Insulated Gate Bipolar Transistor (IGBT) BUK856-800A

GENERAL DESCRIPTION

Fast-switching N-channel insulated gate bipolar power transistor in a plastic envelope.
The device is intended for use in motor control, DC/DC and AC/DC converters, and in general purpose high frequency switching applications.

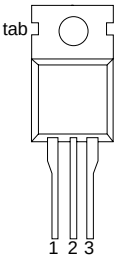
QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{CE}	Collector-emitter voltage	800	V
I_C	Collector current (DC)	24	A
P_{tot}	Total power dissipation	125	W
V_{CEsat}	Collector-emitter on-state voltage	3.5	V
E_{off}	Turn-off energy Loss	1.0	mJ

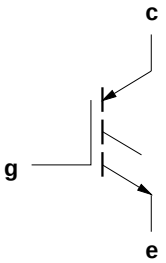
PINNING - TO220AB

PIN	DESCRIPTION
1	gate
2	collector
3	emitter
tab	collector

PIN CONFIGURATION



SYMBOL



LIMITING VALUES

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CE}	Collector-emitter voltage	-	-5	800	V
V_{CGR}	Collector-gate voltage	R_{GE} = 20 kΩ	-	800	V
$\pm V_{GE}$	Gate-emitter voltage	-	-	30	V
I_C	Collector current (DC)	T_{mb} = 25 ˚C	-	24	A
I_C	Collector current (DC)	T_{mb} = 100 ˚C	-	12	A
I_{CLM}	Collector Current (Clamped Inductive Load)	$T_j \leq T_{jmax.}$ $V_{CL} \leq 500$ V	-	40	A
I_{CM}	Collector current (pulsed peak value, on-state)	$T_j \leq T_{jmax.}$	-	50	A
P_{tot}	Total power dissipation	T_{mb} = 25 ˚C	-	125	W
T_{stg}	Storage temperature	-	- 55	150	˚C
T_j	Junction Temperature	-	-	150	˚C

THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$R_{th\ j\text{-}mb}$	Junction to mounting base	-	-	1.0	K/W
$R_{th\ j\text{-}a}$	Junction to ambient	In free air	60	-	K/W

STATIC CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CES}$	Collector-emitter breakdown voltage	V_{GE} = 0 V; I_C = 0.25 mA	800	-	-	V
$V_{GE(TO)}$	Gate threshold voltage	V_{CE} = V_{GE}; I_C = 1 mA	3	4	5.5	V
I_{CES}	Zero gate voltage collector current	V_{CE} = 800 V; V_{GE} = 0 V; T_j = 25 ˚C	-	10	200	µA
I_{CES}	Zero gate voltage collector current	V_{CE} = 800 V; V_{GE} = 0 V; T_j =125 ˚C	-	0.2	1	mA
I_{ECS}	Reverse collector current	V_{CE} = -5 V; V_{GE} = 0 V	-	0.1	5	mA
I_{GES}	Gate emitter leakage current	V_{GE} = ±30 V; V_{CE} = 0 V	-	10	100	nA
V_{CEsat}	Collector-emitter saturation voltage	V_{GE} = 15 V; I_C = 12 A	-	2.4	3.5	V
		V_{GE} = 15 V; I_C = 24 A	-	3.1	-	V

DYNAMIC CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fe}	Forward transconductance	V_{CE} = 15 V; I_C = 6 A	3	7	-	S
C_{ies}	Input capacitance	V_{GE} = 0 V; V_{CE} = 25 V; f = 1 MHz	-	900	1250	pF
C_{oes}	Output capacitance		-	85	120	pF
C_{res}	Feedback capacitance		-	30	50	pF
$t_{d\,on}$	Turn-on delay time	I_C = 12 A; V_{CC} = 500 V;	-	25	-	ns
t_r	Turn-on rise time	V_{GE} = 15 V; R_G = 25Ω;	-	45	-	ns
E_{on}	Turn-on Energy Loss	T_j = 25˚C;	-	0.6	-	mJ
$t_{d\,off}$	Turn-off delay time	Inductive Load	-	230	350	ns
t_f	Turn-off fall time	Energy Losses include all 'tail'	-	200	400	ns
E_{off}	Turn-off Energy Loss	losses	-	0.5	1	mJ
$t_{d\,on}$	Turn-on delay time	I_C = 12 A; V_{CC} = 500 V;	-	25	-	ns
t_r	Turn-on rise time	V_{GE} = 15 V; R_G = 25Ω;	-	45	-	ns
E_{on}	Turn-on Energy Loss	T_j = 125˚C;	-	0.6	-	mJ
$t_{d\,off}$	Turn-off delay time	Inductive Load	-	300	450	ns
t_f	Turn-off fall time	Energy Losses include all 'tail'	-	400	800	ns
E_{off}	Turn-off Energy Loss	losses	-	1	2	mJ

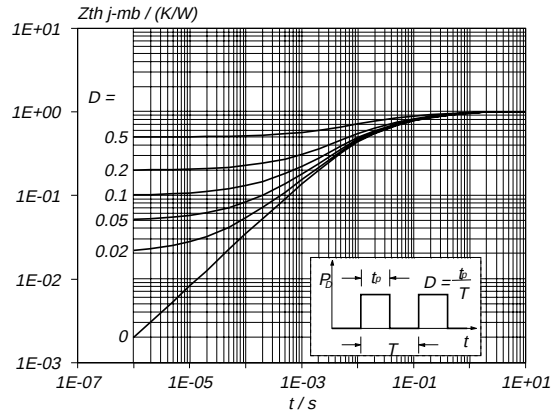


Fig.1. Transient thermal impedance
$Z_{th\ j\text{-}mb} = f(t)$; *parameter* $D = t_p/T$

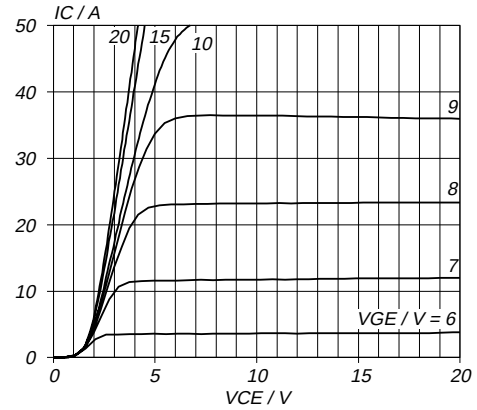


Fig.4. Typical output characteristics, T_j=25 ˚C.
$I_C=f(V_{CE})$; *parameter* V_{GE}

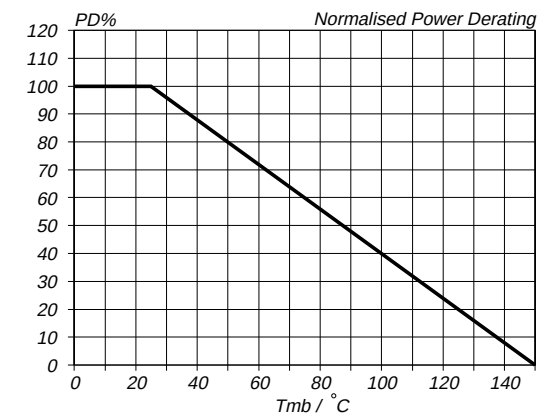


Fig.2. Normalised power dissipation.
$PD\% = 100.P_D/P_{D\ 25^{\circ}C} = f(T_{mb})$

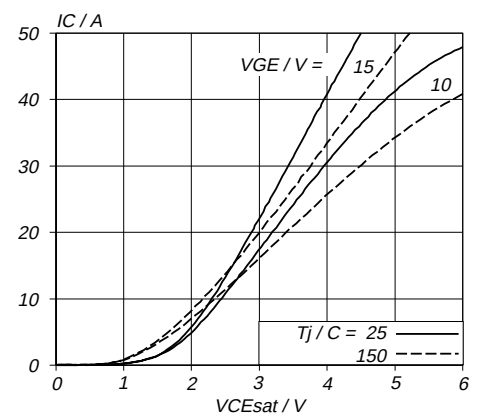


Fig.5. Typical on-state characteristics
$I_C=f(V_{CE})$; *parameters* T_j, V_{GE}

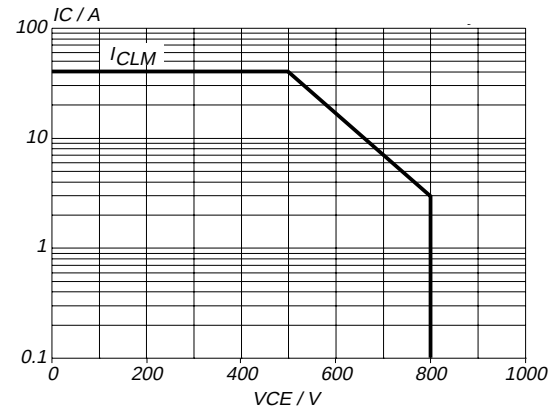


Fig.3. Turn-off Safe Operating Area
conditions: $T_j \leq T_{jmax.}$; $R_G = 50\ \Omega$

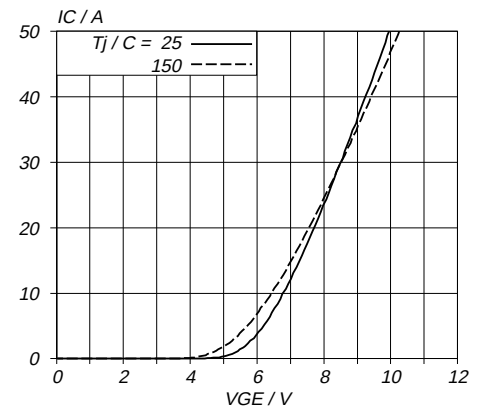


Fig.6. Typical transfer characteristics
$I_C=f(V_{GE})$; *conditions:* V_{CE}=15 V; *parameter* T_j

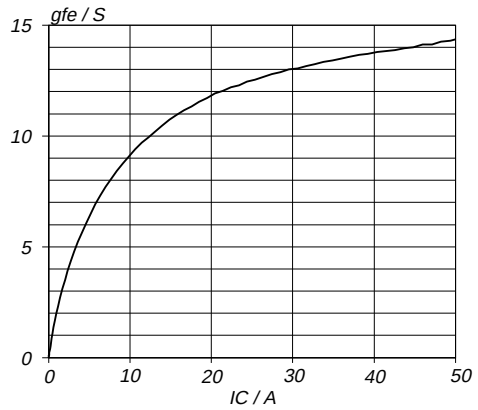


Fig.7. Typical transconductance, T_j = 25 ˚C. $g_{fe} = f(I_C)$; conditions: V_{CE} = 15 V

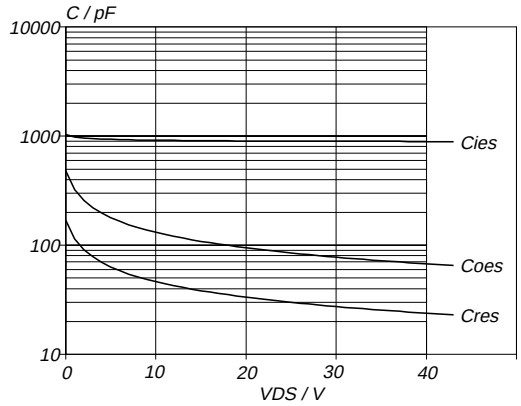


Fig.10. Typical capacitances, C_{ies}, C_{oes}, C_{res}. $C = f(V_{CE})$; conditions: V_{GE} = 0 V; f = 1MHz.

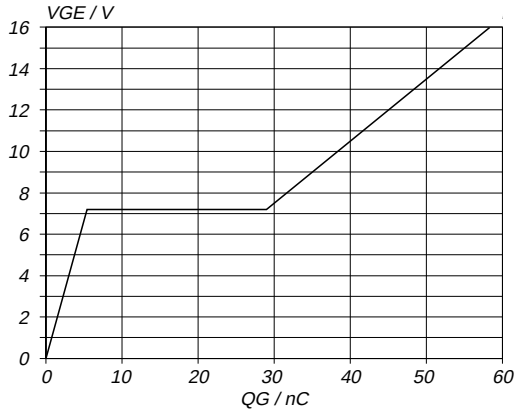


Fig.8. Typical turn-on gate-charge characteristics. $V_{GE} = f(Q_G)$; conditions: I_C = 12 A; parameter V_{CE}

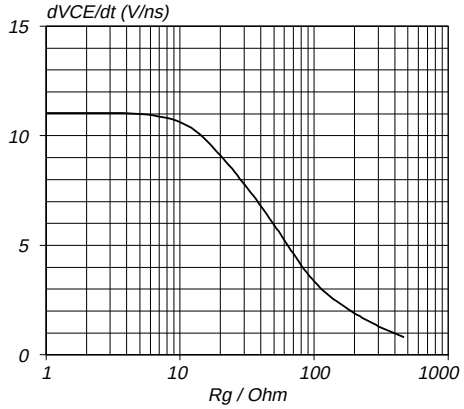


Fig.11. Typical turn-off dV_{CE}/dt vs. R_G conditions: I_C = 12 A; V_{CL} = 500 V; T_j = 125 ˚C

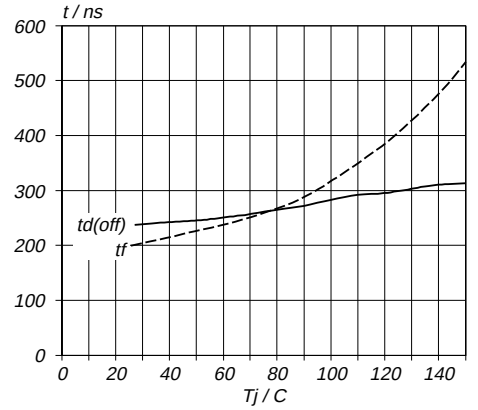


Fig.9. Typical Switching Times vs. T_j conditions: I_C = 12 A; V_{CL} = 500 V; R_G = 25 Ω

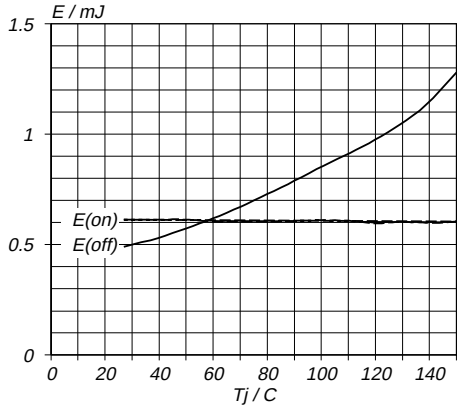


Fig.12. Typical Switching losses vs. T_j conditions: I_C = 12 A; V_{CL} = 500 V; R_G = 25 Ω

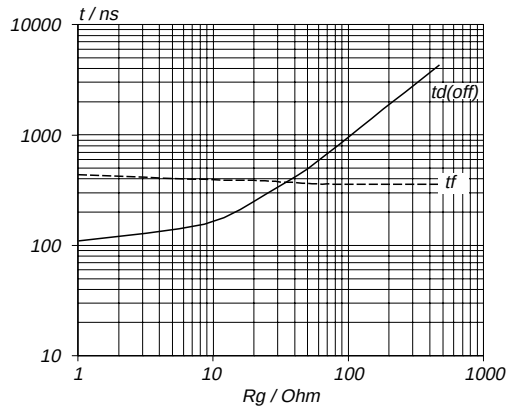


Fig.13. Typical Switching Times vs. R_G conditions: I_C = 12 A; V_{CL} = 500 V; T_j = 125 ˚C

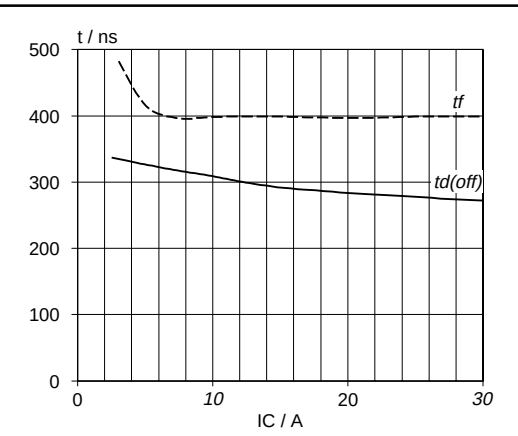


Fig.14. Typical Switching Times vs. I_C conditions: V_{CL} = 500 V; R_G = 25 Ω; T_j = 125˚C

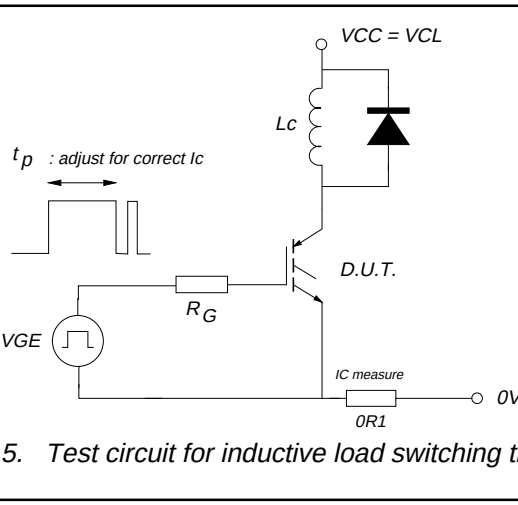


Fig.15. Test circuit for inductive load switching times.

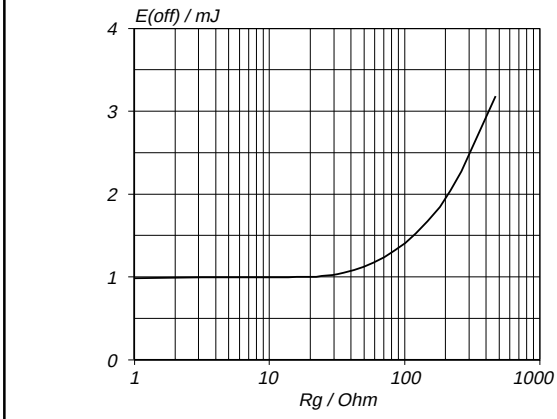


Fig.16. Typical Energy loss at turn-off vs. R_G conditions: I_C = 12 A; V_{CL} = 500 V; T_j = 125 ˚C

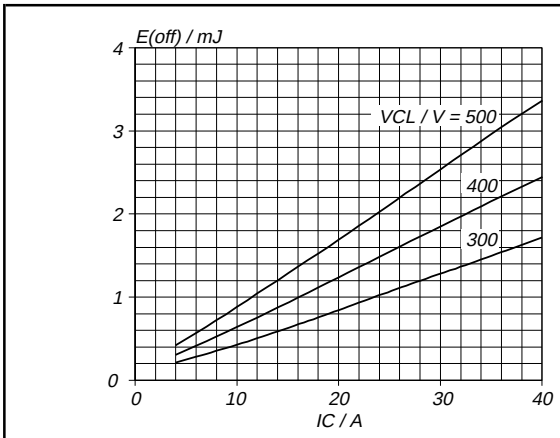


Fig.17. Typical Energy loss at turn-off vs. I_C conditions: V_{CL} = 500 V; R_G = 25 Ω; T_j = 125˚C; parameter V_{CL}

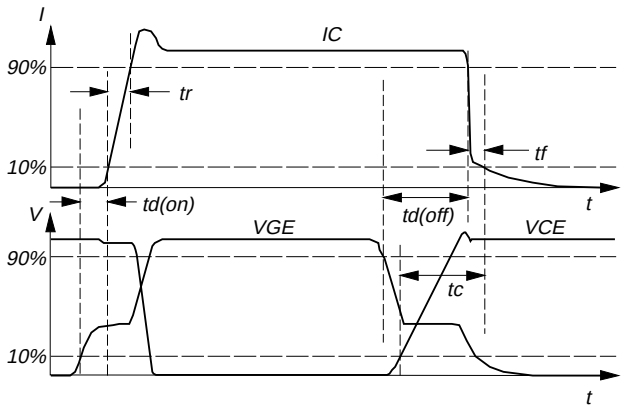


Fig.18. Inductive Load Switching Times definitions.

MECHANICAL DATA

Dimensions in mm

Net Mass: 2 g

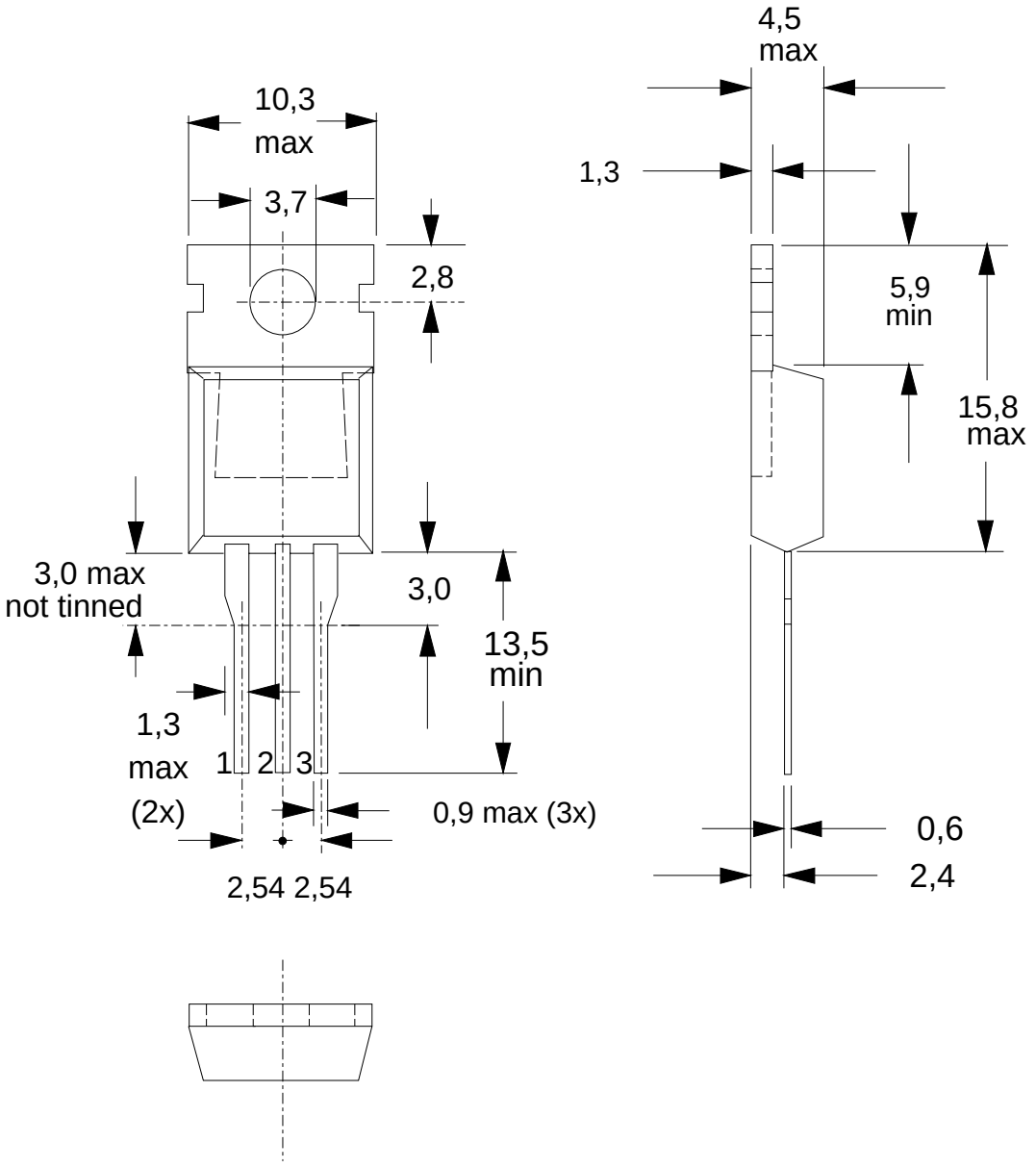


Fig.19. TO220AB; pin 2 connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Refer to mounting instructions for TO220 envelopes.
3. Epoxy meets UL94 V0 at 1/8".

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 are given 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 this 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.	

LIFE SUPPORT APPLICATIONS

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