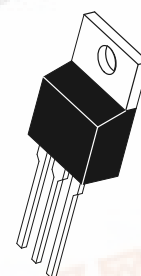
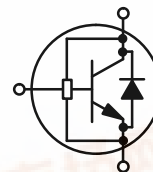


MJE18002D2

POWER TRANSISTORS
2 AMPERES
1000 VOLTS
50 WATTS



CASE 221A-06
TO-220AB

Advance Information

High Speed, High Gain Bipolar NPN Power Transistor with Integrated Collector-Emitter Diode and Built-in Efficient Antisaturation Network

The MJE18002D2 use a newly developed technology, so called H2BIP*, to design the state of art transistor dedicated to the Electronic Light Ballast and PFC** circuit.

The main advantages brought by these new transistors are:

- Improved Global Efficiency Due to the Low Base Drive Requirements
- DC Current Gain Typically Centered at 45
- Extremely Low Storage Time Variation, Thanks to the Antisaturation Network
- Easy to Use Thanks to the Integrated Collector/Emitter Diode

The MOTOROLA "Sig Sixma" philosophy provides tight and reproducible parameter distribution.

* High speed High gain BIPolar transistor

** Power Factor Control

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--|----------------|------------|---------------------|
| Collector-Emitter Sustaining Voltage | V_{CEO} | 450 | Vdc |
| Collector-Base Breakdown Voltage | V_{CBO} | 1000 | Vdc |
| Collector-Emitter Breakdown Voltage | V_{CES} | 1000 | Vdc |
| Emitter-Base Voltage | V_{EBO} | 12 | Vdc |
| Collector Current — Continuous | I_C | 2 | Adc |
| — Peak (1) | I_{CM} | 5 | |
| Base Current — Continuous | I_B | 1 | Adc |
| — Peak (1) | I_{BM} | 2 | |
| *Total Device Dissipation @ $T_C = 25^\circ\text{C}$ | P_D | 50 | Watt |
| *Derate above 25°C | | 0.4 | W/ $^\circ\text{C}$ |
| Operating and Storage Temperature | T_J, T_{stg} | -65 to 150 | $^\circ\text{C}$ |

THERMAL CHARACTERISTICS

| | | | |
|--|-----------------|------|--------------------|
| Thermal Resistance — Junction to Case | $R_{\theta JC}$ | 2.5 | $^\circ\text{C/W}$ |
| — Junction to Ambient | $R_{\theta JA}$ | 62.5 | |
| Maximum Lead Temperature for Soldering Purposes: 1/8" from case for 5 seconds | T_L | 260 | $^\circ\text{C}$ |

(1) Pulse Test: Pulse Width = 5 ms, Duty Cycle \leq 10%.

This document contains information on a new product. Specifications and information herein are subject to change without notice.

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MOTOROLA



MJE18002D2

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

OFF CHARACTERISTICS

| | | | | | |
|---|-----------------------|---|-----|-------------------|------|
| Collector–Emitter Sustaining Voltage (I _C = 100 mA, L = 25 mH) | V _{CEO(sus)} | 450 | 570 | | Vdc |
| Collector Cutoff Current (V _{CE} = Rated V _{CEO} , I _B = 0) | I _{CEO} | | | 100 | μAdc |
| Collector Cutoff Current (V _{CE} = Rated V _{CES} , V _{EB} = 0) (V _{CE} = 500 V, V _{EB} = 0) | I _{CES} | @ T _C = 25°C @ T _C = 125°C @ T _C = 125°C | | 100 500 100 | μAdc |
| Emitter–Cutoff Current (V _{EB} = 10 Vdc, I _C = 0) | I _{EBO} | | | 100 | μAdc |

ON CHARACTERISTICS

| | | | | | | |
|--|--|----------------------|-------------------|----------------------------|-------------------------|-----|
| Base–Emitter Saturation Voltage (I _C = 0.4 Adc, I _B = 40 mAdc) (I _C = 1 Adc, I _B = 0.2 Adc) | @ T _C = 25°C @ T _C = 25°C | V _{BE(sat)} | | 0.78 0.87 | 1 1.1 | Vdc |
| Collector–Emitter Saturation Voltage (I _C = 0.4 Adc, I _B = 40 mAdc) (I _C = 1 Adc, I _B = 0.2 Adc) | @ T _C = 25°C @ T _C = 125°C @ T _C = 25°C @ T _C = 125°C | V _{CE(sat)} | | 0.36 0.5 0.4 0.65 | 0.6 1 0.75 1.2 | Vdc |
| DC Current Gain (I _C = 0.4 Adc, V _{CE} = 1 Vdc) (I _C = 1 Adc, V _{CE} = 1 Vdc) | @ T _C = 25°C @ T _C = 125°C @ T _C = 25°C @ T _C = 125°C | h _{FE} | 14 8 6 4 | 25 15 10 6 | | — |

DYNAMIC CHARACTERISTICS

| | | | | | |
|---|-----------------|--|-----|-----|-----|
| Current Gain Bandwidth (I _C = 0.5 Adc, V _{CE} = 10 Vdc, f = 1 MHz) | f _T | | 13 | | MHz |
| Output Capacitance (V _{CB} = 10 Vdc, I _E = 0, f = 1 MHz) | C _{ob} | | 50 | 100 | pF |
| Input Capacitance (V _{EB} = 8 Vdc) | C _{ib} | | 340 | 500 | pF |

DIODE CHARACTERISTICS

| | | | | | | |
|--|---|-----------------|--|-------------------------------|-------------------|----|
| Forward Diode Voltage (I _{EC} = 1 Adc) (I _{EC} = 0.2 Adc) (I _{EC} = 0.4 Adc) | @ T _C = 25°C @ T _C = 25°C @ T _C = 125°C @ T _C = 25°C @ T _C = 125°C | V _{EC} | | 1.2 0.9 0.6 1 0.6 | 1.5 1.2 1.3 | V |
| Forward Recovery Time (I _F = 0.2 Adc, di/dt = 10 A/μs) (I _F = 0.4 Adc, di/dt = 10 A/μs) (I _F = 1 Adc, di/dt = 10 A/μs) | @ T _C = 25°C @ T _C = 25°C @ T _C = 25°C | t _{fr} | | 540 517 480 | | ns |

MJE18002D2

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

SWITCHING CHARACTERISTICS: Resistive Load (D.C. $\leq 10\%$, Pulse Width = 20 μs)

| | | | | | | | |
|---------------|--|-----------------------------|-----------|------|-----|------|---------------|
| Turn-on Time | $I_C = 1 \text{ Adc}$, $I_{B1} = 0.2 \text{ Adc}$ $I_{B2} = 0.5 \text{ Adc}$ $V_{CC} = 300 \text{ Vdc}$ | @ $T_C = 25^\circ\text{C}$ | t_{on} | | 100 | 150 | ns |
| | | @ $T_C = 125^\circ\text{C}$ | | | 94 | | |
| Turn-off Time | | @ $T_C = 25^\circ\text{C}$ | t_{off} | 0.95 | | 1.25 | μs |
| | | @ $T_C = 125^\circ\text{C}$ | | | 1.5 | | |

SWITCHING CHARACTERISTICS: Inductive Load ($V_{clamp} = 300 \text{ V}$, $V_{CC} = 15 \text{ V}$, $L = 200 \mu\text{H}$)

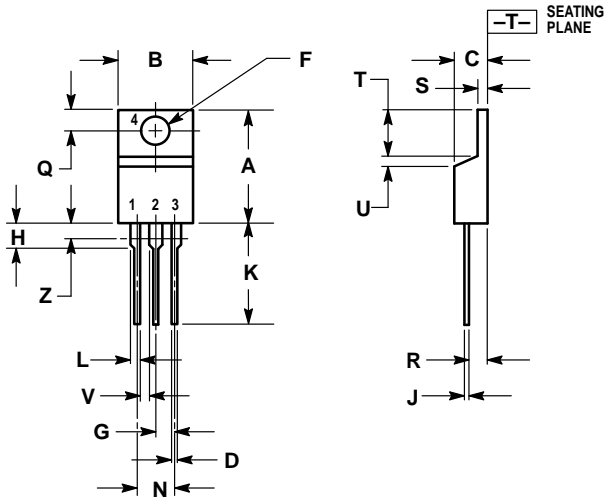
| | | | | | | | |
|----------------|---|-----------------------------|-------|-----|------|------|---------------|
| Fall Time | $I_C = 0.4 \text{ Adc}$ $I_{B1} = 40 \text{ mAdc}$ $I_{B2} = 0.2 \text{ Adc}$ | @ $T_C = 25^\circ\text{C}$ | t_f | | 130 | 175 | ns |
| | | @ $T_C = 125^\circ\text{C}$ | | | 120 | | |
| Storage Time | | @ $T_C = 25^\circ\text{C}$ | t_s | | 0.55 | 0.65 | μs |
| | | @ $T_C = 125^\circ\text{C}$ | | | 0.7 | | |
| Crossover Time | | @ $T_C = 25^\circ\text{C}$ | t_c | | 110 | 175 | ns |
| | | @ $T_C = 125^\circ\text{C}$ | | | 100 | | |
| Fall Time | $I_C = 0.8 \text{ Adc}$ $I_{B1} = 160 \text{ mAdc}$ $I_{B2} = 160 \text{ mAdc}$ | @ $T_C = 25^\circ\text{C}$ | t_f | | 130 | 175 | ns |
| | | @ $T_C = 125^\circ\text{C}$ | | | 140 | | |
| Storage Time | | @ $T_C = 25^\circ\text{C}$ | t_s | 2.1 | | 3 | 2.4 |
| | | @ $T_C = 125^\circ\text{C}$ | | | | | |
| Crossover Time | | @ $T_C = 25^\circ\text{C}$ | t_c | | 275 | 350 | ns |
| | | @ $T_C = 125^\circ\text{C}$ | | | 350 | | |
| Fall Time | $I_C = 1 \text{ Adc}$ $I_{B1} = 0.2 \text{ Adc}$ $I_{B2} = 0.5 \text{ Adc}$ | @ $T_C = 25^\circ\text{C}$ | t_f | | 100 | 150 | ns |
| | | @ $T_C = 125^\circ\text{C}$ | | | 100 | | |
| Storage Time | | @ $T_C = 25^\circ\text{C}$ | t_s | | 1.05 | 1.2 | μs |
| | | @ $T_C = 125^\circ\text{C}$ | | | 1.45 | | |
| Crossover Time | | @ $T_C = 25^\circ\text{C}$ | t_c | | 100 | 150 | ns |
| | | @ $T_C = 125^\circ\text{C}$ | | | 115 | | |

DYNAMIC SATURATION VOLTAGE

| | | | | | | | | |
|--|---|-------------------|----------------------------|----------------|--|------|-----|---|
| Dynamic Saturation Voltage: Determined 1 μs and 3 μs respectively after rising I_{B1} reaches 90% of final I_{B1} | $I_C = 0.4 \text{ Adc}$ $I_{B1} = 40 \text{ mA}$ $V_{CC} = 300 \text{ V}$ | @ 1 μs | @ $T_C = 25^\circ\text{C}$ | $V_{CE(dsat)}$ | | 7.4 | | V |
| | | @ 3 μs | @ $T_C = 25^\circ\text{C}$ | | | 2.5 | | |
| | $I_C = 1 \text{ Adc}$ $I_{B1} = 0.2 \text{ A}$ $V_{CC} = 300 \text{ V}$ | @ 1 μs | @ $T_C = 25^\circ\text{C}$ | | | 11.7 | | |
| | | @ 3 μs | @ $T_C = 25^\circ\text{C}$ | | | | 1.3 | |

MJE18002D2

PACKAGE DIMENSIONS



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

| DIM | INCHES | | MILLIMETERS | |
|-----|--------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.570 | 0.620 | 14.48 | 15.75 |
| B | 0.380 | 0.405 | 9.66 | 10.28 |
| C | 0.160 | 0.190 | 4.07 | 4.82 |
| D | 0.025 | 0.035 | 0.64 | 0.88 |
| F | 0.142 | 0.147 | 3.61 | 3.73 |
| G | 0.095 | 0.105 | 2.42 | 2.66 |
| H | 0.110 | 0.155 | 2.80 | 3.93 |
| J | 0.018 | 0.025 | 0.46 | 0.64 |
| K | 0.500 | 0.562 | 12.70 | 14.27 |
| L | 0.045 | 0.060 | 1.15 | 1.52 |
| N | 0.190 | 0.210 | 4.83 | 5.33 |
| Q | 0.100 | 0.120 | 2.54 | 3.04 |
| R | 0.080 | 0.110 | 2.04 | 2.79 |
| S | 0.045 | 0.055 | 1.15 | 1.39 |
| T | 0.235 | 0.255 | 5.97 | 6.47 |
| U | 0.000 | 0.050 | 0.00 | 1.27 |
| V | 0.045 | — | 1.15 | — |
| Z | — | 0.080 | — | 2.04 |

- STYLE 1:
 PIN 1. BASE
 2. COLLECTOR
 3. EMITTER
 4. COLLECTOR

**CASE 221A-06
 TO-220AB
 ISSUE Y**

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