

150V Radiation Tolerant power MOSFET

BUP15CN027E-01

Features

- LOW $R_{DS(on)}$
- Single Event Effect (SEE) tolerant
- Total Ionisation Dose (TID) tolerant
30 kRad approved
- N-channel



Product validation



Qualified according AEC Q101

Electrical parameters in Table 4 are guaranteed pre- and post-irradiation.

Description

Table 1 Product information

Type	Comment	Pin Configuration			Package
		1	2	3	
BUP15CN027E-01		G	D	S	TO-247

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Maximum ratings

1 Maximum ratings

Table 2 Maximum ratings

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain source voltage	V_{DS}	-	-	150	V	
Gate source voltage	V_{GS}	-20	-	20	V	static
Drain gate voltage	V_{DG}	-	-	150	V	
Continuous drain current ¹	I_D	-	-	98	A	$T_C = 25\text{ °C}$ $T_C = 100\text{ °C}$
		-	-	62		
Continuous source current	I_S	-	-	98	A	
Drain current pulsed	I_{DM}	-	-	294	Apk	t_p limited by $T_{j,max}$
Total power dissipation ²	P_{tot}	-	-	390	W	$T_C \leq 25\text{ °C}$
Operating temperature	T_{op}	-40	-	125	°C	
Storage temperature	T_{stg}	-55	-	150	°C	
Junction temperature	T_j	-40	-	150	°C	
Avalanche energy, single pulse	E_{AS}	-	-	1200	mJ	$V_{DD} = 50V, L = 108\mu H$

¹ Limited by $T_{j,max}$

² For $T_C > 25\text{ °C}$ derating is required.

Thermal characteristics

2 Thermal characteristics

Table 3 Thermal characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	$R_{th,JC}$	-	-	0.32	K/W	
Thermal resistance, junction - ambient	$R_{th,JA}$	-	-	62	K/W	leaded
Soldering temperature	T_{sol}	-	-	260	°C	1.6 mm (0.063 in.) from case for 10 s

Electrical characteristics

3 Electrical characteristics

at $T_A=25^\circ\text{C}$, unless otherwise specified

Table 4 Static characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	BV_{DSS}	150	-	-	V	$I_D = 0.25\text{mA}$, $V_{GS} = 0\text{V}$
Gate threshold voltage	$V_{GS(th)}$	2	-	4	V	$I_D = 1.0\text{mA}$, $V_{DS} \geq V_{GS}$
Gate to source leakage current	I_{GSS}	-100 -200	-	100 200	nA	$V_{DS} = 0\text{V}$, $V_{GS} = \pm 20\text{V}$, $T_A = 25^\circ\text{C}$ $V_{DS} = 0\text{V}$, $V_{GS} = \pm 20\text{V}$, $T_A = 125^\circ\text{C}$
Zero gate voltage drain current	I_{DSS}	-	-	25 250	μA	$V_{DS} = 120\text{V}$, $V_{GS} = 0\text{V}$, $T_A = 25^\circ\text{C}$ $V_{DS} = 120\text{V}$, $V_{GS} = 0\text{V}$, $T_A = 125^\circ\text{C}$
Drain source on-state resistance ¹	$R_{DS(ON)}$	-	16.7	27 35	$\text{m}\Omega$	$V_{GS} = 10\text{V}$, $I_D = 35\text{A}$, $T_A = 25^\circ\text{C}$ $V_{GS} = 10\text{V}$, $I_D = 35\text{A}$, $T_A = 125^\circ\text{C}$
Diode forward voltage ^{1,2}	V_{SD}	-	-	1.1	V	$V_{GS} = 0\text{V}$, $I_S = 45\text{A}$

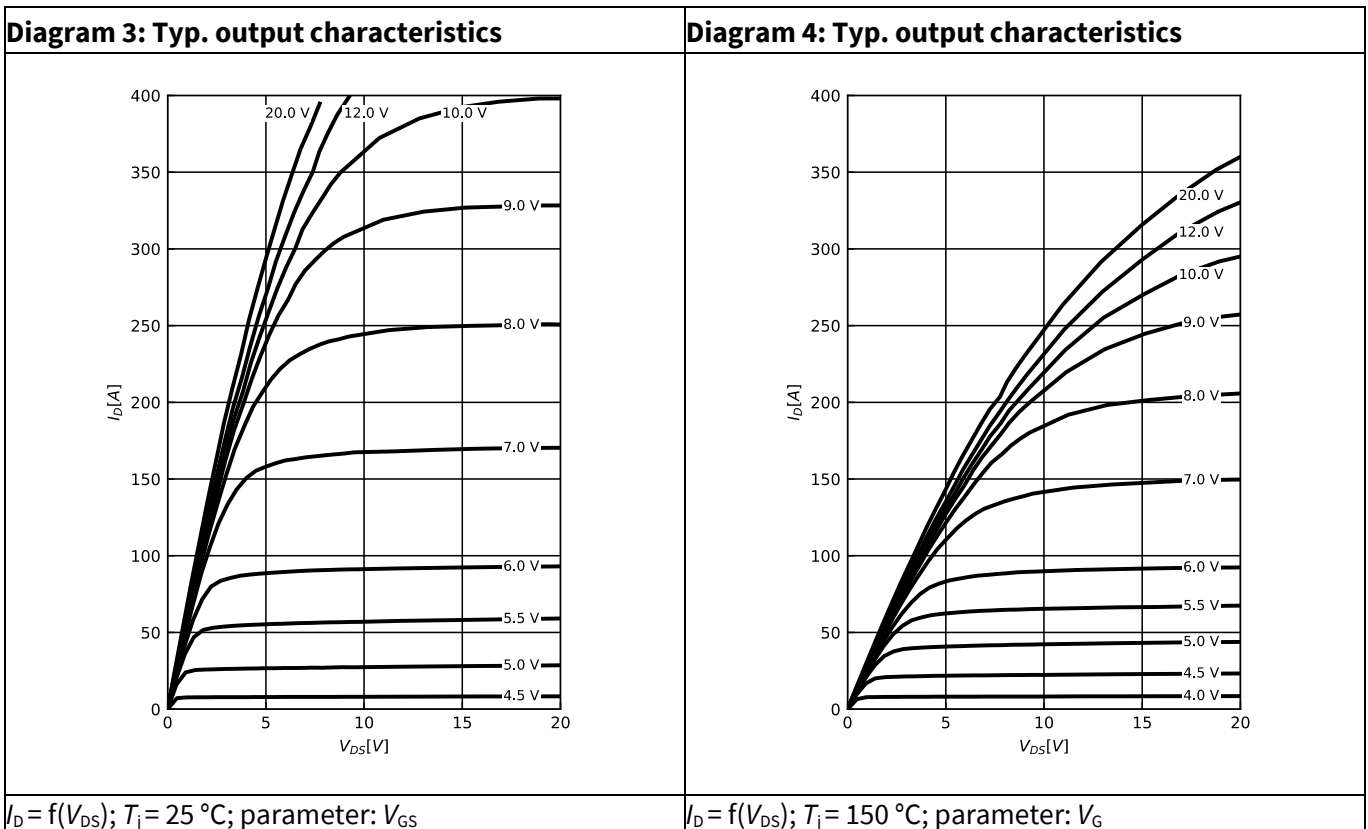
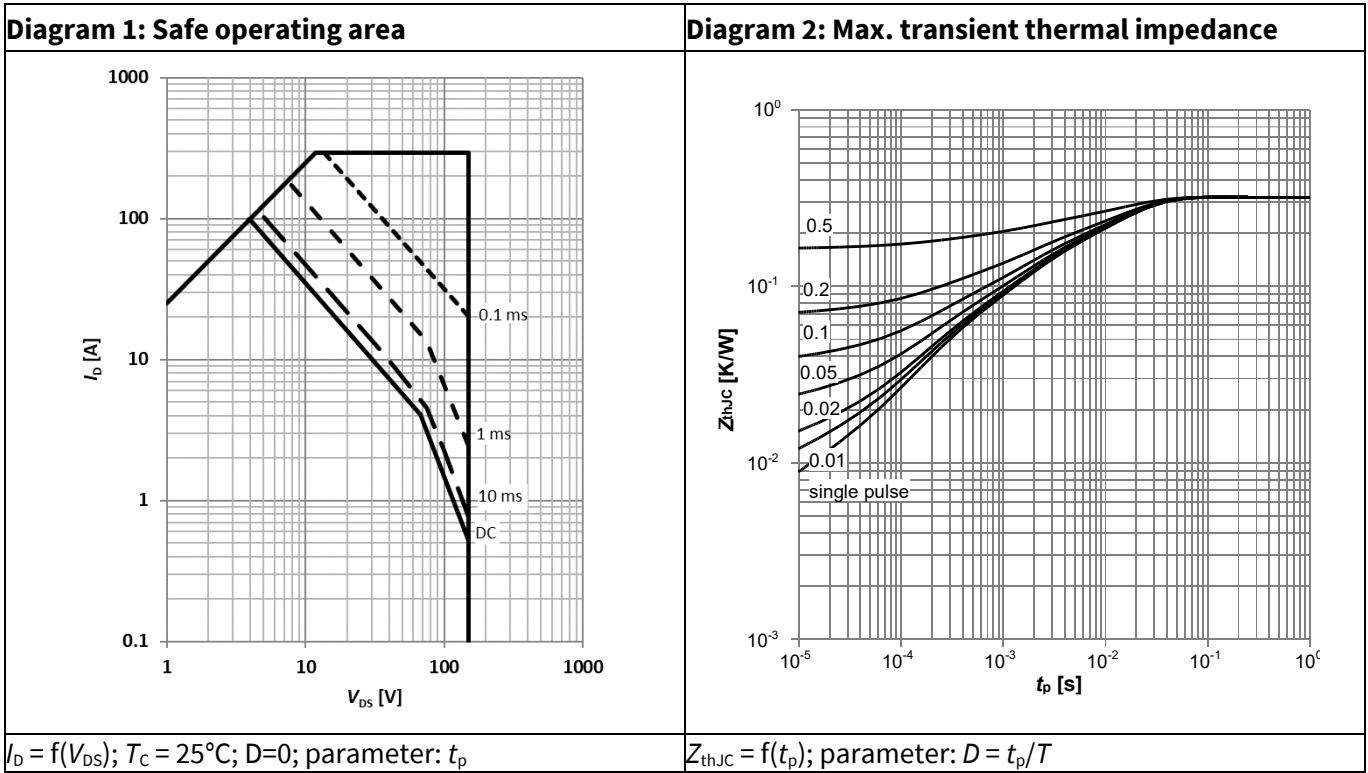
Table 5 Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Turn-on delay time	$t_{d(ON)}$	-	25	-	ns	$V_{DD} = 50\% V_{DS}$, $I_D = 35\text{A}$, $R_G = 4.7\Omega$
Rise time	t_r	-	64	-	ns	$V_{DD} = 50\% V_{DS}$, $I_D = 35\text{A}$, $R_G = 4.7\Omega$
Turn-off delay time	$t_{d(OFF)}$	-	51	-	ns	$V_{DD} = 50\% V_{DS}$, $I_D = 35\text{A}$, $R_G = 4.7\Omega$
Fall time	t_f	-	56	-	ns	$V_{DD} = 50\% V_{DS}$, $I_D = 35\text{A}$, $R_G = 4.7\Omega$
Reverse recovery time	t_{rr}	-	333	-	ns	$V_{DD} \leq 50\text{V}$, $I_D = 45\text{A}$
Common source input capacitance	C_{iss}	-	4.7	-	nF	$V_{DS} = 100\text{V}$, $V_{GS} = 0\text{V}$, $f = 1.0\text{MHz}$
Common source output capacitance	C_{oss}	-	447	-	pF	$V_{DS} = 100\text{V}$, $V_{GS} = 0\text{V}$, $f = 1.0\text{MHz}$
Common source reverse transfer capacitance	C_{rss}	-	83	-	pF	$V_{DS} = 100\text{V}$, $V_{GS} = 0\text{V}$, $f = 1.0\text{MHz}$
Total gate charge	Q_G	-	80	-	nC	$V_{DD} = 50\% V_{DS}$, $V_{GS} = 10\text{V}$, $I_D = 45\text{A}$

¹ Pulsed measurement: Pulse Width < 300 μs , Duty Cycle < 2.0%.

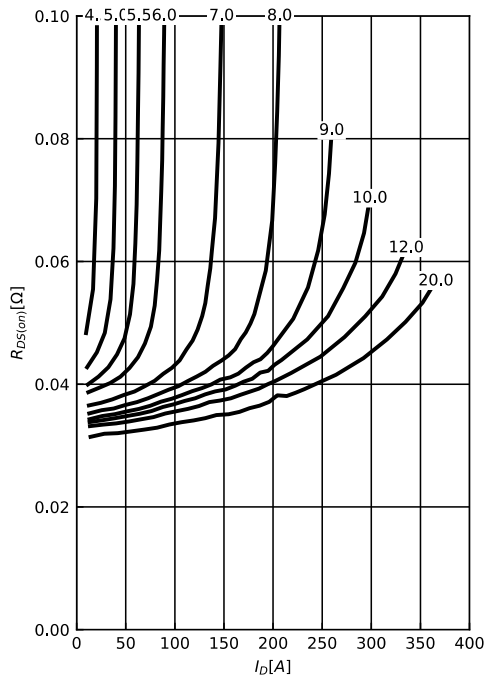
² Measured within 2.0 mm of case

4 Electrical characteristics diagrams



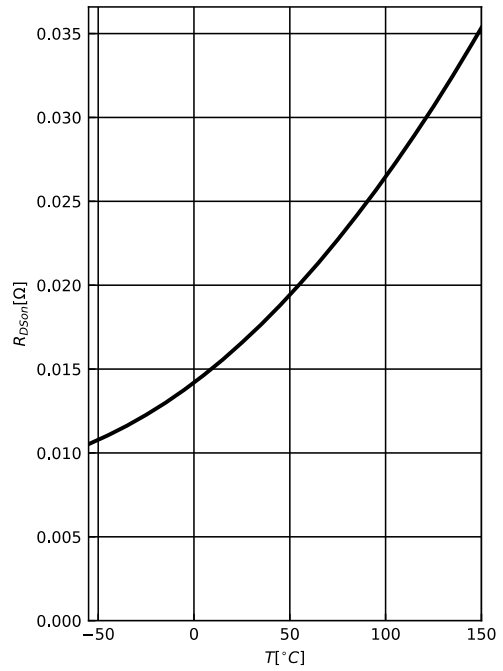
Electrical characteristics diagrams

Diagram 5: Typ. drain-source on-state resistance



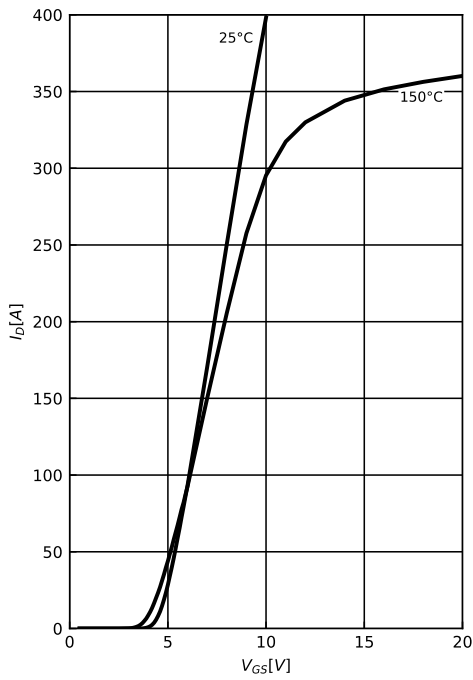
$R_{DS(on)} = f(I_D); T_j = 150^\circ\text{C}; \text{parameter: } V_{GS}$

Diagram 6: Typ. drain-source on-state resistance



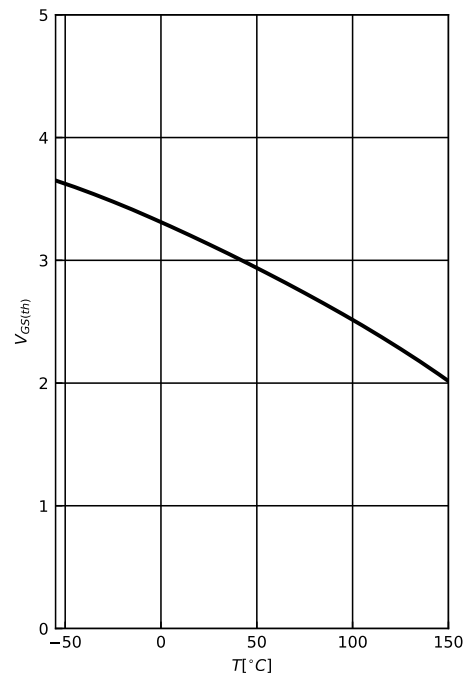
$R_{DS(on)} = f(T_j); I_D = 35\text{A}$

Diagram 7: Typ. transfer characteristics



$I_D = f(V_{GS}); V_{DS} = 20\text{V}; \text{parameter: } T_j$

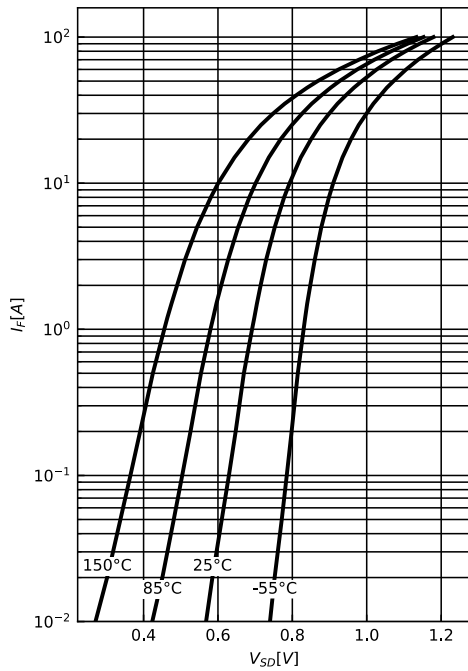
Diagram 8: Typ. gate threshold voltage



$V_{GS(th)} = f(T_j); I_D = 1\text{mA}$

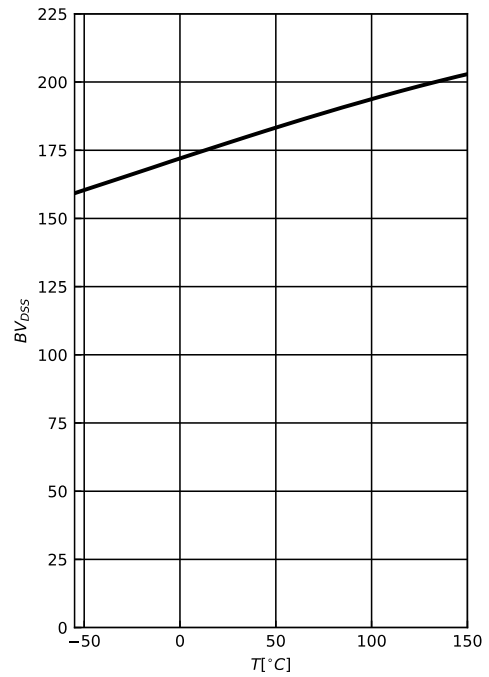
Electrical characteristics diagrams

Diagram 9: Forward characteristics of reverse diode



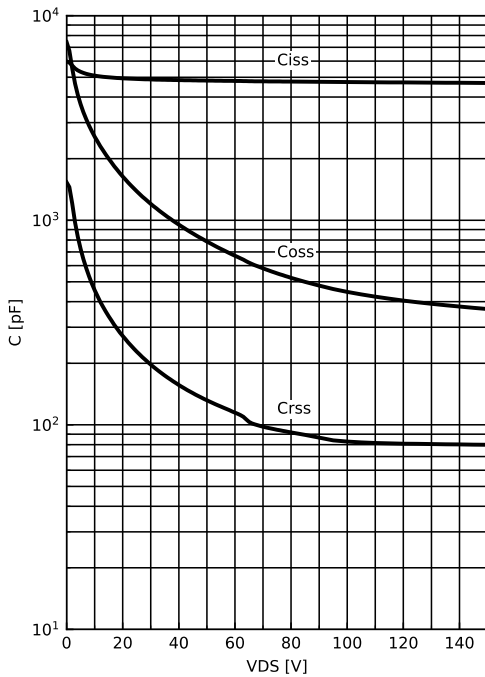
$I_F = f(V_{SD});$ parameter: T_j

Diagram 10: Drain-source breakdown voltage



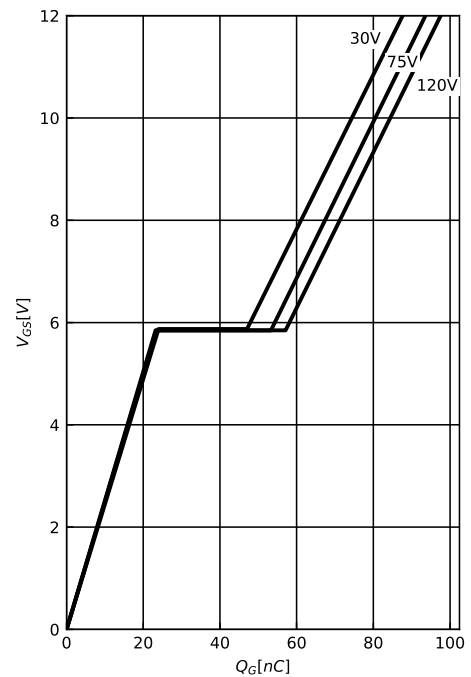
$BV_{DSS} = f(T_j); I_D = 250\mu A$

Diagram 11: Typ. capacitances



$C = f(V_{DS}); V_{GS} = 0 V; f = 1 MHz$

Diagram 12: Typ. gate charge



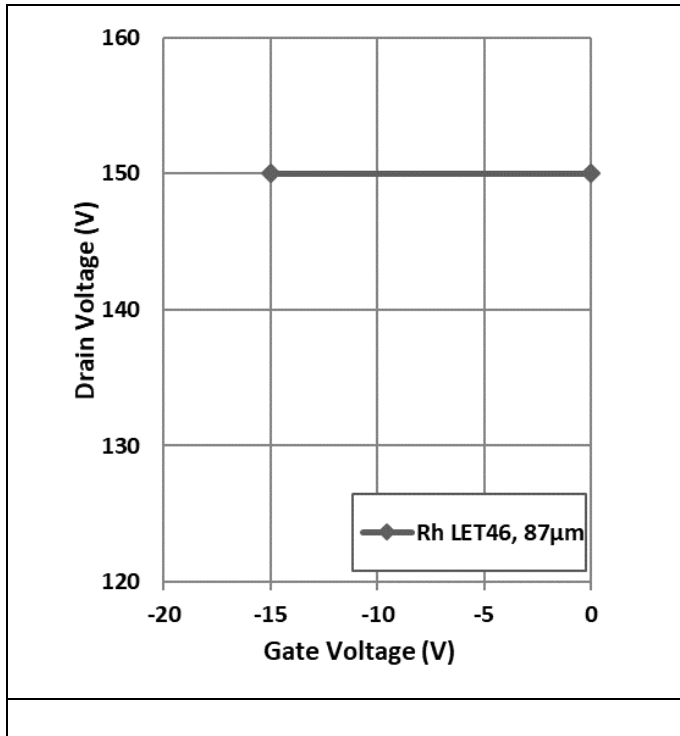
$V_{GS} = f(Q_{gate}); I_D = 45.0 A$ pulsed; parameter: V_{DD}

Diagram 13: SEE - Safe operating area

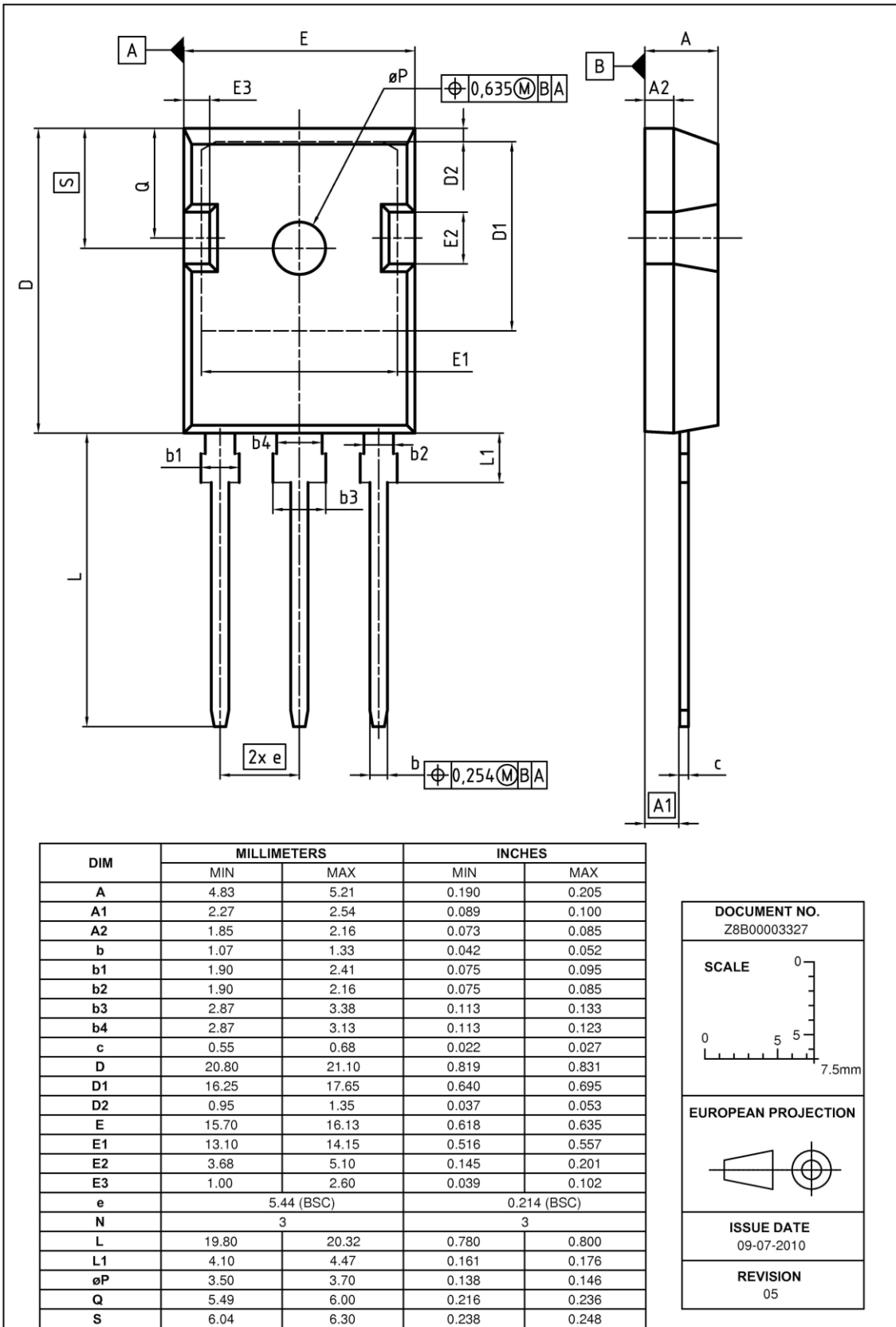
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5 Package outlines



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Package outlines



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