

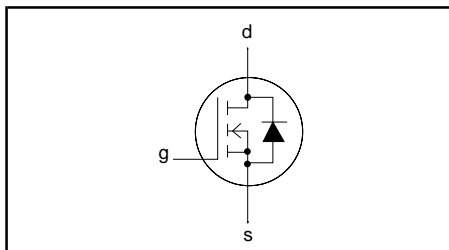
# N-channel TrenchMOS™ transistor

# PHK4NQ10T

## FEATURES

- Low on-state resistance
- Fast switching
- Low profile surface mount package

## SYMBOL



## QUICK REFERENCE DATA

$V_{DS} = 100\text{ V}$
$I_D = 4\text{ A}$
$R_{DS(ON)} \leq 70\text{ m}\Omega (V_{GS} = 10\text{ V})$

## GENERAL DESCRIPTION

N-channel enhancement mode field-effect transistor in a plastic envelope using 'trench' technology.

### Applications:-

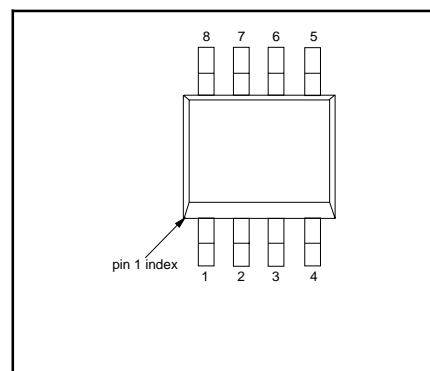
- Motor and relay drivers
- d.c. to d.c. converters

The PHK4NQ10T is supplied in the SOT96-1 (SO8) surface mounting package.

## PINNING

PIN	DESCRIPTION
1-3	source
4	gate
5-8	drain

## SOT96-1 (SO8)



## 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 $150\text{ }^\circ\text{C}$	-	100	V
$V_{DGR}$	Drain-gate voltage	$T_j = 25\text{ }^\circ\text{C}$ to $150\text{ }^\circ\text{C}$ ; $R_{GS} = 20\text{ k}\Omega$	-	100	V
$V_{GS}$	Gate-source voltage		-	$\pm 20$	V
$I_D$	Drain current ( $t_p \leq 10\text{ s}$ )	$T_a = 25\text{ }^\circ\text{C}$	-	4	A
		$T_a = 70\text{ }^\circ\text{C}$	-	3	A
$I_{DM}$	Drain current (pulse peak value)	$T_a = 25\text{ }^\circ\text{C}$	-	16	A
$P_{tot}$	Total power dissipation	$T_a = 25\text{ }^\circ\text{C}$ , $t \leq 10\text{ s}$	-	2.5	W
		$T_a = 70\text{ }^\circ\text{C}$ , $t \leq 10\text{ s}$	-	1.6	W
$T_j, T_{stg}$	Operating junction and storage temperature		- 65	150	$^\circ\text{C}$

## THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$R_{th\ j-a}$	Thermal resistance junction to ambient	Surface mounted, FR4 board, $t \leq 10\text{ sec}$	-	50	K/W
$R_{th\ j-a}$	Thermal resistance junction to ambient	Surface mounted, FR4 board	150	-	K/W

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

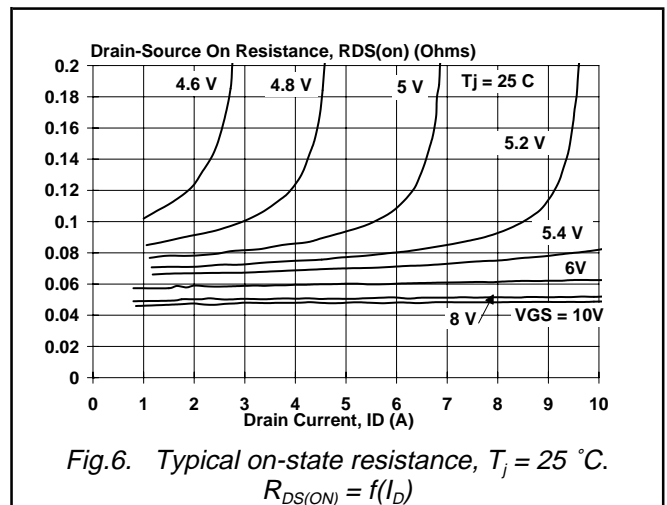
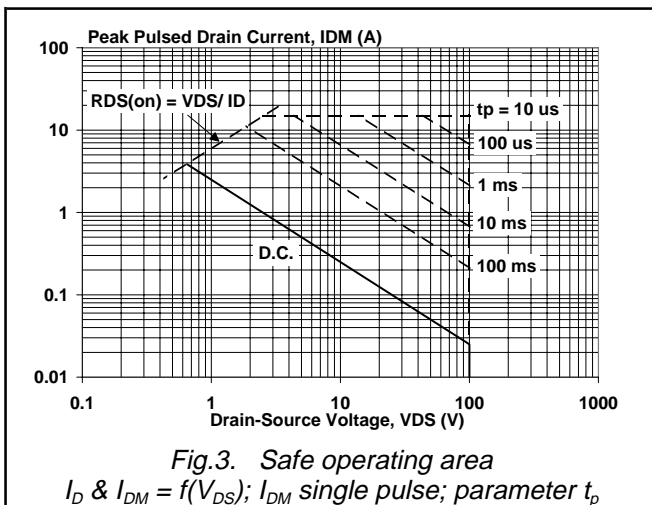
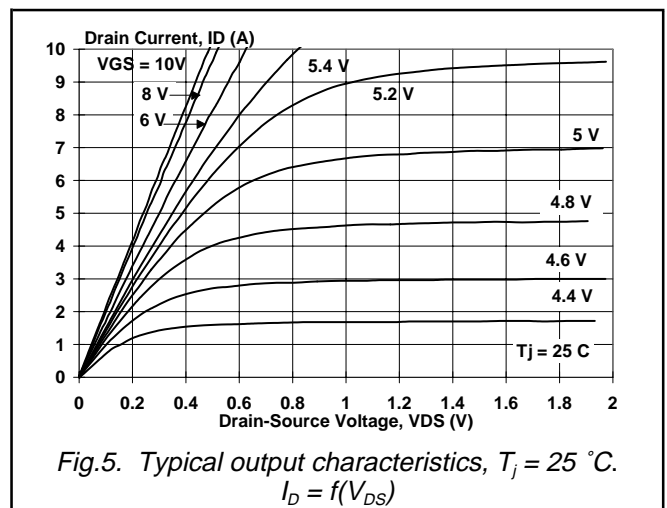
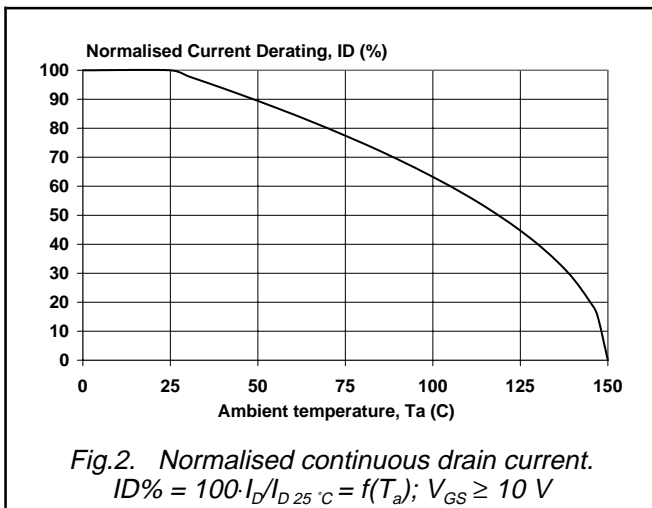
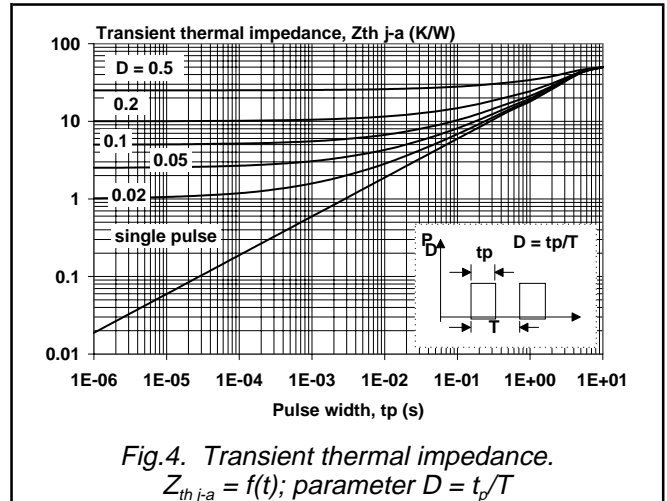
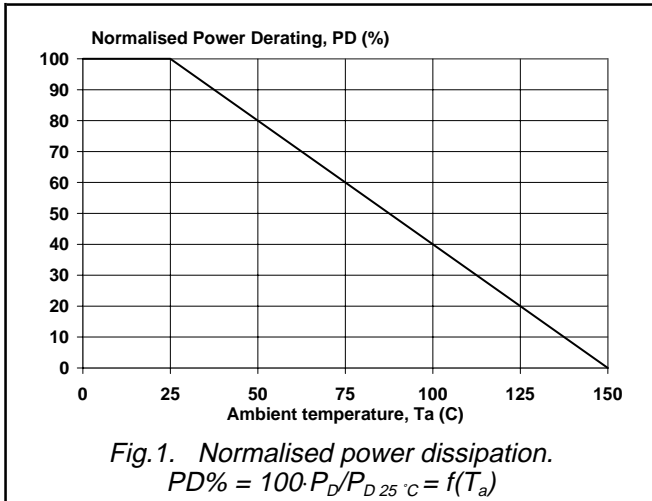
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0\text{ V}; I_D = 10\ \mu\text{A};$ $T_j = -55^\circ\text{C}$	100 89	- -	- -	V V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}; I_D = 1\ \text{mA}$ $T_j = 150^\circ\text{C}$ $T_j = -55^\circ\text{C}$	2 1.1 -	3 -	4 - 6	V V V
$R_{DS(ON)}$	Drain-source on-state resistance	$V_{GS} = 10\text{ V}; I_D = 4\ \text{A}$ $T_j = 150^\circ\text{C}$	- -	65 -	70 168	m $\Omega$ m $\Omega$
$I_{GSS}$	Gate source leakage current	$V_{GS} = \pm 20\text{ V}; V_{DS} = 0\text{ V}$	-	10	100	nA
$I_{DSS}$	Zero gate voltage drain current	$V_{DS} = 100\text{ V}; V_{GS} = 0\text{ V};$ $T_j = 150^\circ\text{C}$	-	0.05 5	10 100	$\mu\text{A}$ $\mu\text{A}$
$Q_{g(tot)}$	Total gate charge	$I_D = 4\ \text{A}; V_{DD} = 80\text{ V}; V_{GS} = 10\text{ V}$	-	22	-	nC
$Q_{gs}$	Gate-source charge		-	4	-	nC
$Q_{gd}$	Gate-drain (Miller) charge		-	8	-	nC
$t_{d\ on}$	Turn-on delay time	$V_{DD} = 50\text{ V}; R_D = 12\ \Omega;$	-	6	-	ns
$t_r$	Turn-on rise time	$V_{GS} = 10\text{ V}; R_G = 5.6\ \Omega$	-	13	-	ns
$t_{d\ off}$	Turn-off delay time	Resistive load	-	26	-	ns
$t_f$	Turn-off fall time		-	12	-	ns
$L_d$	Internal drain inductance	Measured from drain lead to centre of die	-	1	-	nH
$L_s$	Internal source inductance	Measured from source lead to source bond pad	-	3	-	nH
$C_{iss}$	Input capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 25\text{ V}; f = 1\ \text{MHz}$	-	880	-	pF
$C_{oss}$	Output capacitance		-	137	-	pF
$C_{rss}$	Feedback capacitance		-	84	-	pF

**REVERSE DIODE LIMITING VALUES 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)	$T_a = 25^\circ\text{C}; t_p \leq 10\ \text{s}$	-	-	2.3	A
$I_{SM}$	Pulsed source current (body diode)		-	-	15	A
$V_{SD}$	Diode forward voltage	$I_F = 4\ \text{A}; V_{GS} = 0\text{ V}$	-	0.82	1.2	V
$t_{rr}$	Reverse recovery time	$I_F = 4\ \text{A}; -di_F/dt = 100\ \text{A}/\mu\text{s};$	-	60	-	ns
$Q_{rr}$	Reverse recovery charge	$V_{GS} = 0\text{ V}; V_R = 25\text{ V}$	-	120	-	nC

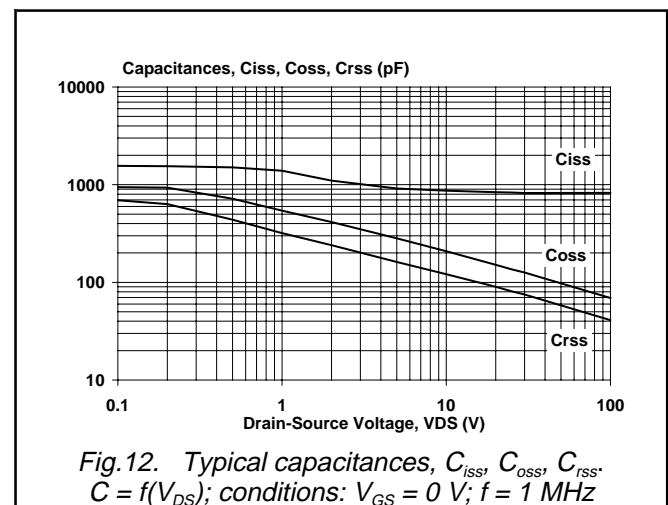
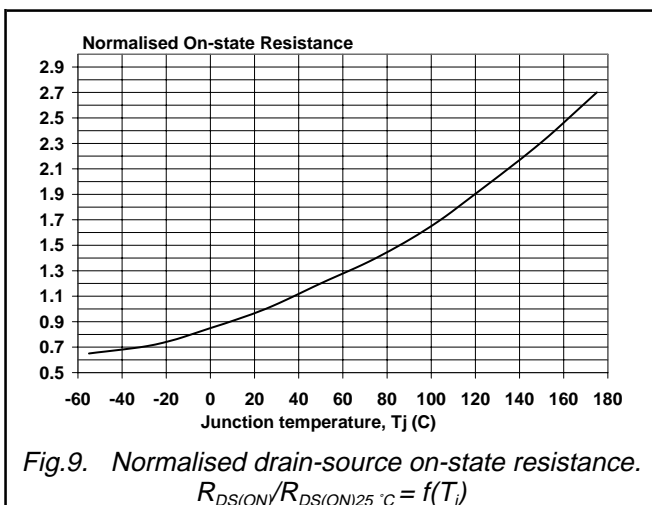
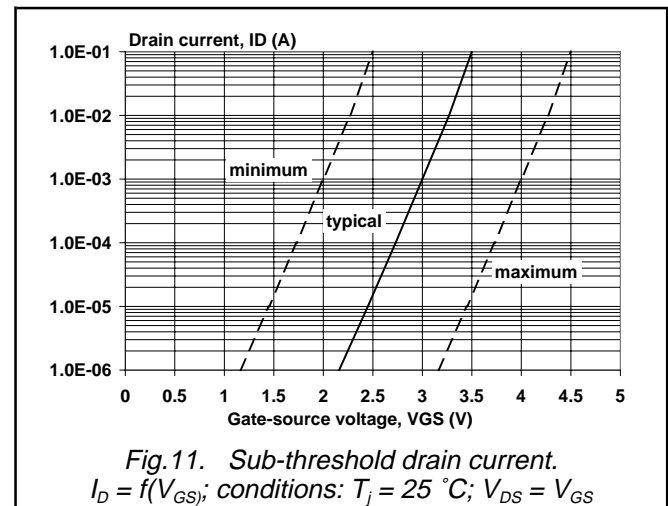
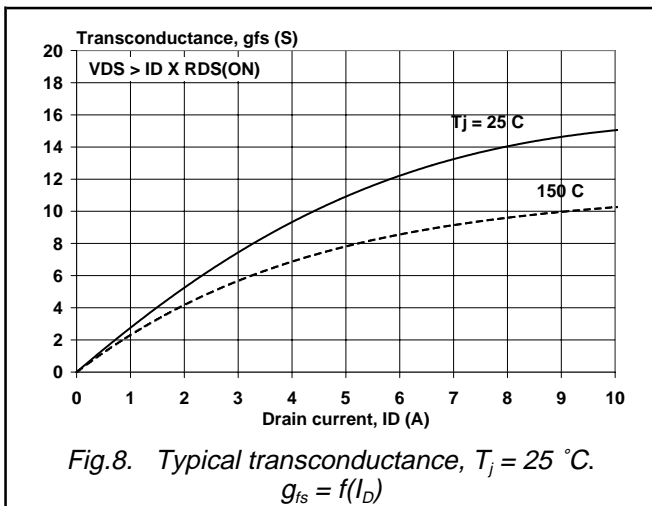
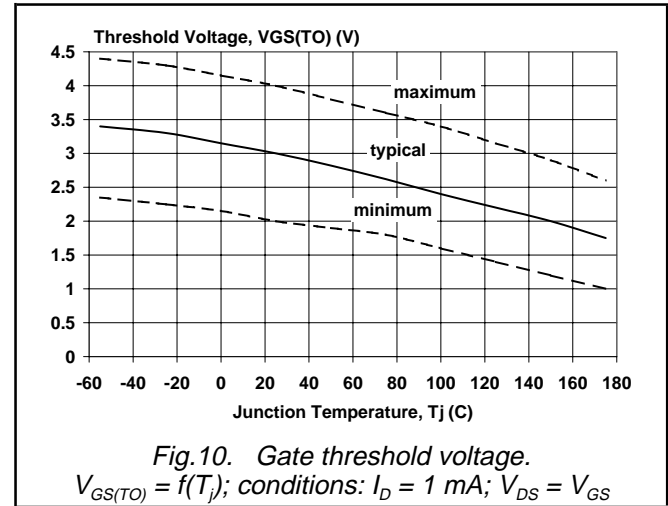
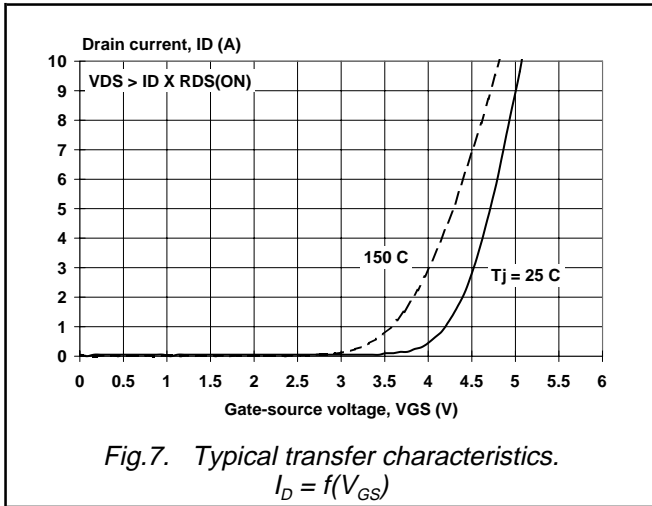
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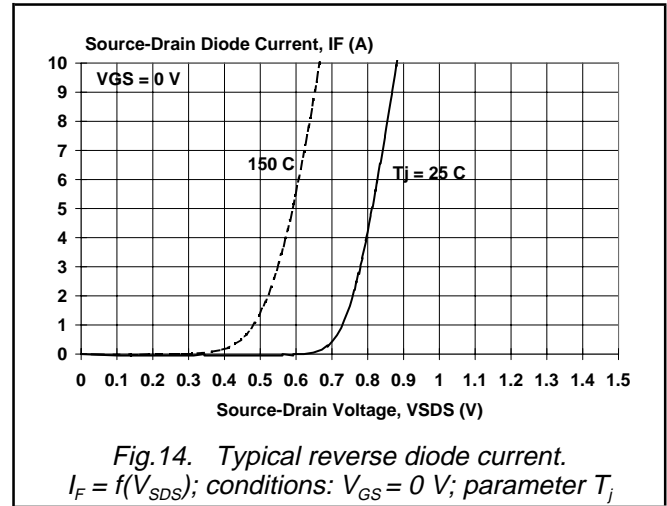
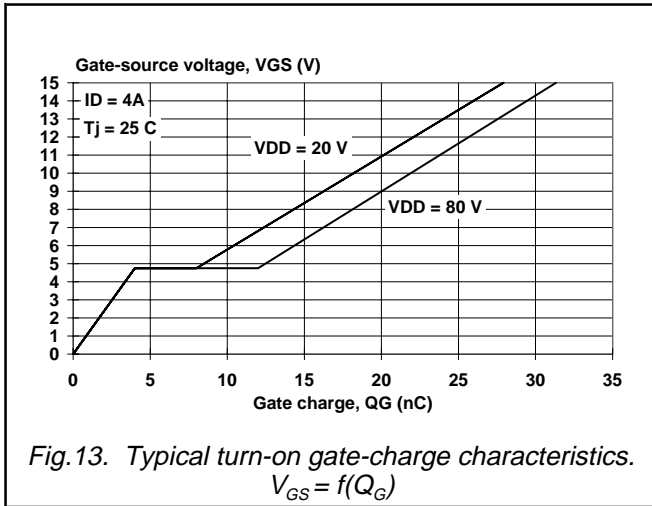
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MECHANICAL DATA

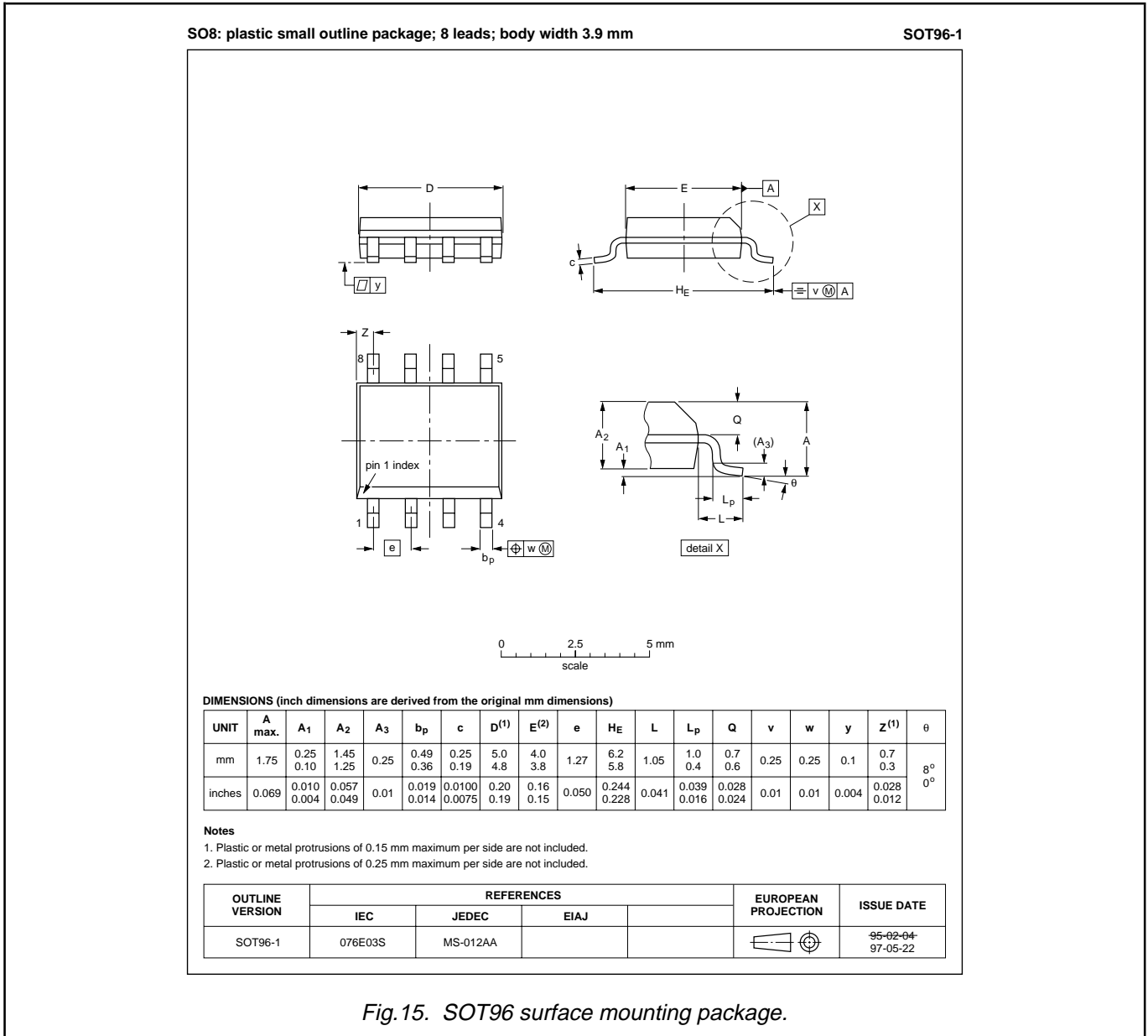


Fig. 15. SOT96 surface mounting package.

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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**DEFINITIONS**

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