

## DARLINGTON COMPLEMENTARY SILICON-POWER TRANSISTORS

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

### FEATURES:

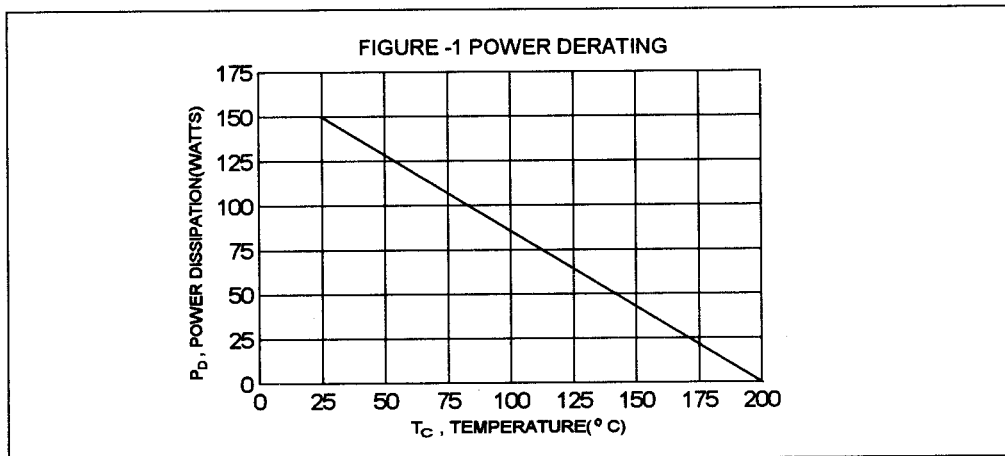
- \* Monolithic Construction with Bult-in Base-Emitter Shunt Resistors.
- \* High DC Current Gain -  
hFE = 3500 (typ) @  $I_C = 5.0 A$

### MAXIMUM RATINGS

Characteristic	Symbol	2N6050 2N6057	2N6051 2N6058	2N6052 2N6059	Unit
Collector-Emitter Voltage	$V_{CEO}$	60	80	100	V
Collector-Base Voltage	$V_{CBO}$	60	80	100	V
Emitter-Base Voltage	$V_{EBO}$	5			V
Collector Current - Continuous -Peak	$I_C$	12 20			A
Base Current	$I_B$	0.2			A
Total Power Dissipation @ $T_C = 25^\circ C$ Derated above $25^\circ C$	$P_D$	150 0.857			W W/ $^\circ C$
Operating and Storage Junction Temperature Range	$T_J, T_{STG}$	-65 to +200			$^\circ C$

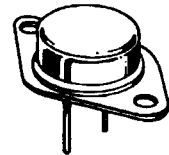
### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	$R_{\theta JC}$	1.17	$^\circ C/W$

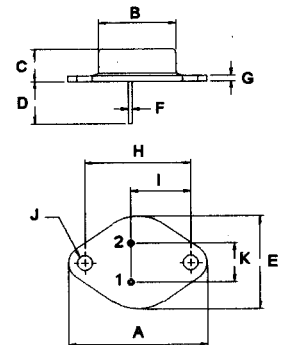


PNP	NPN
2N6050	2N6057
2N6051	2N6058
2N6052	2N6059

DARLINGTON  
12 AMPERE  
COMPLEMENTARY SILICON  
POWER TRANSISTORS  
60-100 VOLTS  
150 WATTS



TO-3



PIN 1. BASE  
2. EMITTER  
COLLECTOR(CASE)

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) ( $I_C = 100 \text{ mA}$ , $I_B = 0$ ) 2N6050, 2N6057 2N6051, 2N6058 2N6052, 2N6059	$V_{CE(sus)}$	60 80 100		V
Collector Cutoff Current ( $V_{CE} = 30 \text{ V}$ , $I_B = 0$ ) ( $V_{CE} = 40 \text{ V}$ , $I_B = 0$ ) ( $V_{CE} = 50 \text{ V}$ , $I_B = 0$ ) 2N6050, 2N6057 2N6051, 2N6058 2N6052, 2N6059	$I_{CEO}$		1.0 1.0 1.0	mA
Collector Cutoff Current ( $V_{CE} = \text{Rated } V_{CEO}$ , $V_{BE(off)} = 1.5 \text{ V}$ ) ( $V_{CE} = \text{Rated } V_{CEO}$ , $V_{BE(off)} = 1.5 \text{ V}$ , $T_c = 150^\circ\text{C}$ )	$I_{CEX}$		0.5 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 ( $I_C = 6.0 \text{ A}$ , $V_{CE} = 3.0 \text{ V}$ ) ( $I_C = 12 \text{ A}$ , $V_{CE} = 3.0 \text{ V}$ )	hFE	750 100	18000	
Collector-Emitter Saturation Voltage ( $I_C = 6.0 \text{ A}$ , $I_B = 24 \text{ mA}$ ) ( $I_C = 12 \text{ A}$ , $I_B = 120 \text{ mA}$ )	$V_{CE(sat)}$		2.0 3.0	V
Base-Emitter On Voltage ( $I_C = 6.0 \text{ A}$ , $V_{CE} = 3.0 \text{ V}$ )	$V_{BE(on)}$		2.8	V
Base-Emitter Saturation Voltage ( $I_C = 12 \text{ A}$ , $I_B = 120 \text{ mA}$ )	$V_{BE(sat)}$		4.0	V

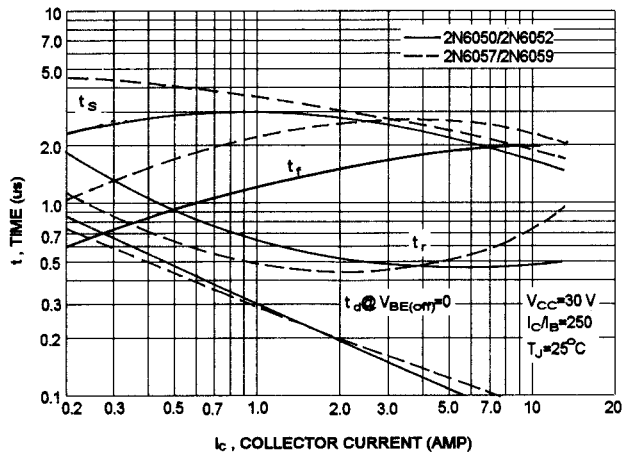
**DYNAMIC CHARACTERISTICS**

Current-Gain-Bandwidth Product (2) ( $I_C = 5.0 \text{ A}$ , $V_{CE} = 3.0 \text{ V}$ , $f = 1.0 \text{ MHz}$ )	$f_T$	4.0		MHz
Small-Signal Current Gain ( $I_C = 5.0 \text{ A}$ , $V_{CE} = 3.0 \text{ V}$ , $f = 1.0 \text{ KHZ}$ )	$h_{fe}$	300		

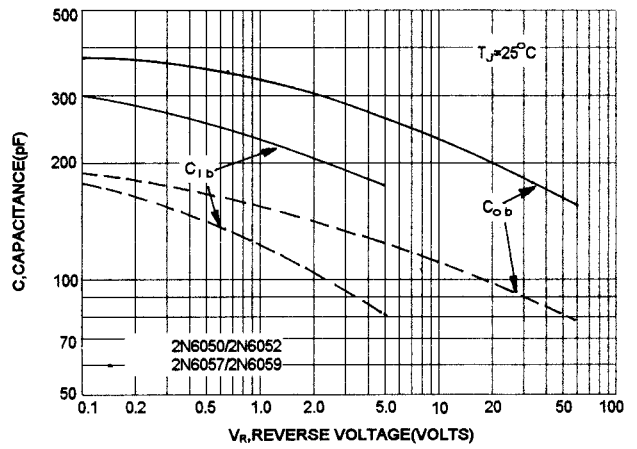
(1) Pulse Test: Pulse width  $\leq 300 \text{ us}$  , Duty Cycle  $\leq 2.0\%$

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

SWITCHING TIME

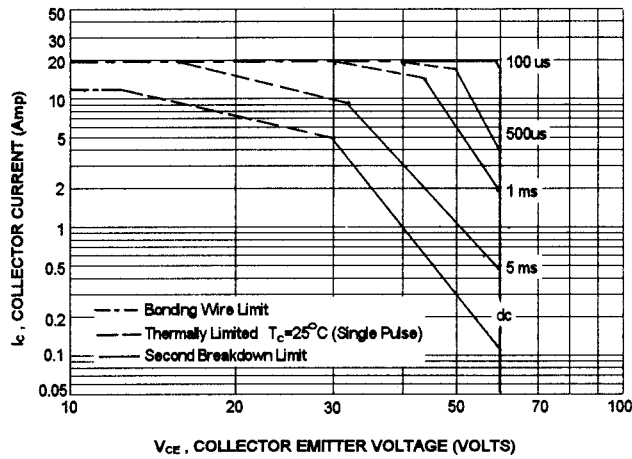


CAPACITANCES

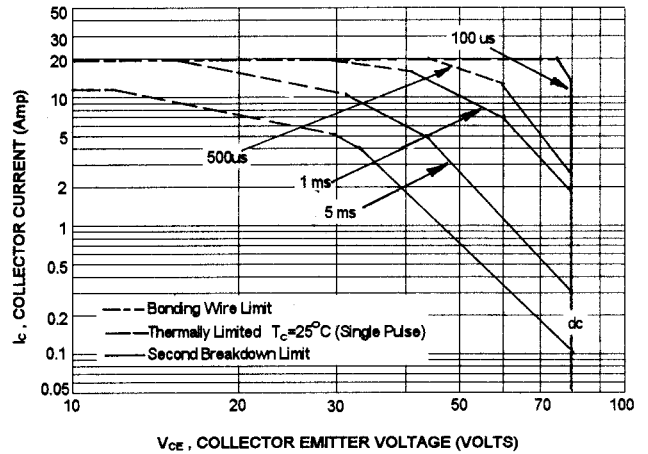


ACTIVE-REGION SAFE OPERATING AREA (SOA)

2N6050, 2N6057

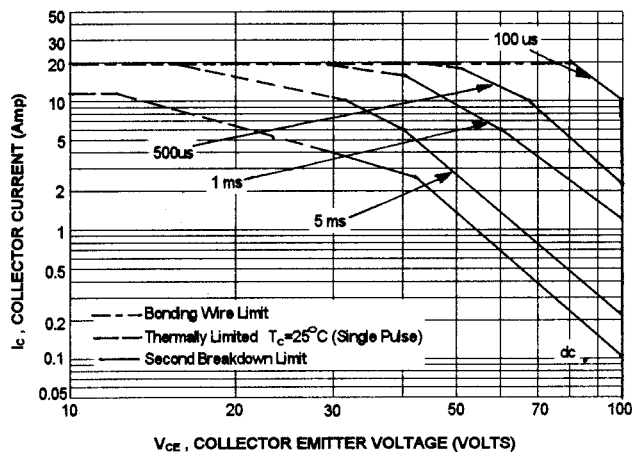


2N6051, 2N6058



ACTIVE-REGION SAFE OPERATING AREA (SOA)

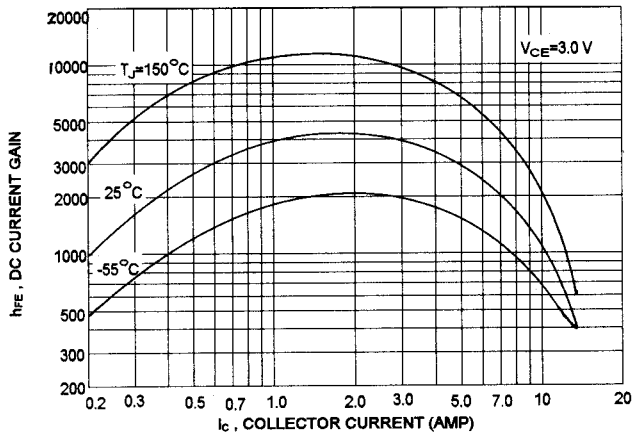
2N6052, 2N6059



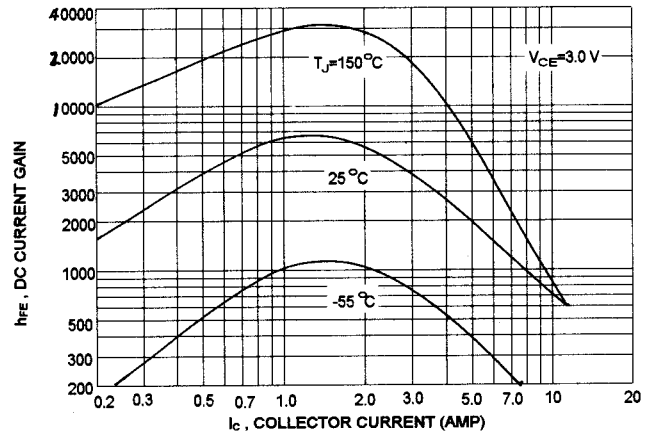
There are two limitation on the power handling ability of a transistor: average junction temperature and second breakdown safe operating area curves indicate  $I_c$ - $V_{CE}$  limits of the transistor that must be observed for reliable operation i.e., the transistor must not be subjected to greater 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.

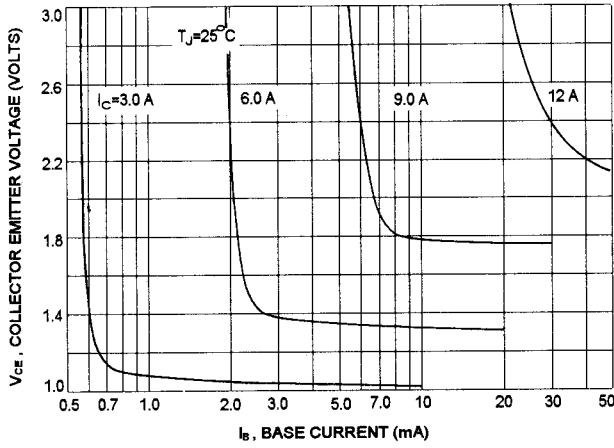
PNP 2N6050, 2N6051, 2N6052  
DC CURRENT GAIN



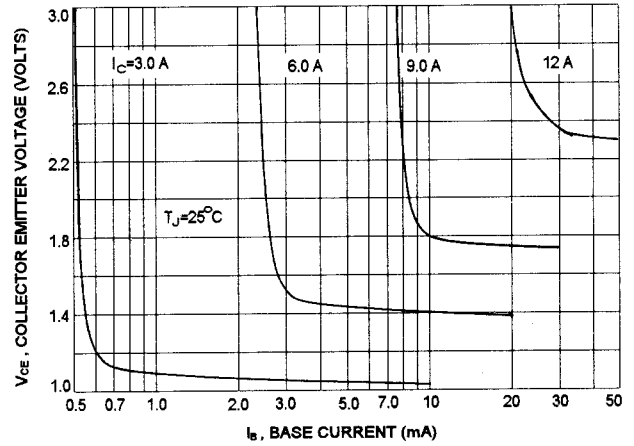
NPN 2N6057, 2N6058, 2N6059  
DC CURRENT GAIN



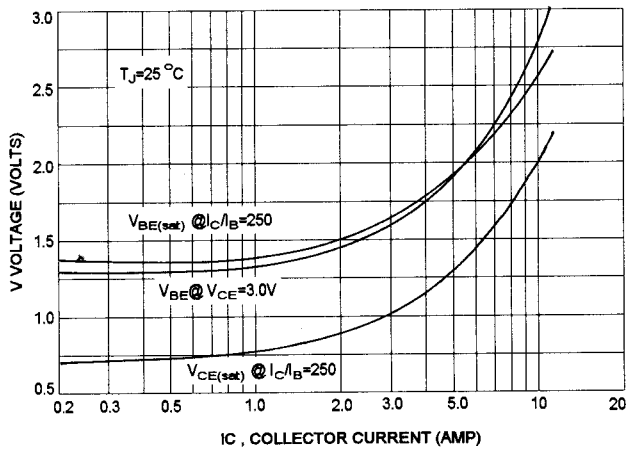
COLLECTOR SATURATION REGION



COLLECTOR SATURATION REGION



"ON" VOLTAGES



"ON" VOLTAGES

