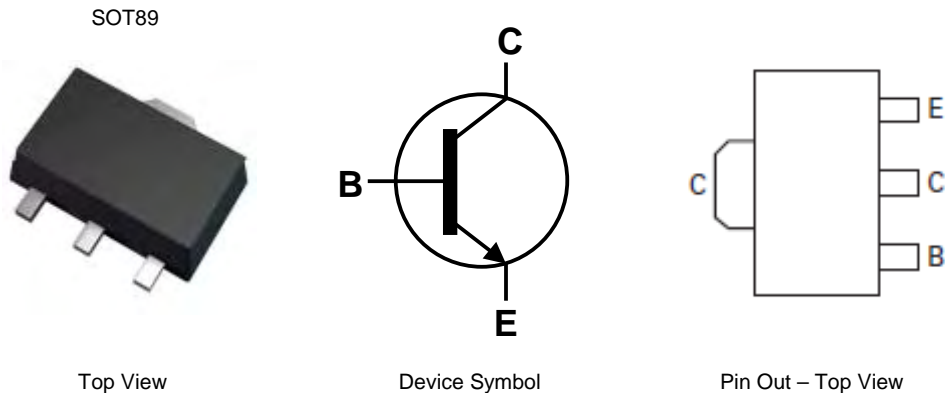


Features

- $BV_{CEO} > 32V$
- Max Continuous Current $I_C = 1A$
- Epitaxial Planar Die Construction
- Complementary PNP Type Available (2DB1132)
- Ideally Suited for Automated Assembly Processes
- Ideal for Medium Power Switching or Amplification Applications
- **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 Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish (Ⓔ3)
- Weight: 0.055 grams (Approximate)



Ordering Information (Note 4)

| Product | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-------------|---------|--------------------|-----------------|-------------------|
| 2DD1664P-13 | N13P | 13 | 12 | 2,500 |
| 2DD1664Q-13 | N13Q | 13 | 12 | 2,500 |
| 2DD1664R-13 | N13R | 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> 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>

Marking Information



N13x = Product Type Marking Code:
 Where N13P = 2DD1664P
 N13Q = 2DD1664Q
 N13R = 2DD1664R

YWW = Date Code Marking
 Y = Last digit of year ex: 1 = 2011
 WW = Week code (01 - 53)

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

| Characteristic | Symbol | Value | Unit |
|------------------------------|------------------|-------|------|
| Collector-Base Voltage | V _{CB0} | 40 | V |
| Collector-Emitter Voltage | V _{CEO} | 32 | V |
| Emitter-Base Voltage | V _{EBO} | 6 | V |
| Continuous Collector Current | I _C | 1 | A |
| Peak Pulse Current (Note 6) | I _{CM} | 2 | A |

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 5) | P _D | 1 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | R _{θJA} | 125 | °C/W |
| Thermal Resistance, Junction to Leads (Note 7) | R _{θJL} | 22 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +150 | °C |

- Notes:
- 5. For a device surface mounted on FR-4 PCB with minimum suggested pad layout; high coverage of single sided 1 oz copper, in still air conditions
 - 6. Measured under pulsed conditions. Pulse width = 300μs. Duty cycle ≤ 2%.
 - 7. Thermal resistance from junction to solder-point (at the end of the collector lead).

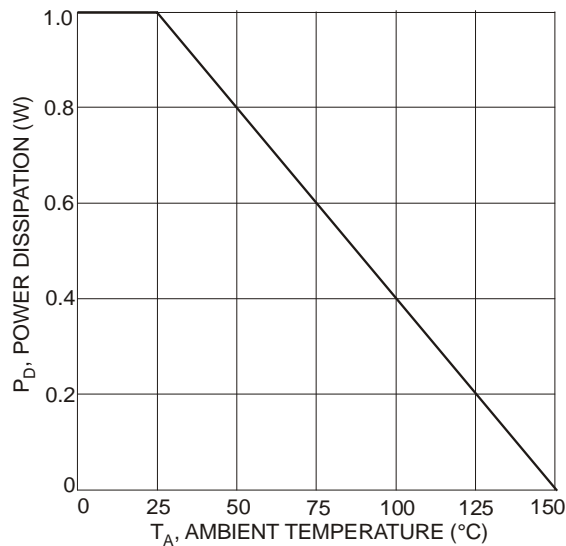


Figure 1. Power Dissipation vs. Ambient Temperature

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|----------------------|----------|-----|-----|------|--|
| Collector-Base Breakdown Voltage | BV _{CBO} | 40 | - | - | V | I _C = 100μA |
| Collector-Emitter Breakdown Voltage (Note 8) | BV _{CEO} | 32 | - | - | V | I _C = 10mA |
| Emitter-Base Breakdown Voltage | BV _{EBO} | 6 | - | - | V | I _E = 100μA |
| Collector-Emitter Cut-off Current | I _{CES} | - | - | 100 | nA | V _{CE} = 32V |
| Collector-Base Cut-off Current | I _{CBO} | - | - | 100 | nA | V _{CB} = 36V |
| Base-Emitter Cut-off Current | I _{EBO} | - | - | 100 | nA | V _{EB} = 6V |
| Static Forward Current Transfer Ratio (Note 8) | h _{FE} | 2DD1664P | 82 | 180 | - | I _C = 100mA, V _{CE} = 3V |
| | | 2DD1664Q | 120 | 270 | | |
| | | 2DD1664R | 180 | 390 | | |
| Collector-Emitter saturation Voltage (Note 8) | V _{CE(sat)} | - | 120 | 400 | mV | I _C = 500mA, I _B = 50mA |
| Transition frequency | f _T | - | 280 | - | MHz | I _E = 50mA, V _{CE} = 5V, f = 30MHz |
| Output Capacitance | C _{ob} | - | 10 | - | pF | I _E = 0A, V _{CB} = 10V, f = 1MHz |

Notes: 8. Measured under pulsed conditions. Pulse width = 300μs. Duty cycle ≤ 2%

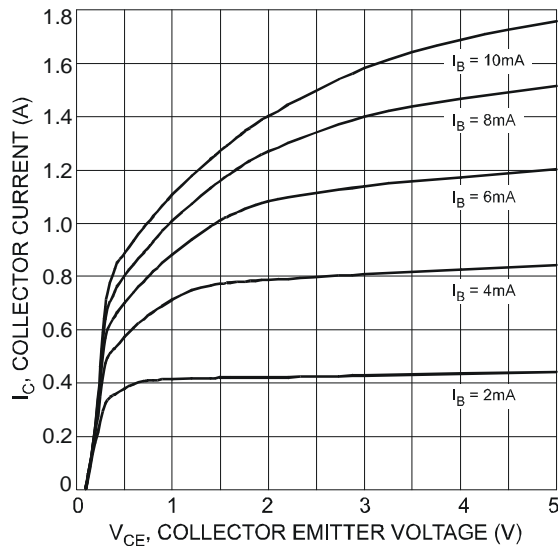
Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)


Figure 2. Typical Collector Current vs. Collector-Emitter Voltage

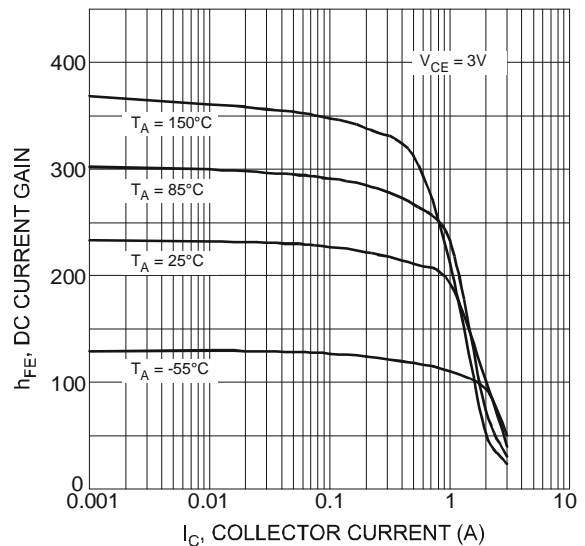


Figure 3. Typical DC Current Gain vs. Collector Current (2DD1664R)

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

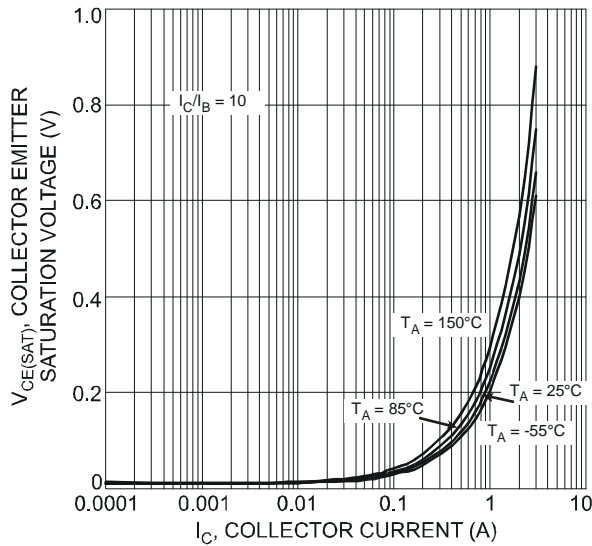


Figure 4. Typical Collector-Emitter Saturation Voltage vs. Collector Current

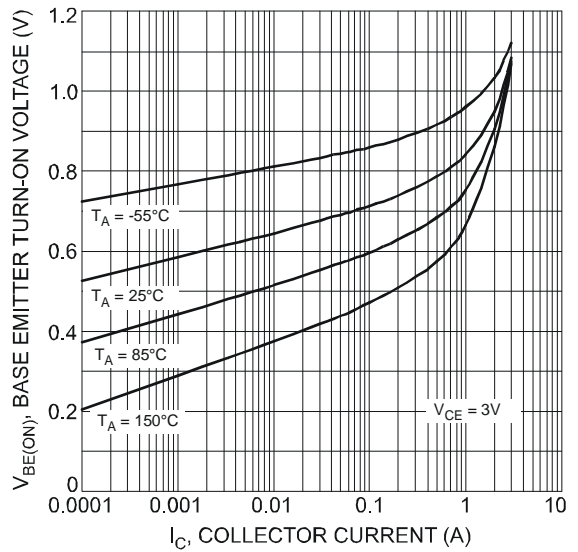


Figure 5. Typical Base-Emitter Turn-On Voltage vs. Collector Current

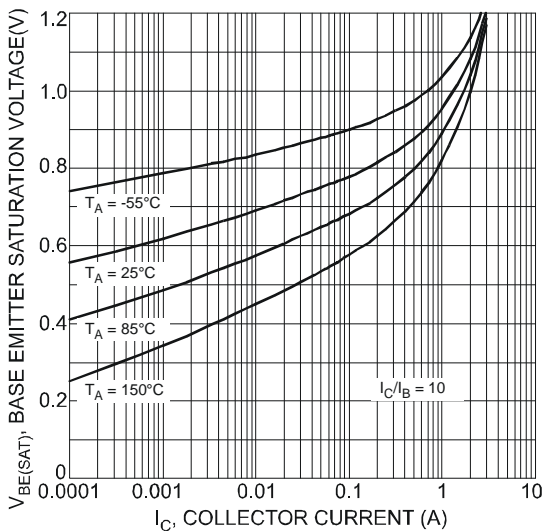


Figure 6. Typical Base-Emitter Saturation Voltage vs. Collector Current

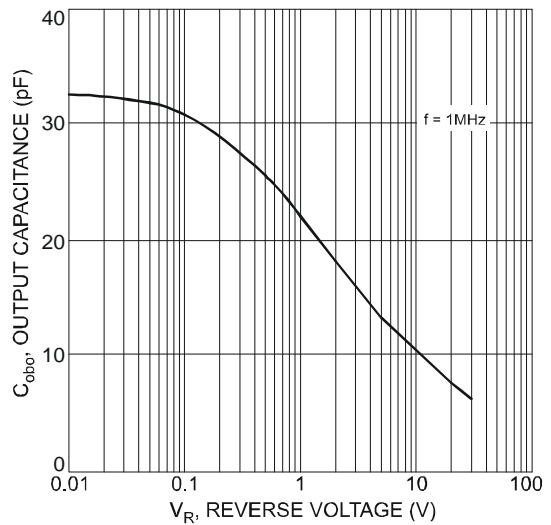


Figure 7. Typical Output Capacitance Characteristics

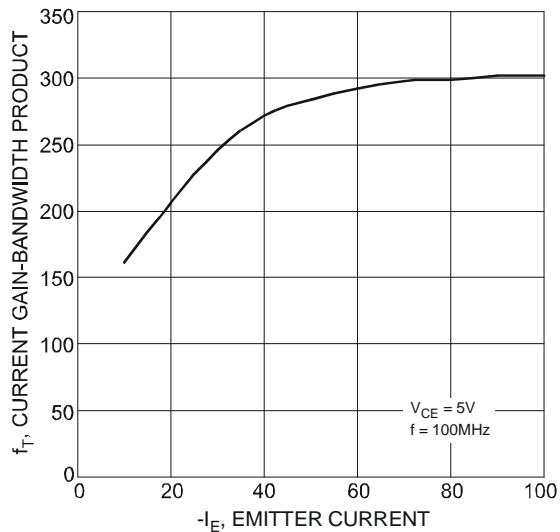
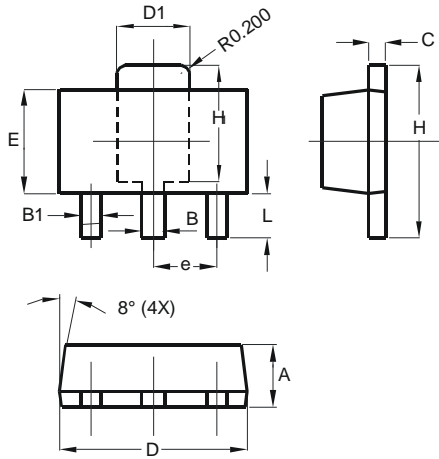


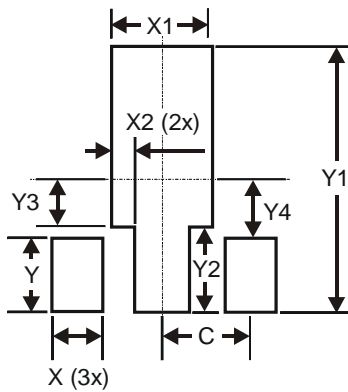
Figure 8. Typical Gain-Bandwidth Product vs. Emitter Current

Package Outline Dimensions



| 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



| 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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