

NPN Silicon Power Darlington Transistors

General-purpose EpiBase power Darlington transistors, suitable for linear and switching applications.

- Replacement for 2N3055 and Driver
- High Gain Darlington Performance
- Built-in Diode Protection for Reverse Polarity Protection
- Can Be Driven from Low-Level Logic
- Popular Voltage Range
- Operating Range — -65 to $+200^{\circ}\text{C}$

MAXIMUM RATINGS (1)

Rating	Symbol	2N6576	2N6577	2N6578	Unit
Collector-Emitter Voltage	$V_{CEO}(\text{sus})$	60	90	120	Vdc
Collector-Base Voltage	V_{CB}	60	90	120	Vdc
Emitter-Base Voltage	V_{EB}		7.0		Vdc
Collector Current — Continuous	I_C		15		Adc
— Peak			30		
Base Current — Continuous	I_B		0.25		Adc
— Peak			0.50		
Emitter Current — Continuous	I_E		15.25		Adc
— Peak			30.5		
Total Power Dissipation @ $T_C = 25^{\circ}\text{C}$ Derate above 25°C	P_D		120		Watts
			0.685		$\text{W}/^{\circ}\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}		—65 to +200		$^{\circ}\text{C}$

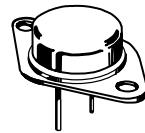
THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.46	$^{\circ}\text{C}/\text{W}$
Maximum Lead Temperature for Soldering Purposes: 1/16" from Case for 10s.	T_L	265	$^{\circ}\text{C}$

(1) Indicates JEDEC Registered Data.

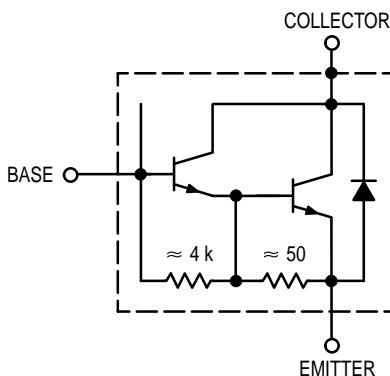
**2N6576
2N6577
2N6578**

**15 AMPERE
POWER TRANSISTORS
NPN SILICON
DARLINGTON
60, 90, 120 VOLTS
120 WATTS**



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

DARLINGTON SCHEMATIC



2N6576 2N6577 2N6578

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage (1) ($I_C = 200 \text{ mA}_\text{dc}$, $I_B = 0$)	$V_{\text{CEO}(\text{sus})}$	2N6576 2N6577 2N6578	60 90 120	— — —
Collector Cutoff Current ($V_{\text{CE}} = \text{Rated Value}$)	I_{CEO}	—	1.0	mA_dc
Collector Cutoff Current ($V_{\text{CER}} = \text{Rated } V_{\text{CEO}(\text{sus})} \text{ Value}$, $R_{\text{BE}} = 10 \text{ k}\Omega$, $T_C = 150^\circ\text{C}$)	I_{CER}	—	5.0	mA_dc
Collector Cutoff Current ($V_{\text{CEX}} = \text{Rated } V_{\text{CEO}(\text{sus})} \text{ Value}$, $V_{\text{BE}(\text{off})} = 1.5 \text{ Vdc}$)	I_{CEV}	—	5.0	mA_dc
Collector Cutoff Current ($V_{\text{CB}} = \text{Rated Value}$)	I_{CBO}	—	0.5	mA_dc
ON CHARACTERISTICS				
DC Current Gain ($I_C = 15 \text{ Adc}$, $V_{\text{CE}} = 4.0 \text{ Vdc}$) ($I_C = 10 \text{ Adc}$, $V_{\text{CE}} = 3.0 \text{ Vdc}$) ($I_C = 4.0 \text{ Adc}$, $V_{\text{CE}} = 3.0 \text{ Vdc}$) ($I_C = 0.4 \text{ Adc}$, $V_{\text{CE}} = 3.0 \text{ Vdc}$)	h_{FE}	100 500 2000 200	— 5,000 20,000 —	—
Collector-Emitter Saturation Voltage ($I_C = 15 \text{ Adc}$, $I_B = 0.15 \text{ Adc}$) ($I_C = 10 \text{ Adc}$, $I_B = 0.1 \text{ Adc}$)	$V_{\text{CE}(\text{sat})}$	— —	4.0 2.8	Vdc
Base-Emitter Saturation Voltage ($I_C = 15 \text{ Adc}$, $I_B = 0.15 \text{ Adc}$) ($I_C = 10 \text{ Adc}$, $I_B = 0.1 \text{ Adc}$)	$V_{\text{BE}(\text{sat})}$	— —	4.5 3.5	Vdc
Collector-Emitter Diode Voltage Drop ($I_{\text{EC}} = 15 \text{ Adc}$)	V_F	—	4.5	Vdc
DYNAMIC CHARACTERISTICS				
Magnitude of Common-Emitter Small-Signal Short-Circuit Current Transfer Ratio ($I_C = 3.0 \text{ Adc}$, $V_{\text{CE}} = 3.0 \text{ Vdc}$, $f = 1.0 \text{ MHz}$)	$ \text{h}_{\text{fe}} $	10	200	—

SWITCHING CHARACTERISTICS

RESISTIVE LOAD (Figure 2)

Delay Time	$(V_{\text{CC}} = 30 \text{ Vdc}, I_C = 10 \text{ Adc}, I_{\text{B1}} = 0.1 \text{ Adc}, t_p = 300 \mu\text{s, Duty Cycle} \leq 2.0\%)$	t_d	—	0.15	μs
Rise Time		t_r	—	1.0	μs
Storage Time	$(V_{\text{CC}} = 30 \text{ Vdc}, I_C = 10 \text{ Adc}, I_{\text{B1}} = I_{\text{B2}} = 0.1 \text{ Adc}, t_p = 300 \mu\text{s, Duty Cycle} \leq 2.0\%)$	t_s	—	2.0	μs
Fall Time		t_f	—	7.0	μs

* Indicates JEDEC Registered Data

(1) Pulse test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

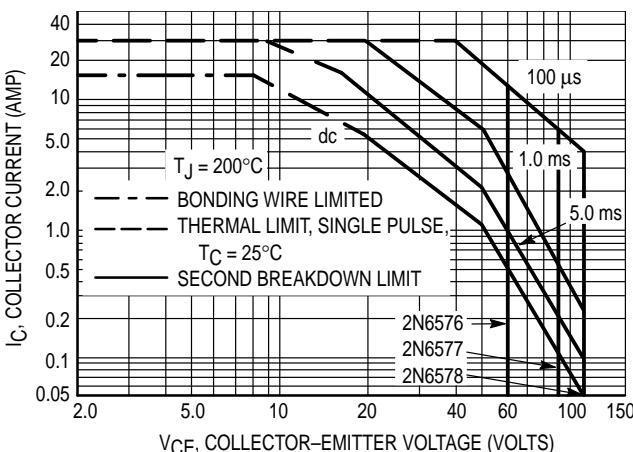
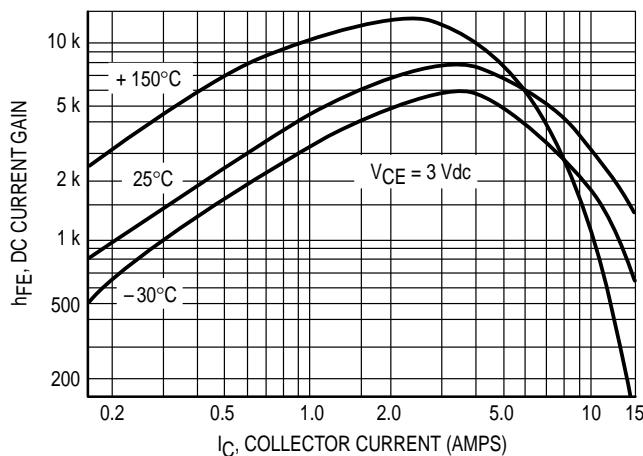
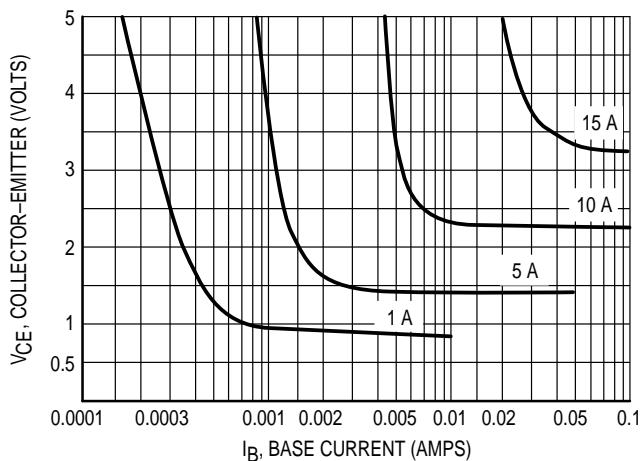
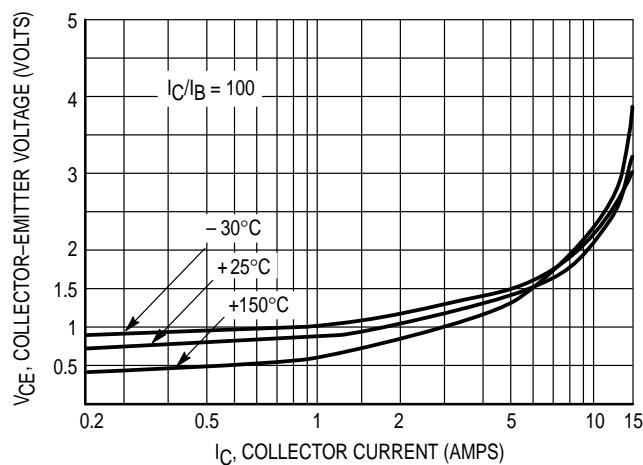
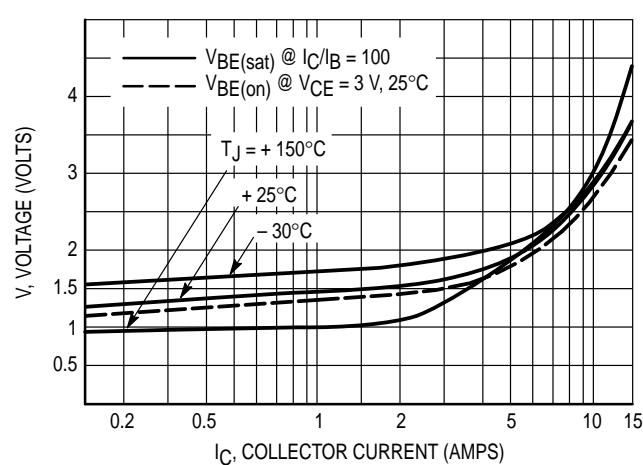
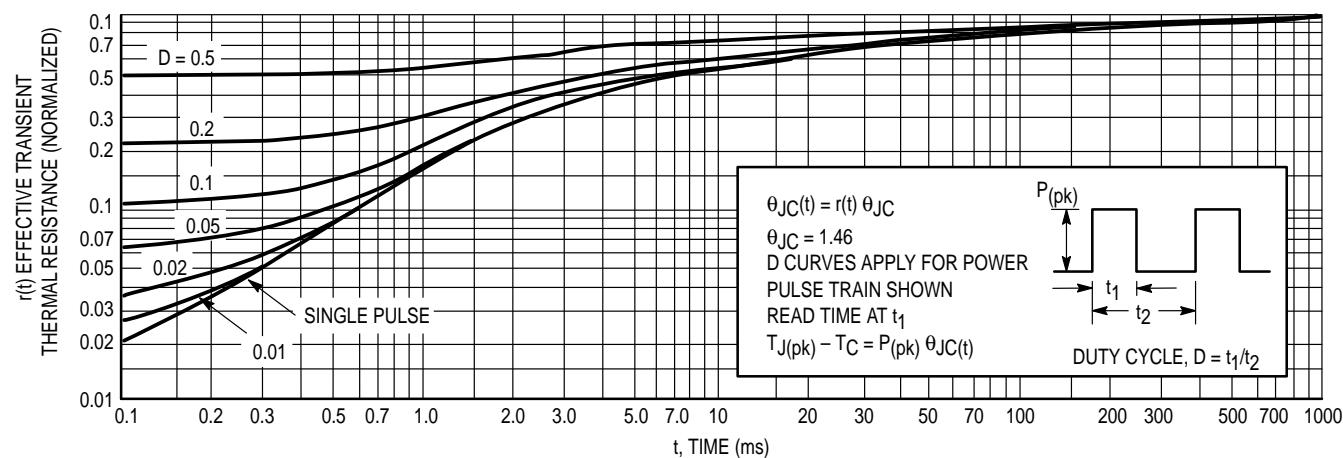


Figure 1. Rated Forward Biased
Safe-Operating Area

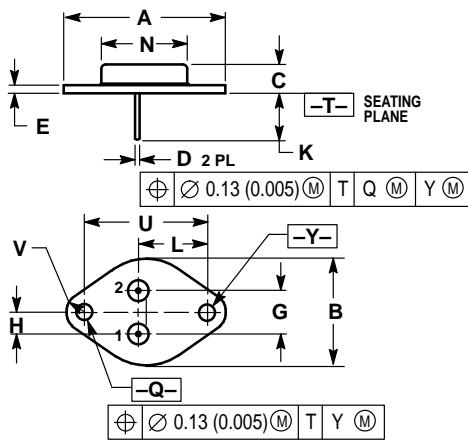
There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate $I_C - V_{\text{CE}}$ limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater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

The data of Figure 1 is based on $T_C = 25^\circ\text{C}$; $T_{\text{J(pk)}}$ is variable depending on power level. Second breakdown pulse limits are valid for duty cycles to 10%.

$T_{\text{J(pk)}}$ may be calculated from the data in Figure 6. 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 2. DC Current Gain

Figure 3. Collector Saturation Region

Figure 4. Collector Saturation Voltage

Figure 5. Base-Emitter Voltage

Figure 6. Thermal Response

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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