



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

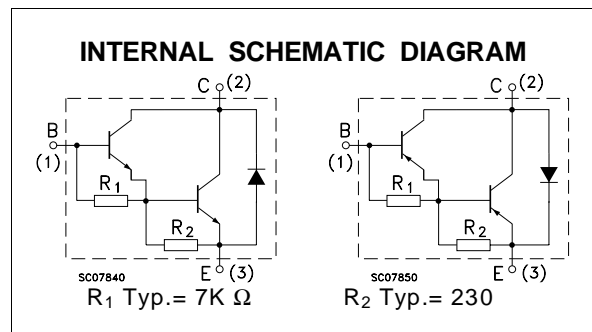
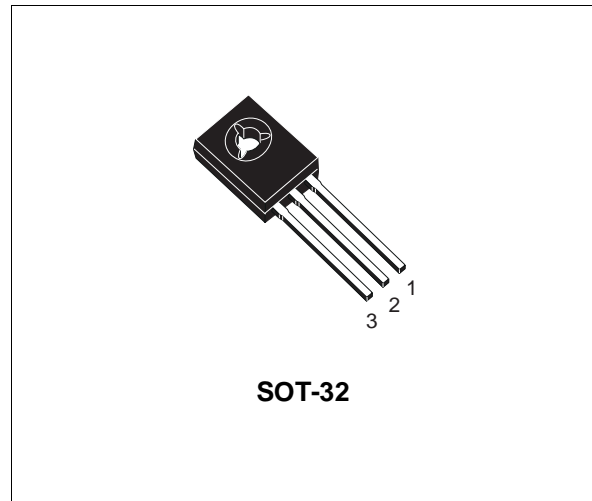
- LINEAR AND SWITCHING INDUSTRIAL EQUIPMENT

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 _{thj-case} | Thermal Resistance Junction-case | Max | 3.12 | °C/W |
| R _{thj-amb} | Thermal Resistance Junction-ambient | Max | 100 | °C/W |

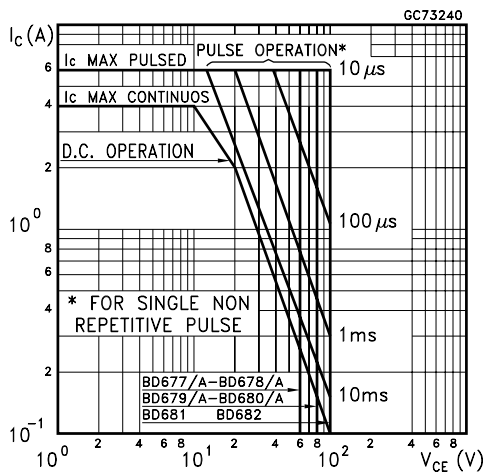
ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

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

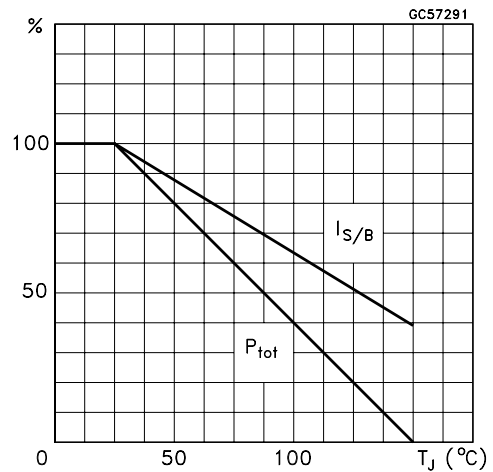
* Pulsed: Pulse duration = 300 μs, duty cycle 1.5 %

For PNP types voltage and current values are negative.

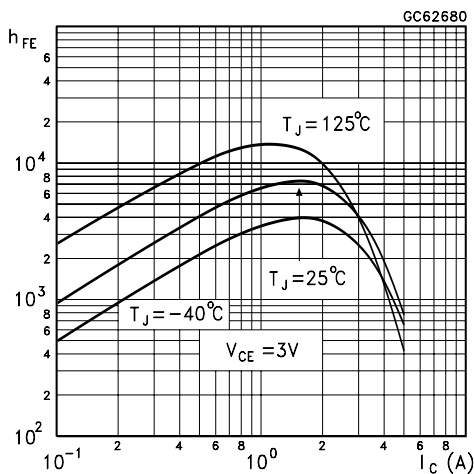
Safe Operating Areas



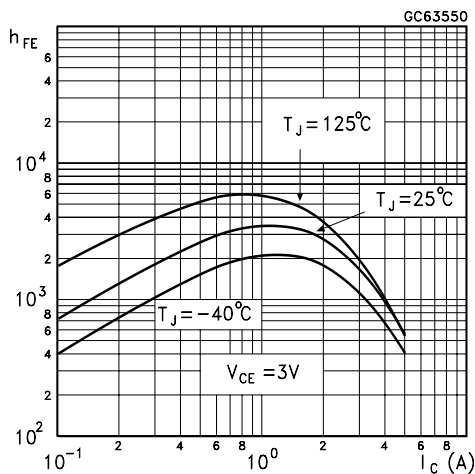
Derating Curve



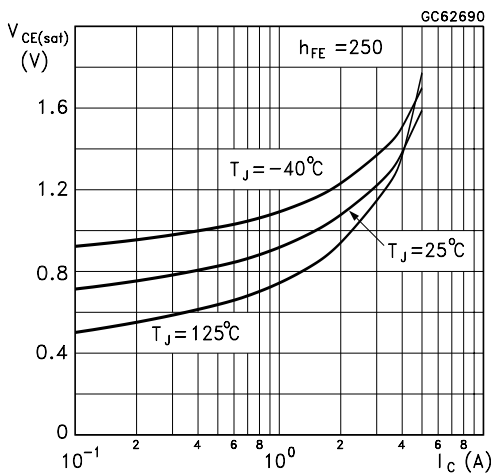
DC Current Gain (NPN type)



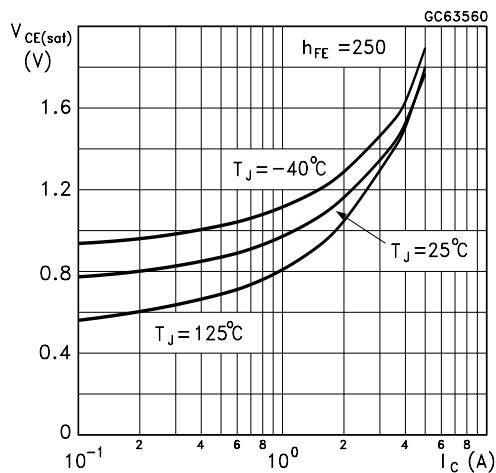
DC Current Gain (PNP type)



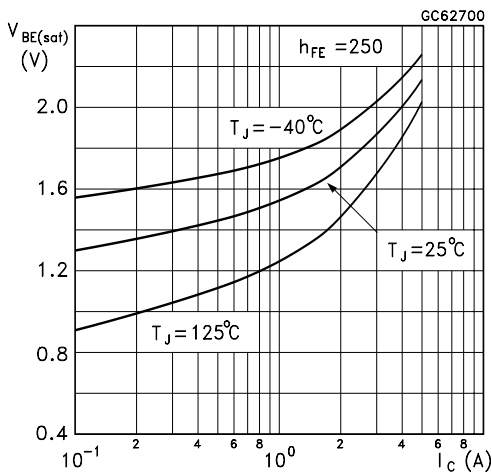
Collector-Emitter Saturation Voltage (NPN type)



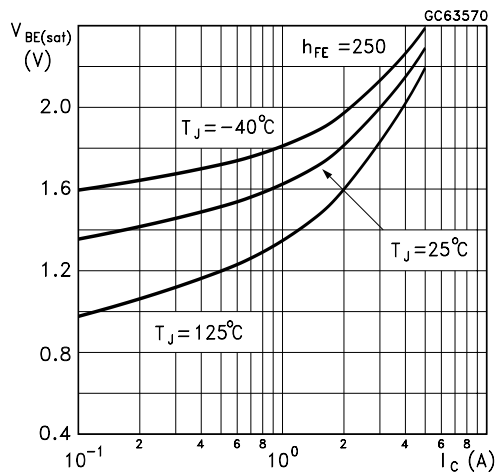
Collector-Emitter Saturation Voltage (PNP type)



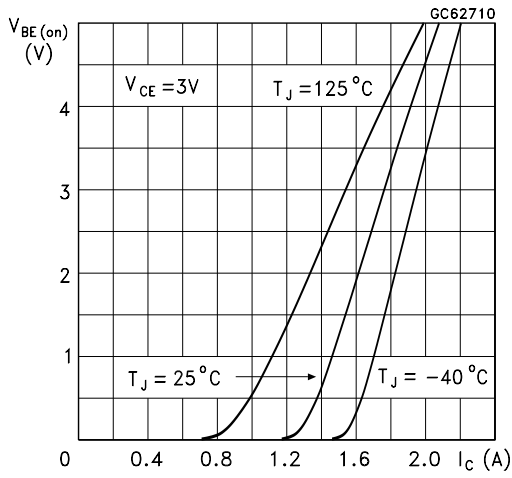
Base-Emitter Saturation Voltage (NPN type)



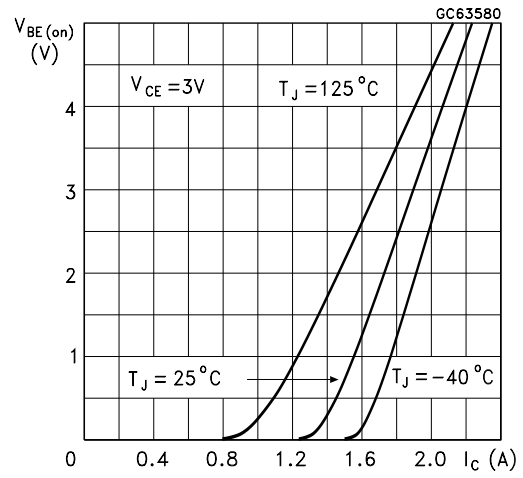
Base-Emitter Saturation Voltage (PNP type)



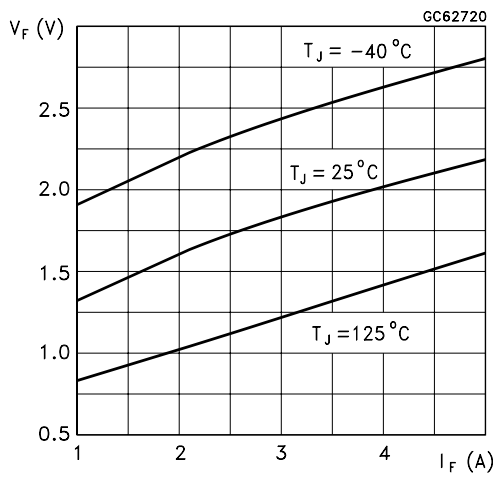
Base-Emitter On Voltage (NPN type)



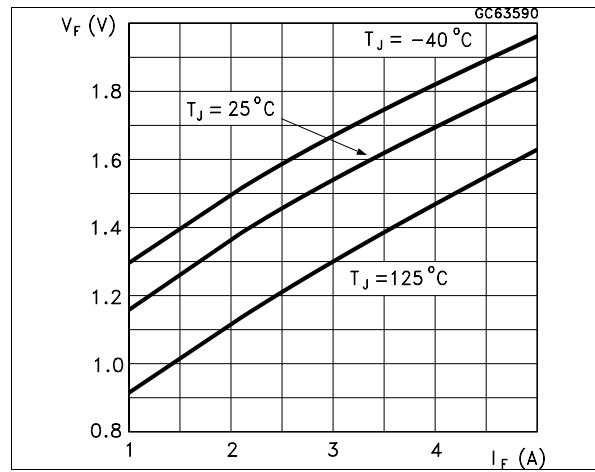
Base-Emitter On Voltage (PNP type)



Freewheel Diode Forward Voltage (NPN types)

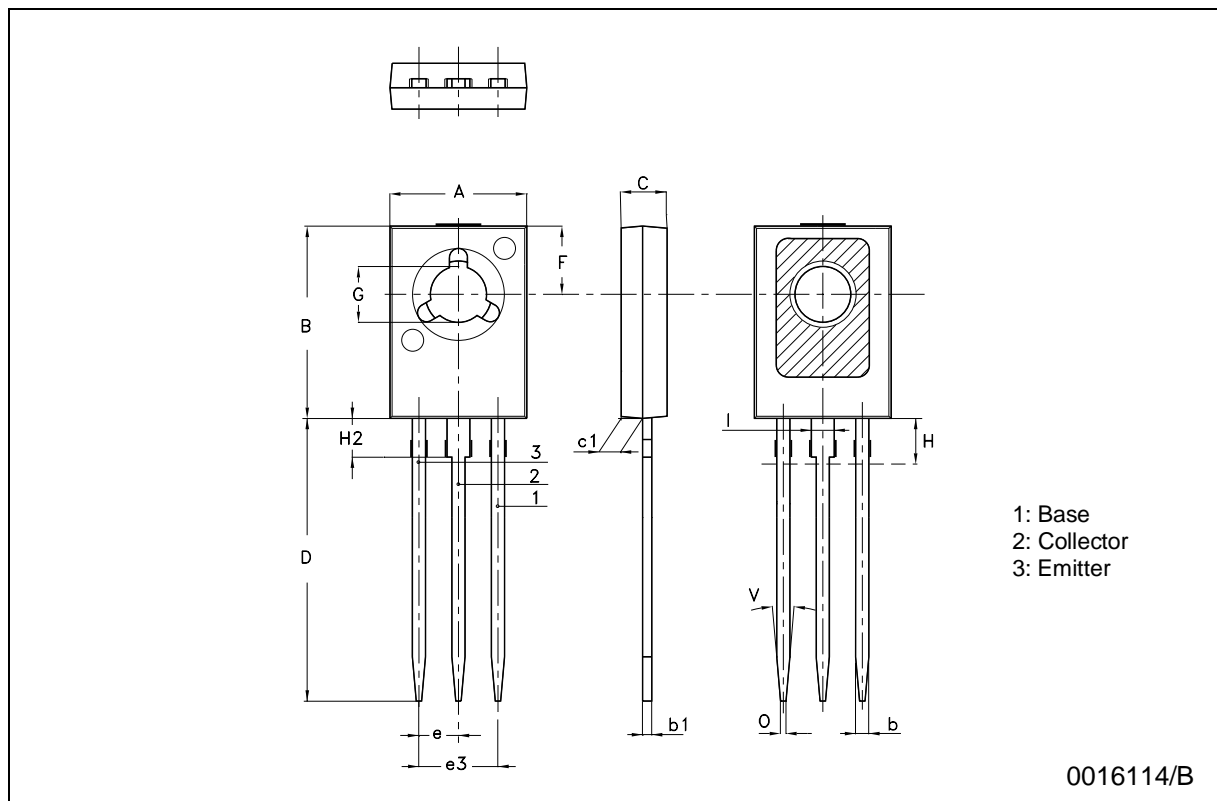


Freewheel Diode Forward Voltage (PNP types)



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 | | 0.425 |
| b | 0.7 | | 0.9 | 0.028 | | 0.035 |
| b1 | 0.40 | | 0.65 | 0.015 | | 0.025 |
| C | 2.4 | | 2.7 | 0.094 | | 0.106 |
| c1 | 1.0 | | 1.3 | 0.039 | | 0.051 |
| D | 15.4 | | 16.0 | 0.606 | | 0.630 |
| e | | 2.2 | | | 0.087 | |
| e3 | | 4.4 | | | 0.173 | |
| F | | 3.8 | | | 0.150 | |
| G | 3 | | 3.2 | 0.118 | | 0.126 |
| H | | | 2.54 | | | 0.100 |
| H2 | | 2.15 | | | 0.084 | |
| I | | 1.27 | | | 0.05 | |
| O | | 0.3 | | | 0.011 | |
| V | | 10° | | | 10° | |



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