

PowerMOS transistor

BUZ54A

T-39-13

July 1987

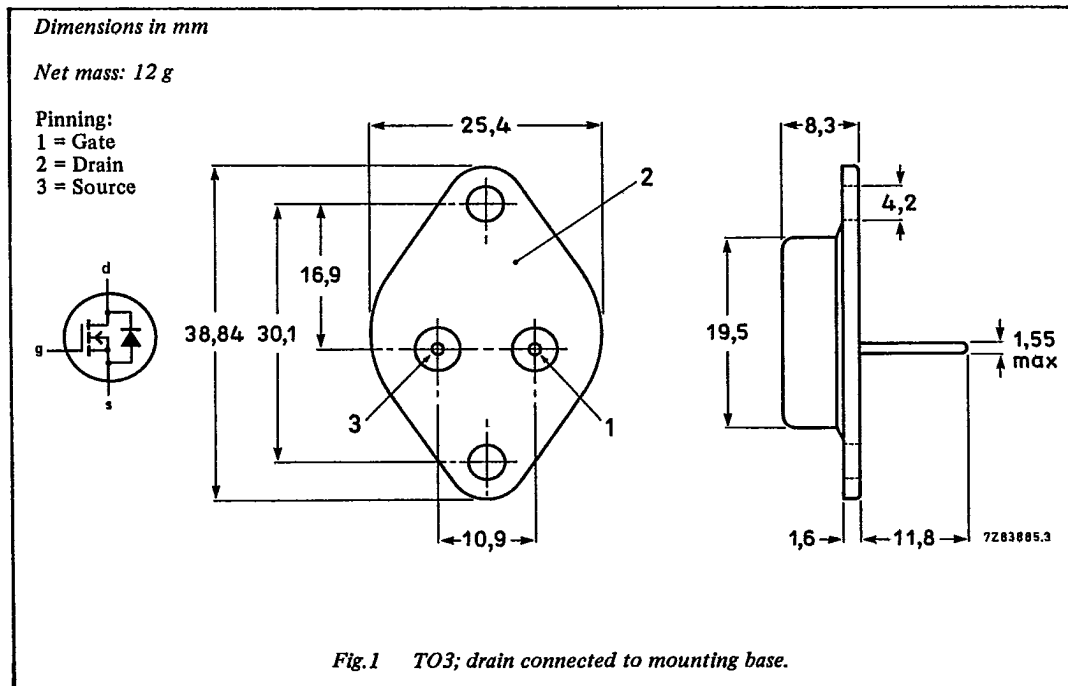
GENERAL DESCRIPTION

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



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 _G S	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 _G (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

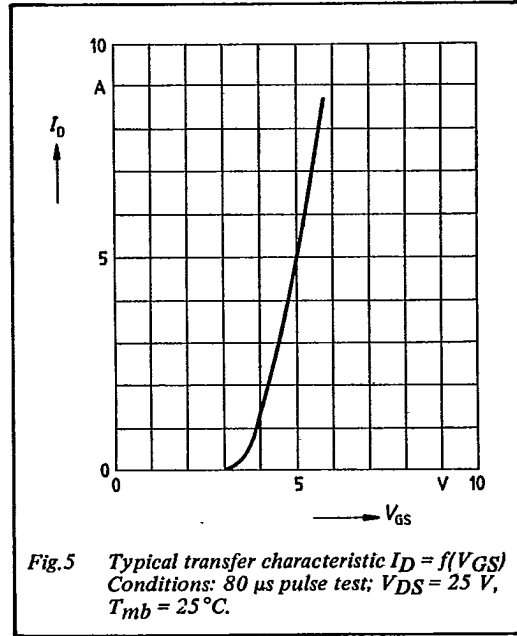
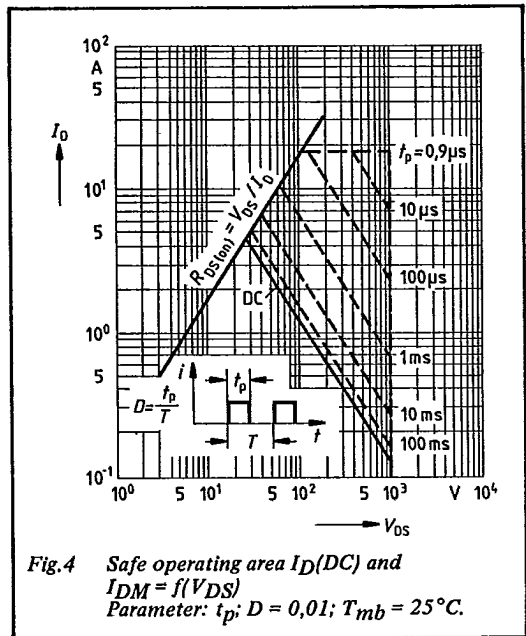
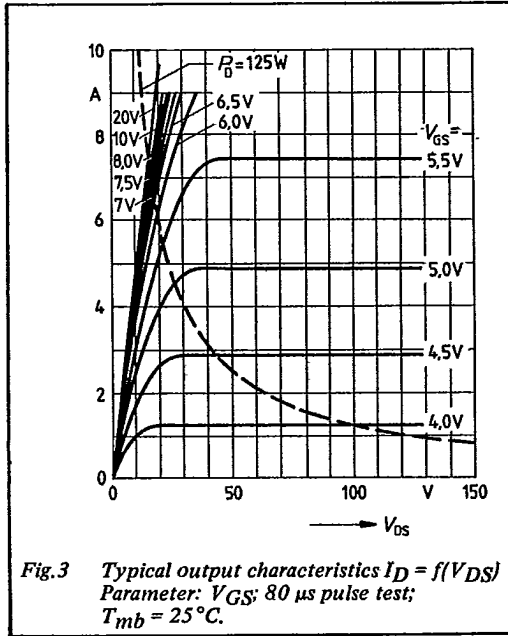
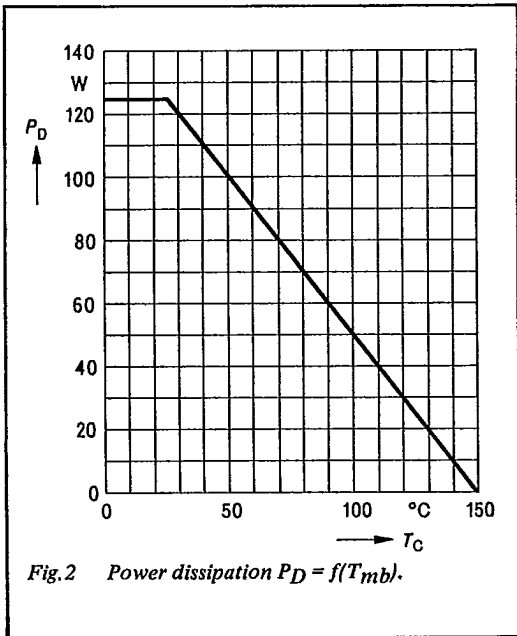
T_{mb} = 25 °C unless otherwise specified

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

REVERSE DIODE RATINGS 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	$T_{mb} = 25\text{ }^{\circ}\text{C}$	—	—	4,5	A
I _{DRM}	Pulsed reverse drain current	$T_{mb} = 25\text{ }^{\circ}\text{C}$	—	—	18	A
V _{SD}	Diode forward on-voltage	$I_F = 9\text{ A}; V_{GS} = 0\text{ V};$ $T_j = 25\text{ }^{\circ}\text{C}$	—	1,5	1,4	V
t _{rr}	Reverse recovery time	$I_F = 4,5\text{ A}; T_j = 25\text{ }^{\circ}\text{C}$	—	2000	—	ns
Q _{rr}	Reverse recovery charge	$-dI_F/dt = 100\text{ A}/\mu\text{s};$ $T_j = 25\text{ }^{\circ}\text{C};$ $V_{GS} = 0\text{ V}; V_R = 100\text{ V}$	—	30	—	μC



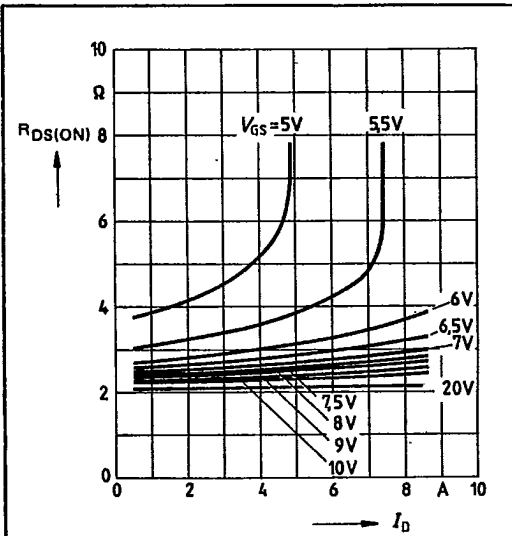


Fig.6 Typical drain-source on-state resistance $R_{DS(ON)} = f(I_D)$
Parameter: V_{GS} ; $T_j = 25^\circ\text{C}$.

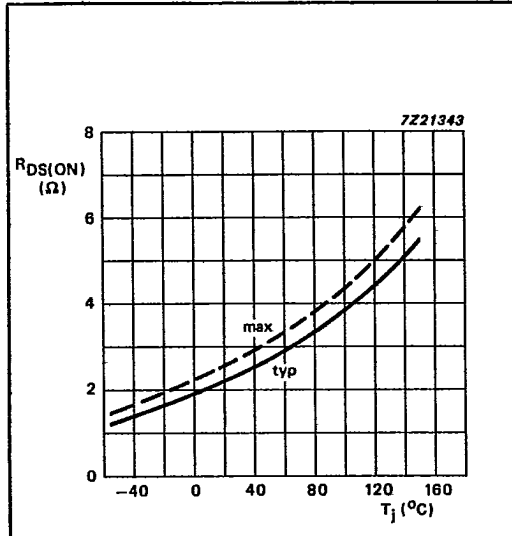


Fig.7 Drain-source on-state resistance $R_{DS(ON)} = f(T_j)$
Conditions: $I_D = 2,6 \text{ A}$; $V_{GS} = 10 \text{ V}$.

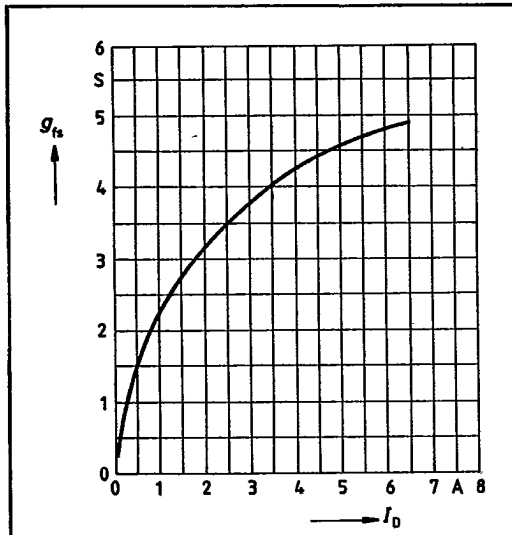


Fig.8 Typical transconductance $g_{fs} = f(I_D)$
Conditions: 80 μs pulse test;
 $V_{DS} = 25 \text{ V}$; $T_j = 25^\circ\text{C}$.

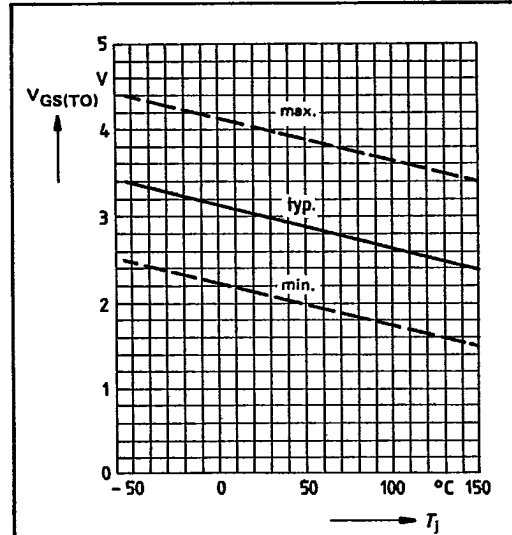
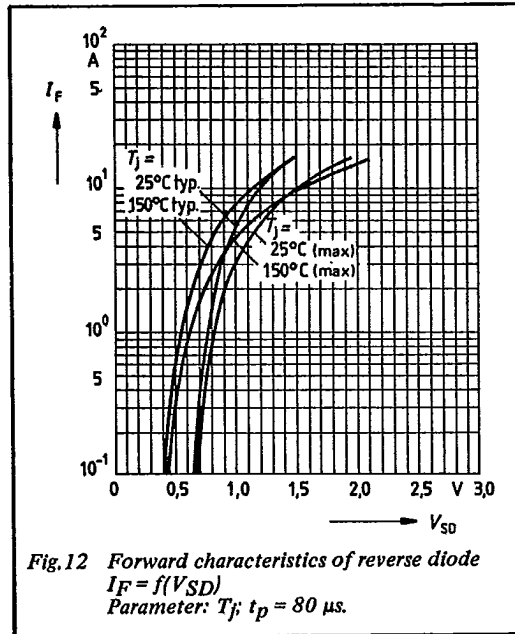
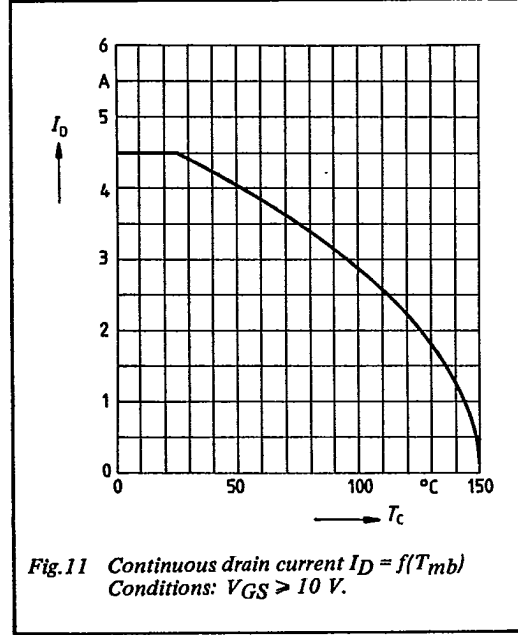
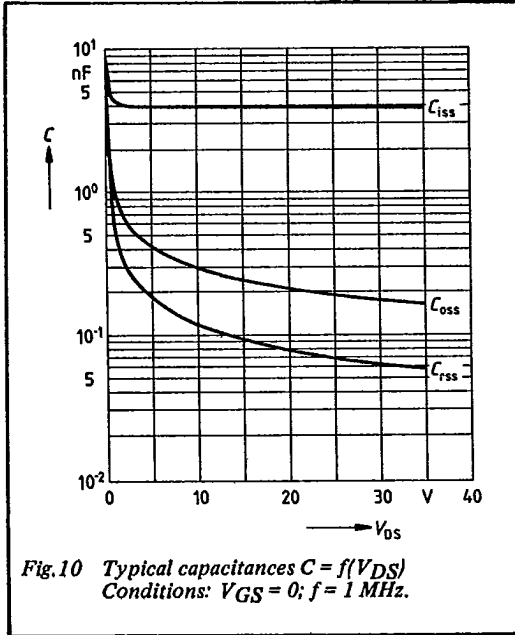


Fig.9 Gate threshold voltage $V_{GS(TO)} = f(T_j)$
Conditions: $V_{DS} = V_{GS}$; $I_D = 1 \text{ mA}$.

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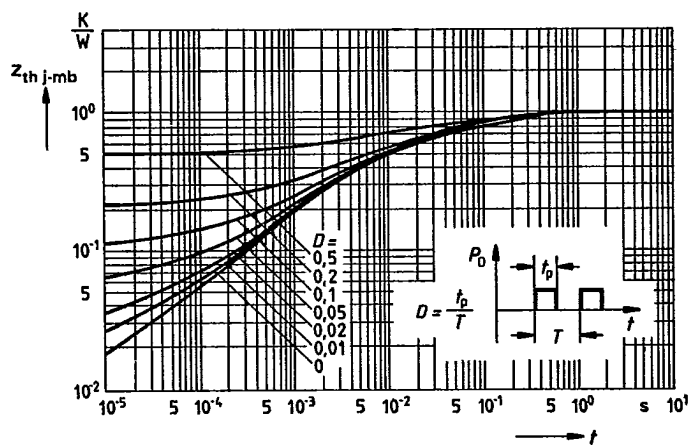


Fig.13 Transient thermal impedance $Z_{th\ j-mb} = f(t)$
Parameter: $D = t_p/T$.

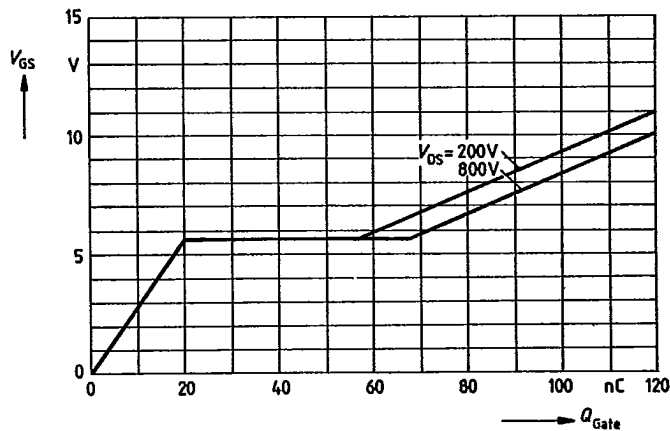


Fig.14 Typical gate-charge $V_{GS} = f(Q_{Gate})$
Parameter: $V_{DS}; I_{DM} = 8,0\ A$.