

Plastic Darlington Complementary Silicon Power Transistors

... designed for general purpose amplifier and high-speed switching applications.

- High DC Current Gain
 $h_{FE} = 1400$ (Typ) @ I_C
 $= 2.0$ Adc
- Collector–Emitter Sustaining Voltage — @ 10 mAdc
 $V_{CEO(sus)} = 45$ Vdc (Min) — BD776
 $= 60$ Vdc (Min) — BD777, 778
 $= 80$ Vdc (Min) — BD780
- Reverse Voltage Protection Diode
- Monolithic Construction with Built–in Base–Emitter output Resistor

MAXIMUM RATINGS

Rating	Symbol	BD776	BD777 BD778	BD780	Unit
Collector–Emitter Voltage	V_{CEO}	45	60	80	Vdc
Collector–Base Voltage	V_{CB}	45	60	80	Vdc
Emitter–Base Voltage	V_{EB}	5.0			Vdc
Collector Current — Continuous Peak	I_C	4.0 6.0			Adc
Base Current	I_B	100			mAdc
Total Device Dissipation $T_C = 25^\circ\text{C}$ – Derate above 25°C	P_D	15 0.12			Watts W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	–65 to +150			$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristics	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	8.34	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	83.3	$^\circ\text{C}/\text{W}$

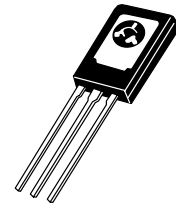
**NPN
BD777
PNP
BD776**

BD778

BD780*

*ON Semiconductor Preferred Device

**DARLINGTON
4-AMPERE
COMPLEMENTARY
SILICON
POWER TRANSISTORS
45, 60, 80 VOLTS
15 WATTS**



**CASE 77–08
TO–225AA TYPE**

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

BD777 BD776 BD778 BD780

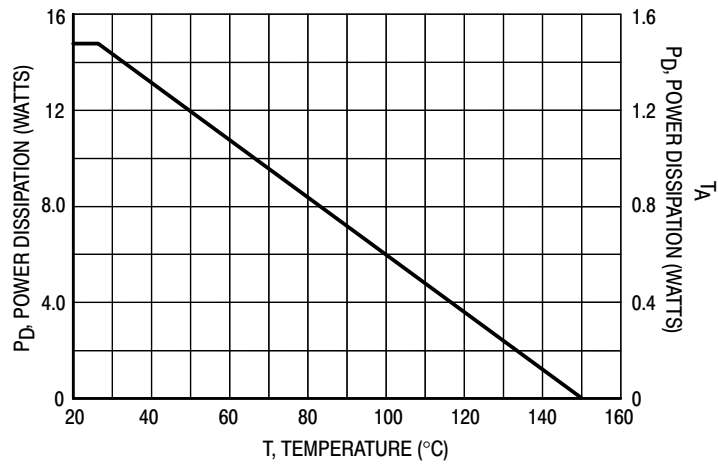


Figure 1. Power Derating

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector–Emitter Sustaining Voltage (1) ($I_C = 10\text{ mAdc}$, $I_B = 0$)	BD776 BD777, BD778 BD780	$V_{CEO(sus)}$	45 60 80	— — — Vdc
Collector Cutoff Current ($V_{CE} = 20\text{ Vdc}$, $I_B = 0$) ($V_{CE} = 30\text{ Vdc}$, $I_B = 0$) ($V_{CE} = 40\text{ Vdc}$, $I_B = 0$)	BD776 BD777, BD778 BD780	I_{CEO}	— — —	100 100 100 $\mu\text{A dc}$
Collector Cutoff Current ($V_{CB} = \text{Rated}$, $V_{CEO(sus)}$, $I_E = 0$) ($V_{CB} = \text{Rated}$, $V_{CEO(sus)}$, $I_E = 0$, $I_C = 100^\circ\text{C}$)		I_{CBO}	— —	1.0 100 $\mu\text{A dc}$
Emitter Cutoff Current ($V_{BE} = 5.0\text{ Vdc}$, $I_C = 0$)		I_{EBO}	—	1.0 $\mu\text{A dc}$
ON CHARACTERISTICS				
DC Current Gain ($I_C = 2.0\text{ Adc}$, $V_{CE} = 3.0\text{ Vdc}$)		H_{FE}	750	—
Collector–Emitter Saturation Voltage ($I_C = 1.5\text{ Adc}$, $I_B = 6\text{ mA dc}$)		$V_{CE(Sat)}$	—	1.5 Vdc
Base Emitter Saturation Voltage ($I_C = 1.5\text{ Adc}$, $I_B = 6\text{ mA dc}$)		$V_{BE(Sat)}$	—	2.5 Vdc
Base–Emitter On Voltage ($I_C = 1.5\text{ Adc}$, $V_{CE} = 3\text{ Vdc}$)		$V_{BE(On)}$	—	2.3 Vdc
Output Diode Voltage Drop ($I_{EC} = 2.0\text{ Adc}$)		V_{EC}	—	2.0 Vdc
DYNAMIC CHARACTERISTICS				
Current Gain Bandwidth Product ($I_C = 1.0\text{ Adc}$, $V_{CE} = 2.0\text{ Vdc}$)		f_T	20	— MHz
		Symbol	Min	Typ Unit
Turn–On Time ($I_C = 250\text{ mA}$, $V_{CE} = 2\text{ V}$)	BD775–777 BD776–778–780	t_{on}	— —	250 150 ns
Turn–Off Time ($I_C = 250\text{ mA}$, $V_{CE} = 2\text{ V}$)	BD775–777 BD776–778–780	t_{off}	— —	600 400 ns

BD777 BD776 BD778 BD780

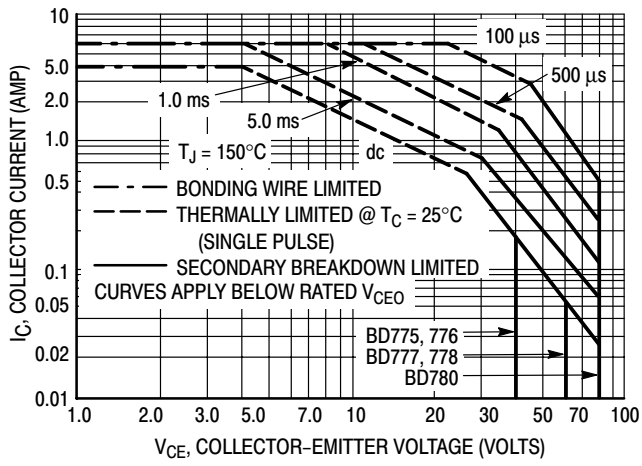


Figure 2. Active Region Safe Operating Area

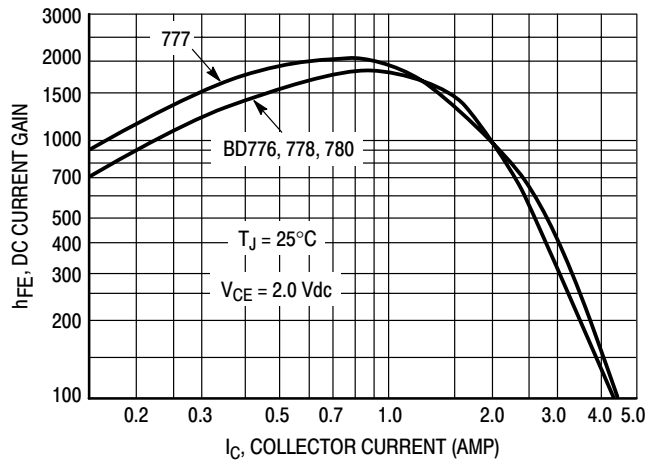


Figure 3. Typical DC Current Gain

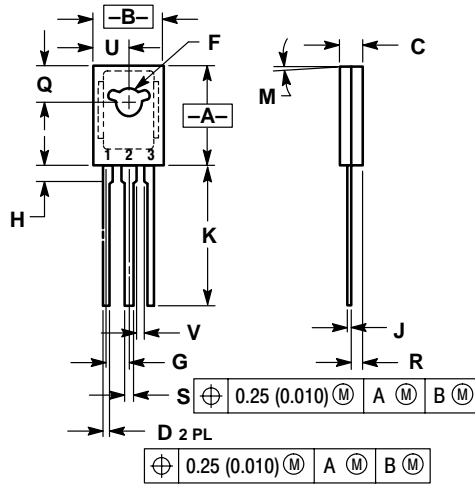


Figure 4. Darlington Circuit Schematic

BD777 BD776 BD778 BD780

PACKAGE DIMENSIONS

CASE 77-08 TO-225AA TYPE ISSUE V



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.425	0.435	10.80	11.04
B	0.295	0.305	7.50	7.74
C	0.095	0.105	2.42	2.66
D	0.020	0.026	0.51	0.66
F	0.115	0.130	2.93	3.30
G	0.094 BSC		2.39 BSC	
H	0.050	0.095	1.27	2.41
J	0.015	0.025	0.39	0.63
K	0.575	0.655	14.61	16.63
M	5° TYP		5° TYP	
Q	0.148	0.158	3.76	4.01
R	0.045	0.055	1.15	1.39
S	0.025	0.035	0.64	0.88
U	0.145	0.155	3.69	3.93
V	0.040	---	1.02	---

- STYLE 1:
PIN 1. EMITTER
2. COLLECTOR
3. BASE

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