

Darlington Complementary Silicon Power Transistors

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

- High DC Current Gain —
 $h_{FE} = 3000$ (Typ) @ $I_C = 4.0$ Adc
- Collector-Emitter Sustaining Voltage — @ 100 mA
 $V_{CEO(sus)} = 60$ Vdc (Min) — 2N6055
 $= 80$ Vdc (Min) — 2N6056
- Low Collector-Emitter Saturation Voltage —
 $V_{CE(sat)} = 2.0$ Vdc (Max) @ $I_C = 4.0$ Adc
 $= 3.0$ Vdc (Max) @ $I_C = 8.0$ Adc
- Monolithic Construction with Built-In Base-Emitter Shunt Resistors

MAXIMUM RATINGS (1)

Rating	Symbol	2N6055	2N6056	Unit
Collector-Emitter Voltage	V_{CEO}	60	80	Vdc
Collector-Base Voltage	V_{CB}	60	80	Vdc
Emitter-Base Voltage	V_{EB}	5.0		Vdc
Collector Current — Continuous Peak	I_C	8.0 16		Adc
Base Current	I_B	120		mAdc
		2N6055 2N6056		
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	100 0.571		Watts W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200		$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	2N6055 2N6056	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.75	$^\circ\text{C/W}$

(1) Indicates JEDEC Registered Data

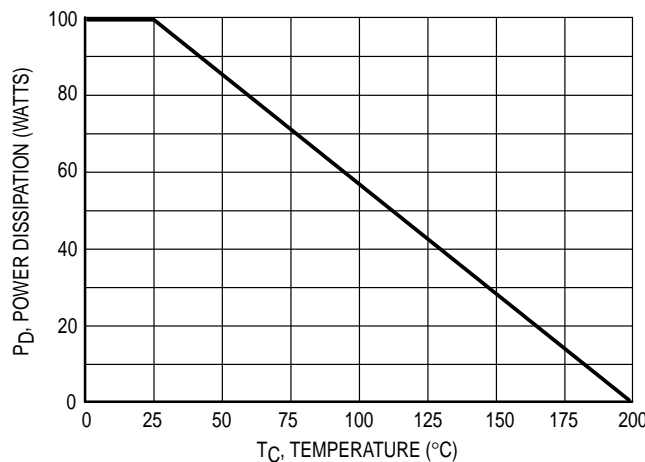


Figure 1. Power Derating

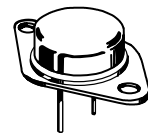
Preferred devices are Motorola recommended choices for future use and best overall value.

REV 1

NPN
2N6055
2N6056*

*Motorola Preferred Device

DARLINGTON
8 AMPERE
COMPLEMENTARY
SILICON
POWER TRANSISTORS
60-80 VOLTS
100 WATTS



CASE 1-07
TO-204AA
(TO-3)

2N6055 2N6056

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage (1) ($I_C = 100 \text{ mAdc}$, $I_B = 0$)	$V_{CE(sus)}$	60 80	— —	Vdc
Collector Cutoff Current ($V_{CE} = 30 \text{ Vdc}$, $I_B = 0$) ($V_{CE} = 40 \text{ Vdc}$, $I_B = 0$)	I_{CEO}	— —	0.5 0.5	mAdc
Collector Cutoff Current ($V_{CE} = \text{Rated } V_{CB}$, $V_{BE(off)} = 1.5 \text{ Vdc}$) ($V_{CE} = \text{Rated } V_{CB}$, $V_{BE(off)} = 1.5 \text{ Vdc}$, $T_C = 150^\circ\text{C}$)	I_{CEX}	— —	0.5 5.0	mAdc
Emitter Cutoff Current ($V_{BE} = 5.0 \text{ Vdc}$, $I_C = 0$)	I_{EBO}	—	2.0	mAdc

ON CHARACTERISTICS (1)

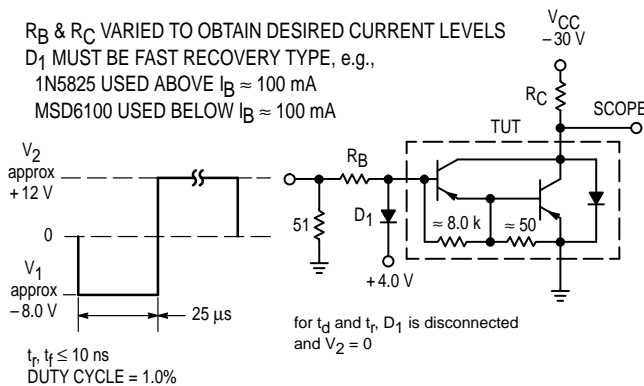
DC Current Gain ($I_C = 4.0 \text{ Adc}$, $V_{CE} = 3.0 \text{ Vdc}$) ($I_C = 8.0 \text{ Adc}$, $V_{CE} = 3.0 \text{ Vdc}$)	h_{FE}	750 100	18000 —	—
Collector-Emitter Saturation Voltage ($I_C = 4.0 \text{ Adc}$, $I_B = 16 \text{ mAdc}$) ($I_C = 8.0 \text{ Adc}$, $I_B = 80 \text{ mAdc}$)	$V_{CE(sat)}$	— —	2.0 3.0	Vdc
Base-Emitter Saturation Voltage ($I_C = 8.0 \text{ Adc}$, $I_B = 80 \text{ mAdc}$)	$V_{BE(sat)}$	—	4.0	Vdc
Base-Emitter On Voltage ($I_C = 4.0 \text{ Adc}$, $V_{CE} = 3.0 \text{ Vdc}$)	$V_{BE(on)}$	—	2.8	Vdc

DYNAMIC CHARACTERISTICS

Magnitude of Common Emitter Small-Signal Short Circuit Current Transfer Ratio ($I_C = 3.0 \text{ Adc}$, $V_{CE} = 3.0 \text{ Vdc}$, $f = 1.0 \text{ MHz}$)	$ h_{fe} $	4.0	—	—
Output Capacitance ($V_{CB} = 10 \text{ Vdc}$, $I_E = 0$, $f = 0.1 \text{ MHz}$)	C_{ob}	—	200	pF
Small-Signal Current Gain ($I_C = 3.0 \text{ Adc}$, $V_{CE} = 3.0 \text{ Vdc}$, $f = 1.0 \text{ kHz}$)	h_{fe}	300	—	—

* Indicates JEDEC Registered Data.

(1) Pulse Test: Pulse Width = 300 μs , Duty Cycle = 2.0%



For NPN test circuit reverse diode, polarities and input pulses.

Figure 2. Switching Times Test Circuit

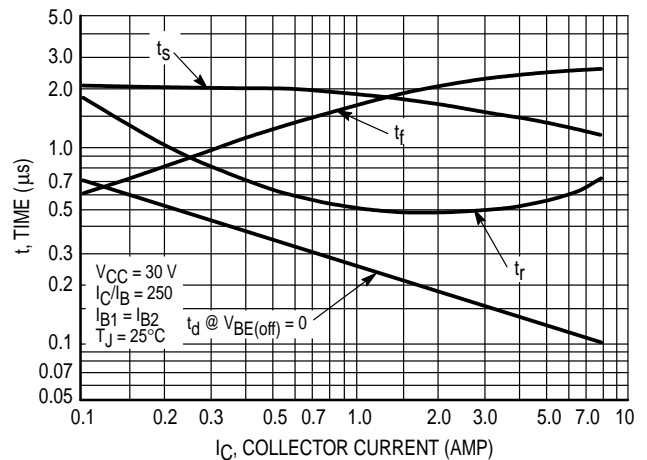


Figure 3. Switching Times

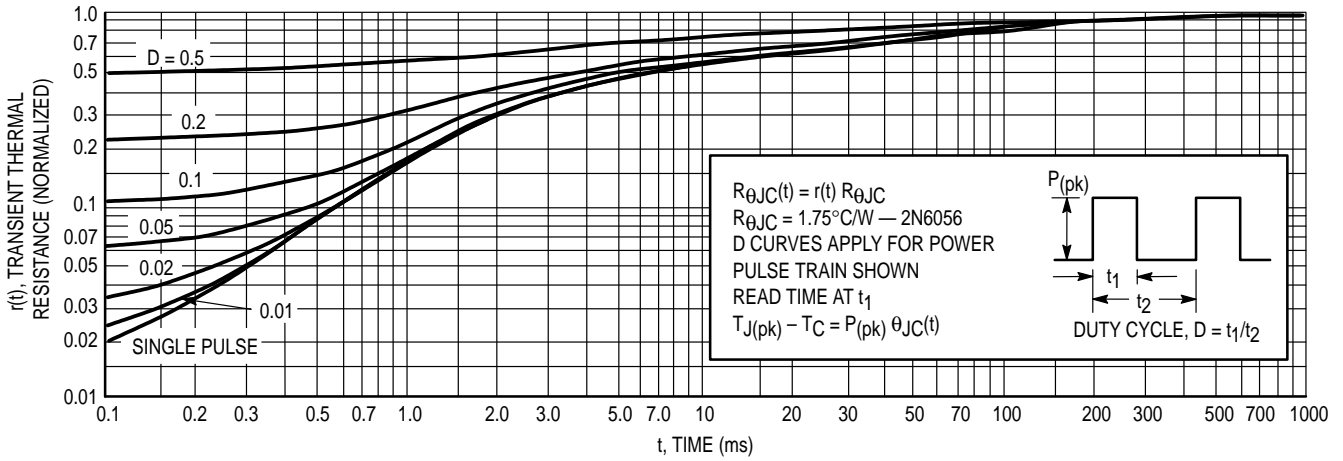


Figure 4. Thermal Response

ACTIVE-REGION SAFE OPERATING AREA

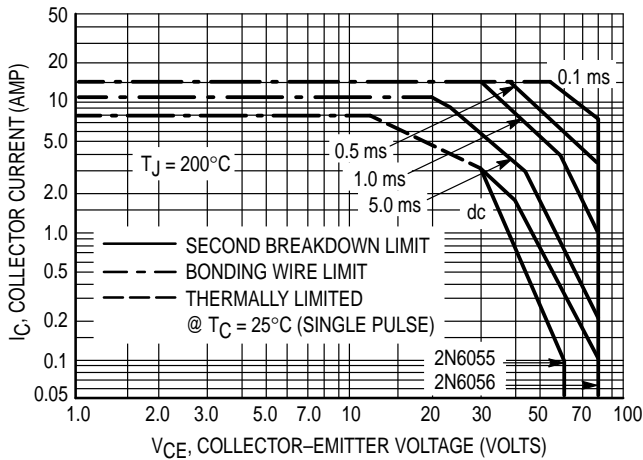


Figure 5. 2N6055 and 2N6056

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 $T_{J(pk)} = 200^{\circ}\text{C}$; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \leq 200^{\circ}\text{C}$. $T_{J(pk)}$ 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.

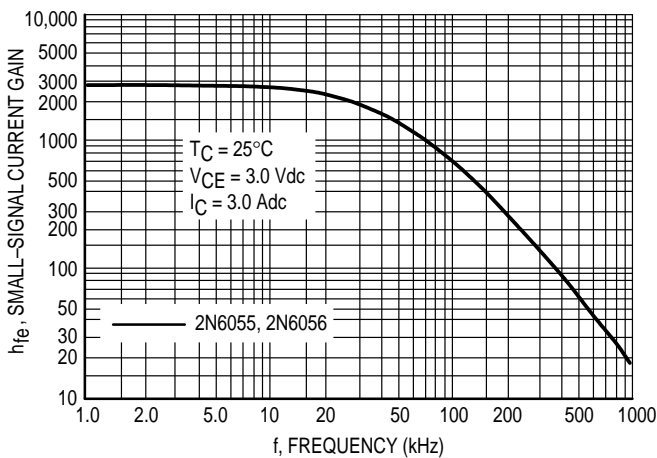


Figure 6. Small-Signal Current Gain

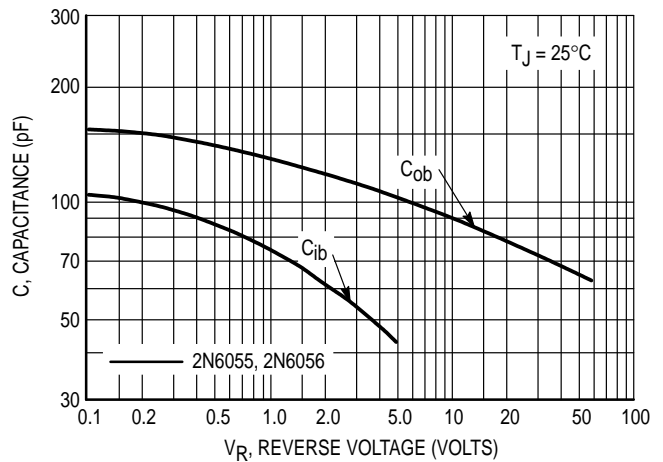


Figure 7. Capacitance

NPN
2N6055, 2N6056

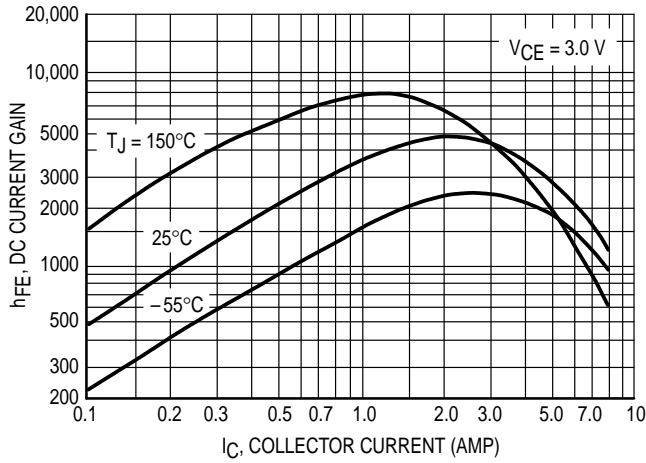


Figure 8. DC Current Gain

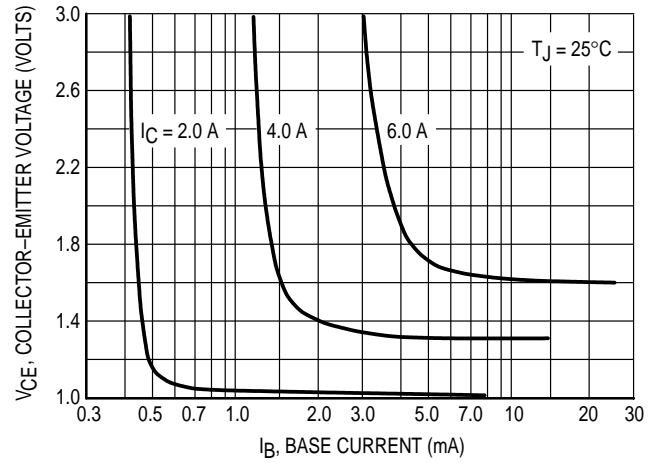


Figure 9. Collector Saturation Region

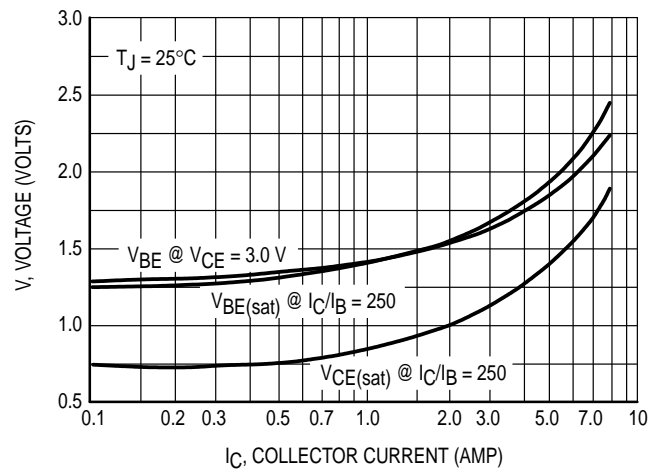
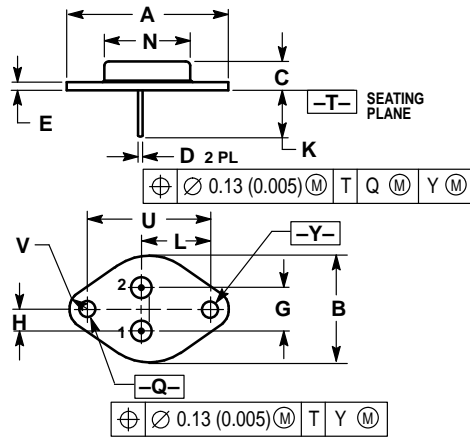


Figure 10. "On" Voltages

PACKAGE DIMENSIONS



- 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	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	1.550 REF		39.37 REF	
B	—	1.050	—	26.67
C	0.250	0.335	6.35	8.51
D	0.038	0.043	0.97	1.09
E	0.055	0.070	1.40	1.77
G	0.430 BSC		10.92 BSC	
H	0.215 BSC		5.46 BSC	
K	0.440	0.480	11.18	12.19
L	0.665 BSC		16.89 BSC	
N	—	0.830	—	21.08
Q	0.151	0.165	3.84	4.19
U	1.187 BSC		30.15 BSC	
V	0.131	0.188	3.33	4.77

STYLE 1:
 PIN 1: BASE
 2: EMITTER
 CASE: COLLECTOR

CASE 1-07
 TO-204AA (TO-3)
 ISSUE Z

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