

Complementary power Darlington transistors

Features

- Complementary NPN - PNP transistors
- Monolithic Darlington configuration

Applications

- Audio power amplifier
- DC-AC converter
- Easy driver for low voltage DC motor
- General purpose switching applications

Description

The SGSD100 is an epitaxial-base NPN power transistor in monolithic Darlington configuration mounted in TO-247 plastic package. It is intended for use in general purpose and high current amplifier applications. The complementary PNP type is the SGSD200.

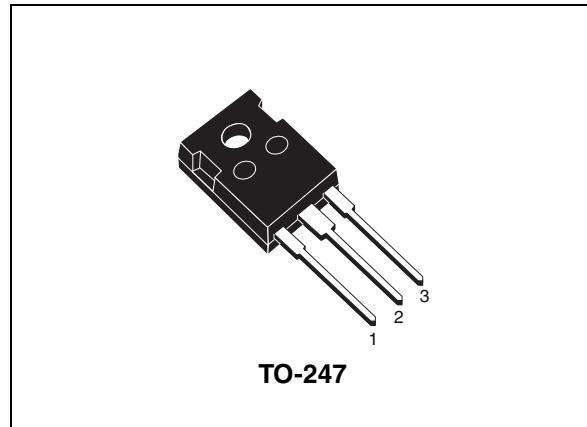


Figure 1. Internal schematic diagrams

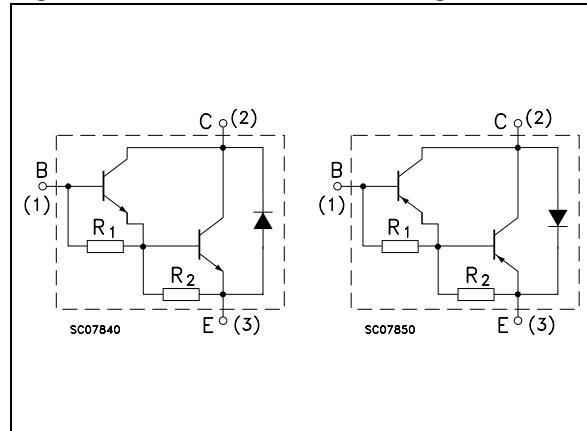


Table 1. Device summary

Order code	Marking	Package	Packaging
SGSD100	SGSD100	TO-247	Tube
SGSD200	SGSD200		

1 Absolute maximum rating

Table 2. Absolute maximum rating

Symbol	Parameter	Value		Unit
		NPN	SGSD100	
		PNP	SGSD200	
V_{CBO}	Collector-emitter voltage ($I_E = 0$)	80		V
V_{CEO}	Collector-emitter voltage ($I_B = 0$)	80		V
I_C	Collector current	25		A
I_{CM}	Collector peak current ($t_P < 5\text{ms}$)	40		A
I_B	Base current	6		A
I_{BM}	Base peak current ($t_P < 5\text{ms}$)	10		A
P_{TOT}	Total dissipation at $T_c \leq 25^\circ\text{C}$	130		W
T_{stg}	Storage temperature	-65 to 150		$^\circ\text{C}$
T_J	Max. operating junction temperature	150		$^\circ\text{C}$

Note: For PNP type voltage and current values are negative

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max	0.96	$^\circ\text{C/W}$

2 Electrical characteristics

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

Table 4. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector cut-off current ($I_E = 0$)	$V_{CE} = 80\text{ V}$ $V_{CE} = 80\text{ V}$ $T_C = 100^\circ\text{C}$			0.5 1.5	mA mA
I_{CEV}	Collector cut-off current ($V_{BE} = -0.3\text{V}$)	$V_{CE} = 80\text{ V}$ $V_{CE} = 80\text{ V}$ $T_C = 100^\circ\text{C}$			0.1 2	mA mA
I_{CEO}	Collector cut-off current ($I_B = 0$)	$V_{CE} = 60\text{ V}$ $V_{CE} = 60\text{ V}$ $T_C = 100^\circ\text{C}$			0.5 1.5	mA mA
I_{EBO}	Emitter cut-off current ($I_C = 0$)	$V_{EB} = 5\text{ V}$			2	mA
$V_{CEO(sus)}^{(1)}$	Collector-emitter sustaining voltage ($I_B = 0$)	$I_C = 50\text{ mA}$	80			V
$V_{CE(sat)}^{(1)}$	Collector-emitter saturation voltage	$I_C = 5\text{ A}$ $I_B = 20\text{ mA}$		0.95	1.2	V
		$I_C = 5\text{ A}$ $I_B = 20\text{ mA}$ $T_C = 100^\circ\text{C}$		0.8		V
		$I_C = 10\text{ A}$ $I_B = 40\text{ mA}$		1.2	1.75	V
		$I_C = 10\text{ A}$ $I_B = 40\text{ mA}$ $T_C = 100^\circ\text{C}$		1.3		V
		$I_C = 20\text{ A}$ $I_B = 80\text{ mA}$		2	3.5	V
		$I_C = 20\text{ A}$ $I_B = 80\text{ mA}$ $T_C = 100^\circ\text{C}$		2.3		V
$V_{BE(sat)}^{(1)}$	Base-emitter saturation voltage	$I_C = 20\text{ A}$ $I_B = 80\text{ mA}$		2.6	3.3	V
		$I_C = 20\text{ A}$ $I_B = 80\text{ mA}$ $T_C = 100^\circ\text{C}$		2.5		V
$V_{BE}^{(1)}$	Base-emitter voltage	$I_C = 10\text{ A}$ $V_{CE} = 3\text{ V}$	1	1.8	3	V
		$I_C = 10\text{ A}$ $V_{CE} = 3\text{ V}$ $T_C = 100^\circ\text{C}$		1.6		V
$h_{FE}^{(1)}$	DC current gain	$I_C = 5\text{ A}$ $V_{CE} = 3\text{ V}$	600	5000	15000	
		$I_C = 5\text{ A}$ $V_{CE} = 3\text{ V}$ $T_C = 100^\circ\text{C}$		8000		
		$I_C = 10\text{ A}$ $V_{CE} = 3\text{ V}$	500	4000	12000	
		$I_C = 10\text{ A}$ $V_{CE} = 3\text{ V}$ $T_C = 100^\circ\text{C}$		8000		
		$I_C = 20\text{ A}$ $V_{CE} = 3\text{ V}$	300	2000	6000	
		$I_C = 20\text{ A}$ $V_{CE} = 3\text{ V}$ $T_C = 100^\circ\text{C}$		2000		
$V_F^{(1)}$	Diode forward voltage	$I_F = 5\text{ A}$		1.2		V
		$I_F = 5\text{ A}$ $T_C = 100^\circ\text{C}$		0.85		V
		$I_F = 10\text{ A}$		1.6		V
		$I_F = 10\text{ A}$ $T_C = 100^\circ\text{C}$		1.4		V
		$I_F = 20\text{ A}$		2.3		V
		$I_F = 20\text{ A}$ $T_C = 100^\circ\text{C}$		1.3		V

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$E_{s/b}$	Second breakdown energy	$V_{CC} = 30 \text{ V}$ $L = 3 \text{ mH}$ $V_{CC} = 30 \text{ V}$ $L = 3 \text{ mH}$ $T_C = 100 \text{ }^\circ\text{C}$	250 250			mJ mJ
$I_{s/b}$	Second breakdown current	$V_{CE} = 25 \text{ V}$ $t = 500 \text{ ms}$	6			A

1. *Pulsed : Pulse duration = 300 μs , duty cycle $\leq 1.5\%$*

Note: For PNP type voltage and current values are negative

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

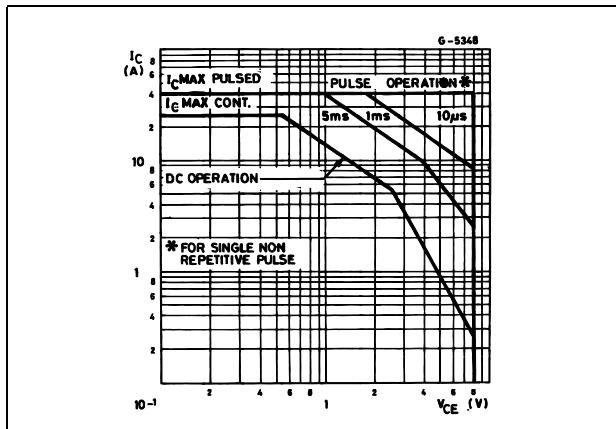


Figure 3. DC current gain (NPN type)

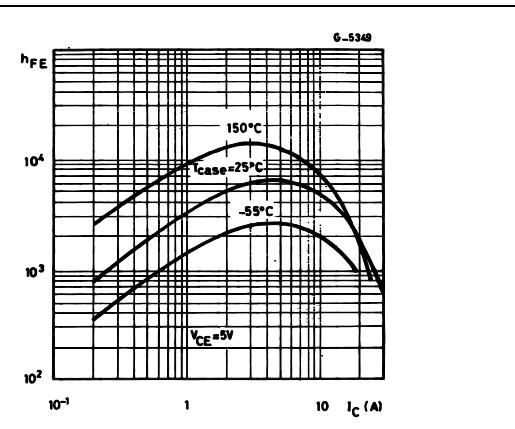


Figure 4. DC current gain (PNP type)

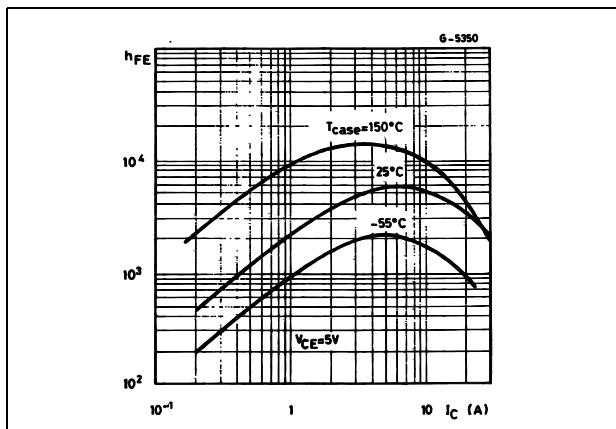


Figure 5. DC current gain (NPN type)

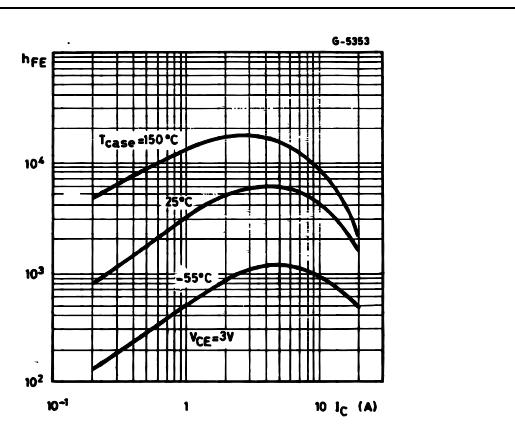


Figure 6. DC current gain (PNP type)

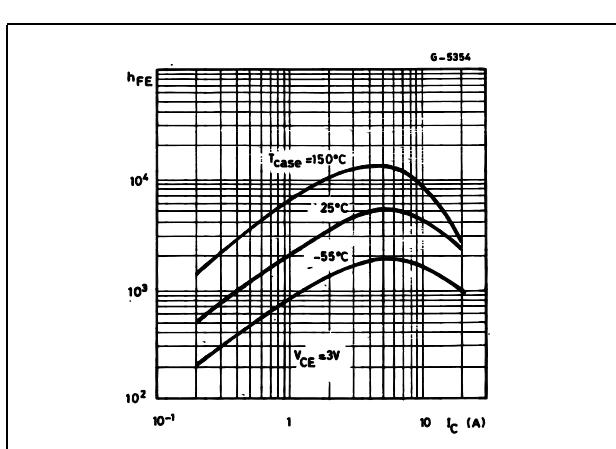


Figure 7. Collector-emitter saturation voltage (NPN type)

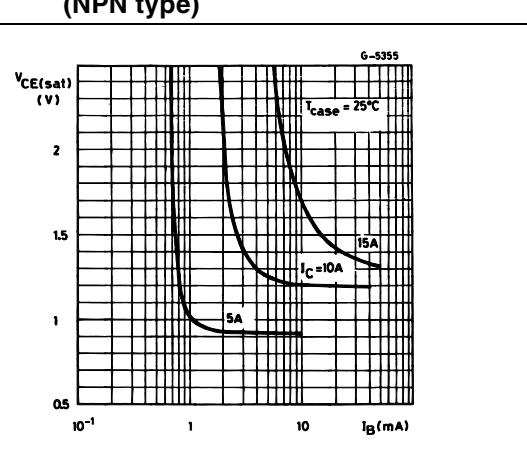
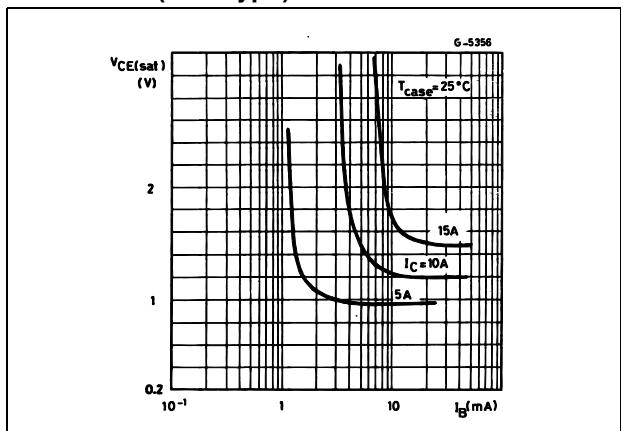


Figure 8. Base-emitter saturation voltage (PNP type)

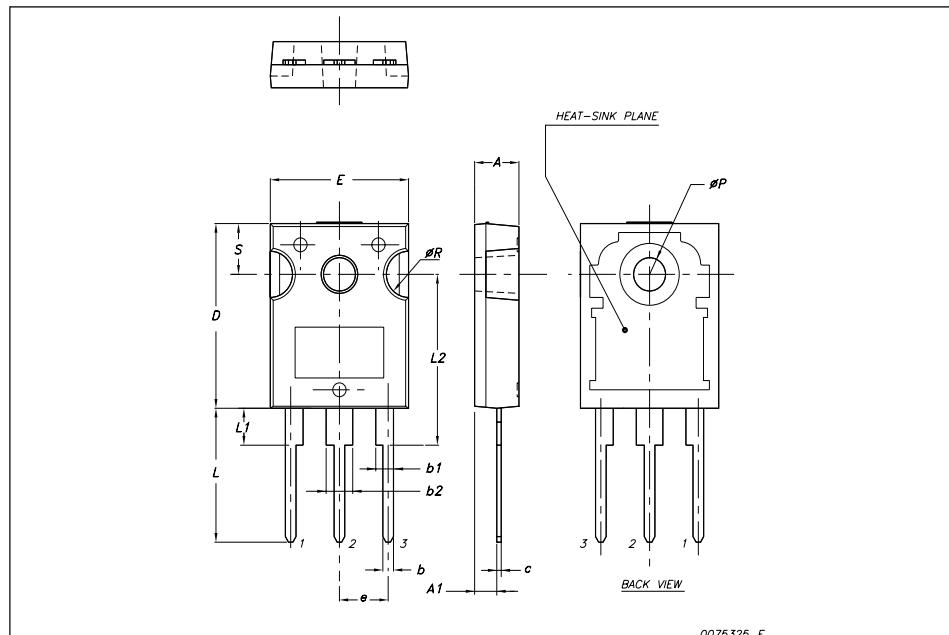


3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com

TO-247 Mechanical data

Dim.	mm.		
	Min.	Typ	Max.
A	4.85		5.15
A1	2.20		2.60
b	1.0		1.40
b1	2.0		2.40
b2	3.0		3.40
c	0.40		0.80
D	19.85		20.15
E	15.45		15.75
e		5.45	
L	14.20		14.80
L1	3.70		4.30
L2		18.50	
$\varnothing P$	3.55		3.65
$\varnothing R$	4.50		5.50
S		5.50	



4 Revision history

Table 5. Document revision history

Date	Revision	Changes
11-Oct-2003	3	
24-Jan-2007	4	Package change from TO-218 to TO-247.

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