

1. Description

SiliconMAX™ products use the latest Philips TrenchMOS™ technology to achieve the lowest possible on-state resistance in a SOT96-1 (SO8) package.

Product availability:

PSMN005-30K in SOT96-1 (SO8).

2. Features

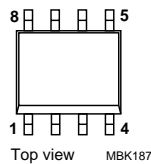
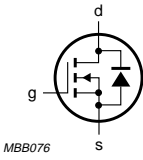
- Very low on-state resistance
- Fast switching
- TrenchMOS™ technology.

3. Applications

- DC to DC convertors
- Computer motherboards
- Switch mode power supplies.

4. Pinning information

Table 1: Pinning - SOT96-1, simplified outline and symbol

Pin	Description	Simplified outline	Symbol
1,2,3	source (s)	 <p>Top view MBK187</p>	 <p>MBB076</p>
4	gate (g)		
5,6,7,8	drain (d)		

SOT96-1 (SO8)

5. Quick reference data

Table 2: Quick reference data

Symbol	Parameter	Conditions	Typ	Max	Unit
V_{DS}	drain-source voltage (DC)	$T_j = 25$ to 150 °C	-	30	V
I_D	drain current (DC)	$T_{sp} = 80$ °C	-	20	A
P_{tot}	total power dissipation	$T_{sp} = 80$ °C	-	3.5	W
T_j	junction temperature		-	150	°C
R_{DSon}	drain-source on-state resistance	$V_{GS} = 10$ V; $I_D = 15$ A; $T_j = 25$ °C	4.4	5.5	mΩ

6. Limiting values

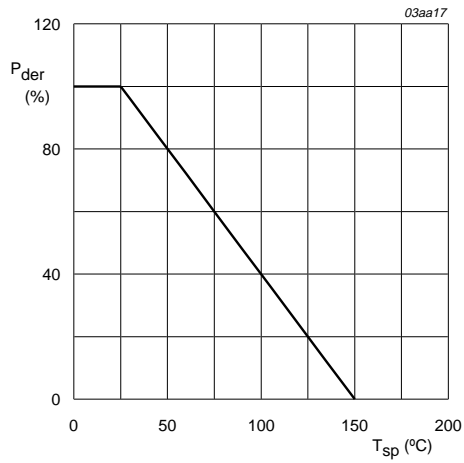
Table 3: Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	drain-source voltage (DC)	$T_j = 25$ to 150 °C	-	30	V
V_{GS}	gate-source voltage (DC)		-	±20	V
I_D	drain current (DC)	$T_{sp} = 80$ °C; $V_{GS} = 10$ V	-	20	A
I_{DM}	peak drain current	$T_{sp} = 25$ °C; pulsed; $t_p \leq 10$ μs	-	60	A
P_{tot}	total power dissipation	$T_{sp} = 80$ °C	-	3.5	W
T_{stg}	storage temperature		-55	+150	°C
T_j	operating junction temperature		-55	+150	°C

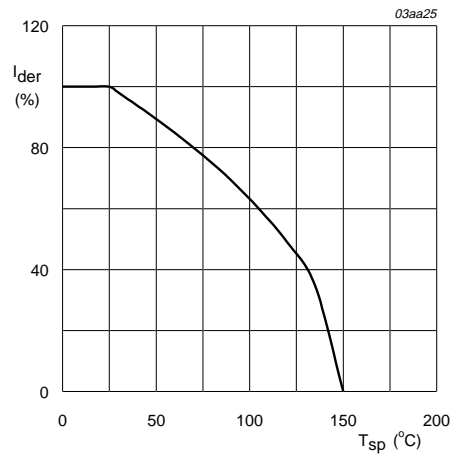
Source-drain diode

I_S	source (diode forward) current (DC)	$T_{sp} = 80$ °C	-	20	A
I_{SM}	peak source (diode forward) current	$T_{sp} = 25$ °C; pulsed; $t_p \leq 10$ μs	-	60	A



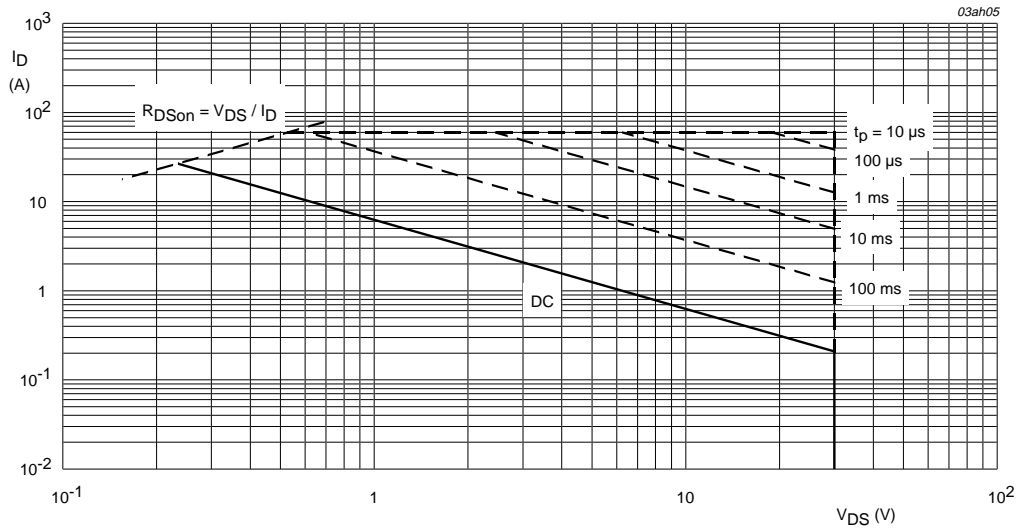
$$P_{der} = \frac{P_{tot}}{P_{tot(25^{\circ}C)}} \times 100\%$$

Fig 1. Normalized total power dissipation as a function of mounting base temperature.



$$I_{der} = \frac{I_D}{I_{D(25^{\circ}C)}} \times 100\%$$

Fig 2. Normalized continuous drain current as a function of mounting base temperature.



T_{sp} = 25 °C; I_{DM} is single pulse.

Fig 3. Safe operating area; continuous and peak drain currents as a function of drain-source voltage.

7. Thermal characteristics

Table 4: Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point	mounted on a metal clad board; Figure 4	-	-	20	K/W

7.1 Transient thermal impedance

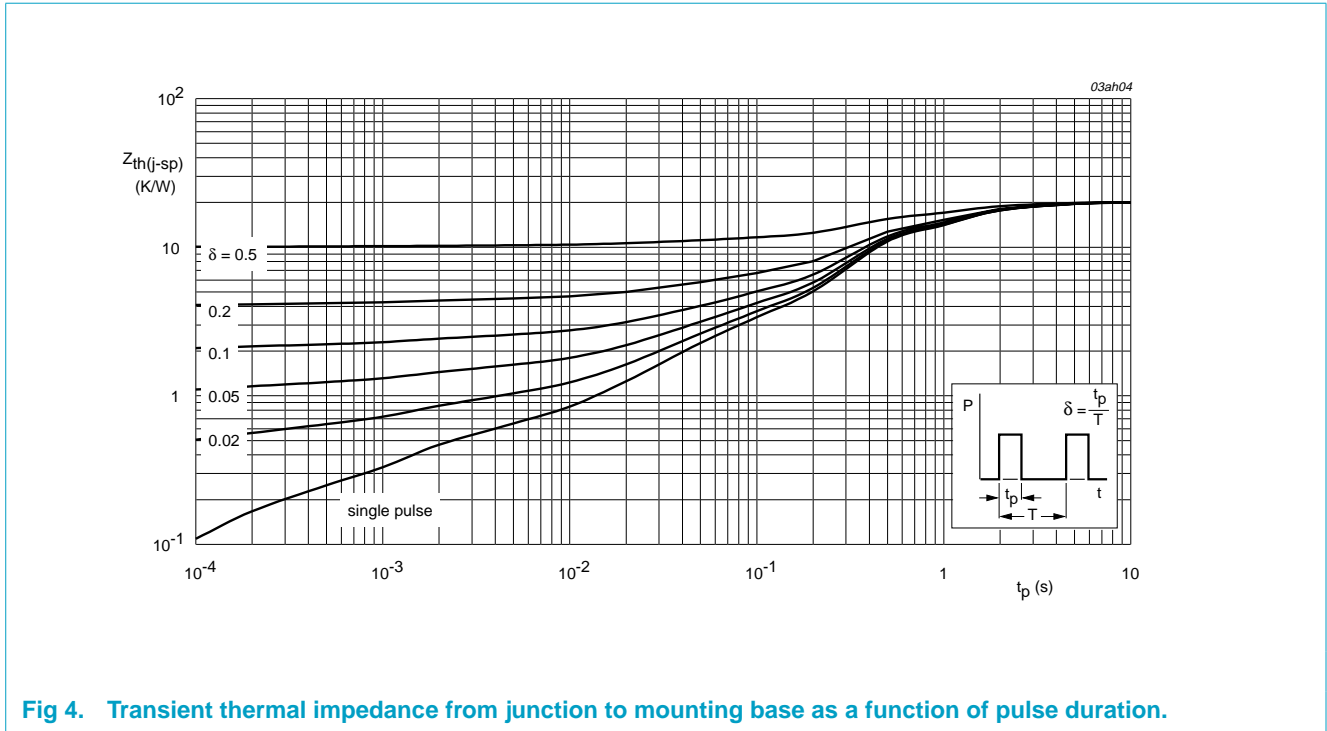
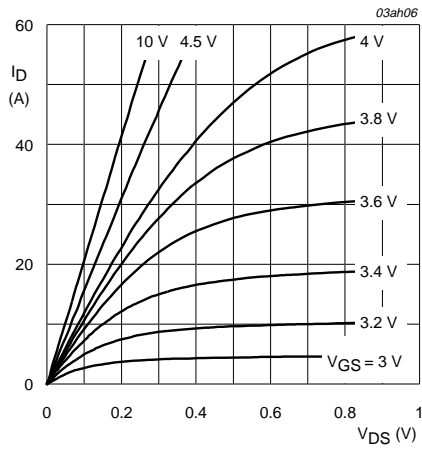


Fig 4. Transient thermal impedance from junction to mounting base as a function of pulse duration.

8. Characteristics

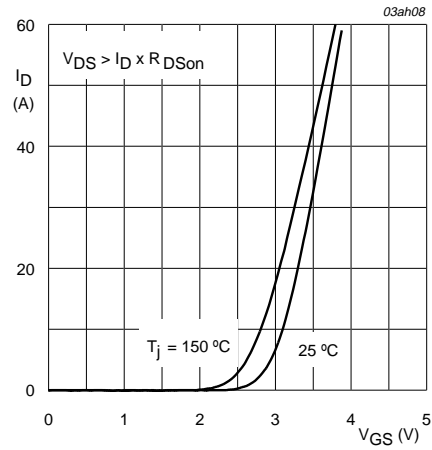
Table 5: Characteristics
 $T_j = 25\text{ °C}$ unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 250\ \mu\text{A}; V_{GS} = 0\ \text{V}$	30	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$I_D = 1\ \text{mA}; V_{DS} = V_{GS}$				
		$T_j = 25\text{ °C}$	1	-	3	V
		$T_j = 150\text{ °C}$	0.5	-	-	V
I_{DSS}	drain-source leakage current	$V_{DS} = 30\ \text{V}; V_{GS} = 0\ \text{V}$				
		$T_j = 25\text{ °C}$	-	-	1	μA
I_{GSS}	gate-source leakage current	$V_{GS} = \pm 20\ \text{V}; V_{DS} = 0\ \text{V}$	-	-	100	nA
		$T_j = 150\text{ °C}$	-	-	0.5	mA
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 10\ \text{V}; I_D = 15\ \text{A}$				
		$T_j = 25\text{ °C}$	-	4.4	5.5	m Ω
		$V_{GS} = 4.5\ \text{V}; I_D = 13\ \text{A}$				
		$T_j = 25\text{ °C}$	-	6.6	8	m Ω
Dynamic characteristics						
g_{fs}	forward transconductance	$V_{DS} = 15\ \text{V}; I_D = 20\ \text{A}$	-	60	-	S
$Q_{g(tot)}$	total gate charge	$I_D = 20\ \text{A}; V_{DD} = 15\ \text{V}; V_{GS} = 4.5\ \text{V}$	-	34	-	nC
Q_{gs}	gate-source charge		-	15	-	nC
Q_{gd}	gate-drain (Miller) charge		-	14	-	nC
C_{iss}	input capacitance	$V_{GS} = 0\ \text{V}; V_{DS} = 25\ \text{V}; f = 1\ \text{MHz}$	-	3100	-	pF
C_{oss}	output capacitance		-	605	-	pF
C_{rss}	reverse transfer capacitance		-	405	-	pF
$t_{d(on)}$	turn-on delay time	$V_{DD} = 15\ \text{V}; R_L = 15\ \Omega; V_{GS} = 10\ \text{V}; R_G = 6\ \Omega$	-	18	-	ns
t_r	rise time		-	16	-	ns
$t_{d(off)}$	turn-off delay time		-	65	-	ns
t_f	fall time		-	45	-	ns
Source-drain (reverse) diode						
V_{SD}	source-drain (diode forward) voltage	$I_S = 15\ \text{A}; V_{GS} = 0\ \text{V}$	-	0.81	1.3	V
t_{rr}	reverse recovery time	$I_S = 10\ \text{A}; dI_S/dt = -100\ \text{A}/\mu\text{s}; V_{GS} = 0\ \text{V}$	-	35	-	ns
Q_r	recovery charge		-	20	-	nC



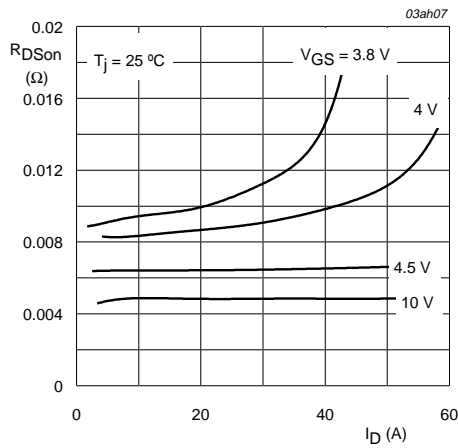
$T_j = 25\text{ }^\circ\text{C}$

Fig 5. Output characteristics: drain current as a function of drain-source voltage; typical values.



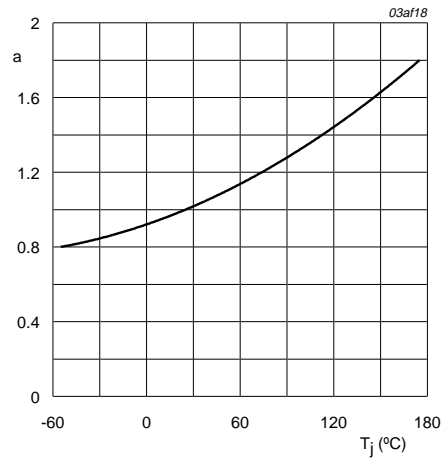
$T_j = 25\text{ }^\circ\text{C}$ and $175\text{ }^\circ\text{C}$; $V_{DS} > I_D \times R_{DSon}$

Fig 6. Transfer characteristics: drain current as a function of gate-source voltage; typical values.



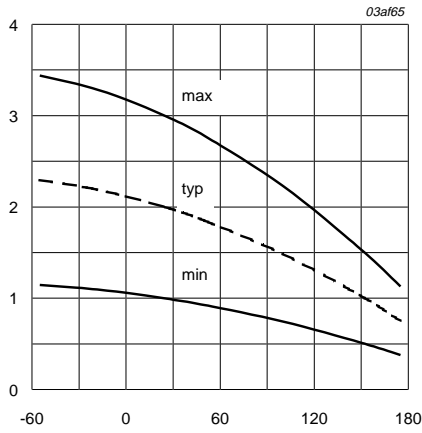
$T_j = 25\text{ }^\circ\text{C}$

Fig 7. Drain-source on-state resistance as a function of drain current; typical values.



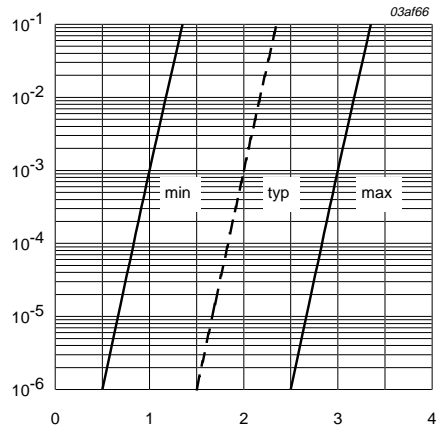
$$a = \frac{R_{DSon}}{R_{DSon}(25^\circ\text{C})}$$

Fig 8. Normalized drain-source on-state resistance factor as a function of junction temperature.



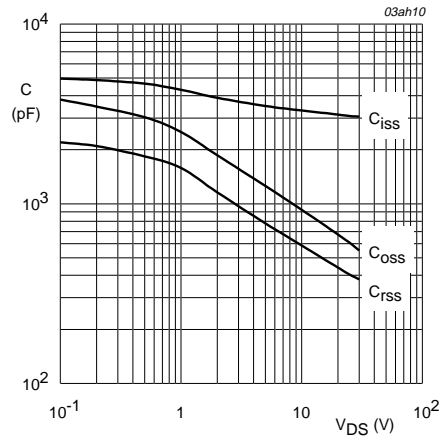
$I_D = 1 \text{ mA}; V_{DS} = V_{GS}$

Fig 9. Gate-source threshold voltage as a function of junction temperature.



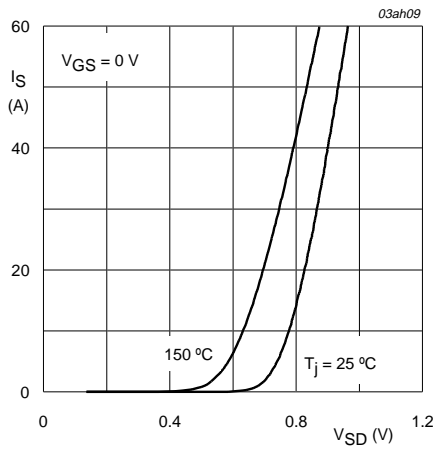
$T_j = 25 \text{ }^\circ\text{C}; V_{DS} = 5 \text{ V}$

Fig 10. Sub-threshold drain current as a function of gate-source voltage.



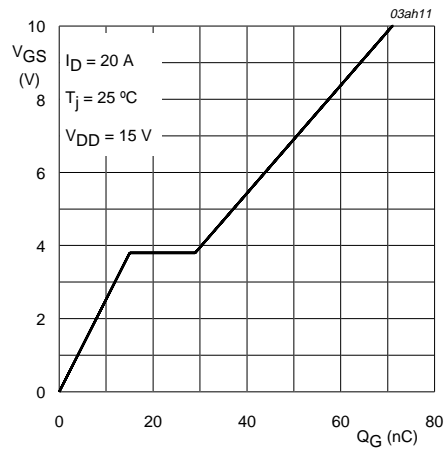
$V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$

Fig 11. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values.



$T_j = 25\text{ °C}$ and 175 °C ; $V_{GS} = 0\text{ V}$

Fig 12. Source (diode forward) current as a function of source-drain (diode forward) voltage; typical values.



$I_D = 20\text{ A}$; $V_{DD} = 15\text{ V}$

Fig 13. Gate-source voltage as a function of gate charge; typical values.

9. Package outline

SO8: plastic small outline package; 8 leads; body width 3.9 mm

SOT96-1

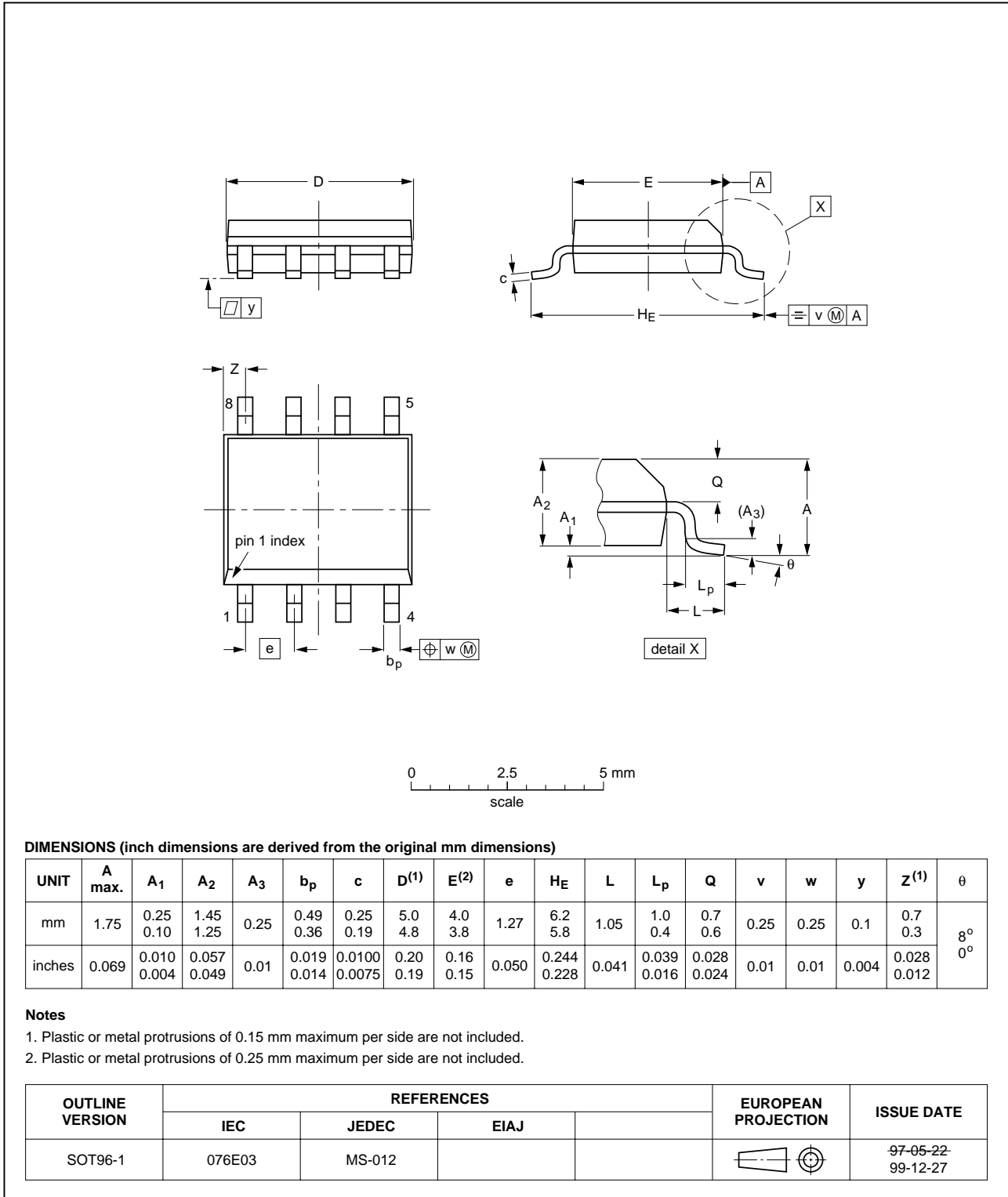


Fig 14. SOT96-1 (SO8).

10. Revision history

Table 6: Revision history

Rev	Date	CPCN	Description
01	20020306	-	Product Data; initial version

11. Data sheet status

Data sheet status ^[1]	Product status ^[2]	Definition
Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
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[1] Please consult the most recently issued data sheet before initiating or completing a design.

[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL <http://www.semiconductors.philips.com>.

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