



BUK7880-55A

N-channel TrenchMOS standard level FET

19 June 2015

Product data sheet

1. General description

Standard level N-channel enhancement mode Field-Effect Transistor (FET) in a plastic package using NXP General Purpose Automotive (GPA) 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
- Suitable for standard level gate drive sources

3. Applications

- 12 V and 24 V loads
- Automotive systems
- General purpose power switching
- Motors, lamps and solenoids

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j \geq 25\text{ °C}; T_j \leq 150\text{ °C}$	-	-	55	V
I_D	drain current	$V_{GS} = 10\text{ V}; T_{sp} = 25\text{ °C};$ Fig. 2 ; Fig. 3	-	-	7	A
P_{tot}	total power dissipation	$T_{sp} = 25\text{ °C};$ Fig. 1	-	-	8	W
Static characteristics						
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 10\text{ V}; I_D = 10\text{ A}; T_j = 25\text{ °C};$ Fig. 9 ; Fig. 10	-	68	80	m Ω
Avalanche ruggedness						
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	$I_D = 7\text{ A}; V_{sup} \leq 55\text{ V}; R_{GS} = 50\text{ }\Omega;$ $V_{GS} = 10\text{ V}; T_{j(init)} = 25\text{ °C};$ unclamped	-	-	53	mJ

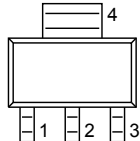
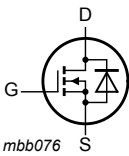


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5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	 <p>SC-73 (SOT223)</p>	 <p>mbb076</p>
2	D	drain		
3	S	source		
4	D	drain		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BUK7880-55A	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223
BUK7880-55A/CU	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223

7. Marking

Table 4. Marking codes

Type number	Marking code
BUK7880-55A	788055A
BUK7880-55A/CU	788055

8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	drain-source voltage	$T_j \geq 25\text{ °C}$; $T_j \leq 150\text{ °C}$	-	55	V
V_{DGR}	drain-gate voltage	$R_{GS} = 20\text{ k}\Omega$	-	55	V
V_{GS}	gate-source voltage		-20	20	V
P_{tot}	total power dissipation	$T_{sp} = 25\text{ °C}$; Fig. 1	-	8	W
I_D	drain current	$T_{sp} = 100\text{ °C}$; $V_{GS} = 10\text{ V}$; Fig. 2	-	5	A
		$T_{sp} = 25\text{ °C}$; $V_{GS} = 10\text{ V}$; Fig. 2 ; Fig. 3	-	7	A
I_{DM}	peak drain current	$T_{sp} = 25\text{ °C}$; pulsed; $t_p \leq 10\text{ }\mu\text{s}$; Fig. 3	-	30	A

Symbol	Parameter	Conditions	Min	Max	Unit
T _{stg}	storage temperature		-55	150	°C
T _j	junction temperature		-55	150	°C
Source-drain diode					
I _S	source current	T _{sp} = 25 °C	-	7	A
I _{SM}	peak source current	pulsed; t _p ≤ 10 μs; T _{sp} = 25 °C	-	30	A
Avalanche ruggedness					
E _{DS(AL)S}	non-repetitive drain-source avalanche energy	I _D = 7 A; V _{sup} ≤ 55 V; R _{GS} = 50 Ω; V _{GS} = 10 V; T _{j(init)} = 25 °C; unclamped	-	53	mJ
E _{DS(AL)R}	repetitive drain-source avalanche energy	Fig. 4	[1][2][3][4]	-	J

- [1] Maximum value not quoted. Repetitive rating defined in avalanche rating figure.
- [2] Single-pulse avalanche rating limited by maximum junction temperature of 150 °C.
- [3] Repetitive avalanche rating limited by an average junction temperature of 150 °C
- [4] Refer to application note AN10273 for further information.

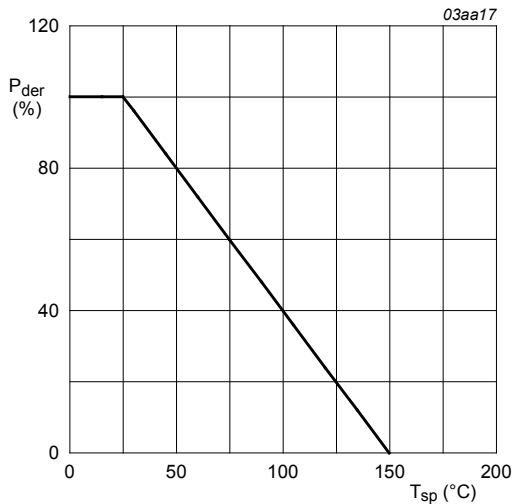


Fig. 1. Normalized total power dissipation as a function of solder point temperature

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

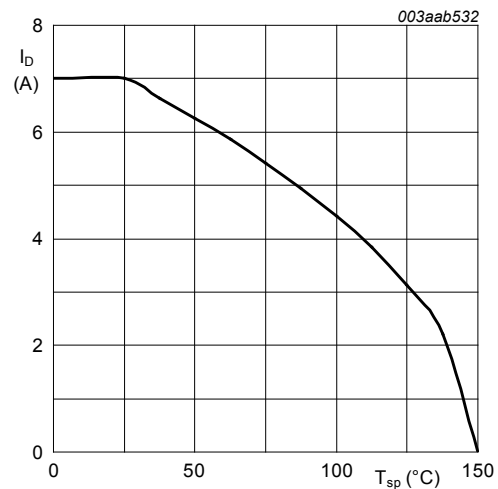


Fig. 2. Continuous drain current as a function of solder point temperature

$$V_{GS} \geq 10 \text{ V}$$

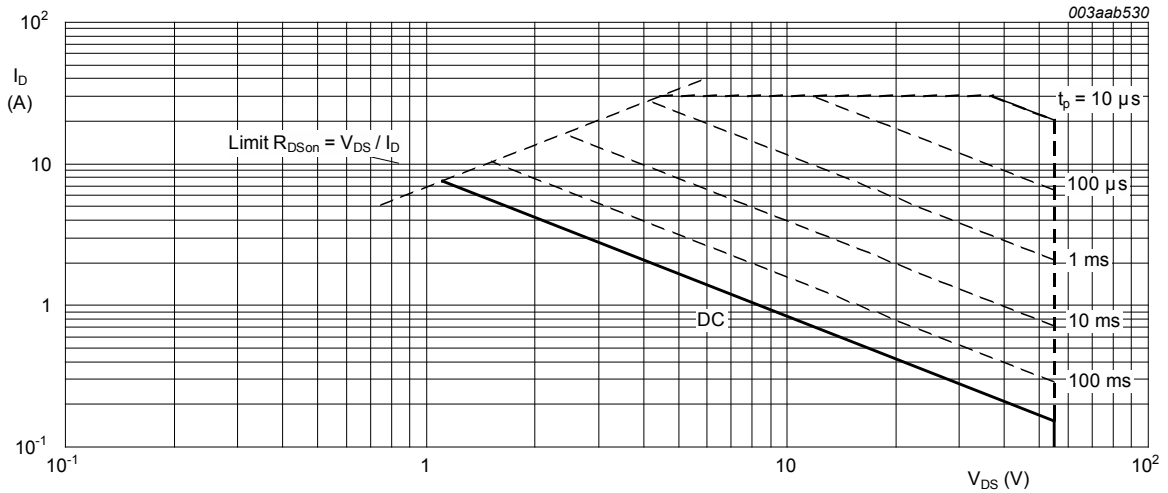


Fig. 3. Safe operating area; continuous and peak drain currents as a function of drain-source voltage

$T_{sp} = 25\text{ }^{\circ}\text{C}$; I_{DM} is single pulse

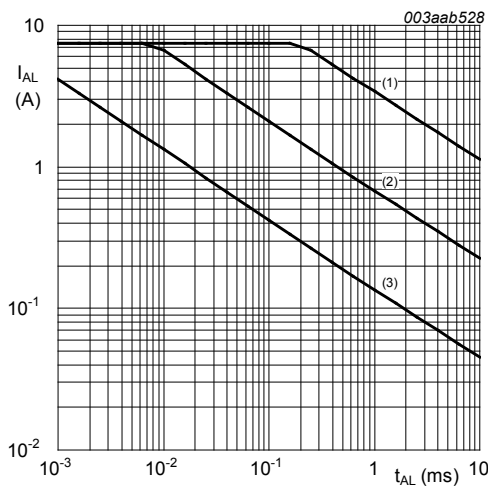


Fig. 4. Single-pulse and repetitive avalanche rating; avalanche current as a function of avalanche time

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point		-	-	15	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient		-	120	-	K/W

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 250 \mu A; V_{GS} = 0 V; T_j = 25 \text{ }^\circ C$	55	-	-	V
		$I_D = 250 \mu A; V_{GS} = 0 V; T_j = -55 \text{ }^\circ C$	50	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_j = 25 \text{ }^\circ C$; Fig. 8	2	3	4	V
V_{GSth}	gate-source threshold voltage	$I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_j = -55 \text{ }^\circ C$; Fig. 8	-	-	4.4	V
		$I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_j = 150 \text{ }^\circ C$; Fig. 8	1.2	-	-	V
I_{DSS}	drain leakage current	$V_{DS} = 55 \text{ V}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ }^\circ C$	-	0.05	10	μA
I_{GSS}	gate leakage current	$V_{GS} = 20 \text{ V}; V_{DS} = 0 \text{ V}; T_j = 25 \text{ }^\circ C$	-	2	100	nA
		$V_{GS} = -20 \text{ V}; V_{DS} = 0 \text{ V}; T_j = 25 \text{ }^\circ C$	-	2	100	nA
R_{DSon}	drain-source on-state resistance	$V_{GS} = 10 \text{ V}; I_D = 10 \text{ A}; T_j = 150 \text{ }^\circ C$; Fig. 9 ; Fig. 10	-	-	148	m Ω
		$V_{GS} = 10 \text{ V}; I_D = 10 \text{ A}; T_j = 25 \text{ }^\circ C$; Fig. 9 ; Fig. 10	-	68	80	m Ω
I_{DSS}	drain leakage current	$V_{DS} = 55 \text{ V}; V_{GS} = 0 \text{ V}; T_j = 150 \text{ }^\circ C$	-	-	500	μA
Dynamic characteristics						
$Q_{G(tot)}$	total gate charge	$I_D = 10 \text{ A}; V_{DS} = 44 \text{ V}; V_{GS} = 10 \text{ V}$; Fig. 11	-	12	-	nC
Q_{GS}	gate-source charge		-	2.5	-	nC
Q_{GD}	gate-drain charge		-	5	-	nC
C_{iss}	input capacitance	$V_{GS} = 0 \text{ V}; V_{DS} = 25 \text{ V}; f = 1 \text{ MHz}$; $T_j = 25 \text{ }^\circ C$; Fig. 12	-	374	500	pF
C_{oss}	output capacitance		-	92	110	pF
C_{riss}	reverse transfer capacitance		-	62	85	pF
$t_{d(on)}$	turn-on delay time		$V_{DS} = 30 \text{ V}; R_L = 1.2 \text{ } \Omega; V_{GS} = 10 \text{ V}$; $R_{G(ext)} = 10 \text{ } \Omega$	-	8	-
t_r	rise time	-		52	-	ns
$t_{d(off)}$	turn-off delay time	-		17	-	ns
t_f	fall time	-		9	-	ns
Source-drain diode						
V_{SD}	source-drain voltage	$I_S = 15 \text{ A}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ }^\circ C$; Fig. 13	-	0.85	1.2	V
t_{rr}	reverse recovery time	$I_S = 20 \text{ A}; dI_S/dt = -100 \text{ A}/\mu s$	-	33	-	ns
Q_r	recovered charge	$V_{GS} = -10 \text{ V}; V_{DS} = 30 \text{ V}$	-	31	-	nC

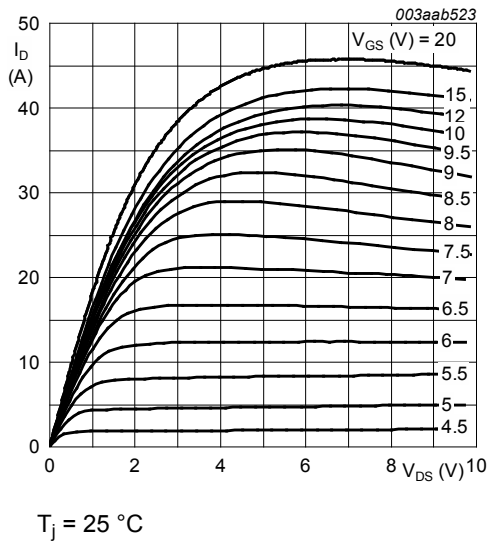


Fig. 5. Output characteristics: drain current as a function of drain-source voltage; typical values

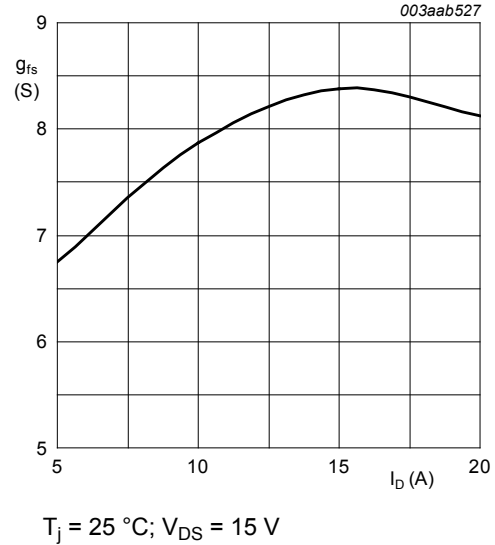


Fig. 6. Forward transconductance as a function of drain current; typical values

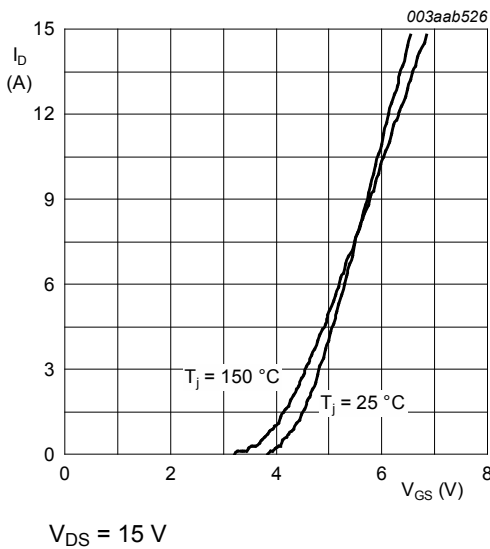


Fig. 7. Transfer characteristics: drain current as a function of gate-source voltage; typical values

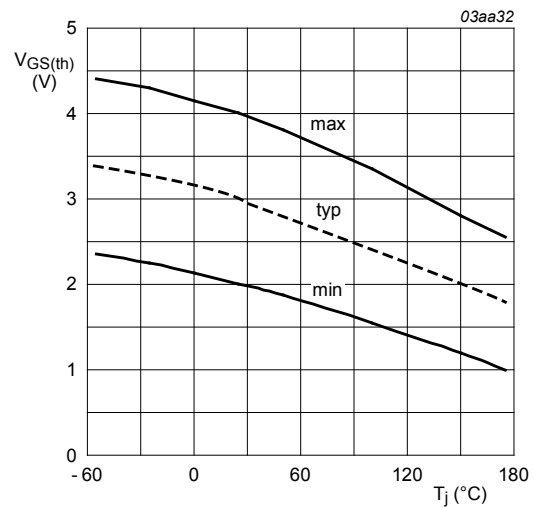


Fig. 8. Gate-source threshold voltage as a function of junction temperature

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

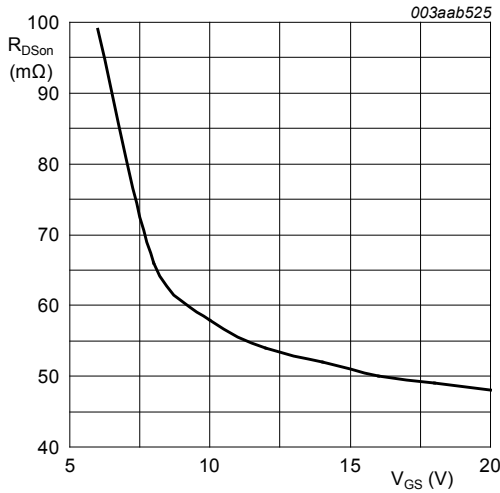


Fig. 9. Drain-source on-state resistance as a function of gate-source voltage; typical values

$$T_j = 25\text{ }^\circ\text{C}; I_D = 10\text{ A}$$

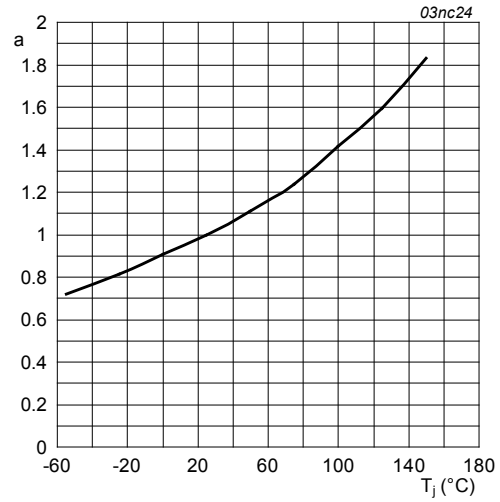


Fig. 10. Normalized drain source on-state resistance factor as a function of junction temperature

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

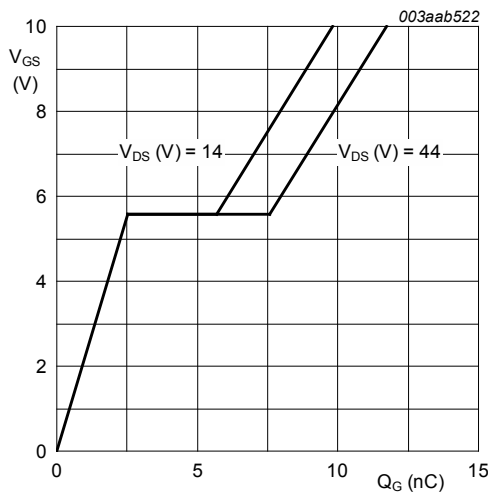


Fig. 11. Gate-source voltage as a function of gate charge; typical values

$$T_j = 25\text{ }^\circ\text{C}; I_D = 10\text{ A}$$

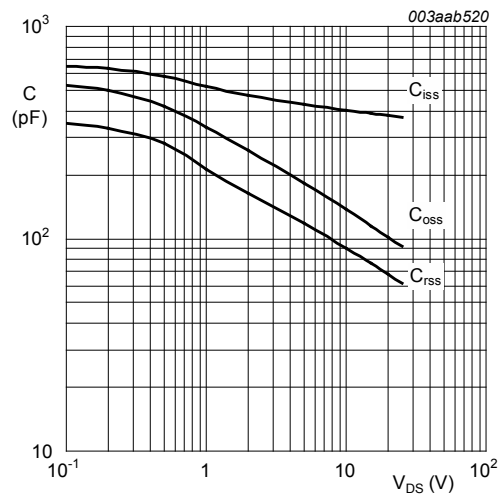


Fig. 12. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

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

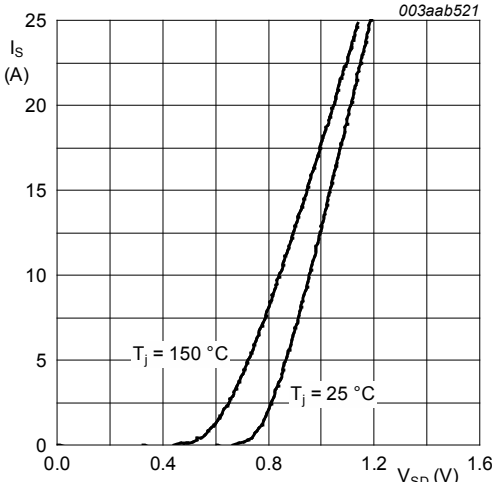


Fig. 13. Source current as a function of source-drain voltage; typical values

$$V_{GS} = 0V$$

11. Package outline

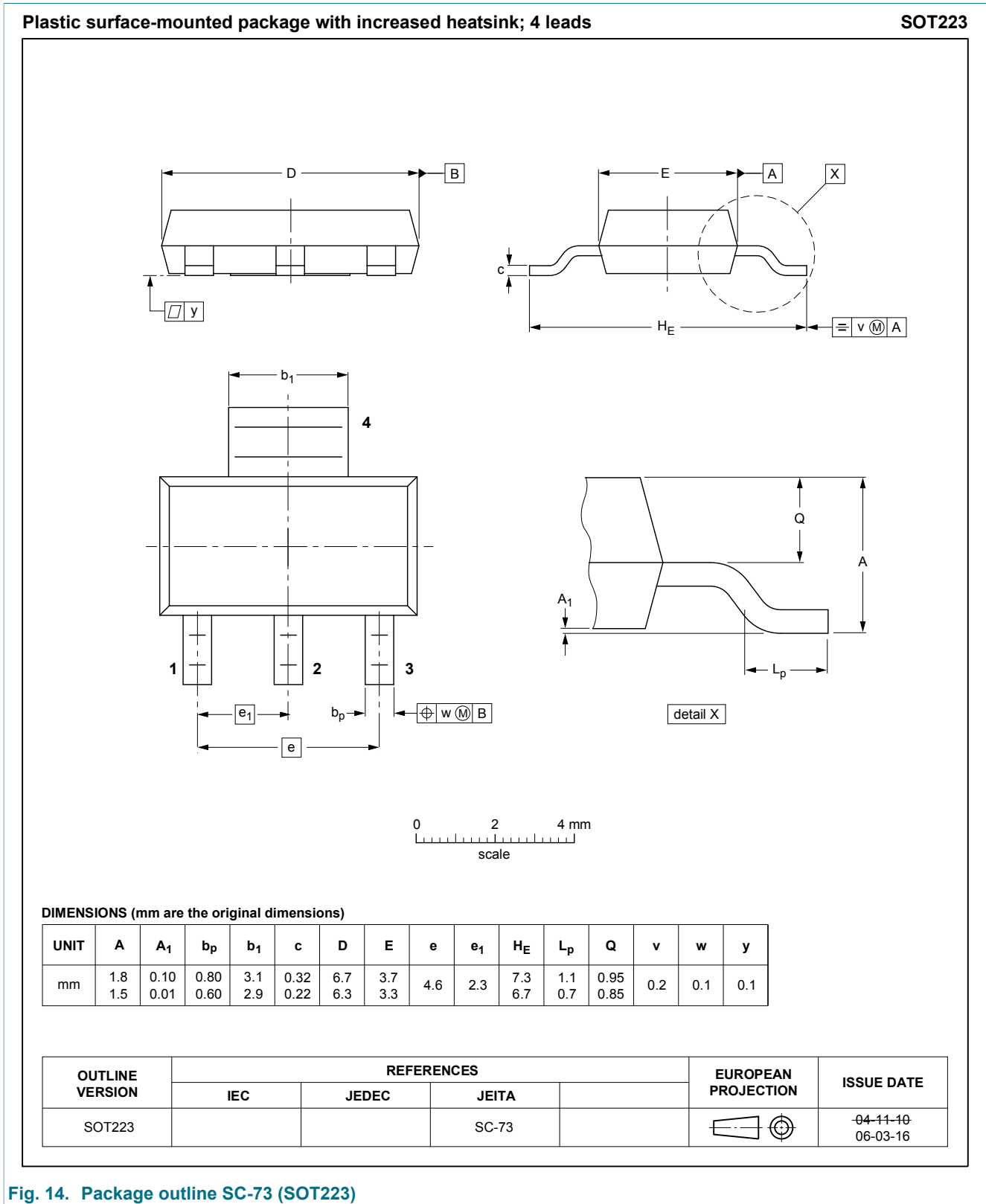


Fig. 14. Package outline SC-73 (SOT223)

12. Legal information

12.1 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.
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