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 Min @ I_C = 8 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 − Peak (Note 1)	I_C	16 30	Adc
Base Current − Continuous	I_B	5.0	Adc
Total Power Dissipation @ T_C = 25°C Derate Above 25°C	P_D	200 1.43	Watts W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	− 65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.7	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	40	°C/W

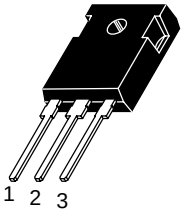
Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

1. Pulse Test: Pulse Width = 5 μs, Duty Cycle ≤ 10%.

ON Semiconductor®

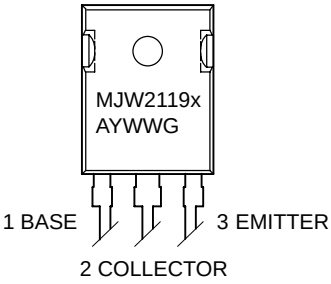
http://onsemi.com

16 A
COMPLEMENTARY SILICON
POWER TRANSISTORS
250 V, 200 W



TO−247
CASE 340L
STYLE 3

MARKING DIAGRAM



x = 3 or 4
A = Assembly Location
Y = Year
WW = Work Week
G = Pb−Free Package

ORDERING INFORMATION

Device	Package	Shipping
MJW21193	TO−247	30 Units/Rail
MJW21193G	TO−247 (Pb−Free)	30 Units/Rail
MJW21194	TO−247	30 Units/Rail
MJW21194G	TO−247 (Pb−Free)	30 Units/Rail

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector−Emitter Sustaining Voltage (I_C = 100 mAdc, I_B = 0)	$V_{CEO(sus)}$	250	−	−	Vdc
Collector Cutoff Current (V_{CE} = 200 Vdc, I_B = 0)	I_{CEO}	−	−	100	μAdc
Emitter Cutoff Current (V_{CE} = 5 Vdc, I_C = 0)	I_{EBO}	−	−	100	μAdc
Collector Cutoff Current (V_{CE} = 250 Vdc, $V_{BE(off)}$ = 1.5 Vdc)	I_{CEX}	−	−	100	μAdc
SECOND BREAKDOWN					
Second Breakdown Collector Current with Base Forward Biased	$I_{S/b}$				Adc
(V_{CE} = 50 Vdc, t = 1 s (non−repetitive)		4.0	−	−	
(V_{CE} = 80 Vdc, t = 1 s (non−repetitive)		2.25	−	−	
ON CHARACTERISTICS					
DC Current Gain	h_{FE}				
(I_C = 8 Adc, V_{CE} = 5 Vdc)		20	−	70	
(I_C = 16 Adc, I_B = 5 Adc)		8	−	−	
Base−Emitter On Voltage (I_C = 8 Adc, V_{CE} = 5 Vdc)	$V_{BE(on)}$	−	−	2.2	Vdc
Collector−Emitter Saturation Voltage	$V_{CE(sat)}$				Vdc
(I_C = 8 Adc, I_B = 0.8 Adc)		−	−	1.4	
(I_C = 16 Adc, I_B = 3.2 Adc)		−	−	4	
DYNAMIC CHARACTERISTICS					
Total Harmonic Distortion at the Output	T_{HD}				%
V_{RMS} = 28.3 V, f = 1 kHz, P_{LOAD} = 100 W_{RMS} h_{FE} unmatched		−	0.8	−	
(Matched pair h_{FE} = 50 @ 5 A/5 V) h_{FE} matched		−	0.08	−	
Current Gain Bandwidth Product (I_C = 1 Adc, V_{CE} = 10 Vdc, f_{test} = 1 MHz)	f_T	4	−	−	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f_{test} = 1 MHz)	C_{ob}	−	−	500	pF

PNP MJW21193

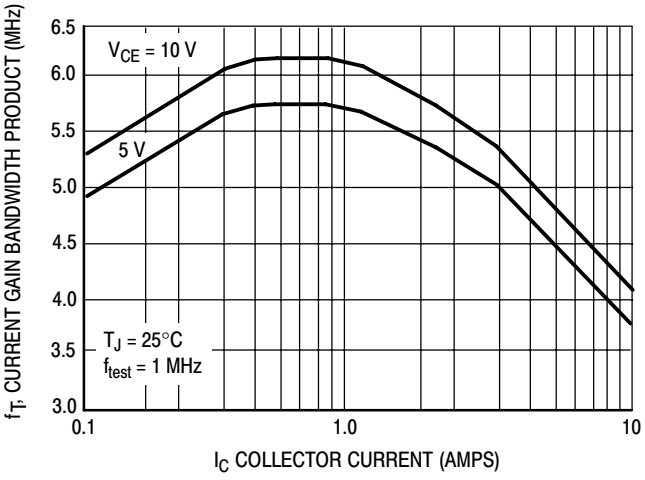


Figure 1. Typical Current Gain Bandwidth Product

NPN MJW21194

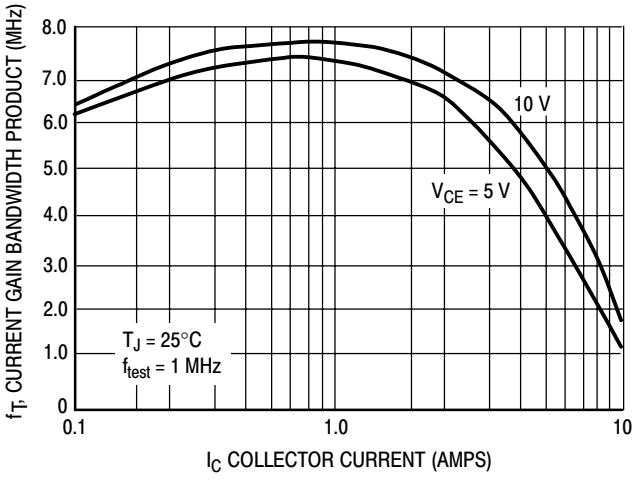


Figure 2. Typical Current Gain Bandwidth Product

TYPICAL CHARACTERISTICS

PNP MJW21193

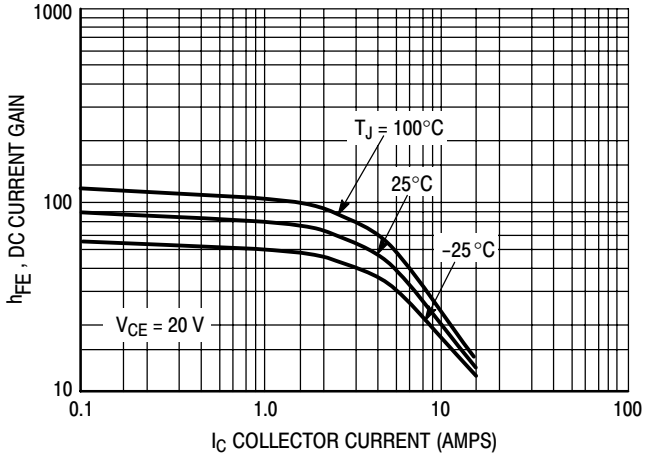


Figure 3. DC Current Gain, V_{CE} = 20 V

NPN MJW21194

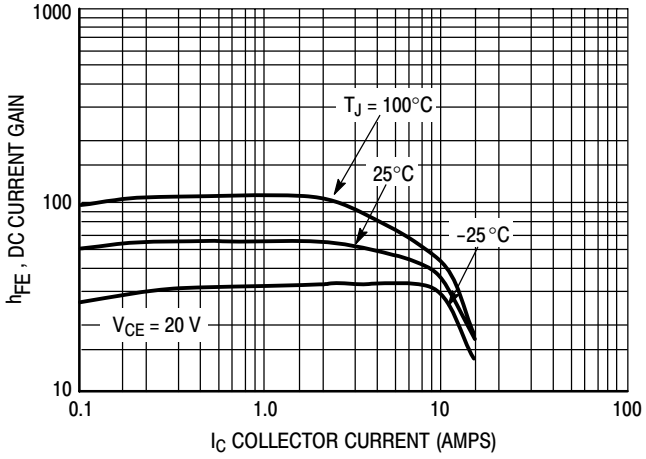


Figure 4. DC Current Gain, V_{CE} = 20 V

PNP MJW21193

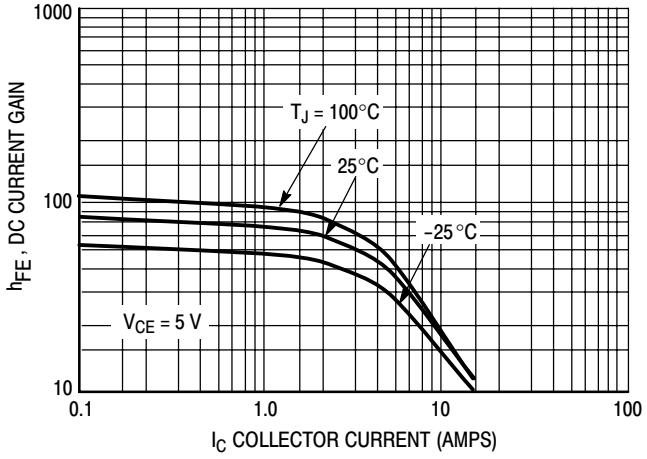


Figure 5. DC Current Gain, V_{CE} = 5 V

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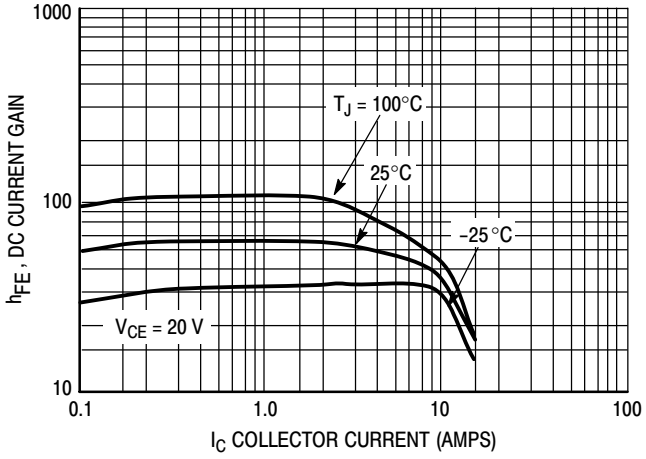

Figure 6. DC Current Gain, V_{CE} = 5 V

PNP MJW21193

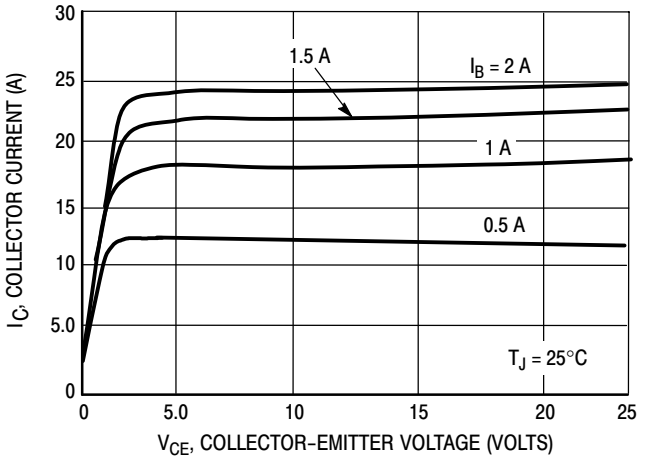

Figure 7. Typical Output Characteristics

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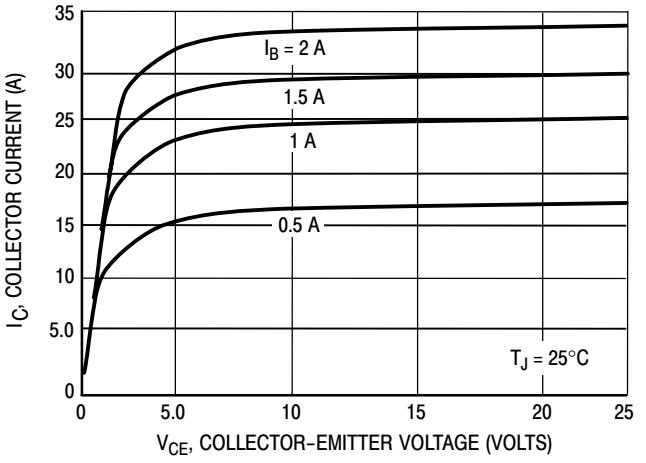

Figure 8. Typical Output Characteristics

TYPICAL CHARACTERISTICS

PNP MJW21193

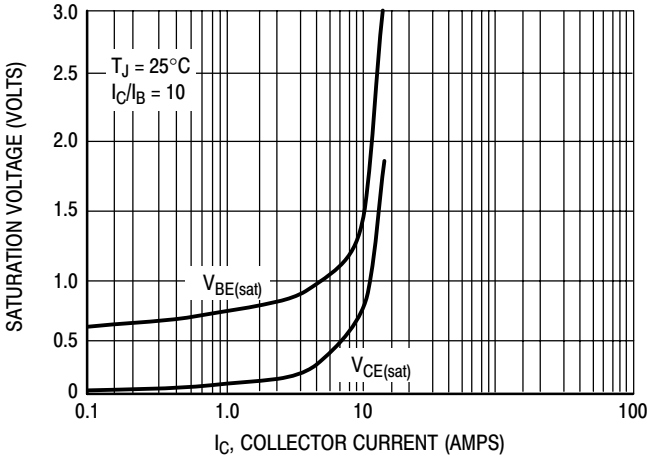

Figure 9. Typical Saturation Voltages

NPN MJW21194

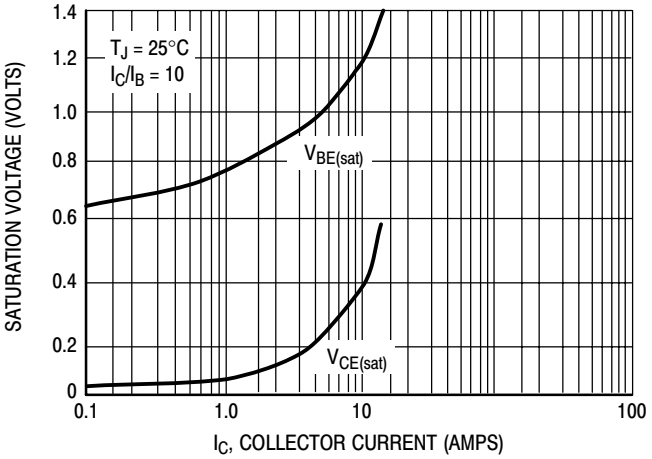

Figure 10. Typical Saturation Voltages

PNP MJW21193

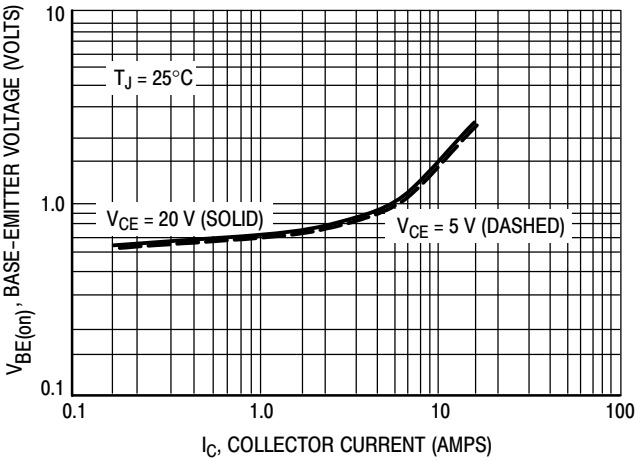

Figure 11. Typical Base−Emitter Voltage

NPN MJW21194

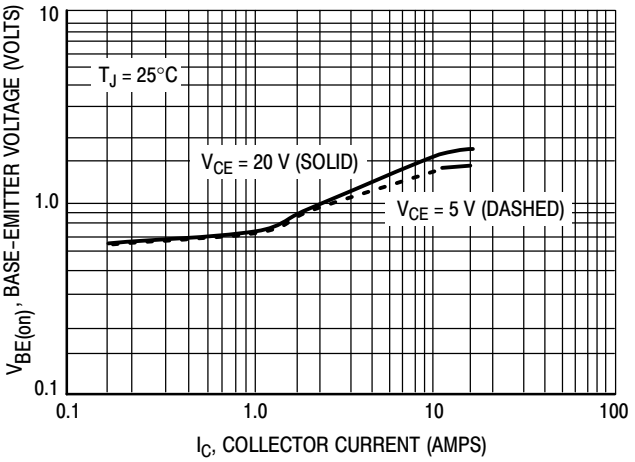

Figure 12. Typical Base−Emitter Voltage

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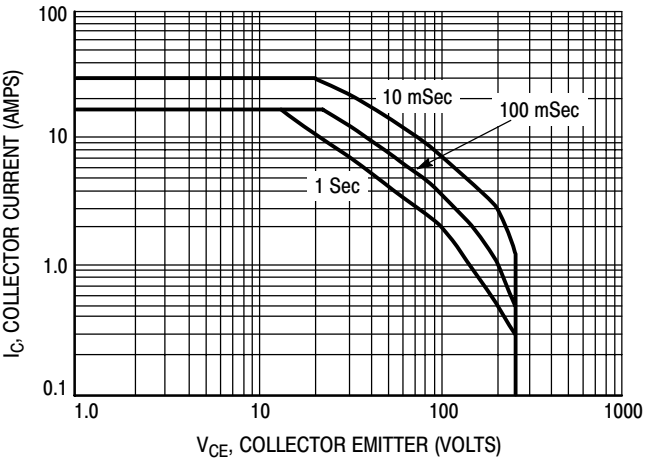

Figure 13. Active Region Safe Operating Area

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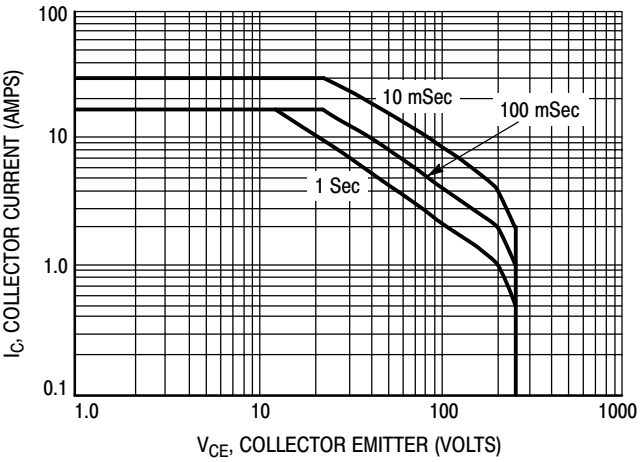


Figure 14. Active Region Safe Operating Area

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.

The data of Figure 13 is based on $T_{J(pk)}$ = 150°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.

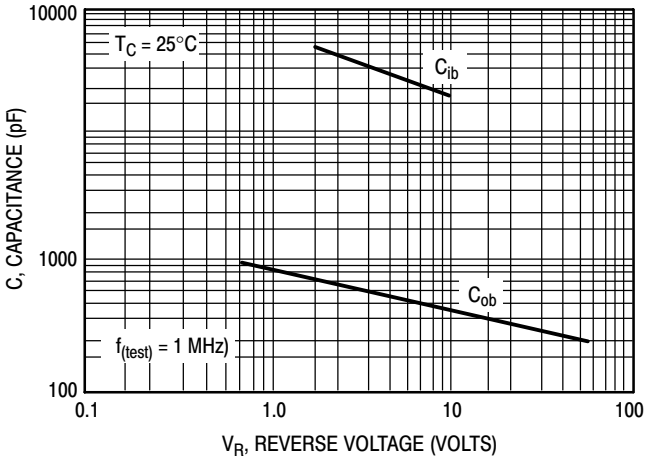


Figure 15. MJW21193 Typical Capacitance

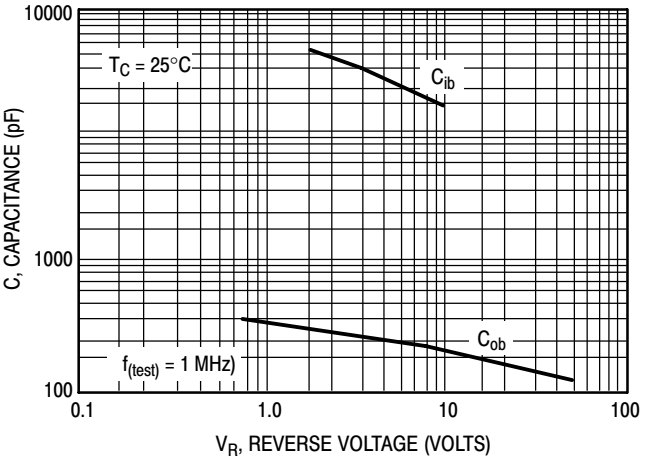


Figure 16. MJW21194 Typical Capacitance

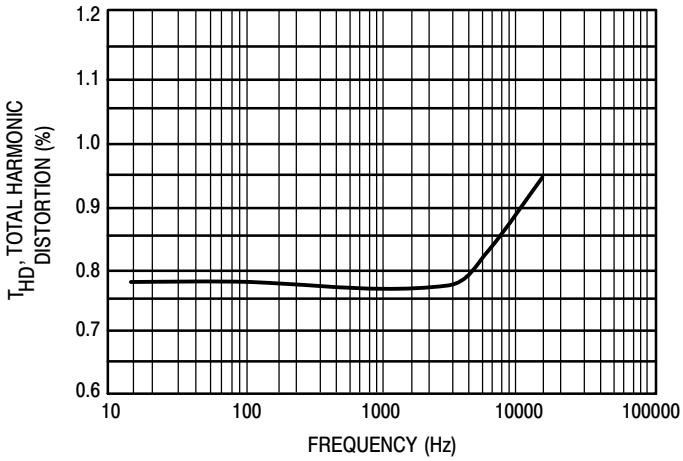


Figure 17. Typical Total Harmonic Distortion

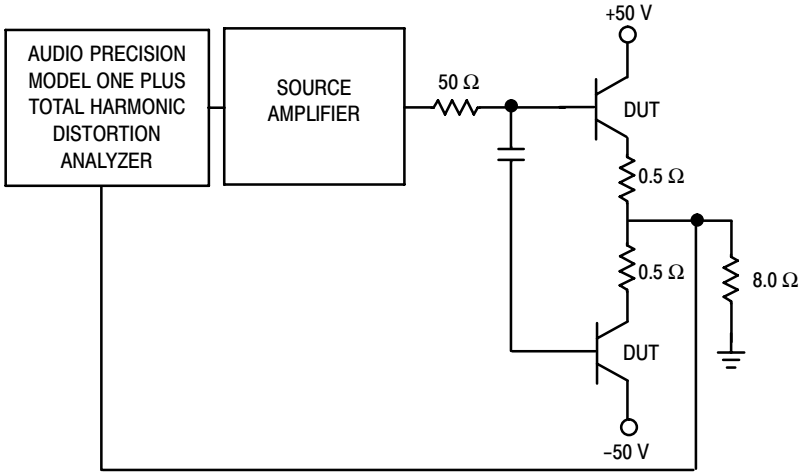
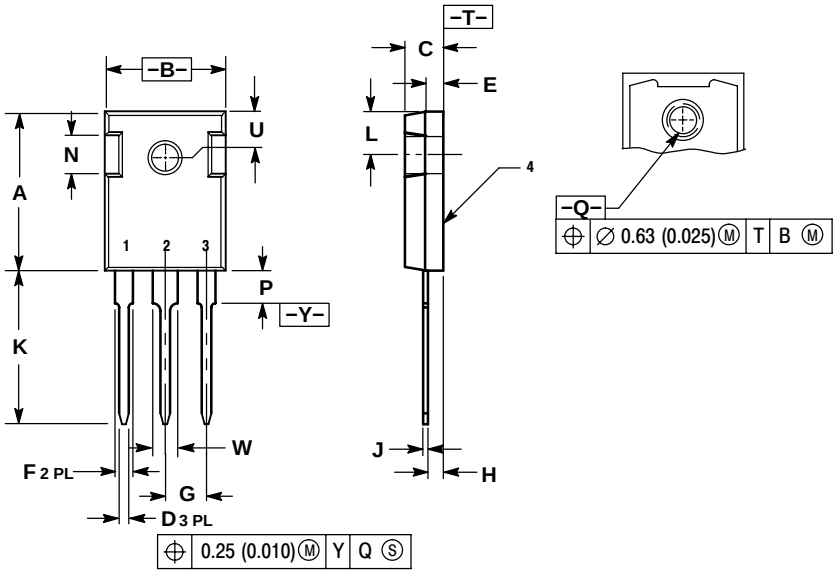


Figure 18. Total Harmonic Distortion Test Circuit

PACKAGE DIMENSIONS

TO−247
CASE 340L−02
ISSUE D



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

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	20.32	21.08	0.800	8.30
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

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

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
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