

# Complementary Silicon Plastic Power Transistors

... designed for use in general-purpose amplifier and switching applications.

- DC Current Gain Specified to 7.0 Amperes  
 $h_{FE} = 30-150 @ I_C$   
 = 3.0 Adc — 2N6111, 2N6288  
 = 2.3 (Min) @  $I_C = 7.0$  Adc — All Devices
- Collector-Emitter Sustaining Voltage —  
 $V_{CEO(sus)} = 30$  Vdc (Min) — 2N6111, 2N6288  
 = 50 Vdc (Min) — 2N6109  
 = 70 Vdc (Min) — 2N6107, 2N6292
- High Current Gain — Bandwidth Product  
 $f_T = 4.0$  MHz (Min) @  $I_C = 500$  mAdc — 2N6288, 90, 92  
 = 10 MHz (Min) @  $I_C = 500$  mAdc — 2N6107, 09, 11
- TO-220AB Compact Package
- These devices are available in Pb-free package(s). Specifications herein apply to both standard and Pb-free devices. Please see our website at [www.onsemi.com](http://www.onsemi.com) for specific Pb-free orderable part numbers, or contact your local ON Semiconductor sales office or representative.

## \*MAXIMUM RATINGS

Rating	Symbol	2N6111 2N6288	2N6109	2N6107 2N6292	Unit
Collector-Emitter Voltage	$V_{CEO}$	30	50	70	Vdc
Collector-Base Voltage	$V_{CB}$	40	60	80	Vdc
Emitter-Base Voltage	$V_{EB}$	5.0			Vdc
Collector Current — Continuous Peak	$I_C$	7.0 10			Adc
Base Current	$I_B$	3.0			Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	40 0.32			Watts W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-65 to +150			$^\circ\text{C}$

## THERMAL CHARACTERISTICS

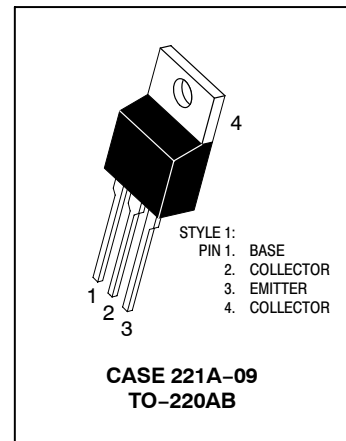
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	3.125	$^\circ\text{C}/\text{W}$

\*Indicates JEDEC Registered Data.

**PNP**  
**2N6107**  
**2N6109\***  
**2N6111**  
**NPN**  
**2N6288**  
**2N6292\***

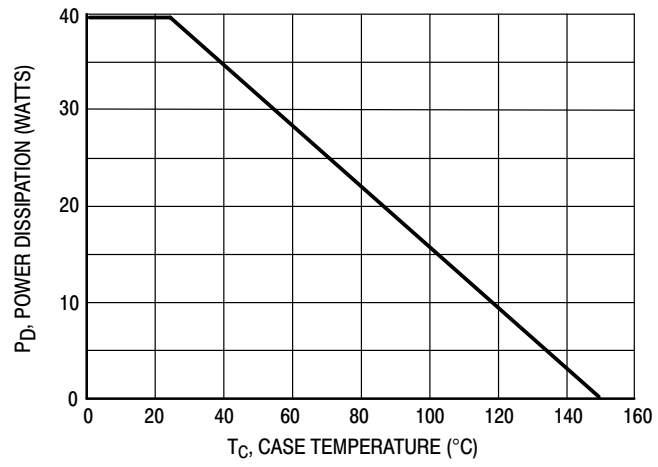
\*ON Semiconductor Preferred Device

**7 AMPERE**  
**POWER TRANSISTORS**  
**COMPLEMENTARY**  
**SILICON**  
**30-50-70 VOLTS**  
**40 WATTS**



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

**2N6107 2N6109 2N6111 2N6288 2N6292**



**Figure 1. Power Derating**

## 2N6107 2N6109 2N6111 2N6288 2N6292

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

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector–Emitter Sustaining Voltage (1) ( $I_C = 100\text{ mA}$ , $I_B = 0$ )	$V_{CEO(sus)}$	30 50 70	— — —	Vdc
				2N6111, 2N6288 2N6109 2N6107, 2N6292
Collector Cutoff Current ( $V_{CE} = 20\text{ Vdc}$ , $I_B = 0$ ) ( $V_{CE} = 40\text{ Vdc}$ , $I_B = 0$ ) ( $V_{CE} = 60\text{ Vdc}$ , $I_B = 0$ )	$I_{CEO}$	— — —	1.0 1.0 1.0	mA
				2N6111, 2N6288 2N6109 2N6107, 2N6292
Collector Cutoff Current ( $V_{CE} = 40\text{ Vdc}$ , $V_{EB(off)} = 1.5\text{ Vdc}$ ) ( $V_{CE} = 60\text{ Vdc}$ , $V_{EB(off)} = 1.5\text{ Vdc}$ ) ( $V_{CE} = 80\text{ Vdc}$ , $V_{EB(off)} = 1.5\text{ Vdc}$ ) ( $V_{CE} = 30\text{ Vdc}$ , $V_{EB(off)} = 1.5\text{ Vdc}$ , $T_C = 150^\circ\text{C}$ ) ( $V_{CE} = 50\text{ Vdc}$ , $V_{EB(off)} = 1.5\text{ Vdc}$ , $T_C = 150^\circ\text{C}$ ) ( $V_{CE} = 70\text{ Vdc}$ , $V_{EB(off)} = 1.5\text{ Vdc}$ , $T_C = 150^\circ\text{C}$ )	$I_{CEX}$	— — — — — —	100 100 100 2.0 2.0 2.0	$\mu\text{A}$   mA
				2N6111, 2N6288 2N6109 2N6107, 2N6292 2N6111, 2N6288 2N6109 2N6107, 2N6292
Emitter Cutoff Current ( $V_{BE} = 5.0\text{ Vdc}$ , $I_C = 0$ )	$I_{EBO}$	—	1.0	mA

### ON CHARACTERISTICS (1)

DC Current Gain ( $I_C = 2.0\text{ A}$ , $V_{CE} = 4.0\text{ Vdc}$ ) ( $I_C = 2.5\text{ A}$ , $V_{CE} = 4.0\text{ Vdc}$ ) ( $I_C = 3.0\text{ A}$ , $V_{CE} = 4.0\text{ Vdc}$ ) ( $I_C = 7.0\text{ A}$ , $V_{CE} = 4.0\text{ Vdc}$ )	$h_{FE}$	30 30 30 2.3	150 150 150 —	—
				2N6107, 2N6292 2N6109 2N6111, 2N6288 All Devices
Collector–Emitter Saturation Voltage ( $I_C = 7.0\text{ A}$ , $I_B = 3.0\text{ A}$ )	$V_{CE(sat)}$	—	3.5	Vdc
Base–Emitter On Voltage ( $I_C = 7.0\text{ A}$ , $V_{CE} = 4.0\text{ Vdc}$ )	$V_{BE(on)}$	—	3.0	Vdc

### DYNAMIC CHARACTERISTICS

Current Gain — Bandwidth Product (2) ( $I_C = 500\text{ mA}$ , $V_{CE} = 4.0\text{ Vdc}$ , $f_{test} = 1.0\text{ MHz}$ )	$f_T$	4.0 10	— —	MHz
				2N6288, 92 2N6107, 09, 11
Output Capacitance ( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	$C_{ob}$	—	250	pF
Small–Signal Current Gain ( $I_C = 0.5\text{ A}$ , $V_{CE} = 4.0\text{ Vdc}$ , $f = 50\text{ kHz}$ )	$h_{fe}$	20	—	—

\*Indicates JEDEC Registered Data.

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

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

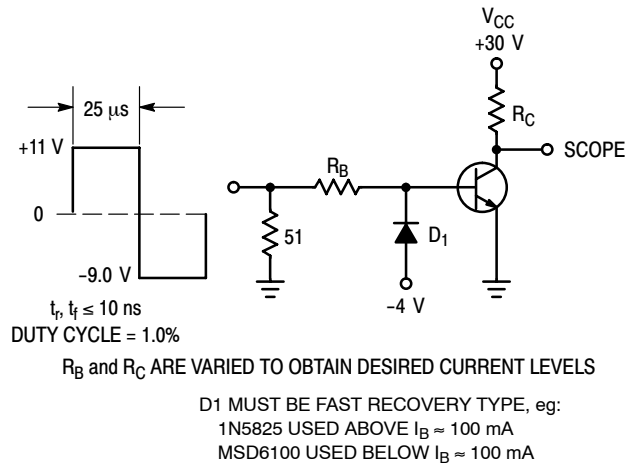


Figure 2. Switching Time Test Circuit

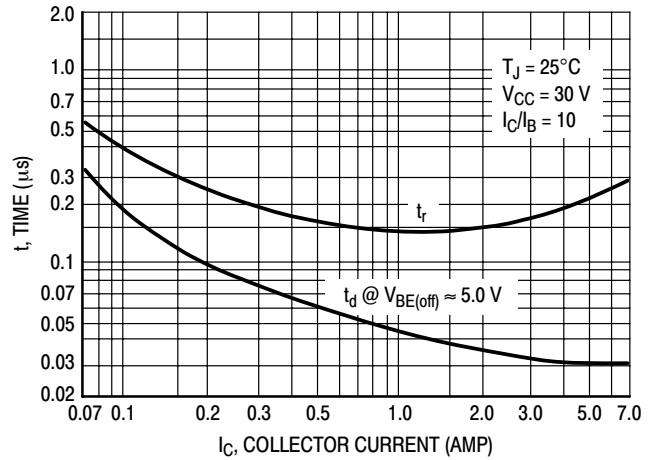


Figure 3. Turn-On Time

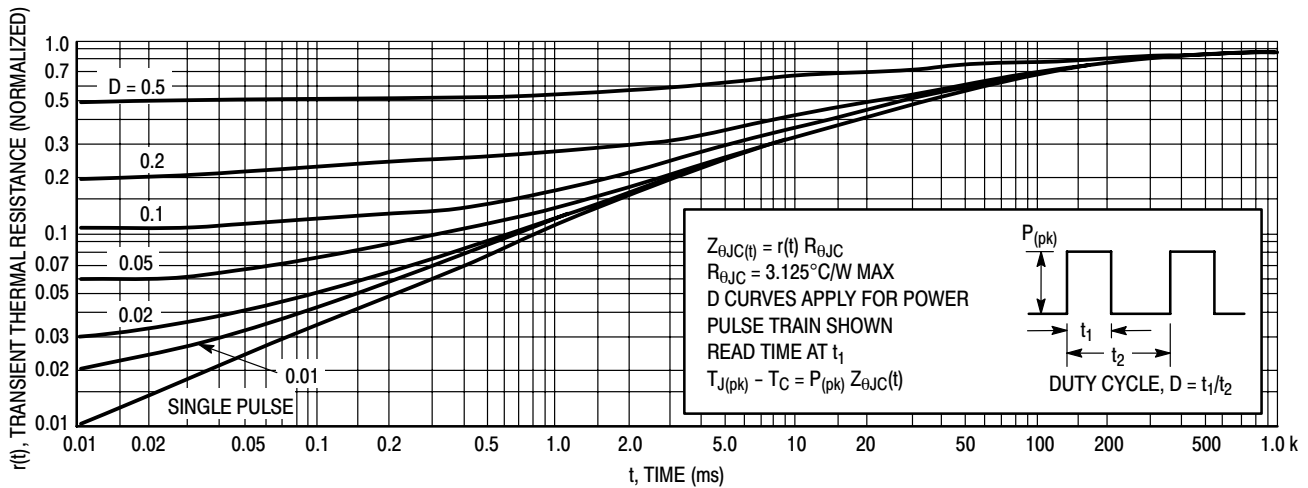


Figure 4. Thermal Response

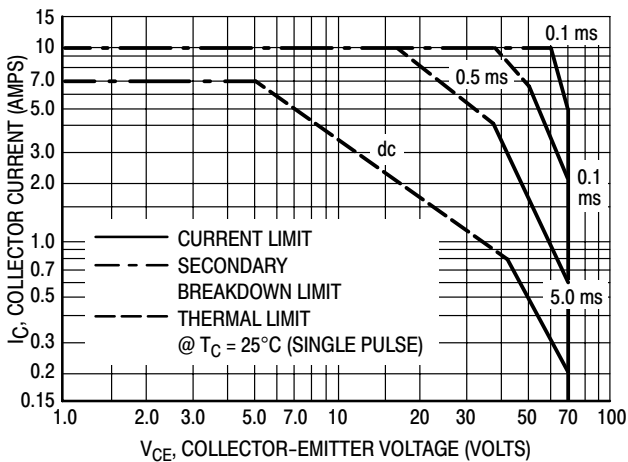


Figure 5. Active-Region Safe Operating Area

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  $T_{J(pk)} = 150^\circ\text{C}$ ;  $T_C$  is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{J(pk)} \leq 150^\circ\text{C}$ .  $T_{J(pk)}$  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.

2N6107 2N6109 2N6111 2N6288 2N6292

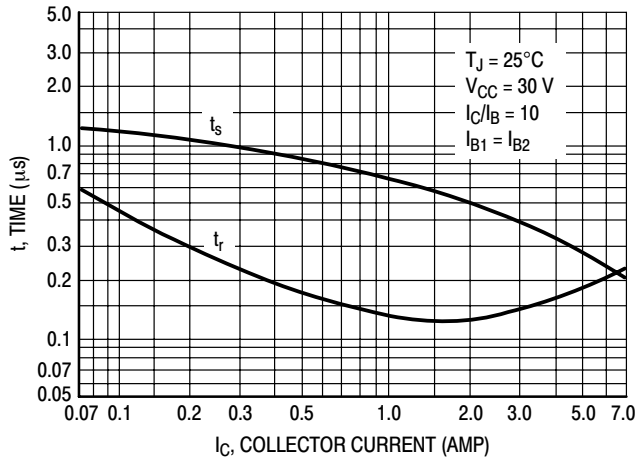


Figure 6. Turn-Off Time

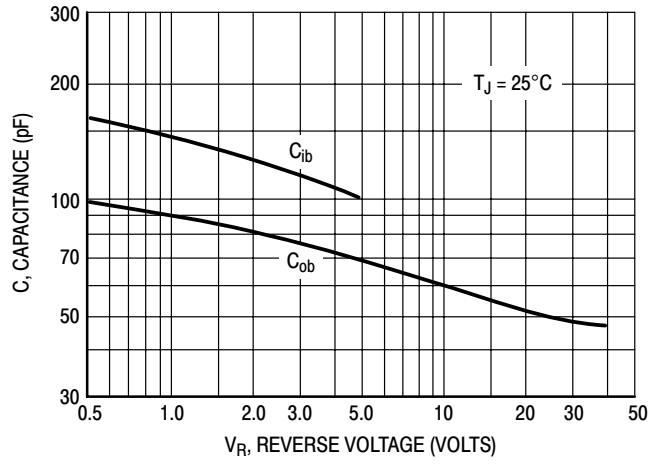
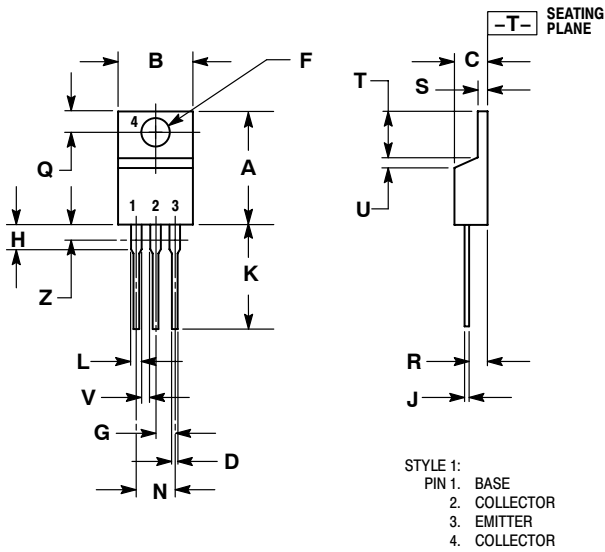


Figure 7. Capacitance

PACKAGE DIMENSIONS

TO-220AB  
CASE 221A-09  
ISSUE AA



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.035	0.64	0.88
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.018	0.025	0.46	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	---	1.15	---
Z	---	0.080	---	2.04

## Notes

**ON Semiconductor** and  are registered 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. This literature is subject to all applicable copyright laws and is not for resale in any manner.

### PUBLICATION ORDERING INFORMATION

**LITERATURE FULFILLMENT:**

Literature Distribution Center for ON Semiconductor  
P.O. Box 61312, Phoenix, Arizona 85082-1312 USA

**Phone:** 480-829-7710 or 800-344-3860 Toll Free USA/Canada

**Fax:** 480-829-7709 or 800-344-3867 Toll Free USA/Canada

**Email:** [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

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

**Japan:** ON Semiconductor, Japan Customer Focus Center  
2-9-1 Kamimeguro, Meguro-ku, Tokyo, Japan 153-0051  
**Phone:** 81-3-5773-3850

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

**Order Literature:** <http://www.onsemi.com/litorder>

For additional information, please contact your  
local Sales Representative.