

# **DATA SHEET**

## **BUJ403A**

### **Silicon Diffused Power Transistor**

Product specification

October 2018

## Silicon Diffused Power Transistor

BUJ403A

## GENERAL DESCRIPTION

High-voltage, high-speed planar-passivated npn power switching transistor in TO220AB envelope intended for use in high frequency electronic lighting ballast applications, converters, inverters, switching regulators, motor control systems, etc.

## QUICK REFERENCE DATA

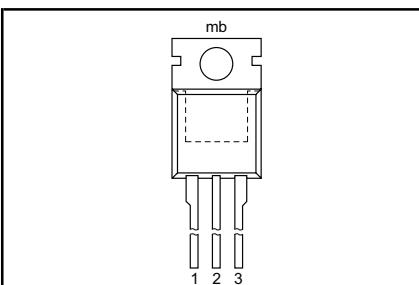
SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$V_{CESM}$	Collector-emitter voltage peak value	$V_{BE} = 0 \text{ V}$	-	1200	V
$V_{CBO}$	Collector-Base voltage (open emitter)		-	1200	V
$V_{CEO}$	Collector-emitter voltage (open base)		-	550	V
$I_C$	Collector current (DC)		-	6	A
$I_{CM}$	Collector current peak value		-	10	A
$P_{tot}$	Total power dissipation	$T_{mb} \leq 25 \text{ }^{\circ}\text{C}$	-	100	W
$V_{CEsat}$	Collector-emitter saturation voltage	$I_C = 2 \text{ A}; I_B = 0.4 \text{ A}$	0.15	1.0	V
$h_{FEsat}$	DC current gain	$I_C = 3 \text{ A}; V_{CE} = 5 \text{ V}$	15.5	-	V
$t_f$	Fall time	$I_C = 2.5 \text{ A}; I_{B1} = 0.5 \text{ A}$	170	300	ns

## PINNING - TO220AB

## PIN CONFIGURATION

## SYMBOL

PIN	DESCRIPTION		
1	base		
2	collector		
3	emitter		
tab	collector		



## 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	$V_{BE} = 0 \text{ V}$	-	1200	V
$V_{CEO}$	Collector to emitter voltage (open base)		-	550	V
$V_{CBO}$	Collector to base voltage (open emitter)		-	1200	V
$I_C$	Collector current (DC)		-	6	A
$I_{CM}$	Collector current peak value		-	10	A
$I_B$	Base current (DC)		-	3	A
$I_{BM}$	Base current peak value		-	5	A
$P_{tot}$	Total power dissipation	$T_{mb} \leq 25 \text{ }^{\circ}\text{C}$	-	100	W
$T_{stg}$	Storage temperature		-65	150	°C
$T_j$	Junction temperature		-	150	°C

## THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$R_{th\ j-mb}$	Junction to mounting base		-	1.25	K/W
$R_{th\ j-a}$	Junction to ambient	in free air	60	-	K/W

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## STATIC CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{CES}$ , $I_{CBO}$	Collector cut-off current <sup>1</sup>	$V_{BE} = 0 \text{ V}$ ; $V_{CE} = V_{CESMmax}$	-	-	1.0	mA
$I_{CES}$		$V_{BE} = 0 \text{ V}$ ; $V_{CE} = V_{CESMmax}$ ; $T_j = 125^\circ\text{C}$	-	-	2.0	mA
$I_{CEO}$	Collector cut-off current <sup>1</sup>	$V_{CEO} = V_{CEO Mmax}(550\text{V})$	-	-	0.1	mA
$I_{EBO}$	Emitter cut-off current	$V_{EB} = 7 \text{ V}$ ; $I_C = 0 \text{ A}$	-	-	0.1	mA
$V_{CEO Sust}$	Collector-emitter sustaining voltage	$I_B = 0 \text{ A}$ ; $I_C = 10 \text{ mA}$ ; $L = 25 \text{ mH}$	550	-	-	V
$V_{CEsat}$	Collector-emitter saturation voltage	$I_C = 2.0 \text{ A}$ ; $I_B = 0.4 \text{ A}$	-	0.15	1.0	V
$V_{BEsat}$	Base-emitter saturation voltage	$I_C = 2.0 \text{ A}$ ; $I_B = 0.4 \text{ A}$	-	0.91	1.5	V
$h_{FE}$	DC current gain	$I_C = 1 \text{ mA}$ ; $V_{CE} = 5 \text{ V}$	13	25	-	
$h_{FE}$		$I_C = 500 \text{ mA}$ ; $V_{CE} = 5 \text{ V}$	20	30	47	
$h_{FEsat}$	DC current gain	$I_C = 2.0 \text{ A}$ ; $V_{CE} = 5 \text{ V}$	13	18.5	25	
$h_{FEsat}$		$I_C = 3.0 \text{ A}$ ; $V_{CE} = 5 \text{ V}$	-	15.5	-	

## DYNAMIC CHARACTERISTICS

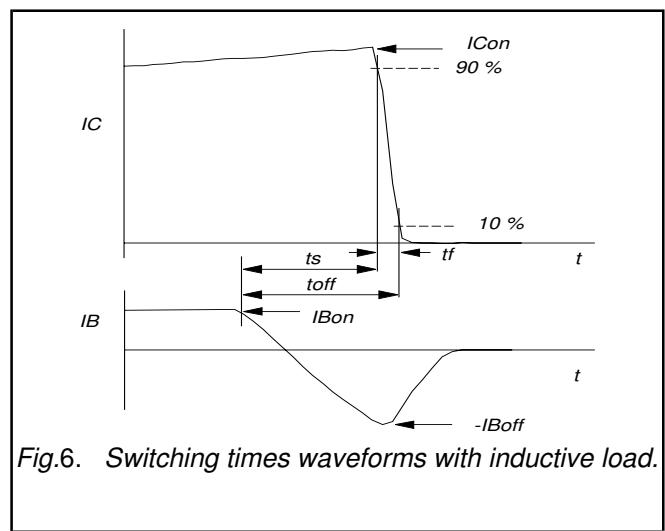
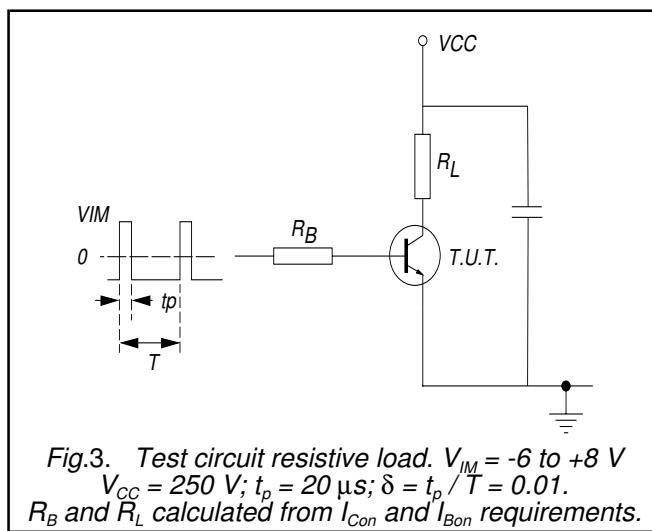
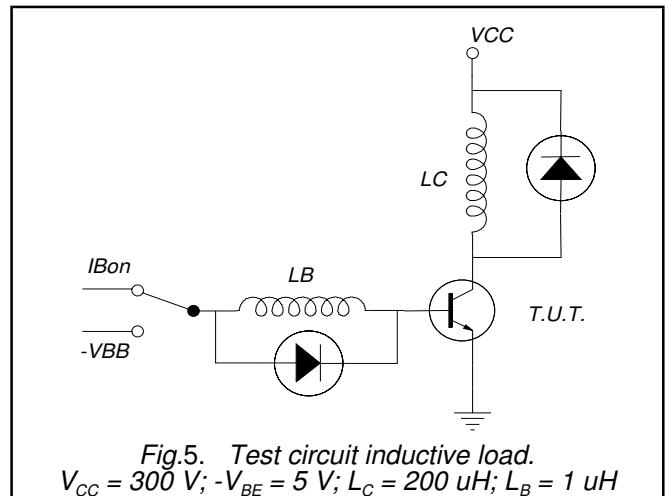
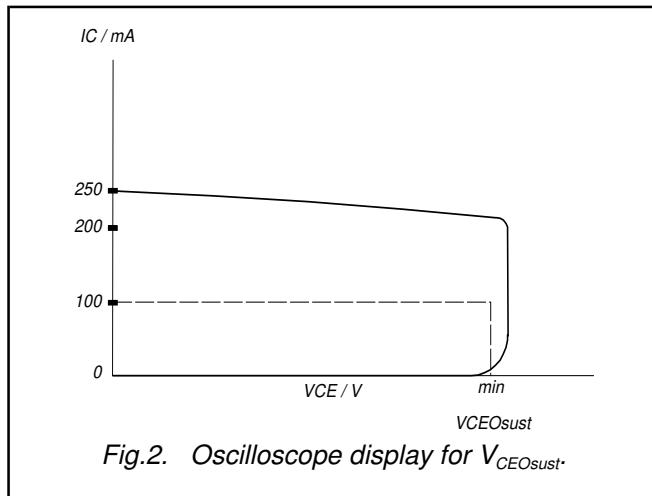
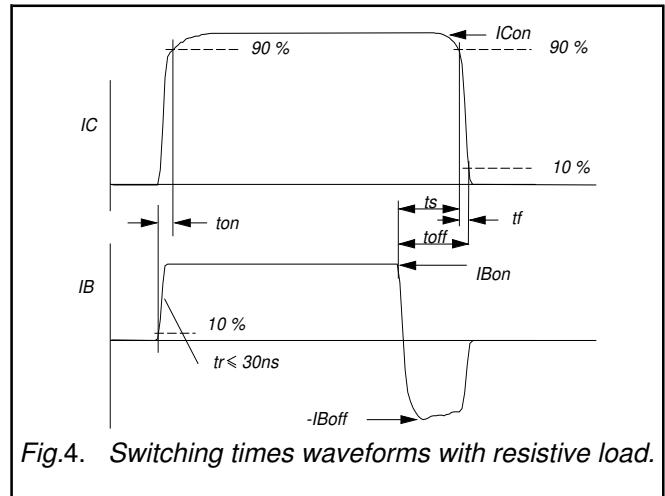
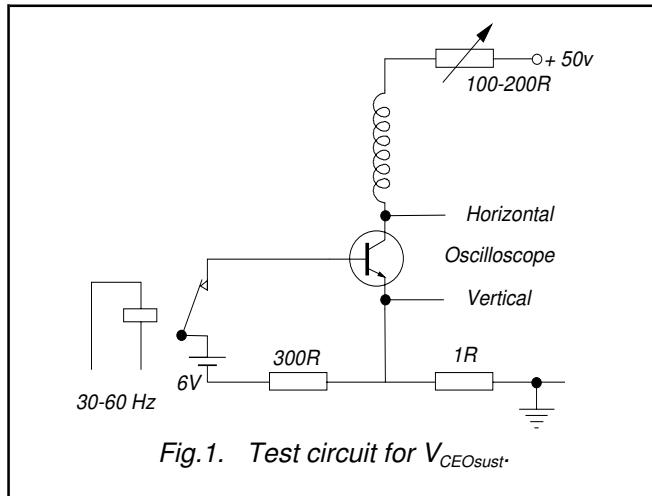
 $T_{mb} = 25^\circ\text{C}$  unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$t_{on}$	Switching times (resistive load)	$I_{Con} = 2.5 \text{ A}$ ; $I_{Bon} = -I_{Boff} = 0.5 \text{ A}$ ; $R_L = 75 \text{ ohms}$ ; $V_{BB2} = 4 \text{ V}$	-	0.5	$\mu\text{s}$
$t_s$	Turn-on time		-	0.5	$\mu\text{s}$
$t_f$	Turn-off storage time		-	3	$\mu\text{s}$
	Turn-off fall time		-	0.3	$\mu\text{s}$
$t_s$	Switching times (inductive load)	$I_{Con} = 2.5 \text{ A}$ ; $I_{Bon} = 0.5 \text{ A}$ ; $L_B = 1 \mu\text{H}$ ; $-V_{BB} = 5 \text{ V}$	-	1.5	$\mu\text{s}$
$t_f$	Turn-off storage time		170	300	$\mu\text{s}$
	Turn-off fall time				ns
$t_s$	Switching times (inductive load)	$I_{Con} = 2.5 \text{ A}$ ; $I_{Bon} = 0.5 \text{ A}$ ; $L_B = 1 \mu\text{H}$ ; $-V_{BB} = 5 \text{ V}$ ; $T_j = 100^\circ\text{C}$	-	1.8	$\mu\text{s}$
$t_f$	Turn-off storage time		-	300	$\mu\text{s}$
	Turn-off fall time				ns

<sup>1</sup> Measured with half sine-wave voltage (curve tracer).

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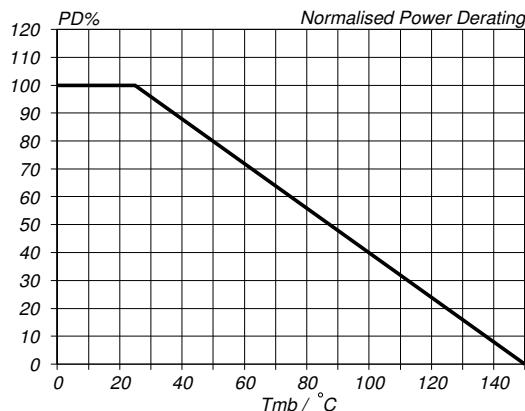


Fig.7. Normalised power dissipation.  
 $PD\% = 100 \cdot PD/PD_{25^\circ C} = f(T_{mb})$

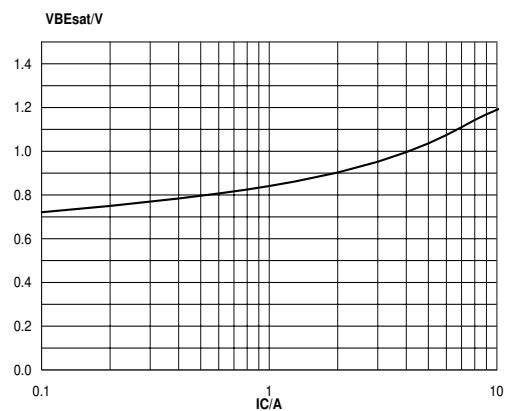


Fig.10. Base-Emitter saturation voltage.  
Solid lines = typ values,  $V_{BEsat} = f(IC)$ ; at  $IC/IB = 4$ .

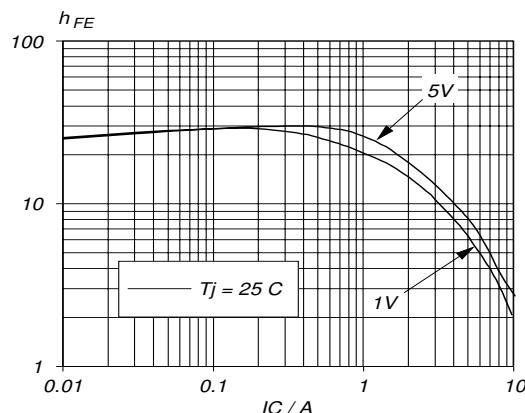


Fig.8. Typical DC current gain.  $h_{FE} = f(I_C)$   
parameter  $V_{CE}$

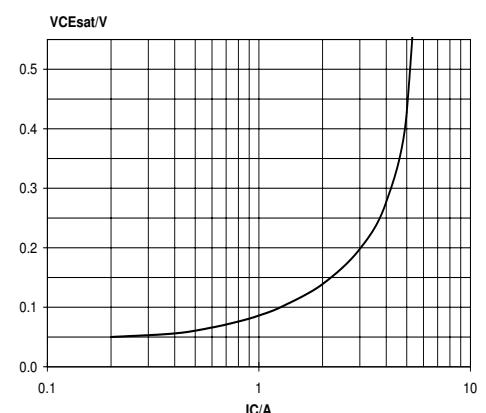


Fig.11. Collector-Emitter saturation voltage.  
Solid lines = typ values,  $V_{CEsat} = f(IC)$ ; at  $IC/IB = 4$ .

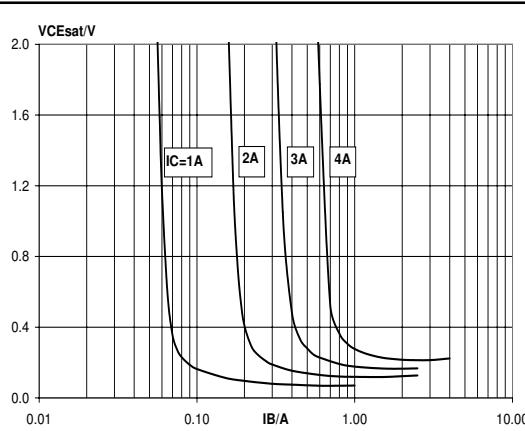


Fig.9. Collector-Emitter saturation voltage.  
Solid lines = typ values,  $V_{CEsat} = f(IB)$ ;  $T_j = 25^\circ C$ .

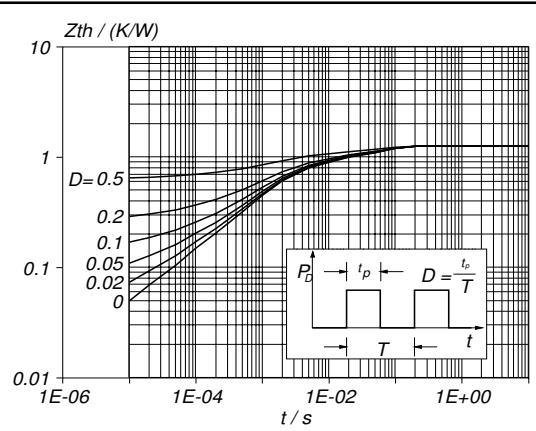
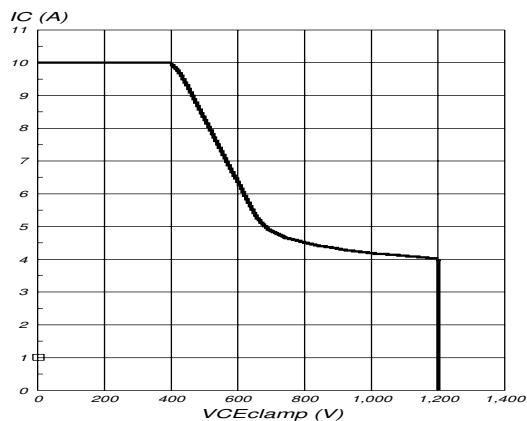
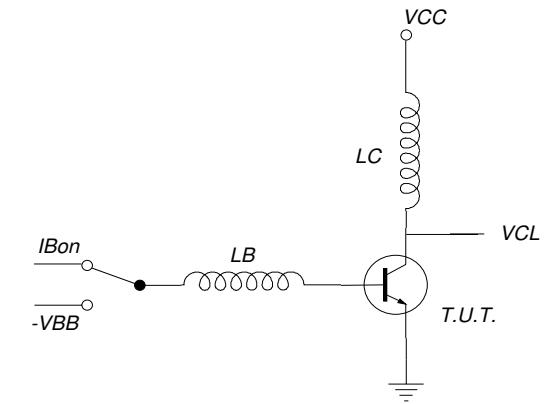


Fig.12. Transient thermal impedance.  
 $Z_{th,j-mb} = f(t)$ ; parameter  $D = t_p/T$

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Fig.13. Reverse bias safe operating area  $T_j \leq T_{jmax}$ Fig.14. Test Circuit for reverse bias safe operating area  
 $V_{cl} \leq 1000V$ ;  $V_{cc} = 150V$ ;  $V_{BB} = -5V$ ;  $L_B = 1\mu H$ ;  $L_c = 200\mu H$

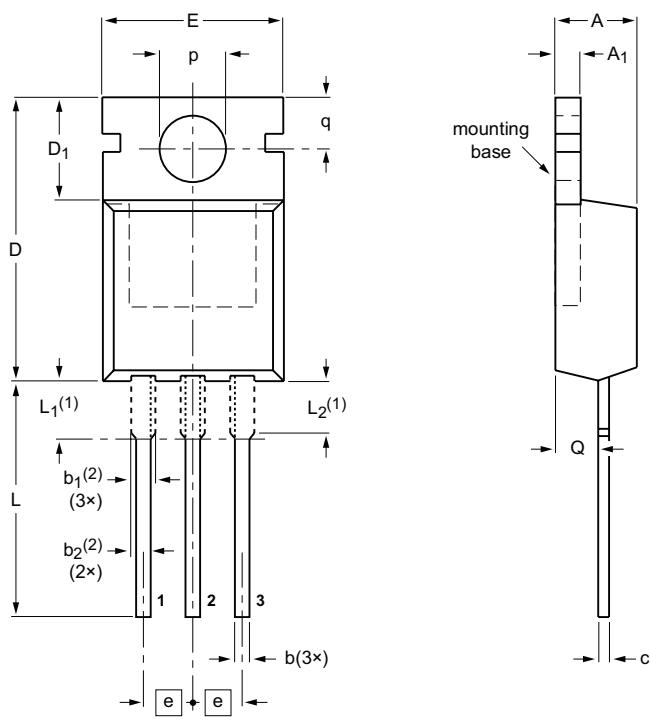
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## MECHANICAL DATA

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

SOT78



0 5 10 mm  
scale

## DIMENSIONS (mm are the original dimensions)

UNIT	A	A <sub>1</sub>	b	b <sub>1(2)</sub>	b <sub>2(2)</sub>	c	D	D <sub>1</sub>	E	e	L	L <sub>1(1)</sub>	L <sub>2(1)</sub> max.	p	q	Q
mm	4.7	1.40	0.9	1.6	1.3	0.7	16.0	6.6	10.3	2.54	15.0	3.30	3.0	3.8	3.0	2.6
	4.1	1.25	0.6	1.0	1.0	0.4	15.2	5.9	9.7		12.8	2.79	3.5	3.5	2.7	2.2

## Notes

1. Lead shoulder designs may vary.
2. Dimension includes excess dambar.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT78		3-lead TO-220AB	SC-46			08-04-23 08-06-13

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Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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