PowerMOS transistor BUK483-60A

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope suitable for surface mount applications.
The device is intended for use in automotive and general purpose switching applications.

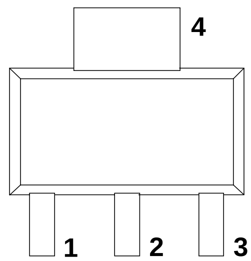
QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{DS}	Drain-source voltage	60	V
I_D	Drain current (DC)	3.2	A
P_{tot}	Total power dissipation	1.8	W
T_j	Junction temperature	150	˚C
$R_{DS(ON)}$	Drain-source on-state resistance; V_{GS} = 10 V	0.10	Ω

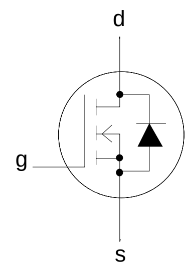
PINNING - SOT223

PIN	DESCRIPTION
1	gate
2	drain
3	source
4	drain (tab)

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	-	-	60	V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	60	V
$\pm V_{GS}$	Gate-source voltage	-	-	30	V
I_D	Drain current (DC)	T_{amb} = 25 ˚C	-	3.2	A
I_D	Drain current (DC)	T_{amb} = 100 ˚C	-	2.0	A
I_{DM}	Drain current (pulse peak value)	T_{amb} = 25 ˚C	-	13	A
P_{tot}	Total power dissipation	T_{amb} = 25 ˚C	-	1.8	W
T_{stg}	Storage temperature	-	- 55	150	˚C
T_j	Junction temperature	-	-	150	˚C

THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$R_{th\ j-sp}$	From junction to solder point[1]	Mounted on any PCB	-	12	15	K/W
$R_{th\ j-amb}$	From junction to ambient	Mounted on PCB of fig.18	-	-	70	K/W

1 Temperature measured at solder joint on drain tab.

STATIC CHARACTERISTICS

T_j = 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	60	70	-	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} = 60 V; V_{GS} = 0 V;	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 60 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 = 3.2 A	-	0.07	0.10	Ω

DYNAMIC CHARACTERISTICS

T_j = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 3.2 A	-	6.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	650	825	pF
C_{oss}	Output capacitance		-	240	350	pF
C_{rss}	Feedback capacitance		-	120	160	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	10	20	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	35	55	ns
$t_{d\ off}$	Turn-off delay time	R_{gen} = 50 Ω	-	60	90	ns
t_f	Turn-off fall time		-	55	80	ns

REVERSE DIODE LIMITING VALUES AND CHARACTERISTICS

T_j = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	3.2	A
I_{DRM}	Pulsed reverse drain current	-	-	-	13	A
V_{SD}	Diode forward voltage	I_F = 3.2 A; V_{GS} = 0 V	-	0.85	1.1	V
t_{rr}	Reverse recovery time	I_F = 3.2 A; -dI_F/dt = 100 A/µs;	-	70	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = -10 V; V_R = 30 V	-	0.25	-	µC

AVALANCHE LIMITING VALUE

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 3.2 A; V_{DD} ≤ 25 V; V_{GS} = 10 V; R_{GS} = 50 Ω; T_{amb} = 25 ˚C	-	-	45	mJ

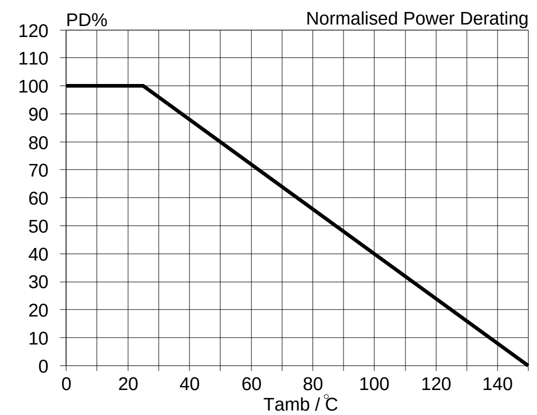


Fig.1. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\ 25\ ^\circ C} = f(T_{amb})$

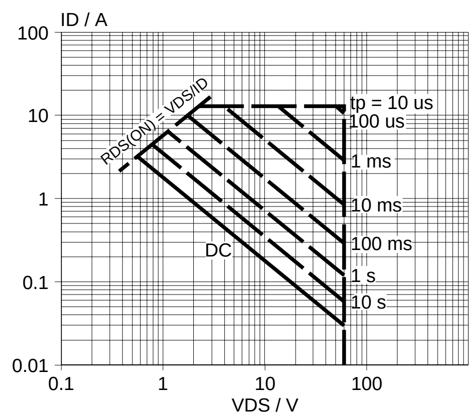


Fig.4. Safe operating area $T_{amb} = 25\ ^\circ C$
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

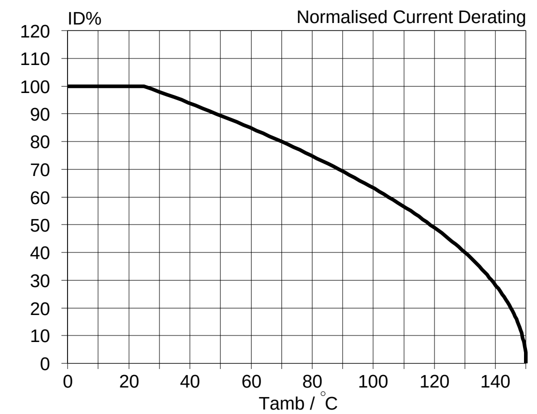


Fig.2. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\ 25\ ^\circ C} = f(T_{amb})$; conditions: $V_{GS} \geq 10$ V

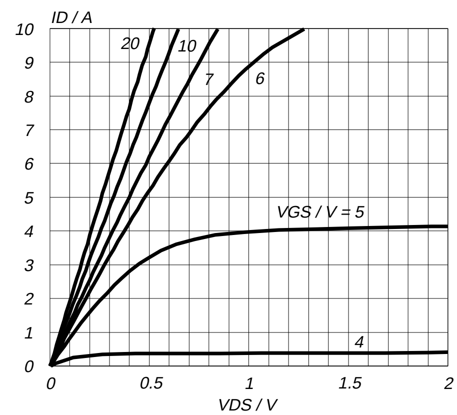


Fig.5. Typical output characteristics, $T_j = 25\ ^\circ C$.
$I_D = f(V_{DS})$; parameter V_{GS}

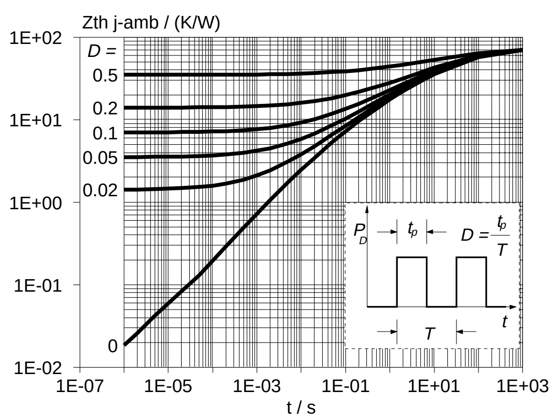


Fig.3. Transient thermal impedance.
$Z_{th\ j\text{-}amb} = f(t)$; parameter $D = t_p/T$

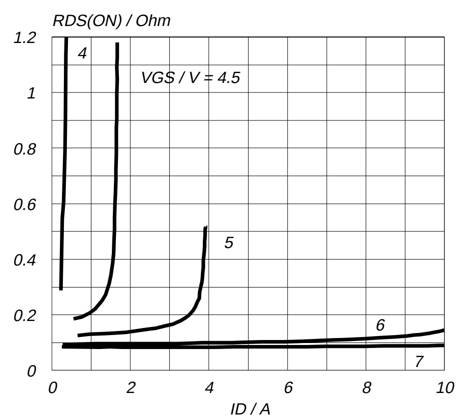


Fig.6. Typical on-state resistance, $T_j = 25\ ^\circ C$.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

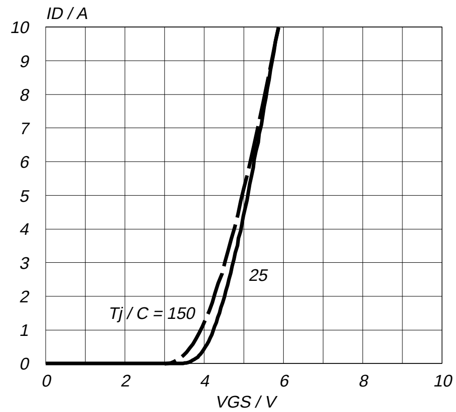


Fig.7. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

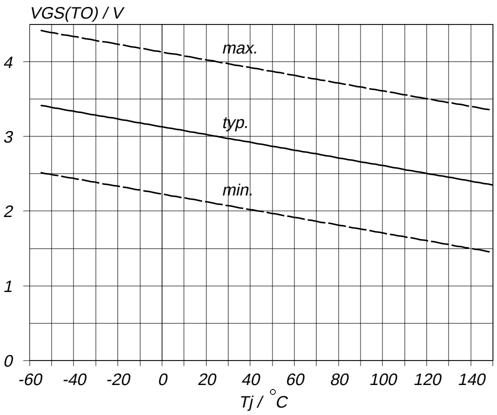


Fig.10. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

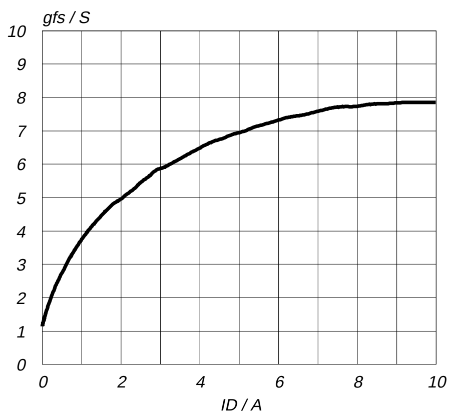


Fig.8. Typical transconductance, T_j = 25 ˚C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

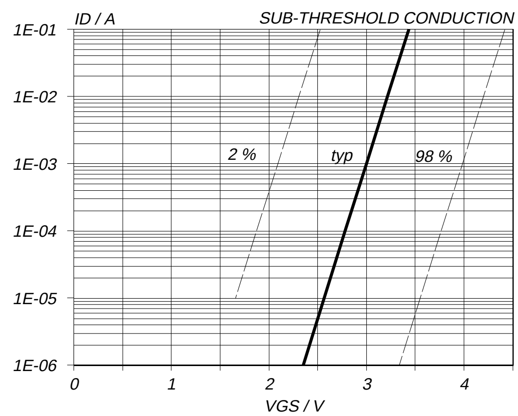


Fig.11. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: T_j = 25 ˚C; $V_{DS} = V_{GS}$

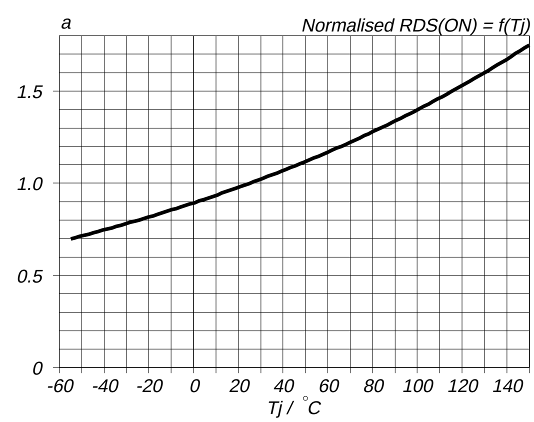


Fig.9. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,^{\circ}C} = f(T_j)$; I_D = 3.2 A; V_{GS} = 10 V

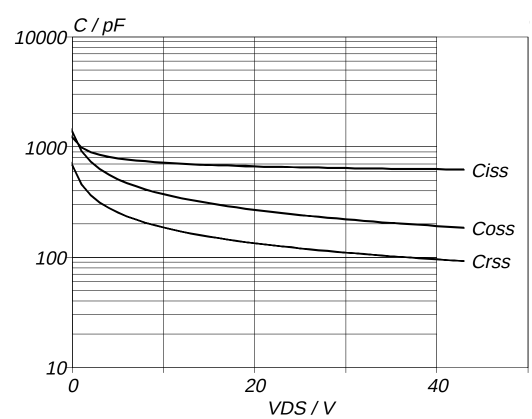


Fig.12. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: V_{GS} = 0 V; f = 1 MHz

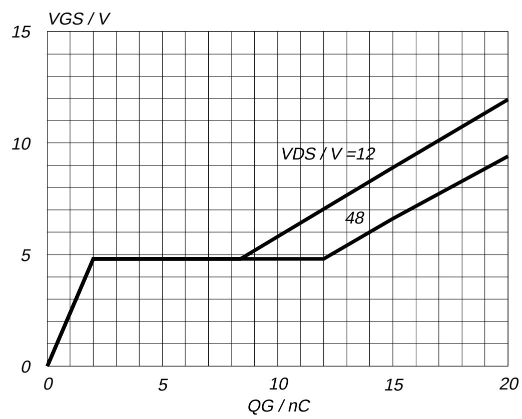


Fig.13. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 3.2$ A; parameter V_{DS}

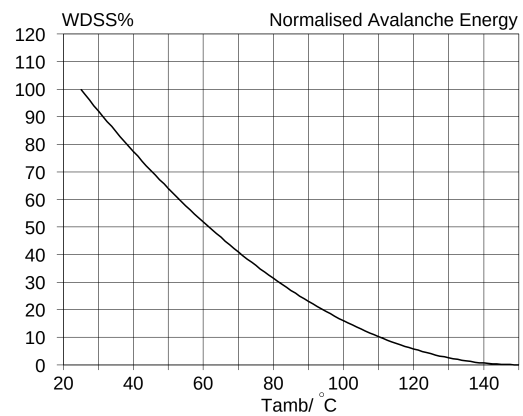


Fig.15. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{amb})$; conditions: $I_D = 3.2$ A

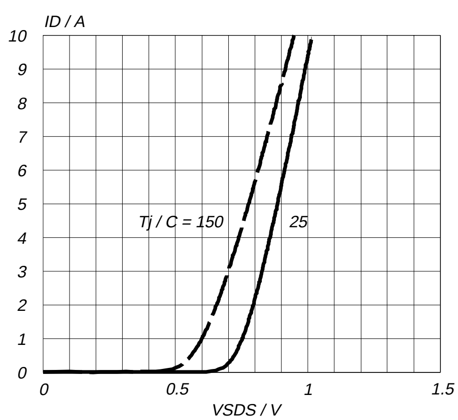


Fig.14. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

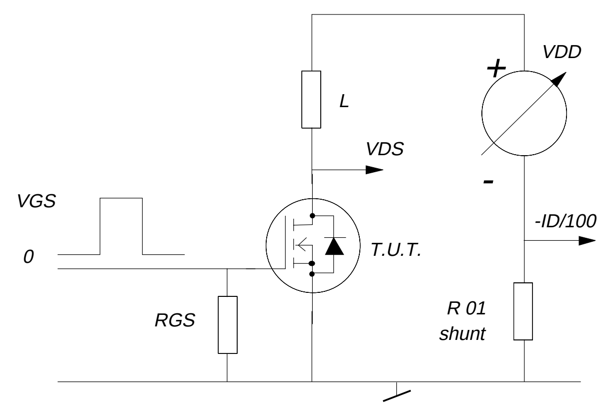


Fig.16. Avalanche energy test circuit.
$$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$$

MOUNTING INSTRUCTIONS

Dimensions in mm.

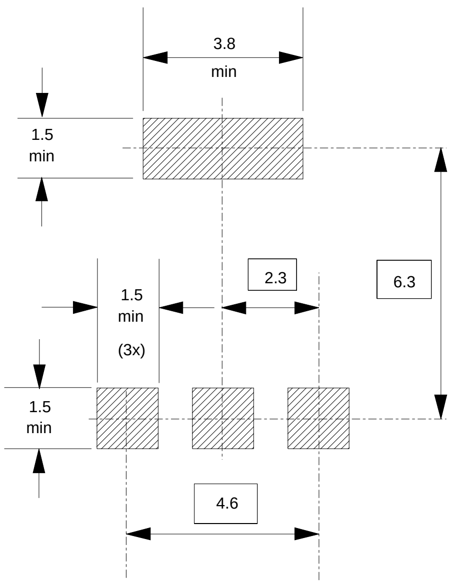


Fig.17. soldering pattern for surface mounting SOT223.

PRINTED CIRCUIT BOARD

Dimensions in mm.

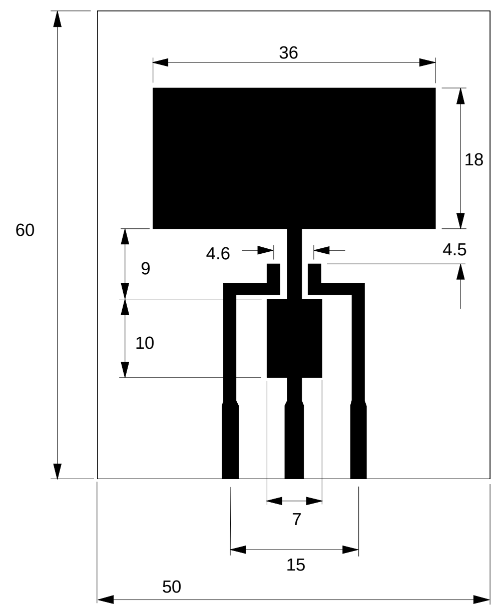


Fig.18. PCB for thermal resistance and power rating for SOT223.
PCB: FR4 epoxy glass (1.6 mm thick), copper laminate (35 µm thick).

MECHANICAL DATA

Dimensions in mm

Net Mass: 0.11 g

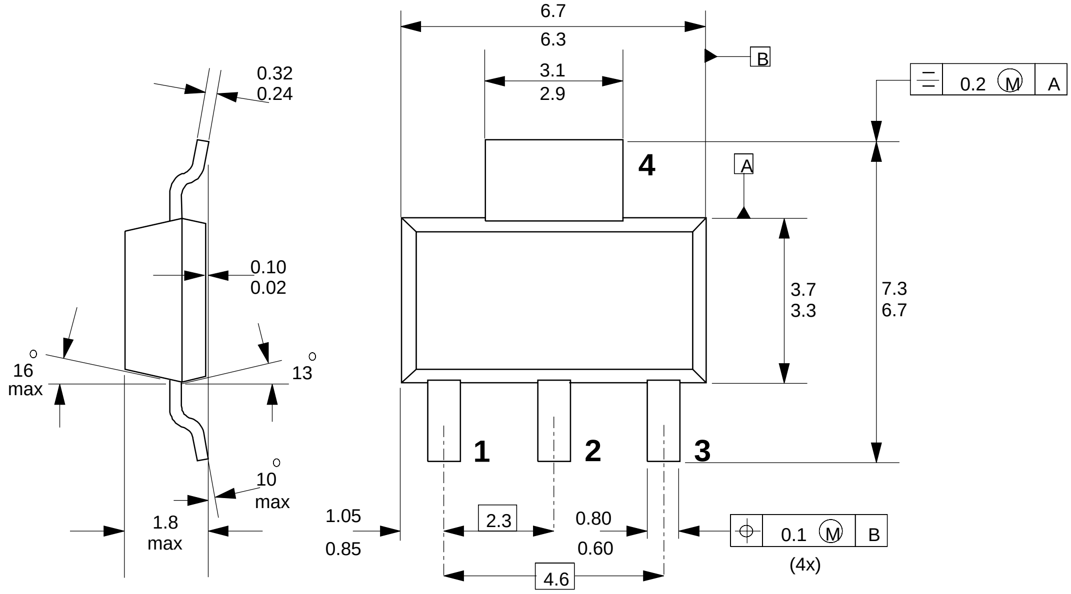


Fig.19. SOT223 surface mounting package.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Refer to surface mounting instructions for SOT223 envelope.
3. Epoxy meets UL94 V0 at 1/8".

DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values are given in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of this specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	
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