

# 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 $25^\circ\text{C}$	$P_D$	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%.

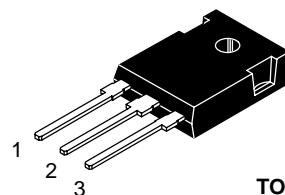
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



ON Semiconductor®

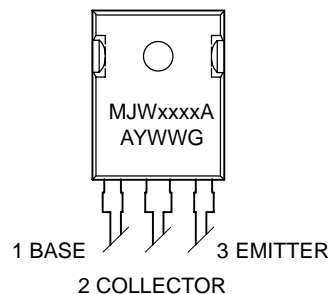
<http://onsemi.com>

**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.

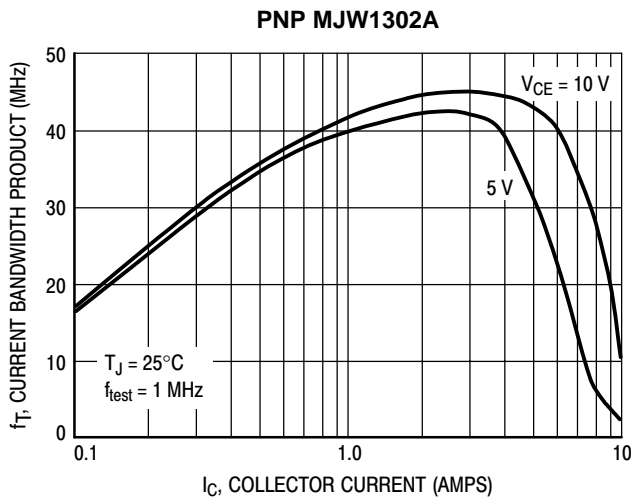
## MJW3281A (NPN) MJW1302A (PNP)

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

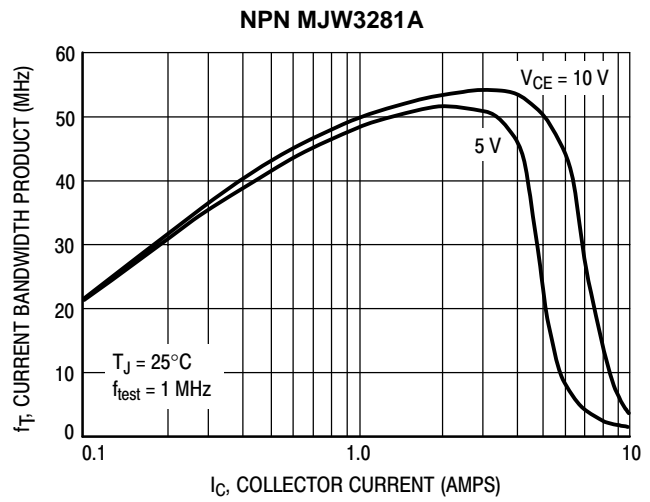
Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Collector-Emitter Sustaining Voltage ( $I_C = 100\text{ mA}_{dc}$ , $I_B = 0$ )	$V_{CEO(sus)}$	230	–	–	Vdc
Collector Cutoff Current ( $V_{CB} = 230\text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	–	–	50	$\mu\text{A}_{dc}$
Emitter Cutoff Current ( $V_{EB} = 5\text{ Vdc}$ , $I_C = 0$ )	$I_{EBO}$	–	–	5	$\mu\text{A}_{dc}$
<b>SECOND BREAKDOWN</b>					
Second Breakdown Collector with Base Forward Biased ( $V_{CE} = 50\text{ Vdc}$ , $t = 1\text{ s}$ (non-repetitive)) ( $V_{CE} = 100\text{ Vdc}$ , $t = 1\text{ s}$ (non-repetitive))	$I_{S/b}$	4 1	– –	– –	Adc
<b>ON CHARACTERISTICS</b>					
DC Current Gain ( $I_C = 100\text{ mA}_{dc}$ , $V_{CE} = 5\text{ Vdc}$ ) ( $I_C = 1\text{ A}_{dc}$ , $V_{CE} = 5\text{ Vdc}$ ) ( $I_C = 3\text{ A}_{dc}$ , $V_{CE} = 5\text{ Vdc}$ ) ( $I_C = 5\text{ A}_{dc}$ , $V_{CE} = 5\text{ Vdc}$ ) ( $I_C = 7\text{ A}_{dc}$ , $V_{CE} = 5\text{ Vdc}$ ) ( $I_C = 8\text{ A}_{dc}$ , $V_{CE} = 5\text{ Vdc}$ ) ( $I_C = 15\text{ A}_{dc}$ , $V_{CE} = 5\text{ Vdc}$ )	$h_{FE}$	50 50 50 50 50 45 12	125 – – – 115 – 35	200 200 200 200 200 – –	–
Collector-Emitter Saturation Voltage ( $I_C = 10\text{ A}_{dc}$ , $I_B = 1\text{ A}_{dc}$ )	$V_{CE(sat)}$	–	0.4	2	Vdc
Base-Emitter On Voltage ( $I_C = 8\text{ A}_{dc}$ , $V_{CE} = 5\text{ Vdc}$ )	$V_{BE(on)}$	–	–	2	Vdc
<b>DYNAMIC CHARACTERISTICS</b>					
Current-Gain – Bandwidth Product ( $I_C = 1\text{ A}_{dc}$ , $V_{CE} = 5\text{ Vdc}$ , $f_{test} = 1\text{ MHz}$ )	$f_T$	–	30	–	MHz
Output Capacitance ( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $f_{test} = 1\text{ MHz}$ )	$C_{ob}$	–	–	600	pF

# MJW3281A (NPN) MJW1302A (PNP)

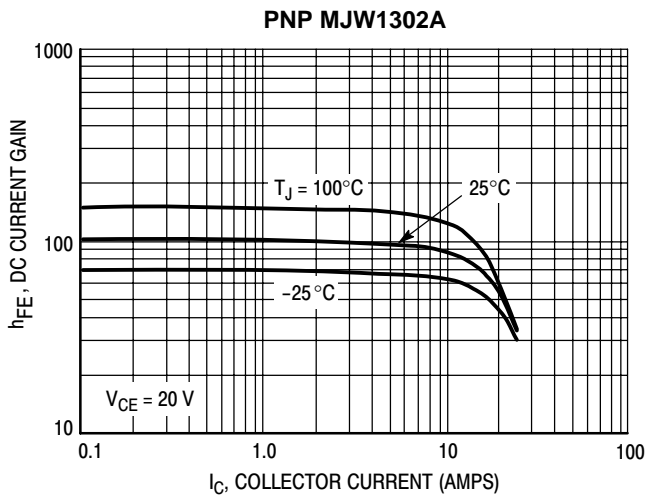
## TYPICAL CHARACTERISTICS



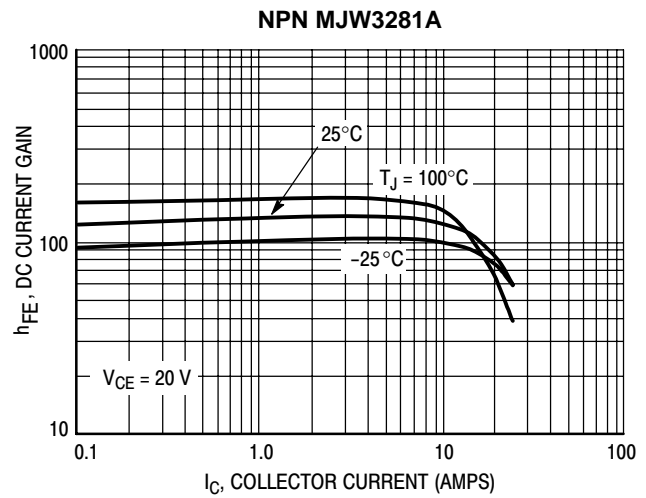
**Figure 1. Typical Current Gain Bandwidth Product**



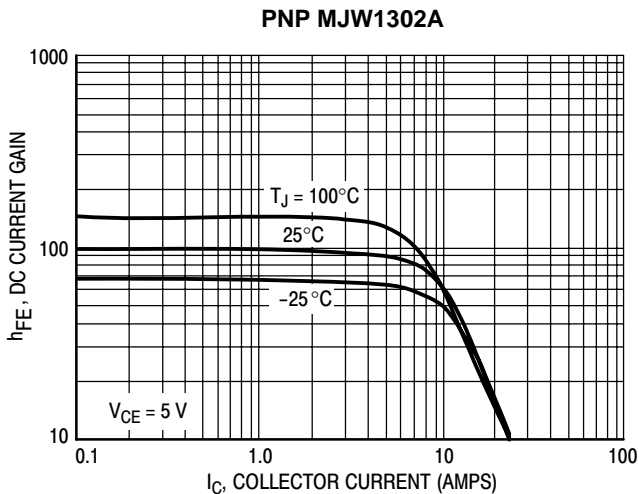
**Figure 2. Typical Current Gain Bandwidth Product**



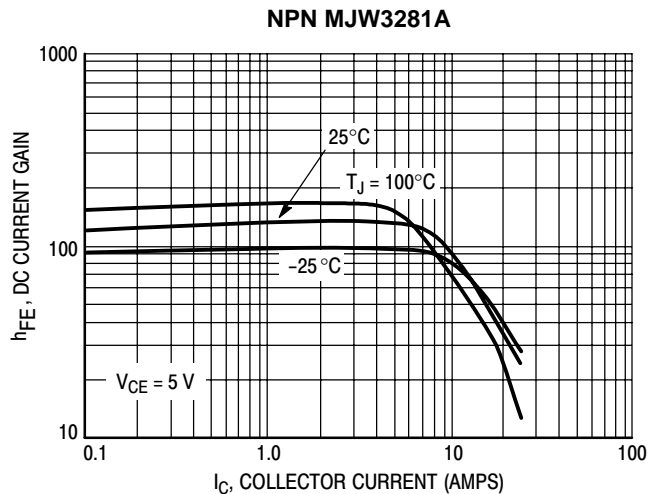
**Figure 3. DC Current Gain,  $V_{CE} = 20 \text{ V}$**



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



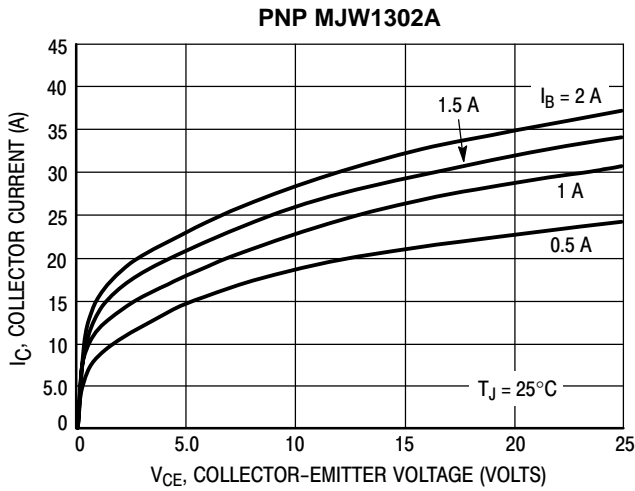
**Figure 5. DC Current Gain,  $V_{CE} = 5 \text{ V}$**



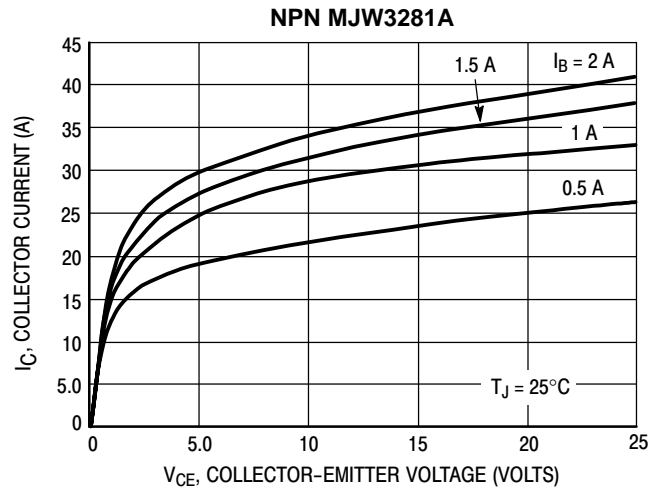
**Figure 6. DC Current Gain,  $V_{CE} = 5 \text{ V}$**

# MJW3281A (NPN) MJW1302A (PNP)

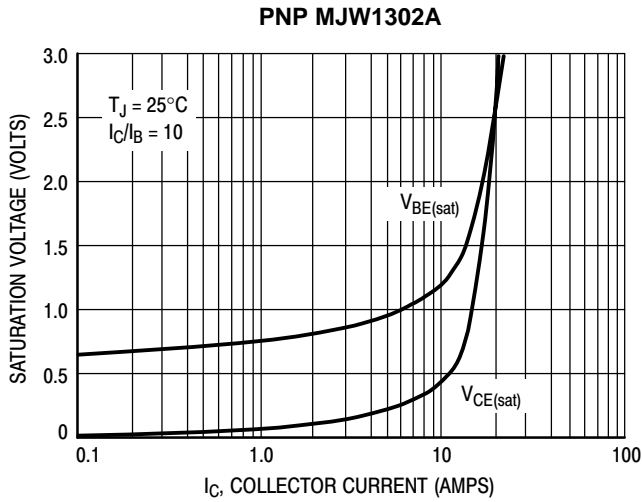
## TYPICAL CHARACTERISTICS



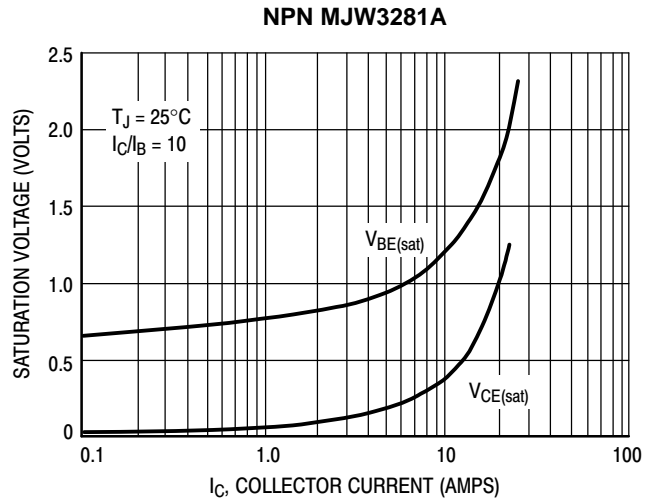
**Figure 7. Typical Output Characteristics**



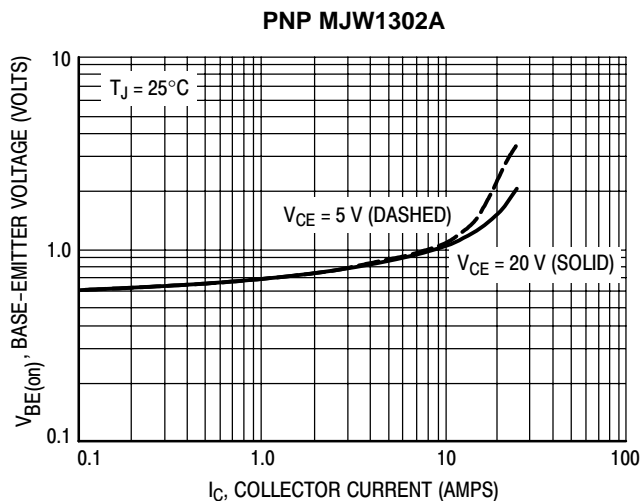
**Figure 8. Typical Output Characteristics**



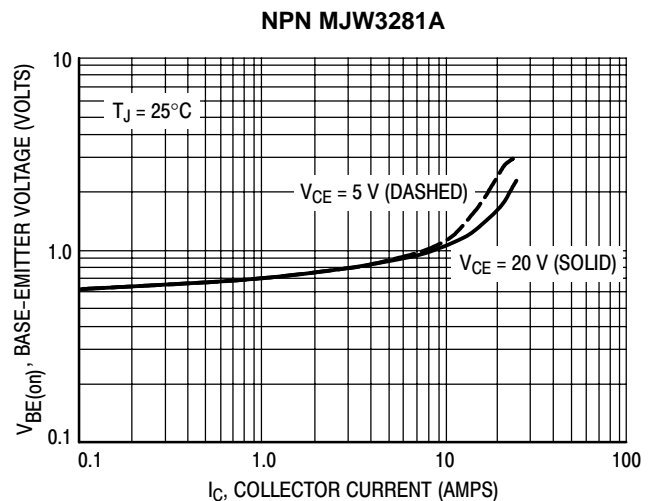
**Figure 9. Typical Saturation Voltages**



**Figure 10. Typical Saturation Voltages**



**Figure 11. Typical Base-Emitter Voltage**



**Figure 12. Typical Base-Emitter Voltage**

# MJW3281A (NPN) MJW1302A (PNP)

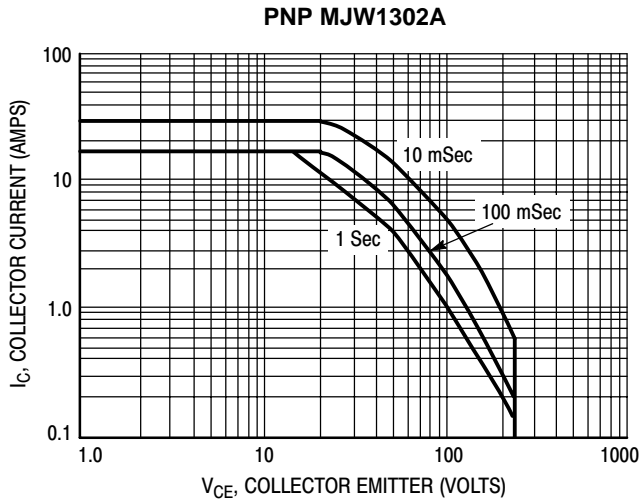


Figure 13. Active Region Safe Operating Area

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.

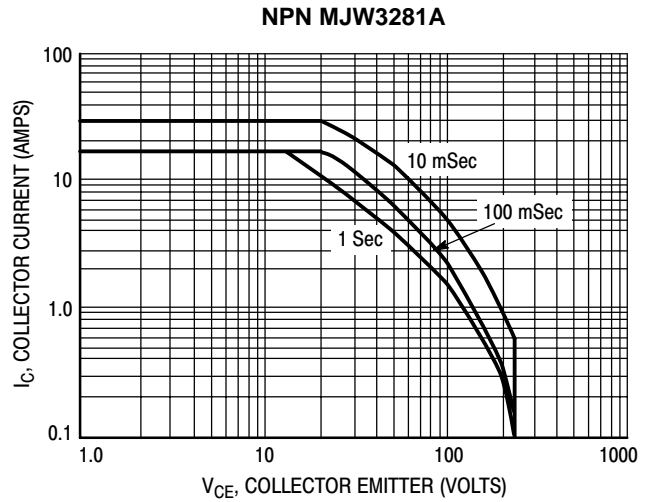


Figure 14. Active Region Safe Operating Area

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

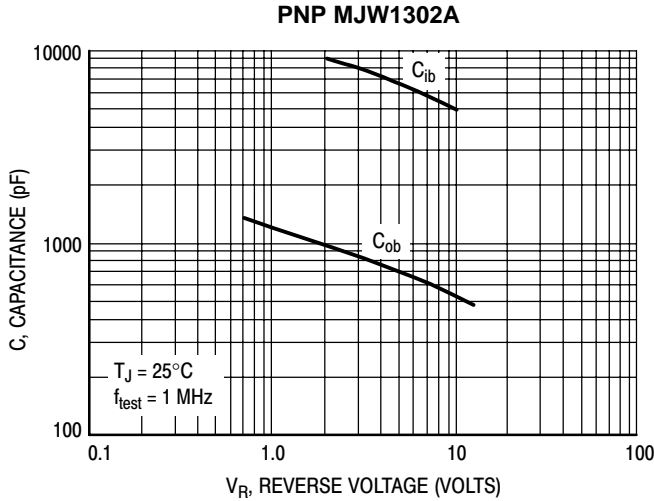


Figure 15. MJW1302A Typical Capacitance

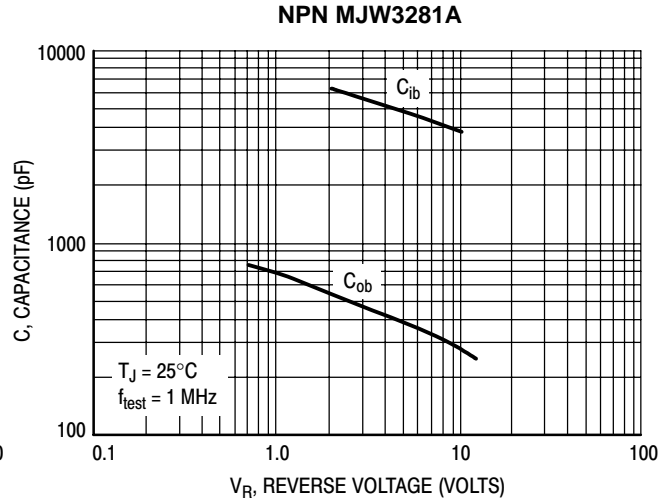
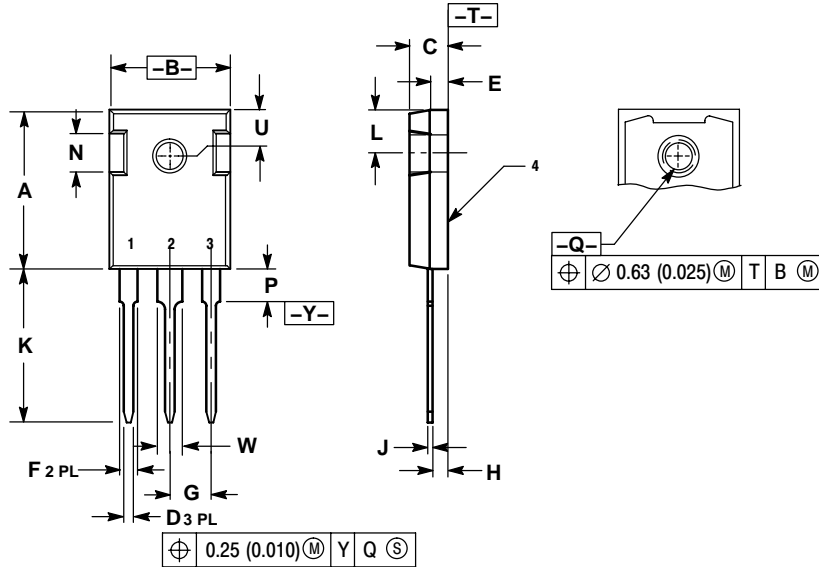


Figure 16. MJW3281A Typical Capacitance

# MJW3281A (NPN) MJW1302A (PNP)

## PACKAGE DIMENSIONS

TO-247  
CASE 340L-02  
ISSUE 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

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 61312, Phoenix, Arizona 85082-1312 USA  
**Phone:** 480-829-7710 or 800-344-3860 Toll Free USA/Canada  
**Fax:** 480-829-7709 or 800-344-3867 Toll Free USA/Canada  
**Email:** orderlit@onsemi.com

**N. American Technical Support:** 800-282-9855 Toll Free  
USA/Canada

**Japan:** ON Semiconductor, Japan Customer Focus Center  
2-9-1 Kamimeguro, Meguro-ku, Tokyo, Japan 153-0051  
**Phone:** 81-3-5773-3850

**ON Semiconductor Website:** <http://onsemi.com>

**Order Literature:** <http://www.onsemi.com/litorder>

For additional information, please contact your local Sales Representative.

**MJW3281A/D**