

Features

- $BV_{CEO} > 450V$
- $BV_{CES} > 700V$
- $BV_{EBO} > 9V$
- $I_C = 1.5A$ High Continuous Collector Current
- Integrated Collector-Emitter Diode to Act as Free-wheeling Diode
- Anti-saturation for Faster Switching
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)

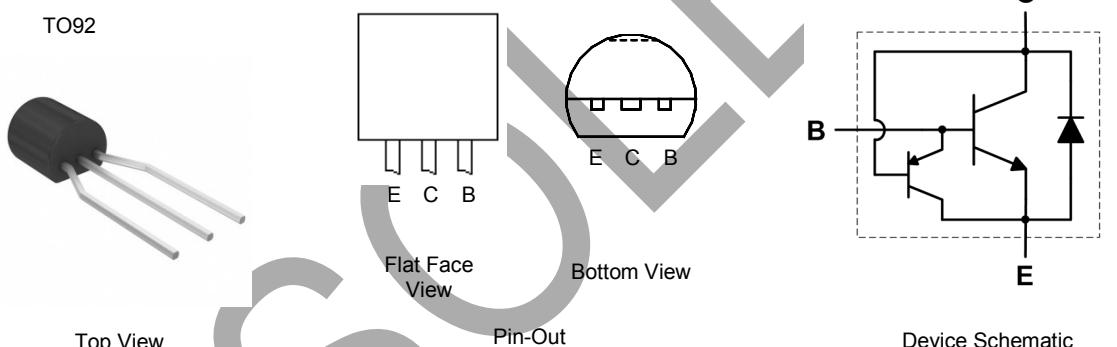
Applications

Low Power AC-DC SMPS for:

- Battery Chargers for Mobile Phone / Tablets / Smartphones
- Power Supply for DVD / STB
- LED Lighting

Mechanical Data

- Case: TO92 (Type C)
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Terminals: Matte Tin Finish; Solderable per MIL-STD-202, Method 208 (E3)
- Weight: TO92: 200mg (Approximate)



Ordering Information (Note 4)

| Product | Package | Marking | Quantity |
|-----------------|---------------------|------------|---------------------------|
| APT13003DZTR-G1 | TO92 (Joggled Legs) | 13003DZ-G1 | 2,000 Taped, per Ammo Box |

Notes:

1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
2. See <https://www.diodes.com/quality/lead-free/> 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



Flat Face View

▲ = Manufacturers' code marking
 For TO92, 13003DZ-G1 = Product Type Marking ID
 YWW = Date Code Marking
 e.g. 312 = Year 2013, Week 12.
 8 = Assembly site code
 XX = Batch Number

Absolute Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|--|-----------|-------|------|
| Collector-Emitter Voltage ($V_{BE} = 0\text{V}$) | V_{CES} | 700 | V |
| Collector-Emitter Voltage | V_{CEO} | 450 | V |
| Emitter-Base Voltage | V_{EBO} | 9 | V |
| Continuous Collector Current | I_C | 1.5 | A |
| Peak Pulse Collector Current | I_{CM} | 3 | A |
| Continuous Base Current | I_B | 0.75 | A |
| Peak Pulse Base Current | I_{BM} | 1.5 | A |

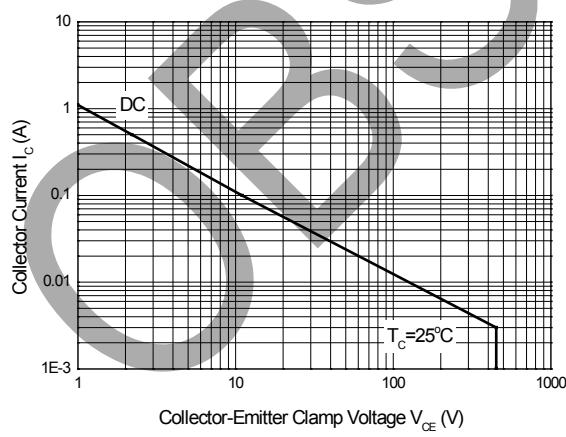
Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---|-----------------|-------------|------|
| Power Dissipation | P_D | 1.1 | W |
| Thermal Resistance, Junction to Ambient Air | $R_{\theta JA}$ | 113.6 | °C/W |
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 83.3 | °C/W |
| Operating and Storage Temperature Range | T_J, T_{STG} | -65 to +150 | °C |

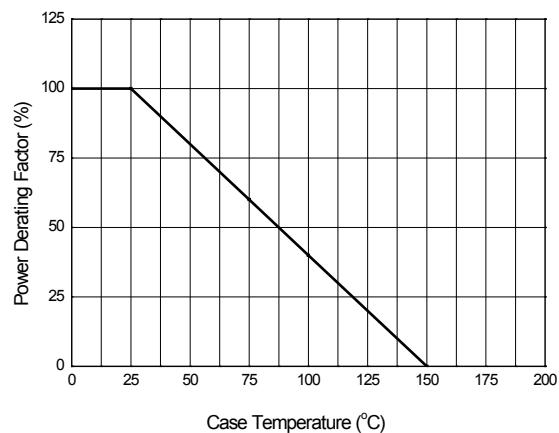
ESD Ratings (Note 5)

| Characteristic | Symbol | Value | Unit | JEDEC Class |
|--|---------|-------|------|-------------|
| Electrostatic Discharge - Human Body Model | ESD HBM | 8,000 | V | 3B |
| Electrostatic Discharge - Machine Model | ESD MM | 400 | V | C |

Note: 5. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Safe Operating Areas and Derating Information (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)


Safe Operating Area

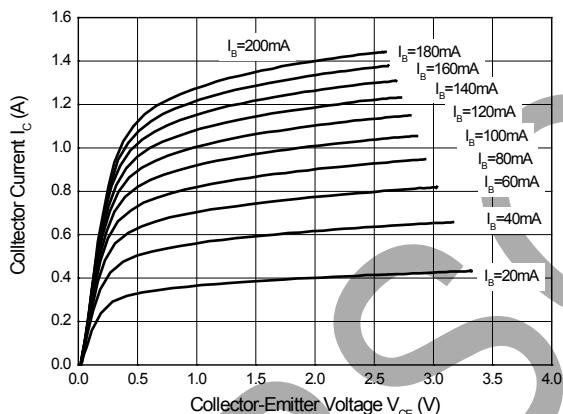


Power Derating Curve

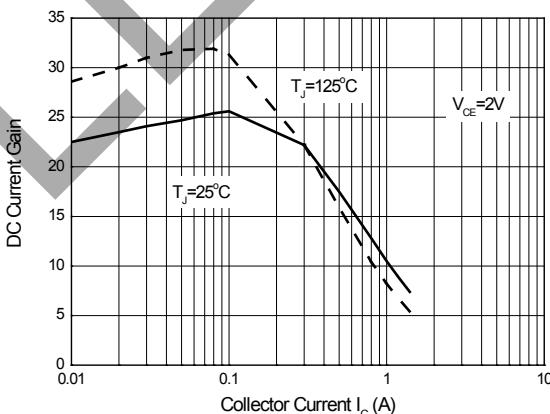
Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|-----------------------------|-----------|-----|------------|---------------|--|
| Collector-Emitter Breakdown Voltage | BV_{CES} | 700 | — | — | V | $I_C = 100\mu\text{A}, V_{BE} = 0\text{V}$ |
| Collector-Emitter Breakdown Voltage | BV_{CEO} | 450 | — | — | V | $I_C = 100\mu\text{A}$ |
| Emitter-Base Breakdown Voltage | BV_{EBO} | 9 | — | — | V | $I_E = 100\mu\text{A}$ |
| Collector Cutoff Current | I_{CEV} | — | — | 10 | μA | $V_{CE} = 700\text{V}, V_{BE} = -1.5\text{V}$ |
| DC Current Transfer Static Ratio (Note 6) | h_{FE} | 16 5.0 | — | 30 25 | — | $I_C = 0.5\text{A}, V_{CE} = 2\text{V}$ $I_C = 1.0\text{A}, V_{CE} = 2\text{V}$ |
| Collector-Emitter Saturation Voltage (Note 6) | $V_{\text{CE}(\text{sat})}$ | — | — | 0.3 0.4 | V | $I_C = 0.5\text{A}, I_B = 0.1\text{A}$ $I_C = 1\text{A}, I_B = 0.25\text{A}$ |
| Base-Emitter Saturation Voltage (Note 6) | $V_{\text{BE}(\text{sat})}$ | — | — | 1.0 1.2 | V | $I_C = 0.5\text{A}, I_B = 0.1\text{A}$ $I_C = 1\text{A}, I_B = 0.25\text{A}$ |
| Output Capacitance | C_{obo} | — | 18 | — | pF | $V_{CB} = 10\text{V}, f = 0.1\text{MHz}$ |
| Transition Frequency | f_T | 4 | — | — | MHz | $I_C = 0.1\text{A}, V_{CE} = 10\text{V}$ |
| Turn-on Time with Resistive Load | t_{on} | — | — | 0.7 | — | |
| Storage Time with Resistive Load | t_s | — | — | 3.0 | μs | $I_C = 1\text{A}, V_{CC} = 125\text{V}, I_{B1} = 0.2\text{A}, I_{B2} = -0.2\text{A}$ |
| Fall Time with Resistive Load | t_f | — | — | 0.35 | — | |

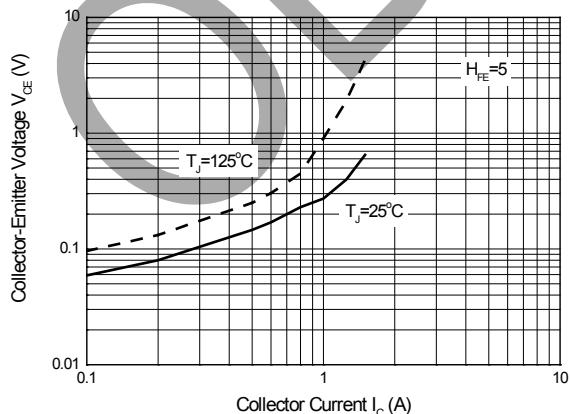
Note: 6. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

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


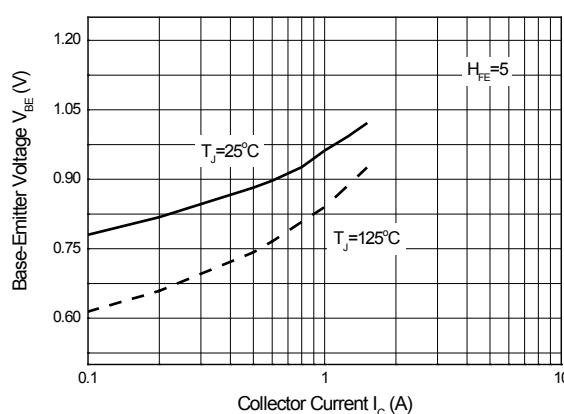
Static Characteristics



DC Current Gain



Collector-Emitter Saturation Region

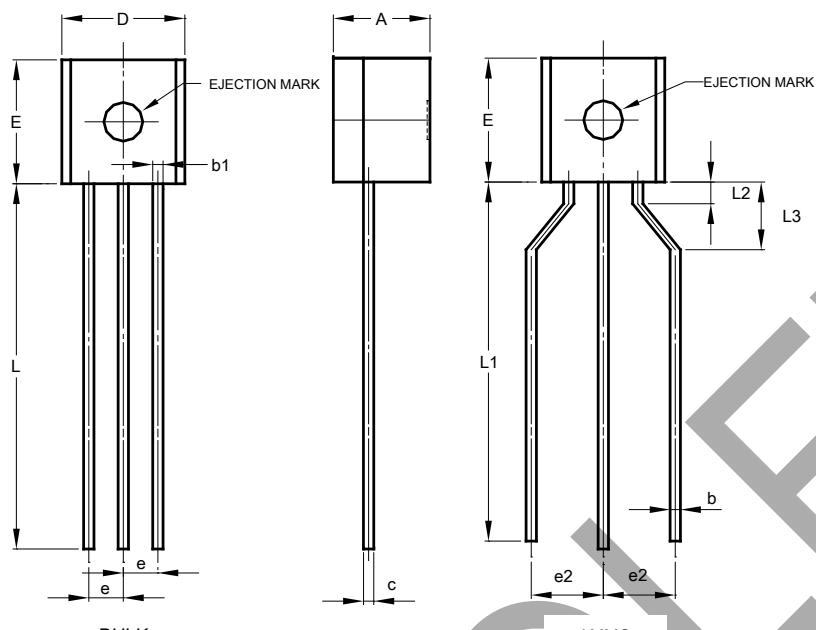


Base-Emitter Saturation Voltage

Package Outline Dimensions

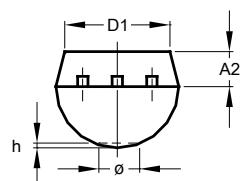
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

TO92 (Type C)



| TO92 (Type C) | | | |
|---------------|-------|-------|------|
| Dim | Min | Max | Typ |
| A | 3.30 | 3.70 | - |
| A2 | 1.10 | 1.40 | - |
| b | 0.38 | 0.55 | - |
| c | 0.36 | 0.51 | - |
| D | 4.40 | 4.70 | - |
| D1 | 3.430 | - | - |
| E | 4.30 | 4.70 | - |
| e | - | - | 1.27 |
| e2 | 2.440 | 2.640 | - |
| h | 0.00 | 0.38 | - |
| L | 14.10 | 14.50 | - |
| L1 | 12.50 | 14.50 | - |
| L3 | 2.50 | 3.50 | - |
| Ø | - | 1.60 | - |

All Dimensions in mm



Note: For high voltage applications, the appropriate industry sector guidelines should be considered with regards to voltage spacing between terminals.

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