

Silicon NPN High-Power Transistor

... designed for general-purpose power amplifier and switching applications.

- Collector-Emitter Sustaining Voltage —
 $V_{CEO(sus)} = 80 \text{ Vdc (Min)}$
- DC Current Gain —
 $h_{FE} = 20 \text{ (Min) @ } I_C = 6.0 \text{ Adc}$
- Low Collector — Emitter Saturation Voltage —
 $V_{CE(sat)} = 1.0 \text{ Vdc (Max) @ } I_C = 7.0 \text{ Adc}$
- High Current — Gain-Bandwidth Product —
 $f_T = 4.0 \text{ MHz (Min) @ } I_C = 1.0 \text{ Adc}$

MAXIMUM RATINGS (1)

| Rating | Symbol | Max | Unit |
|--|----------------|--------------|------------------------------------|
| Collector-Emitter Voltage | V_{CEO} | 80 | Vdc |
| Collector-Base Voltage | V_{CB} | 80 | Vdc |
| Emitter-Base Voltage | V_{EB} | 5.0 | Vdc |
| Collector Current — Continuous Peak | I_C | 15 30 | A dc |
| Base Current | I_B | 5.0 | A dc |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 160 0.915 | Watts $\text{W}/^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | -65 to +200 | $^\circ\text{C}$ |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--------------------------------------|---------------|-----|---------------------------|
| Thermal Resistance, Junction to Case | θ_{JC} | 1.1 | $^\circ\text{C}/\text{W}$ |

(1) Indicates JEDEC registered data. Units and conditions differ on some parameters and re-registration reflecting these changes has been requested. All above values meet or exceed present JEDEC registered data.

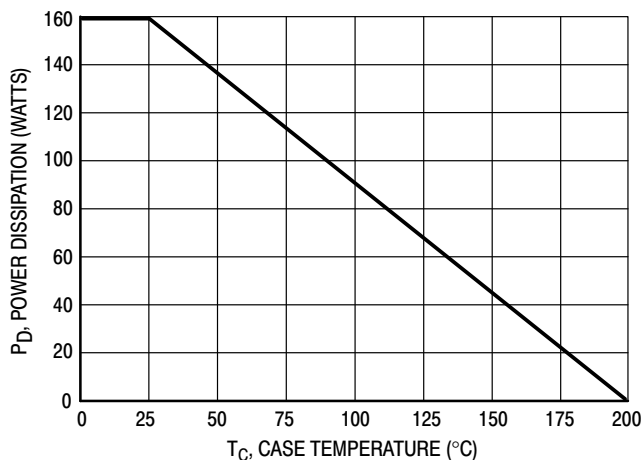


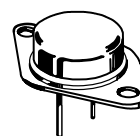
Figure 1. Power Derating

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

2N5882

ON Semiconductor Preferred Device

**15 AMPERE
 SILICON
 POWER TRANSISTOR
 80 VOLTS
 160 WATTS**



**CASE 1-07
 TO-204AA
 (TO-3)**

2N5882

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

| Characteristic | Symbol | Min | Max | Unit |
|--|----------------|-----|------------|------|
| OFF CHARACTERISTICS | | | | |
| Collector–Emitter Sustaining Voltage (2) ($I_C = 200 \text{ mAdc}$, $I_B = 0$) | $V_{CEO(sus)}$ | 80 | — | Vdc |
| Collector Cutoff Current ($V_{CE} = 40 \text{ Vdc}$, $I_B = 0$) | I_{CEO} | — | 1.0 | mAdc |
| Collector Cutoff Current ($V_{CE} = 80 \text{ Vdc}$, $V_{BE(off)} = 1.5 \text{ Vdc}$) ($V_{CE} = 80 \text{ Vdc}$, $V_{BE(off)} = 1.5 \text{ Vdc}$, $T_C = 150^\circ\text{C}$) | I_{CEX} | — | 0.5 5.0 | mAdc |
| Collector Cutoff Current ($V_{CB} = 80 \text{ Vdc}$, $I_E = 0$) | I_{CBO} | — | 0.5 | mAdc |
| Emitter Cutoff Current ($V_{EB} = 5.0 \text{ Vdc}$, $I_C = 0$) | I_{EBO} | — | 1.0 | mAdc |

ON CHARACTERISTICS

| | | | | |
|--|---------------|-----------------|---------------|-----|
| DC Current Gain (1) ($I_C = 2.0 \text{ Adc}$, $V_{CE} = 4.0 \text{ Vdc}$) ($I_C = 6.0 \text{ Adc}$, $V_{CE} = 4.0 \text{ Vdc}$) ($I_C = 15 \text{ Adc}$, $V_{CE} = 4.0 \text{ Vdc}$) | h_{FE} | 35 20 4.0 | — 100 — | — |
| Collector–Emitter Saturation Voltage (2) ($I_C = 7.0 \text{ Adc}$, $I_B = 0.7 \text{ Adc}$) ($I_C = 15 \text{ Adc}$, $I_B = 3.75 \text{ Adc}$) | $V_{CE(sat)}$ | — — | 1.0 4.0 | Vdc |
| Base–Emitter Saturation Voltage (1) ($I_C = 15 \text{ Adc}$, $I_B = 3.75 \text{ Adc}$) | $V_{BE(sat)}$ | — | 2.5 | Vdc |
| Base–Emitter On Voltage (2) ($I_C = 6.0 \text{ Adc}$, $V_{CE} = 4.0 \text{ Vdc}$) | $V_{BE(on)}$ | — | 1.5 | Vdc |

DYNAMIC CHARACTERISTICS

| | | | | |
|--|----------|-----|-----|-----|
| Current–Gain — Bandwidth Product (3) ($I_C = 1.0 \text{ Adc}$, $V_{CE} = 10 \text{ Vdc}$, $f_{test} = 1.0 \text{ MHz}$) | f_T | 4.0 | — | MHz |
| Output Capacitance ($V_{CB} = 10 \text{ Vdc}$, $I_E = 0$, $f = 100 \text{ kHz}$) | C_{ob} | — | 400 | pF |
| Small–Signal Current Gain ($I_C = 2.0 \text{ Adc}$, $V_{CE} = 4.0 \text{ Vdc}$, $f = 1.0 \text{ kHz}$) | h_{fe} | 20 | — | — |

SWITCHING CHARACTERISTICS

| | | | | | |
|--------------|---|-------|---|-----|---------------|
| Rise Time | $(V_{CC} = 30 \text{ Vdc}$, $I_C = 6.0 \text{ Adc}$, $I_{B1} = I_{B2} = 0.6 \text{ Adc}$ See Figure 2) | t_r | — | 0.7 | μs |
| Storage Time | | t_s | — | 1.0 | μs |
| Fall Time | | t_f | — | 0.8 | μs |

*Indicates JEDEC Registered Data.

(2) Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2.0\%$

(3) $f_T = |h_{fe}| \cdot f_{test}$.

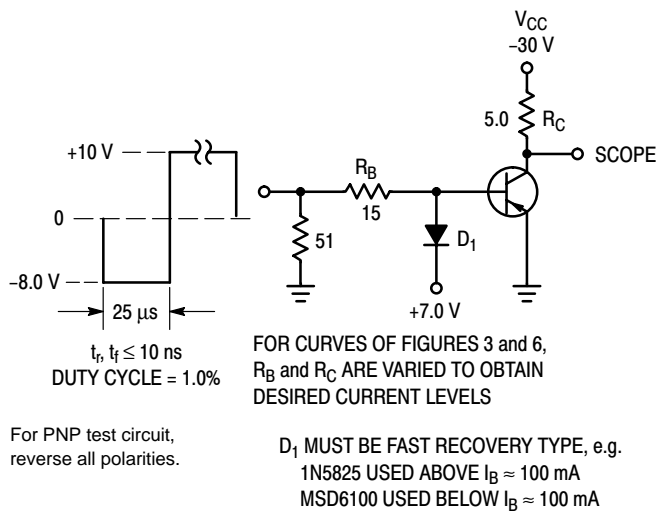


Figure 2. Switching Times Test Circuit

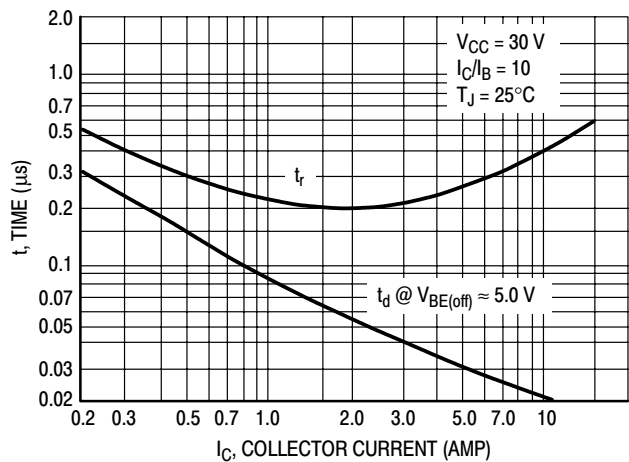


Figure 3. Turn–On Time

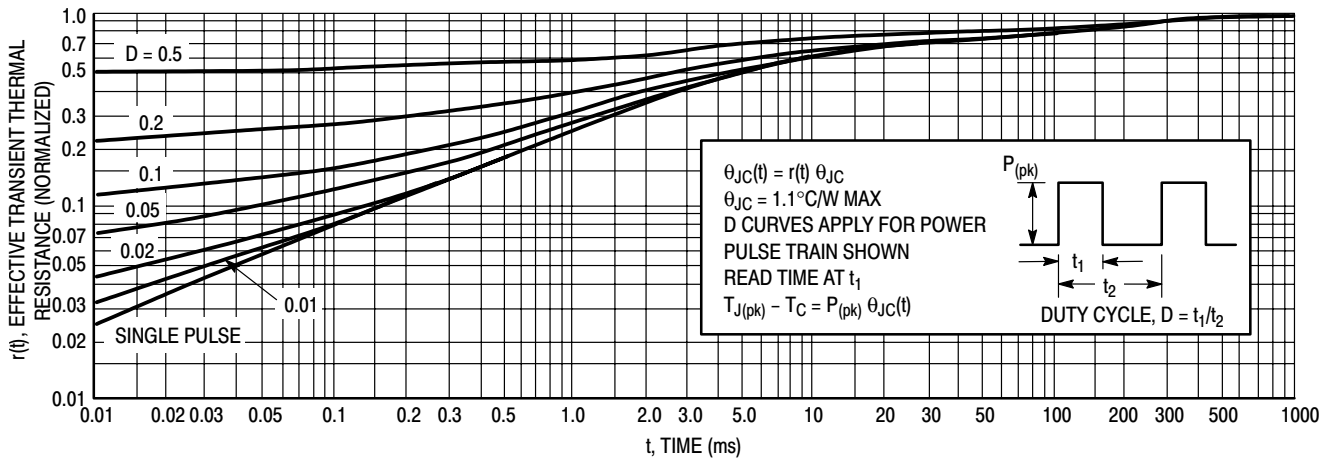


Figure 4. Thermal Response

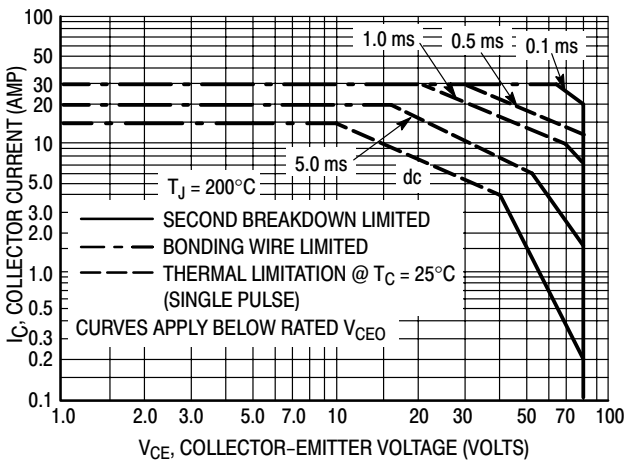


Figure 5. Active-Region Safe Operating Area

There are two limitations on the power handling ability of a transistor: average junction temperature and second 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 5 is based on $T_{J(pk)} = 200^{\circ}\text{C}$; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} < 200^{\circ}\text{C}$. $T_{J(pk)}$ may be calculated from the data in Figure 4. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

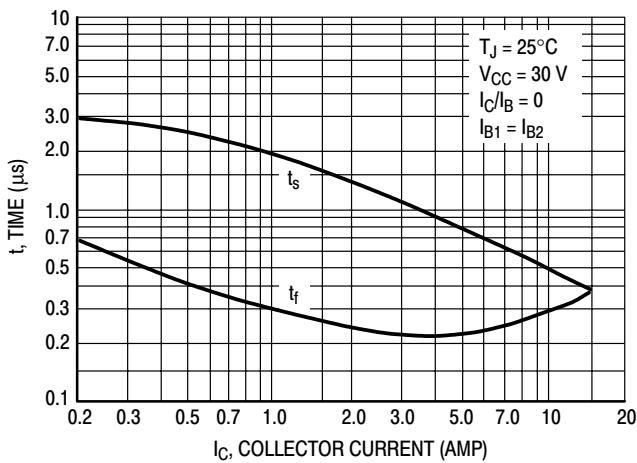


Figure 6. Turn-Off Time

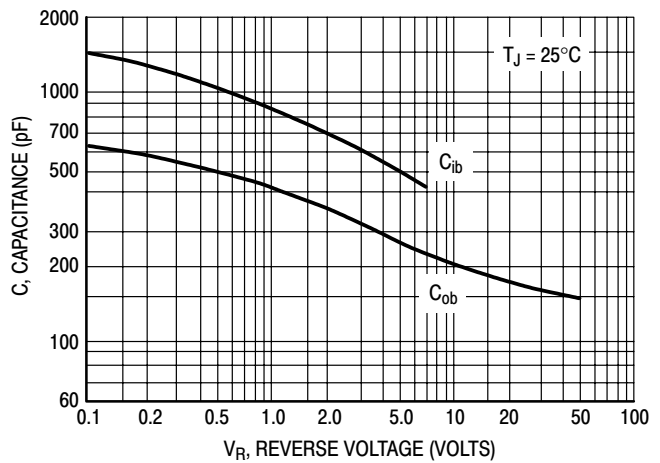


Figure 7. Capacitance

2N5882

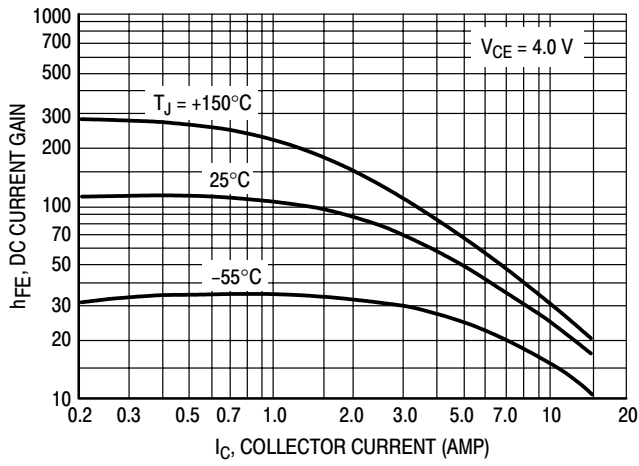


Figure 8. DC Current Gain

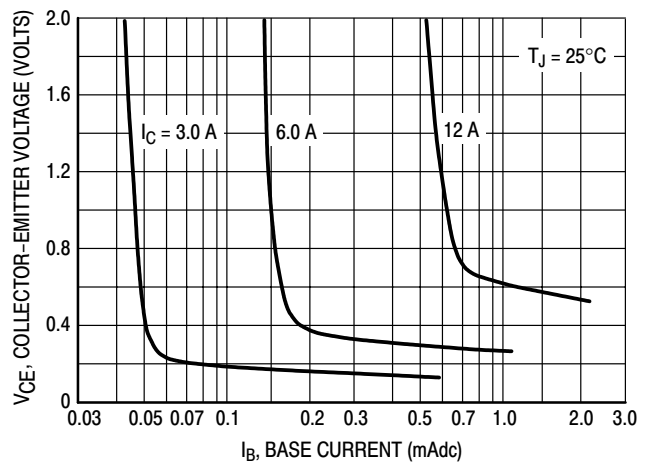


Figure 9. Collector Saturation Region

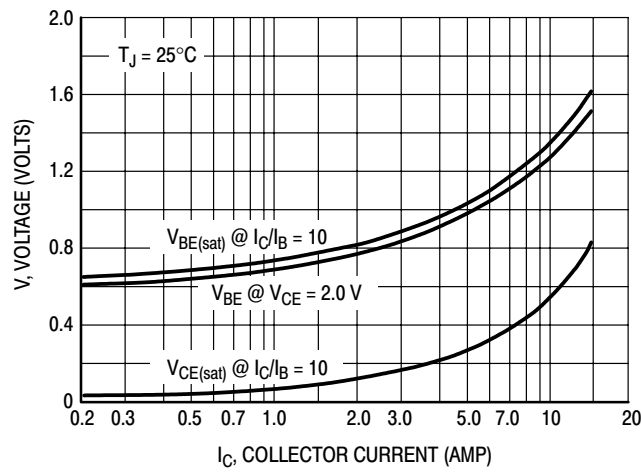
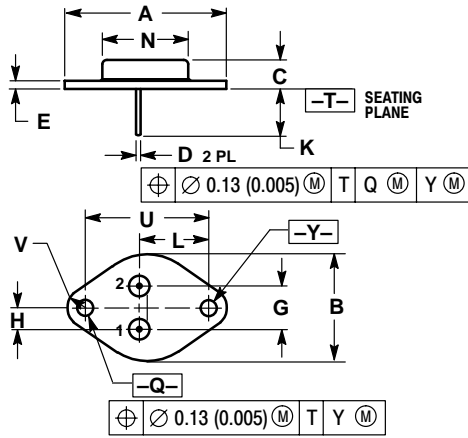


Figure 10. "On" Voltage

2N5882

PACKAGE DIMENSIONS

CASE 1-07 TO-204AA (TO-3) 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 |

STYLE 1:
PIN 1: BASE
2: EMITTER
CASE: COLLECTOR

Notes

www.DataSheet4U.com

Notes

www.DataSheet4U.com

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

NORTH AMERICA 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
 Fax Response Line: 303-675-2167 or 800-344-3810 Toll Free USA/Canada

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

EUROPE: LDC for ON Semiconductor – European Support

German Phone: (+1) 303-308-7140 (Mon-Fri 2:30pm to 7:00pm CET)
Email: ONlit-german@hibbertco.com
French Phone: (+1) 303-308-7141 (Mon-Fri 2:00pm to 7:00pm CET)
Email: ONlit-french@hibbertco.com
English Phone: (+1) 303-308-7142 (Mon-Fri 12:00pm to 5:00pm GMT)
Email: ONlit@hibbertco.com

EUROPEAN TOLL-FREE ACCESS*: 00-800-4422-3781

*Available from Germany, France, Italy, UK, Ireland

CENTRAL/SOUTH AMERICA:

Spanish Phone: 303-308-7143 (Mon-Fri 8:00am to 5:00pm MST)
Email: ONlit-spanish@hibbertco.com
Toll-Free from Mexico: Dial 01-800-288-2872 for Access –
 then Dial 866-297-9322

ASIA/PACIFIC: LDC for ON Semiconductor – Asia Support

Phone: 1-303-675-2121 (Tue-Fri 9:00am to 1:00pm, Hong Kong Time)
Toll Free from Hong Kong & Singapore:
001-800-4422-3781

Email: ONlit-asia@hibbertco.com

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.