

# 2SD1047

## High power NPN epitaxial planar bipolar transistor

#### Features

- High breakdown voltage V<sub>CEO</sub> = 140 V
- Typical f<sub>t</sub> = 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.

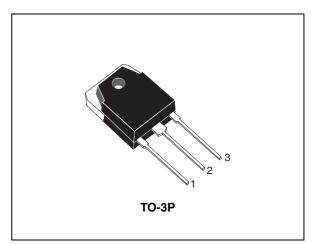


Figure 1. Internal schematic diagram

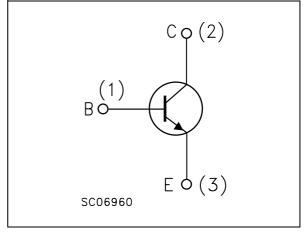


Table 1.	Device summary
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Order code	Marking	Package	Packaging
2SD1047	2SD1047	TO-3P	Tube

Doc ID 018729 Rev 1

## 1 Electrical ratings

#### Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V <sub>CBO</sub>	Collector-base voltage ( $I_E = 0$ )	200	V
V <sub>CEO</sub>	Collector-emitter voltage (I <sub>B</sub> = 0)	140	V
V <sub>EBO</sub>	Emitter-base voltage (I <sub>C</sub> = 0)	6	V
۱ <sub>C</sub>	Collector current	12	А
I <sub>CM</sub>	Collector peak current (t <sub>P</sub> < 5 ms)	20	Α
P <sub>tot</sub>	Total dissipation at $T_c = 25 \text{ °C}$	100	W
T <sub>stg</sub>	Storage temperature	-65 to 150	°C
TJ	Max. operating junction temperature	150	°C

#### Table 3. Thermal data

Symbol	Parameter	Value	Unit	
R <sub>thj-case</sub>	Thermal resistance junction-case	max	1.25	°C/W



## 2 Electrical characteristics

(T<sub>case</sub> = 25 °C; unless otherwise specified)

Table 4.	Electrical	characteristics

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
I <sub>CBO</sub>	Collector cut-off current $(I_E = 0)$	V <sub>CB</sub> = 200 V			0.1	μA
I <sub>EBO</sub>	Emitter cut-off current $(I_{\rm C} = 0)$	V <sub>EB</sub> = 6 V			0.1	μA
V <sub>(BR)CEO</sub> <sup>(1)</sup>	Collector-emitter breakdown voltage (I <sub>B</sub> = 0)	I <sub>C</sub> = 50 mA	140			V
V <sub>(BR)CBO</sub>	Collector-base breakdown voltage (I <sub>E</sub> = 0)	I <sub>C</sub> = 100 μA	200			V
V <sub>(BR)EBO</sub> <sup>(1)</sup>	Emitter-base breakdown voltage (I <sub>C</sub> = 0)	I <sub>E</sub> = 1 mA	6			V
V <sub>CE(sat)</sub> <sup>(1)</sup>	Collector-emitter saturation voltage	$I_{C} = 5 \text{ A} \qquad I_{B} = 500 \text{ mA}$ $I_{C} = 7 \text{ A} \qquad I_{B} = 700 \text{ mA}$			0.5 0.7	V V
V <sub>BE</sub>	Base-emitter voltage	$V_{CE} = 5 V$ $I_C = 5 A$			1.3	V
h <sub>FE</sub>	DC current gain	$      I_{C} = 1 A   V_{CE} = 5 V       I_{C} = 5 A   V_{CE} = 4 V $	60 50		200	
f <sub>T</sub>	Transition frequency	$I_{\rm C} = 0.5 \ {\rm A}$ $V_{\rm CE} = 12 \ {\rm V}$		20		MHz
C <sub>CBO</sub>	Collector-base capacitance (I <sub>E</sub> = 0)	V <sub>CB</sub> = 10 V f = 1 MHz		150		pF
	Resistive Load					
t <sub>on</sub>	Turn-on time	$V_{CC} = 60 V$ $I_{C} = 5 A$		0.22		μs
t <sub>stg</sub>	Storage time	I <sub>B1</sub> = -I <sub>B2</sub> = 0.5 A		4.3		μs
t <sub>f</sub>	Fall time			0.5		μs

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



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### 2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

#### Figure 3. Output characteristics

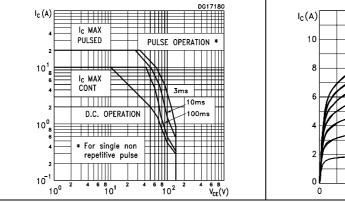


Figure 4. DC current gain

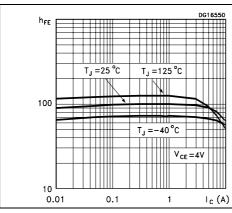


Figure 6. Base-emitter voltage

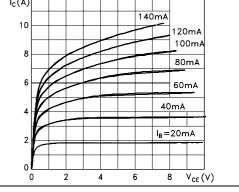


Figure 5. Collector-emitter saturation voltage

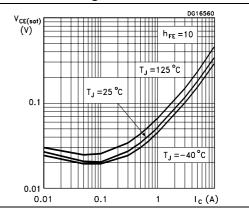
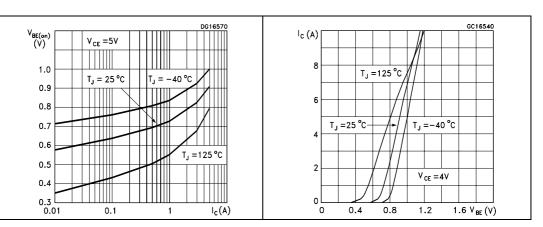
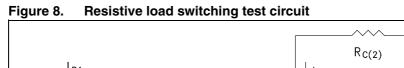


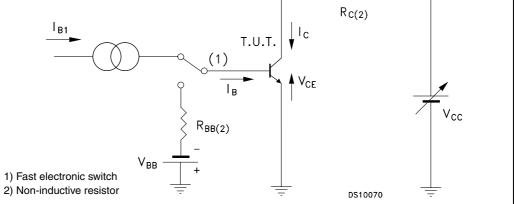
Figure 7. Base-emitter voltage





### 2.2 Test circuit



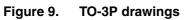


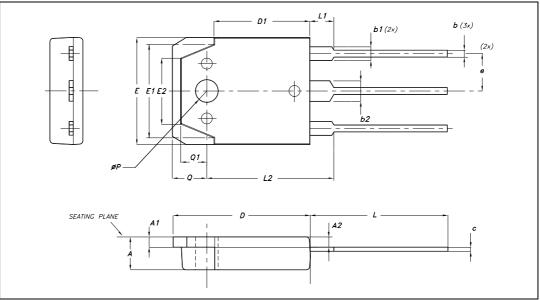


Dim.		mm	
Dim.	Min.	Тур.	Max.
А	4.6		5
A1	1.45	1.50	1.65
A2	1.20	1.40	1.60
b	0.80	1	1.20
b1	1.80		2.20
b2	2.80		3.20
с	0.55	0.60	0.75
D	19.70	19.90	20.10
D1		13.90	
E	15.40		15.80
E1		13.60	
E2		9.60	
е	5.15	5.45	5.75
L	19.50	20	20.50
L1		3.50	
L2	18.20	18.40	18.60
Р	3.10		3.30
Q		5	
Q1		3.80	

Table 5.TO-3P mechanical data









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## 3 Package mechanical data

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## 4 Revision history

Table 6.Document revision history

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



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