

40V NPN SILICON PLANAR MEDIUM POWER TRANSISTOR IN SOT89

Features

- $BV_{CEO} > 40V$
- $I_C = 1A$ high Continuous Current
- Low saturation voltage $V_{CE(sat)} < 500mV @ 1A$
- Complementary PNP type: FCX591A
- **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

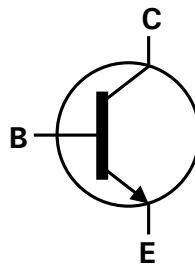
- Case: SOT89
- Case material: molded plastic. "Green" molding compound.
- UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208
- Weight: 0.05 grams (Approximate)

Applications

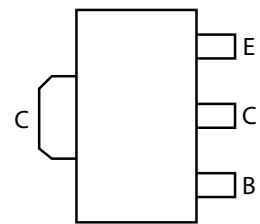
- Power MOSFET gate driving
- Low loss power switching



Top View



Device Symbol



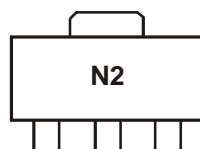
Top View
Pin Out

Ordering Information (Notes 4 & 5)

| Product | Compliance | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|------------|------------|---------|--------------------|-----------------|-------------------|
| FCX491ATA | AEC-Q101 | N2 | 7 | 12 | 1,000 |
| FCX491AQTA | Automotive | N2 | 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> 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-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified.
 5. For packaging details, go to our website at <http://www.diodes.com>.

Marking Information



N2 = Product Type Marking Code

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

| Characteristic | Symbol | Value | Unit |
|------------------------------|-----------|-------|------|
| Collector-Base Voltage | V_{CB0} | 40 | V |
| Collector-Emitter Voltage | V_{CEO} | 40 | V |
| Emitter-Base Voltage | V_{EBO} | 7 | V |
| Continuous Collector Current | I_C | 1 | A |
| Peak Pulse Current | I_{CM} | 2 | A |

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

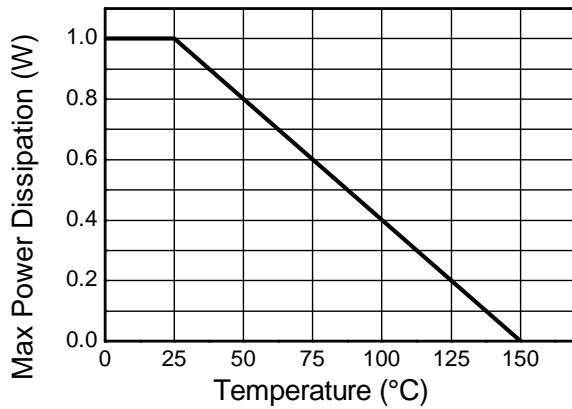
| Characteristic | Symbol | Value | Unit |
|------------------------------------------------------|-----------------|-------------|--------------------|
| Power Dissipation (Note 6) | P_D | 1 | W |
| Thermal Resistance, Junction to Ambient Air (Note 6) | $R_{\theta JA}$ | 125 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Leads (Note 7) | $R_{\theta JL}$ | 10.01 | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range | T_J, T_{STG} | -65 to +150 | $^\circ\text{C}$ |

ESD Ratings (Note 8)

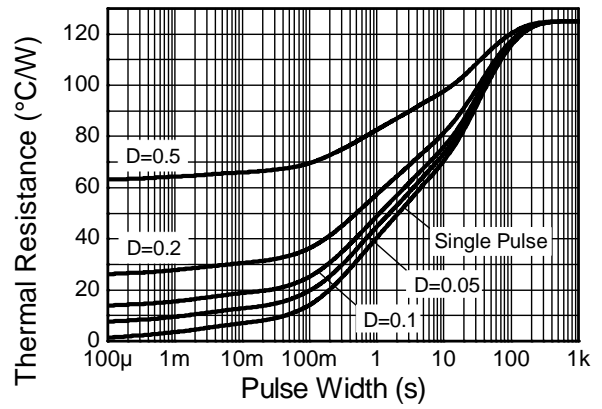
| Characteristic | Symbol | Value | Unit | JEDEC Class |
|--------------------------------------------|---------|------------|------|-------------|
| Electrostatic Discharge - Human Body Model | ESD HBM | 4,000 | V | 3A |
| Electrostatic Discharge - Machine Model | ESD MM | ≥ 400 | V | C |

- Notes:
6. For a device surface mounted on 15mm X 15mm FR4 PCB with high coverage of single sided 1 oz copper, in still air conditions; device measured when operating in steady state condition.
 7. Thermal resistance from junction to solder-point (on the exposed collector pad).
 8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

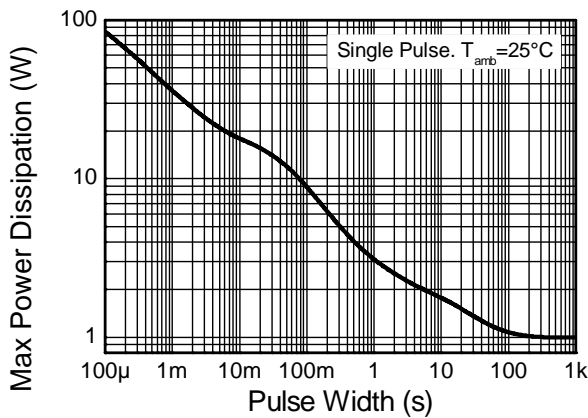
Thermal Characteristics and Derating Information



Derating Curve



Transient Thermal Impedance



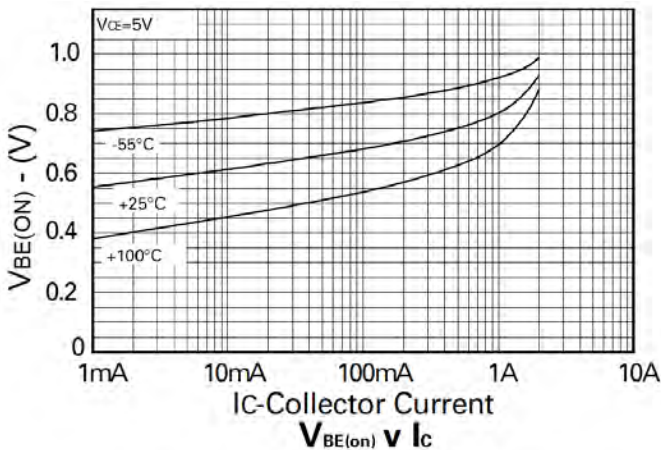
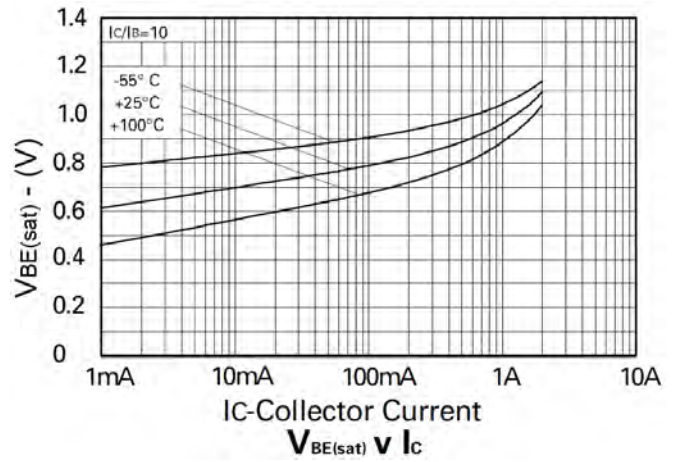
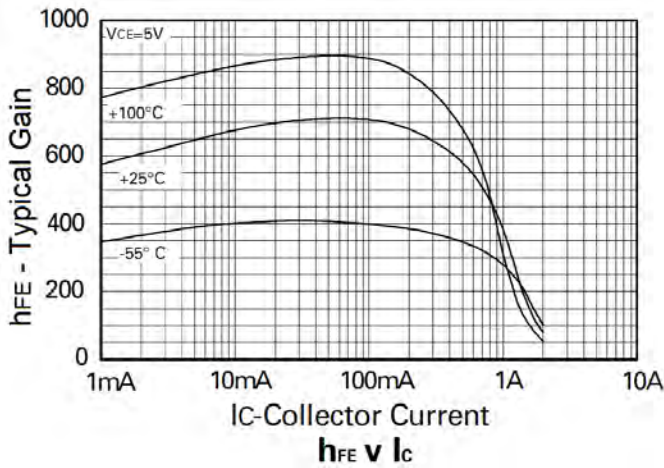
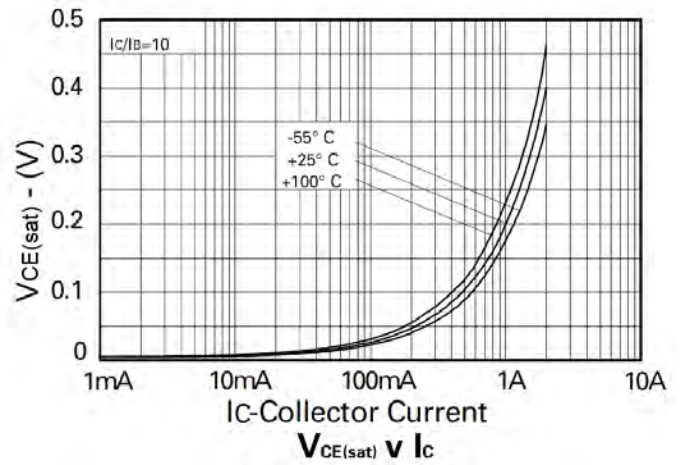
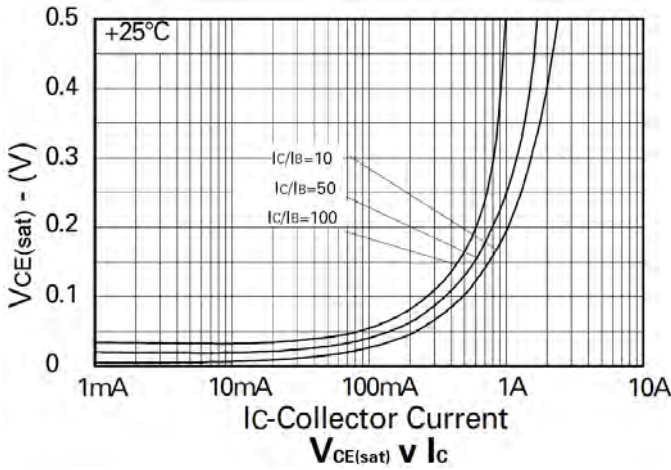
Pulse Power Dissipation

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|-----------------------------------------------|---------------|-----|-----|-----|------|-----------------------------------------------------------------|
| Collector-Base Breakdown Voltage | BV_{CBO} | 40 | - | - | V | $I_C = 100\mu\text{A}$ |
| Collector-Emitter Breakdown Voltage (Note 9) | BV_{CEO} | 40 | - | - | V | $I_C = 10\text{mA}$ |
| Emitter-Base Breakdown Voltage | BV_{EBO} | 7 | - | - | V | $I_E = 100\mu\text{A}$ |
| Collector Cutoff Current | I_{CBO} | - | - | 100 | nA | $V_{CB} = 30\text{V}$ |
| Emitter Cutoff Current | I_{EBO} | - | - | 100 | nA | $V_{EB} = 4\text{V}$ |
| Emitter Cutoff Current | I_{CES} | - | - | 100 | nA | $V_{CE} = 30\text{V}$ |
| DC current transfer Static ratio (Note 9) | h_{FE} | 300 | - | - | - | $I_C = 1\text{mA}, V_{CE} = 5\text{V}$ |
| | | 300 | - | 900 | | $I_C = 500\text{mA}, V_{CE} = 5\text{V}$ |
| | | 200 | - | - | | $I_C = 1\text{A}, V_{CE} = 5\text{V}$ |
| | | 35 | - | - | | $I_C = 2\text{A}, V_{CE} = 5\text{V}$ |
| Collector-Emitter Saturation Voltage (Note 9) | $V_{CE(sat)}$ | - | - | 0.3 | V | $I_C = 500\text{mA}, I_B = 50\text{mA}$ |
| | | - | - | 0.5 | | $I_C = 1\text{A}, I_B = 100\text{mA}$ |
| Base-Emitter Saturation Voltage (Note 9) | $V_{BE(sat)}$ | - | - | 1.1 | V | $I_C = 1\text{A}, I_B = 100\text{mA}$ |
| Base-Emitter Turn-on Voltage (Note 9) | $V_{BE(on)}$ | - | - | 1.0 | V | $I_C = 1\text{A}, V_{CE} = 5\text{V}$ |
| Transitional Frequency | f_T | 150 | - | - | MHz | $I_C = 50\text{mA}, V_{CE} = 10\text{V}$ $f = 100\text{MHz}$ |
| Output capacitance | C_{obo} | - | - | 10 | pF | $V_{CB} = 10\text{V}, f = 1\text{MHz}$, |

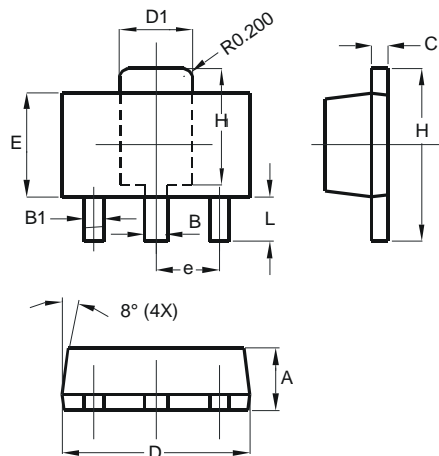
Note: 9. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

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



Package Outline Dimensions

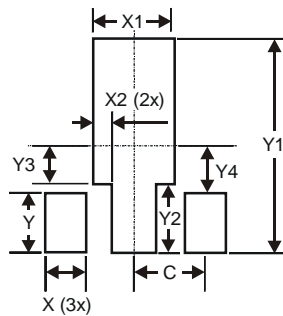
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| 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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