

PowerMOS transistor**BUZ54A**

T-39-13

July 1987

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a metal envelope.

This device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and DC/AC 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 (d.c.)	4,5	A
P_{tot}	Total power dissipation	125	W
$R_{DS(ON)}$	Drain-source on-state resistance	2,6	Ω

MECHANICAL DATA

Dimensions in mm

Net mass: 12 g

Pinning:

- 1 = Gate
2 = Drain
3 = Source

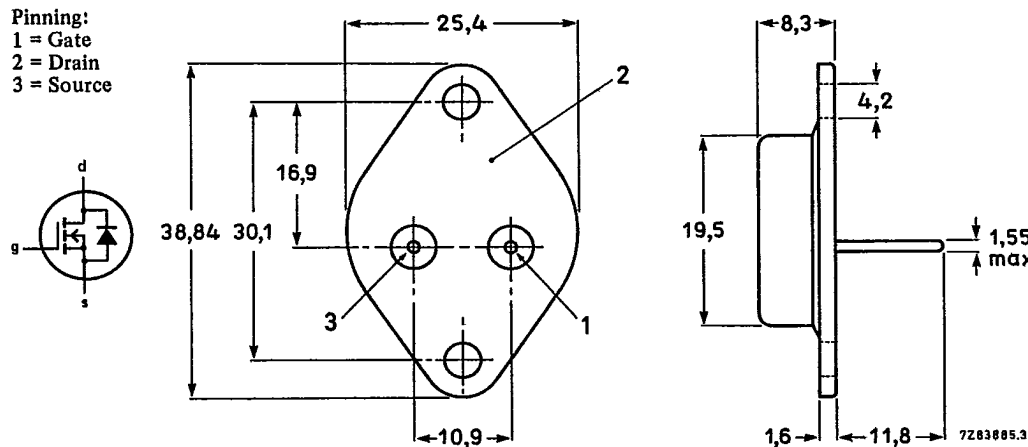


Fig.1 TO3; drain connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO3 envelopes.

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RATINGS

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 k Ω	—	1000	V
$\pm$ V _{GS}	Gate-source voltage	—	—	20	V
I _D	Drain current (d.c.)	T _{mb} = 25 °C	—	4,5	A
I _D	Drain current (d.c.)	T _{mb} = 100 °C	—	2,8	A
I _{DM}	Drain current (pulse peak value)	T _{mb} = 25 °C	—	18	A
P _{tot}	Total power dissipation	T _{mb} = 25 °C	—	125	W
T _{stg}	Storage temperature	—	—55	150	°C
T _j	Junction temperature	—	—	150	°C

THERMAL RESISTANCES

From junction to mounting base	R _{th j-mb} = 1,0 K/W
From junction to ambient	R _{th j-a} = 35 K/W

STATIC CHARACTERISTICS

T_{mb} = 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	1000	—	—	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} = 1000 V; V _{GS} = 0 V; T _j = 25 °C	—	20	250	μ A
I _{DSS}	Zero gate voltage drain current	V _{DS} = 1000 V; V _{GS} = 0 V; T _j = 125 °C	—	0,1	1,0	mA
I _{GSS}	Gate source leakage current	V _{GS} = $\pm$ 20 V; V _{DS} = 0 V	—	10	100	nA
R _{DS(ON)}	Drain-source on-state resistance	V _{GS} = 10 V; I _D = 2,6 A	—	2,3	2,6	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g _{fs}	Forward transconductance	V _{DS} = 25 V; I _D = 2,6 A	1,4	3,5	—	S
C _{iss}	Input capacitance	V _{GS} = 0 V; V _{DS} = 25 V; f = 1 MHz	—	3900	5000	pF
C _{oss}	Output capacitance		—	180	300	pF
C _{rss}	Feedback capacitance		—	60	90	pF
t _{d on}	Turn-on delay time	V _{DD} = 30 V; I _D = 2,4 A;	—	60	90	ns
t _r	Turn-on rise time	V _{GS} = 10 V; R _{GS} = 50 Ω ;	—	90	140	ns
t _{d off}	Turn-off delay time	R _{gen} = 50 Ω	—	330	430	ns
t _f	Turn-off fall time		—	110	140	ns
L _d	Internal drain inductance	Measured from contact screw on header closer to source pin and centre of die	—	5,0	—	nH
L _s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	—	12,5	—	nH

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REVERSE DIODE RATINGS AND CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	$T_{mb} = 25^{\circ}\text{C}$	—	—	4,5	A
I_{DRM}	Pulsed reverse drain current	$T_{mb} = 25^{\circ}\text{C}$	—	—	18	A
V_{SD}	Diode forward on-voltage	$I_F = 9\text{ A}; V_{GS} = 0\text{ V};$ $T_j = 25^{\circ}\text{C}$	—	1,5	1,4	V
t_{rr}	Reverse recovery time	$I_F = 4,5\text{ A}; T_j = 25^{\circ}\text{C}$	—	2000	—	ns
Q_{rr}	Reverse recovery charge	$-dI_F/dt = 100\text{ A}/\mu\text{s};$ $T_j = 25^{\circ}\text{C};$ $V_{GS} = 0\text{ V}; V_R = 100\text{ V}$	—	30	—	μC

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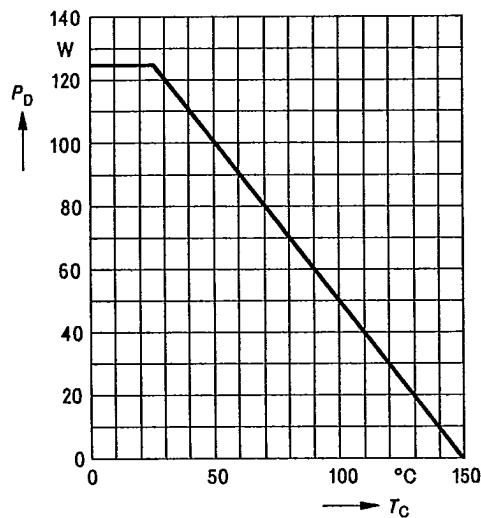


Fig. 2 Power dissipation $P_D = f(T_{mb})$.

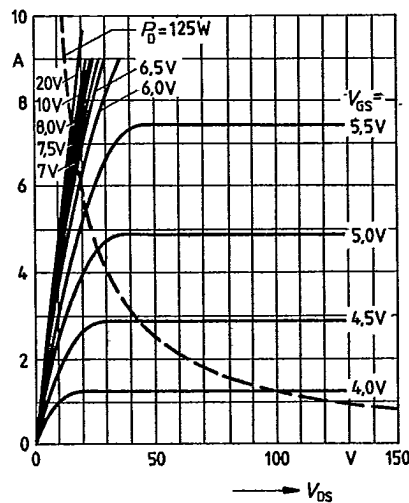


Fig. 3 Typical output characteristics $I_D = f(V_{DS})$
Parameter: V_{GS} ; 80 μs pulse test;
 $T_{mb} = 25^\circ C$.

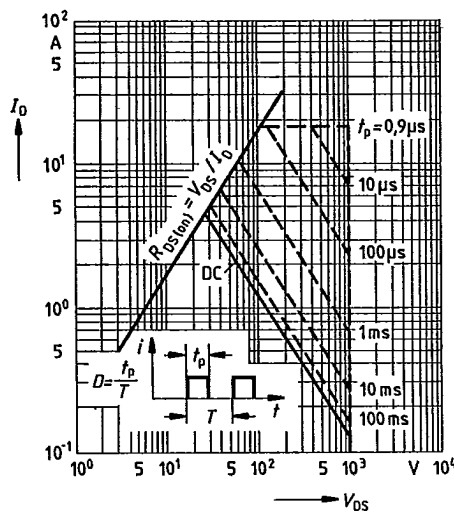


Fig. 4 Safe operating area $I_D(DC)$ and
 $I_{DM} = f(V_{DS})$
Parameter: t_p ; $D = 0.01$; $T_{mb} = 25^\circ C$.

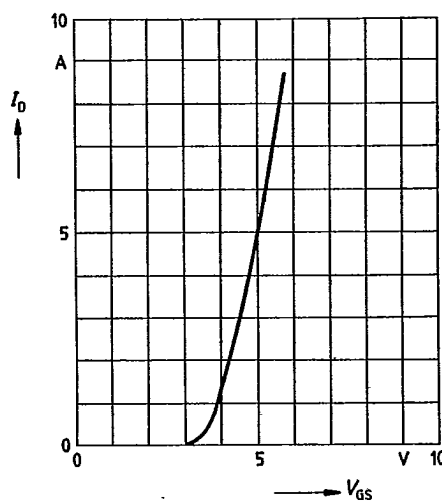


Fig. 5 Typical transfer characteristic $I_D = f(V_{GS})$
Conditions: 80 μs pulse test; $V_{DS} = 25 V$,
 $T_{mb} = 25^\circ C$.

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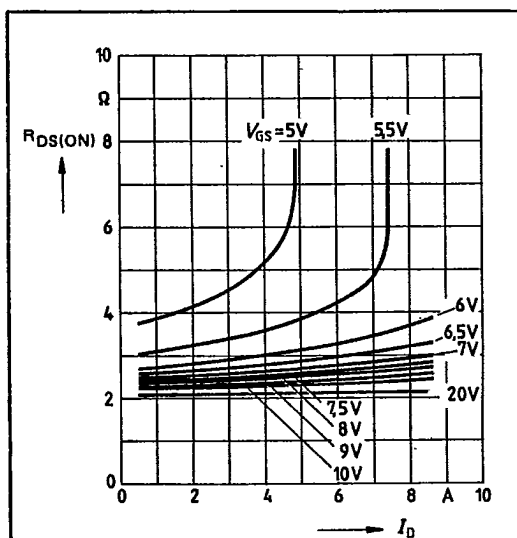


Fig. 6 Typical drain-source on-state resistance $R_{DS(ON)} = f(I_D)$
Parameter: $V_{GS} = 5V$; $T_j = 25^\circ C$.

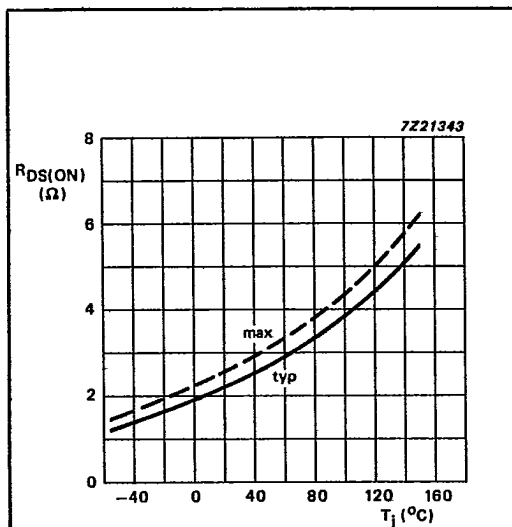


Fig. 7 Drain-source on-state resistance $R_{DS(ON)} = f(T_j)$
Conditions: $I_D = 2,6 A$; $V_{GS} = 10 V$.

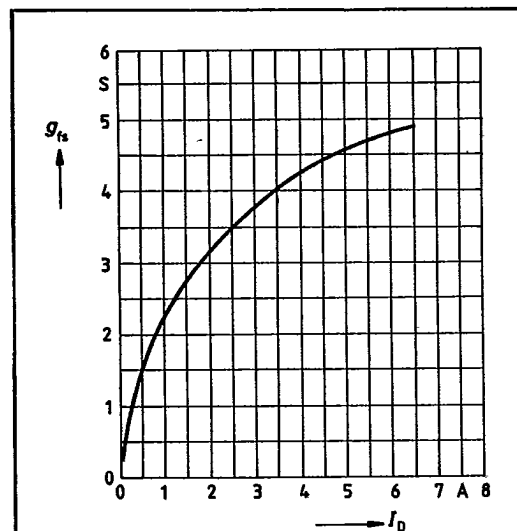


Fig. 8 Typical transconductance $g_{fs} = f(I_D)$
Conditions: $80 \mu s$ pulse test;
 $V_{DS} = 25 V$; $T_j = 25^\circ C$.

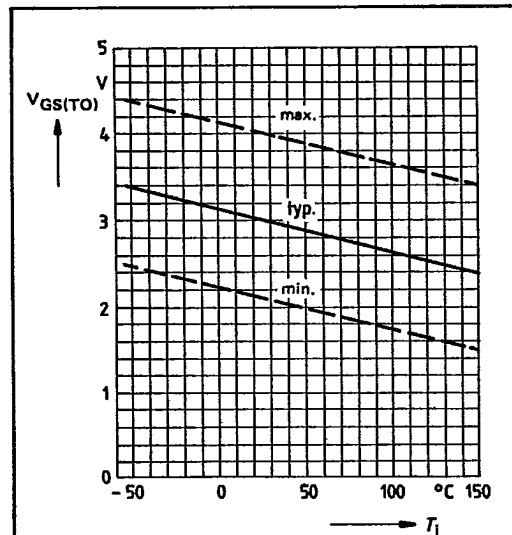


Fig. 9 Gate threshold voltage $V_{GS(TO)} = f(T_j)$
Conditions: $V_{DS} = V_{GS}$; $I_D = 1 mA$.

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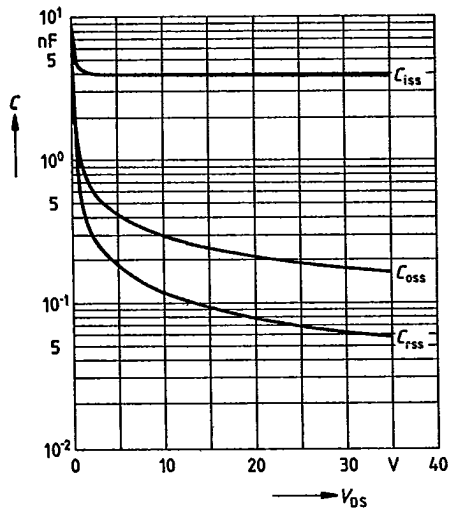


Fig. 10 Typical capacitances $C = f(V_{DS})$
Conditions: $V_{GS} = 0$; $f = 1 \text{ MHz}$.

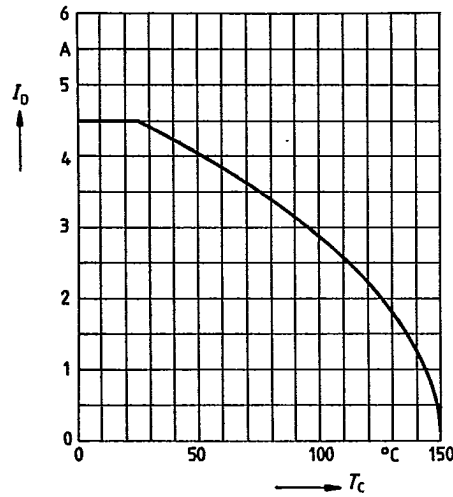


Fig. 11 Continuous drain current $I_D = f(T_{mb})$
Conditions: $V_{GS} \geq 10 \text{ V}$.

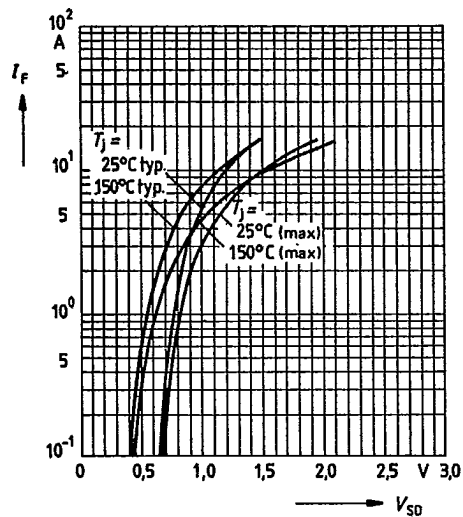


Fig. 12 Forward characteristics of reverse diode
 $I_F = f(V_{SD})$
Parameter: T_j ; $t_p = 80 \mu\text{s}$.

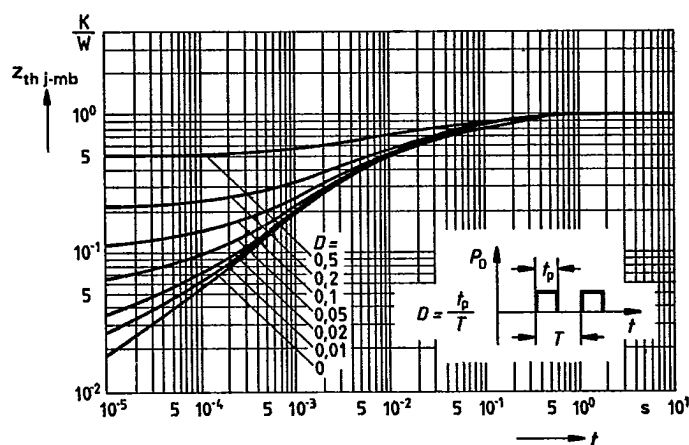


Fig.13 Transient thermal impedance $Z_{th\ j-mb} = f(t)$
Parameter: $D = t_p/T$.

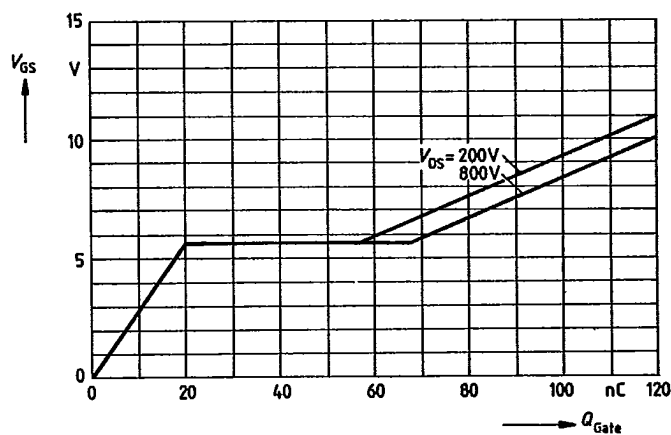


Fig.14 Typical gate-charge $V_{GS} = f(Q_{Gate})$
Parameter: $V_{DS}; I_{DM} = 8,0\ A$.