

## DARLINGTON COMPLEMENTARY SILICON POWER TRANSISTORS

General-purpose power amplifier and low frequency switching applications

### FEATURES:

\* Low Collector-Emitter Saturation Voltage -

$$V_{CE(SAT)} = 2.0V(\text{Max.}) @ I_C = 4.0A$$

$$= 3.0V(\text{Max.}) @ I_C = 8.0A$$

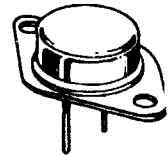
\* Monolithic Construction With Built-In Base-Emitter Shunt Resistors

PNP	NPN
2N6053	2N6055
2N6054	2N6056

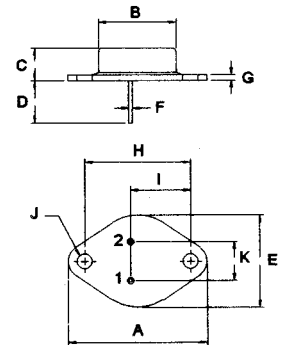
DARLINGTON  
8 AMPERE  
COMPLEMENTARY SILICON  
POWER TRANSISTORS  
60 - 80 Volts  
100 Watts

### MAXIMUM RATINGS

Characteristic	Symbol	2N6053 2N6055	2N6054 2N6056	Unit
Collector-Emitter Voltage	$V_{CEO}$	60	80	V
Collector-Base Voltage	$V_{CBO}$	60	80	V
Emitter-Base Voltage	$V_{EBO}$	5.0		V
Collector Current-Continuous -Peak	$I_C$ $I_{CM}$	8.0 16		A
Base Current	$I_B$	120		mA
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	100 0.571		W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{STG}$	- 65 to +200		$^\circ\text{C}$



TO-3

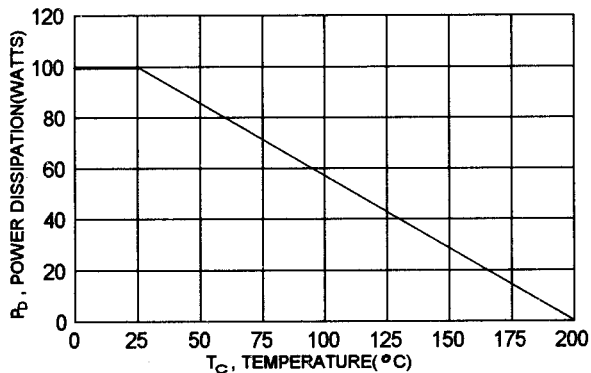


PIN 1. BASE  
2. EMITTER  
COLLECTOR(CASE)

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	1.75	$^\circ\text{C/W}$

FIGURE -1 POWER DERATING



DIM	MILLIMETERS	
	MIN	MAX
A	38.75	39.96
B	19.28	22.23
C	7.96	9.28
D	11.18	12.19
E	25.20	26.67
F	0.92	1.09
G	1.38	1.62
H	29.90	30.40
I	16.64	17.30
J	3.88	4.36
K	10.67	11.18

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

Characteristic	Symbol	Min	Max	Unit
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**OFF CHARACTERISTICS**

Collector - Emitter Sustaining Voltage (1) ( $I_C = 100\text{ mA}$ , $I_B = 0$ )	2N6053, 2N6055 2N6054, 2N6056	$V_{CE(sus)}$	60 80	V
Collector Cutoff Current ( $V_{CE} = 30\text{ V}$ , $I_B = 0$ ) ( $V_{CE} = 40\text{ V}$ , $I_B = 0$ )	2N6053, 2N6055 2N6054, 2N6056	$I_{CEO}$	0.5 0.5	mA
Collector Cutoff Current ( $V_{CE} = 60\text{ V}$ , $V_{BE(off)} = 1.5\text{ V}$ ) ( $V_{CE} = 80\text{ V}$ , $V_{BE(off)} = 1.5\text{ V}$ ) ( $V_{CE} = 60\text{ V}$ , $V_{BE(off)} = 1.5\text{ V}$ , $T_c = 150^\circ\text{C}$ ) ( $V_{CE} = 80\text{ V}$ , $V_{BE(off)} = 1.5\text{ V}$ , $T_c = 150^\circ\text{C}$ )	2N6053, 2N6055 2N6054, 2N6056 2N6053, 2N6055 2N6054, 2N6056	$I_{CEX}$	0.5 0.5 5.0 5.0	mA
Emitter Cutoff Current ( $V_{EB} = 5.0\text{ V}$ , $I_C = 0$ )		$I_{EBO}$	2.0	mA

**ON CHARACTERISTICS (1)**

DC Current Gain ( $I_C = 4.0\text{ A}$ , $V_{CE} = 3.0\text{ V}$ ) ( $I_C = 8.0\text{ A}$ , $V_{CE} = 3.0\text{ V}$ )		hFE	750 100	18000
Collector-Emitter Saturation Voltage ( $I_C = 4.0\text{ A}$ , $I_B = 16\text{ mA}$ ) ( $I_C = 8.0\text{ A}$ , $I_B = 80\text{ mA}$ )		$V_{CE(sat)}$	2.0 3.0	V
Base-Emitter On Voltage ( $I_C = 4\text{ A}$ , $V_{CE} = 3.0\text{ V}$ )		$V_{BE(on)}$	2.8	V
Base-Emitter Saturation Voltage ( $I_C = 8.0\text{ A}$ , $I_B = 80\text{ mA}$ )		$V_{BE(sat)}$	4.0	V

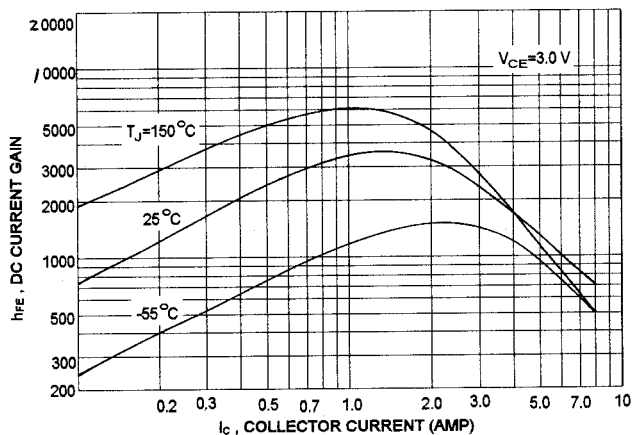
**DYNAMIC CHARACTERISTICS**

Output capacitance ( $V_{CB} = 10\text{ V}$ , $I_E = 0$ , $f = 0.1\text{ MHz}$ )	2N6053, 2N6054 2N6055, 2N6056	$C_{ob}$	350 220	pF
Small-Signal Current Gain ( $I_C = 3.0\text{ A}$ , $V_{CE} = 3.0\text{ V}$ , $f = 1.0\text{ KHZ}$ )		$h_{fe}$	300	

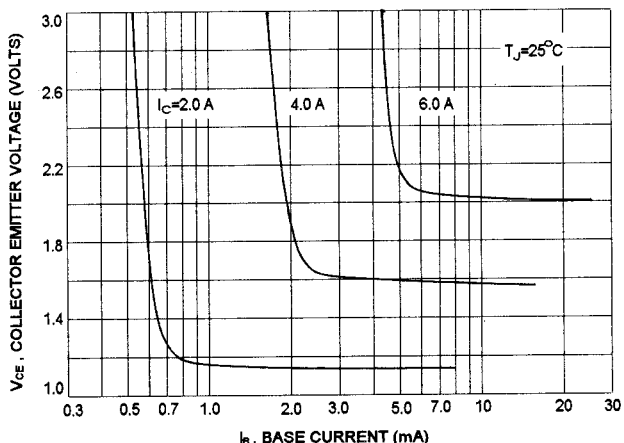
(1) Pulse Test: Pulse width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$

PNP 2N6053, 2N6054

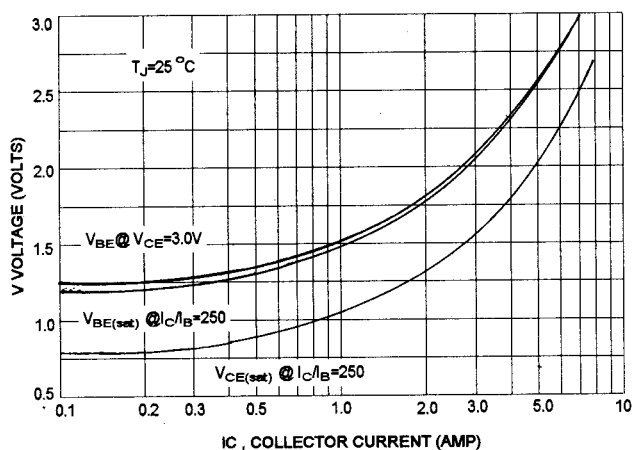
DC CURRENT GAIN



COLLECTOR SATURATION REGION

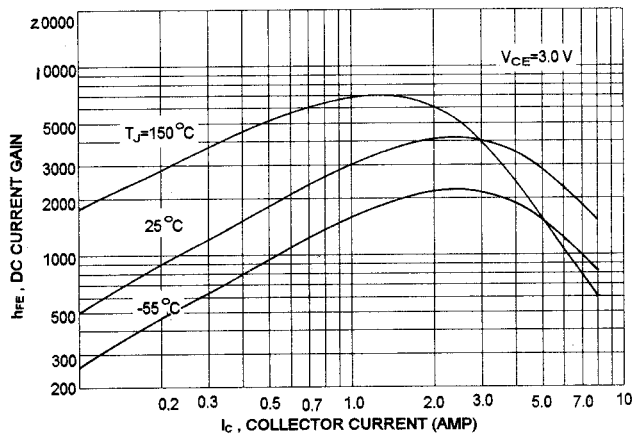


"ON" VOLTAGES

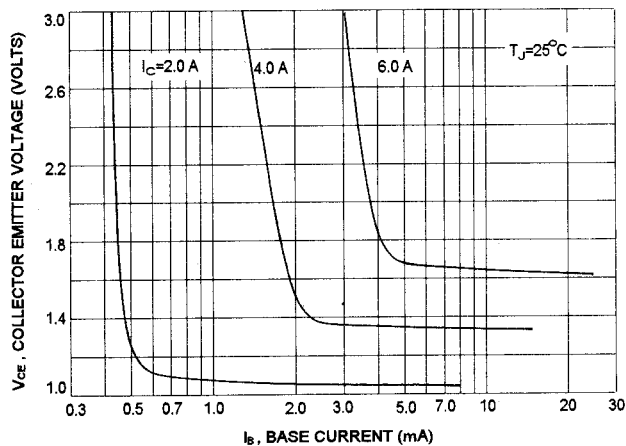


NPN 2N6055, 2N6056

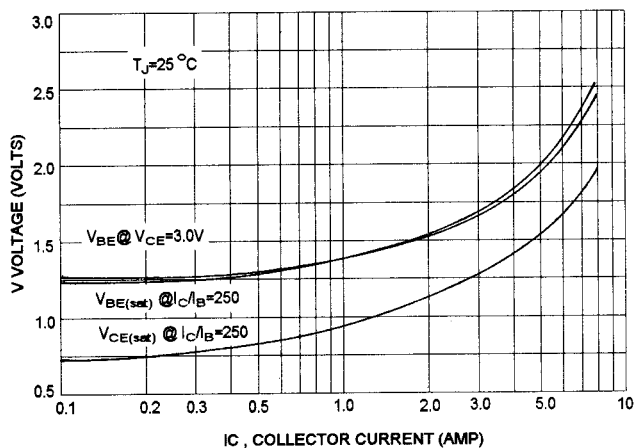
DC CURRENT GAIN



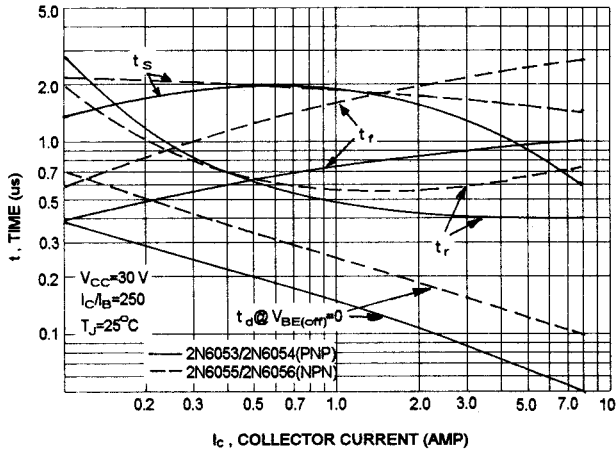
COLLECTOR SATURATION REGION



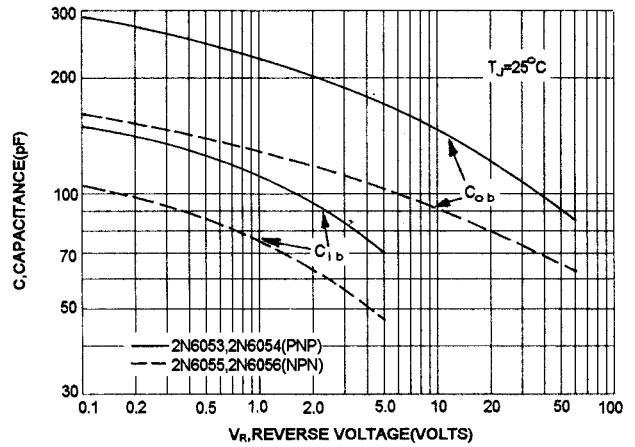
"ON" VOLTAGES



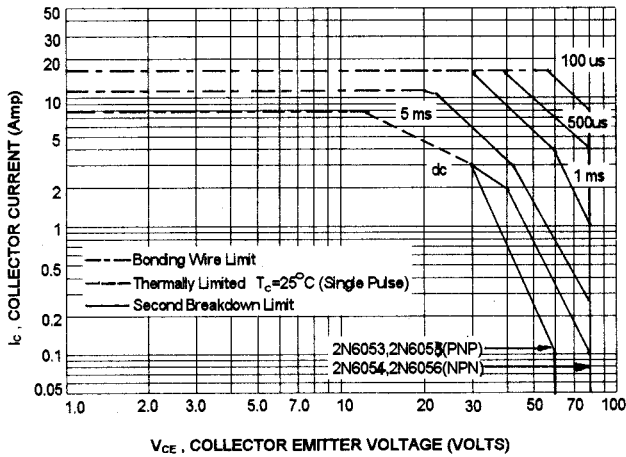
SWITCHING TIME



CAPACITANCES



ACTIVE-REGION SAFE OPERATING AREA (SOA)



There are two limitation 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 curves indicate.

The data of SOA curve is base on  $T_{J(PK)}=200^\circ C$ ;  $T_C$  is variable depending on conditions. second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{J(PK)} \leq 200^\circ C$ . At high case temperatures, thermal limitation will reduce the power that can be handled to values less than the limitations imposed by second breakdown.