

## Silicon Diffused Power Transistor

BUT11AI

## GENERAL DESCRIPTION

Enhanced performance, high speed switching npn transistor in TO220AB envelope specially suited for high frequency electronic lighting ballast applications and converters, inverters, switching regulators, motor control systems etc.

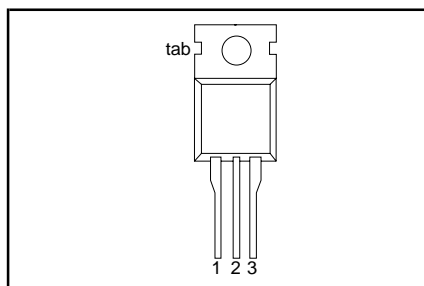
## QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$V_{CESM}$	Collector-emitter voltage peak value	$V_{BE} = 0 \text{ V}$	-	1000	V
$V_{CEO}$	Collector-emitter voltage (open base)		-	450	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	$I_C = 2.5 \text{ A}; I_B = 0.33 \text{ A}$	-	1.5	V
$I_{CSat}$	Collector Saturation current		2.5		A
$t_f$	Inductive fall time	$I_{Con} = 2.5 \text{ A}; I_{Bon} = 0.5 \text{ A}$	0.08	0.15	$\mu\text{s}$

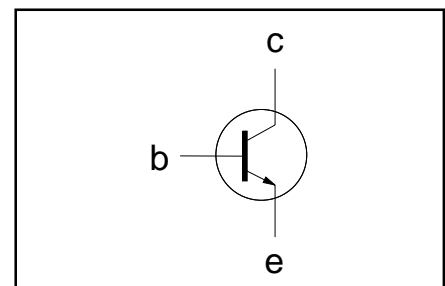
## PINNING - TO220AB

PIN	DESCRIPTION
1	base
2	collector
3	emitter
tab	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-emitter voltage peak value	$V_{BE} = 0 \text{ V}$	-	1000	V
$V_{CEO}$	Collector-emitter voltage (open base)		-	450	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
$I_{CES}$	Collector cut-off current <sup>1</sup>	$V_{BE} = 0\text{ V}; V_{CE} = V_{CESMmax}$	-	-	1.0	mA
$I_{CES}$		$V_{BE} = 0\text{ V}; V_{CE} = V_{CESMmax}$ $T_j = 125\text{ }^{\circ}\text{C}$	-	-	2.0	mA
$I_{EBO}$	Emitter cut-off current	$V_{EB} = 9.0\text{ V}; I_C = 0\text{ A}$	-	-	10.0	mA
$V_{CEO\text{sust}}$	Collector-emitter sustaining voltage	$I_B = 0\text{ A}; I_C = 100\text{ mA};$ $L = 25\text{ mH}$	450	-	-	V
$V_{CE\text{sat}}$	Collector-emitter saturation voltage	$I_C = 2.5\text{ A}; I_B = 0.33\text{ A}$	-	-	1.5	V
$V_{BE\text{sat}}$	Base-emitter saturation voltage	$I_C = 2.5\text{ A}; I_B = 0.33\text{ A}$	-	-	1.3	V
$h_{FE}$	DC current gain	$I_C = 5\text{ mA}; V_{CE} = 5\text{ V}$	10	20	35	
$h_{FE}$		$I_C = 0.5\text{ A}; V_{CE} = 5\text{ V}$	14	22	35	
$h_{FE\text{sat}}$		$I_C = 2.5\text{ A}; V_{CE} = 5\text{ V}$	9	13	17	

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

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$t_{on}$	Switching times resistive load Turn-on time	$I_{Con} = 2.5\text{ A}; I_{Bon} = 0.5\text{ A}; -I_{Boff} = 0.5\text{ A}$	0.6 3.4 0.6	1.0	$\mu\text{s}$
$t_s$	Turn-off storage time		-	4.0	$\mu\text{s}$
$t_f$	Turn-off fall time		-	0.8	$\mu\text{s}$
	Switching times inductive load	$I_{Con} = 2.5\text{ A}; I_{Bon} = 0.5\text{ A}; L_B = 1\text{ }\mu\text{H};$ $-V_{BB} = 5\text{ V}$			
$t_s$	Turn-off storage time		1.1	1.4	$\mu\text{s}$
$t_f$	Turn-off fall time		80	150	ns
$t_s$	Turn-off storage time	$I_{Con} = 2.5\text{ A}; I_{Bon} = 0.5\text{ A}; L_B = 1\text{ }\mu\text{H};$ $-V_{BB} = 5\text{ V}; T_j = 100\text{ }^{\circ}\text{C}$	1.2	1.5	$\mu\text{s}$
$t_f$	Turn-off fall time		140	300	ns

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

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**MECHANICAL DATA**

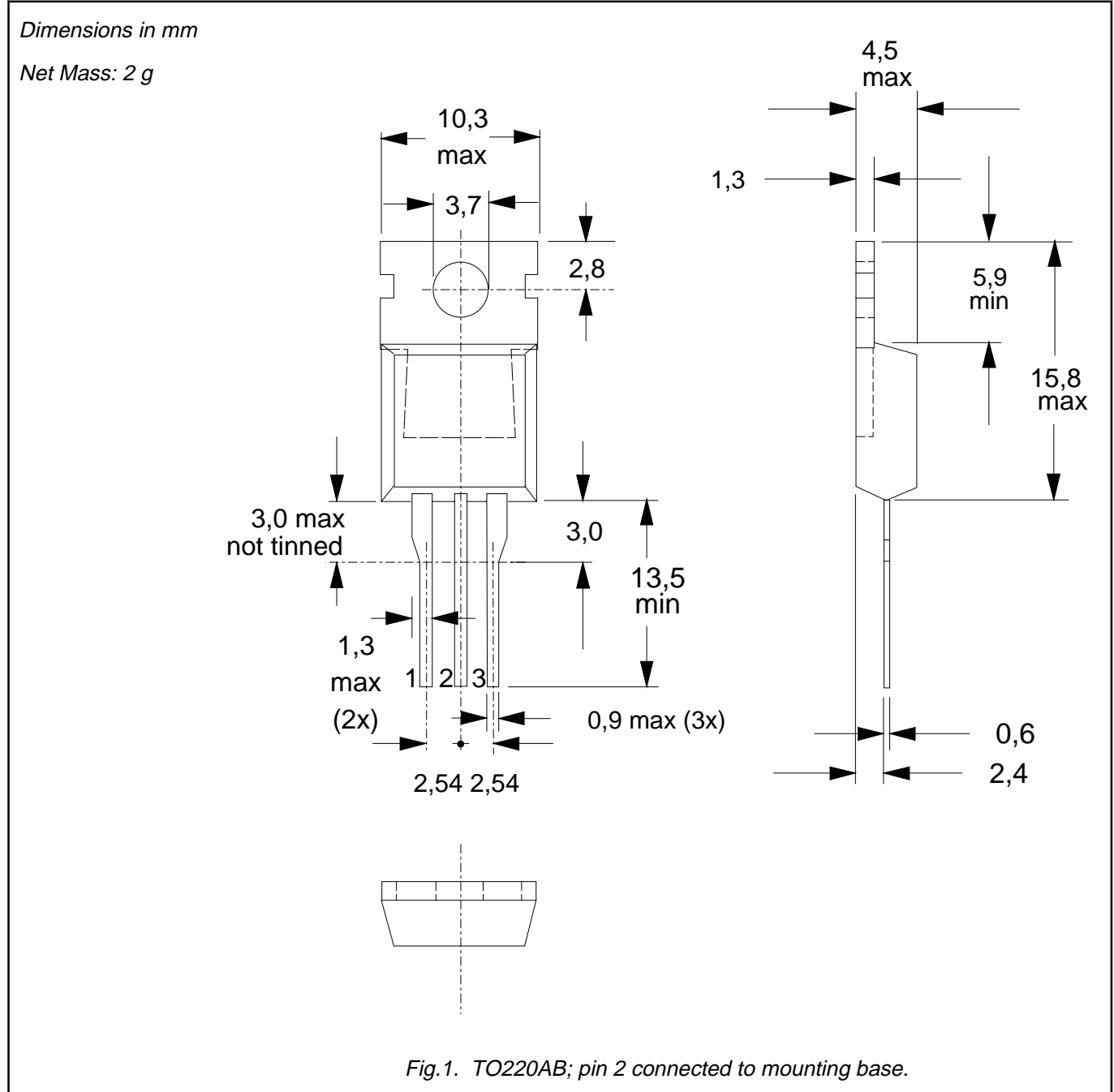


Fig.1. TO220AB; pin 2 connected to mounting base.

**Notes**

1. Refer to mounting instructions for TO220 envelopes.
2. Epoxy meets UL94 V0 at 1/8".

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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>	
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<b>Application information</b>	
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