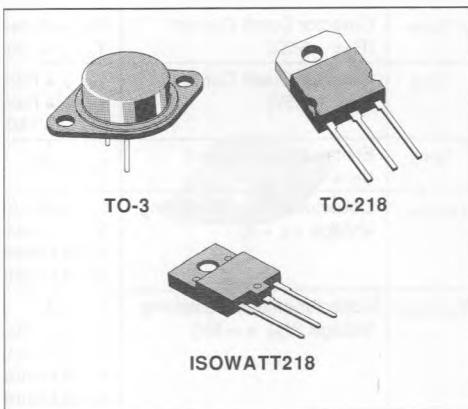
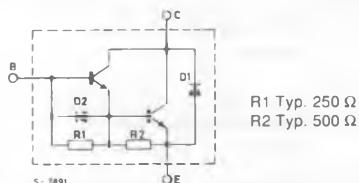


EPITAXIAL PLANAR NPN
DESCRIPTION

The MJ10004/5, MJ10004P/5P and MJ10004PFI/5PFI are silicon epitaxial planar NPN transistors in monolithic Darlington configuration with integrated speed-up diode.

They are mounted respectively in TO-3 metal case, TO-218 plastic package and ISOWATT218 fully isolated package.

They are designed for high power, fast switching applications.


INTERNAL SCHEMATIC DIAGRAM

ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | MJ10004/4P/4PFI | MJ10005/5P/5PFI | Unit | |
|-----------|--|-----------------|-----------------|-------------------|------------|
| V_{CEX} | Collector-emitter Voltage ($V_{BE} = -5V$) | 350 | 400 | V | |
| V_{CEV} | Collector-emitter Voltage ($V_{BE} = 1.5V$) | 400 | 450 | V | |
| V_{CEO} | Collector-emitter Voltage ($I_C = 0$) | 450 | 500 | V | |
| V_{EBO} | Emitter-base Voltage ($I_C = 0$) | 8 | | V | |
| I_C | Collector Current | 20 | | A | |
| I_{CM} | Collector Peak Current | 30 | | A | |
| I_B | Base Current | 2.5 | | A | |
| I_{BM} | Base Peak Current | 5 | | A | |
| | | TO-3 | TO-218 | ISOWATT218 | |
| P_{101} | Total Power Dissipation at $T_c \leq 25^\circ C$ | 175 | 125 | 60 | W |
| T_{stg} | Storage Temperature | - 65 to 200 | - 65 to 150 | - 65 to 150 | $^\circ C$ |
| T_j | Max. Operating Junction Temperature | 200 | 150 | 150 | $^\circ C$ |

THERMAL DATA

| | | TO-3 | TO-218 | ISOWATT218 | |
|------------------|----------------------------------|------|--------|------------|-----------|
| $R_{th(j-case)}$ | Thermal Resistance Junction-case | Max | 1 | 1 | 2.08 °C/W |

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

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|------------------|---|--|--------------------------|------|-----------------|------------------|
| I_{CER} | Collector Cutoff Current ($R_{BE} = 50\Omega$) | $V_{CE} = \text{Rated } V_{CEV}$ $T_{case} = 100^{\circ}C$ | | | 5 | mA |
| I_{CEV} | Collector Cutoff Current ($V_{BE} = 1.5V$) | $V_{CEV} = \text{Rated Value}$ $V_{CEV} = \text{Rated Value}$ $T_{case} = 150^{\circ}C$ | | | 0.25 5 | mA mA |
| I_{EBO} | Emitter Cutoff Current ($I_C = 0$) | $V_{EB} = 2V$ | | | 175 | mA |
| $V_{CEO(sus)^*}$ | Collector-emitter Sustaining Voltage ($I_B = 0$) | $I_C = 250mA$ $V_{clamp} = \text{Rated } V_{CEO}$ for MJ10004/4P/4PFI for MJ10005/5P/4PFI | 350 400 | | | V V |
| $V_{CEX(sus)^*}$ | Collector-emitter Sustaining Voltage ($V_{BE} = -5V$) | $I_C = 2A$ $V_{clamp} = \text{Rated } V_{CEX}$ $T_{case} = 100^{\circ}C$ for MJ10004/4P/4PFI for MJ10005/5P/5PFI $I_C = 10A$ $T_{case} = 100^{\circ}C$ $V_{clamp} = \text{Rated } V_{CEX}$ for MJ10004/4P/4PFI for MJ10005/5P/5PFI | 400 450 275 325 | | | V V V V |
| $V_{CE(sat)^*}$ | Collector-emitter Saturation Voltage | $I_C = 10A$ $I_B = 400mA$ $I_C = 20A$ $I_B = 2A$ $I_C = 10A$ $I_B = 400mA$ $T_{case} = 100^{\circ}C$ | | | 1.9 3 2.5 | V V V |
| $V_{BE(sat)^*}$ | Base-emitter Saturation Voltage | $I_C = 10A$ $I_B = 400mA$ $I_C = 10A$ $I_B = 400mA$ $T_{case} = 100^{\circ}C$ | | | 2.5 2.5 | V V |
| h_{FE}^* | DC Current Gain | $I_C = 5A$ $V_{CE} = 5V$ $I_C = 10A$ $V_{CE} = 5V$ | 50 40 | | 600 400 | |
| V_F^* | Diode Forward Voltage | $I_F = 10A$ | | 1.8 | 5 | V |
| h_{fe} | Small-signal Current Gain | $I_C = 1A$ $V_{CE} = 10V$ $f = 1MHz$ | 10 | | | |
| C_{ob} | Output Capacitance | $V_{CB} = 10V$ $I_E = 0$ $f = 100MHz$ | 100 | | 325 | pF |
| t_{on} | Turn-on Time | $V_{CC} = 250V$ $I_C = 10A$ $I_{B1} = -I_{B2} = 400mA$ | | 0.5 | 0.8 | μs |
| t_s | Storage Time | $V_{BE(off)} = 5V$ | | 1 | 1.5 | μs |
| t_f | Fall Time | $t_p = 50\mu s$ Duty Cycle – 2% | | 0.3 | 0.5 | μs |