

Philips Components

Data sheet	
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PHILIPS INTERNATIONAL

# BUK638-1000A/B

## PowerMOS transistor

### Fast recovery diode FET

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#### GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.  
 FREDFET with fast recovery reverse diode, particularly suitable for motor control applications, eg. in full bridge configurations for which faster recovery characteristics simplify design for inductive loads.

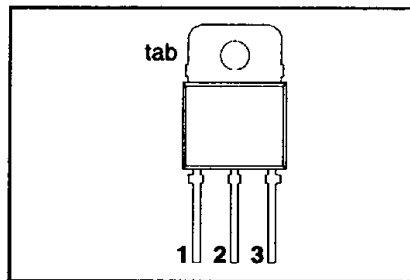
#### QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	<b>BUK638</b>	<b>-1000A</b>	<b>-1000B</b>	
$V_{DS}$	Drain-source voltage	1000	1000	V
$I_D$	Drain current (DC)	6.2	5.6	A
$P_{tot}$	Total power dissipation	220	220	W
$R_{DS(ON)}$	Drain-source on-state resistance	2.4	3.0	$\Omega$
$t_{rr}$	Diode reverse recovery time	250	250	ns

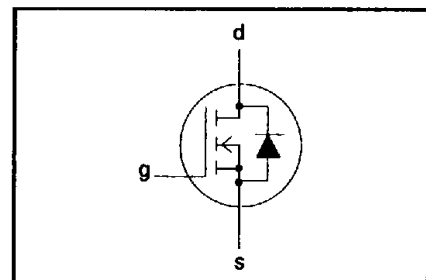
#### PINNING - SOT93

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	-	-	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)	$T_{mb} = 25 \text{ }^\circ\text{C}$	-	<b>-1000A</b> 6.2	A
$I_D$	Drain current (DC)	$T_{mb} = 100 \text{ }^\circ\text{C}$	-	<b>-1000B</b> 5.6	A
$I_{DM}$	Drain current (pulse peak value)	$T_{mb} = 25 \text{ }^\circ\text{C}$	-	25	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	$^\circ\text{C}$

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### THERMAL RESISTANCES

T-39-15

From junction to mounting base	$R_{th,j-mb} = 0.57 \text{ K/W}$
From junction to ambient	$R_{th,j-a} = 45 \text{ K/W}$

### 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	$V_{GS} = 0 \text{ V}; I_D = 0.25 \text{ mA}$	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	$V_{DS} = 1000 \text{ V}; V_{GS} = 0 \text{ V}; T_J = 25 \text{ }^\circ\text{C}$	-	20	200	$\mu\text{A}$
$I_{DSS}$	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	$V_{GS} = 10 \text{ V}; I_D = 3.5 \text{ A}$	-	2.0	2.4	$\Omega$
		<b>BUK638-1000A</b>	-	2.5	3.0	$\Omega$
		<b>BUK638-1000B</b>	-			

### DYNAMIC CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$g_{fs}$	Forward transconductance	$V_{DS} = 25 \text{ V}; I_D = 3.5 \text{ A}$	1.5	3.0	-	S
$C_{iss}$	Input capacitance	$V_{GS} = 0 \text{ V}; V_{DS} = 25 \text{ V}; f = 1 \text{ MHz}$	-	3000	3500	pF
$C_{oss}$	Output capacitance		-	300	350	pF
$C_{rss}$	Feedback capacitance		-	150	250	pF
$t_{d,on}$	Turn-on delay time	$V_{DD} = 30 \text{ V}; I_D = 2.5 \text{ A};$	-	60	90	ns
$t_r$	Turn-on rise time	$V_{GS} = 10 \text{ V}; R_{GS} = 50 \text{ } \Omega;$	-	100	140	ns
$t_{d,off}$	Turn-off delay time	$R_{gen} = 50 \text{ } \Omega$	-	350	430	ns
$t_f$	Turn-off fall time		-	100	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	-	-	-	6.2	A
$I_{DRM}$	Pulsed reverse drain current	-	-	-	25	A
$V_{SD}$	Diode forward voltage	$I_F = 6.2 \text{ A}; V_{GS} = 0 \text{ V}$	-	1.1	1.5	V
$t_{rr}$	Reverse recovery time	$I_F = 6.2 \text{ A}; T_J = 25 \text{ }^\circ\text{C}$	-	200	250	ns
		$-di_F/dt = T_J = 125 \text{ }^\circ\text{C}$	-	250	300	ns
$Q_{rr}$	Reverse recovery charge	$100 \text{ A}/\mu\text{s}; T_J = 25 \text{ }^\circ\text{C}$	-	1.3	2.0	$\mu\text{C}$
		$V_{GS} = 0 \text{ V}; T_J = 125 \text{ }^\circ\text{C}$	-	3.5	5.0	$\mu\text{C}$
$I_{rrm}$	Reverse recovery current	$V_R = 100 \text{ V}; T_J = 125 \text{ }^\circ\text{C}$	-	7.0	-	A

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**AVALANCHE LIMITING VALUE**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$W_{DSS}$	Drain-source non-repetitive unclamped inductive turn-off energy	$I_D = 6.2\text{ A}$ ; $V_{DD} \leq 250\text{ V}$ ; $V_{GS} = 10\text{ V}$ ; $R_{GS} = 50\text{ }\Omega$	-	-	750	mJ