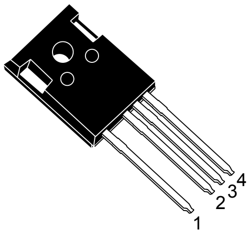
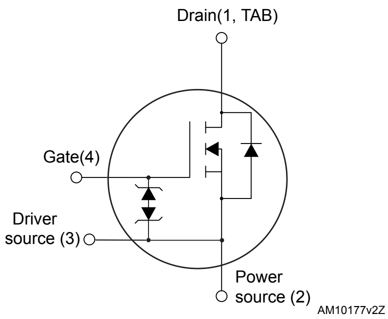
STW75N60M6-4

Datasheet

N-channel 600 V, 32 mΩ typ., 72 A, MDmesh™ M6 Power MOSFET in a TO247-4 package



TO247-4



Features

Order code	V_{DS}	$R_{DS(on)}$ max.	I_D
STW75N60M6-4	600 V	36 mΩ	72 A

- Reduced switching losses
- Lower $R_{DS(on)}$ per area vs previous generation
- Low gate input resistance
- 100% avalanche tested
- Zener-protected
- Excellent switching performance thanks to the extra driving source pin

Applications

- Switching applications
- LLC converters
- Boost PFC converters

Description

The new MDmesh™ M6 technology incorporates the most recent advancements to the well-known and consolidated MDmesh family of SJ MOSFETs. STMicroelectronics builds on the previous generation of MDmesh devices through its new M6 technology, which combines excellent $R_{DS(on)}$ per area improvement with one of the most effective switching behaviors available, as well as a user-friendly experience for maximum end-application efficiency.

Product status link
STW75N60M6-4

Product summary	
Order code	STW75N60M6-4
Marking	75N60M6
Package	TO247-4
Packing	Tube

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{GS}	Gate-source voltage	±25	V
I_D	Drain current (continuous) at T_C = 25 °C	72	A
	Drain current (continuous) at T_C = 100 °C	45	A
I_{DM} (1)	Drain current (pulsed)	288	A
P_{TOT}	Total power dissipation at T_C = 25 °C	446	W
dv/dt (2)	Peak diode recovery voltage slope	15	V/ns
dv/dt (3)	MOSFET dv/dt ruggedness	100	
T_{stg}	Storage temperature range	-55 to 150	°C
T_J	Operating junction temperature range		

1. *Pulse width is limited by safe operating area.*
2. *$I_{SD} \leq 72$ A, di/dt = 400 A/µs, $V_{DS(peak)} < V_{(BR)DSS}$, V_{DD} = 400 V*
3. *$V_{DS} \leq 480$ V*

Table 2. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj\text{-}case}$	Thermal resistance junction-case	0.28	°C/W
$R_{thj\text{-}amb}$	Thermal resistance junction-ambient	50	°C/W

Table 3. Avalanche characteristics

Symbol	Parameter	Value	Unit
I_{AR}	Avalanche current, repetitive or not repetitive (pulse width limited by T_{Jmax})	11	A
E_{AS}	Single pulse avalanche energy (starting T_J = 25 °C, I_D = I_{AR}, V_{DD} = 50 V)	1.4	J

2 Electrical characteristics

(T_C = 25 °C unless otherwise specified)

Table 4. On/off-states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V, I_D = 1 mA	600			V
I_{DSS}	Zero-gate voltage drain current	V_{GS} = 0 V, V_{DS}= 600 V			1	µA
		V_{GS} = 0 V, V_{DS} = 600 V, T_C = 125 °C[(1)]			100	
I_{GSS}	Gate-body leakage current	V_{DS} = 0 V, V_{GS} = ±25 V			±5	µA
$V_{GS(th)}$	Gate threshold voltage	V_{DS} = V_{GS}, I_D = 250 µA	3.25	4	4.75	V
$R_{DS(on)}$	Static drain-source on-resistance	V_{GS} = 10 V, I_D = 36 A		32	36	mΩ

1. *Defined by design, not subject to production test.*

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	V_{GS} = 0 V, V_{DS} = 100 V, f = 1 MHz	-	4850	-	pF
C_{oss}	Output capacitance		-	380	-	pF
C_{rss}	Reverse transfer capacitance		-	3.5	-	pF
$C_{oss\ eq.}$ [(1)]	Equivalent output capacitance	V_{GS} = 0 V, V_{DS} = 0 to 480 V	-	851	-	pF
R_G	Intrinsic gate resistance	f = 1 MHz open drain	-	1.5	-	Ω
Q_g	Total gate charge	V_{DD} = 480 V, I_D = 72 A, V_{GS} = 0 to 10 V (see Figure 2)	-	106	-	nC
Q_{gs}	Gate-source charge		-	32	-	nC
Q_{gd}	Gate-drain charge		-	45	-	nC

1. *$C_{oss\ eq.}$ is defined as the constant equivalent capacitance giving the same charging time as C_{oss} when V_{DS} increases from 0 to 80% V_{DSS}.*

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	V_{DD} = 300 V, I_D = 36 A, R_G = 4.7 Ω, V_{GS} = 10 V (see Figure 1 and Figure 6)	-	TBD	-	ns
t_r	Rise time		-	TBD	-	ns
$t_{d(off)}$	Turn-off delay time		-	TBD	-	ns
t_f	Fall time		-	TBD	-	ns

Table 7. Source-drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-		72	A
I_{SDM} (1)	Source-drain current (pulsed)		-		288	A
V_{SD} (2)	Forward on voltage	V_{GS} = 0 V, I_{SD} = 72 A	-		1.6	V
t_{rr}	Reverse recovery time	I_{SD} = 72 A, di/dt = 100 A/µs, V_{DD} = 60 V (see Figure 3)	-	367		ns
Q_{rr}	Reverse recovery charge		-	6.4		µC
I_{RRM}	Reverse recovery current		-	35		A
t_{rr}	Reverse recovery time	I_{SD} = 72 A, di/dt = 100 A/µs, V_{DD} = 60 V, T_J = 150 °C (see Figure 3)	-	552		ns
Q_{rr}	Reverse recovery charge		-	13.7		µC
I_{RRM}	Reverse recovery current		-	49.6		A

1. *Pulse width is limited by safe operating area.*
2. *Pulse test: pulse duration = 300 µs, duty cycle 1.5%.*

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

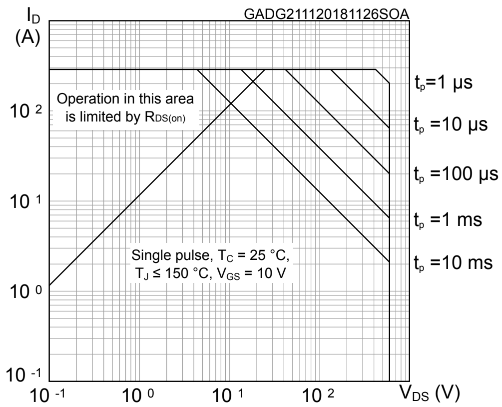


Figure 2. Thermal impedance

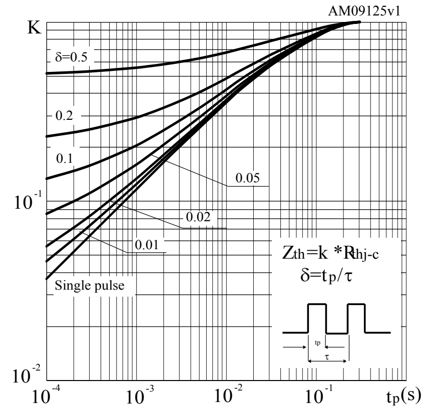


Figure 3. Output characteristics

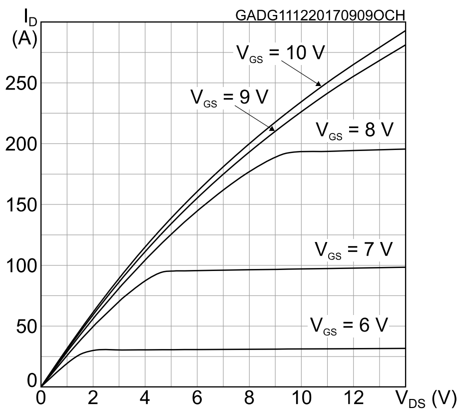


Figure 4. Transfer characteristics

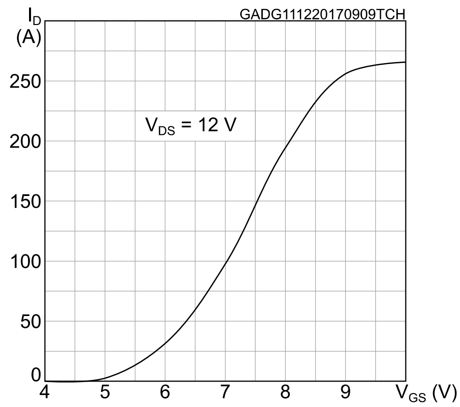


Figure 5. Gate charge vs gate-source voltage

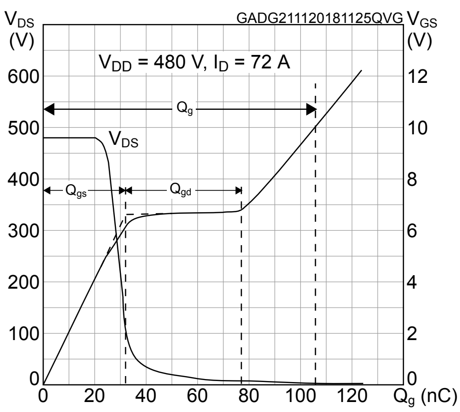


Figure 6. Static drain-source on-resistance

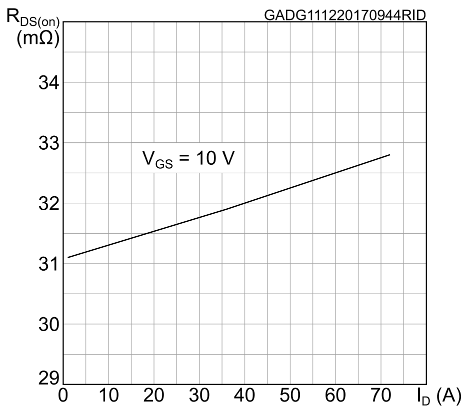


Figure 7. Normalized on-resistance vs temperature

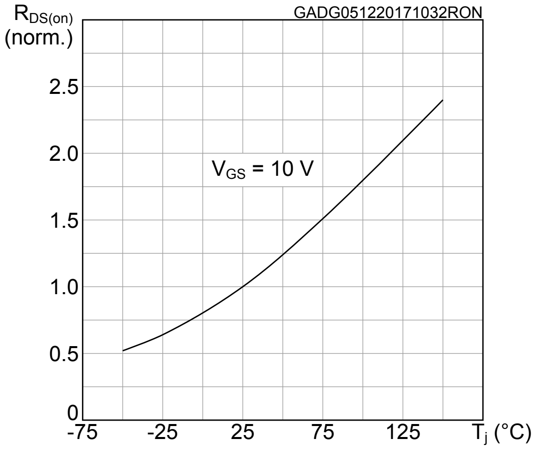


Figure 8. Normalized $V_{(BR)DSS}$ vs temperature

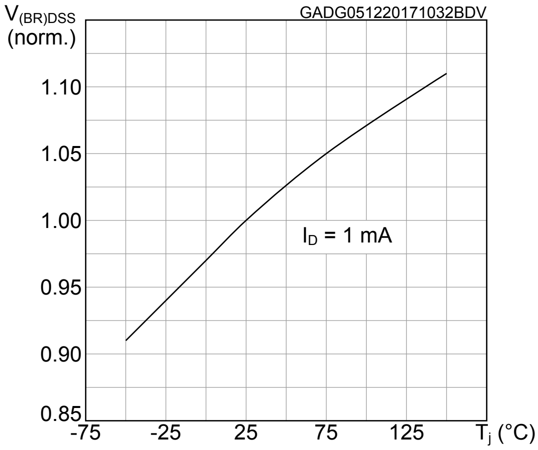


Figure 9. Capacitance variations

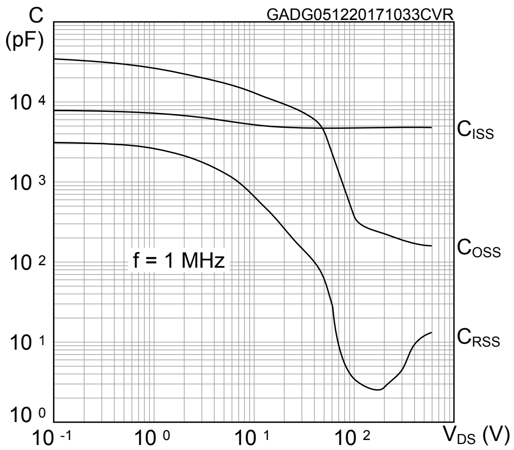


Figure 10. Normalized gate threshold voltage vs temperature

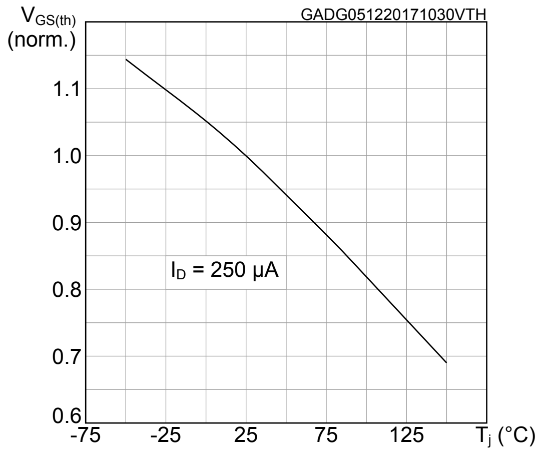


Figure 11. Output capacitance stored energy

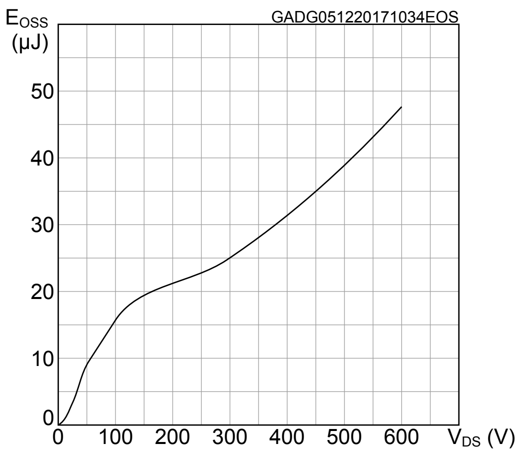
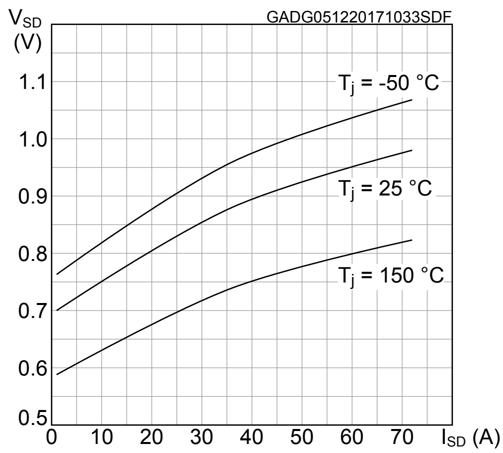


Figure 12. Source-drain diode forward characteristics



3 Test circuits

Figure 13. Switching times test circuit for resistive load

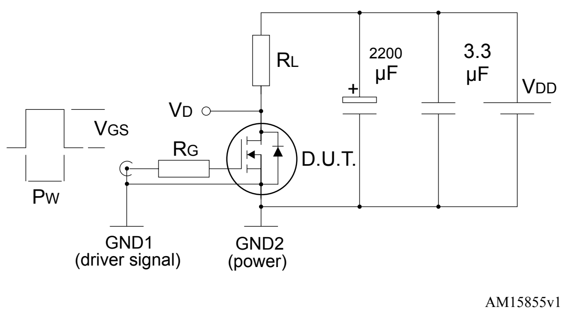


Figure 14. Test circuit for gate charge behavior

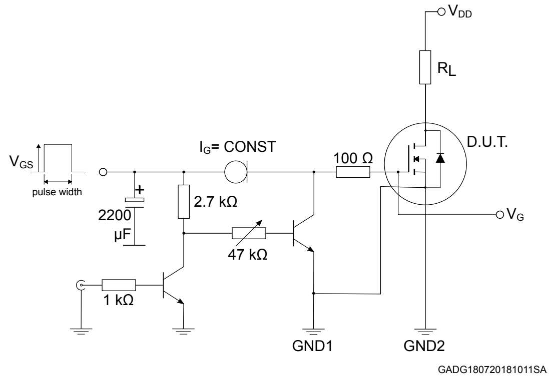


Figure 15. Test circuit for inductive load switching and diode recovery times

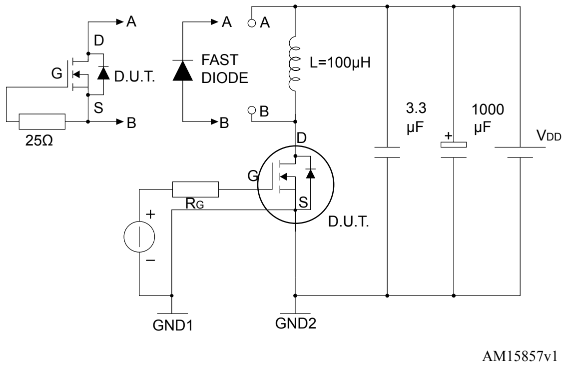


Figure 16. Unclamped inductive load test circuit

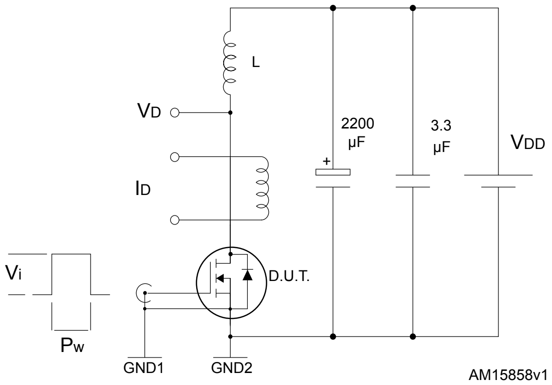


Figure 17. Unclamped inductive waveform

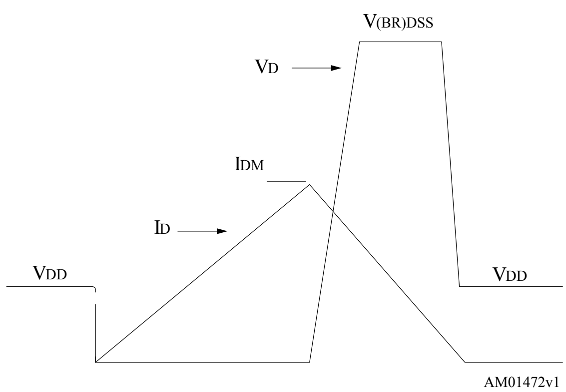
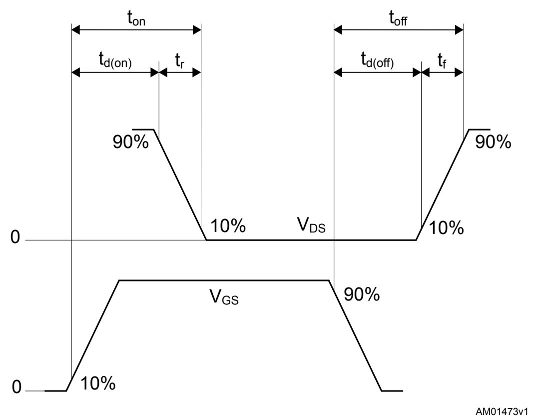


Figure 18. Switching time waveform



4 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

4.1 TO247-4 package information

Figure 19. TO247-4 package outline

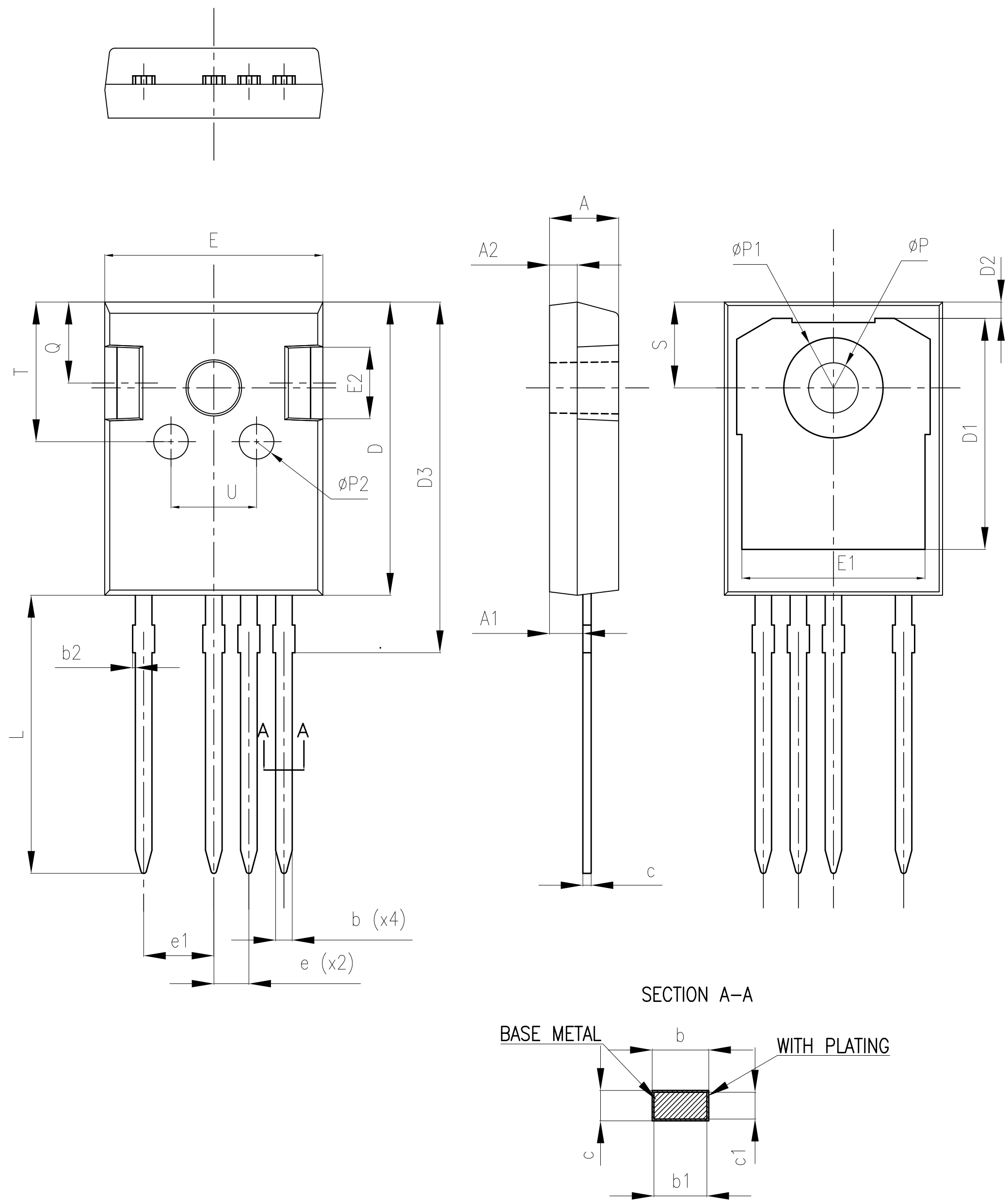


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Table 8. TO247-4 mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.90	5.00	5.10
A1	2.31	2.41	2.51
A2	1.90	2.00	2.10
b	1.16		1.29
b1	1.15	1.20	1.25
b2	0		0.20
c	0.59		0.66
c1	0.58	0.60	0.62
D	20.90	21.00	21.10
D1	16.25	16.55	16.85
D2	1.05	1.20	1.35
D3	24.97	25.12	25.27
E	15.70	15.80	15.90
E1	13.10	13.30	13.50
E2	4.90	5.00	5.10
E3	2.40	2.50	2.60
e	2.44	2.54	2.64
e1	4.98	5.08	5.18
L	19.80	19.92	20.10
P	3.50	3.60	3.70
P1			7.40
P2	2.40	2.50	2.60
Q	5.60		6.00
S		6.15	
T	9.80		10.20
U	6.00		6.40

Revision history

Table 9. **Document revision history**

Date	Revision	Changes
11-Dec-2017	1	Initial version
07-Dec-2018	2	Removed maturity status indication from cover page. The document status is production data. Updated schematic diagram on cover page. Updated Table 1. Absolute maximum ratings, Table 5. Dynamic and Table 7. Source-drain diode. Updated Section 2.1 Electrical characteristics (curves). Minor text changes

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4.1 TO247-4 package information 8

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Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

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- *Подбор аналогов.*
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- *Комплексную поставку.*
- *Работу по проектам и поставку образцов.*
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- *Оценку стоимости проекта по компонентам.*
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