

MJW3281A (NPN) MJW1302A (PNP)

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 | $^\circ\text{C}/\text{W}$ |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

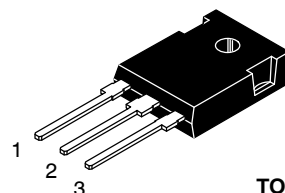
*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



ON Semiconductor®

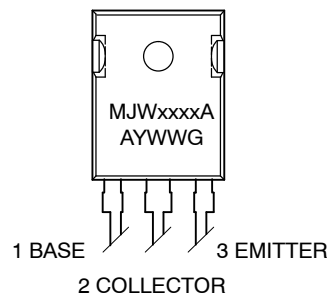
<http://onsemi.com>

**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 |

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

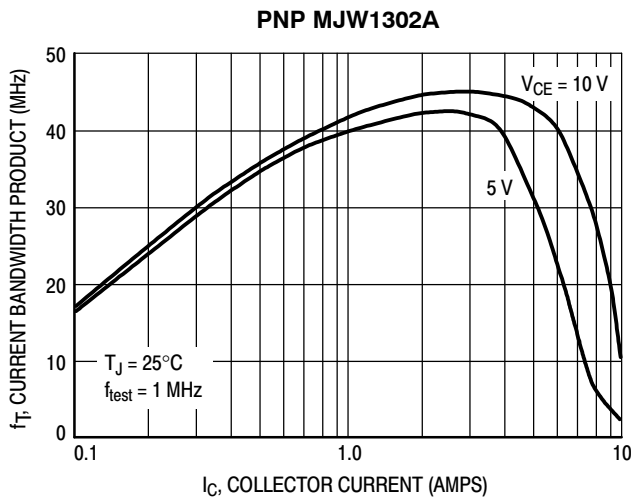


Figure 1. Typical Current Gain Bandwidth Product

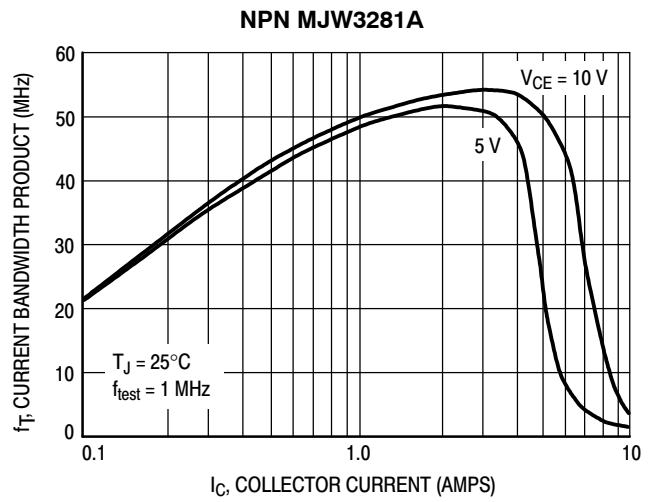


Figure 2. Typical Current Gain Bandwidth Product

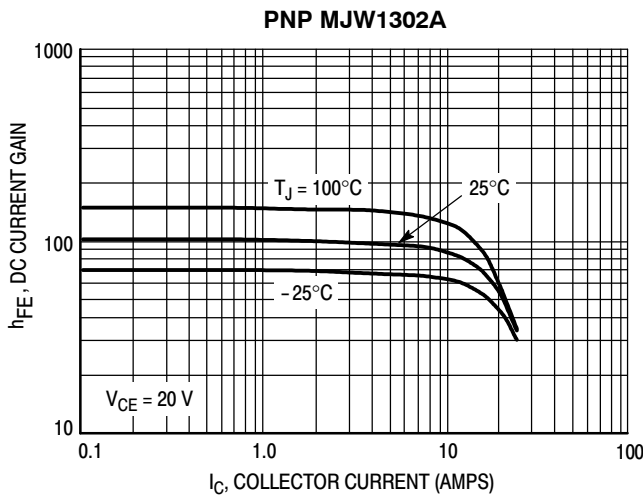


Figure 3. DC Current Gain, $V_{CE} = 20$ V

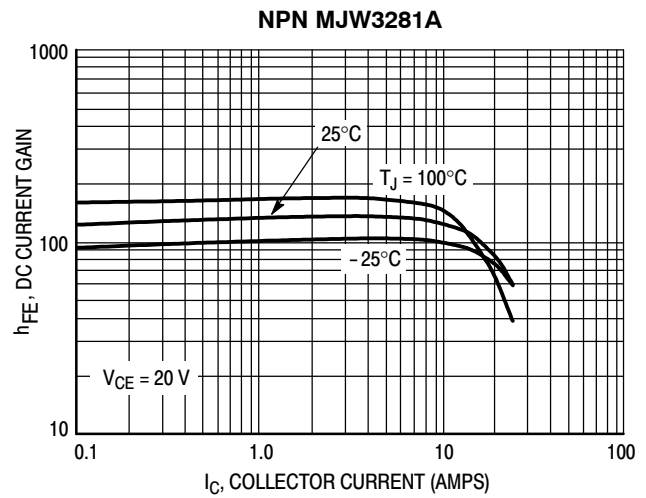


Figure 4. DC Current Gain, $V_{CE} = 20$ V

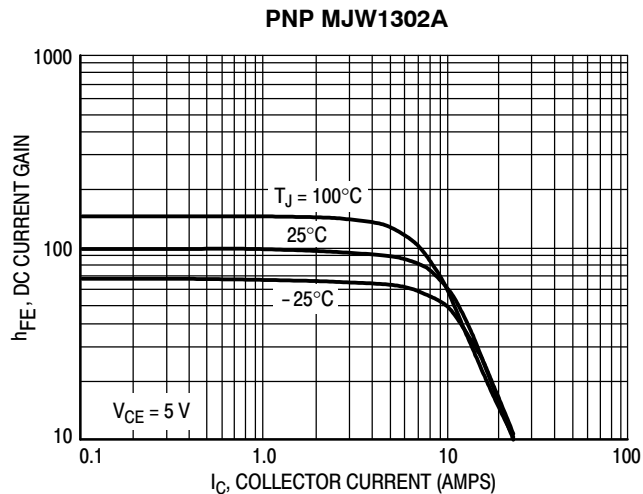


Figure 5. DC Current Gain, $V_{CE} = 5$ V

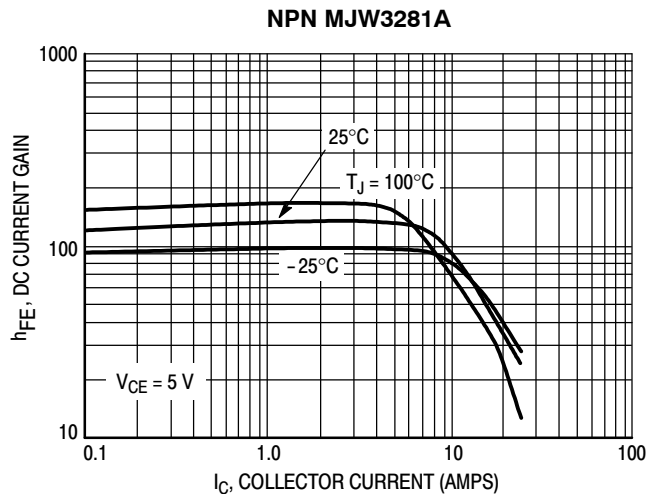


Figure 6. DC Current Gain, $V_{CE} = 5$ V

MJW3281A (NPN) MJW1302A (PNP)

TYPICAL CHARACTERISTICS

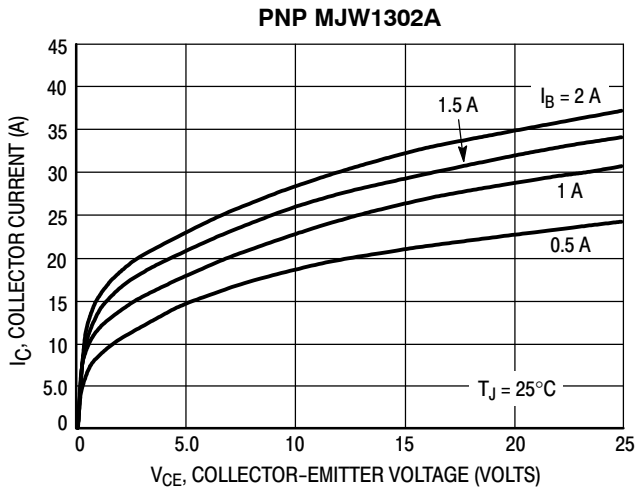


Figure 7. Typical Output Characteristics

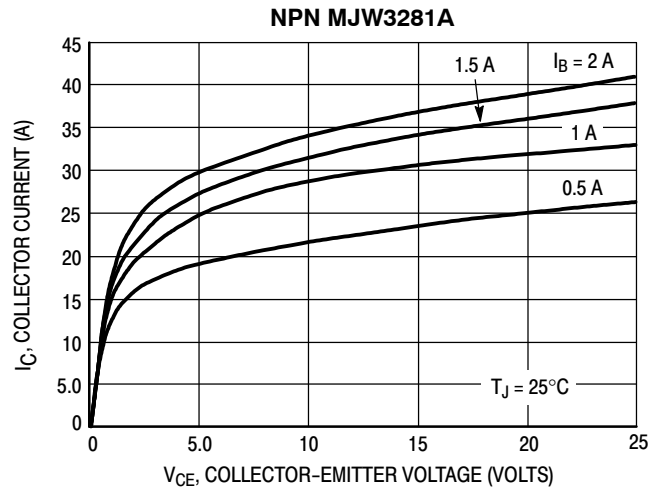


Figure 8. Typical Output Characteristics

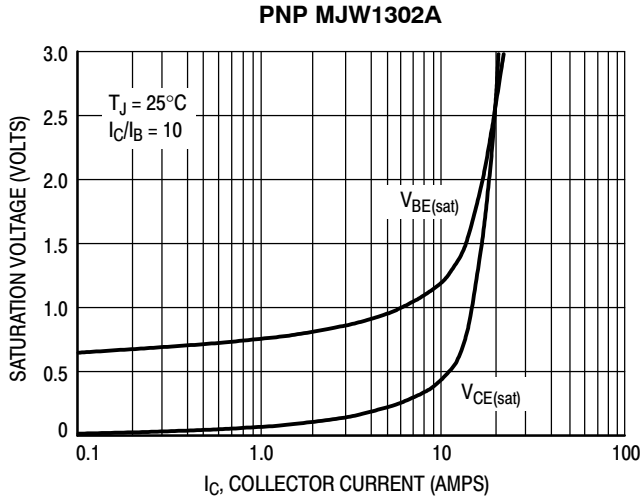


Figure 9. Typical Saturation Voltages

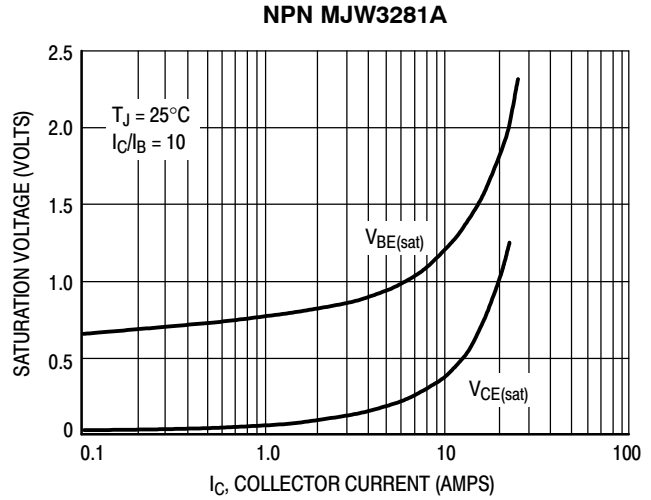


Figure 10. Typical Saturation Voltages

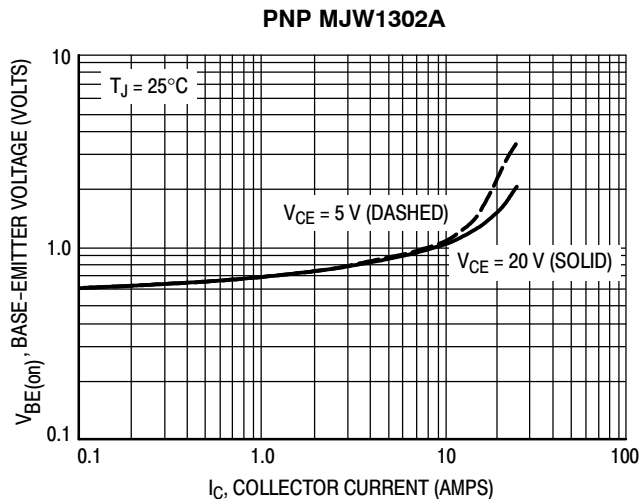


Figure 11. Typical Base-Emitter Voltage

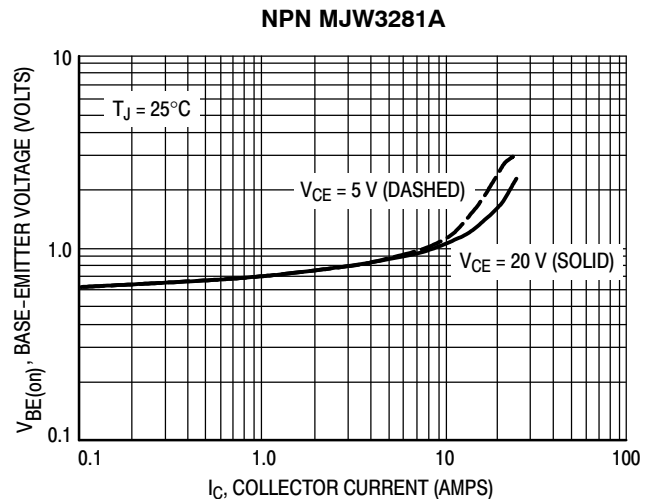


Figure 12. Typical Base-Emitter Voltage

MJW3281A (NPN) MJW1302A (PNP)

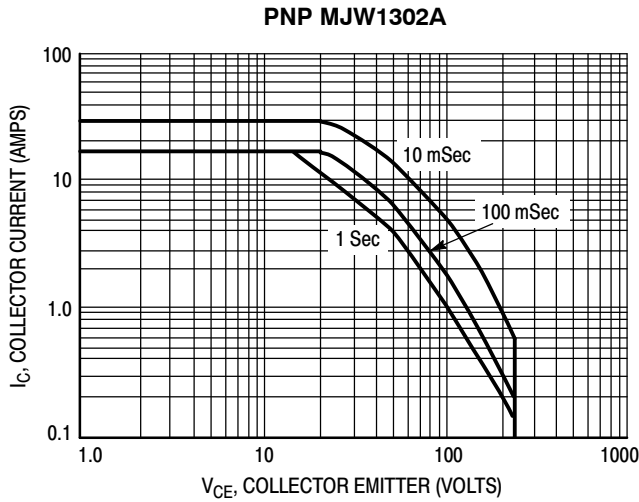


Figure 13. Active Region Safe Operating Area

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.

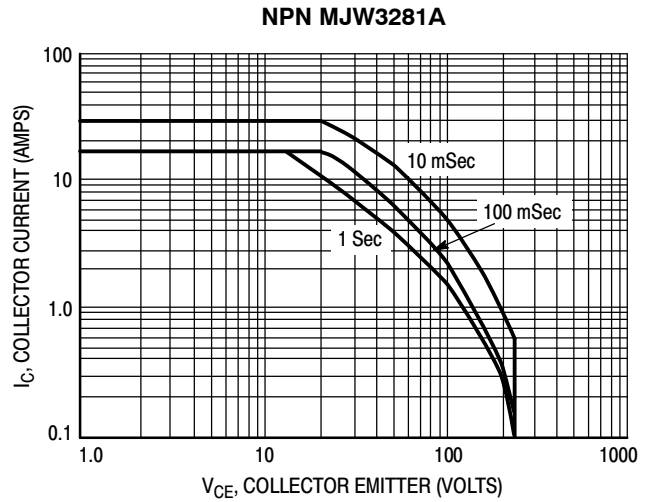


Figure 14. Active Region Safe Operating Area

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

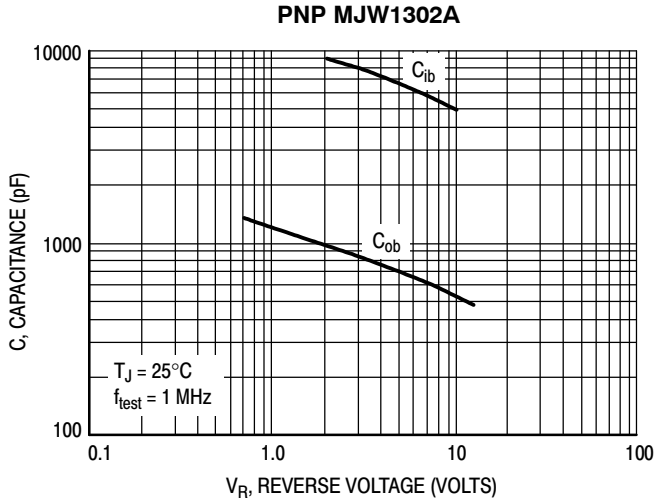


Figure 15. MJW1302A Typical Capacitance

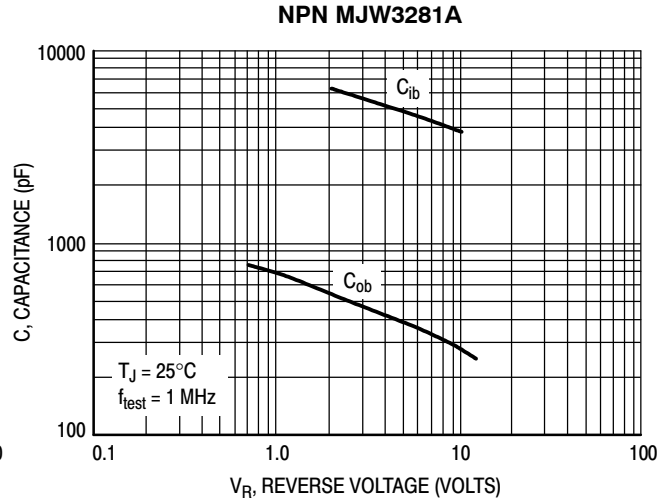
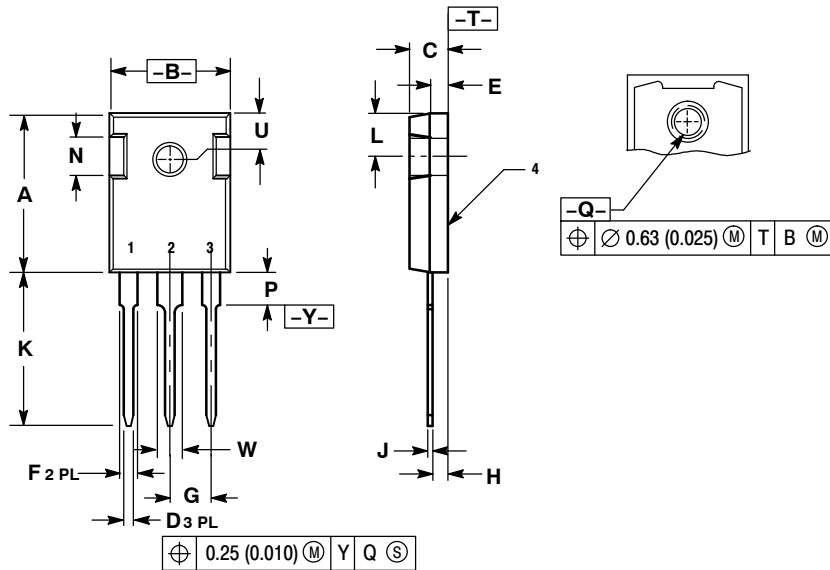


Figure 16. MJW3281A Typical Capacitance

MJW3281A (NPN) MJW1302A (PNP)

PACKAGE DIMENSIONS

TO-247
CASE 340L-02
ISSUE E




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 | 1.90 | 2.60 | 0.075 | 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 | 19.81 | 20.83 | 0.780 | 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 |

PowerBase is a trademark of Semiconductor Components Industries, LLC.

ON Semiconductor and  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5773-3850

ON Semiconductor Website: www.onsemi.com

Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative