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2SD1047

High power NPN epitaxial planar bipolar transistor

Features

- High breakdown voltage $V_{CEO} = 140$ V
- Typical $f_t = 20$ MHz
- Fully characterized at 125 °C

Application

- Power supply

Description

The device is a NPN transistor manufactured using new BiT-LA (Bipolar transistor for linear amplifier) technology. The resulting transistor shows good gain linearity behaviour.

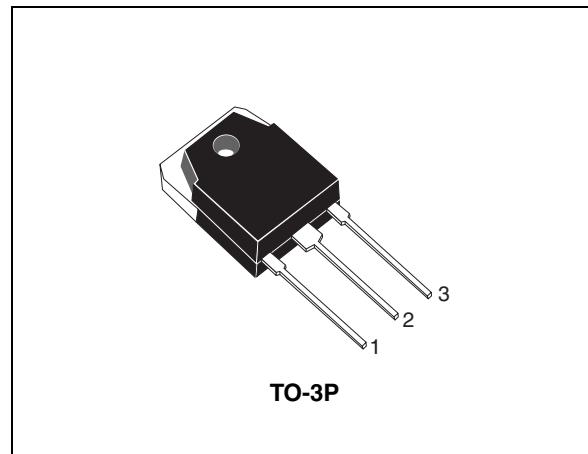


Figure 1. Internal schematic diagram

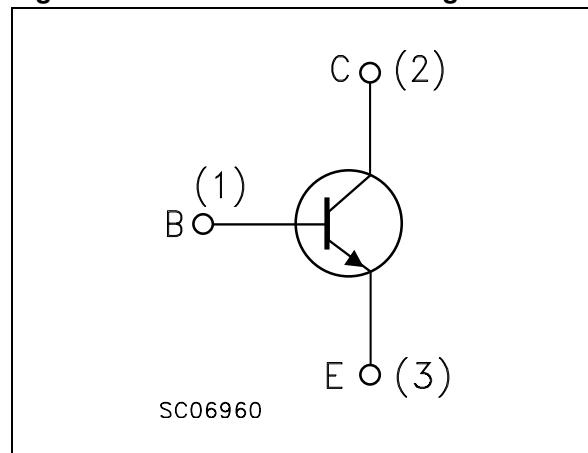


Table 1. Device summary

Order code	Marking	Package	Packaging
2SD1047	2SD1047	TO-3P	Tube

Electrical ratings

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1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-base voltage ($I_E = 0$)	200	V
V_{CEO}	Collector-emitter voltage ($I_B = 0$)	140	V
V_{EBO}	Emitter-base voltage ($I_C = 0$)	6	V
I_C	Collector current	12	A
I_{CM}	Collector peak current ($t_P < 5$ ms)	20	A
P_{tot}	Total dissipation at $T_c = 25$ °C	100	W
T_{stg}	Storage temperature	-65 to 150	°C
T_J	Max. operating junction temperature	150	°C

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max	1.25	°C/W

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Electrical characteristics

2 Electrical characteristics

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

Table 4. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector cut-off current ($I_E = 0$)	$V_{CB} = 200 V$			0.1	μA
I_{EBO}	Emitter cut-off current ($I_C = 0$)	$V_{EB} = 6 V$			0.1	μA
$V_{(BR)CEO}^{(1)}$	Collector-emitter breakdown voltage ($I_B = 0$)	$I_C = 50 mA$	140			V
$V_{(BR)CBO}$	Collector-base breakdown voltage ($I_E = 0$)	$I_C = 100 \mu A$	200			V
$V_{(BR)EBO}^{(1)}$	Emitter-base breakdown voltage ($I_C = 0$)	$I_E = 1 mA$	6			V
$V_{CE(sat)}^{(1)}$	Collector-emitter saturation voltage	$I_C = 5 A \quad I_B = 500 mA$ $I_C = 7 A \quad I_B = 700 mA$			0.5 0.7	V
V_{BE}	Base-emitter voltage	$V_{CE} = 5 V \quad I_C = 5 A$			1.3	V
h_{FE}	DC current gain	$I_C = 1 A \quad V_{CE} = 5 V$ $I_C = 5 A \quad V_{CE} = 4 V$	60 50		200	
f_T	Transition frequency	$I_C = 0.5 A \quad V_{CE} = 12 V$		20		MHz
C_{CBO}	Collector-base capacitance ($I_E = 0$)	$V_{CB} = 10 V \quad f = 1 MHz$		150		pF
t_{on} t_{stg} t_f	Resistive Load Turn-on time Storage time Fall time	$V_{CC} = 60 V \quad I_C = 5 A$ $I_{B1} = -I_{B2} = 0.5 A$		0.22 4.3 0.5		μs μs μs

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

Electrical characteristics

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2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

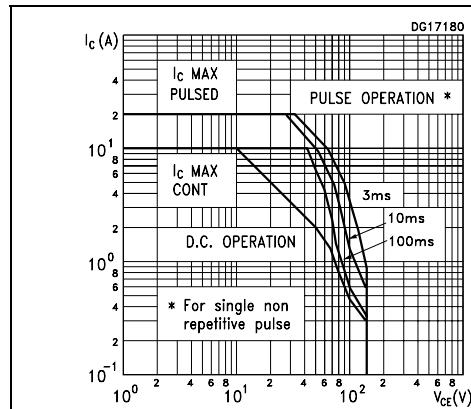


Figure 3. Output characteristics

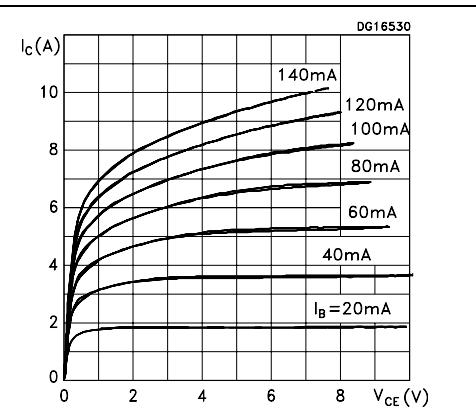


Figure 4. DC current gain

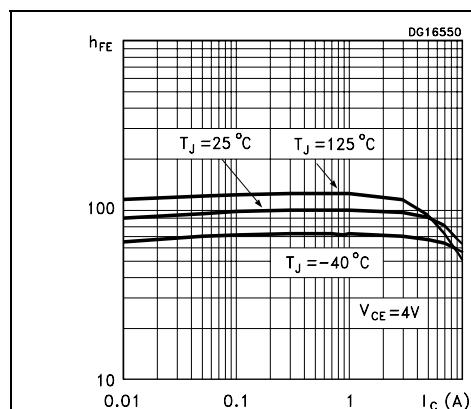


Figure 5. Collector-emitter saturation voltage

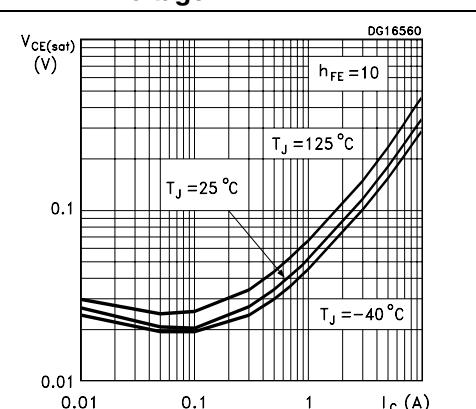


Figure 6. Base-emitter voltage

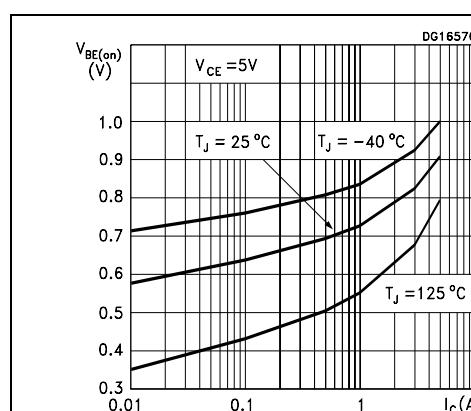
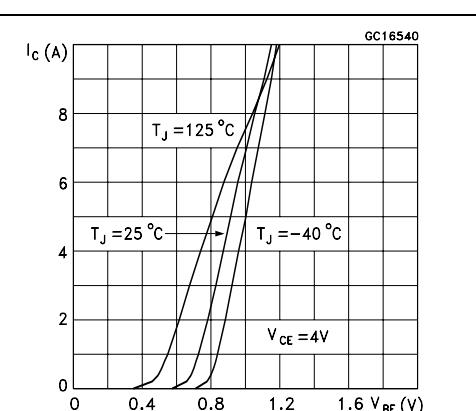
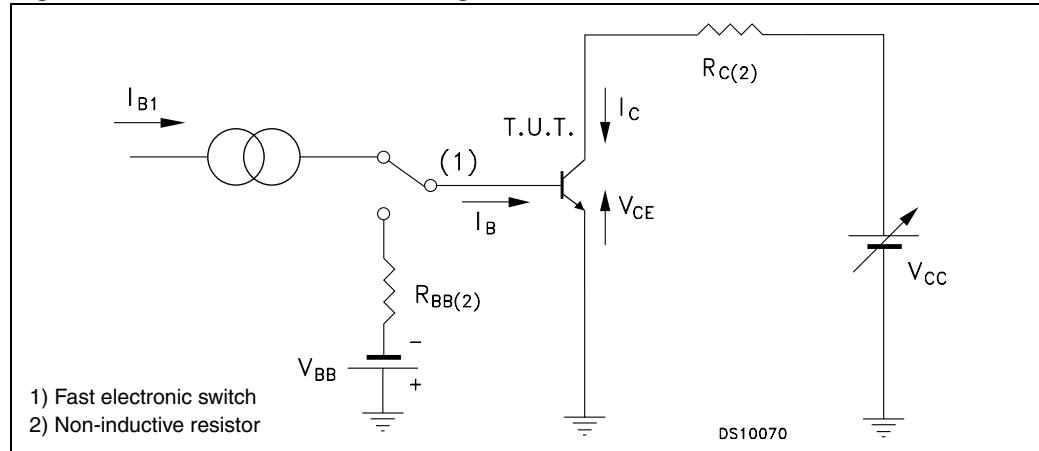


Figure 7. Base-emitter voltage



2SD1047**Electrical characteristics**

2.2 Test circuit

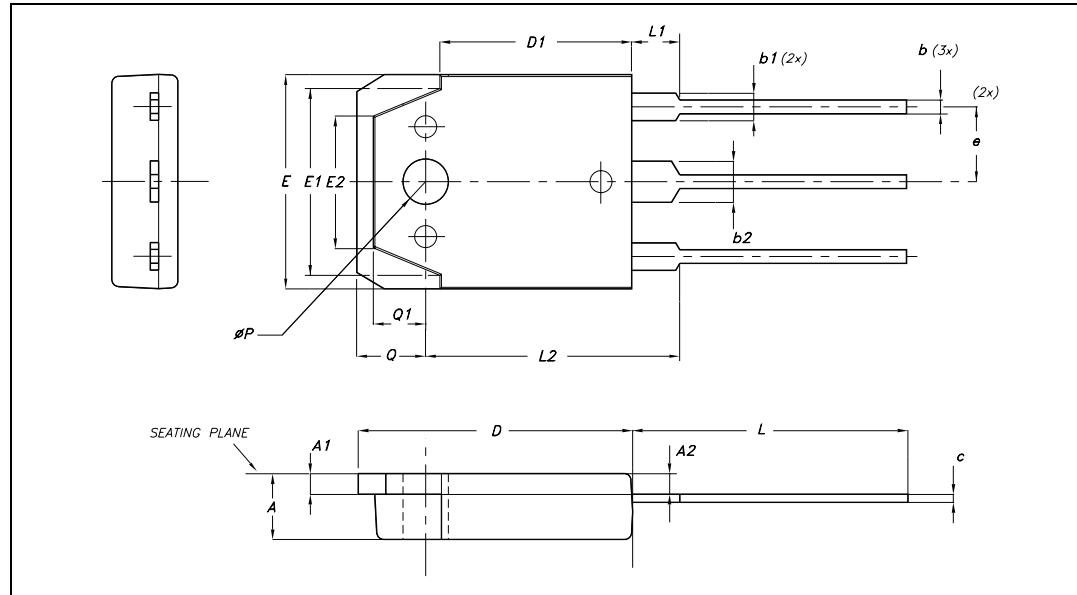
Figure 8. Resistive load switching test circuit

Electrical characteristics

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Table 5. TO-3P mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.6		5
A1	1.45	1.50	1.65
A2	1.20	1.40	1.60
b	0.80	1	1.20
b1	1.80		2.20
b2	2.80		3.20
c	0.55	0.60	0.75
D	19.70	19.90	20.10
D1		13.90	
E	15.40		15.80
E1		13.60	
E2		9.60	
e	5.15	5.45	5.75
L	19.50	20	20.50
L1		3.50	
L2	18.20	18.40	18.60
P	3.10		3.30
Q		5	
Q1		3.80	

2SD1047**Electrical characteristics****Figure 9. TO-3P drawings**

Package mechanical data**2SD1047****3 Package mechanical data**

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2SD1047**Revision history**

4 Revision history

Table 6. Document revision history

Date	Revision	Changes
12-Apr-2011	1	Initial release.

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