New Jersey Semi-Conductor Products, Inc.

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NPN 2N5629 2N5630 2N5631
PNP 2N6029 2N6030 2N6031

HIGH-VOLTAGE – HIGH POWER TRANSISTORS

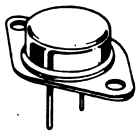
. . . designed for use in high power audio amplifier applications and high voltage switching regulator circuits.

- High Collector-Emitter Sustaining Voltage –
  $V_{CEO(sus)}$ = 100 Vdc – 2N5629, 2N6029
  = 120 Vdc – 2N5630, 2N6030
  = 140 Vdc – 2N5631, 2N6031
- High DC Current Gain – @ I_C = 8.0 Adc
  h_{FE} = 25 (Min) – 2N5629, 2N6029
  = 20 (Min) – 2N5630, 2N6030
  = 15 (Min) – 2N5631, 2N6031
- Low Collector-Emitter Saturation Voltage –
  $V_{CE(sat)}$ = 1.0 Vdc (Max) @ I_C = 10 Adc

16 AMPERE

POWER TRANSISTORS COMPLEMENTARY SILICON

100-120-140 VOLTS
200 WATTS



*MAXIMUM RATINGS

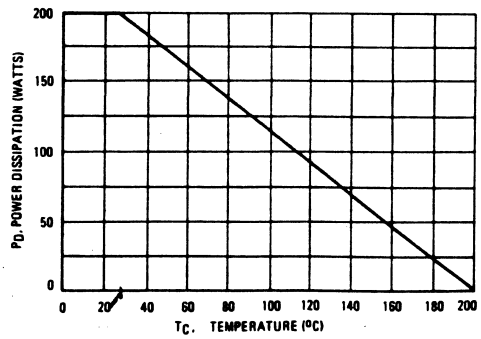
Rating	Symbol	2N5629 2N6029	2N5630 2N6030	2N5631 2N6031	Unit
Collector-Emitter Voltage	V_{CEO}	100	120	140	Vdc
Collector-Base Voltage	V_{CB}	100	120	140	Vdc
Emitter-Base Voltage	V_{EB}	← 7.0 →			Vdc
Collector Current - Continuous	I_C	← 16 →			Adc
Peak		← 20 →			
Base Current Continuous	I_B	← 5.0 →			Adc
Total Device Dissipation @ T_C = 25°C	P_D	← 200 →			Watts
Derate above 25°C		← 1.14 →			W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200			°C

*THERMAL CHARACTERISTICS

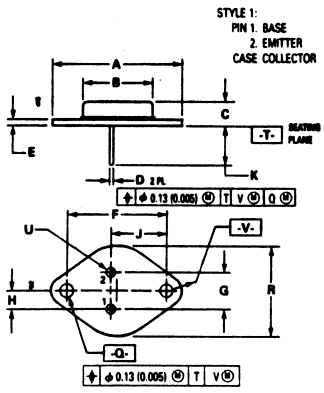
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}	0.875	°C/W

*Indicates JEDEC Registered Data.

FIGURE 1 – POWER DERATING



Safe Area Curves are indicated by Figure 5. All Limits are applicable and must be observed.



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	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	—	39.37	—	1.550
B	—	21.08	—	0.830
C	6.35	8.25	0.250	0.325
D	0.97	1.09	0.038	0.043
E	1.40	1.77	0.055	0.070
F	30.15 BSC		1.187 BSC	
G	10.92 BSC		0.430 BSC	
H	5.46 BSC		0.215 BSC	
J	16.89 BSC		0.665 BSC	
K	11.18	12.19	0.440	0.480
Q	3.84	4.19	0.151	0.165
R	—	26.67	—	1.050
U	4.83	5.33	0.190	0.210
V	3.84	4.19	0.151	0.165

CASE 1-06
TO-204AA
(TO-3)

Quality Semi-Conductors

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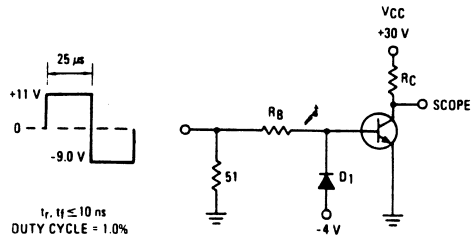
2N5629, 2N5630, 2N5631 NPN
2N6029, 2N6030, 2N6031 PNP

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

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Sustaining Voltage (1) (I_C = 200 mAdc, I_B = 0)	2N5629, 2N6029	$V_{CEO(sus)}$	100	—	Vdc
	2N5630, 2N6030		120		
	2N5631, 2N6031		140	—	
Collector-Emitter Cutoff Current		I_{CEO}			mAdc
(V_{CE} = 50 Vdc, I_B = 0)	2N5629, 2N6029		—	2.0	
(V_{CE} = 60 Vdc, I_B = 0)	2N5630, 2N6030		—	2.0	
(V_{CE} = 70 Vdc, I_B = 0)	2N5631, 2N6031		—	2.0	
Collector-Emitter Cutoff Current		I_{CEX}			mAdc
(V_{CE} = Rated V_{CB}, $V_{EB(off)}$ = 1.5 Vdc)			—	2.0	
(V_{CE} = Rated V_{CB}, $V_{EB(off)}$ = 1.5 Vdc, T_C = 150°C)			—	7.0	
Collector-Base Cutoff Current (V_{CB} = Rated V_{CB}, I_E = 0)		I_{CBO}	—	2.0	mAdc
Emitter-Base Cutoff Current (V_{BE} = 7.0 Vdc, I_C = 0)		I_{EBO}	—	5.0	mAdc
ON CHARACTERISTICS (1)					
DC Current Gain		h_{FE}			—
(I_C = 8.0 Adc, V_{CE} = 2.0 Vdc)	2N5629, 2N6029		25	100	
	2N5630, 2N6030		20	80	
	2N5631, 2N6031		15	60	
(I_C = 16 Adc, V_{CE} = 2.0 Vdc)	All Types		4.0	—	
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$			Vdc
(I_C = 10 Adc, I_B = 1.0 Adc)	All Types		—	1.0	
(I_C = 16 Adc, I_B = 4.0 Adc)			—	2.0	
Base-Emitter Saturation Voltage (I_C = 10 Adc, I_B = 1.0 Adc)		$V_{BE(sat)}$	—	1.8	Vdc
Base-Emitter On Voltage (I_C = 8.0 Adc, V_{CE} = 2.0 Vdc)		$V_{BE(on)}$	—	1.5	Vdc
DYNAMIC CHARACTERISTICS					
Current-Gain—Bandwidth Product (2) (I_C = 1.0 Adc, V_{CE} = 20 Vdc, f_{test} = 0.5 MHz)		f_T	1.0	—	MHz
Output Capacitance	2N5629, 30, 31	C_{ob}	—	500	pF
(V_{CB} = 10 Vdc, I_E = 0, f = 0.1 MHz)	2N6029, 30, 31			1000	
Small-Signal Current Gain (I_C = 4.0 Adc, V_{CE} = 10 Vdc, f = 1.0 kHz)		h_{fe}	15	—	—

*Indicates JEDEC Registered Data.
(1) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≥ 2.0%.
(2) $f_T = |h_{fe}| \cdot f_{test}$

FIGURE 2 – SWITCHING TIMES TEST CIRCUIT



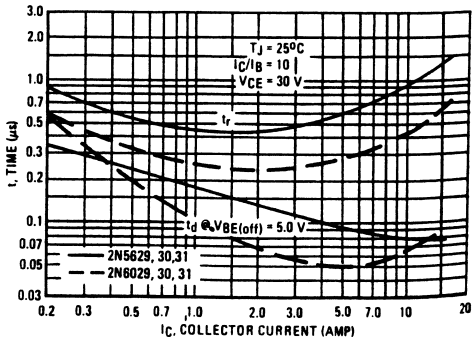
t_r, $t_f \leq 10$ ns
DUTY CYCLE = 1.0%

R_B and R_C VARIED TO OBTAIN DESIRED CURRENT LEVELS

D_1 MUST BE FAST RECOVERY TYPE, eg:
MBD5300 USED ABOVE $I_B \approx 100$ mA
MSD6100 USED BELOW $I_B \approx 100$ mA

For PNP test circuit, reverse all polarities and D1.

FIGURE 3 – TURN-ON TIME



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