

**PowerMOS transistor**

**BUK438W-800A/B**

**GENERAL DESCRIPTION**

N-channel enhancement mode field-effect power transistor in a plastic envelope.  
 The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

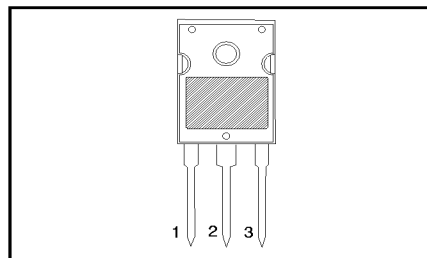
**QUICK REFERENCE DATA**

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	<b>BUK438</b>	<b>-800A</b>	<b>-800B</b>	
$V_{DS}$	Drain-source voltage	800	800	V
$I_D$	Drain current (DC)	7.6	6.6	A
$P_{tot}$	Total power dissipation	220	220	W
$R_{DS(ON)}$	Drain-source on-state resistance	1.5	2.0	$\Omega$

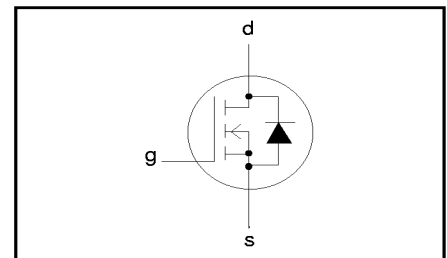
**PINNING - SOT429 (TO247)**

PIN	DESCRIPTION
1	gate
2	drain
3	source
tab	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	-	-	800	V
$V_{DGR}$	Drain-gate voltage	$R_{GS} = 20\text{ k}\Omega$	-	800	V
$\pm V_{GS}$	Gate-source voltage	-	-	30	V
$I_D$	Drain current (DC)	$T_{mb} = 25\text{ }^\circ\text{C}$	-	<b>-800A</b> 7.6	A
$I_D$	Drain current (DC)	$T_{mb} = 100\text{ }^\circ\text{C}$	-	<b>-800B</b> 6.6	A
$I_{DM}$	Drain current (pulse peak value)	$T_{mb} = 25\text{ }^\circ\text{C}$	-	30	A
$P_{tot}$	Total power dissipation	$T_{mb} = 25\text{ }^\circ\text{C}$	-	220	W
$T_{stg}$	Storage temperature	-	-55	150	$^\circ\text{C}$
$T_J$	Junction temperature	-	-	150	$^\circ\text{C}$

**THERMAL RESISTANCES**

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$R_{th\ j-mb}$	Thermal resistance junction to mounting base		-	-	0.57	K/W
$R_{th\ j-a}$	Thermal resistance junction to ambient		-	45	-	K/W

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**STATIC CHARACTERISTICS** $T_{mb} = 25\text{ °C}$  unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0\text{ V}; I_D = 0.25\text{ mA}$	800	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}; I_D = 1\text{ mA}$	2.1	3.0	4.0	V
$I_{DSS}$	Zero gate voltage drain current	$V_{DS} = 800\text{ V}; V_{GS} = 0\text{ V}; T_j = 25\text{ °C}$	-	5	50	$\mu\text{A}$
$I_{DSS}$	Zero gate voltage drain current	$V_{DS} = 800\text{ V}; V_{GS} = 0\text{ V}; T_j = 125\text{ °C}$	-	0.1	1.0	mA
$I_{GSS}$	Gate source leakage current	$V_{GS} = \pm 30\text{ V}; V_{DS} = 0\text{ V}$	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	$V_{GS} = 10\text{ V}; I_D = 4.0\text{ A}$	-	1.2	1.5	$\Omega$
		<b>BUK438-800A</b>	-	1.6	2.0	$\Omega$
		<b>BUK438-800B</b>	-			

**DYNAMIC CHARACTERISTICS** $T_{mb} = 25\text{ °C}$  unless otherwise specified

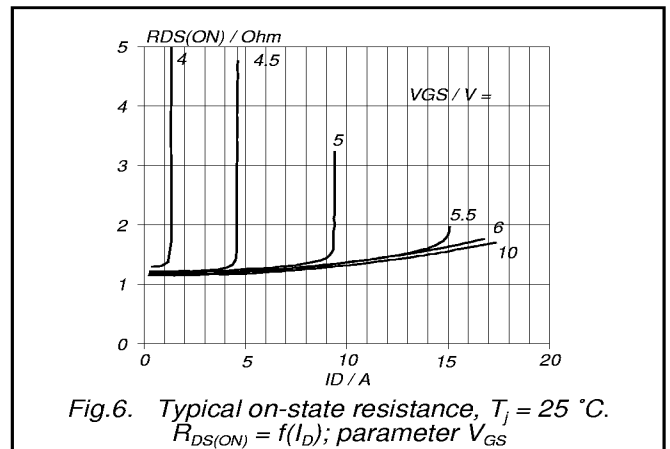
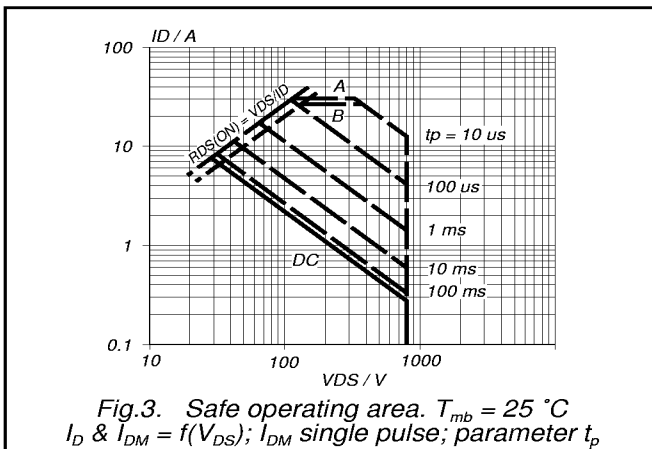
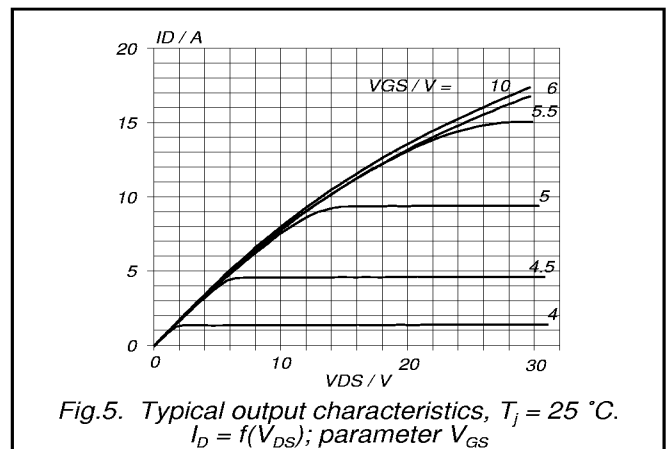
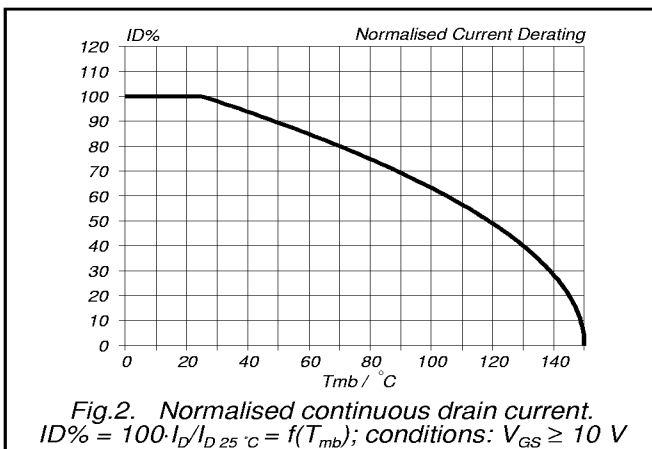
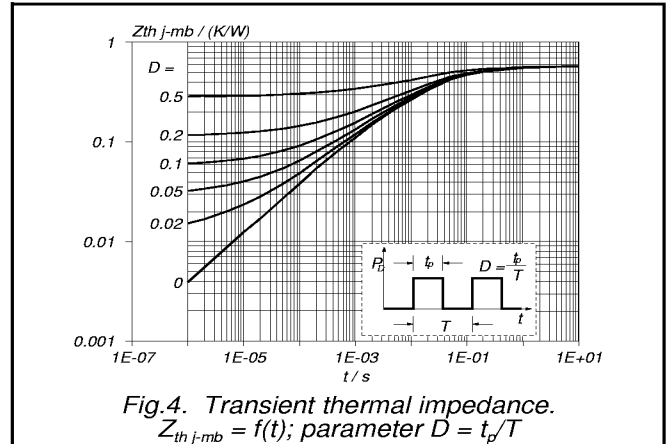
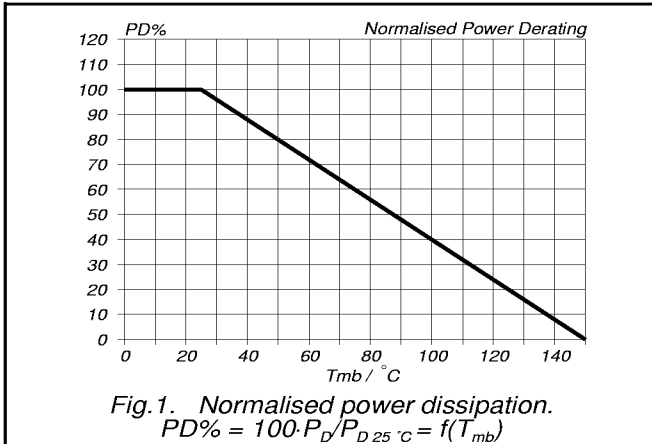
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$g_{fs}$	Forward transconductance	$V_{DS} = 25\text{ V}; I_D = 4.0\text{ A}$	3.0	7.5	-	S
$C_{iss}$	Input capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 25\text{ V}; f = 1\text{ MHz}$	-	2000	3000	pF
$C_{oss}$	Output capacitance		-	200	300	pF
$C_{rss}$	Feedback capacitance		-	100	200	pF
$t_{d\ on}$	Turn-on delay time	$V_{DD} = 30\text{ V}; I_D = 2.6\text{ A};$	-	40	90	ns
$t_r$	Turn-on rise time	$V_{GS} = 10\text{ V}; R_{GS} = 50\ \Omega;$	-	100	140	ns
$t_{d\ off}$	Turn-off delay time	$R_{gen} = 50\ \Omega$	-	300	430	ns
$t_f$	Turn-off fall time		-	100	140	ns
$L_d$	Internal drain inductance	Measured from contact screw on tab to centre of die	-	5	-	nH
$L_d$	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
$L_s$	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

**REVERSE DIODE LIMITING VALUES AND CHARACTERISTICS** $T_{mb} = 25\text{ °C}$  unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{DR}$	Continuous reverse drain current	-	-	-	7.6	A
$I_{DRM}$	Pulsed reverse drain current	-	-	-	30	A
$V_{SD}$	Diode forward voltage	$I_F = 7.6\text{ A}; V_{GS} = 0\text{ V}$	-	0.9	1.3	V
$t_{rr}$	Reverse recovery time	$I_F = 7.6\text{ A}; -dI_F/dt = 100\text{ A}/\mu\text{s};$	-	1.5	-	$\mu\text{s}$
$Q_{rr}$	Reverse recovery charge	$V_{GS} = 0\text{ V}; V_R = 100\text{ V}$	-	20	-	$\mu\text{C}$

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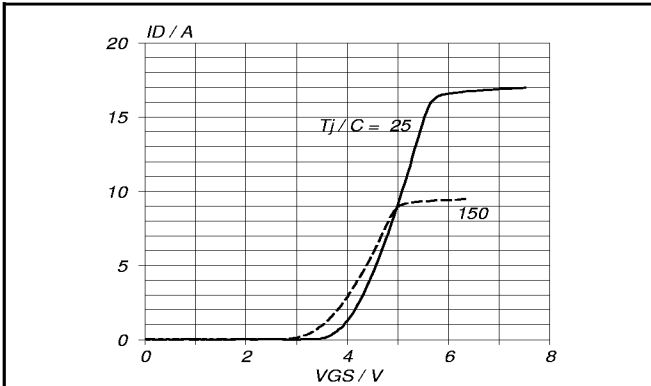


Fig. 7. Typical transfer characteristics.  
 $I_D = f(V_{GS})$ ; conditions:  $V_{DS} = 25 \text{ V}$ ; parameter  $T_j$

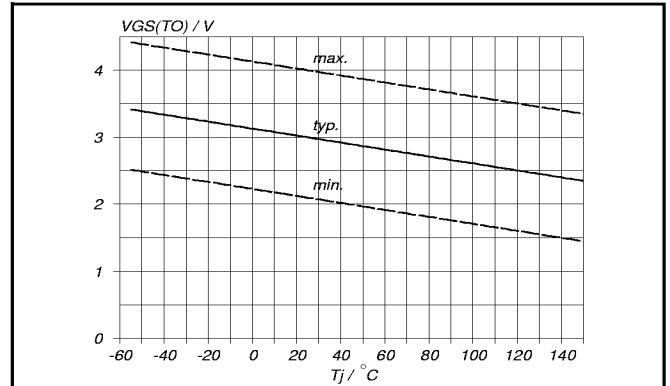


Fig. 10. Gate threshold voltage.  
 $V_{GS(TO)} = f(T_j)$ ; conditions:  $I_D = 1 \text{ mA}$ ;  $V_{DS} = V_{GS}$

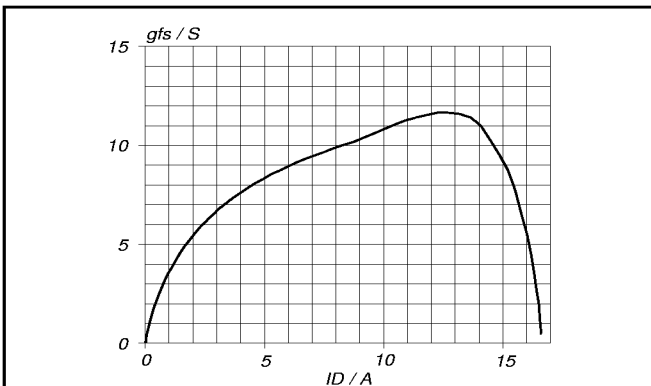


Fig. 8. Typical transconductance,  $T_j = 25 \text{ }^\circ\text{C}$ .  
 $g_{fs} = f(I_D)$ ; conditions:  $V_{DS} = 25 \text{ V}$

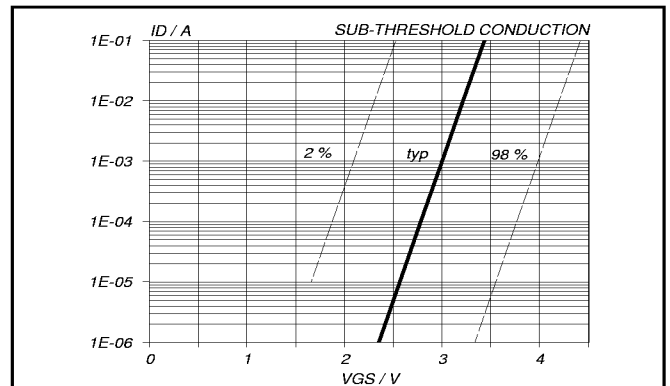


Fig. 11. Sub-threshold drain current.  
 $I_D = f(V_{GS})$ ; conditions:  $T_j = 25 \text{ }^\circ\text{C}$ ;  $V_{DS} = V_{GS}$

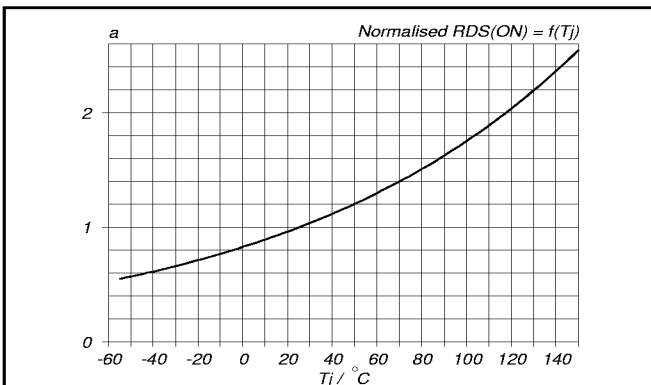


Fig. 9. Normalised drain-source on-state resistance.  
 $a = R_{DS(ON)}/R_{DS(ON)25 \text{ }^\circ\text{C}} = f(T_j)$ ;  $I_D = 4 \text{ A}$ ;  $V_{GS} = 10 \text{ V}$

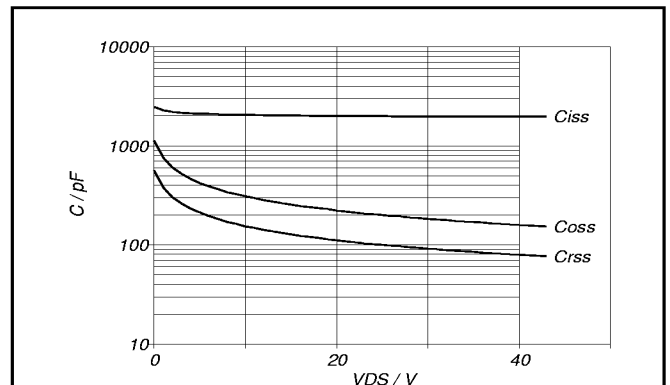


Fig. 12. Typical capacitances,  $C_{iss}$ ,  $C_{oss}$ ,  $C_{rss}$ .  
 $C = f(V_{DS})$ ; conditions:  $V_{GS} = 0 \text{ V}$ ;  $f = 1 \text{ MHz}$

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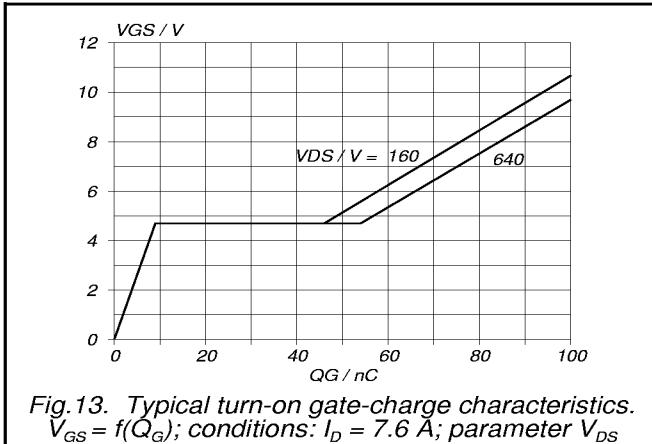


Fig.13. Typical turn-on gate-charge characteristics.  
 $V_{GS} = f(Q_G)$ ; conditions:  $I_D = 7.6$  A; parameter  $V_{DS}$

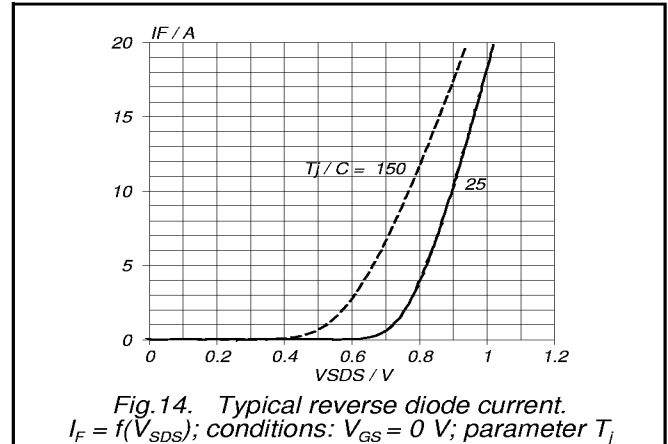
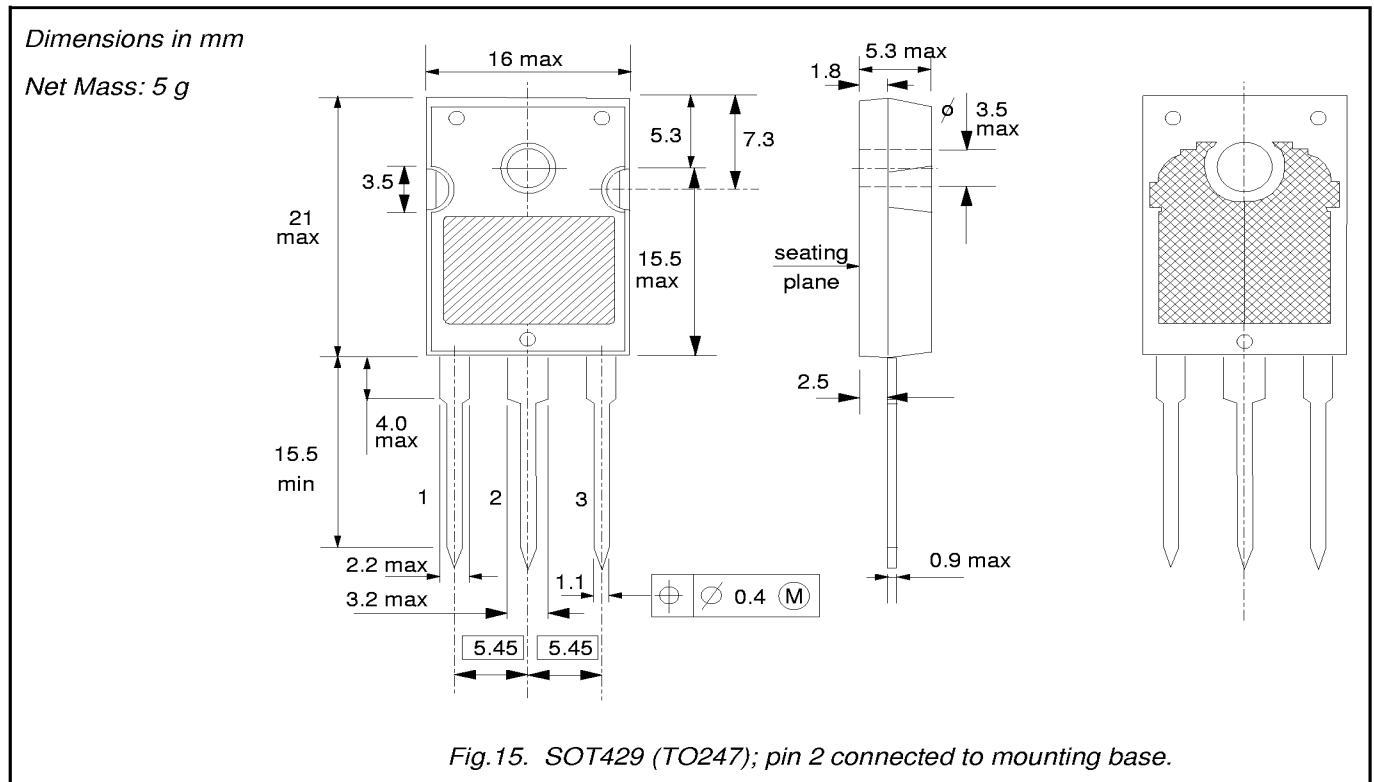


Fig.14. Typical reverse diode current.  
 $I_F = f(V_{SDS})$ ; conditions:  $V_{GS} = 0$  V; parameter  $T_J$

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**MECHANICAL DATA**



**Notes**

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Refer to mounting instructions for SOT429 envelopes.
3. Epoxy meets UL94 V0 at 1/8".