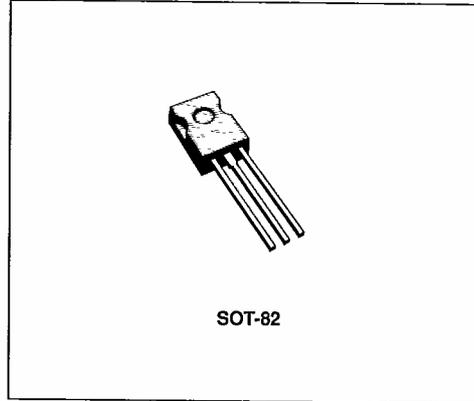
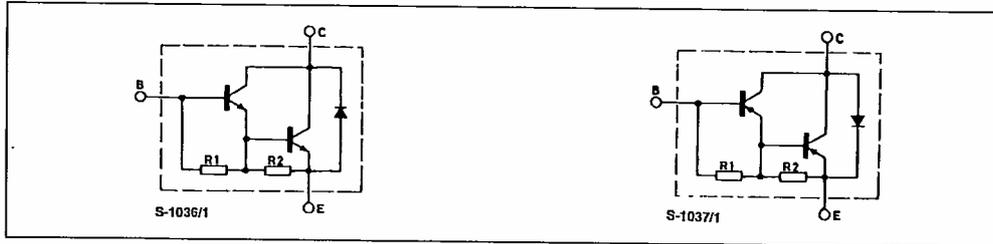


**DESCRIPTION**

The BD331, BD333, BD335 (NPN types) and BD332, BD334, BD336 (PNP types) are complementary epitaxial-base Darlington transistors in SOT-82 plastic package. They are intended for use in audio output stages, general amplifier and switching applications.



**INTERNAL SCHEMATIC DIAGRAMS**



**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	NPN PNP	Value			Unit
			BD331 BD332	BD333 BD334	BD335 BD336	
V <sub>CB0</sub>	Collector-base Voltage (I <sub>E</sub> = 0)		60	80	100	V
V <sub>CE0</sub>	Collector-emitter Voltage (I <sub>B</sub> = 0)		60	80	100	V
V <sub>EB0</sub>	Base-emitter Voltage (I <sub>C</sub> = 0)		5			V
I <sub>C</sub>	Collector Current		6			A
I <sub>CM</sub>	Collector Peak Current (t <sub>p</sub> < 10 ms)		10			A
I <sub>B</sub>	Base Current		0.15			A
P <sub>tot</sub>	Total Power Dissipation at T <sub>case</sub> ≤ 25 °C		60			W
T <sub>stg</sub>	Storage Temperature		- 65 to 150			°C
T <sub>j</sub>	Junction Temperature		150			°C

For PNP types voltage and current values are negative.

$R_{th \text{ J-case}}$	Thermal Resistance Junction-case	Max	2.08	$^{\circ}\text{C/W}$
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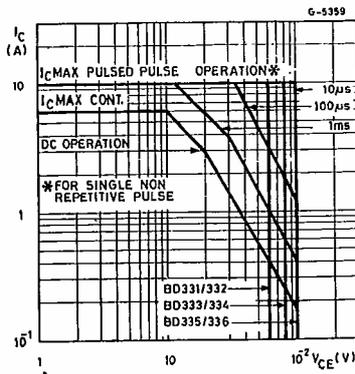
### T-33-29

#### ELECTRICAL CHARACTERISTICS ( $T_{\text{case}} = 25^{\circ}\text{C}$ unless otherwise specified)

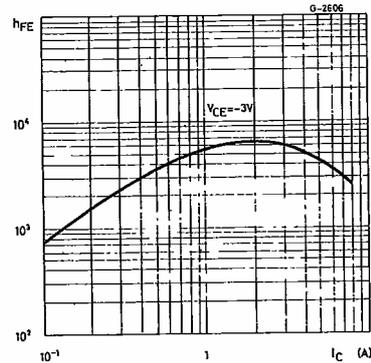
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{\text{CBO}}$	Collector Cutoff Current ( $I_{\text{E}} = 0$ )	$V_{\text{CB}} = \text{rated } V_{\text{CBO}}$ $T_{\text{case}} = 150^{\circ}\text{C}$			0.2 2	mA mA
$I_{\text{CEO}}$	Collector Cutoff Current ( $I_{\text{B}} = 0$ )	$V_{\text{CE}} = 1/2 V_{\text{CEO max}}$			0.5	mA
$I_{\text{EBO}}$	Emitter Cutoff Current ( $I_{\text{C}} = 0$ )	$V_{\text{EB}} = 5 \text{ V}$			5	mA
$V_{\text{CE(sat)}}$ *	Collector-emitter Saturation Voltage	$I_{\text{C}} = 3 \text{ A}$ $I_{\text{B}} = 12 \text{ mA}$			2	V
$V_{\text{BE}}$ *	Base-emitter Voltage	$I_{\text{C}} = 3 \text{ A}$ $V_{\text{CE}} = 3 \text{ V}$			2.5	V
$h_{\text{FE}}$ *	DC Current Gain	$I_{\text{C}} = 0.5 \text{ A}$ $V_{\text{CE}} = 3 \text{ V}$ for <b>BD331, BD333, BD335</b> for <b>BD332, BD334, BD336</b> $I_{\text{C}} = 3 \text{ A}$ $V_{\text{CE}} = 3 \text{ V}$ for <b>BD331, BD333, BD335</b> for <b>BD332, BD334, BD336</b> $I_{\text{C}} = 6 \text{ A}$ $V_{\text{CE}} = 3 \text{ V}$ for <b>BD331, BD333, BD335</b> for <b>BD332, BD334, BD336</b>		1900 2700 750 750 3000 400		
$V_{\text{F}}$ *	Parallel Diode Forward Voltage	$I_{\text{F}} = 3 \text{ A}$		1.8		V
$h_{\text{fe}}$	Small Signal Current Gain	$I_{\text{C}} = 3 \text{ A}$ $V_{\text{CE}} = 3 \text{ V}$ $f = 1 \text{ MHz}$ for <b>BD331, BD333, BD335</b> for <b>BD332, BD334, BD336</b>		50 150		
$t_{\text{on}}$	Turn-on Time	$I_{\text{C}} = 3 \text{ A}$ $V_{\text{CC}} = 30 \text{ V}$		1	2	$\mu\text{s}$
$t_{\text{off}}$	Turn-off Time	$I_{\text{B1}} = -I_{\text{B2}} = 12 \text{ mA}$		5	10	$\mu\text{s}$

\* Pulsed : pulse duration = 300  $\mu\text{s}$ , duty cycle  $\leq 1.5\%$ .  
For PNP types voltage and current values are negative.

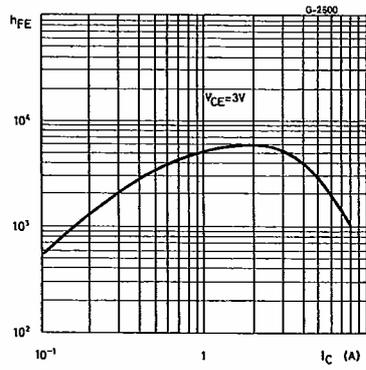
#### Safe Operating Areas.



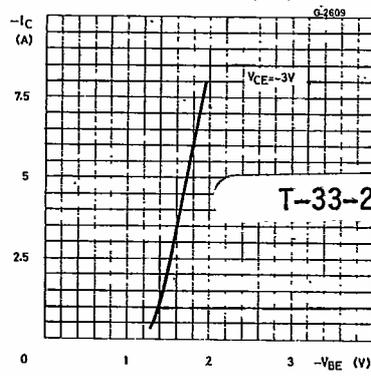
#### DC Current Gain (NPN types).



DC Current gain (PNP types).

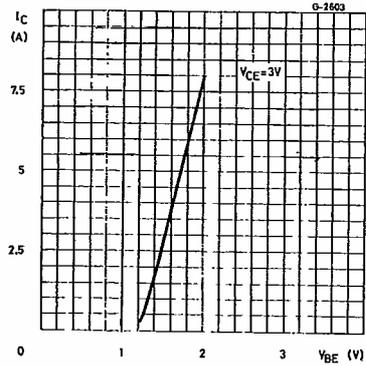


DC Transconductance (NPN types).

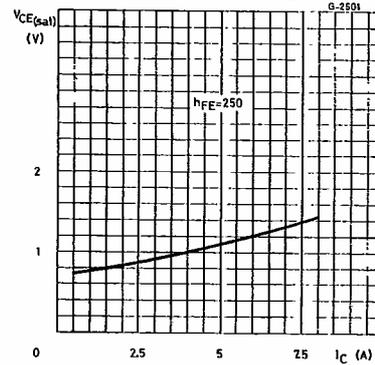


T-33-29

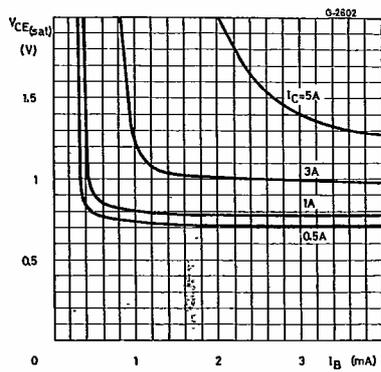
DC Transconductance (PNP types).



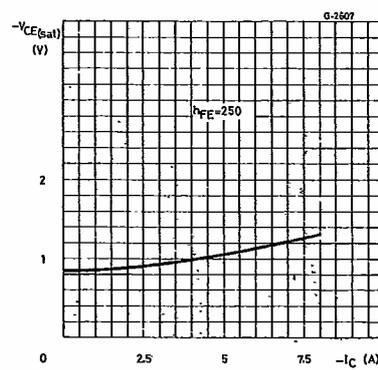
Collector-emitter Saturation Voltage (NPN types).



Collector-emitter Saturation Voltage (NPN types).



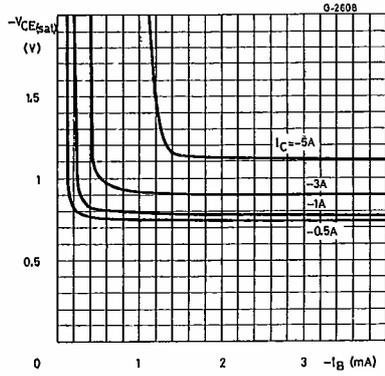
Collector-emitter Saturation Voltage (PNP types).



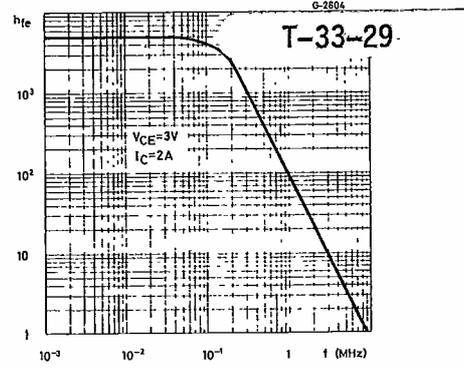
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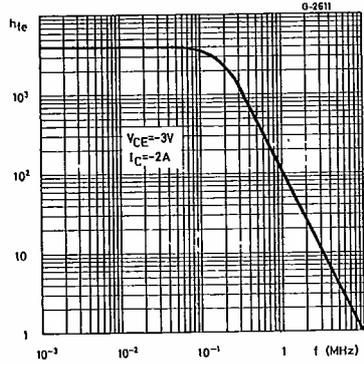
Collector-emitter Saturation Voltage (PNP types).



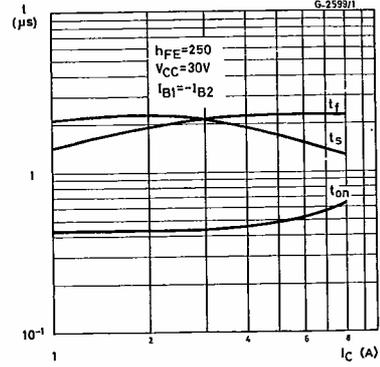
Small Signal Current Gain (NPN types).



Small Signal Current Gain (PNP types).



Saturated Switching Characteristics (NPN types).



Saturated Switching Characteristics (PNP types).

