T-39-11

Philips Components

Data sheet	
status	Product specification
date of issue	March 1991

PHILIPS INTERNATIONAL 56E D [redacted] 7110826 0044155 07T [redacted] PHIN

BUK428-500B
PowerMOS transistor

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.

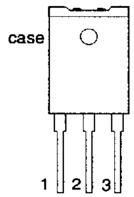
QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{DS}	Drain-source voltage	500	V
I_D	Drain current (DC)	6.1	A
P_{tot}	Total power dissipation	45	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.5	Ω

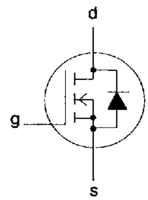
PINNING - SOT199

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	-	-	500	V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	500	V
$\pm V_{GS}$	Gate-source voltage	-	-	30	V
I_D	Drain current (DC)	T_{hs} = 25 ˚C	-	6.1	A
I_D	Drain current (DC)	T_{hs} = 100 ˚C	-	3.8	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 ˚C	-	24	A
P_{tot}	Total power dissipation	T_{hs} = 25 ˚C	-	45	W
T_{stg}	Storage temperature	-	- 55	150	˚C
T_j	Junction Temperature	-	-	150	˚C

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THERMAL RESISTANCES

From junction to mounting base	$R_{th\ j\text{-}hs}$ = 2.8 K/W
From junction to ambient	$R_{th\ j\text{-}a}$ = 35 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	500	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 500 V; V_{GS} = 0 V; T_j = 25 ˚C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 500 V; V_{GS} = 0 V; T_j =125 ˚C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 8 A	-	0.4	0.5	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 8 A	9.0	14.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	2400	2800	pF
C_{oss}	Output capacitance		-	270	420	pF
C_{rss}	Feedback capacitance		-	110	200	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.9 A;	-	30	60	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	90	130	ns
$t_{d\ off}$	Turn-off delay time	R_{gen} = 50 Ω	-	300	400	ns
t_f	Turn-off fall time		-	110	140	ns
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

ISOLATION

T_{hs} = 25 ˚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. ≤ 65 % ; clean and dustfree	-	-	2500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	22	-	pF

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REVERSE DIODE LIMITING VALUES AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	6.8	A
I_{DRM}	Pulsed reverse drain current	-	-	-	27	A
V_{SD}	Diode forward voltage	I_F = 6.8 A ;V_{GS} = 0 V	-	0.9	1.2	V
t_{rr}	Reverse recovery time	I_F = 6.8 A; -dI_F/dt = 100 A/µs;	-	800	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	9.0	-	µC

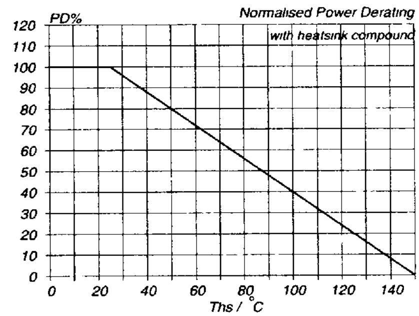

Fig.1. Normalised power dissipation.
PD% = 100·P_D/$P_{D\,25\,˚C}$ = f(T_{hs})

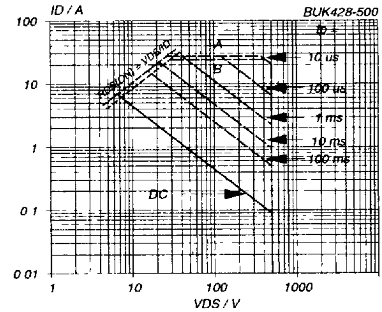

Fig.3. Safe operating area. T_{hs} = 25 ˚C
I_D & I_{DM} = f(V_{DS}); I_{DM} single pulse; parameter t_p

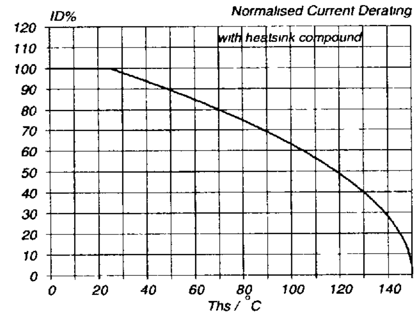

Fig.2. Normalised continuous drain current.
ID% = 100·I_D/$I_{D\,25\,˚C}$ = f(T_{hs}); conditions: V_{GS} ≥ 10 V

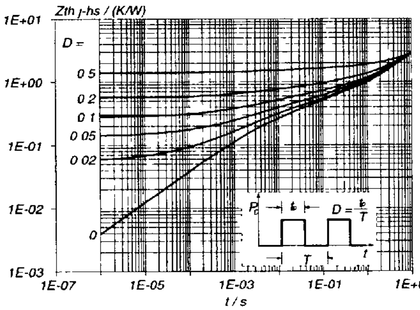

Fig.4. Transient thermal impedance.
$Z_{th\,j\text{-}hs}$ = f(t); parameter D = t_p/T

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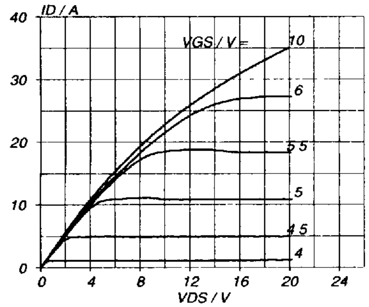

Fig.5. Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

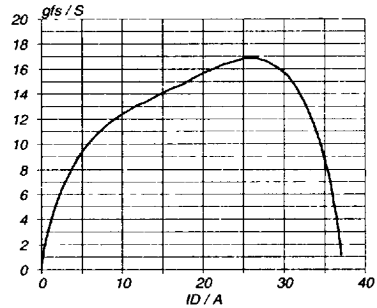

Fig.8. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

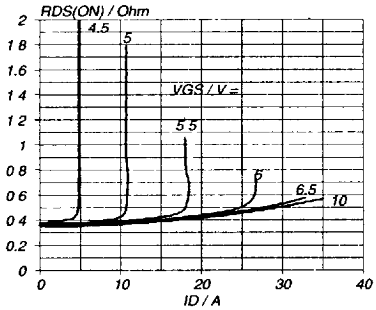

Fig.6. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

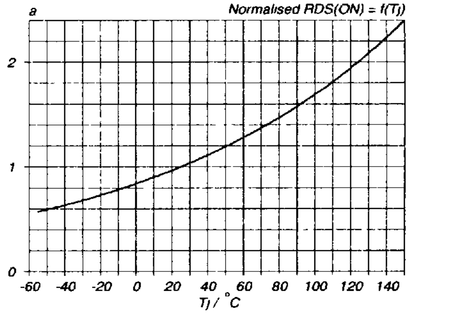

Fig.9. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 8$ A; $V_{GS} = 10$ V

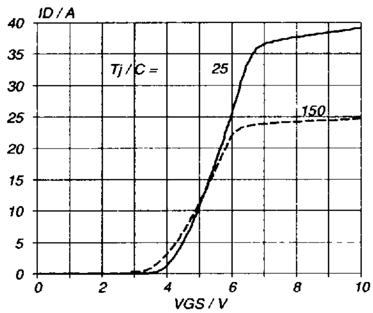

Fig.7. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

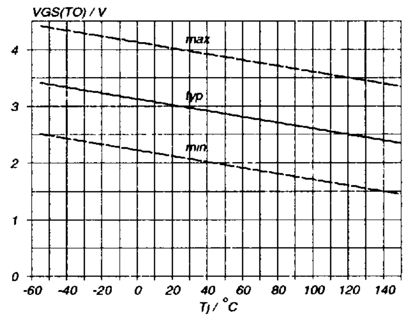

Fig.10. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

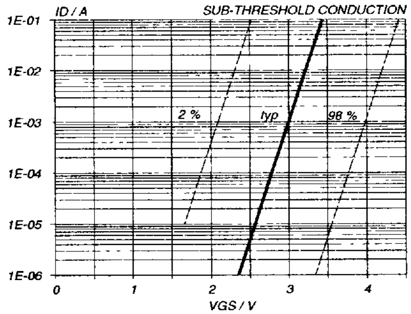

Fig.11. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

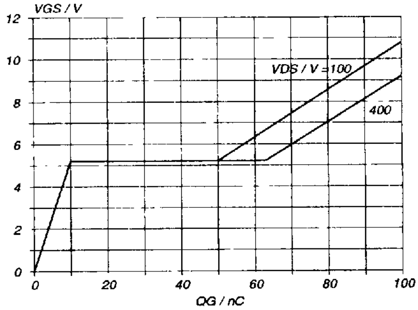

Fig.13. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 15$ A; parameter V_{DS}

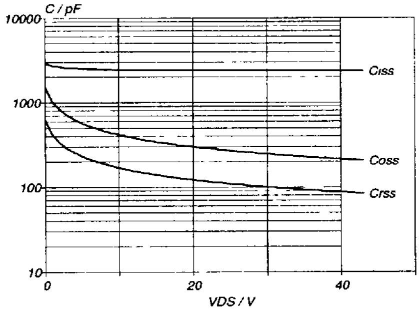

Fig.12. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

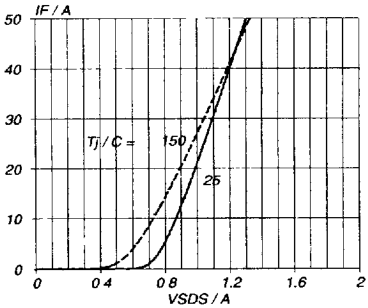

Fig.14. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j