

## PowerMOS transistor

BUK446-1000B

## GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full-pack 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.

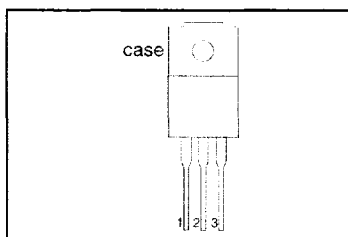
## QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
$V_{DS}$	Drain-source voltage	1000	V
$I_D$	Drain current (DC)	1.5	A
$P_{tot}$	Total power dissipation	30	W
$R_{DS(ON)}$	Drain-source on-state resistance	5	$\Omega$

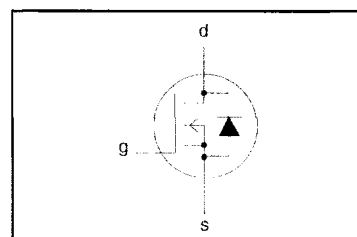
## PINNING - SOT186

PIN	DESCRIPTION
1	gate
2	drain
3	source
case	isolated

## 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	-	-	1000	V
$V_{DGR}$	Drain-gate voltage	$R_{GS} = 20 \text{ k}\Omega$	-	1000	V
$\pm V_{GS}$	Gate-source voltage	-	-	30	V
$I_D$	Drain current (DC)	$T_{hs} = 25 \text{ }^\circ\text{C}$	-	1.5	A
$I_D$	Drain current (DC)	$T_{hs} = 100 \text{ }^\circ\text{C}$	-	1.0	A
$I_{DM}$	Drain current (pulse peak value)	$T_{hs} = 25 \text{ }^\circ\text{C}$	-	6	A
$P_{tot}$	Total power dissipation	$T_{hs} = 25 \text{ }^\circ\text{C}$	-	30	W
$T_{slg}$	Storage temperature	-	-55	150	$^\circ\text{C}$
$T_j$	Junction Temperature	-	-	150	$^\circ\text{C}$

## THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$R_{th-j-hs}$	Thermal resistance junction to heatsink	with heatsink compound	-	-	4.16	K/W
$R_{th-j-a}$	Thermal resistance junction to ambient		-	55	-	K/W

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## STATIC CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0\text{ V}; I_D = 0.25\text{ mA}$	1000	-	-	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	$V_{DS} = 1000\text{ V}; V_{GS} = 0\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$	-	2	20	$\mu\text{A}$
$I_{DSS}$	Zero gate voltage drain current	$V_{DS} = 1000\text{ V}; V_{GS} = 0\text{ V}; T_j = 125\text{ }^{\circ}\text{C}$	-	0.1	1.0	mA
$I_{GSS}$	Gate source leakage current	$V_{GS} = \pm 30\text{ V}; V_{DS} = 0\text{ V}$	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	$V_{GS} = 10\text{ V}; I_D = 1.5\text{ A}$	-	4.5	5.0	$\Omega$

## DYNAMIC CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$g_{fs}$	Forward transconductance	$V_{DS} = 25\text{ V}; I_D = 1.5\text{ A}$	3.0	4.3	-	S
$C_{iss}$	Input capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 25\text{ V}; f = 1\text{ MHz}$	-	1000	1250	pF
$C_{oss}$	Output capacitance		-	80	120	pF
$C_{rss}$	Feedback capacitance		-	30	50	pF
$t_{d\ on}$	Turn-on delay time	$V_{DD} = 30\text{ V}; I_D = 2.3\text{ A};$ $V_{GS} = 10\text{ V}; R_{GS} = 50\text{ }\Omega;$ $R_{gen} = 50\text{ }\Omega$	-	10	25	ns
$t_r$	Turn-on rise time		-	50	70	ns
$t_{d\ off}$	Turn-off delay time		-	130	150	ns
$t_f$	Turn-off fall time		-	40	60	ns
$L_d$	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

## ISOLATION LIMITING VALUE &amp; CHARACTERISTIC

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{isol}$	Repetitive peak voltage from all three terminals to external heatsink	R.H. $\leq 65\%$ ; clean and dustfree	-	-	1500	V
$C_{isol}$	Capacitance from T2 to external heatsink	$f = 1\text{ MHz}$	-	12	-	pF

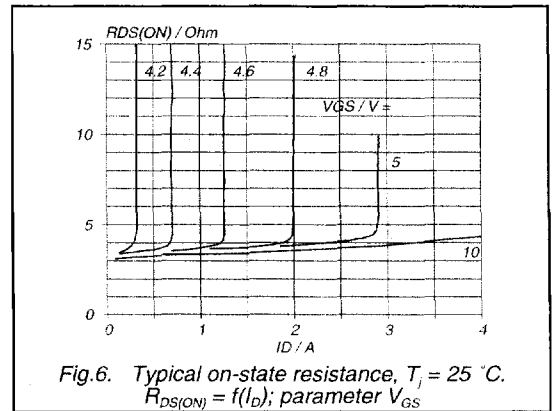
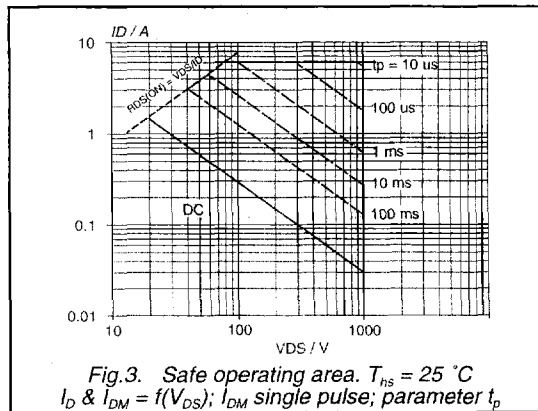
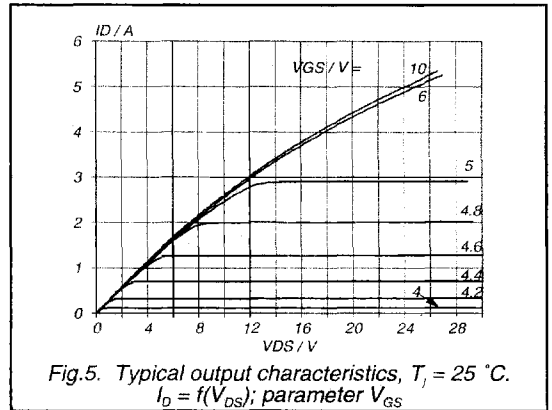
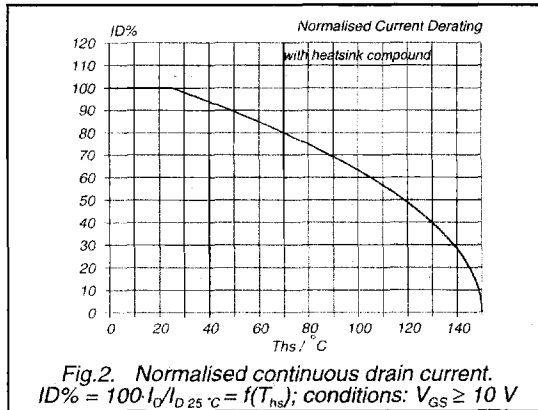
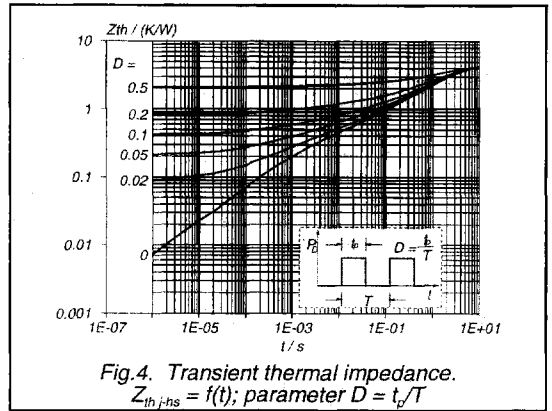
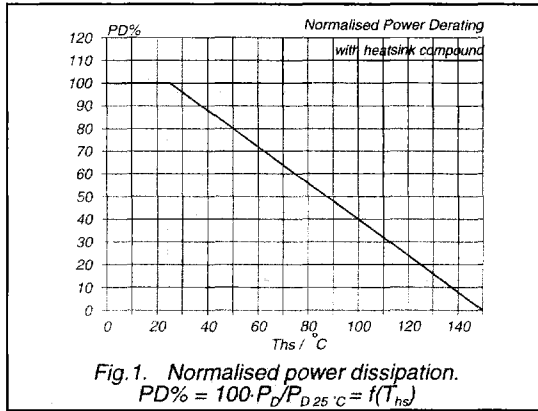
## REVERSE DIODE LIMITING VALUES AND CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{DR}$	Continuous reverse drain current	-	-	-	1.7	A
$I_{DRM}$	Pulsed reverse drain current	-	-	-	6.8	A
$V_{SD}$	Diode forward voltage	$I_F = 1.7\text{ A}; V_{GS} = 0\text{ V}$	-	1.0	1.3	V
$t_{rr}$	Reverse recovery time	$I_F = 1.7\text{ A}; -di_F/dt = 100\text{ A}/\mu\text{s};$ $V_{GS} = 0\text{ V}; V_R = 100\text{ V}$	-	1800	-	ns
$Q_{rr}$	Reverse recovery charge		-	12	-	$\mu\text{C}$

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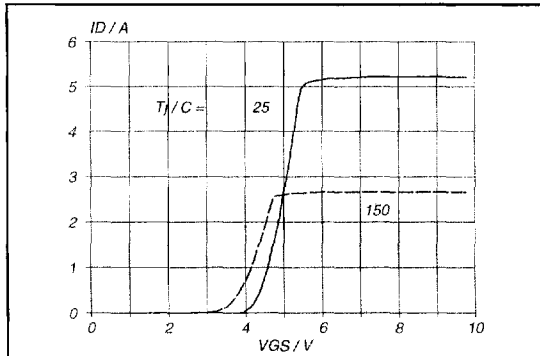


Fig. 7. Typical transfer characteristics.  
 $I_D = f(V_{GS})$ ; conditions:  $V_{DS} = 25\text{ V}$ ; parameter  $T_j$

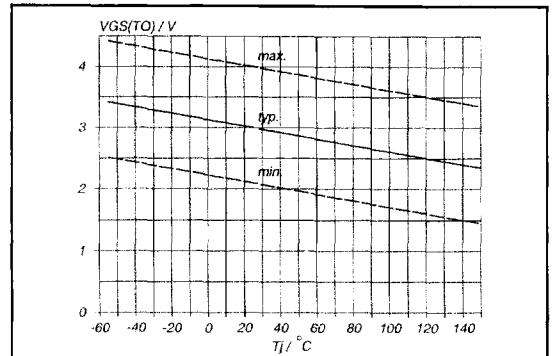


Fig. 10. Gate threshold voltage.  
 $V_{GS(T0)} = f(T_j)$ ; conditions:  $I_D = 1\text{ mA}$ ;  $V_{DS} = V_{GS}$

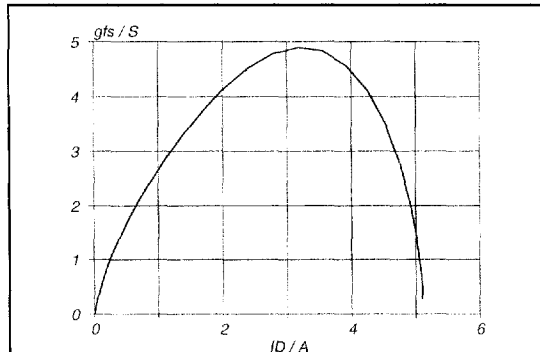


Fig. 8. Typical transconductance,  $T_j = 25\text{ °C}$ .  
 $g_{fs} = f(I_D)$ ; conditions:  $V_{DS} = 25\text{ V}$

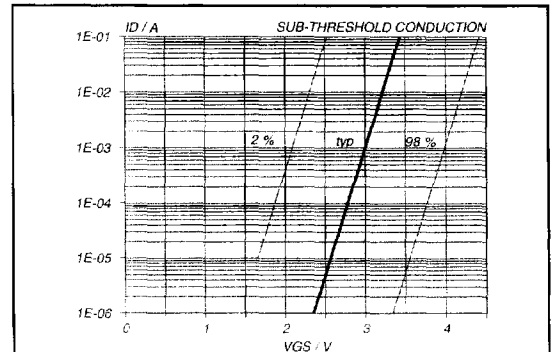


Fig. 11. Sub-threshold drain current.  
 $I_D = f(V_{GS})$ ; conditions:  $T_j = 25\text{ °C}$ ;  $V_{DS} = V_{GS}$

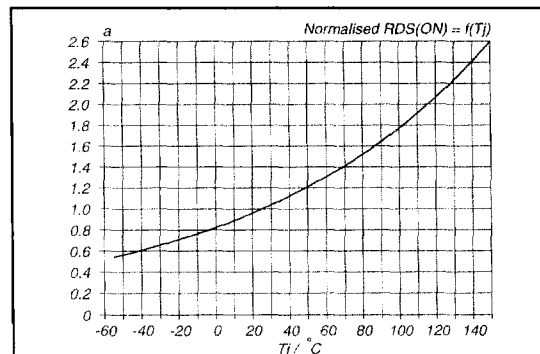


Fig. 9. Normalised drain-source on-state resistance.  
 $a = R_{DS(ON)}/R_{DS(ON)25\text{ °C}} = f(T_j)$ ;  $I_D = 1.5\text{ A}$ ;  $V_{GS} = 10\text{ V}$

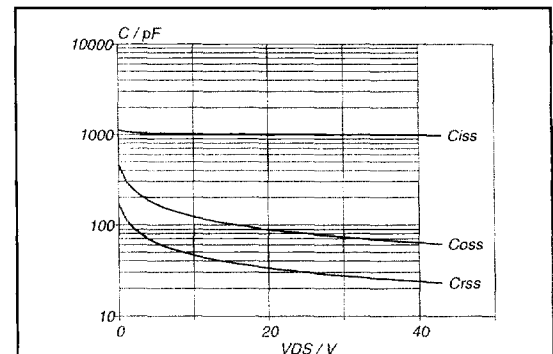


Fig. 12. Typical capacitances,  $C_{iss}$ ,  $C_{oss}$ ,  $C_{rss}$ .  
 $C = f(V_{DS})$ ; conditions:  $V_{GS} = 0\text{ V}$ ;  $f = 1\text{ MHz}$

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