

DATA SHEET

BUJ105AB

Silicon Diffused Power Transistor

Product specification

October 2001



Silicon Diffused Power Transistor

BUJ105AB

GENERAL DESCRIPTION

High-voltage, high-speed planar-passivated npn power switching transistor in SOT404 (D²-PAK) surface-mount package intended for use in high frequency electronic lighting ballast applications, converters, inverters, switching regulators, motor control systems, etc.

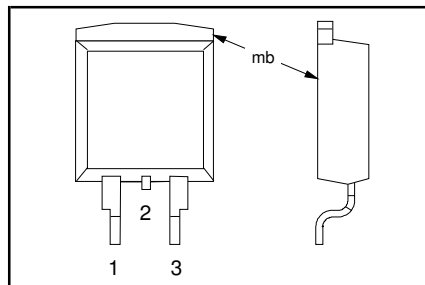
QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
V_{CESM}	Collector-emitter voltage peak value	$V_{BE} = 0\text{ V}$	-	700	V
V_{CBO}	Collector-Base voltage (open emitter)		-	700	V
V_{CEO}	Collector-emitter voltage (open base)		-	400	V
I_C	Collector current (DC)		-	8	A
I_{CM}	Collector current peak value		-	16	A
P_{tot}	Total power dissipation	$T_{mb} \leq 25\text{ °C}$	-	125	W
V_{CEsat}	Collector-emitter saturation voltage	$I_C = 4.0\text{ A}; I_B = 0.8\text{ A}$	0.3	1.0	V
h_{FEsat}		$I_C = 4.0\text{ A}; V_{CE} = 5\text{ V}$	11	15	
t_f	Fall time	$I_C = 5\text{ A}; I_{B1} = 1\text{ A}$	20	50	ns

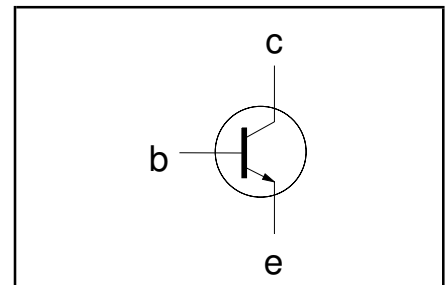
PINNING - SOT404

PIN	DESCRIPTION
1	base
2	collector
3	emitter
mb	collector

PIN CONFIGURATION



SYMBOL



LIMITING VALUES

Limiting values in accordance with the Absolute Maximum Rating System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CESM}	Collector to emitter voltage	$V_{BE} = 0\text{ V}$	-	700	V
V_{CEO}	Collector to emitter voltage (open base)		-	400	V
V_{CBO}	Collector to base voltage (open emitter)		-	700	V
I_C	Collector current (DC)		-	8	A
I_{CM}	Collector current peak value		-	16	A
I_B	Base current (DC)		-	4	A
I_{BM}	Base current peak value		-	8	A
P_{tot}	Total power dissipation	$T_{mb} \leq 25\text{ °C}$	-	125	W
T_{stg}	Storage temperature		-65	150	°C
T_j	Junction temperature		-	150	°C

THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$R_{th\ j-mb}$	Thermal resistance junction to mounting base		-	1.0	K/W
$R_{th\ j-a}$	Thermal resistance junction to ambient	minimum footprint, FR4 board	55	-	K/W

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STATIC CHARACTERISTICS

 $T_{mb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CES}, I_{CBO} I_{CES}	Collector cut-off current ¹	$V_{BE} = 0\text{ V}; V_{CE} = V_{CESMmax}$ $V_{BE} = 0\text{ V}; V_{CE} = V_{CESMmax}$ $T_j = 125\text{ }^{\circ}\text{C}$	- -	- -	0.2 0.5	mA mA
I_{CEO} I_{EBO} $V_{CEOsust}$	Collector cut-off current Emitter cut-off current Collector-emitter sustaining voltage	$V_{CEO} = V_{CEOMmax} (400\text{V})$ $V_{EB} = 9\text{ V}; I_C = 0\text{ A}$ $I_B = 0\text{ A}; I_C = 10\text{ mA};$ $L = 25\text{ mH}$	- - 400	- - -	0.1 1 -	mA mA V
V_{CEsat} V_{BEsat} h_{FE} h_{FE} h_{FEsat}	Collector-emitter saturation voltage Base-emitter saturation voltage DC current gain	$I_C = 4.0\text{ A}; I_B = 0.8\text{ A}$ $I_C = 4.0\text{ A}; I_B = 0.8\text{ A}$ $I_C = 1\text{ mA}; V_{CE} = 5\text{ V}$ $I_C = 500\text{ mA}; V_{CE} = 5\text{ V}$ $I_C = 4.0\text{ A}; V_{CE} = 5\text{ V}$	- - 10 13 8	0.3 1.0 14 23 11	1.0 1.5 34 36 15	V V

DYNAMIC CHARACTERISTICS

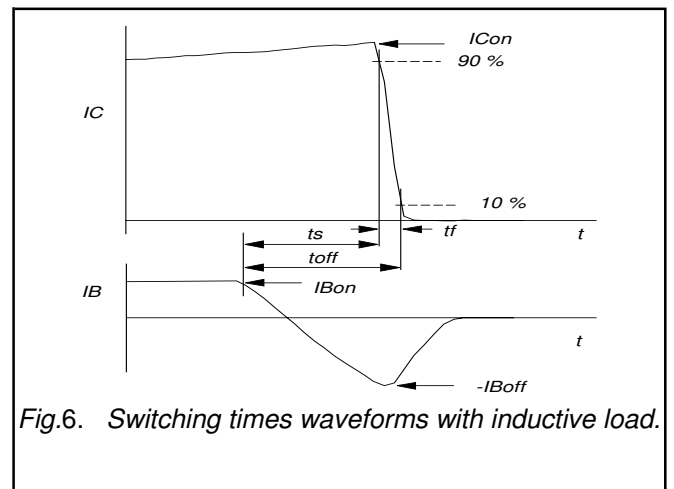
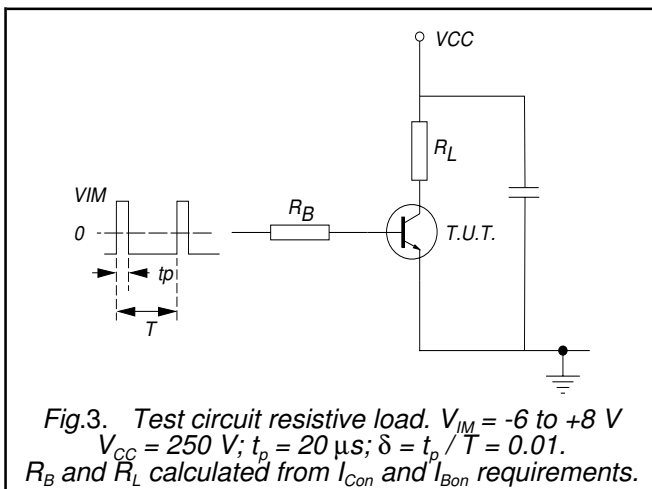
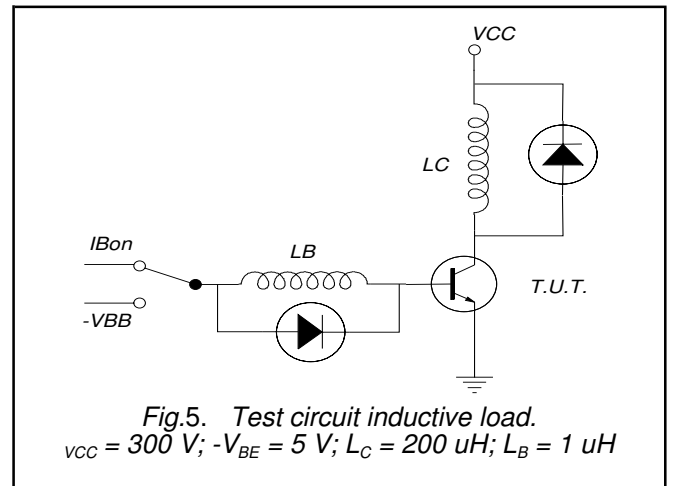
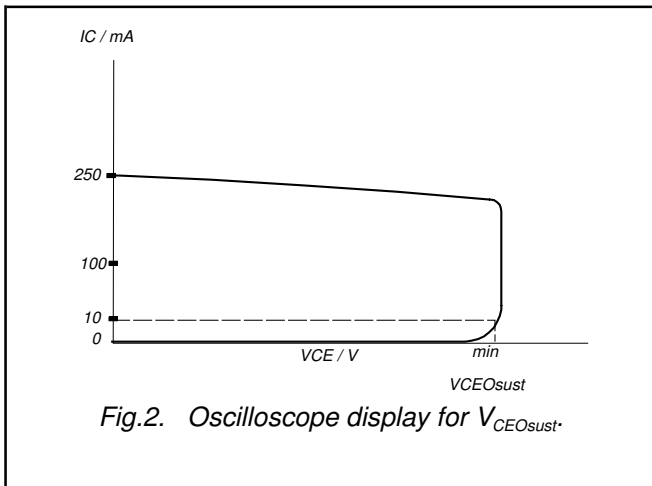
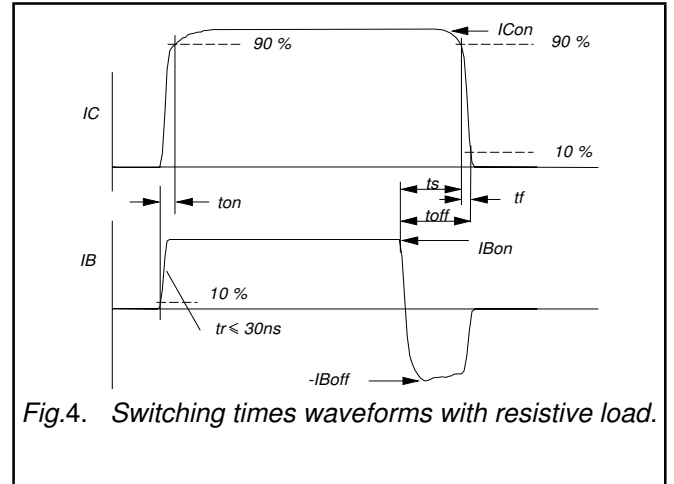
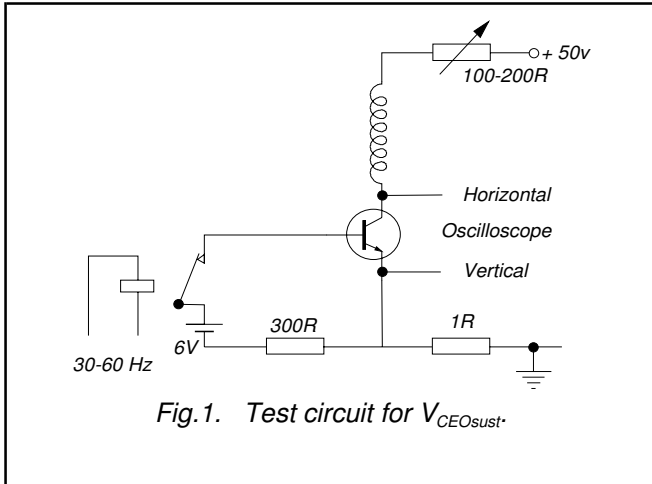
 $T_{mb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
t_{on} t_s t_f	Switching times (resistive load) Turn-on time Turn-off storage time Turn-off fall time	$I_{Con} = 5\text{ A}; I_{Bon} = -I_{Boff} = 1\text{ A};$ $R_L = 75\text{ ohms}; V_{BB2} = 4\text{ V};$	0.65 1.8 0.3	1 2.5 0.5	μs μs μs
t_s t_f	Switching times (inductive load) Turn-off storage time Turn-off fall time	$I_{Con} = 5\text{ A}; I_{Bon} = 1\text{ A}; L_B = 1\text{ }\mu\text{H};$ $-V_{BB} = 5\text{ V}$	1.2 20	1.7 50	μs ns
t_s t_f	Switching times (inductive load) Turn-off storage time Turn-off fall time	$I_{Con} = 5\text{ A}; I_{Bon} = 1\text{ A}; L_B = 1\text{ }\mu\text{H};$ $-V_{BB} = 5\text{ V}; T_j = 100\text{ }^{\circ}\text{C}$	1.4 25	1.9 100	μs ns

¹ Measured with half sine-wave voltage (curve tracer).

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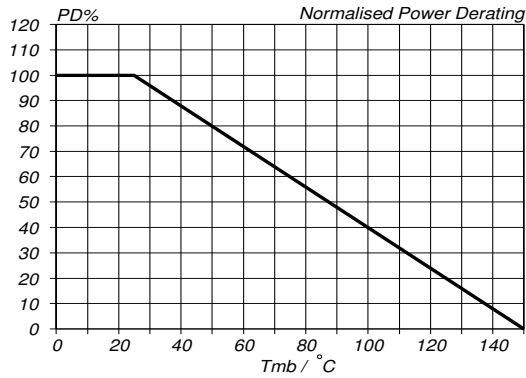


Fig. 7. Normalised power dissipation.
 $PD\% = 100 \cdot PD / PD_{25^\circ C} = f(T_{mb})$

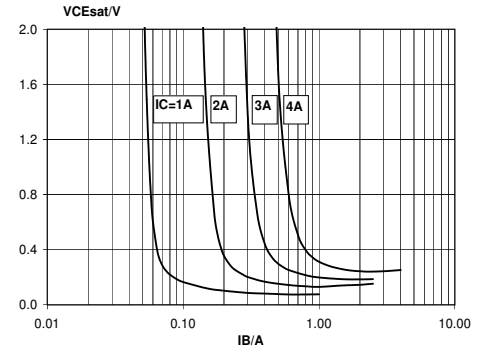


Fig. 10. Collector-Emitter saturation voltage.
 Solid lines = typ values, $V_{CEsat} = f(I_B)$; $T_j = 25^\circ C$.

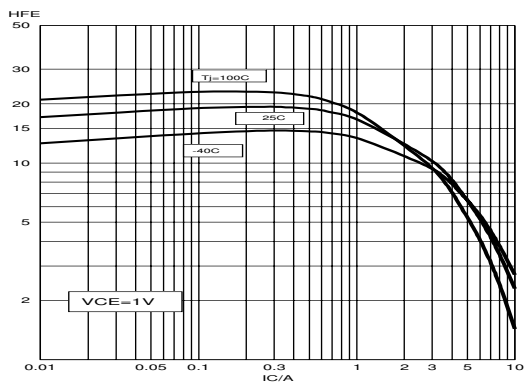


Fig. 8. Typical DC current gain. $h_{FE} = f(I_C)$
 parameter V_{CE}

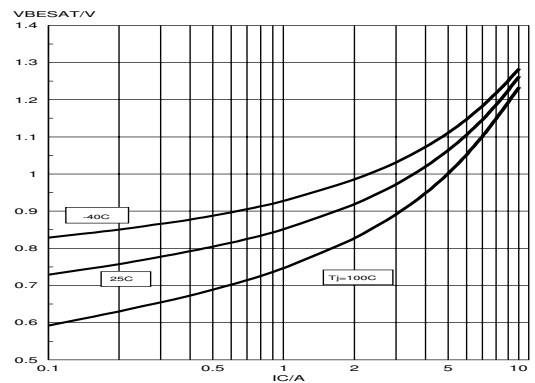


Fig. 11. Base-Emitter saturation voltage.
 Solid lines = typ values, $V_{BEsat} = f(I_C)$; at $I_C/I_B = 4$.

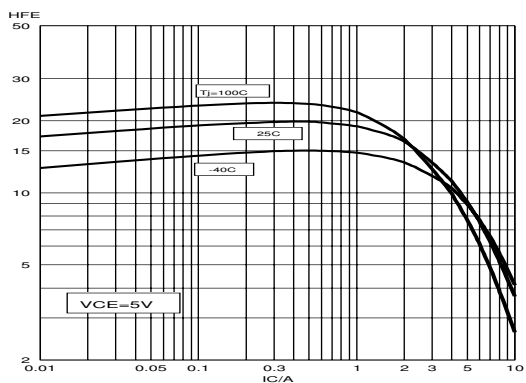


Fig. 9. Typical DC current gain. $h_{FE} = f(I_C)$
 parameter V_{CE}

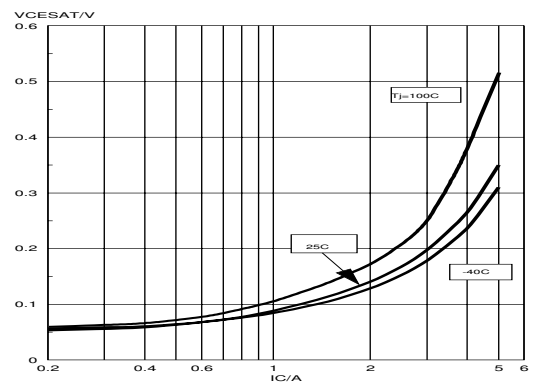


Fig. 12. Collector-Emitter saturation voltage.
 Solid lines = typ values, $V_{CEsat} = f(I_C)$; at $I_C/I_B = 4$.

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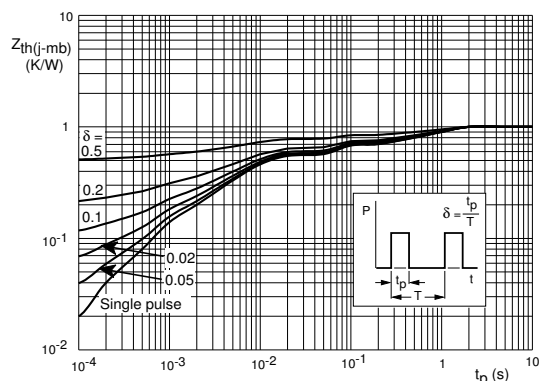


Fig. 13. Transient thermal impedance.
 $Z_{th(j-mb)} = f(t)$; parameter $\delta = t_p/T$

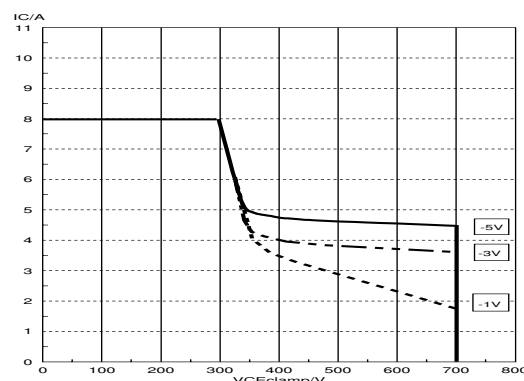


Fig. 15. Reverse bias safe operating area ($T_j < T_{jmax}$)
 for $-V_{BE} = 5V, 3V$ & $1V$.

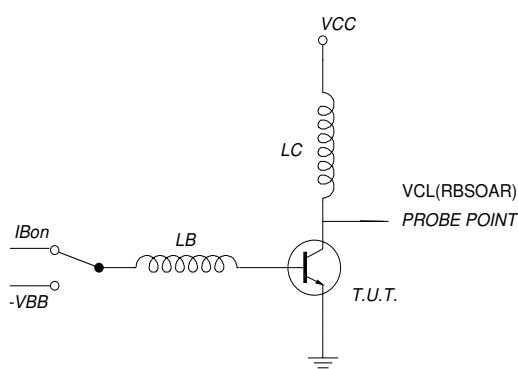


Fig. 14. Test circuit for reverse bias safe operating area.

$V_{clamp} < 700V$; $V_{CC} = 150V$; $-V_{BE} = 5V, 3V$ & $1V$;
 $L_B = 1\mu H$; $L_C = 200\mu H$.

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MECHANICAL DATA

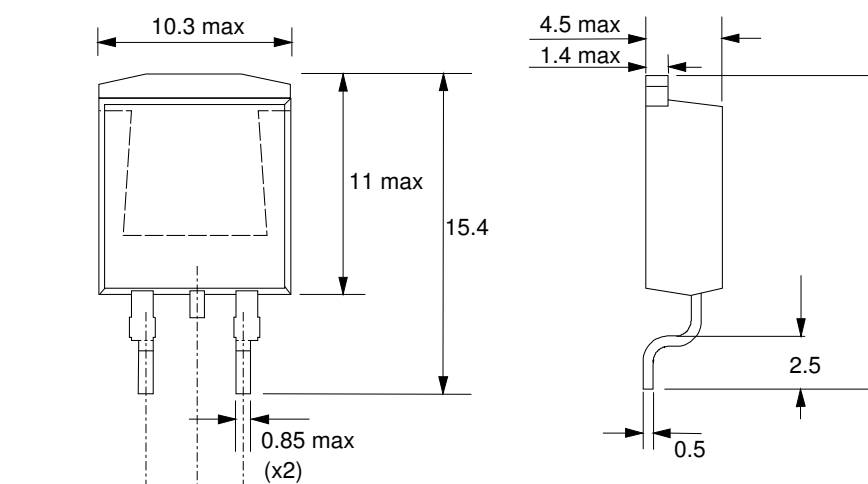
*Dimensions in mm**Net Mass: 1.4 g*

Fig.16. SOT404 : centre pin connected to mounting base.

MOUNTING INSTRUCTIONS

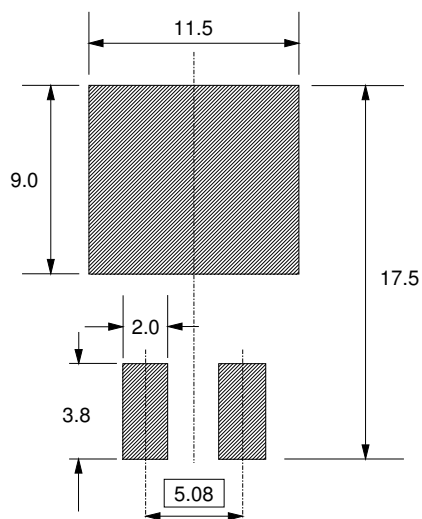
Dimensions in mm

Fig.17. SOT404 : soldering pattern for surface mounting.

Notes

1. Plastic meets UL94 V0 at 1/8".

Legal information

DATA SHEET STATUS

DOCUMENT STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾	DEFINITION
Objective data sheet	Development	This document contains data from the objective specification for product development.
Preliminary data sheet	Qualification	This document contains data from the preliminary specification.
Product data sheet	Production	This document contains the product specification.

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