

MJE170G, MJE171G, MJE172G (PNP), MJE180G, MJE181G, MJE182G (NPN)

Complementary Plastic Silicon Power Transistors

The MJE170/180 series is designed for low power audio amplifier and low current, high speed switching applications.

Features

- High DC Current Gain
- High Current–Gain – Bandwidth Product
- Annular Construction for Low Leakages
- Epoxy Meets UL 94 V–0 @ 0.125 in
- These Devices are Pb–Free and are RoHS Compliant*

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--|----------------|-----------------|--------------------------|
| Collector–Base Voltage MJE170G, MJE180G MJE171G, MJE181G MJE172G, MJE182G | V_{CB} | 60 80 100 | Vdc |
| Collector–Emitter Voltage MJE170G, MJE180G MJE171G, MJE181G MJE172G, MJE182G | V_{CEO} | 40 60 80 | Vdc |
| Emitter–Base Voltage | V_{EB} | 7.0 | Vdc |
| Collector Current – Continuous | I_C | 3.0 | Adc |
| Collector Current – Peak | I_{CM} | 6.0 | Adc |
| Base Current | I_B | 1.0 | Adc |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 12.5 0.012 | W W/ $^\circ\text{C}$ |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 1.5 0.1 | W W/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | –65 to +150 | $^\circ\text{C}$ |
| ESD – Human Body Model | HBM | 3B | V |
| ESD – Machine Model | MM | C | V |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

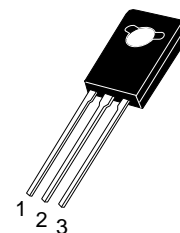
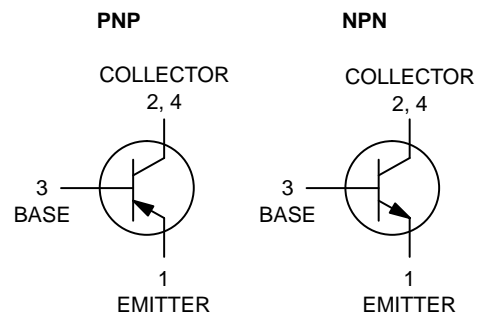
*For additional information on our Pb–Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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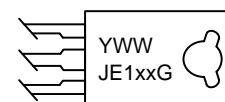
<http://onsemi.com>

**3 AMPERES
POWER TRANSISTORS
COMPLEMENTARY SILICON
40 – 60 – 80 VOLTS
12.5 WATTS**



TO-225
CASE 77-09
STYLE 1

MARKING DIAGRAM



- Y = Year
- WW = Work Week
- JE1xx = Specific Device Code
x = 70, 71, 72, 80, 81, or 82
- G = Pb–Free Package

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

MJE170G, MJE171G, MJE172G (PNP), MJE180G, MJE181G, MJE182G (NPN)

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|---|-----------------|------|---------------|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 10 | $^{\circ}C/W$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 83.4 | $^{\circ}C/W$ |

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

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

OFF CHARACTERISTICS

| | | | | |
|---|----------------|----------------|-------------------|-----------------------------|
| Collector-Emitter Sustaining Voltage ($I_C = 10 \text{ mAdc}$, $I_B = 0$) MJE170G, MJE180G MJE171G, MJE181G MJE172G, MJE182G | $V_{CEO(sus)}$ | 40 60 80 | - - - | Vdc |
| Collector Cutoff Current ($V_{CB} = 60 \text{ Vdc}$, $I_E = 0$) MJE170G, MJE180G ($V_{CB} = 80 \text{ Vdc}$, $I_E = 0$) MJE171G, MJE181G ($V_{CB} = 100 \text{ Vdc}$, $I_E = 0$) MJE172G, MJE182G ($V_{CB} = 60 \text{ Vdc}$, $I_E = 0$, $T_C = 150^{\circ}C$) MJE170G, MJE180G ($V_{CB} = 80 \text{ Vdc}$, $I_E = 0$, $T_C = 150^{\circ}C$) MJE171G, MJE181G ($V_{CB} = 100 \text{ Vdc}$, $I_E = 0$, $T_C = 150^{\circ}C$) MJE172G, MJE182G | I_{CBO} | - - - | 0.1 0.1 0.1 | μAdc mAdc |
| Emitter Cutoff Current ($V_{BE} = 7.0 \text{ Vdc}$, $I_C = 0$) | I_{EBO} | - | 0.1 | μAdc |

ON CHARACTERISTICS

| | | | | |
|--|---------------|----------------|-------------------|-----|
| DC Current Gain ($I_C = 100 \text{ mAdc}$, $V_{CE} = 1.0 \text{ Vdc}$) ($I_C = 500 \text{ mAdc}$, $V_{CE} = 1.0 \text{ Vdc}$) ($I_C = 1.5 \text{ Adc}$, $V_{CE} = 1.0 \text{ Vdc}$) | h_{FE} | 50 30 12 | 250 - - | - |
| Collector-Emitter Saturation Voltage ($I_C = 500 \text{ mAdc}$, $I_B = 50 \text{ mAdc}$) ($I_C = 1.5 \text{ Adc}$, $I_B = 150 \text{ mAdc}$) ($I_C = 3.0 \text{ Adc}$, $I_B = 600 \text{ mAdc}$) | $V_{CE(sat)}$ | - - - | 0.3 0.9 1.7 | Vdc |
| Base-Emitter Saturation Voltage ($I_C = 1.5 \text{ Adc}$, $I_B = 150 \text{ mAdc}$) ($I_C = 3.0 \text{ Adc}$, $I_B = 600 \text{ mAdc}$) | $V_{BE(sat)}$ | - - | 1.5 2.0 | Vdc |
| Base-Emitter On Voltage ($I_C = 500 \text{ mAdc}$, $V_{CE} = 1.0 \text{ Vdc}$) | $V_{BE(on)}$ | - | 1.2 | Vdc |

DYNAMIC CHARACTERISTICS

| | | | | |
|---|----------|--------|----------|-----|
| Current-Gain - Bandwidth Product (Note 1) ($I_C = 100 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$, $f_{test} = 10 \text{ MHz}$) | f_T | 50 | - | MHz |
| Output Capacitance ($V_{CB} = 10 \text{ Vdc}$, $I_E = 0$, $f = 0.1 \text{ MHz}$) MJE171G/MJE172G MJE181G/MJE182G | C_{ob} | - - | 60 40 | pF |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

1. $f_T = |h_{fe}| \cdot f_{test}$

MJE170G, MJE171G, MJE172G (PNP), MJE180G, MJE181G, MJE182G (NPN)

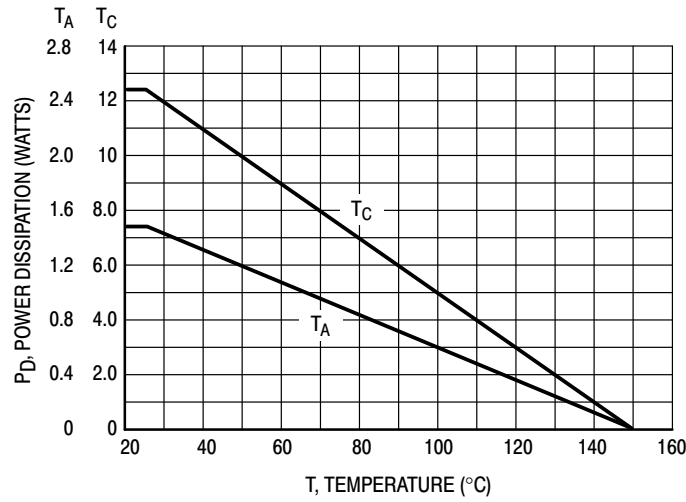


Figure 1. Power Derating

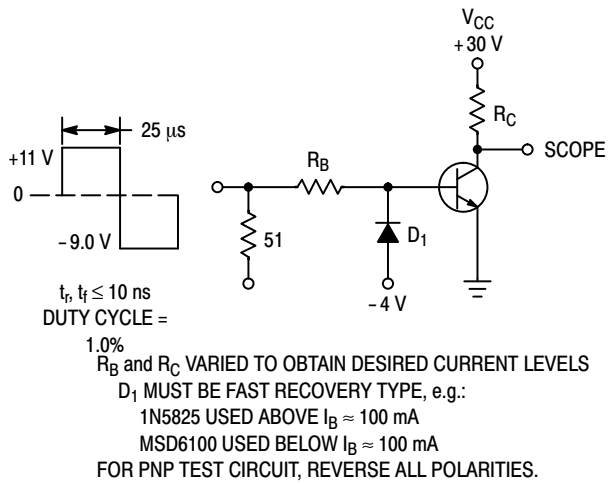


Figure 2. Switching Time Test Circuit

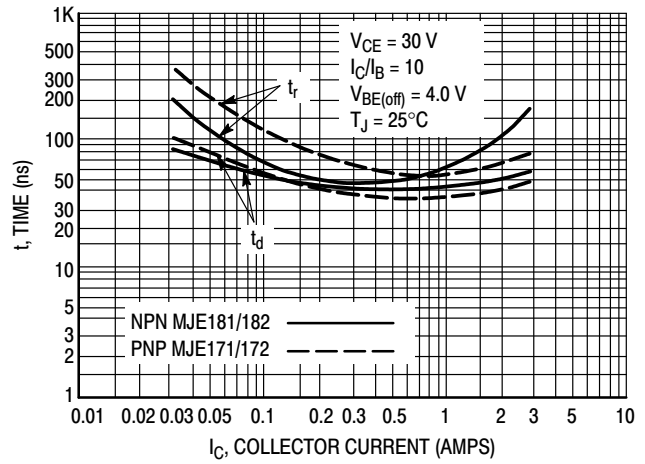


Figure 3. Turn-On Time

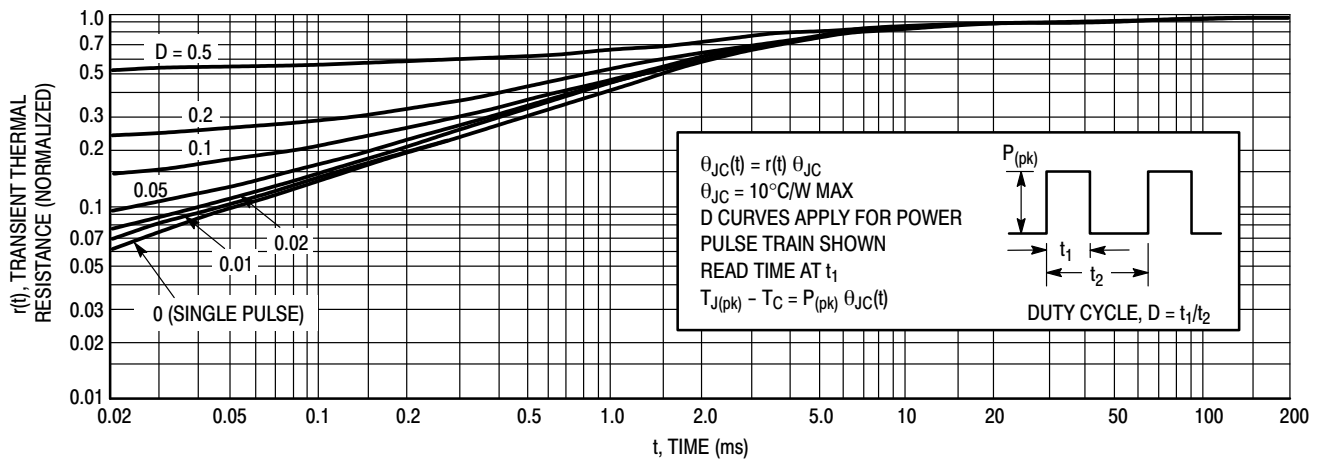


Figure 4. Thermal Response

MJE170G, MJE171G, MJE172G (PNP), MJE180G, MJE181G, MJE182G (NPN)

ACTIVE-REGION SAFE OPERATING AREA

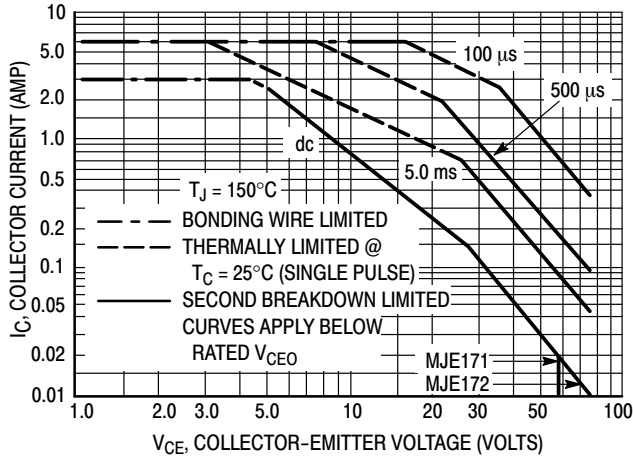


Figure 5. MJE171, MJE172

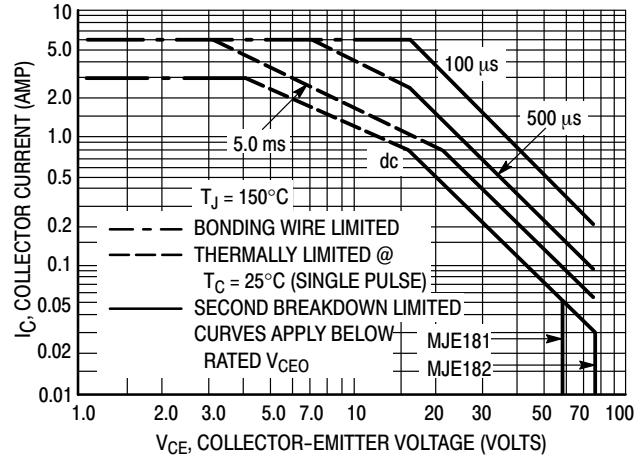


Figure 6. MJE181, MJE182

There are two limitations on the power handling ability of a transistor – average junction temperature and second breakdown. Safe operating area curves indicate $I_C - V_{CE}$ limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figures 5 and 6 is based on $T_{J(pk)} = 150^\circ\text{C}$; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} < 150^\circ\text{C}$. $T_{J(pk)}$ may be calculated from the data in Figure 4. At high case temperature, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

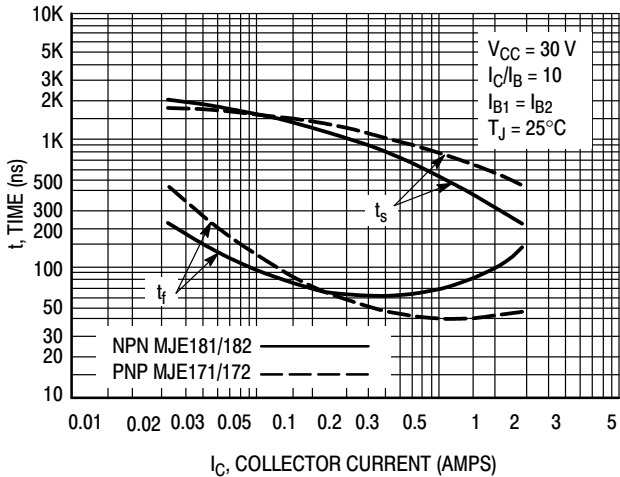


Figure 7. Turn-Off Time

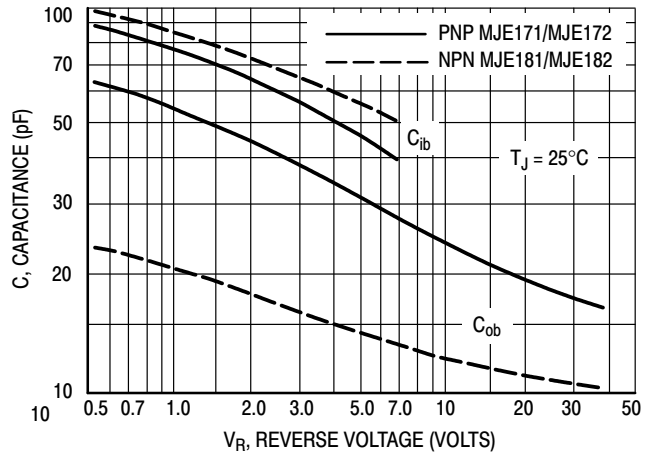


Figure 8. Capacitance

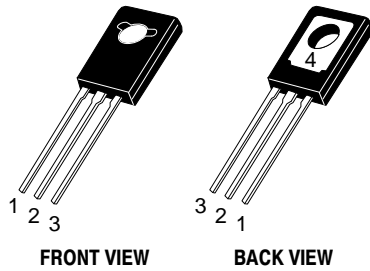
MJE170G, MJE171G, MJE172G (PNP), MJE180G, MJE181G, MJE182G (NPN)

ORDERING INFORMATION

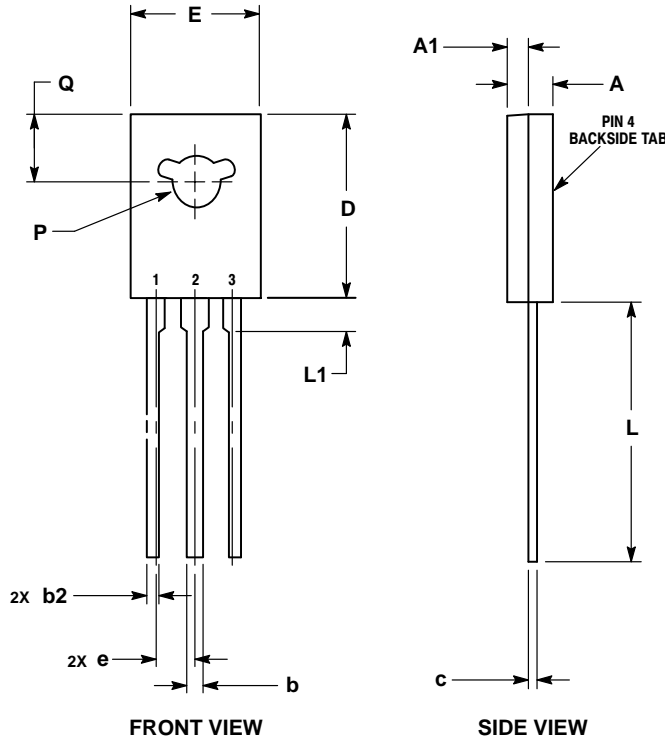
| Device | Package | Shipping |
|---------|---------------------|-----------------|
| MJE170G | TO-225 (Pb-Free) | 500 Units / Box |
| MJE171G | TO-225 (Pb-Free) | 500 Units / Box |
| MJE172G | TO-225 (Pb-Free) | 500 Units / Box |
| MJE180G | TO-225 (Pb-Free) | 500 Units / Box |
| MJE181G | TO-225 (Pb-Free) | 500 Units / Box |
| MJE182G | TO-225 (Pb-Free) | 500 Units / Box |

MJE170G, MJE171G, MJE172G (PNP), MJE180G, MJE181G, MJE182G (NPN)

PACKAGE DIMENSIONS



TO-225
CASE 77-09
ISSUE AC



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
 2. CONTROLLING DIMENSION: MILLIMETERS.
 3. NUMBER AND SHAPE OF LUGS OPTIONAL.

| DIM | MILLIMETERS | |
|-----|-------------|-------|
| | MIN | MAX |
| A | 2.40 | 3.00 |
| A1 | 1.00 | 1.50 |
| b | 0.60 | 0.90 |
| b2 | 0.51 | 0.88 |
| c | 0.39 | 0.63 |
| D | 10.60 | 11.10 |
| E | 7.40 | 7.80 |
| e | 2.04 | 2.54 |
| L | 14.50 | 16.63 |
| L1 | 1.27 | 2.54 |
| P | 2.90 | 3.30 |
| Q | 3.80 | 4.20 |

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

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