

**SOT89 NPN SILICON PLANAR  
MEDIUM POWER HIGH VOLTAGE TRANSISTOR**

**FCX658A**

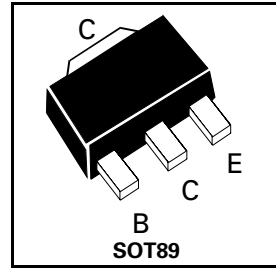
ISSUE 1 – NOVEMBER 2000

**FEATURES**

- \* 400 Volt  $V_{CE0}$
- \* 0.5 Amp continuous current
- \*  $P_{tot}=1$  Watt
- \* Optimised  $h_{fe}$  characterised upto 200mA

**APPLICATIONS**

- \* Telephone dialler circuits
- \* Hook switches for modems
- \* Predrivers within HID lamp ballasts
- \* (SLIC) Subscriber Line Interface Cards



Partmarking Detail - 65A

**ABSOLUTE MAXIMUM RATINGS.**

| PARAMETER  | SYMBOL        | VALUE       | UNIT                 |
|--|---------------|-------------|----------------------|
| Collector-Base Voltage   | $V_{CBO}$     | 400         | V                    |
| Collector-Emitter Voltage  | $V_{CEO}$     | 400         | V                    |
| Emitter-Base Voltage   | $V_{EBO}$     | 5           | V                    |
| Peak Pulse Current   | $I_{CM}$      | 1           | A                    |
| Continuous Collector Current   | $I_C$         | 500         | mA                   |
| Power Dissipation at $T_{amb}=25^{\circ}C$<br>derate above $25^{\circ}C$ | $P_{tot}$     | 1<br>5.7    | W<br>mW/ $^{\circ}C$ |
| Operating and Storage Temperature Range                                  | $T_j:T_{stg}$ | -55 to +150 | $^{\circ}C$          |

# FCX658A

## ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated).

| PARAMETER                             | SYMBOL                | MIN.                  | TYP.                    | MAX.                  | UNIT        | CONDITIONS.   |
|---------------------------------------|-----------------------|-----------------------|-------------------------|-----------------------|-------------|---|
| Collector-Base Breakdown Voltage      | $V_{(BR)CBO}$         | 400                   | 480                     |                       | V           | $I_C = 100\mu\text{A}$  |
| Collector-Emitter Breakdown Voltage   | $V_{(BR)CEO}$         | 400                   | 465                     |                       | V           | $I_C = 10\text{mA}^*$   |
| Emitter-Base Breakdown Voltage        | $V_{(BR)EBO}$         | 5                     | 7.8                     |                       | V           | $I_E = 100\mu\text{A}$  |
| Collector Cut-Off Current             | $I_{CBO}$             |                       |                         | 100                   | nA          | $V_{CB} = 320\text{V}$  |
| Collector Cut-Off Current             | $I_{CES}$             |                       |                         | 100                   | nA          | $V_{CE} = 320\text{V}$  |
| Emitter Cut-Off Current               | $I_{EBO}$             |                       |                         | 100                   | nA          | $V_{EB} = 4\text{V}$  |
| Collector-Emitter Saturation Voltage  | $V_{CE(sat)}$         |                       |                         | 0.165<br>0.125<br>0.2 | V<br>V<br>V | $I_C = 20\text{mA}, I_B = 1\text{mA}$<br>$I_C = 50\text{mA}, I_B = 5\text{mA}^*$<br>$I_C = 100\text{mA}, I_B = 10\text{mA}^*$   |
| Base-Emitter Saturation Voltage       | $V_{BE(sat)}$         |                       | 0.75                    | 0.85                  | V           | $I_C = 100\text{mA}, I_B = 10\text{mA}^*$   |
| Base-Emitter Turn On Voltage          | $V_{BE(on)}$          |                       | 0.70                    | 0.85                  | V           | $I_C = 100\text{mA}, V_{CE} = 5\text{V}^*$  |
| Static Forward Current Transfer Ratio | $h_{FE}$              | 85<br>100<br>55<br>35 | 150<br>170<br>130<br>90 |                       |             | $I_C = 1\text{mA}, V_{CE} = 5\text{V}^*$<br>$I_C = 10\text{mA}, V_{CE} = 10\text{V}^*$<br>$I_C = 100\text{mA}, V_{CE} = 5\text{V}^*$<br>$I_C = 200\text{mA}, V_{CE} = 10\text{V}^*$ |
| Transition Frequency                  | $f_T$                 | 50                    |                         |                       | MHz         | $I_C = 20\text{mA}, V_{CE} = 20\text{V}$<br>$f = 20\text{MHz}$  |
| Output Capacitance                    | $C_{obo}$             |                       |                         | 10                    | pF          | $V_{CB} = 20\text{V}, f = 1\text{MHz}$  |
| Switching times                       | $t_{on}$<br>$t_{off}$ |                       | 130<br>3300             |                       | ns<br>ns    | $I_C = 100\text{mA}, V_{CE} = 100\text{V}$<br>$I_{B1} = 10\text{mA}, I_{B2} = -20\text{mA}$   |

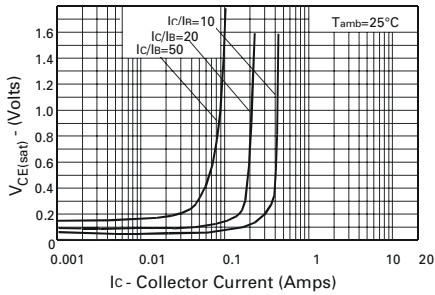
\* Measured under pulsed conditions. Pulse width=300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$

### NB

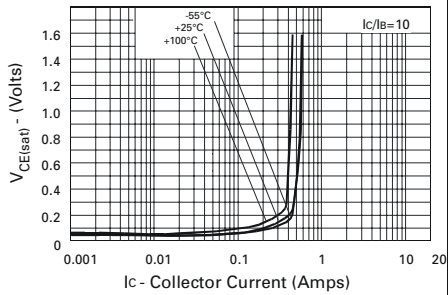
For high voltage applications the appropriate industry sector PCB guidelines should be considered with regard to voltage spacing between conductors.

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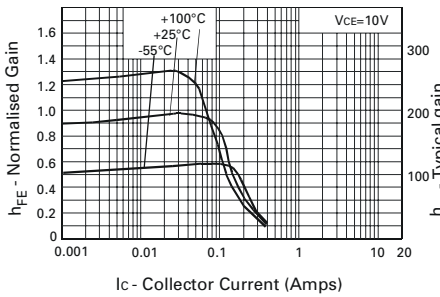
## TYPICAL CHARACTERISTICS



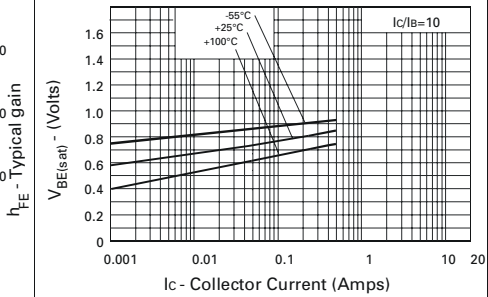
**$V_{CE(sat)}$  v  $I_C$**



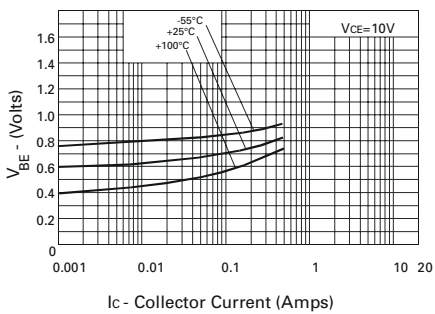
**$V_{CE(sat)}$  v  $I_C$**



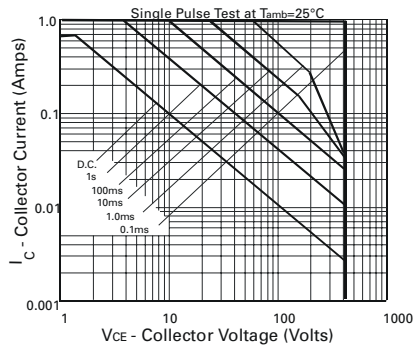
**$h_{FE}$  v  $I_C$**



**$V_{BE(sat)}$  v  $I_C$**



**$V_{BE(on)}$  v  $I_C$**

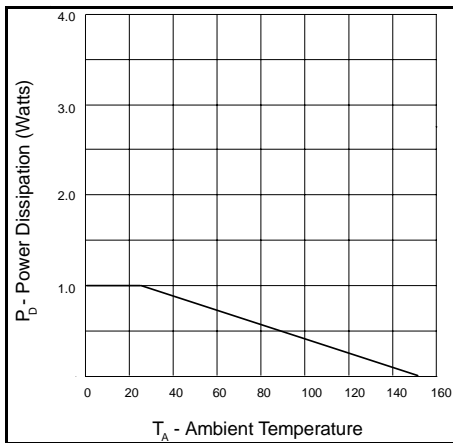


**Safe Operating Area**

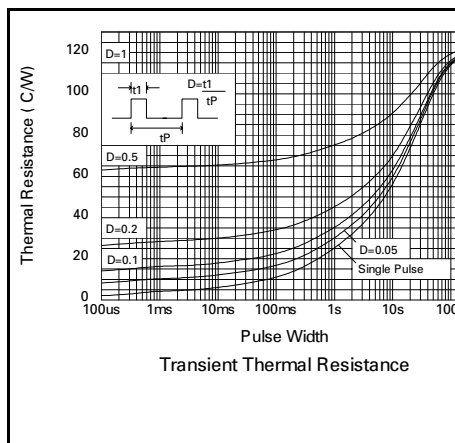
# FCX658

## THERMAL CHARACTERISTICS

| PARAMETER  | SYMBOL                               | MAX.      | UNIT         |
|--|--------------------------------------|-----------|--------------|
| Thermal Resistance: Junction to Ambient <sub>1</sub><br>Junction to Case | $R_{th(j-amb)1}$<br>$R_{th(j-case)}$ | 125<br>10 | °C/W<br>°C/W |



SOT89 (1W) Derating



Transient thermal resistance for a Zetex 1W SOT89 device mounted on a 15 mm x 15 mm ceramic substrate



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