


## Features

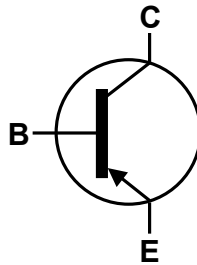
- $BV_{CEO} > -32V$
- $I_C = -2A$  high Continuous Current
- Low saturation voltage  $V_{CE(sat)} < 800mV @ 2A$
- Complementary NPN Type: 2DD1766
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

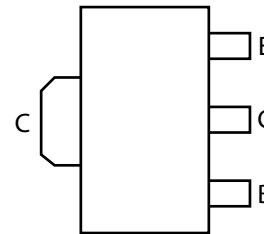
- Case: SOT89
- Case material: Molded Plastic, "Green" Molding Compound.
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 
- Weight: 0.052 grams (approximate)



Top View



Device Symbol



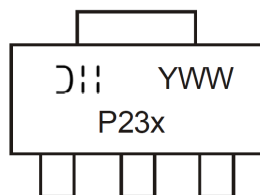
Pin Out – Top View

## Ordering Information (Note 4)

| Part Number  | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|--------------|---------|--------------------|-----------------|-------------------|
| 2DB1188P-13  | P23P    | 13                 | 12              | 2,500             |
| 2DB1188Q-13  | P23Q    | 13                 | 12              | 2,500             |
| 2DB1188Q-13R | P23Q    | 13                 | 12              | 4,000             |
| 2DB1188R-13  | P23R    | 13                 | 12              | 2,500             |

- 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](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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>

## Marking Information



P23x = Product Type Marking Code  
 Where P23P = 2DB1188P  
 P23Q = 2DB1188Q  
 P23R = 2DB1188R

D = Manufacturers' code marking  
 YWW = Date Code Marking  
 Y = Last Digit of Year (ex: 1 = 2011)  
 WW = Week Code (01 – 53)

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**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    | $V_{CEO}$ | -32   | V    |
| Emitter-Base Voltage         | $V_{EBO}$ | -6    | V    |
| Continuous Collector Current | $I_C$     | -2    | A    |
| Peak Pulse Collector Current | $I_{CM}$  | -3    | A    |
| Base Current                 | $I_B$     | -500  | mA   |

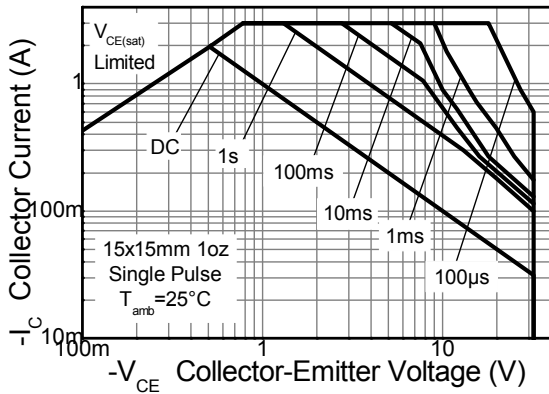
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**Thermal Characteristics** (@ $T_A = +25^\circ\text{C}$  unless otherwise specified.)

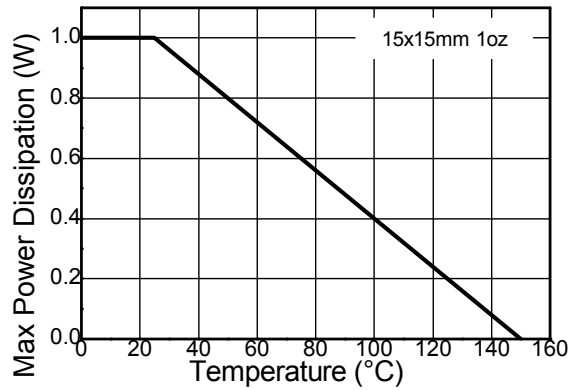
| Characteristic                                   | Symbol          | Value       | Unit                      |
|--|-----------------|-------------|---------------------------|
| Power Dissipation (Note 5)                       | $P_D$           | 1           | W                         |
| Thermal Resistance, Junction to Ambient (Note 5) | $R_{\theta JA}$ | 125         | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction to Leads (Note 6)   | $R_{\theta JL}$ | 19          | $^\circ\text{C}/\text{W}$ |
| Operating and Storage Temperature Range          | $T_J, T_{STG}$  | -55 to +150 | $^\circ\text{C}$          |

- Notes:
5. For a device surface mounted on 15mm x 15mm FR4 PCB with high coverage of single sided 1 oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
  6. Thermal resistance from junction to solder-point (on the exposed collector pad).

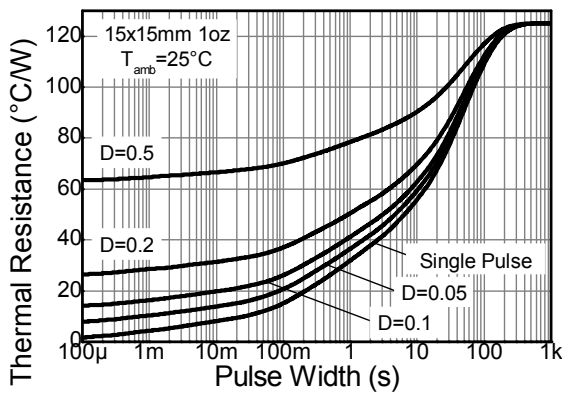
**Thermal Characteristics and Derating Information**



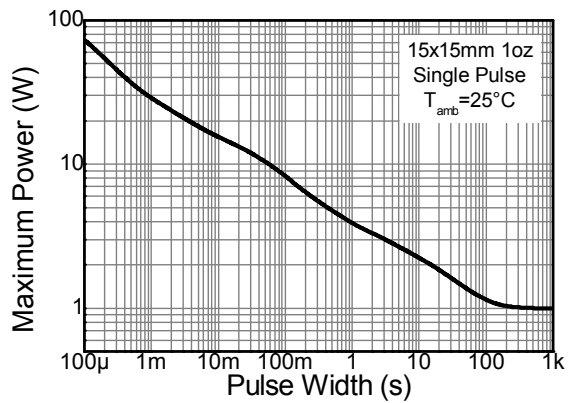
**Safe Operating Area**



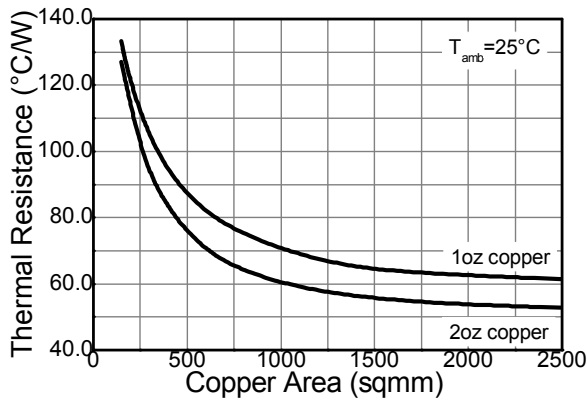
**Derating Curve**



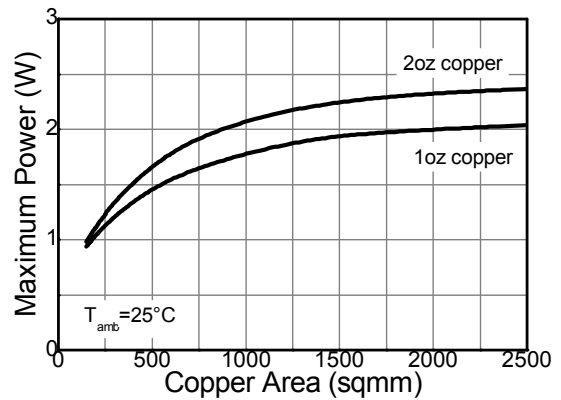
**Transient Thermal Impedance**



**Pulse Power Dissipation**



**R<sub>TH</sub> vs Area**



**P<sub>D</sub> vs Area**

**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic                       | Symbol        | Min | Typ   | Max  | Unit | Test Condition  |
|--------------------------------------|---------------|-----|-------|------|------|---|
| <b>OFF CHARACTERISTICS (Note 7)</b>  |               |     |       |      |      |   |
| Collector-Base Breakdown Voltage     | $BV_{CBO}$    | -40 | —     | —    | V    | $I_C = -100\mu\text{A}, I_E = 0$                            |
| Collector-Emitter Breakdown Voltage  | $BV_{CEO}$    | -32 | —     | —    | V    | $I_C = -10\text{mA}, I_B = 0$                               |
| Emitter-Base Breakdown Voltage       | $BV_{EBO}$    | -6  | —     | —    | V    | $I_E = -100\mu\text{A}, I_C = 0$                            |
| Collector Cutoff Current             | $I_{CBO}$     | —   | —     | -100 | nA   | $V_{CB} = -20\text{V}, I_E = 0$                             |
| Emitter Cutoff Current               | $I_{EBO}$     | —   | —     | -100 | nA   | $V_{EB} = -5\text{V}, I_C = 0$                              |
| <b>ON CHARACTERISTICS (Note 7)</b>   |               |     |       |      |      |   |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | —   | -0.35 | -0.8 | V    | $I_C = -2\text{A}, I_B = -0.2\text{A}$                      |
| DC Current Gain                      | 2DB1188P      | 82  | —     | 180  | —    | $V_{CE} = -3\text{V}, I_C = -0.5\text{A}$                   |
|                                      | 2DB1188Q      | 120 | —     | 270  | —    |   |
|                                      | 2DB1188R      | 180 | —     | 390  | —    |   |
| <b>SMALL SIGNAL CHARACTERISTICS</b>  |               |     |       |      |      |   |
| Current Gain-Bandwidth Product       | $f_T$         | —   | 120   | —    | MHz  | $V_{CE} = -5\text{V}, I_C = -0.1\text{A}, f = 30\text{MHz}$ |
| Output Capacitance                   | $C_{obo}$     | —   | 20    | —    | pF   | $V_{CB} = -10\text{V}, f = 1\text{MHz}$                     |

Notes: 7. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

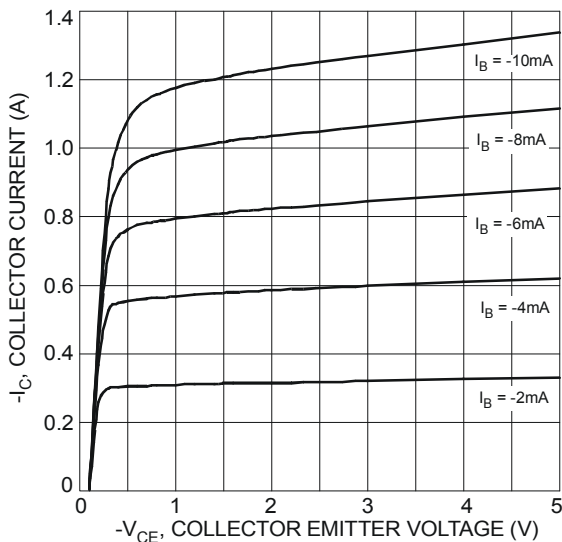


Figure 1. Typical Collector Current vs. Collector-Emitter Voltage

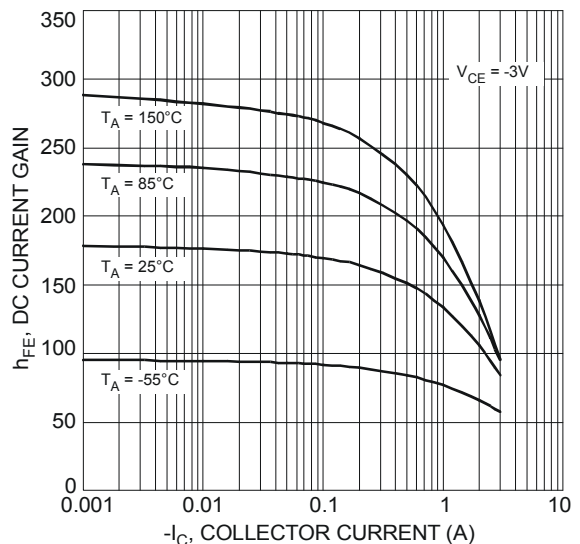


Figure 2. Typical DC Current Gain vs. Collector Current (2DB1188Q)

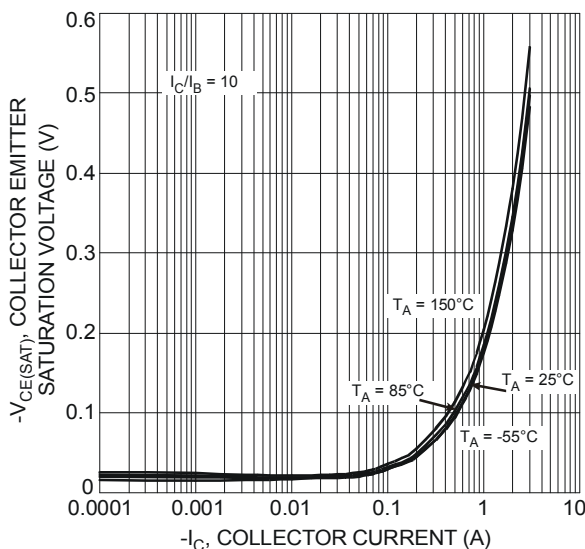


Figure 3. Typical Collector-Emitter Saturation Voltage vs. Collector Current

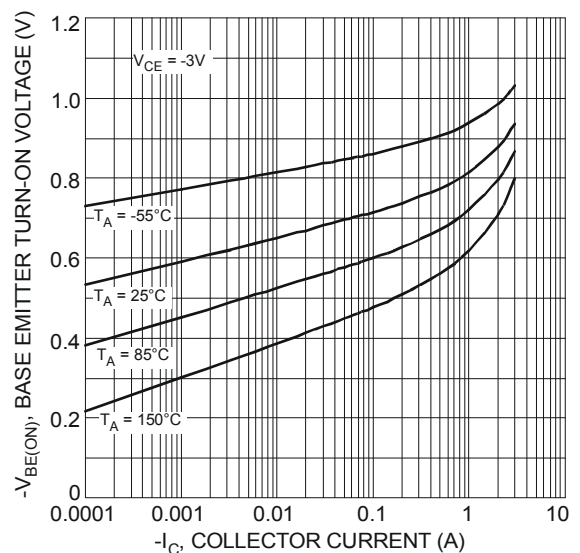


Figure 4. Typical Base-Emitter Turn-On Voltage vs. Collector Current

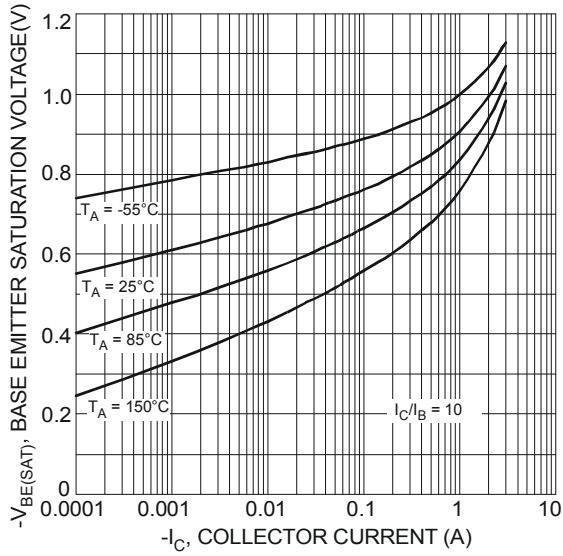


Figure 5. Typical Base-Emitter Saturation Voltage vs. Collector Current

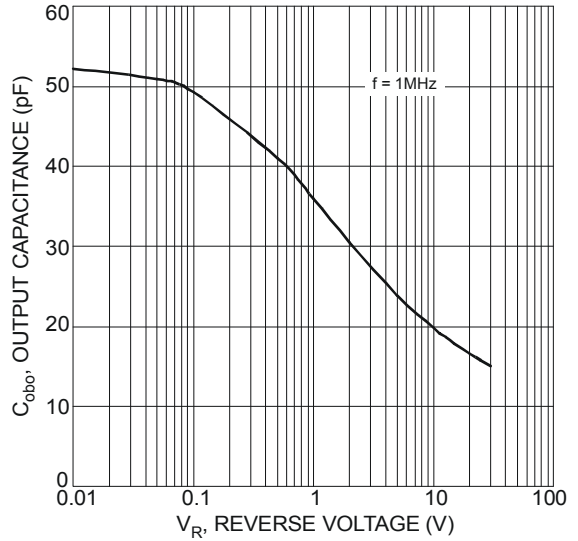


Figure 6. Typical Output Capacitance Characteristics

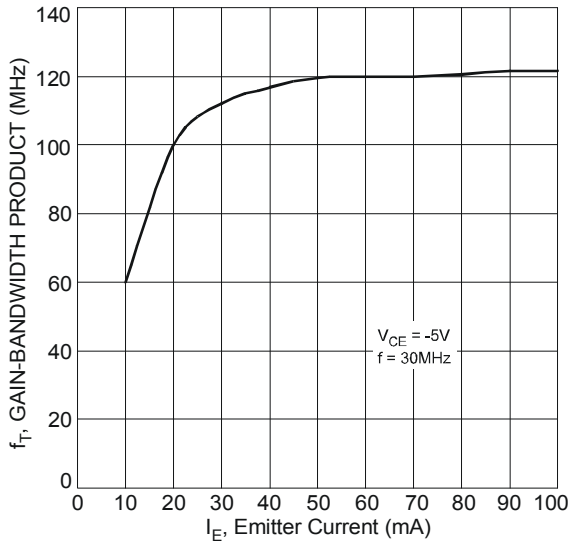
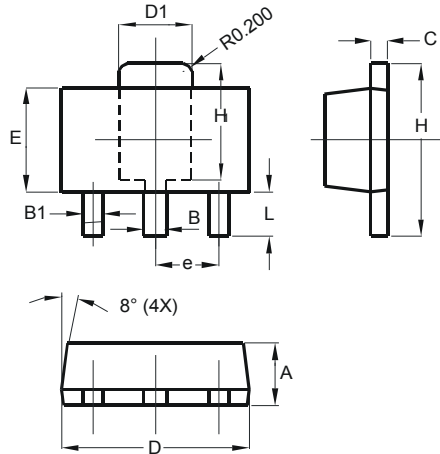


Figure 7. Typical Gain-Bandwidth Product vs. Emitter Current

## Package Outline Dimensions

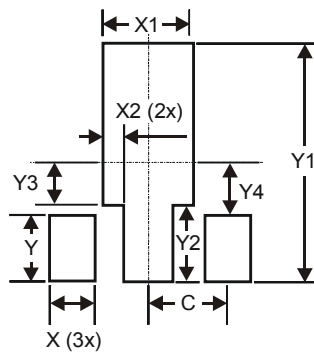
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| 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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