

#### Features

- Epitaxial Planar Die Construction
- Low Collector-Emitter Saturation Voltage
- Ideal for Low Power Amplification and Switching
- Complementary NPN Type Available (2DD2652)
- Ultra-Small Surface Mount Package
- Lead Free By Design/RoHS Compliant (Note 1)
- "Green Device" (Note 2)



2DB1689

LOW V<sub>CE(SAT)</sub> PNP SURFACE MOUNT TRANSISTOR

#### **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 Alloy42 leadframe. Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Marking Information: See Page 3
- Ordering Information: See Page 3
- Weight: 0.006 grams (approximate)



Top View



**Device Schematic** 

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

| Characteristic                 | Symbol           | Value | Unit |
|--------------------------------|------------------|-------|------|
| Collector-Base Voltage         | V <sub>CBO</sub> | -15   | V    |
| Collector-Emitter Voltage      | V <sub>CEO</sub> | -12   | V    |
| Emitter-Base Voltage           | V <sub>EBO</sub> | -6    | V    |
| Collector Current - Continuous | Ic               | -1.5  | А    |
| Peak Pulse Collector Current   | I <sub>CM</sub>  | -3    | А    |

### **Thermal Characteristics**

| Characteristic   | Symbol               | Value       | Unit |
|--|----------------------|-------------|------|
| Power Dissipation (Note 3) @ $T_A = 25^{\circ}C$                         | PD                   | 300         | mW   |
| Thermal Resistance, Junction to Ambient (Note 3) @ T <sub>A</sub> = 25°C | $R_{	ext{	heta}JA}$  | 417         | °C/W |
| Power Dissipation (Note 4) @ $T_A = 25^{\circ}C$                         | PD                   | 500         | mW   |
| Thermal Resistance, Junction to Ambient (Note 4) @ T <sub>A</sub> = 25°C | $R_{	ext{	heta}JA}$  | 250         | °C/W |
| Operating and Storage Temperature Range                                  | TJ, T <sub>STG</sub> | -55 to +150 | °C   |

#### **Electrical Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

| Characteristic                               |                      | Min | Тур  | Max  | Unit | Conditions                                      |
|--|----------------------|-----|------|------|------|---|
| OFF CHARACTERISTICS                          |                      |     |      |      |      |   |
| Collector-Base Breakdown Voltage             | V <sub>(BR)CBO</sub> | -15 |      |      | V    | $I_{C} = -10 \mu A, I_{E} = 0$                  |
| Collector-Emitter Breakdown Voltage (Note 5) | V <sub>(BR)CEO</sub> | -12 | _    |      | V    | $I_{\rm C} = -1 {\rm mA}, \ I_{\rm B} = 0$      |
| Emitter-Base Breakdown Voltage               | V <sub>(BR)EBO</sub> | -6  | _    | _    | V    | $I_{E} = -10\mu A$ , $I_{C} = 0$                |
| Collector Cut-Off Current                    | I <sub>СВО</sub>     | _   | _    | -0.1 | μΑ   | $V_{CB} = -15V, I_E = 0$                        |
| Emitter Cut-Off Current                      | I <sub>EBO</sub>     | _   | _    | -0.1 | μΑ   | $V_{EB} = -6V, I_{C} = 0$                       |
| ON CHARACTERISTICS (Note 5)                  |                      |     |      |      |      |   |
| Collector-Emitter Saturation Voltage         | V <sub>CE(SAT)</sub> | _   | -110 | -200 | mV   | $I_{C} = -500 \text{mA}, I_{B} = -25 \text{mA}$ |
| DC Current Gain                              |                      | 270 | _    | 680  |      | $V_{CE} = -2V, I_{C} = -200 \text{mA}$          |
| SMALL SIGNAL CHARACTERISTICS                 |                      |     |      |      |      |   |
| Output Capacitance                           | C <sub>obo</sub>     |     | 8.5  | _    | pF   | $V_{CB} = -10V, I_E = 0,$<br>f = 1MHz           |
| Current Gain-Bandwidth Product               | f⊤                   |     | 300  | _    | MHz  | $V_{CE} = -2V, I_C = -100mA, f = 100MHz$        |

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.

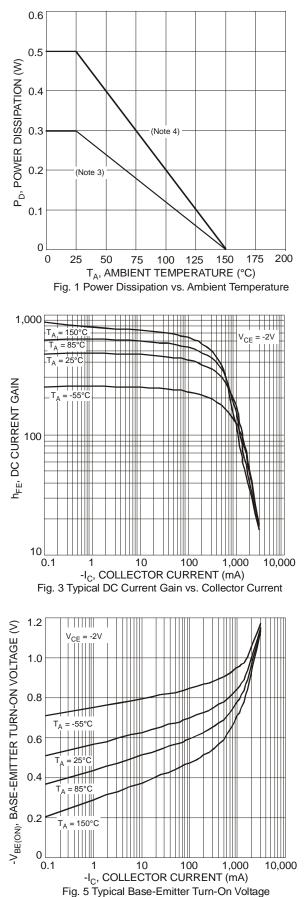
4. Device mounted on FR-4 PCB with 1 inch<sup>2</sup> copper pad layout.

5. Measured under pulsed conditions. Pulse width =  $300\mu s$ . Duty cycle  $\leq 2\%$ .

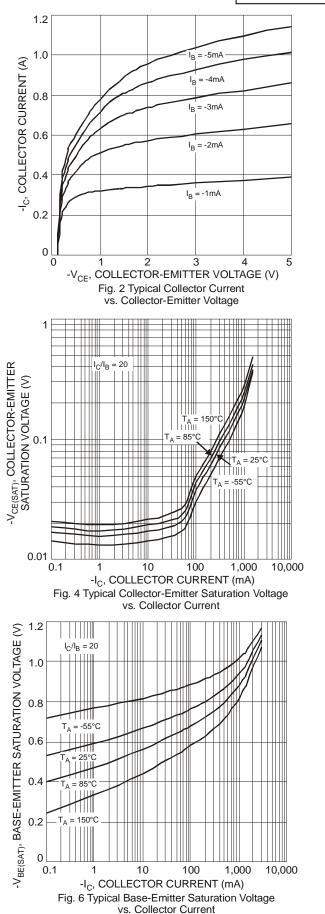
Notes:



## 2DB1689



vs. Collector Current

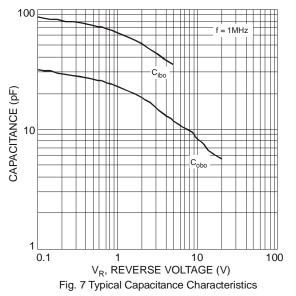


' 0.1 Fig.

NEW PRODUCT

2DB1689 Document number: DS31639 Rev. 2 - 2



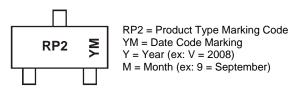


### Ordering Information (Note 6)

| Part Number | Case    | Packaging        |
|-------------|---------|------------------|
| 2DB1689-7   | SOT-323 | 3000/Tape & Reel |

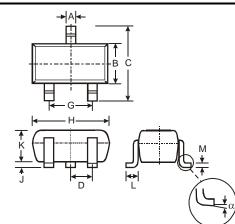
Notes: 6. For packaging details, go to our website at http://www.diodes.com/datasheets/ap02007.pdf.

# **Marking Information**



| Date Code Key |      |     |      |      |     |      |      |     |      |      |     |      |
|---------------|------|-----|------|------|-----|------|------|-----|------|------|-----|------|
| Year          | 2008 |     | 2009 | 2010 |     | 2011 | 2012 |     | 2013 | 2014 |     | 2015 |
| Code          | V    |     | W    | Х    |     | Y    | Z    |     | А    | В    |     | С    |
| Month         | Jan  | Feb | Mar  | Apr  | Мау | Jun  | Jul  | Aug | Sep  | Oct  | Nov | Dec  |
| Code          | 1    | 2   | 3    | 4    | 5   | 6    | 7    | 8   | 9    | 0    | N   | D    |

## Package Outline Dimensions



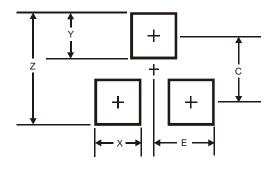
|     | SOT-323              |      |      |  |  |  |
|-----|----------------------|------|------|--|--|--|
| Dim | Min                  | Max  | Тур  |  |  |  |
| Α   | 0.25                 | 0.40 | 0.30 |  |  |  |
| В   | 1.15                 | 1.35 | 1.30 |  |  |  |
| С   | 2.00                 | 2.20 | 2.10 |  |  |  |
| D   | -                    | -    | 0.65 |  |  |  |
| G   | 1.20                 | 1.40 | 1.30 |  |  |  |
| Н   | 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 |  |  |  |
| Μ   | 0.10                 | 0.18 | 0.11 |  |  |  |
| α   | 0°                   | 8°   | -    |  |  |  |
| All | All Dimensions in mm |      |      |  |  |  |

2DB1689



2DB1689

### Suggested Pad Layout



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

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