

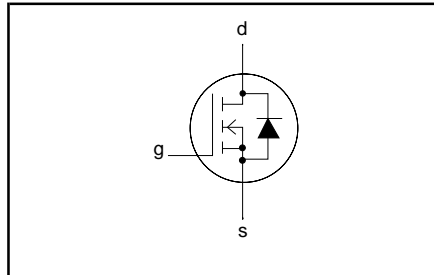
# PowerMOS transistor Avalanche energy rated

IRF730

## FEATURES

- Repetitive Avalanche Rated
- Fast switching
- High thermal cycling performance
- Low thermal resistance

## SYMBOL



## QUICK REFERENCE DATA

$V_{DSS} = 400\text{ V}$
$I_D = 7.2\text{ A}$
$R_{DS(ON)} \leq 1\ \Omega$

## GENERAL DESCRIPTION

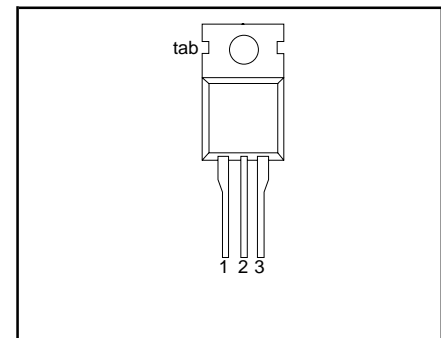
N-channel, enhancement mode field-effect power transistor, intended for use in off-line switched mode power supplies, T.V. and computer monitor power supplies, d.c. to d.c. converters, motor control circuits and general purpose switching applications.

The IRF730 is supplied in the SOT78 (TO220AB) conventional leaded package.

## PINNING

PIN	DESCRIPTION
1	gate
2	drain
3	source
tab	drain

## SOT78 (TO220AB)



## LIMITING VALUES

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{DSS}$	Drain-source voltage	$T_j = 25\text{ }^\circ\text{C}$ to $150\text{ }^\circ\text{C}$	-	400	V
$V_{DGR}$	Drain-gate voltage	$T_j = 25\text{ }^\circ\text{C}$ to $150\text{ }^\circ\text{C}$ ; $R_{GS} = 20\text{ k}\Omega$	-	400	V
$V_{GS}$	Gate-source voltage		-	$\pm 30$	V
$I_D$	Continuous drain current	$T_{mb} = 25\text{ }^\circ\text{C}$ ; $V_{GS} = 10\text{ V}$	-	7.2	A
		$T_{mb} = 100\text{ }^\circ\text{C}$ ; $V_{GS} = 10\text{ V}$	-	4.6	A
$I_{DM}$	Pulsed drain current	$T_{mb} = 25\text{ }^\circ\text{C}$	-	29	A
$P_D$	Total dissipation	$T_{mb} = 25\text{ }^\circ\text{C}$	-	125	W
$T_j, T_{stg}$	Operating junction and storage temperature range		-55	150	$^\circ\text{C}$

## AVALANCHE ENERGY LIMITING VALUES

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$E_{AS}$	Non-repetitive avalanche energy	Unclamped inductive load, $I_{AS} = 4.8\text{ A}$ ; $t_p = 0.23\text{ ms}$ ; $T_j$ prior to avalanche = $25\text{ }^\circ\text{C}$ ; $V_{DD} \leq 50\text{ V}$ ; $R_{GS} = 50\ \Omega$ ; $V_{GS} = 10\text{ V}$ ; refer to fig:17	-	290	mJ
$E_{AR}$	Repetitive avalanche energy <sup>1</sup>	$I_{AR} = 7.2\text{ A}$ ; $t_p = 2.5\ \mu\text{s}$ ; $T_j$ prior to avalanche = $25\text{ }^\circ\text{C}$ ; $R_{GS} = 50\ \Omega$ ; $V_{GS} = 10\text{ V}$ ; refer to fig:18	-	9.4	mJ
$I_{AS}, I_{AR}$	Repetitive and non-repetitive avalanche current		-	7.2	A

<sup>1</sup> pulse width and repetition rate limited by  $T_j$  max.

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### THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$R_{th\ j-mb}$	Thermal resistance junction to mounting base		-	-	1	K/W
$R_{th\ j-a}$	Thermal resistance junction to ambient	in free air	-	60	-	K/W

### ELECTRICAL CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0\text{ V}; I_D = 0.25\text{ mA}$	400	-	-	V
$\frac{\Delta V_{(BR)DSS}}{\Delta T_j}$	Drain-source breakdown voltage temperature coefficient	$V_{DS} = V_{GS}; I_D = 0.25\text{ mA}$	-	0.1	-	%/K
$R_{DS(ON)}$	Drain-source on resistance	$V_{GS} = 10\text{ V}; I_D = 3.6\text{ A}$	-	0.7	1	$\Omega$
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}; I_D = 0.25\text{ mA}$	2.0	3.0	4.0	V
$g_{fs}$	Forward transconductance	$V_{DS} = 30\text{ V}; I_D = 3.6\text{ A}$	2	4	-	S
$I_{DSS}$	Drain-source leakage current	$V_{DS} = 400\text{ V}; V_{GS} = 0\text{ V}$	-	1	25	$\mu\text{A}$
$I_{GSS}$	Gate-source leakage current	$V_{DS} = 320\text{ V}; V_{GS} = 0\text{ V}; T_j = 125\text{ }^\circ\text{C}$ $V_{GS} = \pm 30\text{ V}; V_{DS} = 0\text{ V}$	-	30	250	$\mu\text{A}$
$Q_{g(tot)}$	Total gate charge	$I_D = 7.2\text{ A}; V_{DD} = 320\text{ V}; V_{GS} = 10\text{ V}$	-	52	62	nC
$Q_{gs}$	Gate-source charge		-	3	5	nC
$Q_{gd}$	Gate-drain (Miller) charge		-	26	30	nC
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 200\text{ V}; R_D = 27\text{ }\Omega;$	-	12	-	ns
$t_r$	Turn-on rise time	$R_G = 12\text{ }\Omega$	-	33	-	ns
$t_{d(off)}$	Turn-off delay time		-	93	-	ns
$t_f$	Turn-off fall time		-	42	-	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 to centre of die	-	4.5	-	nH
$L_s$	Internal source inductance	Measured from source lead to source bond pad	-	7.5	-	nH
$C_{iss}$	Input capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 25\text{ V}; f = 1\text{ MHz}$	-	620	-	pF
$C_{oss}$	Output capacitance		-	108	-	pF
$C_{rss}$	Feedback capacitance		-	63	-	pF

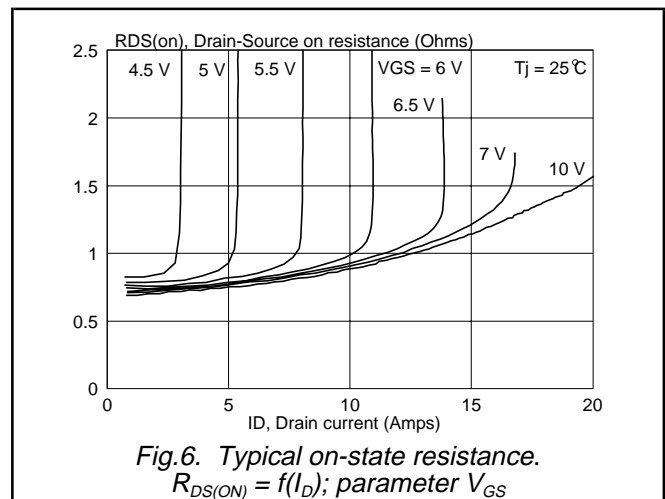
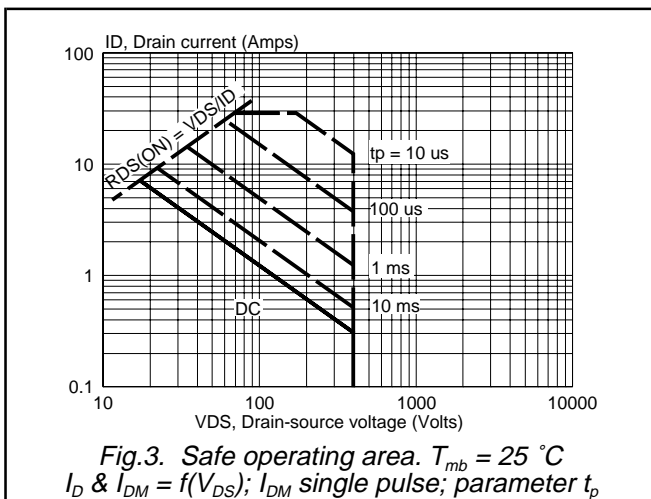
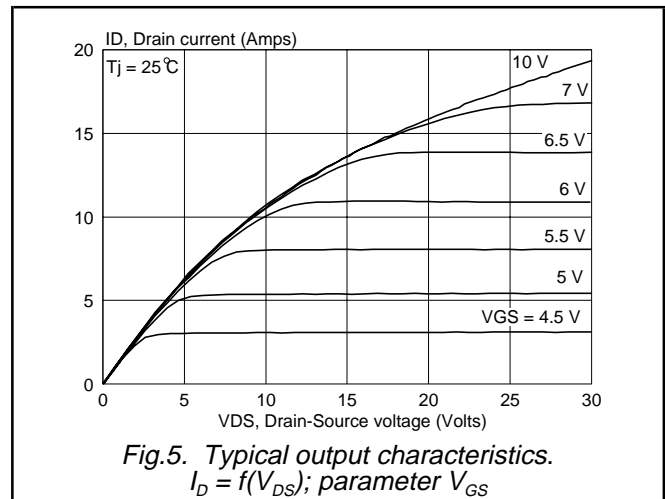
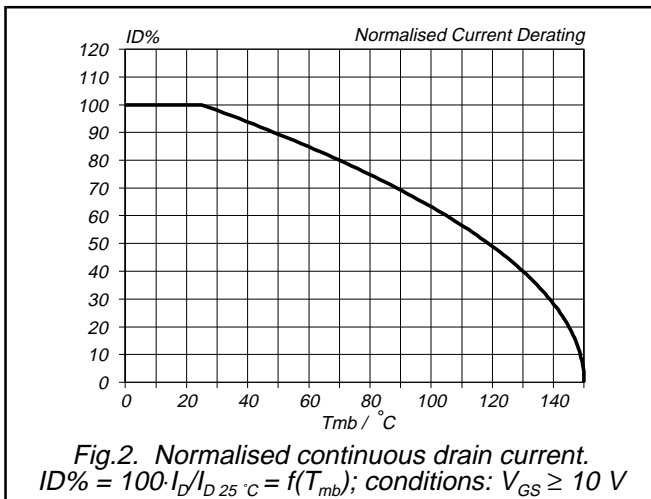
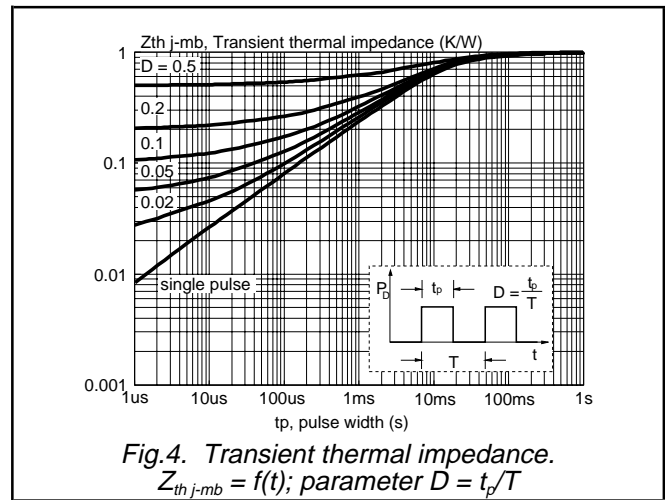
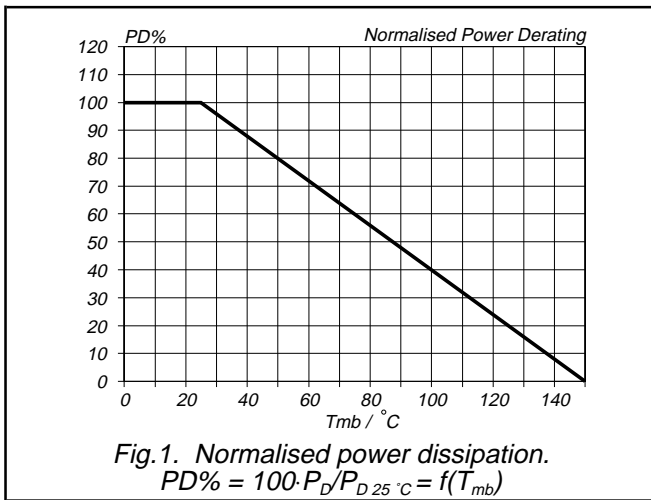
### SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_S$	Continuous source current (body diode)	$T_{mb} = 25\text{ }^\circ\text{C}$	-	-	7.2	A
$I_{SM}$	Pulsed source current (body diode)	$T_{mb} = 25\text{ }^\circ\text{C}$	-	-	29	A
$V_{SD}$	Diode forward voltage	$I_S = 7.2\text{ A}; V_{GS} = 0\text{ V}$	-	-	1.2	V
$t_{rr}$	Reverse recovery time	$I_S = 7.2\text{ A}; V_{GS} = 0\text{ V}; dl/dt = 100\text{ A}/\mu\text{s}$	-	270	-	ns
$Q_{rr}$	Reverse recovery charge		-	3.3	-	$\mu\text{C}$

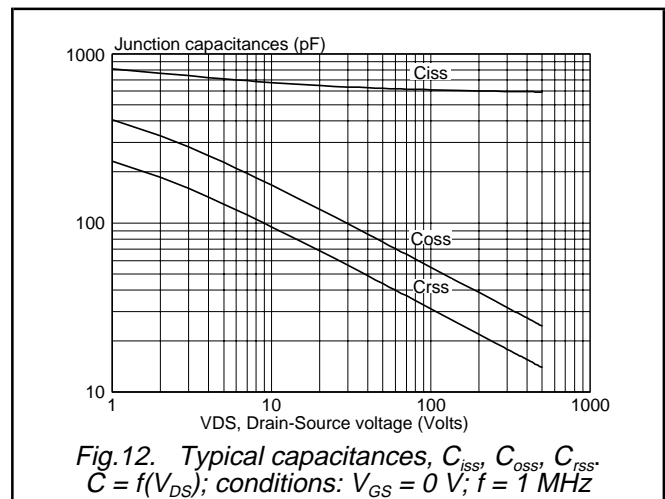
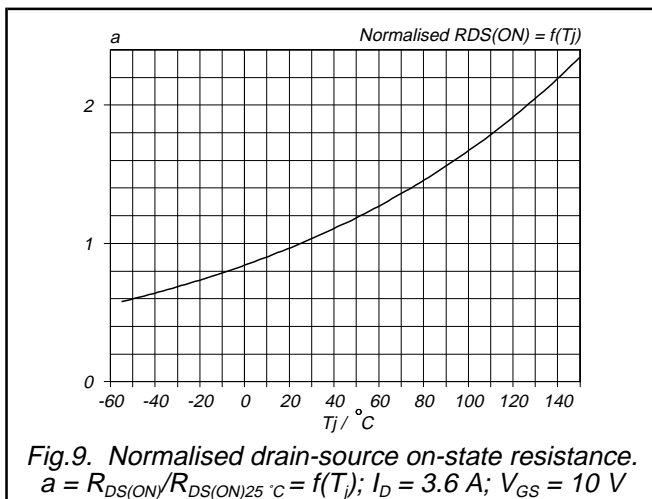
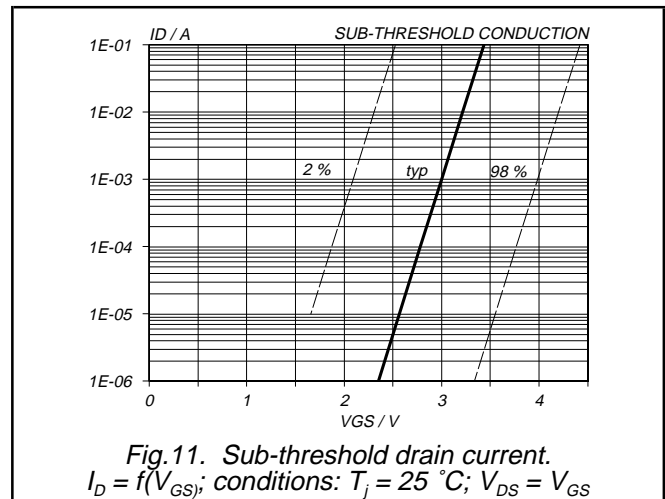
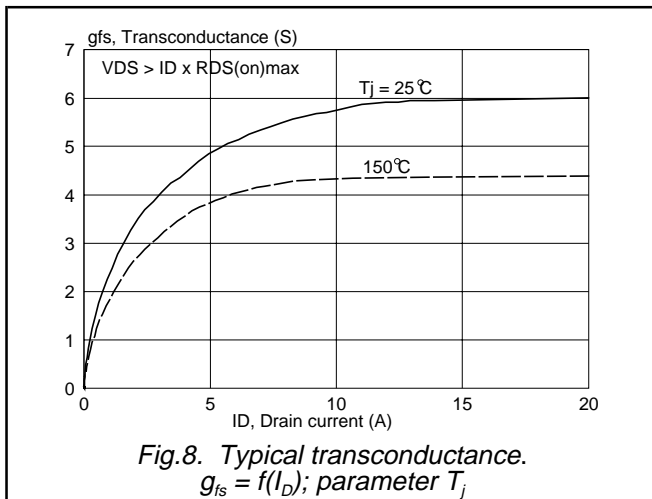
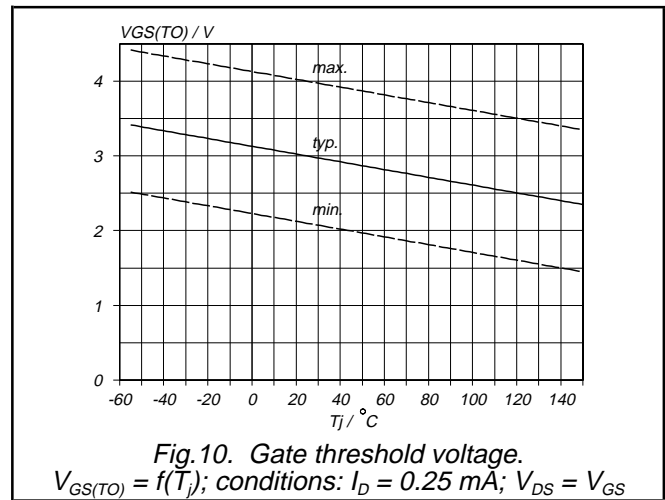
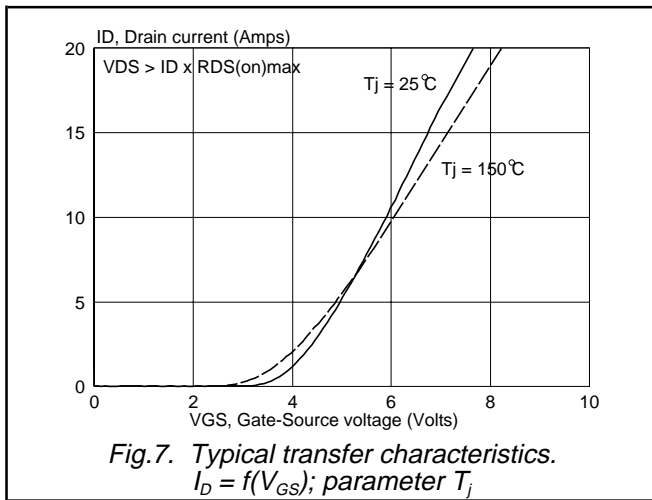
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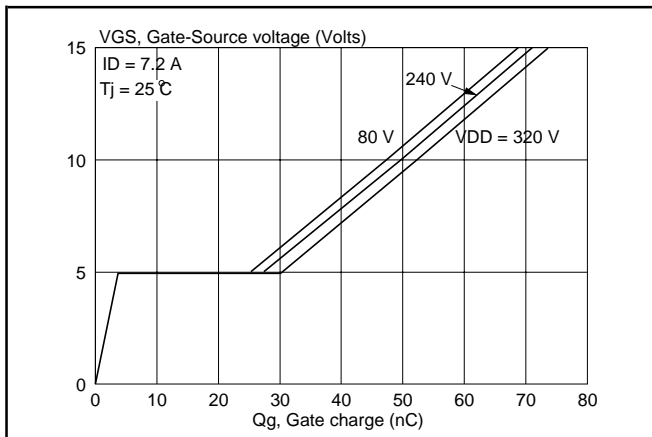


Fig. 13. Typical turn-on gate-charge characteristics.  
 $V_{GS} = f(Q_G)$ ; parameter  $V_{DS}$

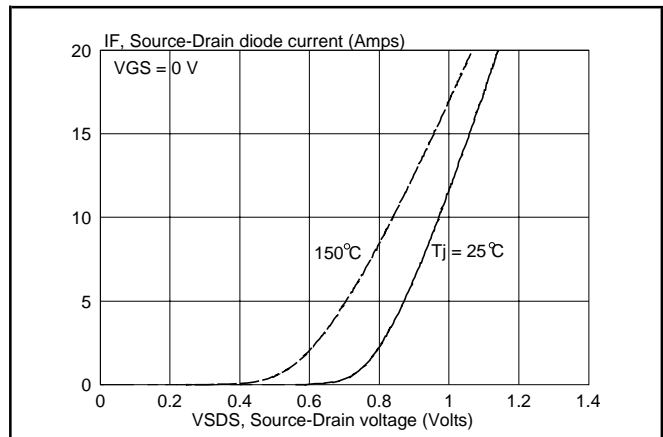


Fig. 16. Source-Drain diode characteristic.  
 $I_F = f(V_{SDS})$ ; parameter  $T_j$

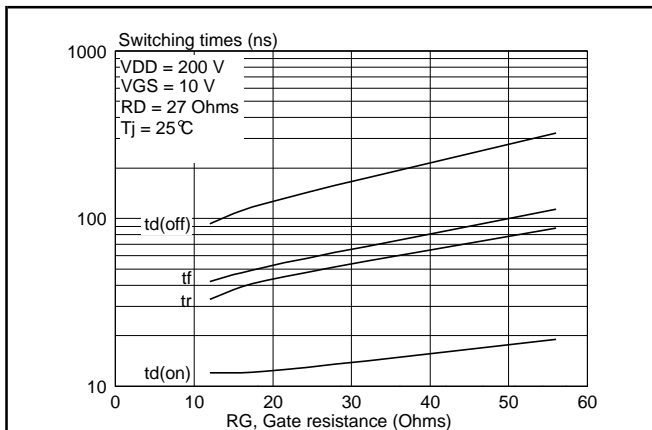


Fig. 14. Typical switching times;  $t_{d(on)}$ ,  $t_r$ ,  $t_{d(off)}$ ,  $t_f = f(R_G)$

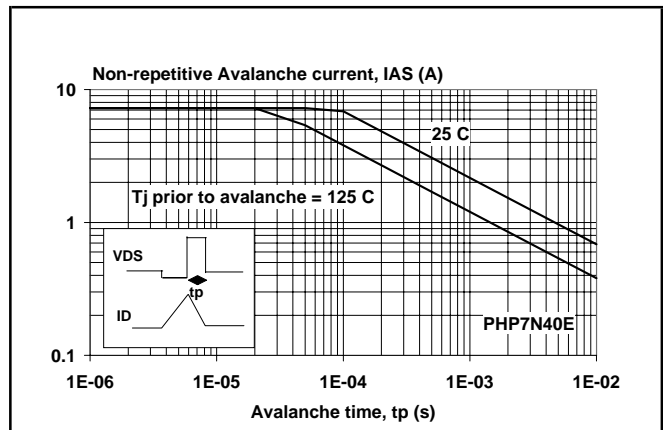


Fig. 17. Maximum permissible non-repetitive avalanche current ( $I_{AS}$ ) versus avalanche time ( $t_p$ ); unclamped inductive load

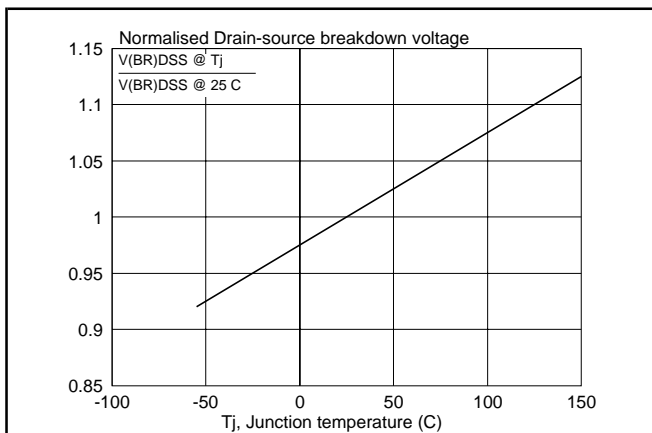


Fig. 15. Normalised drain-source breakdown voltage;  
 $V_{(BR)DSS} / V_{(BR)DSS 25^\circ C} = f(T_j)$

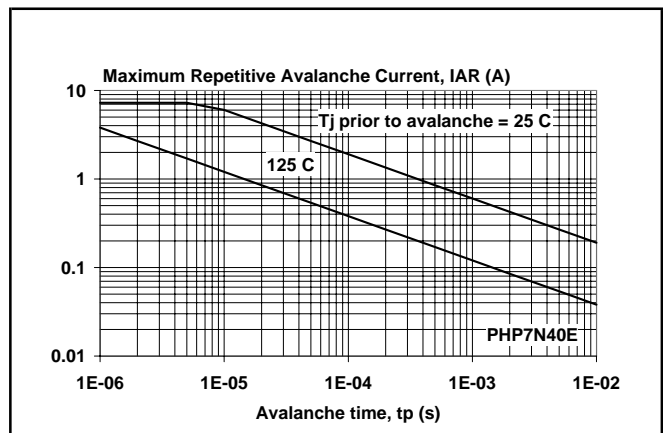


Fig. 18. Maximum permissible repetitive avalanche current ( $I_{AR}$ ) versus avalanche time ( $t_p$ )

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MECHANICAL DATA

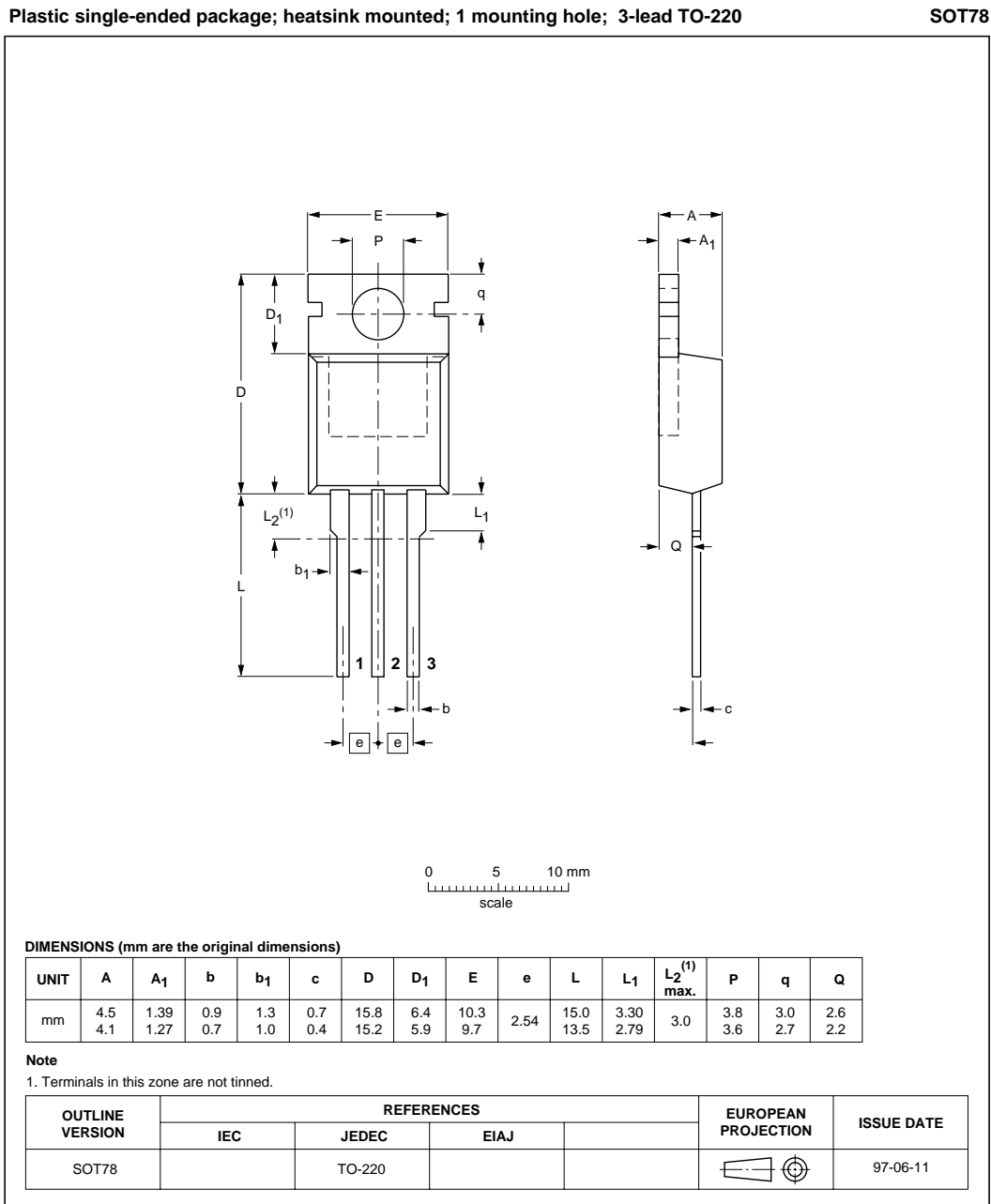


Fig.19. SOT78 (TO220AB); pin 2 connected to mounting base (Net mass:2g)

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 mounting instructions for SOT78 (TO220AB) package.
3. Epoxy meets UL94 V0 at 1/8".

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### 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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