

DATA SHEET

BUJ303B

Silicon Diffused Power Transistor

Product specification

March 2018

Silicon Diffused Power Transistor

BUJ303B

GENERAL DESCRIPTION

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

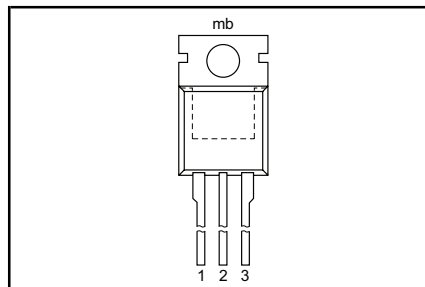
QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
V_{CESM}	Collector-emitter voltage peak value	$V_{BE} = 0\text{ V}$	-	1050	V
V_{CBO}	Collector-Base voltage (open emitter)		-	1050	V
V_{CEO}	Collector-emitter voltage (open base)		-	400	V
I_C	Collector current (DC)		-	5	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	$I_C = 3\text{ A}; I_B = 1\text{ A}$	0.25	1.5	V
h_{FEsat}	DC current gain	$I_C = 3\text{ A}; V_{CE} = 1.5\text{ V}$	10.5	-	
t_f	Fall time	$I_C = 2.5\text{ A}, I_{B1} = 0.5\text{ A}$	300	-	ns

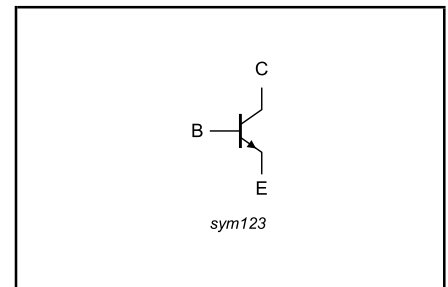
PINNING - TO220AB

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	$V_{BE} = 0\text{ V}$	-	1050	V
V_{CEO}	Collector to emitter voltage (open base)		-	400	V
V_{CBO}	Collector to base voltage (open emitter)		-	1050	V
I_C	Collector current (DC)		-	5	A
I_{CM}	Collector current peak value		-	10	A
I_B	Base current (DC)		-	2	A
I_{BM}	Base current peak value		-	4	A
P_{tot}	Total power dissipation	$T_{mb} \leq 25\text{ }^{\circ}\text{C}$	-	100	W
T_{stg}	Storage temperature		-65	150	$^{\circ}\text{C}$
T_j	Junction temperature		-	150	$^{\circ}\text{C}$

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

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CES}, I_{CBO} I_{CES}	Collector cut-off current ¹	$V_{BE} = 0\text{ V}; V_{CE} = V_{CESMmax}$ $V_{BE} = 0\text{ V}; V_{CE} = V_{CESMmax}$ $T_j = 125\text{ }^{\circ}\text{C}$	- -	- -	1.0 2.0	mA mA
I_{CEO}	Collector cut-off current ¹	$V_{CEO} = V_{CEOMmax}(400\text{V})$	-	-	0.1	mA
I_{EBO}	Emitter cut-off current	$V_{EB} = 9\text{ V}; I_C = 0\text{ A}$	-	-	0.1	mA
$V_{CEOsust}$	Collector-emitter sustaining voltage	$I_C = 300\text{ mA}; L = 25\text{ mH}$	400	-	-	V
V_{CESat}	Collector-emitter saturation voltage	$I_C = 3\text{ A}; I_B = 1\text{ A}$ $I_C = 1\text{ A}; I_B = 0.2\text{ A}$	- -	0.25 -	1.5 0.5	V V
V_{BEsat}	Base-emitter saturation voltage	$I_C = 3\text{ A}; I_B = 1\text{ A}$	-	1.0	1.5	V
h_{FE}	DC current gain	$I_C = 10\text{ mA}; V_{CE} = 5\text{ V}$ $I_C = 800\text{ mA}; V_{CE} = 3\text{ V}$	10 23	- 31	- 40	
h_{FEsat}	DC current gain	$I_C = 3\text{ A}; V_{CE} = 1.5\text{ V}$	-	10.5	-	

DYNAMIC CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
	Switching times (resistive load)	$I_{Con} = 2.5\text{ A}; I_{Bon} = 0.5\text{ A}; I_{Boff} = -1\text{ A};$ $V_{CC} = 250\text{ V};$			
t_{on}	Turn-on time		1	-	μs
t_s	Turn-off storage time		2.5	-	μs
t_f	Turn-off fall time		0.3	-	μs
	Switching times (inductive load)	$I_{Con} = 2.5\text{ A}; I_{Bon} = 0.5\text{ A}; -V_{BB} = 5\text{ V};$ $L_C = 300\text{ }\mu\text{H}; L_B = 1\text{ }\mu\text{H}; V_{CC} = 350\text{ V}$			
t_s	Turn-off storage time		2	-	μs
t_f	Turn-off fall time		200	-	ns
	Switching times (inductive load)	$I_{Con} = 2.5\text{ A}; I_{Bon} = 0.5\text{ A}; -V_{BB} = 5\text{ V};$ $L_C = 300\text{ }\mu\text{H}; L_B = 1\text{ }\mu\text{H}; V_{CC} = 350\text{ V};$ $T_j = 100\text{ }^{\circ}\text{C}$			
t_s	Turn-off storage time		3	-	μs
t_f	Turn-off fall time		300	-	ns

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

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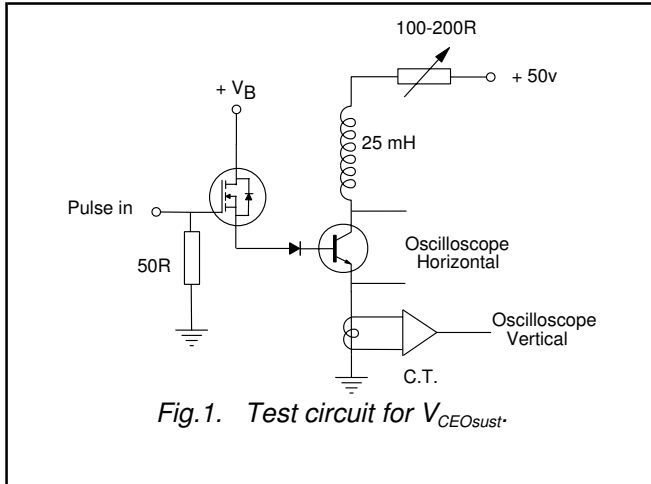
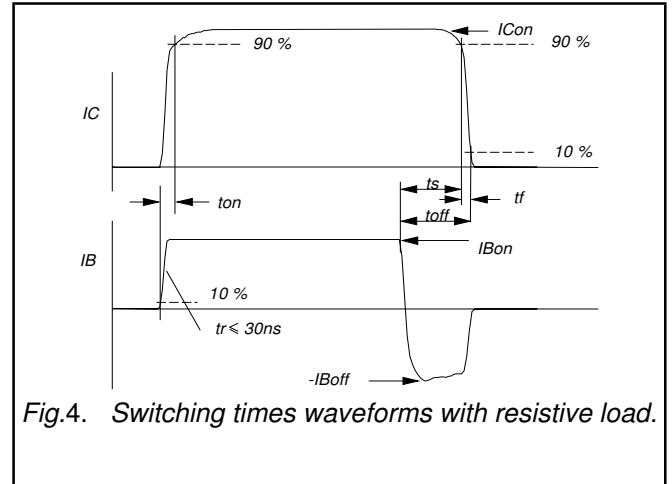
Fig.1. Test circuit for $V_{CEOsust}$.

Fig.4. Switching times waveforms with resistive load.

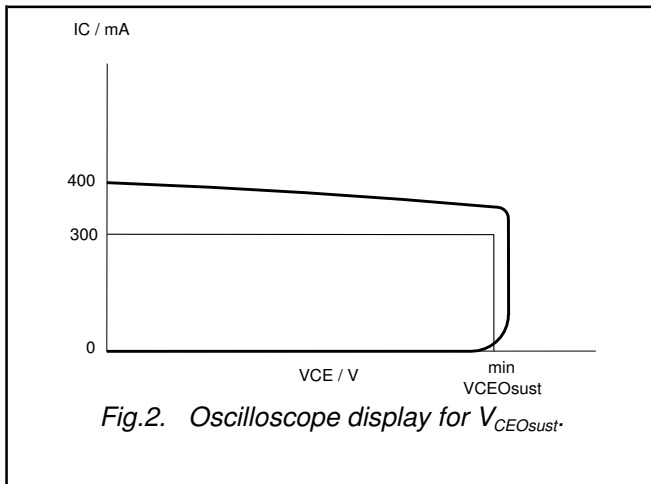
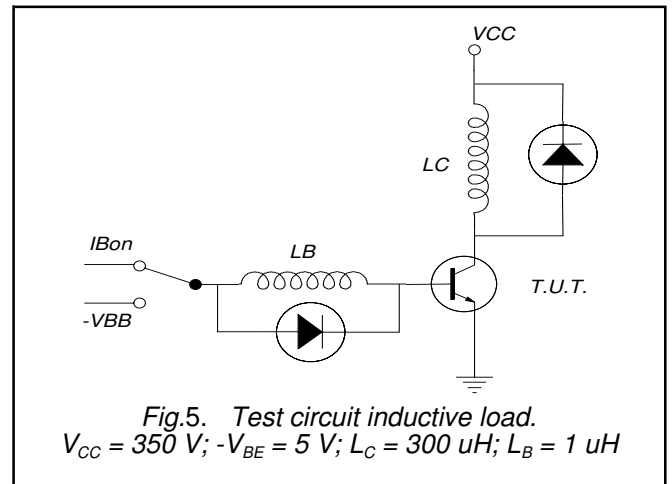
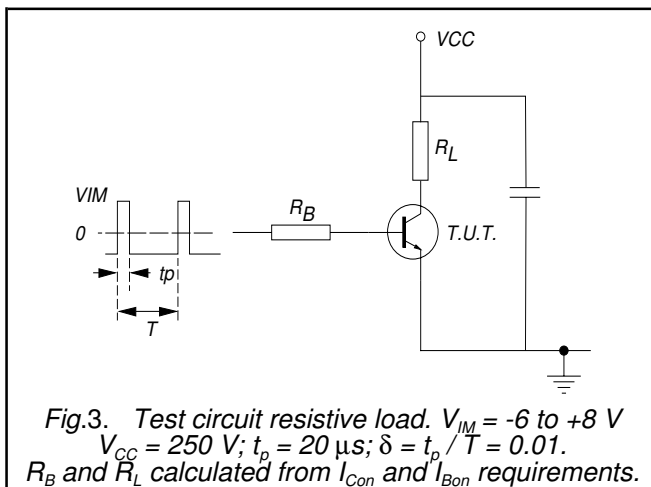
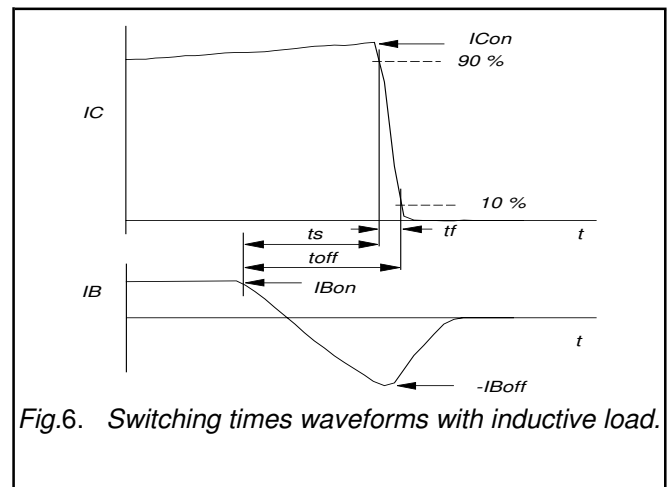
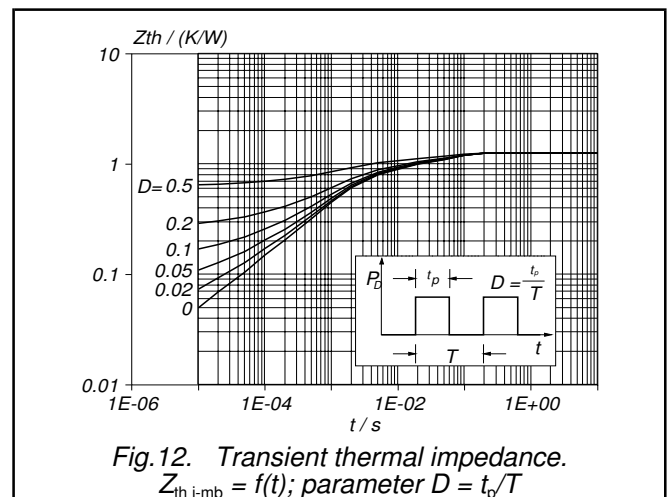
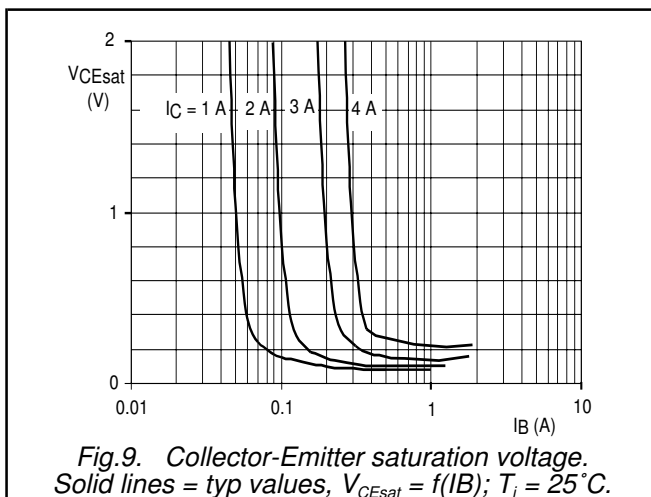
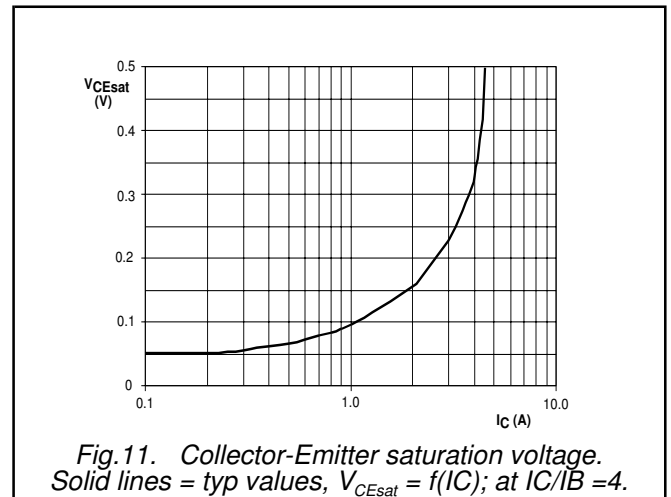
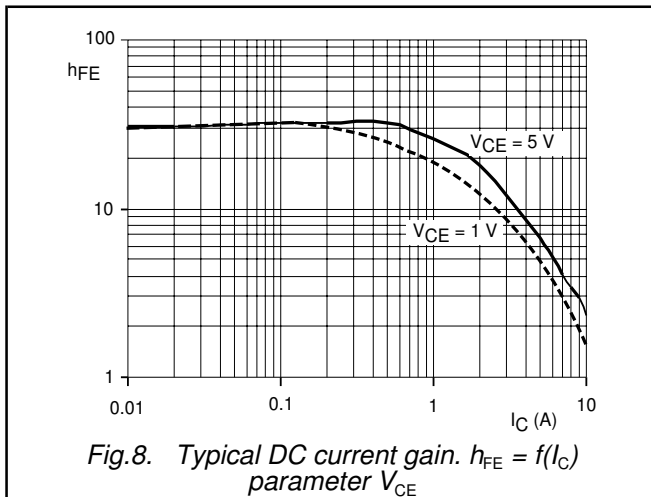
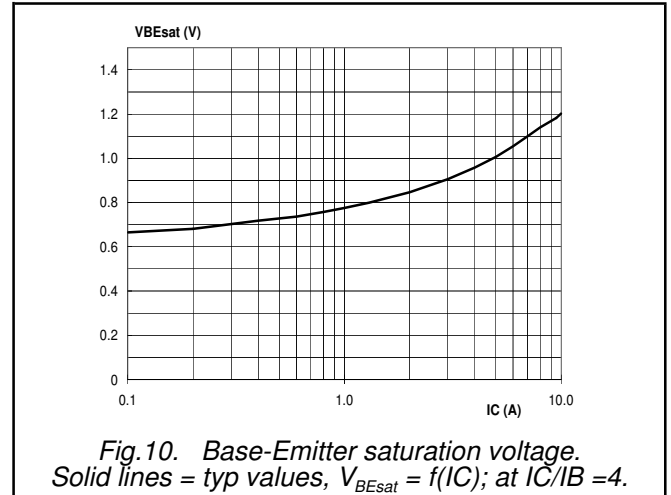
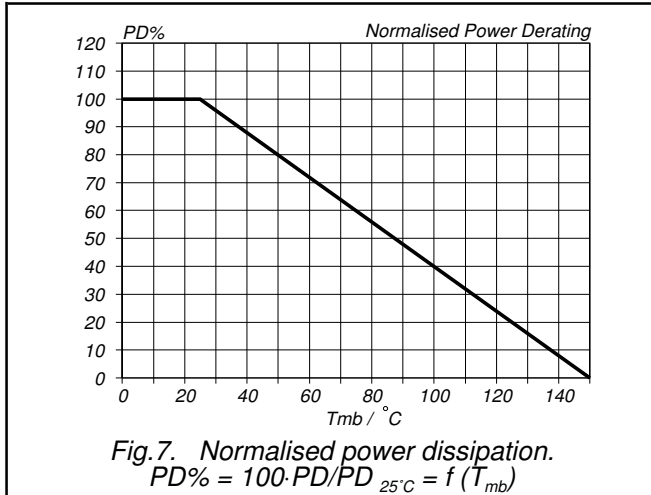
Fig.2. Oscilloscope display for $V_{CEOsust}$.Fig.5. Test circuit inductive load.
 $V_{CC} = 350 V$; $-V_{BE} = 5 V$; $L_C = 300 uH$; $L_B = 1 uH$ Fig.3. Test circuit resistive load. $V_{IM} = -6$ to $+8 V$
 $V_{CC} = 250 V$; $t_p = 20 \mu s$; $\delta = t_p / T = 0.01$.
 R_B and R_L calculated from I_{Con} and I_{Bon} requirements.

Fig.6. Switching times waveforms with inductive load.

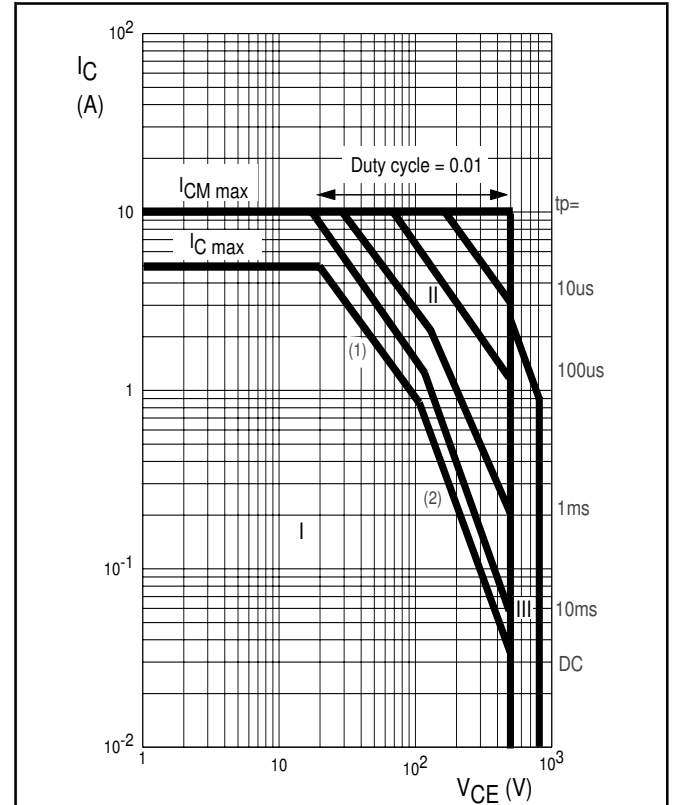
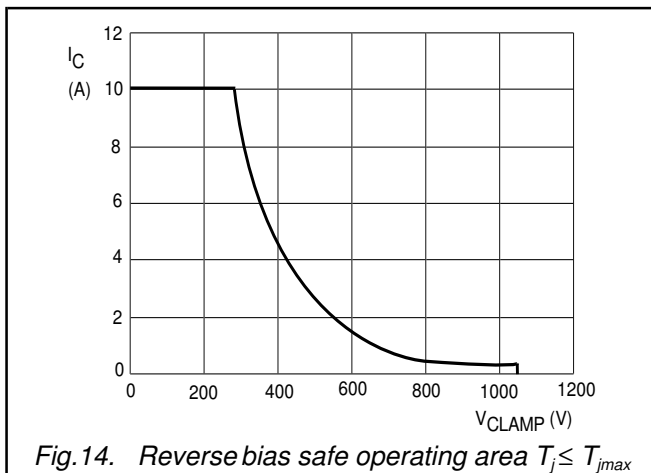
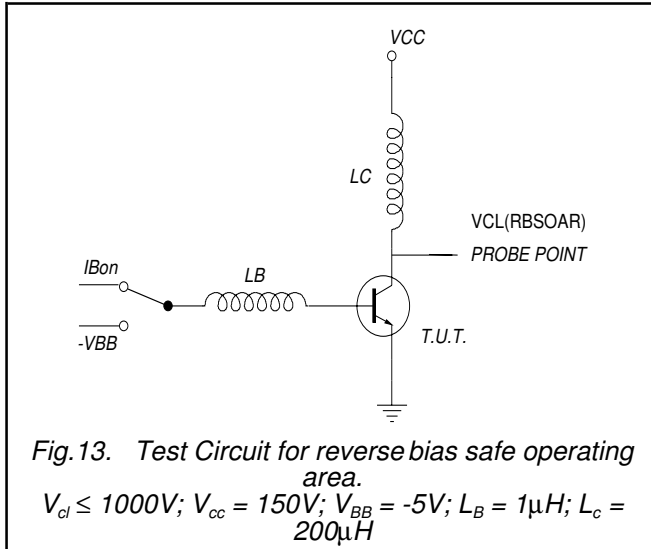
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- (1) P_{tot} max and P_{tot} peak max lines.
 - (2) Second breakdown limits.
 - I Region of permissible DC operation.
 - II Extension for repetitive pulse operation.
 - III Extension during turn-on in single transistor converters provided that $R_{BE} \leq 100 \Omega$ and $t_p \leq 0.6 \mu s$.
- NB:** Mounted with heatsink compound and 30 ± 5 newton force on the centre of the envelope.

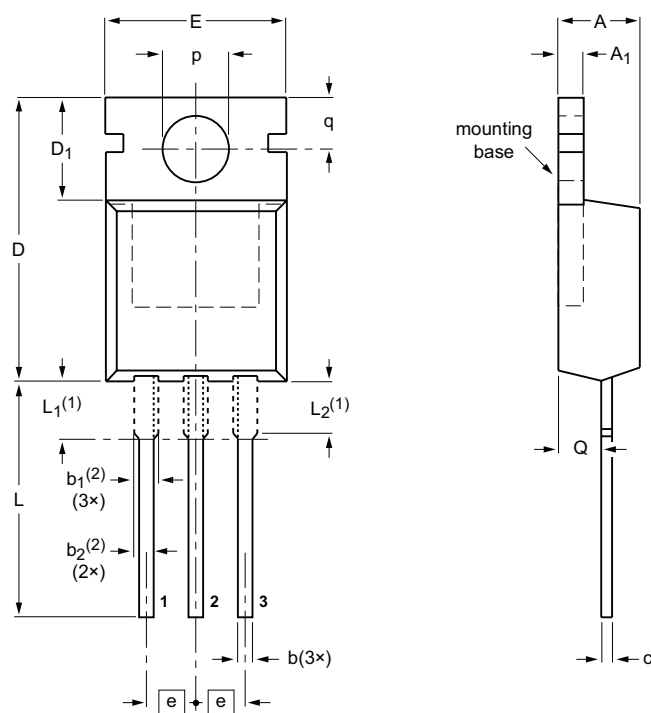
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MECHANICAL DATA

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 (2)	b ₂ (2)	c	D	D ₁	E	e	L	L ₁ (1)	L ₂ (1) max.	p	q	Q
mm	4.7 4.1	1.40 1.25	0.9 0.6	1.6 1.0	1.3 1.0	0.7 0.4	16.0 15.2	6.6 5.9	10.3 9.7	2.54	15.0 12.8	3.30 2.79	3.0	3.8 3.5	3.0 2.7	2.6 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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Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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