

Silicon Power Transistors

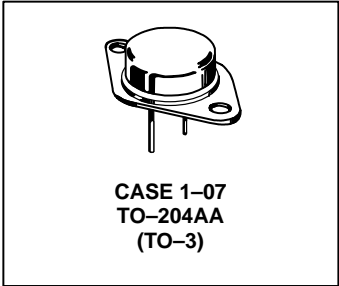
The MJ21195 and MJ21196 utilize Perforated Emitter technology and are specifically designed for high power audio output, disk head positioners and linear applications.

- Total Harmonic Distortion Characterized
- High DC Current Gain –
 $h_{FE} = 25 \text{ Min @ } I_C = 8 \text{ Adc}$
- Excellent Gain Linearity
- High SOA: 3 A, 80 V, 1 Second

**PNP
MJ21195***
**NPN
MJ21196***

*ON Semiconductor Preferred Device

**16 AMPERE
COMPLEMENTARY
SILICON POWER
TRANSISTORS
250 VOLTS
250 WATTS**



MAXIMUM RATINGS

Rating	Sym- bol	Value	Unit
Collector–Emitter Voltage	V _{CEO}	250	Vdc
Collector–Base Voltage	V _{CBO}	400	Vdc
Emitter–Base Voltage	V _{EBO}	5	Vdc
Collector–Emitter Voltage – 1.5 V	V _{CEX}	400	Vdc
Collector Current — Continuous Peak (1)	I _C	16 30	Adc
Base Current — Continuous	I _B	5	Adc
Total Power Dissipation @ T _C = 25°C Derate Above 25°C	P _D	250 1.43	Watts W/°C
Operating and Storage Junction Temperature Range	T _J , T _{stg}	–65 to +200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	R _{θJC}	0.7	°C/W

ELECTRICAL CHARACTERISTICS (T_C = 25°C ± 5°C unless otherwise noted)

Characteristic	Symbol	Min	Typical	Max	Unit
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

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

(continued)

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

MJ21195 MJ21196

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}	—	—	100	μAdc
Collector Cutoff Current ($V_{CE} = 250\text{ Vdc}$, $V_{BE(\text{off})} = 1.5\text{ Vdc}$)	I_{CEX}	—	—	100	μAdc

SECOND BREAKDOWN

Second Breakdown Collector Current with Base Forward Biased ($V_{CE} = 50\text{ Vdc}$, $t = 1\text{ s}$ (non-repetitive)) ($V_{CE} = 80\text{ Vdc}$, $t = 1\text{ s}$ (non-repetitive))	$I_{S/b}$	5 2.5	— —	— —	Adc
---	-----------	----------	--------	--------	--------------

ON CHARACTERISTICS

DC Current Gain ($I_C = 8\text{ Adc}$, $V_{CE} = 5\text{ Vdc}$) ($I_C = 16\text{ Adc}$, $V_{CE} = 5\text{ Vdc}$)	h_{FE}	25 8	— —	75	
Base-Emitter On Voltage ($I_C = 8\text{ Adc}$, $V_{CE} = 5\text{ Vdc}$)	$V_{BE(\text{on})}$	—	—	2.2	Vdc
Collector-Emitter Saturation Voltage ($I_C = 8\text{ Adc}$, $I_B = 0.8\text{ Adc}$) ($I_C = 16\text{ Adc}$, $I_B = 3.2\text{ Adc}$)	$V_{CE(\text{sat})}$	— —	— —	1.4 4	Vdc

DYNAMIC CHARACTERISTICS

Total Harmonic Distortion at the Output $V_{RMS} = 28.3\text{ V}$, $f = 1\text{ kHz}$, $P_{LOAD} = 100\text{ WRMS}$ ed (Matched pair $h_{FE} = 50 @ 5\text{ A/5 V}$)	T_{HD}	h_{FE} unmatch h_{FE} matched	— —	0.8 0.08	— —	%
Current Gain Bandwidth Product ($I_C = 1\text{ Adc}$, $V_{CE} = 10\text{ Vdc}$, $f_{\text{test}} = 1\text{ MHz}$)	f_T	4	—	—	—	MHz
Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f_{\text{test}} = 1\text{ MHz}$)	C_{ob}	—	—	500	—	pF

(1) Pulse Test: Pulse Width = 300 μs , Duty Cycle $\leq 2\%$

PNP MJ21195

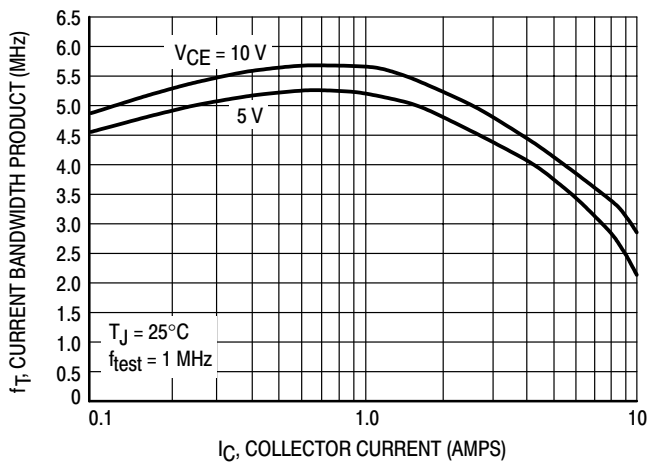


Figure 1. Typical Current Gain Bandwidth Product

NPN MJ21196

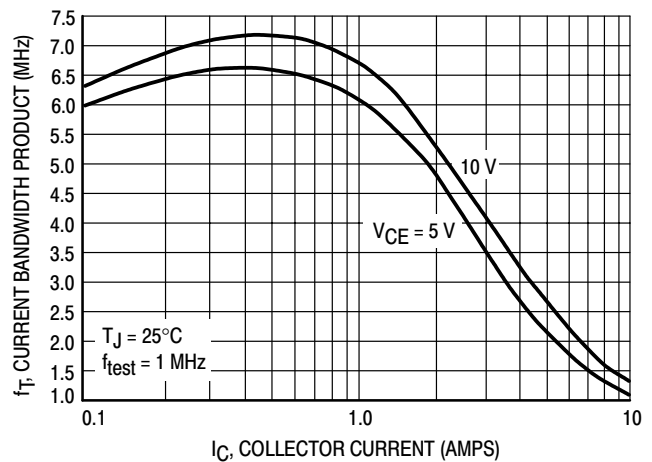


Figure 2. Typical Current Gain Bandwidth Product

TYPICAL CHARACTERISTICS

PNP MJ21195

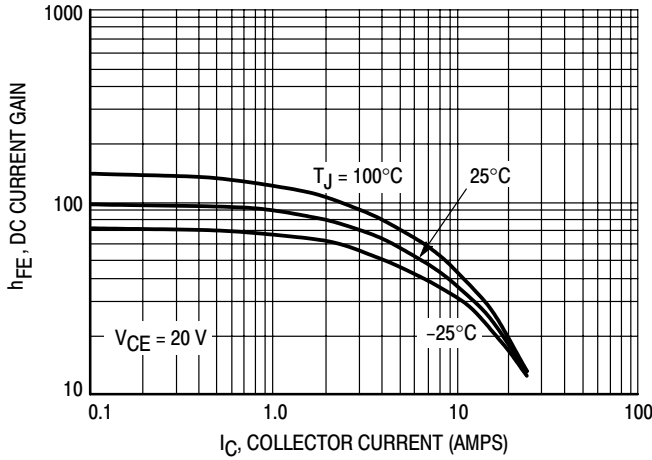


Figure 3. DC Current Gain, $V_{CE} = 20\text{ V}$

NPN MJ21196

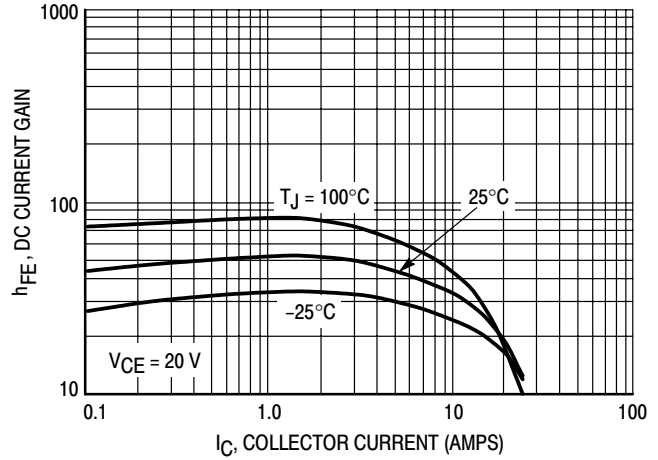


Figure 4. DC Current Gain, $V_{CE} = 20\text{ V}$

PNP MJ21195

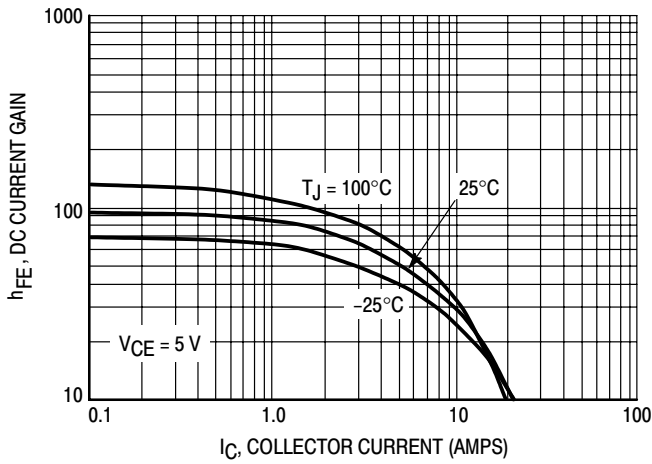


Figure 5. DC Current Gain, $V_{CE} = 5\text{ V}$

NPN MJ21196

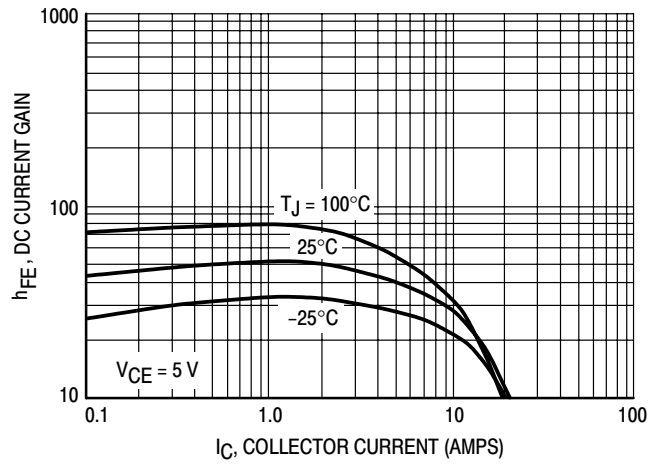


Figure 6. DC Current Gain, $V_{CE} = 5\text{ V}$

PNP MJ21195

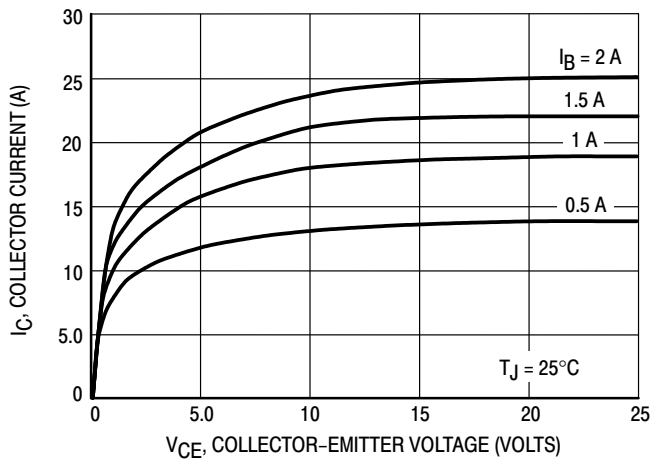


Figure 7. Typical Output Characteristics

NPN MJ21196

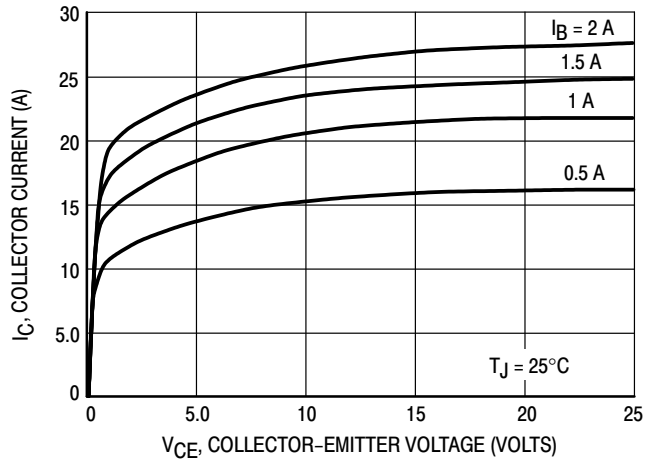


Figure 8. Typical Output Characteristics

TYPICAL CHARACTERISTICS

PNP MJ21195

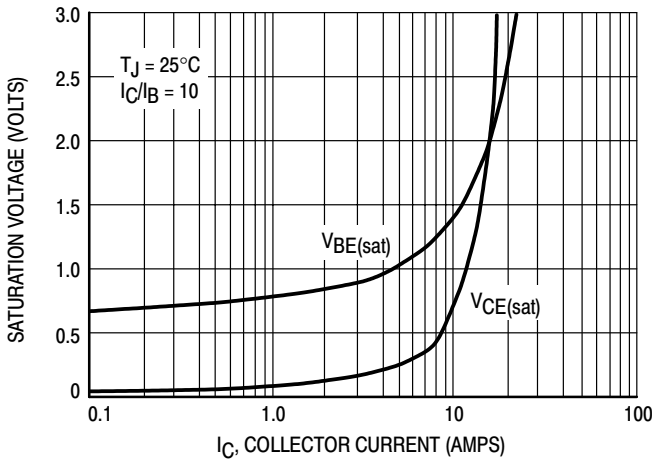


Figure 9. Typical Saturation Voltages

NPN MJ21196

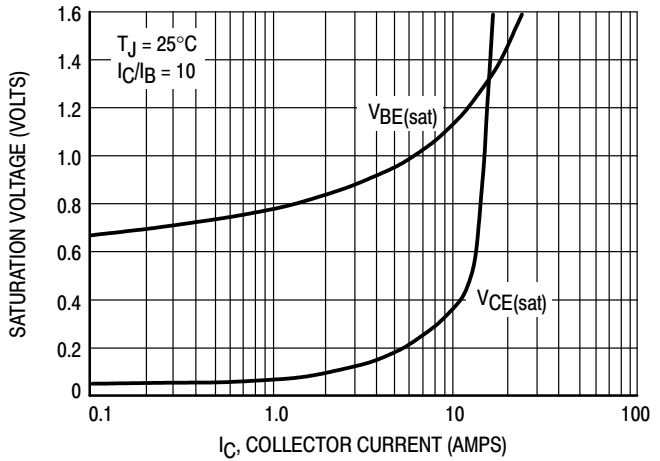


Figure 10. Typical Saturation Voltages

PNP MJ21195

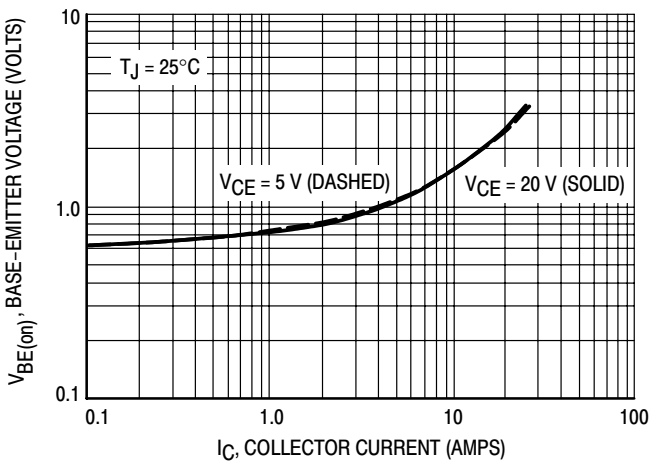


Figure 11. Typical Base-Emitter Voltage

NPN MJ21196

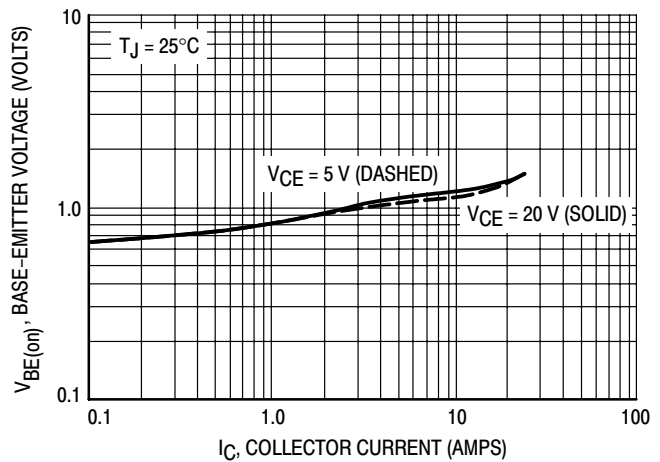


Figure 12. Typical Base-Emitter Voltage

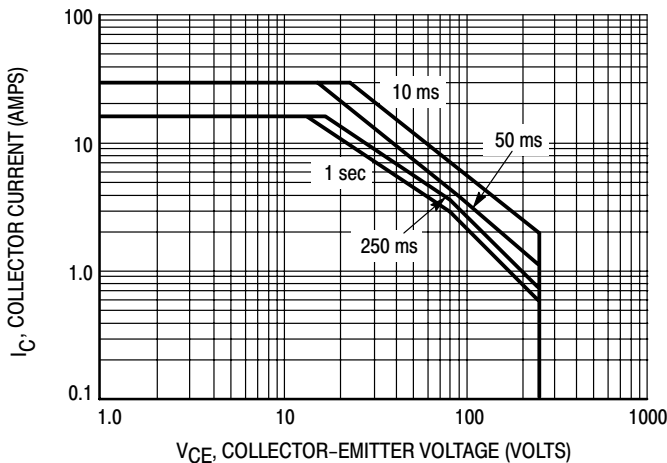


Figure 13. Active Region Safe Operating Area

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.

The data of Figure 13 is based on $T_{J(pk)} = 200^\circ\text{C}$; 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.

MJ21195 MJ21196

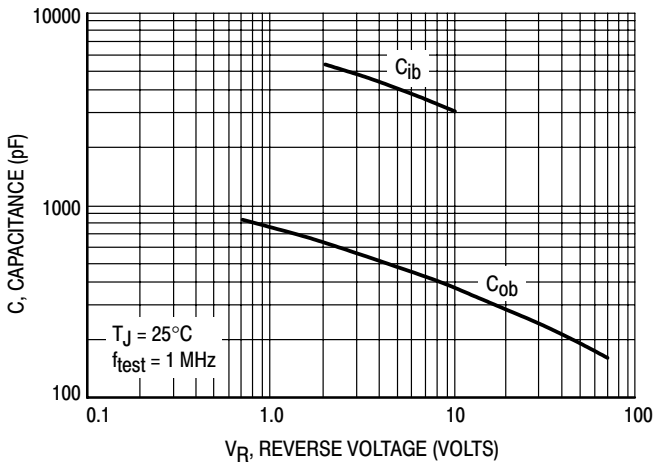


Figure 14. MJ21195 Typical Capacitance

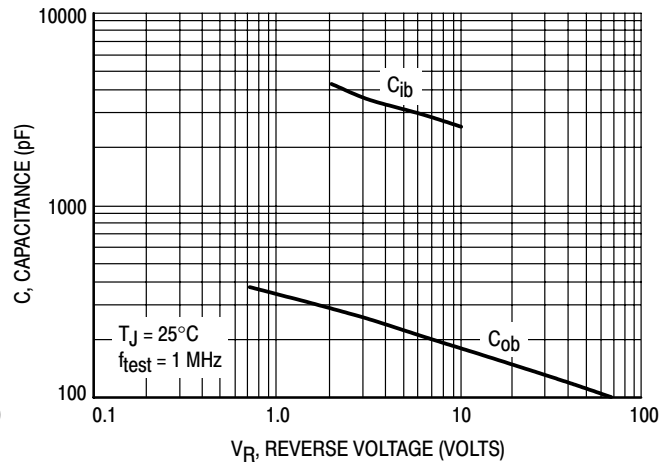


Figure 15. MJ21196 Typical Capacitance

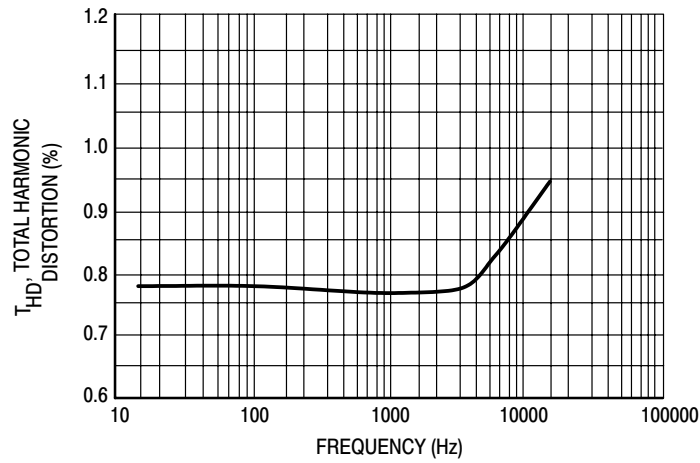


Figure 16. Typical Total Harmonic Distortion

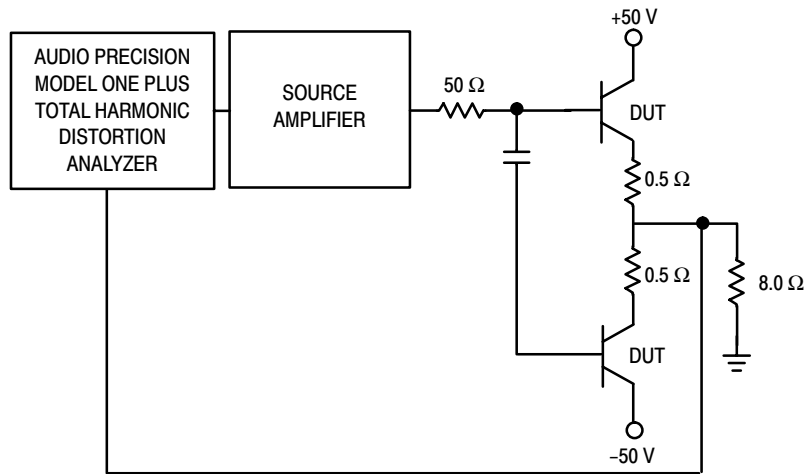
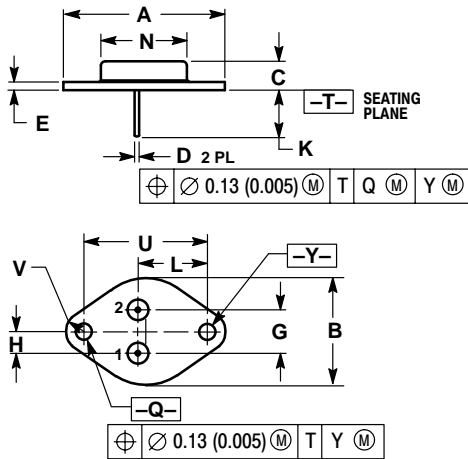


Figure 17. Total Harmonic Distortion Test Circuit

MJ21195 MJ21196

PACKAGE DIMENSIONS


TO-204 (TO-3) CASE 1-07 ISSUE Z



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. ALL RULES AND NOTES ASSOCIATED WITH REFERENCED TO-204AA OUTLINE SHALL APPLY.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	1.550 REF		39.37 REF	
B	---	1.050	---	26.67
C	0.250	0.335	6.35	8.51
D	0.038	0.043	0.97	1.09
E	0.055	0.070	1.40	1.77
G	0.430 BSC		10.92 BSC	
H	0.215 BSC		5.46 BSC	
K	0.440	0.480	11.18	12.19
L	0.665 BSC		16.89 BSC	
N	---	0.830	---	21.08
Q	0.151	0.165	3.84	4.19
U	1.187 BSC		30.15 BSC	
V	0.131	0.188	3.33	4.77

Notes

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer.

PUBLICATION ORDERING INFORMATION

Literature Fulfillment:

Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: ONlit@hibbertco.com

N. American Technical Support: 800-282-9855 Toll Free USA/Canada

JAPAN: ON Semiconductor, Japan Customer Focus Center
4-32-1 Nishi-Gotanda, Shinagawa-ku, Tokyo, Japan 141-0031
Phone: 81-3-5740-2700
Email: r14525@onsemi.com

ON Semiconductor Website: <http://onsemi.com>

For additional information, please contact your local Sales Representative.