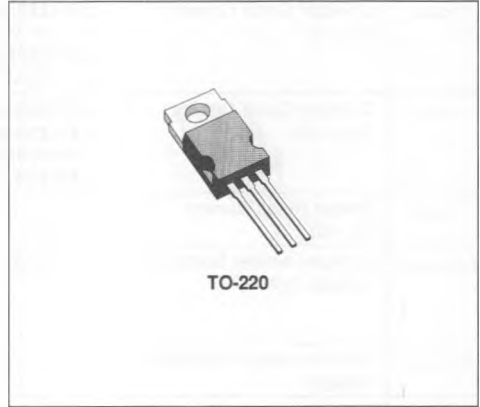


MEDIUM POWER LINEAR AND SWITCHING APPLICATIONS

DESCRIPTION

The BD239, BD239A, BD239B and BD239C are silicon epitaxial-base NPN power transistors in Jedec TO-220 plastic package, intended for use in medium power linear and switching applications.

The complementary PNP types are the BD240, BD240A, BD240B and BD240C respectively.



INTERNAL SCHEMATIC DIAGRAMS



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | NPN PNP* | Value | | | | Unit |
|-----------|--|-------------|----------------|------------------|------------------|------------------|------------|
| | | | BD239 BD240 | BD239A BD240A | BD239B BD240B | BD239C BD240C | |
| V_{CEr} | Collector-emitter Voltage ($R_{BE} = 100 \Omega$) | | 55 | 70 | 90 | 115 | V |
| V_{CE0} | Collector-emitter Voltage ($I_B = 0$) | | 45 | 60 | 80 | 100 | V |
| V_{EBO} | Emitter-base Voltage ($I_C = 0$) | | 5 | | | | V |
| I_C | Collector Current | | 2 | | | | A |
| I_{CM} | Collector Peak Current | | 4 | | | | A |
| I_B | Base Current | | 0.6 | | | | A |
| P_{Tot} | Total Power Dissipation at $T_{case} \leq 25^\circ C$ $T_{amb} \leq 25^\circ C$ | | 30 | | | | W |
| | | | 2 | | | | W |
| T_{sig} | Storage Temperature | | - 65 to 150 | | | | $^\circ C$ |
| T_j | Junction Temperature | | 150 | | | | $^\circ C$ |

* For PNP types voltage and current values are negative.

THERMAL DATA

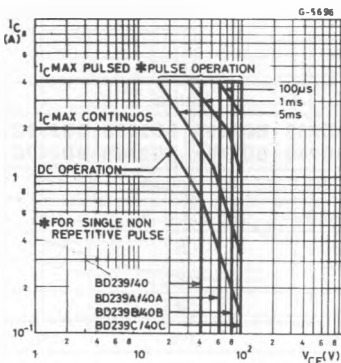
| | | | | |
|------------------|-------------------------------------|-----|------|------|
| $R_{th\ j-case}$ | Thermal Resistance Junction-case | Max | 4.17 | °C/W |
| $R_{th\ j-amb}$ | Thermal Resistance Junction-ambient | Max | 62.5 | °C/W |

ELECTRICAL CHARACTERISTICS ($T_{case} = 25\text{ °C}$ unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|------------------|--|---|-----------------------|------|------|------|
| I_{CEO} | Collector Cutoff Current ($I_B = 0$) | for BD239/40/39A/40A $V_{CE} = 30\text{ V}$ for BD239B/40B/39C/40C $V_{CE} = 60\text{ V}$ | | | 0.3 | mA |
| I_{CES} | Collector Cutoff Current ($V_{BE} = 0$) | for BD239/40 $V_{CE} = 45\text{ V}$ for BD239A/40A $V_{CE} = 60\text{ V}$ for BD239B/40B $V_{CE} = 80\text{ V}$ for BD239C/40C $V_{CE} = 100\text{ V}$ | | | 0.2 | mA |
| I_{EBO} | Emitter Cutoff Current ($I_C = 0$) | $V_{EB} = 5\text{ V}$ | | | 1 | mA |
| $V_{CE(0sus)^*}$ | Collector-emitter Sustaining Voltage ($I_B = 0$) | $I_C = 30\text{ mA}$ for BD239/40 for BD239A/40A for BD239B/40B for BD239C/40C | 45 60 80 100 | | | V |
| $V_{CE(sat)^*}$ | Collector-emitter Saturation Voltage | $I_C = 1\text{ A}$ $I_B = 0.2\text{ mA}$ | | | 0.7 | V |
| $V_{BE(on)^*}$ | Base-emitter Voltage | $I_C = 1\text{ A}$ $V_{CE} = 4\text{ V}$ | | | 1.3 | V |
| h_{FE}^* | DC Current Gain | $I_C = 0.2\text{ A}$ $V_{CE} = 4\text{ V}$ $I_C = 1\text{ A}$ $V_{CE} = 4\text{ V}$ | 40 15 | | | |
| h_{ie} | Small Signal Current Gain | $I_C = 0.2\text{ A}$ $V_{CE} = 10\text{ V}$ $f = 1\text{ KHz}$ $I_C = 0.2\text{ A}$ $V_{CE} = 10\text{ V}$ $f = 1\text{ MHz}$ | 20 3 | | | |

* Pulsed : pulse duration = 300 μs , duty cycle $\leq 2\%$.

Safe Operating Areas.



For the others characteristics curves see TIP31/TIP32 series.