

MJW3281A (NPN) MJW1302A (PNP)

Preferred Devices

Complementary NPN-PNP Silicon Power Bipolar Transistors

The MJW3281A and MJW1302A are PowerBase™ power transistors for high power audio, disk head positioners and other linear applications.

Features

- Designed for 100 W Audio Frequency
- Gain Complementary:
Gain Linearity from 100 mA to 7 A
 $h_{FE} = 45$ (Min) @ $I_C = 8$ A
- Low Harmonic Distortion
- High Safe Operation Area – 1 A/100 V @ 1 Second
- High f_T – 30 MHz Typical
- Pb-Free Packages are Available*

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

| Rating | Symbol | Value | Unit |
|---|----------------|-------------|--------------------------|
| Collector-Emitter Voltage | V_{CEO} | 230 | Vdc |
| Collector-Base Voltage | V_{CBO} | 230 | Vdc |
| Emitter-Base Voltage | V_{EBO} | 5.0 | Vdc |
| Collector-Emitter Voltage – 1.5 V | V_{CEX} | 230 | Vdc |
| Collector Current – Continuous – Peak (Note 1) | I_C | 15 25 | Adc |
| Base Current – Continuous | I_B | 1.5 | Adc |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate Above 25°C | P_D | 200 1.43 | W W/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | -65 to +150 | $^\circ\text{C}$ |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|---|-----------------|-------|---------------------------|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 0.625 | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 40 | $^\circ\text{C}/\text{W}$ |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

1. Pulse Test: Pulse Width = 5 ms, Duty Cycle < 10%.

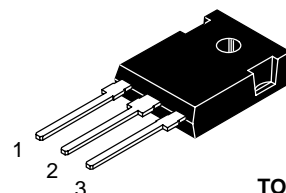
*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



ON Semiconductor®

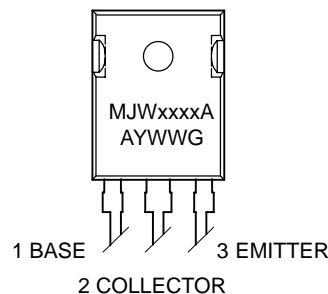
<http://onsemi.com>

**15 AMPERES
COMPLEMENTARY
SILICON POWER TRANSISTORS
230 VOLTS 200 WATTS**



TO-247
CASE 340L

MARKING DIAGRAM



xxxx = 3281 or 1302
A = Assembly Location
Y = Year
WW = Work Week
G = Pb-Free Package

ORDERING INFORMATION

| Device | Package | Shipping |
|-----------|---------------------|---------------|
| MJW3281A | TO-247 | 30 Units/Rail |
| MJW3281AG | TO-247 (Pb-Free) | 30 Units/Rail |
| MJW1302A | TO-247 | 30 Units/Rail |
| MJW1302AG | TO-247 (Pb-Free) | 30 Units/Rail |

Preferred devices are recommended choices for future use and best overall value.

MJW3281A (NPN) MJW1302A (PNP)

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 _{dc} , I _B = 0) | V _{CEO(sus)} | 230 | – | – | V _{dc} |
| Collector Cutoff Current (V _{CB} = 230 V _{dc} , I _E = 0) | I _{CBO} | – | – | 50 | μA _{dc} |
| Emitter Cutoff Current (V _{EB} = 5 V _{dc} , I _C = 0) | I _{EBO} | – | – | 5 | μA _{dc} |
| SECOND BREAKDOWN | | | | | |
| Second Breakdown Collector with Base Forward Biased (V _{CE} = 50 V _{dc} , t = 1 s (non–repetitive) (V _{CE} = 100 V _{dc} , t = 1 s (non–repetitive) | I _{S/b} | 4 1 | – – | – – | A _{dc} |
| ON CHARACTERISTICS | | | | | |
| DC Current Gain (I _C = 100 mA _{dc} , V _{CE} = 5 V _{dc}) (I _C = 1 A _{dc} , V _{CE} = 5 V _{dc}) (I _C = 3 A _{dc} , V _{CE} = 5 V _{dc}) (I _C = 5 A _{dc} , V _{CE} = 5 V _{dc}) (I _C = 7 A _{dc} , V _{CE} = 5 V _{dc}) (I _C = 8 A _{dc} , V _{CE} = 5 V _{dc}) (I _C = 15 A _{dc} , V _{CE} = 5 V _{dc}) | h _{FE} | 50 50 50 50 50 45 12 | 125 – – – 115 – 35 | 200 200 200 200 200 – – | – |
| Collector–Emitter Saturation Voltage (I _C = 10 A _{dc} , I _B = 1 A _{dc}) | V _{CE(sat)} | – | 0.4 | 2 | V _{dc} |
| Base–Emitter On Voltage (I _C = 8 A _{dc} , V _{CE} = 5 V _{dc}) | V _{BE(on)} | – | – | 2 | V _{dc} |
| DYNAMIC CHARACTERISTICS | | | | | |
| Current–Gain – Bandwidth Product (I _C = 1 A _{dc} , V _{CE} = 5 V _{dc} , f _{test} = 1 MHz) | f _T | – | 30 | – | MHz |
| Output Capacitance (V _{CB} = 10 V _{dc} , I _E = 0, f _{test} = 1 MHz) | C _{ob} | – | – | 600 | pF |

MJW3281A (NPN) MJW1302A (PNP)

TYPICAL CHARACTERISTICS

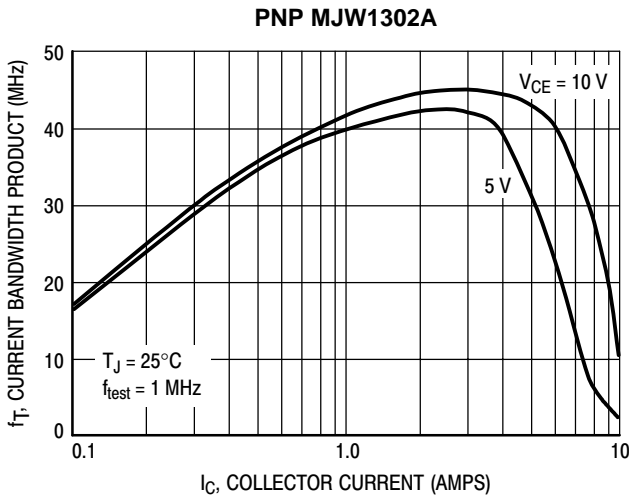


Figure 1. Typical Current Gain Bandwidth Product

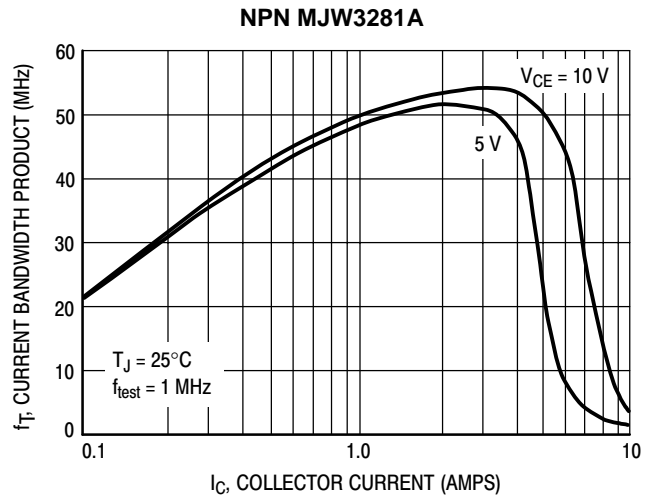


Figure 2. Typical Current Gain Bandwidth Product

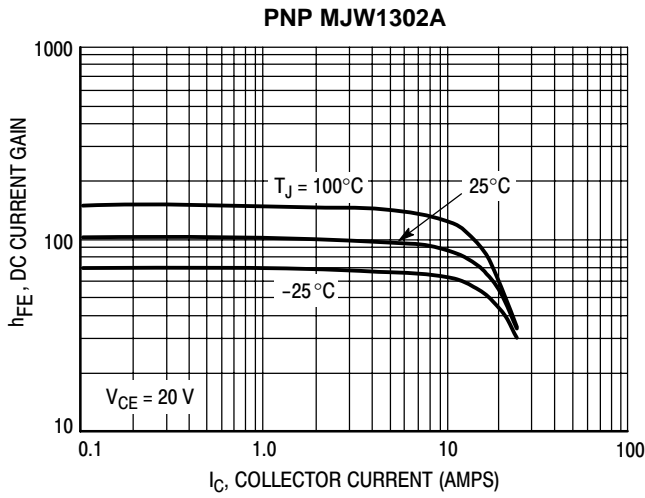


Figure 3. DC Current Gain, $V_{CE} = 20 V$

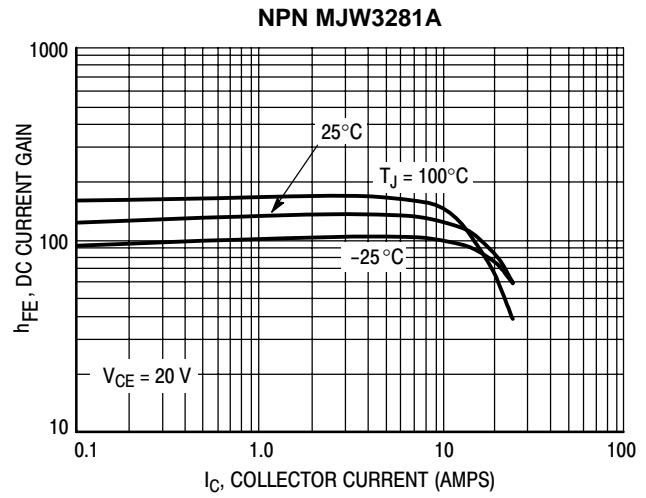


Figure 4. DC Current Gain, $V_{CE} = 20 V$

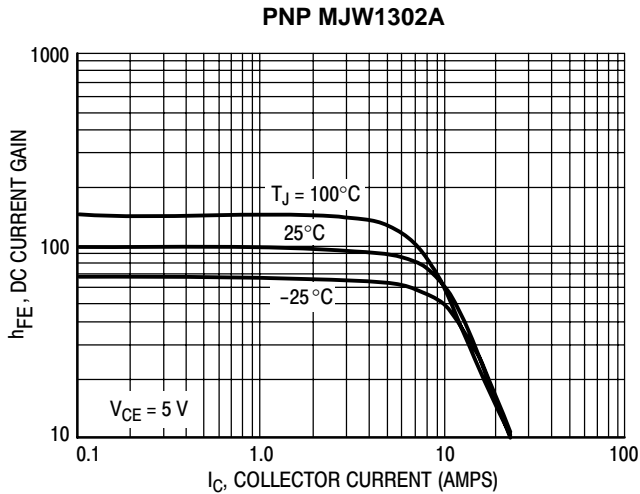


Figure 5. DC Current Gain, $V_{CE} = 5 V$

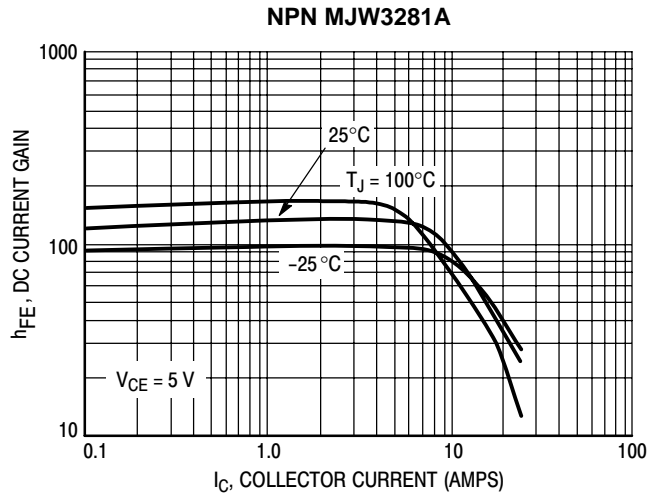


Figure 6. DC Current Gain, $V_{CE} = 5 V$

MJW3281A (NPN) MJW1302A (PNP)

TYPICAL CHARACTERISTICS

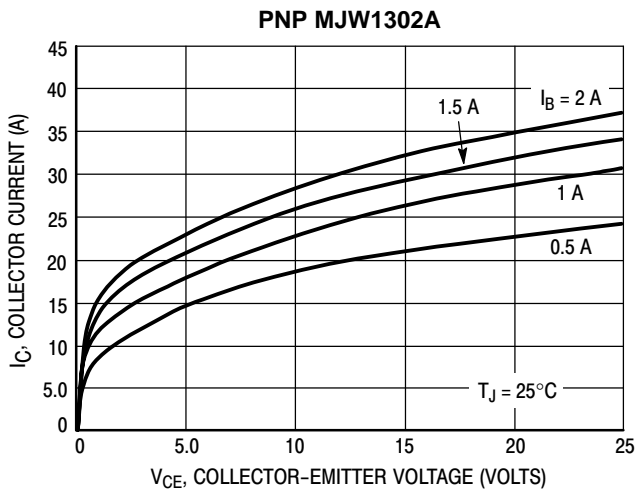


Figure 7. Typical Output Characteristics

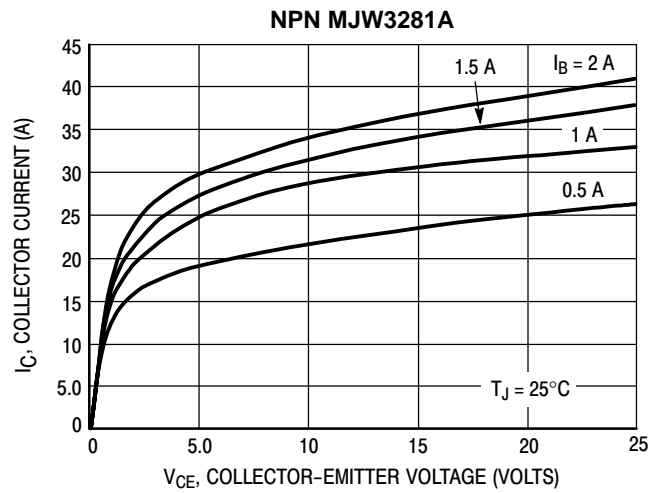


Figure 8. Typical Output Characteristics

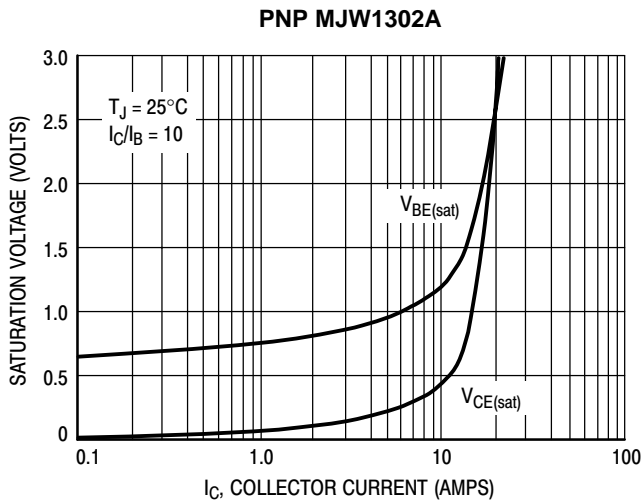


Figure 9. Typical Saturation Voltages

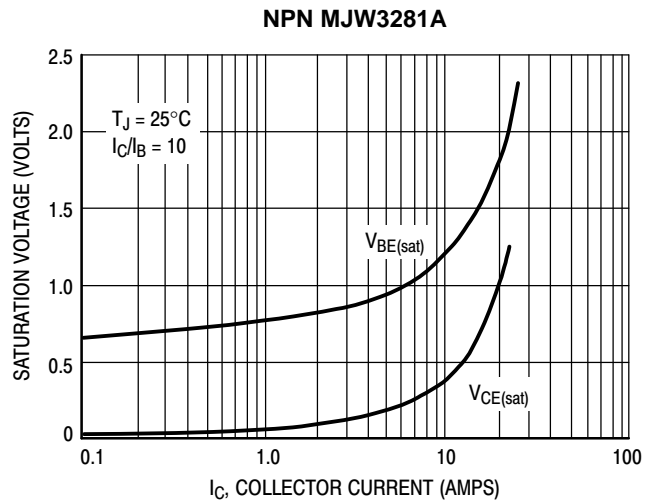


Figure 10. Typical Saturation Voltages

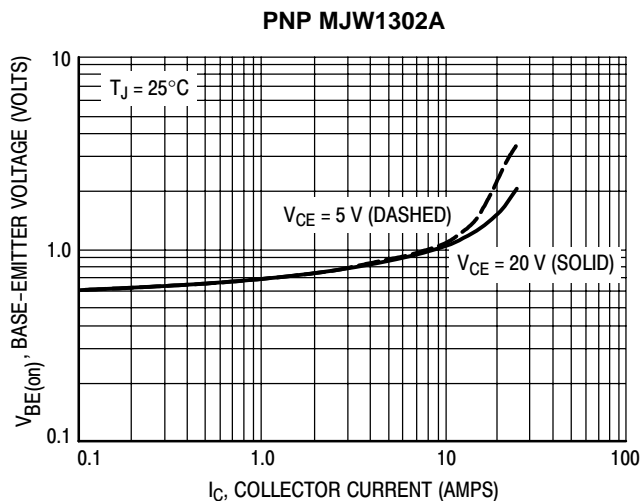


Figure 11. Typical Base-Emitter Voltage

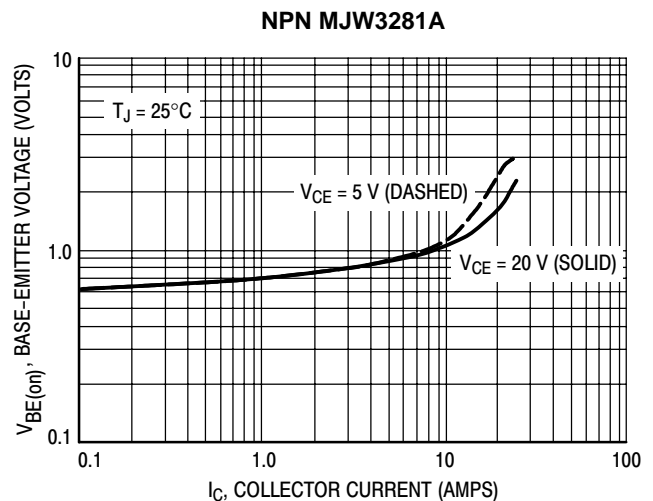


Figure 12. Typical Base-Emitter Voltage

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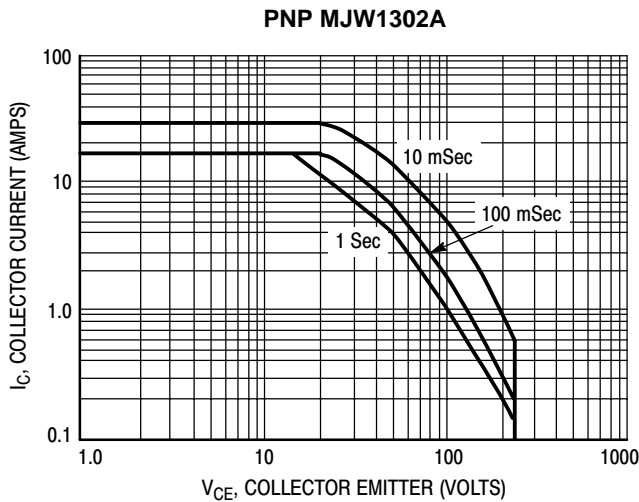


Figure 13. Active Region Safe Operating Area

There are two limitations on the power handling ability of a transistor; average junction temperature and secondary 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.

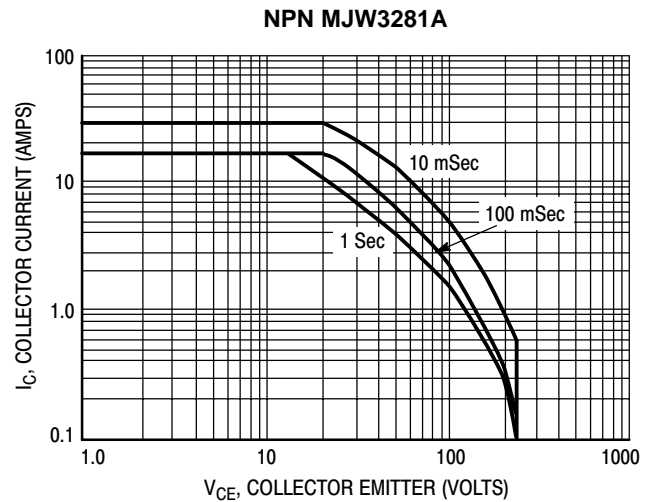


Figure 14. Active Region Safe Operating Area

The data of Figures 13 and 14 is based on $T_{J(pk)} = 150^\circ\text{C}$; T_C is variable depending on conditions. At high case temperatures, thermal limitations will reduce the power than can be handled to values less than the limitations imposed by second breakdown.

TYPICAL CHARACTERISTICS

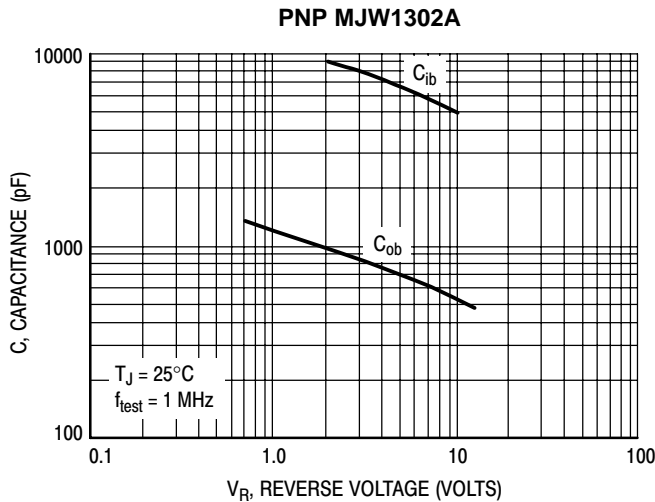


Figure 15. MJW1302A Typical Capacitance

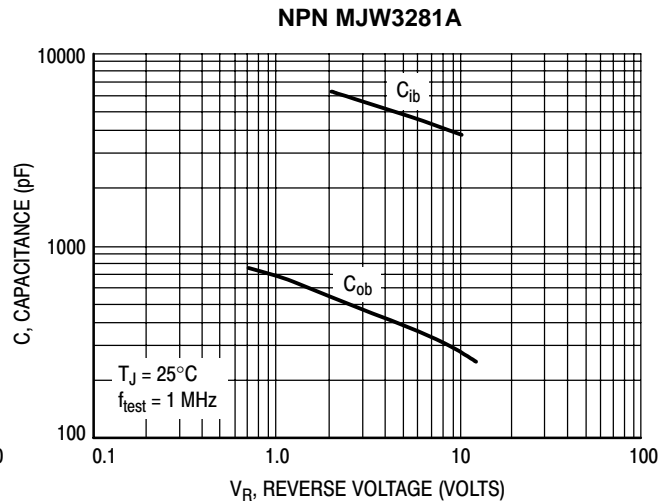
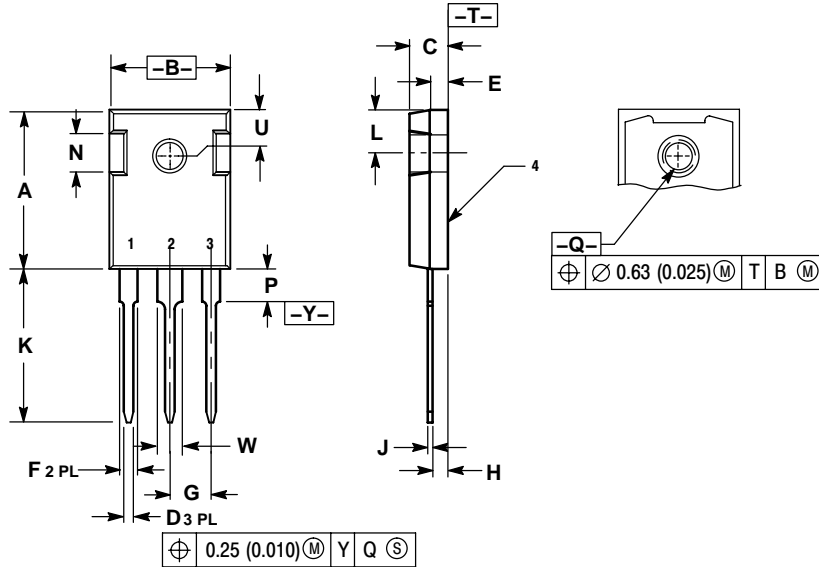


Figure 16. MJW3281A Typical Capacitance

MJW3281A (NPN) MJW1302A (PNP)

PACKAGE DIMENSIONS

TO-247
CASE 340L-02
ISSUE D



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|-------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 20.32 | 21.08 | 0.800 | 0.830 |
| B | 15.75 | 16.26 | 0.620 | 0.640 |
| C | 4.70 | 5.30 | 0.185 | 0.209 |
| D | 1.00 | 1.40 | 0.040 | 0.055 |
| E | 2.20 | 2.60 | 0.087 | 0.102 |
| F | 1.65 | 2.13 | 0.065 | 0.084 |
| G | 5.45 BSC | | 0.215 BSC | |
| H | 1.50 | 2.49 | 0.059 | 0.098 |
| J | 0.40 | 0.80 | 0.016 | 0.031 |
| K | 20.06 | 20.83 | 0.790 | 0.820 |
| L | 5.40 | 6.20 | 0.212 | 0.244 |
| N | 4.32 | 5.49 | 0.170 | 0.216 |
| P | --- | 4.50 | --- | 0.177 |
| Q | 3.55 | 3.65 | 0.140 | 0.144 |
| U | 6.15 BSC | | 0.242 BSC | |
| W | 2.87 | 3.12 | 0.113 | 0.123 |

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