

PowerMOS transistor

BUK438-500B

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.

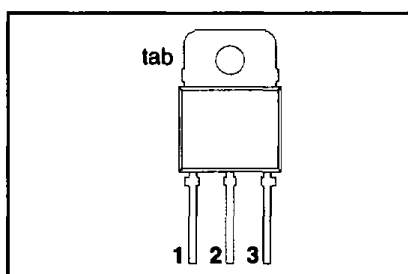
QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{DS}	Drain-source voltage	500	V
I_D	Drain current (DC)	13.5	A
P_{tot}	Total power dissipation	220	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.5	Ω

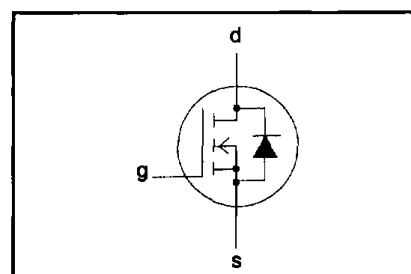
PINNING - SOT93

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	-	-	500	V
V_{DGR}	Drain-gate voltage	$R_{GS} = 20\text{ k}\Omega$	-	500	V
$\pm V_{GS}$	Gate-source voltage	-	-	30	V
I_D	Drain current (DC)	$T_{mb} = 25\text{ }^\circ\text{C}$	-	13.5	A
I_D	Drain current (DC)	$T_{mb} = 100\text{ }^\circ\text{C}$	-	8.5	A
I_{DM}	Drain current (pulse peak value)	$T_{mb} = 25\text{ }^\circ\text{C}$	-	54	A
P_{tot}	Total power dissipation	$T_{mb} = 25\text{ }^\circ\text{C}$	-	220	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
$R_{th\ j-mb}$	Thermal resistance junction to mounting base		-	-	0.57	K/W
$R_{th\ j-a}$	Thermal resistance junction to ambient		-	45	-	K/W

PowerMOS transistor

BUK438-500B

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	$V_{GS} = 0\text{ V}; I_D = 0.25\text{ mA}$	500	-	-	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	$V_{DS} = 500\text{ V}; V_{GS} = 0\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$	-	2	20	μA
I_{DSS}	Zero gate voltage drain current	$V_{DS} = 500\text{ V}; V_{GS} = 0\text{ V}; T_j = 125\text{ }^{\circ}\text{C}$	-	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	$V_{GS} = 10\text{ V}; I_D = 8\text{ A}$	-	0.4	0.5	Ω

DYNAMIC CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	$V_{DS} = 25\text{ V}; I_D = 8\text{ A}$	9.0	12.0	-	S
C_{iss}	Input capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 25\text{ V}; f = 1\text{ MHz}$	-	2400	2800	pF
C_{oss}	Output capacitance		-	270	420	pF
C_{rss}	Feedback capacitance		-	110	200	pF
t_{don}	Turn-on delay time	$V_{DD} = 30\text{ V}; I_D = 2.9\text{ A};$ $V_{GS} = 10\text{ V}; R_{GS} = 50\text{ }\Omega;$ $R_{gen} = 50\text{ }\Omega$	-	30	60	ns
t_r	Turn-on rise time		-	90	130	ns
t_{doff}	Turn-off delay time		-	300	400	ns
t_f	Turn-off fall time		-	110	140	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

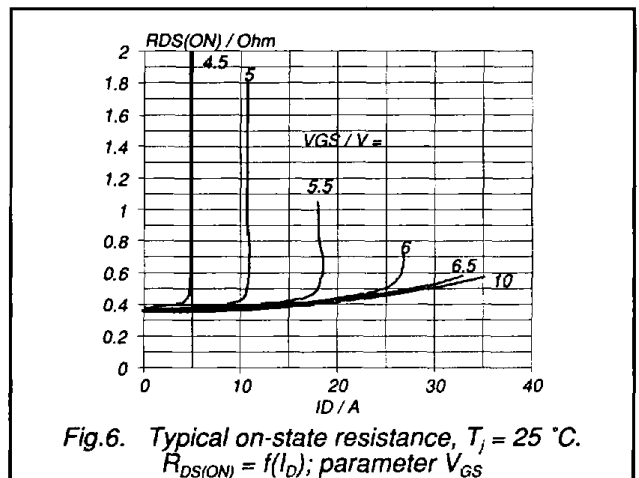
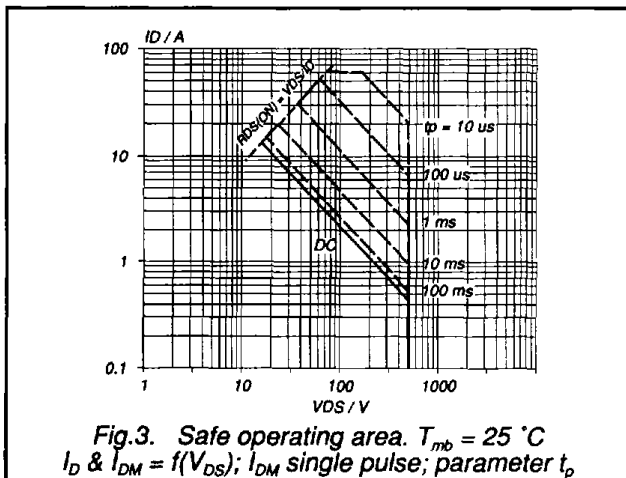
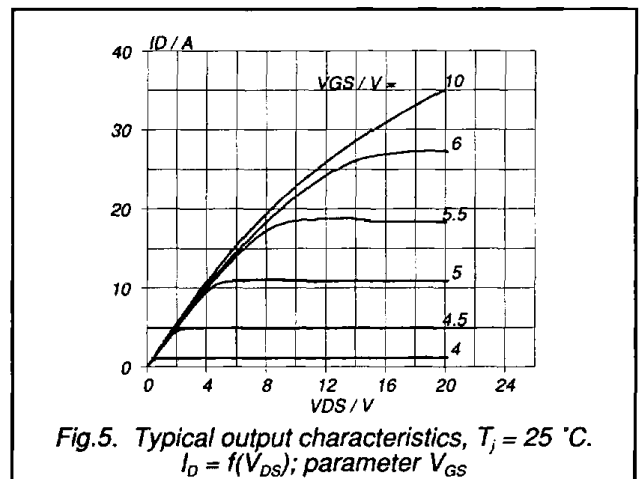
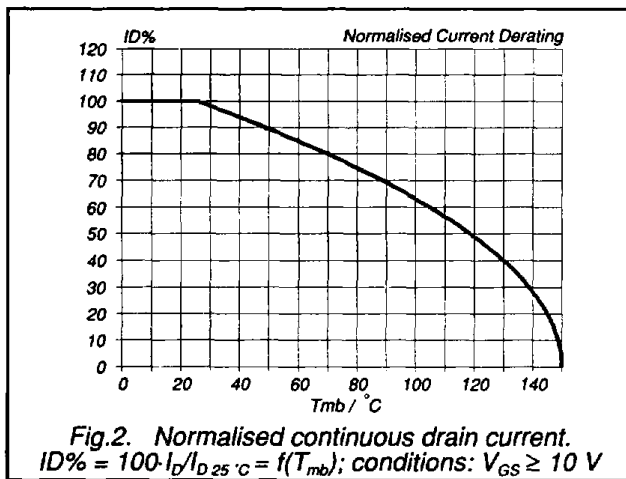
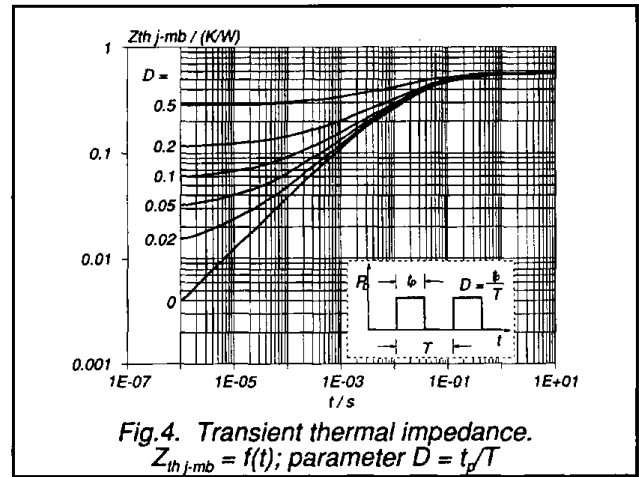
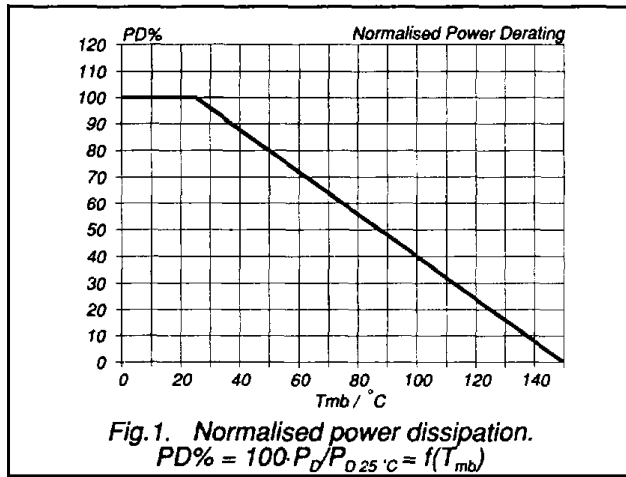
REVERSE DIODE LIMITING VALUES AND CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	15	A
I_{DRM}	Pulsed reverse drain current	-	-	-	60	A
V_{SD}	Diode forward voltage	$I_F = 15\text{ A}; V_{GS} = 0\text{ V}$	-	1.0	1.4	V
t_{rr}	Reverse recovery time	$I_F = 15\text{ A}; -di_F/dt = 100\text{ A}/\mu\text{s};$	-	800	-	ns
Q_{rr}	Reverse recovery charge	$V_{GS} = 0\text{ V}; V_R = 100\text{ V}$	-	9.0	-	μC

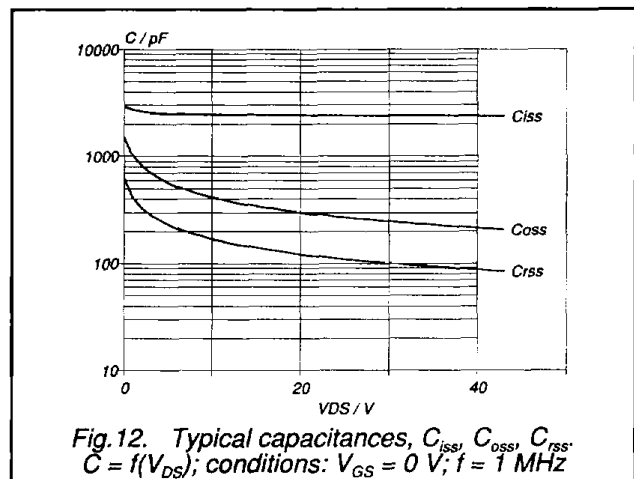
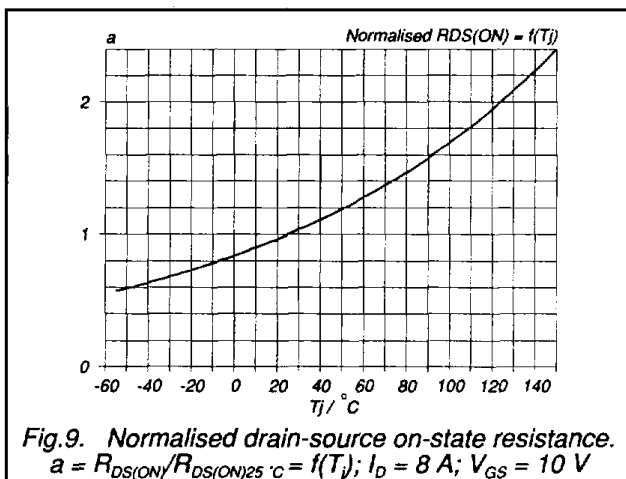
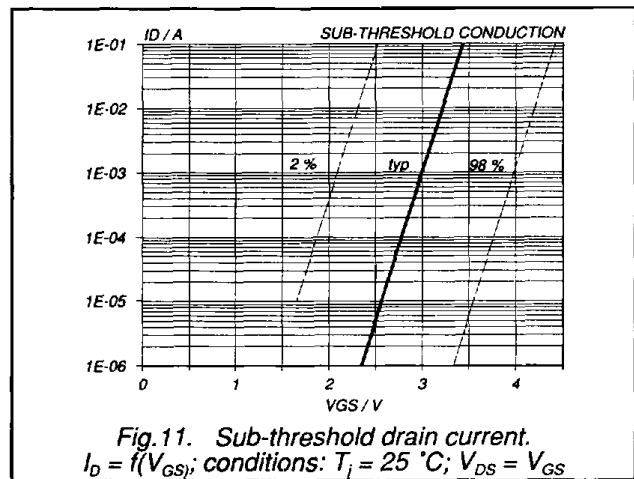
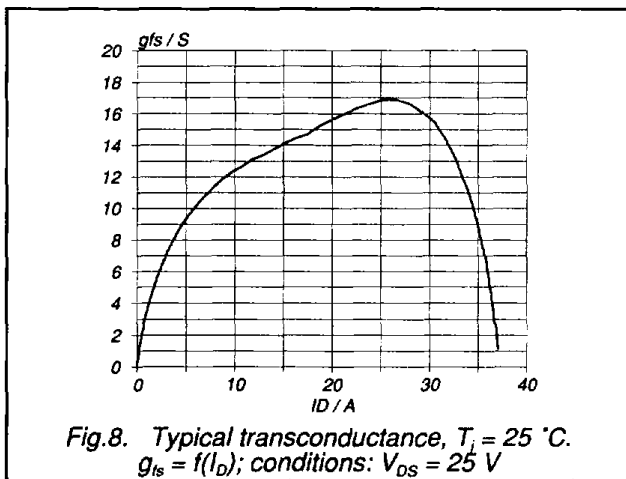
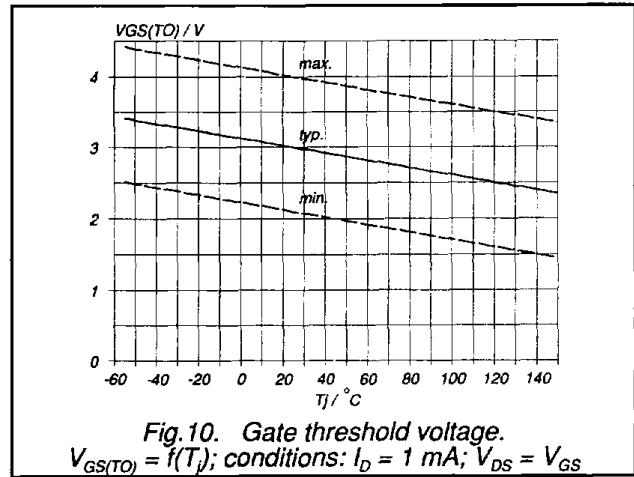
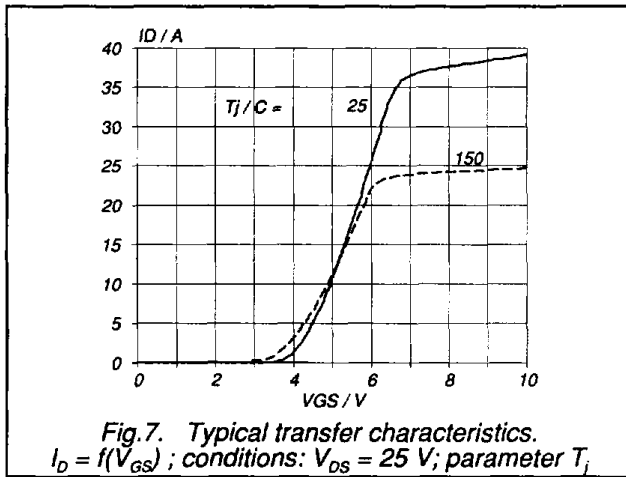
PowerMOS transistor

BUK438-500B



PowerMOS transistor

BUK438-500B



PowerMOS transistor

BUK438-500B

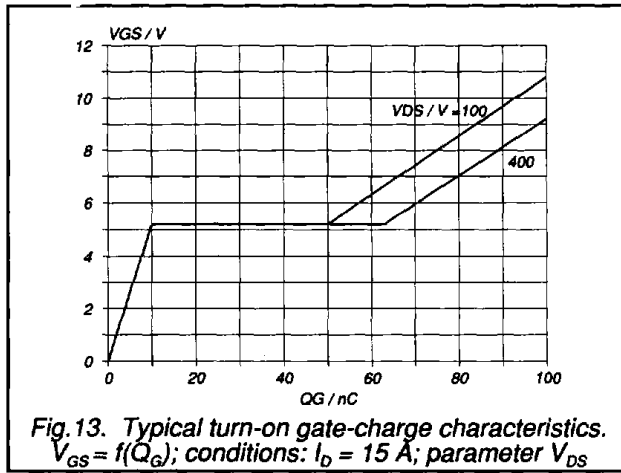


Fig. 13. Typical turn-on gate-charge characteristics.
 $V_{GS} = f(Q_G)$; conditions: $I_D = 15 \text{ A}$; parameter V_{DS}

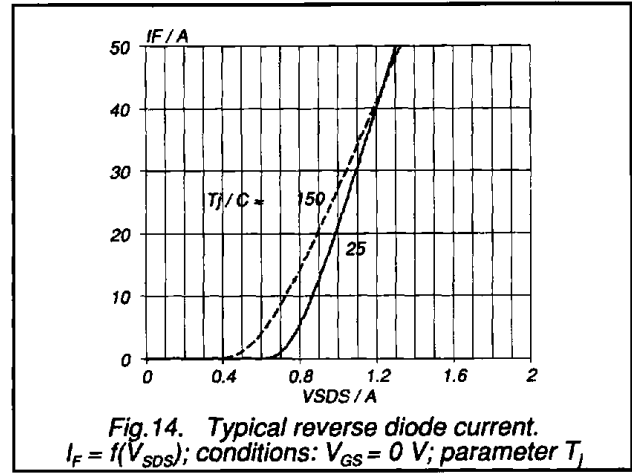


Fig. 14. Typical reverse diode current.
 $I_F = f(V_{SDS})$; conditions: $V_{GS} = 0 \text{ V}$; parameter T_J