

PowerMOS transistor

BUK454-600B

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.

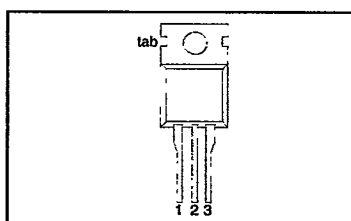
QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{DS}	Drain-source voltage	600	V
I_D	Drain current (DC)	2.6	A
P_{tot}	Total power dissipation	75	W
$R_{DS(ON)}$	Drain-source on-state resistance	4.5	Ω

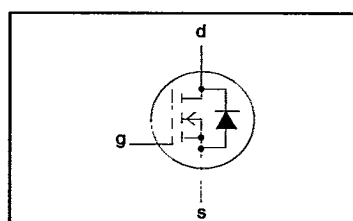
PINNING - TO220AB

PIN	DESCRIPTION
1	gate
2	drain
3	source
tab	drain

PIN CONFIGURATION



SYMBOL



LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	Drain-source voltage	-	-	600	V
V_{DGR}	Drain-gate voltage	$R_{GS} = 20 \text{ k}\Omega$	-	600	V
$\pm V_{GS}$	Gate-source voltage	-	-	30	V
I_D	Drain current (DC)	$T_{mb} = 25^\circ\text{C}$	-	2.6	A
I_D	Drain current (DC)	$T_{mb} = 100^\circ\text{C}$	-	1.6	A
I_{DM}	Drain current (pulse peak value)	$T_{mb} = 25^\circ\text{C}$	-	10.4	A
P_{tot}	Total power dissipation	$T_{mb} = 25^\circ\text{C}$	-	75	W
T_{stg}	Storage temperature	-	-55	150	$^\circ\text{C}$
T_j	Junction Temperature	-	-	150	$^\circ\text{C}$

THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
R_{thj-mb}	Thermal resistance junction to mounting base		-	-	1.67	K/W
R_{thj-a}	Thermal resistance junction to ambient		-	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
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0\text{ V}; I_D = 0.25\text{ mA}$	600	-	-	V
$V_{GS(TH)}$	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	$V_{DS} = 600\text{ V}; V_{GS} = 0\text{ V}; T_J = 25\text{ }^{\circ}\text{C}$	-	2	20	μA
I_{DSS}	Zero gate voltage drain current	$V_{DS} = 600\text{ V}; V_{GS} = 0\text{ V}; T_J = 125\text{ }^{\circ}\text{C}$	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	$V_{DS} = \pm 30\text{ V}; V_{GS} = 0\text{ V}$	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	$V_{GS} = 10\text{ V}; I_D = 1.2\text{ A}$	-	4.0	4.5	Ω

DYNAMIC CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	$V_{DS} = 25\text{ V}; I_D = 1.2\text{ A}$	1.9	2.5	-	S
C_{iss}	Input capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 25\text{ V}; f = 1\text{ MHz}$	-	300	500	pF
C_{oss}	Output capacitance		-	50	80	pF
C_{rss}	Feedback capacitance		-	30	55	pF
t_{don}	Turn-on delay time	$V_{DD} = 30\text{ V}; I_D = 2.1\text{ A};$	-	15	20	ns
t_r	Turn-on rise time	$V_{GS} = 10\text{ V}; R_{GS} = 50\text{ }\Omega;$	-	40	60	ns
t_{doff}	Turn-off delay time	$R_{gen} = 50\text{ }\Omega$	-	50	65	ns
t_f	Turn-off fall time		-	30	40	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

REVERSE DIODE LIMITING VALUES AND CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	2.8	A
I_{DRM}	Pulsed reverse drain current	-	-	-	11.2	A
V_{SD}	Diode forward voltage	$I_F = 2.8\text{ A}; V_{GS} = 0\text{ V}$	-	1.0	1.3	V
t_{rr}	Reverse recovery time	$I_F = 2.8\text{ A}; -dI_F/dt = 100\text{ A}/\mu\text{s};$	-	350	-	ns
Q_{rr}	Reverse recovery charge	$V_{GS} = 0\text{ V}; V_R = 100\text{ V}$	-	3.5	-	μC

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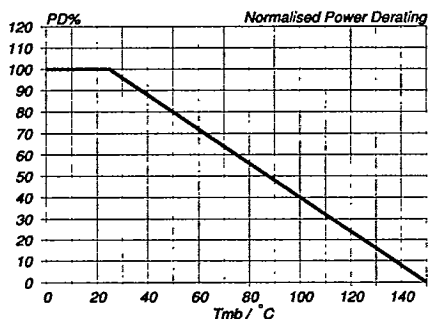


Fig. 1. Normalised power dissipation.
 $PD\% = 100 \cdot P_D / P_{D\ 25\ ^\circ C} = f(T_{mb})$

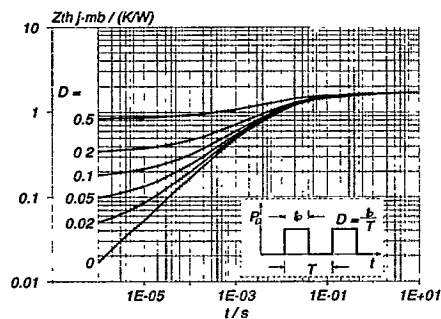


Fig. 4. Transient thermal impedance.
 $Z_{th\ j-mb} = f(t)$; parameter $D = t_p / T$

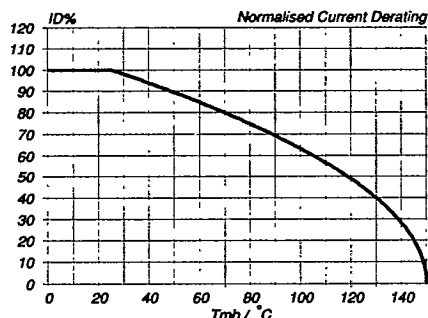


Fig. 2. Normalised continuous drain current.
 $ID\% = 100 \cdot I_D / I_{D\ 25\ ^\circ C} = f(T_{mb})$; conditions: $V_{GS} \geq 10\ V$

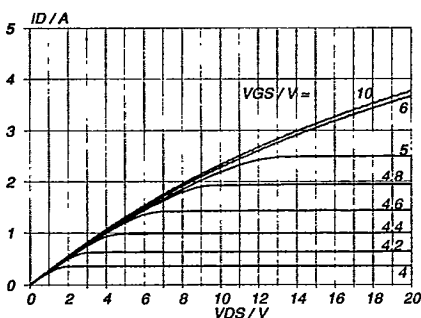


Fig. 5. Typical output characteristics, $T_j = 25\ ^\circ C$.
 $I_D = f(V_{DS})$; parameter V_{GS}

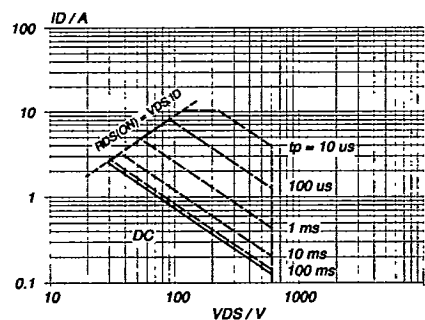


Fig. 3. Safe operating area. $T_{mb} = 25\ ^\circ C$.
 I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

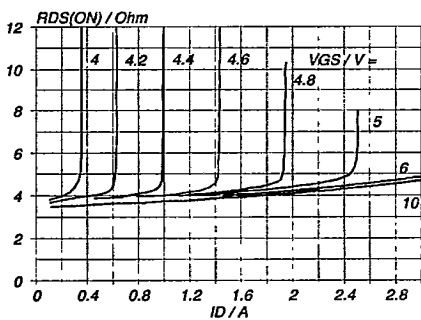
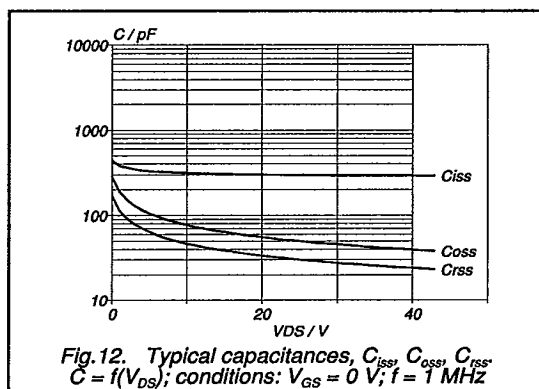
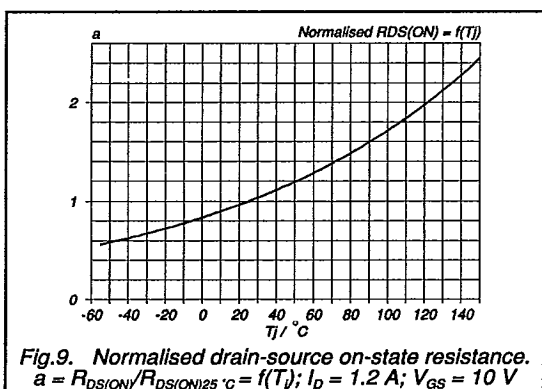
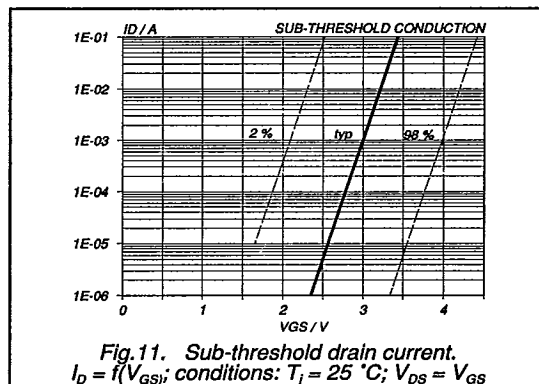
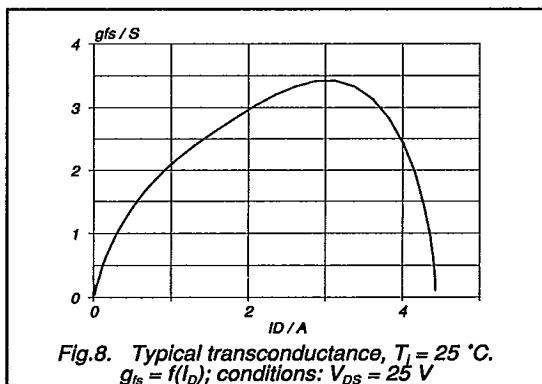
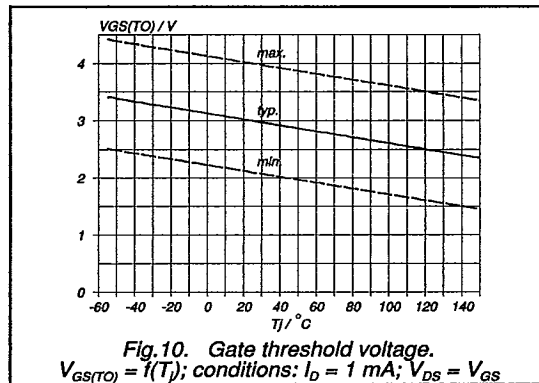
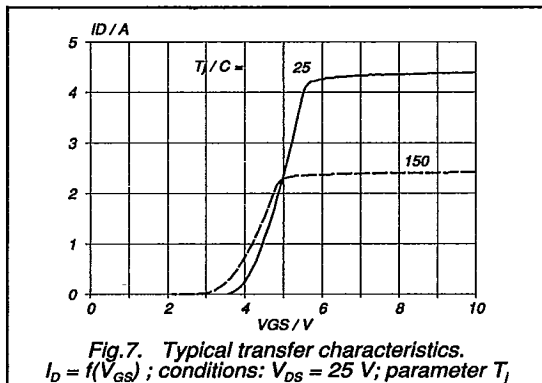


Fig. 6. Typical on-state resistance, $T_j = 25\ ^\circ C$.
 $R_{DS(ON)} = f(I_D)$; parameter V_{GS}

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