

MJW21193 (PNP) MJW21194 (NPN)

Preferred Devices

Silicon Power Transistors

The MJW21193 and MJW21194 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_{CB0} | 400 | Vdc |
| Emitter–Base Voltage | V_{EBO} | 5.0 | Vdc |
| Collector–Emitter Voltage – 1.5 V | V_{CEX} | 400 | Vdc |
| Collector Current – Continuous – Peak (Note 1) | I_C | 16 30 | Adc |
| Base Current – Continuous | I_B | 5.0 | Adc |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate Above 25°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 | $R_{\theta JC}$ | 0.7 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 40 | $^\circ\text{C/W}$ |

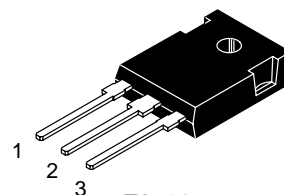
1. Pulse Test: Pulse Width = 5 μs , Duty Cycle $\leq 10\%$.



ON Semiconductor™

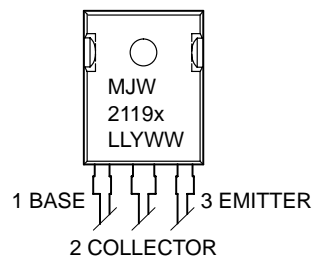
<http://onsemi.com>

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



TO-247
CASE 340K
STYLE 3

MARKING DIAGRAM



MJW2119x = Device Code
x = 3 or 4
LL = Location Code
Y = Year
WW = Work Week

ORDERING INFORMATION

| Device | Package | Shipping |
|----------|---------|---------------|
| MJW21193 | TO-247 | 30 Units/Rail |
| MJW21194 | TO-247 | 30 Units/Rail |

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

MJW21193 (PNP) MJW21194 (NPN)

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)} | 250 | – | – | V _{dc} |
| Collector Cutoff Current (V _{CE} = 200 V _{dc} , I _B = 0) | I _{CEO} | – | – | 100 | μA _{dc} |
| Emitter Cutoff Current (V _{CE} = 5 V _{dc} , I _C = 0) | I _{EBO} | – | – | 100 | μA _{dc} |
| Collector Cutoff Current (V _{CE} = 250 V _{dc} , V _{BE(off)} = 1.5 V _{dc}) | I _{CEX} | – | – | 100 | μA _{dc} |

SECOND BREAKDOWN

| | | | | | |
|---|------------------|-------------|--------|--------|-----------------|
| Second Breakdown Collector Current with Base Forward Biased (V _{CE} = 50 V _{dc} , t = 1 s (non–repetitive) (V _{CE} = 80 V _{dc} , t = 1 s (non–repetitive) | I _{S/b} | 4.0 2.25 | – – | – – | A _{dc} |
|---|------------------|-------------|--------|--------|-----------------|

ON CHARACTERISTICS

| | | | | | |
|---|----------------------|---------|--------|----------|-----------------|
| DC Current Gain (I _C = 8 A _{dc} , V _{CE} = 5 V _{dc}) (I _C = 16 A _{dc} , I _B = 5 A _{dc}) | h _{FE} | 20 8 | – – | 60 – | |
| Base–Emitter On Voltage (I _C = 8 A _{dc} , V _{CE} = 5 V _{dc}) | V _{BE(on)} | – | – | 2.2 | V _{dc} |
| Collector–Emitter Saturation Voltage (I _C = 8 A _{dc} , I _B = 0.8 A _{dc}) (I _C = 16 A _{dc} , I _B = 3.2 A _{dc}) | V _{CE(sat)} | – – | – – | 1.4 4 | V _{dc} |

DYNAMIC CHARACTERISTICS

| | | | | | | |
|--|--|-----------------|--------|-------------|--------|-----|
| Total Harmonic Distortion at the Output V _{RMS} = 28.3 V, f = 1 kHz, P _{LOAD} = 100 W _{RMS} (Matched pair h _{FE} = 50 @ 5 A/5 V) | h _{FE} unmatched h _{FE} matched | T _{HD} | – – | 0.8 0.08 | – – | % |
| Current Gain Bandwidth Product (I _C = 1 A _{dc} , V _{CE} = 10 V _{dc} , f _{test} = 1 MHz) | | f _T | 4 | – | – | MHz |
| Output Capacitance (V _{CB} = 10 V _{dc} , I _E = 0, f _{test} = 1 MHz) | | C _{ob} | – | – | 500 | pF |

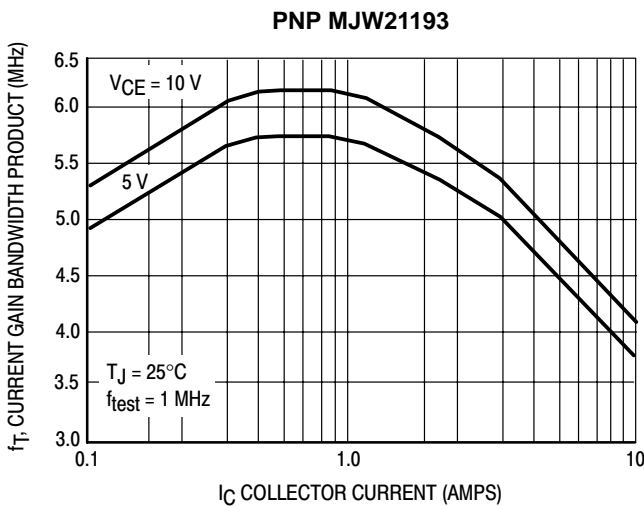


Figure 1. Typical Current Gain Bandwidth Product

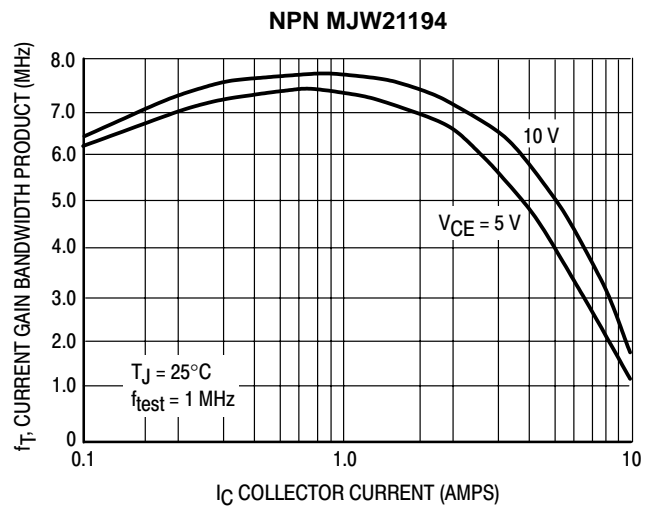


Figure 2. Typical Current Gain Bandwidth Product

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TYPICAL CHARACTERISTICS

PNP MJW21193

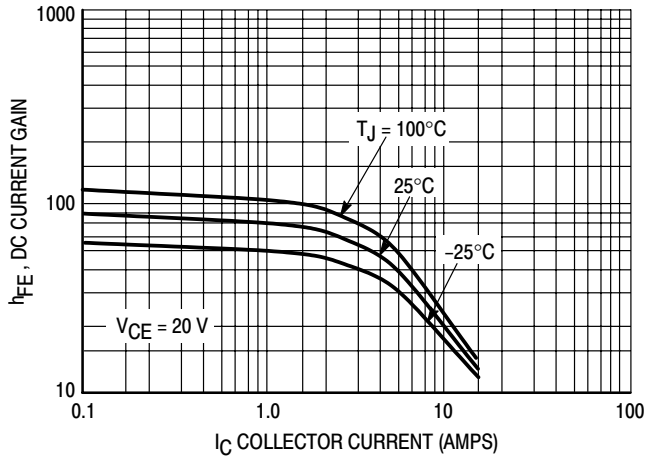


Figure 3. DC Current Gain, $V_{CE} = 20\text{ V}$

NPN MJW21194

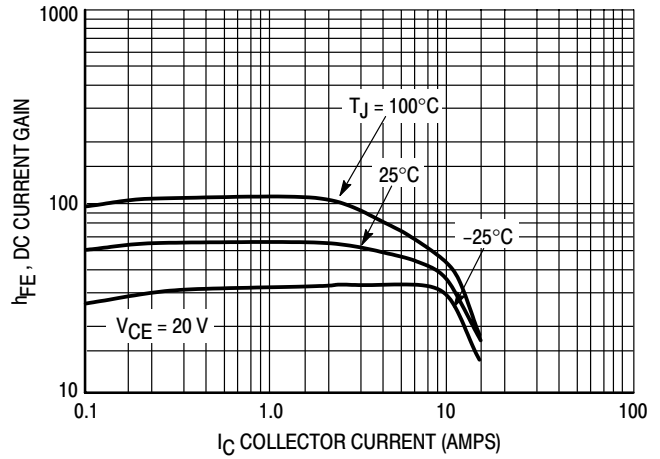


Figure 4. DC Current Gain, $V_{CE} = 20\text{ V}$

PNP MJW21193

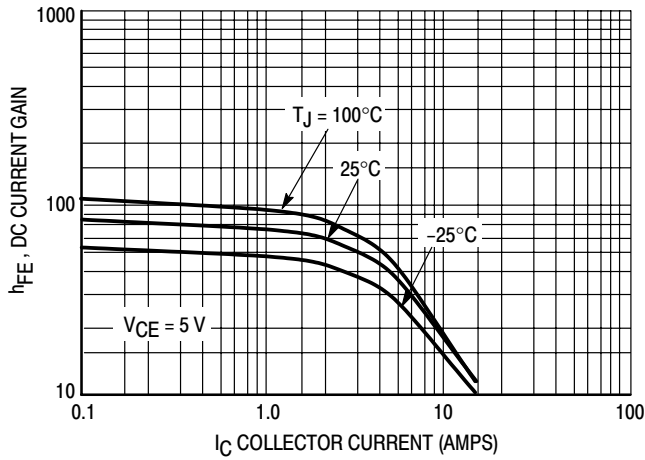


Figure 5. DC Current Gain, $V_{CE} = 5\text{ V}$

NPN MJW21194

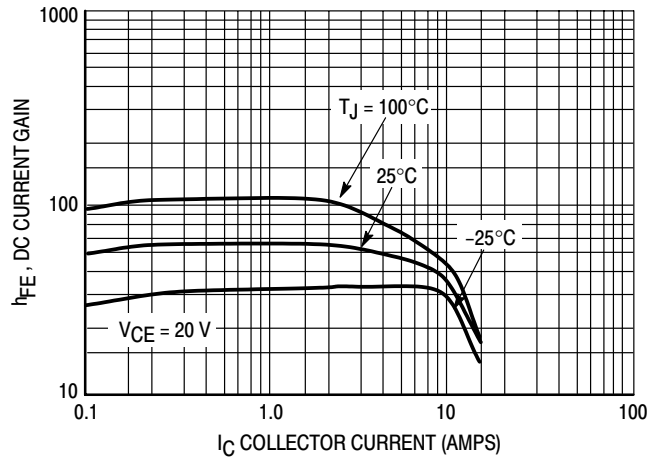


Figure 6. DC Current Gain, $V_{CE} = 5\text{ V}$

PNP MJW21193

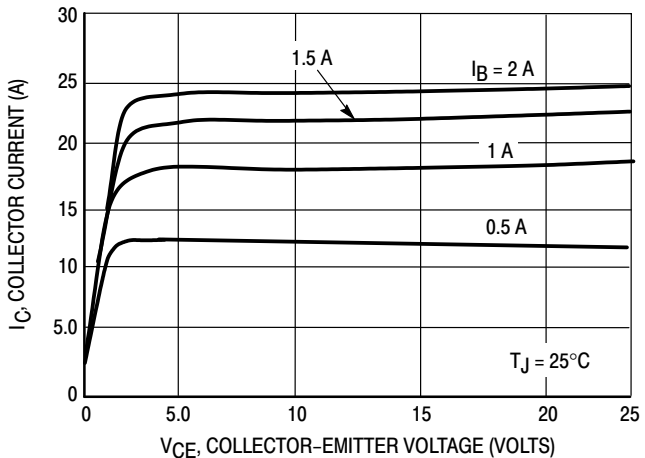


Figure 7. Typical Output Characteristics

NPN MJW21194

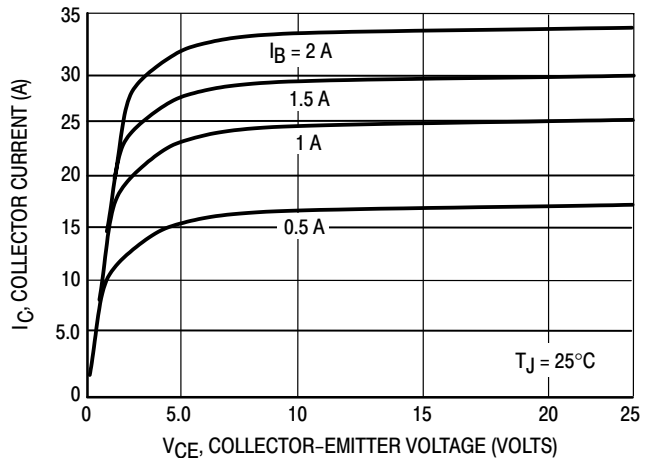


Figure 8. Typical Output Characteristics

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TYPICAL CHARACTERISTICS

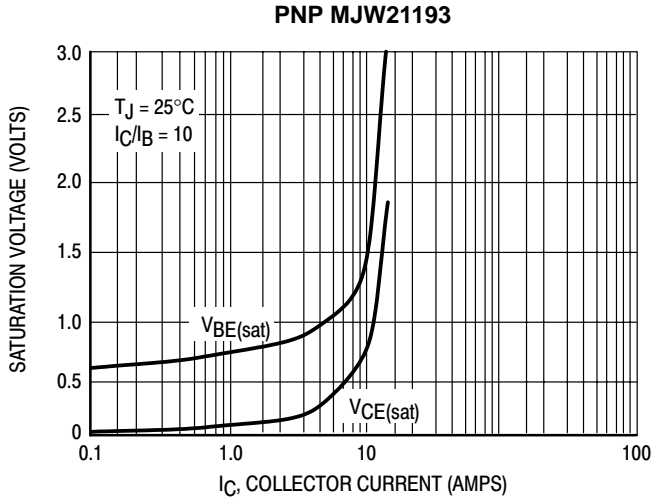


Figure 9. Typical Saturation Voltages

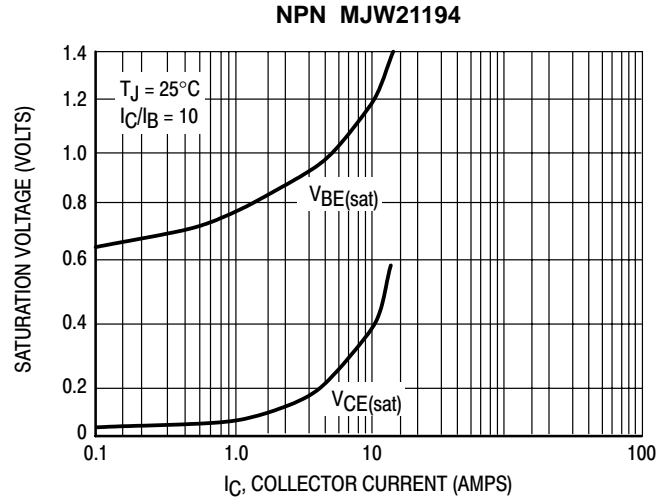


Figure 10. Typical Saturation Voltages

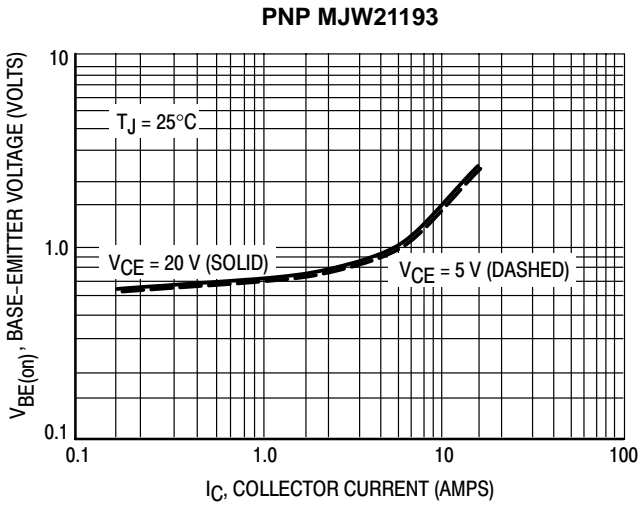


Figure 11. Typical Base-Emitter Voltage

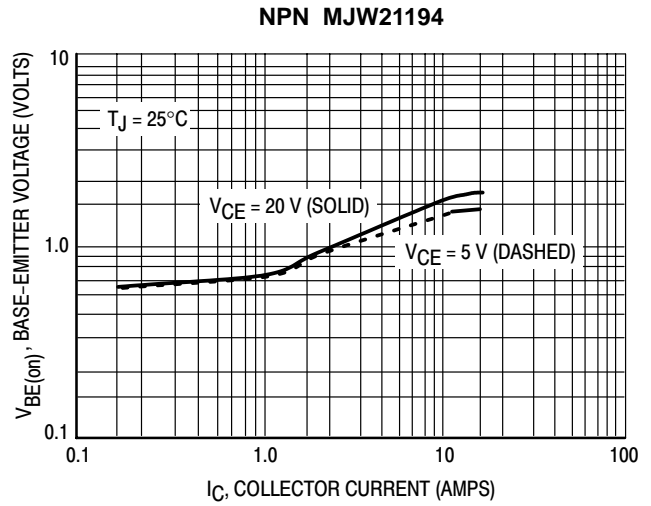


Figure 12. Typical Base-Emitter Voltage

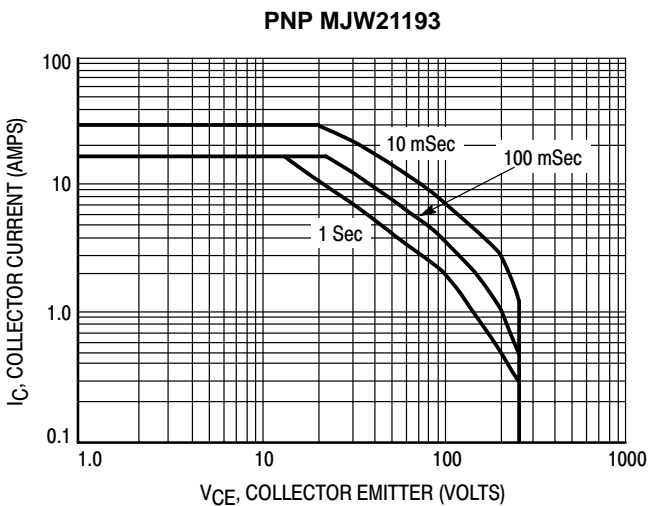


Figure 13. Active Region Safe Operating Area

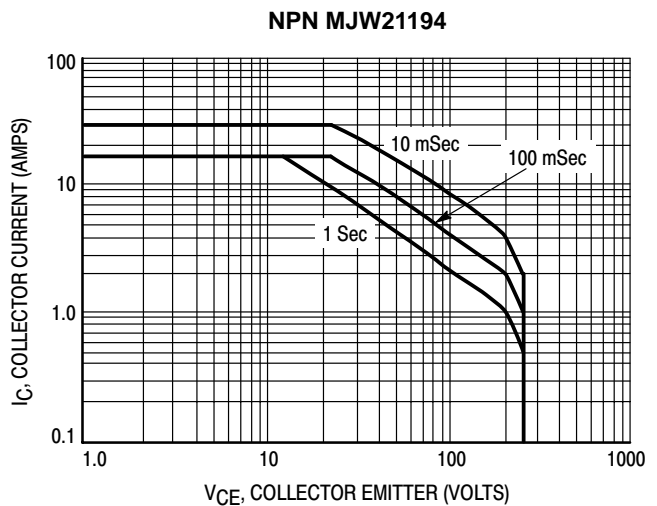


Figure 14. Active Region Safe Operating Area

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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.

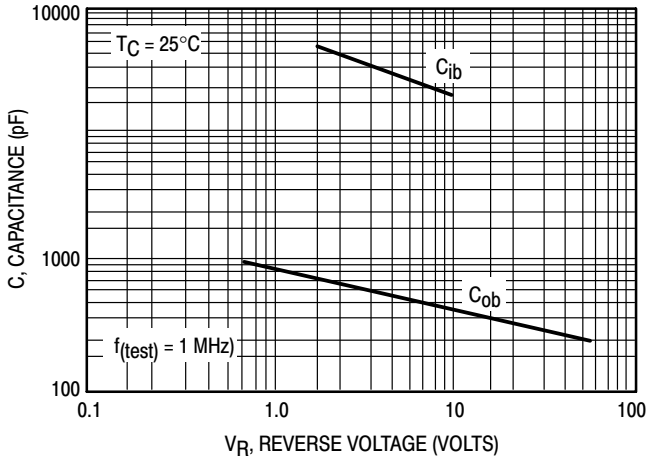


Figure 15. MJW21193 Typical Capacitance

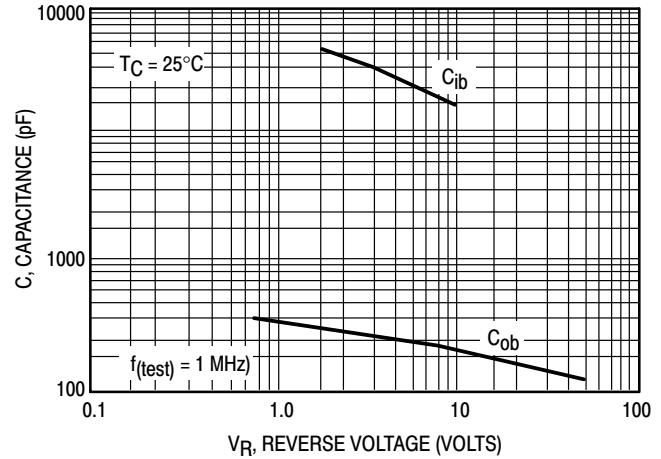


Figure 16. MJW21194 Typical Capacitance

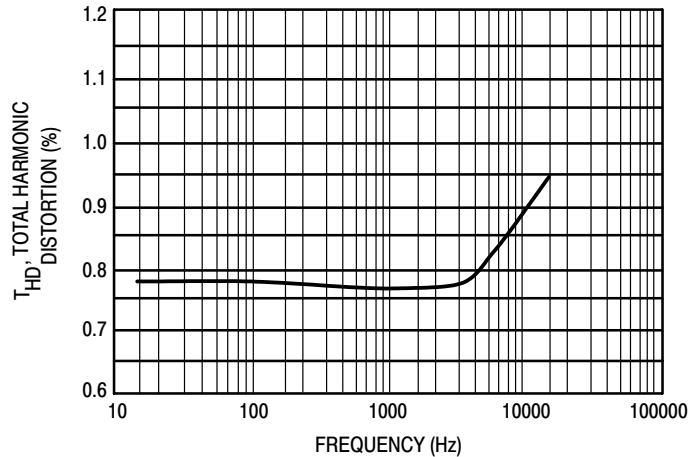


Figure 17. Typical Total Harmonic Distortion

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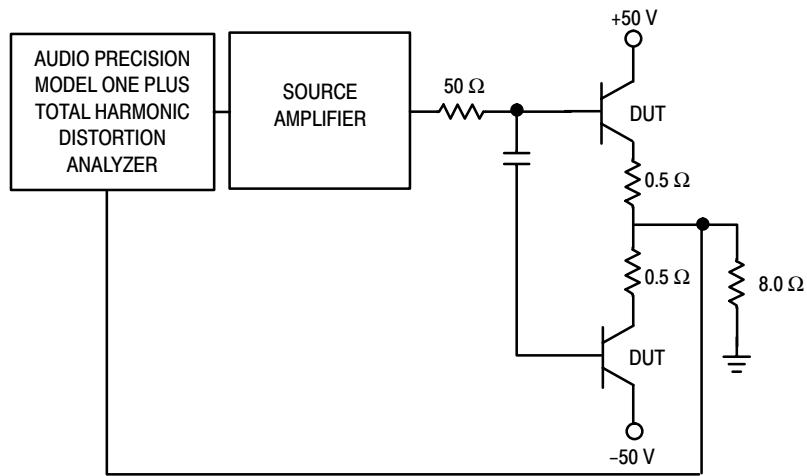
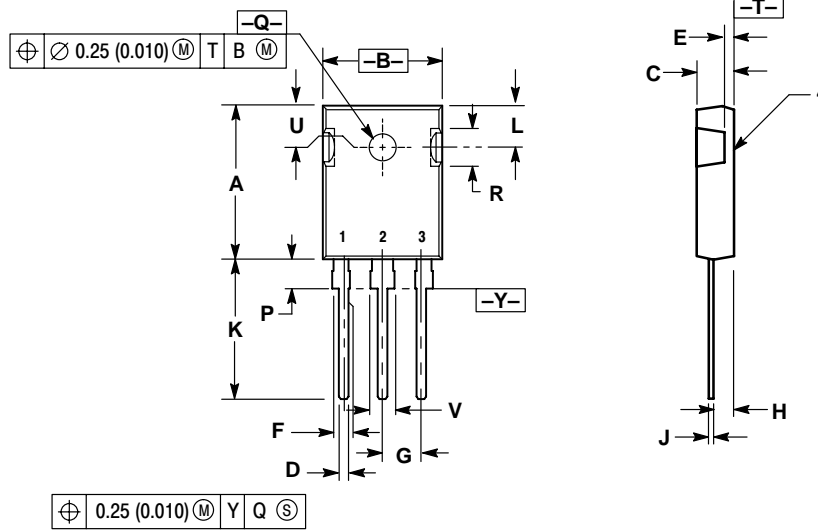


Figure 18. Total Harmonic Distortion Test Circuit

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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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