

# N-channel enhancement mode MOS transistor

PHN110

### FEATURES

- High speed switching
- No secondary breakdown
- Very low on-resistance.

### APPLICATIONS

- Motor and actuator driver, power management, synchronized rectifying, etc.

### PINNING - SO8 (SOT96-1)

PIN	SYMBOL	DESCRIPTION
1	n.c	not connected
2	s	source
3	s	source
4	g	gate
5	d	drain
6	d	drain
7	d	drain
8	d	drain

### DESCRIPTION

N-channel enhancement mode MOS transistor in an 8-pin plastic SO8 (SOT96-1) package.

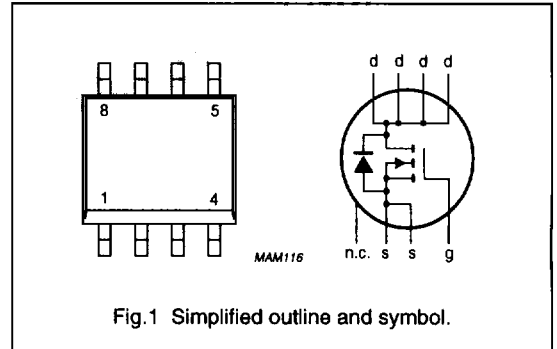


Fig.1 Simplified outline and symbol.

### CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static discharge during transport or handling.

### QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{DS}$	drain-source voltage (DC)		-	30	V
$V_{SD}$	source-drain diode forward voltage	$I_S = 1.25\text{ A}$	-	1.2	V
$V_{GSO}$	gate-source voltage (DC)	open drain	-	$\pm 20$	V
$V_{GSth}$	gate-source threshold voltage	$I_D = 1\text{ mA}; V_{DS} = V_{GS}$	1	2.8	V
$I_D$	drain current (DC)		-	3.5	A
$R_{DSon}$	drain-source on-state resistance	$I_D = 2.2\text{ A}; V_{GS} = 10\text{ V}$	-	0.1	$\Omega$
$P_{tot}$	total power dissipation	up to $T_s = 80\text{ }^\circ\text{C}$	-	2	W

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## LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{DS}$	drain-source voltage (DC)		–	30	V
$V_{GSO}$	gate-source voltage (DC)	open drain	–	$\pm 20$	V
$I_D$	drain current (DC)	$T_s \leq 80\text{ °C}$	–	3.5	A
$I_{DM}$	peak drain current	note 1	–	14	A
$P_{tot}$	total power dissipation	up to $T_s = 80\text{ °C}$	–	2	W
		up to $T_{amb} = 25\text{ °C}$ ; note 2	–	2	W
		up to $T_{amb} = 25\text{ °C}$ ; note 3	–	1.3	W
$T_{stg}$	storage temperature		–65	+150	°C
$T_j$	operating junction temperature		–	150	°C
<b>Source-drain diode</b>					
$I_S$	source current (DC)	$T_s \leq 80\text{ °C}$	–	1.5	A
$I_{SM}$	peak pulsed source current	note 1	–	6	A

### Notes

1. Pulse width and duty cycle limited by maximum junction temperature.
2. Value based on PCB with a  $R_{th\ a-tp}$  (ambient to tie-point) of 27.5 K/W.
3. Value based on PCB with a  $R_{th\ a-tp}$  (ambient to tie-point) of 90 K/W.

## THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j-s}$	thermal resistance from junction to soldering point	35	K/W

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**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	$V_{GS} = 0; I_D = 10\ \mu\text{A}$	30	–	–	V
$V_{GSth}$	gate-source threshold voltage	$V_{GS} = V_{DS}; I_D = 1\ \text{mA}$	1	–	2.8	V
$I_{DSS}$	drain-source leakage current	$V_{GS} = 0; V_{DS} = 24\ \text{V}$	–	–	100	nA
$I_{GSS}$	gate leakage current	$V_{GS} = \pm 20\ \text{V}; V_{DS} = 0$	–	–	$\pm 100$	nA
$I_{Don}$	on-state drain current	$V_{GS} = 10\ \text{V}; V_{DS} = 1\ \text{V}$	3.5	–	–	A
		$V_{GS} = 4.5\ \text{V}; V_{DS} = 5\ \text{V}$	2	–	–	A
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = 4.5\ \text{V}; I_D = 1\ \text{A}$	–	0.11	0.2	$\Omega$
		$V_{GS} = 10\ \text{V}; I_D = 2.2\ \text{A}$	–	0.08	0.1	$\Omega$
$ y_{fs} $	forward transfer admittance	$V_{DS} = 20\ \text{V}; I_D = 2.2\ \text{A}$	2	4.5	–	S
$C_{iss}$	input capacitance	$V_{GS} = 0; V_{DS} = 20\ \text{V}; f = 1\ \text{MHz}$	–	250	–	pF
$C_{oss}$	output capacitance	$V_{GS} = 0; V_{DS} = 20\ \text{V}; f = 1\ \text{MHz}$	–	140	–	pF
$C_{rss}$	reverse transfer capacitance	$V_{GS} = 0; V_{DS} = 20\ \text{V}; f = 1\ \text{MHz}$	–	50	–	pF
$Q_g$	total gate charge	$V_{GS} = 10\ \text{V}; V_{DS} = 15\ \text{V}; I_D = 2.3\ \text{A}$	–	10	30	nC
$Q_{gs}$	gate-source charge	$V_{GS} = 10\ \text{V}; V_{DS} = 15\ \text{V}; I_D = 2.3\ \text{A}$	–	1	–	nC
$Q_{gd}$	gate-drain charge	$V_{GS} = 10\ \text{V}; V_{DS} = 15\ \text{V}; I_D = 2.3\ \text{A}$	–	2.5	–	nC
$t_{on}$	turn-on time	$V_{GS} = 0\ \text{to}\ 10\ \text{V}; V_{DD} = 20\ \text{V};$ $I_D = 1\ \text{A}; R_L = 20\ \Omega$	–	15	40	ns
$t_{off}$	turn-off time	$V_{GS} = 10\ \text{to}\ 0\ \text{V}; V_{DD} = 20\ \text{V};$ $I_D = 1\ \text{A}; R_L = 20\ \Omega$	–	25	140	ns
<b>Source-drain diode</b>						
$V_{SD}$	source drain diode forward voltage	$V_{GS} = 0; I_S = 1.25\ \text{A}$	–	–	1.2	V
$t_{rr}$	reverse recovery time	$I_S = 1.25\ \text{A}; di/dt = 100\ \text{A}/\mu\text{s}$	–	35	100	ns