

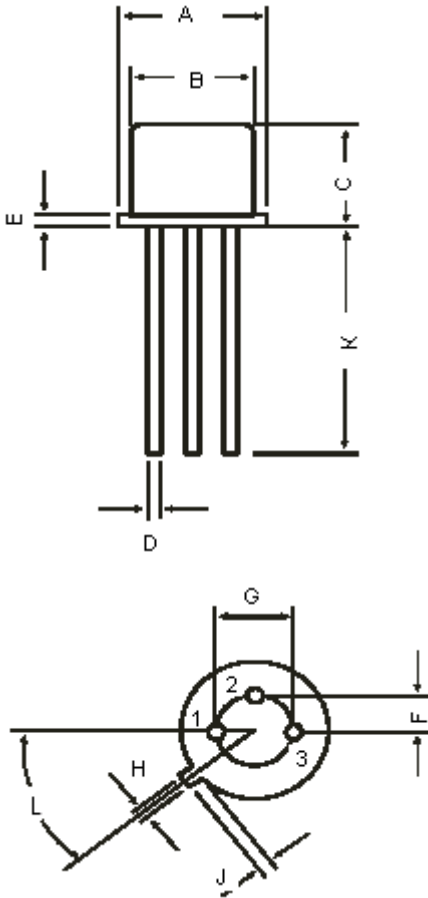
# High Speed Switching Transistors



## Features:

- NPN silicon planar epitaxial transistors
- Fast switching devices exhibiting short turn-off and low saturation voltage characteristics
- NPN silicon high speed saturated switching, transistors with low power and high speed switching applications

## TO-18 Metal Can Package



| Dimensions | Minimum | Maximum |
|------------|---------|---------|
| A          | 5.24    | 5.84    |
| B          | 4.52    | 4.97    |
| C          | 4.31    | 5.33    |
| D          | 0.4     | 0.53    |
| E          | -       | 0.76    |
| F          | -       | 1.27    |
| G          | -       | 2.97    |
| H          | 0.91    | 1.17    |
| J          | 0.71    | 1.21    |
| K          | 12.7    | -       |
| L          | 45°     |         |

Dimensions : Millimetres



## Pin Configuration

1. Emitter
2. Base
3. Collector

# High Speed Switching Transistors

## Absolute Maximum Ratings

| Parameter  | Symbol         | Value       | Unit                       |
|--|----------------|-------------|----------------------------|
| Collector Emitter Voltage  | $V_{CEO}$      | 15          | V                          |
|  | $V_{CES}$      | 40          |                            |
| Collector Base Voltage   | $V_{CBO}$      |             |                            |
| Emitter Base Voltage   | $V_{EBO}$      | 4.5         |                            |
| Collector Current Continuous   | $I_C$          | 200         | mA                         |
| Collector Current Peak (10 $\mu$ s Pulse)  | $I_C$ (Peak)   | 500         |                            |
| Power Dissipation at $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$                               | $P_D$          | 360         | mW                         |
|  |                | 2.06        | mW / $^\circ\text{C}$      |
| Power Dissipation at $T_C = 25^\circ\text{C}$<br>$T_C = 100^\circ\text{C}$<br>Derate above $100^\circ\text{C}$ | $P_D$          | 1.2         | W<br>mW / $^\circ\text{C}$ |
|  |                | 0.68        |                            |
|  |                | 6.85        |                            |
| Operating and Storage Junction Temperature Range   | $T_j, T_{stg}$ | -65 to +200 | $^\circ\text{C}$           |

## Electrical Characteristics ( $T_a = 25^\circ\text{C}$ unless otherwise specified)

| Parameter                            | Symbol            | Test Condition   | 2N2369      | 2N2369A     | Unit                |
|--------------------------------------|-------------------|--|-------------|-------------|---------------------|
| Collector Emitter Voltage            | $V_{CEO^*}$ (sus) | $I_C = 10\text{ mA}, I_B = 0$  | >15         |             | V                   |
|                                      | $V_{CES}$         | $I_C = 10\ \mu\text{A}, V_{BE} = 0$  | >40         |             |                     |
| Collector Base Voltage               | $V_{CBO}$         | $I_C = 10\ \mu\text{A}, I_E = 0$   | >40         |             |                     |
| Emitter Base Voltage                 | $V_{EBO}$         | $I_E = 10\ \mu\text{A}, I_C = 0$   | >4.5        |             |                     |
| Collector Cut off Current            | $I_{CBO}$         | $V_{CB} = 20\text{ V}, I_E = 0$  | <400        | -           | nA                  |
|                                      | $I_{CES}$         | $V_{CB} = 20\text{ V}, I_E = 0, T_a = 150^\circ\text{C}$<br>$V_{CE} = 20\text{ V}, V_{BE} = 0$ | <30<br>-    | -<br><400   | $\mu\text{A}$<br>nA |
| Base Current                         | $I_B$             | $V_{CE} = 20\text{ V}, V_{BE} = 0$   | -           | <400        | nA                  |
| Collector Emitter Saturation Voltage | $V_{CE(sat)^*}$   | $I_C = 10\text{ mA}, I_B = 1\text{ mA}$  | <0.25       | <0.2        | V                   |
|                                      |                   | $I_C = 30\text{ mA}, I_B = 3\text{ mA}$  | -           | <0.25       |                     |
|                                      |                   | $I_C = 100\text{ mA}, I_B = 10\text{ mA}$  | -           | <0.5        |                     |
|                                      |                   | $I_C = 10\text{ mA}, I_B = 1\text{ mA}, T_a = 125^\circ\text{C}$                               | -           | <0.3        |                     |
| Base Emitter Saturation Voltage      | $V_{BE(sat)^*}$   | $I_C = 10\text{ mA}, I_B = 1\text{ mA}$  | 0.7 to 0.85 | 0.7 to 0.85 | V                   |
|                                      |                   | $I_C = 30\text{ mA}, I_B = 3\text{ mA}$  | -           | <1.15       |                     |
|                                      |                   | $I_C = 100\text{ mA}, I_B = 10\text{ mA}$  | -           | <1.6        |                     |
|                                      |                   | $I_C = 10\text{ mA}, I_B = 1\text{ mA}, T_a = +125^\circ\text{C}$                              | -           | >0.59       |                     |
|                                      |                   | $I_C = 10\text{ mA}, I_B = 1\text{ mA}, T_a = -55^\circ\text{C}$                               | -           | <1.2        |                     |
| DC Current Gain                      | $h_{FE^*}$        | $I_C = 10\text{ mA}, V_{CE} = 1\text{ V}$  | 40 to 120   | 40 to 120   | -                   |
|                                      |                   | $I_C = 10\text{ mA}, V_{CE} = 1\text{ V}, T_a = -55^\circ\text{C}$                             | >20         | -           |                     |
|                                      |                   | $I_C = 100\text{ mA}, V_{CE} = 0.35\text{ V}, T_a = -55^\circ\text{C}$                         | -           | >20         |                     |
|                                      |                   | $I_C = 10\text{ mA}, V_{CE} = 0.35\text{ V}$   | -           | 40 to 120   |                     |
|                                      |                   | $I_C = 30\text{ mA}, V_{CE} = 0.4\text{ V}$  | -           | >30         |                     |
|                                      |                   | $I_C = 100\text{ mA}, V_{CE} = 1\text{ V}$   | -           | >20         |                     |
|                                      |                   | $I_C = 100\text{ mA}, V_{CE} = 2\text{ V}$   | >20         | -           |                     |

# High Speed Switching Transistors



| Parameter                          | Symbol    | Test Condition  | 2N2369 | 2N2369A | Unit |
|------------------------------------|-----------|---|--------|---------|------|
| <b>Small Signal Characteristic</b> |           |   |        |         |      |
| Transition Frequency               | $f_t$     | $V_{CE} = 10\text{ V}, I_C = 10\text{ mA}, f = 100\text{ MHz}$                        | >500   |         | MHz  |
| Output Capacitance                 | $C_{obo}$ | $V_{CB} = 5\text{ V}, I_E = 0, f = 140\text{ kHz}$                                    | <4     |         | pF   |
| Turn on Time                       | $t_{on}$  | $I_C = 10\text{ mA}, I_{B1} = 3\text{ mA}, I_B = -1.5\text{ mA}, V_{CC} = 3\text{ V}$ | <12    |         | ns   |
| Turn off Time                      | $t_{off}$ | $I_C = 10\text{ mA}, I_{B1} = 3\text{ mA}, I_B = -1.5\text{ mA}, V_{CC} = 3\text{ V}$ | -      | <15     |      |
| Storage time                       | $t_s$     | $I_C = 100\text{ mA}, I_{B1} = I_B = 10\text{ mA}, V_{CC} = 10\text{ V}$              | <13    |         |      |

\*Pulse Test : Pulse Width = 300  $\mu$ s, Duty Cycle = 2%

## Specification Table

| $V_{CEO}$<br>Maximum<br>(V) | $I_C$<br>Maximum<br>(A) | $V_{CE(sat)}$<br>Maximum<br>(V)<br>at $I_C = 10\text{ mA}$ | $t_{off}$<br>Maximum<br>(ns)<br>at $I_C = 10\text{ mA}$ | $h_{FE}$<br>Minimum<br>at $I_C = 10\text{ mA}$ | $P_D$<br>at $T_a = 25^\circ\text{C}$<br>(mW) | Package<br>and<br>Pin Out | Part Number |
|-----------------------------|-------------------------|--|---|--|--|---------------------------|-------------|
| 15                          | 0.2                     | 0.25   | 18  | 40   | 360  | TO-18                     | 2N2369      |
|                             |                         | 0.2  |   |  |  |                           | 2N2369A     |

**Important Notice** : This data sheet and its contents (the "Information") belong to the members of the Premier Farnell group of companies (the "Group") or are licensed to it. No licence is granted for the use of it other than for information purposes in connection with the products to which it relates. No licence of any intellectual property rights is granted. The Information is subject to change without notice and replaces all data sheets previously supplied. The Information supplied is believed to be accurate but the Group assumes no responsibility for its accuracy or completeness, any error in or omission from it or for any use made of it. Users of this data sheet should check for themselves the Information and the suitability of the products for their purpose and not make any assumptions based on information included or omitted. Liability for loss or damage resulting from any reliance on the Information or use of it (including liability resulting from negligence or where the Group was aware of the possibility of such loss or damage arising) is excluded. This will not operate to limit or restrict the Group's liability for death or personal injury resulting from its negligence. Multicomp is the registered trademark of the Group. © Premier Farnell plc 2012.