

Insulated Gate Bipolar Transistor (IGBT)

BUK854-500 IS

GENERAL DESCRIPTION

N-channel insulated gate bipolar power transistor in a plastic envelope.
The device is intended for use in automotive ignition applications, and other general purpose switching applications requiring low on-state voltage.

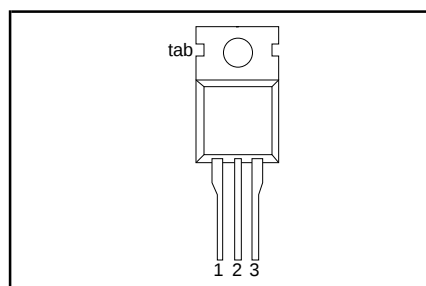
QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{CE}	Collector-emitter voltage	500	V
V_{EC}	Reverse Collector-Emitter Voltage	25	V
I_C	Collector current (DC)	15	A
P_{tot}	Total power dissipation	85	W
V_{CEsat}	Collector-emitter on-state voltage	2	V

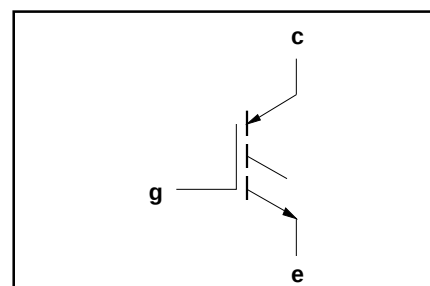
PINNING - TO220AB

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	-	-25	500	V
V_{CGR}	Collector-gate voltage	$R_{GE} = 20 \text{ k}\Omega$	-	500	V
$\pm V_{GE}$	Gate-emitter voltage	-	-	30	V
I_C	Collector current (DC)	$T_{mb} = 25^\circ\text{C}$	-	15	A
I_C	Collector current (DC)	$T_{mb} = 100^\circ\text{C}$	-	8.5	A
I_{CM}	Collector current (pulsed peak value, on-state)	-	-	25	A
I_{CLM}	Collector current (clamped inductive load)	$V_{CL} = 350 \text{ V}$ $R_G \geq 1 \text{ k}\Omega$	-	25	A
E_{ECR}	Reverse Avalanche Energy (repetitive)	$I_E = 2 \text{ A}$	-	5	mJ
P_{tot}	Total power dissipation	$T_{mb} = 25^\circ\text{C}$	-	85	W
T_{stg}	Storage temperature	-	- 55	150	$^\circ\text{C}$
T_j	Junction Temperature	-	-	150	$^\circ\text{C}$

THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$R_{th \text{ j-mb}}$	Junction to mounting base	-	-	1.47	K/W
$R_{th \text{ j-a}}$	Junction to ambient	In free air	60	-	K/W

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STATIC CHARACTERISTICS

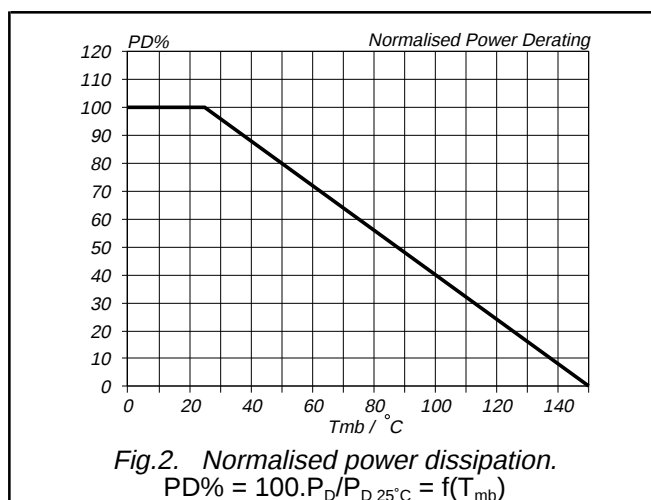
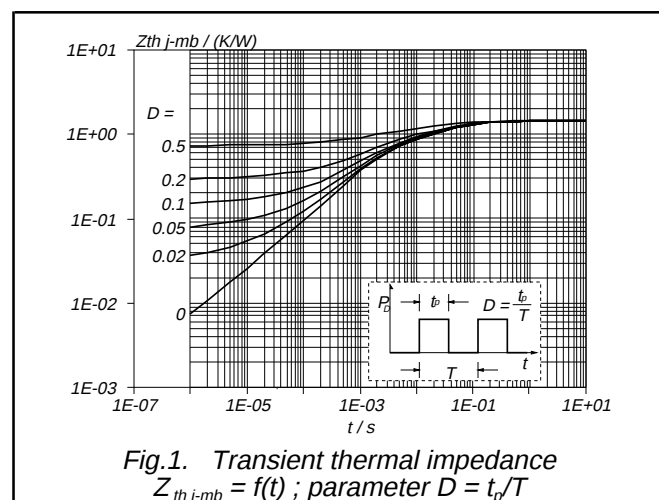
 $T_{mb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CES}$	Collector-emitter breakdown voltage	$V_{GE} = 0\text{ V}; I_C = 0.25\text{ mA}$	500	-	-	V
$V_{(BR)EC}$	Reverse Collector-Emitter breakdown voltage	$I_E = 10\text{ mA}$	25	30	-	V
$V_{GE(TO)}$	Gate threshold voltage	$V_{CE} = V_{GE}; I_C = 1\text{ mA}$	2.5	4	5.5	V
I_{CES}	Zero gate voltage collector current	$V_{CE} = 500\text{ V}; V_{GE} = 0\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$	-	1	20	μA
I_{CES}	Zero gate voltage collector current	$V_{CE} = 500\text{ V}; V_{GE} = 0\text{ V}; T_j = 125\text{ }^{\circ}\text{C}$	-	0.1	1	mA
I_{EC}	Reverse collector current	$V_{CE} = -25\text{ V}$	-	0.5	10	mA
I_{EC}	Reverse collector current	$V_{CE} = -25\text{ V}; T_j = 125\text{ }^{\circ}\text{C}$	-	5	-	mA
I_{GES}	Gate emitter leakage current	$V_{GE} = \pm 30\text{ V}; V_{CE} = 0\text{ V}$	-	10	100	nA
V_{CESat}	Collector-emitter saturation voltage	$V_{GE} = 15\text{ V}; I_C = 8.5\text{ A}$	-	1.4	2	V
		$V_{GE} = 15\text{ V}; I_C = 15\text{ A}$	-	1.7	-	V
		$V_{GE} = 15\text{ V}; I_C = 8.5\text{ A}; T_j = 100\text{ }^{\circ}\text{C}$	-	1.5	2	V
		$V_{GE} = 15\text{ V}; I_C = 8.5\text{ A}; T_j = -40\text{ }^{\circ}\text{C}$	-	1.4	1.9	V

DYNAMIC CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fe}	Forward transconductance	$V_{CE} = 15\text{ V}; I_C = 3\text{ A}$	1.5	4.5	-	S
C_{ies}	Input capacitance	$V_{GE} = 0\text{ V}; V_{CE} = 25\text{ V}; f = 1\text{ MHz}$	-	400	750	pF
C_{oes}	Output capacitance		-	40	80	pF
C_{res}	Feedback capacitance		-	15	40	pF
$t_{d\ off}$	Turn-off delay time	$I_C = 8.5\text{ A}; V_{CL} = 350\text{ V}; R_G = 1\text{ k}\Omega;$	-	3.5	4.5	μs
t_f	Fall time	$V_{GE} = 15\text{ V}; T_j = 100\text{ }^{\circ}\text{C};$ Inductive Load	-	4	6	μs
t_c	Crossover Time		-	5.5	7.5	μs
E_{off}	Turn-off Energy loss		-	6.5	9	mJ



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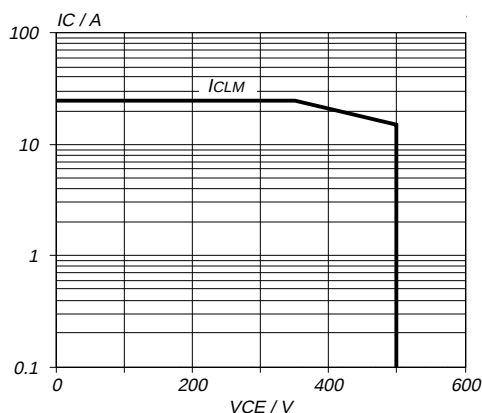


Fig.3. Turn-off Safe Operating Area
conditions: $T_j \leq T_{jmax}$; $R_G \geq 1 \text{ k}\Omega$

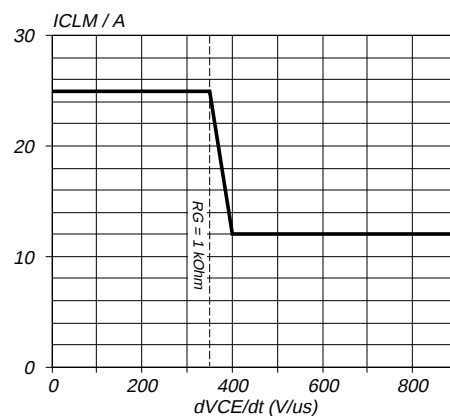


Fig.6. Derating of I_{CLM} with turn-off dV_{CE}/dt
conditions: $V_{CL} \leq 350 \text{ V}$; $T_j \leq T_{jmax}$

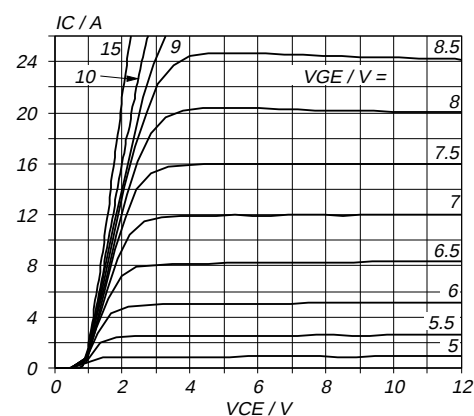


Fig.4. Typical Output Characteristics
 $I_C = f(V_{CE})$; parameter V_{GE} ; conditions: $T_j = 25^\circ\text{C}$

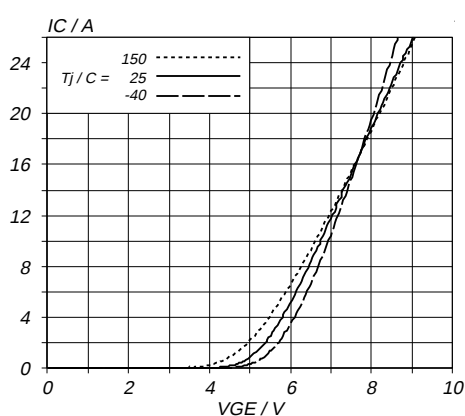


Fig.7. Typical Transfer Characteristics
 $I_C = f(V_{GE})$, parameter T_j ; conditions: $V_{CE} = 15 \text{ V}$

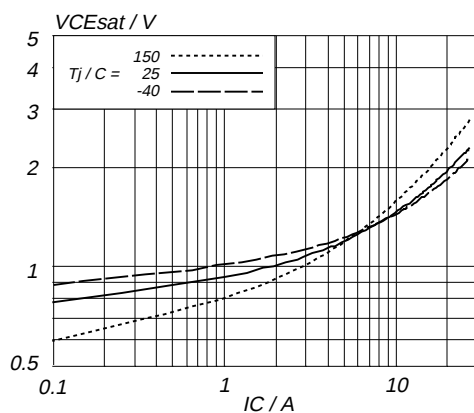


Fig.5. Typical On-state Voltage
 $V_{CEsat} = f(I_C)$; parameter T_j ; conditions: $V_{GE} = 15 \text{ V}$

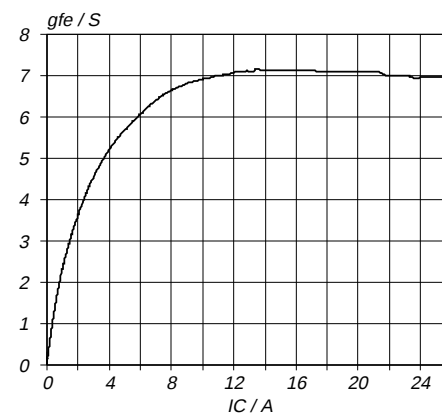


Fig.8. Typical Forward Transconductance
 $g_{fe} = f(I_C)$; conditions: $V_{CE} = 15 \text{ V}$; $T_j = 25^\circ\text{C}$

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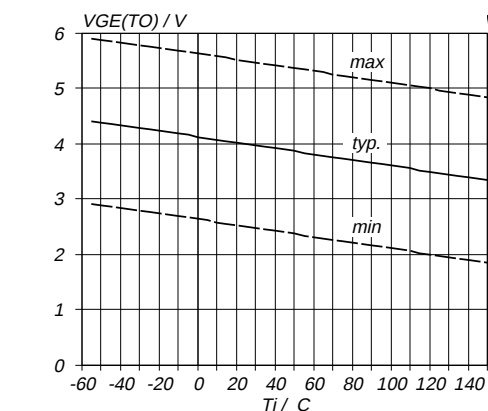


Fig.9. Gate Threshold Voltage
 $V_{GE(TO)} = f(T_j)$; conditions: $I_C = 1 \text{ mA}$; $V_{CE} = V_{GE}$

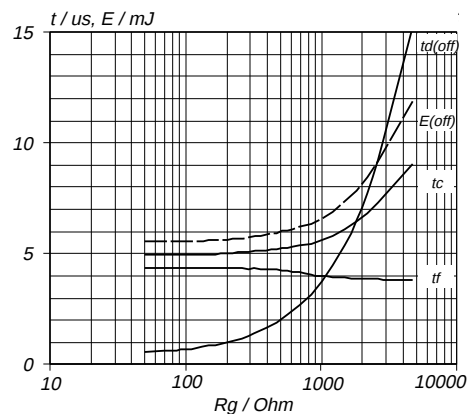


Fig.12. Typical Switching Characteristics vs. R_G
 conditions: $T_j = 100^\circ\text{C}$; $I_C = 8.5 \text{ A}$; $V_{CL} = 350 \text{ V}$

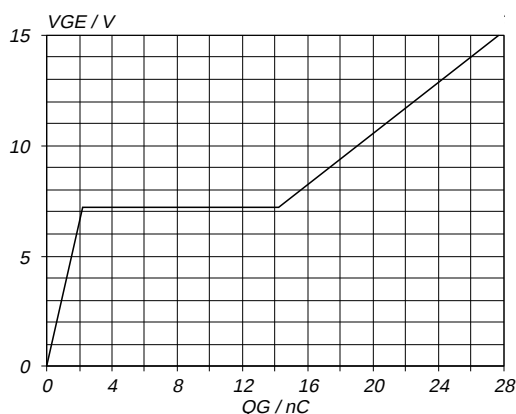


Fig.10. Typical Turn-on Gate Charge Characteristics
 $V_{GE} = f(Q_G)$; conditions: $I_C = 8.5 \text{ A}$; $V_{CE} = 350 \text{ V}$

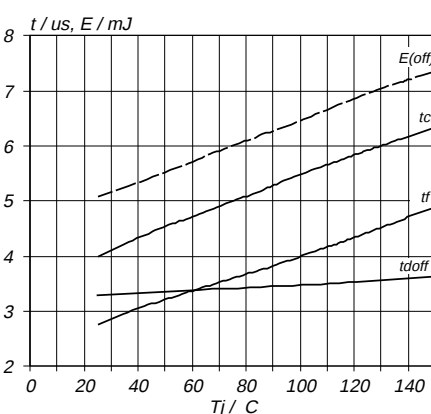


Fig.13. Typical Switching Characteristics vs. T_j
 conditions: $I_C = 8.5 \text{ A}$; $V_{CL} = 350 \text{ V}$; $R_G = 1 \text{ k}\Omega$

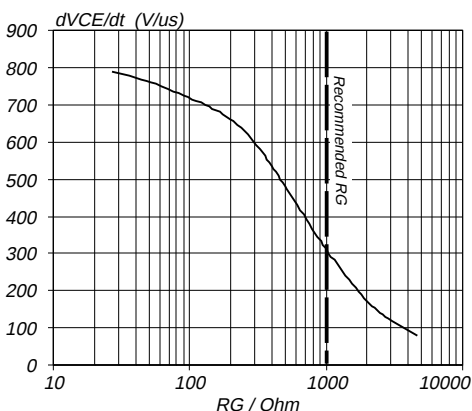


Fig.11. Typical Turn-off dV_{CE}/dt vs. R_G
 conditions: $T_j = 100^\circ\text{C}$; $I_C = 8.5 \text{ A}$; $V_{CL} = 350 \text{ V}$

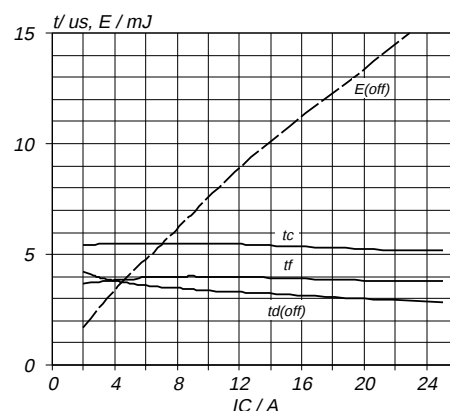
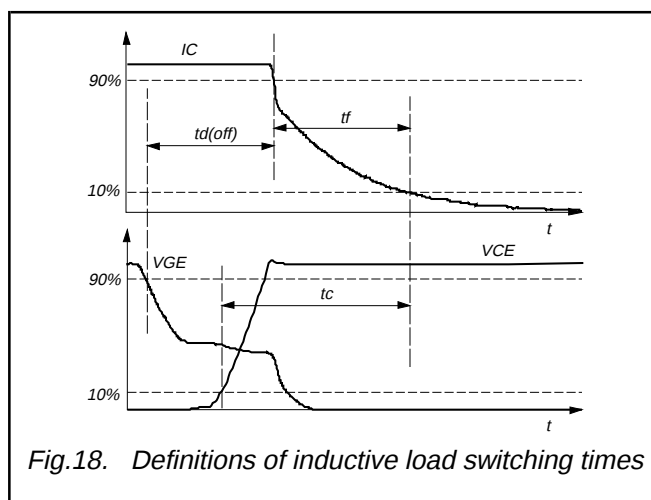
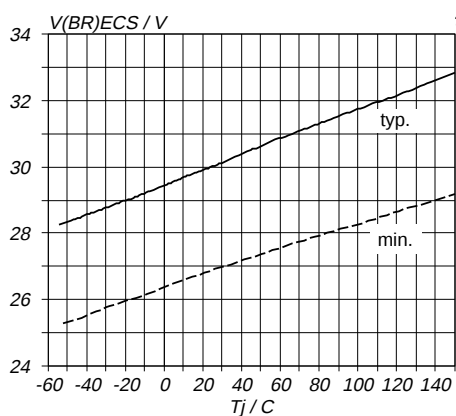
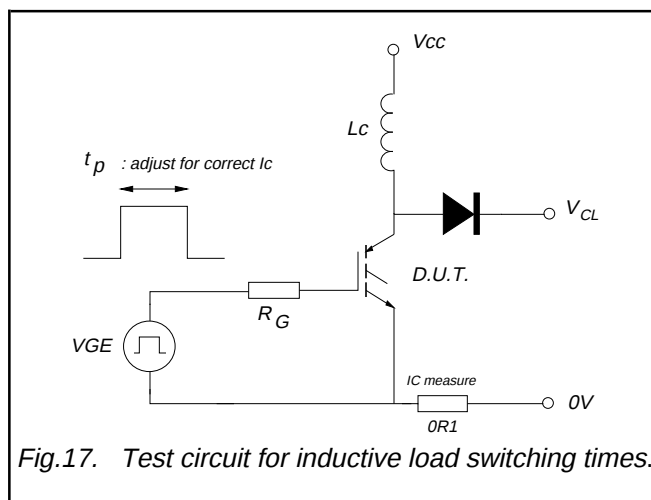
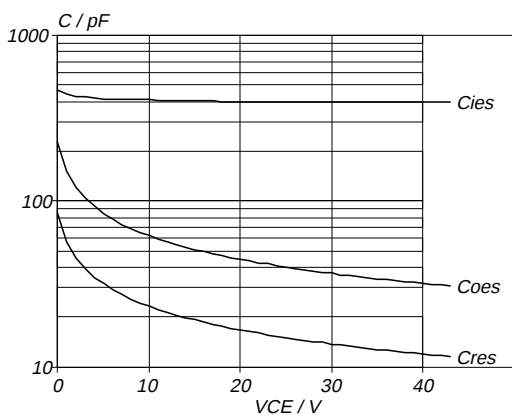


Fig.14. Typical Switching Characteristics vs. I_C
 conditions: $T_j = 100^\circ\text{C}$; $V_{CL} = 350 \text{ V}$; $R_G = 1 \text{ k}\Omega$

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MECHANICAL DATA

Dimensions in mm

Net Mass: 2 g

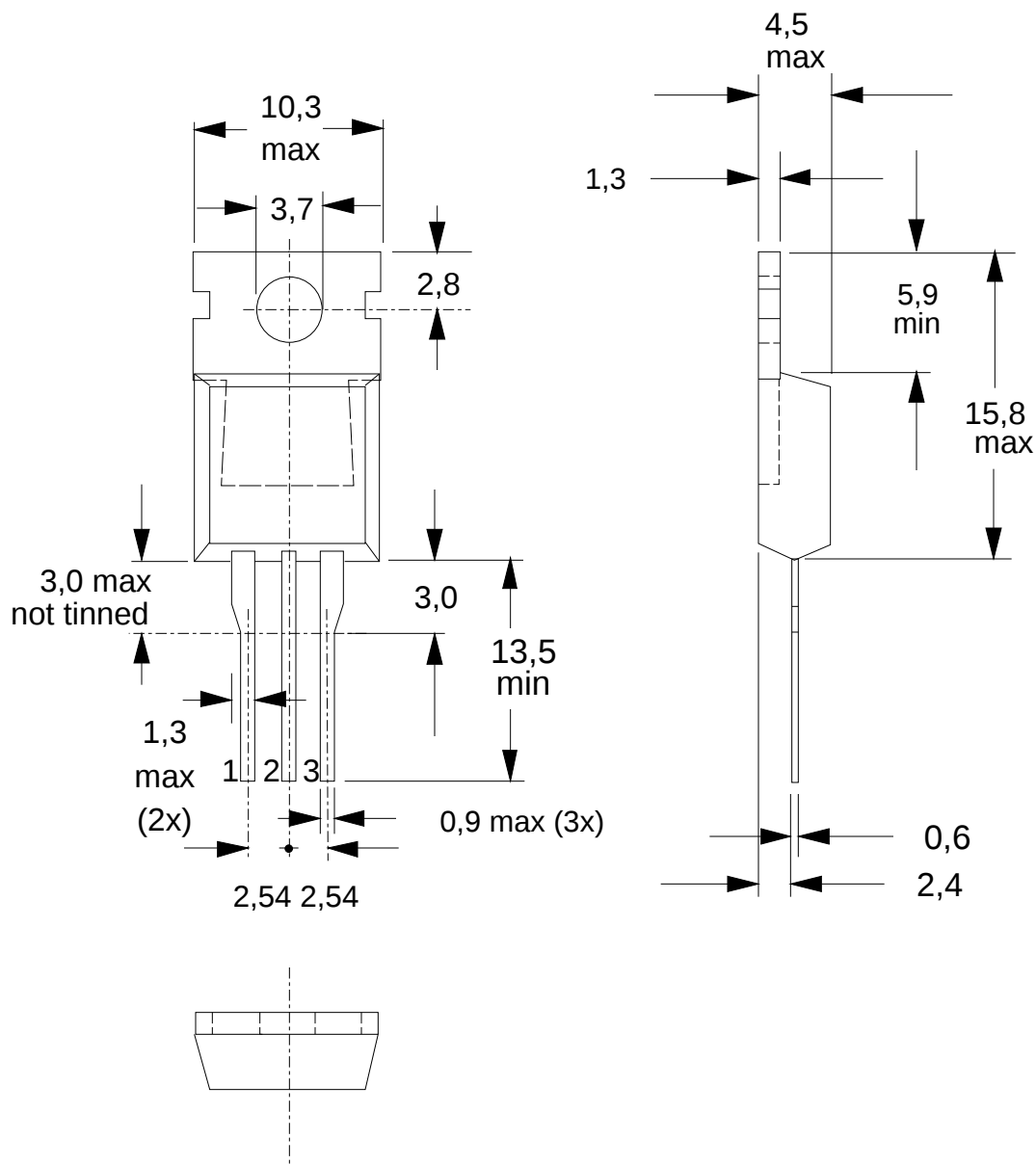


Fig.19. TO220AB; pin 2 connected to mounting base.

Notes

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

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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.	
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