

# MJW21195 (PNP) MJW21196 (NPN)

Preferred Devices

## Silicon Power Transistors

The MJW21195 and MJW21196 utilize Perforated Emitter technology and are specifically designed for high power audio output, disk head positioners and linear applications.

- Total Harmonic Distortion Characterized
- High DC Current Gain –  
 $h_{FE} = 20 \text{ Min @ } I_C = 8 \text{ Adc}$
- Excellent Gain Linearity
- High SOA: 2.25 A, 80 V, 1 Second

### MAXIMUM RATINGS

| Rating  | Symbol         | Value          | Unit                         |
|---|----------------|----------------|------------------------------|
| Collector–Emitter Voltage   | $V_{CEO}$      | 250            | Vdc                          |
| Collector–Base Voltage  | $V_{CBO}$      | 400            | Vdc                          |
| Emitter–Base Voltage  | $V_{EBO}$      | 5.0            | Vdc                          |
| Collector–Emitter Voltage – 1.5 V   | $V_{CEX}$      | 400            | Vdc                          |
| Collector Current – Continuous<br>– Peak (Note 1)                                     | $I_C$          | 16<br>30       | Adc                          |
| Base Current – Continuous   | $I_B$          | 5.0            | Adc                          |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate Above $25^\circ\text{C}$ | $P_D$          | 200<br>1.43    | Watts<br>W/ $^\circ\text{C}$ |
| Operating and Storage Junction<br>Temperature Range                                   | $T_J, T_{stg}$ | –65 to<br>+150 | $^\circ\text{C}$             |

### THERMAL CHARACTERISTICS

| Characteristic                             | Symbol          | Max | Unit               |
|--|-----------------|-----|--------------------|
| Thermal Resistance,<br>Junction to Case    | $R_{\theta JC}$ | 0.7 | $^\circ\text{C/W}$ |
| Thermal Resistance,<br>Junction to Ambient | $R_{\theta JA}$ | 40  | $^\circ\text{C/W}$ |

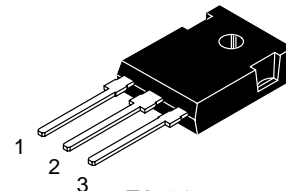
1. Pulse Test: Pulse Width = 5  $\mu\text{s}$ , Duty Cycle  $\leq 10\%$ .



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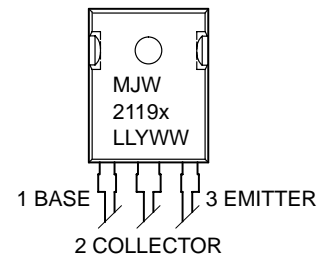
<http://onsemi.com>

**16 AMPERES  
COMPLEMENTARY  
SILICON POWER  
TRANSISTORS  
250 VOLTS  
200 WATTS**



TO-247  
CASE 340K  
STYLE 3

### MARKING DIAGRAM



MJW2119x = Device Code  
x = 5 or 6  
LL = Location Code  
Y = Year  
WW = Work Week

### ORDERING INFORMATION

| Device   | Package | Shipping      |
|----------|---------|---------------|
| MJW21195 | TO-247  | 30 Units/Rail |
| MJW21196 | TO-247  | 30 Units/Rail |

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

# MJW21195 (PNP) MJW21196 (NPN)

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

| Characteristic | Symbol | Min | Typical | Max | Unit |
|----------------|--------|-----|---------|-----|------|
|----------------|--------|-----|---------|-----|------|

### OFF CHARACTERISTICS

|  |                |     |   |     |                 |
|--|----------------|-----|---|-----|-----------------|
| Collector–Emitter Sustaining Voltage ( $I_C = 100\text{ mAdc}$ , $I_B = 0$ ) | $V_{CEO(sus)}$ | 250 | – | –   | Vdc             |
| Collector Cutoff Current ( $V_{CE} = 200\text{ Vdc}$ , $I_B = 0$ )           | $I_{CEO}$      | –   | – | 100 | $\mu\text{Adc}$ |

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

| Characteristic | Symbol | Min | Typical | Max | Unit |
|----------------|--------|-----|---------|-----|------|
|----------------|--------|-----|---------|-----|------|

### OFF CHARACTERISTICS

|   |           |   |   |    |                 |
|---|-----------|---|---|----|-----------------|
| Emitter Cutoff Current ( $V_{CE} = 5\text{ Vdc}$ , $I_C = 0$ )                          | $I_{EBO}$ | – | – | 50 | $\mu\text{Adc}$ |
| Collector Cutoff Current ( $V_{CE} = 250\text{ Vdc}$ , $V_{BE(off)} = 1.5\text{ Vdc}$ ) | $I_{CEX}$ | – | – | 50 | $\mu\text{Adc}$ |

### SECOND BREAKDOWN

|   |           |             |        |        |     |
|---|-----------|-------------|--------|--------|-----|
| Second Breakdown Collector Current with Base Forward Biased<br>( $V_{CE} = 50\text{ Vdc}$ , $t = 1\text{ s}$ (non–repetitive))<br>( $V_{CE} = 80\text{ Vdc}$ , $t = 1\text{ s}$ (non–repetitive)) | $I_{S/b}$ | 4.0<br>2.25 | –<br>– | –<br>– | Adc |
|---|-----------|-------------|--------|--------|-----|

### ON CHARACTERISTICS

|   |               |         |        |          |     |
|---|---------------|---------|--------|----------|-----|
| DC Current Gain<br>( $I_C = 8\text{ Adc}$ , $V_{CE} = 5\text{ Vdc}$ )<br>( $I_C = 16\text{ Adc}$ , $I_B = 5\text{ Adc}$ )                       | $h_{FE}$      | 20<br>8 | –<br>– | 80<br>–  |     |
| Base–Emitter On Voltage ( $I_C = 8\text{ Adc}$ , $V_{CE} = 5\text{ Vdc}$ )  | $V_{BE(on)}$  | –       | –      | 2.0      | Vdc |
| Collector–Emitter Saturation Voltage<br>( $I_C = 8\text{ Adc}$ , $I_B = 0.8\text{ Adc}$ )<br>( $I_C = 16\text{ Adc}$ , $I_B = 3.2\text{ Adc}$ ) | $V_{CE(sat)}$ | –<br>–  | –<br>– | 1.0<br>3 | Vdc |

### DYNAMIC CHARACTERISTICS

|  |  |          |        |             |        |     |
|--|--|----------|--------|-------------|--------|-----|
| Total Harmonic Distortion at the Output<br>$V_{RMS} = 28.3\text{ V}$ , $f = 1\text{ kHz}$ , $P_{LOAD} = 100\text{ W}_{RMS}$<br>(Matched pair $h_{FE} = 50 @ 5\text{ A}/5\text{ V}$ ) | $h_{FE}$<br>unmatched<br>$h_{FE}$<br>matched | THD      | –<br>– | 0.8<br>0.08 | –<br>– | %   |
| Current Gain Bandwidth Product<br>( $I_C = 1\text{ Adc}$ , $V_{CE} = 10\text{ Vdc}$ , $f_{test} = 1\text{ MHz}$ )  |  | $f_T$    | 4      | –           | –      | MHz |
| Output Capacitance<br>( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $f_{test} = 1\text{ MHz}$ )   |  | $C_{ob}$ | –      | –           | 500    | pF  |

PNP MJW21195

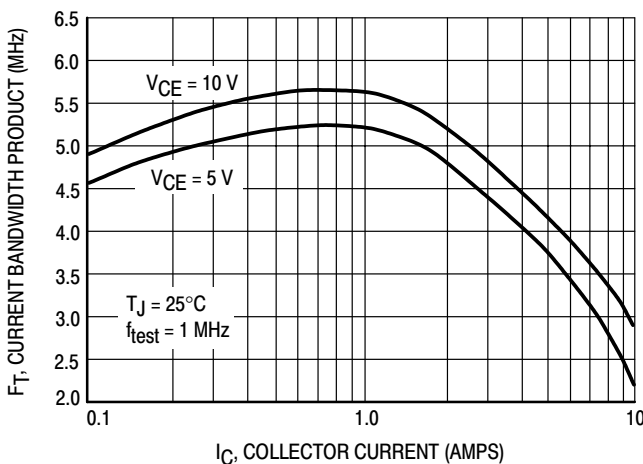


Figure 1. Typical Current Gain Bandwidth Product

NPN MJW21196

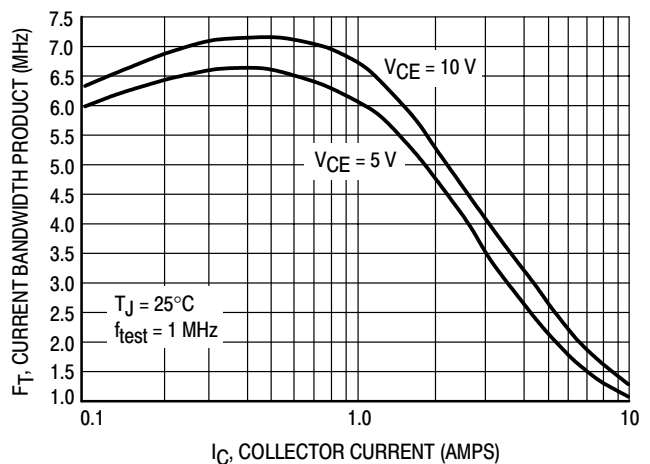


Figure 2. Typical Current Gain Bandwidth Product

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## TYPICAL CHARACTERISTICS

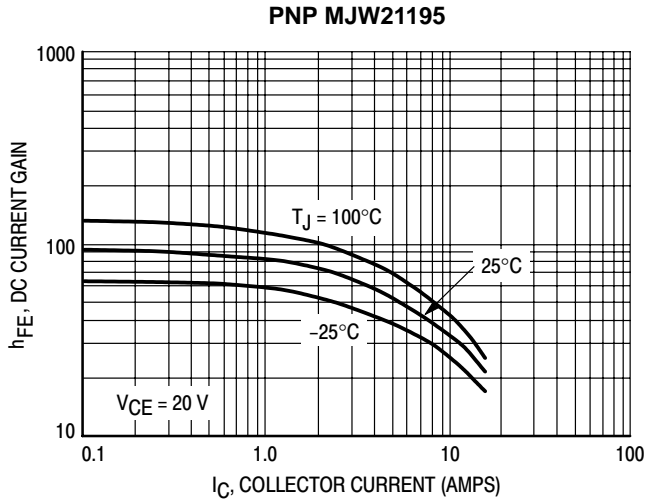


Figure 3. DC Current Gain,  $V_{CE} = 20\text{ V}$

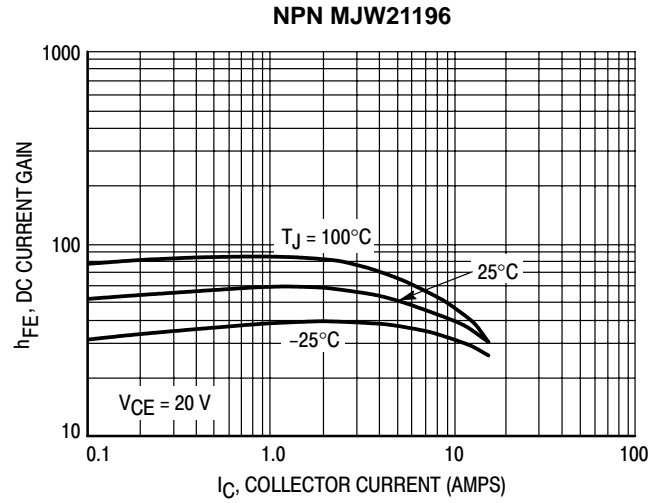


Figure 4. DC Current Gain,  $V_{CE} = 20\text{ V}$

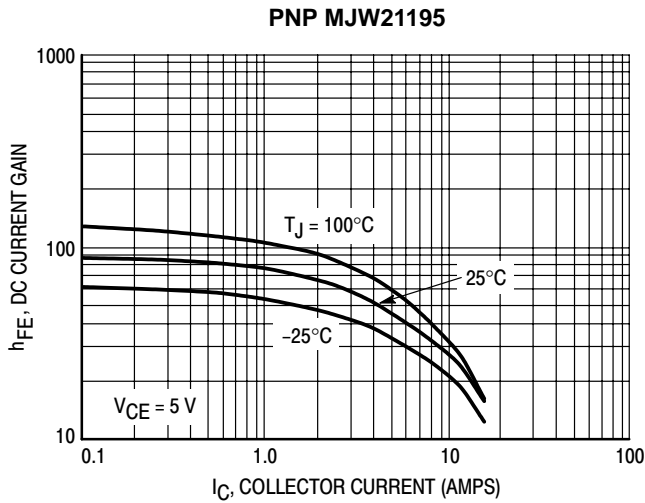


Figure 5. DC Current Gain,  $V_{CE} = 5\text{ V}$

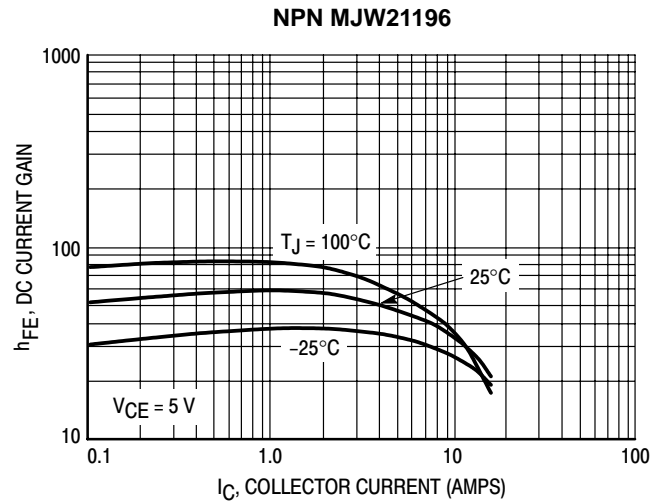


Figure 6. DC Current Gain,  $V_{CE} = 5\text{ V}$

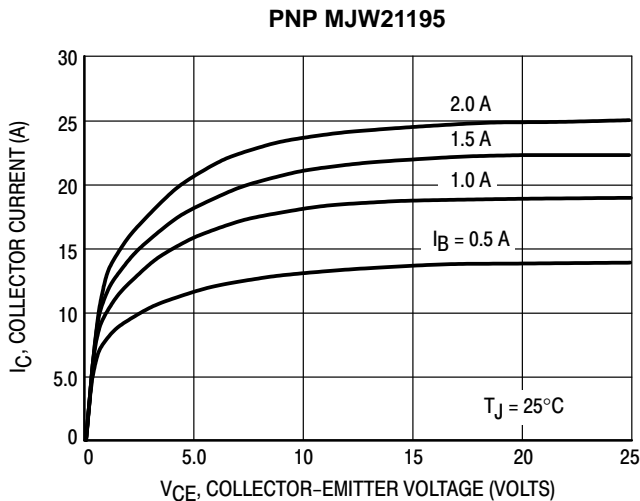


Figure 7. Typical Output Characteristics

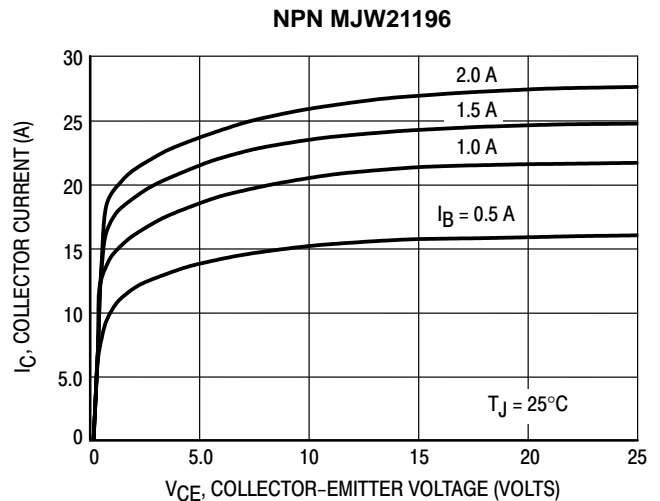
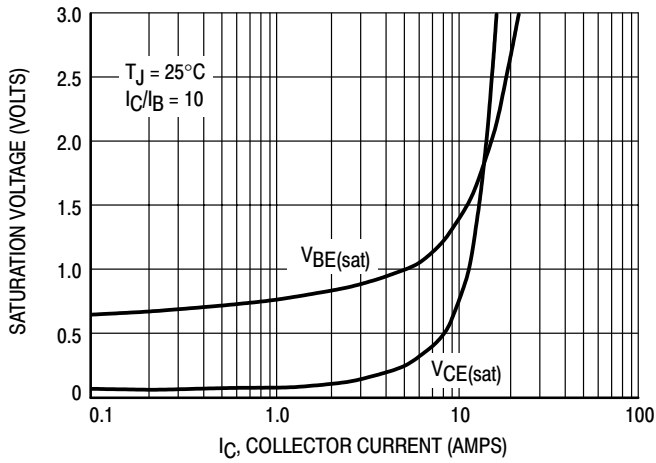


Figure 8. Typical Output Characteristics

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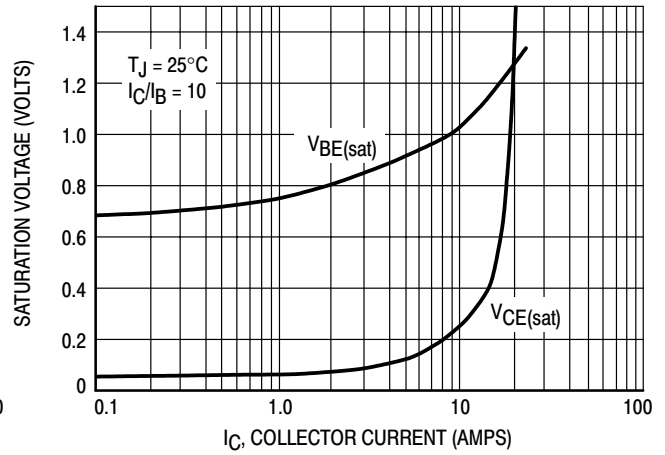
## TYPICAL CHARACTERISTICS

**PNP MJW21195**



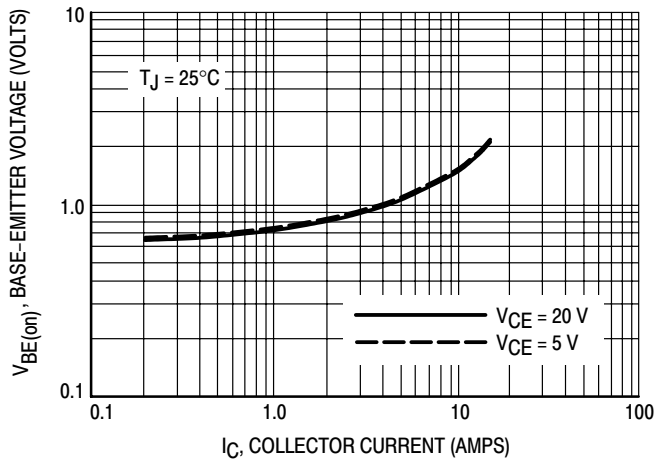
**Figure 9. Typical Saturation Voltages**

**NPN MJW21196**



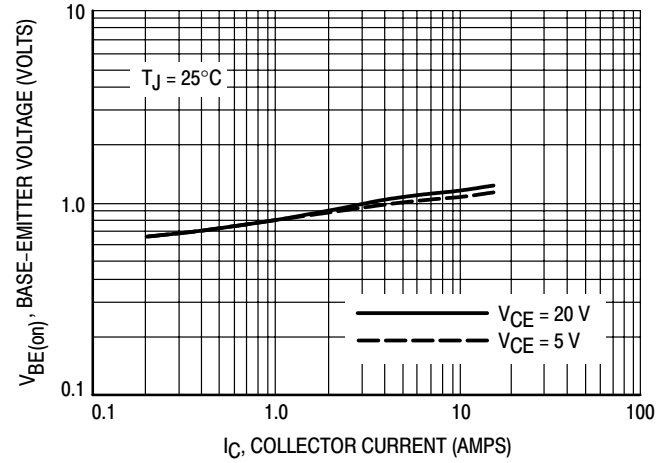
**Figure 10. Typical Saturation Voltages**

**PNP MJW21195**



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

**NPN MJW21196**



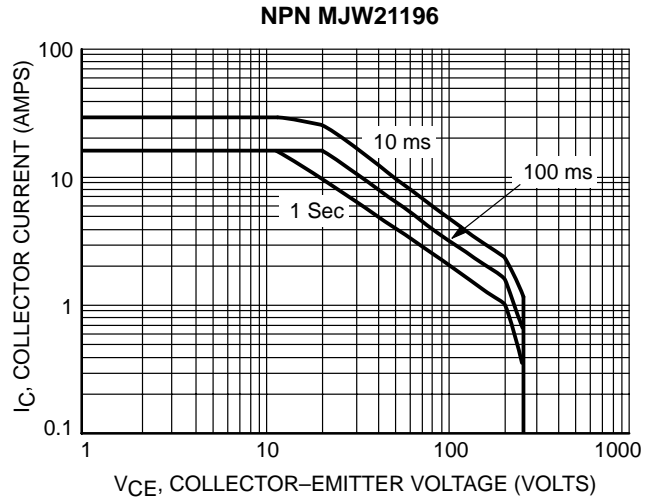
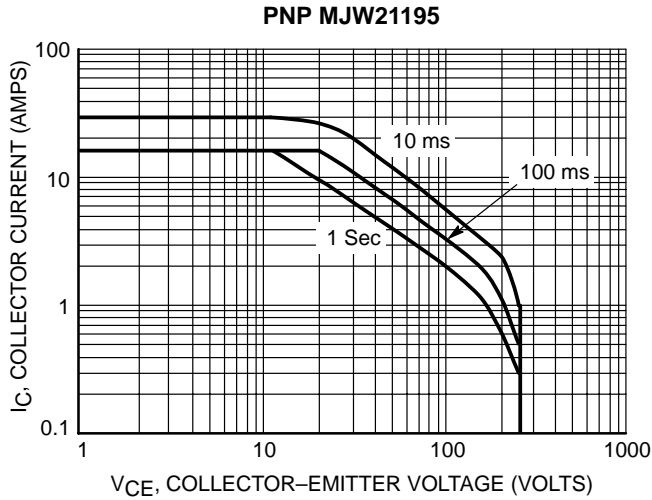
**Figure 12. Typical Base-Emitter Voltage**

## MJW21195 (PNP) MJW21196 (NPN)

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 Figure 13 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



## MJW21195 (PNP) MJW21196 (NPN)

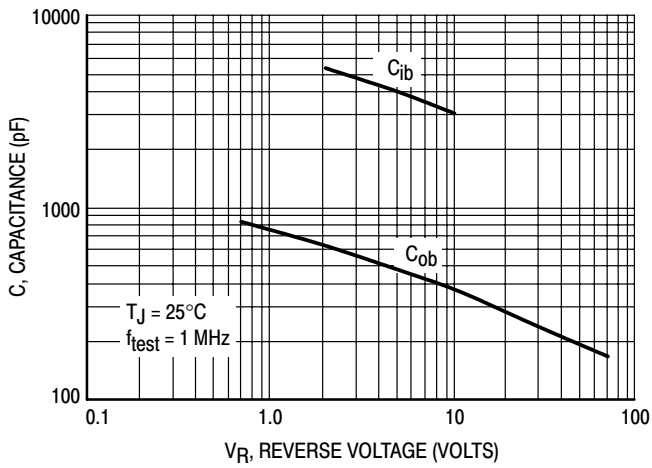


Figure 15. MJW21195 Typical Capacitance

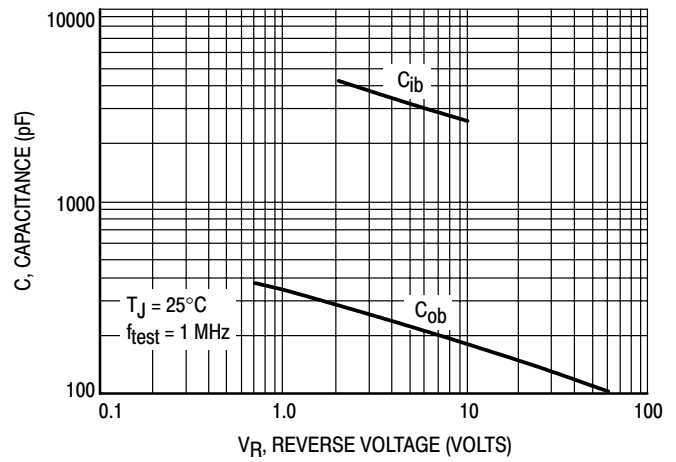


Figure 16. MJW21196 Typical Capacitance

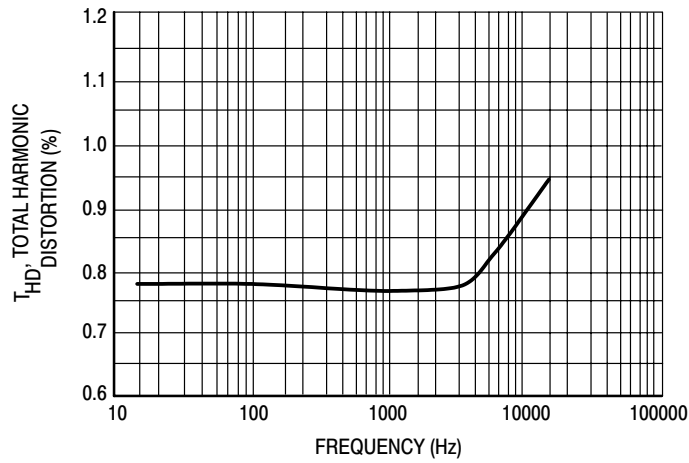


Figure 17. Typical Total Harmonic Distortion

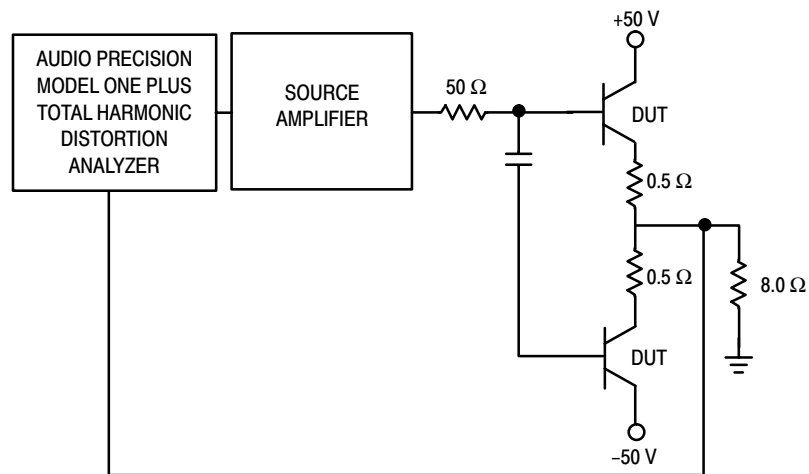
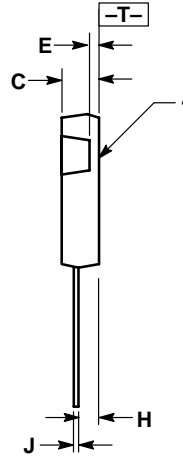
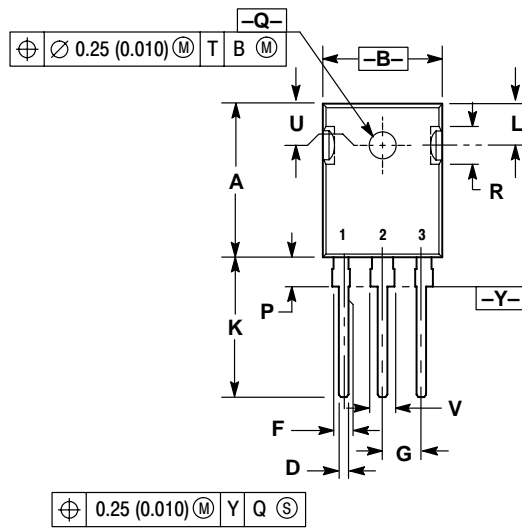


Figure 18. Total Harmonic Distortion Test Circuit

# MJW21195 (PNP) MJW21196 (NPN)

## 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

## MJW21195 (PNP) MJW21196 (NPN)

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