

## TO-39 NPN SILICON PLANAR TRANSISTOR

### General Transistor

#### ABSOLUTE MAXIMUM RATINGS

| DESCRIPTION                                                                    | SYMBOL         | VALUE        | UNIT                      |
|--------------------------------------------------------------------------------|----------------|--------------|---------------------------|
| Collector Emitter Voltage                                                      | $V_{CEO}$      | 80           | V                         |
| Collector Base Voltage                                                         | $V_{CBO}$      | 140          | V                         |
| Emitter Base Voltage                                                           | $V_{EBO}$      | 7.0          | V                         |
| Collector Current Continuous                                                   | $I_C$          | 1.0          | A                         |
| Power Dissipation at $T_a=25^\circ\text{C}$<br>Derate Above $25^\circ\text{C}$ | $P_D$          | 0.8<br>4.6   | W<br>mW/ $^\circ\text{C}$ |
| Power Dissipation at $T_c=25^\circ\text{C}$<br>Derate Above $25^\circ\text{C}$ | $P_D$          | 5.0<br>28.6  | W<br>mW/ $^\circ\text{C}$ |
| Operating and Storage Junction<br>Temperature Range                            | $T_j, T_{stg}$ | - 65 to +200 | $^\circ\text{C}$          |

#### THERMAL RESISTANCE

|                                 |               |      |                    |
|---------------------------------|---------------|------|--------------------|
| Junction to Case                | $R_{th(j-c)}$ | 16.5 | $^\circ\text{C/W}$ |
| Junction to Ambient in free air | $R_{th(j-a)}$ | 89.5 | $^\circ\text{C/W}$ |

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

| DESCRIPTION                          | SYMBOL                 | TEST CONDITION                                                      | MIN       | TYP | MAX      | UNIT |
|--------------------------------------|------------------------|---------------------------------------------------------------------|-----------|-----|----------|------|
| Collector Emitter Voltage            | V <sub>CEO</sub>       | I <sub>C</sub> =1mA, I <sub>B</sub> =0                              | 80        |     |          | V    |
| Collector Base Voltage               | V <sub>CBO</sub>       | I <sub>C</sub> =100μA, I <sub>E</sub> =0                            | 140       |     |          | V    |
| Emitter Base Voltage                 | V <sub>EBO</sub>       | I <sub>E</sub> =100μA, I <sub>C</sub> =0                            | 7.0       |     |          | V    |
| Collector Cut Off Current            | I <sub>CBO</sub>       | V <sub>CB</sub> =90V, I <sub>E</sub> =0                             |           |     | 10       | nA   |
|                                      |                        | V <sub>CB</sub> =90V, I <sub>E</sub> =0, T <sub>a</sub> =150°C      |           |     | 10       | μA   |
| Emitter Cut Off Current              | I <sub>EBO</sub>       | V <sub>EB</sub> =5V, I <sub>C</sub> =0                              |           |     | 10       | nA   |
|                                      |                        |                                                                     | 2N3019    |     | 2N3020   |      |
| DC Current Gain                      | *h <sub>FE</sub>       | I <sub>C</sub> =0.1mA, V <sub>CE</sub> =10V                         | >50       |     | 30 - 100 |      |
|                                      |                        | I <sub>C</sub> =10mA, V <sub>CE</sub> =10V                          | >90       |     | 40 - 120 |      |
|                                      |                        | I <sub>C</sub> =150mA, V <sub>CE</sub> =10V                         | 100 - 300 |     | 40 - 120 |      |
|                                      |                        | I <sub>C</sub> =150mA, V <sub>CE</sub> =10V, T <sub>c</sub> = -55°C | >40       |     | -        |      |
|                                      |                        | I <sub>C</sub> =500mA, V <sub>CE</sub> =10V                         | >50       |     | 30 - 100 |      |
|                                      |                        | I <sub>C</sub> =1A, V <sub>CE</sub> =10V                            | >15       |     | >15      |      |
|                                      |                        |                                                                     | MIN       | TYP | MAX      | UNIT |
| Collector Emitter Saturation Voltage | *V <sub>CE (sat)</sub> | I <sub>C</sub> =150mA, I <sub>B</sub> =15mA                         |           |     | 0.2      | V    |
|                                      |                        | I <sub>C</sub> =500mA, I <sub>B</sub> =50mA                         |           |     | 0.5      | V    |
| Base Emitter Saturation Voltage      | *V <sub>BE (sat)</sub> | I <sub>C</sub> =150mA, I <sub>B</sub> =15mA                         |           |     | 1.1      | V    |

\*Pulse Test: Pulse Width  $\leq 300\text{ms}$ , Duty Cycle  $\leq 1\%$

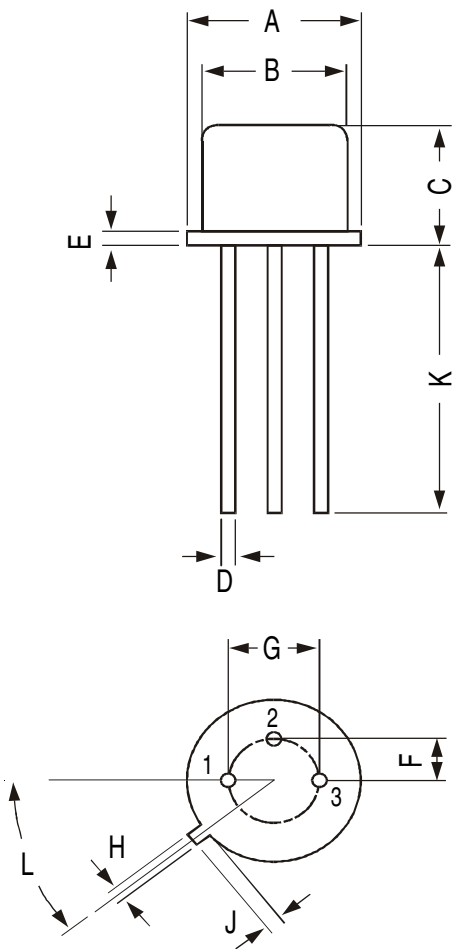
2N3019\_20Rev\_1 040406E

ELECTRICAL CHARACTERISTICS (T<sub>a</sub>=25°C unless specified otherwise)

SMALL SIGNAL CHARACTERISTICS

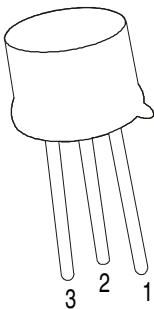
| DESCRIPTION                  | SYMBOL            | TEST CONDITION                                                                    | MIN | TYP | MAX | UNIT |
|------------------------------|-------------------|-----------------------------------------------------------------------------------|-----|-----|-----|------|
| Output Capacitance           | C <sub>ob</sub>   | V <sub>CB</sub> =10V, I <sub>E</sub> =0, f=1MHz                                   |     |     | 12  | pF   |
| Input Capacitance            | C <sub>ib</sub>   | V <sub>EB</sub> =0.5V, I <sub>C</sub> =0, f=1MHz                                  |     |     | 60  | pF   |
| Small Signal Current Gain    | h <sub>fe</sub>   | I <sub>C</sub> =1mA, V <sub>CE</sub> =5V, f=1KHz                                  |     |     |     |      |
|                              |                   | 2N3019                                                                            | 80  |     | 400 |      |
|                              |                   | 2N3020                                                                            | 30  |     | 200 |      |
| Collector Base Time Constant | rb'C <sub>C</sub> | I <sub>E</sub> =10mA, V <sub>CB</sub> =10V, f=79.8MHz                             |     |     | 400 | ps   |
| Noise Figure                 | NF                | I <sub>C</sub> =100µA, V <sub>CE</sub> =10V, R <sub>S</sub> =1KΩ, f=1.0KHz 2N3019 |     |     | 4.0 | dB   |

TO-39 Metal Can Package



All dimensions are in mm

| DIM | MIN    | MAX    |
|-----|--------|--------|
| A   | 8.50   | 9.39   |
| B   | 7.74   | 8.50   |
| C   | 6.09   | 6.60   |
| D   | 0.40   | 0.53   |
| E   | —      | 0.88   |
| F   | 2.41   | 2.66   |
| G   | 4.82   | 5.33   |
| H   | 0.71   | 0.86   |
| J   | 0.73   | 1.02   |
| K   | 12.70  | —      |
| L   | 42 DEG | 48 DEG |



- PIN CONFIGURATION
1. EMITTER
  2. BASE
  3. COLLECTOR

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