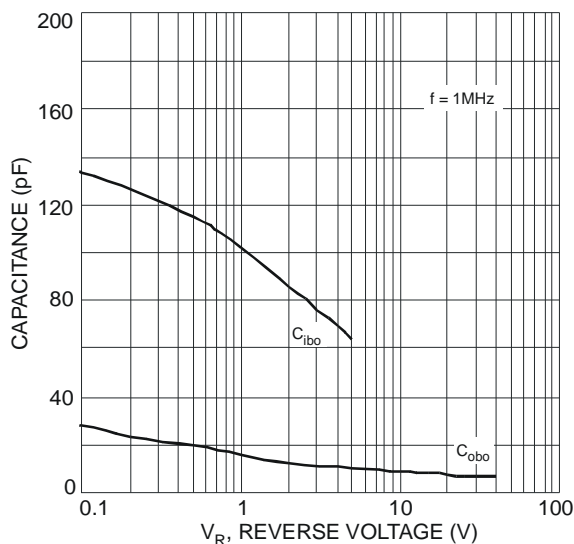


Fig. 7 Typical Capacitance Characteristics

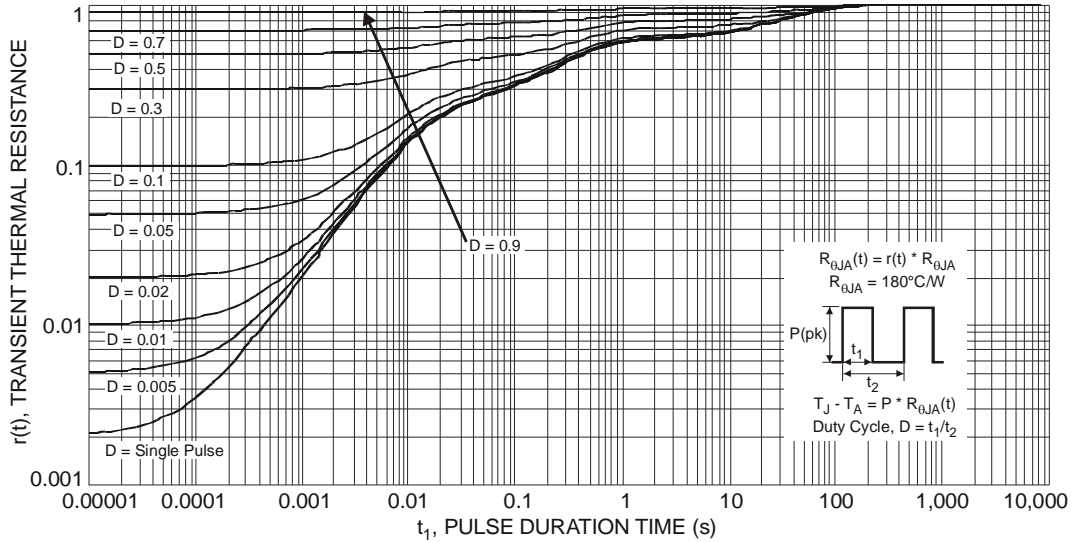


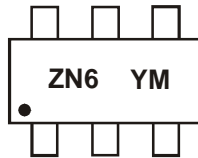
Fig. 8 Transient Thermal Response (Note 4)

Ordering Information (Note 6)

| Part Number | Case | Packaging |
|-------------|---------|------------------|
| DSS4140V-7 | SOT-563 | 3000/Tape & Reel |

Notes: 6. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

Marking Information



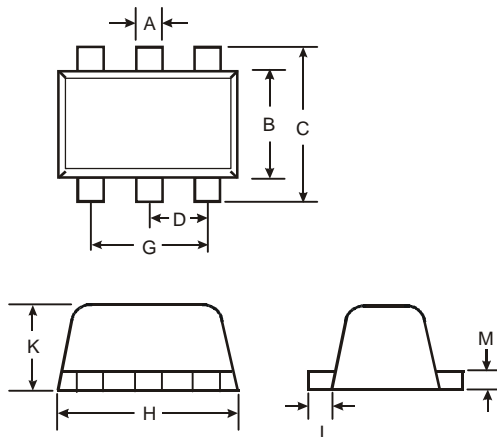
ZN6 = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: V = 2008)
M = Month (ex: 9 = September)

Date Code Key

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

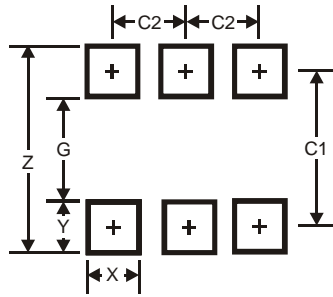
| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D |

Package Outline Dimensions



| SOT-563 | | | |
|----------------------|------|------|------|
| Dim | Min | Max | Typ |
| A | 0.15 | 0.30 | 0.20 |
| B | 1.10 | 1.25 | 1.20 |
| C | 1.55 | 1.70 | 1.60 |
| D | - | - | 0.50 |
| G | 0.90 | 1.10 | 1.00 |
| H | 1.50 | 1.70 | 1.60 |
| K | 0.55 | 0.60 | 0.60 |
| L | 0.10 | 0.30 | 0.20 |
| M | 0.10 | 0.18 | 0.11 |
| All Dimensions in mm | | | |

Suggested Pad Layout



| Dimensions | Value (in mm) |
|------------|---------------|
| Z | 2.2 |
| G | 1.2 |
| X | 0.375 |
| Y | 0.5 |
| C1 | 1.7 |
| C2 | 0.5 |

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