

# FCX1053A

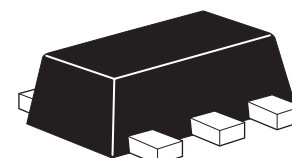
## SOT89 NPN medium power transistor

### Summary

$BV_{CEO} = 75V$

$R_{CE(sat)} = 78m\Omega$

$I_C = 3A$

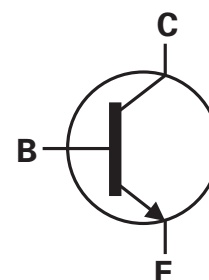


### Description

This medium power NPN transistor, offered in the SOT89 package provides high current and low saturation voltage making it ideal for use in various driving and power management applications.

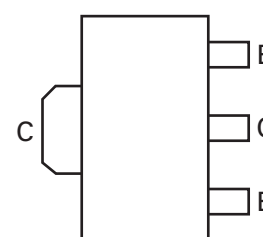
### Features

- Extremely low equivalent on-resistance;  $R_{CE(sat)} = 7.8m\Omega$  at 4.5A
- 3 Amps continuous current
- Up to 10 amps peak current
- Very low saturation voltages
- Excellent  $h_{FE}$  characteristics up to 10 amps



### Applications

- Emergency lighting circuits
- Motor driving (including DC fans)
- Solenoid, relay and actuator drivers
- DC-DC modules
- Backlight inverters
- Power switches
- MOSFET gate drivers



Pinout - top view

### Ordering information

| Device     | Reel size (inches) | Tape width (mm) | Quantity per reel |
|------------|--------------------|-----------------|-------------------|
| FCX1053ATA | 7                  | 12              | 1,000             |

### Device marking

053

**Absolute maximum ratings**

| Parameter                                                 | Symbol         | Value       | Unit                   |
|-----------------------------------------------------------|----------------|-------------|------------------------|
| Collector-base voltage                                    | $V_{CBO}$      | 150         | V                      |
| Collector-emitter voltage                                 | $V_{CEO}$      | 75          | V                      |
| Emitter-base voltage                                      | $V_{EBO}$      | 5           | V                      |
| Continuous collector current <sup>(a)</sup>               | $I_C$          | 3           | A                      |
| Peak pulse current                                        | $I_{CM}$       | 10          | A                      |
| Power dissipation at $T_{amb} = 25^{\circ}\text{C}^{(a)}$ | $P_D$          | 1.6         | W                      |
| Linear derating factor                                    |                | 13          | mW/ $^{\circ}\text{C}$ |
| Power dissipation at $T_{amb} = 25^{\circ}\text{C}^{(b)}$ | $P_D$          | 2.0         | W                      |
| Linear derating factor                                    |                | 16          | mW/ $^{\circ}\text{C}$ |
| Operating and storage temperature range                   | $T_j, T_{stg}$ | -55 to +150 | $^{\circ}\text{C}$     |

**Thermal resistance**

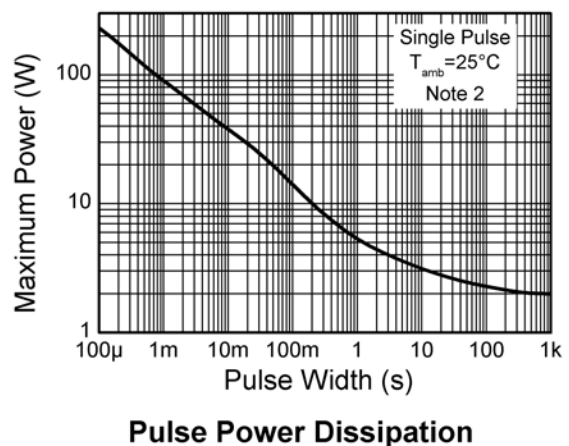
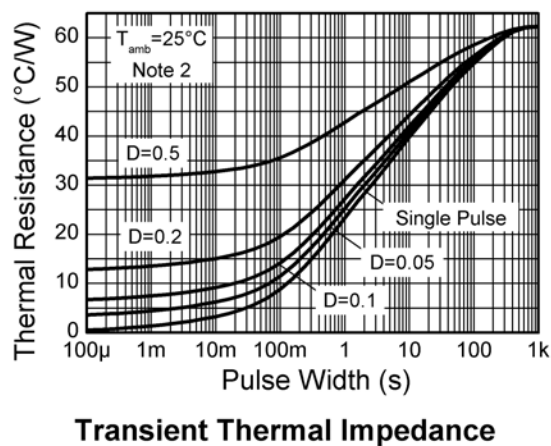
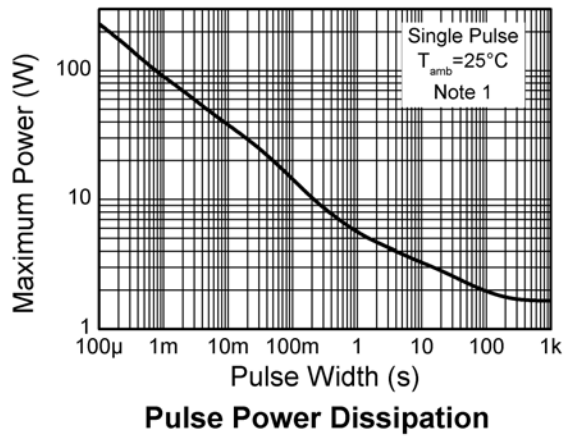
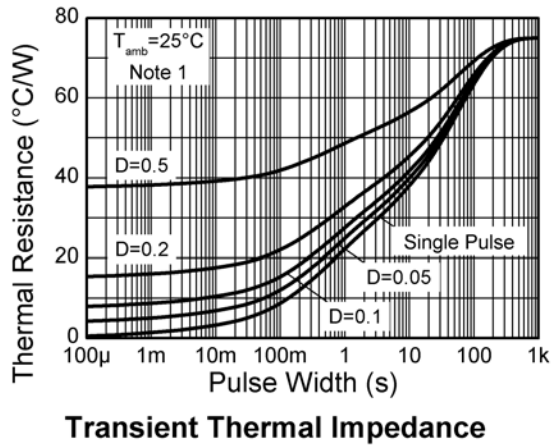
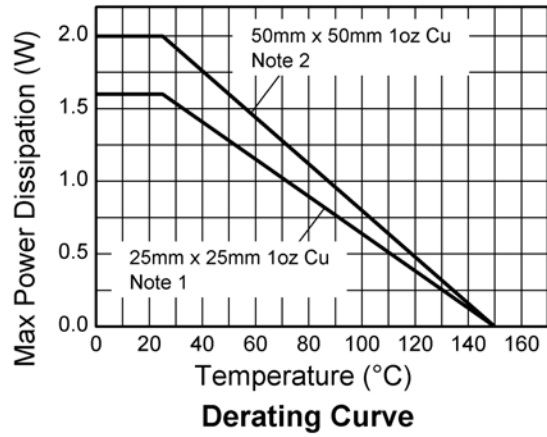
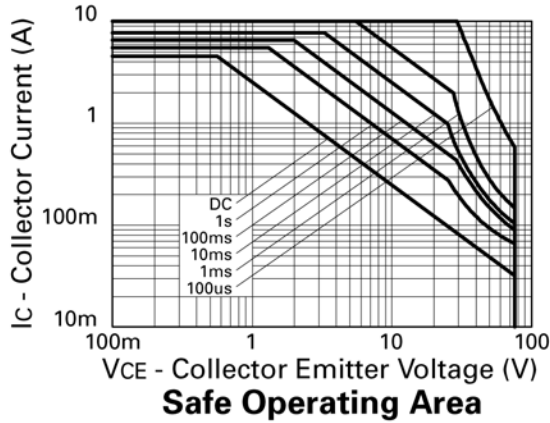
| Parameter                          | Symbol          | Value | Unit                        |
|------------------------------------|-----------------|-------|-----------------------------|
| Junction to ambient <sup>(a)</sup> | $R_{\theta JA}$ | 72    | $^{\circ}\text{C}/\text{W}$ |
| Junction to ambient <sup>(b)</sup> | $R_{\theta JA}$ | 62    | $^{\circ}\text{C}/\text{W}$ |

**NOTES:**

(a) For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.

(b) For a device surface mounted on 50mm x 50mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.

## Thermal characteristics



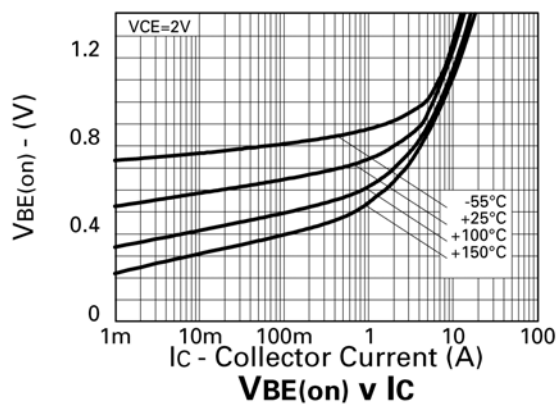
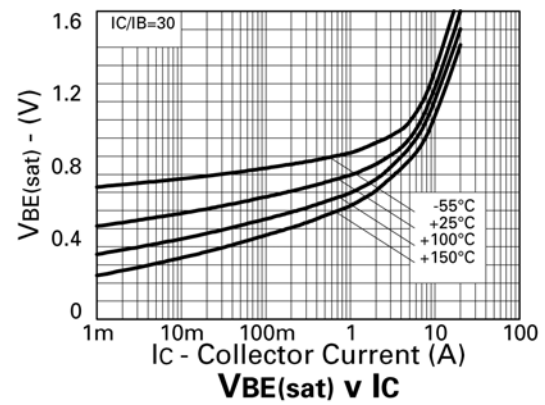
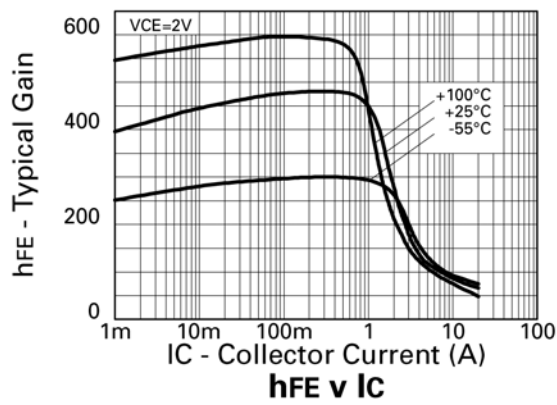
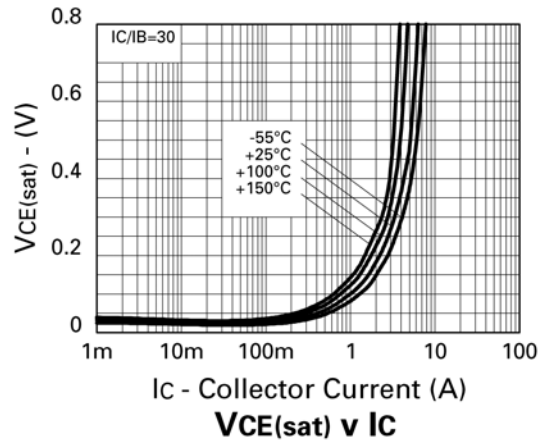
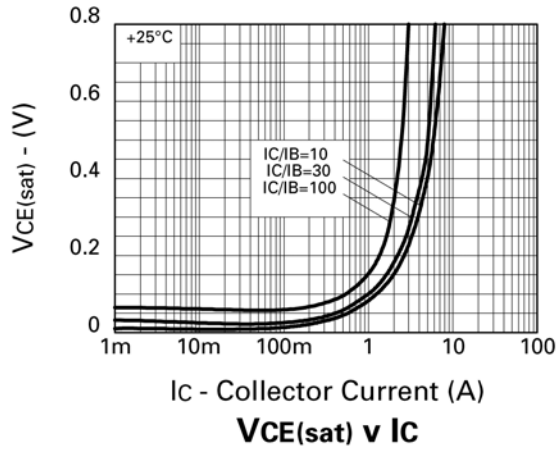
## Electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

| Parameter                             | Symbol        | Min. | Typ. | Max. | Unit | Conditions                                                                      |
|---------------------------------------|---------------|------|------|------|------|---------------------------------------------------------------------------------|
| Collector-base breakdown voltage      | $V_{(BR)CBO}$ | 150  | 250  |      | V    | $I_C = 100\mu\text{A}$                                                          |
| Collector-emitter breakdown voltage   | $V_{CES}$     | 150  | 250  |      | V    | $I_C = 100\mu\text{A}$                                                          |
| Collector-emitter breakdown voltage   | $V_{CEO}$     | 75   | 100  |      | V    | $I_C = 10\text{mA}$                                                             |
| Collector-emitter breakdown voltage   | $V_{CEV}$     | 150  | 250  |      | V    | $I_C = 100\mu\text{A}$ , $V_{EB} = 1\text{V}$                                   |
| Emitter-base breakdown voltage        | $V_{(BR)EBO}$ | 5    | 8.8  |      | V    | $I_E = 100\mu\text{A}$                                                          |
| Collector cut-off current             | $I_{CBO}$     |      | 0.9  | 10   | nA   | $V_{CB} = 120\text{V}$                                                          |
| Emitter cut-off current               | $I_{EBO}$     |      | 0.3  | 10   | nA   | $V_{EB} = 4\text{V}$                                                            |
| Collector-emitter cut-off current     | $I_{CES}$     |      | 1.5  | 10   | nA   | $V_{CES} = 120\text{V}$                                                         |
| Collector-emitter saturation voltage  | $V_{CE(sat)}$ |      | 21   | 30   | mV   | $I_C = 0.2\text{A}$ , $I_B = 20\text{mA}^{(*)}$                                 |
|                                       |               |      | 55   | 75   | mV   | $I_C = 0.5\text{A}$ , $I_B = 20\text{mA}^{(*)}$                                 |
|                                       |               |      | 150  | 200  | mV   | $I_C = 1\text{A}$ , $I_B = 10\text{mA}^{(*)}$                                   |
|                                       |               |      | 160  | 210  | mV   | $I_C = 2\text{A}$ , $I_B = 100\text{mA}^{(*)}$                                  |
|                                       |               |      | 350  | 440  | mV   | $I_C = 4.5\text{A}$ , $I_B = 200\text{mA}^{(*)}$                                |
| Base-emitter saturation voltage       | $V_{BE(sat)}$ |      | 900  | 1000 | mV   | $I_C = 3\text{A}$ , $I_B = 100\text{mA}^{(*)}$                                  |
| Base-emitter turn-on voltage          | $V_{BE(on)}$  |      | 825  | 950  | mV   | $I_C = 3\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$                                  |
| Static forward current transfer ratio | $h_{FE}$      | 270  | 440  | 1200 |      | $I_C = 10\text{mA}$ , $V_{CE} = 2\text{V}^{(*)}$                                |
|                                       |               | 300  | 450  |      |      | $I_C = 0.5\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$                                |
|                                       |               | 300  | 450  |      |      | $I_C = 1\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$                                  |
|                                       |               | 40   | 60   |      |      | $I_C = 4.5\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$                                |
|                                       |               |      | 20   |      |      | $I_C = 10\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$                                 |
| Switching times                       | $t_{on}$      |      | 162  |      | ns   | $I_C = 2\text{A}$ , $I_{B1} = I_{B2} = \pm 20\text{mA}$ , $V_{CC} = 50\text{V}$ |
|                                       | $t_{off}$     |      | 900  |      | ns   | $I_C = 2\text{A}$ , $I_{B1} = I_{B2} = \pm 20\text{mA}$ , $V_{CC} = 50\text{V}$ |
| Transition frequency                  | $f_T$         |      | 140  |      | MHz  | $I_C = 50\text{mA}$ , $V_{CE} = 10\text{V}$ , $f = 100\text{MHz}$               |
| Output capacitance                    | $C_{OBO}$     |      | 21   | 30   | pF   | $V_{CB} = 10\text{V}$ , $f = 1\text{MHz}$                                       |

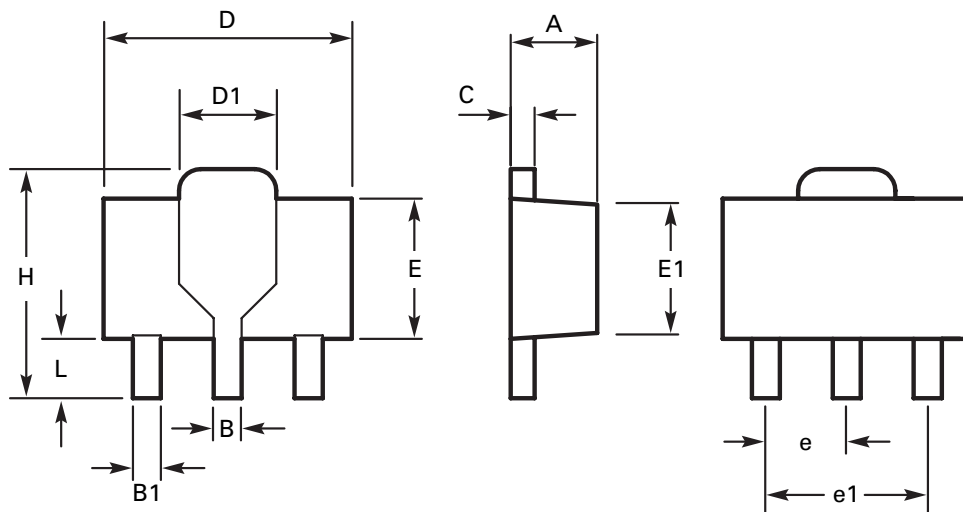
### NOTES:

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

## Typical characteristics



## Package outline - SOT89



| DIM | Millimeters |      | Inches |       | DIM | Millimeters |      | Inches    |       |
|-----|-------------|------|--------|-------|-----|-------------|------|-----------|-------|
|     | Min         | Max  | Min    | Max   |     | Min         | Max  | Min       | Max   |
| A   | 1.40        | 1.60 | 0.550  | 0.630 | E1  | 2.13        | 2.29 | 0.084     | 0.090 |
| B   | 0.44        | 0.56 | 0.017  | 0.022 | e   | 1.50 BSC    |      | 0.059 BSC |       |
| B1  | 0.36        | 0.48 | 0.014  | 0.019 | e1  | 3.00 BSC    |      | 0.118 BSC |       |
| C   | 0.35        | 0.44 | 0.014  | 0.019 | H   | 3.94        | 4.25 | 0.155     | 0.167 |
| D   | 4.40        | 4.60 | 0.173  | 0.181 | L   | 0.89        | 1.20 | 0.155     | 0.167 |
| E   | 2.29        | 2.60 | 0.090  | 0.102 |     | -           | -    | -         | -     |

**Note:** Controlling dimensions are in millimeters. Approximate dimensions are provided in inches

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| Zetex GmbH<br>Streitfeldstraße 19<br>D-81673 München<br>Germany                   | Zetex Inc<br>700 Veterans Memorial Highway<br>Hauppauge, NY 11788<br>USA    | Zetex (Asia Ltd)<br>3701-04 Metroplaza Tower 1<br>Hing Fong Road, Kwai Fong<br>Hong Kong | Zetex Semiconductors plc<br>Zetex Technology Park, Chadderton<br>Oldham, OL9 9LL<br>United Kingdom |
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