

# 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.

- 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

### 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	Watts 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.

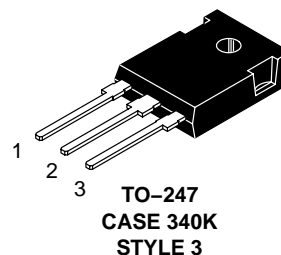
1. Pulse Test: Pulse Width = 5 ms, Duty Cycle < 10%.



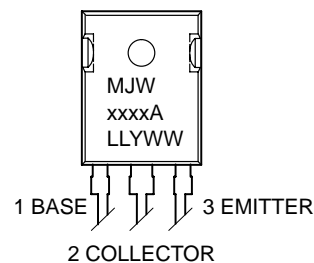
ON Semiconductor®

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



### MARKING DIAGRAM



MJWxxxxA = Device Code  
xxxx = 3281 OR 1302  
LL = Location Code  
Y = Year  
WW = Work Week

### ORDERING INFORMATION

Device	Package	Shipping
MJW3281A	TO-247	30 Units/Rail
MJW1302A	TO-247	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
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### OFF CHARACTERISTICS

Collector–Emitter Sustaining Voltage ( $I_C = 100\text{ mAdc}$ , $I_B = 0$ )	$V_{CEO(sus)}$	230	–	–	Vdc
Collector Cutoff Current ( $V_{CB} = 230\text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	–	–	50	$\mu\text{Adc}$
Emitter Cutoff Current ( $V_{EB} = 5\text{ Vdc}$ , $I_C = 0$ )	$I_{EBO}$	–	–	5	$\mu\text{Adc}$

### SECOND BREAKDOWN

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
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### ON CHARACTERISTICS

DC Current Gain ( $I_C = 100\text{ mAdc}$ , $V_{CE} = 5\text{ Vdc}$ ) ( $I_C = 1\text{ Adc}$ , $V_{CE} = 5\text{ Vdc}$ ) ( $I_C = 3\text{ Adc}$ , $V_{CE} = 5\text{ Vdc}$ ) ( $I_C = 5\text{ Adc}$ , $V_{CE} = 5\text{ Vdc}$ ) ( $I_C = 7\text{ Adc}$ , $V_{CE} = 5\text{ Vdc}$ ) ( $I_C = 8\text{ Adc}$ , $V_{CE} = 5\text{ Vdc}$ ) ( $I_C = 15\text{ Adc}$ , $V_{CE} = 5\text{ Vdc}$ )	$h_{FE}$	50 50 50 50 50 45 12	125 – – – 115 – 35	200 200 200 200 200 – –	–
Collector–Emitter Saturation Voltage ( $I_C = 10\text{ Adc}$ , $I_B = 1\text{ Adc}$ )	$V_{CE(sat)}$	–	0.4	2	Vdc
Base–Emitter On Voltage ( $I_C = 8\text{ Adc}$ , $V_{CE} = 5\text{ Vdc}$ )	$V_{BE(on)}$	–	–	2	Vdc

### DYNAMIC CHARACTERISTICS

Current–Gain – Bandwidth Product ( $I_C = 1\text{ Adc}$ , $V_{CE} = 5\text{ Vdc}$ , $f_{test} = 1\text{ MHz}$ )	$f_T$	–	30	–	MHz
Output Capacitance ( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $f_{test} = 1\text{ MHz}$ )	$C_{ob}$	–	–	600	pF

PNP MJW1302A

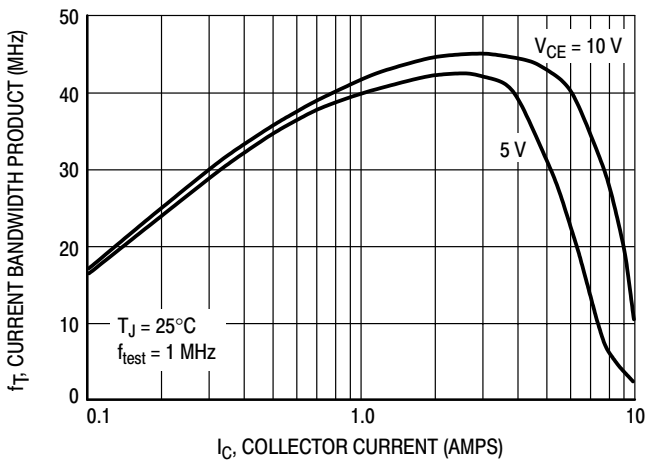


Figure 1. Typical Current Gain Bandwidth Product

NPN MJW3281A

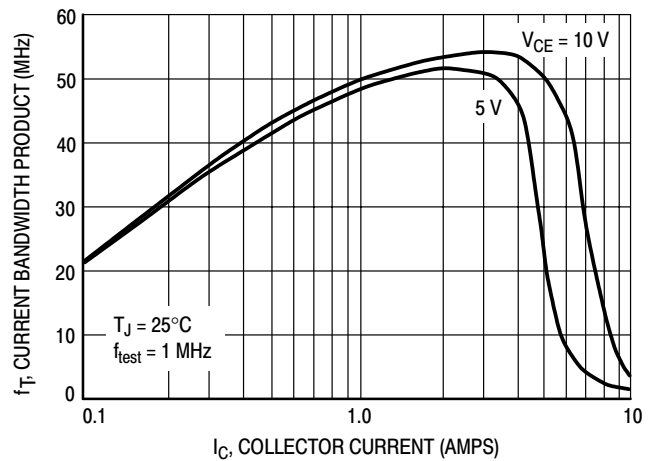
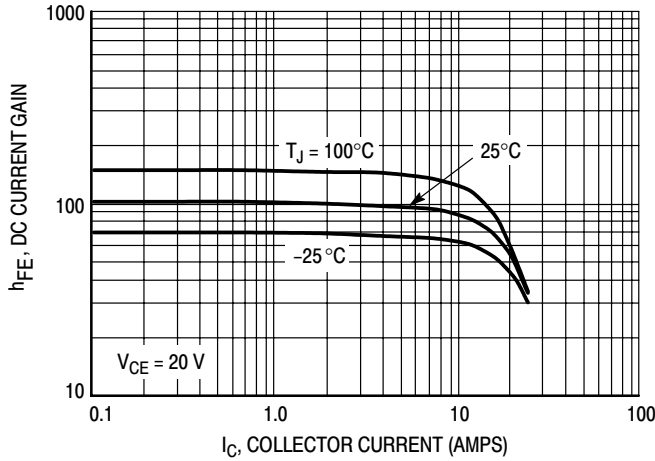


Figure 2. Typical Current Gain Bandwidth Product

# MJW3281A (NPN) MJW1302A (PNP)

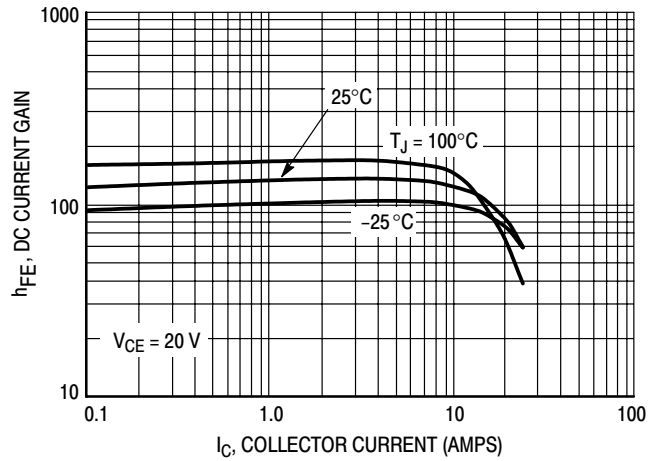
## TYPICAL CHARACTERISTICS

**PNP MJW1302A**



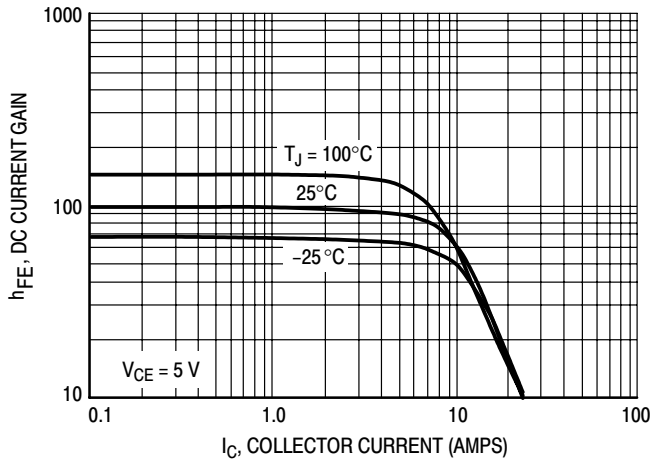
**Figure 3. DC Current Gain,  $V_{CE} = 20\text{ V}$**

**NPN MJW3281A**



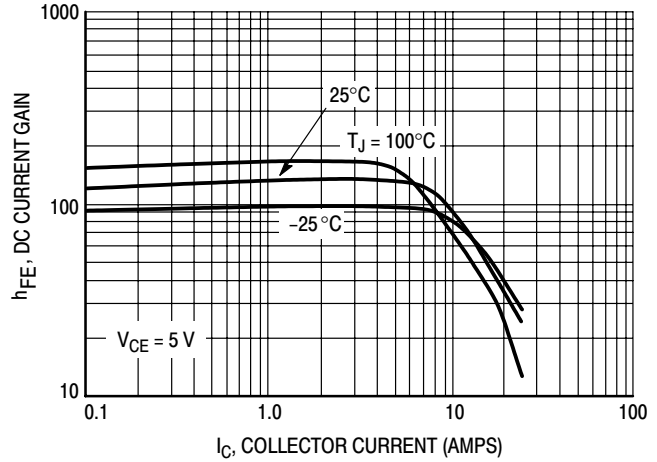
**Figure 4. DC Current Gain,  $V_{CE} = 20\text{ V}$**

**PNP MJW1302A**



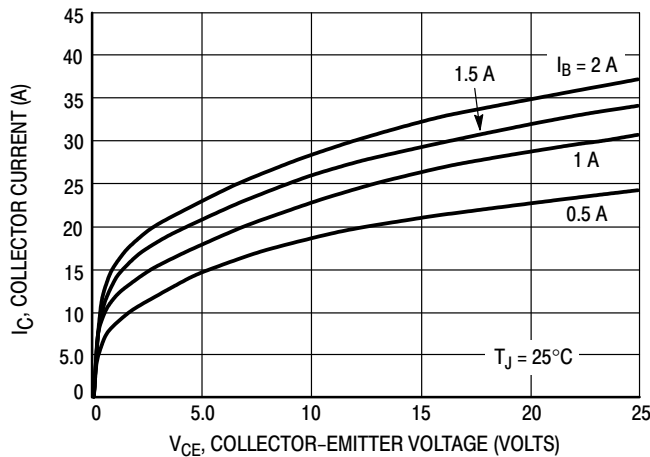
**Figure 5. DC Current Gain,  $V_{CE} = 5\text{ V}$**

**NPN MJW3281A**



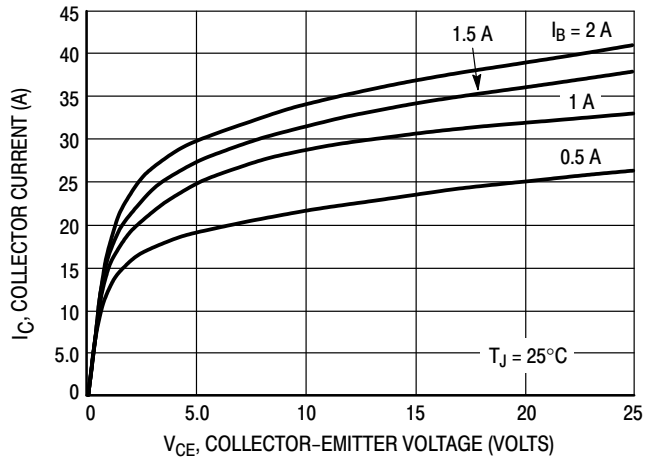
**Figure 6. DC Current Gain,  $V_{CE} = 5\text{ V}$**

**PNP MJW1302A**



**Figure 7. Typical Output Characteristics**

**NPN MJW3281A**



**Figure 8. Typical Output Characteristics**

# MJW3281A (NPN) MJW1302A (PNP)

## TYPICAL CHARACTERISTICS

PNP MJW1302A

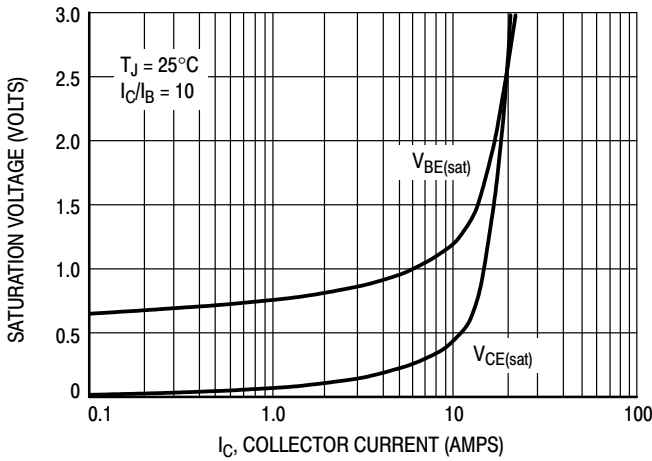


Figure 9. Typical Saturation Voltages

NPN MJW3281A

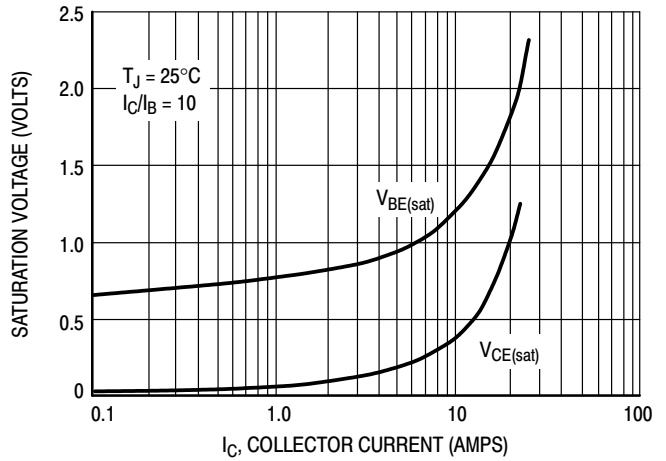


Figure 10. Typical Saturation Voltages

PNP MJW1302A

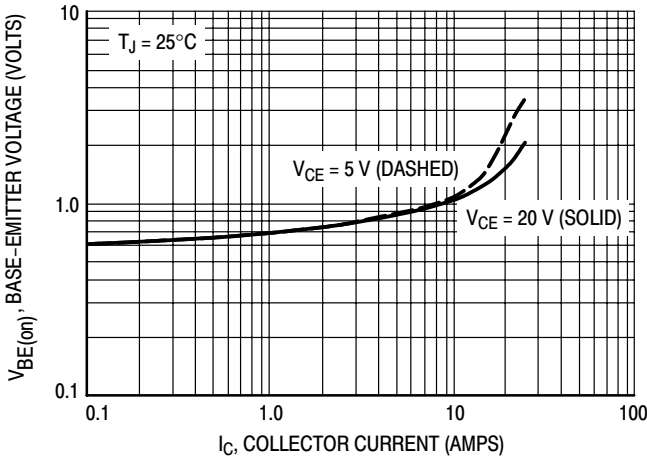


Figure 11. Typical Base-Emitter Voltage

NPN MJW3281A

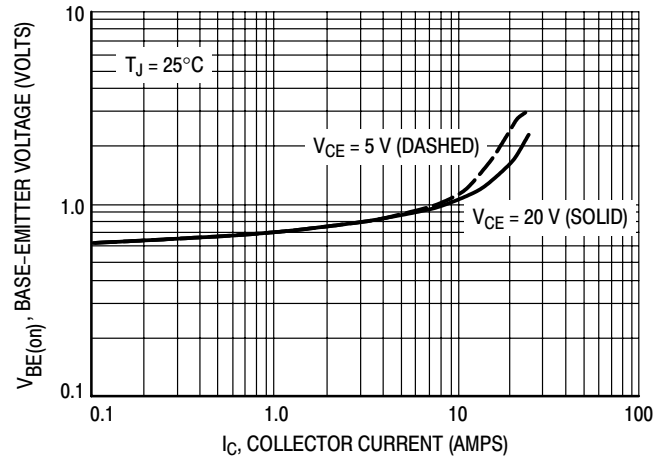


Figure 12. Typical Base-Emitter Voltage

PNP MJW1302A

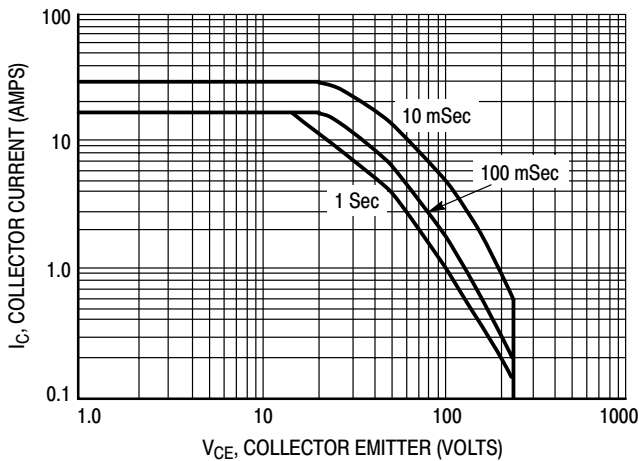


Figure 13. Active Region Safe Operating Area

NPN MJW3281A

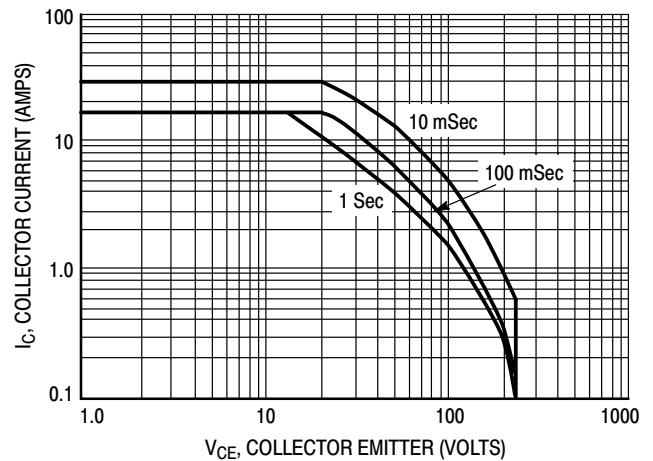


Figure 14. Active Region Safe Operating Area

## MJW3281A (NPN) MJW1302A (PNP)

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.

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

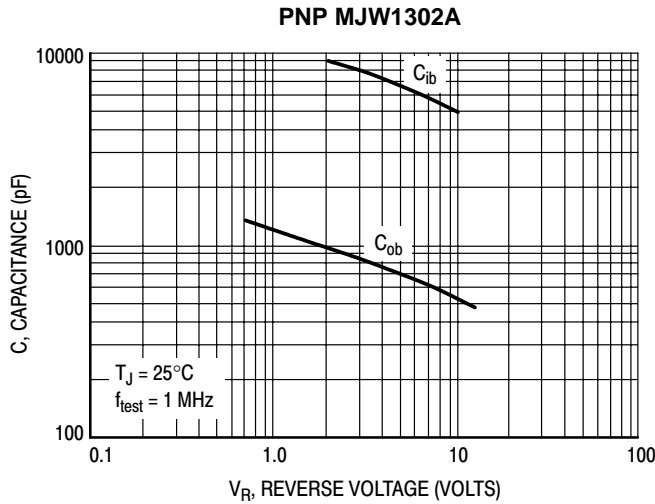


Figure 15. MJW1302A Typical Capacitance

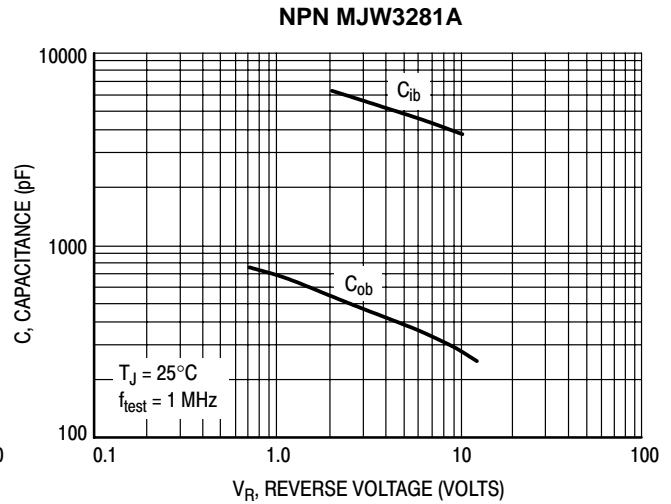
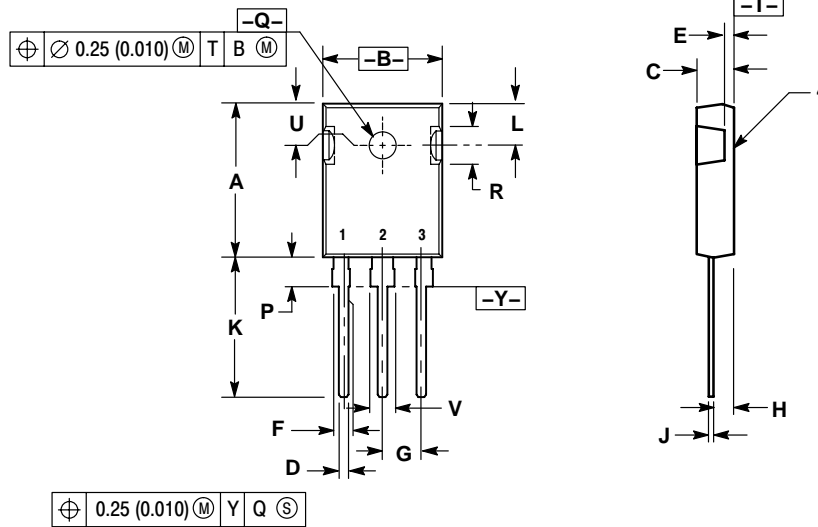


Figure 16. MJW3281A Typical Capacitance

# MJW3281A (NPN) MJW1302A (PNP)

## PACKAGE DIMENSIONS

TO-247  
CASE 340K-01  
ISSUE C



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

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	19.7	20.3	0.776	0.799
B	15.3	15.9	0.602	0.626
C	4.7	5.3	0.185	0.209
D	1.0	1.4	0.039	0.055
E	1.27 REF		0.050 REF	
F	2.0	2.4	0.079	0.094
G	5.5 BSC		0.216 BSC	
H	2.2	2.6	0.087	0.102
J	0.4	0.8	0.016	0.031
K	14.2	14.8	0.559	0.583
L	5.5 NOM		0.217 NOM	
P	3.7	4.3	0.146	0.169
Q	3.55	3.65	0.140	0.144
R	5.0 NOM		0.197 NOM	
U	5.5 BSC		0.217 BSC	
V	3.0	3.4	0.118	0.134

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

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**MJW3281A/D**