

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

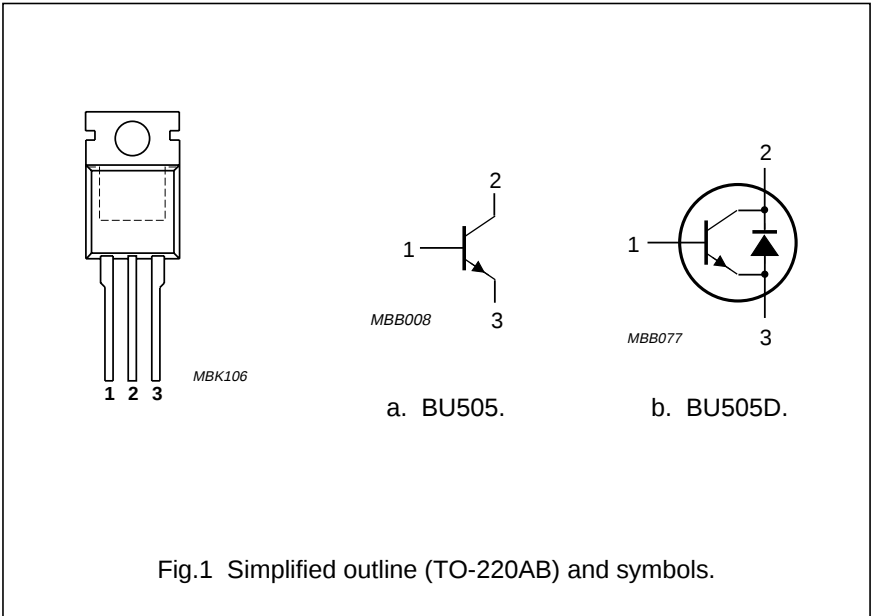
High-voltage, high-speed switching NPN power transistor in a TO-220AB package. The BU505D has an integrated efficiency diode.

APPLICATIONS

- Horizontal deflection circuits of colour television receivers.

PINNING

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



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	—	μs

THERMAL CHARACTERISTICS

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

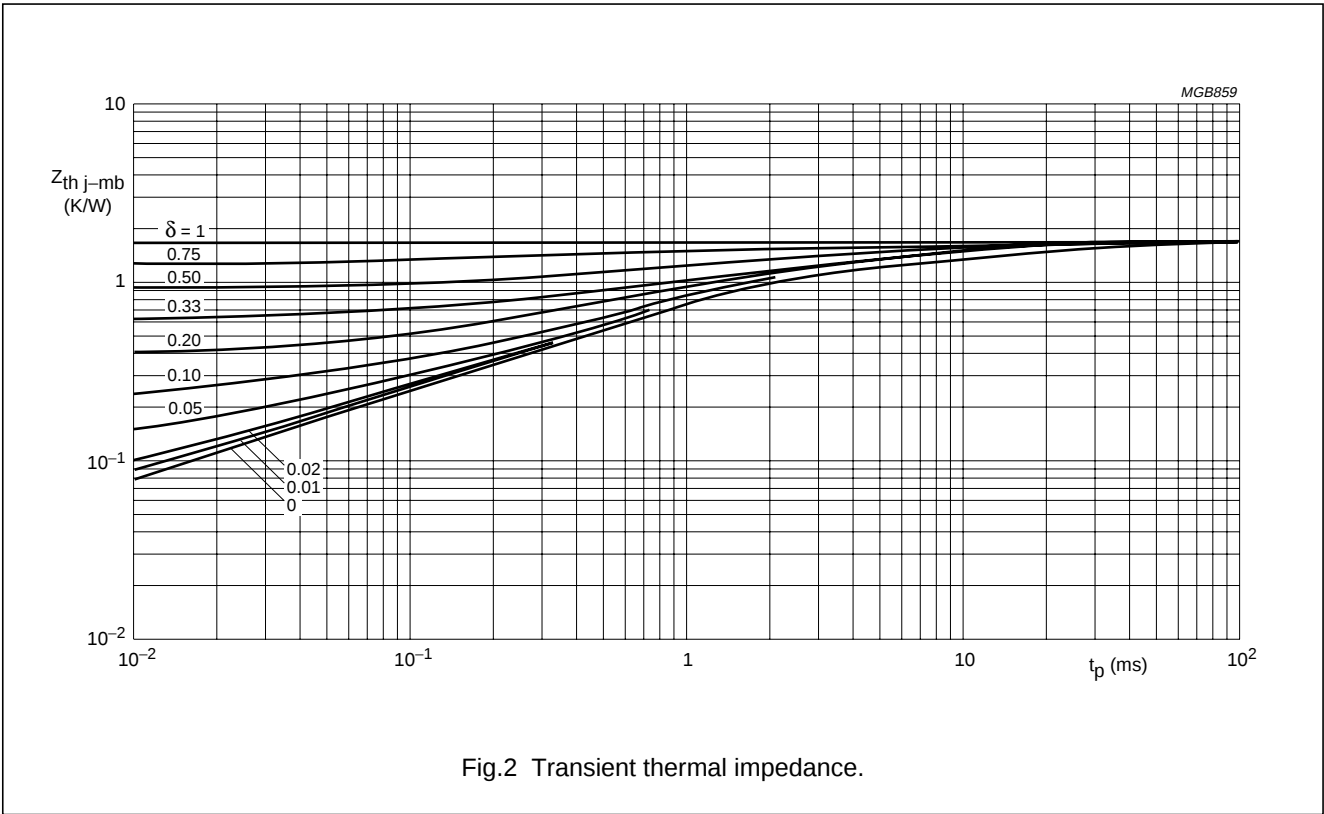
Silicon diffused power transistors

BU505; BU505D

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	$T_{mb} \leq 25\text{ }^{\circ}\text{C}$; see Fig.4	–	75	W
T_{stg}	storage temperature		–65	+150	$^{\circ}\text{C}$
T_j	junction temperature		–	150	$^{\circ}\text{C}$



Silicon diffused power transistors

BU505; BU505D

CHARACTERISTICS

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

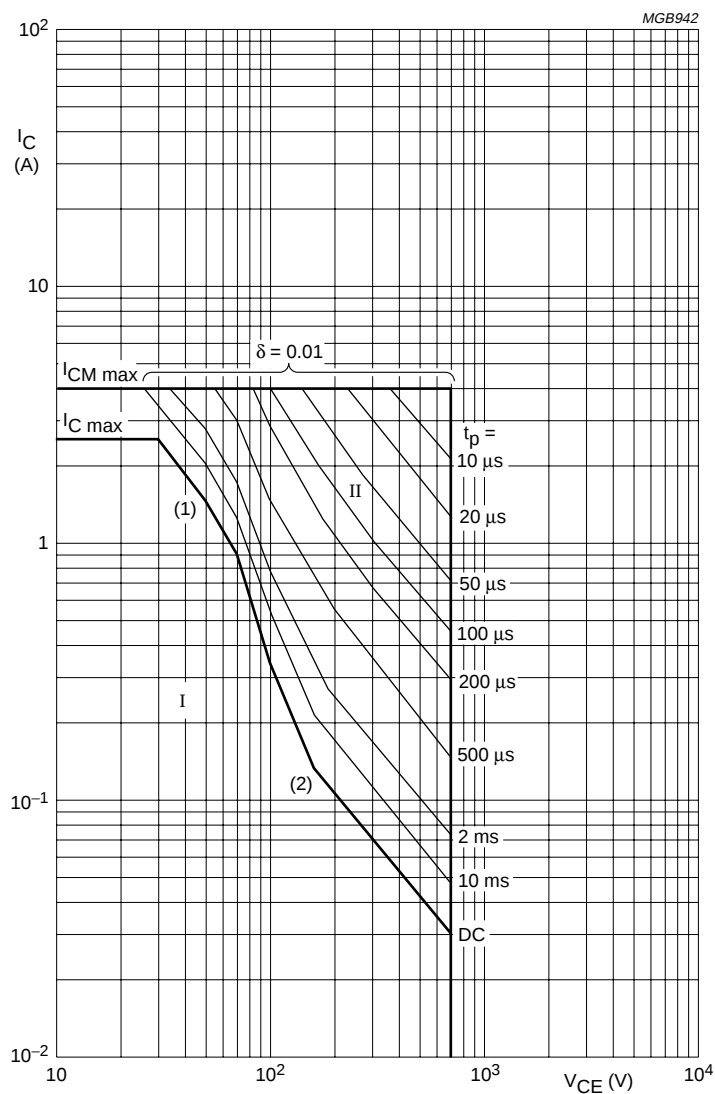
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{CEOsust}$	collector-emitter sustaining voltage	see Figs 5 and 6	700	—	—	V
V_{CEsat}	collector-emitter saturation voltage	$I_C = 2\text{ A}$; $I_B = 900\text{ mA}$	—	—	1	V
V_{BEsat}	base-emitter saturation voltage	$I_C = 2\text{ A}$; $I_B = 900\text{ mA}$	—	—	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
		$V_{CE} = V_{CESmax}$; $V_{BE} = 0$; $T_j = 125\text{ }^{\circ}\text{C}$; 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
Switching times in horizontal deflection circuit (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	—	μs
		$L_B = 15\text{ }\mu\text{H}$	—	7.5	—	μs
		$L_B = 25\text{ }\mu\text{H}$	—	9.5	—	μs
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	—	μs
		$L_B = 15\text{ }\mu\text{H}$	—	0.9	—	μs
		$L_B = 25\text{ }\mu\text{H}$	—	0.85	—	μs

Note

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

Silicon diffused power transistors

BU505; BU505D

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

I - Region of permissible DC operation.

II - Permissible extension for repetitive pulse operation.

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

(2) Second breakdown limits.

Fig.3 Forward bias SOAR.

Silicon diffused power transistors

BU505; BU505D

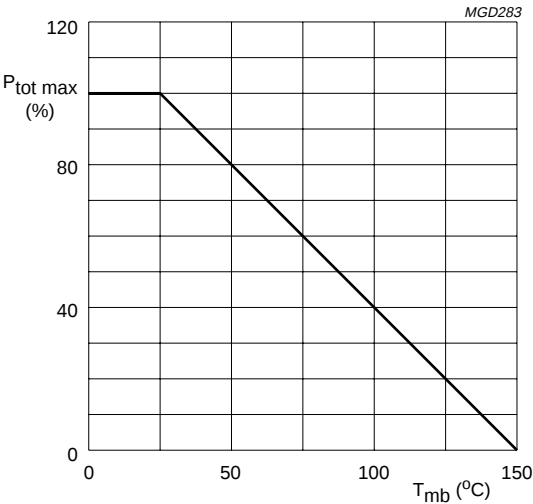


Fig.4 Power derating curve.

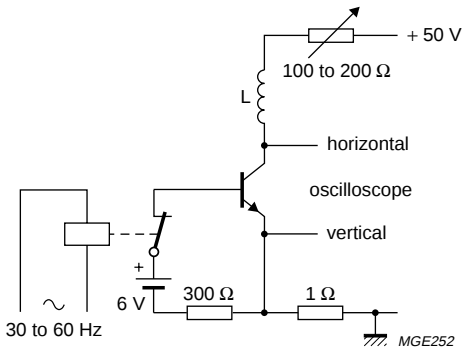


Fig.5 Test circuit for collector-emitter sustaining voltage.

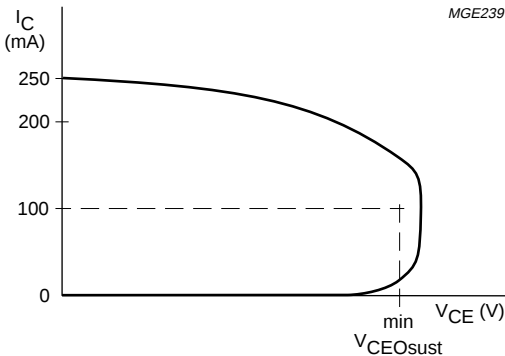


Fig.6 Oscilloscope display for collector-emitter sustaining voltage.

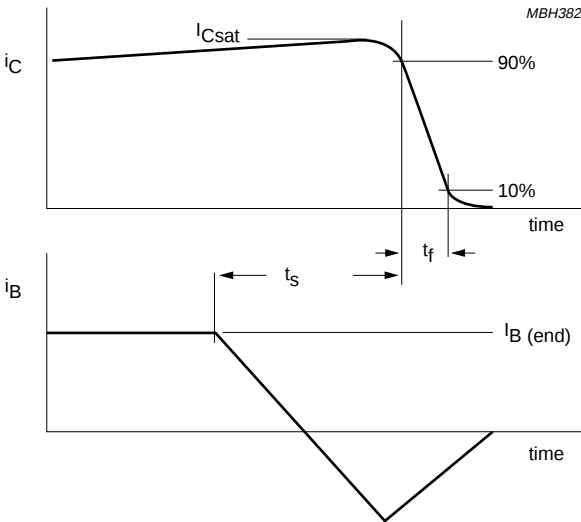


Fig.7 Switching time waveforms.

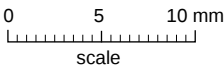
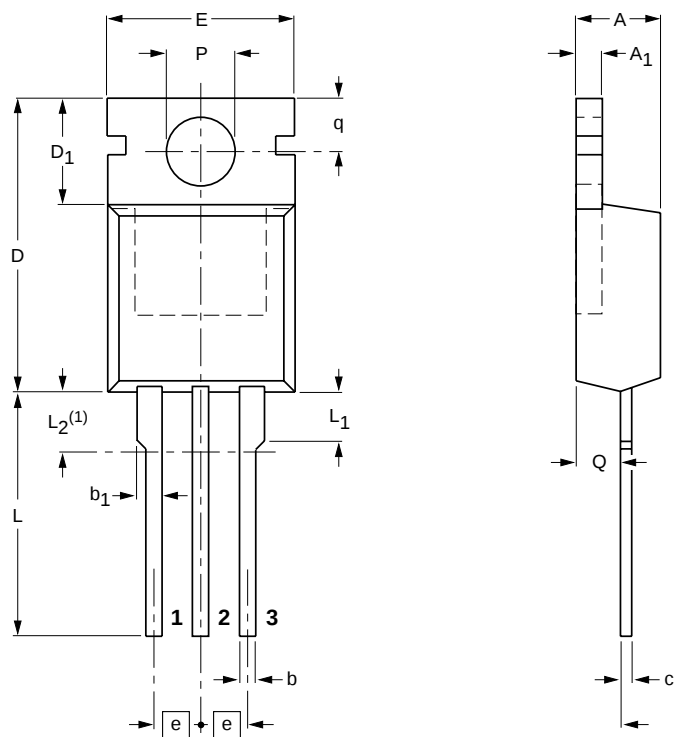
Silicon diffused power transistors

BU505; BU505D

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 ₁	b	b ₁	c	D	D ₁	E	e	L	L ₁	L ₂ ⁽¹⁾ 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

Silicon diffused power transistors

BU505; BU505D

DEFINITIONS

Data sheet status	
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.
Limiting values	
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.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

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Silicon diffused power transistors

BU505; BU505D

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Silicon diffused power transistors

BU505; BU505D

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BU505; BU505D

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Printed in The Netherlands

137067/00/01/pp12

Date of release: 1997 Aug 13

Document order number: 9397 750 02708

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