

PowerMOS transistor

BUK455-450B

T-39-13

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{DS}	Drain-source voltage	450	V
I_D	Drain current (DC)	5.7	A
P_{tot}	Total power dissipation	100	W
$R_{DS(ON)}$	Drain-source on-state resistance	1.3	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:
1 = Gate
2 = Drain
3 = Source

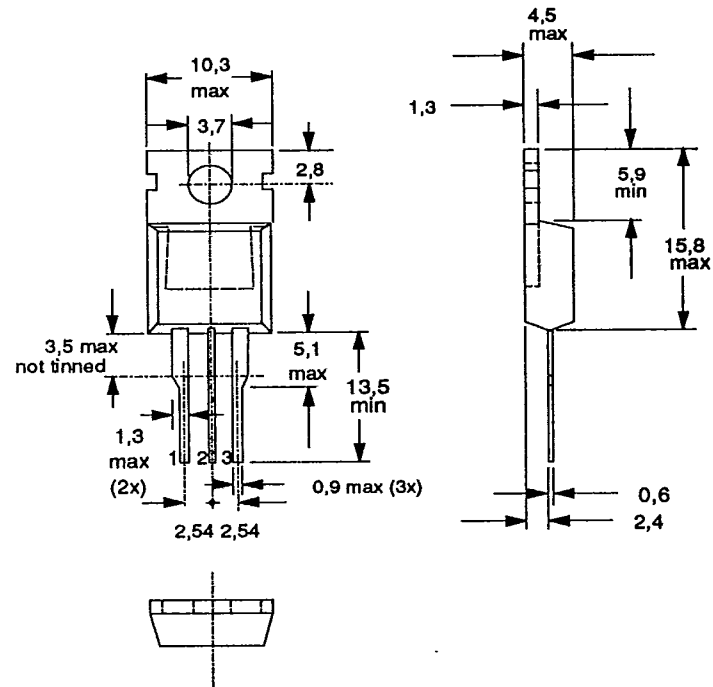
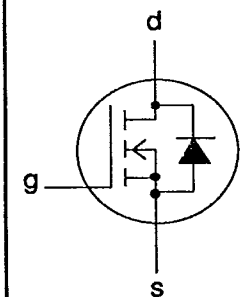


Fig.1 TO220AB; drain connected to mounting base.

- 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.

PowerMOS transistor

BUK455-450B

T-39-13

RATINGS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	Drain-source voltage	-	-	450	V
V_{DGR}	Drain-gate voltage	$R_{GS} = 20 \text{ k}\Omega$	-	450	V
$\pm V_{GS}$	Gate-source voltage	-	-	30	V
I_D	Drain current (DC)	$T_{mb} = 25^\circ\text{C}$	-	5.7	A
I_D	Drain current (DC)	$T_{mb} = 100^\circ\text{C}$	-	3.6	A
I_{DM}	Drain current (pulse peak value)	$T_{mb} = 25^\circ\text{C}$	-	23	A
P_{tot}	Total power dissipation	$T_{mb} = 25^\circ\text{C}$	-	100	W
T_{stg}	Storage temperature	-	-55	150	$^\circ\text{C}$
T_j	Junction Temperature	-	-	150	$^\circ\text{C}$

THERMAL RESISTANCES

From junction to mounting base	$R_{th\ j-mb} = 1.25 \text{ K/W}$
From junction to ambient	$R_{th\ j-a} = 60 \text{ K/W}$

STATIC CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0 \text{ V}; I_D = 0.25 \text{ mA}$	450	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}; I_D = 1 \text{ mA}$	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	$V_{DS} = 450 \text{ V}; V_{GS} = 0 \text{ V}; T_j = 25^\circ\text{C}$	-	2	20	μA
I_{DSS}	Zero gate voltage drain current	$V_{DS} = 450 \text{ V}; V_{GS} = 0 \text{ V}; T_j = 125^\circ\text{C}$	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	$V_{GS} = \pm 30 \text{ V}; V_{DS} = 0 \text{ V}$	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	$V_{GS} = 10 \text{ V}; I_D = 2.5 \text{ A}$	-	1.2	1.3	Ω

DYNAMIC CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	$V_{DS} = 25 \text{ V}; I_D = 2.5 \text{ A}$	3.5	4.5	-	S
C_{iss}	Input capacitance	$V_{GS} = 0 \text{ V}; V_{DS} = 25 \text{ V}; f = 1 \text{ MHz}$	-	750	1000	pF
C_{oss}	Output capacitance		-	90	140	pF
C_{rss}	Feedback capacitance		-	40	70	pF
$t_{d\ on}$	Turn-on delay time	$V_{DD} = 30 \text{ V}; I_D = 2.6 \text{ A};$	-	10	45	ns
t_r	Turn-on rise time	$V_{GS} = 10 \text{ V}; R_{GS} = 50 \Omega;$	-	45	60	ns
$t_{d\ off}$	Turn-off delay time	$R_{gen} = 50 \Omega$	-	100	140	ns
t_f	Turn-off fall time		-	40	65	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

PowerMOS transistor

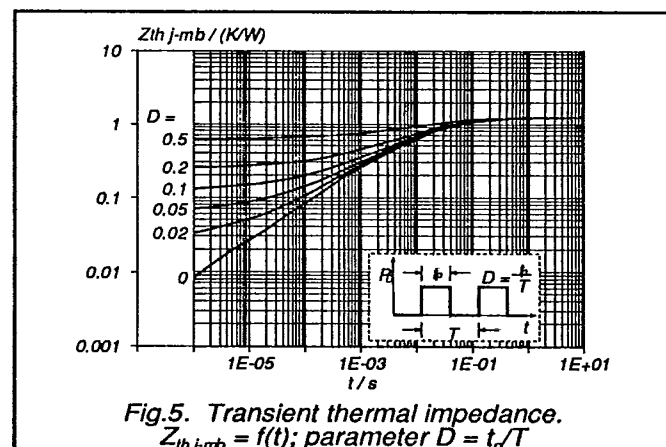
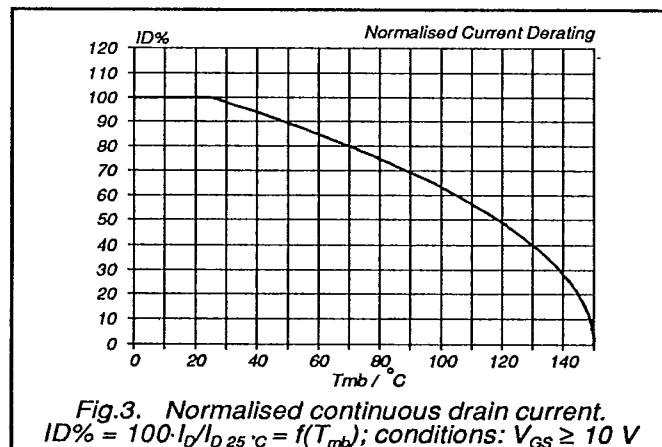
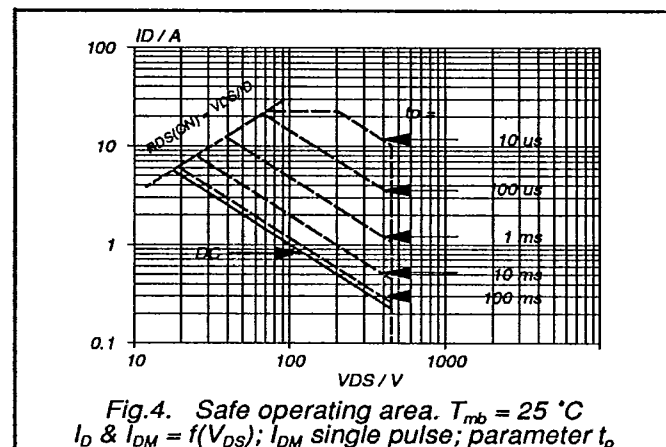
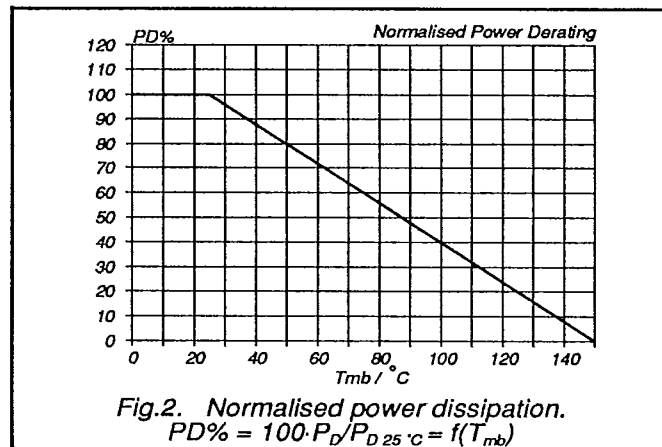
BUK455-450B

T-39-13

REVERSE DIODE RATINGS AND CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	5.7	A
I_{DRM}	Pulsed reverse drain current	-	-	-	23	A
V_{SD}	Diode forward voltage	$I_F = 5.7\text{ A}; V_{GS} = 0\text{ V}$	-	1.1	1.5	V
t_{rr}	Reverse recovery time	$I_F = 5.7\text{ A}; -di_F/dt = 100\text{ A}/\mu\text{s}; V_{GS} = 0\text{ V}; V_R = 100\text{ V}$	-	1200	-	ns
Q_{rr}	Reverse recovery charge	$I_F = 5.7\text{ A}; -di_F/dt = 100\text{ A}/\mu\text{s}; V_{GS} = 0\text{ V}; V_R = 100\text{ V}$	-	6.0	-	μC



PowerMOS transistor

BUK455-450B

T-39-13

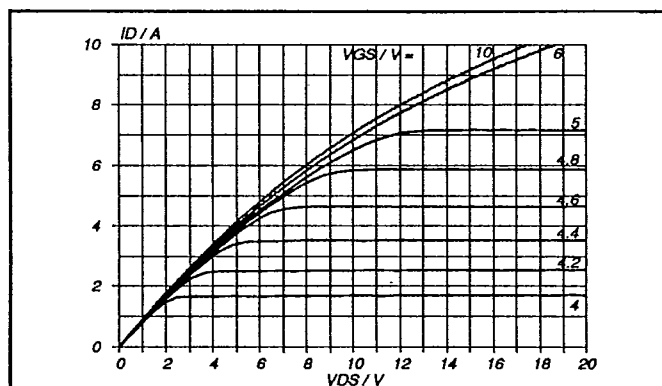


Fig. 6. ¹ Typical output characteristics, $T_j = 25^\circ\text{C}$.
 $I_D = f(V_{DS})$; parameter V_{GS}

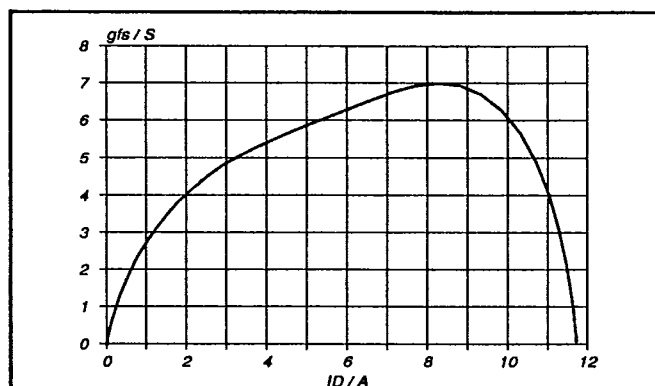


Fig. 9. Typical transconductance, $T_j = 25^\circ\text{C}$.
 $g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

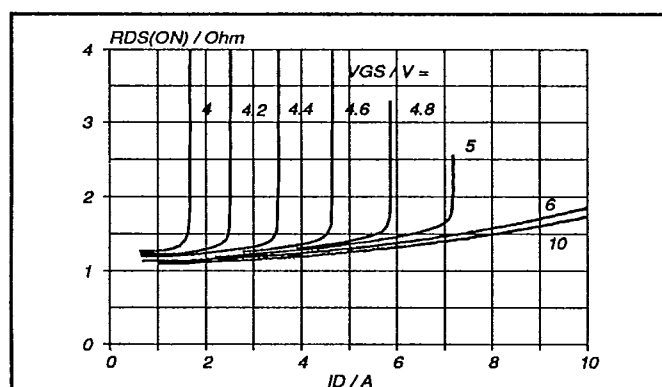


Fig. 7. Typical on-state resistance, $T_j = 25^\circ\text{C}$.
 $R_{DS(ON)} = f(I_D)$; parameter V_{GS}

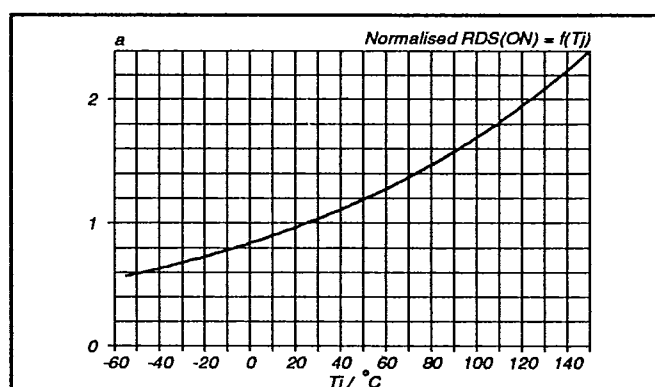


Fig. 10. Normalised drain-source on-state resistance.
 $a = R_{DS(ON)}/R_{DS(ON)25^\circ\text{C}} = f(T_j)$; $I_D = 2.5$ A; $V_{GS} = 10$ V

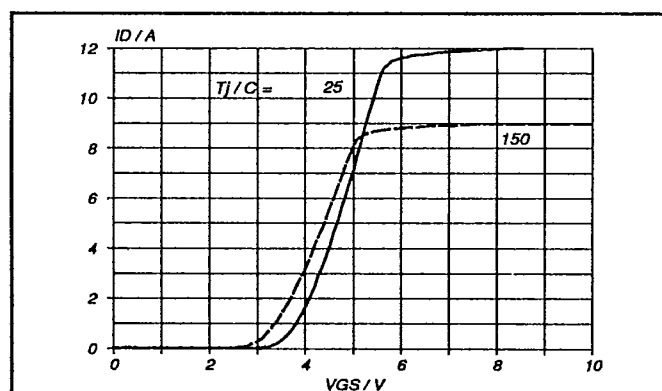


Fig. 8. Typical transfer characteristics.
 $I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

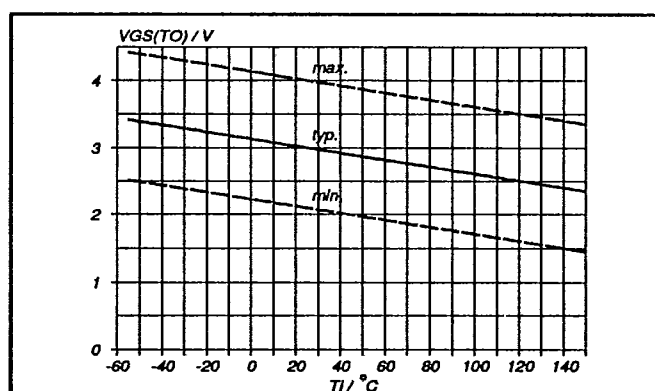


Fig. 11. Gate threshold voltage.
 $V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

PowerMOS transistor

BUK455-450B

T-39-13

