

TrenchMOS™ transistor Logic level FET

BUK9621-30

GENERAL DESCRIPTION

N-channel enhancement mode logic level field-effect power transistor in a plastic envelope suitable for surface mounting using 'trench' technology. The device features very low on-state resistance and has integral zener diodes giving ESD protection up to 2kV. It is intended for use in automotive and general purpose switching applications.

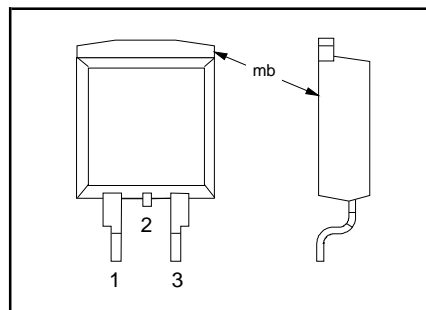
QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{DS}	Drain-source voltage	30	V
I_D	Drain current (DC)	50	A
P_{tot}	Total power dissipation	94	W
T_j	Junction temperature	175	°C
$R_{DS(ON)}$	Drain-source on-state resistance $V_{GS} = 5\text{ V}$	21	mΩ

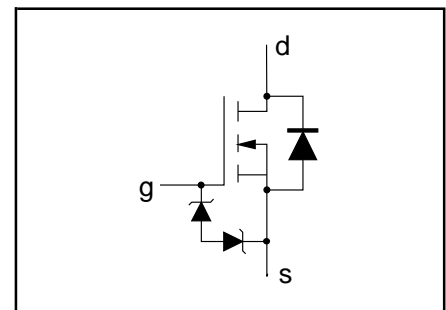
PINNING - SOT404 (D²PAK)

PIN	DESCRIPTION
1	gate
2	drain
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	-	-	30	V
V_{DGR}	Drain-gate voltage	$R_{GS} = 20\text{ k}\Omega$	-	30	V
$\pm V_{GS}$	Gate-source voltage	-	-	10	V
I_D	Drain current (DC)	$T_{mb} = 25\text{ }^\circ\text{C}$	-	50	A
I_D	Drain current (DC)	$T_{mb} = 100\text{ }^\circ\text{C}$	-	29	A
I_{DM}	Drain current (pulse peak value)	$T_{mb} = 25\text{ }^\circ\text{C}$	-	200	A
P_{tot}	Total power dissipation	$T_{mb} = 25\text{ }^\circ\text{C}$	-	94	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	-	-	1.6	K/W
$R_{th\ j-a}$	Thermal resistance junction to ambient	pcb mounted, minimum footprint	50	-	K/W

ESD LIMITING VALUE

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_C	Electrostatic discharge capacitor voltage, all pins	Human body model (100 pF, 1.5 kΩ)	-	2	kV

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STATIC CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0\text{ V}; I_D = 0.25\text{ mA};$ $T_j = -55^\circ\text{C}$	30 27	- -	- -	V V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}; I_D = 1\text{ mA}$ $T_j = 175^\circ\text{C}$ $T_j = -55^\circ\text{C}$	1 0.5 -	1.5 - -	2 - 2.3	V V V
I_{DSS}	Zero gate voltage drain current	$V_{DS} = 30\text{ V}; V_{GS} = 0\text{ V};$ $T_j = 175^\circ\text{C}$	-	0.05	10	μA
I_{GSS}	Gate source leakage current	$V_{GS} = \pm 5\text{ V}; V_{DS} = 0\text{ V}$ $T_j = 175^\circ\text{C}$	-	0.02	500	μA
$\pm V_{(BR)GSS}$	Gate-source breakdown voltage	$I_G = \pm 1\text{ mA};$ $T_j = 175^\circ\text{C}$	10	-	10	V
$R_{DS(ON)}$	Drain-source on-state resistance	$V_{GS} = 5\text{ V}; I_D = 25\text{ A}$ $T_j = 175^\circ\text{C}$	- -	19 -	21 39	$\text{m}\Omega$ $\text{m}\Omega$

DYNAMIC CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	$V_{DS} = 25\text{ V}; I_D = 25\text{ A}$	8	30	-	S
$Q_{g(\text{tot})}$	Total gate charge	$I_D = 25\text{ A}; V_{DD} = 30\text{ V}; V_{GS} = 5\text{ V}$	-	21	-	nC
Q_{gs}	Gate-source charge		-	6	-	nC
Q_{gd}	Gate-drain (Miller) charge		-	14	-	nC
C_{iss}	Input capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 25\text{ V}; f = 1\text{ MHz}$	-	1325	-	pF
C_{oss}	Output capacitance		-	336	-	pF
C_{rss}	Feedback capacitance		-	171	-	pF
$t_{d\text{ on}}$	Turn-on delay time	$V_{DD} = 30\text{ V}; I_D = 25\text{ A};$ $V_{GS} = 5\text{ V}; R_G = 10\ \Omega$ Resistive load	-	20	-	ns
t_r	Turn-on rise time		-	106	-	ns
$t_{d\text{ off}}$	Turn-off delay time		-	72	-	ns
t_f	Turn-off fall time		-	77	-	ns
L_d	Internal drain inductance	Measured from tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead solder point to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead solder point to source bond pad	-	7.5	-	nH

REVERSE DIODE LIMITING VALUES AND CHARACTERISTICS

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

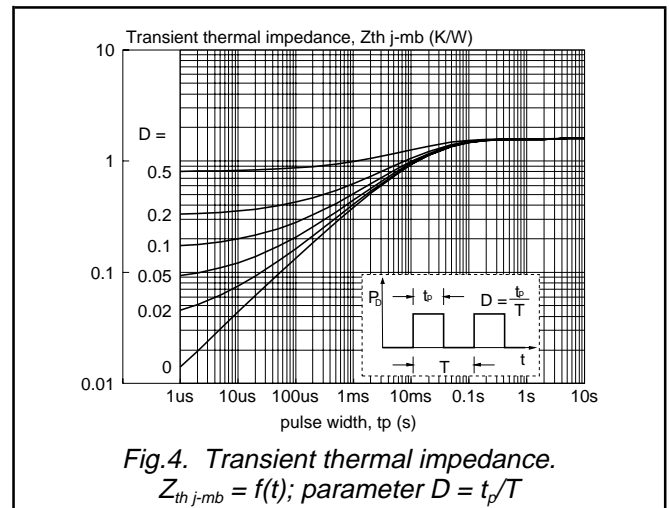
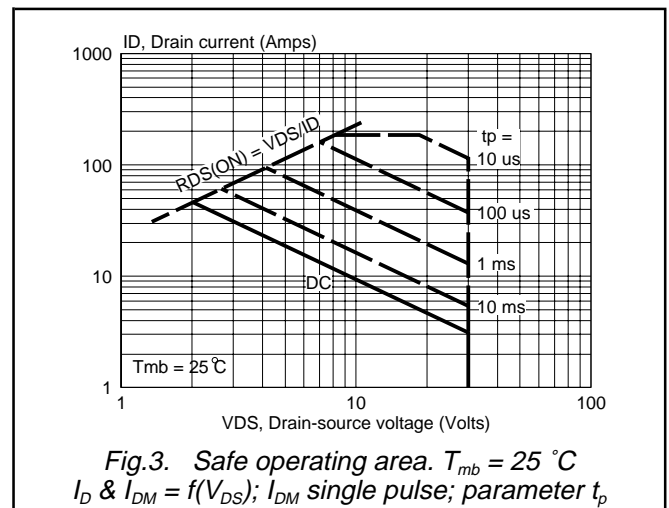
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current		-	-	50	A
I_{DRM}	Pulsed reverse drain current		-	-	200	A
V_{SD}	Diode forward voltage	$I_F = 25\text{ A}; V_{GS} = 0\text{ V}$	-	0.95	1.2	V
t_{rr}	Reverse recovery time	$I_F = 25\text{ A}; -di_F/dt = 100\text{ A}/\mu\text{s};$	-	128	-	ns
Q_{rr}	Reverse recovery charge	$V_{GS} = -10\text{ V}; V_R = 25\text{ V}$	-	0.5	-	μC

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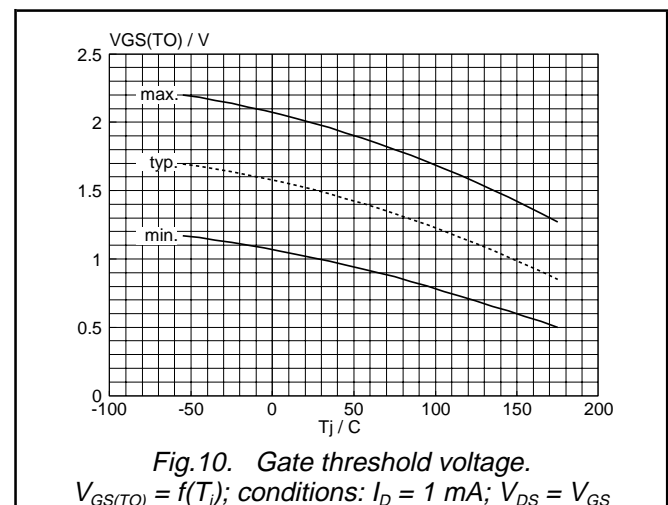
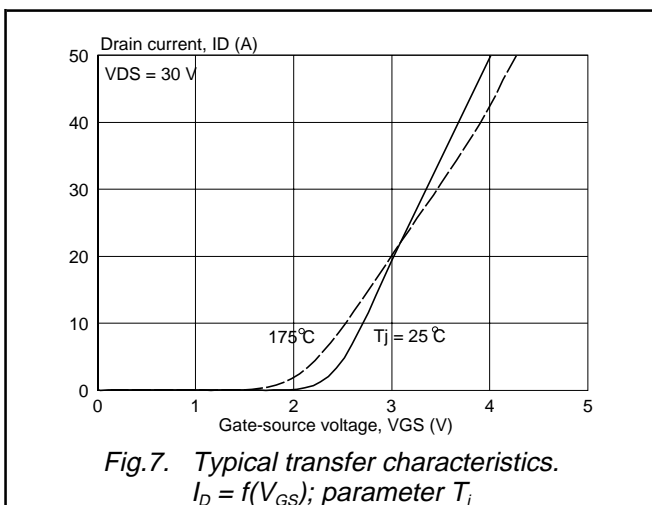
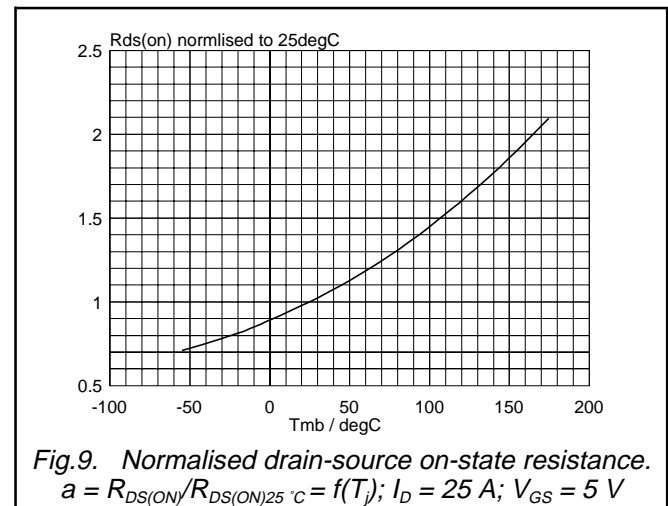
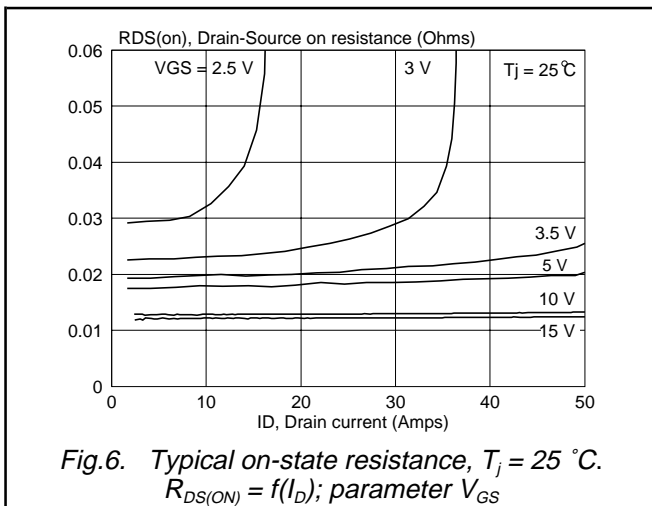
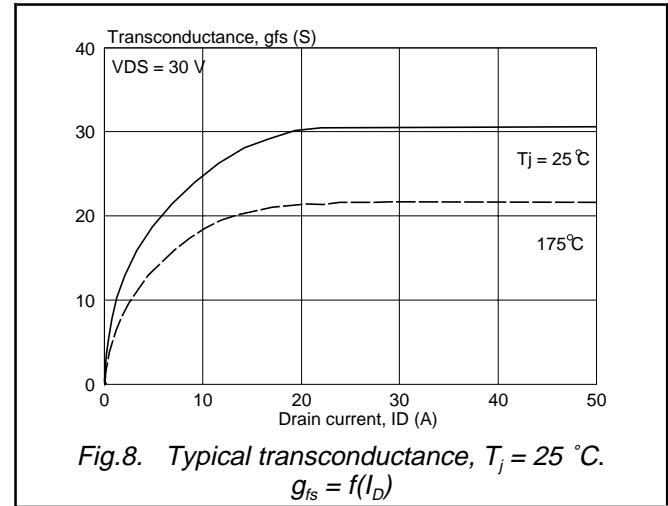
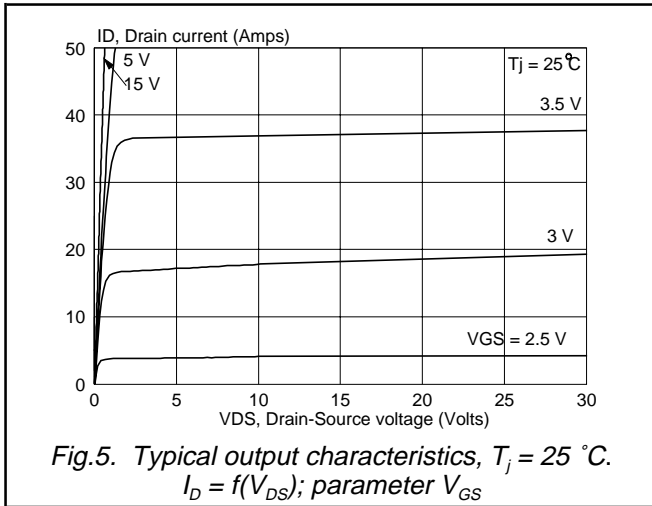
AVALANCHE LIMITING VALUE

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	$I_D = 25 \text{ A}; V_{DD} \leq 25 \text{ V}; V_{GS} = 10 \text{ V}; R_{GS} = 50 \text{ } \Omega; T_{mb} = 25 \text{ } ^\circ\text{C}$	-	-	70	mJ



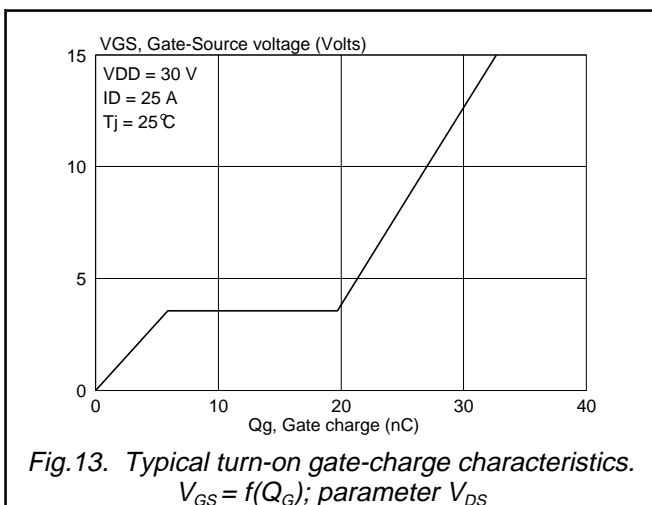
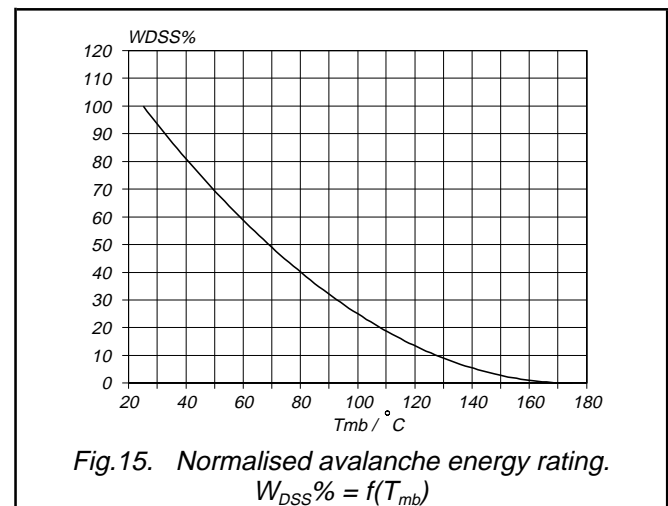
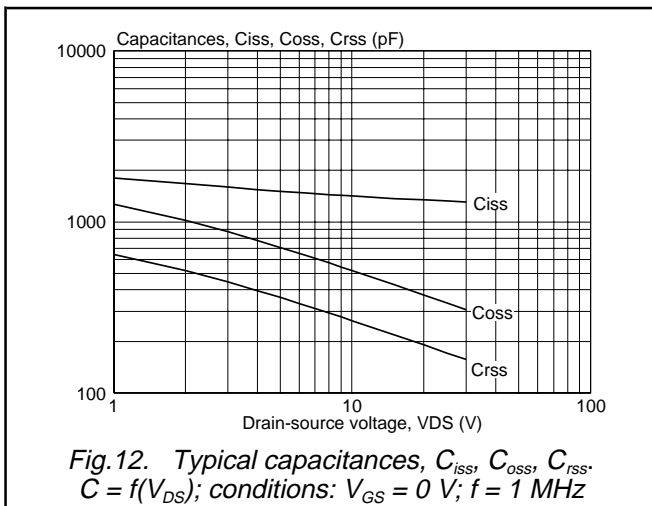
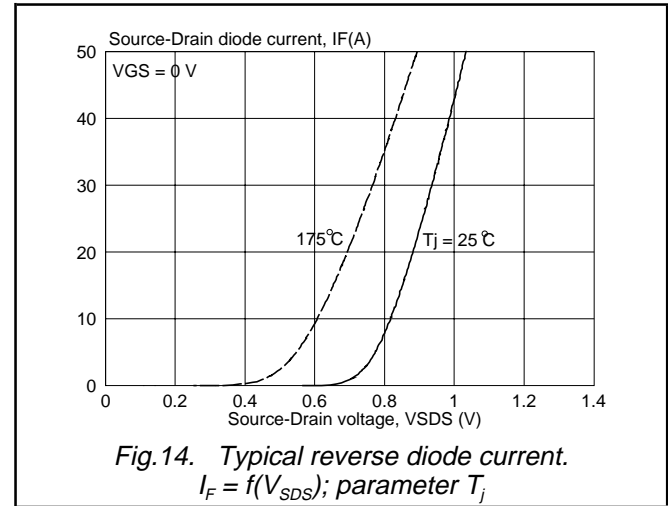
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MECHANICAL DATA

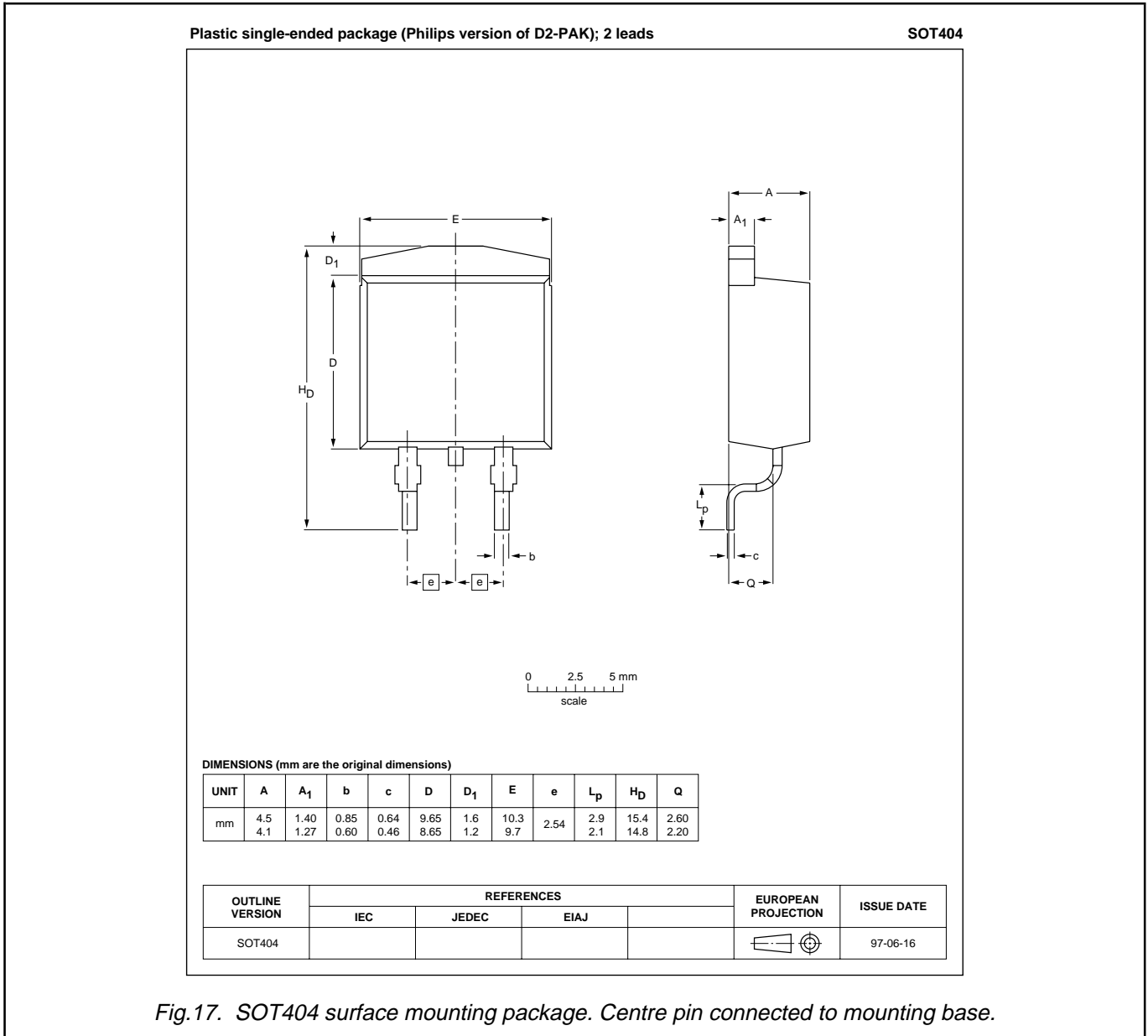


Fig.17. SOT404 surface mounting package. Centre pin connected to mounting base.

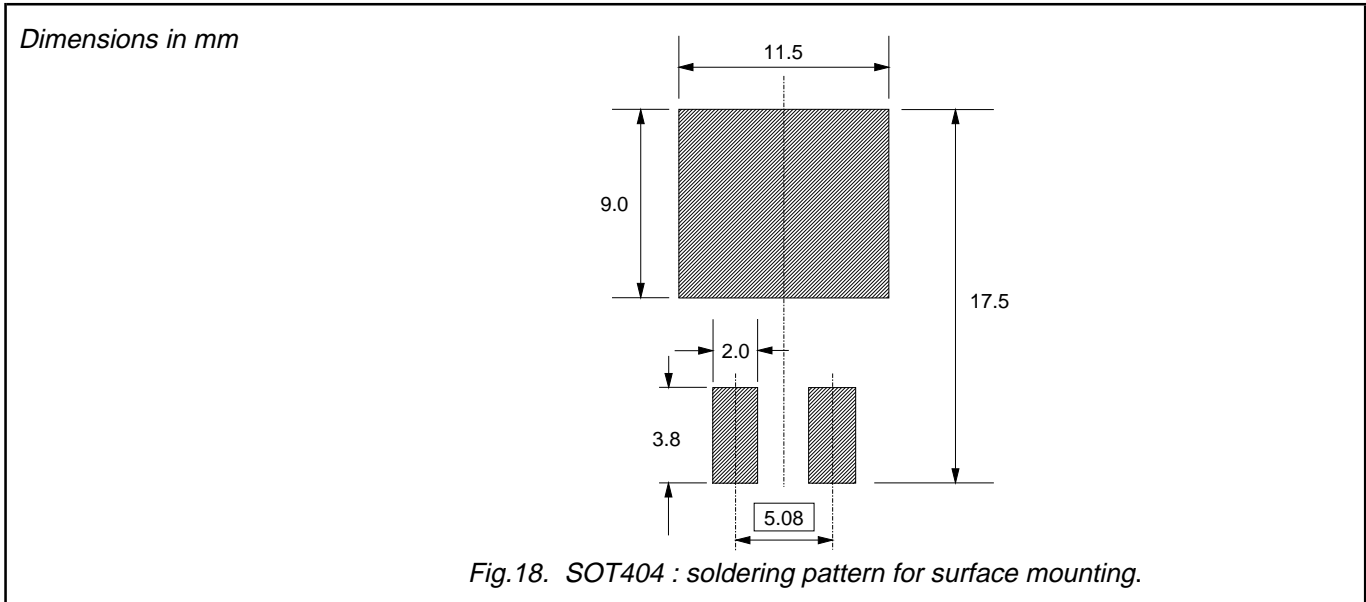
Notes

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

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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