

## Features

- $BV_{CEO} > -120V$
- Darlington Transistor  $h_{FE} > 3k @ -1A$
- Low Saturation Voltage  $< -1.3V @ -1A$
- $I_C = -1A$  Continuous Collector Current
- Specification is also available in Eline and SOT223 package outlines
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

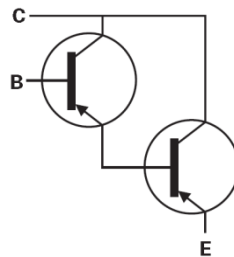
- Case: SOT89
- Case Material: Molded Plastic, "Green" Molding Compound, UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 <sup>Ⓔ3</sup>
- Weight 0.052 grams (Approximate)

## Applications

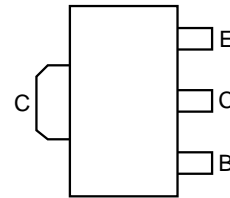
- Various Driving Functions
  - Lamps
  - Motors
  - Relays and Solenoids
- High Output Current Switches



Top View



Device Symbol



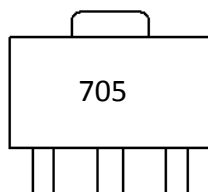
Top View Pin-Out

## Ordering Information (Note 4)

| Part Number | Compliance | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-------------|------------|---------|--------------------|-----------------|-------------------|
| FCX705TA    | AEC-Q101   | 705     | 7                  | 8               | 1,000             |

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
  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



705 = Product Type Marking Code

**Absolute Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic               | Symbol           | Value | Unit |
|------------------------------|------------------|-------|------|
| Collector-Base Voltage       | V <sub>CBO</sub> | -140  | V    |
| Collector-Emitter Voltage    | V <sub>CEO</sub> | -120  | V    |
| Emitter-Base Voltage         | V <sub>EBO</sub> | -10   | V    |
| Continuous Collector Current | I <sub>C</sub>   | -1    | A    |
| Peak Pulse Current           | I <sub>CM</sub>  | -4    | A    |

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

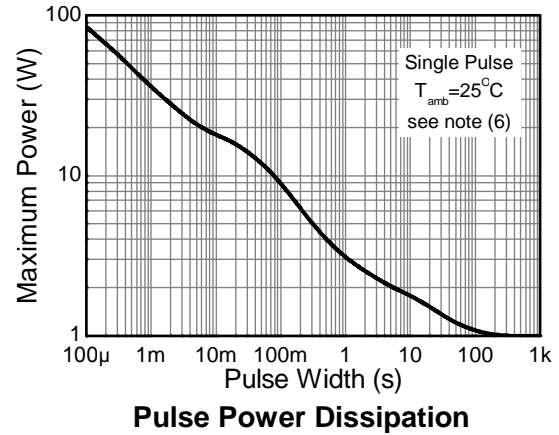
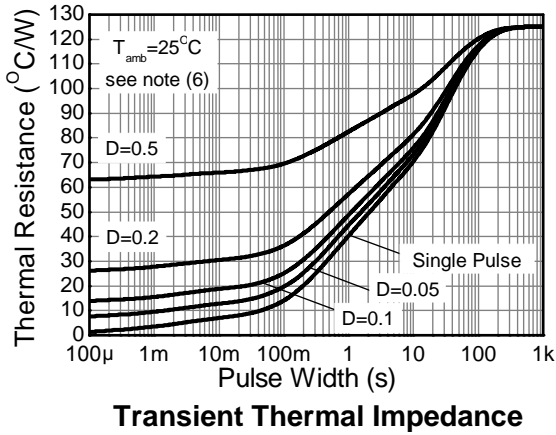
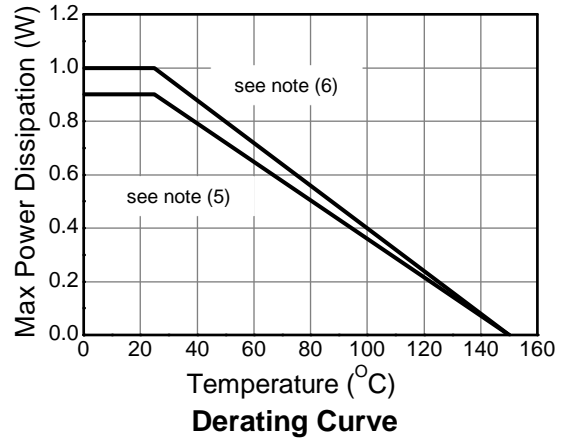
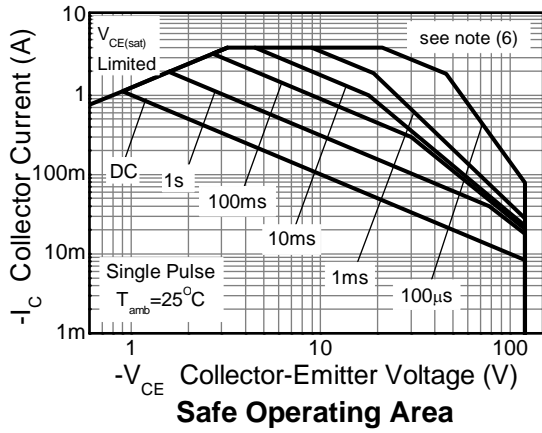
| Characteristic                          | Symbol                            | Value           | Unit |
|---|-----------------------------------|-----------------|------|
| Power Dissipation                       | P <sub>D</sub>                    | (Note 5)<br>0.9 | W    |
|   |                                   | (Note 6)<br>1   |      |
| Thermal Resistance, Junction to Ambient | R <sub>θJA</sub>                  | (Note 5)<br>139 | °C/W |
|   |                                   | (Note 6)<br>125 |      |
| Thermal Resistance, Junction to Leads   | R <sub>θJL</sub>                  | 5.2             | °C/W |
| Operating and Storage Temperature Range | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150     | °C   |

**ESD Ratings** (Note 8)

| Characteristic                             | Symbol  | Value | Unit | JEDEC Class |
|--|---------|-------|------|-------------|
| Electrostatic Discharge - Human Body Model | ESD HBM | 2,000 | V    | 2           |
| Electrostatic Discharge - Machine Model    | ESD MM  | 200   | V    | B           |

- Notes:
5. For a device mounted with the exposed collector pad on 15mm x 15mm 1oz copper that is on a single-sided 1.6mm FR-4 PCB; device is measured under still air conditions whilst operating in a steady-state.
  6. Same as Note 5, except the device is mounted on 25mm x 25mm 1oz copper.
  7. Thermal resistance from junction to solder-point (at the end of the leads).
  8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

**Thermal Characteristics and Derating Information**

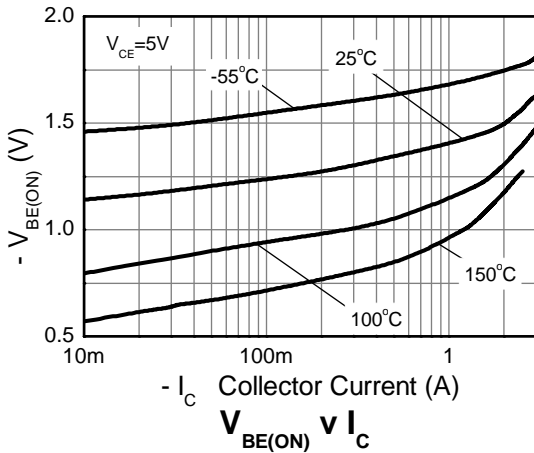
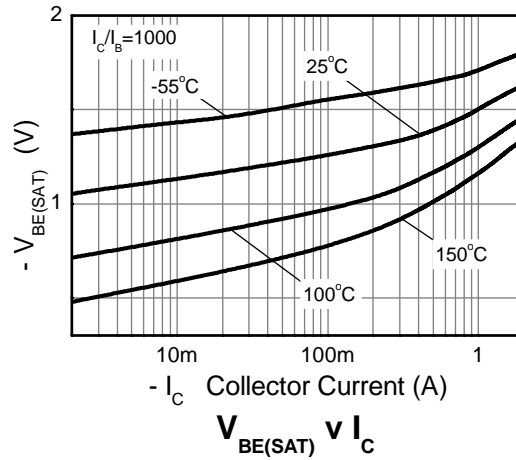
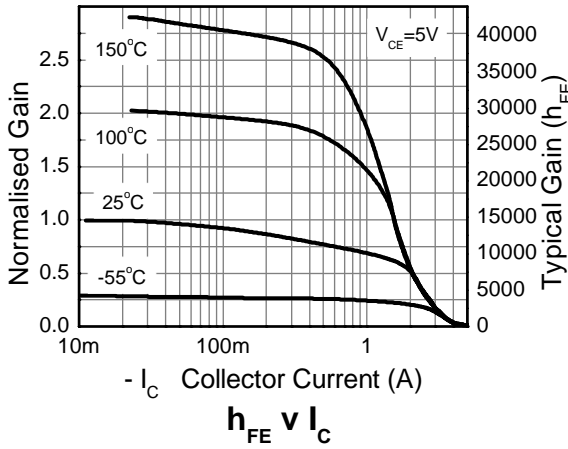
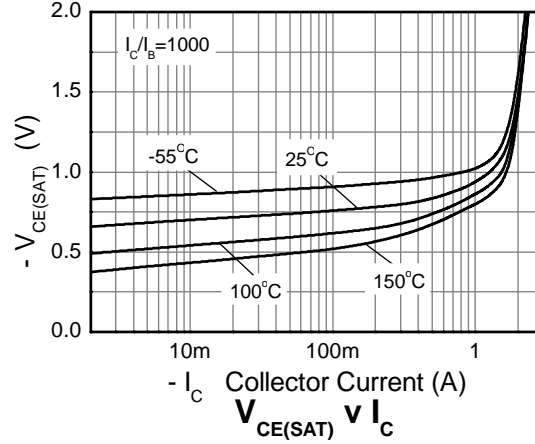
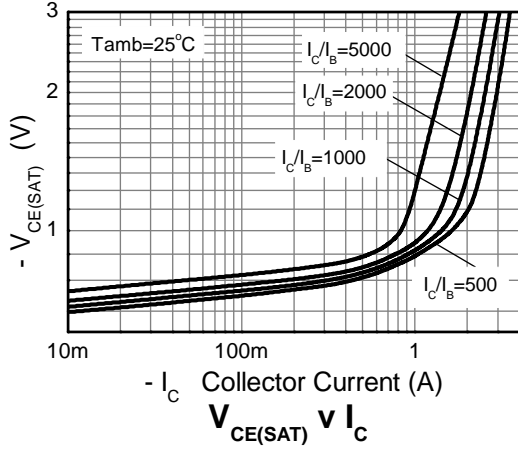


**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic                               | Symbol        | Min                  | Typ              | Max                | Unit                | Test Condition  |
|--|---------------|----------------------|------------------|--------------------|---------------------|---|
| <b>OFF CHARACTERISTICS</b>                   |               |                      |                  |                    |                     |   |
| Collector-Base Breakdown Voltage             | $BV_{CBO}$    | -140                 | —                | —                  | V                   | $I_C = -100\mu\text{A}$   |
| Collector-Emitter Breakdown Voltage (Note 9) | $BV_{CEO}$    | -120                 | —                | —                  | V                   | $I_{CEO} = -10\text{mA}$  |
| Emitter-Base Breakdown Voltage               | $BV_{EBO}$    | -10                  | —                | —                  | V                   | $I_{EBO} = -100\mu\text{A}$   |
| Collector Cut-off Current                    | $I_{CBO}$     | —                    | —                | -100<br>-10        | nA<br>$\mu\text{A}$ | $V_{CB} = -120\text{V}$<br>$V_{CB} = -120\text{V}, T_A = +150^\circ\text{C}$  |
| Emitter-base Cut-off Current                 | $I_{EBO}$     | —                    | —                | -100               | nA                  | $V_{EB} = -8\text{V}$   |
| <b>ON CHARACTERISTICS (Note 9)</b>           |               |                      |                  |                    |                     |   |
| Static Forward Current Transfer Ratio        | $h_{FE}$      | 3k<br>3k<br>3k<br>2k | —<br>—<br>—<br>— | —<br>—<br>30k<br>— | —                   | $I_C = -10\text{mA}, V_{CE} = -5\text{V}$<br>$I_C = -100\text{mA}, V_{CE} = -5\text{V}$<br>$I_C = -1\text{A}, V_{CE} = -5\text{V}$<br>$I_C = -2\text{A}, V_{CE} = -5\text{V}$ |
| Collector-Emitter Saturation Voltage         | $V_{CE(SAT)}$ | —                    | —                | -1.3<br>-2.5       | V                   | $I_C = -1\text{A}, I_B = -1\text{mA}$<br>$I_C = -2\text{A}, I_B = -2\text{mA}$  |
| Base-Emitter Saturation Voltage              | $V_{BE(SAT)}$ | —                    | —                | -1.8               | V                   | $I_C = -1\text{A}, I_B = -1\text{mA}$   |
| Base-Emitter Turn-On Voltage                 | $V_{BE(ON)}$  | —                    | —                | -1.7               | V                   | $I_C = -1\text{A}, V_{CE} = -5\text{V}$   |
| <b>SMALL SIGNAL CHARACTERISTICS (Note 9)</b> |               |                      |                  |                    |                     |   |
| Transition Frequency                         | $f_T$         | —                    | 160              | —                  | MHz                 | $I_C = -100\text{mA}, V_{CE} = -10\text{V}$<br>$f = 20\text{MHz}$   |
| Input Capacitance                            | $C_{ibo}$     | —                    | 90               | —                  | pF                  | $V_{CB} = -500\text{mV}, f = 1\text{MHz}$   |
| Output Capacitance                           | $C_{obo}$     | —                    | 15               | —                  | pF                  | $V_{CB} = -10\text{V}, f = 1\text{MHz}$   |
| Turn-On Time                                 | $t_{ON}$      | —                    | 0.6              | —                  | $\mu\text{s}$       | $I_C = -500\text{mA}, V_{CE} = -10\text{V}$<br>$I_{B1} = -I_{B2} = 0.5\text{mA}$  |
| Turn-Off Time                                | $t_{OFF}$     | —                    | 0.8              | —                  | $\mu\text{s}$       | $I_C = -500\text{mA}, V_{CE} = -10\text{V}$<br>$I_{B1} = -I_{B2} = 0.5\text{mA}$  |

Note: 9. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

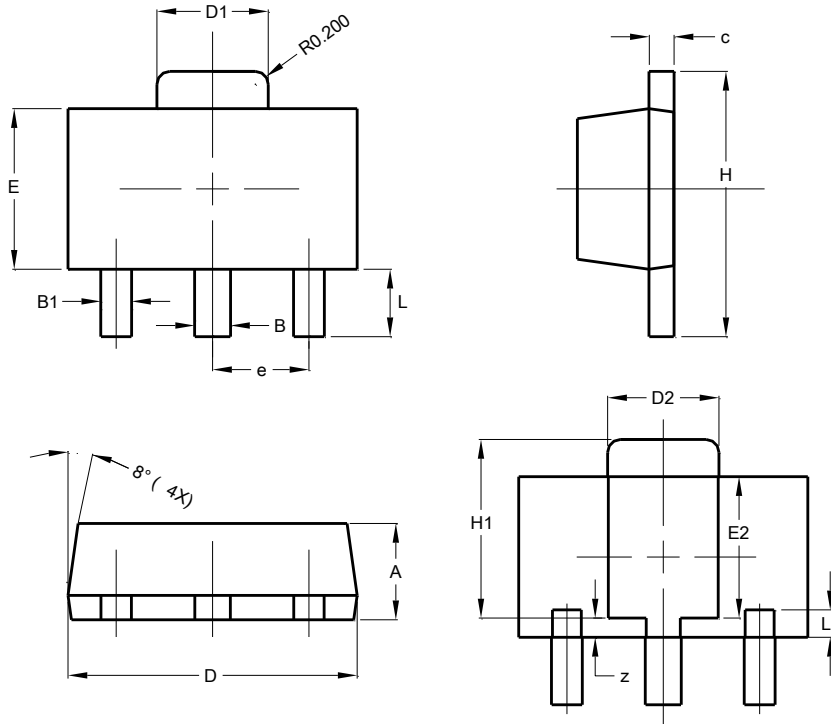
**Typical Electrical Characteristics**



**Package Outline Dimensions**

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

**SOT89**

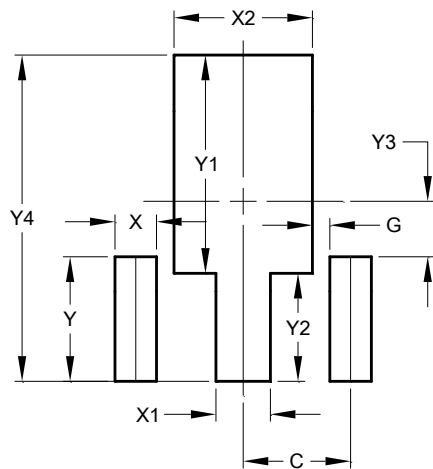


| SOT89                |       |       |       |
|----------------------|-------|-------|-------|
| Dim                  | Min   | Max   | Typ   |
| A                    | 1.40  | 1.60  | 1.50  |
| B                    | 0.50  | 0.62  | 0.56  |
| B1                   | 0.42  | 0.54  | 0.48  |
| c                    | 0.35  | 0.43  | 0.38  |
| D                    | 4.40  | 4.60  | 4.50  |
| D1                   | 1.62  | 1.83  | 1.71  |
| D2                   | 1.61  | 1.81  | 1.71  |
| E                    | 2.40  | 2.60  | 2.50  |
| E2                   | 2.05  | 2.35  | 2.20  |
| e                    | -     | -     | 1.50  |
| H                    | 3.95  | 4.25  | 4.10  |
| H1                   | 2.63  | 2.93  | 2.78  |
| L                    | 0.90  | 1.20  | 1.05  |
| L1                   | 0.327 | 0.527 | 0.427 |
| z                    | 0.20  | 0.40  | 0.30  |
| All Dimensions in mm |       |       |       |

**Suggested Pad Layout**

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

**SOT89**



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 1.500         |
| G          | 0.244         |
| X          | 0.580         |
| X1         | 0.760         |
| X2         | 1.933         |
| Y          | 1.730         |
| Y1         | 3.030         |
| Y2         | 1.500         |
| Y3         | 0.770         |
| Y4         | 4.530         |

Note: For high voltage applications, the appropriate industry sector guidelines should be considered with regards to creepage and clearance distances between device Terminals and PCB tracking.

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