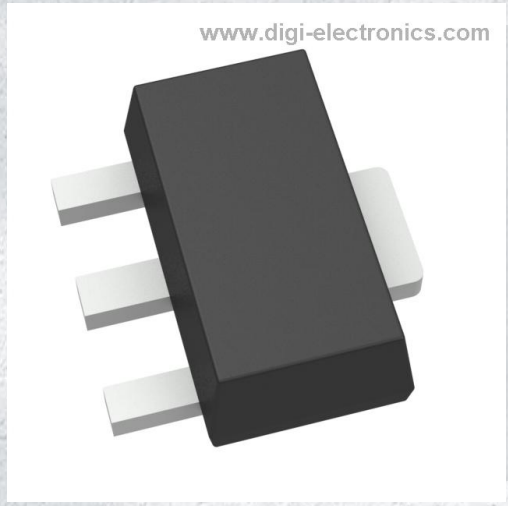
# BSR33QTA Datasheet




| | |
|---|---|
| DiGi Electronics Part Number | BSR33QTA-DG |
| Manufacturer | Diodes Incorporated |
| Manufacturer Product Number | BSR33QTA |
| Description | TRANS PNP 80V 1A SOT89-3 |
| Detailed Description | Bipolar (BJT) Transistor PNP 80 V 1 A 100MHz 2.1 W Surface Mount SOT-89-3 |

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RFQ Email: Info@DiGi-Electronics.com

## Purchase and inquiry

| Manufacturer Product Number: | Manufacturer: |
| --- | --- |
| BSR33QTA | Diodes Incorporated |
| Series: | Product Status: |
| - | Active |
| Transistor Type: | Current - Collector (Ic) (Max): |
| PNP | 1 A |
| Voltage - Collector Emitter Breakdown (Max): | Vce Saturation (Max) @ Ib, Ic: |
| 80 V | 500mV @ 50mA, 500mA |
| Current - Collector Cutoff (Max): | DC Current Gain (hFE) (Min) @ Ic, Vce: |
| 100nA (ICBO) | 100 @ 100mA, 5V |
| Power - Max: | Frequency - Transition: |
| 2.1 W | 100MHz |
| Operating Temperature: | Mounting Type: |
| -65°C ~ 150°C (TJ) | Surface Mount |
| Package / Case: | Supplier Device Package: |
| TO-243AA | SOT-89-3 |
| Base Product Number: | |
| BSR33 | |

## Environmental & Export classification

| RoHS Status: | Moisture Sensitivity Level (MSL): |
| --- | --- |
| ROHS3 Compliant | 1 (Unlimited) |
| REACH Status: | ECCN: |
| REACH Unaffected | EAR99 |
| HTSUS: | |
| 8541.29.0075 | |

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Diodes Incorporated

Lead-free Green

**BSR33**

**80V PNP MEDIUM POWER TRANSISTOR IN SOT89**

## Features

- $BV_{CEO}$ > -80V
- $I_C$ = -1A High Continuous Current
- Low saturation voltage $V_{CE(sat)}$ < -250mV @ -150mA
- Complementary type BSR43
- **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**
- **PPAP capable (Note 4)**

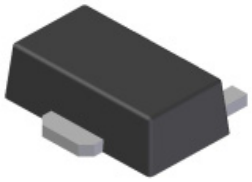
## Mechanical Data

- Case: SOT89
- Case Material: Molded Plastic, "Green" Molding Compound UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.052 grams (Approximate)

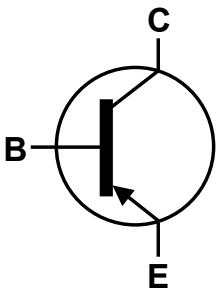
## Application

- Load management functions
- Solenoid, relay and actuator drivers
- DC – DC modules

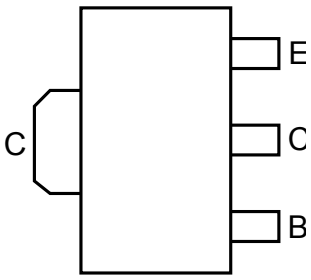
SOT89



Top View




Device Symbol



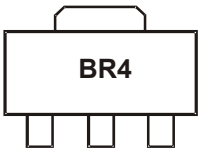

Top View
Pin-Out

## Ordering Information (Notes 4 & 5)

| Product | Compliance | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---|---|---|---|---|---|
| BSR33TA | AEC-Q101 | BR4 | 7 | 12 | 1,000 |
| BSR33QTA | Automotive | BR4 | 7 | 12 | 1,000 |

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html 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. Automotive products are AEC-Q10x qualified and are PPAP capable. Automotive, AEC-Q10x and standard products are electrically and thermally the same, except where specified. For more information, please refer to http://www.diodes.com/quality/product_compliance_definitions/.
5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

## Marking Information




BR4 = Product Type Marking Code

## Absolute Maximum Ratings (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | -90 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | -80 | V |
| Emitter-Base Voltage | $V_{EBO}$ | -5 | V |
| Continuous Collector Current | $I_C$ | -1 | A |
| Peak Pulse Current | $I_{CM}$ | -2 | A |
| Peak Base Current | $I_{BM}$ | -200 | mA |

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

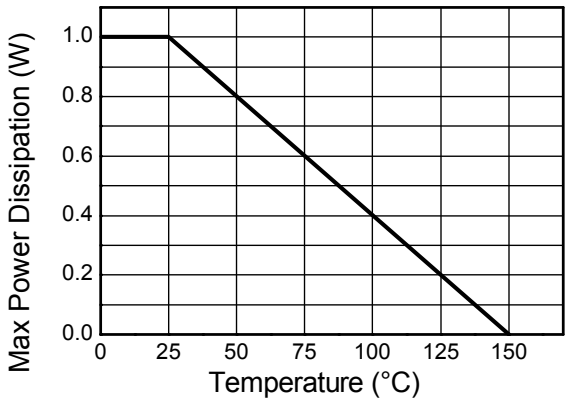
| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Power Dissipation | (Note 6) | $P_D$ | 1 | W |
| | (Note 7) | | 1.5 | |
| | (Note 8) | | 2.1 | |
| Thermal Resistance, Junction to Ambient Air | (Note 6) | $R_{\theta JA}$ | 125 | °C/W |
| | (Note 7) | | 83 | |
| | (Note 8) | | 60 | |
| Thermal Resistance, Junction to Lead | (Note 9) | $R_{\theta JL}$ | 13 | °C/W |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -65 to +150 | °C |

## ESD Ratings (Note 10)

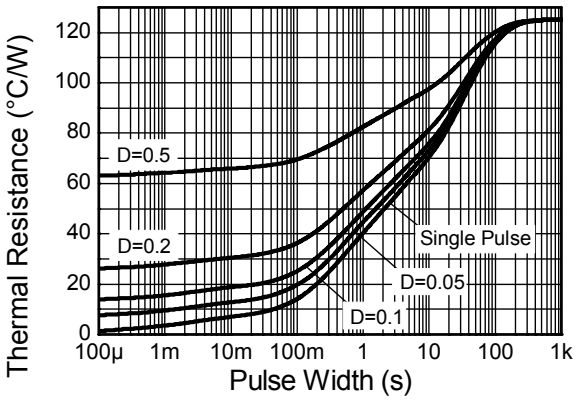
| Characteristic | Symbol | Value | Unit | JEDEC Class |
|---|---|---|---|---|
| Electrostatic Discharge - Human Body Model | ESD HBM | 4,000 | V | 3A |
| Electrostatic Discharge - Machine Model | ESD MM | 400 | V | C |

Notes:
6. For a device mounted with the exposed collector pad on 15mm x 15mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
7. Same as note (6), except the device is mounted on 25mm x 25mm 1oz copper.
8. Same as note (6), except the device is mounted on 50mm x 50mm 1oz copper.
9. Thermal resistance from junction to solder-point (on the exposed collector pad).
10. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

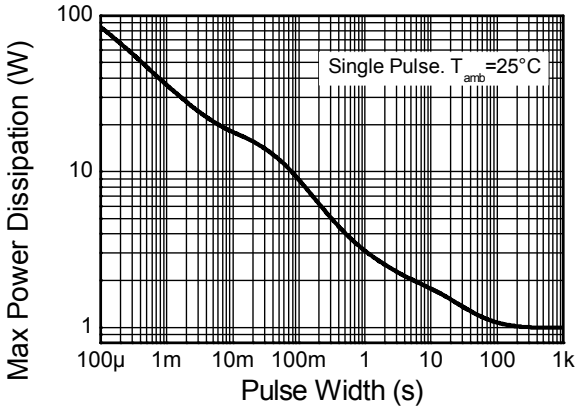
## Thermal Characteristics and Derating Information



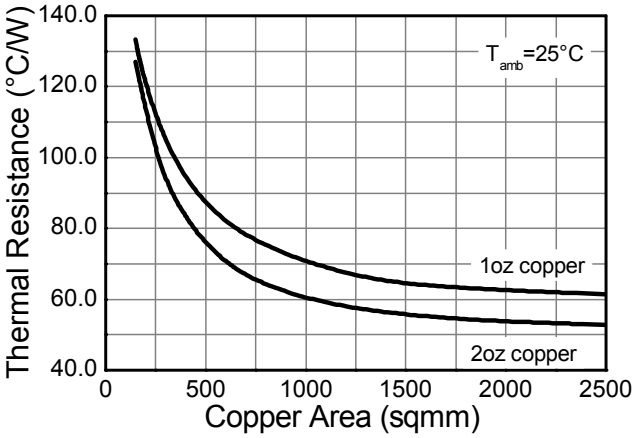

**Derating Curve**

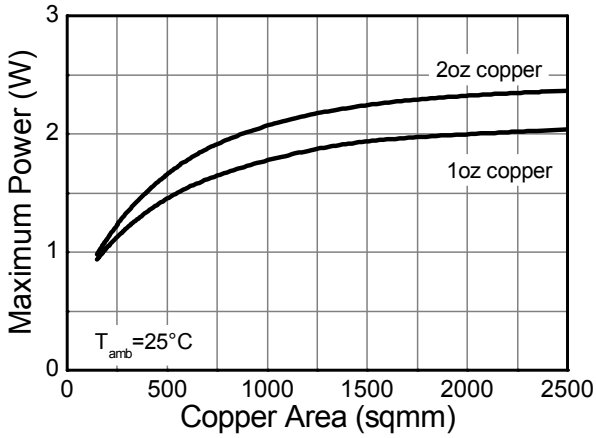



**Transient Thermal Impedance**




**Pulse Power Dissipation**



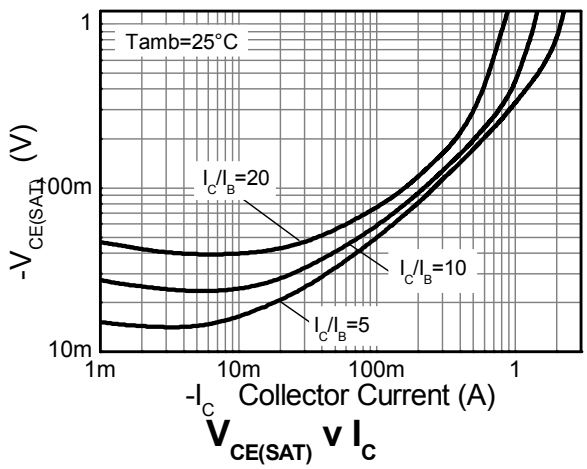



## Electrical Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

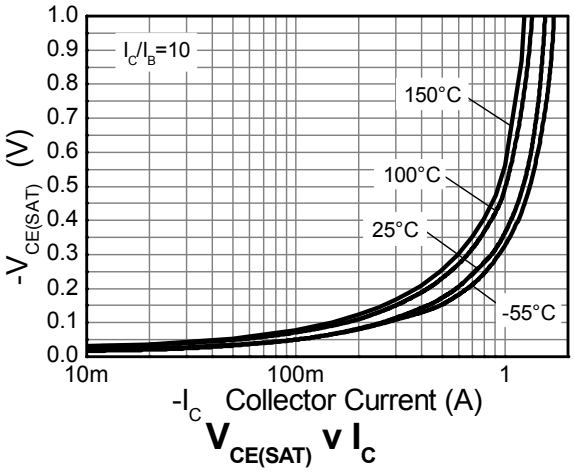
| Characteristic | Symbol | Min | Typ. | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| Collector-Base Breakdown Voltage | $BV_{CBO}$ | -90 | – | – | V | $I_C$ = -100µA |
| Collector-Emitter Breakdown Voltage (Note 11) | $BV_{CEO}$ | -80 | – | – | V | $I_C$ = -10mA |
| Emitter-Base Breakdown Voltage | $BV_{EBO}$ | -5 | – | – | V | $I_E$ = -100µA |
| Collector Cutoff Current | $I_{CBO}$ | – | – | -100<br>-50 | nA<br>µA | $V_{CB}$ = -60V<br>$V_{CB}$ = -60V, $T_J$ = +150°C |
| DC current transfer Static ratio (Note 11) | $h_{FE}$ | 30<br>100<br>50 | –<br>–<br>– | –<br>300<br>– | – | $I_C$ = -100µA, $V_{CE}$ = -5V<br>$I_C$ = -100mA, $V_{CE}$ = -5V<br>$I_C$ = -500mA, $V_{CE}$ = -5V |
| Collector-Emitter Saturation Voltage (Note 11) | $V_{CE(sat)}$ | –<br>– | –<br>– | -0.25<br>-0.5 | V | $I_C$ = -150mA, $I_B$ = -15mA<br>$I_C$ = -500mA, $I_B$ = -50mA |
| Base-Emitter Saturation Voltage (Note 11) | $V_{BE(sat)}$ | – | – | -1.0<br>-1.2 | V | $I_C$ = -150mA, $I_B$ = -15mA<br>$I_C$ = -500mA, $I_B$ = -50mA |
| Transitional Frequency | $f_T$ | 100 | – | – | MHz | $I_C$ = -50mA, $V_{CE}$ = -10V<br>f = 35MHz |
| Output capacitance | $C_{obo}$ | – | – | 20 | pF | $V_{CB}$ = -10V, f = 1MHz |
| Input Capacitance | $C_{ibo}$ | – | – | 120 | pF | $V_{CB}$ = -0.5V, f = 1MHZ |
| Turn-On Time | $T_{on}$ | – | – | 500 | ns | $V_{CC}$ =-20V, $I_C$ = -100mA |
| Turn-Off Time | $T_{off}$ | – | – | 650 | ns | $I_{B1}$ =$I_{B2}$ = -5mA |

Note: 11. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

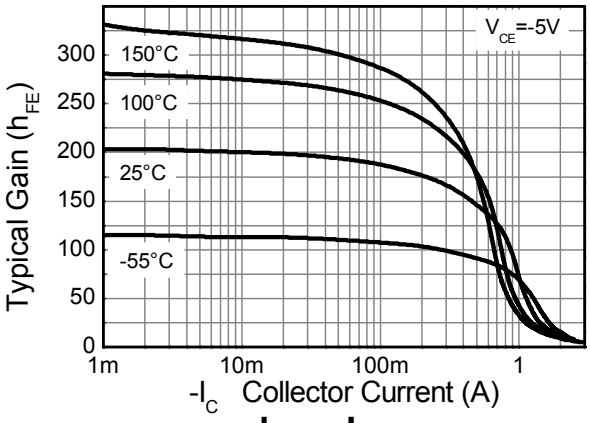
## Typical Electrical Characteristics (@$T_A$ = +25°C, unless otherwise specified.)



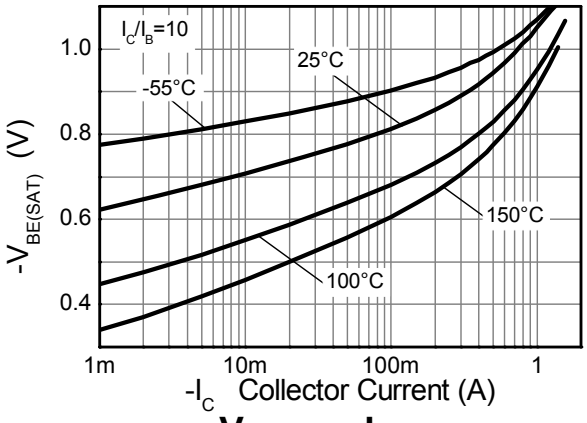

$V_{CE(SAT)}$ v $I_C$



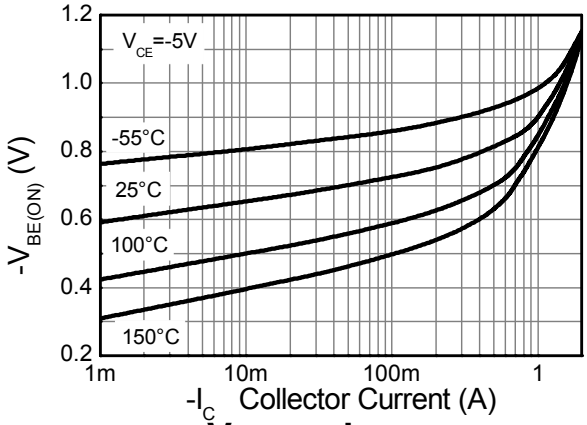

$V_{CE(SAT)}$ v $I_C$




$h_{FE}$ v $I_C$



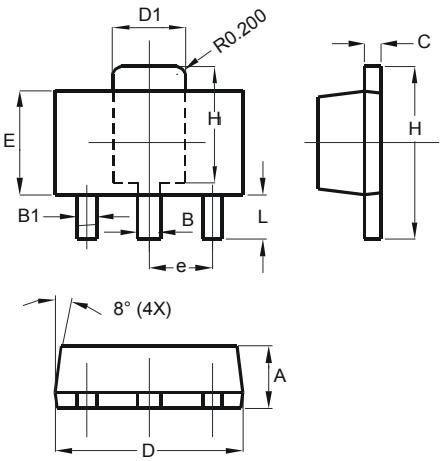

$V_{BE(SAT)}$ v $I_C$




$V_{BE(ON)}$ v $I_C$

## Package Outline Dimensions

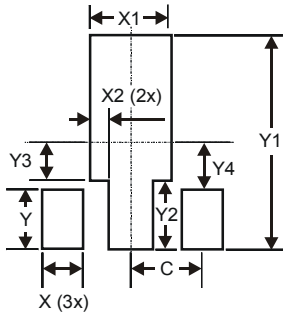
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.




| SOT89 | | |
|---|---|---|
| **Dim** | **Min** | **Max** |
| **A** | 1.40 | 1.60 |
| **B** | 0.44 | 0.62 |
| **B1** | 0.35 | 0.54 |
| **C** | 0.35 | 0.44 |
| **D** | 4.40 | 4.60 |
| **D1** | 1.62 | 1.83 |
| **E** | 2.29 | 2.60 |
| **e** | 1.50 Typ | |
| **H** | 3.94 | 4.25 |
| **H1** | 2.63 | 2.93 |
| **L** | 0.89 | 1.20 |
| **All Dimensions in mm** | | |

## Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.




| Dimensions | Value (in mm) |
|---|---|
| **X** | 0.900 |
| **X1** | 1.733 |
| **X2** | 0.416 |
| **Y** | 1.300 |
| **Y1** | 4.600 |
| **Y2** | 1.475 |
| **Y3** | 0.950 |
| **Y4** | 1.125 |
| **C** | 1.500 |

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BSR33

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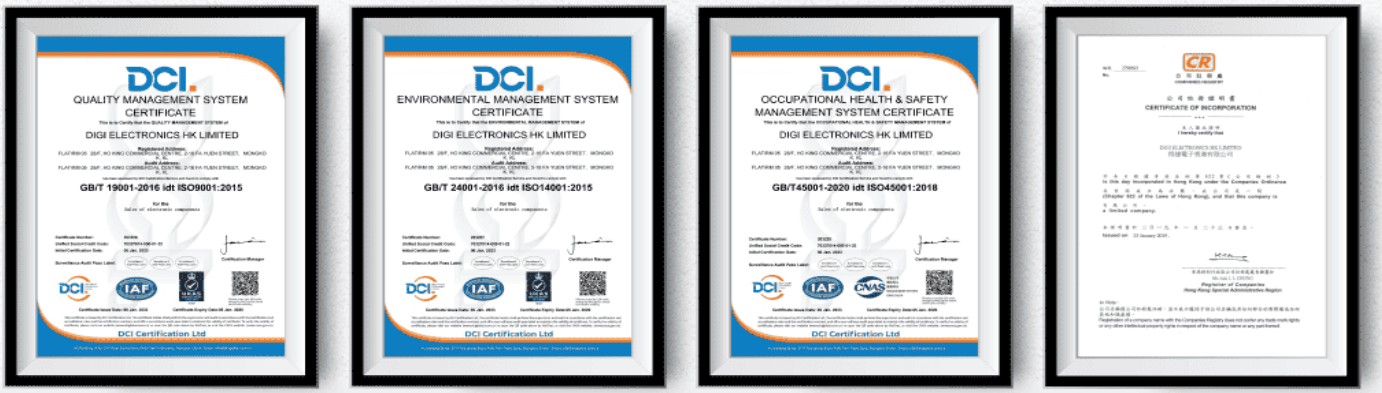



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