

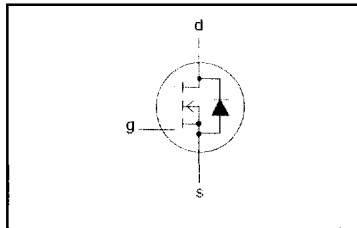
# PowerMOS transistors Avalanche energy rated

**PHX3N60E**

## FEATURES

- Repetitive Avalanche Rated
- Fast switching
- Stable off-state characteristics
- High thermal cycling performance
- Isolated package

## SYMBOL



## QUICK REFERENCE DATA

$V_{DSS} = 600\text{ V}$
$I_D = 1.7\text{ A}$
$R_{DS(ON)} \leq 4.4\ \Omega$

## GENERAL DESCRIPTION

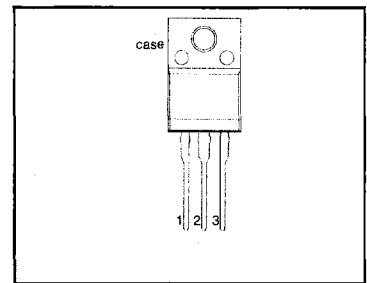
N-channel, enhancement mode field-effect power transistor, intended for use in off-line switched mode power supplies, T.V. and computer monitor power supplies, d.c. to d.c. converters, motor control circuits and general purpose switching applications.

The PHX3N60E is supplied in the SOT186A full pack, isolated package.

## PINNING

PIN	DESCRIPTION
1	gate
2	drain
3	source
case	isolated

## SOT186A



## 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 $150\text{ }^\circ\text{C}$	-	600	V
$V_{DGR}$	Drain-gate voltage	$T_j = 25\text{ }^\circ\text{C}$ to $150\text{ }^\circ\text{C}$ ; $R_{GS} = 20\text{ k}\Omega$	-	600	V
$V_{GS}$	Gate-source voltage		-	$\pm 30$	V
$I_D$	Continuous drain current	$T_{hs} = 25\text{ }^\circ\text{C}$ ; $V_{GS} = 10\text{ V}$	-	1.7	A
$I_{DM}$	Pulsed drain current	$T_{hs} = 100\text{ }^\circ\text{C}$ ; $V_{GS} = 10\text{ V}$	-	1.1	A
$P_D$	Total dissipation	$T_{hs} = 25\text{ }^\circ\text{C}$	-	1.1	A
$T_j, T_{stg}$	Operating junction and storage temperature range	$T_{hs} = 25\text{ }^\circ\text{C}$	- 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, $I_D = 2.2\text{ A}$ ; $V_{DD} \leq 50\text{ V}$ ; starting $T_j = 25\text{ }^\circ\text{C}$ ; $R_{GS} = 50\ \Omega$ ; $V_{GS} = 10\text{ V}$	-	171	mJ
$E_{AR}$	Repetitive avalanche energy <sup>1</sup>		-	5	mJ
$I_{AS}, I_{AR}$	Repetitive and non-repetitive avalanche current		-	2.2	A

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

# PowerMOS transistors

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### ISOLATION LIMITING VALUE & CHARACTERISTIC

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{isol}$	R.M.S. isolation voltage from all three terminals to external heatsink	$f = 50\text{-}60\text{ Hz}$ ; sinusoidal waveform; R.H. $\leq 65\%$ ; clean and dustfree	-		2500	V
$C_{isol}$	Capacitance from T2 to external heatsink	$f = 1\text{ MHz}$	-	10	-	pF

### THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$R_{th(j-hs)}$	Thermal resistance junction to heatsink	with heatsink compound	-	-	4.1	K/W
$R_{th(j-a)}$	Thermal resistance junction to ambient		-	55	-	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	$V_{GS} = 0\text{ V}$ ; $I_D = 0.25\text{ mA}$	600	-	-	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	$V_{GS} = 10\text{ V}$ ; $I_D = 1.4\text{ A}$	-	4	4.4	$\Omega$
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$ ; $I_D = 0.25\text{ mA}$	2.0	3.0	4.0	V
$g_{fs}$	Forward transconductance	$V_{DS} = 30\text{ V}$ ; $I_D = 1.4\text{ A}$	0.7	1.7	-	S
$I_{DSS}$	Drain-source leakage current	$V_{DS} = 600\text{ V}$ ; $V_{GS} = 0\text{ V}$	-	1	100	$\mu\text{A}$
$I_{GSS}$	Gate-source leakage current	$V_{DS} = 480\text{ V}$ ; $V_{GS} = 0\text{ V}$ ; $T_j = 125\text{ }^{\circ}\text{C}$ $V_{GS} = \pm 30\text{ V}$ ; $V_{DS} = 0\text{ V}$	-	50	500	$\mu\text{A}$
$Q_{g(tot)}$	Total gate charge	$I_D = 2.8\text{ A}$ ; $V_{DD} = 480\text{ V}$ ; $V_{GS} = 10\text{ V}$	-	25	30	nC
$Q_{gs}$	Gate-source charge		-	2	3	nC
$Q_{gd}$	Gate-drain (Miller) charge		-	12	15	nC
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 300\text{ V}$ ; $R_D = 100\text{ }\Omega$ ; $R_G = 18\text{ }\Omega$	-	10	-	ns
$t_r$	Turn-on rise time		-	26	-	ns
$t_{d(off)}$	Turn-off delay time		-	66	-	ns
$t_f$	Turn-off fall time		-	30	-	ns
$L_d$	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	$V_{GS} = 0\text{ V}$ ; $V_{DS} = 25\text{ V}$ ; $f = 1\text{ MHz}$	-	300	-	pF
$C_{oss}$	Output capacitance		-	43	-	pF
$C_{fss}$	Feedback capacitance		-	25	-	pF

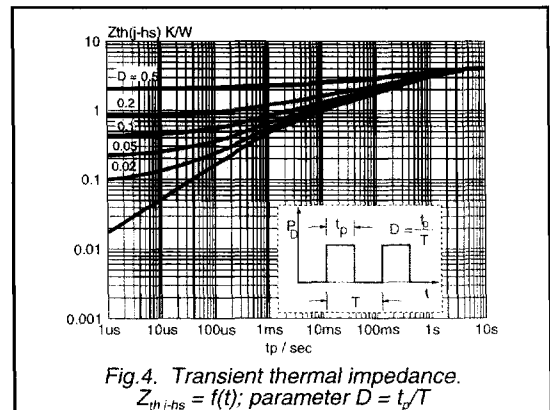
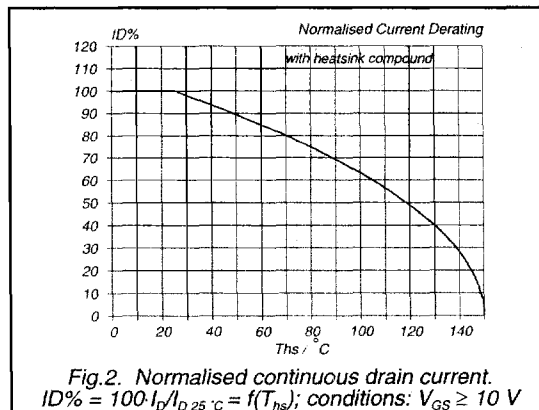
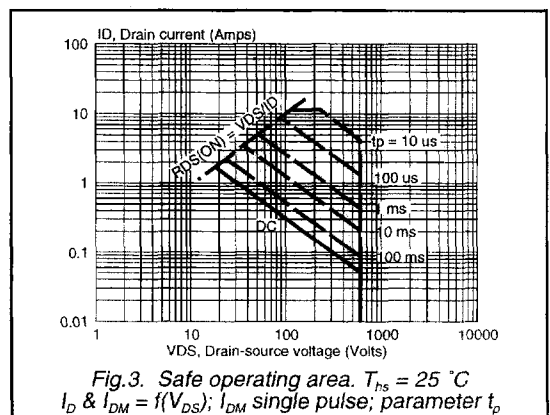
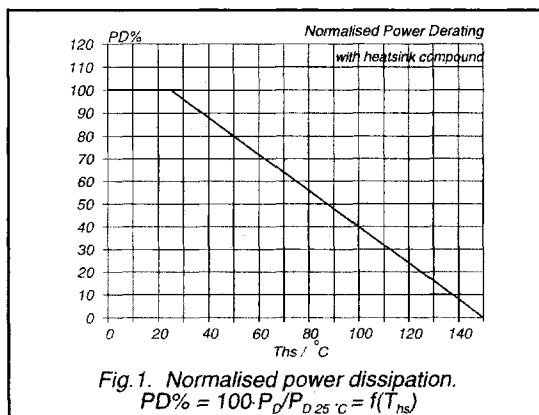
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**SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS**

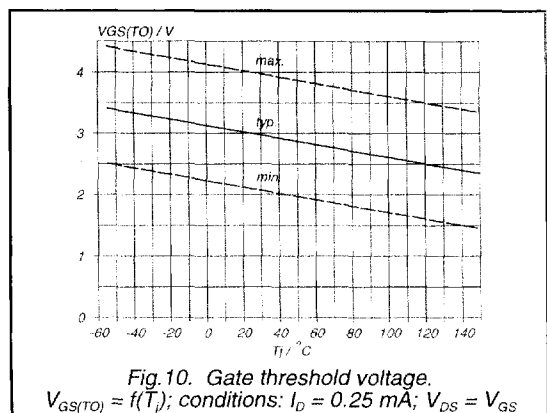
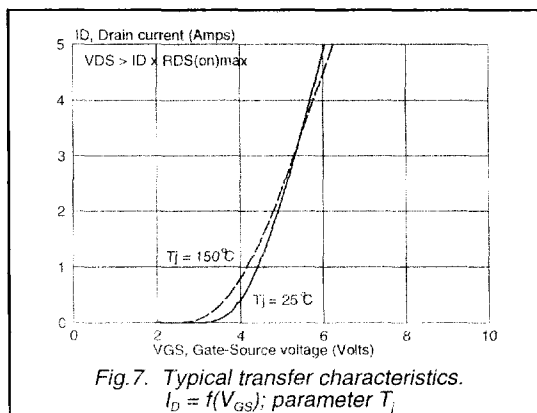
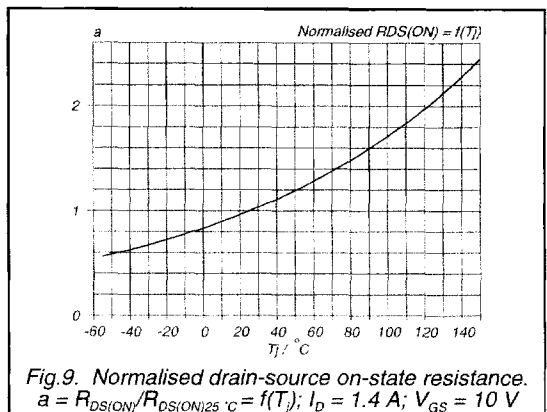
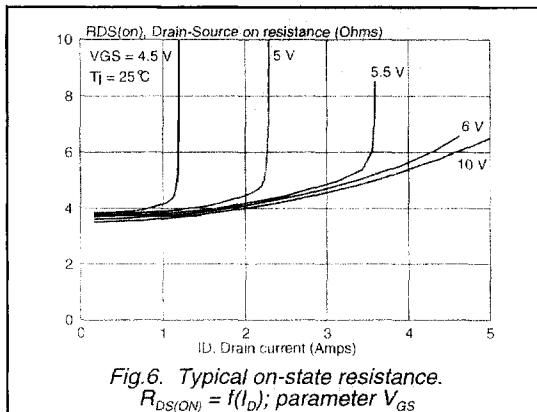
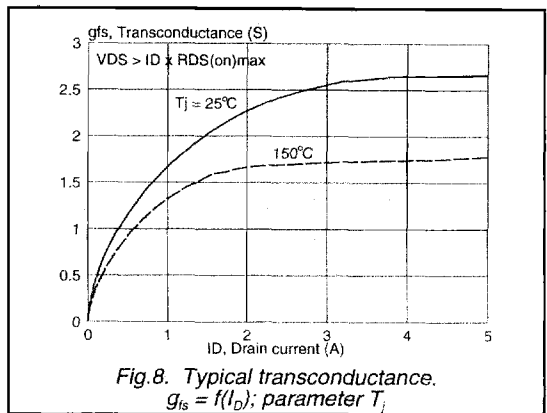
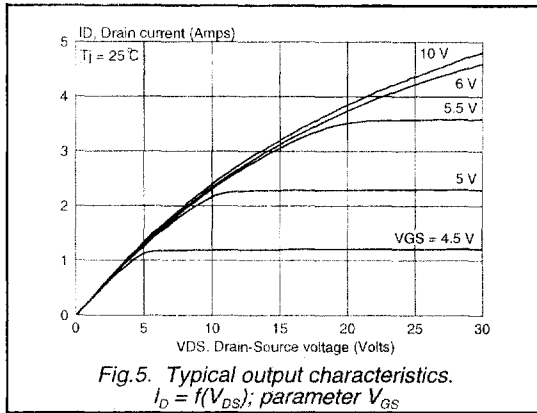
$T_j = 25^\circ\text{C}$  unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_S$	Continuous source current (body diode)	$T_{hs} = 25^\circ\text{C}$	-	-	2.8	A
$I_{SM}$	Pulsed source current (body diode)	$T_{hs} = 25^\circ\text{C}$	-	-	11	A
$V_{SD}$	Diode forward voltage	$I_S = 2.8\text{ A}; V_{GS} = 0\text{ V}$	-	-	1.2	V
$t_{rr}$	Reverse recovery time	$I_S = 2.8\text{ A}; V_{GS} = 0\text{ V}; di/dt = 100\text{ A}/\mu\text{s}$	-	500	-	ns
$Q_{rr}$	Reverse recovery charge		-	3	-	$\mu\text{C}$



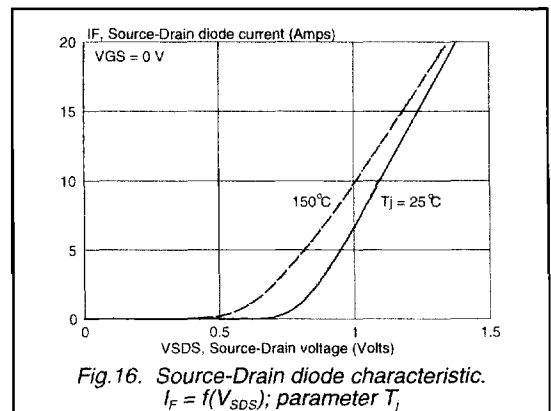
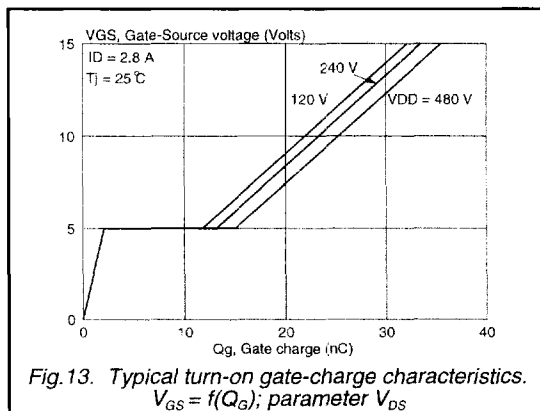
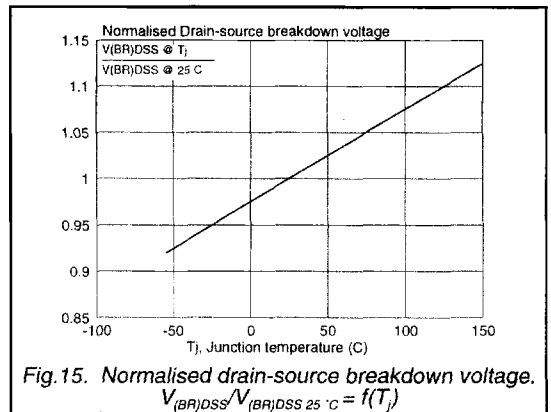
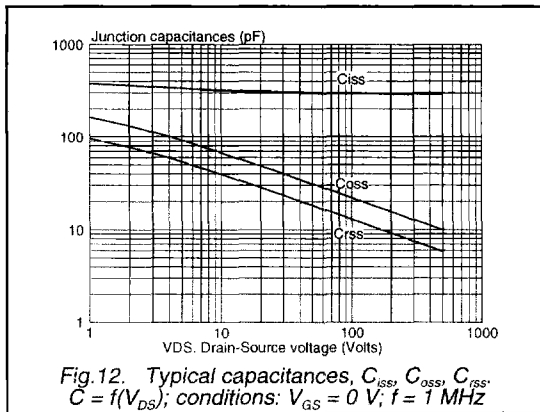
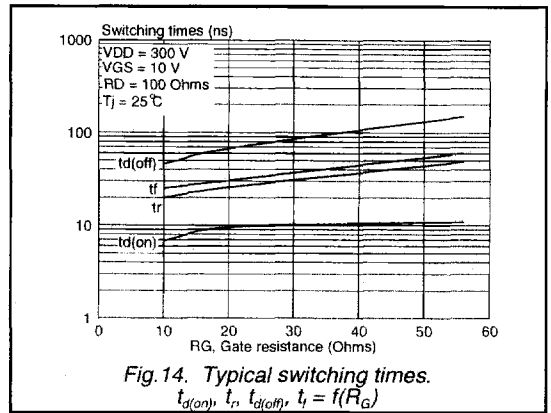
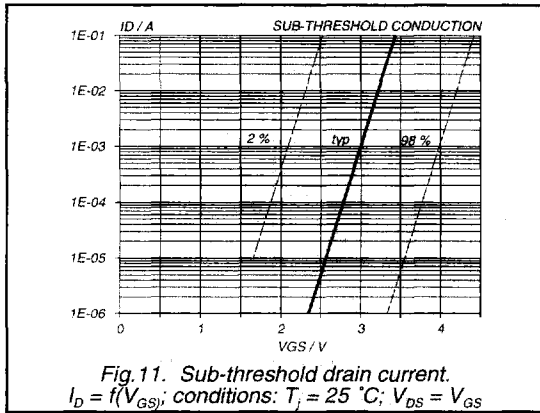
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