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Kind regards,

Team Nexperia



# BUK7515-100A

N-channel TrenchMOS standard level FET

5 April 2014

Product data sheet

## 1. General description

Standard level N-channel enhancement mode Field-Effect Transistor (FET) in a plastic package using TrenchMOS technology. This product has been designed and qualified to the appropriate AEC standard for use in automotive critical applications.

## 2. Features and benefits

- AEC Q101 compliant
- Low conduction losses due to low on-state resistance

## 3. Applications

- Automotive and general purpose power switching

## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DS}$	drain-source voltage	$T_j \geq 25\text{ °C}; T_j \leq 175\text{ °C}$	-	-	100	V
$I_D$	drain current	$T_{mb} = 25\text{ °C}$	-	-	75	A
$P_{tot}$	total power dissipation		-	-	300	W
<b>Static characteristics</b>						
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 10\text{ V}; I_D = 25\text{ A}; T_j = 25\text{ °C}$	-	12	15	m $\Omega$
<b>Avalanche ruggedness</b>						
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	$I_D = 35\text{ A}; V_{sup} \leq 25\text{ V}; R_{GS} = 50\text{ }\Omega;$ $V_{GS} = 10\text{ V}; T_{j(init)} = 25\text{ °C};$ unclamped	-	-	120	mJ

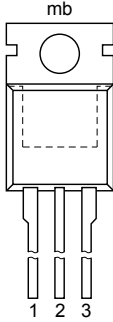
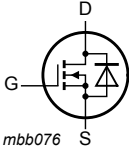


Scan or click this QR code to view the latest information for this product



## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	 <p style="text-align: center;"><b>TO-220AB (SOT78A)</b></p>	
2	D	drain		
3	S	source		
mb	D	mounting base; connected to drain		

## 6. Ordering information

Table 3. Ordering information

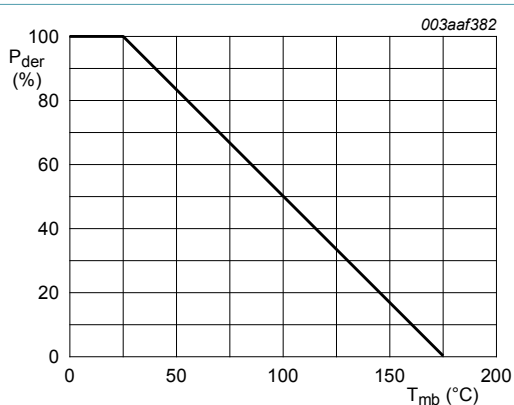
Type number	Package		
	Name	Description	Version
BUK7515-100A	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78A

## 7. Limiting values

**Table 4. Limiting values**

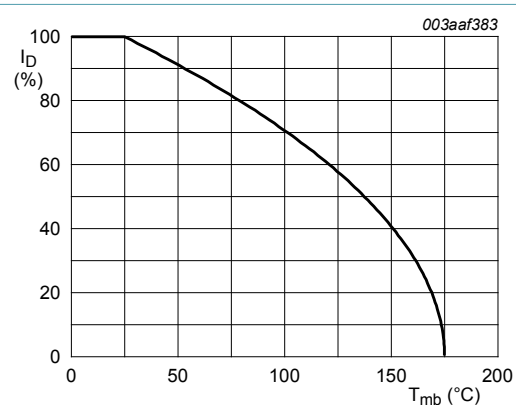
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V <sub>DS</sub>	drain-source voltage	T <sub>j</sub> ≥ 25 °C; T <sub>j</sub> ≤ 175 °C	-	100	V
V <sub>DGR</sub>	drain-gate voltage	R <sub>GS</sub> = 20 kΩ	-	100	V
V <sub>GS</sub>	gate-source voltage		-20	20	V
P <sub>tot</sub>	total power dissipation	T <sub>mb</sub> = 25 °C	-	300	W
I <sub>D</sub>	drain current	T <sub>mb</sub> = 25 °C	-	75	A
		T <sub>mb</sub> = 100 °C	-	60.8	A
I <sub>DM</sub>	peak drain current	T <sub>mb</sub> = 25 °C; pulsed	-	240	A
T <sub>stg</sub>	storage temperature		-55	175	°C
T <sub>j</sub>	junction temperature		-55	175	°C
<b>Source-drain diode</b>					
I <sub>S</sub>	source current	T <sub>mb</sub> = 25 °C	-	75	A
I <sub>SM</sub>	peak source current	pulsed; T <sub>mb</sub> = 25 °C	-	240	A
<b>Avalanche ruggedness</b>					
E <sub>DS(AL)S</sub>	non-repetitive drain-source avalanche energy	I <sub>D</sub> = 35 A; V <sub>sup</sub> ≤ 25 V; R <sub>GS</sub> = 50 Ω; V <sub>GS</sub> = 10 V; T <sub>j(init)</sub> = 25 °C; unclamped	-	120	mJ



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

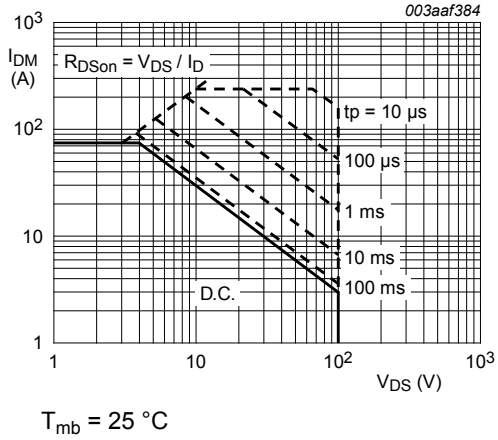
$$P_{der} = \frac{P_{tot}}{P_{tot(25^{\circ}\text{C})}} \times 100\%$$



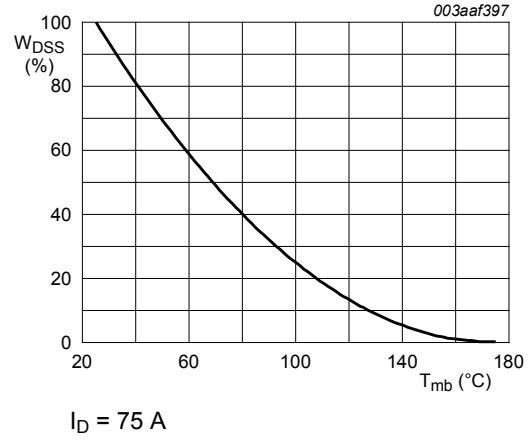
V<sub>GS</sub> ≥ 10 V

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

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



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

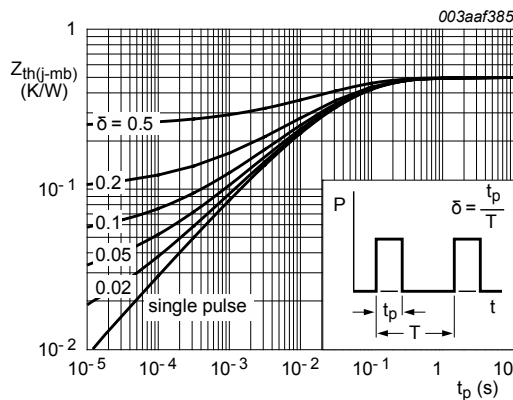


**Fig. 4. Normalised drain-source non-repetitive avalanche energy as a function of mounting-base temperature**

## 8. Thermal characteristics

**Table 5. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base		-	-	0.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W



**Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration**

## 9. Characteristics

**Table 6. Characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 0.25 \text{ mA}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	100	-	-	V
		$I_D = 0.25 \text{ mA}; V_{GS} = 0 \text{ V}; T_j = -55 \text{ }^\circ\text{C}$	89	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_j = 25 \text{ }^\circ\text{C}$	2	3	4	V
		$I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_j = 175 \text{ }^\circ\text{C}$	1	-	-	V
		$I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_j = -55 \text{ }^\circ\text{C}$	-	-	4.4	V
$I_{DSS}$	drain leakage current	$V_{DS} = 100 \text{ V}; V_{GS} = 0 \text{ V}; T_j = 175 \text{ }^\circ\text{C}$	-	-	500	$\mu\text{A}$
		$V_{DS} = 100 \text{ V}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	0.05	10	$\mu\text{A}$
$I_{GSS}$	gate leakage current	$V_{GS} = 20 \text{ V}; V_{DS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	2	100	nA
		$V_{GS} = -20 \text{ V}; V_{DS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	2	100	nA
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 10 \text{ V}; I_D = 25 \text{ A}; T_j = 175 \text{ }^\circ\text{C}$	-	-	40.5	m $\Omega$
		$V_{GS} = 10 \text{ V}; I_D = 25 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$	-	12	15	m $\Omega$
<b>Dynamic characteristics</b>						
$C_{iss}$	input capacitance	$V_{GS} = 0 \text{ V}; V_{DS} = 25 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \text{ }^\circ\text{C}$	-	4500	6000	pF
$C_{oss}$	output capacitance		-	550	660	pF
$C_{rss}$	reverse transfer capacitance		-	305	400	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = 30 \text{ V}; R_L = 1.2 \text{ } \Omega; V_{GS} = 10 \text{ V}; R_{G(ext)} = 10 \text{ } \Omega; T_j = 25 \text{ }^\circ\text{C}$	-	35	55	ns
$t_r$	rise time		-	85	125	ns
$t_{d(off)}$	turn-off delay time		-	150	225	ns
$t_f$	fall time		-	70	100	ns
$L_D$	internal drain inductance	from contact screw on tab to centre of die; $T_j = 25 \text{ }^\circ\text{C}$	-	3.5	-	nH
		from drain lead 6 mm from package to centre of die; $T_j = 25 \text{ }^\circ\text{C}$	-	4.5	-	nH
$L_S$	internal source inductance	from source lead 6 mm from package to source bond pad ; $T_j = 25 \text{ }^\circ\text{C}$	-	7.5	-	nH
<b>Source-drain diode</b>						
$V_{SD}$	source-drain voltage	$I_S = 25 \text{ A}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	0.85	1.2	V
		$I_S = 75 \text{ A}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	1.1	-	V
$t_{rr}$	reverse recovery time	$I_S = 75 \text{ A}; dI_S/dt = -100 \text{ A}/\mu\text{s}; V_{GS} = -10 \text{ V}; V_{DS} = 30 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	80	-	ns
$Q_r$	recovered charge	$V_{GS} = -10 \text{ V}; V_{DS} = 30 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	0.35	-	$\mu\text{C}$

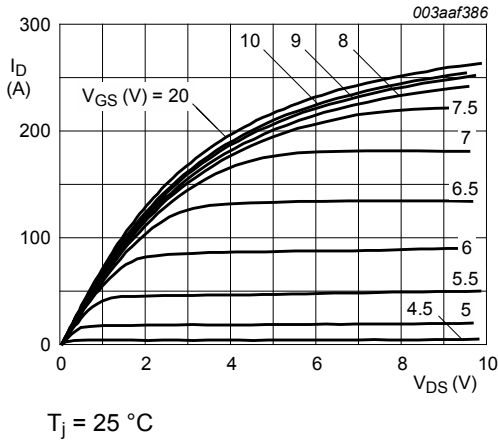


Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values

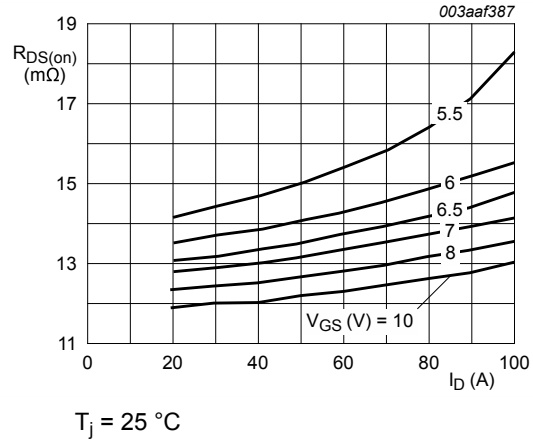


Fig. 7. Drain-source on-state resistance as a function of drain current; typical values

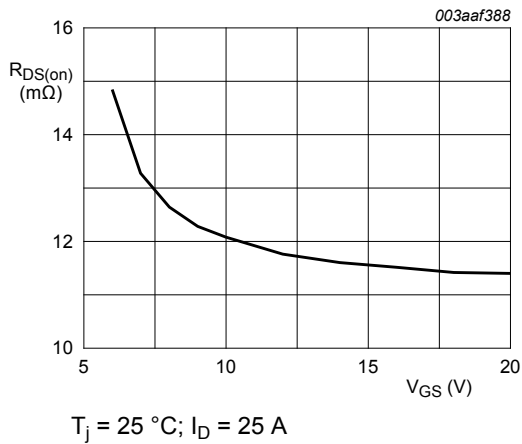


Fig. 8. Drain-source on-state resistance as a function of gate-source voltage; typical values

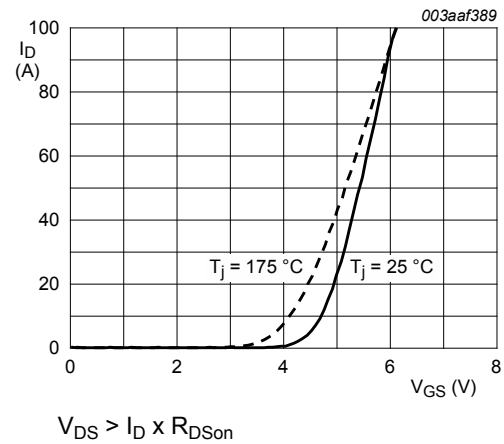


Fig. 9. Transfer characteristics: drain current as a function of gate-source voltage; typical values

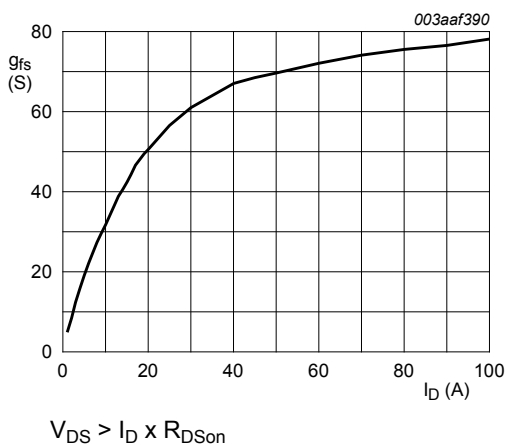


Fig. 10. Forward transconductance as a function of drain current; typical values

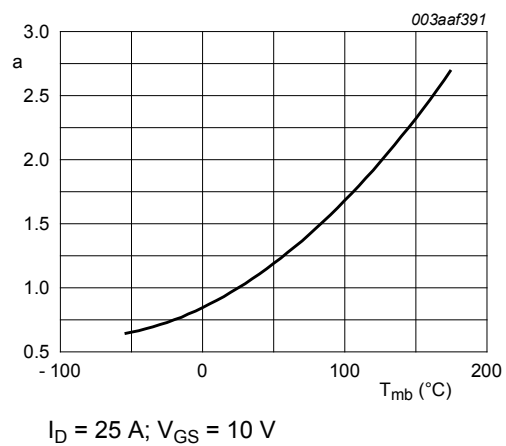


Fig. 11. Normalized drain-source on-state resistance factor as a function of junction temperature

$$a = \frac{R_{DS(on)}}{R_{DS(on)(25^\circ C)}}$$

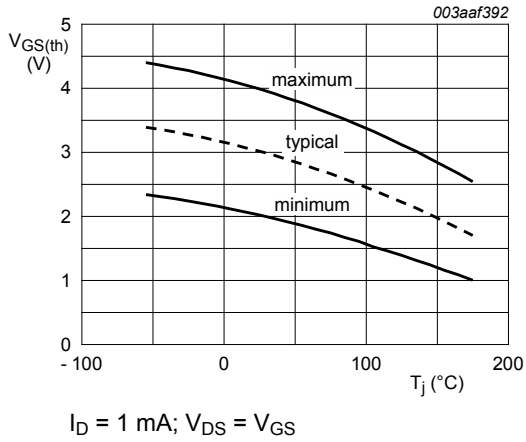


Fig. 12. Gate-source threshold voltage as a function of junction temperature

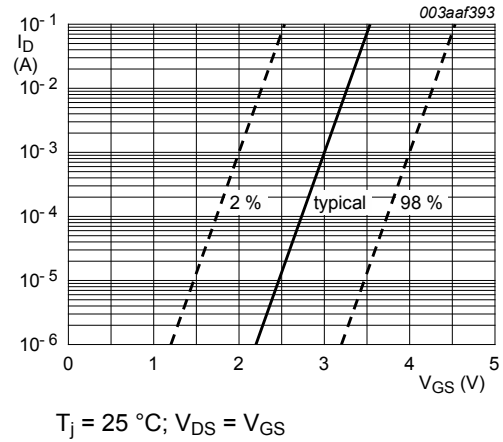


Fig. 13. Sub-threshold drain current as a function of gate-source voltage

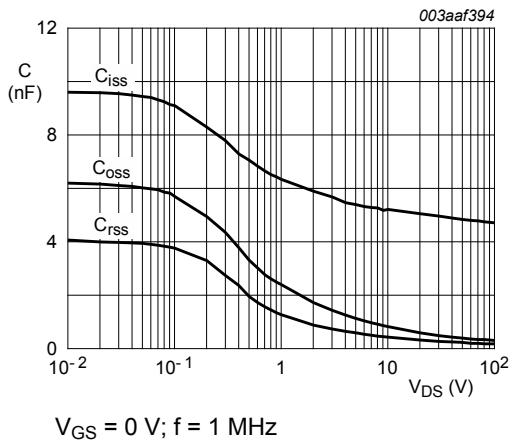


Fig. 14. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

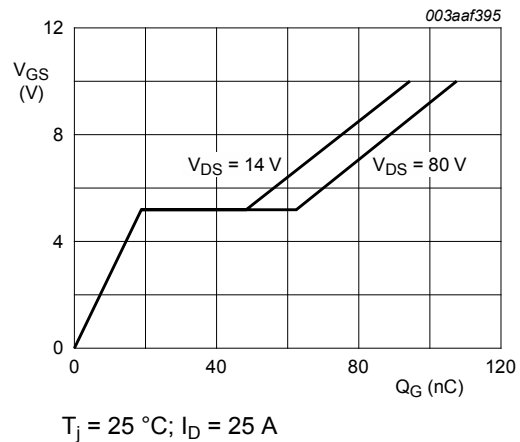


Fig. 15. Gate-source voltage as a function of gate charge; typical values

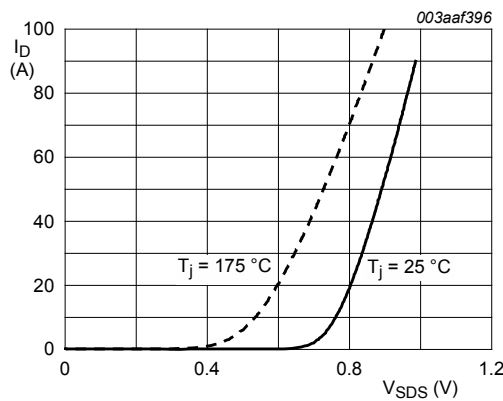


Fig. 16. Source (diode forward) current as a function of source-drain (diode forward) voltage; typical values



### 10. Package outline

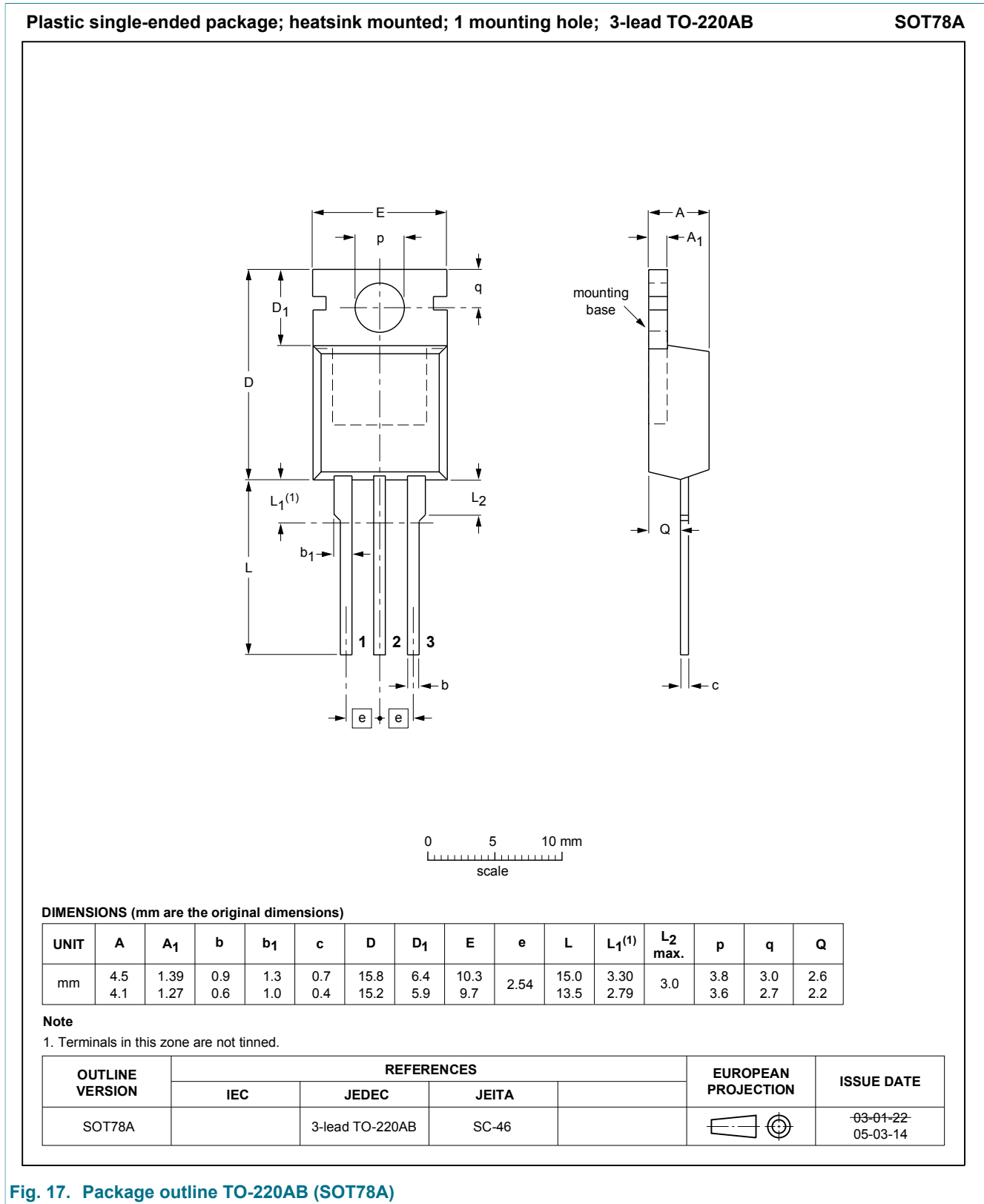


Fig. 17. Package outline TO-220AB (SOT78A)

## 11. Legal information

### 11.1 Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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