



BUK98180-100A

N-channel TrenchMOS logic level FET

16 March 2016

Product data sheet

1. General description

Logic 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

- Low conduction losses due to low on-state resistance
- Q101 compliant
- Suitable for logic level gate drive sources

3. Applications

- 12 V, 24 V and 42 V loads
- Automotive and 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 ≥ 25 °C; T _j ≤ 150 °C		-	-	100	V
I _D	drain current	V _{GS} = 5 V; T _{sp} = 25 °C; Fig. 2 ; Fig. 3		-	-	4.6	A
P _{tot}	total power dissipation	T _{sp} = 25 °C; Fig. 1		-	-	8	W
Static characteristics							
R _{DSon}	drain-source on-state resistance	V _{GS} = 10 V; I _D = 5 A; T _j = 25 °C		-	147	173	mΩ
		V _{GS} = 4.5 V; I _D = 5 A; T _j = 25 °C		-	-	201	mΩ
		V _{GS} = 5 V; I _D = 5 A; T _j = 25 °C; Fig. 12 ; Fig. 13		-	153	180	mΩ
Avalanche ruggedness							
E _{DS(AL)S}	non-repetitive drain-source avalanche energy	I _D = 4 A; V _{sup} ≤ 100 V; R _{GS} = 50 Ω; V _{GS} = 5 V; T _{j(init)} = 25 °C; unclamped		-	-	16	mJ

5. Pinning information

Table 2. Pinning information

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

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BUK98180-100A	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223
BUK98180-100A/CU	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223

7. Marking

Table 4. Marking codes

Type number	Marking code
BUK98180-100A	918010
BUK98180-100A/CU	918010

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	$T_j \geq 25\text{ °C}$; $T_j \leq 150\text{ °C}$	-	100	V
V_{DGR}	drain-gate voltage	$R_{GS} = 20\text{ k}\Omega$	-	100	V
V_{GS}	gate-source voltage		-10	10	V
P_{tot}	total power dissipation	$T_{sp} = 25\text{ °C}$; Fig. 1	-	8	W
I_D	drain current	$T_{sp} = 25\text{ °C}$; $V_{GS} = 5\text{ V}$; Fig. 2 ; Fig. 3	-	4.6	A
		$T_{sp} = 100\text{ °C}$; $V_{GS} = 5\text{ V}$; Fig. 2	-	3	A
I_{DM}	peak drain current	$T_{sp} = 25\text{ °C}$; pulsed; $t_p \leq 10\text{ }\mu\text{s}$; Fig. 3	-	18	A

Symbol	Parameter	Conditions		Min	Max	Unit
T _{stg}	storage temperature			-55	150	°C
T _j	junction temperature			-55	150	°C
V _{GSM}	peak gate-source voltage	pulsed; t _p ≤ 50 μs		-15	15	V
Source-drain diode						
I _S	source current	T _{sp} = 25 °C		-	4.6	A
I _{SM}	peak source current	pulsed; t _p ≤ 10 μs; T _{sp} = 25 °C		-	18	A
Avalanche ruggedness						
E _{DS(AL)S}	non-repetitive drain-source avalanche energy	I _D = 4 A; V _{sup} ≤ 100 V; R _{GS} = 50 Ω; V _{GS} = 5 V; T _{j(init)} = 25 °C; unclamped		-	16	mJ

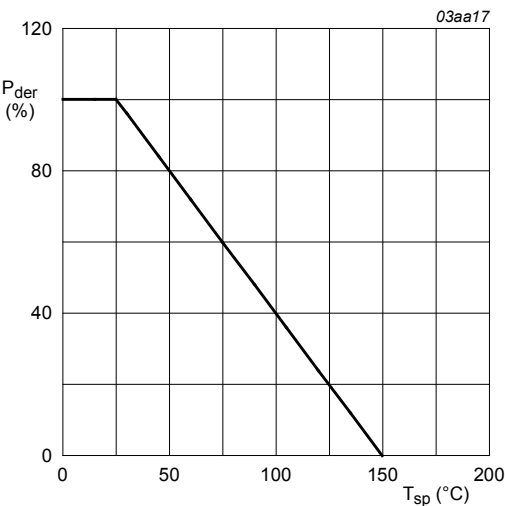


Fig. 1. Normalized total power dissipation as a function of solder point temperature

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

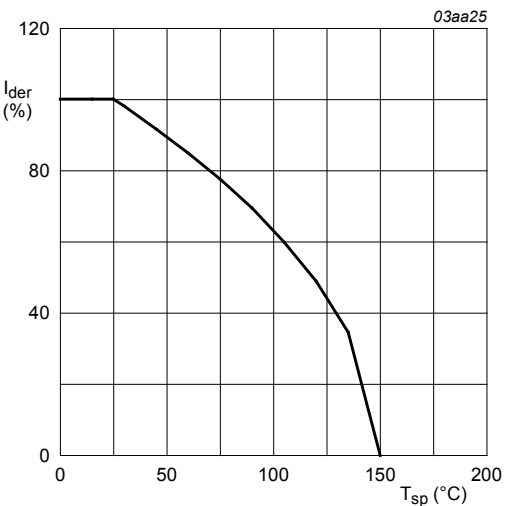


Fig. 2. Normalized continuous drain current as a function of solder point temperature

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

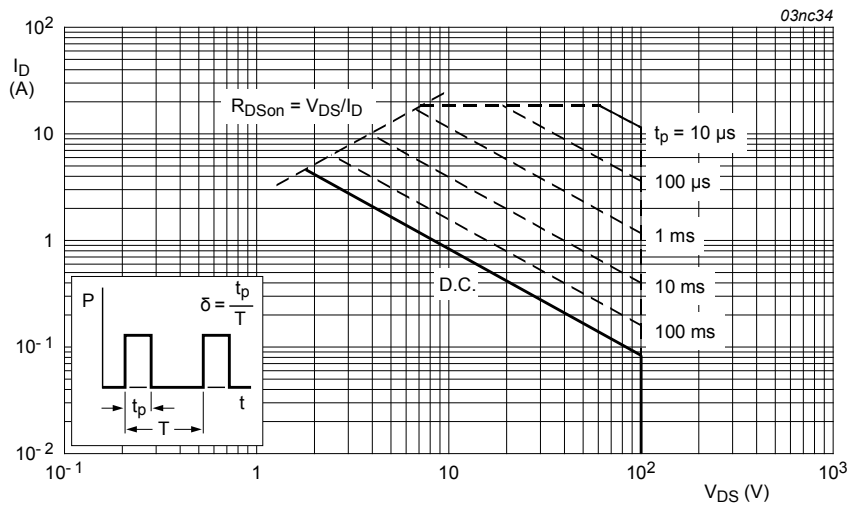


Fig. 3. Safe operating area; continuous and peak drain currents as a function of drain-source voltage

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

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	Fig. 4	-	-	15	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient		-	120	-	K/W

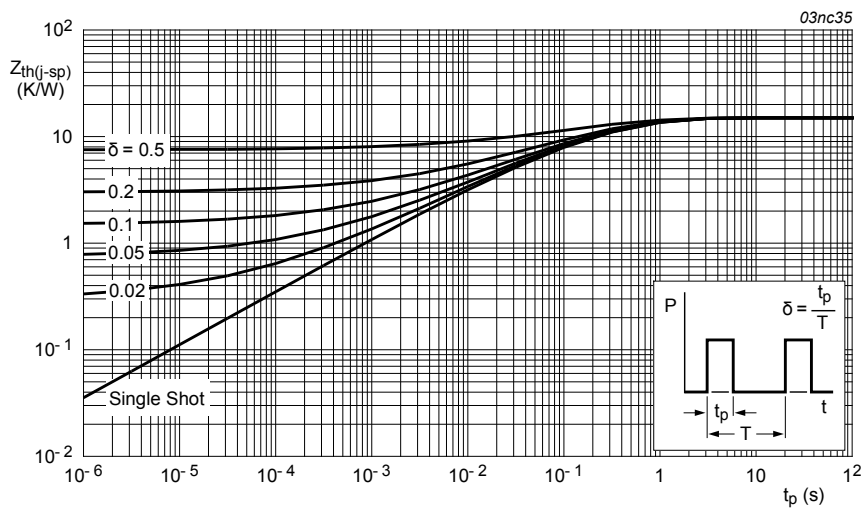


Fig. 4. Transient thermal impedance from junction to solder point as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V _{(BR)DSS}	drain-source breakdown voltage	I _D = 0.25 mA; V _{GS} = 0 V; T _j = 25 °C		100	-	-	V
		I _D = 0.25 mA; V _{GS} = 0 V; T _j = -55 °C		89	-	-	V
V _{GS(th)}	gate-source threshold voltage	I _D = 1 mA; V _{DS} = V _{GS} ; T _j = 25 °C; Fig. 11		1	1.5	2	V
		I _D = 1 mA; V _{DS} = V _{GS} ; T _j = -55 °C; Fig. 11		-	-	2.3	V
		I _D = 1 mA; V _{DS} = V _{GS} ; T _j = 150 °C; Fig. 11		0.6	-	-	V
I _{DSS}	drain leakage current	V _{DS} = 100 V; V _{GS} = 0 V; T _j = 150 °C		-	-	500	μA
		V _{DS} = 100 V; V _{GS} = 0 V; T _j = 25 °C		-	0.05	10	μA
I _{GSS}	gate leakage current	V _{GS} = 10 V; V _{DS} = 0 V; T _j = 25 °C		-	2	100	nA
		V _{GS} = -10 V; V _{DS} = 0 V; T _j = 25 °C		-	2	100	nA
R _{DSon}	drain-source on-state resistance	V _{GS} = 10 V; I _D = 5 A; T _j = 25 °C		-	147	173	mΩ
		V _{GS} = 4.5 V; I _D = 5 A; T _j = 25 °C		-	-	201	mΩ
		V _{GS} = 5 V; I _D = 5 A; T _j = 25 °C; Fig. 12 ; Fig. 13		-	153	180	mΩ
		V _{GS} = 5 V; I _D = 5 A; T _j = 150 °C; Fig. 12 ; Fig. 13		-	-	389	mΩ
Dynamic characteristics							
C _{iss}	input capacitance	V _{GS} = 0 V; V _{DS} = 25 V; f = 1 MHz; T _j = 25 °C; Fig. 14		-	464	619	pF
C _{oss}	output capacitance			-	60	72	pF
C _{rss}	reverse transfer capacitance			-	36	50	pF
t _{d(on)}	turn-on delay time	V _{DS} = 30 V; R _L = 1.2 Ω; V _{GS} = 5 V; R _{G(ext)} = 10 Ω; T _j = 25 °C		-	7	-	ns
t _r	rise time			-	89	-	ns
t _{d(off)}	turn-off delay time			-	18	-	ns
t _f	fall time			-	25	-	ns
Source-drain diode							
V _{SD}	source-drain voltage	I _S = 5 A; V _{GS} = 0 V; T _j = 25 °C; Fig. 15		-	0.85	1.2	V
t _{rr}	reverse recovery time	I _S = 20 A; dI _S /dt = -100 A/μs; V _{GS} = -10 V; V _{DS} = 30 V; T _j = 25 °C		-	49	-	ns
Q _r	recovered charge			-	130	-	nC

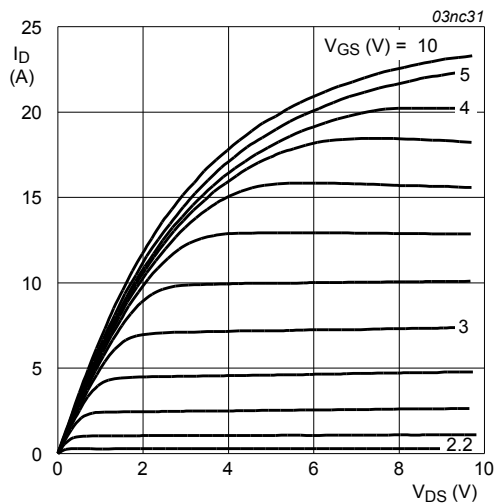


Fig. 5. Output characteristics: drain current as a function of drain-source voltage; typical values

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

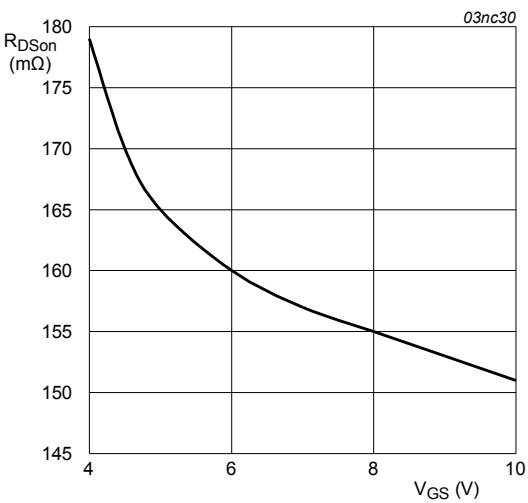


Fig. 6. Drain-source on-state resistance as a function of gate-source voltage; typical values

$T_j = 25^\circ\text{C}; I_D = 5\text{A}$

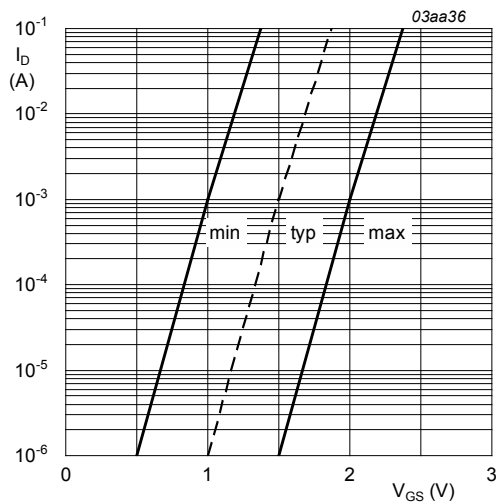


Fig. 7. Sub-threshold drain current as a function of gate-source voltage

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

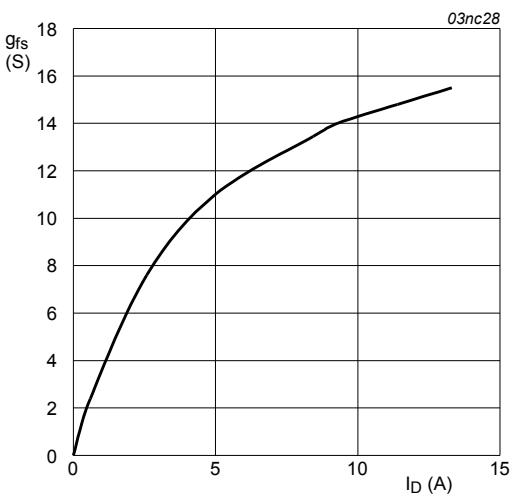


Fig. 8. Forward transconductance as a function of drain current; typical values

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

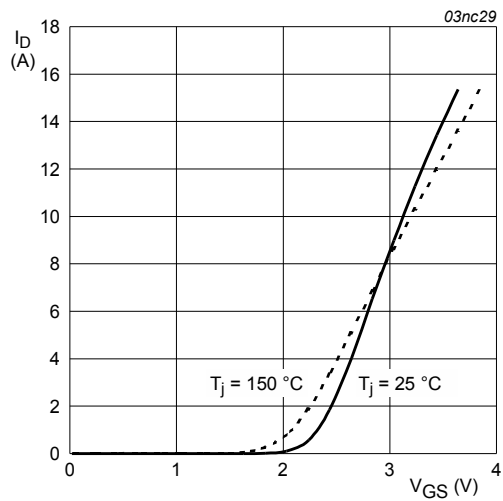


Fig. 9. Transfer characteristics: drain current as a function of gate-source voltage; typical values

$V_{DS} = 25\text{ V}$

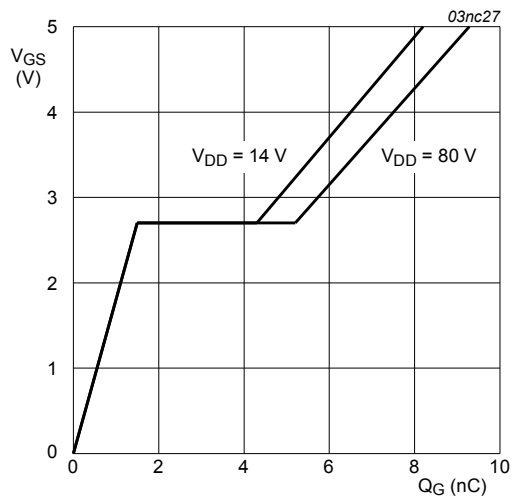


Fig. 10. Gate-source voltage as a function of turn-on gate charge; typical values

$T_j = 25\text{ }^{\circ}\text{C}; I_D = 5\text{ A}$

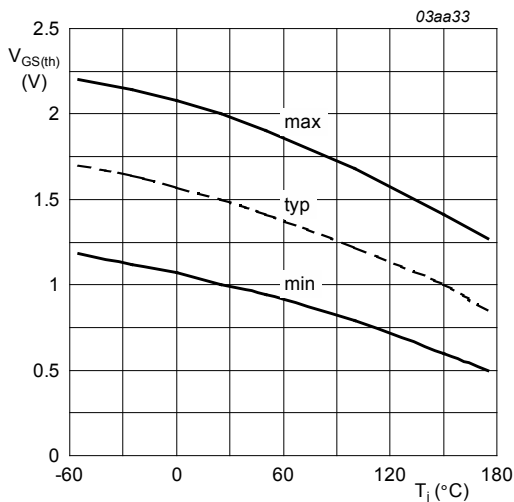


Fig. 11. Gate-source threshold voltage as a function of junction temperature

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

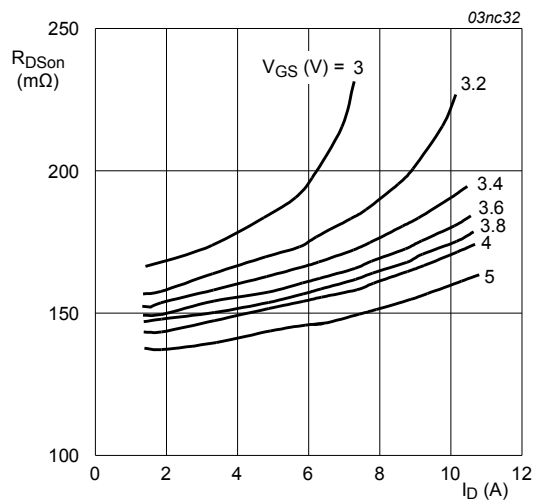


Fig. 12. Drain-source on-state resistance as a function of drain current; typical values

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

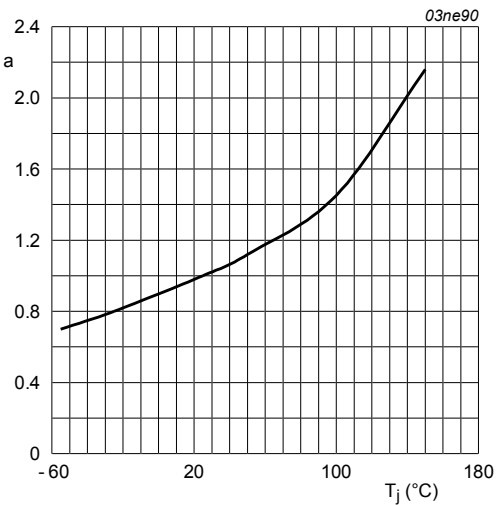


Fig. 13. Normalized drain-source on-state resistance factor as a function of junction temperature

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

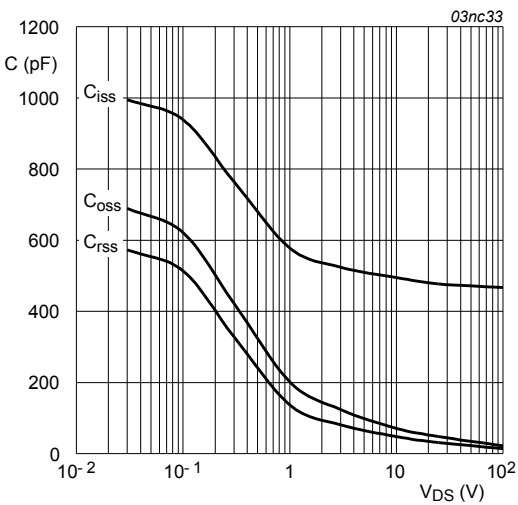


Fig. 14. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

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

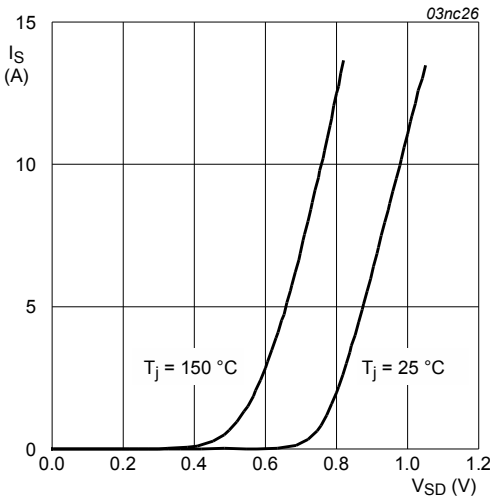


Fig. 15. Reverse diode current as a function of reverse diode voltage; typical value

$$V_{GS} = 0V$$

11. Package outline

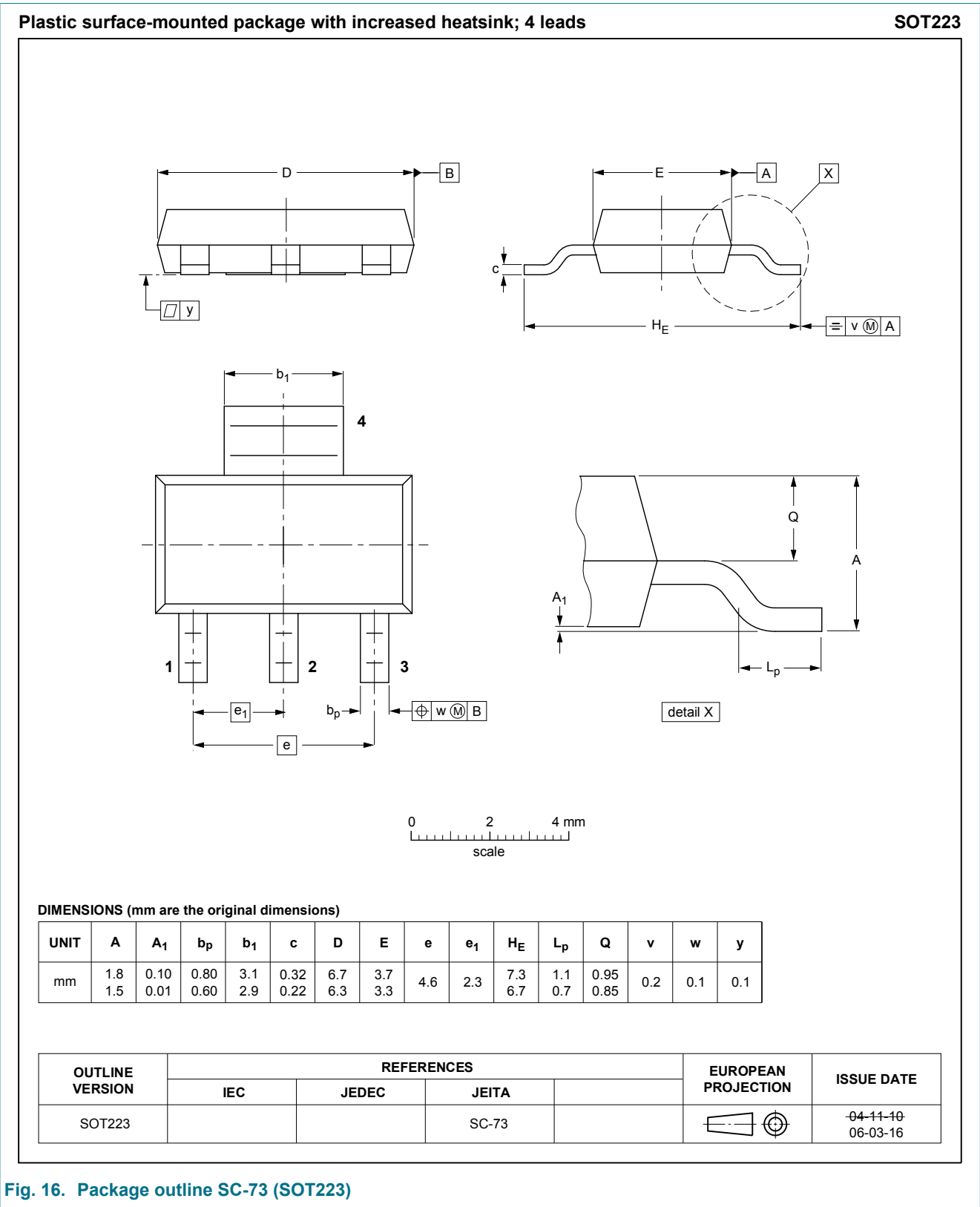


Fig. 16. Package outline SC-73 (SOT223)

12. Legal information

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Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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