

# 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 $25^\circ\text{C}$	$P_D$	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	$^\circ\text{C}/\text{W}$

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%.

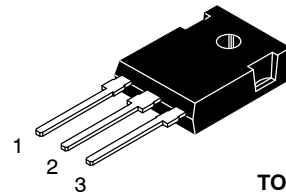
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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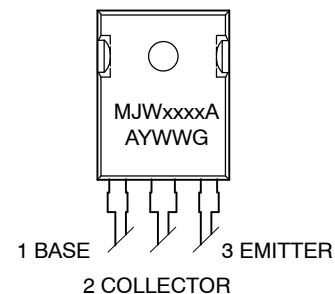
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**15 AMPERES  
COMPLEMENTARY  
SILICON POWER TRANSISTORS  
230 VOLTS 200 WATTS**



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

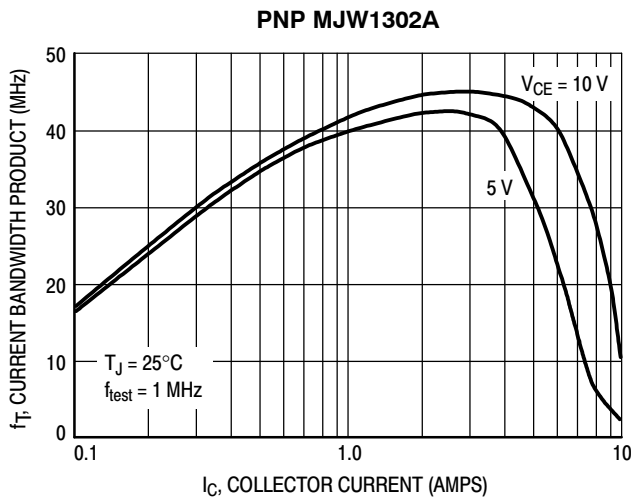
## MJW3281A (NPN) MJW1302A (PNP)

### ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

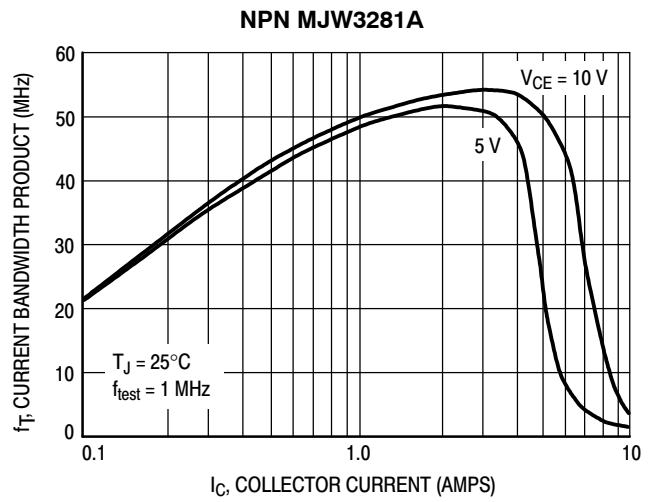
Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Collector-Emitter Sustaining Voltage (I <sub>C</sub> = 100 mA <sub>dc</sub> , I <sub>B</sub> = 0)	V <sub>CEO(sus)</sub>	230	–	–	V <sub>dc</sub>
Collector Cutoff Current (V <sub>CB</sub> = 230 V <sub>dc</sub> , I <sub>E</sub> = 0)	I <sub>CBO</sub>	–	–	50	μA <sub>dc</sub>
Emitter Cutoff Current (V <sub>EB</sub> = 5 V <sub>dc</sub> , I <sub>C</sub> = 0)	I <sub>EBO</sub>	–	–	5	μA <sub>dc</sub>
<b>SECOND BREAKDOWN</b>					
Second Breakdown Collector with Base Forward Biased (V <sub>CE</sub> = 50 V <sub>dc</sub> , t = 1 s (non-repetitive)) (V <sub>CE</sub> = 100 V <sub>dc</sub> , t = 1 s (non-repetitive))	I <sub>S/b</sub>	4 1	– –	– –	A <sub>dc</sub>
<b>ON CHARACTERISTICS</b>					
DC Current Gain (I <sub>C</sub> = 100 mA <sub>dc</sub> , V <sub>CE</sub> = 5 V <sub>dc</sub> ) (I <sub>C</sub> = 1 A <sub>dc</sub> , V <sub>CE</sub> = 5 V <sub>dc</sub> ) (I <sub>C</sub> = 3 A <sub>dc</sub> , V <sub>CE</sub> = 5 V <sub>dc</sub> ) (I <sub>C</sub> = 5 A <sub>dc</sub> , V <sub>CE</sub> = 5 V <sub>dc</sub> ) (I <sub>C</sub> = 7 A <sub>dc</sub> , V <sub>CE</sub> = 5 V <sub>dc</sub> ) (I <sub>C</sub> = 8 A <sub>dc</sub> , V <sub>CE</sub> = 5 V <sub>dc</sub> ) (I <sub>C</sub> = 15 A <sub>dc</sub> , V <sub>CE</sub> = 5 V <sub>dc</sub> )	h <sub>FE</sub>	50 50 50 50 50 45 12	125 – – – 115 – 35	200 200 200 200 200 – –	–
Collector-Emitter Saturation Voltage (I <sub>C</sub> = 10 A <sub>dc</sub> , I <sub>B</sub> = 1 A <sub>dc</sub> )	V <sub>CE(sat)</sub>	–	0.4	2	V <sub>dc</sub>
Base-Emitter On Voltage (I <sub>C</sub> = 8 A <sub>dc</sub> , V <sub>CE</sub> = 5 V <sub>dc</sub> )	V <sub>BE(on)</sub>	–	–	2	V <sub>dc</sub>
<b>DYNAMIC CHARACTERISTICS</b>					
Current-Gain – Bandwidth Product (I <sub>C</sub> = 1 A <sub>dc</sub> , V <sub>CE</sub> = 5 V <sub>dc</sub> , f <sub>test</sub> = 1 MHz)	f <sub>T</sub>	–	30	–	MHz
Output Capacitance (V <sub>CB</sub> = 10 V <sub>dc</sub> , I <sub>E</sub> = 0, f <sub>test</sub> = 1 MHz)	C <sub>ob</sub>	–	–	600	pF

# MJW3281A (NPN) MJW1302A (PNP)

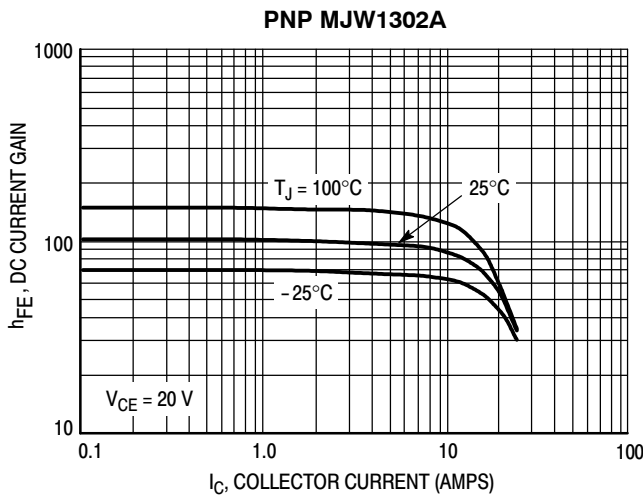
## TYPICAL CHARACTERISTICS



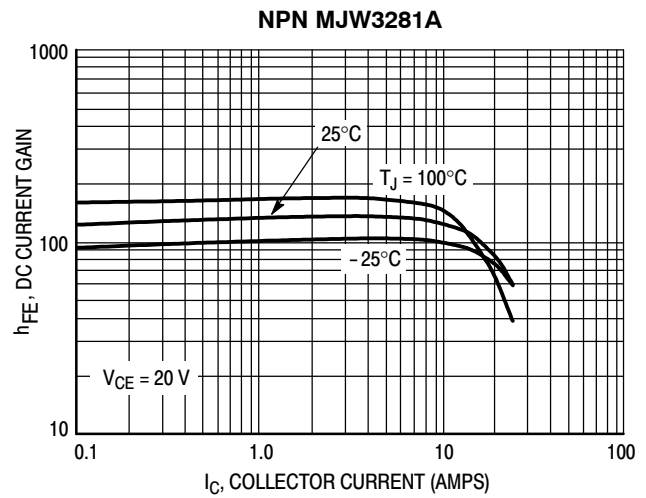
**Figure 1. Typical Current Gain Bandwidth Product**



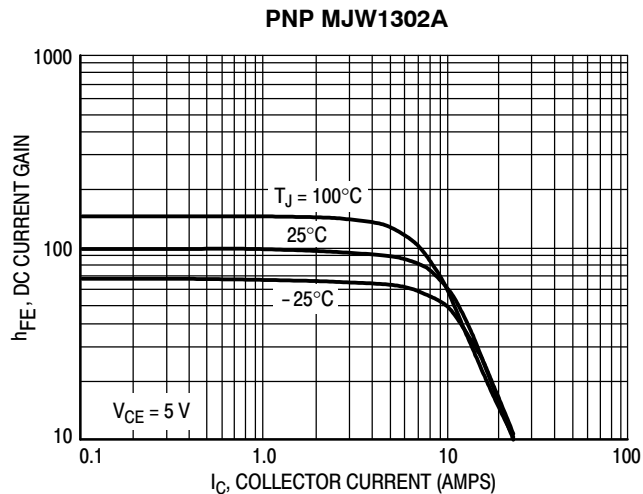
**Figure 2. Typical Current Gain Bandwidth Product**



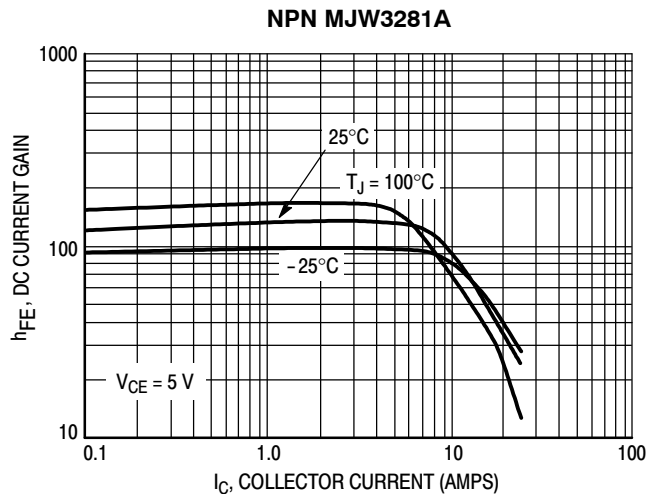
**Figure 3. DC Current Gain,  $V_{CE} = 20$  V**



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



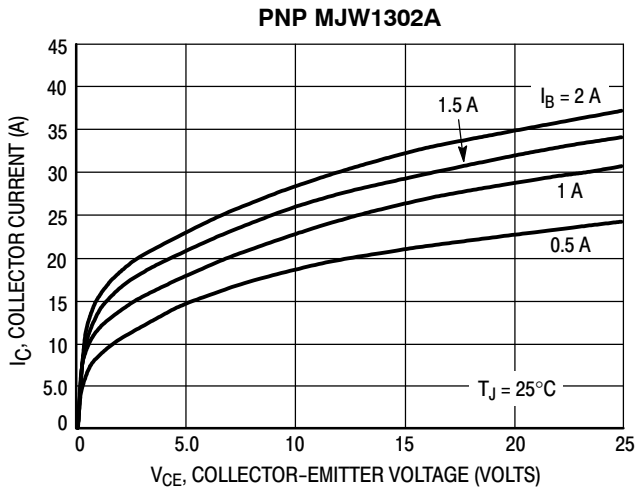
**Figure 5. DC Current Gain,  $V_{CE} = 5$  V**



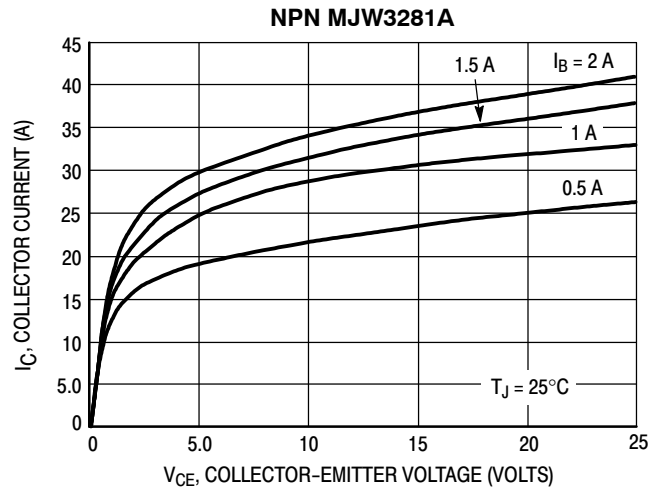
**Figure 6. DC Current Gain,  $V_{CE} = 5$  V**

# MJW3281A (NPN) MJW1302A (PNP)

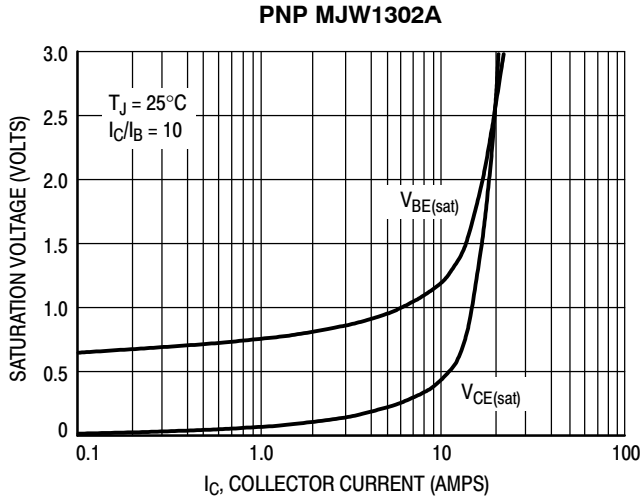
## TYPICAL CHARACTERISTICS



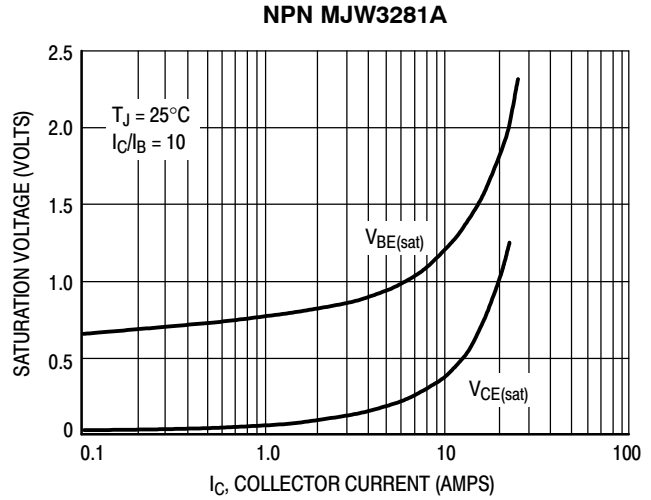
**Figure 7. Typical Output Characteristics**



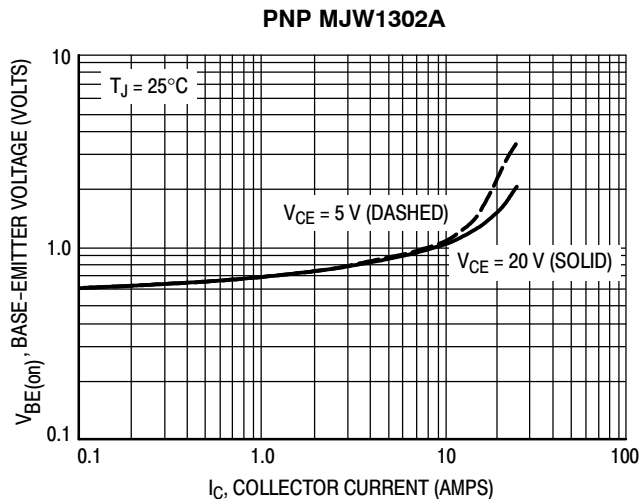
**Figure 8. Typical Output Characteristics**



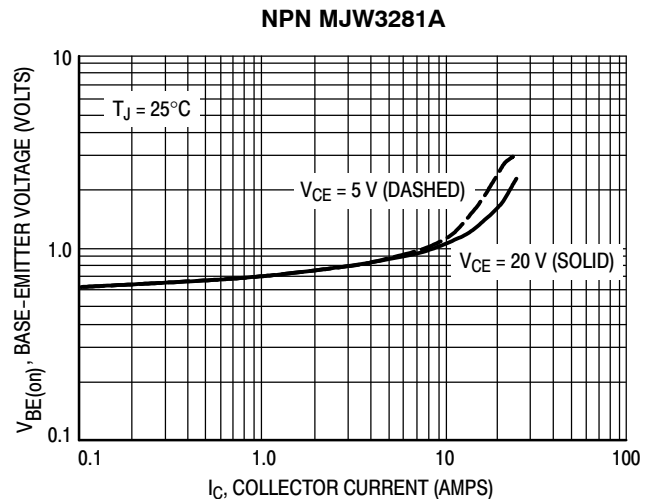
**Figure 9. Typical Saturation Voltages**



**Figure 10. Typical Saturation Voltages**



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



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

# MJW3281A (NPN) MJW1302A (PNP)

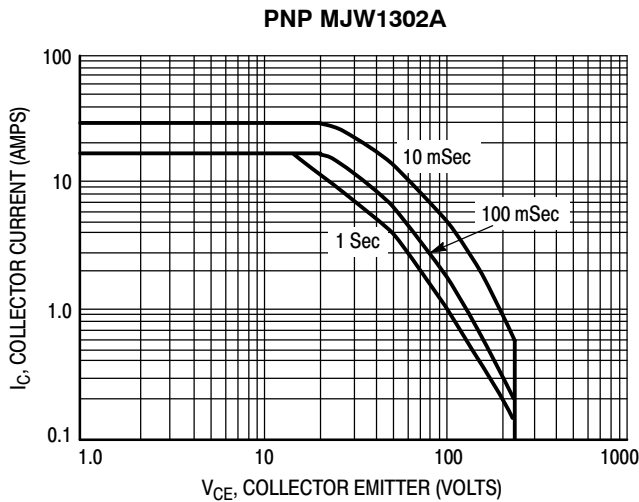


Figure 13. Active Region Safe Operating Area

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.

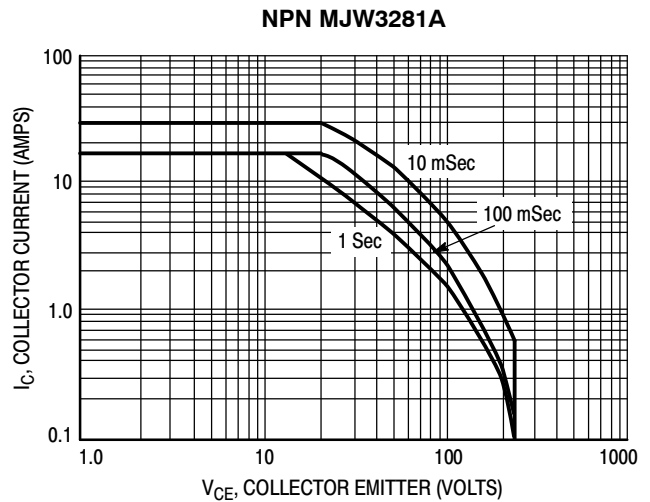


Figure 14. Active Region Safe Operating Area

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

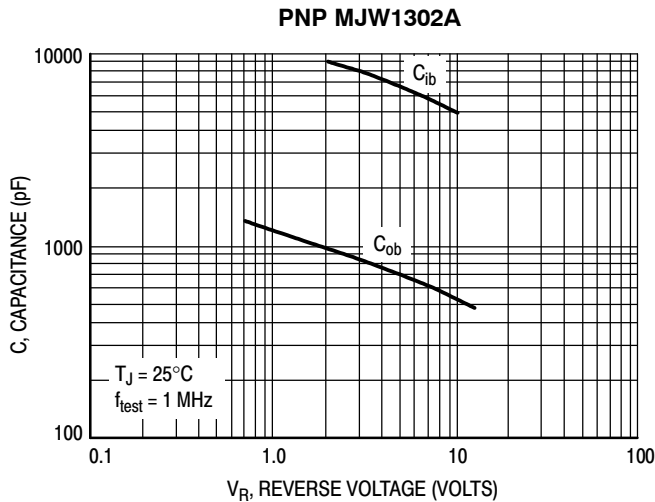


Figure 15. MJW1302A Typical Capacitance

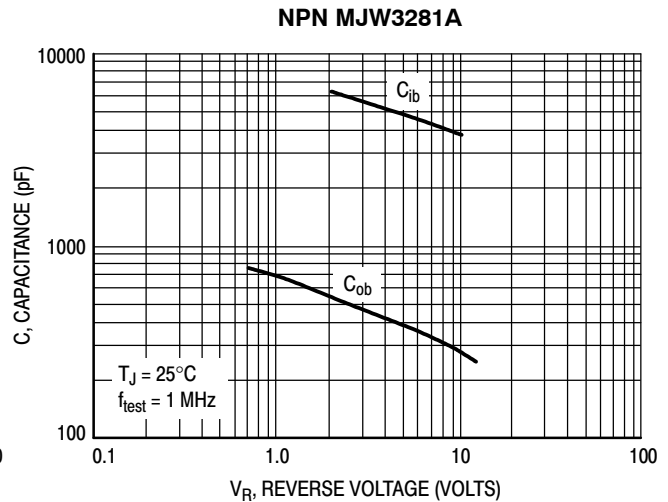
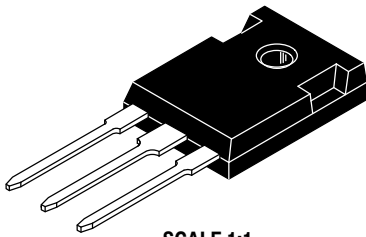


Figure 16. MJW3281A Typical Capacitance

# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

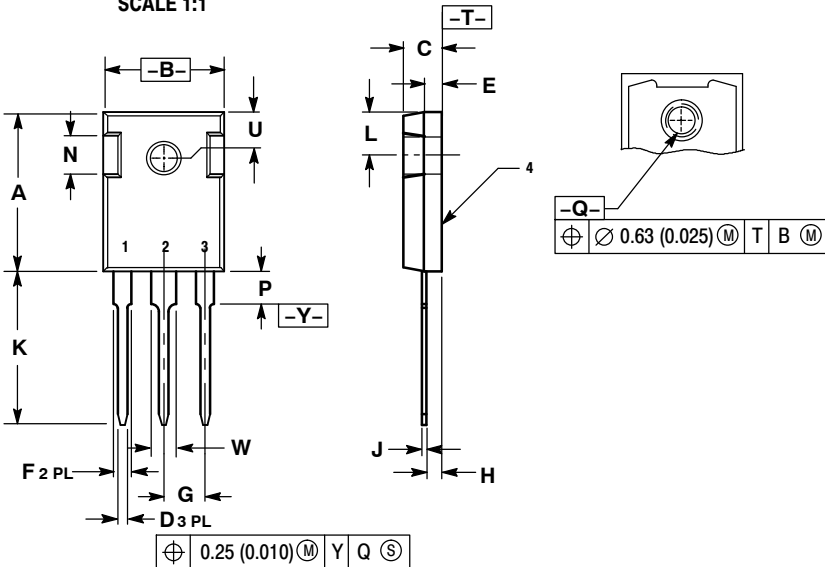
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TO-247  
CASE 340L-02  
ISSUE F

DATE 26 OCT 2011

SCALE 1:1

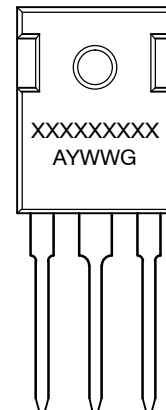


NOTES:

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

### GENERIC MARKING DIAGRAM\*



XXXXXX = Specific Device Code  
 A = Assembly Location  
 Y = Year  
 WW = Work Week  
 G = Pb-Free Package

- STYLE 1:  
PIN 1. GATE  
2. DRAIN  
3. SOURCE  
4. DRAIN
- STYLE 2:  
PIN 1. ANODE  
2. CATHODE (S)  
3. ANODE 2  
4. CATHODES (S)
- STYLE 3:  
PIN 1. BASE  
2. COLLECTOR  
3. EMITTER  
4. COLLECTOR
- STYLE 4:  
PIN 1. GATE  
2. COLLECTOR  
3. EMITTER  
4. COLLECTOR
- STYLE 5:  
PIN 1. CATHODE  
2. ANODE  
3. GATE  
4. ANODE
- STYLE 6:  
PIN 1. MAIN TERMINAL 1  
2. MAIN TERMINAL 2  
3. GATE  
4. MAIN TERMINAL 2

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present.

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