

# TrenchMOS™ transistor

## Standard level FET

**BUK7640-100A**

### GENERAL DESCRIPTION

N-channel enhancement mode standard level field-effect power transistor in a plastic envelope suitable for surface mounting. Using 'trench' technology the device features very low on-state resistance. It is intended for use in automotive and general purpose switching applications.

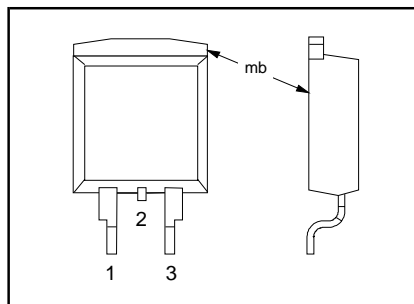
### QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
$V_{DS}$	Drain-source voltage	100	V
$I_D$	Drain current (DC)	37	A
$P_{tot}$	Total power dissipation	138	W
$T_j$	Junction temperature	175	°C
$R_{DS(ON)}$	Drain-source on-state resistance $V_{GS} = 10\text{ V}$	40	mΩ

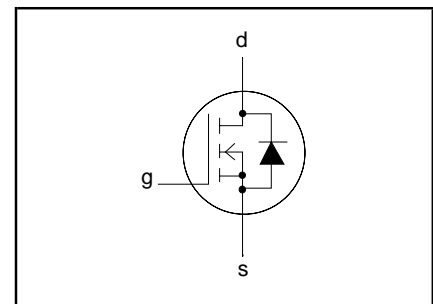
### PINNING - SOT404

PIN	DESCRIPTION
1	gate
2	drain (no connection possible)
3	source
mb	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	-	-	100	V
$V_{DGR}$	Drain-gate voltage	$R_{GS} = 20\text{ k}\Omega$	-	100	V
$\pm V_{GS}$	Gate-source voltage	-	-	20	V
$I_D$	Drain current (DC)	$T_{mb} = 25\text{ °C}$	-	37	A
$I_D$	Drain current (DC)	$T_{mb} = 100\text{ °C}$	-	26	A
$I_{DM}$	Drain current (pulse peak value)	$T_{mb} = 25\text{ °C}$	-	149	A
$P_{tot}$	Total power dissipation	$T_{mb} = 25\text{ °C}$	-	138	W
$T_{stg}, T_j$	Storage & operating temperature	-	- 55	175	°C

### THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$R_{th\ j-mb}$	Thermal resistance junction to mounting base	-	-	1.1	K/W
$R_{th\ j-a}$	Thermal resistance junction to ambient	Minimum footprint, FR4 board	50	-	K/W

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### STATIC CHARACTERISTICS

T<sub>j</sub> = 25°C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V <sub>(BR)DSS</sub>	Drain-source breakdown voltage	V <sub>GS</sub> = 0 V; I <sub>D</sub> = 0.25 mA; T <sub>j</sub> = -55°C	100	-	-	V
V <sub>GS(TO)</sub>	Gate threshold voltage	V <sub>DS</sub> = V <sub>GS</sub> ; I <sub>D</sub> = 1 mA	89	-	-	V
		T <sub>j</sub> = 175°C	2	3	4	V
		T <sub>j</sub> = -55°C	1	-	-	V
I <sub>DSS</sub>	Zero gate voltage drain current	V <sub>DS</sub> = 100 V; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 175°C	-	0.05	10	μA
I <sub>GSS</sub>	Gate source leakage current	V <sub>GS</sub> = ±20 V; V <sub>DS</sub> = 0 V	-	-	500	μA
R <sub>DS(ON)</sub>	Drain-source on-state resistance	V <sub>GS</sub> = 10 V; I <sub>D</sub> = 25 A T <sub>j</sub> = 175°C	-	2	100	nA
			-	30	40	mΩ
			-	-	108	mΩ

### DYNAMIC CHARACTERISTICS

T<sub>mb</sub> = 25°C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
C <sub>iss</sub>	Input capacitance	V <sub>GS</sub> = 0 V; V <sub>DS</sub> = 25 V; f = 1 MHz	-	1720	2293	pF
C <sub>oss</sub>	Output capacitance		-	216	259	pF
C <sub>rss</sub>	Feedback capacitance		-	133	182	pF
t <sub>d on</sub>	Turn-on delay time	V <sub>DD</sub> = 30 V; R <sub>load</sub> = 1.2Ω;	-	12	18	ns
t <sub>r</sub>	Turn-on rise time	V <sub>GS</sub> = 10 V; R <sub>G</sub> = 10 Ω	-	55	83	ns
t <sub>d off</sub>	Turn-off delay time		-	48	67	ns
t <sub>f</sub>	Turn-off fall time		-	30	42	ns
L <sub>d</sub>	Internal drain inductance	Measured from upper edge of drain tab to centre of die	-	2.5	-	nH
L <sub>s</sub>	Internal source inductance	Measured from source lead soldering point to source bond pad	-	7.5	-	nH

### REVERSE DIODE LIMITING VALUES AND CHARACTERISTICS

T<sub>j</sub> = 25°C unless otherwise specified

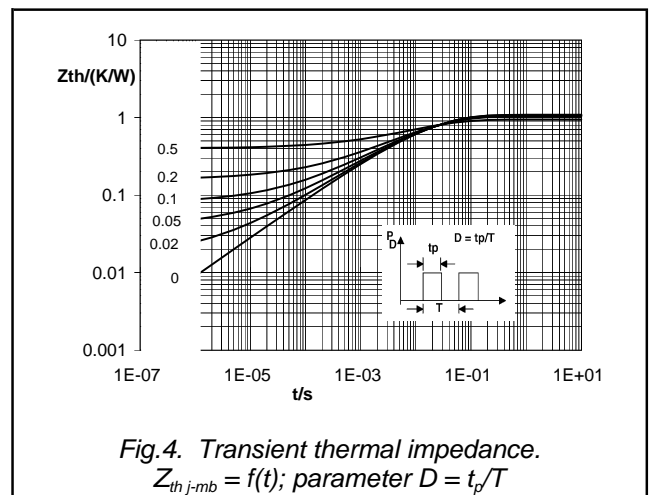
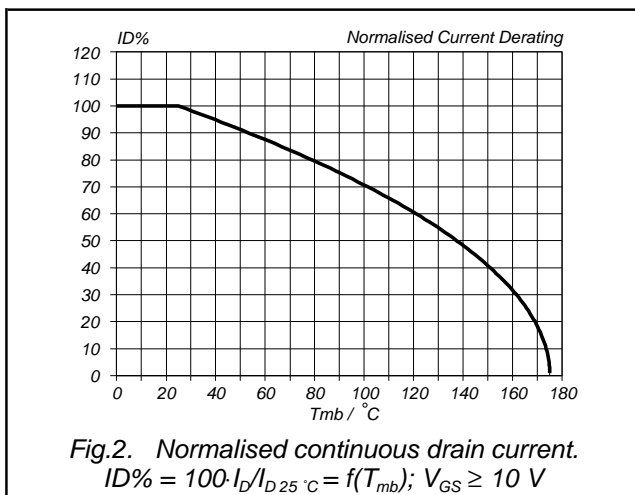
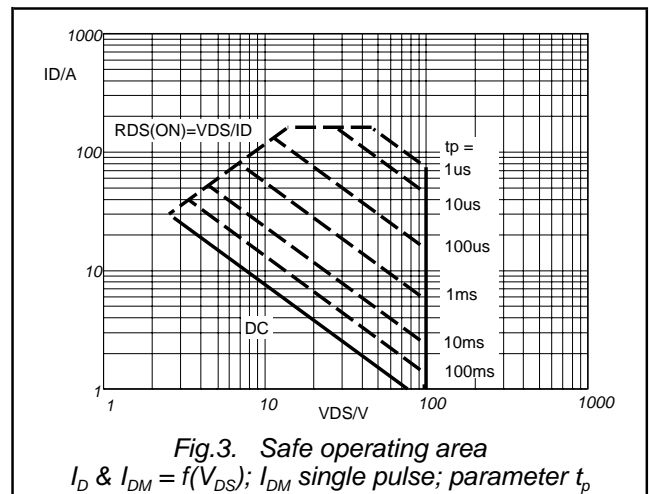
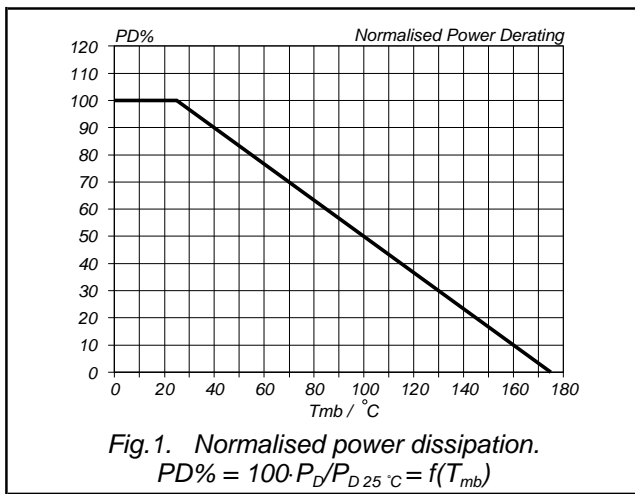
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I <sub>DR</sub>	Continuous reverse drain current		-	-	37	A
I <sub>DRM</sub>	Pulsed reverse drain current		-	-	149	A
V <sub>SD</sub>	Diode forward voltage	I <sub>F</sub> = 25 A; V <sub>GS</sub> = 0 V	-	0.85	1.2	V
		I <sub>F</sub> = 37 A; V <sub>GS</sub> = 0 V	-	1.1	-	V
t <sub>rr</sub>	Reverse recovery time	I <sub>F</sub> = 37 A; -di <sub>F</sub> /dt = 100 A/μs;	-	70	-	ns
Q <sub>rr</sub>	Reverse recovery charge	V <sub>GS</sub> = -10 V; V <sub>R</sub> = 30 V	-	0.24	-	μC

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**AVALANCHE LIMITING VALUE**

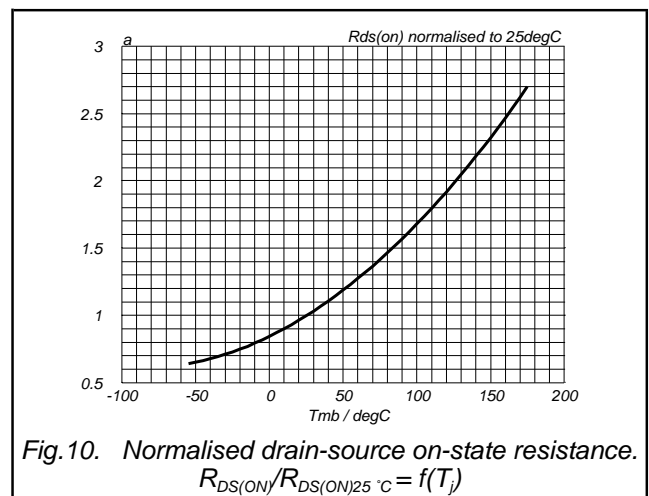
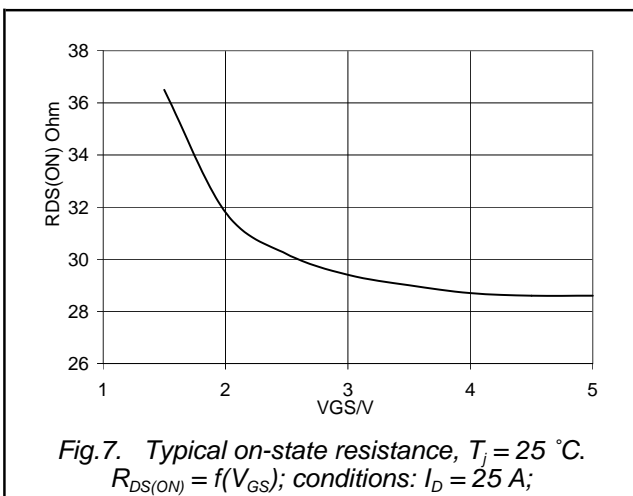
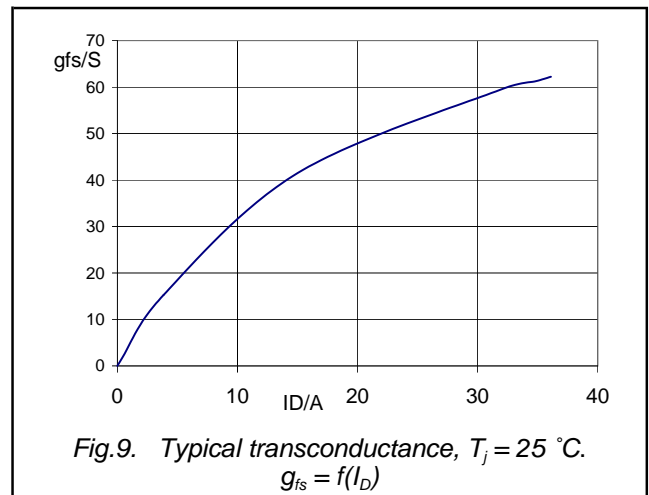
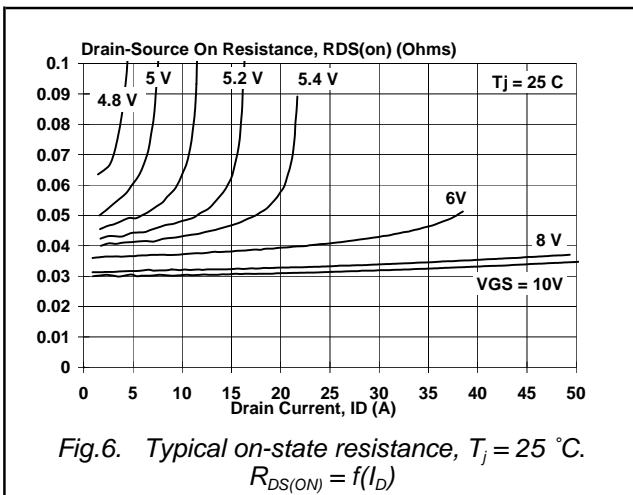
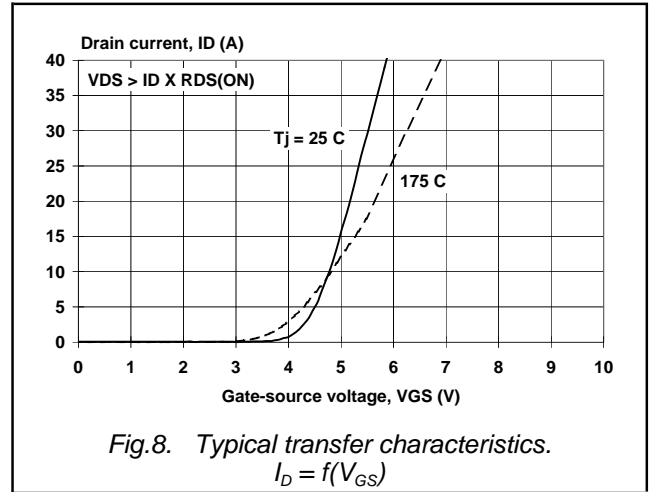
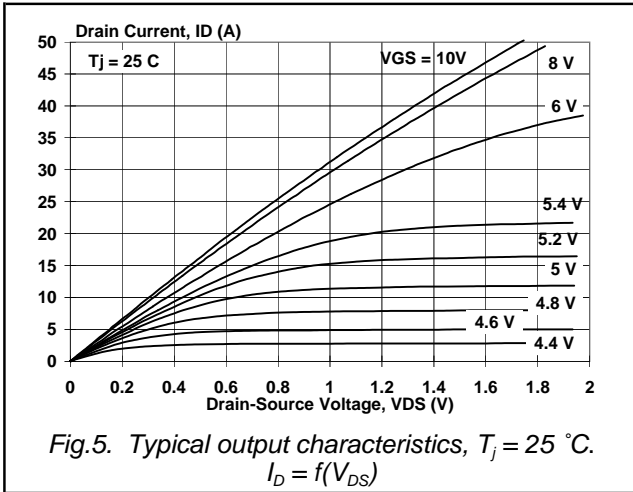
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$W_{DSS}^1$	Drain-source non-repetitive unclamped inductive turn-off energy	$I_D = 26 \text{ A}; V_{DD} \leq 25 \text{ V}; V_{GS} = 10 \text{ V}; R_{GS} = 50 \text{ } \Omega; T_{mb} = 25 \text{ } ^\circ\text{C}$	-	-	31	mJ



<sup>1</sup> For maximum permissible repetitive avalanche current see fig.18.

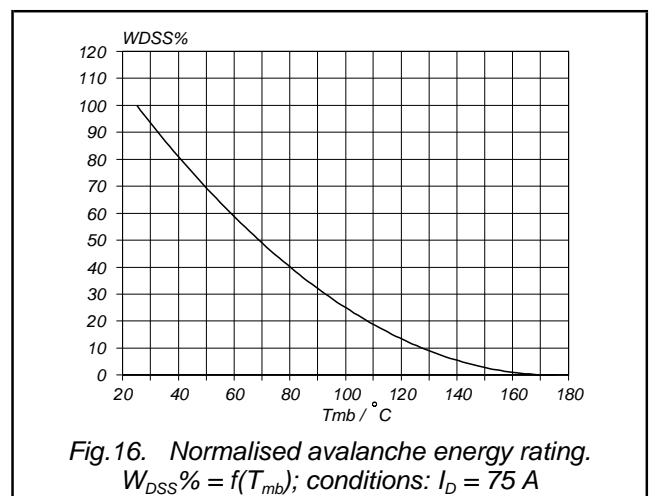
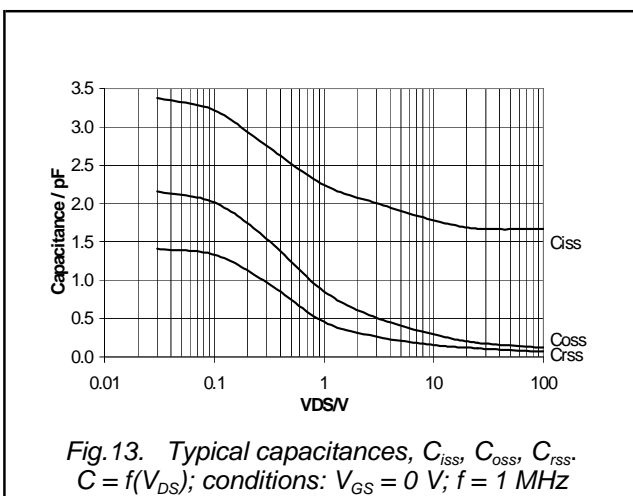
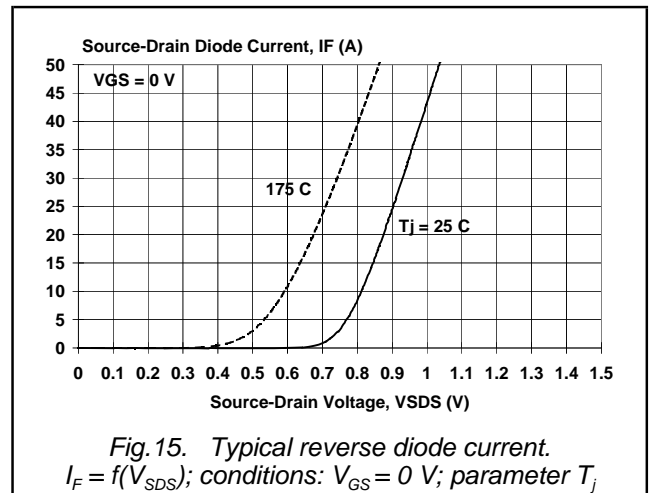
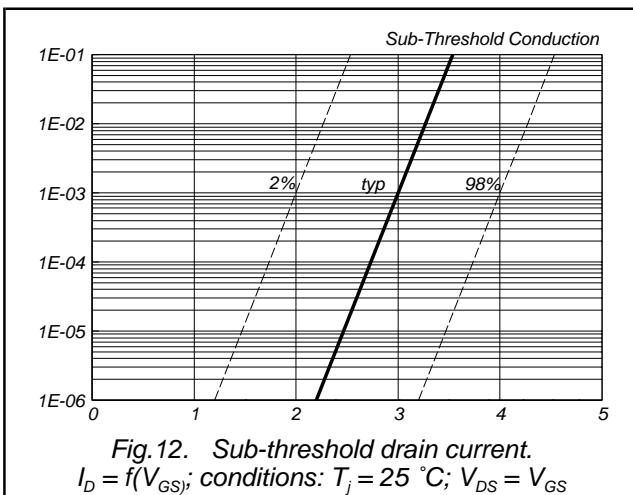
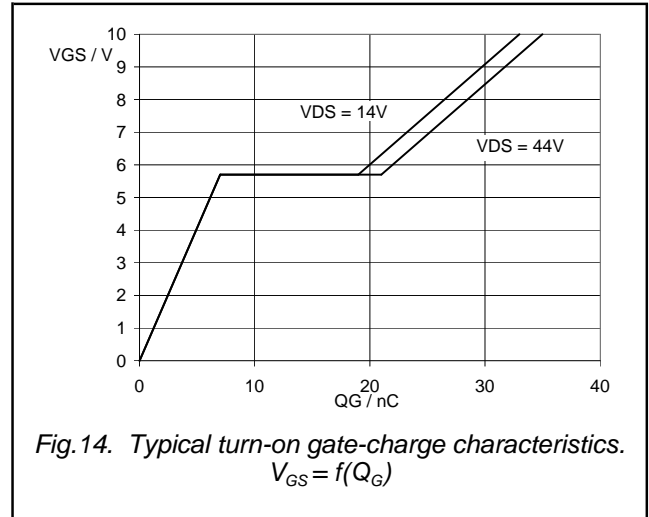
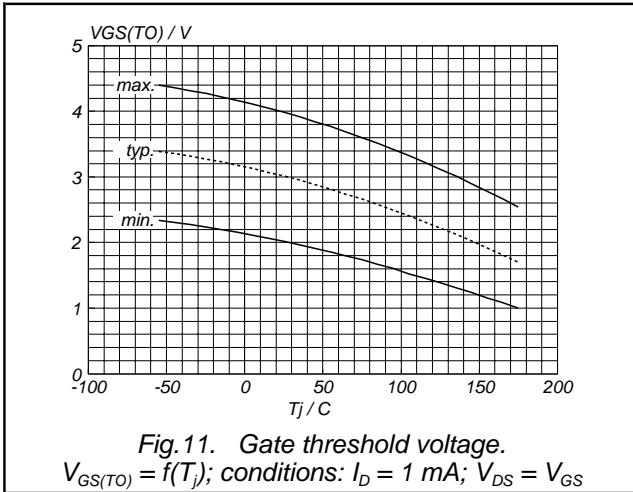
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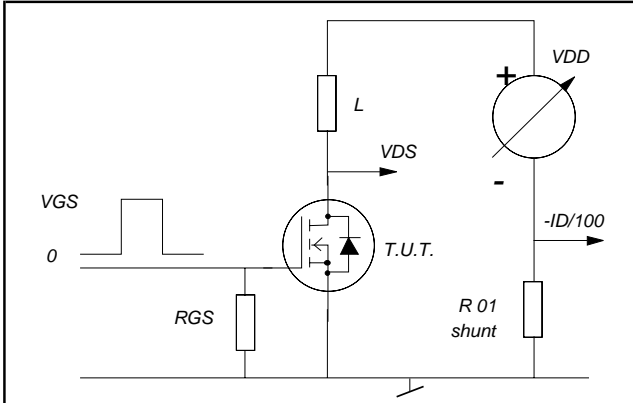


Fig. 17. Avalanche energy test circuit.

$$W_{DSS} = 0.5 \cdot L I_D^2 \cdot BV_{DSS} / (BV_{DSS} - V_{DD})$$

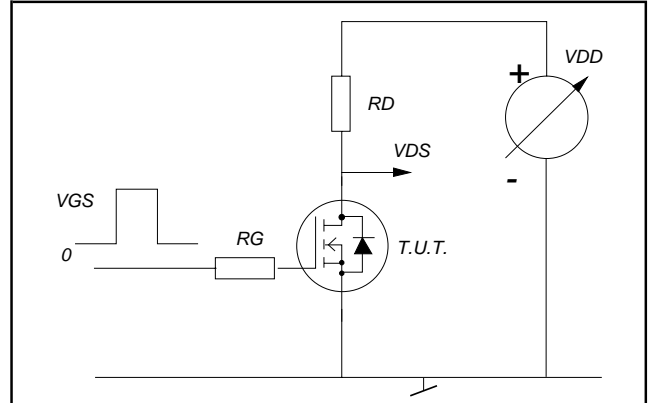


Fig. 19. Switching test circuit.

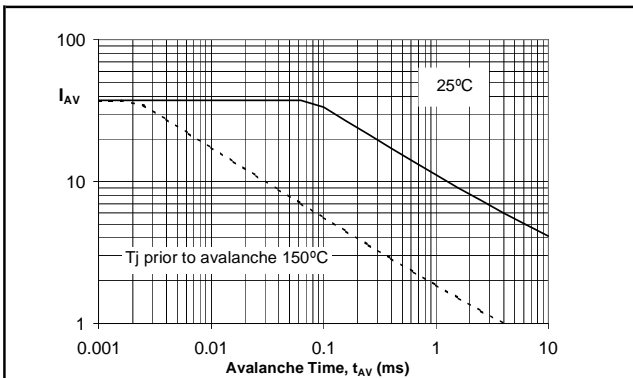
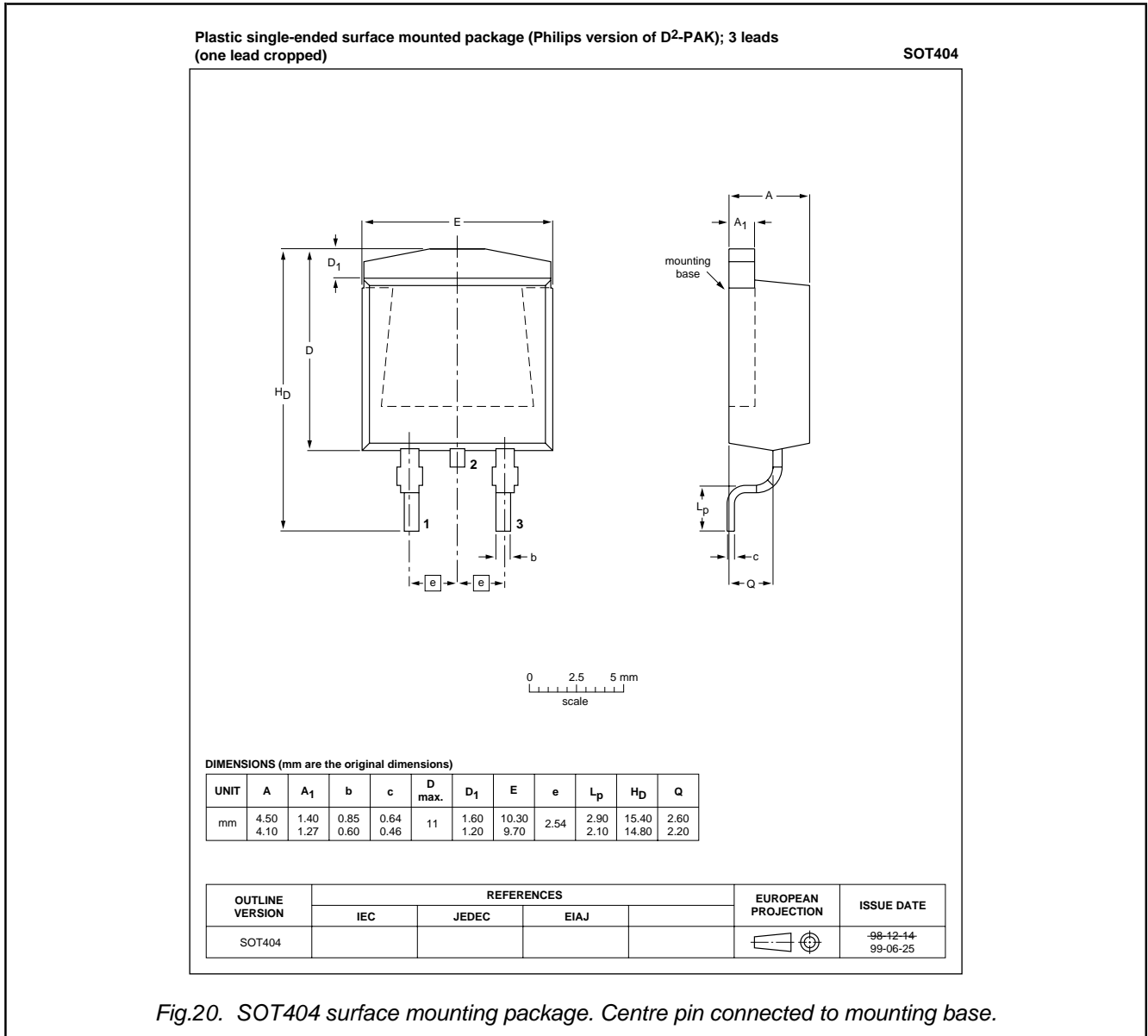


Fig. 18. Maximum permissible repetitive avalanche current ( $I_{AV}$ ) versus avalanche time ( $t_{AV}$ ) for unclamped inductive loads.

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MECHANICAL DATA



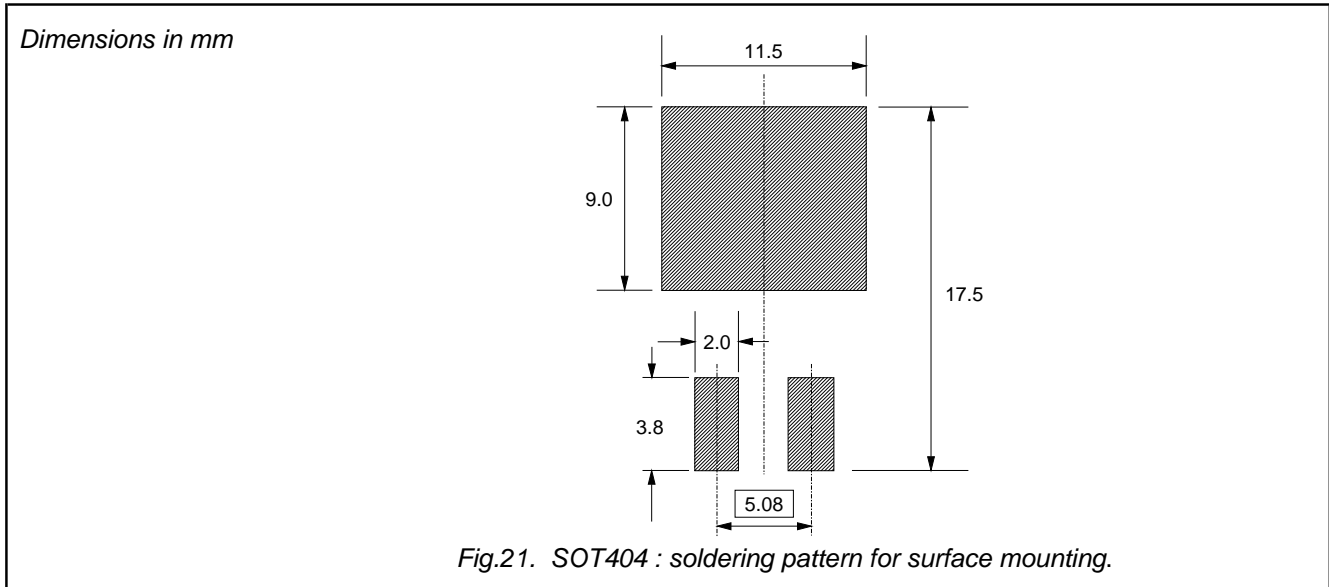
Notes

1. This product is supplied in anti-static packaging. The gate-source input must be protected against static discharge during transport or handling.
2. Refer to SMD Footprint Design and Soldering Guidelines, Data Handbook SC18.
3. Epoxy meets UL94 V0 at 1/8".

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**MOUNTING INSTRUCTIONS**



**DEFINITIONS**

<b>Data sheet status</b>	
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.
<b>Limiting values</b>	
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.	
<b>Application information</b>	
Where application information is given, it is advisory and does not form part of the specification.	
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