

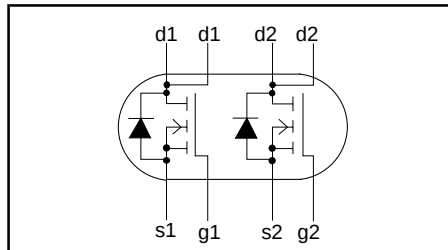
Dual N-channel enhancement mode TrenchMOS™ transistor

PHN203

FEATURES

- Dual device
- Low threshold voltage
- Fast switching
- Logic level compatible
- Surface mount package

SYMBOL



QUICK REFERENCE DATA

$V_{DS} = 25 \text{ V}$
$I_D = 6.3 \text{ A}$
$R_{DS(ON)} \leq 30 \text{ m}\Omega \text{ (} V_{GS} = 10 \text{ V)}$
$R_{DS(ON)} \leq 55 \text{ m}\Omega \text{ (} V_{GS} = 4.5 \text{ V)}$

GENERAL DESCRIPTION

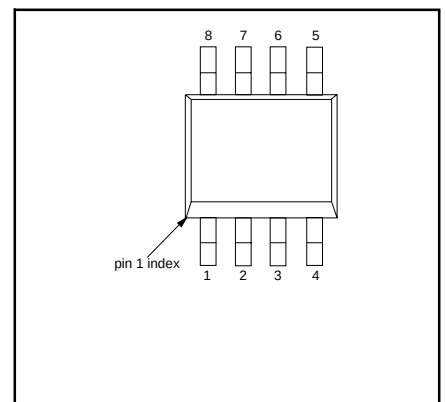
N-channel enhancement mode field-effect power transistor in a plastic envelope using 'trench' technology. The device has very low on-state resistance. It is intended for use in dc to dc converters and general purpose switching applications.

The PHN203 is supplied in the SOT96-1 (SO8) surface mounting package.

PINNING

PIN	DESCRIPTION
1	source 1
2	gate 1
3	source 2
4	gate 2
5,6	drain 2
7,8	drain 1

SOT96-1



LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	Repetitive peak drain-source voltage	$T_j = 25^\circ\text{C to } 150^\circ\text{C}$	-	25	V
V_{DS}	Continuous drain-source voltage		-	25	V
V_{DGR}	Drain-gate voltage	$R_{GS} = 20 \text{ k}\Omega$	-	25	V
V_{GS}	Gate-source voltage		-	± 20	V
I_D	Drain current per MOSFET ¹	$T_a = 25^\circ\text{C}$	-	6.3	A
		$T_a = 70^\circ\text{C}$	-	5	A
I_D	Drain current per MOSFET (both MOSFETs conducting) ¹	$T_a = 25^\circ\text{C}$	-	4.4	A
		$T_a = 70^\circ\text{C}$	-	3.5	A
I_{DM}	Drain current per MOSFET (pulse peak value)	$T_a = 25^\circ\text{C}$	-	25	A
P_{tot}	Total power dissipation (either or both MOSFETs conducting) ¹	$T_a = 25^\circ\text{C}$	-	2	W
		$T_a = 70^\circ\text{C}$	-	1.3	W
T_{stg}, T_j	Storage & operating temperature		- 55	150	$^\circ\text{C}$

¹ Surface mounted on FR4 board, $t \leq 10 \text{ sec}$

Dual N-channel enhancement mode TrenchMOS™ transistor

PHN203

THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$R_{th\ j-a}$	Thermal resistance junction to ambient	Surface mounted on FR4 board, $t \leq 10$ sec; either or both MOSFETs conducting	-	62.5	K/W
$R_{th\ j-a}$	Thermal resistance junction to ambient	Surface mounted on FR4 board; either or both MOSFETs conducting	150	-	K/W

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 (per MOSFET)	Unclamped inductive load, $I_{AS} = 6.3$ A; $t_p = 0.2$ ms; T_j prior to avalanche = 25°C ; $V_{DD} \leq 15$ V; $R_{GS} = 50\ \Omega$; $V_{GS} = 10$ V	-	20	mJ
I_{AS}	Non-repetitive avalanche current (per MOSFET)		-	6.3	A

ELECTRICAL CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0$ V; $I_D = 10\ \mu\text{A}$; $T_j = -55^\circ\text{C}$	25 22.5	- -	- -	V V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; $I_D = 1$ mA $T_j = 150^\circ\text{C}$ $T_j = -55^\circ\text{C}$	1 0.4 -	2 - -	2.8 - 3.2	V V V
$R_{DS(ON)}$	Drain-source on-state resistance	$V_{GS} = 10$ V; $I_D = 4$ A $V_{GS} = 4.5$ V; $I_D = 2$ A $V_{GS} = 10$ V; $I_D = 4$ A; $T_j = 150^\circ\text{C}$	- - -	27 40 43	30 55 51	m Ω m Ω m Ω
g_{fs}	Forward transconductance	$V_{DS} = 20$ V; $I_D = 4$ A	5	9.7	-	S
I_{DSS}	Zero gate voltage drain current	$V_{DS} = 20$ V; $V_{GS} = 0$ V; $V_{DS} = 20$ V; $V_{GS} = 0$ V; $T_j = 150^\circ\text{C}$	- -	60 0.1	100 10	nA μA
I_{GSS}	Gate source leakage current	$V_{GS} = \pm 20$ V; $V_{DS} = 0$ V	-	10	100	nA
$Q_{g(tot)}$	Total gate charge	$I_D = 4$ A; $V_{DD} = 20$ V; $V_{GS} = 10$ V	-	20	-	nC
Q_{gs}	Gate-source charge		-	1.9	-	nC
Q_{gd}	Gate-drain (Miller) charge		-	6.1	-	nC
t_{don}	Turn-on delay time	$V_{DD} = 20$ V; $R_D = 18\ \Omega$; $V_{GS} = 10$ V; $R_G = 6\ \Omega$	-	8	-	ns
t_r	Turn-on rise time		-	11	-	ns
t_{doff}	Turn-off delay time	Resistive load	-	31	-	ns
t_f	Turn-off fall time		-	17	-	ns
L_d	Internal drain inductance	Measured from drain lead to centre of die	-	2.5	-	nH
L_s	Internal source inductance	Measured from source lead to source bond pad	-	5	-	nH
C_{iss}	Input capacitance	$V_{GS} = 0$ V; $V_{DS} = 20$ V; $f = 1$ MHz	-	611	-	pF
C_{oss}	Output capacitance		-	260	-	pF
C_{rss}	Feedback capacitance		-	137	-	pF

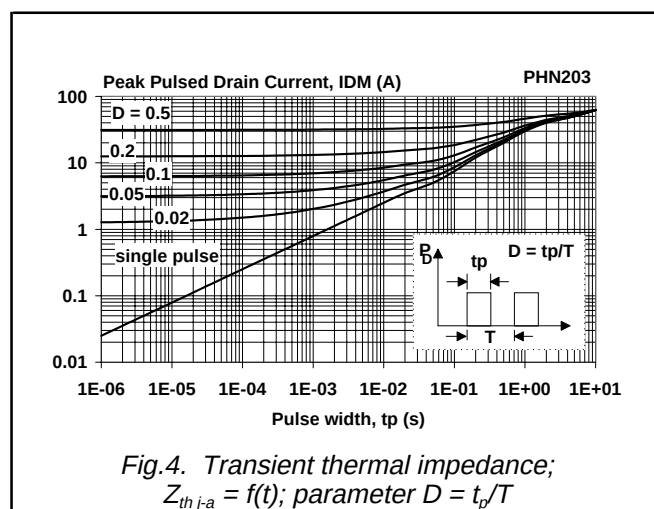
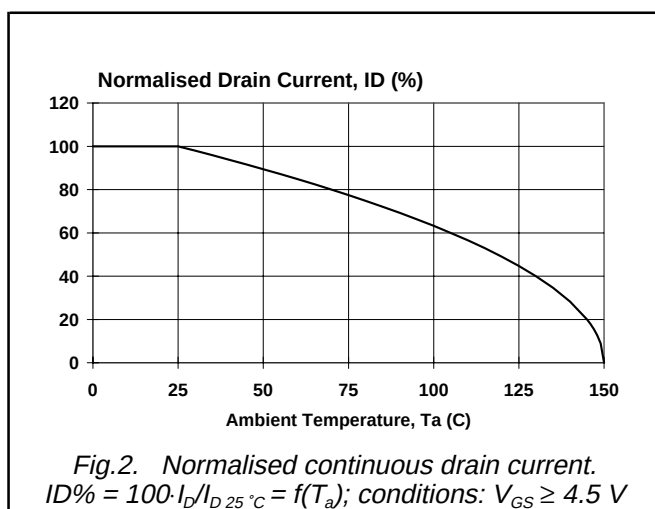
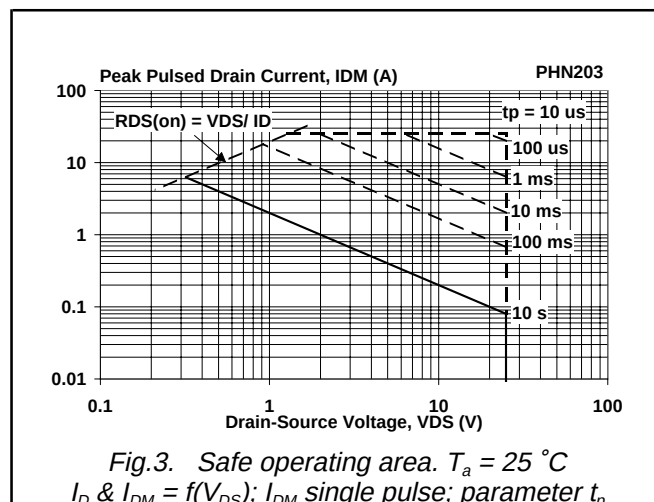
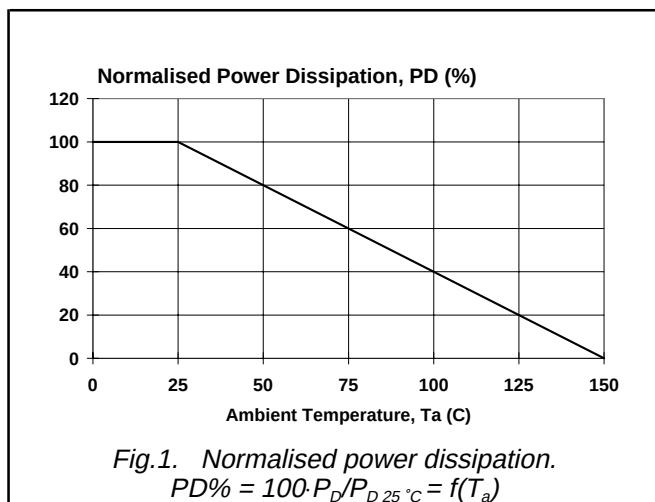
Dual N-channel enhancement mode TrenchMOS™ transistor

PHN203

REVERSE DIODE LIMITING VALUES AND CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_S	Continuous source diode current (per MOSFET)	$T_a = 25^\circ\text{C}$	-	-	2.85	A
I_{SM}	Pulsed source diode current (per MOSFET)		-	-	25	A
V_{SD}	Diode forward voltage	$I_F = 1.25\text{ A}$; $V_{GS} = 0\text{ V}$	-	0.75	1	V
t_{rr}	Reverse recovery time	$I_F = 1.25\text{ A}$; $-dI_F/dt = 100\text{ A}/\mu\text{s}$;	-	35	-	ns
Q_{rr}	Reverse recovery charge	$V_{GS} = 0\text{ V}$; $V_R = 25\text{ V}$	-	24	-	nC



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PHN203

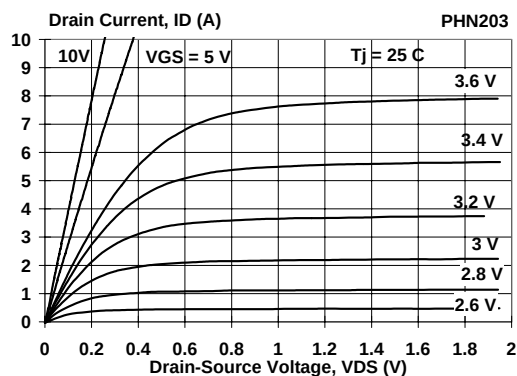


Fig.5. Typical output characteristics, $T_j = 25\text{ }^{\circ}\text{C}$.
 $I_D = f(V_{DS})$; parameter V_{GS}

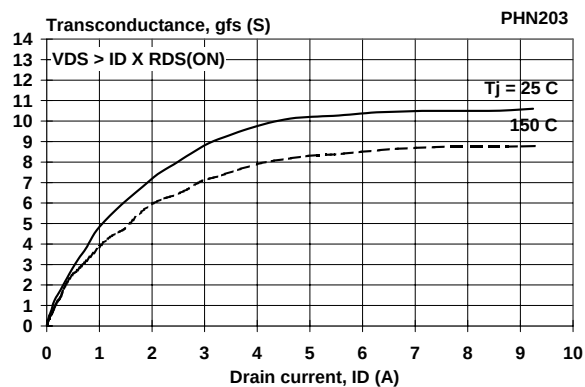


Fig.8. Typical transconductance, $T_j = 25\text{ }^{\circ}\text{C}$.
 $g_{fs} = f(I_D)$

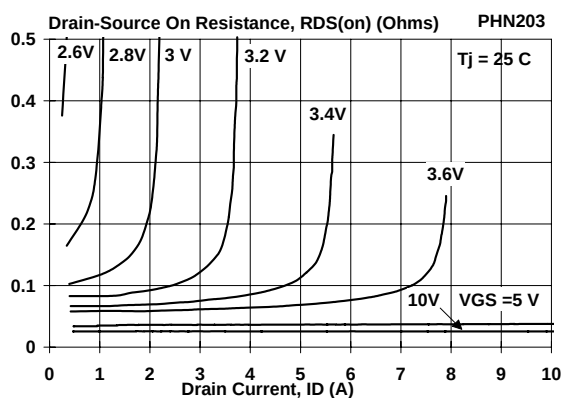


Fig.6. Typical on-state resistance, $T_j = 25\text{ }^{\circ}\text{C}$.
 $R_{DS(ON)} = f(I_D)$; parameter V_{GS}

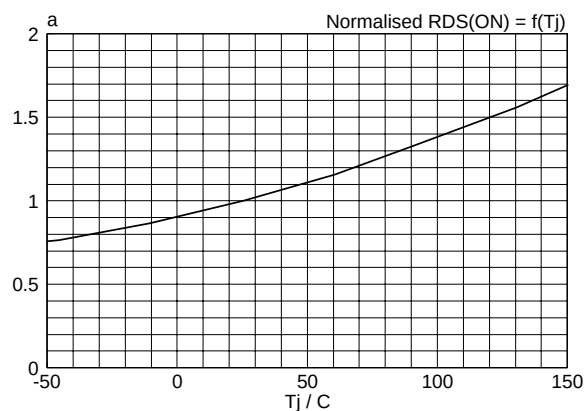


Fig.9. Normalised drain-source on-state resistance.
 $R_{DS(ON)}/R_{DS(ON)25\text{ }^{\circ}\text{C}} = f(T_j)$

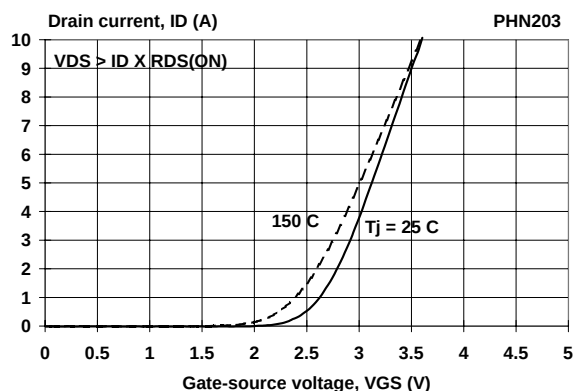


Fig.7. Typical transfer characteristics.
 $I_D = f(V_{GS})$

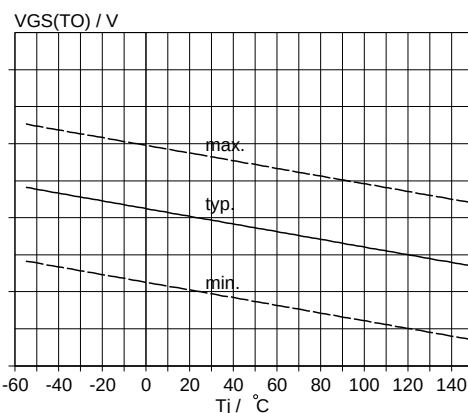
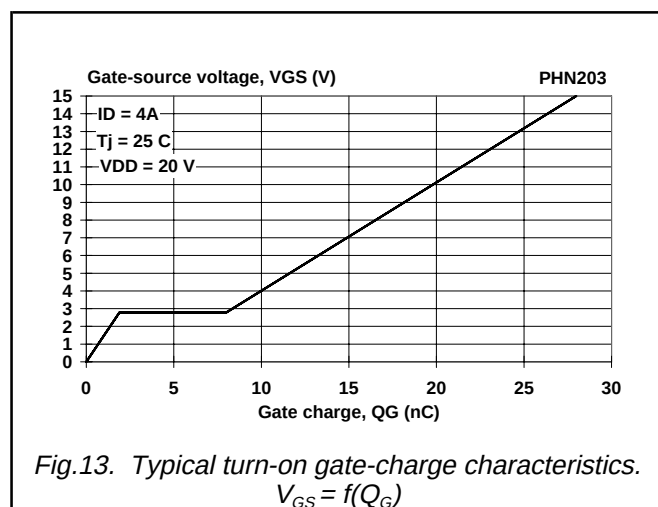
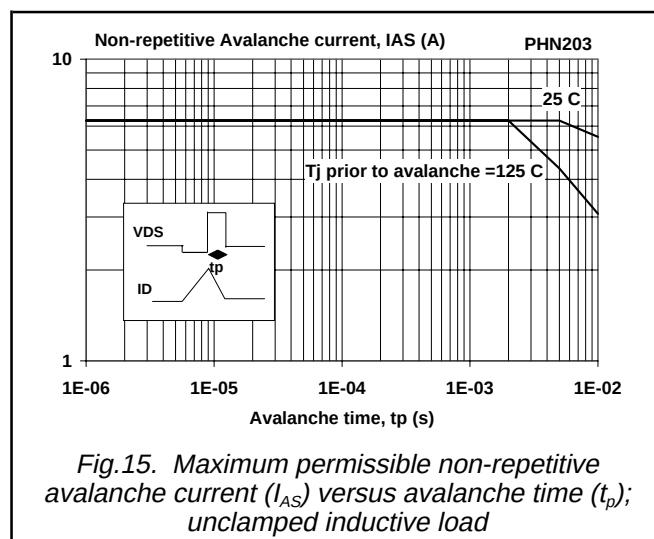
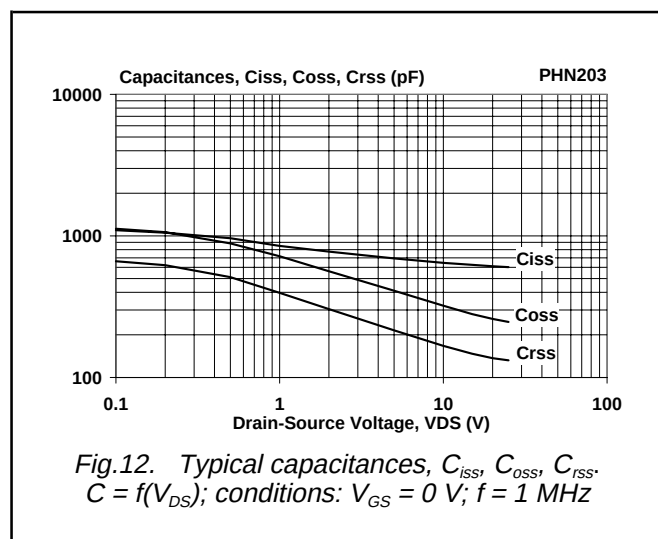
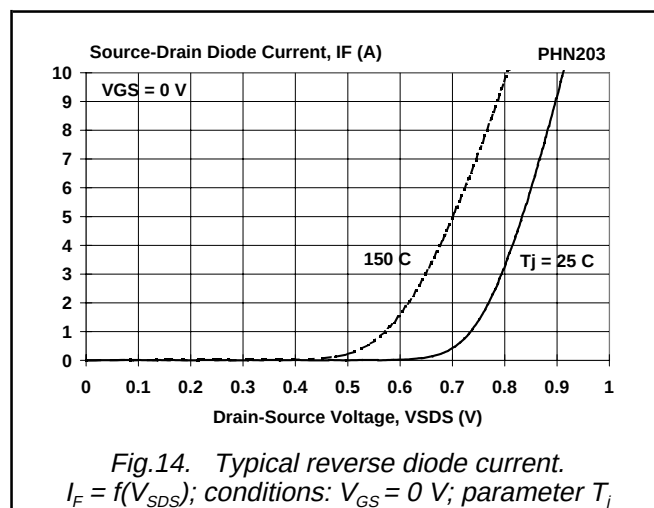
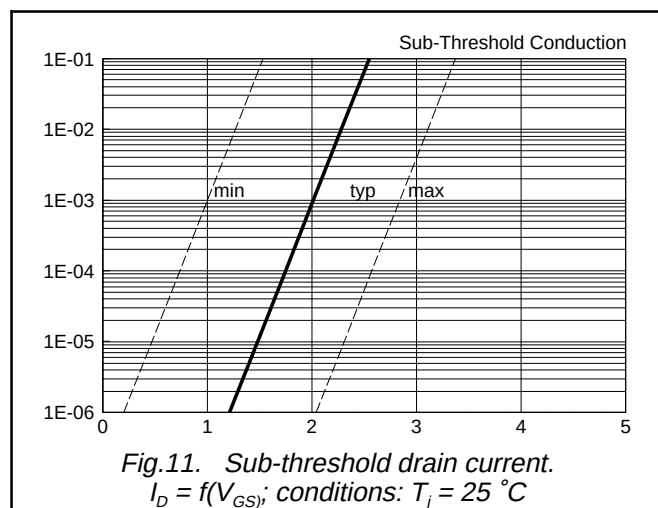


Fig.10. Gate threshold voltage.
 $V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1\text{ mA}$; $V_{DS} = V_{GS}$

Dual N-channel enhancement mode TrenchMOS™ transistor

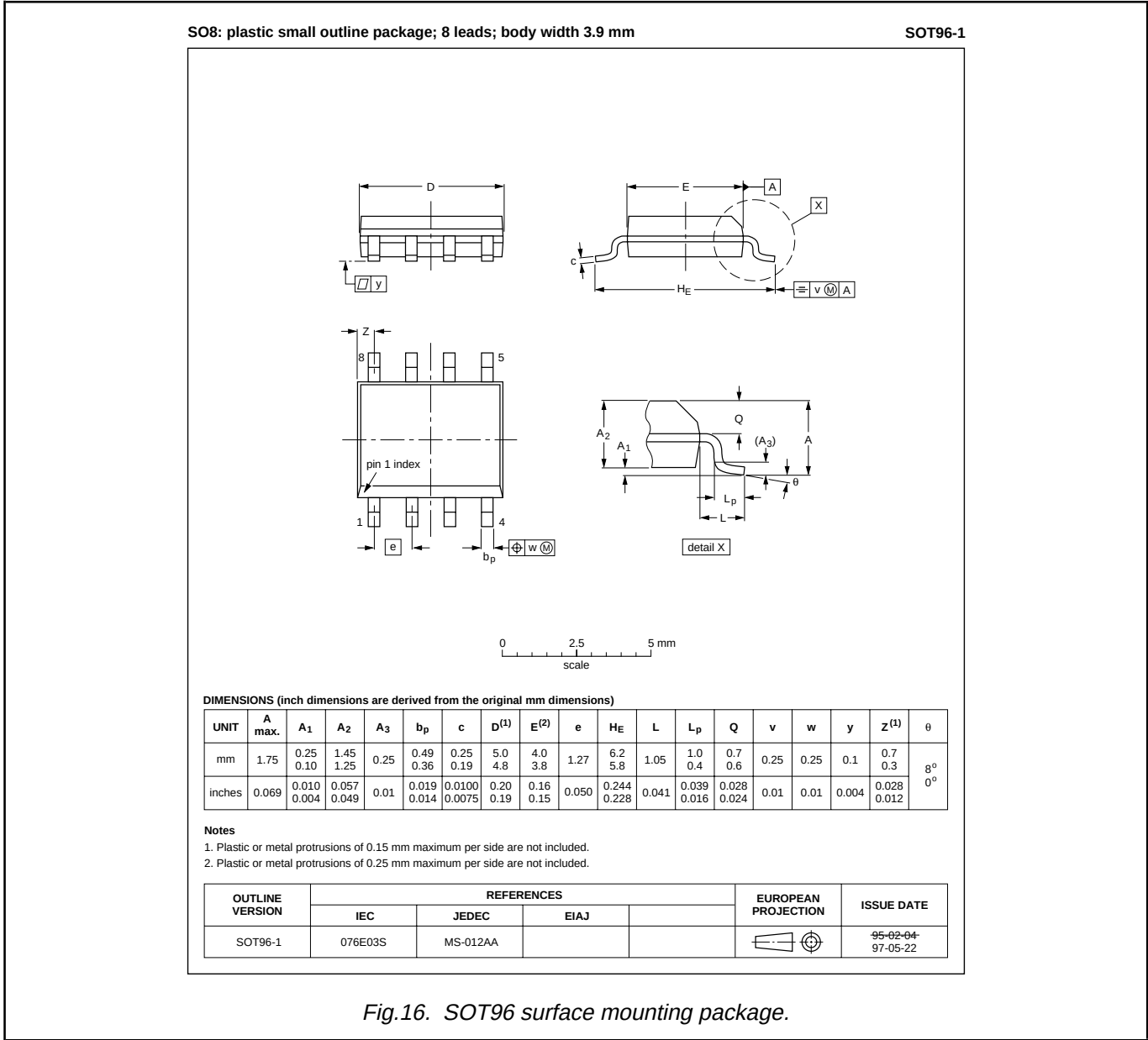
PHN203



Dual N-channel enhancement mode
TrenchMOS™ transistor

PHN203

MECHANICAL DATA



- 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 Integrated Circuit Packages, Data Handbook IC26.
 3. Epoxy meets UL94 V0 at 1/8".

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PHN203

DEFINITIONS

Data sheet status	
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.
Limiting values	
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.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	
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