

## Complementary power Darlingtons

### Features

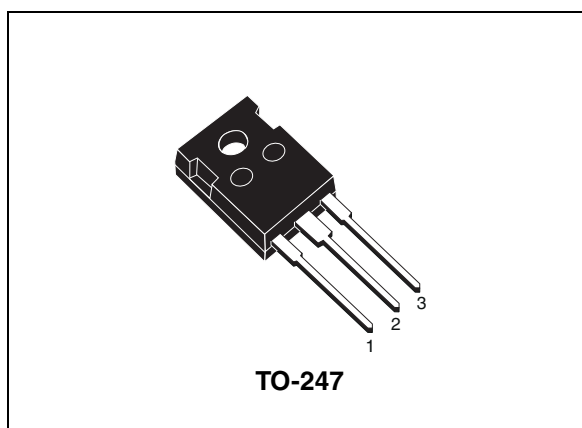
- Complementary NPN - PNP transistors
- Monolithic Darlingtons configuration

### Applications

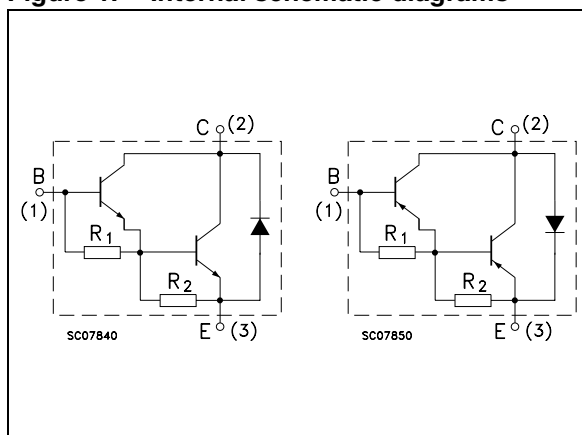
- Audio power amplifier
- DC-AC converter
- Easy driver for low voltage DC motor
- General purpose switching applications

### Description

The SGSD100 is an epitaxial-base NPN power transistor in monolithic Darlingtons 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 ( $t_p < 5ms$ )		40	A
$I_B$	Base current		6	A
$I_{BM}$	Base peak current ( $t_p < 5ms$ )		10	A
$P_{TOT}$	Total dissipation at $T_c \leq 25^\circ C$		130	W
$T_{stg}$	Storage temperature		-65 to 150	$^\circ C$
$T_J$	Max. operating junction temperature		150	$^\circ C$

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	$^\circ C/W$

## 2 Electrical characteristics

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

**Table 4. Electrical characteristics**

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

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

1. Pulsed : Pulse duration = 300  $\mu\text{s}$ , 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

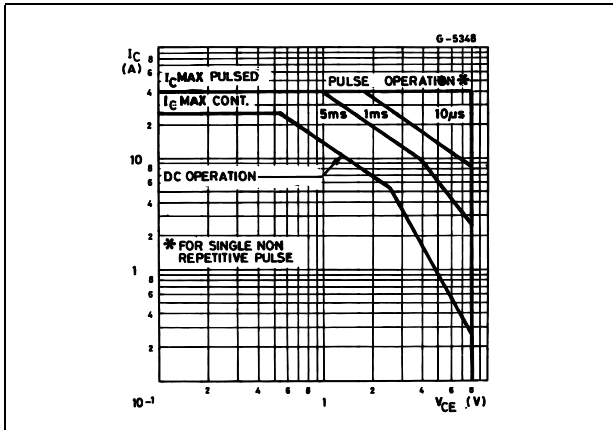


Figure 3. DC current gain (NPN type)

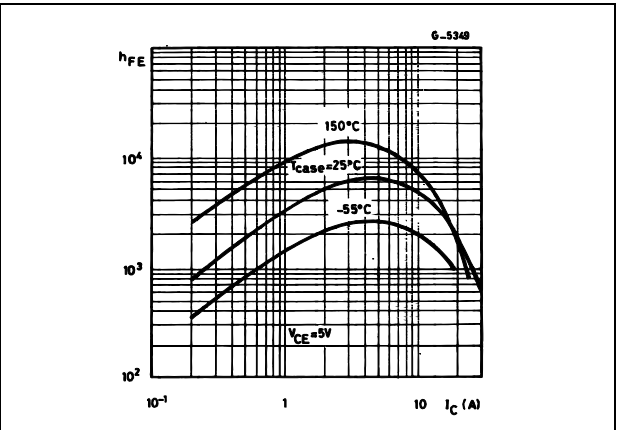


Figure 4. DC current gain (PNP type)

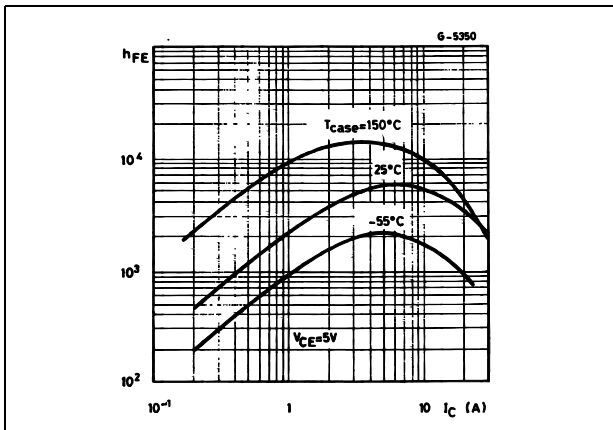


Figure 5. DC current gain (NPN type)

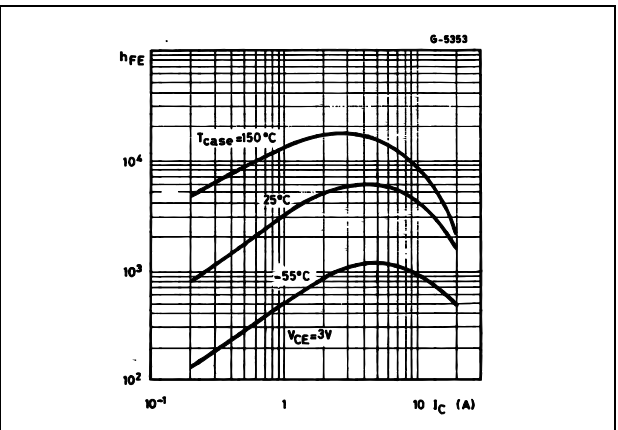


Figure 6. DC current gain (PNP type)

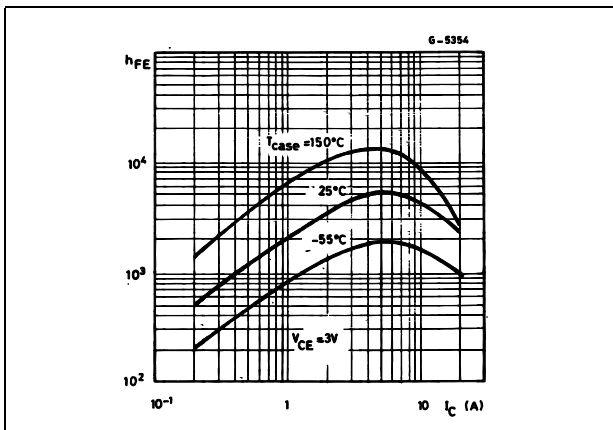
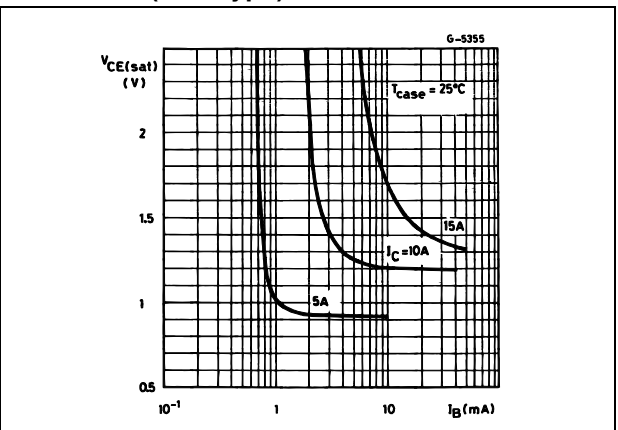
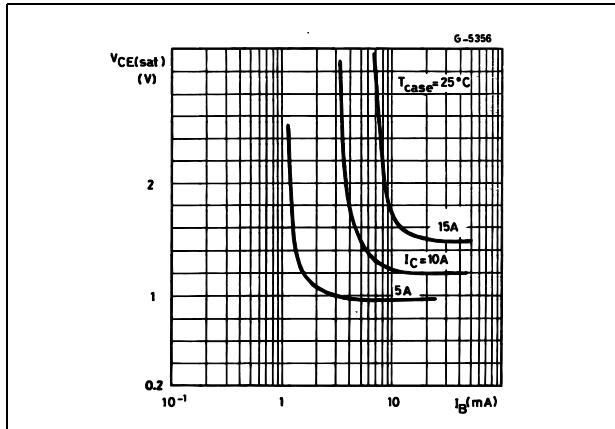


Figure 7. Collector-emitter saturation voltage (NPN type)



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

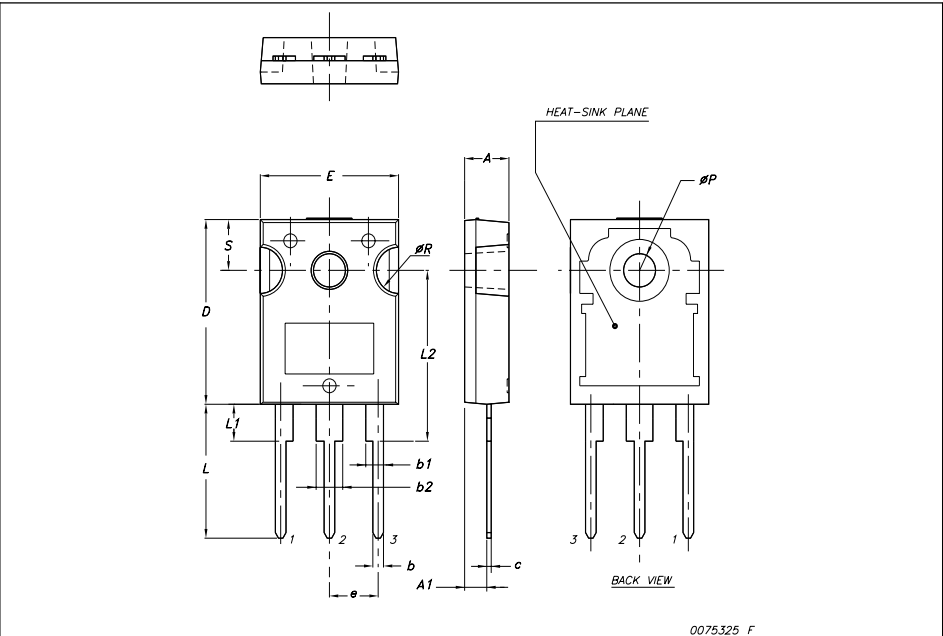


### 3 Package mechanical data

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](http://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	
øP	3.55		3.65
øR	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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