

PNP  
**2N5986, 2N5987**  
**2N5988**  
NPN  
**2N5989, 2N5991**

**HIGH POWER PLASTIC  
COMPLEMENTARY SILICON POWER TRANSISTORS**

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

- Collector-Base Voltage –  $V_{CB0} = 60 \text{ Vdc} - 2N5986, 2N5989$   
= 80 Vdc – 2N5987  
= 100 Vdc – 2N5988, 2N5991
- Collector-Emitter Voltage –  $V_{CE0} = 40 \text{ Vdc} - 2N5986, 2N5989$   
= 60 Vdc – 2N5987  
= 80 Vdc – 2N5988, 2N5991
- DC Current Gain –  
 $h_{FE} = 20-120 @ I_C = 6.0 \text{ Adc}$   
= 7.0 (Min) @  $I_C = 12 \text{ Adc}$
- Collector-Emitter Saturation Voltage –  
 $V_{CE(sat)} = 0.7 \text{ Vdc (Max) @ } I_C = 6.0 \text{ Adc}$

**\*MAXIMUM RATINGS**

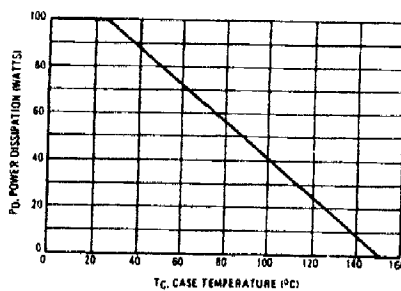
Rating	Symbol	2N5986 2N5989	2N5987	2N5988 2N5991	Unit
Collector-Base Voltage	$V_{CB}$	60	80	100	Vdc
Collector-Emitter Voltage	$V_{CE0}$	40	60	80	Vdc
Emitter-Base Voltage	$V_{EB}$	5.0			Vdc
Collector Current – Continuous Peak	$I_C$	12 20			Adc
Base Current	$I_B$	4.0			Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	100 0.8			Watts W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-65 to +150			$^\circ\text{C}$

**THERMAL CHARACTERISTICS**

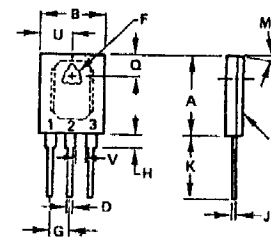
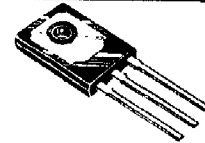
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$\theta_{JC}$	1.25	$^\circ\text{C/W}$

\*Indicates JEDEC Registered Data

**FIGURE 1 – POWER DERATING**



**12 AMPERE  
POWER TRANSISTORS  
COMPLEMENTARY SILICON**  
40, 60, 80 VOLTS  
100 WATTS



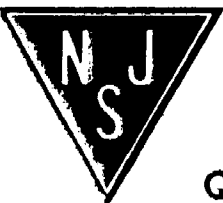
STYLE 2:  
PIN 1. EMITTER  
2. COLLECTOR  
3. BASE

**NOTES:**

1. DIM "D" UNCONTROLLED IN ZONE "H"
2. DIM "F" DIA THRU
3. HEAT SINK CONTACT AREA (BOTTOM)
4. LEADS WITHIN 0.005" RAD OF TRUE POSITION (TP) AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	16.13	16.38	0.635	0.645
B	12.57	12.83	0.495	0.505
C	3.18	3.43	0.125	0.135
D	1.09	1.24	0.043	0.049
F	3.51	3.76	0.138	0.148
G	4.22 BSC		0.165 BSC	
H	2.67	2.92	0.105	0.115
J	0.813	0.864	0.032	0.034
K	15.11	16.38	0.595	0.645
M	90 TYP		90 TYP	
Q	4.70	4.95	0.185	0.195
R	1.91	2.16	0.076	0.085
U	6.22	6.48	0.245	0.255
V	2.03	-	0.080	-

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## 2N5986, 2N5987, 2N5988 PNP / 2N5989, 2N5991 NPN

### \*ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector-Emitter Sustaining Voltage (I <sub>C</sub> = 0.2 Adc, I <sub>B</sub> = 0)	V <sub>CE(sus)</sub>	40 60 80	—	Vdc
Collector Cutoff Current (V <sub>CE</sub> = 20 Vdc, I <sub>B</sub> = 0) (V <sub>CE</sub> = 30 Vdc, I <sub>B</sub> = 0) (V <sub>CE</sub> = 40 Vdc, I <sub>B</sub> = 0)	I <sub>CEO</sub>	— — —	2.0 2.0 2.0	mA <sub>dc</sub>
Collector Cutoff Current (V <sub>CE</sub> = 60 Vdc, V <sub>BE(off)</sub> = 1.5 Vdc) (V <sub>CE</sub> = 80 Vdc, V <sub>BE(off)</sub> = 1.5 Vdc) (V <sub>CE</sub> = 100 Vdc, V <sub>BE(off)</sub> = 1.5 Vdc) (V <sub>CE</sub> = 40 Vdc, V <sub>BE(off)</sub> = 1.5 Vdc, T <sub>C</sub> = 125°C) (V <sub>CE</sub> = 60 Vdc, V <sub>BE(off)</sub> = 1.5 Vdc, T <sub>C</sub> = 125°C) (V <sub>CE</sub> = 80 Vdc, V <sub>BE(off)</sub> = 1.5 Vdc, T <sub>C</sub> = 125°C)	I <sub>CEx</sub>	— — — — — —	200 200 200 2.0 2.0 2.0	μA <sub>dc</sub>   mA <sub>dc</sub>
Emitter Cutoff Current (V <sub>BE</sub> = 5.0 Vdc, I <sub>C</sub> = 0)	I <sub>EBO</sub>	—	1.0	mA <sub>dc</sub>
<b>ON CHARACTERISTICS</b>				
DC Current Gain (I <sub>C</sub> = 1.5 Adc, V <sub>CE</sub> = 2.0 Vdc) (I <sub>C</sub> = 6.0 Adc, V <sub>CE</sub> = 2.0 Vdc) (I <sub>C</sub> = 12 Adc, V <sub>CE</sub> = 2.0 Vdc)	h <sub>FE</sub>	40 20 7.0	— 120 —	—
Collector-Emitter Saturation Voltage (I <sub>C</sub> = 6.0 Adc, I <sub>B</sub> = 0.6 Adc) (I <sub>C</sub> = 12 Adc, I <sub>B</sub> = 1.8 Adc)	V <sub>CE(sat)</sub>	— —	0.6 1.7	Vdc
Base-Emitter Saturation Voltage (I <sub>C</sub> = 12 Adc, I <sub>B</sub> = 1.8 Adc)	V <sub>BE(sat)</sub>	—	2.5	Vdc
Base-Emitter On Voltage (I <sub>C</sub> = 6.0 Adc, V <sub>CE</sub> = 2.0 Vdc)	V <sub>BE(on)</sub>	—	1.4	Vdc
<b>DYNAMIC CHARACTERISTICS</b>				
Current-Gain — Bandwidth Product (I <sub>C</sub> = 0.5 Adc, V <sub>CE</sub> = 10 Vdc, f <sub>test</sub> = 1.0 MHz)	f <sub>T</sub>	2.0	—	MHz
Output Capacitance (V <sub>CB</sub> = 10 Vdc, I <sub>E</sub> = 0, f = 1.0 MHz)	C <sub>ob</sub>	— —	500 300	pF
Small-Signal Current Gain (I <sub>C</sub> = 2.0 Adc, V <sub>CE</sub> = 4.0 Vdc, f = 1.0 kHz)	h <sub>fe</sub>	20	—	—

\*Indicates JEDEC Registered Data.

(1) f<sub>T</sub> = |h<sub>fe</sub>| @ f<sub>test</sub>

FIGURE 2 — SWITCHING TIMES TEST CIRCUIT

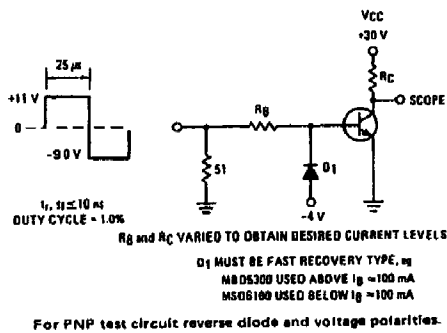


FIGURE 3 — TURN-ON TIME

