

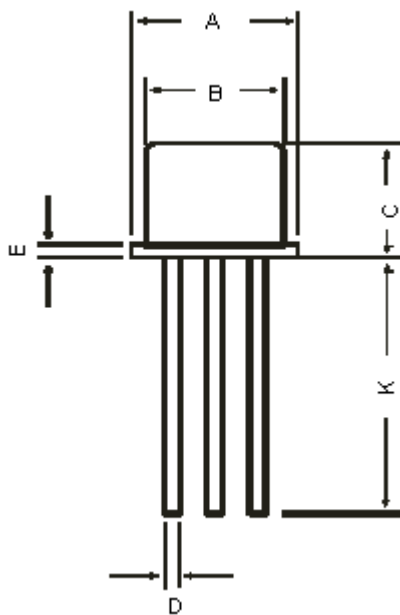
# High Speed Switching Transistors



## Features:

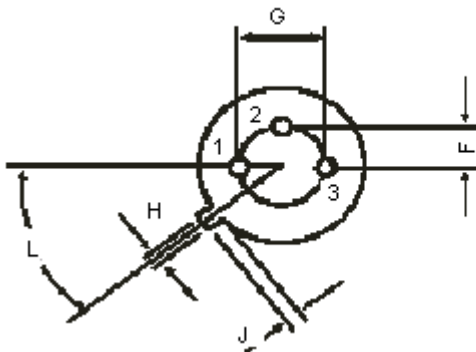
- PNP silicon planar switching transistors
- Fast switching devices exhibiting short turn-off and low saturation voltage characteristics
- Switching and linear application DC and VHF amplifier applications

## 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

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## Absolute Maximum Ratings

| Parameter                                                                        | Symbol         | Rating      | Unit                        |
|----------------------------------------------------------------------------------|----------------|-------------|-----------------------------|
| Collector Emitter Voltage                                                        | $V_{CEO}$      | 60          | V                           |
| Collector Base Voltage                                                           | $V_{CBO}$      |             |                             |
| Emitter Base Voltage                                                             | $V_{EBO}$      | 5           |                             |
| Collector Current Continuous                                                     | $I_C$          | 600         | mA                          |
| Power Dissipation at $T_a = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 400<br>2.28 | mW<br>mW / $^\circ\text{C}$ |
| Power Dissipation at $T_c = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 1.8<br>10.3 | W<br>mW / $^\circ\text{C}$  |
| Operating and Storage Junction<br>Temperature Range                              | $T_j, T_{stg}$ | -           | $^\circ\text{C}$            |

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

| Parameter                            | Symbol           | Test Condition                                                                                                                                                                                                                                     | Value                                |                                         | Unit          |
|--------------------------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-----------------------------------------|---------------|
|                                      |                  |                                                                                                                                                                                                                                                    | Minimum                              | Maximum                                 |               |
| Collector Emitter Voltage            | $V_{CEO}^*$      | $I_C = 10 \text{ mA}, I_B = 0$                                                                                                                                                                                                                     | 60                                   | -                                       | V             |
| Collector Base Voltage               | $V_{CBO}$        | $I_C = 10 \mu\text{A}, I_E = 0$                                                                                                                                                                                                                    |                                      | -                                       |               |
| Emitter Base Voltage                 | $V_{EBO}$        | $I_E = 10 \mu\text{A}, I_C = 0$                                                                                                                                                                                                                    | 5                                    | -                                       |               |
| Collector Cut off Current            | $I_{CBO}$        | $V_{CB} = 50 \text{ V}, I_E = 0$                                                                                                                                                                                                                   | -                                    | 10                                      | nA            |
|                                      | $I_{CEX}$        | $T_a = 150^\circ\text{C}$                                                                                                                                                                                                                          | -                                    | 10                                      | $\mu\text{A}$ |
|                                      |                  | $V_{CB} = 50 \text{ V}, I_E = 0$<br>$V_{CE} = 30 \text{ V}, V_{BE} = 0.5 \text{ V}$                                                                                                                                                                | -                                    | 50                                      | nA            |
| Base Current                         | $I_B$            | $V_{CE} = 30 \text{ V}, V_{BE} = 0.5 \text{ V}$                                                                                                                                                                                                    | -                                    | 50                                      | nA            |
| Collector Emitter Saturation Voltage | $V_{CE (Sat)}^*$ | $I_C = 150 \text{ mA}, I_B = 15 \text{ mA}$<br>$I_C = 500 \text{ mA}, I_B = 50 \text{ mA}$                                                                                                                                                         | -                                    | 0.4<br>1.6                              | V             |
| Base Emitter Saturation Voltage      | $V_{BE (Sat)}^*$ | $I_C = 150 \text{ mA}, I_B = 15 \text{ mA}$<br>$I_C = 500 \text{ mA}, I_B = 50 \text{ mA}$                                                                                                                                                         | -                                    | 1.3<br>2.6                              | V<br>V        |
|                                      | -                | -                                                                                                                                                                                                                                                  | 2N2906A                              | 2N2907A                                 | -             |
| DC Current Gain                      | $h_{FE}$         | $I_C = 0.1 \text{ mA}, V_{CE} = 10 \text{ V}$<br>$I_C = 1 \text{ mA}, V_{CE} = 10 \text{ V}$<br>$I_C = 10 \text{ mA}, V_{CE} = 10 \text{ V}$<br>$I_C = 150 \text{ mA}, V_{CE} = 10 \text{ V}^*$<br>$I_C = 500 \text{ mA}, V_{CE} = 10 \text{ V}^*$ | >40<br>>40<br>>40<br>40 - 120<br>>40 | >75<br>>100<br>>100<br>100 - 300<br>>50 | -             |

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

| Parameter               | Symbol       | Test Condition                                                    | Value   |         | Unit |
|-------------------------|--------------|-------------------------------------------------------------------|---------|---------|------|
|                         |              |                                                                   | Minimum | Maximum |      |
| Dynamic Characteristics |              |                                                                   |         |         |      |
| Transition Frequency    | $f_{T^{**}}$ | $I_C = 50 \text{ mA}, V_{CE} = 20 \text{ V}, f = 100 \text{ MHz}$ | 200     | -       | MHz  |
| Output Capacitance      | $C_{ob}$     | $V_{CB} = 10 \text{ V}, I_E = 0, f = 100 \text{ KHz}$             | -       | 8       | pF   |
| Input Capacitance       | $C_{ib}$     | $V_{BE} = 2 \text{ V}, I_C = 0, f = 100 \text{ KHz}$              | -       | 30      |      |
| Switching Time          |              |                                                                   |         |         |      |
| Delay Time              | $t_d$        | $I_C = 150 \text{ mA}, I_{B1} = 15 \text{ mA}$                    | -       | 10      | ns   |
| Rise Time               | $t_r$        | $V_{CC} = 30 \text{ V}$                                           | -       | 40      |      |
| Turn on Time            | $t_{on}$     | -                                                                 | -       | 45      |      |
| Storage time            | $t_s$        | $I_C = 150 \text{ mA}, I_{B1} = I_{B2} = 15 \text{ mA}$           | -       | 80      |      |
| Fall Time               | $t_f$        | $V_{CC} = 6 \text{ V}$                                            | -       | 30      |      |
| Turn Off Time           | $t_{off}$    | -                                                                 | -       | 100     |      |

\* Pulse Test :- pulse width = 300  $\mu\text{s}$ , duty cycle = 2%

\*\*  $f_T$  is defined as the frequency at which  $|h_{fe}|$  extrapolates to unity

## Specification Table

| $V_{CEO}$<br>Maximum<br>(V) | $I_C$<br>Maximum<br>(A) | $V_{CE(sat)}$<br>Maximum<br>(V)<br>at $I_C = 150 \text{ mA}$ | $t_{off}$<br>Maximum<br>(ns) | $h_{FE}$<br>Minimum<br>at $I_C = 150 \text{ mA}$ | $P_D$<br>at $T_a = 25^\circ\text{C}$<br>(mW) | Package<br>and<br>Pin Out | Part Number        |
|-----------------------------|-------------------------|--------------------------------------------------------------|------------------------------|--------------------------------------------------|----------------------------------------------|---------------------------|--------------------|
| 60                          | 0.6                     | 0.4                                                          | 100                          | 40                                               | 400                                          | TO-18                     | 2N2906A<br>2N2907A |

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