

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°C

MAXIMUM RATINGS (1)

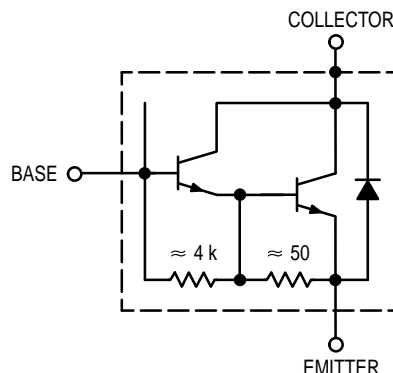
Rating	Symbol	2N6576	2N6577	2N6578	Unit
Collector-Emitter Voltage	$V_{CEO(sus)}$	60	90	120	Vdc
Collector-Base Voltage	V_{CB}	60	90	120	Vdc
Emitter-Base Voltage	V_{EB}	7.0			Vdc
Collector Current — Continuous — Peak	I_C	15 30			Adc
Base Current — Continuous — Peak	I_B	0.25 0.50			Adc
Emitter Current — Continuous — Peak	I_E	15.25 30.5			Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	120 0.685			Watts 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	$R_{\theta JC}$	1.46	°C/W
Maximum Lead Temperature for Soldering Purposes: 1/16" from Case for 10s.	T_L	265	°C

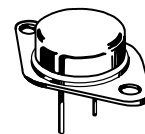
(1) Indicates JEDEC Registered Data.

DARLINGTON SCHEMATIC



2N6576
2N6577
2N6578

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



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

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) ($I_C = 200\text{ mAdc}$, $I_B = 0$)	$V_{CEO(sus)}$	60 90 120	— — —	Vdc
Collector Cutoff Current ($V_{CE} = \text{Rated Value}$)	I_{CEO}	—	1.0	mAdc
Collector Cutoff Current ($V_{CE} = \text{Rated } V_{CEO(sus)} \text{ Value}$, $R_{BE} = 10\text{ k}\Omega$, $T_C = 150^\circ\text{C}$)	I_{CER}	—	5.0	mAdc
Collector Cutoff Current $V_{CEX} = \text{Rated } V_{CEO(sus)} \text{ Value}$, $V_{BE(off)} = 1.5\text{ Vdc}$)	I_{CEV}	—	5.0	mAdc
Collector Cutoff Current ($V_{CB} = \text{Rated Value}$)	I_{CBO}	—	0.5	mAdc

ON CHARACTERISTICS

DC Current Gain ($I_C = 15\text{ Adc}$, $V_{CE} = 4.0\text{ Vdc}$) ($I_C = 10\text{ Adc}$, $V_{CE} = 3.0\text{ Vdc}$) ($I_C = 4.0\text{ Adc}$, $V_{CE} = 3.0\text{ Vdc}$) ($I_C = 0.4\text{ Adc}$, $V_{CE} = 3.0\text{ Vdc}$)	h_{FE}	100 500 2000 200	— 5,000 20,000 —	—
Collector–Emitter Saturation Voltage ($I_C = 15\text{ Adc}$, $I_B = 0.15\text{ Adc}$) ($I_C = 10\text{ Adc}$, $I_B = 0.1\text{ Adc}$)	$V_{CE(sat)}$	— —	4.0 2.8	Vdc
Base–Emitter Saturation Voltage ($I_C = 15\text{ Adc}$, $I_B = 0.15\text{ Adc}$) ($I_C = 10\text{ Adc}$, $I_B = 0.1\text{ Adc}$)	$V_{BE(sat)}$	— —	4.5 3.5	Vdc
Collector–Emitter Diode Voltage Drop ($I_{EC} = 15\text{ Adc}$)	V_F	—	4.5	Vdc

DYNAMIC CHARACTERISTICS

Magnitude of Common–Emitter Small–Signal Short–Circuit Current Transfer Ratio ($I_C = 3.0\text{ Adc}$, $V_{CE} = 3.0\text{ Vdc}$, $f = 1.0\text{ MHz}$)	$ h_{fe} $	10	200	—
--	------------	----	-----	---

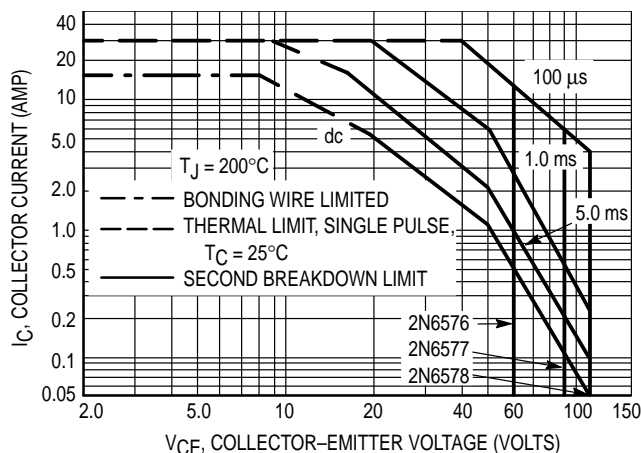
SWITCHING CHARACTERISTICS

RESISTIVE LOAD (Figure 2)

Delay Time	$(V_{CC} = 30\text{ Vdc}$, $I_C = 10\text{ Adc}$, $I_{B1} = 0.1\text{ Adc}$, $t_p = 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2.0\%$)	t_d	—	0.15	μs
Rise Time		t_r	—	1.0	μs
Storage Time	$(V_{CC} = 30\text{ Vdc}$, $I_C = 10\text{ Adc}$, $I_{B1} = I_{B2} = 0.1\text{ Adc}$, $t_p = 300\text{ }\mu\text{s}$, 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 $\leq 300\text{ }\mu\text{s}$, 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 $I_C - V_{CE}$ 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 $T_C = 25^\circ\text{C}$; $T_{J(pk)}$ is variable depending on power level. Second breakdown pulse limits are valid for duty cycles to 10%.

$T_{J(pk)}$ 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.

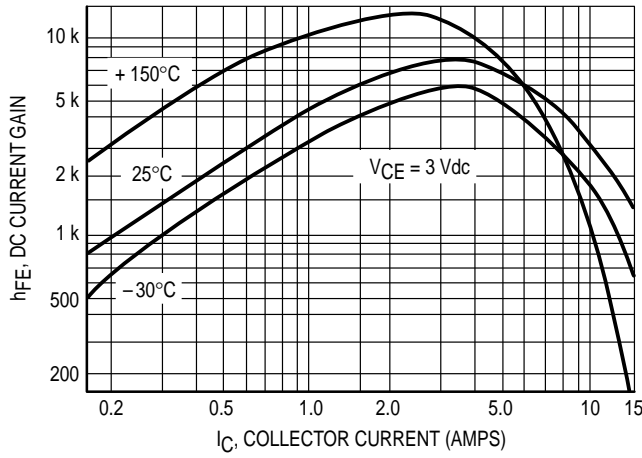


Figure 2. DC Current Gain

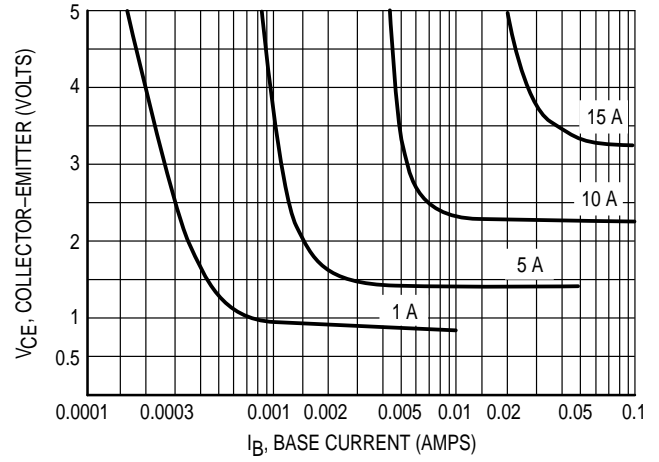


Figure 3. Collector Saturation Region

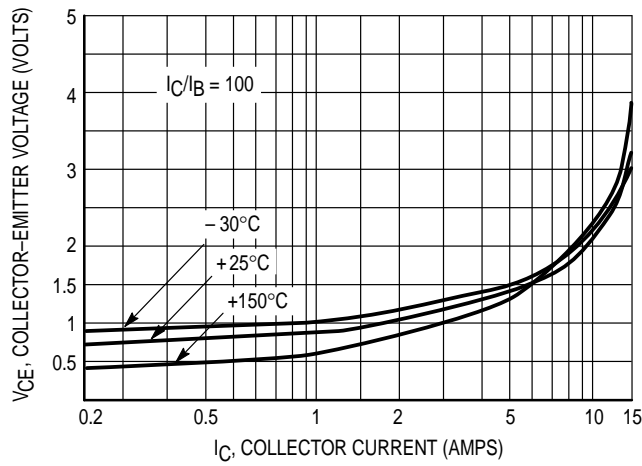


Figure 4. Collector Saturation Voltage

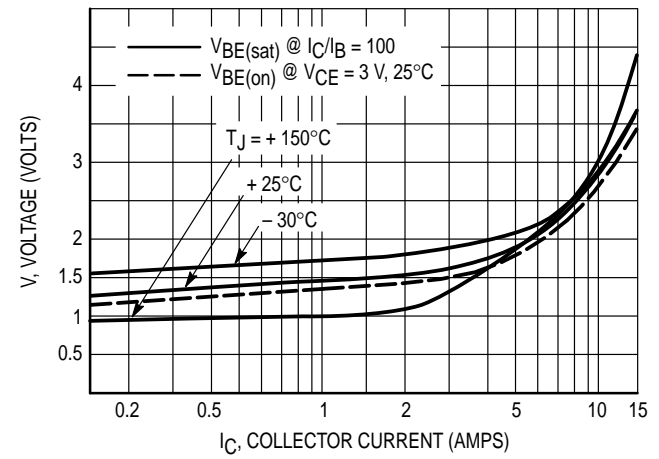


Figure 5. Base-Emitter Voltage

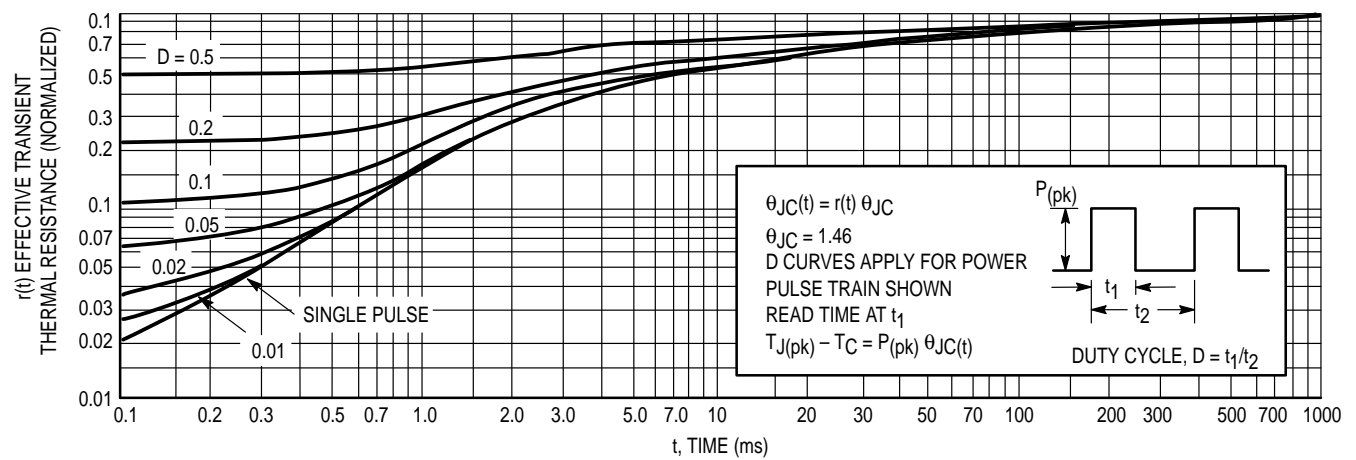
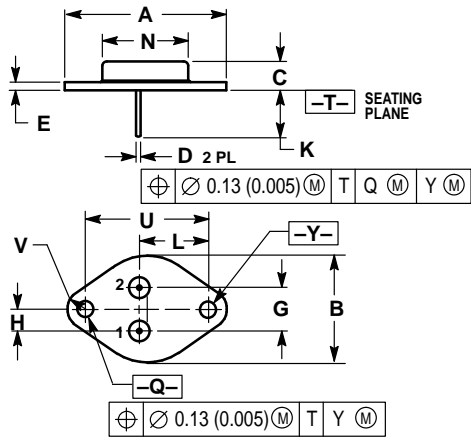


Figure 6. Thermal Response

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

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters can and do vary in different applications. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

How to reach us:
USA/EUROPE: Motorola Literature Distribution;
P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447

MFAX: RMFAX0@email.sps.mot.com - TOUCHTONE (602) 244-6609
INTERNET: <http://Design-NET.com>

JAPAN: Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, Toshikatsu Otsuki,
6F Seibu-Butsuryu-Center, 3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-3521-8315

HONG KONG: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298

