

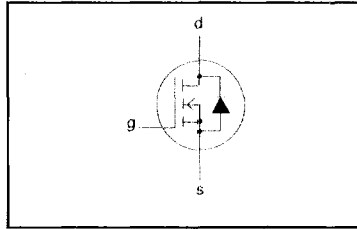
**PowerMOS transistors
Avalanche energy rated**

PHP8N50E, PHB8N50E, PHW8N50E

FEATURES

- Repetitive Avalanche Rated
- Fast switching
- Stable off-state characteristics
- High thermal cycling performance
- Low thermal resistance

SYMBOL



QUICK REFERENCE DATA

$V_{DSS} = 500\text{ V}$
$I_D = 8.5\text{ A}$
$R_{DS(ON)} \leq 0.85\ \Omega$

GENERAL DESCRIPTION

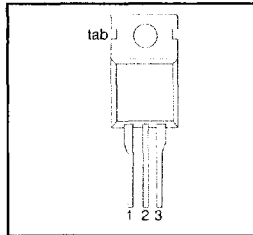
N-channel, enhancement mode field-effect power transistor, intended for use in off-line switched mode power supplies, T.V. and computer monitor power supplies, d.c. to d.c. converters, motor control circuits and general purpose switching applications.

The PHP8N50E is supplied in the SOT78 (TO220AB) conventional leaded package.
The PHW8N50E is supplied in the SOT429 (TO247) conventional leaded package.
The PHB8N50E is supplied in the SOT404 surface mounting package.

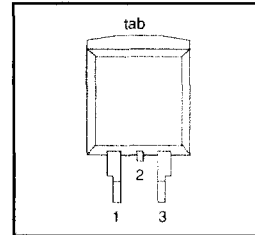
PINNING

PIN	DESCRIPTION
1	gate
2	drain ¹
3	source
tab	drain

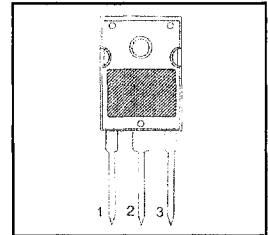
SOT78 (TO220AB)



SOT404



SOT429 (TO247)



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 $150\text{ }^\circ\text{C}$	-	500	V
V_{DGR}	Drain-gate voltage	$T_j = 25\text{ }^\circ\text{C}$ to $150\text{ }^\circ\text{C}$; $R_{GS} = 20\text{ k}\Omega$	-	500	V
V_{GS}	Gate-source voltage		-	± 30	V
I_D	Continuous drain current	$T_{mb} = 25\text{ }^\circ\text{C}$; $V_{GS} = 10\text{ V}$	-	8.5	A
		$T_{mb} = 100\text{ }^\circ\text{C}$; $V_{GS} = 10\text{ V}$	-	5.4	A
I_{DM}	Pulsed drain current	$T_{mb} = 25\text{ }^\circ\text{C}$	-	34	A
P_D	Total dissipation	$T_{mb} = 25\text{ }^\circ\text{C}$	-	147	W
T_j, T_{stg}	Operating junction and storage temperature range		- 55	150	$^\circ\text{C}$

¹ It is not possible to make connection to pin 2 of the SOT404 package.

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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, $I_D = 8$ A; $V_{DD} \leq 50$ V; starting $T_j = 25$ °C; $R_{GS} = 50$ Ω ; $V_{GS} = 10$ V	-	510	mJ
E_{AR}	Repetitive avalanche energy ²		-	13	mJ
I_{AS} , I_{AR}	Repetitive and non-repetitive avalanche current		-	8	A

THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
R_{thj-mb}	Thermal resistance junction to mounting base		-	-	0.85	K/W
R_{thj-a}	Thermal resistance junction to ambient	SOT78 package, in free air	-	60	-	K/W
		SOT429 package, in free air	-	45	-	K/W
		SOT404 package, pcb mounted, minimum footprint	-	50	-	K/W

ELECTRICAL CHARACTERISTICS

$T_j = 25$ °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0$ V; $I_D = 0.25$ mA	500	-	-	V
$\Delta V_{(BR)DSS} / \Delta T_j$	Drain-source breakdown voltage temperature coefficient	$V_{DS} = V_{GS}$; $I_D = 0.25$ mA	-	0.1	-	%/K
$R_{DS(ON)}$	Drain-source on resistance	$V_{GS} = 10$ V; $I_D = 4.8$ A	-	0.7	0.85	Ω
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; $I_D = 0.25$ mA	2.0	3.0	4.0	V
g_{fs}	Forward transconductance	$V_{DS} = 30$ V; $I_D = 4.8$ A	3.5	6	-	S
I_{DSS}	Drain-source leakage current	$V_{DS} = 500$ V; $V_{GS} = 0$ V	-	1	25	μ A
I_{GSS}	Gate-source leakage current	$V_{DS} = 400$ V; $V_{GS} = 0$ V; $T_j = 125$ °C $V_{GS} = \pm 30$ V; $V_{DS} = 0$ V	-	40	250	μ A
I_{GSS}	Gate-source leakage current	$V_{GS} = \pm 30$ V; $V_{DS} = 0$ V	-	10	200	nA
$Q_{g(tot)}$	Total gate charge	$I_D = 8.5$ A; $V_{DD} = 400$ V; $V_{GS} = 10$ V	-	88	110	nC
Q_{gs}	Gate-source charge		-	6	7	nC
Q_{gd}	Gate-drain (Miller) charge		-	47	60	nC
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 250$ V; $R_D = 30$ Ω ;	-	18	-	ns
t_r	Turn-on rise time	$R_G = 9.1$ Ω	-	50	-	ns
$t_{d(off)}$	Turn-off delay time		-	104	-	ns
t_f	Turn-off fall time		-	60	-	ns
L_d	Internal drain inductance	Measured from tab to centre of die	-	3.5	-	nH
L_σ	Internal drain inductance	Measured from drain lead to centre of die (SOT78 and SOT429 packages only)	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead to source bond pad	-	7.5	-	nH
C_{iss}	Input capacitance	$V_{GS} = 0$ V; $V_{DS} = 25$ V; $f = 1$ MHz	-	1060	-	pF
C_{oss}	Output capacitance		-	160	-	pF
C_{rss}	Feedback capacitance		-	90	-	pF

² pulse width and repetition rate limited by T_j max.

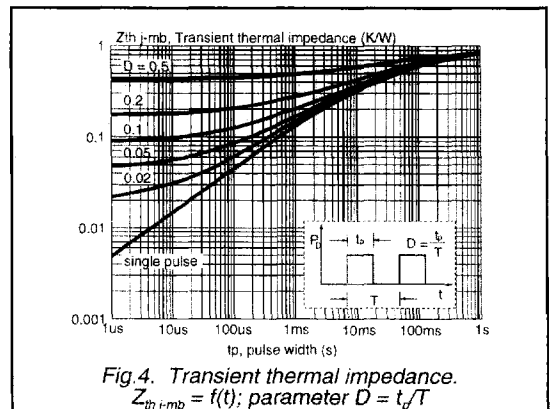
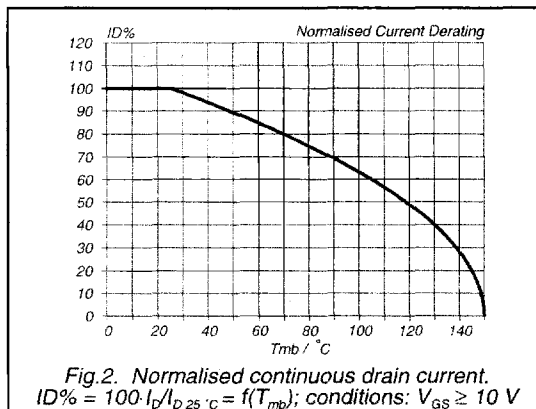
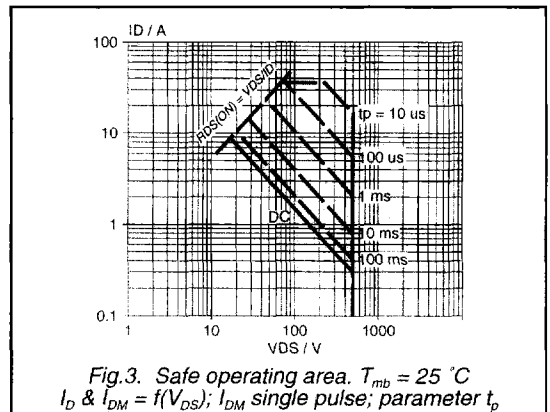
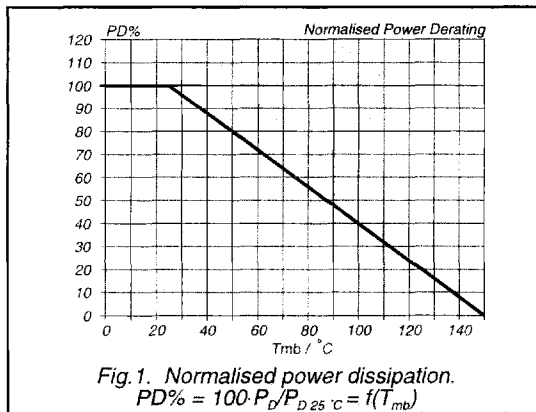
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SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

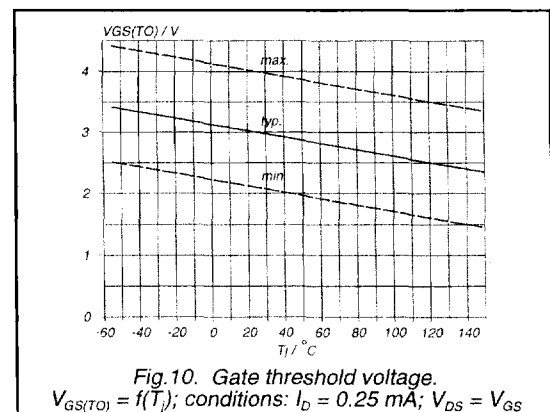
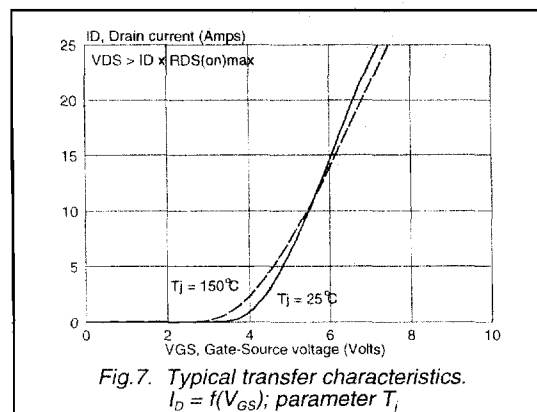
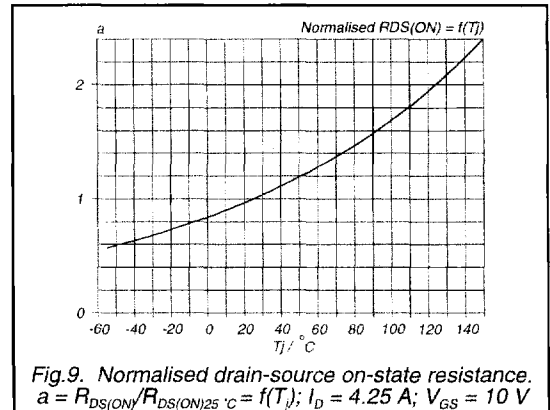
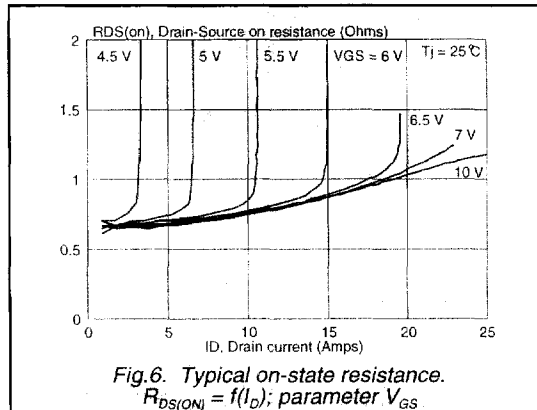
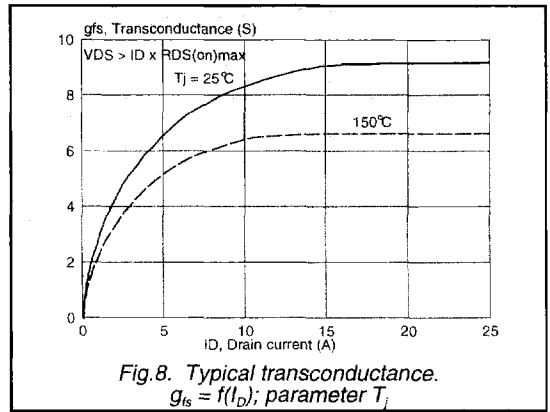
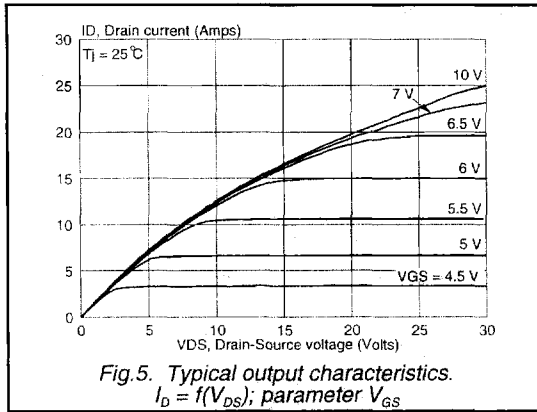
$T_j = 25^\circ\text{C}$ unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_S	Continuous source current (body diode)	$T_{mb} = 25^\circ\text{C}$	-	-	8.5	A
I_{SM}	Pulsed source current (body diode)	$T_{mb} = 25^\circ\text{C}$	-	-	34	A
V_{SD}	Diode forward voltage	$I_S = 8.5\text{ A}; V_{GS} = 0\text{ V}$	-	-	1.2	V
t_{rr}	Reverse recovery time	$I_S = 8.5\text{ A}; V_{GS} = 0\text{ V}; di/dt = 100\text{ A}/\mu\text{s}$	-	440	-	ns
Q_{rr}	Reverse recovery charge		-	6.4	-	μC



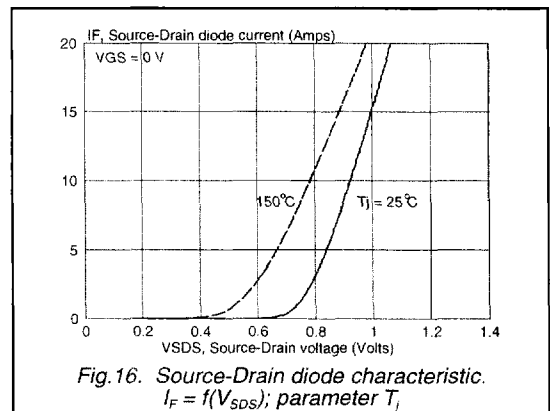
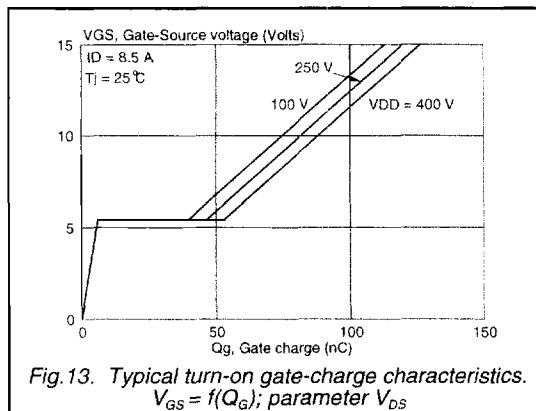
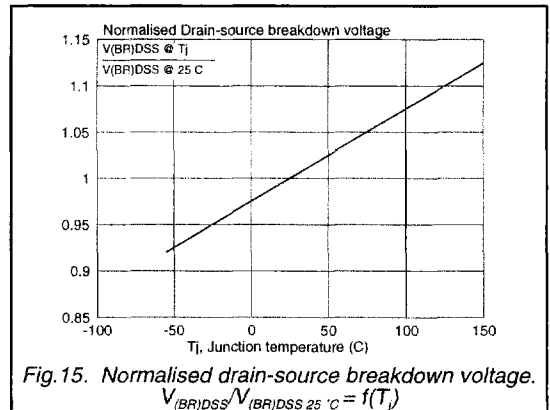
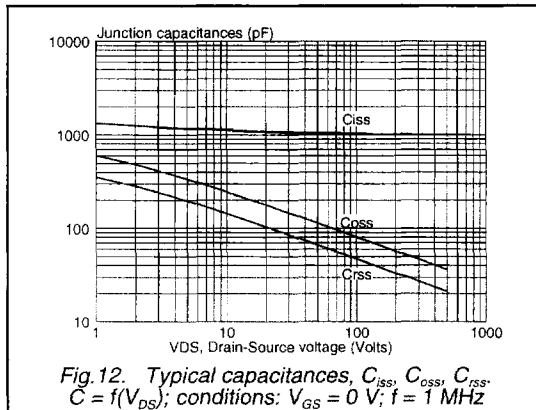
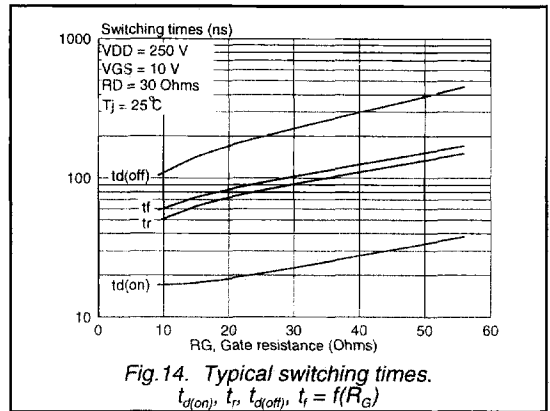
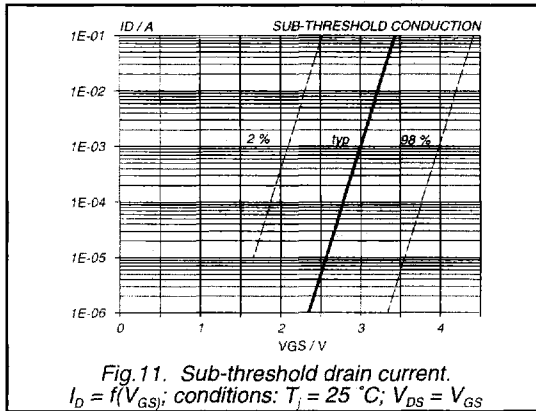
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