2SD1047

High power NPN epitaxial planar bipolar transistor

Features

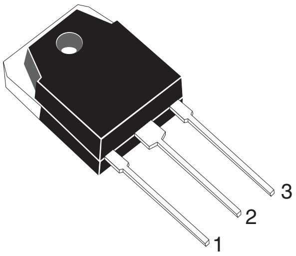
- High breakdown voltage V_{CEO} = 140 V
- Typical f_t = 20 MHz
- Fully characterized at 125 °C

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.



TO-3P

Figure 1. Internal schematic diagram

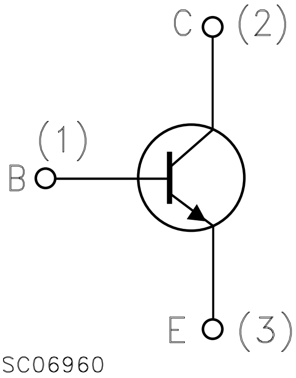


Table 1. Device summary

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

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
$R_{thj\text{-}case}$	Thermal resistance junction-case max	1.25	°C/W

2 Electrical characteristics

(T_{case} = 25 °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 µA	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 I_B = 500 mA I_C = 7 A I_B = 700 mA			0.5 0.7	V V
V_{BE}	Base-emitter voltage	V_{CE} = 5 V I_C = 5 A			1.3	V
h_{FE}	DC current gain	I_C = 1 A V_{CE} = 5 V I_C = 5 A V_{CE} = 4 V	60 50		200	
f_T	Transition frequency	I_C = 0.5 A V_{CE} = 12 V		20		MHz
C_{CBO}	Collector-base capacitance ($I_E = 0$)	V_{CB} = 10 V f = 1 MHz		150		pF
t_{on} t_{stg} t_f	Resistive Load Turn-on time Storage time Fall time	V_{CC} = 60 V 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 ≤ 1.5 %

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

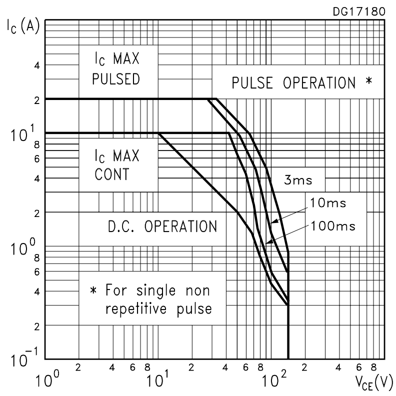


Figure 3. Output characteristics

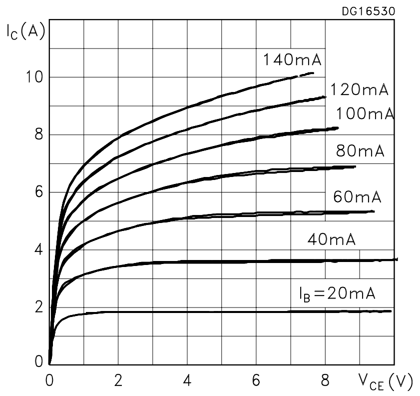


Figure 4. DC current gain

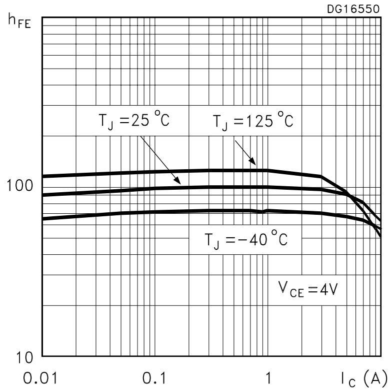


Figure 5. Collector-emitter saturation voltage

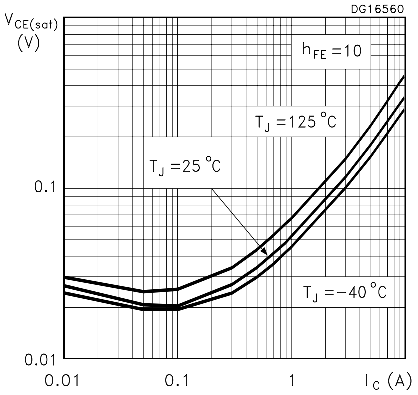


Figure 6. Base-emitter voltage

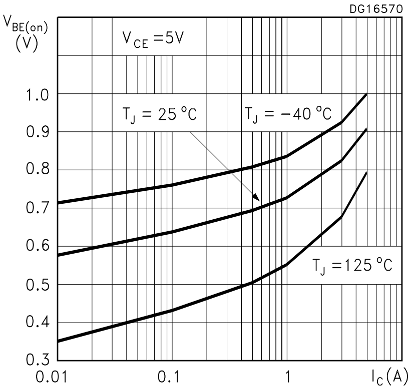
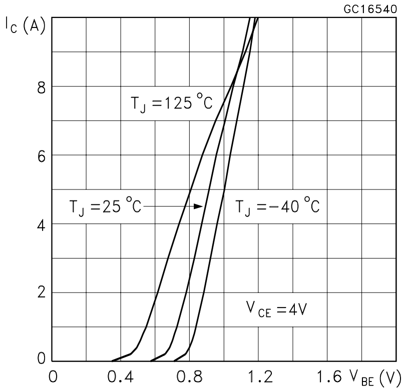
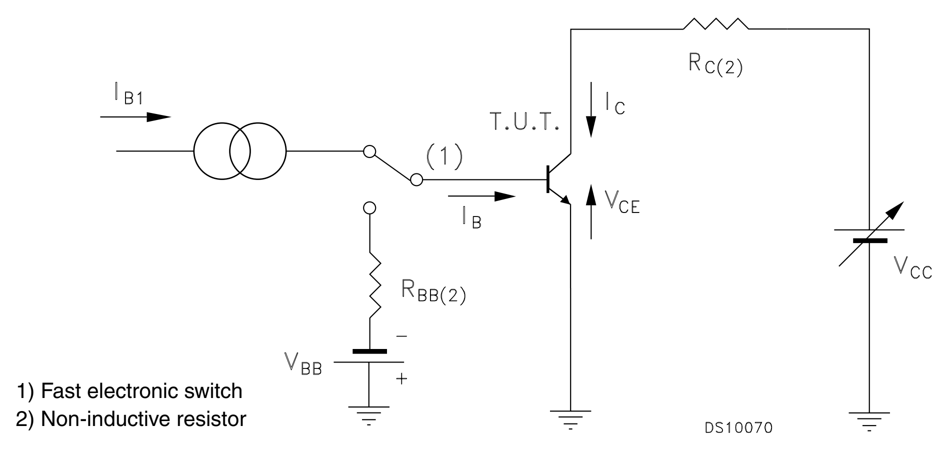


Figure 7. Base-emitter voltage



2.2 Test circuit

Figure 8. Resistive load switching test circuit



1) Fast electronic switch
2) Non-inductive resistor

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	

Figure 9. TO-3P drawings