



# BD677/A/679/A/681 BD678/A/680/A/682

## COMPLEMENTARY SILICON POWER DARLINGTON TRANSISTORS

- STMicroelectronics PREFERRED SALESTYPES
- COMPLEMENTARY PNP - NPN DEVICES
- MONOLITHIC DARLINGTON CONFIGURATION
- INTEGRATED ANTIPARALLEL COLLECTOR-EMITTER DIODE

### APPLICATION

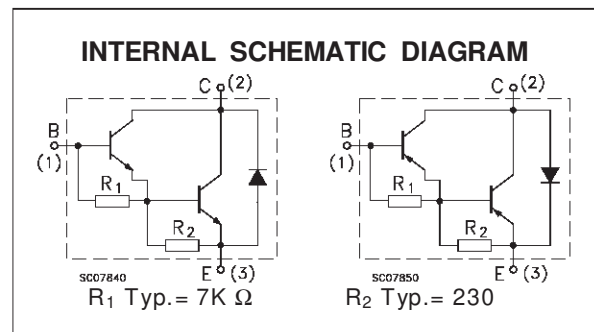
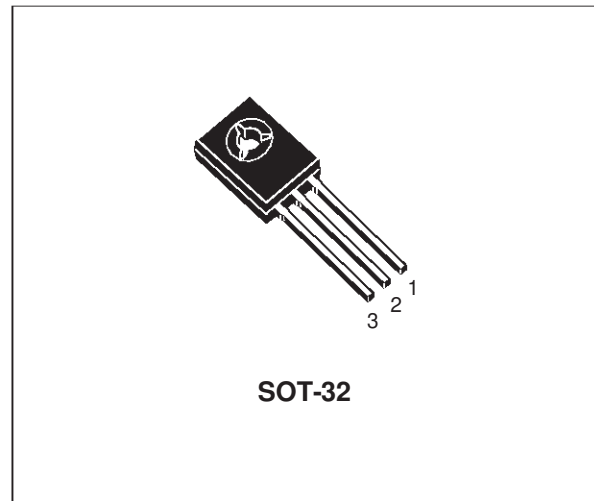
- LINEAR AND SWITCHING INDUSTRIAL EQUIPMENT

### DESCRIPTION

The BD677, BD677A, BD679, BD679A and BD681 are silicon epitaxial-base NPN power transistors in monolithic Darlington configuration mounted in Jedec SOT-32 plastic package.

They are intended for use in medium power linear and switching applications

The complementary PNP types are BD678, BD678A, BD680, BD680A and BD682 respectively.



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value			Unit	
		NPN	BD677/A	BD679/A		BD681
		PNP	BD678/A	BD680/A		BD682
$V_{CBO}$	Collector-Base Voltage ( $I_E = 0$ )	60	80	100	V	
$V_{CEO}$	Collector-Emitter Voltage ( $I_B = 0$ )	60	80	100	V	
$V_{EBO}$	Emitter-Base Voltage ( $I_C = 0$ )	5			V	
$I_C$	Collector Current	4			A	
$I_{CM}$	Collector Peak Current	6			A	
$I_B$	Base Current	0.1			A	
$P_{tot}$	Total Dissipation at $T_c \leq 25^\circ C$	40			W	
$T_{stg}$	Storage Temperature	-65 to 150			$^\circ C$	
$T_j$	Max. Operating Junction Temperature	150			$^\circ C$	

For PNP types voltage and current values are negative.

# BD677/677A/678/678A/679/679A/680/680A/681/682

## THERMAL DATA

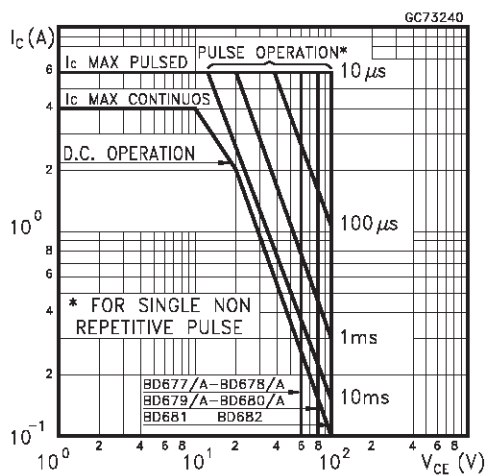
R <sub>thj-case</sub>	Thermal Resistance Junction-case	Max	3.12	°C/W
R <sub>thj-amb</sub>	Thermal Resistance Junction-ambient	Max	100	°C/W

## ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 25 °C unless otherwise specified)

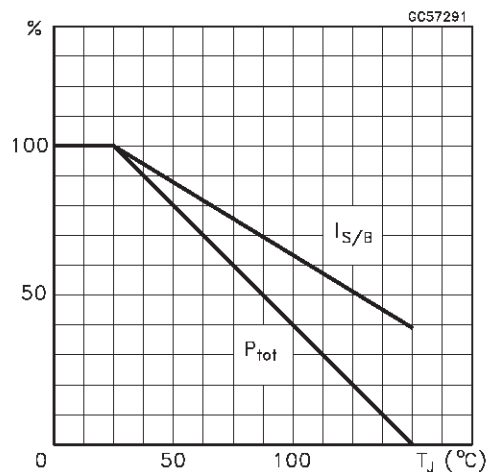
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I <sub>CBO</sub>	Collector Cut-off Current (I <sub>E</sub> = 0)	V <sub>CE</sub> = rated V <sub>CBO</sub> V <sub>CE</sub> = rated V <sub>CBO</sub> T <sub>C</sub> = 100 °C			0.2 2	mA mA
I <sub>CEO</sub>	Collector Cut-off Current (I <sub>B</sub> = 0)	V <sub>CE</sub> = half rated V <sub>CEO</sub>			0.5	mA
I <sub>EBO</sub>	Emitter Cut-off Current (I <sub>C</sub> = 0)	V <sub>EB</sub> = 5 V			2	mA
V <sub>CEO(sus)*</sub>	Collector-Emitter Sustaining Voltage	I <sub>C</sub> = 50 mA for <b>BD677/677A/678/678A</b> for <b>BD679/679A/680/680A</b> for <b>BD681/682</b>	60 80 100			V V V
V <sub>CE(sat)*</sub>	Collector-Emitter Saturation Voltage	for <b>BD677/678/679/680/681/682</b> I <sub>C</sub> = 1.5 A I <sub>B</sub> = 30 mA for <b>BD677A/678A/679A/680A</b> I <sub>C</sub> = 2 A I <sub>B</sub> = 40 mA			2.5 2.8	V V
V <sub>BE*</sub>	Base-Emitter Voltage	for <b>BD677/678/679/680/681/682</b> I <sub>C</sub> = 1.5 A V <sub>CE</sub> = 3 V for <b>BD677A/678A/679A/680A</b> I <sub>C</sub> = 2 A V <sub>CE</sub> = 3 V			2.5 2.5	V V
h <sub>FE*</sub>	DC Current Gain	for <b>BD677/678/679/680/681/682</b> I <sub>C</sub> = 1.5 A V <sub>CE</sub> = 3 V for <b>BD677A/678A/679A/680A</b> I <sub>C</sub> = 2 A V <sub>CE</sub> = 3 V	750 750			
h <sub>fe</sub>	Small Signal Current Gain	I <sub>C</sub> = 1.5 A V <sub>CE</sub> = 3 V f = 1 MHz	1			

\* Pulsed: Pulse duration = 300 ms, duty cycle 1.5 %

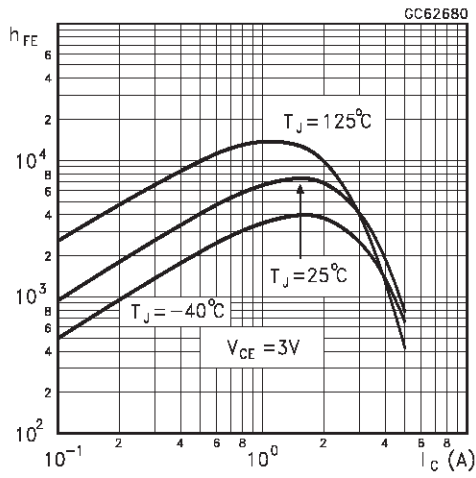
## Safe Operating Areas



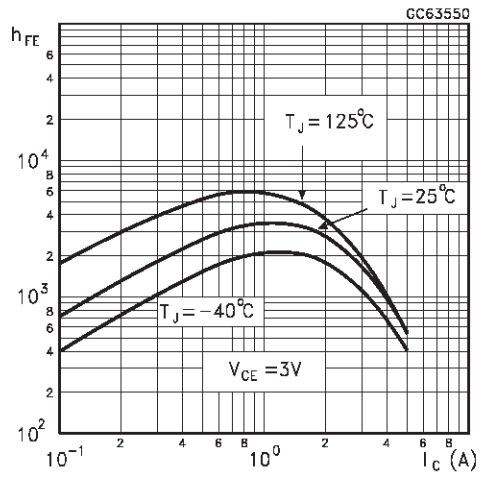
## Derating Curve



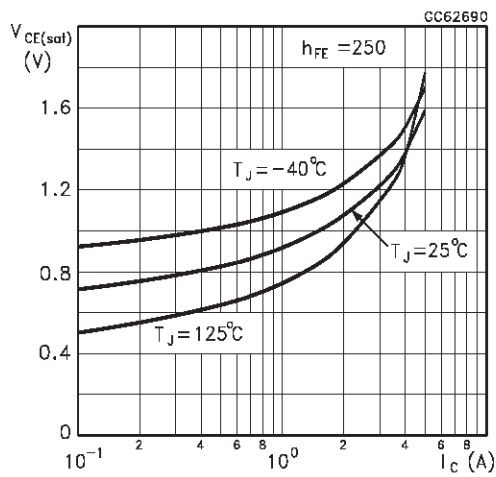
DC Current Gain (NPN type)



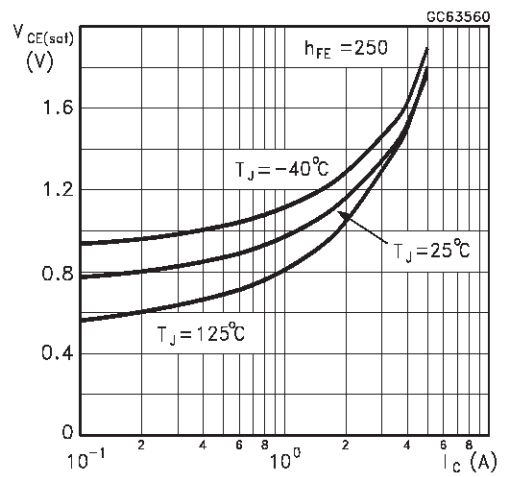
DC Current Gain (PNP type)



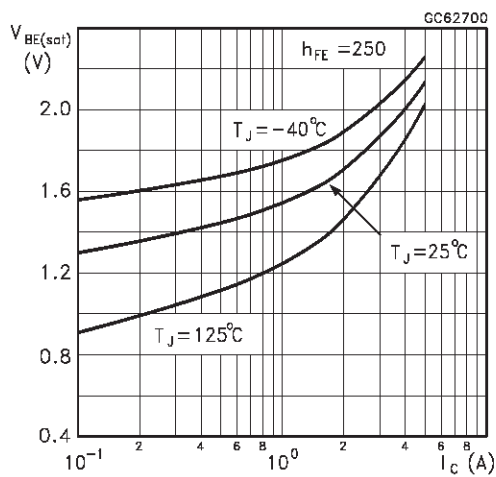
Collector-Emitter Saturation Voltage (NPN type)



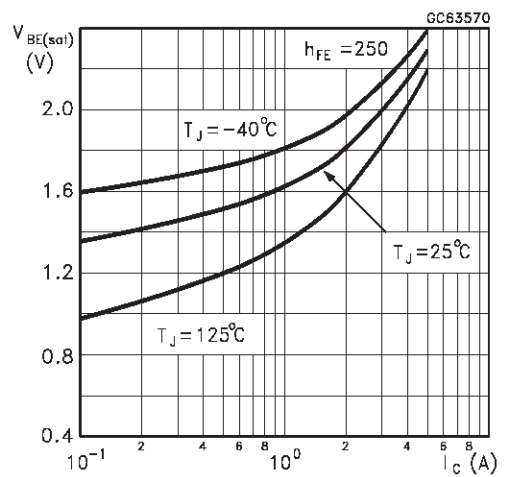
Collector-Emitter Saturation Voltage (PNP type)



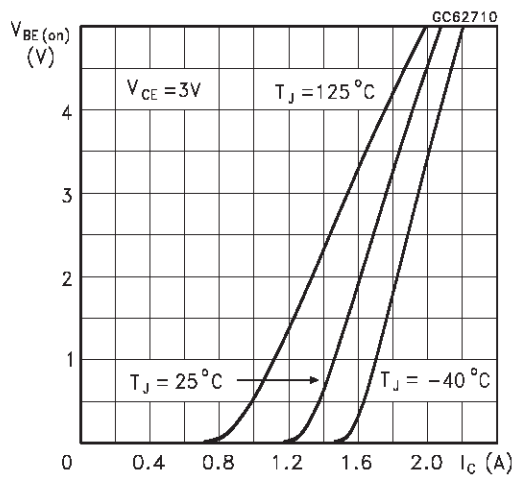
Base-Emitter Saturation Voltage (NPN type)



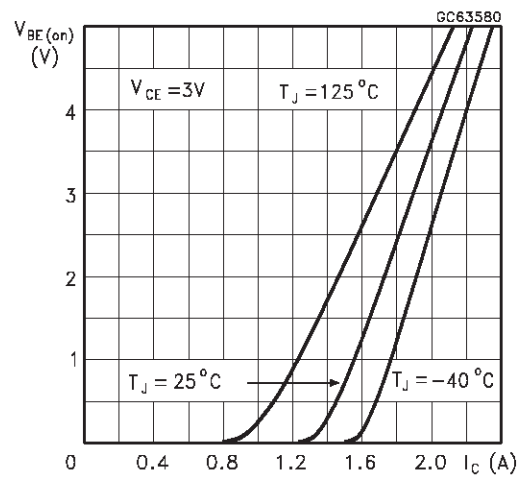
Base-Emitter Saturation Voltage (PNP type)



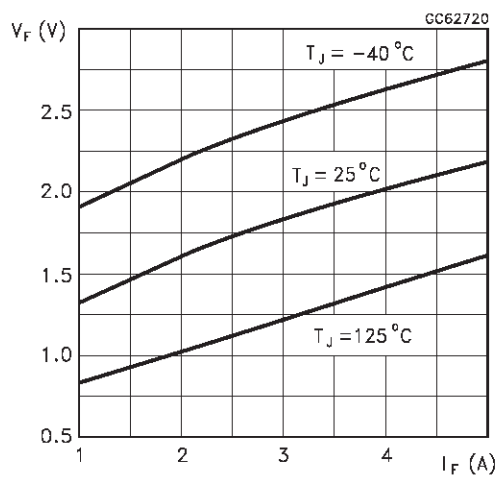
Base-Emitter On Voltage (NPN type)



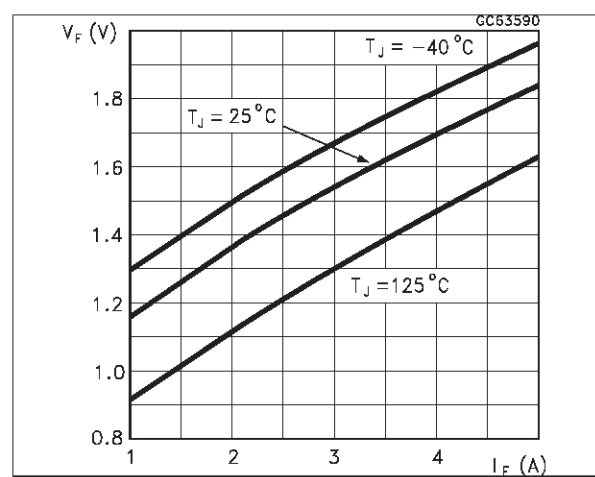
Base-Emitter On Voltage (PNP type)



Freewheel Diode Forward Voltage (NPN types)

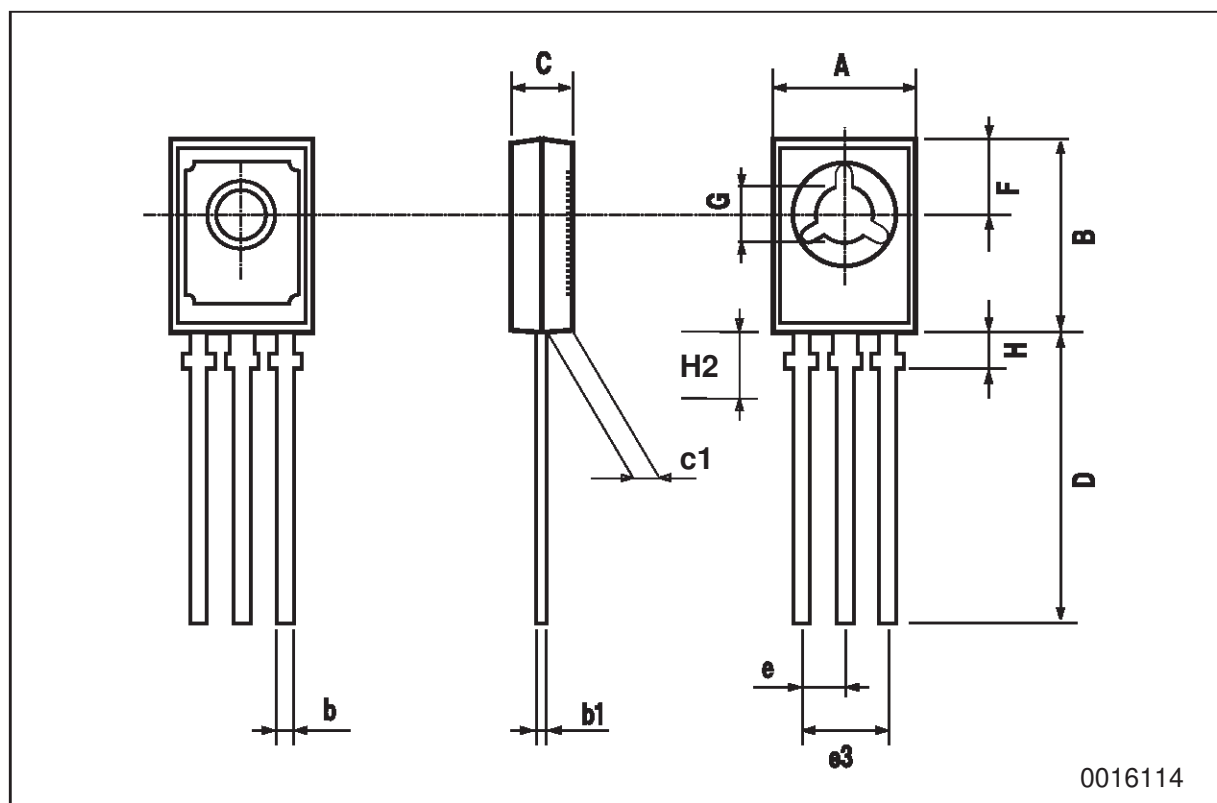


Freewheel Diode Forward Voltage (PNP types)



## SOT-32 (TO-126) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	7.4		7.8	0.291		0.307
B	10.5		10.8	0.413		0.445
b	0.7		0.9	0.028		0.035
b1	0.49		0.75	0.019		0.030
C	2.4		2.7	0.040		0.106
c1	1.0		1.3	0.039		0.050
D	15.4		16.0	0.606		0.629
e		2.2			0.087	
e3	4.15		4.65	0.163		0.183
F		3.8			0.150	
G	3		3.2	0.118		0.126
H			2.54			0.100



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