

# DATA SHEET

## **BU505; BU505D** Silicon diffused power transistors

Product specification  
Supersedes data of February 1996  
File under Discrete Semiconductors, SC06

1997 Aug 13

# Silicon diffused power transistors

# BU505; BU505D

### DESCRIPTION

High-voltage, high-speed switching NPN power transistor in a TO-220AB package. The BU505D has an integrated efficiency diode.

### APPLICATIONS

- Horizontal deflection circuits of colour television receivers.

### PINNING

PIN	DESCRIPTION
1	base
2	collector; connected to mounting base
3	emitter

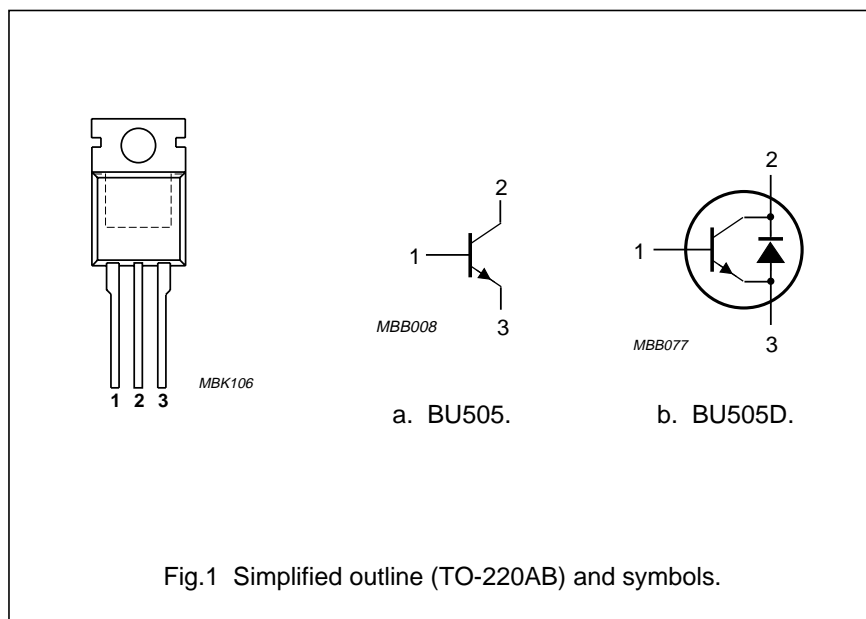


Fig.1 Simplified outline (TO-220AB) and symbols.

### QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$V_{CESM}$	collector-emitter peak voltage	$V_{BE} = 0$	—	1500	V
$V_{CEO}$	collector-emitter voltage	open base	—	700	V
$V_{CESat}$	collector-emitter saturation voltage	$I_C = 2\text{ A}; I_B = 900\text{ mA}$	—	1	V
$V_F$	diode forward voltage (BU505D)	$I_F = 2\text{ A}$	—	1.8	V
$I_{Csat}$	collector saturation current		—	2	A
$I_C$	collector current (DC)	see Fig.3	—	2.5	A
$I_{CM}$	collector current (peak value)	see Fig.3	—	4	A
$P_{tot}$	total power dissipation	$T_{mb} \leq 25\text{ }^\circ\text{C}$ ; see Fig.4	—	75	W
$t_f$	fall time	inductive load; see Fig.7	0.9	—	$\mu\text{s}$

### THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j-mb}$	thermal resistance from junction to mounting base	1.67	K/W

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**LIMITING VALUES**

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CESM}$	collector-emitter peak voltage	$V_{BE} = 0$	–	1500	V
$V_{CEO}$	collector-emitter voltage	open base	–	700	V
$I_{Csat}$	collector saturation current		–	2	A
$I_C$	collector current (DC)	see Fig.3	–	2.5	A
$I_{CM}$	collector current (peak value)	see Fig.3	–	4	A
$I_B$	base current (DC)		–	2	A
$I_{BM}$	base current (peak value)		–	4	A
$P_{tot}$	total power dissipation	$T_{mb} \leq 25\text{ °C}$ ; see Fig.4	–	75	W
$T_{stg}$	storage temperature		–65	+150	°C
$T_j$	junction temperature		–	150	°C

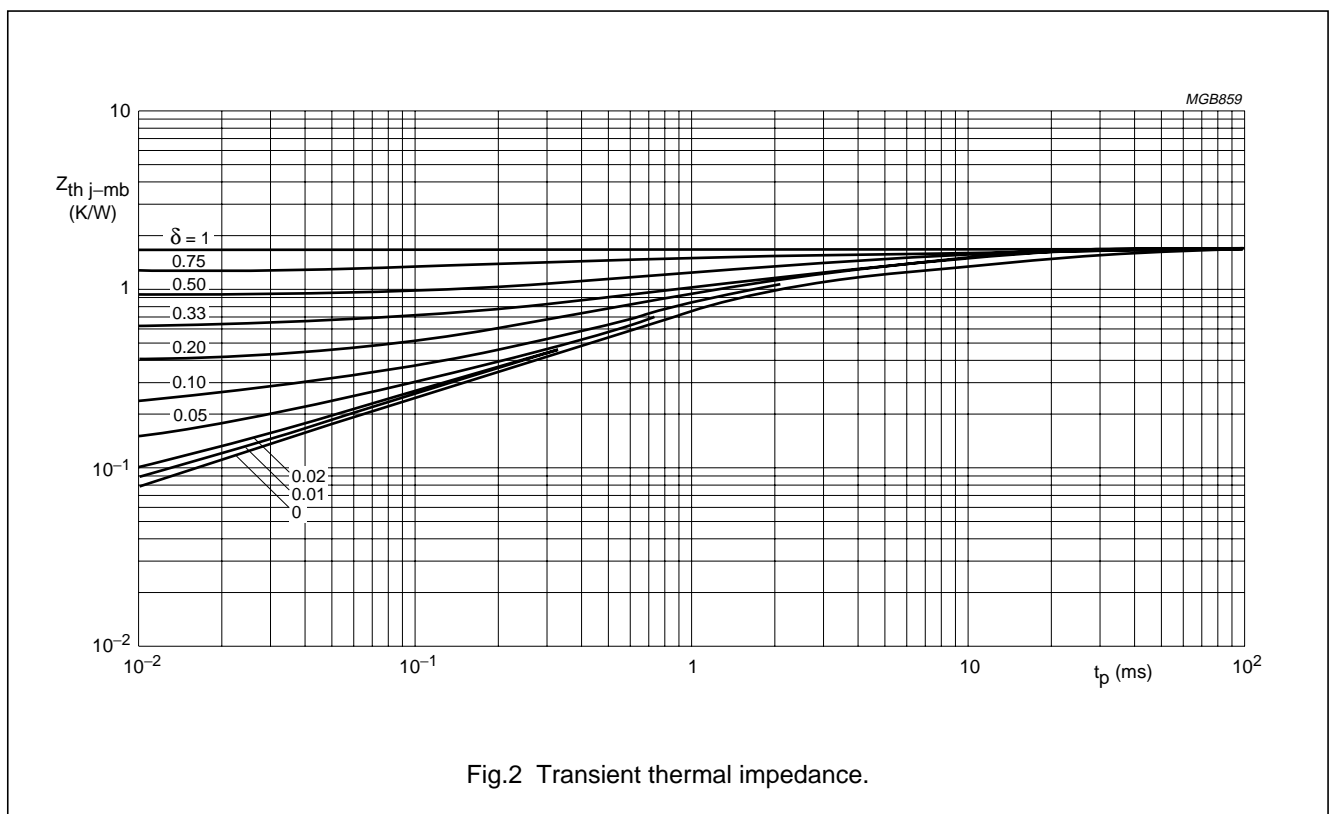


Fig.2 Transient thermal impedance.

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**CHARACTERISTICS**

$T_j = 25\text{ °C}$  unless otherwise specified.

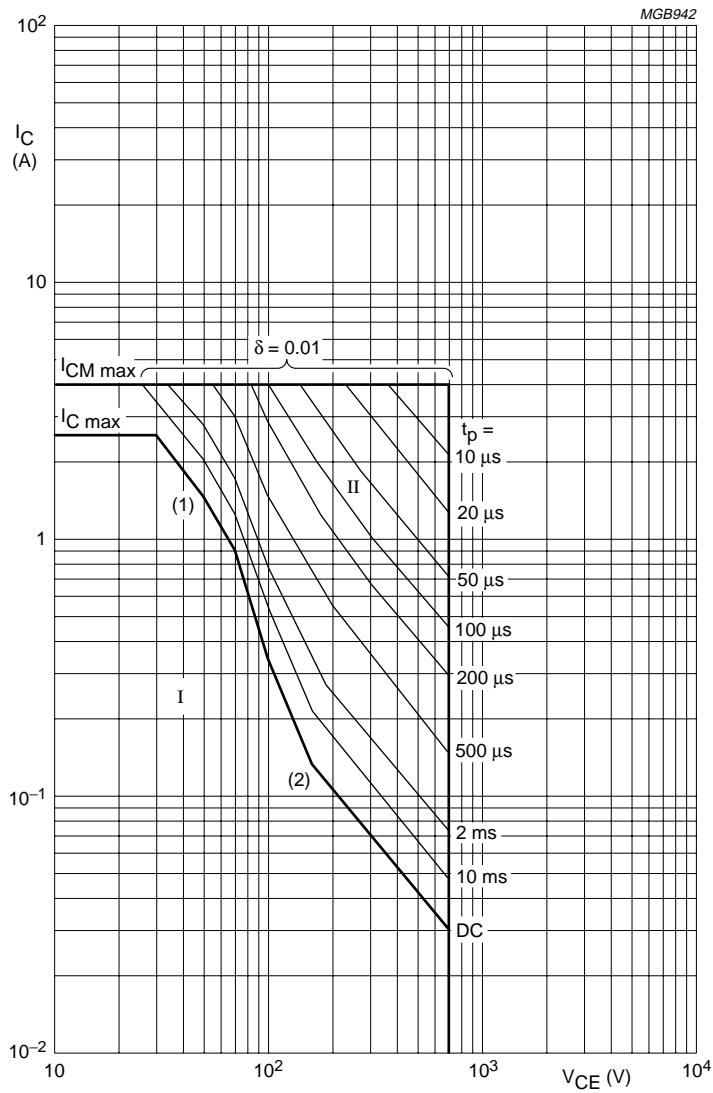
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{CEOsust}$	collector-emitter sustaining voltage	see Figs 5 and 6	700	–	–	V
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 2\text{ A}; I_B = 900\text{ mA}$	–	–	1	V
$V_{BEsat}$	base-emitter saturation voltage	$I_C = 2\text{ A}; I_B = 900\text{ mA}$	–	–	1.3	V
$V_{EBO}$	emitter-base voltage	$I_E = 10\text{ mA}; I_C = 0$	–	6	–	V
$V_F$	diode forward voltage (BU505D)	$I_F = 2\text{ A}$	–	–	1.8	V
$I_{CES}$	collector-emitter cut-off current	$V_{CE} = V_{CESmax}; V_{BE} = 0;$ note 1	–	–	0.15	mA
		$V_{CE} = V_{CESmax}; V_{BE} = 0;$ $T_j = 125\text{ °C};$ note 1	–	–	1	mA
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = 5\text{ V}; I_C = 0$	–	–	1	mA
$h_{FE}$	DC current gain	$V_{CE} = 5\text{ V}; I_C = 100\text{ mA}$	6	13	30	
$f_T$	transition frequency	$V_{CE} = 5\text{ V}; I_C = 100\text{ mA};$ $f = 5\text{ MHz}$	–	7	–	MHz
$C_c$	collector capacitance	$V_{CB} = 10\text{ V}; I_E = i_e = 0;$ $f = 1\text{ MHz}$	–	65	–	pF
<b>Switching times in horizontal deflection circuit</b> (see Fig.7)						
$t_s$	storage time	$I_{CM} = 2\text{ A}; I_{B(end)} = 900\text{ mA};$ $V_{dr} = -4\text{ V}$	–	–	–	–
		$L_B = 10\text{ }\mu\text{H}$	–	6.5	–	$\mu\text{s}$
		$L_B = 15\text{ }\mu\text{H}$	–	7.5	–	$\mu\text{s}$
		$L_B = 25\text{ }\mu\text{H}$	–	9.5	–	$\mu\text{s}$
$t_f$	fall time	$I_{CM} = 2\text{ A}; I_{B(end)} = 900\text{ mA};$ $V_{dr} = -4\text{ V}$	–	–	–	–
		$L_B = 10\text{ }\mu\text{H}$	–	0.9	–	$\mu\text{s}$
		$L_B = 15\text{ }\mu\text{H}$	–	0.9	–	$\mu\text{s}$
		$L_B = 25\text{ }\mu\text{H}$	–	0.85	–	$\mu\text{s}$

**Note**

1. Measured with a half-sinewave voltage (curve tracer).

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$T_{mb} = 25\text{ }^{\circ}\text{C}$ .

I - Region of permissible DC operation.

II - Permissible extension for repetitive pulse operation.

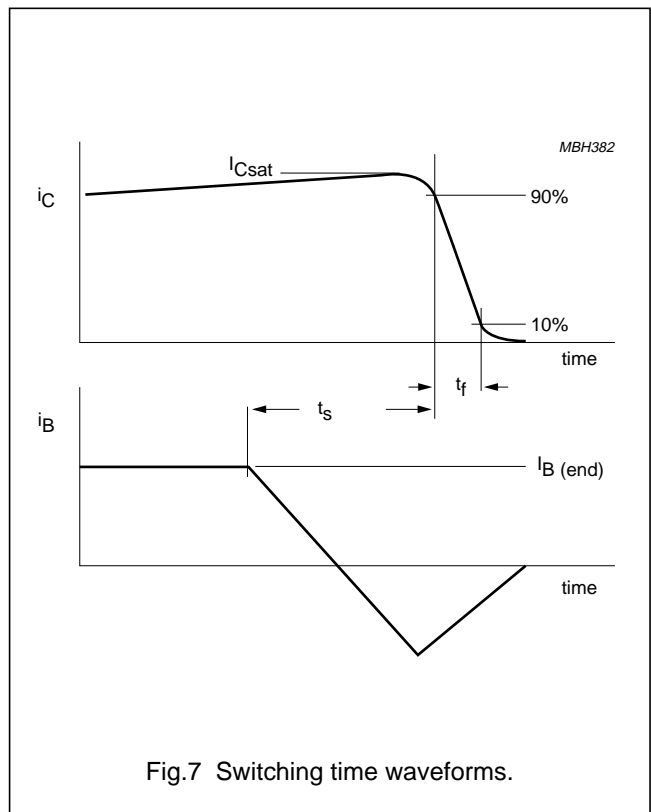
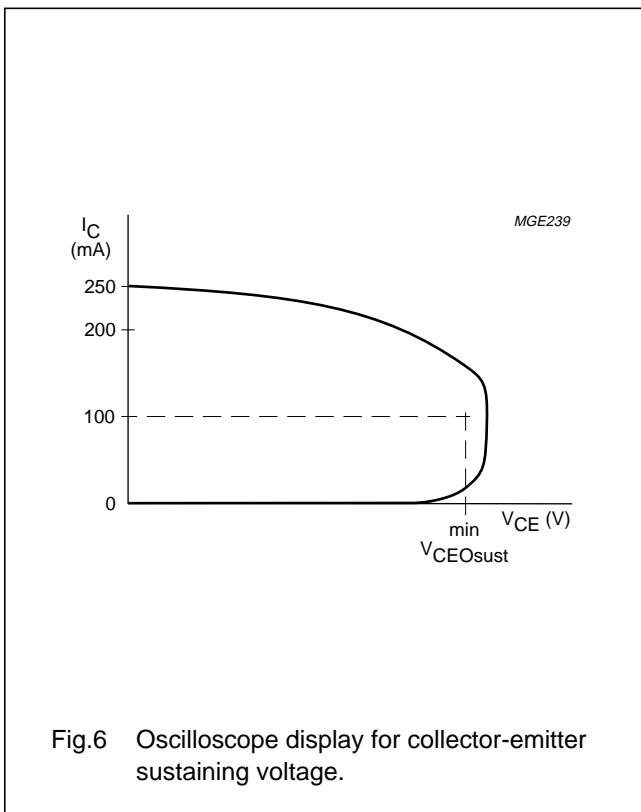
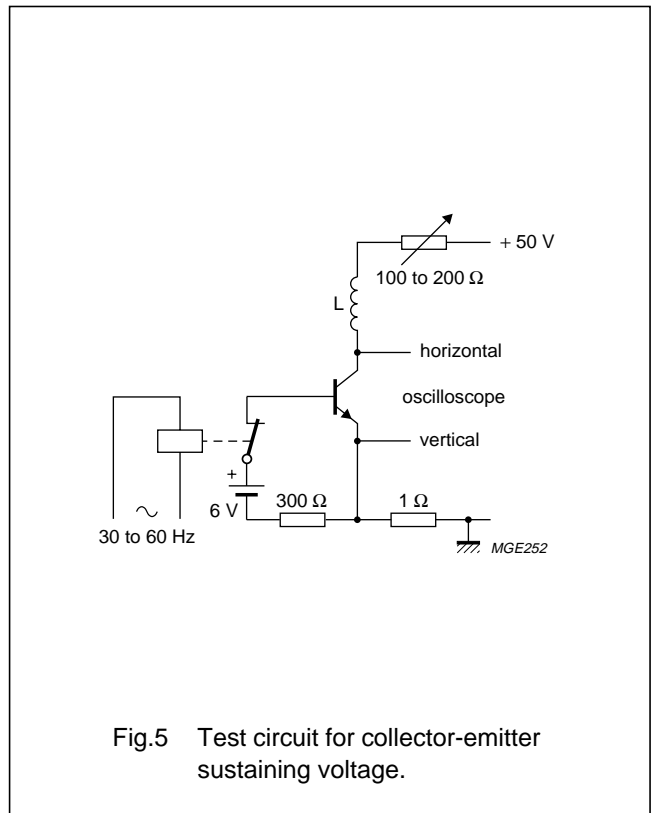
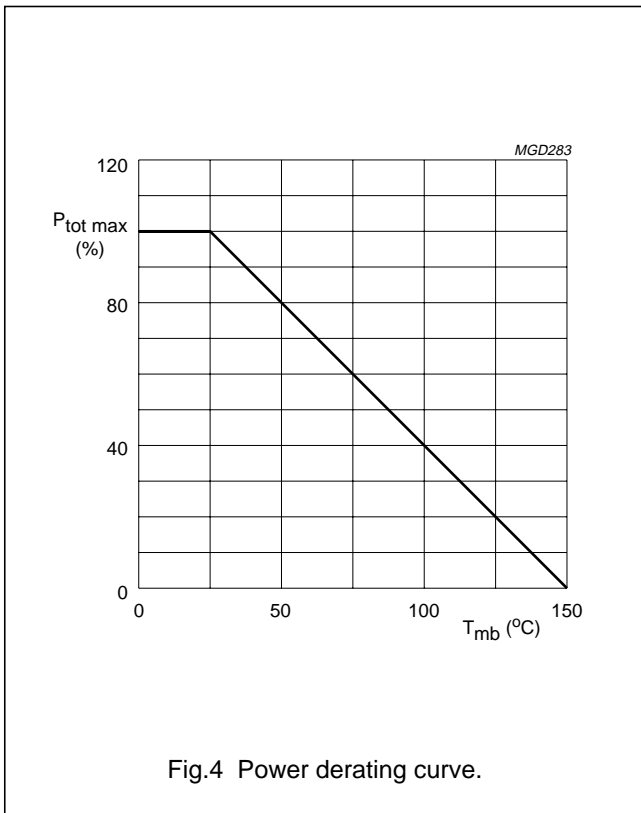
(1)  $P_{tot\ max}$  and  $P_{tot\ peak\ max}$  lines.

(2) Second breakdown limits.

Fig.3 Forward bias SOAR.

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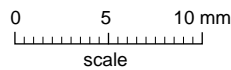
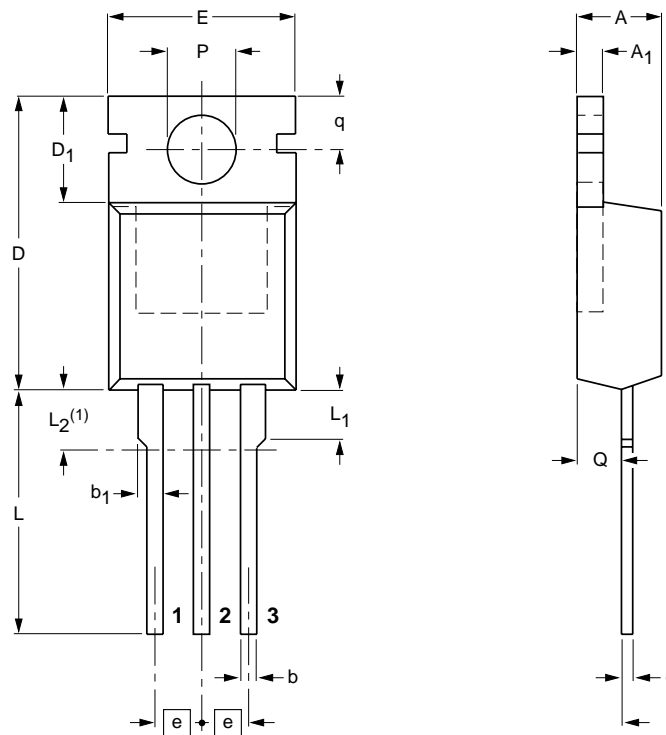
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PACKAGE OUTLINE

Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB

SOT78



DIMENSIONS (mm are the original dimensions)

UNIT	A	A <sub>1</sub>	b	b <sub>1</sub>	c	D	D <sub>1</sub>	E	e	L	L <sub>1</sub>	L <sub>2</sub> <sup>(1)</sup> max.	P	q	Q
mm	4.5 4.1	1.39 1.27	0.9 0.7	1.3 1.0	0.7 0.4	15.8 15.2	6.4 5.9	10.3 9.7	2.54	15.0 13.5	3.30 2.79	3.0	3.8 3.6	3.0 2.7	2.6 2.2

Note

1. Terminals in this zone are not tinned.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT78		TO-220AB				97-06-11

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**DEFINITIONS**

<b>Data sheet status</b>	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
<b>Limiting values</b>	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
<b>Application information</b>	
Where application information is given, it is advisory and does not form part of the specification.	

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